

# MMT

A decorative graphic consisting of several overlapping, wavy, translucent blue bands that flow across the top of the page.

## DC/DC CONVERTER

A decorative graphic in the bottom-left corner featuring a cluster of vibrant green leaves with water droplets, and several flowing, translucent green ribbons that sweep across the bottom of the page.

2019

<http://www.mmtmachrone.com>

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198	<b>68DW Series</b> 3 Watt , 1500V Isolated , 2:1 Input Voltage Range, Single & Dual Output Dc-Dc Converter, 1.25" x 0.8"
200	<b>68D1 Series</b> 3 Watt , 1500V Isolated , 2:1 Input Voltage Range, Single & Dual Output Dc-Dc Converter, 1.25" x 0.8"
202	<b>68D5 Series</b> 5-6 Watt , 1500V Isolated , 2:1 Input Voltage Range, Single & Dual Output Dc-Dc Converter, 1.25" x 0.8"
204	<b>68D8 Series</b> 8 Watt , 1600V Isolated , 2:1 Input Voltage Range, Single & Dual Output Dc-Dc Converter, 1.2" x 0.4"
204	<b>68D10 Series</b> 12 Watt , 1500V Isolated , 2:1 Input Voltage Range, Single & Dual Output Dc-Dc Converter, 1.25" x 0.8"
206	<b>68D12 Series</b> 10 Watt , 1500V Isolated , 2:1 Input Voltage Range, Single & Dual Output Dc-Dc Converter, 1.25" x 0.8"
208	<b>68D15 Series</b> 15 Watt , 1500V Isolated , 2:1 Input Voltage Range, Single & Dual Output Dc-Dc Converter, 1" x 1"
210	<b>68D20 Series</b> 20 Watt , 1500V Isolated , 2:1 Input Voltage Range, Single & Dual Output Dc-Dc Converter, 1" x 1"

212	<b>68DW-R1</b> 10 Watt , 1600V Isolated , 4:1 Input Voltage Range, Single & Dual Output Dc-Dc Converter, DIL
214	<b>68DW5</b> 5-6 Watt , 1500V Isolated , 4:1 Input Voltage Range, Single & Dual Output Dc-Dc Converter, 1.25" x 0.8"
216	<b>68DW8</b> 8 Watt , 1600V Isolated , 4:1 Input Voltage Range, Single & Dual Output Dc-Dc Converter, 1.2" x 0.4"
218	<b>68DW10</b> 10 Watt , 1500V Isolated , 4:1 Input Voltage Range, Single & Dual Output Dc-Dc Converter, 1.25" x 0.8"
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222	<b>68DW10-M</b> 10 Watt , 5000V Isolated , 4:1 Input Voltage Range, Single & Dual Output Dc-Dc Converter, DIL
224	<b>68DW12</b> 12 Watt , 1500V Isolated , 4:1 Input Voltage Range, Single & Dual Output Dc-Dc Converter, 1.25" x 0.8"
226	<b>68DW15</b> 15 Watt , 1500V Isolated , 4:1 Input Voltage Range, Single & Dual Output Dc-Dc Converter, 1" x 1"
228	<b>68DW20</b> 20 Watt , 1500V Isolated , 4:1 Input Voltage Range, Single & Dual Output Dc-Dc Converter, 1" x 1"
230	<b>69D Series</b> 3 Watt , 1500V Isolated , 4:1 Input Voltage Range, Single & Dual Output Dc-Dc Converter, 1.25" x 0.8"
232	<b>70D Series</b> 3 Watt , 500V Isolated , Single & Dual Output Dc-Dc Converter, DIL5
234	<b>75DW-6W Series</b> 6 Watt , 1500V Isolated , 4:1 Input Voltage Range, Single & Dual Output Dc-Dc Converter, 5
236	<b>76D-3W Series</b> 3 Watt , 1500V Isolated , 4:1 Input Voltage Range, Single & Dual Output Dc-Dc Converter, 1" x 1"
	<b>76D-6W Series</b> 6 Watt , 1500V Isolated , 4:1 Input Voltage Range, Single & Dual Output Dc-Dc Converter, 1" x 1"



238	<p><b>82D Series</b> 6 Watt , 500V Isolated , Single &amp; Dual Output Dc-Dc Converter, DIL5</p>
240	<p><b>85D Series</b> 5 Watt , 500V Isolated , Single &amp; Dual Output Dc-Dc Converter, DIL5</p>
242	<p><b>87D Series</b> 15 Watt , 1500V Isolated , 4:1 Input Voltage Range, Triple Output Dc-Dc Converter, 2" x 2"</p>
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250	<p><b>93D-R3 Series</b> 60 Watt , 1600V Isolated , 2:1 Input Voltage Range, Single Output Dc-Dc Converter, 2" x 1 "</p>
252	<p><b>93DW Series</b> 60 Watt , 3000V Isolated , 4:1 Input Voltage Range, Single &amp; Dual Output Dc-Dc Converter, 2.6" x 3"</p>
255	<p><b>95D Series</b> 20 Watt , 1500V Isolated , 2:1 Input Voltage Range, Single &amp; Dual Output Dc-Dc Converter, 2" x 2"</p>
258	<p><b>95D-R3 Series</b> 20 Watt , 1500V Isolated , 2:1 Input Voltage Range, Single &amp; Dual Output Dc-Dc Converter, 2" x 1"</p>
260	<p><b>95DW Series</b> 20 Watt , 1500V Isolated , 4:1 Input Voltage Range, Single &amp; Dual Output Dc-Dc Converter, 2" x 2"</p>
262	<p><b>95DW-R3 Series</b> 20 Watt , 1500V Isolated , 4:1 Input Voltage Range, Single &amp; Dual Output Dc-Dc Converter, 2" x 1"</p>
265	<p><b>96D Series</b> 30 Watt , 3000V Isolated , 2:1 Input Voltage Range, Single &amp; Dual Output Dc-Dc Converter, 2" x 2"</p>
266	<p><b>96D-R5 Series</b> 30 Watt , 1600V Isolated , 2:1 Input Voltage Range, Single &amp; Dual Output Dc-Dc Converter, 2" x 1"</p>
269	<p><b>96DW Series</b> 30 Watt , 3000V Isolated , 4:1 Input Voltage Range, Single &amp; Dual Output Dc-Dc Converter, 2" x 2"</p>
272	<p><b>96DW-R5 Series</b> 30 Watt , 1600V Isolated , 4:1 Input Voltage Range, Single &amp; Dual Output Dc-Dc Converter, 2" x 1"</p>

- 276            **96DW-R6 Series**  
                 30 Watt , 1500V Isolated , 4:1 Input Voltage Range,  
                 Single & Dual Output Dc-Dc Converter, 1" x 1"
- 279            **98DW20-R3 Series**  
                 20 Watt , 3000V Isolated , 4:1 Input Voltage Range,  
                 Single & Dual Output Dc-Dc Converter, DIL
- 281            **98DW30-R3 Series**  
                 30 Watt , 3000V Isolated , 4:1 Input Voltage Range,  
                 Single & Dual Output Dc-Dc Converter, DIL
- 283            **99D-R2 Series**  
                 40 Watt , 1500V Isolated , 2:1 Input Voltage Range,  
                 Single & Dual Output Dc-Dc Converter, 2" x 2"
- 285            **99D-R3 Series**  
                 40 Watt , 1500V Isolated , 2:1 Input Voltage Range,  
                 Single & Dual Output Dc-Dc Converter, 2" x 1"
- 287            **99DW-R2 Series**  
                 40 Watt , 1500V Isolated , 4:1 Input Voltage Range,  
                 Single & Dual Output Dc-Dc Converter, 2" x 2"
- 287            **99DW-R3 Series**  
                 40 Watt , 1500V Isolated , 4:1 Input Voltage Range,  
                 Single & Dual Output Dc-Dc Converter, 2" x 1"
- 289            **99DW-R315WM Series**  
                 15 Watt , 3000V Isolated , 4:1 Input Voltage Range,  
                 Single & Dual Output Dc-Dc Converter, 2" x 1" DIL

**FEATURES :**

- 3PIN SIP Package
- Pin-out compatible with LM78XX Linear
- UL94V-0 Package Material
- Operating Temperature:-40°C TO +85°C
- Efficiency up to 97%,Non isolated,no need for heatsink
- Short circuit protection, Thermal shutdown

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Range	Output Voltage	Output Current	Efficiency	
	Vdc	Vdc	mA	Min.Vin(%)	Max.Vin(%)
01D-1R5-500	4.75-30	1.5	500	73	63
01D-1R8-500	4.75-34	1.8	500	82	71
01D-2R5-500	4.75-34	2.5	500	87	77
01D-3R3-500	4.75-34	3.3	500	91	81
01D-05-500	6.5-34	5.0	500	94	86
01D-6R5-500	8.0-34	6.5	500	95	88
01D-09-500	11-34	9.0	500	96	92
01D-12-500	15-34	12	500	97	94
01D-15-500	18-34	15	500	97	95

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
<b>Voltage Tolerance</b>				±3	%
<b>Short Circuit Protection</b>	Hiccup, automatic recovery				
<b>Line Regulation</b>	1.5V to 6.5V		0.2	0.4	%
<b>Line Regulation</b>	9V to 15.5V		0.1	0.2	%
<b>Load Regulation</b>	1.5V to 6.5V (10% To 100% F.L.)		0.4	0.6	%
<b>Load Regulation</b>	9V to 15.5V (10% To 100% F.L.)		0.25	0.4	%
<b>Ripple &amp; Noise (without Output Capacitor)</b>	1.5V to 6.5V (BW=DC To 20MHz)		20	30	mVp-p
	9V to 15.5V (BW=DC To 20MHz)		30	40	mVp-p
<b>Transient response setting time</b>	50% load step change		350		us

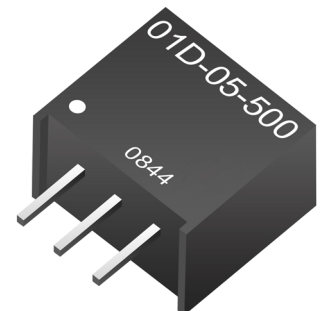
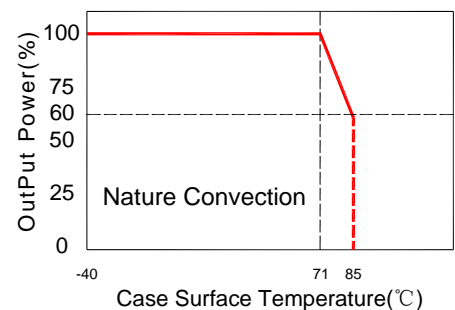


DC-DC Converter

**01D-500 SERIES**

Non-Isolated

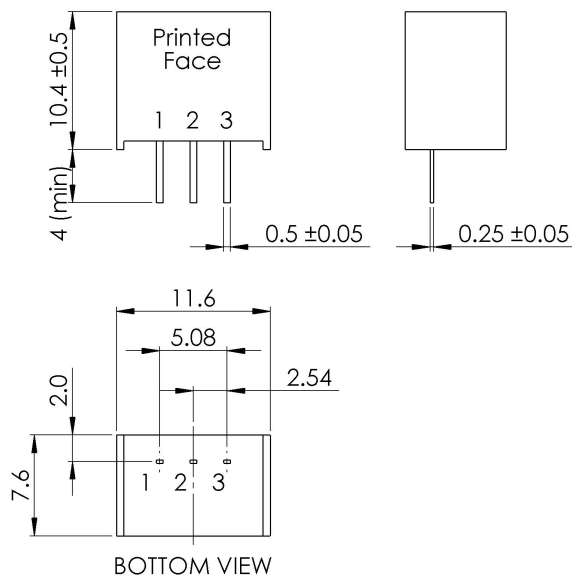
Single Output

**Temperature Derating Graph**

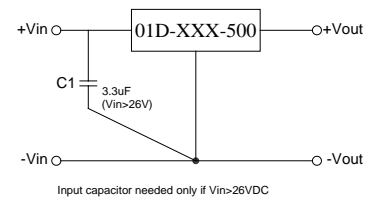
## General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Switching Frequency			330		KHz
Operating Temperature	With derating	-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Non-Conductive Black Plastic				
Weight			2.0		g
Dimensions		11.6x7.6x10.4			mm
MTBF(+25°C)	using MIL-HDBK 217F	21098x10 <sup>3</sup>			hours
MTBF(+71°C)	using MIL-HDBK 217F	4212x10 <sup>3</sup>			hours

## Markings and Dimensions



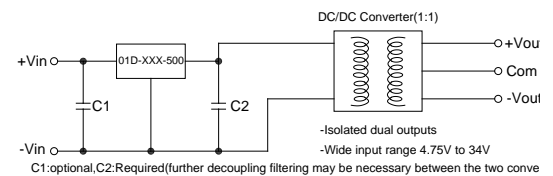
## Application Examples



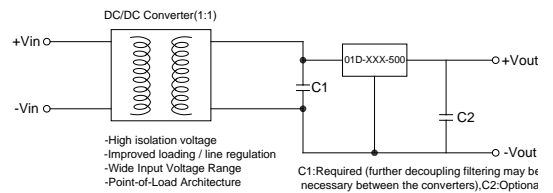
Add a blocking diode to  $V_{out}$  if current can flow backwards into the output, as this can damage the converter when it is powered down.  
See Application Examples for details.

## Application Examples

High efficiency, isolated, dual unregulated outputs



Isolated (up to 6kV), wide Input range regulated output



## Part Number

01D - 05 - 500  
A B C  
A: Series  
B: Output Voltage  
C: Output Current

## PIN Assignment

PIN	1	2	3
Function	+Vin	GND	+Vout

**FEATURES :**

- 3PIN SIP Package
- Pin-out compatible with LM78XX Linear
- UL94V-0 Package Material
- Operating Temperature:-40°C TO +85°C
- Efficiency up to 96%,Non isolated, no need for heatsink
- Short circuit protection

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Range	Output Voltage	Output Current	Efficiency	
	Vdc	Vdc	mA	Min.Vin(%)	Max.Vin(%)
01D-1R2-1A	4.6-36	1.2	1000	74	62
01D-1R5-1A	4.6-36	1.5	1000	78	65
01D-1R8-1A	4.6-36	1.8	1000	82	69
01D-2R5-1A	4.6-36	2.5	1000	87	75
01D-3R3-1A	4.75-36	3.3	1000	91	78
01D-05-1A	6.5-36	5.0	1000	92	84
01D-6R5-1A	9.0-36	6.5	1000	93	87
01D-09-1A	12-36	9.0	1000	95	90
01D-12-1A	15-36	12	1000	95	92
01D-15-1A	18-36	15	1000	96	94

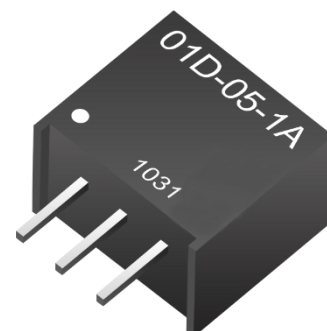
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
<b>Voltage Tolerance</b>				±2	%
<b>Short Circuit Protection</b>	Hiccup, automatic recovery				
<b>Line Regulation</b>	1.2V to 1.5V			0.3	%
<b>Line Regulation</b>	1.8V to 15V			0.3	%
<b>Load Regulation</b>	1.2V to 1.5V (10% To 100% F.L)			0.6	%
<b>Load Regulation</b>	1.8 V to 15V (10% To 100% F.L)			0.4	%
<b>Ripple &amp; Noise (without Output Capacitor)</b>	1.2V to 6.5V (BW=DC To 20MHz)			50	mVp-p
	9V to 15V (BW=DC To 20MHz)			75	mVp-p
<b>Transient response setting time</b>	50% load step change		250		us
<b>Capacitive load</b>				470	uF

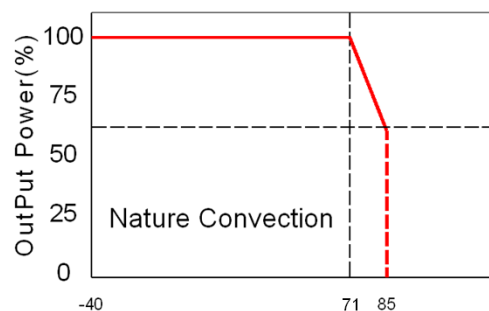


DC-DC Converter  
**01D-1A SERIES**

Non-Isolated  
Single Output



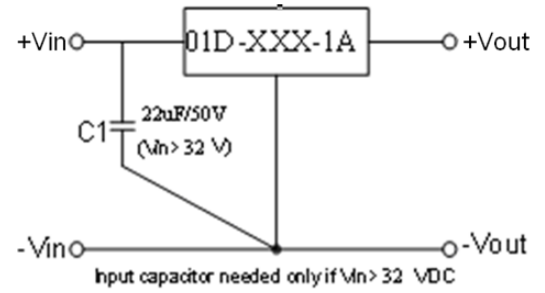
**Temperature Derating Graph**



General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Switching Frequency			500		KHz
Operating Temperature	With derating	-40		85	°C
Storage Temperature		-55		125	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Non-Conductive Black Plastic				
Weight			2.0		g
Dimensions			11.6x7.6x10.4		mm
MTBF(+25°C)	using MIL-HDBK 217F		5000x10 <sup>3</sup>		hours
MTBF(+71°C)	using MIL-HDBK 217F		1000x10 <sup>3</sup>		hours

Application Examples

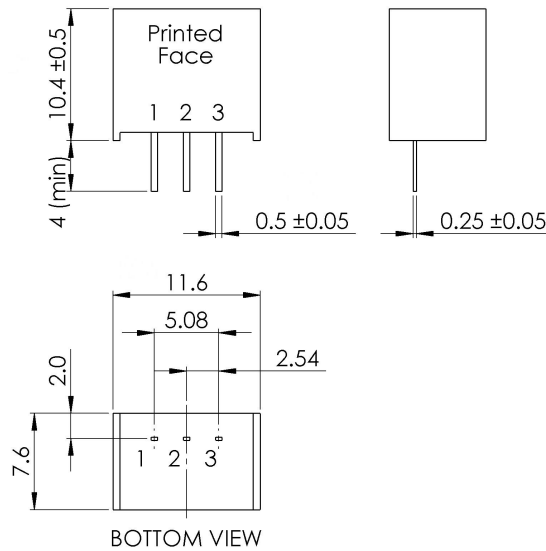


Part Number

01D - 05 - 1A  
A B C

A: Series  
B: Output Voltage  
C: Output Current

Markings and Dimensions



Unit : mm  
Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

PIN Assignment

PIN	1	2	3
Function	+Vin	GND	+Vout

**FEATURES :**

- Open frame packages
- Remote On/Off
- Adjustable output voltages
- Operating Temperature:-40°C TO +85°C
- Efficiency up to 95%,Non isolated, no need for heatsink
- Short circuit protection
- Wide input voltage ranges 4.5~14VDC and 10~30 VDC

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Range	Output Voltage	Output Current	Efficiency	
	Vdc	Vdc	mA	(%)	Output Voltage (Vdc)
01D-1206-3A	4.5-14	0.59-6.0	3000	93	3.3
01D-2406-3A	10-30	3.0-6.0	3000	91	5.0
01D-2415-3A	10-30	5.0-15	3000	95	12

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Input Voltage Range	See table	4.5	12	30	V
Internal Input Filter	Capacitors		10		uF
No Load Input Current			30		mA

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance			±2	±3	%
Short Circuit Protection	Hiccup, automatic recovery				
Line Regulation	Vin=min to max at full load		±0.2		%
Load Regulation	0% To 100% F.L.(Vo≥ 2.5V)		±0.8		%
Current Limit			220		%
Ripple & Noise	100% F.L BW=20MHz	60	75	150	mVp-p
Dynamic load response (Recovery time)	50% load step change		120		us
Capacitive load	ESR > 1m ohm			500	uF

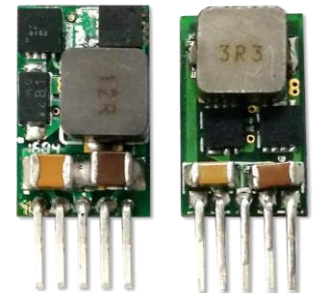
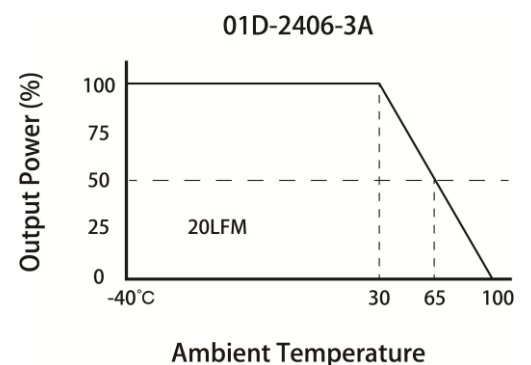


DC-DC Converter

**01D-3A SERIES**

Non-Isolated

Single Output

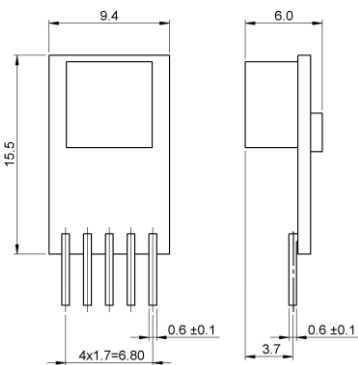
**Temperature Derating Graph**

## General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Temperature Coefficient	-40°C ~ +85°C ambient	-1		+1	%/°C
Switching Frequency		270	300	330	KHz
Operating Temperature	With derating	-40		85	°C
Storage Temperature		-55		125	°C
Humidity	Non Condensing	5		95	%
Cooling	Free air Convection				
Case material	Open Frame				
Weight			2		g
Dimensions	01D-1206-3A	15.5x9.4x6.0			mm
	01D-2406-3A / 01D-2415-3A	16.5x10.4x6.0			
MTBF(+25°C)	Using MIL-HDBK 217F	4.4x10 <sup>6</sup>			Hours

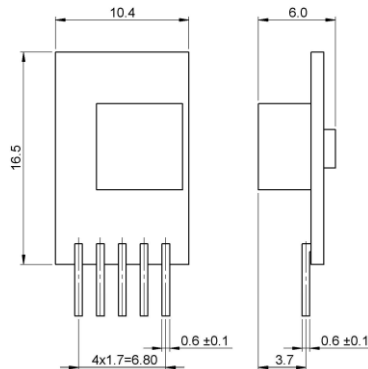
## Markings and dimensions

01D-1206-3A



Unit : mm  
Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

01D-2406-3A / 01D-2415-3A



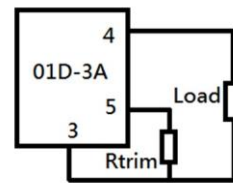
Unit : mm  
Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

## Part Number

$$\frac{01D}{A} - \frac{24}{B} \frac{06}{C} - \frac{3A}{D}$$

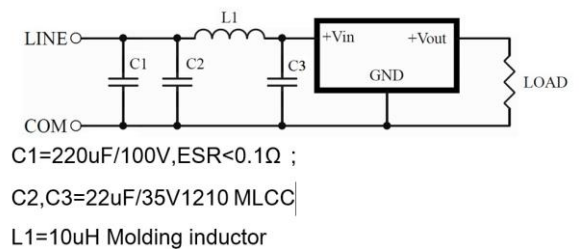
- A : Series  
B : Input Voltage  
C : Maximum Output Voltage  
D : Output Current

## Trim Applications



Part Number	R trim [KΩ]
01D-1206-3A	1.18/(Vo-0.59)
01D-2406-3A	11.2/(Vo-3)
01D-2415-3A	8.4/(Vo-5)

## Recommended Test Circuit Meets EN55032 Class A



## PIN Assignment

Pin	1	2	3	4	5
Function	Remote On/Off	+Vin	GND	+Vout	Trim



**FEATURES :**

- OUTPUT CURRENT UP TO 6A
- INPUT RANGE 2.4VDC TO 5.5VDC, 8.3VDC TO 14VDC
- HIGH EFFICIENCY – 94% @5.0Vin 3.3V ,FULL LOAD  
– 89% @12.0Vin 3.3V FULL LOAD
- INPUT UNDER-VOLTAGE LOCKOUT
- SIP PACKAGES
- COMPLIANT TO RoHS EU DIRECTIVE 2002/95/EC
- SMALL SIZE AND LOW PROFILE : 22.9 X 10.2 X 5mm
- OUTPUT VOLTAGE PROGRAMMABLE FROM 0.75VDC TO 3.3VDC,0.75VDC TO 5VDC VIA EXTERNAL RESISTOR



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	ON/OFF Logic	Input Range	Output Voltage	Output Current		Efficiency (%) 3.3Vdc @6A
				Min. Load	Max. Load	
02D-05-06S	Positive (option) Negative (standard)	2.4 ~ 5.5Vdc Vin(min) = Vo(Set)+0.5	0.75 ~3.3Vdc	0A	6A	94% @5.0Vin
02D-12-06S		Vo(set)<3.63V Vin=8.3~14Vdc Vo(set)>3.63V Vin=8.3~13.2Vdc	0.75 ~5.0Vdc			89% @12Vin

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	05 Series Vo(set)	2.4	5	5.5	Vdc
	12 Series Vo(set)	8.3	12	14	
Input Current	Vin=Vin(min); Io=Io(max)			6	A
Input Filter(Note4)	C filter				
No Load Current	Vo(set)=0.75Vdc		20 @Vin=5		mA
	Vo(set)=0.75Vdc		19 @Vin=12		
	Vo(set)=3.3Vdc		45 @Vin=5		
	Vo(set)=5.0Vdc		100 @Vin=12		
Under Voltage Lockout	Start-up Voltage		2.2@Vin= 5		V
			4.5@Vin=12		
	Shutdown Voltage		2.0 @Vin=5		
			3.8 @Vin=12		

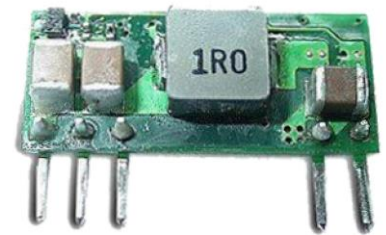
Input reflected ripple current 5~20MHz, 1uH source impedance:35mA-p-p

DC-DC Converter

**02D-6A SERIES**

Non-Isolated

Single Output



**Applications**

- Wireless Network
- Telecom/Datacom
- Distributed Power Architectures
- Industry Control System
- Semiconductor Equipment
- Microprocessor Power Applications

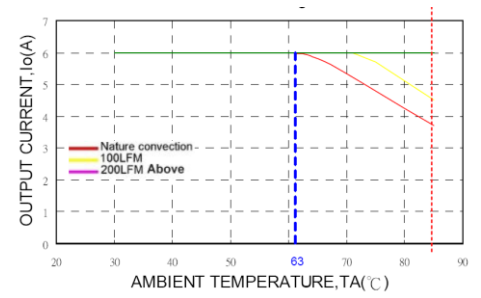
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Output current				6	A
Voltage Tolerance	Full load and Vin(min)			±2	%
Minimum load				0	A
Line Regulation	Vin=Vin ( min ) to Vin ( max ) at Full Load		±0.3		%
Load Regulation	No Load to Full Load		±0.5		%
Ripple & Noise (Note2)	20MHz bandwidth			60	mVp-p
Temperature coefficient			±0.4		%
Dynamic load response(Note 2)	$\Delta I_o / \Delta t = 2.5A/uS, V_{in}(nom)$ Peak deviation		200		mV
	Load change step (50% to 100% or 100% to 50% of Io(max)) Setting time (Vo<10%peak deviation)		25		uS
Dynamic load Response(Note 3)	$\Delta I_o / \Delta t = 2.5A/uS, V_{in}(nom)$ Peak deviation		50		mV
	Load change step (50% to 100% or 100% to 50% of Io(max)) Setting time (Vo<10%peak deviation)		50		uS
Output current limit			220		%
Output short-circuit current	Hiccup, automatic recovery				
External load capacitance	ESR≥1mΩ			1000	uF
	ESR≥10mΩ			3000	uF
Output voltage overshoot-startup	Vin=Vin(min) to Vin(max);F.L		1		%
Voltage adjustability (see fig.1)	05 Series	0.7525		3.3 @Vin=5	V
	12 Series	0.7525		5.0 @Vin=12	V

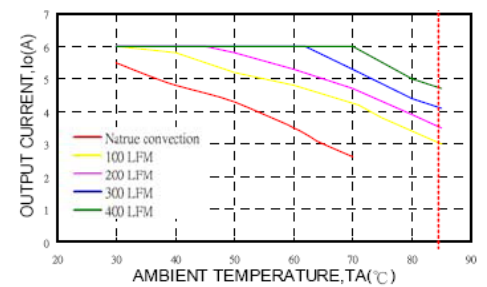
**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Switching Frequency			300		KHz
Isolation voltage			None		
Efficiency			See table		
Dimensions	As figure of marking and dimension				mm
Weight			2.8		g
MTBF (Note 1)	MIL-HDBK-217F		3.247 x 10 <sup>6</sup>		hrs

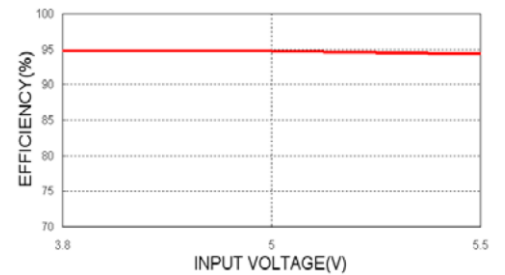
**02D-05-06S,Vo=3.3V,Derating Curve**



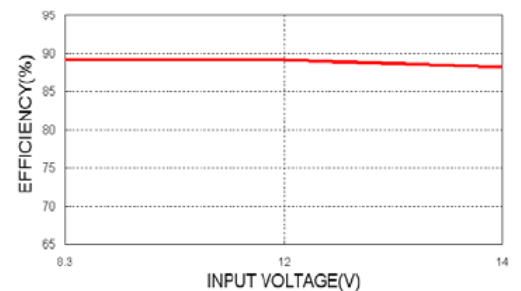
**02D-12-06S,Vo=3.3V,Derating Curve**



**02D-05-06S,Vo=3.3V Efficiency VS Input Voltage**



**02D-12-06S,Vo=3.3V Efficiency VS Input Voltage**



**Environmental Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Operating temperature range	with derating	-40		85	°C
Storage temperature range	With derating	-55		125	°C
Thermal shock		MIL-STD-810F			
Over temperature protection			135		°C

**Feature Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Remote ON/OFF					
Positive logic(option)	ON=(Vin-4)<Vr<Vin(Max)			10	uA
	OFF=0V<Vr<0.3V			1	mA
Negative logic(standard)	ON=0V<Vr<0.3V@I <sub>IN</sub>			10	uA
	OFF=1.5V<Vr<Vin(Max)@I <sub>IN</sub>			1	mA
Input current of Remote control pin		0.01		1.0	mA
Remote off state input current Nominal Vin			5		mA
Rise time (Time for Vo to rise from 10% to 90%of Vo(set ))				6	ms
Turn-on delay time	Case 1 (Note 5)		3		ms
	Case 2 (Note 6)		3		ms

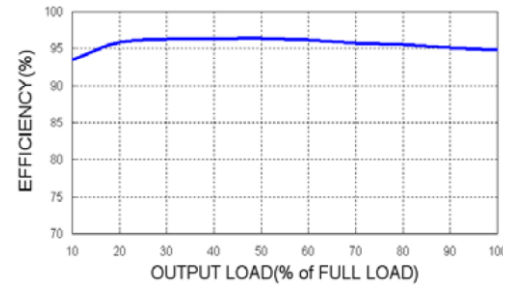
**Note :**

1. MIL-HDBK-217F Notice2 @Ta=25 °C, Full load(Ground, Benign, controlled environment).
2. External with Cout = 1uF ceramic//10uF tantalum capacitors.
3. External with Cout = 2×150uF polymer capacitors.
4. It's necessary to equip the external input capacitors at the input of the module. The capacitors should connect as close as possible to the input terminals that ensuring module stability. The external Cin is 2×150μF low-ESR polymer capacitors // 2×47μF ceramic capacitors at least.
5. Case 1 :On/Off input is set to logic low (module on) and then input power is applied (delay from instant at which Vin=Vin(min) until Vo=10% of Vo(set))
6. Case 2 :Input power is applied for at least one second and then the On/Off input is set to logic low (delay from instant at which Von/off=0.3V until Vo=10% of Vo(set))

**CAUTION :**

This power module is not internally fused.  
An input line fuse must always be used.

**02D-05-06S,Vo=3.3V  
Efficiency VS Output Load**



**02D-12-06S,Vo=3.3V  
Efficiency VS Output Load**

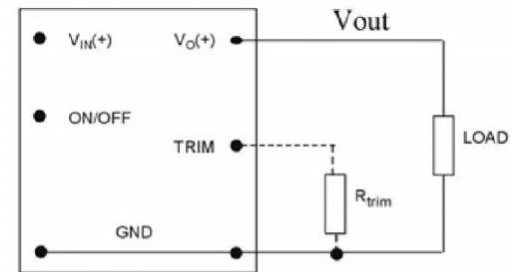
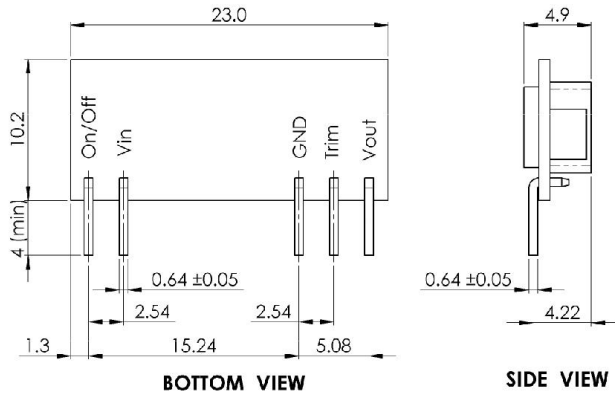


Fig. 1

Markings and Dimensions

02D-05-06S

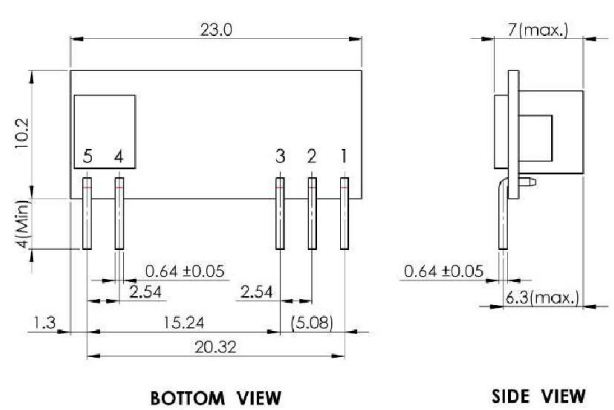


**BOTTOM VIEW**

**SIDE VIEW**

Unit : mm  
Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

02D-12-06S



**BOTTOM VIEW**

**SIDE VIEW**

Unit : mm  
Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

**FEATURES :**

- OUTPUT CURRENT UP TO 10A
- INPUT RANGE FROM 8.3VDC TO 14.0VDC
- HIGH EFFICIENCY - 93% @ 3.3V FULL LOAD
- INPUT UNDER-VOLTAGE LOCKOUT
- SMD PACKAGES
- COMPLIANT TO RoHS EU DIRECTIVE 2002/95/EC
- SMALL SIZE AND LOW PROFILE : 33.0X 13.5 X 7.7mm
- OUTPUT VOLTAGE PROGRAMMABLE FROM 0.75VDC TO 5.0VDC VIA EXTERNAL RESISTOR



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	ON/OFF Logic	Input Range	Output Voltage	Output Current		Efficiency (%) 12Vin, 3.3Vdc @10A
				Min. Load	Max. Load	
03D-12-10	Negative	Vo(set) ≤ 3.63V Vin = 8.3-14Vdc	0.75 ~ 5.0Vdc	0A	10A	93%

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo(set) ≤ 3.63V	8.3	Vin(nom)=12V	14	Vdc
	Vo(set) > 3.63V	8.3	Vin(nom)=12V	13.2	Vdc
Input Current	Vin=8.3 to 14.0Vdc; Io(max.)			7	A
Input Filter(Note4)	C filter				
No Load Current (Vin=12V,Io=0, Module enabled)	Vo(set)=0.75Vdc		40		mA
	Vo(set)=5.0Vdc		100		mA
Under Voltage Lockout	Start-up Voltage		7.9		V
	Shutdown Voltage		7.8		V

Input reflected ripple current 5~20MHz, 1uH source impedance:20mA<sub>p-p</sub>

DC-DC Converter

**03D-10A SERIES**

Non-Isolated

Single Output



**Applications**

- Wireless Network
- Telecom/Datacom
- Distributed Power Architectures
- Industry Control System
- Semiconductor Equipment
- Microprocessor Power Applications

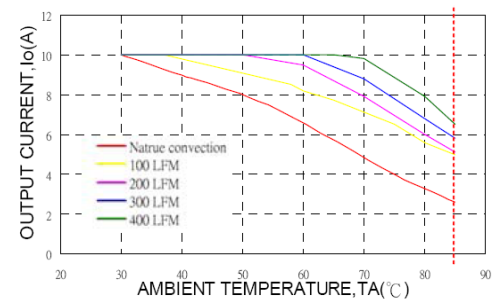
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
<b>Output current</b>				10	A
<b>Voltage Tolerance</b>	Full load and Vin(nom.)			±2	%
<b>Minimum load</b>				0	A
<b>Line Regulation</b>	Vin=Vin ( min ) to Vin ( max ) at Full Load		±0.3		%
<b>Load Regulation</b>	No Load to Full Load		±0.4		%
<b>Ripple &amp; Noise (Note2)</b>	20MHz bandwidth			75	mVp-p
<b>Temperature coefficient</b>			±0.4		%
<b>Dynamic load response (Note 2)</b>	$\Delta I_o / \Delta t = 2.5A/\mu S, V_{in}(nom)$	Peak deviation		200	mV
	Load change step (50% to 100% or 100% to 50% of Io(max))	Setting time (Vo<10%peak deviation)		25	uS
<b>Dynamic load Response (Note 3)</b>	$\Delta I_o / \Delta t = 2.5A/\mu S, V_{in}(nom)$	Peak deviation		100	mV
	Load change step (50% to 100% or 100% to 50% of Io(max))	Setting time (Vo<10%peak deviation)		25	uS
<b>Output current limit</b>		200			%
<b>Output short-circuit current</b>	Hiccup, automatic recovery				
<b>External load capacitance</b>	ESR $\geq$ 1m $\Omega$			1000	uF
	ESR $\geq$ 10m $\Omega$			5000	uF
<b>Output voltage overshoot-startup</b>	Vin=Vin(min) to Vin(max);F.L		1		%
<b>Voltage adjustability (see fig.1)</b>		0.7525		5.0	V

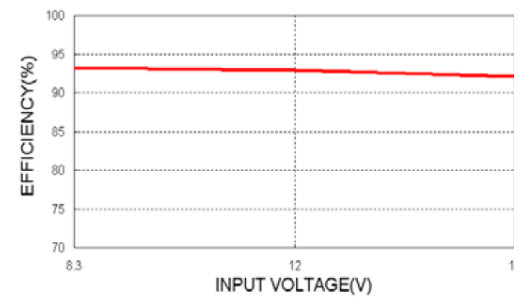
**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
<b>Switching Frequency</b>			300		KHz
<b>Isolation voltage</b>			None		
<b>Efficiency</b>			See table		
<b>Dimensions</b>			33.0 X 13.5 X 7.7		mm
<b>Weight</b>			6.0		g
<b>MTBF (Note 1)</b>	MIL-HDBK-217F		1.048 x 10 <sup>6</sup>		hrs

**03D-12-10,Vo=3.3V,Derating Curve**



**03D-12-10,Vo=3.3V Efficiency VS Input Voltage**



**03D-12-10,Vo=3.3V Efficiency VS Output Load**

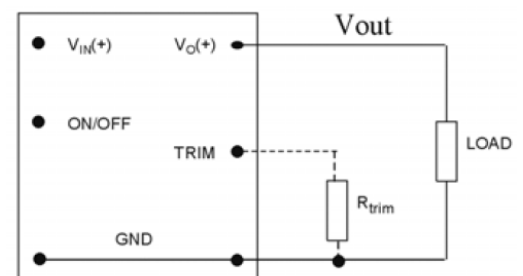


Fig. 1

**Environmental Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Operating temperature range	with derating	-40		85	°C
Storage temperature range		-55		125	°C
Thermal shock		MIL-STD-810F			
Over temperature protection			125		°C

**Feature Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Remote ON/OFF					
Negative logic(standard)	ON = $0V < V_r < 0.3V @ I_{IN}$			10	uA
	OFF = $2.5V < V_r < V_{in(Max)} @ I_{IN}$			1	mA
Input current of Remote control pin		0.01		1.0	mA
Remote off state input current Nominal Vin			2.0		mA
Remote sense range				0.5	V
Rise time (Time for Vo to rise from 10% to 90% of Vo(set))				6	ms
Turn-on delay time	Case 1 (Note 5)		3		ms
	Case 2 (Note 6)		3		ms

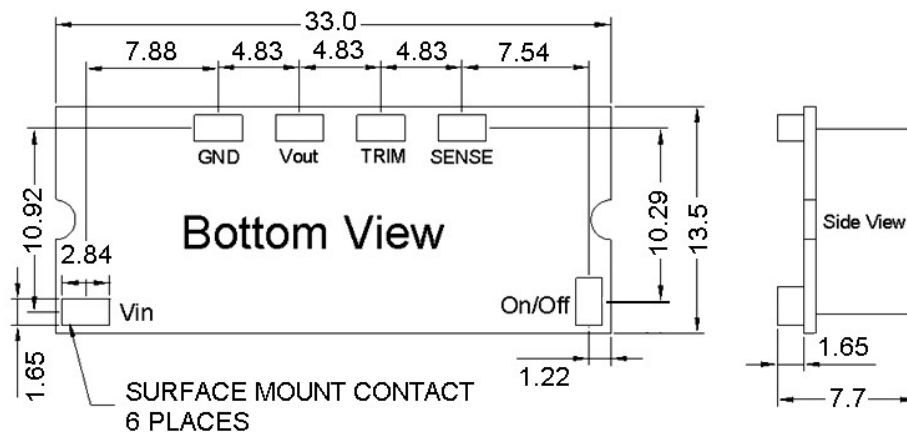
**Note :**

1. MIL-HDBK-217F Notice2 @Ta=25 °C, Full load(Ground, Benign, controlled environment).
2. External with Cout = 1μF ceramic//10μF tantalum capacitors.
3. External with Cout = 2×150μF polymer capacitors.
4. It's necessary to equip the external input capacitors at the input of the module. The capacitors should connect as close as possible to the input terminals that ensuring module stability. The external Cin is 4×47μF ceramic capacitors at least.
5. Case 1 :On/Off input is set to logic low (module on) and then input power is applied (delay from instant at which Vin=Vin(min.) until Vo=10% of Vo(set))
6. Case 2 :Input power is applied for at least one second and then the On/Off input is set to logic low (delay from instant at which Von/off=0.3V until Vo=10% of Vo(set))

**CAUTION :**

This power module is not internally fused. An input line fuse must always be used.

**Markings and Dimensions**



Unit : mm  
Tolerance : XX.X ± 0.5 • XX.XX ± 0.25

**FEATURES :**

- OUTPUT CURRENT UP TO 16A
- INPUT RANGE FROM 8.3VDC TO 14.0VDC
- HIGH EFFICIENCY – 92% @ 3.3V FULL LOAD
- INPUT UNDER-VOLTAGE LOCKOUT
- SIP & SMD PACKAGES
- COMPLIANT TO RoHS EU DIRECTIVE 2002/95/EC
- SMALL SIZE AND LOW PROFILE : 50.8X 12.7 X 7.2mm
- OUTPUT VOLTAGE PROGRAMMABLE FROM 0.75VDC TO 5.0VDC VIA EXTERNAL RESISTOR



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	ON/OFF Logic	Input Range	Output Voltage	Output Current		Efficiency (%) 12Vin, 3.3Vdc @16A
				Min. Load	Max. Load	
04D-12-16	Negative	Vo(set) ≤ 3.63V Vin = 8.3-14Vdc	0.75 ~ 5.0Vdc	0A	16A	92%
04D-12-16-SIP						

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
<b>Voltage Tolerance</b>	Vo(set) ≤ 3.63V	8.3	Vin(nom)=12V	14	Vdc
	Vo(set) > 3.63V	8.3	Vin(nom)=12V	13.2	Vdc
<b>Input Current</b>	Vin=8.3 to 14.0Vdc; Io(max.)			10	A
<b>Input Filter(Note4)</b>	C filter				
<b>No Load Current (Vin=12V,Io=0, Module enabled)</b>	Vo(set)=0.75Vdc		40		mA
	Vo(set)=5.0Vdc		100		mA
<b>Under Voltage Lockout</b>	Start-up Voltage		7.9		V
	Shutdown Voltage		7.8		V

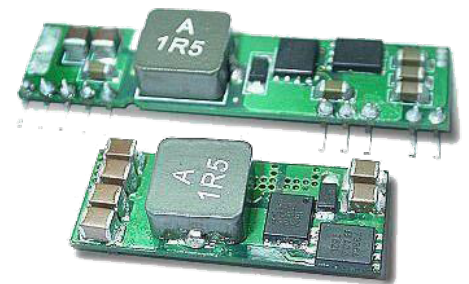
Input reflected ripple current 5~20MHz, 1uH source impedance:20mA-p-p

DC-DC Converter

**04D-16A SERIES**

Non-Isolated

Single Output



**Applications**

- Wireless Network
- Telecom/Datacom
- Distributed Power Architectures
- Industry Control System
- Semiconductor Equipment
- Microprocessor Power Applications



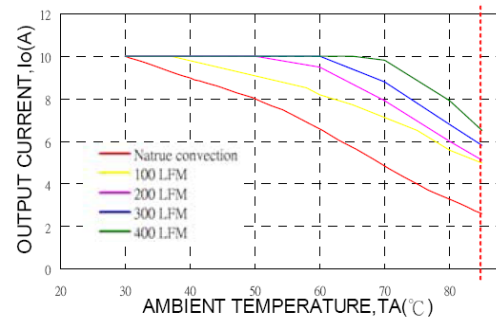
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Output current				16	A
Voltage Tolerance	Full load and Vin(nom.)			±2	%
Minimum load				0	A
Line Regulation	Vin=Vin ( min ) to Vin ( max ) at Full Load		±0.3		%
Load Regulation	No Load to Full Load		±0.4		%
Ripple & Noise (Note2)	20MHz bandwidth			75	mVp-p
Temperature coefficient			±0.4		%
Dynamic load response (Note 2)	$\Delta I_o / \Delta t = 2.5A/uS$ , Vin(nom)	Peak deviation	200		mV
	Load change step (50% to 100% or 100% to 50% of Io(max))	Setting time (Vo<10%peak deviation)	25		uS
Dynamic load Response (Note 3)	$\Delta I_o / \Delta t = 2.5A/uS$ , Vin(nom)	Peak deviation	100		mV
	Load change step (50% to 100% or 100% to 50% of Io(max))	Setting time (Vo<10%peak deviation)	25		uS
Output current limit		200			%
Output short-circuit current	Hiccup, automatic recovery				
External load capacitance	ESR≥1mΩ			1000	uF
	ESR≥10mΩ			5000	uF
Output voltage overshoot-startup	Vin=Vin(min) to Vin(max);F.L		1		%
Voltage adjustability (see fig.1)		0.7525		5.0	V

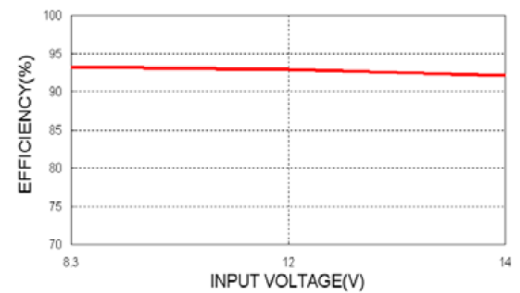
**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Switching Frequency			300		KHz
Isolation voltage		None			
Efficiency		See table			
Dimensions		50.8 X 12.7 X 7.2			mm
Weight		6.0			g
MTBF (Note 1)	MIL-HDBK-217F	6.704 x 10 <sup>5</sup>			hrs

**04D-12-16-SIP,Vo=3.3V,Derating Curve**



**04D-12-16-SIP,Vo=3.3V Efficiency VS Input Voltage**



**04D-12-16-SIP,Vo=3.3V Efficiency VS Output Load**

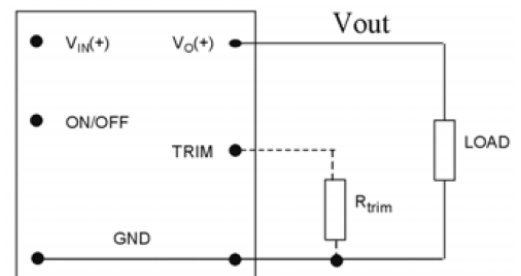
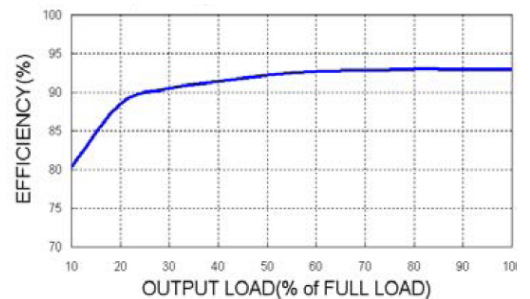


Fig. 1

**Environmental Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Operating temperature range	with derating	-40		85	°C
Storage temperature range		-55		125	°C
Thermal shock		MIL-STD-810F			
Over temperature protection			125		°C

**Feature Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Remote ON/OFF					
Negative logic(standard)	ON = $0V < V_r < 0.3V @ I_{IN}$			10	uA
	OFF = $2.5V < V_r < V_{in(Max)} @ I_{IN}$			1	mA
Input current of Remote control pin		0.01		1.0	mA
Remote off state input current Nominal Vin			2.0		mA
Remote sense range				0.5	V
Rise time (Time for Vo to rise from 10% to 90% of Vo(set))				6	ms
Turn-on delay time	Case 1 (Note 5)		3		ms
	Case 2 (Note 6)		3		ms

**Note :**

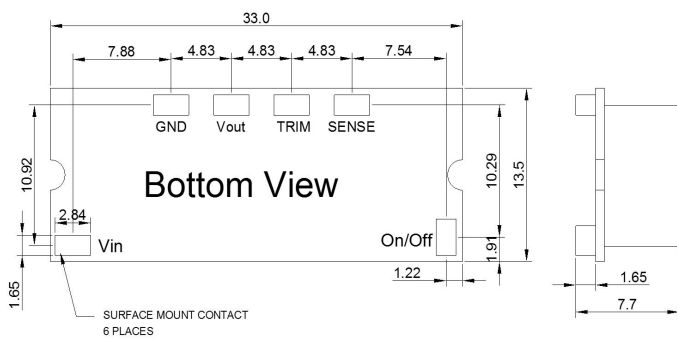
1. MIL-HDBK-217F Notice2 @Ta=25 °C, Full load(Ground, Benign, controlled environment).
2. External with Cout = 1μF ceramic//10μF tantalum capacitors.
3. External with Cout = 2×150μF polymer capacitors.
4. It's necessary to equip the external input capacitors at the input of the module. The capacitors should connect as close as possible to the input terminals that ensuring module stability. The external Cin is 6×47μF ceramic capacitors at least.
5. Case 1 :On/Off input is set to logic low (module on) and then input power is applied (delay from instant at which Vin=Vin(min.) until Vo=10% of Vo(set))
6. Case 2 :Input power is applied for at least one second and then the On/Off input is set to logic low (delay from instant at which Von/off=0.3V until Vo=10% of Vo(set))

**CAUTION :**

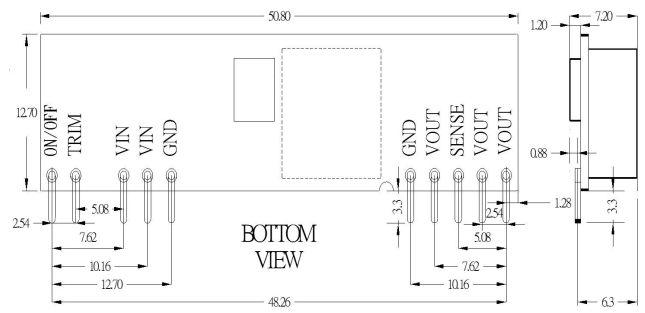
This power module is not internally fused. An input line fuse must always be used.

**Markings and Dimensions**

04D-12-16



04D-12-16-SIP



**FEATURES :**

- 3PIN SIP Package
- Pin-out compatible with LM78XX Linear
- UL94V-0 Package Material
- Operating Temperature:-40°C TO +85°C
- Efficiency up to 96%,Non isolated, no need for heatsink
- Low Profile (L\*W\*H = 11.5 \* 8.5 \* 17.5mm)
- Short circuit protection, Thermal Shutdown
- Wide input voltage ranges, up to 72V

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Range	Output Voltage	Output Current	Efficiency	
	Vdc	Vdc	mA	Min.Vin(%)	Max.Vin(%)
08D-3R3-500	9 ~ 72	3.3	500	81	72
08D-05-500	9 ~ 72	5.0	500	87	80
08D-6R5-500	9 ~ 72	6.5	500	91	80
08D-09-500	14~ 72	9.0	500	92	85
08D-12-500	17 ~ 72	12	500	94	88
08D-15-500	21 ~ 72	15	500	94	90
08D-24-300	36 ~ 72	24	300	96	92

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Input Voltage Range	See table	9	48	72	V
Internal Input Filter	Capacitors			2.2	uF
No Load Input Current	Vin=48V	1	5	7	mA

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance			±2	±3	%
Short Circuit Protection	Hiccup, automatic recovery				
Line Regulation	Vin=min to max at full load		±0.3	±0.5	%
Load Regulation	10% To 100% F.L		±0.4	±0.5	%
Ripple & Noise (without Output Capacitor)	10% TO 100% F.L BW=20MHz			60	mVp-p
Transient response setting time	50% load step change		350	500	us
Capacitive load				100	uF

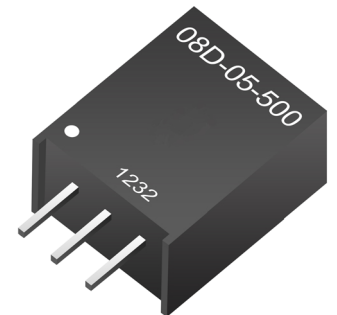
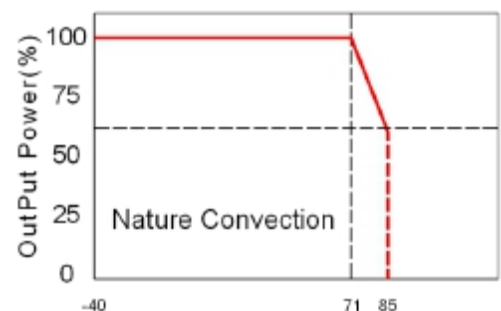


DC-DC Converter

**08D-500 SERIES**

Non-Isolated

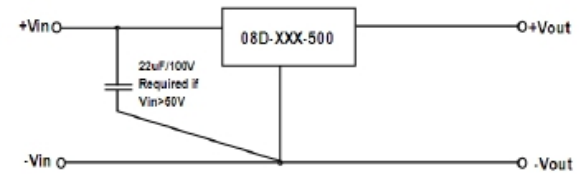
Single Output

**Temperature Derating Graph**

## General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Temperature Coefficient	-40°C ~ +85°C ambient			0.015	%/°C
Switching		150		500	KHz
Operating Temperature	With derating	-40		85	°C
Storage Temperature		-55		125	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Non-Conductive Black Plastic				
Potting Material			Epoxy(UL94V-0)		
Weight			4.0		g
Dimensions			11.5x8.5x17.5		mm
MTBF(+25°C)	using MIL-HDBK 217F		7395x10 <sup>3</sup>		hours

## Application Examples

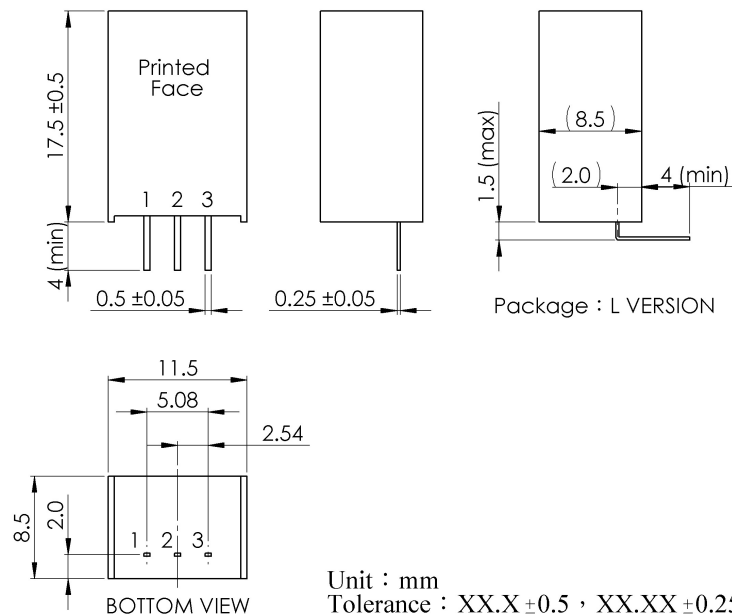


## Part Number

08D - 05 - 500  
A B C

A: Series  
B: Output Voltage  
C: Output Current

## Markings and Dimensions



## PIN Assignment

PIN	1	2	3
Function	+Vin	GND	+Vout

**FEATURES :**

- 6PIN SIP Package
- High Efficiency up to 85%
- Unregulated Output Types
- Single Output 5/9/12/15V/24V Approved By UL60950-1
- Internal SMD Construction
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency	Package Style
	Vdc	mA	%TYP	
10D-XXS03NNL	3.3	303	70	1
★10D-XXS05NNL	5	200	70	1
★10D-XXS09NNL	9	112	75	1
★10D-XXS12NNL	12	84	78	1
★10D-XXS15NNL	15	67	80	1
★10D-XXS24NNL	24	42	82	1
10D-XXS05N2NL	5	200	70	2
10D-XXS09N2NL	9	112	75	2
10D-XXS12N2NL	12	84	78	2
10D-XXS15N2NL	15	67	80	2
10D-XXS24N2NL	24	42	82	2

**Note:**

- 1."XX" Is Input Voltage:03=3.3Vdc,05=5Vdc,09=9Vdc,12=12Vdc,15=15Vdc,24=24Vdc,48=48Vdc.
2. Over 48Vdc input voltage, using the 2nd package.
3. The input voltage increases, there will be an increase in efficiency.
4. " ★ " marked as recognized by UL 60950-1.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V,5V (10% To 100% F.L)			15	%
Load Regulation	9V,12V,15V,24V (10% To 100% F.L)			10	%
Ripple & Noise	BW=DC To 20MHZ			100	mVp-p
Transient response setting time	50% load step change		350		us



DC-DC Converter

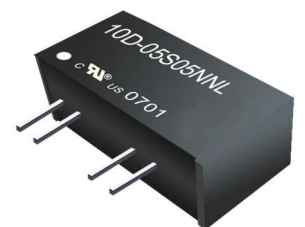
10D SERIES

1Watt

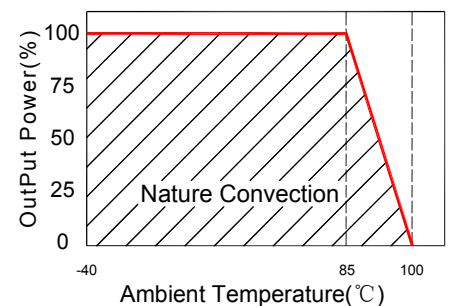
1KV Isolated

Single Output

SIP6



**Temperature Derating Graph**



**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F@25°C	3500000			Hours
Weight	Package1 or Package2		2.1 or 2.7		g
Dimensions	Package 1		19.5x6.0x10.0		mm
Dimensions	Package 2		19.5x7.1x10.0		mm

**Application Note**

**Filtering**

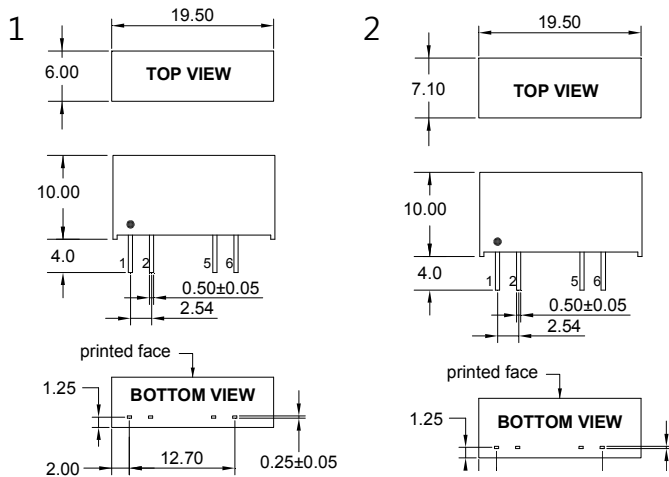
In some circuits which are sensitive to noise and ripple, a filtering capacitor may be added to the DC/DC output end and input end to reduce the noise and ripple. However, the capacitance of the output filter capacitor must proper. If the capacitance is too big, a startup problem might arise. For every channel of output, providing the safe and reliable operation is ensured, the greatest capacitance of its filter capacitor refer to the external capacitor table. To get an extreme low ripple, an "LC" filtering network may be connected to the input and output ends of the DC/DC converter, which may produce a more significant filtering effect. It should also be noted that the inductance and the frequency of the "LC" filtering network should be staggered with the DC/DC frequency to avoid mutual interference (see figure 1).



<Figure 1>  
External Capacitor Table

Vin	External Capacitor	Vout	External Capacitor
3.3VDC	4.7uF/25V	3.3VDC	22uF/16V
5VDC	4.7uF/25V	5VDC	10uF/25V
9VDC	4.7uF/25V	9VDC	4.7uF/25V
12VDC	2.2uF/25V	12VDC	2.2uF/25V
15VDC	1uF/50V	15VDC	1uF/50V
24VDC	1uF/50V	24VDC	1uF/50V
48VDC	1uF/100V	--	--

**Markings and dimensions**

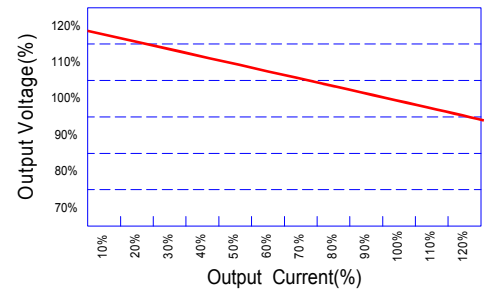


UNIT: mm Unless otherwise specified, all tolerances are ±0.25

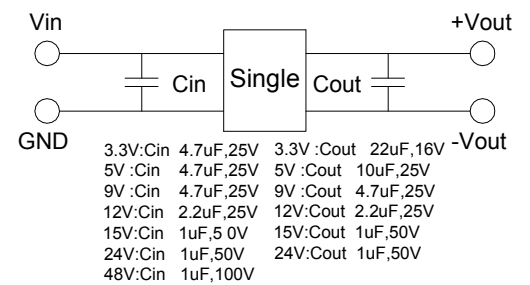
**PIN Connection**

PIN	1	2	5	6
Single	+Vin	-Vin	-Vout	+Vout

**Tolerance Envelope Graph**



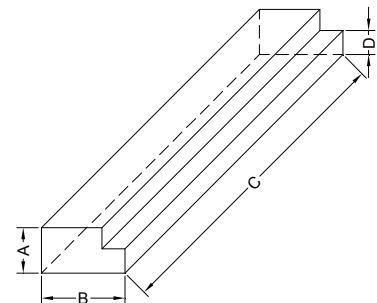
**Recommended Test Circuit**



**Part Number**

10D - 05 S 05 N 2 NL A:Series  
 A B C D E F G B:Input Voltage  
 C:Single(S)  
 D:Output Voltage  
 E:UNRegulated(N)  
 F:Packge  
 G:RoHS Version

**Packaging**



Size(mm)			
A	B	C	D
9.5	16.5	522	5.0

**FEATURES :**

- 4PIN SIP & 8PIN DIL Package
- High Efficiency up to 85%.
- Unregulated Output Types
- Single Output 3.3/5/9/12/15V Approved By UL60950-1
- Internal SMD Construction
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency	Package Style
	Vdc	mA	%TYP	"X"
★11D-XXS03NNL	3.3	76	65	1
★11D-XXS05NNL	5	50	65	1
★11D-XXS09NNL	9	28	67	1
★11D-XXS12NNL	12	21	70	1
★11D-XXS15NNL	15	16	70	1
★11D-XXS24NNL	24	10	70	1
11D-XXS03NXNL	3.3	76	65	2/3/4/5
11D-XXS05NXNL	5	50	65	2/3/4/5
11D-XXS09NXNL	9	28	70	2/3/4/5
11D-XXS12NXNL	12	21	70	2/3/4/5
11D-XXS15NXNL	15	16	70	2/3/4
11D-XXS24NXNL	24	10	70	2/3/4
11D-XXD03NXNL	±3.3	±38	65	2/3
11D-XXD05NXNL	±5	±25	65	2/3
11D-XXD09NXNL	±9	±14	70	2/3
11D-XXD12NXNL	±12	±10	70	2/3
11D-XXD15NXNL	±15	±8	70	2/3
11D-XXD24NXNL	±24	±5	70	2/3

**Note :**

- 1."XX" Is Input Voltage:03=3.3Vdc,05=5Vdc,09=9Vdc, 12=12Vdc, 15=15Vdc,24=24Vdc
- 2.Over 15V,24V input voltage using the 1/2/3/4 Package.
- 3.The input voltage increases, there will be an increase in efficiency.
4. " ★ " marked as recognized by UL 60950-1.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±5	%
Filter	Capacitor				



DC-DC Converter

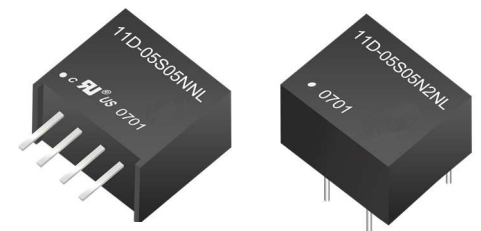
**11D SERIES**

0.25Watt

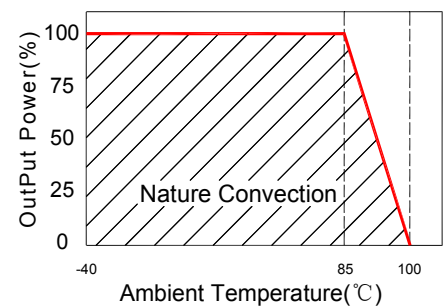
1KV Isolated

Single & Dual Output

SIP4 & DIL8



**Temperature Derating Graph**



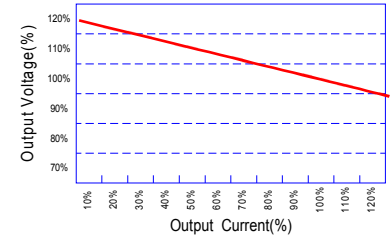
Output Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V,5V (10% To 100% F.L)			15	%
Load Regulation	9V,12V,15V,24V (10% To 100% F.L)			10	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight	Package 1/2/3/4/5	1.5/1.5/1.9/1.9/1.1			g
Dimensions	Package 1	11.50x6.00x10.00			mm
Dimensions	Package 2	12.70x10.16x6.80			mm
Dimensions	Package 3	12.70x10.16x7.50			mm
Dimensions	Package 4	11.50x7.50x10.00			mm
Dimensions	Package 5	11.50x6.00x7.50			mm

Tolerance Envelope Graph

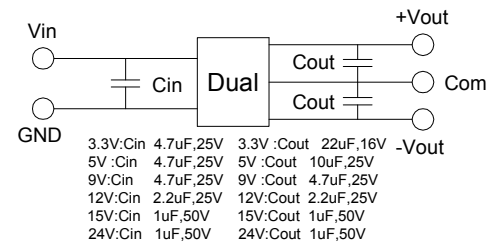
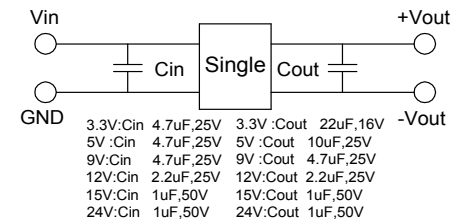


Part Number

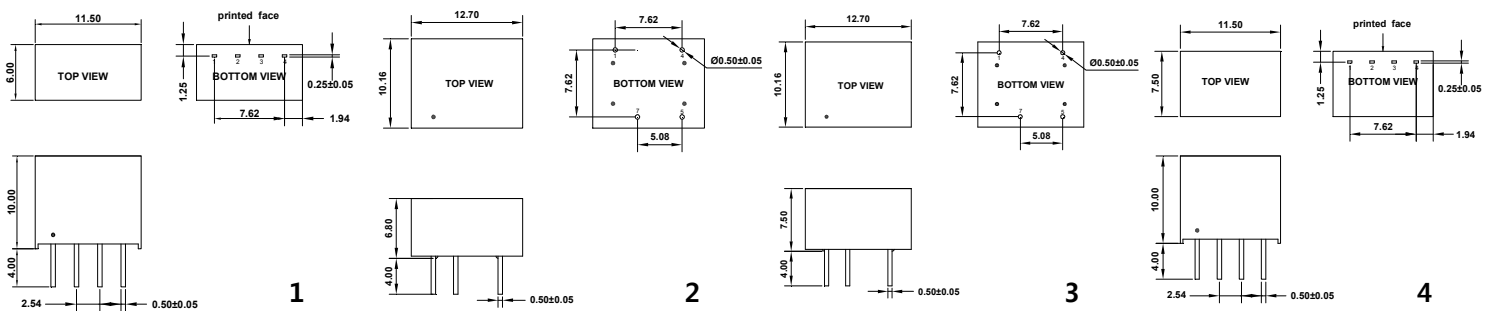
11D - 05 S 05 N 2 NL  
A B C D E F G

- A:Series
- B:Input Voltage
- C:Single(S)Dual(D)
- D:Output Voltage
- E:Unregulated(N)
- F:Package
- G:RoHS Version

Recommended Test Circuit



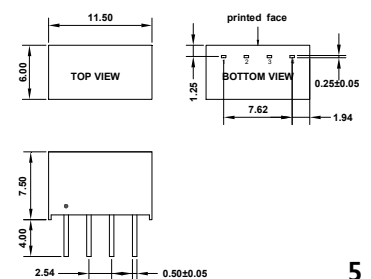
Markings and Dimensions



Unit:mm Unless otherwise specified, all tolerances are ±0.25

PIN Connection

PIN	1	2	3	4	5	6	7	8
Single(4Pin)	-Vin	+Vin	-Vout	+Vout				
Single(8Pin)	-Vin	No Pin	No Pin	+Vin	+Vout	No Pin	-Vout	NC
Dual(8Pin)	-Vin	No Pin	No Pin	+Vin	+Vout	No Pin	Com	-Vout



5



**FEATURES :**

- 7PIN SIP Package
- High Efficiency up to 80%
- Regulated Output Types
- Internal SMD Construction
- No External Component Required
- Industry Standard Pinout
- Operating Temperature:-40°C TO +85°C

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency
	Vdc	mA	%TYP
12D-XXS03RNL	3.3	303	65
12D-XXS05RNL	5	200	65
12D-XXS09RNL	9	112	70
12D-XXS12RNL	12	84	70
12D-XXS15RNL	15	67	70
12D-XXS24RNL	24	42	70

**Note:**

- 1."XX" Is Input Voltage:03=3.3Vdc, 05=5Vdc, 09=9Vdc 12=12Vdc,15=15Vdc,24=24Vdc.
- 2.The input voltage increases, there will be an increase in efficiency.
- 3.Input 3.3V, then output will be 12V MAX;Output 3.3V, then input will be 12V MAX

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo, Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Continuous				
Line Regulation	Regulated			±0.5	%
Load Regulation	Regulated			±1.5	%
Ripple & Noise	Output:5V,9V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output:12-24V TYPES BW=DC To 20MHz			1% of Vout	mVp-p
Transient response setting time	50% load step change		350		us



DC-DC Converter

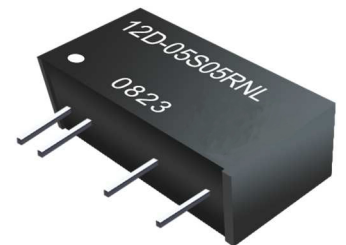
12D-R SERIES

1Watt

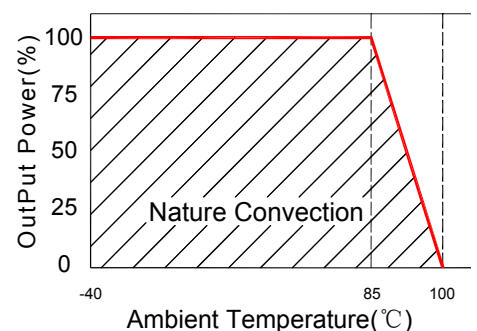
3KV Isolated

Single Output

SIP7



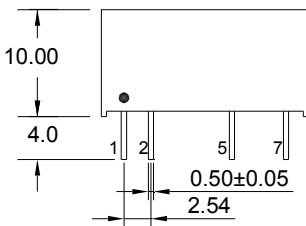
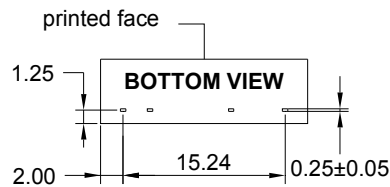
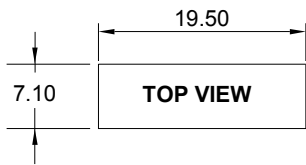
**Temperature Derating Graph**



**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operation Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F@25°C	1500000			Hours
Weight			2.7		g
Dimensions		19.5x7.1x10.0			mm

**Markings and dimensions**



UNIT: mm

Unless otherwise specified, all tolerances are ±0.25

**PIN Connection**

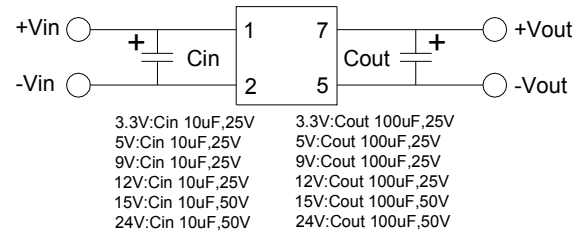
Pin	1	2	5	7
Single	+Vin	-Vin	-Vout	+Vout

**Part Number**

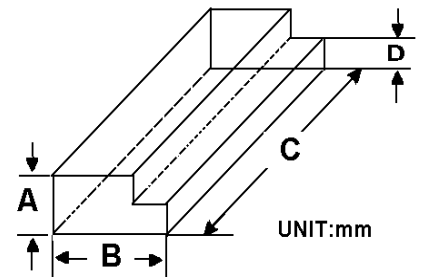
12D	-	05	S	05	R	NL
A		B	C	D	E	F

- A : Series
- B : Input Voltage
- C : Single(S);Dual(D)
- D : Output Voltage
- E : Regulated(R)
- F : RoHS Version

**Recommended Test Circuit**



**Packaging**



Size(mm)			
A	B	C	D
9.5	16.5	52.2	5.0

**FEATURES :**

- 7PIN SIP Package
- High Efficiency up to 85%
- Unregulated Output Types
- Single Output 5/9/12/15V Approved By UL 60950-1
- Internal SMD Construction
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency	Package Style
	Vdc	mA	%TYP	
12D-XXS03NNL	3.3	303	70	1
★12D-XXS05NNL	5	200	70	1
★12D-XXS09NNL	9	112	75	1
★12D-XXS12NNL	12	84	78	1
★12D-XXS15NNL	15	67	80	1
12D-XXS24NNL	24	42	82	1
12D-XXD03NNL	±3.3	±150	70	1
12D-XXD05NNL	±5	±100	70	1
12D-XXD09NNL	±9	±56	75	1
12D-XXD12NNL	±12	±42	78	1
12D-XXD15NNL	±15	±34	80	1
12D-XXD24NNL	±24	±21	82	1
12D-XXS05N2NL	5	200	70	2
12D-XXS09N2NL	9	112	75	2
12D-XXS12N2NL	12	84	78	2
12D-XXS15N2NL	15	67	80	2
12D-XXS24N2NL	24	42	82	2
12D-XXD05N2NL	±5	±100	70	2
12D-XXD09N2NL	±9	±56	75	2
12D-XXD12N2NL	±12	±42	78	2
12D-XXD15N2NL	±15	±34	80	2
12D-XXD24N2NL	±24	±21	82	2

**Note :**

- 1."XX" Is Input Voltage: 03=3.3Vdc 05=5Vdc, 09=9Vdc, 12=12Vdc, 15=15Vdc, 24=24Vdc, 48=48Vdc.
2. Over 48Vdc input voltage, using the 2nd package.
3. The input voltage increases, there will be an increase in efficiency.
- 4." ★" marked as recognized by UL 60950-1.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±5	%
Filter	Capacitor				



DC-DC Converter

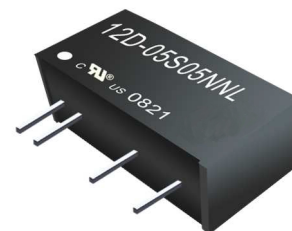
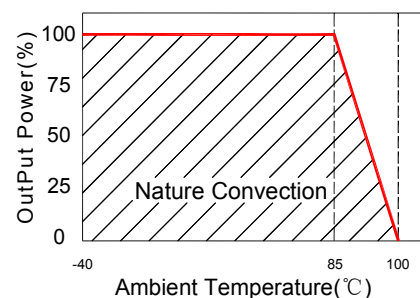
**12D-3KV SERIES**

1Watt

3KV Isolated

Single &amp; Dual Output

SIP7

**Temperature Derating Graph**

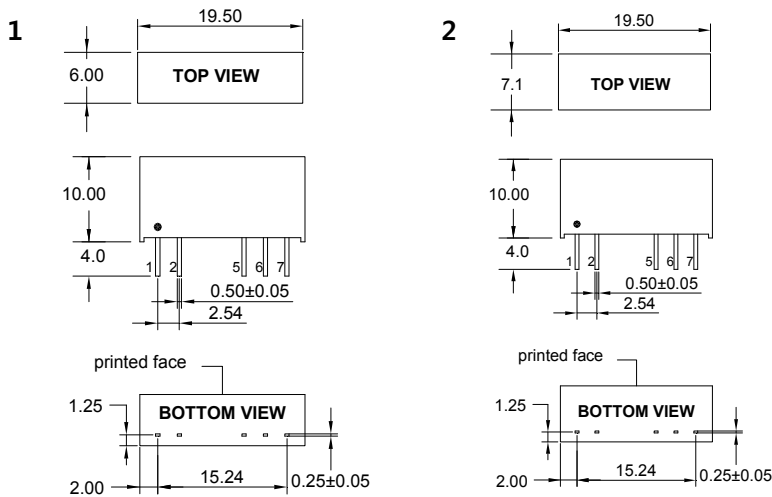
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V,5V (10% To 100% F.L)			15	%
Load Regulation	9V,12V,15V,24V (10% To 100% F.L)			10	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight	Package 1 or Package2		2.1 or 2.7		g
Dimensions	Package 1		19.5x6.0x10.0		mm
Dimensions	Package 2		19.5x7.1x10.0		mm

**Markings and dimensions**

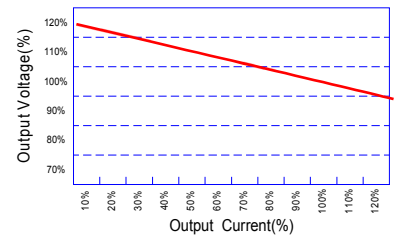


Unit:mm Unless otherwise specified, all tolerances are ±0.25

**PIN Connection**

PIN	1	2	5	6	7
Single	+Vin	-Vin	-Vout	No Pin	+Vout
Dual	+Vin	-Vin	-Vout	Com	+Vout

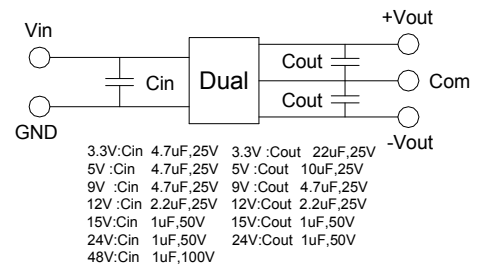
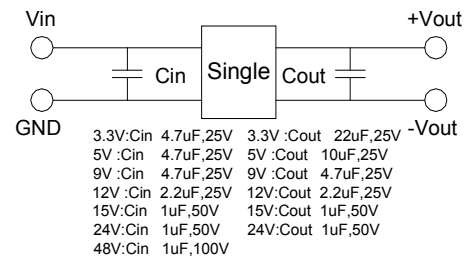
**Tolerance Envelope Graph**



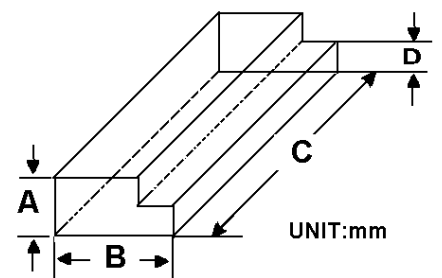
**Part Number**

12D - 05 S 05 N 2 NL  
 A B C D E F G  
 A:Series  
 B:Input Voltage  
 C:Single(S)Dual(D)  
 D:Output Voltage  
 E:Unregulated(N)  
 F:Package  
 G:RoHS Version

**Recommended Test Circuit**



**Packaging**



Size (mm)			
A	B	C	D
9.5	16.5	52.2	5.0

**FEATURES :**

- 7PIN SIP Package
- High Efficiency up to 85%
- Unregulated Output Types
- Internal SMD Construction
- No External Component Required
- Industry Standard Pinout
- Operating Temperature:-40°C TO +85°C

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency
	Vdc	mA	%TYP
12D-XXS05N6KVNL	5	200	70
12D-XXS09N6KVNL	9	112	75
12D-XXS12N6KVNL	12	84	78
12D-XXS15N6KVNL	15	67	80
12D-XXS24N6KVNL	24	42	82
12D-XXD05N6KVNL	±5	±100	70
12D-XXD09N6KVNL	±9	±56	75
12D-XXD12N6KVNL	±12	±42	78
12D-XXD15N6KVNL	±15	±34	80
12D-XXD24N6KVNL	±24	±21	82

**Note :**

- 1."XX" Is Input Voltage: 03=3.3Vdc,05=5Vdc,09=9Vdc,12=12Vdc,15=15Vdc,24=24Vdc.
2. The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	5V (10% To 100% F.L)			15	%
Load Regulation	9V,12V,15V,24V (10% To 100% F.L)			10	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
setting time	change		350		us



DC-DC Converter

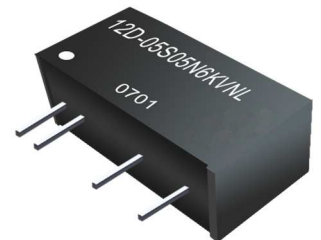
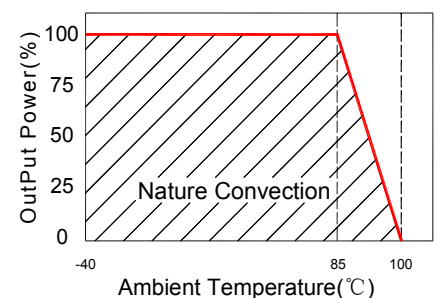
**12D-6KV SERIES**

1Watt

6KV Isolated

Single &amp; Dual Output

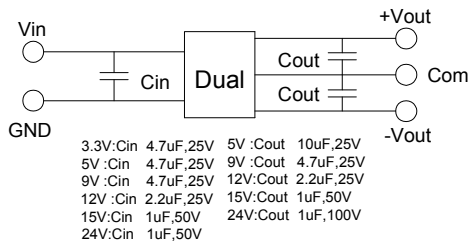
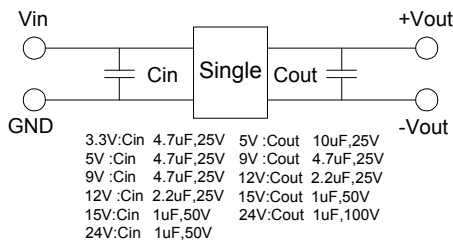
SIP7

**Temperature Derating Graph**

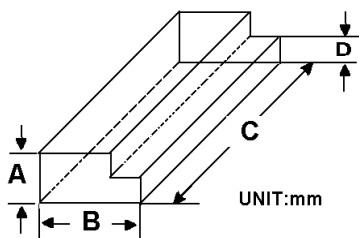
## General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight			2.7		g
Dimensions		19.5x7.10x10.0			mm

## Recommended Test Circuit

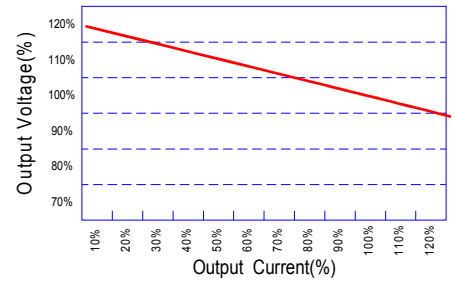


## Packaging



Size (mm)			
A	B	C	D
9.5	16.5	52.2	5.0

## Tolerance Envelope Graph

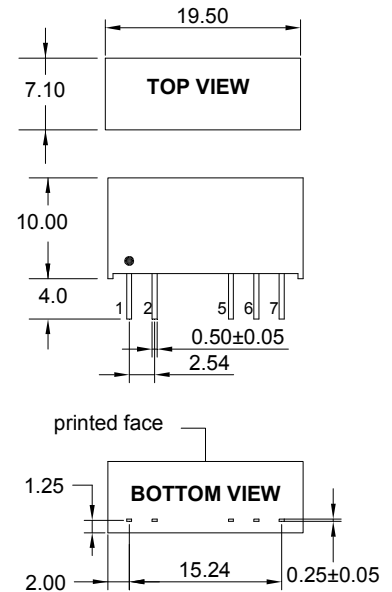


## Part Number

12D - 05 S 05 N 6KV NL  
 A B C D E F G

- A:Series
- B:Input Voltage
- C:Single(S)Dual(D)
- D:Output Voltage
- E:Unregulated(N)
- F:Isolation Voltage
- G:RoHS Version

## Markings and dimensions



Unit:mm Unless otherwise specified, all tolerances are ±0.25

## PIN Connection

PIN	1	2	5	6	7
Single	+Vin	-Vin	-Vout	No Pin	+Vout
Dual	+Vin	-Vin	-Vout	Common	+Vout

**FEATURES :**

- 7PIN SIP Package
- High Efficiency up to 85%
- Unregulated Output Types
- Internal SMD Construction
- No External Component Required
- Industry Standard Pinout
- Operating Temperature:-40°C TO +85°C

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency
	Vdc	mA	%TYP
12D-XXS05N2WNL	5	400	70
12D-XXS09N2WNL	9	222	75
12D-XXS12N2WNL	12	167	80
12D-XXS15N2WNL	15	133	80
12D-XXS24N2WNL	24	84	85
12D-XXD05N2WNL	±5	±200	70
12D-XXD09N2WNL	±9	±111	75
12D-XXD12N2WNL	±12	±84	80
12D-XXD15N2WNL	±15	±67	80
12D-XXD24N2WNL	±24	±42	85

**Note :**

- 1."XX" Is Input Voltage : 05=5Vdc,09=9Vdc,12=12Vdc,15=15Vdc,24=24Vdc.
2. The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±5	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	5V (10% To 100% F.L)			15	%
Load Regulation	9V,12V,15V,24V (10% To 100% F.L)			10	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
setting time	50% load step change		350		us



DC-DC Converter

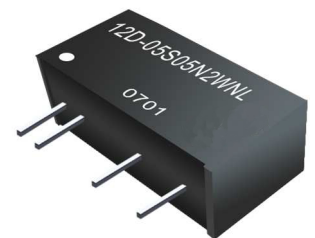
12D-2W SERIES

2Watt

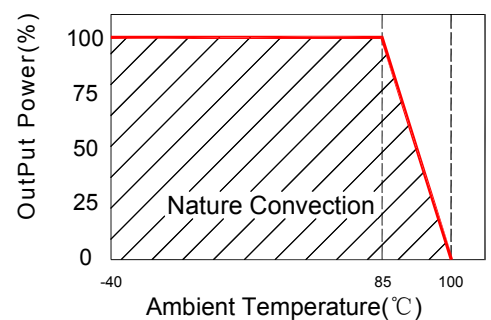
3KV Isolated

Single & Dual Output

SIP7



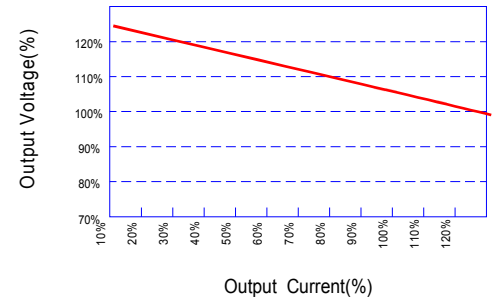
**Temperature Derating Graph**



## General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight			2.7		g
Dimensions		19.5x7.10x10.0			mm

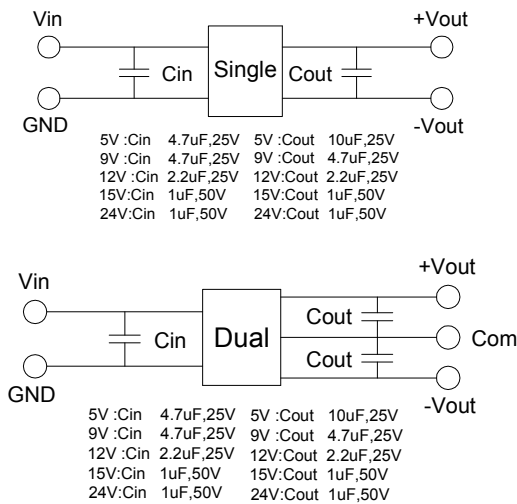
## Tolerance Envelope Graph



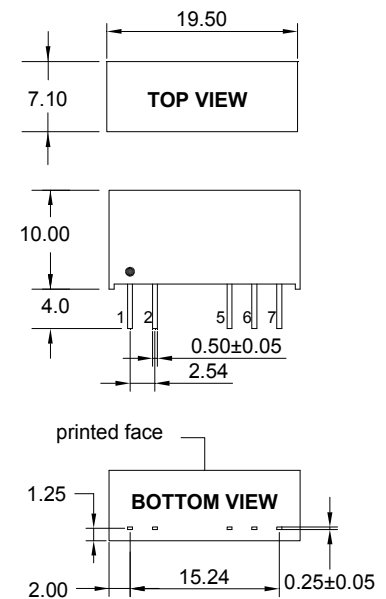
## Part Number

12D - 05 S 05 N 2W NL  
 A B C D E F G  
 A:Series  
 B:Input Voltage  
 C:Single(S) Dual(D)  
 D:Output Voltage  
 E:Unregulated(N)  
 F:Output Power  
 G:RoHS Version

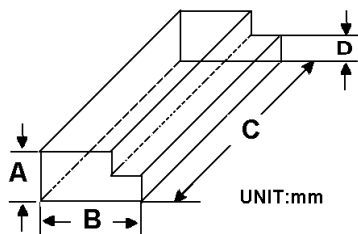
## Recommended Test Circuit



## Markings and dimensions



## Packaging



Size (mm)			
A	B	C	D
9.50	16.50	522	5.00

Unit:mm Unless otherwise specified, all tolerances are ±0.25

## PIN Connection

PIN	1	2	5	6	7
Single	+Vin	-Vin	-Vout	No Pin	+Vout
Dual	+Vin	-Vin	-Vout	Common	+Vout



**FEATURES :**

- 7PIN SIP Package
- High Efficiency up to 87%
- Unregulated Output Types
- Internal SMD Construction
- No External Component Required
- Industry Standard Pinout
- Operating Temperature:-40°C TO +85°C

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency
	Vdc	mA	%TYP
12D-05S05N3W	5	600	82
12D-05S09N3W	9	333	85
12D-05S12N3W	12	250	85
12D-05S15N3W	15	200	85
12D-12S05N3W	5	600	82
12D-12S09N3W	9	333	85
12D-12S12N3W	12	250	86
12D-12S15N3W	15	200	87
12D-24S05N3W	5	600	82
12D-24S09N3W	9	333	85
12D-24S12N3W	12	250	85
12D-24S15N3W	15	200	85
12D-05D05N3W	±5	±300	82
12D-05D09N3W	±9	±167	85
12D-05D12N3W	±12	±125	82
12D-05D15N3W	±15	±100	85
12D-12D05N3W	±5	±300	82
12D-12D09N3W	±9	±167	85
12D-12D12N3W	±12	±125	86
12D-12D15N3W	±15	±100	87
12D-24D05N3W	±5	±300	82
12D-24D09N3W	±9	±167	85
12D-24D12N3W	±12	±125	85
12D-24D15N3W	±15	±100	85

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				



DC-DC Converter

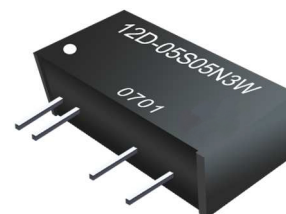
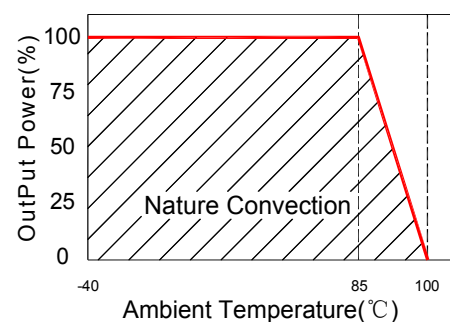
**12D-3W SERIES**

3Watt

3KV Isolated

Single &amp; Dual Output

SIP7

**Temperature Derating Graph**



**FEATURES :**

- 7PIN SIP Package
- High Efficiency up to 81%
- Reinforced insulation
- The patient leakage current: Max 2µA
- Unregulated Output Types
- Internal SMD Construction
- Industry Standard Pinout
- Operating Temperature:-40°C TO +85°C
- Design refer to EN60601-1, ANSI/AAMI ES60601-1

12D1M series meet reinforced insulation requirements.

They are specially designed for applications where require compact size, high isolation, low isolation capacitor and low leakage current power. They are widely used in medical, electricity, IGBT driver and so on.

They are suitable for:

1. Where the voltage of the input power supply is stable (Voltage variation: ±10% Vin)
2. Where isolation is necessary between input and output (isolation voltage ≤4200VAC or 6000VDC)
3. Where do not has high requirement of line regulation and the ripple & noise of the output voltage

Such as: Medical collection and isolation, High voltage collection circuit, IGBT-driven circuits, etc.



DC-DC Converter

12D1M SERIES

1Watt

4.2KVac or 6KVdc Isolated

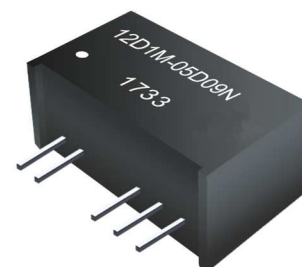
Single & Dual Output

SIP7

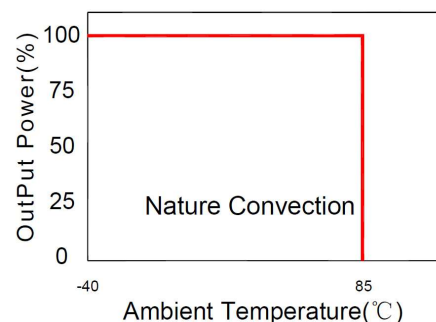
Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency	Max. Capacitive Load(Note)
	Vdc	mA	%Min/Typ	uF
12D1M-05S05N	5	200	74/78	1000
12D1M-05S12N	12	84	72/76	470
12D1M-05S15N	15	67	72/76	470
12D1M-12S05N	5	200	73/77	1000
12D1M-12S12N	12	84	77/81	470
12D1M-12S15N	15	67	77/81	470
12D1M-24S05N	5	200	72/76	1000
12D1M-24S12N	12	84	74/78	470
12D1M-24S15N	15	67	74/78	470
12D1M-05D05N	±5	±100	74/78	470
12D1M-05D09N	±9	±56	76/80	470
12D1M-05D12N	±12	±42	70/74	220
12D1M-05D15N	±15	±34	72/76	220
12D1M-12D05N	±5	±100	73/77	470
12D1M-12D09N	±9	±56	76/80	470
12D1M-12D12N	±12	±42	69/73	220
12D1M-12D15N	±15	±34	71/75	220
12D1M-24D05N	±5	±100	71/75	470
12D1M-24D09N	±9	±56	75/79	470
12D1M-24D12N	±12	±42	72/76	220
12D1M-24D15N	±15	±34	72/76	220

Note: The capacitive loads of positive and negative outputs are identical.



Temperature Derating Graph



**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types	Vo, Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	5V (10% To 100% F.L)			20	%
Load Regulation	9V(10% To 100% F.L)			15	%
Load Regulation	12V (10% To 100% F.L)			15	%
Load Regulation	15V(10% To 100% F.L)			15	%
Ripple & Noise	20MHz bandwidth		70	120	mVp-p
Output Short Circuit	(NOTE)			3	S

**Note:**  
Supply voltage must be discontinued at the end of short circuit duration which less than 3s.

**General Specifications**

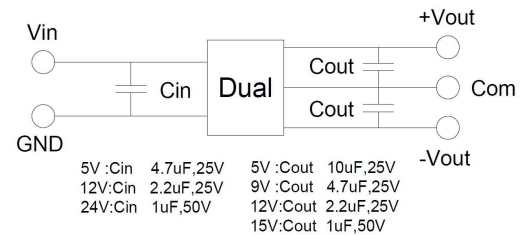
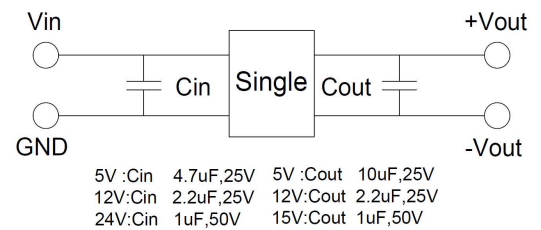
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Isolation Capacitance	Input-output, 100KHz/0.1V		5		pF
Switching Frequency	Full load,nominal input		100		KHz
Operating Temperature		-40		+85	°C
Storage Temperature		-55		+125	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Transformer Creepage		5			mm
Transformer Clearance		5			mm
PCB Creepage & Clearance		5.5			mm
Case material	DAP				
MTBF	MIL-HDBK-217F@25°C	3500000			Hours
Weight			4.0		g
Dimensions			19.5x9.8x12.5		mm

**Part Number**

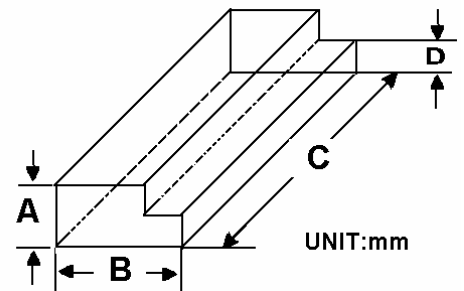
12D1M - 05 S 05 N  
A B C D E

- A: Series
- B: Input Voltage
- C: Single Output
- D: Output Voltage
- E: Unregulated (N)

**Recommended Test Circuit**

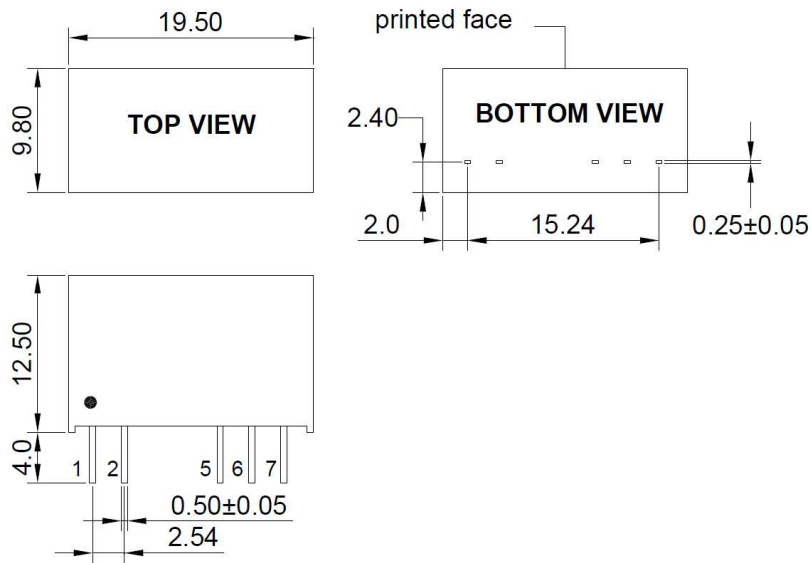


**Packaging**



Size(mm)			
A	B	C	D
12.0	28.55	550	6.00

Markings and Dimensions



UNIT: mm Unless otherwise specified, all tolerances are ±0.25

PIN Connection						
Pin	1	2	5	6	7	
Single	+Vin	-Vin	-Vout	No Pin	+Vout	
Dual	+Vin	-Vin	-Vout	Com	+Vout	

**FEATURES :**

- 7PIN SIP Package
- High Efficiency up to 84%
- Reinforced insulation
- The patient leakage current: Max 2μA
- Unregulated Output Types
- Internal SMD Construction
- Industry Standard Pinout
- Operating Temperature:-40°C TO +85°C
- Design refer to EN60601-1, ANSI/AAMI ES60601-1

12D1M-2W series meet reinforced insulation requirements. They are specially designed for applications where require compact size, high isolation, low isolation capacitor and low leakage current power. They are widely used in medical, electricity, IGBT driver and so on. They are suitable for:

1. Where the voltage of the input power supply is stable (voltage variation: ±10% Vin)
2. Where isolation is necessary between input and output (isolation voltage ≤4200VAC or 6000VDC)
3. Where do not has high requirement of line regulation and the ripple & noise of the output voltage

Such as: Medical collection and isolation, High voltage collection circuit, IGBT-driven circuits, etc.



DC-DC Converter

**12D1M-2W SERIES**

2Watt

4.2KVac or 6KVdc Isolated

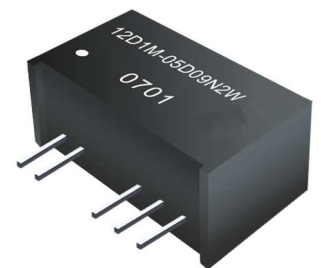
Single & Dual Output

SIP7

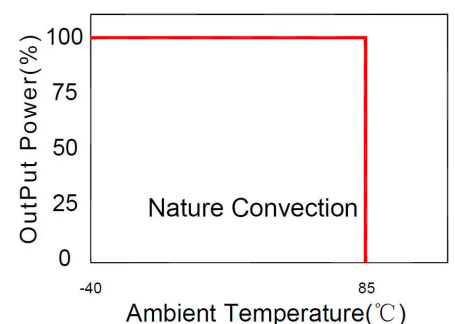
Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency	Max. Capacitive Load(Note)
	Vdc	mA	%Min/Typ	uF
12D1M-05S05N2W	5	400	73/77	1000
12D1M-05S12N2W	12	167	75/79	470
12D1M-05S15N2W	15	133	75/79	470
12D1M-12S05N2W	5	400	73/77	1000
12D1M-12S12N2W	12	167	76/80	470
12D1M-12S15N2W	15	133	78/82	470
12D1M-24S05N2W	5	400	75/79	1000
12D1M-24S12N2W	12	167	78/82	470
12D1M-24S15N2W	15	133	80/84	470
12D1M-05D05N2W	±5	±200	74/78	470
12D1M-05D09N2W	±9	±111	74/78	470
12D1M-05D12N2W	±12	±84	74/78	220
12D1M-05D15N2W	±15	±67	76/80	220
12D1M-12D05N2W	±5	±200	74/78	470
12D1M-12D09N2W	±9	±111	78/82	470
12D1M-12D12N2W	±12	±84	78/82	220
12D1M-12D15N2W	±15	±67	76/80	220
12D1M-24D05N2W	±5	±200	75/79	470
12D1M-24D09N2W	±9	±111	77/81	470
12D1M-24D12N2W	±12	±84	78/82	220
12D1M-24D15N2W	±15	±67	77/81	220

**Note:** The capacitive loads of positive and negative outputs are identical.



**Temperature Derating Graph**



**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types	Vo, Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	5V (10% To 100% F.L)			20	%
Load Regulation	9V(10% To 100% F.L)			15	%
Load Regulation	12V (10% To 100% F.L)			15	%
Load Regulation	15V(10% To 100% F.L)			15	%
Ripple & Noise	20MHz bandwidth		100	150	mVp-p
Output Short Circuit	(NOTE)			3	S

**Note:**

Supply voltage must be discontinued at the end of short circuit duration which less than 3s.

**General Specifications**

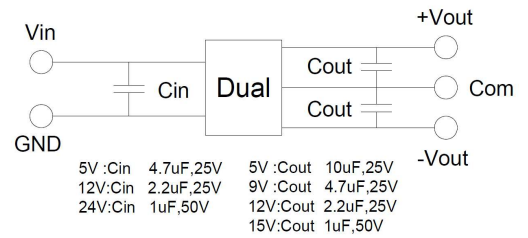
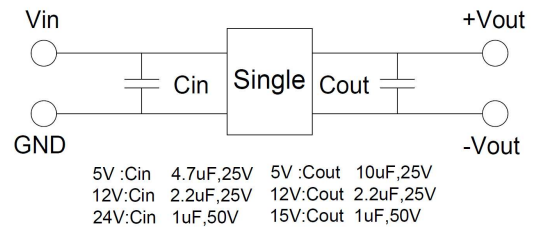
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Isolation Capacitance	Input-output, 100KHz/0.1V		5		pF
Switching Frequency	Full load,nominal input		100		KHz
Operating Temperature		-40		+85	°C
Storage Temperature		-55		+125	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Transformer Creepage		5			mm
Transformer Clearance		5			mm
PCB Creepage & Clearance		5.5			mm
Case material	DAP				
MTBF	MIL-HDBK-217F@25°C	3500000			Hours
Weight			4.0		g
Dimensions			19.5x9.8x12.5		mm

**Part Number**

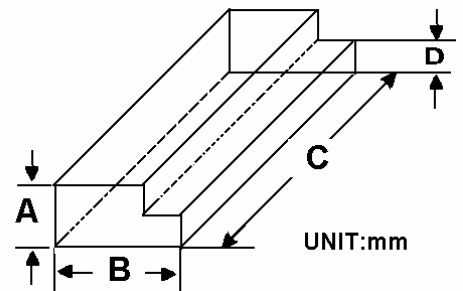
12D1M - 05 S 05 N 2W  
A B C D E F

- A: Series
- B: Input Voltage
- C: Single Output
- D: Output Voltage
- E: Unregulated (N)
- F: Output Power

**Recommended Test Circuit**

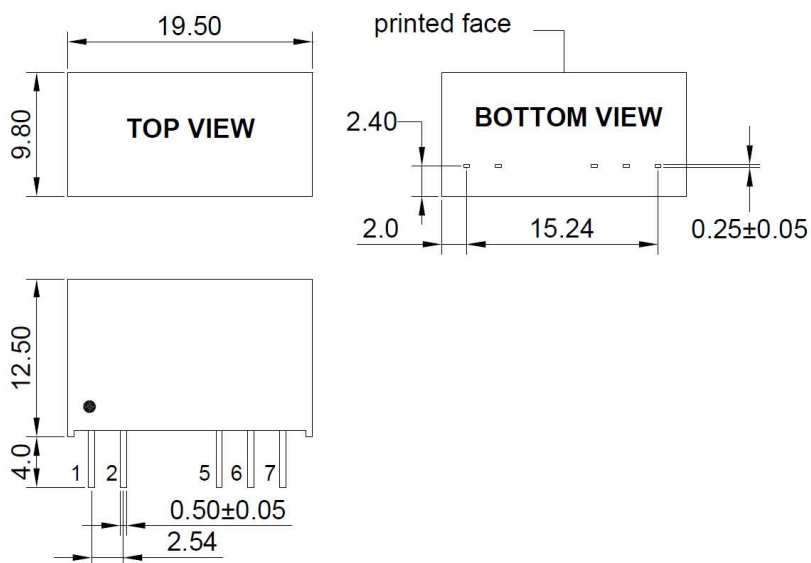


**Packaging**



Size(mm)			
A	B	C	D
12.0	28.55	550	6.00

Markings and Dimensions



UNIT: mm Unless otherwise specified, all tolerances are±0.25

PIN Connection						
Pin	1	2	5	6	7	
Single	+Vin	-Vin	-Vout	No Pin	+Vout	
Dual	+Vin	-Vin	-Vout	Com	+Vout	



**FEATURES :**

- 7PIN SIP Package
- High Efficiency up to 88%
- Unregulated Output Types
- Internal SMD Construction
- Industry Standard Pinout
- Operating Temperature:-40°C TO +85°C

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Ripple & Noise		Efficiency	Package Style
	Vdc	mA	Typ(mVp-p)	Max(mVp-p)	%TYP	
12DA-05S05N	5	200	25	50	82	1
12DA-05S09N	9	112	25	50	82	1
12DA-05S12N	12	84	25	50	82	1
12DA-05S15N	15	67	25	50	84	1
12DA-12S05N	5	200	25	50	82	1
12DA-12S09N	9	112	25	50	84	1
12DA-12S12N	12	84	25	50	86	1
12DA-12S15N	15	67	25	50	87	1
12DA-15S05N	5	200	25	50	83	1
12DA-15S09N	9	112	25	50	86	1
12DA-15S12N	12	84	25	50	87	1
12DA-15S15N	15	67	25	50	87	1
12DA-24S05N	5	200	25	50	84	1
12DA-24S09N	9	112	25	50	85	1
12DA-24S12N	12	84	25	50	86	1
12DA-24S15N	15	67	25	50	86	1
12DA-48S05N2	5	200	-	80	78	2
12DA-48S09N2	9	112	-	80	81	2
12DA-48S12N2	12	84	-	80	81	2
12DA-48S15N2	15	67	-	80	82	2
12DA-05D05N	±5	±100	25	50	84	1
12DA-05D09N	±9	±56	25	50	86	1
12DA-05D12N	±12	±42	25	50	86	1
12DA-05D15N	±15	±34	25	50	86	1
12DA-12D05N	±5	±100	25	50	85	1
12DA-12D09N	±9	±56	25	50	87	1
12DA-12D12N	±12	±42	25	50	88	1
12DA-12D15N	±15	±34	25	50	87	1
12DA-15D05N	±5	±100	25	50	83	1
12DA-15D09N	±9	±56	25	50	86	1
12DA-15D12N	±12	±42	25	50	87	1
12DA-15D15N	±15	±34	25	50	87	1
12DA-24D05N	±5	±100	25	50	84	1
12DA-24D09N	±9	±56	25	50	85	1
12DA-24D12N	±12	±42	25	50	86	1
12DA-24D15N	±15	±34	25	50	86	1
12DA-48D05N2	±5	±100	-	80	79	2
12DA-48D09N2	±9	±56	-	80	81	2
12DA-48D12N2	±12	±42	-	80	81	2
12DA-48D15N2	±15	±34	-	80	82	2



DC-DC Converter

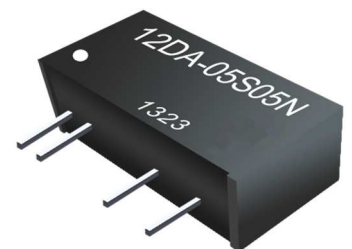
12DA SERIES

1Watt

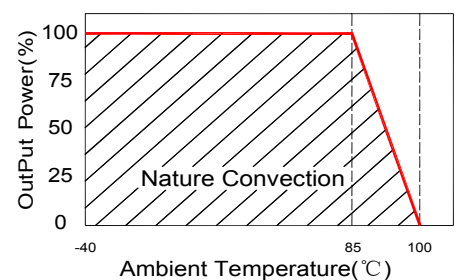
3KV Isolated

Single & Dual Output

SIP7



Temperature Derating Graph



## Input Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	$V_{o,Io}$ Nom			$\pm 10$	%
Filter	Capacitor				

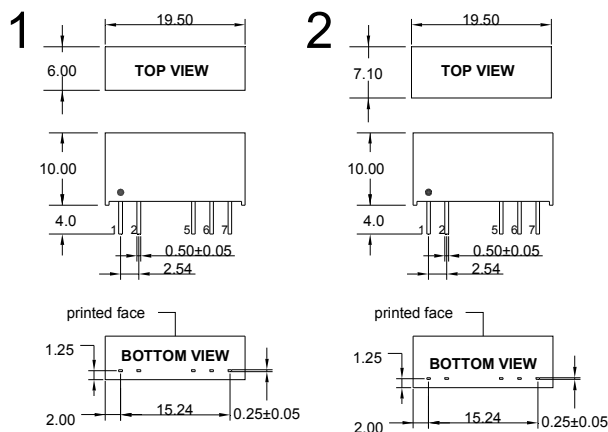
## Output Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			$\pm 5$	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF $V_{in}$		1.2		%
Load Regulation	5V,9V (10% To 100% F.L)			7	%
Load Regulation	12V,15V (10% To 100% F.L)			5	%
Load Regulation	$\pm 5V, \pm 9V$ (10% To 100% F.L)			7	%
Load Regulation	$\pm 12V, \pm 15V$ (10% To 100% F.L)			5	%

## General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Isolation Voltage			3000		Vdc
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight	Package1 or Package2		2.1 or 2.7		g
Dimensions	Package1 or Package2	19.5x6.0x10.0 or 19.5x7.1x10.0			mm

## Markings and dimensions



Unit:mm Unless otherwise specified, all tolerances are  $\pm 0.25$

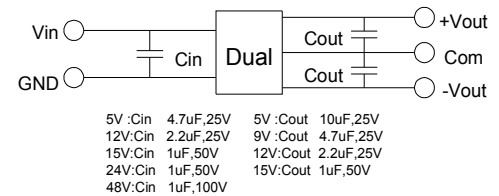
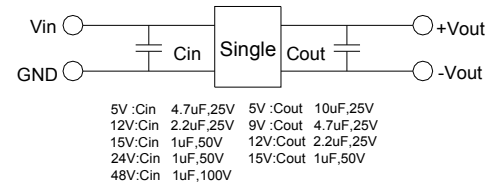
## Part Number

12DA - 05 S 05 N

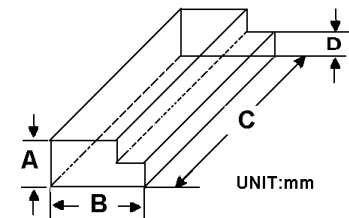
A B C D E

A:Series  
B:Input Voltage  
C:Single(S)Dual(D)  
D:Output Voltage  
E:Unregulated(N)

## Recommended Test Circuit



## Packaging



Size (mm)			
A	B	C	D
9.50	16.5	52.2	5.0

## PIN Connection

PIN	1	2	5	6	7
Single	+Vin	-Vin	-Vout	No Pin	+Vout
Dual	+Vin	-Vin	-Vout	Com	+Vout

**FEATURES :**

- 7PIN SIP Package
- High Efficiency up to 88%
- Unregulated Output Types
- Internal SMD Construction
- Industry Standard Pinout
- Operating Temperature:-40°C TO +85°C



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Ripple & Noise		Efficiency
	Vdc	mA	Typ(mVp-p)	Max(mVp-p)	%TYP
12DA-05S05N2W	5	400	40	60	82
12DA-05S09N2W	9	222	40	60	86
12DA-05S12N2W	12	167	50	80	87
12DA-05S15N2W	15	133	50	80	86
12DA-12S05N2W	5	400	40	60	83
12DA-12S09N2W	9	222	40	60	87
12DA-12S12N2W	12	167	50	80	88
12DA-12S15N2W	15	133	50	80	87
12DA-15S05N2W	5	400	40	60	84
12DA-15S09N2W	9	222	40	60	86
12DA-15S12N2W	12	167	50	80	87
12DA-15S15N2W	15	133	50	80	88
12DA-24S05N2W	5	400	40	60	84
12DA-24S09N2W	9	222	40	60	87
12DA-24S12N2W	12	167	50	80	87
12DA-24S15N2W	15	133	50	80	88
12DA-05D05N2W	±5	±200	40	60	82
12DA-05D09N2W	±9	±111	40	60	85
12DA-05D12N2W	±12	±84	50	80	86
12DA-05D15N2W	±15	±67	50	80	86
12DA-12D05N2W	±5	±200	40	60	84
12DA-12D09N2W	±9	±111	40	60	87
12DA-12D12N2W	±12	±84	50	80	87
12DA-12D15N2W	±15	±67	50	80	87
12DA-15D05N2W	±5	±200	40	60	84
12DA-15D09N2W	±9	±111	40	60	86
12DA-15D12N2W	±12	±84	50	80	88
12DA-15D15N2W	±15	±67	50	80	88
12DA-24D05N2W	±5	±200	40	60	85
12DA-24D09N2W	±9	±111	40	60	87
12DA-24D12N2W	±12	±84	50	80	88
12DA-24D15N2W	±15	±67	50	80	88

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

DC-DC Converter

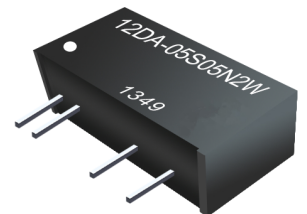
12DA-2W SERIES

2Watt

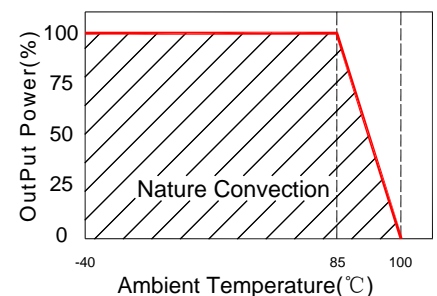
3KV Isolated

Single & Dual Output

SIP7



**Temperature Derating Graph**



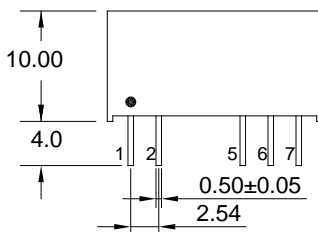
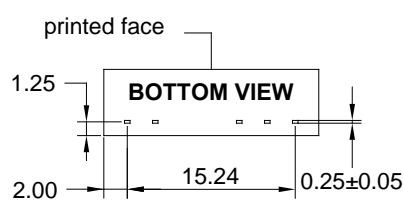
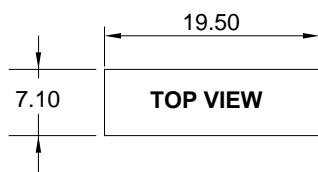
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
<b>Voltage Tolerance</b>	100% full load			±5	%
<b>Short Circuit Protection</b>	Short Term			1	Sec
<b>Line Regulation</b>	For 1.0% OF Vin		1.2		%
<b>Load Regulation</b>	5V,9V (10% To 100% F.L.)			10	%
<b>Load Regulation</b>	12V,15V (10% To 100% F.L.)			7	%
<b>Load Regulation</b>	±5V,±9V (10% To 100% F.L.)			9	%
<b>Load Regulation</b>	±12V,±15V (10% To 100% F.L.)			6	%

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
<b>Isolation Resistance</b>	500Vdc	1000			MΩ
<b>Switching Frequency</b>	Full load, nominal input		100		KHz
<b>Operating Temperature</b>		-40		+85	°C
<b>Humidity</b>	Non Condensing			95	%
<b>Cooling</b>	Free air Convection				
<b>Case material</b>	DAP				
<b>MTBF</b>	MIL-HDBK-217F @25°C	3500000			Hours
<b>Weight</b>			2.7		g
<b>Dimensions</b>			19.5x7.1x10.0		mm

**Markings and dimensions**



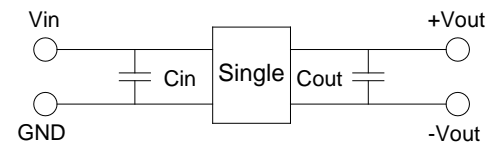
Unit:mm Unless otherwise specified, all tolerances are ±0.25

**Part Number**

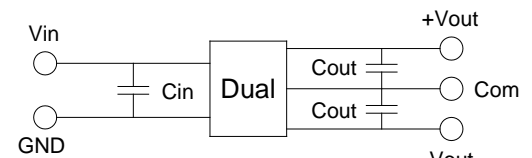
12DA - 05 S 05 N 2W  
A B C D E F

A:Series  
B:Input Voltage  
C:Single(S)Dual(D)  
D:Output Voltage  
E:Unregulated(N)  
F:Output Power

**Recommended Test Circuit**

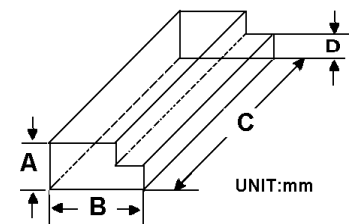


5V :Cin 4.7uF,25V 5V :Cout 10uF,25V  
12V:Cin 2.2uF,25V 9V :Cout 4.7uF,25V  
15V:Cin 1uF,50V 12V:Cout 2.2uF,25V  
24V:Cin 1uF,50V 15V:Cout 1uF,50V



5V :Cin 4.7uF,25V 5V :Cout 10uF,25V  
12V:Cin 2.2uF,25V 9V :Cout 4.7uF,25V  
15V:Cin 1uF,50V 12V:Cout 2.2uF,25V  
24V:Cin 1uF,50V 15V:Cout 1uF,50V

**Packaging**



Size (mm)			
A	B	C	D
9.50	16.5	522	5.0

**PIN Connection**

PIN	1	2	5	6	7
<b>Single</b>	+Vin	-Vin	-Vout	No Pin	+Vout
<b>Dual</b>	+Vin	-Vin	-Vout	Com	+Vout

## FEATURES :

- 7PIN SIP Package
- High Efficiency up to 82%
- Output Continuous Short Circuit Protection
- Unregulated Output Types
- Internal SMD Construction
- Industry Standard Pinout
- Operating Temperature:-40°C TO +105°C



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Ripple & Noise		Efficiency	Package Style
	Vdc	mA	Typ (mVp-p)	Max (mVp-p)	%TYP	
12DB-05S05N	5	200	60	100	80	1
12DB-05S09N	9	112	60	100	80	1
12DB-05S12N	12	84	60	100	80	1
12DB-05S15N	15	67	60	100	80	1
12DB-12S05N	5	200	60	100	80	1
12DB-12S09N	9	112	60	100	80	1
12DB-12S12N	12	84	60	100	82	1
12DB-12S15N	15	67	60	100	81	1
12DB-15S05N2	5	200	60	100	78	2
12DB-15S09N2	9	112	60	100	79	2
12DB-15S12N2	12	84	60	100	79	2
12DB-15S15N2	15	67	60	100	79	2
12DB-24S05N2	5	200	60	100	77	2
12DB-24S09N2	9	112	60	100	79	2
12DB-24S12N2	12	84	60	100	79	2
12DB-24S15N2	15	67	60	100	79	2
12DB-24S24N2	24	42	60	100	81	2
12DB-05D05N	±5	±100	60	100	80	1
12DB-05D09N	±9	±56	60	100	80	1
12DB-05D12N	±12	±42	60	100	80	1
12DB-05D15N	±15	±34	60	100	80	1
12DB-12D05N	±5	±100	60	100	80	1
12DB-12D09N	±9	±56	60	100	80	1
12DB-12D12N	±12	±42	60	100	82	1
12DB-12D15N	±15	±34	60	100	81	1
12DB-15D05N2	±5	±100	60	100	78	2
12DB-15D09N2	±9	±56	60	100	78	2
12DB-15D12N2	±12	±42	60	100	78	2
12DB-15D15N2	±15	±34	60	100	78	2
12DB-24D05N2	±5	±100	60	100	78	2
12DB-24D09N2	±9	±56	60	100	79	2
12DB-24D12N2	±12	±42	60	100	79	2
12DB-24D15N2	±15	±34	60	100	78	2

## Input Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo, Io Nom			±10	%
Filter	Capacitor				

## DC-DC Converter

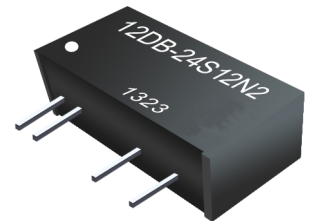
## 12DB SERIES

### 1Watt

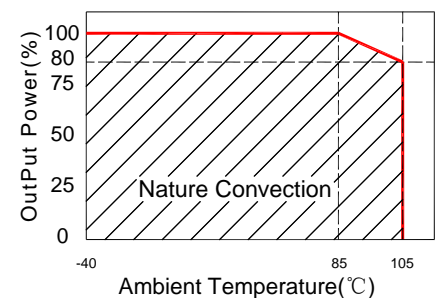
### 3KV Isolated

### Single & Dual Output

### SIP7



## Temperature Derating Graph



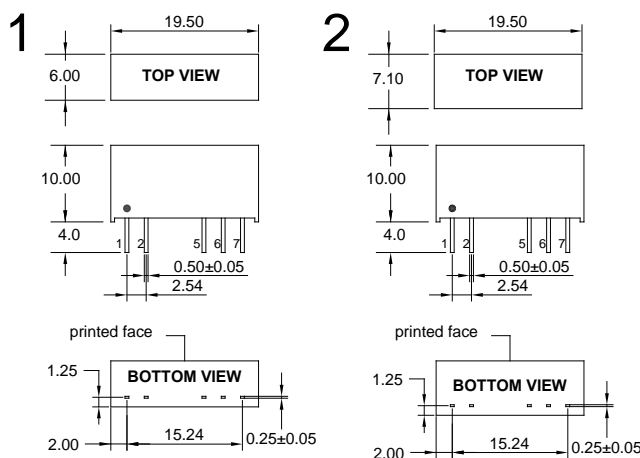
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
<b>Voltage Tolerance</b>	100% full load			±5	%
<b>Short Circuit Protection</b>	Continuous				
<b>Line Regulation</b>	For 1.0% OF Vin		1.2		%
<b>Load Regulation</b>	5V,9V (10% To 100% F.L)			15	%
<b>Load Regulation</b>	12~24V (10% To 100% F.L)			10	%
<b>Load Regulation</b>	±5V,±9V (10% To 100% F.L)			15	%
<b>Load Regulation</b>	±12V~±24V (10% To 100% F.L)			10	%

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
<b>Isolation Resistance</b>	500Vdc	1000			MΩ
<b>Switching Frequency</b>	Full load, nominal input		100		KHz
<b>Operating Temperature</b>		-40		+105	°C
<b>Storage Temperature</b>		-55		+125	°C
<b>Humidity</b>	Non Condensing			95	%
<b>Cooling</b>	Free air Convection				
<b>Case material</b>	DAP				
<b>MTBF</b>	MIL-HDBK-217F @25°C	3500000			Hours
<b>Weight</b>	Package1 or Package2		2.1 or 2.7		g
<b>Dimensions</b>	Package1 or Package2	19.5x6.0x10.0 or 19.5x7.1x10.0			mm

**Markings and dimensions**



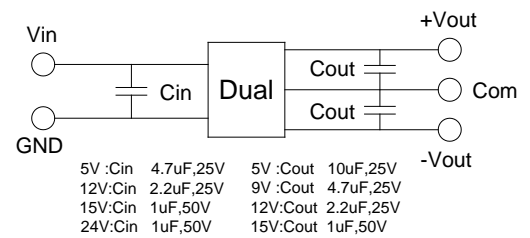
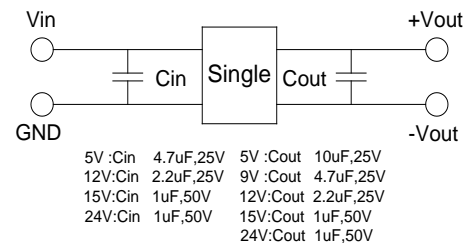
Unit:mm Unless otherwise specified, all tolerances are ±0.25

**Part Number**

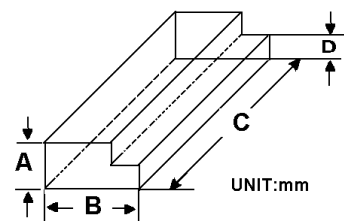
12DB - 05 S 05 N 2  
A B C D E F

A:Series  
B:Input Voltage  
C:Single(S)Dual(D)  
D:Output Voltage  
E:Unregulated(N)  
F:Packge

**Recommended Test Circuit**



**Packaging**



Size (mm)			
A	B	C	D
9.50	16.5	52.2	5.0

**PIN Connection**

PIN	1	2	5	6	7
<b>Single</b>	+Vin	-Vin	-Vout	No Pin	+Vout
<b>Dual</b>	+Vin	-Vin	-Vout	Com	+Vout

**FEATURES :**

- 7PIN SIP Package
- High Efficiency up to 82%
- Output Continuous Short Circuit Protection
- Unregulated Output Types
- Internal SMD Construction
- Industry Standard Pinout
- Operating Temperature:-40°C TO +105°C

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Ripple & Noise		Efficiency
	Vdc	mA	Typ (mVp-p)	Max (mVp-p)	%TYP
12DB-05S05N4KV	5	200	60	100	80
12DB-05S09N4KV	9	112	60	100	80
12DB-05S12N4KV	12	84	60	100	80
12DB-05S15N4KV	15	67	60	100	80
12DB-12S05N4KV	5	200	60	100	80
12DB-12S09N4KV	9	112	60	100	80
12DB-12S12N4KV	12	84	60	100	82
12DB-12S15N4KV	15	67	60	100	81
12DB-15S05N4KV	5	200	60	100	78
12DB-15S09N4KV	9	112	60	100	79
12DB-15S12N4KV	12	84	60	100	79
12DB-15S15N4KV	15	67	60	100	79
12DB-24S05N4KV	5	200	60	100	77
12DB-24S09N4KV	9	112	60	100	79
12DB-24S12N4KV	12	84	60	100	79
12DB-24S15N4KV	15	67	60	100	79
12DB-24S24N4KV	24	42	60	100	81
12DB-05D05N4KV	±5	±100	60	100	80
12DB-05D09N4KV	±9	±56	60	100	80
12DB-05D12N4KV	±12	±42	60	100	80
12DB-05D15N4KV	±15	±34	60	100	80
12DB-12D05N4KV	±5	±100	60	100	80
12DB-12D09N4KV	±9	±56	60	100	80
12DB-12D12N4KV	±12	±42	60	100	82
12DB-12D15N4KV	±15	±34	60	100	81
12DB-15D05N4KV	±5	±100	60	100	78
12DB-15D09N4KV	±9	±56	60	100	78
12DB-15D12N4KV	±12	±42	60	100	78
12DB-15D15N4KV	±15	±34	60	100	78
12DB-24D05N4KV	±5	±100	60	100	78
12DB-24D09N4KV	±9	±56	60	100	79
12DB-24D12N4KV	±12	±42	60	100	79
12DB-24D15N4KV	±15	±34	60	100	78

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo, Io Nom			±10	%
Filter	Capacitor				



DC-DC Converter

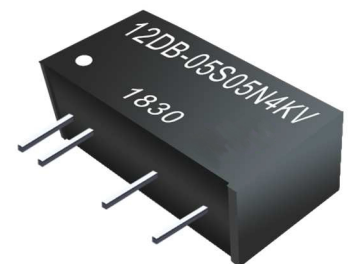
12DB-4KV SERIES

1Watt

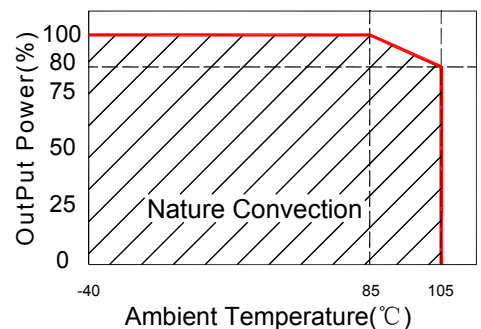
4KV Isolated

Single & Dual Output

SIP7



**Temperature Derating Graph**



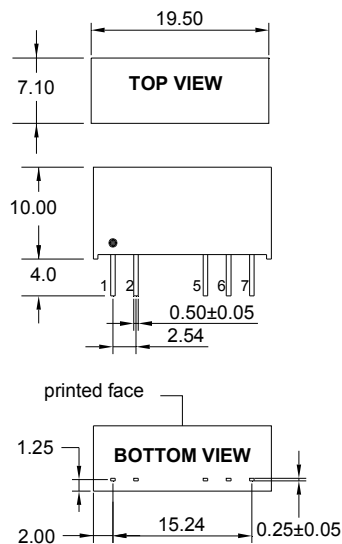
## Output Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Continuous				
Line Regulation	For 1.0% of Vin		1.2		%
Load Regulation	5V,9V (10% To 100% F.L)			15	%
Load Regulation	12~24V (10% To 100% F.L)			10	%
Load Regulation	±5V,±9V (10% To 100% F.L)			15	%
Load Regulation	±12~±24V (10% To 100% F.L)			10	%

## General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+105	°C
Storage Temperature		-55		+125	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F@25°C	3500000			Hours
Weight			2.7		g
Dimensions			19.5x7.1x10.0		mm

## Markings and dimensions



UNIT: mm Unless otherwise specified, all tolerances are ±0.25

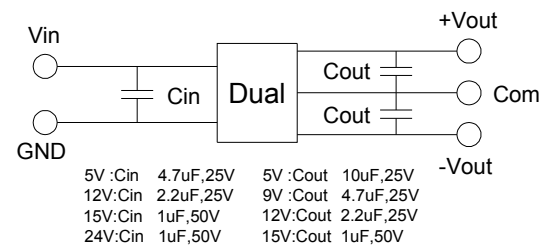
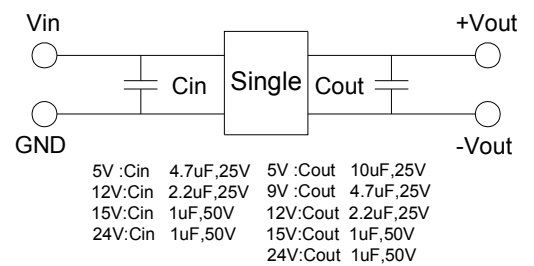
## PIN Connection

Pin	1	2	5	6	7
Single	+Vin	-Vin	-Vout	No Pin	+Vout
Dual	+Vin	-Vin	-Vout	Com	+Vout

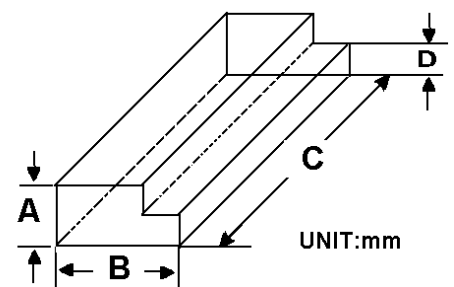
## Part Number

12DB	-	05	S	05	N	4KV
A	B	C	D	E	F	
A	:					Series
B	:					Input Voltage
C	:					Single(S);Dual(D)
D	:					Output Voltage
E	:					Unregulated(N)
F	:					Isolation Voltage

## Recommended Test Circuit



## Packaging



Size(mm)			
A	B	C	D
9.5	16.5	522	5.0



**FEATURES :**

- 7PIN SIP Package
- High Efficiency up to 85%
- Output Continuous Short Circuit Protection
- Unregulated Output Types
- Internal SMD Construction
- Industry Standard Pinout
- Operating Temperature:-40°C TO +105°C



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Ripple & Noise		Efficiency
	Vdc	mA	Typ (mVp-p)	Max (mVp-p)	%TYP
12DB-05S05N2W	5	400	60	100	80
12DB-05S09N2W	9	222	60	100	82
12DB-05S12N2W	12	167	60	100	82
12DB-05S15N2W	15	133	60	100	82
12DB-12S05N2W	5	400	60	100	82
12DB-12S09N2W	9	222	60	100	82
12DB-12S12N2W	12	167	60	100	84
12DB-12S15N2W	15	133	60	100	84
12DB-15S05N2W	5	400	60	100	80
12DB-15S09N2W	9	222	60	100	82
12DB-15S12N2W	12	167	60	100	83
12DB-15S15N2W	15	133	60	100	83
12DB-24S05N2W	5	400	60	100	82
12DB-24S09N2W	9	222	60	100	84
12DB-24S12N2W	12	167	60	100	84
12DB-24S15N2W	15	133	60	100	84
12DB-24S24N2W	24	84	60	100	85
12DB-05D05N2W	±5	±200	60	100	80
12DB-05D09N2W	±9	±111	60	100	82
12DB-05D12N2W	±12	±84	60	100	82
12DB-05D15N2W	±15	±67	60	100	82
12DB-12D05N2W	±5	±200	60	100	82
12DB-12D09N2W	±9	±111	60	100	84
12DB-12D12N2W	±12	±84	60	100	84
12DB-12D15N2W	±15	±67	60	100	84
12DB-15D05N2W	±5	±200	60	100	80
12DB-15D09N2W	±9	±111	60	100	82
12DB-15D12N2W	±12	±84	60	100	83
12DB-15D15N2W	±15	±67	60	100	83
12DB-24D05N2W	±5	±200	60	100	82
12DB-24D09N2W	±9	±111	60	100	78
12DB-24D12N2W	±12	±84	60	100	78
12DB-24D15N2W	±15	±67	60	100	80

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

DC-DC Converter

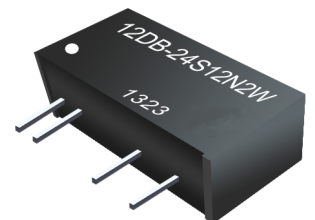
12DB-2W SERIES

2Watt

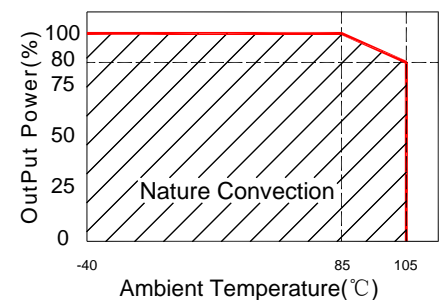
3KV Isolated

Single & Dual Output

SIP7



**Temperature Derating Graph**



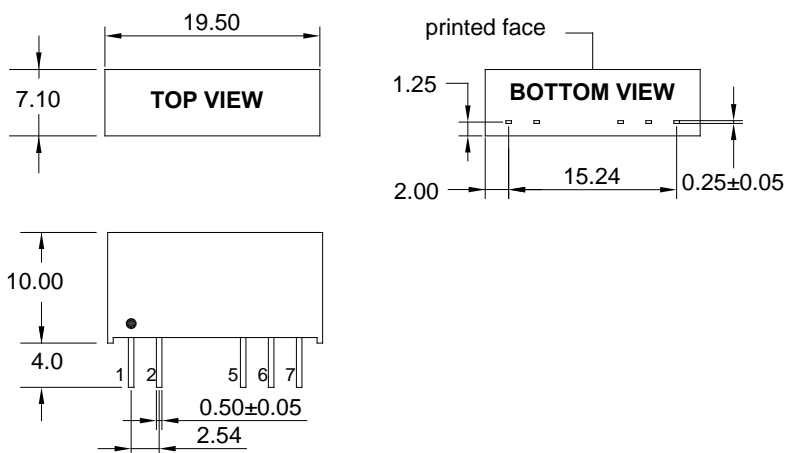
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
<b>Voltage Tolerance</b>	100% full load			±5	%
<b>Short Circuit Protection</b>	Continuous				
<b>Line Regulation</b>	For 1.0% OF Vin		1.2		%
<b>Load Regulation</b>	5V,9V (10% To 100% F.L)			15	%
<b>Load Regulation</b>	12~24V (10% To 100% F.L)			10	%
<b>Load Regulation</b>	±5V,±9V (10% To 100% F.L)			15	%
<b>Load Regulation</b>	±12V~±24V (10% To 100% F.L)			10	%

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
<b>Isolation Resistance</b>	500Vdc	1000			MΩ
<b>Switching Frequency</b>	Full load, nominal input		100		KHz
<b>Operating Temperature</b>		-40		+105	°C
<b>Storage Temperature</b>		-55		+125	°C
<b>Humidity</b>	Non Condensing			95	%
<b>Cooling</b>	Free air Convection				
<b>Case material</b>	DAP				
<b>MTBF</b>	MIL-HDBK-217F @25°C	3500000			Hours
<b>Weight</b>			2.7		g
<b>Dimensions</b>			19.5x7.1x10.0		mm

**Markings and dimensions**



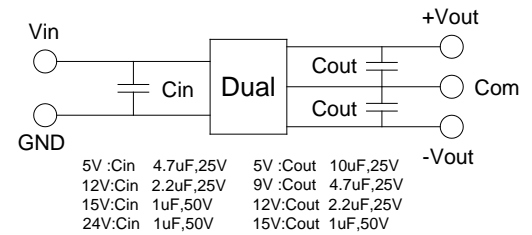
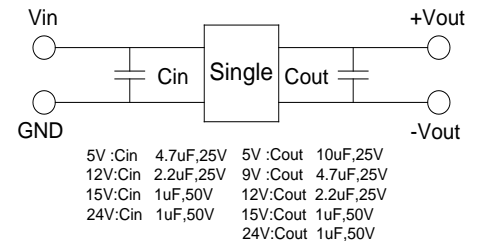
Unit:mm Unless otherwise specified, all tolerances are ±0.25

**Part Number**

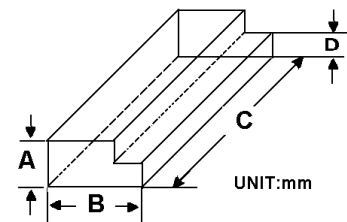
12DB - 05 S 05 N 2W  
A B C D E F

A:Series  
B:Input Voltage  
C:Single(S)Dual(D)  
D:Output Voltage  
E:Unregulated(N)  
F:Output Power

**Recommended Test Circuit**



**Packaging**



Size (mm)			
A	B	C	D
9.50	16.5	522	5.0

**PIN Connection**

PIN	1	2	5	6	7
<b>Single</b>	+Vin	-Vin	-Vout	No Pin	+Vout
<b>Dual</b>	+Vin	-Vin	-Vout	Com	+Vout

**FEATURES :**

- 2:1Wide Input Voltages Range
- 7PIN SIP Package
- High Efficiency up to 80%
- Regulated Output Types
- Internal SMD Construction
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Output Voltage	Output Current	Efficiency
	Vdc	Vdc	mA	%TYP
12DZ-05S05R	4.5-9	5	200	65
12DZ-05S09R	4.5-9	9	112	70
12DZ-05S12R	4.5-9	12	84	70
12DZ-05S15R	4.5-9	15	67	70
12DZ-05S24R	4.5-9	24	42	75
12DZ-12S05R	9-18	5	200	70
12DZ-12S09R	9-18	9	112	72
12DZ-12S12R	9-18	12	84	73
12DZ-12S15R	9-18	15	67	75
12DZ-12S24R	9-18	24	42	80
12DZ-24S05R	18-36	5	200	75
12DZ-24S09R	18-36	9	112	75
12DZ-24S12R	18-36	12	84	78
12DZ-24S15R	18-36	15	67	78
12DZ-24S24R	18-36	24	42	80

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types	Vo, Io Nom			2:1	
Filter	Capacitor				

DC-DC Converter

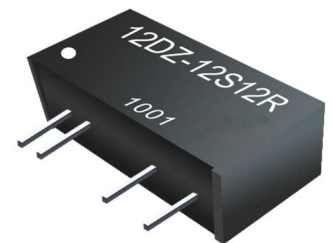
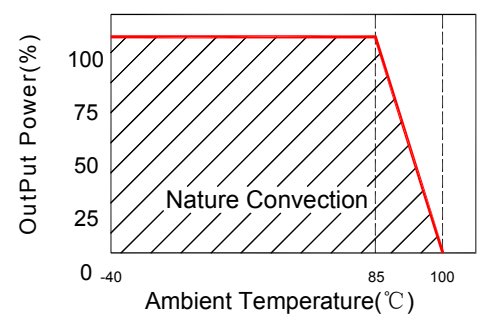
**12DZ SERIES**

1Watt 3KV Isolated

2 : 1 Input Voltage Range

Single Output

SIP7

**Temperature Derating Graph**

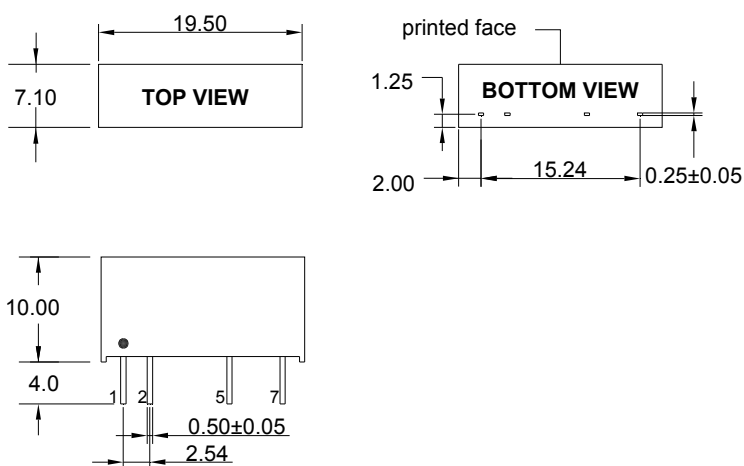
## Output Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Continuous				
Line Regulation	Regulated			±0.5	%
Load Regulation	Regulated			±1.5	%
Ripple & Noise	Output:5V,9V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output:12-24V TYPES BW=DC To 20MHz		1%	of Vout	mVp-p
Transient response setting time	50% load step change		350		us

## General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	1500000			Hours
Weight			2.7		g
Dimensions			19.5x7.1x10.0		mm

## Markings and dimensions



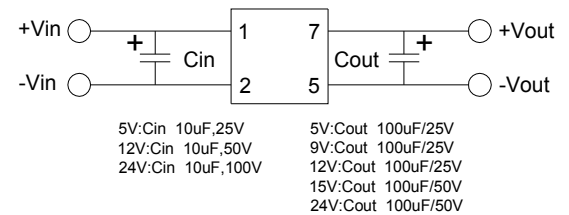
UNIT : mm Unless otherwise specified, all tolerances are ±0.25

## Part Number

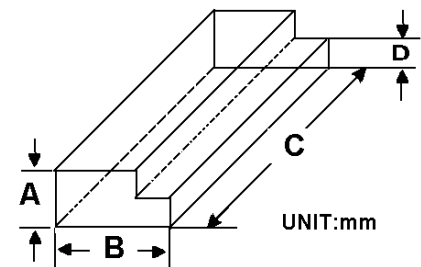
12DZ - 05 S 05 R  
A B C D E

A:Series  
B:Input Voltage  
C:Single Output  
D:Output Voltage  
E:Regulated(R)

## Recommended Test Circuit



## Packaging



Size(mm)			
A	B	C	D
9.5	16.5	522	5.0

## PIN Connection

Pin	1	2	5	7
Single	+Vin	-Vin	-Vout	+Vout

**FEATURES :**

- 2:1Wide Input Voltages Range
- 7PIN SIP Package
- High Efficiency up to 83%
- Regulated Output Types
- Internal SMD Construction
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Output Voltage	Output Current	Efficiency
	Vdc	Vdc	mA	%TYP
12DZ-05S05R2W	4.5-9	5	400	70
12DZ-05S09R2W	4.5-9	9	222	72
12DZ-05S12R2W	4.5-9	12	167	75
12DZ-05S15R2W	4.5-9	15	133	78
12DZ-05S24R2W	4.5-9	24	84	80
12DZ-12S05R2W	9-18	5	400	75
12DZ-12S09R2W	9-18	9	222	78
12DZ-12S12R2W	9-18	12	167	80
12DZ-12S15R2W	9-18	15	133	80
12DZ-12S24R2W	9-18	24	84	83
12DZ-24S05R2W	18-36	5	400	76
12DZ-24S09R2W	18-36	9	222	78
12DZ-24S12R2W	18-36	12	167	80
12DZ-24S15R2W	18-36	15	133	80
12DZ-24S24R2W	18-36	24	84	83

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types	Vo, Io Nom			2:1	
Filter	Capacitor				



DC-DC Converter

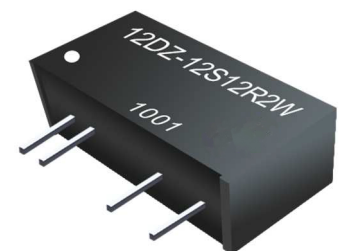
**12DZ-2W SERIES**

2Watt 3KV Isolated

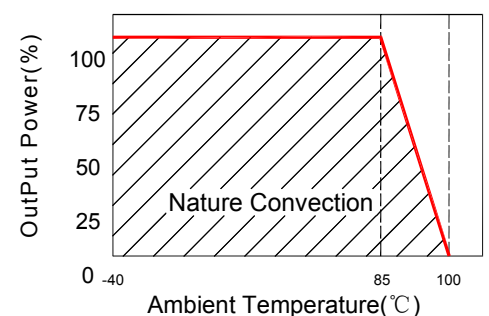
2 : 1 Input Voltage Range

Single Output

SIP7



**Temperature Derating Graph**



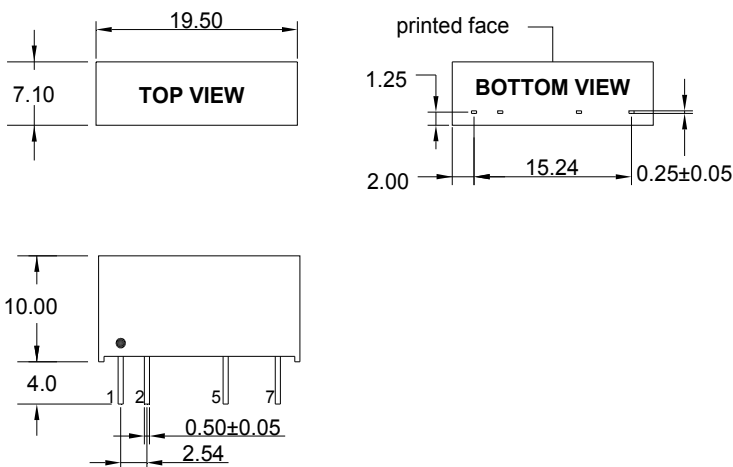
Output Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Continuous				
Line Regulation	Regulated			±0.5	%
Load Regulation	Regulated			±1.5	%
Ripple & Noise	Output:5V,9V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output:12-24V TYPES BW=DC To 20MHz		1%	of Vout	mVp-p
Transient response setting time	50% load step change		350		us

General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	1500000			Hours
Weight			2.7		g
Dimensions			19.5x7.1x10.0		mm

Markings and dimensions



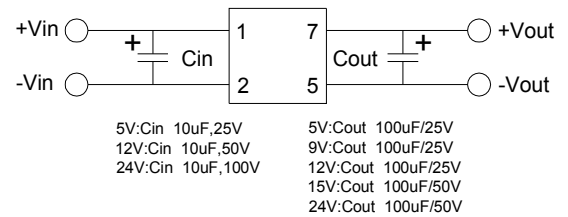
UNIT : mm Unless otherwise specified, all tolerances are ±0.25

Part Number

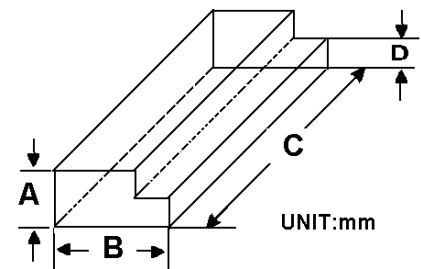
12DZ - 05 S 05 R 2W  
A B C D E F

A:Series  
B:Input Voltage  
C:Single Output  
D:Output Voltage  
E:Regulated(R)  
F:Output Power

Recommended Test Circuit



Packaging



Size(mm)			
A	B	C	D
9.5	16.5	52.2	5.0

PIN Connection

Pin	1	2	5	7
Single	+Vin	-Vin	-Vout	+Vout

**FEATURES :**

- 4 PIN SIP and 8 PIN DIL Package
- High Efficiency up to 85%
- Unregulated Output Types
- Internal SMD Construction
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout
- Output 3.3/5/9/12/15V Approved By UL60950-1

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency	Package Style
	Vdc	mA	%TYP	
★13D-XXS03NNL	3.3	303	70	1
★13D-XXS05NNL	5	200	70	1
★13D-XXS09NNL	9	110	75	1
★13D-XXS12NNL	12	84	78	1
★13D-XXS15NNL	15	67	80	1
★13D-XXS24NNL	24	42	82	1
13D-XXS03N2NL	3.3	303	70	2
13D-XXS05N2NL	5	200	70	2
13D-XXS09N2NL	9	110	75	2
13D-XXS12N2NL	12	84	78	2
13D-XXS15N2NL	15	67	80	2
13D-XXS24N2NL	24	42	82	2
13D-XXS03N3NL	3.3	303	70	3
13D-XXS05N3NL	5	200	70	3
13D-XXS09N3NL	9	110	75	3
13D-XXS12N3NL	12	84	78	3
13D-XXS03N4NL	3.3	303	70	4
13D-XXS05N4NL	5	200	70	4
13D-XXS09N4NL	9	110	75	4
13D-XXS12N4NL	12	84	78	4
13D-XXS15N4NL	15	67	80	4
13D-XXS24N4NL	24	42	82	4

**Note:**

- 1."XX" Is Input Voltage:03=3.3Vdc,05=05Vdc,09 =9Vdc,12=12Vdc,15=15Vdc,24=24Vdc
2. The input voltage increases, there will be an increase in efficiency.
- 3." ★" marked as recognized by UL 60950-1.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				



DC-DC Converter

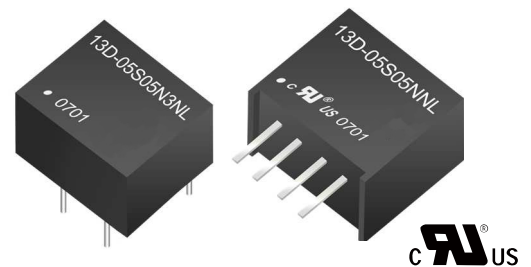
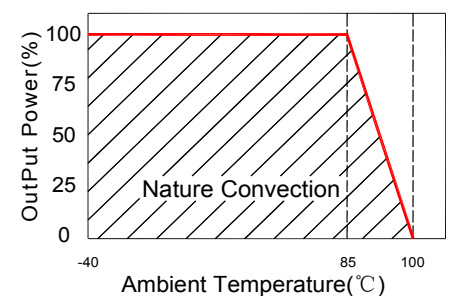
**13D SERIES**

1Watt

1KV Isolated

Single Output

SIP4 &amp; DIL8

**Temperature Derating Graph**

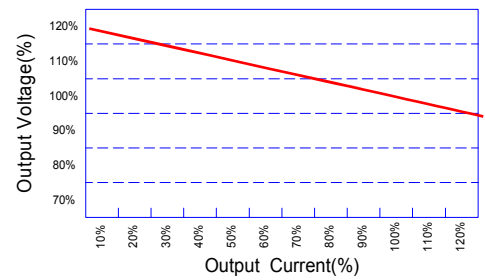
## Output Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V,5V (10% To 100% F.L)			15	%
Load Regulation	9V,12V,15V,24V (10% To 100% F.L)			10	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting	50% load step change		350		us

## General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight	Package 1/2/3/4		1.5/1.9/1.5/2.7		g
Dimensions	Package 1		11.50x6.00x10.00		mm
Dimensions	Package 2		11.50x7.50x10.00		mm
Dimensions	Package 3		12.70x10.16x6.80		mm
Dimensions	Package 4		12.70x12.70x9.50		mm

## Tolerance Envelope Graph

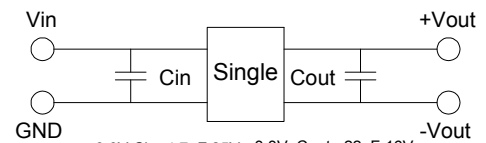


## Part Number

13D - 05 S 05 N 2 NL  
A B C D E F G

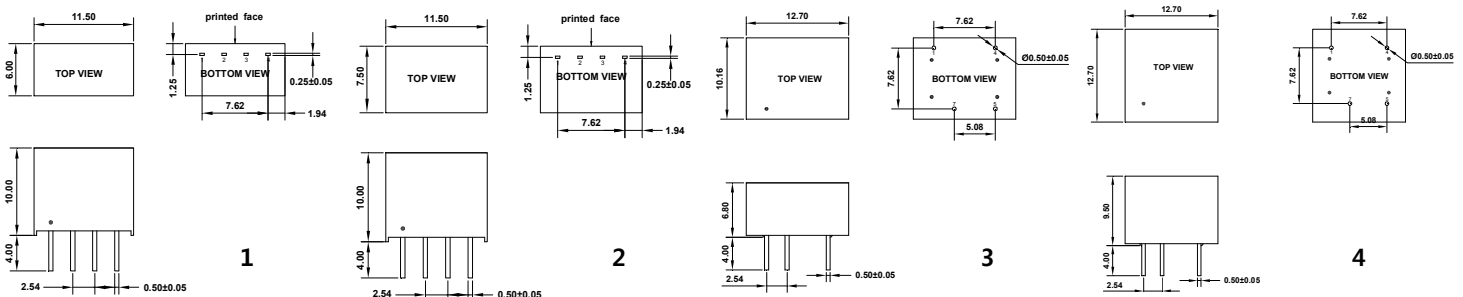
A:Series  
B:Input Voltage  
C:Single Output  
D:Output Voltage  
E:Unregulated(N)  
F:Package  
G:RoHS Version

## Recommended Test Circuit



3.3V:Cin 4.7uF,25V 3.3V:Cout 22uF,16V  
5V:Cin 4.7uF,25V 5V:Cout 10uF,25V  
9V:Cin 4.7uF,25V 9V:Cout 4.7uF,25V  
12V:Cin 2.2uF,25V 12V:Cout 2.2uF,25V  
15V:Cin 1uF,50V 15V:Cout 1uF,50V  
24V:Cin 1uF,50V 24V:Cout 1uF,50V

## Markings and dimensions



Unit:mm Unless otherwise specified, all tolerances are ±0.25

## PIN Connection

PIN	1	2	3	4	5	7
4in	-Vin	+Vin	-Vout	+Vout		
8in	-Vin			+Vin	+Vout	-Vout



**FEATURES :**

- 4PIN SIP Package.
- High Efficiency up to 85%.
- Unregulated Output Types.
- Internal SMD Construction
- Operating Temperature:-40°C TO +85°C
- No External Component Required
- Industry Standard Pinout



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency
	Vdc	mA	%
13D-XXS05N2WNL	5	400	70
13D-XXS09N2WNL	9	222	75
13D-XXS12N2WNL	12	167	80
13D-XXS15N2WNL	15	133	80
13D-XXS24N2WNL	24	84	85

**Note:**

- 1."XX" Is Input Voltage : 05=5Vdc,09=9Vdc,12=12Vdc,15=15Vdc,24=24Vdc.
- 2.The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V,5V (10% To 100% F.L)			15	%
Load Regulation	9V,12V,15V,24V (10% To 100% F.L)			10	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

DC-DC Converter

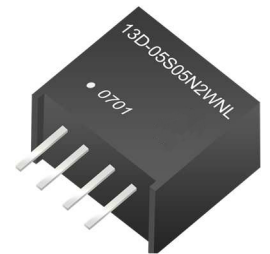
**13D-2W SERIES**

2Watt

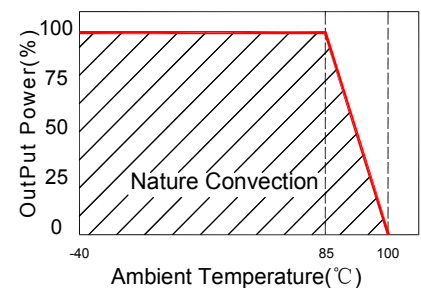
1KV Isolated

Single Output

SIP4



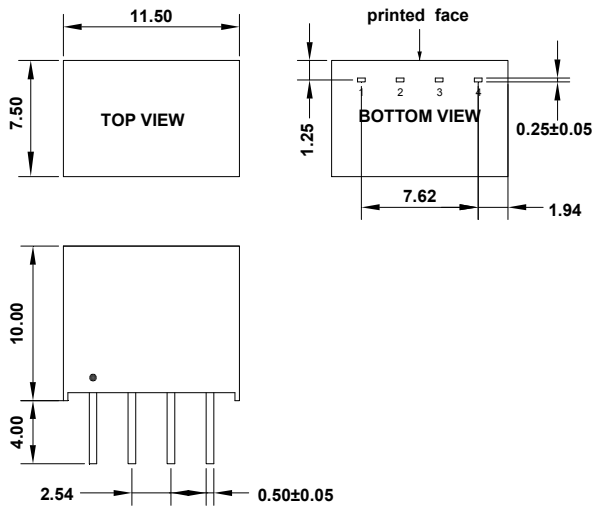
**Temperature Derating Graph**



**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight			1.8		g
Dimensions			11.50x7.50x10.00		mm

**Markings and Dimensions**

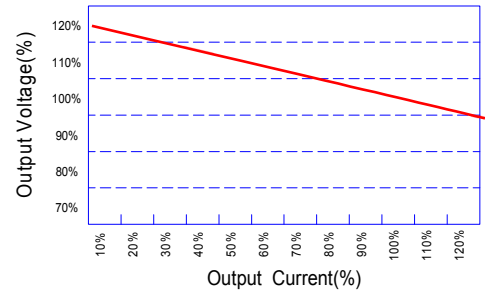


Unit:mm Unless otherwise specified, all tolerances are ±0.25

**PIN Connection**

PIN	1	2	3	4
Single	-Vin	+Vin	-Vout	+Vout

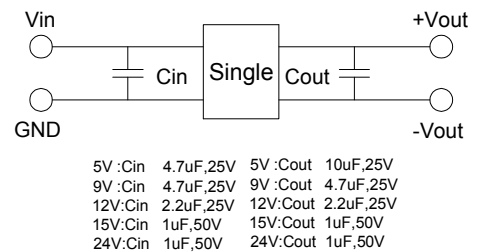
**Tolerance Envelope Graph**



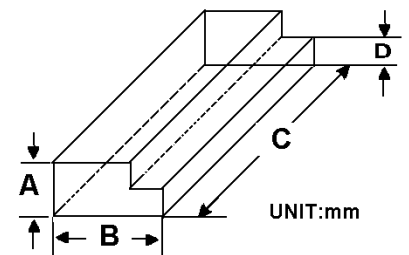
**Part Number**

13D - 05 S 05 N 2W NL  
 A B C D E F G  
 A:Series  
 B:Input Voltage  
 C:Single(S)  
 D:Output Voltage  
 E:Unregulated(N)  
 F:Output Power  
 G:RoHS Version

**Recommended Test Circuit**



**Packaging**



Size(mm)			
A	B	C	D
9.50	16.50	522	5.00

**FEATURES :**

- 4 PIN SIP and 8 PIN DIL Package.
- High insulation 3000Vdc.
- High Efficiency up to 85%.
- Unregulated Output Types.
- Internal SMD Construction
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency	Package Style
	Vdc	mA	%TYP	"X"
13D1-XXS03NX	3.3	303	70	1/2/3/4
13D1-XXS05NX	5	200	70	1/2/3/4
13D1-XXS09NX	9	112	75	1/2/3/4
13D1-XXS12NX	12	84	78	1/2/3/4
13D1-XXS15NX	15	67	80	2/3/4
13D1-XXS24NX	24	42	82	2/3/4

**Note:**

- 1."XX" Is Input Voltage:03=3.3Vdc,05=05Vdc,09=09Vdc,12=12Vdc,15=15Vdc,24=24Vdc.
2. Vin:15Vdc, Vout:15Vdc, using the 2 package.
3. Vin:24Vdc, Vout:24Vdc, using the 3 package.
4. The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V & 5V (10% To 100% F.L)			15	%
Load Regulation	9V,12V,15V&24V (10% To 100% F.L)			10	%
Ripple & Noise	BW=DC To 20MHz (Package 1)			150	mVp-p
Ripple & Noise	BW=DC To 20MHz (Package 2/3/4)			100	mVp-p
Transient response setting time	50% load step change		350		us



DC-DC Converter

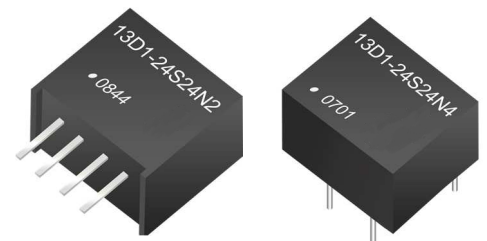
**13D1 SERIES**

1Watt

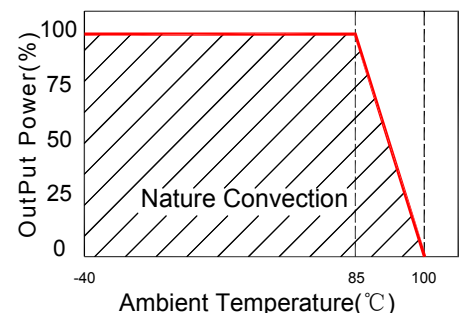
3KV Isolated

Single Output

SIP4 & DIL8



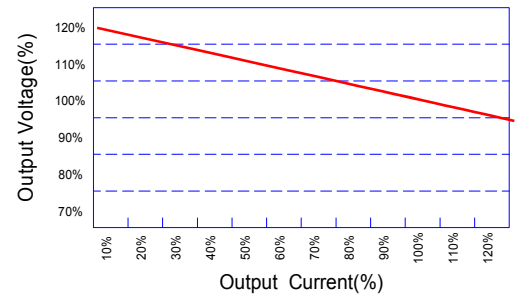
**Temperature Derating Graph**



General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight	Package 1/2/3/4		1.1/1.5/1.9/1.9		g
Dimensions	Package 1		11.50x6.00x7.5		mm
Dimensions	Package 2		11.50x6.00x10.0		mm
Dimensions	Package 3		11.50x7.50x10.0		mm
Dimensions	Package 4		12.7x10.16x7.50		mm

Tolerance Envelope Graph

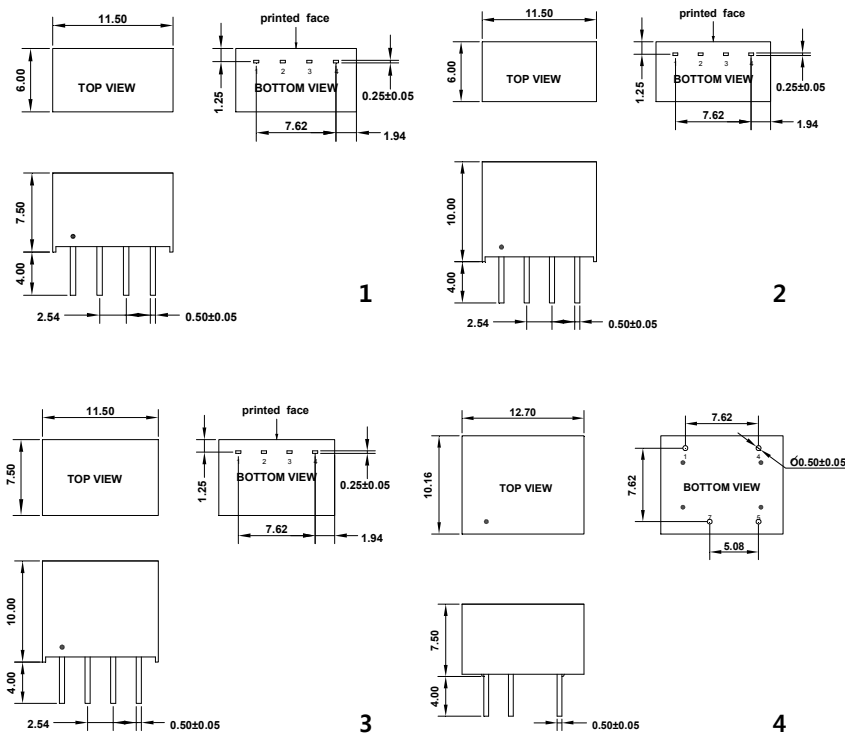


Part Number

13D1 - 03 S 05 N 2  
A B C D E F

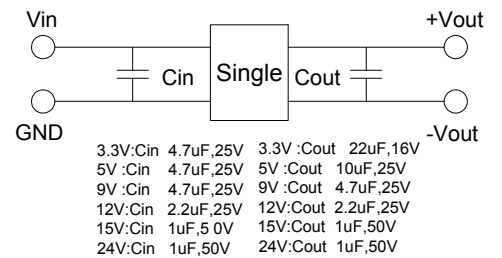
- A:Series
- B:Input Voltage
- C:Single Output
- D:Output Voltage
- E:Unregulated(N)
- F:Package

Markings and Dimensions



Unit:mm Unless otherwise specified, all tolerances are ±0.25

Recommended Test Circuit



PIN Connection

PIN	1	2	3	4	5	7
4in	-Vin	+Vin	-Vout	+Vout		
8in	-Vin			+Vin	+Vout	-Vout

**FEATURES :**

- Small Footprint
- 14PIN SMD Package
- High Efficiency up to 80%
- Unregulated Output Types
- High Power Density
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency
	Vdc	mA	%TYP
13DS-XXS03NNL	3.3	303	65
13DS-XXS05NNL	5	200	70
13DS-XXS09NNL	9	110	75
13DS-XXS12NNL	12	84	78
13DS-XXS15NNL	15	67	80

**Note:**

- 1."XX" Is Input Voltage:03=3.3Vdc,05=5Vdc,09=9Vdc,12=12Vdc,15=15Vdc.
2. The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±5	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V (10% To 100% F.L)		15		%
Load Regulation	5V,9V (10% To 100% F.L)			15&9.0	%
Load Regulation	12V,15 V (10% To 100% F.L)			7.5&7.0	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

DC-DC Converter

**13DS SERIES**

1Watt

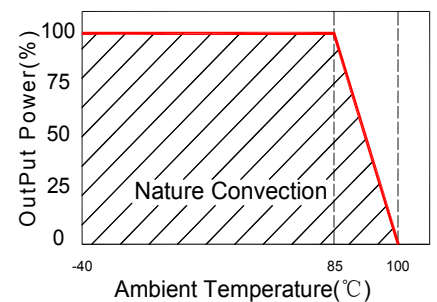
1KV Isolated

Single Output

SMD



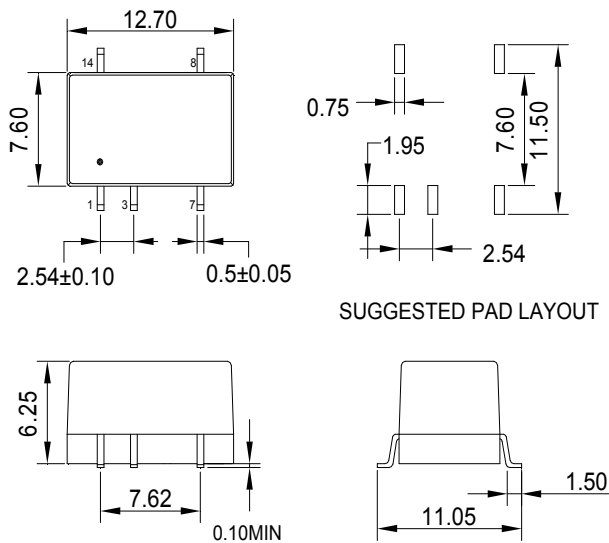
**Temperature Derating Graph**



**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight			1.2		g
Dimensions			12.70x7.6x6.25		mm

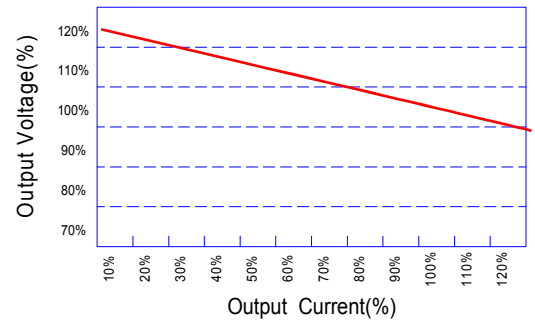
**Markings and dimensions**



SUGGESTED PAD LAYOUT

Unit:mm Unless otherwise specified, all tolerances are ±0.25

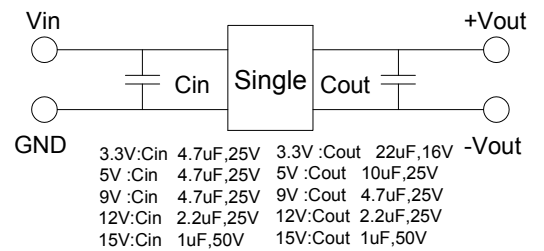
**Tolerance Envelope Graph**



**Part Number**

13DS - 05 S 05 N NL  
 A B C D E F  
 A:Series  
 B:Input Voltage  
 C:Single(S)  
 D:Output Voltage  
 E:Unregulated(N)  
 F:RoHS Version

**Recommended Test Circuit**



**PIN Connection**

PIN	1	3	7	8	14
Single	-Vin	+Vin	-Vout	+Vout	NC

**FEATURES :**

- Small Footprint
- 14PIN SMD Package
- High Efficiency up to 72%
- Unregulated Output Types
- High Power Density
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency
	Vdc	mA	%TYP
13DS-03S03N0.25W	3.3	76	65
13DS-03S05N0.25W	5	50	65
13DS-03S09N0.25W	9	28	70
13DS-03S12N0.25W	12	21	72
13DS-03S15N0.25W	15	16	72
13DS-05S03N0.25W	3.3	76	65
13DS-05S05N0.25W	5	50	65
13DS-05S09N0.25W	9	28	70
13DS-05S12N0.25W	12	21	72
13DS-05S15N0.25W	15	16	72
13DS-09S03N0.25W	3.3	76	65
13DS-09S05N0.25W	5	50	65
13DS-09S09N0.25W	9	28	70
13DS-09S12N0.25W	12	21	72
13DS-09S15N0.25W	15	16	72
13DS-12S03N0.25W	3.3	76	65
13DS-12S05N0.25W	5	50	65
13DS-12S09N0.25W	9	28	70
13DS-12S12N0.25W	12	21	72
13DS-12S15N0.25W	15	16	72
13DS-15S03N0.25W	3.3	76	65
13DS-15S05N0.25W	5	50	65
13DS-15S09N0.25W	9	28	70
13DS-15S12N0.25W	12	21	72
13DS-15S15N0.25W	15	16	72

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo, Io Nom			±10	%
Filter	Capacitor				

DC-DC Converter

**13DS-0.25W SERIES**

0.25Watt

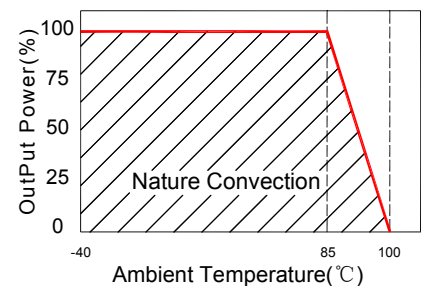
1KV Isolated

Single Output

SMD



**Temperature Derating Graph**



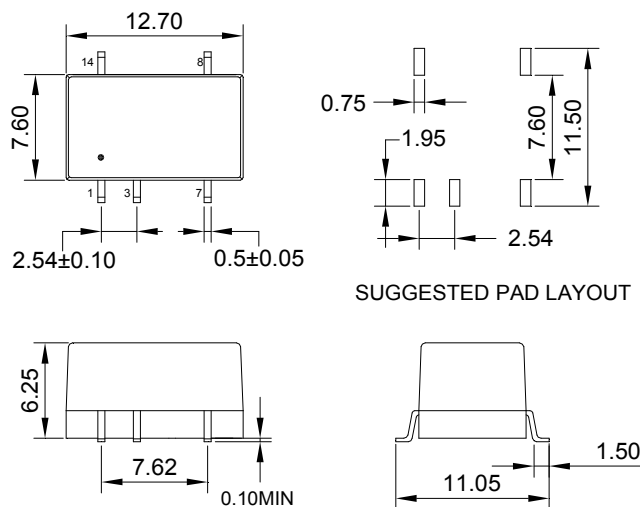
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V (10% To 100% F.L)		15		%
Load Regulation	5V,9V (10% To 100% F.L)			15&9.0	%
Load Regulation	12V,15 V (10% To 100% F.L)			7.5&7.0	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting	50% load step change		350		us

**General Specifications**

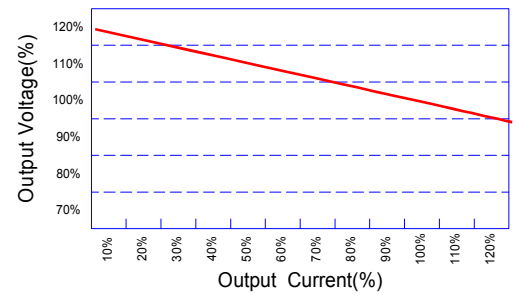
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight			1.2		g
Dimensions			12.7x7.6x6.25		mm

**Markings and dimensions**



UNIT:mm Unless otherwise specified,all tolerances are ±0.25

**Tolerance Envelope Graph**

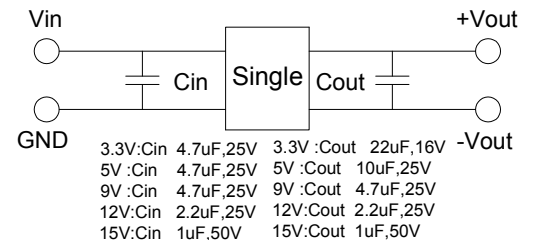


**Part Number**

13DS - 05 S 05 N 0.25  
A B C D E F

- A:Series
- B:Input Voltage
- C:Single Output
- D:Output Voltage
- E:Unregulated(N)
- F:Output Power

**Recommended Test Circuit**



**PIN Connection**

PIN	1	3	7	8	14
Single	-Vin	+Vin	-Vout	+Vout	NC



**FEATURES :**

- Small Footprint
- 14PIN SMD Package
- High Efficiency up to 78%
- Unregulated Output Types
- High Power Density
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency
	Vdc	mA	%TYP
13DS-03S03N0.5W	3.3	150	65
13DS-03S05N0.5W	5	100	70
13DS-03S09N0.5W	9	56	70
13DS-03S12N0.5W	12	42	70
13DS-03S15N0.5W	15	33	70
13DS-05S03N0.5W	3.3	150	68
13DS-05S05N0.5W	5	100	70
13DS-05S09N0.5W	9	56	72
13DS-05S12N0.5W	12	42	72
13DS-05S15N0.5W	15	33	72
13DS-09S03N0.5W	3.3	150	70
13DS-09S05N0.5W	5	100	72
13DS-09S09N0.5W	9	56	72
13DS-09S12N0.5W	12	42	72
13DS-09S15N0.5W	15	33	72
13DS-12S03N0.5W	3.3	150	70
13DS-12S05N0.5W	5	100	70
13DS-12S09N0.5W	9	56	72
13DS-12S12N0.5W	12	42	72
13DS-12S15N0.5W	15	33	72
13DS-15S03N0.5W	3.3	150	70
13DS-15S05N0.5W	5	100	73
13DS-15S09N0.5W	9	56	75
13DS-15S12N0.5W	12	42	76
13DS-15S15N0.5W	15	33	78

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

DC-DC Converter

**13DS-0.5W SERIES**

0.5Watt

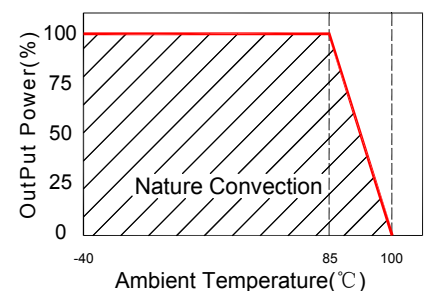
1KV Isolated

Single Output

SMD



**Temperature Derating Graph**



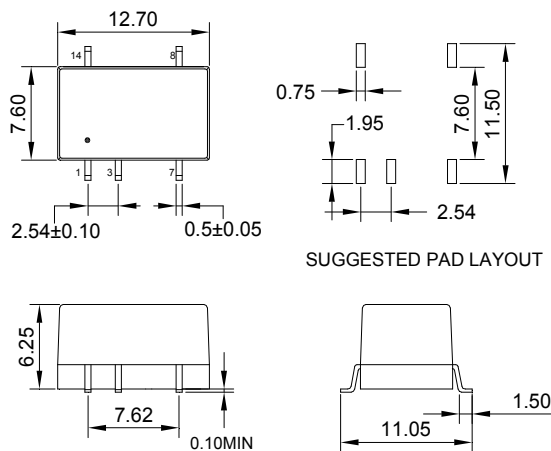
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V (10% To 100% F.L)		15		%
Load Regulation	5V,9V (10% To 100% F.L)			15&9.0	%
Load Regulation	12V,15 V (10% To 100% F.L)			7.5&7.0	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting	50% load step change		350		us

**General Specifications**

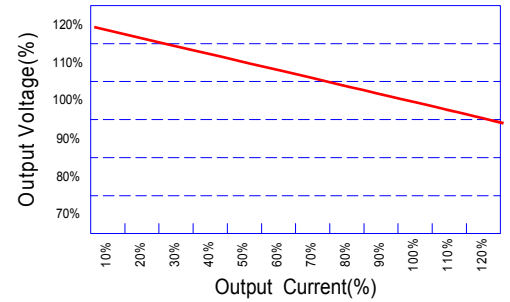
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight			1.2		g
Dimensions			12.7x7.6x6.25		mm

**Markings and dimensions**



UNIT: mm Unless otherwise specified, all tolerances are ±0.25

**Tolerance Envelope Graph**

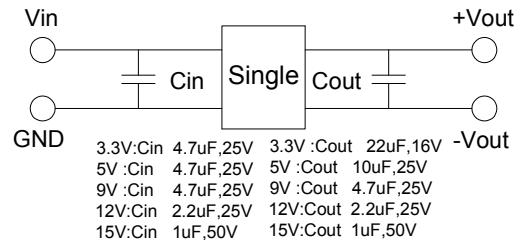


**Part Number**

13DS - 05 S 05 N 0.5W  
A B C D E F

- A:Series
- B:Input Voltage
- C:Single Output
- D:Output Voltage
- E:Unregulated(N)
- F:Output Power

**Recommended Test Circuit**



**PIN Connection**

PIN	1	3	7	8	14
Single	-Vin	+Vin	-Vout	+Vout	NC

**FEATURES :**

- Small Footprint
- 14PIN SMD Package
- High Efficiency up to 74%
- Unregulated Output Types
- High Power Density
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency
	Vdc	mA	%TYP
13DS-03S03N2W	3.3	606	67
13DS-03S05N2W	5	400	72
13DS-03S09N2W	9	222	72
13DS-03S12N2W	12	167	72
13DS-05S03N2W	3.3	606	70
13DS-05S05N2W	5	400	72
13DS-05S09N2W	9	222	74
13DS-05S12N2W	12	167	74
13DS-09S03N2W	3.3	606	72
13DS-09S05N2W	5	400	74
13DS-09S09N2W	9	222	74
13DS-09S12N2W	12	167	74
13DS-12S03N2W	3.3	606	72
13DS-12S05N2W	5	400	72
13DS-12S09N2W	9	222	74
13DS-12S12N2W	12	167	74

DC-DC Converter

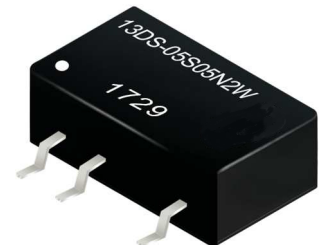
**13DS-2W SERIES**

2Watt

1KV Isolated

Single Output

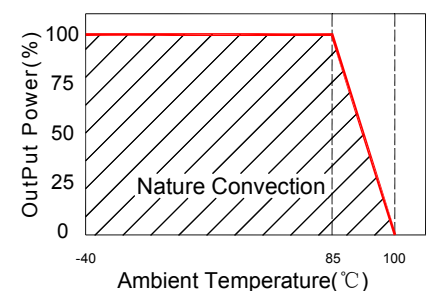
SMD



**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

**Temperature Derating Graph**



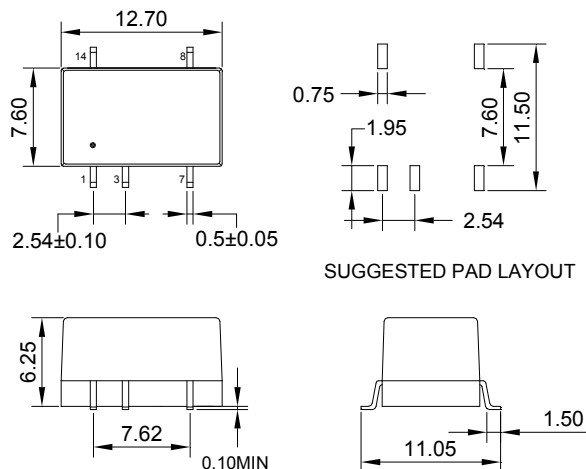
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V (10% To 100% F.L)		15		%
Load Regulation	5V,9V (10% To 100% F.L)			15&9.0	%
Load Regulation	12V (10% To 100% F.L)			7.5	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

**General Specifications**

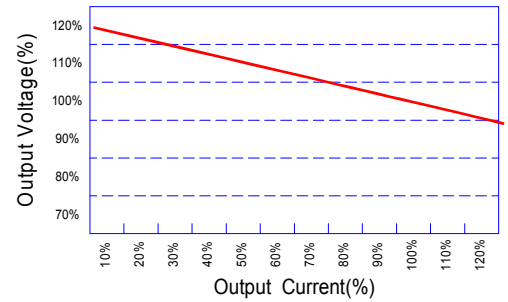
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight			1.2		g
Dimensions			12.7x7.6x6.25		mm

**Markings and dimensions**



UNIT:mm Unless otherwise specified,all tolerances are ±0.25

**Tolerance Envelope Graph**

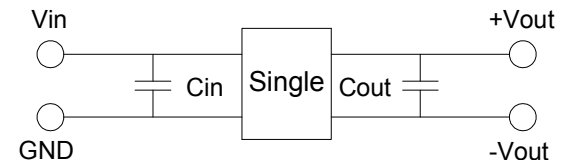


**Part Number**

13DS - 03 S 03 N 2W  
A B C D E

- A:Series
- B:Input Voltage
- C:Single Output
- D:Output Voltage
- E:Unregulated(N)

**Recommended Test Circuit**



3.3V:Cin 4.7uF,25V 3.3V :Cout 22uF,16V  
 5V :Cin 4.7uF,25V 5V :Cout 10uF,25V  
 9V :Cin 4.7uF,25V 9V :Cout 4.7uF,25V  
 12V:Cin 2.2uF,25V 12V:Cout 2.2uF,25V

**PIN Connection**

Pin	1	3	7	8	14
Single	-Vin	+Vin	-Vout	+Vout	NC

**FEATURES :**

- Small Footprint
- 22PIN SMD Package
- High Efficiency up to 80%
- Recognized By UL 60950-1
- Unregulated Output Types
- High Power Density
- Industry Standard Pinout
- Operating Temperature:-40°C TO +85°C
- No External Component Required



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency	Package Style
	Vdc	mA	%TYP	
13DS1-XXS03NNL	3.3	303	65	1
13DS1-XXS05NNL	5	200	70	1
13DS1-XXS09NNL	9	112	75	1
13DS1-XXS12N2NL	12	84	78	2
13DS1-XXS15N2NL	15	67	80	2
13DS1-XXD03NNL	±3.3	±150	65	1
13DS1-XXD05NNL	±5	±100	70	1
13DS1-XXD09NNL	±9	±56	75	1
13DS1-XXD12N2NL	±12	±42	78	2
13DS1-XXD15N2NL	±15	±34	80	2

**Note:**

- 1."XX" Is Input Voltage:03=3.3Vdc,05=5Vdc, 09=9Vdc,12=12Vdc,15=15Vdc.
- 2.Over 12Vdc,15Vdc input voltage, using the 2nd package.
- 3.The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V (10% To 100% F.L)		15		%
Load Regulation	5V,9V (10% To 100% F.L)			12&8.0	%
Load Regulation	12V,15V (10% To 100% F.L)			8.5&7.0	%
Ripple & Noise	BW=DC To 20MHz			75	mVp-p
Transient response setting time	50% load step change		350		us

**DC-DC Converter**

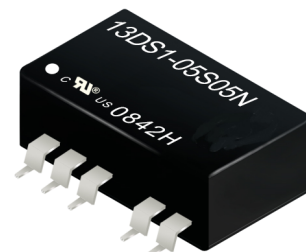
**13DS1 SERIES**

**1Watt**

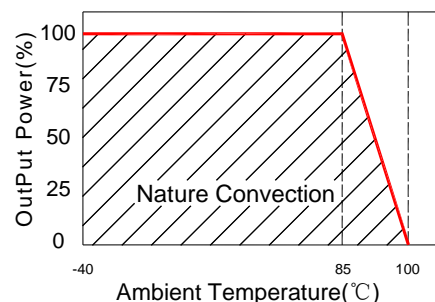
**3KV Isolated**

**Single & Dual Output**

**SMD**



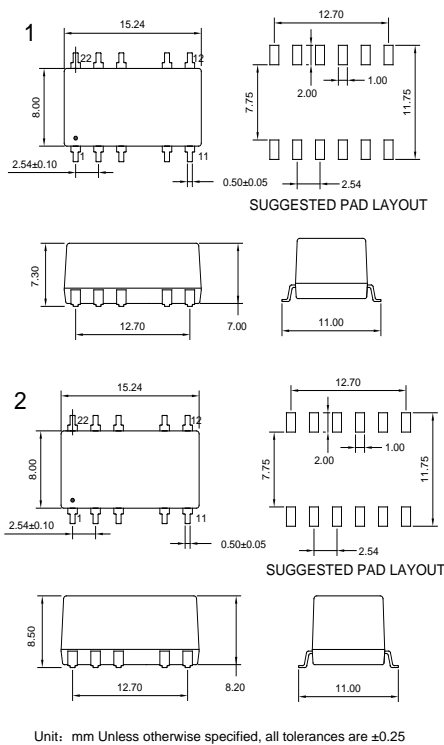
**Temperature Derating Graph**



**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight	Package1 or Package2		1.8		g
Dimensions	Package 1	15.24x8.0x7.30			mm
Dimensions	Package 2	15.24x8.0x8.50			mm

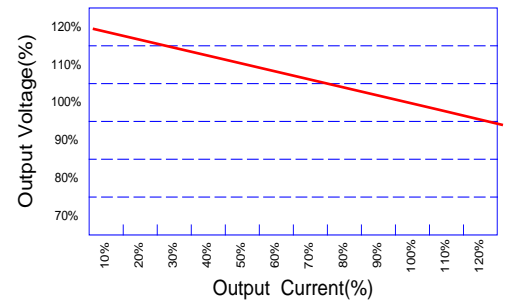
**Markings and dimensions**



**PIN Connection**

PIN	1	3	5	9	11	12	14	18	20	22
Single	-Vin	+Vin	NC	-Vout	NC	NC	+Vout	NC	NC	NC
Dual	-Vin	+Vin	NC	Com	-Vout	NC	+Vout	NC	NC	NC

**Tolerance Envelope Graph**

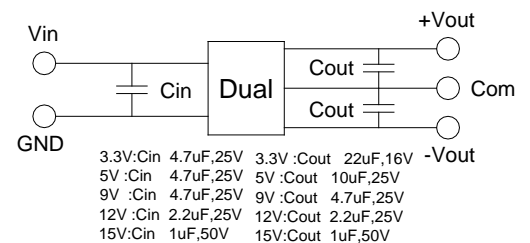
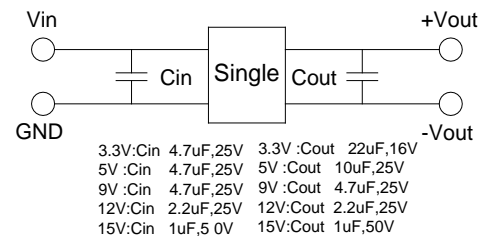


**Part Number**

13DS1 - 05 S 12 N 2 NL  
A B C D E F G

- A:Series
- B:Input Voltage
- C:Single(S)Dual(D)
- D:Output Voltage
- E:Unregulated(N)
- F:Package
- G:RoHS Version

**Recommended Test Circuit**



**FEATURES :**

- Small Footprint
- 22PIN SMD Package
- High Efficiency up to 80%
- Unregulated Output Types
- High Power Density
- Industry Standard Pinout
- Operating Temperature:-40°C TO +85°C
- No External Component Required



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency
	Vdc	mA	%TYP
13DS1-XXS05N2W	5	400	70
13DS1-XXS09N2W	9	222	75
13DS1-XXS12N2W	12	167	80
13DS1-XXS15N2W	15	133	80
13DS1-XXD05N2W	±5	±200	70
13DS1-XXD09N2W	±9	±111	75
13DS1-XXD12N2W	±12	±84	80
13DS1-XXD15N2W	±15	±67	80

**Note:**

- 1."XX" Is Input Voltage:05=5Vdc,09=9Vdc,12=12Vdc, 15=15Vdc.
- 2.The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	5V&9V (10% To 100% F.L)			15	%
Load Regulation	12V&15V (10% To 100% F.L)			10	%
Ripple & Noise	BW=DC To 20MHz			75	mVp-p
Transient response setting time	50% load step change		350		us

DC-DC Converter

13DS1-2W SERIES

2Watt

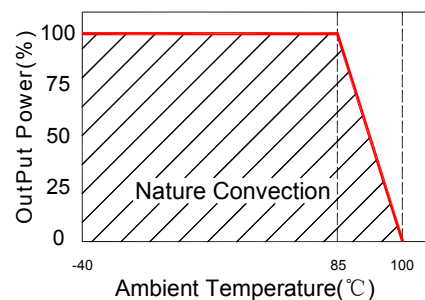
3KV Isolated

Single & Dual Output

SMD



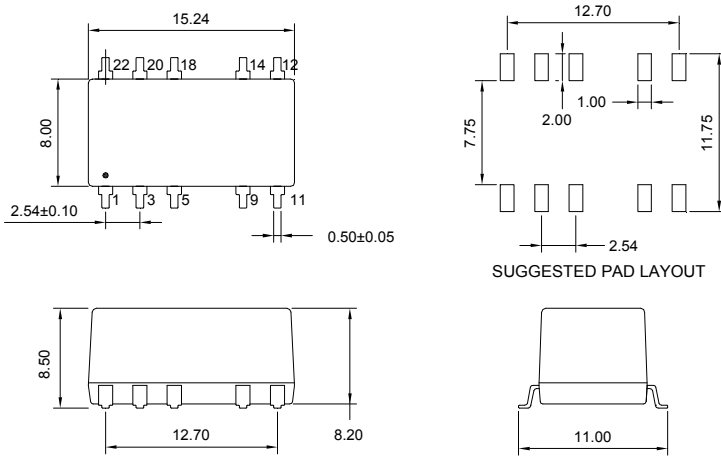
**Temperature Derating Graph**



General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight			1.5		g
Dimensions		15.24x8.0x8.5			mm

Markings and dimensions

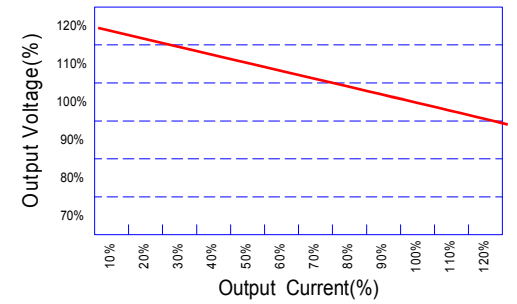


Unit : mm Unless otherwise specified, all tolerances are ±0.25

PIN Connection

PIN	1	3	5	9	11	12	14	18	20	22
Single	-Vin	+Vin	NC	-Vout	NC	NC	+Vout	NC	NC	NC
Dual	-Vin	+Vin	NC	Com	-Vout	NC	+Vout	NC	NC	NC

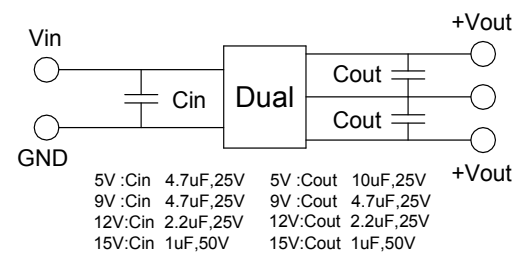
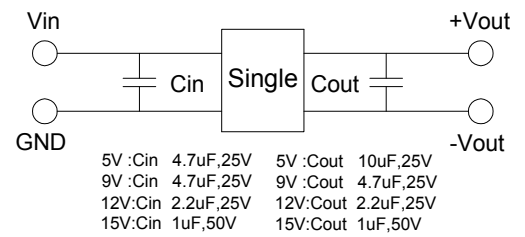
Tolerance Envelope Graph



Part Number

13DS1 - 05 S 05 N 2W  
 A B C D E F  
 A:Series  
 B:Input Voltage  
 C:Single(S) Dual(D)  
 D:Output Voltage  
 E:Unregulated(N)  
 F:Output Power

Recommended Test Circuit





**FEATURES :**

- Small Footprint
- 18PIN SMD Package
- High Efficiency up to 80%
- Unregulated Output Types
- High Power Density
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency	Package Style
	Vdc	mA	%TYP	
13DS2-XXS03NNL	3.3	303	65	1
13DS2-XXS05NNL	5	200	70	1
13DS2-XXS09NNL	9	112	75	1
13DS2-XXS12N2NL	12	84	78	2
13DS2-XXS15N2NL	15	67	80	2
13DS2-XXD03NNL	±3.3	±150	65	1
13DS2-XXD05NNL	±5	±100	70	1
13DS2-XXD09NNL	±9	±56	75	1
13DS2-XXD12N2NL	±12	±42	78	2
13DS2-XXD15N2NL	±15	±34	80	2

**Note:**

- 1."XX" Is Input Voltage:03=3.3Vdc,05=5Vdc, 09=9Vdc,12=12Vdc, 15=15Vdc.
2. Over 12Vdc,15Vdc input voltage, using the 2nd package.
- 3.The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V (10% To 100% F.L)		15		%
Load Regulation	5V, 9V (10% To 100% F.L)			12&8.0	%
Load Regulation	12V ,15V (10% To 100% F.L.)			8.5&7.0	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

**DC-DC Converter**

**13DS2 SERIES**

**1Watt**

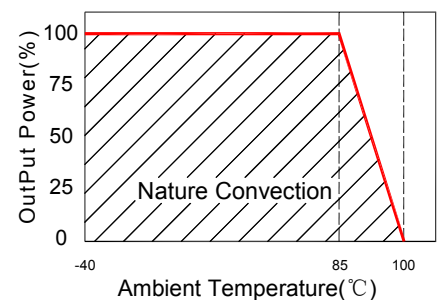
**1KV Isolated**

**Single & Dual Output**

**SMD**



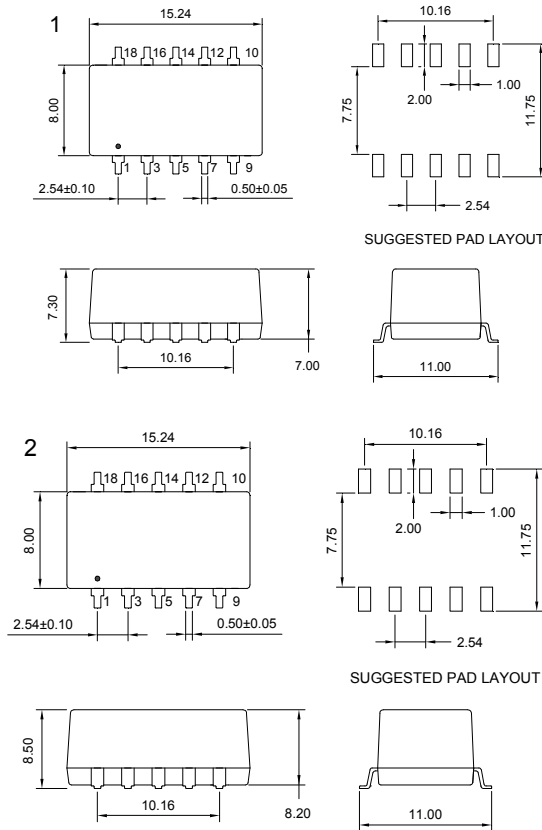
**Temperature Derating Graph**



**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight	Package1 or Package2		1.36/1.5		g
Dimensions	Package 1	15.24x8.0x7.30			mm
Dimensions	Package 2	15.24x8.0x8.50			mm

**Markings and dimensions**

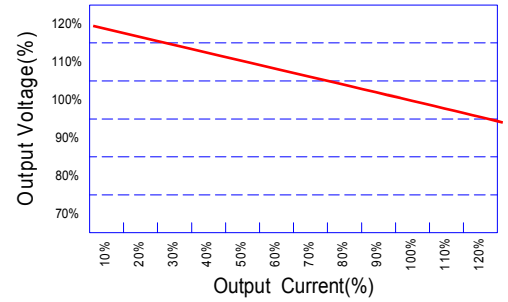


Unit : mm Unless otherwise specified, all tolerances are ±0.25

**PIN Connection**

PIN	1	3	5	7	9	10	12	14	16	18
Single	-Vin	+Vin	NC	-Vout	-Vout	NC	+Vout	NC	NC	NC
Dual	-Vin	+Vin	NC	Com	-Vout	NC	+Vout	NC	NC	NC

**Tolerance Envelope Graph**

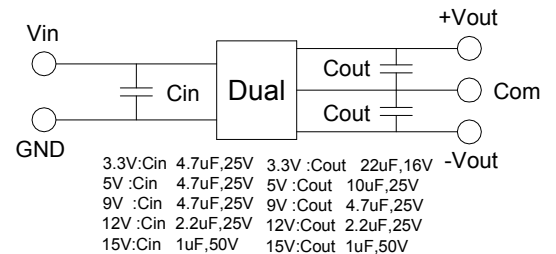
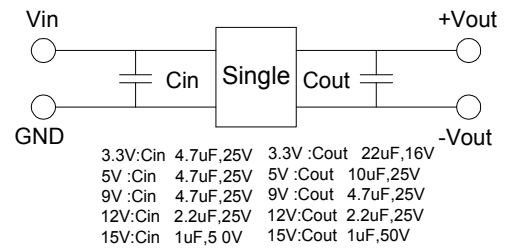


**Part Number**

13DS2 - 05 S 12 N 2 NL  
A B C D E F G

- A:Series
- B:Input Voltage
- C:Single(S)Dual(D)
- D:Output Voltage
- E:Unregulated(N)
- F:Package
- G:RoHS Version

**Recommended Test Circuit**



**FEATURES :**

- Small Footprint
- 18PIN SMD Package
- High Efficiency up to 75%
- Unregulated Output Types
- High Power Density
- Industry Standard Pinout
- Operating Temperature:-40°C TO +85°C
- No External Component Required



DC-DC Converter

13DS2-N33KV SERIES

1Watt

3KV Isolated

Single & Dual Output

SMD

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency
	Vdc	mA	%TYP
13DS2-XXS03N33KV	3.3	303	65
13DS2-XXS05N33KV	5	200	70
13DS2-XXS09N33KV	9	111	75
13DS2-XXD03N33KV	±3.3	±151	65
13DS2-XXD05N33KV	±5	±100	70
13DS2-XXD09N33KV	±9	±56	75

**Note:**

- 1."XX" Is Input Voltage:03=3.3,05=5Vdc,09=9Vdc
- 2.The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

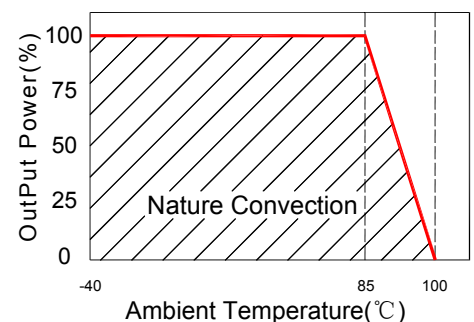
Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	10% To 100% F.L			15	%
Ripple & Noise	BW=DC To 20MHz			75	mVp-p
Transient response setting time	50% load step change		350		us



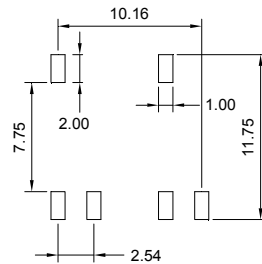
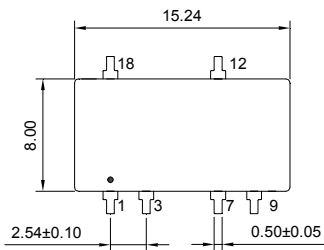
**Temperature Derating Graph**



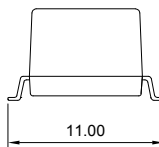
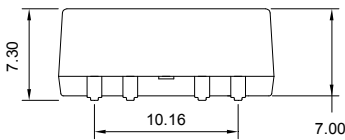
**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight			1.36		g
Dimensions		15.24x8.0x7.3			mm

**Markings and dimensions**



SUGGESTED PAD LAYOUT

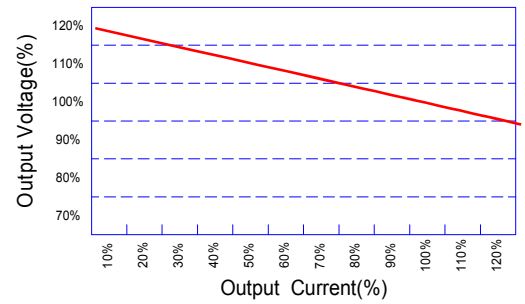


Unit : mm Unless otherwise specified, all tolerances are ±0.25

**PIN Connection**

PIN	1	3	7	9	12	18
Single	-Vin	+Vin	-Vout	-Vout	+Vout	NC
Dual	-Vin	+Vin	Com	-Vout	+Vout	NC

**Tolerance Envelope Graph**

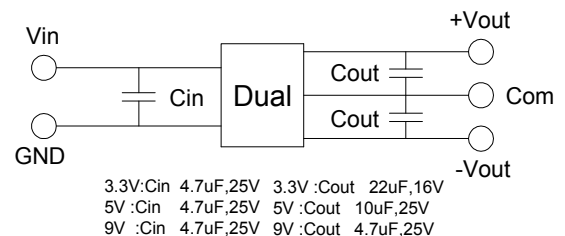
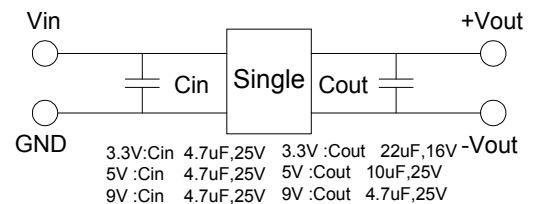


**Part Number**

13DS2 - 05 S 05 N 3 3KV  
A B C D E F G

- A:Series
- B:Input Voltage
- C:Single Output
- D:Output Voltage
- E:Unregulated(N)
- F:Package
- G:Isolation Voltage

**Recommended Test Circuit**



**FEATURES :**

- Small Footprint
- 18PIN SMD Package
- High Efficiency up to 80%
- Unregulated Output Types
- High Power Density
- Industry Standard Pinout
- Operating Temperature:-40°C TO +85°C
- No External Component Required



**DC-DC Converter**

**13DS2-N42W SERIES**

**2Watt**

**1KV Isolated**

**Single & Dual Output**

**SMD**

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency
	Vdc	mA	%TYP
13DS2-XXS05N42W	5	400	70
13DS2-XXS09N42W	9	222	75
13DS2-XXS12N42W	12	167	80
13DS2-XXS15N42W	15	133	80
13DS2-XXD05N42W	±5	±200	70
13DS2-XXD09N42W	±9	±111	75
13DS2-XXD12N42W	±12	±84	80
13DS2-XXD15N42W	±15	±67	80

**Note:**

- 1."XX" Is Input Voltage:05=5Vdc,09=9Vdc,12=12Vdc, 15=15Vdc, 24=24Vdc.
- 2.The input voltage increases, there will be an increase in efficiency.



**Input Specifications**

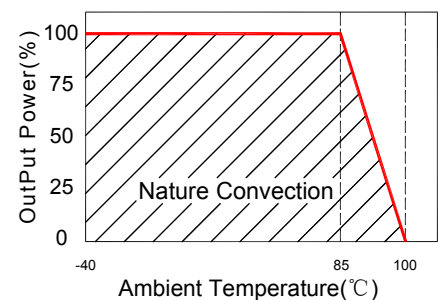
Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	5V & 9V (10% To 100% F.L)			15	%
Load Regulation	12V & 15V (10% To 100% F.L.)			10	%
Ripple & Noise	BW=DC To 20MHz			75	mVp-p
Transient response setting time	50% load step change		350		us



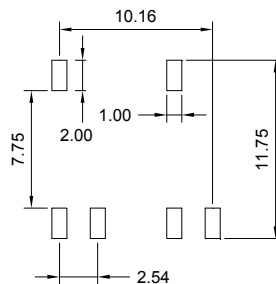
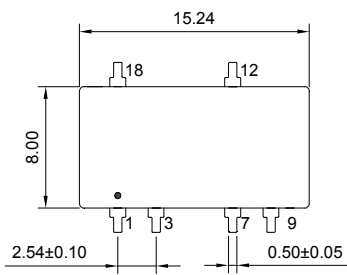
**Temperature Derating Graph**



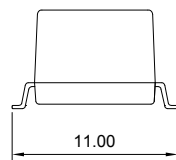
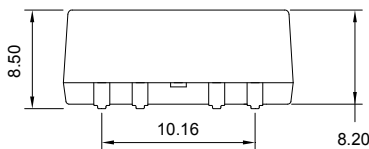
**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight			1.5		g
Dimensions		15.24x8.0x8.5			mm

**Markings and dimensions**



SUGGESTED PAD LAYOUT

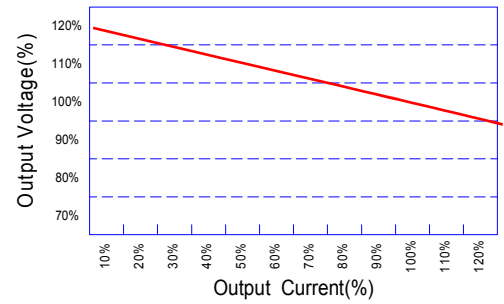


Unit : mm Unless otherwise specified, all tolerances are ±0.25

**PIN Connection**

PIN	1	3	7	9	12	18
Single	-Vin	+Vin	-Vout	-Vout	+Vout	NC
Dual	-Vin	+Vin	Com	-Vout	+Vout	NC

**Tolerance Envelope Graph**

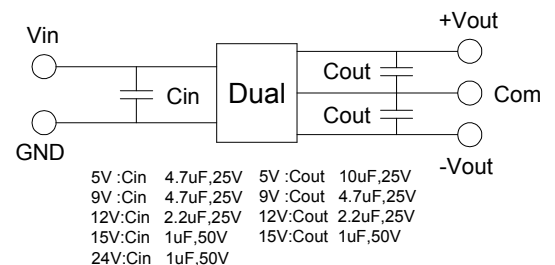
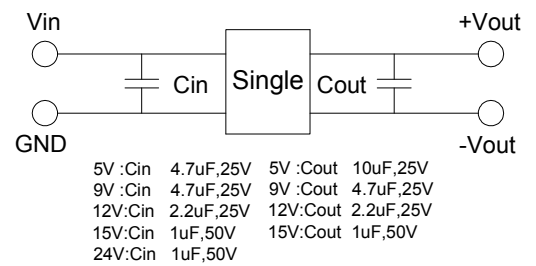


**Part Number**

13DS2 - 05 S 05 N 4 2W  
A B C D E F G

- A:Series
- B:Input Voltage
- C:Single(S)Dual(D)
- D:Output Voltage
- E:Unregulated(N)
- F:Package
- G:Output Power

**Recommended Test Circuit**



**FEATURES :**

- Small Footprint
- 14PIN SMD Package
- High Efficiency up to 80%
- Unregulated Output Types
- High Power Density
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency
	Vdc	mA	%TYP
13DS3-XXS03NNL	3.3	303	65
13DS3-XXS05NNL	5	200	70
13DS3-XXS09NNL	9	111	75
13DS3-XXS12NNL	12	84	78
13DS3-XXS15NNL	15	67	80

**Note:**

- 1."XX" Is Input Voltage: 03=3.3Vdc,05=5Vdc,09=9Vdc,12=12Vdc,15=15Vdc.
2. The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V (10% To 100% F.L)		15		%
Load Regulation	5V,9V (10% To 100% F.L)			15&9.0	%
Load Regulation	12V,15V (10% To 100% F.L)			7.5&7.0	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

DC-DC Converter

13DS3 SERIES

1Watt

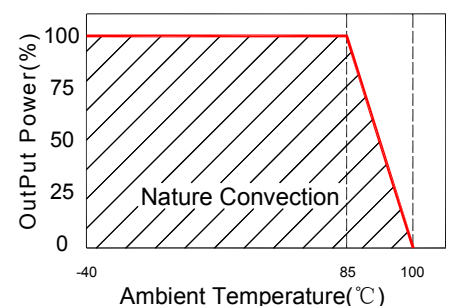
1KV Isolated

Single Output

SMD



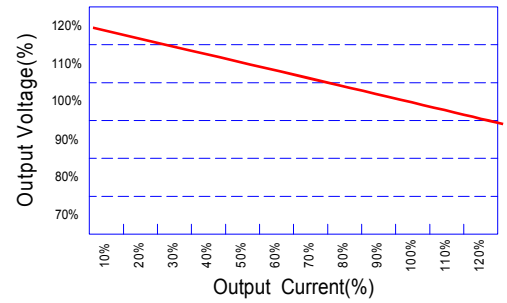
**Temperature Derating Graph**



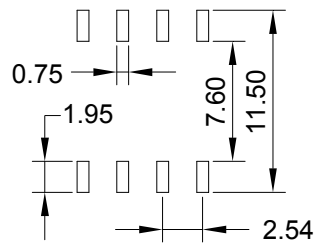
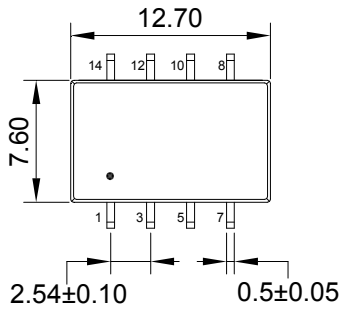
**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight			1.2		g
Dimensions		12.7x7.6x6.25			mm

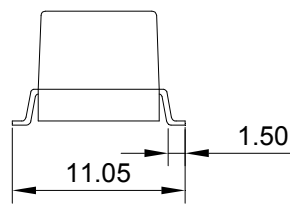
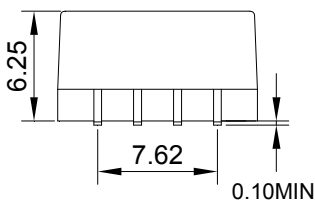
**Tolerance Envelope Graph**



**Markings and dimensions**



SUGGESTED PAD LAYOUT



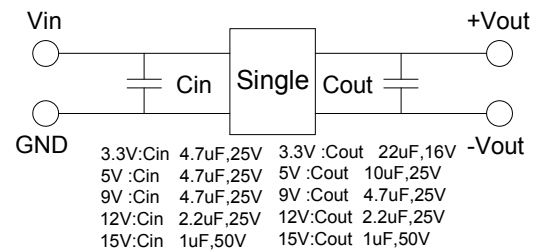
Unit : mm Unless otherwise specified, all tolerances are ±0.25

**Part Number**

13DS3 - 05 S 05 N NL  
A B C D E F

- A:Series
- B:Input Voltage
- C:Single(S)
- D:Output Voltage
- E:Unregulated(N)
- F:RoHS Version

**Recommended Test Circuit**



**PIN Connection**

PIN	1	3	7	8	Other
Single	-Vin	+Vin	-Vout	+Vout	NC



**FEATURES :**

- Small Footprint
- 22PIN SMD Package
- High Efficiency up to 80%
- Unregulated Output Types
- High Power Density
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency	Package Style
	Vdc	mA	%TYP	
13DS4-XXS03NNL	3.3	303	65	1
13DS4-XXS05NNL	5	200	70	1
13DS4-XXS09NNL	9	112	75	1
13DS4-XXS12N2NL	12	84	78	2
13DS4-XXS15N2NL	15	67	80	2
13DS4-XXD03NNL	±3.3	±150	65	1
13DS4-XXD05NNL	±5	±100	70	1
13DS4-XXD09NNL	±9	±56	75	1
13DS4-XXD12N2NL	±12	±42	78	2
13DS4-XXD15N2NL	±15	±34	80	2

**Note:**

- 1."XX" Is Input Voltage:03=3.3Vdc,05=5Vdc, 09=9Vdc,12=12Vdc, 15=15Vdc.
2. Over 12Vdc,15Vdc input voltage, using the 2nd package.
- 3.The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V (10% To 100% F.L)		15		%
Load Regulation	5V,9V (10% To 100% F.L)			12&8.0	%
Load Regulation	12V,15V (10% To 100% F.L)			8.5&7.0	%
Ripple & Noise	BW=DC To 20MHz			75	mVp-p
Transient response setting time	50% load step change		350		us

DC-DC Converter

13DS4 SERIES

1Watt

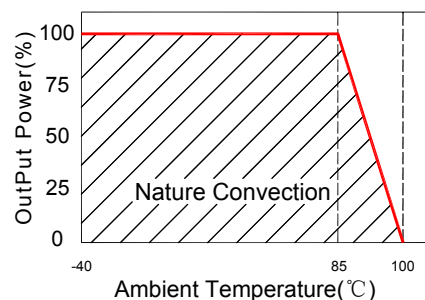
1KV Isolated

Single & Dual Output

SMD



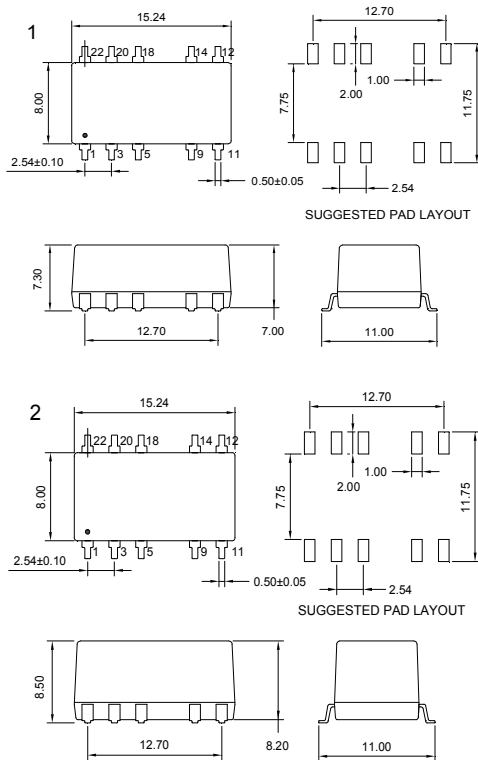
Temperature Derating Graph



General Specifications

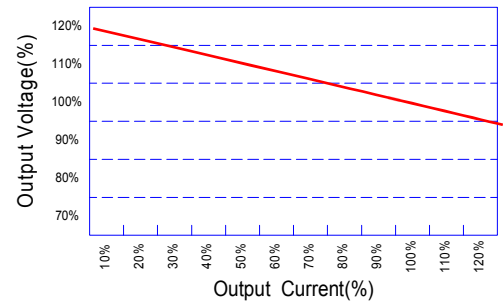
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight	Package1 or Package2		1.36/1.5		g
Dimensions	Package 1		15.24x8.0x7.30		mm
Dimensions	Package 2		15.24x8.0x8.50		mm

Markings and dimensions



Unit : mm Unless otherwise specified, all tolerances are ±0.25

Tolerance Envelope Graph

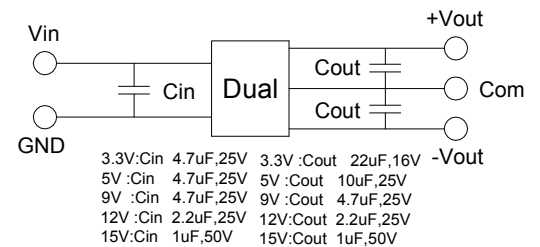
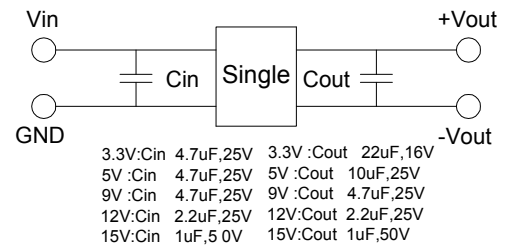


Part Number

13DS4 - 05 S 12 N 2 NL  
A B C D E F G

- A:Series
- B:Input Voltage
- C:Single(S)Dual(D)
- D:Output Voltage
- E:Unregulated(N)
- F:Packge
- G:RoHS Version

Recommended Test Circuit



PIN Connection

PIN	1	3	5	9	11	12	14	18	20	22
Single	-Vin	+Vin	NC	-Vout	NC	NC	+Vout	NC	NC	NC
Dual	-Vin	+Vin	NC	Com	-Vout	NC	+Vout	NC	NC	NC

**FEATURES :**

- 7PIN SIP Package
- High Efficiency up to 85%
- Unregulated Output Types
- Internal SMD Construction
- 1KVDC & 1.5KVDC Isolation
- No External Component Required
- Industry Standard Pinout
- Operating Temperature:-40°C TO +85°C



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency	Package Style
	Vdc	mA	%TYP	
14D-XXS03N (NL/1.5KV)	3.3	303	70	1
14D-XXS05N (NL/1.5KV)	5	200	70	1
14D-XXS09N (NL/1.5KV)	9	112	75	1
14D-XXS12N (NL/1.5KV)	12	84	78	1
14D-XXS15N (NL/1.5KV)	15	67	80	1
14D-XXS24N (NL/1.5KV)	24	42	82	1
14D-XXD03N (NL/1.5KV)	±3.3	±150	70	1
14D-XXD05N (NL/1.5KV)	±5	±100	70	1
14D-XXD09N (NL/1.5KV)	±9	±56	75	1
14D-XXD12N (NL/1.5KV)	±12	±42	78	1
14D-XXD15N (NL/1.5KV)	±15	±34	80	1
14D-XXD24N (NL/1.5KV)	±24	±21	82	1
14D-XXS05N2 (NL/1.5KV)	5	200	70	2
14D-XXS09N2 (NL/1.5KV)	9	112	75	2
14D-XXS12N2 (NL/1.5KV)	12	84	78	2
14D-XXS15N2 (NL/1.5KV)	15	67	80	2
14D-XXS24N2 (NL/1.5KV)	24	42	82	2
14D-XXD05N2 (NL/1.5KV)	±5	±100	70	2
14D-XXD09N2 (NL/1.5KV)	±9	±56	75	2
14D-XXD12N2 (NL/1.5KV)	±12	±42	78	2
14D-XXD15N2 (NL/1.5KV)	±15	±34	80	2
14D-XXD24N2 (NL/1.5KV)	±24	±21	82	2

**Note:**

- 1."XX" Is Input Voltage:03 = 3.3Vdc,05=5Vdc,09=9Vdc,12=12Vdc,15=15Vdc,24=24Vdc,48=48Vdc.
2. Over 48Vdc input voltage, using the 2nd package.
3. The input voltage increases, there will be an increase in efficiency.
4. No suffix is standard isolation (1KVDC) e.g. 14D-05S05N1,14D-05S05N2NL  
\*add suffix /1.5KV for 1.5KVDC isolation, e.g. 14D-05S05N1.5KV,14D-05S05N2.5KV

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

DC-DC Converter

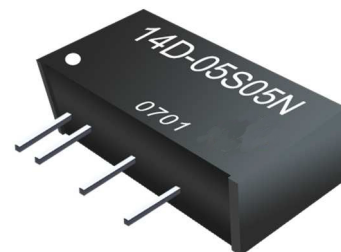
14D SERIES

1Watt

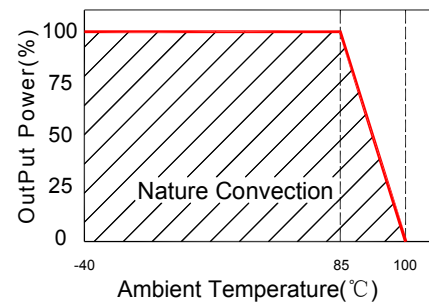
1KV & 1.5KV Isolated

Single & Dual Output

SIP7



Temperature Derating Graph



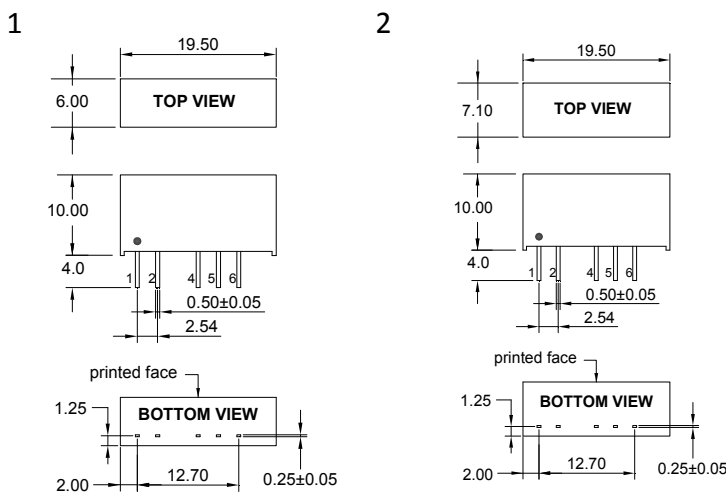
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V,5V (10% To 100% F.L)			15	%
Load Regulation	9V,12V,15V,24V (10% To 100% F.L)			10	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight	Package1 or Package2		2.1 or 2.7		g
Dimensions	Package 1		19.5x6.0x10.0		mm
Dimensions	Package 2		19.5x7.1x10.0		mm

**Markings and dimensions**

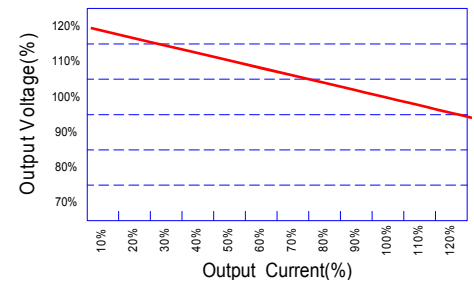


Unit : mm Unless otherwise specified, all tolerances are ±0.25

**PIN Connection**

PIN	1	2	4	5	6
Single	+Vin	-Vin	-Vout	NO PIN	+Vout
Dual	+Vin	-Vin	-Vout	Common	+Vout

**Tolerance Envelope Graph**



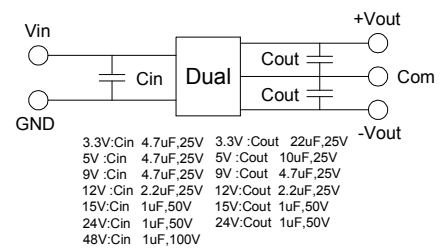
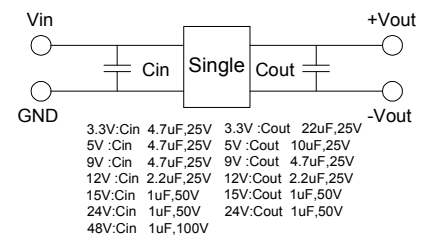
**Part Number**

14D - 05 S 05 N 2 NL      14D - 24 S 24 N 2 1.5KV  
 A    B    C    D    E    F    G                      A    B    C    D    E    F    G

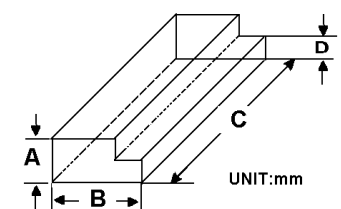
A:Series  
 B:Input Voltage  
 C:Single(S)Dual(D)  
 D:Output Voltage  
 E:Unregulated(N)  
 F:Package  
 G:RoHS Version

A:Series  
 B:Input Voltage  
 C:Single(S) Dual(D)  
 D:Output Voltage  
 E:Unregulated(N)  
 F:Package  
 G:Isolation Voltage

**Recommended Test Circuit**



**Packaging**



Size(mm)			
A	B	C	D
9.50	16.50	522	5.00

**FEATURES :**

- 7PIN SIP Package
- High Efficiency up to 87%
- Unregulated Output Types
- Internal SMD Construction
- No External Component Required
- Industry Standard Pinout
- Operating Temperature:-40°C TO +85°C



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency
	Vdc	mA	%TYP
14D-05S05N3W	5	600	82
14D-05S09N3W	9	333	85
14D-05S12N3W	12	250	82
14D-05S15N3W	15	200	85
14D-12S05N3W	5	600	82
14D-12S09N3W	9	333	85
14D-12S12N3W	12	250	86
14D-12S15N3W	15	200	87
14D-24S05N3W	5	600	82
14D-24S09N3W	9	333	85
14D-24S12N3W	12	250	85
14D-24S15N3W	15	200	86
14D-05D05N3W	±5	±300	82
14D-05D09N3W	±9	±167	85
14D-05D12N3W	±12	±125	82
14D-05D15N3W	±15	±100	85
14D-12D05N3W	±5	±300	82
14D-12D09N3W	±9	±167	85
14D-12D12N3W	±12	±125	86
14D-12D15N3W	±15	±100	87
14D-24D05N3W	±5	±300	82
14D-24D09N3W	±9	±167	85
14D-24D12N3W	±12	±125	85
14D-24D15N3W	±15	±100	86

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

DC-DC Converter

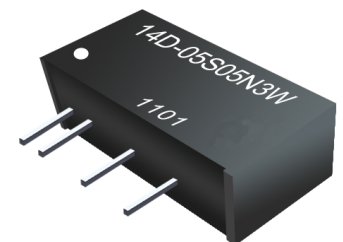
14D-3W SERIES

3Watt

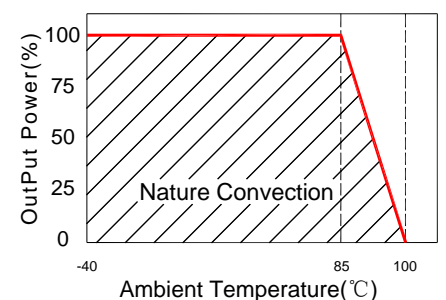
1KV Isolated

Single & Dual Output

SIP7



**Temperature Derating Graph**



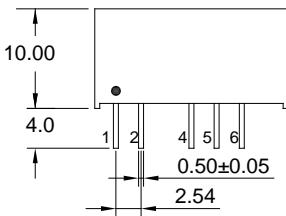
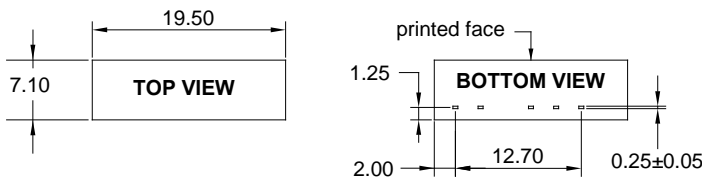
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	5V (10% To 100% F.L)			15	%
Load Regulation	9V,12V,15V (10% To 100% F.L)			10	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight			2.7		g
Dimensions			19.5x7.1x10.0		mm

**Markings and dimensions**

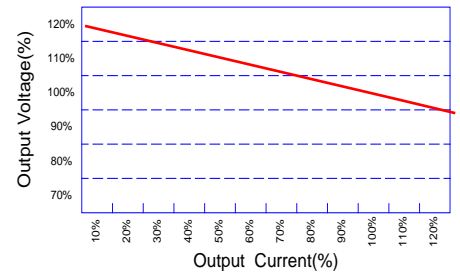


Unit : mm Unless otherwise specified, all tolerances are ±0.25

**PIN Connection**

PIN	1	2	4	5	6
Single	+Vin	-Vin	-Vout	NO PIN	+Vout
Dual	+Vin	-Vin	-Vout	Common	+Vout

**Tolerance Envelope Graph**

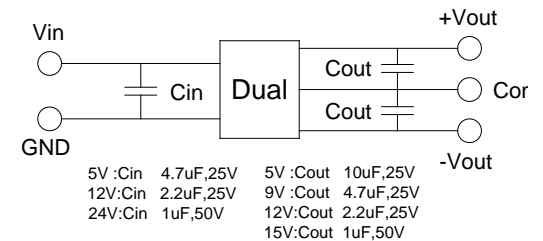
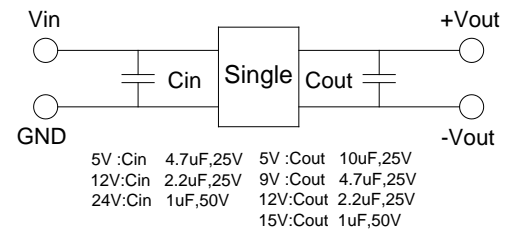


**Part Number**

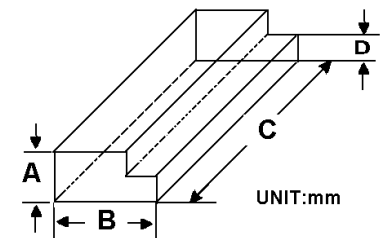
14D - 05 S 05 N 3W  
A B C D E F

- A:Series
- B:Input Voltage
- C:Single(S)Dual(D)
- D:Output Voltage
- E:Unregulated(N)
- F:Output Power

**Recommended Test Circuit**



**Packaging**



Size(mm)			
A	B	C	D
9.50	16.50	522	5.00

**FEATURES :**

- 7PIN SIP Package
- High Efficiency up to 88%
- Unregulated Output Types
- Internal SMD Construction
- Industry Standard Pinout
- Operating Temperature:-40°C TO +85°C



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Ripple & Noise		Efficiency	Package Style
	Vdc	mA	Typ (mVp-p)	Max (mVp-p)	%Typ	
14DA-05S05N	5	200	25	50	82	1
14DA-05S09N	9	112	25	50	82	1
14DA-05S12N	12	84	25	50	82	1
14DA-05S15N	15	67	25	50	84	1
14DA-12S05N	5	200	25	50	82	1
14DA-12S09N	9	112	25	50	84	1
14DA-12S12N	12	84	25	50	86	1
14DA-12S15N	15	67	25	50	87	1
14DA-15S05N	5	200	25	50	83	1
14DA-15S09N	9	112	25	50	86	1
14DA-15S12N	12	84	25	50	87	1
14DA-15S15N	15	67	25	50	87	1
14DA-24S05N	5	200	25	50	84	1
14DA-24S09N	9	112	25	50	85	1
14DA-24S12N	12	84	25	50	86	1
14DA-24S15N	15	67	25	50	86	1
14DA-48S05N2	5	200	-	100	78	2
14DA-48S09N2	9	112	-	100	81	2
14DA-48S12N2	12	84	-	100	81	2
14DA-48S15N2	15	67	-	100	82	2
14DA-05D05N	±5	±100	30	60	84	1
14DA-05D09N	±9	±56	30	60	86	1
14DA-05D12N	±12	±42	30	60	86	1
14DA-05D15N	±15	±34	30	60	86	1
14DA-12D05N	±5	±100	30	60	85	1
14DA-12D09N	±9	±56	30	60	87	1
14DA-12D12N	±12	±42	30	60	88	1
14DA-12D15N	±15	±34	30	60	87	1
14DA-15D05N	±5	±100	30	60	83	1
14DA-15D09N	±9	±56	30	60	86	1
14DA-15D12N	±12	±42	30	60	87	1
14DA-15D15N	±15	±34	30	60	87	1
14DA-24D05N	±5	±100	30	60	84	1
14DA-24D09N	±9	±56	30	60	85	1
14DA-24D12N	±12	±42	30	60	86	1
14DA-24D15N	±15	±34	30	60	86	1
14DA-48D05N2	±5	±100	-	100	79	2
14DA-48D09N2	±9	±56	-	100	81	2
14DA-48D12N2	±12	±42	-	100	81	2
14DA-48D15N2	±15	±34	-	100	82	2

DC-DC Converter

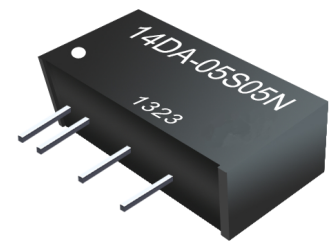
14DA SERIES

1Watt

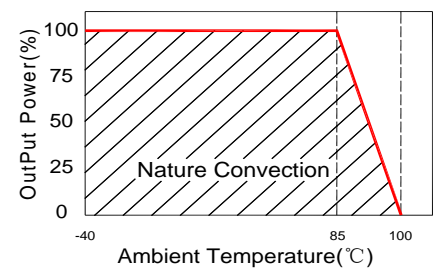
1KV Isolated

Single & Dual Output

SIP7



Temperature Derating Graph



**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

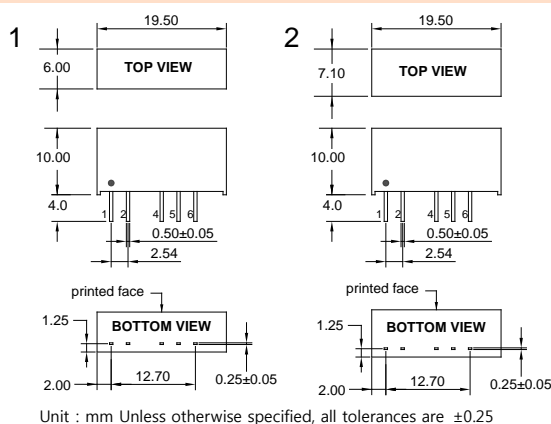
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	5V,9V (10% To 100% F.L)			7	%
Load Regulation	12V,15V (10% To 100% F.L)			5	%
Load Regulation	±5V,±9V (10% To 100% F.L)			7	%
Load Regulation	±12V,±15V (10% To 100% F.L)			5	%

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight	Package1 or Package2		2.1 or 2.7		g
Dimensions	Package1 or Package2		19.5x6.0x10.0 or 19.5x7.1x10.0		mm

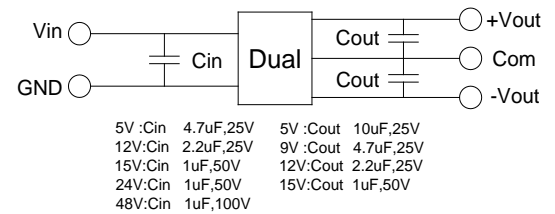
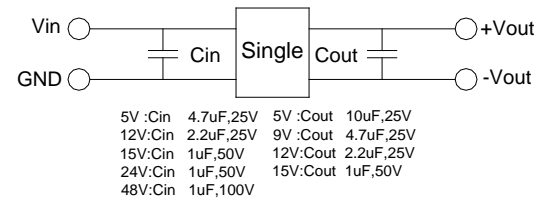
**Markings and dimensions**



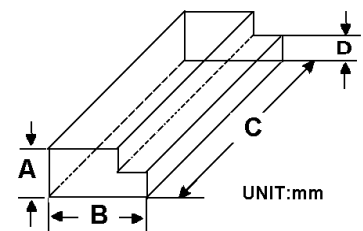
**Part Number**

14DA - 05 S 05 N  
 A B C D E  
 A:Series  
 B:Input Voltage  
 C:Single(S)Dual(D)  
 D:Output Voltage  
 E:Unregulated(N)

**Recommended Test Circuit**



**Packaging**



Size(mm)			
A	B	C	D
9.50	16.50	522	5.00

**PIN Connection**

PIN	1	2	4	5	6
Single	+Vin	-Vin	-Vout	No Pin	+Vout
Dual	+Vin	-Vin	-Vout	Com	+Vout



**FEATURES :**

- 7PIN SIP Package
- High Efficiency up to 82%
- Output Continuous Short Circuit Protection
- Unregulated Output Types
- Internal SMD Construction
- 1KVDC & 1.5KVDC Isolation
- Industry Standard Pinout
- Operating Temperature:-40°C TO +105°C



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Ripple & Noise		Efficiency	Package Style
	Vdc	mA	Typ (mVp-p)	Max (mVp-p)	%Typ	
14DB-05S05N (1.5KV)	5	200	60	100	80	1
14DB-05S09N (1.5KV)	9	112	60	100	80	1
14DB-05S12N (1.5KV)	12	84	60	100	80	1
14DB-05S15N (1.5KV)	15	67	60	100	80	1
14DB-12S05N (1.5KV)	5	200	60	100	80	1
14DB-12S09N (1.5KV)	9	112	60	100	80	1
14DB-12S12N (1.5KV)	12	84	60	100	82	1
14DB-12S15N (1.5KV)	15	67	60	100	81	1
14DB-15S05N2 (1.5KV)	5	200	60	100	78	2
14DB-15S09N2 (1.5KV)	9	112	60	100	79	2
14DB-15S12N2 (1.5KV)	12	84	60	100	79	2
14DB-15S15N2 (1.5KV)	15	67	60	100	79	2
14DB-24S05N2 (1.5KV)	5	200	60	100	77	2
14DB-24S09N2 (1.5KV)	9	112	60	100	79	2
14DB-24S12N2 (1.5KV)	12	84	60	100	79	2
14DB-24S15N2 (1.5KV)	15	67	60	100	79	2
14DB-24S24N2 (1.5KV)	24	42	60	100	81	2
14DB-05D05N (1.5KV)	±5	±100	60	120	80	1
14DB-05D09N (1.5KV)	±9	±56	60	120	80	1
14DB-05D12N (1.5KV)	±12	±42	60	120	80	1
14DB-05D15N (1.5KV)	±15	±34	60	120	80	1
14DB-12D05N (1.5KV)	±5	±100	60	120	80	1
14DB-12D09N (1.5KV)	±9	±56	60	120	80	1
14DB-12D12N (1.5KV)	±12	±42	60	120	82	1
14DB-12D15N (1.5KV)	±15	±34	60	120	81	1
14DB-15D05N2 (1.5KV)	±5	±100	60	120	78	2
14DB-15D09N2 (1.5KV)	±9	±56	60	120	78	2
14DB-15D12N2 (1.5KV)	±12	±42	60	120	78	2
14DB-15D15N2 (1.5KV)	±15	±34	60	120	78	2
14DB-24D05N2 (1.5KV)	±5	±100	60	120	78	2
14DB-24D09N2 (1.5KV)	±9	±56	60	120	79	2
14DB-24D12N2 (1.5KV)	±12	±42	60	120	79	2
14DB-24D15N2 (1.5KV)	±15	±34	60	120	78	2

DC-DC Converter

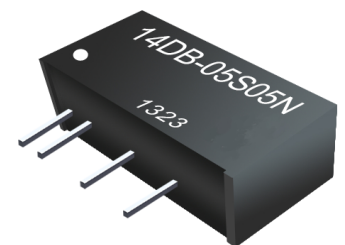
**14DB SERIES**

1Watt

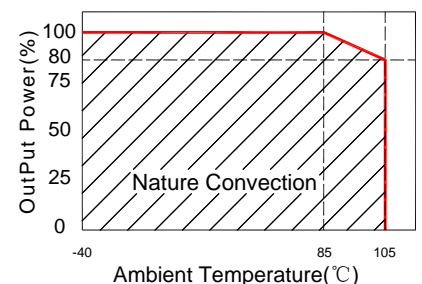
1KV & 1.5KV Isolated

Single & Dual Output

SIP7



**Temperature Derating Graph**



**NOTE :**

No suffix is standard isolation (1KVDC) e.g, 14DB-05S05N,14DB-15S05N2

\*add suffix /1.5KV for 1.5KVDC isolation, e.g, 14DB-05S05N1.5KV,14DB-15S05N21.5KV

## Input Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

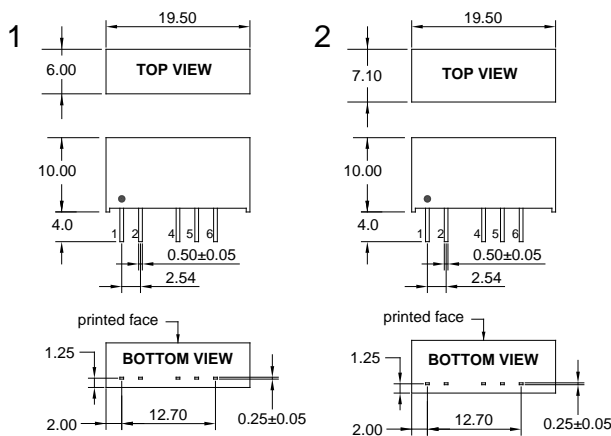
## Output Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Continuous				
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	5V,9V (10% To 100% F.L)			15	%
Load Regulation	12~24V (10% To 100% F.L)			10	%
Load Regulation	±5V,±9V (10% To 100% F.L)			15	%
Load Regulation	±12~±24V (10% To 100% F.L)			10	%

## General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+105	°C
Storage Temperature		-55		+125	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight	Package1 or Package2		2.1 or 2.7		g
Dimensions	Package1 or Package2	19.5x6.0x10.0 or 19.5x7.1x10.0			mm

## Markings and dimensions

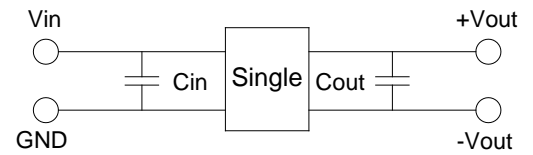


Unit : mm Unless otherwise specified, all tolerances are ±0.25

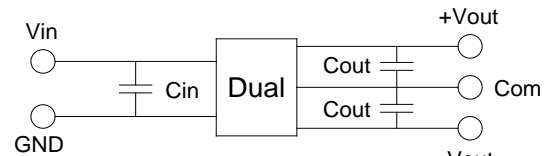
## Part Number

14DB - 05 S 05 N 2	14DB - 24 S 24 N 2 1.5KV
A B C D E F	A B C D E F G
A:Series	A:Series
B:Input Voltage	B:Input Voltage
C:Single(S)Dual(D)	C:Single(S) Dual(D)
D:Output Voltage	D:Output Voltage
E:Unregulated(N)	E:Unregulated(N)
F:Package	F:Package
	G:Isolation Voltage

## Recommended Test Circuit

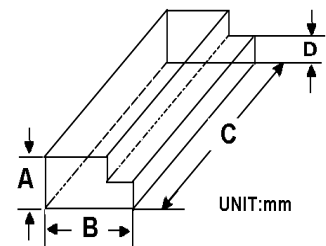


5V :Cin	4.7uF,25V	5V :Cout	10uF,25V
12V:Cin	2.2uF,25V	9V :Cout	4.7uF,25V
15V:Cin	1uF,50V	12V:Cout	2.2uF,25V
24V:Cin	1uF,50V	15V:Cout	1uF,50V
		24V:Cout	1uF,50V



5V :Cin	4.7uF,25V	5V :Cout	10uF,25V
12V:Cin	2.2uF,25V	9V :Cout	4.7uF,25V
15V:Cin	1uF,50V	12V:Cout	2.2uF,25V
24V:Cin	1uF,50V	15V:Cout	1uF,50V

## Packaging



Size(mm)			
A	B	C	D
9.50	16.50	522	5.00

## PIN Connection

PIN	1	2	4	5	6
Single	+Vin	-Vin	-Vout	No Pin	+Vout
Dual	+Vin	-Vin	-Vout	Com	+Vout

**FEATURES :**

- 7PIN SIP Package
- High Efficiency up to 85%
- Output Continuous Short Circuit Protection
- Unregulated Output Types
- Internal SMD Construction
- Industry Standard Pinout
- Operating Temperature:-40°C TO +105°C



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Ripple & Noise		Efficiency
	Vdc	mA	Typ (mVp-p)	Max (mVp-p)	%Typ
14DB-05S05N2W	5	400	60	100	80
14DB-05S09N2W	9	222	60	100	82
14DB-05S12N2W	12	167	60	100	82
14DB-05S15N2W	15	133	60	100	82
14DB-12S05N2W	5	400	60	100	82
14DB-12S09N2W	9	222	60	100	82
14DB-12S12N2W	12	167	60	100	84
14DB-12S15N2W	15	133	60	100	84
14DB-15S05N2W	5	400	60	100	80
14DB-15S09N2W	9	222	60	100	82
14DB-15S12N2W	12	167	60	100	83
14DB-15S15N2W	15	133	60	100	83
14DB-24S05N2W	5	400	60	100	82
14DB-24S09N2W	9	222	60	100	84
14DB-24S12N2W	12	167	60	100	84
14DB-24S15N2W	15	133	60	100	84
14DB-24S24N2W	24	84	60	100	85
14DB-05D05N2W	±5	±200	60	120	80
14DB-05D09N2W	±9	±111	60	120	82
14DB-05D12N2W	±12	±84	60	120	82
14DB-05D15N2W	±15	±67	60	120	82
14DB-12D05N2W	±5	±200	60	120	82
14DB-12D09N2W	±9	±111	60	120	84
14DB-12D12N2W	±12	±84	60	120	84
14DB-12D15N2W	±15	±67	60	120	84
14DB-15D05N2W	±5	±200	60	120	80
14DB-15D09N2W	±9	±111	60	120	82
14DB-15D12N2W	±12	±84	60	120	83
14DB-15D15N2W	±15	±67	60	120	83
14DB-24D05N2W	±5	±200	60	120	82
14DB-24D09N2W	±9	±111	60	120	78
14DB-24D12N2W	±12	±84	60	120	78
14DB-24D15N2W	±15	±67	60	120	80

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

DC-DC Converter

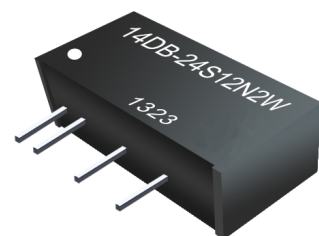
14DB-2W SERIES

2Watt

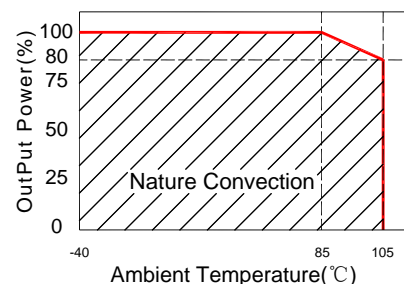
1KV Isolated

Single & Dual Output

SIP7



Temperature Derating Graph



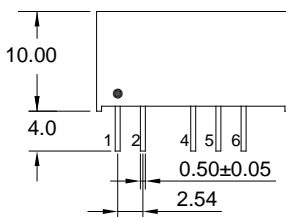
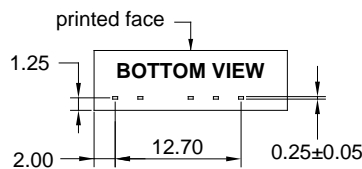
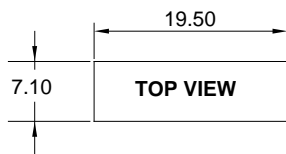
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Continuous				
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	5V,9V (10% To 100% F.L)			15	%
Load Regulation	12~24V (10% To 100% F.L)			10	%
Load Regulation	±5V,±9V (10% To 100% F.L)			15	%
Load Regulation	±12~±24V (10% To 100% F.L)			10	%

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+105	°C
Storage Temperature		-55		+125	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight			2.7		g
Dimensions			19.5x7.1x10.0		mm

**Markings and dimensions**



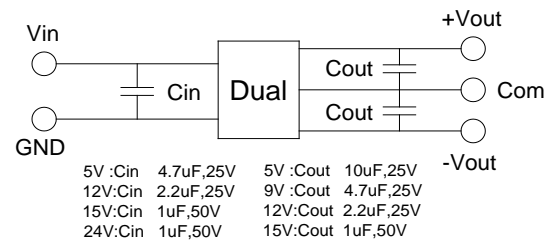
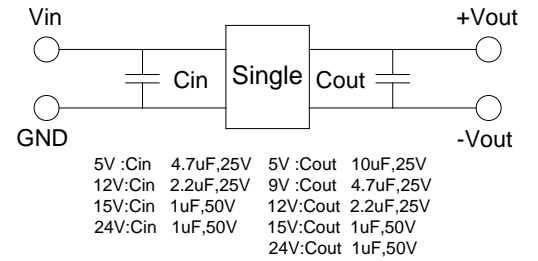
Unit : mm Unless otherwise specified, all tolerances are ±0.25

**Part Number**

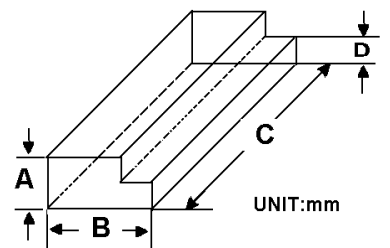
14DB - 05 S 05 N 2W  
A B C D E F

- A:Series
- B:Input Voltage
- C:Single(S)Dual(D)
- D:Output Voltage
- E:Unregulated(N)
- F:Output Power

**Recommended Test Circuit**



**Packaging**



Size(mm)			
A	B	C	D
9.50	16.50	52.2	5.00

**PIN Connection**

PIN	1	2	4	5	6
Single	+Vin	-Vin	-Vout	No Pin	+Vout
Dual	+Vin	-Vin	-Vout	Com	+Vout

**FEATURES :**

- 2:1Wide Input Voltages Range
- 7PIN SIP Package
- High Efficiency up to 80%
- Regulated Output Types
- Internal SMD Construction
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Output Voltage	Output Current	Efficiency
	Vdc	Vdc	mA	%TYP
14DZ-05S05R	4.5-9	5	200	65
14DZ-05S09R	4.5-9	9	112	70
14DZ-05S12R	4.5-9	12	84	70
14DZ-05S15R	4.5-9	15	67	70
14DZ-05S24R	4.5-9	24	42	75
14DZ-12S05R	9-18	5	200	70
14DZ-12S09R	9-18	9	112	72
14DZ-12S12R	9-18	12	84	73
14DZ-12S15R	9-18	15	67	75
14DZ-12S24R	9-18	24	42	80
14DZ-24S05R	18-36	5	200	75
14DZ-24S09R	18-36	9	112	75
14DZ-24S12R	18-36	12	84	78
14DZ-24S15R	18-36	15	67	78
14DZ-24S24R	18-36	24	42	80

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types	Vo, Io Nom			2:1	
Filter	Capacitor				

DC-DC Converter

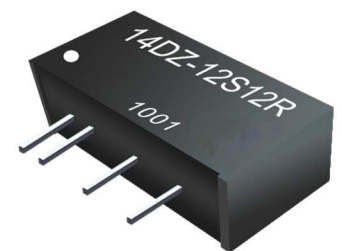
**14DZ SERIES**

1Watt 3KV Isolated

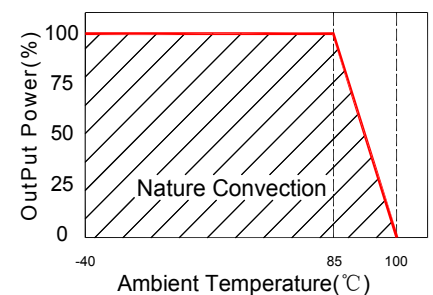
2 : 1 Input Voltage Range

Single Output

SIP7



**Temperature Derating Graph**



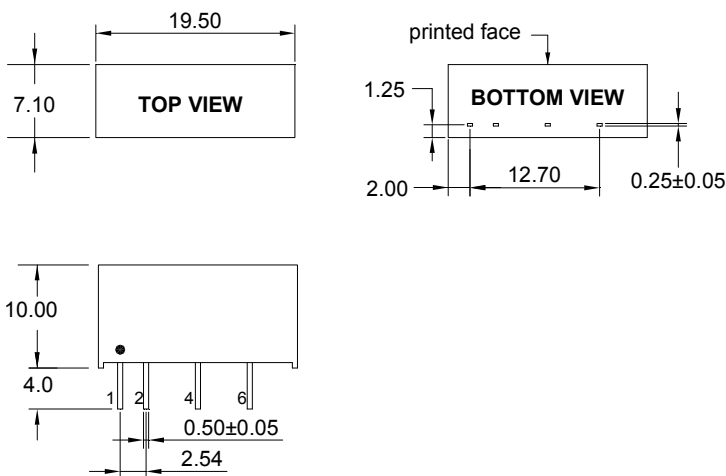
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Continuous				
Line Regulation	Regulated			±0.5	%
Load Regulation	Regulated			±1.5	%
Ripple & Noise	Output:5V,9V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output:12-24V TYPES BW=DC To 20MHz		1% of Vout		mVp-p
Transient response setting time	50% load step change		350		us

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	1500000			Hours
Weight			2.7		g
Dimensions			19.5x7.1x10.0		mm

**Markings and dimensions**



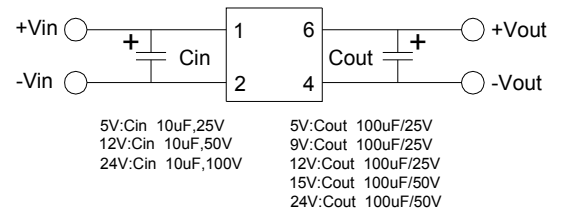
UNIT : mm Unless otherwise specified, all tolerances are ±0.25

**Part Number**

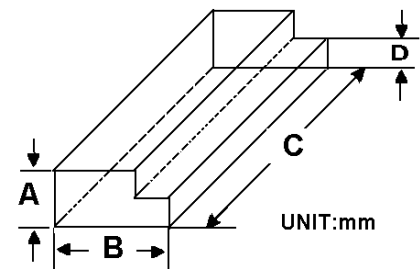
14DZ - 05 S 05 R  
A B C D E

A:Series  
B:Input Voltage  
C:Single Output  
D:Output Voltage  
E:Regulated(R)

**Recommended Test Circuit**



**Packaging**



Size(mm)			
A	B	C	D
9.5	16.5	52.2	5.0

**PIN Connection**

Pin	1	2	4	6
Single	+Vin	-Vin	-Vout	+Vout

**FEATURES :**

- 2:1Wide Input Voltages Range
- 7PIN SIP Package
- High Efficiency up to 83%
- Regulated Output Types
- Internal SMD Construction
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Output Voltage	Output Current	Efficiency
	Vdc	Vdc	mA	%TYP
14DZ-05S05R2W	4.5-9	5	400	70
14DZ-05S09R2W	4.5-9	9	222	72
14DZ-05S12R2W	4.5-9	12	167	75
14DZ-05S15R2W	4.5-9	15	133	78
14DZ-05S24R2W	4.5-9	24	84	80
14DZ-12S05R2W	9-18	5	400	75
14DZ-12S09R2W	9-18	9	222	78
14DZ-12S12R2W	9-18	12	167	80
14DZ-12S15R2W	9-18	15	133	80
14DZ-12S24R2W	9-18	24	84	83
14DZ-24S05R2W	18-36	5	400	76
14DZ-24S09R2W	18-36	9	222	78
14DZ-24S12R2W	18-36	12	167	80
14DZ-24S15R2W	18-36	15	133	80
14DZ-24S24R2W	18-36	24	84	83

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types	Vo, Io Nom			2:1	
Filter	Capacitor				

DC-DC Converter

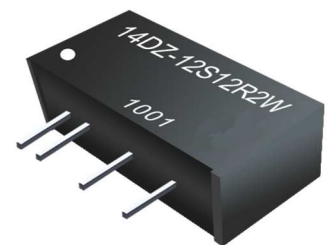
**14DZ-2W SERIES**

2Watt 3KV Isolated

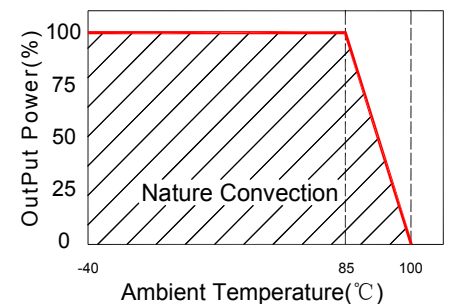
2 : 1 Input Voltage Range

Single Output

SIP7



**Temperature Derating Graph**



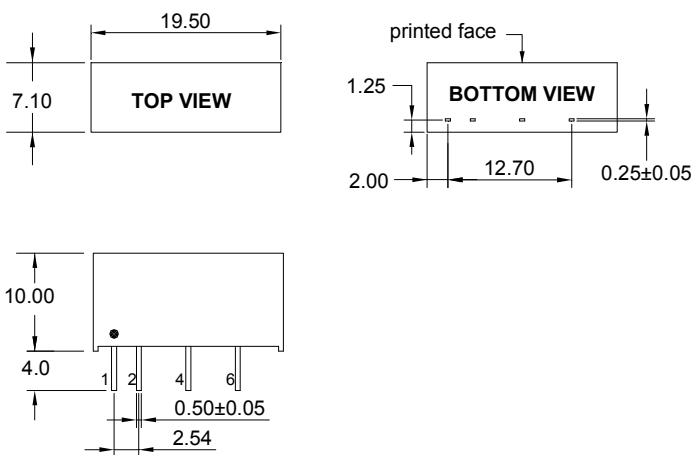
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Continuous				
Line Regulation	Regulated			±0.5	%
Load Regulation	Regulated			±1.5	%
Ripple & Noise	Output:5V,9V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output:12-24V TYPES BW=DC To 20MHz		1% of Vout		mVp-p
Transient response setting time	50% load step change		350		us

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	1500000			Hours
Weight			2.7		g
Dimensions			19.5x7.1x10.0		mm

**Markings and dimensions**



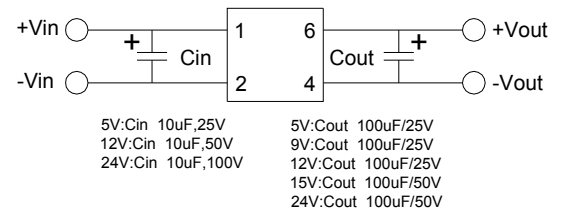
UNIT : mm Unless otherwise specified, all tolerances are ±0.25

**Part Number**

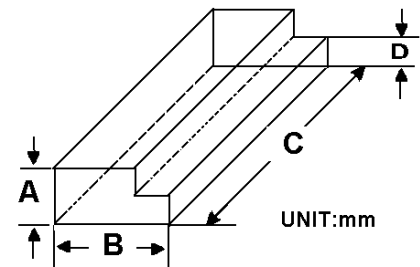
14DZ - 05 S 05 R 2W  
A B C D E F

A:Series  
B:Input Voltage  
C:Single Output  
D:Output Voltage  
E:Regulated(R)  
F:Output Power

**Recommended Test Circuit**



**Packaging**



Size(mm)			
A	B	C	D
9.5	16.5	522	5.0

**PIN Connection**

Pin	1	2	4	6
Single	+Vin	-Vin	-Vout	+Vout



**FEATURES :**

- 7PIN SIP & 14PIN DIL Package
- High Efficiency up to 70%
- Output Regulation <1.5%
- Internal SMD Construction
- No External Component Required
- Industry Standard Pinout
- Operating Temperature: -40°C TO +85°C



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency	Package Style
	Vdc	mA	%Typ	
15D-XXS03RNL	3.3	100	45	1
15D-XXS05RNL	5	100	45	1
15D-XXS09RNL	9	100	55	1
15D-XXS12RNL	12	84	55	1
15D-XXS15RNL	15	67	60	1
15D-XXS03R2NL	3.3	100	45	2
15D-XXS05R2NL	5	100	45	2
15D-XXS09R2NL	9	100	55	2
15D-XXS12R2NL	12	84	55	2
15D-XXS15R2NL	15	67	60	2
15D-XXS24R2NL	24	42	60	2
15D-XXS03R3NL	3.3	100	45	3
15D-XXS05R3NL	5	100	45	3
15D-XXS09R3NL	9	100	55	3
15D-XXS12R3NL	12	84	55	3
15D-XXS15R3NL	15	67	60	3
15D-XXS03R4NL	3.3	100	45	4
15D-XXS05R4NL	5	100	45	4
15D-XXS09R4NL	9	100	55	4
15D-XXS12R4NL	12	84	55	4
15D-XXS15R4NL	15	67	60	4
15D-XXS24R4NL	24	42	60	4

DC-DC Converter

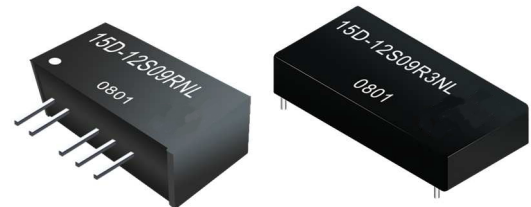
**15D SERIES**

1Watt

1KV Isolated

Single Output

SIP7 & DIL14



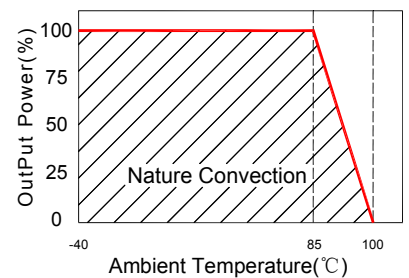
**Note:**

- 1."XX" Is Input Voltage: 03=3.3Vdc, 05=5Vdc, 09=9Vdc, 12=12Vdc, 15=15Vdc, 24=24Vdc
2. Over 24Vdc input voltage, using the 2nd or 4nd package
3. The input voltage increases, there will be an increase in efficiency.
4. Input 3.3V, then output will be 12V MAX Output 3.3V, then input will be 12V MAX

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo, Io Nom			±5	%
Filter	Capacitor				

**Temperature Derating Graph**



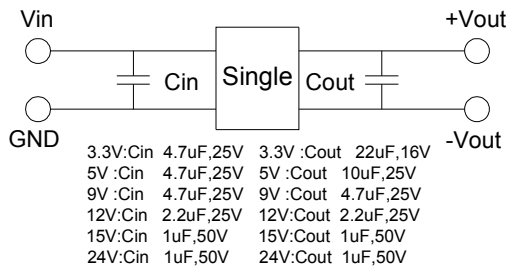
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Continuous				
Line Regulation	For 1.0% OF Vin		0.25		%
Load Regulation	10% To 100% F.L			1.5	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	1500000			Hours
Weight	Package 1/2/3/4	2.1/2.7/2.3/3.0			g
Dimensions	Package 1	19.50x6.00x10.00			mm
Dimensions	Package 2	19.5x7.10x10.00			mm
Dimensions	Package 3	20.32x10.16x6.80			mm
Dimensions	Package 4	20.32x10.16x7.70			mm

**Recommended Test Circuit**



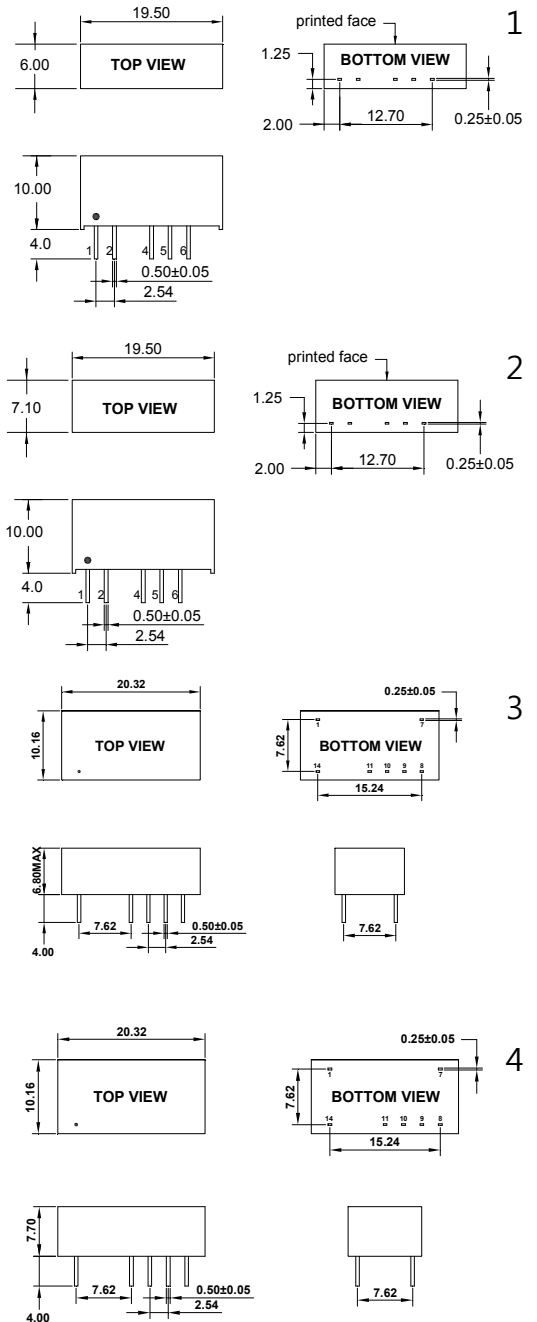
**PIN Connection**

PIN	1	2	4	5	6	7	8	9	10	11	14
7PIN	+Vin	-Vin	-Vout	CTRL	+Vout						
14PIN	-Vin					NC	NC	+Vout	CTRL	-Vout	+Vin

**Part Number**

15D - 05 S 05 R 2 NL  
 A B C D E F G  
 A:Series  
 B:Input Voltage  
 C:Single(S)  
 D:Output Voltage  
 E:Regulated(R)  
 F:Packge  
 G:RoHS Version

**Markings and dimensions**



Unit : mm Unless otherwise specified, all tolerances are ±0.25

**FEATURES :**

- 2:1Wide Input Voltages Range
- High Efficiency up to 85%
- Regulated Output Types
- Low Ripple And Noise
- Internal SMD Construction
- Operating Temperature:-40~+85°C
- Industry Standard Pinout
- Continuous Short Circuit Protection With Current Foldback



DC-DC Converter

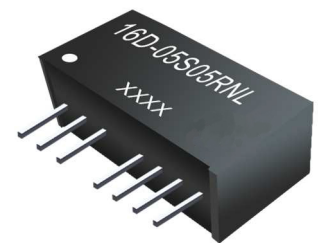
**16D-Single SERIES**

1Watt 1KV Isolated

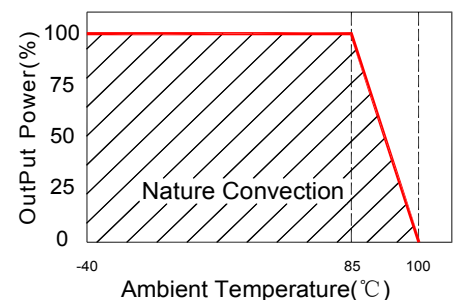
2 : 1 Input Voltage Range

Single Output

SIP8



**Temperature Derating Graph**



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Output Voltage	Output Current	Efficiency
	Vdc	Vdc	mA	%TYP
16D-05S05RNL	5-9	5	200	60
16D-05S09RNL	5-9	9	111	70
16D-05S12RNL	5-9	12	84	70
16D-05S15RNL	5-9	15	67	70
16D-05S24RNL	5-9	24	42	70
16D-12S05RNL	9-18	5	200	70
16D-12S09RNL	9-18	9	111	80
16D-12S12RNL	9-18	12	84	80
16D-12S15RNL	9-18	15	67	80
16D-12S24RNL	9-18	24	42	80
16D-24S05RNL	18-36	5	200	75
16D-24S09RNL	18-36	9	111	80
16D-24S12RNL	18-36	12	84	80
16D-24S15RNL	18-36	15	67	80
16D-24S24RNL	18-36	24	42	80
16D-48S05RNL	36-72	5	200	70
16D-48S09RNL	36-72	9	111	80
16D-48S12RNL	36-72	12	84	80
16D-48S15RNL	36-72	15	67	80
16D-48S24RNL	36-72	24	42	80

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types	Vo, Io Nom			2:1	
Filter	Capacitor				

Output Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±3	%
Short Circuit Protection	Continuous				
Line Regulation	Regulated			±0.5	%
Load Regulation	Regulated			±0.8	%
Ripple & Noise	Output:5V-9V TYPES BW=DC To 20MHZ			100	mVp-p
Ripple & Noise	Output:12-24V TYPES BW=DC To 20MHZ		1% of Vout		mVp-p
Transient response setting time	50% load step change		350		us

General Specifications

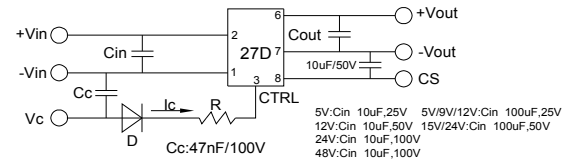
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	1500000			Hours
Weight			4.5		g
Dimensions			21.8x9.2x11.1		mm

Part Number

16D - 05 S 05 R NL  
A B C D E F

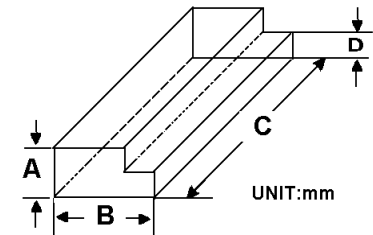
A:Series  
B:Input Voltage  
C:Single(S)  
D:Output Voltage  
E:Regulated(R)  
F:RoHS Version

Recommended Test Circuit



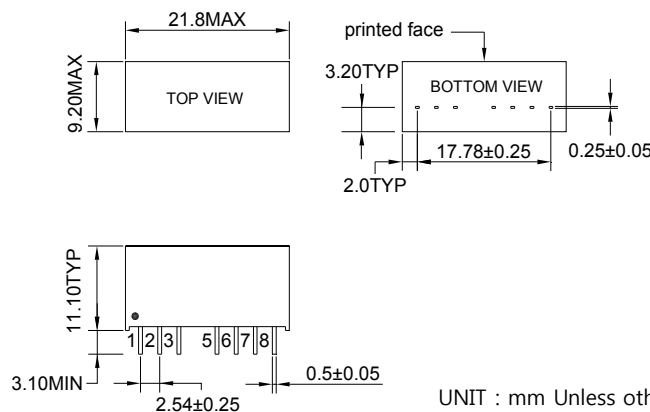
- When open or high impedance, the converter works well; When this pin is 'high', the converter shut down. It should be note that the input current should be between 5-10mA,exceeding the maximum 20mA will cause permanent damage to the converter.
- To make sure the product work at perfect operation status with full loading external capacitor is necessary and it is recommended to use high frequency low resistance electrolytic capacitor.

Packaging



Size(mm)			
A	B	C	D
12.0	28.55	550	6.00

Markings and dimensions



UNIT : mm Unless otherwise specified, all tolerances are ±0.25

PIN Connection

Pin	1	2	3	5	6	7	8
Single	-Vin	+Vin	Ctrl-Control input can (can be left open)	NE-No external connection allowed	+Vout	-Vout	CS Optional External capacitor

**FEATURES :**

- 2:1Wide Input Voltages Range
- High Efficiency up to 85%
- Regulated Output Types
- Low Ripple And Noise
- Internal SMD Construction
- Operating Temperature:-40~+85°C
- Industry Standard Pinout
- Continuous Short Circuit Protection With Current Foldback



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Output Voltage	Output Current	Efficiency
	Vdc	Vdc	mA	%TYP
16D-05D05RNL	5-9	±5	±100	60
16D-05D09RNL	5-9	±9	±56	70
16D-05D12RNL	5-9	±12	±42	70
16D-05D15RNL	5-9	±15	±34	70
16D-05D24RNL	5-9	±24	±21	70
16D-12D05RNL	9-18	±5	±100	70
16D-12D09RNL	9-18	±9	±56	80
16D-12D12RNL	9-18	±12	±42	80
16D-12D15RNL	9-18	±15	±34	80
16D-12D24RNL	9-18	±24	±21	80
16D-24D05RNL	18-36	±5	±100	75
16D-24D09RNL	18-36	±9	±56	80
16D-24D12RNL	18-36	±12	±42	80
16D-24D15RNL	18-36	±15	±34	80
16D-24D24RNL	18-36	±24	±21	80
16D-48D05RNL	36-72	±5	±100	70
16D-48D09RNL	36-72	±9	±56	80
16D-48D12RNL	36-72	±12	±42	80
16D-48D15RNL	36-72	±15	±34	80
16D-48D24RNL	36-72	±24	±21	80

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types	Vo, Io Nom			2:1	
Filter	Capacitor				

DC-DC Converter

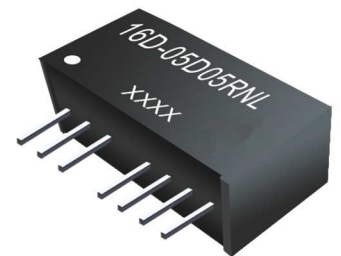
**16D-Dual SERIES**

1Watt 1KV Isolated

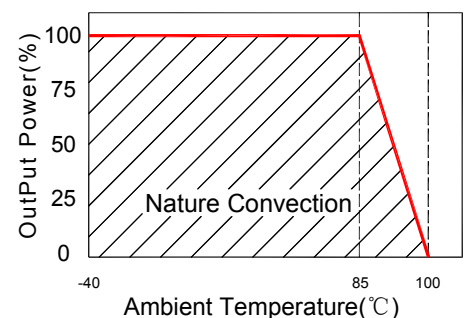
2 : 1 Input Voltage Range

Dual Output

SIP8



**Temperature Derating Graph**



Output Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±3	%
Short Circuit Protection	Continuous				
Line Regulation	Regulated			±0.5	%
Load Regulation	Regulated			±0.8	%
Ripple & Noise	Output:5-9V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output:12-24V TYPES BW=DC To 20MHz		1% of Vout		mVp-p
Transient response setting time	50% load step change		350		us

General Specifications

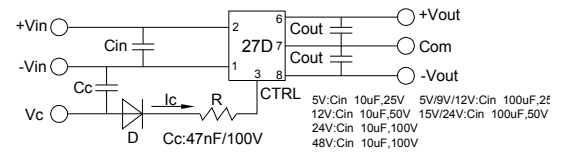
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	1500000			Hours
Weight			4.5		g
Dimensions			21.8x9.2x11.1		mm

Part Number

16D - 05 D 05 R NL  
A B C D E F

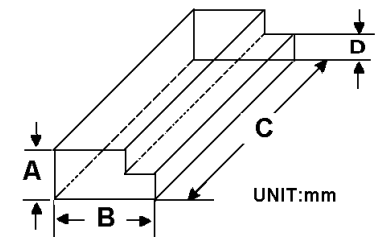
A:Series  
B:Input Voltage  
C: Dual Output  
D: Output Voltage  
E: Regulated(R)  
F: RoHS Version

Recommended Test Circuit



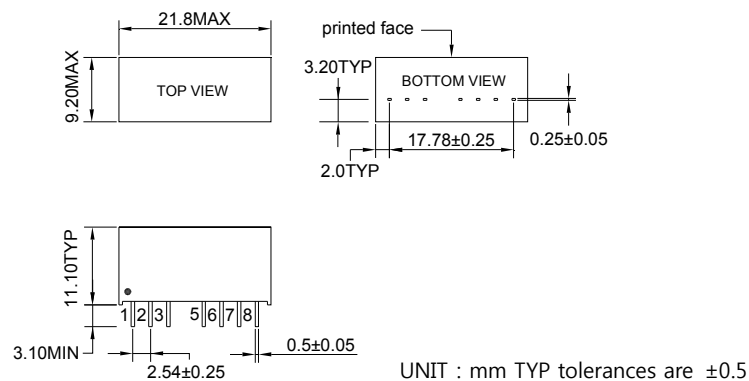
- When open or high impedance, the converter works well; When this pin is 'high', the converter shut down. It should be note that the input current should be between 5-10mA, exceeding the maximum 20mA will cau permanent damage to the converter.
- To make sure the product work at perfect operation status with full loading external capacitor is necessary and it is recommended to use high frequency low resistance electrolytic capacitor.

Packaging



Size(mm)			
A	B	C	D
12.0	28.55	550	6.00

Markings and dimensions



PIN Connection

Pin	1	2	3	5	6	7	8
Dual	-Vin	+Vin	Ctrl-Control input can (can be left open)	NE-No external connection allowed	+Vout	COM	-Vout

**FEATURES :**

- 7PIN SIP Package
- High Efficiency up to 85%
- Unregulated Output Types
- Internal SMD Construction
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output2		Efficiency	Recognized By UL 60950-1
	Voltage (Vdc)	Current (mA)	%Typ	
17D-XXDXX03NNL	3.3	150	70	17D-05D0505NNL 17D-05D0512NNL 17D-12D0512NNL 17D-12D1212NNL 17D-24D0505NNL 17D-24D2424NNL
17D-XXDXX05NNL	5	100	70	
17D-XXDXX09NNL	9	56	70	
17D-XXDXX12NNL	12	42	70	
17D-XXDXX15NNL	15	34	70	
17D-XXDXX24N2NL	24	21	70	

**Note:**

- 1."XX" Is Voltage:03 = 3.3Vdc,05=5Vdc,09=9Vdc 12=12Vdc,15=15Vdc,24=24Vdc.
2. 3.3V for output only, not for input.
3. The input voltage increases, there will be an increase in efficiency.
4. Over 24Vdc input voltage or Output voltage, using the 2nd package.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±5	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V,5V (10% To 100% F.L)			15	%
Load Regulation	9V,12V,15V (10% To 100% F.L.)			10	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

DC-DC Converter

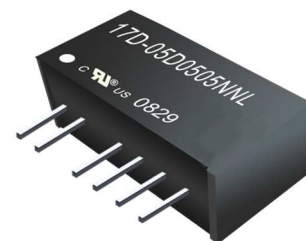
**17D SERIES**

1Watt

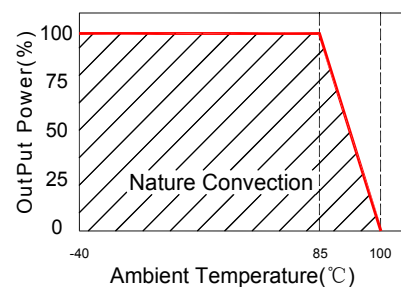
1KV Isolated

Twin Output

SIP7



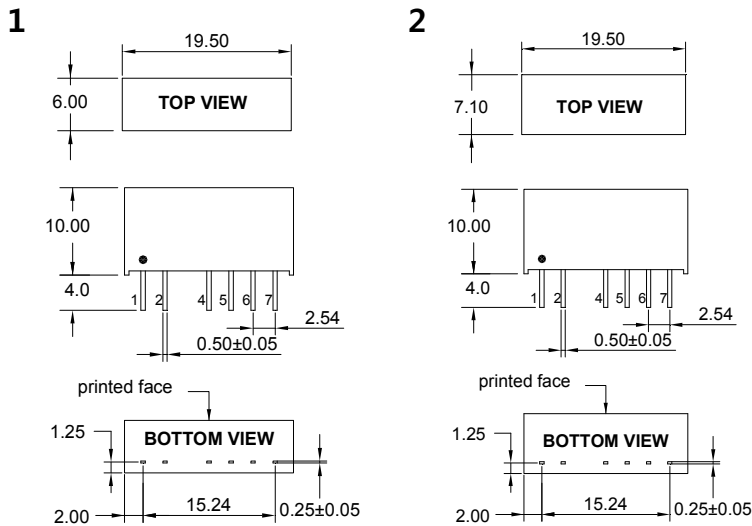
**Temperature Derating Graph**



**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight			2.1 or 2.7		g
Dimensions			19.5x6.0x10.0		mm
Dimensions			19.5x7.1x10.0		mm

**Markings and dimensions**

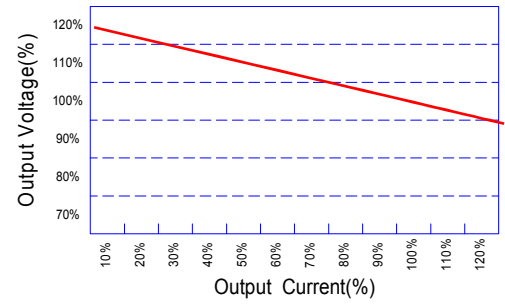


Unit : mm Unless otherwise specified, all tolerances are ±0.25

**PIN Connection**

PIN	1	2	4	5	6	7
Dual	+Vin	-Vin	+Vout1	- Vout1	+Vout2	-Vout2

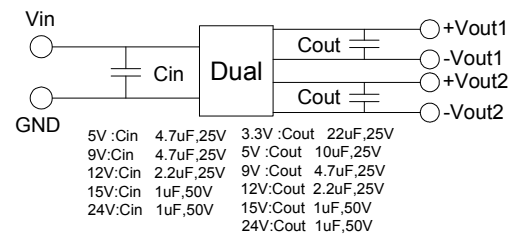
**Tolerance Envelope Graph**



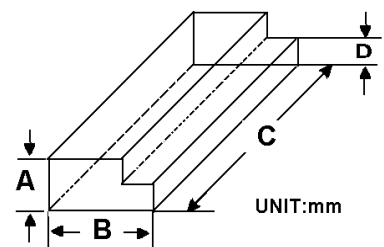
**Part Number**

17D - 05 D 0503 N NL  
 A B C D E F  
 A:Series  
 B:Input Voltage  
 C:Dual(D)  
 D:Output Voltage  
 E:Unregulated(N)  
 F:RoHS Version

**Recommended Test Circuit**



**Packaging**



Size(mm)			
A	B	C	D
9.50	16.50	522	5.00



**FEATURES :**

- 24PIN DIP Package
- High Efficiency up to 85%
- Unregulated Output Types
- Internal SMD Construction
- No External Component Required
- Industry Standard Pinout
- Operating Temperature:-40°C To +85°C



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency
	(Vdc)	(mA)	%Typ
18D-XXS05NNL	5	200	70
18D-XXS09NNL	9	111	75
18D-XXS12NNL	12	84	78
18D-XXS15NNL	15	67	80
18D-XXS24NNL	24	42	82
18D-XXS05N2WNL	5	400	70
18D-XXS09N2WNL	9	222	75
18D-XXS12N2WNL	12	167	80
18D-XXS15N2WNL	15	133	80
18D-XXS24N2WNL	24	84	85

**Note:**

- 1."XX" Is Input Voltage:05=5Vdc,09=9Vdc,12=12Vdc,15=15Vdc,24=24Vdc.
2. The input voltage increases, there will be an increase in efficiency

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% of Vin		1.2		%
Load Regulation	5V (20% To 100% F.L)			15	%
Load Regulation	9V,12V,15V,24V (20% To 100% F.L)			10	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

DC-DC Converter

**18D-Single SERIES**

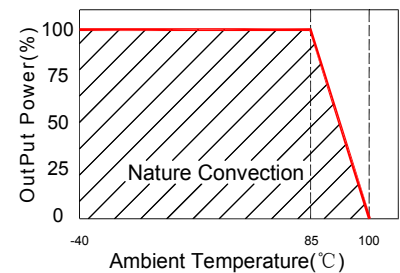
1Watt/2Watt

6KV Isolated

DIP24



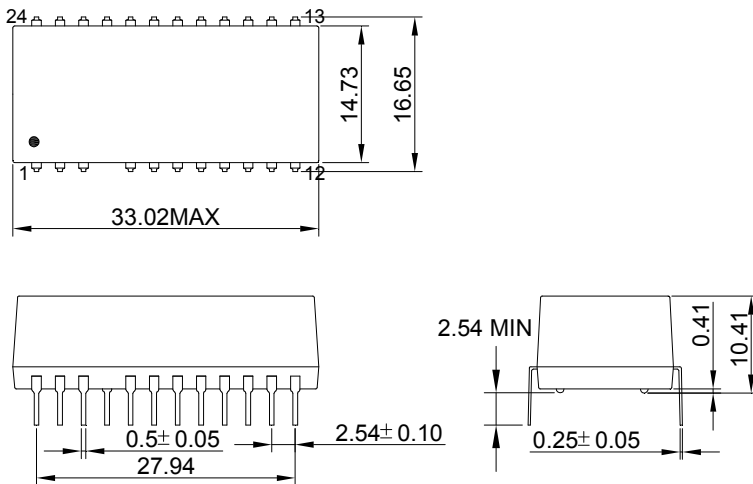
**Temperature Derating Graph**



**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		50		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight			9.5		g
Dimensions		33.02x14.73x10.41			mm

**Markings and dimensions**

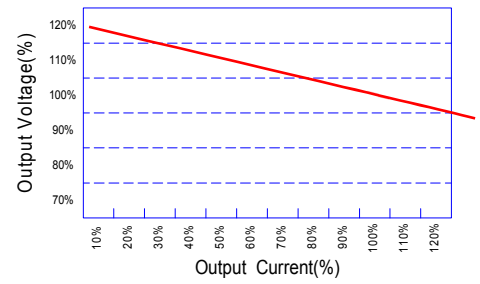


Unit : mm Unless otherwise specified, all tolerances are ±0.25

**PIN Connection**

PIN	1	2	10,15	12,13	Other
Single	+Vin	-Vin	-Vout	+Vout	NC

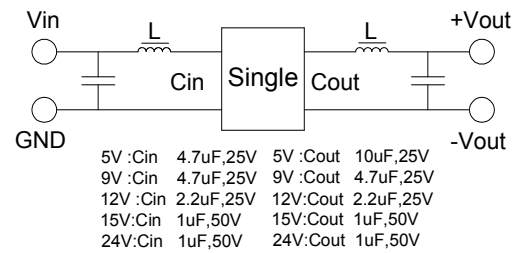
**Tolerance Envelope Graph**



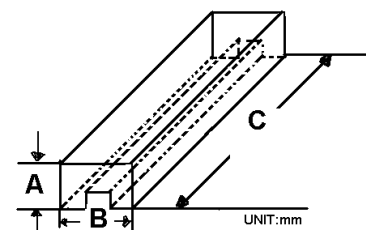
**Part Number**

18D - 05 S 05 N 2W NL  
 A B C D E F G  
 A:Series  
 B:Input Voltage  
 C:Single(S)  
 D:Output Voltage  
 E:Unregulated(N)  
 F:Output Power  
 G:RoHS Version

**Recommended Test Circuit**



**Packaging**



Size(mm)		
A	B	C
13.23	12.30	530

**FEATURES :**

- 24PIN DIP Package
- High Efficiency up to 85%
- Unregulated Output Types
- Internal SMD Construction
- No External Component Required
- Industry Standard Pinout
- Operating Temperature:-40°C To +85°C



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency
	(Vdc)	(mA)	%Typ
18D-XXD05NNL	±5	±100	70
18D-XXD09NNL	±9	±56	75
18D-XXD12NNL	±12	±42	78
18D-XXD15NNL	±15	±34	80
18D-XXD24NNL	±24	±21	82
18D-XXD05N2WNL	±5	±200	70
18D-XXD09N2WNL	±9	±111	75
18D-XXD12N2WNL	±12	±84	80
18D-XXD15N2WNL	±15	±67	80
18D-XXD24N2WNL	±24	±42	85

**Note:**

- 1."XX" Is Input Voltage:05=5Vdc,09=9Vdc,12=12Vdc,15=15Vdc,24=24Vdc.
2. The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% of Vin		1.2		%
Load Regulation	5V (20% To 100% F.L)			15	%
Load Regulation	9V,12V,15V,24V (20% To 100% F.L)			10	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

DC-DC Converter

18D-Dual SERIES

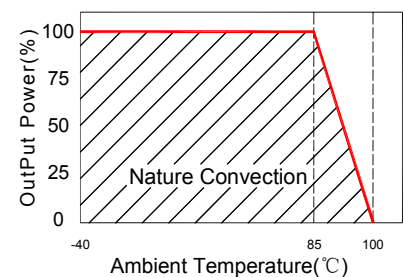
1Watt/2Watt

6KV Isolated

DIP24



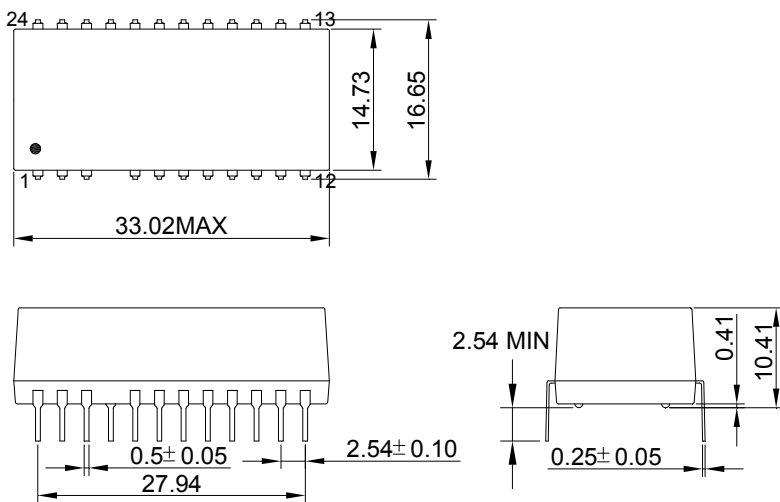
**Temperature Derating Graph**



**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		50		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight			9.5		g
Dimensions		33.02x14.73x10.41			mm

**Markings and dimensions**

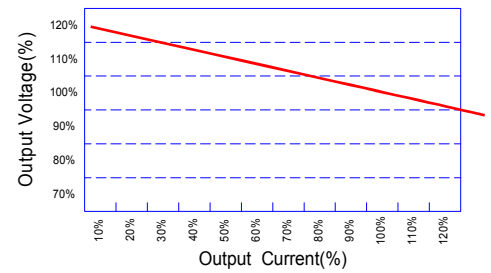


Unit : mm Unless otherwise specified, all tolerances are ±0.25

**PIN Connection**

PIN	1	2	8,17	10,15	12,13	Other
Dual	+Vin	-Vin	-Vout	Com	+Vout	NC

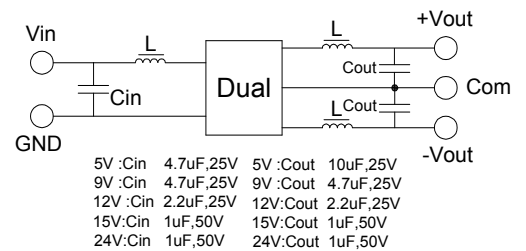
**Tolerance Envelope Graph**



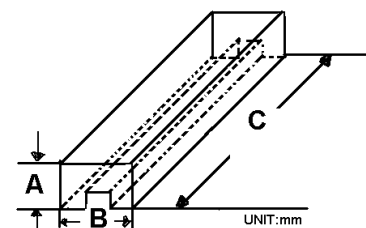
**Part Number**

18D - 05 D 05 N 2W NL  
 A B C D E F G  
 A:Series  
 B:Input Voltage  
 C:Dual(D)  
 D:Output Voltage  
 E:Unregulated(N)  
 F:Output Power  
 G:RoHS Version

**Recommended Test Circuit**



**Packaging**



Size(mm)		
A	B	C
13.23	12.30	530

**FEATURES :**

- 7PIN SIP PACKAGE
- High Efficiency up to 85%
- Single Output 5/9/12/15V/24V Approved By UL60950-1
- Unregulated Output Types
- Internal SMD Construction
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency
	Vdc	mA	%Typ
★19D-XXS05NNL	5	400	70
★19D-XXS09NNL	9	222	75
★19D-XXS12NNL	12	167	80
★19D-XXS15NNL	15	133	80
★19D-XXS24NNL	24	84	85
19D-XXD05NNL	±5	±200	70
19D-XXD09NNL	±9	±111	75
19D-XXD12NNL	±12	±84	80
19D-XXD15NNL	±15	±67	80
19D-XXD24NNL	±24	±42	85

**Note:**

- 1."XX" Is Input Voltage:05=5Vdc, 09=9Vdc,12=12Vdc,15=15Vdc,24=24Vdc.
- 2.The input voltage increases, there will be an increase in efficiency.
- 3." ★" marked as recognized by UL 60950-1.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	5V (10% To 100% F.L)			15	%
Load Regulation	9V,12V,15V,24V (10% To 100% F.L.)			10	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

DC-DC Converter

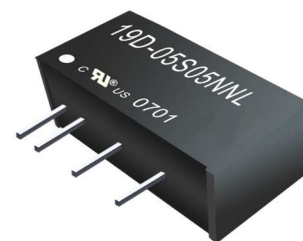
**19D SERIES**

2Watt

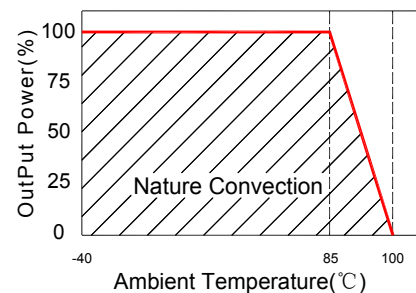
1KV Isolated

Single & Dual Output

SIP7



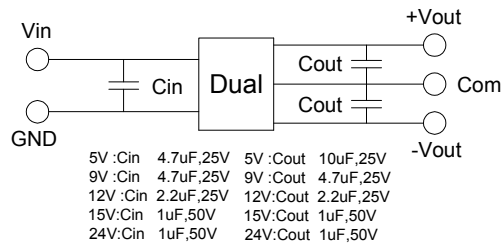
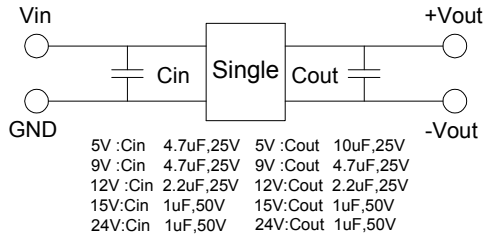
**Temperature Derating Graph**



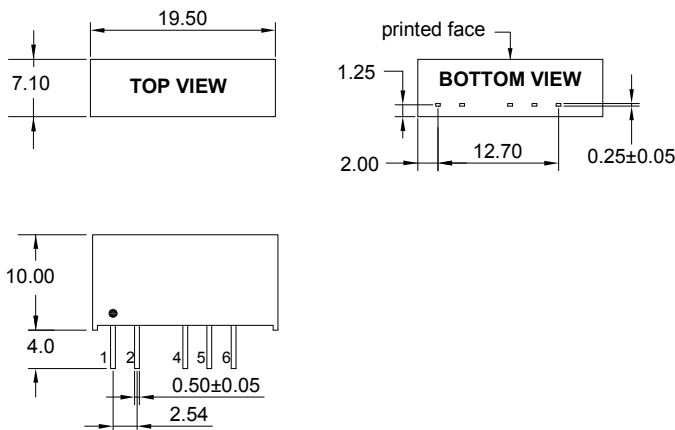
General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		75		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight			2.7		g
Dimensions			19.5x7.1x10.0		mm

Recommended Test Circuit

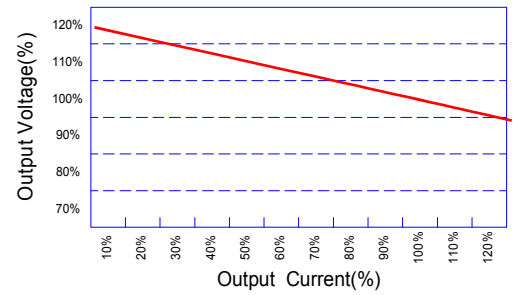


Markings and dimensions



Unit : mm Unless otherwise specified, all tolerances are ±0.25

Tolerance Envelope Graph

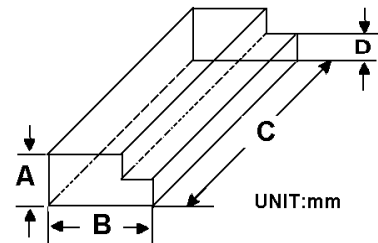


Part Number

19D - 05 S 05 N NL  
 A B C D E F

- A:Series
- B:Input Voltage
- C:Single(S)Dual(D)
- D:Output Voltage
- E:Unregulated(N)
- F:RoHS Version

Packaging



Size(mm)			
A	B	C	D
9.50	16.50	522	5.00

PIN Connection

PIN	1	2	4	5	6
Single	+Vin	-Vin	-Vout	NO PIN	+Vout
Dual	+Vin	-Vin	-Vout	Com	+Vout

**FEATURES :**

- 7PIN SIP Package
- High Efficiency up to 88%
- Unregulated Output Types
- Internal SMD Construction
- Industry Standard Pinout
- Operating Temperature:-40°C TO +85°C

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Ripple & Noise		Efficiency
	Vdc	mA	Typ (mVp-p)	Max (mVp-p)	%Typ
19DA-05S05N	5	400	40	60	82
19DA-05S09N	9	222	40	60	86
19DA-05S12N	12	167	50	80	87
19DA-05S15N	15	133	50	80	86
19DA-12S05N	5	400	40	60	83
19DA-12S09N	9	222	40	60	87
19DA-12S12N	12	167	50	80	88
19DA-12S15N	15	133	50	80	87
19DA-15S05N	5	400	40	60	84
19DA-15S09N	9	222	40	60	86
19DA-15S12N	12	167	50	80	87
19DA-15S15N	15	133	50	80	88
19DA-24S05N	5	400	40	60	84
19DA-24S09N	9	222	40	60	87
19DA-24S12N	12	167	50	80	87
19DA-24S15N	15	133	50	80	88
19DA-05D05N	±5	±200	50	80	82
19DA-05D09N	±9	±111	50	80	85
19DA-05D12N	±12	±84	50	80	86
19DA-05D15N	±15	±67	50	80	86
19DA-12D05N	±5	±200	50	80	84
19DA-12D09N	±9	±111	50	80	87
19DA-12D12N	±12	±84	50	80	87
19DA-12D15N	±15	±67	50	80	87
19DA-15D05N	±5	±200	50	80	84
19DA-15D09N	±9	±111	50	80	86
19DA-15D12N	±12	±84	50	80	88
19DA-15D15N	±15	±67	50	80	88
19DA-24D05N	±5	±200	50	80	85
19DA-24D09N	±9	±111	50	80	87
19DA-24D12N	±12	±84	50	80	88
19DA-24D15N	±15	±67	50	80	88

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				



DC-DC Converter

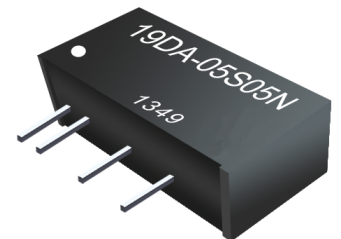
**19DA SERIES**

2Watt

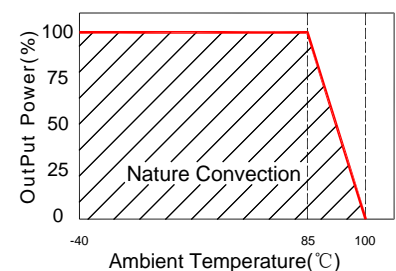
1KV Isolated

Single & Dual Output

SIP7



**Temperature Derating Graph**



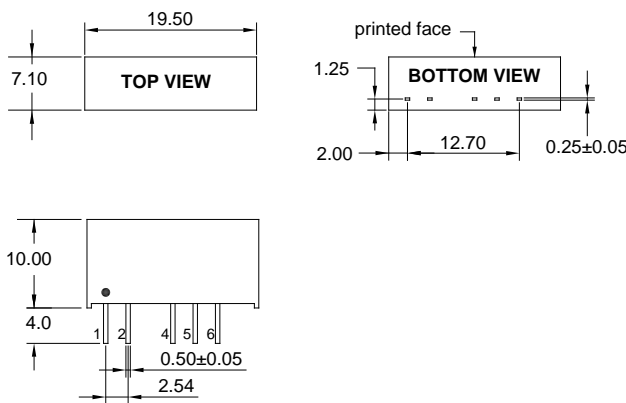
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	5V,9V (10% To 100% F.L)			10	%
Load Regulation	12V,15V (10% To 100% F.L)			7	%
Load Regulation	±5V,±9V (10% To 100% F.L)			9	%
Load Regulation	±12V,±15V (10% To 100% F.L)			6	%

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		75		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight			2.7		g
Dimensions			19.5x7.1x10.0		mm

**Markings and dimensions**



Unit : mm Unless otherwise specified, all tolerances are ±0.25

**PIN Connection**

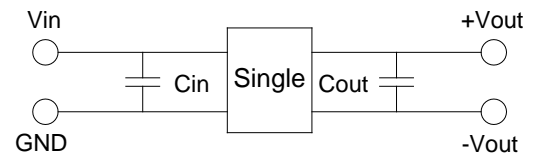
PIN	1	2	4	5	6
Single	+Vin	-Vin	-Vout	No Pin	+Vout
Dual	+Vin	-Vin	-Vout	Com	+Vout

**Part Number**

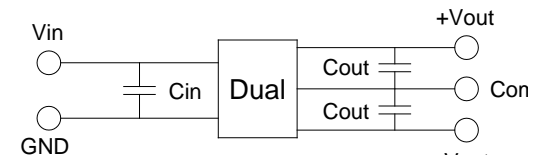
19DA - 05 S 05 N  
A B C D E

A:Series  
B:Input Voltage  
C:Single(S)Dual(D)  
D:Output Voltage  
E:Unregulated(N)

**Recommended Test Circuit**

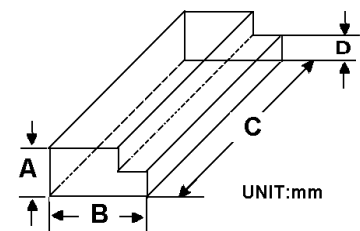


5V :Cin 4.7uF,25V 5V :Cout 10uF,25V  
12V:Cin 2.2uF,25V 9V :Cout 4.7uF,25V  
15V:Cin 1uF,50V 12V:Cout 2.2uF,25V  
24V:Cin 1uF,50V 15V:Cout 1uF,50V



5V :Cin 4.7uF,25V 5V :Cout 10uF,25V  
12V:Cin 2.2uF,25V 9V :Cout 4.7uF,25V  
15V:Cin 1uF,50V 12V:Cout 2.2uF,25V  
24V:Cin 1uF,50V 15V:Cout 1uF,50V

**Packaging**



Size(mm)			
A	B	C	D
9.50	16.50	52.2	5.00



**FEATURES :**

- 14PIN DIL Package
- High Efficiency up to 85%
- Internal SMD Construction
- Unregulated Output Types
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency	Package Style	Recognized By UL 60950-1
	Vdc	mA	%Typ		
22D-XXS03NNL	3.3	303	70	1	
22D-XXS05NNL	5	200	70	1	
22D-XXS09NNL	9	112	75	1	
22D-XXS12NNL	12	84	78	1	
22D-XXS15NNL	15	67	80	1	
22D-XXS24NNL	24	42	82	1	22D-05D05NNL
22D-XXD03NNL	±3.3	±150	70	1	22D-05D12NNL
22D-XXD05NNL	±5	±100	70	1	22D-05D15NNL
22D-XXD09NNL	±9	±56	75	1	22D-05D24NNL
22D-XXD12NNL	±12	±42	78	1	22D-12D12NNL
22D-XXD15NNL	±15	±34	80	1	22D-12D15NNL
22D-XXD24NNL	±24	±21	82	1	22D-24D05NNL
22D-XXS05N2NL	5	200	70	2	22D-24D12NNL
22D-XXS09N2NL	9	112	75	2	22D-24D24NNL
22D-XXS12N2NL	12	84	78	2	
22D-XXS15N2NL	15	67	80	2	
22D-XXS24N2NL	24	42	82	2	
22D-XXD05N2NL	±5	±100	70	2	
22D-XXD09N2NL	±9	±56	75	2	
22D-XXD12N2NL	±12	±42	78	2	
22D-XXD15N2NL	±15	±34	80	2	
22D-XXD24N2NL	±24	±21	82	2	

**Note:**

- 1."XX" Is Input Voltage:03 = 3.3Vdc,05=5Vdc,09=9Vdc,12=12Vdc,15=15Vdc.24=24Vdc, 48=48Vdc.
2. Over 48Vdc input voltage, using the 2nd package.
3. The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

DC-DC Converter

**22D SERIES**

1Watt

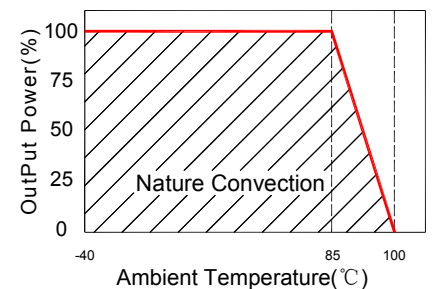
1KV Isolated

Single & Dual Output

DIL14



**Temperature Derating Graph**



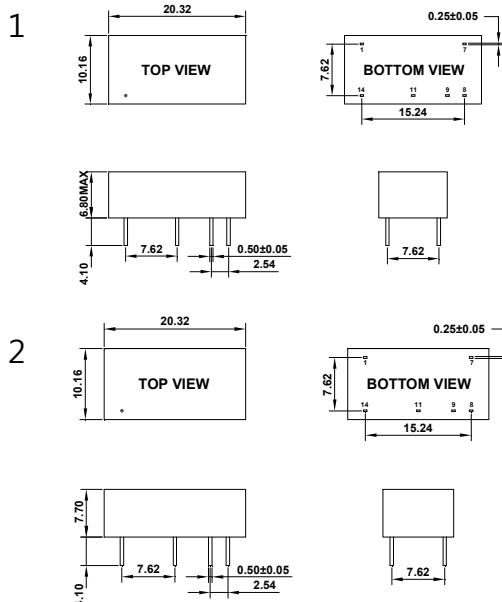
Output Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V,5V (10% To 100% F.L.)			15	%
Load Regulation	9V,12V,15V,24V (10% To 100% F.L.)			10	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

General Specifications

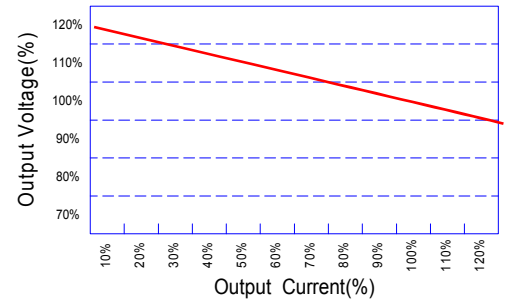
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight	Package 1 or Package 2		2.3 or 2.8		g
Dimensions	Package 1		20.32x10.16x6.80		mm
Dimensions	Package 2		20.32x10.16x7.70		mm

Markings and dimensions



Unit : mm Unless otherwise specified, all tolerances are ±0.25

Tolerance Envelope Graph

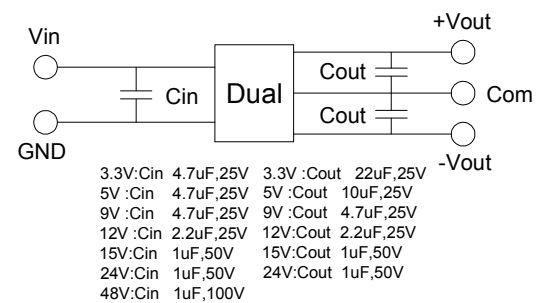
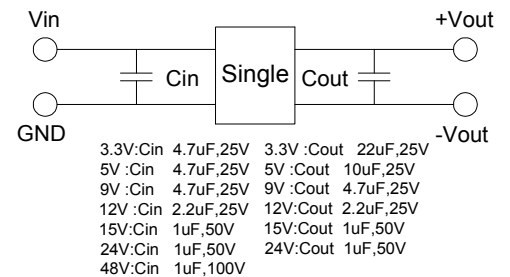


Part Number

22D - 05 D 05 N 2 NL  
A B C D E F G

- A:Series
- B:Input Voltage
- C:Single(S)Dual(D)
- D:Output Voltage
- E:Unregulated(N)
- F:Package
- G:RoHS Version

Recommended Test Circuit



PIN Connection

PIN	1	7	8	9	11	14
Single	-Vin	NC	-Vout	+Vout	NC	+Vin
Dual	-Vin	NC	COM	+Vout	-Vout	+Vin

**FEATURES :**

- 14PIN DIL Package
- High Efficiency up to 85%
- Internal SMD Construction
- Unregulated Output Types
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency	Recognized By UL 60950-1
	Vdc	mA	%Typ	
24D-XXS05NNL	5	400	70	
24D-XXS09NNL	9	222	75	24D-05D05NNL
24D-XXS12NNL	12	167	80	24D-05D12NNL
24D-XXS15NNL	15	133	80	24D-05D15NNL
24D-XXS24NNL	24	84	85	24D-05D24NNL
24D-XXD05NNL	±5	±200	70	24D-12D12NNL
24D-XXD09NNL	±9	±111	75	24D-12D15NNL
24D-XXD12NNL	±12	±84	80	24D-24D05NNL
24D-XXD15NNL	±15	±67	80	24D-24D09NNL
24D-XXD24NNL	±24	±42	85	24D-24D15NNL
				24D-24D24NNL

**Note:**

- 1."XX" Is Input Voltage:03 = 3.3Vdc, 05=5Vdc, 09=9Vdc,12=12Vdc,15=15Vdc 24=24Vdc.
2. The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	5V (10% To 100% F.L)			15	%
Load Regulation	9V,12V,15V,24V (10% To 100% F.L)			10	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

DC-DC Converter

**24D SERIES**

2Watt

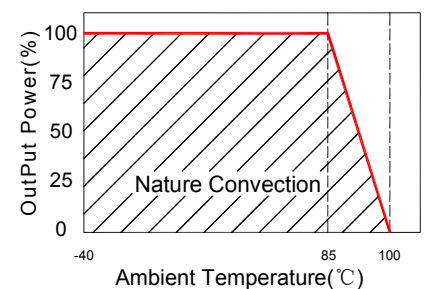
1KV Isolated

Single & Dual Output

DIL14



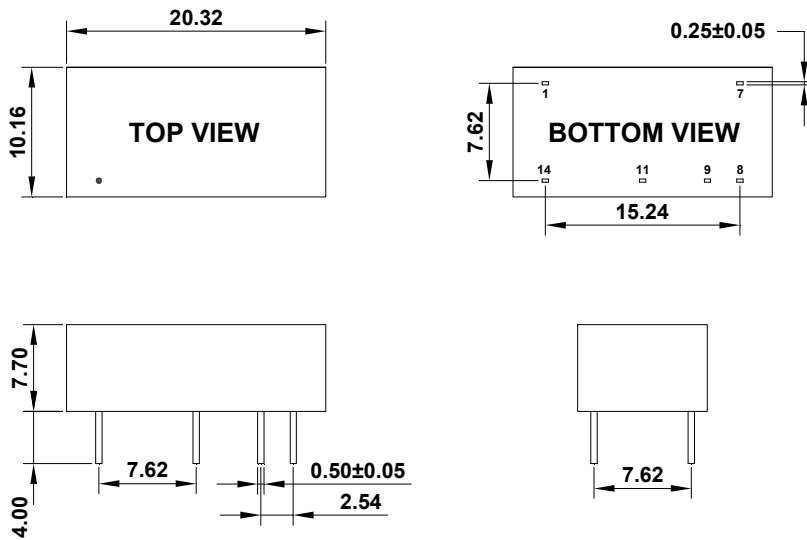
**Temperature Derating Graph**



General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		75		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight			2.8		g
Dimensions		20.32x10.16x7.70			mm

Markings and dimensions

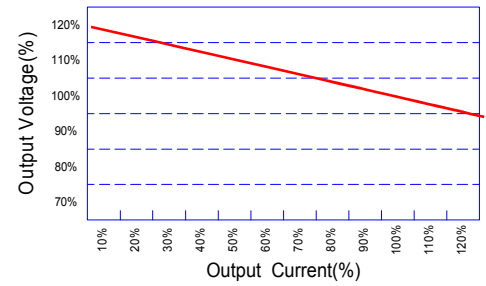


Unit : mm Unless otherwise specified, all tolerances are ±0.25

PIN Connection

PIN	1	7	8	9	11	14
Single	-Vin	NC	-Vout	+Vout	No Pin	+Vin
Dual	-Vin	NC	COM	+Vout	-Vout	+Vin

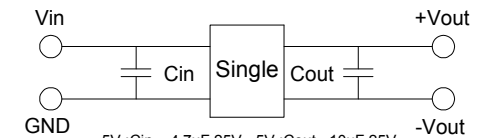
Tolerance Envelope Graph



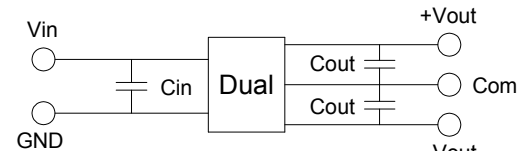
Part Number

24D - 05 D 05 N NL  
 A B C D E F  
 A:Series  
 B:Input Voltage  
 C:Single(S)Dual(D)  
 D:Output Voltage  
 E:Unregulated(N)  
 F:RoHS Version

Recommended Test Circuit

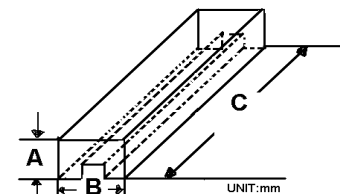


5V :Cin 4.7uF,25V 5V :Cout 10uF,25V  
 9V :Cin 4.7uF,25V 9V :Cout 4.7uF,25V  
 12V :Cin 2.2uF,25V 12V:Cout 2.2uF,25V  
 15V:Cin 1uF,50V 15V:Cout 1uF,50V  
 24V:Cin 1uF,50V 24V:Cout 1uF,50V



5V :Cin 4.7uF,25V 5V :Cout 10uF,25V  
 9V :Cin 4.7uF,25V 9V :Cout 4.7uF,25V  
 12V :Cin 2.2uF,25V 12V:Cout 2.2uF,25V  
 15V:Cin 1uF,50V 15V:Cout 1uF,50V  
 24V:Cin 1uF,50V 24V:Cout 1uF,50V

Packaging



Size(mm)		
A	B	C
13.23	12.30	530

**FEATURES :**

- 14PIN DIL Package
- High Efficiency up to 85%
- Internal SMD Construction
- Unregulated Output Types
- Operating Temperature:-40°C TO +85°C
- No External Component Required
- Industry Standard Pinout



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output2		Efficiency
	Voltage (VDC)	Current (mA)	%Typ
25D-XXDXX03NNL	3.3	150	70
25D-XXDXX05NNL	5	100	75
25D-XXDXX09NNL	9	56	75
25D-XXDXX12NNL	12	42	75
25D-XXDXX15NNL	15	34	75
25D-XXDXX24N2NL	24	21	75

**Note:**

- 1."XX" Is Voltage:03= 3.3Vdc,05=5Vdc,09=9Vdc 12=12Vdc,15=15Vdc,24=24Vdc.
2. 3.3V for output only, not for input.
3. The input voltage increases, there will be an increase in efficiency.
4. Over 24Vdc input voltage or Output voltage, using the 2nd package

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±5	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V,5V (10% To 100% F.L)			15	%
Load Regulation	9V,12V,15V,24V (10% To 100% F.L)			10	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

DC-DC Converter

**25D SERIES**

1Watt

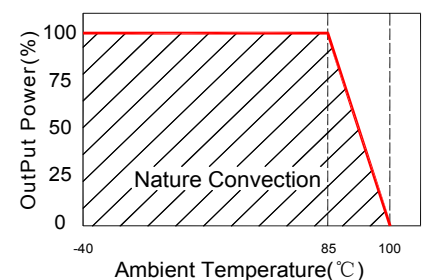
1KV Isolated

Twin Output

DIL14



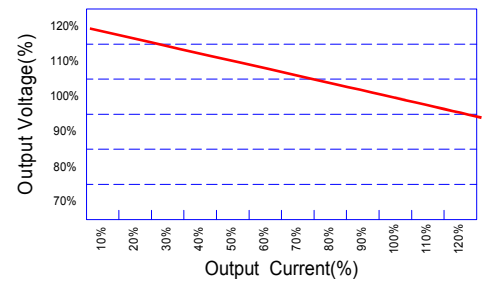
**Temperature Derating Graph**



General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight			2.3 or 2.8		g
Dimensions			20.32x10.16x6.80		mm
Dimensions			20.32x10.16x7.70		mm

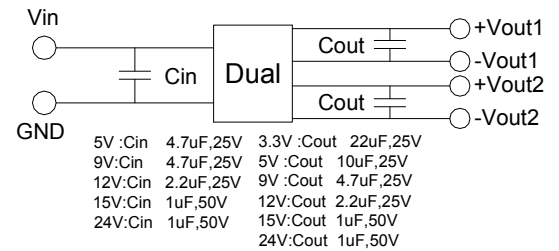
Tolerance Envelope Graph



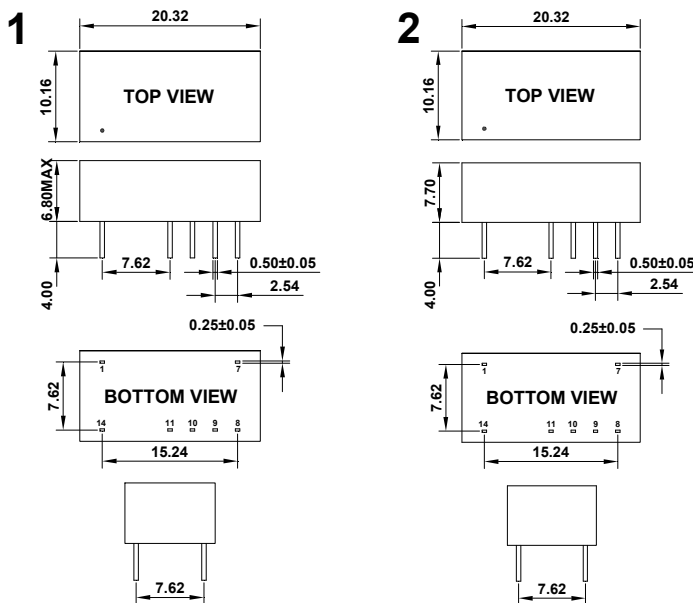
Part Number

25D - 12 D 0505 N NL  
 A B C D E F  
 A:Series  
 B:Input Voltage  
 C:Dual Output  
 D:Output Voltage  
 E:Unregulated(N)  
 F:RoHS Version

Recommended Test Circuit



Markings and dimensions

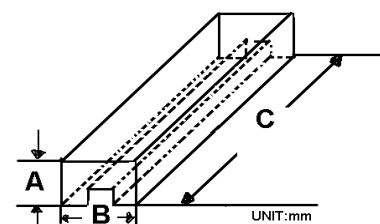


Unit : mm Unless otherwise specified, all tolerances are ±0.25

PIN Connection

PIN	1	7	8	9	10	11	14
Dual	-Vin	NC	-Vout2	+Vout2	-Vout1	+Vout1	+Vin

Packaging



Size(mm)		
A	B	C
13.23	12.30	530

**FEATURES :**

- 14PIN DIL Package
- High Efficiency up to 85%
- Internal SMD Construction
- Unregulated Output Types
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency	Package Style
	Vdc	mA	%Typ	
26D-XXS03NNL	3.3	303	70	1
26D-XXS05NNL	5	200	70	1
26D-XXS09NNL	9	112	75	1
26D-XXS12NNL	12	84	78	1
26D-XXS15NNL	15	67	80	1
26D-XXS24NNL	24	42	82	1
26D-XXD03NNL	±3.3	±150	70	1
26D-XXD05NNL	±5	±100	70	1
26D-XXD09NNL	±9	±56	75	1
26D-XXD12NNL	±12	±42	78	1
26D-XXD15NNL	±15	±34	80	1
26D-XXD24NNL	±24	±21	82	1
26D-XXS03N2NL	3.3	303	70	2
26D-XXS05N2NL	5	200	70	2
26D-XXS09N2NL	9	112	75	2
26D-XXS12N2NL	12	84	78	2
26D-XXS15N2NL	15	67	80	2
26D-XXS24N2NL	24	42	82	2
26D-XXD03N2NL	±3.3	±150	70	2
26D-XXD05N2NL	±5	±100	70	2
26D-XXD09N2NL	±9	±56	75	2
26D-XXD12N2NL	±12	±42	78	2
26D-XXD15N2NL	±15	±34	80	2
26D-XXD24N2NL	±24	±21	82	2

Recognized By UL 60950-1

26D-05S05NNL,26D-05S09NNL,26D-05S12NNL,26D-05S15NNL,26D-05S24NNL,  
26D-24S05NNL,26D-24S24NNL

**Note:**

- 1."XX" Is Input Voltage:03 = 3.3Vdc,05=5Vdc,09=9Vdc,12=12Vdc,15=15Vdc,24=24Vdc,.
2. The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

DC-DC Converter

**26D SERIES**

1Watt

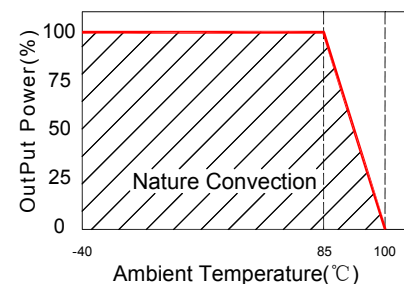
3KV Isolated

Single & Dual Output

DIL14



**Temperature Derating Graph**



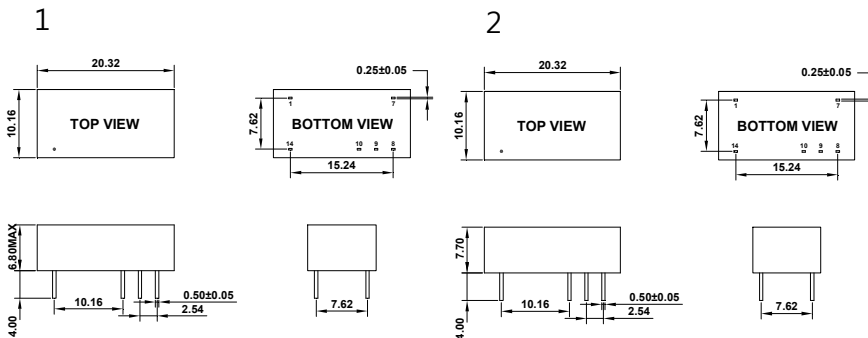
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Short Term			1	Sec
Line Regulation	For 1.0% OF Vin		1.2		%
Load Regulation	3.3V,5V (10% To 100% F.L)			15	%
Load Regulation	9V,12V,15V,24V (10% To 100% F.L.)			10	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	3500000			Hours
Weight	Package 1 or Package 2		2.3 or 3.0		g
Dimensions	Package 1		20.32x10.16x6.80		mm
Dimensions	Package 2		20.32x10.16x7.70		mm

**Markings and Dimensions**

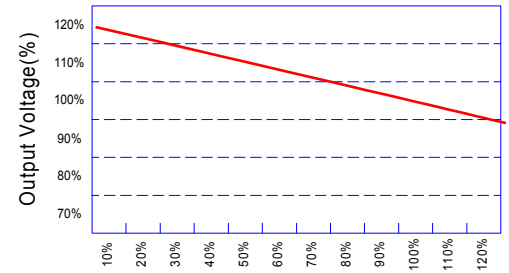


Unit : mm Unless otherwise specified, all tolerances are ±0.25

**PIN Connection**

PIN	1	7	8	9	10	14
Single	-Vin	NC	+Vout	No Pin	-Vout	+Vin
Dual	-Vin	NC	+Vout	Com	-Vout	+Vin

**Tolerance Envelope Graph**

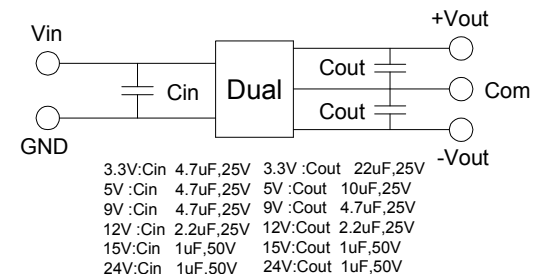
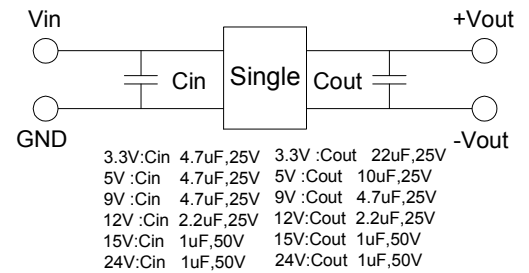


**Part Number**

26D - 05 S 05 N 2 NL  
A B C D E F G

- A:Series
- B:Input Voltage
- C:Single(S)Dual(D)
- D:Output Voltage
- E:Unregulated(N)
- F:Package
- G:RoHS Version

**Recommended Test Circuit**





**FEATURES :**

- 2:1Wide Input Voltages Range
- High Efficiency up to 85%
- Regulated Output Types
- Low Ripple And Noise
- Internal SMD Construction
- 1KVDC & 3KVDC Isolation
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout
- Continuous Short Circuit Protection With Current Foldback

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Output Voltage	Output Current	Efficiency
	Vdc	Vdc	mA	%TYP
27D-05S05R (NL/3KV)	5-9	5	400	65
27D-05S09R (NL/3KV)	5-9	9	222	70
27D-05S12R (NL/3KV)	5-9	12	167	70
27D-05S15R (NL/3KV)	5-9	15	133	70
27D-05S24R (NL/3KV)	5-9	24	84	70
27D-12S05R (NL/3KV)	9-18	5	400	70
27D-12S09R (NL/3KV)	9-18	9	222	80
27D-12S12R (NL/3KV)	9-18	12	167	80
27D-12S15R (NL/3KV)	9-18	15	133	80
27D-12S24R (NL/3KV)	9-18	24	84	80
27D-24S05R (NL/3KV)	18-36	5	400	75
27D-24S09R (NL/3KV)	18-36	9	222	80
27D-24S12R (NL/3KV)	18-36	12	167	80
27D-24S15R (NL/3KV)	18-36	15	133	80
27D-24S24R (NL/3KV)	18-36	24	84	80
27D-48S05R (NL/3KV)	36-72	5	400	70
27D-48S09R (NL/3KV)	36-72	9	222	80
27D-48S12R (NL/3KV)	36-72	12	167	80
27D-48S15R (NL/3KV)	36-72	15	133	80
27D-48S24R (NL/3KV)	36-72	24	84	80

**NOTE :**

No suffix is standard isolation (1KVDC) e.g. 27D-12S05RNL ,  
 \*add suffix /3KV for 3KVDC isolation, e.g. 27D-12S05R3KV

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types	Vo, Io Nom			2:1	
Filter	Capacitor				



DC-DC Converter

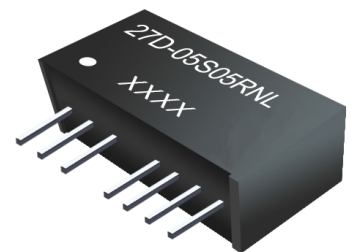
**27D-Single SERIES**

2Watt 1KV & 3KV Isolated

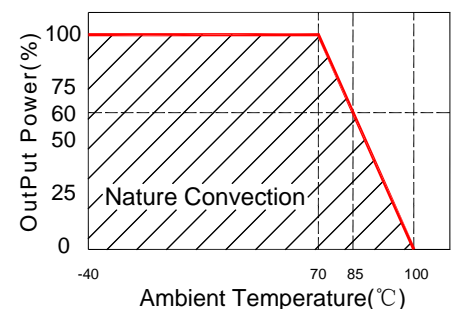
2 : 1 Input Voltage Range

Single Output

SIP7



**Temperature Derating Graph**



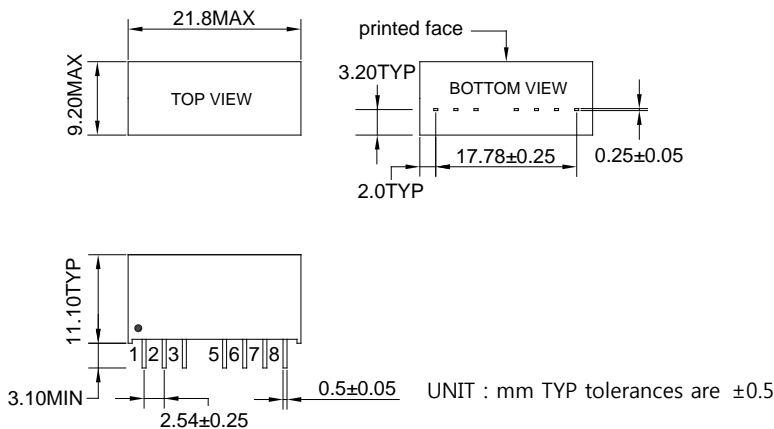
Output Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±3	%
Short Circuit Protection	Continuous				
Line Regulation	Regulated			±0.5	%
Load Regulation	Regulated			±0.8	%
Ripple & Noise	Output:5V-9V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output:12-24V TYPES BW=DC To 20MHz		1% of Vout		mVp-p
Transient response setting time	50% load step change		350		us

General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	1500000			Hours
Weight			4.5		g
Dimensions			21.8x9.2x11.1		mm

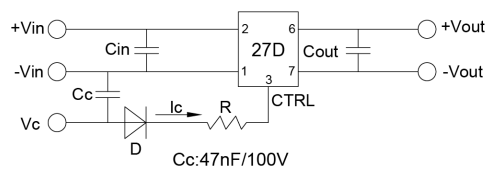
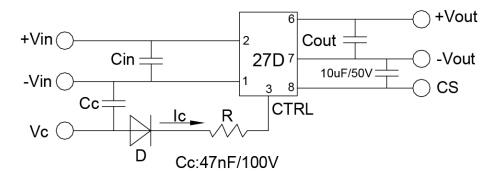
Markings and dimensions



Part Number

27D - 05 S 05 R NL	27D - 05 S 05 R 3KV
A B C D E F	A B C D E F
A:Series	A:Series
B:Input Voltage	B:Input Voltage
C:Single(S)	C:Single Output
D:Output Voltage	D:Output Voltage
E:Regulated(R)	E:Regulated(R)
F:RoHS Version	F:Isolation Voltage

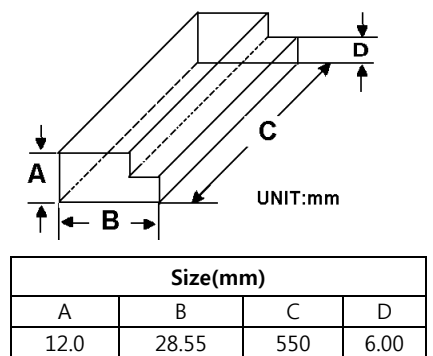
Recommended Test Circuit



5V:Cin 10uF,25V	5V:Cout 100uF/25V
12V:Cin 10uF,50V	9V:Cout 100uF/25V
24V:Cin 10uF,100V	12V:Cout 100uF/25V
48V:Cin 10uF,100V	15V:Cout 100uF/50V
	24V:Cout 100uF/50V

- When open or high impedance, the converter works well; when this pin is 'high', the converter shut down. It should be note that the input current should be between 5-10mA, exceeding the maximum 20mA will cause permanent damage to the converter.
- To make sure the product work at perfect operation status with full loading external capacitor is necessary and it is recommended to use high frequency low resistance electrolytic capacitor.

Packaging



PIN Connection

Pin	1	2	3	5	6	7	8
1KV	-Vin	+Vin	Ctrl-Control input can (can be left open)	NE-No external connection allowed	+Vout	-Vout	CS Optional External capacitor
3KV	-Vin	+Vin	Ctrl-Control input can (can be left open)	No Pin	+Vout	-Vout	NC

**FEATURES :**

- 2:1Wide Input Voltages Range
- High Efficiency up to 85%
- Regulated Output Types
- Low Ripple And Noise
- Internal SMD Construction
- 1KVDC & 3KVDC Isolation
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout
- Continuous Short Circuit Protection With Current Foldback

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Intput Voltage	Output Voltage	Output Current	Efficiency
	Vdc	Vdc	mA	%TYP
27D-05D05R (NL/3KV)	5-9	±5	±200	65
27D-05D09R (NL/3KV)	5-9	±9	±111	70
27D-05D12R (NL/3KV)	5-9	±12	±84	70
27D-05D15R (NL/3KV)	5-9	±15	±67	70
27D-05D24R (NL/3KV)	5-9	±24	±42	80
27D-12D05R (NL/3KV)	9-18	±5	±200	70
27D-12D09R (NL/3KV)	9-18	±9	±111	80
27D-12D12R (NL/3KV)	9-18	±12	±84	80
27D-12D15R (NL/3KV)	9-18	±15	±67	80
27D-12D24R (NL/3KV)	9-18	±24	±42	80
27D-24D05R (NL/3KV)	18-36	±5	±200	75
27D-24D09R (NL/3KV)	18-36	±9	±111	80
27D-24D12R (NL/3KV)	18-36	±12	±84	80
27D-24D15R (NL/3KV)	18-36	±15	±67	80
27D-24D24R (NL/3KV)	18-36	±24	±42	80
27D-48D05R (NL/3KV)	36-72	±5	±200	70
27D-48D09R (NL/3KV)	36-72	±9	±111	80
27D-48D12R (NL/3KV)	36-72	±12	±84	80
27D-48D15R (NL/3KV)	36-72	±15	±67	80
27D-48D24R (NL/3KV)	36-72	±24	±42	80

**NOTE:**

No suffix is standard isolation (1KVDC) e.g, 27D-12D05RNL ,  
 \*add suffix /3KV for 3KVDC isolation, e.g, 27D-12D05R3KV

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types	Vo, Io Nom			2:1	
Filter	Capacitor				



DC-DC Converter

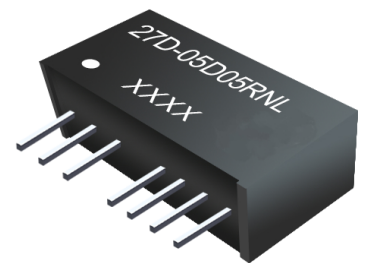
27D-Dual SERIES

2Watt 1KV & 3KV Isolated

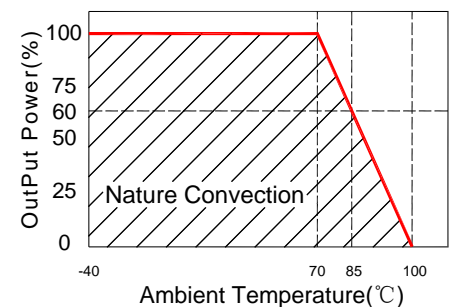
2 : 1 Input Voltage Range

Dual Output

SIP7



Temperature Derating Graph



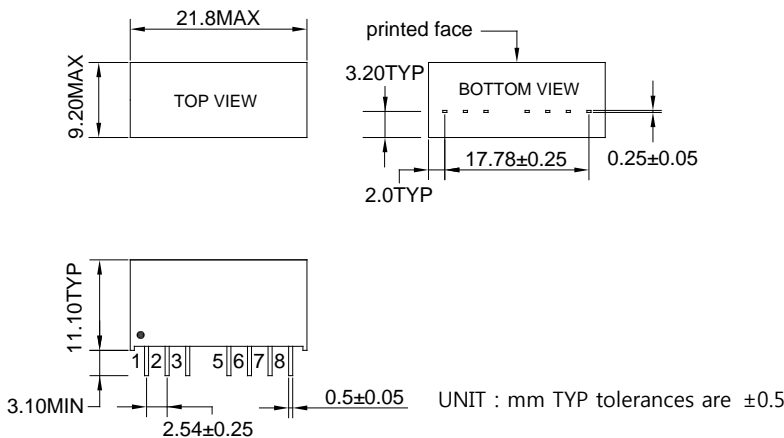
Output Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±3	%
Short Circuit Protection	Continuous				
Line Regulation	Regulated			±0.5	%
Load Regulation	Regulated			±0.8	%
Ripple & Noise	Output:5V-9V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output:12-24V TYPES BW=DC To 20MHz		1%	of Vout	mVp-p
Transient response setting time	50% load step change		350		us

General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	1500000			Hours
Weight			4.5		g
Dimensions			21.8x9.2x11.1		mm

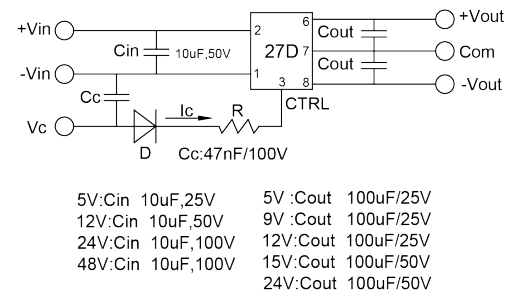
Markings and dimensions



Part Number

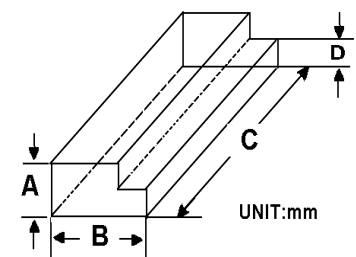
27D - 05 D 05 R NL	27D - 05 D 05 R 3KV
A B C D E F	A B C D E F
A:Series	A:Series
B:Input Voltage	B:Input Voltage
C: Dual(D)	C: Dual Output
D: Output Voltage	D: Output Voltage
E: Regulated(R)	E: Regulated(R)
F: RoHS Version	F: Isolation Voltage

Recommended Test Circuit



1. When open or high impedance, the converter works well; when this pin is 'high', the converter shut down. It should be note that the input current should be between 5-10mA, exceeding the maximum 20mA will cause permanent damage to the converter.
2. To make sure the product work at perfect operation status with full loading external capacitor is necessary and it is recommended to use high frequency low resistance electrolytic capacitor.

Packaging



Size(mm)			
A	B	C	D
12.0	28.55	550	6.00

PIN Connection

Pin	1	2	3	5	6	7	8
1KV	-Vin	+Vin	Ctrl-Control input can (can be left open)	NE-No external connection allowed	+Vout	COM	-Vout
3KV	-Vin	+Vin	Ctrl-Control input can (can be left open)	No Pin	+Vout	COM	-Vout

**FEATURES :**

- 2:1Wide Input Voltages Range
- High Efficiency up to 80%
- Regulated Output Types
- Low Ripple And Noise
- Internal SMD Construction
- 1.5KVDC & 3KVDC Isolation
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout
- Continuous Short Circuit Protection With Current Foldback

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Output Voltage	Output Current	Efficiency
	Vdc	Vdc	mA	%TYP
27D-12S03R3W (3KV)	9-18	3.3	909	70
27D-12S05R3W (3KV)	9-18	5	600	70
27D-12S09R3W (3KV)	9-18	9	333	75
27D-12S12R3W (3KV)	9-18	12	250	78
27D-12S15R3W (3KV)	9-18	15	200	80
27D-24S03R3W (3KV)	18-36	3.3	700	68
27D-24S05R3W (3KV)	18-36	5	600	70
27D-24S09R3W (3KV)	18-36	9	333	75
27D-24S12R3W (3KV)	18-36	12	250	78
27D-24S15R3W (3KV)	18-36	15	200	80
27D-48S03R3W (3KV)	36-72	3.3	700	68
27D-48S05R3W (3KV)	36-72	5	600	70
27D-48S09R3W (3KV)	36-72	9	333	75
27D-48S12R3W (3KV)	36-72	12	250	78
27D-48S15R3W (3KV)	36-72	15	200	80

**NOTE :**

No suffix is standard isolation (1.5KVDC) e.g, 27D-12S05R3W  
 \*add suffix /3KV for 3KVDC isolation, e.g, 27D-12S05R3W3KV

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types	Vo, Io Nom			2:1	
Filter	Capacitor				



DC-DC Converter

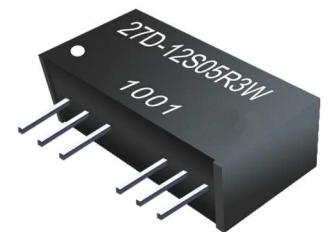
**27D-3W SERIES**

3Watt 1.5KV & 3KV Isolated

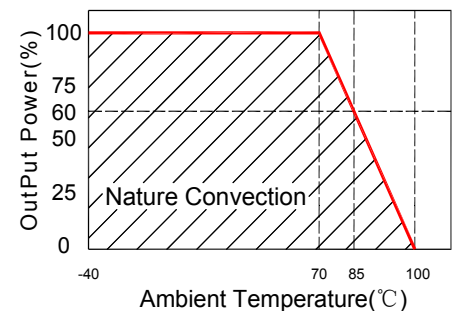
2 : 1 Input Voltage Range

Single Output

SIP8



**Temperature Derating Graph**



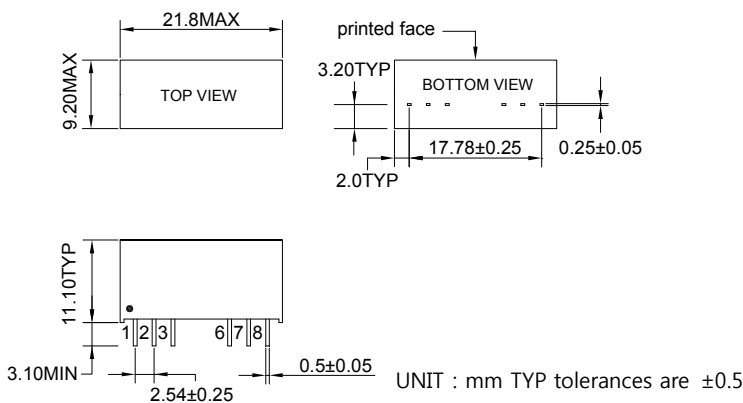
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±3	%
Short Circuit Protection	Continuous				
Line Regulation	Regulated			±0.5	%
Load Regulation	Regulated			±0.8	%
Ripple & Noise	Output:3.3V-9V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output:12-15V TYPES BW=DC To 20MHz		1% of Vout		mVp-p
Transient response setting time	50% load step change		350		us

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	1500000			Hours
Weight			4.5		g
Dimensions			21.8x9.2x11.1		mm

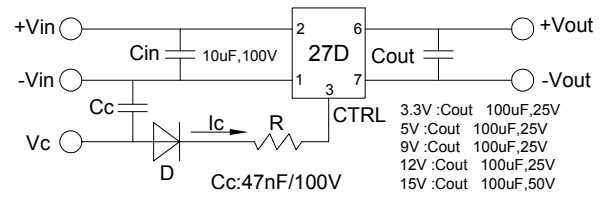
**Markings and dimensions**



**Part Number**

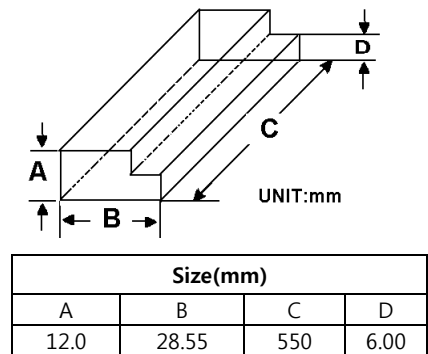
27D - 12 S 05 R 3W 3KV  
 A B C D E F G  
 A:Series  
 B:Input Voltage  
 C:Single Output  
 D:Output Voltage  
 E:Regulated(R)  
 F:Output Power  
 G:Isolation Voltage

**Recommended Test Circuit**



1. When open or high impedance, the converter works well; when this pin is 'high', the converter shut down. It should be note that the input current should be between 5-10mA, exceeding the maximum 20mA will cause permanent damage to the converter.
2. To make sure the product work at perfect operation status with full loading external capacitor is necessary and it is recommended to use high frequency low resistance electrolytic capacitor.

**Packaging**



**PIN Connection**

Pin	1	2	3	6	7	8
Single	-Vin	+Vin	Ctrl-Control input can (can be left open)	+Vout	-Vout	NC

**FEATURES :**

- 2:1Wide Input Voltages Range
- High Efficiency up to 80%
- Regulated Output Types
- Low Ripple And Noise
- Internal SMD Construction
- 1.5KVDC & 3KVDC Isolation
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout
- Continuous Short Circuit Protection With Current Foldback

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Output Voltage	Output Current	Efficiency
	Vdc	Vdc	mA	%TYP
27D-12D05R3W (3KV)	9-18	±5	±300	70
27D-12D09R3W (3KV)	9-18	±9	±167	75
27D-12D12R3W (3KV)	9-18	±12	±125	78
27D-12D15R3W (3KV)	9-18	±15	±100	80
27D-24D05R3W (3KV)	18-36	±5	±300	70
27D-24D09R3W (3KV)	18-36	±9	±167	75
27D-24D12R3W (3KV)	18-36	±12	±125	78
27D-24D15R3W (3KV)	18-36	±15	±100	80
27D-48D05R3W (3KV)	36-72	±5	±300	70
27D-48D09R3W (3KV)	36-72	±9	±167	75
27D-48D12R3W (3KV)	36-72	±12	±125	78
27D-48D15R3W (3KV)	36-72	±15	±100	80

**NOTE :**

No suffix is standard isolation (1.5KVDC) e.g. 27D-12D05R3W  
 \*add suffix /3KV for 3KVDC isolation, e.g. 27D-12D05R3W3KV

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types	Vo, Io Nom			2:1	
Filter	Capacitor				



DC-DC Converter

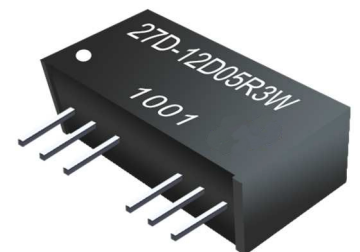
**27D-3W SERIES**

3Watt 1.5KV & 3KV Isolated

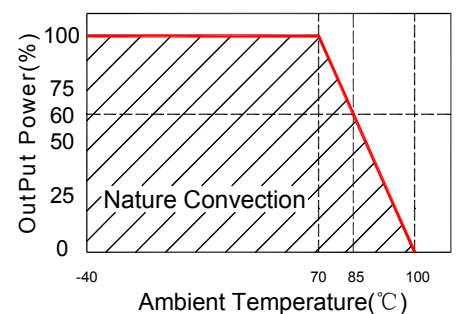
2 : 1 Input Voltage Range

Dual Output

SIP8



**Temperature Derating Graph**



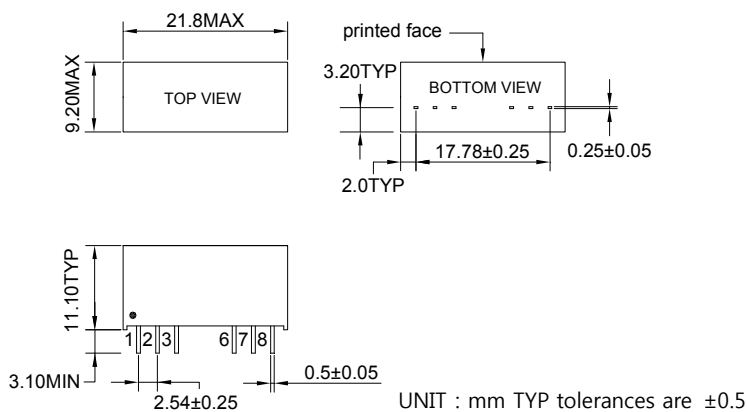
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±3	%
Short Circuit Protection	Continuous				
Line Regulation	Regulated			±0.5	%
Load Regulation	Regulated			±0.8	%
Ripple & Noise	Output:5-9V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output:12-15V TYPES BW=DC To 20MHz		1% of Vout		mVp-p
Transient response setting time	50% load step change		350		us

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	1500000			Hours
Weight			4.5		g
Dimensions			21.8x9.2x11.1		mm

**Markings and dimensions**

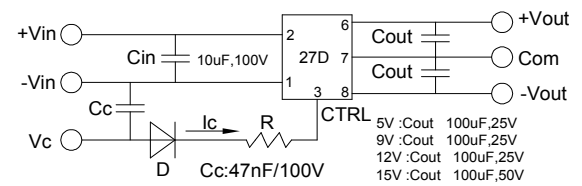


**Part Number**

27D - 12 D 05 R 3W 3KV  
A B C D E F G

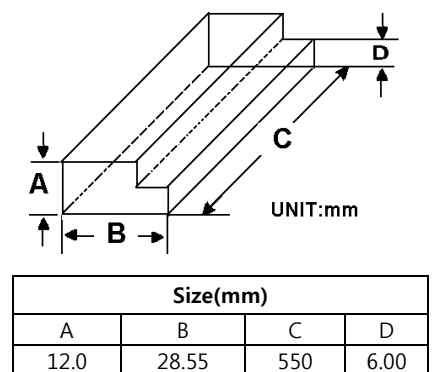
- A:Series
- B:Input Voltage
- C:Dual Output
- D:Output Voltage
- E:Regulated(R)
- F:Output Power
- G:Isolation Voltage

**Recommended Test Circuit**



1. When open or high impedance, the converter works well; when this pin is 'high', the converter shut down. It should be note that the input current should be between 5-10mA, exceeding the maximum 20mA will cause permanent damage to the converter.
2. To make sure the product work at perfect operation status with full loading external capacitor is necessary and it is recommended to use high frequency low resistance electrolytic capacitor.

**Packaging**



**PIN Connection**

Pin	1	2	3	6	7	8
Dual	-Vin	+Vin	Ctrl-Control input can (can be left open)	+Vout	COM	-Vout



**FEATURES :**

- 6W SIP8 Package
- 2:1 Wide Input Voltages Range
- 100% Burned In
- High Efficiency Up To 88%
- Customized Solutions Available
- Remote Control: On/Off
- UL94V-0 Package Material
- RoHS Compliant
- Operating Temperature From -40°C To +85°C
- 3 Years Warranty



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage Range	Nominal Input Voltage	Output Voltage Range	Output Current	Efficiency
	Vdc	Vdc	Vdc	mA	%TYP
27D-12S03R6W	9-18	12	3.3	1500	84
27D-12S05R6W	9-18		5	1200	85
27D-12S09R6W	9-18		9	666	86
27D-12S12R6W	9-18		12	500	87
27D-12S15R6W	9-18		15	400	88
27D-12S24R6W	9-18		24	250	88
27D-24S03R6W	18-36	24	3.3	1500	84
27D-24S05R6W	18-36		5	1200	85
27D-24S09R6W	18-36		9	666	86
27D-24S12R6W	18-36		12	500	87
27D-24S15R6W	18-36		15	400	88
27D-24S24R6W	18-36		24	250	88
27D-48S03R6W	36-72	48	3.3	1500	84
27D-48S05R6W	36-72		5	1200	85
27D-48S09R6W	36-72		9	666	86
27D-48S12R6W	36-72		12	500	87
27D-48S15R6W	36-72		15	400	88
27D-48S24R6W	36-72		24	250	88
27D-12D05R6W	9-18	12	±5	±600	85
27D-12D12R6W	9-18		±12	±250	87
27D-12D15R6W	9-18		±15	±200	87
27D-24D05R6W	18-36	24	±5	±600	85
27D-24D12R6W	18-36		±12	±250	87
27D-24D15R6W	18-36		±15	±200	87
27D-48D05R6W	36-72	48	±5	±600	85
27D-48D12R6W	36-72		±12	±250	87
27D-48D15R6W	36-72		±15	±200	87

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types	Vo, Io Nom			2:1	
Input current at no load (Nominal input voltage)	12V models		60		mA
	24V models		30		
	48V models		15		
Filter	Capacitor				

DC-DC Converter

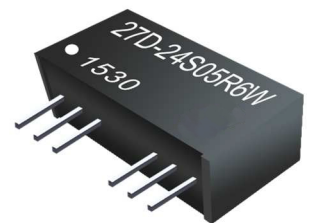
**27D-6W SERIES**

6Watt 1.5KV Isolated

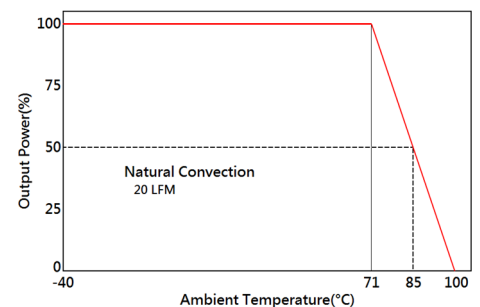
2 : 1 Input Voltage Range

Single & Dual Output

SIP8



**Temperature Derating Graph**



**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±2	%
Short Circuit Protection	Continuous, Auto-Recovery				
Line Regulation				±0.5	%
Load Regulation	Single output models Dual output models			±0.5 ±5	%
Ripple & Noise	Output:3V-10V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output>10V TYPES BW=DC To 20MHz			1% of Vout	mVp-p
Transient response setting time	50% load step change		350		us

**General Specifications**

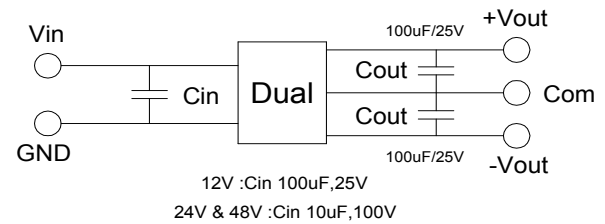
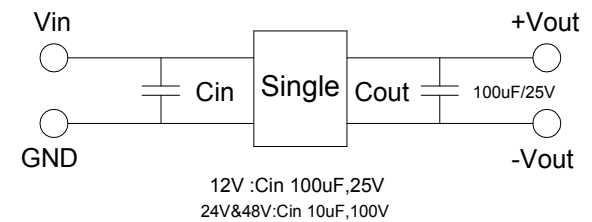
Parameters	Conditions	Min	Typ	Max	Units
Isolation Voltage			1500		Vdc
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		500		KHz
Operating Temperature		-40		85	°C
Storage Temperature		-55		125	°C
Humidity	Non Condensing			95	%
Cooling	Natural Convection (20LFM)				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	1500000			Hours
Weight			4.5		g
Dimensions			21.8x9.2x11.1		mm

**Part Number**

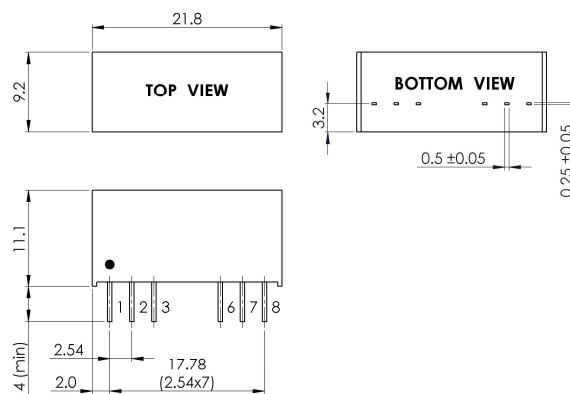
27D- 24 S 05 R 6W  
A B C D E F

- A: Series
- B: Input Voltage
- C: Single Output
- D: Output Voltage
- E: Regulated(R)
- F: Watt

**Recommended Test Circuit**



**Markings and dimensions**



Unit : mm  
Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

**PIN Connection**

Pin	1	2	3	6	7	8
Single	-Vin	+Vin	Ctrl	+Vout	-Vout	NC
Dual	-Vin	+Vin	Ctrl	+Vout	COM	-Vout

**FEATURES :**

- 4:1 Wide Input Voltages Range
- High Efficiency up to 80%
- Regulated Output Types
- Low Ripple And Noise
- Internal SMD Construction
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout
- Continuous Short Circuit Protection With Current Fold back

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage Range	Output Voltage Range	Output Current	Efficiency
	Vdc	Vdc	mA	%TYP
27DW-24S05RNL	9-36	5	400	75
27DW-24S09RNL	9-36	9	222	80
27DW-24S12RNL	9-36	12	167	80
27DW-24S15RNL	9-36	15	133	80
27DW-24S24RNL	9-36	24	84	80
27DW-48S05RNL	18-75	5	400	70
27DW-48S09RNL	18-75	9	222	80
27DW-48S12RNL	18-75	12	167	80
27DW-48S15RNL	18-75	15	133	80
27DW-48S24RNL	18-75	24	84	80

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo, Io Nom			4:1	
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±3	%
Short Circuit Protection	Continuous				
Line Regulation	Regulated			±0.5	%
Load Regulation	Regulated			±0.8	%
Ripple & Noise	Output:5-9V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output:12-24V TYPES BW=DC To 20MHz			1% of Vout	mVp-p
Transient response setting time	50% load step change		350		us



DC-DC Converter

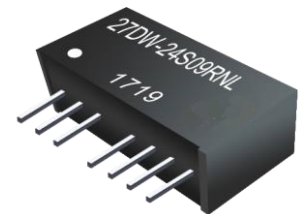
27DW-Single SERIES

2Watt 1KV Isolated

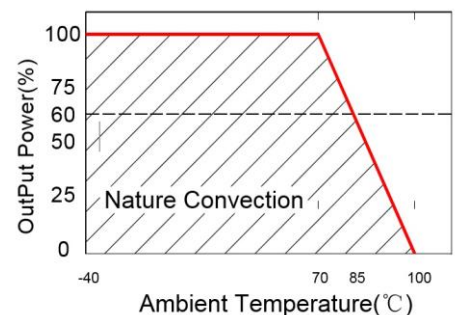
4 : 1 Input Voltage Range

Single Output

SIP8



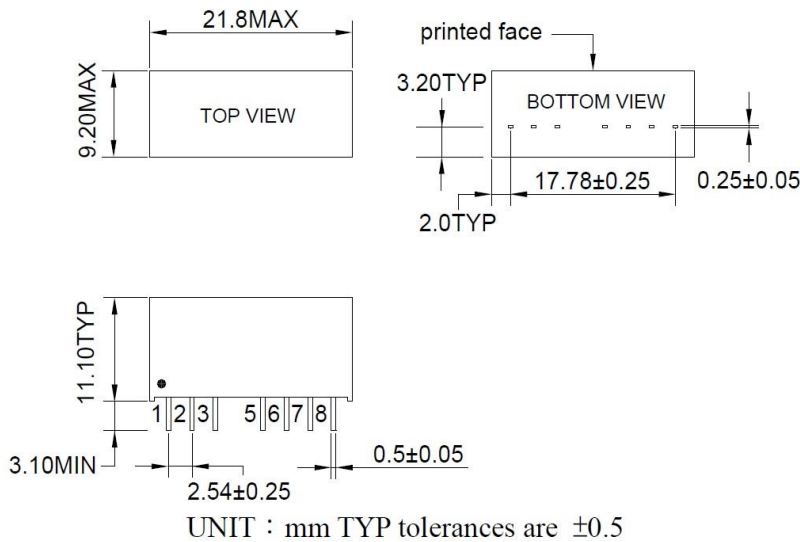
**Temperature Derating Graph**



**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F@25°C	1500000			Hours
Weight			4.5		g
Dimensions			21.8X9.2X11.1		mm

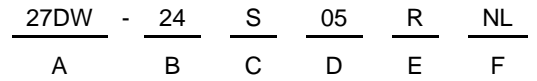
**Markings and dimensions**



**PIN Connection**

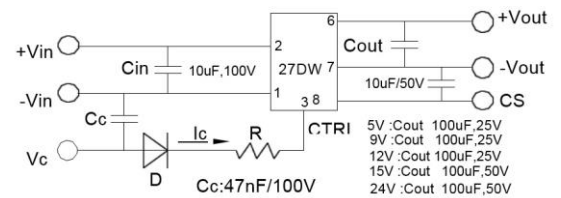
Pin	1	2	3	5	6	7	8
Single	-Vin	+Vin	Ctrl-Control input can (can be left open)	NE-No external connection allowed	+Vout	-Vout	CS Optional External capacitor

**Part Number**



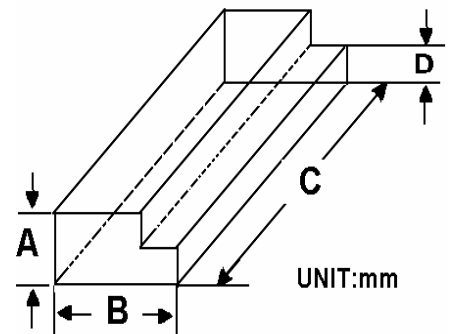
- A : Series
- B : Input Voltage
- C : Single Output
- D : Output Voltage
- E : Regulated(R)
- F : RoHS Version

**Recommended Test Circuit**



- When open or high impedance, the converter works well; when this pin is 'high', the converter shut down. It should be note that the input current should be between 5-10mA, exceeding the maximum 20mA will cause permanent damage to the converter.
- To make sure the product work at perfect operation status with full loading external capacitor is necessary and it is recommended to use high frequency low resistance electrolytic capacitor.

**Packaging**



Size(mm)			
A	B	C	D
12.0	28.55	550	6.00

**FEATURES :**

- 4:1 Wide Input Voltages Range
- High Efficiency up to 80%
- Regulated Output Types
- Low Ripple And Noise
- Internal SMD Construction
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout
- Continuous Short Circuit Protection With Current Fold back

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage Range	Output Voltage Range	Output Current	Efficiency
	Vdc	Vdc	mA	%TYP
27DW-24D05RNL	9-36	±5	±200	75
27DW-24D09RNL	9-36	±9	±111	80
27DW-24D12RNL	9-36	±12	±84	80
27DW-24D15RNL	9-36	±15	±67	80
27DW-24D24RNL	9-36	±24	±42	80
27DW-48D05RNL	18-75	±5	±200	70
27DW-48D09RNL	18-75	±9	±111	80
27DW-48D12RNL	18-75	±12	±84	80
27DW-48D15RNL	18-75	±15	±67	80
27DW-48D24RNL	18-75	±24	±42	80

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo, Io Nom			4:1	
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±3	%
Short Circuit Protection	Continuous				
Line Regulation	Regulated			±0.5	%
Load Regulation	Regulated			±0.8	%
Ripple & Noise	Output:5-9V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output:12-24V TYPES BW=DC To 20MHz			1% of Vout	mVp-p
Transient response setting time	50% load step change		350		us



DC-DC Converter

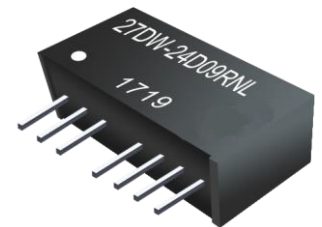
27DW-Dual SERIES

2Watt 1KV Isolated

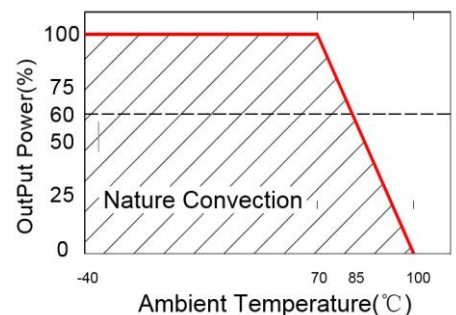
4 : 1 Input Voltage Range

Dual Output

SIP8



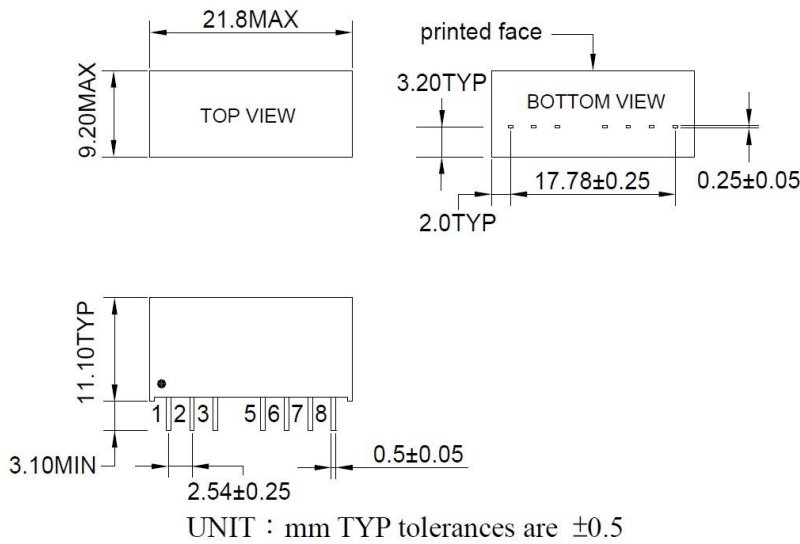
**Temperature Derating Graph**



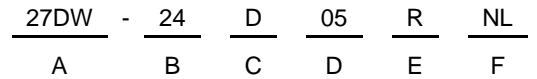
General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F@25°C	1500000			Hours
Weight			4.5		g
Dimensions			21.8X9.2X11.1		mm

Markings and dimensions

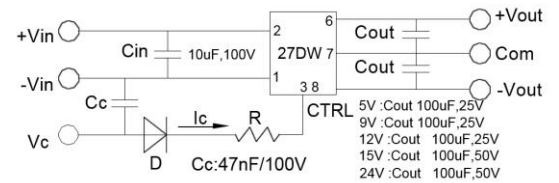


Part Number



- A : Series
- B : Input Voltage
- C : Dual Output
- D : Output Voltage
- E : Regulated(R)
- F : RoHS Version

Recommended Test Circuit

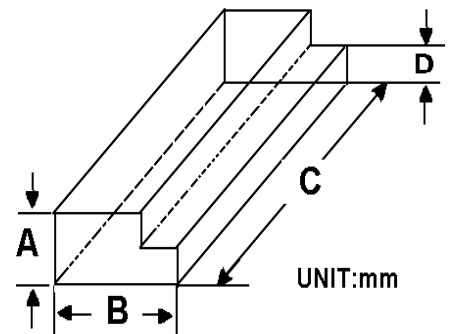


- When open or high impedance, the converter works well; when this pin is 'high', the converter shut down. It should be note that the input current should be between 5-10mA, exceeding the maximum 20mA will cause permanent damage to the converter.
- To make sure the product work at perfect operation status with full loading external capacitor is necessary and it is recommended to use high frequency low resistance electrolytic capacitor.

PIN Connection

Pin	1	2	3	5	6	7	8
Dual	-Vin	+Vin	Ctrl-Control input can (can be left open)	NE-No external connection allowed	+Vout	Com	-Vout

Packaging



Size(mm)			
A	B	C	D
12.0	28.55	550	6.00

**FEATURES :**

- 4:1Wide Input Voltages Range
- High Efficiency up to 80%
- Regulated Output Types
- Low Ripple And Noise
- Internal SMD Construction
- 1.5KVDC & 3KVDC Isolation
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout
- Continuous Short Circuit Protection With Current Foldback

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Output Voltage	Output Current	Efficiency
	Vdc	Vdc	mA	%TYP
27DW-24S03R3W (3KV)	9-36	3.3	700	68
27DW-24S05R3W (3KV)	9-36	5	600	70
27DW-24S09R3W (3KV)	9-36	9	333	75
27DW-24S12R3W (3KV)	9-36	12	250	78
27DW-24S15R3W (3KV)	9-36	15	200	80
27DW-48S03R3W (3KV)	18-75	3.3	700	68
27DW-48S05R3W (3KV)	18-75	5	600	70
27DW-48S09R3W (3KV)	18-75	9	333	75
27DW-48S12R3W (3KV)	18-75	12	250	78
27DW-48S15R3W (3KV)	18-75	15	200	80

**NOTE :**

No suffix is standard isolation (1.5KVDC) e.g, 27DW-24S05R3W  
 \*add suffix /3KV for 3KVDC isolation, e.g, 27DW-24S05R3W3KV

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types	Vo, Io Nom			4:1	
Filter	Capacitor				



DC-DC Converter

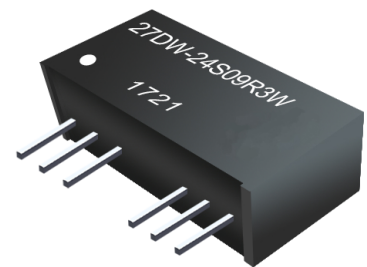
**27DW-3W SERIES**

3Watt 1.5KV & 3KV Isolated

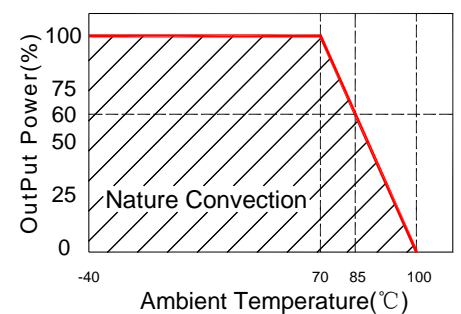
4 : 1 Input Voltage Range

Single Output

SIP8



**Temperature Derating Graph**



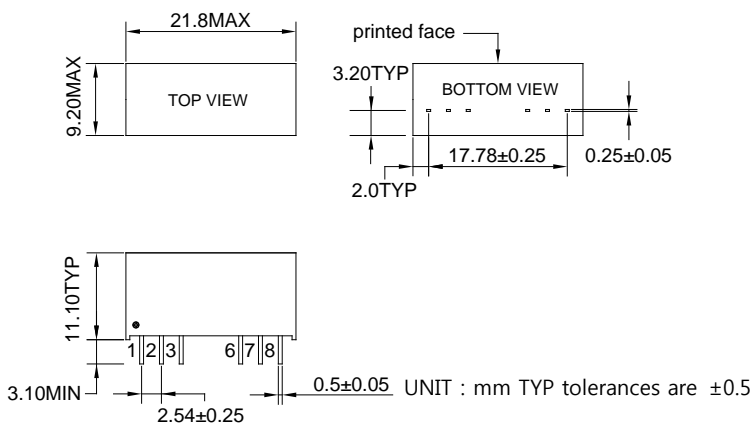
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±3	%
Short Circuit Protection	Continuous				
Line Regulation	Regulated			±0.5	%
Load Regulation	Regulated			±0.8	%
Ripple & Noise	Output:3.3V-9V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output:12-15V TYPES BW=DC To 20MHz		1% of Vout		mVp-p
Transient response setting time	50% load step change		350		us

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	1500000			Hours
Weight			4.5		g
Dimensions			21.8x9.2x11.1		mm

**Markings and dimensions**

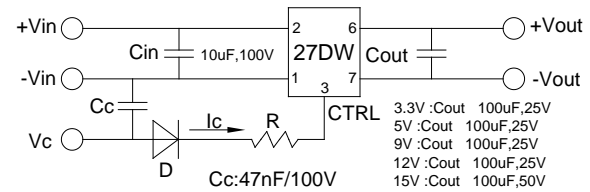


**Part Number**

27DW - 24 S 05 R 3W 3KV  
A B C D E F G

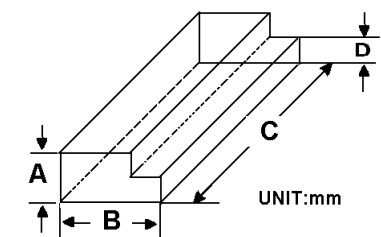
A:Series  
B:Input Voltage  
C:Single Output  
D:Output Voltage  
E:Regulated(R)  
F:Output Power  
G:Isolation Voltage

**Recommended Test Circuit**



1. When open or high impedance, the converter works well; when this pin is 'high', the converter shut down. It should be note that the input current should be between 5-10mA, exceeding the maximum 20mA will cause permanent damage to the converter.
2. To make sure the product work at perfect operation status with full loading external capacitor is necessary and it is recommended to use high frequency low resistance electrolytic capacitor.

**Packaging**



Size(mm)			
A	B	C	D
12.0	28.55	550	6.00

**PIN Connection**

Pin	1	2	3	6	7	8
Single	-Vin	+Vin	Ctrl-Control input can (can be left open)	+Vout	-Vout	NC



**FEATURES :**

- 4:1Wide Input Voltages Range
- High Efficiency up to 80%
- Regulated Output Types
- Low Ripple And Noise
- Internal SMD Construction
- 1.5KVDC & 3KVDC Isolation
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout
- Continuous Short Circuit Protection With Current Foldback

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Output Voltage	Output Current	Efficiency
	Vdc	Vdc	mA	%TYP
27DW-24D05R3W (3KV)	9-36	±5	±300	70
27DW-24D09R3W (3KV)	9-36	±9	±167	75
27DW-24D12R3W (3KV)	9-36	±12	±125	78
27DW-24D15R3W (3KV)	9-36	±15	±100	80
27DW-48D05R3W (3KV)	18-75	±5	±300	70
27DW-48D09R3W (3KV)	18-75	±9	±167	75
27DW-48D12R3W (3KV)	18-75	±12	±125	78
27DW-48D15R3W (3KV)	18-75	±15	±100	80

**NOTE :**

No suffix is standard isolation (1.5KVDC) e.g, 27DW-24D05R3W  
 \*add suffix /3KV for 3KVDC isolation, e.g, 27DW-24D05R3W3KV

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types	Vo, Io Nom			4:1	
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±3	%
Short Circuit Protection	Continuous				
Line Regulation	Regulated			±0.5	%
Load Regulation	Regulated			±0.8	%
Ripple & Noise	Output:5-9V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output:12-15V TYPES BW=DC To 20MHz		1%		of Vout mVp-p
Transient response setting time	50% load step change		350		us



**DC-DC Converter**

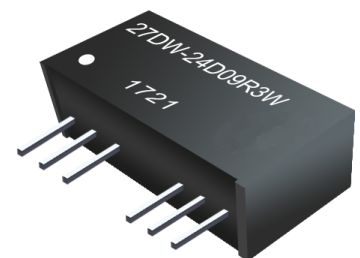
**27DW-3W SERIES**

3Watt 1.5KV & 3KV Isolated

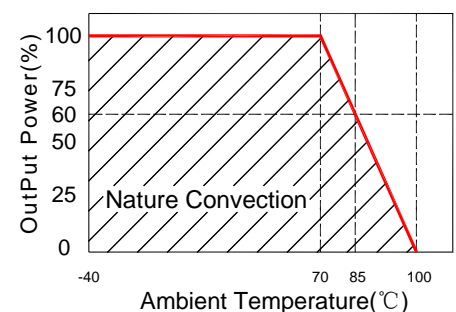
4 : 1 Input Voltage Range

Dual Output

SIP8



**Temperature Derating Graph**



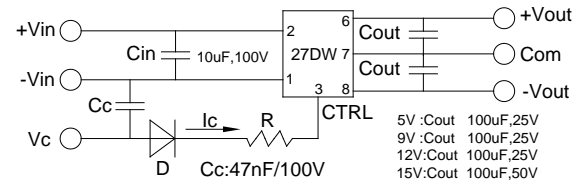
**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	1500000			Hours
Weight			4.5		g
Dimensions			21.8x9.2x11.1		mm

**Part Number**

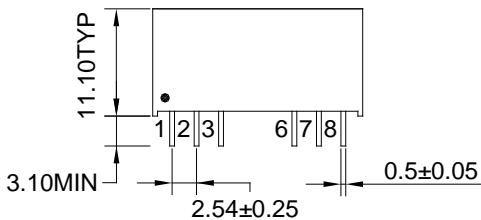
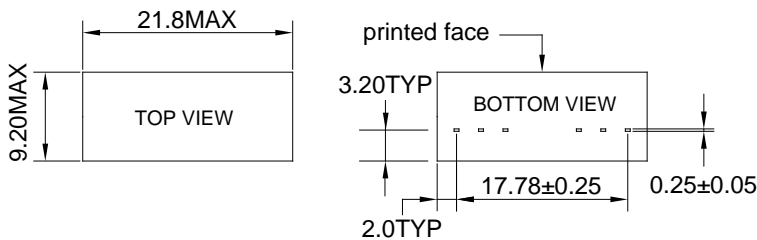
27DW - 24 D 05 R 3W 3KV  
 A B C D E F G  
 A:Series  
 B:Input Voltage  
 C:Dual Output  
 D:Output Voltage  
 E:Regulated(R)  
 F:Output Power  
 G:Isolation Voltage

**Recommended Test Circuit**



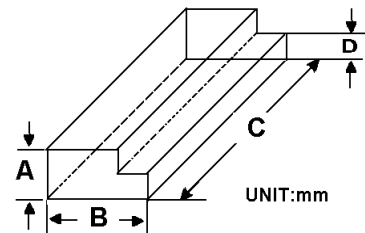
1. When open or high impedance, the converter works well; when this pin is 'high', the converter shut down. It should be note that the input current should be between 5-10mA, exceeding the maximum 20mA will cause permanent damage to the converter.
2. To make sure the product work at perfect operation status with full loading external capacitor is necessary and it is recommended to use high frequency low resistance electrolytic capacitor.

**Markings and dimensions**



UNIT : mm TYP tolerances are ±0.5

**Packaging**



Size(mm)			
A	B	C	D
12.0	28.55	550	6.00

**PIN Connection**

Pin	1	2	3	6	7	8
Dual	-Vin	+Vin	Ctrl-Control input can (can be left open)	+Vout	COM	-Vout

**FEATURES :**

- 6W SIP8 Package
- 4:1 Wide Input Voltages Range
- High Efficiency Up To 88%
- Customized Solutions Available
- Remote Control: On/Off
- Operating Temperature From -40°C To +85°C
- UL94V-0 Package Material
- EMC Standard of EMI EN55032:2012+AC:2013 (Class B) Approved
- EMC Standard of EMS EN55024:2010 Approved



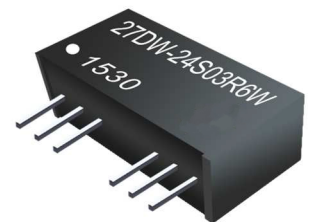
Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage Range	Nominal Input Voltage	Output Voltage Range	Output Current	Efficiency
	Vdc	Vdc	Vdc	mA	%TYP
27DW-24S03R6W	9-36	24	3.3	1500	81
27DW-24S05R6W	9-36		5	1200	84
27DW-24S09R6W	9-36		9	666	86
27DW-24S12R6W	9-36		12	500	87
27DW-24S15R6W	9-36		15	400	88
27DW-24S24R6W	9-36		24	250	87
27DW-48S03R6W	18-72	48	3.3	1500	81
27DW-48S05R6W	18-72		5	1200	84
27DW-48S09R6W	18-72		9	666	86
27DW-48S12R6W	18-72		12	500	87
27DW-48S15R6W	18-72		15	400	87
27DW-48S24R6W	18-72		24	250	87
27DW-24D05R6W	9-36	24	±5	±600	84
27DW-24D12R6W	9-36		±12	±250	87
27DW-24D15R6W	9-36		±15	±200	87
27DW-48D05R6W	18-72	48	±5	±600	84
27DW-48D12R6W	18-72		±12	±250	87
27DW-48D15R6W	18-72		±15	±200	87

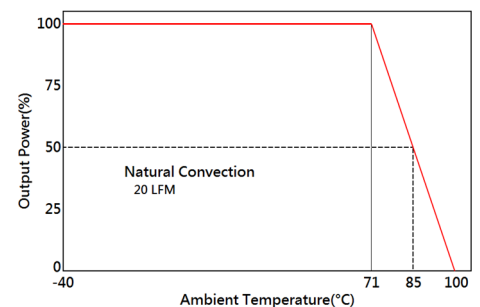
DC-DC Converter

**27DW-6W SERIES**

6Watt 1.5KV Isolated  
4 : 1 Input Voltage Range  
Single & Dual Output  
SIP8



Temperature Derating Graph



**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				4:1	
Input current at no load (Nominal input voltage)	24V models 48V models		30 15		mA
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±2	%
Short Circuit Protection	Continuous, Auto-Recovery				
Line Regulation				±0.5	%
Load Regulation	Single output models Dual output models			±0.5 ±5	%
Ripple & Noise	Output:3V-10V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output>10V TYPES BW=DC To 20MHz			1% of Vout	mVp-p
Transient response setting time	50% load step change		350		us

**General Specifications**

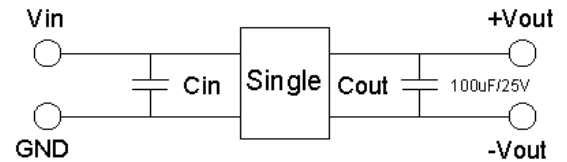
Parameters	Conditions	Min	Typ	Max	Units
Isolation Voltage			1500		Vdc
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		500		KHz
Operating Temperature		-40		85	°C
Storage Temperature		-55		125	°C
Humidity	Non Condensing			95	%
Cooling	Natural Convection (20LFM)				
Case material	DAP				
MTBF	MIL-HDBK-217F @25°C	1500000			Hours
Weight			4.5		g
Dimensions		21.8x9.2x11.1			mm

**Part Number**

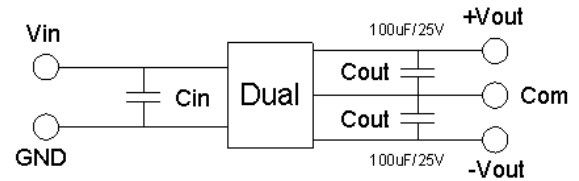
**27DW - 24 S 05 R 6W**  
**A B C D E F**

**A: Series**  
**B: Input Voltage**  
**C: Single Output**  
**D: Output Voltage**  
**E: Regulated(R)**  
**F: Watt**

**Recommended Test Circuit**

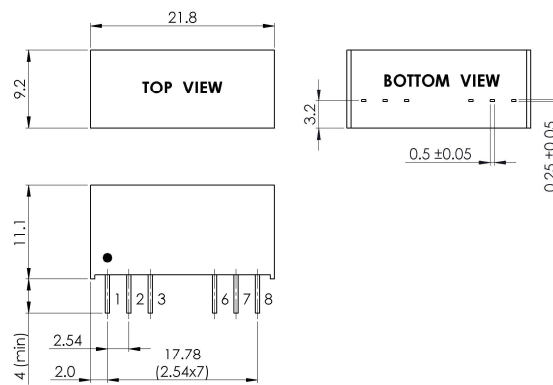


24V&48V: Cin 10uF,100V



24V & 48V :Cin 10uF,100V

**Markings and dimensions**



Unit : mm  
 Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

**PIN Connection**

Pin	1	2	3	6	7	8
Single	-Vin	+Vin	Ctrl	+Vout	-Vout	NC
Dual	-Vin	+Vin	Ctrl	+Vout	COM	-Vout

**FEATURES :**

- 9W SIP8 Package
- 4:1 Wide Input Voltages Range
- High Efficiency up to 89%
- Customized Solutions Available
- Remote Control: On/Off
- Operating Temperature: -40°C TO +75°C
- UL94V-0 Package Material
- EMC Standard of EMI EN55032:2012+AC:2013 (Class B) Approved
- EMC Standard of EMS EN55024:2010 Approved



DC-DC Converter

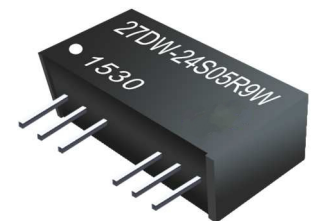
**27DW-9W SERIES**

9Watt 1.6KV Isolated

4 : 1 Input Voltage Range

Single & Dual Output

SIP8



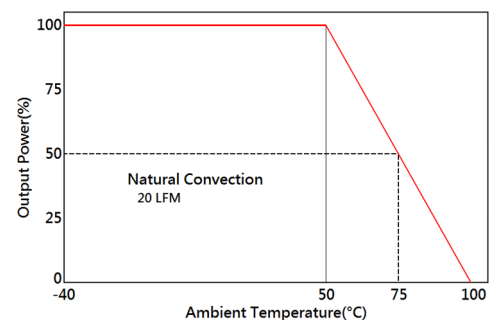
Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage Range	Nominal Input Voltage	Output Voltage Range	Output Current	Efficiency
	Vdc	Vdc	Vdc	mA	%TYP
27DW-24S03R9W	9-36	24	3.3	2000	82
27DW-24S05R9W	9-36		5	1600	85
27DW-24S09R9W	9-36		9	1000	88
27DW-24S12R9W	9-36		12	750	88
27DW-24S15R9W	9-36		15	600	89
27DW-24S24R9W	9-36		24	375	89
27DW-48S03R9W	18-75	48	3.3	2000	82
27DW-48S05R9W	18-75		5	1600	85
27DW-48S09R9W	18-75		9	1000	89
27DW-48S12R9W	18-75		12	750	89
27DW-48S15R9W	18-75		15	600	89
27DW-48S24R9W	18-75		24	375	89
27DW-24D05R9W	9-36	24	±5	±800	86
27DW-24D12R9W	9-36		±12	±375	88
27DW-24D15R9W	9-36		±15	±300	88
27DW-48D05R9W	18-75	48	±5	±800	85
27DW-48D12R9W	18-75		±12	±375	88
27DW-48D15R9W	18-75		±15	±300	87

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types	24VIN(nom)	9	24	36	
	48VIN(nom)	18	48	75	
Input current at no load (Nominal input voltage)	24V models		9		mA
	48V models		4		
Filter	Capacitor				

**Temperature Derating Graph**



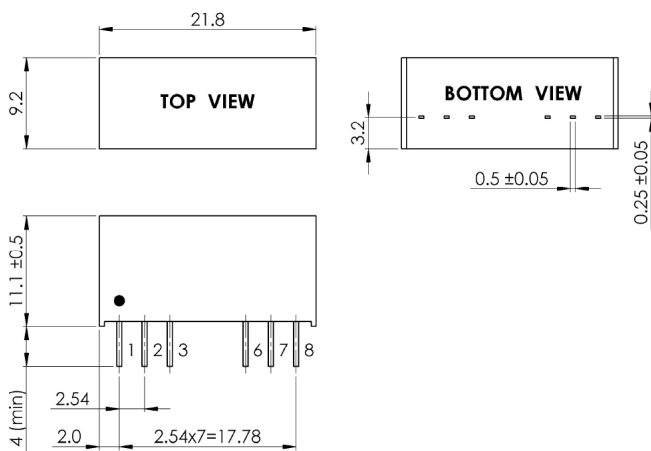
Output Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load	-1.0		+1.0	%
Short Circuit Protection	Continuous, Auto-Recovery				
Line Regulation		-0.5		+0.5	%
Load Regulation	Single output models Dual output models	-0.5 -5.0		+0.5 +5.0	%
Ripple & Noise	Output:3-10V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output > 10V TYPES BW=DC To 20MHz			1% of Vout	mVp-p
Transient response setting time	25% load step change		250		us

General Specifications

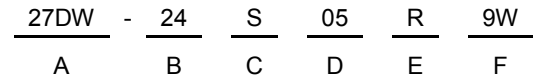
Parameters	Conditions	Min	Typ	Max	Units
Isolation Voltage			1600		Vdc
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency (Full load, nominal input)	Single Dual		400 500		KHz
Operating Temperature	With derating	-40		75	°C
Storage Temperature		-55		125	°C
Humidity	Non Condensing			95	%
Cooling	Natural Convection (20LFM)				
Case material	Plastic				
MTBF	MIL-HDBK-217F@25°C	2.696 x 10 <sup>6</sup>			Hours
Weight			4.8		g
Dimensions		21.8X9.2X11.1			mm

Markings and dimensions



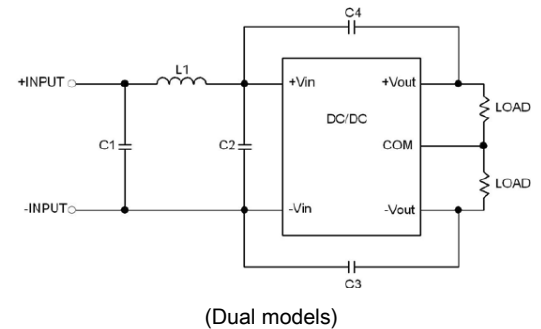
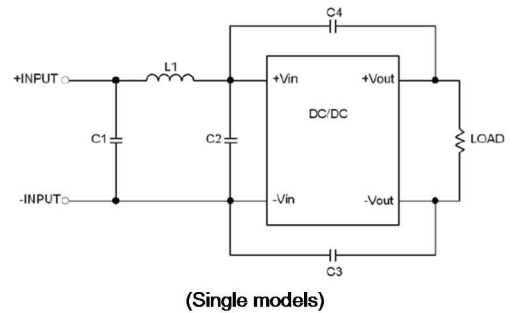
Unit : mm  
Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

Part Number



- A : Series
- B : Input Voltage
- C : Single(S);Dual(D)
- D : Output Voltage
- E : Regulated(R)
- F : Watt

Recommended Test Circuit To Meet EN55022 Class A



PIN Assignment

Pin	1	2	3	6	7	8
Single	-Vin	+Vin	Ctrl	+Vout	-Vout	NC
Dual	-Vin	+Vin	Ctrl	+Vout	Com	-Vout

**FEATURES :**

- 2:1 Wide Input Voltages Range
- 16PIN SMD Package
- High Efficiency up to 85%
- Regulated Output Types
- Internal SMD Construction
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage Range	Output Voltage	Output Current	Efficiency
	Vdc	Vdc	mA	%TYP
28D-05S03R	4.5-9	3.3	500	70
28D-05S05R	4.5-9	5	400	73
28D-05S12R	4.5-9	12	167	75
28D-05S15R	4.5-9	15	133	73
28D-05D05R	4.5-9	±5	±200	70
28D-05D12R	4.5-9	±12	±84	72
28D-05D15R	4.5-9	±15	±67	73
28D-12S03R	9-18	3.3	500	73
28D-12S05R	9-18	5	400	77
28D-12S12R	9-18	12	167	80
28D-12S15R	9-18	15	133	80
28D-12D05R	9-18	±5	±200	73
28D-12D12R	9-18	±12	±84	80
28D-12D15R	9-18	±15	±67	78
28D-24S03R	18-36	3.3	500	73
28D-24S05R	18-36	5	400	80
28D-24S12R	18-36	12	167	84
28D-24S15R	18-36	15	133	85
28D-24D05R	18-36	±5	±200	76
28D-24D12R	18-36	±12	±84	80
28D-24D15R	18-36	±15	±67	82
28D-48S03R	36-75	3.3	500	71
28D-48S05R	36-75	5	400	76
28D-48S12R	36-75	12	167	81
28D-48S15R	36-75	15	133	81
28D-48D05R	36-75	±5	±200	76
28D-48D12R	36-75	±12	±84	79
28D-48D15R	36-75	±15	±67	80

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo, Io Nom			2:1	
Filter	Capacitor				



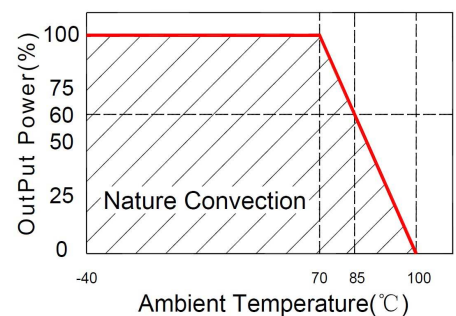
DC-DC Converter

**28D SERIES**

2Watt 1.5KV Isolated  
2 : 1 Input Voltage Range  
Single & Dual Output  
SMD



**Temperature Derating Graph**



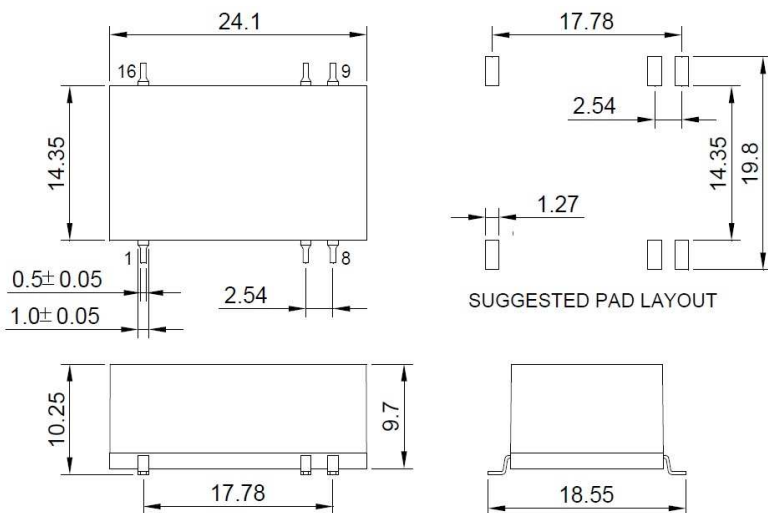
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±2	%
Short Circuit Protection	Continuous				
Line Regulation	Regulated			±0.5	%
Load Regulation	Regulated			±0.8	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

**General Specifications**

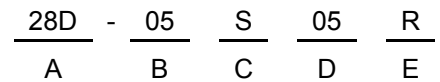
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F@25°C	1000000			Hours
Weight			3.9		g
Dimensions		24.1x14.35x10.25			mm

**Markings and dimensions**



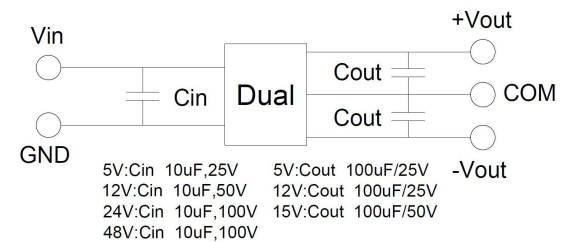
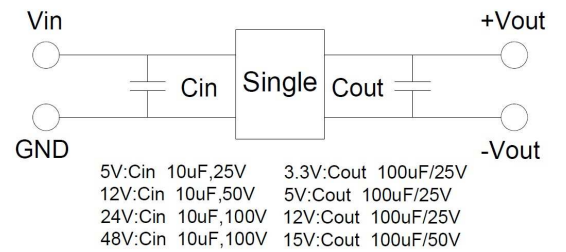
UNIT:mm Unless otherwise specified,all tolerances are ±0.25

**Part Number**



- A : Series
- B : Input Voltage
- C : Single(S);Dual(D)
- D : Output Voltage
- E : Regulated(R)

**Recommended Test Circuit**



**PIN Assignment**

Pin	1	7	8	9	10	16
Single	-Vin	NC	NC	+Vout	-Vout	+Vin
Dual	-Vin	NC	Com	+Vout	-Vout	+Vin



**FEATURES :**

- 2:1 Wide Input Voltages Range
- 16PIN SMD Package
- High Efficiency up to 83%
- Regulated Output Types
- Internal SMD Construction
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage Range	Output Voltage	Output Current	Efficiency
	Vdc	Vdc	mA	%TYP
28D-05S03R1W	4.5-9	3.3	303	68
28D-05S05R1W	4.5-9	5	200	71
28D-05S12R1W	4.5-9	12	84	73
28D-05S15R1W	4.5-9	15	67	71
28D-05D05R1W	4.5-9	±5	±100	68
28D-05D12R1W	4.5-9	±12	±42	70
28D-05D15R1W	4.5-9	±15	±34	71
28D-12S03R1W	9-18	3.3	303	71
28D-12S05R1W	9-18	5	200	75
28D-12S12R1W	9-18	12	84	78
28D-12S15R1W	9-18	15	67	78
28D-12D05R1W	9-18	±5	±100	71
28D-12D12R1W	9-18	±12	±42	78
28D-12D15R1W	9-18	±15	±34	76
28D-24S03R1W	18-36	3.3	303	71
28D-24S05R1W	18-36	5	200	78
28D-24S12R1W	18-36	12	84	82
28D-24S15R1W	18-36	15	67	83
28D-24D05R1W	18-36	±5	±100	74
28D-24D12R1W	18-36	±12	±42	78
28D-24D15R1W	18-36	±15	±34	80
28D-48S03R1W	36-75	3.3	303	70
28D-48S05R1W	36-75	5	200	74
28D-48S12R1W	36-75	12	84	80
28D-48S15R1W	36-75	15	67	80
28D-48D05R1W	36-75	±5	±100	74
28D-48D12R1W	36-75	±12	±42	77
28D-48D15R1W	36-75	±15	±34	78

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo, Io Nom			2:1	
Filter	Capacitor				



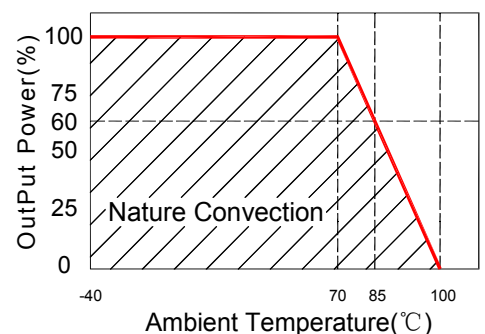
DC-DC Converter

**28D-1W SERIES**

1Watt 1.5KV Isolated  
2 : 1 Input Voltage Range  
Single & Dual Output  
SMD



**Temperature Derating Graph**



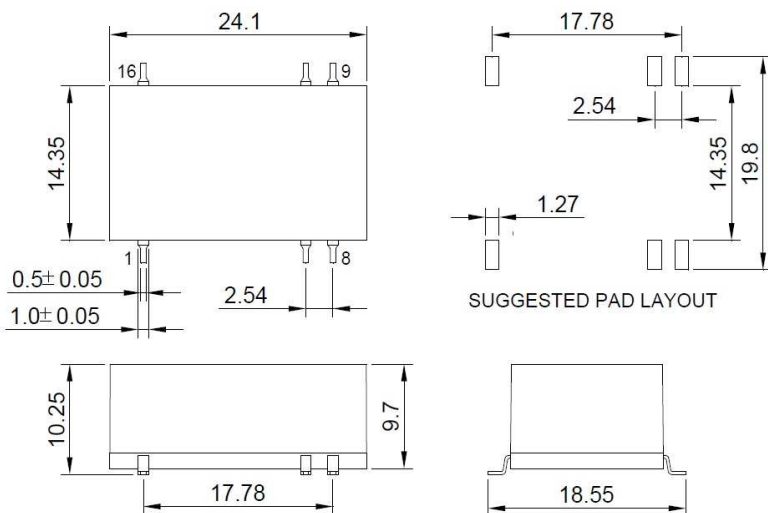
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±2	%
Short Circuit Protection	Continuous				
Line Regulation	Regulated			±0.5	%
Load Regulation	Regulated			±0.8	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

**General Specifications**

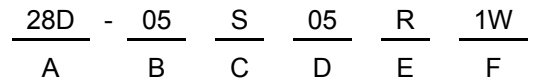
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F@25°C	1000000			Hours
Weight			3.9		g
Dimensions			24.1x14.35x10.25		mm

**Markings and dimensions**



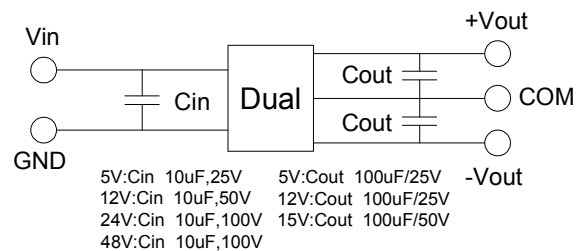
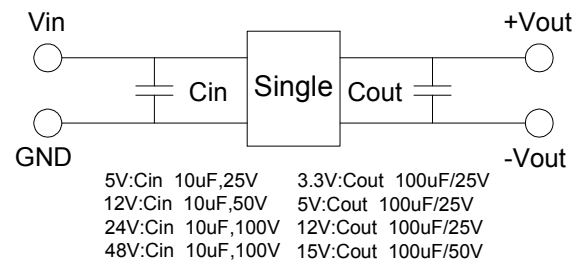
UNIT:mm Unless otherwise specified,all tolerances are ±0.25

**Part Number**



- A : Series
- B : Input Voltage
- C : Single(S);Dual(D)
- D : Output Voltage
- E : Regulated(R)
- F : Output Power

**Recommended Test Circuit**



**PIN Assignment**

Pin	1	7	8	9	10	16
Single	-Vin	NC	NC	+Vout	-Vout	+Vin
Dual	-Vin	NC	Com	+Vout	-Vout	+Vin

**FEATURES :**

- 2:1 Wide Input Voltages Range
- 16PIN SMD Package
- High Efficiency up to 87%
- Regulated Output Types
- Internal SMD Construction
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage Range	Output Voltage	Output Current	Efficiency
	Vdc	Vdc	mA	%TYP
28D-05S03R3W	4.5-9	3.3	700	70
28D-05S05R3W	4.5-9	5	600	75
28D-05S12R3W	4.5-9	12	250	77
28D-05S15R3W	4.5-9	15	200	75
28D-05D05R3W	4.5-9	±5	±300	72
28D-05D12R3W	4.5-9	±12	±125	74
28D-05D15R3W	4.5-9	±15	±100	75
28D-12S03R3W	9-18	3.3	700	75
28D-12S05R3W	9-18	5	600	79
28D-12S12R3W	9-18	12	250	82
28D-12S15R3W	9-18	15	200	82
28D-12D05R3W	9-18	±5	±300	72
28D-12D12R3W	9-18	±12	±125	82
28D-12D15R3W	9-18	±15	±100	80
28D-24S03R3W	18-36	3.3	700	75
28D-24S05R3W	18-36	5	600	80
28D-24S12R3W	18-36	12	250	86
28D-24S15R3W	18-36	15	200	87
28D-24D05R3W	18-36	±5	±300	78
28D-24D12R3W	18-36	±12	±125	82
28D-24D15R3W	18-36	±15	±100	84
28D-48S03R3W	36-75	3.3	700	73
28D-48S05R3W	36-75	5	600	78
28D-48S12R3W	36-75	12	250	83
28D-48S15R3W	36-75	15	200	83
28D-48D05R3W	36-75	±5	±300	78
28D-48D12R3W	36-75	±12	±125	81
28D-48D15R3W	36-75	±15	±100	82

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo, Io Nom			2:1	
Filter	Capacitor				



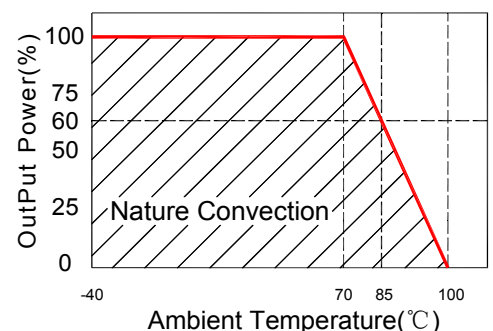
DC-DC Converter

**28D-3W SERIES**

3Watt 1.5KV Isolated  
2 : 1 Input Voltage Range  
Single & Dual Output  
SMD



**Temperature Derating Graph**



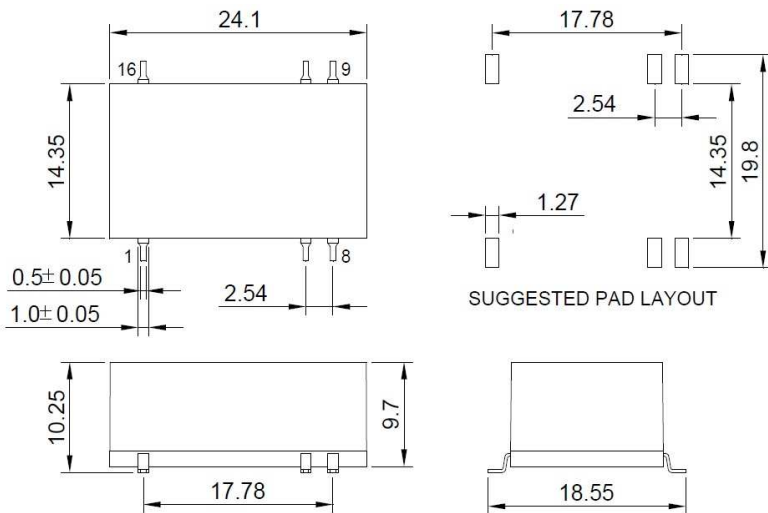
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±2	%
Short Circuit Protection	Continuous				
Line Regulation	Regulated			±0.5	%
Load Regulation	Regulated			±0.8	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

**General Specifications**

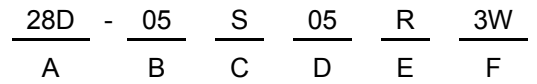
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F@25°C	1000000			Hours
Weight			3.9		g
Dimensions			24.1x14.35x10.25		mm

**Markings and dimensions**



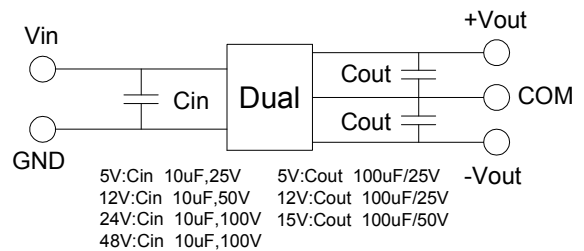
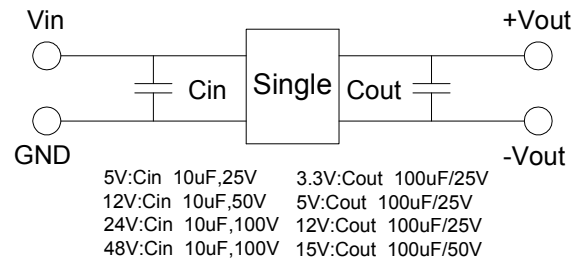
UNIT:mm Unless otherwise specified,all tolerances are ±0.25

**Part Number**



- A : Series
- B : Input Voltage
- C : Single(S);Dual(D)
- D : Output Voltage
- E : Regulated(R)
- F : Output Power

**Recommended Test Circuit**



**PIN Assignment**

Pin	1	7	8	9	10	16
Single	-Vin	NC	NC	+Vout	-Vout	+Vin
Dual	-Vin	NC	Com	+Vout	-Vout	+Vin

**FEATURES :**

- 12PIN SIP Package
- High Efficiency up to 85%
- Unregulated & Regulated Output Types
- Low Ripple & Noise
- Internal SMD Construction
- Industry Standard Pinout
- Operating Temperature:-40°C TO +85°C
- No External Component Required



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency	Recognized By UL 60950-1
	Vdc	mA	%Typ	
30D-XXS05RNL	5	360	58	30D-05S05NNL 30D-05S05RNL 30D-05S24RNL 30D-12S24NNL 30D-15S15NNL 30D-24S05NNL 30D-24S05RNL
30D-XXS05NNL	5	360	70	
30D-XXD05NNL	±5	±180	70	
30D-XXS09RNL	9	200	60	
30D-XXS09NNL	9	200	70	
30D-XXD09NNL	±9	±100	70	
30D-XXS12RNL	12	150	60	
30D-XXS12NNL	12	150	75	
30D-XXD12RNL	±12	±75	60	
30D-XXD12NNL	±12	±75	75	
30D-XXS15RNL	15	120	60	
30D-XXS15NNL	15	120	75	
30D-XXD15RNL	±15	±60	60	
30D-XXD15NNL	±15	±60	75	
30D-XXS24RNL	24	75	60	
30D-XXS24NNL	24	75	80	
30D-XXD24RNL	±24	±38	60	
30D-XXD24NNL	±24	±38	80	

DC-DC Converter

30D SERIES

1.8Watt

0.5KV Isolated

Single & Dual Output

SIP12



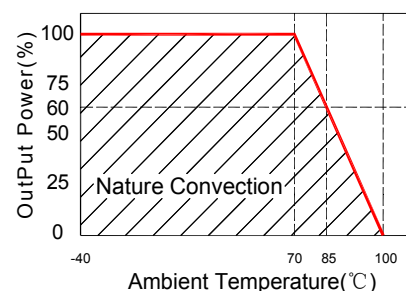
**Note:**

- 1."XX" Is Input Voltage :05=5Vdc,09=9Vdc,12=12Vdc,15=15Vdc,24=24Vdc.
- 2.The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

**Temperature Derating Graph**



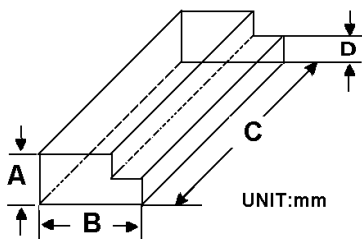
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Regulated (Continuous)				
Short Circuit Protection	Unregulated (Short Trem)			1	Sec
Line Regulation	Regulated			±0.3	%
Load Regulation	Regulated			±0.5	%
Ripple & Noise	BW=DC To 20MHz			50	mVp-p
Line Regulation	Unregulated (For 1% of Vin)		1.2		%
Load Regulation	Unregulated (20% To 100% F.L)			10	%
Transient response setting time	50% load step change		350		us

**General Specifications**

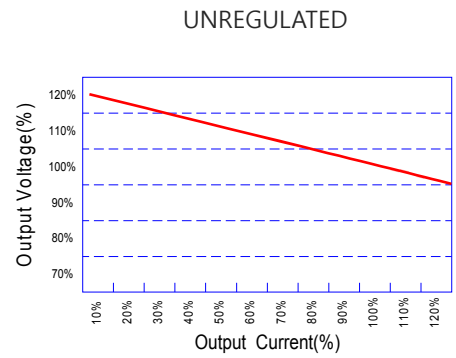
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F@25°C (Unregulated)	2500000			Hours
MTBF	MIL-HDBK-217F@25°C (Regulated)	1500000			Hours
Weight			8.3		g
Dimensions			32.2X9.0X15.2		mm

**Packaging**



Size(mm)			
A	B	C	D
12.0	28.55	550	6.00

**Tolerance Envelope Graph**

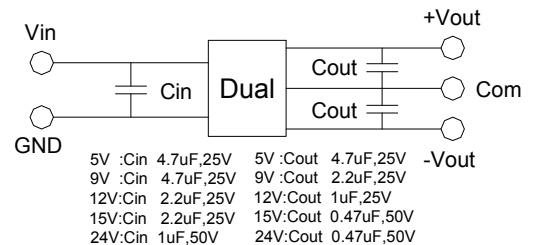
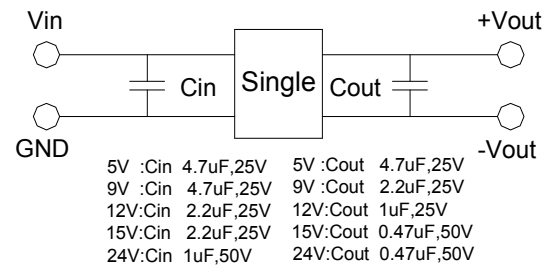


**Part Number**

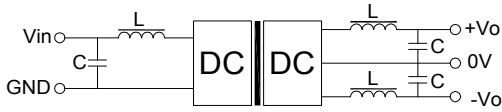
30D - 05 S 05 R NL  
A B C D E F

- A:Series
- B:Input Voltage
- C:Single(S)Dual(D)
- D:Output Voltage
- E:Regulated(R)Unregulated(N)
- F:RoHS Version

**Recommended Test Circuit**



Application Note



<Figure 1>

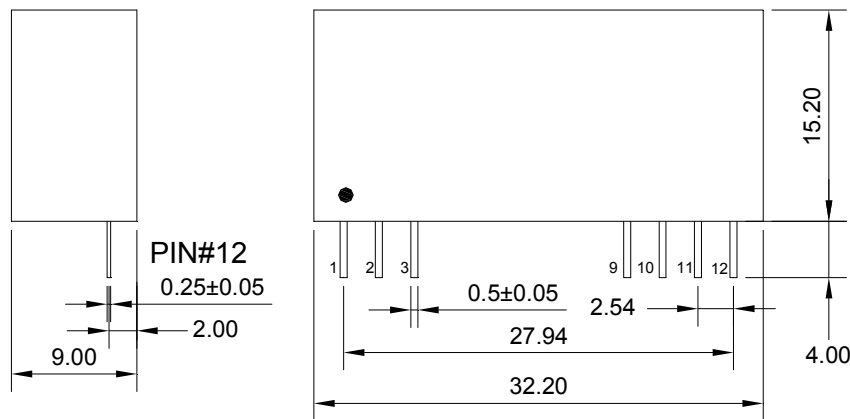
External Capacitor Table

Vin	External capacitor	Vout	External capacitor
5VDC	4.7uF/25V	5VDC	4.7uF/25V
9VDC	4.7uF/25V	9VDC	2.2uF/25V
12VDC	2.2uF/25V	12VDC	1uF/25V
15VDC	2.2uF/25V	15VDC	0.47uF/50V
24VDC	1uF/50V	24VDC	0.47uF/50V

Filtering

In some circuits which are sensitive to noise and ripple, a filtering capacitor may be added to the DC/DC output end and input end to reduce the noise and ripple. However, the capacitance of the output filter capacitor must proper. If the capacitance is too big, a startup problem might arise. For every channel of output, providing the safe and reliable operation is ensured, the greatest capacitance of its filter capacitor refer to the external capacitor table. To get an extreme low ripple, an "LC" filtering network may be connected to the input and output ends of the DC/DC converter, which may produce a more significant filtering effect. It should also be noted that the inductance and the frequency of the "LC" filtering network should be staggered with the DC/DC frequency to avoid mutual interference (see figure 1).

Markings and dimensions



Unit : mm Unless otherwise specified, all tolerances are ±0.25

PIN Connection

PIN	1	2	3	9	10	11	12
Single	+Vin	NC	NC	NC	-Vout	+Vout	-Vin
Dual	+Vin	-Vout	COM	NC	COM	+Vout	-Vin

**FEATURES :**

- 10W SIP PACKAGE
- 4:1 WIDE INPUT RANGE
- 100% BURNED IN
- HIGH EFFICIENCY
- UL94V-0 PACKAGE MATERIAL
- CUSTOMIZED SOLUTIONS AVAILABLE
- RoHS COMPLIANT
- Medical EMC Standard of EMI EN 55011 : 2009 + A1 : 2010 (CLASS A) Approved
- Medical EMC Standard of EMS EN 60601-1-2 : 2015 Approved
- Medical /Industry/ITE Application



DC-DC Converter

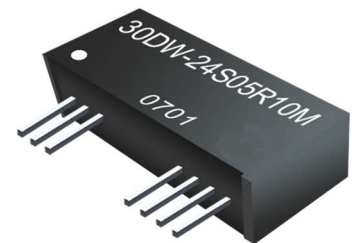
**30DW-10WM SERIES**

10Watt 3KVac Isolated

4 : 1 Input Voltage Range

Single & Dual Output

SIP



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Efficiency
	Vdc	No Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP
30DW-24S03R10WM	9-36	50	503	3.3	2500	80
30DW-24S05R10WM	9-36	50	508	5	2000	82
30DW-24S12R10WM	9-36	30	502	12	833	83
30DW-24S15R10WM	9-36	30	505	15	670	83
30DW-24D05R10WM	9-36	30	502	±5	±1000	83
30DW-24D12R10WM	9-36	30	506	±12	±420	83
30DW-24D15R10WM	9-36	30	512	±15	±340	83
30DW-48S03R10WM	18-75	30	252	3.3	2500	80
30DW-48S05R10WM	18-75	30	254	5	2000	82
30DW-48S12R10WM	18-75	20	251	12	833	83
30DW-48S15R10WM	18-75	20	252	15	670	83
30DW-48D05R10WM	18-75	20	251	±5	±1000	83
30DW-48D12R10WM	18-75	20	253	±12	±420	83
30DW-48D15R10WM	18-75	20	256	±15	±340	83

**Input Specifications**

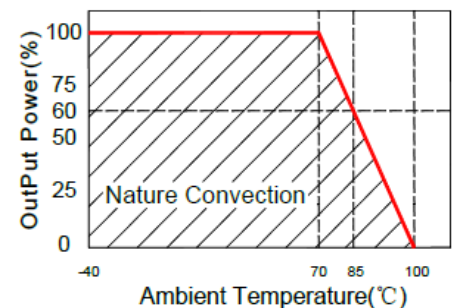
Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				4:1	%
Filter			PI Network		

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic Recovery				
Line Regulation				±0.5	%
Load Regulation	Single Dual(Balance Load)			±0.5	%
Cross Regulation	Dual(25% To 100% Load)			±5	%
Ripple & Noise	Output:3-15V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output > 15V TYPES BW=DC To 20MHz			1% of Vout	mVp-p
Transient response setting time	25% load step change			350	us



**Temperature Derating Graph**





General Specifications

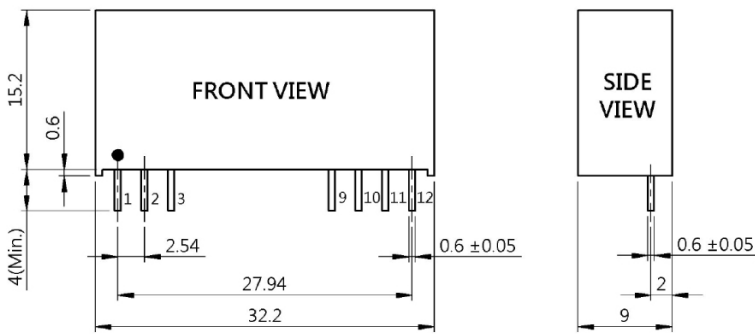
Parameters	Conditions	Min	Typ	Max	Units
Isolation Voltage			3000		Vac
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			400		KHz
Operating Temperature	With derating	-40		100	°C
Storage Temperature		-55		125	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material				Plastic	
MTBF	MIL-HDBK-217F@25°C	700000			Hours
Weight			12.5		g
Dimensions			32.2x15.2x9.0		mm

Part Number

30DW - 24 S 03 R 10W M  
 A B C D E F G

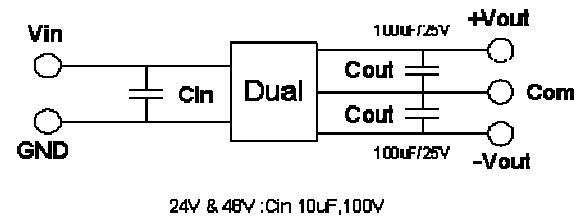
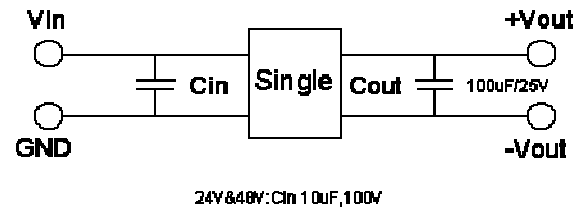
- A: Series
- B: Input Voltage
- C: Single Output(D),Dual(D)
- D: Output Voltage
- E: Regulated (R)
- F: Power Rating
- G: Medical Application

Markings and dimensions



UNIT : mm  
 TOLERANCES UNLESS OTHERWISE SPECIFIED : ±0.25

Recommended Test Circuit



PIN Assignment

Pin	1	2	3	9	10	11	12
Single	-Vin	+Vin	Remote ON/OFF	NC	+Vout	-Vout	NC
Dual	-Vin	+Vin	Remote ON/OFF	NC	+Vout	Common	-Vin

**FEATURES :**

- 24PIN DIP Package
- High Efficiency up to 85%
- Unregulated & Regulated Output Types
- Low Ripple & Noise
- Internal SMD Construction
- Industry Standard Pinout
- Operating Temperature:-40°C TO +85°C
- No External Component Required



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency
	Vdc	mA	%Typ
40D-XXS05RNL	5	360	58
40D-XXS05NNL	5	360	70
40D-XXD05NNL	±5	±180	70
40D-XXS09RNL	9	200	60
40D-XXS09NNL	9	200	70
40D-XXD09NNL	±9	±100	70
40D-XXS12RNL	12	150	60
40D-XXS12NNL	12	150	75
40D-XXD12RNL	±12	±75	60
40D-XXD12NNL	±12	±75	75
40D-XXS15RNL	15	120	60
40D-XXS15NNL	15	120	75
40D-XXD15RNL	±15	±60	60
40D-XXD15NNL	±15	±60	75
40D-XXS24RNL	24	75	60
40D-XXS24NNL	24	75	80
40D-XXD24RNL	±24	±38	60
40D-XXD24NNL	±24	±38	80

Recognized By UL 60950-1

40D-05S05NNL,40D-05S09NNL,40D-05S24NNL,  
40D-12S09NNL,40D-24S05NNL,40D-24S24NNL

**Note:**

- 1."XX" Is Input Voltage :05=5Vdc,09=9Vdc,12=12Vdc,15=15Vdc,24=24Vdc.
- 2.The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

DC-DC Converter

**40D SERIES**

1.8Watt

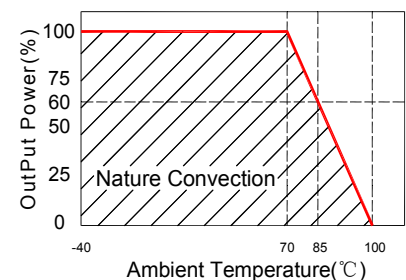
0.5KV Isolated

Single & Dual Output

DIP24



**Temperature Derating Graph**



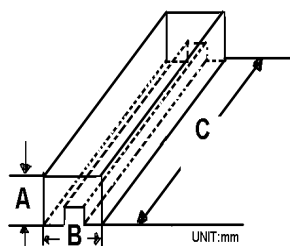
Output Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Regulated (Continuous)				
Short Circuit Protection	Unregulated (Short Term)			1	Sec
Line Regulation	Regulated			±0.3	%
Load Regulation	Regulated			±0.5	%
Ripple & Noise	BW=DC To 20MHz			50	mVp-p
Line Regulation	Unregulated (For 1% of Vin)		1.2		%
Load Regulation	Unregulated (20% To 100% F.L)			10	%

General Specifications

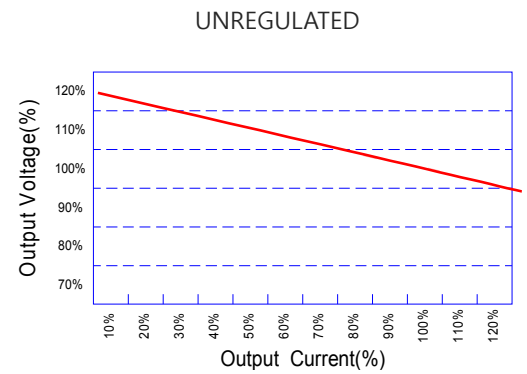
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		50		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F@25°C (Unregulated)	2500000			Hours
MTBF	MIL-HDBK-217F@25°C (Regulated)	1500000			Hours
Weight			9.0		g
Dimensions		33.02X14.73X10.41			mm

Packaging



Size(mm)		
A	B	C
13.23	12.30	530

Tolerance Envelope Graph

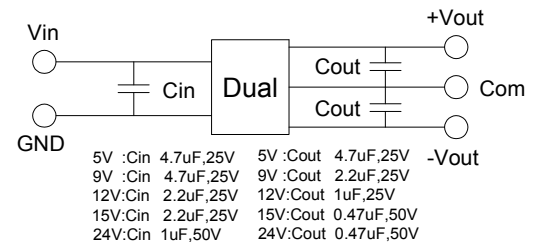
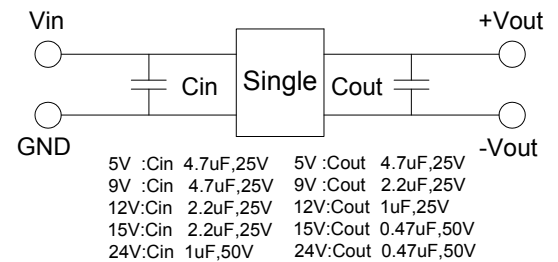


Part Number

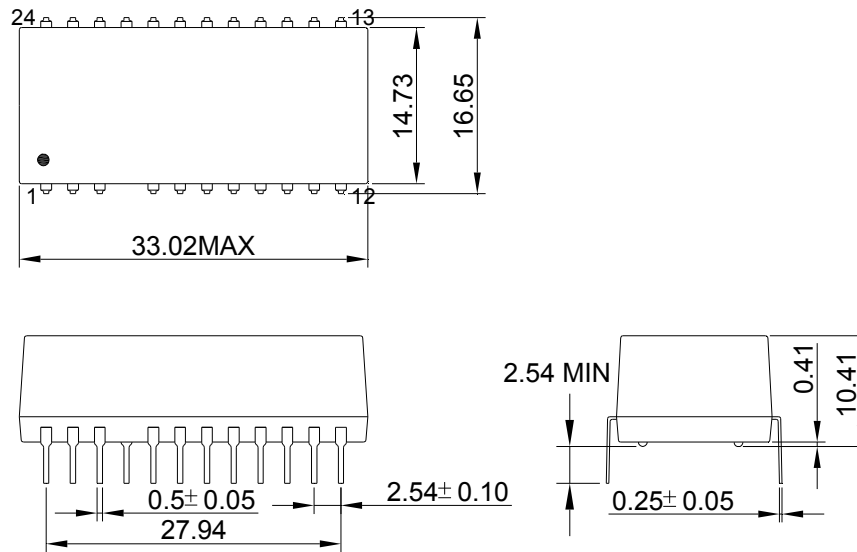
40D - 05 S 05 R NL  
A B C D E F

- A:Series
- B:Input Voltage
- C:Single(S)Dual(D)
- D:Output Voltage
- E:Regulated(R)Unregulated(N)
- F:RoHS Version

Recommended Test Circuit



Markings and dimensions



Unit : mm Unless otherwise specified, all tolerances are ±0.25

PIN Connection

PIN	1,24	2	3	10	11,14	12,13	15	22	23	Other
Single	+Vin	NC	NC	-Vout	+Vout	-Vin	-Vout	NC	NC	NC
Dual	+Vin	-Vout	Com	Com	+Vout	-Vin	Com	Com	-Vout	NC

**FEATURES :**

- 24PIN DIP PACKAGE
- High Efficiency up to 85%
- Unregulated & Regulated Output Types
- Low Ripple & Noise
- Internal SMD Construction
- Industry Standard Pinout
- Operating Temperature:-40°C TO +85°C
- No External Component Required



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency
	Vdc	mA	%Typ
41D-XXS05RNL	5	360	58
41D-XXS05NNL	5	360	70
41D-XXD05NNL	±5	±180	70
41D-XXS09RNL	9	200	60
41D-XXS09NNL	9	200	70
41D-XXD09NNL	±9	±100	70
41D-XXS12RNL	12	150	60
41D-XXS12NNL	12	150	75
41D-XXD12RNL	±12	±75	60
41D-XXD12NNL	±12	±75	75
41D-XXS15RNL	15	120	60
41D-XXS15NNL	15	120	75
41D-XXD15RNL	±15	±60	60
41D-XXD15NNL	±15	±60	75
41D-XXS24RNL	24	75	60
41D-XXS24NNL	24	75	80
41D-XXD24RNL	±24	±38	60
41D-XXD24NNL	±24	±38	80

Recognized By UL 60950-1

41D-05S05NNL,41D-05S05RNL,41D-05S09NNL,41D-05S24NNL,  
41D-12S05RNL,41D-24S05NNL,41D-24S24NNL

**Note:**

- 1."XX" Is Input Voltage :05=5Vdc,09=9Vdc,12=12Vdc,15=15Vdc,24=24Vdc.
- 2.The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

DC-DC Converter

**41D SERIES**

1.8Watt

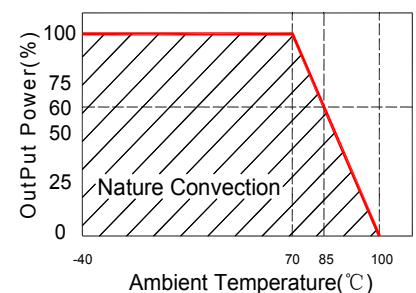
2KVrms Isolated

Single & Dual Output

DIP24



**Temperature Derating Graph**



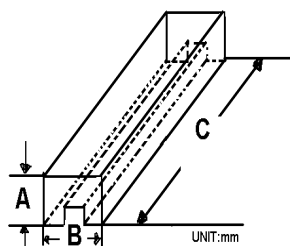
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
<b>Voltage Tolerance</b>	100% full load			±5	%
<b>Short Circuit Protection</b>	Regulated (Continuous)				
<b>Short Circuit Protection</b>	Unregulated (Short Term)			1	Sec
<b>Line Regulation</b>	Regulated			±0.3	%
<b>Load Regulation</b>	Regulated			±0.5	%
<b>Ripple &amp; Noise</b>	BW=DC To 20MHz			50	mVp-p
<b>Line Regulation</b>	Unregulated (For 1% of Vin)		1.2		%
<b>Load Regulation</b>	Unregulated (20% To 100% F.L)			10	%

**General Specifications**

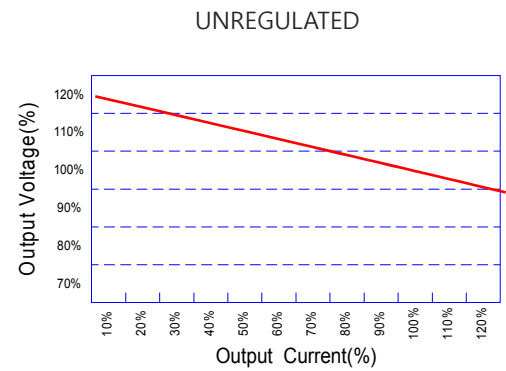
Parameters	Conditions	Min	Typ	Max	Units
<b>Isolation Resistance</b>	500Vdc	1000			MΩ
<b>Switching Frequency</b>	Full load, nominal input		50		KHz
<b>Operating Temperature</b>		-40		+85	°C
<b>Humidity</b>	Non Condensing			95	%
<b>Cooling</b>	Free air Convection				
<b>Case material</b>	DAP				
<b>MTBF</b>	MIL-HDBK-217F@25°C (Unregulated)	2500000			Hours
<b>MTBF</b>	MIL-HDBK-217F@25°C (Regulated)	1500000			Hours
<b>Weight</b>			9.0		g
<b>Dimensions</b>		33.02X14.73X10.41			mm

**Packaging**



Size(mm)		
A	B	C
13.23	12.30	530

**Tolerance Envelope Graph**

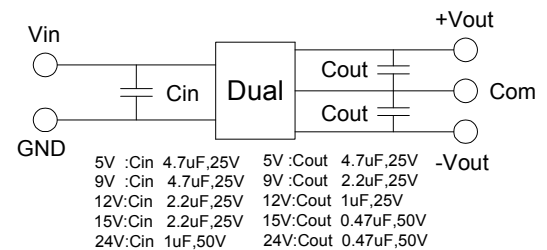
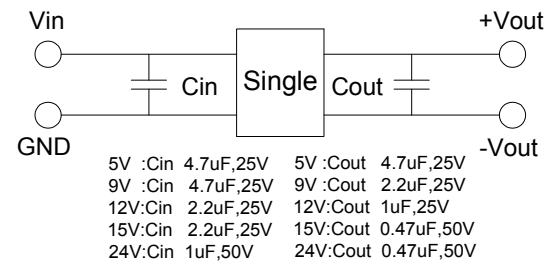


**Part Number**

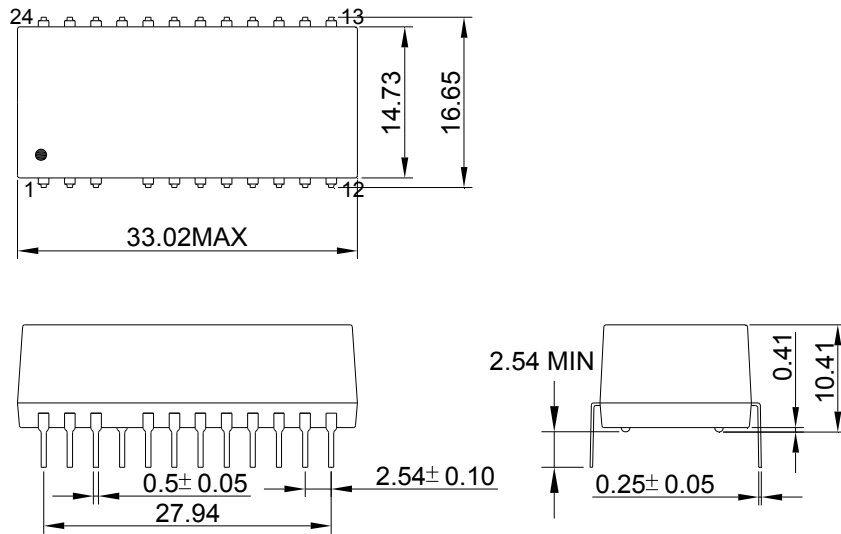
41D - 05 S 05 R NL  
A B C D E F

- A:Series
- B:Input Voltage
- C:Single(S)Dual(D)
- D:Output Voltage
- E:Regulated(R)Unregulated(N)
- F:RoHS Version

**Recommended Test Circuit**



Markings and dimensions



Unit : mm Unless otherwise specified, all tolerances are ±0.25

PIN Connection

PIN	1,2	9,10	11,12	13,14	15,16	23,24	Other
Single	+Vin	-Vout	+Vout	NC	NC	-Vin	NC
Dual	+Vin	COM	+Vout	COM	-Vout	-Vin	NC

**FEATURES :**

- 24PIN SMD Package
- High Efficiency up to 85%
- Unregulated & Regulated Output Types
- Low Ripple & Noise
- Internal SMD Construction
- Industry Standard Pinout
- Operating Temperature:-40°C TO +85°C
- No External Component Required



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency	Recognized By UL 60950-1
	Vdc	mA	%Typ	
43D-XXS05RNL	5	360	58	43D-05S05NNL 43D-05S24NNL 43D-09S05NNL 43D-24S05NNL 43D-24S24NNL
43D-XXS05NNL	5	360	70	
43D-XXD05NNL	±5	±180	70	
43D-XXS09RNL	9	200	60	
43D-XXS09NNL	9	200	70	
43D-XXD09NNL	±9	±100	70	
43D-XXS12RNL	12	150	60	
43D-XXS12NNL	12	150	75	
43D-XXD12RNL	±12	±75	60	
43D-XXD12NNL	±12	±75	75	
43D-XXS15RNL	15	120	60	
43D-XXS15NNL	15	120	75	
43D-XXD15RNL	±15	±60	60	
43D-XXD15NNL	±15	±60	75	
43D-XXS24RNL	24	75	60	
43D-XXS24NNL	24	75	80	
43D-XXD24RNL	±24	±38	60	
43D-XXD24NNL	±24	±38	80	

**Note:**

- 1."XX" Is Input Voltage :05=5Vdc,09=9Vdc,12=12Vdc,15=15Vdc,24=24Vdc.
- 2.The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

DC-DC Converter

**43D SERIES**

1.8Watt

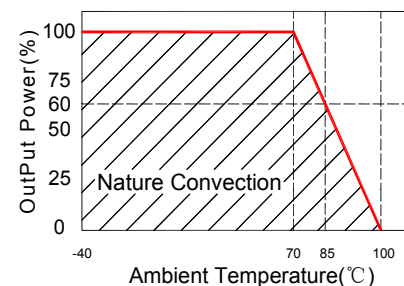
0.5KV Isolated

Single & Dual Output

SMD



**Temperature Derating Graph**





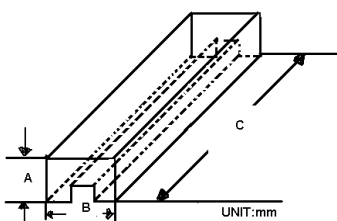
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
<b>Voltage Tolerance</b>	100% full load			±5	%
<b>Short Circuit Protection</b>	Regulated (Continuous)				
<b>Short Circuit Protection</b>	Unregulated (Short Trem)			1	Sec
<b>Line Regulation</b>	Regulated			±0.3	%
<b>Load Regulation</b>	Regulated			±0.5	%
<b>Ripple &amp; Noise</b>	BW=DC To 20MHz			50	mVp-p
<b>Line Regulation</b>	Unregulated (For 1% of Vin)		1.2		%
<b>Load Regulation</b>	Unregulated (20% To 100% F.L)			10	%
<b>Transient response setting time</b>	50% load step change		350		us

**General Specifications**

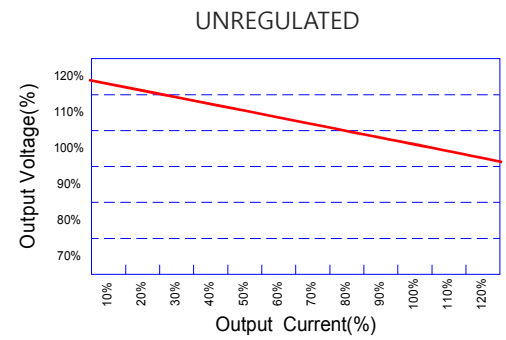
Parameters	Conditions	Min	Typ	Max	Units
<b>Isolation Resistance</b>	500Vdc	1000			MΩ
<b>Switching Frequency</b>	Full load, nominal input		50		KHz
<b>Operating Temperature</b>		-40		+85	°C
<b>Humidity</b>	Non Condensing			95	%
<b>Cooling</b>	Free air Convection				
<b>Case material</b>	DAP				
<b>MTBF</b>	MIL-HDBK-217F@25°C (Unregulated)	2500000			Hours
<b>MTBF</b>	MIL-HDBK-217F@25°C (Regulated)	1500000			Hours
<b>Weight</b>			8.9		g
<b>Dimensions</b>		33.02X14.73X10.70			mm

**Packaging**



Size(mm)		
A	B	C
18.71	23.00	522

**Tolerance Envelope Graph**

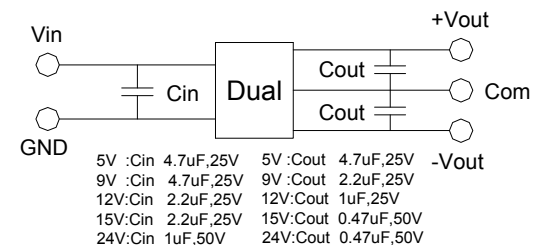
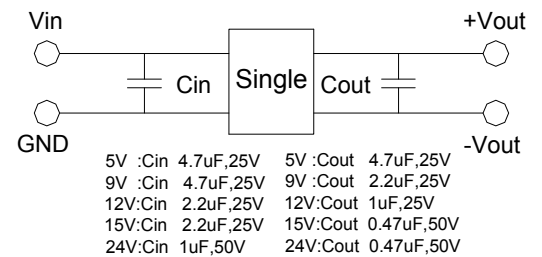


**Part Number**

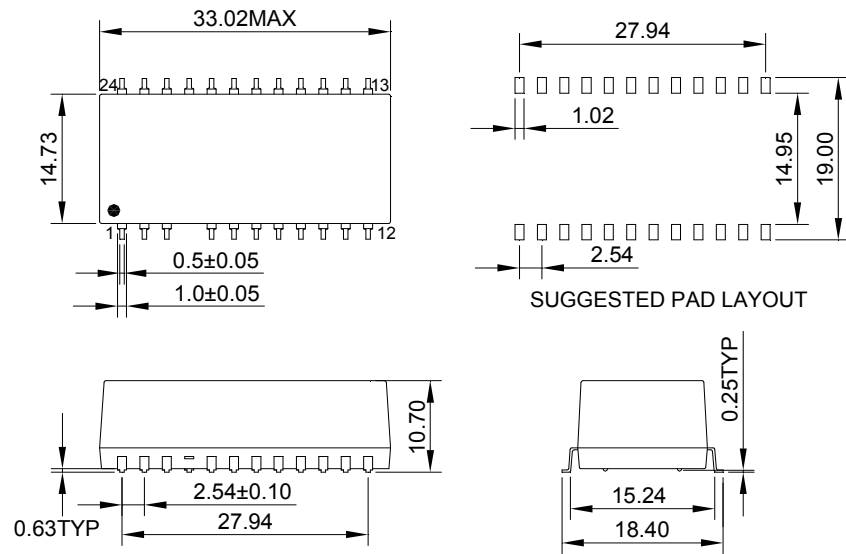
43D - 05 S 05 R NL  
A B C D E F

- A:Series
- B:Input Voltage
- C:Single(S)Dual(D)
- D:Output Voltage
- E:Regulated(R)Unregulated(N)
- F:RoHS Version

**Recommended Test Circuit**



Markings and dimensions



Unit : mm Unless otherwise specified, all tolerances are  $\pm 0.25$

PIN Connection

PIN	1,24	2	3	10	11,14	12,13	15	22	23	Other
Single	+Vin	NC	NC	-Vout	+Vout	-Vin	-Vout	NC	NC	NC
Dual	+Vin	-Vout	Com	Com	+Vout	-Vin	Com	Com	-Vout	NC

**FEATURES :**

- 24PIN DIL PACKAGE
- High Efficiency up to 70%
- Regulated Output Types
- Low Ripple And Noise
- Internal SMD Construction
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency
	Vdc	mA	%Typ
45D-XXS05RNL	5	400	60
45D-XXS09RNL	9	222	60
45D-XXS12RNL	12	167	60
45D-XXS15RNL	15	133	60
45D-XXS24RNL	24	84	60
45D-XXD12RNL	±12	±84	60
45D-XXD15RNL	±15	±67	60
45D-XXD24RNL	±24	±42	60

**Note:**

- 1."XX" Is Input Voltage :05=5Vdc,09=9Vdc,12=12Vdc,15=15Vdc,24=24Vdc,36=36Vdc, 48=48Vdc.
- 2.The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Continuous				
Short Circuit Protection	Automatic				
Line Regulation	Regulated			±0.3	%
Load Regulation	Regulated			±0.5	%
Ripple & Noise	BW=DC To 20MHz			50	mVp-p
Transient response setting time	50% load step change		350		us

DC-DC Converter

**45D SERIES**

2Watt

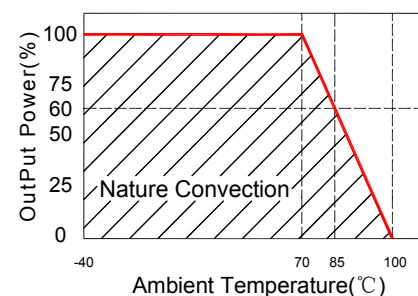
3KVrms Isolated

Single & Dual Output

DIL24



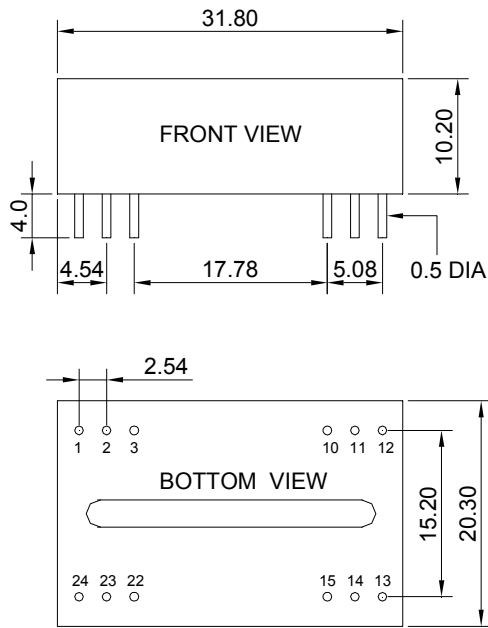
**Temperature Derating Graph**



**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		125		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F@25°C	1500000			Hours
Weight			12.8		g
Dimensions		31.80x20.30x10.20			mm

**Markings and dimensions**



Unit : mm Unless otherwise specified, all tolerances are ±0.25

**PIN Connection**

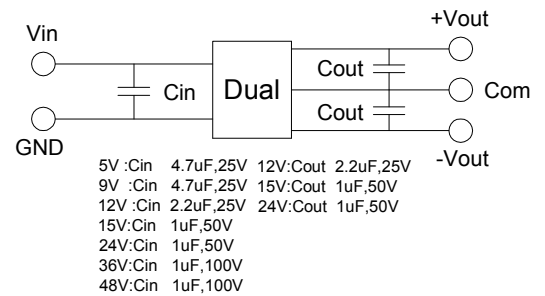
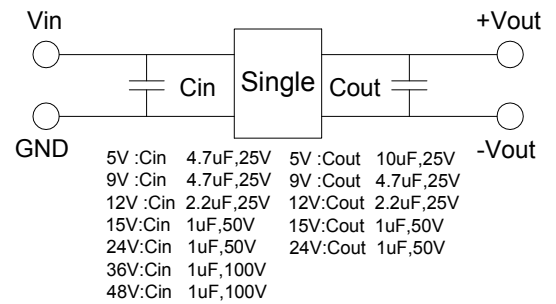
PIN	1.2.3	10.11	12	13	14	15	22.23.24
SINGLE	+Vin	NC	-Vout	+Vout	NC	NC	-Vin
DUAL	+Vin	COM	NC	-Vout	NC	+Vout	-Vin

**Part Number**

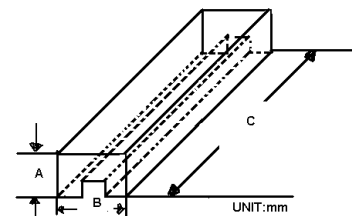
45D - 05 S 05 R NL  
A B C D E F

A:Series  
B:Input Voltage  
C:Single(S)Dual(D)  
D:Output Voltage  
E:Regulated(R)  
F:RoHS Version

**Recommended Test Circuit**



**Packaging**



Size(mm)		
A	B	C
18.71	23.00	522

**FEATURES :**

- 24PIN DIL PACKAGE
- High Efficiency up to 85%
- Regulated Output Types
- Low Ripple And Noise
- Internal SMD Construction
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency
	Vdc	mA	%Typ
46D-XXS05CN	5	600	65
46D-XXS09CN	9	333	70
46D-XXS12CN	12	250	75
46D-XXS15CN	15	200	80
46D-XXS24CN	24	125	80
46D-XXD05CN	±5	±300	65
46D-XXD09CN	±9	±167	70
46D-XXD12CN	±12	±125	75
46D-XXD15CN	±15	±100	80
46D-XXD24CN	±24	±63	80

**Note:**

- 1."XX" Is Input Voltage:05=5Vdc,09=9Vdc,12=12Vdc,15=15Vdc,24=24Vdc,48=48Vdc.
2. The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±3	%
Short Circuit Protection	Continuous				
Line Regulation	Regulated			±0.5	%
Load Regulation	Regulated			±0.8	%
Ripple & Noise	Output:5-9V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output:12-24V TYPES BW=DC To 20MHz			1% of Vout	mVp-p
Transient response setting time	50% load step change		350		us

DC-DC Converter

**46D SERIES**

3Watt

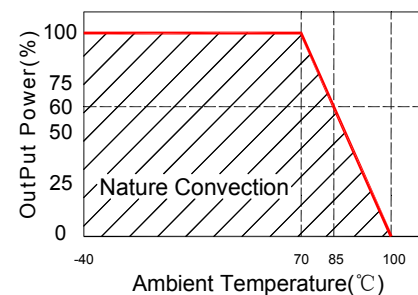
1.5KV Isolated

Single & Dual Output

DIL24



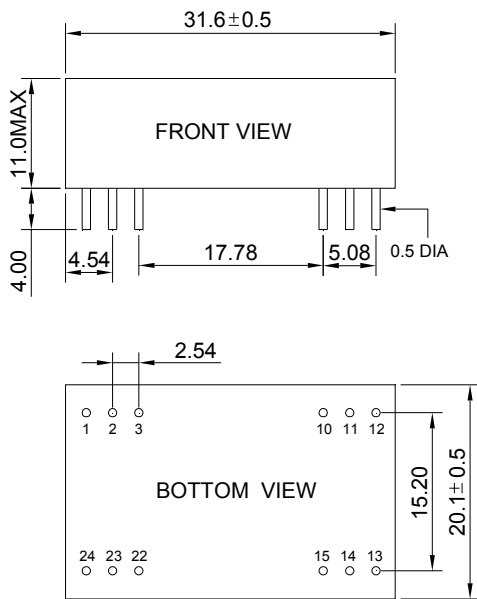
**Temperature Derating Graph**



**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel Coated Copper With Non-Conductive Base				
MTBF	MIL-HDBK-217F@25°C	1500000			Hours
Weight			16.8		g
Dimensions		31.60X20.10X11.0			mm

**Markings and Dimensions**



Unit : mm Unless otherwise specified, all tolerances are ±0.25

**PIN Connection**

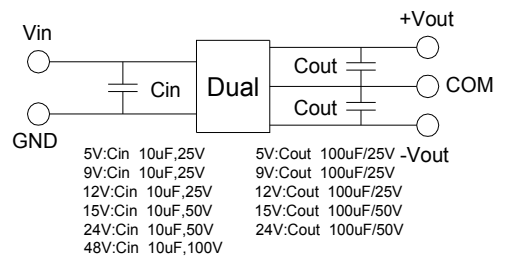
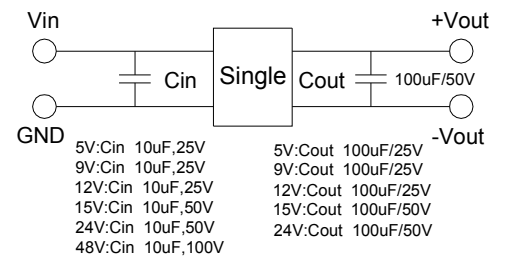
PIN	1.2.3	10.11	12	13	14	15	22.23.24
Single	+Vin	NC	-Vout	+Vout	NC	NC	-Vin
Dual	+Vin	COM	NC	-Vout	NC	+Vout	-Vin

**Part Number**

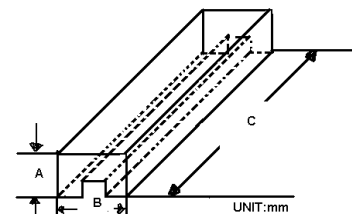
46D	-	05	S	05	C	N
A		B	C	D	E	F

- A : Series
- B : Input Voltage
- C : Single(S);Dual(D)
- D : Output Voltage
- E : Types
- F : Package

**Recommended Test Circuit**



**Packaging**



Size(mm)		
A	B	C
18.71	23.00	522

**FEATURES :**

- 24PIN DIL Package
- Low Ripple & Noise
- High Efficiency up to 85%
- Unregulated & Regulated Output Types
- Internal SMD Construction
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency
	Vdc	mA	%Typ
50D-XXS05RNL	5	360	58
50D-XXS05NNL	5	360	70
50D-XXD05NNL	±5	±180	70
50D-XXS09RNL	9	200	60
50D-XXS09NNL	9	200	70
50D-XXD09NNL	±9	±100	70
50D-XXS12RNL	12	150	60
50D-XXS12NNL	12	150	75
50D-XXD12RNL	±12	±75	60
50D-XXD12NNL	±12	±75	75
50D-XXS15RNL	15	120	60
50D-XXS15NNL	15	120	75
50D-XXD15RNL	±15	±60	60
50D-XXD15NNL	±15	±60	75
50D-XXS24RNL	24	75	60
50D-XXS24NNL	24	75	80
50D-XXD24RNL	±24	±38	60
50D-XXD24NNL	±24	±38	80

**Note:**

- 1."XX" Is Input Voltage :05=5Vdc,09=9Vdc,12=12Vdc,15=15Vdc,24=24Vdc.
- 2.The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
<b>Voltage Tolerance</b>	Vo,Io Nom			±10	%
<b>Filter</b>	Capacitor				

DC-DC Converter

**50D SERIES**

1.8Watt

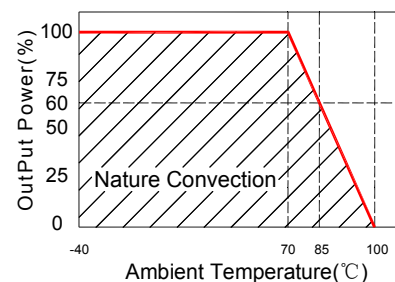
0.5KV Isolated

Single & Dual Output

DIL24



**Temperature Derating Graph**



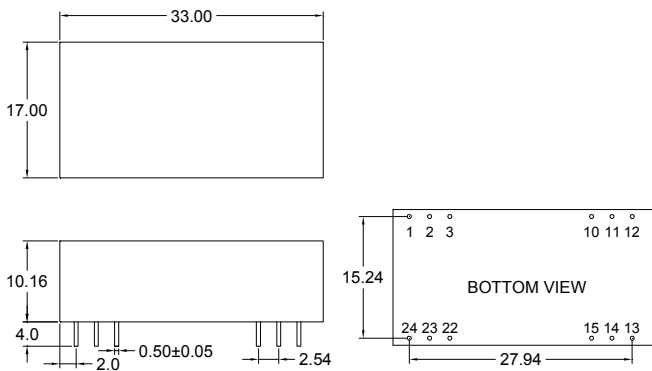
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Regulated (Continuous)				
Short Circuit Protection	Unregulated (Short Trem)			1	Sec
Line Regulation	Regulated			±0.3	%
Load Regulation	Regulated			±0.5	%
Ripple & Noise	BW=DC To 20MHz			50	mVp-p
Line Regulation	Unregulated (For 1% of Vin)		1.2		%
Load Regulation	Unregulated (20% To 100% F.L)			10	%

**General Specifications**

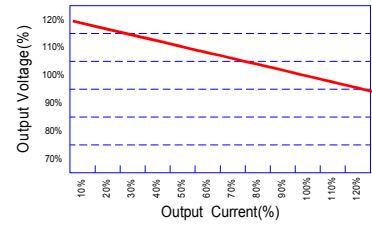
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		50		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F@25°C (Unregulated)	2500000			Hours
MTBF	MIL-HDBK-217F@25°C (Regulated)	1500000			Hours
Weight			15.5		g
Dimensions			33.0x17.0x10.16		mm

**Markings and Dimensions**



Unit : mm Unless otherwise specified, all tolerances are ±0.25

**Tolerance Envelope Graph**

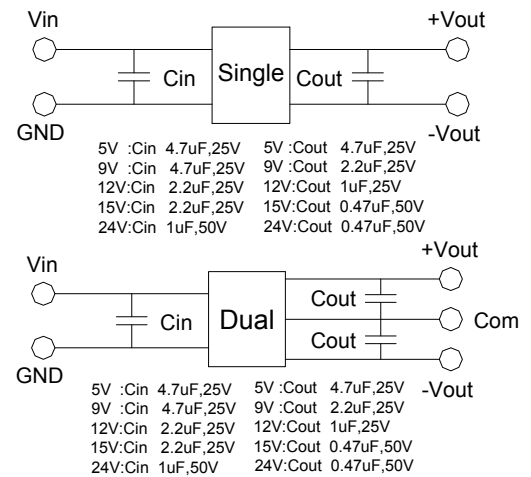


**Part Number**

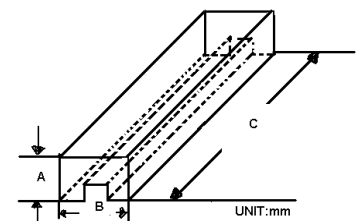
50D - 05 S 05 R NL  
A B C D E F

- A:Series
- B:Input Voltage
- C:Single(S)Dual(D)
- D:Output Voltage
- E:Regulated(R)Unregulated(N)
- F:RoHS Version

**Recommended Test Circuit**



**Packaging**



Size(mm)		
A	B	C
18.71	23.00	522

**PIN Connection**

PIN	1	2	3	10	11	12	13	14	15	22	23	24
Single	+Vin	NC	NC	-Vout	+Vout	-Vin	-Vin	+Vout	-Vout	NC	NC	+Vin
Dual	+Vin	-Vout	Com	Com	+Vout	-Vin	-Vin	+Vout	Com	Com	-Vout	+Vin



**FEATURES :**

- 24PIN DIL PACKAGE
- Low Ripple & Noise
- High Efficiency up to 85%
- Unregulated & Regulated Output Types
- Internal SMD Construction
- No External Component Required
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency
	Vdc	mA	%Typ
52D-XXS05RNL	5	360	58
52D-XXS05NNL	5	360	70
52D-XXD05NNL	±5	±180	70
52D-XXS09RNL	9	200	60
52D-XXS09NNL	9	200	70
52D-XXD09NNL	±9	±100	70
52D-XXS12RNL	12	150	60
52D-XXS12NNL	12	150	75
52D-XXD12RNL	±12	±75	60
52D-XXD12NNL	±12	±75	75
52D-XXS15RNL	15	120	60
52D-XXS15NNL	15	120	75
52D-XXD15RNL	±15	±60	60
52D-XXD15NNL	±15	±60	75
52D-XXS24RNL	24	75	60
52D-XXS24NNL	24	75	80
52D-XXD24RNL	±24	±38	60
52D-XXD24NNL	±24	±38	80

**Note:**

- 1."XX" Is Input Voltage :05=5Vdc,09=9Vdc,12=12Vdc,15=15Vdc,24=24Vdc.
- 2.The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				



DC-DC Converter

**52D SERIES**

1.8Watt

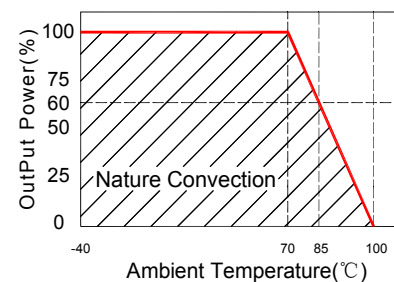
0.5KV Isolated

Single & Dual Output

DIL24



**Temperature Derating Graph**



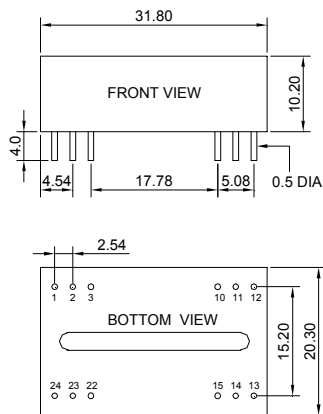
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±5	%
Short Circuit Protection	Regulated (Continuous)				
Short Circuit Protection	Unregulated (Short Trem)			1	Sec
Line Regulation	Regulated			±0.3	%
Load Regulation	Regulated			±0.5	%
Ripple & Noise	BW=DC To 20MHz			50	mVp-p
Line Regulation	Unregulated (For 1% of Vin)		1.2		%
Load Regulation	Unregulated (20% To 100% F.L)			10	%

**General Specifications**

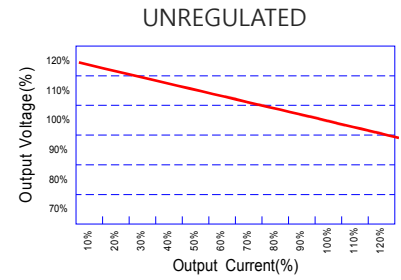
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		50		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
MTBF	MIL-HDBK-217F@25°C	2500000			Hours
MTBF	MIL-HDBK-217F@25°C (Regulated)	1500000			Hours
Weight			12.8		g
Dimensions		31.80x20.30x10.20			mm

**Markings and dimensions**



Unit : mm Unless otherwise specified, all tolerances are ±0.25

**Tolerance Envelope Graph**

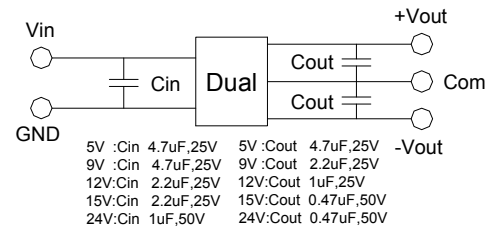
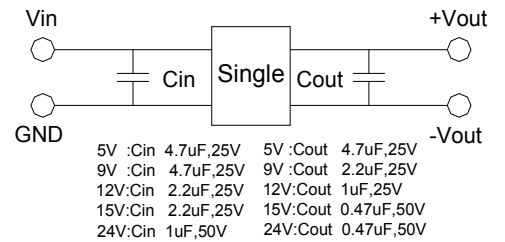


**Part Number**

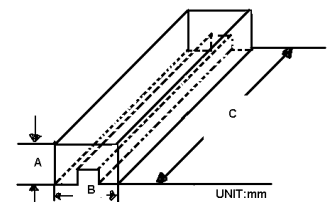
52D - 05 S 05 R NL  
A B C D E F

- A:Series
- B:Input Voltage
- C:Single(S)Dual(D)
- D:Output Voltage
- E:Regulated(R)Unregulated(N)
- F:RoHS Version

**Recommended Test Circuit**



**Packaging**



Size(mm)		
A	B	C
18.71	23.00	522

**PIN Connection**

PIN	1	2	3	10	11	12	13	14	15	22	23	24
Single	+Vin	NC	NC	-Vout	+Vout	-Vin	-Vin	+Vout	-Vout	NC	NC	+Vin
Dual	+Vin	-Vout	Com	Com	+Vout	-Vin	-Vin	+Vout	Com	Com	-Vout	+Vin

**FEATURES :**

- 24PIN DIL PACKAGE
- Low Ripple & Noise
- High Efficiency up to 85%
- Regulated Output Types
- Internal SMD Construction
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency
	Vdc	mA	%Typ
54D-XXS05CN	5	600	65
54D-XXS09CN	9	333	70
54D-XXS12CN	12	250	75
54D-XXS15CN	15	200	80
54D-XXS24CN	24	125	80
54D-XXD05CN	±5	±300	65
54D-XXD09CN	±9	±167	70
54D-XXD12CN	±12	±125	75
54D-XXD15CN	±15	±100	80
54D-XXD24CN	±24	±63	80

**Note:**

- 1."XX" Is Input Voltage: 05=5Vdc, 09=9Vdc, 12=12Vdc, 15=15Vdc, 24=24Vdc, 48=48Vdc.
- 2.The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±3	%
Short Circuit Protection	Continuous				
Line Regulation	Regulated			±0.5	%
Load Regulation	Regulated			±0.8	%
Ripple & Noise	Output:5-9V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output:12-24V TYPES BW=DC To 20MHz			1% of Vout	mVp-p
Transient response setting time	50% load step change		350		us

DC-DC Converter

**54D SERIES**

3Watt

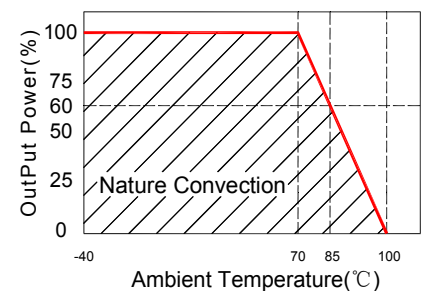
0.5KV Isolated

Single & Dual Output

DIL24



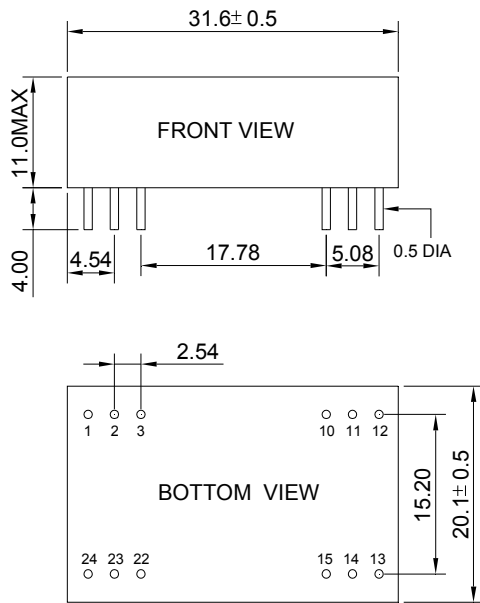
**Temperature Derating Graph**



**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		100		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel Coated Copper With Non-Conductive Base				
MTBF	MIL-HDBK-217F@25°C	1500000			Hours
Weight			16.8		g
Dimensions		31.60x20.10x11.0			mm

**Markings and Dimensions**



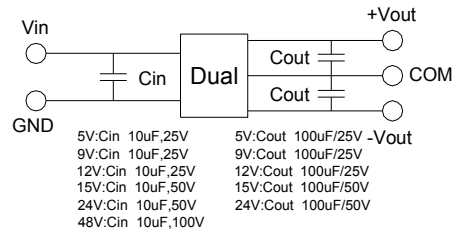
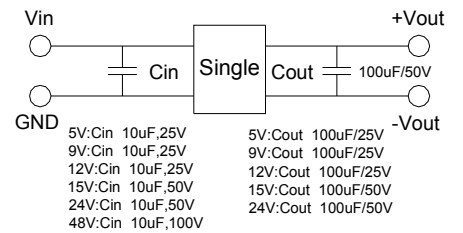
UNIT: mm Unless otherwise specified, all tolerances are ±0.25

**Part Number**

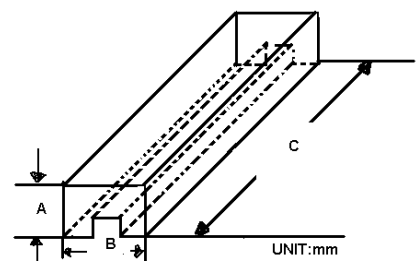
54D	-	05	S	05	C	N
A		B	C	D	E	F

- A : Series
- B : Input Voltage
- C : Single(S);Dual(D)
- D : Output Voltage
- E : Types
- F : Package

**Recommended Test Circuit**



**Packaging**



Size(mm)		
A	B	C
18.71	23.00	522

**PIN Connection**

PIN	1	2	3	10	11	12	13	14	15	22	23	24
Single	+Vin	NC	NC	-Vout	+Vout	-Vin	-Vin	+Vout	-Vout	NC	NC	+Vin
Dual	+Vin	-Vout	Com	Com	+Vout	-Vin	-Vin	+Vout	Com	Com	-Vout	+Vin

**FEATURES :**

- 5PIN DIL PACKAGE
- Low Ripple & Noise
- High Efficiency up to 85%
- Regulated Output Types
- Internal SMD Construction
- Operating Temperature:-40°C TO +85°C
- Industry Standard Pinout



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Output Voltage	Output Current	Efficiency
	Vdc	mA	%Typ
60D-XXS05CN	5	600	65
60D-XXS09CN	9	333	70
60D-XXS12CN	12	250	75
60D-XXS15CN	15	200	80
60D-XXS24CN	24	125	80
60D-XXD05CN	±5	±300	65
60D-XXD09CN	±9	±167	70
60D-XXD12CN	±12	±125	75
60D-XXD15CN	±15	±100	80
60D-XXD24CN	±24	±63	80

**Note:**

- 1."XX" Is Input Voltage :05=5Vdc,09=9Vdc,12=12Vdc,15=15Vdc,24=24Vdc,48=48Vdc.
- 2.The input voltage increases, there will be an increase in efficiency.

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Vo,Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±3	%
Short Circuit Protection	Continuous				
Line Regulation	Regulated			±0.5	%
Load Regulation	Regulated			±0.8	%
Ripple & Noise	Output:5-9V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output:12-24V TYPES BW=DC To 20MHz			1% of Vout	mVp-p

DC-DC Converter

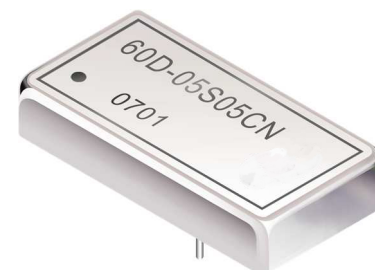
**60D SERIES**

3Watt

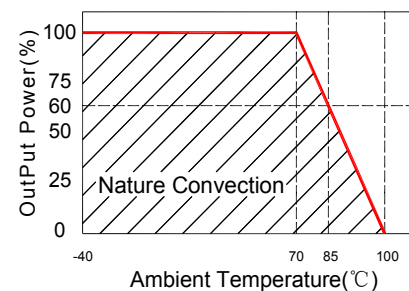
1.5KV Isolated

Single & Dual Output

DIL5



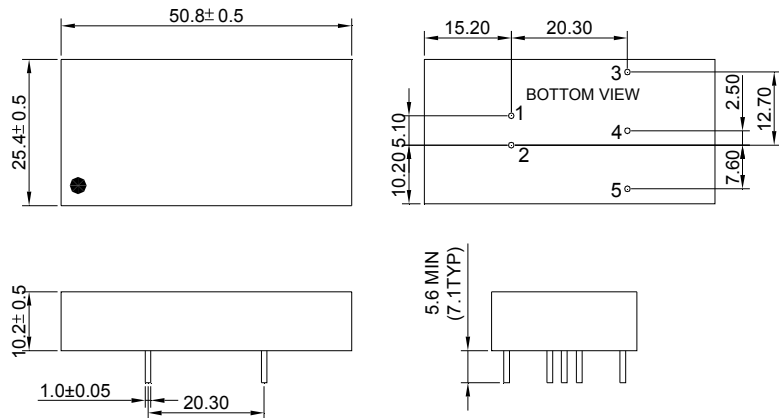
**Temperature Derating Graph**



**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
<b>Isolation Resistance</b>	500Vdc	1000			MΩ
<b>Switching Frequency</b>	Full load, nominal input		100		KHz
<b>Operating Temperature</b>		-40		+85	°C
<b>Humidity</b>	Non Condensing			95	%
<b>Cooling</b>	Free air Convection				
<b>Case material</b>	Nickel Coated With Non-Conductive Base				
<b>MTBF</b>	MIL-HDBK-217F@25°C	1500000			Hours
<b>Weight</b>			31.7		g
<b>Dimensions</b>			50.8x25.4x10.2		mm

**Markings and Dimensions**



Unit : mm Unless otherwise specified, all tolerances are ±0.25

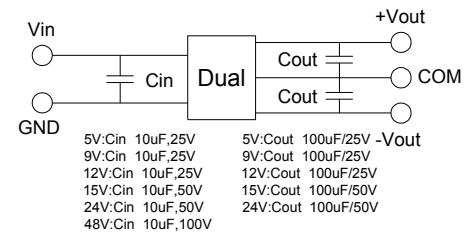
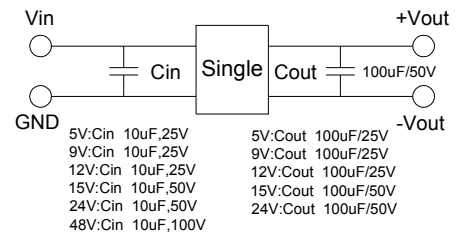
**PIN Connection**

PIN	1	2	3	4	5
<b>Single</b>	+Vin	-Vin	+Vout	NO PIN	-Vout
<b>Dual</b>	+Vin	-Vin	+Vout	COM	-Vout

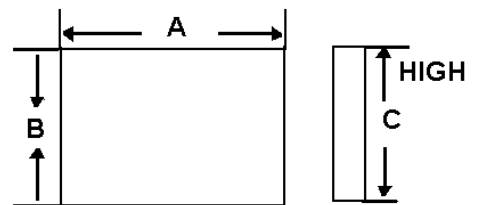
**Part Number**

60D - 05 S 05 C N  
 A B C D E F  
 A:Series  
 B:Input Voltage  
 C:Single(S) Dual(D)  
 D:Output Voltage  
 E:Types  
 F:Package

**Recommended Test Circuit**



**Packaging**



Size(mm)		
A	B	C
54.00	50.30	30.00

**FEATURES :**

- 2:1Wide Input Voltage
- 10 Watt Package
- Efficiency To 80%
- PI Input Filter
- 1500Vdc Isolation
- MTBF:>1,500,000 hrs
- Operating Temperature:-40°C TO +100°C



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Efficiency	Capacitor Load
	Vdc	No-Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP	uF TYP
61D-12S03RNL	9-18	30	705	3.3	2000	78	2200
61D-12S05RNL	9-18	30	1016	5	2000	82	2200
61D-12S09RNL	9-18	30	1004	9	1111	83	1000
61D-12S12RNL	9-18	30	992	12	833	84	680
61D-12S15RNL	9-18	30	992	15	666	84	470
61D-12S18RNL	9-18	30	980	18	555	85	470
61D-12S24RNL	9-18	30	980	24	416	85	330
61D-12D05RNL	9-18	30	1016	±5	±1000	82	±1000
61D-12D09RNL	9-18	30	992	±9	±555	84	±470
61D-12D12RNL	9-18	30	992	±12	±416	84	±470
61D-12D15RNL	9-18	30	980	±15	±333	85	±330
61D-12D18RNL	9-18	30	980	±18	±277	85	±220
61D-12D24RNL	9-18	30	980	±24	±208	85	±220
61D-24S03RNL	18-36	25	352	3.3	2000	78	2200
61D-24S05RNL	18-36	25	508	5	2000	82	2200
61D-24S09RNL	18-36	25	496	9	1111	84	1000
61D-24S12RNL	18-36	25	496	12	833	84	680
61D-24S15RNL	18-36	25	490	15	666	85	470
61D-24S18RNL	18-36	25	490	18	555	85	470
61D-24S24RNL	18-36	25	484	24	416	86	330
61D-24D05RNL	18-36	25	508	±5	±1000	82	±1000
61D-24D09RNL	18-36	25	502	±9	±555	83	±470
61D-24D12RNL	18-36	25	496	±12	±416	84	±470
61D-24D15RNL	18-36	25	496	±15	±333	84	±330
61D-24D18RNL	18-36	25	490	±18	±277	85	±220
61D-24D24RNL	18-36	25	490	±24	±208	85	±220

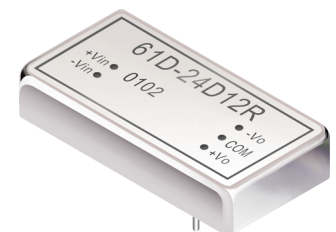
DC-DC Converter

61D SERIES

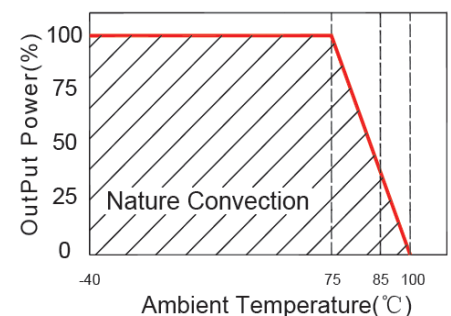
10Watt 1.5KV Isolated  
2 : 1 Input Voltage Range

Single & Dual Output

2" x 1"



Temperature Derating Graph



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Efficiency	Capacitor Load
	Vdc	No-Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP	uF TYP
61D-48S03RNL	36-72	20	176	3.3	2000	78	2200
61D-48S05RNL	36-72	20	251	5	2000	83	2200
61D-48S09RNL	36-72	20	248	9	1111	84	1000
61D-48S12RNL	36-72	20	248	12	833	84	680
61D-48S15RNL	36-72	20	248	15	666	84	470
61D-48S18RNL	36-72	20	245	18	555	85	470
61D-48S24RNL	36-72	20	245	24	416	86	330
61D-48D05RNL	36-72	20	254	±5	±1000	82	±1000
61D-48D09RNL	36-72	20	248	±9	±555	84	±470
61D-48D12RNL	36-72	20	245	±12	±416	85	±470
61D-48D15RNL	36-72	20	245	±15	±333	85	±330
61D-48D18RNL	36-72	20	242	±18	±277	86	±220
61D-48D24RNL	36-72	20	242	±24	±208	86	±220

Input Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				2:1	
Filter	Pi TYPE				

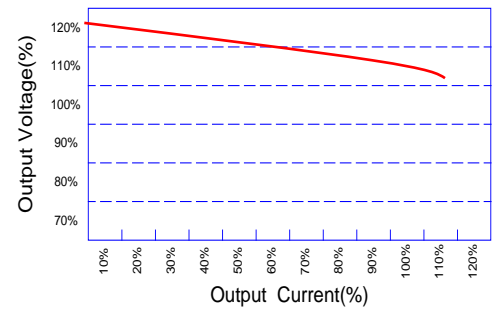
Output Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic recovery				
Line Regulation				±0.5	%
Load Regulation	Single (25% to 100%)			±0.5	%
Load Regulation	Dual (25% to 100%,Balance Load)			±2.0	%
Cross Regulation	DUAL (25% to 100%)			±5.0	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			300		KHz
Operating Temperature	With derating	-40		100	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel Coated With Non-Conductive Base				
Weight			36.5		g
Dimensions			50.8x25.4x10.6		mm
Potting Material			Epoxy (UL94V-0 rated)		

Tolerance Envelope Graph

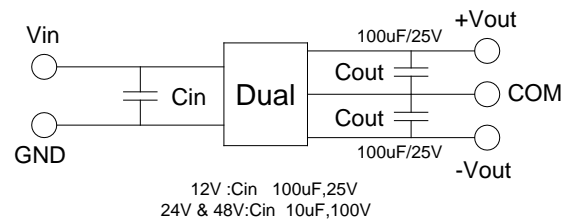
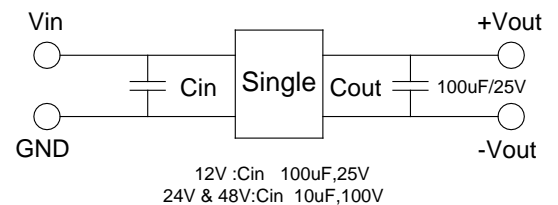


Part Number

61D - 12 S 05 R NL  
A B C D E F

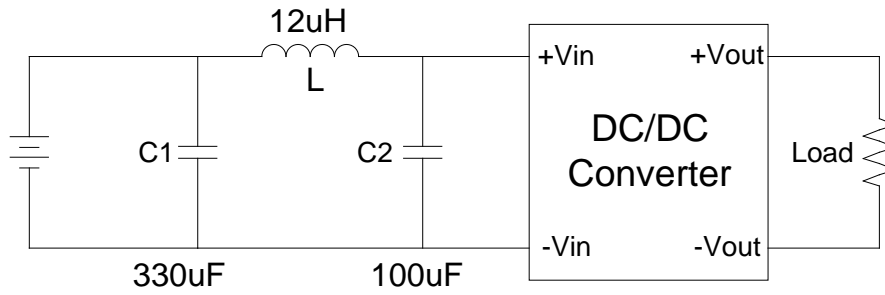
- A:Series
- B:Input Voltage
- C:Single(S)Dual(D)
- D:Output Voltage
- E:Regulated(R)
- F:RoHS Version

Recommended Test Circuit



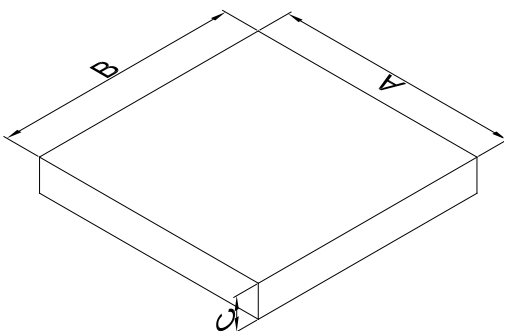
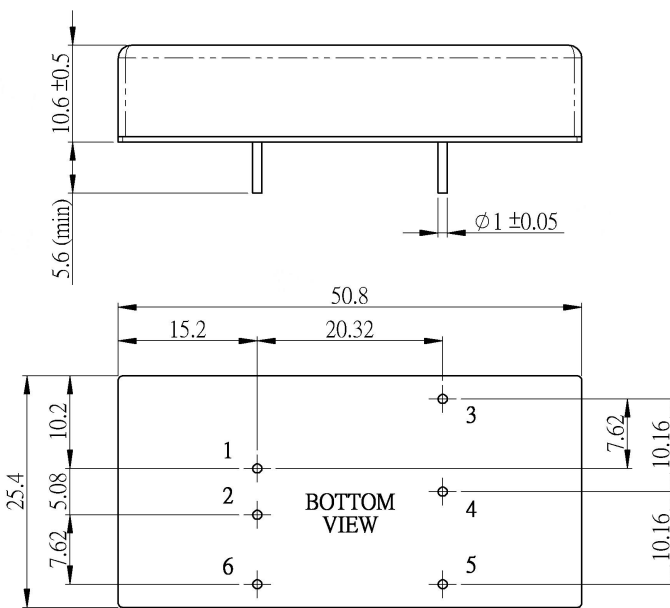


Suggest adding input external filter(C1,C2,L)to meet conducted emissions(EN55022 class A)



Markings and dimensions

Packaging



Size(mm)		
A	B	C
210.00	210.00	30.00

Unit : mm  
Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

PIN Connection

Pin	1	2	3	4	5	6
Single	+Vin	-Vin	+Vout	NO PIN	-Vout	NO PIN
Dual	+Vin	-Vin	+Vout	COM	-Vout	NO PIN

**FEATURES :**

- 2:1Wide Input Voltage
- 10 Watt Package
- Efficiency To 82%
- PI Input Filter
- 1500Vdc Isolation
- MTBF:>1,500,000 hrs
- Operating Temperature:-40°C TO +85°C



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Efficiency	Capacitor Load
	Vdc	No-Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP	uF TYP
61D-12S03BNL	9-18	30	733	3.3	2000	75	2200
61D-12S05BNL	9-18	30	1054	5	2000	79	2200
61D-12S12BNL	9-18	30	1041	12	833	80	1000
61D-12S15BNL	9-18	30	1027	15	666	81	470
61D-12S24BNL	9-18	30	1014	24	416	82	330
61D-12D05BNL	9-18	30	1054	±5	±1000	79	±1000
61D-12D12BNL	9-18	30	1027	±12	±416	81	±470
61D-12D15BNL	9-18	30	1014	±15	±333	82	±330
61D-12D24BNL	9-18	30	1014	±24	±208	82	±220
61D-24S03BNL	18-36	25	366	3.3	2000	75	2200
61D-24S05BNL	18-36	25	527	5	2000	79	2200
61D-24S12BNL	18-36	25	514	12	833	81	680
61D-24S15BNL	18-36	25	507	15	666	82	470
61D-24S24BNL	18-36	25	507	24	416	82	470
61D-24D05BNL	18-36	25	527	±5	±1000	79	±1000
61D-24D12BNL	18-36	25	514	±12	±416	81	±470
61D-24D15BNL	18-36	25	514	±15	±333	81	±330
61D-24D24BNL	18-36	25	507	±24	±208	82	±220
61D-48S03BNL	36-72	20	183	3.3	2000	75	2200
61D-48S05BNL	36-72	20	263	5	2000	79	2200
61D-48S12BNL	36-72	20	257	12	833	81	680
61D-48S15BNL	36-72	20	257	15	666	81	470
61D-48S24BNL	36-72	20	253	24	416	82	330
61D-48D05BNL	36-72	20	263	±5	±1000	79	±1000
61D-48D12BNL	36-72	20	253	±12	±416	82	±470
61D-48D15BNL	36-72	20	253	±15	±333	82	±330
61D-48D24BNL	36-72	20	253	±24	±208	82	±220

DC-DC Converter

**61D-BNL SERIES**

10Watt 1.5KV Isolated

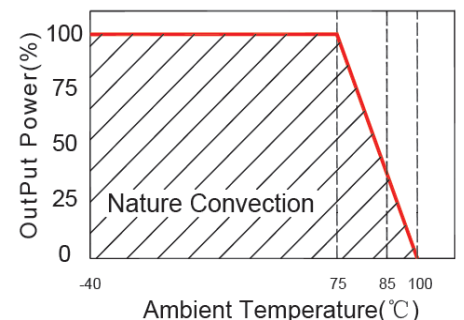
2 : 1 Input Voltage Range

Single & Dual Output

2" x 1"



**Temperature Derating Graph**



**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				2:1	
Filter	Pi TYPE				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance				±2	%
Short Circuit Protection	Continuous				
Line Regulation				±0.5	%
Load Regulation	Single (25% to 100%)			±0.5	%
Load Regulation	Dual			±2.0	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

**General Specifications**

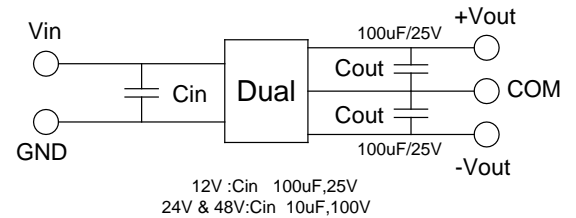
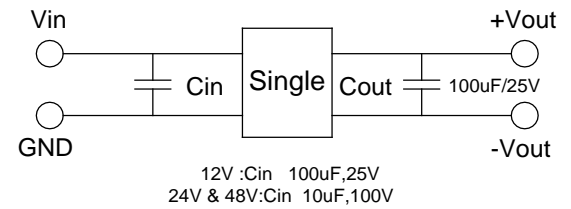
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			200		KHz
Operating Temperature		-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material		Copper			
Weight			36.5		g
Dimensions			51.0x25.4x11.5		mm
Potting Material			Silicone(UL94V-0 rated)		
Radiated Emissions	EN55022		CLASS A		
	FCC 47 CFR Part 15 subpart A		CLASS A		

**Part Number**

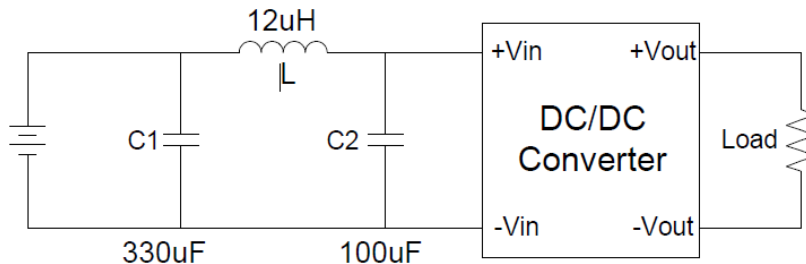
61D - 48 S 05 B NL  
A B C D E F

- A: Series
- B: Input Voltage
- C: Single (S) / Dual (D)
- D: Output Voltage
- E: Version
- F: RoHs Version

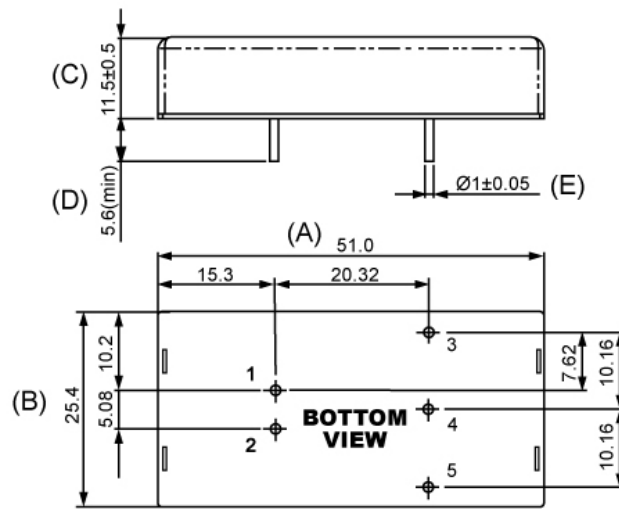
**Recommended Test Circuit**



**Suggest adding input external filter(C1,C2,L)to meet conducted emissions(EN55022 class A)**



Markings and dimensions



UNIT : mm  
 Tolerances : XX.X  $\pm 0.5$ , XX.XX  $\pm 0.25$

PIN Connection					
Pin	1	2	3	4	5
Single	+Vin	-Vin	+Vout	NO PIN	-Vout
Dual	+Vin	-Vin	+Vout	COM	-Vout

**FEATURES :**

- 10W DIL PACKAGE
- 2:1 WIDE INPUT RANGE
- 100% BURNED IN
- HIGH EFFICIENCY
- UL94V-0 PACKAGE MATERIAL
- CUSTOMIZED SOLUTIONS AVAILABLE
- RoHS COMPLIANT
- Remote Control:On/Off



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Efficiency	Capacitor Load
	Vdc	No-Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP	uF MAX
61D-12S03R3	9-18	70	994	3.3	3000	83	1500
61D-12S05R3	9-18	70	980	5	2000	85	1500
61D-12S12R3	9-18	30	971	12	835	86	120
61D-12S15R3	9-18	30	967	15	665	86	120
61D-12D05R3	9-18	70	1004	±5	±1000	83	±1000
61D-12D12R3	9-18	30	972	±12	±418	86	±120
61D-12D15R3	9-18	30	968	±15	±333	86	±120
61D-24S03R3	18-36	70	497	3.3	3000	83	3300
61D-24S05R3	18-36	70	490	5	2000	85	3300
61D-24S12R3	18-36	30	485	12	835	86	330
61D-24S15R3	18-36	30	483	15	665	86	330
61D-24D05R3	18-36	70	502	±5	±1000	83	±2000
61D-24D12R3	18-36	30	486	±12	±418	86	±330
61D-24D15R3	18-36	30	484	±15	±333	86	±330
61D-48S03R3	36-75	40	248	3.3	3000	83	5600
61D-48S05R3	36-75	40	245	5	2000	85	5600
61D-48S12R3	36-75	30	243	12	835	86	680
61D-48S15R3	36-75	30	242	15	665	86	680
61D-48D05R3	36-75	40	251	±5	±1000	83	±3300
61D-48D12R3	36-75	30	243	±12	±418	86	±220
61D-48D15R3	36-75	30	242	±15	±333	86	±220

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				2:1	
Filter	PI TYPE				

DC-DC Converter

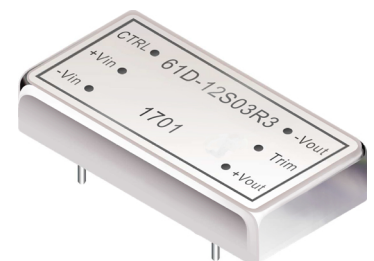
**61D-R3 SERIES**

10Watt 1.5KV Isolated

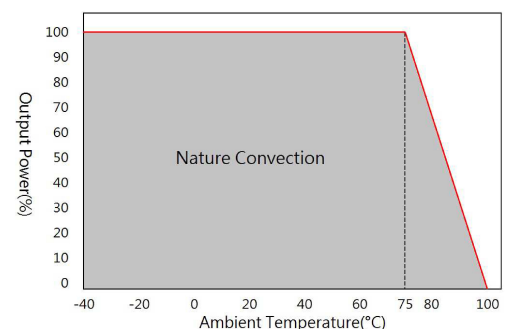
2 : 1 Input Voltage Range

Single & Dual Output

2" x 1"



**Temperature Derating Graph**



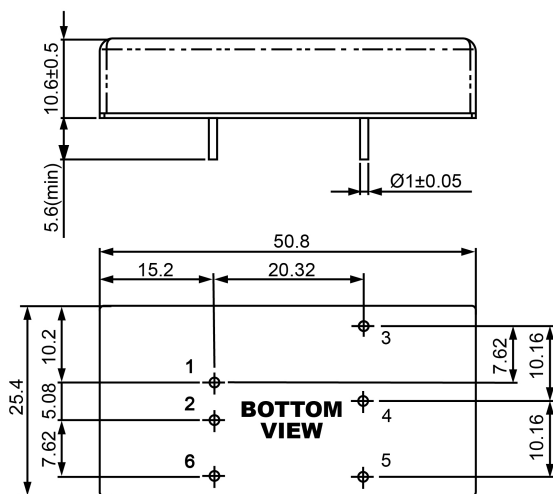
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic recovery				
Line Regulation				±0.5	%
Load Regulation	Single			±0.5	%
	Dual(Balance Load)			±1.0	%
Cross Regulation	DUAL (25% to 100%)			±5	%
Ripple & Noise	Output:3-15V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output > 15V TYPES BW=DC To 20MHz			1% of Vout	mVp-p
Transient response setting time	25% load step change		300		us

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Voltage			1500		Vdc
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			300		KHz
Operating Temperature	With derating	-40		100	°C
Storage Temperature		-55		125	°C
Humidity	Non Condensing	5		95	%
Cooling	Free air Convection				
Case material	Nickel Coated With Non-Conductive Base				
MTBF	MIL-HDBK-217F@25°C	3.342x10 <sup>6</sup>			Hours
Weight			32.6		g
Dimensions			50.8x25.4x10.6		mm

**Markings and dimensions**



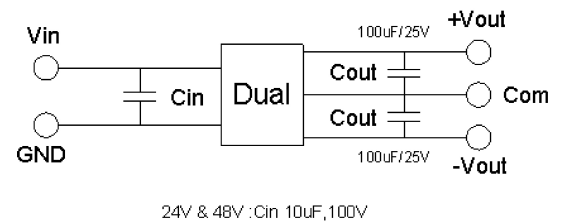
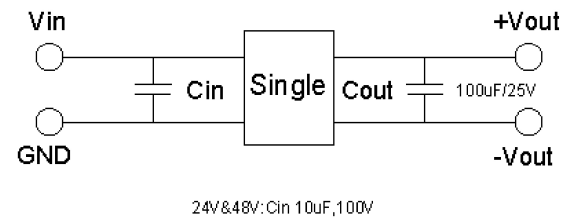
UNIT : mm  
Tolerances : XX.X ±0.5, XX.XX±0.25

**Part Number**

61D - 12 S 03 R 3  
A B C D E F

- A: Series
- B: Input Voltage
- C: Single Output(S), Dual (D)
- D: Output Voltage
- E: Regulated(R)
- F: Package

**Recommended Test Circuit**



**PIN Assignment**

Pin	1	2	3	4	5	6
Single	+Vin	-Vin	+Vout	Trim	-Vout	Remote On/Off
Dual	+Vin	-Vin	+Vout	Com	-Vout	Remote On/Off

**FEATURES :**

- 4:1Wide Input Voltage
- 10 Watt Package
- Efficiency To 80%
- PI Input Filter
- 1500Vdc Isolation
- MTBF:>1,500,000 hrs
- Operating Temperature:-40°C TO +100°C

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Efficiency	Capacitor Load
	Vdc	No-Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP	uF TYP
61DW-24S05RNL	9-36	25	508	5	2000	82	3300
61DW-24S09RNL	9-36	25	502	9	1111	83	680
61DW-24S12RNL	9-36	25	490	12	833	85	680
61DW-24S15RNL	9-36	25	490	15	666	85	470
61DW-24D05RNL	9-36	25	508	±5	±1000	82	±2200
61DW-24D09RNL	9-36	25	502	±9	±555	83	±470
61DW-24D12RNL	9-36	25	490	±12	±416	85	±470
61DW-24D15RNL	9-36	25	490	±15	±333	85	±330
61DW-48S05RNL	18-72	20	254	5	2000	82	1000
61DW-48S09RNL	18-72	20	251	9	1111	83	680
61DW-48S12RNL	18-72	20	245	12	833	85	680
61DW-48S15RNL	18-72	20	245	15	666	85	470
61DW-48D05RNL	18-72	20	254	±5	±1000	82	±2200
61DW-48D09RNL	18-72	20	251	±9	±555	83	±470
61DW-48D12RNL	18-72	20	245	±12	±416	85	±470
61DW-48D15RNL	18-72	20	245	±15	±333	85	±330

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				4:1	
Filter	PI TYPE				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic recovery				
Line Regulation				±0.5	%
Load Regulation	Single (25% to 100%)			±0.5	%
Load Regulation	Dual (25% to 100%,Balance Load)			±2.0	%
Cross Regulation	DUAL (25% to 100%)			±5.0	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us



DC-DC Converter

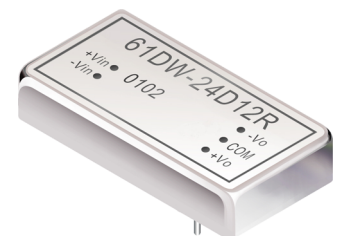
**61DW SERIES**

10Watt 1.5KV Isolated

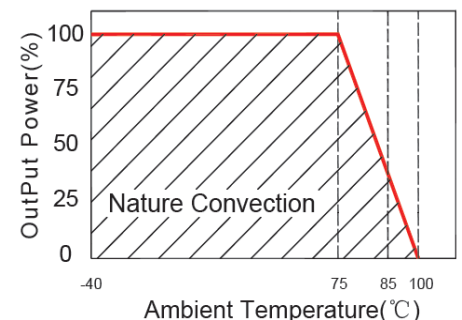
4 : 1 Input Voltage Range

Single & Dual Output

2" x 1"



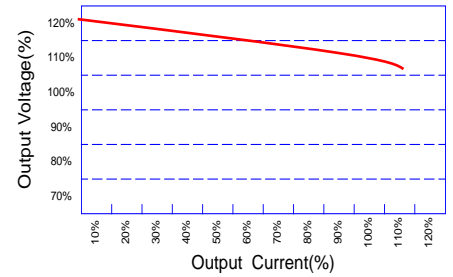
**Temperature Derating Graph**



General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			300		KHz
Operating Temperature	With derating	-40		100	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel Coated With Non-Conductive Base				
Weight			36.5		g
Dimensions			50.8x25.4x10.6		mm
Potting Material	Epoxy (UL94V-0 rated)				

Tolerance Envelope Graph

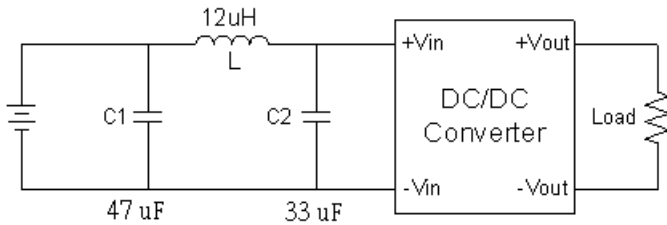


Part Number

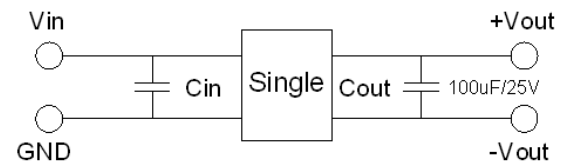
61DW - 24 S 05 R NL  
A B C D E F

- A:Series
- B:Input Voltage
- C:Single(S)Dual(D)
- D:Output Voltage
- E:Regulated(R)
- F:RoHS Version

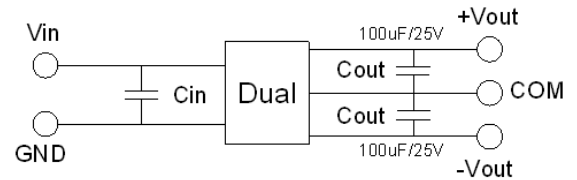
Suggest adding input external filter(C1,C2,L)to meet conducted emissions(EN55022 class A)



Recommended Test Circuit

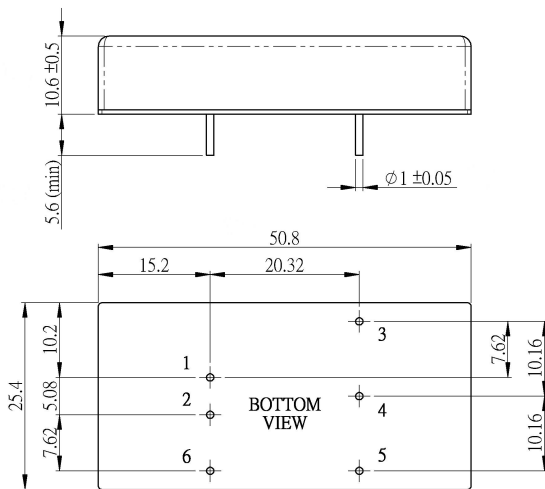


24V & 48V:Cin 10uF,100V



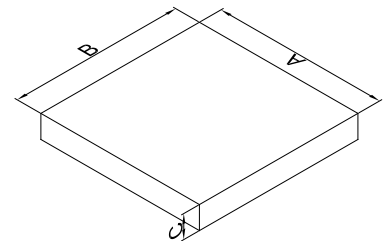
24V & 48V:Cin 10uF,100V

Markings and dimensions



Unit : mm  
Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

Packaging



Size(mm)		
A	B	C
210.00	210.00	30.00

PIN Connection

Pin	1	2	3	4	5	6
Single	+Vin	-Vin	+Vout	NO PIN	-Vout	NO PIN
Dual	+Vin	-Vin	+Vout	COM	-Vout	NO PIN



**FEATURES :**

- 10W DIL PACKAGE
- 4:1 WIDE INPUT RANGE
- 100% BURNED IN
- HIGH EFFICIENCY
- UL94V-0 PACKAGE MATERIAL
- CUSTOMIZED SOLUTIONS AVAILABLE
- RoHS COMPLIANT
- Remote Control:On/Off



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage		Input Current		Output Voltage		Output Current		Efficiency	Capacitor Load
	Vdc	No-Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP	uF MAX			
61DW-24S03R3	9-36	60	497	3.3	3000	83	3300			
61DW-24S05R3	9-36	60	484	5	2000	86	3300			
61DW-24S12R3	9-36	40	474	12	835	88	330			
61DW-24S15R3	9-36	20	483	15	665	86	330			
61DW-24D05R3	9-36	70	502	±5	±1000	83	±2000			
61DW-24D12R3	9-36	40	486	±12	±418	86	±330			
61DW-24D15R3	9-36	40	484	±15	±333	86	±330			
61DW-48S03R3	18-75	30	248	3.3	3000	83	5600			
61DW-48S05R3	18-75	30	245	5	2000	85	5600			
61DW-48S12R3	18-75	30	243	12	835	86	680			
61DW-48S15R3	18-75	30	242	15	665	86	680			
61DW-48D05R3	18-75	30	251	±5	±1000	83	±3300			
61DW-48D12R3	18-75	30	243	±12	±418	86	±220			
61DW-48D15R3	18-75	30	242	±15	±333	86	±220			

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				4:1	
Filter	Pi TYPE				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic recovery				
Line Regulation				±0.5	%
Load Regulation	Single Dual(Balance Load)			±0.5 ±1.0	%
Cross Regulation	DUAL (25% to 100% Load)			±5	%
Ripple & Noise	Output:3-15V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output > 15V TYPES BW=DC To 20MHz			1% of Vout	mVp-p
Transient response setting time	25% load step change		300		us

DC-DC Converter

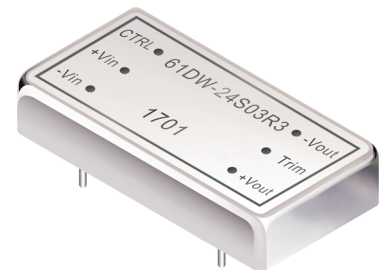
**61DW-R3 SERIES**

10Watt 1.5KV Isolated

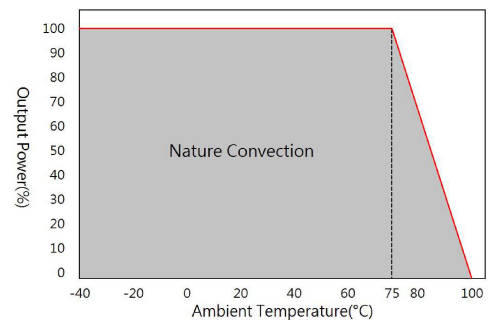
4 : 1 Input Voltage Range

Single & Dual Output

2" x 1"



**Temperature Derating Graph**



**General Specifications**

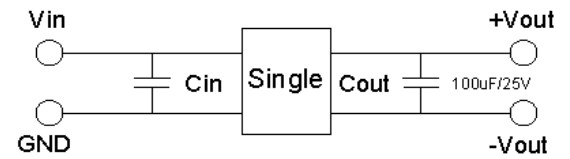
Parameters	Conditions	Min	Typ	Max	Units
Isolation Voltage			1500		Vdc
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			300		KHz
Operating Temperature	With derating	-40		100	°C
Storage Temperature		-55		125	°C
Humidity	Non Condensing	5		95	%
Cooling	Free air Convection				
Case material	Nickel coated copper with no-conductive base				
MTBF	MIL-HDBK-217F@25°C	3.342x10 <sup>6</sup>			Hours
Weight			32.6		g
Dimensions		50.8x25.4x10.6			mm

**Part Number**

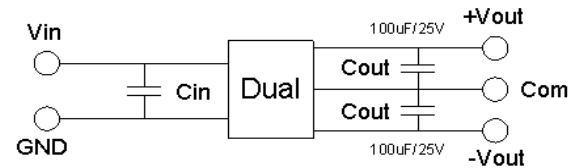
61DW - 24 S 03 R 3  
 A B C D E F

- A: Series
- B: Input Voltage
- C: Single Output(S), Dual (D)
- D: Output Voltage
- E: Regulated(R)
- F: Package

**Recommended Test Circuit**

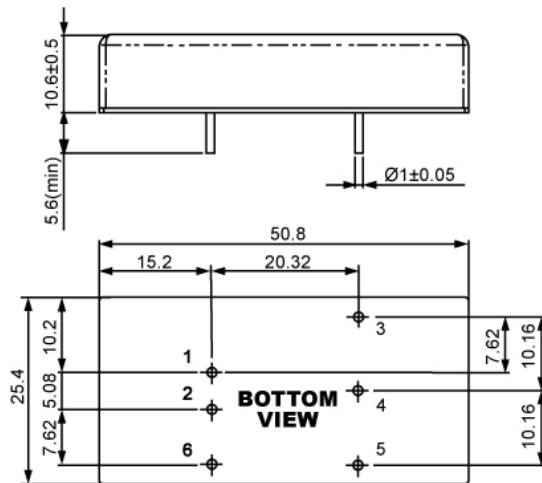


24V&48V: Cin 10uF,100V



24V & 48V :Cin 10uF,100V

**Markings and dimensions**



UNIT : mm  
 Tolerances : XX.X ±0.5, XX.XX±0.25

**PIN Assignment**

Pin	1	2	3	4	5	6
Single	+Vin	-Vin	+Vout	Trim	-Vout	Remote On/Off
Dual	+Vin	-Vin	+Vout	Com	-Vout	Remote On/Off

**FEATURES :**

- 2:1Wide Input Voltage
- Efficiency To 80%
- 1500Vdc Isolation
- MTBF:>1,500,000 hrs
- Operating Temperature:-40°C TO +85°C

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Output Voltage	Output Current	Efficiency
	Vdc	Vdc	mA	%TYP
66D-12S05RNNL	9-18	5	1000	75
66D-12S12RNNL	9-18	12	470	80
66D-12S15RNNL	9-18	15	400	80
66D-12D12RNNL	9-18	±12	±230	80
66D-12D15RNNL	9-18	±15	±190	80
66D-24S05RNNL	18-36	5	1000	75
66D-24S12RNNL	18-36	12	470	80
66D-24S15RNNL	18-36	15	400	80
66D-24D12RNNL	18-36	±12	±230	80
66D-24D15RNNL	18-36	±15	±190	80
66D-48S05RNNL	36-72	5	1000	80
66D-48S12RNNL	36-72	12	470	80
66D-48S15RNNL	36-72	15	400	80
66D-48D12RNNL	36-72	±12	±230	80
66D-48D15RNNL	36-72	±15	±190	80

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				2:1	
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance				±2	%
Short Circuit Protection	Continuous				
Line Regulation				±0.5	%
Load Regulation	Single			±0.5	%
Load Regulation	Dual			±2.0	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us



DC-DC Converter

**66D SERIES**

5Watt 1.5KV Isolated

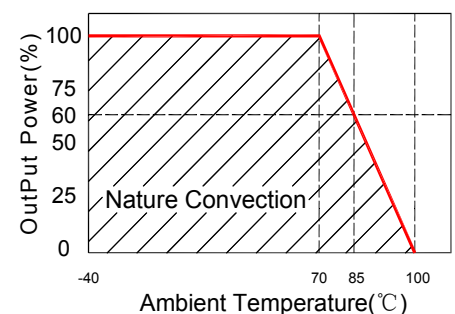
2 : 1 Input Voltage Range

Single & Dual Output

2" x 1"



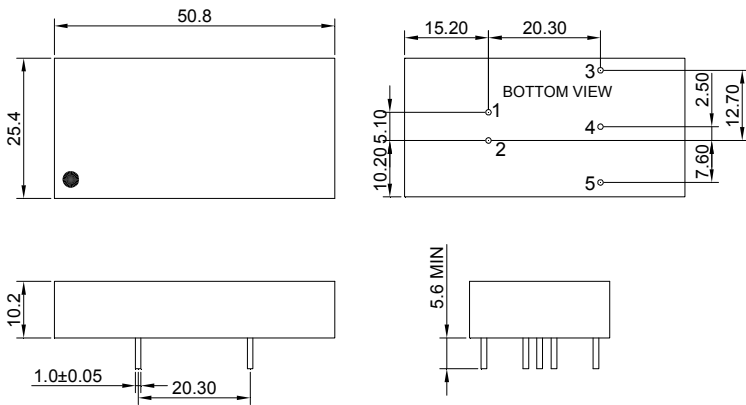
**Temperature Derating Graph**



General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			200		KHz
Operating Temperature		-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel Coated With Non-Conductive Base				
Weight			36.5		g
Dimensions		50.8x25.4x10.2			mm

Markings and Dimensions



UNIT : mm Unless otherwise specified, all tolerances are ±0.25

PIN Connection

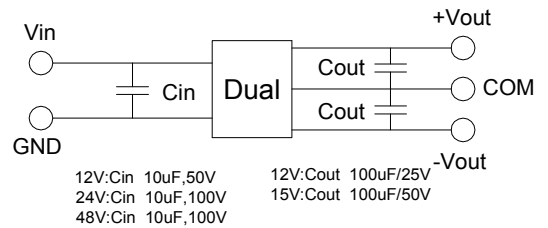
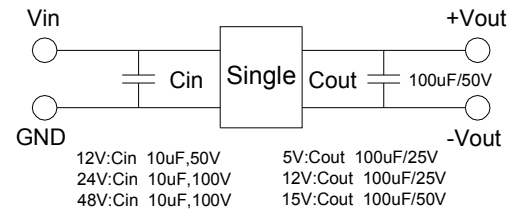
Pin	1	2	3	4	5
Single	+Vin	-Vin	+Vout	NO PIN	-Vout
Dual	+Vin	-Vin	+Vout	COM	-Vout

Part Number

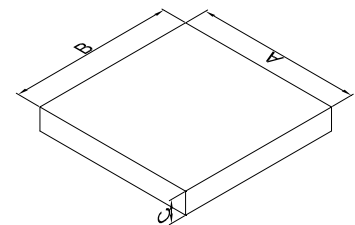
66D - 12 S 05 R N NL  
 A B C D E F G

A:Series  
 B:Input Voltage  
 C:Single(S) Dual(D)  
 D:Output Voltage  
 E:Regulated(R)  
 F:Package  
 G:RoHS Version

Recommended Test Circuit



Packaging



Size(mm)		
A	B	C
210.00	210.00	30.00

**FEATURES :**

- 2:1Wide Input Voltage
- 15 Watt Package
- Efficiency To 80%
- PI Input Filter
- 1500Vdc Isolation
- MTBF:>1,500,000 hrs
- Operating Temperature:-40°C TO +100°C



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage		Input Current		Output Voltage		Output Current	Efficiency	Capacitor Load
	Vdc	No-Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP	µF TYP		
67D-12S05RNL	9-18	30	1524	5	3000	82	2200		
67D-12S09RNL	9-18	30	1470	9	1666	85	1000		
67D-12S12RNL	9-18	30	1470	12	1250	85	1000		
67D-12S15RNL	9-18	30	1470	15	1000	85	680		
67D-12S18RNL	9-18	30	1470	18	833	85	470		
67D-12S24RNL	9-18	30	1453	24	625	86	470		
67D-12D05RNL	9-18	30	1524	±5	±1500	82	±1000		
67D-12D09RNL	9-18	30	1488	±9	±833	84	±470		
67D-12D12RNL	9-18	30	1488	±12	±625	84	±470		
67D-12D15RNL	9-18	30	1488	±15	±500	84	±330		
67D-12D18RNL	9-18	30	1470	±18	±416	85	±220		
67D-12D24RNL	9-18	30	1470	±24	±312	85	±220		
67D-24S05RNL	18-36	25	744	5	3000	84	3300		
67D-24S09RNL	18-36	25	735	9	1666	85	1000		
67D-24S12RNL	18-36	25	735	12	1250	85	1000		
67D-24S15RNL	18-36	25	726	15	1000	86	680		
67D-24S18RNL	18-36	25	726	18	833	86	470		
67D-24S24RNL	18-36	25	718	24	625	87	470		
67D-24D05RNL	18-36	25	753	±5	±1500	83	±1000		
67D-24D09RNL	18-36	25	735	±9	±833	85	±470		
67D-24D12RNL	18-36	25	735	±12	±625	85	±470		
67D-24D15RNL	18-36	25	735	±15	±500	85	±220		
67D-24D18RNL	18-36	25	718	±18	±416	87	±220		
67D-24D24RNL	18-36	25	718	±24	±312	87	±220		

DC-DC Converter

67D SERIES

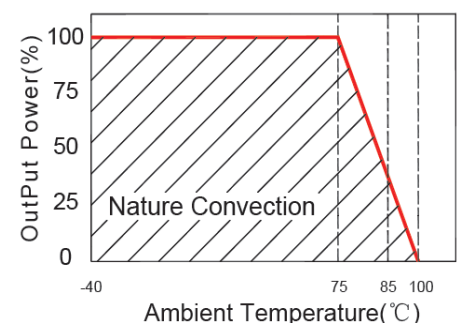
15Watt 1.5KV Isolated  
2 : 1 Input Voltage Range

Single & Dual Output

2" x 1"



Temperature Derating Graph



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Efficiency	Capacitor Load
	Vdc	No-Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP	uF TYP
67D-48S05RNL	36-72	20	372	5	3000	84	3300
67D-48S09RNL	36-72	20	367	9	1666	85	1000
67D-48S12RNL	36-72	20	363	12	1250	86	1000
67D-48S15RNL	36-72	20	359	15	1000	87	680
67D-48S18RNL	36-72	20	359	18	833	87	470
67D-48S24RNL	36-72	20	359	24	625	87	470
67D-48D05RNL	36-72	20	372	±5	±1500	84	±1000
67D-48D09RNL	36-72	20	367	±9	±833	85	±470
67D-48D12RNL	36-72	20	363	±12	±625	86	±470
67D-48D15RNL	36-72	20	359	±15	±500	87	±330
67D-48D18RNL	36-72	20	359	±18	±416	87	±220
67D-48D24RNL	36-72	20	359	±24	±312	87	±220

Input Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				2:1	
Filter	Pi TYPE				

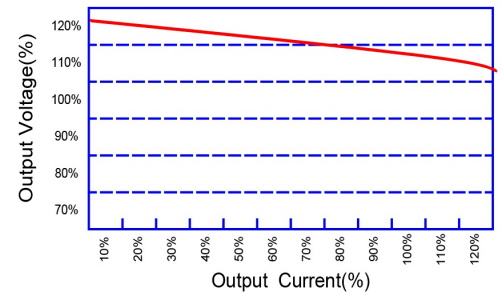
Output Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic recovery				
Line Regulation				±0.5	%
Load Regulation	Single (25% to 100%)			±1.0	%
Load Regulation	Dual (25% to 100%,Balance Load)			±2.0	%
Cross Regulation	DUAL (25% to 100%)			±5.0	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			300		KHz
Operating Temperature	With derating	-40		100	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel Coated With Non-Conductive Base				
Weight			36.5		g
Dimensions			50.8x25.4x10.6		mm
Potting Material			Epoxy (UL94V-0 rated)		

Tolerance Envelope Graph

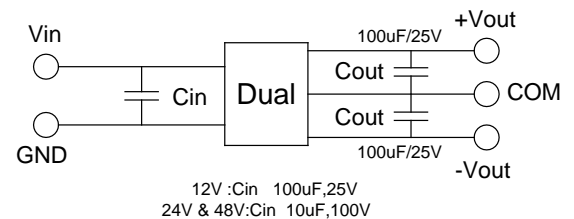
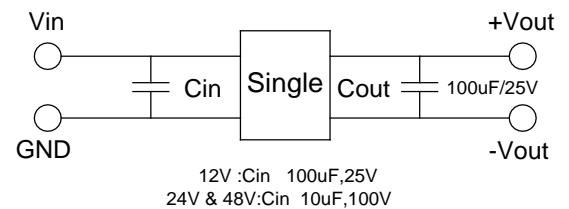


Part Number

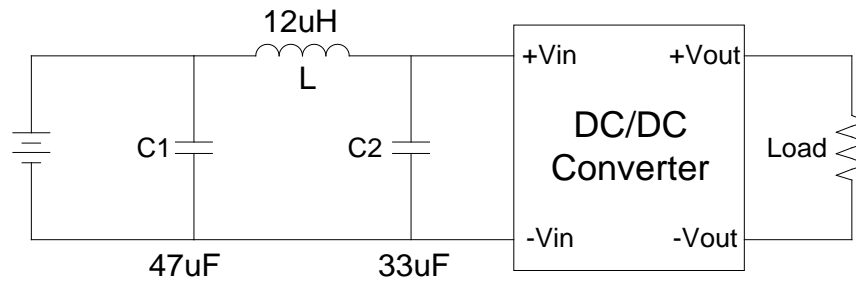
67D - 12 S 05 R NL  
A B C D E F

- A:Series
- B:Input Voltage
- C:Single(S)Dual(D)
- D:Output Voltage
- E:Regulated(R)
- F:RoHS Version

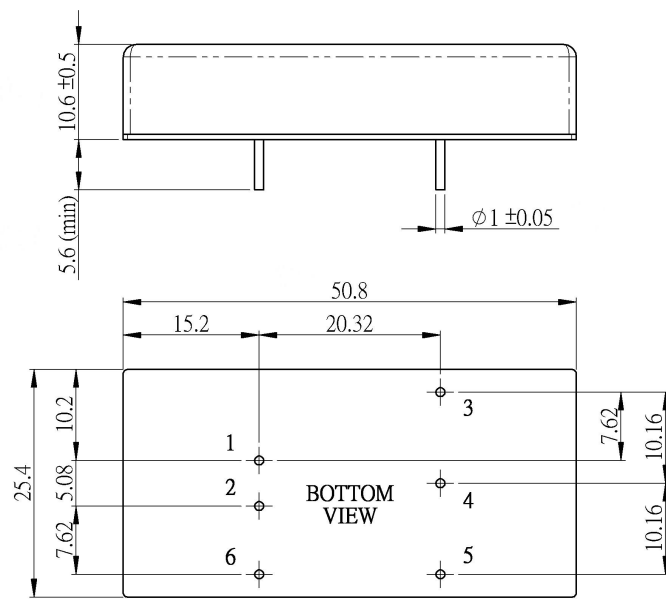
Recommended Test Circuit



Suggest adding input external filter(C1,C2,L)to meet conducted emissions(EN55022 class A)



Markings and dimensions



Unit : mm  
Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

PIN Connection

Pin	1	2	3	4	5	6
Single	+Vin	-Vin	+Vout	NO PIN	-Vout	NO PIN
Dual	+Vin	-Vin	+Vout	COM	-Vout	NO PIN

**FEATURES :**

- 15W DIL PACKAGE
- 2:1 WIDE INPUT RANGE
- 100% BURNED IN
- HIGH EFFICIENCY
- UL94V-0 PACKAGE MATERIAL
- CUSTOMIZED SOLUTIONS AVAILABLE
- RoHS COMPLIANT
- Remote Control:On/Off



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Efficiency	Capacitor Load
	Vdc	No-Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP	uF MAX
67D-12S03R3	9-18	70	1310	3.3	4000	84	1500
67D-12S05R3	9-18	70	1453	5	3000	86	1500
67D-12S12R3	9-18	30	1453	12	1250	86	120
67D-12S15R3	9-18	30	1453	15	1000	86	120
67D-12D05R3	9-18	70	1488	±5	±1500	84	±1000
67D-12D12R3	9-18	30	1454	±12	±625	86	±120
67D-12D15R3	9-18	30	1454	±15	±500	86	±120
67D-24S03R3	18-36	70	655	3.3	4000	84	3300
67D-24S05R3	18-36	70	727	5	3000	86	3300
67D-24S12R3	18-36	30	727	12	1250	86	330
67D-24S15R3	18-36	30	727	15	1000	86	330
67D-24D05R3	18-36	70	744	±5	±1500	84	±2000
67D-24D12R3	18-36	30	727	±12	±625	86	±330
67D-24D15R3	18-36	30	727	±15	±500	86	±330
67D-48S03R3	36-75	40	327	3.3	4000	84	5600
67D-48S05R3	36-75	40	363	5	3000	86	5600
67D-48S12R3	36-75	30	363	12	1250	86	680
67D-48S15R3	36-75	30	363	15	1000	86	680
67D-48D05R3	36-75	40	372	±5	±1500	84	±3300
67D-48D12R3	36-75	30	368	±12	±625	85	±220
67D-48D15R3	36-75	30	368	±15	±500	85	±220

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				2:1	
Filter	Pi TYPE				

DC-DC Converter

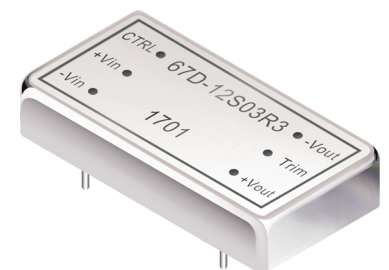
**67D-R3 SERIES**

15Watt 1.5KV Isolated

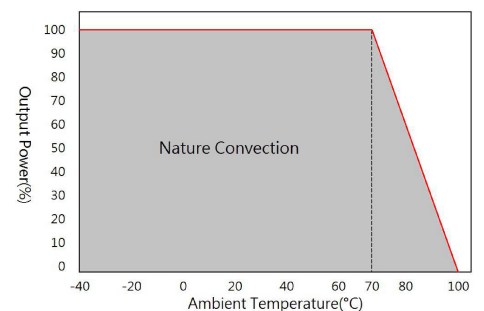
2 : 1 Input Voltage Range

Single & Dual Output

2" x 1"



**Temperature Derating Graph**





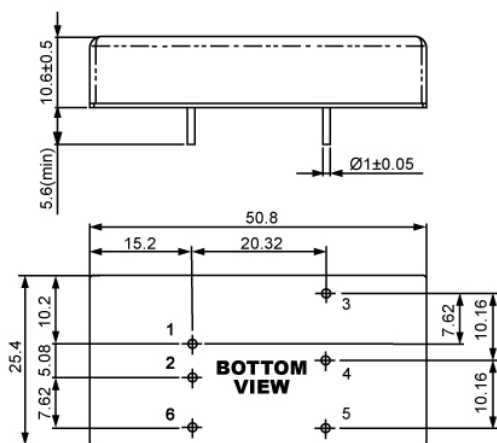
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic recovery				
Line Regulation				±0.5	%
Load Regulation	Single			±0.5	%
	Dual (Balance Load)			±1.0	%
Cross Regulation	DUAL (25% to 100% Load)			±5	%
Ripple & Noise	Output:3-15V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output > 15V TYPES BW=DC To 20MHz			1% of Vout	mVp-p
Transient response setting time	25% load step change		300		us

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Voltage			1500		Vdc
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			300		KHz
Operating Temperature	With derating	-40		100	°C
Storage Temperature		-55		125	°C
Humidity	Non Condensing	5		95	%
Cooling	Free air Convection				
Case material	Nickel coated copper with no-conductive base				
MTBF	MIL-HDBK-217F@25°C	2.318x10 <sup>6</sup>			Hours
Weight			32.6		g
Dimensions		50.8x25.4x10.6			mm

**Markings and dimensions**



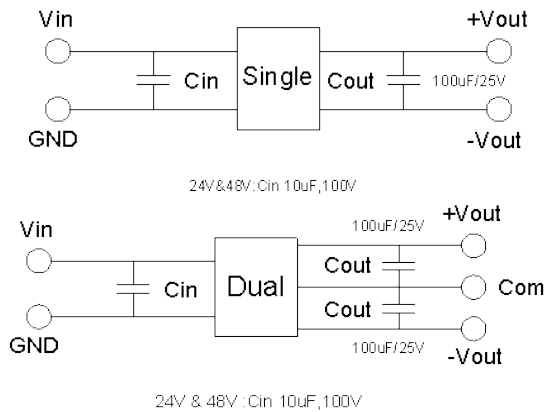
UNIT : mm  
Tolerances : XX.X ±0.5, XX.XX±0.25

**Part Number**

67D - 12 S 03 R 3  
A B C D E F

- A: Series
- B: Input Voltage
- C: Single Output(S), Dual (D)
- D: Output Voltage
- E: Regulated(R)
- F: Package

**Recommended Test Circuit**



24V & 48V :Cin 10uF,100V

24V & 48V :Cin 10uF,100V

**PIN Assignment**

Pin	1	2	3	4	5	6
Single	+Vin	-Vin	+Vout	Trim	-Vout	Remote On/Off
Dual	+Vin	-Vin	+Vout	Com	-Vout	Remote On/Off

**FEATURES :**

- 4:1Wide Input Voltage
- 15 Watt Package
- Efficiency To 80%
- PI Input Filter
- 1500Vdc Isolation
- MTBF:>1,500,000 hrs
- Operating Temperature:-40°C TO +100°C



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage		Input Current		Output Voltage		Output Current		Efficiency	Capacitor Load
	Vdc	No-Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP	uF TYP			
67DW-24S05RNL	9-36	25	753	5	3000	83	3300			
67DW-24S09RNL	9-36	25	744	9	1666	84	680			
67DW-24S12RNL	9-36	25	735	12	1250	85	680			
67DW-24S15RNL	9-36	25	726	15	1000	86	470			
67DW-24D05RNL	9-36	25	753	±5	±1500	83	±2200			
67DW-24D09RNL	9-36	25	744	±9	±833	84	±470			
67DW-24D12RNL	9-36	25	735	±12	±625	85	±470			
67DW-24D15RNL	9-36	25	726	±15	±500	86	±330			
67DW-48S05RNL	18-72	20	376	5	3000	83	3300			
67DW-48S09RNL	18-72	20	372	9	1666	84	680			
67DW-48S12RNL	18-72	20	367	12	1250	85	680			
67DW-48S15RNL	18-72	20	363	15	1000	86	470			
67DW-48D05RNL	18-72	20	376	±5	±1500	83	±2200			
67DW-48D09RNL	18-72	20	372	±9	±833	84	±470			
67DW-48D12RNL	18-72	20	367	±12	±625	85	±470			
67DW-48D15RNL	18-72	20	363	±15	±500	86	±330			

DC-DC Converter

**67DW SERIES**

15Watt 1.5KV Isolated

4 : 1 Input Voltage Range

Single & Dual Output

2" x 1"



**Input Specifications**

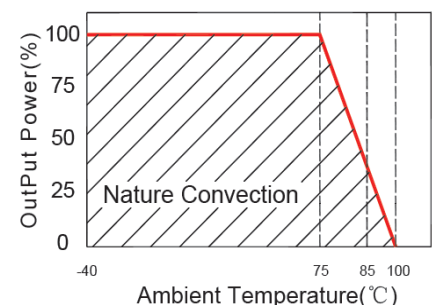
Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				4:1	
Filter	Pi TYPE				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic recovery				
Line Regulation				±0.5	%
Load Regulation	Single (25% to 100%)			±1.0	%
Load Regulation	Dual (25% to 100%,Balance Load)			±2.0	%
Cross Regulation	DUAL (25% to 100% F.L)			±5.0	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us



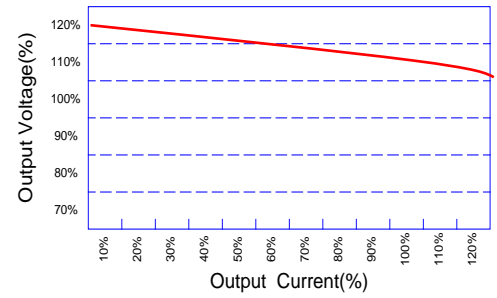
**Temperature Derating Graph**



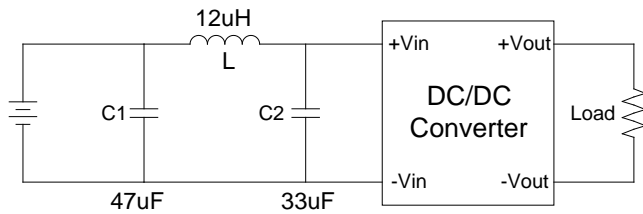
**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			300		KHz
Operating Temperature	With derating	-40		100	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel Coated With Non-Conductive Base				
Weight			36.5		g
Dimensions			50.8x25.4x10.6		mm
Potting Material	Epoxy (UL94V-0 rated)				

**Tolerance Envelope Graph**



**Exceeding the absolute ratings of the unit could cause damage, It is not allowed for continuous operating**

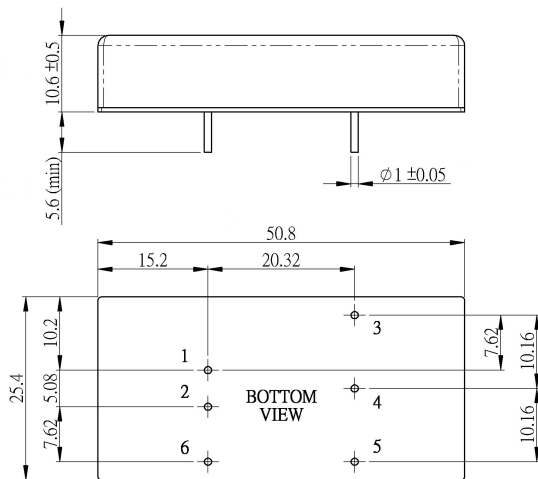


**Part Number**

67DW - 24 S 05 R NL  
A B C D E F

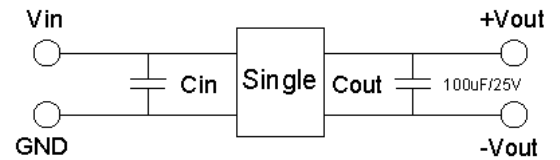
- A:Series
- B:Input Voltage
- C:Single(S)Dual(D)
- D:Output Voltage
- E:Regulated(R)
- F:RoHS Version

**Markings and dimensions**

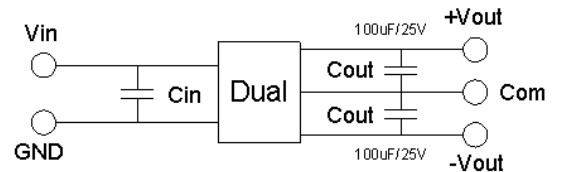


Unit : mm  
Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

**Recommended Test Circuit**



24V & 48V : Cin 10uF, 100V



24V & 48V : Cin 10uF, 100V

**PIN Connection**

Pin	1	2	3	4	5	6
Single	+Vin	-Vin	+Vout	NO PIN	-Vout	NO PIN
Dual	+Vin	-Vin	+Vout	COM	-Vout	NO PIN

**FEATURES :**

- 15W DIL PACKAGE
- 4:1 WIDE INPUT RANGE
- 100% BURNED IN
- HIGH EFFICIENCY
- UL94V-0 PACKAGE MATERIAL
- CUSTOMIZED SOLUTIONS AVAILABLE
- RoHS COMPLIANT
- Remote Control:On/Off

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Efficiency	Capacitor Load
	Vdc	No-Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP	uF MAX
67DW-24S03R3	9-36	60	663	3.3	4000	83	3300
67DW-24S05R3	9-36	60	727	5	3000	86	3300
67DW-24S12R3	9-36	40	727	12	1250	86	330
67DW-24S15R3	9-36	20	727	15	1000	86	330
67DW-24D05R3	9-36	70	754	±5	±1500	83	±2000
67DW-24D12R3	9-36	40	726	±12	±625	86	±330
67DW-24D15R3	9-36	40	726	±15	±500	86	±330
67DW-48S03R3	18-75	30	331	3.3	4000	83	5600
67DW-48S05R3	18-75	30	363	5	3000	86	5600
67DW-48S12R3	18-75	30	363	12	1250	86	680
67DW-48S15R3	18-75	30	363	15	1000	86	680
67DW-48D05R3	18-75	30	377	±5	±1500	83	±3300
67DW-48D12R3	18-75	30	363	±12	±625	86	±220
67DW-48D15R3	18-75	30	363	±15	±500	86	±220

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				4:1	
Filter	PI TYPE				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic recovery				
Line Regulation				±0.5	%
Load Regulation	Single Dual(Balance Load)			±0.5 ±1.0	%
Cross Regulation	Dual (25% to 100% Load)			±5	%
Ripple & Noise	Output:3-15V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output > 15V TYPES BW=DC To 20MHz			1% of Vout	mVp-p
Transient response setting time	25% load step change		300		us



DC-DC Converter

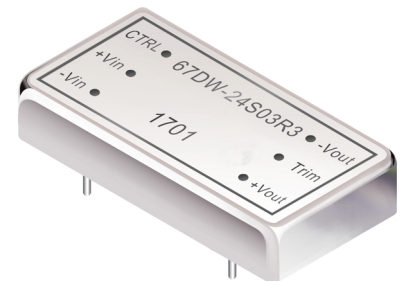
**67DW-R3 SERIES**

15Watt 1.5KV Isolated

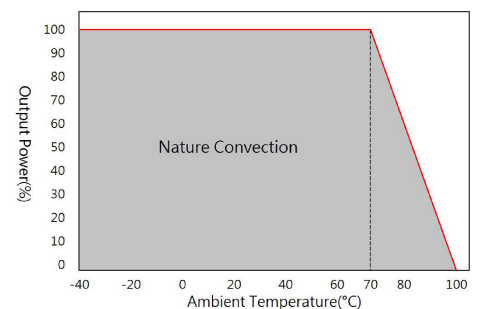
4 : 1 Input Voltage Range

Single & Dual Output

2" x 1"



**Temperature Derating Graph**



**General Specifications**

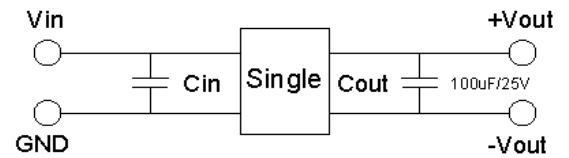
Parameters	Conditions	Min	Typ	Max	Units
Isolation Voltage			1500		Vdc
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			300		KHz
Operating Temperature	With derating	-40		100	°C
Storage Temperature		-55		125	°C
Humidity	Non Condensing	5		95	%
Cooling	Free air Convection				
Case material	Nickel coated copper with no-conductive base				
MTBF	MIL-HDBK-217F@25°C	2.43x10 <sup>6</sup>			Hours
Weight			32.6		g
Dimensions		50.8x25.4x10.6			mm

**Part Number**

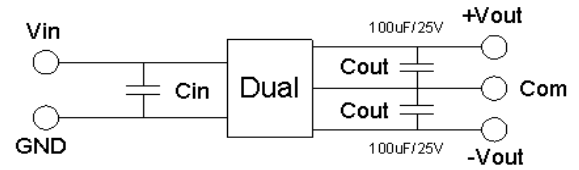
67DW - 24 S 03 R 3  
 A B C D E F

- A: Series
- B: Input Voltage
- C: Single Output(S), Dual (D)
- D: Output Voltage
- E: Regulated(R)
- F: Package

**Recommended Test Circuit**

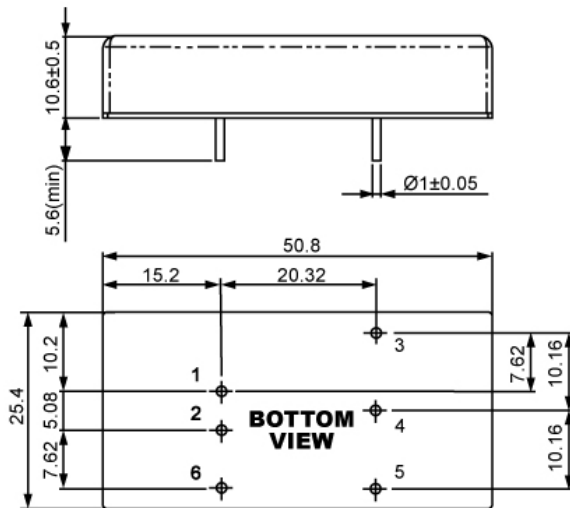


24V&48V: Cin 10uF, 100V



24V & 48V :Cin 10uF, 100V

**Markings and dimensions**



UNIT : mm  
 Tolerances : XX.X ±0.5, XX.XX±0.25

**PIN Assignment**

Pin	1	2	3	4	5	6
Single	+Vin	-Vin	+Vout	Trim	-Vout	Remote On/Off
Dual	+Vin	-Vin	+Vout	Com	-Vout	Remote On/Off

**FEATURES :**

- 2:1Wide Input Voltage
- 3 Watt 24PIN DIL Package
- Efficiency To 80%
- 1500Vdc Isolation
- MTBF:>1,500,000 hrs
- Operating Temperature:-40°C TO +85°C

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Output Voltage	Output Current	Efficiency
	Vdc	Vdc	mA	%TYP
68D-05S05CN	4.5-9	5	600	75
68D-05S12CN	4.5-9	12	250	80
68D-05S15CN	4.5-9	15	200	80
68D-12S05CN	9-18	5	600	75
68D-12S12CN	9-18	12	250	80
68D-12S15CN	9-18	15	200	80
68D-12D05CN	9-18	±5	±300	75
68D-12D12CN	9-18	±12	±125	75
68D-12D15CN	9-18	±15	±100	75
68D-24S05CN	18-36	5	600	75
68D-24S12CN	18-36	12	250	80
68D-24S15CN	18-36	15	200	80
68D-24D05CN	18-36	±5	±300	75
68D-24D12CN	18-36	±12	±125	80
68D-24D15CN	18-36	±15	±100	80
68D-48S05CN	36-72	5	600	75
68D-48S12CN	36-72	12	250	80
68D-48S15CN	36-72	15	200	80
68D-48D05CN	36-72	±5	±300	75
68D-48D12CN	36-72	±12	±125	80
68D-48D15CN	36-72	±15	±100	80

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				2:1	
Filter	Capacitor				



DC-DC Converter

**68D SERIES**

3Watt 1.5KV Isolated

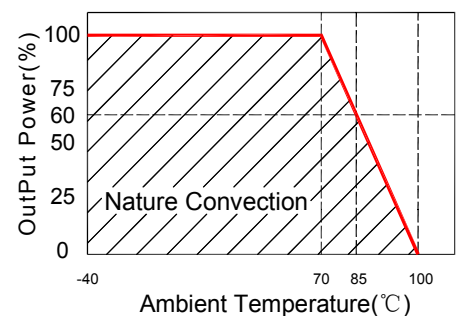
2 : 1 Input Voltage Range

Single & Dual Output

1.25" x 0.8"



**Temperature Derating Graph**



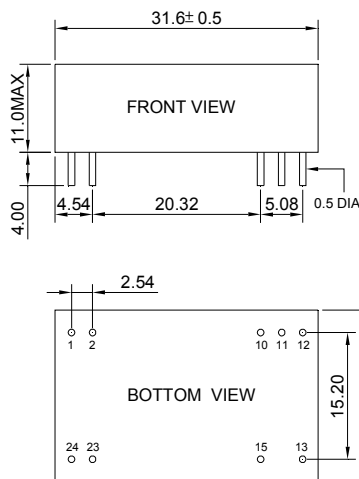
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance				±2	%
Short Circuit Protection	Continuous				
Line Regulation				±0.5	%
Load Regulation	Single			±0.5	%
Load Regulation	Dual			±2.0	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			200		KHz
Operating Temperature		-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel Coated Copper With Non-Conductive Base				
Weight			16.2		g
Dimensions		31.60x20.10x11.0			mm

**Markings and dimensions**

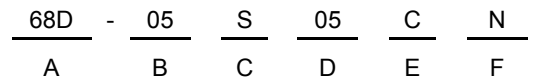


UNIT : mm Unless otherwise specified, all tolerances are±0.25

**PIN Connection**

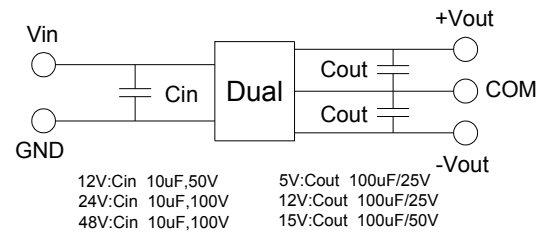
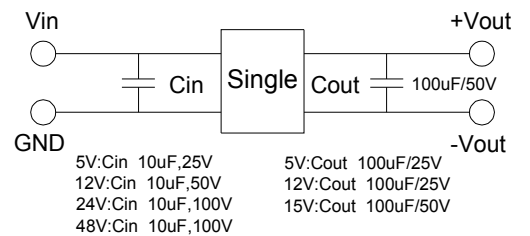
Pin	1.2	10.11	12	13	15	23.24
Single	+Vin	No Pin	-Vout	+Vout	No Pin	-Vin
Dual	+Vin	Com	No Pin	-Vout	+Vout	-Vin

**Part Number**

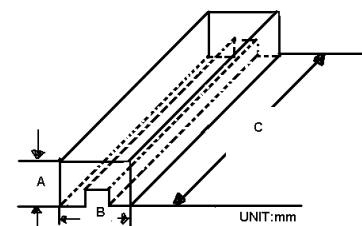


- A : Series
- B : Input Voltage
- C : Single(S);Dual(D)
- D : Output Voltage
- E : Types
- F : Package

**Recommended Test Circuit**



**Packaging**



Size(mm)		
A	B	C
18.71	23.00	522

**FEATURES :**

- 2:1Wide Input Voltage
- 3 Watt 24PIN DIL Package
- Efficiency To 80%
- 1500Vdc Isolation
- MTBF:>1,500,000 hrs
- Operating Temperature:-40°C TO +85°C



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Output Voltage	Output Current	Efficiency
	Vdc	Vdc	mA	%TYP
68D1-05S05RNL	4.5-9	5	600	75
68D1-05S12RNL	4.5-9	12	250	77
68D1-05S15RNL	4.5-9	15	200	80
68D1-12S05RNL	9-18	5	600	75
68D1-12S12RNL	9-18	12	250	80
68D1-12S15RNL	9-18	15	200	80
68D1-12D05RNL	9-18	±5	±300	75
68D1-12D12RNL	9-18	±12	±125	75
68D1-12D15RNL	9-18	±15	±100	75
68D1-24S05RNL	18-36	5	600	78
68D1-24S12RNL	18-36	12	250	80
68D1-24S15RNL	18-36	15	200	80
68D1-24D05RNL	18-36	±5	±300	75
68D1-24D12RNL	18-36	±12	±125	80
68D1-24D15RNL	18-36	±15	±100	80
68D1-48S05RNL	36-72	5	600	78
68D1-48S12RNL	36-72	12	250	80
68D1-48S15RNL	36-72	15	200	80
68D1-48D05RNL	36-72	±5	±300	75
68D1-48D12RNL	36-72	±12	±125	80
68D1-48D15RNL	36-72	±15	±100	80

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				2:1	
Filter	Capacitor				

DC-DC Converter

**68D1 SERIES**

3Watt 1.5KV Isolated

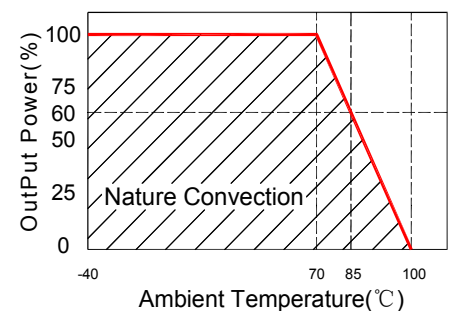
2 : 1 Input Voltage Range

Single & Dual Output

1.25" X 0.8"



**Temperature Derating Graph**





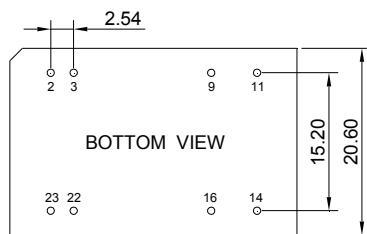
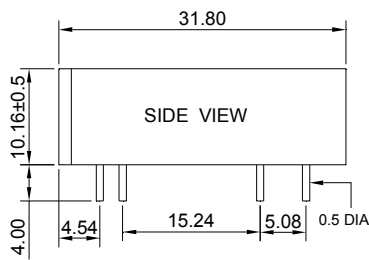
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance				±2	%
Short Circuit Protection	Continuous				
Line Regulation				±0.5	%
Load Regulation	Single			±0.5	%
Load Regulation	Dual			±2.0	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			200		KHz
Operating Temperature		-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel Coated With Non-Conductive Base or Black Coated Copper With Non-Conductive Base				
Weight			16.2		g
Dimensions		31.80x20.60x10.16			mm

**Markings and dimensions**



UNIT : mm Unless otherwise specified, all tolerances are ±0.25

**PIN Connection**

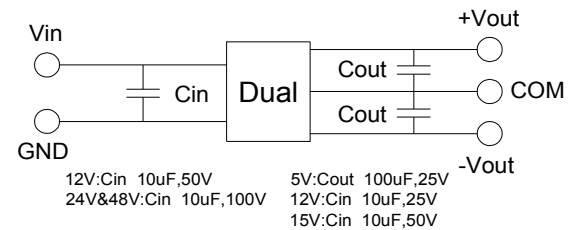
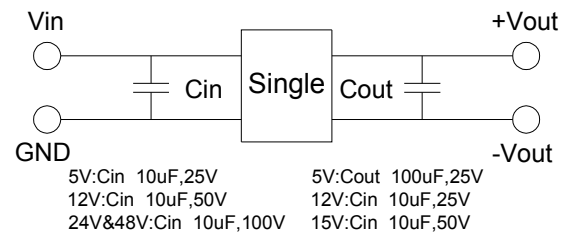
Pin	2,3	9	11	14	16	22,23
Single	-Vin	No Pin	NC	+Vout	-Vout	+Vin
Dual	-Vin	Com	-Vout	+Vout	Com	+Vin

**Part Number**

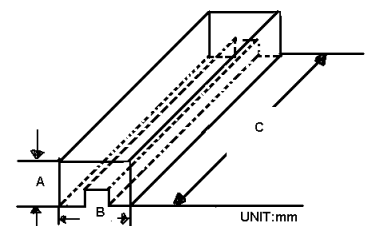
68D1 - 12 S 05 R NL  
A B C D E F

A:Series  
B:Input Voltage  
C:Single(S)Dual(D)  
D:Output Voltage  
E:Regulated(R)  
F:RoHS Version

**Recommended Test Circuit**



**Packaging**



Size(mm)		
A	B	C
18.71	23.00	522

**FEATURES :**

- 2:1Wide Input Voltage
- 5-6 Watt 24PIN DIL Package
- Efficiency To 80%
- 1500Vdc Isolation
- MTBF:>1,500,000 hrs
- Operating Temperature:-40°C TO +85°C

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage Vdc	Output Voltage Vdc	Output Current mA	Input Current		Efficiency %TYP
				No Load mA	Full Load mA	
68D5-12S03CN	9-18	3.3	1000	7.5	405	70
68D5-12S05CN	9-18	5	1000	7.5	545	75
68D5-12S12CN	9-18	12	470	7.5	585	80
68D5-12S15CN	9-18	15	400	7.5	625	80
68D5-12D05CN	9-18	±5	±500	12	545	75
68D5-12D12CN	9-18	±12	±230	12	575	80
68D5-12D15CN	9-18	±15	±190	12	590	80
68D5-24S03CN	18-36	3.3	1000	5	195	70
68D5-24S05CN	18-36	5	1000	5	265	78
68D5-24S12CN	18-36	12	470	5	285	80
68D5-24S15CN	18-36	15	400	5	305	80
68D5-24D05CN	18-36	±5	±500	7.5	265	80
68D5-24D12CN	18-36	±12	±230	7.5	285	80
68D5-24D15CN	18-36	±15	±190	7.5	295	80
68D5-48S03CN	36-72	3.3	1000	2	98	70
68D5-48S05CN	36-72	5	1000	2	133	80
68D5-48S12CN	36-72	12	470	2	145	80
68D5-48S15CN	36-72	15	400	2	154	80
68D5-48D05CN	36-72	±5	±500	3	265	80
68D5-48D12CN	36-72	±12	±230	3	142	80

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				2:1	
Filter	Capacitor				



DC-DC Converter

**68D5 SERIES**

5-6Watt 1.5KV Isolated

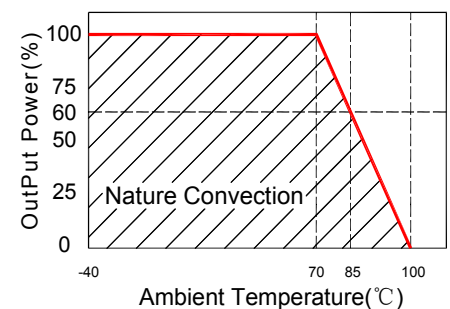
2 : 1 Input Voltage Range

Single & Dual Output

1.25" x 0.8"



**Temperature Derating Graph**



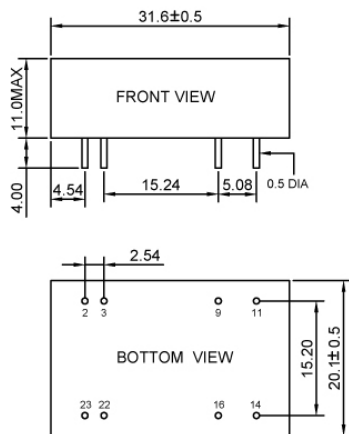
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance				±2	%
Short Circuit Protection	Continuous				
Line Regulation				±0.5	%
Load Regulation	Single (F.L To 10% Load)			±0.5	%
Load Regulation	Dual (F.L To 1/4 Load)			±1.0	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

**General Specifications**

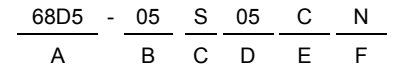
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			200		KHz
Operating Temperature		-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel Coated Copper With Non-Conductive Base				
Weight			16.2		g
Dimensions		31.60x20.10x11.0			mm

**Markings and dimensions**



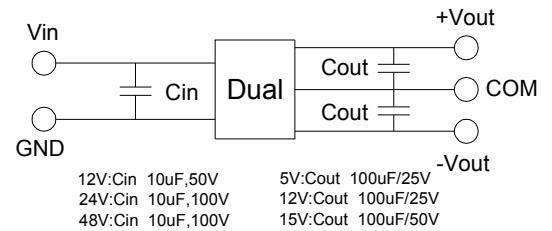
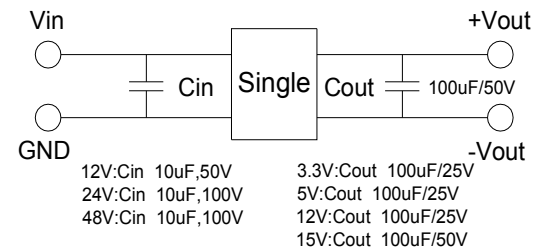
UNIT : mm Unless otherwise specified, all tolerances are ±0.25

**Part Number**

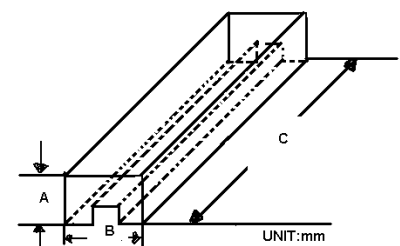


- A : Series
- B : Input Voltage
- C : Single(S);Dual(D)
- D : Output Voltage
- E : Types(C)
- F : Package

**Recommended Test Circuit**



**Packaging**



SIZE(mm)		
A	B	C
18.71	23.00	522

**PIN Connection**

Pin	2.3	9	11	14	16	22.23
Single	-Vin	No Pin	NC	+Vout	-Vout	+Vin
Dual	-Vin	Com	-Vout	+Vout	Com	+Vin

**FEATURES :**

- 8W DIL PACKAGE
- 2:1 WIDE INPUT RANGE
- 100% BURNED IN
- HIGH EFFICIENCY
- UL94V-0 PACKAGE MATERIAL
- CUSTOM SOLUTIONS AVAILABLE
- RoHS COMPLIANT
- 1600Vdc Isolation
- Remote Control:On/Off



DC-DC Converter

**68D8 SERIES**

8Watt 1.6KV Isolated

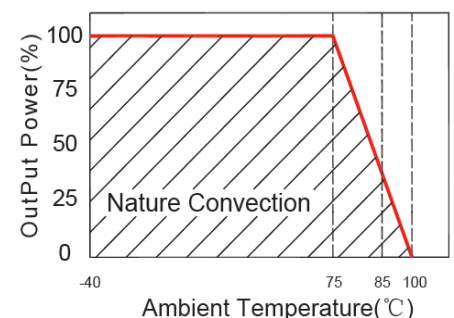
2 : 1 Input Voltage Range

Single & Dual Output

1.2" x 0.4"



Temperature Derating Graph



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Efficiency
	Vdc	No Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP
68D8-05S12RNL	4.5-9	120	1927	12	666	83
68D8-05S15RNL	4.5-9	120	1927	15	533	83
68D8-05D12RNL	4.5-9	120	1927	±12	±333	83
68D8-05D15RNL	4.5-9	120	1927	±15	±266	83
68D8-12S03RNL	9-18	50	784	3.3	2424	85
68D8-12S05RNL	9-18	50	784	5	1600	86
68D8-12S12RNL	9-18	50	784	12	666	87
68D8-12S15RNL	9-18	50	784	15	533	87
68D8-12D05RNL	9-18	50	784	±5	±800	85
68D8-12D12RNL	9-18	50	784	±12	±333	87
68D8-12D15RNL	9-18	50	784	±15	±267	87
68D8-24S03RNL	18-36	30	392	3.3	2424	85
68D8-24S05RNL	18-36	30	392	5	1600	86
68D8-24S12RNL	18-36	30	392	12	666	87
68D8-24S15RNL	18-36	30	392	15	533	87
68D8-24D05RNL	18-36	30	392	±5	±800	85
68D8-24D12RNL	18-36	30	392	±12	±333	87
68D8-24D15RNL	18-36	30	392	±15	±267	87
68D8-48S03RNL	36-75	20	196	3.3	2424	85
68D8-48S05RNL	36-75	20	196	5	1600	86
68D8-48S12RNL	36-75	20	196	12	666	87
68D8-48S15RNL	36-75	20	196	15	533	87
68D8-48D05RNL	36-75	20	196	±5	±800	85
68D8-48D12RNL	36-75	20	196	±12	±333	87

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				2:1	
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic Recovery				
Line Regulation				±0.5	%
Load Regulation	Single Dual(Balance Load)			±0.5 ±1	%
Cross Regulation	Dual (25% To 100% Load)			±5	%
Ripple & Noise	Output:3-15V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output > 15V TYPES BW=DC To 20MHz			1% of Vout	mVp-p
Transient response setting time	25% load step change		350		us

**General Specifications**

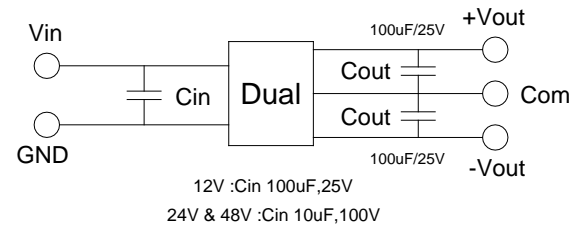
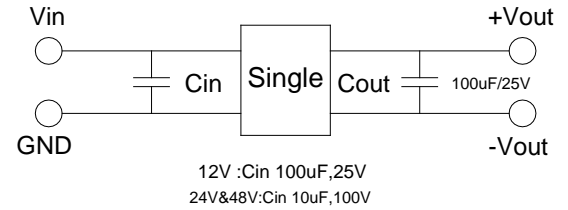
Parameters	Conditions	Min	Typ	Max	Units
Isolation Voltage			1600		Vdc
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			400		KHz
Operating Temperature	With derating	-40		100	°C
Storage Temperature		-55		125	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel coated copper with no-conductive base				
MTBF	MIL-HDBK-217F@25°C	1500000			Hours
Weight			16.2		g
Dimensions			31.6x20.1x10.0		mm

**Part Number**

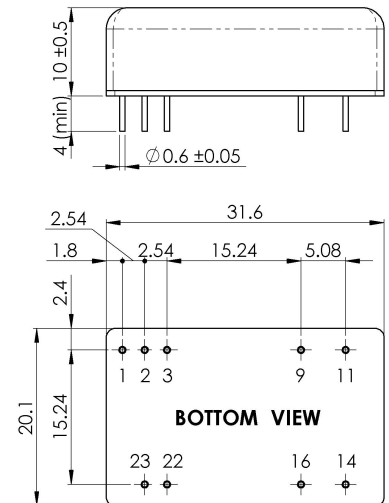
68D8 - 12 S 03 R NL  
A B C D E F

- A : Series
- B : Input Voltage
- C : Single Output(S),Dual(D)
- D : Output Voltage
- E : Regulated(R)
- F : RoHs Version

**Recommended Test Circuit**



**Markings and dimensions**



Unit : mm  
Tolerance : XX.X ±0.5 , XX.XX ±0.25

**PIN Assignment**

Pin	1	2,3	9	11	14	16	22,23
Single	Remote ON/OFF	-Vin	NC	NC	+Vout	-Vout	+Vin
Dual	Remote ON/OFF	-Vin	Common	-Vout	+Vout	Common	+Vin

**FEATURES :**

- 10W DIL PACKAGE
- 2:1 WIDE INPUT RANGE
- 100% BURNED IN
- HIGH EFFICIENCY
- UL94V-0 PACKAGE MATERIAL
- CUSTOM SOLUTIONS AVAILABLE
- RoHS COMPLIANT
- 3 YEARS WARRANTY
- Remote Control:On/Off



DC-DC Converter

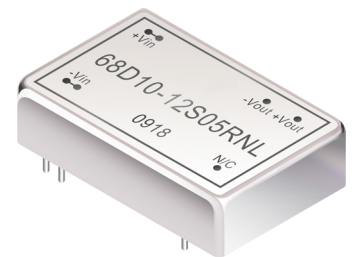
**68D10 SERIES**

10Watt 1.5KV Isolated

2 : 1 Input Voltage Range

Single & Dual Output

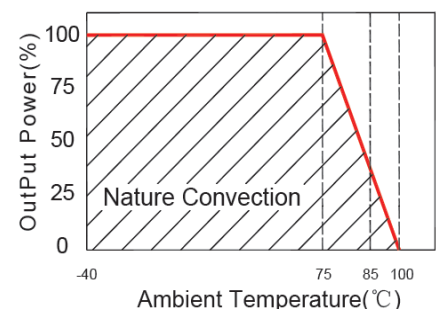
1.25" x 0.8"



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage		Input Current		Output Voltage		Output Current	Efficiency
	Vdc	No Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP		
68D10-12S03RNL	9-18	50	1006	3.3	3000	82		
68D10-12S05RNL	9-18	50	1016	5	2000	82		
68D10-12S12RNL	9-18	30	1004	12	833	83		
68D10-12S15RNL	9-18	30	1009	15	670	83		
68D10-12D05RNL	9-18	30	1004	±5	±1000	83		
68D10-12D12RNL	9-18	30	1012	±12	±420	83		
68D10-12D15RNL	9-18	30	1024	±15	±340	83		
68D10-24S03RNL	18-36	40	503	3.3	3000	82		
68D10-24S05RNL	18-36	40	508	5	2000	82		
68D10-24S12RNL	18-36	30	502	12	833	83		
68D10-24S15RNL	18-36	30	504	15	670	83		
68D10-24D05RNL	18-36	30	502	±5	±1000	83		
68D10-24D12RNL	18-36	30	506	±12	±420	83		
68D10-24D15RNL	18-36	30	512	±15	±340	83		
68D10-48S03RNL	36-75	30	251	3.3	3000	82		
68D10-48S05RNL	36-75	30	254	5	2000	82		
68D10-48S12RNL	36-75	20	251	12	833	83		
68D10-48S15RNL	36-75	20	252	15	670	83		
68D10-48D05RNL	36-75	20	251	±5	±1000	83		
68D10-48D12RNL	36-75	20	253	±12	±420	83		
68D10-48D15RNL	36-75	20	256	±15	±340	83		

**Temperature Derating Graph**



**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				2:1	
Filter		PI Network			

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic Recovery				
Line Regulation				±0.5	%
Load Regulation	Single Dual(Balance Load)			±0.5 ±0.5	%
Cross Regulation	Dual (25% To 100% Load)			±5	%
Ripple & Noise	Output:3-15V TYPES BW=DC To 20MHZ			100	mVp-p
Ripple & Noise	Output > 15V TYPES BW=DC To 20MHZ			1% of Vout	mVp-p
Transient response setting time	25% load step change		350		us

**General Specifications**

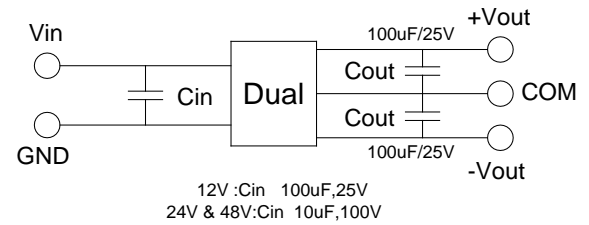
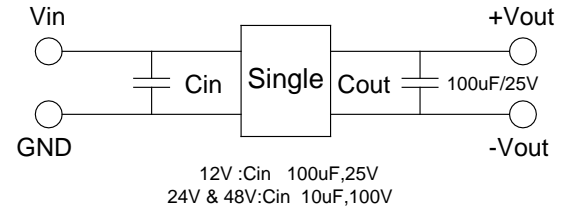
Parameters	Conditions	Min	Typ	Max	Units
Isolation Voltage			1500		Vdc
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			400		KHz
Operating Temperature	With derating	-40		100	°C
Storage Temperature		-55		125	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel coated copper with no-conductive base				
MTBF	MIL-HDBK-217F@25°C	900000			Hours
Weight			17.5		g
Dimensions			31.6x20.1x10.0		mm

**Part Number**

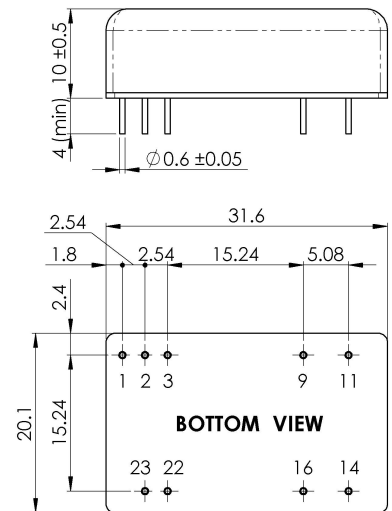
68D10 - 24 S 03 R NL  
A B C D E F

- A: Series
- B: Input Voltage
- C: Single Output (S),Dual (D)
- D: Output Voltage
- E: Regulated(R)
- F: RoHs Version

**Recommended Test Circuit**



**Markings and dimensions**



Unit : mm  
Tolerance : XX.X ±0.5 , XX.XX ±0.25

**PIN Assignment**

Pin	1	2,3	9	11	14	16	22,23
Single	Remote ON/OFF	-Vin	NC	NC	+Vout	-Vout	+Vin
Dual	Remote ON/OFF	-Vin	Common	-Vout	+Vout	Common	+Vin

**FEATURES :**

- 12W DIL PACKAGE
- 2:1 WIDE INPUT RANGE
- 100% BURNED IN
- HIGH EFFICIENCY
- UL94V-0 PACKAGE MATERIAL
- CUSTOM SOLUTIONS AVAILABLE
- RoHS COMPLIANT
- 3 YEARS WARRANTY
- Remote Control:On/Off



DC-DC Converter

**68D12 SERIES**

12Watt 1.5KV Isolated

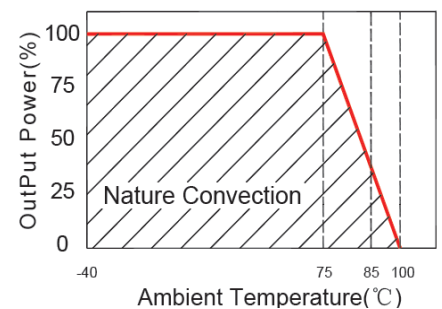
2 : 1 Input Voltage Range

Single & Dual Output

1.25" x 0.8"



Temperature Derating Graph



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage		Input Current		Output Voltage		Output Current		Efficiency
	Vdc	No Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP			
68D12-12S03RNL	9-18	40	1203	3.3	3500	80			
68D12-12S05RNL	9-18	40	1220	5	2400	82			
68D12-12S12RNL	9-18	40	1205	12	1000	83			
68D12-12S15RNL	9-18	40	1205	15	800	83			
68D12-12D05RNL	9-18	40	1205	±5	±1200	83			
68D12-12D12RNL	9-18	40	1205	±12	±500	83			
68D12-12D15RNL	9-18	40	1205	±15	±400	83			
68D12-24S03RNL	18-36	30	602	3.3	3500	80			
68D12-24S05RNL	18-36	30	610	5	2400	82			
68D12-24S12RNL	18-36	30	602	12	1000	83			
68D12-24S15RNL	18-36	30	602	15	800	83			
68D12-24D05RNL	18-36	30	602	±5	±1200	83			
68D12-24D12RNL	18-36	30	602	±12	±500	83			
68D12-24D15RNL	18-36	30	602	±15	±400	83			
68D12-48S03RNL	36-75	30	301	3.3	3500	80			
68D12-48S05RNL	36-75	30	305	5	2400	82			
68D12-48S12RNL	36-75	30	301	12	1000	83			
68D12-48S15RNL	36-75	30	301	15	800	83			
68D12-48D05RNL	36-75	30	301	±5	±1200	83			
68D12-48D12RNL	36-75	30	301	±12	±500	83			
68D12-48D15RNL	36-75	30	301	±15	±400	83			



**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				2:1	
Filter		PI Network			

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic Recovery				
Line Regulation				±0.5	%
Load Regulation	Single Dual(Balance Load)			±0.5 ±0.5	%
Cross Regulation	Dual (25% To 100% Load)			±5	%
Ripple & Noise	Output:3-15V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output > 15V TYPES BW=DC To 20MHz			1% of Vout	mVp-p
Transient response setting time	25% load step change		350		us

**General Specifications**

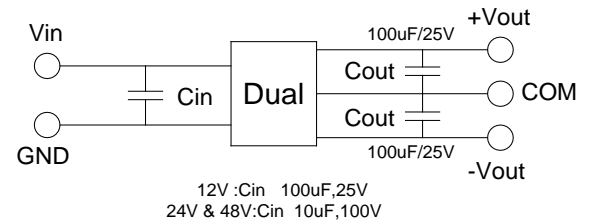
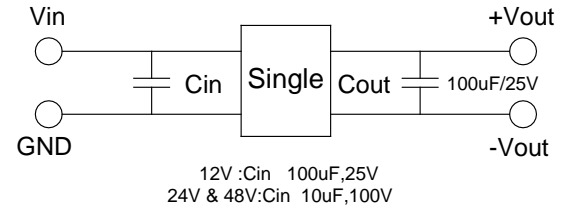
Parameters	Conditions	Min	Typ	Max	Units
Isolation Voltage			1500		Vdc
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			400		KHz
Operating Temperature	With derating	-40		100	°C
Storage Temperature		-55		125	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel coated copper with no-conductive base				
MTBF	MIL-HDBK-217F@25°C	900000			Hours
Weight			17.5		g
Dimensions			31.6x20.1x10.0		mm

**Part Number**

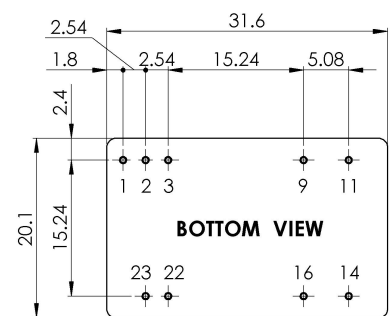
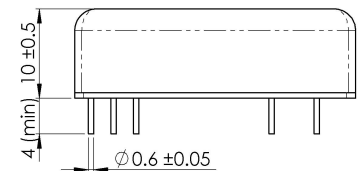
68D12 - 24 S 05 R NL  
A B C D E F

- A: Series
- B: Input Voltage
- C: Single Output (S),Dual (D)
- D: Output Voltage
- E: Regulated(R)
- F: RoHs Version

**Recommended Test Circuit**



**Markings and dimensions**



Unit : mm  
Tolerance : XX.X ±0.5 , XX.XX ±0.25

**PIN Assignment**

Pin	1	2,3	9	11	14	16	22,23
Single	Remote ON/OFF	-Vin	NC	NC	+Vout	-Vout	+Vin
Dual	Remote ON/OFF	-Vin	Common	-Vout	+Vout	Common	+Vin

**FEATURES :**

- 15W DIL PACKAGE
- 2:1 WIDE INPUT RANGE
- 100% BURNED IN
- HIGH EFFICIENCY
- UL94V-0 PACKAGE MATERIAL
- CUSTOM SOLUTIONS AVAILABLE
- RoHS COMPLIANT
- Remote Control:On/Off



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage		Input Current		Output Voltage		Output Current	Efficiency
	Vdc	No Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP		
68D15-12S03RNL	9-18	60	1294	3.3	4000	85		
68D15-12S05RNL	9-18	60	1453	5	3000	86		
68D15-12S12RNL	9-18	30	1420	12	1250	88		
68D15-12S15RNL	9-18	30	1420	15	1000	88		
68D15-12D12RNL	9-18	30	1420	±12	±625	88		
68D15-12D15RNL	9-18	30	1420	±15	±500	88		
68D15-24S03RNL	18-36	50	647	3.3	4000	85		
68D15-24S05RNL	18-36	50	718	5	3000	87		
68D15-24S12RNL	18-36	20	702	12	1250	89		
68D15-24S15RNL	18-36	20	702	15	1000	89		
68D15-24D12RNL	18-36	20	710	±12	±625	88		
68D15-24D15RNL	18-36	20	710	±15	±500	88		
68D15-48S03RNL	36-75	40	323	3.3	4000	85		
68D15-48S05RNL	36-75	40	363	5	3000	86		
68D15-48S12RNL	36-75	20	359	12	1250	87		
68D15-48S15RNL	36-75	20	351	15	1000	89		
68D15-48D12RNL	36-75	20	355	±12	±625	88		
68D15-48D15RNL	36-75	20	355	±15	±500	88		

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				2:1	
Filter			PI Network		

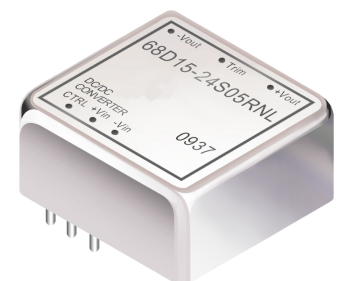
DC-DC Converter

**68D15 SERIES**

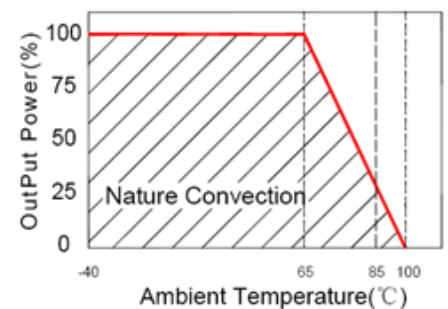
15Watt 1.5KV Isolated  
2 : 1 Input Voltage Range

Single & Dual Output

1" x 1"



**Temperature Derating Graph**



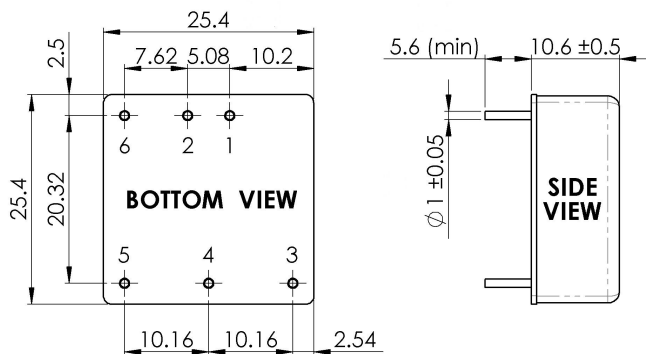
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic Recovery				
Line Regulation				±0.5	%
Load Regulation	Single Dual(Balance Load)			±0.5 ±1	%
Cross Regulation	Dual (25% To 100% Load)			±5	%
Ripple & Noise	Output:3-15V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output > 15V TYPES BW=DC To 20MHz			1% of Vout	mVp-p
Transient response setting time	25% load step change		250		us

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Voltage			1500		Vdc
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			400		KHz
Operating Temperature	With derating	-40		100	°C
Storage Temperature		-55		125	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel coated copper with no-conductive base				
MTBF	MIL-HDBK-217F@25°C	560000			Hours
Weight			16.5		g
Dimensions			25.4x25.4x10.6		mm

**Markings and dimensions**



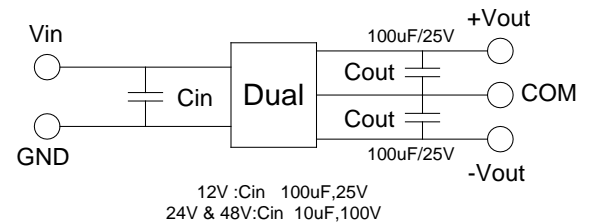
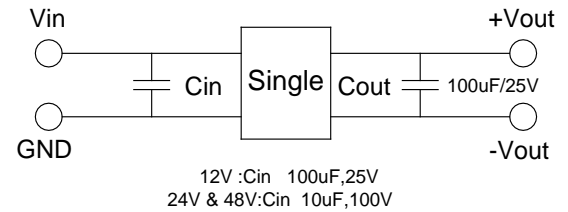
Unit : mm  
Tolerance : XX.X +0.5 , XX.XX +0.25

**Part Number**

68D15 - 24 S 05 R NL  
A B C D E F

- A: Series
- B: Input Voltage
- C: Single Output (S),Dual (D)
- D: Output Voltage
- E: Regulated(R)
- F: RoHs Version

**Recommended Test Circuit**



**PIN Assignment**

Pin	1	2	3	4	5	6
Single	+Vin	-Vin	+Vout	Trim	-Vout	Remote On/Off
Dual	+Vin	-Vin	+Vout	Com	-Vout	Remote On/Off

**FEATURES :**

- 20W DIL PACKAGE
- 2:1 WIDE INPUT RANGE
- 100% BURNED IN
- HIGH EFFICIENCY
- UL94V-0 PACKAGE MATERIAL
- CUSTOMIZED SOLUTIONS AVAILABLE
- RoHS COMPLIANT
- Remote Control:On/Off



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage		Input Current		Output Voltage		Output Current		Efficiency	Capacitor load
	Vdc	No Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP	uF MAX			
68D20-12S03RNL	9-18	120	1455	3.3	4500	85	6600			
68D20-12S05RNL	9-18	120	1893	5	4000	88	6600			
68D20-12S12RNL	9-18	40	1897	12	1670	88	960			
68D20-12S15RNL	9-18	40	1889	15	1330	88	470			
68D20-12D12RNL	9-18	40	1871	±12	±833	89	470			
68D20-12D15RNL	9-18	40	1873	±15	±667	89	330			
68D20-24S03RNL	18-36	70	719	3.3	4500	86	6600			
68D20-24S05RNL	18-36	70	936	5	4000	89	6600			
68D20-24S12RNL	18-36	25	938	12	1670	89	960			
68D20-24S15RNL	18-36	25	933	15	1330	89	470			
68D20-24D12RNL	18-36	25	935	±12	±833	89	470			
68D20-24D15RNL	18-36	25	926	±15	±667	90	330			
68D20-48S03RNL	36-75	30	355	3.3	4500	87	6600			
68D20-48S05RNL	36-75	30	473	5	4000	88	6600			
68D20-48S12RNL	36-75	15	469	12	1670	89	330			
68D20-48S15RNL	36-75	15	466	15	1330	89	330			
68D20-48D12RNL	36-75	25	478	±12	±833	87	330			
68D20-48D15RNL	36-75	25	473	±15	±667	88	220			

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				2:1	
Filter			LC Network		

DC-DC Converter

**68D20 SERIES**

20Watt 1.5KV Isolated

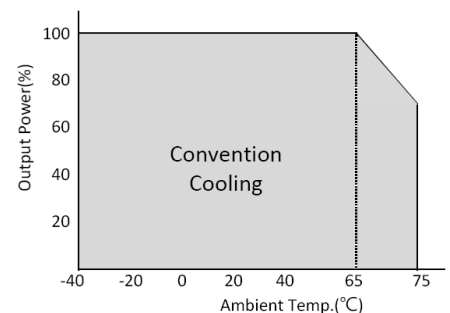
2 : 1 Input Voltage Range

Single & Dual Output

1" x 1"



**Temperature Derating Graph**



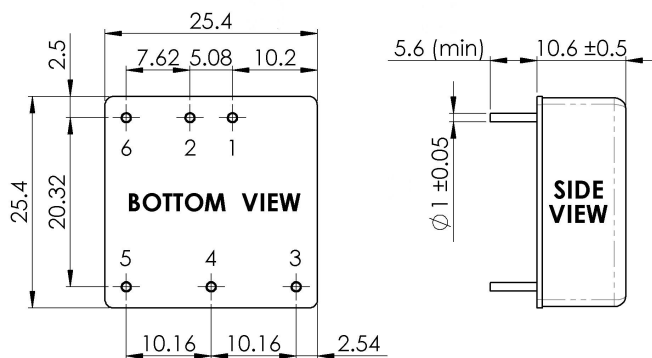
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic Recovery				
Line Regulation				±0.5	%
Load Regulation	Single Dual(Balance Load)			±0.5 ±1	%
Cross Regulation	Dual (25% To 100% Load)			±5	%
Ripple & Noise	Output:3-15V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output > 15V TYPES BW=DC To 20MHz			1% of Vout	mVp-p
Transient response setting time	25% load step change		300		us

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Voltage			1500		Vdc
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			330		KHz
Operating Temperature	With derating	-40		75	°C
Storage Temperature		-55		125	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel coated copper with no-conductive base				
MTBF	MIL-HDBK-217F@25°C	340000			Hours
Weight			16.5		g
Dimensions			25.4x25.4x10.6		mm

**Markings and dimensions**



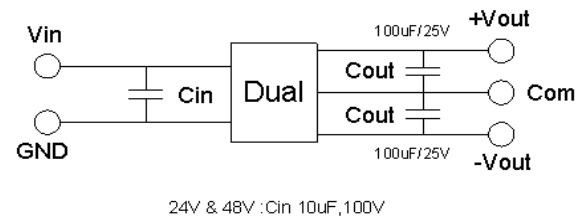
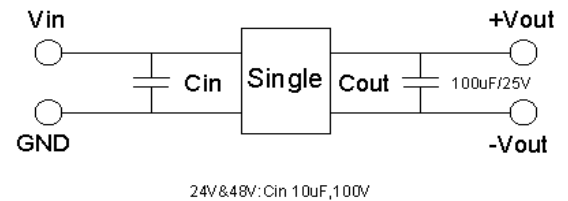
Unit : mm  
Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

**Part Number**

68D20 - 24 S 05 R NL  
A B C D E F

- A: Series
- B: Input Voltage
- C: Single Output (S),Dual (D)
- D: Output Voltage
- E: Regulated(R)
- F: RoHs Version

**Recommended Test Circuit**



**PIN Assignment**

Pin	1	2	3	4	5	6
Single	+Vin	-Vin	+Vout	Trim	-Vout	Remote On/Off
Dual	+Vin	-Vin	+Vout	Com	-Vout	Remote On/Off

**FEATURES :**

- 10W DIL PACKAGE
- 4:1 WIDE INPUT RANGE
- 100% BURNED IN
- HIGH EFFICIENCY
- UL94V-0 PACKAGE MATERIAL
- CUSTOMIZED SOLUTIONS AVAILABLE
- RoHS COMPLIANT
- Design refer to EN50155
- Remote Control: On/Off

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Efficiency
	Vdc	No Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP
68DW-24S03R1	9-36	50	485	3.3	3000	85
68DW-24S05R1	9-36	50	485	5	2000	86
68DW-24S12R1	9-36	30	479	12	833	87
68DW-24S15R1	9-36	30	474	15	670	88
68DW-24D05R1	9-36	30	502	±5	±1000	83
68DW-24D12R1	9-36	30	474	±12	±420	88
68DW-24D15R1	9-36	30	474	±15	±340	88
68DW-48S03R1	18-75	30	243	3.3	3000	85
68DW-48S05R1	18-75	30	243	5	2000	86
68DW-48S12R1	18-75	20	240	12	833	87
68DW-48S15R1	18-75	20	237	15	670	88
68DW-48D05R1	18-75	20	251	±5	±1000	83
68DW-48D12R1	18-75	20	237	±12	±420	88
68DW-48D15R1	18-75	20	237	±15	±340	88
68DW-110S03R1	40-160	12	106	3.3	3000	85
68DW-110S05R1	40-160	12	106	5	2000	86
68DW-110S12R1	40-160	6	105	12	833	87
68DW-110S15R1	40-160	6	104	15	670	88
68DW-110D05R1	40-160	6	110	±5	±1000	83
68DW-110D12R1	40-160	6	104	±12	±420	88
68DW-110D15R1	40-160	6	104	±15	±340	88

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				4:1	%
Filter			PI Network		



DC-DC Converter

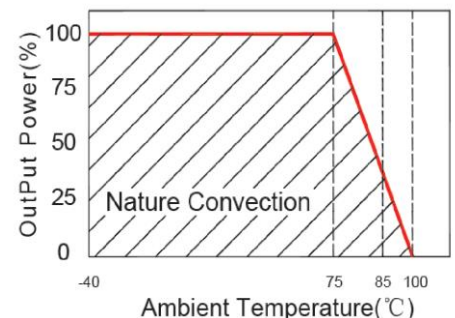
**68DW-R1 SERIES**

10Watt 1.6KV Isolated

4 : 1 Input Voltage Range

Single & Dual Output

DIL

**Temperature Derating Graph**

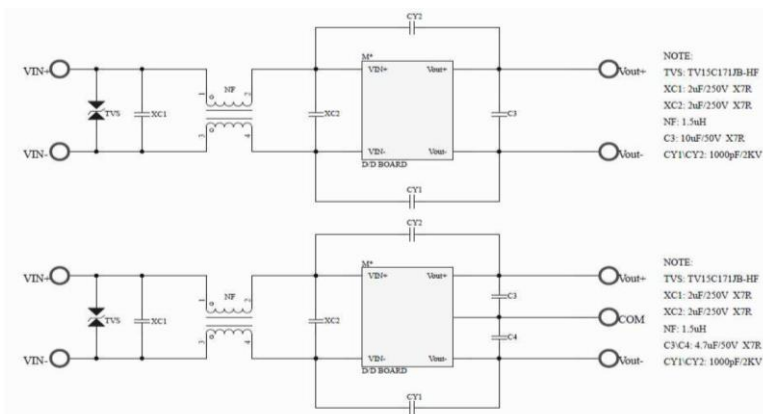
## Output Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@ Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic Recovery				
Line Regulation				±0.5	%
Load Regulation	Single Dual(Balance Load)			±0.5 ±0.5	%
Cross Regulation	Dual(25% To 100% Load)			±5	%
Ripple & Noise	Output:3-15V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output > 15V TYPES BW=DC To 20MHz			1% of Vout	mVp-p
Transient response setting time	25% load step change			350	us

## General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Voltage			1600		Vdc
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			400		KHz
Operating Temperature	With derating	-40		100	°C
Storage Temperature		-55		125	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel coated copper with no-conductive base				
MTBF	MIL-HDBK-217F@25°C	900000			Hours
Weight			17.5		g
Dimensions			31.6x20.1x10.0		mm

## Recommended Test Circuit

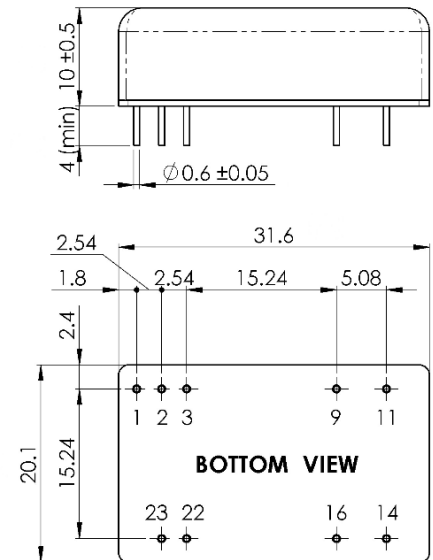


## Part Number

68DW	-	24	S	03	R	1
A		B	C	D	E	F

- A : Series  
B : Input Voltage  
C : Single(S);Dual(D)  
D : Output Voltage  
E : Regulated(R)  
F : Case Type

## Markings and dimensions



Unit : mm  
Tolerance : XX.X ±0.5 , XX.XX ±0.25

## PIN Assignment

Pin	1	2,3	9	11	14	16	22,23
Single	Remote	-Vin	NC	NC	+Vout	-Vout	+Vin
Dual	Remote	-Vin	Common	-Vout	+Vout	Common	+Vin

**FEATURES :**

- 4:1Wide Input Voltage
- 5-6 Watt 24PIN DIL Package
- Efficiency To 80%
- 1500Vdc Isolation
- MTBF:>1,500,000 hrs
- Operating Temperature:-40°C TO +85°C

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Output Voltage	Output Current	Input Current		Efficiency
				No Load	Full Load	
				mA	mA	
68DW5-24S03RNNL	9-36	3.3	1000	7.5	195	70
68DW5-24S05RNNL	9-36	5	1000	7.5	265	80
68DW5-24S12RNNL	9-36	12	470	7.5	285	80
68DW5-24S15RNNL	9-36	15	400	7.5	305	80
68DW5-24D05RNNL	9-36	±5	±500	12	265	80
68DW5-24D12RNNL	9-36	±12	±230	12	285	80
68DW5-24D15RNNL	9-36	±15	±190	12	295	80
68DW5-48S03RNNL	18-72	3.3	1000	5	98	70
68DW5-48S05RNNL	18-72	5	1000	5	133	75
68DW5-48S12RNNL	18-72	12	470	5	145	80
68DW5-48S15RNNL	18-72	15	400	5	154	80
68DW5-48D05RNNL	18-72	±5	±500	7.5	265	75
68DW5-48D12RNNL	18-72	±12	±230	7.5	142	80
68DW5-48D15RNNL	18-72	±15	±200	7.5	156	80

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				4:1	
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance				±2	%
Short Circuit Protection	Continuous				
Line Regulation				±0.5	%
Load Regulation	Single (F.L To 10% Load)			±0.5	%
Load Regulation	Dual (F.L To 1/4 Load)			±1.0	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us



DC-DC Converter

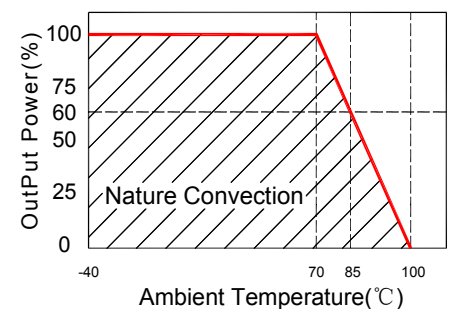
**68DW5 SERIES**

5-6Watt 1.5KV Isolated

4 : 1 Input Voltage Range

Single & Dual Output

1.25" x 0.8"

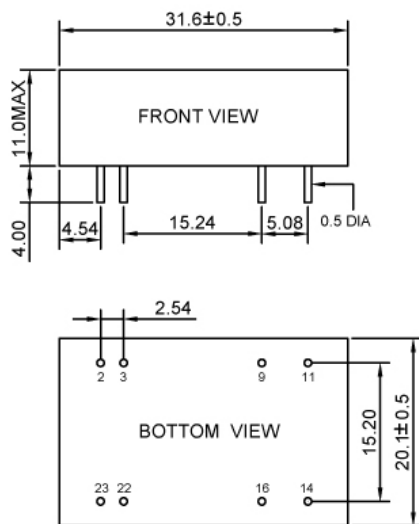
**Temperature Derating Graph**



## General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			200		KHz
Operating Temperature		-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel Coated Copper With Non-Conductive Base				
Weight			16.2		g
Dimensions		31.60x20.10x11.0			mm

## Markings and dimensions



UNIT : mm Unless otherwise specified, all tolerances are ±0.25

## PIN Connection

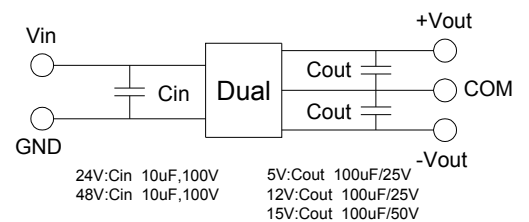
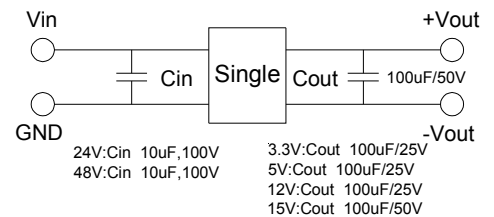
Pin	2.3	9	11	14	16	22.23
Single	-Vin	No Pin	NC	+Vout	-Vout	+Vin
Dual	-Vin	Com	-Vout	+Vout	Com	+Vin

## Part Number

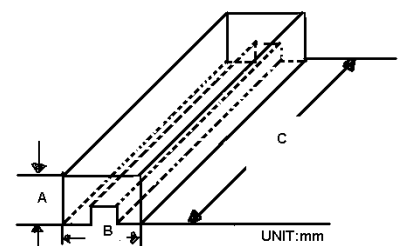
68DW5 - 24 S 05 R N NL  
 A B C D E F G

- A : Series
- B : Input Voltage
- C : Single(S);Dual(D)
- D : Output Voltage
- E : Regulated(R)
- F : Package
- G : RoHS Version

## Recommended Test Circuit



## Packaging



SIZE(mm)		
A	B	C
18.71	23.00	522

**FEATURES :**

- 8W DIL PACKAGE
- 4:1 WIDE INPUT RANGE
- 100% BURNED IN
- HIGH EFFICIENCY
- UL94V-0 PACKAGE MATERIAL
- CUSTOM SOLUTIONS AVAILABLE
- RoHS COMPLIANT
- 1600Vdc Isolation
- Remote Control:On/Off



DC-DC Converter

**68DW8 SERIES**

8Watt 1.6KV Isolated

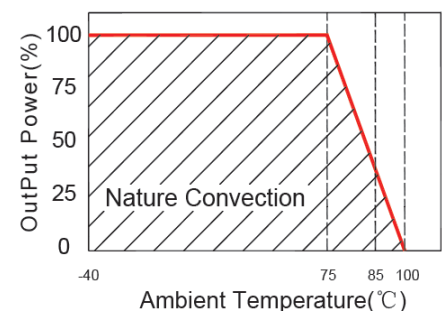
4 : 1 Input Voltage Range

Single & Dual Output

1.2" x 0.4"



Temperature Derating Graph



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Efficiency
	Vdc	No Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP
68DW8-24S03RNL	9-36	30	392	3.3	2424	85
68DW8-24S05RNL	9-36	30	392	5	1600	86
68DW8-24S12RNL	9-36	30	392	12	666	87
68DW8-24S15RNL	9-36	30	392	15	533	87
68DW8-24D05RNL	9-36	30	392	±5	±800	85
68DW8-24D12RNL	9-36	30	392	±12	±333	87
68DW8-24D15RNL	9-36	30	392	±15	±267	87
68DW8-48S03RNL	18-75	20	196	3.3	2424	85
68DW8-48S05RNL	18-75	20	196	5	1600	86
68DW8-48S12RNL	18-75	20	196	12	666	87
68DW8-48S15RNL	18-75	20	196	15	533	87
68DW8-48D05RNL	18-75	20	196	±5	±800	85
68DW8-48D12RNL	18-75	20	196	±12	±333	87

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				4:1	
Filter			PI Network		

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic Recovery				
Line Regulation				±0.5	%
Load Regulation	Single Dual(Balance Load)			±0.5 ±1	%
Cross Regulation	Dual (25% To 100% Load)			±5	%
Ripple & Noise	Output:3-15V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output > 15V TYPES BW=DC To 20MHz			1% of Vout	mVp-p
Transient response setting time	25% load step change		350		us

**General Specifications**

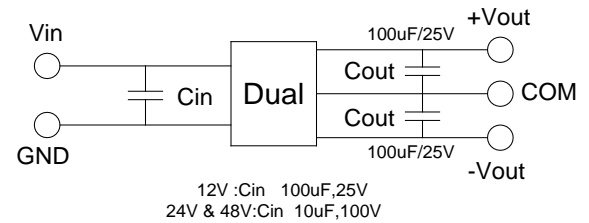
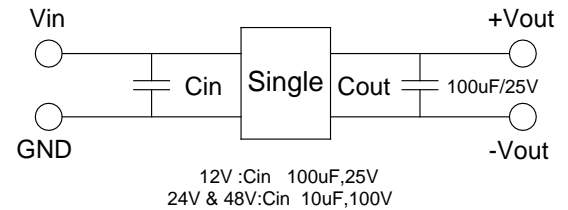
Parameters	Conditions	Min	Typ	Max	Units
Isolation Voltage			1600		Vdc
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			400		KHz
Operating Temperature	With derating	-40		100	°C
Storage Temperature		-55		125	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel coated copper with no-conductive base				
MTBF	MIL-HDBK-217F@25°C	1500000			Hours
Weight			16.2		g
Dimensions		31.6x20.1x10.0			mm

**Part Number**

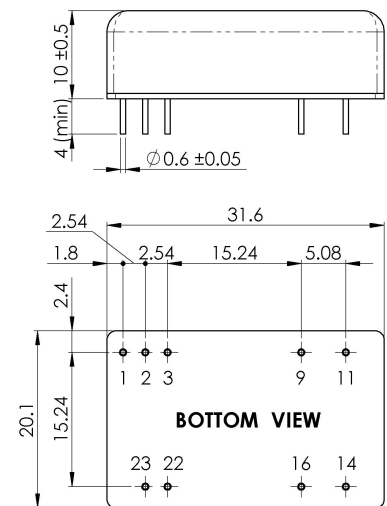
68DW8 - 12 S 03 R NL  
A B C D E F

- A : Series
- B : Input Voltage
- C : Single Output(S),Dual(D)
- D : Output Voltage
- E : Regulated(R)
- F : RoHs Version

**Recommended Test Circuit**



**Markings and dimensions**



Unit : mm  
 Tolerance : XX.X ±0.5 , XX.XX ±0.25

**PIN Assignment**

Pin	1	2,3	9	11	14	16	22,23
Single	Remote ON/OFF	-Vin	NC	NC	+Vout	-Vout	+Vin
Dual	Remote ON/OFF	-Vin	Common	-Vout	+Vout	Common	+Vin

**FEATURES :**

- 10W DIL PACKAGE
- 4:1 WIDE INPUT RANGE
- 100% BURNED IN
- HIGH EFFICIENCY
- UL94V-0 PACKAGE MATERIAL
- CUSTOM SOLUTIONS AVAILABLE
- RoHS COMPLIANT
- 3 YEARS WARRANTY
- Remote Control: On/Off



DC-DC Converter

**68DW10 SERIES**

10Watt 1.5KV Isolated

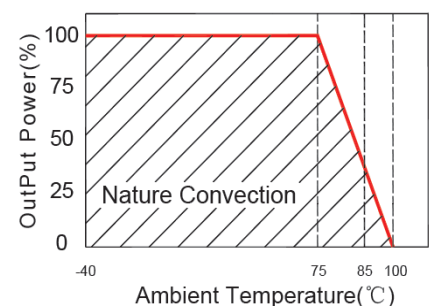
4 : 1 Input Voltage Range

Single & Dual Output

1.25" x 0.8"



**Temperature Derating Graph**



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Efficiency
	Vdc	No Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP
68DW10-24S03RNL	9-36	50	503	3.3	3000	82
68DW10-24S05RNL	9-36	50	508	5	2000	82
68DW10-24S12RNL	9-36	30	502	12	833	83
68DW10-24S15RNL	9-36	30	505	15	670	83
68DW10-24D05RNL	9-36	30	502	±5	±1000	83
68DW10-24D12RNL	9-36	30	506	±12	±420	83
68DW10-24D15RNL	9-36	30	512	±15	±340	83
68DW10-48S03RNL	18-75	30	252	3.3	3000	82
68DW10-48S05RNL	18-75	30	254	5	2000	82
68DW10-48S12RNL	18-75	20	251	12	833	83
68DW10-48S15RNL	18-75	20	252	15	670	83
68DW10-48D05RNL	18-75	20	251	±5	±1000	83
68DW10-48D12RNL	18-75	20	253	±12	±420	83
68DW10-48D15RNL	18-75	20	256	±15	±340	83

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				4:1	
Filter			PI Network		

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic Recovery				
Line Regulation				±0.5	%
Load Regulation	Single Dual(Balance Load)			±0.5 ±0.5	%
Cross Regulation	Dual (25% To 100% Load)			±5	%
Ripple & Noise	Output:3-15V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output > 15V TYPES BW=DC To 20MHz			1% of Vout	mVp-p
Transient response setting time	25% load step change			350	us

**General Specifications**

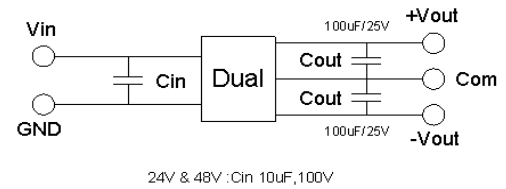
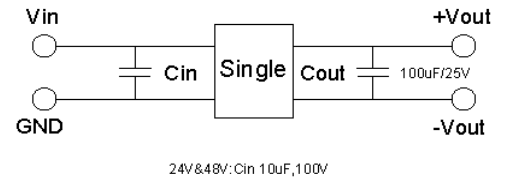
Parameters	Conditions	Min	Typ	Max	Units
Isolation Voltage			1500		Vdc
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			400		KHz
Operating Temperature	With derating	-40		100	°C
Storage Temperature		-55		125	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel coated copper with no-conductive base				
MTBF	MIL-HDBK-217F@25°C	900000			Hours
Weight			17.5		g
Dimensions			31.6x20.1x10.0		mm

**Part Number**

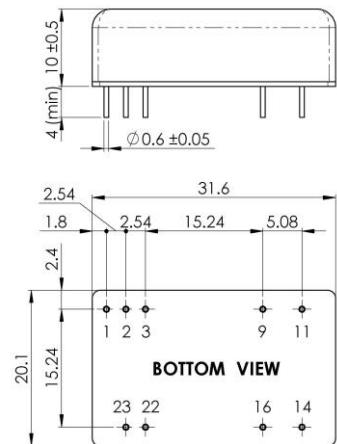
68DW10 - 24 S 03 R NL  
 A B C D E F

- A: Series
- B: Input Voltage
- C: Single Output (S),Dual (D)
- D: Output Voltage
- E: Regulated(R)
- F: RoHs Version

**Recommended Test Circuit**



**Markings and dimensions**



Unit : mm  
 Tolerance : XX.X ±0.5 , XX.XX ±0.25

**PIN Assignment**

Pin	1	2,3	9	11	14	16	22,23
Single	Remote ON/OFF	-Vin	NC	NC	+Vout	-Vout	+Vin
Dual	Remote ON/OFF	-Vin	Common	-Vout	+Vout	Common	+Vin

**FEATURES :**

- 10W DIL PACKAGE
- 4:1 WIDE INPUT RANGE
- 100% BURNED IN
- HIGH EFFICIENCY
- UL94V-0 PACKAGE MATERIAL
- CUSTOMIZED SOLUTIONS AVAILABLE
- RoHS COMPLIANT
- Remote Control: On/Off

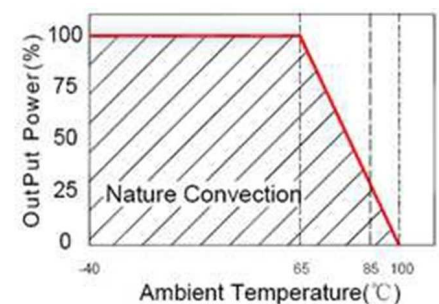
**DC-DC Converter****68DW10-R6 SERIES****10Watt 1.5KV Isolated****4 : 1 Input Voltage Range****Single & Dual Output****1" x 1"**

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Efficiency
	Vdc	No Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP
68DW10-24S03R6	9-36	50	388	3.3	2400	85
68DW10-24S05R6	9-36	40	496	5	2000	84
68DW10-24S12R6	9-36	20	482	12	830	86
68DW10-24S15R6	9-36	20	474	15	660	87
68DW10-24D12R6	9-36	20	482	±12	±415	86
68DW10-24D15R6	9-36	20	474	±15	±330	87
68DW10-48S03R6	18-75	30	194	3.3	2400	85
68DW10-48S05R6	18-75	40	248	5	2000	84
68DW10-48S12R6	18-75	10	241	12	830	86
68DW10-48S15R6	18-75	10	237	15	660	87
68DW10-48D12R6	18-75	10	241	±12	±415	86
68DW10-48D15R6	18-75	10	374	±15	±330	87

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				4:1	
Filter			PI Network		

**Temperature Derating Graph**

## Output Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic Recovery				
Line Regulation				±0.5	%
Load Regulation	Single Dual(Balance Load)			±0.5 ±1	%
Cross Regulation	Dual (25% To 100% Load)			±5	%
Ripple & Noise	Output:3-15V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output > 15V TYPES BW=DC To 20MHz			1% of Vout	mVp-p
Transient response setting time	25% load step change		300		us

## General Specifications

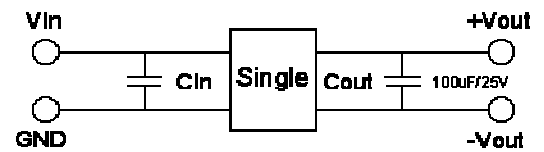
Parameters	Conditions	Min	Typ	Max	Units
Isolation Voltage			1500		Vdc
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			400		KHz
Operating Temperature	With derating	-40		100	°C
Storage Temperature		-55		125	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel coated copper with no-conductive base				
MTBF	MIL-HDBK-217F@25°C	560000			Hours
Weight			16.5		g
Dimensions		25.4x25.4x10.6			mm

## Part Number

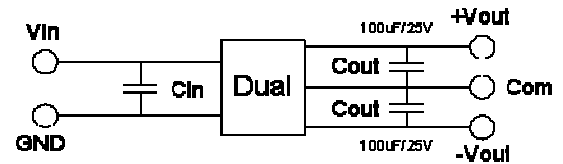
68DW10 - 24 S 05 R 6  
A B C D E F

A: Series  
B: Input Voltage  
C: Single Output(S),Dual(D)  
D: Output Voltage  
E: Regulated (R)  
F: Package

## Recommended Test Circuit

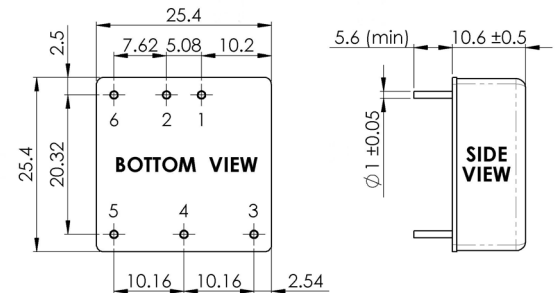


24V&48V :Cin 10uF,100V



24V & 48V :Cin 10uF,100V

## Markings and dimensions



Unit : mm  
Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

## PIN Assignment

Pin	1	2	3	4	5	6
Single	+Vin	-Vin	+Vout	Trim	-Vout	Remote On/Off
Dual	+Vin	-Vin	+Vout	Com	-Vout	Remote On/Off

**FEATURES :**

- 10W DIL PACKAGE
- 4:1 WIDE INPUT RANGE
- 100% BURNED IN
- HIGH EFFICIENCY
- UL94V-0 PACKAGE MATERIAL
- CUSTOMIZED SOLUTIONS AVAILABLE
- RoHS COMPLIANT
- Medical EMC Standard of EMI EN 55011:2009 + A1:2010 (CLASS A) Approved.
- Medical EMC Standard of EMS EN 60601-1-2:2015 Approved.
- Medical/Industry/ITE Application



DC-DC Converter

**68DW10-M SERIES**

10Watt 5KVac Isolated

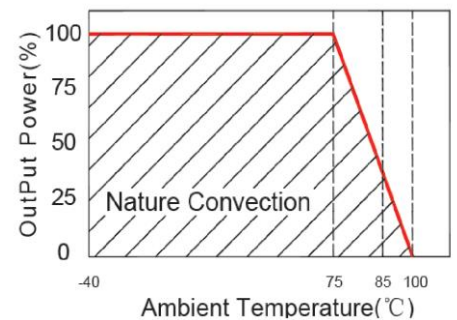
4 : 1 Input Voltage Range

Single & Dual Output

DIL



**Temperature Derating Graph**



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Efficiency
	Vdc	No Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP
68DW10-24S03RM	9-36	7	414	3.3	2500	83
68DW10-24S05RM	9-36	7	496	5	2000	84
68DW10-24S12RM	9-36	7	496	12	833	84
68DW10-24S15RM	9-36	7	499	15	670	84
68DW10-24D05RM	9-36	7	496	±5	±1000	84
68DW10-24D12RM	9-36	7	494	±12	±420	85
68DW10-24D15RM	9-36	7	500	±15	±340	85
68DW10-48S03RM	18-75	4	207	3.3	2500	83
68DW10-48S05RM	18-75	4	248	5	2000	84
68DW10-48S12RM	18-75	4	248	12	833	84
68DW10-48S15RM	18-75	4	249	15	670	84
68DW10-48D05RM	18-75	4	248	±5	±1000	84
68DW10-48D12RM	18-75	4	247	±12	±420	85
68DW10-48D15RM	18-75	4	250	±15	±340	85

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				4:1	%
Filter		PI Network			

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@ Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic Recovery				
Line Regulation				±0.5	%
Load Regulation	Single Dual(Balance Load)			±0.5	%
Cross Regulation	Dual(25% To 100% Load)			±5	%
Ripple & Noise	Output:3-15V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output > 15V TYPES BW=DC To 20MHz			1% of Vout	mVp-p
Transient response setting time	25% load step change			350	us



**General Specifications**

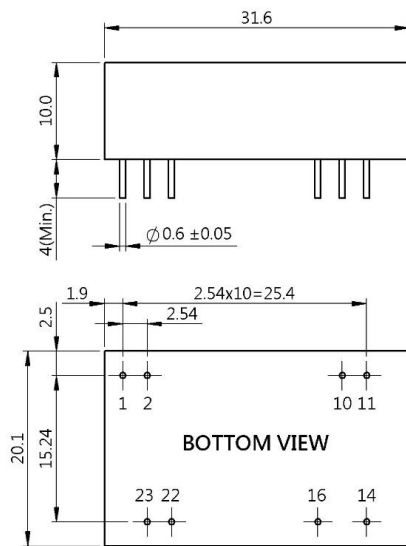
Parameters	Conditions	Min	Typ	Max	Units
Isolation Voltage			5000		Vac
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			300		KHz
Operating Temperature	With derating	-40		100	°C
Storage Temperature		-55		125	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material			Plastic		
MTBF	MIL-HDBK-217F@25°C	900000			Hours
Weight			15.5		g
Dimensions			31.6x20.1x10.0		mm

**Part Number**

68DW10 - 24 S 03 R M  
 A B C D E F

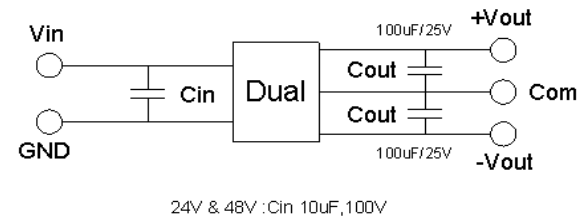
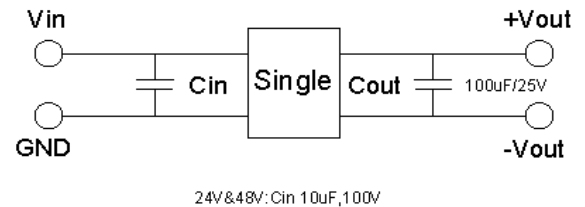
- A: Series
- B: Input Voltage
- C: Single Output(D),Dual(D)
- D: Output Voltage
- E: Regulated (R)
- F: Medical Application

**Markings and dimensions**



Unit : mm  
 Tolerance : XX.X ±0.5 , XX.XX ±0.25

**Recommended Test Circuit**



**PIN Assignment**

Pin	1	2	10	11	14	16	22	23
Single	Ctrl	-Vin	Trim	NC	+Vout	-Vout	+Vin	+Vin
Dual	Ctrl	-Vin	Trim	-Vout	+Vout	Common	+Vin	+Vin

**FEATURES :**

- 12W DIL PACKAGE
- 4:1 WIDE INPUT RANGE
- 100% BURNED IN
- HIGH EFFICIENCY
- UL94V-0 PACKAGE MATERIAL
- CUSTOM SOLUTIONS AVAILABLE
- RoHS COMPLIANT
- 3 YEARS WARRANTY
- Remote Control:On/Off



DC-DC Converter

**68DW12 SERIES**

12Watt 1.5KV Isolated

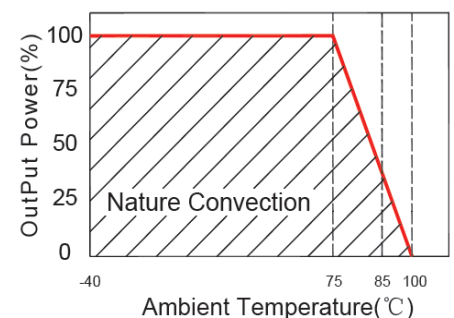
4 : 1 Input Voltage Range

Single & Dual Output

1.25" x 0.8"



**Temperature Derating Graph**



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Efficiency
	Vdc	No Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP
68DW12-24S03RNL	9-36	50	602	3.3	3500	80
68DW12-24S05RNL	9-36	50	610	5	2400	82
68DW12-24S12RNL	9-36	30	602	12	1000	83
68DW12-24S15RNL	9-36	30	602	15	800	83
68DW12-24D05RNL	9-36	30	602	±5	±1200	83
68DW12-24D12RNL	9-36	30	602	±12	±500	83
68DW12-24D15RNL	9-36	30	602	±15	±400	83
68DW12-48S03RNL	18-75	40	301	3.3	3500	80
68DW12-48S05RNL	18-75	40	305	5	2400	82
68DW12-48S12RNL	18-75	30	301	12	1000	83
68DW12-48S15RNL	18-75	30	301	15	800	83
68DW12-48D05RNL	18-75	30	301	±5	±1200	83
68DW12-48D12RNL	18-75	30	301	±12	±500	83
68DW12-48D15RNL	18-75	30	301	±15	±400	83

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				4:1	
Filter			PI Network		

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic Recovery				
Line Regulation				±0.5	%
Load Regulation	Single Dual(Balance Load)			±0.5 ±0.5	%
Cross Regulation	Dual (25% To 100% Load)			±5	%
Ripple & Noise	Output:3-15V TYPES BW=DC To 20MHZ			100	mVp-p
Ripple & Noise	Output > 15V TYPES BW=DC To 20MHZ			1% of Vout	mVp-p
Transient response setting time	25% load step change		350		us

**General Specifications**

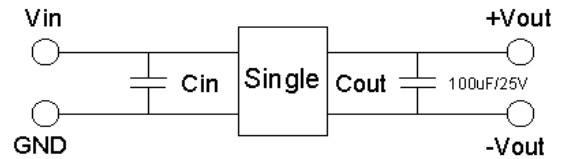
Parameters	Conditions	Min	Typ	Max	Units
Isolation Voltage			1500		Vdc
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			400		KHz
Operating Temperature	With derating	-40		100	°C
Storage Temperature		-55		125	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel coated copper with no-conductive base				
MTBF	MIL-HDBK-217F@25°C	900000			Hours
Weight			17.5		g
Dimensions		31.6x20.1x10.0			mm

**Part Number**

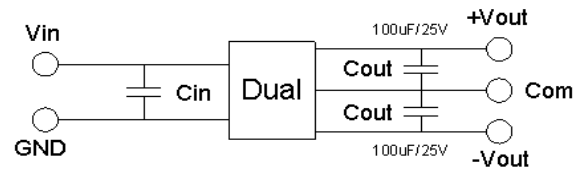
68DW12 - 24 S 05 R NL  
 A B C D E F

- A: Series
- B: Input Voltage
- C: Single Output (S),Dual (D)
- D: Output Voltage
- E: Regulated(R)
- F: RoHs Version

**Recommended Test Circuit**

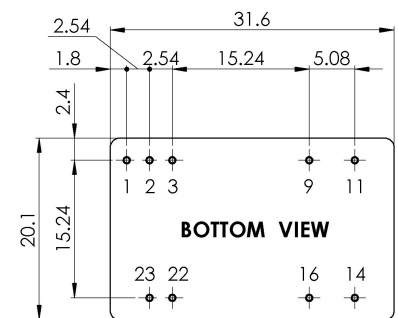
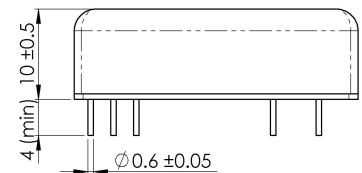


24V&48V: Cin 10uF,100V



24V & 48V :Cin 10uF,100V

**Markings and dimensions**



Unit : mm  
 Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

**PIN Assignment**

Pin	1	2,3	9	11	14	16	22,23
Single	Remote ON/OFF	-Vin	NC	NC	+Vout	-Vout	+Vin
Dual	Remote ON/OFF	-Vin	Common	-Vout	+Vout	Common	+Vin

**FEATURES :**

- 15W DIL PACKAGE
- 4:1 WIDE INPUT RANGE
- 100% BURNED IN
- HIGH EFFICIENCY
- UL94V-0 PACKAGE MATERIAL
- CUSTOM SOLUTIONS AVAILABLE
- RoHS COMPLIANT
- Remote Control:On/Off



**DC-DC Converter**

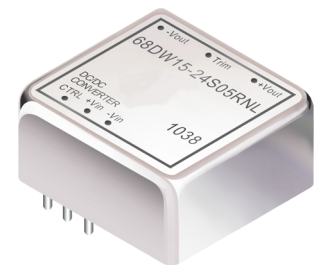
**68DW15 SERIES**

**15Watt 1.5KV Isolated**

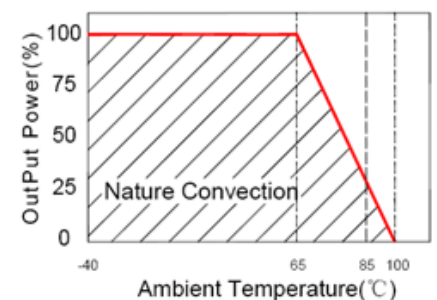
**4 : 1 Input Voltage Range**

**Single & Dual Output**

**1" x 1"**



**Temperature Derating Graph**



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Efficiency
	Vdc	No Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP
68DW15-24S03RNL	9-36	50	639	3.3	4000	86
68DW15-24S05RNL	9-36	40	718	5	3000	87
68DW15-24S12RNL	9-36	20	710	12	1250	88
68DW15-24S15RNL	9-36	20	710	15	1000	88
68DW15-24D12RNL	9-36	20	710	±12	±625	88
68DW15-24D15RNL	9-36	20	710	±15	±500	88
68DW15-48S03RNL	18-75	30	319	3.3	4000	86
68DW15-48S05RNL	18-75	40	359	5	3000	87
68DW15-48S12RNL	18-75	10	355	12	1250	88
68DW15-48S15RNL	18-75	10	355	15	1000	88
68DW15-48D12RNL	18-75	10	355	±12	±625	88
68DW15-48D15RNL	18-75	10	355	±15	±500	88

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				4:1	
Filter			PI Network		

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic Recovery				
Line Regulation				±0.5	%
Load Regulation	Single Dual(Balance Load)			±0.5 ±1	%
Cross Regulation	Dual (25% To 100% Load)			±5	%
Ripple & Noise	Output:3-15V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output > 15V TYPES BW=DC To 20MHz			1% of Vout	mVp-p
Transient response setting time	25% load step change		300		us

**General Specifications**

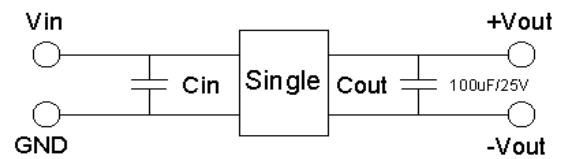
Parameters	Conditions	Min	Typ	Max	Units
Isolation Voltage			1500		Vdc
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			400		KHz
Operating Temperature	With derating	-40		100	°C
Storage Temperature		-55		125	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel coated copper with no-conductive base				
MTBF	MIL-HDBK-217F@25°C	560000			Hours
Weight			16.5		g
Dimensions		25.4x25.4x10.6			mm

**Part Number**

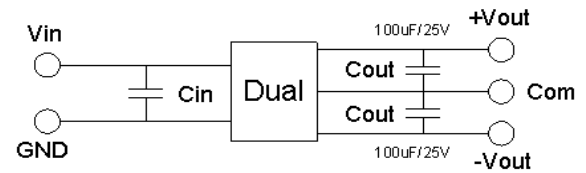
68DW15 - 24 S 05 R NL  
 A B C D E F

- A: Series
- B: Input Voltage
- C: Single Output (S),Dual (D)
- D: Output Voltage
- E: Regulated(R)
- F: RoHs Version

**Recommended Test Circuit**

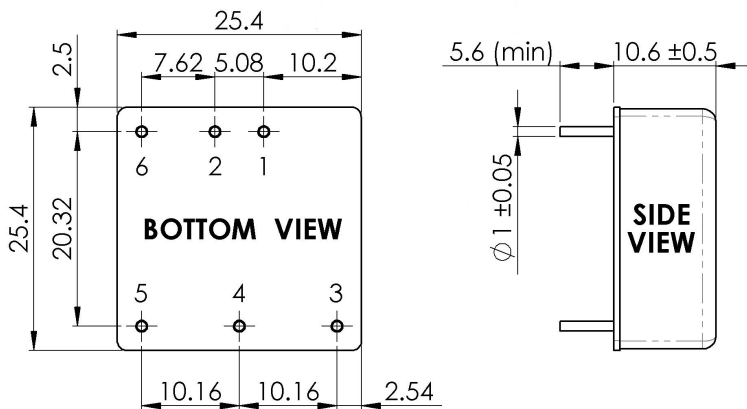


24V&48V: Cin 10uF,100V



24V & 48V :Cin 10uF,100V

**Markings and dimensions**



Unit : mm  
 Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

**PIN Assignment**

Pin	1	2	3	4	5	6
Single	+Vin	-Vin	+Vout	Trim	-Vout	Remote On/Off
Dual	+Vin	-Vin	+Vout	COM	-Vout	Remote On/Off

**FEATURES :**

- 20W DIL PACKAGE
- 4:1 WIDE INPUT RANGE
- 100% BURNED IN
- HIGH EFFICIENCY
- UL94V-0 PACKAGE MATERIAL
- CUSTOMIZED SOLUTIONS AVAILABLE
- RoHS COMPLIANT
- Remote Control:On/Off

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Efficiency	Capacitor load
	Vdc	No Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP	uF MAX
68DW20-24S03RNL	9-36	70	719	3.3	4500	86	6600
68DW20-24S05RNL	9-36	70	947	5	4000	88	6600
68DW20-24S12RNL	9-36	25	938	12	1670	89	960
68DW20-24S15RNL	9-36	25	924	15	1330	90	470
68DW20-24D12RNL	9-36	25	936	±12	±833	89	470
68DW20-24D15RNL	9-36	25	937	±15	±667	89	330
68DW20-48S03RNL	18-75	30	360	3.3	4500	86	6600
68DW20-48S05RNL	18-75	30	473	5	4000	88	6600
68DW20-48S12RNL	18-75	15	474	12	1670	88	330
68DW20-48S15RNL	18-75	15	472	15	1330	88	330
68DW20-48D12RNL	18-75	25	468	±12	±833	89	330
68DW20-48D15RNL	18-75	25	468	±15	±667	89	220

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				4:1	
Filter			LC Network		

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic Recovery				
Line Regulation				±0.5	%
Load Regulation	Single Dual(Balance Load)			±0.5 ±1	%
Cross Regulation	Dual (25% To 100% Load)			±5	%
Ripple & Noise	Output:3-15V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output > 15V TYPES BW=DC To 20MHz			1% of Vout	mVp-p
Transient response setting time	25% load step change		300		us



DC-DC Converter

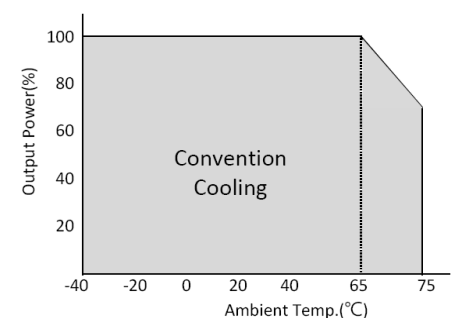
**68DW20 SERIES**

20Watt 1.5KV Isolated

4 : 1 Input Voltage Range

Single & Dual Output

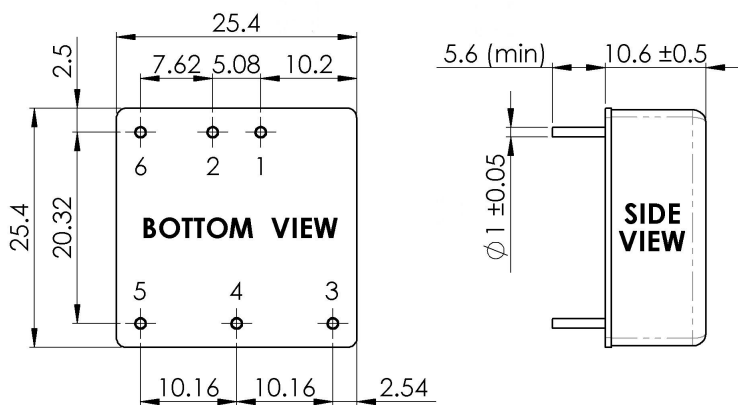
1" x 1"

**Temperature Derating Graph**

## General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Voltage			1500		Vdc
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			330		KHz
Operating Temperature	With derating	-40		75	°C
Storage Temperature		-55		125	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel coated copper with no-conductive base				
MTBF	MIL-HDBK-217F@25°C	340000			Hours
Weight			16.5		g
Dimensions			25.4x25.4x10.6		mm

## Markings and dimensions



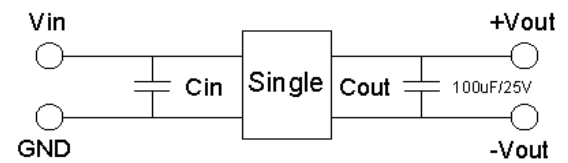
Unit : mm  
Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

## Part Number

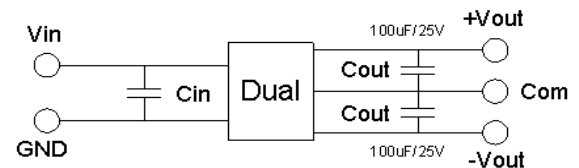
68DW20 - 24 S 05 R NL  
A B C D E F

A: Series  
B: Input Voltage  
C: Single Output (S),Dual (D)  
D: Output Voltage  
E: Regulated(R)  
F: RoHs Version

## Recommended Test Circuit



24V & 48V : Cin 10uF, 100V



24V & 48V : Cin 10uF, 100V

## PIN Assignment

Pin	1	2	3	4	5	6
Single	+Vin	-Vin	+Vout	Trim	-Vout	Remote On/Off
Dual	+Vin	-Vin	+Vout	Com	-Vout	Remote On/Off

**FEATURES :**

- 4:1 Wide Input Voltage
- 3 Watt 24PIN DIL Package
- Efficiency To 80%
- 1500Vdc Isolation
- MTBF:>1,500,000 hrs
- Operating Temperature:-40°C TO +85°C

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Output Voltage	Output Current	Efficiency
	Vdc	Vdc	mA	%TYP
69D-24S05CN	9-36	5	600	75
69D-24S12CN	9-36	12	250	80
69D-24S15CN	9-36	15	200	75
69D-24D05CN	9-36	±5	±300	75
69D-24D12CN	9-36	±12	±125	75
69D-24D15CN	9-36	±15	±100	75
69D-48S05CN	18-72	5	600	75
69D-48S12CN	18-72	12	250	80
69D-48S15CN	18-72	15	200	75
69D-48D05CN	18-72	±5	±300	75
69D-48D12CN	18-72	±12	±125	75
69D-48D15CN	18-72	±15	±100	75

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				4:1	
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance				±2	%
Short Circuit Protection	Continuous				
Line Regulation				±0.5	%
Load Regulation	Single			±0.5	%
Load Regulation	Dual			±2.0	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us



DC-DC Converter

**69D SERIES**

3Watt 1.5KV Isolated

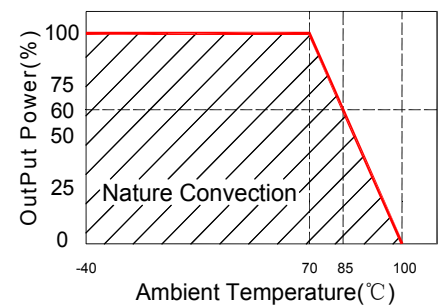
4 : 1 Input Voltage Range

Single & Dual Output

1.25" x 0.8"



**Temperature Derating Graph**

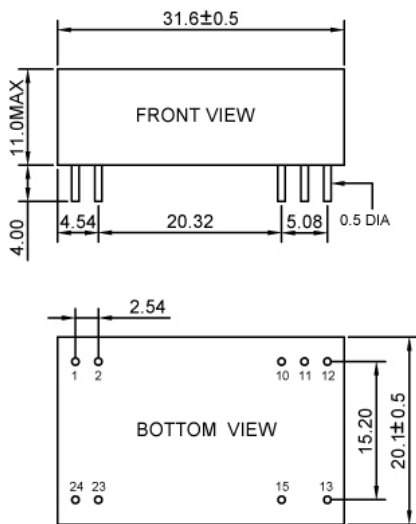




**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			200		KHz
Operating Temperature		-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel Coated Copper With Non-Conductive Base				
Weight			16.2		g
Dimensions		31.60x20.10x11.0			mm

**Markings and dimensions**



UNIT : mm Unless otherwise specified, all tolerances are ±0.25

**PIN Connection**

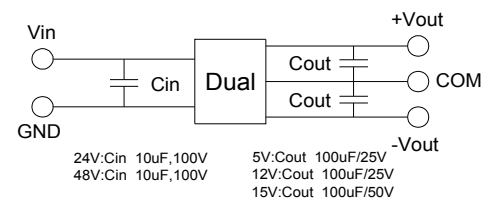
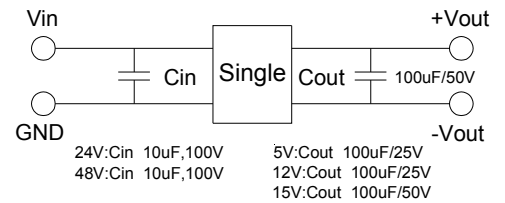
Pin	1,2	10,11	12	13	15	23,24
Single	+Vin	No Pin	-Vout	+Vout	No Pin	-Vin
Dual	+Vin	Com	No Pin	-Vout	+Vout	-Vin

**Part Number**

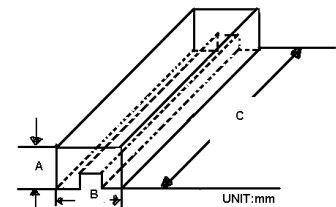
69D - 24 S 05 C N  
A B C D E F

- A : Series
- B : Input Voltage
- C : Single(S);Dual(D)
- D : Output Voltage
- E : Types
- F : Package

**Recommended Test Circuit**



**Packaging**



Size(mm)		
A	B	C
18.71	23.00	52.2

**FEATURES :**

- Up to 3 Watt Output Power
- 500Vdc Isolation
- Low Ripple and Noise
- Regulated Output Types
- MTBF:>1,500,000 hrs
- Operating Temperature:-40°C TO +85°C

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Output Voltage	Output Current	Efficiency
	Vdc	Vdc	mA	%Typ
70D-05S05RNL	5	5	600	60
70D-05S12RNL	5	12	250	65
70D-05D12RNL	5	±12	±125	65
70D-12S12RNL	12	12	250	65
70D-12S15RNL	12	15	200	65
70D-12D15RNL	12	±15	±100	65
70D-24S05RNL	24	5	600	60
70D-24D12RNL	24	±12	±125	65
70D-24D15RNL	24	±15	±100	65
70D-48S12RNL	48	12	250	65
70D-48D12RNL	48	±12	±125	65
70D-48D15RNL	48	±15	±100	65

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Type	Vo,Io Nom			±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance				±5	%
Short Circuit Protection	Continuous				
Line Regulation	Regulated			±0.3	%
Load Regulation	Regulated			±0.5	%
Ripple & Noise	BW=DC To 20MHz			50	mVp-p
Line Regulation	Unregulated (For 1% of Vin)		±1.2		%
Load Regulation	Unregulated (20% To 100% F.L)			±10	%
Transient response setting time	50% load step change		350		us



DC-DC Converter

**70D SERIES**

3Watt

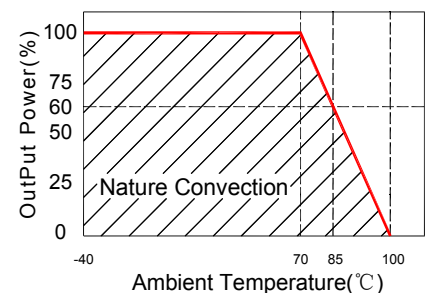
0.5KV Isolated

Single & Dual Output

DIL5



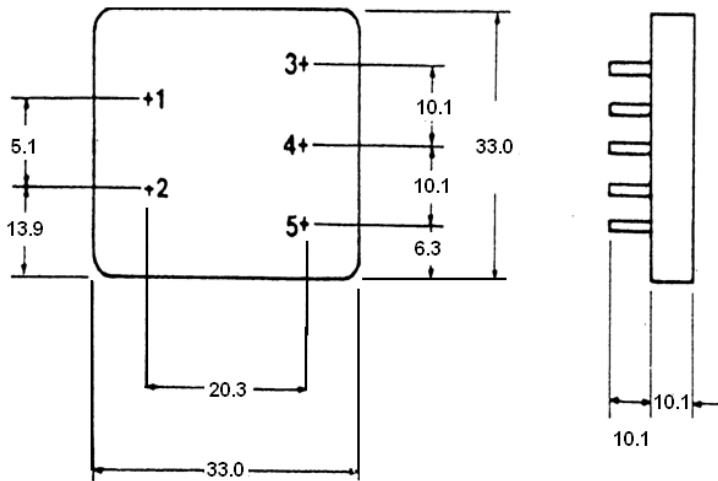
**Temperature Derating Graph**



**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			20		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	DAP				
Weight			55		g
Dimensions			33.0x33.0x10.1		mm

**Markings and dimensions**



Unit : mm Unless otherwise specified, all tolerances are ±0.25

**PIN Connection**

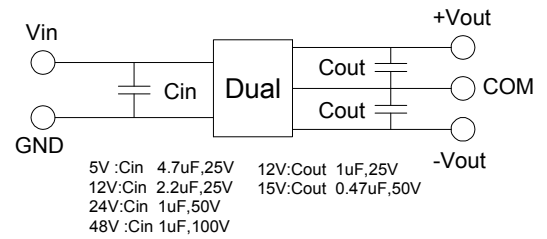
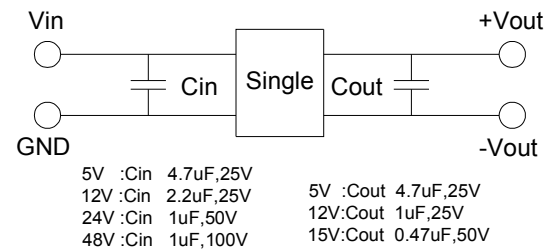
PIN	1	2	3	4	5
Single	+Vin	-Vin	No Pin	+Vout	-Vout
Dual	+Vin	-Vin	+Vout	COM	-Vout

**Part Number**

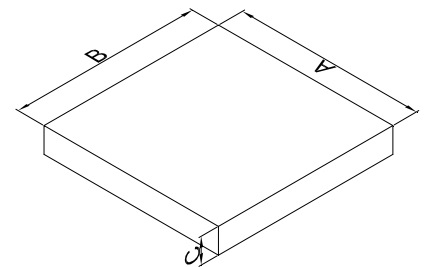
70D - 05 S 05 R NL  
A B C D E F

A:Series  
B:Input Voltage  
C:Single(S)Dual(D)  
D:Output Voltage  
E:Regulated(R)  
F:RoHS Version

**Recommended Test Circuit**



**Packaging**



Size(mm)		
A	B	C
210.00	210.00	30.00

**FEATURES :**

- 4:1 Wide Input Voltage.
- 6 Watt 24PIN DIL Package.
- Efficiency To 85%
- 1500Vdc Isolation
- MTBF:>1,500,000 hrs
- Operating Temperature:-40°C TO +85°C



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Output Voltage	Output Current	Input Current		Efficiency
				No Load	Full Load	
	Vdc	Vdc	mA	mA	mA	%TYP
75DW-24S05R6W	9-36	5	1200	6.5	313	80
75DW-24S12R6W	9-36	12	500	6.5	294	85
75DW-24S15R6W	9-36	15	400	6.5	294	85
75DW-24S24R6W	9-36	24	250	6.5	294	85
75DW-24D05R6W	9-36	±5	±600	8	313	80
75DW-24D12R6W	9-36	±12	±250	8	298	84
75DW-24D15R6W	9-36	±15	±200	8	298	84
75DW-48S05R6W	18-75	5	1200	3	160	78
75DW-48S12R6W	18-75	12	500	3	156	80
75DW-48S15R6W	18-75	15	400	3	156	80
75DW-48S24R6W	18-75	24	250	3	156	80
75DW-48D05R6W	18-75	±5	±600	4	160	78
75DW-48D12R6W	18-75	±12	±250	4	156	80
75DW-48D15R6W	18-75	±15	±200	4	156	80

DC-DC Converter

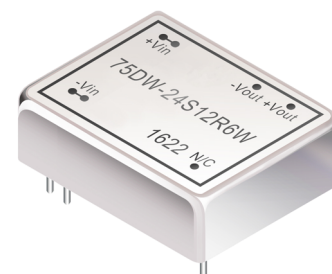
**75DW-6W SERIES**

6Watt 1.5KV Isolated

4 : 1 Input Voltage Range

Single & Dual Output

DIL



**Input Specifications**

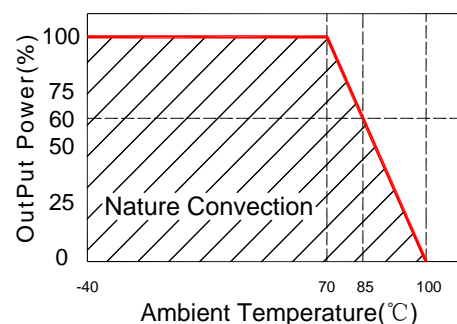
Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				4:1	
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance				±2	%
Short Circuit Protection	Continuous				
Line Regulation				±0.5	%
Load Regulation	Single (F.L To 10% Load)			±0.8	%
Load Regulation	Dual (F.L To 10% Load)			±1.0	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us



**Temperature Derating Graph**



**General Specifications**

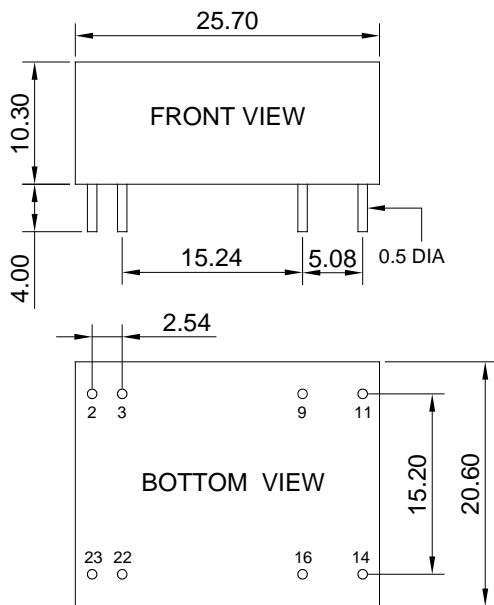
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			200		KHz
Operating Temperature		-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel Coated Copper With Non-Conductive Base				
Weight			11.8		g
Dimensions		25.7x20.6x10.3			mm

**Part Number**

75DW - 24 S 12 R 6W  
 A B C D E F

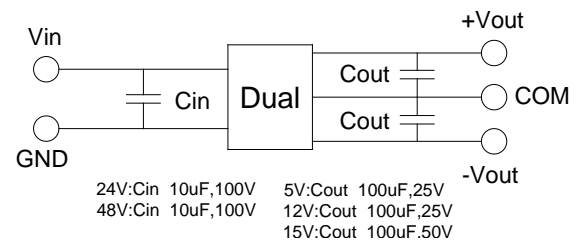
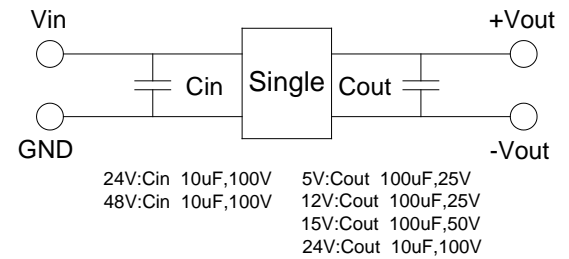
A:Series  
 B:Input Voltage  
 C:Single Output  
 D:Output Voltage  
 E:Regulated(R)  
 F:Output Power

**Markings and dimensions**



UNIT : mm Unless otherwise specified, all tolerances are ±0.25

**Recommended Test Circuit**



**PIN Connection**

Pin	2.3	9	11	14	16	22.23
Single	-Vin	No Pin	NC	+Vout	-Vout	+Vin
Dual	-Vin	Com	-Vout	+Vout	Com	+Vin

**FEATURES :**

- 2:1Wide Input Voltage
- 3 Watt 5PIN DIL Package
- Efficiency To 85%
- 1500Vdc Isolation
- MTBF:>1,500,000 hrs
- Operating Temperature:-40°C TO +85°C

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Output Voltage	Output Current	Efficiency
	Vdc	Vdc	mA	%TYP
76D-05S05C	4.5-9	5	600	75
76D-05S12C	4.5-9	12	250	77
76D-05S15C	4.5-9	15	200	77
76D-12S05C	9-18	5	600	75
76D-12S12C	9-18	12	250	80
76D-12S15C	9-18	15	200	80
76D-12D05C	9-18	±5	±300	75
76D-12D12C	9-18	±12	±125	82
76D-12D15C	9-18	±15	±100	82
76D-24S05C	18-36	5	600	75
76D-24S12C	18-36	12	250	85
76D-24S15C	18-36	15	200	85
76D-24D05C	18-36	±5	±300	75
76D-24D12C	18-36	±12	±125	85
76D-24D15C	18-36	±15	±100	85
76D-48S05C	36-75	5	600	78
76D-48S12C	36-75	12	250	85
76D-48S15C	36-75	15	200	85
76D-48D05C	36-75	±5	±300	75
76D-48D12C	36-75	±12	±125	85
76D-48D15C	36-75	±15	±100	85

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				2:1	
Filter	Capacitor				



DC-DC Converter

**76D-3W SERIES**

3Watt 1.5KV Isolated

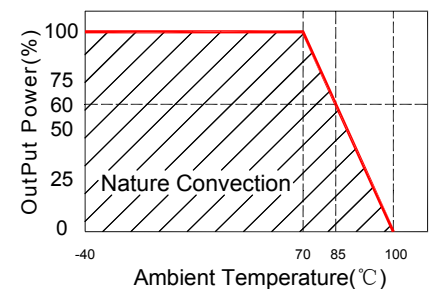
2 : 1 Input Voltage Range

Single & Dual Output

1" x 1"



**Temperature Derating Graph**



**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance				±2	%
Short Circuit Protection	Continuous				
Line Regulation				±0.5	%
Load Regulation	Single (F.L To 10% Load)			±0.8	%
Load Regulation	Dual (F.L To 10% Load)			±1.0	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

**General Specifications**

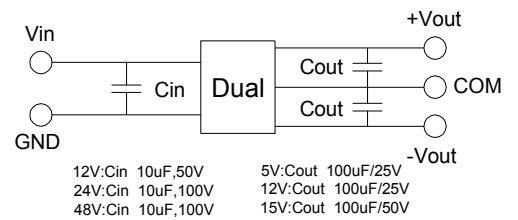
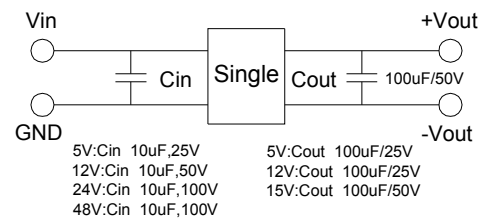
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			200		KHz
Operating Temperature		-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel Coated Copper With Non-Conductive Base				
Weight			15.0		g
Dimensions		25.4x25.4x10.6			mm

**Part Number**

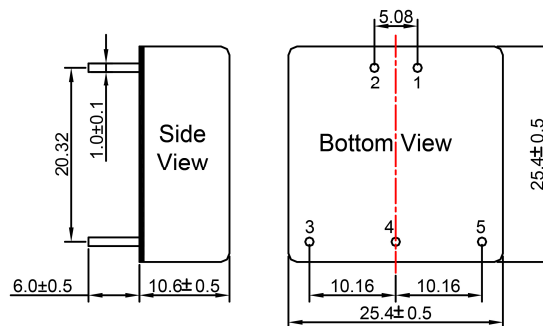
76D - 12 D 05 C  
A B C D E

A:Series  
B:Input Voltage  
C:Dual Output  
D:Output Voltage  
E:Types

**Recommended Test Circuit**



**Markings and dimensions**



UNIT : mm Unless otherwise specified, all tolerances are ±0.25

**PIN Connection**

Pin	1	2	3	4	5
Single	+Vin	-Vin	-Vout	No Pin	+Vout
Dual	+Vin	-Vin	-Vout	COM	+Vout

**FEATURES :**

- 2:1 Wide Input Voltage
- 6 Watt 5PIN DIL Package
- Efficiency To 87%
- 1500Vdc Isolation
- MTBF:>1,500,000 hrs
- Operating Temperature:-40°C TO +85°C

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Output Voltage	Output Current	Input Current		Efficiency
				NO LOAD	FULL LOAD	
	Vdc	Vdc	mA	mA	mA	%TYP
76D-12S05R6W	9-18	5	1200	7.5	625	80
76D-12S12R6W	9-18	12	500	7.5	625	80
76D-12S15R6W	9-18	15	400	7.5	625	80
76D-12D05R6W	9-18	±5	±600	12	625	80
76D-12D12R6W	9-18	±12	±250	12	600	83
76D-12D15R6W	9-18	±15	±200	12	600	83
76D-24S05C6W	18-36	5	1200	5	305	82
76D-24S12C6W	18-36	12	500	5	287	87
76D-24S15C6W	18-36	15	400	5	287	87
76D-24S24C6W	18-36	24	250	5	287	87
76D-24D05C6W	18-36	±5	±600	7.5	310	80
76D-24D12C6W	18-36	±12	±250	7.5	295	85
76D-24D15C6W	18-36	±15	±200	7.5	295	85
76D-48S05C6W	36-75	5	1200	2	155	80
76D-48S12C6W	36-75	12	500	2	145	85
76D-48S15C6W	36-75	15	400	2	145	85
76D-48S24C6W	36-75	24	250	2	145	85
76D-48D05C6W	36-75	±5	±600	3	155	80
76D-48D12C6W	36-75	±12	±250	3	145	85

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				2:1	
Filter	Capacitor				



DC-DC Converter

**76D-6W SERIES**

6Watt 1.5KV Isolated

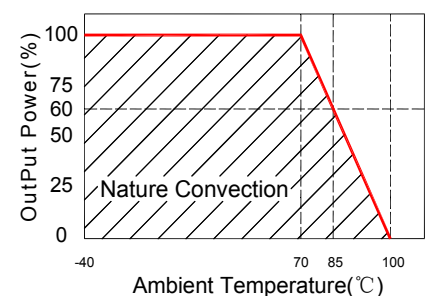
2 : 1 Input Voltage Range

Single & Dual Output

1" x 1"



**Temperature Derating Graph**





**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance				±2	%
Short Circuit Protection	Continuous				
Line Regulation				±0.5	%
Load Regulation	Single (F.L To 10% Load)			±0.8	%
Load Regulation	Dual (F.L To 10% Load)			±1.0	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

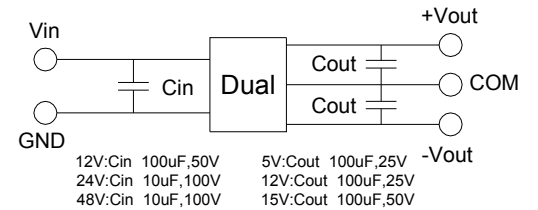
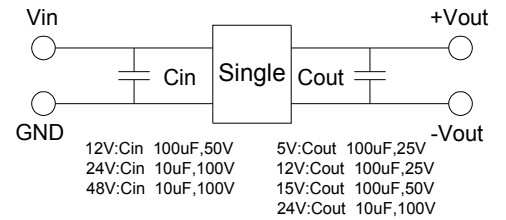
**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			200		KHz
Operating Temperature		-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel Coated Copper With Non-Conductive Base				
Weight			15.0		g
Dimensions			25.4x25.4x10.6		mm

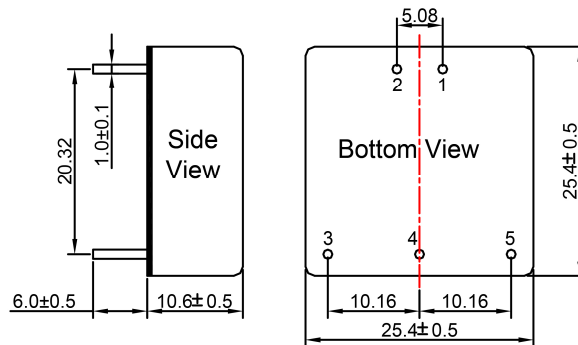
**Part Number**

76D - 12 S 05 R/C 6W  
 A B C D E F  
 A:Series  
 B:Input Voltage  
 C:Single Output  
 D:Output Voltage  
 E:Regulated(R/C)  
 F:Output Power

**Recommended Test Circuit**



**Markings and Dimensions**



UNIT : mm Unless otherwise specified, all tolerances are ±0.25

**PIN Connection**

Pin	1	2	3	4	5
Single	+Vin	-Vin	-Vout	No Pin	+Vout
Dual	+Vin	-Vin	-Vout	COM	+Vout

**FEATURES :**

- Up to 6 Watt Output Power
- 5 Pin Package
- Low Ripple and Noise
- Regulated Output Types
- 500Vdc Isolation
- MTBF:>1,500,000 hrs
- Operating Temperature:-40°C TO +85°C



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Output Voltage	Output Current	Efficiency
	Vdc	Vdc	mA	%Typ
82D-05S05RNNL	5	5	1200	60
82D-05S12RNNL	5	12	500	65
82D-05D15RNNL	5	±15	±200	65
82D-12S12RNNL	12	12	500	65
82D-12S15RNNL	12	15	400	65
82D-12D12RNNL	12	±12	±250	65
82D-24S05RNNL	24	5	1200	60
82D-24S15RNNL	24	15	400	65
82D-24D12RNNL	24	±12	±250	65
82D-48S15RNNL	48	15	400	65
82D-48D12RNNL	48	±12	±250	65
82D-48D15RNNL	48	±15	±200	65

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Type				±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance				±5	%
Short Circuit Protection	Continuous				
Line Regulation				±0.3	%
Load Regulation				±0.5	%
Ripple & Noise	BW=DC To 20MHz			50	mVp-p
Transient response setting time	50% load step change		350		us

DC-DC Converter

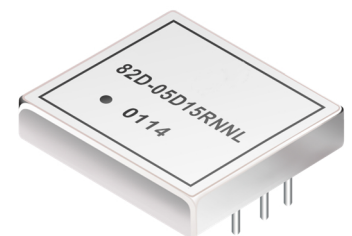
**82D SERIES**

6Watt

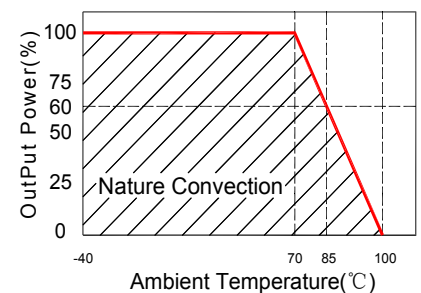
0.5KV Isolated

Single & Dual Output

DIL5



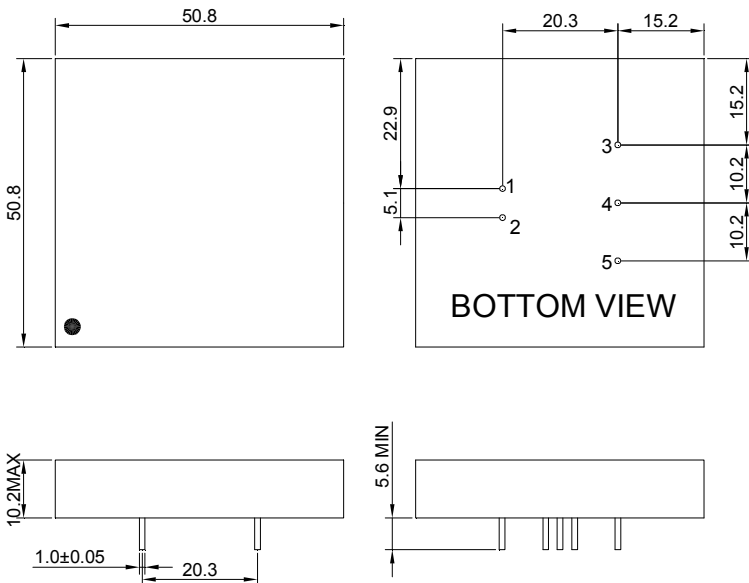
**Temperature Derating Graph**



**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			50		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel Coated With Non-Conductive Base				
Weight			57		g
Dimensions		50.8x50.8x10.2			mm

**Markings and dimensions**



Unit : mm Unless otherwise specified, all tolerances are ±0.25

**PIN Connection**

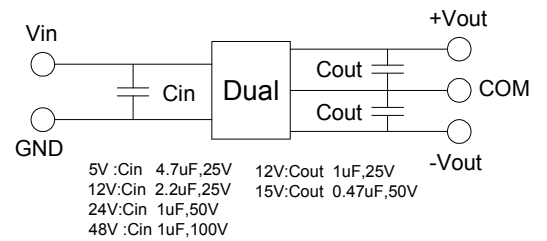
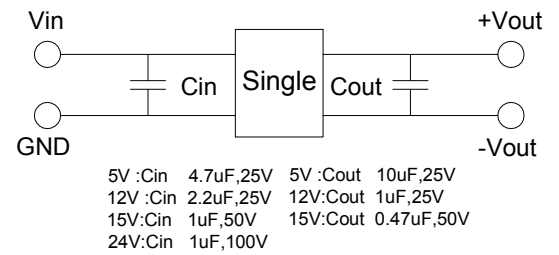
PIN	1	2	3	4	5
Single	+Vin	-Vin	+Vout	NO PIN	-Vout
Dual	+Vin	-Vin	+Vout	COM	-Vout

**Part Number**

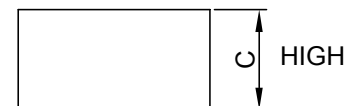
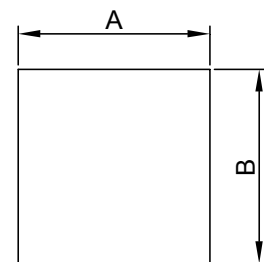
82D - 05 D 12 R N NL  
A B C D E F G

A:Series  
B:Input Voltage  
C:Single(S) Dual(D)  
D:Output Voltage  
E:Regulated(R)  
F:Package  
G:RoHS Version

**Recommended Test Circuit**



**Packaging**



Size(mm)		
A	B	C
51.50	52.30	27.00

**FEATURES :**

- Up to 5 Watt Output Power
- 5 Pin Package
- Low Ripple and Noise
- Regulated Output Types
- 500Vdc Isolation
- MTBF:>1,500,000 hrs
- Operating Temperature:-40°C TO +85°C



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Output Voltage	Output Current	Efficiency
	Vdc	Vdc	mA	%Typ
85D-05S05RNNL	5	5	1000	60
85D-05S12RNNL	5	12	470	65
85D-05D15RNNL	5	±15	±190	65
85D-12S12RNNL	12	12	470	65
85D-12S15RNNL	12	15	400	65
85D-12D12RNNL	12	±12	±230	65
85D-24S05RNNL	24	5	1000	60
85D-24S15RNNL	24	15	400	65
85D-24D12RNNL	24	±12	±230	65
85D-48S15RNNL	48	15	400	65
85D-48D12RNNL	48	±12	±230	65
85D-48D15RNNL	48	±15	±190	65

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Type				±10	%
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance				±5	%
Short Circuit Protection	Continuous				
Line Regulation				±0.3	%
Load Regulation				±0.5	%
Ripple & Noise	BW=DC To 20MHz			50	mVp-p
Transient response setting time	50% load step change		350		us

DC-DC Converter

**85D SERIES**

5Watt

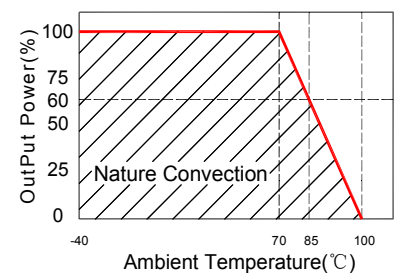
0.5KV Isolated

Single & Dual Output

DIL5



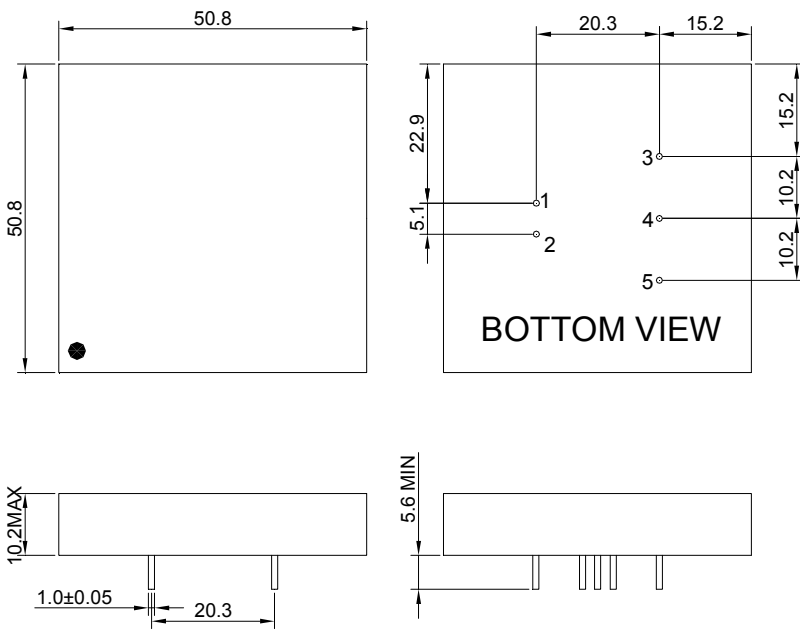
**Temperature Derating Graph**



**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			20		KHz
Operating Temperature		-40		+85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel Coated With Non-Conductive Base				
Weight			55		g
Dimensions		50.8x50.8x10.2			mm

**Markings and dimensions**



Unit : mm Unless otherwise specified, all tolerances are ±0.25

**PIN Connection**

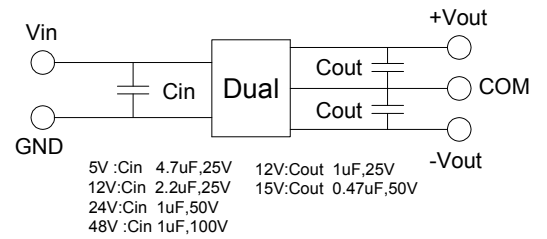
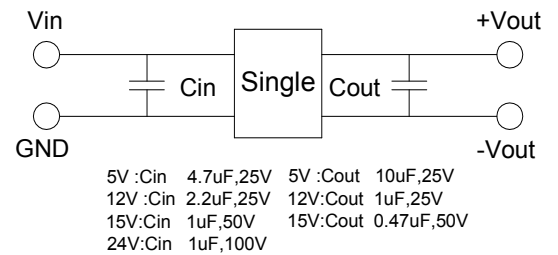
PIN	1	2	3	4	5
Single	+Vin	-Vin	+Vout	NO PIN	-Vout
Dual	+Vin	-Vin	+Vout	COM	-Vout

**Part Number**

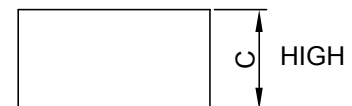
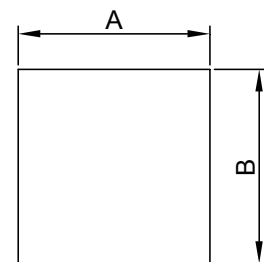
85D - 05 S 05 R N NL  
A B C D E F G

- A:Series
- B:Input Voltage
- C:Single(S) Dual(D)
- D:Output Voltage
- E:Regulated(R)
- F:Package
- G:RoHS Version

**Recommended Test Circuit**



**Packaging**



Size(mm)		
A	B	C
51.50	52.30	27.00

**FEATURES :**

- 15Watt Isolated Output
- Recognized By UL 60950-1
- Singles Dual And Triples
- Efficiency To 80%
- Remote ON/OFF Control
- Wide 4:1 Input Voltage Range
- 8PIN Package
- SIX-Sided Shielding
- 1500Vdc Isolation
- MTBF:>1,500,000 hrs
- Operating Temperature:-40°C TO +100°C



DC-DC Converter

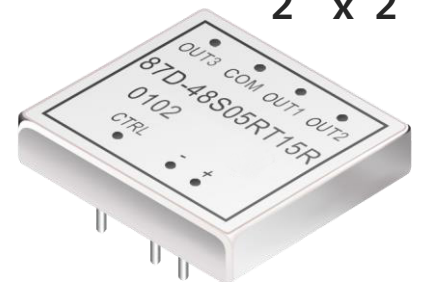
**87D SERIES**

15Watt 1.5KV Isolated

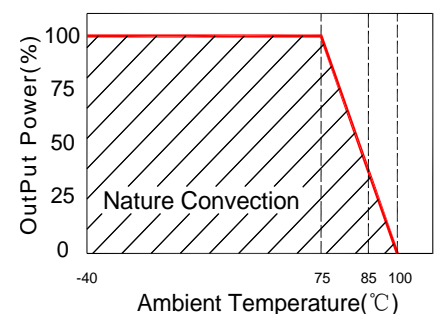
4 : 1 Input Voltage Range

Triple Output

2" x 2"



**Temperature Derating Graph**



**Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified**

Part Number	Input Voltage	Output 1 Voltage	Output 2 Voltage	Output 3 Voltage
	Vdc	Vdc	Vdc	Vdc
87D-24S05RNL	9-36	5@3A		
87D-24S12RNL	9-36	12@1.25A		
87D-24S15RNL	9-36	15@1A		
87D-24D12RNL	9-36		12@0.625A	-12@0.625A
87D-24D15RNL	9-36		15@0.5A	-15@0.5A
87D-24S05RT12RNL	9-36	5@1.5A	12@0.31A	-12@0.31A
87D-24S05RT15RNL	9-36	5@1.5A	15@0.25A	-15@0.25A
87D-48S05RNL	20-72	5@3A		
87D-48S12RNL	20-72	12@1.25A		
87D-48S15RNL	20-72	15@1A		
87D-48D12RNL	20-72		12@0.625A	-12@0.625A
87D-48D15RNL	20-72		15@0.5A	-15@0.5A
87D-48S05RT12RNL	20-72	5@1.5A	12@0.31A	-12@0.31A
87D-48S05RT15RNL	20-72	5@1.5A	15@0.25A	-15@0.25A

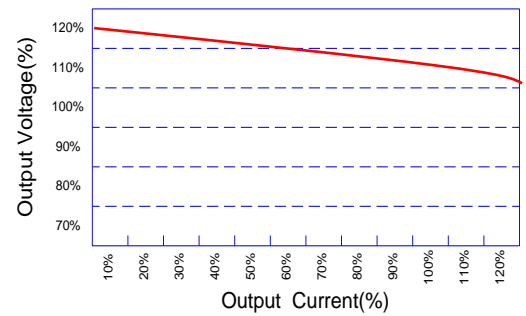
**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				4:1	
Filter	Capacitor				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance				±2	%
Single Voltage Tolerance				±1	%
Dual +Voltage Tolerance				±3	%
Dual -Voltage Tolerance				±1	%
Triple	5V			±5	%
Triple	12V/15V			±2	%
Triple	-5V			±1	%
Short Circuit Protection	Continuous				
Line Regulation	Single/Dual(H.L To L.L)			±0.2	%
Load Regulation	Single/Dual (F.L To 1/4F.L)			±1.0	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Line Regulation	Triple(H.L To L.L)			±1.0	%
Load Regulation	Triple(F.L To 1/4F.L)			±0.2	%
Transient response setting time	50% load step change		350		us

**Tolerance Envelope Graph**



**Part Number**

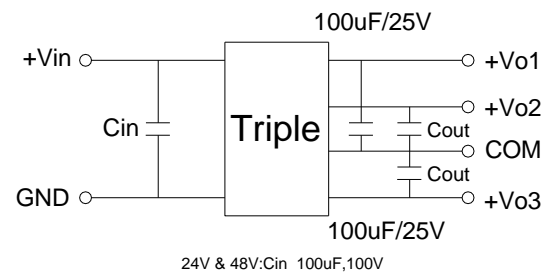
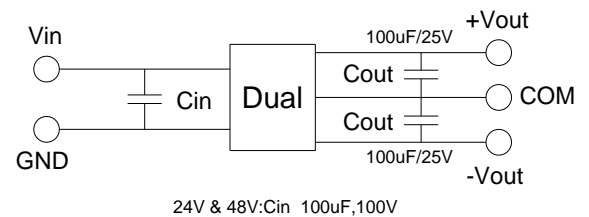
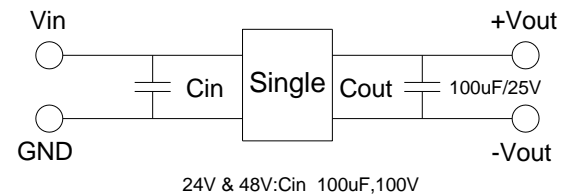
87D - 24 S 05 R T 12 R NL  
 A B C D E F G H I

- A: Series
- B: Input Voltage
- C: Single (S) / Dual (D)
- D: Output Voltage
- E: Regulated(R)
- F: Triple(T)
- G: Output Voltage
- H: Regulated(R)
- I: RoHs Version

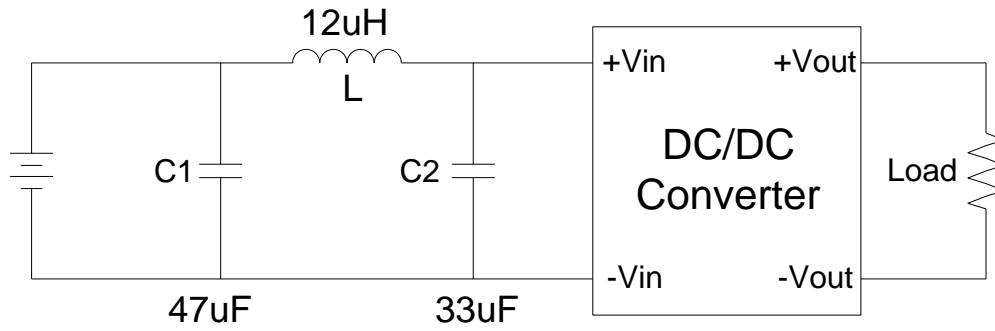
**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			100		KHz
Operating Temperature		-40		100	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel Coated With Non-Conductive Base or Black Coated Copper With Non-Conductive Base				
Weight			72.8		g
Dimensions			50.8x50.8x13.2		mm
Potting Material	Epoxy (UL94V-0 rated)				
Conducted Emissions	EN55022		CLASS A		
Radiated Emissions	EN55022		CLASS A		

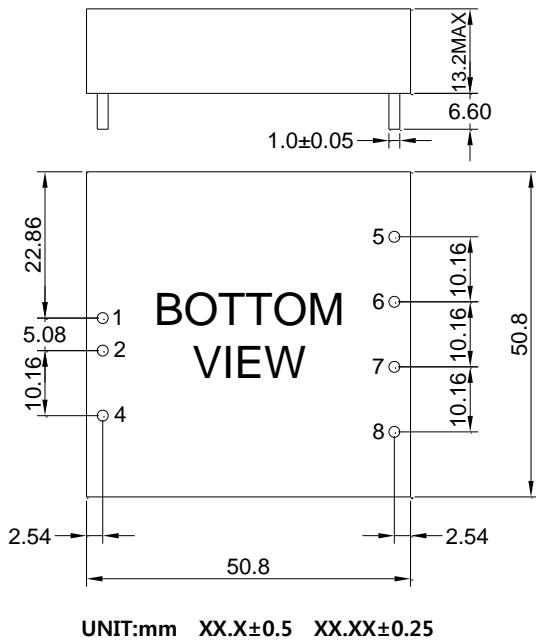
**Recommended Test Circuit**



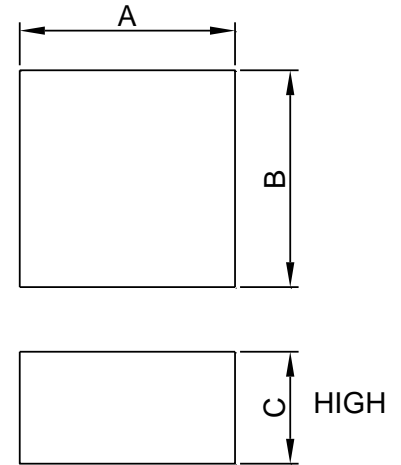
Suggest adding input external filter(C1,C2,L)to meet conducted emissions(EN55022 class A)



Markings and dimensions



Packaging



Size(mm)		
A	B	C
51.50	52.30	27.00

PIN Connection

Pin	1	2	3	4	5	6	7	8
Single	+Vin	-Vin	NO PIN	Control	NO PIN	Output 1	-Output 1	Trim
Dual	+Vin	-Vin	NO PIN	Control	Output 2	Com	Output 3	Trim
Triple	+Vin	-Vin	NO PIN	Control	Output 2	Output 1	Com	Output 3



**FEATURES :**

- 60W DIL PACKAGE
- INDUSTRY STANDARD PACKAGE
- 2:1 WIDE INPUT RANGE
- 100% BURNED IN
- HIGH EFFICIENCY
- UL94V-0 PACKAGE MATERIAL
- CUSTOM SOLUTIONS AVAILABLE
- RoHS COMPLIANT
- 3 YEARS WARRANTY



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage		Input Current		Output Voltage		Output Current	Efficiency
	Vdc	No-Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP		
93D-12S05RNL	9-18	40	5208	5	10000	80		
93D-12S12RNL	9-18	40	5882	12	5000	85		
93D-12S15RNL	9-18	40	5814	15	4000	86		
93D-12D05RNL	9-18	40	5144	±5	±5000	81		
93D-12D12RNL	9-18	40	5747	±12	±2500	87		
93D-12D15RNL	9-18	40	5747	±15	±2000	87		
93D-24S05RNL	18-36	30	2572	5	10000	81		
93D-24S12RNL	18-36	30	2841	12	5000	88		
93D-24S15RNL	18-36	30	2841	15	4000	88		
93D-24D05RNL	18-36	30	2572	±5	±5000	81		
93D-24D12RNL	18-36	30	2874	±12	±2500	87		
93D-24D15RNL	18-36	30	2841	±15	±2000	88		
93D-48S05RNL	36-72	20	1270	5	10000	82		
93D-48S12RNL	36-72	20	1420	12	5000	88		
93D-48S15RNL	36-72	20	1420	15	4000	88		
93D-48D05RNL	36-72	20	1270	±5	±5000	82		
93D-48D12RNL	36-72	20	1437	±12	±2500	87		
93D-48D15RNL	36-72	20	1437	±15	±2000	87		

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				2:1	
Filter	Pi Network				
Protection	Fuse Recommended				

DC-DC Converter

93D SERIES

60Watt 3KV Isolated

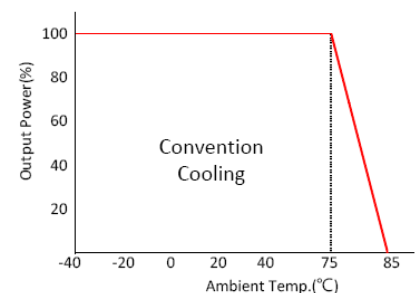
2 : 1 Input Voltage Range

Single & Dual Output

2.6" x 3"



Temperature Derating Graph



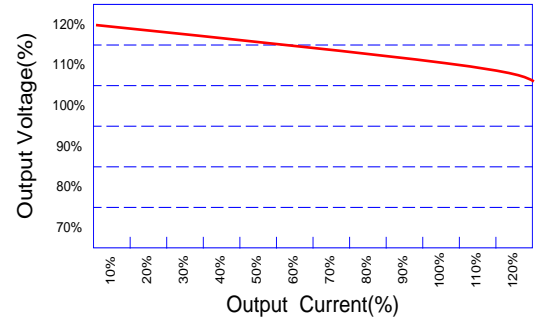
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit/Restart Protection	Hiccup, automatic recovery				
Over Load Protection		120	150	180	%
Line Regulation	Single & Dual (H/L to L/L)			±0.5	%
Load Regulation	Single & Dual (Balance Load), 25% TO 100% load			±0.5	%
Cross Regulation	Dual (25% to 100% load)			±5	%
Ripple & Noise	BW=DC To 20MHz (with 1uF Cap.)			150	mVp-p
Transient response setting time	50% load step change			400	us
Capacitive load				1500	uF
External Trim Adj. Range				±10	%

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			50		KHz
Operating Temperature	With derating	-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Six-Side Shielded Case	Nickel Coated with Non-Conductive Base			
Weight			227		g
Dimensions			76.7X66.5X21.6		mm
Potting Material	Epoxy (UL94V-0 rated)				
Radiated Emissions	EN55022		CLASS A		
Conducted Emissions	EN55022		CLASS A		
Isolation Voltage	For 10 seconds			3000	VDC
MTBF	MIL-HDBK-217F @25°C , Ground Benign	299424			Hours
Storage Temperature		-55		+100	°C
Case Temperature				+90	°C
Isolation Capacitance				2500	pF

**Tolerance Envelope Graph**

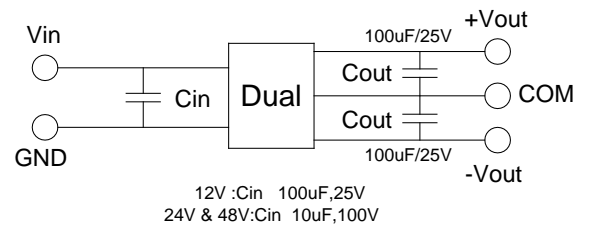
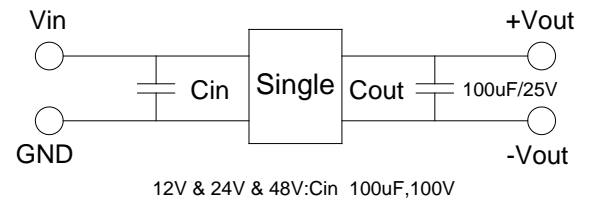


**Part Number**

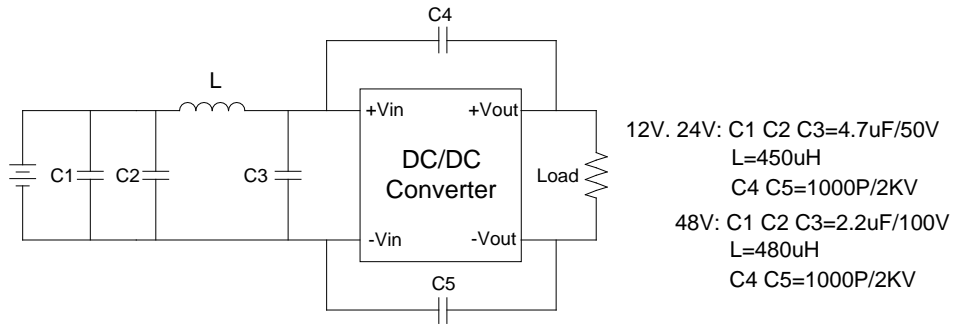
93D - 12 S 05 R NL  
A B C D E F

- A: Series
- B: Input Voltage
- C: Single Output (S),Dual (D)
- D: Output Voltage
- E: Regulated(R)
- F: RoHs Version

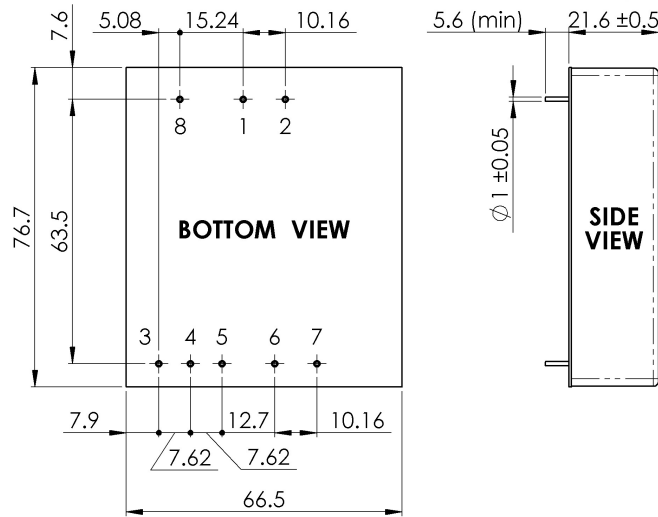
**Recommended Test Circuit**



Suggest adding input external filter(C1,C2,C3,C4,C5,L) to meet conducted emissions (EN55022 class A) requirement for the module . These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.



Markings and dimensions



Unit : mm  
 Tolerance : XX.X±0.5 , XX.XX±0.25

PIN Assignment

Pin	1	2	3	4	5	6	7	8
Single	+Vin	-Vin	No Pin	Trim	No Pin	+Vout	-Vout	Remote On/Off
Dual	+Vin	-Vin	+Vout	Com	-Vout	No Pin	No Pin	Remote On/Off

**FEATURES :**

- 2:1 WIDE INPUT RANGE
- 100% BURNED IN
- HIGH EFFICIENCY UP TO 90%
- Under Voltage Lockout
- Over Temperature Protection
- Remote Control ON/OFF
- UL94V-0 Package Material



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Efficiency	Capacitor Load
	Vdc	No-Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP	uF max.
93D-24S03R2NL	18-36	150	2162	3.3	14000	89	28800
93D-24S05R2NL	18-36	150	2777	5	12000	90	15000
93D-24S12R2NL	18-36	30	2777	12	5000	90	2800
93D-24S15R2NL	18-36	30	2777	15	4000	90	1800
93D-48S03R2NL	36-72	75	1081	3.3	14000	89	28800
93D-48S05R2NL	36-72	75	1388	5	12000	90	15000
93D-48S12R2NL	36-72	30	1388	12	5000	90	2800
93D-48S15R2NL	36-72	30	1388	15	4000	90	1800

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				2:1	
Filter	Pi Network				
Protection	Fuse Recommended				

**Output Specifications  
(Temperature Coefficient : ±0.05%/°C)**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit/Restart Protection	Hiccup, automatic recovery				
Over Load Protection			150		%
Line Regulation				±0.5	%
Load Regulation	10% to 100% load			±0.5	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	25% load step change		300		us
Thermal Shutdown			110		°C
External Trim Adj. Range				±10	%

DC-DC Converter

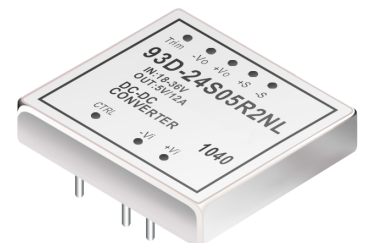
**93D-R2 SERIES**

60Watt 1.5KV Isolated

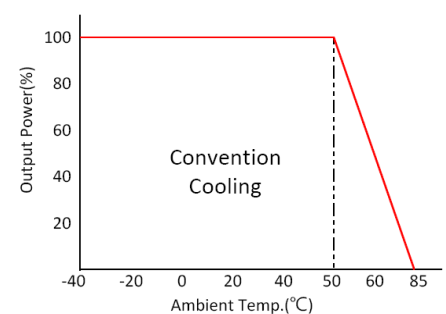
2 : 1 Input Voltage Range

Single Output

2" x 2"



**Temperature Derating Graph**



General Specifications

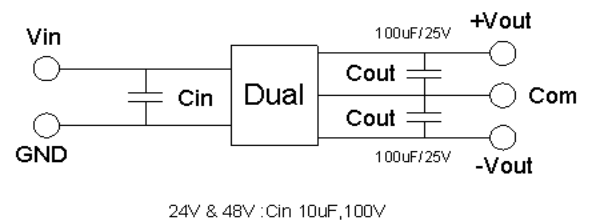
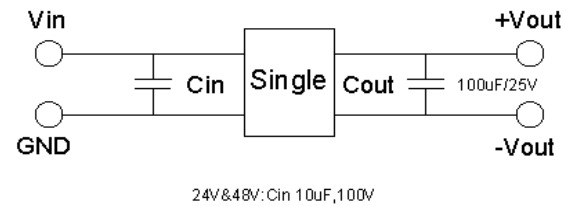
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			300		KHz
Operating Temperature	With derating	-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel Coated with Non-Conductive Base				
Weight			70		g
Dimensions			51.0X51.0X10.3		mm
Potting Material	Epoxy (UL94V-0 rated)				
Remote ON/OFF	ON		Open		
	OFF		Short to -Vin		
Isolation Voltage				1500	VDC
MTBF	MIL-HDBK-217F @25°C , Ground Benign	110000			Hours
Storage Temperature				+125	°C
Case Temperature				+105	°C
Isolation Capacitance				2500	pF

Part Number

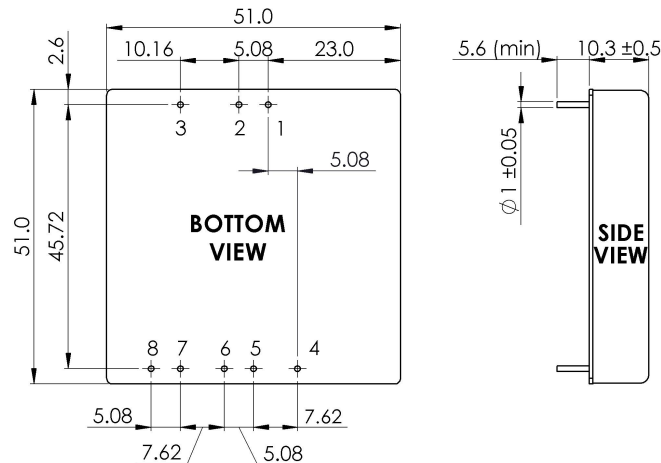
93D - 24 S 05 R 2 NL  
 A B C D E F G

- A: Series
- B: Input Voltage
- C: Single Output (S),Dual (D)
- D: Output Voltage
- E: Regulated(R)
- F: Package
- G: RoHS Version

Recommended Test Circuit



Markings and dimensions



Unit : mm  
 Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

PIN Assignment

Pin	1	2	3	4	5	6	7	8
Function	+Vin	-Vin	Ctrl	-Sense	+Sense	+Vout	-Vout	Trim

**FEATURES :**

- 2"X1" DIL Package
- 2:1 Wide Input Range
- 100% Burned In
- High Efficiency Up To 91%
- Customized Solutions Available
- Over Temperature Protection
- Remote Control ON/OFF
- UL94V-0 Package Material



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

DC-DC Converter

**93D-R3 SERIES**

60Watt 1.6KV Isolated

2 : 1 Input Voltage Range

Single Output

2" x 1"

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Efficiency	Capacitor Load
	Vdc	No-Load (mA TYP)	Full Load (mA TYP)	Vdc	(mA)	%TYP	uF max.
93D-24S03R3NL	18-36	90	2160	3.3	14000	87	16500
93D-24S05R3NL	18-36	90	2760	5	12000	88	16500
93D-24S12R3NL	18-36	40	2780	12	5000	89	3300
93D-24S15R3NL	18-36	40	2780	15	4000	89	2200
93D-48S03R3NL	36-72	60	1010	3.3	14000	88	16500
93D-48S05R3NL	36-72	60	1360	5	12000	89	16500
93D-48S12R3NL	36-72	30	1380	12	5000	90	3300
93D-48S15R3NL	36-72	30	1370	15	4000	91	2200

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				2:1	
Filter	Pi Network				
Protection	Fuse Recommended				



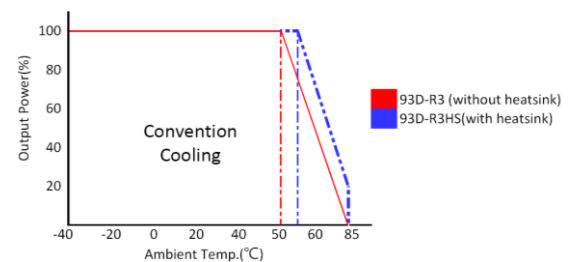
**Output Specifications**

(Temperature Coefficient : ±0.05%/°C)

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit/Restart Protection	Hiccup, automatic recovery				
Over Load Protection			150		%
Line Regulation				±0.5	%
Load Regulation	10% to 100% load			±0.5	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	25% load step change		250		us
External Trim Adj. Range				±10	%



**Temperature Derating Graph**



General Specifications

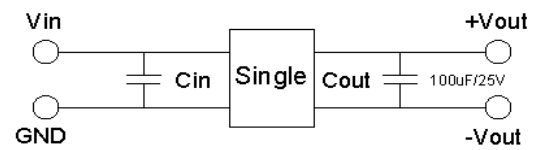
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			300		KHz
Operating Temperature	Refer to temperature derating graph (with derating)	-40		85	°C
Humidity	Non Condensing	5		95	%
Cooling	Free air Convection				
Case material	Nickel Coated with Non-Conductive Base				
Weight			48.6		g
Dimensions	93D-R3 Model	50.8X25.4X13.1			mm
	93D-R3HS Model	50.8X25.4X17.8			
Potting Material	Epoxy (UL94V-0 rated)				
Remote ON/OFF	ON	Open			
	OFF	Short to -Vin			
Isolation Voltage				1600	VDC
MTBF	MIL-HDBK-217F @25°C , Ground Benign	109600			Hours
Storage Temperature		-55		+125	°C
Case Temperature				+110	°C
Isolation Capacitance				2200	pF

Part Number

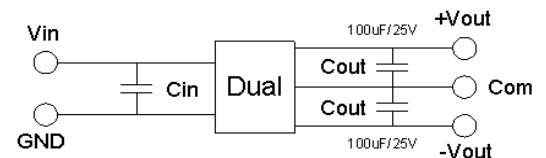
93D - 24 S 05 R 3 NL  
 A B C D E F G

- A: Series
- B: Input Voltage
- C: Single Output(S),Dual(D)
- D: Output Voltage
- E: Regulated (R)
- F: Package(3 or 3HS)
- G: RoHs Version

Recommended Test Circuit



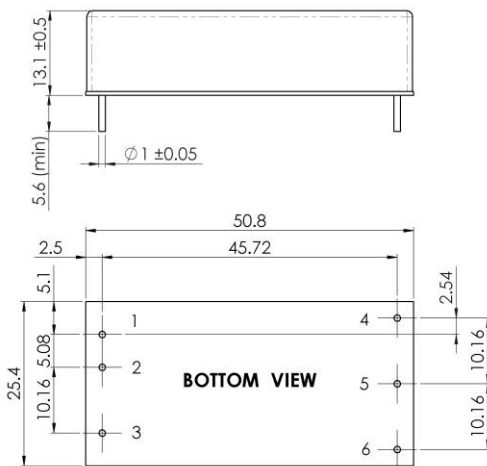
24V & 48V : Cin 10uF, 100V



24V & 48V : Cin 10uF, 100V

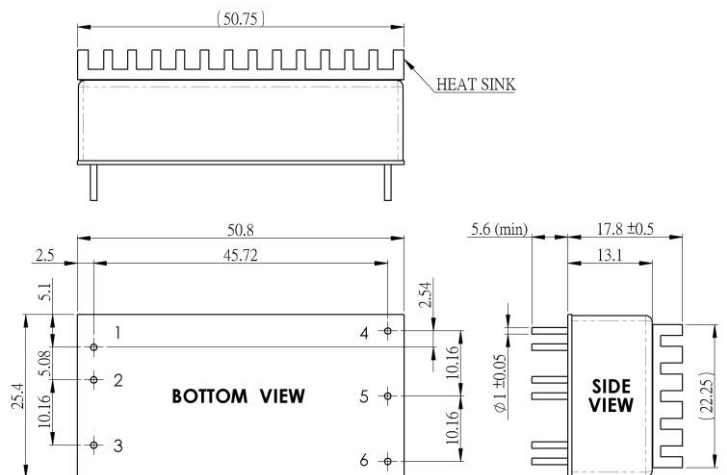
Markings and dimensions

93D-R3 Outline



Unit : mm  
 Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

93D-R3HS Outline



Unit : mm  
 Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

PIN Assignment

Pin	1	2	3	4	5	6
Function	+Vin	-Vin	Ctrl	+Vout	-Vout	Trim

**FEATURES :**

- 60W DIL PACKAGE
- INDUSTRY STANDARD PACKAGE
- 4:1 WIDE INPUT RANGE
- 100% BURNED IN
- HIGH EFFICIENCY
- UL94V-0 PACKAGE MATERIAL
- CUSTOM SOLUTIONS AVAILABLE
- RoHS COMPLIANT
- 3 YEARS WARRANTY



DC-DC Converter

**93DW SERIES**

60Watt 3KV Isolated

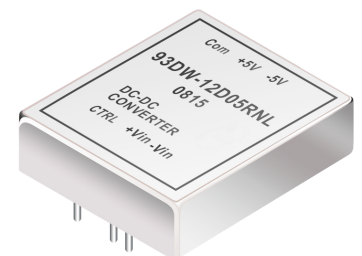
4 : 1 Input Voltage Range

Single & Dual Output

2.6" x 3"

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

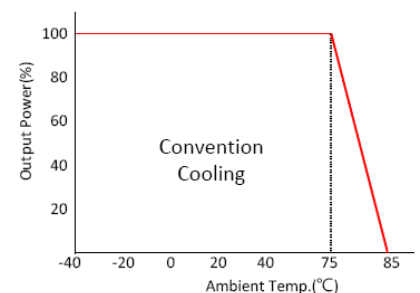
Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Efficiency
	Vdc	No-Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP
93DW-24S05RNL	9-36	30	2480	5	10000	84
93DW-24S12RNL	9-36	30	2941	12	5000	85
93DW-24S15RNL	9-36	30	2941	15	4000	85
93DW-24D05RNL	9-36	30	2480	±5	±5000	84
93DW-24D12RNL	9-36	30	2941	±12	±2500	85
93DW-24D15RNL	9-36	30	2941	±15	±2000	85
93DW-48S05RNL	18-72	20	1225	5	10000	85
93DW-48S12RNL	18-72	20	1453	12	5000	86
93DW-48S15RNL	18-72	20	1453	15	4000	86
93DW-48D05RNL	18-72	20	1225	±5	±5000	85
93DW-48D12RNL	18-72	20	1453	±12	±2500	86
93DW-48D15RNL	18-72	20	1453	±15	±2000	86



**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				4:1	
Filter	Pi Network				
Protection	Fuse Recommended				

**Temperature Derating Graph**





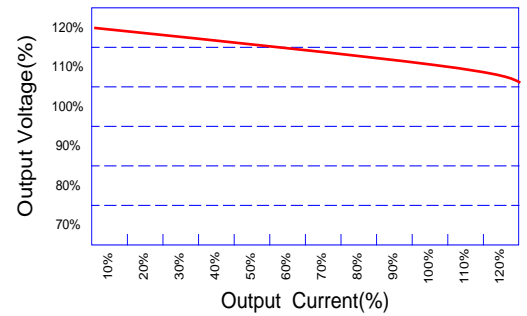
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit/Restart Protection	Hiccup, automatic recovery				
Over Load Protection		120	150	180	%
Line Regulation	Single & Dual (H/L to L/L)			±0.5	%
Load Regulation	Single & Dual (Balance Load), 25% TO 100% load			±0.5	%
Cross Regulation	Dual (25% to 100% load)			±5	%
Ripple & Noise	BW=DC To 20MHz (with 1uF Cap.)			150	mVp-p
Transient response setting time	50% load step change			400	us
Capacitive load				4800	uF
External Trim Adj. Range				±10	%

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			50		KHz
Operating Temperature	With derating	-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Six-Side Shielded Case		Nickel Coated with Non-Conductive Base		
Weight			227		g
Dimensions			76.7X66.5X21.6		mm
Potting Material			Epoxy (UL94V-0 rated)		
Radiated Emissions	EN55022		CLASS A		
Conducted Emissions	EN55022		CLASS A		
Isolation Voltage	For 10 seconds			3000	VDC
MTBF	MIL-HDBK-217F @25°C , Ground Benign	299424			Hours
Storage Temperature		-55		+100	°C
Case Temperature				+90	°C
Isolation Capacitance				2500	pF

**Tolerance Envelope Graph**

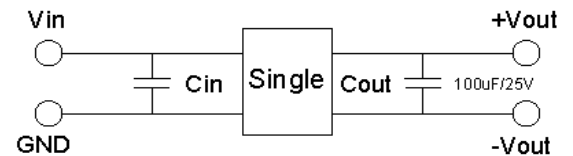


**Part Number**

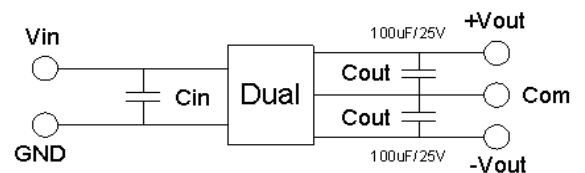
93DW - 24 S 05 R NL  
 A B C D E F

- A: Series
- B: Input Voltage
- C: Single Output (S),Dual (D)
- D: Output Voltage
- E: Regulated(R)
- F: RoHs Version

**Recommended Test Circuit**

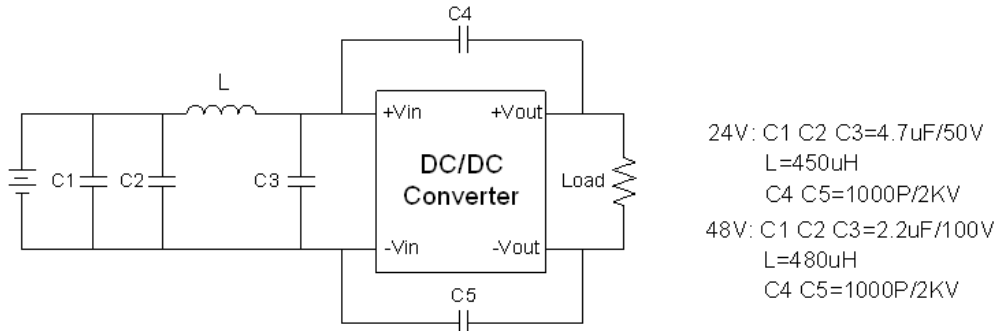


24V&48V: Cin 10uF,100V

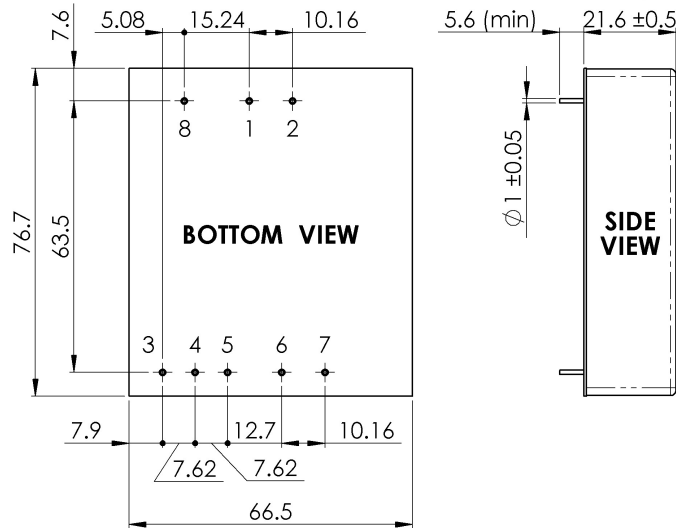


24V & 48V :Cin 10uF,100V

Suggest adding input external filter(C1,C2,C3,C4,C5,L) to meet conducted emissions (EN55022 class A) requirement for the module . These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.



Markings and dimensions



Unit : mm  
 Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

PIN Assignment

Pin	1	2	3	4	5	6	7	8
Single	+Vin	-Vin	No Pin	Trim	No Pin	+Vout	-Vout	Remote On/Off
Dual	+Vin	-Vin	+Vout	Com	-Vout	No Pin	No Pin	Remote On/Off

**FEATURES :**

- 2:1Wide Input Voltage
- 20 Watt Package
- Efficiency To 80%
- PI Input Filter
- 1500Vdc Isolation
- MTBF:>1,500,000 hrs
- Operating Temperature:-40°C TO +85°C



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Efficiency
	Vdc	No-Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP
95D-12S03RNL	9-18	25	1890	3.3	5500	80
95D-12S05RNL	9-18	25	2032	5	4000	82
95D-12S12RNL	9-18	25	1964	12	1670	85
95D-12S15RNL	9-18	25	1955	15	1330	85
95D-24S03RNL	18-36	20	945	3.3	5500	80
95D-24S05RNL	18-36	20	1016	5	4000	82
95D-24S12RNL	18-36	20	982	12	1670	85
95D-24S15RNL	18-36	20	977	15	1330	85
95D-24D12RNL	18-36	20	991	±12	±833	84
95D-24D15RNL	18-36	20	991	±15	±666	84
95D-48S03RNL	36-72	15	472	3.3	5500	80
95D-48S05RNL	36-72	15	508	5	4000	82
95D-48S12RNL	36-72	15	491	12	1670	85
95D-48S15RNL	36-72	15	488	15	1330	85
95D-48D12RNL	36-72	15	495	±12	±833	84
95D-48D15RNL	36-72	15	495	±15	±666	84

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				2:1	
Filter	PI TYPE				

DC-DC Converter

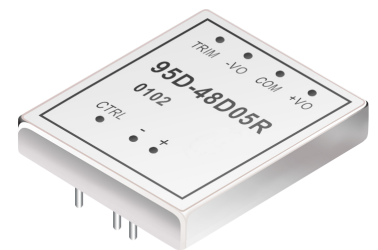
**95D SERIES**

20Watt 1.5KV Isolated

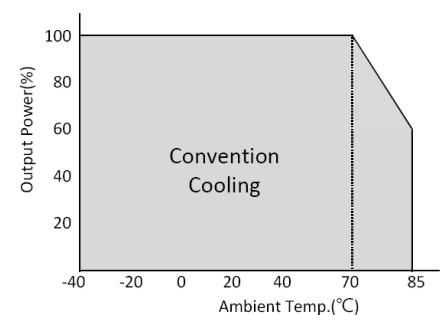
2 : 1 Input Voltage Range

Single & Dual Output

2" x 2"



**Temperature Derating Graph**



**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic recovery				
Line Regulation				±0.5	%
Load Regulation	Single(25% to 100% load)			±0.5	%
Load Regulation	Dual(Balance load), 25% to 100% load			±2.0	%
Cross Regulation	Dual (25% to 100% load)			±5.0	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

**Part Number**

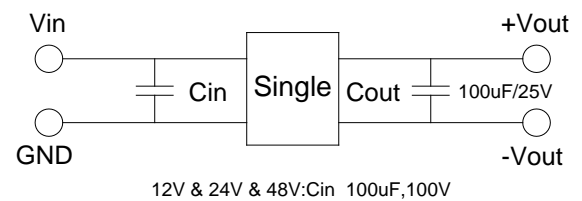
95D - 24 S 05 R 2 NL  
A B C D E F G

- A: Series
- B: Input Voltage
- C: Single Output (S),Dual (D)
- D: Output Voltage
- E: Regulated(R)
- F: Package
- G: RoHs Version

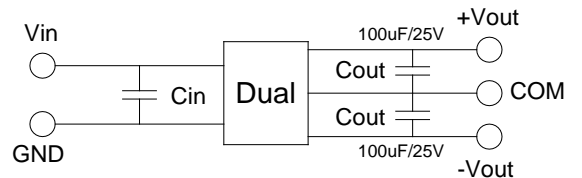
**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			300		KHz
Operating Temperature		-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel Coated with Non-Conductive Base				
Weight			55		g
Dimensions	Package 1		51.4x41.6x12.3		mm
Dimensions	Package 2		51.0x51.0x10.3		mm
Potting Material	Epoxy (UL94V-0 rated)				
Radiated Emissions	EN55022		CLASS A		
Conducted Emissions	EN55022		CLASS A		

**Recommended Test Circuit**

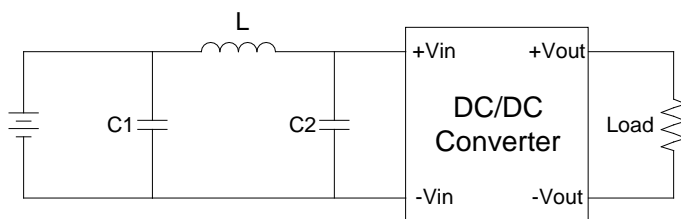


12V & 24V & 48V:Cin 100uF,100V



12V :Cin 100uF,25V  
24V & 48V:Cin 10uF,100V

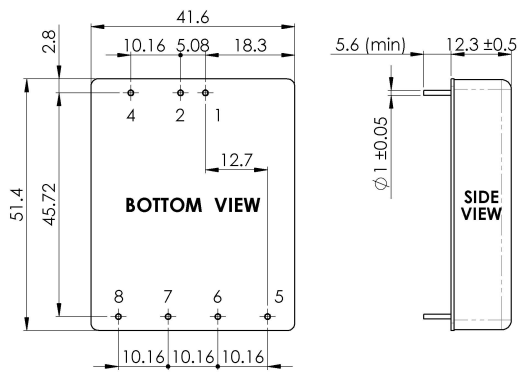
**Suggest adding input external filter(C1,C2,C3,C4,C5,L) to meet conducted emissions (EN55022 class A) requirement for the module . These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.**



12V: C1 C2 =330uF/100V  
L=12uH  
24V.48V: C1 C2 =220uF/100V  
L=12uH

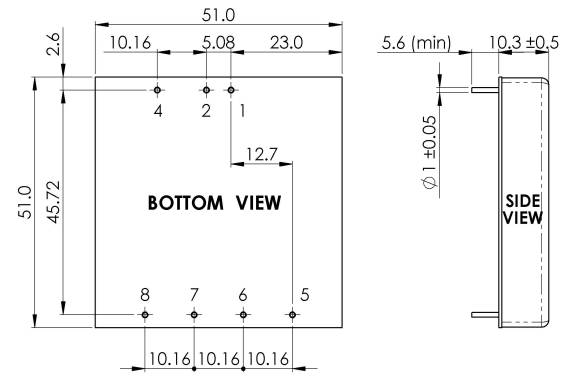
Markings and dimensions

Standard Model (-RNL)



Unit : mm  
Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

Extended Model (-R2NL)



Unit : mm  
Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

PIN Assignment

Pin	1	2	3	4	5	6	7	8
Single	+Vin	-Vin	No Pin	Ctrl	NC	+Vout	-Vout	Trim
Dual	+Vin	-Vin	No Pin	Ctrl	+Vout	Com	-Vout	Trim

**FEATURES :**

- 20W DIL PACKAGE
- 2:1 WIDE INPUT RANGE
- 100% BURNED IN
- HIGH EFFICIENCY
- UL94V-0 PACKAGE MATERIAL
- CUSTOMIZED SOLUTIONS AVAILABLE
- RoHS COMPLIANT
- Remote Control:On/Off



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Efficiency	Capacitor load
	Vdc	No-Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP	uF MAX
95D-12S03R3NL	9-18	70	1800	3.3	5500	84	1500
95D-12S05R3NL	9-18	70	1937	5	4000	86	1500
95D-12S12R3NL	9-18	30	1941	12	1670	86	120
95D-12S15R3NL	9-18	30	1933	15	1330	86	120
95D-12D05R3NL	9-18	70	1984	±5	±2000	84	±1000
95D-12D12R3NL	9-18	30	1964	±12	±835	85	±120
95D-12D15R3NL	9-18	30	1955	±15	±665	85	±120
95D-24S03R3NL	18-36	70	900	3.3	5500	84	3300
95D-24S05R3NL	18-36	70	968	5	4000	86	3300
95D-24S12R3NL	18-36	30	970	12	1670	86	330
95D-24S15R3NL	18-36	30	966	15	1330	86	330
95D-24D05R3NL	18-36	70	992	±5	±2000	84	±2000
95D-24D12R3NL	18-36	30	982	±12	±835	85	±330
95D-24D15R3NL	18-36	30	977	±15	±665	85	±330
95D-48S03R3NL	36-75	40	450	3.3	5500	84	5600
95D-48S05R3NL	36-75	40	484	5	4000	86	5600
95D-48S12R3NL	36-75	30	485	12	1670	86	680
95D-48S15R3NL	36-75	30	483	15	1330	86	680
95D-48D05R3NL	36-75	40	496	±5	±2000	84	±3300
95D-48D12R3NL	36-75	30	491	±12	±835	85	±220
95D-48D15R3NL	36-75	30	488	±15	±665	85	±220

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				2:1	
Filter			Pi TYPE		

DC-DC Converter

**95D-R3 SERIES**

20Watt 1.5KV Isolated

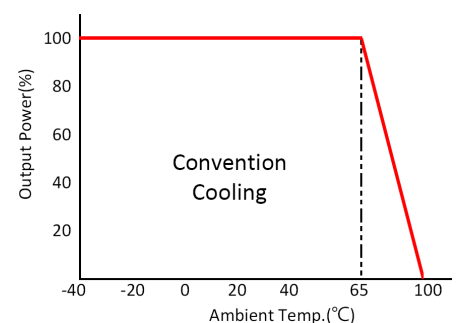
2 : 1 Input Voltage Range

Single & Dual Output

2" x 1"



**Temperature Derating Graph**



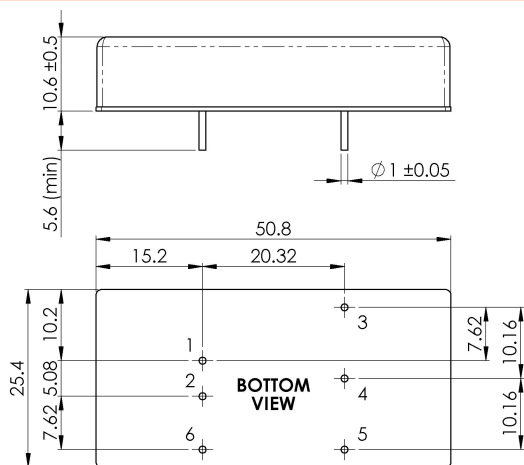
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic recovery				
Line Regulation				±0.5	%
Load Regulation	Single Dual(Balance Load)			±0.5 ±1	%
Cross Regulation	Dual (25% to 100% load)			±5	%
Ripple & Noise	Output:3-15V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output > 15V TYPES BW=DC To 20MHz		1% of Vout		mVp-p
Transient response setting time	25% load step change		300		us

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Voltage			1500		Vdc
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			300		KHz
Operating Temperature	With derating	-40		100	°C
Storage Temperature		-55		125	°C
Humidity	Non Condensing	5		95	%
Cooling	Free air Convection				
Case material	Nickel coated copper with no-conductive base				
MTBF	MIL-HDBK-217F@25°C	659000			Hours
Weight			32.6		g
Dimensions			50.8x25.4x10.6		mm

**Markings and dimensions**



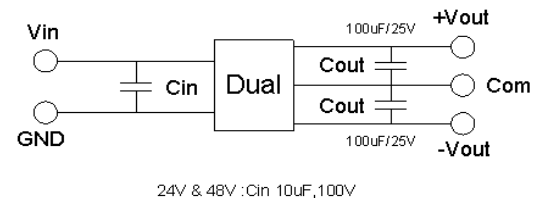
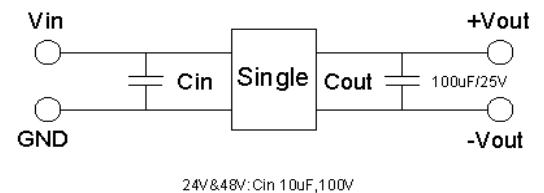
Unit : mm  
Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

**Part Number**

95D - 24 S 05 R 3 NL  
A B C D E F G

- A: Series
- B: Input Voltage
- C: Single Output (S),Dual (D)
- D: Output Voltage
- E: Regulated(R)
- F: Case Type
- G: RoHs Version

**Recommended Test Circuit**



**PIN Assignment**

Pin	1	2	3	4	5	6
Single	+Vin	-Vin	+Vout	Trim	-Vout	Remote On/Off
Dual	+Vin	-Vin	+Vout	Com	-Vout	Remote On/Off

**FEATURES :**

- 4:1Wide Input Voltage
- 20 Watt Package
- Efficiency To 80%
- PI Input Filter
- 1500Vdc Isolation
- MTBF:>1,500,000 hrs
- Operating Temperature:-40°C TO +85°C



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Efficiency
	Vdc	No-Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP
95DW-24S05RNL	9-36	25	1016	5	4000	82
95DW-24S12RNL	9-36	25	982	12	1670	85
95DW-24S15RNL	9-36	25	978	15	1330	85
95DW-24D12RNL	9-36	25	991	±12	±833	84
95DW-24D15RNL	9-36	25	991	±15	±666	84
95DW-48S05RNL	18-72	20	508	5	4000	82
95DW-48S12RNL	18-72	20	491	12	1670	85
95DW-48S15RNL	18-72	20	489	15	1330	85
95DW-48D12RNL	18-72	20	495	±12	±833	84
95DW-48D15RNL	18-72	20	495	±15	±666	84

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				4:1	
Filter	Pi TYPE				

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic recovery				
Line Regulation				±0.5	%
Load Regulation	Single(25% to 100% load)			±0.5	%
Load Regulation	Dual(Balance load), 25% to 100% load			±2.0	%
Cross Regulation	Dual (25% to 100% load)			±5.0	%
Ripple & Noise	BW=DC To 20MHz			100	mVp-p
Transient response setting time	50% load step change		350		us

DC-DC Converter

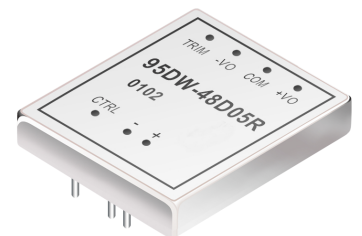
**95DW SERIES**

20Watt 1.5KV Isolated

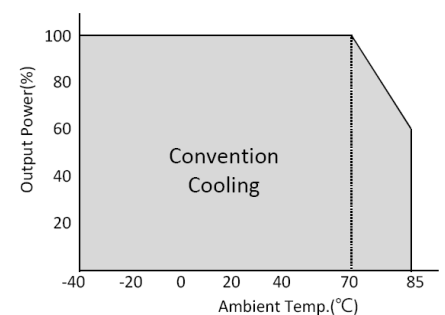
4 : 1 Input Voltage Range

Single & Dual Output

2" x 2"



**Temperature Derating Graph**



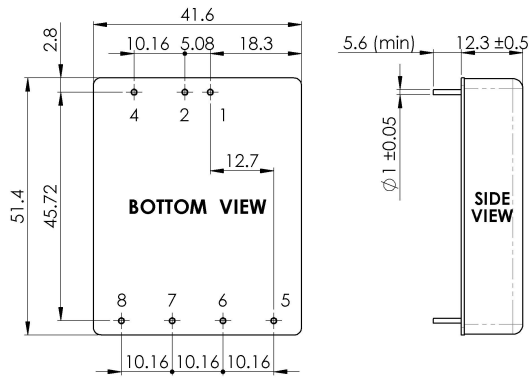


**General Specifications**

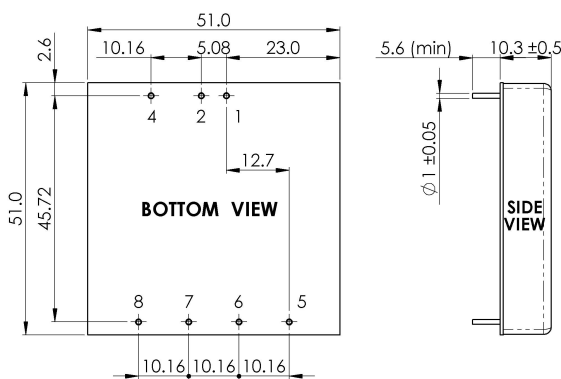
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			300		KHz
Operating Temperature		-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel Coated with Non-Conductive Base				
Weight			55		g
Dimensions	Package 1	51.4x41.6x12.3			mm
Dimensions	Package 2	51.0x51.0x10.3			mm
Potting Material	Epoxy (UL94V-0 rated)				
Radiated Emissions	EN55022	CLASS A			
Conducted Emissions	EN55022	CLASS A			

**Markings and dimensions**

Standard Model (-RNL)



Extended model(-R2NL)



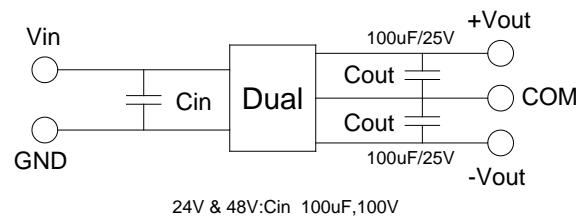
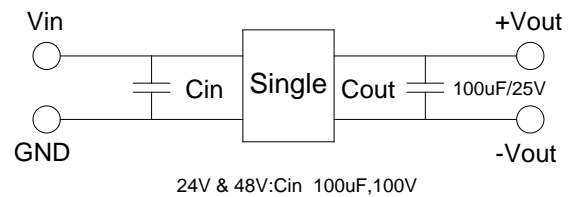
Unit : mm  
Tolerance : XX.X±0.5 , XX.XX±0.25

**Part Number**

95DW - 24 S 05 R 2 NL  
A B C D E F G

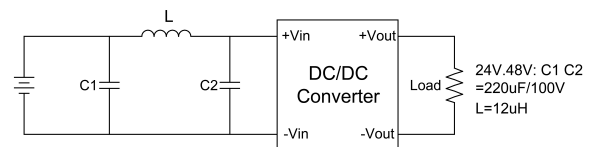
- A: Series
- B: Input Voltage
- C: Single Output (S),Dual (D)
- D: Output Voltage
- E: Regulated(R)
- F: Package
- G: RoHs Version

**Recommended Test Circuit**



**Input filter components(C1,C2,L) are used to help meet conducted emissions requirement for the module .**

**These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.**



**PIN Connection**

Pin	1	2	3	4	5	6	7	8
Single	+Vin	-Vin	No Pin	Ctrl	NC	+Vout	-Vout	Trim
Dual	+Vin	-Vin	No Pin	Ctrl	+Vout	Com	-Vout	Trim

**FEATURES :**

- 20W DIL PACKAGE
- 4:1 WIDE INPUT RANGE
- 100% BURNED IN
- HIGH EFFICIENCY
- UL94V-0 PACKAGE MATERIAL
- CUSTOMIZED SOLUTIONS AVAILABLE
- RoHS COMPLIANT
- Remote Control:On/Off



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Efficiency	Capacitor load
	Vdc	No-Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP	uF MAX
95DW-24S03R3NL	9-36	60	900	3.3	5500	84	3300
95DW-24S05R3NL	9-36	60	968	5	4000	86	3300
95DW-24S12R3NL	9-36	40	970	12	1670	86	330
95DW-24S15R3NL	9-36	20	966	15	1330	86	330
95DW-24D05R3NL	9-36	70	900	±5	±2000	84	±2000
95DW-24D12R3NL	9-36	40	959	±12	±835	87	±330
95DW-24D15R3NL	9-36	40	944	±15	±665	88	±330
95DW-48S03R3NL	18-75	30	450	3.3	5500	84	5600
95DW-48S05R3NL	18-75	30	484	5	4000	86	5600
95DW-48S12R3NL	18-75	30	485	12	1670	86	680
95DW-48S15R3NL	18-75	30	483	15	1330	86	680
95DW-48D05R3NL	18-75	30	496	±5	±2000	84	±3300
95DW-48D12R3NL	18-75	30	497	±12	±835	84	±220
95DW-48D15R3NL	18-75	30	483	±15	±665	86	±220

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				4:1	
Filter			Pi TYPE		

DC-DC Converter

**95DW-R3 SERIES**

20Watt 1.5KV Isolated

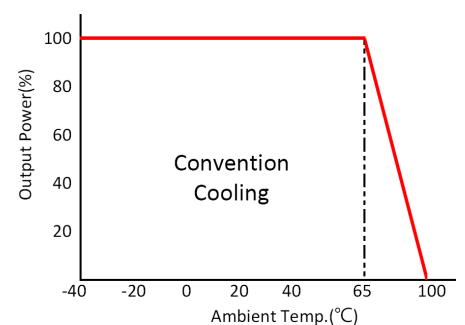
4 : 1 Input Voltage Range

Single & Dual Output

2" x 1"



**Temperature Derating Graph**



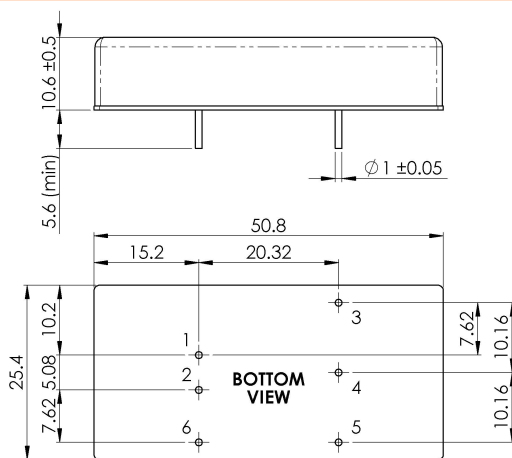
Output Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic recovery				
Line Regulation				±0.5	%
Load Regulation	Single Dual(Balance Load)			±0.5 ±1	%
Cross Regulation	Dual (25% to 100% load)			±5	%
Ripple & Noise	Output:3-15V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output > 15V TYPES BW=DC To 20MHz		1% of Vout		mVp-p
Transient response setting time	25% load step change		300		us

General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Voltage			1500		Vdc
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			300		KHz
Operating Temperature	With derating	-40		100	°C
Storage Temperature		-55		125	°C
Humidity	Non Condensing	5		95	%
Cooling	Free air Convection				
Case material	Nickel coated copper with no-conductive base				
MTBF	MIL-HDBK-217F@25°C	659000			Hours
Weight			32.6		g
Dimensions			50.8x25.4x10.6		mm

Markings and dimensions



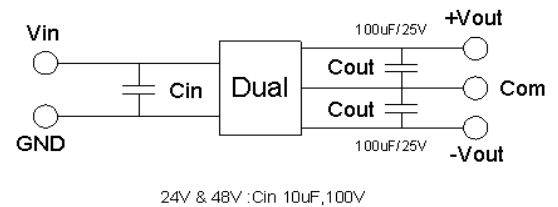
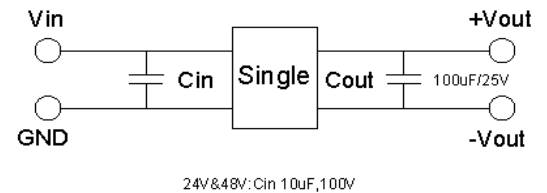
Unit : mm  
Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

Part Number

95DW - 24 S 05 R 3 NL  
A B C D E F G

- A: Series
- B: Input Voltage
- C: Single Output (S),Dual (D)
- D: Output Voltage
- E: Regulated(R)
- F: Case Type
- G: RoHs Version

Recommended Test Circuit



PIN Assignment

Pin	1	2	3	4	5	6
Single	+Vin	-Vin	+Vout	Trim	-Vout	Remote On/Off
Dual	+Vin	-Vin	+Vout	Com	-Vout	Remote On/Off

**FEATURES :**

- 30W DIL PACKAGE
- 2:1 WIDE INPUT RANGE
- 100% BURNED IN
- HIGH EFFICIENCY
- UL 94V-0 PACKAGE MATERIAL
- CUSTOMIZED SOLUTIONS AVAILABLE
- RoHS COMPLIANT
- 3 YEARS WARRANTY



DC-DC Converter

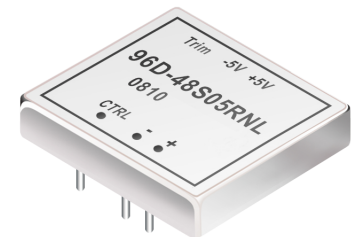
96D SERIES

30Watt 3KV Isolated

2 : 1 Input Voltage Range

Single & Dual Output

2" x 2"



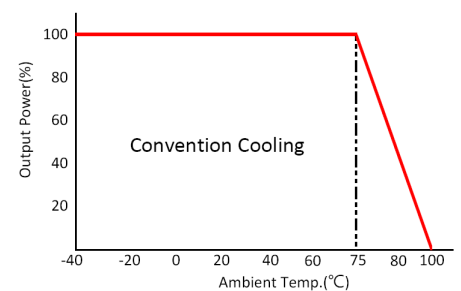
Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Efficiency
	Vdc	No-Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP
96D-12S03RNL	9-18	30	2179	3.3	6500	82
96D-12S05RNL	9-18	30	3012	5	6000	83
96D-12S12RNL	9-18	30	2941	12	2500	85
96D-12S15RNL	9-18	30	2941	15	2000	85
96D-24S03RNL	18-36	25	1089	3.3	6500	82
96D-24S05RNL	18-36	25	1506	5	6000	83
96D-24S12RNL	18-36	25	1470	12	2500	85
96D-24S15RNL	18-36	25	1470	15	2000	85
96D-48S03RNL	36-72	20	544	3.3	6500	82
96D-48S05RNL	36-72	20	753	5	6000	83
96D-48S12RNL	36-72	20	735	12	2500	85
96D-48S15RNL	36-72	20	735	15	2000	85
96D-12D05RNL	9-18	30	3048	±5	±3000	83
96D-12D12RNL	9-18	30	2941	±12	±1250	85
96D-12D15RNL	9-18	30	2941	±15	±1000	85
96D-24D05RNL	18-36	25	1506	±5	±3000	83
96D-24D12RNL	18-36	25	1470	±12	±1250	85
96D-24D15RNL	18-36	25	1470	±15	±1000	85
96D-48D05RNL	36-72	20	753	±5	±3000	83
96D-48D12RNL	36-72	20	735	±12	±1250	85
96D-48D15RNL	36-72	20	735	±15	±1000	85

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				2:1	
Filter	Pi Network				
Protection	Fuse Recommended				

Temperature Derating Graph



**Output Specifications**  
(Temperature Coefficient :  $\pm 0.05\%/^{\circ}\text{C}$ )

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			$\pm 2$	%
Short Circuit /Restart Protection	Hiccup, automatic recovery				
Over Load Protection			150		
Line Regulation	Single & Dual (H/L to L/L)			$\pm 0.5$	%
Load Regulation	Single & Dual,Balance Load (FL-50%FL)			$\pm 0.5$	%
Cross Regulation	Dual (25% to 100% load)			$\pm 5$	%
Ripple & Noise	BW=DC To 20MHz (with 1uF Cap.)			100	mVp-p
Transient response setting time	50% load step change			350	us
Capacitive load				4800	uF
External Trim Adj. Range	$\pm 10\%$ of Output Voltage				

**General Specifications**

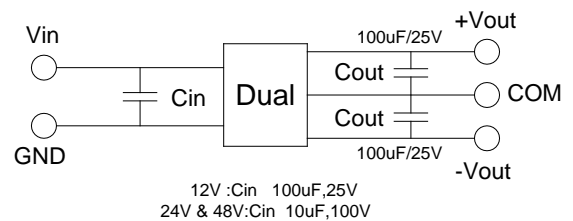
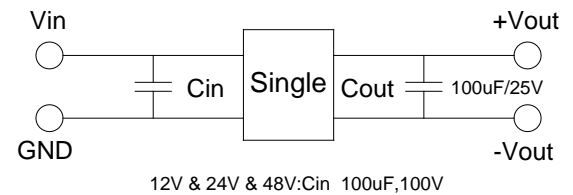
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			M $\Omega$
Switching Frequency			270		KHz
Operating Temperature		-40		100	$^{\circ}\text{C}$
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel Coated with Non-Conductive Base				
Weight			65		g
Dimensions			51.0X51.0X10.3		mm
Potting Material	Epoxy (UL94V-0 rated)				
Radiated Emissions	EN55022		CLASS A		
Conducted Emissions	EN55022		CLASS A		
Efficiency		82			%
Isolation Voltage	For 10 seconds			3000	Vdc
MTBF	MIL-HDBK-217F @25 $^{\circ}\text{C}$ , Ground Benign	400000			Hours
Storage Temperature		-50		+100	$^{\circ}\text{C}$
Case Temperature				+95	$^{\circ}\text{C}$
Isolation Capacitance				2500	pF

**Part Number**

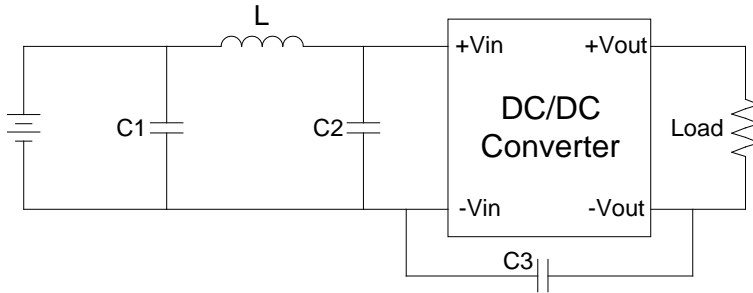
96D - 24 S 05 R NL  
A B C D E F

- A: Series
- B: Input Voltage
- C: Single Output (S),Dual (D)
- D: Output Voltage
- E: Regulated(R)
- F: RoHs Version

**Recommended Test Circuit**

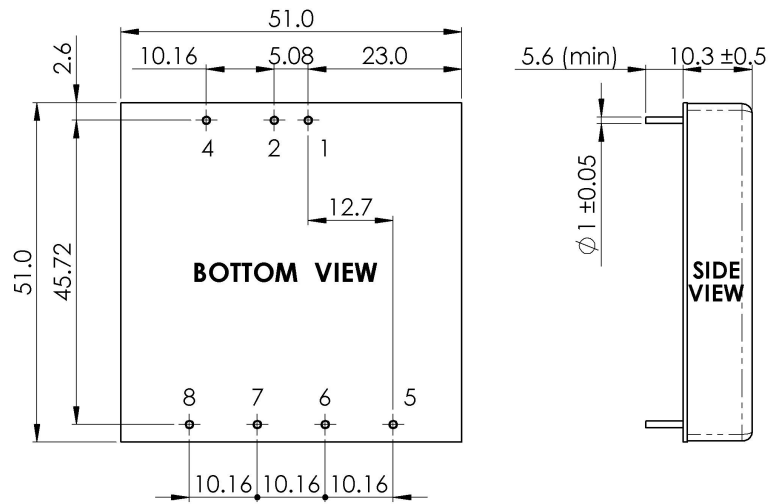


Suggest adding input external filter(C1,C2,L) to meet conducted emissions (EN55022 class A) requirement for the module . These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.



- 12V: C1 =330uF/100V  
L=12uH
- 12V: C2 =100uF/100V  
C3=N/A
- 24V.48V: C1=220uF/100V  
L=12uH
- 24V.48V: C2 =100uF/100V
- 24V: C3=N/A
- 48V: C3=1000pF/2KV

Markings and dimensions



Unit : mm  
Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

PIN Connection

Pin	1	2	3	4	5	6	7	8
Single	+Vin	-Vin	No Pin	Ctrl	NO PIN	+Vout	-Vout	Trim
Dual	+Vin	-Vin	No Pin	Ctrl	+Vout	Com	-Vout	Trim

**FEATURES :**

- 30W DIL PACKAGE
- 100% BURNED IN
- 2:1 WIDE INPUT RANGE
- HIGH EFFICIENCY UP TO 88%
- UL 94V-0 PACKAGE MATERIAL
- CUSTOMIZED SOLUTIONS AVAILABLE
- Remote On/Off
- RoHS COMPLIANT

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage		Input Current		Output Voltage		Output Current		Output Ripple & Noise	Capacitor Load MAX	Efficiency
	Vdc	No-Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	mVp-p	uF	%TYP			
96D-12S03R5NL	9-18	100	2398	3.3	7500	100	20000	86			
96D-12S05R5NL	9-18	100	2841	5.0	6000	100	14400	88			
96D-12S12R5NL	9-18	100	2809	12	2500	100	3000	89			
96D-12S15R5NL	9-18	100	2809	15	2000	100	2000	89			
96D-24S03R5NL	18-36	100	1200	3.3	7500	100	20000	86			
96D-24S05R5NL	18-36	100	1420	5.0	6000	100	14400	88			
96D-24S12R5NL	18-36	100	1404	12	2500	100	3000	89			
96D-24S15R5NL	18-36	100	1404	15	2000	100	2000	89			
96D-48S03R5NL	36-72	100	600	3.3	7500	100	20000	86			
96D-48S05R5NL	36-72	100	710	5.0	6000	100	14400	88			
96D-48S12R5NL	36-72	100	702	12	2500	100	3000	89			
96D-48S15R5NL	36-72	100	702	15	2000	100	2000	89			
96D-12D12R5NL	9-18	100	2873	±12	±1250	100	±2000	89			
96D-12D15R5NL	9-18	100	2873	±15	±1000	100	±1300	89			
96D-24D12R5NL	18-36	100	1437	±12	±1250	100	±2000	89			
96D-24D15R5NL	18-36	100	1437	±15	±1000	100	±1300	89			
96D-48D12R5NL	36-72	100	718	±12	±1250	100	±2000	89			
96D-48D15R5NL	36-72	100	718	±15	±1000	100	±1300	89			

**Note:**

1. BELLCORE TR-NWT-000332. Case I: 50% Stress, Temperature at 40°C. (Ground fixed and controlled environment)  
MIL-STD-217F Notice2 @Ta=25 °C, Full load (Ground, Benign, controlled environment)
2. The ON/OFF control pin voltage is referred to -Input. (Leave open if not used.)



DC-DC Converter

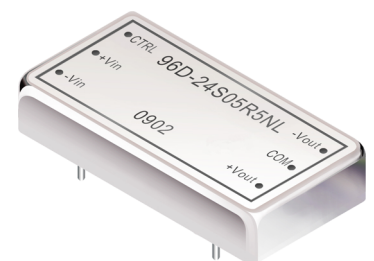
**96D-R5 SERIES**

30Watt 1.6KV Isolated

2 : 1 Input Voltage Range

Single & Dual Output

2" x 1"



**Applications**

- Industry Control System
- Semiconductor Equipment
- Wireless Network
- Telecom/Datacom
- Measurement

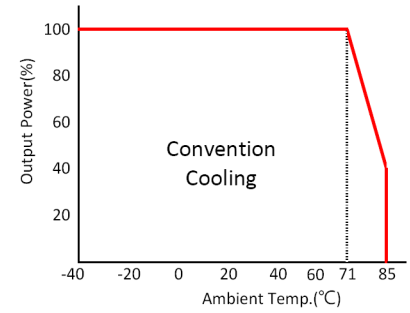
**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				2:1	
Filter	Pi Type				
Input surge voltage	12V, 24V input		50		Vdc
100mS max	48V input		100		Vdc
Input reflected ripple current	Nominal Vin and full load		20		mAp-p
Start up time	Nominal Vin and constant resistive load	Power up	30		mS
		Remote ON/OFF	30		mS
Start-up voltage	12V input		9		Vdc
Start-up voltage	24V input		18		Vdc
Start-up voltage	48V input		36		Vdc
Shutdown voltage	12V input		8		Vdc
Shutdown voltage	24V input		17		Vdc
Shutdown voltage	48V input		35		Vdc
Protection	Fuse Recommended				
Remote ON/OFF (Note 2)	DC-DC ON		OPEN		
(Negative logic)(Option)	DC-DC OFF		Short to ground		
Input current of Remote control pin	Nominal Vin		-0.5mA ~ +0.5mA		
Remote off state input current	Nominal Vin		3mA		

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit /Restart Protection	Hiccup, automatic recovery				
Over Load Protection	nominal input		150		V
	3.3V Output		3.9		V
Over Voltage Protection (Zener Diode Clamp)	5.0V Output		6.2		V
	12V Output		15 & ±15		V
	15V Output		18 & ±18		V
Line Regulation	LL to HL at Full Load			±0.5	%
Load Regulation	Single			±0.5	%
Load Regulation	Dual, Balance Load,25% to 100% load			±1.0	%
Cross Regulation	Dual (25% to 100% load)			±5.0	%
Ripple & Noise	20MHz bandwidth			100	mVp-p
Transient response recovery time	25% load step change		250	350	us
External Trim Adj. Range			±10% of Output		
Temperature coefficient				±0.05	% / °C

**Derating Curve (without Heat-Sink)**

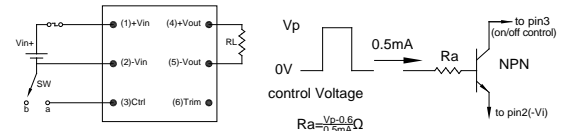


**Part Number**

96D - 24 S 05 R 5 NL  
 A B C D E F G

- A: Series
- B: Input Voltage
- C: Single Output (S),Dual (D)
- D: Output Voltage
- E: Regulated(R)
- F: Package
- G: RoHs Version

**Remote On/Off Note**



When pin3 short to pin2,D/D ON=>OFF  
 When pin3 leave open,D/D=>ON

The components used in the above figure, together with the manufacturers' part numbers for these components, are as follows:

Single Output	C1	C2/C3
-24S	4.7µF/50V 1812 MLCC	1000pF/2KV 1808 MLCC
-48S	2.2µF/100V 1812 MLCC	1000pF/2KV 1808 MLCC
Dual Output	C1	C2/C4
-24D	4.7µF/50V 1812 MLCC	1000pF/2KV 1808 MLCC
-48D	2.2µF/100V 1812 MLCC	1000pF/2KV 1808 MLCC



**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			300		KHz
Isolation Capacitance			2200		pF
Case material	Nickel coated copper with no-conductive base				
Potting material	Epoxy (UL94-V0)				
Isolation Voltage	For 10 seconds			1600	VDC
Design meets safety	IEC60950-1, UL60950-1, EN60950-1				
Dimensions	-R5NL	50.8X 25.4 X 10.6			mm
	-R5HSNL	50.8X 25.4 X 15.3			mm
Weight		36.5			g
MTBF (Note 1)	BELLCORE-TR-NWT-000332	3.163 x 10 <sup>6</sup>			hrs
	MIL-HDBK-217F	4.347 x 10 <sup>5</sup>			hrs

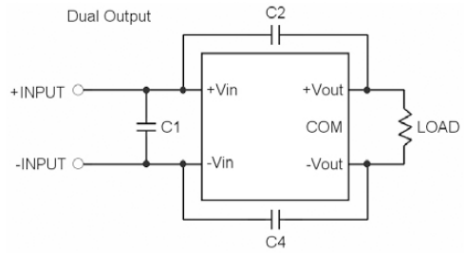
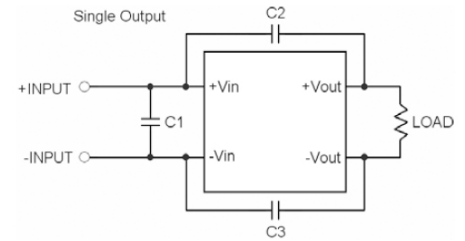
**Environmental Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Operating Temperature		-40		85	°C
Maximum case temperature				115	°C
Storage Temperature		-55		125	°C
Over temperature			115		°C
Thermal impedance	Convection		12		°C/Watt
	Convection with heat-sink		10		°C/Watt
Thermal shock			MIL-STD-810F		
Vibration			MIL-STD-810F		
Relative humidity			5% to 95% RH		

**EMC Characteristics**

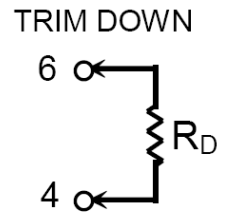
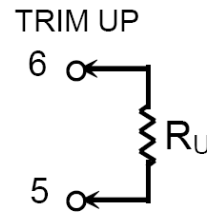
Parameters	Conditions	Min	Typ	Max	Units
EMI	EN55022		Class A		
ESD	EN61000-4-2	Air ±8KV Perf. Criteria A			
		Contact ±6KV Perf. Criteria A			
Radiated immunity	EN61000-4-3	10 V/m Perf. Criteria A			
Fast transient	EN61000-4-4	± 2KV Perf. Criteria A			
Surge	EN61000-4-5	± 1KV Perf. Criteria A			
Conducted immunity	EN61000-4-6	10 Vrms Perf. Criteria A			

**Recommended Filter for EN55022 Class A Compliance**

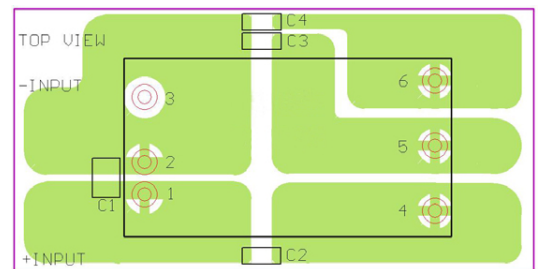


**External Output Trimming**

Output can be externally trimmed by using the method shown below.

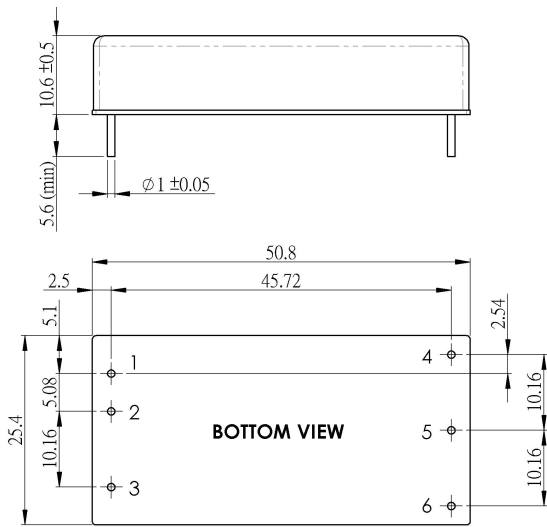


**Recommended EN55022 Class A Filter Circuit Layout**



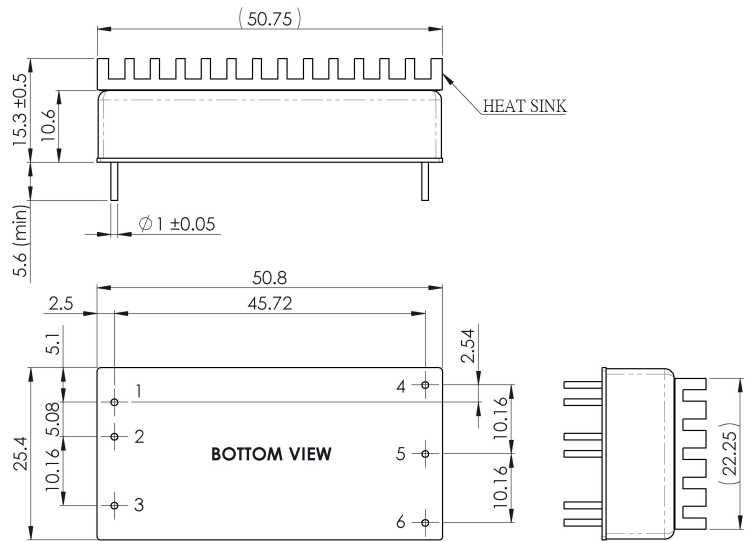
Markings and dimensions

-R5NL



Unit : mm  
Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

-R5HSNL



Unit : mm  
Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

PIN Connection

Pin	1	2	3	4	5	6
Single	+Vin	-Vin	Ctrl	+Vout	-Vout	Trim
Dual	+Vin	-Vin	Ctrl	+Vout	COM	-Vout

**FEATURES :**

- 30W DIL PACKAGE
- 4:1 WIDE INPUT RANGE
- 100% BURNED IN
- HIGH EFFICIENCY
- UL 94V-0 PACKAGE MATERIAL
- CUSTOMIZED SOLUTIONS AVAILABLE
- RoHS COMPLIANT
- 3 YEARS WARRANTY



**DC-DC Converter**

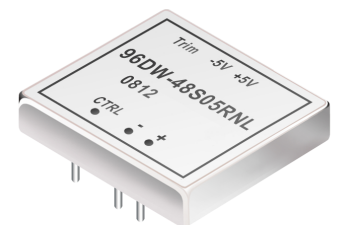
**96DW SERIES**

**30Watt 3KV Isolated**

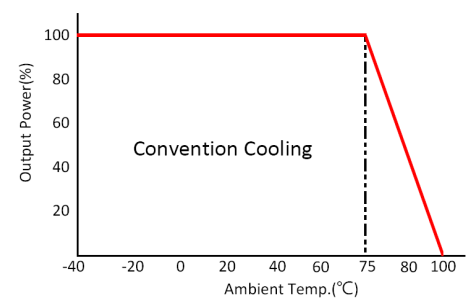
**4 : 1 Input Voltage Range**

**Single & Dual Output**

**2" x 2"**



**Temperature Derating Graph**



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Efficiency
	Vdc	No-Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP
96DW-24S03RNL	9-36	25	1103	3.3	6500	81
96DW-24S05RNL	9-36	25	1524	5	6000	82
96DW-24S12RNL	9-36	25	1524	12	2500	82
96DW-24S15RNL	9-36	25	1524	15	2000	82
96DW-48S03RNL	18-72	20	545	3.3	6500	82
96DW-48S05RNL	18-72	20	753	5	6000	83
96DW-48S12RNL	18-72	20	753	12	2500	83
96DW-48S15RNL	18-72	20	753	15	2000	83
96DW-24D05RNL	9-36	25	1524	±5	±3000	82
96DW-24D12RNL	9-36	25	1524	±12	±1250	82
96DW-24D15RNL	9-36	25	1524	±15	±1000	82
96DW-48D05RNL	18-72	20	753	±5	±3000	83
96DW-48D12RNL	18-72	20	753	±12	±1250	83
96DW-48D15RNL	18-72	20	753	±15	±1000	83

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				4:1	
Filter	Pi Network				
Protection	Fuse Recommended				

## Output Specifications (Temperature Coefficient : $\pm 0.05\%/^{\circ}\text{C}$ )

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			$\pm 2$	%
Short Circuit / Restart Protection	Hiccup, automatic recovery				
Over Load Protection			150		%
Line Regulation	Single & Dual (H/L to L/L)			$\pm 0.5$	%
Load Regulation	Single & Dual,Balance Load (F.L-50%F.L)			$\pm 0.5$	%
Cross Regulation	Dual (25% to 100% load)			$\pm 5$	%
Ripple & Noise	BW=DC To 20MHz (with 1uF Cap.)			100	mVp-p
Transient response setting time	50% load step change			350	us
Capacitive load				2200	uF
External Trim Adj. Range	$\pm 10\%$ of Output Voltage				

## General Specifications

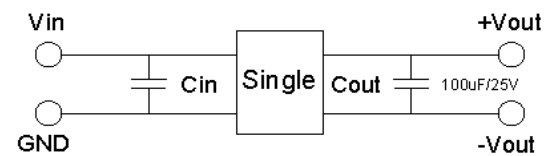
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			M $\Omega$
Switching Frequency			270		KHz
Operating Temperature		-40		100	$^{\circ}\text{C}$
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel Coated with Non-Conductive Base				
Weight			65		g
Dimensions			51.0X51.0X10.3		mm
Potting Material	Epoxy (UL94V-0 rated)				
Radiated Emissions	EN55022		CLASS A		
Conducted Emissions	EN55022		CLASS A		
Efficiency		81			%
Isolation Voltage	For 10 seconds			3000	VDC
MTBF	MIL-HDBK-217F @25 $^{\circ}\text{C}$ , Ground Benign	400000			Hours
Storage Temperature		-50		+100	$^{\circ}\text{C}$
Case Temperature				+95	$^{\circ}\text{C}$
Isolation Capacitance				2500	pF

## Part Number

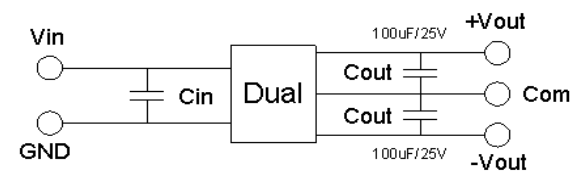
96DW - 24 S 05 R NL  
 A B C D E F

- A: Series
- B: Input Voltage
- C: Single Output (S),Dual (D)
- D: Output Voltage
- E: Regulated(R)
- F: RoHs Version

## Recommended Test Circuit

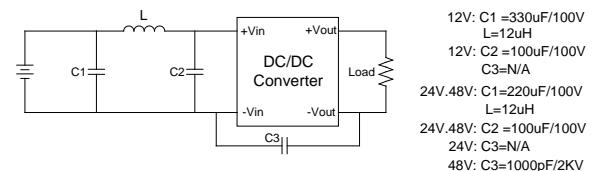


24V&48V: Cin 10uF,100V



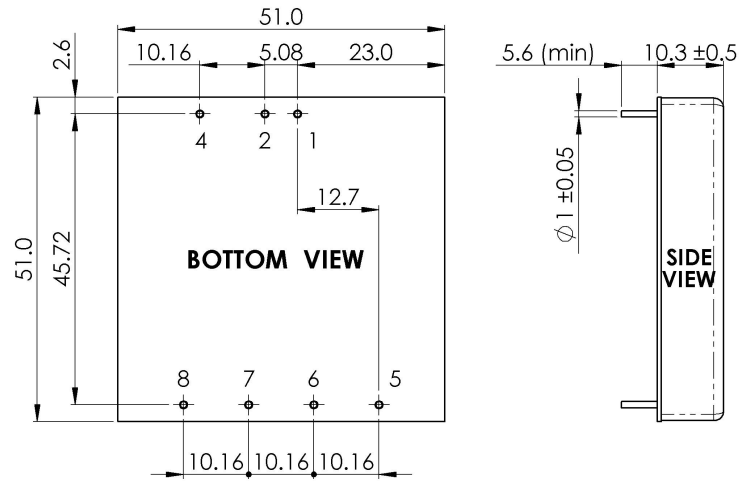
24V & 48V :Cin 10uF,100V

**Suggest adding input external filter(C1,C2,L) to meet conducted emissions (EN55022 class A) requirement for the module . These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.**



12V: C1 =330uF/100V  
 L=12uH  
 12V: C2 =100uF/100V  
 C3=N/A  
 24V,48V: C1=220uF/100V  
 L=12uH  
 24V,48V: C2 =100uF/100V  
 24V: C3=N/A  
 48V: C3=1000pF/2KV

Markings and dimensions



Unit : mm  
Tolerance : XX.X±0.5 , XX.XX±0.25

PIN Connection

Pin	1	2	3	4	5	6	7	8
Single	+Vin	-Vin	No Pin	Ctrl	No Pin	+Vout	-Vout	Trim
Dual	+Vin	-Vin	No Pin	Ctrl	+Vout	Com	-Vout	Trim

**FEATURES :**

- 30W DIL PACKAGE
- 100% BURNED IN
- 4:1 WIDE INPUT RANGE
- HIGH EFFICIENCY UP TO 88%
- UL 94V-0 PACKAGE MATERIAL
- CUSTOMIZED SOLUTIONS AVAILABLE
- Remote On/Off
- RoHS COMPLIANT

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage		Input Current		Output Voltage		Output Current		Output Ripple & Noise	Capacitor Load MAX	Efficiency
	Vdc	No-Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	mVp-p	uF	%TYP			
96DW-24S03R5NL	9-36	100	1265	3.3	7500	100	20000	86			
96DW-24S05R5NL	9-36	100	1488	5.0	6000	100	14400	87			
96DW-24S12R5NL	9-36	100	1471	12	2500	100	3000	88			
96DW-24S15R5NL	9-36	100	1471	15	2000	100	2000	88			
96DW-24D12R5NL	9-36	100	1471	±12	1250	100	±2000	88			
96DW-24D15R5NL	9-36	100	1471	±15	1000	100	±1300	88			
96DW-48S03R5NL	18-75	70	629	3.3	7500	100	20000	86			
96DW-48S05R5NL	18-75	70	744	5.0	6000	100	14400	87			
96DW-48S12R5NL	18-75	70	727	12	2500	100	3000	88			
96DW-48S15R5NL	18-75	70	727	15	2000	100	2000	88			
96DW-48D12R5NL	18-75	70	727	±12	1250	100	±2000	88			
96DW-48D15R5NL	18-75	70	727	±15	1000	100	±1300	88			

**Note:**

1. BELLCORE TR-NWT-000332. Case I: 50% Stress, Temperature at 40°C. (Ground fixed and controlled environment)

MIL-STD-217F Notice2 @Ta=25 °C, Full load (Ground, Benign, controlled environment)

2. The ON/OFF control pin voltage is referred to -Input. (Leave open if not used.)



DC-DC Converter

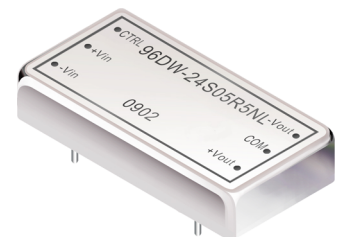
**96DW-R5 SERIES**

30Watt 1.6KV Isolated

4 : 1 Input Voltage Range

Single & Dual Output

2" x 1"



**Applications**

- Industry Control System
- Semiconductor Equipment
- Wireless Network
- Telecom/Datacom
- Measurement

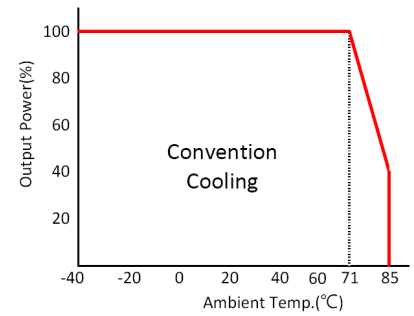
**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				4:1	
Filter	Pi Type				
Input surge voltage	24V input		50		Vdc
100mS max	48V input		100		Vdc
Input reflected ripple current	Nominal Vin and full load		20		mAp-p
Start up time	Nominal Vin and constant resistive load	Power up	30		mS
		Remote ON/OFF	30		mS
Start-up voltage	24V input		9		Vdc
Start-up voltage	48V input		18		Vdc
Shutdown voltage	24V input		8		Vdc
Shutdown voltage	48V input		16		Vdc
Protection	Fuse Recommended				
Remote ON/OFF (Note 2)	DC-DC ON		OPEN		
(Negative logic)(Option)	DC-DC OFF		Short to ground		
Input current of Remote control pin	Nominal Vin		-0.5mA ~ +0.5mA		
Remote off state input current	Nominal Vin		3mA		

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit /Restart Protection	Hiccup, automatic recovery				
Over Load Protection	nominal input		150		V
	3.3V Output		3.9		V
Over Voltage Protection (Zener Diode Clamp)	5.0V Output		6.2		V
	12V Output	15 & ±15			V
	15V Output	18 & ±18			V
Line Regulation	LL to HL at Full Load			±0.5	%
Load Regulation	Single			±0.5	%
Load Regulation	Dual, Balance Load,25% to 100% load			±1.0	%
Cross Regulation	Dual (25% to 100% load)			±5.0	%
Ripple & Noise	20MHz bandwidth			100	mVp-p
Transient response recovery time	25% load step change		250	350	us
External Trim Adj. Range			±10% of Output		
Temperature coefficient				±0.05	% / °C

**Derating Curve (without Heat-Sink)**

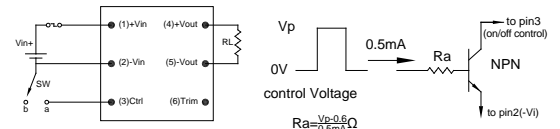


**Part Number**

96DW - 24 S 05 R 5 NL  
A B C D E F G

- A: Series
- B: Input Voltage
- C: Single Output (S),Dual (D)
- D: Output Voltage
- E: Regulated(R)
- F: Package
- G: RoHs Version

**Remote On/Off Note**



When pin3 short to pin2,D/D ON=>OFF  
When pin3 leave open,D/D=>ON

The components used in the above figure, together with the manufacturers' part numbers for these components, are as follows:

Single Output	C1	C2/C3
-24S	4.7µF/50V 1812 MLCC	1000pF/2KV 1808 MLCC
-48S	2.2µF/100V 1812 MLCC	1000pF/2KV 1808 MLCC
Dual Output	C1	C2/C4
-24D	4.7µF/50V 1812 MLCC	1000pF/2KV 1808 MLCC
-48D	2.2µF/100V 1812 MLCC	1000pF/2KV 1808 MLCC

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			300		KHz
Isolation Capacitance			2200		pF
Case material	Nickel coated copper with no-conductive base				
Epoxy (UL94-V0)			Epoxy (UL94-V0)		
Isolation Voltage	For 10 seconds			1600	VDC
Design meets safety	IEC60950-1, UL60950-1, EN60950-1				
Dimensions	-R5NL	50.8X 25.4 X 10.6			mm
	-R5HSNL	50.8X 25.4 X 15.3			mm
Weight			36.5		g
MTBF (Note 1)	BELLCORE-TR-NWT-000332		3.163 x 10 <sup>6</sup>		hrs
	MIL-HDBK-217F		4.347 x 10 <sup>5</sup>		hrs

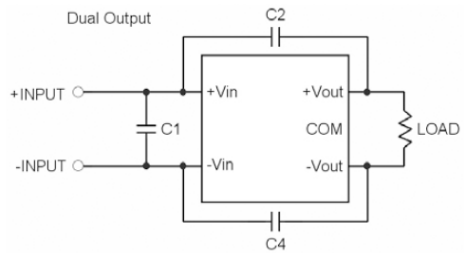
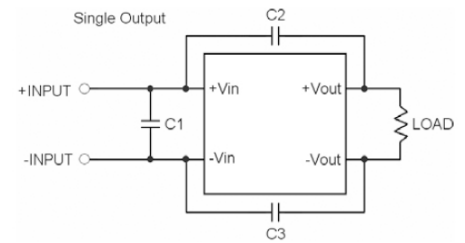
**Environmental Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Operating Temperature		-40		85	°C
Maximum case temperature				115	°C
Storage Temperature		-55		125	°C
Over temperature			115		°C
Thermal impedance	Convection		12		°C/Watt
	Convection with heat-sink		10		°C/Watt
Thermal shock			MIL-STD-810F		
Vibration			MIL-STD-810F		
Relative humidity			5% to 95% RH		

**EMC Characteristics**

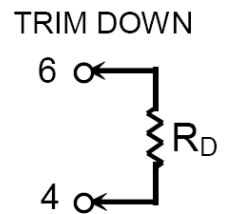
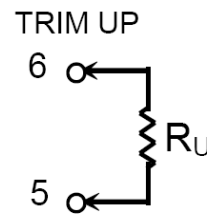
Parameters	Conditions	Min	Typ	Max	Units
EMI	EN55022		Class A		
ESD	EN61000-4-2		Air ±8KV Perf. Criteria A		
			Contact ±6KV Perf. Criteria A		
Radiated immunity	EN61000-4-3		10 V/m Perf. Criteria A		
Fast transient	EN61000-4-4		± 2KV Perf. Criteria A		
Surge	EN61000-4-5		± 1KV Perf. Criteria A		
Conducted immunity	EN61000-4-6		10 Vrms Perf. Criteria A		

**Recommended Filter for EN55022 Class A Compliance**

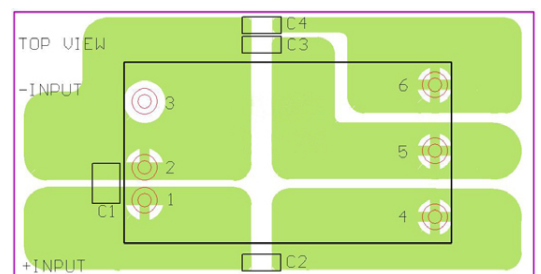


**External Output Trimming**

Output can be externally trimmed by using the method shown below.



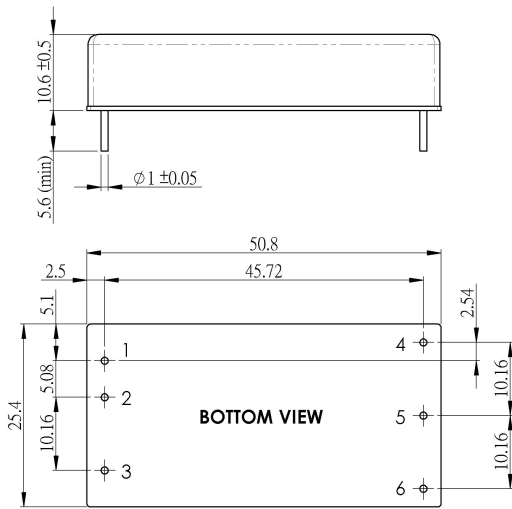
**Recommended EN55022 Class A Filter Circuit Layout**





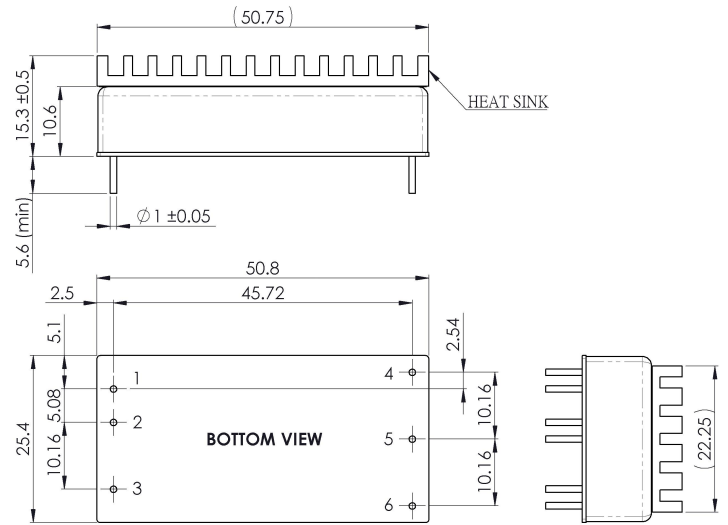
Markings and dimensions

-R5NL



Unit : mm  
Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

-R5HSNL



Unit : mm  
Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

PIN Connection

Pin	1	2	3	4	5	6
Single	+Vin	-Vin	Ctrl	+Vout	-Vout	Trim
Dual	+Vin	-Vin	Ctrl	+Vout	COM	-Vout

**FEATURES :**

- 4:1Wide Input Voltages Range
- High Efficiency up to 92%
- Regulated Output Types
- 1" X 1" DIL Package
- Operating Temperature:-40°C TO +80°C
- Industry Standard Pinout
- UL/cUL/IEC 60950-1 , 62368-1 Approved (5V/12V Single Output Only)
- EMC Standard of EMI EN55032:2012+AC:2013 (Class B) Approved
- EMC Standard of EMS EN55024:2010 Approved

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage Range	Nominal Input Voltage	Output Voltage Range	Output Current	Efficiency
	Vdc	Vdc	Vdc	(mA)	%TYP
96DW-24S03R6NL	9-36	24	3.3	7000	86
96DW-24S05R6NL	9-36		5	6000	88
96DW-24S12R6NL	9-36		12	2500	89
96DW-24S15R6NL	9-36		15	2000	89
96DW-24S24R6NL	9-36		24	1250	90
96DW-48S03R6NL	18-75	48	3.3	7000	87
96DW-48S05R6NL	18-75		5	6000	89
96DW-48S12R6NL	18-75		12	2500	90
96DW-48S15R6NL	18-75		15	2000	91
96DW-48S24R6NL	18-75		24	1250	92
96DW-24D12R6NL	9-36	24	±12	±1250	89
96DW-24D15R6NL	9-36		±15	±1000	91
96DW-24D24R6NL	9-36		±24	±625	91
96DW-48D12R6NL	18-75	48	±12	±1250	91
96DW-48D15R6NL	18-75		±15	±1000	92
96DW-48D24R6NL	18-75		±24	±625	92

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
<b>Voltage Types</b>				4:1	
<b>Input current at no load (Nominal input voltage)</b>	24V models		10		mA
	48V models		10		
<b>Surge Voltage (1 sec. max.)</b>	24V models			50	Vdc
	48V models			100	



DC-DC Converter

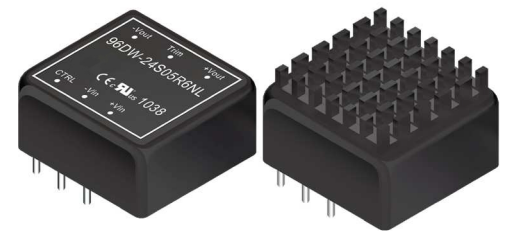
**96DW-R6 SERIES**

30Watt 1.5KV Isolated

4 : 1 Input Voltage Range

Single & Dual Output

1" x 1"



**Part Number**

96DW - 48 S 05 R 6 NL  
A B C D E F G

- A: Series
- B: Input Voltage
- C: Single Output(S)or Dual Output(D)
- D: Output Voltage
- E: Regulated(R)
- F: Package
- G: RoHS Version

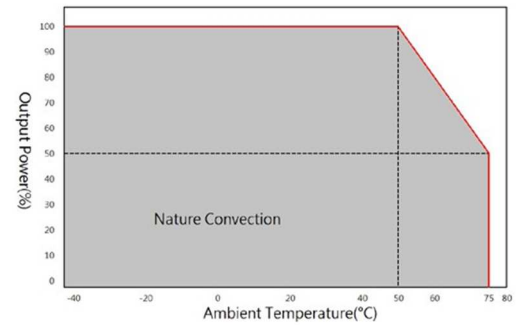
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
<b>Voltage Tolerance</b>	100% full load			±2	%
<b>Short Circuit Protection</b>	Continuous ,Auto-Recovery				
<b>Output Power Protection</b>	Continuous ,Auto-Recovery	110		170	%
<b>Over Voltage Protection</b>	3.3Vdc	3.7		5.4	Vdc
	5Vdc	5.6		7.0	
	12Vdc	13.5		19.6	
	15Vdc	18.3		22.0	
<b>Line Regulation</b>	24Vdc	29.1		32.5	%
	Nominal Input Voltage			±0.5	
<b>Load Regulation</b>	Single			±0.5	%
	Dual (Balance load)			±1.0	%
<b>Cross Regulation</b>	Dual(25% to 100% load)			±5.0	%
<b>Ripple &amp; Noise</b>	BW=DC To 20MHz				
	Single :				
	3.3V & 5V with 22uF				
	12V & 15V with 2*22uF				
	24V with 2*6.8uF				
<b>Start up time</b>	Dual : ( at each output)				
	±12V&±15V with10uF				
	±24V with 4.7uF				
<b>Start up time</b>	Nominal Input Voltage			30	ms
<b>Transient response setting time</b>	25% load step change		350		us

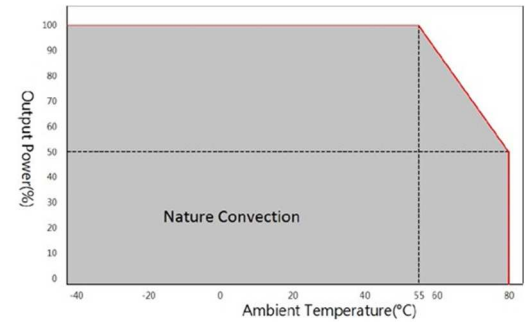
**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
<b>Isolation Voltage</b>	Input To Output	1500			Vdc
	Input(Output) To Case	1000			
<b>Isolation Resistance</b>	500Vdc	1000			MΩ
<b>Switching Frequency</b>	Full load, nominal input	275			KHz
<b>Operating Temperature</b>		-40		80	°C
<b>Case Temperature</b>				105	°C
<b>Humidity</b>	Non Condensing	5		95	%
<b>Cooling</b>	Free air Convection				
<b>Case material</b>	Six-side shield case				
<b>MTBF</b>	MIL-HDBK-217F@25°C	1200000			Hours
<b>Weight</b>	without heatsink		22		g
	with heatsink		24.5		
<b>Dimensions</b>		25.4X25.4X10.6			mm

**Temperature Derating Graph @20LFM**

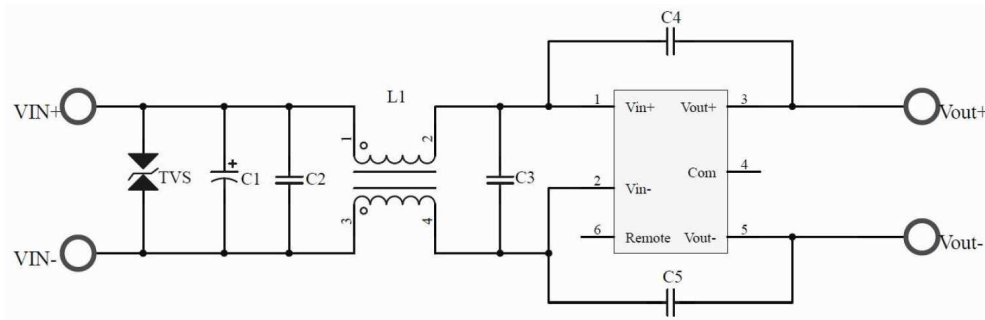


**Derating Curve**



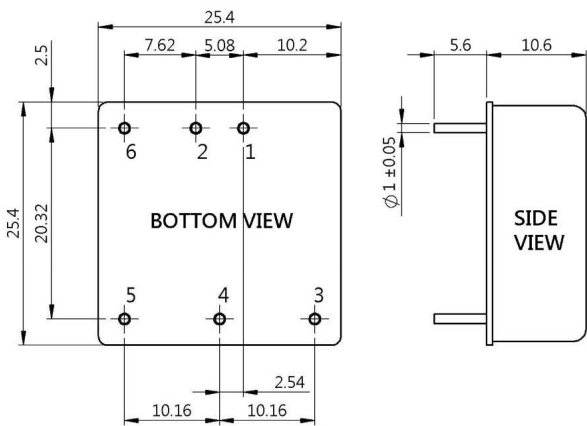
**Derating Curve With Heat-sink**

Recommended Test Circuit Meets EN55024 Criterion A and EN55032 Class B

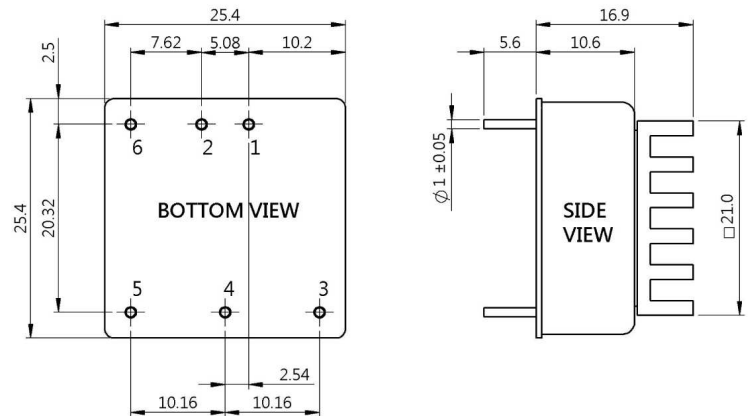


24V C1 220uF/100V&C2&C3 4.7uF/50V C4&C5 2200pF/2kV L1 0.94mH TVS 3.0SMCJ58AG  
 48V C1 220uF/100V&C2&C3 4.7uF/100V C4&C5 3200pF/2kV L1 6.20mH TVS 3.0SMCJ120AG

Markings and Dimensions



Unit : mm  
 Tolerance : XX.X ±0.5 , XX.XX ±0.25



Unit : mm  
 Tolerance : XX.X ±0.5 , XX.XX ±0.25

PIN Assignment

Pin	1	2	3	4	5	6
Single	+Vin	-Vin	+Vout	Trim	-Vout	Remote ON/OFF
Dual	+Vin	-Vin	+Vout	Com	-Vout	Remote ON/OFF

**FEATURES :**

- 4:1 Wide Input Voltages Range
- High Efficiency up to 89%
- Regulated Output Types
- No minimum load required
- Operating Temperature: -40°C TO +100°C
- Industry Standard Pinout
- 3KV Isolation
- Design refer to EN50155
- Railway EMC Standard EN 50121-3-2 Approved
- Railway Standard EN 50155 : 2007+AC : 2010+AC : 2012, clause 12.2.1~6, 12.2.9 and 12.2.11 Approved



DC-DC Converter

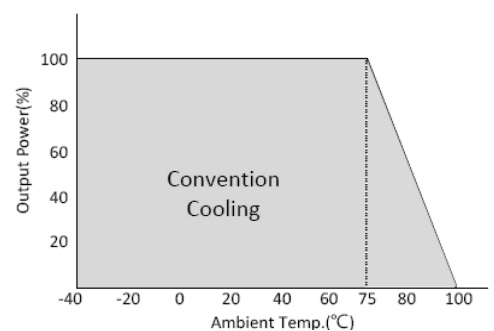
**98DW20-R3 SERIES**

20Watt 3KV Isolated

4 : 1 Input Voltage Range

Single &amp; Dual Output

DIL

**Temperature Derating Graph**

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage Range	Nominal Input Voltage	Output Voltage Range	Output Current	Efficiency
	Vdc	Vdc	Vdc	A	%TYP
98DW20-24S03R3NL	9-36	24	3.3	4.5	85
98DW20-24S05R3NL	9-36		5	4.0	86
98DW20-24S12R3NL	9-36		12	1.67	88
98DW20-24S15R3NL	9-36		15	1.33	88
98DW20-48S03R3NL	18-75	48	3.3	4.5	85
98DW20-48S05R3NL	18-75		5	4.0	86
98DW20-48S12R3NL	18-75		12	1.67	88
98DW20-48S15R3NL	18-75		15	1.33	88
98DW20-110S03R3NL	40-160	110	3.3	4.5	84
98DW20-110S05R3NL	40-160		5	4.0	85
98DW20-110S12R3NL	40-160		12	1.67	87
98DW20-110S15R3NL	40-160		15	1.33	87
98DW20-24D12R3NL	9-36	24	±12	±0.833	88
98DW20-24D15R3NL	9-36		±15	±0.667	89
98DW20-48D12R3NL	18-75	48	±12	±0.833	88
98DW20-48D15R3NL	18-75		±15	±0.667	89
98DW20-110D12R3NL	40-160	110	±12	±0.833	87
98DW20-110D15R3NL	40-160		±15	±0.667	87

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
<b>Voltage Types</b>				4:1	
<b>Input current at no load (Nominal input voltage)</b>	24V models		7		mA
	48V models		5		
	110V models		4		
<b>Surge Voltage (1 sec. max.)</b>	24V models			50	Vdc
	48V models			100	
	110V models			170	
<b>Input Filter</b>	PI Type				
<b>Reflected ripple current</b>			30		mAp-p
<b>Remote ON/OFF (Refer to -Vin PIN)</b>	Positive Logic				
	ON : Open	3		12	Vdc
	OFF: Short	0		1.2	
	Input current of Ctrl PIN	0.5		0.5	mA
Remote off input current		3			

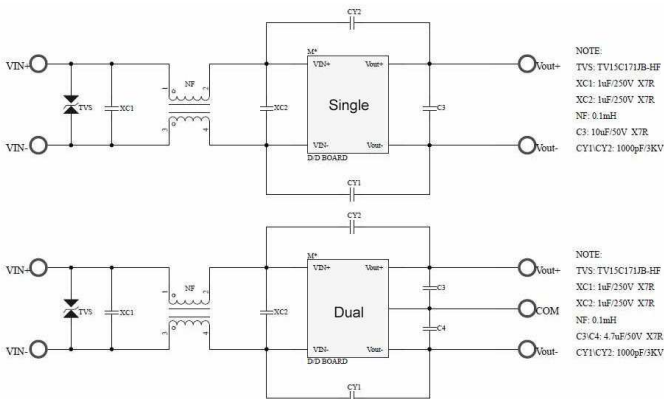
**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±2	%
Short Circuit Protection	Continuous , Auto-Recovery				
Output Power Protection	Continuous , Auto-Recovery	110		170	%
Over Voltage Protection	3.3Vdc	3.7		5.4	Vdc
	5Vdc	5.6		7.0	
	12Vdc	13.5		19.6	
	15Vdc	16.8		20.5	
Line Regulation	Nominal Input Voltage			±0.5	%
Load Regulation	Single output models			±0.5	%
	Dual output models			±5	
Ripple & Noise (BW=DC To 20MHz Measured with a 10uF MLCC.)	3.3V&5.0V models			75	mVp-p
	Other models			100	
Start up time	Nominal Input Voltage			30	ms
Transient response setting time	50% load step change		350		us

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Voltage	Input To Output	3000			Vdc
	Input(Output) To Case	1600			
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		330		KHz
Operating Temperature		-40		100	°C
Case Temperature				105	°C
Humidity	Non Condensing	5		95	%
Cooling	Free air Convection				
Case material	Six-side shield case				
MTBF	MIL-HDBK-217F@25°C	1500000			Hours
Weight			30		g
Dimensions			50.8x25.4x10.6		mm

**Recommended Test Circuit**

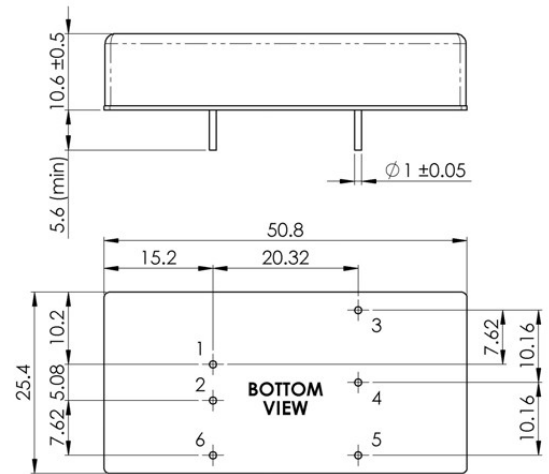


**Part Number**

98DW20 - 24 S 05 R 3 NL  
 A B C D E F G

- A: Series
- B: Input Voltage
- C: Single Output(D),Dual(D)
- D: Output Voltage
- E: Regulated (R)
- F: Package
- G: RoHs Version

**Markings and dimensions**



Unit : mm  
 Tolerance : XX.X ±0.5 , XX.XX ±0.25

**PIN Assignment**

Pin	1	2	3	4	5	6
Single	+Vin	-Vin	+Vout	Trim	-Vout	Remote ON/OFF
Dual	+Vin	-Vin	+Vout	COM	-Vout	Remote ON/OFF

**FEATURES :**

- 4:1 Wide Input Voltages Range
- High Efficiency up to 88%
- Regulated Output Types
- No minimum load required
- Operating Temperature:-40°C TO +100°C
- Industry Standard Pinout
- 3KV Isolation
- Design refer to EN50155

Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage Range	Nominal Input Voltage	Output Voltage Range	Output Current	Efficiency
	Vdc	Vdc	Vdc	A	%TYP
98DW30-24S03R3NL	9-36	24	3.3	7.5	85
98DW30-24S05R3NL	9-36		5	6	86
98DW30-24S12R3NL	9-36		12	2.5	88
98DW30-24S15R3NL	9-36		15	2	88
98DW30-48S03R3NL	18-75	48	3.3	7.5	85
98DW30-48S05R3NL	18-75		5	6	86
98DW30-48S12R3NL	18-75		12	2.5	88
98DW30-48S15R3NL	18-75		15	2	88
98DW30-110S03R3NL	40-160	110	3.3	7.5	85
98DW30-110S05R3NL	40-160		5	6	86
98DW30-110S12R3NL	40-160		12	2.5	88
98DW30-110S15R3NL	40-160		15	2	88
98DW30-24D12R3NL	9-36	24	±12	±1.25	88
98DW30-24D15R3NL	9-36		±15	±1	88
98DW30-48D12R3NL	18-75	48	±12	±1.25	88
98DW30-48D15R3NL	18-75		±15	±1	88
98DW30-110D12R3NL	40-160	110	±12	±1.25	88
98DW30-110D15R3NL	40-160		±15	±1	88

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				4:1	
Input current at no load (Nominal input voltage)	24V models		6		mA
	48V models		5		
	110V models		4		
Surge Voltage (1 sec. max.)	24V models			50	Vdc
	48V models			100	
	110 models			170	
Input Filter	PI Type				
Reflected ripple current			30		mAp-p
Remote ON/OFF (Refer to -Vin PIN)	Positive Logic				Vdc
	ON : Open	3		12	
	OFF: Short	0		1.2	
	Input current of Ctrl PIN		0.5		0.5
Remote off input current			3		



DC-DC Converter

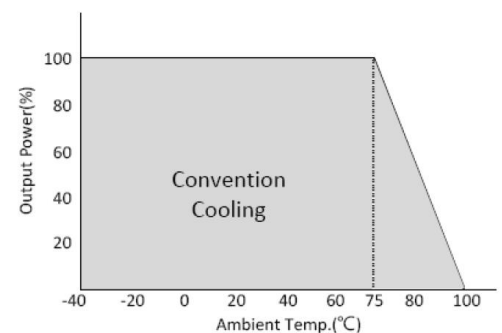
**98DW30-R3 SERIES**

**30Watt 3KV Isolated**

**4 : 1 Input Voltage Range**

**Single & Dual Output**

**DIL**

**Temperature Derating Graph**

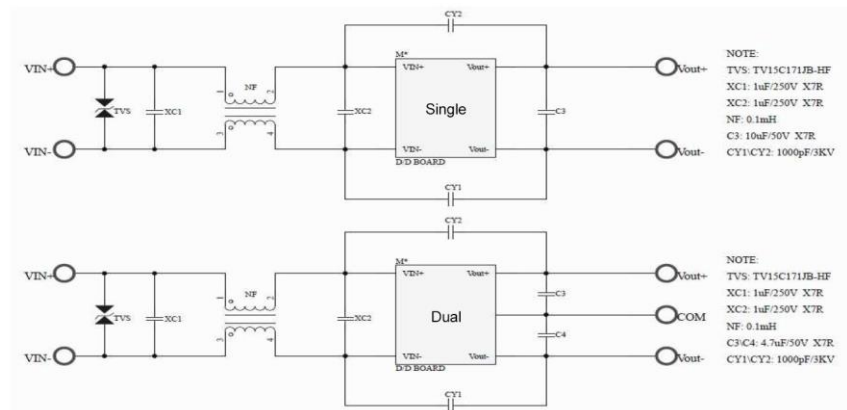
## Output Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	100% full load			±2	%
Short Circuit Protection	Continuous ,Auto-Recovery				
Output Power Protection	Continuous ,Auto-Recovery	110%		170%	
Over Voltage Protection	3.3Vdc	3.7		5.4	Vdc
	5Vdc	5.6		7.0	
	12Vdc	13.5		19.6	
	15Vdc	16.8		20.5	
Line Regulation	Nominal Input Voltage			±0.5	%
Load Regulation	Single output models			±0.5	%
	Dual output models			±5	
Ripple & Noise (BW=DC To 20MHz Measured with a 10uF MLCC.)	3.3V&5.0V models			75	mVp-p
	Other models			100	
Start up time	Nominal Input Voltage			30	ms
Transient response setting time	50% load step change		350		us

## General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Voltage	Input To Output	3000			Vdc
	Input(Output) To Case	1600			
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency	Full load, nominal input		330		KHz
Operating Temperature		-40		100	°C
Case Temperature				105	°C
Humidity	Non Condensing	5		95	%
Cooling	Free air Convection				
Case material	Six-side shield case				
MTBF	MIL-HDBK-217F@25°C	1500000			Hours
Weight			40		g
Dimensions			51.0x25.4x13.0		mm

## Recommended Test Circuit

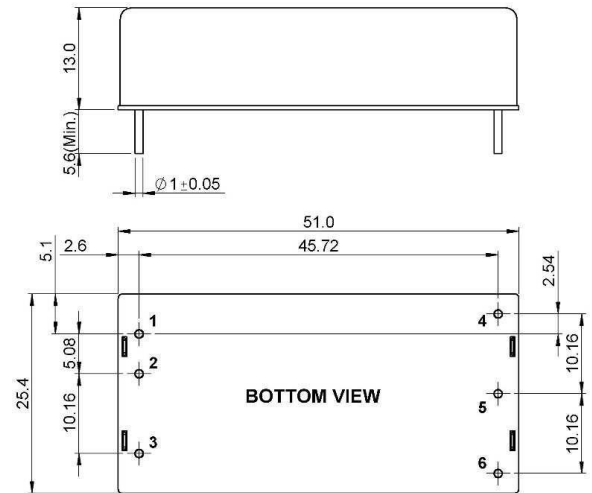


## Part Number

98DW30 - 24 S 05 R 3 NL  
A B C D E F G

- A : Series  
B : Input Voltage  
C : Single(S);Dual(D)  
D : Output Voltage  
E : Regulated(R)  
F : Package  
G : RoHS Version

## Markings and dimensions



Unit : mm  
Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

## PIN Assignment

Pin	1	2	3	4	5	6
Single	+Vin	-Vin	Ctrl	+Vout	-Vout	Trim
Dual	+Vin	-Vin	Ctrl	+Vout	Com	-Vout



**FEATURES :**

- 2"X2" DIL Package
- 2:1 Wide Input Range
- 100% Burned In
- High Efficiency Up To 91%
- Customized Solutions Available
- Shielded Metal Case with insulated baseplate
- Remote Control ON/OFF
- UL94V-0 Package Material



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Capacitor Load	Efficiency
	Vdc	No-Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	uF	%TYP
99D-12S03R2NL	9-18	120	3125	3.3	10000	16000	88
99D-12S05R2NL	9-18	130	3703	5	8000	10000	90
99D-12S12R2NL	9-18	50	3750	12	3300	2000	88
99D-12S15R2NL	9-18	50	3721	15	2650	1200	89
99D-12D12R2NL	9-18	60	3752	±12	±1670	±1000	89
99D-12D15R2NL	9-18	60	3764	±15	±1340	±680	89
99D-24S03R2NL	18-36	70	1544	3.3	10000	16000	89
99D-24S05R2NL	18-36	80	1831	5	8000	10000	91
99D-24S12R2NL	18-36	30	1833	12	3300	2000	90
99D-24S15R2NL	18-36	30	1840	15	2650	1200	90
99D-24D12R2NL	18-36	30	1855	±12	±1670	±1000	90
99D-24D15R2NL	18-36	30	1861	±15	±1340	±680	90
99D-48S03R2NL	36-75	40	763	3.3	10000	16000	90
99D-48S05R2NL	36-75	50	915	5	8000	10000	91
99D-48S12R2NL	36-75	30	916	12	3300	2000	90
99D-48S15R2NL	36-75	30	920	15	2650	1200	90
99D-48D12R2NL	36-75	30	927	±12	±1670	±1000	90
99D-48D15R2NL	36-75	30	930	±15	±1340	±680	90

**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				2:1	
Filter	Pi Network				
Protection	Fuse Recommended				

**DC-DC Converter**

**99D-R2 SERIES**

**40Watt 1.5KV Isolated**

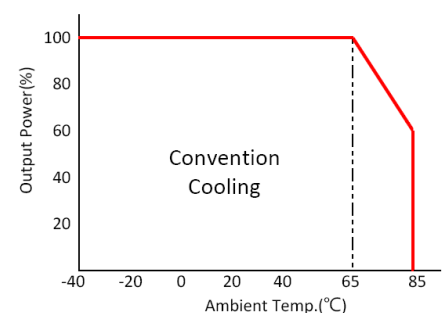
**2 : 1 Input Voltage Range**

**Single & Dual Output**

**2" x 2"**



**Temperature Derating Graph**



**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic recovery				
Line Regulation				±0.5	%
Load Regulation	Single			±0.5	%
	Dual(Balance Load)			±1	%
Cross Regulation	Dual (25% to 100% load)			±5.	%
Ripple & Noise	Output:3-15V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output > 15V TYPES BW=DC To 20MHz			1% of Vout	mVp-p
Transient response setting time	25% load step change		300		us
External Trim Adj. Range				±10	%

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			300		KHz
Operating Temperature	Refer to temperature derating graph (with derating)	-40		85	°C
Humidity	Non Condensing	5		95	%
Cooling	Free air Convection				
Case material	Nickel Coated with Non-Conductive Base				
Weight			70		g
Dimensions			51.0X51.0X10.3		mm
Potting Material			Epoxy (UL94V-0 rated)		
Remote ON/OFF	ON		Open		
	OFF		Short to -Vin		
Isolation Voltage				1500	VDC
MTBF	MIL-HDBK-217F @25°C , Ground Benign	151100			Hours
Storage Temperature		-55		+125	°C
Case Temperature				+105	°C
Isolation Capacitance				2500	pF

**PIN Assignment**

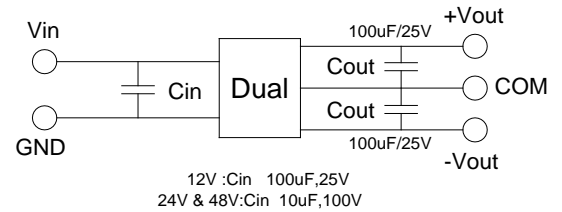
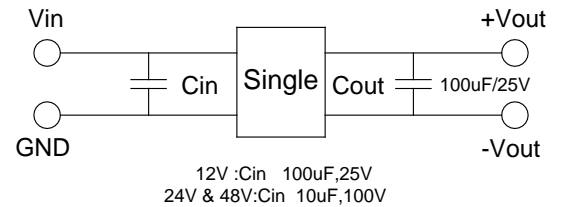
Pin	1	2	3	4	5	6	7	8
Single	+Vin	-Vin	Remote On/Off	-Sense	+Sense	+Vout	-Vout	Trim
Dual	+Vin	-Vin	Remote On/Off	+Vout	Com	Com	-Vout	Trim

**Part Number**

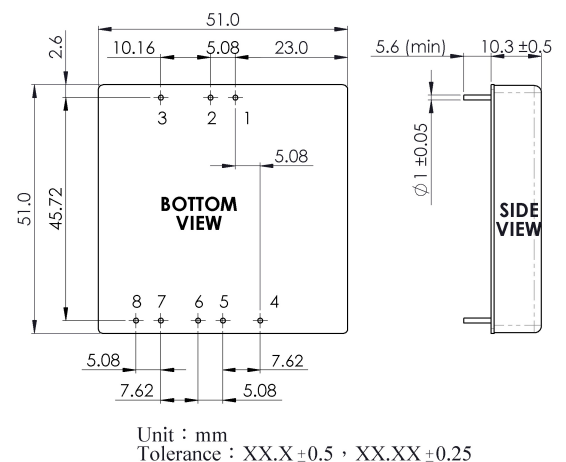
99D - 24 S 05 R 2 NL  
A B C D E F G

- A: Series
- B: Input Voltage
- C: Single Output(S),Dual(D)
- D: Output Voltage
- E: Regulated(R)
- F: Package
- G: RoHS Version

**Recommended Test Circuit**



**Markings and dimensions**



**FEATURES :**

- 2"X1" DIL Package
- 2:1 Wide Input Range
- 100% Burned In
- High Efficiency Up To 91%
- Customized Solutions Available
- Shielded Metal Case with insulated baseplate
- Remote Control ON/OFF
- UL94V-0 Package Material



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Capacitor Load	Efficiency
	Vdc	No-Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	uF	%TYP
99D-12S03R3NL	9-18	160	2471	3.3	8000	16000	89
99D-12S05R3NL	9-18	160	3745	5	8000	10000	89
99D-12S12R3NL	9-18	60	3752	12	3340	1800	89
99D-12S15R3NL	9-18	60	3708	15	2670	1200	90
99D-12D12R3NL	9-18	60	3795	±12	±1670	±1000	88
99D-12D15R3NL	9-18	60	3806	±15	±1340	±680	88
99D-24S03R3NL	18-36	90	1235	3.3	8000	16000	89
99D-24S05R3NL	18-36	90	1851	5	8000	10000	90
99D-24S12R3NL	18-36	50	1855	12	3340	1800	90
99D-24S15R3NL	18-36	50	1833	15	2670	1200	91
99D-24D12R3NL	18-36	50	1876	±12	±1670	±1000	89
99D-24D15R3NL	18-36	50	1882	±15	±1340	±680	89
99D-48S03R3NL	36-75	70	611	3.3	8000	16000	90
99D-48S05R3NL	36-75	70	925	5	8000	10000	90
99D-48S12R3NL	36-75	40	917	12	3340	1800	91
99D-48S15R3NL	36-75	40	916	15	2670	1200	91
99D-48D12R3NL	36-75	40	938	±12	±1670	±1000	89
99D-48D15R3NL	36-75	40	941	±15	±1340	±680	89

DC-DC Converter

**99D-R3 SERIES**

40Watt 1.5KV Isolated

2 : 1 Input Voltage Range

Single & Dual Output

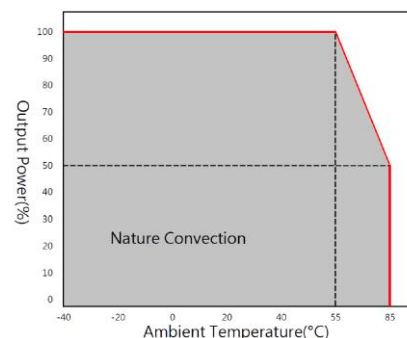
2" x 1"



**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				2:1	
Filter	Pi Network				
Protection	Fuse Recommended				

**Temperature Derating Graph**



**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@ Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic recovery				
Line Regulation				±0.5	%
Load Regulation	Single Dual(Balance Load)			±0.5 ±2	%
Cross Regulation	Dual (25% to 100% load)			±5	%
Ripple & Noise	Output:3-15V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output > 15V TYPES BW=DC To 20MHz			1% of Vout	mVp-p
Transient response setting time	25% load step change		300		us
External Trim Adj. Range				±10	%

**General Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			350		KHz
Operating Temperature	Refer to temperature derating graph (with derating)	-40		85	°C
Humidity	Non Condensing	5		95	%
Cooling	Free air Convection				
Case material	Nickel Coated with Non-Conductive Base				
Weight			30		g
Dimensions			50.8X25.4X11.6		mm
Potting Material			Epoxy (UL94V-0 rated)		
Remote ON/OFF	ON OFF		Open Short to -Vin		
Isolation Voltage				1500	VDC
MTBF	MIL-HDBK-217F @25°C , Ground Benign	328000			Hours
Storage Temperature		-55		+125	°C
Case Temperature				+105	°C
Isolation Capacitance				1500	pF

**PIN Assignment**

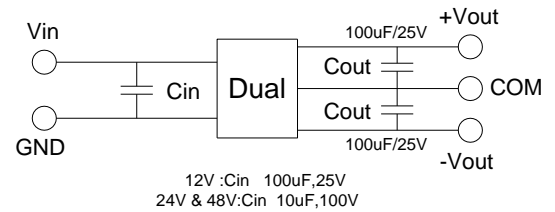
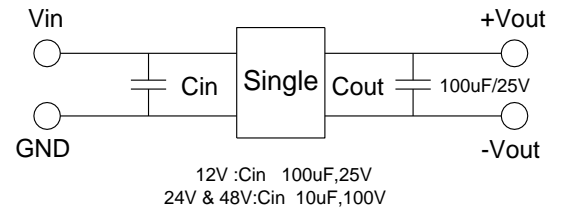
Pin	1	2	3	4	5	6
Single	+Vin	-Vin	Remote On/Off	+Vout	-Vout	Trim
Dual	+Vin	-Vin	Remote On/Off	+Vout	Com	-Vout

**Part Number**

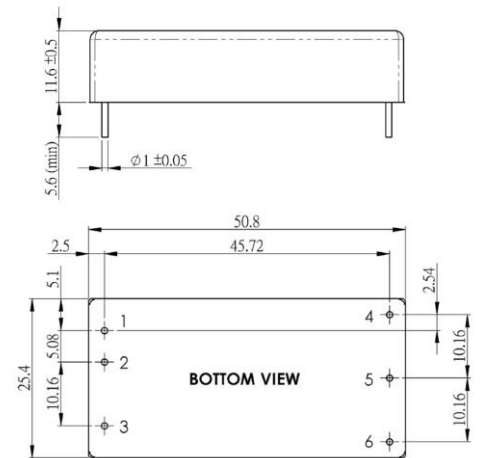
99D - 24 S 05 R 3 NL  
A B C D E F G

- A: Series
- B: Input Voltage
- C: Single Output(S),Dual(D)
- D: Output Voltage
- E: Regulated(R)
- F: Package
- G: RoHs Version

**Recommended Test Circuit**



**Markings and dimensions**



Unit : mm  
Tolerance : XX.X ±0.5 , XX.XX ±0.25

**FEATURES :**

- 2"X2" DIL Package
- 4:1 Wide Input Range
- 100% Burned In
- High Efficiency Up To 90%
- Customized Solutions Available
- Shielded Metal Case with insulated baseplate
- Remote Control ON/OFF
- UL94V-0 Package Material



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage		Input Current		Output Voltage		Output Current		Capacitor Load	Efficiency
	Vdc	No-Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	uF Max	%TYP			
99DW-24S03R2NL	9-36	100	1544	3.3	10000	16000	89			
99DW-24S05R2NL	9-36	110	1851	5	8000	10000	90			
99DW-24S12R2NL	9-36	40	1875	12	3300	2000	88			
99DW-24S15R2NL	9-36	40	1882	15	2650	1000	88			
99DW-24D12R2NL	9-36	40	1897	±12	±1670	±1000	88			
99DW-24D15R2NL	9-36	40	1903	±15	±1340	±680	88			
99DW-48S03R2NL	18-75	70	763	3.3	10000	16000	89			
99DW-48S05R2NL	18-75	80	925	5	8000	10000	90			
99DW-48S12R2NL	18-75	30	937	12	3300	2000	88			
99DW-48S15R2NL	18-75	30	941	15	2650	1000	88			
99DW-48D12R2NL	18-75	30	948	±12	±1670	±1000	88			
99DW-48D15R2NL	18-75	30	951	±15	±1340	±680	88			

DC-DC Converter

**99DW-R2 SERIES**

40Watt 1.5KV Isolated

4 : 1 Input Voltage Range

Single & Dual Output

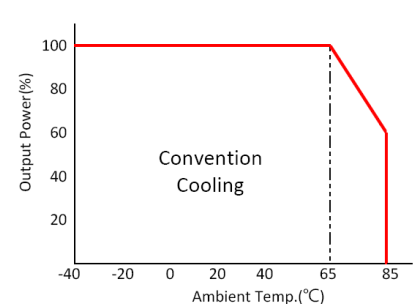
2" x 2"



**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				4:1	
Filter	Pi Network				
Protection	Fuse Recommended				

**Temperature Derating Graph**



## Output Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic recovery				
Line Regulation				±0.5	%
Load Regulation	Single Dual(Balance Load)			±0.5 ±1	%
Cross Regulation	Dual (25% to 100% load)			±5	%
Ripple & Noise	Output:3-15V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output > 15V TYPES BW=DC To 20MHz			1% of Vout	mVp-p
Transient response setting time	25% load step change		350		us
External Trim Adj. Range				±10	%

## General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			300		KHz
Operating Temperature	Refer to temperature derating graph (with derating)	-40		85	°C
Humidity	Non Condensing	5		95	%
Cooling	Free air Convection				
Case material	Nickel Coated with Non-Conductive Base				
Weight			70		g
Dimensions			51.0X51.0X10.3		mm
Potting Material			Epoxy (UL94V-0 rated)		
Remote ON/OFF	ON OFF		Open Short to -Vin		
Isolation Voltage				1500	VDC
MTBF	MIL-HDBK-217F @25°C , Ground Benign	151100			Hours
Storage Temperature		-55		+125	°C
Case Temperature				+105	°C
Isolation Capacitance				2500	pF

## PIN Assignment

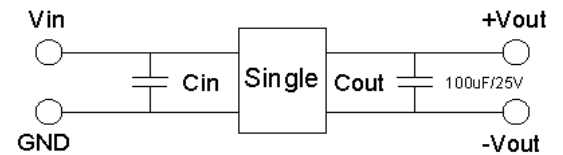
Pin	1	2	3	4	5	6	7	8
Single	+Vin	-Vin	Remote On/Off	-Sense	+Sense	+Vout	-Vout	Trim
Dual	+Vin	-Vin	Remote On/Off	+Vout	Com	Com	-Vout	Trim

## Part Number

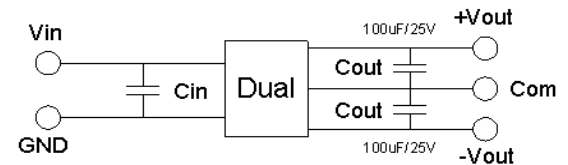
99DW - 24 S 05 R 2 NL  
A B C D E F G

- A: Series
- B: Input Voltage
- C: Single Output(S),Dual(D)
- D: Output Voltage
- E: Regulated(R)
- F: Package
- G: RoHs Version

## Recommended Test Circuit

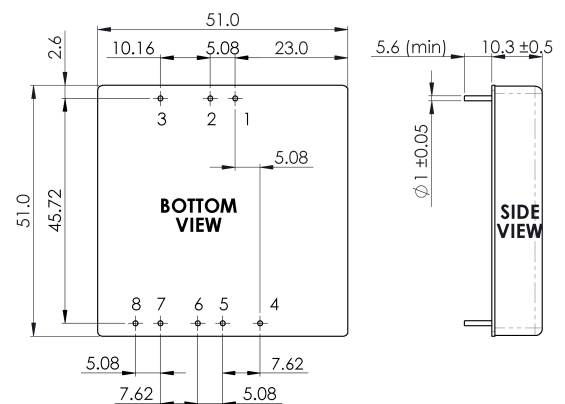


24V&48V: Cin 10uF,100V



24V & 48V : Cin 10uF,100V

## Markings and dimensions



Unit : mm  
Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

**FEATURES :**

- 2"X1" DIL Package
- 4:1 Wide Input Range
- 100% Burned In
- High Efficiency Up To 90%
- Customized Solutions Available
- Shielded Metal Case with insulated baseplate
- Remote Control ON/OFF
- UL94V-0 Package Material



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage		Input Current		Output Voltage		Output Current		Capacitor Load	Efficiency
	Vdc	No-Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	uF Max	%TYP			
99DW-24S03R3NL	9-36	90	1235	3.3	8000	16000	89			
99DW-24S05R3NL	9-36	90	1851	5	8000	10000	90			
99DW-24S12R3NL	9-36	50	1876	12	3340	1800	89			
99DW-24S15R3NL	9-36	50	1875	15	2670	1200	89			
99DW-24D12R3NL	9-36	50	1897	±12	±1670	±1000	88			
99DW-24D15R3NL	9-36	50	1903	±15	±1340	±680	88			
99DW-48S03R3NL	18-75	60	617	3.3	8000	16000	89			
99DW-48S05R3NL	18-75	60	925	5	8000	10000	90			
99DW-48S12R3NL	18-75	40	927	12	3340	1800	90			
99DW-48S15R3NL	18-75	40	927	15	2670	1200	90			
99DW-48D12R3NL	18-75	40	948	±12	±1670	±1000	88			
99DW-48D15R3NL	18-75	40	951	±15	±1340	±680	88			

DC-DC Converter

**99DW-R3 SERIES**

40Watt 1.5KV Isolated

4 : 1 Input Voltage Range

Single & Dual Output

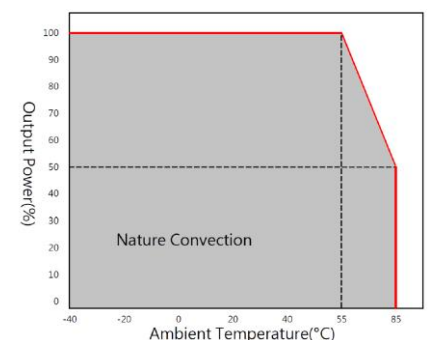
2" x 1"



**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				4:1	
Filter	Pi Network				
Protection	Fuse Recommended				

**Temperature Derating Graph**



## Output Specifications

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@ Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic recovery				
Line Regulation				±0.5	%
Load Regulation	Single Dual(Balance Load)			±0.5 ±2	%
Cross Regulation	Dual (25% to 100% load)			±5	%
Ripple & Noise	Output:3-15V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output > 15V TYPES BW=DC To 20MHz			1% of Vout	mVp-p
Transient response setting time	25% load step change		300		us
External Trim Adj. Range				±10	%

## General Specifications

Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			350		KHz
Operating Temperature	Refer to temperature derating graph (with derating)	-40		85	°C
Humidity	Non Condensing	5		95	%
Cooling	Free air Convection				
Case material	Nickel Coated with Non-Conductive Base				
Weight			30		g
Dimensions			50.8X25.4X11.6		mm
Potting Material			Epoxy (UL94V-0 rated)		
Remote ON/OFF	ON OFF		Open Short to -Vin		
Isolation Voltage				1500	VDC
MTBF	MIL-HDBK-217F @25°C , Ground Benign	328000			Hours
Storage Temperature		-55		+125	°C
Case Temperature				+105	°C
Isolation Capacitance				1500	pF

## PIN Assignment

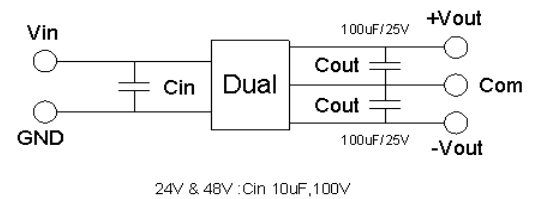
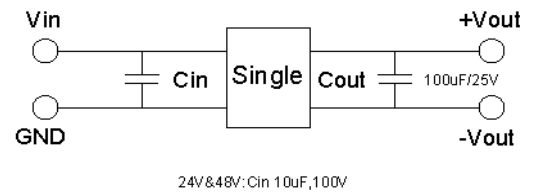
Pin	1	2	3	4	5	6
Single	+Vin	-Vin	Remote On/Off	+Vout	-Vout	Trim
Dual	+Vin	-Vin	Remote On/Off	+Vout	Com	-Vout

## Part Number

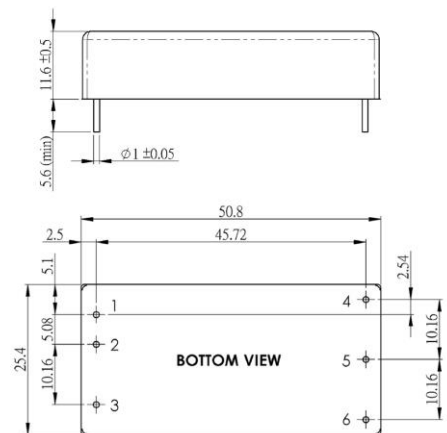
99DW - 24 S 05 R 3 NL  
 A B C D E F G

- A: Series
- B: Input Voltage
- C: Single Output(S),Dual(D)
- D: Output Voltage
- E: Regulated(R)
- F: Package
- G: RoHs Version

## Recommended Test Circuit



## Markings and dimensions



Unit : mm  
 Tolerance : XX.X ±0.5 , XX.XX ±0.25



**FEATURES :**

- 15W 2"X1" DIL Package
- 4:1 Wide Input Voltages Range
- 100% Burned In
- High Efficiency Up To 86%
- Customized Solutions Available
- Remote Control: On/Off
- Operating Temperature From -40°C To +85°C
- UL94V-0 Package Material
- Design refer to AAMI/CSA 60601-1,IEC/EN60601-1 3.1 edition
- Medical /Industry/ITE Application



**DC-DC Converter**

**99DW-R315WM SERIES**

**15Watt 3KVac Isolated**

**4 : 1 Input Voltage Range**

**Single & Dual Output**

**2" x 1" DIL**



Specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified

Part Number	Input Voltage	Input Current		Output Voltage	Output Current	Efficiency	Capacitor load
	Vdc	No Load (mA TYP)	Full Load (mA TYP)	Vdc	Full Load (mA)	%TYP	uF MAX
99DW-24S05R315WM	9-36	10	726	5	3000	86	3300
99DW-24S12R315WM	9-36	10	726	12	1250	86	330
99DW-24S15R315WM	9-36	10	726	15	1000	86	330
99DW-24D05R315WM	9-36	10	744	±5	±1500	84	±2000
99DW-24D12R315WM	9-36	10	726	±12	±625	86	±330
99DW-24D15R315WM	9-36	10	726	±15	±500	86	±330
99DW-48S05R315WM	18-75	7	363	5	3000	86	5600
99DW-48S12R315WM	18-75	7	363	12	1250	86	680
99DW-48S15R315WM	18-75	7	363	15	1000	86	680
99DW-48D05R315WM	18-75	7	372	±5	±1500	84	±3300
99DW-48D12R315WM	18-75	7	367	±12	±625	85	±220
99DW-48D15R315WM	18-75	7	367	±15	±500	85	±220

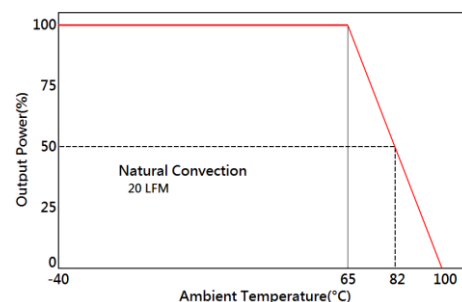
**Input Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Types				4:1	
Filter	Pi Network				
Protection	Fuse Recommended				
Start up Time	Constant resistive load		15		ms
Remote ON/OFF	DC-DC ON (Referred to -Vin pin)	2.2	OPEN	12	Vdc
	DC-DC OFF	0		1.2	Vdc

**Output Specifications**

Parameters	Conditions	Min	Typ	Max	Units
Voltage Tolerance	Full load@Vin(nom.)			±2	%
Short Circuit Protection	Hiccup, automatic Recovery				
Line Regulation				±0.5	%
Load Regulation	Single			±0.5	%
	Dual(Balance Load)			±2	
Cross Regulation	Dual(25% To 100% Load)			±5	%
Ripple & Noise	Output:3-15V TYPES BW=DC To 20MHz			100	mVp-p
Ripple & Noise	Output > 15V TYPES BW=DC To 20MHz			1% of Vout	mVp-p
Transient response setting time	25% load step change		300		us

**Temperature Derating Graph**



**General Specifications**

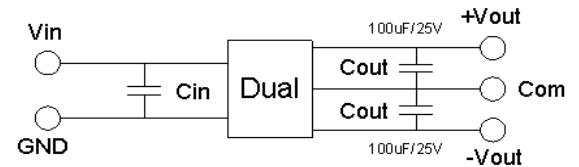
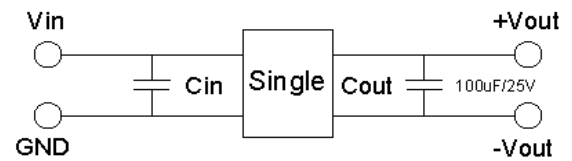
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			350		KHz
Operating Temperature	Refer to temperature derating graph (with derating)	-40		82	°C
Humidity	Non Condensing	5		95	%
Cooling	Natural Convection (20LFM)				
Case material	Plastic				
Weight	22 g				
Dimensions	50.8x25.4x10.2 mm				
Potting Material	Epoxy (UL94V-0 rated)				
Remote ON/OFF	ON	Open			
	OFF	Short to -Vin			
Isolation Voltage				3000	Vac
MTBF	MIL-HDBK-217F @25°C , Ground Benign	500000			Hours
Storage Temperature		-55		+125	°C
Case Temperature				+95	°C

**Part Number**

**99DW-** 24 S 05 R 3 15W M  
**A B C D E F G H**

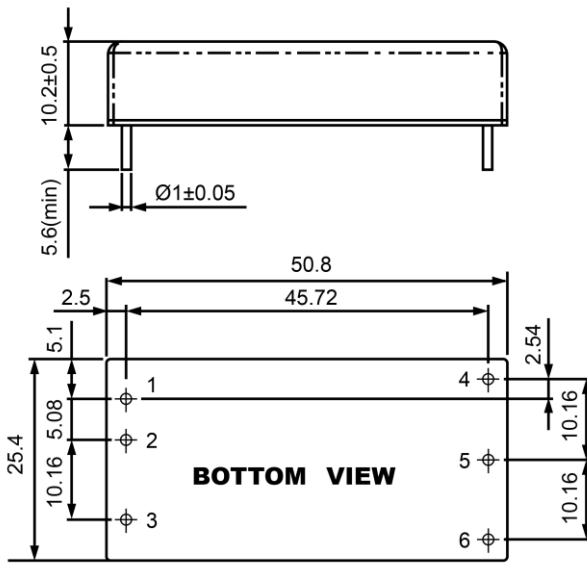
- A: Series**
- B: Input Voltage**
- C: Single Output**
- D: Output Voltage**
- E: Regulated(R)**
- F: Package**
- G: Power Rating**
- H: Medical Application**

**Recommended Test Circuit**



24V & 48V :Cin 10uF,100V

**Markings and dimensions**



UNIT : mm  
 Tolerances : XX.X ±0.5, XX.XX±0.25

**PIN Assignment**

Pin	1	2	3	4	5	6
<b>Single</b>	+Vin	-Vin	Remote ON/OFF	+Vout	No Pin	-Vout
<b>Dual</b>	+Vin	-Vin	Remote ON/OFF	+Vout	Com	-Vout