

MMT

A decorative graphic consisting of several overlapping, wavy, translucent blue lines that flow across the top half of the page, creating a sense of motion and energy.

DC/DC CONVERTER

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

20 Watt

2019

<http://www.mmtmachrone.com>

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

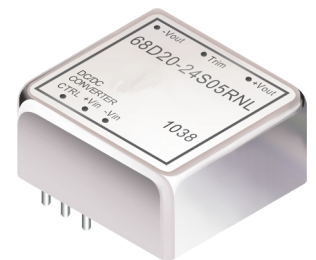
68D20 SERIES

20Watt 1.5KV Isolated

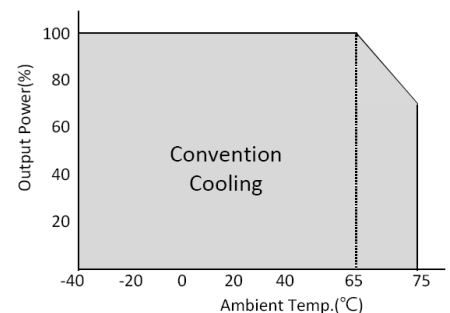
2 : 1 Input Voltage Range

Single & Dual Output

1" x 1"



Temperature Derating Graph



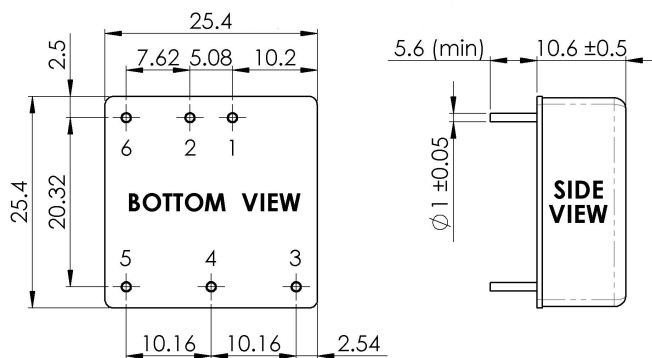
Output Specifications

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



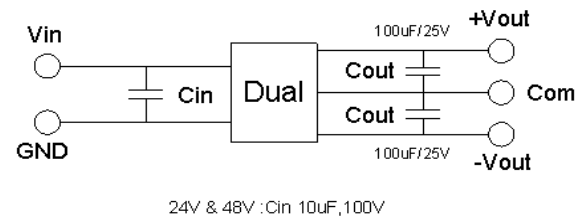
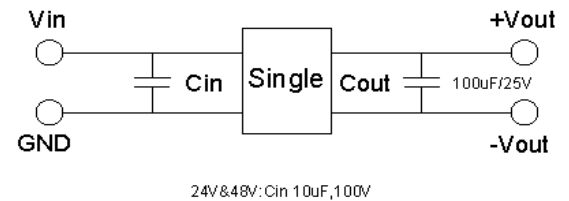
Unit : mm
Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

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 :

- 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

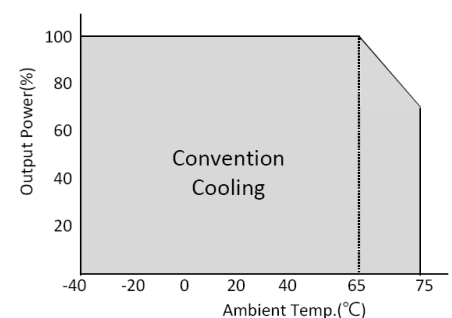
68DW20 SERIES

20Watt 1.5KV Isolated

4 : 1 Input Voltage Range

Single & Dual Output

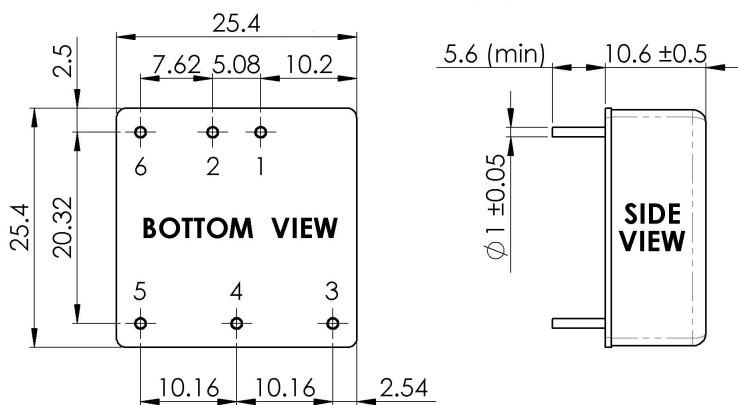
1" x 1"

**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



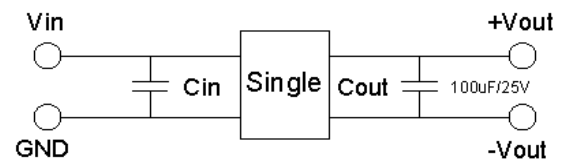
Unit : mm
Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

Part Number

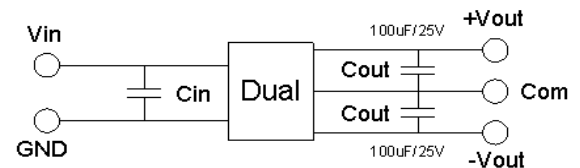
68DW20 - 24 S 05 R NL
A B C D E F

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 :

- 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

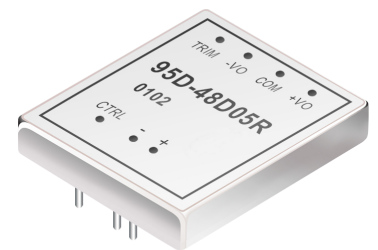
95D SERIES

20Watt 1.5KV Isolated

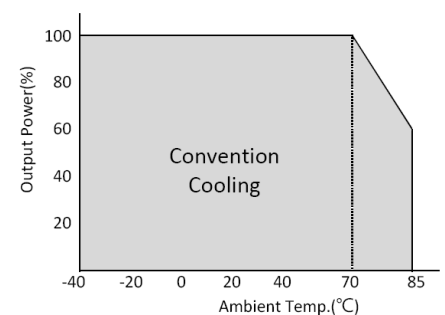
2 : 1 Input Voltage Range

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

General Specifications

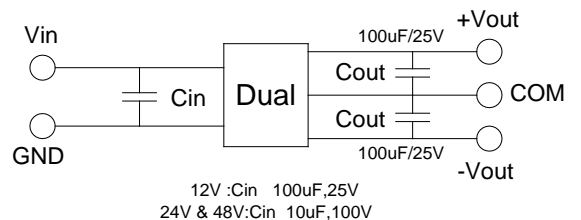
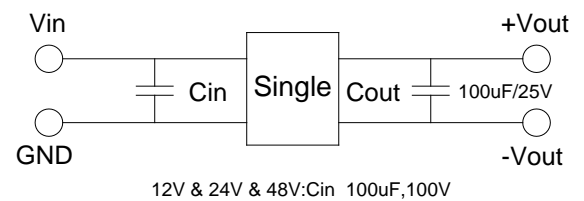
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			300		KHz
Operating Temperature		-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel Coated with Non-Conductive Base				
Weight			55		g
Dimensions	Package 1		51.4x41.6x12.3		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		

Part Number

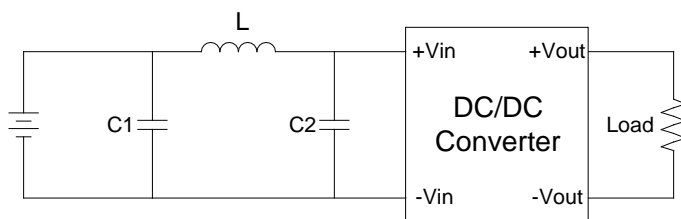
95D - 24 S 05 R 2 NL
A B C D E F G

- A: Series
- B: Input Voltage
- C: Single Output (S),Dual (D)
- D: Output Voltage
- E: Regulated(R)
- F: Package
- G: RoHs Version

Recommended Test Circuit



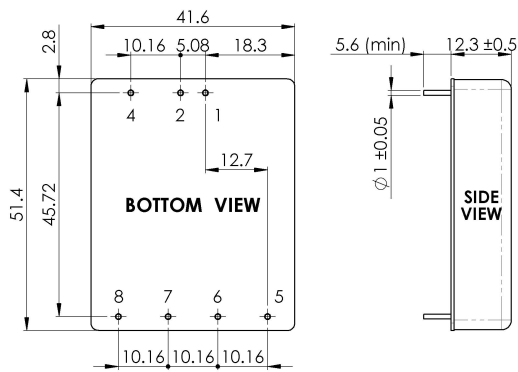
Suggest adding input external filter(C1,C2,C3,C4,C5,L) to meet conducted emissions (EN55022 class A) requirement for the module . These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.



12V: C1 C2 =330uF/100V
L=12uH
24V.48V: C1 C2 =220uF/100V
L=12uH

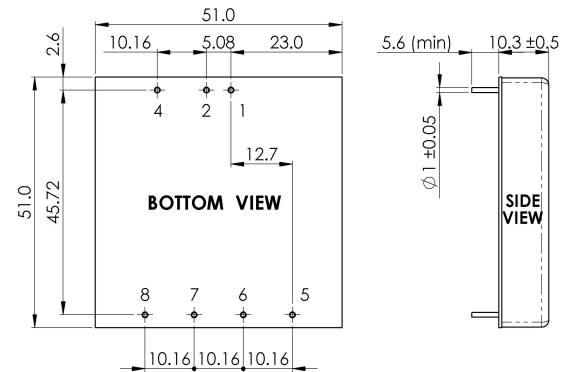
Markings and dimensions

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

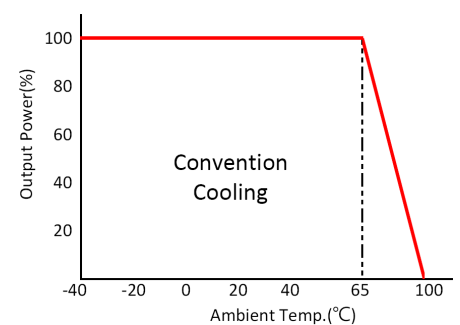
2 : 1 Input Voltage Range

Single & Dual Output

2" x 1"



Temperature Derating Graph



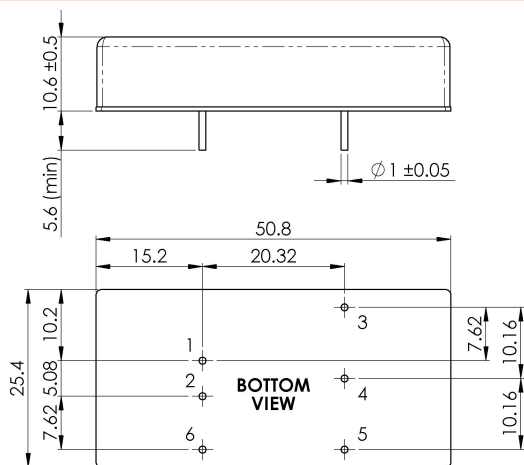
Output Specifications

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



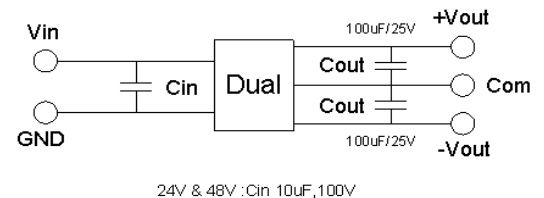
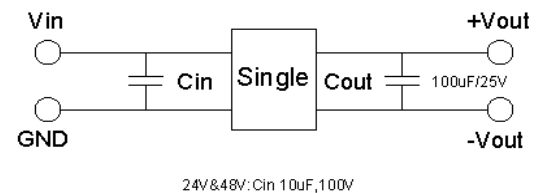
Unit : mm
Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

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

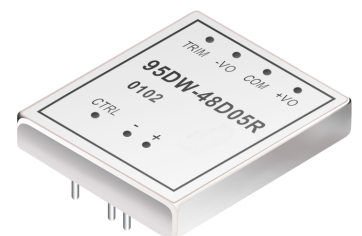
95DW SERIES

20Watt 1.5KV Isolated

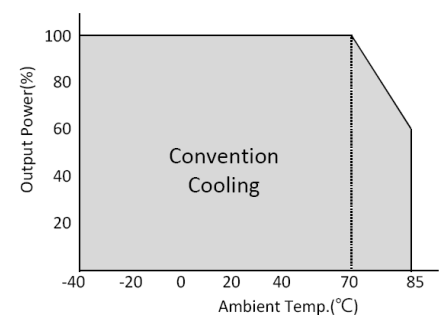
4 : 1 Input Voltage Range

Single & Dual Output

2" x 2"



Temperature Derating Graph



General Specifications

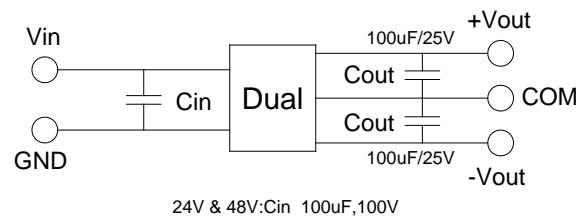
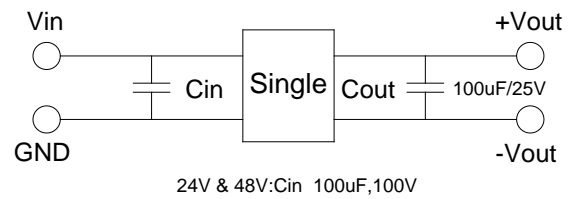
Parameters	Conditions	Min	Typ	Max	Units
Isolation Resistance	500Vdc	1000			MΩ
Switching Frequency			300		KHz
Operating Temperature		-40		85	°C
Humidity	Non Condensing			95	%
Cooling	Free air Convection				
Case material	Nickel Coated with Non-Conductive Base				
Weight			55		g
Dimensions	Package 1	51.4x41.6x12.3			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			

Part Number

95DW - 24 S 05 R 2 NL
 A B C D E F G

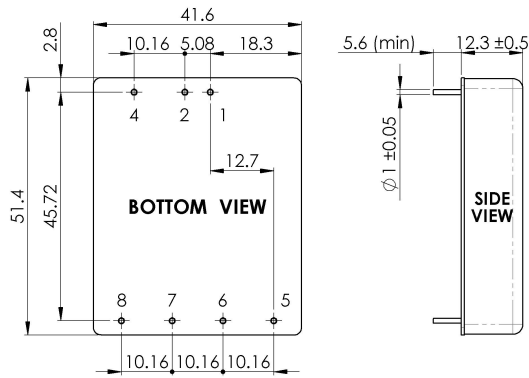
- A: Series
- B: Input Voltage
- C: Single Output (S),Dual (D)
- D: Output Voltage
- E: Regulated(R)
- F: Package
- G: RoHs Version

Recommended Test Circuit

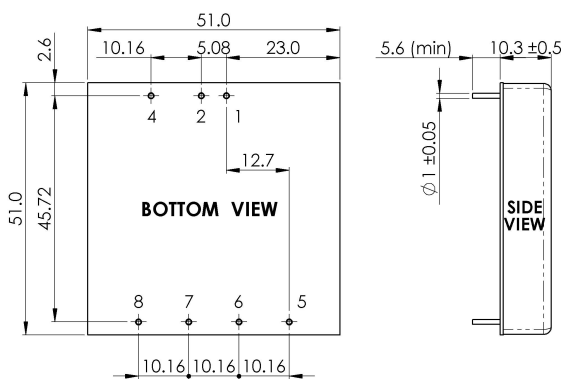


Markings and dimensions

Standard Model (-RNL)



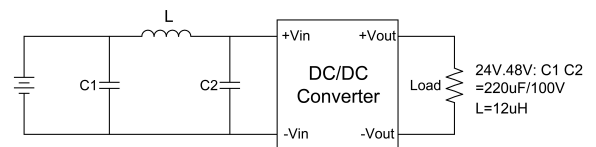
Extended model(-R2NL)



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

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

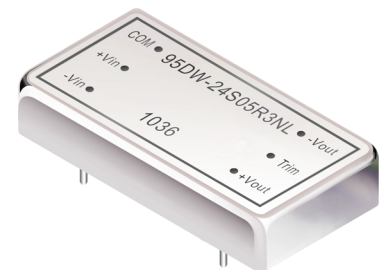
95DW-R3 SERIES

20Watt 1.5KV Isolated

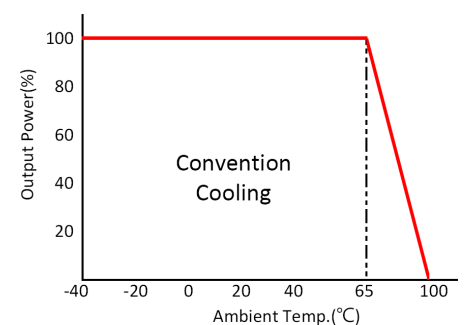
4 : 1 Input Voltage Range

Single & Dual Output

2" x 1"



Temperature Derating Graph



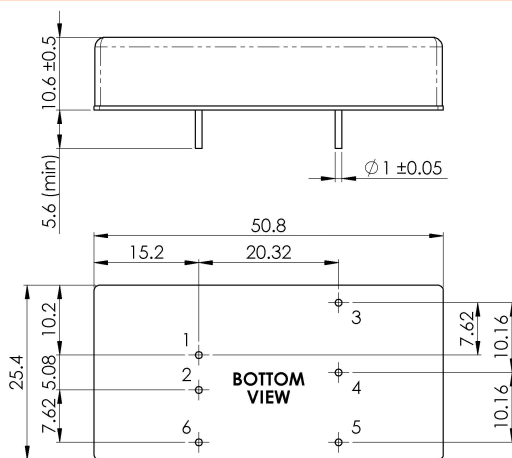
Output Specifications

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



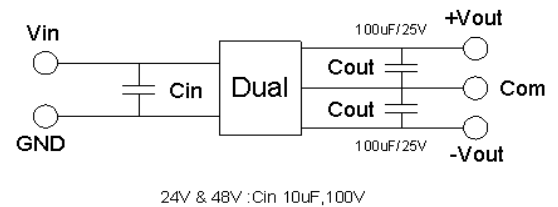
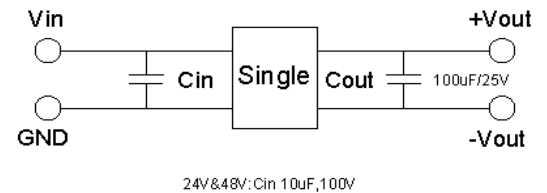
Unit : mm
Tolerance : XX.X ± 0.5 , XX.XX ± 0.25

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 :

- 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

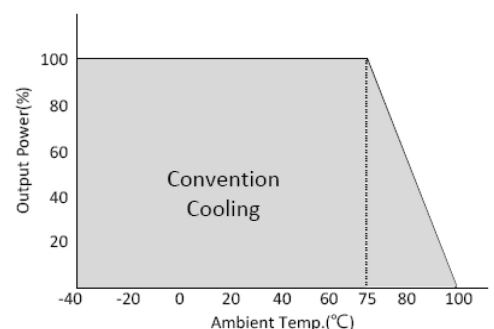
98DW20-R3 SERIES

20Watt 3KV Isolated

4 : 1 Input Voltage Range

Single & 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
Voltage Types				4:1	
Input current at no load (Nominal input voltage)	24V models		7		mA
	48V models		5		
	110V models		4		
Surge Voltage (1 sec. max.)	24V models			50	Vdc
	48V models			100	
	110V models			170	
Input Filter	PI Type				
Reflected ripple current			30		mAp-p
Remote ON/OFF (Refer to -Vin PIN)	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			

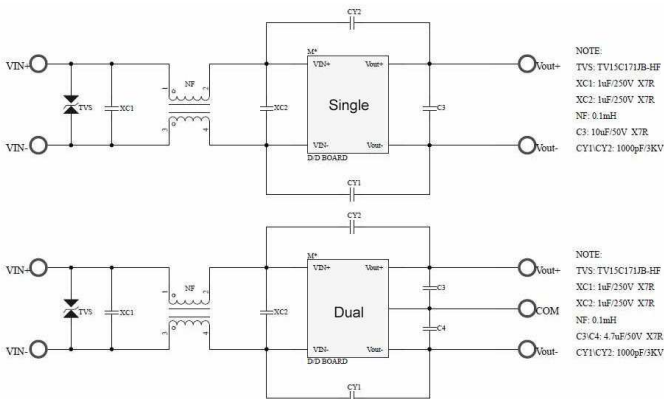
Output Specifications

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

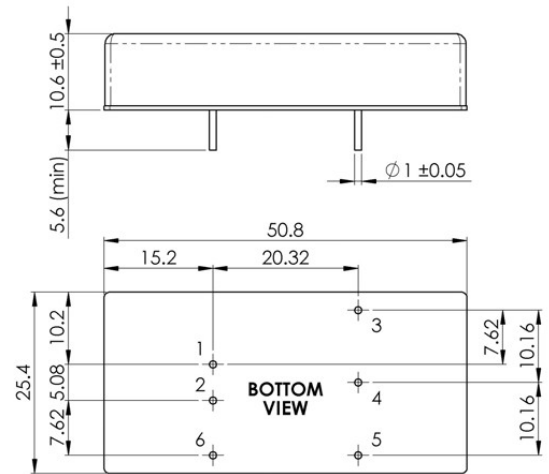


Part Number

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