# DC/DC CONVERTER

# 1.8 Watt

2019

http://www.mmtmachrone.com

## 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℃ TO +85℃
- 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-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 | |

30D-05S05NNL
30D-05S05RNL
30D-05S24RNL
30D-12S24NNL
30D-15S15NNL
30D-24S05NNL
30D-24S05RNL

**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

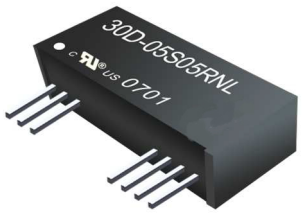
# 30D SERIES

## 1.8Watt

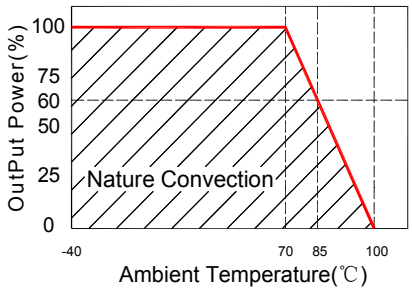
## 0.5KV Isolated

## Single & Dual Output

## SIP12




## Temperature Derating Graph



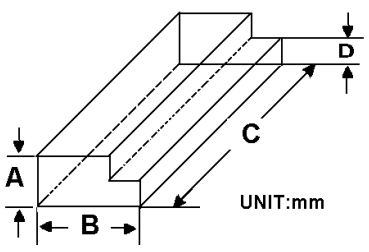
## Output Specifications

| 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

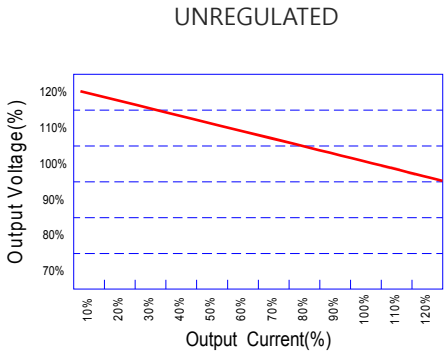
| Parameters | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| Isolation Resistance | 500Vdc | 1000 | | | MΩ |
| Switching Frequency | Full load, nominal input | | 100 | | KHz |
| Operating Temperature | | -40 | | +85 | ℃ |
| Humidity | Non Condensing | | | 95 | % |
| Cooling | Free air Convection | | | | |
| Case material | DAP | | | | |
| MTBF | MIL-HDBK-217F@25℃ (Unregulated) | 2500000 | | | Hours |
| MTBF | MIL-HDBK-217F@25℃ (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

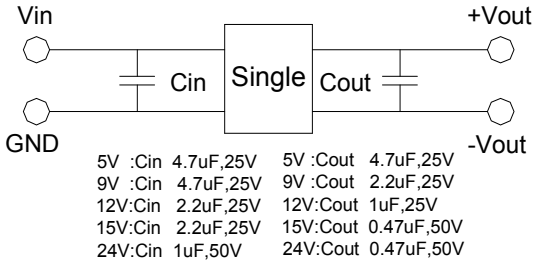


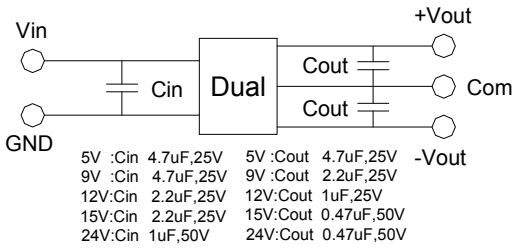

## Part Number

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

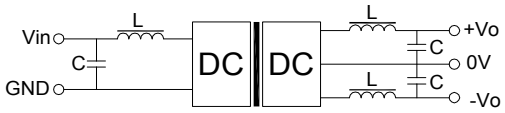
A:Series
B:Input Voltage
C:Single(S)Dual(D)
D:Output Voltage
E:Regulated(R)Unregulated(N)
F:RoHS Version

## Recommended Test Circuit



## Application Note




<Figure 1>

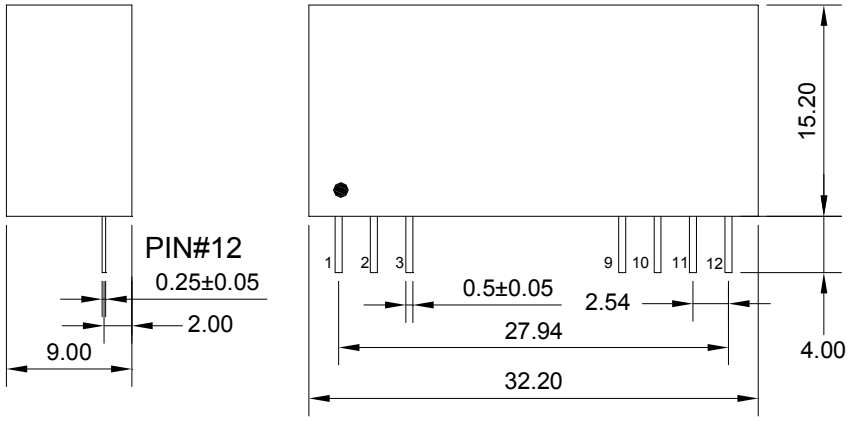
External Capacitor Table

| 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 :

- 24PIN DIP Package
- High Efficiency up to 85%
- Unregulated & Regulated Output Types
- Low Ripple & Noise
- Internal SMD Construction
- Industry Standard Pinout
- Operating Temperature:-40℃ TO +85℃
- 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

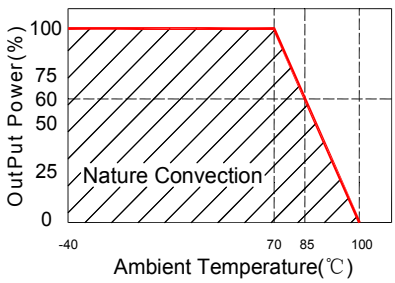
## 1.8Watt

## 0.5KV Isolated

## Single & Dual Output

## DIP24


## Temperature Derating Graph



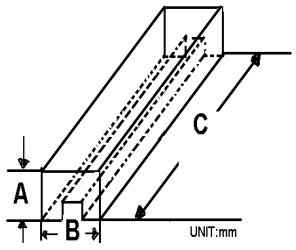
## Output Specifications

| 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

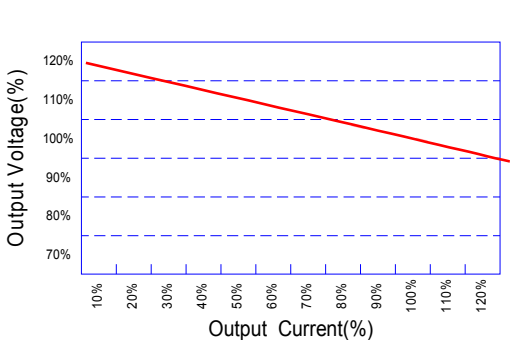
| Parameters | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| Isolation Resistance | 500Vdc | 1000 | | | MΩ |
| Switching Frequency | Full load, nominal input | | 50 | | KHz |
| Operating Temperature | | -40 | | +85 | ℃ |
| Humidity | Non Condensing | | | 95 | % |
| Cooling | Free air Convection | | | | |
| Case material | DAP | | | | |
| MTBF | MIL-HDBK-217F@25℃ (Unregulated) | 2500000 | | | Hours |
| MTBF | MIL-HDBK-217F@25℃ (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

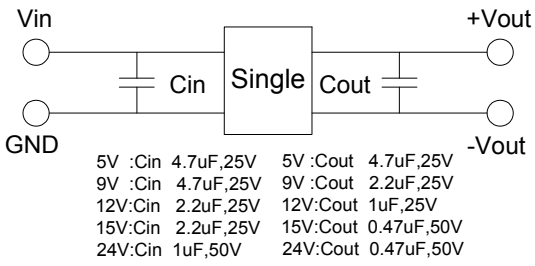


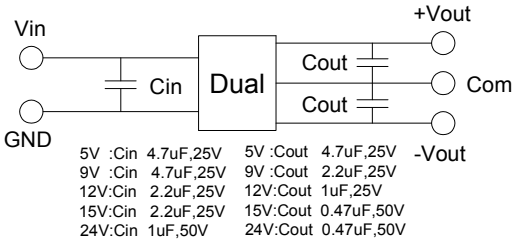

## Part Number

40D - 05 S 05 R NL
A B C D E F

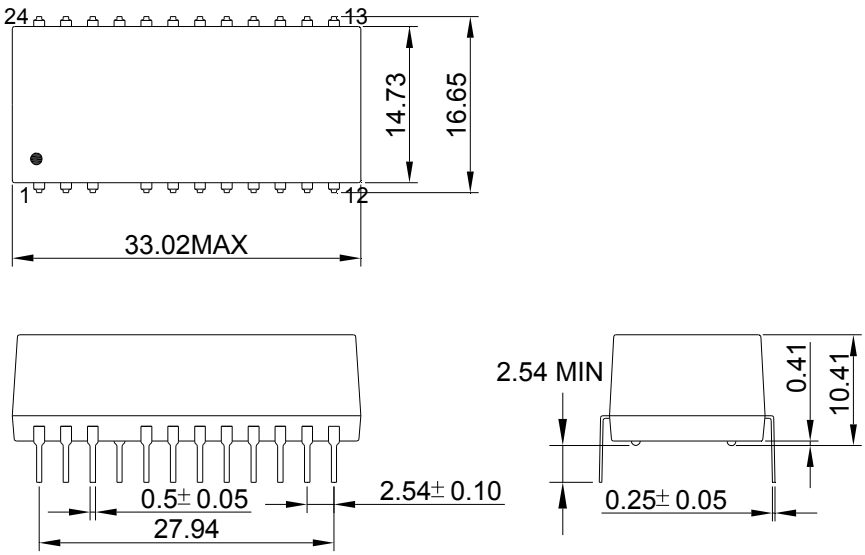
A:Series
B:Input Voltage
C:Single(S)Dual(D)
D:Output Voltage
E:Regulated(R)Unregulated(N)
F:RoHS Version

## 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℃ TO +85℃
- 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

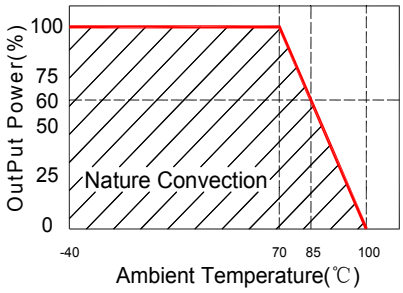
## 1.8Watt

## 2KVrms Isolated

## Single & Dual Output

## DIP24


## Temperature Derating Graph



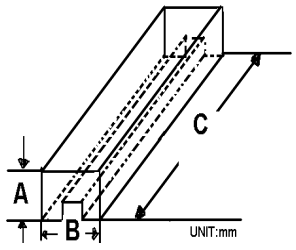
## Output Specifications

| Parameters | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| 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

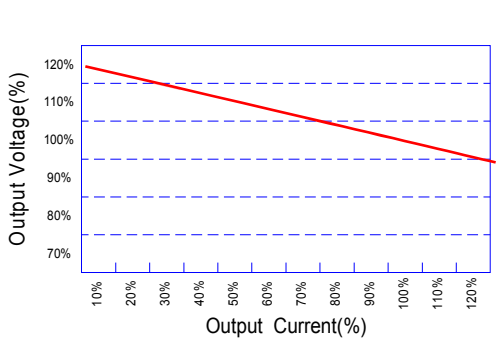
| Parameters | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| Isolation Resistance | 500Vdc | 1000 | | | MΩ |
| Switching Frequency | Full load, nominal input | | 50 | | KHz |
| Operating Temperature | | -40 | | +85 | ℃ |
| Humidity | Non Condensing | | | 95 | % |
| Cooling | Free air Convection | | | | |
| Case material | DAP | | | | |
| MTBF | MIL-HDBK-217F@25℃ (Unregulated) | 2500000 | | | Hours |
| MTBF | MIL-HDBK-217F@25℃ (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

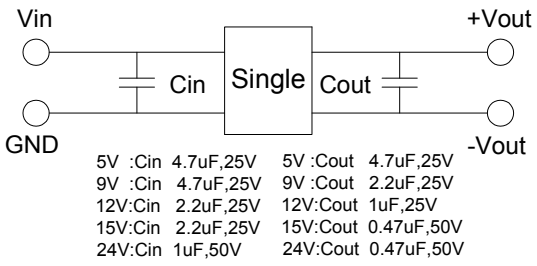



## Part Number

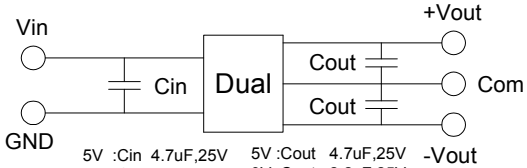
41D - 05 S 05 R NL
A B C D E F

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

## Recommended Test Circuit

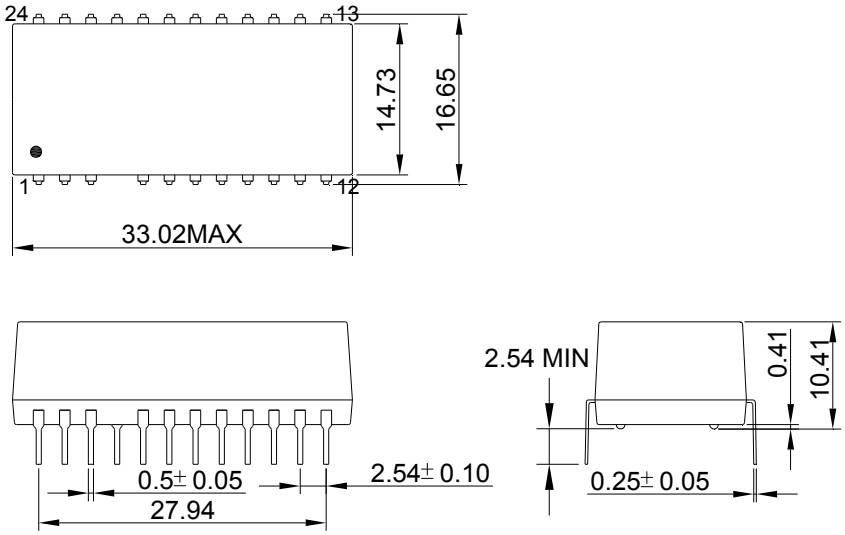



5V :Cin 4.7uF,25V 5V :Cout 4.7uF,25V
9V :Cin 4.7uF,25V 9V :Cout 2.2uF,25V
12V:Cin 2.2uF,25V 12V:Cout 1uF,25V
15V:Cin 2.2uF,25V 15V:Cout 0.47uF,50V
24V:Cin 1uF,50V 24V:Cout 0.47uF,50V




5V :Cin 4.7uF,25V 5V :Cout 4.7uF,25V
9V :Cin 4.7uF,25V 9V :Cout 2.2uF,25V
12V:Cin 2.2uF,25V 12V:Cout 1uF,25V
15V:Cin 2.2uF,25V 15V:Cout 0.47uF,50V
24V:Cin 1uF,50V 24V:Cout 0.47uF,50V

## 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℃ TO +85℃
- No External Component Required

# DC-DC Converter

# 43D SERIES

## 1.8Watt

## 0.5KV Isolated

## Single & Dual Output

## SMD


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

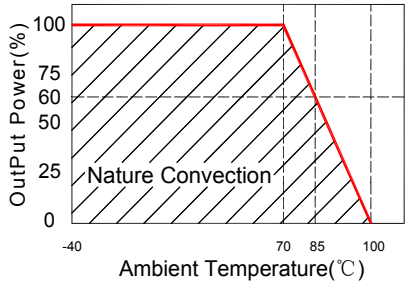
| Part Number | Output Voltage | Output Current | Efficiency | Recognized By UL 60950-1 |
|---|---|---|---|---|
| | Vdc | mA | %Typ | |
| 43D-XXS05RNL | 5 | 360 | 58 | |
| 43D-XXS05NNL | 5 | 360 | 70 | |
| 43D-XXD05NNL | ±5 | ±180 | 70 | |
| 43D-XXS09RNL | 9 | 200 | 60 | |
| 43D-XXS09NNL | 9 | 200 | 70 | |
| 43D-XXD09NNL | ±9 | ±100 | 70 | |
| 43D-XXS12RNL | 12 | 150 | 60 | |
| 43D-XXS12NNL | 12 | 150 | 75 | 43D-05S05NNL |
| 43D-XXD12RNL | ±12 | ±75 | 60 | 43D-05S24NNL |
| 43D-XXD12NNL | ±12 | ±75 | 75 | 43D-09S05NNL |
| 43D-XXS15RNL | 15 | 120 | 60 | 43D-24S05NNL |
| 43D-XXS15NNL | 15 | 120 | 75 | 43D-24S24NNL |
| 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 | | | | |

## Temperature Derating Graph



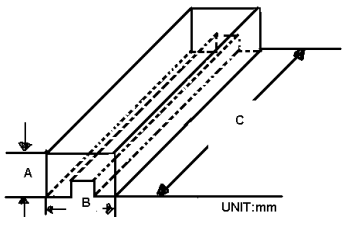
## Output Specifications

| 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

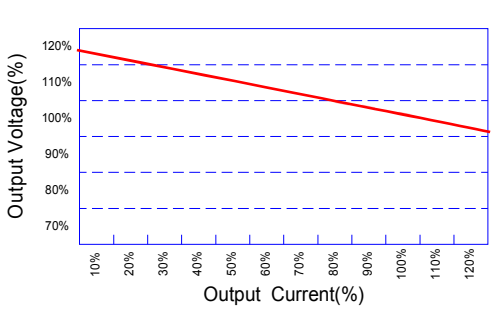
| Parameters | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| Isolation Resistance | 500Vdc | 1000 | | | MΩ |
| Switching Frequency | Full load, nominal input | | 50 | | KHz |
| Operating Temperature | | -40 | | +85 | ℃ |
| Humidity | Non Condensing | | | 95 | % |
| Cooling | Free air Convection | | | | |
| Case material | DAP | | | | |
| MTBF | MIL-HDBK-217F@25℃ (Unregulated) | 2500000 | | | Hours |
| MTBF | MIL-HDBK-217F@25℃ (Regulated) | 1500000 | | | Hours |
| Weight | | | 8.9 | | g |
| Dimensions | | | 33.02X14.73X10.70 | | mm |

## Packaging




| Size(mm) | | |
|---|---|---|
| A | B | C |
| 18.71 | 23.00 | 522 |

## Tolerance Envelope Graph

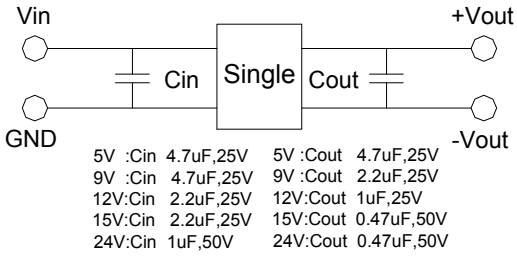



## Part Number

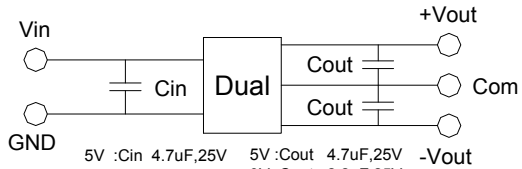
43D - 05 S 05 R NL
A B C D E F

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

## Recommended Test Circuit

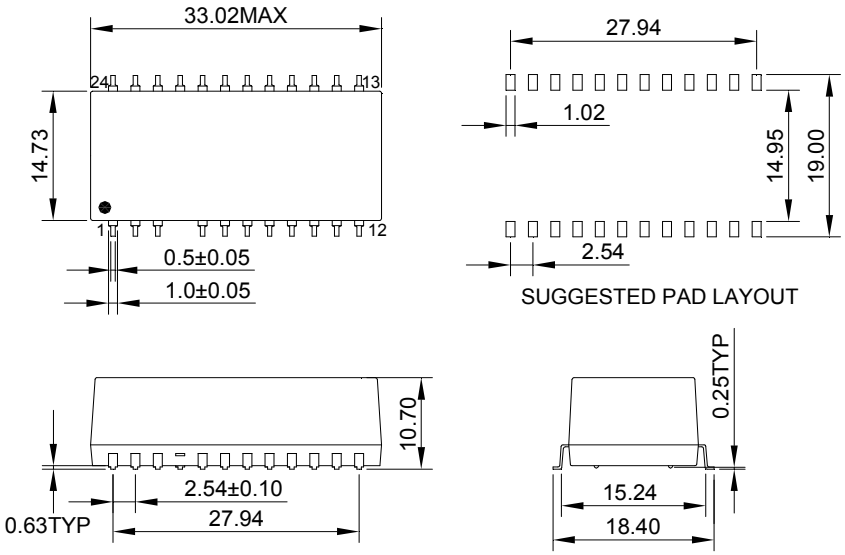



5V :Cin 4.7uF,25V 5V :Cout 4.7uF,25V
9V :Cin 4.7uF,25V 9V :Cout 2.2uF,25V
12V:Cin 2.2uF,25V 12V:Cout 1uF,25V
15V:Cin 2.2uF,25V 15V:Cout 0.47uF,50V
24V:Cin 1uF,50V 24V:Cout 0.47uF,50V




5V :Cin 4.7uF,25V 5V :Cout 4.7uF,25V
9V :Cin 4.7uF,25V 9V :Cout 2.2uF,25V
12V:Cin 2.2uF,25V 12V:Cout 1uF,25V
15V:Cin 2.2uF,25V 15V:Cout 0.47uF,50V
24V:Cin 1uF,50V 24V:Cout 0.47uF,50V

## 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 DIL Package
- Low Ripple & Noise
- High Efficiency up to 85%
- Unregulated & Regulated Output Types
- Internal SMD Construction
- No External Component Required
- Operating Temperature:-40℃ TO +85℃
- 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 |
|---|---|---|---|---|---|
| Voltage Tolerance | Vo,Io Nom | | | ±10 | % |
| Filter | Capacitor | | | | |

# DC-DC Converter

# 50D SERIES

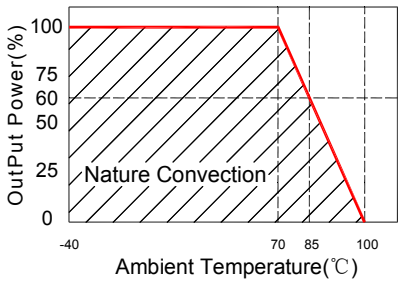
## 1.8Watt

## 0.5KV Isolated

## Single & Dual Output

## DIL24


## Temperature Derating Graph



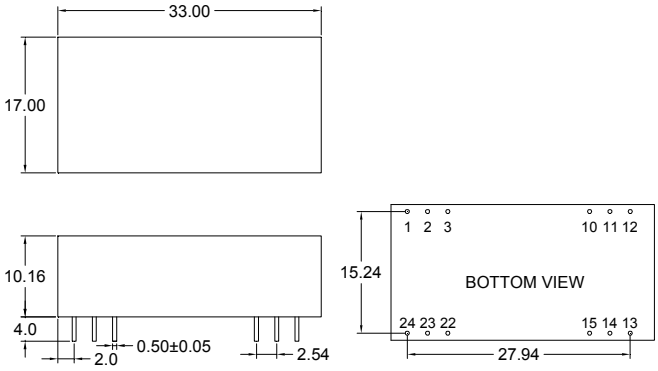
## Output Specifications

| 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

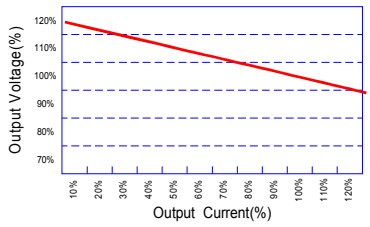
| Parameters | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| Isolation Resistance | 500Vdc | 1000 | | | MΩ |
| Switching Frequency | Full load, nominal input | | 50 | | KHz |
| Operating Temperature | | -40 | | +85 | ℃ |
| Humidity | Non Condensing | | | 95 | % |
| Cooling | Free air Convection | | | | |
| Case material | DAP | | | | |
| MTBF | MIL-HDBK-217F@25℃ (Unregulated) | 2500000 | | | Hours |
| MTBF | MIL-HDBK-217F@25℃ (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

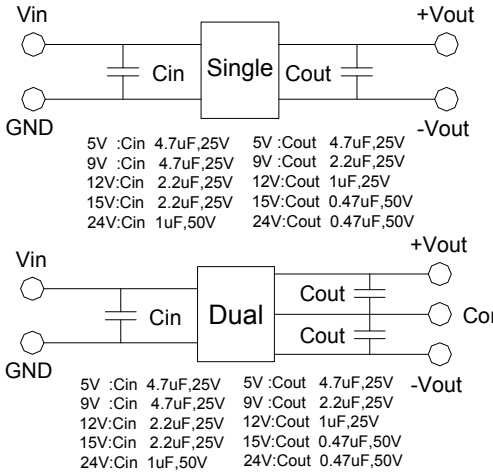



## Part Number

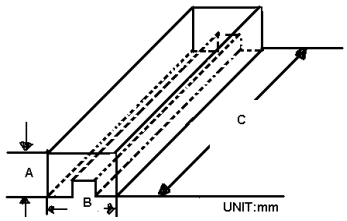
50D - 05 S 05 R NL
A B C D E F

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℃ TO +85℃
- 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

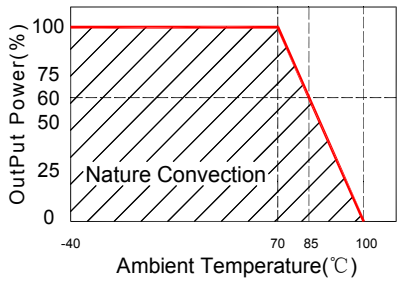
## 1.8Watt

## 0.5KV Isolated

## Single & Dual Output

## DIL24


## Temperature Derating Graph



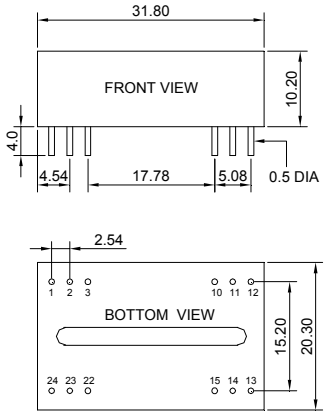
## Output Specifications

| 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

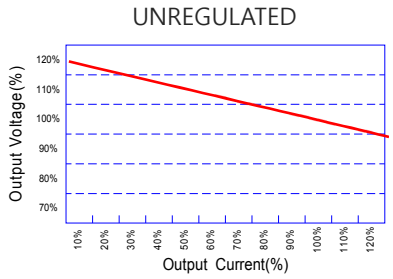
| Parameters | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| Isolation Resistance | 500Vdc | 1000 | | | MΩ |
| Switching Frequency | Full load, nominal input | | 50 | | KHz |
| Operating Temperature | | -40 | | +85 | ℃ |
| Humidity | Non Condensing | | | 95 | % |
| Cooling | Free air Convection | | | | |
| Case material | DAP | | | | |
| MTBF | MIL-HDBK-217F@25℃ | 2500000 | | | Hours |
| MTBF | MIL-HDBK-217F@25℃ (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

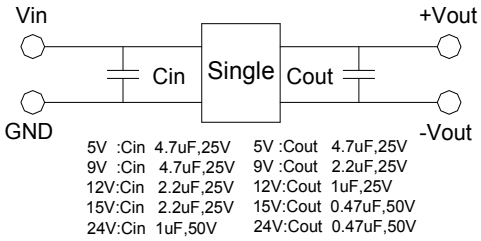



## Part Number

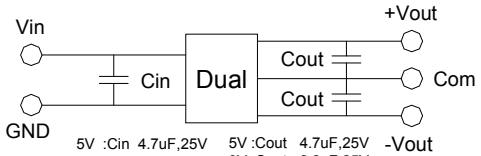
52D - 05 S 05 R NL
A B C D E F

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

## Recommended Test Circuit

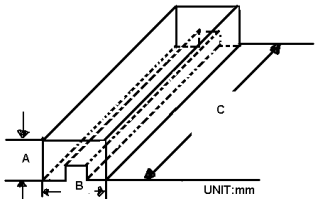



| | | | |
|---|---|---|---|
| 5V :Cin | 4.7uF,25V | 5V :Cout | 4.7uF,25V |
| 9V :Cin | 4.7uF,25V | 9V :Cout | 2.2uF,25V |
| 12V:Cin | 2.2uF,25V | 12V:Cout | 1uF,25V |
| 15V:Cin | 2.2uF,25V | 15V:Cout | 0.47uF,50V |
| 24V:Cin | 1uF,50V | 24V:Cout | 0.47uF,50V |




| | | | |
|---|---|---|---|
| 5V :Cin | 4.7uF,25V | 5V :Cout | 4.7uF,25V |
| 9V :Cin | 4.7uF,25V | 9V :Cout | 2.2uF,25V |
| 12V:Cin | 2.2uF,25V | 12V:Cout | 1uF,25V |
| 15V:Cin | 2.2uF,25V | 15V:Cout | 0.47uF,50V |
| 24V:Cin | 1uF,50V | 24V:Cout | 0.47uF,50V |

## 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 |