



Wide Input Voltage Range 60 Watt Dc-Dc Converter



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 Vdc | Input Current | | Output Voltage Vdc | Output Current Full Load (mA) | Efficiency %TYP |
|--------------|----------------------|------------------|--------------------|-----------------------|----------------------------------|--------------------|
| | | No-Load (mA TYP) | 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 | | | | |

Output Specifications (Temperature Coefficient : ±0.03%/°C)

| Parameters | Conditions | Min | Typ | Max | Units |
|---------------------------------|--------------------------------|-----|-----|------|-------|
| Voltage Tolerance | Single/Dual | | | ±2 | % |
| Short Circuit/ Restart | Continuous/ Automatic | | | | |
| Over Load Protection | | 120 | 150 | 180 | % |
| Line Regulation | Single & Dual (H/L to L/L) | | | ±0.5 | % |
| Load Regulation | Single & Dual (F.L-50%F.L) | | | ±0.5 | % |
| Minimum Load | 30% of Full Load | | | | |
| Ripple & Noise | BW=DC To 20MHz (with 1uF Cap.) | | | 150 | mVp-p |
| Transient response setting time | 50% Step Load Change | | | 400 | us |
| Capacitive load | | | | 1500 | uF |
| External Trim Adj. Range | ±10% of Output Voltage | | | | |

General Specifications

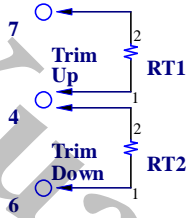
| Parameters | Conditions | Min | Typ | Max | Units |
|-----------------------|-------------------------------------|--------|-----------------------|------|-------|
| Isolation Resistance | 500Vdc | 1000 | | | MΩ |
| Switching Frequency | | | 50 | | KHz |
| Operating Temperature | | -40 | | 85 | °C |
| Humidity | Non Condensing | | | 95 | % |
| Cooling | Free air Convection | | | | |
| Case material | Six-Side Shielded Case | | | | |
| Weight | | | 227.5 | | g |
| Dimensions | Appearance size | | 76.7X66.5mmX21.5 | | mm |
| Potting Material | | | Epoxy (UL94V-0 rated) | | |
| Radiated Emissions | EN55022 | | CLASS A | | |
| Conducted Emissions | EN55022 | | CLASS A | | |
| Efficiency | | 80 | | | % |
| 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 |



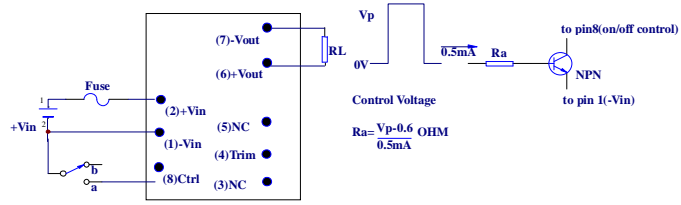
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Output Voltage Adjustment

Output can be externally trimmed by using the method shown below.

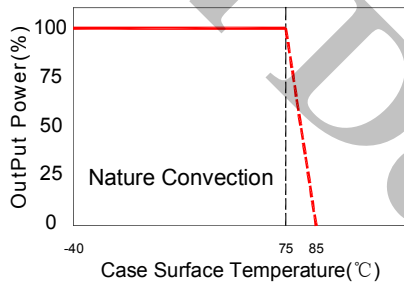


Control Pin Suggest Circuit

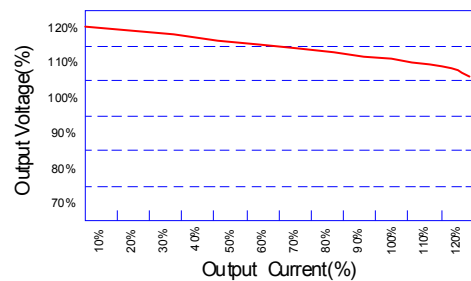


When pin8 short to pin1,D/D ON=>OFF
When pin8 leave open,D/D => ON

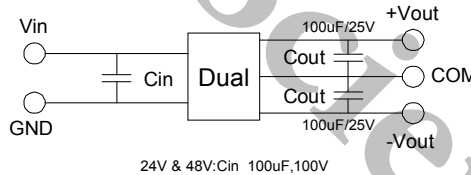
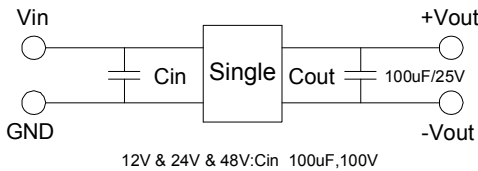
Temperature Derating Graph



Tolerance Envelope Graph



Recommended Test Circuit

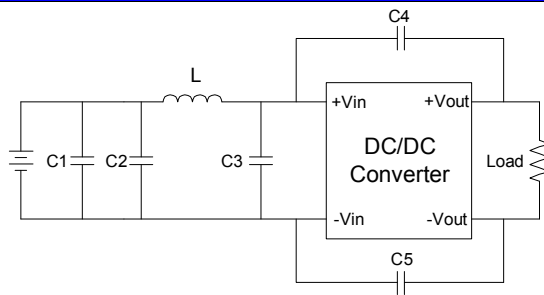


Part Number

93D - 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

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. 24V: C1 C2 C3=4.7uF/50V
L=450uH
C4 C5=1000P/2KV
48V: C1 C2 C3=2.2uF/100V
L=480uH
C4 C5=1000P/2KV



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| Markings and dimensions | Packaging | | | | | | | | | |
|---|---|----------|--|--|---|---|---|------|------|------|
| <p>UNIT: mm XX.X±0.5 XX.XX±0.25 Pin Size Tolerance: 1.0Φ ±0.05mm</p> | <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <thead> <tr> <th colspan="3">SIZE(mm)</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">68.0</td> <td style="text-align: center;">78.0</td> <td style="text-align: center;">24.0</td> </tr> </tbody> </table> | SIZE(mm) | | | A | B | C | 68.0 | 78.0 | 24.0 |
| SIZE(mm) | | | | | | | | | | |
| A | B | C | | | | | | | | |
| 68.0 | 78.0 | 24.0 | | | | | | | | |

| PIN Connection | | | | | | | | |
|----------------|------|------|--------|------|--------|--------|--------|---------------|
| 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 |