

6 Watt**24 PIN DIL Package V
4:1 Input Range**

- o Wide 4:1 Input Range
- o Efficiency up to 85%
- o Continuous Short Circuit Protection
- o Add Suffix „A“ for Metal Case
- o EMC filter meets EN55022 Class A without external components
- o Isolation Voltage
 - Suffix „H1.5“ = 1.500 VDC
 - Suffix „H3“ = 3.000 VDC

| MODEL NUMBER | INPUT VOLTAGE | OUTPUT VOLTAGE | OUTPUT CURRENT FULL LOAD | INPUT CURRENT | | %EFF | CAPACITOR LOAD |
|----------------|---------------|----------------|--------------------------|---------------|-----------|---------|----------------|
| | | | | NO LOAD | FULL LOAD | | |
| 6VRS24X3.3M-Hx | 9-36 VDC | 3.3 VDC | 1400 mA | 10 mA | 257 mA | 76 | 470 µF |
| 6VRS24X5M-Hx | | 5 VDC | 1200 mA | | 316 mA | 80 | |
| 6VRS24X12M-Hx | | 12 VDC | 500 mA | | 301 mA | 84 | 100 µF |
| 6VRS24X15M-Hx | | 15 VDC | 400 mA | | | | |
| 6VRS24X24M-Hx | | 24 VDC | 250 mA | | | | 47 µF |
| 6VRD24X3.3M-Hx | | ±3.3 VDC | ±909 mA | | 324 mA | 78 | ±220 µF |
| 6VRD24X5M-Hx | | ±5 VDC | ±600 mA | | 308 mA | 82 | |
| 6VRD24X12M-Hx | | ±12 VDC | ±250 mA | 301 mA | 84 | ±100 µF | |
| 6VRD24X15M-Hx | | ±15 VDC | ±200 mA | 15 mA | | | |
| 6VRD24X24M-Hx | | ±24 VDC | ±125 mA | 20 mA | 308 mA | 82 | ±47 µF |
| 6VRS48X3.3M-Hx | 18-75 VDC | 3.3 VDC | 1400 mA | 7 mA | 128 mA | 76 | 470 µF |
| 6VRS48X5M-Hx | | 5 VDC | 1200 mA | | 154 mA | 82 | |
| 6VRS48X12M-Hx | | 12 VDC | 500 mA | | 151 mA | 84 | 100 µF |
| 6VRS48X15M-Hx | | 15 VDC | 400 mA | | 149 mA | 85 | |
| 6VRS48X24M-Hx | | 24 VDC | 250 mA | | | | |
| 6VRD48X3.3M-Hx | | ±3.3 VDC | ±909 mA | | | | 160 mA |
| 6VRD48X5M-Hx | | ±5 VDC | ±600 mA | | 154 mA | 82 | |
| 6VRD48X12M-Hx | | ±12 VDC | ±250 mA | 151 mA | 84 | ±100 µF | |
| 6VRD48X15M-Hx | | ±15 VDC | ±200 mA | | | | |
| 6VRD48X24M-Hx | | ±24 VDC | ±125 mA | 10 mA | 156 mA | 81 | ±47 µF |

SPECIFICATIONS

All Specifications Typical At Nominal Line, Full Load, and 25°C Unless Otherwise Noted

| INPUT SPECIFICATIONS | | |
|---|-------------------|--------|
| Input Voltage Range | 4:1 | |
| Under Voltage lockout | 24 Vin Module ON | 8.5 V |
| | 24 Vin Module OFF | 7.0 V |
| | 48 Vin Module ON | 16.5 V |
| | 48 Vin Module OFF | 14.5 V |
| Start up Time (Nominal Vin and constant resistive Load) | 20 mS | |
| Input Filter | Pi Type | |
| Input Current (No-Load) | see table max. | |
| Input Current (Full-Load) | see table | |
| Input Reflected Ripple Current ¹⁾ | 20 mA p-p | |

| OUTPUT SPECIFICATIONS | |
|--|---|
| Voltage Accuracy | ±2.0% |
| Voltage Balance (Dual Output) | ±2.0% |
| Maximum Output Current | see table |
| Minimum Output Current | 0 mA |
| Temperature Coefficient | ±0.02%/°C |
| Capacitive Load ²⁾ | see table |
| Ripple & Noise 20MHz BW ³⁾ | 24 V Dual Output 80 mV p-p max. 100 mV p-p max. |
| Short Circuit Protection | Indefinite (Hiccup) (Automatic Recovery) |
| Line Regulation | ±0.5% max. |
| Load Regulation (0% to 100%) | ±1.2% max. |
| Cross Regulation (Dual Output) ⁴⁾ | ±5% |
| Over Load Protection | 160% of I _{out} |
| Transient Recovery Time ⁵⁾ | 300 μs |
| Transient Response Deviation ⁵⁾ | 3.3 V Single Output ±3% max. ±5% max. |

NOTE:

1. Measured Input reflected ripple current with a simulated source inductance of 12 μH and a source capacitor C_{in} (47 μF, ESR<1.0 Ohm at 100 kHz).
2. Tested by minimal Vin and constant resistive load.
3. Ripple and Noise measured with 1.0 μF ceramic capacitor.
4. One load is 25% to 100% load, the other load is 100% load, the output voltage variable rate is within ±5%.
5. Tested by normal Vin and 25% load step change (75%-50%-25% of I_o).

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| GENERAL SPECIFICATION | | |
|---|---------------------------------------|---|
| Efficiency | | see table |
| I/O Isolation Voltage (3 sec) | Input/Output (add Suffix "H1.5") | 1500 VDC |
| | Input/Output (add Suffix "H3") | 3000 VDC |
| | Case/Input & Output (only Metal Case) | 1000 VDC |
| Isolation Resistance | | 1000 Mohms |
| Isolation Capacitance | | 1000 pF |
| Switching Frequency | | 330 kHz |
| Operating Temperature Range | | -40°C to +85°C (see Derating Curve) -40°C to +60°C (for 100% Load) |
| Case Temperature | | +100°C max. |
| Storage Temperature Range | | -55°C to +125°C |
| Cooling | | Natural Convection |
| Humidity | | 95% RH |
| Reliability Calculated MTBF (MIL-HDBK-217F) | | >800 khrs |
| Safety Standard (design to meet) | | IEC/EN 60950-1 |
| Environmental compliance (designed to meet) | | RoHS |
| Radiated Emissions | | EN55022 Class A |
| Conducted Emissions | | EN55022 Class A |
| ESD | | IEC61000-4-2 Perf. Criteria B |
| RS | | IEC61000-4-3 Perf. Criteria A |
| EFT ⁶⁾ | | IEC61000-4-4 Perf. Criteria A |
| Surge ⁶⁾ | | IEC61000-4-5 Perf. Criteria A |
| CS | | IEC61000-4-6 Perf. Criteria A |
| PFMF | | IEC61000-4-8 Perf. Criteria A |
| Case Material add Suffix "A" | | Non-conductive Black Plastic (UL94V-0 rated) Nickel-coated Copper |
| Base Material | | Non-conductive Black Plastic (UL94V-0 rated) |
| Pin Material | | Ø0.5 mm Brass Solder-coated |
| Potting Material | | Epoxy (UL94V-0 rated) |
| Dimensions | | 1.25 x 0.8 x 0.4 Inches (31.75 x 20.32 x 10.16 mm) |
| Weight | Plastic Case | 13 g |
| | Metal Case | 16.5 g |

NOTE

6. An external filter capacitor is required if the module has to meet EN61000-4-4 and EN61000-4-5.
The filter capacitor M+R suggest: Nippon chemi-con KY series, 220 µF/100 V.

ABSOLUTE SPECIFICATIONS

These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.

| | | |
|---|------|-------------------|
| Input Surge Voltage (100 ms) | 24 V | -0.7-50 VDC max. |
| | 48 V | -0.7-100 VDC max. |
| Soldering Temperature (1.5 mm from case 10 sec. max.) | | +260°C max. |

NOTE:

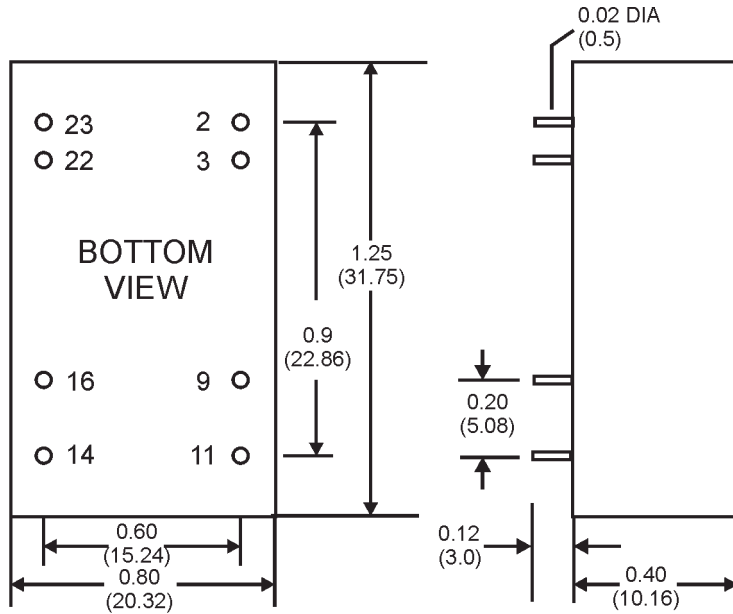
Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating.

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MECHANICAL SPECIFICATIONS

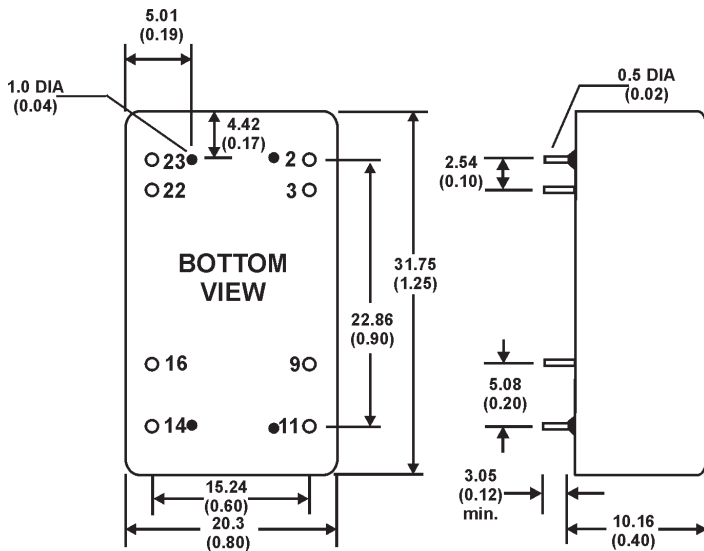
Case "V" (Plastic Case)



| PIN CONNECTIONS | | |
|-----------------|---------------|---------|
| PIN | SINGLE | DUAL |
| 2 | -INPUT | -INPUT |
| 3 | -INPUT | -INPUT |
| 9 | NO PIN | COMMON |
| 11 | NOT CONNECTED | -OUTPUT |
| 14 | +OUTPUT | +OUTPUT |
| 16 | -OUTPUT | COMMON |
| 22 | +INPUT | +INPUT |
| 23 | +INPUT | +INPUT |

All Dimensions in Inches(mm)
 Tolerance:
 Pin diameter: ±0.002 (±0.05)
 Pin Pitch and length tolerance: ±0.014 (±0.35)
 Case Tolerance: ±0.02 (±0.5)

Case "V" (Metal Case) - add Suffix „A“

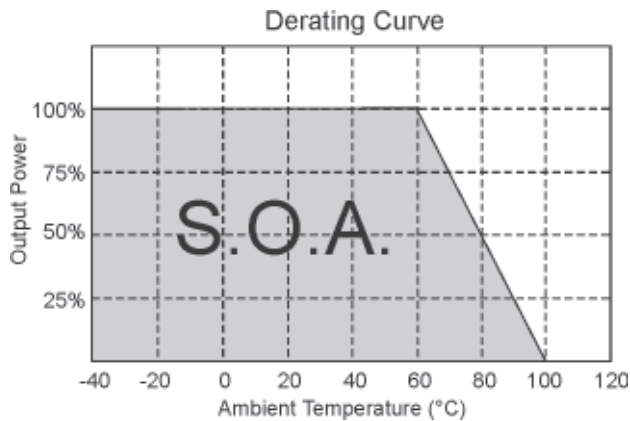


| PIN CONNECTIONS | | |
|-----------------|---------------|---------|
| PIN | SINGLE | DUAL |
| 2 | -INPUT | -INPUT |
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| 16 | -OUTPUT | COMMON |
| 22 | +INPUT | +INPUT |
| 23 | +INPUT | +INPUT |

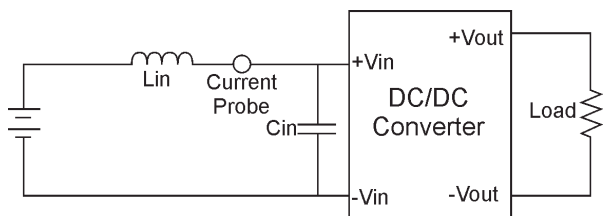
All Dimensions in mm (Inches)
 Tolerances:
 Pin diameter ± 0.05 (±0.002)
 Pin pitch ±0.35 (±0.014)
 Case ±0.5 (±0.02)
 Stand-off tolerance ±0.1 (±0.004)

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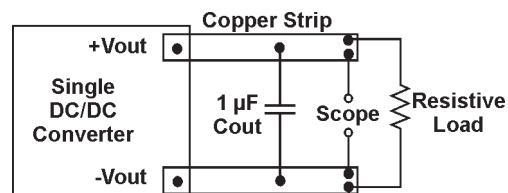
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APPLICATION NOTES & DIAGRAMS**TEST CONFIGURATIONS****Input Reflected Ripple Current Test Step**

Input reflected ripple current is measured through a source inductor L_{in} (12 μ H) and a source capacitor C_{in} (47 μ F, ESR<1.0 Ohm at 100 kHz) at nominal input and full load.

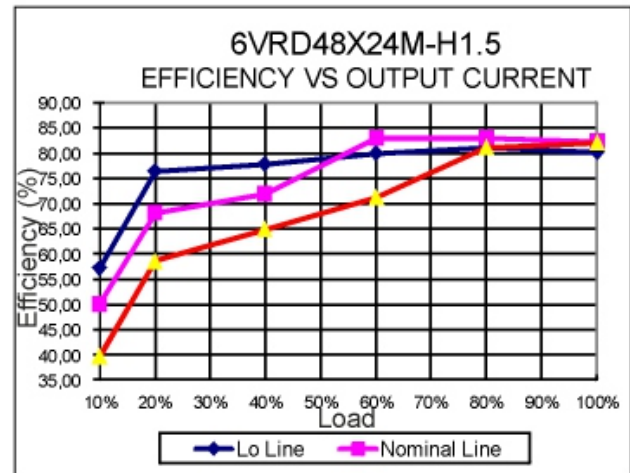
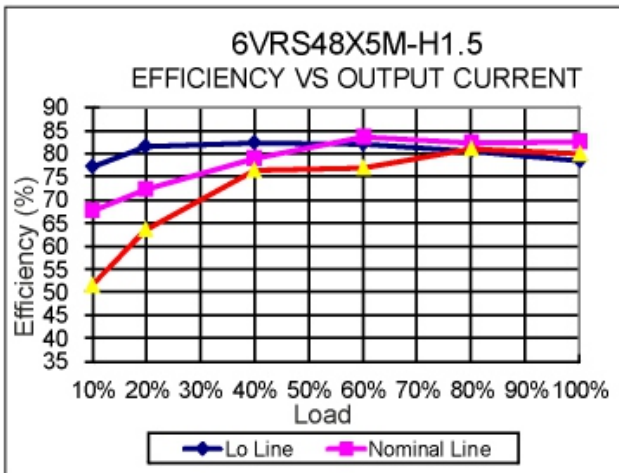
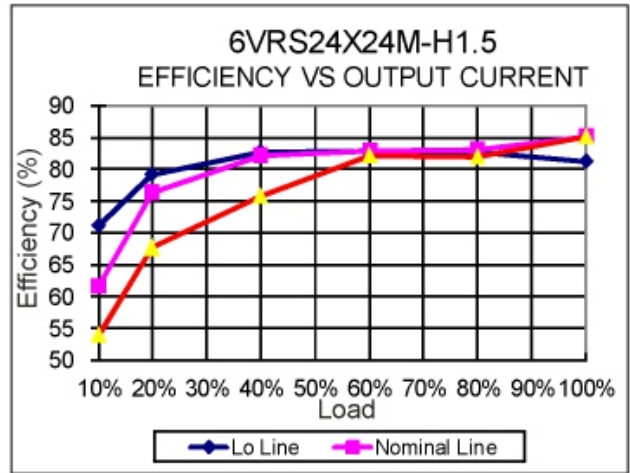
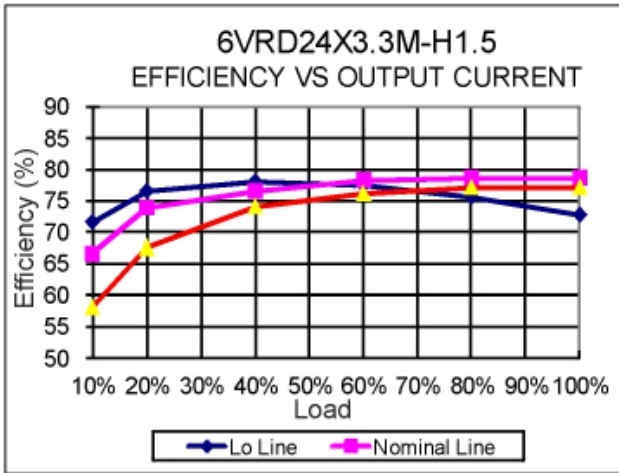
**Output Ripple & Noise Measurement Test**

Use a capacitor C_{out} (1.0 μ F) measurement. The Scope measurement bandwidth is 0-20 MHz.



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NOTICE:
 The information in this document has been carefully checked. However, no responsibility is assumed for inaccuracies!
 Specifications can be changed without notice. The latest and most complete information can be found on our website.