

**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		324 mA	78	47 µF
6VRD24X3.3M-Hx		±3.3 VDC	±909 mA				
6VRD24X5M-Hx		±5 VDC	±600 mA	308 mA	82	±220 µF	
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		149 mA	85	100 µF
6VRS48X15M-Hx		15 VDC	400 mA				
6VRS48X24M-Hx		24 VDC	250 mA		160 mA	79	47 µF
6VRD48X3.3M-Hx		±3.3 VDC	±909 mA				
6VRD48X5M-Hx		±5 VDC	±600 mA	154 mA	82	±220 µF	
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 <sup>1)</sup>		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 <sup>2)</sup>		see table
Ripple & Noise 20MHz BW <sup>3)</sup>	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) <sup>4)</sup>		±5%
Over Load Protection		160% of Iout
Transient Recovery Time <sup>5)</sup>		300 µs
Transient Response Deviation <sup>5)</sup>	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 Cin (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 Io).

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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 <sup>6)</sup>	IEC61000-4-4 Perf. Criteria A	
Surge <sup>6)</sup>	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:

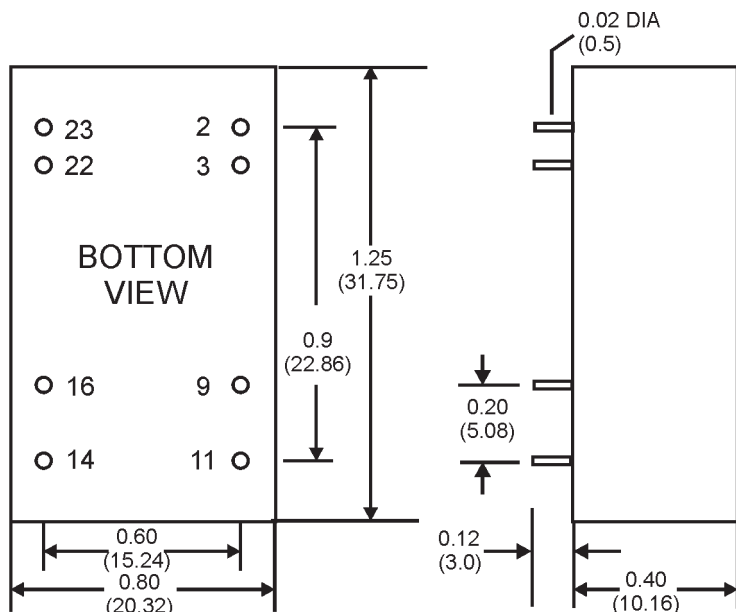
Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating.

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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)

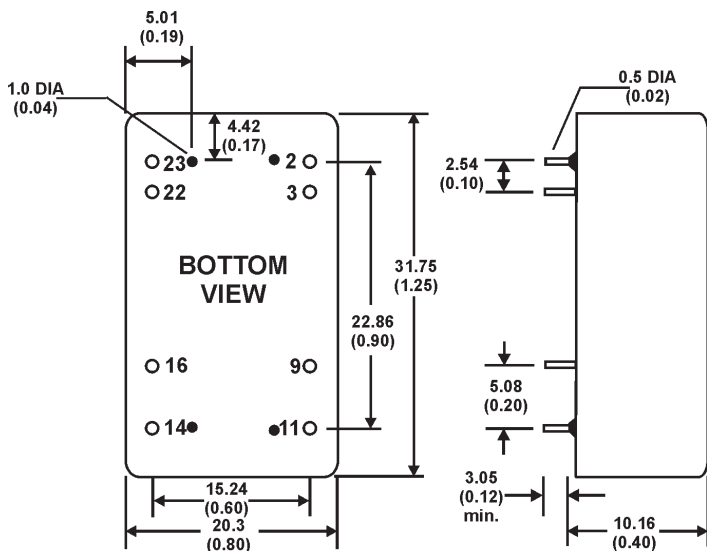
Tolerance:

Pin diameter:  $\pm 0.002$  ( $\pm 0.05$ )

Pin Pitch and length tolerance:  $\pm 0.014$  ( $\pm 0.35$ )

Case Tolerance:  $\pm 0.02$  ( $\pm 0.5$ )

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



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 mm (Inches)

Tolerances:

Pin diameter  $\pm 0.05$  ( $\pm 0.002$ )

Pin pitch  $\pm 0.35$  ( $\pm 0.014$ )

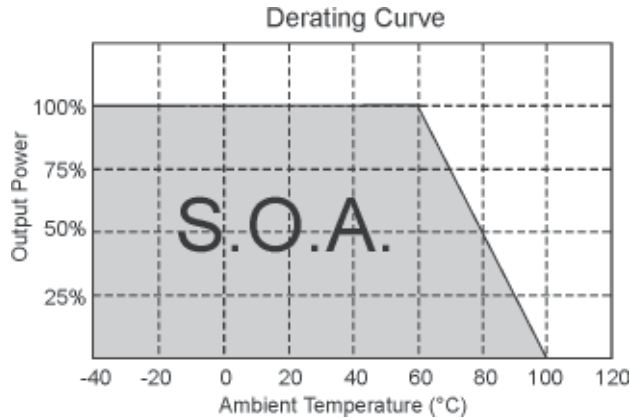
Case  $\pm 0.5$  ( $\pm 0.02$ )

Stand-off tolerance  $\pm 0.1$  ( $\pm 0.004$ )

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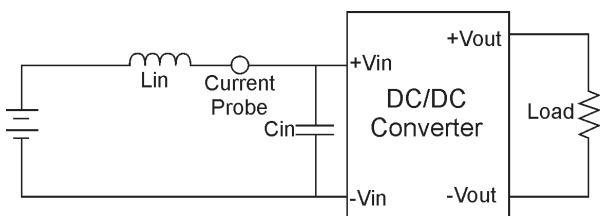
**APPLICATION NOTES & DIAGRAMS**



**TEST CONFIGURATIONS**

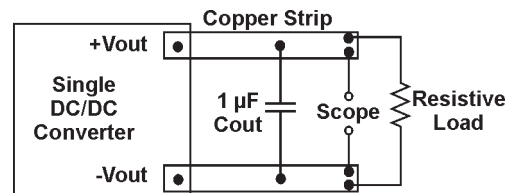
**Input Reflected Ripple Current Test Step**

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



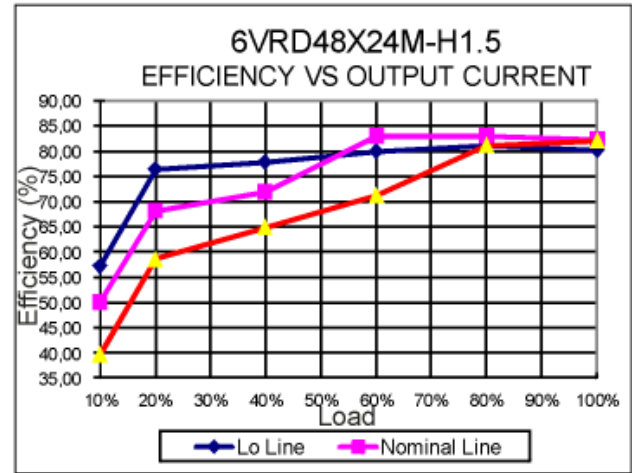
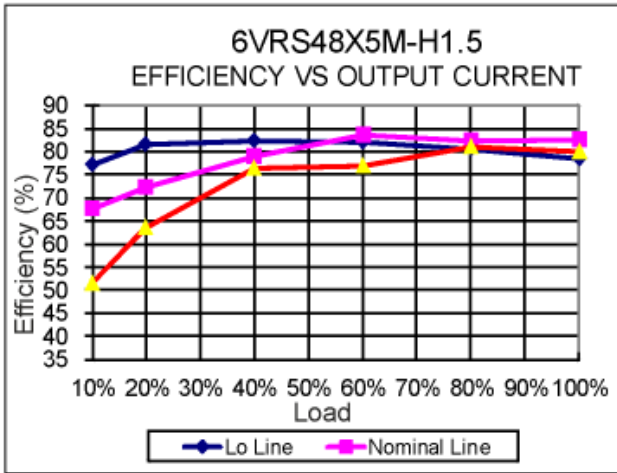
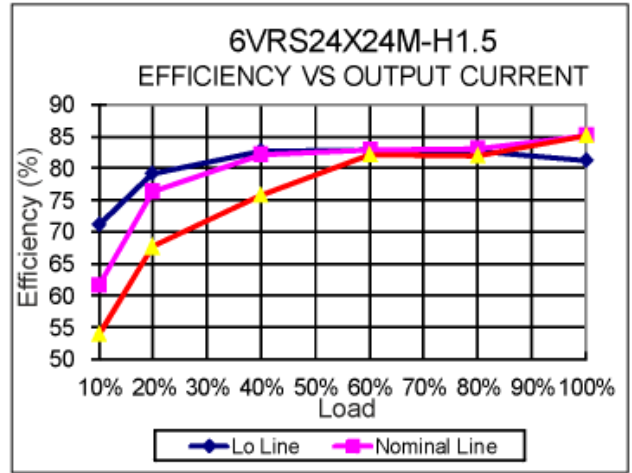
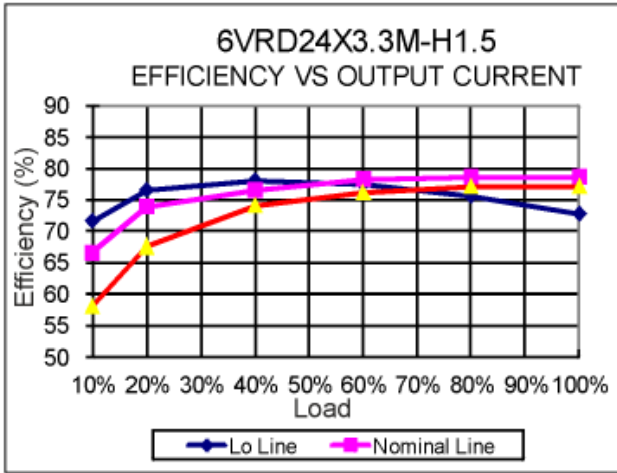
**Output Ripple & Noise Measurement Test**

Use a capacitor  $C_{out}$  (1.0  $\mu$ 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.