

6 Watt**24 PIN DIL Package V
2:1 Input Range**

- o Wide 2:1 Input Range
- o Efficiency up to 84%
- 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		
6VRS12W3.3M-Hx	9-18 VDC	3.3 VDC	1400 mA	7 mA	513 mA	75	470 µF
6VRS12W5M-Hx		5 VDC	1200 mA		633 mA	79	
6VRS12W12M-Hx		12 VDC	500 mA	10 mA	602 mA	83	100 µF
6VRS12W15M-Hx		15 VDC	400 mA		595 mA	84	
6VRS12W24M-Hx		24 VDC	250 mA	20 mA	610 mA	82	47 µF
6VRD12W3.3M-Hx		±3.3 VDC	±909 mA	10 mA	658 mA	76	±220 µF
6VRD12W5M-Hx		±5 VDC	±600 mA		625 mA	80	
6VRD12W12M-Hx		±12 VDC	±250 mA	15 mA	602 mA	83	±100 µF
6VRD12W15M-Hx		±15 VDC	±200 mA	20 mA	595 mA	84	
6VRD12W24M-Hx		±24 VDC	±125 mA	35 mA	617 mA	81	±47 µF
6VRS24W3.3M-Hx	18-36 VDC	3.3 VDC	1400 mA	7 mA	260 mA	74	470 µF
6VRS24W5M-Hx		5 VDC	1200 mA		316 mA	79	
6VRS24W12M-Hx		12 VDC	500 mA		301 mA	83	100 µF
6VRS24W15M-Hx		15 VDC	400 mA			83	
6VRS24W24M-Hx		24 VDC	250 mA	10 mA	305 mA	82	47 µF
6VRD24W3.3M-Hx		±3.3 VDC	±909 mA	7 mA	329 mA	76	±220 µF
6VRD24W5M-Hx		±5 VDC	±600 mA		312 mA	80	
6VRD24W12M-Hx		±12 VDC	±250 mA	10 mA	301 mA	83	±100 µF
6VRD24W15M-Hx		±15 VDC	±200 mA	15 mA	298 mA	84	
6VRD24W24M-Hx		±24 VDC	±125 mA	20 mA	305 mA	82	±47 µF
6VRS48W3.3M-Hx	36-75 VDC	3.3 VDC	1400 mA	7 mA	128 mA	76	470 µF
6VRS48W5M-Hx		5 VDC	1200 mA		154 mA	82	
6VRS48W12M-Hx		12 VDC	500 mA		151 mA	84	100 µF
6VRS48W15M-Hx		15 VDC	400 mA				
6VRS48W24M-Hx		24 VDC	250 mA				47 µF
6VRD48W3.3M-Hx		±3.3 VDC	±909 mA		162 mA	78	±220 µF
6VRD48W5M-Hx		±5 VDC	±600 mA				
6VRD48W12M-Hx		±12 VDC	±250 mA		151 mA	84	±100 µF
6VRD48W15M-Hx		±15 VDC	±200 mA				
6VRD48W24M-Hx		±24 VDC	±125 mA				

SPECIFICATIONS

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

INPUT SPECIFICATIONS

Input Voltage Range		2:1
Under Voltage lockout	12 Vin Module ON	8.5 V
	12 Vin Module OFF	7 V
	24 Vin Module ON	16.5 V
	24 Vin Module OFF	14.5 V
	48 Vin Module ON	34.5 V
	48 Vin Module OFF	31.5 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⁾		80 mV p-p max.
	24 V Dual Output	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% max.
	3.3 V Single Output	±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 B
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		Ø.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)	12 V	-0.7-25 VDC max.
	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:

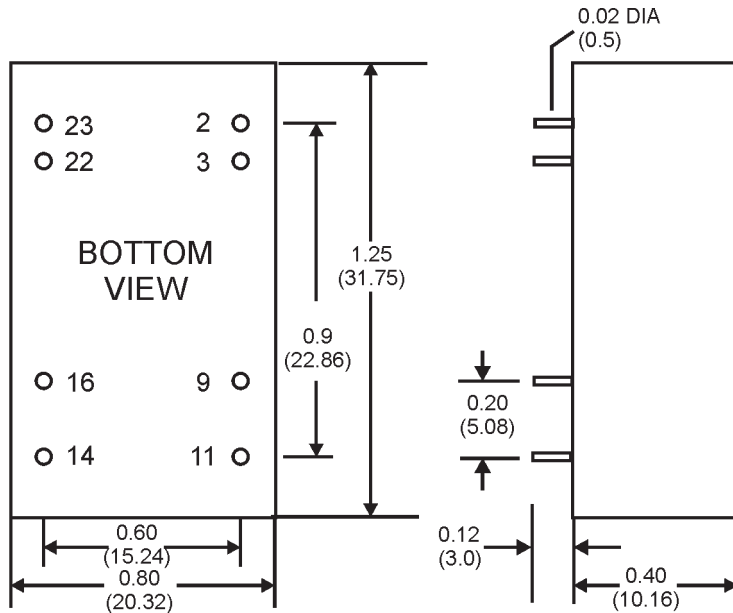
Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating.

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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)

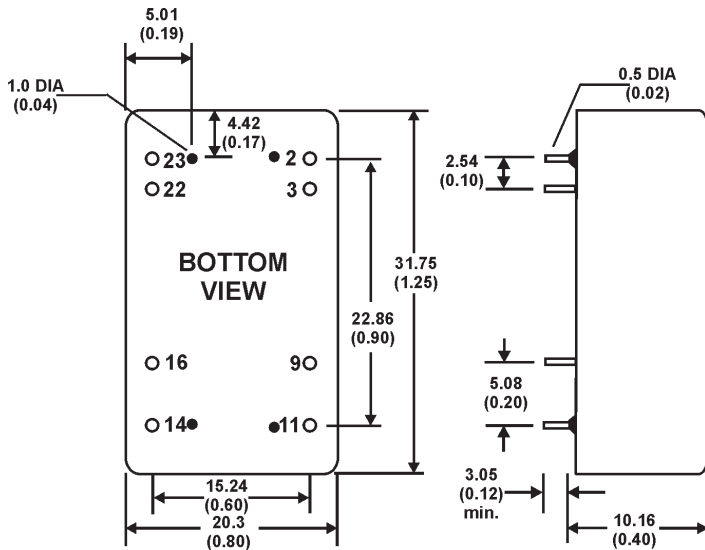
Tolerance:

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
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 ± 0.05 (± 0.002)

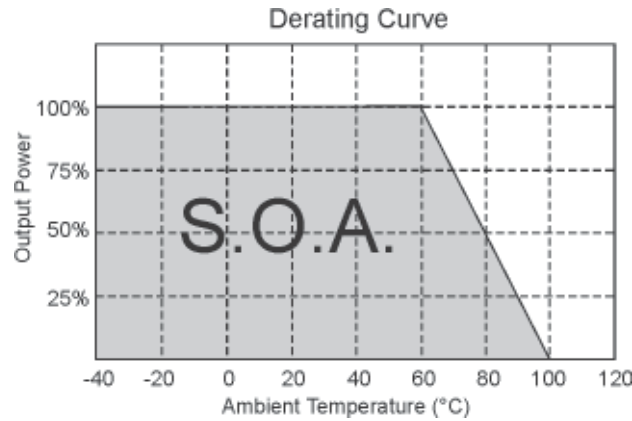
Pin pitch ± 0.35 (± 0.014)

Case ± 0.5 (± 0.02)

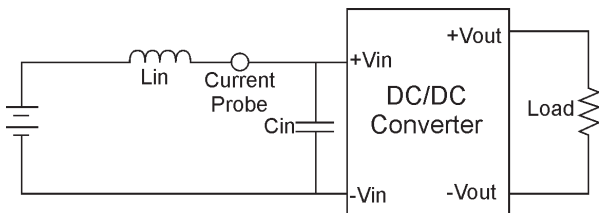
Stand-off tolerance ± 0.1 (± 0.004)

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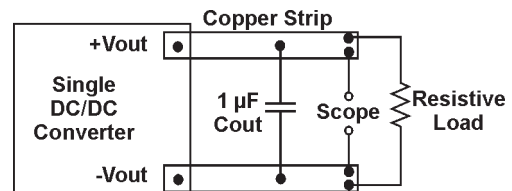
APPLICATION NOTES & DIAGRAMS**TEST CONFIGURATIONS****Input Reflected Ripple Current Test Step**

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

**Output Ripple & Noise Measurement Test**

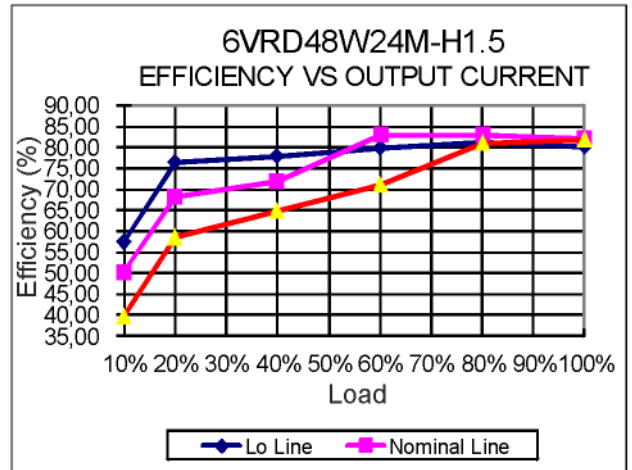
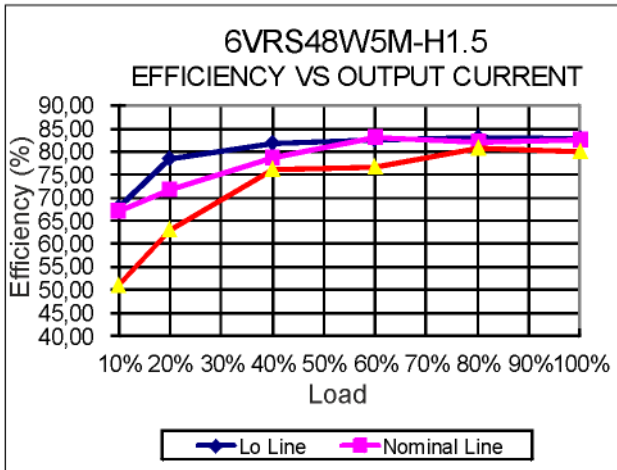
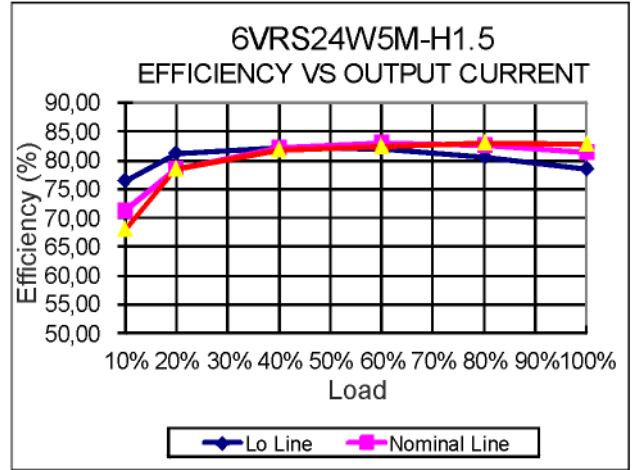
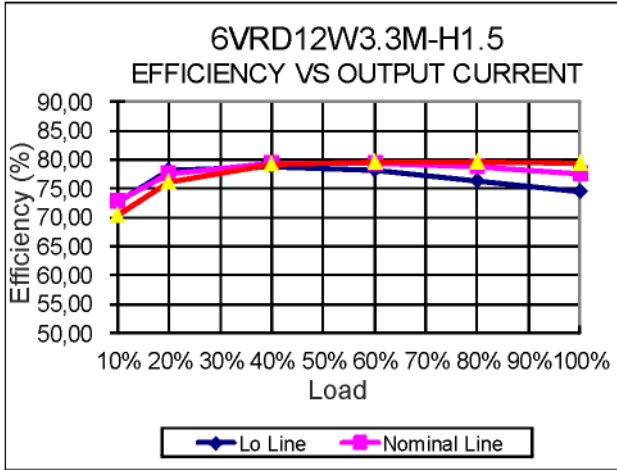
Use a capacitor C_{out} (1.0 μF) measurement.

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.