

**12 Watt****24 Pin DIL Package V****2:1 Input Range**

- o **Wide Input Range**
- o **Pi Input Filter**
- o **Regulated Single & Dual Outputs**
- o **Continuous Short Circuit Protection**
- o **Standard 1600 VDC I/O-Isolation**
- o **High Efficiency up to 91%**
- o **Low no Load Current Consumption**

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	INPUT CURRENT		%EFF	Capacitor Load
				NO LOAD	FULL LOAD		
12VRS12W2.5M	9-18 VDC	2.5 VDC	3500 mA	15 mA	889 mA	85	2000 µF
12VRS12W3.3M		3.3 VDC	3500 mA		1146 mA	87	
12VRS12W5M		5 VDC	2400 mA		1163 mA	89	
12VRS12W12M		12 VDC	1000 mA		1149 mA	90	430 µF
12VRS12W15M		15 VDC	800 mA				300 µF
12VRD12W12M		±12 VDC	±500 mA		1136 mA	91	±200 µF
12VRD12W15M		±15 VDC	±400 mA				±120 µF
12VRS24W2.5M		18-36 VDC	2.5 VDC		3500 mA	15 mA	445 mA
12VRS24W3.3M	3.3 VDC		3500 mA	573 mA	87		
12VRS24W5M	5 VDC		2400 mA	581 mA	89		
12VRS24W12M	12 VDC		1000 mA	575 mA	90		430 µF
12VRS24W15M	15 VDC		800 mA				300 µF
12VRD24W12M	±12 VDC		±500 mA	562 mA	91		±200 µF
12VRD24W15M	±15 VDC		±400 mA				±120 µF
12VRS48W2.5M	36-75 VDC		2.5 VDC	3500 mA	15 mA		225 mA
12VRS48W3.3M		3.3 VDC	3500 mA	283 mA		88	
12VRS48W5M		5 VDC	2400 mA	291 mA		89	
12VRS48W12M		12 VDC	1000 mA	294 mA		88	430 µF
12VRS48W15M		15 VDC	800 mA	291 mA		89	300 µF
12VRD48W12M		±12 VDC	±500 mA	294 mA		88	±200 µF
12VRD48W15M		±15 VDC	±400 mA	291 mA		89	±120 µF

**SPECIFICATIONS**

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

**INPUT SPECIFICATIONS**

Input Voltage Range			2:1
Start up Time (Nominal Vin and constant resistive load)			20 ms
Input Filter			Pi Type
Input Current (No-Load)			15 mA
Input Reflected Ripple Current			20 mA p-p
Remote ON/OFF Control	ON	3 to 12 VDC or open circuit	
	OFF	0 to 1.2 VDC or Short Circuit Pin1 and Pin2/3	
	OFF idle current		5 mA

**OUTPUT SPECIFICATIONS**

Voltage Accuracy			±1.2%
Temperature Coefficient			±0.02%/°C
Capacitive Load <sup>1)</sup>			see table
Transient Recovery Time <sup>2)</sup>			250 µs
Transient Response Deviation <sup>2)</sup>			±3% max.
Ripple & Noise 20MHz BW <sup>3)</sup>			85 mV p-p max.
Short Circuit Protection			Indefinite (hiccup) (Automatic Recovery)
Over Voltage Protection (Zener Diode Clamp)	2.5 V, 3.3 V		3.9 V
	5 V		6.2 V
	12 V		15 V
	15 V		18 V
	±12 V		±15 V
	±15 V		±18 V
Over Current Protection			150% of FL
Line Regulation			±0.5% max.
Load Regulation (0% Load to Full Load)	Single		±0.5% max.
	Dual		±1.0% max.
Cross Regulation (Dual Output) <sup>4)</sup>			±5%

**NOTE:**

1. Tested by minimal Vin and constant resistive load.
2. Tested by nominal Vin and 25% step load change (75% - 50% - 25% of Ib).
3. Maximum value at nominal input voltage, measured with 20 MHz bandwidth and 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%.

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<b>GENERAL SPECIFICATION</b>		
Efficiency		see table
Isolation Voltage (3 sec)	Input/Output	1600 VDC
	Case/Input & Output	1600 VDC
Isolation Resistance		1000 Mohms min.
Isolation Capacitance		1200 pF max.
Switching Frequency		330 kHz
Operating Temperature Range		-40°C to +85°C (see derating curve) -40°C to +60°C (for 100% Load)
Storage Temperature Range		-40°C to +125°C
Case Temperature		+100°C max.
Cooling		Natural Convection
Humidity		95% rel H
Reliability Calculated MTBF (MIL-HDBK-217F)		>1 Mhrs
Safety Standard (designed to meet)		IEC 60950-1:2001
Radiated Emissions		EN55022 Class A
Conducted Emissions <sup>5)</sup>		EN55022 Class A
ESD (Electrostatic Discharge)		EN61000-4-2 Perf. Criteria B
RS (Radiated, Radio-Frequency, Electromagnetic Field)		EN61000-4-3 Perf. Criteria A
EFT (Electrical Fast Transient)		EN61000-4-4 Perf. Criteria B
Surge <sup>6)</sup>		EN61000-4-5 Perf. Criteria B
CS (Conducted Radio Frequency Disturbances)		EN61000-4-6 Perf. Criteria A
PFMF (Power Frequency Magnetic Field)		EN61000-4-8 Perf. Criteria A
Dimensions		1.25x0.8x0.4 Inches (31.8x20.3x10.2 mm)
Case Material		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)
Weight		18.0 g

**NOTE:**

5. Input filter components (C1, L) are used to help meet conducted emissions 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.

6. An external filter capacitor is required if the module has to meet EN61000-4-5.

The filter capacitor M+R suggest: Nippon - chemi - con KY series, 330 µF/100 V.

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**ABSOLUTE SPECIFICATIONS**

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

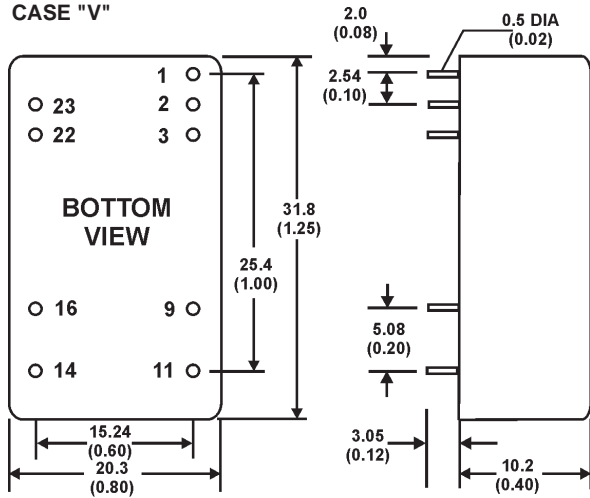
Input Surge Voltage (1000 mS)	12 V	-0.7 VDC to 36 VDC
	24 V	-0.7 VDC to 50 VDC
	48 V	-0.7 VDC to 100 VDC

Lead/Lead Free Soldering Temperature (1.5 mm from case 10 sec.)	+260°C max.
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NOTE: Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating.

**MECHANICAL SPECIFICATIONS**

**CASE "V"**



PIN CONNECTIONS		
PIN	SINGLE	Dual
1	REMOTE ON/OFF	REMOTE ON/OFF
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:

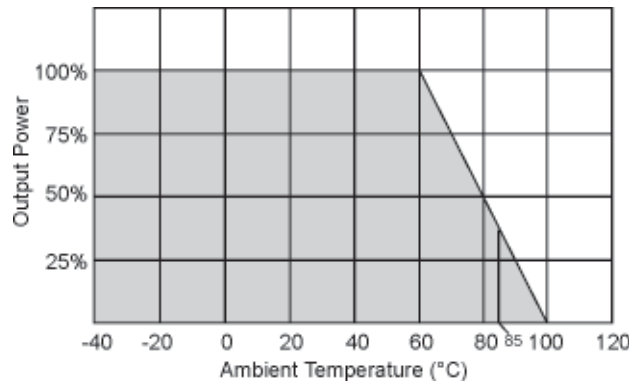
Pin diameter ± 0.05 (±0.002)

Pin pitch ±0.35 (±0.014)

Case ±0.5 (±0.02)

**APPLICATION NOTES & DIAGRAMS**

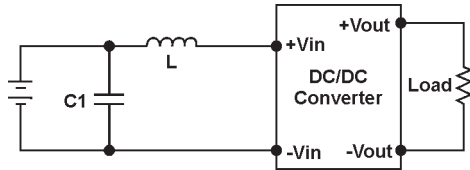
**Derating Curve**



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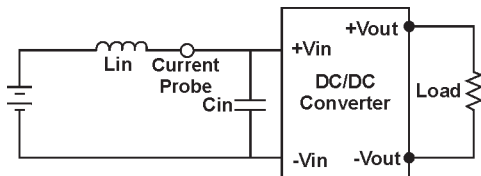
**Input Filter Recommendation**



INPUT FILTER		
	C1	L
12VRS/D12W...	100 µF, 100V	12 µH
12VRS/D24W...	100 µF, 100V	12 µH
12VRS/D48W...	100 µF, 100V	12 µH

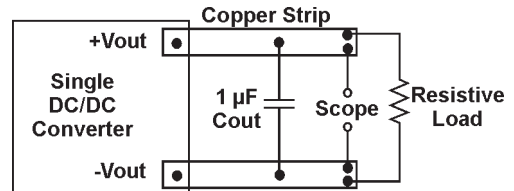
**Input Reflected Ripple Current Test Step**

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

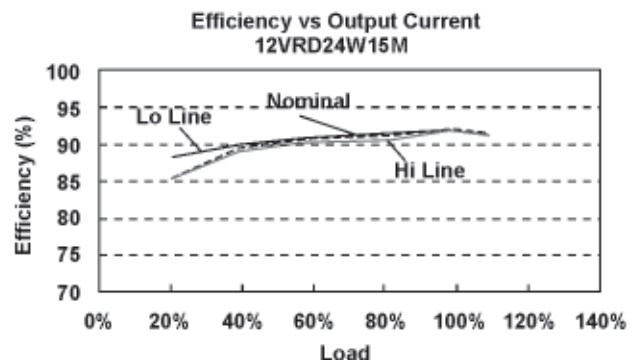
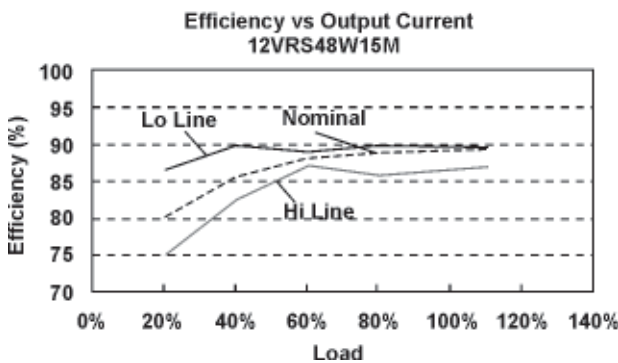
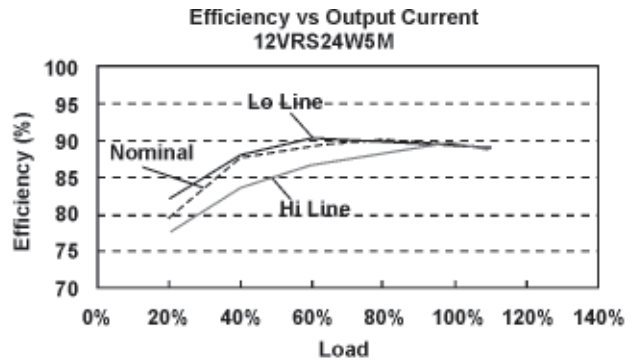
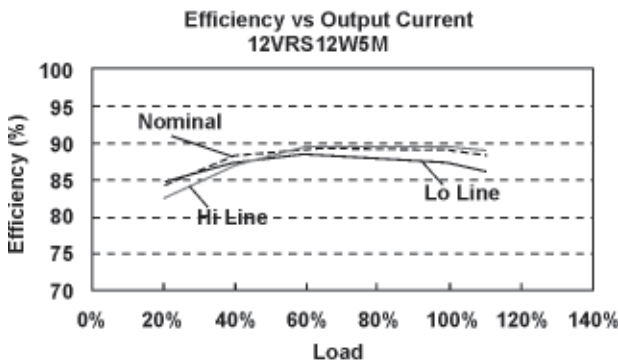


**Output Ripple & Noise Measurement Test**

Use a capacitor  $C_{out}$  (1 µF) measurement. The Scope measurement bandwidth is 0-20 MHz.



**Efficiency-Load Deviation**



**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.