

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

- o Wide 4:1 Input Range
- o Efficiency up to 81%
- 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		
3VRS24X3.3M-Hx	9-36 VDC	3.3 VDC	900 mA	10 mA	176 mA	73	470 µF
3VRS24X5M-Hx		5 VDC	600 mA		167 mA	77	
3VRS24X12M-Hx		12 VDC	250 mA		158 mA	81	100 µF
3VRS24X15M-Hx		15 VDC	200 mA				
3VRS24X24M-Hx		24 VDC	125 mA				47 µF
3VRD24X3.3M-Hx		±3.3 VDC	±450 mA				171 mA
3VRD24X5M-Hx		±5 VDC	±300 mA	162 mA	79		
3VRD24X12M-Hx		±12 VDC	±125 mA	15 mA	158 mA	81	±100 µF
3VRD24X15M-Hx		±15 VDC	±100 mA				
3VRD24X24M-Hx		±24 VDC	±63 mA				20 mA
3VRS48X3.3M-Hx	18-75 VDC	3.3 VDC	900 mA	7 mA	83 mA	75	470 µF
3VRS48X5M-Hx		5 VDC	600 mA		81 mA	79	
3VRS48X12M-Hx		12 VDC	250 mA		79 mA	81	100 µF
3VRS48X15M-Hx		15 VDC	200 mA				
3VRS48X24M-Hx		24 VDC	125 mA				47 µF
3VRD48X3.3M-Hx		±3.3 VDC	±450 mA				83 mA
3VRD48X5M-Hx		±5 VDC	±300 mA		79 mA	81	
3VRD48X12M-Hx		±12 VDC	±125 mA		81 mA		±100 µF
3VRD48X15M-Hx		±15 VDC	±100 mA				
3VRD48X24M-Hx		±24 VDC	±63 mA			10 mA	79

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	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. 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%.
5. Tested by normal Vin and 25% load step change (75%-50%-25% of I_o).

SPECIFICATIONS

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

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 +70°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
Radiated Emissions		EN55022 Class A
Conducted Emissions		EN55022 Class A
ESD		IEC61000-4-2 Perf. Criteria A
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		Ø.5 mm Brass Solder-coated
Potting Material		Epoxy (UL94V-0 rated)
Dimensions		1.25 x 0.8 x 0.4 Inches (31.8 x 20.32 x 10.2 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 IEC61000-4-4 and IEC61000-4-5.
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	50 VDC max.
	48 V	100 VDC max.
Soldering Temperature (1.5 mm from case 10 sec. max.)		+260°C max.

NOTE:

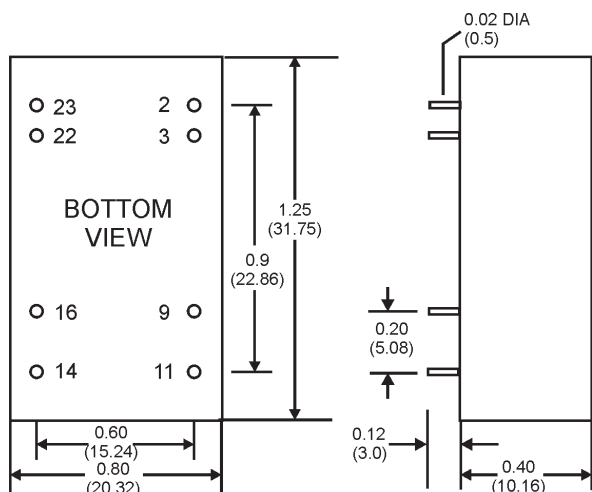
Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating.

SPECIFICATIONS

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

MECHANICAL SPECIFICATIONS

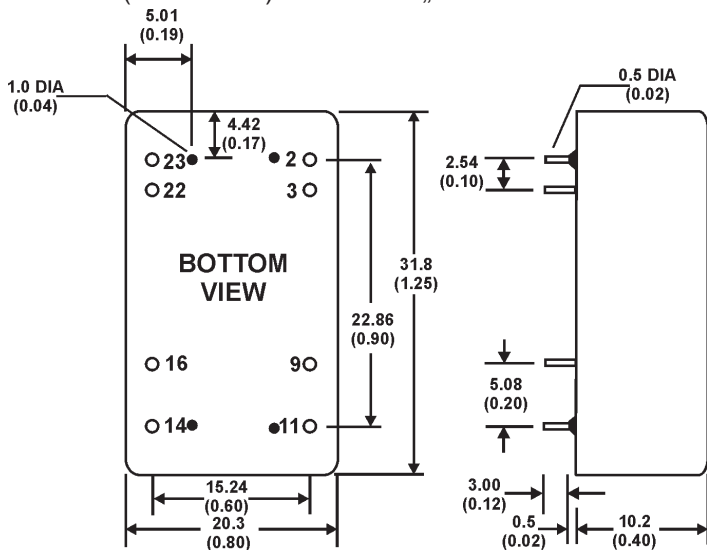
Case "V" (Plastic Case)



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)

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

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



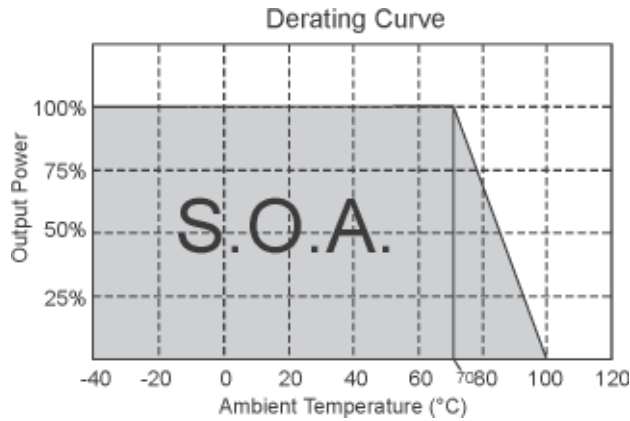
All Dimensions in mm (Inches)
 Tolerances:
 Pin diameter ± 0.05 (±0.002)
 Pin pitch ±0.35 (±0.014)
 Case ±0.5 (±0.02)
 Stand-off tolerance ±0.1 (±0.004)

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

SPECIFICATIONS

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

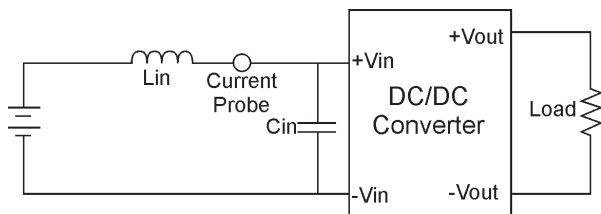
APPLICATION NOTES & DIAGRAMS



TEST CONFIGURATIONS

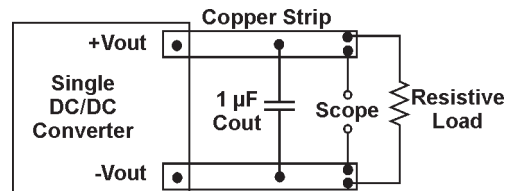
Input Reflected Ripple Current Test Step

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.



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.