

8 Watt

24 Pin DIL Package V Railway System



- o Ultra Wide Input Range
- o Efficiency up to 86%
- o 3000 VDC I/O Isolation Voltage
- o Continuous Short Circuit Protection
- o Under Voltage Lock-out Circuit
- o Over Voltage Protection
- o Over Load Protection
- o Remote ON/OFF Control
- o EN50155 Approval for Railway Applications



MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT MAX. @FULL LOAD	INPUT CURRENT		%EFF	CAPACITOR LOAD (µF) ¹⁾
				NO LOAD	FULL LOAD		
8VRS24R3.3M-H3	13-70 VDC	3.3 VDC	2400 mA	30 mA	397.59 mA	83	1330
8VRS24R5M-H3		5 VDC	1600 mA	20 mA	387.60 mA	86	
8VRS24R12M-H3		12 VDC	665 mA	10 mA	391.18 mA	85	330
8VRS24R15M-H3		15 VDC	535 mA		388.18 mA	86	220
8VRD24R5M-H3		±5 VDC	±800 mA		401.61 mA	83	±900
8VRD24R12M-H3		±12 VDC	±335 mA		394.12 mA	85	±220
8VRD24R15M-H3		±15 VDC	±265 mA		385.17 mA	86	±100
8VRS110R3.3M-H3	42-176 VDC	3.3 VDC	2400 mA	10 mA	88.89 mA	81	1330
8VRS110R5M-H3		5 VDC	1600 mA		86.58 mA	84	
8VRS110R12M-H3		12 VDC	665 mA	5 mA	86.36 mA	84	330
8VRS110R15M-H3		15 VDC	535 mA		87.90 mA	83	220
8VRD110R5M-H3		±5 VDC	±800 mA		90.91. mA	80	±900
8VRD110R12M-H3		±12 VDC	±335 mA		89.14 mA	82	±220
8VRD110R15M-H3		±15 VDC	±265 mA		87.08 mA	83	±100

NOTE:

1. Tested by nominal input voltage and constant resistor load.

SPECIFICATIONS

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

INPUT SPECIFICATIONS

Input Voltage Range	nominal 24 VDC nominal 110 VDC	13 VDC to 70 VDC 42 VDC to 176 VDC
Under Voltage Lockout	24 V Module ON	12.6 VDC
	24 V Module OFF	11.4 VDC
	110 V Module ON	41 VDC
	110 V Module OFF	37 VDC
Start Up Time (Nominal Vin and constant resistive load)		30 mS
Input Filter		Pi Type
Input Reflected Ripple Current ¹⁾		20 mA p-p
Remote ON/OFF Control ²⁾	ON	3 VDC to 12 VDC or Open Circuit
	OFF	0 VDC to 1.2 VDC or Short Circuit Pin1 and Pin 2/3
	OFF idle current	5 mA

OUTPUT SPECIFICATIONS

Voltage Accuracy		±1%
Temperature Coefficient		±0.02%/°C
Ripple and Noise, 20MHz BW ³⁾		75 mV p-p max.
Over Load Protection		160% of Iout
Over Voltage Protection (Zener Diode Clamp)	3.3 VDC	3.9 V
	5 VDC	6.2 V
	12 VDC	15 V
	15 VDC	18 V
	±5 VDC	±6.2 V
	±12 VDC	±15 V
	±15 VDC	±18 V
Short Circuit Protection		Indefinite (hiccup) (Automatic Recovery)
Transient Recovery Time ⁴⁾		250 µs
Transient Response Deviation ⁴⁾		±3% max.
	Single Output 3.3 VDC	±5% max.
Line Regulation		±0.5% max.
Load Regulation (Io= 0% to 100%)		±0.5% max.
Cross Regulation ⁵⁾	Dual Output	±5%

NOTE:

1. Measured Input Reflected ripple current with a simulated source inductance of 12 µH and a source capacitor Cin (33 µF ESR<1.0 Ohm at 100 kHz).
2. Remote on/off control pin is referenced to -Vin (Pin2, Pin3).
3. Ripple/Noise measured with a 0.1 µF ceramic capacitor and 10 µF electrolytic capacitor.
4. Tested by normal Vin and 25% load step change (75%-50%-25% of Io) at 1 A/µs.
5. 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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GENERAL SPECIFICATION		
Efficiency		see table
Isolation Voltage (60 sec.)	Input / Output	3000 VDC
	Input / Case	1000 VDC
	Output / Case	1000 VDC
Isolation Resistance		1000 MOhms
Isolation Capacitance		1000 pF
Switching Frequency	24 V Models	330 kHz
	110 V Models	220 kHz
Operating Temperature		-40°C to +85°C (see Derating Curve) -40°C to +70°C (for 100% Load)
Maximum Case Temperature		+105°C
Storage Temperature		-55°C to +125°C
Cooling ¹⁾		Nature Convection
Humidity		95% rel H
Thermal Shock		IEC60068
Shock		EN61373
Vibration		EN61373
Reliability Calculated MTBF (MIL-HDBK-217F)		>800 khrs
Safety Standard		IEC/EN60950-1, EN50155
Safety Approvals		IEC/EN60950-1, EN50155
Radiated Emission	40 dBuV from 30-230 MHz	EN50121-3-2
	47 dBuV from 230-1000 MHz	
Conducted Emissions ²⁾	99 dBuV from 0.15-0.5 MHz	EN50121-3-2
	93 dBuV from 0.5-30 MHz	
ESD	Air ±8 kV	EN50121-3-2 Perf. Criteria A
	Contact ±6 kV	
RS	20 V/m	EN50121-3-2 Perf. Criteria A
EFT ³⁾	2.0 kV	EN50121-3-2 Perf. Criteria A
Surge ³⁾	2.0 kV	EN50121-3-2 Perf. Criteria A
CS	10 V	EN50121-3-2 Perf. Criteria A
PFMF	10 A/m	EN61000-4-8 Perf. Criteria A

NOTE:

- "Nature Convection" is usually about 30-65 LFM but is not equal to still air (0 LFM).
- Input filter components are used to meet conducted emissions 79 dBuV from 0.15-0.5 MHz and 73 dBuV from 0.5-30 MHz requirement for the module, which application refer to the EMI Filter of design & feature configuration..
- An external filter capacitor is required if the module has to meet EFT and Surge in EN50121-3-2.

The filter capacitor M+R suggest:

8VRS/D24R...: one electrolytic capacitor (Nippon - chemi - con KY series, 330 µF/100 V).

8VRS/D110R...: two electrolytic capacitors (Ruby - con BXF series, 100 µF/250 V) in parallel.

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GENERAL SPECIFICATION

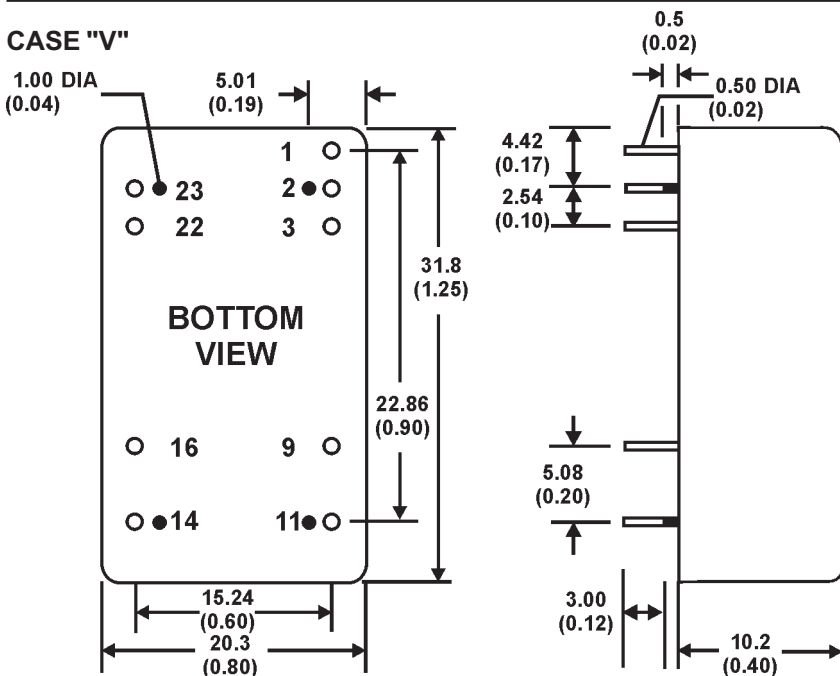
Dimensions	1.25 x 0.8 x 0.4 Inches (31.8 x 20.3 x 10.2 mm)
Case Material	Nickel-coated Copper
Base Material	Non-conductive Black Plastic (UL94V-0 rated)
Pin Material	Ø0.5 mm Brass Solder-coated
Potting Material	Epoxy (UL94V-0 rated)
Weight	18 g

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 110 V	100 VDC max. 185 VDC max.
Lead/Lead Free Soldering Temperature (1.5 mm from case 10 sec.)		+260°C max.

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	CTRL	CTRL
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

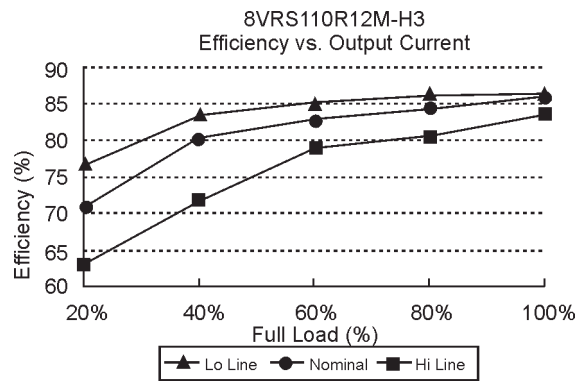
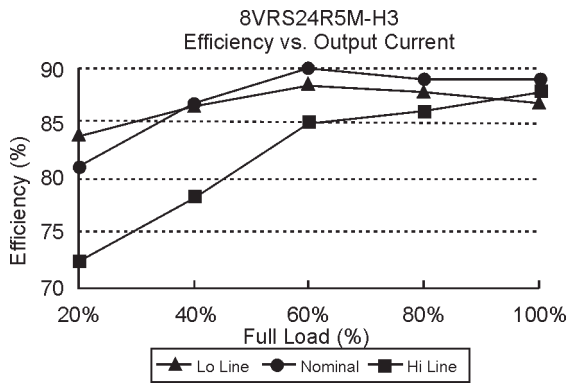
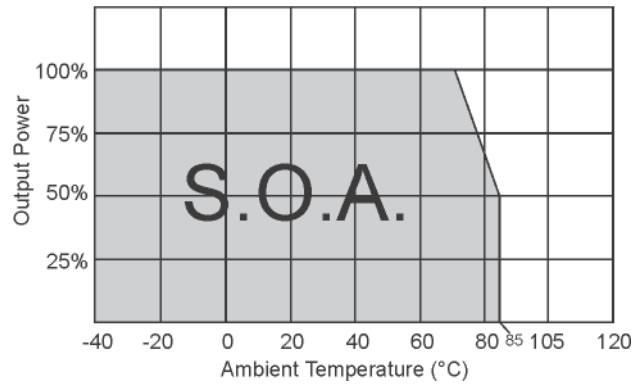
- All Dimensions in mm (Inches).
1. Pin diameter: 0.5 ± 0.05 (0.02 ± 0.002)
 2. Pin pitch tolerance: ± 0.35 (± 0.014)
 3. Case Tolerance: ± 0.5 (± 0.02)
 4. Stand-off tolerance: ± 0.1 (± 0.004)

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DIAGRAMS

Derating Curve



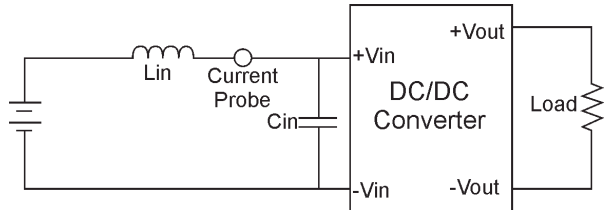
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TEST CONFIGURATIONS

Input Reflected Ripple Current Test Step

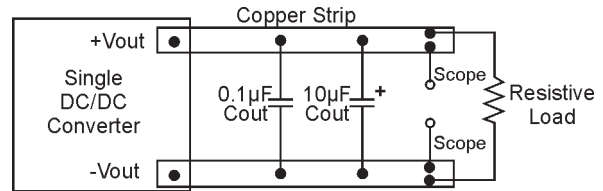
Input reflected ripple current is measured through a source inductor L_{in} (12 μH) and a source capacitor C_{in} (33 μF , ESR <1.0 Ohms at 100 kHz) at nominal input and full load.



Output Ripple & Noise Measurement Test

Use a 0.1 μF ceramic capacitor and a 10 μF electrolytic capacitor measurement.

The Scope measurement bandwidth is 0-20 MHz.



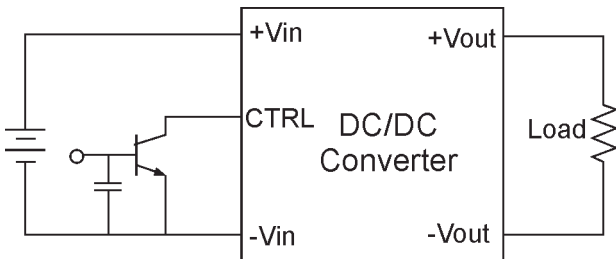
DESIGN & FEATURE CONFIGURATIONS

CTRL Module ON/OFF

Positive logic turns on the module during high logic and off during low logic.

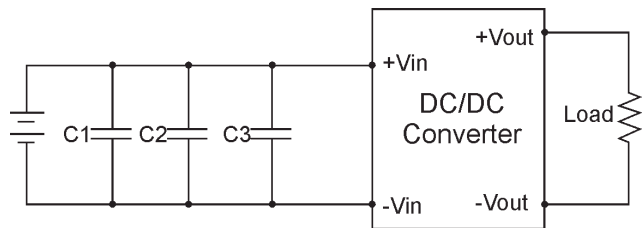
Ctrl module on/off can be controlled by an external switch between the ctrl terminal and -Vin terminal. The switch can be an open collector or open drain.

For positive logic if the ctrl feature is not used, please leave the ctrl pin floating.



EMI Filter

Input filter components (C1, C2, C3) are used to help meet conducted emissions 79 dBuV from 0.15-0.5 MHz. These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.



EMI FILTER	
	C1, C2, C3
8VRS-D24R-M-H3	NONE
8VRS-D110R-M-H3	MLCC, 1 μF , 250 V

Over Voltage Protection

The module includes an internal output over voltage protection circuit, which monitors the voltage on the output terminals. If this voltage exceeds the over voltage set point, the module will activate the control loop of internal circuit to clamp the output voltage.

Over Current Protection

The module includes an internal over current protection circuit, which will endure current limiting for an unlimited duration during output over load condition. If the output current exceeds the OCP set point, the module will shut down automatically (hiccup). The module will try to restart after shut down. If the over load condition still exists, the module will shut down again.

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.