

40 Watt**2x1 Inch Package B1
2:1 Input Range - Metal Case**

- o Pi Input Filter
- o Efficiency up to 92%
- o Remote On/Off Control
- o Continuous Short Circuit Protection
- o Over Load Protection
- o Over Voltage Protection
- o Soft Start

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.	CAPACITOR LOAD (µF)
			MIN. LOAD	FULL LOAD	NO LOAD	FULL LOAD		
40B1RS12W3.3M	9-18 VDC	3.3 VDC	0 mA	8000 mA	100 mA	2444 mA	90	21800
40B1RS12W5M		5 VDC			160 mA	3663 mA	91	13600
40B1RS12W12M		12 VDC		40 mA	2300			
40B1RS12W15M		15 VDC		2666 mA	1500			
40B1RD12W12M		±12 VDC		±1666 mA	50 mA		±1200	
40B1RD12W15M		±15 VDC		±1333 mA	3623 mA		92	±750
40B1RS24W3.3M		18-36 VDC		3.3 VDC	8000 mA	60 mA	1208 mA	91
40B1RS24W5M	5 VDC			90 mA		1811 mA	92	13600
40B1RS24W12M	12 VDC			3333 mA	30 mA	1831 mA	91	2300
40B1RS24W15M	15 VDC			2666 mA	40 mA	1811 mA	92	1500
40B1RD24W12M	±12 VDC			±1666 mA	50 mA	1831 mA	91	±1200
40B1RD24W15M	±15 VDC			±1333 mA	40 mA	1811 mA	92	±750
40B1RS48W3.3M	36-75 VDC			3.3 VDC	8000 mA	40 mA	604 mA	91
40B1RS48W5M		5 VDC		60 mA		905 mA	92	13600
40B1RS48W12M		12 VDC	3333 mA	20 mA	915 mA	91	2300	
40B1RS48W15M		15 VDC	2666 mA		905 mA	92	1500	
40B1RD48W12M		±12 VDC	±1666 mA	30 mA	906 mA		±1200	
40B1RD48W15M		±15 VDC	±1333 mA	40 mA			±750	

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	Module ON/OFF 12 V	8.6 VDC/7.9 VDC
	Module ON/OFF 24 V	17.8 VDC/16 VDC
	Module ON/OFF 48 V	33.5 VDC/30.5 VDC
Start up Time (Nominal Vin and constant resistive load)		30 mS
Input Filter		Pi Type
Maximum Input Current (No-Load)		see table
Input Current (Full-Load)		see table
Input Reflected Ripple Current ¹⁾		20 mA p-p
Remote ON/OFF (CTRL) ²⁾	ON: 3 - 12 VDC or open Circuit OFF: 0 - 1.2 VDC or Short Circuit Pin2 and Pin3 OFF idle Current: 5 mA	

OUTPUT SPECIFICATIONS

Voltage Accuracy	Single & Dual	±1%
Voltage Adjustability	(Single Output Only)	±10% max.
Maximum Output Current		see table
Cross Regulation ³⁾	Dual	±5%
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
	±12 VDC	±15 V
	±15 VDC	±18 V
Over Load Protection		115% to 130% of Output Current max.
Ripple and Noise ⁴⁾	3.3 V, 5 V	100 mV p-p max.
	12V, 15 V	150 mV p-p max.
Temperature Coefficient		±0.02%/°C
Capacitive Load ⁵⁾		see table
Transient Recovery Time ⁶⁾		250 µs
Transient Response Deviation ⁶⁾		±3% max.
Short Circuit Protection		Indefinite (hiccup) (Automatic Recovery)
Line Regulation		±0.5% max.
Load Regulation	Single (Io=0% to 100%)	±0.5% max.
	Dual (Io=0% to 100%)	±1.0% max. (balanced Load)

NOTE:

1. Measured Input reflected ripple current with a simulated source inductance of 12 µH.
2. The Remote ON/OFF Control Pin is referenced to -Vin (Pin2).
3. Dual: One Load is 25% to 100% Load, the other Load is 100% Load, the output Voltage variable rate is within ±5%.
4. Measured with 20 MHz bandwidth and 1.0 µF ceramic Capacitor.
5. Tested by minimal Vin and constant resistive load.
6. Tested by normal Vin and 25% Load step change (75%-50%-25% of Io).

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GENERAL SPECIFICATION

Efficiency		see table
Isolation Voltage (3 sec)	Input / Output Case/Input & Output	1600 VDC 1600 VDC
Isolation Resistance		1000 MOhms min.
Isolation Capacitance		1000 pF max.
Switching Frequency		270 kHz
Operating Ambient Temperature		-40°C to +71°C (see Derating Curve) -40°C to +55°C (for 100% Load)
Case Temperature		+105°C max.
Storage Temperature Range		-40°C to +125°C
Cooling		Nature Convection
Humidity		95% rel H
Safety Standard (designed to meet)		IEC/EN 60950-1
EMC Characteristics	Radiated Emissions	EN55022 Class A
	Conducted Emissions ⁷⁾	EN55022 Class A
	ESD	EN61000-4-2 Perf. Criteria A
	RS	EN61000-4-3 Perf. Criteria A
	EFT ⁸⁾	EN61000-4-4 Perf. Criteria A
	Surge ⁸⁾	EN61000-4-5 Perf. Criteria A
	CS	EN61000-4-6 Perf. Criteria A
	PFMF	EN61000-4-8 Perf. Criteria A
Reliability Calculated MTBF (MIL-HDBK-217F)		>328 khrs
Dimensions		50.8 x 25.4 x 10.16 mm (2.00 x 1.00 x 0.4 Inches)
Case Material		Nickel-coated Copper
Base Material		Non-conductive Black Plastic (UL94V-0 rated)
Pin Material		Ø1.0 mm Brass Solder-coated
Potting Material		Epoxy (UL94V-0 rated)
Weight		32.0 g

NOTE:

7. The 40B1RS/D-Series can meet EN55022 Class B with an external filter in parallel with the input pins.

8. 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, 220µF/100V.

ABSOLUTE SPECIFICATIONS

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

Input Voltage (100 mS)	12 V	-0.7 VDC to 25 VDC
	24 V	-0.7 VDC to 50 VDC
	48 V	-0.7 VDC to 100 VDC
Soldering Temperature (1.5 mm from case 10 sec. max.)		+260°C max.

NOTE:

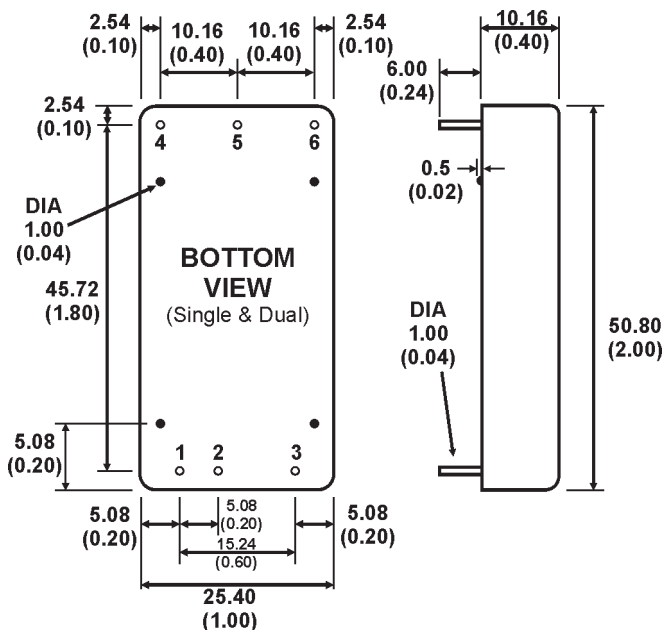
Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating.

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MECHANICAL SPECIFICATIONS

Case "B1"



PIN CONNECTIONS		
PIN	SINGLE	Dual
1	+INPUT	+INPUT
2	-INPUT	-INPUT
3	REMOTE CTRL.	REMOTE CTRL.
4	+OUTPUT	+OUTPUT
5	-OUTPUT	COMMON
6	TRIM	-OUTPUT

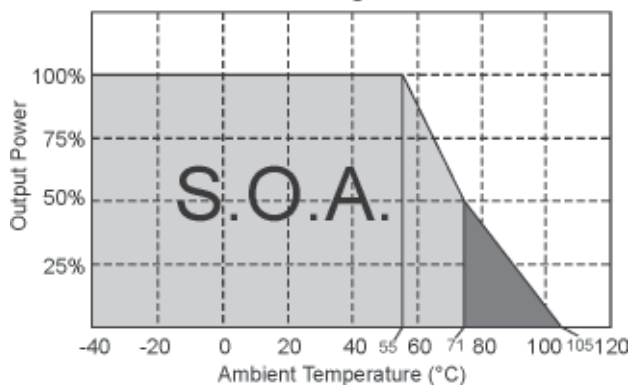
All Dimensions in mm (Inches)

Tolerance:

- 1. Pin Diameter: 1.0 ±0.05 (0.04 ±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)

APPLICATION NOTES & DIAGRAMS

Derating Curve



External Output Trimming

Output can be externally trimmed by using the method as below.
(Single output models only)



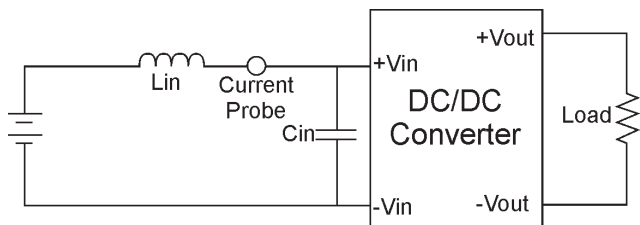
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TEST CONFIGURATIONS

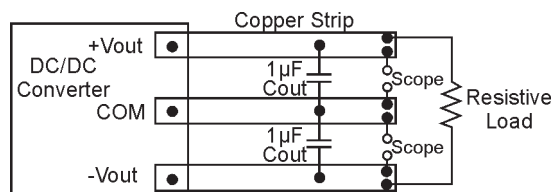
Input Reflected Ripple Current Test Step

Input reflected ripple current is measured through a source inductor L_{in} (4.7 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

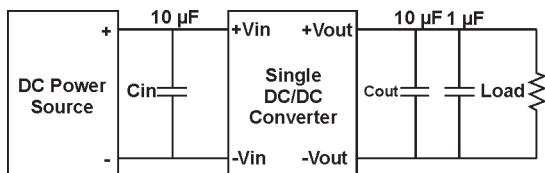
Use a capacitor C_{out} (1.0 μ F) measurement. The Scope measurement bandwidth is 0-20 MHz.



DESIGN & FEATURE CONFIGURATIONS

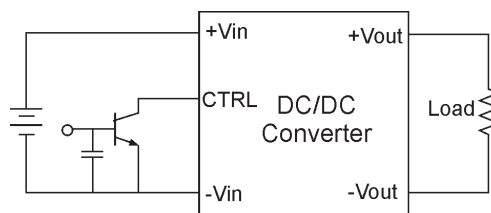
Output Ripple & Noise Reduction

To reduce ripple and noise, it is recommended to use a 1 μ F ceramic disk capacitor and a 10 μ F electrolytic.



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.

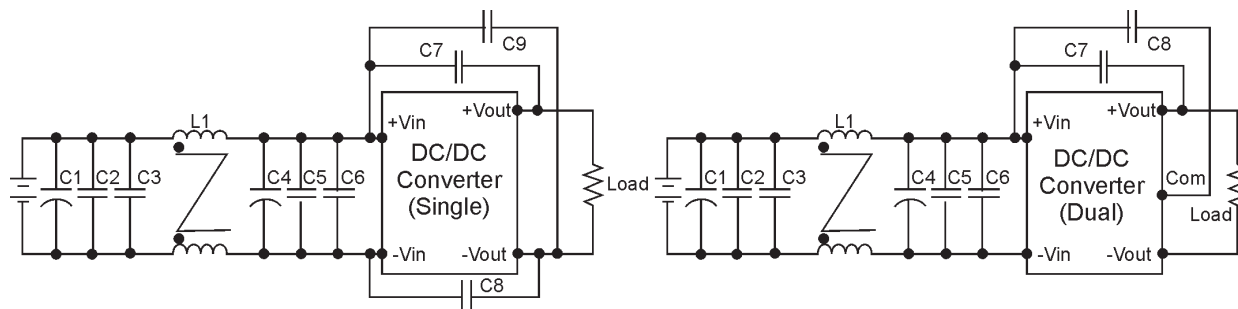


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EMI Filter

Input filter components 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.

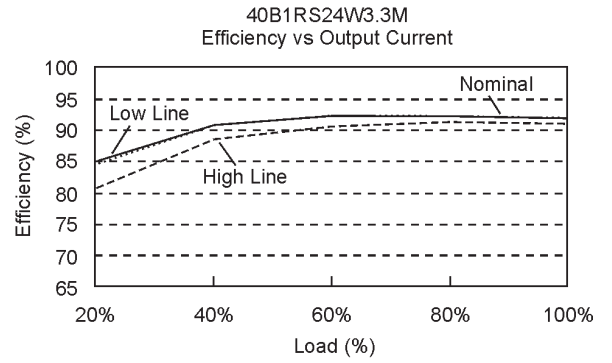
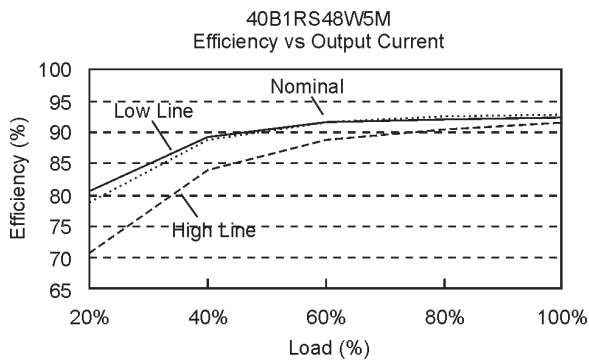
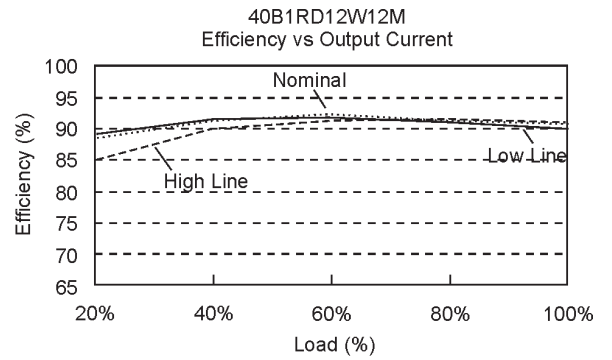
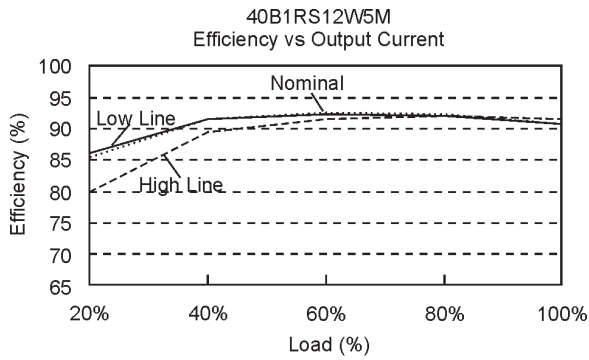


EMI FILTER							
	C1	L1	C2/C3/C5/C6	C4	C7	C8	C9
40B1RS12W...	220 μF, 100V	Common Choke 68 μH	1812,6.8pF,50V	330 μF, 100 V			1206,1000pF 2kV
40B1RS24W...	220 μF, 100V	Common Choke 68 μH	1812,4.7pF,50V	220 μF, 100 V	1206,1000pF 2kV	1206,1000pF 2kV	
40B1RS48W...	220 μF, 100V	Common Choke 68 μH	1812,1.5pF,100V	220 μF, 100 V	1206,1000pF 2kV	1206,1000pF 2kV	
	C1	L1	C2/C3/C5/C6	C4	C7	C8	
40B1RD12W...	220 μF, 100V	Common Choke 68 μH	1812,6.8pF,50V	330 μF, 100 V	1206,1000pF 2kV	1206,1000pF 2kV	
40B1RD24W...	220 μF, 100V	Common Choke 68 μH	1812,4.7pF,50V	220 μF, 100 V	1206,1000pF 2kV	1206,1000pF 2kV	
40B1RD48W...	220 μF, 100V	Common Choke 68 μH	1812,1.5pF,100V	220 μF, 100 V	1206,1000pF 2kV	1206,1000pF 2kV	

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ELECTRICAL CHARACTERISTIC CURVER



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.