

MI1500BRU

15W, Miniature 1"x1" Case, Ultrawide 4:1 Input Range DC/DC Converters



Key Features:

- 15W Output Power
- Miniature 1"x1" Case
- Efficiency Up to 91%
- Ultrawide 4:1 Wide Input Range
- -40°C to +105°C Operating Temperature Range
- 1500VDC Isolation
- Single & Dual Outputs
- Short Circuit Protection
- Over Voltage Protection
- Over Current Protection

Electrical Specifications

Specifications typical @ +25°C, nominal input voltage & rated output current, unless otherwise noted. Specifications subject to change without notice.

Input		Min.	Typ.	Max.	Units
Parameter	Conditions				
Input Voltage	24 VDC Input	9	24	36	VDC
	48 VDC Input	18	48	75	
Input Start Voltage	24 VDC Input	--	--	9	VDC
	48 VDC Input	--	--	18	
Input Under Voltage Protection	24 VDC Input	5.5	6.5	--	VDC
	48 VDC Input	12	15.5	--	
Reflected Ripple Current	Nominal Input Voltage	--	30	--	mA
Input Filter			PI Filter		

Output		Min.	Typ.	Max.	Units
Parameter	Conditions				
Output Voltage Accuracy	0% - 100% Load	--	±1.0	±3.0	%
Line Regulation	Vin = Min. to Max. @ Full Load	--	±0.2	±0.5	
Load Regulation	5%-100% Load	--	±0.5	±1.0	%
Ripple & Noise, See Note 3	20 MHz bandwidth, 100% load	--	50	100	mVp-p
Transient Recovery Time	25% Load step change	--	300	500	µs
Transient Response Deviation		--	±3	±8	%
Temperature Coefficient	Full load	--	±0.01	±0.02	%/°C
Output Short Circuit	Continuous, self-recovery				

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	60 seconds, leakage current < 1 mA	1500	--	--	VDC
Isolation Resistance	500 VDC	1000	--	--	MΩ
Isolation Capacitance	100 KHz /0.1V	--	2000	--	pF
Switching Frequency	Full load, nominal Vin	--	300	--	kHz

Environmental

Parameter	Conditions		Min.	Typ.	Max.	Units
Operating Temperature Range	See Fig. 1	3.3, 5 VDC	-40	--	+95	°C
		Others	-40	--	+105	
Storage Temperature Range	--		-50	--	+125	
Cooling	Free air convection					
Humidity, See Note 6	Non condensing		--	--	95	%RH

Physical

Case Size	1.0 x 1.0 x 0.4724 in (See mechanical diagrams on page 5)
Case Material	Aluminum alloy
Weight	0.55 oz (15.59g) Typ.

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL-HDBK-217F@25 °C	1.0	--	--	MHours

Absolute Maximum Ratings

Lead Temperature	1.5mm from case for 10 seconds	--	--	300	°C
Input Voltage Surge (1 sec)	24 VDC Input	-0.7	--	50	VDC
	48 VDC Input	-0.7	--	100	

Caution: Exceeding Absolute Maximum Ratings may damage the module. These are not continuous operating ratings.



RoHS

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Model Number	Input				Output			Full Load Efficiency (% Typ)	Reflected Ripple Current (mA Typ)	Capacitive Load (μF, Max) (See Note 3 & 5)	Fuse Rating Slow-Blow (mA) (See Note 1)
	Voltage (VDC)		Current (mA)		Voltage (VDC)	Current (mA, Max)	Current (mA, Min)				
	Nominal	Range	Full Load (Typ)	No Load							
MI1524S-03BRU	24	9-36	625	30	3.3	4000	0	88	30	4700	4000
MI1524S-05BRU	24	9-36	694	30	5	3000	0	90	30	4700	4000
MI1524S-12BRU	24	9-36	694	6	12	1250	0	90	30	1000	4000
MI1524S-15BRU	24	9-36	687	6	15	1000	0	91	30	820	4000
MI1524S-24BRU	24	9-36	687	10	24	625	0	91	30	270	4000
MI1524D-05BRU	24	9-36	694	30	±5	±1500	0	87	30	#1500	4000
MI1524D-12BRU	24	9-36	694	6	±12	±625	0	90	30	#470	4000
MI1524D-15BRU	24	9-36	687	6	±15	±500	0	90	30	#330	4000
MI1524D-24BRU	24	9-36	687	10	±24	±312	0	89	30	#200	4000
MI1548S-03BRU	48	18-75	313	15	3.3	4000	0	86/88	30	4700	2000
MI1548S-05BRU	48	18-75	348	15	5	3000	0	88/90	30	4700	2000
MI1548S-12BRU	48	18-75	344	3	12	1250	0	89/91	30	1000	2000
MI1548S-15BRU	48	18-75	344	3	15	1000	0	89/91	30	820	2000
MI1548S-24BRU	48	18-75	344	4	24	625	0	89/91	30	270	2000
MI1548D-05BRU	48	18-75	348	15	±5	±1500	0	84/86	30	#1500	2000
MI1548D-12BRU	48	18-75	344	3	±12	±625	0	87/89	30	#470	2000
MI1548D-15BRU	48	18-75	344	3	±15	±500	0	87/89	30	#330	2000
MI1548D-24BRU	48	18-75	344	4	±24	±312	0	88/90	30	#200	2000

Typical Characteristic Curves

Temperature Derating Curves

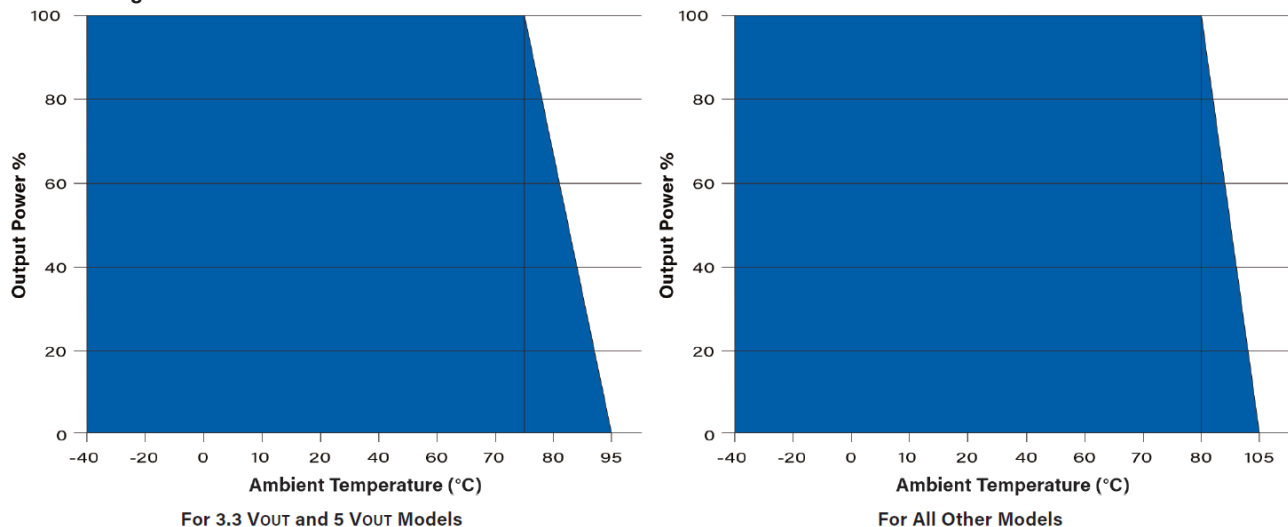


Fig. 1

Notes:

1. It is recommended that a fuse be used on the input of a power supply for protection. See the Model Selection Guide.
2. # refers for each output.
3. All DC-DC converters of this series are tested before delivery using the recommended circuit shown in Fig.6. Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values C_{in} and C_{out} and/or by selecting capacitors with a low ESR (equivalent series resistance). Also make sure that the capacitance is not exceeding the specified max. capacitive load value of the product.
4. If the product works under the minimum required load, it cannot guarantee that the performance of the product complies with all the performance indicators in this manual.
5. The maximum capacitive load is tested within the input voltage range and under full load conditions.
6. Unless otherwise specified, all indicators in this manual are measured at $T_a=25^\circ\text{C}$, humidity<75% RH, nominal input voltage, and rated output load.
7. Product specifications are subject to change without prior notice.

Efficiency Vs Input Voltage (Full Load)

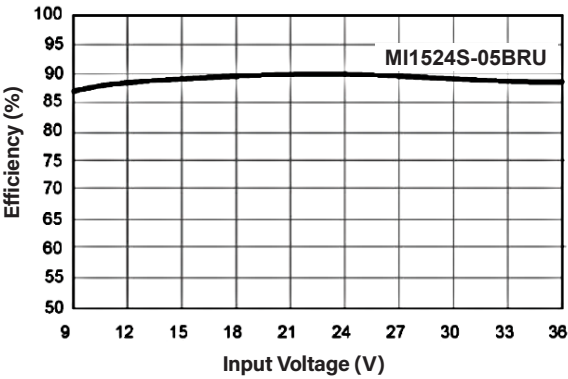


Fig. 2

Efficiency Vs Output Voltage (Vin=24V)

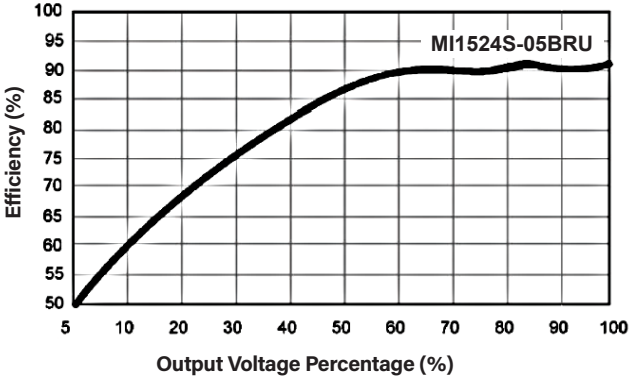


Fig. 3

Efficiency Vs Input Voltage (Full Load)

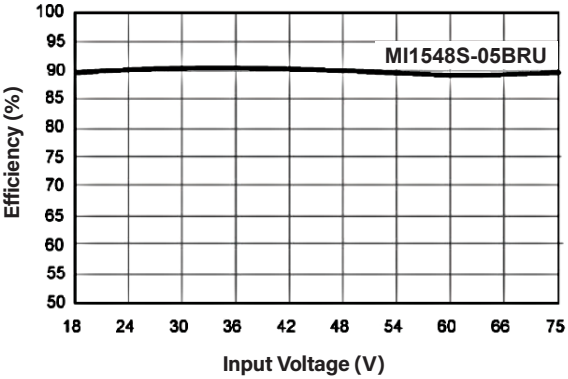


Fig. 4

Efficiency Vs Output Voltage (Vin=48V)

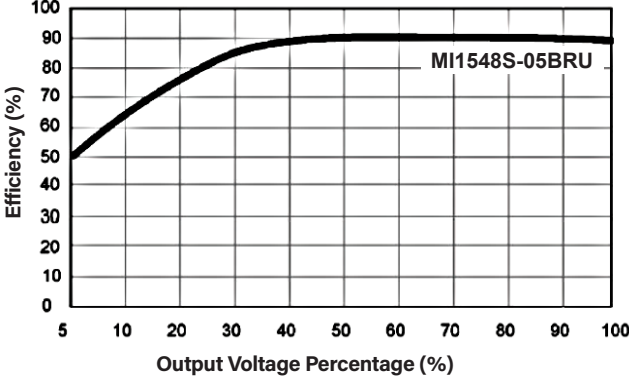


Fig. 5

Application Circuits

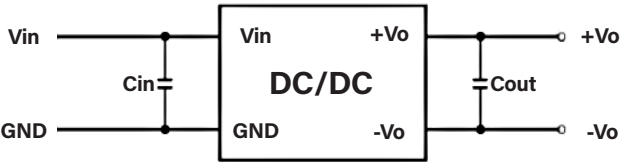


Fig. 6

Recommended Component Parameters		
Vout (VDC)	Cin (uF)	Cout (uF)
3.3/5/12/15	100uF	100uF
24		47uF

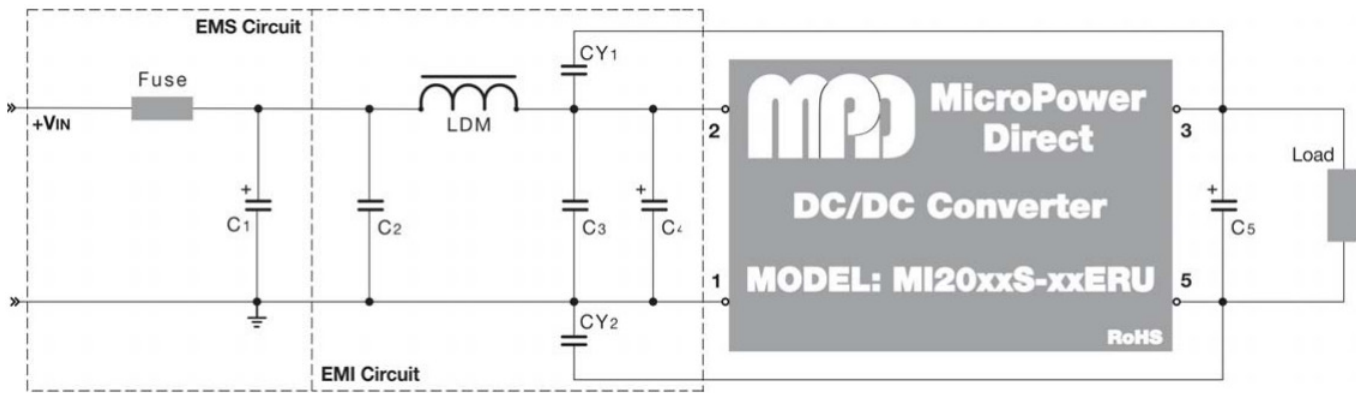


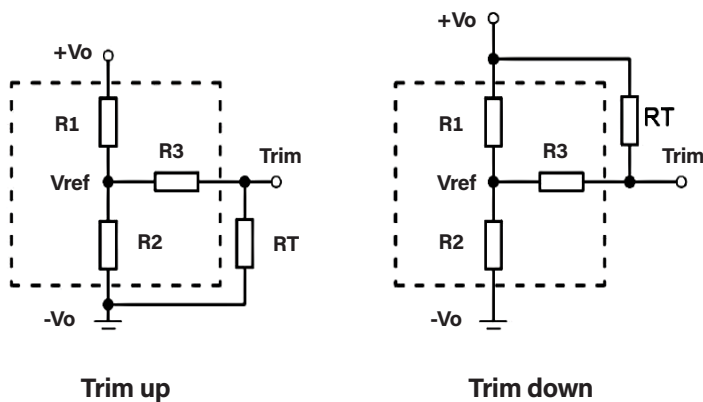
Fig. 7

EMI recommended component parameters

Model	Vin: 24V	Vin: 48V
FUSE	Choose according to actual input current	
C0, C4	330uF/50V	330uF/100V
C1, C2	4.7uF/50V	4.7uF/100V
C3	Refer to the Cout in Fig. 6	
LDM1	2.2uH/4A	2.2uH/2A
CY1, CY2	1nF/2KV	

EMI Characteristics

Parameter	Standard	Criteria	Level
Radiated Emissions	CISPR32/EN 55032	--	Class A w/o Ext. Components
Conducted Emissions	CISPR32/EN 55032	--	Class A/Class B, See Fig. 7-2
ESD	IEC/EN 61000-4-2	B	±6KV Contact, ±8 kV Air
RS	IEC/EN 61000-4-3	A	10V/m
EFT	IEC/EN 61000-4-4	B	±2KV (See Fig. 7-1 for recommended circuit)
Input Voltage Surge	IEC/EN61000-4-5	B	±2KV Line-Line (See Fig. 7-1 for recommended circuit)
CS	IEC/EN61000-4-6	A	3 Vr. m. s



Trim resistor connections (dashed line shows internal resistor network)

Fig. 8

Trim

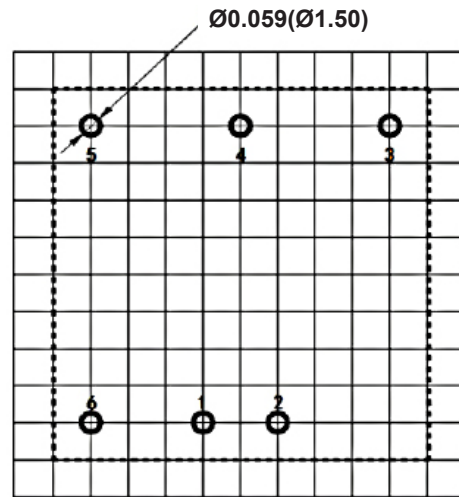
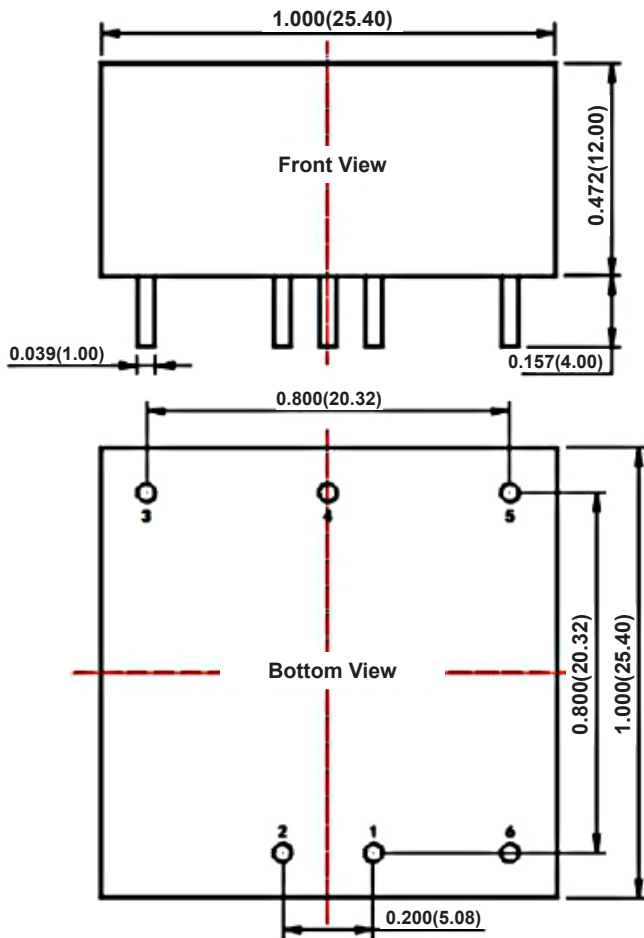
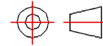
Vout (V)	R1 (KΩ)	R2 (KΩ)	R3 (KΩ)	Vref (V)
3.3	10	6.064	13.622	1.24
5	2.4	2.344	13.622	2.5
12	8.2	2.153	17.346	2.5
15	12	2.388	21.016	2.5
24	10	1.158	10.714	2.5

$$\text{Up : } R_t = \frac{nR_2}{R_2 - n} - R_3 \quad n = \frac{V_{ref}}{V_o - V_{ref}} * R_1$$

$$\text{Down : } R_t = \frac{nR_1}{R_1 - n} - R_3 \quad n = \frac{V_o - V_{ref}}{V_{ref}} * R_2$$

Mechanical Dimensions

Third Angle Projection



Note: The grid distance is 2.54mm*2.54mm

Pin	Function (Single)	Function (Double)
1	GND	GND
2	Vin	Vin
3	+Vo	+Vo
4	Trim	COM
5	-Vo	-Vo
6	Ctrl	Ctrl

Note:

Unit: inches(mm)

Pin section tolerances: $\pm 0.004(\pm 0.10)$

General tolerances: $\pm 0.020(\pm 0.50)$

MPD has a very wide range of high performance AC/DC power supplies ranging from 600W UChannel units to 1W units in miniature Single-In-Line (SIP) packages. All are designed and certified to international safety and EMC/EMI standards.

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