MI600BRU

6W, Miniature 1"x1" Case, Ultrawide 4:1 Input Range DC/DC Converters

Key Features:

- 6W Output Power
- Miniature 1"x1" Case
- Ultrawide 4:1 Wide Input Range
- -40°C to +85°C Operating Temperature Range
- 1500VDC Isolation
- Single & Dual Outputs
- Short Circuit Protection
- Industry Standard Pin-Out

Electrical Specifications

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

Input

Parameter	Conditions		Min.	Typ.	Max.	Units
Input Voltage Range, See Note 4	24 VDC Input		9.0	24	36.0	VDC
	48 VDC Input		18.0	48	75.0	VDC
Reflected Ripple Current	24 VDC Input		--	20	--	mA
	48 VDC Input		--	20	--	mA
Input Filter	PI Filter					

Output

Parameter	Conditions		Min.	Typ.	Max.	Units
Output Voltage Accuracy	0% - 100% Load		--	±1.0	±3.0	%
Line Regulation	Full Load	Vo1	--	±0.2	±0.5	%
		Vo2	--	±0.5	±1.0	
Load Regulation	5%-100% Load	Vo1	--	±0.5	±1.0	%
		Vo2	--	±0.5	±1.5	
Ripple & Noise, See Note 3	20 MHz bandwidth, 5%-100% load		--	50	100	mVp-p
Temperature Coefficient	Full load		--	--	±0.03	% / °C
Output Short Circuit	Continuous, self-recovery					

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	60 seconds	1500	--	--	VDC
Isolation Resistance	500 VDC	1000	--	--	MΩ
Isolation Capacitance	100 KHz /0. 1V	--	1000	--	pF
Switching Frequency	PWM	--	312.5	--	kHz

Environmental

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature Range	See Fig 1	-40	-	+85	°C
Storage Temperature Range	--	-55	-	+125	°C
Cooling	Free air convection				
Humidity, See Note 8	Non condensing	5	--	95	%RH

Physical

Case Size	1.0 x 1.0 x 0.4724 in (See mechanical diagrams on page 4)
Case Material	Alluminum alloy
Weight	0.41 oz (11.6 gms) Typ.

Reliability Specifications

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

Absolute Maximum Ratings

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Voltage Surge (1 Sec)	24 VDC Input	-0.7	--	50	VDC
	48 VDC Input	-0.7	--	100	VDC
Lead Temperature	1.5 mm from Case for 10 Sec.	--	--	300	°C

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

CE

RoHS

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Model Selection Guide

Model Number	Input				Output			Efficiency (%, Typ)	Reflected Ripple Current (mA Typ)	Capacitive Load (μF, Max) (See Note7)	Fuse Rating Slow-Blow (mA) (See Note1)
	Voltage (VDC)		Current (mA)		Voltage (VDC)	Current (mA, Max)	Current (mA, Min)				
	Nominal	Range	Full-Load	No-Load							
MI624S-03BRU	24	9.0 – 36.0	261	5	3.3	1500	0.0	79	20.0	1800	1500
MI624S-05BRU	24	9.0 – 36.0	292	5	5.0	1200	0.0	83	20.0	1000	1500
MI624S-09BRU	24	9.0 – 36.0	292	5	9.0	667	0.0	85	20.0	680	1500
MI624S-12BRU	24	9.0 – 36.0	292	5	12.0	500	0.0	87	20.0	470	1500
MI624S-15BRU	24	9.0 – 36.0	292	5	15.0	400	0.0	87	20.0	220	1500
MI624S-24BRU	24	9.0 – 36.0	292	5	24.0	250	0.0	88	20.0	100	1500
MI624D-05BRU	24	9.0 – 36.0	292	5	±5.0	±600	±0.0	83	20.0	470	1500
MI624D-12BRU	24	9.0 – 36.0	292	5	±12.0	±250	±0.0	87	20.0	100	1500
MI624D-15BRU	24	9.0 – 36.0	292	5	±15.0	±200	±0.0	87	20.0	100	1500
MI624D-24BRU	24	9.0 – 36.0	292	5	±24.0	±125	±0.0	87	20.0	100	1500
MI648S-03BRU	48	18.0 – 75.0	130	4	3.3	1500	±0.0	79	20.0	1800	750
MI648S-05BRU	48	18.0 – 75.0	146	4	5.0	1200	0.0	83	20.0	1000	750
MI648S-12BRU	48	18.0 – 75.0	146	4	12.0	500	0.0	87	20.0	470	750
MI648S-15BRU	48	18.0 – 75.0	146	4	15.0	400	0.0	88	20.0	220	750
MI648S-24BRU	48	18.0 – 75.0	146	4	24.0	250	0.0	88	20.0	100	750
MI648D-05BRU	48	18.0 – 75.0	146	4	±5.0	±600	0.0	83	20.0	470	750
MI648D-12BRU	48	18.0 – 75.0	146	4	±12.0	±250	±0.0	87	20.0	100	750
MI648D-15BRU	48	18.0 – 75.0	146	4	±15.0	±200	±0.0	88	20.0	100	750

Typical Characteristic Curves

Temperature Derating Curve

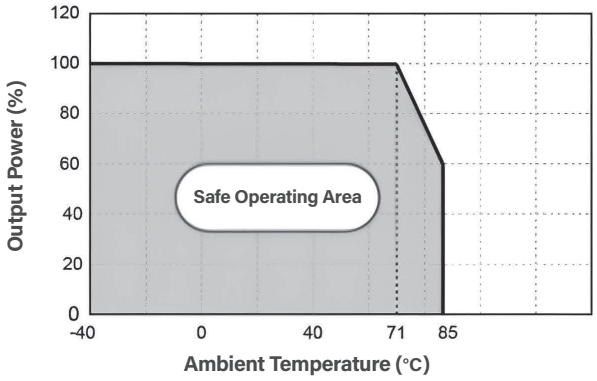


Fig. 1

Notes:

1. It is recommended that a fuse be used on the input of a power supply for protection. See the Model Selection table above for the correct rating.
2. All DC-DC converters of this series are tested before delivery using the recommended circuit shown in Fig. 6.
3. Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values Cin and Cout 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. The input voltage should not exceed the specified range value, otherwise it may cause permanent and irreparable damage.
5. It is recommended to use at a load of over 5%. If the load is below 5%, the ripple index of the product may exceed the specifications, but it does not affect the reliability of the product.
6. Suggested dual output module load imbalance: ≤ ± 5%. If it exceeds ± 5%, it cannot be guaranteed that the product performance meets all performance indicators in this manual.
7. The maximum capacitive load is tested within the input voltage range and under full load conditions.
8. Unless otherwise specified, all indicators in this manual are measured at Ta=25 °C, humidity<75% RH, nominal input voltage, and output rated load.
9. All indicator testing methods in this manual are based on our company's corporate standards.
10. Our company can provide product customization, and specific requirements can be directly contacted by our technical personnel.
11. Product specifications are subject to change without prior notice.

Efficiency VS Input Voltage (Full Load)

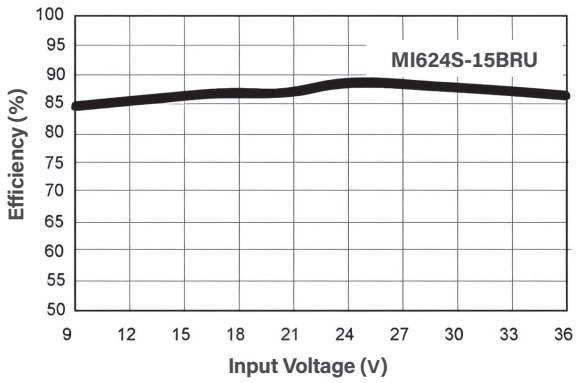


Fig. 2

Efficiency VS Output Voltage (Vin=24V)

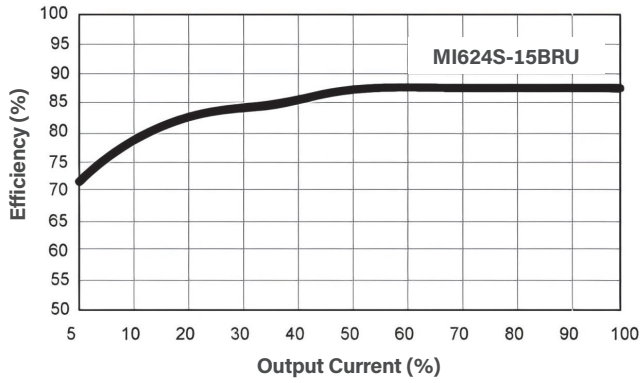


Fig. 3

Efficiency VS Input Voltage (full load)

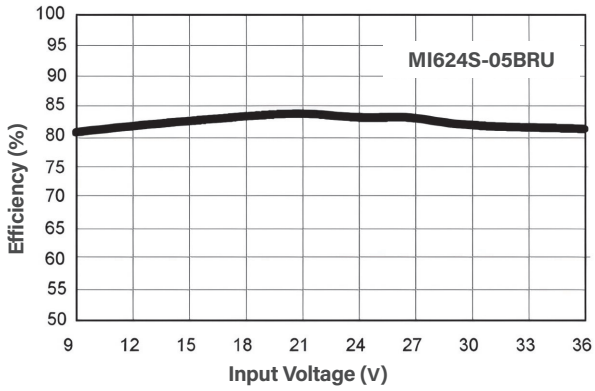


Fig. 4

Efficiency VS Output Voltage (Vin=24V)

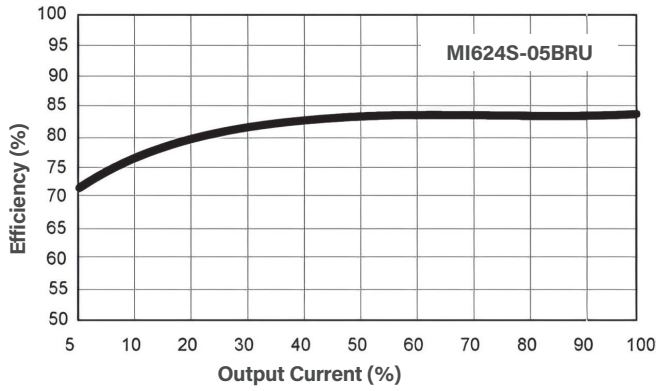


Fig. 5

Application Circuits

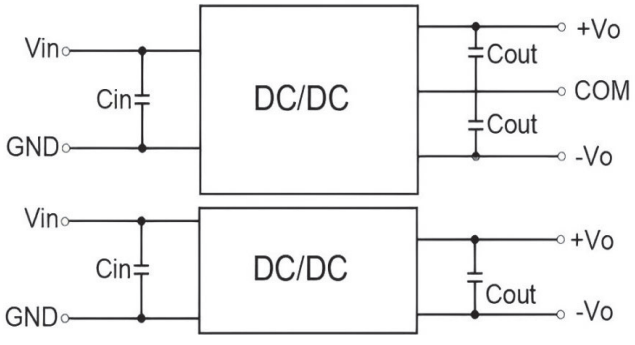
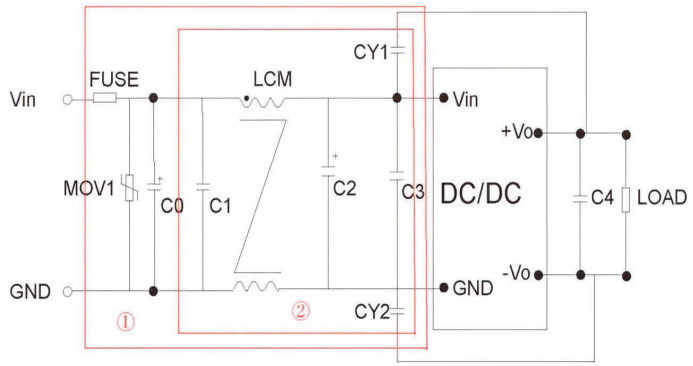


Fig. 6

Recommended component parameters		
Vin	24V	48V
Cin	100uF	10-47uF
Cout	10uF	10uF

EMC compliance circuit



Note: Part 1 in Figure 7 is for EMC testing, Part 2 is used for EMI filtering and can be selected according to requirements.

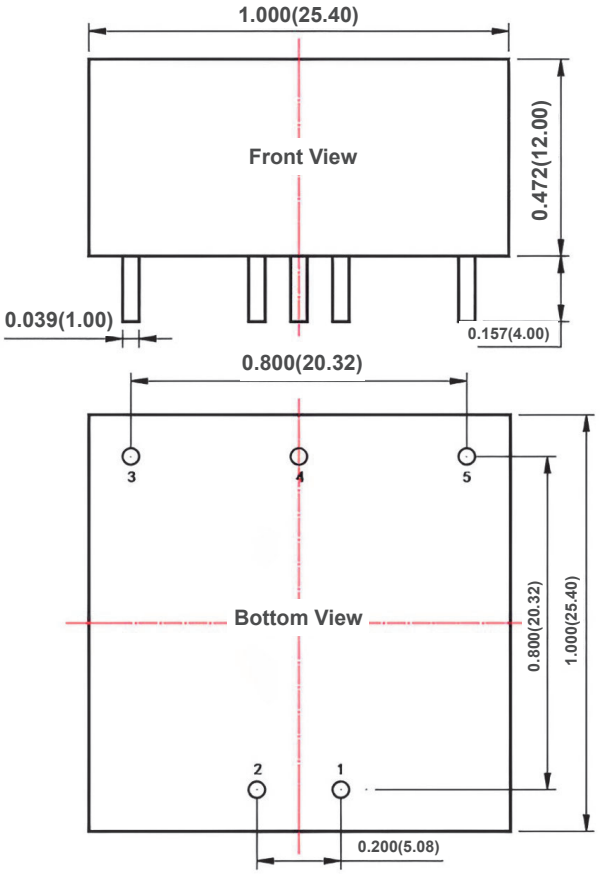
Fig. 7

EMI Recommended Parameter Table		
Vin	24V	48V
FUSE	Choose according to actual input current	
MOV	20D470K	14D101K
C0	680uF/50V	680uF/100V
C1	1uF/50V	1uF/100V
C2	330uF/50V	330uF/100V
C3	4.7uF/50V	4.7uF/100V
C4	Refer to the Cout in Fig.6	
LCM	4.7mH	
CY1, CY2	1nF/2KV	

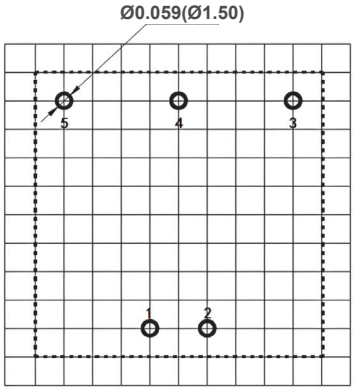
EMI Characteristics

Parameter	Standard	Criteria	Level
Radiated Emissions	CISPR32/EN 55032	--	Class B
Conducted Emissions	CISPR32/EN 55032	--	Class B
ESD	IEC/EN61000-4-2	B	±4 kV Contact
RS	IEC/EN61000-4-3	A	10V/m
EFT	IEC/EN61000-4-4	B	±4kV(see Fig.7 for recommended circuit)
Surge	IEC/EN61000-4-5	B	line to line±2KV (see Fig.7 for recommended circuit)
CS	IEC/EN61000-4-6	A	3Vr.m.s

Mechanical Dimensions



PCB Layout



Note: The grid distance is 2.54mm*2.54mm

Pin Definition Table

Pin	Single	Dual
1	GND	GND
2	Vin	Vin
3	+Vo	+Vo
4	No Pin	COM
5	-Vo	-Vo

Note:
Unit: inches(mm)
Pin section tolerances: ±0.004(±0.10)
General tolerances: ±0.020(±0.50)