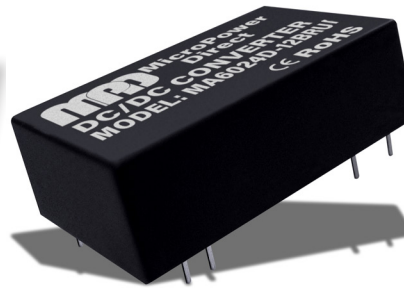
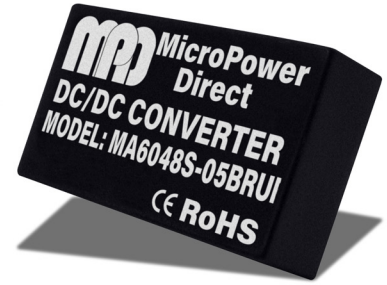


MA600BRUI

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



Key Features:

- 6W Output Power
- Miniature DIP Case
- Ultrawide 4:1 Wide Input Range
- -40°C to +85°C Operating Temperature Range
- 3000VDC Isolation
- Efficiency to 88%
- Input Undervoltage Protection
- Short Circuit Protection



MicroPower Direct
MPD
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Electrical Specifications

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

Input		Conditions	Min.	Typ.	Max.	Units
Parameter						
Input Voltage Range, See Note 3	24 VDC Input		9	24	36	VDC
	48 VDC Input		18	48	75	
Reflected Ripple Current	24 VDC Input			20		mA
	48 VDC Input			20		
Starting Voltage	24VDC Input				9	VDC
	48VDC Input				18	
Input Undervoltage Protection	24VDC Input		5.5	6.5		VDC
	48VDC Input		12	15.5		
Start Time	Nominal input and constant resistance load			10		ms
Input Filter			PI Filter			

Output		Conditions	Min.	Typ.	Max.	Units
Parameter						
Output Voltage Accuracy	5% - 100% Load			±3.0		
	0% to 5% load	Single Output		±1.0	±3.0	%
		Dual Output		±2.0	±5.0	
Output Voltage Balance	Dual Output, Balanced Load			±0.5	±1.5	%
Linear Regulation	Input voltage low to high limit, full load	Positive Output		±0.2	±0.5	%
		Negative Output		±0.5	±1	
Load Regulation	5%-100% Load	Positive Output		±0.5	±1.0	%
		Negative Output		±0.5	±1.5	
Ripple & Noise, See Note 2	20 MHz bandwidth, 5%-100% load			85	120	mVp-p
Transient Recovery Time	25% load step change			300	500	µs
Transient Response Deviation	25% load step change			±3	±5	%
Temperature Drift Coefficient	Full load				±0.03	%/°C
Overcurrent Protection	Input Voltage Range	24V Output	110	220		%Io
		Other Output	110	140		
Short-Circuit Protection			Continuous, self-recovery			

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	60 seconds	3000			VDC
Isolation Resistance	500 VDC	1000			MΩ
Isolation Capacitance	100 KHz /0. 1V		1000		pF
Switching Frequency	Full Load, Nominal Input Voltage		300		kHz
Input Voltage Surge (1 Sec)	24 VDC Input	-0.7		50	VDC
	48 VDC Input	-0.7		100	
Lead Temperature	1.5 mm from Case for 10 Sec.			300	°C

Reliability Specifications

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

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

CompuMess Elektronik GmbH

CME

Lise-Meitner-Str. 4 | 85716 Unterschleißheim | ☎ +49 89 321501-0 | 📠 +49 89 321501-11 | ✉ info@compumess.de | www.compumess.de

Model Selection Guide

Model Number	Input			Output			Full Load Efficiency (% Typ)	Capacitive Load (µF Max) (See Note 2 & 6)	Fuse Rating Slow-Blow (mA)
	Voltage (VDC)			Voltage (VDC)	Current (mA, Max)	Current (mA, Min)			
	Nominal	Range	Max						
MA624S-03BRUI	24	9.0 – 36.0	40	3.3	1500	0.0	79	2200	1500
MA624S-05BRUI	24	9.0 – 36.0	40	5.0	1200	0.0	82	2200	1500
MA624S-09BRUI	24	9.0 – 36.0	40	9.0	667	0.0	85	1000	1500
MA624S-12BRUI	24	9.0 – 36.0	40	12.0	500	0.0	86	680	1500
MA624S-15BRUI	24	9.0 – 36.0	40	15.0	400	0.0	88	680	1500
MA624S-24BRUI	24	9.0 – 36.0	40	24.0	250	0.0	87	680	1500
MA624D-05BRUI	24	9.0 – 36.0	40	±5.0	±600	±0.0	80	#680	1500
MA624D-12BRUI	24	9.0 – 36.0	40	±12.0	±250	±0.0	84	#330	1500
MA624D-15BRUI	24	9.0 – 36.0	40	±15.0	±200	±0.0	85	#220	1500
MA648S-03BRUI	48	18.0 – 75.0	80	3.3	1500	0.0	79	2200	750
MA648S-05BRUI	48	18.0 – 75.0	80	5.0	1200	0.0	83	2200	750
MA648S-12BRUI	48	18.0 – 75.0	80	12.0	500	0.0	87	680	750
MA648S-15BRUI	48	18.0 – 75.0	80	15.0	400	0.0	88	680	750
MA648S-24BRUI	48	18.0 – 75.0	80	24.0	250	0.0	87	680	750

Notes:

- All DC/DC converters in this series are tested according to the recommended testing circuit (Figure 6) before leaving the factory.
- If further reduction of input and output ripple is required, the external capacitance C_{in} and C_{out} of the input and output can be increased or a capacitor with a small series equivalent impedance value can be selected, but the capacitance value cannot exceed the maximum capacitive load of the product.
- The input voltage should not exceed the specified range value, otherwise it may cause permanent and irreparable damage.
- 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.
- Suggested dual output module load imbalance: $\leq \pm 5\%$. If it exceeds $\pm 5\%$, it cannot be guaranteed that the product performance meets all performance indicators in this manual.
- The maximum capacitive load is tested within the input voltage range and under full load conditions.
- Unless otherwise specified, all indicators in this manual are measured at T_a=25 °C, humidity<75% RH, nominal input voltage, and output rated load.
- All indicator testing methods in this manual are based on our company's corporate standards.
- Our company can provide product customization, and specific requirements can be directly contacted by our technical personnel.
- Product specifications are subject to change without prior notice.

Typical Characteristic Curves

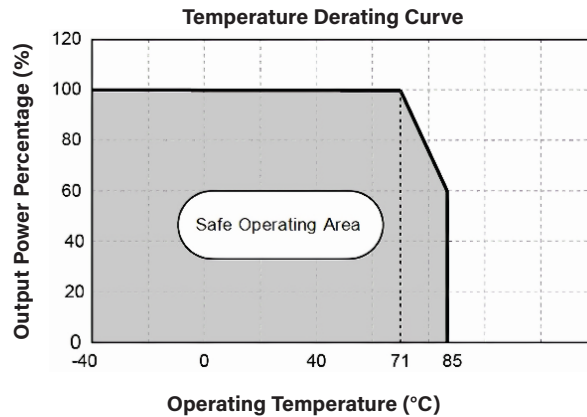


Fig. 1

Environmental

Parameter	Conditions	Min.	Typ	Max.	Units
Operating Temperature Range	See Fig 1	-40		+85	°C
Storage Temperature Range		-55		+125	°C
Humidity, See Note 7	Non condensing	5		95	%RH

Efficiency VS Input Voltage (full load)

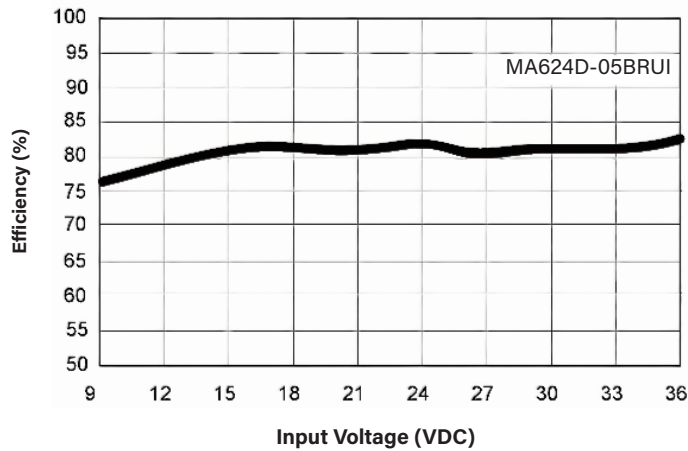


Fig. 2

Efficiency VS Output Load (Vin=24V)

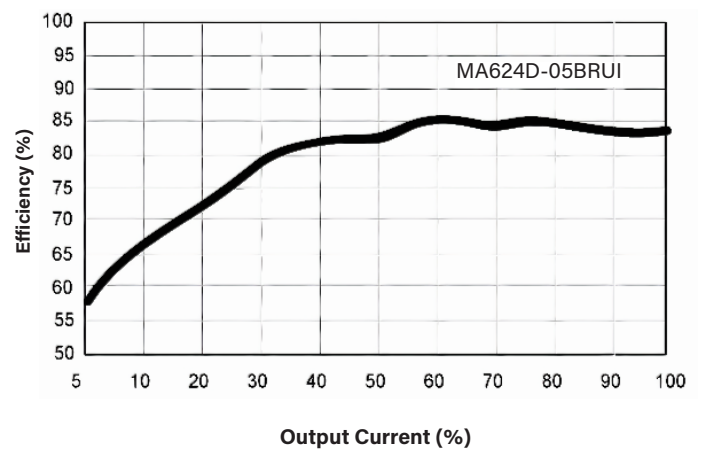


Fig. 3

Efficiency VS Input Voltage (Full load)

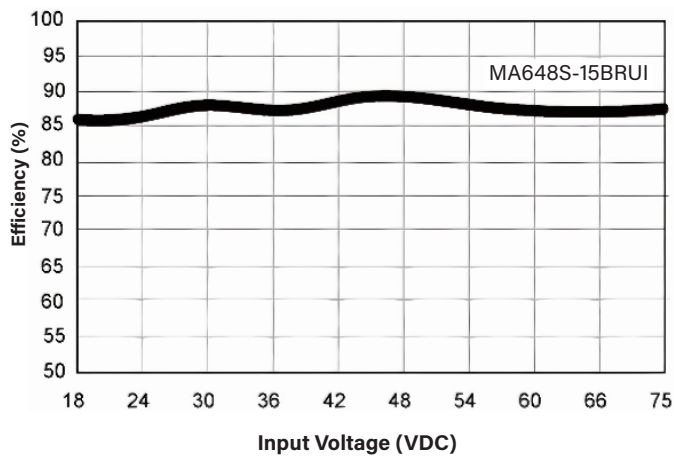


Fig. 4

Efficiency VS Output Load (Vin=48V)

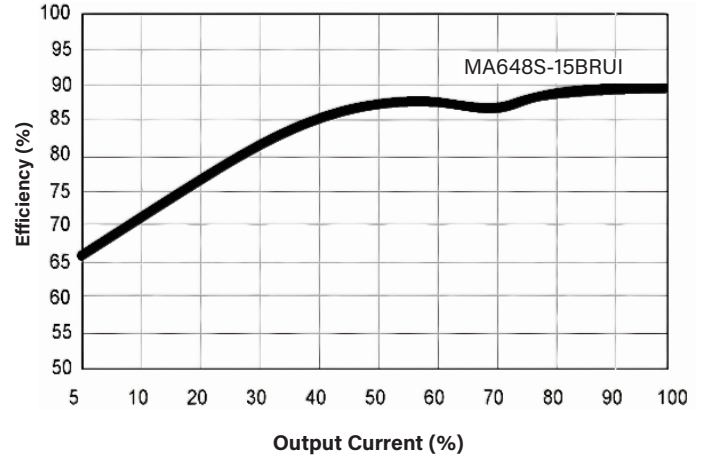


Fig. 5

Application Circuits

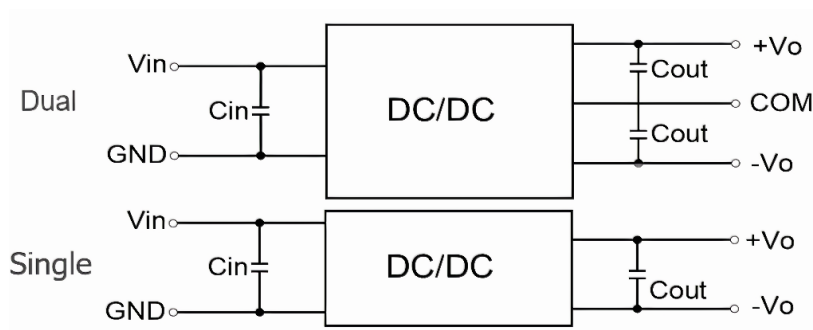


Fig. 6

Recommended Capacitive Load Value Table

V_{in}	24V	48V
C_{in}	100uF	10-47uF
C_{out}	10uF	

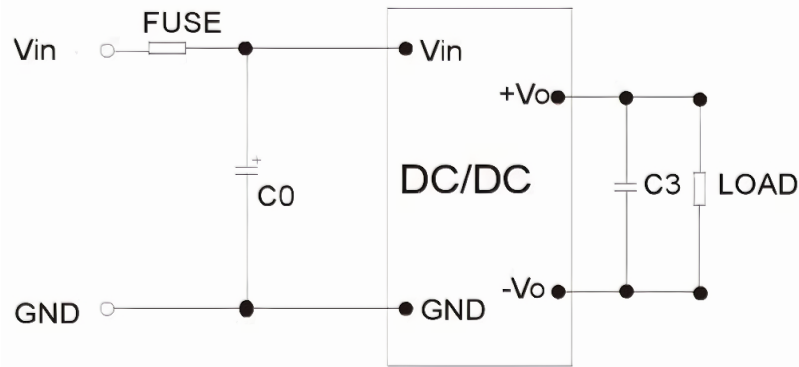


Fig. 7

EMC Solution Recommended Circuit (Enhanced EMS & EMI if Required)

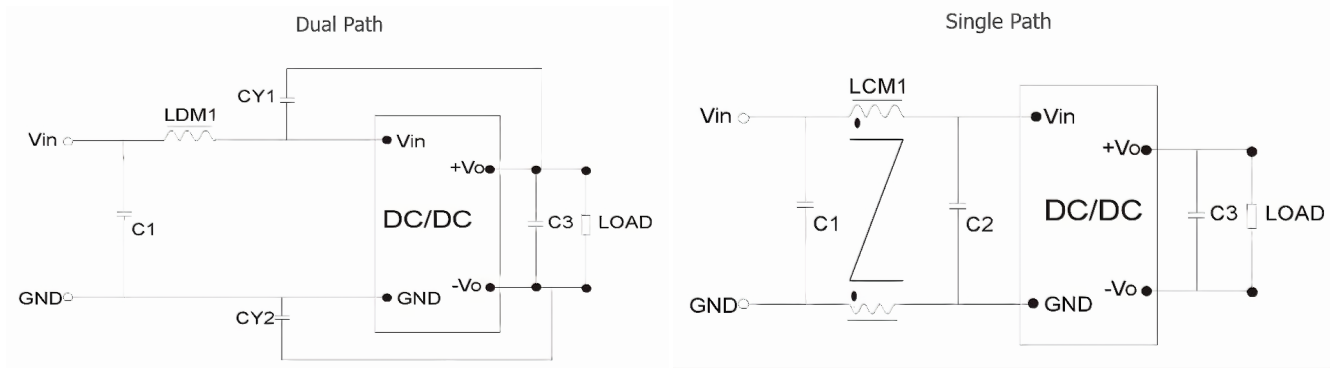


Fig. 8

Note: Part 1 in Figure 8 is for EMC testing; The second part is used for EMI filtering, which can be selected according to the demand.

EMC Solution - Recommended Circuit Value

Model	Vin:24V	Model	Vin:24V	Vin:48V
FUSE	Select according to the actual input current of the customer	FUSE	Select according to the actual input current of the customer	
C0	1000μF/50V	C0	1000μF/50V	680μF/100V
C1	1μF/50V	C1,C2	2.2μF/50V	2.2μF/100V
C3	Refer to the Cout parameters in Figure 6	C3	Refer to the Cout parameters in Figure 6	
LDM1	4.7μH	LCM1	2.2mH	
CY1,CY2	1nF/3KV			

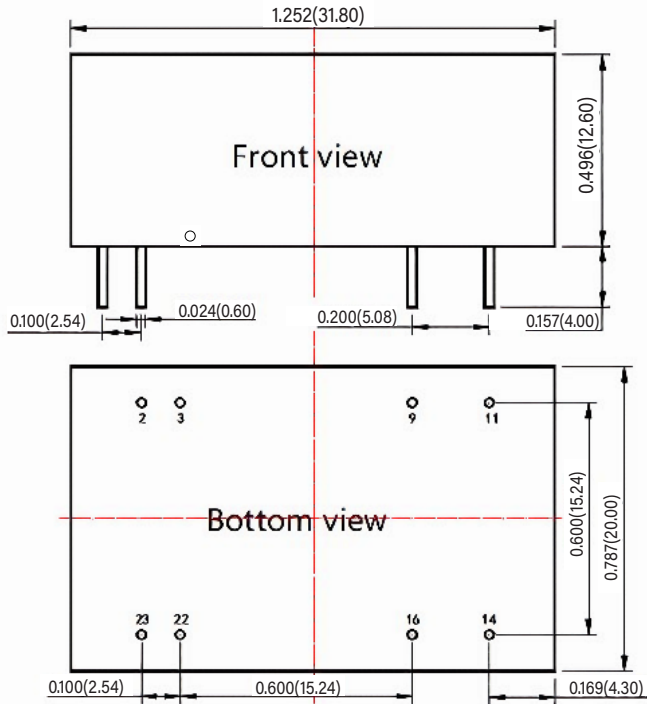
EMI Characteristics

Parameter	Standard	Criteria	Level
Radiated Emissions	CISPR32/EN 55032		Class A
Conducted Emissions	CISPR32/EN 55032		Class A
ESD	IEC/EN 61000-4-2	B	±4 kV Contact
RS	IEC/EN 61000-4-3	A	10V/m
EFT	IEC/EN 61000-4-4	B	±2KV (See Fig. 7 for recommended circuit)
Surge	IEC/EN 61000-4-5	B	line to line ±2KV (See Fig. 7 for recommended circuit)
CS	IEC/EN 61000-4-6	A	3Vr.m.s
Voltage sag, drop, and short-term interruption immunity	IEC/EN 61000-4-29	B	0-70%

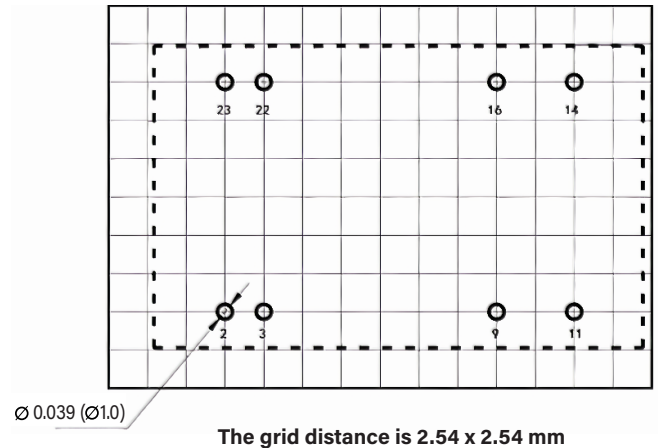
Mechanical Dimensions

Physical

Case Size	1.25 x 0.787 x 0.496 in (See mechanical diagrams)
Case Material	Black flame retardant and heat-resistant plastic (UL 94V-0 rated)
Weight	0.448Oz (12.7g) Typ.



PCB Layout



Pin Definition Table

Pin	Single	Dual
2	GND	GND
3	GND	GND
9	NC	COM
11	NC	-Vo
14	+Vo	+Vo
16	-Vo	COM
22	Vin	Vin
23	Vin	Vin

NC: Pin to be isolated from circuitry

Note:

Unit: inches(mm)

Pin section tolerances: ± 0.004 (± 0.10)

General tolerances: ± 0.020 (± 0.50)