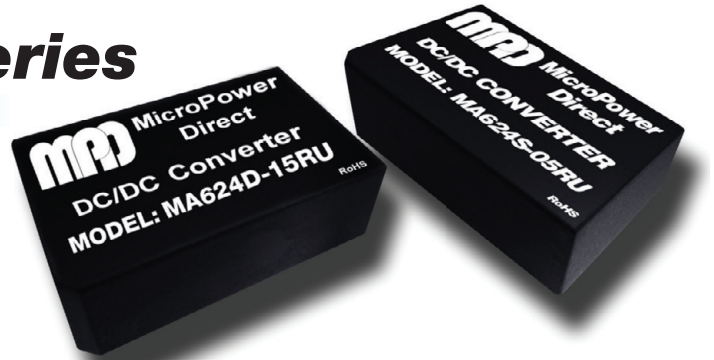


# MA600RU Series

## Wide 4:1 Input, 6W, Single & Dual Output DC/DC Converters



### Key Features:

- 6W Output Power
- 4:1 Input Voltage Range
- 1,500 VDC Isolation
- 16 Standard Models
- Single & Dual Outputs
- Compact DIP Case
- -40°C to +85°C Operation
- Industry Standard Pin-Out

3.0 kV Isolation Models Available

2:1 Input Range Models Available

RoHS



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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						
Parameter	Conditions	Min.	Typ.	Max.	Units	
Input Start Voltage	24 VDC Input	7.0	8.0	9.0	VDC	
	48 VDC Input	14.0	16.0	18.0		
Under Voltage Shutdown	24 VDC Input			8.5	VDC	
	48 VDC Input			17.5		
Input Filter	π (Pi) Filter					

Output						
Parameter	Conditions	Min.	Typ.	Max.	Units	
Output Voltage Accuracy			±1.0	±2.0	%	
Output Voltage Balance	Dual Output, Balanced Loads		±1.0	±2.0	%	
Line Regulation	V <sub>IN</sub> = Min to Max		±0.1	±0.5	%	
Load Regulation	I <sub>OUT</sub> = 0% to 100%		±0.6	±1.2	%	
Ripple & Noise (20 MHz)	See Note 1			70	mV P - P	
	Over Line, Load & Temp.			100		
Transient Recovery Time, See Note 2	25% Load Step Change		300	600	μSec	
Transient Response Deviation			±3.0		%	
Temperature Coefficient			±0.01	±0.02	%/°C	
Output Overload Protection	Foldback	110	145		%	
Output Short Circuit	Continuous (Autorecovery)					

General						
Parameter	Conditions	Min.	Typ.	Max.	Units	
Isolation Voltage	60 Seconds	1,500			VDC	
Isolation Resistance	500 VDC	1,000			MΩ	
Isolation Capacitance	100 kHz/1.0V		1,000		pF	
Switching Frequency			330		kHz	

EMI Characteristics						
Parameter	Standard	Level				
Radiated Emissions	EN 55022	Class A				
Conducted Emissions	EN 55022	Class A				
ESD	EN 61000-4-2	Criteria A; ±8 kV Air ±6 kV Contact				
RS	EN 61000-4-3	Criteria A; 10V/m				
EFT	See Note 3	EN 61000-4-4	Criteria A; ±2 kV			
Surge	See Note 3	EN 61000-4-5	Criteria A; ±1 kV			
CS		EN 61000-4-6	Criteria A; 10V/m			

Environmental						
Parameter	Conditions	Min.	Typ.	Max.	Units	
Operating Temperature Range	Ambient	-40	+25	+85	°C	
Operating Temperature Range	Case			+100	°C	
Storage Temperature Range		-50		+125	°C	
Cooling	Free Air Convection					
Humidity	RH, Non-condensing			95	%	

Physical						
Parameter	Conditions	Min.	Typ.	Max.	Units	
Case Size		1.25 x 0.80 x 0.40 Inches (31.75 x 20.32 x 10.16 mm)				
Case Material	Non-Conductive Black Plastic (UL94-V0)					
Weight	0.45 Oz (12.8g)					

Reliability Specifications						
Parameter	Conditions	Min.	Typ.	Max.	Units	
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	800			kHours	

Absolute Maximum Ratings						
Parameter	Conditions	Min.	Typ.	Max.	Units	
Input Voltage Surge (1 Sec)	24 VDC Input	-0.7		50.0	VDC	
	48 VDC Input	-0.7		100.0		
Lead Temperature	1.5 mm From Case for 10 Sec			260	°C	

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

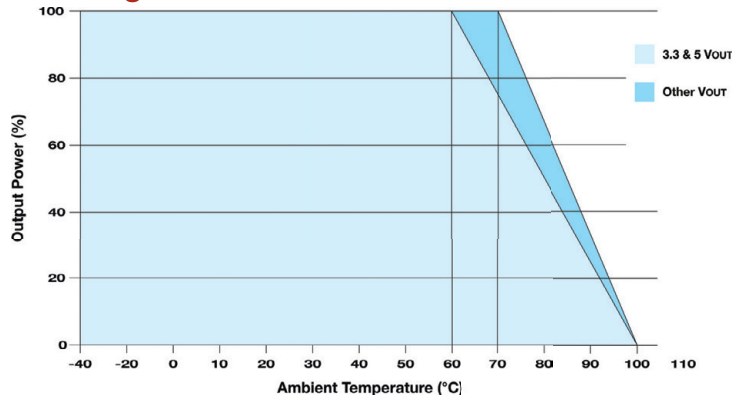
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Model Number	Input				Output			Efficiency (% Typ)	Reflected Ripple Current (mA Typ)	Capacitive Load (µF Max)	Fuse Rating Slow-Blow (mA)
	Voltage (VDC)		Current (mA)		Voltage (VDC)	Current (mA, Max)	Current (mA, Min)				
	Nominal	Range	Full-Load	No-Load							
MA624S-05RU	24	9.0 - 36.0	214	20	3.3	1,200.0	0.0	77	20.0	470	1,500
MA624S-05RU	24	9.0 - 36.0	313	20	5.0	1,200.0	0.0	80	20.0	470	1,500
MA624S-12RU	24	9.0 - 36.0	298	20	12.0	500.0	0.0	84	20.0	100	1,500
MA624S-15RU	24	9.0 - 36.0	298	20	15.0	400.0	0.0	84	20.0	100	1,500
MA624S-24RU	24	9.0 - 36.0	298	20	24.0	250.0	0.0	84	20.0	47	1,500
MA624D-05RU	24	9.0 - 36.0	260	20	±5.0	±500.0	±0.0	80	20.0	±100	1,500
MA624D-12RU	24	9.0 - 36.0	298	20	±12.0	±250.0	±0.0	84	20.0	±100	1,500
MA624D-15RU	24	9.0 - 36.0	298	20	±15.0	±200.0	±0.0	84	20.0	±100	1,500
MA648S-03RU	48	18.0 - 75.0	107	10	3.3	1,200.0	0.0	77	15.0	470	800
MA648S-05RU	48	18.0 - 75.0	156	10	5.0	1,200.0	0.0	80	15.0	470	800
MA648S-12RU	48	18.0 - 75.0	149	10	12.0	500.0	0.0	84	15.0	100	800
MA648S-15RU	48	18.0 - 75.0	149	10	15.0	400.0	0.0	84	15.0	100	800
MA648S-24RU	48	18.0 - 75.0	149	10	24.0	250.0	0.0	84	15.0	47	800
MA648D-05RU	48	18.0 - 75.0	130	10	±5.0	±500.0	±0.0	80	15.0	±100	800
MA648D-12RU	48	18.0 - 75.0	149	10	±12.0	±250.0	±0.0	84	15.0	±100	800
MA648D-15RU	48	18.0 - 75.0	149	10	±15.0	±200.0	±0.0	84	15.0	±100	800

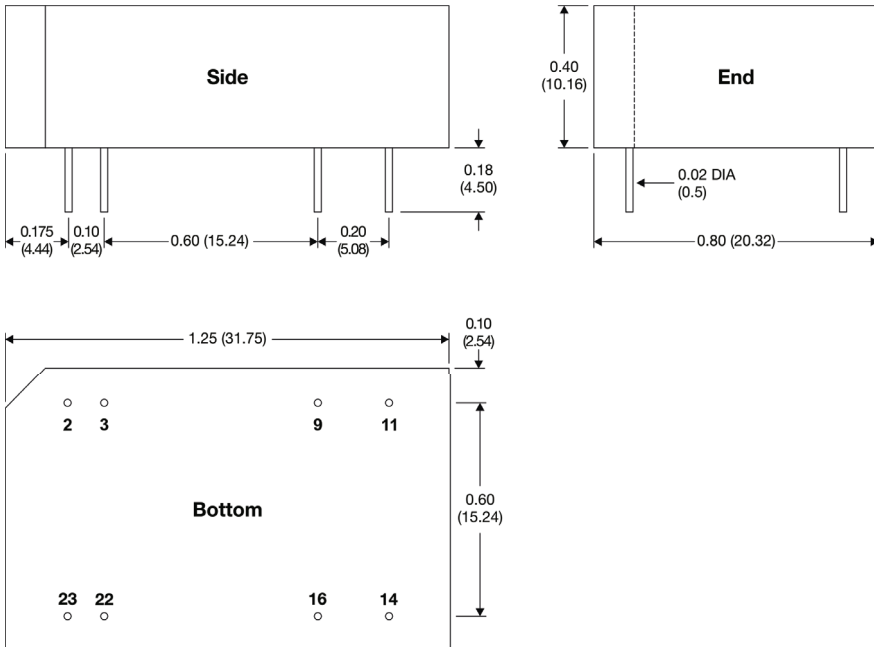
Notes:

- When measuring output ripple, it is recommended that an external 3.3 µF ceramic capacitor be placed from the +V<sub>OUT</sub> pin to the -V<sub>OUT</sub> pin for single output units and from each output to common for dual output units.
- Transient recovery is measured to within a 1% error band for a load step change of 75% to 100%.
- Operation at no-load will not damage these units.
- An external 220 µF/100V capacitor connected across the input pins is required to meet EN61000-4-4 and EN61000-4-5.
- Dual output units may be connected to provide a 10, 24 or 30 VDC output. To do this, connect the load across the positive (+V<sub>OUT</sub>) and negative (-V<sub>OUT</sub>) outputs and float the output common.
- The converter should be connected to a low ac-impedance source. An input source with a highly inductive impedance may affect the stability of the converter. In applications where the converter output loading is high and input power is supplied over long lines, it may be necessary to use a capacitor on the input to insure start-up. In this case, it is recommended that a low ESR (ESR <1.0Ω at 100 kHz) capacitor be mounted close to the converter. For 24V input units a 4.7 µF is recommended; and for 48V units a 2.2 µF.
- It is recommended that a fuse be used on the input of a power supply for protection. See the table above for the correct rating.

Derating Curve



Mechanical Dimensions



For 3 kV Isolation, See MA600x-xxRUI Series Datasheet  
 For 2:1 Inputs, See MA600x-xxRW Series Datasheet

Pin Connections

Pin	Single	Dual
2, 3	-V <sub>IN</sub>	-V <sub>IN</sub>
9	No Pin	Common
11	NC	-V <sub>OUT</sub>
14	+V <sub>OUT</sub>	+V <sub>OUT</sub>
16	-V <sub>OUT</sub>	Common
22, 23	+V <sub>IN</sub>	+V <sub>IN</sub>

NC: No Connection

Mechanical Notes:

- All dimensions are typical in inches (mm)
- Tolerance x.x = ±0.02 (±0.50)
- Tolerance x.xx = ±0.01 (±0.25)



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