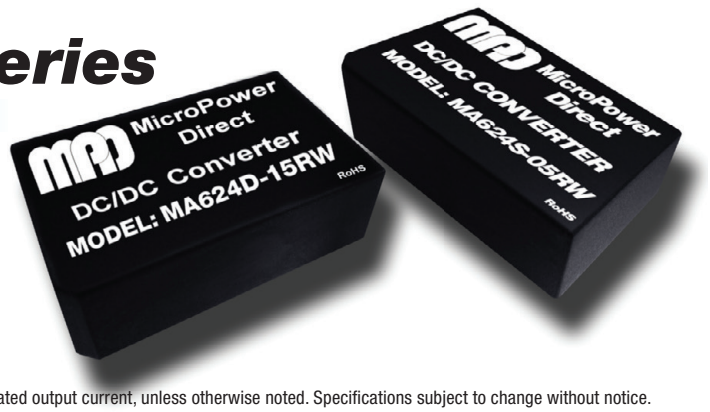
MA600RW Series

Wide 2:1 Input, 6W, Single & Dual Output DC/DC Converters



Key Features:

- 6W Output Power
- 2:1 Input Voltage Range
- 1,500 VDC Isolation
- 24 Standard Models
- Single & Dual Outputs
- Compact DIP Case
- -40°C to +85°C Operation
- Industry Standard Pin-Out

3.0 kV Isolation Models Available

4:1 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	12 VDC Input	7.0	8.0	9.0	VDC
	24 VDC Input	14.0	16.0	18.0	
	48 VDC Input	32.0	34.0	36.0	
Under Voltage Shutdown	12 VDC Input			8.5	VDC
	24 VDC Input			16.0	
	48 VDC Input			35.0	
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_{IN} = Min to Max		±0.1	±0.5	%
Load Regulation	I_{OUT} = 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

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	1.0			MHours

Absolute Maximum Ratings

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Voltage Surge (1 Sec)	12 VDC Input	-0.7		25.0	VDC
	24 VDC Input	-0.7		50.0	
	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 Selection Guide

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							
MA612S-03RW	12	9.0 - 18.0	440	40	3.3	1,200.0	0.0	75	30.0	470	1,500
MA612S-05RW	12	9.0 - 18.0	641	40	5.0	1,200.0	0.0	78	30.0	470	1,500
MA612S-12RW	12	9.0 - 18.0	609	40	12.0	500.0	0.0	82	30.0	100	1,500
MA612S-15RW	12	9.0 - 18.0	609	40	15.0	400.0	0.0	82	30.0	100	1,500
MA612S-24RW	12	9.0 - 18.0	595	40	24.0	250.0	0.0	84	30.0	47	1,500
MA612D-05RW	12	9.0 - 18.0	534	40	±5.0	±500.0	±0.0	78	30.0	±100	1,500
MA612D-12RW	12	9.0 - 18.0	609	40	±12.0	±250.0	±0.0	82	30.0	±100	1,500
MA612D-15RW	12	9.0 - 18.0	609	40	±15.0	±200.0	±0.0	82	30.0	±100	1,500
MA624S-05RW	24	18.0 - 36.0	214	20	3.3	1,200.0	0.0	77	20.0	470	700
MA624S-05RW	24	18.0 - 36.0	313	20	5.0	1,200.0	0.0	80	20.0	470	700
MA624S-12RW	24	18.0 - 36.0	298	20	12.0	500.0	0.0	84	20.0	100	700
MA624S-15RW	24	18.0 - 36.0	298	20	15.0	400.0	0.0	84	20.0	100	700
MA624S-24RW	24	18.0 - 36.0	298	20	24.0	250.0	0.0	84	20.0	47	700
MA624D-05RW	24	18.0 - 36.0	260	20	±5.0	±500.0	±0.0	80	20.0	±100	700
MA624D-12RW	24	18.0 - 36.0	298	20	±12.0	±250.0	±0.0	84	20.0	±100	700
MA624D-15RW	24	18.0 - 36.0	298	20	±15.0	±200.0	±0.0	84	20.0	±100	700
MA648S-03RW	48	36.0 - 72.0	107	10	3.3	1,200.0	0.0	77	15.0	470	350
MA648S-05RW	48	36.0 - 72.0	156	10	5.0	1,200.0	0.0	80	15.0	470	350
MA648S-12RW	48	36.0 - 72.0	149	10	12.0	500.0	0.0	84	15.0	100	350
MA648S-15RW	48	36.0 - 72.0	149	10	15.0	400.0	0.0	84	15.0	100	350
MA648S-24RW	48	36.0 - 72.0	149	10	24.0	250.0	0.0	84	15.0	47	350
MA648D-05RW	48	36.0 - 72.0	130	10	±5.0	±500.0	±0.0	80	15.0	±100	350
MA648D-12RW	48	36.0 - 72.0	149	10	±12.0	±250.0	±0.0	84	15.0	±100	350
MA648D-15RW	48	36.0 - 72.0	149	10	±15.0	±200.0	±0.0	84	15.0	±100	350

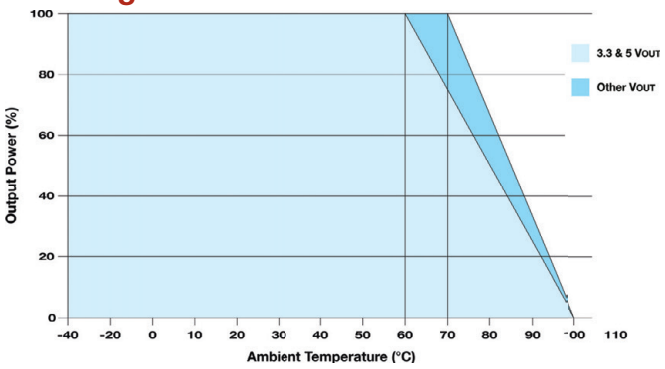
Notes:

1. When measuring output ripple, it is recommended that an external 3.3 µF ceramic capacitor be placed from the +Vout pin to the -Vout pin for single output units and from each output to common for dual output units.
2. Transient recovery is measured to within a 1% error band for a load step change of 75% to 100%.
3. Operation at no-load will not damage these units.
4. An external 220 µF/100V capacitor connected across the input pins is required to meet EN61000-4-4 and EN61000-4-5.
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 (+Vout) and negative (-Vout) outputs and float the output common.
6. 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 12V input units a 3.3 µF is recommended; and for 24V & 48V units a 2.2 µF.
7. 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.

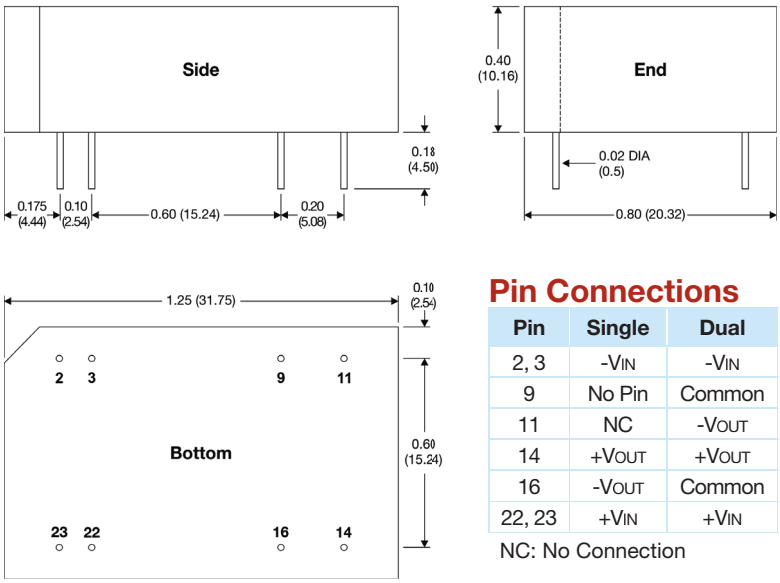
For 3 kV Isolation, See **MA600x-xxRWI** Series Datasheet

For 4:1 Inputs, See **MA600x-xxRU** Series Datasheet

Derating Curve



Mechanical Dimensions



Pin Connections

Pin	Single	Dual
2, 3	-Vin	-Vin
9	No Pin	Common
11	NC	-Vout
14	+Vout	+Vout
16	-Vout	Common
22, 23	+Vin	+Vin

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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