

MA1000RU Series

4:1 Input Range, 10W Single & Dual Output DC/DC Converters



Key Features:

- 10W Output Power
- 4:1 Input Voltage Range
- EN 60950 Approved
- Compact DIP Case
- 1,600 VDC I/O Isolation
- Meets EN 55032 "A"
- Single & Dual Outputs
- Remote On/Off Control
- Wide Temperature Operation
- Industry Standard Pin-Out



MicroPower Direct



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	24 VDC Input	9.0	24.0	36.0	VDC	
	48 VDC Input	18.0	48.0	72.0		
Start Up Time	Nominal VIN & Constant Resistive Load	20		mS		
Input Filter	π (Pi) Filter					
Input Reflected Ripple Current			20.0		mA P - P	
Output						
Parameter	Conditions	Min.	Typ.	Max.	Units	
Output Voltage Accuracy		±1.2		%		
Line Regulation	VIN = Min to Max			±0.2	%	
	Single Output			±0.5	%	
Load Regulation, See Note 2	Dual Output			±1.0	%	
	See Note 3			±5.0	%	
Cross Regulation, Dual Output	See Note 4			85	mV P - P	
Ripple & Noise (20 MHz)	See Note 4			250	μSec	
Transient Recovery Time, See Note 5	25% Load Step Change			±3.0	%	
Transient Response Deviation				170	% IOUT	
Output Power Protection				±0.02	%/°C	
Temperature Coefficient				Continuous (Autorecovery)		
Output Short Circuit Protection						
General						
Parameter	Conditions	Min.	Typ.	Max.	Units	
Isolation Voltage	Input/Output, 60 Seconds	1,600			VDC	
	Case/Input, Output, 60 Seconds	1,600				
Isolation Resistance	500 VDC	1,000			MΩ	
Isolation Capacitance	100 kHz/1V		1,500		pF	
Switching Frequency			270		kHz	
Remote On/Off (See Page 2)						
Parameter	Conditions	Min.	Typ.	Max.	Units	
Supply On	See Note On Page 3	3.0		12	VDC	
Supply Off		0.0		1.2	VDC	
Standby Input Current			5.0		mA	
Control Common	Referenced to -Input (Pins 2, 3)					
Environmental						
Parameter	Conditions	Min.	Typ.	Max.	Units	
Operating Temperature Range	Ambient	-40		+85	°C	
	Case			+105	°C	
Storage Temperature Range		-40		+125	°C	
Cooling	Free Air Convection					
Humidity	RH, Non-condensing		95		%	
Physical						
Case Size	See Mechanical Diagram (Page 3)					
Case Material	Copper With Nickel Coating (UL94V-0)					
Weight	0.63 Oz (18g)					
Reliability Specifications						
Parameter	Conditions	Min.	Typ.	Max.	Units	
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	1.0			MHours	
Safety Standards	UL 60950, EN 62368, EN 60950					
Absolute Maximum Ratings						
Parameter	Conditions	Min.	Typ.	Max.	Units	
Input Voltage Surge (1 Sec)	24 VDC Input			50.0	VDC	
	48 VDC Input			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.

Model Selection Guide

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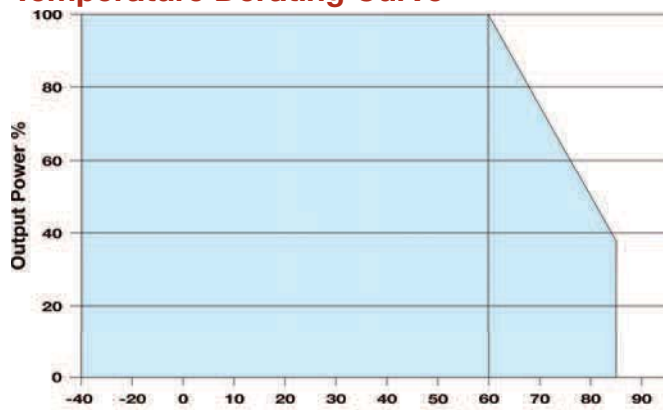


Model Number	Input				Output			Over Voltage Protection (VDC)	Max Capacitive Load (µF Max)	Efficiency (% Typ)	Fuse Rating Slow-Blow (mA)
	Voltage (VDC)		Current (mA)		Voltage (VDC)	Current (mA, Max)	Current (mA, Min)				
	Nominal	Range	Full-Load	No-Load							
MA1024S-03RU	24	9.0 - 36.0	440	15	3.3	2,700	0.0	3.9	1,330	85	3,000
MA1024S-05RU	24	9.0 - 36.0	480	15	5.0	2,000	0.0	6.2	1,330	87	3,000
MA1024S-12RU	24	9.0 - 36.0	475	15	12.0	833	0.0	15.0	288	88	3,000
MA1024S-15RU	24	9.0 - 36.0	475	15	15.0	667	0.0	18.0	200	88	3,000
MA1024D-05RU	24	9.0 - 36.0	495	15	±5.0	±1,000	±0.0	±15.0	900	85	3,000
MA1024D-12RU	24	9.0 - 36.0	480	15	±12.0	±417	±0.0	±15.0	133	87	3,000
MA1024D-15RU	24	9.0 - 36.0	480	15	±15.0	±330	±0.0	±18.0	90	87	3,000
MA1048S-03RU	48	18.0 - 75.0	225	15	3.3	2,700	0.0	3.9	1,330	84	1,500
MA1048S-05RU	48	18.0 - 75.0	240	15	5.0	2,000	0.0	6.2	1,330	87	1,500
MA1048S-12RU	48	18.0 - 75.0	240	15	12.0	833	0.0	15.0	288	87	1,500
MA1048S-15RU	48	18.0 - 75.0	240	15	15.0	667	0.0	18.0	200	87	1,500
MA1048D-05RU	48	18.0 - 75.0	250	15	±5.0	±1,000	±0.0	±15.0	900	85	1,500
MA1048D-12RU	48	18.0 - 75.0	240	15	±12.0	±417	±0.0	±15.0	133	88	1,500
MA1048D-15RU	48	18.0 - 75.0	240	15	±15.0	±330	±0.0	±18.0	90	88	1,500

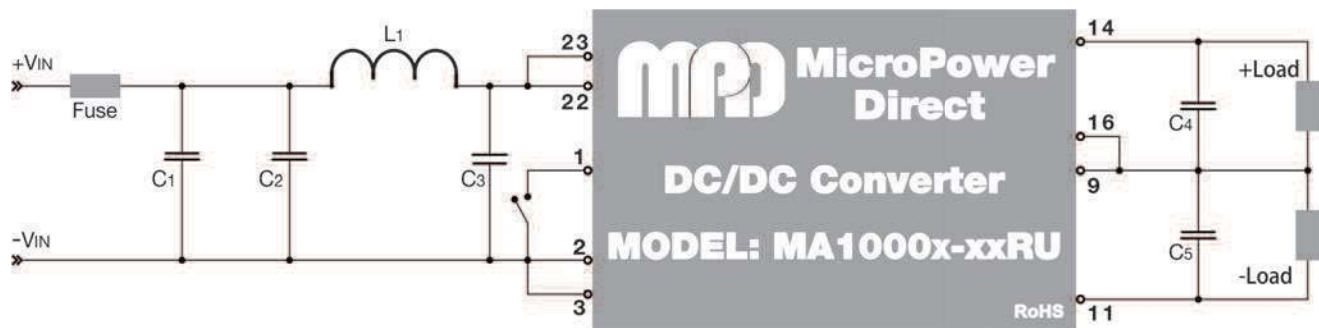
Notes:

1. The specified maximum capacitive load is for each output.
2. Load regulation is specified for a load change of 0% to 100%. Load regulation for 3.3V output models is ±1.0% max for a load change of 0% to 100%.
3. When measuring cross regulation, the load on one output is varied from 25% to 100% while the other output is held at 100%.
4. Output ripple is measured with a 1.0 µF capacitor connected from the +Vout to the -Vout pins for single output units and from each output to common for dual output models. See the typical connection diagram & notes on page 3.
5. Transient recovery is measured to within a 1% error band for a load step change of 75% to 50% to 25%.
6. Operation at no-load will not damage these units. However, they may not meet all specifications.
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.

Temperature Derating Curve



Typical Connection



To help meet conducted emissions requirements, the filter components (C2, C3 & L1) in the diagram above should be used. The recommended values are 2.2 µF/100V for C2 & C3 and 12 µH for L1. These components should be mounted as close to the module as possible. To meet the requirements of EN 61000-4-4 & EN 61000-4-5, an external filter capacitor (C1 in the diagram above) is required. The recommended value for C1 is 330 µF/100V.

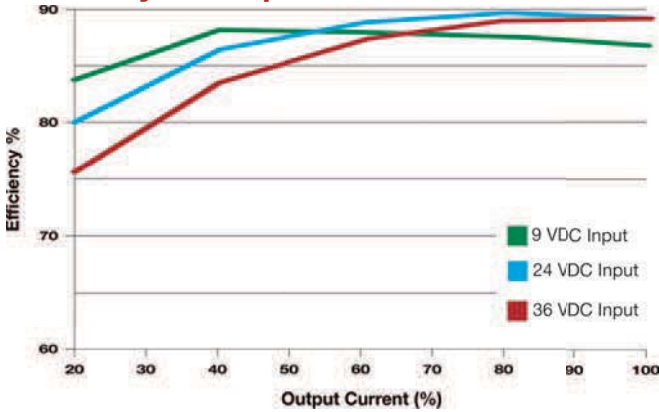
When measuring output ripple, it is recommended that an external 1.0 µF ceramic capacitor be placed from the +Vout pin to the -Vout pin for single output units and from each output to common for dual output units. For noise sensitive applications, the use of 3.3 µF capacitors will reduce the output ripple.

The Remote On/Off circuit is referenced to the minus input of the unit (pins 2 & 3). If the On/Off input (pin 1) is connected to the minus input, the unit is shut off. If pin 1 is left open, the unit operates normally.

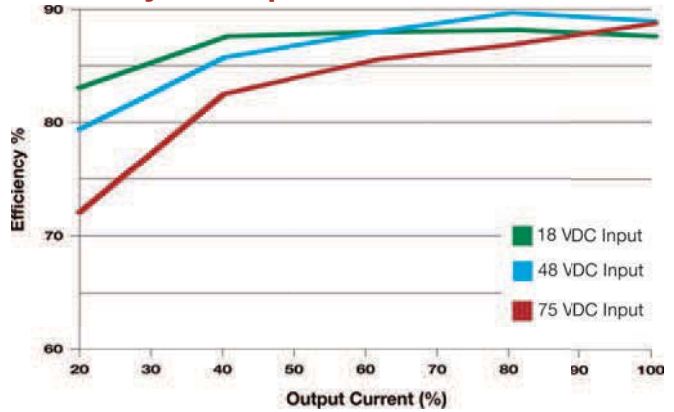
EMI Characteristics

Parameter	Standard	Criteria/Level
Radiated Emissions	EN 55032	Class A
Conducted Emissions	EN 55032	Class A
ESD	EN 61000-4-2	A
RS	EN 61000-4-3	A
EFT	EN 61000-4-4	A
Surge	EN 61000-4-5	A
CS	EN 61000-4-6	A
PFM	EN 61000-4-8	A

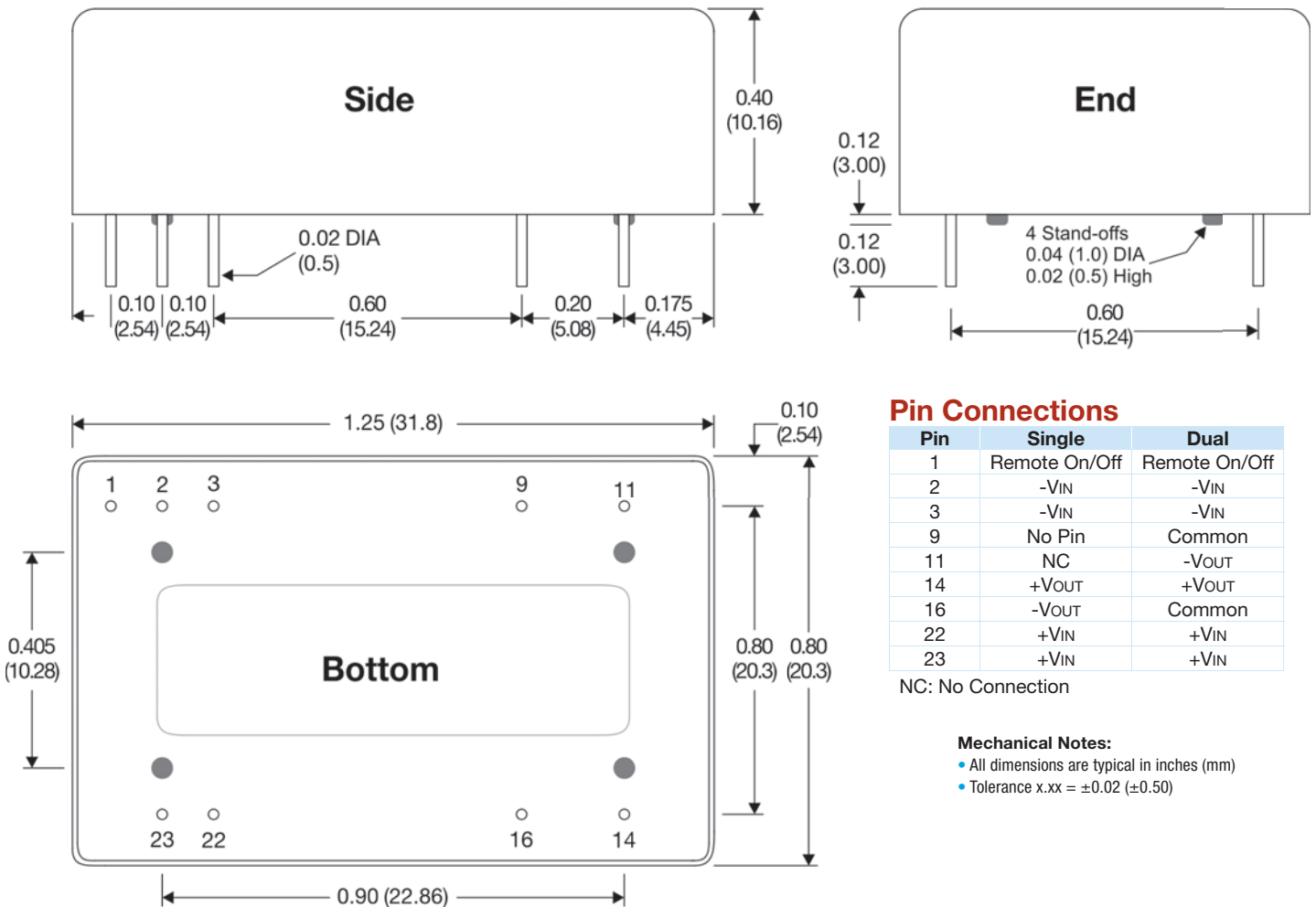
Efficiency vs Output Load: 24 VIN Models



Efficiency vs Output Load: 48 VIN Models



Mechanical Dimensions



Pin Connections

Pin	Single	Dual
1	Remote On/Off	Remote On/Off
2	-VIN	-VIN
3	-VIN	-VIN
9	No Pin	Common
11	NC	-VOUT
14	+VOUT	+VOUT
16	-VOUT	Common
22	+VIN	+VIN
23	+VIN	+VIN

NC: No Connection

Mechanical Notes:

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

MPD offers a wide range of DC/DC converters in the standard 24 pin DIP package. Models range from 1W to 15W and offer wide input ranges, high isolation & tight regulation. Many are approved to EN 60950. For full information, go to our website or contact the factory.



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