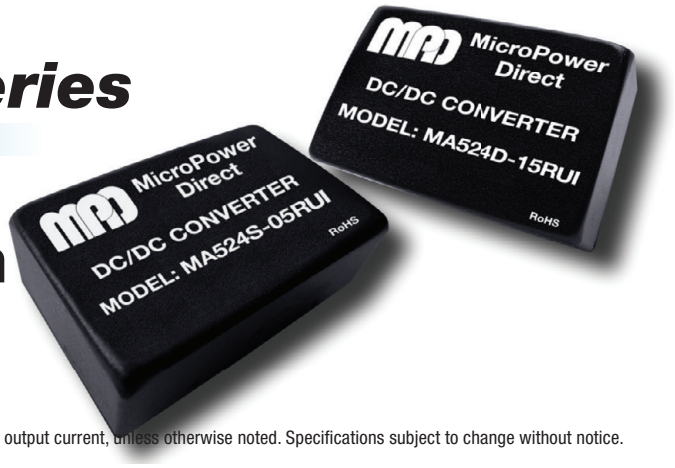
MA500RUI Series

Wide 4:1 Input, 5W, High 3.5 kVDC Isolation DC/DC Converters



Key Features:

- 5W Output Power
- 4:1 Input Voltage Range
- 3,500 VDC Isolation
- 14 Standard Models
- High Efficiency
- Compact DIP Case
- -40°C to +85°C Operation
- Metal Case Available
- Low Cost

Alternate Pin-Out Available

1.5 kV Isolation 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 Voltage Range	24 VDC Input	9.0	24.0	36.0	VDC
	48 VDC Input	18.0	48.0	72.0	
Input Reflected Ripple Current			35		mA P - P
Input Filter	π (Pi) Filter				

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Accuracy			±1.0		%
Line Regulation	V_{IN} = Min to Max		±0.5		%
Load Regulation	I_{OUT} = 25% to 100%		±0.5		%
Cross Regulation	See Note 1		±0.5		%
Ripple & Noise (20 MHz)	See Note 2		60		mV P - P
Temperature Coefficient			±0.02		%/°C
Output Short Circuit	Continuous (Autorecovery)				

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage, See Note 3	3 Seconds	3,500			VDC
Isolation Resistance	500 VDC	1,000			MΩ
Isolation Capacitance	100 kHz/0.1V		60		pF
Switching Frequency		100		400	kHz

Environmental

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature Range	Ambient	-40	+25	+85	°C
Operating Temperature Range	Case			+100	°C
Storage Temperature Range		-40		+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, Plastic	Non-Conductive Black Plastic (UL94-V0)
Weight, Plastic Case	0.44 Oz (12.5g)
Case Material, Metal	Nickel-Coated Copper With Non-Conductive Base (UL94-V0)
Weight, Metal Case	0.53 Oz (15g)

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)	24 VDC Input	-0.7		40.0	VDC
	48 VDC Input	-0.7		80.0	
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

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							
MA524S-03RUI-xx	24	9.0 - 36.0	243.0	20	3.3	1,200.0	300.0	68	35.0	2,200	600
MA524S-05RUI-xx	24	9.0 - 36.0	285.0	20	5.0	1,000.0	250.0	73	35.0	1,000	600
MA524S-12RUI-xx	24	9.0 - 36.0	282.0	20	12.0	416.0	105.0	74	35.0	470	600
MA524S-15RUI-xx	24	9.0 - 36.0	282.0	20	15.0	333.0	84.0	74	35.0	470	600
MA524D-05RUI-xx	24	9.0 - 36.0	271.0	20	±5.0	±500.0	±125.0	77	35.0	±1,000	600
MA524D-12RUI-xx	24	9.0 - 36.0	254.0	20	±12.0	±208.0	±53.0	82	35.0	±220	600
MA524D-15RUI-xx	24	9.0 - 36.0	254.0	20	±15.0	±166.0	±42.0	82	35.0	±220	600
MA548S-03RUI-xx	48	18.0 - 72.0	118.0	15	3.3	1,200.0	300.0	70	35.0	2,200	300
MA548S-05RUI-xx	48	18.0 - 72.0	143.0	15	5.0	1,000.0	250.0	73	35.0	1,000	300
MA548S-12RUI-xx	48	18.0 - 72.0	141.0	15	12.0	416.0	105.0	74	35.0	470	300
MA548S-15RUI-xx	48	18.0 - 72.0	137.0	15	15.0	333.0	84.0	76	35.0	470	300
MA548D-05RUI-xx	48	18.0 - 72.0	145.0	15	±5.0	±500.0	±125.0	72	35.0	±1,000	300
MA548D-12RUI-xx	48	18.0 - 72.0	139.0	15	±12.0	±208.0	±53.0	75	35.0	±220	300
MA548D-15RUI-xx	48	18.0 - 72.0	139.0	15	±15.0	±166.0	±42.0	75	35.0	±220	300

For the alternate pin-out (see page 4) , add suffix “P2” to model number (i.e. **MA524S-05RUI-P2**)

Notes:

1. Cross regulation is measured with the output being tested at 100% load while the other output is varied from 25% to 100% load.
2. See the typical connection circuit on page three for typical external filtering components. For help with a specific model or layout issue, contact the factory.
3. Isolation voltage is specified for Input to output. On units with the optional metal case, the isolation voltage for Input - Case and Output - Case is 1,000 VDC.
4. Operation at no-load will not damage the unit, but they may not meet all specifications. To meet all specifications, a minimum load of 33% should be maintained.
5. 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.

Model Number

MA-5XXX-XXRXMI

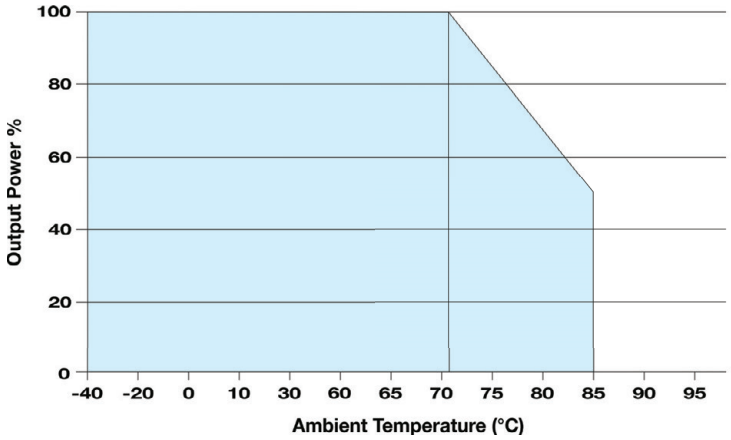
- **Case Style**: A = Dual In Line (DIP)
- **Output Power**: 5 = 5W
- **Input Voltage**: 05 = 5 VDC, 12 = 12 VDC, 24 = 24 VDC, 48 = 48 VDC
- **Outputs**: S = Single, D = Dual
- **Output Voltage**: 05 = 5 VDC, 09 = 9 VDC, 12 = 12 VDC, 15 = 15 VDC, 24 = 24 VDC
- **I/O Isolation**: Blank = 1.5 kVDC, I = 3.5 kVDC
- **Case Type**: Blank = Plastic, M = Metal
- **Input Range**: W = 2:1Input, U = 4:1 Input
- **Regulation**: R = Regulated

NEW DIP DC/DC Converter Families From MPD

Series	Power	Input Range	Isolation
MA100X-xxRW	1W	2:1	1.5 kVDC
MA100X-xxRWI	1W	2:1	3.5 kVDC
MA100X-xxRU	1W	4:1	1.5 kVDC
MA100X-xxRUI	1W	4:1	3.5 kVDC
MA200X-xxRW	2W	2:1	1.5 kVDC
MA200X-xxRWI	2W	2:1	3.5 kVDC
MA200X-xxRU	2W	4:1	1.5 kVDC
MA200X-xxRUI	2W	4:1	3.5 kVDC
MA300X-xxRW	3W	2:1	1.5 kVDC
MA300X-xxRWI	3W	2:1	3.0 kVDC
MA300X-xxRU	3W	4:1	1.5 kVDC
MA300X-xxRUI	3W	4:1	3.0 kVDC
MA400X-xxRW	4W	2:1	1.5 kVDC
MA400X-xxRWI	4W	2:1	3.5 kVDC
MA400X-xxRU	4W	4:1	1.5 kVDC
MA400X-xxRUI	4W	4:1	3.5 kVDC
MA500X-xxRW	5W	2:1	1.5 kVDC
MA500X-xxRWI	5W	2:1	3.5 kVDC
MA500X-xxRU	5W	4:1	1.5 kVDC
MA500X-xxRUI	5W	4:1	3.5 kVDC
MA600X-xxRW	6W	2:1	1.5 kVDC
MA600X-xxRWI	6W	2:1	3.0 kVDC
MA600X-xxRU	6W	4:1	1.5 kVDC
MA600X-xxRUI	6W	4:1	3.0 kVDC

Visit our website or contact the factory for more information.

Derating Curve



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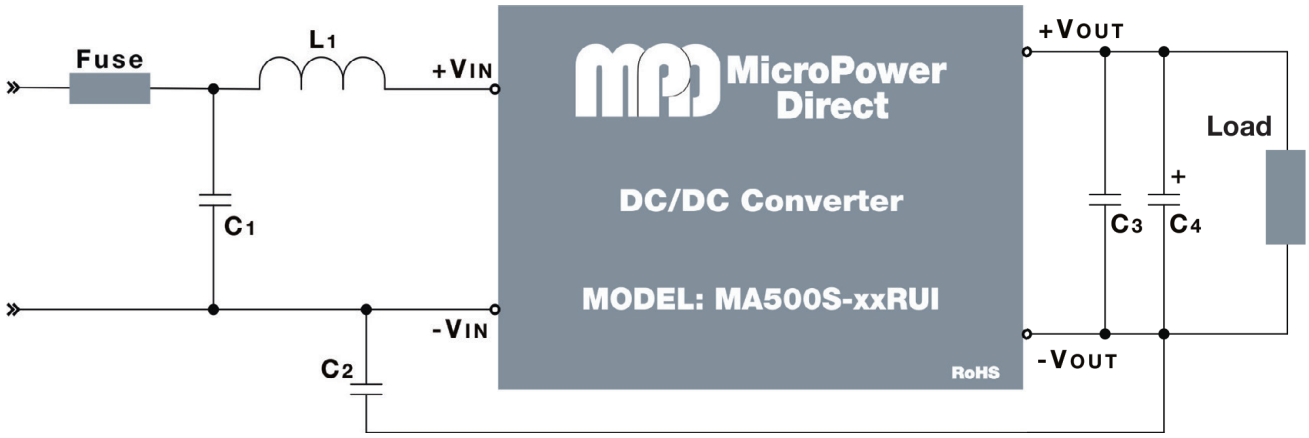
Typical Connection

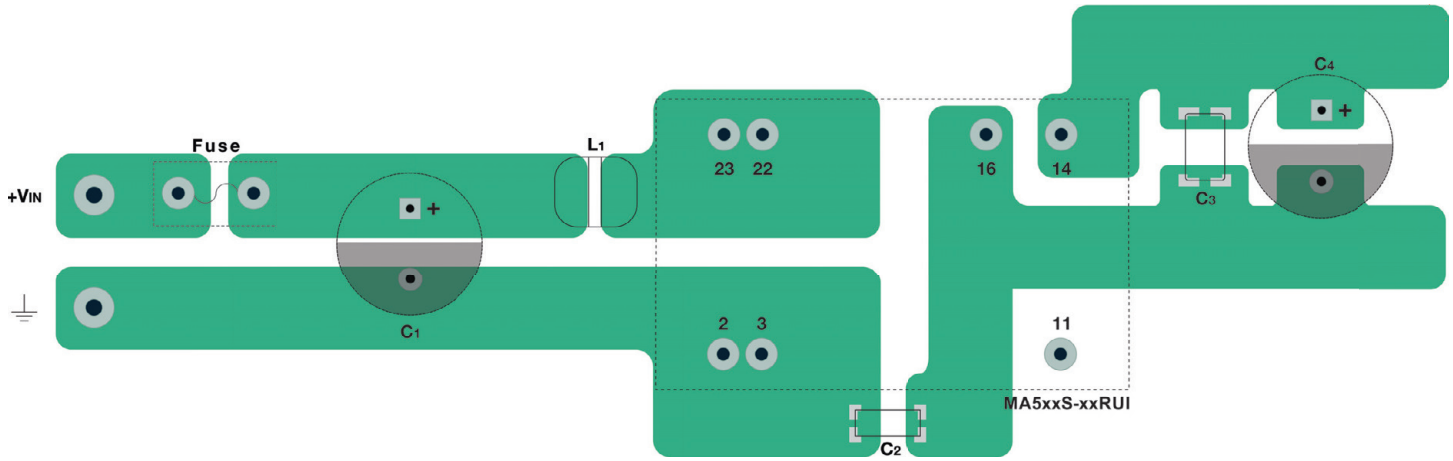


The diagram above illustrates a typical connection of the **MA500RUI** series for applications that require meeting conducted EMC standards. The units do not require external components to operate as specified. For applications requiring very low output noise levels, the output filtering capacitors (C_3 is a low ESR electrolytic & C_4 is a ceramic) will often be sufficient. Care must be taken in choosing output capacitors not to exceed the capacitive load specification for the unit. For dual output units, output capacitors should be connected from each output to common. All external components should be mounted as close to the unit as possible.

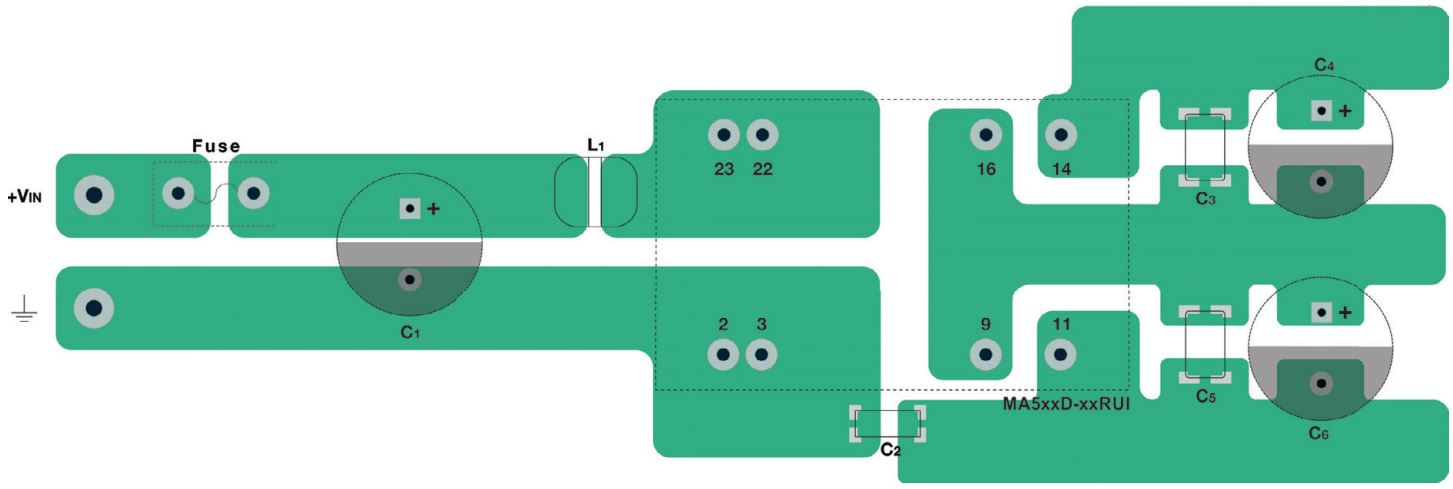
The recommended values for components are:

Component	24 VIN	48 VIN
C_1	220 µF/100V	220 µF/100V
LCM	12 µH	12 µH
C_2	470 pF/4kV MLCC	470 pF/4kV MLCC
C_3	100 µF	100 µF
C_4	4.7 - 10 µF	4.7 - 10 µF

Typical Board Layout: With External Filter Components, Single Output



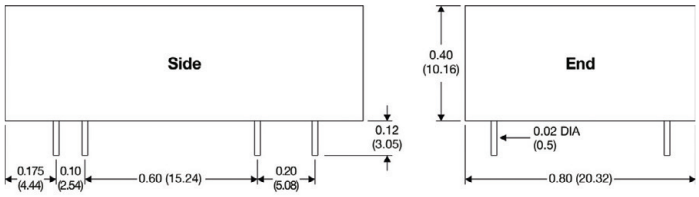
Typical Board Layout: With External Filter Components, Dual Output

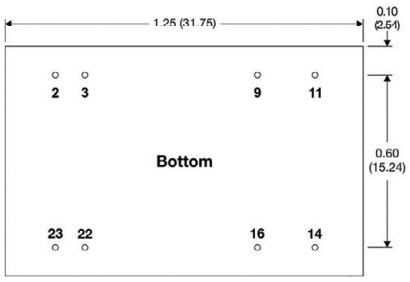


Input noise and surge suppression modules are available for a number of **MPD** DC/DC power supplies. Contact the factory for more information.

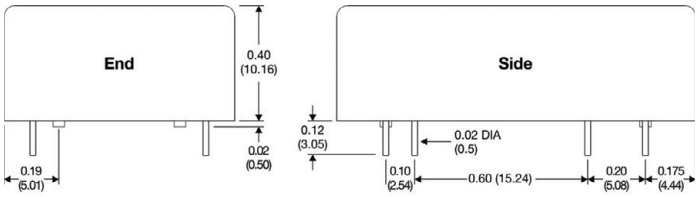
Mechanical Dimensions

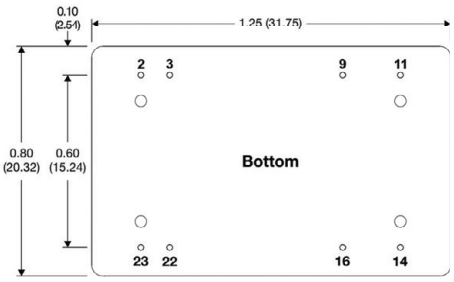
Standard Units - Plastic Case





Standard Units - Metal Case





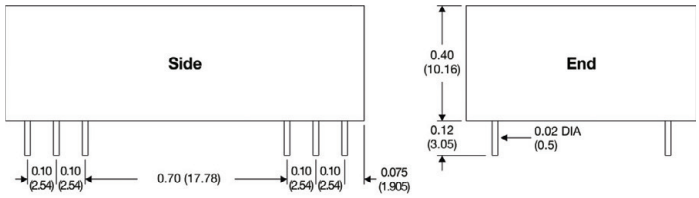
Pin Connections

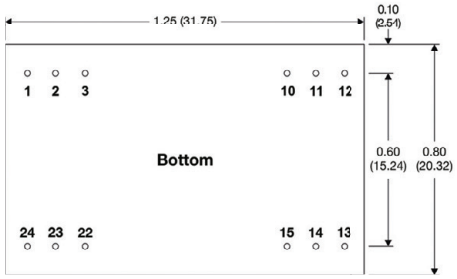
Pin	Single Output
2	-VIN
3	-VIN
9	No Pin
11	No Connection
14	+VOUT
16	-VOUT
22	+VIN
23	+VIN

Pin	Dual Output
2	-VIN
3	-VIN
9	Common
11	-VOUT
14	+VOUT
16	Common
22	+VIN
23	+VIN

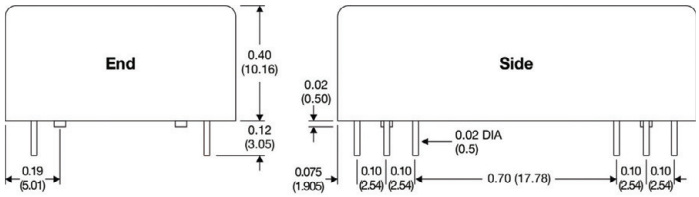
For the alternate pin-out, add suffix "P2" to model number
(i.e. **MA524S-05RUI-P2**)

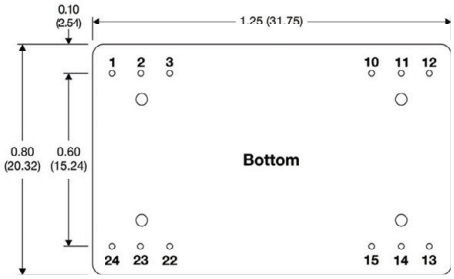
Alternate Pin-Out Units - Plastic Case





Alternate Pin-Out Units - Metal Case





Pin Connections

Pin	Single Output
1	+VIN
2	No Connection
3	No Connection
10	-VOUT
11	+VOUT
12	-VIN
13	-VIN
14	+VOUT
15	-VOUT
22	No Connection
23	No Connection
24	+VIN

Pin	Dual Output
1	+VIN
2	-VOUT
3	Common
10	Common
11	+VOUT
12	-VIN
13	-VIN
14	+VOUT
15	Common
22	Common
23	-VOUT
24	+VIN

Notes:

- All dimensions are typical in inches (mm)
- Tolerance x.xx = ±0.02 (±0.50)
- Pin 1 is marked by a "dot" or indentation on the top of the unit

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