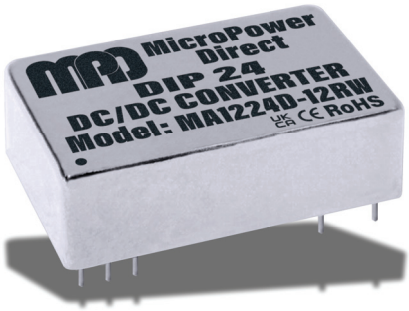
MA1200RW

2:1 Input Range, 12W Single & Dual Output DC/DC Converters



Key Features:

- 12W Output Power
- 2:1 Input Voltage Range
- Compact DIP Case
- 1,600 VDC I/O Isolation
- Meets EN 62368
- Meets EN 55032
- Single & Dual Outputs
- Remote On/Off Control
- No Minimum Load
- Wide Temp Operation
- Overload Protection
- Short Circuit Protection
- Industry Standard Pin-Out
- ***LOW COST***

CE
UK CA
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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	12 VDC Input	9.0	12.0	18.0	VDC
	24 VDC Input	18.0	24.0	36.0	
	48 VDC Input	36.0	48.0	72.0	
Start Up Time	Nominal VIN & Constant Resistive Load		20		mS
Input Filter	p (π) 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			±0.5	%
Load Regulation, See Note 1	Single Output			±0.5	%
	Dual Output			±1.0	
Cross Regulation, Dual Output	See Note 2		±5.0		%
Ripple & Noise (20 MHz)	See Note 3			85	mV P - P
Transient Recovery Time, See Note 4	25% Load Step Change		250		μSec
Transient Response Deviation	2.5 , 3.3 VOUT			±3.0	%
	All 2.5 , 3.3 VOUT				
Output Power Protection			150		% I_{OUT}
Temperature Coefficient			±0.02		%/°C
Output Short Circuit Protection	Continuous (Autorecovery)				

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		MV
Isolation Capacitance	100 kHz/1V		1,200		pF
Switching Frequency			330		kHz

Remote On/Off (See Page 3)

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			+100	°C
Storage Temperature Range		-40		+125	°C
Cooling	Free Air Convection				
Humidity	RH, Non-condensing		95		%

Physical

Case Size and Weight	See Mechanical Diagram (Page 3)
Case Material	Copper With Nickel Coating (UL94V-0)

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			36.0	VDC
	24 VDC Input			50.0	
	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 Number	Input				Output			Over Voltage Protection (VDC)	Max Capacitive Load (µF Max)	Efficiency (%, Typ)	Fuse Rating Slow-Blow (A)
	Voltage (VDC)		Current (mA)		Voltage (VDC)	Current (mA, Max)	Current (mA, Min)				
	Nominal	Range	Full-Load	No-Load							
MA1212S-02RW	12	9.0 - 18.0	848	15	2.5	3,500	0.0	3.9	2,000	86	2.50
MA1212S-03RW	12	9.0 - 18.0	1,109	15	3.3	3,500	0.0	3.9	2,000	86	2.50
MA1212S-05RW	12	9.0 - 18.0	1,136	15	5.0	2,400	0.0	6.2	2,000	88	2.50
MA1212S-051RW	12	9.0 - 18.0	1,159	15	5.1	2,400	0.0	6.2	2,000	88	2.50
MA1212S-12RW	12	9.0 - 18.0	1,111	15	12.0	1,000	0.0	15.0	430	90	2.50
MA1212S-15RW	12	9.0 - 18.0	1,111	15	15.0	800	0.0	18.0	300	90	2.50
MA1212D-12RW	12	9.0 - 18.0	1,111	15	±12.0	±500	±0.0	±15.0	200	90	2.50
MA1212D-15RW	12	9.0 - 18.0	1,111	15	±15.0	±400	±0.0	±18.0	120	90	2.50
MA1224S-02RW	24	18.0 - 36.0	429	15	2.5	3,500	0.0	3.9	2,000	85	1.25
MA1224S-03RW	24	18.0 - 36.0	553	15	3.3	3,500	0.0	3.9	2,000	87	1.25
MA1224S-05RW	24	18.0 - 36.0	562	15	5.0	2,400	0.0	6.2	2,000	89	1.25
MA1224S-051RW	24	18.0 - 36.0	567	15	5.1	2,400	0.0	6.2	2,000	90	1.25
MA1224S-12RW	24	18.0 - 36.0	562	15	12.0	1,000	0.0	15.0	430	89	1.25
MA1224S-15RW	24	18.0 - 36.0	556	15	15.0	800	0.0	18.0	300	90	1.25
MA1224D-12RW	24	18.0 - 36.0	562	15	±12.0	±500	±0.0	±15.0	200	89	1.25
MA1224D-15RW	24	18.0 - 36.0	549	15	±15.0	±400	±0.0	±18.0	120	91	1.25
MA1248S-02RW	48	36.0 - 75.0	217	15	2.5	3,500	0.0	3.9	2,000	84	0.80
MA1248S-03RW	48	36.0 - 75.0	280	15	3.3	3,500	0.0	3.9	2,000	86	0.80
MA1248S-05RW	48	36.0 - 75.0	278	15	5.0	2,400	0.0	6.2	2,000	90	0.80
MA1248S-051RW	48	36.0 - 75.0	287	15	5.1	2,400	0.0	6.2	2,000	89	0.80
MA1248S-12RW	48	36.0 - 75.0	287	15	12.0	1,000	0.0	15.0	430	87	0.80
MA1248S-15RW	48	36.0 - 75.0	281	15	15.0	800	0.0	18.0	300	89	0.80
MA1248D-12RW	48	36.0 - 75.0	287	15	±12.0	±500	±0.0	±15.0	200	87	0.80
MA1248D-15RW	48	36.0 - 75.0	287	15	±15.0	±400	±0.0	±18.0	120	87	0.80

Notes:

1. 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%.
2. When measuring cross regulation, the load on one output is varied from 25% to 100% while the other output is held at 100%.
3. Output ripple is measured with a 1.0 F 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 below.
4. Transient recovery is measured to within a 1% error band for a load step change of 75% to 50% to 25%.
5. Operation at no-load will not damage these units. However, they may not meet all specifications.
6. The specified maximum capacitive load is for each output.
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.
8. The unit includes an internal over current protection (OCP) circuit. This circuit will will continue to limit the current as long as the over load condition exists. If the output current exceeds the OCP set point, the unit will shut down (hiccup). After a shutdown, the unit will try to restart. If the overload condition still exists, the unit will shut down again.
9. The unit also includes an internal over voltage protection (OVP) circuit. This circuit monitors the voltage level at the output terminals. If the voltage level exceeds the over voltage set point (see specifications above), the circuit will be activated and the output voltage will be clamped.

Typical Connection

To meet the requirements of EN 61000-4-4 & EN 61000-4-5, the external filter circuit (C1, C2 & L1) in the diagram above) are required. The recommended value for C1 is 330 µF/100V; for C2, use a 100 µF/100V, and for L1, 12 µH.

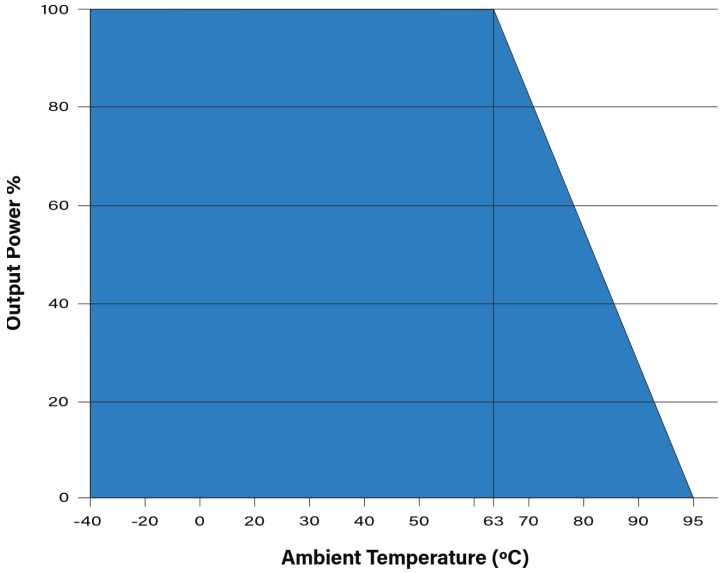
When measuring output ripple, it is recommended that an external 1.0 F ceramic capacitor be placed from the +VOUT pin to the -VOUT pin for single output units and from each output to common for dual output units. For noise sensitive applications, the use of 3.3 F capacitors will reduce the output ripple.

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. The OFF idle current is typically 5 mA.

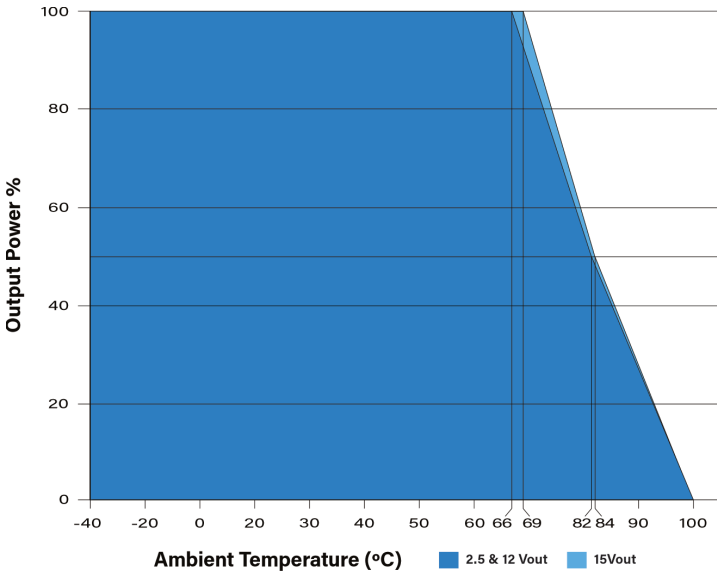
EMI/EMC Characteristics

Parameter	Standard	Criteria	Level
Radiated Emissions, See note at left	EN 55032		Class A
Conducted Emissions, See note at left	EN 55032		Class A
ESD	EN 61000-4-2	B	±6 kV Contact
			±8 kV Air
RS	EN 61000-4-3	A	20V/m
EFT, See note at left	EN 61000-4-4	B	±2 kV
Surge, See note at left	EN 61000-4-5	B	±1 kV
CS	EN 61000-4-6	A	10 Vrms
PFMF	EN 61000-4-8	A	1A/m

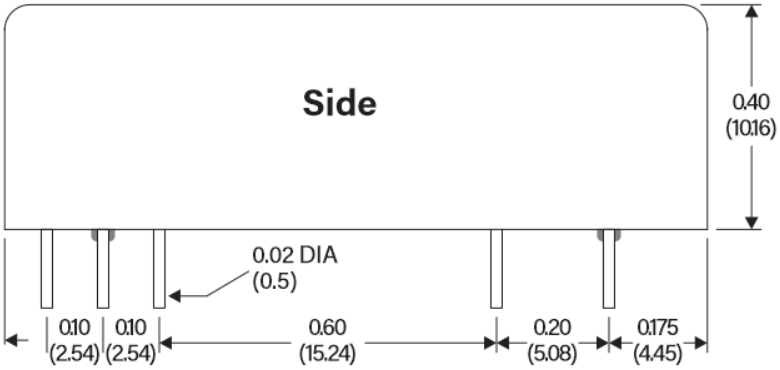
Output Power Derating 1: 3.3, 5 & 5.1 VOUT Models

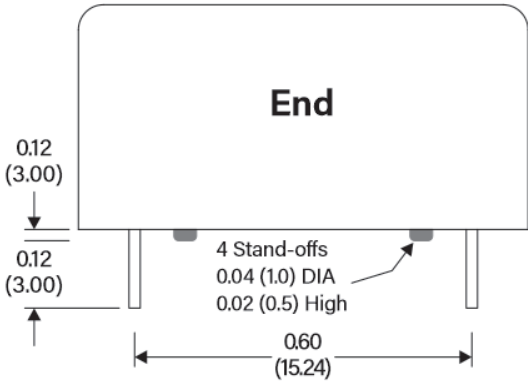


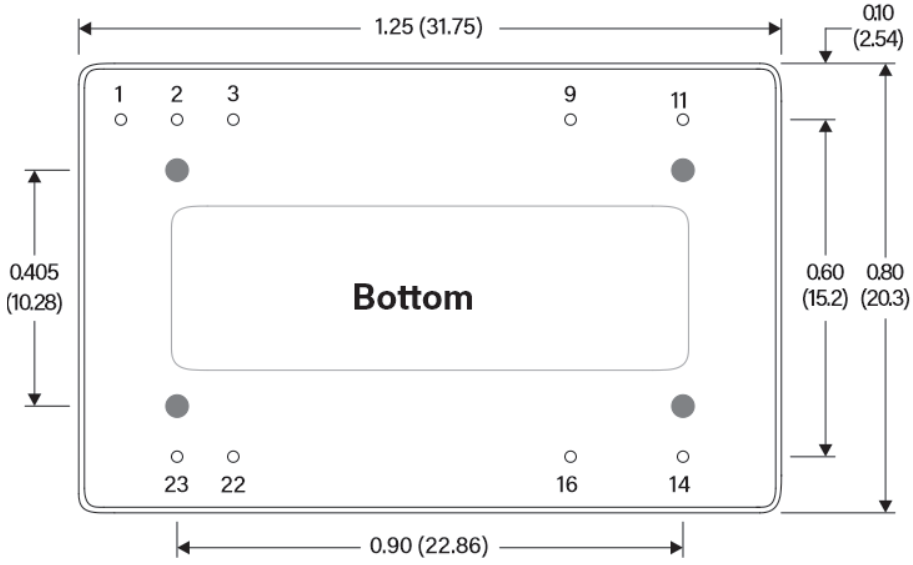
Output Power Derating 2: 2.5 & 12 VOUT Models



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)
- Weight (Typ) = 0.493 Oz (14.0g)

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