

MI2500RW Series



Compact, 1 x 1 Inch 25W, 2:1 Input Range DC/DC Converters

Electrical Specifications

Specifications typical @ +25°C, nominal input voltage & rated output current, unless otherwise noted. Specifications subject to change without notice.

Key Features:

- 25W Output Power
- 2:1 Input Voltage Range
- Compact 1 x 1 Inch Case
- 1,500 VDC Isolation
- 18 Standard Models
- Efficiency to 90%
- Wide Temp Operation
- Industry Standard Pin-Out

RoHS



Input

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Start Voltage	12 VDC Input			9.0	VDC
	24 VDC Input			18.0	
	48 VDC Input			36.0	
Input Filter	LC Filter				
Start-Up Time	See Note 1			30	mS

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Accuracy				±1.0	%
Output Voltage Balance	Dual Output, Balanced Loads			±2.0	%
Line Regulation	V _{IN} = Min to Max			±0.2	%
Load Regulation, Min Load to Full Load	Single Output			±0.2	%
	Dual Output			±1.0	
Cross Regulation, Dual Outputs	Asymmetrical Load 25%/100%			±5.0	%
Ripple & Noise, See Note 2	3.3 & 5.0 Vout Models		100		mV P - P
	12, 15 & Dual Output Models		150		
Transient Recovery Time, See Note 3			250		µSec
Transient Response Deviation	25% Load Step Change		±3.0	±5.0	%
Temperature Coefficient				±0.02	%/°C
Output Power Protection			150		%
Output Short Circuit, See Note 4	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, 1V			2,000	pF
Switching Frequency			285		kHz

Environmental

Parameter	Conditions	Min.	Max No Hsink	Max. Heatsink	Units
Operating Temperature Range, Ambient Without Heatsink	MI2524S-03RW, MI2548S-03RW	-40	+57	+65	°C
	MI2524S-05RW, MI2524S-12RW				
	MI2524S-15RW, MI2548S-05RW			+64	
	MI2548S-12RW, MI2548S-15RW				
	MI2512S-03RW		+53	+61	
	MI2512S-05RW, MI2512S-12RW, MI2512S-15RW				
	MI2512D-12RW, MI2512D-15RW		+50	+59	
Operating Temperature Range Case			+105	°C	
Storage Temperature Range		-50	+125	°C	
Cooling	Free Air Convection				
Humidity	RH, Non-condensing			95	%

Physical

Case Size	See Mechanical Diagrams (Page 4)				
Case Material	Metal with Non-Conductive Base				
Weight	0.58 Oz (16.5g)				

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	313			kHours

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			260.0	°C

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

MicroPower Direct

292 Page Street
Suite D
Stoughton, MA 02072
USA

T: (781) 344-8226
F: (781) 344-8481
E: sales@micropowerelectronics.com
W: www.micropowerelectronics.com



www.micropowerelectronics.com

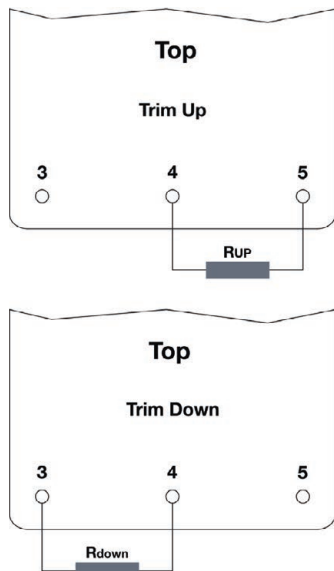
Model Number	Input				Output			Efficiency (% Typ)	Over Voltage Protection (VDC)	Capacitive Load (µF Max)	Fuse Rating Slow-Blow (mA)
	Voltage (VDC)		Current (mA)		Voltage (VDC)	Current (mA, Max)	Current (mA, Min)				
	Nominal	Range	Full-Load	No-Load							
MI2512S-03RW	12	9.0 - 18.0	1,900	75	3.3	6,000	0.0	87	3.9	10,300	5,000
MI2512S-05RW	12	9.0 - 18.0	2,340	85	5.0	5,000	0.0	89	6.2	6,800	5,000
MI2512S-12RW	12	9.0 - 18.0	2,350	80	12.0	2,090	0.0	89	15.0	1,200	5,000
MI2512S-15RW	12	9.0 - 18.0	2,350	80	15.0	1,670	0.0	89	18.0	750	5,000
MI2512D-12RW	12	9.0 - 18.0	2,340	75	±12.0	±1,040	0.0	89	±15.0	±680	5,000
MI2512D-15RW	12	9.0 - 18.0	2,360	75	±15.0	±840	0.0	89	±18.0	±380	5,000
MI2524S-03RW	24	18.0 - 36.0	940	55	3.3	6,000	0.0	88	3.9	10,300	2,500
MI2524S-05RW	24	18.0 - 36.0	1,160	60	5.0	5,000	0.0	90	6.2	6,800	2,500
MI2524S-12RW	24	18.0 - 36.0	1,160	55	12.0	2,090	0.0	90	15.0	1,200	2,500
MI2524S-15RW	24	18.0 - 36.0	1,160	55	15.0	1,670	0.0	90	18.0	750	2,500
MI2524D-12RW	24	18.0 - 36.0	1,170	50	±12.0	±1,040	0.0	89	±15.0	±680	2,500
MI2524D-15RW	24	18.0 - 36.0	1,180	50	±15.0	±840	0.0	89	±18.0	±380	2,500
MI2548S-03RW	48	36.0 - 75.0	470	35	3.3	6,000	0.0	88	3.9	10,300	1,250
MI2548S-05RW	48	36.0 - 75.0	580	40	5.0	5,000	0.0	90	6.2	6,800	1,250
MI2548S-12RW	48	36.0 - 75.0	580	35	12.0	2,090	0.0	90	15.0	1,200	1,250
MI2548S-15RW	48	36.0 - 75.0	580	35	15.0	1,670	0.0	90	18.0	750	1,250
MI2548D-12RW	48	36.0 - 75.0	585	40	±12.0	±1,040	0.0	89	±15.0	±680	1,250
MI2548D-15RW	48	36.0 - 75.0	590	40	±15.0	±840	0.0	89	±18.0	±380	1,250

Notes:

- Start up time is measured at nominal input and with a constant resistive load.
- When measuring output ripple, it is recommended that an external 1 µF capacitor and 10 µF capacitor be connected in parallel from the +VOUT to the -VOUT pin for single output units; or 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 25%.
- Short circuit protection is provided by a "hiccup mode" circuit.
- Operation at no-load will not damage these units.
- 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.

For heatsink option, add suffix "H" to model number (i.e. **MI2512S-05RW-H**)

External Trim



An external resistor may be added to adjust the converter output on single output units.

To adjust the output UP, connect a 5%, 3W resistor between the minus output pin (5) and the Vout trim pin (6). To adjust the output DOWN, connect a 5%, 3W resistor between the plus output pin (4) and the Vout trim pin (6).

The trim table at right gives suggested resistor values for this adjustment.

MI25xxS-03RW

Trim Down												
Vout	Vo x 0.99	Vo x 0.98	Vo x 0.97	Vo x 0.96	Vo x 0.95	Vo x 0.94	Vo x 0.93	Vo x 0.92	Vo x 0.91	Vo x 0.90	Volts	
RDOWN	72.61	32.55	19.20	12.52	8.51	5.84	3.94	2.51	1.39	0.50		kΩ

Trim Up												
Vout	Vo x 1.01	Vo x 1.02	Vo x 1.03	Vo x 1.04	Vo x 1.05	Vo x 1.06	Vo x 1.07	Vo x 1.08	Vo x 1.09	Vo x 1.10	Volts	
RUP	60.84	27.40	16.25	10.68	7.34	5.11	3.51	2.32	1.39	0.65		kΩ

MI25xxS-05RW

Trim Down												
Vout	Vo x 0.99	Vo x 0.98	Vo x 0.97	Vo x 0.96	Vo x 0.95	Vo x 0.94	Vo x 0.93	Vo x 0.92	Vo x 0.91	Vo x 0.90	Volts	
RDOWN	138.88	62.41	36.92	24.18	16.53	11.44	7.79	5.06	2.94	1.24		kΩ

Trim Up												
Vout	Vo x 1.01	Vo x 1.02	Vo x 1.03	Vo x 1.04	Vo x 1.05	Vo x 1.06	Vo x 1.07	Vo x 1.08	Vo x 1.09	Vo x 1.10	Volts	
RUP	106.87	47.76	28.06	18.21	12.30	8.36	5.55	3.44	1.79	0.48		kΩ

MI25xxS-12RW

Trim Down												
Vout	Vo x 0.99	Vo x 0.98	Vo x 0.97	Vo x 0.96	Vo x 0.95	Vo x 0.94	Vo x 0.93	Vo x 0.92	Vo x 0.91	Vo x 0.90	Volts	
RDOWN	413.55	184.55	108.22	70.05	47.15	31.88	20.98	12.80	6.44	1.35		kΩ

Trim Up												
Vout	Vo x 1.01	Vo x 1.02	Vo x 1.03	Vo x 1.04	Vo x 1.05	Vo x 1.06	Vo x 1.07	Vo x 1.08	Vo x 1.09	Vo x 1.10	Volts	
RUP	351.00	157.50	93.00	60.75	41.40	28.50	19.29	12.37	7.00	2.70		kΩ

MB25xxS-15RW

Trim Down												
Vout	Vo x 0.99	Vo x 0.98	Vo x 0.97	Vo x 0.96	Vo x 0.95	Vo x 0.94	Vo x 0.93	Vo x 0.92	Vo x 0.91	Vo x 0.90	Volts	
RDOWN	530.73	238.61	141.24	92.56	63.35	43.87	29.96	19.53	11.41	4.92		kΩ

Trim Up												
Vout	Vo x 1.01	Vo x 1.02	Vo x 1.03	Vo x 1.04	Vo x 1.05	Vo x 1.06	Vo x 1.07	Vo x 1.08	Vo x 1.09	Vo x 1.10	Volts	
RUP	422.77	189.89	112.26	73.44	50.15	34.63	23.54	15.22	8.75	3.58		kΩ



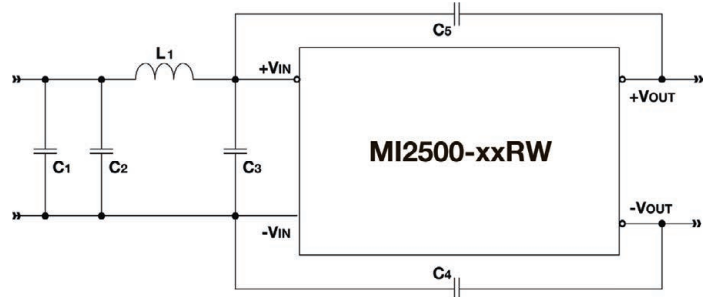
EMC Specifications

All units should meet EN 55022 (CE/RE) class A/B with the simple external circuit shown; using the component values given in the table.

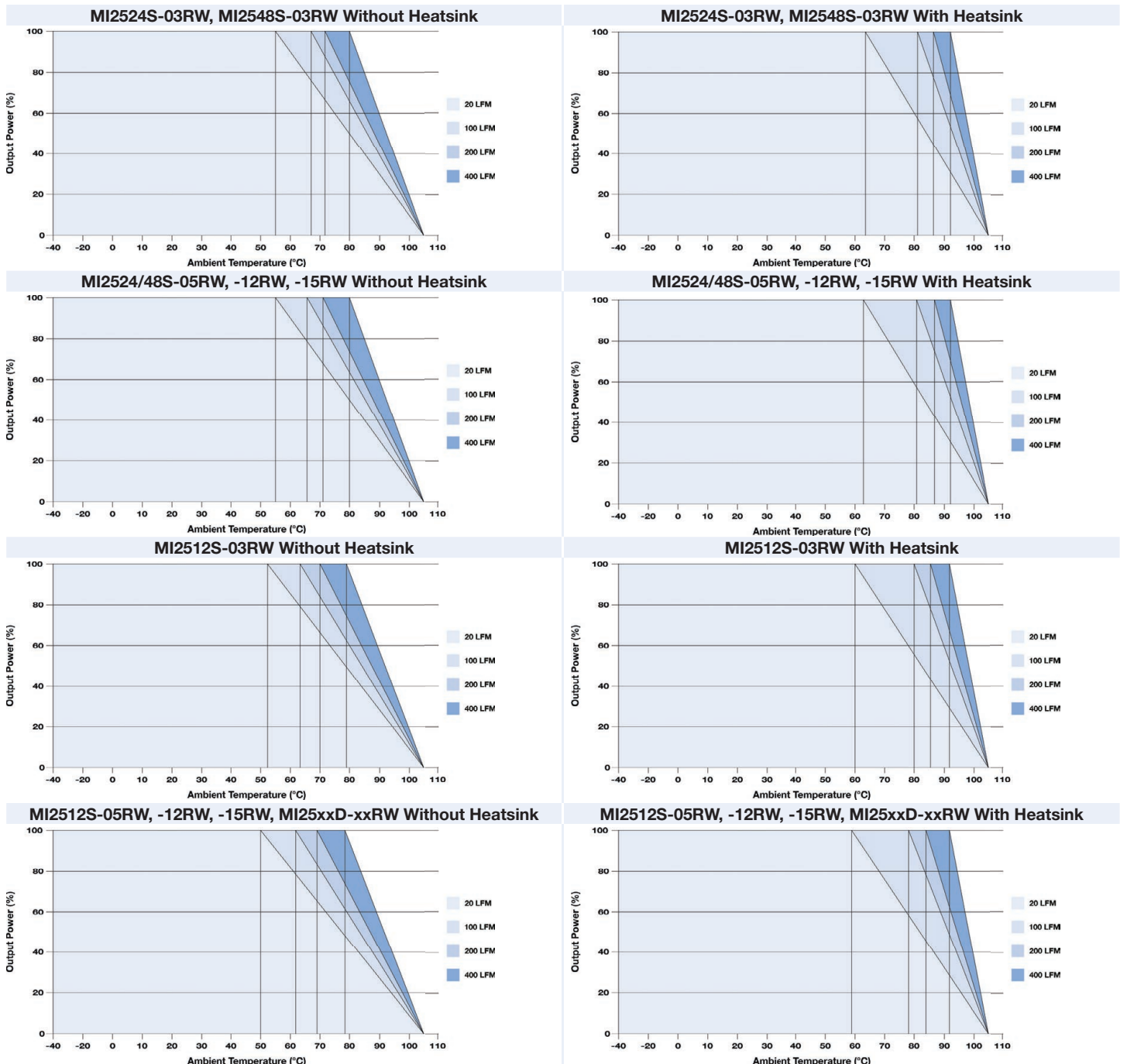
To meet the requirements of EN 61000-4-4 and EN 61000-4-5, the value of C₁ should be changed to 330 μ F/200V. Contact the factory for more information.

Standard	Model	C ₁	C ₂	L ₁	C ₃	C ₄ / C ₅
EN55022 Class A	MI2512x-xxRW	---	3.3 μ F/25V 1210 MLCC	1 μ H	---	---
	MI2524x-xxRW	---	3.3 μ F/50V 1210 MLCC	2.2 μ H	---	---
	MI2548x-xxRW	---	3.3 μ F/100V 1210 MLCC	4.7 μ H	---	---
EN55022 Class B	MI2512x-xxRW	3.3 μ F/25V 1210 MLCC	3.3 μ F/25V 1210 MLCC	1 μ H	3.3 μ F/25V 1210 MLCC	1,800 pF/2kV 1206 MLCC
	MI2524x-xxRW	3.3 μ F/50V 1210 MLCC	3.3 μ F/50V 1210 MLCC	2.2 μ H	3.3 μ F/50V 1210 MLCC	1,800 pF/2kV 1206 MLCC
	MI2548x-xxRW	3.3 μ F/100V 1210 MLCC	3.3 μ F/100V 1210 MLCC	4.7 μ H	3.3 μ F/100V 1210 MLCC	1,800 pF/2kV 1206 MLCC

Parameter	Standard	
Radiated Emissions	EN 55022	Class A/B
Conducted Emissions	EN 55022	Class A/B
ESD	EN 61000-4-2	Criteria A; \pm 8 kV Air, \pm 6 kV Contact
RS	EN 61000-4-3	Criteria A; 10V/m
EFT, See Notes	EN 61000-4-4	Criteria A; \pm 2 kV
Surge, See Notes	EN 61000-4-5	Criteria A; \pm 1 kV
CS	EN 61000-4-6	Criteria A; 10 V/rms



Derating Curves

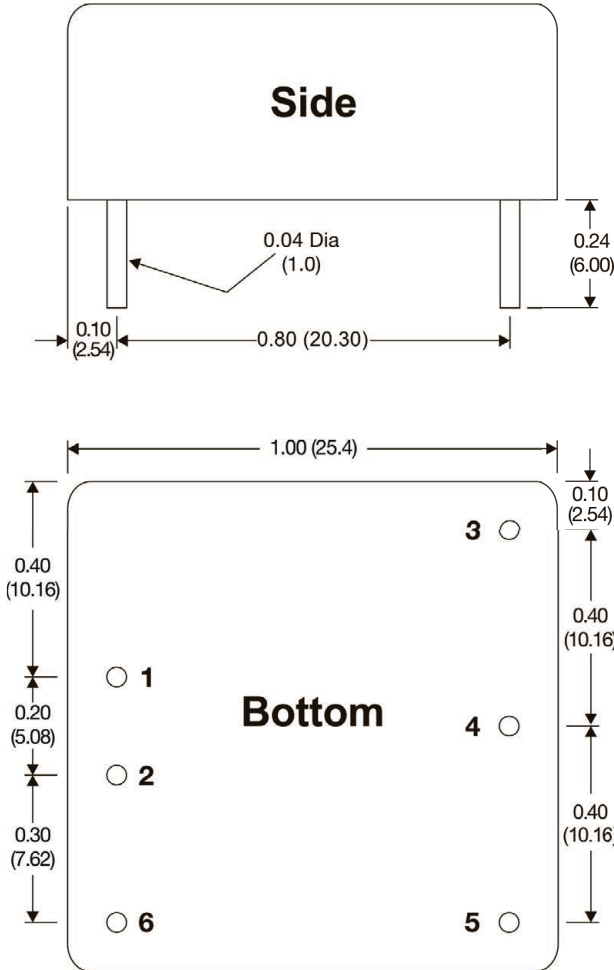


Remote On/Off

Parameter	Min	Typ	Max	Units
Supply On	3.5		12.0	VDC
Supply Off	0.0		1.2	VDC
Standby Input Current		3.0		mA
Control Common	Referenced to Negative Input (pin 2)			
Control Input Current (ON)		0.5		mA
Control Input Current (OFF)		-0.5		mA

Applying a signal to pin 3 will turn the unit ON/OFF. If the pin is left open, the unit operates. If grounded, the unit will shut off. The specifications for the ON/OFF function are given in the table at left.

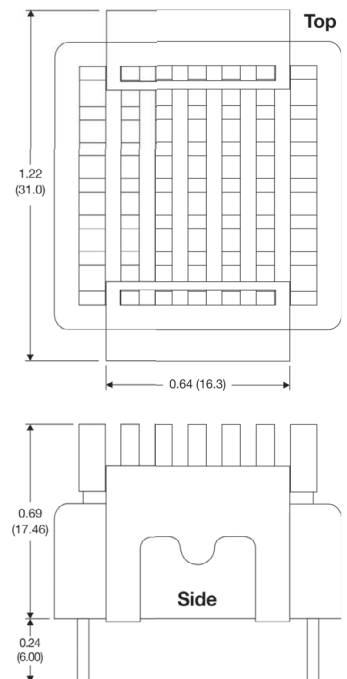
Mechanical Dimensions



Pin Connections

Pin	Single	Pin	Dual
1	+VIN	1	+VIN
2	-VIN	2	-VIN
3	+VOUT	3	+VOUT
4	Trim	4	Common
5	-VOUT	5	-VOUT
6	Remote On/Off	6	Remote On/Off

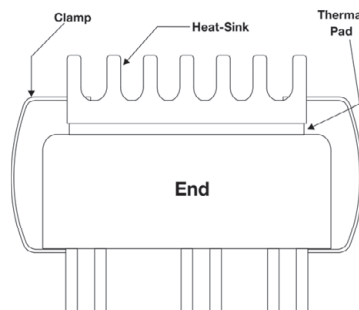
Mechanical Dimensions: With Optional Heatsink



For the heatsink option, add suffix "H" to the model number (i.e. MI2524S-12RW-H)

Notes:

- All dimensions are typical in inches (mm)
- Tolerance x.xx = ±0.02 (±0.50)
- Heatsink is black, anodized aluminum



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