



## FEATURES

- ◆ RoHS compliant
- ◆ High efficiency to 89%
- ◆ Power density up to 2.4W/cm<sup>3</sup>
- ◆ UL 94V-0 package material
- ◆ Industry standard pinout
- ◆ Non latching current limit
- ◆ Constant 350kHz frequency
- ◆ 1.5kV input to output isolation
- ◆ Versatile control options
- ◆ Continuous rating to 15W at 40°C without Heatsink
- ◆ Operation to zero load
- ◆ Protected against load faults
- ◆ Internal over temperature protection
- ◆ Uses no electrolytic capacitors

## MODEL SELECTION

### WRB<sup>①</sup>24<sup>②</sup>03<sup>③</sup>Y<sup>④</sup>MD<sup>⑤</sup>-15W<sup>⑥</sup>

- ① Product Series
- ② Input Voltage
- ③ Output Voltage
- ④ Wide (2:1) Input Range
- ⑤ Metal Shield
- ⑥ DIP Package Style
- ⑦ Rated Power

## DESCRIPTION

The WRB-YMD-15W series of DC/DC converters combines ease of application with versatility. The pin pattern is based on the popular industry standard, but two additional pins may optionally be fitted to provide a variety of features not commonly found on units of this type. High efficiency enables full rating to be achieved in a small package without heatsinking, and a high surge capability will provide for start-up and transient loads, whilst being thermally protected against sustained overload. Overload protection of the "constant current" type ensures start-up into complex load conditions. The copper case achieves efficient heat transfer and screening. The product range has been recognized by Underwriters Laboratory (UL) to UL 1950 for operational insulation, file number E179522 applies.



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## SELECTION GUIDE

order code	Input Voltage range	Nominal Input Voltage	Output Voltag	Output Current	Current Limit		Efficiency	MTTF <sup>2</sup>
		V	V	A	A(MIN.)	A(MAX.)	%	kHrs
WRB2403YMD-15W	18-36VDC	24	3.3	4.4	7.5	11	81	335
WRB2405YMD-15W	18-36VDC	24	5	3	5	7.5	84	286
WRB2412YMD-15W	18-36VDC	24	12	1.25	2.5	3.7	86	286
WRB2415YMD-15W	18-36VDC	24	15	1	2	3	87	281
WRB4803YMD-15W	36-72VDC	48	3.3	4.4	7.5	11	83	295
WRB4805YMD-15W	36-72VDC	48	5	3	5	7.5	85	301
WRB4812YMD-15W	36-72VDC	48	12	1.25	2.5	3.7	88	302
WRB4815YMD-15W	36-72VDC	48	15	1	2	3	89	296

## INPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Voltage range	Continuous operation, 24V input types	18	24	36	V
	Continuous operation, 48V input types	36	48	72	

## OUTPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Voltage set point error	50% load			0.5	%
Overall voltage error	Case temperature -40oC to 110oC Load 0% - 100% Input specified range			2.5	
Temperature coefficient of output voltage (slope)				250	ppm/C
Deviation of output voltage	Temperature MIN-MAX				
Line regulation	Operating voltage range, 50% load		0.5	1	%
Load Regulation	0% - 100% rated load			0.1	%
Ripple	rms		70	0.5	mV

## ISOLATION CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation test	Flash tested for 1 second	1500			VDC
Resistance	VISO = 500VDC	1			GΩ

## ABSOLUTE MAXIMUM RATINGS

Input voltage, 24V input types	-0.5V to 40V
Input voltage, 48V input types	-0.5V to 80V
Output voltage	-0.3V to regulated voltage
Output trim control	-1V to +30V
Synchronisation/shutdown control	±15V relative to input return

1. Calculated using MIL-HDBK-217F with nominal input voltage at full load.
  2. Absolute maximum value for 30 seconds. Prolonged operation may damage the product.
- All specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified.

### CONTROL CHARACTERISTICS

Parameter	Conditions	MIN.	TYP.	MAX.	Units
Voltage trimming range	At rated load, trim control at either output	±10			%
Remote switch input (voltage relative to input negative) <sup>1</sup>	Not operating	-15	0	1.5	V
	Operating, open circuit voltage	9	10	11	
Start Delay	Time from application of valid input voltage to output being in specification		25	50	ms
Synchronisation	Specified drive signal	320		440	KHz
Switching frequency		330	350	395	KHz

1. Calculated using MIL-HDBK-217F with nominal input voltage at full load.

2. Absolute maximum value for 30 seconds. Prolonged operation may damage the product.

All specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified.

### TEMPERATURE CHARACTERISTICS

Parameter	Conditions	MIN.	TYP.	MAX.	Units
Case temperature	Full load	-40		110	°C
Storage	Absolute Max. internal temperature	-40		125	
Relative humidity	Non condensing 85°C			85	%
Thermal protection	Operates at case temperature	110			°C

### THERMAL CHARACTERISTICS

Max. permissible loads for a given ambient temperature for any WRB-15W model.

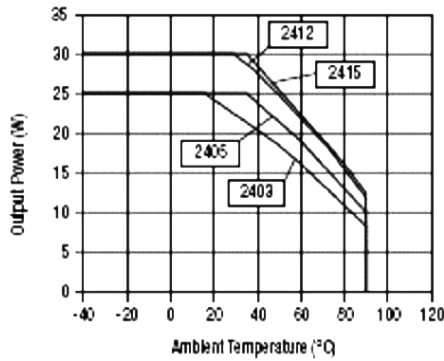
Temperature (°C)	Power (W)	Temperature (°C)	Power (W)
40	15	70	11.7
50	15	80	9.8
53	15	85	8.8
60	13.7	90	7.8

Max. power rating with case temperature maintained by external means (e.g. forced air cooling).

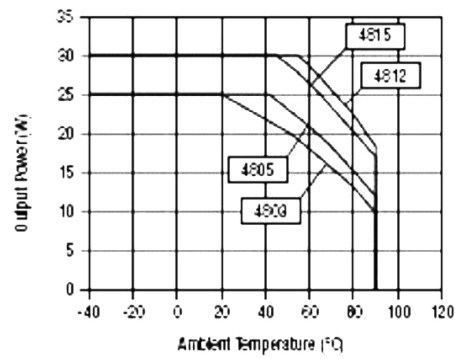
Part Number	Case Temperature			Units
	100°C	105°C	110°C	
WRB2403YMD-15W	19	16	12	W
WRB2405YMD-15W	22	19	15	
WRB2412YMD-15W	25	22	19	
WRB2415YMD-15W	26	24	21	
WRB4803YMD-15W	20	17	13	W
WRB4805YMD-15W	23	20	16	
WRB4812YMD-15W	28	26	23	
WRB4815YMD-15W	30	28	25	

### THERMAL PERFORMANCE

24V Input



48V Input



### TECHNICAL NOTES

#### ISOLATION VOLTAGE

'Hi Pot Test', 'Flash Tested', 'Withstand Voltage', 'Proof Voltage', 'Dielectric Withstand Voltage' & 'Isolation Test Voltage' are all terms that relate to the same thing, a test voltage, applied for a specified time, across a component designed to provide electrical isolation, to verify the integrity of that isolation.

MICRODC Power Solutions WR-YMD-15W series of DC/DC converters are all 100% production tested at their stated isolation voltage. This is 1500 VDC for 1 second.

A question commonly asked is, "What is the continuous voltage that can be applied across the part in normal operation?"

The WR-YMD-15W series has been recognized by Underwriters Laboratory, both input and output should normally be maintained within SELV limits i.e. less than 42.4V peak, or 60VDC.

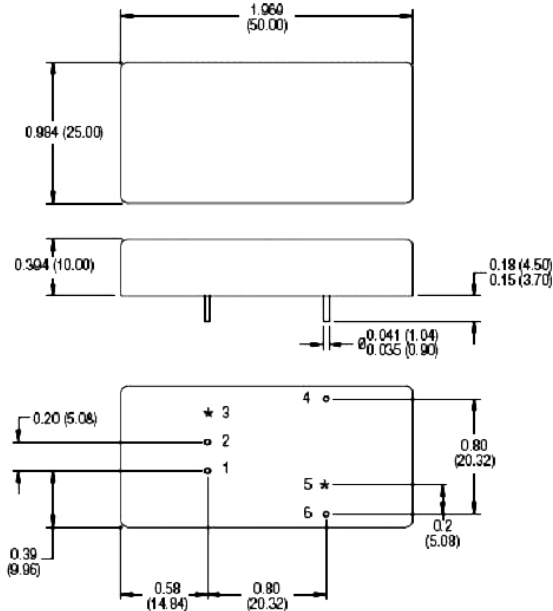
The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with several hundred volts offset applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

#### REPEATED HIGH-VOLTAGE ISOLATION TESTING

It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. While manufactured parts can withstand several times the stated test voltage, the isolation capability does depend on the wire insulation. Any material, including this enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltages thus implying that the number of tests should be strictly limited. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage.

### PACKAGE SPECIFICATIONS

#### MECHANICAL DIMENSIONS



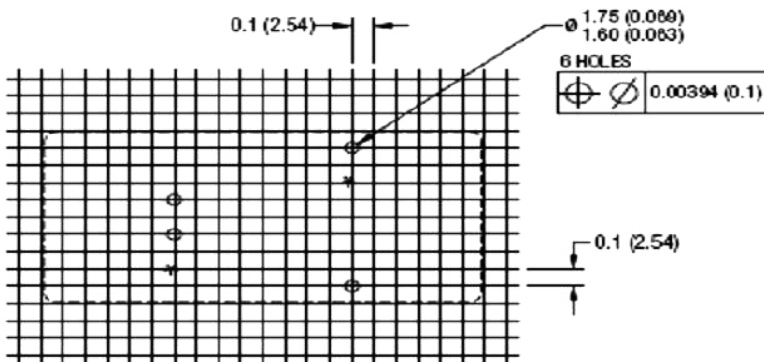
PIN CONNECTIONS	
Pin	Function
1	-V <sub>IN</sub>
2	+V <sub>IN</sub>
3*	SS
4	+V <sub>OUT</sub>
5*	TRIM
6	-V <sub>OUT</sub>

\* Optional pins

The copper case is internally connected to the output (-V<sub>OUT</sub>) pin. Care is needed in the design of this circuit board on which the converter is mounted. Top side tracks must not contact the edge of the case or the ferrite core, visible on the underside of the unit. **The case size may be (LXW)50.08mmX 25.4mm.**

Please note that from 2010 onwards you may receive either a blue or a black case finish.

### RECOMMENDED FOOTPRINT DETAILS



All dimensions in inches  $\pm 0.01$  (mm  $\pm 0.25$ mm)  
\* Optional control pins

#### RoHS COMPLIANT INFORMATION

This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300° C for 10 seconds. The pin termination finish on the SIP package type is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. The DIP types are Matte Tin over Nickel Preplate. Both types in this series are backward compatible with Sn/Pb soldering systems.

#### REACH COMPLIANT INFORMATION

This series has proven that this product does not contain harmful chemicals, it also has harmful chemical substances through the registration, inspection and approval.