MICRODC
Professional Power Module

WRB-YT-1W Series

1W, WIDE INPUT, ISOLATED & REGULATED SINGLE OUTPUT DC/DC CONVERTER



FEATURES

- Efficiency from 60.5%
- Operating temperature: -40°C ~ +85°C
- 1000VDC isolation
- UL94V-0 package material
- No external component required
- Internal SMD construction
- MTBF>1,400,000 hours
- RoHS Compliance
- Lead frame technology
- 5V,12V&24V Input
- 5V,12V&15V Output
- Power density 0.7W/cm^3
- Multi layer ceramic capacitors

MODEL SELECTION

WRB①12②05③Y④ T⑤-1W⑥

①Product Series ②Input Voltage
③Output Voltage ④Wide (2:1) Input Range
⑤SMD14 Package Style ⑥Rated Power

DESCRIPTION

The WRB-YT-1W series are specially designed for applications where a wide range input voltage power supplies are isolated from the input power supply in a distributed power supply system on a circuit board.
These products apply to:
1) Where the voltage of the input power supply is wide range (voltage range ≤2:1);
2) Where isolation is necessary between input and output (Isolation Voltage ≤1000VDC);
3) Where the regulation of the output voltage and the output ripple noise are demanded.

RoHS MICRODC Green Technology

CE REACH

MICRODC reserves the copyright

SELECTION GUIDE

order code	Input Voltage (VDC)*	Input Current (mA)		Output Voltage (VDC)	Output Current (mA)	Effciency (%)		MTTF (kHrs)
	Nominal	0%Load	100%Load		100%Load	Min.	Typ.	
WRB0505YT-1W	5	25	320	05	200	60.5	62	921
WRB0512YT-1W	5	30	300	12	83	63.5	67	1118
WRB0515YT-1W	5	60	320	15	66	60.5	63	869
WRB1205YT-1W	12	10	110	05	200	68.0	73	1281
WRB1212YT-1W	12	12	130	12	83	65.0	66	1175
WRB1215YT-1W	12	15	120	15	66	65.0	67	1283
WRB2405YT-1W	24	6	120	05	200	65.0	70	1379
WRB2412YT-1W	24	8	60	12	83	65.0	68	1278
WRB2415YT-1W	24	9	60	15	66	65.0	67	1223

* Input voltage can not exceed this value, or will cause the permanent damage.

COMMON SPECIFICATIONS

Item	Test conditions	Min.	Typ.	Max.	Units
Input voltage	WRB05XXYT-1W types		10V		
	WRB12XXYT-1W types		17.5V		
	WRB24XXYT-1W types		40V		
Minimum load	See graph				
Lead temperature	1.5mm from case for 10 seconds			245	℃
Cooling	Free air convection		Free air convection		
Short circuit protection			15s		
Case material			Epoxy Resin (UL94-V0)		
Case temperature rise above ambient			30		℃
Operation	See derating graphs	-40		85	
Storage		-50		130	

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

INPUT CHARACTERISTICS

Item	Test conditions	Min.	Typ.	Max.	Units
voltage range	Continuous operation, 5V input types	4.5	5	9	V
	Continuous operation, 12V input types	9	12	18	V
	Continuous operation, 24V input types	18	24	36	V
Reflected ripple current	See graph		12		mA p-p
	1.5mm from case for 10 seconds		6		mA p-p
	Free air convection		6		mA p-p

ISOLATION SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Units
Isolation voltage	Tested for 1 minute and 1mA max	1000			VDC
Isolation resistance	Test at 500VDC	1	10		GΩ
Isolation capacitance			25		pF

*Supply voltage must be discontinued at the end of short circuit duration.

OUTPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Units
Output power	Refer to products program	0.1		1	W
Voltage set point accuracy	With external input/output capacitors		±1	±2	%
Load regulation	10% load to 100% load, with external input/output capacitors		0.1	1	%
Line regulation	Low line to high line		0.2	1	%
Voltage trim range		-10		±10	%/℃
Ripple & noise	20MHz Bandwidth,all output types		100	150	mVp-p
Switching frequency		50		700	kHz

APPLICATION NOTE

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 specify time, across a component designed to provide electrical isolation, to verify the integrity of that isolation.

WRB-YT-1W series of DC/DC converters are all 100% production tested at their stated isolation voltage. This is 1kVDC for 1 second.

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

For a part holding no specific agency approvals, such as the WRB-YT-1W series, 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.

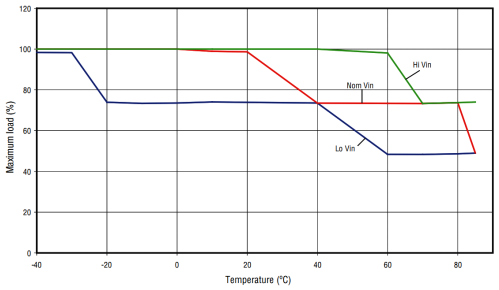
REPEATED HIGH-VOLTAGE ISOLATION TESTING

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. The WRB-YT-1W series has toroidal isolation transformers, with no additional insulation between primary and secondary windings of enameled wire. While parts can be expected to 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 specify test voltage.

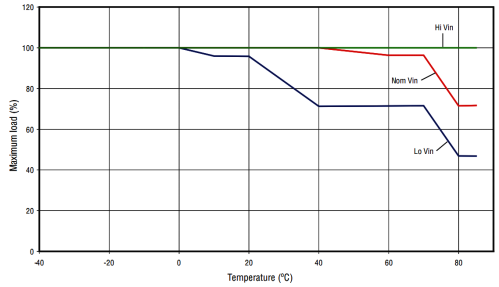
This consideration equally applies to agency recognized parts rated for better than functional isolation where the wire enamel insulation is always supplemented by a further insulation system of physical spacing or barriers.

TEMPERATURE DERATING

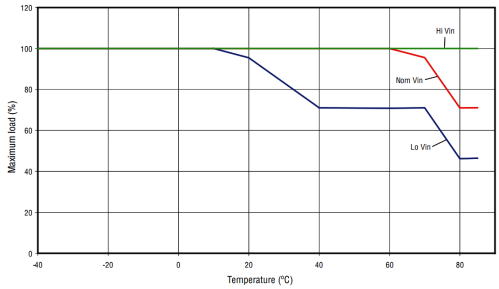
WRB2405YT-1W



WRB2412YT-1W

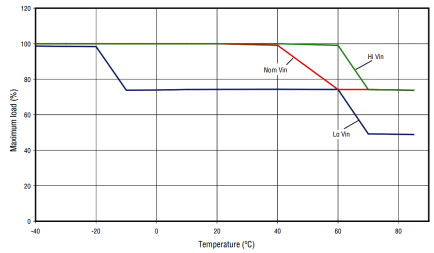


WRB2415YT-1W

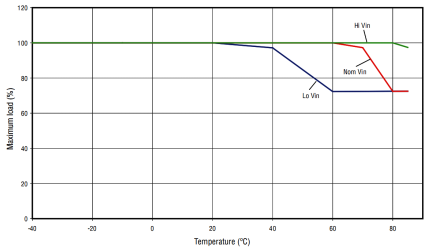


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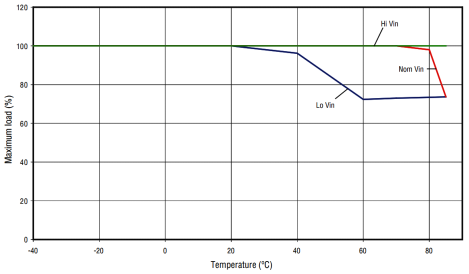
WRB0505YT-1W



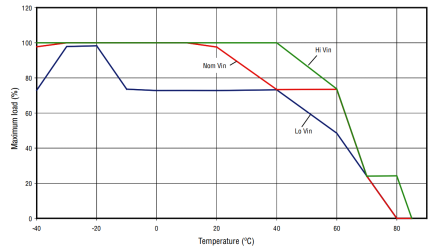
WRB0512YT-1W



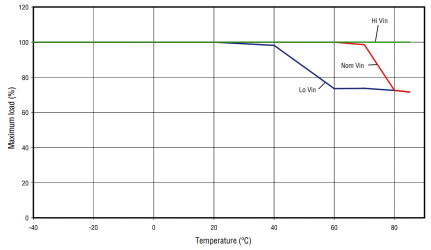
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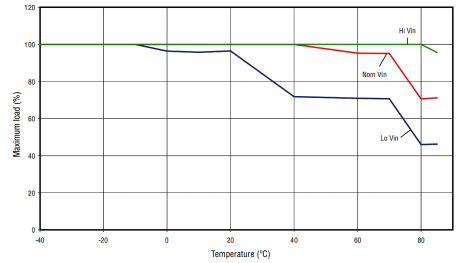
WRB1205YT-1W



WRB1212YT-1W

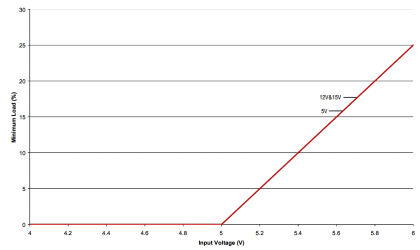


WRB1215YT-1W

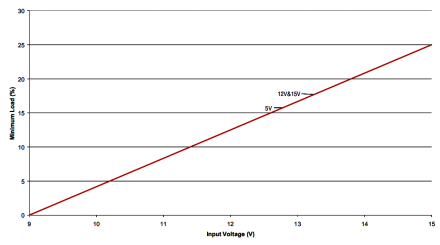


MINIMUM LOAD

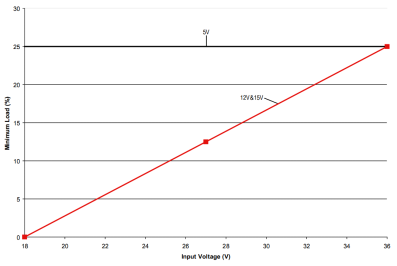
WRB05XXYT-1W



WRB12XXYT-1W



WRB24XXYT-1W



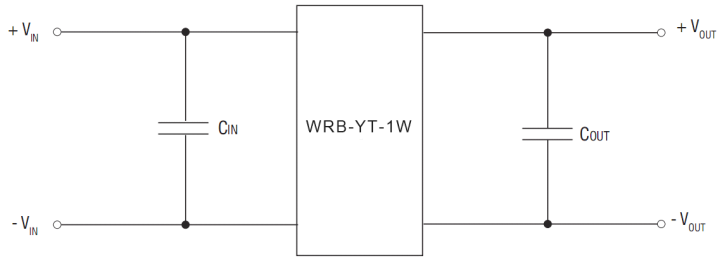
APPLICATION NOTES

Recommended input&output capacitors

Although these converters will work without external capacitors, they are necessary in order to guarantee the full parametric performance over the full line and load range. All parts have been tested and characterized using the following values and test circuit.

Value	
Cin	Cout
10 μ F, 200V good low esr capacitor	22 μ F, 16V good low esr capacitor

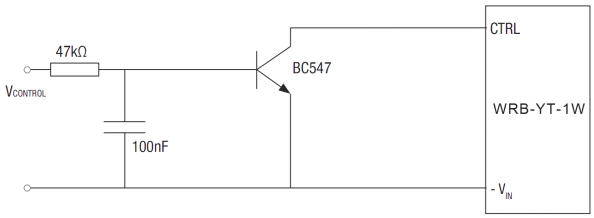
Test circuit, 5V, 12V and 15V output



ON/OFF Pin

This provides an OFF function, which puts the converter into a low power mode. When the pin is un-connected, the converter is on. The circuit used must be able to sink a peak current of 50mA to guarantee turning the converter off. The circuit should be an open collector arrangement, an example circuit is shown below. Voltages should not be applied directly to the ON/OFF pin. The BC547 should be fited close to the WRB-YT-1W ON/OFF pin to prevent the addition of excess wiring capacitance.

CONTROL PIN CIRCUIT INPUT VOLTAGE VCONTROL			
	Min.	Max.	Units
Module ON	0	0.2	V
Module OFF	1.6	30	V



Output voltage adjustment

The trim resistor equations are:

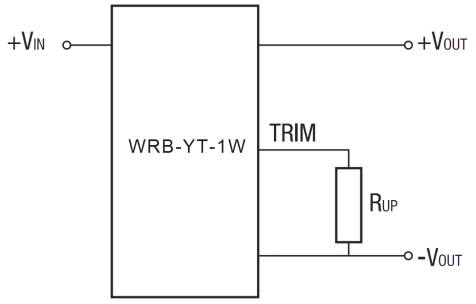
$$R_{DOWN} = \left[\frac{(V_{DOWN} - L) \times G}{V_{NOM} - V_{DOWN}}\right]$$

$$R_{UP} = \left[\frac{G \times L}{V_{UP} - L - K}\right]$$

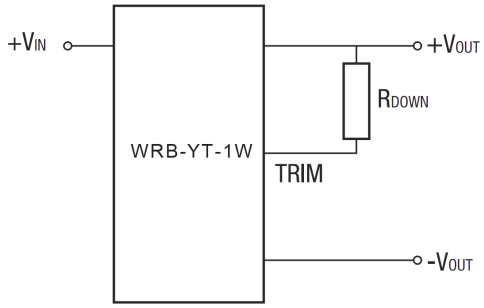
Where:

	G	L	K
WRB0505YT-1W	30100	1.24	3.76
WRB1205YT-1W,WRB2405YT-1W	100000	1.24	3.76
WRBXX12YT-1W	38300	2.5	9.5
WRBXX15YT-1W	49900	2.5	12.5

TRIM UP



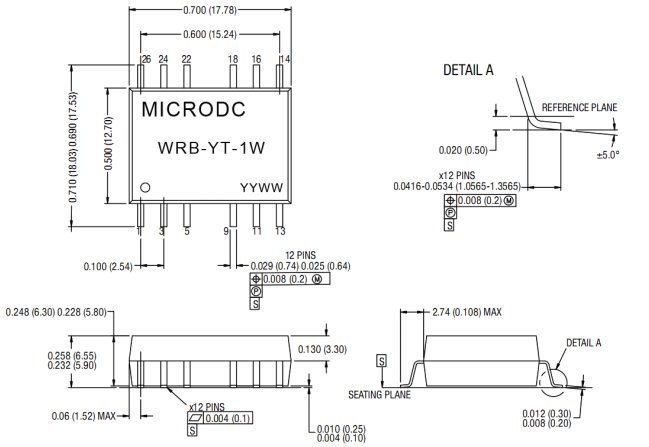
TRIM DOWN



When the output voltage is trimmed up, output current must be derated so that the maximum output power is not exceeded.

OUTLINE DIMENSIONS & FOOTPRINT DETAILS

MECHANICAL DIMENSIONS



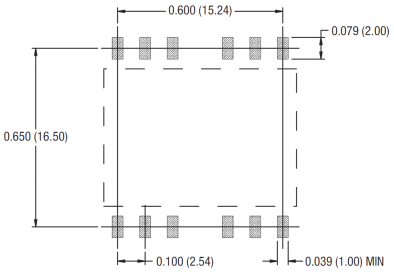
All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch Weight: 2.8g

FOOTPRINT DETAILS

Pin	Function	Pin	Function
1	-Vin	14	NA
3	+Vin	16	TRIM
5	NA	18	NA
9	NA	22	ON/OFF
11	-Vo	24	NA
13	+Vo	26	NA

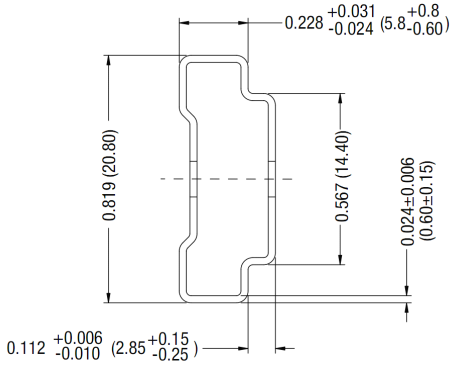
NA:Not available for electrical connection.

RECOMMENDED FOOTPRINT



All dimensions in inches ±0.02 (mm ±0.5mm).

TUBE OUTLINE DIMENSIONS



All dimensions in inches ±0.02 (mm±0.5).

Tube length: 18.70±0.079 (475±2.0). Tube Quantity : 25

Note:

1. The load shouldn't be less than 10%, otherwise ripple will increase dramatically.
2. Operation under 10% load will not damage the converter; However, they may not meet all specification listed.
3. Capacitor MAX load tested at input voltage range and full load.
4. All specifications measured at Ta=25℃, humidity<75%, nominal input voltage and rated output load unless otherwise specified.
5. Only typical models listed, other models may be different, please contact our technical person for more details.
6. In this datasheet, all the test methods of indications are based on corporate standards.

MICRODC
Professional Power Module

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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.