



## FEATURES

- ◆Smallest encapsulated 15W Converter!

Ultra compact size: 2.0" x 1.0" x 0.4"

- ◆Shielded metal case with isolated baseplate

- ◆Ultrawide 4:1 input ranges 9-36 VDC or 18-75VDC

- ◆Output voltage Trim

- ◆I/O- isolation voltage 1500 VDC

- ◆Very high efficiency up to 87%

- ◆Operating temp. range : -40°C to +85°C

- ◆Remote On/Off control

- ◆Industry standard pinout

- ◆3-year product warranty

## MODEL SELECTION

**WRB<sup>①</sup>24<sup>②</sup>05<sup>③</sup>Z<sup>④</sup>M<sup>⑤</sup>D<sup>⑥</sup>-15W(3000)<sup>⑦</sup>**

- ①Product Series      ②Input Voltage
- ③Output Voltage    ④Wide (4:1) Input Range
- ⑤Metal Shield      ⑥2"x1" DIP Package
- ⑦Rated Power(Output current)

## APPLICATIONS

The WRA-ZMD-15W&WRB-ZMD-15W series is the latest generation of high performance dc-dc converter modules setting new standards concerning power density. This product with 15W comes in a encapsulated, shielded metal package with dimensions of only 2.0"x 1.0"x 0.4" and occupies 50% less board space.

All models have ultra wide 4:1 input voltage range and precisely regulated output voltages. Advanced circuit design provides high efficiency up to 87% which allows a operating temperature range of -40°C to +85°C (with derating) Further features include remote On/Off, trimable output and Basic Insulation. This product is fully compliant to RoHS directive. Typical applications for these converters are battery operated equipment, mobile instrumentation, distributed power architectures in communication and industrial electronics and everywhere where space on PCB is critical.



## SELECTION GUIDE

Order code	Input voltage range	Output voltage	Output current max.	Efficiency typ.
WRB2403ZMD-4000	9 – 36 VDC	3,3 VDC	4000 mA	86 %
WRB2403ZMD-15W	9 – 36 VDC	3,3 VDC	4000 mA	86 %
WRB2405ZMD-15W	9 – 36 VDC	5.0VDC	3000 mA	86 %
WRB2412ZMD-15W	9 – 36 VDC	12 VDC	1300 mA	87 %
WRB2415ZMD-15W	9 – 36 VDC	15 VDC	1000 mA	87 %
WRA2405ZMD-15W	9 – 36 VDC	± 5.0 VDC	± 1500 mA	85 %
WRA2412ZMD-15W	9 – 36 VDC	± 12 VDC	± 625 mA	87 %
WRA2415ZMD-15W	9 – 36 VDC	±15 VDC	± 500 mA	88 %
WRB4803ZMD-4000	18 – 75 VDC	3.3 VDC	4000 mA	86 %
WRB4803ZMD-15W	18 – 75 VDC	3.3 VDC	4000 mA	86 %
WRB4805ZMD-15W	18 – 75 VDC	5.0VDC	3000 mA	86 %
WRB4812ZMD-15W	18 – 75 VDC	12 VDC	1300 mA	87 %
WRB4815ZMD-15W	18 – 75 VDC	15 VDC	1000 mA	87 %
WRA4805ZMD-15W	18 – 75 VDC	± 5.0 VDC	± 1500 mA	85 %
WRA4812ZMD-15W	18 – 75 VDC	± 12 VDC	± 625 mA	87 %
WRA4815ZMD-15W	18 – 75 VDC	±15 VDC	± 500 mA	88 %

## Input Specifications

Input current(no load)	24 Vin; 3.3 VDC Vout models:	50 mA typ.
	24 Vin; 5 VDC Vout models:	70 mA typ.
	24 Vin; other models:	20 mA typ.
	48 Vin; 3.3 & 5 VDC models:	40 mA typ.
Input current(full load)	48 Vin; other models:	15 mA typ.
	24 Vin 3.3 VDC models:	690 mA typ.
	24 Vin other models:	770 mA typ..
Start-up voltage / under voltage shut down	48 Vin; 3.3 VDC models:	340 mA typ.
	48 Vin; other models:	380 mA typ.
	24 Vin models	9 VDC /8 VDC
Surge voltage (100 m sec. max.)	48 Vin models	18 VDC /16 VDC
	24 Vin models	50 V max.
Reflected input ripple	48 Vin models	100 V max.
	24 Vin models	30 mA typ.
Conducted noise (input)		EN 55022 level A, level A

#### General Specifications

Temperature ranges	- Operating	-40 °C to +85 °C (with derating)
	- Case temperature	+105 °C max.
	- Storage	-55 °C to +125 °C
Power derating		2.2 %/K above 60°C
Thermal impedance	- Natural convection	18.2 °C/W
Humidity (non condensing)		5 % to 95 % rel H max.
Reliability, calculated MTBF		
Isolation voltage (60sec)	- Input/Output	1'500 VDC
Isolation capacity	- Input/Output	1000 pF typ.
Isolation resistance	- Input/Output (500 VDC)	>1'000 MOhm
Remote ON/OFF (optional):	ON:	3.0---15 VDC or open circuit
	OFF:	0---1.2 VDC or short circuit pin 6 and pin 2
	OFF idle current:	2.5 mA max.
Switching frequency (fixed)		400 kHz typ. (pulse width modulation PWM)
Vibration and thermal shock		MIL-STD-810E
Safety standards		UL /CUL 60950-1, EN 60950-1, IEC 60950-1
Safety approvals	- UL/cUL	

#### Output Specifications

Voltage set accuracy		± 1 %
Regulation	- Input variation Vin min. to Vin max. single output models:	0.2 % max.
	- Load variation 0 – 100 % dual output models:	0.5 % max.
	single output models:	0.2 % max.
	dual output models unbalanced load	1.0 % max.
	dual output models unbalanced load (25% /100%):	5.0 % max.
Minimum load		not required
Ripple and noise (20 MHz bandwidth) coefficient		100 mVpk-pk max. with external capacitor
Temperature coefficient		±0.02 %/K
Output current limitation		at 150 % of Iout max., foldback
Short circuit protection		indefinite (automatic recovery)
Over voltage protection	3.3 VDC models:	3.7 – 5.4 Vout
	5 VDC models:	5.6 – 7.0 Vout
	12 VDC models:	13.5 – 19.6 Vout
	15 VDC models:	16.8 – 20.5 Vout
Start up time (nominal Vin and constant resistive load)		30 ms typ. (for power on and remote on)
Transient response setting time (25% load step change)		250 µs typ.
Max. capacitive load	3.3 & 5 VDC models:	1000 µF
	12 VDC models:	330 µF
	15 VDC models:	220 µF
	±5 VDC models:	±500 µF
	±12 VDC models:	±150 µF
	±15 VDC models:	±100 µF

#### Physical Specifications

Case material	nickel coated copper
Baseplate	non conductive FR4
Potting material	epoxy (UL 94V-0 rated)
Weight	15 g (0.53 oz)
Soldering temperature	max. 265 °C / 10sec.

#### COMMON SPECIFICATIONS

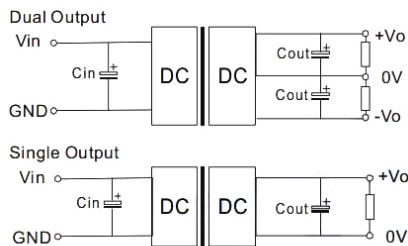
Parameter	Test conditions	Min.	Typ.	Max	Units
Storage Humidity				95	%
Operating Temperature		-40		85	°C
Storage Temperature		-55		105	°C
Temp. Rise at Full Load	Case surface		50		°C
Lead Temperature	1.5mm from case for 10seconds			300	°C
Isolation voltage	Tested for 1 minute and 1mA max	1500			VDC
Isolation resistance	Test at 500VDC	1000			MΩ
Isolation capacitance	100KHz / 0.1V		1000		pF
Switching Frequency	Nominal, full load		500		KHz
MTBF		1000			K hours
Cooling		Free Air Convection			
Case material		Nickel-coated copper			
Weight			30		g

#### APPLICATION NOTE

##### Recommended circuit

All the WRA\_ZMD-15W&WRB\_ZMD-15W Series have been tested according to the following recommended testing circuit before leaving factory. This series should be tested under load.

Never be tested under no load (see Figure 1).



(Figure 1)

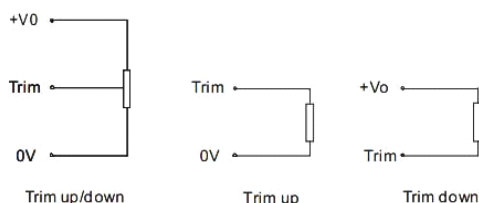
If you want to further decrease the output ripple, you can increase capacitance properly or choose capacitors with low ESR. However, the capacitance can't exceed the maximum capacitor load in the list.

##### Recommended capacitance

To ensure these series can operate efficiently and reliably, the recommended capacitance of input and output sees the below table.

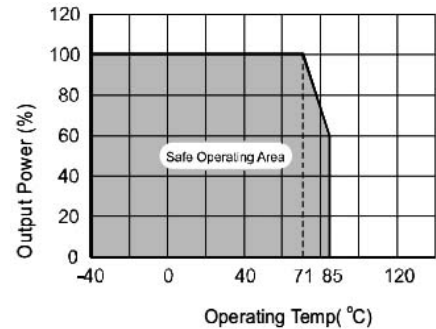
Capacitance		Cout	Cin (12V,24V,48V Input)
Output Voltage			
Single	3.3V,5V	220uF	100uF
	12V,15V	100uF	
Dual	±5V	±220uF	
	±12V,±15V	±100uF	

#### OUTPUT VOLTAGE TRIM UP/DOWN



#### DERATING & EFFICIENCY CURVE

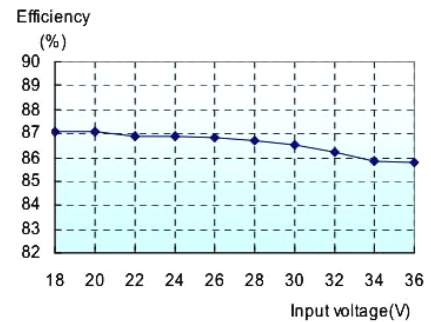
##### 1. Temperature derating curve



##### 2. Efficiency Vs Input voltage

###### WRA2412ZMD-15W

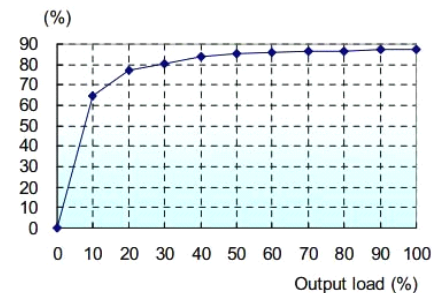
Efficiency VS Input voltage



##### 3. Efficiency Vs Output Power

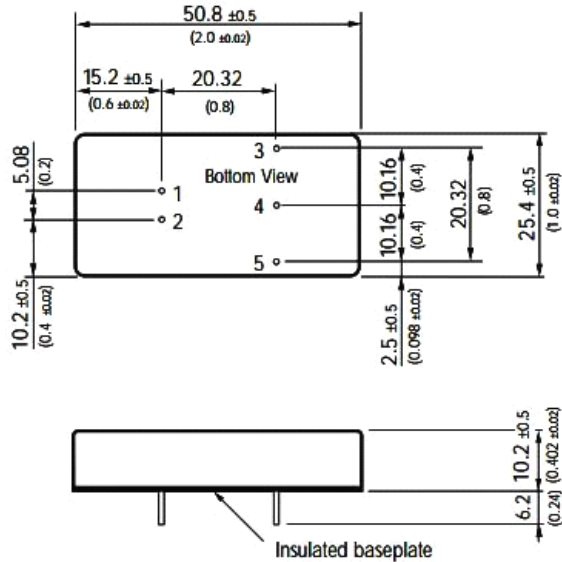
###### WRA2412ZMD-15W

Efficiency VS Output load



#### OUTLINE DIMENSIONS & FOOTPRINT DETAILS

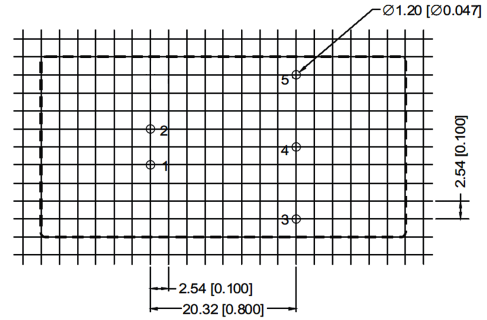
##### MECHANICAL DIMENSIONS



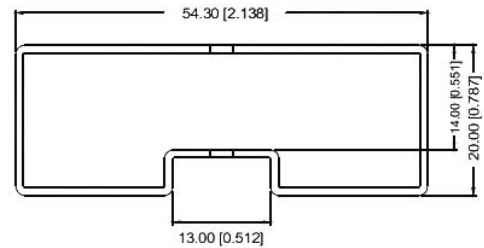
Note:  
Unit : mm[inch]  
Pin diameter tolerances:  $\pm 0.10\text{mm}[\pm 0.004\text{ inch}]$   
General tolerances:  $\pm 0.25\text{mm}[\pm 0.010\text{ inch}]$

Pin-Out		
Pin	Single	Dual
1	+Vin (Vcc)	+Vin (Vcc)
2	-Vin (GND)	-Vin (GND)
3	+Vout	+Vout
4	No pin	Common
5	-Vout	-Vout

##### RECOMMENDED FOOTPRINT



##### TUBE OUTLINE DIMENSIONS



Note:  
Unit : mm[inch]  
General tolerances:  $\pm 0.50\text{mm}[\pm 0.020\text{ inch}]$   
L=230mm[9.055inch] Tube Quantity: 7pcs

Note:

- All specifications are measured at TA=25°C, humidity<75%, nominal input voltage and rated output load unless otherwise specified.
- In this data sheet, all the test methods of indications are based on corporate standards.
- Only typical model listed. Non-standard models will be different from the above, please contact us for more details.
- The products cannot be used in parallel and in plug and play.
- The CTRL control pin voltage is referenced to GND.
- Capacitor or MAX load tested at nominal input voltage and constant resistive load.
- Refer to the diagram of Output Voltage trim up/ down for trim applications.



#### 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.