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date 09/2009

### PART NUMBER: VWRBS2

### **DESCRIPTION:** dc-dc converter

### Description

Designed to convert a wide input voltage range into an isolated regulated voltage, the VWRBS2-SIP series is well suited for providing board-mount local supplies in a wide range of applications, including mixed analog/digital circuits, test & measurement equip., process/machine controls, datacom/telecom fields, etc...

### **Features**

- ·Wide (2:1) input range
- ·High efficiency to 82%
- ·Regulated
- ·Single voltage output
- ·I/O Isolation 1500VDC
- ·No heatsink required
- Short circuit protection
- ·Remote on/off
- ·MTBF >1,000,000 hrs
- ·Temperature range: -40°C~+85°C





Model	Input Voltage		Output	<b>Output Current</b>			Package	
Number	Nominal	Range	Max.	Voltage	Max.	Min.	Efficiency	Style
VWRBS2-D5-S3.3-SIP	5 Vdc	4.5~9.0 Vdc	11 Vdc	3.3 Vdc	500 mA	50 mA	65%	SIP
VWRBS2-D5-S5-SIP	5 Vdc	4.5~9.0 Vdc	11 Vdc	5 Vdc	400 mA	40 mA	68%	SIP
VWRBS2-D5-S9-SIP	5 Vdc	4.5~9.0 Vdc	11 Vdc	9 Vdc	222 mA	22 mA	72%	SIP
VWRBS2-D5-S12-SIP	5 Vdc	4.5~9.0 Vdc	11 Vdc	12 Vdc	167 mA	16 mA	73%	SIP
VWRBS2-D5-S15-SIP	5 Vdc	4.5~9.0 Vdc	11 Vdc	15 Vdc	133 mA	13 mA	72%	SIP
VWRBS2-D5-S24-SIP	5 Vdc	4.5~9.0 Vdc	11 Vdc	24 Vdc	80 mA	8 mA	73%	SIP
VWRBS2-D12-S3.3-SIP	12 Vdc	9.0~18.0 Vdc	22 Vdc	3.3 Vdc	500 mA	50 mA	72%	SIP
VWRBS2-D12-S5-SIP	12 Vdc	9.0~18.0 Vdc	22 Vdc	5 Vdc	400 mA	40 mA	77%	SIP
VWRBS2-D12-S9-SIP	12 Vdc	9.0~18.0 Vdc	22 Vdc	9 Vdc	222 mA	22 mA	79%	SIP
VWRBS2-D12-S12-SIP	12 Vdc	9.0~18.0 Vdc	22 Vdc	12 Vdc	167 mA	16 mA	81%	SIP
VWRBS2-D12-S15-SIP	12 Vdc	9.0~18.0 Vdc	22 Vdc	15 Vdc	133 mA	13 mA	80%	SIP
VWRBS2-D12-S24-SIP	12 Vdc	9.0~18.0 Vdc	22 Vdc	24 Vdc	80 mA	8 mA	80%	SIP
VWRBS2-D24-S3.3-SIP	24 Vdc	18.0~36.0 Vdc	40 Vdc	3.3 Vdc	500 mA	50 mA	72%	SIP
VWRBS2-D24-S5-SIP	24 Vdc	18.0~36.0 Vdc	40 Vdc	5 Vdc	400 mA	40 mA	77%	SIP
VWRBS2-D24-S9-SIP	24 Vdc	18.0~36.0 Vdc	40 Vdc	9 Vdc	222 mA	22 mA	79%	SIP
VWRBS2-D24-S12-SIP	24 Vdc	18.0~36.0 Vdc	40 Vdc	12 Vdc	167 mA	16 mA	81%	SIP
VWRBS2-D24-S15-SIP	24 Vdc	18.0~36.0 Vdc	40 Vdc	15 Vdc	133 mA	13 mA	80%	SIP
VWRBS2-D24-S24-SIP	24 Vdc	18.0~36.0 Vdc	40 Vdc	24 Vdc	80 mA	8 mA	80%	SIP
VWRBS2-D48-S3.3-SIP	48 Vdc	36.0~72.0 Vdc	80 Vdc	3.3 Vdc	500 mA	50 mA	71%	SIP
VWRBS2-D48-S5-SIP	48 Vdc	36.0~72.0 Vdc	80 Vdc	5 Vdc	400 mA	40 mA	75%	SIP
VWRBS2-D48-S9-SIP	48 Vdc	36.0~72.0 Vdc	80 Vdc	9 Vdc	222 mA	22 mA	79%	SIP
VWRBS2-D48-S12-SIP	48 Vdc	36.0~72.0 Vdc	80 Vdc	12 Vdc	167 mA	16 mA	80%	SIP
VWRBS2-D48-S15-SIP	48 Vdc	36.0~72.0 Vdc	80 Vdc	15 Vdc	133 mA	13 mA	79%	SIP
VWRBS2-D48-S24-SIP	48 Vdc	36.0~72.0 Vdc	80 Vdc	24 Vdc	80 mA	8 mA	80%	SIP

### Note:

1. All specifications measured at TA=25°C, humidity <75%, nominal input voltage and rated output load unless otherwise specified.

## **Output Specifications**

Item	Test conditions	Min.	Тур.	Max.	Units
2W Output power		0.2		2	W
Output voltage accuracy	Refer to recommended circuit		±1	±3	%
Line Regulation	Input Voltage from low to high		±0.2	±0.5	%
Load Regulation	10% to 100% full load		±0.5	±1.0	%
Temperature drift	Refer to recommended circuit			0.03	%/°C
Output ripple& noise	20 Hz Bandwidth		35	100	mVp-p
Switching frequency	100% load, nominal input	80K		550K	Hz

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**PART NUMBER: VWRBS2 DESCRIPTION:** dc-dc converter

**General Specifications** 

Output short circuit protection	Continuous	
Temperature rise at full load	15°C typ., 35°C max.	
Cooling	Free air convection	
No-load power consumption	100mW (typical)	
Operating temperature range	-40°C to +85°C	
Storage temperature range	-50°C to +125°C	
Soldering temperature 300°C (1.5mm from case for		
Storage humidity range	<95%	
Case material	Plastic (UL94-V0)	
MTBF	>1,000,000 hrs.	

**Isolation Specifications** 

Item	Test Conditions	Min. Typ.		Max.	Units
Isolation Voltage	Flash tested for 1 min.	1500			Vdc
Isolation Resistance	Test at 500 Vdc	1000			ΜΩ
Isolation Capacitance	Input/Output		80		PF

## Typical Characteristics

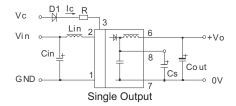
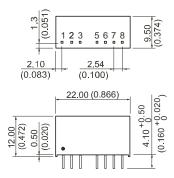


Figure 1

# **Outline Dimensions & Recommended Layout Pattern**



Unit:mm(inch) Pin section:0.50\*0.30mm(0.020\*0.012inch) Pin tolerances: ±0.10mm(±0.004inch) General tolerances:±0.25mm(±0.010inch)

#### Recommended circuit

It is best to test with full load and not to test without load. To further reduce output ripple, you may increase the external capacitor, choose a capacitor with low ESR, or add external inductor to the circuit as shown on the left.

General:

Cin: 5V, 12V 100µF 24V, 48V  $10\mu F \sim 47\mu F$ 

Cout:100µF(typ) Lin: 4.7μH ~ 120 μH

### CS Pin

By connecting a low ESR capacitor between this terminal and the pin-7 (Figure 1). the output ripple and noise may be further improved. Generally, the capacitance is no greater than 47uF.

First Angle Projection 🕣 🏶

RECOMMENDED FOOTPRINT Top view, grid: 2.54mm (0.1 inch), diameter:1.00mm

Dual Output & Single Output



### FOOTPRINT DETAILS

Pin	Single		
FIII			
1	GND		
2	Vin		
3	CTRL		
5	NC		
6	+Vo		
7	OV		
8	cs		

NC:No Connection



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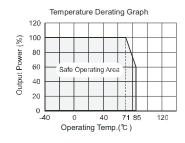
### **Application Notes:**

- All of the VWRBS2-SIP Series have been tested according to the following recommended testing circuit before leaving the factory. This series should be tested under load(Figure 1). If you want to further decrease the input/output ripple, you can increase capacitance properly or choose capacitors with low ESR. However, the capacitance should not be too high(Table 2).

**External Capacitor Table** 

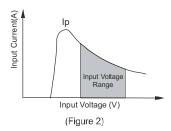
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Single Vout(VDC)	Cout(uF)	Dual Vout(VDC)	Cout(uF)	Cs(uF)		
3.3	2200	-	-	-		
5	1000	±5	±560	47		
9	820	±9	±470	47		
12	680	±12	±330	47		
15	560	±15	±270	47		
24	470	-	-	-		

Table 2



### **DESCRIPTION:** dc-dc converter

Input current
 Nominal input voltage range. The input
 current of the power supply must be sufficient
 to the startup current (Ip) of the DC/DC module
 (Figure 2)



Output Load
 In order to ensure the product operates
 efficiently and reliably, make sure the specified range of input voltage is not exceeded.

No parallel connection or plug and play.

NC Terminals
 Unless otherwise specified, NC terminals of all series are used for converter's interior circuit connection, and are not allowed connection of any external circuit.;

- Remote on/off control (see figure 1)

ON: When control pin (CTRL pin 3) open or  $Ic \le 0.5mA$ , converter will have normal output. OFF: With a 3-10mA input current (Ic) to pin 3, output will be disabled. Under no conditions should input current (Ic) exceed 20mA. The Value of R in Figure 1 can be derived as follows:

example 1 : Logic circuit — Apply 5V TTL logic signal on Vc to disable output

R= 
$$\frac{5V - 0.7V - 0.65V}{0.05 \, \Lambda}$$
 = 730 Ω Choose **720** Ω resistor

example 2 : Short Vin to Vc — Apply 12V on Vc to disable output

R= 
$$\frac{12V - 0.7V - 0.65V}{0.05A}$$
 = 2130 Ω Choose 2KΩ resistor