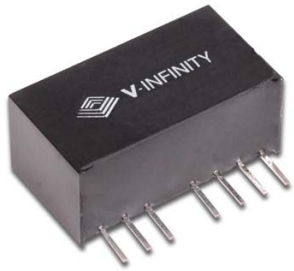
PART NUMBER: VWRBS2 **DESCRIPTION:** dc-dc converter

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**



RoHS

Model Number	Input Voltage Nominal	Input Voltage Range	Input Voltage Max.	Output Voltage	Output Current Max.	Output Current Min.	Efficiency	Package 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.	Typ.	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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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 10sec.)
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			M Ω
Isolation Capacitance	Input/Output		80		PF

Typical Characteristics

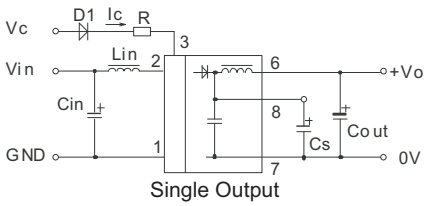
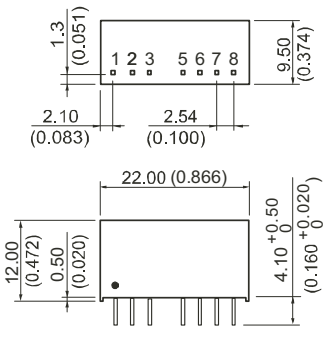


Figure 1

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 10μF ~ 47μF
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.

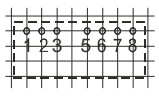
Outline Dimensions & Recommended Layout Pattern



Note:
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)

First Angle Projection

RECOMMENDED FOOTPRINT
Top view,grid:2.54mm(0.1inch), diameter:1.00mm
Dual Output & Single Output



FOOTPRINT DETAILS

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

NC:No Connection

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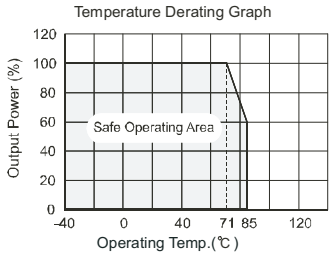
Application Notes:

- 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).

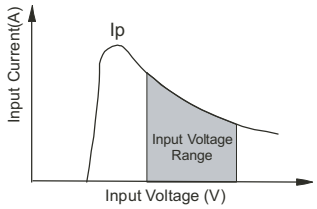
External Capacitor Table

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



- 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)



(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 ≤ 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:

$$R = \frac{Vc - Vd - 0.65V}{Ic}$$

Vc= Voltage at control input
Vd= Diode (D1) voltage drop (.7V voltage drop typical)
Ic= Input Current (5mA recommended disable current)

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

$$R = \frac{5V - 0.7V - 0.65V}{.005A} = 730\ \Omega$$ **Choose 720Ω resistor**

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

$$R = \frac{12V - 0.7V - 0.65V}{.005A} = 2130\ \Omega$$ **Choose 2KΩ resistor**