

**PART NUMBER:** VWRAS2

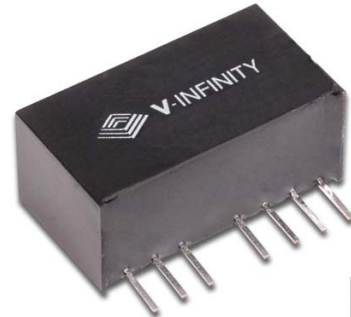
**DESCRIPTION:** dc-dc converter

### Description

Designed to convert a wide input voltage range into an isolated regulated voltage, the VWRAS2-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 80%
- Regulated
- Dual 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 Number	Input Voltage			Output Voltage	Output Current		Efficiency	Package Style
	Nominal	Range	Max.		Max.	Min.		
VWRAS2-D5-D5-SIP	5 Vdc	4.5~9.0 Vdc	11 Vdc	±5 Vdc	±200 mA	±20 mA	67%	SIP
VWRAS2-D5-D9-SIP	5 Vdc	4.5~9.0 Vdc	11 Vdc	±9 Vdc	±111 mA	±11 mA	71%	SIP
VWRAS2-D5-D12-SIP	5 Vdc	4.5~9.0 Vdc	11 Vdc	±12 Vdc	±83 mA	±8 mA	72%	SIP
VWRAS2-D5-D15-SIP	5 Vdc	4.5~9.0 Vdc	11 Vdc	±15 Vdc	±67 mA	±7 mA	73%	SIP
VWRAS2-D12-D5-SIP	12 Vdc	9.0~18.0 Vdc	22 Vdc	±5 Vdc	±200 mA	±20 mA	75%	SIP
VWRAS2-D12-D9-SIP	12 Vdc	9.0~18.0 Vdc	22 Vdc	±9 Vdc	±111 mA	±11 mA	76%	SIP
VWRAS2-D12-D12-SIP	12 Vdc	9.0~18.0 Vdc	22 Vdc	±12 Vdc	±83 mA	±8 mA	78%	SIP
VWRAS2-D12-D15-SIP	12 Vdc	9.0~18.0 Vdc	22 Vdc	±15 Vdc	±67 mA	±7 mA	78%	SIP
VWRAS2-D24-D5-SIP	24 Vdc	18.0~36.0 Vdc	40 Vdc	±5 Vdc	±200 mA	±20 mA	76%	SIP
VWRAS2-D24-D9-SIP	24 Vdc	18.0~36.0 Vdc	40 Vdc	±9 Vdc	±111 mA	±11 mA	78%	SIP
VWRAS2-D24-D12-SIP	24 Vdc	18.0~36.0 Vdc	40 Vdc	±12 Vdc	±83 mA	±8 mA	79%	SIP
VWRAS2-D24-D15-SIP	24 Vdc	18.0~36.0 Vdc	40 Vdc	±15 Vdc	±67 mA	±7 mA	78%	SIP
VWRAS2-D48-D5-SIP	48 Vdc	36.0~72.0 Vdc	80 Vdc	±5 Vdc	±200 mA	±20 mA	75%	SIP
VWRAS2-D48-D9-SIP	48 Vdc	36.0~72.0 Vdc	80 Vdc	±9 Vdc	±111 mA	±11 mA	78%	SIP
VWRAS2-D48-D12-SIP	48 Vdc	36.0~72.0 Vdc	80 Vdc	±12 Vdc	±83 mA	±8 mA	80%	SIP
VWRAS2-D48-D15-SIP	48 Vdc	36.0~72.0 Vdc	80 Vdc	±15 Vdc	±67 mA	±7 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 MHz Bandwidth		35	100	mVp-p
Switching frequency	100% load, nominal input	80K		550K	Hz

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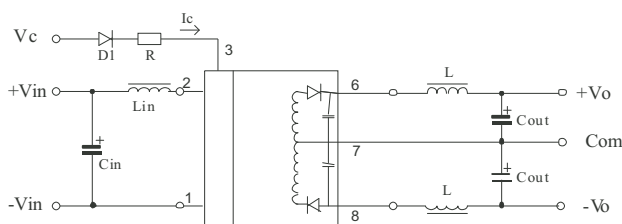
### General Specifications

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



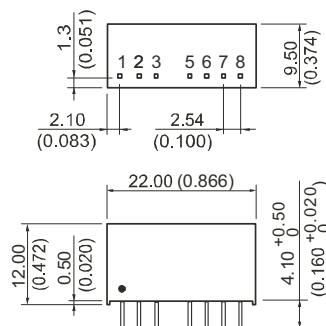
#### Recommended circuit

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  
 Lout: 2.2μH ~ 10μH

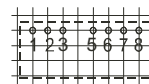
### Outline Dimensions & Recommended Layout Pattern



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	Dual
1	-Vin
2	+Vin
3	CTRL
5	NC
6	+Vo
7	Com
8	-Vo

NC: No Connection

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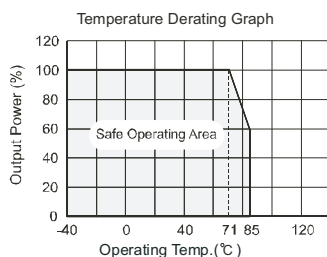
**Application Notes:**

- All of the VWRAS2-SIP Series have been tested according to the following recommended testing circuit before leaving the factory. This series should be tested under load(Figure 3). 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).

**Table 2**

External Capacitor Table

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

**Figure 3**


- Remote on/off control (see figure 1)

 ON: When control pin (CTRL pin 3) open or  $I_c \leq 0.5\text{mA}$ , converter will have normal output.

 OFF: With a 3-10mA input current ( $I_c$ ) to pin 3, output will be disabled. Under no conditions should input current ( $I_c$ ) exceed 20mA. The Value of R in Figure 1 can be derived as follows:

$$R = \frac{V_c - V_d - 0.65V}{I_c}$$

$V_c$ = Voltage at control input  
 $V_d$ = Diode (D1) voltage drop (.7V voltage drop typical)  
 $I_c$ = Input Current (5mA recommended disable current)

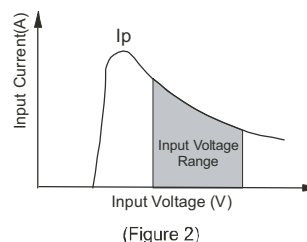
**example 1** : Logic circuit — Apply 5V TTL logic signal on  $V_c$  to disable output

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

**example 2** : Short  $V_{in}$  to  $V_c$  — Apply 12V on  $V_c$  to disable output

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

- Input current  
Nominal input voltage range. The input current of the power supply must be sufficient to the startup current ( $I_p$ ) 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.