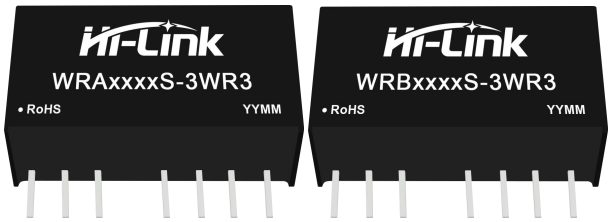
Typical performance

- Ultra-small SIP package
- Wide input voltage range: 2:1
- Working temperature range: -40℃to+85℃
- Isolation voltage 1500VDC
- Low ripple noise
- Short circuit protection (self-recovery)
- The output can be turned off

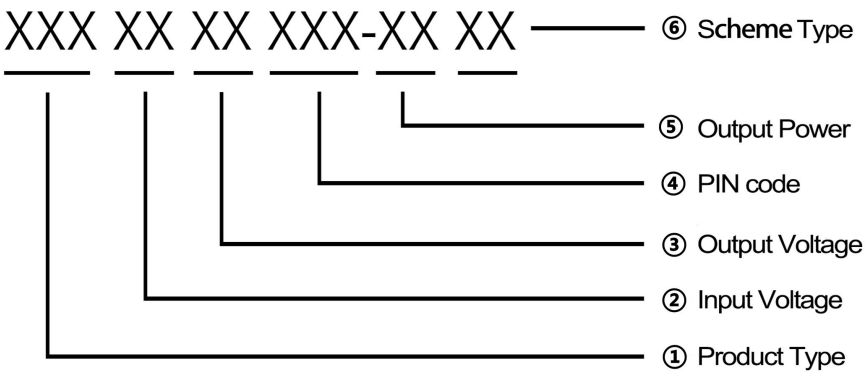
3W, wide voltage input, isolated and regulated positive and negative dual/ Single output, DC/DC module power supply



Isolated regulated output/RoHS

WRA_S-3WR3/WRB_S-3WR3 series products are 2:1 input, isolated regulated output 3W. The product is a SIP-8 plastic lead package with high efficiency, meets the operating temperature of -40℃ to +85℃, and has remote control and continuous short circuit protection functions. Small size and cost-effective design make this converter an ideal solution for communications equipment, instrumentation and industrial electronics applications.

Product Coding Rules



Product Model List

Certificate	Product Model①	Input Voltage range (Vdc)	Output Voltage/Current		Ripple and Noise	Efficiency @ full load	Maximum capacitive
		Nominal value ② (range value)	Output voltage (Vdc)	Output current (mA) (Max.Min.)	Full load (mVp-p) Typ/Max.	%, (Min/Typ)	uF
	WRB0505S-3WR3	5.0(4.5~9.0)	5	600	50/100	70/72	2200
	WRB0512S-3WR3		12	250	50/100	72/74	680
	WRB0515S-3WR3		15	200	50/100	72/74	470

	WRB0524S-3WR3		24	125	50/100	72/74	330
	WRA0505S-3WR3		±5	±300	50/100	70/72	1000
	WRA0512S-3WR3		±12	±125	50/100	72/74	470
	WRA0515S-3WR3		±15	±100	50/100	72/74	220
	WRA0524S-3WR3		±24	±62	50/100	72/74	100
	WRB0505S-3WR3	12 (9.0-18.0)	5	600	50/100	76/78	2200
	WRB0512S-3WR3		12	250	50/100	78/80	680
	WRB0515S-3WR3		15	200	50/100	78/80	470
	WRB0524S-3WR3		24	125	50/100	76/78	330
	WRA1205S-3WR3		±5	±300	50/100	76/78	1000
	WRA1212S-3WR3		±12	±125	50/100	78/80	470
	WRA1215S-3WR3		±15	±100	50/100	78/80	220
	WRA1224S-3WR3		±24	±62	50/100	78/80	100
	WRB2403S-3WR3	24.0(18.0~36.0)	3.3	600	50/100	69/71	2200
	WRB2405S-3WR3		5	600	50/100	76/78	2200
	WRB2412S-3WR3		12	250	50/100	78/80	680
	WRB2415S-3WR3		15	200	50/100	78/80	470
	WRB2424S-3WR3		24	125	50/100	76/78	330
	WRA2405S-3WR3		±5	±300	50/100	76/78	1000
	WRA2412S-3WR3		±12	±125	50/100	78/80	470
	WRA2415S-3WR3		±15	±100	50/100	78/80	220
	WRA2424S-3WR3		±24	±62	50/100	78/80	100
	WRB4805S-3WR3	48.0(36.0~72.0)	5	600	50/100	76/78	2200
	WRB4812S-3WR3		12	250	50/100	78/80	680
	WRB4815S-3WR3		15	200	50/100	78/80	470
	WRB4824S-3WR3		24	125	50/100	78/80	330
	WRA4805S-3WR3		±5	±300	50/100	76/78	1000
	WRA4812S-3WR3		±12	±125	50/100	78/80	470
	WRA4815S-3WR3		±15	±100	50/100	78/80	220
	WRA4824S-3WR3		±24	±62	50/100	78/80	100

Note: 1. Due to limited space, the above is just a list of typical products. If you need products other than the list, please contact the sales department of our company.
2. The maximum capacitive load indicates the maximum capacitive load that can be connected to +Vo or -Vo. If it exceeds this value, the product will not be able to start normally.

Test conditions: Without specified needs, all parameter tests are measured at nominal input voltage, purely resistive rated load and 25°C room temperature.

Input Characteristics

Items	Working conditions	Min.	Typ.	Max.	Unit
Input voltage range	5VDC Input Series	4.5	5	9	VDC
	12VDC Input Series	9	12	18	
	24VDC Input Series	18	24	36	
	48VDC Input Series	36	48	72	
Input current (fully loaded/unloaded)	5VDC Input Series	--	833/40	857/60	mA
	12VDC Input Series	--	320/15	328/30	
	24VDC Input Series	--	160/6	164/10	
	48VDC Input Series	--	80/4	82/6	
Reflected Ripple Current	5VDC Input Series	--	30	--	mA
	12VDC Input Series		40	--	
	24VDC Input Series		55	--	
	48VDC Input Series		45	--	
Impulse voltage (1sec.max)	5VDC Input Series	-0.7	--	12	VDC
	12VDC Input Series	-0.7	--	25	
	24VDC Input Series	-0.7	--	50	
	48VDC Input Series	-0.7	--	100	
Starting voltage	5VDC nominal input series, nominal input voltage	-	-	4.5	
	12VDC nominal input series, nominal input voltage	-	-	9	
	24VDC nominal input series, nominal input voltage	-	-	18	
	48VDC nominal input series, nominal input voltage	-	-	36	
Input filter type		Capacitive filtering			
Hot plug		Not available			
Remote control foot (Ctrl)*	Module on	Ctrl terminal floating or high resistance			

	Module off	Connect to high level (relative to the input ground), so that the current flowing into the Ctrl terminal is 5-10mA

Notes: *For the function description of the remote control pin (Ctrl), please refer to the "Typical Application Reference Circuit" section in this manual.

Output Characteristics

Items	Working and test conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy	5%-100% no-load,Input voltage range	3.3V/5V Output	--	±3.0	±5.0	%
		others	--	±1.0	±3.0	%
No-load output voltage accuracy	Input voltage range		--	±1.5	±5.0	%
Linear adjustment rate	Full load, input voltage from low voltage to high voltage		--	±0.2	±0.5	%
Load Regulation	5%-100% Load		--	±0.4	±75	%
Transient recovery time	25% load step change		--	0.5	2	mS
Transient Response Bias			--	±2.5	±5	%
Ripple & Noise	Pure resistive load, 20MHz bandwidth, peak-to-peak		--	50	100	mVp-p
Temperature Drift Coefficient	Full load		--	±0.02	±0.03	%/° C
Output short circuit protection			sustainable, self-healing			

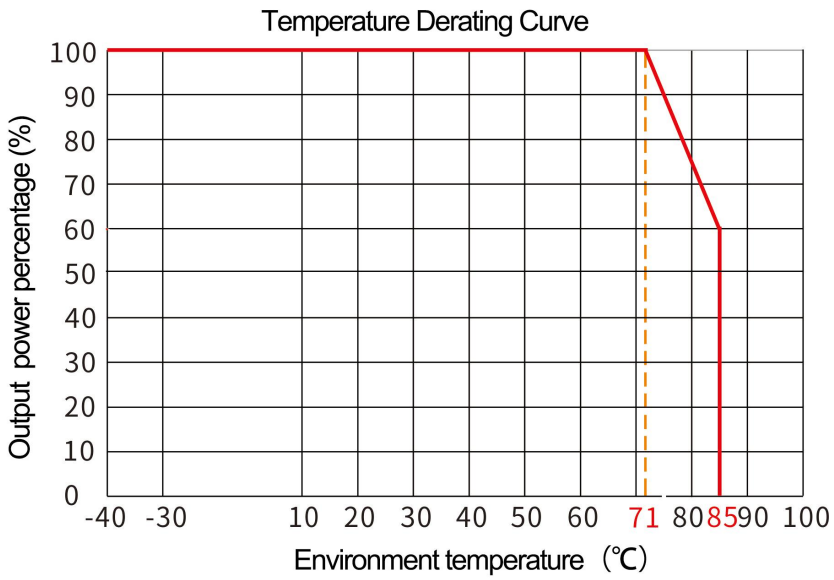
Note: ①The test method of ripple and noise is twisted pair test method.

General Characteristics

Items	Working conditions	Min.	Typ.	Max.	Unit
Insulation voltage	Input-output, test time is 1 minute, leakage current is less than 1mA	1500	--	--	VDC
Insulation voltage (E3)	Input-output, test time is 1 minute, leakage current is less than 1mA	3000	--	--	VDC
Insulation resistance	Input-output, insulation voltage 500VDC	1000	--	--	MΩ
Isolation capacitor	Input-output, 100KHz/0.1V	--	120	--	pF
Operating temperature	Refer to Temperature Derating Curve	-40	--	+85	℃
Storage temperature		-40	--	+125	
Shell temperature rise during operation		--	25	--	
Storage humidity	No condensation	5	--	95	%RH

Pin soldering temperature	The solder joint is 1.5mm away from the shell, 10 seconds	--	--	+300	℃
On-off level	Full load, nominal voltage input	--	300	--	KHz
Shock		10-55Hz, 10G, 30Min.alongX, YandZ			
Shell material		Black flame retardant heat resistant plastic (UL94V-0)			
Minimum time between failures	MIL-HDBK-217F@25℃	1000	--	--	KHrs

Product Characteristic Curve



Typical Application Reference Circuit (Recommended Parament)

1. Typical application circuit

All DC/DC converters of this series are tested according to the recommended test circuit (Figure 2) before leaving the factory.

If it is required to further reduce the input and output ripple, the input and output external capacitors Cin1, Cs and Cout can be appropriately increased or a capacitor with a small series equivalent impedance value can be selected. Cs is used to reduce the ripple. If the ripple has met the requirements, then No need to add Cs anymore. However, an appropriate filter capacitor value should be selected. If the capacitor is too large, it may cause startup problems. For each output, under the condition of ensuring safe and reliable operation, the maximum capacitance of its filter capacitor must be less than the maximum capacitive load

Single:

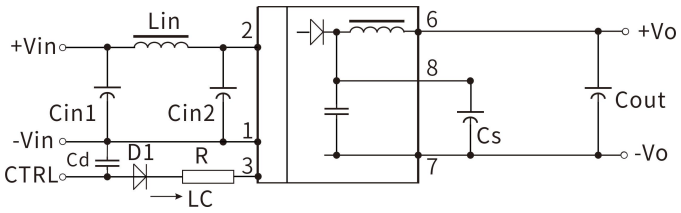


Figure 1

Dual:

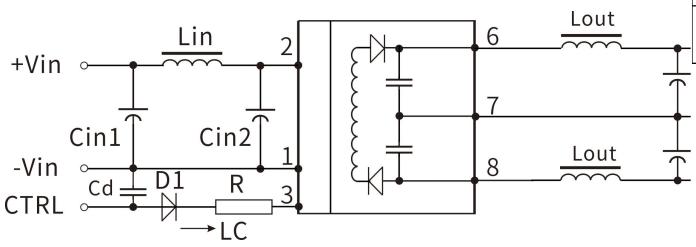


Figure 2

Input voltage	5VDC& 12VDC	24VDC& 48VDC	
Cin1	100uF	10uF	
Cin2	47uF	1uF	
Lin	4.7uH-12uH		
Cs	10uF-22uF		
Cout	100uF (Typ)		
Lout	2.2uH-10uH		
Cd	47nF/100V		

2. EMC typical application circuit

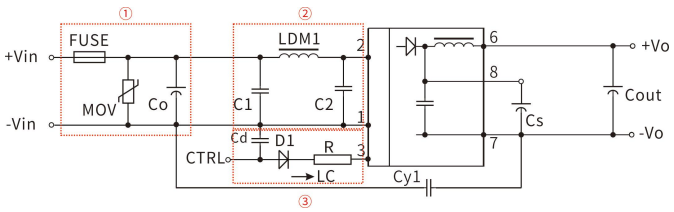


Figure 3

Device code	5V Input	12V Input	24V Input	48V Input
FMSE fuse	Slow blowing fuse, selected according to the actual input current of the customer			
MOV Varistor	-	14D390K	14D560K	14D101K
LDM1 inductor	12uH	12uH	12uH	12uH
Co electrolytic capacitor	1000μF/16V	1000μF/25V	330μF/50V	330μF/100V
C1 Ceramic Capacitor	4.7μF/50V	4.7μF/50V	4.7μF/50V	4.7μF/100V
C2 Ceramic Capacitor	4.7μF/50V	4.7μF/50V	4.7μF/50V	4.7μF/100V
Cout Ceramic Capacitor	Refer to the Cout parameter in Figure 2			
CY1 safety capacitor	1nF/2KV			
D1 diode	RB160M-60V/1A			
R resistance	According to the formula: R=((Vc-Vd-1.0)/Ic)-300Ω			
Cd	47nF/100V			

Notes:

①Part ① in Figure 3 is used for EMS testing; Part ② is used for EMI filtering, which can be selected according to requirements;

②VC is the voltage of the Ctrl terminal relative to the input ground GND, VD is the forward voltage drop of D1, IC is the current flowing into the Ctrl terminal, generally 5-10mA, and the peripheral circuit of the Ctrl terminal is shown in Figure 3-③;

③If there is no parameter description attached to the component in the figure, this component is not required in the periphery of this model.

3. Ctrl terminal

When floating or high resistance, the module outputs normally; when connected to a high level (relative to the input ground), the module is turned off; note that the current flowing into this pin is preferably 5-10mA, and the current exceeds its maximum value (usually 20mA) will cause permanent damage to the module. The R value can be set according to:

$$R=\frac{Vc-Vd-1.0}{Ic}-300$$

Calculated, the detailed parameters refer to the "EMC Typical Application Circuit" section.

4. Input current

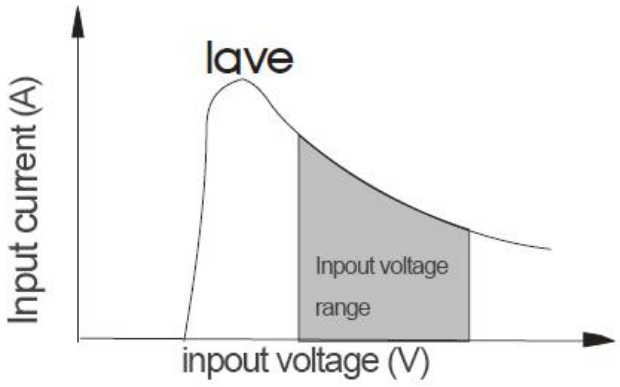
When using an unstable power supply, please ensure that the output voltage fluctuation range and ripple voltage of the power supply do not exceed the specifications of the module itself. The output current of the input power supply must be sufficient to cope with the instantaneous start-up average current Iave of the DC/DC module (see Figure 5).

General: Vin=5V series Iave=1335mA

Vin=12V series Iave=631mA

Vin=24V series Iave=312mA

Vin=48V series Iave=159mA



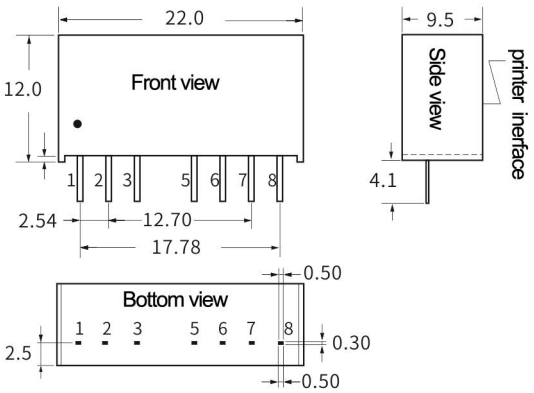
Figures 5

5. Output load requirements

When in use, the minimum output load of the module cannot be less than 5% of the rated load. In order to meet the performance indicators of this technical manual, please connect a 5% dummy load in parallel at the output end. The dummy load is generally a resistor. Please note that the resistor needs to be derated.

Package size and pin function diagram

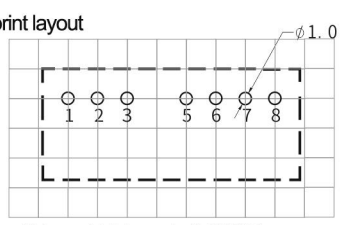
1) Dimension (unit: mm, ±0.25)



2) PIN definition

Pin method	1	2	3	4	5	6	7	8
Single	-Vin	+Vin	CTRL	NP	NC	+Vout	-Vout	CS
	- Input	+ Input	remote control	empty	No electrical	+Output	- Output	ex-capacitor
±Dual	-Vin	+Vin	CTRL	NP	NC	+Vout	COM	-Vout
	- Output	+Output	remote control	empty	No electrical	+Output	Com	- Output

3) Recommended print layout



Notes: grid distance is 2.54*2.54mm

Note: If the definition of each pin of the power module is inconsistent with the selection manual, the label on the physical label shall prevail.

Package description

Package code	LxWxH	
E	22.0x9.5x12.0mm	0.866×0.374×0.472inch

Test Application Reference

Ripple & noise test (Twisted pair method, 20MHZ bandwidth)

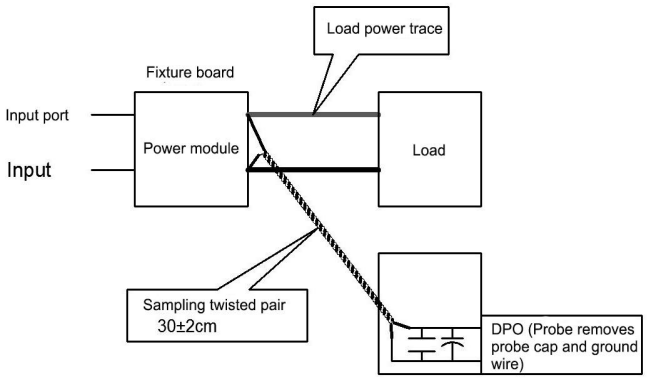
Testing method:

(1) Ripple noise is connected by 12# twisted pair. The oscilloscope bandwidth is set to 20MHz, 100M bandwidth probe, and 0.1uF polypropylene capacitor and 47uF high frequency low resistance electrolytic capacitor are connected in parallel on the probe end. The oscilloscope sampling uses Sample sampling mode.

(2) Schematic diagram of output ripple&noise test:

Connect the power input terminal to the input power supply terminal.

(3) The power output is connected to the electronic load through the fixture board. The test uses a 30cm ± 2 cm sampling line to sample directly from the power output port.The power line selects the insulated wire with the corresponding wire diameter according to the magnitude of the output current.



Product application considerations

1. It is recommended to use it at a load of more than 5%. If the load is lower than 5%, the ripple index of the product may exceed the specification, but it does not affect the reliability of the product;
2. It is recommended that the load unbalance of the dual output module: ≤±5%, if it exceeds ±5%, the product performance cannot be guaranteed to meet all the performance indicators in this manual. For details, please contact our technical staff directly;
3. The maximum capacitive load is tested under the input voltage range and full load conditions;
4. Unless otherwise specified, all indicators in this manual are measured at Ta=25℃, humidity <75%RH, nominal input voltage and output rated load;
5. All index testing methods in this manual are based on the company's corporate standards;
6. Our company can provide product customization, and you can directly contact our technical staff for specific needs;
7. Product specifications are subject to change without notice.

Contact Method

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