

Features

- Ultra-compact SIP package
- Wide 2:1 input voltage range
- Operating ambient temperature range: -40°C to +85°C
- I/O isolation test voltage: 1.5K VDC
- Low output ripple & noise
- Short circuit protection (self-recovery)
- Remote On/Off
- High power density
- EN60950 approved



Ideal Power's 36WRx-S-3WR2 1W Isolated DC/DC Converter (SIP) Series are certified to UKCA, CE, RoHS & EN 62368-1/IEC 62368-1/UL 62368-1 Standards and comply with Efficiency Regulations. These are primarily used in ITE, Audio & Video Industries and customised solutions are available upon request.

Models

	Input Voltage (VDC)		Output		Full Load Efficiency (%) Min./Typ.	Capacitive Load ^② (μF)Max.
	Nominal (Range)	Max. ①	Voltage (VDC)	Current(mA) Max./Min.		
36WRA0505S-3WR2	5 (4.5-9)	11	±5	±250/±13	72/74	1000
36WRA0512S-3WR2			±12	±104/±5	75/77	470
36WRA0515S-3WR2			±15	±83/±4	75/77	330
36WRA0524S-3WR2			±24	±52/±3	74/76	220
36WRB0503S-3WR2			3.3	758/38	66/68	1800
36WRB0505S-3WR2			5	500/25	71/73	2200
36WRB0509S-3WR2			9	278/14	72/74	1000
36WRB0512S-3WR2			12	208/10	75/77	680
36WRB0515S-3WR2			15	167/8	72/74	470
36WRB0524S-3WR2			24	104/5	74/76	330
36WRA1205S-3WR2	12 (9-18)	20	±5	±300/±15	76/78	1000
36WRA1209S-3WR2			±9	±167/±8	76/78	680
36WRA1212S-3WR2			±12	±125/±6	77/79	470
36WRA1215S-3WR2			±15	±100/±5	78/80	330
36WRB1203S-3WR2			3.3	758/38	73/75	2700
36WRB1205S-3WR2			5	600/30	74/76	2200
36WRB1206S-3WR2			6	500/25	77/79	1800
36WRB1209S-3WR2			9	333/17	77/79	1000
36WRB1212S-3WR2			12	250/13	80/82	680
36WRB1215S-3WR2			15	200/10	81/83	470
36WRB1224S-3WR2	24	125/6	79/81	330		
36WRA2405S-3WR2	24 (18-36)	40	±5	±300/±15	77/79	1000
36WRA2409S-3WR2			±9	±167/±8	79/81	680
36WRA2412S-3WR2			±12	±125/±6	81/83	470

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Models (continued)

36WRA2415S-3WR2	24 (18-36)	40	±15	±100/±5	81/83	330
36WRB2403S-3WR2			3.3	758/38	72/74	2700
36WRB2405S-3WR2			5	600/30	79/81	2200
36WRB2409S-3WR2			9	333/17	81/83	1000
36WRB2412S-3WR2			12	250/13	81/83	680
36WRB2415S-3WR2			15	200/10	81/83	470
36WRB2424S-3WR2			24	125/6	81/83	330
36WRA4805S-3WR2	48 (36-75)	80	±5	±300/±15	77/79	1000
36WRA4812S-3WR2			±12	±125/±6	80/82	470
36WRA4815S-3WR2			±15	±100/±5	80/82	330
36WRB4803S-3WR2			3.3	758/38	73/75	2700
36WRB4805S-3WR2			5	600/30	74/76	2200
36WRB4812S-3WR2			12	250/13	78/80	680
36WRB4815S-3WR2			15	200/10	82/84	470
36WRB4824S-3WR2	24	125/6	80/82	330		

Notes:

- Exceeding the maximum input voltage may cause permanent damage.
- The specified maximum capacitive load value for positive and negative output is identical.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Input Current (full load/no-load)	5VDC Input	3.3V Output	--	735/40	758/85	mA
		Others	--	805/40	846/85	
	12VDC Input	3.3V Output	--	278/30	286/40	
		Others	--	314/30	338/40	
	24VDC Input	3.3V Output	--	140/20	145/40	
		Others	--	154/20	163/40	
	48VDC Input	3.3V Output	--	69/5	72/15	
		Others	--	78/5	85/15	
Reflected Ripple Current	5VDC Input	--	20	--		
	12VDC Input	--	20	--		
	24VDC Input	--	55	--		
	48VDC Input	--	55	--		
Surge Voltage (1sec. max.)	5VDC Input	-0.7	--	12		
	12VDC Input	-0.7	--	25		
	24VDC Input	-0.7	--	50		
	48VDC Input	-0.7	--	100		
Starting Voltage	5VDC Input	--	--	4.5	VDC	
	12VDC Input	--	--	9		
	24VDC Input	--	--	18		
	48VDC Input	--	--	36		
Input Filter				Filter capacitor		
Hot Plug				Unavailable		
Ctrl*	Module on			Ctrl pin open (high resistance)		
	Module off			Ctrl pin pulled high (current 5-10mA typ. into		

Note: * For use of Ctrl, please refer to the "design reference" in this manual.

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Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Output Voltage Accuracy	5%-100% load Input voltage range	--	±1	±3		
No-load Output Voltage Accuracy	Input voltage range	WRB1203S-3WR2	--	±5	±8	%
		WRB4803S-3WR2	--	±1.5	±5	
		others	--	±0.2	±0.5	
Linear Regulation	Input voltage variation from low to high at full load	Main road	--	--	±2	
		Side road	--	--	±1	
Load Regulation	5%-100% load	Main road	--	--	±3	
		Side road	--	--	0.5	3
Transient Recovery Time	25% load step change	--	±2.5	±5	%	
Transient Response Deviation		--	±0.02	±0.03	%/°C	
Ripple & Noise*	20MHz bandwidth	WRB1212S-3WR2	--	70	100	mVp-p
		WRB1215S-3WR2	--	70	100	
		WRB4824S-3WR2	--	70	100	
		WRB1224S-3WR2	--	1000	150	
		WRB2415S-3WR2	--	1000	150	
		WRB2424S-3WR2	--	1000	150	
		WRA4805S-3WR2	--	1000	150	
		WRB4803S-3WR2	--	40	75	
Short Circuit Protection		Continuous, self-recovery				

Note:

*The "parallel cable" method is used for Ripple and Noise test, please refer to DC-DC Converter Application Notes for specific information.

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation	Input-output, with the test time of 1 minute and the leak current lower than 1mA	1500	--	--	VDC
Insulation Resistance	Input-output, isolation voltage 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output, 100kHz/0.1V	--	120	--	pF
Operating Temperature	see Fig. 1	-40	--	+85	
Storage Temperature		-55	--	+125	°C
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	+300	
Storage Humidity	Non-condensing	--	--	95	%RH
Switching Frequency (PFM Mode)	Full load, nominal input voltage	--	250	--	kHz
MTBF	MIL-HDBK-217F@25°C	1000	--	--	k hours

Mechanical Specifications

Case material	Black flame-retardant and heat-resistant plastic
Dimensions	22.00 x 9.50 x 12.00 mm
Weight	4.5g(Typ.)
Cooling method	Free air convection

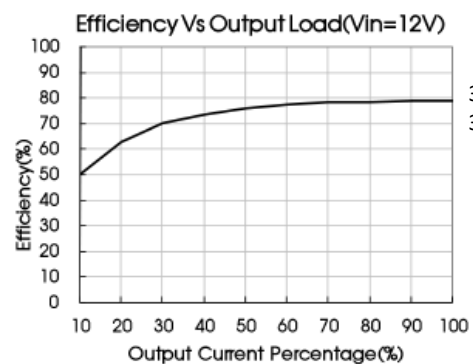
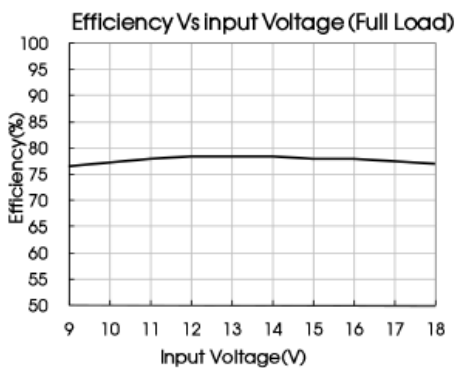
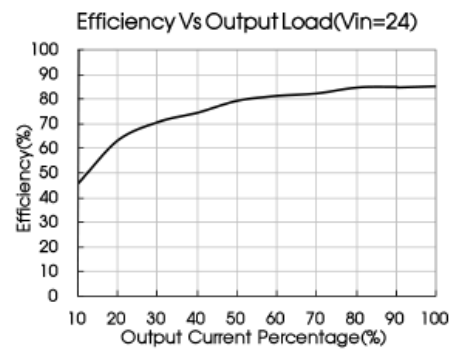
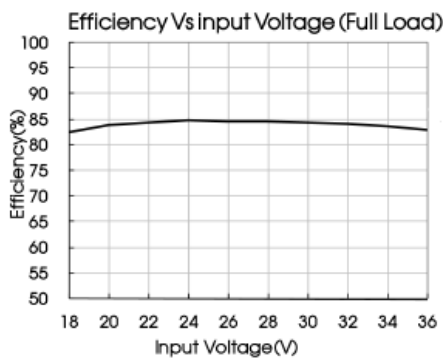
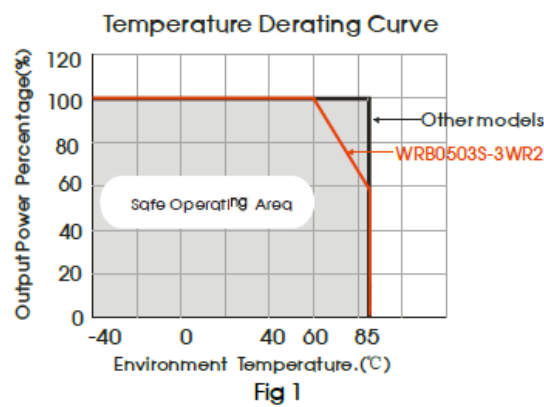
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Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS B (see Fig. 3-② for recommended circuit)	
	RE	CISPR32/EN55032	CLASS B (see Fig. 3-② for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2	Contact $\pm 6\text{KV}$	perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	$\pm 2\text{KV}$ (see Fig. 3-① for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line $\pm 2\text{KV}$ (see Fig. 3-① for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	3 Vr.m.s	perf. Criteria A
	Voltage dips, short interruptions, and voltage variations immunity	IEC/EN61000-4-29	0%, 70%	perf. Criteria B

Characteristic Curve


Design Reference (Figure 1)
1 Typical application

All the DC/DC converters of this series are tested before delivery using the recommended circuit shown in Fig. 2.

Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values C_{in} and C_{out} and/or by selecting capacitors with a low ESR (equivalent series resistance). Also make sure that the capacitance is not exceeding the specified max. capacitive load value of the product.

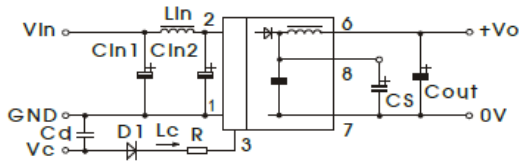
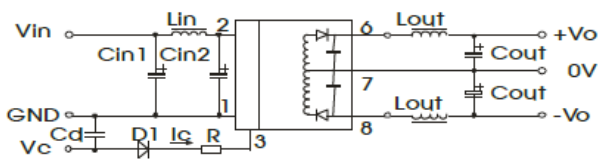
Single

Dual


Fig. 2

Pin	5VDC&12VDC	24VDC&48VDC
Cin1	100µF/25V	10µF/100V
Cin2	47µF/25V	1µF/100V
Lin	4.7µH-12µH	
Cs	10µF/50V-22µF/50V	
Cout	100µF/50V(Typ.)	
Lout	2.2µH-10µH	
Cd	47nF/100V	

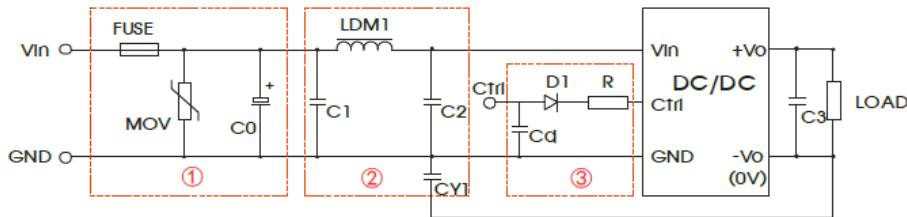
2 EMC compliance circuit


Fig. 3

Model	Vin: 5VDC	Vin: 12VDC	Vin: 24VDC	Vin: 48VDC
FUSE	Slow blown fuses according to the actual input current selections of the clients			
MOV	--	S14K20	S14K30	S14K60
C0	680µF/25V	680µF/25V	330µF/50V	330µF/100V
C1	4.7µF/50V			4.7µF/100V
LDM1	12µH			
C2	4.7µF/50V			4.7µF/100V
C3	Refer to the Cout in Fig.2			
CY1	1nF/2kV			
D1	RB160M-60V/1A			
R	In accordance with the formula: $R = \frac{V_C - V_D - 1.0}{I_C} - 300$			
Cd	47nF/100V			

Design Reference (Figure 1)
3. Ctrl end

The modules are of normal output when the Ctrl end is suspended or of high resistance; the modules turn off when connecting with high level (relative to the input grounding); notice that the current flows into the pin shall be 5 - 10mA, the modules will be permanently damaged if the current exceeds its max. value (20mA in general).

The value of R can be derived as follows:

$$R = \frac{V_C - V_D - 1.0}{I_C} - 300$$

4 Input current

When the electricity is provided by the unstable power supply, please make sure that the range of the output voltage fluctuation and the ripple voltage of the power supply do not exceed the indicators of the modules. Input current of power supply should afford the flash start-up current of this kind of DC/DC module (see Fig. 5).

Generally:

Vin= 5V series Iave =12965mA

Vin=12V series Iave =631mA

Vin=24V series Iave =303mA

Vin=48V series Iave =157mA

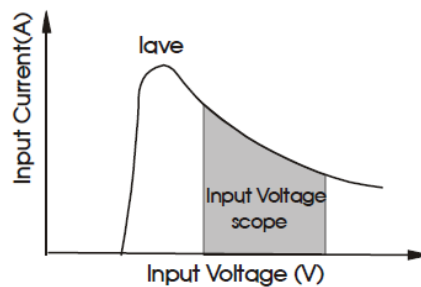
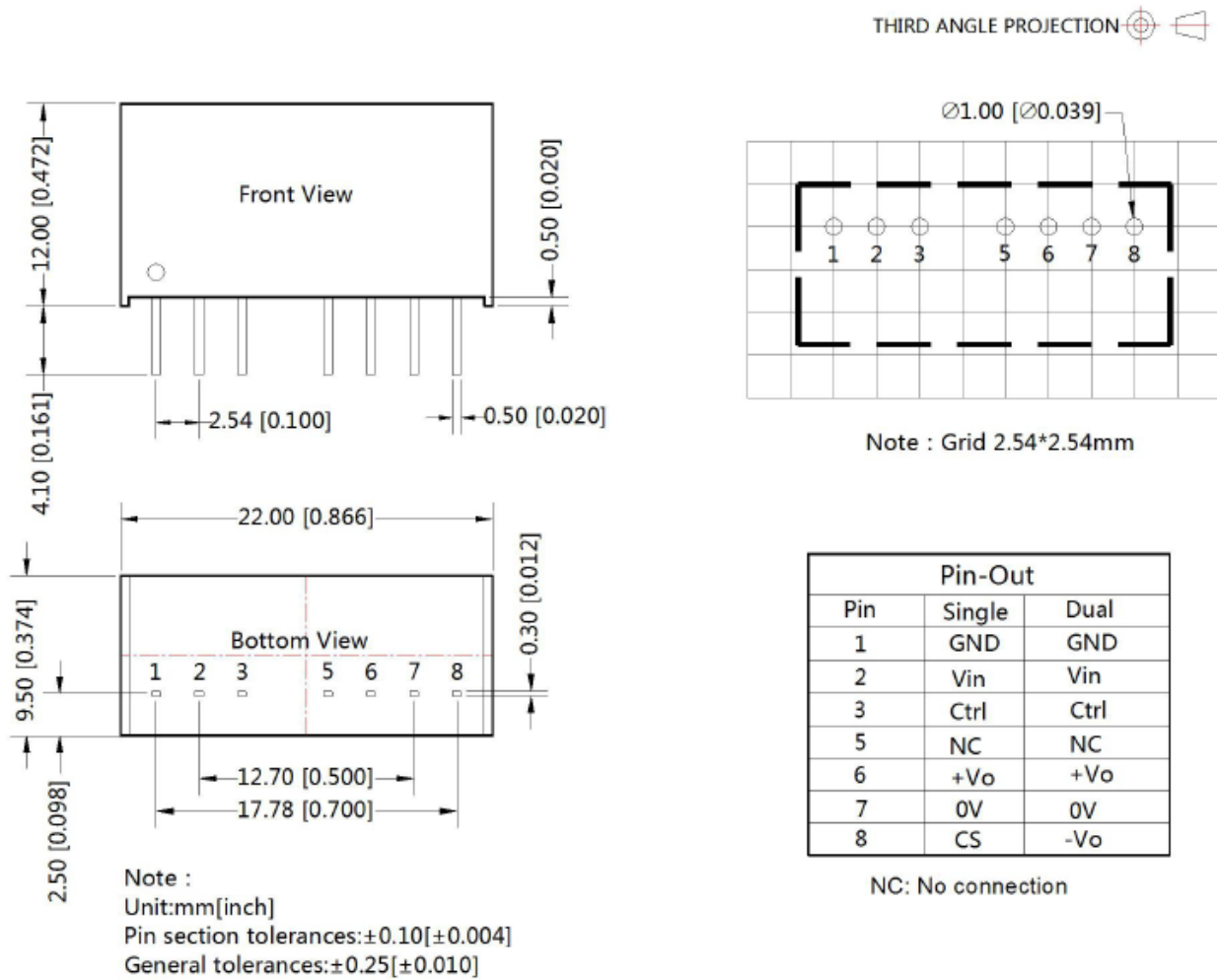


Fig.4

5 Output load requirements

When using, the minimum load of the module output should not be less than 5% of the nominal load. To meet the performance parameters of this datasheet, 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 used in derating.

Dimensions and Recommended Layout

Notes:

For additional information on Product Packaging please refer to www.IdealPower.co.uk.

Recommend using module with more than 5% load, if not, the ripple of the product may exceed the specification, but does not affect the reliability of the product.

The recommended unbalance degree of the dual output module load is $\leq \pm 5\%$; if the degree exceeds $\pm 5\%$, then the product performance cannot be guaranteed to comply with all parameters in the datasheet. Please contact our technicians directly for specific information.

The maximum capacitive load offered were tested at input voltage range and full load.

Unless otherwise specified, parameters in this datasheet were measured under the conditions of $T_a=25^\circ\text{C}$, humidity<75%RH with nominal input voltage and rated output load.

All index testing methods in this datasheet are based on company corporate standards.

We can provide product customization service, please contact our technicians directly for specific information.

Specifications are subject to change without prior notice.

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