

## 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 ripple & noise
- Short-circuit protection (self-recovery)
- Remote On/Off



Ideal Power's 36WRx-S-1WR2 1W Isolated DC/DC Converter (SIP) Series are certified to UKCA, CE & 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

Part No.	Input Voltage (VDC)		Output		Ripple & Noise (mVp-p) Typ./Max.	Full Load Efficiency (%) Min./Typ.	Capacitive Load <sup>②</sup> (μF)Max.
	Nominal (Range)	Max. ①	Voltage (VDC)	Current(mA) Max./Min.			
36WRA0505S-1WR2	5 (4.5-9)	11	±5	±100/±5	70/100	71/73	1000
36WRA0512S-1WR2			±12	±42/±2		74/76	470
36WRA0515S-1WR2			±15	±33/±2		73/75	330
36WRB0503S-1WR2			3.3	303/15		69/71	1800
36WRB0505S-1WR2			5	200/10		70/72	2200
36WRB0512S-1WR2			12	83/4		74/76	1000
36WRB0515S-1WR2			15	67/3		73/75	680
36WRB0524S-1WR2			24	42/2		71/73	470
36WRA1205S-1WR2	12 (9-18)	20	±5	±100/±5	100/150	75/77	1000
36WRA1212S-1WR2			±12	±42/±2		79/81	470
36WRA1215S-1WR2			±15	±33/±2		76/78	330
36WRB1203S-1WR2			3.3	303/15		73/75	2700
36WRB1205S-1WR2			5	200/10		75/77	2200
36WRB1209S-1WR2			9	111/6		77/79	1800
36WRB1212S-1WR2			12	83/4		76/78	1000
36WRB1215S-1WR2			15	67/3		78/80	680
36WRB1224S-1WR2	24	42/2	74/76	470			
36WRA2405S-1WR2	24 (18-36)	40	±5	±100/±5	70/100	77/79	1000
36WRA2409S-1WR2			±9	±56/±3		77/79	680
36WRA2412S-1WR2			±12	±42/±2		76/78	470
36WRA2415S-1WR2			±15	±33/±2		76/78	330
36WRB2403S-1WR2			3.3	303/15		73/75	2700
36WRB2405S-1WR2			5	200/10		75/77	2200

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**Models (continued)**

36WRB2412S-1WR2	24	40	12	83/4	70/100	76/78	1000
36WRB2415S-1WR2	(18-36)		15	67/3		76/78	680
36WRB2424S-1WR2			24	42/2		75/77	470
36WRA4805S-1WR2	48 (36-75)	80	±5	±100/±5	100/150	74/76	1000
36WRA4812S-1WR2			±12	±42/±2		76/78	470
36WRA4815S-1WR2			±15	±33/±2		78/80	330
36WRB4803S-1WR2			3.3	303/15		73/75	2700
36WRB4805S-1WR2			5	200/10		74/76	2200
36WRB4812S-1WR2			12	83/4		78/80	1000
36WRB4815S-1WR2			15	67/3		77/79	680

**Notes:**

- ① Exceeding the maximum input voltage may cause permanent damage.
- ② For the dual output modules, the capacitive loads of positive and negative outputs are the same.

**Input Specifications**

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load/no-load)	5VDC Input	--	281/40	290/60	mA
	12VDC Input	--	111/15	114/30	
	24VDC Input	--	55/6	57/10	
	48VDC Input	--	27/4	28/6	
Reflected Ripple Current	5VDC Input	--	30	--	mA
	12VDC Input	--	40	--	
	24VDC Input	--	55	--	
	48VDC Input	--	45	--	
Surge Voltage (1sec. max.)	5VDC Input	-0.7	--	12	VDC
	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 Ctrl.)	
Note: * For use of Ctrl, please refer to the "design reference" in this manual.					

## Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Output Voltage Accuracy	5%-100% load Input voltage range	3.3V/5V output	--	±2	±5	
		others	--	±1	±3	
No-load Output Voltage Accuracy	Input voltage range	--	±1.5	±5	%	
Linear Regulation	Input voltage variation from low to high at full load	--	±0.2	±0.5		
Load Regulation	5%-100% load	--	±0.4	±0.75		
Transient Recovery Time	25% load step change	--	0.5	2	ms	
Transient Response Deviation		--	±2.5	±5	%	
Temperature Coefficient	Full load	--	±0.02	±0.03	%/°C	
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

## 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	--	200	--	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

## 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 ±6KV	perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	±2KV (see Fig. 3-① for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line ±2KV (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%	

**Characteristic Curve**

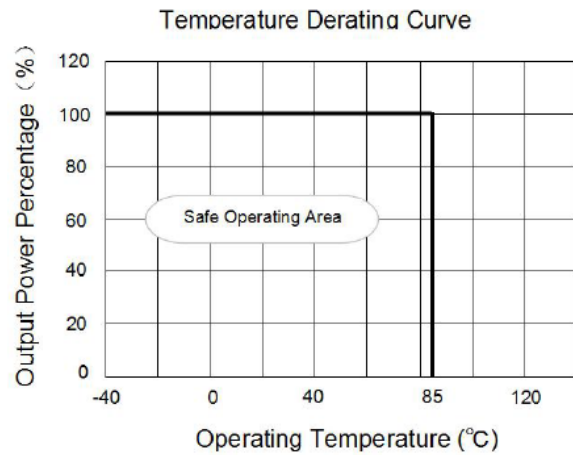
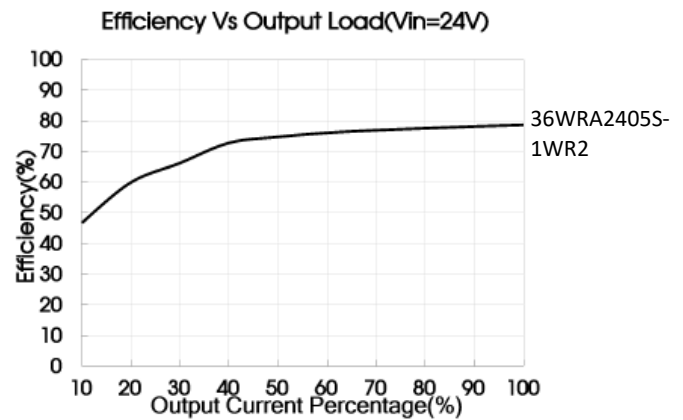
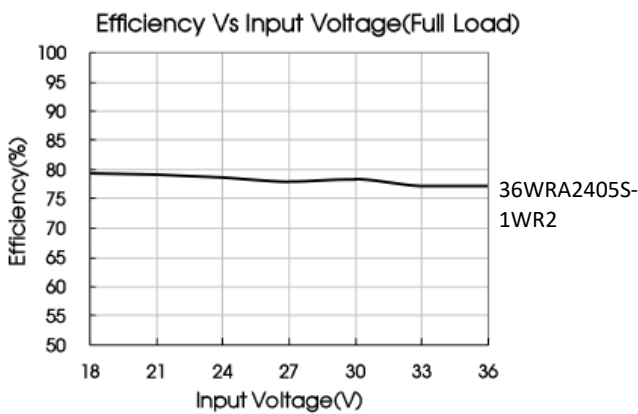
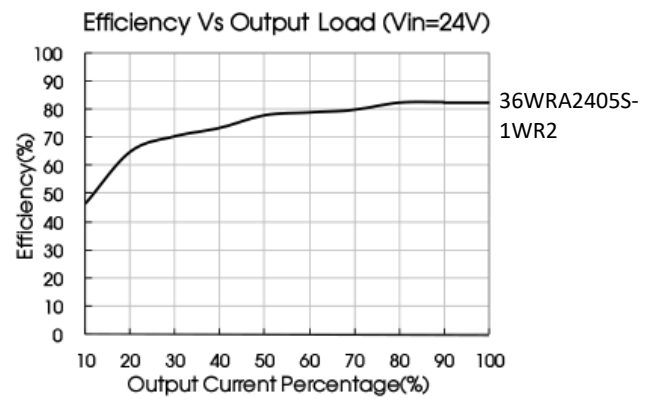
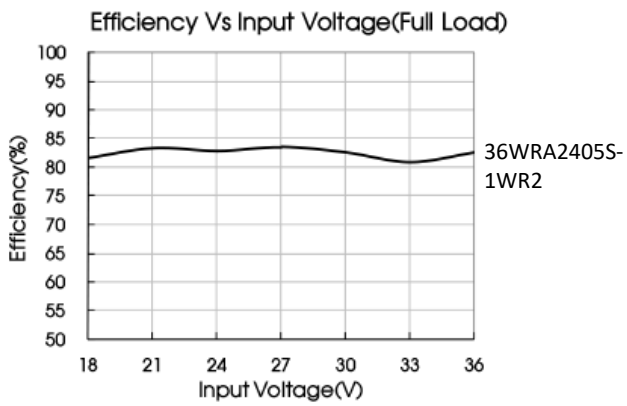


Fig 1



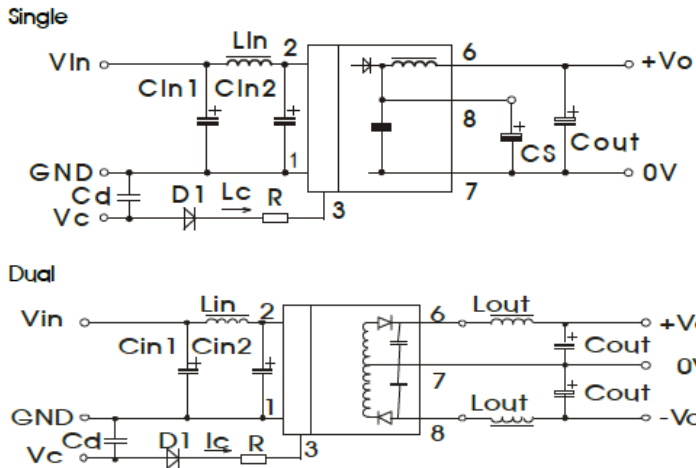
DC - DC

## 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.



$V_{in}$	5VDC&12VDC	24VDC&48VDC
$C_{in1}$	100 $\mu$ F/25V	10 $\mu$ F/100V
$C_{in2}$	47 $\mu$ F/25V	1 $\mu$ F/100V
$L_{in}$	4.7 $\mu$ H-12 $\mu$ H	
$C_s$	10 $\mu$ F-22 $\mu$ F/50V	
$C_{out}$	$V_o(3/\pm 3/5/\pm 5/9/\pm 9V):100\mu F/16V$	
	$V_o(12/\pm 12/15/\pm 15V):100\mu F/25V$	
	$V_o(24/\pm 24V):100\mu F/50V$	
$L_{out}$	2.2 $\mu$ H-10 $\mu$ H	
$C_d$	47nF/100V	

Fig. 2

### 2 EMC compliance circuit

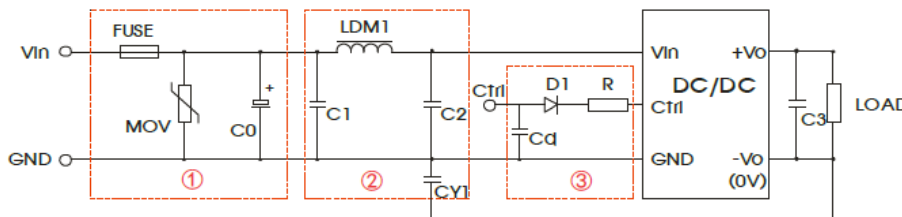


Fig. 3

Model	$V_{in}$ : 5VDC	$V_{in}$ : 12VDC	$V_{in}$ : 24VDC	$V_{in}$ : 48VDC
FUSE	Slow blown fuses according to the actual input current selections of the clients			
MOV	--	S14K25	S14K35	S14K60
C0	1000 $\mu$ F/16V	1000 $\mu$ F/25V	330 $\mu$ F/50V	330 $\mu$ F/100V
C1	4.7 $\mu$ F/50V			
LDM1	12 $\mu$ H			
C2	4.7 $\mu$ F/50V			4.7 $\mu$ F/100V
C3	Refer to the $C_{out}$ in Fig.2			
CY1	1nF/2kV			
D1	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)****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 startup current of this kind of DC/DC module (see Fig. 5).

Generally:

Vin= 5V series Iave =445mA

Vin=12V series Iave =205mA

Vin=24V series Iave =104mA

Vin=48V series Iave =53mA

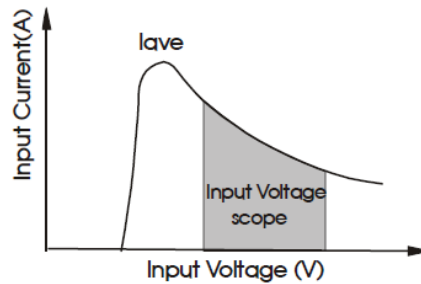
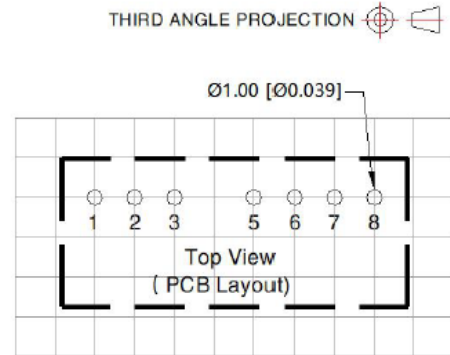
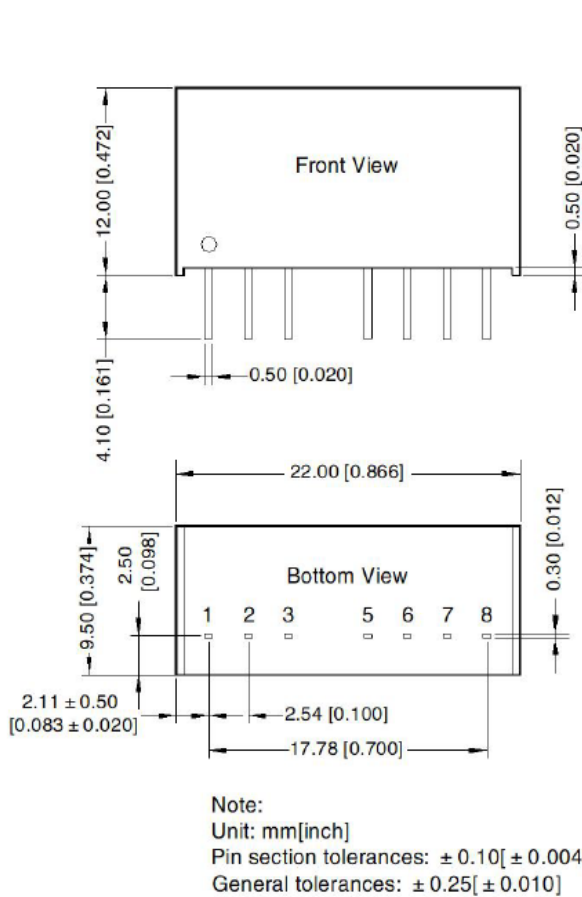


Fig. 5

**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**


Note: Grid 2.54\*2.54mm

Pin-Out		
Pin	Single	Dual
1	GND	GND
2	Vin	Vin
3	Ctrl	Ctrl
5	NC	NC
6	+Vo	+Vo
7	0V	0V
8	CS	-Vo

WR\_XS-1WR2 Series without Pin 3 and Pin 5

NC: Not available for electrical connection

**Notes:**

 For additional information on Product Packaging please refer to [www.IdealPower.co.uk](http://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.