

## FEATURES

- Fix input unregulated single output
- Continuous short-circuit protection.
- Industry standard pin-out
- I/O isolation test voltage 1.5KVDC, 3K VDC/1s
- Operating temperature range - 40°C to +105°C
- No-load input current as low as 5mA
- High efficiency up to 85%
- UL62368, EN62368 approved

## RS PRO 1W isolated DC-DC converters

- 2233658, 2233659, 2233661, 2233664



RS Professionally Approved Products bring to you professional quality parts across all product categories. Our product range has been tested by engineers and provides a comparable quality to the leading brands without paying a premium price.

## Product Description

PCB Mount DC-DC converters are specially designed for applications where an isolated voltage is required in a distributed power supply system. They are suitable for: pure digital circuits, low frequency analog circuits, relay-driven circuits and data switching circuits. Featuring continuous short circuit protection and no-load input current as low as 5mA

## General Specifications

<b>Model</b>	DC-DC 1W Isolated DC-DC converter
<b>Mounting Type</b>	PCB
<b>MTBF</b>	MIL-HDBK-217F@25°C > 3,500,000 hrs
<b>Applications</b>	Industrial control systems, instrumentation, analog, relay-driven and data switching circuits.

RS Stock#	Input Voltage (Vdc)	Output Voltage	Output Current Max/Min	Wattage	Max. Capacitive Load(μF)	Efficiency (Typ)
	Nominal					
2233658	5V (4.5-5.5)	3.3V	303/30mA	1W	2400	74%
2233659		5V	200/20mA	1W	2400	82%
2233661		12V	84/9mA	1W	560	83%
2233664		24V	42/5mA	1W	220	85%

### Input Specifications

Input Specification						
Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	12VDC input	3.3VDC/5VDC output	-	270/5	286/10	mA
		12VDC output	-	241/12	254/20	
		24V output	-	241/18	254/30	
Reflected Ripple Current	Nominal input voltage		-	15	-	
Surge Voltage (1sec. max.)			-0.7	-	9	VDC
Input Filter			Capacitance Filter			
Hot Plug			Unavailable			

### Output Specifications

Output Specification						
Item	Operating Conditions		Min	Typ.	Max	Unit
Voltage Accuracy			See output regulation curves (Fig. 1)			
Linear Regulation	Input voltage change: $\pm 1\%$	3.3VDC output	-	-	1.5	
		Other output	-	-	1.2	
Load Regulation	10% -100% load	3.3VDC output	-	15	20	%
		5VDC output		10	15	
		12VDC output		7	10	
		15VDC output		6	10	
		24VDC output	-	5	10	
Temperature Coefficient	100% load		-	$\pm 0.02$	-	%/°C
Ripple & Noise *	20MHz bandwidth	Other output	-	30	75	mV p-p
		24VDC output		50	100	
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
Insulation Voltage	Input-output, with the test time of 1 minute and the leak current lower than 1mA	1500	-	-	VDC
	Input-output, with the test time of 1 second and the leak current lower than 1mA	3000	-	-	
Insulation Resistance	Input-output resistance at 500VDC	1000	-	-	MΩ
Isolation Capacitance	Input-output capacitance at 100KHz/0.1V		20		pF
Operating Temperature	Derating if the temperature $\geq 85^{\circ}\text{C}$ , (see Fig. 2)	-40	-	+105	$^{\circ}\text{C}$
Storage Temperature		-55	-	+125	
Case Temperature Rise	Ta=25 $^{\circ}\text{C}$	3.3VDC output	-	25	-
		Other output	-	15	-
Storage Humidity	Non-condensing	-	-	95	%RH
Pin Soldering Resistance Temperature	Welding spot is 1.5mm away from the casing, 10 seconds	-	-	300	$^{\circ}\text{C}$
Switching Frequency *	Full load, nominal input voltage	-	270	-	KHz
MTBF	MIL-HDBK-217F@25 $^{\circ}\text{C}$		3500		K hours

**Typical Performance Curves**

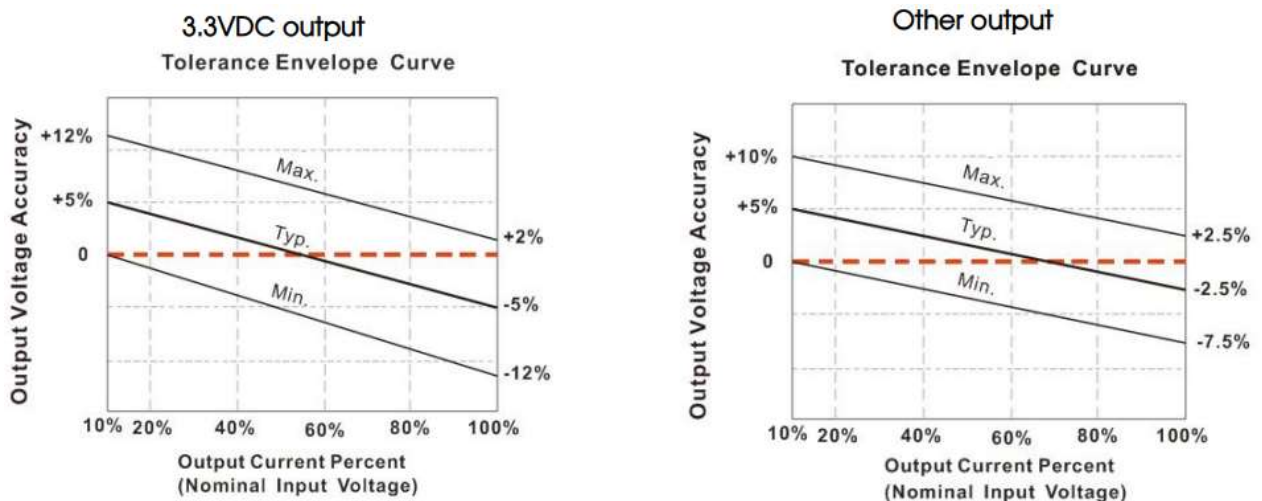
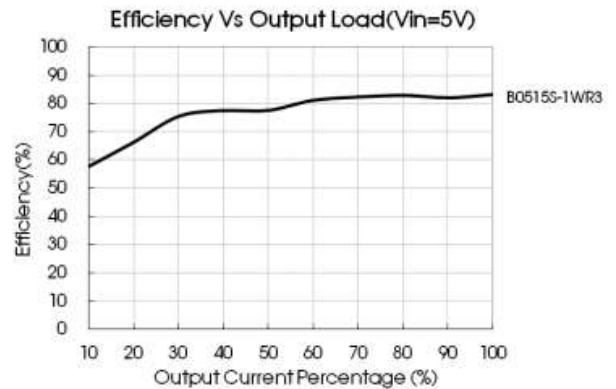
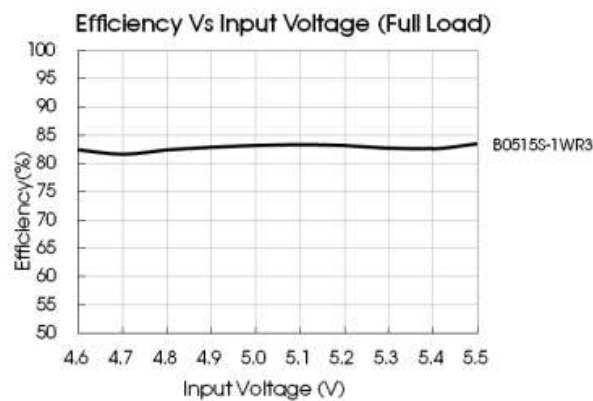
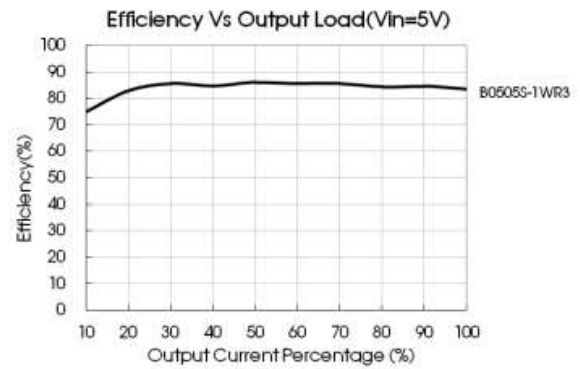
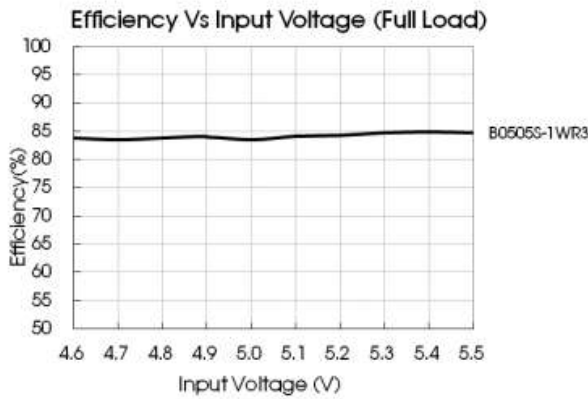
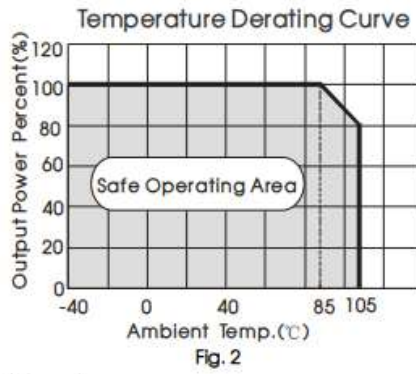


Fig. 1



**Design Reference**

**Typical application**

If it is required to further reduce input and output ripple, a filter capacitor can be connected to the input and output terminals, see Fig.3. Moreover, choosing suitable filter capacitor is very important, start-up problems may be caused by too large capacitance. To ensured the modules running well, the recommended capacitive load values as shown in Table 1.

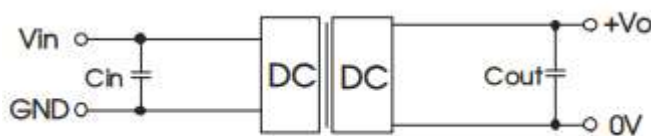
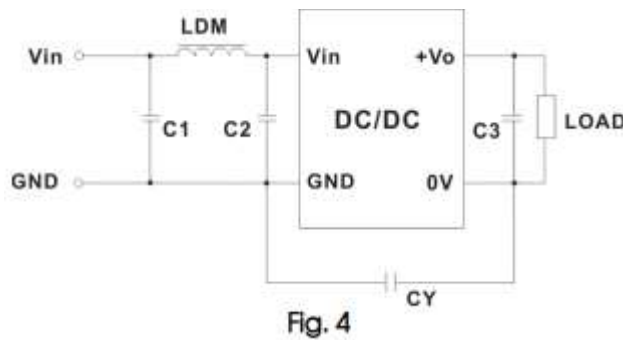


Fig.3

**Table 1** : Recommended input and output capacitor values

Vin	Cin	Vout	Cout
5VDC	4.7 $\mu$ F	3.3VDC	10 $\mu$ F
		5VDC	10 $\mu$ F
		12VDC	2.2 $\mu$ F
		24VDC	1 $\mu$ F

**EMC solution-recommended circuit**

Input voltage 5VDC	Output voltage (VDC)	3.3/5/9	12/15/24
	C1	4.7 $\mu$ F /25V	4.7 $\mu$ F /25V
	C2	4.7 $\mu$ F /25V	4.7 $\mu$ F /25V
	CY	-	1nF/4KVDC VISHAY HGZ102MBP TDK CD45- E2GA102M-GKA
	C3	Refer to the Cout in table 1	
	LDM	6.8 $\mu$ H	6.8 $\mu$ H

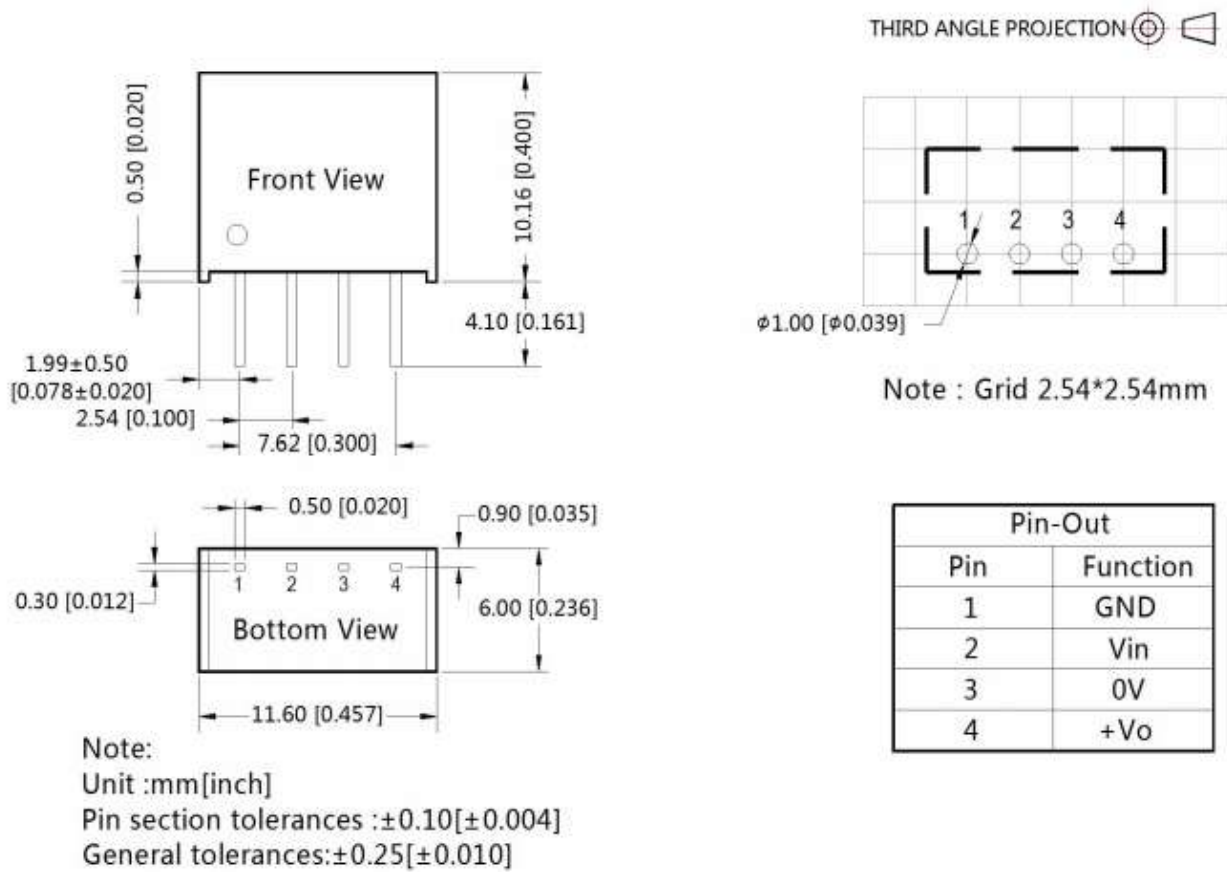
**EMC Specifications**

Emissions	CE	CISPR32/EN55032 CLASS B (see Fig. 4 for recommended circuit)
	RE	CISPR32/EN55032 CLASS B (see Fig. 4 for recommended circuit)
Immunity	ESD	IEC/EN61000-4-2 Air $\pm$ 8kV , Contact $\pm$ 4kV perf. Criteria B

**Mechanical Specifications**

<b>Case material</b>	Black flame-retardant and heat-resistant plastic (UL94 V-0)
<b>Dimensions</b>	11.60*6.00*10.16mm
<b>Weight</b>	1.3g (Typ.)
<b>Cooling Method</b>	Free air convection

## Dimensions and recommended layout



## Approvals

<b>Safety Certification</b>	UL62368, EN62368 approved
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1. If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet.
2. The maximum capacitive load offered were tested at input voltage range and full load.
3. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25°C, humidity
4. Our products shall be classified according to ISO14001 and related environmental laws and regulations.