

## FEATURES

- Fix input single and dual output
- Reinforced insulation
- The patient leakage current: Max 2 $\mu$ A
- Isolation voltage: 4200VAC or 6000VDC
- SIP7 industry standard pin-out
- Operating temperature range - 40°C to +85°C
- High efficiency up to 81%
- EN60601-1, UL60601, ANSI/AAMI ES60601-1 approval (1xMOPP/2xMOOP)

## RS PRO 1W isolated DC-DC converters

RS Stock No: 2351345, 2351350, 2351346, 2351347, 2351351, 2351352,  
2351348, 2351349, 2351353, 2351354, 2351355



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.

## Isolated DC-DC converters

### Product Description

PCB Mount DC-DC converters are specially designed for applications where high isolation, compact size and low leakage current power are required. They are widely used in medical, MOSFET and IGBT driver applications.

### General Specifications

<b>Model</b>	DC-DC 1W Isolated (6KV) 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, Medical, instrumentation, analogue, relay-driven and data switching circuits.

RS Stock#	Input Voltage (Vdc)	Output Voltage	Output Current	Wattage	Max. Capacitive Load(μF)	Efficiency (Typ)
	Nominal					
2351345	5V (4.5-5.5)	±5V	±100/±10mA	1W	470	78%
2351350		5V	200/20mA	1W	1000	78%
2351346	12V (10.8- 13.2)	±12V	±42/±5mA	1W	220	75%
2351347		±15V	±34/±4mA	1W	220	75%
2351351		5V	200/20mA	1W	2400	77%
2351352		12V	84/9mA	1W	470	81%
2351348	24V (21.6-26.4)	±5V	±100/±10mA	1W	1000	75%
2351349		±12V	±42/±5mA	1W	220	76%
2351353		5V	200/20mA	1W	1000	76%
2351354		12V	84/9mA	1W	470	78%
2351355		15V	67/7mA	1W	470	78%

### Input Specifications

Input Specification					
Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (no-load / full load)	5VDC input	-	35/274	60/--	mA
	12VDC input	-	15/114	40/--	
	24VDC input	-	10/56	25/--	
Surge Voltage (1sec. max.)	5VDC input	-0.7	-	9	VDC
	12VDC input	-0.7	-	18	
	24VDC input	-0.7	-	30	
Reflected Ripple Current	Nominal input voltage	-	0.2	-	A
Input Filter		Capacitance Filter			
Hot Plug		Unavailable			
Note: *Reflected ripple current testing method please see DC-DC Converter Application Notes for specific operation.					

### Output Specifications

Output Specification					
Item	Operating Conditions	Min	Typ.	Max	Unit
Output Voltage Accuracy		See tolerance envelope curve (Fig. 1)			
Linear Regulation	Input voltage change: $\pm 1\%$	-	-	$\pm 1.2$	%
Load Regulation	10% -100% load	5VDC output	-	20	
		Others	-	15	
Temperature Coefficient	100% load	-	$\pm 0.02$	-	$\%/^{\circ}\text{C}$
Ripple & Noise *	20MHz bandwidth	-	70	120	mV p-p
Short circuit Protection**		-	-	3	s
Note: *Ripple and noise tested with "parallel cable" method, please see DC-DC Converter Application Notes for specific operation methods. **Supply voltage must be discontinued at the end of short circuit duration which less than 3s					

## General Specifications

Item	Operating Conditions	Min	Typ	Max.	Unit
Isolation	Input-output, with the test time of 1 minute	4200	-	-	VAC
		6000	-	-	VDC
Patient Leakage Current	250VAC, 50/60Hz	-	-	2	μA
Insulation Resistance	Input-output resistance at 500VDC	1000	-	-	MΩ
Isolation Capacitance	Input-output, 100KHz/0.1V		5		pF
Operating Temperature		-40	-	+85	°C
Storage Temperature		-55	-	+125	
Case Temperature Rise	Ta=25°C	-	25	-	
Storage Humidity	Non-condensing	-	-	95	%RH
Pin Welding Resistance Temperature	Welding spot is 1.5mm away from the casing, 10 seconds	-	-	300	°C
Transformer Creepage		5	-	-	mm
Transformer Clearance		5	-	-	
PCB Creepage & Clearance		5.5	-	-	
Switching Frequency *	100% load, nominal input voltage	-	100	-	KHz
MTBF	MIL-HDBK-217F@25°C		3500		K hours

Note:1. Patient leakage current and reinforced insulation is based on a 250 VAC, 50/60 Hz system input voltage. 2. The UL certification (ANSI/AAMI ES60601-1, File No. E347375) of dual output G\_S-1WR2 & single output H\_S-1WR2 series is approved, dual output G\_S-1WR2 & single output H\_S-1WR2 series meets 1xMOPP/2xMOOP when system input voltage is with 250VAC, 50/60Hz.

Typical Performance Curves

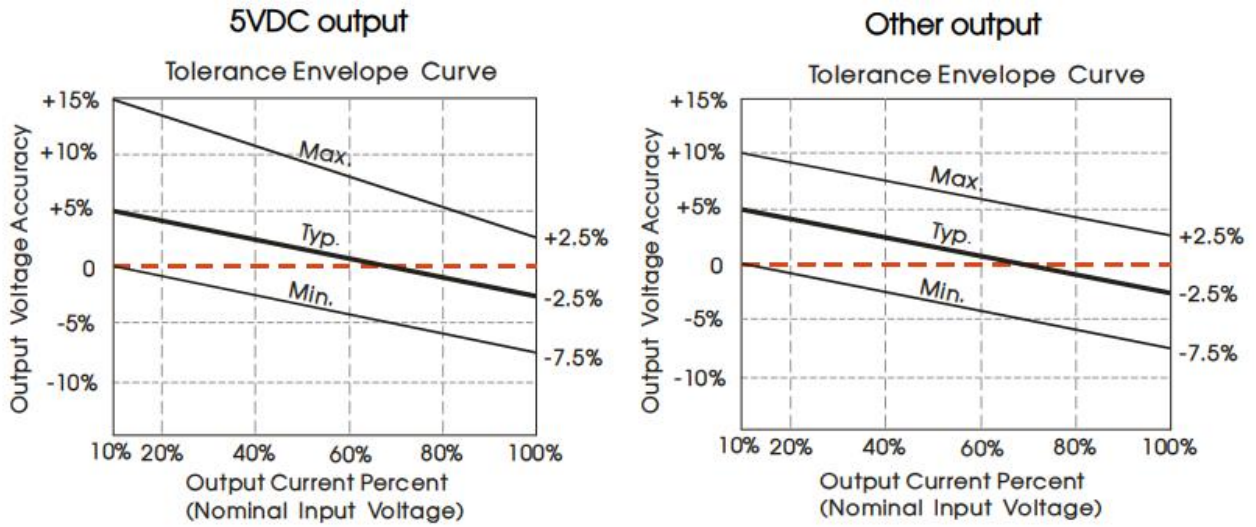


Fig. 1

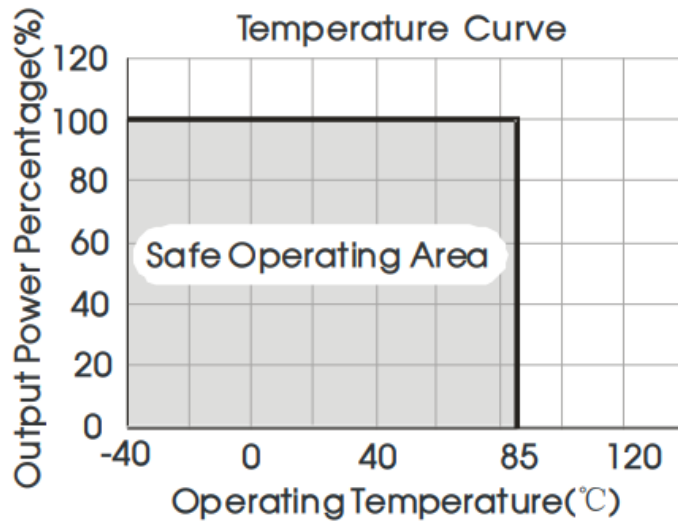


Fig. 2

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 ensure the modules run well, the recommended capacitive load values as shown in Table 1. The simplest device for output voltage regulation, over-voltage and over-current protection is a linear voltage regulator with overheat protection that is connected to the input or output end in series (see Fig. 4).

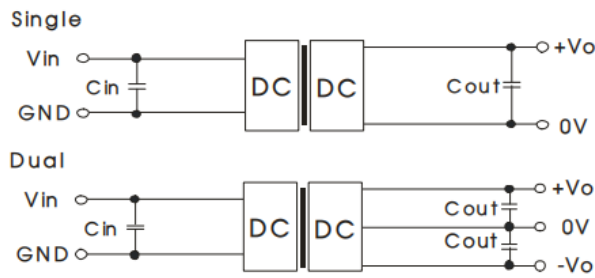


Fig. 3

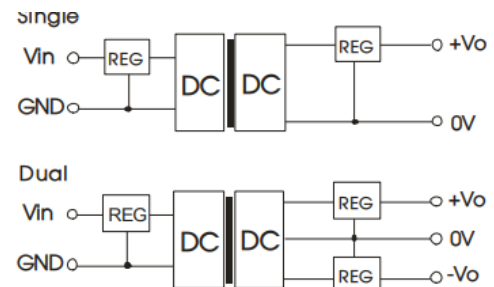


Fig. 4

Recommended capacitive load value table (Table 1)

$V_{in}$ (VDC)	$C_{in}$ ( $\mu$ F)	Single $V_{out}$ (VDC)	$C_{out}$ ( $\mu$ F)	Dual $V_{out}$ (VDC)	$C_{out}$ ( $\mu$ F)
3.3/5	10	3.3/5	10	$\pm 5$	4.7
12/15	4.7	12	2.2	$\pm 9$	2.2
24	2.2	15	1	$\pm 12/\pm 15$	1

### EMC typical recommended circuit (CLASS B)

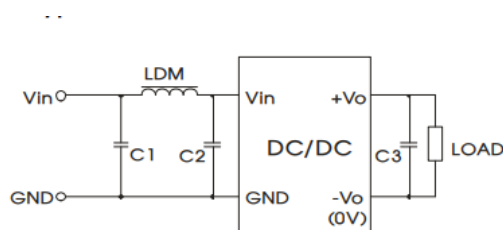


Fig. 5

Recommended typical circuit parameters:

Input voltage (V)		3.3/5/12/15/24
EMI	$C_1, C_2$	4.7 $\mu$ F /50V
	$C_3$	Refer to the $C_{out}$ in Fig.3
	LDM	6.8 $\mu$ H

### Output load requirements

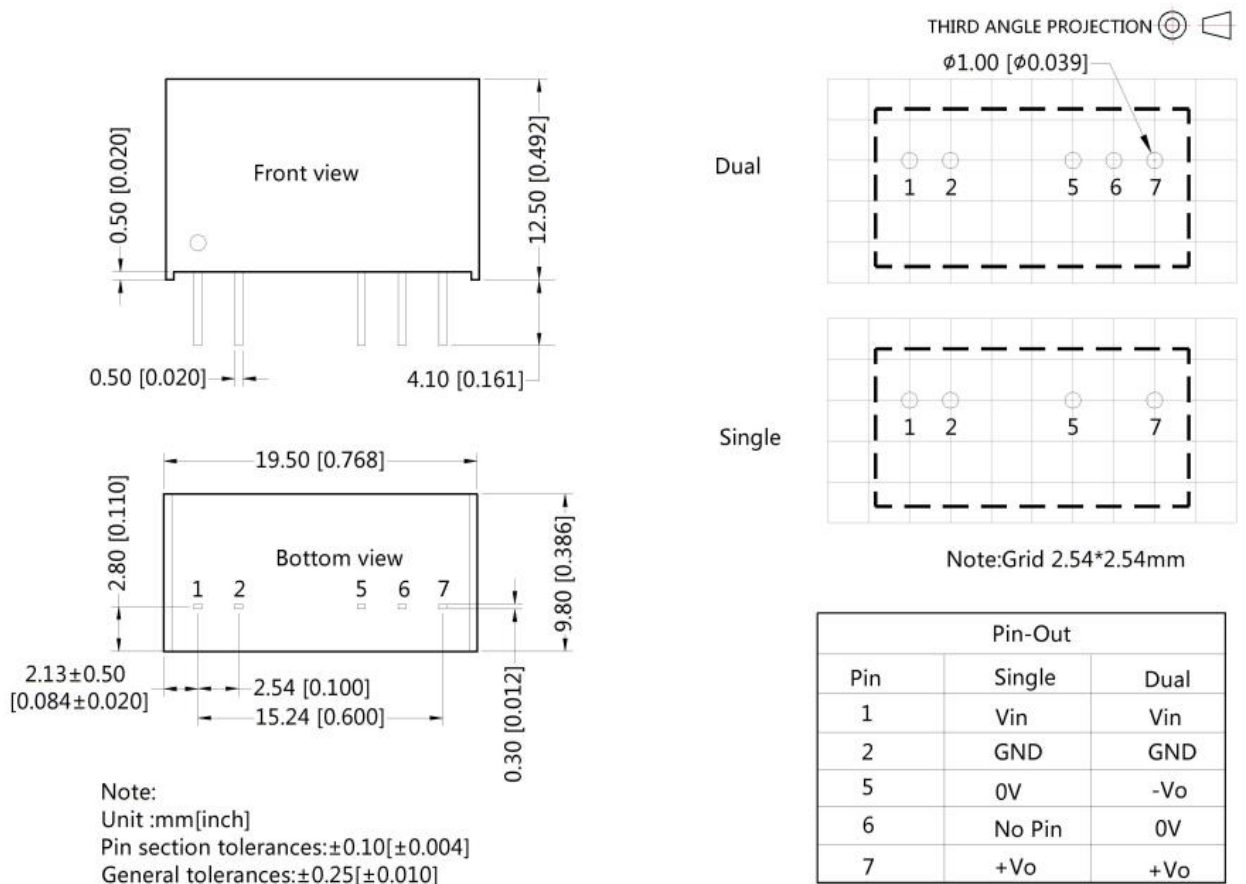
In order to ensure the converter can work reliably with high efficiency, the minimum load should not less than 10% rated load when it is used. If the needed power is indeed small, please parallel a resistor on the output side (The sum of the efficient power and resistor consumption power is not less than 10%).

EMI	CE	EMI CE EN60601-1-2/CISPR 11 GROUP1 CLASS B (see Fig. 5 for recommended circuit)	
	RE	EN60601-1-2/CISPR 11 GROUP1 CLASS B (see Fig. 5 for recommended circuit)	
EMS	ESD	EN60601-1-2(IEC/EN61000-4-2 Contact ±8KV	Perf. Criteria B

## Mechanical Specifications

Case material	Black flame-retardant and heat-resistant plastic (UL94 V-0)
Dimensions	19.50 x 9.80 x 12.50 mm
Weight	4.2g(Typ.)
Cooling Method	Free air convection

## Dimensions and recommended layout



## Approvals

<b>Safety Certification</b>	EN60601-1, UL60601, ANSI/AAMI ES60601-1 (1xMOPP/2xMOOP), IEC60950
-----------------------------	---

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.