DC/DC Converter

G_S-2WR2 & H_S-2WR2 Series

MORNSUN®

2W isolated DC-DC converter with 4.2k VAC/6k VDC Fixed input voltage and unregulated single or dual output

Patent Protection RoHS

FEATURES

- SIP package
- High efficiency up to 84%
- Reinforced insulation
- Patient leakage current 2μA max.
- I/O isolation test voltage 4.2k VAC or 6k VDC
- Operating ambient temperature: -40℃ ~ +85℃
- Internal surface mounted design
- Industry standard pin-out
- EN60601-1, ANSI/AAMI ES60601-1 approved (1xMOPP/2xMOOP)

G_S-2WR2 & H_S-2WR2 series meets reinforced insulation requirements. They are especially designed for applications where extremely high isolation, low insulation capacitor with low leakage current in a compact package size is required. They are widely used in applications such as medical, electrical grid, IGBT driver circuits and similar where:

1. The voltage of the input power supply is relatively stable with a variation of ±10%Vin or less;

2. An extremely high input to output isolation voltage of up to 4200VAC or 6000VDC is required;

3. The requirement for ripple & noise or a tight output regulation is not as strict.

Selection Guide

Certification	Part No.	Input Voltage (VDC)	Output		Full Load Efficiency (%) Min./Typ.	Max. Capacitive Load* (μF)
		Nominal (Range)	Voltage(VDC)	Current (mA) Max./Min.		
UL/CE	G0505S-2WR2	5 (4.5-5.5)	±5	±200/±20	74/78	470
	G0509S-2WR2		±9	±111/±12	74/78	470
	G0512S-2WR2		±12	±83/±9	74/78	220
	G0515S-2WR2		±15	±67/±7	76/80	220
	H0505S-2WR2		5	400/40	73/77	1000
	H0512S-2WR2		12	167/17	75/79	470
	H0515S-2WR2		15	133/14	75/79	470
	G1205S-2WR2	12 (10.8-13.2)	±5	±200/±20	70/74	470
	G1209S-2WR2		±9	±111/±12	76/80	470
	G1212S-2WR2		±12	±83/±9	76/80	220
	G1215S-2WR2		±15	±67/±7	73/77	220
	H1205S-2WR2		5	400/40	72/76	1000
	H1212S-2WR2		12	167/17	75/79	470
	H1215S-2WR2		15	133/14	77/81	470
--	G1505S-2WR2	15 (13.5-16.5)	±5	±200/±20	73/77	470
	G1509S-2WR2		±9	±111/±12	76/80	470
	G1515S-2WR2		±15	±67/±7	69/73	220
UL	H1505S-2WR2		5	400/40	73/77	1000
--	H1515S-2WR2		15	133/14	78/82	470
UL/CE	G2405S-2WR2	24 (21.6-26.4)	±5	±200/±20	75/79	470
	G2409S-2WR2		±9	±111/±12	77/81	470
	G2412S-2WR2		±12	±83/±9	78/82	220
	G2415S-2WR2		±15	±67/±7	77/81	220
	H2405S-2WR2		5	400/40	75/79	1000
	H2412S-2WR2		12	167/17	78/82	470
	H2415S-2WR2		15	133/14	80/84	470

Note:* The specified maximum capacitive load value for positive and negative output is identical.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (no-load/full load)	5V input	--	35/520	80/--	mA
	12V input	--	15/217	40/--	
	15V input	--	18/171	40/--	
	24V input	--	10/106	25/--	
Surge Voltage (1sec. max.)	5V input	-0.7	--	9	VDC
	12V input	-0.7	--	18	
	15V input	-0.7	--	21	
	24V input	-0.7	--	30	
Reflected Ripple Current*		--	0.2	--	A
Input Filter		Capacitance filter			
Hot Plug		Unavailable			

Note:* Please refer to DC-DC Converter Application Note for detailed description of Reflected ripple current testing method.

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Voltage Accuracy①			See Typical Characteristic Curves (Fig. 1)			
Linear Regulation	Input voltage change: ±1%		--	--	±1.2	--
Load Regulation	10%-100% load	5VDC output	--	--	20	%
		9VDC output	--	--	15	
		12VDC output	--	--	15	
		15VDC output	--	--	15	
Ripple & Noise②	20MHz bandwidth		--	100	150	mVp-p
Temperature Coefficient	100% full load		--	±0.02	--	%/℃
Short-circuit Protection③			--	--	3	s

Note: ①Output voltage accuracy of G1515S-2WR2 with 10% load, Min. -5%;
②The "parallel cable" method is used for Ripple and Noise test, please refer to DC-DC Converter Application Notes for specific information;
③At the end of the short circuit duration, the supply voltage must be disconnected from the modules.

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation	Input-output Electric strength test for 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 capacitance at 100kHz/0.1V	--	5	--	pF
Operating Temperature		-40	--	85	℃
Storage Temperature		-55	--	125	
Case Temperature Rise	Ta=25℃	--	25	--	
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	300	
Storage Humidity	Non-condensing	--	--	95	%RH
Switching Frequency	100% load, nominal input voltage	--	100	--	kHz
MTBF	MIL-HDBK-217F @ 25℃	3500	--	--	k hours
Transformer Creepage & Clearance Distance		5	--	--	mm
PCB Creepage & Clearance Distance		5.5	--	--	

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

Mechanical Specifications

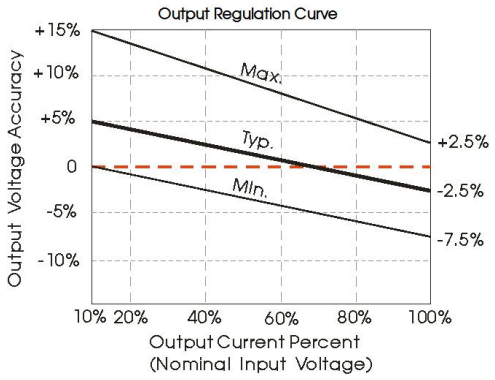
Case Material	Black plastic; flame-retardant and heat-resistant (UL94 V-0)
Dimensions	19.50 x 9.80 x 12.50 mm
Weight	4.2g (Typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)

Emissions	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)
Immunity	ESD	EN60601-1-2/IEC/EN61000-4-2 Contact ±8kV performance Criteria B

Typical Characteristic Curves

5VDC output



Other output

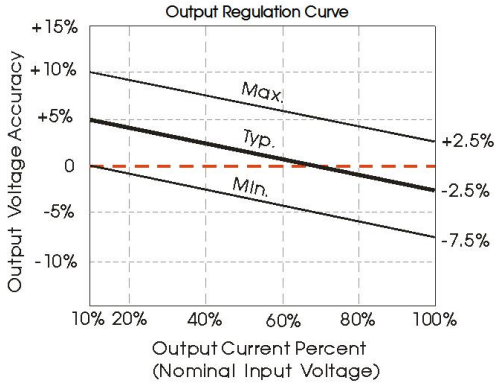


Fig. 1

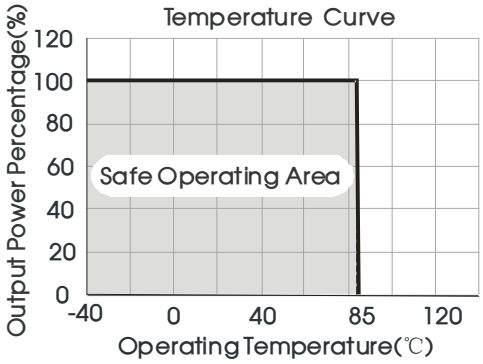
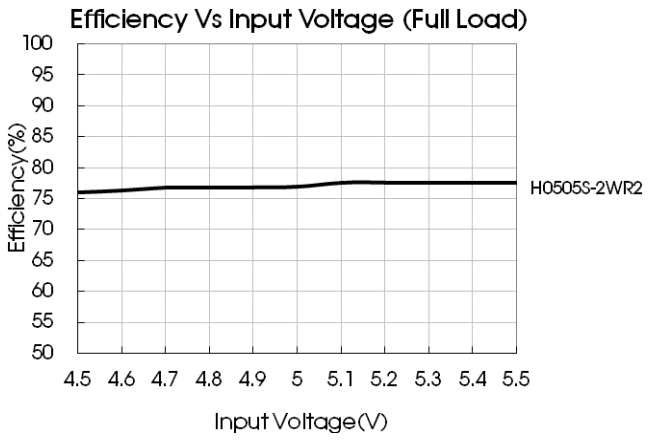
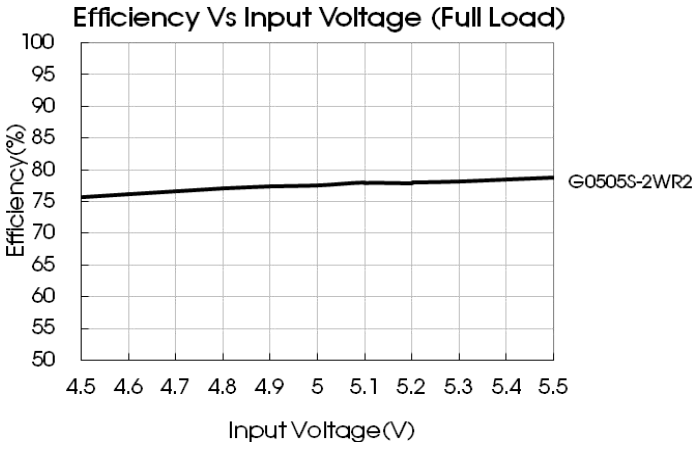
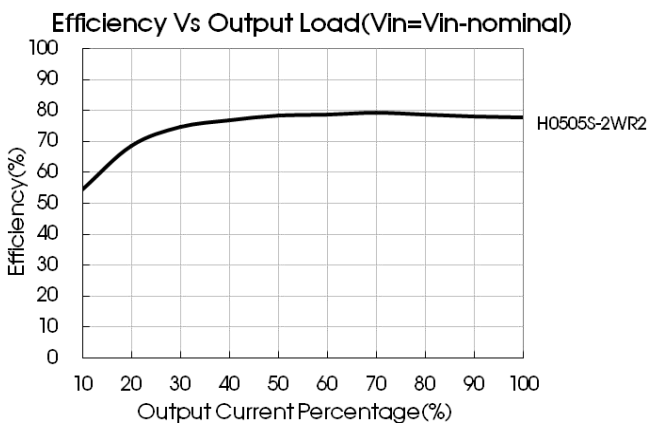
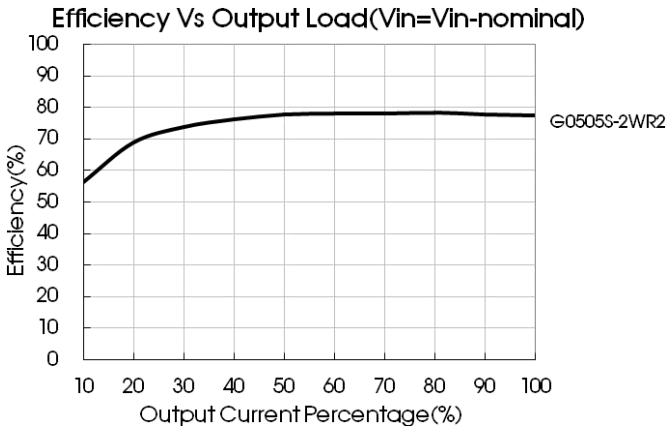


Fig. 2









Design Reference

1. Typical application

Input and/or output ripple can be further reduced, by connecting a filter capacitor from the input and/or output terminals to ground as shown in Fig.3.

Choosing suitable filter capacitor values is very important for a smooth operation of the modules, particularly to avoid start-up problems caused by capacitor values that are too high. For recommended input and output capacitor values refer to Table 1.

For a tight output voltage regulation, including overvoltage, overcurrent and over temperature protection, we recommend the use of a linear regulator that is connected in series to the input and/or output terminals as shown in Fig. 4.

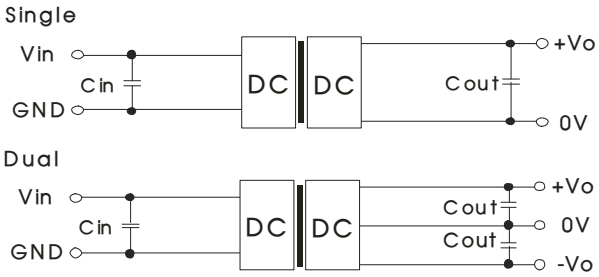


Fig. 3

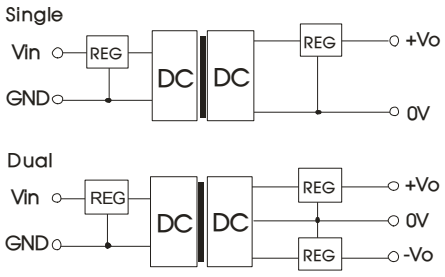


Fig. 4

Table 1: Recommended input and output capacitor values

Vin (VDC)	Cin (μF)	Single Vout (VDC)	Cout (μF)	Dual Vout (VDC)	Cout (μF)
5	10	5	10	±5	4.7
12/15	4.7	12	2.2	±9	2.2
24	2.2	15	1	±12/±15	1

2. EMC (CLASS B) compliance circuit

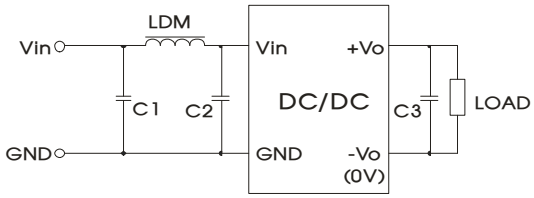


Fig. 5

Table 2: Recommended EMC filter values

Input voltage (V)		5/12/15	24
EMI	C1, C2	4.7μF /50V	
	C3	Refer to the Cout in Fig.3	
	LDM	6.8μH	15μH

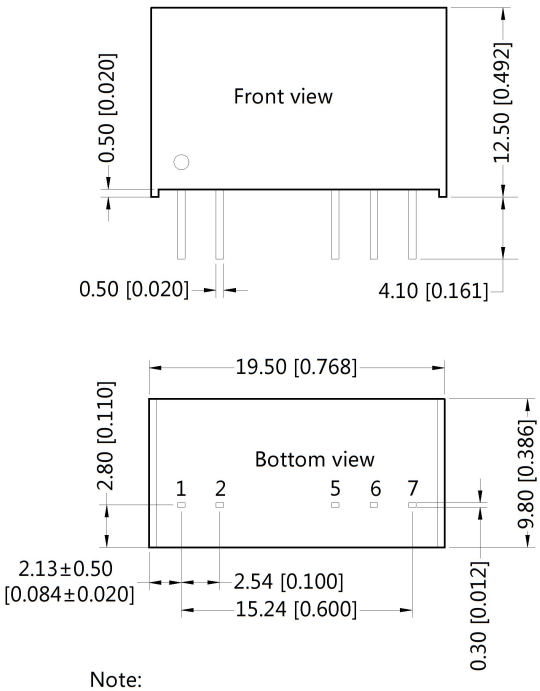
Note: C1 and C2 of G1515S-2WR2 is 10μF/25V, LDM of G1515S-2WR2 is 22μH.

3. Output load requirements

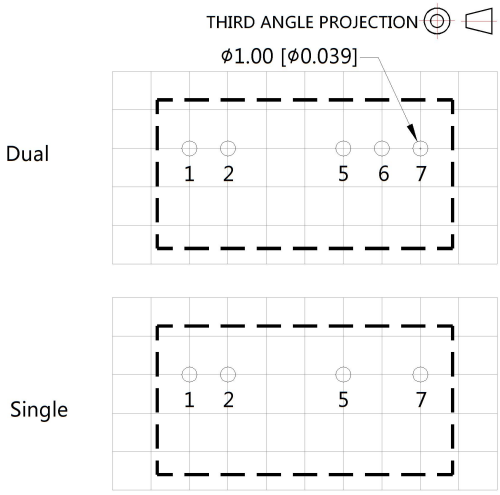
For a reliable and efficient operation of the converter, the minimum load should never be less than 10% of the rated output load. If the total required output power is below 10%, a parallel bleeding resistor is required on the output, ensuring that the sum of the power consumption is always maintained at 10% minimum.

4. For additional information please refer to DC-DC converter application notes on www.mornsun-power.com

Dimensions and Recommended Layout



Note:
Unit :mm[inch]
Pin section tolerances:±0.10[±0.004]
General tolerances:±0.25[±0.010]



Note:Grid 2.54*2.54mm

Pin-Out		
Pin	Single	Dual
1	Vin	Vin
2	GND	GND
5	0V	-Vo
6	No Pin	0V
7	+Vo	+Vo

Notes:
1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58200013;
2. In order to guarantee product performance and datasheet compliance, the product must be operated within specifications and load range requirement;
3. The maximum capacitive load offered were tested at input voltage range and full load;
4. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75%RH with nominal input voltage and rated output load;
5. All index testing methods in this datasheet are based on company corporate standards;
6. We can provide product customization service, please contact our technicians directly for specific information;
7. Products are related to laws and regulations: see "Features" and "EMC";
8. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

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