DC/DC Converter

G_WS-1WR3SG & H_WS-1WR3SG Series

MORNSUN®

1W, Fixed input voltage, 5000VAC or 6000VDC isolated & unregulated dual/single output

Continuous Short Circuit Protection

Patent Protection RoHS

FEATURES

- The leakage current < 2μA
- Isolation Capacitance as low as 4pF
- Creepage & Clearance Distance > 8mm
- Reinforced insulation, Isolation voltage: 5000VAC or 6000VDC
- Operating ambient temperature range: -40℃ to +105℃
- Continuous short-circuit protection

G_WS-1WR3SG & H_WS-1WR3SG series meet reinforced insulation requirements. They are specially designed for applications where require compact size, high isolation, low isolation capacitor and low leakage current power. They are widely used in medical, electricity, IGBT driver and so on. They are suitable for:
1. Where the voltage of the input power supply is stable (voltage variation: ±10%Vin);
2. Where isolation is necessary between input and output (isolation voltage ≤5000VAC or 6000VDC);
3. Where do not has high requirement of line regulation and the ripple & noise of the output voltage;
Such as, medical collection isolation, high voltage collection circuit and IGBT drive circuit.

Selection Guide

Certification	Part No.	Input Voltage (VDC)	Output		Full Load Efficiency (%) Min./Typ.	Capacitive Load(μF)* Max.
		Nominal (Range)	Voltage (VDC)	Current (mA) Max./Min.		
--	H0503WS-1WR3SG	5 (4.5~5.5)	3.3	303/31	70/74	2200
	H0505WS-1WR3SG		5	200/20	75/79	2200
	H0509WS-1WR3SG		9	111/11	75/79	1000
	H0512WS-1WR3SG		12	84/9	76/80	470
	H0515WS-1WR3SG		15	67/7	76/80	470
	H0524WS-1WR3SG		24	42/4	76/80	220
	G0503WS-1WR3SG		±3.3	±152/±15	70/74	1000
	G0505WS-1WR3SG		±5	±100/±10	75/79	1000
	G0509WS-1WR3SG		±9	±56/±6	75/79	470
	G0512WS-1WR3SG		±12	±42/±5	76/80	220
	G0515WS-1WR3SG		±15	±34/±4	76/80	220
	H1203WS-1WR3SG	12 (10.8-13.2)	3.3	303/31	67/71	2200
	H1205WS-1WR3SG		5	200/20	73/77	2200
	H1209WS-1WR3SG		9	111/11	76/80	1000
	H1212WS-1WR3SG		12	84/9	74/78	470
	H1215WS-1WR3SG		15	67/7	75/79	470

Note: *The capacitive loads of positive and negative outputs are identical.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load/no-load)	5V input	--	253/10	286/--	mA
	12V input	--	108/8	125/--	
Surge Voltage (1sec. max.)	5V input	-0.7	--	9	VDC
	12V input	-0.7	--	18	
Reflected Ripple Current*		--	200	--	mA

Input Filter		Capacitance filter
Hot Plug		Unavailable
Note: * Refer to DC-DC Converter Application notes for detailed description of reflected ripple current test method.		

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy			See output regulation curve(Fig. 1)			
Linear Regulation	Input voltage change: ±1%	3.3V output	--	--	1.5	--
		Other output	--	--	1.2	
Load Regulation	10%-100% load	3.3V/5V output	--	--	20	%
		Other output	--	--	15	
Ripple & Noise*	20MHz bandwidth	3.3V output	--	100	150	mVp-p
		Other output	--	80	120	
Temperature Coefficient	100% full load		--	±0.02	--	%/℃
Output 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, the leakage current < 1mA	5000	--	--	VAC
		6000	--	--	VDC
Leakage Current*	250VAC, 50/60Hz	--	--	2	μA
Insulation Resistance	Input-output, isolation voltage 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output, 100kHz/0.1V	--	4	--	pF
Operating Temperature	Derating when operating temperature≥85℃ (see Fig. 2)	-40	--	105	℃
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	
	Wave soldering,10 seconds	255	260	265	
Storage Humidity	Non-condensing	5	--	95	%RH
Switching Frequency	5V input, 100% load	--	300	--	kHz
	12/15/24V input, 100% load	--	200	--	
MTBF	MIL-HDBK-217F@25℃	19360	--	--	k hours
Creepage & Clearance Distance		8	--	--	mm
Note: * Leakage current and reinforced insulation is based on 250 VAC, 50/60 Hz system input voltage.					

Mechanical Specifications

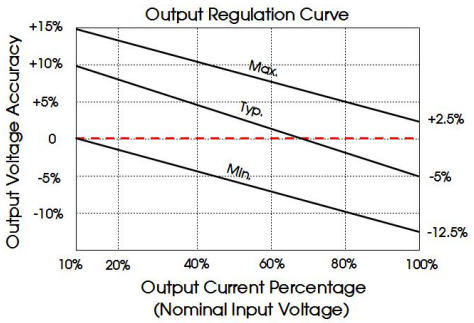
Case Material	Black plastic; flame-retardant and heat-resistant (UL94V-0)
Dimensions	19.65 x 7.90x 10.16mm
Weight	2.4g(Typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)

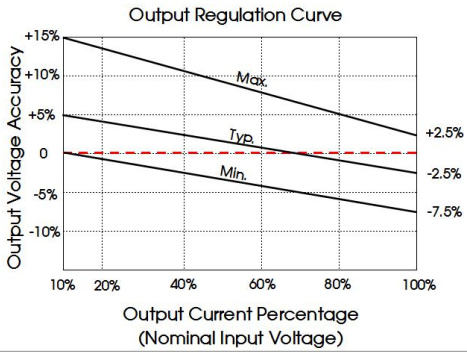
Emissions	CE	H0515WS-1WR3SG H0524WS-1WR3SG G0515WS-1WR3SG	CISPR32/EN55032 CLASS A (see Fig. 4 for recommended circuit) EN60601-1-2/CISPR 11 GROUP1 CLASS A (see Fig. 4 for recommended circuit)
		Other Part No.	CISPR32/EN55032 CLASS B (see Fig. 4 for recommended circuit) EN60601-1-2/CISPR 11 GROUP1 CLASS B (see Fig. 4 for recommended circuit)
	RE	H0515WS-1WR3SG H0524WS-1WR3SG G0515WS-1WR3SG	CISPR32/EN55032 CLASS A (see Fig. 4 for recommended circuit) EN60601-1-2/CISPR 11 GROUP1 CLASS A (see Fig. 4 for recommended circuit)
		Other Part No.	CISPR32/EN55032 CLASS B (see Fig. 4 for recommended circuit) EN60601-1-2/CISPR 11 GROUP1 CLASS B (see Fig. 4 for recommended circuit)
Immunity	ESD		EN60601-1-2 (IEC/EN61000-4-2) Air ±15kV, Contact ±8kV perf. Criteria B

Typical Characteristic Curves

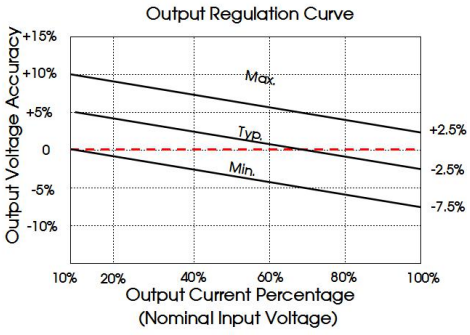
5VDC input 3.3VDC output



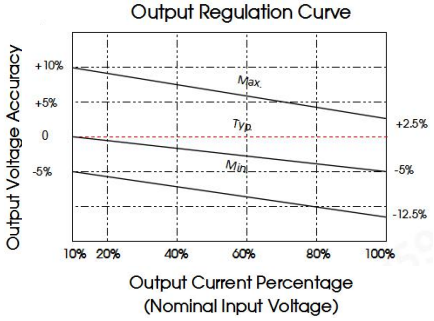
5VDC input 5VDC output



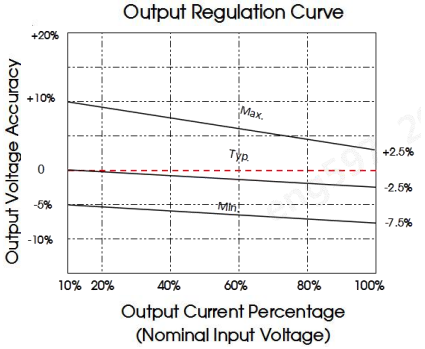
5VDC input Other output



12VDC input 3.3VDC output



12VDC input 5VDC output



12VDC input Other output

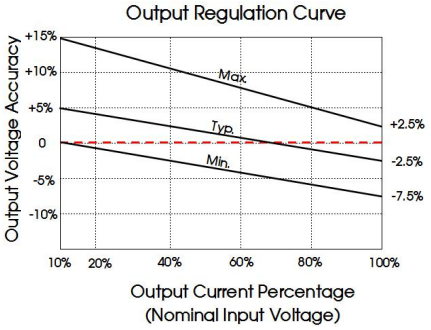


Fig. 1

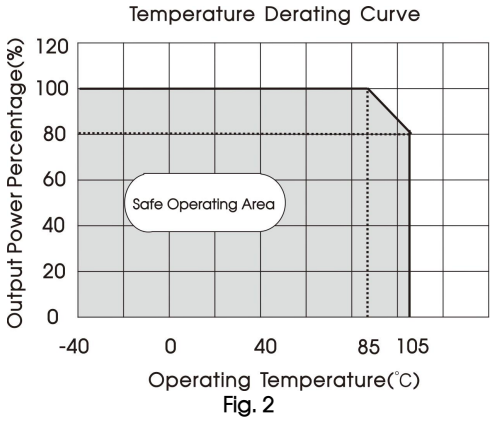


Fig. 2

Design Reference

1. 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.

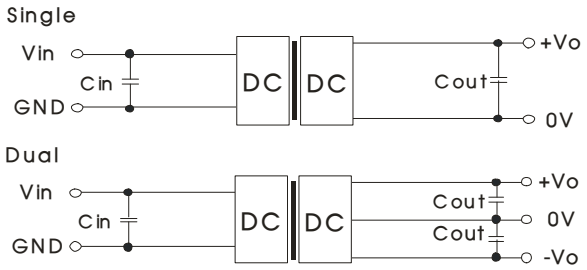


Fig. 3

Table 1: Recommended input and output capacitor values

Vin	Cin	Single Vout	Cout	Dual Vout	Cout
5VDC	10μF/10V	3.3/5VDC	10μF/16V	±3.3VDC	4.7μF/16V
12VDC	10μF/25V	9VDC	10μF/16V	±5/±9VDC	4.7μF/16V
--	--	12VDC	2.2μF/25V	±12/±15VDC	1μF/25V
--	--	15VDC	1μF/25V	±24VDC	0.47μF/50V
--	--	24VDC	0.47μF/50V	--	--

2. EMC compliance circuit

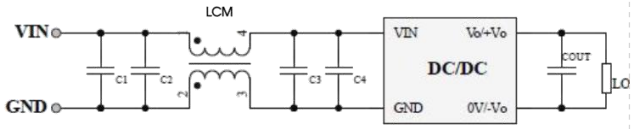


Fig. 4

EMC recommended circuit value table (Table 2)

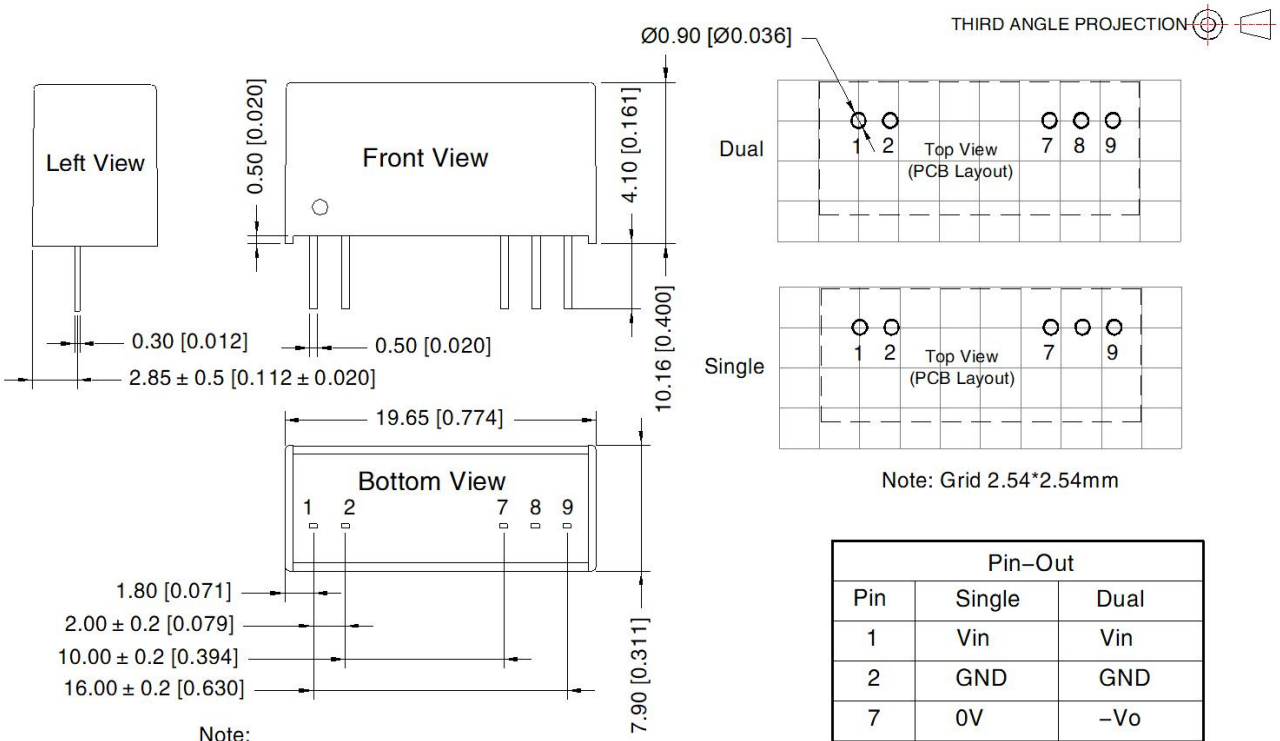
Series		H05_WS-1WR3SG	G05_WS-1WR3SG	H12_WS-1WR3SG
EMI	C1/C3	4.7μF /25V	22μF /16V	4.7μF /16V
	C2/C4	--	--	4.7μF /16V
	Cout	Refer to the Cout in table 1		
	LCM1	FL2D-30-102		FL2D-30-472

3. Minimum Output Load Requirement

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: Grid 2.54*2.54mm

Note:
Unit: mm[inch]
Pin section tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.50[± 0.020]

Pin–Out		
Pin	Single	Dual
1	Vin	Vin
2	GND	GND
7	0V	–Vo
8	No Pin	0V
9	+Vo	+Vo

Notes:
1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58200160;
2. 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;
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, operating altitude within 2000m, with nominal input voltage and rated output load;
5. All index testing methods in this datasheet are based on our 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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