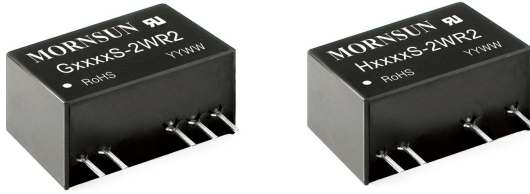


2W isolated DC-DC converter with 4.2k VAC/6k VDC
Fixed input voltage and unregulated single or dual
output

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°C ~ +85°C
- 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 |
| | -- | G1505S-2WR2 | 15 (13.5-16.5) | ±5 | ±200/±20 | 73/77 |
| 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 Accuracy ^① | | 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 & Noise ^② | 20MHz bandwidth | -- | 100 | 150 | mVp-p | |
| Temperature Coefficient | 100% full load | -- | ±0.02 | -- | %/°C | |
| Short-circuit Protection ^③ | | -- | -- | 3 | s | |

Note: ① Output voltage accuracy of G1515S-2WR2 with 10% load, Min. -5%;
 ② The "parallel cable" method is used for Ripple and Noise test, please refer to DC-DC Converter Application Notes for specific information;
 ③ At 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 | °C |
| Storage Temperature | | -55 | -- | 125 | |
| Case Temperature Rise | Ta=25°C | -- | 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°C | 3500 | -- | -- | k hours |
| Transformer Creepage & Clearance Distance | | 5 | -- | -- | mm |
| PCB Creepage & Clearance Distance | | 5.5 | -- | -- | |

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 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

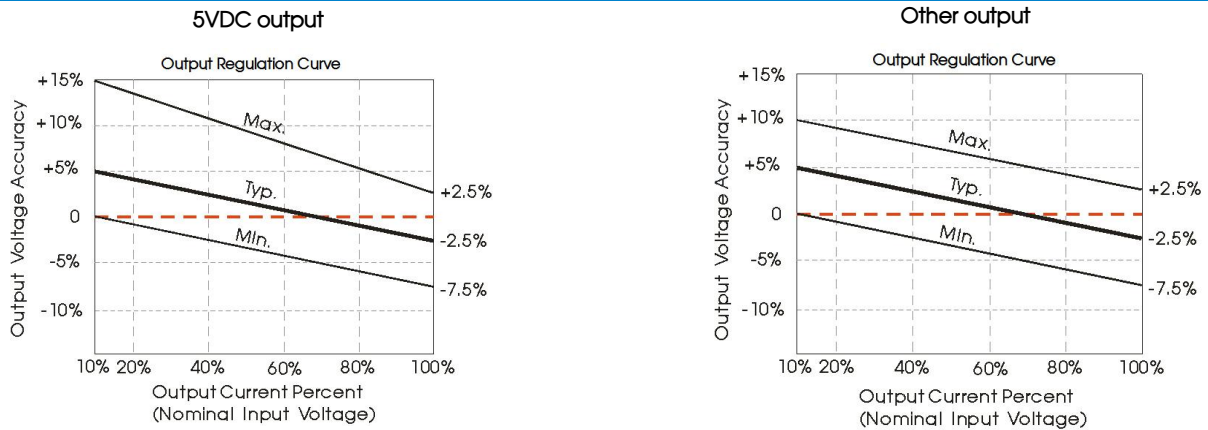


Fig. 1

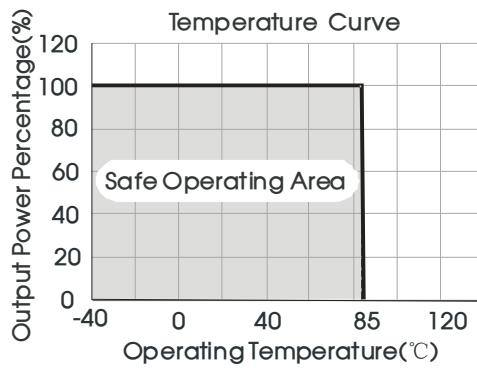
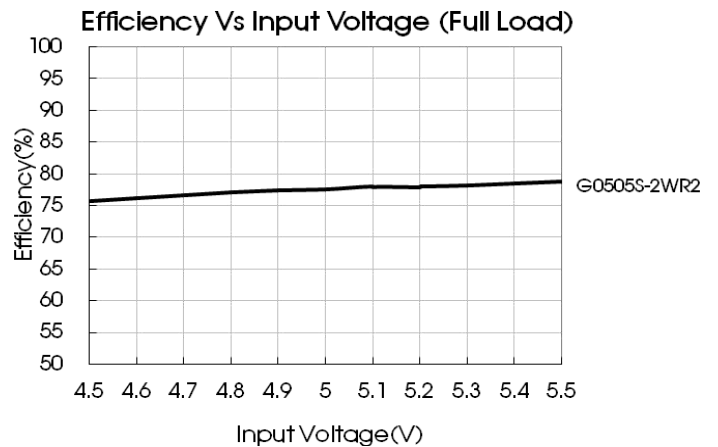
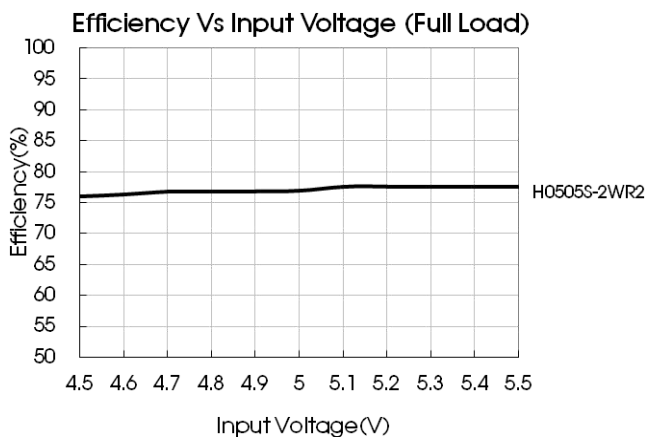
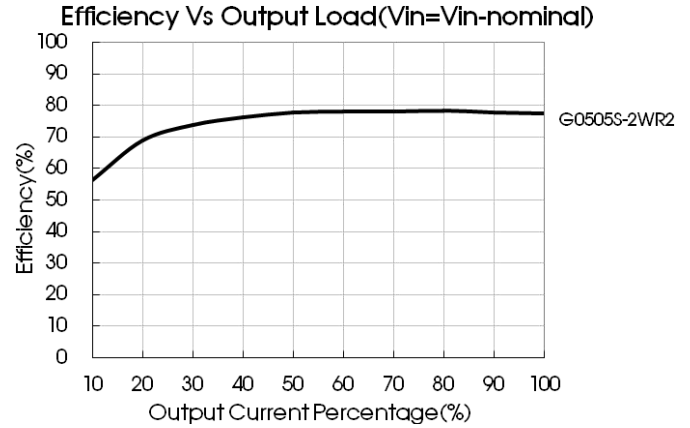
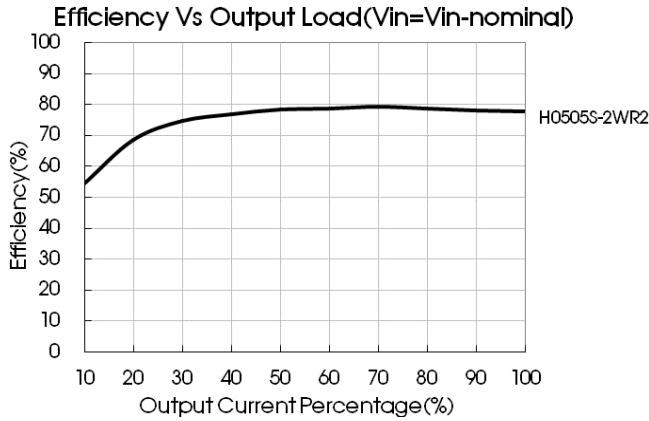


Fig. 2





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.

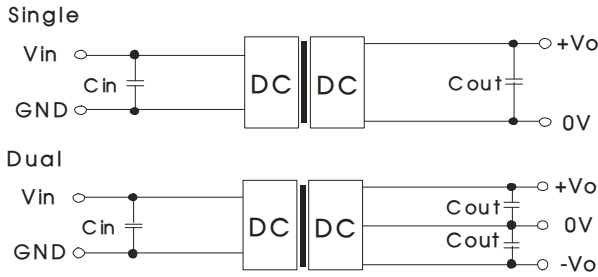


Fig. 3

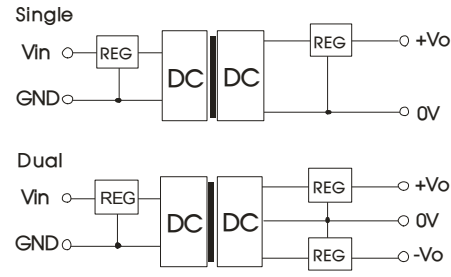


Fig. 4

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

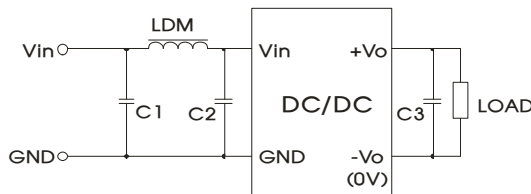


Fig. 5

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 |

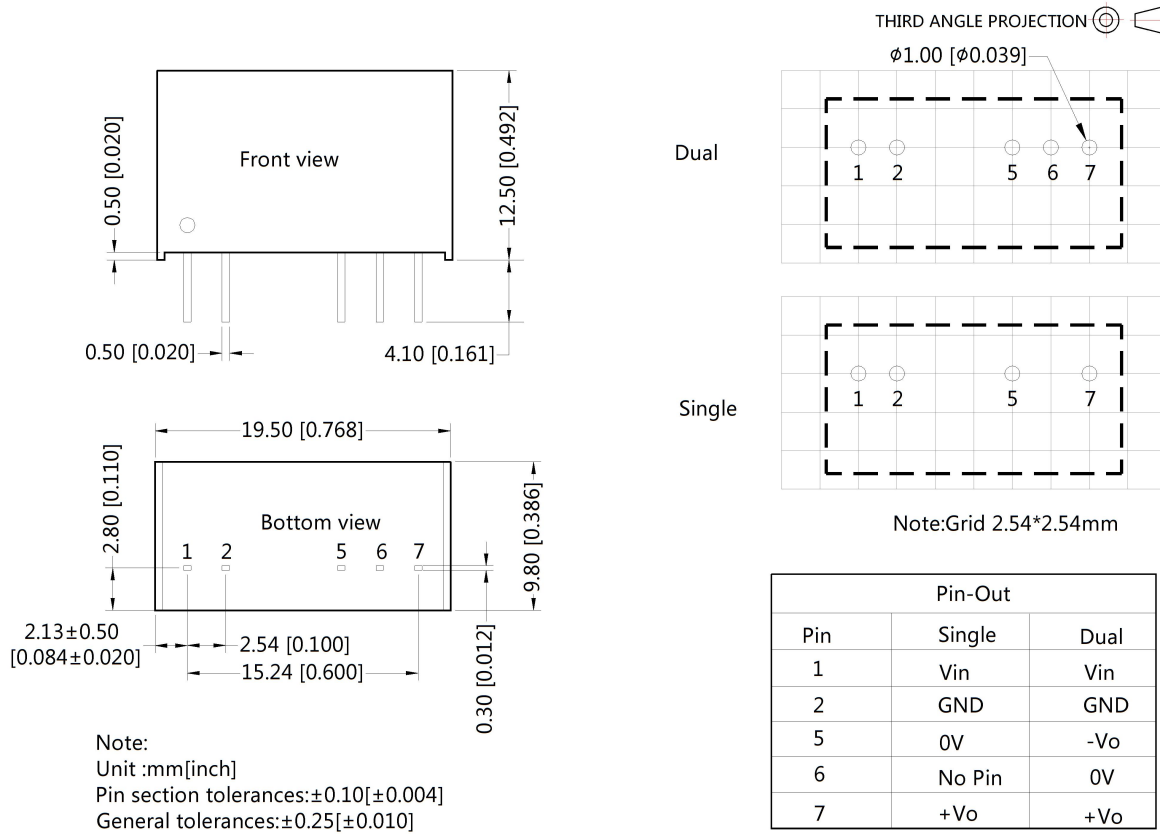
Note: C1 and C2 of G1515S-2WR2 is 10μF/25V, LDM of G1515S-2WR2 is 22μH.

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



Notes:

- For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58200013;
- In order to guarantee product performance and datasheet compliance, the product must be operated within specifications and load range requirement;
- 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 Ta=25°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;
- Products are related to laws and regulations: see "Features" and "EMC";
- 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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