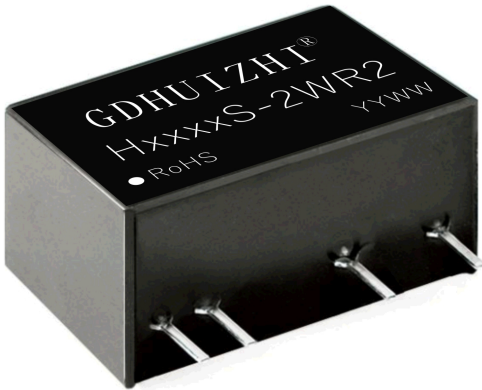


Typical Characteristics

- Fixed-voltage input, isolated, unregulated output, 2W power
- Isolation voltage: 6000VDC (Reinforced Insulation)
- Low no-load power consumption: 0.025W(Typ.)
- Efficiency: up to 91%
- Working ambient temperature: -40℃~+85℃
- MTBF≥3.5 million hours (3500000Hrs)
- Output short-circuit protection: continuous short-circuit protection, automatic recovery
- Compact SIP package, plastic housing
- Industry standard pin-out
- Ripple/noise (20MHz bandwidth) : 30mVp-p(Typ.)

2W, fixed-voltage input, isolated, unregulated, single-output DC/DC power module



Over-temperature protection & continuous output short-circuit protection

RoHS

H\_S-2WR2 Series is a compact, high-efficiency, low-power, fixed-voltage input, isolated, unregulated single-output DC/DC module power supply designed by Huizhi Electronics for its customers;

This product series meets the requirements for reinforced insulation and is primarily used in power supply applications that require compact size, high isolation, low capacitance, and low leakage current. It is suitable for applications such as medical equipment, power systems, and IGBT drivers. This product is suitable for:

- the input voltage is relatively stable (voltage variation range:  $\pm 10\%$  Vin);
- isolation between input and output is required (isolation voltage  $\leq 6000$  VDC);
- output voltage stability requirements are not stringent;
- typical applications: pure digital circuits, general low-frequency analog circuits, relay driver circuits, data switching circuits, etc.;

For example: medical signal isolation, high-voltage signal acquisition circuits, IGBT driver circuits, etc.

Model Number Description

|   |    |    |   |   |    |    |                                               |
|---|----|----|---|---|----|----|-----------------------------------------------|
| H | xx | xx | S | - | 2W | R2 |                                               |
|   |    |    |   |   |    |    | Suffix (2nd-generation product)               |
|   |    |    |   |   |    |    | Rated output power (2W)                       |
|   |    |    |   |   |    |    | Package type (Single In-line Package, SIP)    |
|   |    |    |   |   |    |    | Output voltage (rated)                        |
|   |    |    |   |   |    |    | Input voltage (rated)                         |
|   |    |    |   |   |    |    | Product series (6000V isolated single output) |

Product selection table

| Cer<br>tif<br>ica<br>tio<br>n | Model number | Input voltage<br>range (Vdc)        | Output<br>Voltage/Current |                                 | Ripple and<br>Noise                | Efficiency@<br>Full load | Max.<br>capaci<br>tive<br>load |
|-------------------------------|--------------|-------------------------------------|---------------------------|---------------------------------|------------------------------------|--------------------------|--------------------------------|
|                               |              | Rated value <sup>②</sup><br>(Range) | Output V<br>(Vdc)         | Output I<br>(mA)<br>(Max. Min.) | Full Load<br>(mVp-p)<br>Typ. /Max. | %<br>(Min. / Typ.)       | μ F                            |
|                               | H0303S-2WR2  | 3.3<br>(2.97~3.63)                  | 3.3                       | 606/60                          | 50/80                              | 76/80                    | 2400                           |
|                               | H0305S-2WR2  |                                     | 5                         | 400/40                          | 50/80                              | 81/85                    | 2400                           |
|                               | H0309S-2WR2  |                                     | 9                         | 222/23                          | 50/80                              | 81/85                    | 1000                           |
|                               | H0312S-2WR2  |                                     | 12                        | 166/17                          | 50/80                              | 82/85                    | 560                            |
|                               | H0503S-2WR2  | 5<br>(4.5~5.5)                      | 3.3                       | 606/60                          | 50/80                              | 76/80                    | 2400                           |
|                               | H0505S-2WR2  |                                     | 5                         | 400/40                          | 50/80                              | 82/86                    | 2400                           |
|                               | H0509S-2WR2  |                                     | 9                         | 222/23                          | 50/80                              | 82/86                    | 1000                           |
|                               | H0512S-2WR2  |                                     | 12                        | 166/17                          | 50/80                              | 82/86                    | 560                            |
|                               | H0515S-2WR2  |                                     | 15                        | 133/13                          | 30/80                              | 82/86                    | 560                            |
|                               | H0524S-2WR2  |                                     | 24                        | 83/8                            | 50/80                              | 82/86                    | 220                            |
|                               | H0903S-2WR2  | 9<br>(8.1~9.9)                      | 3.3                       | 606/60                          | 50/80                              | 82/86                    | 220                            |
|                               | H0905S-2WR2  |                                     | 5                         | 400/40                          | 50/80                              | 82/86                    | 220                            |
|                               | H0909S-2WR2  |                                     | 9                         | 222/23                          | 50/80                              | 82/86                    | 220                            |
|                               | H0912S-2WR2  |                                     | 12                        | 166/17                          | 50/80                              | 83/87                    | 220                            |
|                               | H0915S-2WR2  |                                     | 15                        | 133/13                          | 50/80                              | 83/87                    | 220                            |
|                               | H0924S-2WR2  |                                     | 24                        | 83/8                            | 50/80                              | 83/87                    | 220                            |
|                               | H1203S-2WR2  | 12<br>(10.8~13.2)                   | 3.3                       | 606/60                          | 50/80                              | 81/84                    | 2400                           |
|                               | H1205S-2WR2  |                                     | 5                         | 400/40                          | 50/80                              | 82/86                    | 2400                           |
|                               | H1209S-2WR2  |                                     | 9                         | 222/23                          | 50/80                              | 83/87                    | 1000                           |
|                               | H1212S-2WR2  |                                     | 12                        | 166/17                          | 50/80                              | 83/87                    | 560                            |
|                               | H1215S-2WR2  |                                     | 15                        | 133/13                          | 50/80                              | 83/87                    | 560                            |
|                               | H1224S-2WR2  |                                     | 24                        | 83/8                            | 50/80                              | 83/87                    | 220                            |
|                               | H1503S-2WR2  | 15<br>(13.5~16.5)                   | 3.3                       | 606/60                          | 50/80                              | 81/84                    | 2400                           |
|                               | H1505S-2WR2  |                                     | 5                         | 400/40                          | 50/80                              | 82/86                    | 2400                           |
|                               | H1509S-2WR2  |                                     | 9                         | 222/23                          | 50/80                              | 83/87                    | 1000                           |
|                               | H1512S-2WR2  |                                     | 12                        | 166/17                          | 50/80                              | 83/87                    | 560                            |
|                               | H1515S-2WR2  |                                     | 15                        | 133/13                          | 50/80                              | 83/87                    | 560                            |
|                               | H1524S-2WR2  |                                     | 24                        | 83/8                            | 50/80                              | 83/87                    | 220                            |
|                               | H2403S-2WR2  | 24<br>(21.6~26.4)                   | 3.3                       | 606/60                          | 50/80                              | 81/84                    | 2400                           |
|                               | H2405S-2WR2  |                                     | 5                         | 400/40                          | 50/80                              | 82/86                    | 2400                           |
|                               | H2409S-2WR2  |                                     | 9                         | 222/23                          | 50/80                              | 83/87                    | 1000                           |
|                               | H2412S-2WR2  |                                     | 12                        | 166/17                          | 50/80                              | 83/87                    | 560                            |
|                               | H2415S-2WR2  |                                     | 15                        | 133/13                          | 50/80                              | 83/87                    | 560                            |
|                               | H2424S-2WR2  |                                     | 24                        | 83/8                            | 50/80                              | 83/87                    | 220                            |

Note: 1. Due to space limitations, the above is only a list of representative products. For products not included in this list, please contact our Sales Department.

2. The maximum capacitive load indicates the maximum capacitive load that can be connected to +Vo or -Vo. If this value is exceeded, the product will not start properly.

Test Conditions: Unless otherwise specified, all parameter measurements were taken at the nominal input voltage, with a purely resistive rated load, and at an ambient temperature of 25° C.

Input characteristics

| Items                                | Working conditions  | Min.                | Typ.   | Max.  | Unit |
|--------------------------------------|---------------------|---------------------|--------|-------|------|
| Input Current<br>(Full Load/No Load) | 3.3VDC input series | --                  | 756/15 | --/25 | mA   |
|                                      | 5VDC input series   | --                  | 454/10 | --/15 |      |
|                                      | 9VDC input series   | --                  | 250/8  | --/12 |      |
|                                      | 12VDC input series  | --                  | 186/8  | --/12 |      |
|                                      | 15VDC input series  | --                  | 148/8  | --/12 |      |
|                                      | 24VDC input series  | --                  | 92/4   | --/6  |      |
| Reflected ripple current             |                     | --                  | 15     | --    | mA   |
| Impulse voltage<br>(I sec. max)      | 3.3VDC input series | -0.7                | --     | 5     | VDC  |
|                                      | 5VDC input series   | -0.7                | --     | 9     |      |
|                                      | 9VDC input series   | -0.7                | --     | 15    |      |
|                                      | 12VDC input series  | -0.7                | --     | 18    |      |
|                                      | 15VDC input series  | -0.7                | --     | 21    |      |
|                                      | 24VDC input series  | -0.7                | --     | 30    |      |
| Input filter type                    |                     | Capacitor filtering |        |       |      |
| Hot swap                             |                     | Not supported       |        |       |      |

Output characteristics

| Items                         | Operating and test conditions                             |               | Min. | Typ. | Max.  | Unit  |
|-------------------------------|-----------------------------------------------------------|---------------|------|------|-------|-------|
| Output load                   | Load percentage                                           |               | 10   | --   | 100   | %     |
| Output voltage accuracy       | See the error envelope curve                              |               | --   | --   | ±15.0 | %     |
| Line Regulation               | Input voltage variation: ±1%                              | 3.3V output   | --   | --   | ±1.5  | %     |
|                               |                                                           | Others        | --   | --   | ±1.2  | %     |
| Load Regulation               | 10%~100% load                                             | 3.3VDC output | --   | 18   | --    | %     |
|                               |                                                           | 5VDC output   | --   | 12   | --    | %     |
|                               |                                                           | 9VDC output   | --   | 8    | --    | %     |
|                               |                                                           | 12VDC output  | --   | 7    | --    | %     |
|                               |                                                           | 15VDC output  | --   | 6    | --    | %     |
|                               |                                                           | 24VDC output  | --   | 5    | --    | %     |
| Ripple & Noise                | Pure resistive load, 20 MHz bandwidth, peak-to-peak value |               | --   | 50   | 120   | mVp-p |
| Temperature drift coefficient | Full load                                                 |               | --   | --   | ±0.03 | %/° C |

|                                 |                                                          |
|---------------------------------|----------------------------------------------------------|
| Output short-circuit protection | Sustainable short-circuit protection, automatic recovery |
|---------------------------------|----------------------------------------------------------|

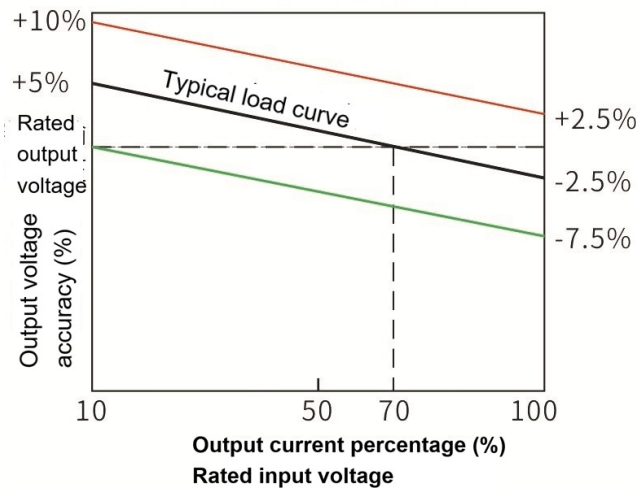
Note: ① Test method for ripple and noise: Twisted-pair test method.

General characteristics

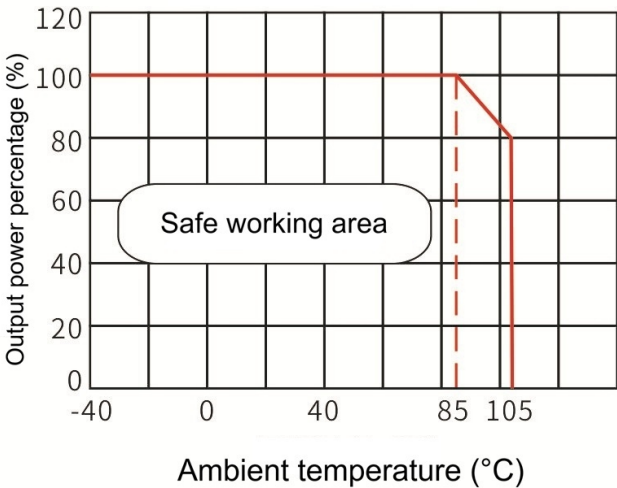
| Items                                | Working conditions                                                     | Min.                                                     | Typ. | Max. | Unit |
|--------------------------------------|------------------------------------------------------------------------|----------------------------------------------------------|------|------|------|
| Insulation voltage                   | Input-output, test duration: 1 minute, leakage current less than 1 mA. | 6000                                                     | --   | --   | VDC  |
| Insulation resistance                | Input-output, insulation voltage 500 VDC.                              | 1000                                                     | --   | --   | MΩ   |
| Isolation capacitor                  | Input-Output, 100 kHz/0.1 V                                            | --                                                       | 40   | --   | pF   |
| Operating temperature                | Use the reference temperature derating curve                           | -40                                                      | --   | +85  | ℃    |
| Storage temperature                  |                                                                        | -40                                                      | --   | +125 |      |
| Maximum operating case temperature   |                                                                        | --                                                       | 25   | --   |      |
| Storage humidity                     | No condensation                                                        | 5                                                        | --   | 95   | %RH  |
| Pin soldering temperature resistance | The solder joint is 1.5 mm from the housing; 10 seconds                | --                                                       | --   | +300 | ℃    |
| Switching frequency                  | Full load, rated voltage input                                         | --                                                       | 100  | --   | KHz  |
| Vibration                            |                                                                        | 10-55Hz, 10G, 30 Min. along X, Y and Z                   |      |      |      |
| Housing material                     |                                                                        | Black flame-retardant, heat-resistant plastic (UL94 V-0) |      |      |      |
| Minimum mean time between failures   | MIL-HDBK-217F@25℃                                                      | 3.5X10 <sup>6</sup>                                      | --   | --   | Hrs  |

Product Performance Curve

Error Envelope Curve



Temperature derating curve

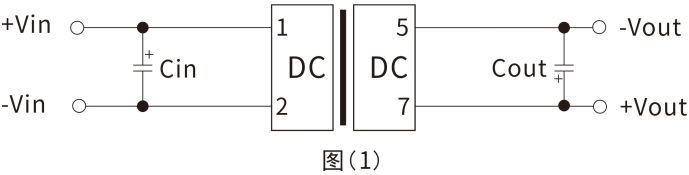


Typical Application Reference Circuit (Recommended Parameters)

1. General applications:

If further reduction of input and output ripple is required, a capacitor filter network can be connected across the input and output terminals; the circuit is shown in Figure 1.

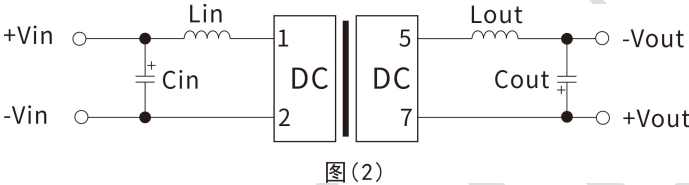
However, care must be taken to select an appropriate filter capacitor. If the capacitor is too large, it is likely to cause startup issues. For each output channel, the recommended capacitive load values—which ensure safe and reliable operation—are listed in Table 1.



Recommended capacitive load values (Table 1)

| Vin (Vdc) | Cin(u F) | Vo(Vdc) | Cout(u F) |
|-----------|----------|---------|-----------|
| 3.3/5     | 4.7      | 3.3/5   | 10        |
| 12        | 2.2      | 9       | 4.7       |
| 15        | 2.2      | 12      | 2.2       |
| 24        | 1        | 15      | 1         |
| —         | —        | 24      | 0.47      |

2. Typical EMI application circuits



Recommended EMI reference circuit values (Table 2)

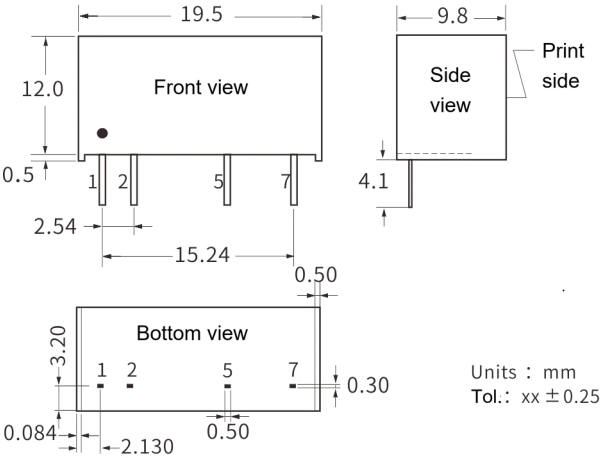
| Vin (Vdc) | 3.3/5/12/15/24 |
|-----------|----------------|
| Cin       | 4.7u F/50V     |
| Cout      | See table 1    |
| Lin       | 4.7uH          |
| Lout      | 4.7uH          |

3. Output load requirements

To ensure that this module operates efficiently and reliably, the minimum output load must not be less than 10% of the rated load during use. If your power requirement is indeed very low, please connect a resistor in parallel between the positive and negative terminals of the output (the total power rating of the resistor must be greater than or equal to 10% of the rated power, and the selected resistor's power rating must be at least 5 times greater than the actual power consumption; otherwise, the resistor will become excessively hot).

Appearance Dimensions and Pin Assignment, Recommended PCB Layout

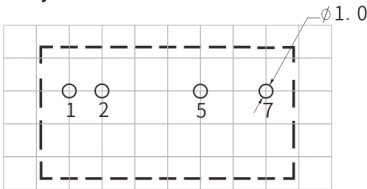
1) Appearance Dimensions (Unit: mm, Tol.: xx ±0.25)



2) Pin Assignment

| 1       | 2       | 3      | 4      | 5        | 6      | 7        |
|---------|---------|--------|--------|----------|--------|----------|
| +Vin    | -Vin    | No Pin | No Pin | -Vout    | No Pin | +Vout    |
| + input | - input | No pin | No pin | - output | No pin | + output |

3) Recommended layout



\*Note: If the pin assignment of the power module is different from those in the selection guide, refer to the labels on the actual product.

Package Description

| Package code | L x W x H           |                           |
|--------------|---------------------|---------------------------|
| S            | 19.5 x 9.8x 12.5 mm | 0.768 × 0.386 × 0.492inch |

Test Application Reference

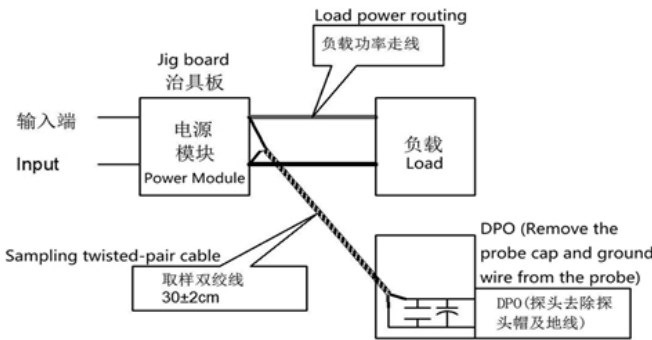
Ripple & Noise Testing: (Twisted-pair method, 20 MHz bandwidth)

Test Method:

1. For ripple and noise testing, use a Category 12 twisted-pair cable. Set the oscilloscope bandwidth to 20 MHz and use a 100 MHz bandwidth probe. Connect a 0.1 μF polypropylene capacitor and a 4.7 μF high-frequency, low-impedance electrolytic capacitor in parallel at the probe tip. Set the oscilloscope to “Sample” mode.

2. Schematic diagram for output ripple and noise testing:

Connect the power supply input to the power source. Connect the power supply output to the electronic load via the fixture board. For testing, use a 30 cm ± 2 cm sampling lead to take a direct sample from the power supply output port. Select insulated wires with appropriate gauge based on the magnitude of the output current.



## Application Precautions

1. Input Requirements: Ensure that the output voltage fluctuation range of the power supply does not exceed the input requirements of the DC/DC module itself; the output power of the input power supply must be greater than the output power of the DC/DC module.
2. Recommended Circuit 1: For applications with general ripple and noise requirements, a filter capacitor can be connected in parallel at both the input and output terminals. The external circuit is shown in Figure (1) below; refer to Table (1). Output Load Requirements: Avoid operating under no-load conditions whenever possible. When the actual power consumption of the load is less than 10% of the module's rated output power or no-load conditions occur, it is recommended to connect a dummy load to the output. The dummy load (resistor) can be calculated based on 5-10% of the module's rated power, where the resistance value =  $U_{out} / (1W \times R^2 \times 10\%)$ ;
3. Overload Protection: Under normal operating conditions, the product's output circuit does not provide overload protection. Prolonged overload will trigger over-temperature protection, causing the output to shut down;
4. The output features continuous short-circuit protection with automatic recovery.
5. The capacitance of the external capacitor connected to the output should not be too large, as this may cause overcurrent or poor startup during module startup;
6. If the product operates below the minimum required load, performance compliance with all specifications in this manual cannot be guaranteed;
7. Maximum capacitive loads are tested within the input voltage range and under full-load conditions;
8. Unless otherwise specified, all specifications in this manual are measured at  $T_a=25^\circ\text{C}$ , humidity  $<75\%$  RH, nominal input voltage, and rated output load;
9. All test methods for the specifications in this manual are based on our company's standards;
10. We offer product customization; please contact our technical or sales staff directly for details;
11. Product specifications are subject to change without notice.

## Contact

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