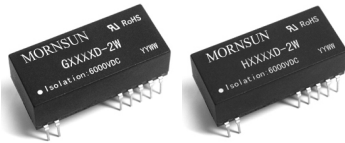


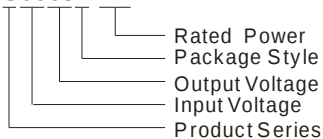
## G\_D-2W & H\_D-2W Series

2W, FIXED INPUT, 6000V ISOLATED & UNREGULATED  
DUAL/SINGLE OUTPUT DC-DC CONVERTER



### PART NUMBER SYSTEM

G0505D-2W



### PRODUCT FEATURES

- Efficiency up to 81%
- Up to 6KVDC Isolation
- DIP Package
- Low Isolation Capacitance
- Operating Temperature Range: -40°C to +85°C
- Low Temperature rise
- Internal SMD Construction
- No External Component Required
- Continuous short circuit protection
- Industry Standard Pinout
- Meets UL Approval

### APPLICATIONS

The G\_D-2W & H\_D-2W Series are designed for application where isolated output is required from a distributed power system.

These products apply to where:

- 1) Input voltage variation  $\leq \pm 10\%$ ;
- 2) 6KVDC input and output isolation;
- 3) Regulated and low ripple noise is not required.

Such as: digital circuits, low frequency analog circuits, and IGBT power device driving circuits.

### SELECTION GUIDE

| Model Number | Input Voltage(VDC)<br>Nominal<br>(Range) | Output Voltage<br>(VDC) | Output Current<br>(mA) |          | Input Current<br>(mA)(typ.) |             | Reflected<br>Ripple<br>Current<br>(mA,typ.) | Max.<br>Capacitive<br>Load( $\mu$ F) | Efficiency<br>(%, typ.)<br>@Max. Load | Approval |
|--------------|------------------------------------------|-------------------------|------------------------|----------|-----------------------------|-------------|---------------------------------------------|--------------------------------------|---------------------------------------|----------|
|              |                                          |                         | Max.                   | Min.     | @Max.<br>Load               | @No<br>Load |                                             |                                      |                                       |          |
| H0505D-2W    | 5<br>(4.5-5.5)                           | 5                       | 400                    | 40       | 547                         | 60.3        | 60.6                                        | 220                                  | 75                                    | UL       |
| H0509D-2W    |                                          | 9                       | 222                    | 23       | 492                         | 52.1        | 72.5                                        |                                      | 76                                    | UL       |
| H0512D-2W    |                                          | 12                      | 167                    | 17       | 504                         | 58.1        | 71.2                                        |                                      | 78                                    | UL       |
| H0515D-2W    |                                          | 15                      | 133                    | 13       | 505                         | 54.9        | 70.3                                        |                                      | 77                                    | UL       |
| G0505D-2W    |                                          | $\pm 5$                 | $\pm 200$              | $\pm 20$ | 533                         | 57.7        | 68.7                                        | 100                                  | 75                                    | UL       |
| G0509D-2W    |                                          | $\pm 9$                 | $\pm 111$              | $\pm 12$ | 498                         | 52.6        | 88.1                                        |                                      | 77                                    | UL       |
| G0512D-2W    |                                          | $\pm 12$                | $\pm 84$               | $\pm 9$  | 512                         | 59.9        | 78.1                                        |                                      | 79                                    | UL       |
| G0515D-2W    |                                          | $\pm 15$                | $\pm 67$               | $\pm 7$  | 502                         | 53.3        | 68.7                                        |                                      | 78                                    | UL       |
| H1205D-2W    | 12<br>(10.8-13.2)                        | 5                       | 400                    | 40       | 217                         | 20.5        | 54                                          | 220                                  | 75                                    | UL       |
| H1209D-2W    |                                          | 9                       | 222                    | 23       | 215                         | 26.9        | 79                                          |                                      | 78                                    | UL       |
| H1212D-2W    |                                          | 12                      | 167                    | 17       | 204                         | 25.4        | 69                                          |                                      | 80                                    | UL       |
| H1215D-2W    |                                          | 15                      | 133                    | 14       | 214                         | 24.3        | 89.5                                        |                                      | 78                                    | UL       |
| G1205D-2W    |                                          | $\pm 5$                 | $\pm 200$              | $\pm 20$ | 215                         | 23.2        | 79                                          | 100                                  | 76                                    | UL       |
| G1209D-2W    |                                          | $\pm 9$                 | $\pm 111$              | $\pm 12$ | 207                         | 22.8        | 94                                          |                                      | 78                                    | UL       |
| G1212D-2W    |                                          | $\pm 12$                | $\pm 84$               | $\pm 9$  | 206                         | 22.9        | 37.5                                        |                                      | 80                                    | UL       |
| G1215D-2W    |                                          | $\pm 15$                | $\pm 67$               | $\pm 7$  | 212                         | 26.9        | 90                                          |                                      | 78                                    | UL       |
| H1505D-2W    | 15<br>(13.5-16.5)                        | 5                       | 400                    | 40       | 170                         | 20.6        | 64.4                                        | 220                                  | 75                                    |          |
| H1515D-2W    |                                          | 15                      | 133                    | 14       | 165                         | 15.4        | 62.5                                        |                                      | 81                                    |          |
| G1515D-2W    |                                          | $\pm 15$                | $\pm 67$               | $\pm 7$  | 166                         | 15.5        | 76.8                                        | 100                                  | 77                                    |          |
| H2405D-2W    | 24<br>(21.6-26.4)                        | 5                       | 400                    | 40       | 109                         | 10.8        | 158.9                                       | 220                                  | 77                                    |          |
| H2409D-2W    |                                          | 9                       | 222                    | 23       | 101                         | 10.1        | 62.5                                        |                                      | 78                                    |          |
| H2412D-2W    |                                          | 12                      | 167                    | 17       | 100                         | 9.3         | 155.6                                       |                                      | 81                                    |          |
| H2415D-2W*   |                                          | 15                      | 133                    | 14       | 100                         | 9.1         | 137.5                                       |                                      | 80                                    |          |
| G2405D-2W*   |                                          | $\pm 5$                 | $\pm 200$              | $\pm 20$ | 104                         | 16.6        | 86.7                                        | 100                                  | 77                                    |          |
| G2409D-2W    |                                          | $\pm 9$                 | $\pm 111$              | $\pm 12$ | 99                          | 9.6         | 98.5                                        |                                      | 78                                    |          |
| G2412D-2W    |                                          | $\pm 12$                | $\pm 84$               | $\pm 9$  | 99                          | 9.3         | 102.7                                       |                                      | 81                                    |          |
| G2415D-2W    |                                          | $\pm 15$                | $\pm 67$               | $\pm 7$  | 100                         | 9.2         | 113.6                                       |                                      | 80                                    |          |

Note: \*Designing. The G\_D-1W/H\_D-1W series also are available in our company.

## INPUT SPECIFICATIONS

| Item                             | Test Conditions    | Min.     | Typ. | Max. | Unit |
|----------------------------------|--------------------|----------|------|------|------|
| Input Surge Voltage (1sec. max.) | 5VDC Input Models  | -0.7     | --   | 9    | VDC  |
|                                  | 12VDC Input Models | -0.7     | --   | 18   |      |
|                                  | 15VDC Input Models | -0.7     | --   | 21   |      |
|                                  | 24VDC Input Models | -0.7     | --   | 30   |      |
| Input Filter                     |                    | C Filter |      |      |      |

## OUTPUT SPECIFICATIONS

| Item                     | Test Conditions             | Min.                         | Typ. | Max.  | Unit  |
|--------------------------|-----------------------------|------------------------------|------|-------|-------|
| Output Power             |                             | 0.2                          | --   | 2     | W     |
| Output Voltage Accuracy  |                             | See tolerance envelope graph |      |       |       |
| Output Voltage Balance   | Dual Output, Balanced Loads | --                           | ±0.5 | ±1    | %     |
| Line Regulation          | For Vin change of ±1%       | --                           | --   | ±1.2  |       |
| Load Regulation          | 10% to 100% load            | 5V output                    | 10   | 15    |       |
|                          |                             | 9V output                    | 8.3  | 15    |       |
|                          |                             | 12V output                   | 6.8  | 15    |       |
|                          |                             | 15V output                   | 6.3  | 15    |       |
| Temperature Drift        | 100% full load              | --                           | --   | ±0.03 | %/°C  |
| Ripple & Noise*          | 20MHz Bandwidth             | --                           | 150  | 250   | mVp-p |
| Short Circuit Protection |                             | Continuous                   |      |       |       |

Note: Dual output models unbalanced load: ±5%.  
 \*Ripple and noise tested by "parallel cable" method. See detailed operation instructions at Testing of Power Converter section, application notes.

## COMMON SPECIFICATIONS

| Item                  | Test Conditions                            | Min.             | Typ. | Max. | Unit    |
|-----------------------|--------------------------------------------|------------------|------|------|---------|
| Isolation Voltage     | Tested for 1 minute and 1mA max            | 6000             | --   | --   | VDC     |
| Isolation Resistance  | Test at 500VDC                             | 1000             | --   | --   | MΩ      |
| Isolation Capacitance | Input/Output, 100KHz/1V                    | --               | 3.5  | --   | pF      |
| Switching Frequency   | Full load, nominal input(5V Input)         | --               | 35   | --   | KHz     |
|                       | Full load, nominal input(12V,15V,24VInput) | --               | 50   | --   |         |
| MTBF                  | MIL-HDBK-217F@25°C                         | 3500             | --   | --   | K hours |
| Case Material         |                                            | Plastic(UL94-V0) |      |      |         |
| Weight                |                                            | --               | 8.2  | --   | g       |

## ENVIRONMENTAL SPECIFICATIONS

| Item                    | Test Conditions                | Min.                | Typ. | Max. | Unit |
|-------------------------|--------------------------------|---------------------|------|------|------|
| Storage Humidity        | Non condensing                 | --                  | --   | 95   | %    |
| Operating Temperature   | Power derating (above 85°C)    | -40                 | --   | 85   | °C   |
| Storage Temperature     |                                | -55                 | --   | 125  |      |
| Temp. rise at full load |                                | --                  | 25   | --   |      |
| Soldering Temperature   | 1.5mm from case for 10 seconds | --                  | --   | 300  |      |
| Cooling                 |                                | Free air convection |      |      |      |

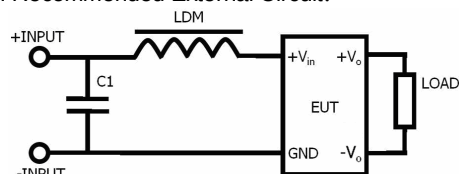
## EMC SPECIFICATIONS

|     |     |                                                               |
|-----|-----|---------------------------------------------------------------|
| EMI | CE  | CISPR22/EN55022 CLASS A (External Circuit Refer to Figure1,2) |
| EMS | ESD | IEC/EN61000-4-2 Contact ±8KV perf. Criteria B                 |

## EMC RECOMMENDED CIRCUIT

G15XXD-2W, G24XXD-2W and H15XXD-2W already meet CLASS A, for other models following Figure 1,2.

EMI Recommended External Circuit:



(Figure 1)

G\_D-2W Series

Recommended external circuit parameters:

Vin: 5V

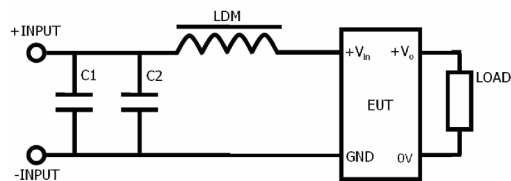
① C1: 4.7μF/50V 1210

② LDM: 6.8μH

Vin: 12V

① C1: 1μF/50V 1210

② LDM: 4.7μH



(Figure 2)

## H\_D-2W Series

Recommended external circuit parameters:

Vin: 5V

① C1: 4.7μF/50V 1210

② LDM: 6.8μH

Vin: 12V

C1: 4.7μF/50V 1210

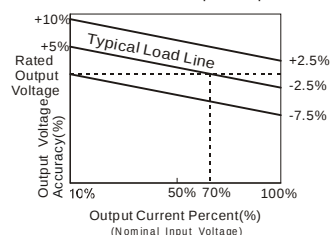
Vin: 24V

① C1、C2: 4.7μF/50V 1210

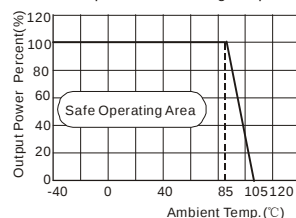
② LDM: 6.8μH

## PRODUCT TYPICAL CURVE

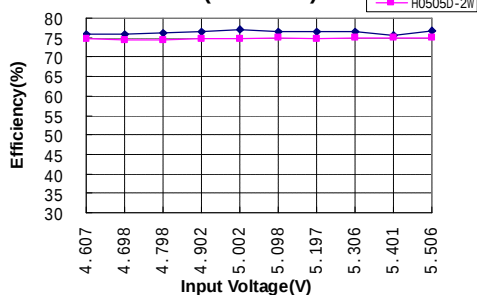
Tolerance Envelope Graph



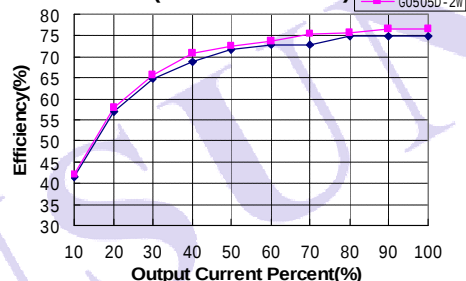
Temperature Derating Graph



Efficiency VS Input Voltage curve (Full Load)

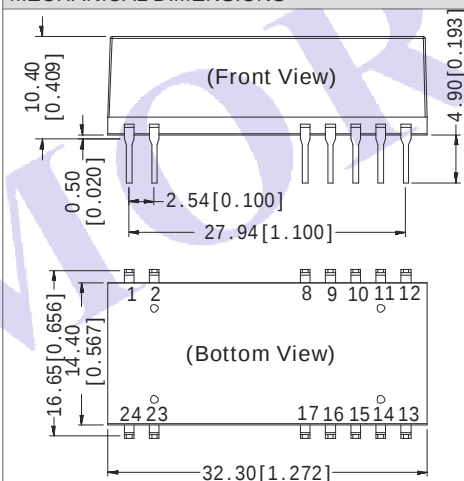


Efficiency VS Output Load curve (Vin=Vin-nominal)



## OUTLINE DIMENSIONS, RECOMMENDED FOOTPRINT & PACKAGING

### MECHANICAL DIMENSIONS



Note:  
Unit:mm(inch)  
Pin section:0.50\*0.30mm(0.020\*0.012inch)  
Pin section tolerances:±0.10mm(±0.004inch)  
General tolerances:±0.25mm(±0.010inch)

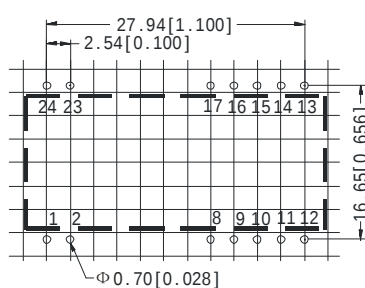
#### FOOTPRINT DETAILS

| Pin    | Single | Dual |
|--------|--------|------|
| 1      | Vin    | Vin  |
| 2      | GND    | GND  |
| 8,17   | NC     | -Vo  |
| 10,15  | 0V     | 0V   |
| 12,13  | +Vo    | +Vo  |
| Others | NC     | NC   |

NC:No Connection

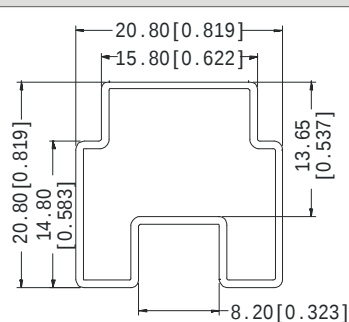
### RECOMMENDED FOOTPRINT

#### Single/Dual



Note: Grid 2.54\*2.54mm.

### TUBE OUTLINE DIMENSIONS

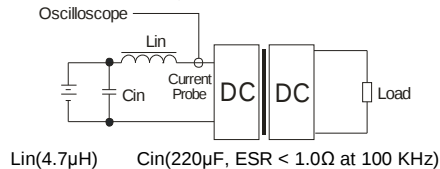


Note:  
Unit :mm[inch]  
General tolerances: ±0.50mm [±0.020inch]  
L=530mm[20.866inch] Tube Quantity: 15pcs  
L=220mm[8.661inch] Tube Quantity: 8pcs  
Short tube inner packaging dimensions: L\*W\*H=255\*170\*80mm;  
Short tube outer packaging dimensions(with six inner packaging boxes):  
L\*W\*H=375\*280\*270mm;  
Long tube inner packaging dimensions: L\*W\*H=580\*200\*100mm;  
Long tube outer packaging dimensions(with two inner packaging boxes):  
L\*W\*H=600\*215\*220mm;  
Long tube outer packaging dimensions(with three inner packaging boxes):  
L\*W\*H=600\*215\*325mm.

## TEST CONFIGURATIONS

### Input Reflected-Ripple Current Test Setup

Input reflected-ripple current is measured with an inductor  $L_{in}$  and Capacitor  $C_{in}$  to simulate source impedance.



## DESIGN CONSIDERATIONS

### 1) Requirement on output load

To ensure this module can operate efficiently and reliably, During operation, the minimum output load **could not be less than 10% of the full load**. If the actual output power is very small, please connect a resistor with proper resistance at the output end in parallel to increase the load, or use our company's products with a lower rated output power (G/H\_D-1Wseries).

### 2) Overload Protection

Under normal operating conditions, the output circuit of these products has no protection against overload. The simplest method is to connect a self-recovery fuse in series at the input end or add a circuit breaker to the circuit.

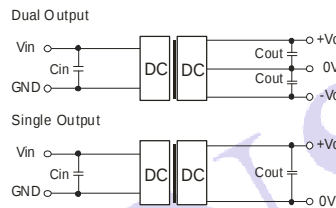
#### Input Fuse Selection Guide

|                    |                       |                    |                      |
|--------------------|-----------------------|--------------------|----------------------|
| 5VDC Input Models  | 1000mA slow-Blow Type | 15VDC Input Models | 250mA slow-Blow Type |
| 12VDC Input Models | 500mA slow-Blow Type  | 24VDC Input Models | 250mA slow-Blow Type |

### 3) Recommended circuit

If you want to further decrease the input/output ripple, an capacitor filtering network may be connected to the input and output ends of the DC/DC converter, see (Figure 3).

It should also be noted that the capacitance of filter capacitor must be proper. If the capacitance is too big, a startup problem might arise. For every channel of output, provided the safe and reliable operation is ensured, the recommended capacitance of its filter capacitor sees (Table 1).



(Figure 3)

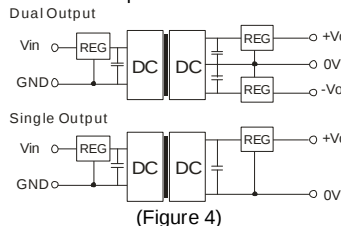
EXTERNAL CAPACITOR TABLE (TABLE 1)

| $V_{in}$<br>(VDC) | $C_{in}$<br>( $\mu F$ ) | Single<br>$V_{out}$<br>(VDC) | $C_{out}$<br>( $\mu F$ ) | Dual<br>$V_{out}$<br>(VDC) | $C_{out}$<br>( $\mu F$ ) |
|-------------------|-------------------------|------------------------------|--------------------------|----------------------------|--------------------------|
| 5                 | 4.7                     | 5                            | 10                       | $\pm 5$                    | 4.7                      |
| 12                | 2.2                     | 9                            | 4.7                      | $\pm 9$                    | 2.2                      |
| 15                | 2.2                     | 12                           | 2.2                      | $\pm 12$                   | 1                        |
| 24                | 1                       | 15                           | 1                        | $\pm 15$                   | 1                        |

It's not recommended to connect any external capacitor in the application field with less than 0.5 watt output.

### 4) Output Voltage Regulation and Over-voltage Protection Circuit

The simplest device for output voltage regulation, over-voltage and over-current protection is a linear regulator and an capacitor filtering network with overheat protection that is connected to the input or output end in series (Figure 4), the recommended capacitance of its filter capacitor sees (Table 1), linear regulator based on the actual voltage and current required.



(Figure 4)

### 5) Cannot use in parallel and hot swap

Note:

- Operation under minimum load will not damage the converter; However, they may not meet all specification listed.
- Max. Capacitive Load tested at input voltage range and full load.
- All specifications measured at  $T_a=25^\circ C$ , humidity<75%, nominal input voltage and rated output load unless otherwise specified.
- In this datasheet, all the test methods of indications are based on our corporate standards.
- All characteristics are for listed model only, non-standard models may perform differently, please contact our technical person for more detail.
- Contact us for your specific requirement.
- Specifications subject to change without prior notice.

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