

## H\_RN-2W & H\_LT-2W Series

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



### FEATURES

- High Efficiency up to 80%
- DIP/SMD Package
- 6kVDC Isolation
- Temperature Range: -40°C ~ +85°C
- Internal SMD Construction
- No Heatsink Required
- No External Component Required
- Continuous Short Circuit Protection
- Industry Standard Pinout
- RoHS Compliance

### APPLICATIONS

The H\_RN-2W&H\_LT-2W series are specially designed for applications where a group of polar power supplies are isolated from the input power supply in a distributed power supply system on a circuit board.

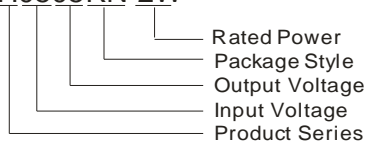
These products apply to:

- 1) Where the voltage of the input power supply is fixed (voltage variation  $\leq \pm 10\%$ );
- 2) Where isolation is necessary between input and output (isolation voltage  $\leq 6000\text{VDC}$ );
- 3) Where the regulation of the output voltage and the output ripple noise are not demanding.

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

### MODEL SELECTION

H0505RN-2W



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### PRODUCT PROGRAM

| Part Number | Input         |           | Output        |              |      | Efficiency (% , Typ.) | Certificate |    |         |
|-------------|---------------|-----------|---------------|--------------|------|-----------------------|-------------|----|---------|
|             | Voltage (VDC) |           | Voltage (VDC) | Current (mA) |      |                       |             |    |         |
|             | Nominal       | Range     |               | Max.         | Min. |                       |             |    |         |
| H0503RN-2W  | 5             | 4.5-5.5   | 3.3           | 606          | 60   | 71                    |             |    |         |
| H0505RN-2W  |               |           | 5             | 400          | 40   | 76                    | CE60601     |    |         |
| H0512RN-2W  |               |           | 12            | 167          | 17   | 79                    | CE60601     |    |         |
| H0515RN-2W  |               |           | 15            | 133          | 13   | 78                    | CE60601     |    |         |
| H0505LT-2W  |               |           | 5             | 400          | 40   | 76                    | CE60601     |    |         |
| H0512LT-2W  |               |           | 12            | 167          | 17   | 79                    | CE60601     |    |         |
| H0515LT-2W  |               |           | 15            | 133          | 13   | 78                    | CE60601     |    |         |
| H1205RN-2W  |               |           | 12            | 10.8-13.2    | 5    | 400                   | 40          | 76 | CE60601 |
| H1212RN-2W  | 12            | 167       |               |              | 17   | 80                    | CE60601     |    |         |
| H1215RN-2W  | 15            | 133       |               |              | 13   | 79                    | CE60601     |    |         |
| H1205LT-2W  | 5             | 400       |               |              | 40   | 76                    | CE60601     |    |         |
| H1212LT-2W  | 12            | 167       |               |              | 17   | 80                    | CE60601     |    |         |
| H1215LT-2W  | 15            | 133       |               |              | 13   | 79                    | CE60601     |    |         |
| H2405RN-2W  | 24            | 21.6-26.4 |               |              | 5    | 400                   | 40          | 77 | CE60601 |
| H2412RN-2W  |               |           |               |              | 12   | 167                   | 17          | 80 | CE60601 |
| H2415RN-2W  |               |           | 15            | 133          | 13   | 78                    | CE60601     |    |         |
| H2403LT-2W  |               |           | 3.3           | 400          | 40   | 71                    |             |    |         |
| H2405LT-2W  |               |           | 5             | 400          | 40   | 77                    | CE60601     |    |         |
| H2412LT-2W  |               |           | 12            | 167          | 17   | 80                    | CE60601     |    |         |
| H2415LT-2W  |               |           | 15            | 133          | 13   | 78                    | CE60601     |    |         |

### COMMON SPECIFICATIONS

| Item                     | Test Conditions                | Min.                           | Typ. | Max. | Units   |
|--------------------------|--------------------------------|--------------------------------|------|------|---------|
| Storage humidity         |                                |                                |      | 95   | %       |
| Operating temperature    |                                | -40                            |      | 85   | °C      |
| Storage temperature      |                                | -55                            |      | 125  |         |
| Temp. rise at full load  |                                |                                | 15   | 25   |         |
| Lead temperature         | 1.5mm from case for 10 seconds |                                |      | 300  |         |
| Cooling                  |                                | Free air convection            |      |      |         |
| Package material         |                                | Epoxy Resin (UL94-V0)          |      |      |         |
| Short circuit protection |                                | Continuous, automatic recovery |      |      |         |
| MTBF                     |                                | 3500                           |      |      | k hours |
| Weight                   |                                |                                | 3.8  |      | g       |

### ISOLATION SPECIFICATIONS

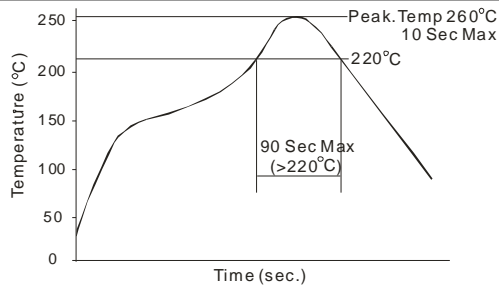
| Item                  | Test Conditions                 | Min. | Typ. | Max. | Units |
|-----------------------|---------------------------------|------|------|------|-------|
| Isolation voltage     | Tested for 1 minute and 1mA max | 6000 |      |      | VDC   |
| Isolation resistance  | Test at 500VDC                  | 1000 |      |      | MΩ    |
| Isolation capacitance |                                 |      | 10   |      | pF    |

## OUTPUT SPECIFICATIONS

| Item                    | Test Conditions               | Min.                         | Typ. | Max.  | Units |
|-------------------------|-------------------------------|------------------------------|------|-------|-------|
| Output power            |                               | 0.2                          |      | 2     | W     |
| Line regulation         | For Vin change of ±1%         |                              |      | ±1.2  | %     |
| Load regulation         | 10% to 100% load (5V output)  |                              | 12.8 | 15    |       |
|                         | 10% to 100% load (12V output) |                              | 6.8  | 15    |       |
|                         | 10% to 100% load (15V output) |                              | 6.3  | 15    |       |
| Output voltage accuracy |                               | See tolerance envelope graph |      |       |       |
| Temperature drift       | 100% full load                |                              |      | ±0.03 | %/°C  |
| Ripple & Noise*         | 20MHz Bandwidth               |                              | 150  | 200   | mVp-p |
| Switching frequency     | Full load, nominal input      |                              | 50   |       | kHz   |

\*Test ripple and noise by "parallel cable" method. See detailed operation instructions at Testing of Power Converter. Section, application notes.

## RECOMMENDED REFLOW SOLDERING PROFILE



Remark: The curve applies only to the hot air reflow soldering

## APPLICATION NOTE

### 1) Requirement On Output Load

To ensure this module can operate efficiently and reliably, a minimum load is specified for this kind of DC/DC converter in addition to a maximum load (namely full load). During operation, make sure the specified range of input voltage is not exceeded, 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.

### 2) Recommended testing and application circuit

If you want to further decrease the input/output ripple, an "LC" filtering network may be connected to the input and output ends of the DC/DC converter, see (Figure 1).

It should also be noted that the inductance and the frequency of the "LC" filtering network should be staggered with the DC/DC frequency to avoid mutual interference. However, the capacitance of the output 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).

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

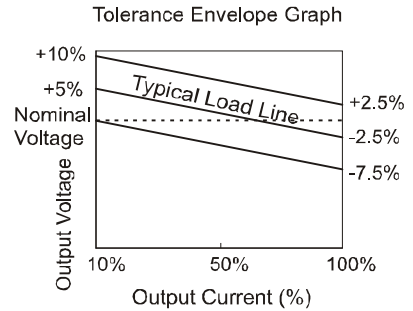
The simplest device for output voltage regulation, over-voltage and over-current protection is a linear voltage regulator with overheat protection that is connected to the input or output end in series (Figure 2).

### 4) Overload Protection

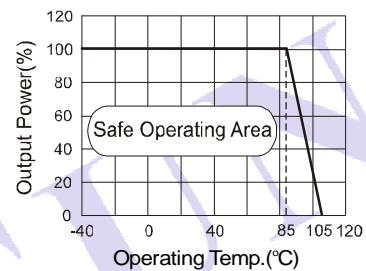
Under normal operating conditions, the output circuit of these products has no protection against overload. The simplest method is to connect a self-recovery fuse in series at the input end or add a circuit breaker to the circuit.

### 5) No parallel connection or plug and play

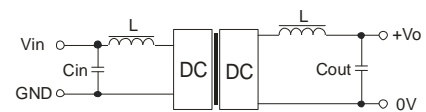
## TYPICAL CHARACTERISTICS



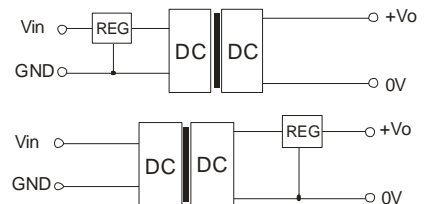
## Temperature Derating Graph



## RECOMMENDED CIRCUIT



(Figure 1)



(Figure 2)

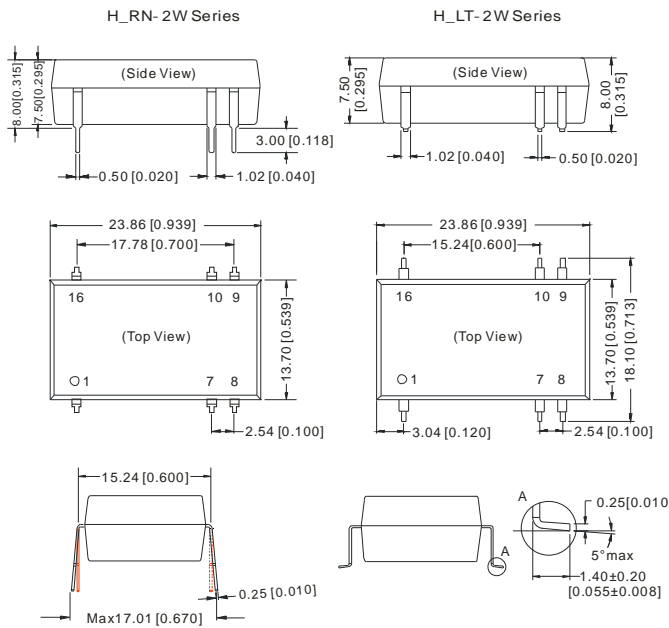
EXTERNAL CAPACITOR TABLE (TABLE 1)

| Vin (VDC) | Cin (μF) | Single Vout (VDC) | Cout (μF) |
|-----------|----------|-------------------|-----------|
| 5         | 4.7      | 5                 | 10        |
| 12        | 2.2      | 12                | 2.2       |
| 24        | 1        | 15                | 1         |

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

# OUTLINE DIMENSIONS & PIN CONNECTIONS

## MECHANICAL DIMENSIONS



| FOOTPRINT DETAILS |          |
|-------------------|----------|
| Pin               | Function |
| 1                 | GND      |
| 7                 | NC       |
| 8                 | NC       |
| 9                 | +Vo      |
| 10                | 0V       |
| 16                | Vin      |

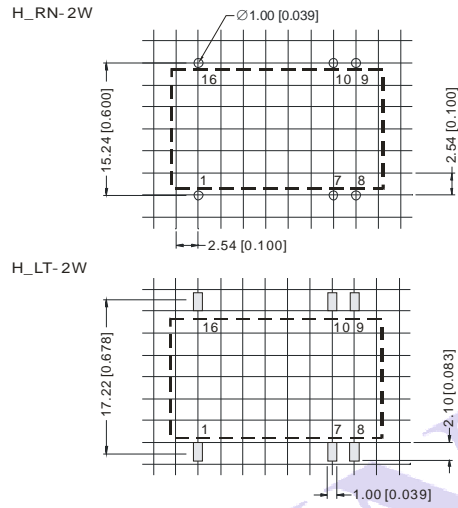
NC:No connection

Note:  
Unit:mm[inch]  
Pin section tolerances:  $\pm 0.10\text{mm}$  [ $\pm 0.004\text{inch}$ ]  
General tolerances:  $\pm 0.25\text{mm}$  [ $\pm 0.010\text{inch}$ ]

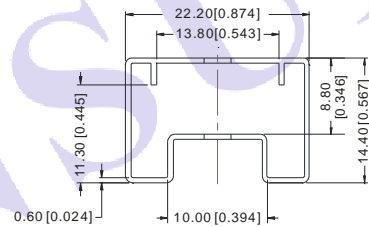
| FOOTPRINT DETAILS |          |
|-------------------|----------|
| Pin               | Function |
| 1                 | GND      |
| 7                 | NC       |
| 8                 | NC       |
| 9                 | +Vo      |
| 10                | 0V       |
| 16                | Vin      |

NC:No connection

## RECOMMENDED FOOTPRINT



## TUBE OUTLINE DIMENSIONS



Note:  
Unit:mm[inch]  
General tolerances:  $\pm 0.50\text{mm}$  [ $\pm 0.020\text{inch}$ ]

L=530mm[20.866inch] pcs/tube: 21  
L=220mm[8.661inch] pcs/tube: 8

### Note:

1. Operation under minimum load will not damage the converter; However, they may not meet all specification listed, and that will reduce the life of product.
2. All specifications measured at  $T_a=25^\circ\text{C}$ , humidity<75%, nominal input voltage and rated output load unless otherwise specified.
3. Only typical models listed, other models may be different, please contact our technical person for more details.
4. In this datasheet, all the test methods of indications are based on corporate standards.