

Thick Film Hybrid Large Power military grade DC/DC Converters (HOL100S Series)

1 Features of military grade DC/DC Converters HOL100S Series

- High reliability
- Width input voltage range : 68V ~ 110V ,
typical DC input voltage 100V
- Output power P_O : 120W ~ 150W
- Operating temperature range T_c : -55°C ~ +125°C
- Low Start-up current
- No output overshoot
- Inhibit function
- under-voltage and over-voltage lock
- Output short circuit and over-current protection
- Output voltage fine tunable
- Output sensing function
- Maximum power density : 100W/in³
- Efficiency 91%
- Hermetically sealed metal cases



Size Weight :

76.70*38.60*10.66mm³

| |
|-----------|
| HOL100S5 |
| HOL100S12 |
| HOL100S28 |

2 Scope of military grade DC/DC Converters HOL100S Series application

High-reliability electronic system for aviation and aerospace, weapon and ships
etc

3 Description of military grade DC/DC Converters HOL100S Series

This series products are high reliable hybrid thick film large power DC/DC converters. By using push-pull circuit topology and pulse width modulation principle, the output sampling voltage isolated by optocoupler to modulate the pulse width and form the closed-loop control to make the product a stable voltage output. This series products are made by thick film hybrid integrated process, hermetically sealed metal cases. Product design and manufacturing meets MIL-PRF-38534 requirements. Customers can connect the matching power EMI filters in the input port to improve the product's electromagnetic compatibility.

4 Electrical performance of military grade DC/DC Converters

HOL100S Series

Tabel2 Rated conditions and recommended operating conditions

| | |
|-------------------------------------|--|
| Absolute Max. Rated value | |
| Output voltage : 67V ~ 112V | Mechanical Shock : 1500g |
| Output power : 150W | Lead resistance to welding temperature : 300°C (15s) |
| Storage temperature : -65°C ~ 150°C | Weight : 100g |
| | ESD : 2000V |

表 3 电特性

| No. | Parameter | Conditions (Unless other wise , - 55°C ≤ T _c ≤ 125°C , V _{IN} = 28V ± 5%) | HOL100S5 | | HOL100S12 | | HOL100S28 | |
|-----|-----------------|--|----------|-----|-----------|-----|-----------|-----|
| | | | Min | Max | Min | Max | Min | Max |
| 1 | Input voltage/V | Low、 High、 Ambient Temperature | 68 | 110 | 68 | 110 | 68 | 110 |

| | | | | | | | | | |
|----|--|---|----------|------|------|-------|-------|-------|-------|
| 2 | Output voltage/V | Full load | Ambient | 4.95 | 5.05 | 11.88 | 12.12 | 27.72 | 28.28 |
| | | | Low/high | 4.95 | 5.05 | 11.88 | 12.12 | 27.50 | 28.50 |
| 3 | Output current/A | $V_{IN}=16V \sim 40V$ | | - | 24 | - | 10.9 | - | 5.3 |
| 4 | Output Power/W | | | - | 120 | - | 130 | - | 150 |
| 5 | Output Ripple Voltage/mV | BW \leq 20MHz , Full load | | - | 100 | - | 100 | - | 280 |
| 6 | Line Regulation/mV | $V_{IN}=16V \sim 40V$, Full load | | - | 50 | - | 120 | - | 280 |
| 7 | Load Regulation/mV | No load to full | | - | 50 | - | 120 | - | 280 |
| 8 | Input current/mA | Inhibited | | - | 10 | - | 10 | - | 10 |
| | | Io=no load | | - | 80 | - | 80 | - | 50 |
| 9 | Input Ripple current/mA | BW \leq 20MHz , Full load | | - | - | - | - | - | - |
| 10 | Efficiency/% | Full load | Ambient | 87 | - | 90 | - | 88 | - |
| | | | Low/high | 85 | - | 88 | - | 86 | - |
| 11 | Isolation/M Ω | Input to output or any pin to case at 500V , $T_c=25^\circ C$ | | 100 | - | 100 | - | 100 | - |
| 12 | Inhibit voltage | | | - | 0.8 | - | 0.8 | - | 0.8 |
| 13 | Inhibit open circuit voltage/V | Full load | | 9 | 14 | 9 | 14 | 9 | 14 |
| 14 | Under voltage turn-on voltage/V | Full load | | 63 | 68 | 63 | 68 | 63 | 68 |
| 15 | Under voltage cut-off voltage/V | Full load | | 60 | 65 | 60 | 65 | 60 | 65 |
| 16 | Short Circuit Protection power consumption | Full load | | - | 35 | - | 35 | - | 35 |
| 17 | Capacitive load/ μF | $T_c=25^\circ C$ | | - | 1000 | - | 1000 | - | 1000 |
| 18 | Switching | Full load | | 250 | 350 | 250 | 350 | 250 | 350 |

| | frequency/kHz | | | | | | | |
|----|-------------------------------------|--|---|-----|---|-----|---|------|
| 19 | Step Load Response Transient(mV pK) | 50%load→full load or Full load →50% load | - | 500 | - | 600 | - | 1400 |
| 20 | Step Load Response Recovery(μs) | 50%load→full load or Full load →50% load | - | 500 | - | 600 | - | 1000 |
| 21 | Step Line Response Transient(mV pK) | $V_{IN} : 16V \rightarrow 40V$, $V_{IN} : 40V \rightarrow 16V$, $I_o = \text{Full load}$ | - | - | - | - | - | - |
| 22 | Step Line Response Recovery(μs) | $V_{IN} : 16V \rightarrow 40V$, $V_{IN} : 40V \rightarrow 16V$, $I_o = \text{Full load}$ | - | - | - | - | - | - |
| 23 | Start-up Overshoot(mV pK) | $V_{IN} : 0 \rightarrow 28V$, $I_o = \text{Full load}$ | - | 50 | - | 120 | - | 280 |
| 24 | Start-up Delay (ms) | $V_{IN} : 0 \rightarrow 28V$, $I_o = \text{Full load}$ | - | 20 | - | 20 | - | 20 |

5 Circuit block diagram of military grade DC/DC Converters

HOL100S Series

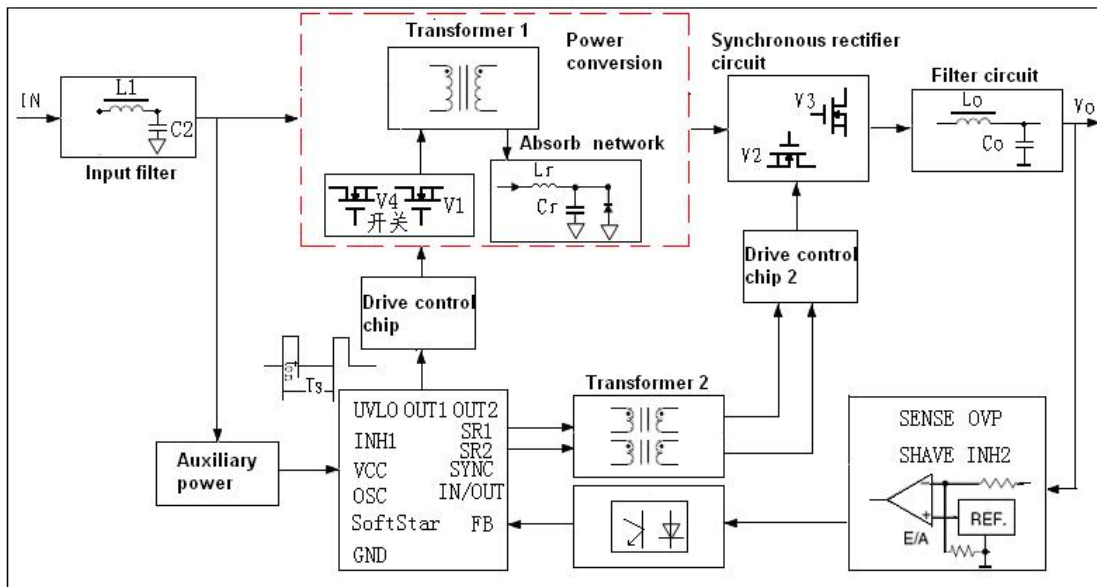


Fig 1 HOL100S Series circuit block diagram

6 Typical Performance Curves of military grade DC/DC Converters HOL100S Series

(Testing condition as per $T_c=25^\circ\text{C}$, $V_{IN}=100\text{V}\pm 5\%$, Full load, unless otherwise specified)

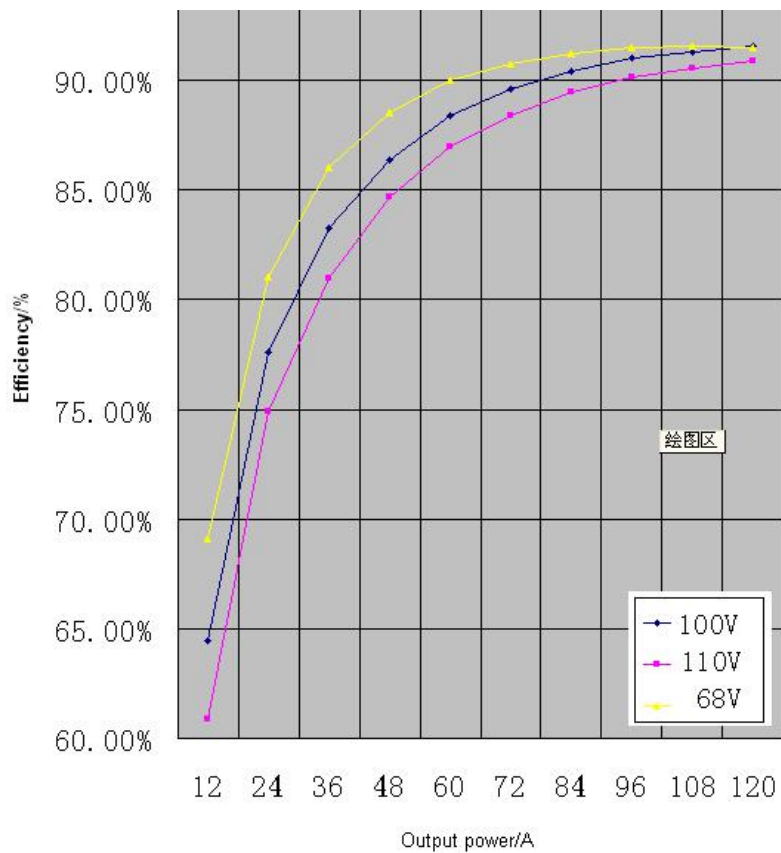


Fig 2 HOL100S9R5 Efficiency curves

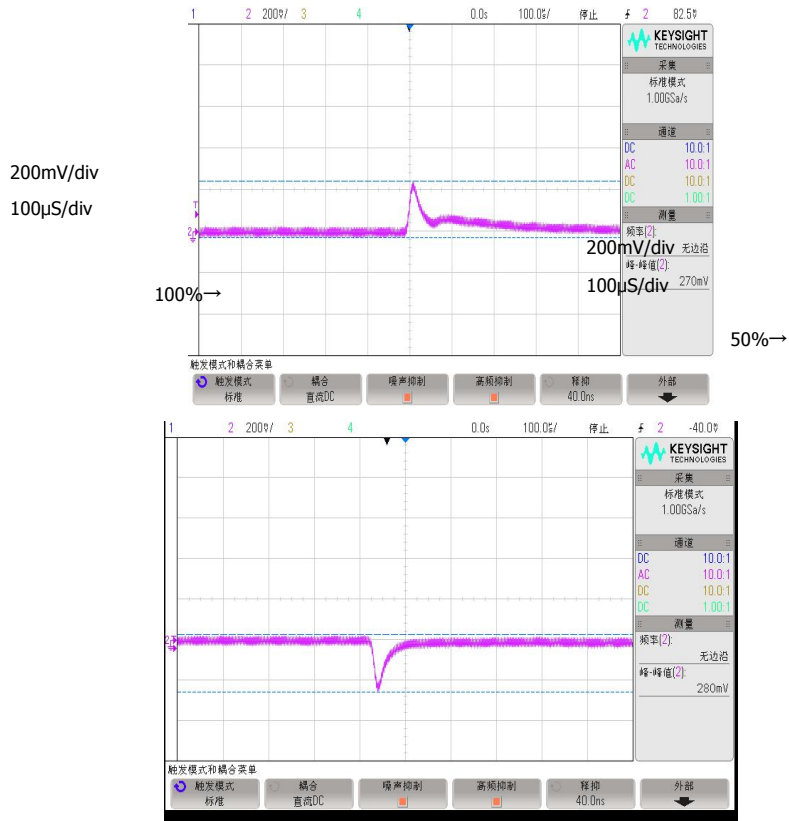


Fig 3 HOL100S9R5 Step Load Response

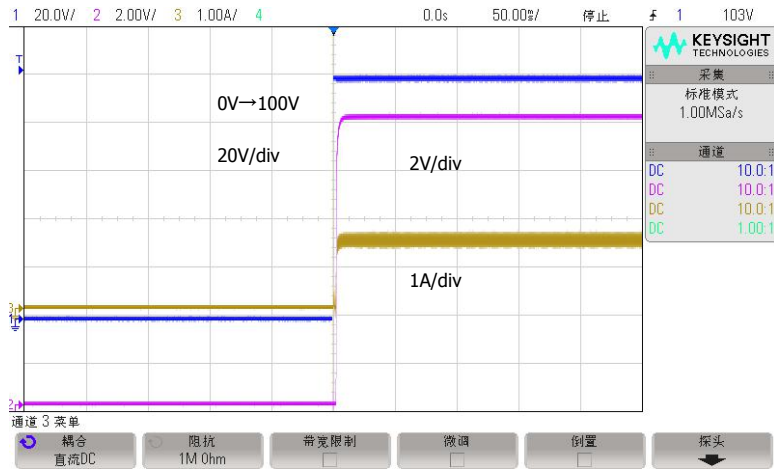


Fig 4 HOL100S9R5 Start-up Overshoot/Start-up Delay

7 MTBF Curves of military grade DC/DC Converters HOL100S Series

Temperature Curves

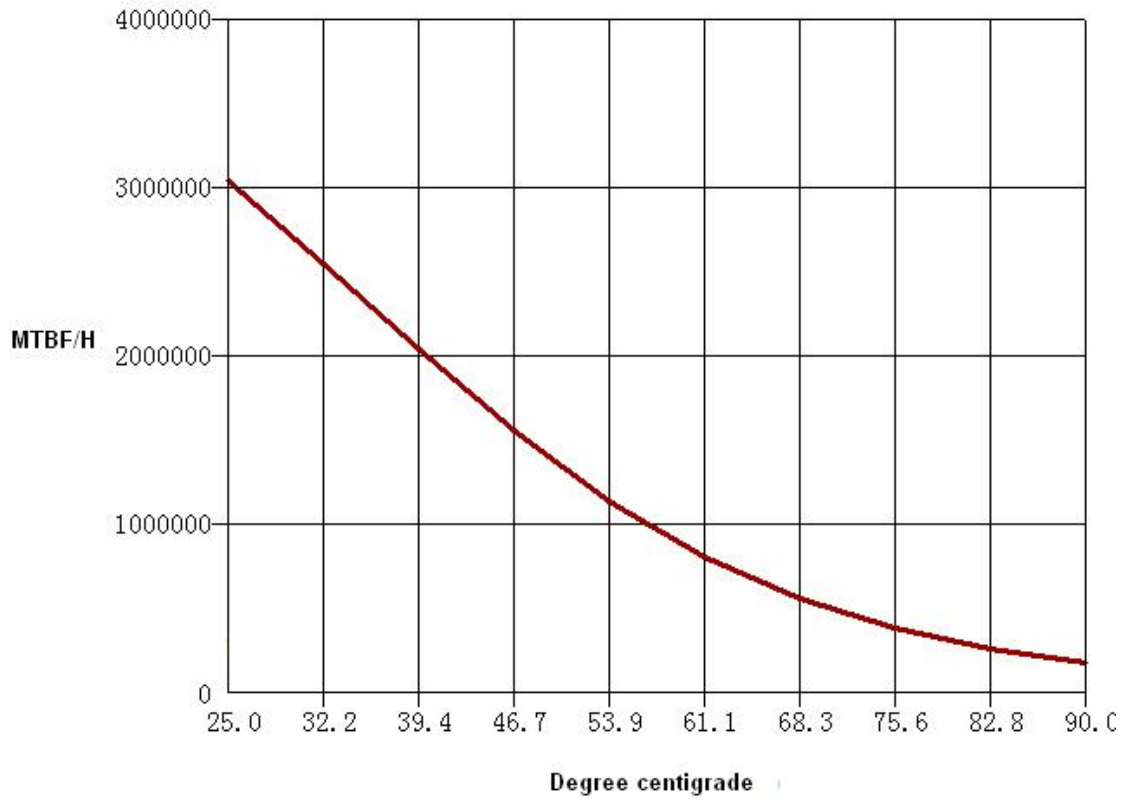


Fig 5 MTBF Temperature Curves (HOL100S9R5)

(Well ground condition)

8 Pin Designations of military grade DC/DC Converters HOL100S Series

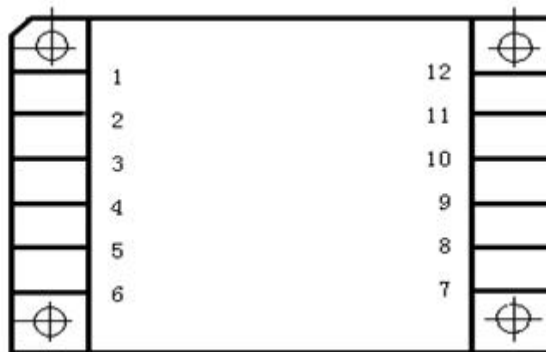


Fig 6 Pin Out Bottom View

Pin Designation

| Pin | Symbol | Designation | Pin | Symbol | Designation |
|-----|---------|-----------------|-----|---------|-------------------------|
| 1 | V_i | Positive input | 7 | V_o | Output |
| 2 | GND_i | Input ground | 8 | GND_o | Output ground |
| 3 | TRIM | Trimming | 9 | SEN- | Negative output sensing |
| 4 | INH1 | Primary Inhibit | 10 | SEN+ | Positive output sensing |
| 5 | NC | NC | 11 | NC | NC |
| 6 | NC | NC | 12 | NC | NC |

9 Typical Connection Diagram of military grade DC/DC Converters

HOL100S Series

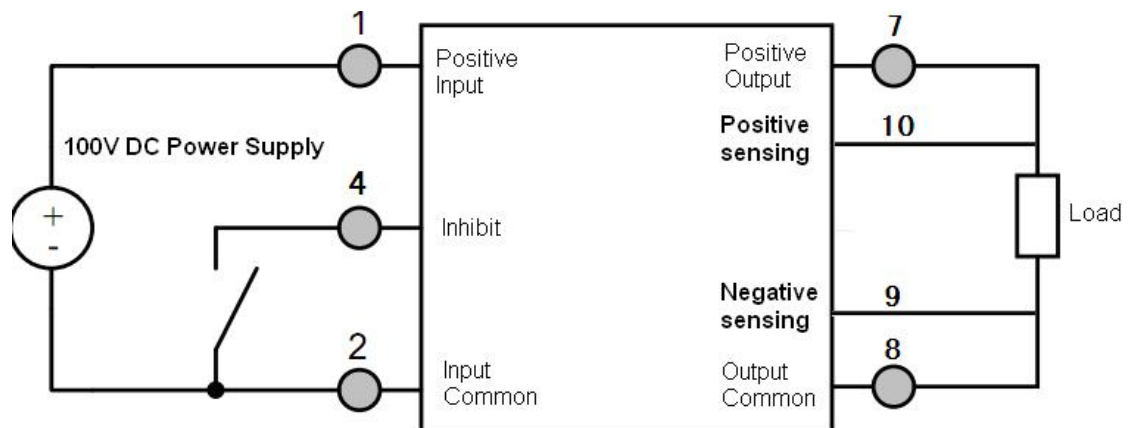


Fig 7 Products Using Connection Diagram

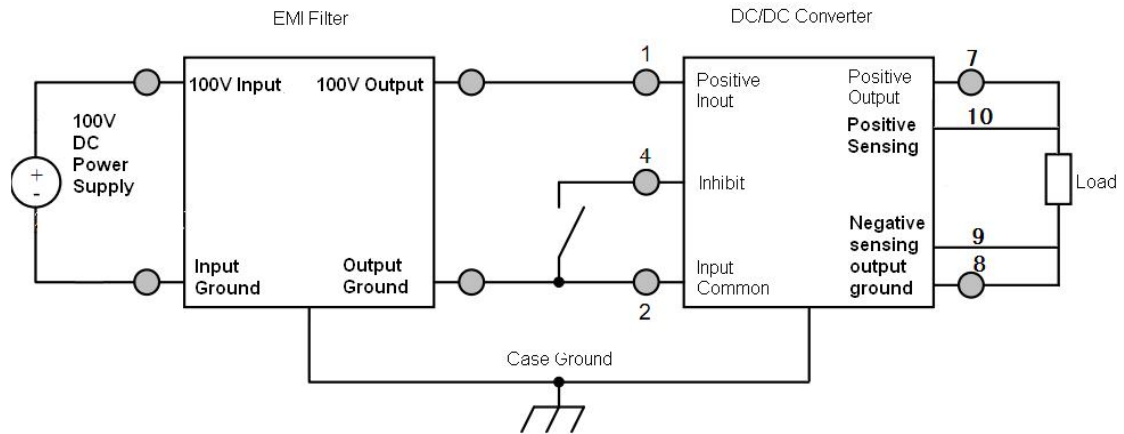


Fig 8 EMI Filter Connection Diagram

10 Package Specifications of military grade DC/DC Converters

HOL100S Series

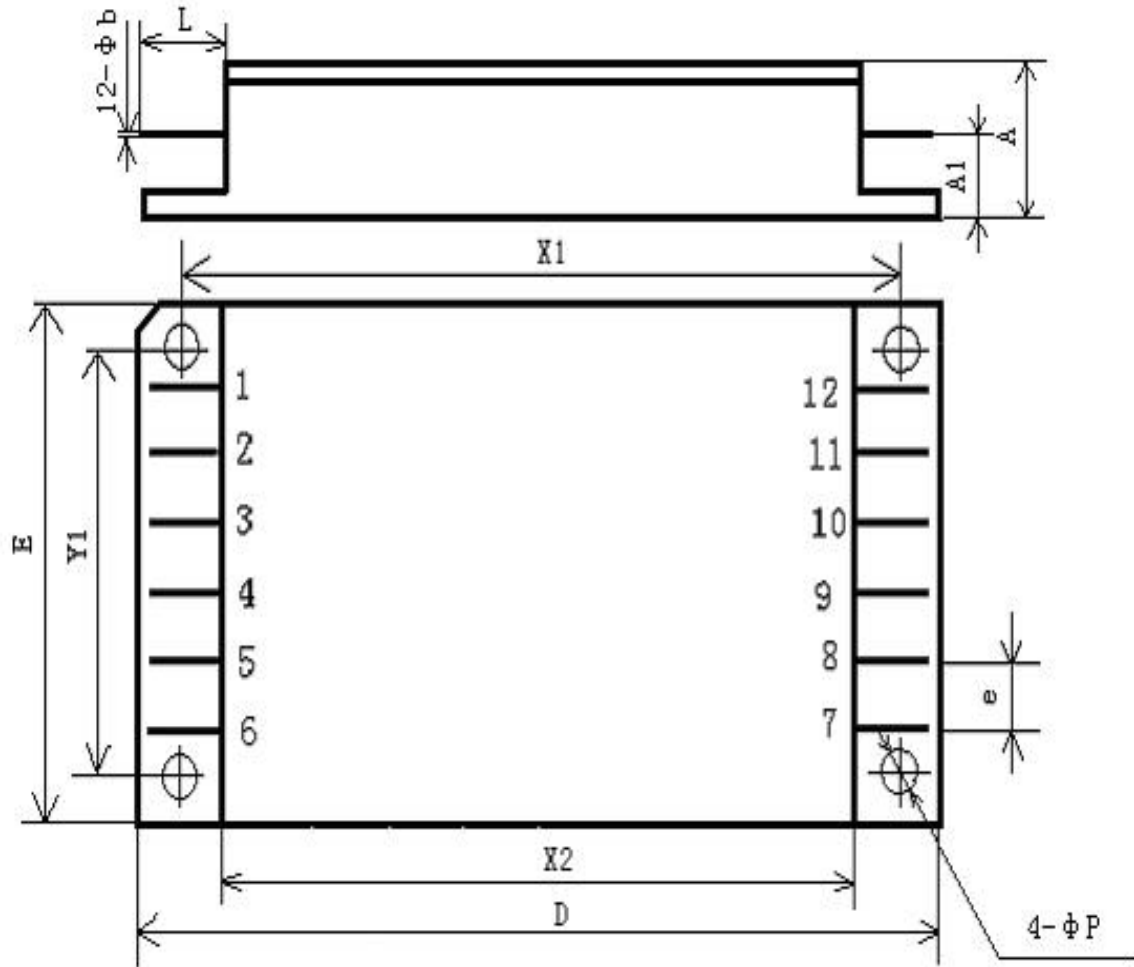


Fig 9 Bottom View

Table 4 Package Outline

| Dimension Symbols | Unit/mm | | |
|-------------------|---------|---------|---------|
| | Minimum | Nominal | Maximum |
| A | - | - | 10.66 |
| A ₁ | 5.29 | - | 5.89 |
| φb | 0.87 | - | 1.13 |
| D | - | - | 76.70 |
| E | - | - | 38.60 |
| e | - | 5.08 | - |
| L | 5.35 | - | - |
| φP | 3.00 | - | 3.60 |
| X ₁ | 69.90 | 70.1 | 70.3 |
| X ₂ | - | - | 64.00 |
| Y ₁ | 31.80 | 32 | 32.20 |

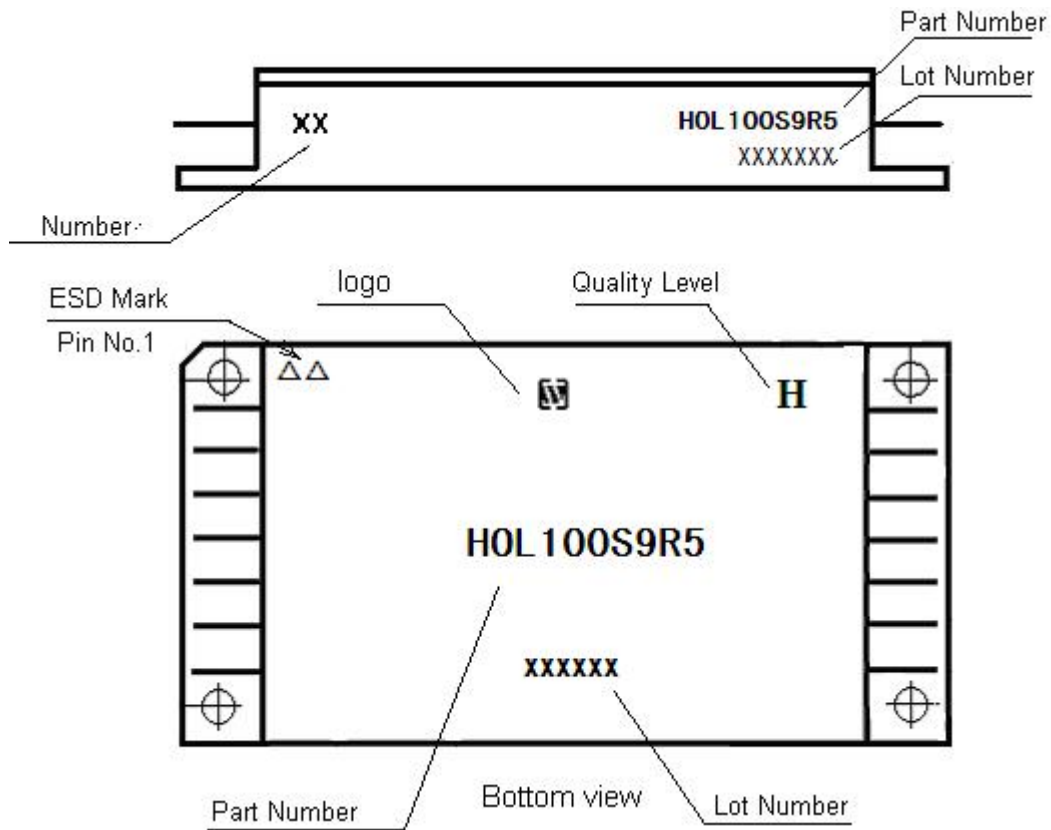
Notes: e is interchangeable size, made by the shell manufacturing and inspection, this specification does not do the assessment requirements.

Table 5 Case Materials

| Case Model | Header | Header Plating | Cover | Cover Plating | Pin | Pin Plating | Sealing Style | Notes |
|-------------|---------------------------|----------------|--------------|---------------|--------------------|-------------|-----------------------|-------|
| fpp6438-12d | Cold Rolled Steel (10#) | Dau-2/Ni4Au1.0 | Kovar (4J42) | Ni | Oxygen-free copper | | Parallel seam welding | |

11 Ordering Information of military grade DC/DC Converters

HOL100S Series



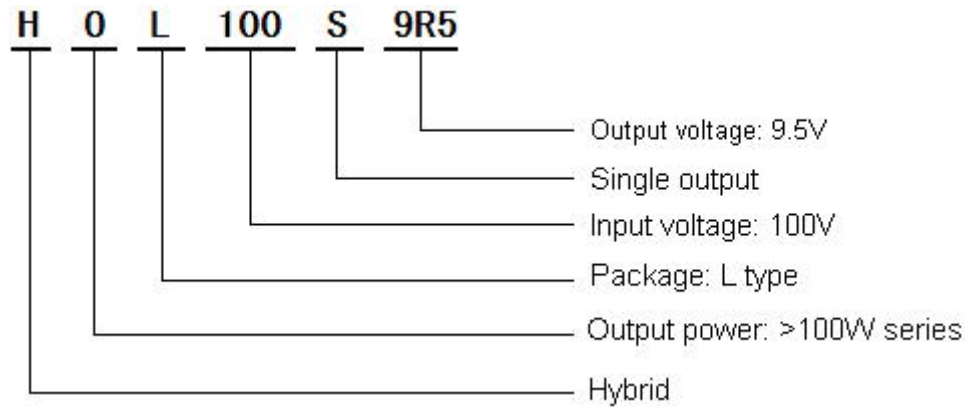


Fig 10 Part Numbering Key

Applications Notes:

- ☆ Both positive and negative terminals for power supply shall be correctly connected when power is applied so as to avoid permanent damage to the device.
- ☆ Testing position shall be the root of the pin of the device when the electrical characteristic is measured.
- ☆ The baseplate of the device shall be closely attached to the circuit board during device mounting so as to avoid the damage on pins. The shockproof actions shall be adopted when necessary.
- ☆ Pins shall not be bended to avoid the glass insulator cracking and case leaking.
- ☆ Pins at inhibit terminal shall be hung in the air during no operation.
- ☆ When ordering this device , the detail electrical specification shall be based on relevant standards. While data offered in this document shall be for reference only.

