

## 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/in<sup>3</sup>
- Efficiency 91%
- Hermetically sealed metal cases



Size Weight :

76.70\*38.60\*10.66mm<sup>3</sup>

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 <sub>c</sub> ≤ 125°C , V <sub>IN</sub> = 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 $\Omega$	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/ $\mu F$	$T_c=25^\circ C$		-	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 <sub>IN</sub> : 16V→40V , V <sub>IN</sub> : 40V→16V , I <sub>o</sub> =Full load	-	-	-	-	-	-
22	Step Line Response Recovery(μs)	V <sub>IN</sub> : 16V→40V , V <sub>IN</sub> : 40V→16V , I <sub>o</sub> =Full load	-	-	-	-	-	-
23	Start-up Overshoot(mV pK)	V <sub>IN</sub> : 0→28V , I <sub>o</sub> =Full load	-	50	-	120	-	280
24	Start-up Delay (ms)	V <sub>IN</sub> : 0→28V , I <sub>o</sub> =Full load	-	20	-	20	-	20

## 5 Circuit block diagram of military grade DC/DC Converters

### HOL100S Series

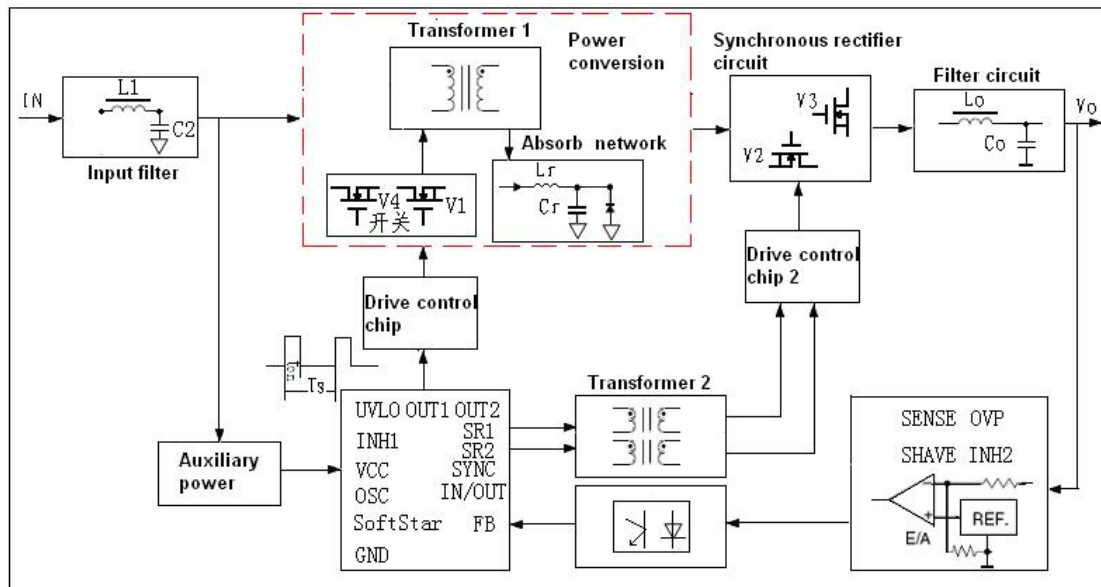


Fig 1 HOL100S Series circuit block diagram

## 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)

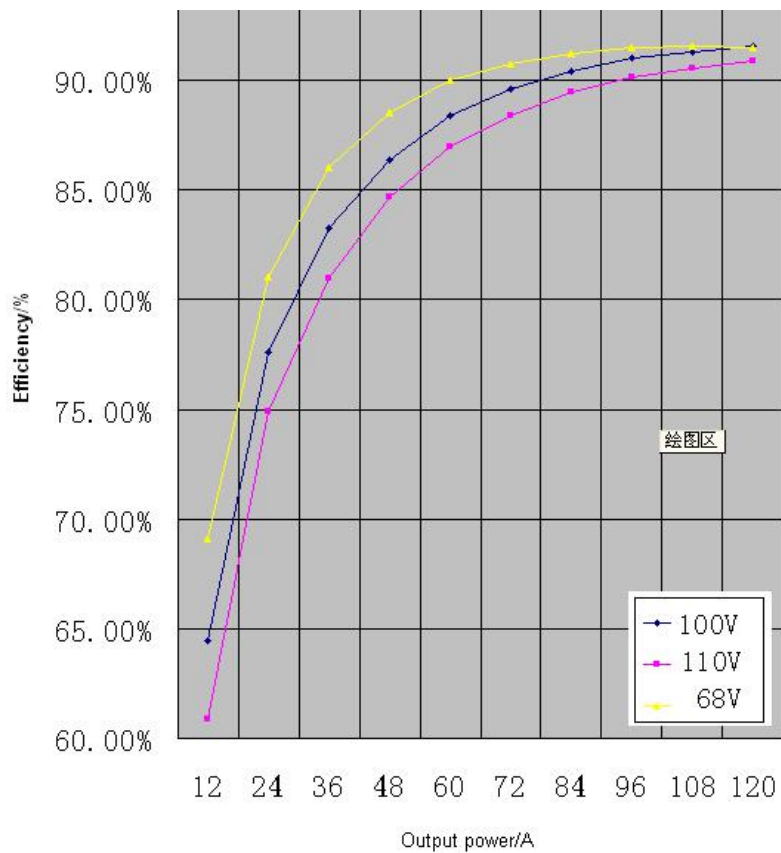


Fig 2 HOL100S9R5 Efficiency curves

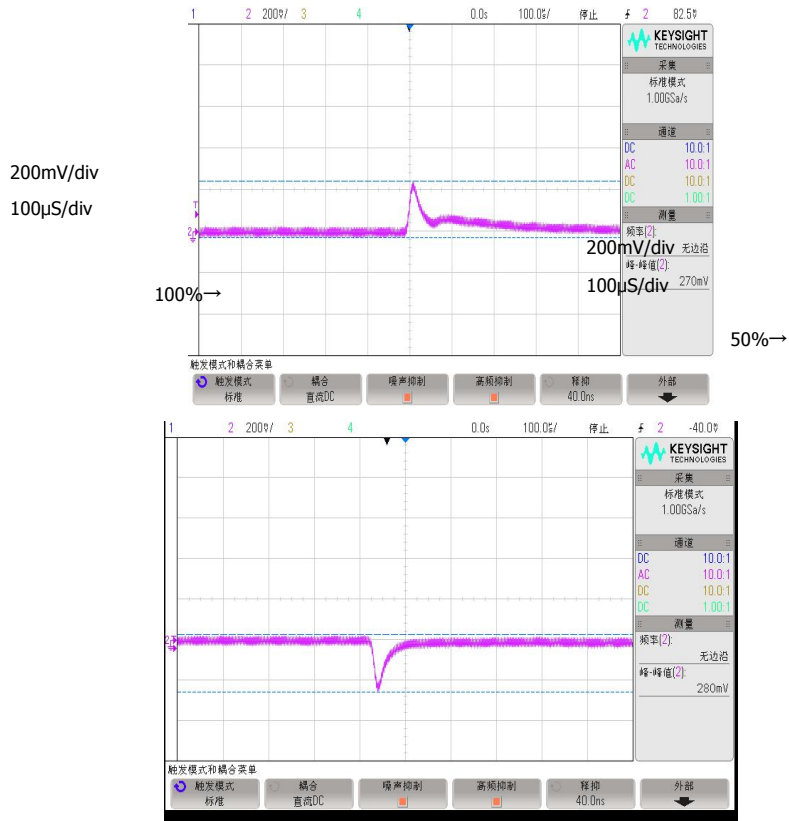


Fig 3 HOL100S9R5 Step Load Response

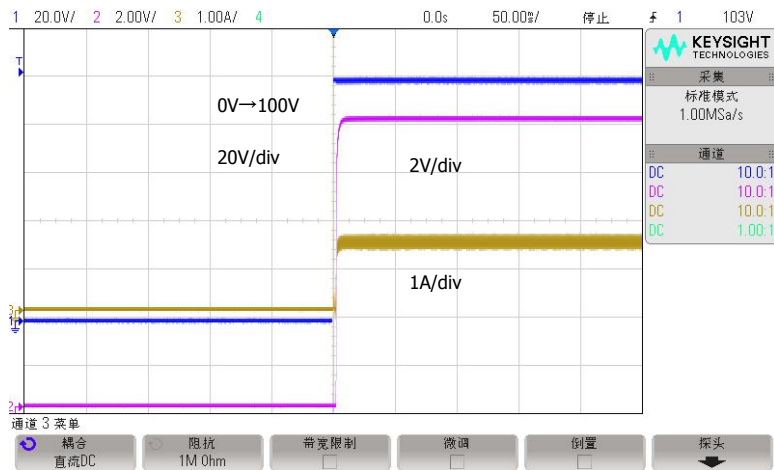


Fig 4 HOL100S9R5 Start-up Overshoot/Start-up Delay

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

Temperature Curves

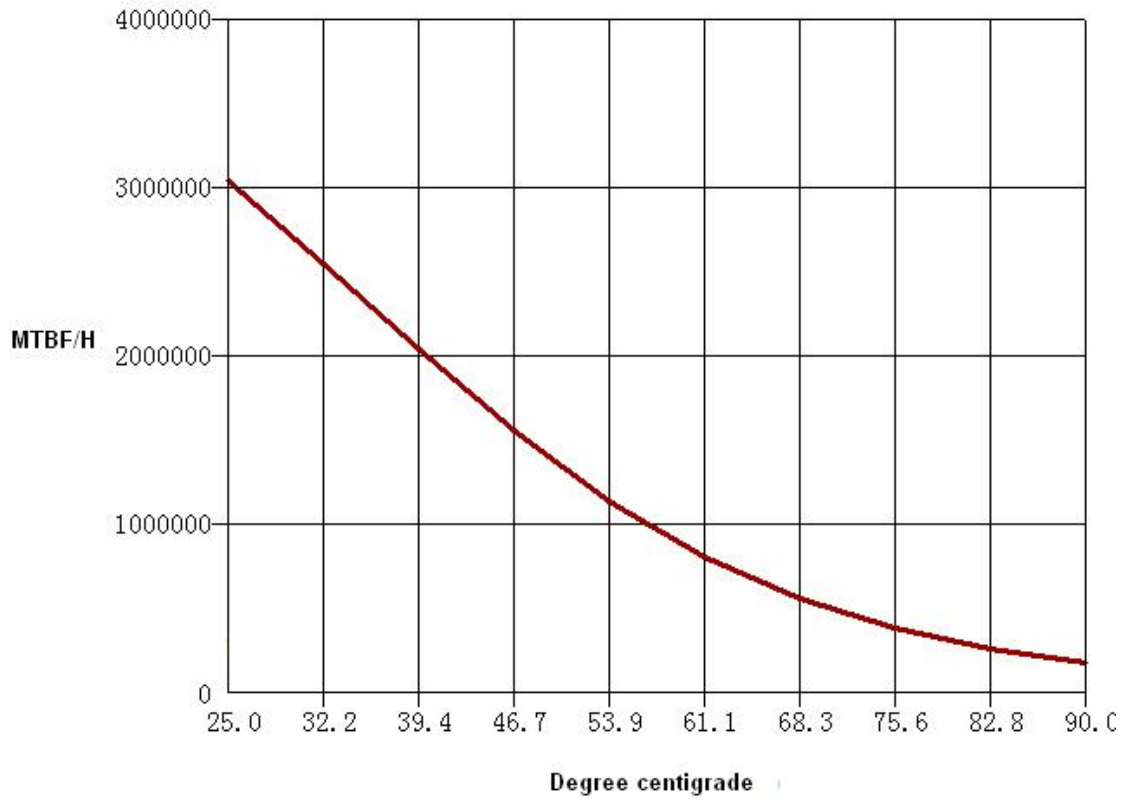


Fig 5 MTBF Temperature Curves (HOL100S9R5)

(Well ground condition)

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

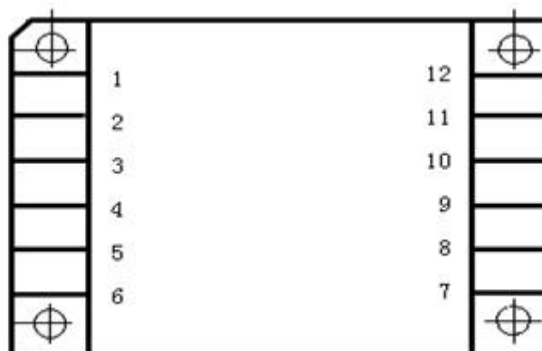


Fig 6 Pin Out Bottom View

### 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

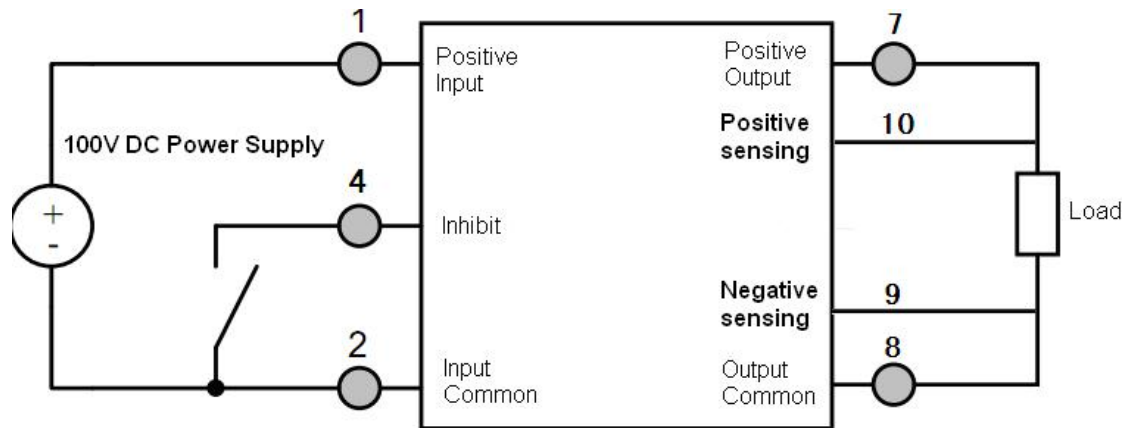


Fig 7 Products Using Connection Diagram



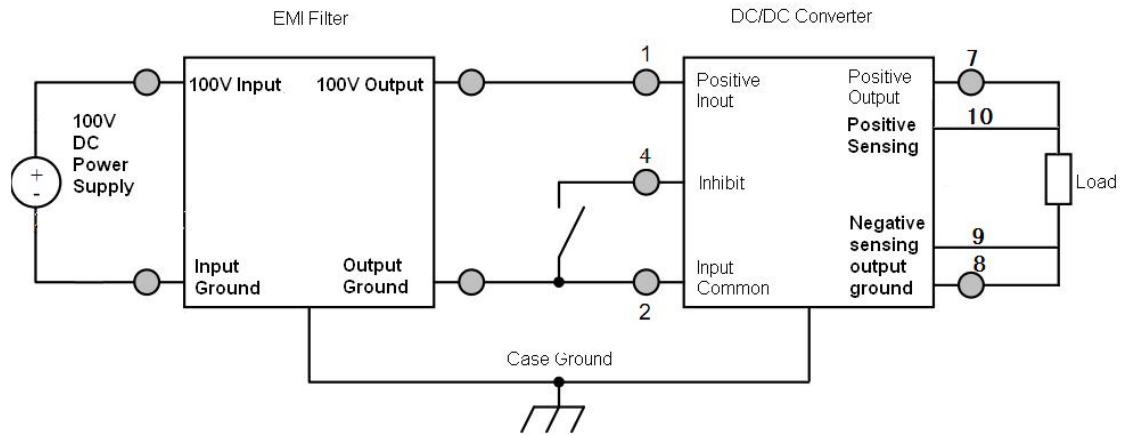


Fig 8 EMI Filter Connection Diagram

## 10 Package Specifications of military grade DC/DC Converters

### HOL100S Series

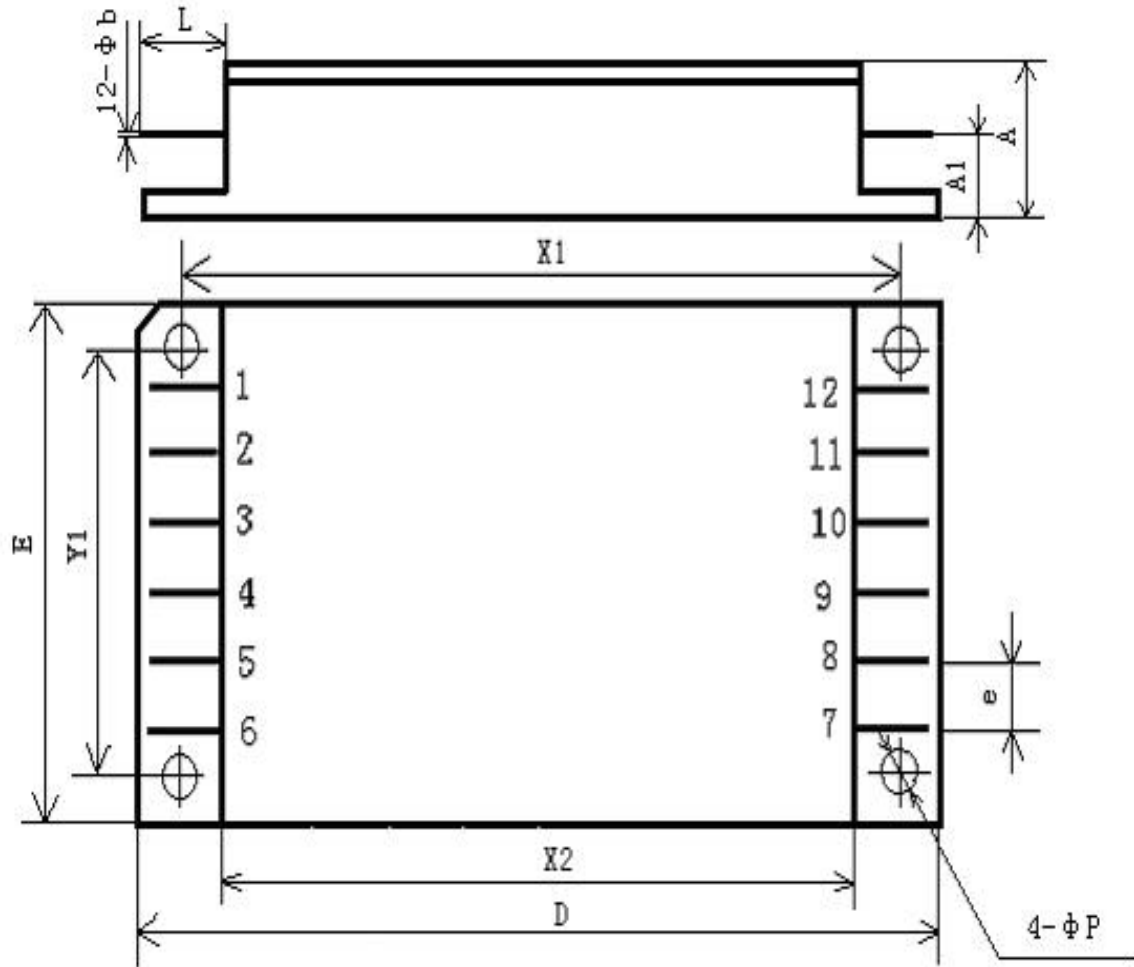


Fig 9 Bottom View

Table 4 Package Outline

Dimension Symbols	Unit/mm		
	Minimum	Nominal	Maximum
A	-	-	10.66
A <sub>1</sub>	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 <sub>1</sub>	69.90	70.1	70.3
X <sub>2</sub>	-	-	64.00
Y <sub>1</sub>	31.80	32	32.20

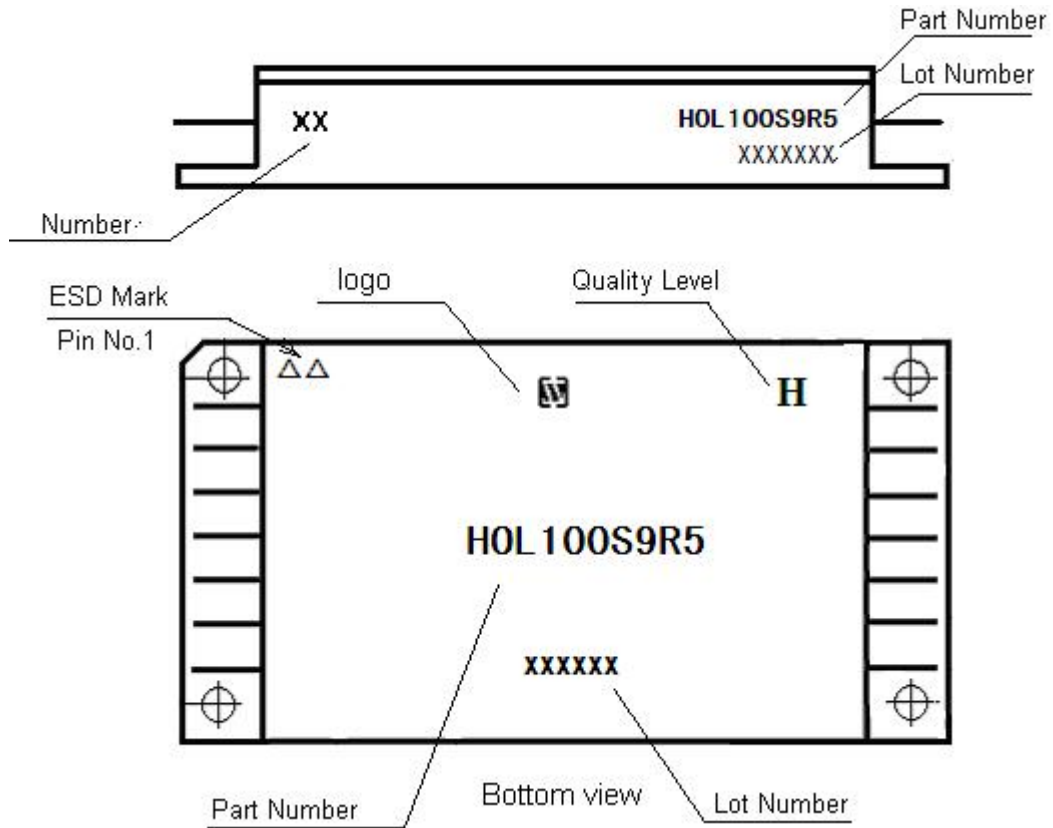
Notes: e is interchangeable size, made by the shell manufacturing and inspection, this specification does not do the assessment requirements.

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



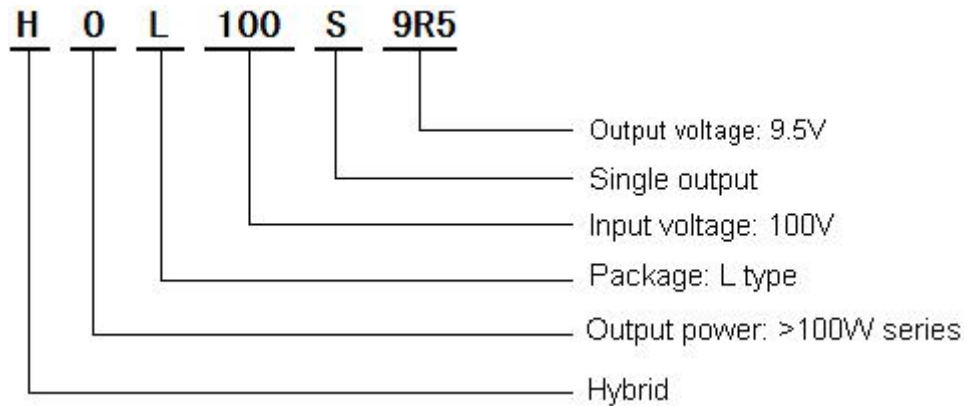


Fig 10 Part Numbering Key

## 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.

