

4 Electrical performance of transient suppression DC-DC converter

Tabel2 Rated conditions and recommended operating conditions

| Absolute Max. Rated value | |
|----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
| Input voltage: 15V~50V Input voltage (Transient,1s) : 80V Output Power: 6.5W Storage temperature: -65℃~150℃ | Mechanical Shock: 1500g Weight (Non-flanged/Flanged) : 19g/24g The intensity of antistatic: 2000V |

Table 3 Electric characteristics

| No. | Parameter | Conditions | HSSA28D5 HSSA28D5F | | HSSA28D12 HSSA28D12F | | HSSA28D15 HSSA28D15F | | |
|-----|---------------------------------|-----------------------------------------------------------------------------|--------------------------------------|-------|-------------------------|-------|-------------------------|--------|--------|
| | | | Q/HW32168-2013 | | Q/HW32169-2013 | | Q/HW32170-2013 | | |
| | | | Min | Max | Min | Max | Min | Max | |
| 1 | Input Voltage/V | Low、High、 Ambient Temperature | 15 | 50 | 15 | 50 | 15 | 50 | |
| 2 | Output Voltage/V | Positive | Ambient Full load | 4.95 | 5.05 | 11.88 | 12.12 | 14.85 | 15.15 |
| | | Negative | | 4.95 | 5.05 | 11.88 | 12.12 | 14.85 | 15.15 |
| | | Positive | Low/high Full load | 4.925 | 5.075 | 11.82 | 12.18 | 14.775 | 15.225 |
| | | Negative | | 4.925 | 5.075 | 11.82 | 12.18 | 14.775 | 15.225 |
| 3 | Output current/A | $V_{IN}=15V\sim 50V$ | — | 0.5 | — | 0.25 | — | 0.2 | |
| 4 | Output Power/W | | 0 | 5 | 0 | 6 | 0 | 6 | |
| 5 | Output Ripple Voltage/mV | $BW\leq 6MHz$, $I_o=Full$ load | — | 50 | — | 50 | — | 50 | |
| 6 | Line Regulation/mV | Positive | $V_{IN}=16V\sim 40V$, $I_o=Full$ | — | 50 | — | 50 | — | 50 |
| | | Negative | | — | 50 | — | 50 | — | 50 |
| 7 | Lode Regulation/mV | Positive | $I_o=No$ load to full | — | 50 | — | 50 | — | 50 |
| | | Negative | | — | 50 | — | 50 | — | 50 |
| 8 | Input current/mA | Inhibited | — | 6 | — | 6 | — | 6 | |
| | | $I_o=no$ load | — | 60 | — | 60 | — | 60 | |
| 9 | Input Ripple current/mA | $BW\leq 20MHz$, $I_o=Full$ load | — | 50 | — | 50 | — | 50 | |
| 10 | Efficiency/% | $I_o=Full$ load | 66 | — | 72 | — | 73 | — | |
| 11 | Isolation/MΩ | Input to output or any pin to case(except pin 7、8)at 500V, $T_c=25^\circ C$ | 100 | — | 100 | — | 100 | — | |
| 12 | Inhibit Function | | 0 | 0.7 | 0 | 0.7 | 0 | 0.7 | |
| 13 | Under voltage open voltage/V | $I_o=Full$ Load | 12.0 | 14.8 | 12.0 | 14.8 | 12 | 14.8 | |
| 14 | Under voltage cut-off voltage/V | $I_o=Full$ Load | 11.0 | 14.5 | 11.0 | 14.5 | 11 | 14.5 | |
| 15 | Short Circuit Protection | | | | | | | | |
| 16 | Capacitive load/ μF | $T_c=25^\circ C$ | — | 500 | — | 500 | — | 500 | |
| 17 | switching frequency/kHz | $I_o=Full$ Load | 350 | 500 | 350 | 500 | 350 | 500 | |
| 18 | Cross Regulation/mV | One road 30% load, The other Load 30%→70% | — | 450 | — | 450 | — | 450 | |

| | | | | | | | | |
|----|-------------------------------------|-------------------------------------------------------------------------------------|---|-----|---|-----|---|-----|
| 19 | Step Load Response Transient(mV pK) | 50%load→full load or Full load →50% load | — | 300 | — | 300 | — | 300 |
| 20 | Step Load Response Recovery(μs) | 50%load→full load or Full load →50% load | — | 400 | — | 450 | — | 500 |
| 21 | Step Line Response Transient(mV pK) | V _{IN} : 16V→40V, V _{IN} : 40V→16V, I _o =Full load | — | 900 | — | 900 | — | 900 |
| 22 | Step Line Response Recovery(μs) | V _{IN} : 16V→40V V _{IN} : 40V→16V I _o =Full load | — | 700 | — | 500 | — | 500 |
| 23 | Start-up Overshoot(mV pK) | V _{IN} : 0→28V, I _o =Full load | — | 25 | — | 50 | — | 50 |
| 24 | Start-up Delay (ms) | V _{IN} : 0→28V, I _o =Full load | — | 20 | — | 20 | — | 20 |

5 Circuit block diagram of transient suppression DC-DC converter

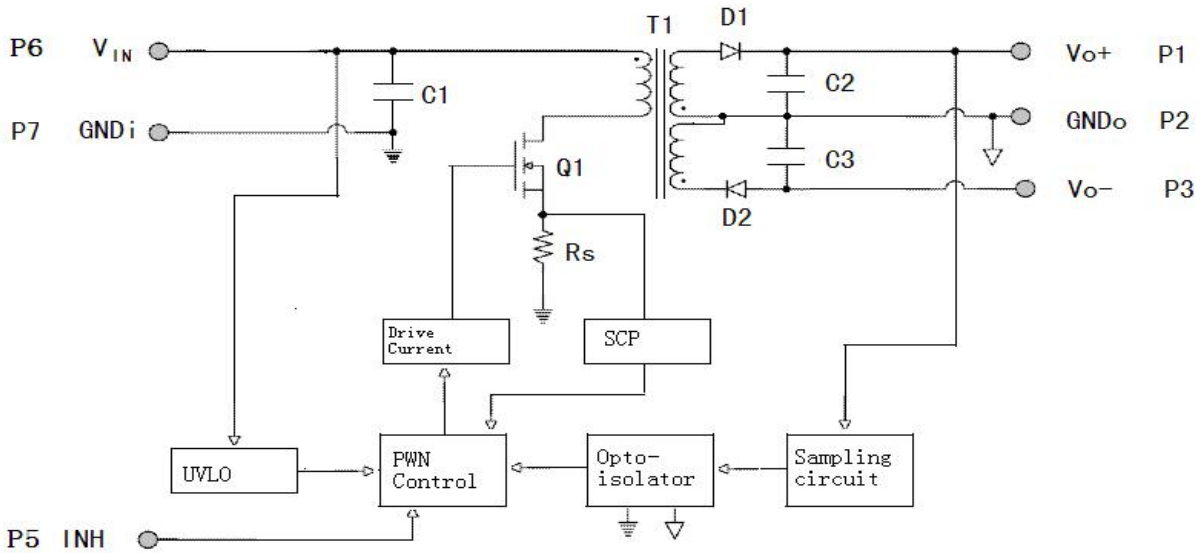


Figure 1 HSSA28D Series circuit block diagram

6. Typical Performance Curves of transient suppression DC-DC converter (Testing condition as per T_c=25°C , V_{IN}=28V±5%, unless otherwise specified)

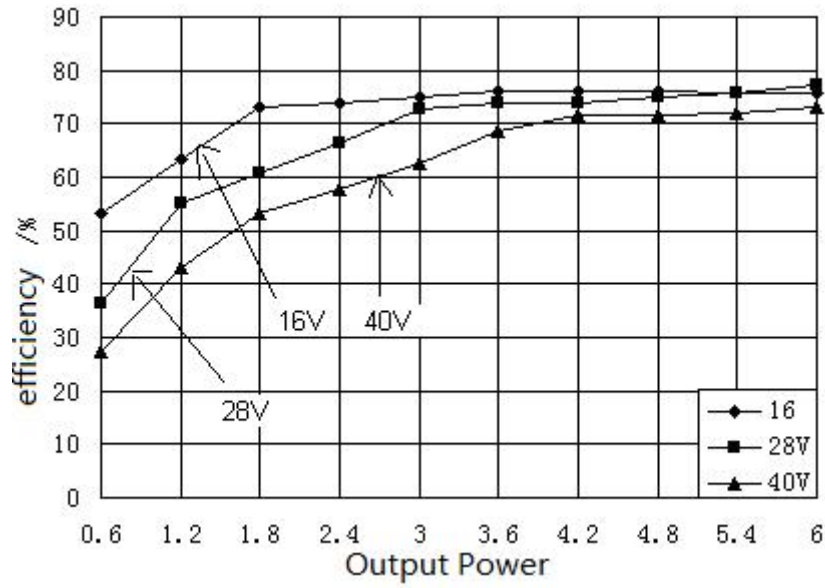


Figure 2 HSSA28D15 Efficiency

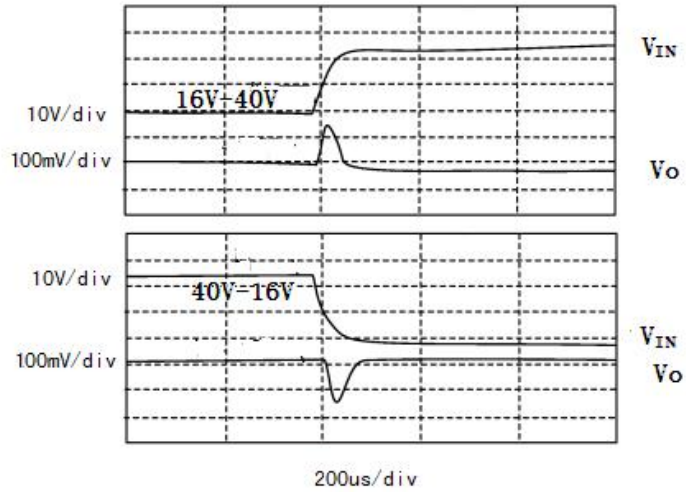


Figure 3 HSSA28D15 step line response

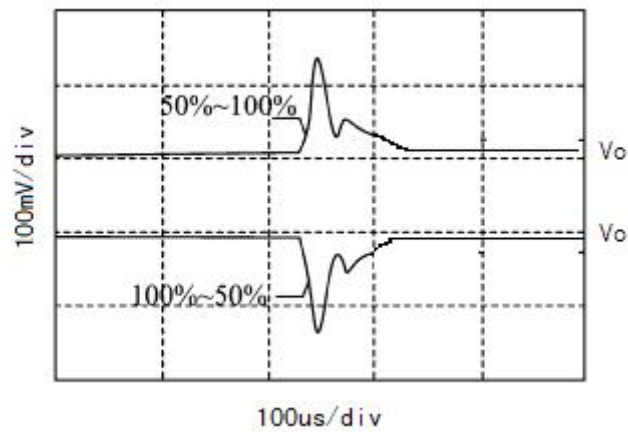


Figure 4 HSSA28D15 Step Load Response

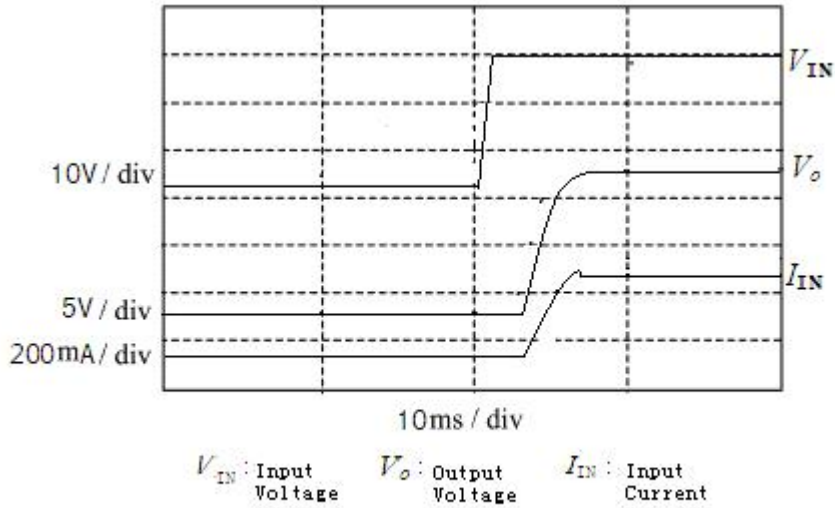


Figure 5 HSSA28D15 Start-up Overshoot/Start-up Delay

7.MTBF Curves of transient suppression DC-DC converter

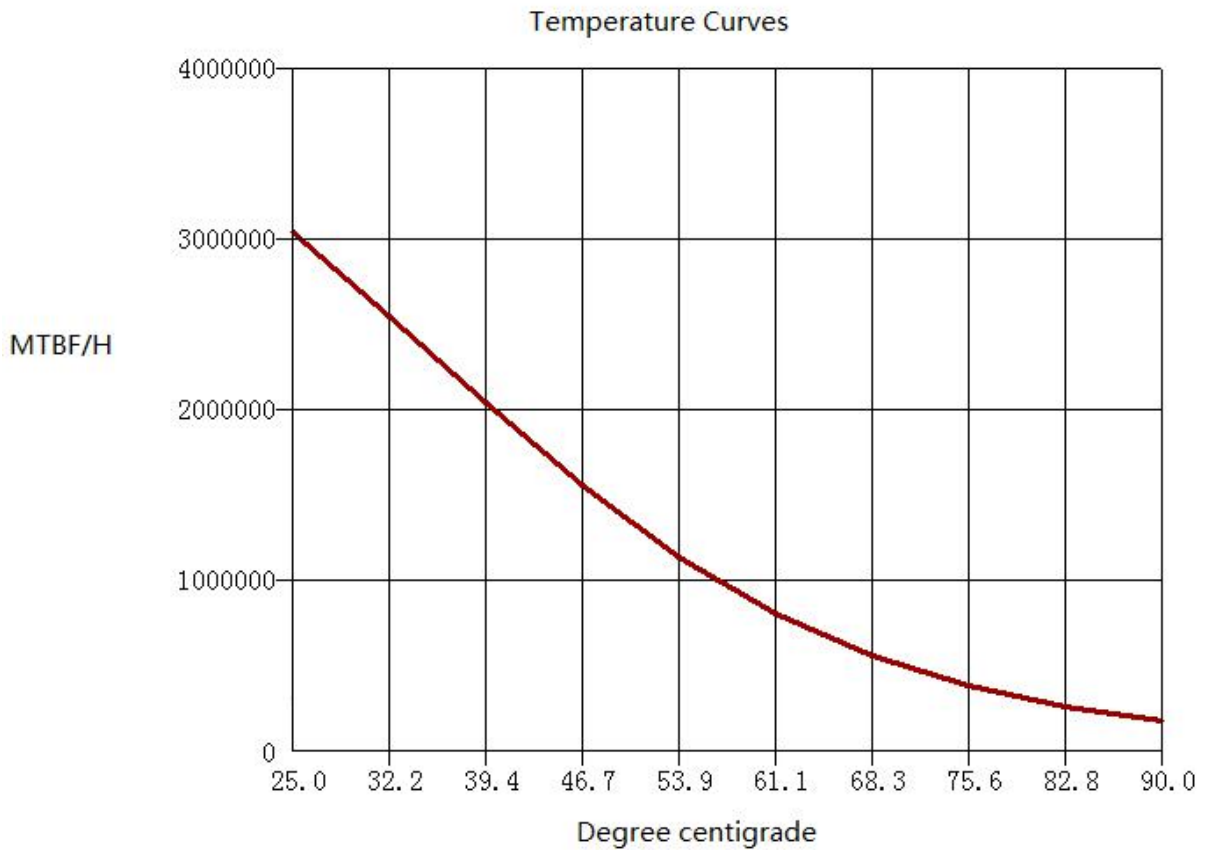


Figure 6 MTBF Temperature Curves (HSSA28D15)

8 Pin Designation of transient suppression DC-DC converter

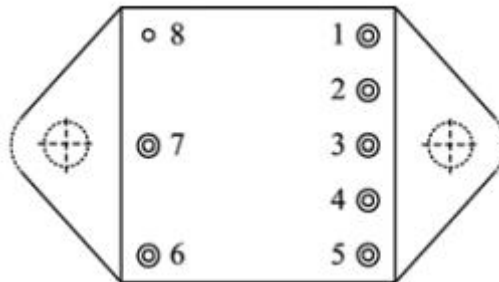


Figure 7 Pin Out Bottom View

Table 4 Pin Designation

| Pin | Symbol | Designation |
|-----|----------|-----------------|
| 1 | V_{O+} | Positive Output |
| 2 | GND_O | Output Common |
| 3 | V_{O-} | Negative Output |
| 4 | NC | NULL |
| 5 | INH | Inhibit |
| 6 | V_{IN} | Positive Input |
| 7 | GND_I | Input Common |
| 8 | GND_C | Case Ground |

9 Typical Connection Diagram of transient suppression DC-DC converter

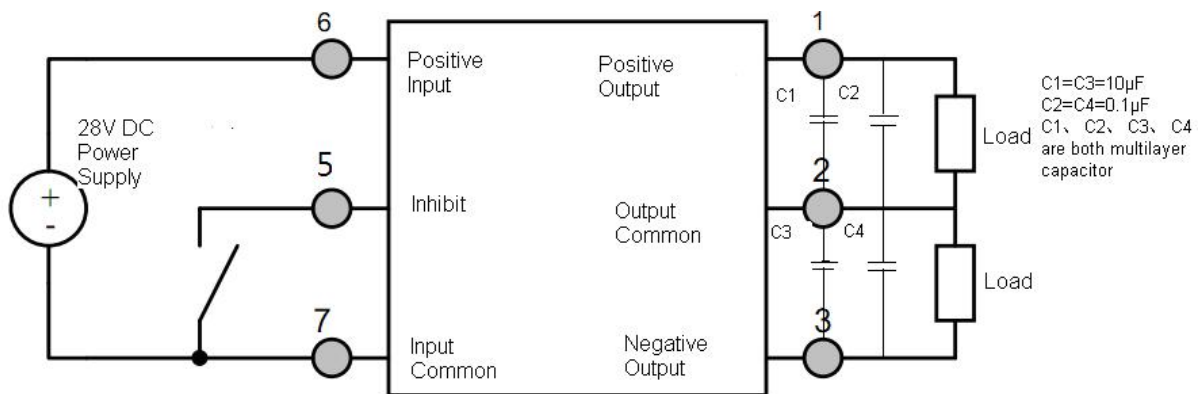


Figure 8 Product Connection Diagram

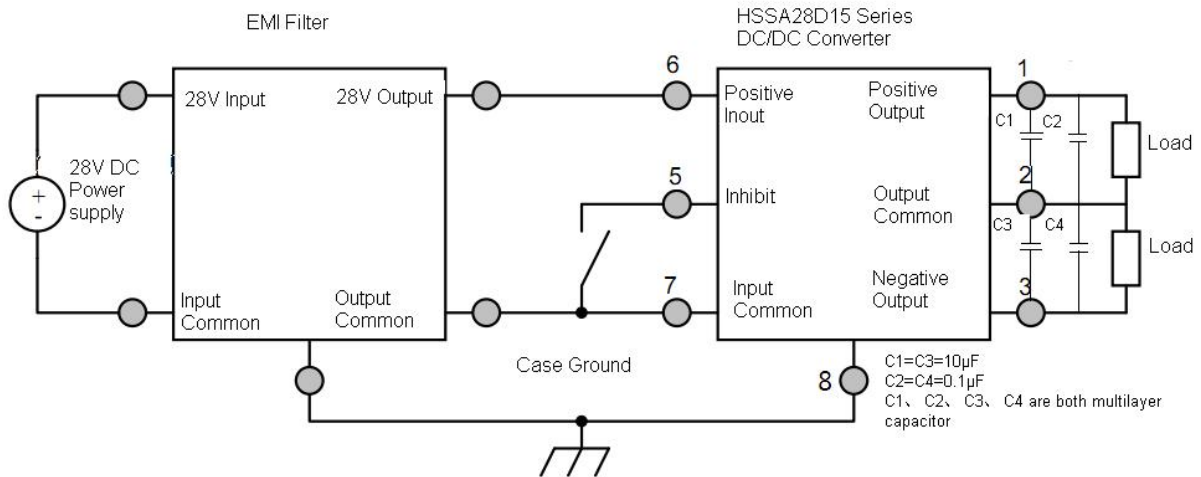


Figure 9 EMI Filter Connection Diagram

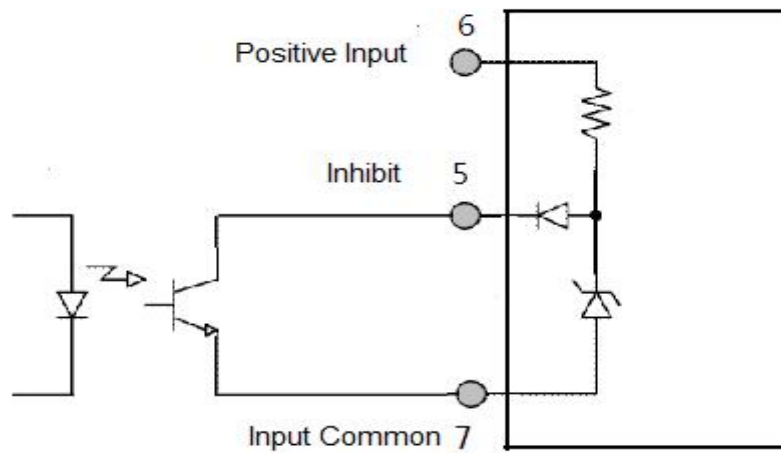


Figure 10 Inhibit Diver Diagram

10 . Package Specifications of transient suppression DC-DC converter (Unit: mm)

① Package without flanged

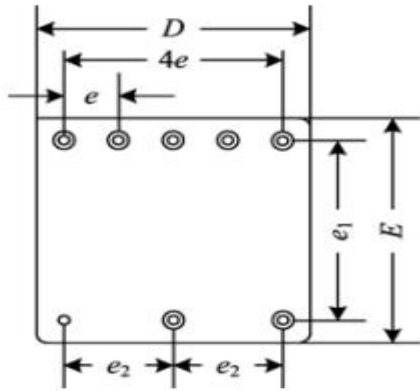


Figure 11 Bottom View

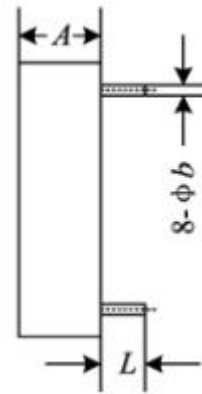


Figure 12 Side View

② Package with Flanged

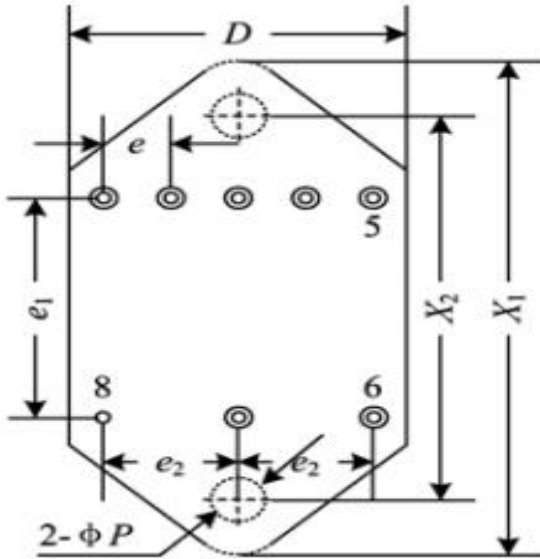


Figure 13 Bottom View

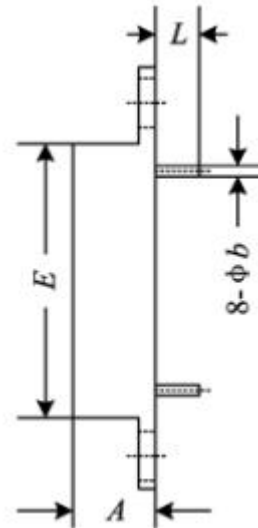


Figure 14 Side View

Table 5 Package Outline

| Dimension Symbols | Unit/mm | | |
|-------------------|---------|---------|---------|
| | Minimum | Nominal | Maximum |
| <i>A</i> | - | 6.86 | 7.16 |
| Φb | 0.51 | 0.64 | 0.77 |
| <i>D</i> | - | 27.23 | 27.57 |
| <i>E</i> | - | 27.23 | 27.57 |
| <i>e</i> | - | 5.08 | - |
| <i>e1</i> | - | 20.32 | - |
| <i>e2</i> | - | 10.16 | - |
| <i>L</i> | 4.95 | 5.21 | - |
| ΦP | 2.50 | 2.80 | 3.10 |
| <i>X1</i> | - | 39.0 | 39.50 |

| | | | |
|----|-------|-------|-------|
| X2 | 32.90 | 33.20 | 33.50 |
|----|-------|-------|-------|

Table 6 Case Materials

| Case Model | Header | Header Plating | Cover | Cover Plating | Pin | Pin Plating | Sealing Style | Notes |
|------------------------------|----------------------------|----------------|--------------|---------------|-----------------------|-------------|------------------|---------------------------------------|
| UPP2727-08a (Non-Flanged) | Cold Rolled Steel (10#) | Nickel | Kovar (4J42) | Nickel | Copper -core Compound | Ni/Au | Compression Seal | Nickel Plating is for case ground pin |
| UPP2727-08u (Flanged) | Cold Rolled Steel (10#) | Nickel | Kovar (4J42) | Nickel | Copper -core Compound | Ni/Au | Compression Seal | Nickel Plating is for case ground pin |

11 Ordering Information of transient suppression DC-DC converter

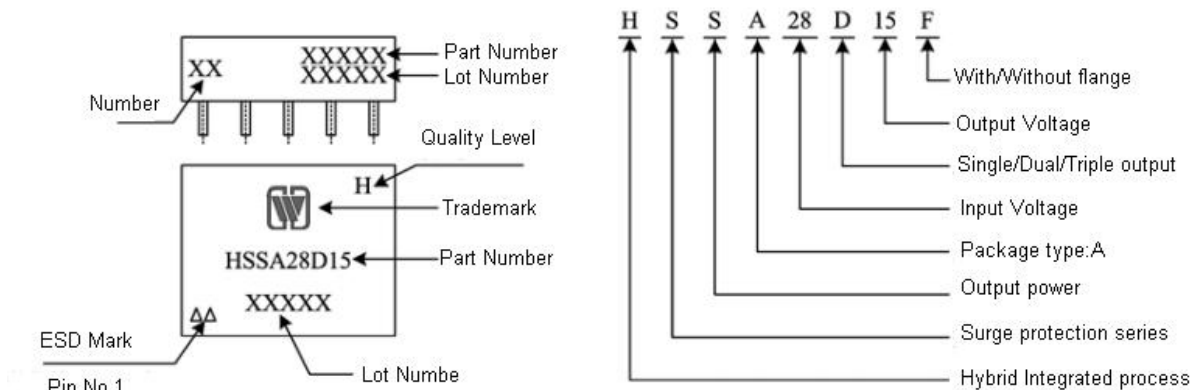


Figure 15 Part Numbering Key

Application 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.

