

HNDO5S3R3 Military Point of Load DC-DC Converter

1 Features of military point of load DC-DC converter

- High reliability
- Low voltage input: 3V~5.5V, Typical 5V
- High conversion efficiency
- Output Power P_o : 16.5W
- Operating temperature T_c : $-55^{\circ}\text{C} \sim +125^{\circ}\text{C}$
- Low start-up current
- No output overshoot
- Inhibit function
- Output over current and short circuit protection
- Maximum power density: $80\text{W}/\text{in}^3$
- Hermetically sealed metal case



尺寸: 25.0×20.0×6.86
重量: 13g

HNDO5S3R3

2 Scope of application of military point of load DC-DC converter

High-reliability electronic system for ground ,vehicle ,radar , aviation and aerospace, etc

3 Description of military point of load DC-DC converter

HNDO5S3R3 is a high reliable, output voltage adjustable non-isolated military point of load DC-DC converter with BUCK circuit topology and pulse width modulation principle. The output sampling voltage is directly feedbacked to modulate the pulse width to achieve closed-loop control to meet the stability of the voltage output requirements. By changing the external resistance method to achieve the output voltage 0.8V-3.3V adjustable.. The series of products are made by thick-film hybrid integrated production process, metal sealed package. The design and manufacturing process of HNDO5S3R3 Series converters are in compliance with MIL-PRF-38534.

4 Technical Specifications of military point of load DC-DC converter

Table 2 Rated conditions and recommended operating conditions

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Absolute Max. Rating	
Input voltage: 3V~5.5V Input voltage (Transient,1s) : 6V Output Power: 18.2W Storage temperature: -65°C~150°C	Mechanical Shock: 1500g Lead solderable temperature: 300°C (15s) Weight: 13.5g

Table 3 Electrical characteristics

Items	Conditions (Unless other wise, -55°C≤Tc≤125°C, VIN=5V±0.15V)	HND05S3R3		Unit
		Min	Max	
Output voltage	V _{IN} =3V~5.5V, I _O =5A	0.8	2.5	V
	V _{IN} =4V~5.5V, I _O =5A	2.5	3.3	
Output current	V _{IN} =3V~5.5V	-	5	A
Output ripple voltage (Peak-peak)	T _A =25°C I _O =5A, V _O =3.3V B _W =10kHz~2MHz	-	35	mV
Load regulation	I _O =0→5A, V _O =3.3V	-	40	mV
Efficiency	V _O =3.3V, I _O =4A	93	-	%
Insulation resistance	T _A =25°C, impose 500V DC voltage between case and any pin (Expect pin 3)	100	-	MΩ
Inhibite voltage	T _A =25°C, V _O =3.3V, I _O =5A	0	0.8	V
Start-up Delay	Input voltage V _{IN} : 0→5V, V _O =3.3V No load	-	10	ms
Start-up Overshoot (peak)	Input voltage V _{IN} : 0→5V, V _O =3.3V No load	-	200	mV

5 Circuit block diagram of military point of load DC-DC converter

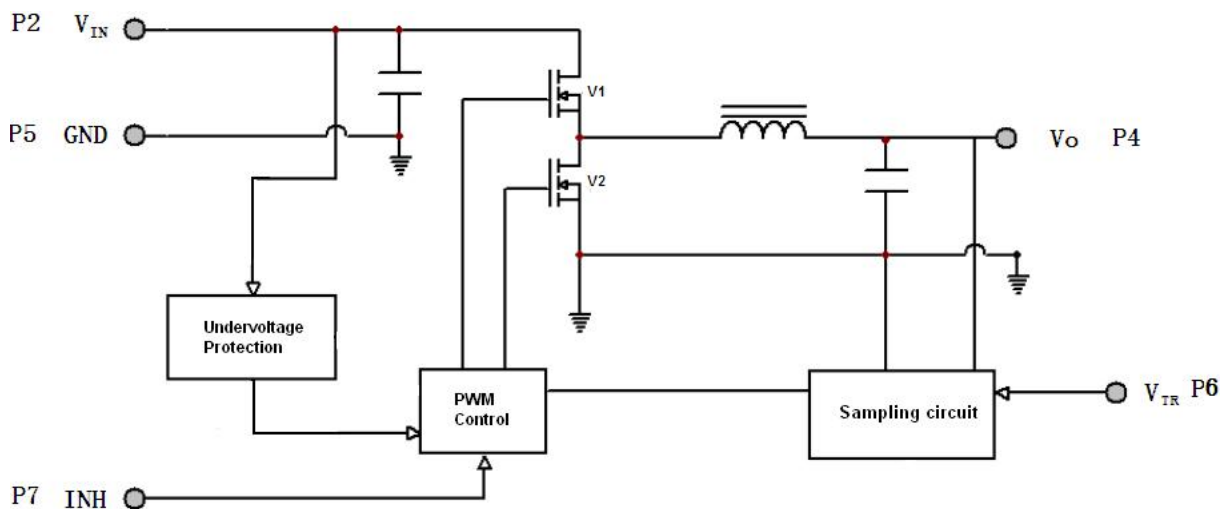


Fig 2 HND05S3R3 circuit block diagram

6 Typical Characteristic Curve of military point of load DC-DC converter (Testing condition as per $T_c=25^\circ\text{C}$, $V_{IN}=5V\pm 0.15V$, $V_o=3.3V$, full load. unless otherwise specified)

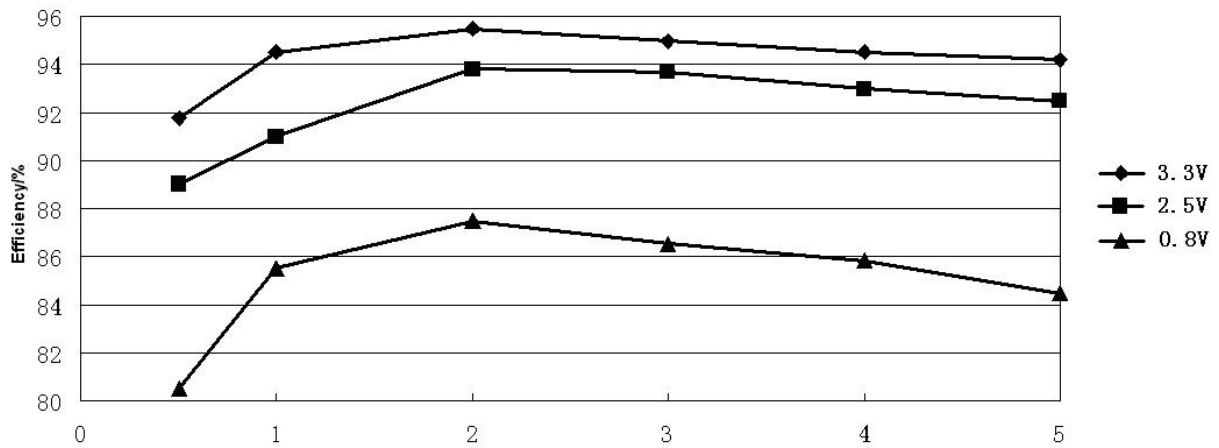


Fig 3 HNDO5S3R3 Efficiency curve

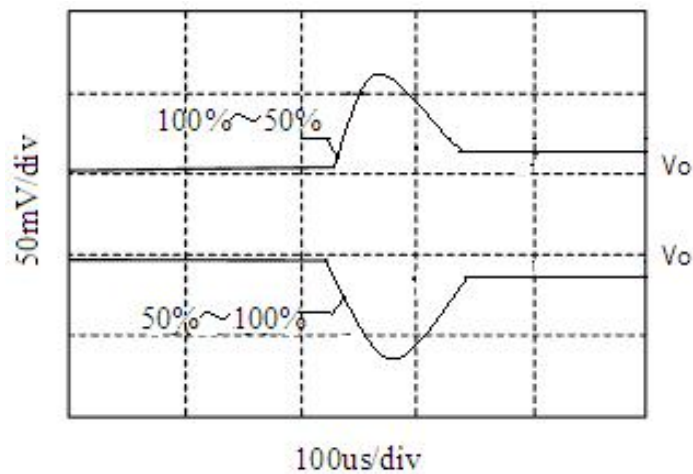
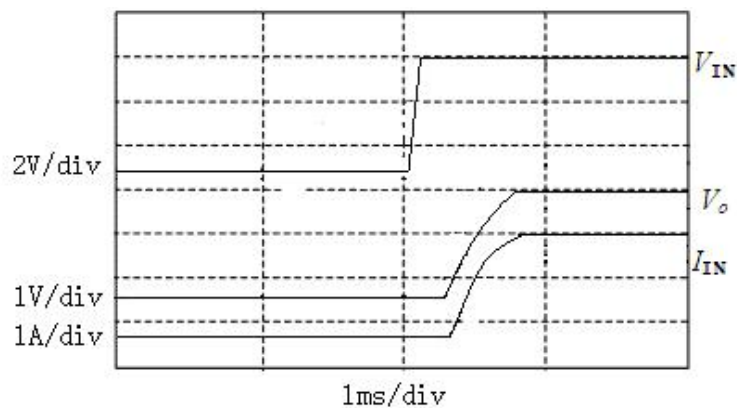


Fig 4 HNDO5S3R3 Load



V_{IN} : 输入电压 V_o : 输出电压 I_{IN} : 输入电流

Fig 5 HNDO5S3R3 Overshoot/Start-up Delay

7 MTBF Curve of military point of load DC-DC converter

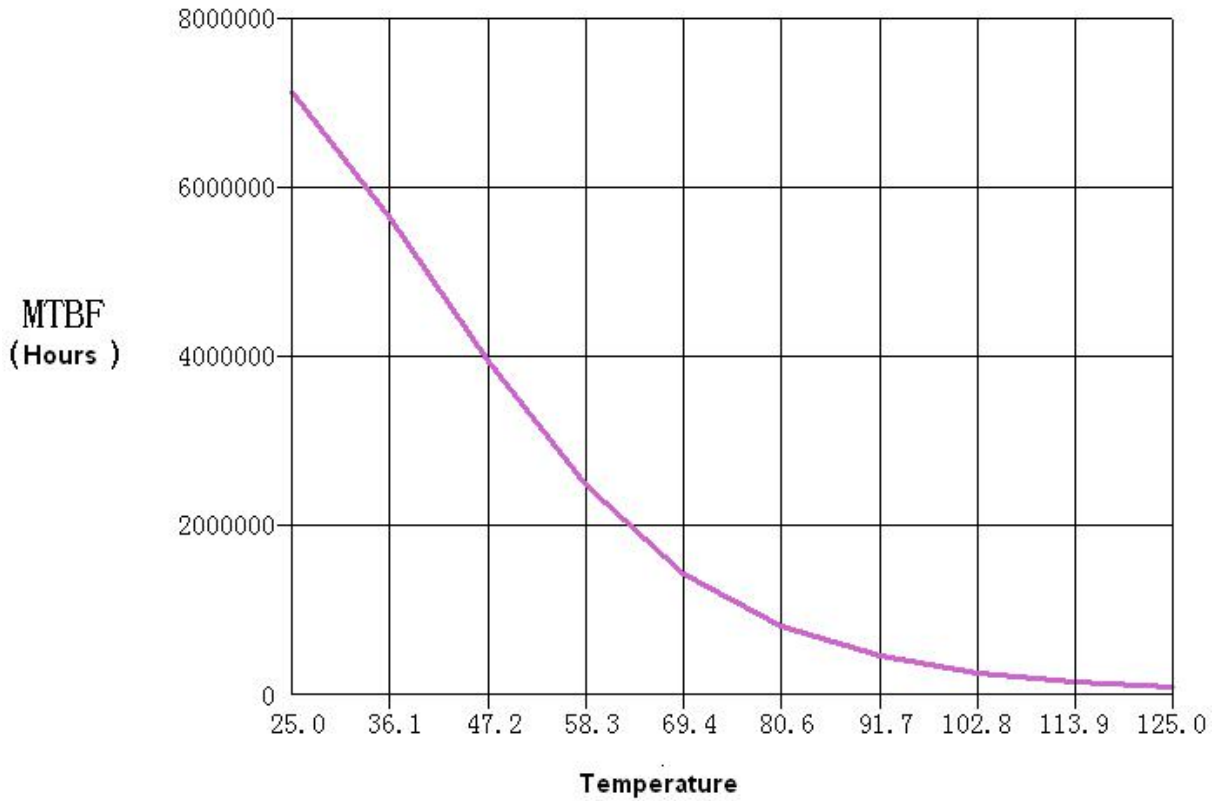


Fig 6 MTBF Temperature Curve (HNDO5S3R3)
(Ground good condition is expected)

8 Pin Designations of military point of load DC-DC converter

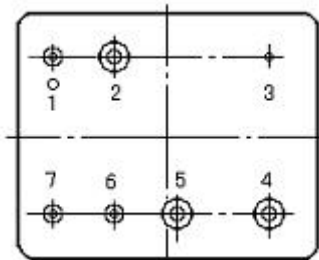


Figure 7 Bottom View

Table 4 Pin Designation

Pin	Symbol	Designation
1	NC	NC
2	V_{IN}	Input
3	GND_c	Case ground

4	V_o	Output
5	GND	Common GND
6	V_{TR}	Output Trimming
7	INH	Inhibit

9 Typical Connection Diagram of military point of load DC-DC converter

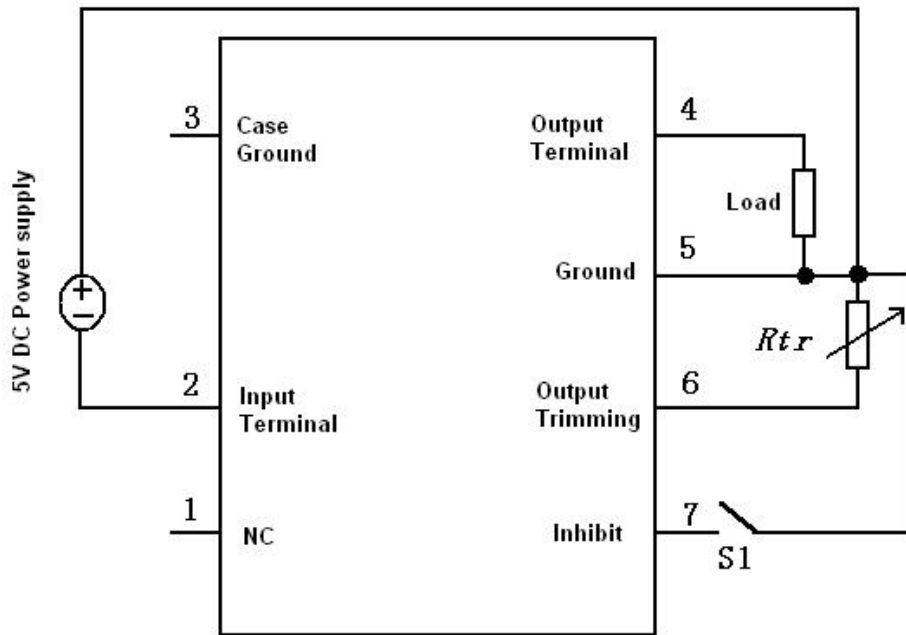


Fig 8 Connection Diagram

In fig 8, By adjusting the external resistor R_{tr} , can achieve different output voltage, R_{tr} and V_o relationship is shown as follow:

$$V_o = \frac{168R_{tr} + 5.267 \times 10^6}{210R_{tr} + 1.071 \times 10^6}$$

$$R_{tr} = \frac{5.267 \times 10^6 - 1.071 \times 10^6 \times V_o}{210 \times V_o - 168}$$

V_o (V)	$R_{tr}(k\Omega)$ reference
3.3	3.3
2.6	6.55
2.5	7.25
0.8	NC

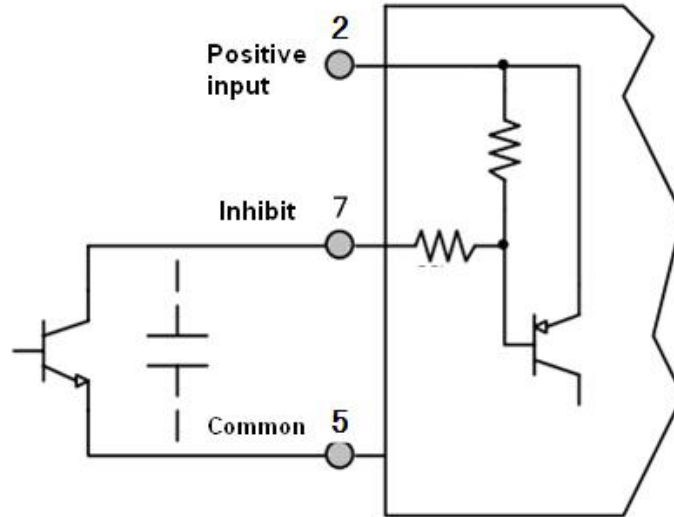


Fig 9 Inhibit Driver Circuit Diagram

In fig 9, By adjusting the external capacitor, can extended circuit start-up delay time.

($C=0.1\mu\text{F}$, Delay time extension 3ms, Depending on the output situation)

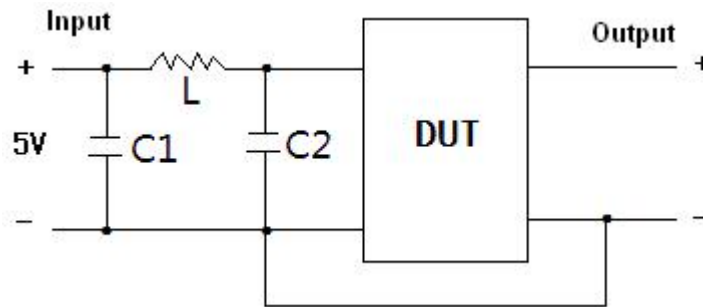


Fig 10 Input recommended connection

In fig 10, By adjusting the parameters of inductance and capacity, can reduce the input ripple voltage.

(When $L=4.7\mu\text{H}$, $C1=100\mu\text{F}$, $C2=47\mu\text{F}$, Input ripple voltage is 100mV, Depending on the output situation)

10 Package Specifications of military point of load DC-DC converter

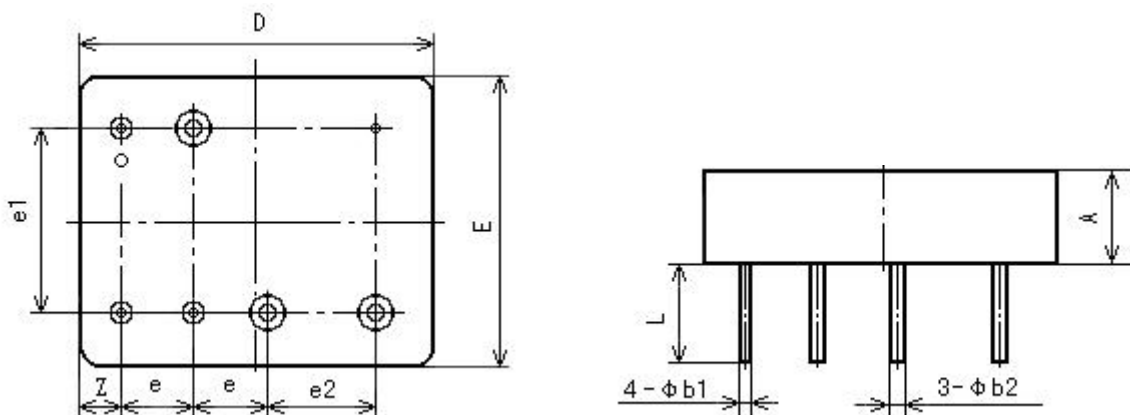


Fig 11 Bottom View

Fig 12 Side View

Table 5 Package Outline

Symbols	Unit/mm		
	Minimum	Nominal	Maximum
<i>A</i>	-	-	7.36
$\Phi b1$	0.32	-	0.58
$\Phi b2$	0.87	-	1.13
<i>D</i>	-	-	25.14
<i>E</i>	-	-	20.66
<i>e</i> ^a	-	5.08	-
<i>e1</i> ^a	-	12.70	-
<i>e2</i> ^a	-	7.62	-
<i>Z</i>	2.62	-	3.22
<i>L</i>	5.40	-	-

^a *e*、*e1*、*e2* interchangeability dimensions are guaranteed by the manufacture and inspection of the enclosure, this specification is not required as an assessment.

Table 6 Case Materials

Case Model	Header	Header Plating	Cover	Cover Plating	Pin	Pin Plating	Sealing	Notes
UPP2520-07	Cold Rolled Steel (10#)	Ni	Iron-nickel alloy(4J42)	Ni	Copper – core Compound	Au	Compression	

11 Ordering Information military point of load DC-DC converter

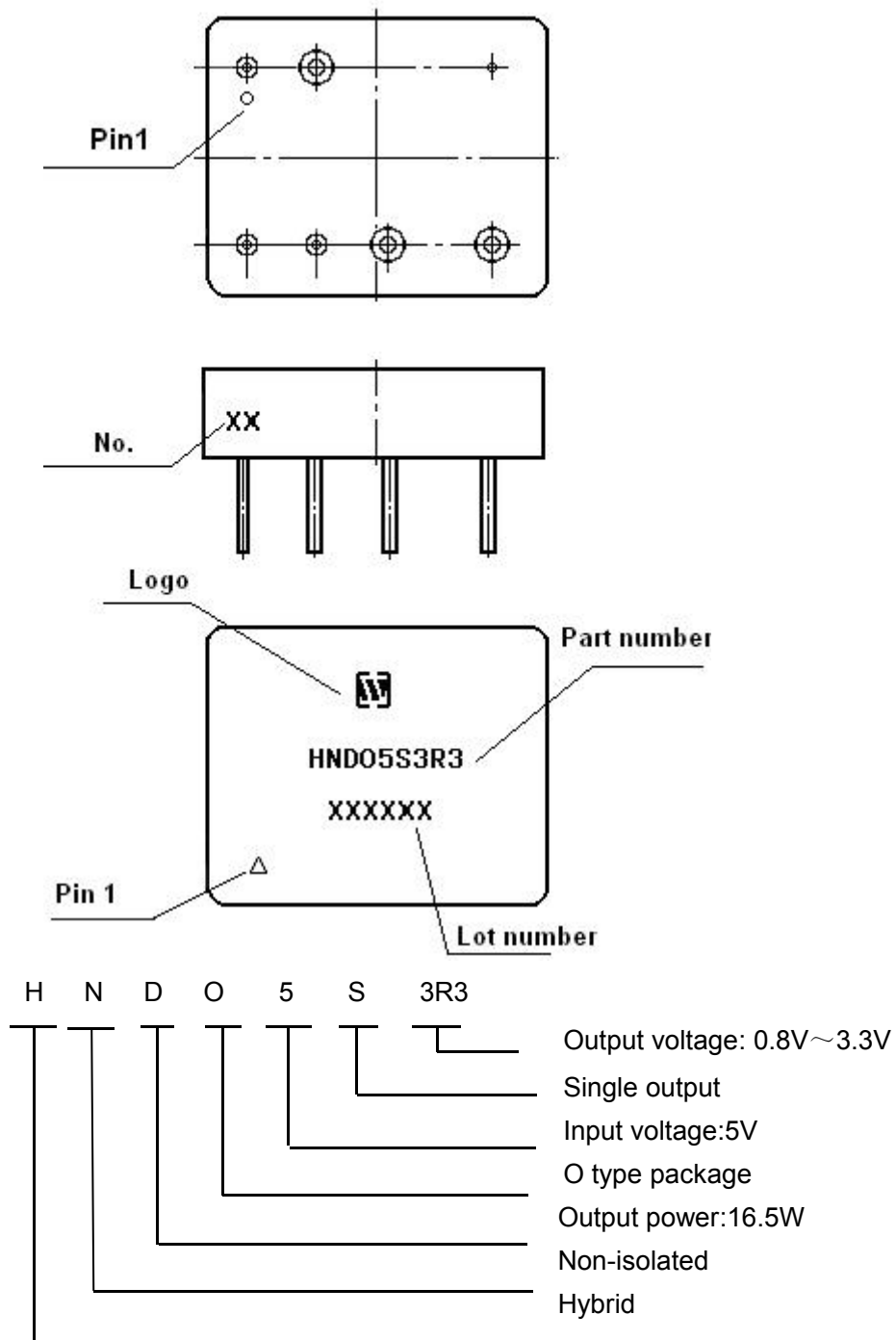


Fig 13 Part Numbering Key

Application notes military point of load DC-DC converter:

- ☆ 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.