

Hybrid Integrated Non-isolated DC DC Converter (HNTF5S Series)

1 Features of non-isolated point of load DC DC converter

- High reliability
- Low input voltage range: 4.5V~5.5V, Nominal
DC input voltage: 5V
- High transfer efficiency
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- Output Power P_O : 33W
- Operating temperature range T_c : -55°C~+125°C
- Low Startup current
- No output overshoot
- Inhibit function
- Input under voltage locked function
and output short circuit protection
- Maximum power density: 19W/in³
- Hermetically sealed metal case



Dimensions: 37.33×28.94×8.9mm (without flange)

Dimensions: 51.30×28.94×8.9mm (with flange)

Weight: 31g(without flange)

34g (with flange)

Table 1 Product models

HNTF5S3R3、 HNTF5S3R3F

2 Scope of application of non-isolated point of load DC DC converter

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

3 Description of non-isolated point of load DC DC converter

This series product is a high reliability and adjustable non-isolated DC DC Converter. Product s adopt buck circuit topology and pulse width modulation principle, the output voltage feeds back the pulse width of modulation controller through directly sampling, achieves the closed loop control, to meet the requirements of a stable voltage output.

Thick film hybrid techniques provide the HNTF5S Series of converters with high reliability and optimum miniaturization. The design and manufacturing process of HNTF5S Series of converters are in compliance with MIL-PRF-38534 and detailed specifications

4 Technical Specifications of non-isolated point of load DC DC converter

Table 2 Rated conditions and recommended operating conditions

Absolute Max. Rating	
Input voltage: 4.5V~5.5V Input voltage (Transient,1s) : 6V Output Power: 36.3W Storage temperature: -65°C~150°C	Mechanical Shock: 1500g Lead resistance welding temperature: 300°C (15s) Weight (without flange/ with flange) : 31g/34g

Table 3 Electrical characteristics

No	Items	Conditions	HNTF5S3R3 HNTF5S3R3F	
			Min	Max
1	Input Voltage/V	Low, High, Ambient Temperature	4.5	5.5
2	Output Voltage/V	IO=full load	Ambient	3.1
			Low/high	2.9
3	Output current/A	$V_{IN}=4.5V \sim 5.5V$	—	10
4	Output Power/W		0	33
5	Output Ripple Voltage/mV	$BW=6MHz$, IO=full load	—	35
6	Line Regulation/mV	$V_{IN}=4.5V \sim 5.5V$, IO=full load	Ambient	—
			Low/high	—
7	Line Regulation/mV	0→full load	Ambient	—
			Low/high	—
8	Efficiency/%	Io=Full load	Ambient	88
			Low/high	86
9	Isolation/MΩ	$T_A=25^\circ C$, 500V between pin and package	100	—
10	Inhibit cut-off Voltage/V	IO=full load	0	0.2
11	Start-up Overshoot(mV pK)	V_{IN} : 0→5V, IO=full load	—	500
12	Start-up Delay (ms)	V_{IN} : 0→5V, IO=full load	—	100

5 Circuit block diagram of non-isolated point of load DC DC converter

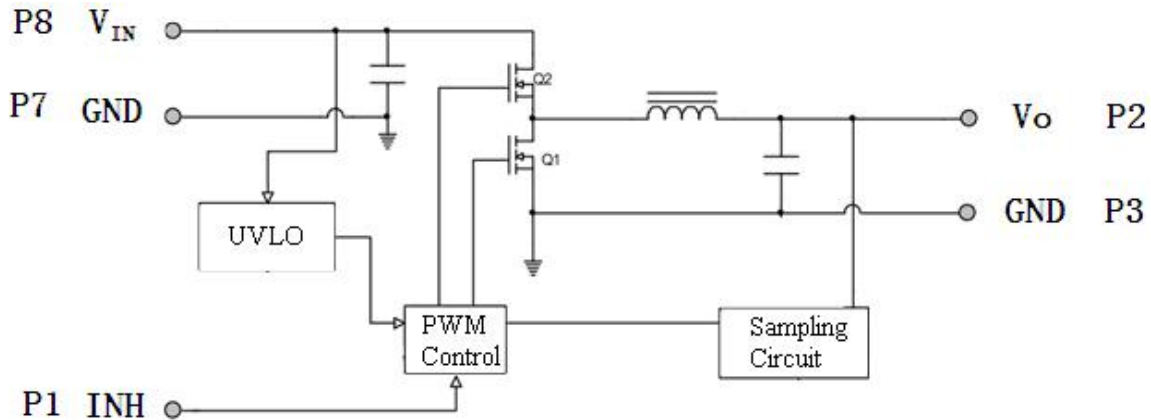


Fig. 1 HNTF5S3R3 Series circuit block diagram

6. Typical Characteristic Curve of non-isolated point of load DC DC converter ($T_c = 25^\circ C$, $V_{IN}=5V \pm 0.15V$, $V_O=3.3V$, IO=full load)

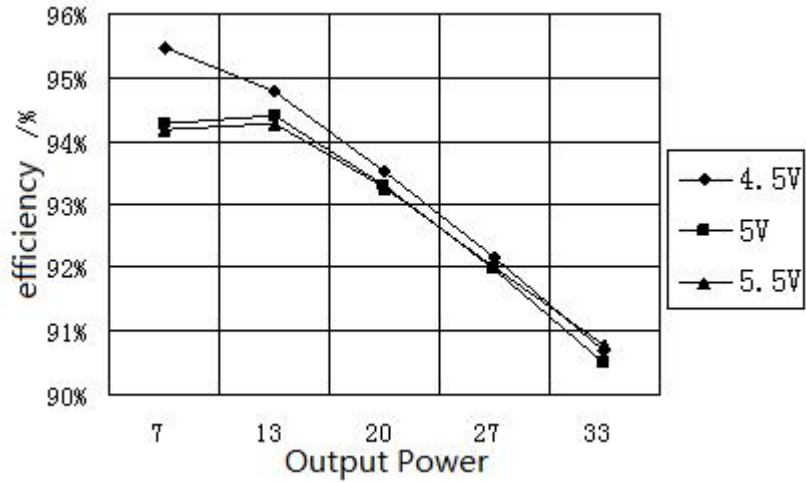


Fig. 2 HNTF5S3R3 Efficiency

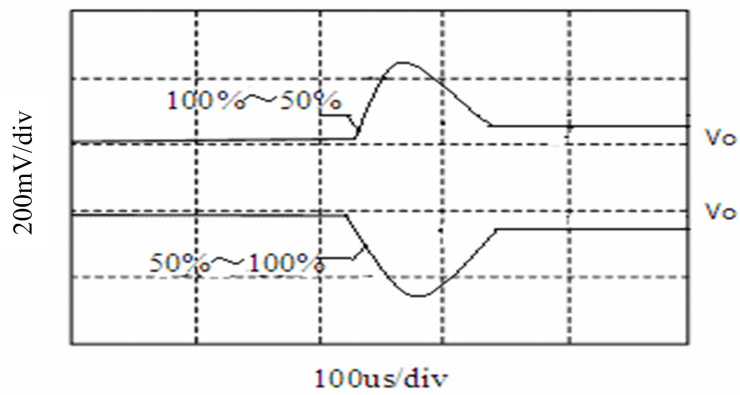


Fig. 3 HNTF5S3R3 Step Line Response

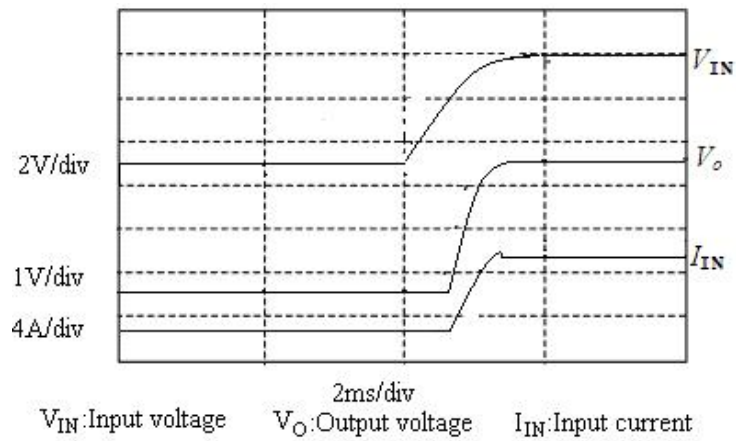


Fig. 4 HNTF5S3R3 Step Load Response

7.MTBF Curve of non-isolated point of load DC DC converter

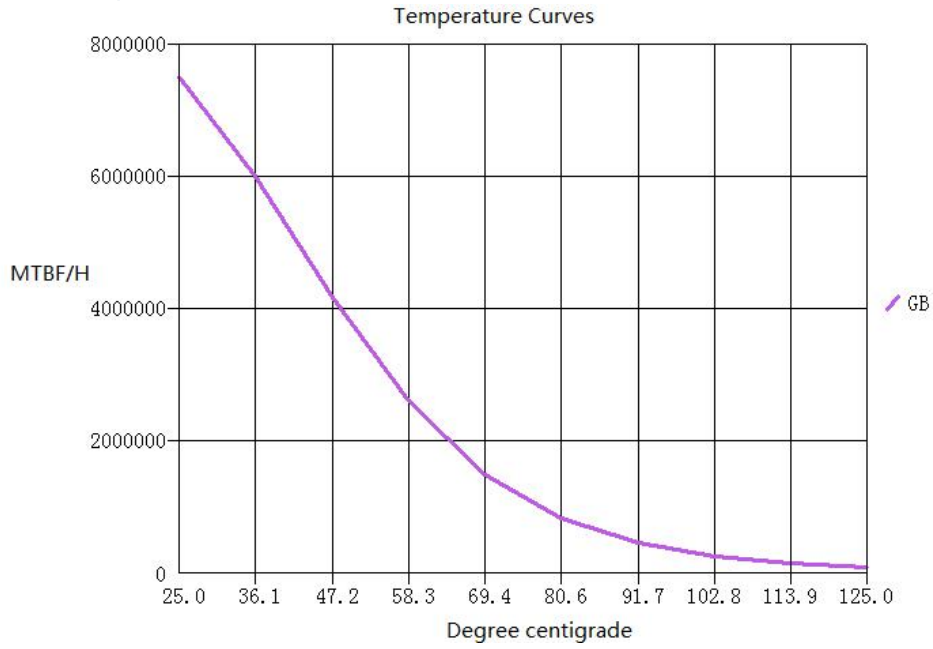


Fig. 6 MTBF Temperature Curve (HNTF5S3R3)

8 Pin Designation of non-isolated point of load DC DC converter

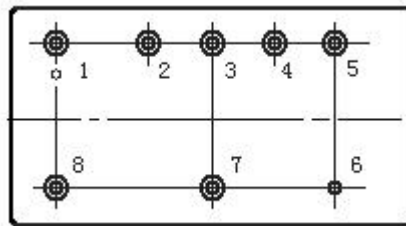


Fig 7 Pin Out Bottom View

Table 4 Pin Designation

Pin	Symbol	Designation	Pin	Symbol	Designation
1	INH	Inhibit	5	NC	No connection
2	V ₀	Output	6	GND _C	Case Ground
3	GND	Common	7	GND	Common
4	NC	No connection	8	V _{IN}	Positive Input

9 Typical Connection Diagram of non-isolated point of load DC DC converter

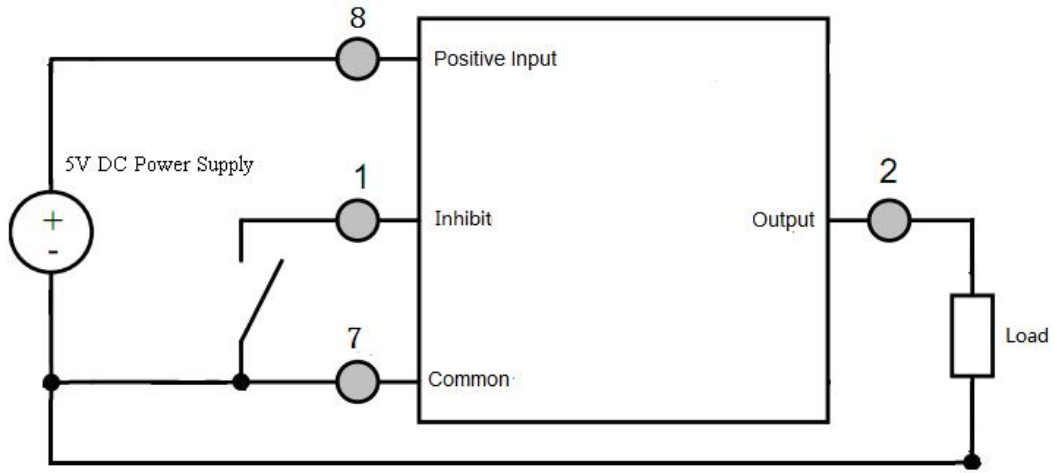


Fig. 8 Connection Diagram

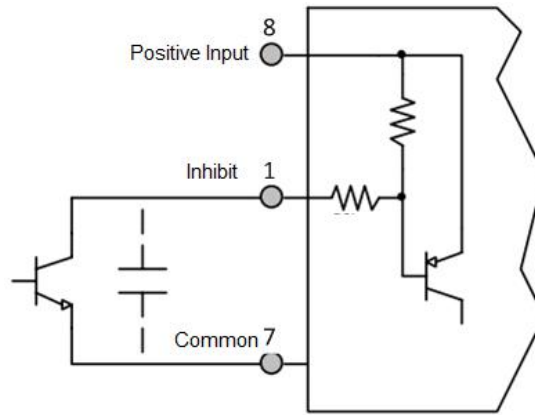


Fig. 10 Inhibit Driver Circuit Diagram

10. Package Specifications of non-isolated point of load DC DC converter (Unit: mm)

① Package without flange

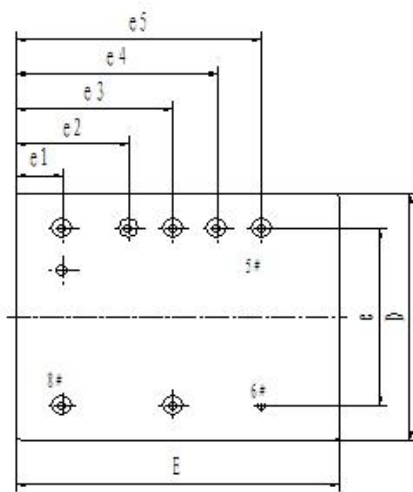


Fig. 11 Bottom View

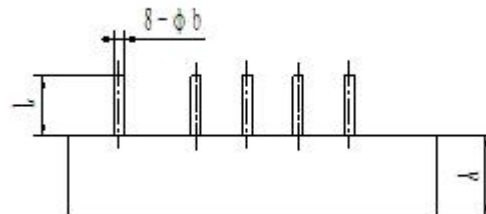


Fig. 12 Side View

② Package with Flange

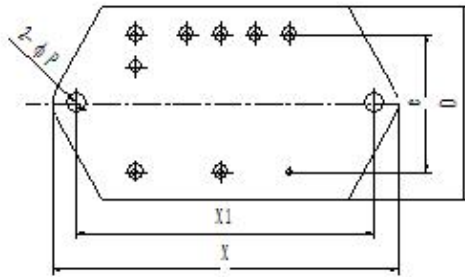


Fig 13 Bottom View

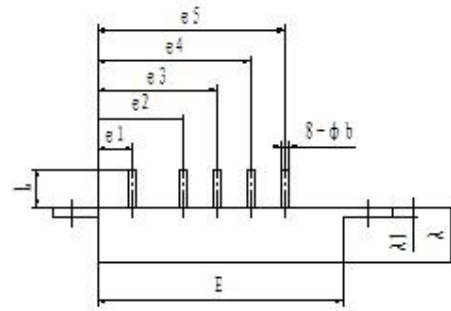


Fig. 14 Side View

Table 5 Package Outline

Symbol	Unit/mm		
	Min	Nominal	Max
<i>A</i>	-	-	8.90
<i>A1</i>	1.20	1.50	1.80
<i>φb</i>	0.87	1.00	1.13
<i>D</i>	-	-	28.94
<i>E</i>	-	-	37.33
<i>e</i>	-	20.32	-
<i>e1</i>	-	5.21	-
<i>e2</i>	-	12.83	-
<i>e3</i>	-	17.91	-
<i>e4</i>	-	22.99	-
<i>e5</i>	-	28.07	-
<i>X</i>	-	-	51.30
<i>X1</i>	43.45	43.95	44.45
<i>P</i>	3.00	3.30	3.60
<i>L</i>	5.35	-	-

Table 6 Case Materials

Case Model	Header	Header Plating	Cover	Cover Plating	Pin	Pin Plating	Sealing	Notes
UPP3728-08b	Cold Rolled Steel (10#)	Nickel	Kovar (4J42)	Nickel	Copper-core Compound	Au	Parallel seam	
UPP3728-08e	Cold Rolled Steel (10#)	Nickel	Kovar (4J42)	Nickel	Copper Compound	Au	Parallel seam	

11 Ordering Information of non-isolated point of load DC DC converter

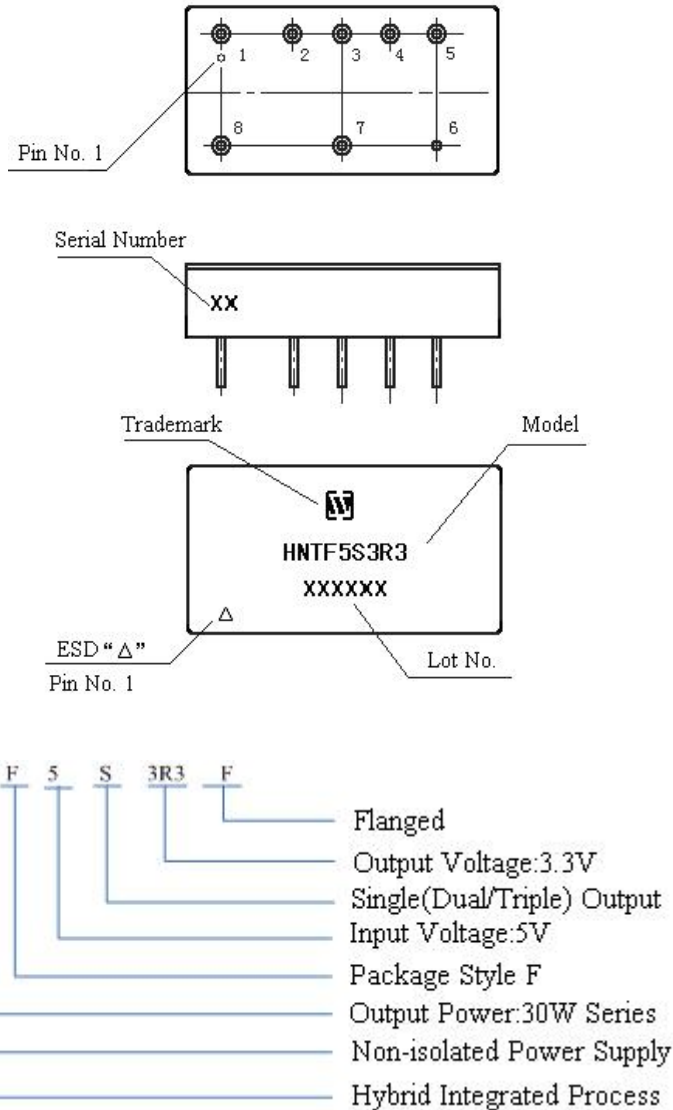


Figure 15 Part Numbering Key

Application Notes of non-isolated 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 pin bottom 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 cracking in the glass insulator 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.