

High-reliability hybrid integrated DC/DC converter (HVSA28 series)

1. Features of Hi-Rel hybrid integrated DC/DC converter (HVSA28 series)

(see Fig. 1 for outside view, and Table 1 for models)

Input DC voltage range: 18~36V,
nominal input DC voltage 28V

Output power: 6W

Operating temperature (T_c): -55~+125°C

Input, output and case are isolated mutually

Insulation resistance: $R \geq 100M\Omega$ (DC 500V)

With the function of inhibit and short-circuit protection

Hermetically sealed metal case



Size: 27.23×27.23×8.50mm³

Weight: 21g

Fig.1 Outside view of HVSA28 series

2. Scope of Hi-Rel hybrid integrated DC/DC converter (HVSA28 series) application

High-reliability electronic system for aviation, aerospace, etc.

Table1 Product models

HVSA28S5
HVSA28S12
HVSA28S28

3. Description of Hi-Rel hybrid integrated DC/DC converter (HVSA28 series)

HVSA28 series products are designed using the single-end forward PWM principle, after the input DC voltage is converted through pulse, it is coupled by high-frequency transformer for energy transmission, and then is output through rectification and filtration in order to achieve DC voltage conversion. The sampling signal of output voltage is coupled to pulse width modulator through the opto-coupler so as to adjust the pulse width automatically. This close-loop control makes the product have a stable output voltage.

This series product is made by the thick-film hybrid integrated process and is hermetically sealed in a metal case. Both the design and manufacture of the product satisfy the requirements of GJB2438A-2002 "General Specification for Hybrid Integrated Circuits" and specific specification of the products. Connection of input pins into HFG-CE03 power filter can improve EMC performance of the product.

4. Electrical performance of Hi-Rel hybrid integrated DC/DC converter (HVSA28 series)

(Table 2, Table 3)

Table 2 Rated conditions and recommended operating conditions

Absolute max. rated value	Input voltage: 40V
	Output power: 6W
Recommended operating conditions	Lead soldering temperature: 300°C/(10s)
	Storage temperature range: -55~125°C
	Inhibit voltage: $\leq 0.2V$
	Input DC voltage range: 18~36V
	Case temperature (T_c): -55~ +125°C

Table 3 Electric characteristics

Parameter	Conditions (unless otherwise specified) $V_{in}=28V\pm 5\%$, $-55^{\circ}C\leq T_C\leq +125^{\circ}C$	HVSA28S5		HVSA28S12		HVSA28S28	
		military standard Q/HW30634-2005		military standard Q/HW30635-2005		military standard Q/HW30636-2005	
		Min.	Max.	Min.	Max.	Min.	Max.
Input voltage/V	I_o = full load	18	36	18	36	18	36
Output voltage/V	I_o = full load	4.925	5.075	11.88	12.12	27.72	28.28
Output power/W	—	—	6	—	6	—	5.6
Output current/A	$V_{in}=18\sim 36V$	0	1.2	0	0.5	—	0.2
Output ripple voltage/mV	Full load, 20Hz~100MHz, $T_A=25^{\circ}C$	—	40	—	40	—	50
Efficiency/%	Full load, $T_A=25^{\circ}C$	65	—	71	—	73	—
Load regulation/mV	No load to full load, $T_A=25^{\circ}C$	—	50	—	50	80	—
Voltage regulation/mV	Full load, $T_A=25^{\circ}C$	—	15	—	15	50	—
Insulation resistance/M Ω	$T_A=25^{\circ}C$, apply 500V DC voltage between any two of input, output and case (except for pin 8)	100	—	100	—	100	—
Inhibit function	$T_A=25^{\circ}C$, current output is shut off in the range of 0~0.2V inhibit voltage	With	With	With	With	With	—
Protection function/s	$T_A=25^{\circ}C$, reducing current protection	5	—	5	—	10	—
Startup function/ms	Full load, $T_A=25^{\circ}C$	—	20	—	20	—	5

5 Circuit block diagram(Fig. 2)

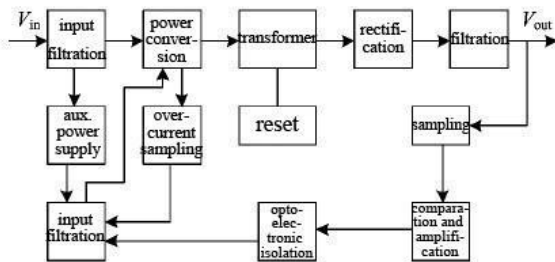


Fig. 2 Circuit block diagram

6 MTBF curve(Fig. 3)

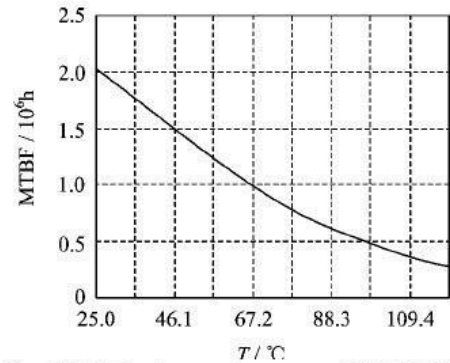


Fig. 3 MTBF vs temperature curve of HVSA28S5

(Note: as per GJB/Z299B-98, envisaged good ground condition)

7 Pin designation

(Fig. 4, Table 3)

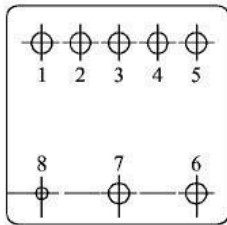


Fig. 4 Bottom view

Table 3 Pin designation

Pin	Function	Pin	Function
1	output	5	Inhibit
2	output ground	6	positive input
3	no connection	7	input ground
4	adjustment*	8	case ground

Note: *by adjusting external resistance between adjusting pin and output pin (positive or ground), the change in output voltage can be adjusted.

8 Connection diagram for typical application(Fig. 5, 6 & 7)

(1) Enable connection diagram

(2) Connection diagram of inhibit pin

(3) Connection diagram of EMI filter

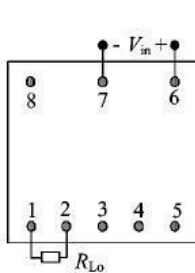


Fig. 5 Single enable connection diagram

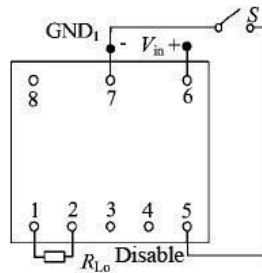


Fig. 6 Inhibit pin connection diagram

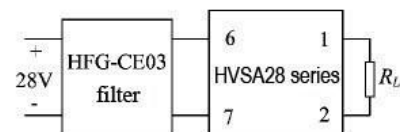


Fig. 7 Connection diagram of EMI filter

9 Package specifications (Fig. 8, Table 4)

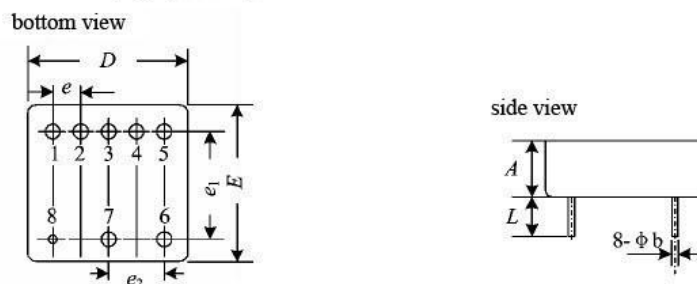


Fig. 8 Outside view of package

Table 4 Package dimensions

Dimension symbol	value /mm		
	min.	nominal	max.
A	—	8.35	8.50
ϕb	0.55	0.64	0.75
D/E	—	27.23	27.50
e	—	5.08	—
e_1	—	20.32	—
e_2	—	10.16	—
L	6.00	—	—

Table 5 Case materials

Case model	Header	Header plating	Cover	Cover plating	Pin material	Pin plating	Sealing style	Notes
UPP2727 -08d	cold rolled steel(10#)	Ni/Au	iron/ nickel alloy (4J42)	Ni/Au	Copper compound	Ni/Au	Compression seal	ground pin (pin 8) plating is Ni

Note: temperature of welded pin within 10s does not exceed 300°C

10 Part numbering key (Fig. 9)

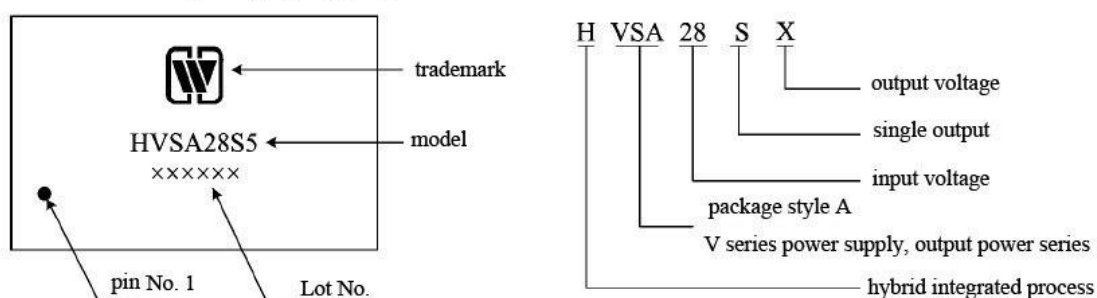


Fig. 9 Part numbering key

Application notes:

- ★ Upon power-on, be sure to correctly connect the positive and negative pole of the power supply to ensure correct power supply for fear of burning.
- ★ When carrying out the electrical performance test, the test position shall be the pins of the product.
- ★ Upon assembly, the bottom of the product shall fit to the circuit board closely so as to avoid damage of pins, and shockproof provision shall be added, if necessary.
- ★ Do not bend the pins to prevent the insulator from breaking, which affects the sealing property.
- ★ When the user places an order for the product, detailed electric performance indexes shall refer to the relevant enterprise standard.