Hybrid HSFM-140 Series Surge Protection Transient Protection DC-DC converter front–end module

1 Features of transient protection DC-DC converter

- High reliability
- Maximum input transient voltage：80V/50ms or 8V/50ms
- Output power P_O：140W
- Operating temperature range :T_C：-55℃～+125℃
- Efficiency：95%
- Match with transient protection DC-DC converter with Input voltage range of 16-40V
- Hermetically sealed metal cases

Size：36.83×28.44×8.40mm（Without flange）

50.80×28.44×8.40mm（With flange）

Weight：31g（Without flange）

34g（With flange）

2 Scope of application of transient protection DC-DC converter

High-reliability electronic system for aviation and aerospace, etc

Table 1 Models

HSFM-140、HSFM-140F

3 Description of transient protection DC-DC converter

HSFM-140 surge protection front-end module is matched with transient protection DC-DC converter.

It is used to treat the Instantaneous input voltage （80V/50ms，8V/50ms），after proces sing , it provides a reliable input voltage for Transient protection DC-DC converter. The mo dule is made of thick-film hybrid integrated process, bare chip assembly and full metal cas e sealed package.

Two operating modes for HSFM-140 surge protection front-end module：

Normal operating mode：When the bus voltage at 16V~40V，the module output voltage follows the input voltage and lower than the input voltage of about △V, while the internal transient protection DC-DC converter charge the external capacitor.

Surge maintenance mode:：When the bus voltage reaches 80V/50ms or 8V/50ms, The output part of the modules will be switched back .The external capacitor discharged to supply power for the transient protection DC-DC converter till the surge ends.

4 Electrical performance of transient protection DC-DC converter

Tabel2 Rated conditions and recommended operating conditions

Absolute Max. Rated value

Output Voltage:46V Input voltage（Transient，50ms）：8V，80V Output Power：145W Storage temperature：-65℃～150℃	Mechanical Shock：1500g Lead resistance welding temperature：300℃（15s） Weight（Non-flanged/flanged）：31g/34g Static strength：2000V

Table 3 Electric characteristics

No.	Parameter	Conditions (Unless otherwise specified, -55℃≤T_c≤125℃, V_{IN}=28V±5%)	HSFM-140	
			Min	Max
1	Input voltage /V	$V_0=V_1-\triangle V^a$, P_0=140W(Pin 8)	20	40
		$V_0=V_1-\triangle V^a$, I_0=7A(Pin 7)	18	20
		$V_0=V_1-\triangle V^a$, I_0=6.5A(expect 18V)(Pin 8)	16	18
2	Efficiency /%	T_A=25℃, I_0=5A (Pin 8)	95	-
3	External storage capacitor ended output voltage/V	V_1=16V~40V, I_{Cext}=50MA(Pin 7), I_0=0A(Pin 8)	43	45
4	External storage capacitor ended output current/mA	V1=16V~40V, Io=0A(Pin 8)	-	50
5	External storage capacitor terminal line regulation/V	T_A=25℃, V1=16V~40V, I_{Cext}=50MA(Pin 7), I_0=0A(Pin 8)	-	250
6	External storage capacitor terminal current regulation /mV	T_A=25℃, V1=16V~40V, I_{Cext}=50MA(Pin 7), I_0=0A(Pin 8)	-	250
7	Input transient voltage	T_A=25℃, Low input transient voltage duration time=50ms(Pin7 with 4700μF×Capacitor 3, Pin 8 with 140W constant power load)	8	-
		T_A=25℃, High input transient voltage duration time=50ms(Pin7 with 4700μF×Capacitor 3, Pin 8 with 140W constant power load)	-	80
8	Isolation	T_A=25℃, Any pin(except pin 6)connect 500V DC Voltage with package	100	-

5 Circuit block diagram of transient protection DC-DC converter

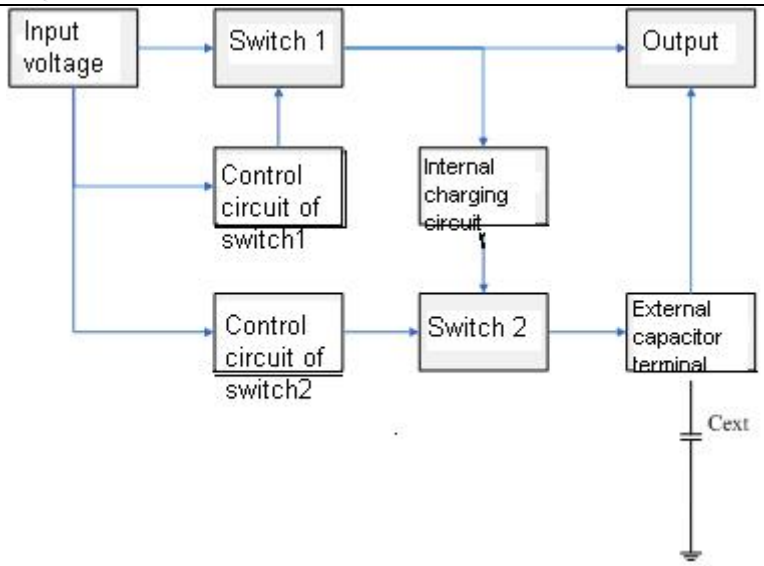

Figure 1 HSFM-140 circuit block diagram

The values of external capacitor Cext can refer to the following formula:

$$Cext = \frac{2 \bullet P \bullet t}{v^2(t1) - v^2(t2)}$$

其中：Cext unit is F

P is output power, unit is W

T is the time of discharge, unit is s

v (t1) is the voltage when external capacitor is charged to full, unit is V

v (t2) is the voltage when external capacitor is discharged to empty, unit is V

6. Typical Performance Curves of transient protection DC-DC converter

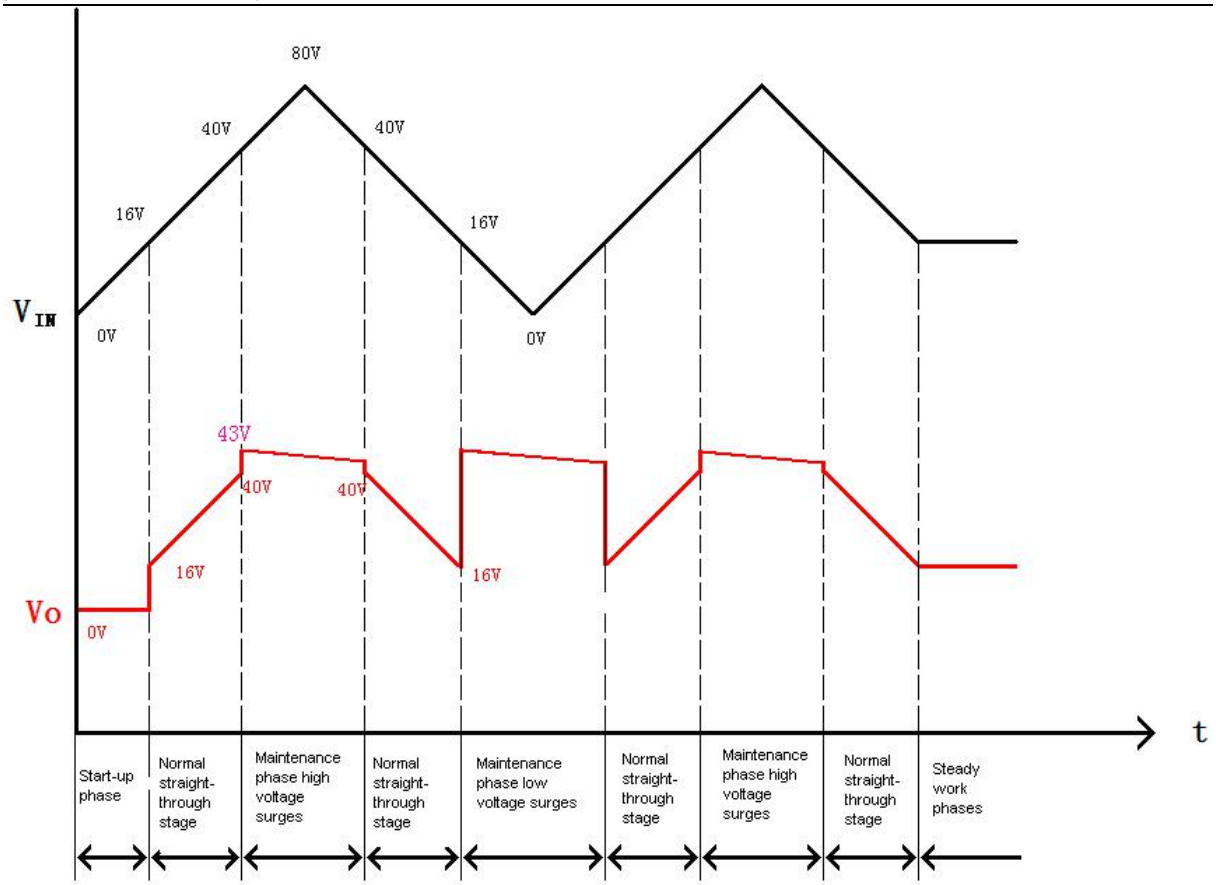

Figure 2 HSFM-140input&output typical curves

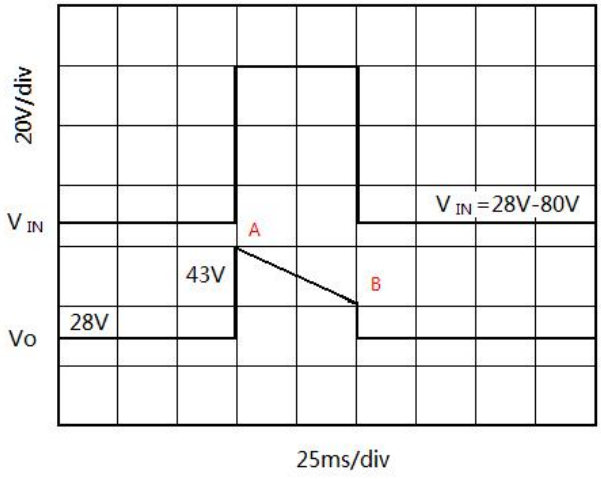

Figure 3 Input surge（80V，50ms）output voltage curves

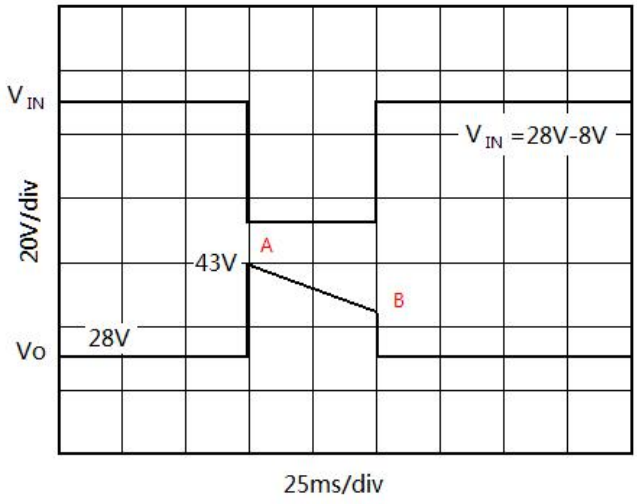

Figure 4 Input surge（8V，50ms）output voltage curves

7. MTBF Curves of transient protection DC-DC converter

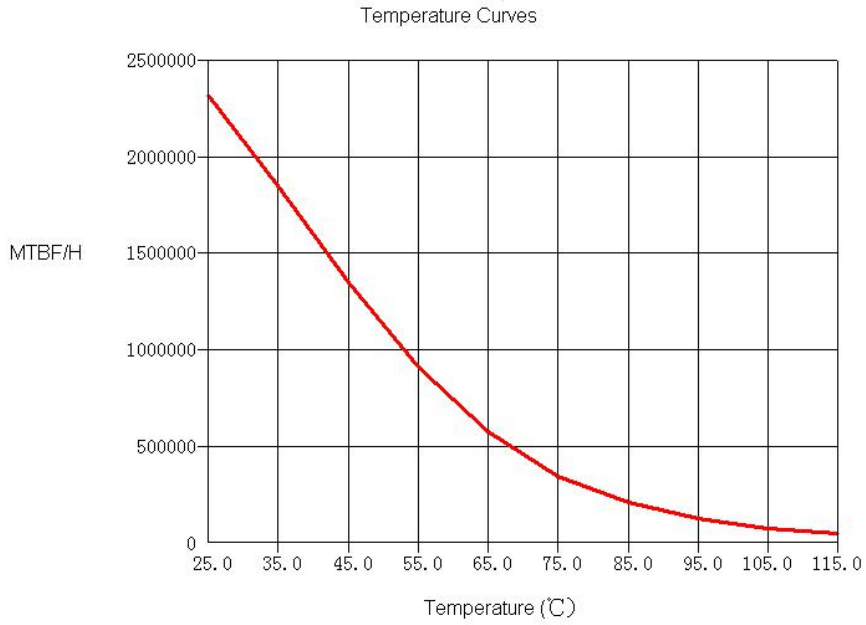

Figure 5 MTBF temperature curves（HSFM-140）

8 Pin Designation of transient protection DC-DC converter

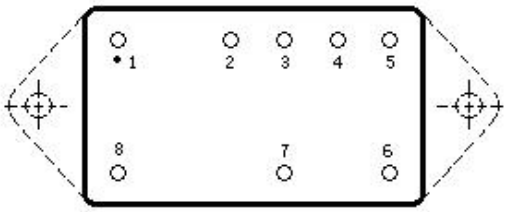

Figure 6 Pin Out Bottom View

Table 4 Pin Designation

Pin	Symbol	Designation
1	V_{IN}	Positive input
2	V_d	Schottky positive terminal
3	NC	null
4	GND	Input output common
5	NC	null
6	GND_C	Case common
7	Cext	external capacitor terminal
8	V_0	Positive output

9 Typical Connection Diagram of transient protection DC-DC co nverter

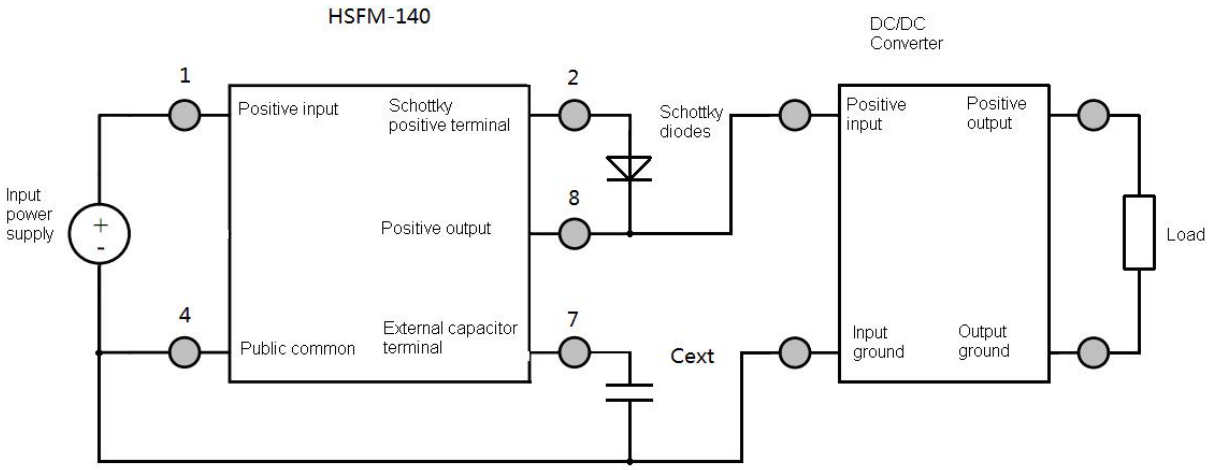

Figure 7 Typical connection diagram

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

①Non-flanged

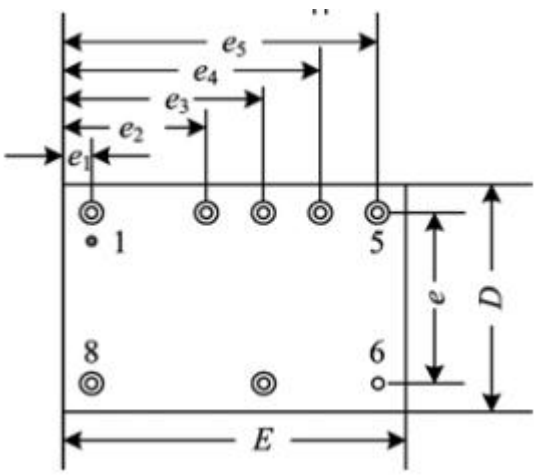

Figure 8 Bottom View

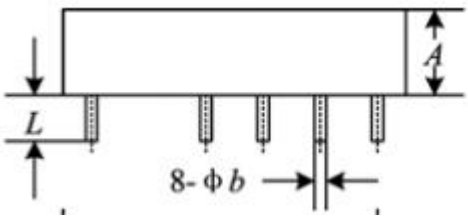

Figure 9 Side View

② With flanged

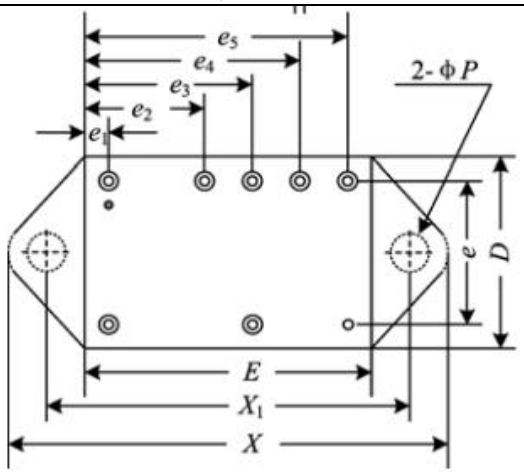

Figure 10 Bottom View

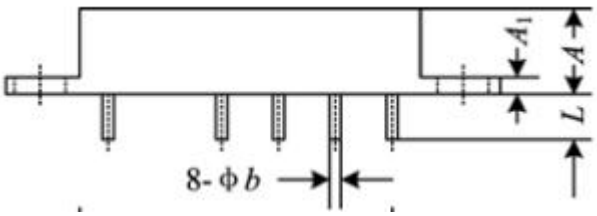

Figure 11 Side View

Table 5 Package Outline

Dimension Symbols	Unit/mm		
	Minimum	Nominal	Maximum
A	–	8.4	8.90
A1	1.20	1.50	1.80
Φb	0.87	1.00	1.13
D	–	28.44	28.94
E	–	36.83	37.33
e	–	20.32	–
e1	–	5.21	–
e2	–	12.83	–
e3	–	17.91	–
e4		22.99	
e5	–	28.07	–
X		50.8	51.30
X1	43.45	43.95	44.45
P	3.00	3.30	3.60
L	5.35	6.35	–

Table 6 Case Materials

Case Model	Header	Header Plating	Cover	Cover Plating	Pin	Pin Plating	Sealing Style	Notes
UPP3728-08c（Non-flanged）	Cold Rolled Steel（10#）	Ni	Kovar (4J42)	Ni	Copper –core Compound	Ni/Au	Compression Seal	Nickel Plating is for case ground pin
UPP3728-08d（Flanged）	Cold Rolled Steel（10#）	Ni	Kovar (4J42)	Ni	Copper –core Compound	Ni/Au	Compression Seal	Nickel Plating is for case ground

11 Ordering Information of transient protection DC-DC converter

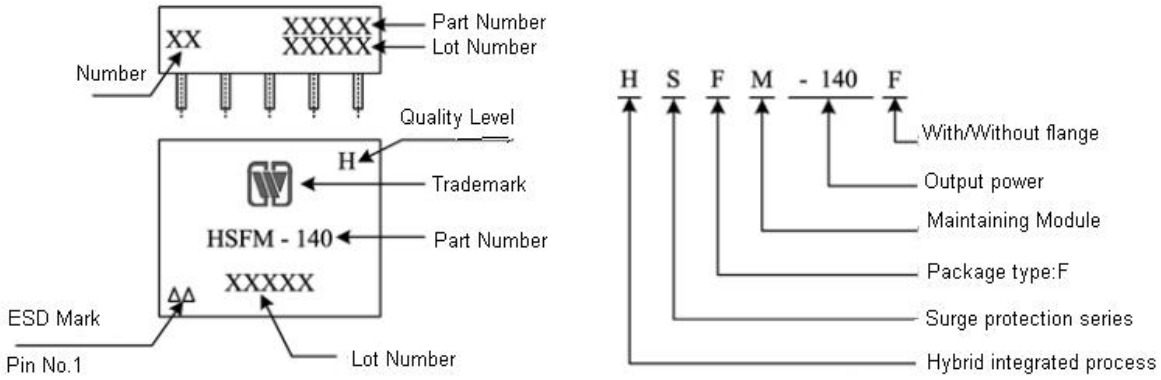

Figure 12 ordering information

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.

☆ 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.