

HSK5131 Series weapon DC-DC converter

1.1 Absolute maximum rated of weapon DC-DC converter

Pulse input voltage V_{INP}

(Positive pulse width 100ms, positive duty cycle 1%) $\cdots -20V \sim +60V$;

Input voltage V_{IN} $\cdots \cdots \cdots 26V$;

Output current limit $\cdots \cdots \cdots 3.0A$;

Storage temperature T_{stg} $\cdots \cdots \cdots -65^{\circ}C \sim 150^{\circ}C$;

Lead welding temperature (10s) T_h $\cdots \cdots \cdots 300^{\circ}C$;

Junction temperature T_j $\cdots \cdots \cdots 175^{\circ}C$;

Thermal resistance $R_{(th)J-C}$ $\cdots \cdots \cdots 3.5^{\circ}C/W$;

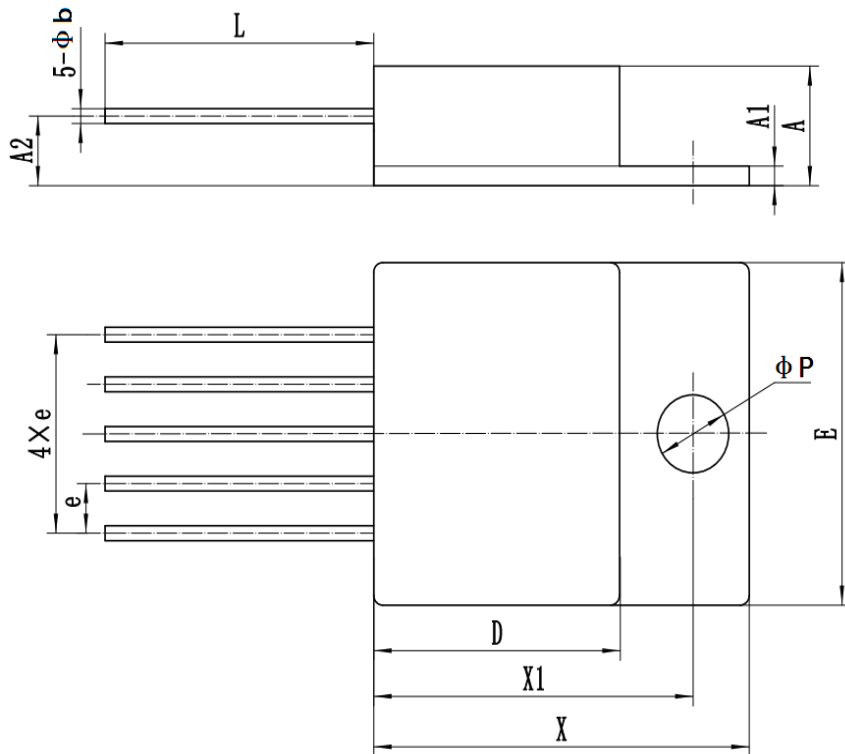
Power consumption P_b (Without heat sink) $\cdots \cdots \cdots 1W$.

1.2 Recommended operating conditions of weapon DC-DC converter

Input voltage V_{IN} $\cdots \cdots \cdots (V_{OUT}+1)V$;

Operating temperature T_c $\cdots \cdots \cdots -55^{\circ}C \sim 125^{\circ}C$;

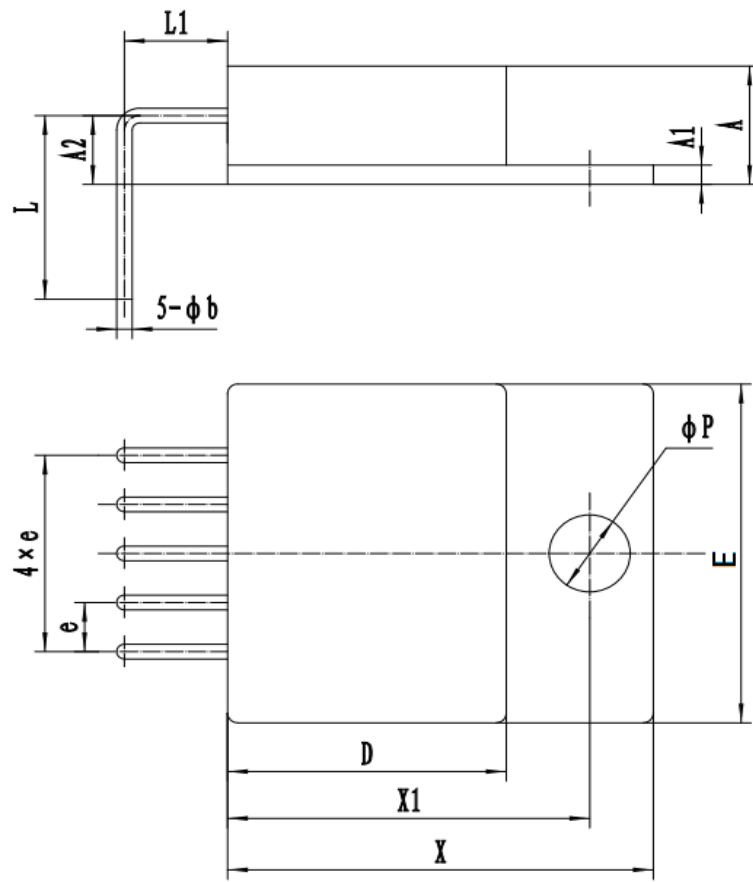
1.3 Package Specifications of weapon DC-DC converter



Unit:mm

Symbols	Data		
	Minimum	Typical	Maxim
A	-	-	6.70
$A1$	0.70	-	1.30
$A2$	3.20	-	3.80
D	-	-	14.22
E	-	-	18.03
X	-	-	21.30
$X1$	17.33	-	18.33
L	12.0	-	-
e	-	2.54	-
ϕb	0.63	-	0.89
ϕP	3.70	-	4.30

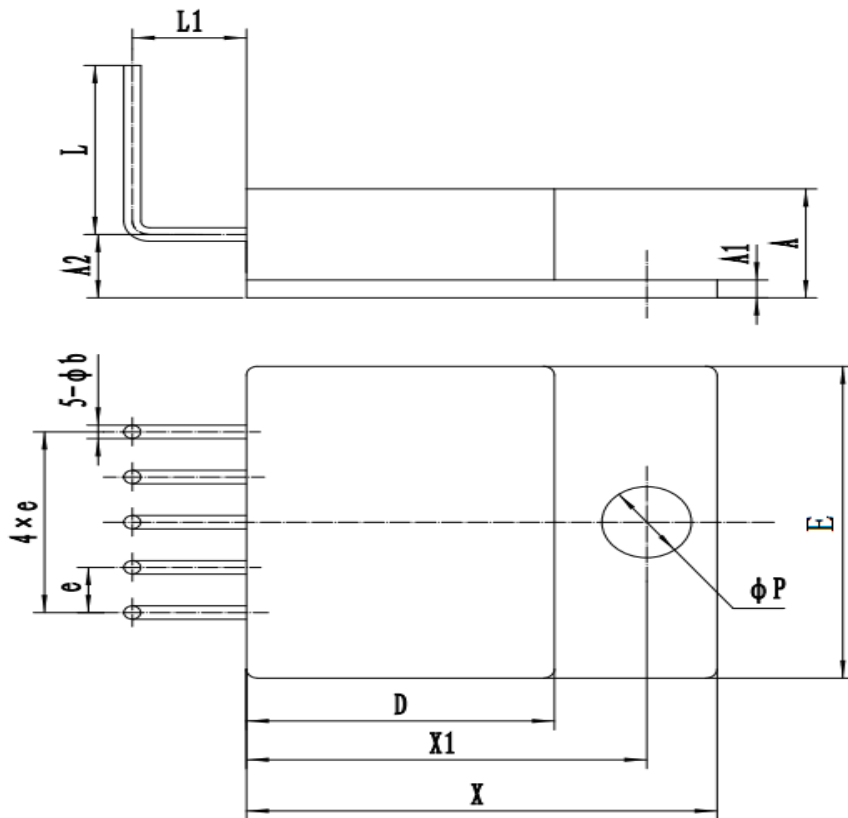
Fig 13a TS Package outline drawing



Unit:mm

Symbols	Data		
	Minimum	Typical	Maxim
<i>A</i>	-	-	6.70
<i>A1</i>	0.70	-	1.30
<i>A2</i>	3.20	-	3.80
<i>D</i>	-	-	14.22
<i>E</i>	-	-	18.03
<i>X</i>	-	-	21.30
<i>X1</i>	17.33	-	18.33
<i>L</i>	9.0	-	-
<i>L1</i>	4.58	-	5.58
<i>e</i>	-	2.54	-
φb	0.63	-	0.89
φP	3.70	-	4.30

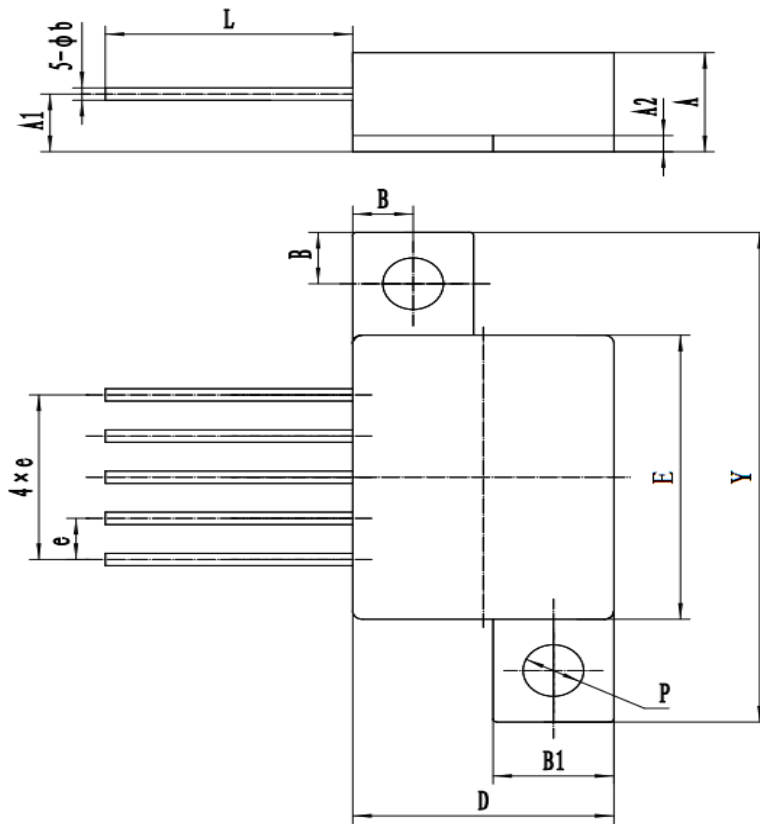
Fig 13b TD Package outline drawing



Unit: mm

Symbols	Data		
	Minimum	Typical	Maxim
A	-	-	6.70
$A1$	0.70	-	1.30
$A2$	3.20	-	3.80
D	-	-	14.22
E	-	-	18.03
X	-	-	21.30
$X1$	17.33	-	18.33
L	9.0	-	-
$L1$	4.58	-	5.58
e	-	2.54	-
ϕb	0.63	-	0.89
ϕP	3.70	-	4.30

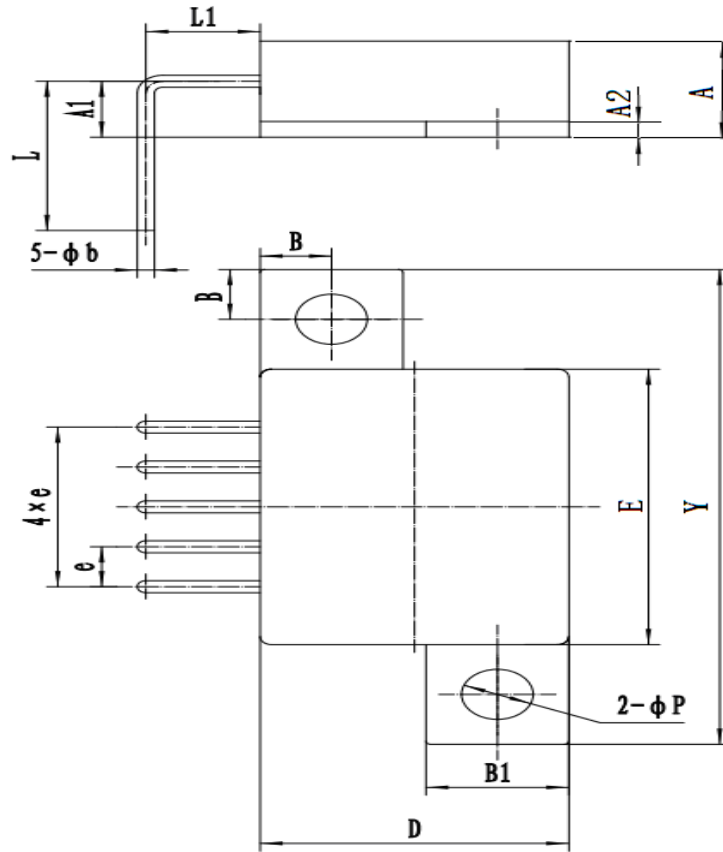
Fig 13c TU Package outline drawing



Unit: mm

Symbols	Data		
	Minimum	Typical	Maxim
A	-	-	6.70
$A1$	3.20	-	3.80
$A2$	0.70	-	1.30
B	2.87	-	3.48
$B1$	6.05	-	6.65
D	-	-	14.22
E	-	-	18.03
Y	-	-	30.72
L	12.0	-	-
e	-	2.54	-
ϕb	0.63	-	0.89
ϕP	2.90	-	3.50

Fig 13d ZS Package outline drawing

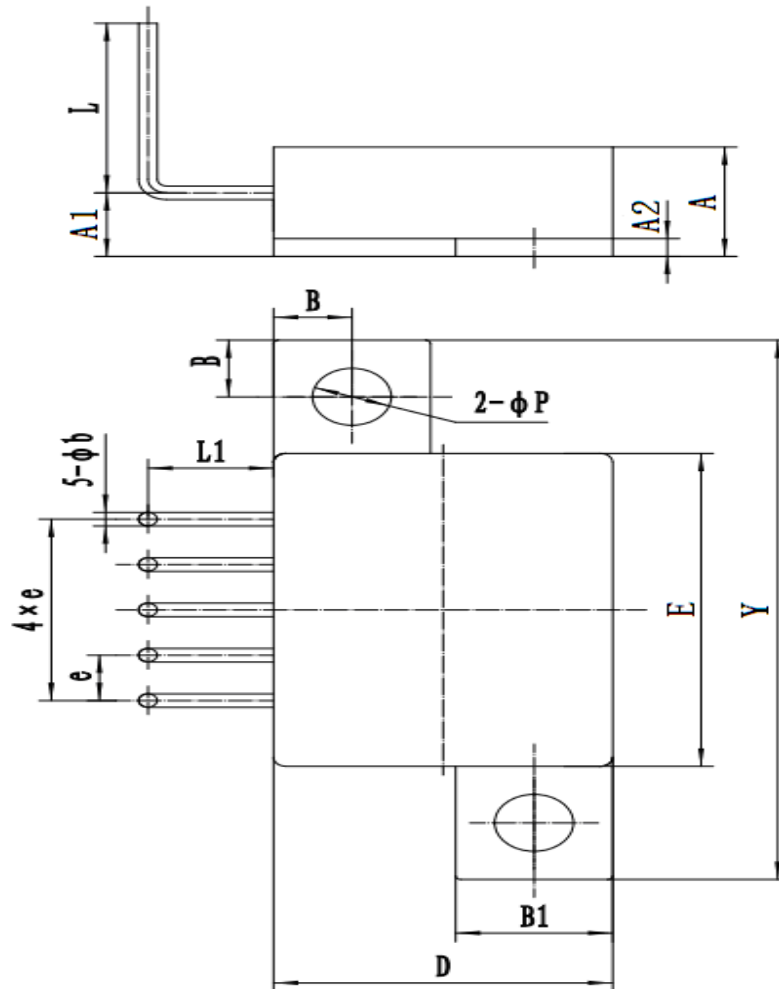


Unit:mm

Symbols	Data		
	Minimum	Typical	Maxim
A	-	-	6.70
$A1$	3.20	-	3.80
$A2$	0.70	-	1.30
B	2.87	-	3.48
$B1$	6.05	-	6.65
D	-	-	14.22
E	-	-	18.03
Y	-	-	30.72
L	9.0	-	-
$L1$	4.58	-	5.58
e	-	2.54	-
ϕb	0.63	-	0.89

ϕP	2.90	-	3.50
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Fig 13e ZD Package outline drawing



Unit:mm

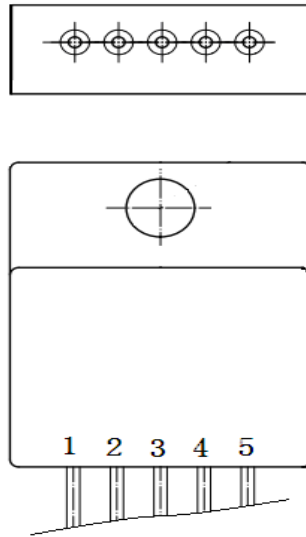
Symbols	Data		
	Minimum	Typical	Maxim
A	-	-	6.70
$A1$	3.20	-	3.80
$A2$	0.70	-	1.30
B	2.87	-	3.48
$B1$	6.05	-	6.65
D	-	-	14.22
E	-	-	18.03
Y	-	-	30.72
L	9.0	-	-

$L1$	4.58	-	5.58
e	-	2.54	-
φb	0.63	-	0.89
φP	2.90	-	3.50

Fig 13f ZU Package outline drawing

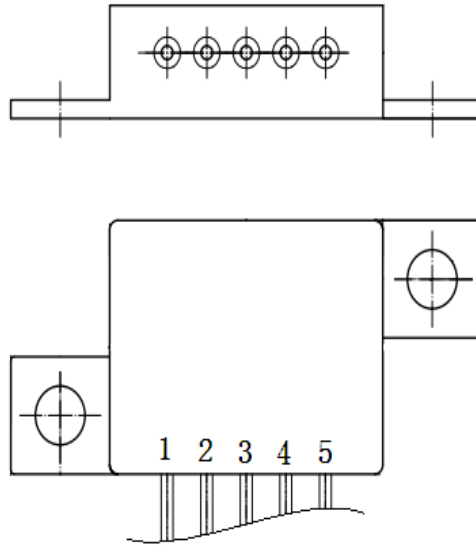
1.4 Pin Designations of weapon DC-DC converter

The leading end arrangement shall be as specified in Fig 14. Fig 14a shows the product leading ends in the form of TS, TD, TU package type. Fig 14b shows the product leading ends in the form of ZS, ZD, ZU package type.



Pin	Symbol	Designation
1	En	Enable
2	V_{IN}	Input
3	GND	GND
4	V_{OUT}	Output
5	NC	NC

Fig 14a Pin Designations (Apply for TS, TD, TU package type)

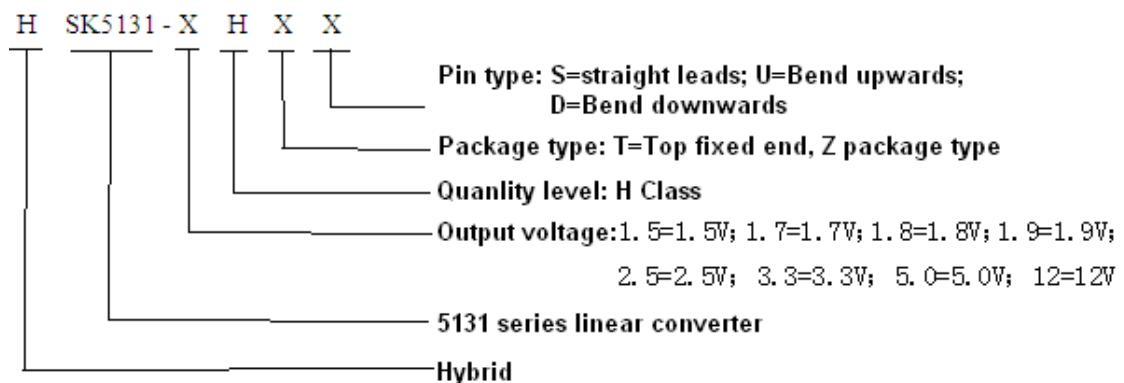


Pin	Symbol	Designation
1	En	Enable
2	V_{IN}	Input
3	GND	GND
4	V_{OUT}	Output
5	NC	NC

Fig 14b Pin Designations (Apply for ZS, ZD, ZU package type)

1.5 Ordering Information of weapon DC-DC converter

Part number contains the use of the production process, serial number, output voltage, quality level and other information. As shown below:



1.6 Technical Specifications of weapon DC-DC converter

Table 5a HSK5131-1.8 Electrical characteristics

Items	Symbol	Condition (Unless otherwise specified, $-55^{\circ}\text{C} \leq T_c \leq 125^{\circ}\text{C}$)	A Group	Limited value		Unit
				Min	Max	
Output voltage	V_{OUT}	$I_{OUT} = 10\text{mA}$, $V_{IN} = 2.8\text{V}$	1, 2, 3	1.764	1.836	V
Input and output voltage difference	V_{DO}	$T_A = 25^{\circ}\text{C}$; $\Delta V_{OUT} = -1\%$; $I_{OUT} = 100\text{mA}$	1	—	600	mV
		$T_A = 25^{\circ}\text{C}$; $\Delta V_{OUT} = -1\%$; $I_{OUT} = 3.0\text{A}$		—	700	
Static (ground) current	I_Q	$T_A = 25^{\circ}\text{C}$; $V_{IN} = 2.8\text{V}$, $I_{OUT} = 1.5\text{A}$	1	—	40	mA
		$T_A = 25^{\circ}\text{C}$; $V_{IN} = 2.8\text{V}$, $I_{OUT} = 3.0\text{A}$		—	60	mA
Load regulation	S_L	$I_{OUT} = 10\text{mA} \rightarrow 2.5\text{A}$, $V_{IN} = 2.8\text{V}$	1, 2, 3	—	2	%
Voltage regulation	S_V	$V_{IN} = 2.8\text{V} \rightarrow 26\text{V}$, $I_{OUT} = 10\text{mA}$	1, 2, 3	—	1	%
Output noise voltage	V_N	$T_A = 25^{\circ}\text{C}$; $C_L = 33\mu\text{F}$; $f \leq 300\text{KHz}$	4	—	100	μV
Output current limit	I_{LIM}	$T_A = 25^{\circ}\text{C}$; $V_{IN} = 2.8\text{V}$; duty cycle = 80%	1	—	9.0	A
Thermal shutdown temperature	T_{SD}	$T_A = 25^{\circ}\text{C}$; $V_{IN} = 3.8\text{V}$; $I_{OUT} = 3.0\text{A}$	4	—	165	$^{\circ}\text{C}$

Table 5b HSK5131-2.5 Electrical characteristics

Items	Symbol	Condition (Unless otherwise specified, $-55^{\circ}\text{C} \leq T_c \leq 125^{\circ}\text{C}$)	A Group	Limited value		Unit
				Min	Max	
Output voltage	V_{OUT}	$I_{OUT} = 10\text{mA}$, $V_{IN} = 3.5\text{V}$	1, 2, 3	2.45	2.55	V
Input and output voltage difference	V_{DO}	$T_A = 25^{\circ}\text{C}$; $\Delta V_{OUT} = -1\%$; $I_{OUT} = 100\text{mA}$	1	—	300	mV
		$T_A = 25^{\circ}\text{C}$; $\Delta V_{OUT} = -1\%$; $I_{OUT} = 3.0\text{A}$		—	600	
Static (ground) current	I_Q	$T_A = 25^{\circ}\text{C}$; $V_{IN} = 3.5\text{V}$, $I_{OUT} = 1.5\text{A}$	1	—	40	mA
		$T_A = 25^{\circ}\text{C}$; $V_{IN} = 3.5\text{V}$, $I_{OUT} = 3.0\text{A}$		—	60	mA
Load regulation	S_L	$I_{OUT} = 10\text{mA} \rightarrow 2.5\text{A}$, $V_{IN} = 3.5\text{V}$	1, 2, 3	—	2	%
Voltage regulation	S_V	$V_{IN} = 3.5\text{V} \rightarrow 26\text{V}$, $I_{OUT} = 10\text{mA}$	1, 2, 3	—	1	%
Output noise voltage	V_N	$T_A = 25^{\circ}\text{C}$; $C_L = 33\mu\text{F}$; $f \leq 300\text{KHz}$	4	—	150	μV
Output current limit	I_{LIM}	$T_A = 25^{\circ}\text{C}$; $V_{IN} = 3.5\text{V}$; duty cycle = 70%	1	—	9.0	A
Thermal shutdown temperature	T_{SD}	$T_A = 25^{\circ}\text{C}$; $V_{IN} = 4.5\text{V}$; $I_{OUT} = 3.0\text{A}$	4	—	165	$^{\circ}\text{C}$

Table 5c HSK5131-3.3 Electrical characteristics

Items	Symbol	Condition (Unless otherwise specified, $-55^{\circ}\text{C} \leq T_c \leq 125^{\circ}\text{C}$)	A Group	Limited value		Unit
				Min	Max	
Output voltage	V_{OUT}	$I_{OUT} = 10\text{mA}$, $V_{IN} = 4.3\text{V}$	1, 2, 3	3.234	3.366	V
Input and output voltage difference	V_{DO}	$T_A = 25^{\circ}\text{C}$; $\Delta V_{OUT} = -1\%$; $I_{OUT} = 100\text{mA}$	1	—	300	mV
		$T_A = 25^{\circ}\text{C}$; $\Delta V_{OUT} = -1\%$; $I_{OUT} = 3.0\text{A}$		—	600	
Static (ground) current	I_Q	$T_A = 25^{\circ}\text{C}$; $V_{IN} = 4.3\text{V}$, $I_{OUT} = 1.5\text{A}$	1	—	40	mA

current		$T_A=25^{\circ}\text{C}; V_{IN}=4.3\text{V}, I_{OUT}=3.0\text{A}$		—	60	mA
Load regulation	S_I	$I_{OUT}=10\text{mA}\rightarrow 2.5\text{A}, V_{IN}=4.3\text{V}$	1, 2, 3	—	2	%
Voltage regulation	S_V	$V_{IN}=4.3\text{V}\rightarrow 26\text{V}, I_{OUT}=10\text{mA}$	1, 2, 3	—	1	%
Output noise voltage	V_N	$T_A=25^{\circ}\text{C}; C_L=33\mu\text{F}; f\leq 300\text{KHz}$	4	—	200	μV
Output current limit	I_{LIM}	$T_A=25^{\circ}\text{C}; V_{IN}=4.3\text{V}; \text{duty cycle}=70\%$	1	—	9.0	A
Thermal shutoff temperature	T_{SD}	$T_A=25^{\circ}\text{C}; V_{IN}=5.3\text{V}; I_{OUT}=3.0\text{A}$	4	—	165	$^{\circ}\text{C}$

Table 5d HSK5131-5.0 Electrical characteristics

Items	Symbol	Condition (Unless otherwise specified, $-55^{\circ}\text{C}\leq T_c\leq 125^{\circ}\text{C}$)	A Group	Limited value		Unit
				Min	Max	
Output voltage	V_{OUT}	$I_{OUT}=10\text{mA}, V_{IN}=6.0\text{V}$	1, 2, 3	4.90	5.10	V
Input and output voltage difference	V_{DO}	$T_A=25^{\circ}\text{C}; \Delta V_{OUT}=-1\%; I_{OUT}=100\text{mA}$	1	—	300	mV
		$T_A=25^{\circ}\text{C}; \Delta V_{OUT}=-1\%; I_{OUT}=3.0\text{A}$		—	600	
Static (ground) current	I_Q	$T_A=25^{\circ}\text{C}; V_{IN}=6.0\text{V}, I_{OUT}=1.5\text{A}$	1	—	40	mA
		$T_A=25^{\circ}\text{C}; V_{IN}=6.0\text{V}, I_{OUT}=3.0\text{A}$		—	60	mA
Load regulation	S_I	$I_{OUT}=10\text{mA}\rightarrow 2.5\text{A}, V_{IN}=6.0\text{V}$	1, 2, 3	—	2	%
Voltage regulation	S_V	$V_{IN}=6.0\text{V}\rightarrow 26\text{V}, I_{OUT}=10\text{mA}$	1, 2, 3	—	1	%
Output noise voltage	V_N	$T_A=25^{\circ}\text{C}; C_L=33\mu\text{F}; f\leq 300\text{KHz}$	4	—	300	μV
Output current limit	I_{LIM}	$T_A=25^{\circ}\text{C}; V_{IN}=6\text{V}; \text{duty cycle}=50\%$	1	—	9.0	A
Thermal shutoff temperature	T_{SD}	$T_A=25^{\circ}\text{C}; V_{IN}=7\text{V}; I_{OUT}=3.0\text{A}$	4	—	165	$^{\circ}\text{C}$

Table 5e HSK5131 function form

Items	Condition	Group	Function representation
Enable function	$T_A=25^{\circ}\text{C}, V_{IN}=V_{OUT}+1\text{V}, I_{OUT}=1\text{A}, E_n=0\text{V}$	7	Output voltage off
	$T_A=25^{\circ}\text{C}, V_{IN}=V_{OUT}+1\text{V}, I_{OUT}=1\text{A}, E_n=V_{IN}$		Output voltage on

1.7 Typical Connection Diagram of weapon DC-DC converter

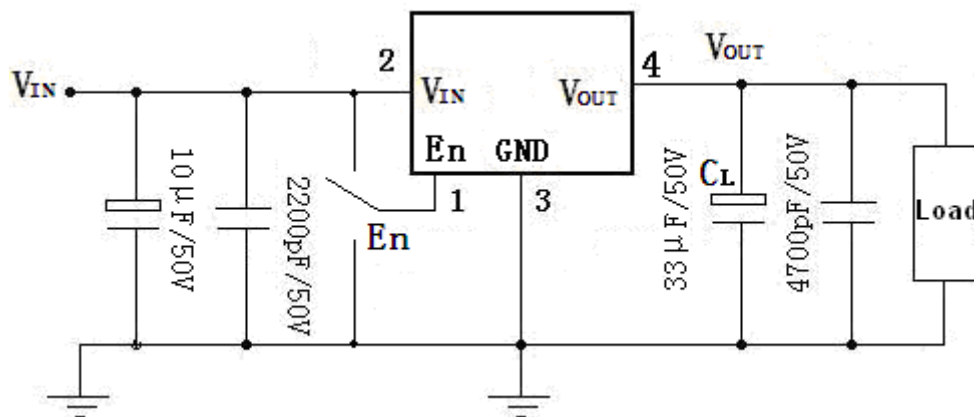


Fig 15 HSK5131 Electrical test line connection diagram

1.8 Application Notes of weapon DC-DC converter

- ☆ The electronic inspection point should be kept as close as possible at the root of the pin;
- ☆ It is strictly forbidden to bend the pins;
- ☆ To prevent the application of two or more absolute maximum ratings on the device at the same time;
- ☆ To prevent the device from falling off;
- ☆ To prevent the output and ground short circuit;
- ☆ To prevent the device from being reversed or dislocated;
- ☆ During assembly, the bottom of the product should be attached as close as possible to the circuit board to avoid damage to the pin, take shockproof measures for necessary ;
- ☆ Focus on device power consumption, the power consumption $P_D = I_O(V_{IN} - V_{OUT})$, When the input/output voltage difference ($V_{IN}-V_{OUT}$) is large, output current I_O should be smaller; When the input/output voltage difference ($V_{IN}-V_{OUT}$) is small , output current I_O should be larger; When the device power consumption is large, be sure to configure the appropriate heat sink to prevent the device damaged due to overheating or into the overheating protection status;
- ☆ Both positive and negative terminals of power supply shall be correctly connected when power is applied so as to avoid permanent damage to the device.;
- ☆ Anti-static measures should be taken during storage and transportation.