

HSK5230 Series Mil-spec DC-DC converter

1.1 Absolute maximum rated of Mil-spec 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 $R_{(th)J-C}$ $\cdots \cdots \cdots 3.5^{\circ}C/W$;

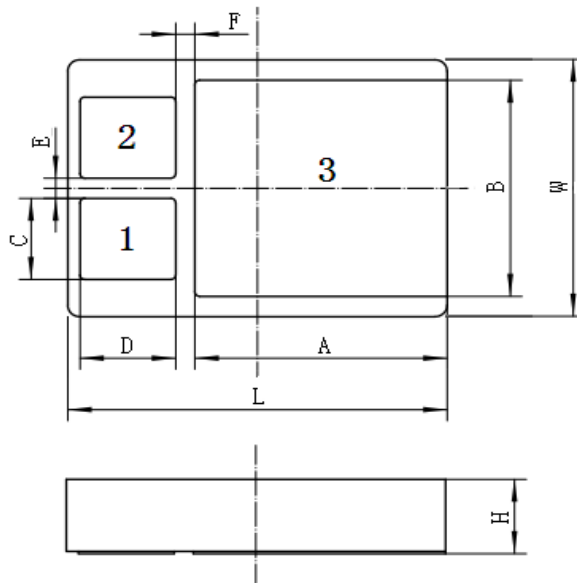
Power consumption P_b (Without heat sink) $\cdots \cdots \cdots 300mW$.

1.2 Recommended operating conditions of Mil-spec 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 Mil-spec DC-DC converter

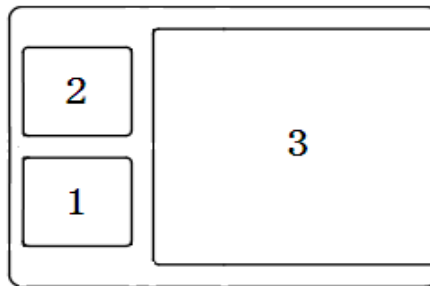


Unit:mm

Symbols	Data		
	Minimum	Typical	Maxim
<i>A</i>	10.24	-	10.84
<i>B</i>	9.23	-	9.83
<i>C</i>	3.4	-	3.8
<i>D</i>	3.8	-	4.2
<i>E</i>	0.80	-	-
<i>F</i>	0.70	-	-
<i>H</i>	-	-	3.90
<i>L</i>	-	-	16.15
<i>W</i>	-	-	11.71

Fig 25 HSK5230 Package outline drawing

1.4 Pin Designations of Mil-spec DC-DC converter



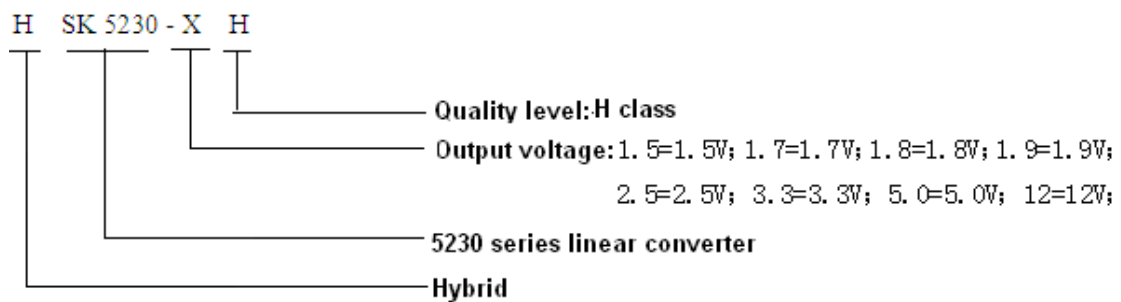
(upward view)

Pin	Symbol	Designation
1	V_{IN}	Input
2	V_{OUT}	Output
3	GND	GND

Fig 26 HSK5230 Pin Designations

1.5 Ordering Information of Mil-spec 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 Mil-spec DC-DC converter

Table 9a HSK5230-1.5 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}	$I_{OUT} = 10\text{mA}$, $V_{IN} = 2.5\text{V}$	1, 2, 3	1.47	1.53	V
Input and output	V_{DO}	$T_A = 25^{\circ}\text{C}$; $\Delta V_{OUT} = -1\%$; $I_{OUT} = 100\text{mA}$	1	—	600	mV

voltage difference		$T_A=25^{\circ}\text{C}$; $\Delta V_{\text{OUT}}=-1\%$; $I_{\text{OUT}}=3.0\text{A}$		—	700	
Static (ground) current	I_Q	$T_A=25^{\circ}\text{C}$; $V_{\text{IN}}=2.5\text{V}$, $I_{\text{OUT}}=1.5\text{A}$	1	—	40	mA
		$T_A=25^{\circ}\text{C}$; $V_{\text{IN}}=2.5\text{V}$, $I_{\text{OUT}}=3.0\text{A}$		—	60	
Load regulation	S_L	$I_{\text{OUT}}=10\text{mA}\rightarrow 2.5\text{A}$, $V_{\text{IN}}=2.5\text{V}$	1, 2, 3	—	2	%
Voltage regulation	S_V	$V_{\text{IN}}=2.5\text{V}\rightarrow 26\text{V}$, $I_{\text{OUT}}=10\text{mA}$	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}	$T_A=25^{\circ}\text{C}$; $V_{\text{IN}}=2.5\text{V}$	1	—	5.0	A
Thermal shutoff temperature	T_{SD}	$T_A=25^{\circ}\text{C}$; $V_{\text{IN}}=3.5\text{V}$; $I_{\text{OUT}}=5.0\text{A}$	4	—	160	$^{\circ}\text{C}$

Table 9b HSK5230-1.9 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}	$I_{\text{OUT}}=10\text{mA}$, $V_{\text{IN}}=2.9\text{V}$	1, 2, 3	1.862	1.938	V
Input and output voltage difference	V_{DO}	$T_A=25^{\circ}\text{C}$; $\Delta V_{\text{OUT}}=-1\%$; $I_{\text{OUT}}=100\text{mA}$	1	—	500	mV
		$T_A=25^{\circ}\text{C}$; $\Delta V_{\text{OUT}}=-1\%$; $I_{\text{OUT}}=3.0\text{A}$		—	650	
Static (ground) current	I_Q	$T_A=25^{\circ}\text{C}$; $V_{\text{IN}}=2.9\text{V}$, $I_{\text{OUT}}=1.5\text{A}$	1	—	40	mA
		$T_A=25^{\circ}\text{C}$; $V_{\text{IN}}=2.9\text{V}$, $I_{\text{OUT}}=3.0\text{A}$		—	60	
Load regulation	S_L	$I_{\text{OUT}}=10\text{mA}\rightarrow 2.5\text{A}$, $V_{\text{IN}}=2.9\text{V}$	1, 2, 3	—	2	%
Voltage regulation	S_V	$V_{\text{IN}}=2.9\text{V}\rightarrow 26\text{V}$, $I_{\text{OUT}}=10\text{mA}$	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}	$T_A=25^{\circ}\text{C}$; $V_{\text{IN}}=2.9\text{V}$	1	—	5.0	A
Thermal shutoff temperature	T_{SD}	$T_A=25^{\circ}\text{C}$; $V_{\text{IN}}=3.9\text{V}$; $I_{\text{OUT}}=5.0\text{A}$	4	—	160	$^{\circ}\text{C}$

Table 9c HSK5230-2.5 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}	$I_{\text{OUT}}=10\text{mA}$, $V_{\text{IN}}=3.5\text{V}$	1, 2, 3	2.45	2.55	V
Input and output voltage difference	V_{DO}	$T_A=25^{\circ}\text{C}$; $\Delta V_{\text{OUT}}=-1\%$; $I_{\text{OUT}}=100\text{mA}$	1	—	150	mV
		$T_A=25^{\circ}\text{C}$; $\Delta V_{\text{OUT}}=-1\%$; $I_{\text{OUT}}=3.0\text{A}$		—	600	
Static (ground) current	I_Q	$T_A=25^{\circ}\text{C}$; $V_{\text{IN}}=3.5\text{V}$, $I_{\text{OUT}}=1.5\text{A}$	1	—	40	mA
		$T_A=25^{\circ}\text{C}$; $V_{\text{IN}}=3.5\text{V}$, $I_{\text{OUT}}=3.0\text{A}$		—	60	
Load regulation	S_L	$I_{\text{OUT}}=10\text{mA}\rightarrow 2.5\text{A}$, $V_{\text{IN}}=3.5\text{V}$	1, 2, 3	—	2	%
Voltage regulation	S_V	$V_{\text{IN}}=3.5\text{V}\rightarrow 26\text{V}$, $I_{\text{OUT}}=10\text{mA}$	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}	$T_A=25^{\circ}\text{C}$; $V_{\text{IN}}=3.5\text{V}$	1	—	5.0	A
Thermal shutoff temperature	T_{SD}	$T_A=25^{\circ}\text{C}$; $V_{\text{IN}}=4.5\text{V}$; $I_{\text{OUT}}=5.0\text{A}$	4	—	160	$^{\circ}\text{C}$

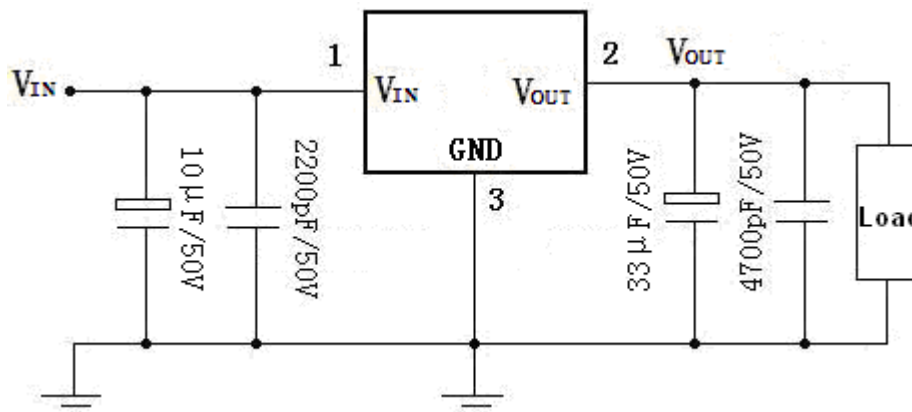
Table 9d HSK5230-3.3 Electrical characteristics

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	—	150	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
		$T_A = 25^{\circ}\text{C}$; $V_{IN} = 4.3\text{V}$, $I_{OUT} = 3.0\text{A}$		—	60	
Load regulation	S_L	$I_{OUT} = 10\text{mA} \rightarrow 2.5\text{A}$, $V_{IN} = 4.3\text{V}$	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	—	150	μV
Output current limit	I_{LIM}	$T_A = 25^{\circ}\text{C}$; $V_{IN} = 4.3\text{V}$	1	—	5.0	A
Thermal shutoff temperature	T_{SD}	$T_A = 25^{\circ}\text{C}$; $V_{IN} = 5.3\text{V}$; $I_{OUT} = 5.0\text{A}$	4	—	160	$^{\circ}\text{C}$

Table 9e HSK5230-5.0 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	—	150	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	
Load regulation	S_L	$I_{OUT} = 10\text{mA} \rightarrow 2.5\text{A}$, $V_{IN} = 6.0\text{V}$	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}	$T_A = 25^{\circ}\text{C}$; $V_{IN} = 6.0\text{V}$	1	—	5.0	A
Thermal shutoff temperature	T_{SD}	$T_A = 25^{\circ}\text{C}$; $V_{IN} = 7.0\text{V}$; $I_{OUT} = 5.0\text{A}$	4	—	160	$^{\circ}\text{C}$

1.7 Typical Connection Diagram of Mil-spec DC-DC converter



1.8 Application Notes of Mil-spec 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.