Current Sensor

Product Series: SHK-VBS-TH

Part number: SHK-VBS-TH-660-S2
SHK-VBS-TH-750-S2

Version: Ver 1.5

Sinomags Technology Co., Ltd

Web site: www.sinomags.com

CONTENT

1. Description

The SHK-VBS-TH current sensor is based on Hall and open-loop design. It is suitable for DC, AC pulsed and any kind of irregular current measurement under the isolated conditions.

Typical applications

- Electrical Power Steering
- Motor drive application
- Converters
- Battery Management

General parameter

Parameter	Symbol	Unit	Value
Working temperature	T_a	℃	-40 ~ 125
Storage temperature	T_{stg}	℃	-40 ~ 125
Mass	m	g	72

Absolute maximum rating

Parameter	Symbol	Unit	Value
Supply voltage	Vcc	V	-0.3 ~ 10 (Not operating)
			6.5
Electrostatic discharge voltage	U_{ESD}	kV	8 (HBM)

Remark: the unrecoverable damage may occur when the product works on the conditions over the absolute maximum ratings. Long-time working on the absolute maximum ratings may cause the degradation on performance and reliability.

Isolation parameter

Parameter	Symbol	Unit	Value	Comment
Insulation voltage	U_d	kV	2.8	RMS voltage for AC test 50Hz/1 min
Insulation resistance	R_{is}	MΩ	500	DC 1kV/1 min
Clearance distance (pri. -sec)	d_{Cl}	mm	9	Shortest distance through air
Creepage distance (pri. -sec)	d_{Cp}	mm	9	Shortest path along device body
Comparative tracking index	CTI	V	600	IEC60112
Case material			V0 according to UL 94	

Selection Guide

Product	**Nominal current**	**Measuring range**
SHK-VBS-TH-660-S2	660 A	660 A
SHK-VBS-TH-750-S2	750 A	750 A

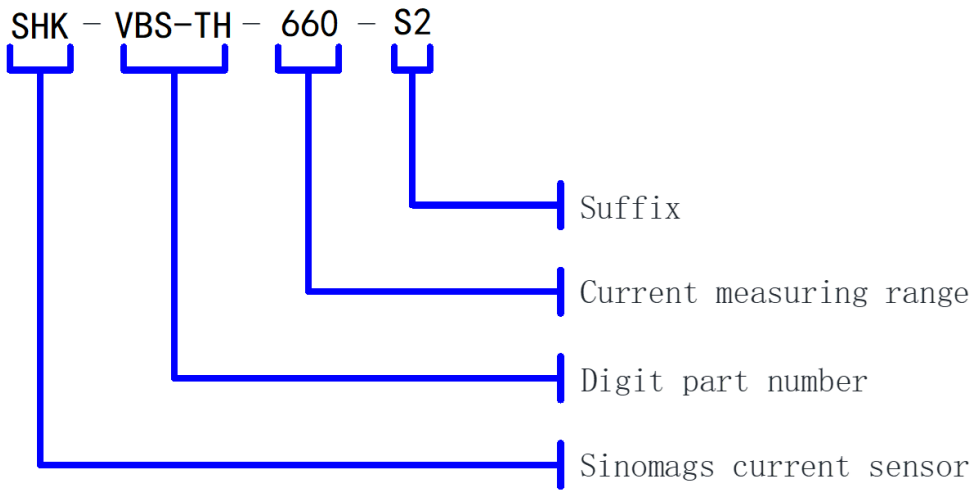
2. Electrical data SHK-VBS-TH-660-S2

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary current measuring range	I_{PM}	A	-660		660	SHK-VBS-TH-660-S2
Supply voltage	V_{CC}	V	4.75	5	5.25	
Current consumption	I_{CC}	mA		40	50	@ V_{CC}= 5.0 V
Output voltage	V_{OUT}	V	$(V_{CC}/5)\times(V_{off}+G\times I_P)$			@ T_a = 25℃
Quiescent voltage	V_{off}	V		2.5		@ T_a = 25℃, V_{CC} = 5.0 V
Sensitivity	G	mV/A		3.03		@ T_a = 25℃, V_{CC} = 5.0 V
Load resistance	R_L	kΩ	10		100	
Ratiometricity error	ε_r	%		±0.5		@ 4.75V ≤ V_{CC} ≤ 5.25V
Sensitivity error	ε_G	%		±1		@ T_a = 25℃, V_{CC} = 5.0 V
Electrical offset voltage error	V_{OE}	mV	-20	±10	20	@ T_a = 25℃, V_{CC} = 5.0 V
Magnetic offset voltage error	V_{OM}	mV		±5		@ T_a = 25℃, V_{CC} = 5.0 V, after ±I_{PM}
Ave. Temp. coefficient of V_{OE}	TCV_{OEAV}	mV/℃		±0.15		@ -40℃≤T_a ≤125℃
Ave. Temp. coefficient of G	TCG_{AV}	%/℃		±0.03		@ -40℃≤T_a ≤125℃
Linearity	ε_L	%		±1		@ T_a = 25℃, V_{CC} = 5.0 V, I = I_{PM}
Accuracy @ 25℃	E_{TOT}	% of I_{PM}	-1		1	@ T_a = 25℃, V_{CC} = 5.0 V
Accuracy @ -40℃ ~ 125℃	E_{TOT}	% of I_{PM}	-3.5		3.5	@ -40℃≤T_a ≤125℃, V_{CC} = 5.0 V
Response time	T_r	µs		2	6	@ 90% of I_{PM}
Frequency bandwidth (-3 dB)	BW	kHz	40			No RC circuit
Output voltage noise	V_{no}	mVpp		20		@ DC ~ 10 kHz

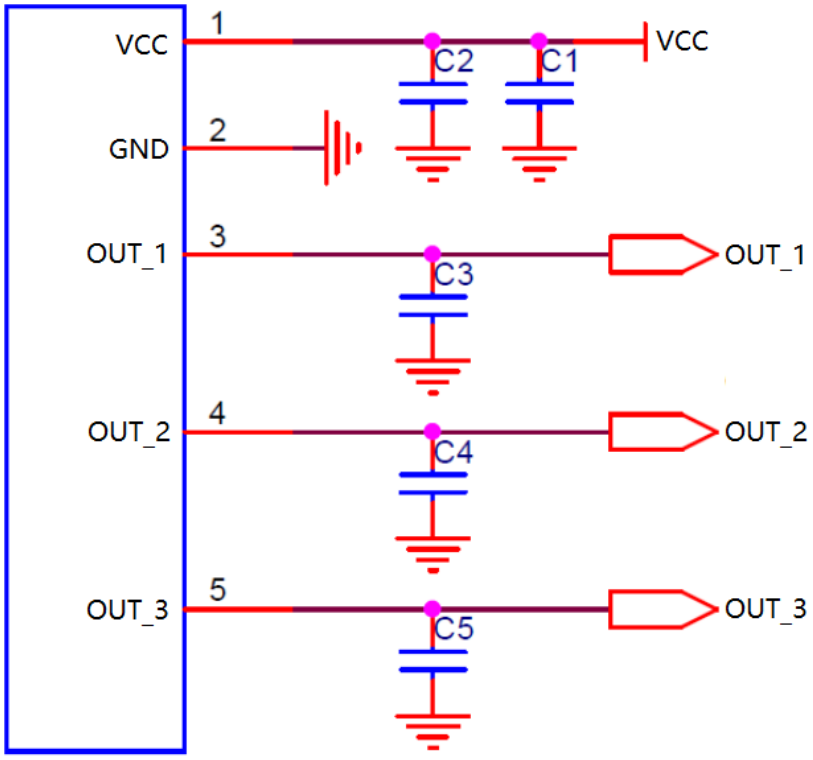
3. Electrical data SHK-VBS-TH-750-S2

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary current measuring range	I_{PM}	A	-750		750	SHK-VBS-TH-750-S2
Supply voltage	V_{CC}	V	4.75	5	5.25	
Current consumption	I_{CC}	mA		40	50	@ V_{CC}= 5.0 V
Output voltage	V_{OUT}	V	$(V_{CC}/5)\times(V_{off}+G\times I_P)$			@ T_a = 25℃
Quiescent voltage	V_{off}	V		2.5		@ T_a = 25℃, V_{CC} = 5.0 V
Sensitivity	G	mV/A		2.66		@ T_a = 25℃, V_{CC} = 5.0 V
Load resistance	R_L	kΩ	10		100	
Ratiometricity error	ε_r	%		±0.5		@ 4.75V ≤ V_{CC} ≤ 5.25V
Sensitivity error	ε_G	%		±1		@ T_a = 25℃, V_{CC} = 5.0 V
Electrical offset voltage error	V_{OE}	mV	-20	±10	20	@ T_a = 25℃, V_{CC} = 5.0 V
Magnetic offset voltage error	V_{OM}	mV		±5		@ T_a = 25℃, V_{CC} = 5.0 V, after ±I_{PM}
Ave. Temp. coefficient of V_{OE}	TCV_{OEAV}	mV/℃		±0.15		@ -40℃≤T_a ≤125℃
Ave. Temp. coefficient of G	TCG_{AV}	%/℃		±0.03		@ -40℃≤T_a ≤125℃
Linearity	ε_L	%		±1		@ T_a = 25℃, V_{CC} = 5.0 V, I = I_{PM}
Accuracy @ 25℃	E_{TOT}	% of I_{PM}	-1		1	@ T_a = 25℃, V_{CC} = 5.0 V
Accuracy @ -40℃ ~ 125℃	E_{TOT}	% of I_{PM}	-3.5		3.5	@ -40℃≤T_a ≤125℃, V_{CC} = 5.0 V
Response time	T_r	μs		2	6	@ 90% of I_{PM}
Frequency bandwidth (-3 dB)	BW	kHz	40			No RC circuit
Output voltage noise	V_{no}	mVpp		20		@ DC ~ 10 kHz

4. Product definition statement



5. Electrical circuit diagram

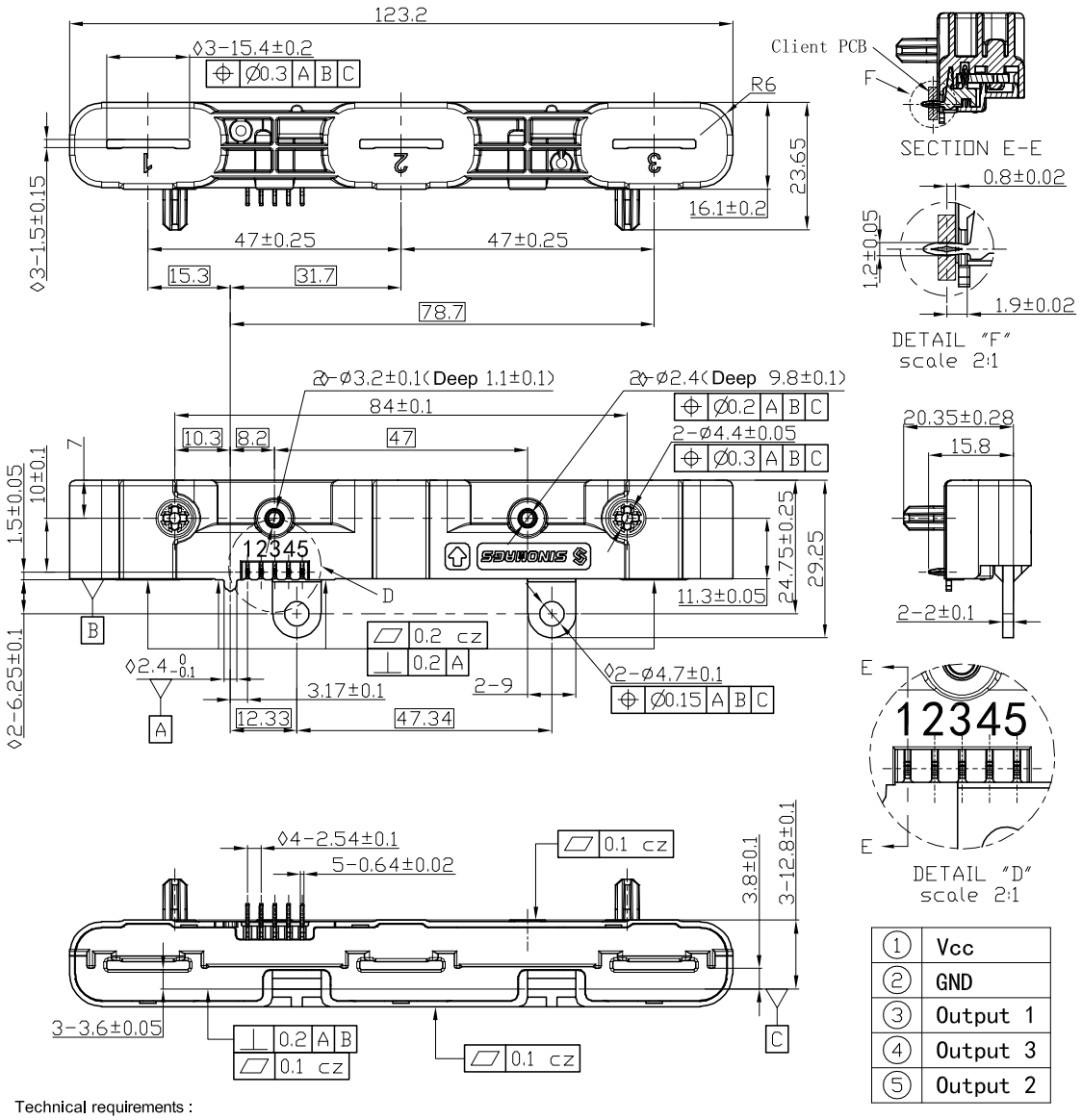


Remarks：

Capacitor recommended specification：

C1	1uF
C2	100nF
C3、C4、C5	1nF

6. Dimension & Pin definitions

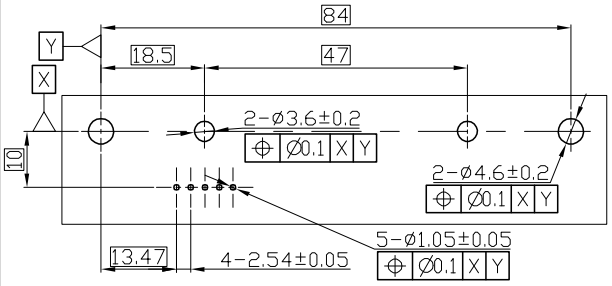


①	Vcc
②	GND
③	Output 1
④	Output 3
⑤	Output 2

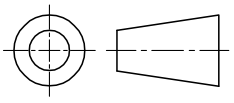
Technical requirements :

1、Focus dimensions : the dimensions marked with a rhombus as the focus control dimensions ;
2、The product shall be free of deformation , burr , crack and other defects , and the internal cleaning test of the product shall refer to the ISO16232 standard ;
3、General tolerance :
0-6 ± 0.1
6-30 ± 0.2
30-120 ± 0.3
4、The working temperature range of the product is -40 ~ 125 ℃ ;
5、The shell assembly is composed of plastic shell , metal insert and magnetic core ;
The material of metal insert is A5052 ;
The material of plastic shell is PBT+30GF , which flame retardancy meets UL94-V0 and CTI meets PLC0 , and it's color is black ;
6、Install self-tapping screws at two step holes (DELTA PT® Φ3 wn5451) ; Torque : 0.8 N·m ± 5% ;
Install M4 bolts on two fixing plates ; Torque : 2 N·m ± 10% ;
7、Product weight : 72 ± 3g ;
8、PCB pressing force : Min ≥ 100 N·m ， Max ≤ 500 N·m .

PCB installation size recommendations



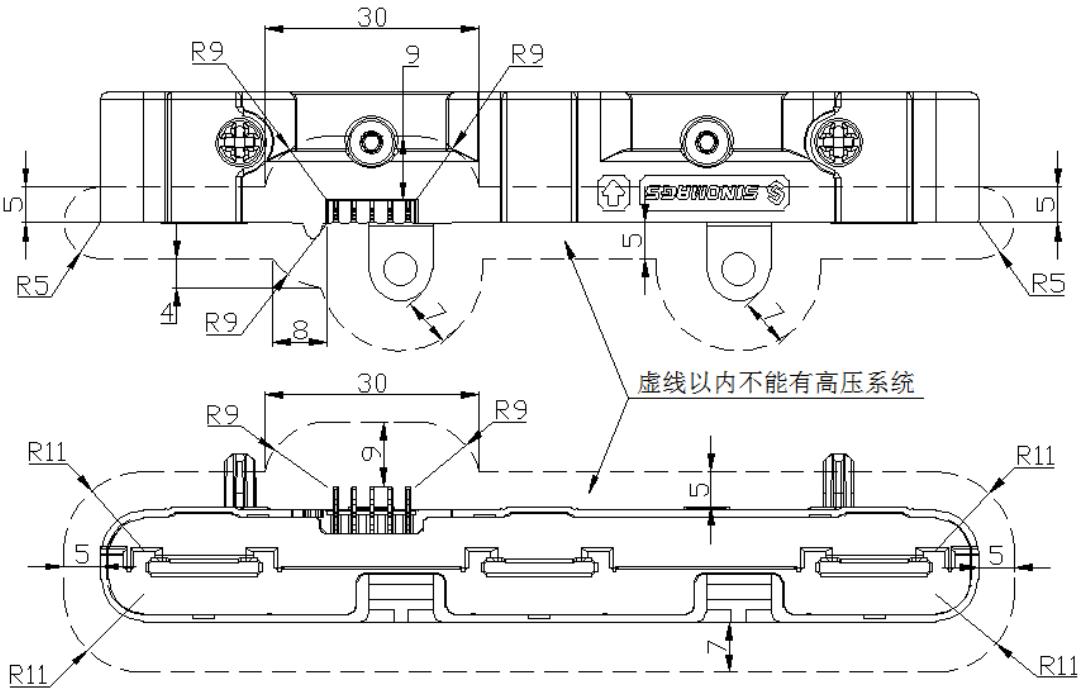
1、PCB thickness : 1.6 ± 0.15mm ;
2、Minimum hole wall copper thickness : 20μm ;
3、The coating material is Au , 1-3μm .



Remarks：

1、The clearance distance and creepage distance of the product are related to the high-voltage layout.

2、High voltage signal cannot be placed 7mm around the metal fixing plate.



7. Environmental test

Name	Test condition
Electrical tests	
Humidity test	85℃/85%,1000hr
Thermal shock	-40℃/125℃, 1000cycles
High temperature test	125℃, 1000hr
Low temperature test	-40℃, 1000hr
Insulation voltage	2800 V, AC/50Hz/1min
Insulation resistance	1000 V, DC/1min
Mechanical tests	
Shocks	ISO16750-3
Vibration test	ISO16750-3
EMC tests	
Electrostatic discharges	ISO10605(07/2008)
Bulk current injection	ISO11452-4(12/2011)
Immunity to Radiated disturbances	ISO11452-2(11/2004), ALSE
Emission radiated	CISPR25(03/2008), ALSE
Immunity power line magnetic fields	ISO11452-8(06/2015)

8. Important notice

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