

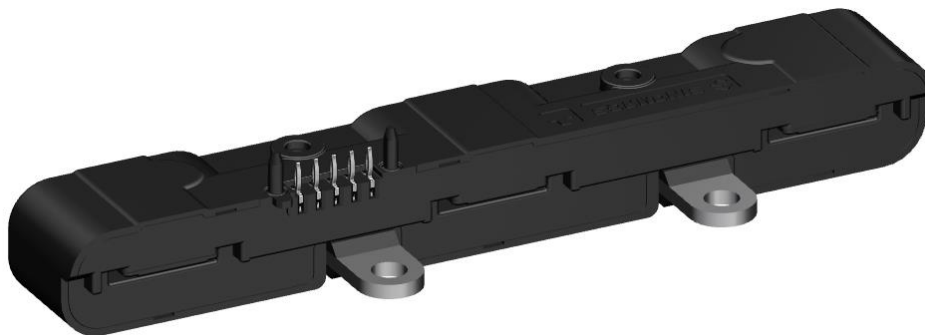
# Current Sensor

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Product Series: SHK-VBS-TH-S5

Part number: SHK-VBS-TH-700-S5  
SHK-VBS-TH-800-S5  
SHK-VBS-TH-900-S5

Version: Ver 1.3



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## 1. Description

The SHK-VBS-TH-S5 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
- Converters
- Motor drive application
- Battery Management

### General parameter

Parameter	Symbol	Unit	Value
Working temperature	$T_a$	°C	-40 ~ 125
Storage temperature	$T_{stg}$	°C	-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

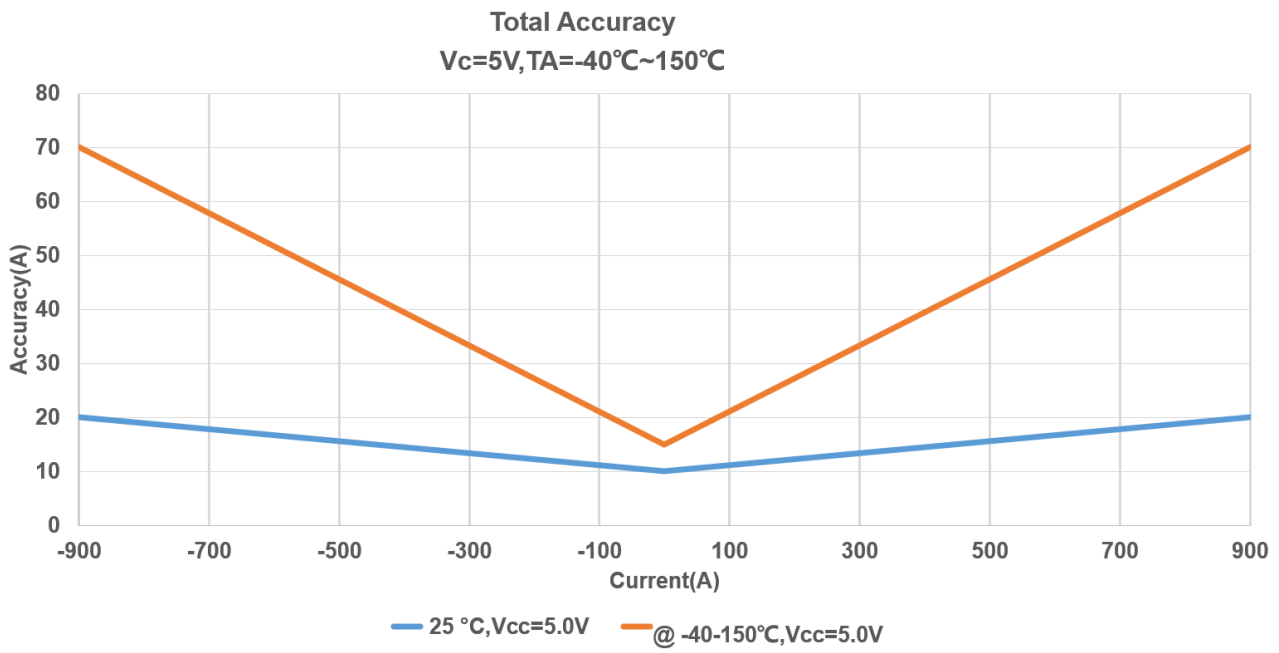
### Selection Guide

Product	Nominal current	Measuring range
SHK-VBS-TH-700-S5	±700 A	±700 A
SHK-VBS-TH-800-S5	±800 A	±800 A
SHK-VBS-TH-900-S5	±900 A	±900 A

## 2. Electrical data SHK-VBS-TH-xxx-S5

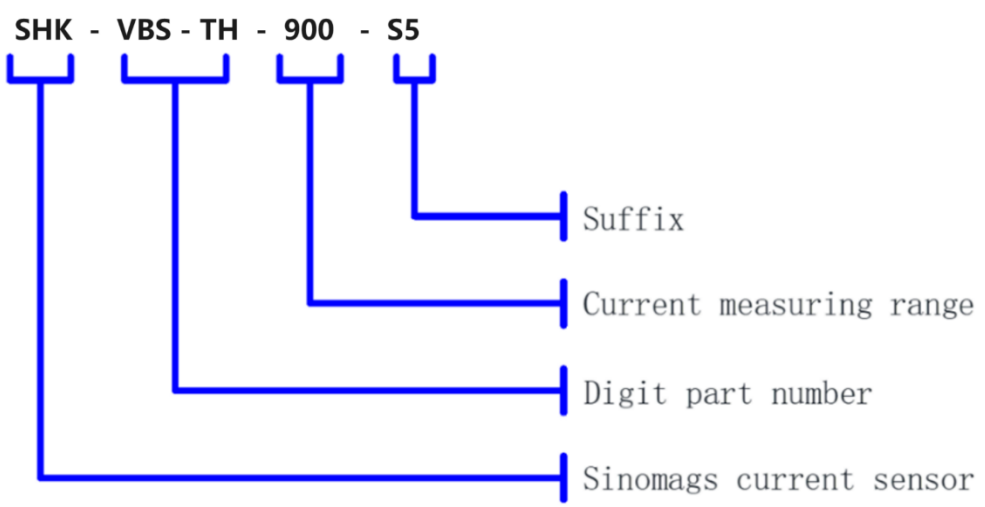
Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary current measuring range	$I_{PM}$	A	-700		700	SHK-VBS-TH-700-S5
			-800		800	SHK-VBS-TH-800-S5
			-900		900	SHK-VBS-TH-900-S5
Supply voltage	$V_{CC}$	V	4.75	5	5.25	
Current consumption	$I_{CC}$	mA		40	50	@ $V_{CC}=5.0\text{ V}$
Output voltage	$V_{OUT}$	V	$(V_{CC}/5) \times (V_{off} + G * I_{pn})$			@ $T_a = 25^\circ\text{C}$
Quiescent voltage	$V_{off}$	V		2.5		@ $T_a = 25^\circ\text{C}, V_{CC} = 5.0\text{ V}$
Sensitivity	G	mV/A		2.86		SHK-VBS-TH-700-S5
				2.5		SHK-VBS-TH-800-S5
				2.22		SHK-VBS-TH-900-S5
Load resistance	$R_L$	k $\Omega$	10		100	
Ratiometricity error	$\epsilon_r$	%		$\pm 0.5$		@ $4.75\text{V} \leq V_{CC} \leq 5.25\text{V}$
Sensitivity error	$\epsilon_G$	%		$\pm 1$		@ $T_a = 25^\circ\text{C}, V_{CC} = 5.0\text{ V}$
Electrical offset voltage error	$V_{OE}$	mV	-20	$\pm 10$	20	@ $T_a = 25^\circ\text{C}, V_{CC} = 5.0\text{ V}$
Magnetic offset voltage error	$V_{OM}$	mV		$\pm 5$		@ $T_a = 25^\circ\text{C}, V_{CC} = 5.0\text{ V}$ , after $\pm I_{PM}$
Ave. Temp. coefficient of $V_{OE}$	$TCV_{OEAV}$	mV/ $^\circ\text{C}$		$\pm 0.15$		@ $-40^\circ\text{C} \leq T_a \leq 125^\circ\text{C}$
Ave. Temp. coefficient of G	$TCG_{AV}$	%/ $^\circ\text{C}$		$\pm 0.03$		@ $-40^\circ\text{C} \leq T_a \leq 125^\circ\text{C}$
Linearity	$\epsilon_L$	%		$\pm 1$		@ $T_a = 25^\circ\text{C}, V_{CC} = 5.0\text{ V}$ , $I = I_{PM}$
Accuracy @ $25^\circ\text{C}$	$E_{TOT}$	% of $I_{PM}$		$\pm 1$		@ $T_a = 25^\circ\text{C}, V_{CC} = 5.0\text{ V}$
Accuracy @ $-40^\circ\text{C} \sim 125^\circ\text{C}$	$E_{TOT}$	% of $I_{PM}$		$\pm 3.5$		@ $-40^\circ\text{C} \leq T_a \leq 125^\circ\text{C}$ , $V_{CC} = 5.0\text{ V}$
Response time	$T_r$	$\mu\text{s}$		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. Total error (mV) for $I_{PM} \leq 900A$

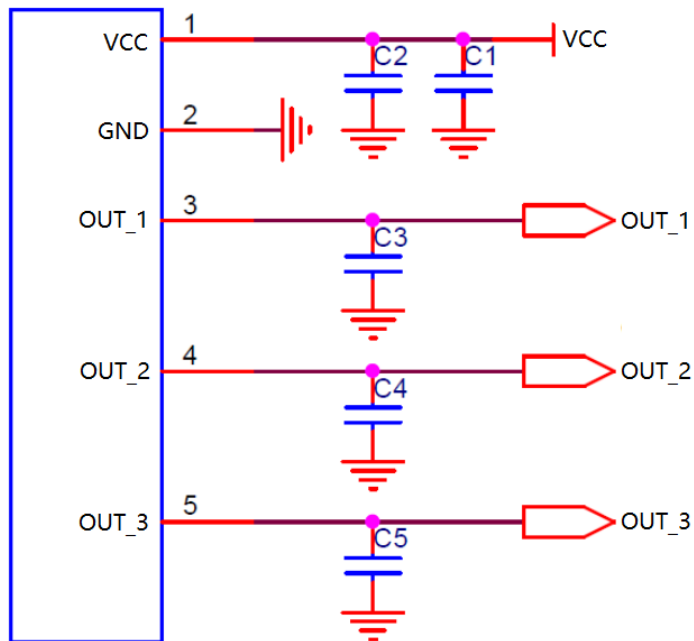


Overall accuracy X specification (mV)				
Ipm(A)	25 °C, Vcc=5.0V		@ -40-150°C, Vcc=5.0V	
900	20	1.00%	70	3.50%
0	10	0.50%	15	0.75%
-900	20	1.00%	70	3.50%

### 4. Product definition statement



### 5. Electrical circuit diagram

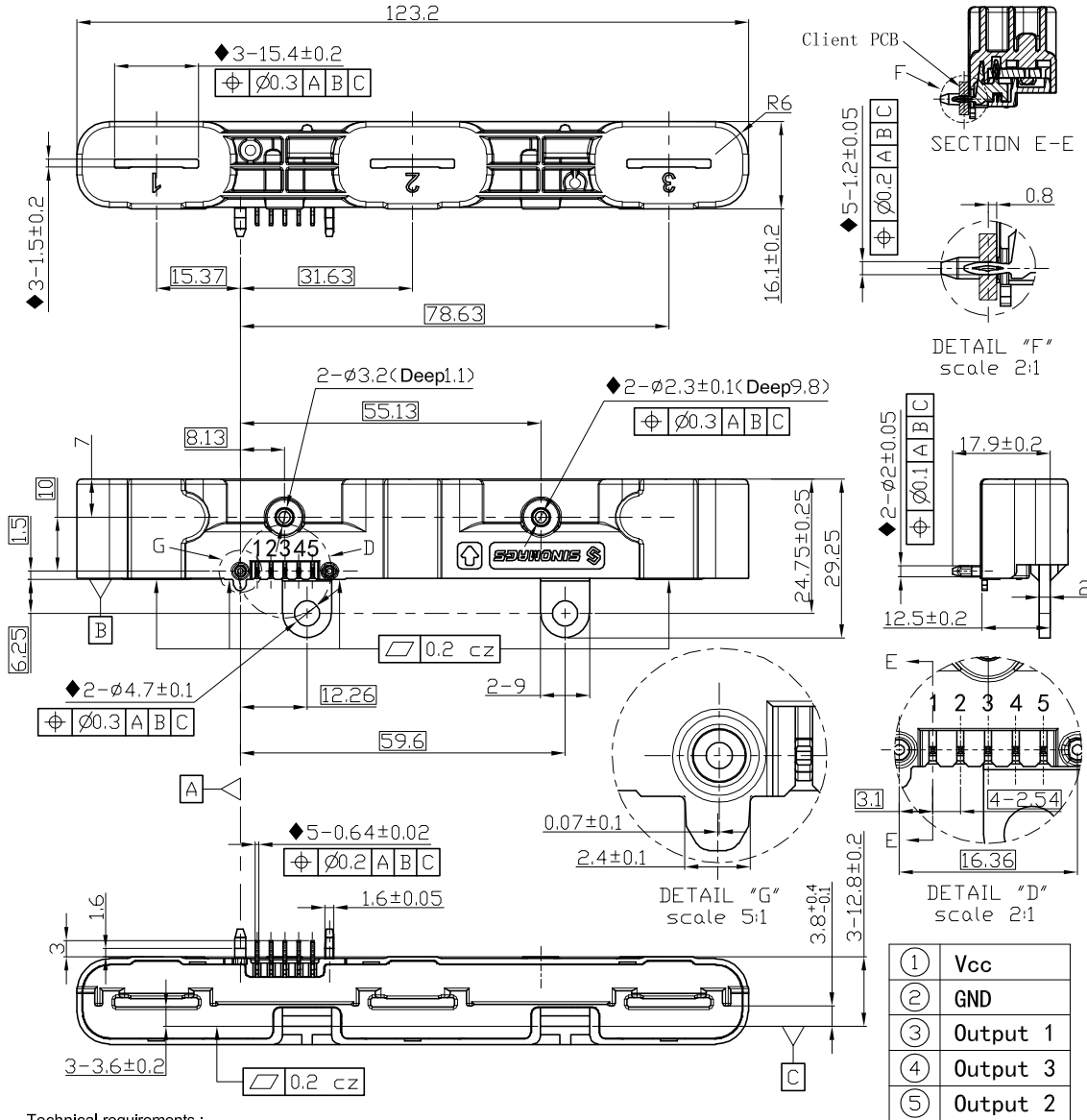


Remarks:

Capacitor recommended specification:

C1	1uF
C2	100nF
C3、C4、C5	1nF

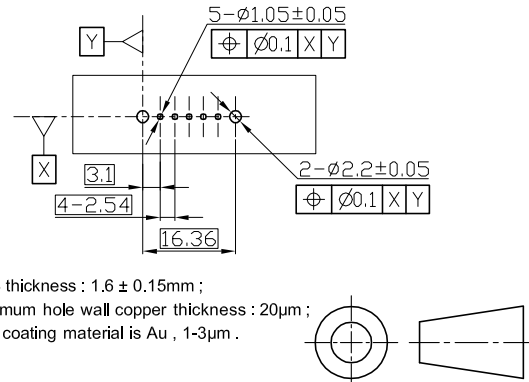
## 6. Dimension & Pin definitions



### 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 °C ;
- 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 ± 0.1 N·m ;  
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 .

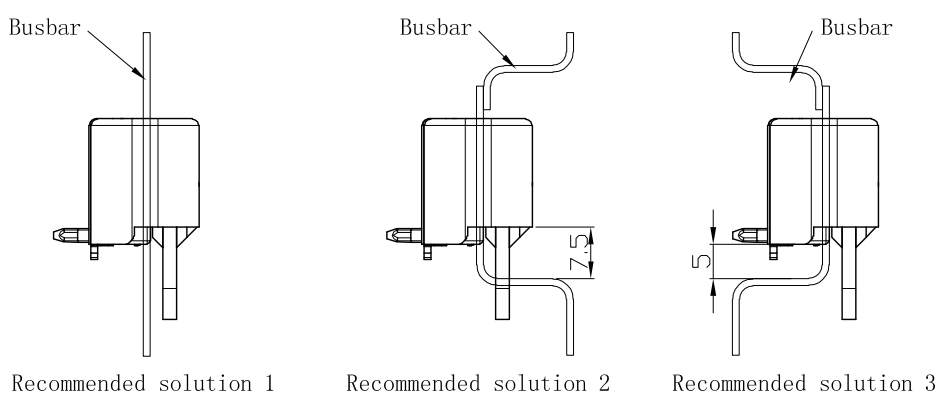
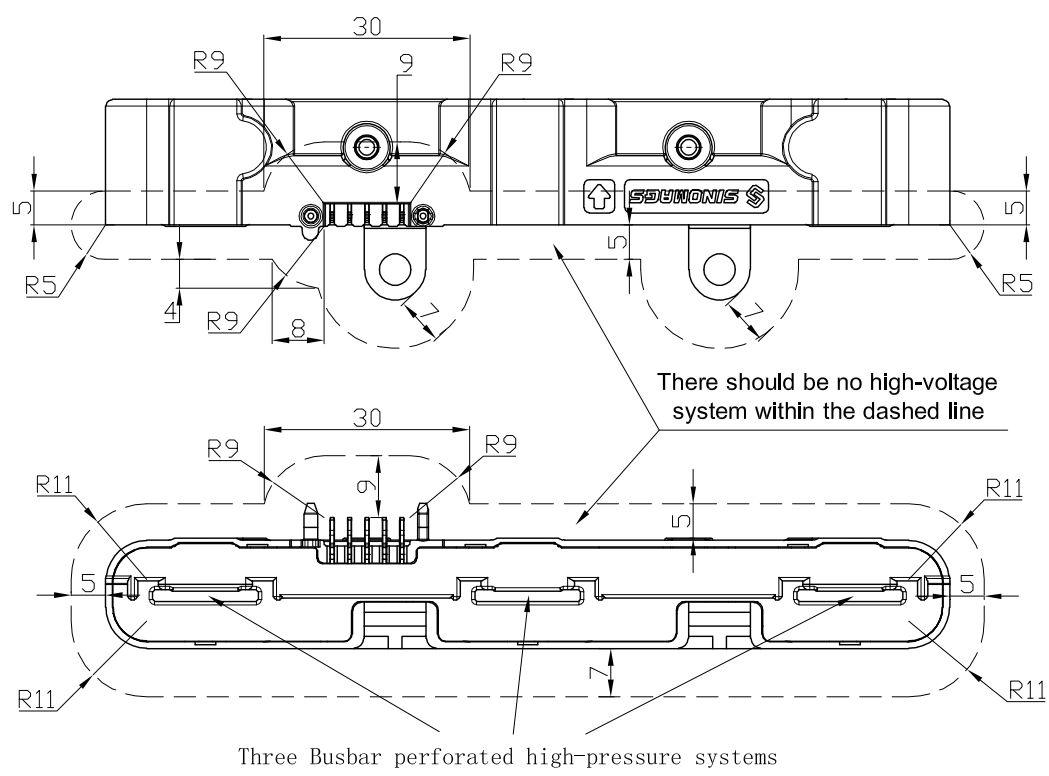
### PCB installation size recommendations



- 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
<b>Electrical tests</b>	
Humidity test	85°C/85%,1000hr
Thermal shock	-40°C/125°C, 1000cycles
High temperature test	125°C, 1000hr
Low temperature test	-40°C, 1000hr
Insulation voltage	2800 V, AC/50Hz/1min
Insulation resistance	1000 V, DC/1min
<b>Mechanical tests</b>	
Shocks	ISO16750-3
Vibration test	ISO16750-3
<b>EMC tests</b>	
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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