



# CURRENT SENSOR

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PRODUCT SERIES: SHK-VBS6

PRODUCT PART NUMBER: SHK-500VBS6;  
SHK-1500VBS6

VERSION: Ver2.7



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## 1. Description

The SHK-VBS6 series current sensor is based on HALL technology 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
- Starter Generators
- Battery Management
- Motor control unit for xEV

### General parameter

Parameter	Symbol	Unit	Value
Working temperature	T_A	°C	-40 ~ 125
Storage temperature	T_stg	°C	-40 ~ 125
Mass	m	g	59

### Absolute maximum rating

Parameter	Symbol	Unit	Value
Supply voltage	V <sub>cc</sub>	V	8
ESD rating (HBM)	U_ESD	kV	8

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.

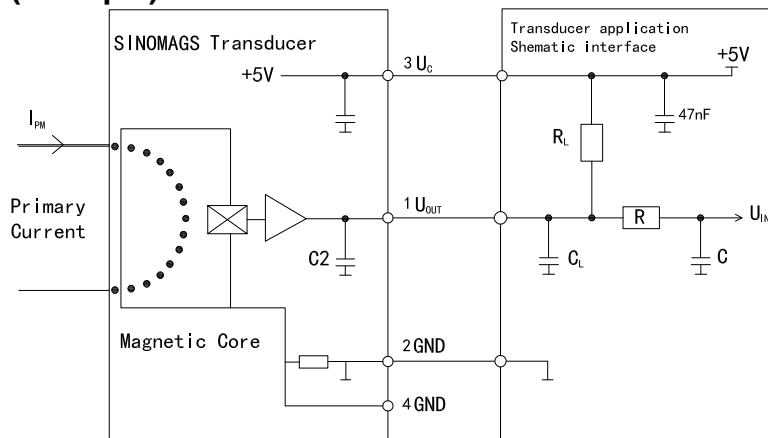
### Isolation parameter

Parameter	Symbol	Unit	Value	Comment
RMS voltage for AC test 50Hz/1 min	U <sub>d</sub>	kV	2.5	
Clearance distance (pri. -sec)	d <sub>Cl</sub>	mm	4.85	
Creepage distance (pri. -sec)	d <sub>Cp</sub>	mm	4.85	
Comparative tracking index	CTI		PLC3	
Case material			V0 according to UL 94	

### Measuring current table

Product	Optimized Range I <sub>pm</sub> (A)	Sensitivity, (mV/A)	T(°C)
SHK-500VBS6	± 500A	4	-40 ~ 125
SHK-1500VBS6	± 1500A	1.33	-40 ~ 125

### System architecture(example)



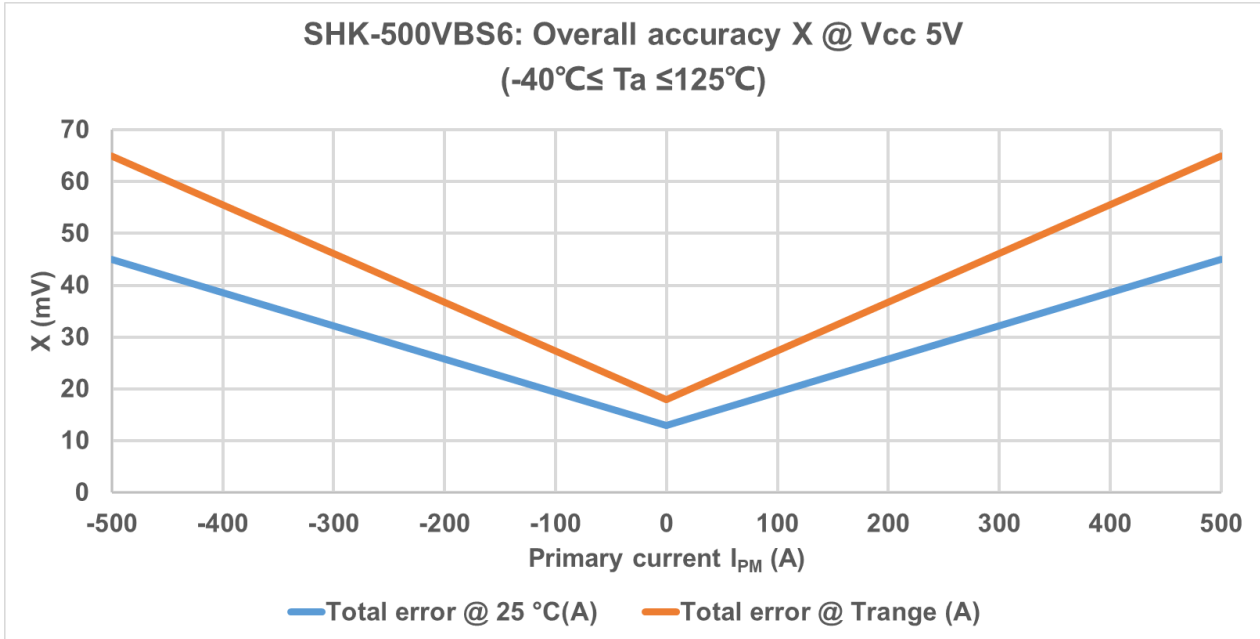
## 2. Electrical data

Condition:  $V_{CC} = 5.0\text{ V}$ ,  $T_A = 25^\circ\text{C}$ , unless specified.

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary current measuring range	$I_{PM}$	A	-500		500	SHK-500VBS6
			-1500		1500	SHK-1500VBS6
Primary nominal RMS current	$I_{PN}$	A	-500		500	SHK-500VBS6
			-1500		1500	SHK-1500VBS6
Supply voltage	$V_{CC}$	V	4.75	5	5.25	
Current consumption	$I_{CC}$	mA		12		@ $V_{CC} = 5.0\text{ V}$
Output voltage	$V_{OUT}$	V	$V_{OUT} = (V_{CC}/5) \times (V_{off} + G \times I_P)$			@ $T_a = 25^\circ\text{C}$
Quiescent voltage	$V_{off}$	V		2.5		@ $T_a = 25^\circ\text{C}$ , $V_{CC} = 5.0\text{ V}$
Sensitivity	G	mV/A		4		SHK-500VBS6 @ $T_a = 25^\circ\text{C}$ , $V_{CC} = 5.0\text{ V}$
				1.33		SHK-1500VBS6 @ $T_a = 25^\circ\text{C}$ , $V_{CC} = 5.0\text{ V}$
Load resistance	$R_L$	k $\Omega$	10			
Output internal resistance	$R_{out}$	$\Omega$		1	10	
Ratiometricity error	$\epsilon_r$	%		$\pm 0.5$		@ $4.75\text{V} \leq V_{CC} \leq 5.25\text{V}$
Sensitivity error	$\epsilon_G$	%		$\pm 0.9$		@ $T_a = 25^\circ\text{C}$ , $V_{CC} = 5.0\text{ V}$
Electrical offset voltage error	$V_{OE}$	mV		$\pm 3.6$		@ $T_a = 25^\circ\text{C}$ , $V_{CC} = 5.0\text{ V}$
Magnetic offset voltage error	$V_{OM}$	mV		$\pm 2.0$		@ $T_a = 25^\circ\text{C}$ , $V_{CC} = 5.0\text{ V}$
Ave. Temp. coefficient of $I_{OE}$	$TCI_{OEAV}$	mA/ $^\circ\text{C}$		$\pm 30$		@ $-40^\circ\text{C} \leq T_a \leq 125^\circ\text{C}$
Ave. Temp. coefficient of $V_{OE}$	$TCV_{OEAV}$	mV/ $^\circ\text{C}$		$\pm 0.04$		@ $-40^\circ\text{C} \leq T_a \leq 125^\circ\text{C}$
Linearity	$\epsilon_L$	%	-1		1	@ $T_a = 25^\circ\text{C}$ , $V_{CC} = 5.0\text{ V}$ , $I = I_{PM}$
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

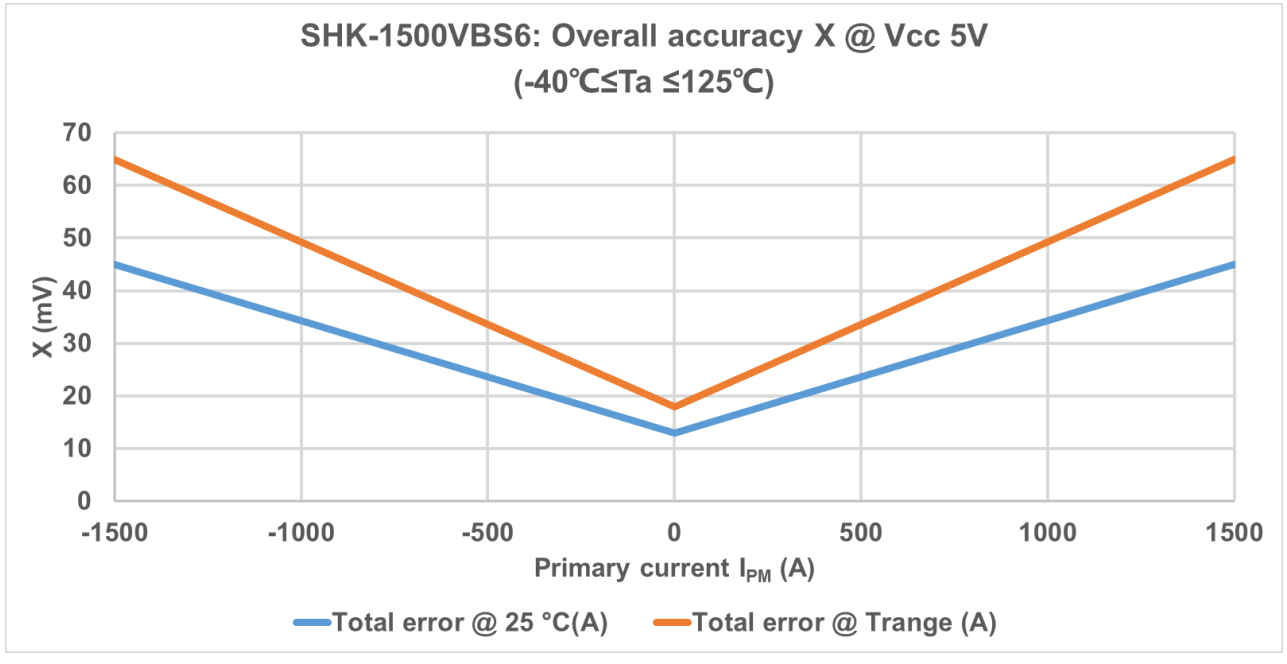
**SHK-500VBS6:**

Overall accuracy X specification						
I <sub>PM</sub> (A)	@T <sub>a</sub> = 25°C, V <sub>CC</sub> = 5.0 V			@-40°C ≤ T <sub>a</sub> ≤ 125°C, V <sub>CC</sub> = 5.0 V		
	-500	45 mV	11.25A	2.25%	65 mV	16.25A
0	13 mV	3.25A	0.65%	18 mV	4.5A	0.90%
500	45 mV	11.25A	2.25%	65 mV	16.25A	3.25%

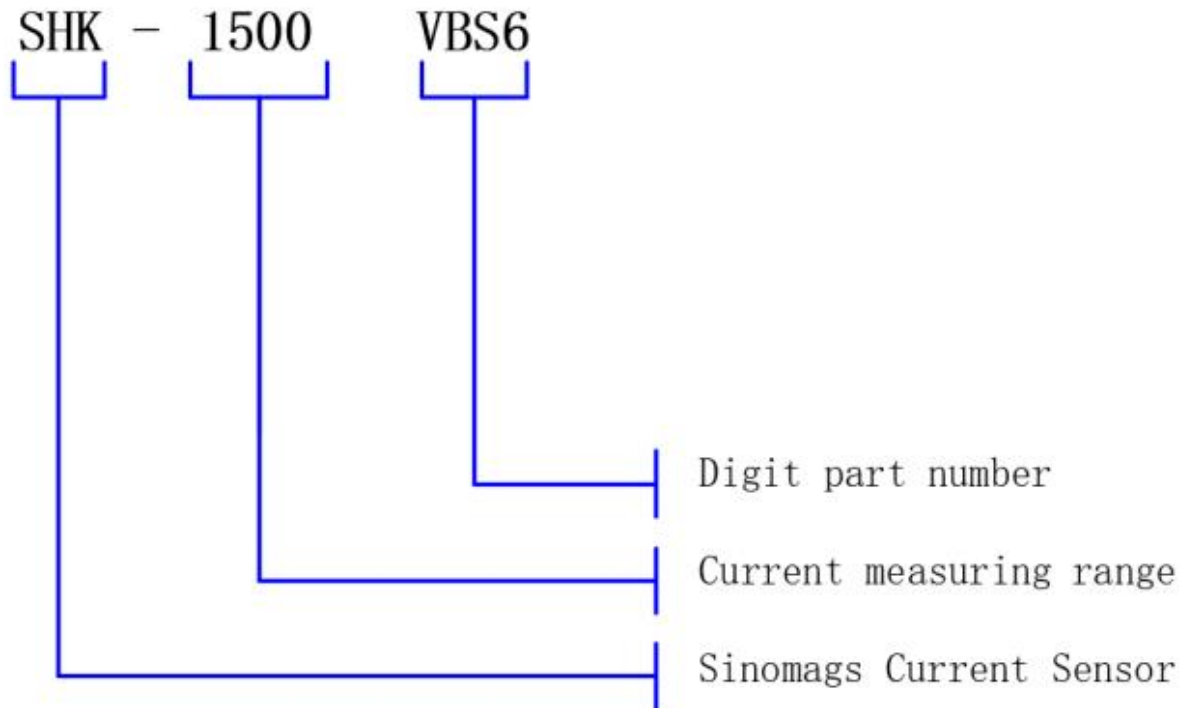


**SHK-1500VBS6:**

Overall accuracy X specification						
$I_{PM}(A)$	@ $T_a = 25^\circ C, V_{CC} = 5.0 V$			@ $-40^\circ C \leq T_a \leq 125^\circ C, V_{CC} = 5.0 V$		
-1500	45 mV	33.75 A	2.25%	65 mV	48.75 A	3.25%
0	13 mV	9.75 A	0.65%	18 mV	13.50 A	0.90%
1500	45 mV	33.75 A	2.25%	65 mV	48.75 A	3.25%



### 3. Product definition statement



## 4. Precautions for use

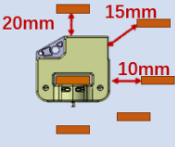
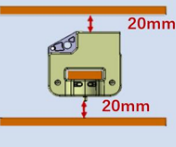
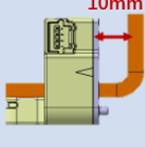
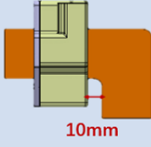
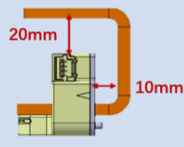
	<b>Situation 1</b> Parallelism of the busbar to be tested with the space of the busbar not to be tested	<b>Situation 2</b> Parallelism of the busbar to be tested with the space of the busbar not to be tested	<b>Situation 3</b> L-shaped busbar installation	<b>Situation 4</b> L-shaped busbar installation	<b>Situation 5</b> U-shaped busbar row installation
<b>illustrations</b>					
<b>Sensor accuracy for each mounting solution</b>	<p>Non-tested busbar:</p> <ol style="list-style-type: none"> <li>1) 20mm from the top of the sensor: 1.5% accuracy</li> <li>2) 45°&amp;15mm from the top right of the sensor: 1% accuracy</li> <li>3) 10mm from the right side of the sensor: 1%accuracy</li> </ol> <p>The rest of the orientation refers to the opposite orientation distance</p>	<p>Non-tested busbar:</p> <ol style="list-style-type: none"> <li>1) 20mm from the top of the sensor: 1.5% accuracy</li> <li>2) 20mm from the bottom of the sensor: 1% accuracy.</li> </ol>	L-shaped busbar mounting: Accuracy 1%	L-shaped busbar mounting: Accuracy 1%	L-shaped busbar mounting: Accuracy 1%

Fig.1 Precautions for use

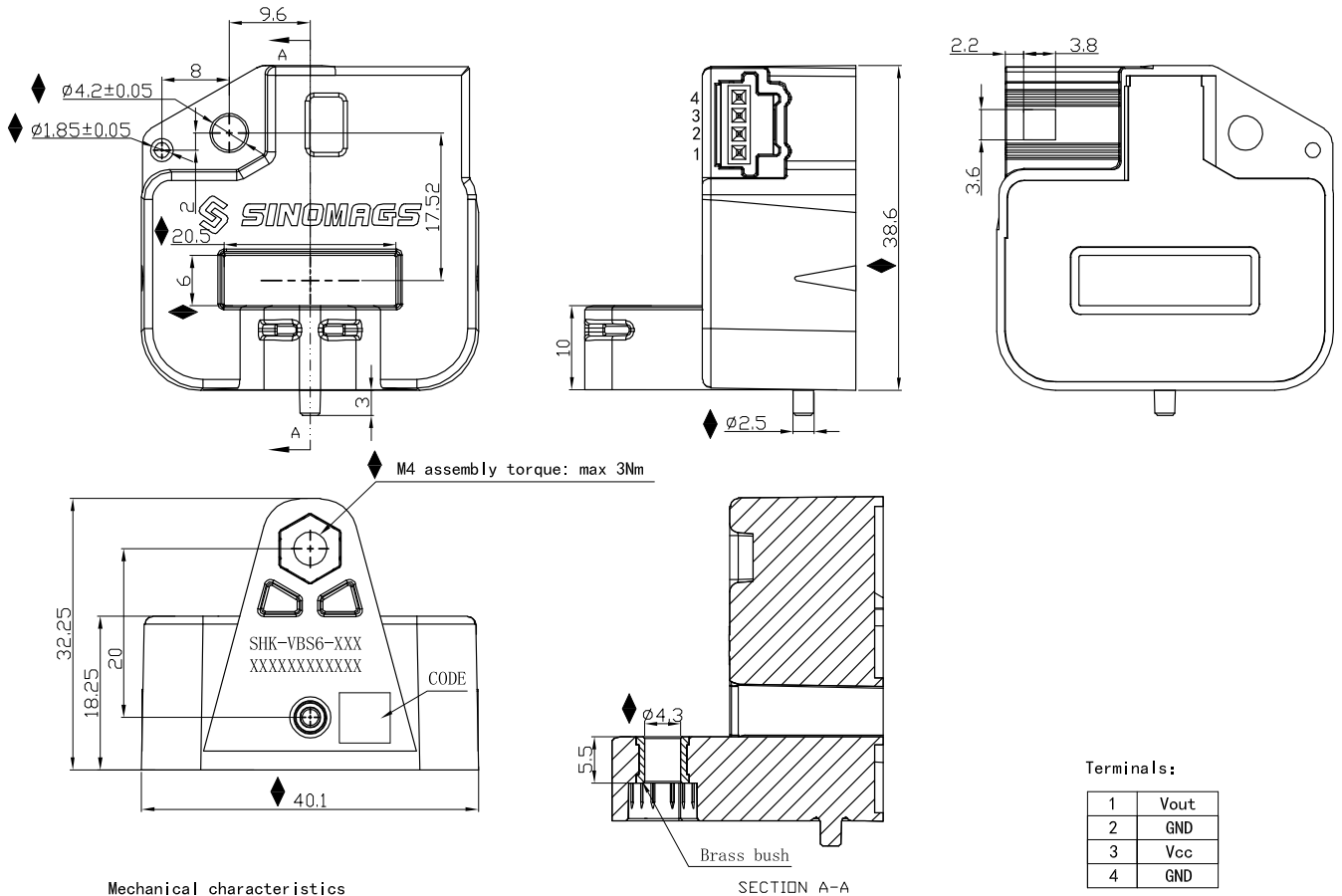
### Notes:

Wire Harness length: Optimum harness length 20 cm, maximum harness length not exceeding 1 meter.

Wire Harness installation: need to separate high and low voltage; and the harness should have a shielding layer.



## 5. Dimension & Pin definitions



**Mechanical characteristics**

1. Connector type:TYCO connector P/N 1473672-1
2. Material:  
Housing: PA66 with 30% GF,UL 94V-0,Black color.  
Contacts: brass,H62,0.64mm quadrilateral
3. Finish:  
Contacts: Matte-tin 3.0um min 5.0um max on solder tail ,  
with entire contact underplated 4.0um min 5.0um max ,  
Nickel-palladium alloy
4. Installation distance 20mm do not have objects  
that can produce magnetic field.
5. Critical dimension

Material : Fit UL94V-0 & RoHS requirements ;  
General tolerance :  $\pm 0.5$   
Unit :mm

