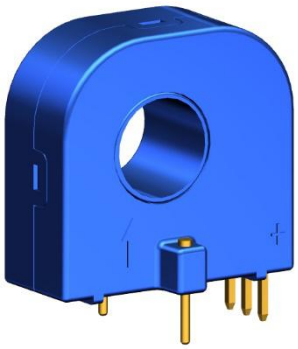
Sinomags Product Datasheet

CURRENT SENSOR

Product series：	STK-CTS/W
Product part number：	STK-15CTS/W 、STK-20CTS/W STK-25CTS/W
Version：	Ver 4.5



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1. Description

STK-CTS/W series current sensors are based on open loop principle with TMR technology. The sensor can detect those current with DC, AC, pulse and irregular wave shape.

Typical application

- Variable speed driving
- continuous current dynamo
- Switch mode power supply
- Weld machine power supply
- MPPT

General Parameter

Parameter	Symbol	Unit	Value
Working temperature	T_A	℃	-40 ~ 105
Storage temperature	T_stg	℃	-40 ~ 105
Mass	m	g	10

Absolute Parameter

Parameter	Symbol	Unit	Value
Supply voltage	V_C	V	5.5
ESD rating (HBM)	U_{ESD}	kV	4

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 parameters

Parameter	Symbol	Unit	Value	Remark
Isolation voltage, 50Hz,1 min	Ud	kV	4	
Impact voltage 1.2/ 50s	Ûw	kV	6	
Clearance	dCl	mm	> 8	Shortest distance through air
Creepage distance	dCp	mm	> 8	Shortest distance along device body
Case material			V0 according to UL 94	

2. STK-15CTS/W parameters

Condition: Vcc = 5.0 V, T_A = 25℃, unless specified.

Parameters	Symbol	Unit	Min.	Typ.	Max.	Remark
Primary current	I_pn	A		15		
Maximum current	I_pm	A	-15		15	
Supply voltage	Vcc	V	4.75	5	5.25	
Consumption current	Icc	mA		5	10	
Full-scale output	V_FS	V		±2		(Vout @ ±I_pn) – Voff
Output resistance	R_out	Ω		1		@Vout
Offset voltage	Voff	V	2.48	2.5	2.52	Vout @ 0 A
Theoretical gain	G_th	mV/A		133		2 V @ I_pn
Gain error	Err_G	%G_th	-0.5		0.5	Adjusted@25℃
Non-linearity	Non-L	%I_pn	-0.5		0.5	±I_pn
reaction time	t_ra	μs		0.5		@10% of I_{PN}
Step response time	t_res	μs		1		@90% of I_{PN}
Delay time	t_delay	μs		1		@300 kHz
-3 dB band width	BW	kHz		400		Back-end non-RC circuit
Noise DC ~ 10 kHz DC ~ 100 kHz	Vnoise	mVpp		 15 25		
Accuracy @ RT	X	% of I_pn	-1		1	@ 25℃
Accuracy	X_TRange	% of I_pn	-2		2	-40℃ ~ 85℃

Note:

1. Accuracy @ RT,X = ((Vout @ In @ 25℃) – (G_fit * In+Voff @ 25℃)) / V_FS,Here In is the current test current. G_fit is the normal temperature fitting gain.
2. Accuracy,X_TRange = ((Vout @ In @ T_x) – (G_fit@25℃ * In+Voff @ 25℃)) / V_FS,The fitting gain of the product at G_fit@25 ℃ is 25 ℃.

3. STK-20CTS/W parameters

Condition: Vcc = 5.0 V, T_A = 25℃, unless specified.

Parameters	Symbol	Unit	Min.	Typ.	Max.	Remark
Primary current	I_pn	A		20		
Maximum current	I_pm	A	-20		20	
Supply voltage	Vcc	V	4.75	5	5.25	
Consumption current	Icc	mA		5	10	
Full-scale output	V_FS	V		±2		(Vout @ ±I_pn) – Voff
Output resistance	R_out	Ω		1		@Vout
Offset voltage	Voff	V	2.48	2.5	2.52	Vout @ 0 A
Theoretical gain	G_th	mV/A		100		2 V @ I_pn
Gain error	Err_G	%G_th	-0.5		0.5	Adjusted@25℃
Non-linearity	Non-L	%I_pn	-0.5		0.5	±I_pn
reaction time	t_ra	μs		0.5		@10% of I_{PN}
Step response time	t_res	μs		1		@90% of I_{PN}
Delay time	t_delay	μs		1		@300 kHz
-3 dB band width	BW	kHz		400		Back-end non-RC circuit
Noise DC ~ 10 kHz DC ~ 100 kHz	Vnoise	mVpp		 15 25		
Accuracy @ RT	X	% of I_pn	-1		1	@ 25℃
Accuracy	X_TRange	% of I_pn	-2		2	-40℃ ~ 85℃

Note:

1. Accuracy @ RT,X = ((Vout @ In @ 25℃) – (G_fit * In+Voff @ 25℃)) / V_FS,Here In is the current test current. G_fit is the normal temperature fitting gain.
2. Accuracy,X_TRange = ((Vout @ In @ T_x) – (G_fit@25℃ * In+Voff @ 25℃)) / V_FS,The fitting gain of the product at G_fit@25 ℃ is 25 ℃.

4. STK-25CTS/W parameters

Condition: Vcc = 5.0 V, T_A = 25℃, unless specified.

Parameters	Symbol	Unit	Min.	Typ.	Max.	Remark
Primary current	I_pn	A		25		
Maximum current	I_pm	A	-25		25	
Supply voltage	Vcc	V	4.75	5	5.25	
Consumption current	Icc	mA		5	10	
Full-scale output	V_FS	V		±2		(Vout @ ±I_pn) – Voff
Output resistance	R_out	Ω		1		@Vout
Offset voltage	Voff	V	2.48	2.5	2.52	Vout @ 0 A
Theoretical gain	G_th	mV/A		80		2 V @ I_pn
Gain error	Err_G	%G_th	-0.5		0.5	Adjusted@25℃
Non-linearity	Non-L	%I_pn	-0.5		0.5	±I_pn
reaction time	t_ra	μs		0.5		@10% of I_{PN}
Step response time	t_res	μs		1		@90% of I_{PN}
Delay time	t_delay	μs		1		@300 kHz
-3 dB band width	BW	kHz		400		Back-end non-RC circuit
Noise DC ~ 10 kHz DC ~ 100 kHz	Vnoise	mVpp		 15 25		
Accuracy @ RT	X	% of I_pn	-1		1	@ 25℃
Accuracy	X_TRange	% of I_pn	-2		2	-40℃ ~ 85℃

Note:

1. Accuracy @ RT,X = ((Vout @ In @ 25℃) – (G_fit * In+Voff @ 25℃)) / V_FS,Here In is the current test current. G_fit is the normal temperature fitting gain.
2. Accuracy,X_TRange = ((Vout @ In @ T_x) – (G_fit@25℃ * In+Voff @ 25℃)) / V_FS,The fitting gain of the product at G_fit@25 ℃ is 25 ℃.

5. Accuracy

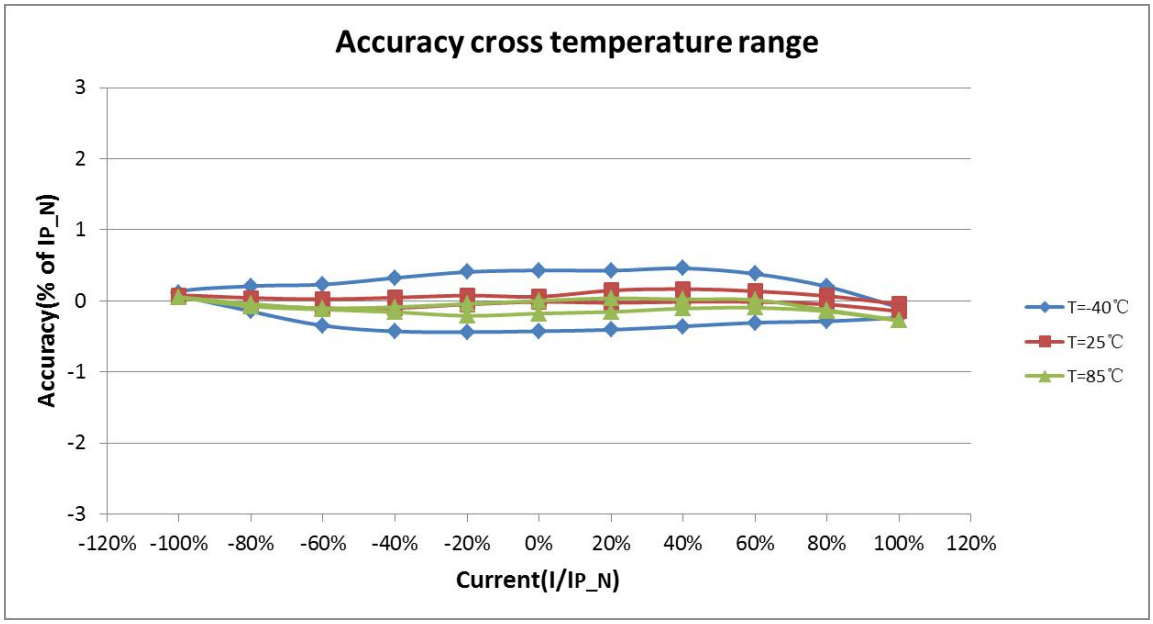


Fig.2 Deviation between actual output and theoretical output of STK-CTS/W current Sensor in full temperature range (-40 ℃ ~ 85 ℃),((Vout @ In @ T_x) – (G_th * In + Voff @ 25℃)) / V_FS.Vout is the sensor Vout pin voltage,Voff is the static output voltage of the sensor,In is the current primary current,T_x is the current temperature,G_th is the theoretical gain of the sensor,V_FS is the full range output of the sensor.

6. Frequency band width

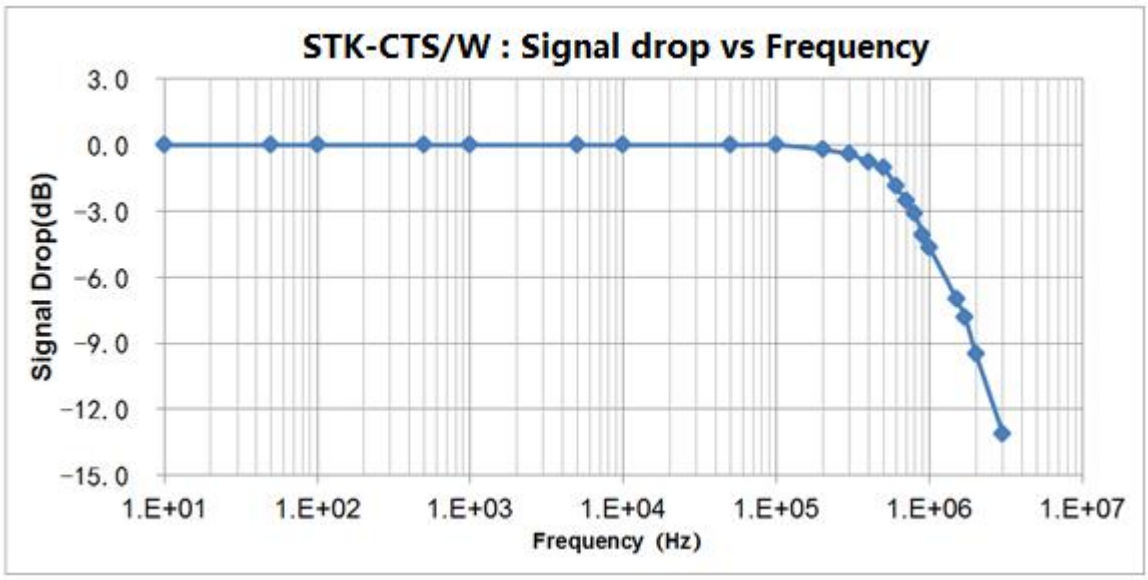


Fig.4 the band width of STK-CTS/W series current sensors.The bandwidth of the sensor is in the range of DC ~ 400 kHz (-3 dB).

7. Step response time

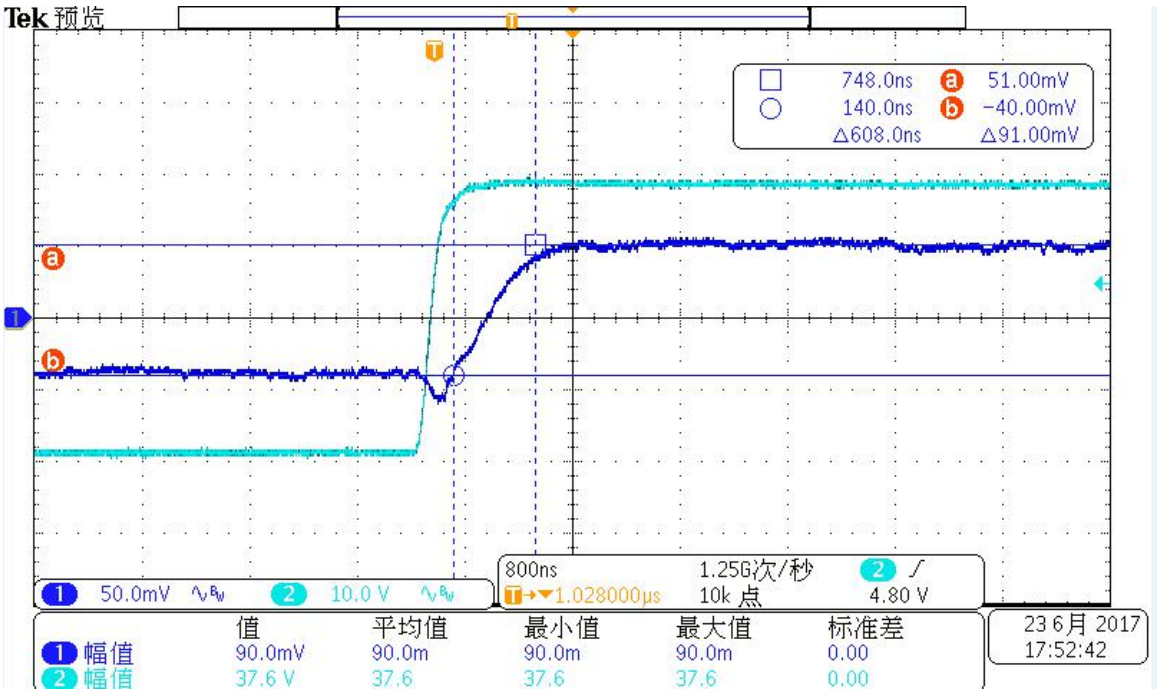


Fig.5 the step response time of STK-CTS/W current sensors. The light blue is primary current, while the dark blue is output signal of current sensor.。The delay from 90% of the original current signal to 90% of the output of the sensor is less than 1 μs.

8. Frequency delay performace

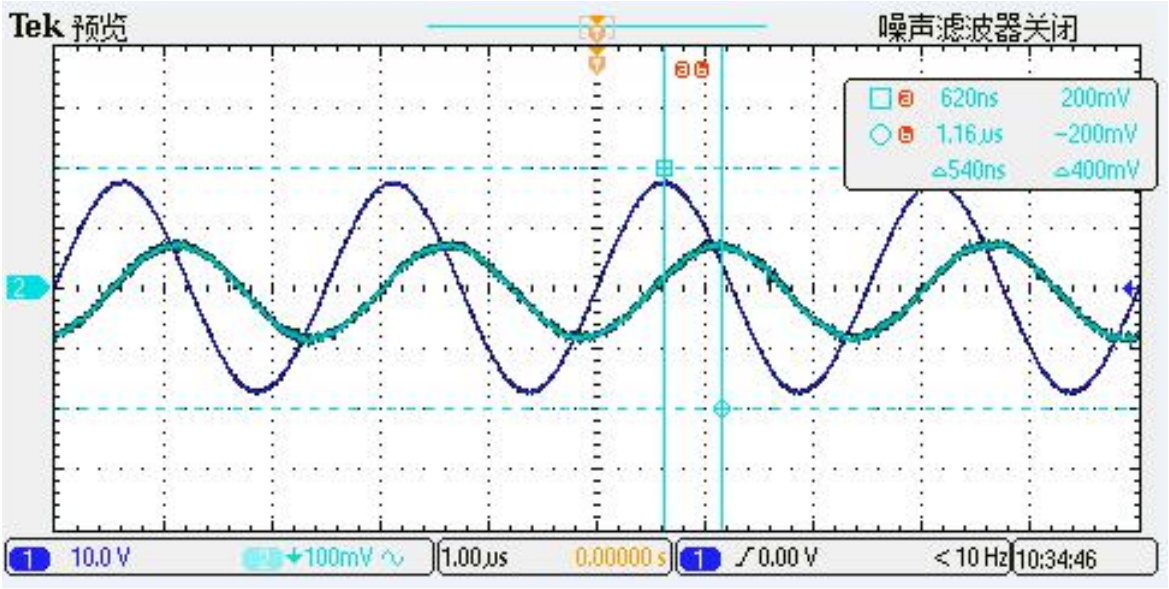
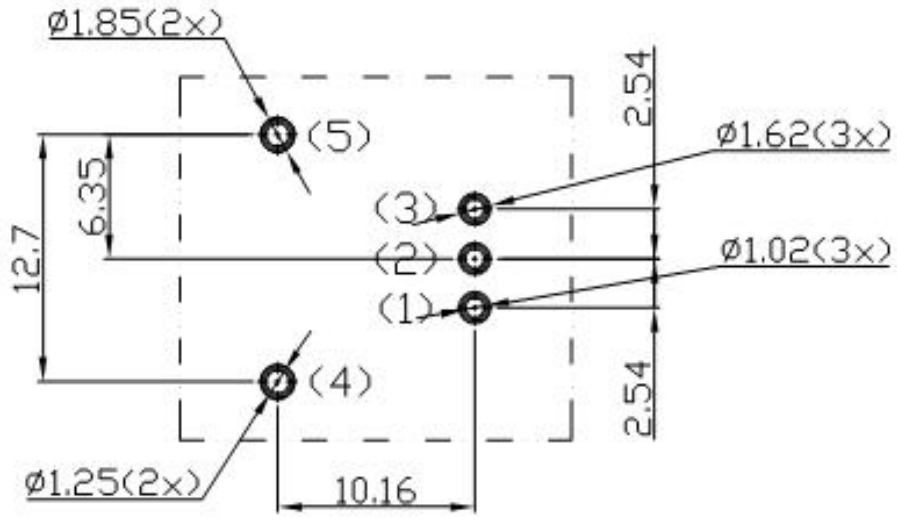


Fig.6 when detection the primary current with a frequency of 400 kHz. The typical results of the output of STK-CTS/w current sensor on the primary current delay characteristics.The delay time from primary current (light blue) to the output of the sensor (dark blue) is less than 1 μs.

9. Install on PCB

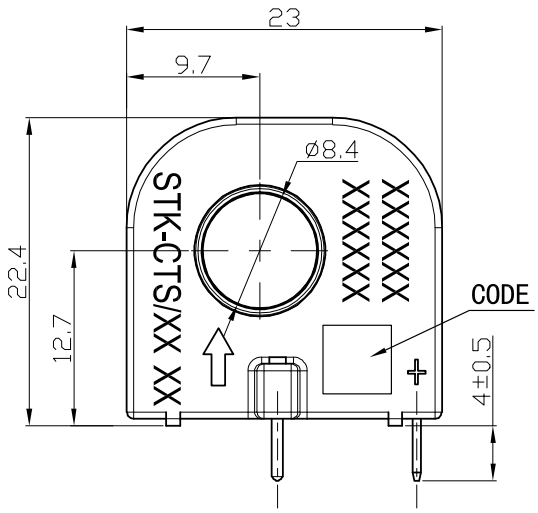


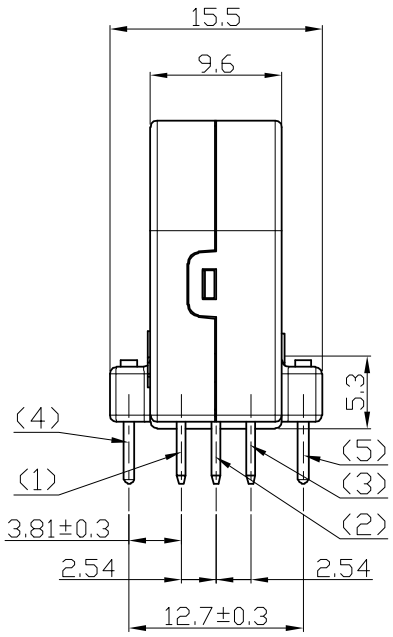
1. Installation angle：Overlooking (viewed from the side where the sensor is installed, unit: mm)
2. It is suggested that the aperture (diameter of secondary signal line × 1.25) mm of PCB should be installed.
3. Maximum PCB thickness 2.5 mm
4. Wave peak welding temperature curve：260 ℃×10 s

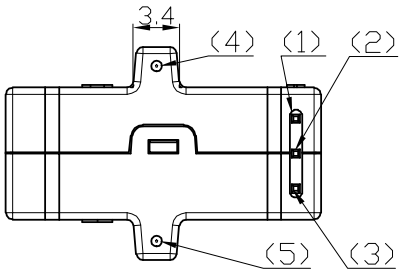
Safe: This current sensor shall be used in IEC61010-1-compliant energy limiting secondary circuits

- This current sensor is used in electronic / electrical equipment that meets the application standards and is subject to the manufacturer's safety operating requirements;
- When operating the current sensor, we should pay attention to the dangerous voltage of the original side current line;
- Failure to connect according to the diagram will cause damage to the product;
- Ignoring the warning can lead to serious consequences;
- Additional protective cover can be added;
- The main power supply must be disconnected.

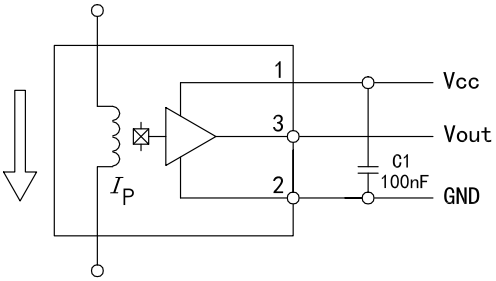
10. Dimensions & Pins & Footprint

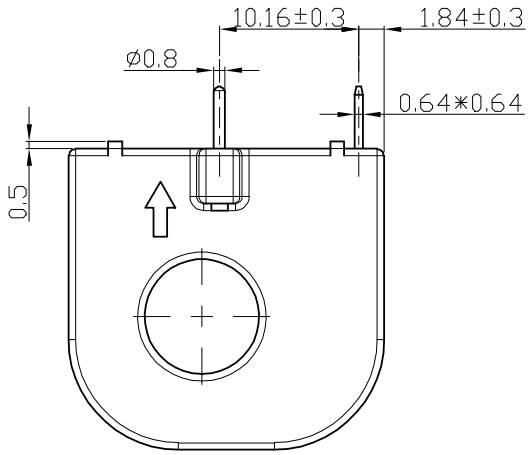






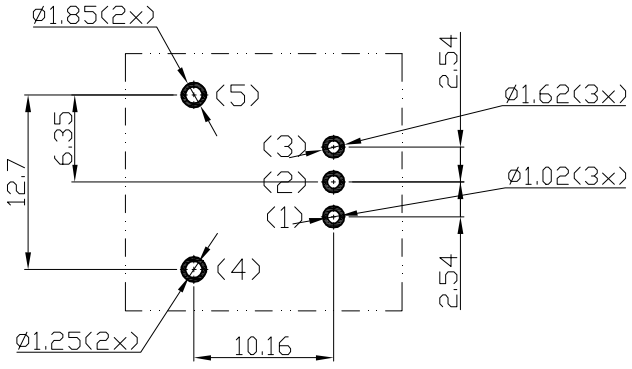
Connection





Terminals

(1)	Vcc
(2)	GND
(3)	Vout
(4)	NC
(5)	NC



Material : Fit UL94V-0 & RoHS requirements ;
General tolerance : ±0.5
Unit :mm