

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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CONTENTS

1. Description	2
2. STK-15CTS/W parameters	3
3. STK-20CTS/W parameters	4
4. STK-25CTS/W parameters	5
5. Accuracy	6
6. Frequency band width	6
7. Step response time	7
8. Frequency delay performace	7
9. Install on PCB	8
10. Dimensions & Pins & Footprint	9

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	°C	-40 ~ 105
Storage temperature	T_stg	°C	-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	Üw	kV	6	
Clearance	dCI	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°C, 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°C
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°C
Accuracy	X_TRange	% of I_pn	-2		2	-40°C ~ 85°C

Note:

1. Accuracy @ RT,X = ((Vout @ In @ 25°C) – (G_fit * In+Voff @ 25°C)) / 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°C * In+Voff @ 25°C)) / V_FS, The fitting gain of the product at G_fit@25 °C is 25 °C.

3. STK-20CTS/W parameters

Condition: Vcc = 5.0 V, T_A = 25°C, 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°C
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	Vnoise	mVpp		15		
DC ~ 100 kHz				25		
Accuracy @ RT	X	% of I_pn	-1		1	@ 25°C
Accuracy	X_TRange	% of I_pn	-2		2	-40°C ~ 85°C

Note:

1. Accuracy @ RT, X = ((Vout @ In @ 25°C) – (G_fit * In + Voff @ 25°C)) / 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°C * In + Voff @ 25°C)) / V_FS, The fitting gain of the product at G_fit@25 °C is 25 °C.

4. STK-25CTS/W parameters

Condition: Vcc = 5.0 V, T_A = 25°C, 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°C
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	Vnoise	mVpp		15		
DC ~ 10 kHz				25		
DC ~ 100 kHz						
Accuracy @ RT	X	% of I_pn	-1		1	@ 25°C
Accuracy	X_TRange	% of I_pn	-2		2	-40°C ~ 85°C

Note:

1. Accuracy @ RT, X = ((Vout @ In @ 25°C) – (G_fit * In + Voff @ 25°C)) / 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°C * In + Voff @ 25°C)) / V_FS, The fitting gain of the product at G_fit@25 °C is 25 °C.

5. Accuracy

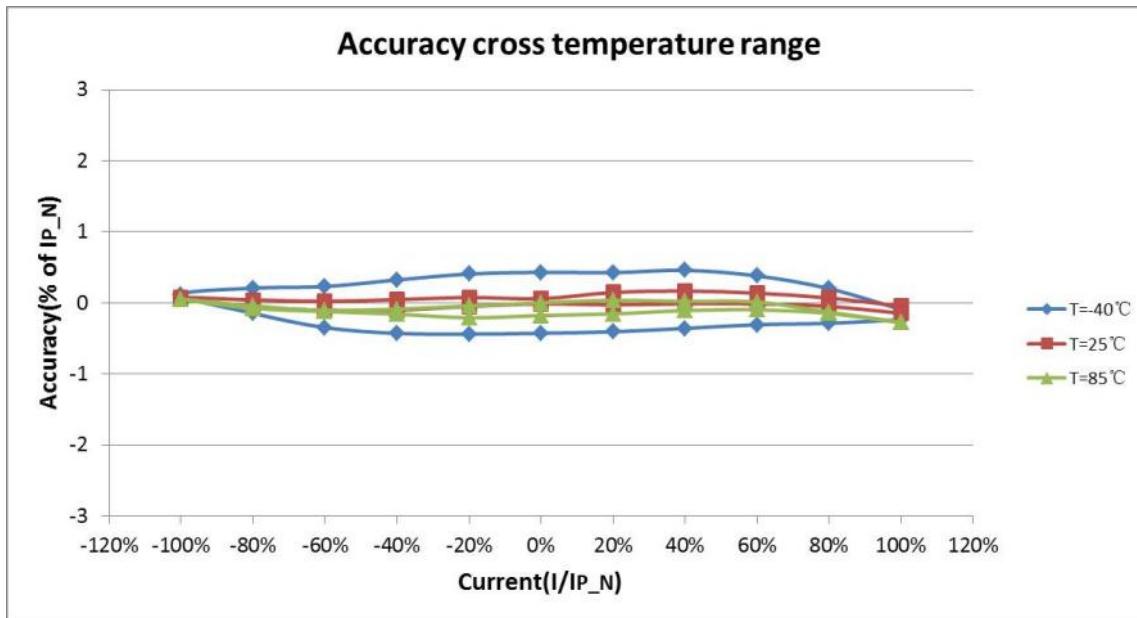


Fig.2 Deviation between actual output and theoretical output of STK-CTS/W current Sensor in full temperature range (-40 °C ~ 85 °C), $((V_{out} @ I_n @ T_x) - (G_{th} * I_n + V_{off} @ 25^\circ C)) / V_{FS}$.
 V_{out} is the sensor V_{out} pin voltage,V_{off} is the static output voltage of the sensor,I_n 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

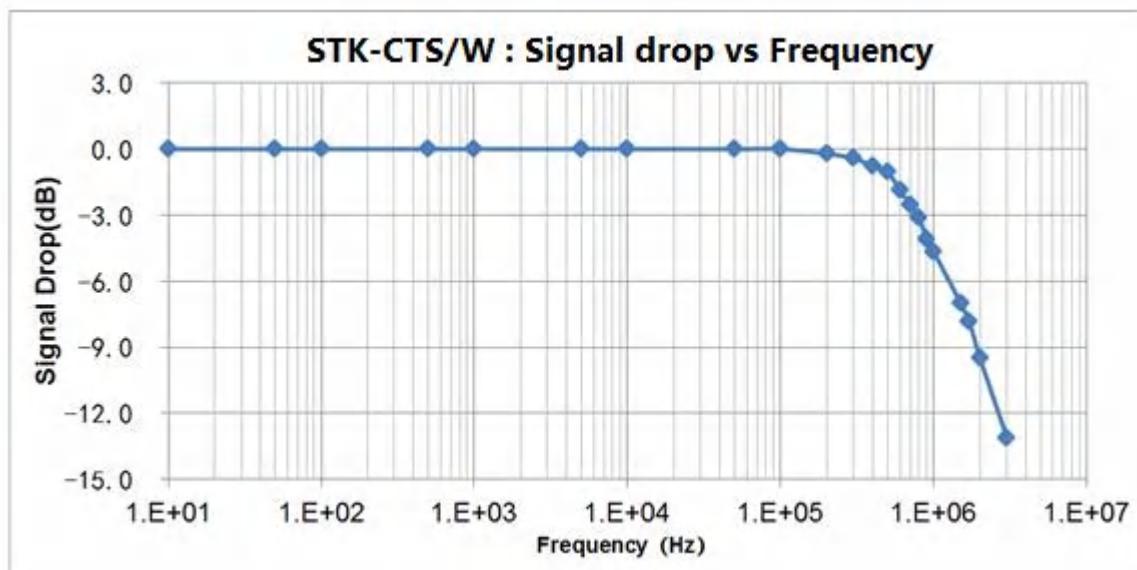


Fig.4 the band width of STK-CTS/W series current sensors.The bandwidth of the sensor is in the range of DC ~ 400 kHz (-3 dB).

7. Step response time

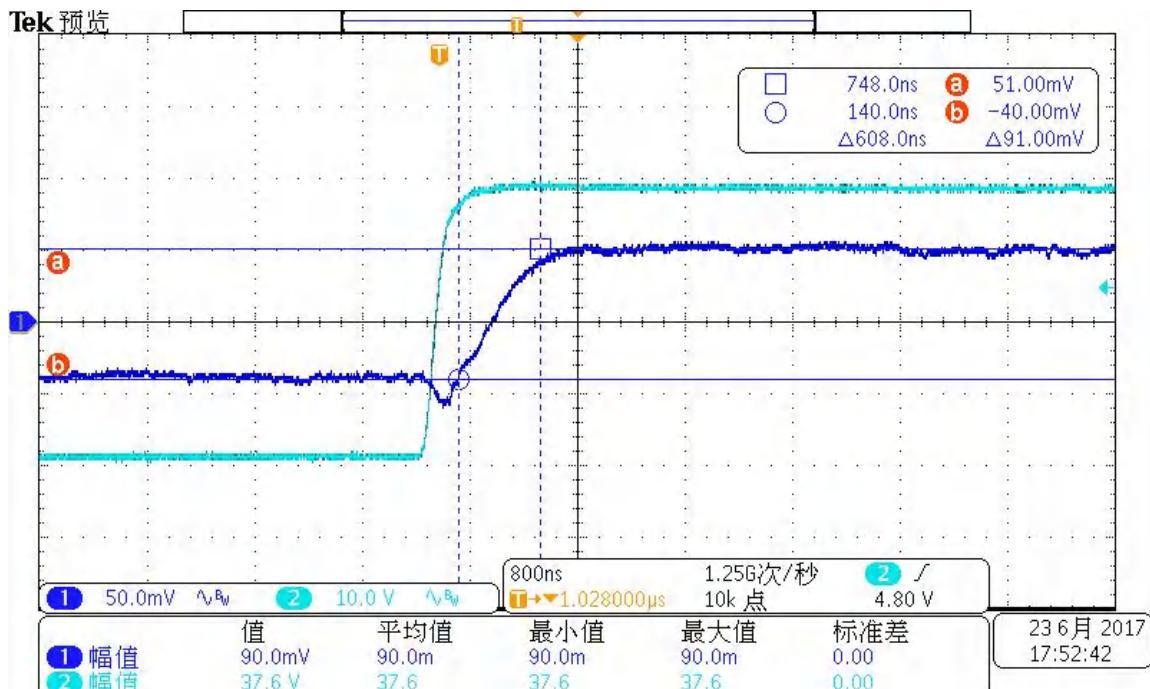


Fig.5 the step response time of STK-CTS/W current sensors. The light blue is primary current, while the dark blue is output signal of current sensor.。The delay from 90% of the original current signal to 90% of the output of the sensor is less than 1 μ s.

8. Frequency delay performance

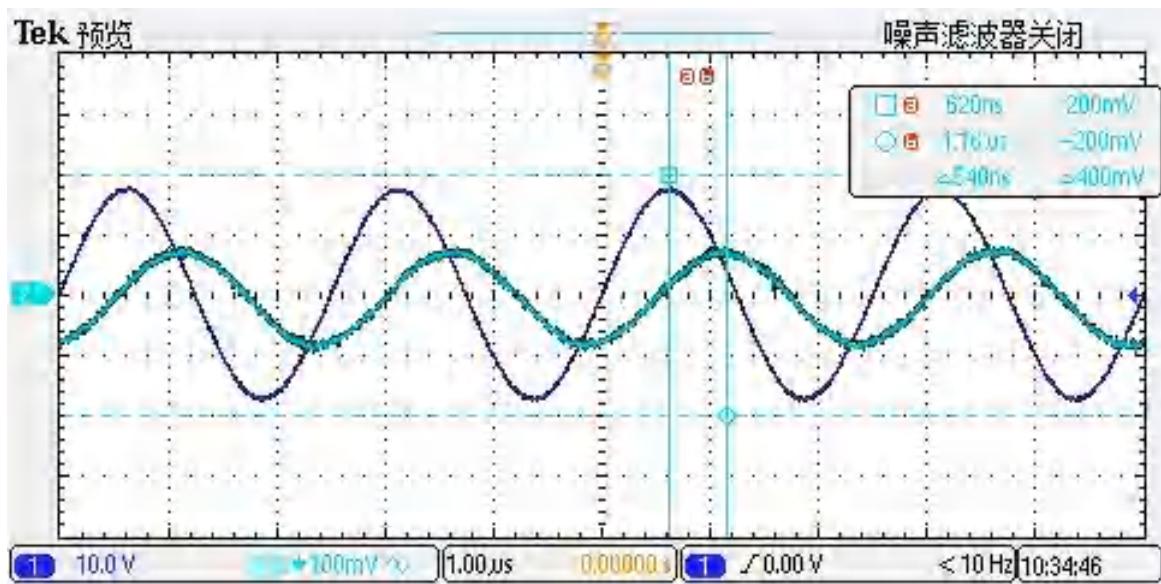
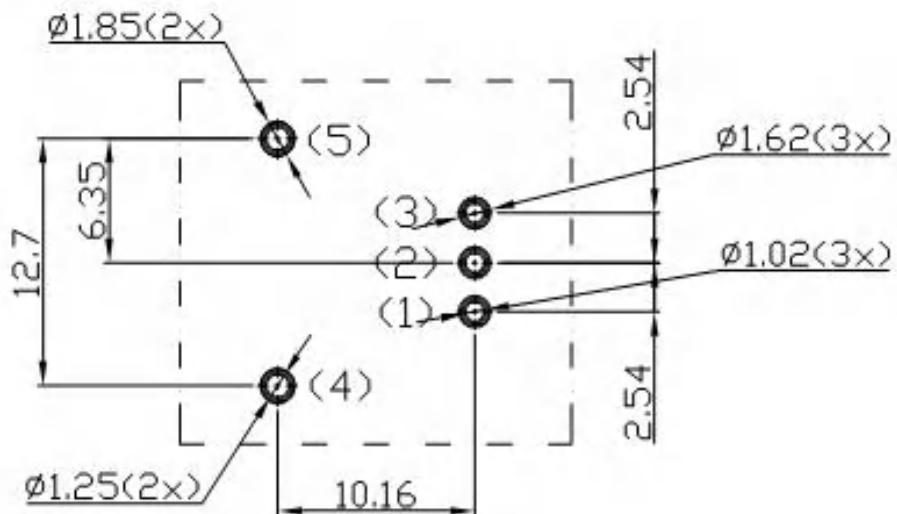


Fig.6 when detection the primary current with a frequency of 400 kHz. The typical results of the output of STK-CTS/w current sensor on the primary current delay characteristics.The delay time from primary current (light blue) to the output of the sensor (dark blue) is less than 1 μ s.

9. Install on PCB



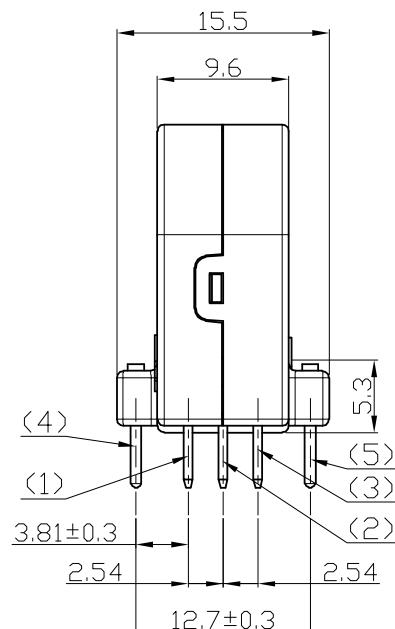
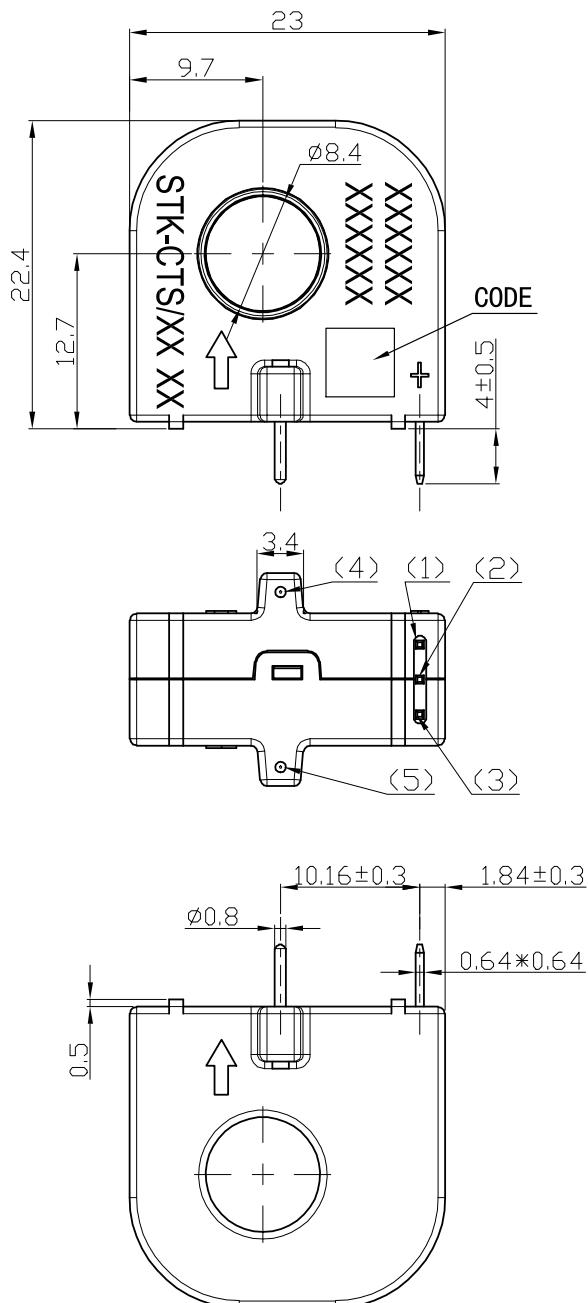
1. Installation angle: Overlooking (viewed from the side where the sensor is installed, unit: mm)
2. It is suggested that the aperture (diameter of secondary signal line \times 1.25) mm of PCB should be installed.
3. Maximum PCB thickness 2.5 mm
4. Wave peak welding temperature curve: 260 °C \times 10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



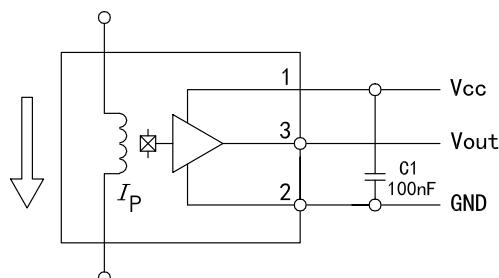
Safe: This current sensor shall be used in IEC61010-1-compliant energy limiting secondary circuits

- 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

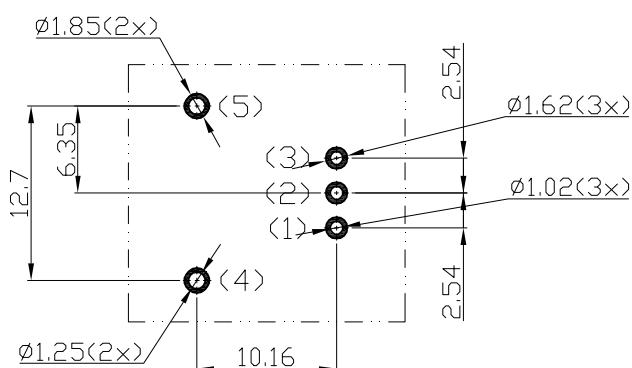


Connection



Terminals

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



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

