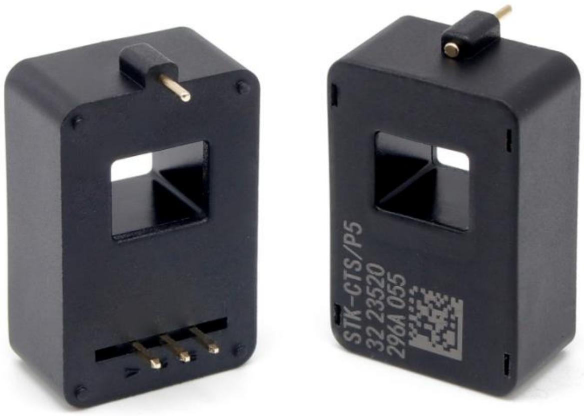
SINOMAGS 希磁科技

Current Sensor

Product Series： STK-CTS/P5

Part number： STK-25CTS/P5
STK-32CTS/P5
STK-40CTS/P5
STK-50CTS/P5

Version： Ver1.7



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Web site ： www.sinomags.com

CONTENT

1. Description

The STK-CTS/P series current sensor is based on TMR (tunnel magnetoresistance) 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

- AC Variable speed drives
- Inverter
- Electric welder power supply
- Switched model power supplies (SMPS)

General parameter

Parameter	Symbol	Unit	Value
Working temperature	T_A	℃	-40 ~ 105
Storage temperature	T_stg	℃	-40 ~ 105
Mass	m	g	10
Maximum traverse temperature	T_mt	℃	105
Remark 1：The product will not be damaged when used at 105 ℃			

Absolute maximum ratin

Parameter	Symbol	Unit	Value
Supply voltage	Vcc	V	6
ESD rating（HBM）	U_{ESD}	kV	4
Remark 2: 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

Paramete	Symbol	Unit	Value	Comment
RMS voltage for AC test 50Hz/1 min	Ud	kV	4	
Impulse withstand voltage 1.2/50μs	Ûw	kV	6	
Clearance distance (pri. -sec)	dCI	mm	> 8	Space shortest distance
Creepage distance (pri. -sec)	dCp	mm	> 8	Shortest distance along the body
Shell material			V0 according to UL 94	

2. Electrical data STK-25CTS/P5

Condition：T_A = 25℃，Vcc = 5 V

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary nominal current	I_pn	A	-10		10	
Primary current measuring range	I_pm	A	-25		25	
Supply voltage	Vcc	V	4.75	5	5.25	
Current consumption	Icc	mA		5	10	
Rated output voltage	V_FS	V		±0.8		(Vout @ ±I_pn) – Voff
Internal output resistance	R_out	Ω		1		@Vout
Quiescent voltage	Voff	V	2.48	2.5	2.52	Vout @ 0 A
Theoretical gain	G_th	mV/A		80		0.8 V @ I_pn
Non-linearity	Non-L	%I_pn		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		@400 kHz
-3dB 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_pm	-0.8		0.8	@ 25℃ When I_pn＜I＜I_pm ΔI (max)≤ 0.2A
Accuracy	X_TRange	% of I_pm	-1.5		1.5	@ -40℃ ~ 85℃ When I_pn＜I＜I_pm ΔI (max)≤ 0.375A
Accuracy	X_TRange	% of I_pm	-3		3	@ 85℃ ~ 105℃ When I_pn＜I＜I_pm ΔI (max)≤ 0.75A

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. Electrical data STK-32CTS/P5

Condition：T_A = 25℃，Vcc = 5 V

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary nominal current	I_pn	A	-12.8		12.8	
Primary current measuring range	I_pm	A	-32		32	
Supply voltage	Vcc	V	4.75	5	5.25	
Current consumption	Icc	mA		5	10	
Rated output voltage	V_FS	V		±0.8		(Vout @ ±I_pn) – Voff
Internal output resistance	R_out	Ω		1		@Vout
Quiescent voltage	Voff	V	2.48	2.5	2.52	Vout @ 0 A
Theoretical gain	G_th	mV/A		62.5		0.8 V @ I_pn
Non-linearity	Non-L	%I_pn		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		@400 kHz
-3dB 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_pm	-0.8		0.8	@ 25℃ When I_pn < I < I_pm ΔI (max)≤ 0.256A
Accuracy	X_TRange	% of I_pm	-1.5		1.5	@ -40℃ ~ 85℃ When I_pn < I < I_pm ΔI (max)≤ 0.48A
Accuracy	X_TRange	% of I_pm	-3		3	@ 85℃ ~ 105℃ When I_pn < I < I_pm ΔI (max)≤ 0.96A

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. Electrical data STK-40CTS/P5

Condition：T_A = 25℃，Vcc = 5 V

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary nominal current	I_pn	A	-16		16	
Primary current measuring range	I_pm	A	-40		40	

Supply voltage	Vcc	V	4.75	5	5.25	
Current consumption	Icc	mA		5	10	
Rated output voltage	V_FS	V		±0.8		(Vout @ ±I_pn) – Voff
Internal output resistance	R_out	Ω		1		@Vout
Quiescent voltage	Voff	V	2.48	2.5	2.52	Vout @ 0 A
Theoretical gain	G_th	mV/A		50		0.8 V @ I_pn
Non-linearity	Non-L	%I_pn		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		@400 kHz
-3dB 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_pm	-0.8		0.8	@ 25℃ When I_pn＜I＜I_pm ΔI (max)≤ 0.32A
Accuracy	X_TRange	% of I_pm	-1.5		1.5	@ -40℃ ~ 85℃ When I_pn＜I＜I_pm ΔI (max)≤ 0.60A
Accuracy	X_TRange	% of I_pm	-3		3	@ 85℃ ~ 105℃ When I_pn＜I＜I_pm ΔI (max)≤ 1.2A

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. Electrical data STK-50CTS/P5

Condition：T_A = 25℃，Vcc = 5 V

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary nominal current	I_pn	A	-20		20	
Primary current measuring range	I_pm	A	-50		50	
Supply voltage	Vcc	V	4.75	5	5.25	
Current consumption	Icc	mA		5	10	
Rated output voltage	V_FS	V		±0.8		(Vout @ ±I_pn) – Voff
Internal output resistance	R_out	Ω		1		@Vout
Quiescent voltage	Voff	V	2.48	2.5	2.52	Vout @ 0 A
Theoretical gain	G_th	mV/A		40		0.8 V @ I_pn
Non-linearity	Non-L	%I_pn		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		@400 kHz
-3dB 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_pm	-0.8		0.8	@ 25℃ When I_pn < I < I_pm ΔI (max)≤ 0.4A
Accuracy	X_TRange	% of I_pm	-1.5		1.5	@ -40℃ ~ 85℃ When I_pn < I < I_pm ΔI (max)≤ 0.75A
Accuracy	X_TRange	% of I_pm	-3		3	@ 85℃ ~ 105℃ When I_pn < I < I_pm ΔI (max)≤ 1.5A

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˚C * In+Voff @ 25℃)) / V_FS,The fitting gain of the product at G_fit@25 ˚C is 25 ˚C.

6. Frequency band width

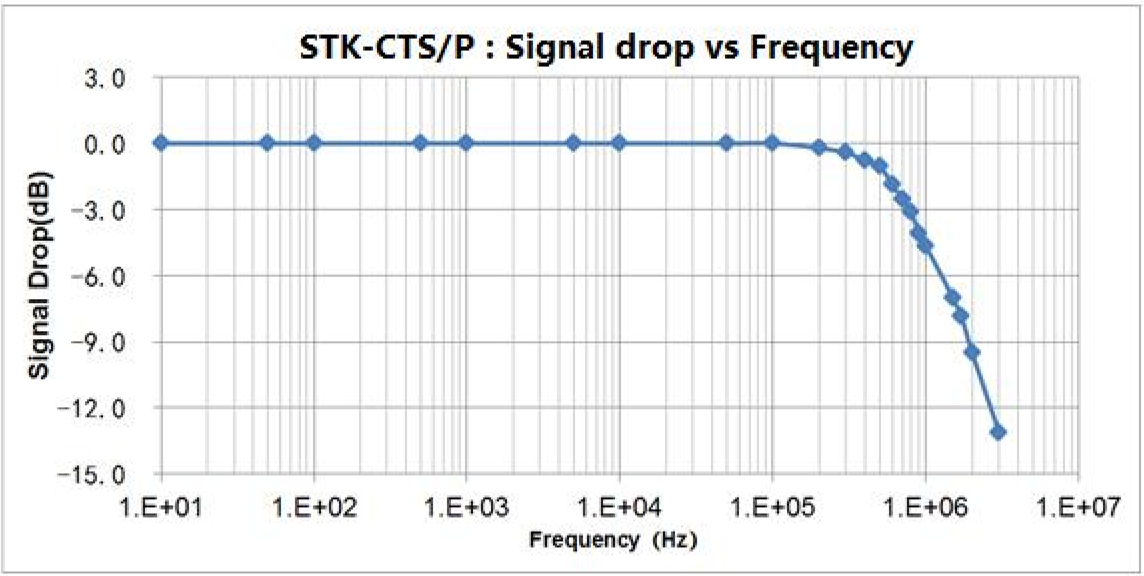


Fig.1 the band width of STK-CTS/P series current sensors.The bandwidth of the sensor is in the range of DC ~400 kHz (-3 dB).

7. Response time & noise with typical circuit

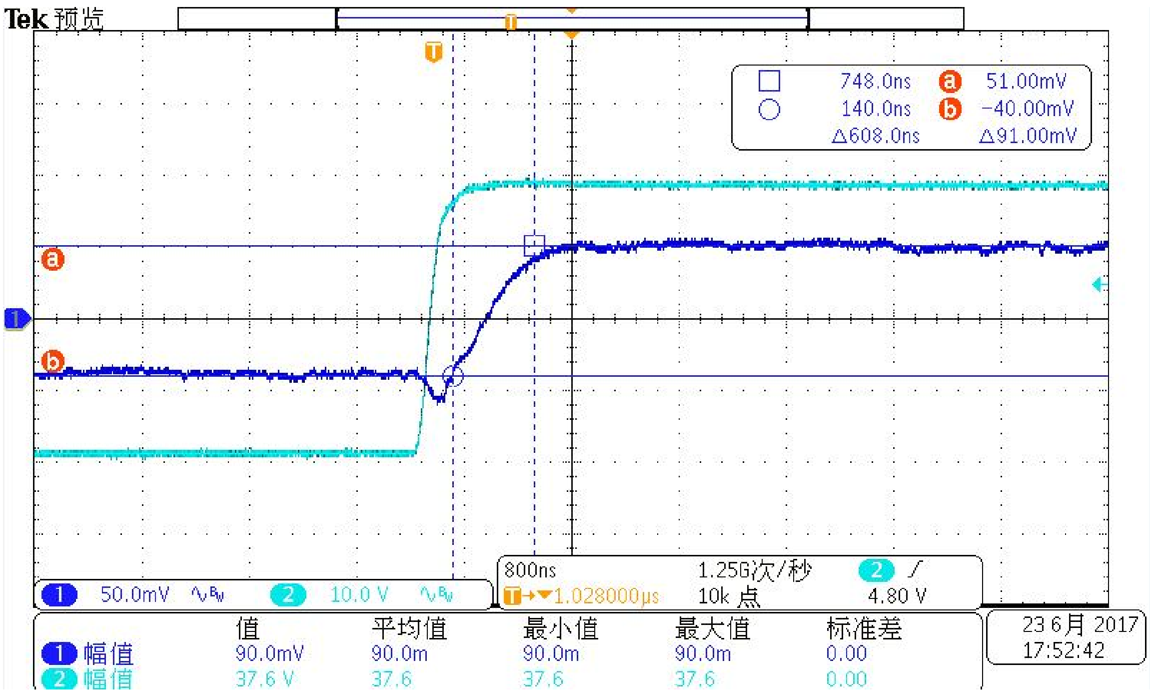


Fig.2 the step response time of STK-CTS/P current sensors. The light blue is primary current, while the dark blue is output signal of current sensor.。The delay from 90% of the original current signal to 90% of the output of the sensor is less than 1us.

8. Frequency delay performace

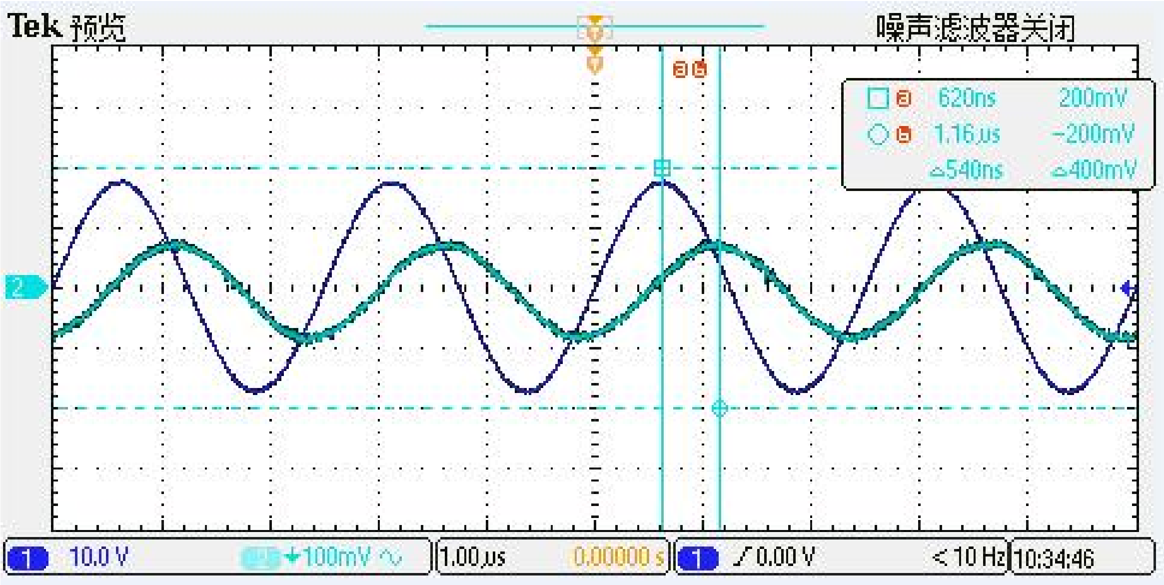
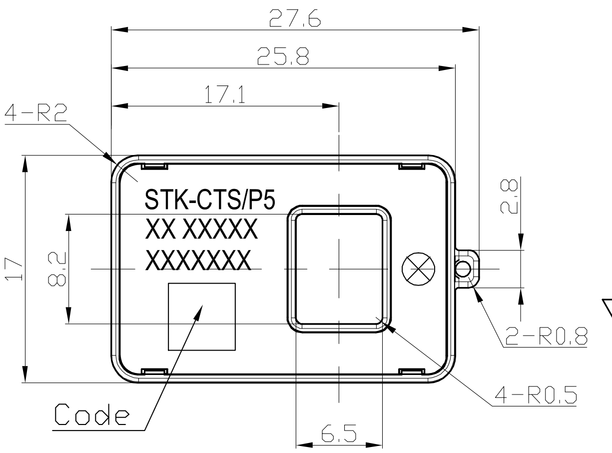
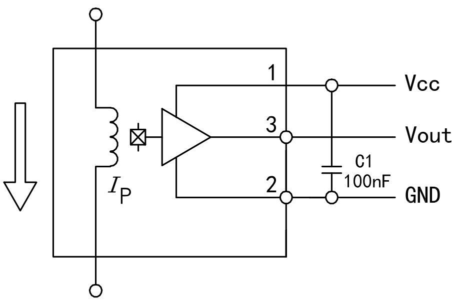


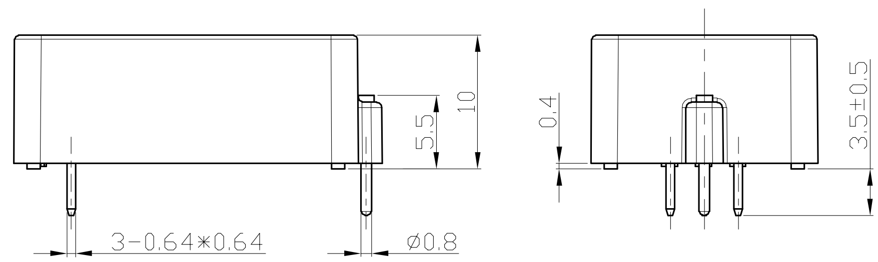
Fig.3 when detection the primary current with a frequency of 400 kHz. The typical results of the output of STK-CTS/P current sensor on the primary current delay characteristics.The delay time from primary current (light blue) to the output of the sensor (dark blue) is less than us.

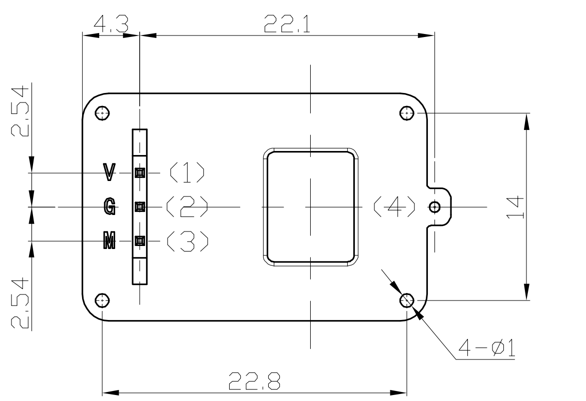
9. STK-CTS/P5 Dimensions & Pins & Footprint



Connection

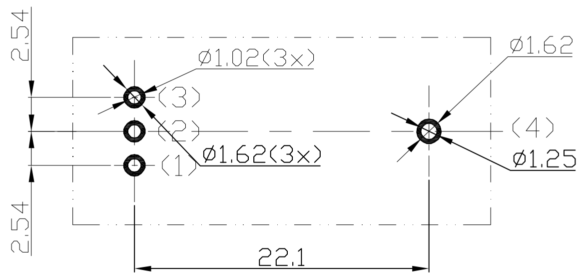






Terminals

(1)	Vcc
(2)	GND
(3)	Vout
(4)	NULL



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