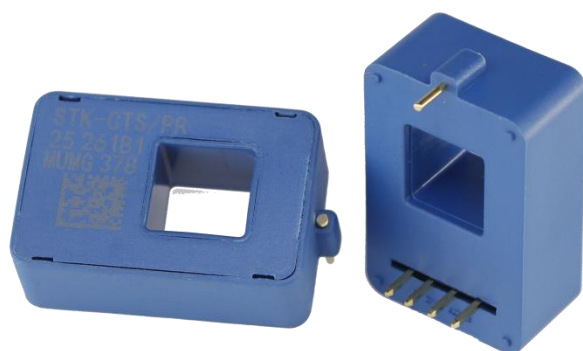


Current Sensor

Product Series: STK-CTS/PR
Part number: STK-10CTS/PR
STK-32CTS/PR
STK-50CTS/PR
Version: V1.4



Sinomags Technology Co., Ltd

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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
- Electric welder power supply
- Inverter
- Switched model power supplies (SMPS)

General parameter

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

Remark 1: The product will not be damaged when used at 105 °C

Absolute maximum rating

Parameter	Symbol	Unit	Value
Supply voltage	V _{CC}	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

Parameter	Symbol	Unit	Value	Comment
RMS voltage for AC test 50Hz/1 min	U _d	kV	4	
Impulse withstand voltage 1.2/50μs	U _w	kV	6	
Clearance distance (pri. -sec)	d _{Cl}	mm	> 8	Space shortest distance
Creepage distance (pri. -sec)	d _{Cp}	mm	> 8	Shortest distance along the body
Shell material			V0 according to UL 94	

2. Electrical data STK-10CTS/PR

Condition: $T_A = 25^{\circ}\text{C}$, $V_{CC} = 5\text{ V}$

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary nominal current	I_{pn}	A		10		
Primary current measuring range	I_{pm}	A	-20		20	
Supply voltage	V_{CC}	V	4.75	5	5.25	
Current consumption	I_{CC}	mA		5	10	
Rated output voltage	V_{FS}	V		± 1		$(V_{out} @ \pm I_{pn}) - V_{off}$
Internal output resistance	R_{out}	Ω		1		@ V_{out}
Quiescent voltage	V_{off}	V	2.48	2.5	2.52	$V_{out} @ 0\text{ A}$
Reference voltage	V_{ref}	V	2.48	2.5	2.52	Output function
Electrical offset voltage ($V_{out} - V_{ref}$) @ 0 A	V_{oe}	mV	-20		20	
Theoretical gain	G_{th}	mV/A		100		1 V @ I_{pn}
Non-linearity	Non-L	% I_{pn}		1		$\pm I_{pn}$
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	V_{noise}	mVpp		15 25		
Accuracy @ RT	X	% of I_{pn}	-1		1	After Quiescent voltage and Rated output voltage calibration
Accuracy @ $-40^{\circ}\text{C} \sim 85^{\circ}\text{C}$	X_{TRange}	% of I_{pn}	-2		2	
Accuracy @ $-40^{\circ}\text{C} \sim 105^{\circ}\text{C}$	X_{TRange}	% of I_{pn}	-2.5		2.5	

Note:

- The accuracy @ $-40^{\circ}\text{C} \sim 105^{\circ}\text{C}$, $X_{TRange} = (((V_{out} - V_{ref}) @ I_n @ T_x) - V_{oe} @ 25^{\circ}\text{C} - G_{th} * I_n) / V_{FS}$, where T_x represents present temperature, G_{th} is fitted gain at room temperature.

3. Electrical data STK-32CTS/PR

Condition: $T_A = 25^{\circ}\text{C}$, $V_{CC} = 5\text{ V}$

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary nominal current	I_{pn}	A		32		
Primary current measuring range	I_{pm}	A	-32		32	
Supply voltage	V_{CC}	V	4.75	5	5.25	
Current consumption	I_{CC}	mA		5	10	
Rated output voltage	V_{FS}	V		± 2		$(V_{out} @ \pm I_{pn}) - V_{off}$
Internal output resistance	R_{out}	Ω		1		@ V_{out}
Quiescent voltage	V_{off}	V	2.48	2.5	2.52	$V_{out} @ 0\text{ A}$
Reference voltage	V_{ref}	V	2.48	2.5	2.52	Output function
Electrical offset voltage ($V_{out} - V_{ref}$) @ 0 A	V_{oe}	mV	-20		20	
Theoretical gain	G_{th}	mV/A		62.5		1 V @ I_{pn}
Non-linearity	Non-L	% I_{pn}		1		$\pm I_{pn}$
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	V_{noise}	mVpp		15 25		
Accuracy @ RT	X	% of I_{pn}	-1		1	After Quiescent voltage and Rated output voltage calibration
Accuracy @ $-40^{\circ}\text{C} \sim 85^{\circ}\text{C}$	X_{TRange}	% of I_{pn}	-2		2	
Accuracy @ $-40^{\circ}\text{C} \sim 105^{\circ}\text{C}$	X_{TRange}	% of I_{pn}	-2.5		2.5	

Note:

- The accuracy @ $-40^{\circ}\text{C} \sim 105^{\circ}\text{C}$, $X_{TRange} = (((V_{out} - V_{ref}) @ I_n @ T_x) - V_{oe} @ 25^{\circ}\text{C} - G_{th} * I_n) / V_{FS}$, where T_x represents present temperature, G_{th} is fitted gain at room temperature.

4. Electrical data STK-50CTS/PR

Condition: $T_A = 25^{\circ}\text{C}$, $V_{CC} = 5\text{ V}$

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary nominal current	I_{pn}	A		50		
Primary current measuring range	I_{pm}	A	-50		50	
Supply voltage	V_{CC}	V	4.75	5	5.25	
Current consumption	I_{CC}	mA		5	10	
Rated output voltage	V_{FS}	V		± 2		$(V_{out} @ \pm I_{pn}) - V_{off}$
Internal output resistance	R_{out}	Ω		1		@ V_{out}
Quiescent voltage	V_{off}	V	2.48	2.5	2.52	$V_{out} @ 0\text{ A}$
Reference voltage	V_{ref}	V	2.48	2.5	2.52	Output function
Electrical offset voltage ($V_{out} - V_{ref}$) @ 0 A	V_{oe}	mV	-20		20	
Theoretical gain	G_{th}	mV/A		40		2 V @ I_{pn}
Non-linearity	Non-L	% I_{pn}		0.5		$\pm I_{pn}$
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	V_{noise}	mVpp		15 25		
Accuracy @ RT	X	% of I_{pn}	-0.5		0.5	After Quiescent voltage and Rated output voltage calibration
Accuracy @ $-40^{\circ}\text{C} \sim 85^{\circ}\text{C}$	X_{TRange}	% of I_{pn}	-1.5		1.5	
Accuracy @ $-40^{\circ}\text{C} \sim 105^{\circ}\text{C}$	X_{TRange}	% of I_{pn}	-2.5		2.5	

Note:

- The accuracy @ $-40^{\circ}\text{C} \sim 105^{\circ}\text{C}$, $X_{TRange} = (((V_{out} - V_{ref}) @ I_n @ T_x) - V_{oe} @ 25^{\circ}\text{C} - G_{th} * I_n) / V_{FS}$, where T_x represents present temperature, G_{th} is fitted gain at room temperature.

5. Frequency band width

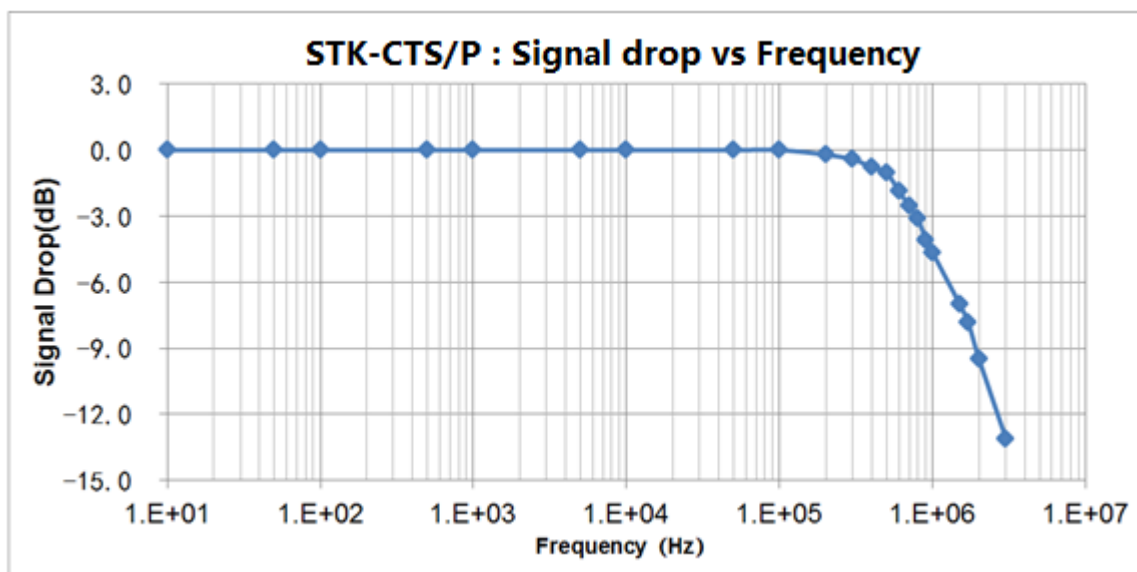


Fig.1 the band width of STK-CTS/P series current sensors. The bandwidth of the sensor is in the range of DC ~400 kHz (-3 dB).

6. Response time & noise with typical circuit

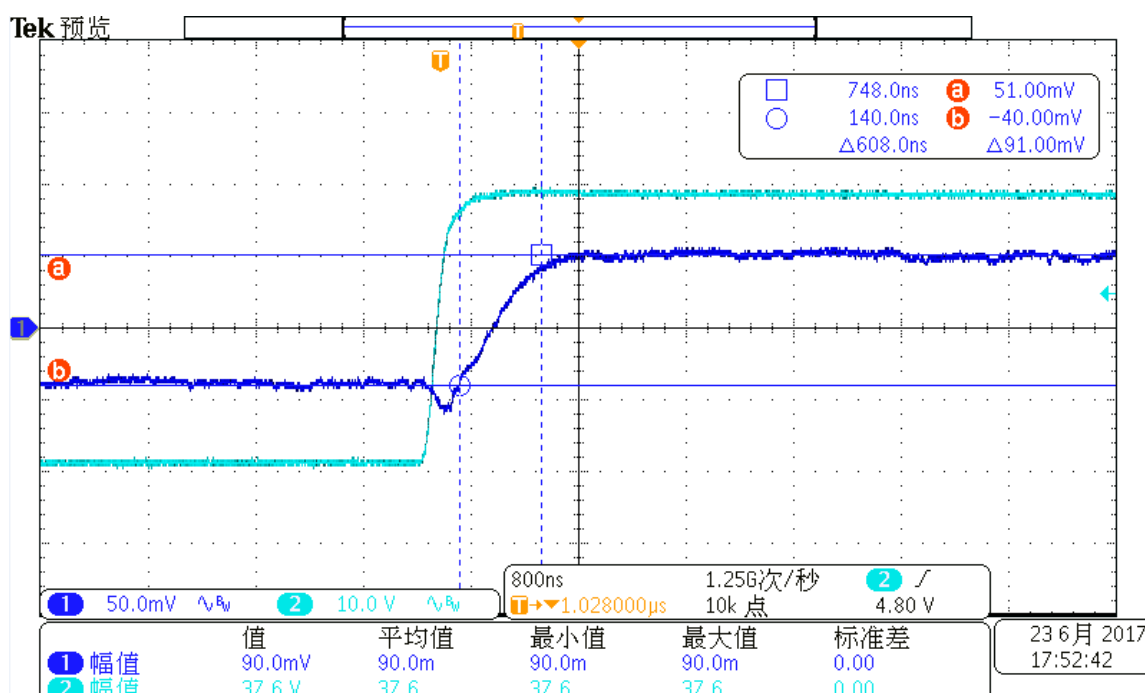


Fig.2 the step response time of STK-CTS/P current sensors. The light blue is primary current, while the dark blue is output signal of current sensor. The delay from 90% of the original current signal to 90% of the output of the sensor is less than 1us.

7. Frequency delay performace

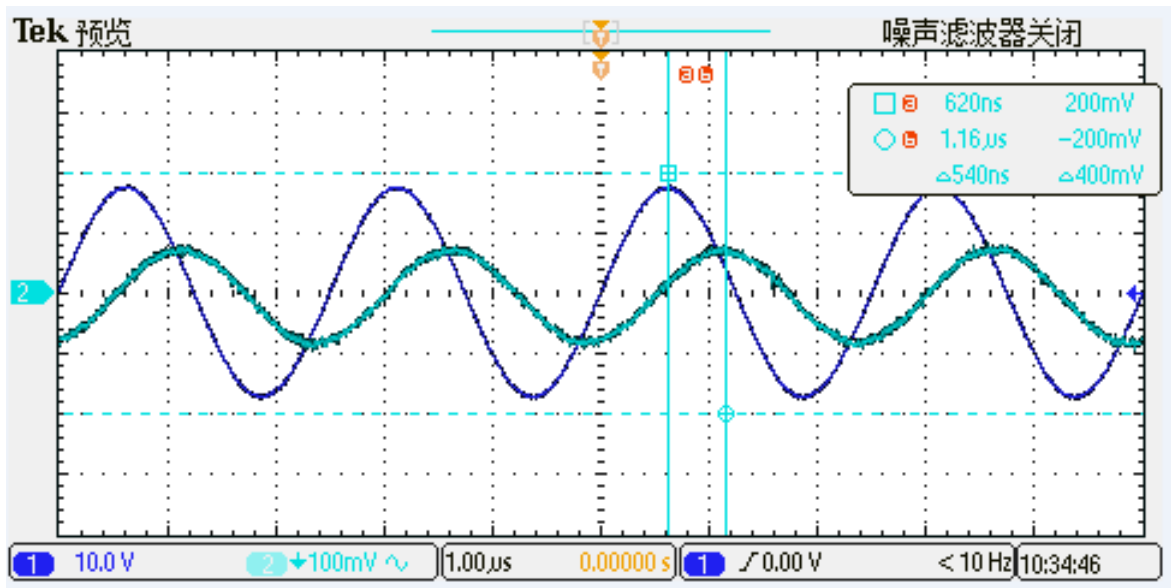


Fig.3 when detection the primary current with a frequency of 400 kHz. The typical results of the output of STK-CTS/P current sensor on the primary current delay characteristics.The delay time from primary current (light blue) to the output of the sensor (dark blue) is less than us.

