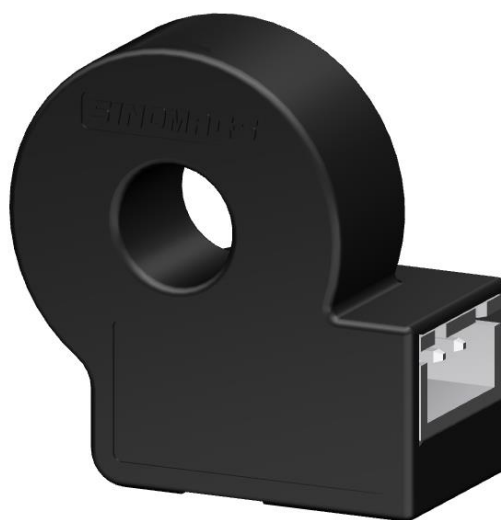


Current Sensor

Product Series: STK-CTS/A1
STK-25CTS/A1
Part number: STK-32CTS/A1
STK-40CTS/A1
Version: Ver1.4



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1.Description

The STK-CTS/A1 series current sensor is based on 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	7
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-25CTS/A1

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	-25		25	
Supply voltage	V_{CC}	V	4.75	5	5.25	
Current consumption	I_{CC}	mA		5	10	
Rated output voltage	V_{FS}	V		± 1.25		$(V_{out} @ \pm I_{pn}) - V_{off}$
Internal output resistance	R_{out}	Ω		1		@ V_{out}
Quiescent voltage	V_{off}	V	1.63	1.65	1.67	$V_{out} @ 0\text{ A}$
Theoretical gain	G_{th}	mV/A		50		$1.25\text{ V} @ I_{pn}$
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		1.8		@ 90% of I_{PN}
Delay time	t_{delay}	μs		1		@ 180 kHz
-3dB band width	BW	kHz		180		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	@ 25°C
Accuracy	X_{TRange}	% of I_{pn}	-2.5		2.5	@ $-40^{\circ}\text{C} \sim 105^{\circ}\text{C}$

Note:

1. Accuracy @ RT, $X = ((V_{out} @ I_n @ 25^{\circ}\text{C}) - (G_{fit} * I_n + V_{off} @ 25^{\circ}\text{C})) / V_{FS}$, Here I_n is the current test current. G_{fit} is the normal temperature fitting gain.
2. Accuracy, $X_{TRange} = ((V_{out} @ I_n @ T_x) - (G_{fit@25^{\circ}\text{C}} * I_n + V_{off} @ 25^{\circ}\text{C})) / V_{FS}$, The fitting gain of the product at $G_{fit@25^{\circ}\text{C}}$ is 25°C .

3. Electrical data STK-32CTS/A1

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		32	
Supply voltage	V_{CC}	V	4.75	5	5.25	
Current consumption	I_{CC}	mA		5	10	
Rated output voltage	V_{FS}	V		± 1.25		$(V_{out} @ \pm I_{pn}) - V_{off}$
Internal output resistance	R_{out}	Ω		1		@ V_{out}
Quiescent voltage	V_{off}	V	1.63	1.65	1.67	$V_{out} @ 0\text{ A}$
Theoretical gain	G_{th}	mV/A		39.06 25		1.25 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		1.8		@ 90% of I_{PN}
Delay time	t_{delay}	μs		1		@ 180 kHz
-3dB band width	BW	kHz		180		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	@ 25°C
Accuracy	X_{TRange}	% of I_{pn}	-2.5		2.5	@ $-40^{\circ}\text{C} \sim 105^{\circ}\text{C}$

Note:

3. Accuracy @ RT, $X = ((V_{out} @ I_n @ 25^{\circ}\text{C}) - (G_{fit} * I_n + V_{off} @ 25^{\circ}\text{C})) / V_{FS}$, Here I_n is the current test current. G_{fit} is the normal temperature fitting gain.

4. Accuracy, $X_{TRange} = ((V_{out} @ I_n @ T_x) - (G_{fit@25^{\circ}\text{C}} * I_n + V_{off} @ 25^{\circ}\text{C})) / V_{FS}$, The fitting gain of the product at $G_{fit@25^{\circ}\text{C}}$ is 25°C .

4.Electrical data STK-40CTS/A1

Condition: T_A = 25℃, V_{cc} = 5 V

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary nominal current	I _{pn}	A	-40		40	
Supply voltage	V _{cc}	V	4.75	5	5.25	
Current consumption	I _{cc}	mA		5	10	
Rated output voltage	V _{FS}	V		±1.25		(V _{out} @ ±I _{pn}) – V _{off}
Internal output resistance	R _{out}	Ω		1		@V _{out}
Quiescent voltage	V _{off}	V	1.63	1.65	1.67	V _{out} @ 0 A
Theoretical gain	G _{th}	mV/A		31.25		1.25 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		1.8		@90% of I _{PN}
Delay time	t _{delay}	μs		1		@180 kHz
-3dB band width	BW	kHz		180		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	@ 25℃
Accuracy	X _{TRange}	% of I _{pn}	-2.5		2.5	@ -40℃ ~ 105℃

Note:

5. Accuracy @ RT, $X = ((V_{out} @ I_n @ 25^{\circ}\text{C}) - (G_{fit} * I_n + V_{off} @ 25^{\circ}\text{C})) / V_{FS}$, Here I_n is the current test current. G_{fit} is the normal temperature fitting gain.

6. Accuracy, $X_{TRange} = ((V_{out} @ I_n @ T_x) - (G_{fit@25^{\circ}\text{C}} * I_n + V_{off} @ 25^{\circ}\text{C})) / V_{FS}$, The fitting gain of the product at G_{fit@25℃} is 25℃.

5.Frequency band width

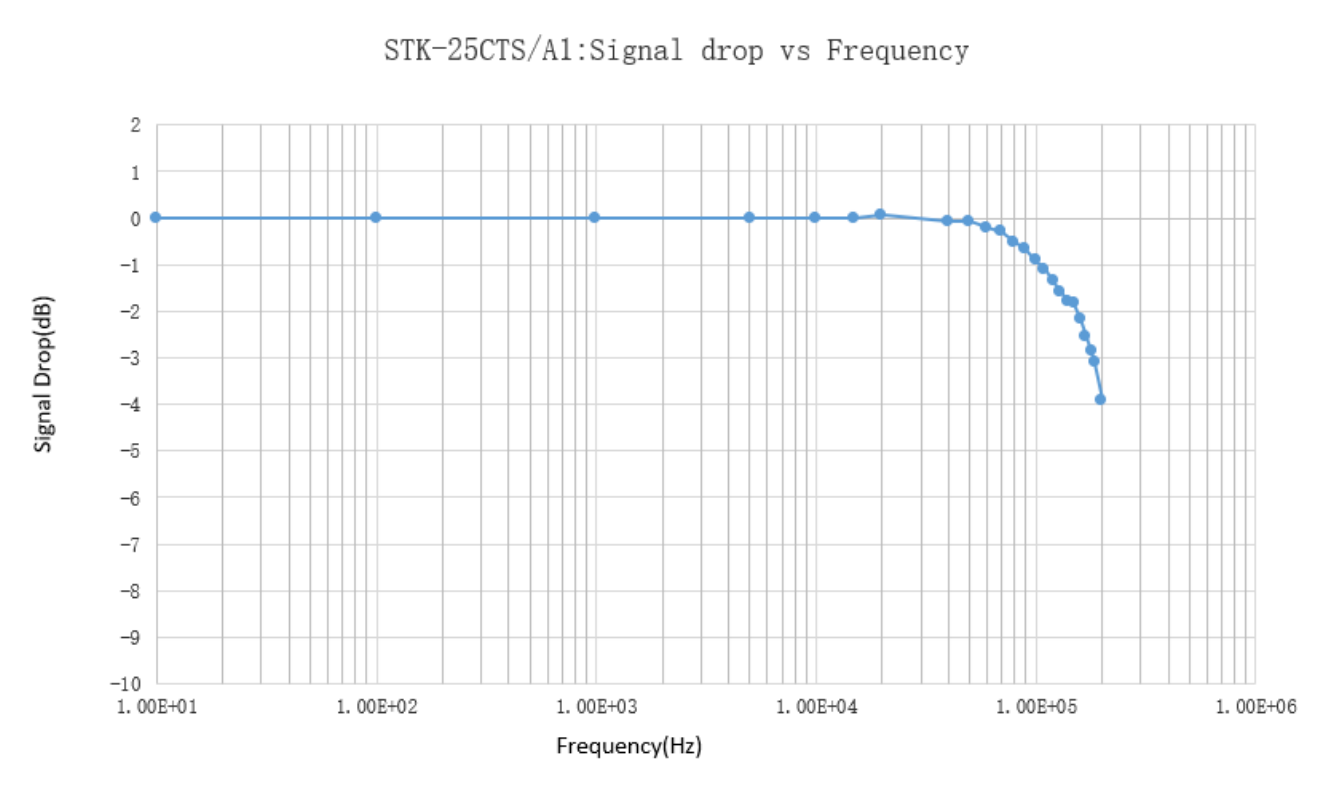


Fig.1 the band width of STK-CTS/A1 series current sensors.The bandwidth of the sensor is in the range of DC ~180 kHz (-3 dB).

6.Response time & noise with typical circuit

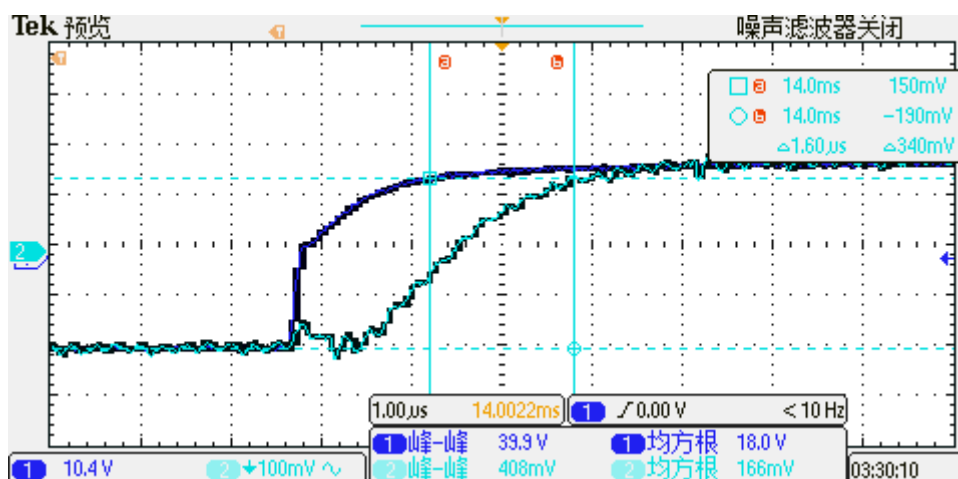


Fig.2 the step response time of STK-CTS/A1 current sensors. The light blue is primary current, while the dark blue is output signal of current sensor. . The delay from 90% of the original current signal to 90% of the output of the sensor is less than 1.8us.

7.Frequency delay performance

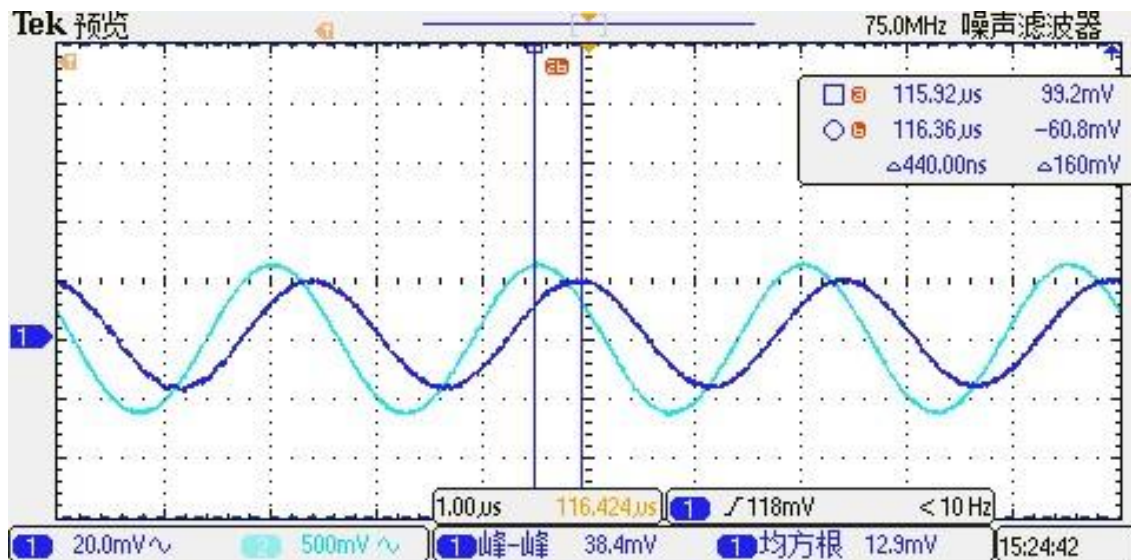


Fig.3 when detection the primary current with a frequency of 180 kHz. The typical results of the output of STK-CTS/A1 current sensor on the primary current delay characteristics. The delay time from primary current (light blue) to the output of the sensor (dark blue) is less than 1μs.

8.STK-CTS/A1 Dimensions & Pins & Footprint

