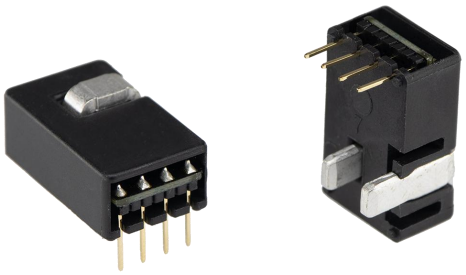
SINOMAGS
希 磁 科 技

CURRENT SENSOR

PRODUCT SERIES: STK-HD/KA

PRODUCT SERIES: STK-20HD/KA
STK-32HD/KA
STK-40HD/KA
STK-50HD/KA

REVISION: Ver 1.0



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Web site: www.sinomags.com

CONTENT

1. Description

STK-HD/KA current sensor is based on the open loop principle. DC, AC, pulses and any kind of irregularities wave can be measured by the current sensor under the isolated conditions.

Typical application

- AC Variable speed drives
- PV string current detection
- Switched model power supplies (SMPS)
- Direct-current dynamo
- MPPT

General parameters

Parameter	Symbol	Unit	Value
Working temperature	T_A	℃	-40 ~ 105
Storage temperature	T_stg	℃	-40 ~ 105
Mass	m	g	3.3

Absolute parameters

Parameters	Symbol	Unit	Value
Supply voltage	V_C	V	6
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
RMS voltage for AC test 50Hz/1 min	Ud	kV	4	
Impulse withstand voltage 1.2/50μs	Ûw	kV	6	
Case material			V0 according to UL 94	
Comparative tracking index	CTI	V	600	

2. Electrical performance of STK-20HD/ KA

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary nominal current rms	I_pn	A		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	
Reference voltage	Vref	V	2.47	2.5	2.53	Output function
Quiescent voltage Vout @ 0 A	Voff	V	2.47	2.5	2.53	
Electrical offset voltage (Vout – Vref) @ 0 A	Voe	mV	-8		8	
Temperature drift of Voe	Voe_TRange	mV	-4		4	25℃ ~ 85℃
Temperature drift of Voe	Voe_TRange	mV	-6		6	-40℃ ~ 105℃
Internal output resistance	R_out	Ω		1		
Internal reference resistance	R_ref	Ω		1		
Theoretical gain	G	mV/A		40		
Rated linearity error	Non-L	%I_pn		0.5		Within ±I_pn
Reaction time	t_ra	μs		0.5		@ 10% of I_pn
Step response time	t_res	μs		1.0		@ 90% of I_pn
Delay time	t_delay	μs		0.5		400 kHz sine wave
Frequency bandwidth (-3dB)	BW	kHz		600		No RC circuit
Output voltage noise DC ~ 10 kHz DC ~ 100 kHz	Vnoise	mVpp		 8 10		@250kHz Sampling Rate
Accuracy @ 25℃	X	% of I_pn	-0.8		0.8	@ 25℃
Accuracy @ -40℃~105℃	X_TRange	% of I_pn	-1.5		1.5	-40℃ ~ 105℃

Remarks：

1. the accuracy @ -40℃~105℃, X_TRange = (((Vout – Vref)@ In @ T_x) – Voe@ 25℃ – G_th * In) / V_FS, where T_x represents present temperature, G_th is fitted gain at room temperature.

3. Electrical performance of STK-32HD/ KA

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary nominal current rms	I_pn	A		32		
Primary current measuring range	I_pm	A	-80		80	
Supply voltage	Vcc	V	4.75	5	5.25	
Current consumption	Icc	mA		5	10	
Reference voltage	Vref	V	2.47	2.5	2.53	Output function
Quiescent voltage Vout @ 0 A	Voff	V	2.47	2.5	2.53	
Electrical offset voltage (Vout – Vref) @ 0 A	Voe	mV	-8		8	
Temperature drift of Voe	Voe_TRange	mV	-4		4	25℃ ~ 85℃
Temperature drift of Voe	Voe_TRange	mV	-6		6	-40℃ ~ 105℃
Internal output resistance	R_out	Ω		1		
Internal reference resistance	R_ref	Ω		1		
Theoretical gain	G	mV/A		25		
Rated linearity error	Non-L	%I_pn		0.5		Within ±I_pn
Reaction time	t_ra	μs		0.5		@ 10% of I_pn
Step response time	t_res	μs		1.0		@ 90% of I_pn
Delay time	t_delay	μs		0.5		400 kHz sine wave
Frequency bandwidth (-3dB)	BW	kHz		600		No RC circuit
Output voltage noise DC ~ 10 kHz DC ~ 100 kHz	Vnoise	mVpp		 8 10		@250kHz Sampling Rate
Accuracy @ 25℃	X	% of I_pn	-0.8		0.8	@ 25℃
Accuracy @ -40℃~105℃	X_TRange	% of I_pn	-1.5		1.5	-40℃ ~ 105℃

Remarks：

1. the accuracy @ -40℃~105℃, X_TRange = (((Vout – Vref)@ In @ T_x) – Voe@ 25℃ – G_th * In) / V_FS, where T_x represents present temperature, G_th is fitted gain at room temperature.

4. Electrical performance of STK-40HD/ KA

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary nominal current rms	I_pn	A		40		
Primary current measuring range	I_pm	A	-100		100	
Supply voltage	Vcc	V	4.75	5	5.25	
Current consumption	Icc	mA		5	10	
Reference voltage	Vref	V	2.47	2.5	2.53	Output function
Quiescent voltage Vout @ 0 A	Voff	V	2.47	2.5	2.53	
Electrical offset voltage (Vout – Vref) @ 0 A	Voe	mV	-8		8	
Temperature drift of Voe	Voe_TRange	mV	-4		4	25℃ ~ 85℃
Temperature drift of Voe	Voe_TRange	mV	-6		6	-40℃ ~ 105℃
Internal output resistance	R_out	Ω		1		
Internal reference resistance	R_ref	Ω		1		
Theoretical gain	G	mV/A		20		
Rated linearity error	Non-L_pn	%I_pn		0.5		Within ±I_pn
Reaction time	t_ra	μs		0.5		@ 10% of I_pn
Step response time	t_res	μs		1.0		@ 90% of I_pn
Delay time	t_delay	μs		0.5		400 kHz sine wave
Frequency bandwidth (-3dB)	BW	kHz		600		No RC circuit
Output voltage noise DC ~ 10 kHz DC ~ 100 kHz	Vnoise	mVpp		 8 10		@250kHz Sampling Rate
Accuracy @ 25℃	X	% of I_pn	-0.8		0.8	@ 25℃
Accuracy @ -40℃~105℃	X_TRange	% of I_pn	-1.5		1.5	-40℃ ~ 105℃

Remarks：

1. the accuracy @ -40℃~105℃, X_TRange = (((Vout – Vref)@ In @ T_x) – Voe@ 25℃ – G_th * In) / V_FS, where T_x represents present temperature, G_th is fitted gain at room temperature.

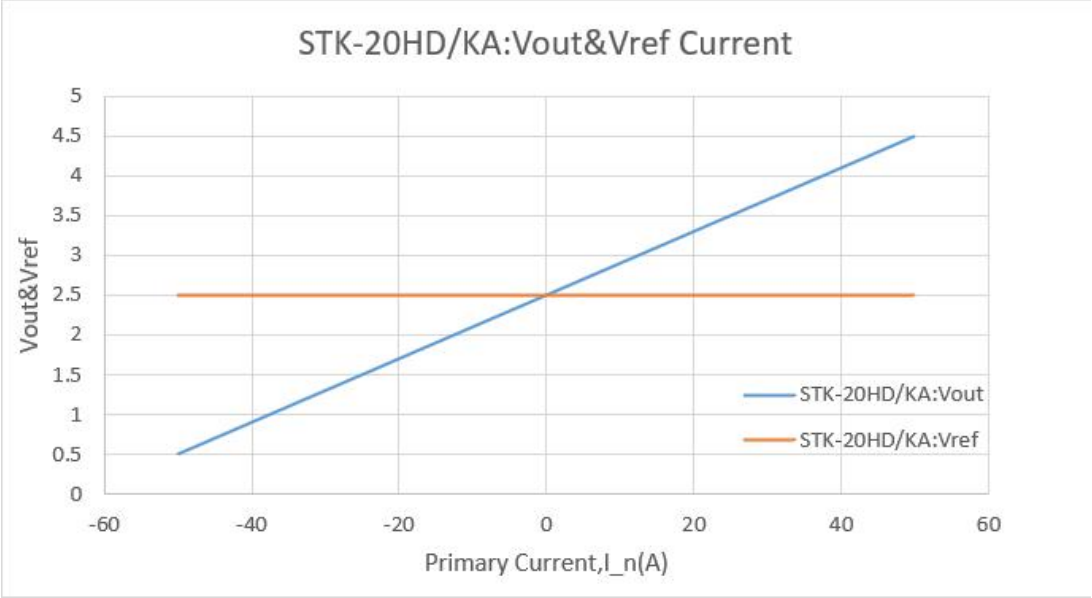
5. Electrical performance of STK-50HD/ KA

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary nominal current rms	I_pn	A		50		
Primary current measuring range	I_pm	A	-125		125	
Supply voltage	Vcc	V	4.75	5	5.25	
Current consumption	Icc	mA		5	10	
Reference voltage	Vref	V	2.47	2.5	2.53	Output function
Quiescent voltage Vout @ 0 A	Voff	V	2.47	2.5	2.53	
Electrical offset voltage (Vout – Vref) @ 0 A	Voe	mV	-8		8	
Temperature drift of Voe	Voe_TRange	mV	-4		4	25℃ ~ 85℃
Temperature drift of Voe	Voe_TRange	mV	-6		6	-40℃ ~ 105℃
Internal output resistance	R_out	Ω		1		
Internal reference resistance	R_ref	Ω		1		
Theoretical gain	G	mV/A		16		
Rated linearity error	Non-L_pn	%I_pn		1		Within ±I_pn
Linearity error @ I_pm	Non-L_pm	%I_pm		3		±I_pm
Reaction time	t_ra	μs		0.5		@ 10% of I_pn
Step response time	t_res	μs		1.0		@ 90% of I_pn
Delay time	t_delay	μs		0.5		400 kHz sine wave
Frequency bandwidth (-3dB)	BW	kHz		600		No RC circuit
Output voltage noise DC ~ 10 kHz DC ~ 100 kHz	Vnoise	mVpp		 8 10		@250kHz Sampling Rate
Accuracy @ 25℃	X	% of I_pn	-0.8		0.8	@ 25℃
Accuracy @ -40℃~105℃	X_TRange	% of I_pn	-1.5		1.5	-40℃ ~ 105℃

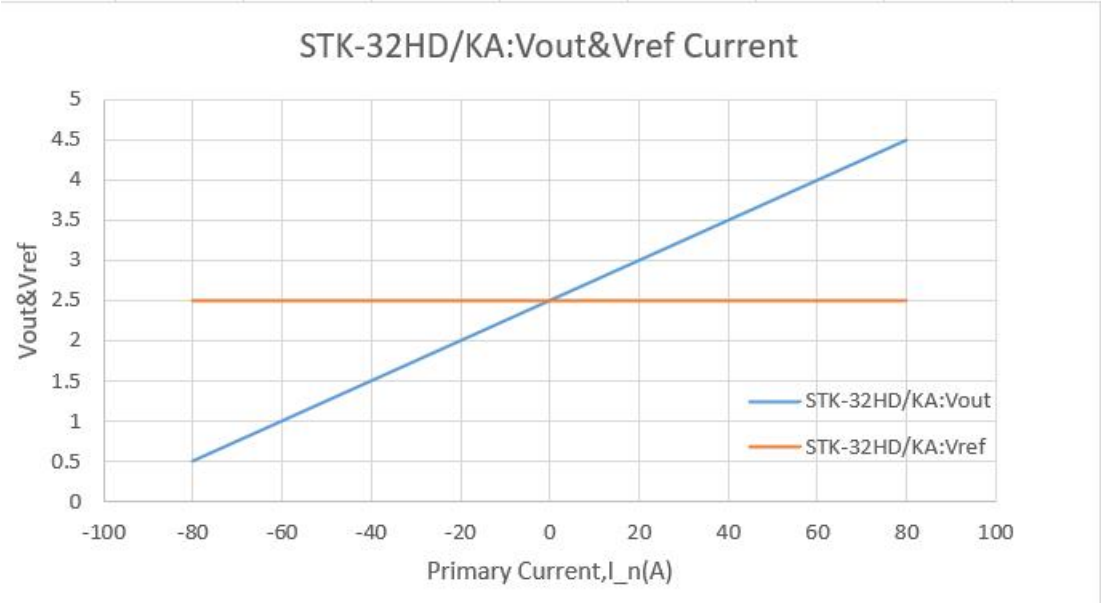
Remarks：

1. the accuracy @ -40℃~105℃, X_TRange = (((Vout – Vref)@ In @ T_x) – Voe@ 25℃ – G_th * In) / V_FS, where T_x represents present temperature, G_th is fitted gain at room temperature.

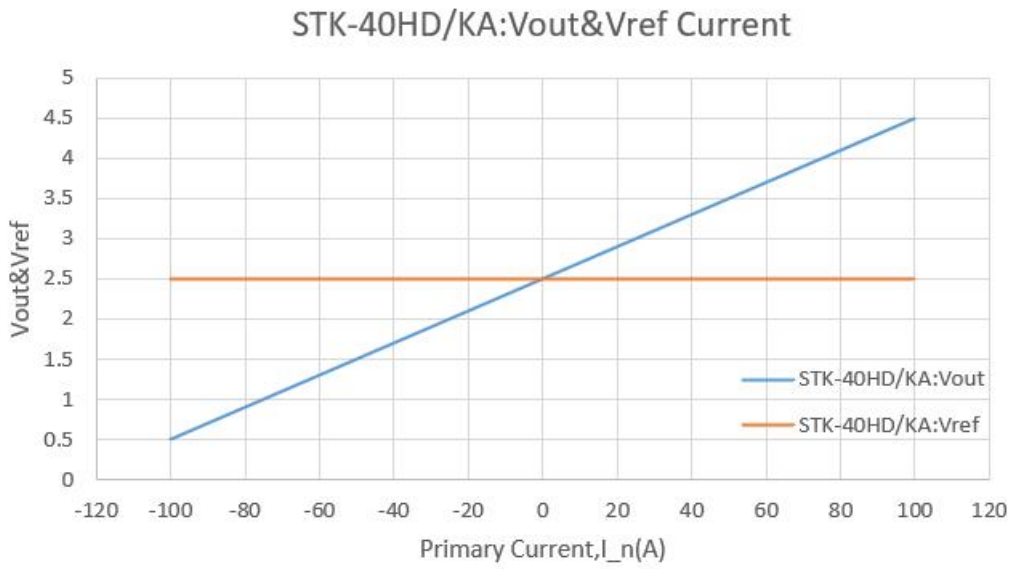
6. Output voltage VS primary current of STK-HD/ KA



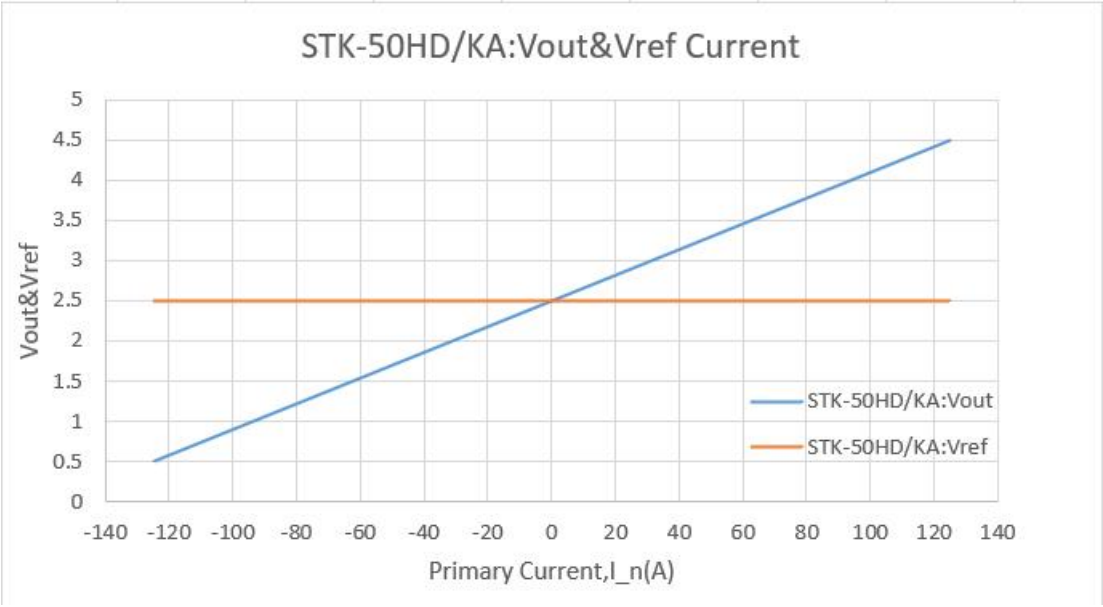
The dependence of Vout&Vref of STK-20HD/KAA on the primary current.



The dependence of Vout&Vref of STK-32HD/KA on the primary current.

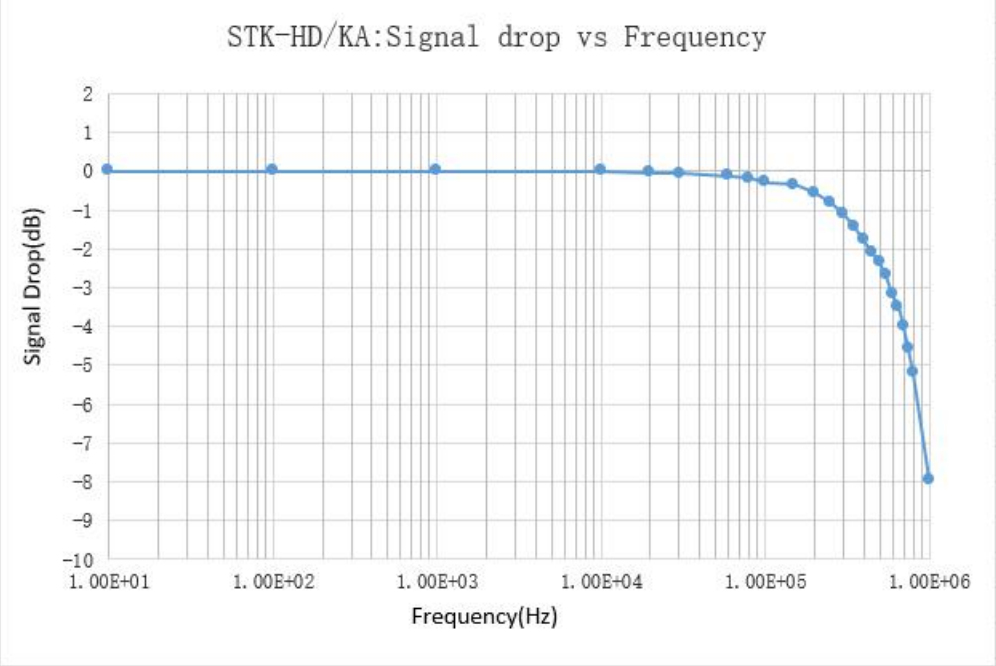


The dependence of Vout&Vref of STK-40HD/KA on the primary current.



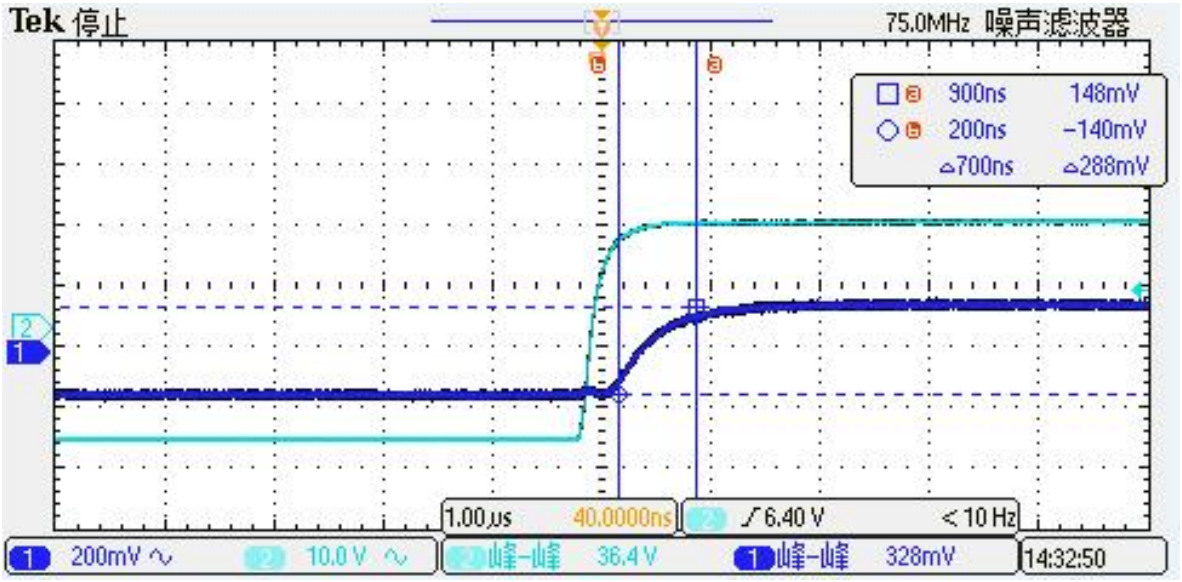
The dependence of Vout&Vref of STK-50HD/KA on the primary current.

7. Frequency band width



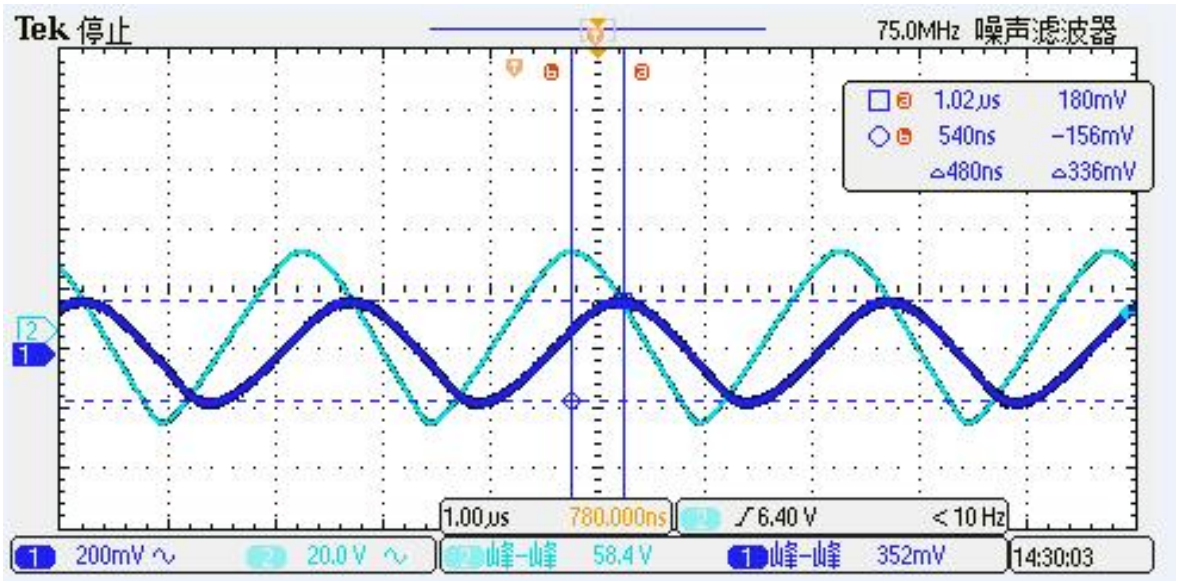
The frequency band width of STK-HD/KA series current sensors.

8. Step response time



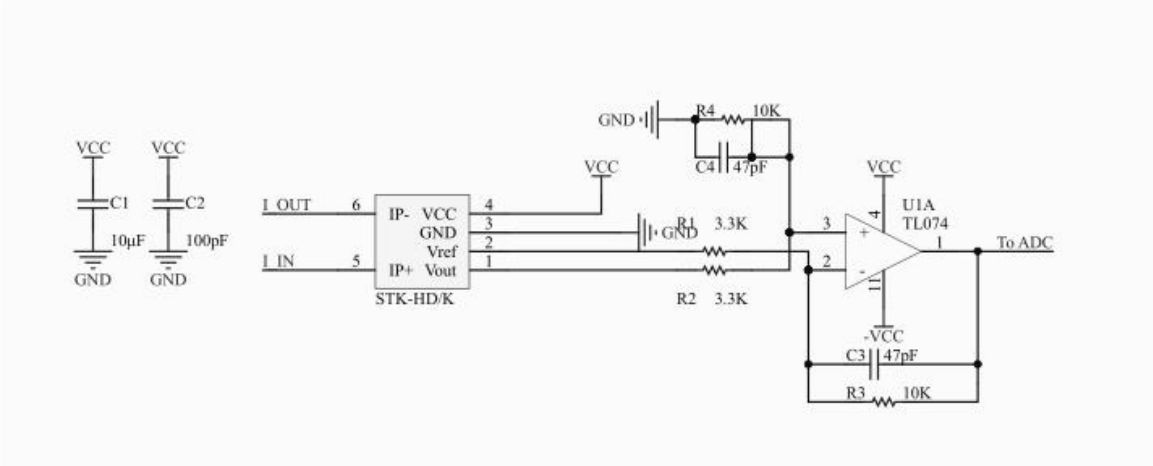
The step response time of STK-HD/KA current sensors. The light blue is primary current, while the dark blue is output signal of current sensor. The step response time is less than 1.0 µs.

9. Delaytime



When detecting the primary current with a frequency of 400 kHz. The delay time from the primary current (light blue) to the output of the sensor (dark blue) is around 0.5 µs.

10. Typical application circuits for STK-HD/KA

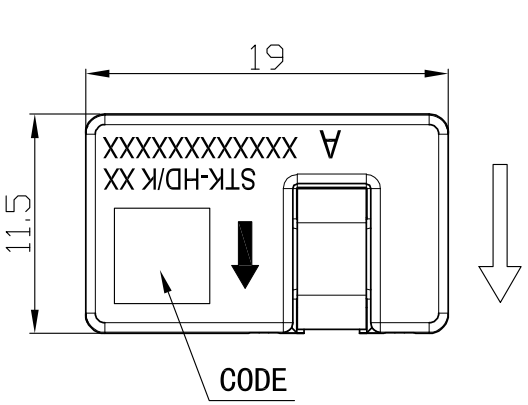


Typical application circuits for STK-HD/KA current sensor. The magnification can be estimated as M = R4/R2 with the condition of R1 = R2, and R3 = R4. The magnification in the above circuit is about 3.

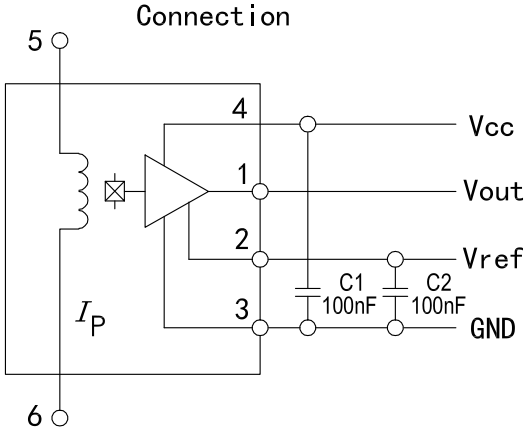
R3 (kohm) = R4 (kohm)	C3 (pF) = C4 (pF)	Theoretical -3dB f = 1/(2πRC) (kHz)	Tested -3dB (kHz)
20	20	398	~400
20	81	98	~100
20	810	10	~10

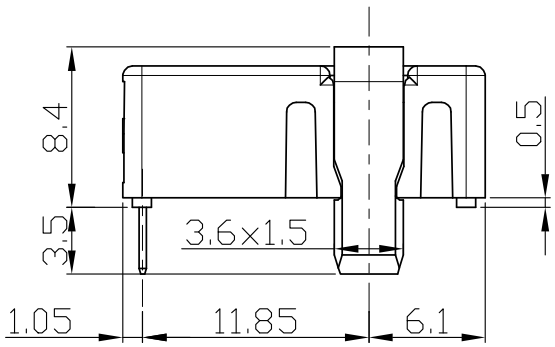
The frequency characteristics of STK_HD/KA series current sensor are not affected by the R-C setting (according to recommended R-C setting), therefore the active filter circuit or R-C circuit can be applied to modulate the sensor's frequency characteristics.

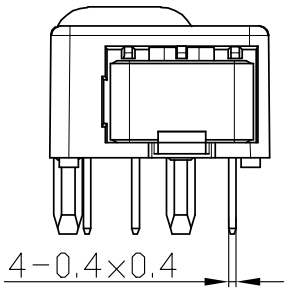
11. Dimensions & Pins & Footprint



Connection

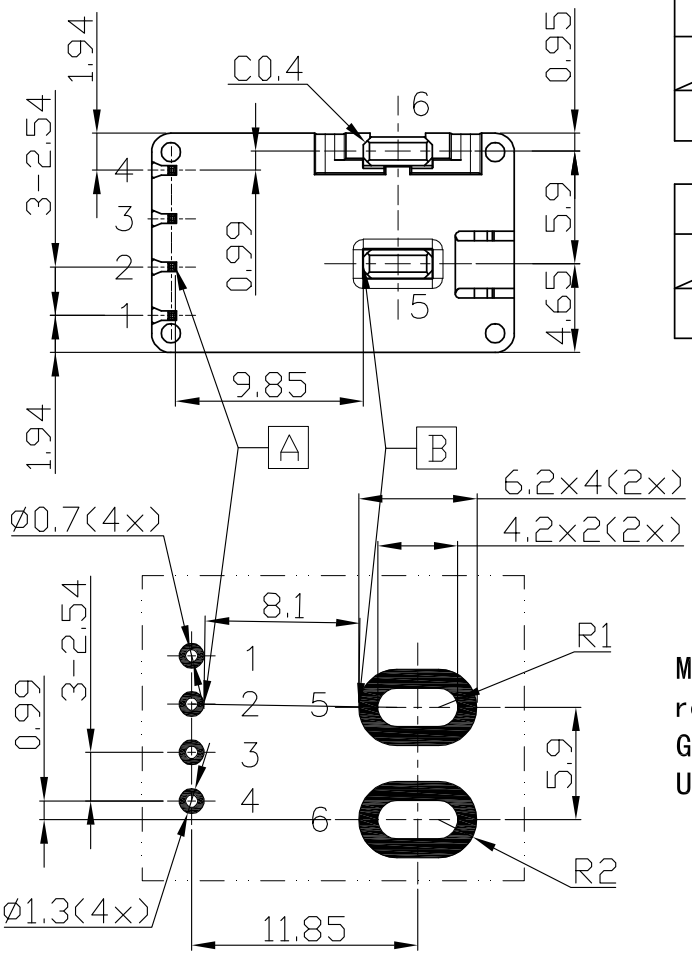






Sensor		
	d_{CI}	d_{Cp}
A-B	9.85mm	11.5mm

On the customer's PCBA		
	d_{CI}	d_{Cp}
A-B	8.1mm	8.1mm



Terminals

1.	Vout	4.	Vcc
2.	Vref	5.	Ip+
3.	GND	6.	Ip-

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