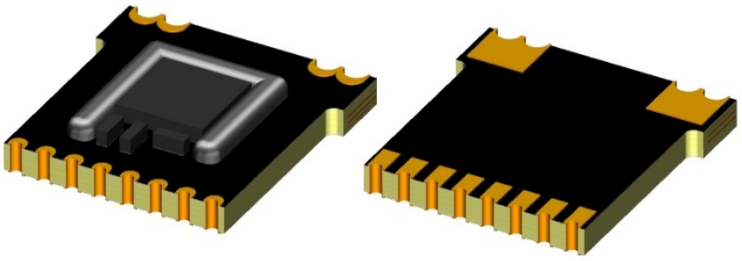
Current Sensor

Product Series: STK-616H

Part number: STK-616H-20AB
STK-616H-25AB
STK-616H-30AB

Version: Ver3.7



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CONTENT

1. Description

The STK-616H 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
- Solar Energy
- 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	1

Absolute maximum rating

Parameter	Symbol	Unit	Value
Supply voltage	Vcc	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 parameter

Parameter	Symbol	Unit	Value	Comment
RMS voltage for AC test 50Hz/1 min	Ud	kV	4.5	
Impulse withstand voltage 1.2/50μs	Ûw	kV	8	
Impulse current 8/20us	Iw	kA	15	
Clearance distance (pri. -sec)	dCl	mm	7.5	Determined by customer's layout
Creepage distance (pri. -sec)	dCp	mm	7.5	

Measuring current table

Product	**Optimized Range I_pn (A)**	**Sensitivity, (mV/A)**	**T(℃)**
STK-616H-20AB	±20 A	40	-40 ~ 105
STK-616H-25AB	±25 A	32	-40 ~ 105
STK-616H-30AB	±30 A	26.67	-40 ~ 105

2. Electrical data

Condition：T_A = 25℃, Vcc = 5 V

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary nominal current	I_pn	A	-20		20	STK-616H-20AB
			-25		25	STK-616H-25AB
			-30		30	STK-616H-30AB
Primary current measuring range	I_pm	A	-50		50	STK-616H-20AB
			-62.5		62.5	STK-616H-25AB
			-75		75	STK-616H-30AB
Supply voltage	Vcc	V	4.75	5	5.25	+/-5%
Current consumption	Icc	mA		5	10	
Quiescent voltage	Vout	V	2.48	2.5	2.52	Vout @ I_P=0 A
Reference voltage	Vref	V	2.48	2.5	2.52	
Rated output voltage	V_FS	V		±0.8		ALL
Electrical offset voltage	V_{OE}	mV		10		Voff - Vref
Temperature drift of V_{OE}	TDV_{OE}	%I_pn	-0.5		0.5	-20℃ ~ 85℃
			-1		1	-40℃ ~ 105℃
Internal output resistance	R_out	Ω		1		Vout
Theoretical gain	G_th	mV/A		40		STK-616H-20AB
				32		STK-616H-25AB
				26.67		STK-616H-30AB
Error of gain	Err_G	%G_th	-1		1	Trimmed in the factory @ 25℃
Rated linearity error	Non-L	%I_pn		±0.5		±I_pn
Step response time	t_res	μs		3.5		@90% of I_pn
Frequency bandwidth (-3dB)	BW	kHz		200		No RC circuit
Output voltage noise(V_{OE}) DC ~ 10 kHz @250 kHz Sampling Rate	Vnoise	mVpp		10		STK-616H-20AB
				8		STK-616H-25AB
				6		STK-616H-30AB
Accuracy @ 25℃	X	% of I_pn		±1		@ 25℃
Accuracy @ -20℃~85℃	X_TRange	% of I_pn	-1.5		1.5	-20℃ ~ 85℃
Accuracy @ -40℃~105℃	X_TRange	% of I_pn	-3		3	-40℃ ~ 105℃

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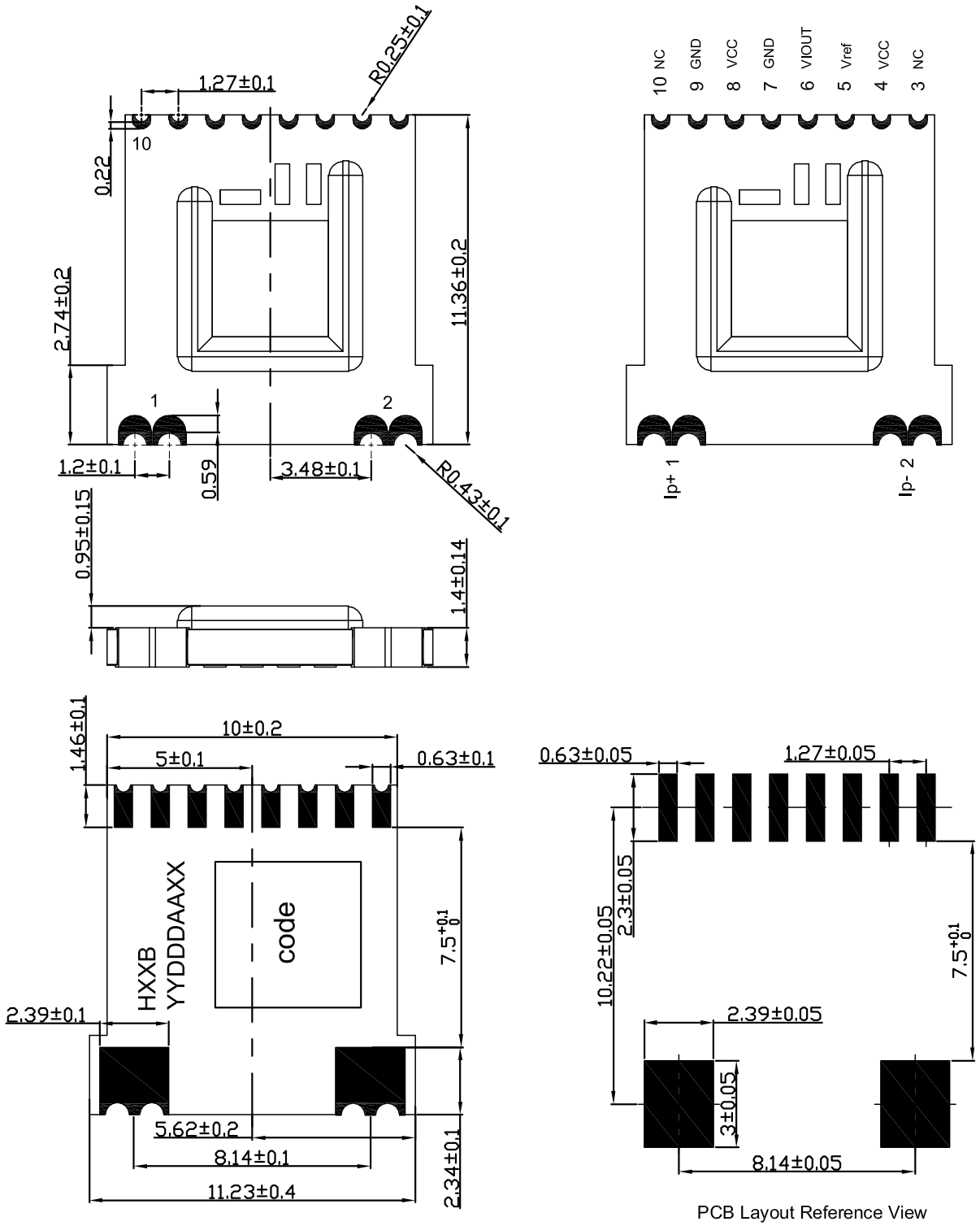
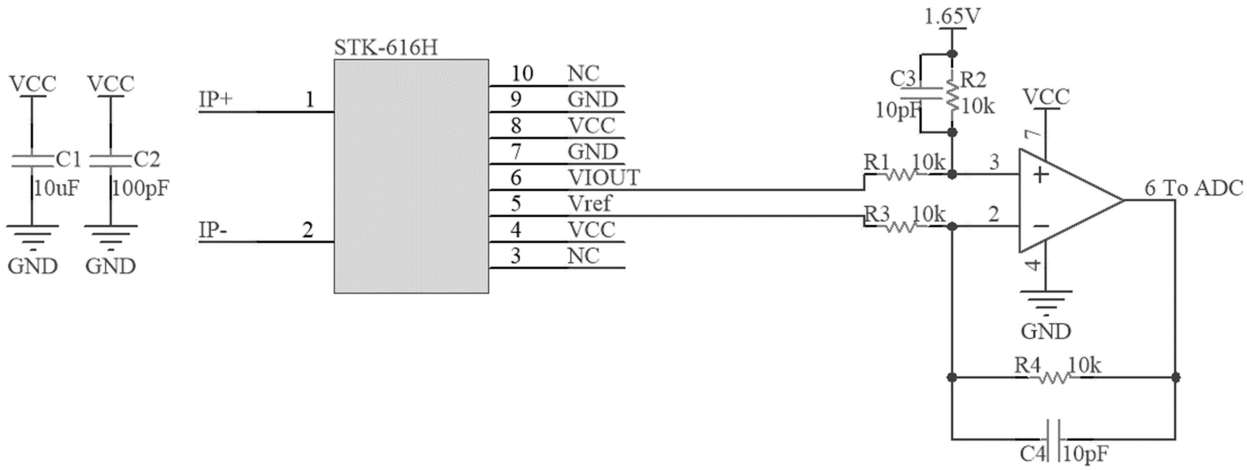
3. Dimension & Pin definitions



PCB Layout Reference View

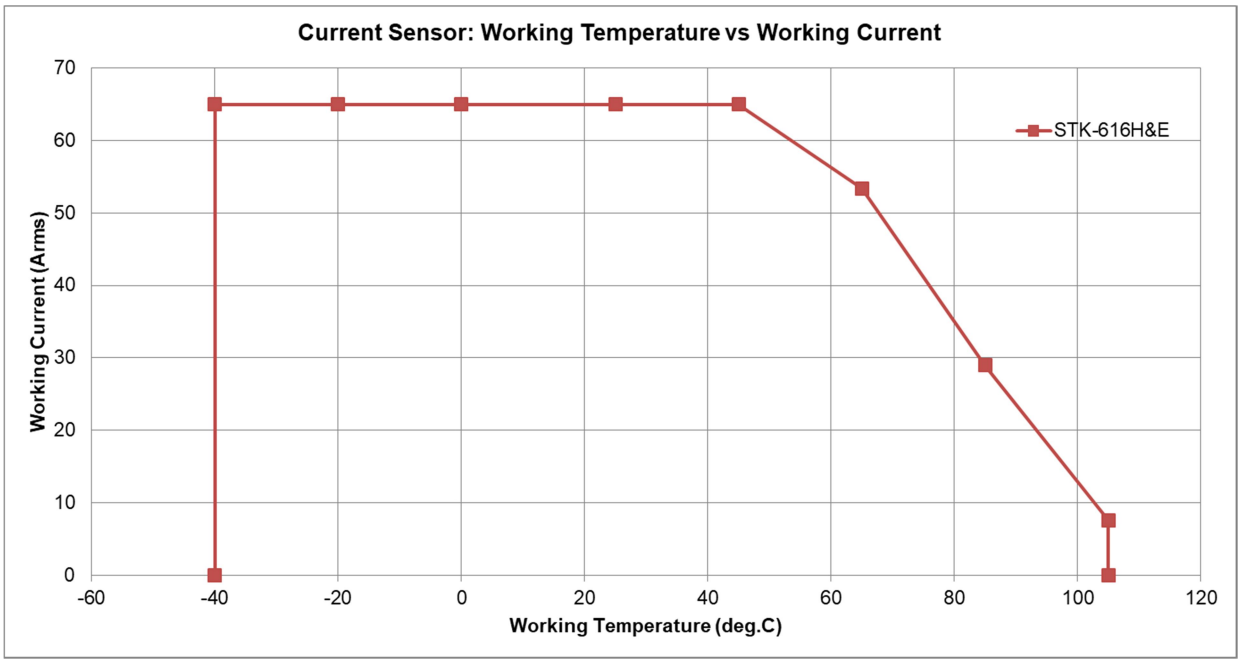
4. Typical Application



Remark:

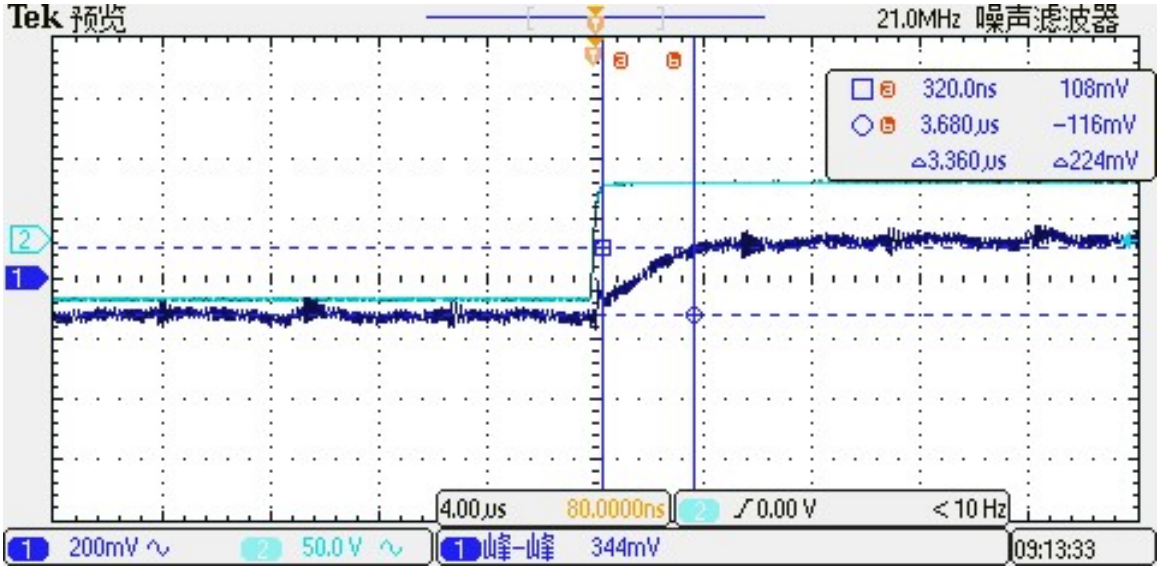
1. Sensor_VIOUT is the output of the sensor, and Sensor_VREF is the reference of the sensor;
2. The signal input to ADC is 1.65+ R2/R1 * (VOUT – VREF) with the conditions: R2 = R4,
3. f = 1/2/π/R4/C4；

5. Working temperature vs Current

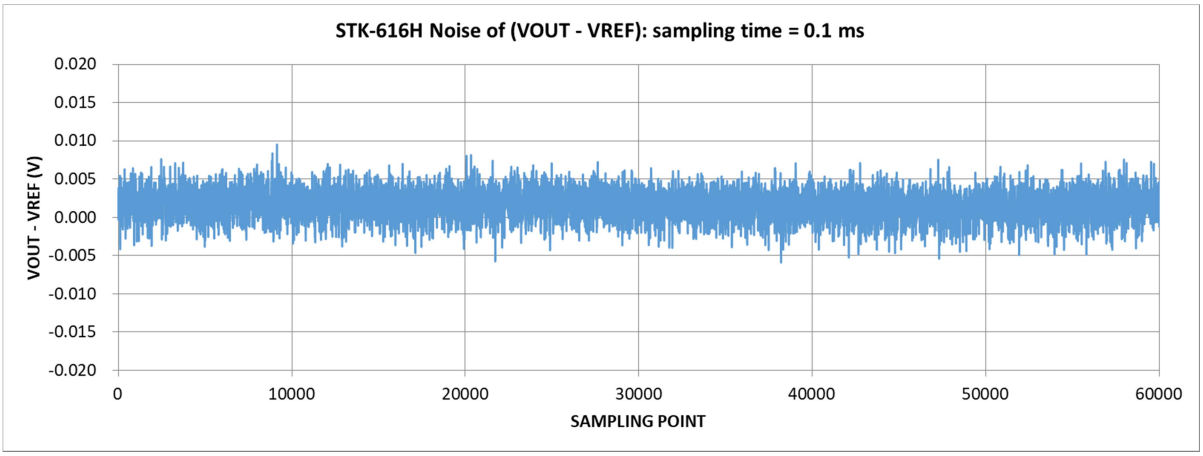


6. Response time & noise with typical circuit

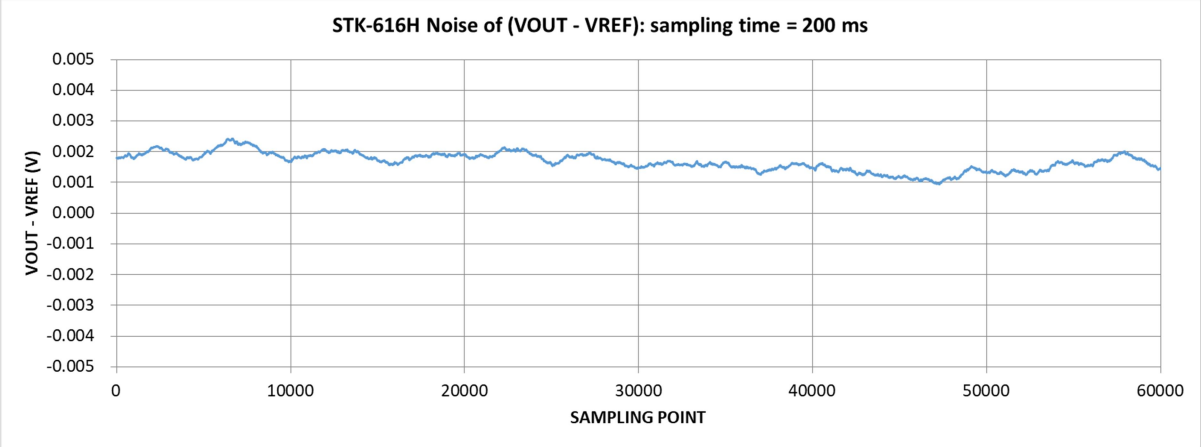
In the typical application circuit, when R2 = R4 = 10kΩ, R1 = R3 = 10kΩ, C3 = C4 = 72 pF, the response time and V_{OE} noise level are shown in below plots.



Response time of 3.5 µs can be achieved.



Filtering 10 kHz, sampling time 0.1 ms.



Filtering 10 kHz, sampling time 200 ms.