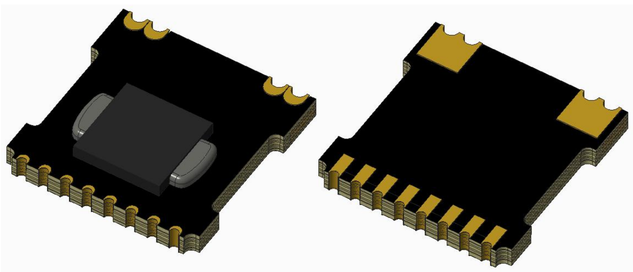
Current Sensor

Product Series: STK-616H

Part number: STK-616H-20GB
STK-616H-30GB

Version: Ver5.3



Sinomags Technology Co., Ltd

Web site: www.sinomags.com

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

General parameter

Parameter	Symbol	Unit	Value
Working temperature	T_A	℃	-40 ~ 125
Storage temperature	Htg	℃	-40 ~ 125
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.

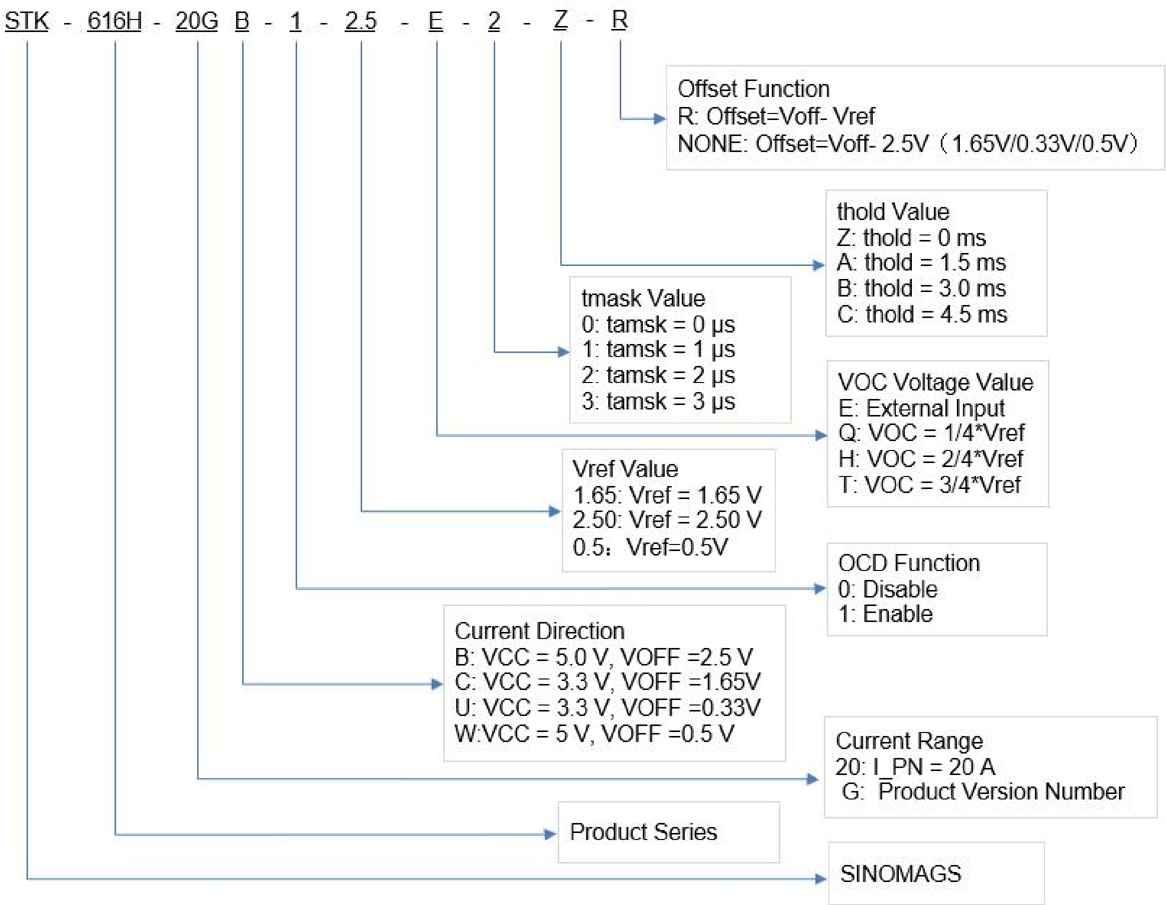
Isolation parameter

Parameter	Symbol	Unit	Value	Comment
RMS voltage for AC test 50Hz/1 min	Ud	kV	2.4	
Impulse withstand voltage 1.2/50μs	Ûw	kV	2.5	
Impulse current 8/20us	Iw	kA	15	
Clearance distance (pri. -sec)	dCI	mm	7	Determined by customer's layout
Creepage distance (pri. -sec)	dCp	mm	7	

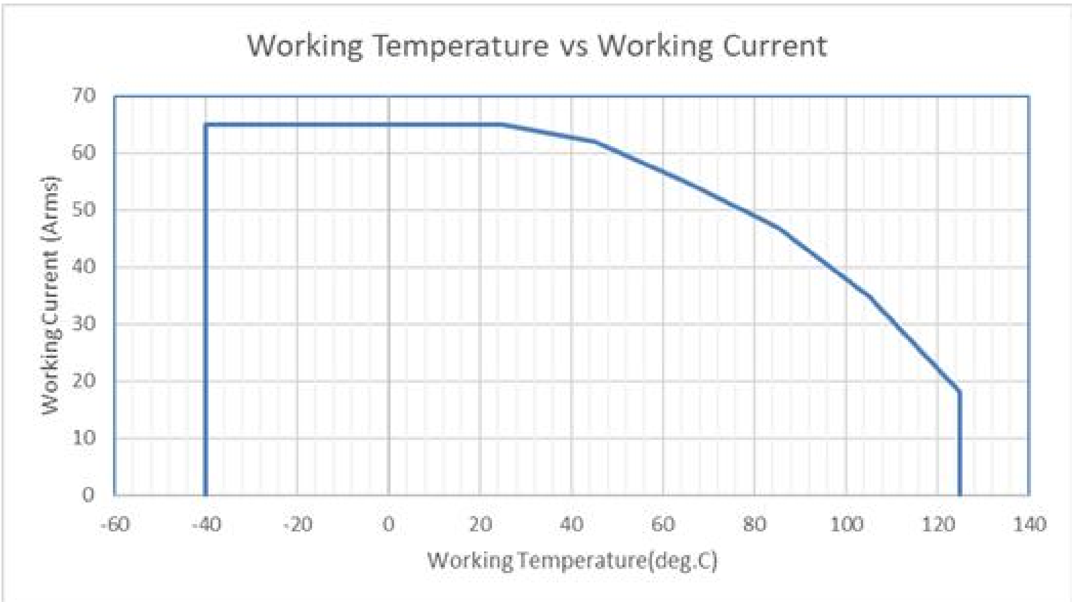
Measuring current table

Product	**Optimized Range I_pn (A)**	**Sensitivity, (mV/A)**	**T(℃)**
STK-616H-20GB-1-2.5-E-2-Z-R	±20 A	40	-40 ~ 125
STK-616H-30GB-1-2.5-E-2-Z-R	±30 A	26.67	-40 ~ 125
STK-616H-20GB	±20 A	40	-40 ~ 125
STK-616H-30GB	±30 A	26.67	-40 ~ 125
STK-616H-65GB	±65 A	30	-40 ~ 125

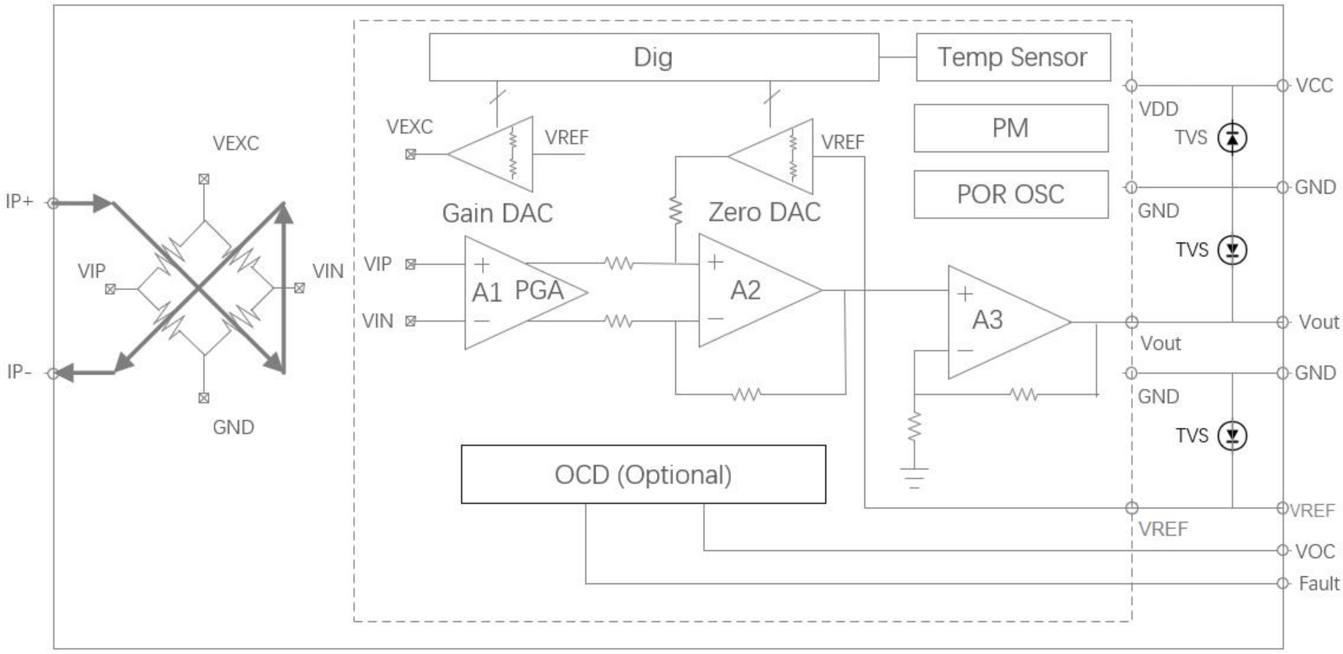
2. Part number definition



3. Temperature vs Current



4. Functional Block Diagram

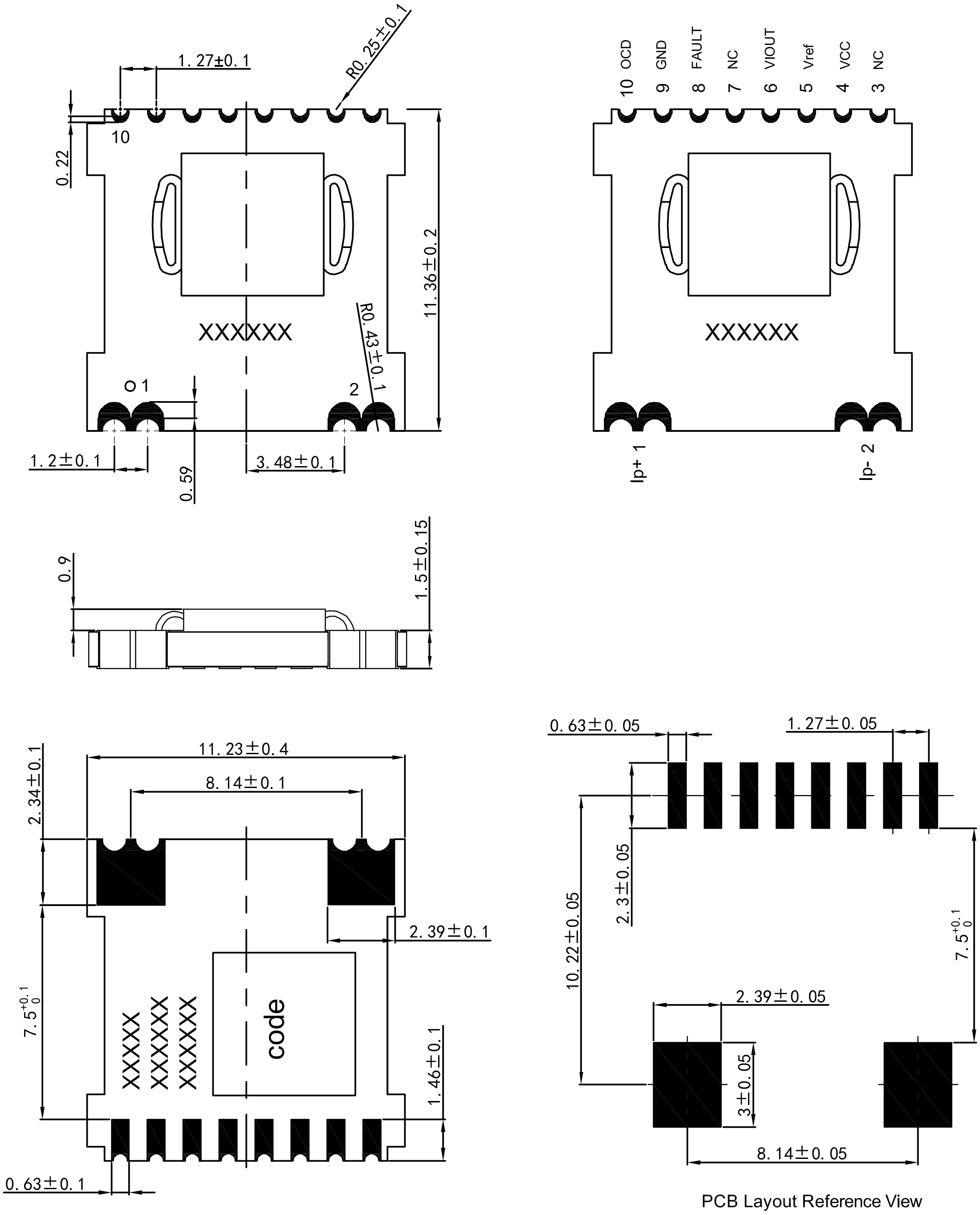


5. Electrical data STK-616H-xxGB

Condition：T_A = 25℃, Vcc = 5 V

Parameter	Symbol	Unit	Min	Typ	Max	Comment
General parameters						
Primary nominal current	I_pn	A	-20		20	STK-616H-20GB
			-30		30	STK-616H-30GB
			-65		65	STK-616H-65GB
Supply voltage	Vcc	V	4.5	5	5.5	
Current consumption	Icc	mA		7	12	
Primary conductor resistance	R_IP	mΩ		0.4		
Quiescent voltage@0A	Voff	V	2.45	2.5	2.55	
Reference voltage	Vref	V	2.45	2.5	2.55	
Electrical offset voltage	Offset	mV		±10		Voff - Vref
Output Specifications	R_out	Ω	1		30	
	R_ref		1		80	
Theoretical gain	G_th	mV/A		40		STK-616H-20GB
				26.67		STK-616H-30GB
				30		STK-616H-65GB
OCD function (if applicable)						
OCD range	VOC	V	0.5		3.3	
FOULT error		%		5%		% of OCD
OCD Hysteresis	IHYS	%		10%		% of OCD
OCD Fault Mask	tmask	μs		2		0, 1, 2, 3 μs
OCD Fault Mask error	Tmask_error	ns		125		
OCD Fault Hold Time	thold	ms		0		0, 1.5, 3, 4.5 ms
Accuracy performance						
Rated linearity error@25℃	Non-L	%I_pn		±1.5		±I_pn
Step response time	t_res	μs		2		@90% of I_pn
Frequency bandwidth	BW	KHz		300		@-3dB
Output voltage noise	Vnoise	mVpp		20		
Accuracy @ 25℃	X	% I_pn		±1.5		@ 0.5*I_pn
Thermal drift of G_th	GAIN_T	% G_th		±1.5		@ -40~125℃ drift related to the value @25℃
Thermal drift of Voff	Voff_T	mV		±15		
Total Accuracy	X_TRange	% I_pn		±3		

6. Dimension of STK-616H



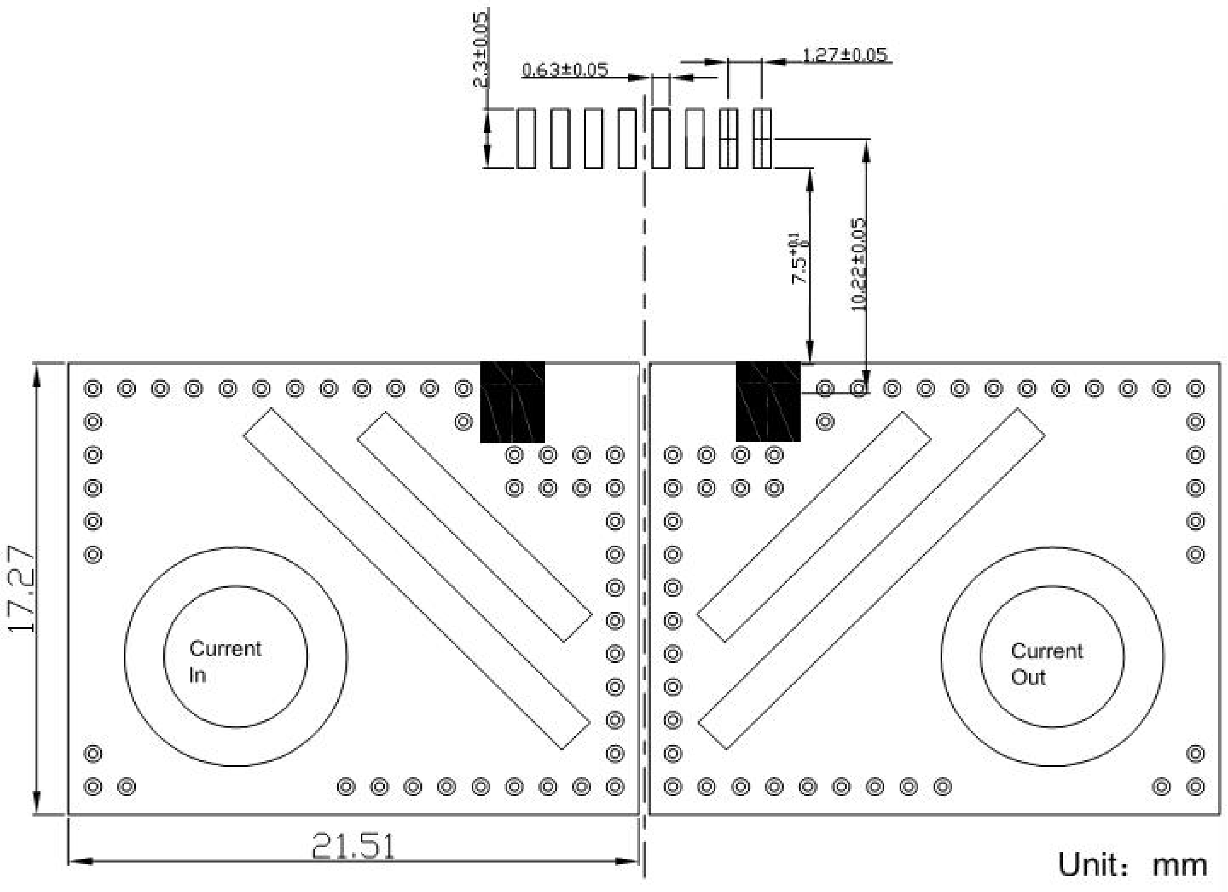
PCB Layout Reference View

The mark of “H XXBN” on the top surface shows the information on the “Part number”: “H” = “STK-616H”, “XX” = “Product sensing range”, “B” = “Current direction”, “N” = Offset function.

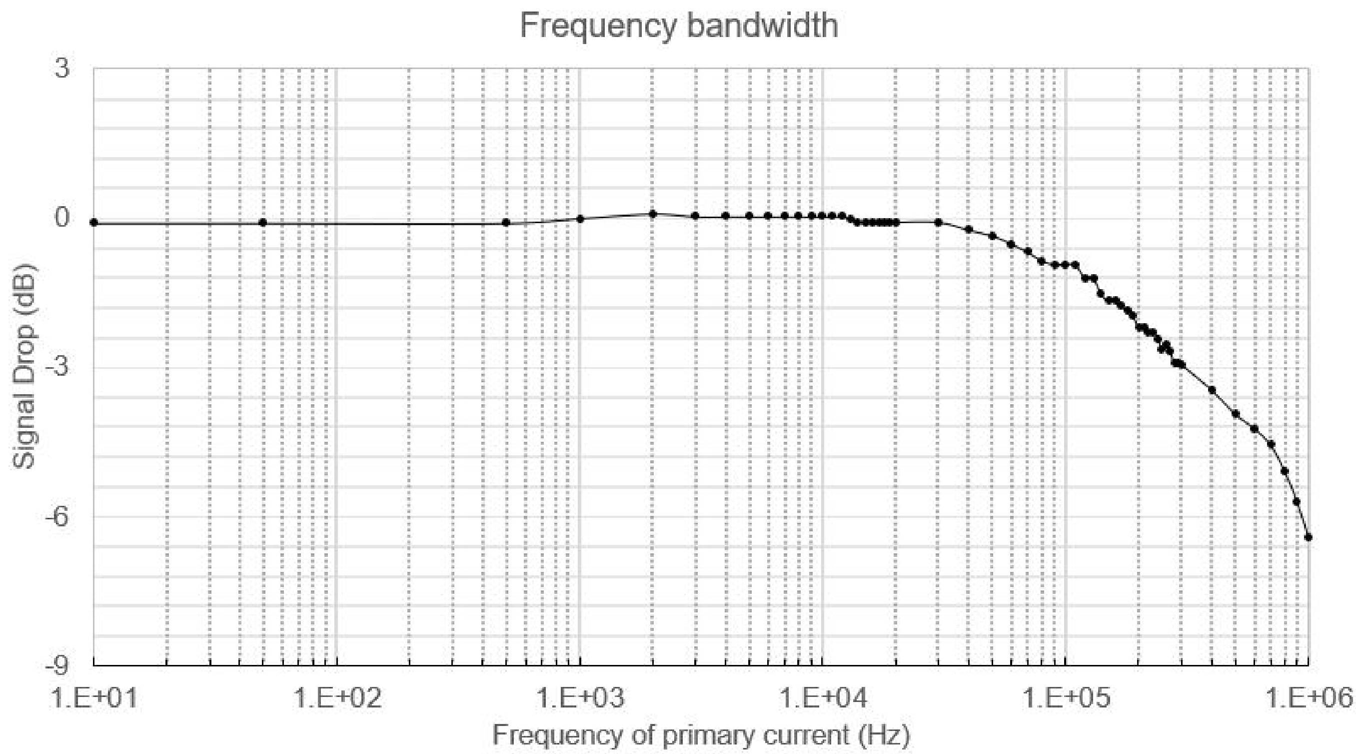
7. Pin definition for product

PIN	Symbol	Description
1	IP+	Primary conductor pin (+)
2	IP-	Primary conductor pin (-)
3	Fault	Over current detection alarm output, the pin is open leakage output. Normally, the output of fault pin is high level.
4	VCC	Power supply pin
5	Vref	Reference pin, output function
6	VOUT	Sensor output pin
7	NC	NC
8	Fault	Over current detection alarm output, the pin is open leakage output. Normally, the output of fault pin is high level.
9	GND	Ground terminal
10	OCD	Over current detection threshold input pin

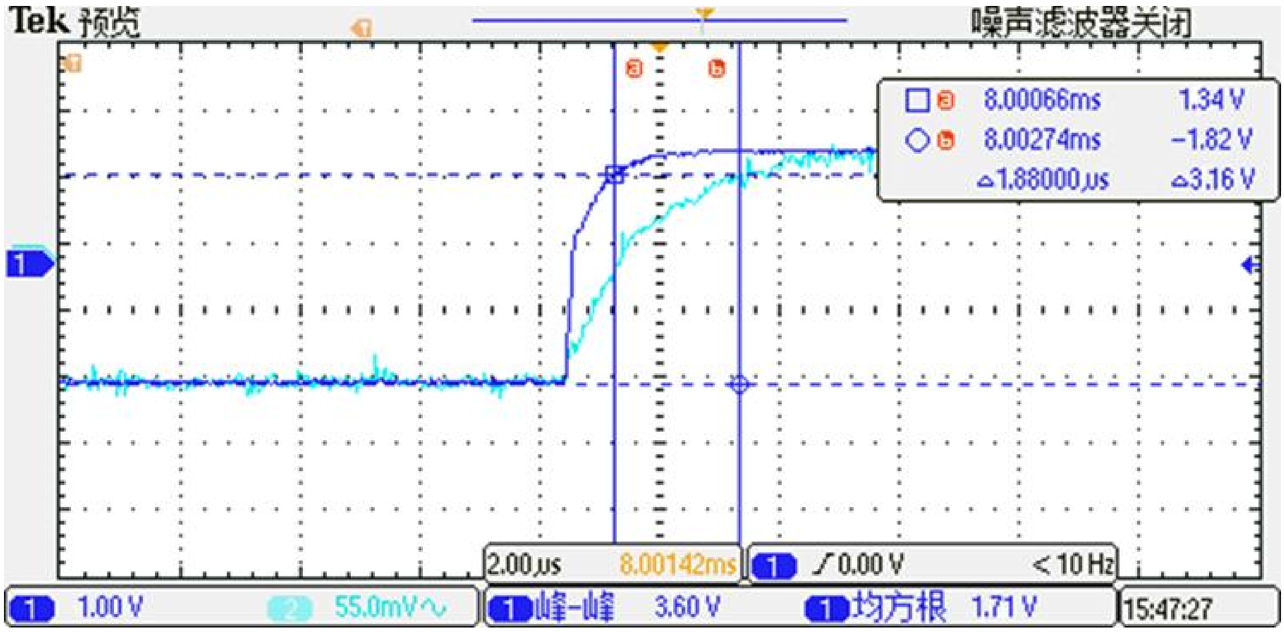
8. PCB layout recommendation



9. Frequency bandwidth

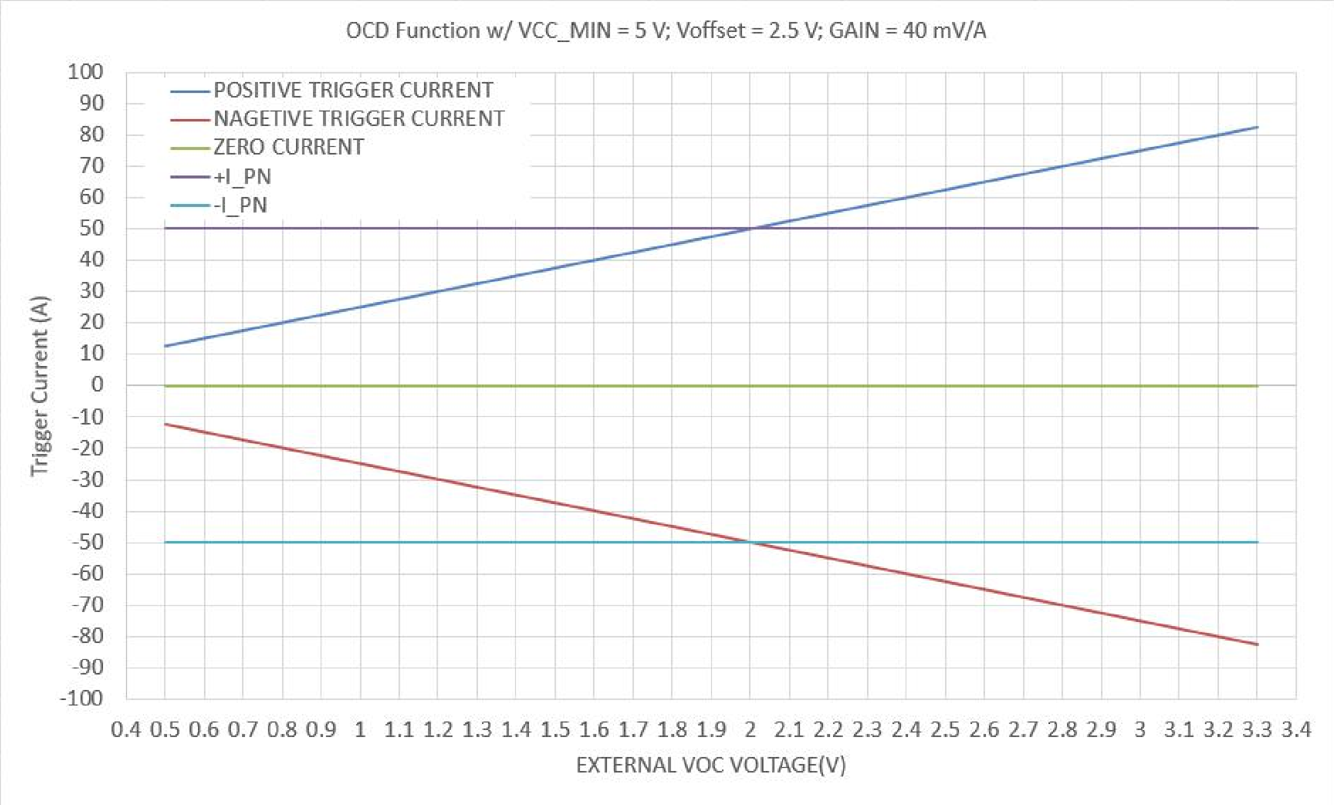


10. Step response time



The typical frequency response of STK-616H current sensor. The response time from 90% of the primary current (blue) to 90% of the secondary output (green) is 2μs.

11. Examples of OCD function



OCD function for STK-616H-20GB

12. General information on OCD

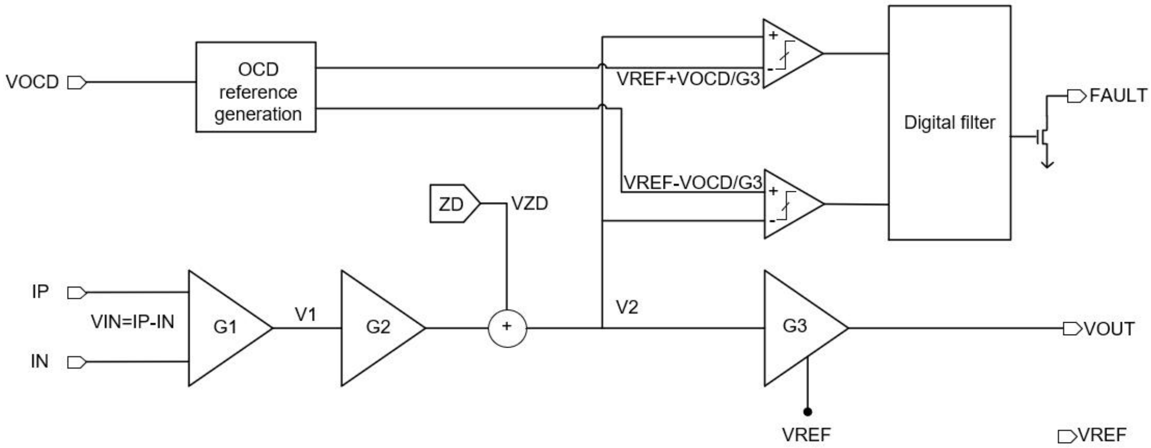
This section describes the general information on OCD function, the specific functions, which are not listed in the section of “electrical data”, can be defined per request.

Since the trigger voltage is set after the second amplifier, the OCD function supports that the trigger current can be higher than I_pn. The trigger voltage can be defined:

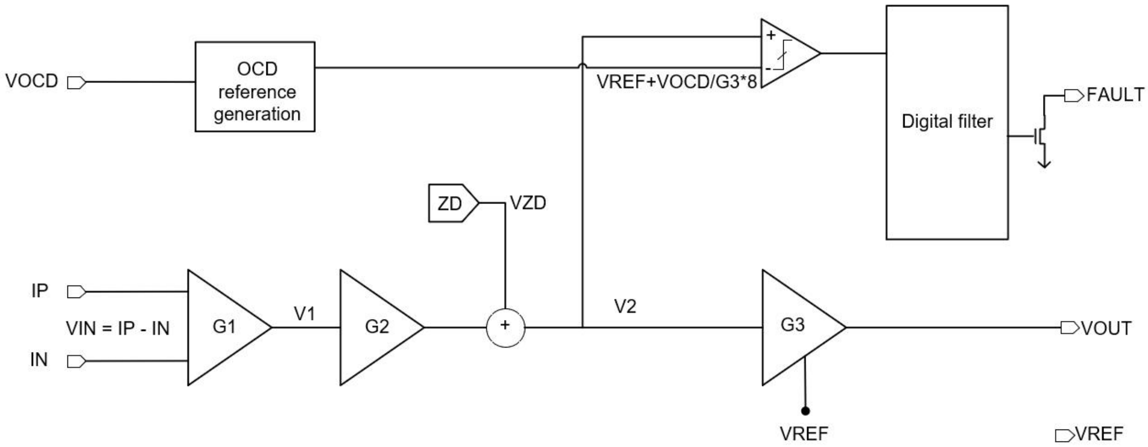
a) Vref = 2.5 V
   ①. 0.5 V ≦ VOC ≦ Vcc – 1.7 V;
   ②. Trigger voltage = Vref +/- VOC;
   ③. Trigger current = (Vref +/- VOC -Voff) / G_th;

b) Vref = 1.65 V
   ①. 0.3 V ≦ VOC ≦ Vcc – 1.7 V;
   ②. Trigger voltage = Vref +/- VOC;
   ③. Trigger current = (Vref +/- VOC -Voff) / G_th

c) Vref = 0.5 V
   ①. 0.2 V ≦ VOC ≦ 0.5 V;
   ②. Trigger voltage = Vref + 8*VOC;
   ③. Trigger current = (Vref + VOC -Voff) / G_th



Functional Block Diagram on OCD function when Vref = 2.5 V



Functional Block Diagram on OCD function when Vref = 0.5 V

With the above definition, below shows the relationship between trigger voltage and the setting of Vcc, VOC.