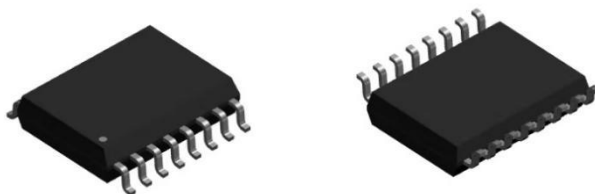


Current Sensor

Product Series: STK-616HM

Part number: STK-616H-10MLB5
STK-616H-20MLB5
STK-616H-30MLB5

Version: Ver1.3



Sinomags Technology Co., Ltd

Web site: www.sinomags.com

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

General parameter

Parameter	Symbol	Unit	Value
Working temperature	T_A	°C	-40 ~ 125
Storage temperature	Htg	°C	-40 ~ 125
Mass	m	g	0.5

Absolute maximum rating

Parameter	Symbol	Unit	Value
Supply voltage	V _{cc}	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.

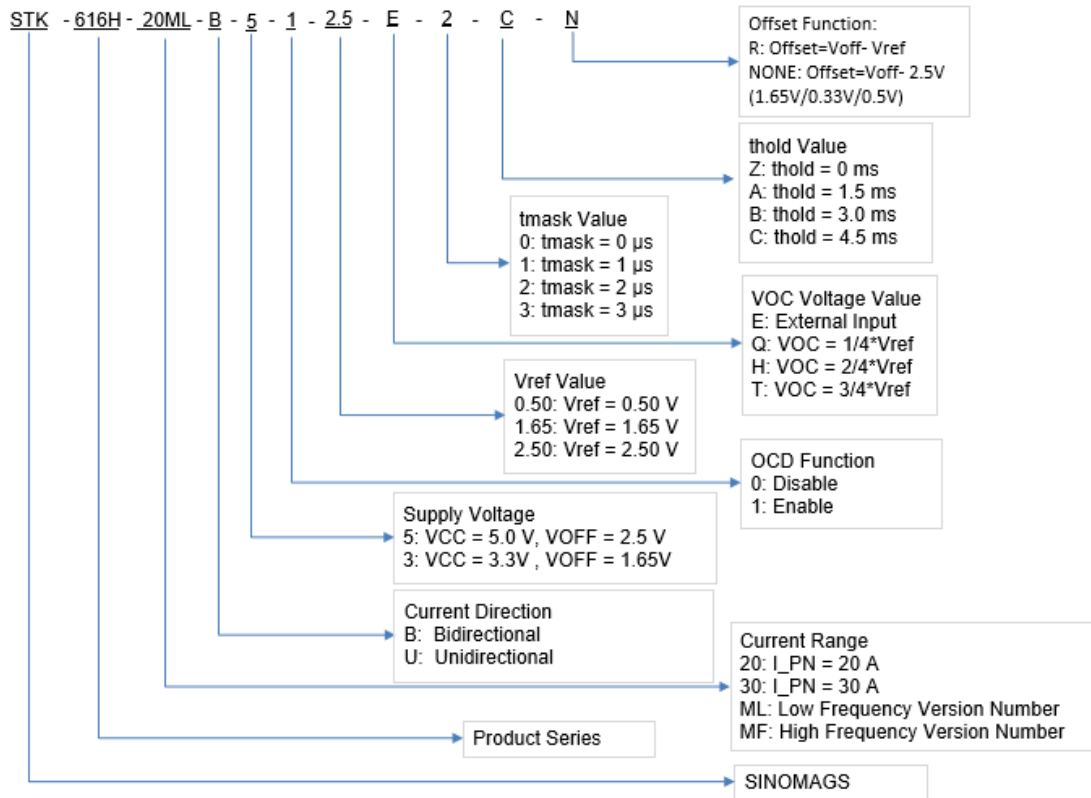
Isolation parameter

Parameter	Symbol	Unit	Value	Comment
RMS voltage for AC test 50Hz/1 min	U _d	kV	3.6	
Impulse withstand voltage 1.2/50μs	Ū _w	kV	6	
Clearance distance (pri. -sec)	d _{Cl}	mm	8	Determined by customer's layout
Creepage distance (pri. -sec)	d _{Cp}	mm	8	

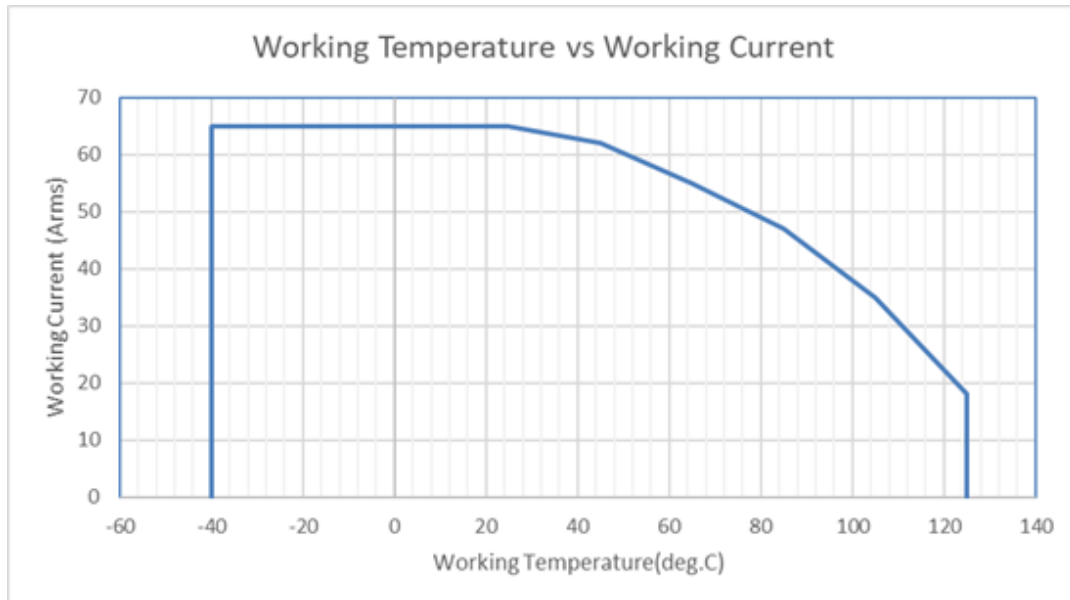
Measuring current table

Product	Optimized Range I _{pn} (A)	Sensitivity, (mV/A)	T(°C)
STK-616H-10MLB5-1-2.5-E-2-A-N	±10A	80	-40 ~ 125
STK-616H-20MLB5-1-2.5-E-2-C-N	±20 A	40	-40 ~ 125
STK-616H-30MLB5-1-2.5-E-2-C-N	±30 A	26.67	-40 ~ 125

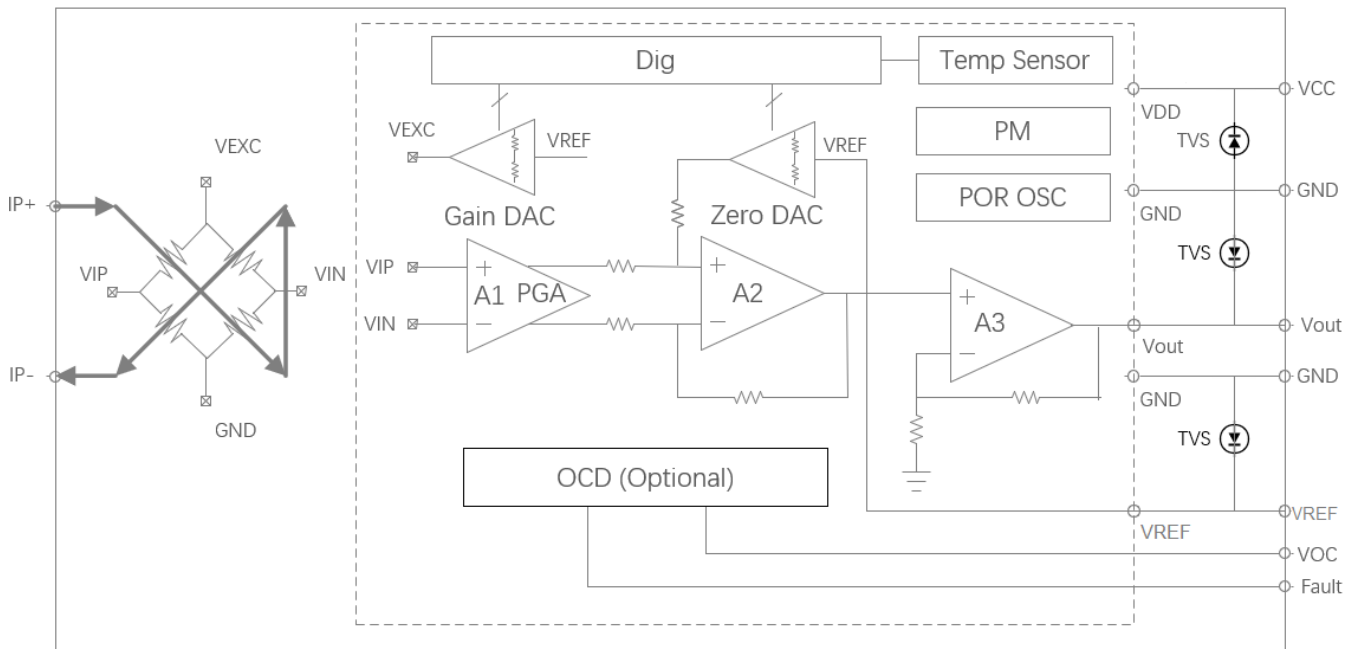
2. Part number definition



3. Temperature vs Current



4. Functional Block Diagram

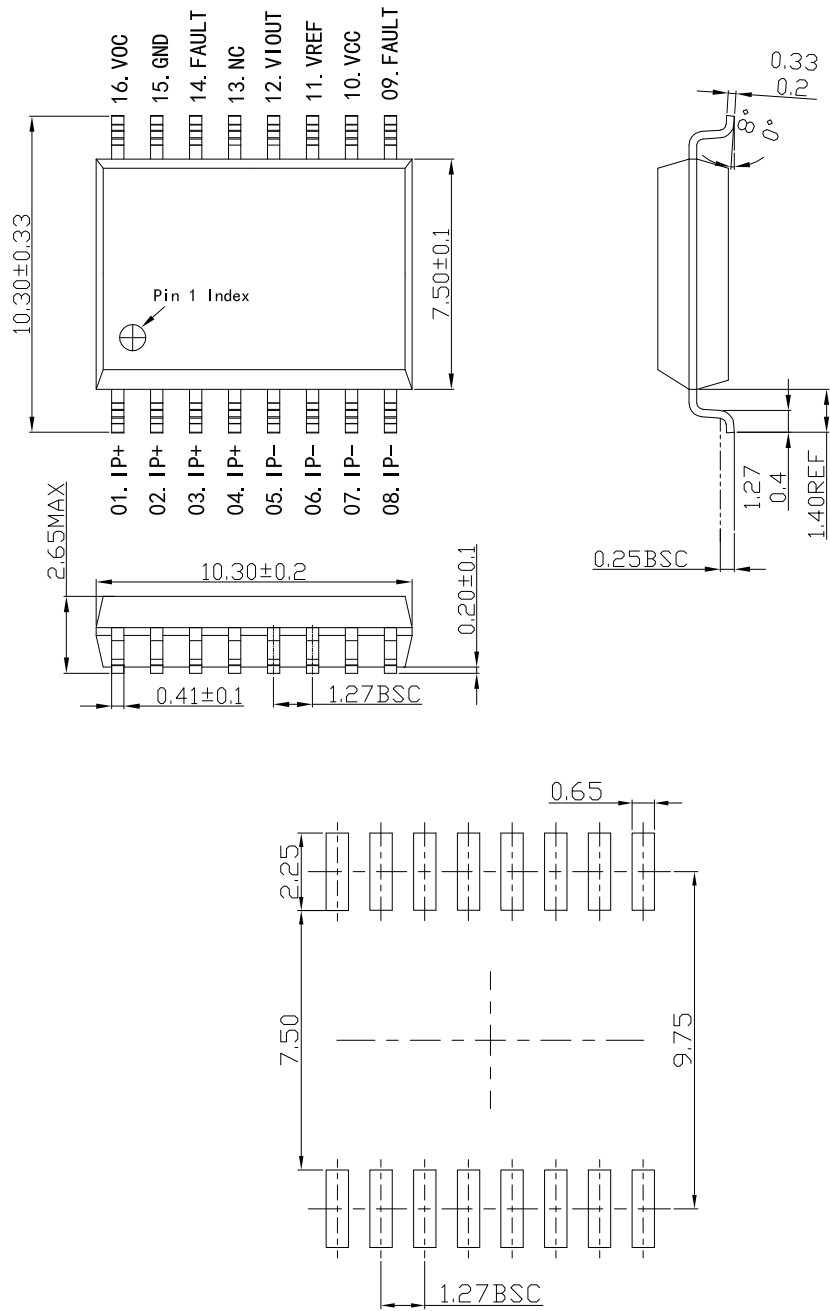


5. Electrical data STK-616H-xxMLB5

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

Parameter	Symbol	Unit	Min	Typ	Max	Comment
General parameters						
Primary nominal current	I _{pn}	A	-10		10	STK-616H-10MLB5
			-20		20	STK-616H-20MLB5
			-30		30	STK-616H-30MLB5
Primary current, measuring range	I _{pm}	A	-25		25	STK-616H-10MLB5
			-50		50	STK-616H-20MLB5
			-75		75	STK-616H-30MLB5
Supply voltage	V _{cc}	V	4.5	5	5.5	
Current consumption	I _{cc}	mA		7	12	
Primary conductor resistance	R _{IP}	mΩ		0.85		
Quiescent voltage@0A	V _{off}	V	2.45	2.5	2.55	
Reference voltage	V _{ref}	V	2.45	2.5	2.55	
Electrical offset voltage	Offset	mV		±10		V _{off} - V _{ref}
Output Specifications	R _{out}	Ω	1		30	
	R _{ref}		1		80	
Theoretical gain	G _{th}	mV/A		80		STK-616H-10MLB5
				40		STK-616H-20MLB5
				26.67		STK-616H-30MLB5
OCD function (if applicable)						
OCD range	V _{OC}	V	0.5		3.3	
FOULT error		%		5%		% of OCD
OCD Hysteresis	I _{HYS}	%		10%		% of OCD
OCD Fault Mask	t _{mask}	μs		2		0, 1, 2, 3 μs
OCD Fault Mask error	T _{mask_error}	ns		125		
OCD Fault Hold Time	t _{hold}	ms		4.5		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		0.9		@90% of I _{pn}
Frequency bandwidth	BW	kHz		600		@-3dB
Output voltage noise	V _{noise}	mV _{pp}		10		
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 V _{off}	V _{off_T}	mV		±15		
Total Accuracy	X_TRange	% I _{pn}		±3.5		

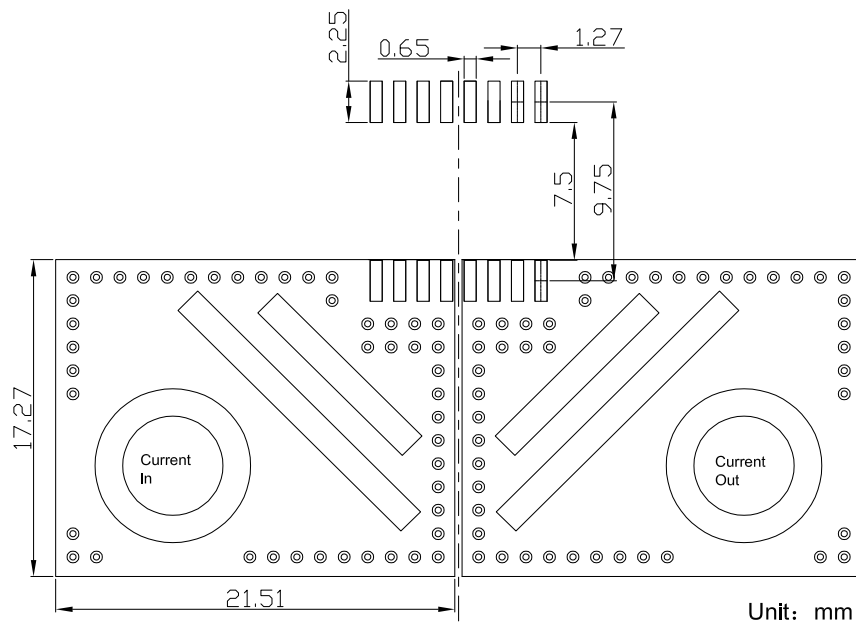
6. Dimension of STK-616HM



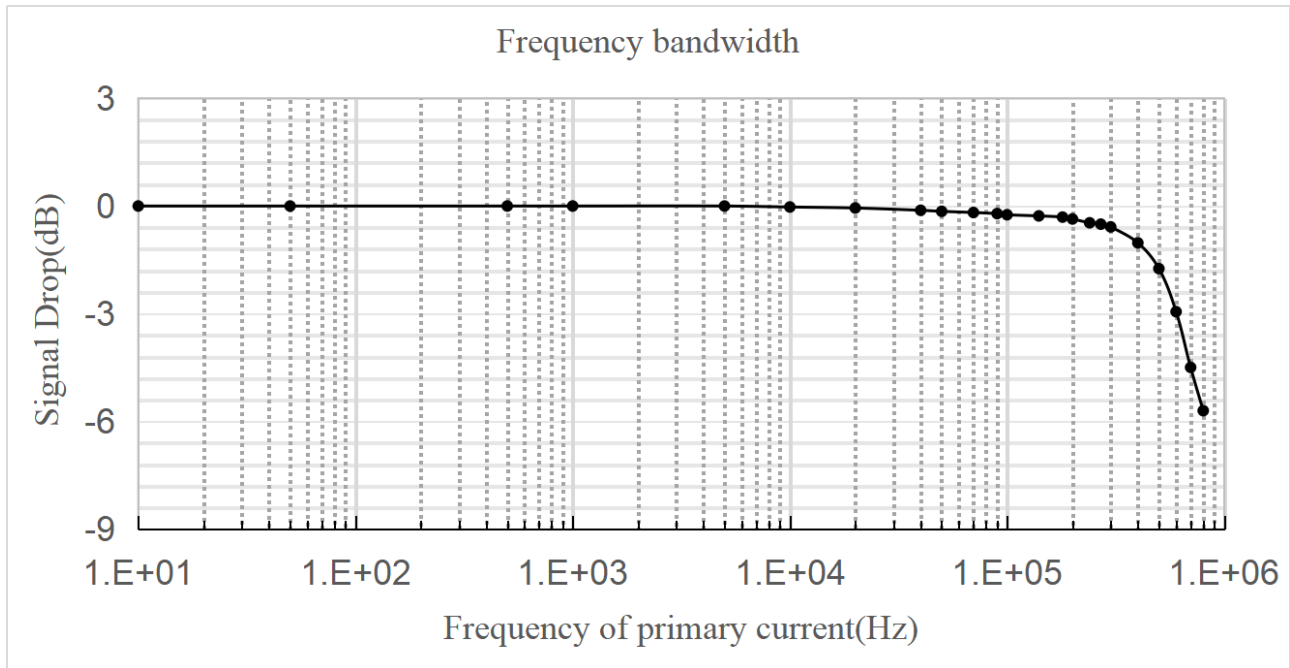
7. Pin definition for product

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

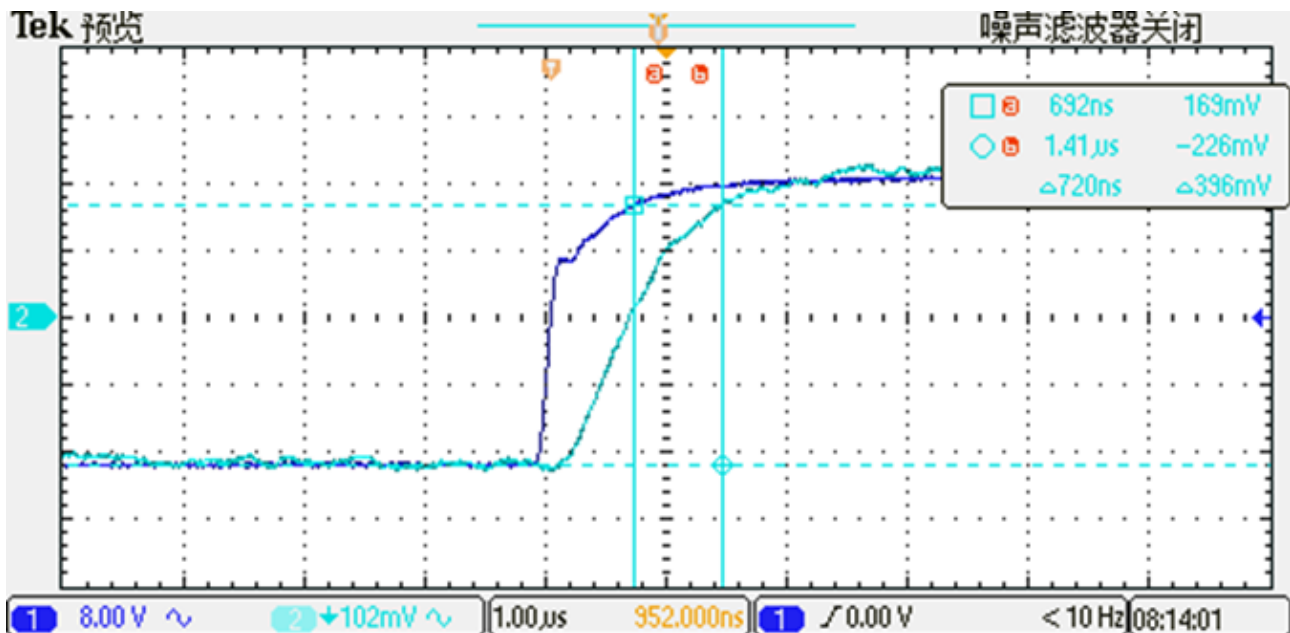
8. PCB layout recommendation



9. Frequency bandwidth

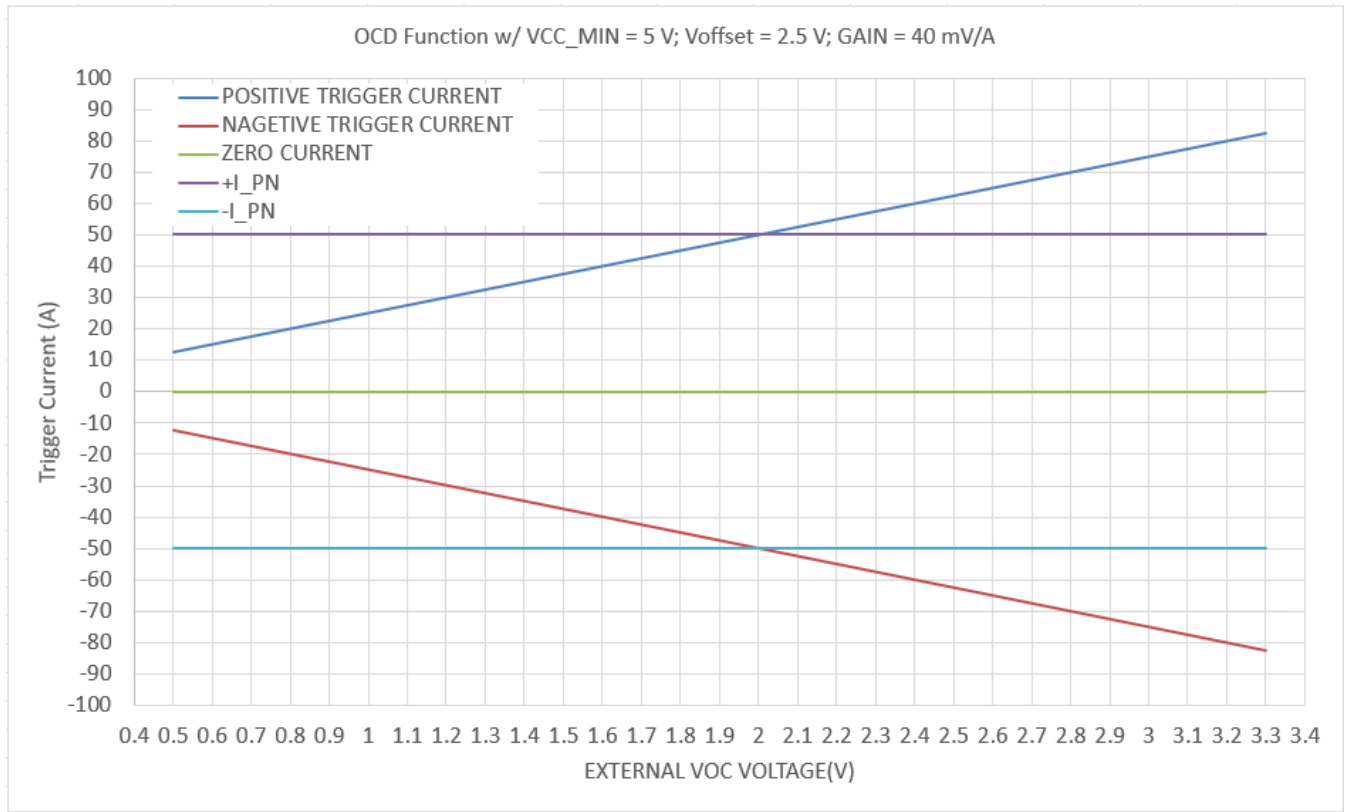


10. Step response time



The typical frequency response of STK-616HM current sensor. The response time from 90% of the primary current (blue) to 90% of the secondary output (green) is 0.9 μs.

11. Examples of OCD function



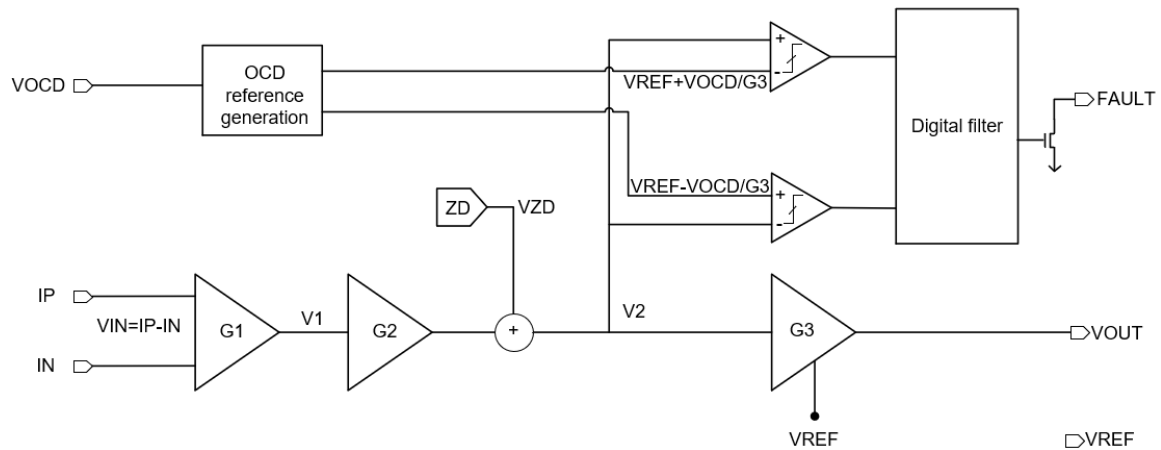
OCD function for STK-616H-20MLB5

12. General information on OCD

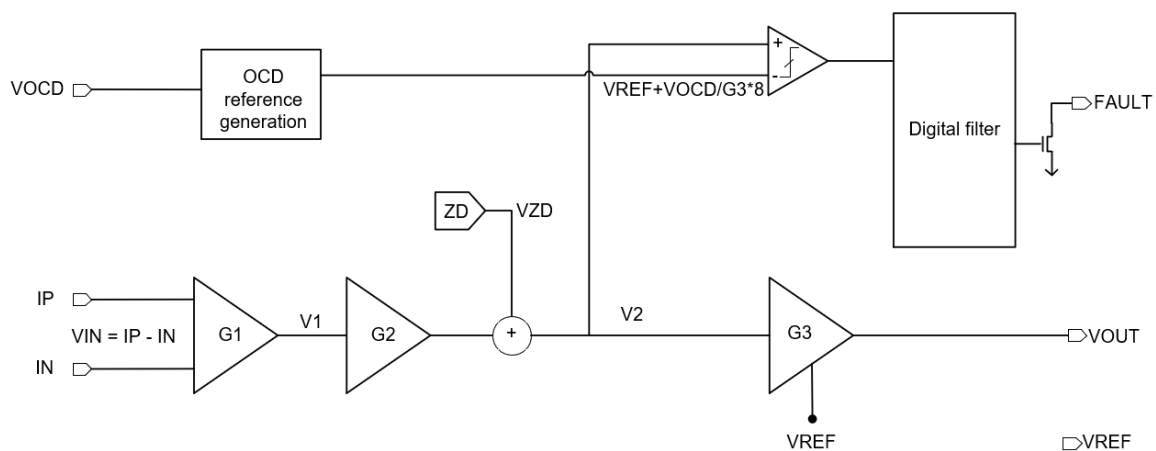
This section describes the general information on OCD function, the specific functions, which are not listed in the section of “electrical data”, can be defined per request.

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) $V_{ref} = 2.5 \text{ V}$
 - ①. $0.5 \text{ V} \leq \text{VOC} \leq V_{cc} - 1.7 \text{ V}$;
 - ②. Trigger voltage = $V_{ref} \pm \text{VOC}$;
 - ③. Trigger current = $(V_{ref} \pm \text{VOC} - V_{off}) / G_{th}$;
- b) $V_{ref} = 1.65 \text{ V}$
 - ①. $0.3 \text{ V} \leq \text{VOC} \leq V_{cc} - 1.7 \text{ V}$;
 - ②. Trigger voltage = $V_{ref} \pm \text{VOC}$;
 - ③. Trigger current = $(V_{ref} \pm \text{VOC} - V_{off}) / G_{th}$
- c) $V_{ref} = 0.5 \text{ V}$
 - ①. $0.2 \text{ V} \leq \text{VOC} \leq 0.5 \text{ V}$;
 - ②. Trigger voltage = $V_{ref} + 8 \times \text{VOC}$;
 - ③. Trigger current = $(V_{ref} + \text{VOC} - V_{off}) / G_{th}$



Functional Block Diagram on OCD function when $V_{ref} = 2.5\text{ V}$



Functional Block Diagram on OCD function when $V_{ref} = 0.5\text{ V}$

With the above definition, below shows the relationship between trigger voltage and the setting of V_{cc} , VOC .

