

CURRENT SENSOR

PRODUCT SERIES: STK-HO

STK-HO-60

PRODUCT PARNUMBER: STK-HO-120

STK-HO-150

REVISION: Ver 1.8



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1. Description

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

Typical application

- AC Variable speed drives
- Power supplies for welding applications
- Switched model power supplies (SMPS)
- UPS
- MPPT
- Static converters for DC motor drives

General parameters

Parameter	Symbol	Unit	Value
Working temperature	T _a	C°	-40 ~ 105
Storage temperature	T _{stg}	C°	-40 ~ 105
Mass	m	g	39.7

Absolute parameters

Parameters	Symbol	Unit	Value
Supply voltage (not-destructive)	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	U _d	kV	4	@ 50Hz/1 min
Impulse withstand voltage	U _w	kV	8	1.2/50μs
Case material			V0	According to UL 94
Comparative tracking index	CTI	V	600	
Clearance (pri. - sec.)	D _{ci}	mm	11.6	Shortest distance through air
Creepage distance (pri. - sec.)	D _{cp}	mm	11.6	When mounted on PCB with recommended layout

2. Electrical performance of STK-HO

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

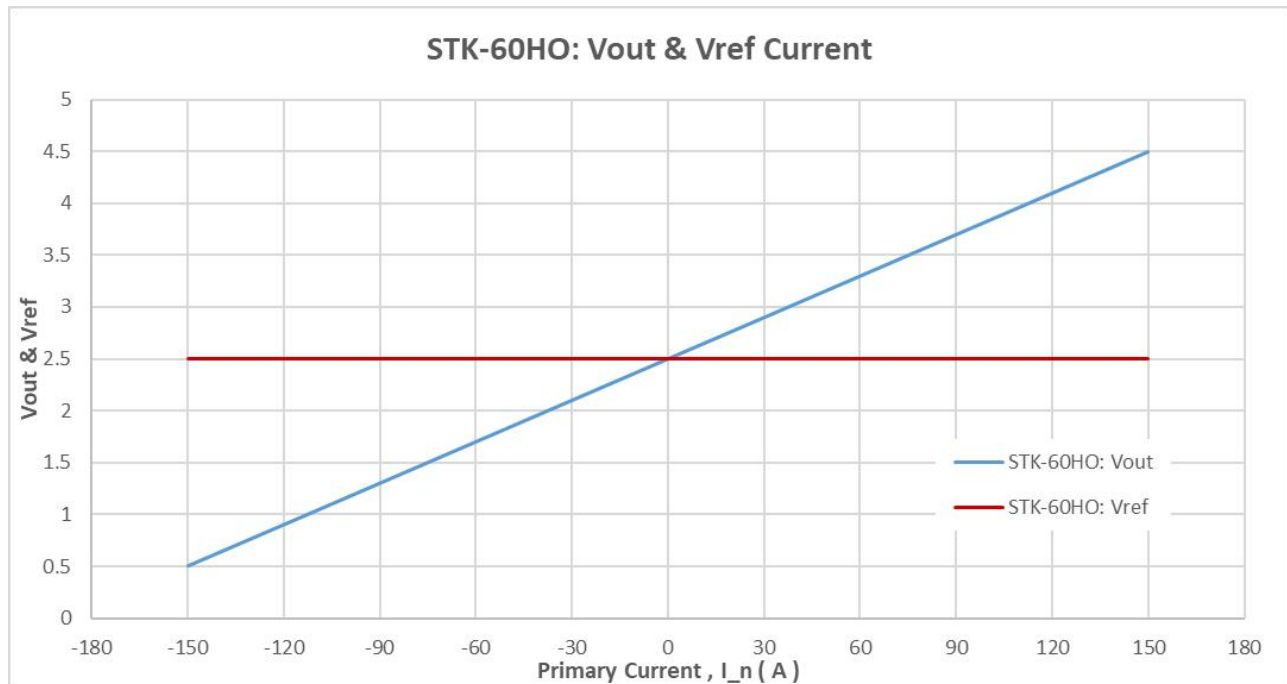
Parameter	Symbol	Unit	Min	Typ	Max	Comment
Primary nominal current rms	I_{pn}	A		60		STK-HO-60
				120		STK-HO-120
				150		STK-HO-150
Primary current measuring range	I_{pm}	A	-150		150	STK-HO-60
			-300		300	STK-HO-120
			-375		375	STK-HO-150
Supply voltage	V_{CC}	V	4.75	5	5.25	
Current consumption	I_{CC}	mA		6	10	
Reference voltage	V_{ref}	V	2.48	2.5	2.52	Output function
Quiescent voltage $V_{out} @ 0\text{ A}$	V_{off}	V	2.48	2.5	2.52	
Electrical offset voltage ($V_{out} - V_{ref}$) @ 0 A	V_{oe}	mV	-5		5	
Rated output voltage ($(V_{out} - V_{ref}) @ I_{pm}$) - V_{oe}	V_{FS}	V	-2		2	
Internal series resistance of reference voltage	R_{ref}	Ω	0	69	200	Series
Internal output resistance	R_{out}	Ω		75		Series
OCD output mask time	T_{mask}	μs		2		
OCD output hold time	T_{hold}	ms		1.5		
Theoretical gain	G	mV/A		13.333		STK-HO-60
				6.667		STK-HO-120
				5.333		STK-HO-150
Rated linearity error	$Non-L_{pn}$	% I_{pn}		0.5		Within $\pm I_{pn}$
Step response time	t_{res}	μs		2	2.5	@ 90% of I_{pn}
Frequency bandwidth (-3dB)	BW	kHz		200		No RC circuit
Output voltage noise	V_{noise}	mVpp		4.4		@140kHz Sampling Rate
Primary current, detection threshold ①	I_{pth}	A		2.93* I_{pn}		overcurrent detection OCD
Accuracy @ 25°C	X	% of I_{pn}	-1.5		1.5	@ 25°C
Accuracy @ $-40^\circ\text{C} \sim 105^\circ\text{C}$ ②	X_{TRange}	% of I_{pn}	-3		3	$-40^\circ\text{C} \sim 105^\circ\text{C}$

Remarks :

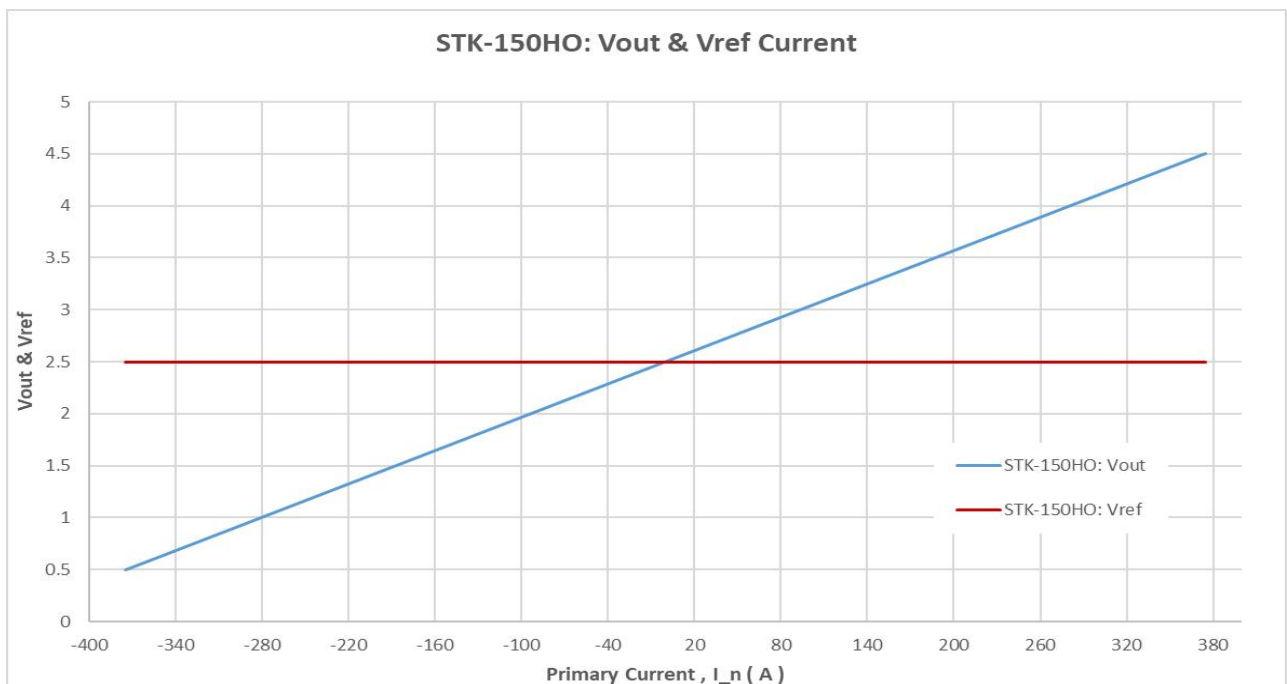
①. HO products may be ordered on request with a dedicated setting of the Trigger current . The product has a built-in overcurrent detection function, When the output voltage detected by the product exceeds the threshold, it is judged to be overcurrent and the output of fault pin changes to low level .

②. the accuracy @ $-40^{\circ}\text{C}\sim 105^{\circ}\text{C}$, $X_{T\text{Range}} = (((V_{\text{out}} - V_{\text{ref}}) @ I_n @ T_x) - V_{\text{oe}} @ 25^{\circ}\text{C} - G_{\text{th}} * I_n) / V_{\text{FS}}$, where T_x represents present temperature, G_{th} is fitted gain at room temperature .

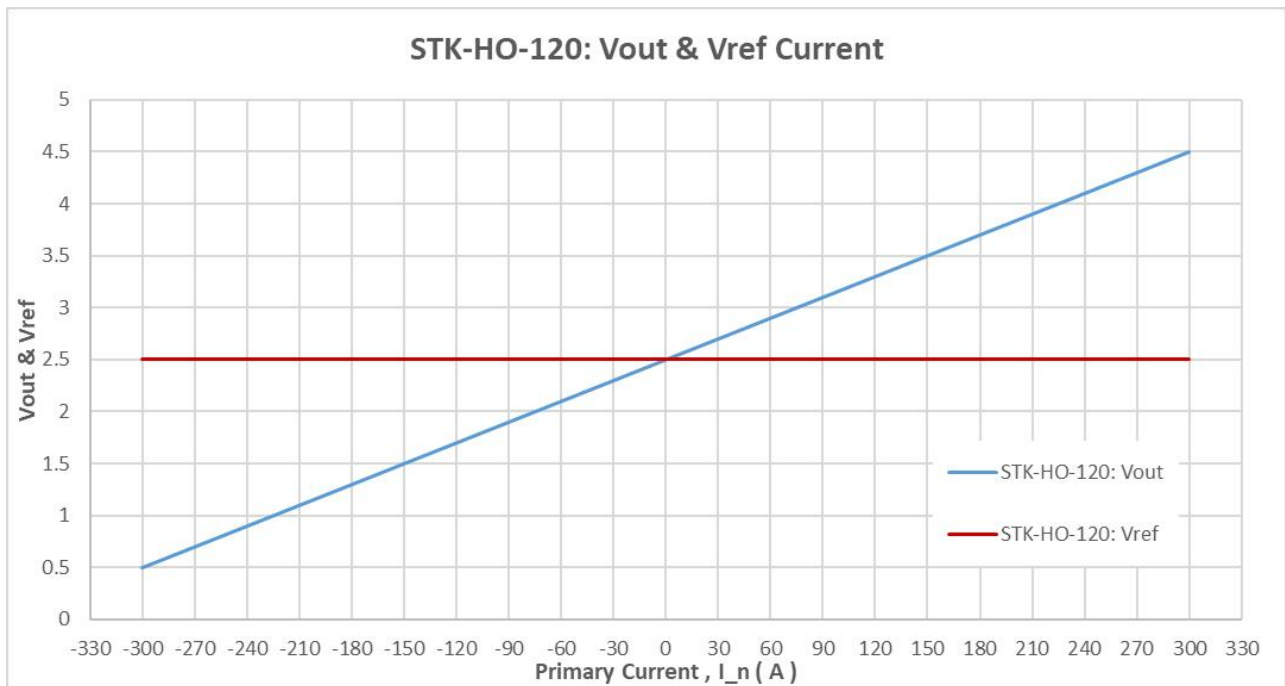
3. Output voltage VS primary current of STK-HO



The dependence of Vout&Vref of STK-60HO on the primary current.

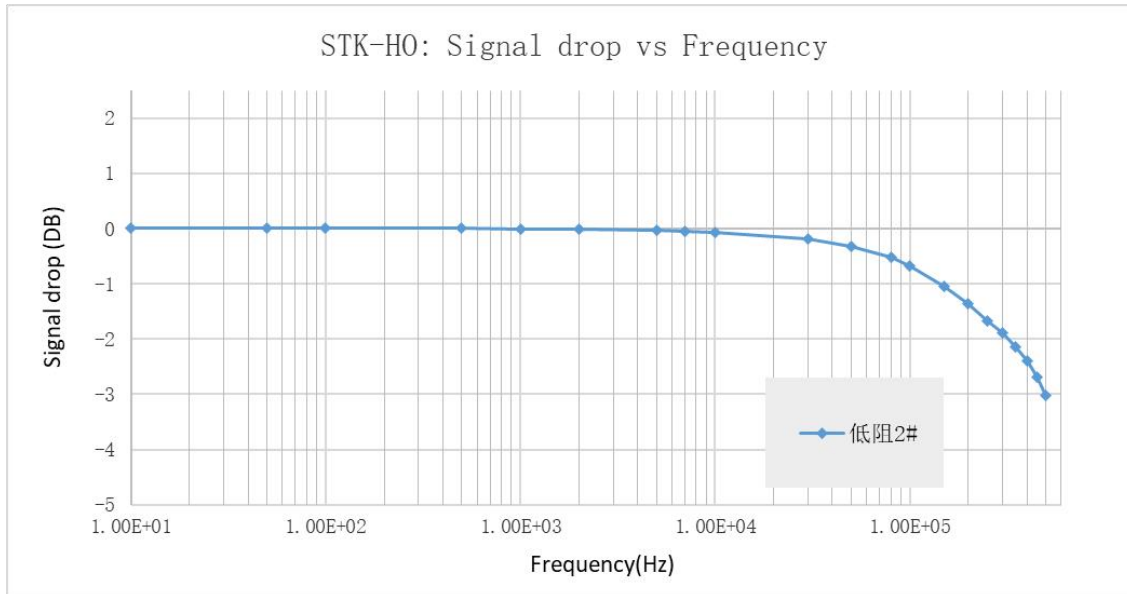


The dependence of Vout&Vref of STK-150HO on the primary current.



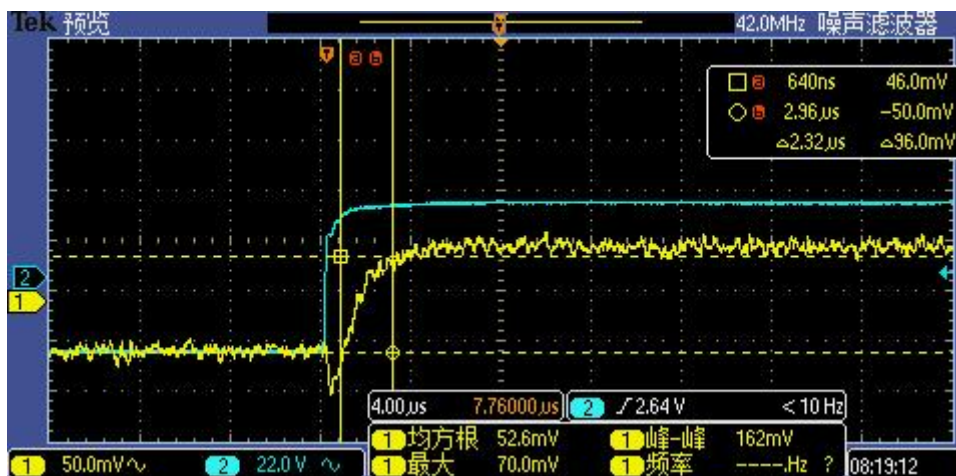
The dependence of Vout&Vref of STK-120HO on the primary current.

4. Frequency bandwidth



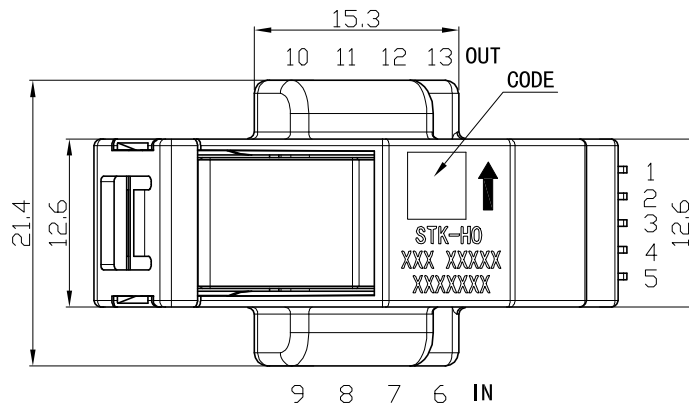
The frequency band width of STK-HO series current sensors.

5. Step response time

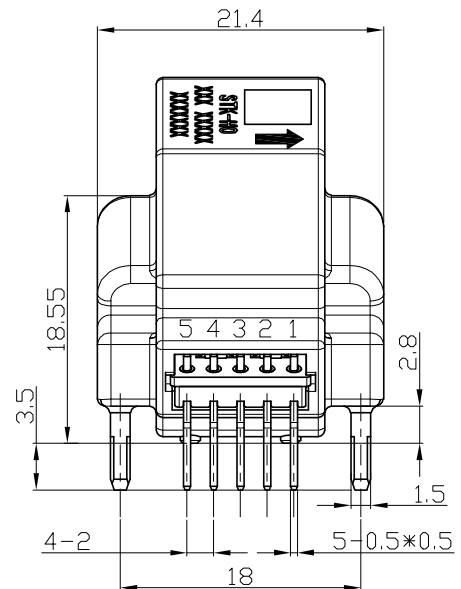
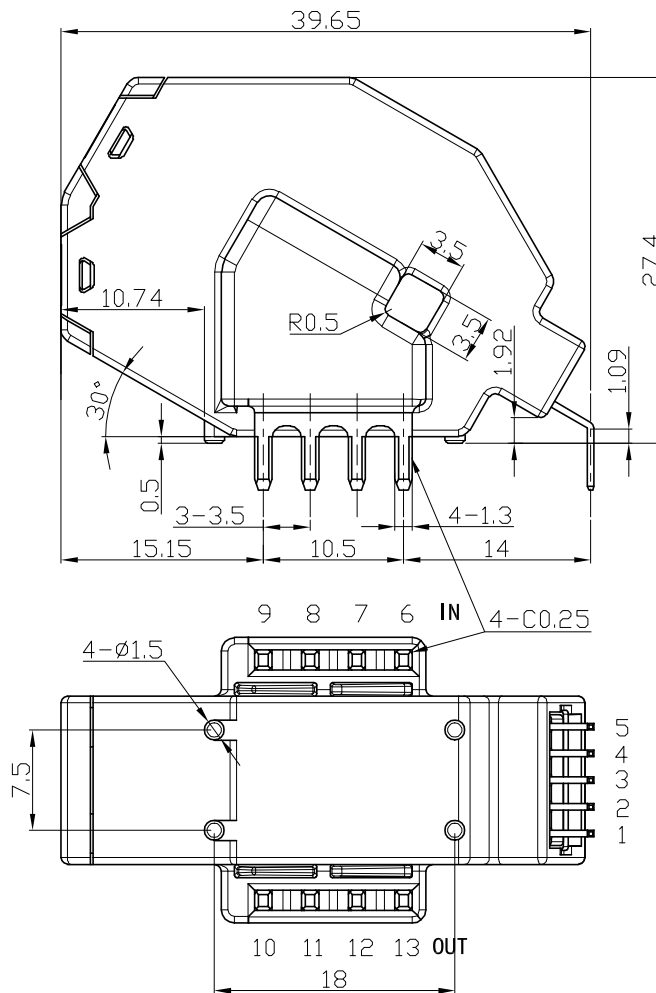
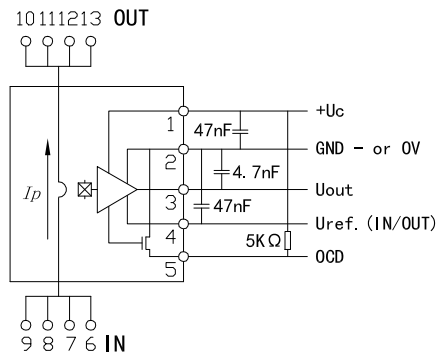


The step response time of STK-HO current sensors. The dark light blue is primary current, while the light blue is output signal of current sensor. The step response time is about 2 μs.

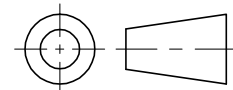
6. Dimensions & Pins & Footprint

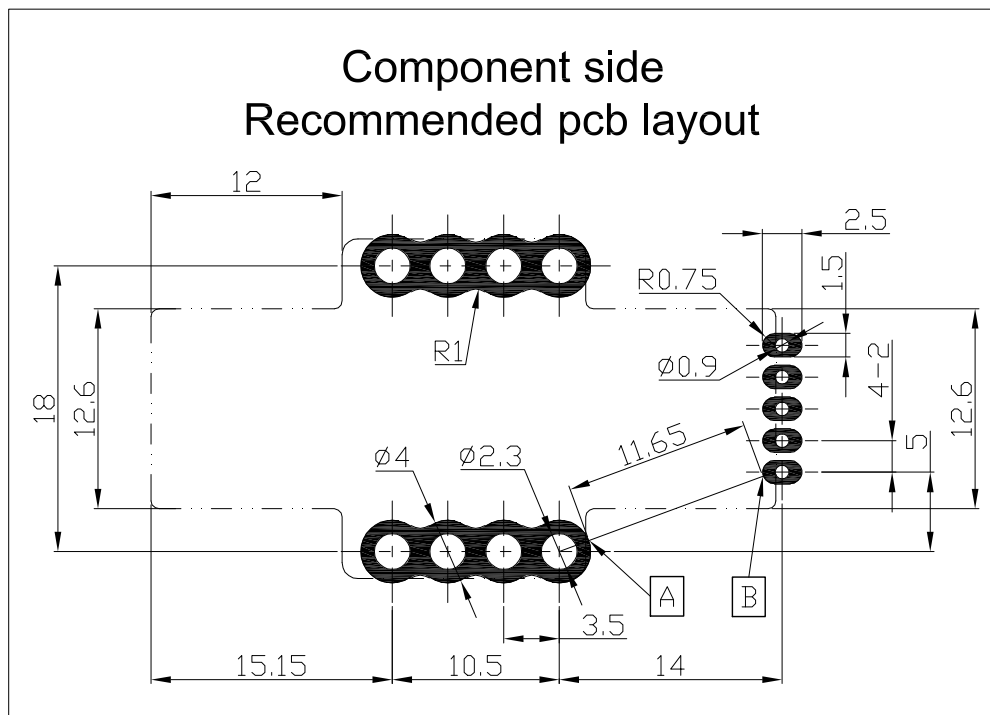


Connection



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



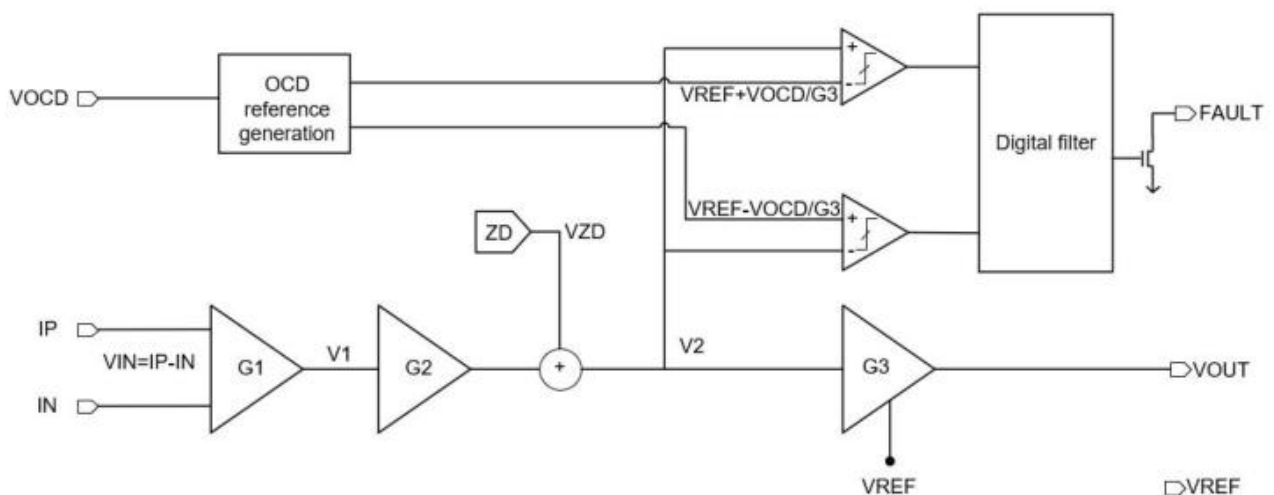


7. General information on OCD

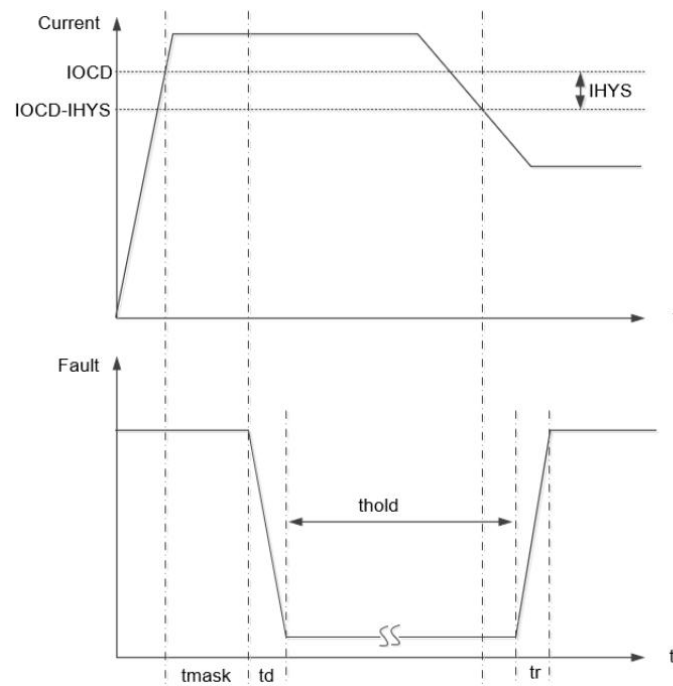
This section describes the general information on OCD function, the specific functions, which are not listed in the section of “electrical data”, can be defined per request.

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) $V_{ref} = 2.5 \text{ V}$
- b) $0.5 \text{ V} \leq V_{OC} \leq V_{ref}$;
- c) Trigger voltage = $V_{ref} \pm V_{OC}$;
- d) Trigger current = $(V_{ref} \pm V_{OC} - V_{off}) / G_{th}$;



Functional Block Diagram on OCD function when Vref = 2.5 V



The above plot shows the definition on the time in OCD function. The typical value for tmask & thold is that tmask = 2 μ s , and thold = 1.5ms . The overcurrent detection function can also set tmask and thold time:

a)

Tmask:set	Value
1	0 μ s
2	1 μ s
3	2 μ s
4	3 μ s

Thold:set	Value
1	0ms
2	1.5ms
3	3ms
4	4.5ms