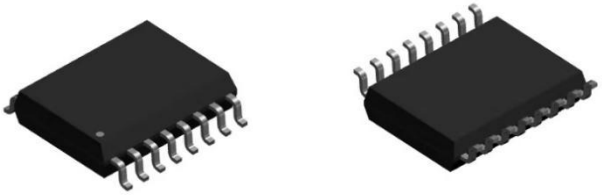
Current Sensor

Product Series: STK-616TMWD

Part number:
STK-616T-20MWDB5
STK-616T-40MWDB5
STK-616T-50MWDB5
STK-616T-65MWDB5
STK-616T-20MWDB3
STK-616T-40MWDB3
STK-616T-65MWDB3

Version: Ver 1.5



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CONTENT

1. Description

The STK-616TM series current sensor is based on TMR (magneto resistance) 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
- AC/DC, DC/DC power supplies
- Switched model power supplies (SMPS)

General parameter

Parameter	Symbol	Unit	Value
Working temperature	T_A	℃	-40 ~ 125
Storage temperature	T_stg	℃	-40 ~ 125
Mass	m	g	0.5

Absolute maximum rating

Parameter	Symbol	Unit	Value
Supply voltage	Vcc	V	6
ESD rating（HBM）	U_ESD	kV	8
Junction temperature	T_J	℃	150

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	5	
Impulse withstand voltage 1.2/50μs	Ûw	kV	6	
Clearance distance (pri. -sec)	Dci	mm	8	Determined by customer's layout
Creepage distance (pri. -sec)	Dcp	mm	8	

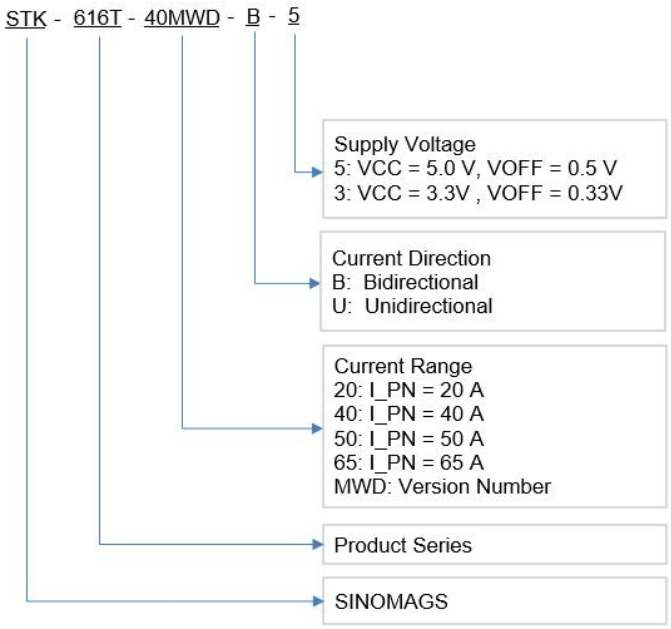
Measuring current table

Product	VOUT	Meas. Range I_pn (A)	Sensitivity (mV/A)	Vcc (V)	T (℃)
STK-616T-20MWDB3	VOUT1	±20A	66	3.3	-40 ~ 125
	VOUT2	±1A	1000	3.3	-40 ~ 125
STK-616T-33MWDB3	VOUT1	±33.3A	39.6	3.3	-40 ~ 125
	VOUT2	±1A	1000	3.3	-40 ~ 125
STK-616T-40MWDB3	VOUT1	±40A	33	3.3	-40 ~ 125
	VOUT2	±1A	1000	3.3	-40 ~ 125
STK-616T-65MWDB3	VOUT1	±65A	20.3	3.3	-40 ~ 125
	VOUT2	±1A	1000	3.3	-40 ~ 125

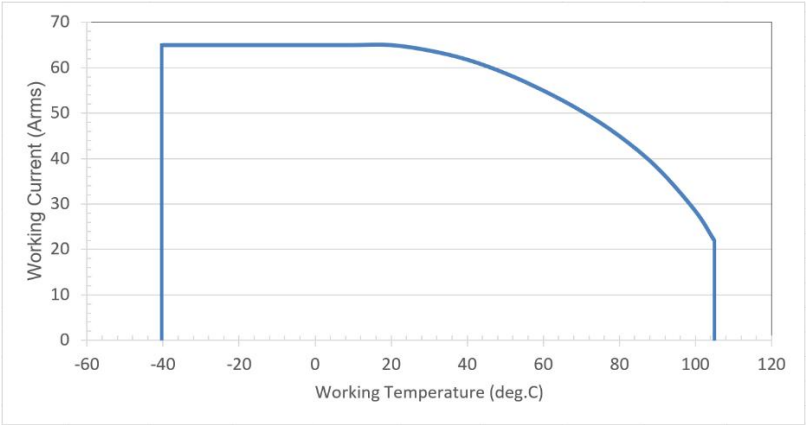
STK-616T-40MWDB5	VOUT1	±40A	50	5	-40 ~ 125
	VOUT2	±1A	1000	5	-40 ~ 125
STK-616T-50MWDB5	VOUT1	±50A	40	5	-40 ~ 125
	VOUT2	±1A	1000	5	-40 ~ 125
STK-616T-65MWDB5	VOUT1	±65A	30.8	5	-40 ~ 125
	VOUT2	±1A	1000	5	-40 ~ 125
STK-616T-20MWDB5	VOUT1	±20A	100	5	-40 ~ 125
	VOUT2	±1A	1000	5	-40 ~ 125

Remark: At present, VOUT2 is mainly used for arc current detection, which mainly detects AC signals after capacitance isolation. VOUT1 is used for normal working current detection and can detect AC and DC signals.

2. Part number definition



3. Temperature vs Current



4. Electrical data STK-616T-XXMWDB5

Condition：T_A = 25℃, Vcc = 5 V

Parameter	Symbol	Unit	Min	Typ	Max	Comment(VOUT1)
General parameters						
Primary nominal current	I_pn	A	-20		20	STK-616T-20MWDB5
			-40		40	STK-616T-40MWDB5
			-50		50	STK-616T-50MWDB5
			-65		65	STK-616T-65MWDB5
Supply voltage	Vcc	V	4.5	5	5.5	
Current consumption	Icc	mA		7	12	
Primary conductor resistance	R_IP	mΩ		0.85		
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		100		STK-616T-20MWDB5
				50		STK-616T-40MWDB5
				40		STK-616T-50MWDB5
				30.8		STK-616T-65MWDB5
Accuracy performance						
Rate dlinearity error@25℃	Non-L	%I_pn		±1.5		±I_pn
Step response time	t_res	μs		0.2		@90% of I_pn STK-616T-XXMWDBX
Frequency bandwidth	BW	MHz		0.6		@-3dB STK-616T-XXMWDBX
Output voltage noise	Vnoise	mVpp		10		@1.4 MHz, VOUT1 STK-616T-XXMWDBX
Accuracy @ 25℃	X	% I_pn		±1.5		@ 0.5*I_pn,Vout1
Thermal drift of G_th	GAIN_T	% G_th		±1.5		@ -40~105℃ drift related to the value @25℃
Thermal drift of Voff	Voff_T	mV		±15		
Total Accuracy	X_TRange	% I_pn		±3.5		@VOUT1

Condition：T_A = 25℃, Vcc = 5 V

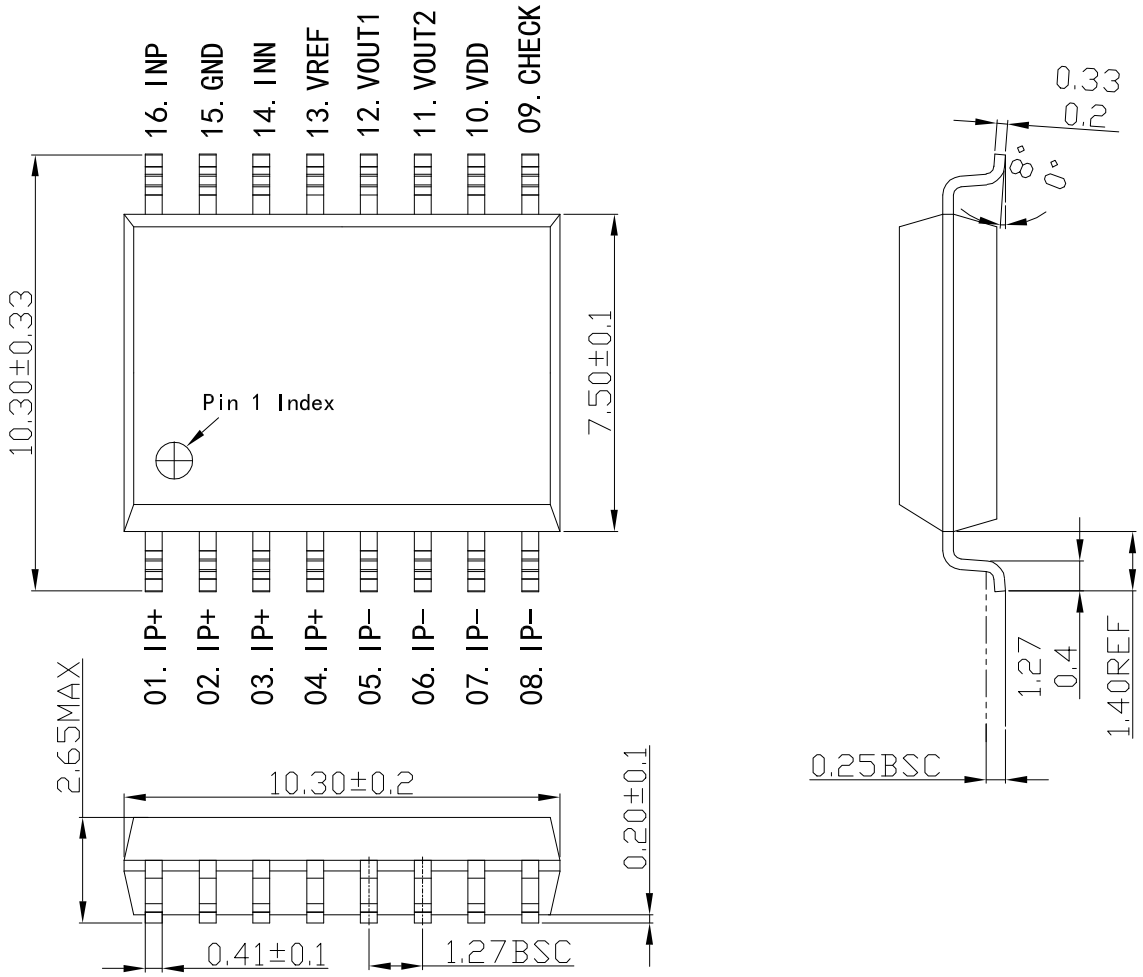
Parameter	Symbol	Unit	Min	Typ	Max	Comment(VOUT2)
General parameters						
Primary nominal current	I_pn	A	-1		1	STK-616T-XXMWDB5
Supply voltage	Vcc	V	4.5	5	5.5	
Current consumption	Icc	mA		7	12	
Primary conductor resistance	R_IP	mΩ		0.85		
Quiescent voltage@0A	Voff	V	2.45	2.5	2.55	
Reference voltage	Vref	V	2.45	2.5	2.55	
Electrical offset voltage	Offset	mV		±100		
Output Specifications	R_out	Ω	1		30	
Theoretical gain	G_th	mV/A		1000		STK-616T-XXXMWDB5 (VOUT2)
Self-checking circuit	V_{out2}/I_{check}	mV/mA	3.5		4	STK-616T-XXXMWDB5 (VOUT2)
Accuracy performance						
Rated linearity error@25℃	Non-L	%I_pn		±1.5		±I_pn
Step response time	t_res	μs		0.2		@90% of I_pn STK-616T-XXMWDBX
Frequency bandwidth	BW	MHz		0.6		@-3dB STK-616T-XXMWDBX
Output voltage noise	Vnoise	mVpp		100		@1.4 MHz, VOUT2 STK-616T-XXMWDBX
Accuracy @ 25℃	X	% I_pn		±3		@ 0.5*I_pn,Vout2
Thermal drift of G_th	GAIN_T	% G_th		±3		@ -40~105℃ drift related to the value @25℃
Thermal drift of Voff	Voff_T	mV		±50		
Total Accuracy	X_TRange	% I_pn		±6		@VOUT2

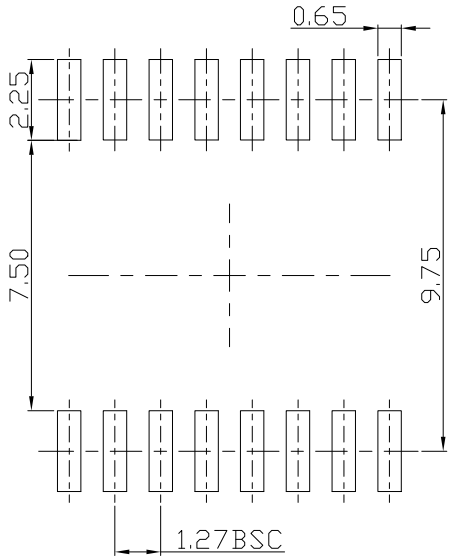
5. Electrical data STK-616T-XXMWDB3

Condition：T_A = 25℃, Vcc = 3.3 V

Parameter	Symbol	Unit	Min	Typ	Max	Comment(VOUT1)
General parameters						
Primary nominal current	I_pn	A	-33		33	STK-616T-33MWDB3
			-20		20	STK-616T-20MWDB3
			-40		40	STK-616T-40MWDB3
			-65		65	STK-616T-65MWDB3
Supply voltage	Vcc	V	3.15	3.3	3.45	
Current consumption	Icc	mA		7	12	
Primary conductor resistance	R_IP	mΩ		0.85		
Quiescent voltage@0A	Voff	V	1.6	1.65	1.7	
Reference voltage	Vref	V	1.6	1.65	1.7	
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		39.6		STK-616T-33MWDB3
				66		STK-616T-20MWDB3
				33		STK-616T-40MWDB3
				20.3		STK-616T-65MWDB3
Accuracy performance						
Rated linearity error@25℃	Non-L	%I_pn		±1.5		±I_pn
Step response time	t_res	μs		0.2		@90% of I_pn STK-616T-XXMWDBX
Frequency bandwidth	BW	MHz		0.6		@-3dB STK-616T-XXMWDBX
Output voltage noise	Vnoise	mVpp		10		@1.4 MHz, VOUT1 STK-616T-XXMWDBX
Accuracy @ 25℃	X	% I_pn		±1.5		@ 0.5*I_pn,Vout1
Thermal drift of G_th	GAIN_T	% G_th		±1.5		@ -40~105℃ drift related to the value @25℃
Thermal drift of Voff	Voff_T	mV		±15		
Total Accuracy	X_TRange	% I_pn		±3.5		@VOUT1

6. Dimension & Pin definitions





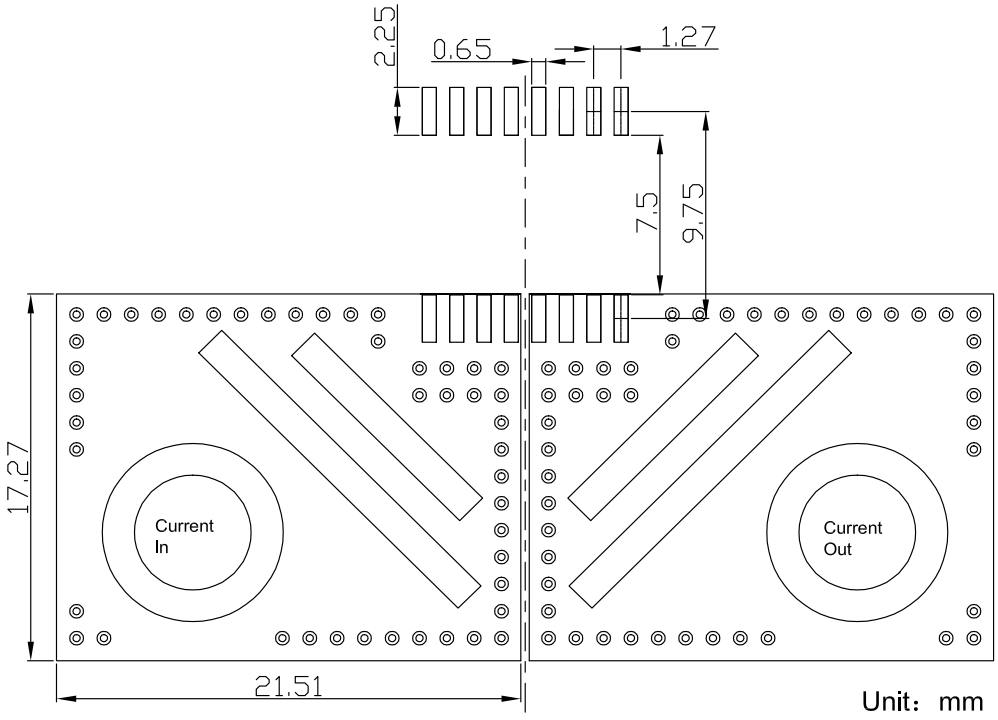
PCB Layout Reference View

7. Pin definitions

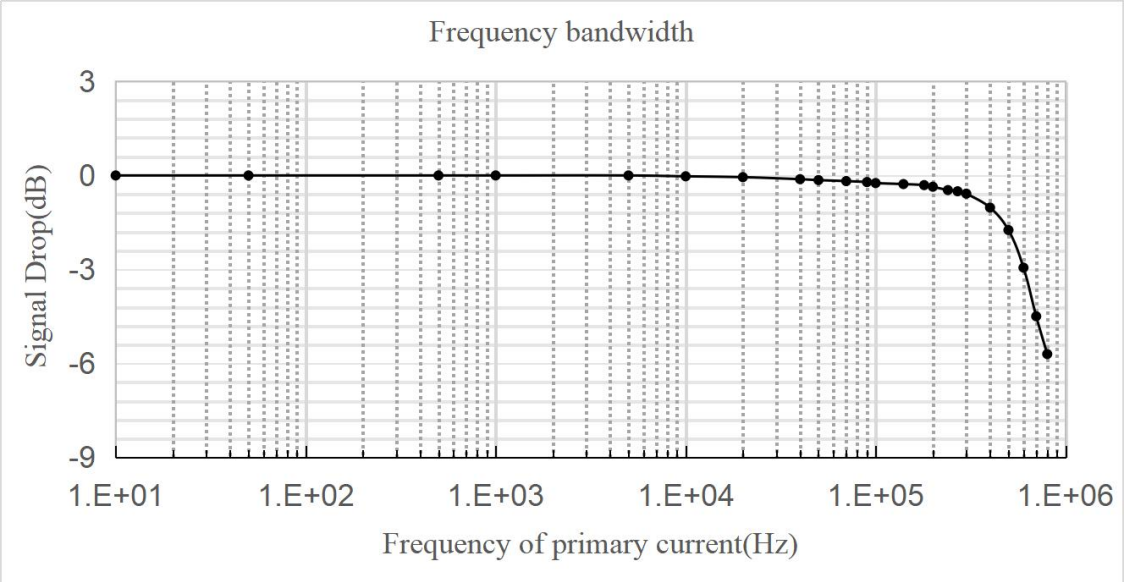
Pin definition for product

PIN	Symbol	Description
1,2,3,4	IP+	Primary conductor pin (+)
5,6,7,8	IP-	Primary conductor pin (-)
9	CHECK	Sensor self-check pin
10	VDD	Power supply pin
11	VOUT2	Sensor output pin
12	VOUT1	Sensor output pin
13	VREF	Reference pin, output function
14	INN	Signal input pin
15	GND	Ground pin (GND)
16	INP	Signal input pin

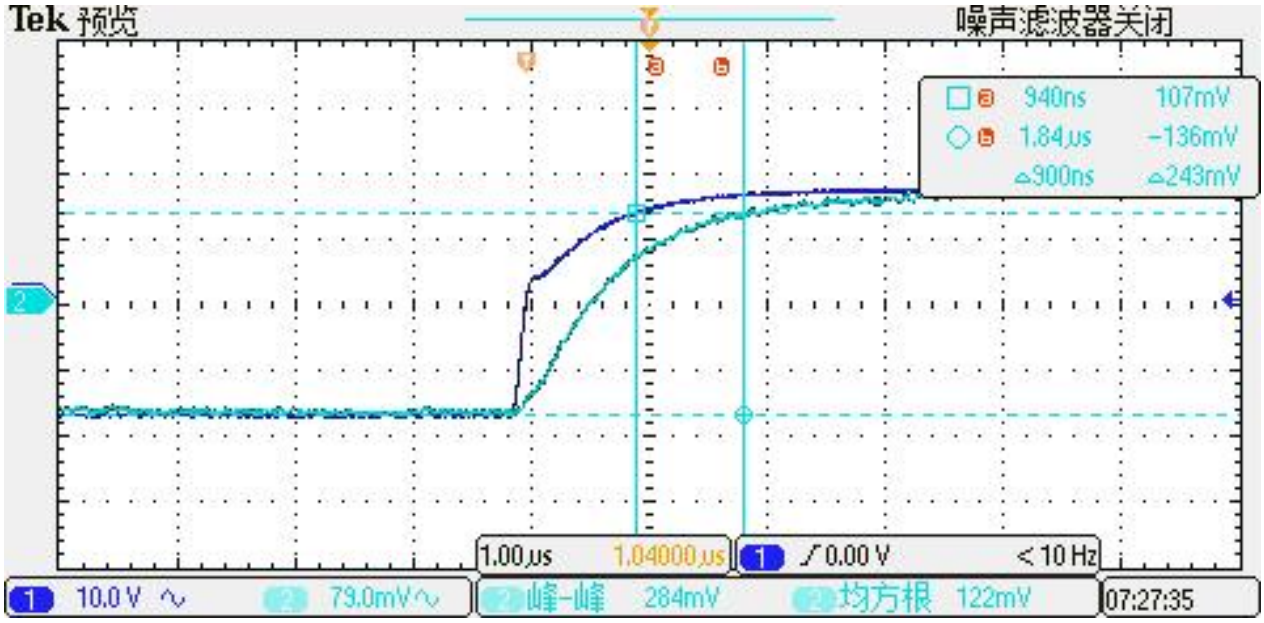
8. PCB layout recommendation



9. Frequency bandwidth of STK-616T-XXMWDBX

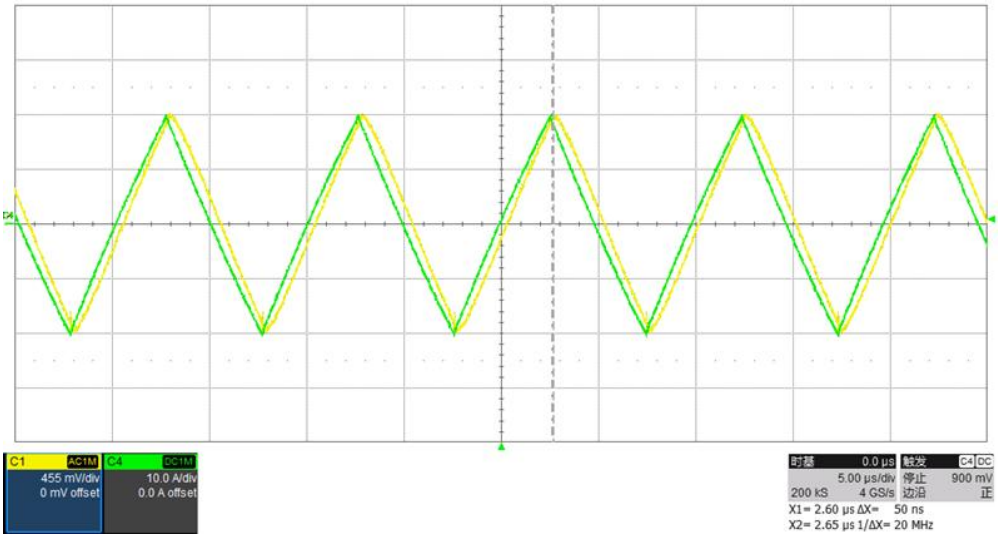


10. Step response time of STK-616T-XXMWDBX

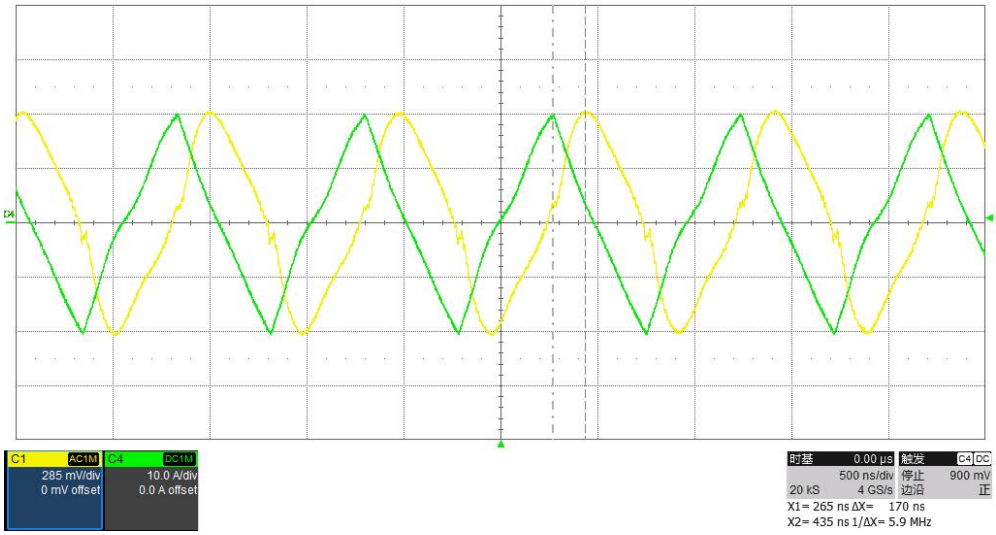


The typical high frequency response of STK-616TMWD current sensor. The response time from 90% of the primary current to 90% of the secondary output is 0.2 μs.

11. The delay time of Triangular Wave

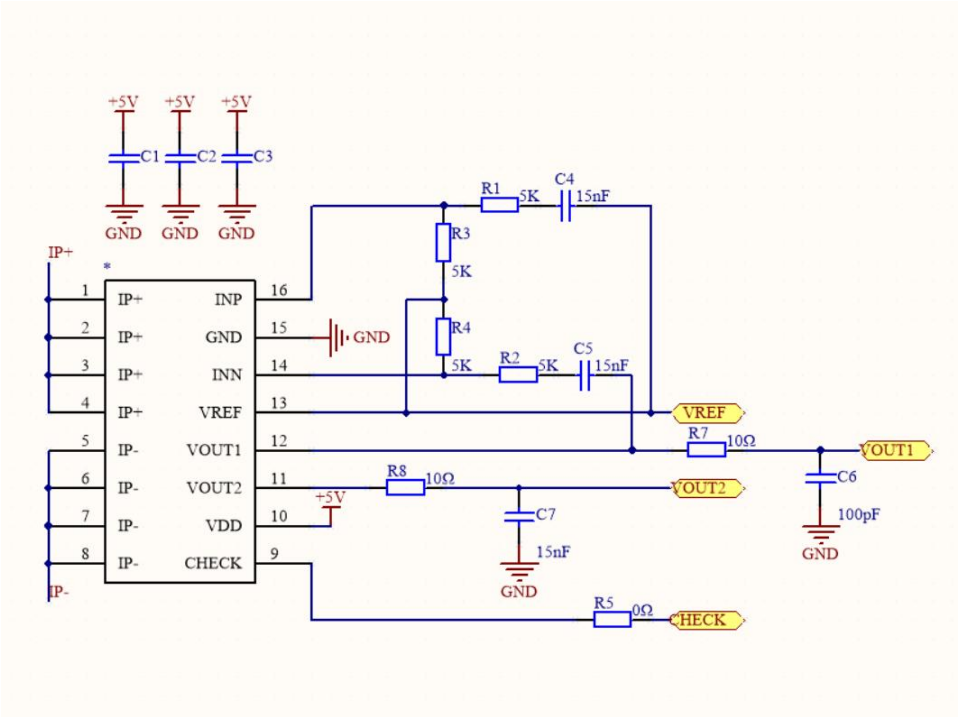


100 kHz Triangular delay---0.2 µs



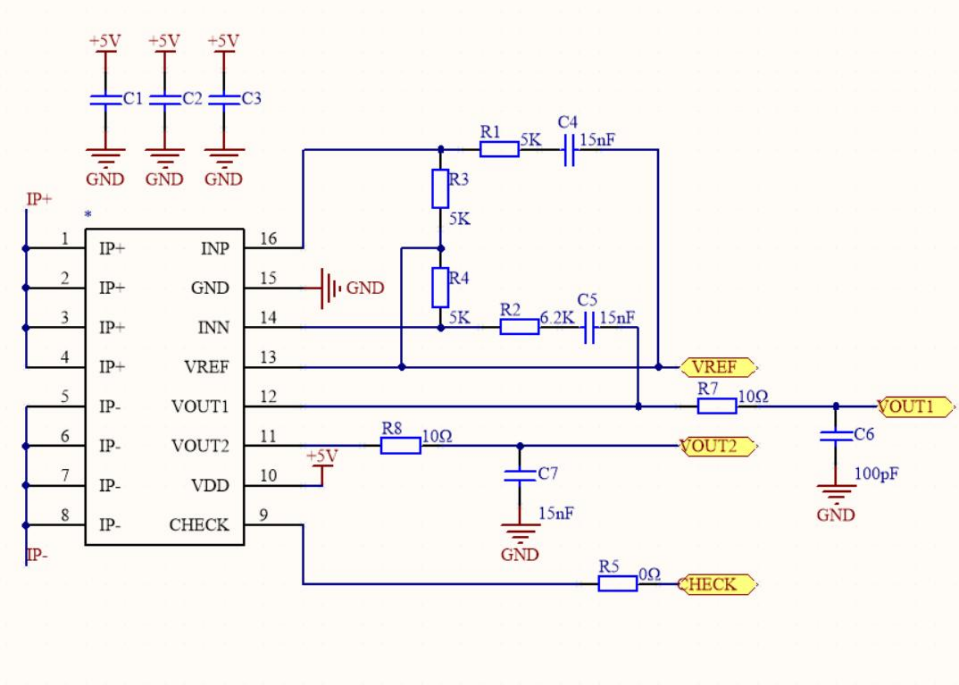
1 MHz Triangular delay---0.2 µs

12. Typical Application of STK-616T-50MWD



Recommended circuit	C4 C5	R1 R2	Low frequency cutoff frequency	Frequency bandwidth@-3dB
1	33nF	5k	500 Hz	400 kHz
2	15nF	5k	1 kHz	
3	6.8nF	5k	2 kHz	

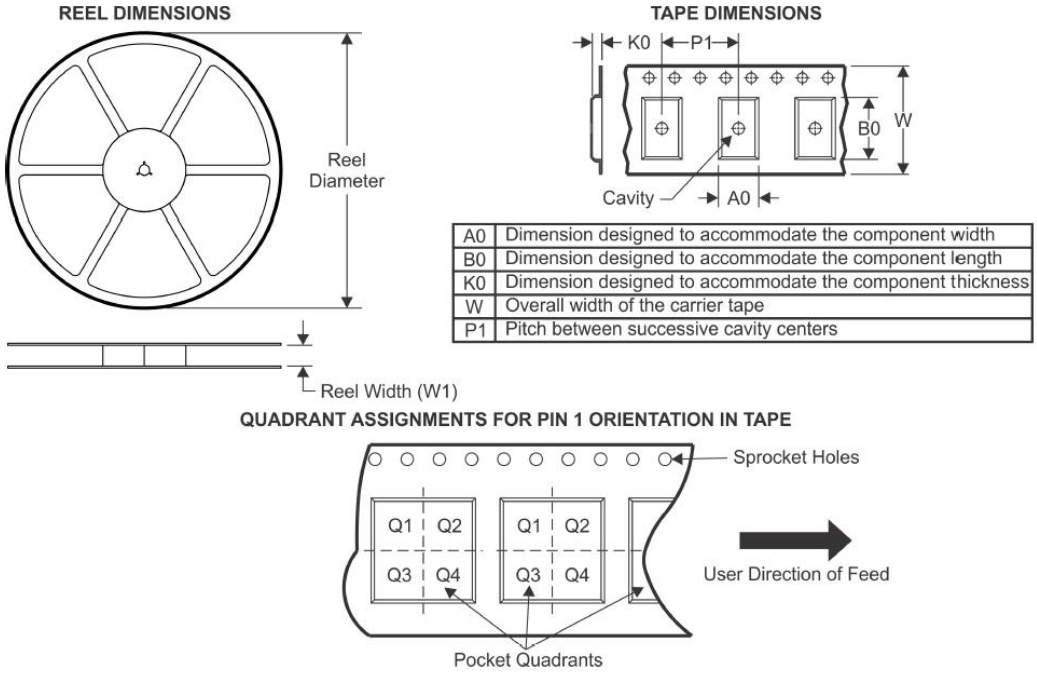
13. Typical Application of STK-616T-20MWD



Recommended circuit	C4 C5	R1 R2	Low frequency cutoff frequency	Frequency bandwidth@-3dB
1	33nF	5k	500 Hz	400 kHz
2	15nF	5k	1 kHz	
3	6.8nF	5k	2 kHz	

14. Package materials information

TAPE AND REEL INFORMATION



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers