

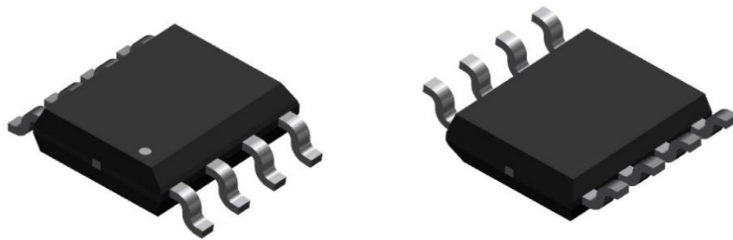
## Current Sensor

Product Series: STK-616ZMF

Part number:

STK-616Z-10MFU5  
STK-616Z-10MFB5  
STK-616Z-10MFB3  
STK-616Z-20MFB5  
STK-616Z-20MFB3  
STK-616Z-25MFB3  
STK-616Z-25MFB5  
STK-616Z-30MFB5  
STK-616Z-30MFB3  
STK-616Z-30MFU5  
STK-616Z-30MFU3  
STK-616Z-40MFB5  
STK-616Z-40MFB3  
STK-616Z-50MFB5  
STK-616Z-50MFB3  
STK-616Z-50MFU3  
STK-616Z-50MFU5  
STK-616Z-65MFB5  
STK-616Z-65MFB3

Version: Ver 3.4



Sinomags Technology Co., Ltd

Web site: [www.sinomags.com](http://www.sinomags.com)

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## 1. Introduction

STK-616ZM series current sensor is based on TMR (tunnel magneto resistance) technology, and it has an open-loop design. It is suitable for DC, AC pulsed and any kind of irregular current measurement under the isolated conditions.

- The product is packaged in standard SOIC8 form.
- AEC-Q100, automotive qualified.

### Typical applications

- AC variable speed drives
- Switching power supply
- Motor control

### General parameter

Parameter	Symbol	Unit	Value
Working temperature	T_A	°C	-40 ~ 125
Storage temperature	T_stg	°C	-40 ~ 125
Mass	m	g	0.1

### Absolute maximum rating

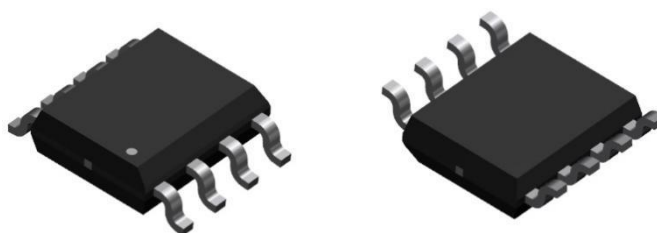
Parameter	Symbol	Unit	Value
Supply voltage	V <sub>CC</sub>	V	6
ESD rating (HBM)	U <sub>ESD</sub>	kV	2

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 <sub>d</sub>	kV	3.6	All
Clearance distance (Shortest distance through air)	d <sub>Cl</sub>	mm	4.2	All
Creepage distance (Shortest path along device body)	d <sub>Cp</sub>	mm	4.2	All

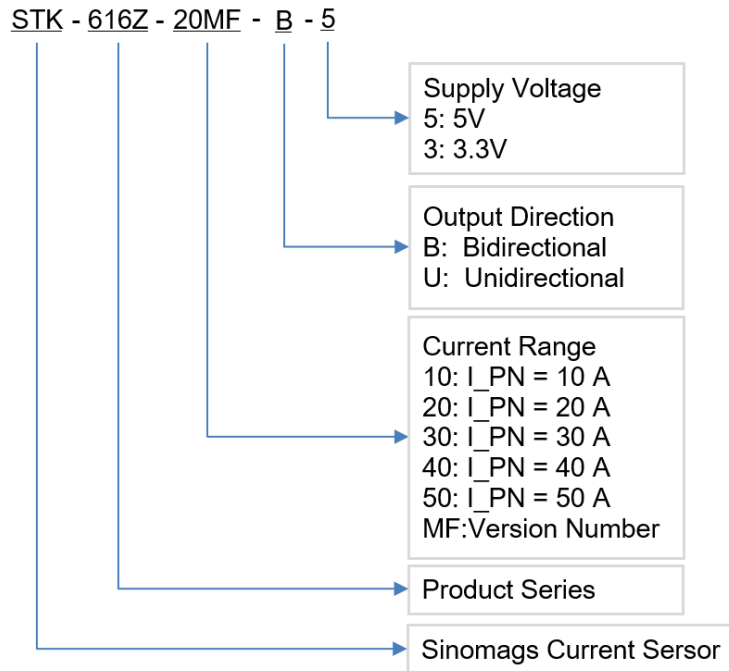
## 2. Package: SOIC8 compatible



### 3. Selection Guide

Part Number	Vcc(V)	Current Range (A)	Sensitivity (mV/A)	Offset (V)	Current Directionality	Top(°C)
STK-616Z-10MFB5	5	±10	200	2.5	Bidirectional	-40~125
STK-616Z-20MFB5	5	±20	100	2.5	Bidirectional	-40~125
STK-616Z-25MFB5	5	±25	80	2.5	Bidirectional	-40~125
STK-616Z-30MFB5	5	±30	66.7	2.5	Bidirectional	-40~125
STK-616Z-40MFB5	5	±40	50	2.5	Bidirectional	-40~125
STK-616Z-50MFB5	5	±50	40	2.5	Bidirectional	-40~125
STK-616Z-65MFB5	5	±65	30	2.5	Bidirectional	-40~125
STK-616Z-10MFU5	5	10	400	0.5	Unidirectional	-40~125
STK-616Z-30MFU5	5	30	133.3	0.5	Unidirectional	-40~125
STK-616Z-50MFU5	5	50	80	0.5	Unidirectional	-40~125
STK-616Z-10MFB3	3.3	±10	132	1.65	Bidirectional	-40~125
STK-616Z-20MFB3	3.3	±20	66	1.65	Bidirectional	-40~125
STK-616Z-25MFB3	3.3	±25	52.8	1.65	Bidirectional	-40~125
STK-616Z-30MFB3	3.3	±30	44	1.65	Bidirectional	-40~125
STK-616Z-40MFB3	3.3	±40	33	1.65	Bidirectional	-40~125
STK-616Z-50MFB3	3.3	±50	26.4	1.65	Bidirectional	-40~125
STK-616Z-65MFB3	3.3	±65	20.3	1.65	Bidirectional	-40~125
STK-616Z-30MFU3	3.3	30	88	0.5	Unidirectional	-40~125
STK-616Z-50MFU3	3.3	50	52.8	0.5	Unidirectional	-40~125

## 4. Production Information



## 5. Electrical data STK-616Z-XXMFB5

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

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Supply voltage	$V_{CC}$	V		5±5%		STK-616Z-XXMFB5
Current consumption	$I_{CC}$	mA		6		STK-616Z-XXMFB5
Primary conductor resistance	$R_{pr}$	mΩ		0.9		STK-616Z-XXMFB5
Quiescent voltage Vout @ 0 A	$V_{IOUT(Q)}$	V		2.5±0.05		STK-616Z-XXMFB5
Zero Current Reference Voltage	$V_{REF}$	V		2.5±0.05		STK-616Z-XXMFB5
Peak output voltage (Vout @ ±I <sub>pm</sub> ) - $V_{IOUT(Q)}$	$V_{FS}$	V		±2		STK-616Z-XXMFB5
Internal output resistance	$R_{out}$	Ω		2		STK-616Z-XXMFB5
Rated linearity error	$E_{LIN}$	% I <sub>PN</sub>		±1.5		±I <sub>PN</sub>
Step response time	$t_{res}$	μs		0.05		@90% of I <sub>pn</sub> STK-616Z-XXMFB5
Frequency bandwidth (-3dB)	BW	MHz		2		@-3dB STK-616Z-XXMFB5
Output voltage noise	Vnoise	mVpp		10		@1.4 MHz
Accuracy @ 25°C	$E_{TOT}$	% of I <sub>PN</sub>		±1.5		All
Accuracy @ -40°C ~ 105°C	$E_{TOT}$	% of I <sub>PN</sub>		±3.5		All

## 6. Electrical data STK-616Z-XXMFU5

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

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Supply voltage	$V_{CC}$	V		5±5%		STK-616Z-XXMFU5
Current consumption	$I_{CC}$	mA		6		STK-616Z-XXMFU5
Primary conductor resistance	$R_{pr}$	mΩ		0.9		STK-616Z-XXMFU5
Quiescent voltage Vout @ 0 A	$V_{IOUT(Q)}$	V		0.5±0.05		STK-616Z-XXMFU5
Zero Current Reference Voltage	$V_{REF}$	V		0.5±0.05		STK-616Z-XXMFU5
Peak output voltage (Vout @ +I <sub>pm</sub> ) - $V_{IOUT(Q)}$	$V_{FS}$	V		4		STK-616Z-XXMFU5
Internal output resistance	$R_{out}$	Ω		2		STK-616Z-XXMFU5
Rated linearity error	$E_{LIN}$	% I <sub>PN</sub>		±1.5		±I <sub>PN</sub>
Step response time	$t_{res}$	μs		0.05		@90% of I <sub>pn</sub> STK-616Z-XXMFU5
Frequency bandwidth (-3dB)	BW	MHz		2		@-3dB STK-616Z-XXMFU5
Output voltage noise	$V_{noise}$	mVpp		10		@1.4 MHz
Accuracy @ 25°C	$E_{TOT}$	% of I <sub>PN</sub>		±1.5		All
Accuracy @ -40°C ~ 105°C	$E_{TOT}$	% of I <sub>PN</sub>		±3.5		All

## 7. Electrical data STK-616Z-XXMFB3

Condition:  $T_A = 25^{\circ}\text{C}$ ,  $V_{CC} = 3.3\text{ V}$

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Supply voltage	$V_{CC}$	V		3.3±5%		STK-616Z-XXMFB3
Current consumption	$I_{CC}$	mA		6		STK-616Z-XXMFB3
Primary conductor resistance	$R_{pr}$	mΩ		0.9		STK-616Z-XXMFB3
Quiescent voltage Vout @ 0 A	$V_{IOUT(Q)}$	V		1.65±0.05		STK-616Z-XXMFB3
Zero Current Reference Voltage	$V_{REF}$	V		1.65±0.05		STK-616Z-XXMFB3
Peak output voltage (Vout @ +I <sub>pm</sub> ) - $V_{IOUT(Q)}$	$V_{FS}$	V		1.32		STK-616Z-XXMFB3
Internal output resistance	$R_{out}$	Ω		2		STK-616Z-XXMFB3
Rated linearity error	$E_{LIN}$	% I <sub>PN</sub>		±1.5		±I <sub>PN</sub>
Step response time	$t_{res}$	μs		0.05		@90% of I <sub>pn</sub> STK-616Z-XXMFB3
Frequency bandwidth (-3dB)	BW	MHz		2		@-3dB STK-616Z-XXMFB3

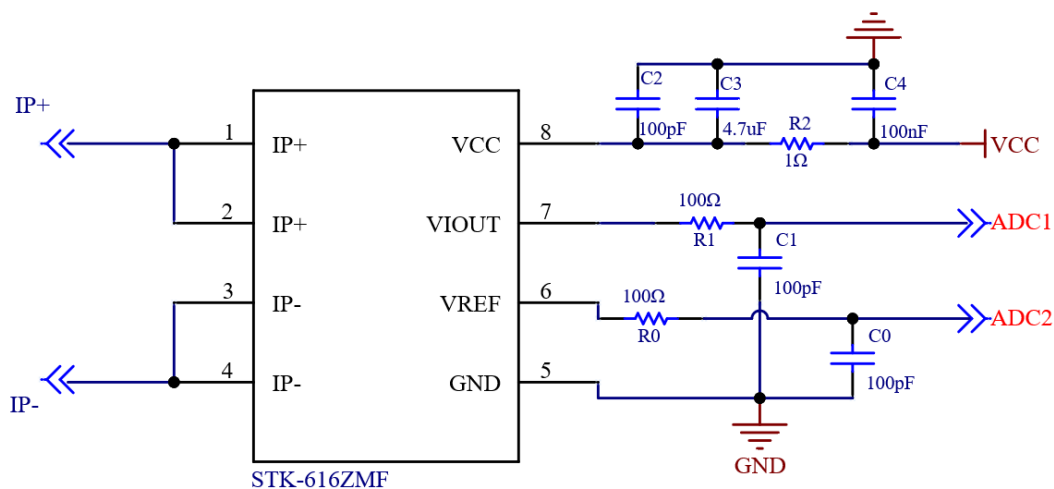
Output voltage noise	Vnoise	mVpp		10		@1.4 MHz
Accuracy @ 25°C	E <sub>TOT</sub>	% of I <sub>PN</sub>		±1.5		All
Accuracy @ -40°C ~ 105°C	E <sub>TOT</sub>	% of I <sub>PN</sub>		±3.5		All

## 8. Electrical data STK-616Z-XXMFU3

Condition: T<sub>A</sub> = 25°C, V<sub>cc</sub> = 3.3 V

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Supply voltage	V <sub>cc</sub>	V		3.3±5%		STK-616Z-XXMFU3
Current consumption	I <sub>cc</sub>	mA		6		STK-616Z-XXMFU3
Primary conductor resistance	R <sub>pr</sub>	mΩ		0.9		STK-616Z-XXMFU3
Quiescent voltage V <sub>out</sub> @ 0 A	V <sub>IOUT(Q)</sub>	V		0.5±0.05		STK-616Z-XXMFU3
Zero Current Reference Voltage	V <sub>REF</sub>	V		0.5±0.05		STK-616Z-XXMFU3
Peak output voltage (V <sub>out</sub> @ +I <sub>pm</sub> ) - V <sub>IOUT(Q)</sub>	V <sub>FS</sub>	V		2.64		STK-616Z-XXMFU3
Internal output resistance	R <sub>out</sub>	Ω		2		STK-616Z-XXMFU3
Rated linearity error	E <sub>LIN</sub>	% I <sub>PN</sub>		±1.5		±I <sub>PN</sub>
Step response time	t <sub>res</sub>	μs		0.05		@90% of I <sub>pn</sub> STK-616Z-XXMFU3
Frequency bandwidth (-3dB)	BW	MHz		2		@-3dB STK-616Z-XXMFU3
Output voltage noise	Vnoise	mVpp		10		@1.4 MHz
Accuracy @ 25°C	E <sub>TOT</sub>	% of I <sub>PN</sub>		±1.5		All
Accuracy @ -40°C ~ 105°C	E <sub>TOT</sub>	% of I <sub>PN</sub>		±3.5		All

## 9. Typical Application Circuit





## 10. Characteristic Definitions

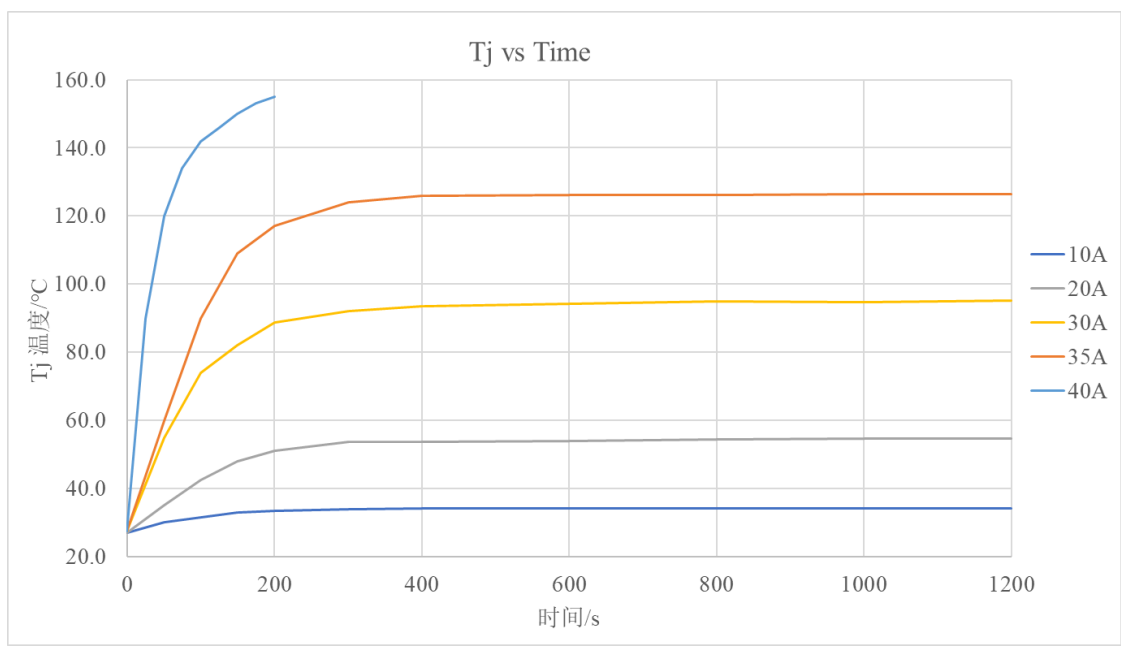
### **SENSITIVITY (Sens)**

The change in sensor output in response to a 1 A change through the primary conductor. The sensitivity is the sensor gain (mv/A) for the full-scale current of the device. The sensitivity is fixed and does not change with the supply voltage.

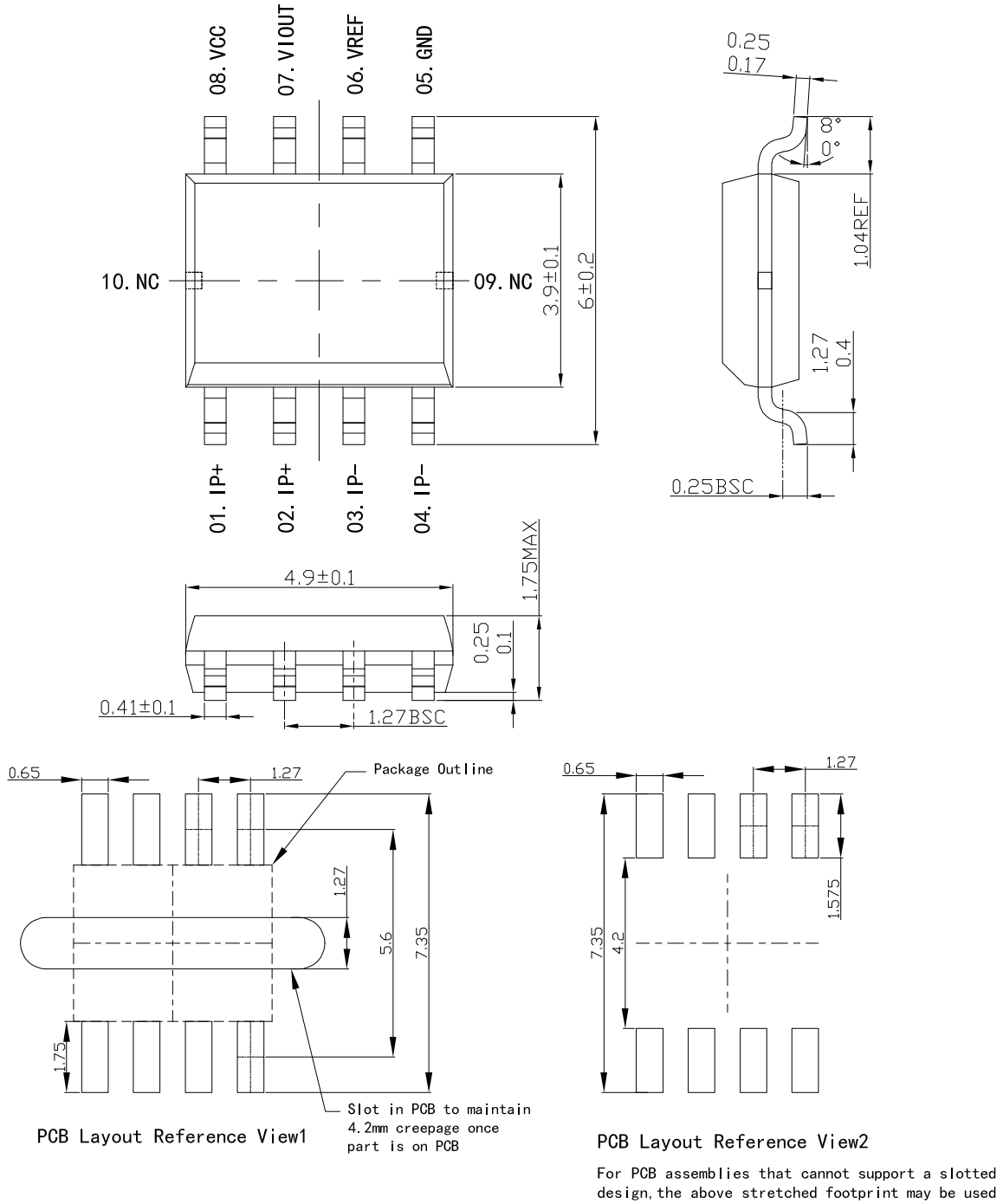
### **ZERO CURRENT OUTPUT VOLTAGE (VIOUT(Q))**

The output of the sensor when the primary current is zero. When the power supply is 5 V, it nominally remains at 2.5 V for a bidirectional device. When the power supply is 3.3 V, it nominally remains at 1.65 V for a bidirectional device.

## 11. Continues current vs working temperature



## 12. Dimension & Pin Definitions

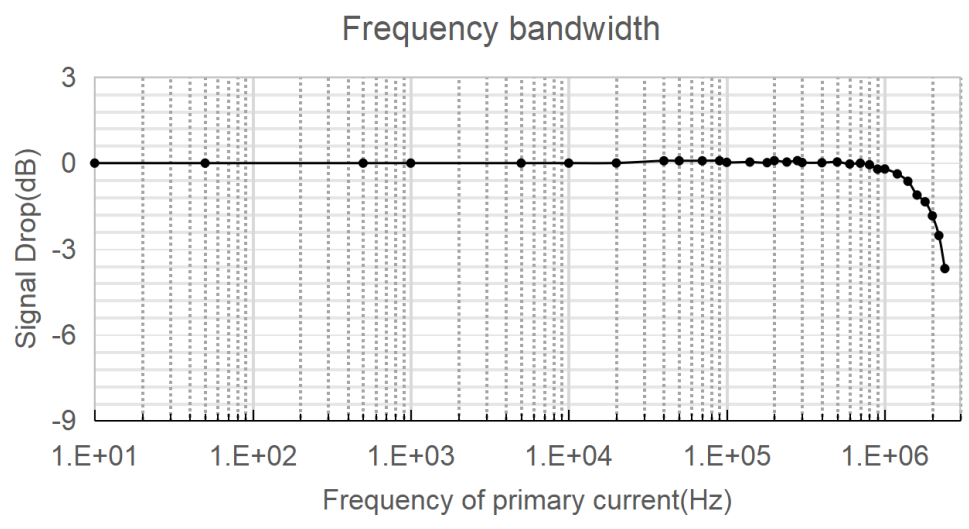


### 13. Pin definitions

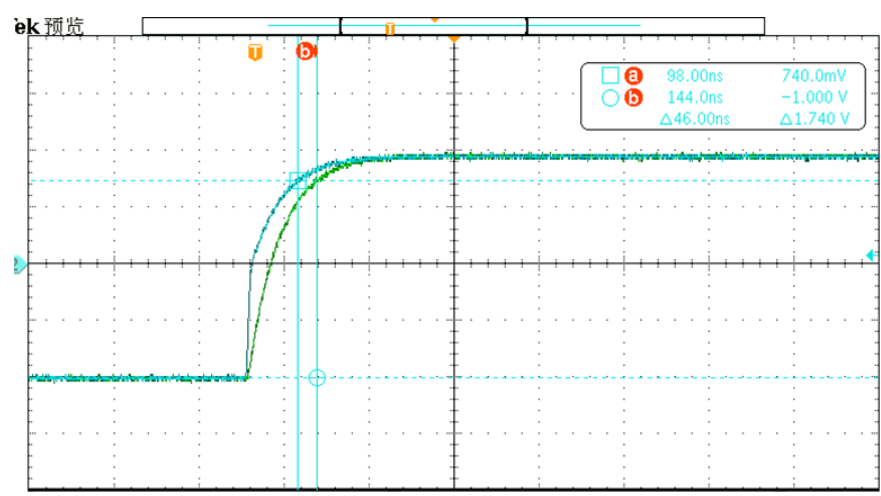
Pin definition for product with OCD function

PIN	Symbol	Description
1,2	IP+	Primary conductor pin ( + )
3,4	IP-	Primary conductor pin ( - )
5	GND	Ground pin (GND)
6	VREF	Zero current voltage reference
7	VIOUT	Sensor output pin
8	VCC	Power supply pin

### 14. Frequency bandwidth of STK-616Z-XXMFBX

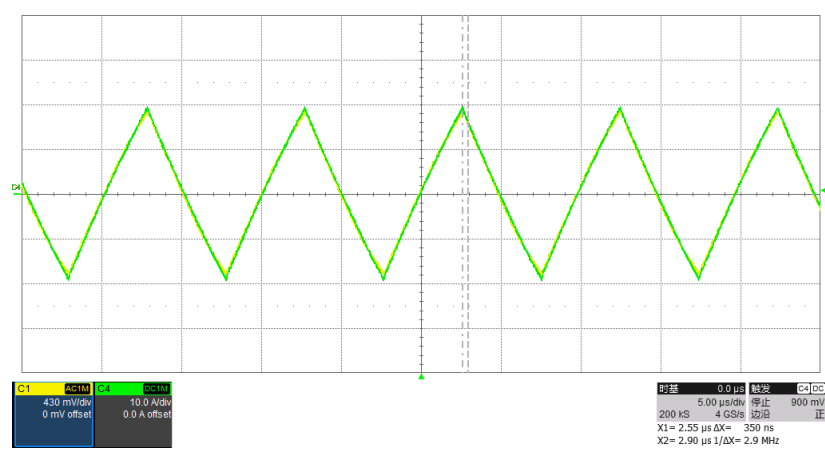


### 15. Step response time of STK-616Z-XXMFBX

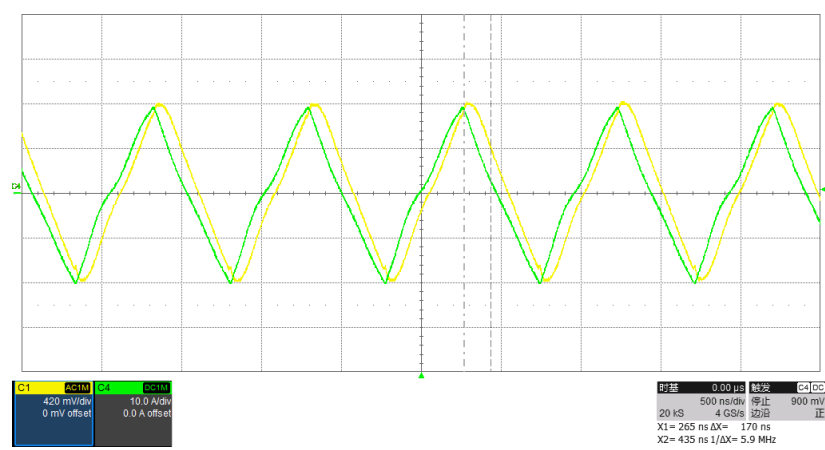


The typical frequency response of STK-616ZMF current sensor. The response time from 90% of the primary current to 90% of the secondary output is 0.05  $\mu$ s.

### 16.The delay time of the Triangular wave



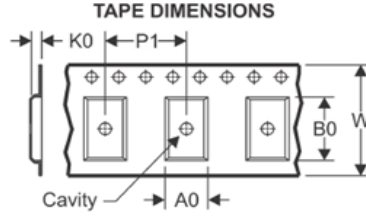
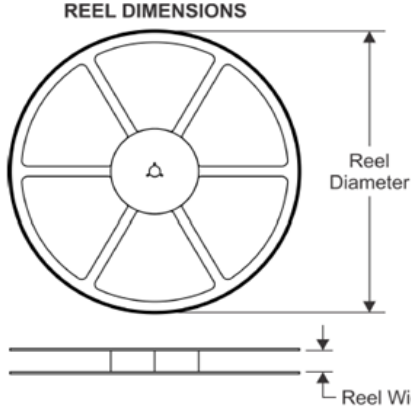
100 kHz Triangular delay---0.05μs



1 MHz Triangular delay---0.05μs

## 17. 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

### QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE

