

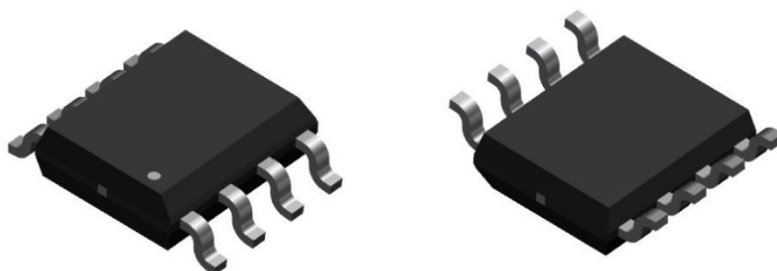
## Current Sensor

Product Series: STK-616ZMF

Part number:

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

Version: Ver 2.8



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.

### Typical applications

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

### General parameter

Parameter	Symbol	Unit	Value
Working temperature	T <sub>A</sub>	°C	-40 ~ 125
Storage temperature	T <sub>stg</sub>	°C	-40 ~ 125
Mass	m	g	0.1

### Absolute maximum rating

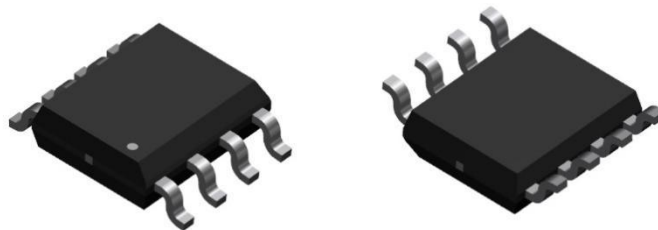
Parameter	Symbol	Unit	Value
Supply voltage	V <sub>CC</sub>	V	6
ESD rating (HBM)	U <sub>ESD</sub>	kV	4

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 <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

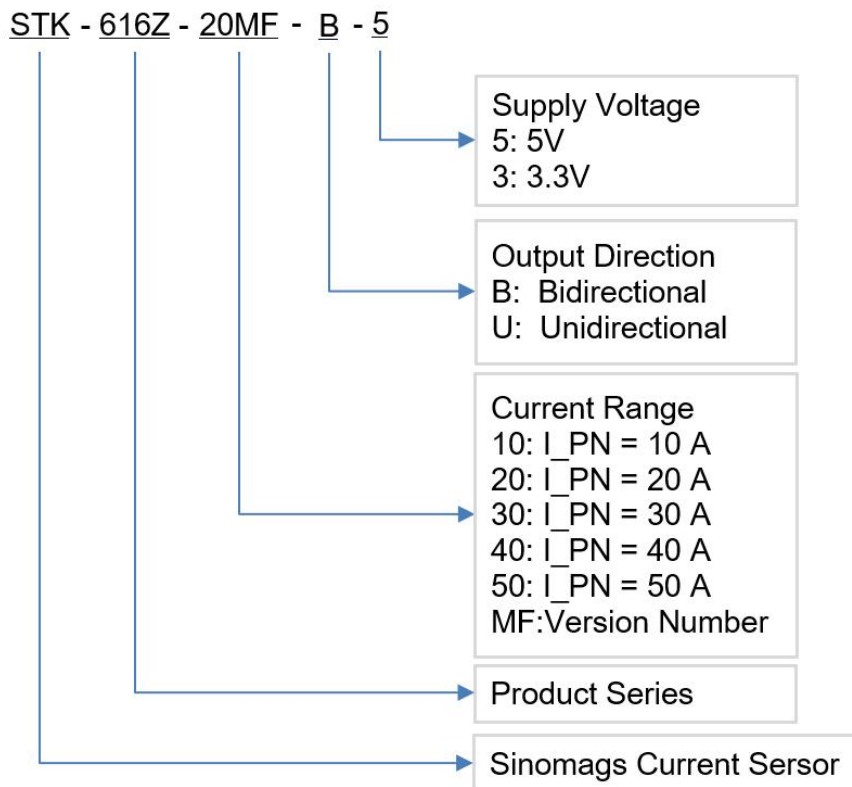
## 2. Package: SOIC8 compatible



### 3. Selection Guide

Part Number	Vcc(V)	Current Range (A)	Sensitivity (mV/A)	Offset (V)	Current Directionality	Top(°C)
STK-616Z-10MFU5	5	10	400	0.5	Unidirectional	-40~125
STK-616Z-10MFB5	5	±10	200	2.5	Bidirectional	-40~125
STK-616Z-20MFB5	5	±20	100	2.5	Bidirectional	-40~125
STK-616Z-30MFB5	5	±30	66.7	2.5	Bidirectional	-40~125
STK-616Z-30MFU5	5	30	133.3	0.5	Unidirectional	-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-50MFB3	5	±50	26.4	1.65	Bidirectional	-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>pn</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	$V_{noise}$	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

## 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

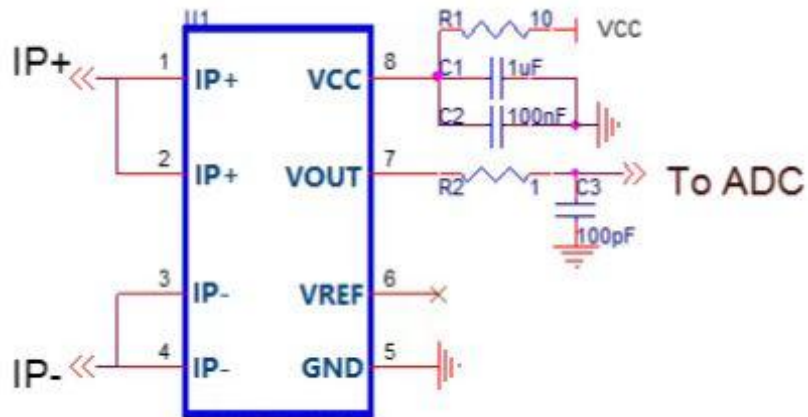
## 7. Electrical data STK-616Z-XXMFB3

 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. Typical Application Circuit



## 9. Characteristic Definitions

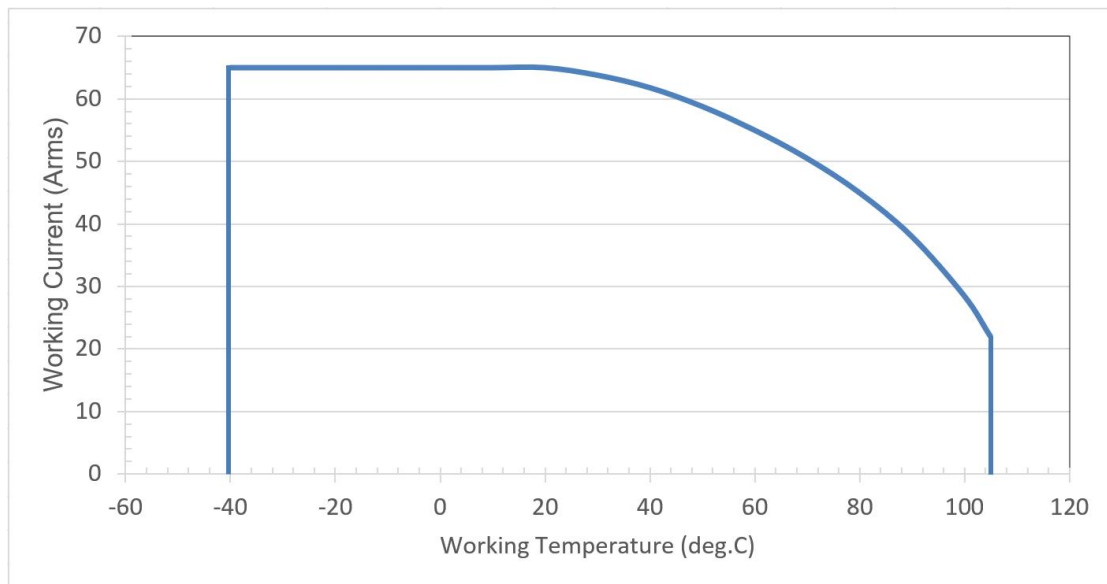
### **SENSITIVITY (Sens)**

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))**

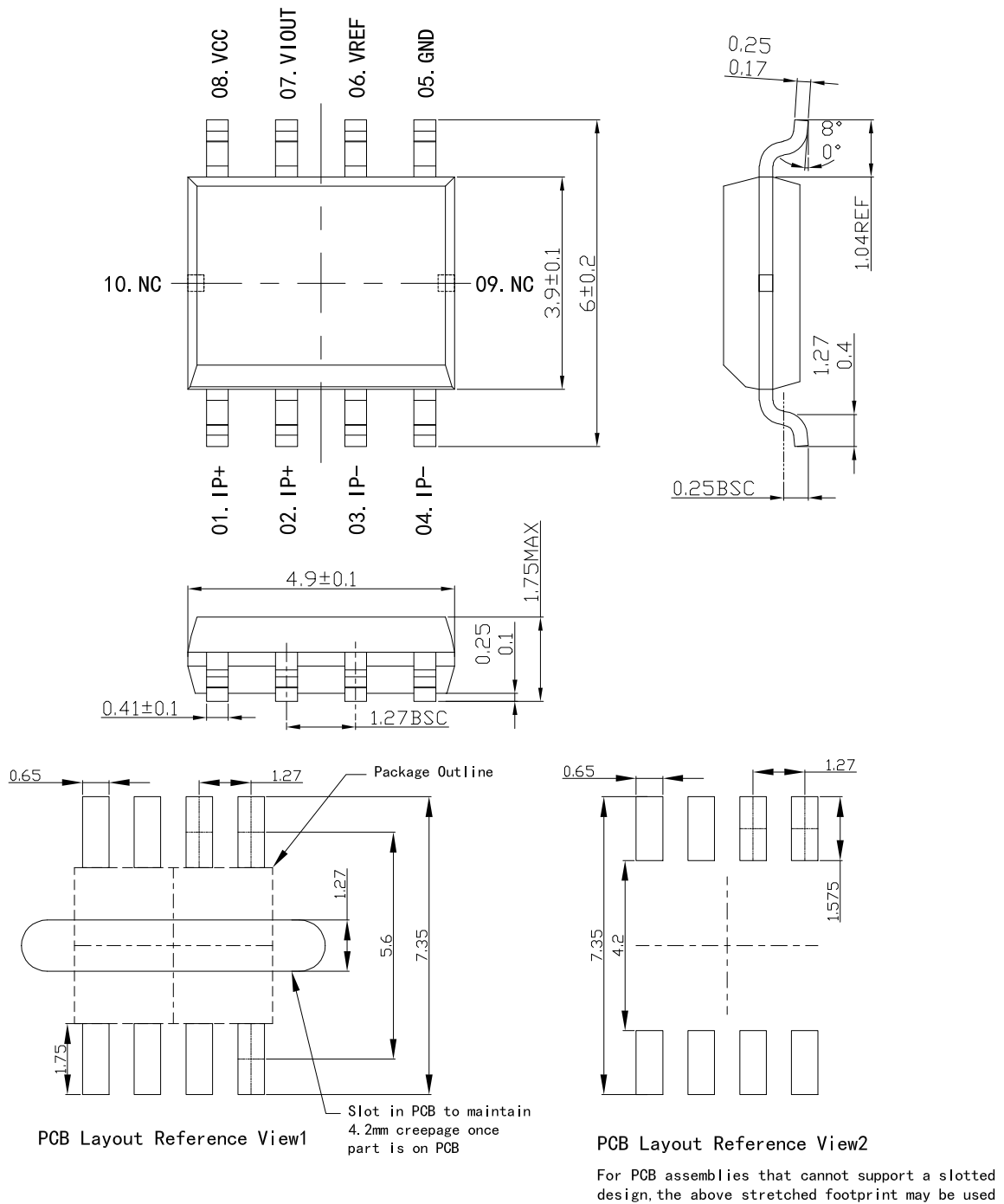
The output of the sensor when the primary current is zero. When the power supply is 5 V, it nominally remains at 2.5 V for a bidirectional device. When the power supply is 3.3 V, it nominally remains at 1.65 V for a bidirectional device.

## 10. Continues current vs working temperature





## 11. Dimension & Pin Definitions

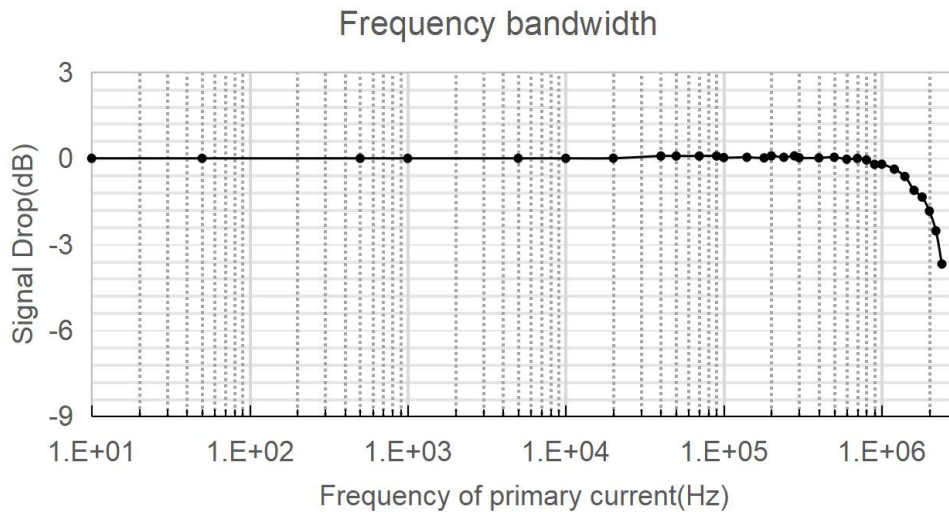


## 12. Pin definitions

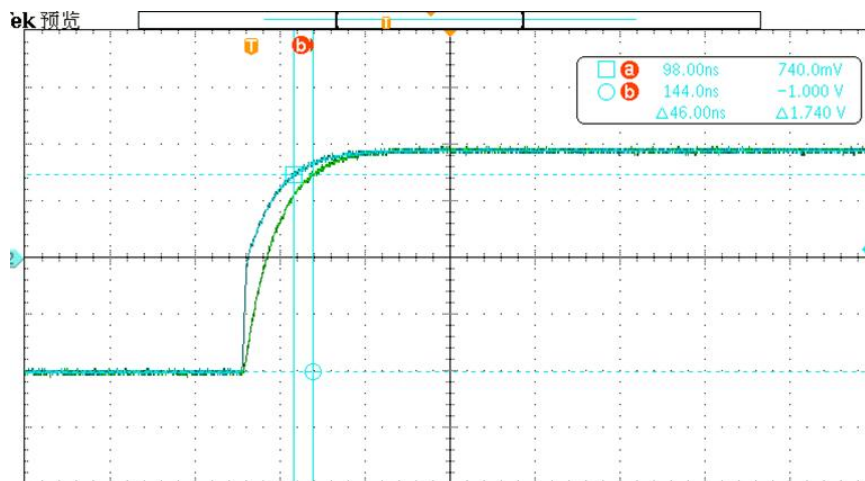
Pin definition for product with OCD function

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

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

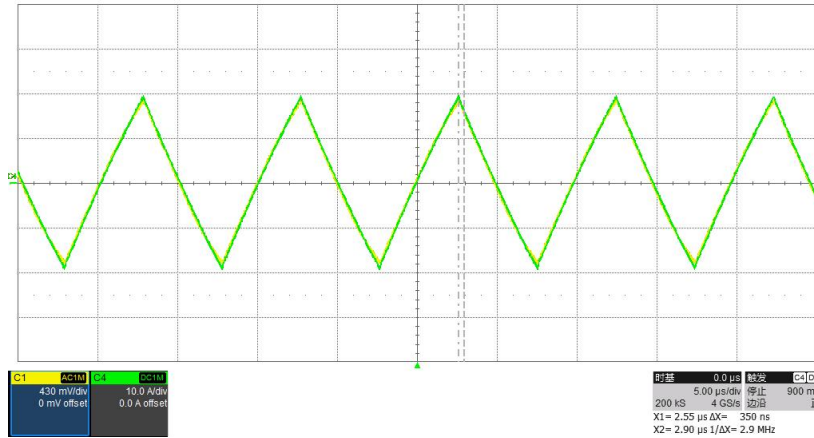


## 14. Step response time of STK-616Z-XXMFBX

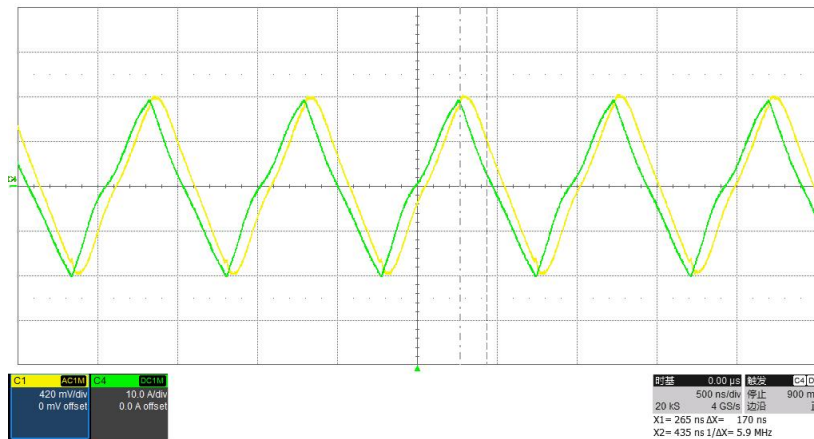


The typical frequency response of STK-616ZMF current sensor. The response time from 90% of the primary current to 90% of the secondary output is 0.05  $\mu$ s.

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



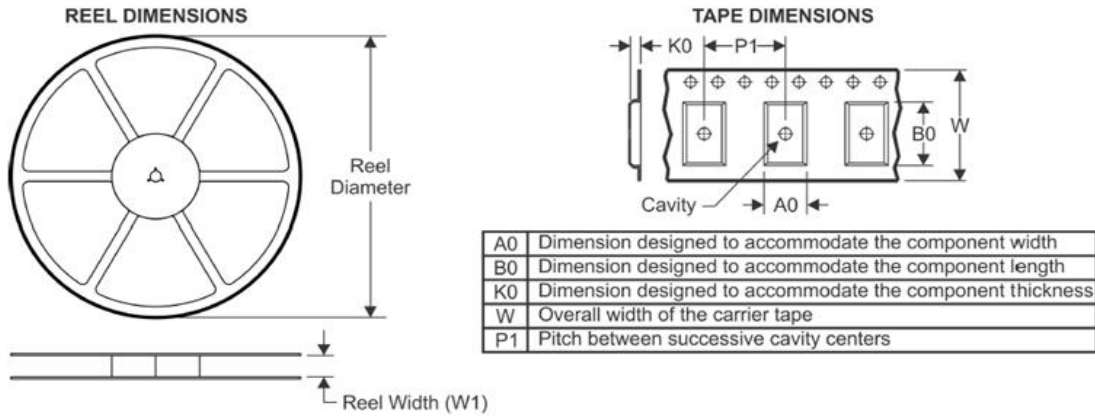
100 kHz Triangular delay---0.05μs



1 MHz Triangular delay---0.05μs

## 16. Package materials information

### TAPE AND REEL INFORMATION



### QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE

