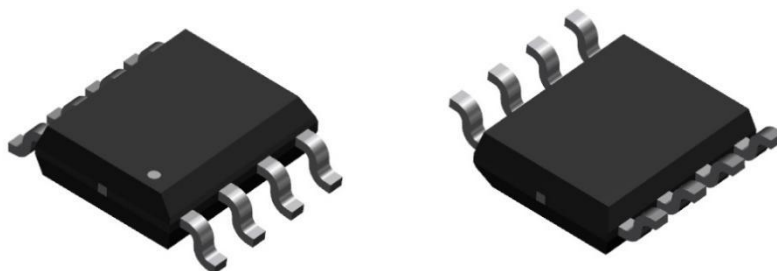


## Current Sensor

Product Series: STK-616YM

Part number: STK-616Y-20MLB5  
STK-616Y-30MLB5  
STK-616Y-40MLB5  
STK-616Y-50MLB5  
STK-616Y-50MLB3

Version: Ver 1.3



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## 1. Introduction

STK-616YM 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_A	°C	-40 ~ 125
Storage temperature	T_stg	°C	-40 ~ 125
Mass	m	g	0.1

### Absolute maximum rating

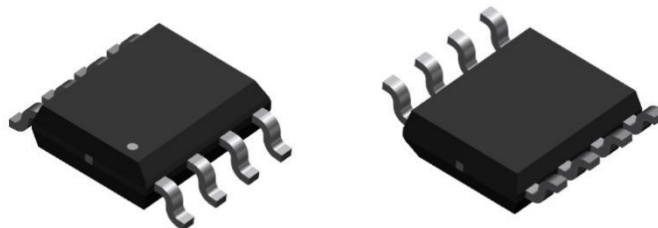
Parameter	Symbol	Unit	Value
Supply voltage	V <sub>CC</sub>	V	6
ESD rating (HBM)	U <sub>ESD</sub>	kV	4

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	2	All
Clearance distance (Shortest distance through air)	d <sub>Cl</sub>	mm	2	All
Creepage distance (Shortest path along device body)	d <sub>Cp</sub>	mm	2	All

## 2. Package: SOIC8 compatible

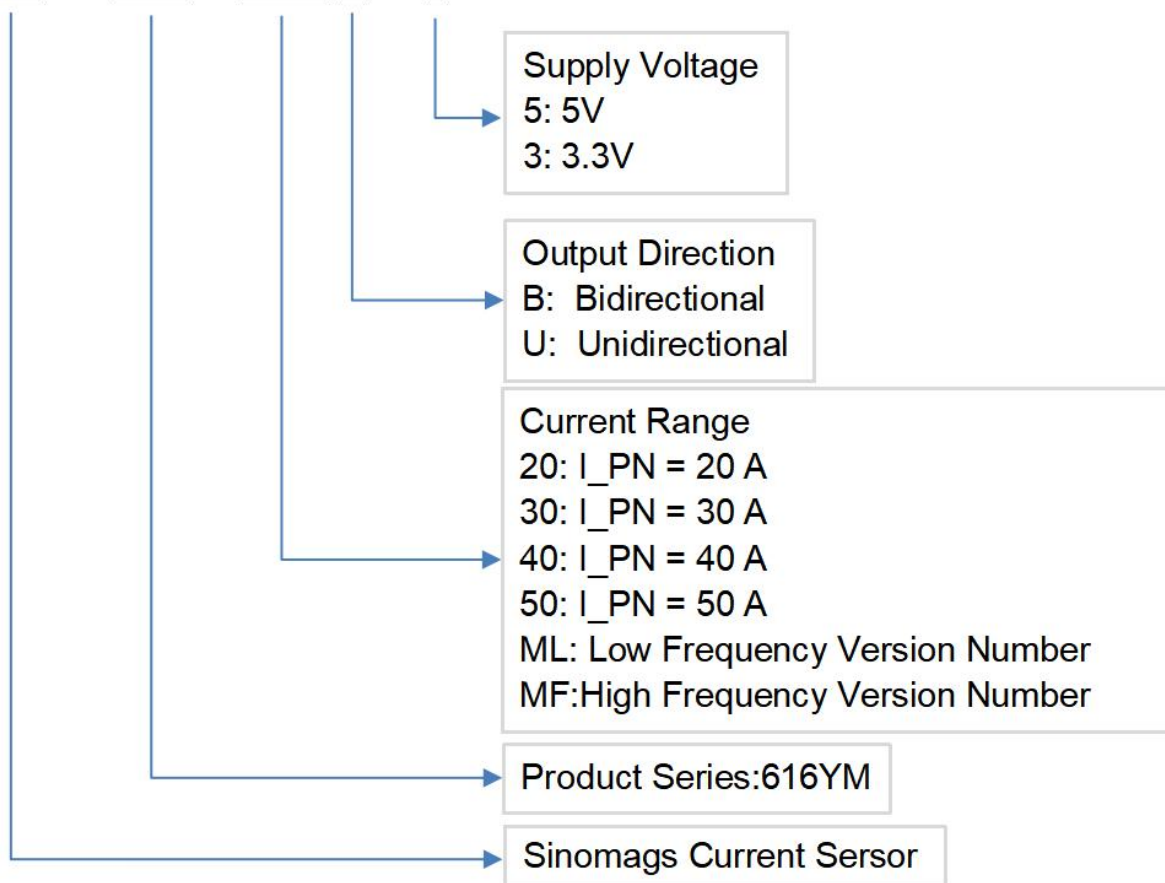


### 3. Selection Guide

Part Number	Vcc(V)	Current Range (A)	Sensitivity (mV/A)	Offset (V)	Current Directionality	Top(°C)
STK-616Y-20MLB5	5	±20	100	2.5	Bidirectional	-40~125
STK-616Y-30MLB5	5	±30	66.7	2.5	Bidirectional	-40~125
STK-616Y-40MLB5	5	±40	50	2.5	Bidirectional	-40~125
STK-616Y-50MLB5	5	±50	40	2.5	Bidirectional	-40~125
STK-616Y-50MLB3	3.3	±50	26.4	1.65	Bidirectional	-40~125

### 4. Production Information

STK - 616Y - 20ML B - 5



**5. Electrical data STK-616Y-XXMXB5**

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

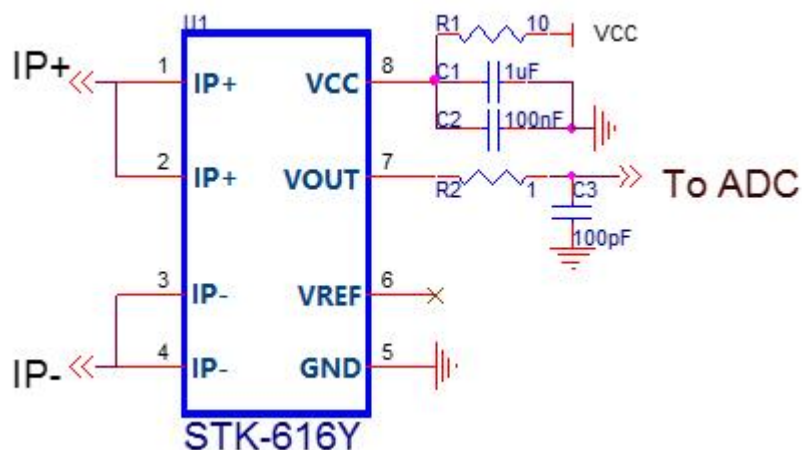
Parameter	Symbol	Unit	Min	Typ	Max	Comment
Supply voltage	$V_{CC}$	V		5±5%		STK-616Y-XXMLB5
Current consumption	$I_{CC}$	mA		6		STK-616Y-XXMLB5
Primary conductor resistance	$R_{pr}$	mΩ		0.9		STK-616Y-XXMLB5
Quiescent voltage Vout @ 0 A	$V_{IOUT(Q)}$	V		2.5±0.05		STK-616Y-XXMLB5
Zero Current Reference Voltage	$V_{REF}$	V		2.5±0.05		STK-616Y-XXMLB5
Peak output voltage (Vout @ ±I <sub>pn</sub> ) - $V_{IOUT(Q)}$	$V_{FS}$	V		±2		STK-616Y-XXMLB5
Internal output resistance	$R_{out}$	Ω		2		STK-616Y-XXMLB5
Rated linearity error	$E_{LIN}$	% I <sub>PN</sub>		±1		±I <sub>PN</sub>
Step response time	$t_{res}$	μs		1		@90% of I <sub>pn</sub> STK-616Y-XXMLB5
Frequency bandwidth (-3dB)	BW	kHz		400		@-3dB STK-616Y-XXMLB5
Step response time	$t_{res}$	μs		0.2		@90% of I <sub>pn</sub> STK-616Y-XXMFB5
Frequency bandwidth (-3dB)	BW	MHz		1.6		@-3dB STK-616Y-XXMFB5
Output voltage noise DC ~ 10 kHz DC ~ 100 kHz	$V_{noise}$	mVpp		20 40		All
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-616Y-XXMxB3

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		$3.3 \pm 5\%$		STK-616Y-XXMLB3
Current consumption	$I_{CC}$	mA		6		STK-616Y-XXMLB3
Primary conductor resistance	$R_{pr}$	m $\Omega$		0.9		STK-616Y-XXMLB3
Quiescent voltage Vout @ 0 A	$V_{IOUT(Q)}$	V		$1.65 \pm 0.05$		STK-616Y-XXMLB3
Zero Current Reference Voltage	$V_{REF}$	V		$1.65 \pm 0.05$		STK-616Y-XXMLB3
Peak output voltage (Vout @ $\pm I_{pm}$ ) $-V_{IOUT(Q)}$	$V_{FS}$	V		$\pm 1.32$		STK-616Y-XXMLB3
Internal output resistance	$R_{out}$	$\Omega$		2		STK-616Y-XXMLB3
Rated linearity error	$E_{LIN}$	% $I_{PN}$		$\pm 1$		$\pm I_{PN}$
Step response time	$t_{res}$	$\mu\text{s}$		1		@90% of $I_{pn}$ STK-616Y-XXMLB3
Frequency bandwidth (-3dB)	BW	kHz		400		@-3dB STK-616Y-XXMLB3
Step response time	$t_{res}$	$\mu\text{s}$		0.2		@90% of $I_{pn}$ STK-616Y-XXMFB3
Frequency bandwidth (-3dB)	BW	MHz		1.6		@-3dB STK-616Y-XXMFB3
Output voltage noise DC ~ 10 kHz DC ~ 100 kHz	$V_{noise}$	mVpp		20 40		All
Accuracy @ $25^\circ\text{C}$	$E_{TOT}$	% of $I_{PN}$		$\pm 1.5$		All
Accuracy @ $-40^\circ\text{C} \sim 105^\circ\text{C}$	$E_{TOT}$	% of $I_{PN}$		$\pm 3.5$		All

## 7. Typical Application Circuit



## 8. Characteristic Definitions

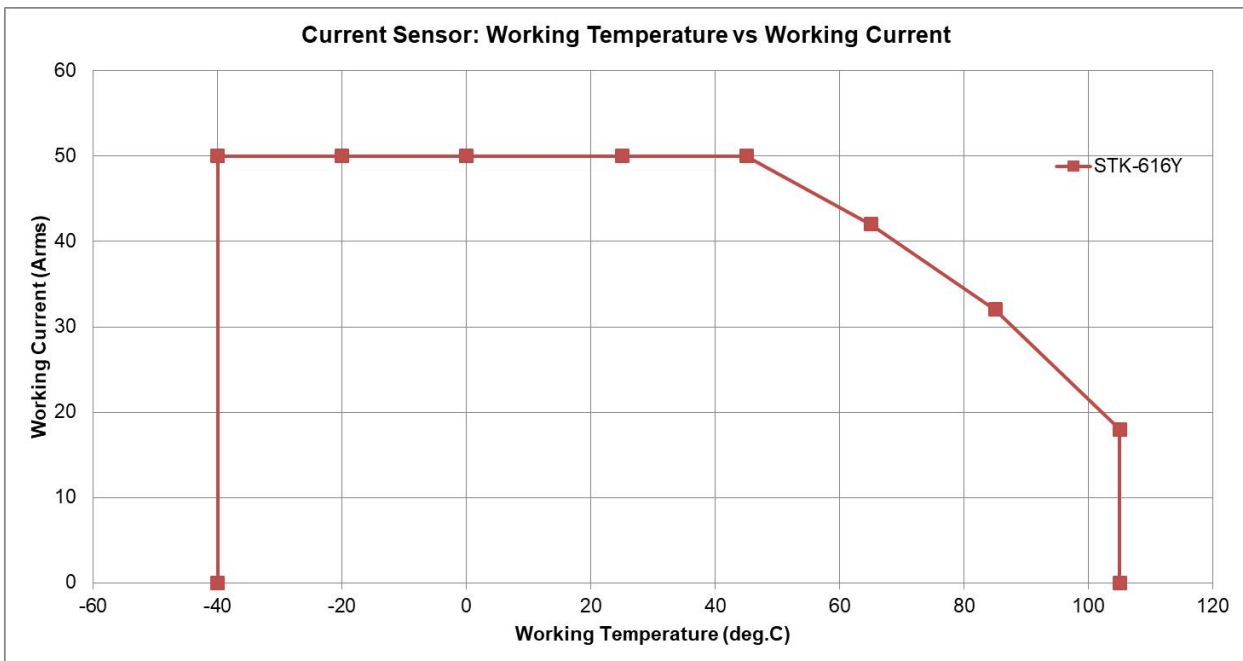
### SENSITIVITY (Sens)

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.

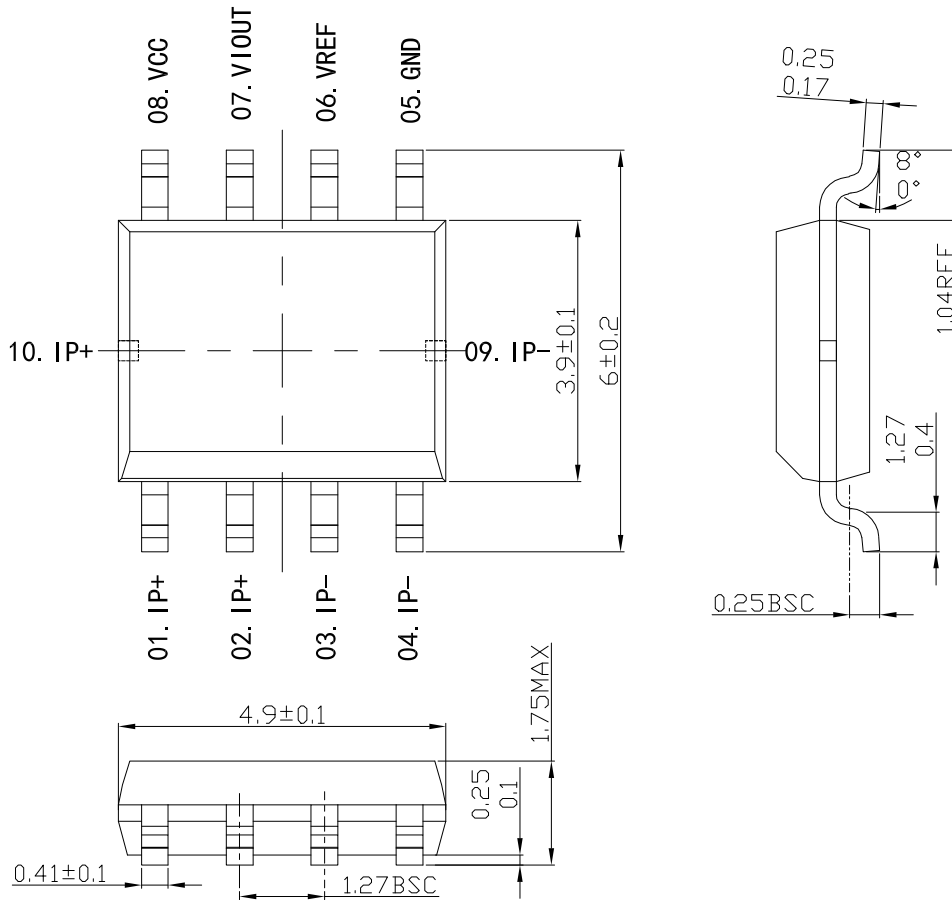
### ZERO CURRENT OUTPUT VOLTAGE (VIOUT(Q))

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.

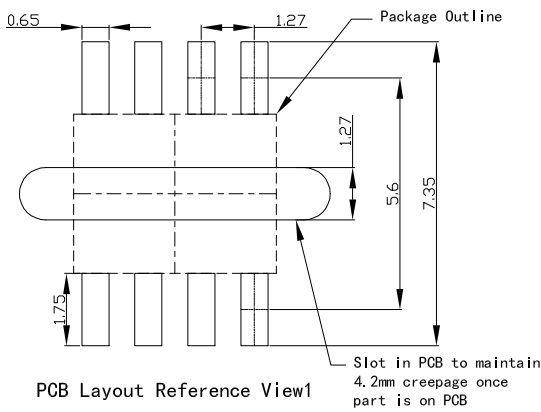
## 9. Continues current vs working temperature



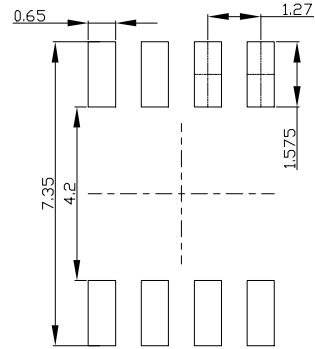
**10. Dimension & Pin Definitions**



Z



PCB Layout Reference View1



PCB Layout Reference View2

For PCB assemblies that cannot support a slotted design, the above stretched footprint may be used

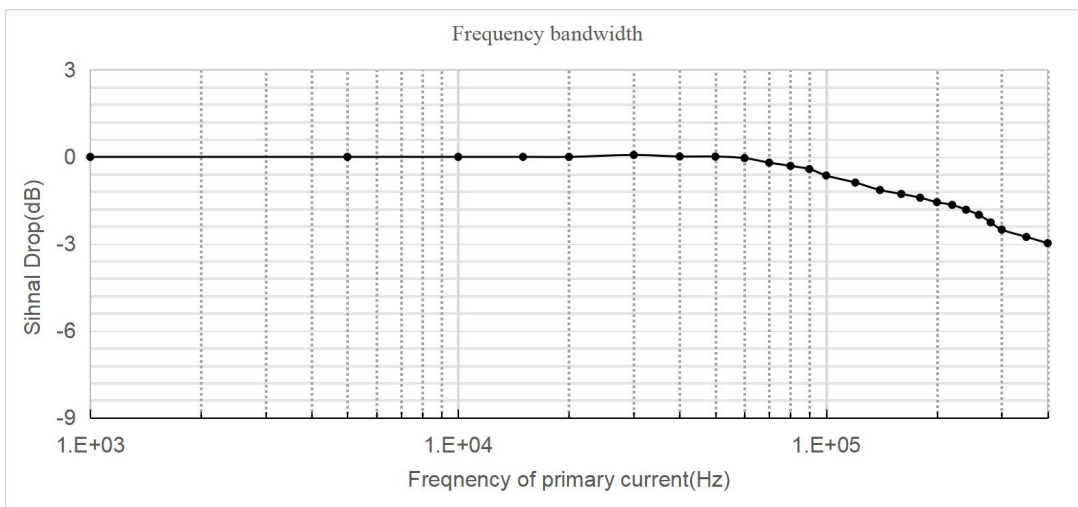


### 11. Pin definitions

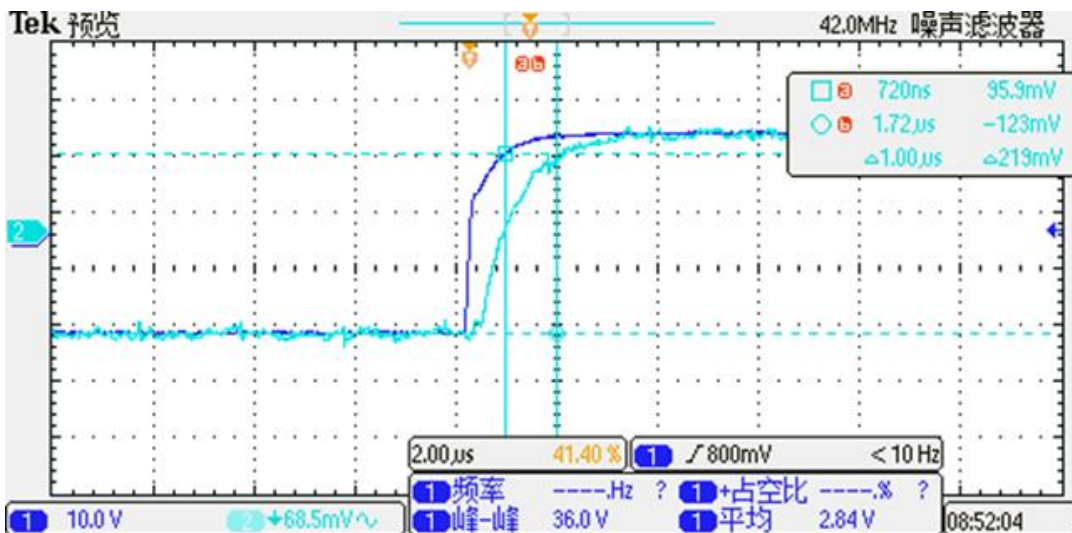
Pin definition for product with OCD function

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

### 12. Frequency Bandwidth of STK-616Y-XXMLBX

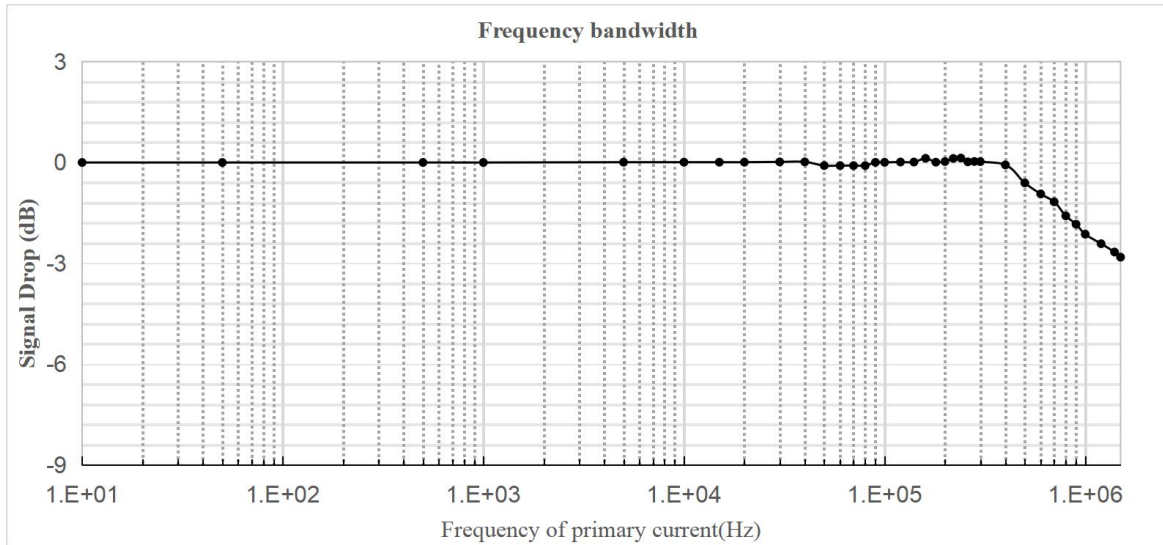


### 13. Step response time of STK-616Y-XXMLBX

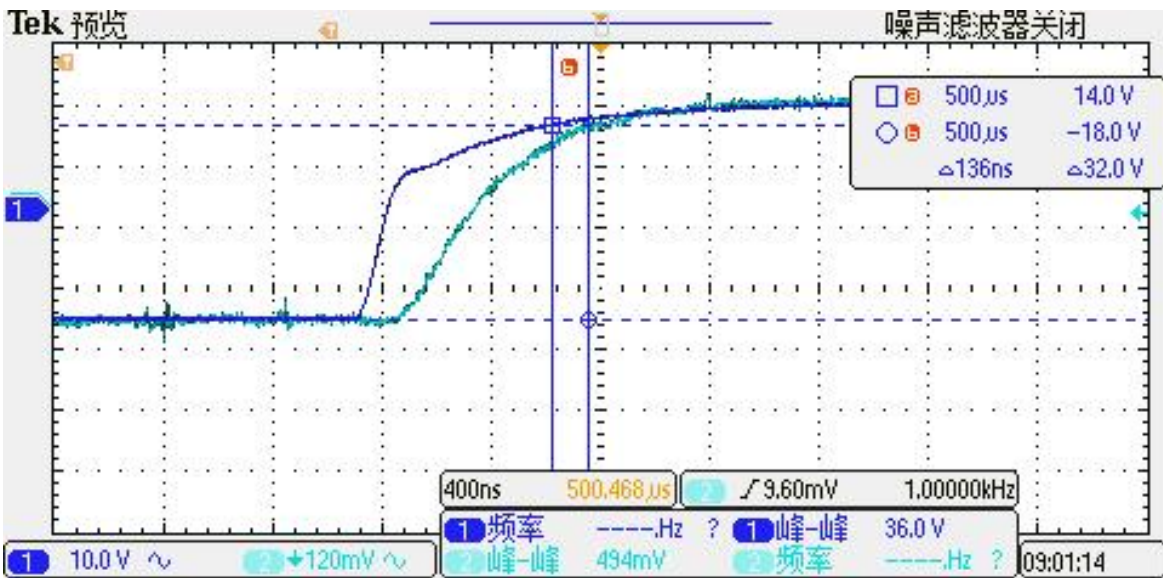


The typical low frequency response of STK-616Y current sensor. The response time from 90% of the primary current to 90% of the secondary output is 1 µs.

### 14. Frequency Bandwidth of STK-616Y-XXMFBX



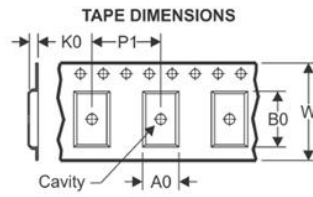
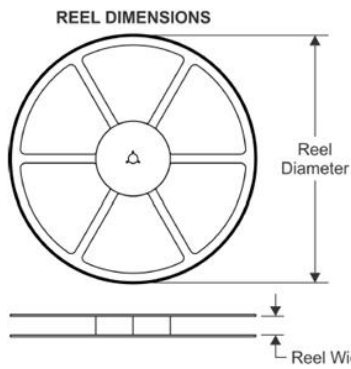
### 15. Step response time of STK-616Y-XXMFBX



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

## 16. Dimension & Pin Definitions

### 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

