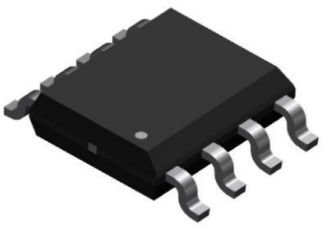
SINOMAGS 希 磁 科 技

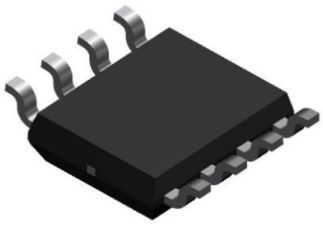
Current Sensor

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 3.5





Sinomags Technology Co., Ltd

Web site: www.sinomags.com

CONTENT

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	℃	-40 ~ 125
Storage temperature	T_stg	℃	-40 ~ 125
Mass	m	g	0.1

Absolute maximum rating

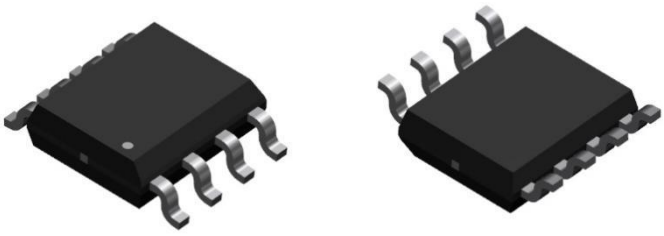
Parameter	Symbol	Unit	Value
Supply voltage	V_{CC}	V	6
ESD rating（HBM）	U_{ESD}	kV	2

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	Ud	kV	3.6	All
Clearance distance (Shortest distance through air)	dCl	mm	4.2	All
Creepage distance (Shortest path along device body)	dCp	mm	4.2	All
Working voltage for basic isolation	V_{WVBI}	Vrms	297	
		Vdc	420	

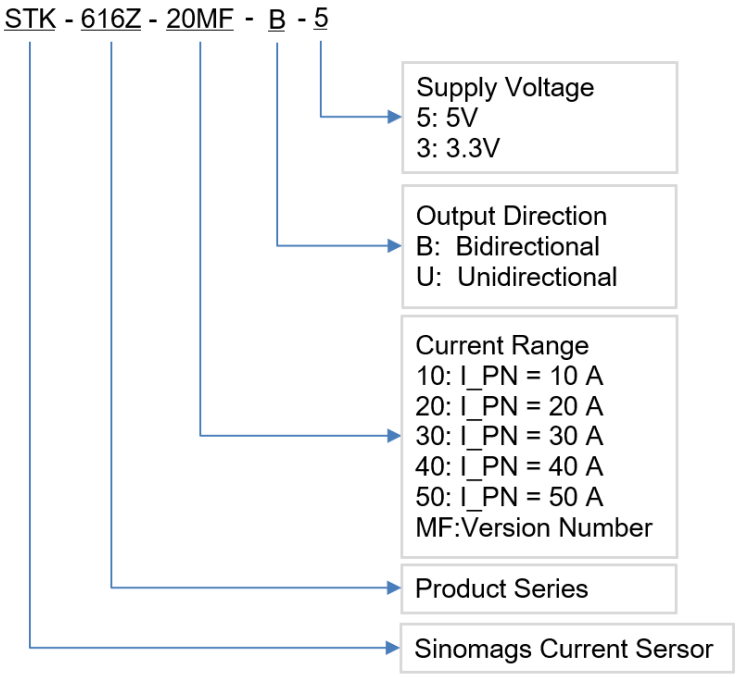
2. Package: SOIC8 compatible



3. Selection Guide

Part Number	Vcc(V)	Current Range (A)	Sensitivity (mV/A)	Offset (V)	Current Directionality	Top(℃)
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℃, Vcc = 5 V

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Supply voltage	Vcc	V		5±5%		STK-616Z-XXMFB5
Current consumption	Icc	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_pm) –$V_{IOUT(Q)}$	V_FS	V		±2		STK-616Z-XXMFB5
Internal output resistance	R_out	Ω		2		STK-616Z-XXMFB5
Rated linearity error	E_{LIN}	% I_{PN}		±1.5		±I_{PN}
Step response time	t_res	μs		0.05		@90% of I_pn STK-616Z-XXMFB5
Frequency bandwidth (-3dB)	BW	MHz		2		@-3dB STK-616Z-XXMFB5
Output voltage noise	Vnoise	mVpp		10		@1.4 MHz
Accuracy @ 25℃	E_{TOT}	% of I_{PN}		±1.5		All
Accuracy @ -40℃ ~ 105℃	E_{TOT}	% of I_{PN}		±3.5		All

6. Electrical data STK-616Z-XXMFU5

Condition：T_A = 25℃, Vcc = 5 V

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Supply voltage	Vcc	V		5±5%		STK-616Z-XXMFU5
Current consumption	Icc	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_pm) –$V_{IOUT(Q)}$	V_FS	V		4		STK-616Z-XXMFU5
Internal output resistance	R_out	Ω		2		STK-616Z-XXMFU5
Rated linearity error	E_{LIN}	% I_{PN}		±1.5		±I_{PN}
Step response time	t_res	μs		0.05		@90% of I_pn STK-616Z-XXMFU5
Frequency bandwidth (-3dB)	BW	MHz		2		@-3dB STK-616Z-XXMFU5
Output voltage noise	Vnoise	mVpp		10		@1.4 MHz
Accuracy @ 25℃	E_{TOT}	% of I_{PN}		±1.5		All
Accuracy @ -40℃ ~ 105℃	E_{TOT}	% of I_{PN}		±3.5		All

7. Electrical data STK-616Z-XXMFB3

Condition：T_A = 25℃, Vcc = 3.3 V

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Supply voltage	Vcc	V		3.3±5%		STK-616Z-XXMFB3
Current consumption	Icc	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_pm) –$V_{IOUT(Q)}$	V_FS	V		1.32		STK-616Z-XXMFB3
Internal output resistance	R_out	Ω		2		STK-616Z-XXMFB3
Rated linearity error	E_{LIN}	% I_{PN}		±1.5		±I_{PN}
Step response time	t_res	μs		0.05		@90% of I_pn STK-616Z-XXMFB3
Frequency bandwidth (-3dB)	BW	MHz		2		@-3dB STK-616Z-XXMFB3

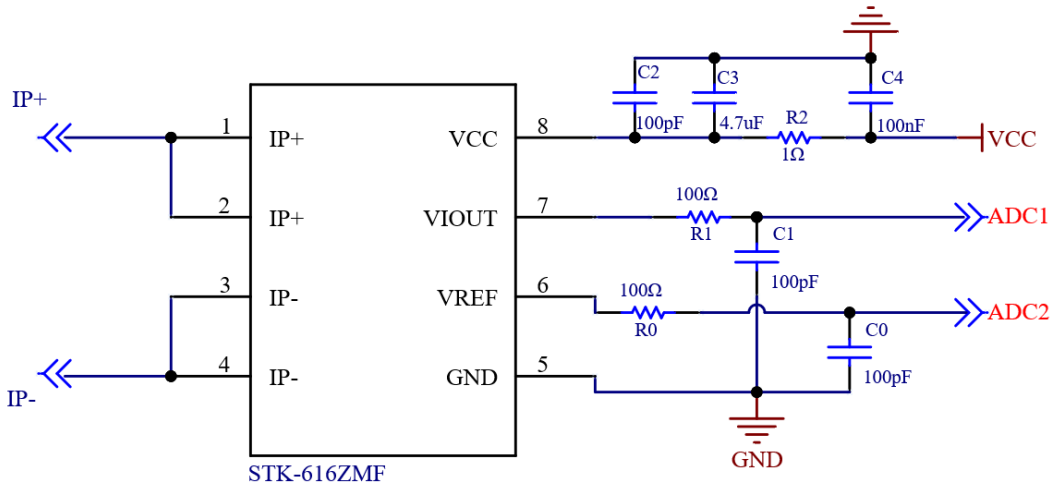
Output voltage noise	Vnoise	mVpp		10		@1.4 MHz
Accuracy @ 25℃	E_{TOT}	% of I_{PN}		±1.5		All
Accuracy @ -40℃ ~ 105℃	E_{TOT}	% of I_{PN}		±3.5		All

8. Electrical data STK-616Z-XXMFU3

Condition：T_A = 25℃, Vcc = 3.3 V

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Supply voltage	Vcc	V		3.3±5%		STK-616Z-XXMFU3
Current consumption	Icc	mA		6		STK-616Z-XXMFU3
Primary conductor resistance	R_pr	mΩ		0.9		STK-616Z-XXMFU3
Quiescent voltage Vout @ 0 A	$V_{IOUT(Q)}$	V		0.5±0.05		STK-616Z-XXMFU3
Zero Current Reference Voltage	V_{REF}	V		0.5±0.05		STK-616Z-XXMFU3
Peak output voltage (Vout @ +I_pm) –$V_{IOUT(Q)}$	V_FS	V		2.64		STK-616Z-XXMFU3
Internal output resistance	R_out	Ω		2		STK-616Z-XXMFU3
Rated linearity error	E_{LIN}	% I_{PN}		±1.5		±I_{PN}
Step response time	t_res	μs		0.05		@90% of I_pn STK-616Z-XXMFU3
Frequency bandwidth (-3dB)	BW	MHz		2		@-3dB STK-616Z-XXMFU3
Output voltage noise	Vnoise	mVpp		10		@1.4 MHz
Accuracy @ 25℃	E_{TOT}	% of I_{PN}		±1.5		All
Accuracy @ -40℃ ~ 105℃	E_{TOT}	% of I_{PN}		±3.5		All

9. Typical Application Circuit



10. Characteristic Definitions

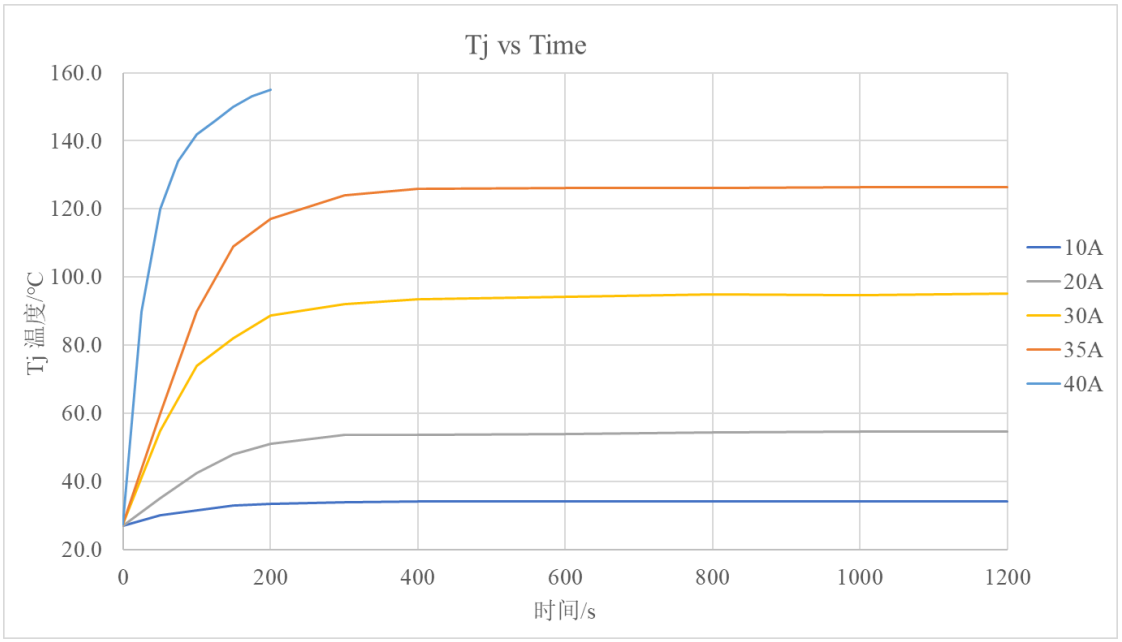
SENSITIVITY (Sens)

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.

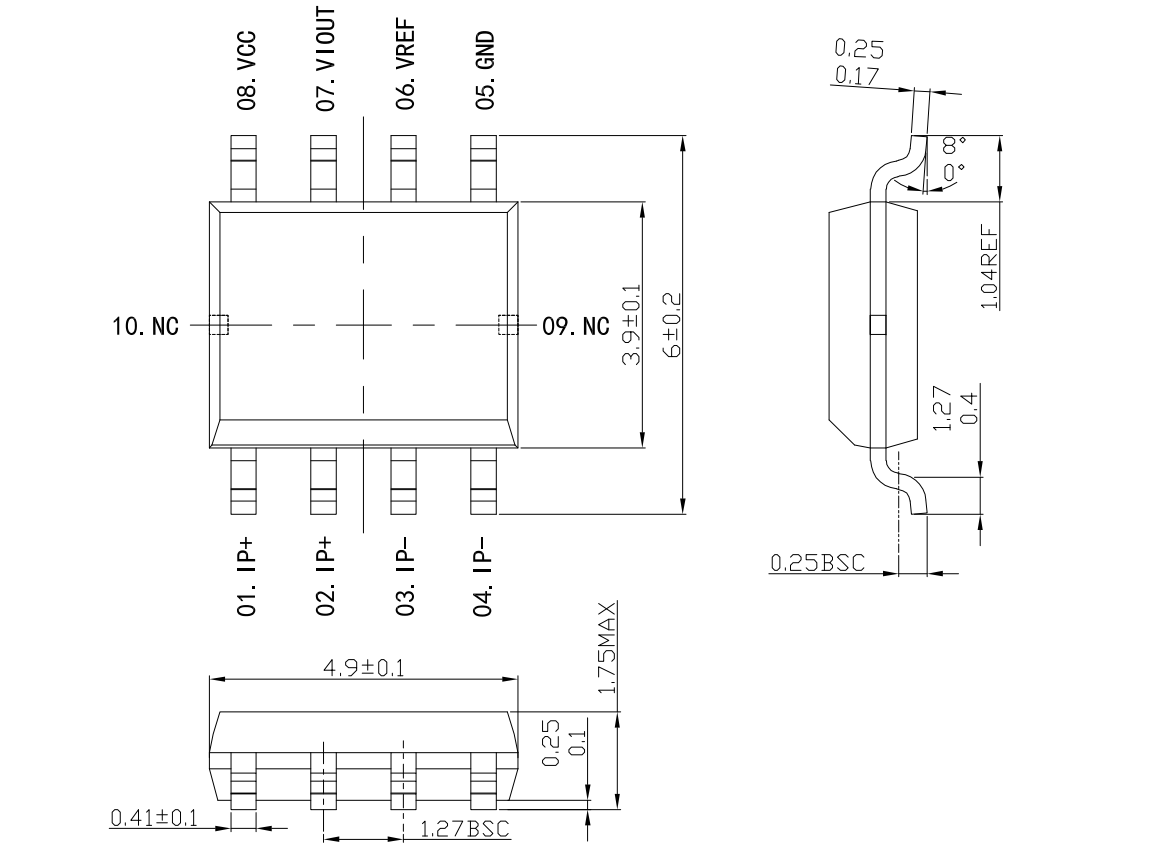
ZERO CURRENT OUTPUT VOLTAGE (VIOUT(Q))

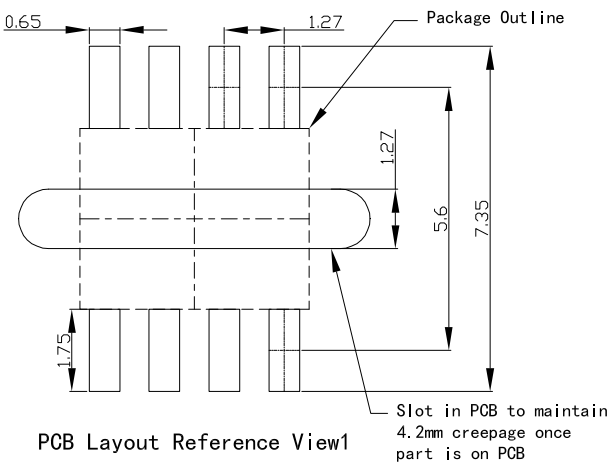
The output of the sensor when the primary current is zero. When the power supply is 5 V, it nominally remains at 2.5 V for a bidirectional device. When the power supply is 3.3 V, it nominally remains at 1.65 V for a bidirectional device.

11. Continues current vs working temperature

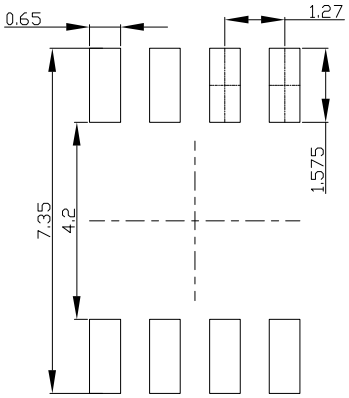


12. Dimension & Pin Definitions





PCB Layout Reference View1



PCB Layout Reference View2

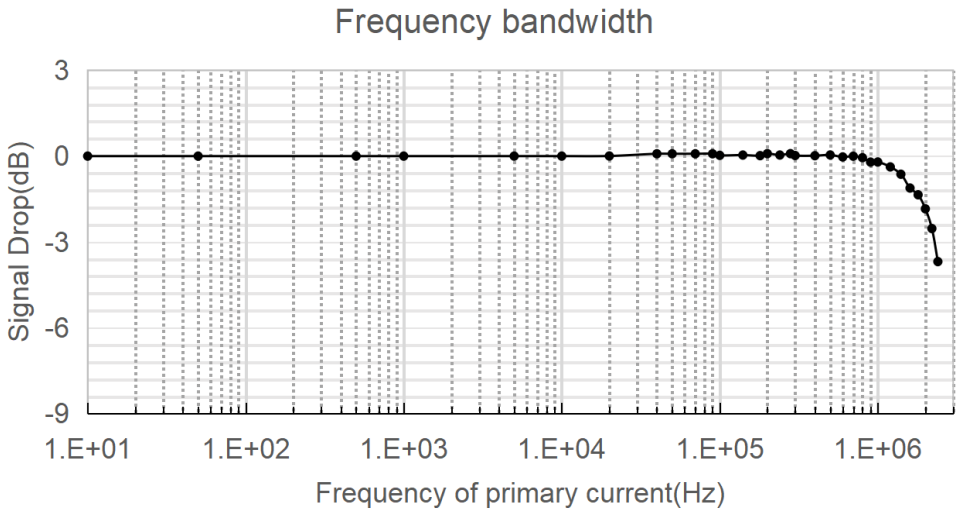
For PCB assemblies that cannot support a slotted design, the above stretched footprint may be used

13. Pin definitions

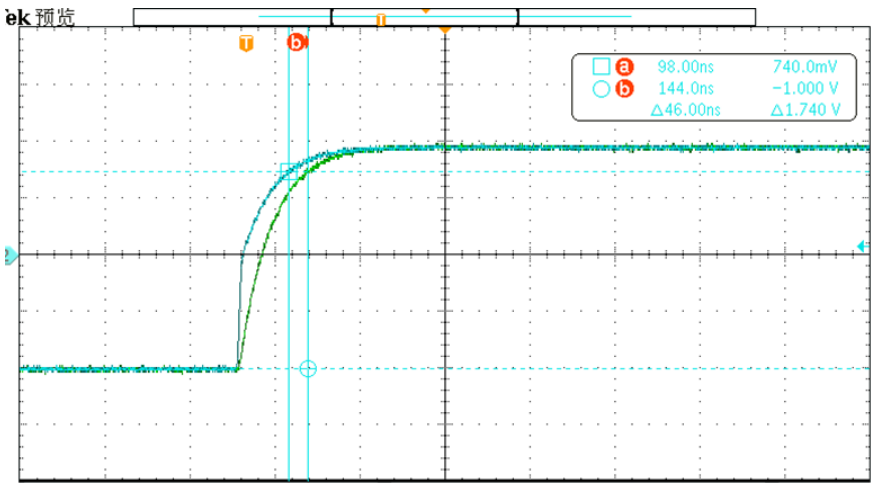
Pin definition for product with OCD function

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

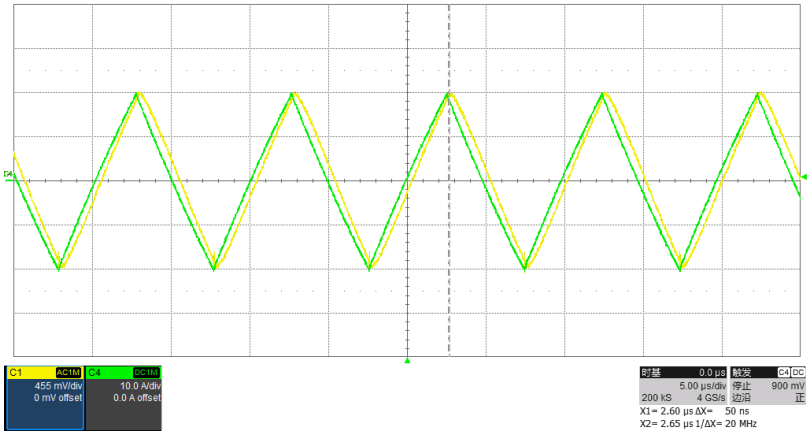


15. Step response time of STK-616Z-XXMFBX

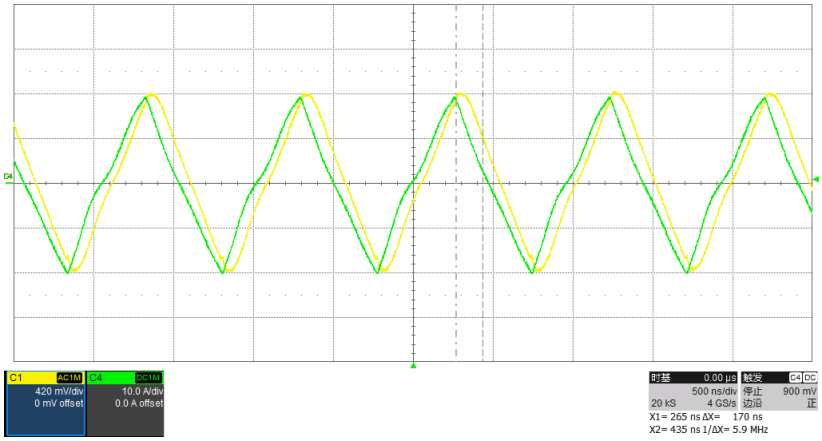


The typical frequency response of STK-616ZMF current sensor. The response time from 90% of the primary current to 90% of the secondary output is 0.05 μs.

16. The delay time of the Triangular wave



100 kHz Triangular delay---0.05µs

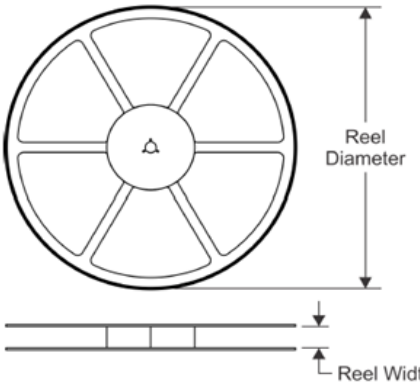


1 MHz Triangular delay---0.05µs

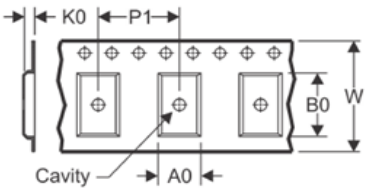
17. Package materials information

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



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