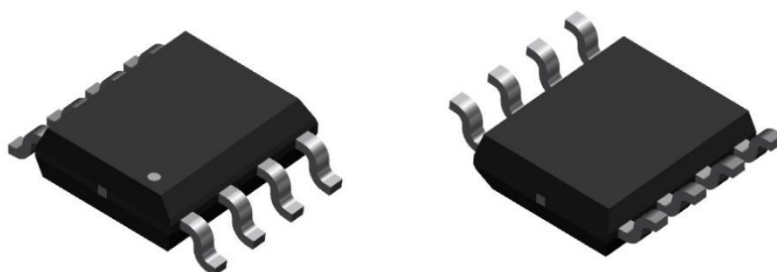


# Current Sensor

Product Series: STK-616ZMF

Part number: STK-616Z-20MFB3

Version: Ver 1.0



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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 <sub>A</sub>   | °C   | -40 ~ 125 |
| Storage temperature | T <sub>stg</sub> | °C   | -40 ~ 125 |
| Mass                | m                | g    | 0.1       |

### Absolute maximum rating

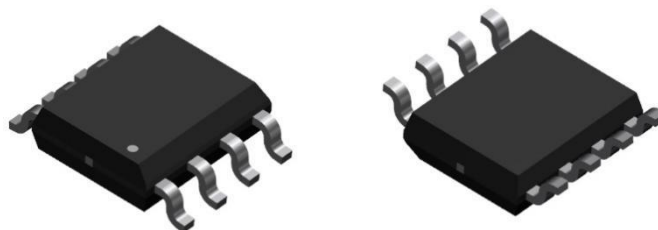
| Parameter        | Symbol           | Unit | Value |
|------------------|------------------|------|-------|
| Supply voltage   | V <sub>CC</sub>  | V    | 6     |
| ESD rating (HBM) | U <sub>ESD</sub> | kV   | 4     |

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

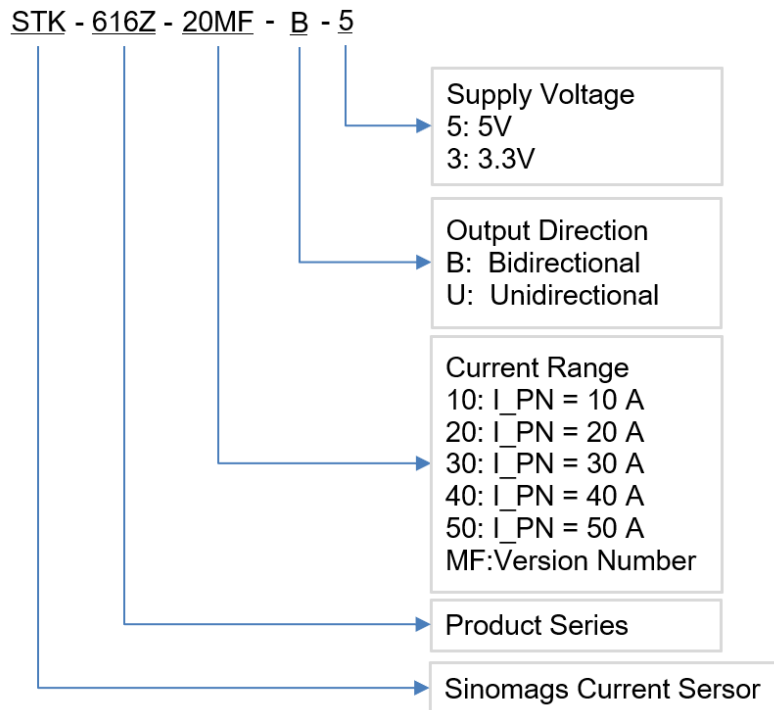
## 2. Package: SOIC8 compatible



### 3. Selection Guide

| Part Number     | Vcc(V) | Current Range (A) | Sensitivity (mV/A) | Offset (V) | Current Directionality | Top(°C) |
|-----------------|--------|-------------------|--------------------|------------|------------------------|---------|
| STK-616Z-20MFB3 | 3.3    | ±20               | 66                 | 1.65       | Bidirectional          | -40~125 |

### 4. Production Information

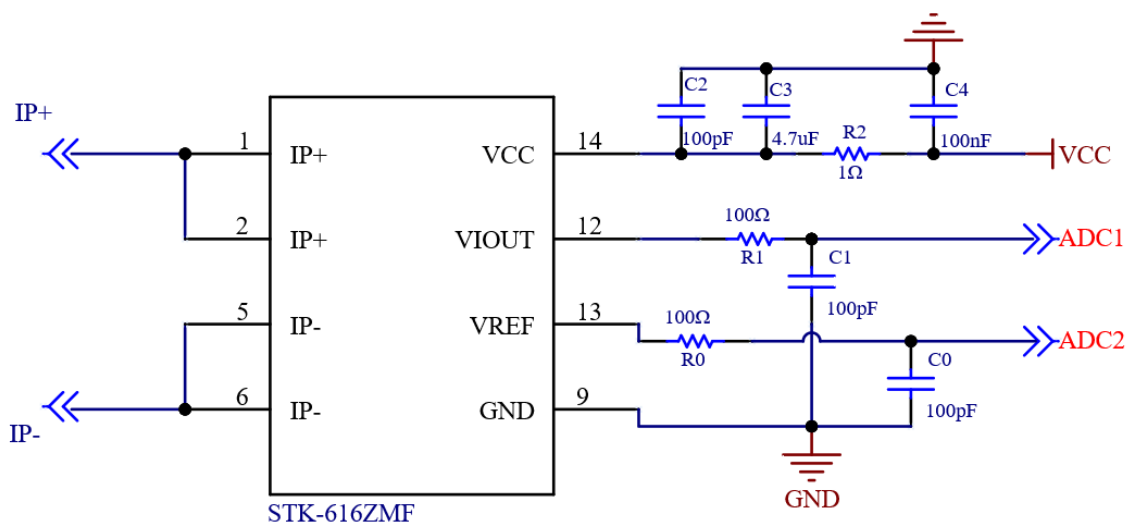


## 5. Electrical data STK-616Z-XXMFB3

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             |     | $3.3 \pm 5\%$   |     | STK-616Z-XXMFB3                     |
| Current consumption                                       | $I_{CC}$      | mA            |     | 6               |     | STK-616Z-XXMFB3                     |
| Primary conductor resistance                              | $R_{pr}$      | m $\Omega$    |     | 0.9             |     | STK-616Z-XXMFB3                     |
| Quiescent voltage<br>Vout @ 0 A                           | $V_{IOUT(Q)}$ | V             |     | $1.65 \pm 0.05$ |     | STK-616Z-XXMFB3                     |
| Zero Current Reference<br>Voltage                         | $V_{REF}$     | V             |     | $1.65 \pm 0.05$ |     | STK-616Z-XXMFB3                     |
| Peak output voltage<br>(Vout @ $+I_{pn}$ ) $-V_{IOUT(Q)}$ | $V_{FS}$      | V             |     | 1.32            |     | STK-616Z-XXMFB3                     |
| Internal output resistance                                | $R_{out}$     | $\Omega$      |     | 2               |     | STK-616Z-XXMFB3                     |
| Rated linearity error                                     | $E_{LIN}$     | % $I_{PN}$    |     | $\pm 1.5$       |     | $\pm I_{PN}$                        |
| Step response time                                        | $t_{res}$     | $\mu\text{s}$ |     | 0.05            |     | @90% of $I_{pn}$<br>STK-616Z-XXMFB3 |
| Frequency bandwidth (-3dB)                                | BW            | MHz           |     | 2               |     | @-3dB<br>STK-616Z-XXMFB3            |
| Output voltage noise                                      | $V_{noise}$   | mVpp          |     | 10              |     | @1.4 MHz                            |
| 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                                 |

## 6. Typical Application Circuit



## 7. Characteristic Definitions

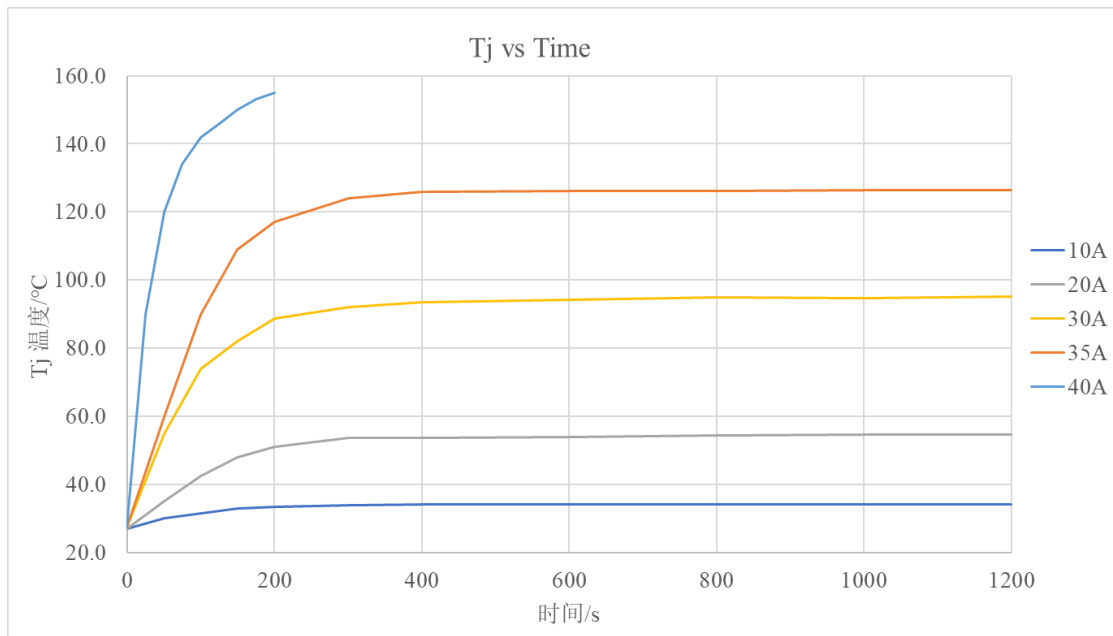
### **SENSITIVITY (Sens)**

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.

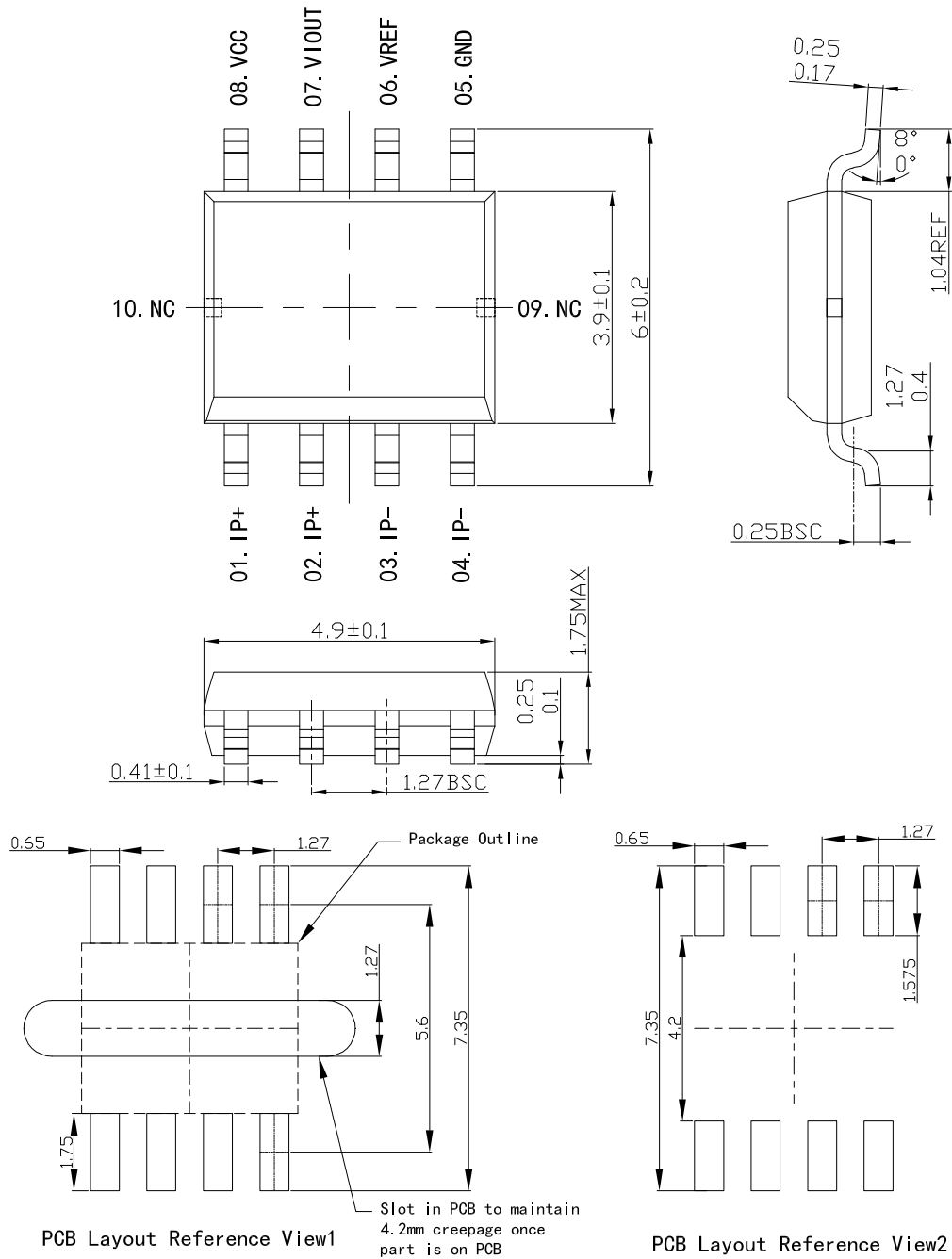
### **ZERO CURRENT OUTPUT VOLTAGE (VIOUT(Q))**

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.

## 8. Continues current vs working temperature



## 9. Dimension & Pin Definitions

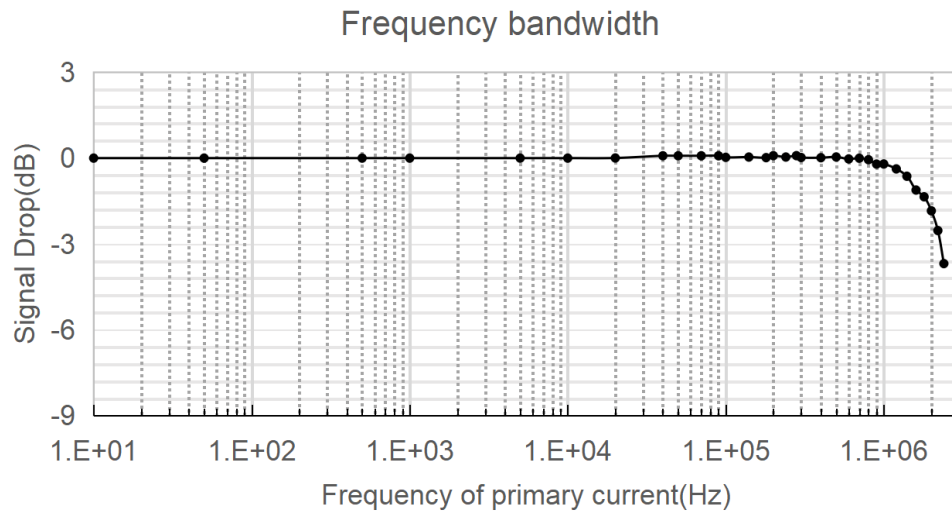


## 10. Pin definitions

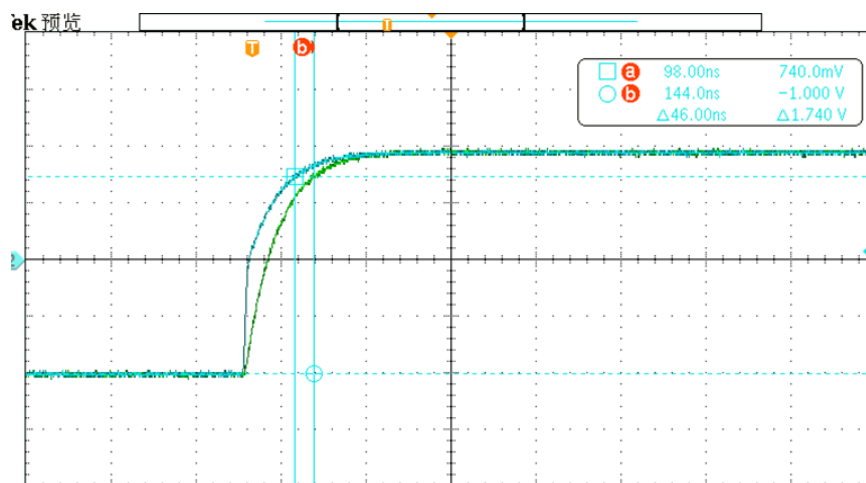
Pin definition for product with OCD function

| 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               |

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

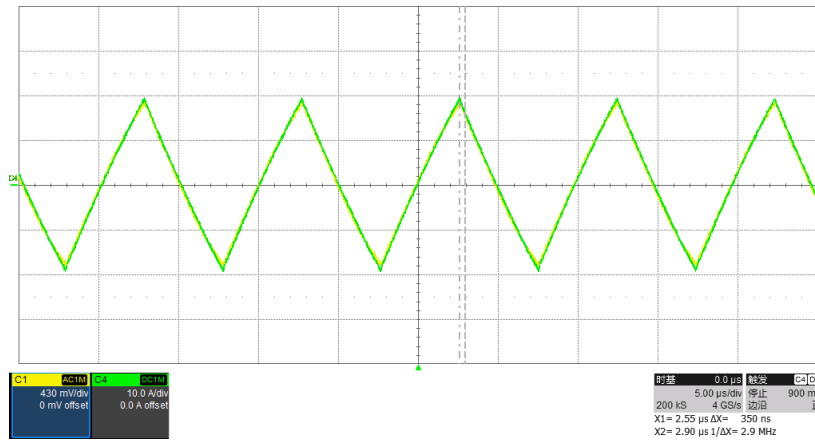


## 12. Step response time of STK-616Z-XXMFBX

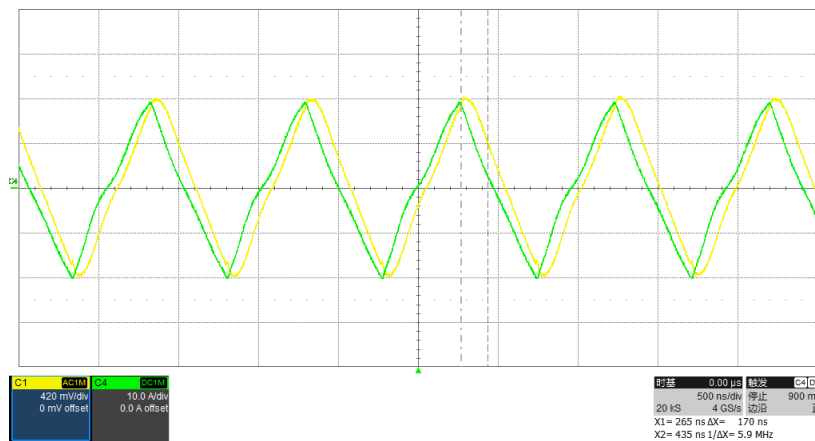


The typical frequency response of STK-616ZMF current sensor. The response time from 90% of the primary current to 90% of the secondary output is 0.05  $\mu$ s.

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



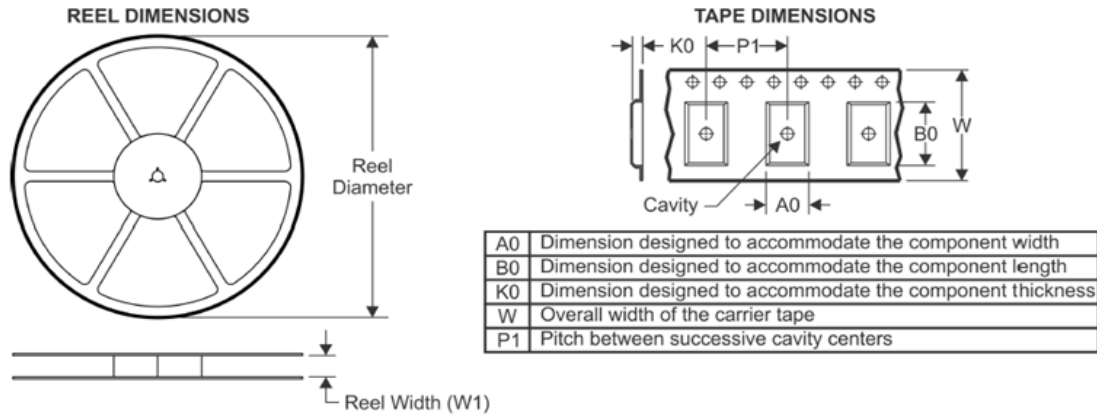
100 kHz Triangular delay---0.05μs



1 MHz Triangular delay---0.05μs

## 14. Package materials information

### TAPE AND REEL INFORMATION



### QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE

