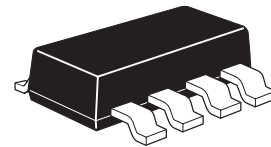


# ZMT31

## ANGLE SENSOR

### DESCRIPTION

The ZMT31 allows the contactless counting of the revolutions of a rotating magnet which is mounted on the axis of a wheel. Zero output voltages of the Wheatstones bridges are used as trigger signals. The sense of rotation of the wheel is taken into account by comparing the signal outputs of both Wheatstone bridges which are proportional to  $\sin 2(\alpha)$  or  $\sin 2(\alpha + 45^\circ)$ . The angle can be determined by evaluating these signals. Alternatively it is possible to use the voltage signals of four half bridges which are trimmed on  $V_B/2$ .



SM8

### FEATURES

- Measures the magnetic field hrot ( $> 50\text{kA/m}$ ) generated by a permanent magnet which rotates over the sensor
- Magnetic field hrot parallel to the chip surface causes a sinusoidal output signal
- Package : SM-8 (available on 12mm tape)

### APPLICATION

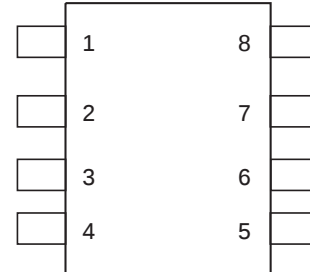
- Contactless counting of the revolutions of a rotating magnet (watermeters etc.)
- Contactless angular measurement
- Automotive (pedal position etc.)
- Contactless rotary switches
- Contactless potentiometer

### ORDERING INFORMATION

| DEVICE  | REEL SIZE | TAPE WIDTH | QUANTITY PER REEL |
|---------|-----------|------------|-------------------|
| ZMT31TA | 7         | 12mm       | 1000              |
| ZMT31TC | 13        | 12mm       | 4000              |

### DEVICE MARKING

- ZMT31



**Bridge1:** pin 1:  $-V_O$  pin 5:  $+V_O$   
pin 8:  $-V_B$  (GND) pin 4:  $+V_B$

**Bridge 2:** pin 2:  $-V_O$  pin 6:  $+V_O$   
pin 7:  $-V_B$  (GND) pin 3:  $+V_B$

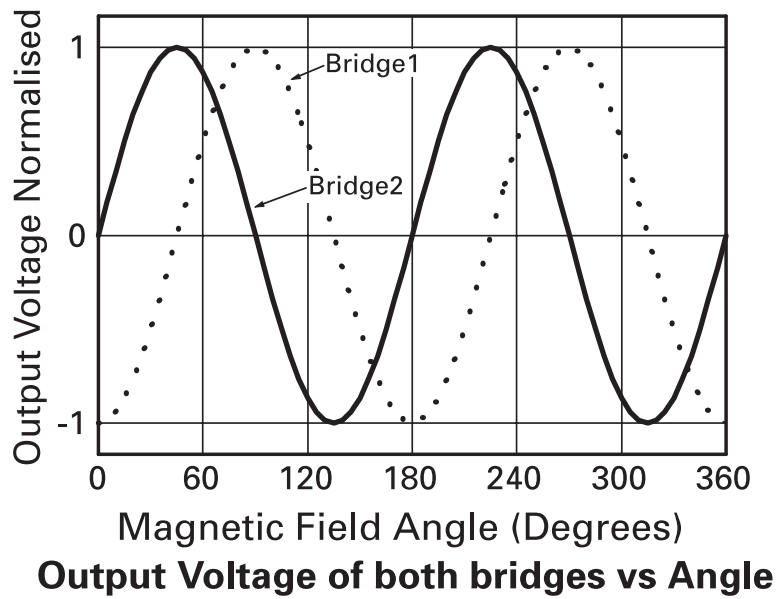
$V_O$  - output voltage  $V_B$  - supply voltage

# ZMT31

| PARAMETER                   | SYMBOL     | LIMIT       | UNIT |
|-----------------------------|------------|-------------|------|
| Supply voltage              | $V_B$      | 5           | V    |
| Total power dissipation     | $P_{tot}$  | 120         | mW   |
| Operating temperature range | $T_{amb}$  | -25 to +130 | °C   |
| Storage temperature range   | $T_{stg}$  | -40 to +130 | °C   |
| Sensor chip alignment error | $\alpha_e$ | $\leq 2$    | °    |

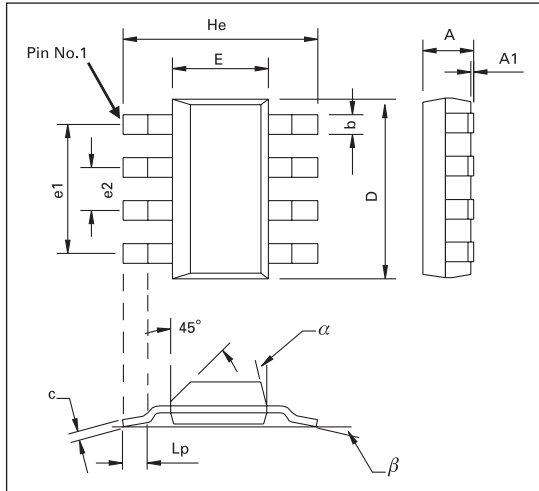
| PARAMETER                                                                         | SYMBOL                          | MIN.  | TYP.  | MAX.  | UNIT           | TEST CONDITIONS                                             |
|-----------------------------------------------------------------------------------|---------------------------------|-------|-------|-------|----------------|-------------------------------------------------------------|
| Bridge resistance                                                                 | $R_{br}$                        | 2.0   | 3.0   | 4.0   | k $\Omega$     |                                                             |
| Offset voltage                                                                    | $V_{Off} / V_B$                 | -2.0  |       | +2.0  | mV/V           | bridge 1: $\alpha=45^\circ$ ;<br>bridge 2: $\alpha=0^\circ$ |
| Sensitivity                                                                       | $S_\alpha$                      | 0.2   |       |       | (mV/V)/°       | bridge 1: $\alpha=0^\circ$ ;<br>bridge 2: $\alpha=45^\circ$ |
| Half bridge symmetry                                                              | $(V_S/2 - V_O)/V_B$             | -2.0  |       | +2.0  | mV/V           | bridge 1: $\alpha=0^\circ$ ;<br>bridge 2: $\alpha=45^\circ$ |
| Output voltage range                                                              | $( V_{max}  +  V_{min} ) / V_B$ | 16    |       |       | mV/V           |                                                             |
| Zero offset angle hysteresis                                                      | $\Delta\alpha$                  |       |       | 2     | °              |                                                             |
| Temperature coefficient of the bridge resistance -25°C < $T_{amb}$ < 100°C        | $T_{CBR}$                       | 0.25  | 0.30  | 0.35  | %/K            |                                                             |
| Temperature coefficient of the open circuit sensitivity -25°C < $T_{amb}$ < 100°C | $T_{CSV}$                       | -0.35 | -0.30 | -0.25 | %/K            | $V_B = \text{const.}$                                       |
|                                                                                   | $T_{CSI}$                       | -0.05 | 0     | 0.05  | %/K            | $I_B = \text{const}$                                        |
| Temperature coefficient of the offset voltage -25°C < $T_{amb}$ < 100°C           | $T_{COFF}$                      | -3    |       | +3    | ( $\mu$ V/V)/K |                                                             |

Output voltage of both Wheatstone bridges versus angle  $\alpha$  of the magnetic field direction



# ZMT31

## PACKAGE OUTLINE



Controlling dimensions are in millimeters. Approximate conversions are given in inches

## PACKAGE DIMENSIONS

| DIM | Millimeters |      |      | Inches |       |        | DIM      | Millimeters |     |      | Inches |       |        |
|-----|-------------|------|------|--------|-------|--------|----------|-------------|-----|------|--------|-------|--------|
|     | Min         | Max  | Typ. | Min    | Max   | Typ.   |          | Min         | Max | Typ. | Min    | Max   | Typ.   |
| A   | -           | 1.7  | -    | -      | 0.067 | -      | e1       | -           | -   | 4.59 | -      | -     | 0.1807 |
| A1  | 0.02        | 0.1  | -    | 0.008  | 0.004 | -      | e2       | -           | -   | 1.53 | -      | -     | 0.0602 |
| b   | -           | -    | 0.7  | -      | -     | 0.0275 | He       | 6.7         | 7.3 | -    | 0.264  | 0.287 | -      |
| c   | 0.24        | 0.32 | -    | 0.009  | 0.013 | -      | Lp       | 0.9         | -   | -    | 0.035  | -     | -      |
| D   | 6.3         | 6.7  | -    | 0.248  | 0.264 | -      | $\alpha$ | -           | 15° | -    | -      | 15°   | -      |
| E   | 3.3         | 3.7  | -    | 0.130  | 0.145 | -      | $\beta$  | -           | -   | 10°  | -      | -     | 10°    |

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ISSUE 4 - JUNE 2004