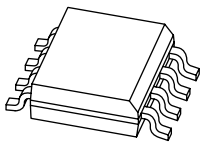


KMZ43T

Magnetic field sensor

Rev. 04 — 26 March 2008 Product data sheet

1. Product profile

1.1 General description

The KMZ43T is a sensitive magnetic field sensor, employing the magnetoresistive effect of thin-film permalloy. The sensor contains two galvanic separated Wheatstone bridges, at a relative angle of 45° to one another.

A rotating magnetic field in the x-y plane will produce two independent sinusoidal output signals, one a function of +cos(2α) and the second a function of +sin(2α), α being the angle between sensor and field direction (see Figure 2). The KMZ43T is suited to high precision angle measurement applications under low field conditions (saturation field strength 25 kA/m).

The sensor can be operated at any frequency between 0 Hz and 1 MHz.

1.2 Features

- Accurate and reliable angle measurement
- Mechanical robustness, contactless principle
- Wear-free operation
- Accuracy independent on mechanical tolerances
- Extended temperature range

1.3 Applications

- Steering angle and torsion
- Headlight adjustment
- Motor positioning
- Window wipers
- Fuel level
- Mirror positioning

1.4 Quick reference data

Table 1. Quick reference data

T_{amb} = 25 °C and H_{ext} = 25 kA/m; V_{CC} = 5 V; unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CC}	supply voltage		[1]	-	5	9	V
V_{peak}	peak output voltage	see Figure 2	[1]	60	67	75	mV
V_{offset}	offset voltage	per supply voltage; see Figure 2	[1]	–2	-	+2	mV/V
R_{bridge}	bridge resistance		[1][2]	2.7	3.2	3.7	kΩ

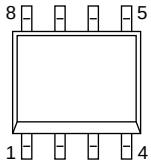
[1] Applicable for bridge 1 and bridge 2.

[2] Bridge resistance between pin 4 to pin 8, pin 3 to pin 7, pin 1 to pin 5 and pin 2 to pin 6.

2. Pinning information

Table 2. Pinning

Pin	Symbol	Description	Simplified outline
1	ON1	output voltage bridge 1	
2	ON2	output voltage bridge 2	
3	V_{CC2}	supply voltage bridge 2	
4	V_{CC1}	supply voltage bridge 1	
5	OP1	output voltage bridge 1	
6	OP2	output voltage bridge 2	
7	GND2	ground 2	
8	GND1	ground 1	



3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
KMZ43T	SO8	plastic small outline package; 8 leads; body width 3.9 mm	SOT96-1

4. Circuit diagram

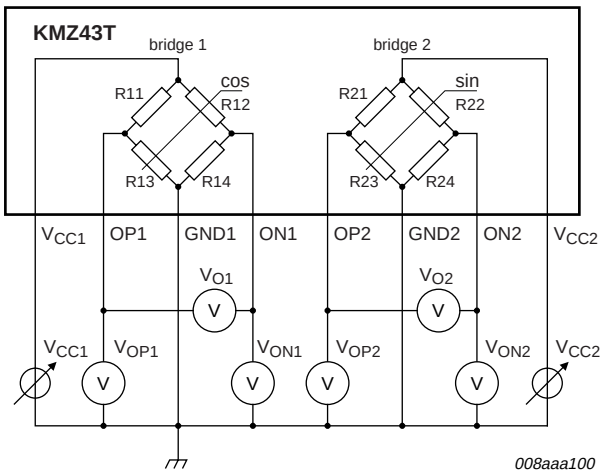


Fig 1. Device and test circuit diagram

5. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CC}	supply voltage	[1]	-	9	V
H_{ext}	external magnetic field strength		25	-	kA/m
T_{amb}	ambient temperature		–40	+150	°C
T_{stg}	storage temperature		–65	+150	°C

[1] Applicable for bridge 1 and bridge 2.

6. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient		155	K/W

7. Characteristics

Table 6. Characteristics

T_{amb} = 25 °C and H_{ext} = 25 kA/m; V_{CC} = 5 V; unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CC}	supply voltage		[1]	-	5	9	V
V_{peak}	peak output voltage	see Figure 2	[1]	60	67	75	mV
TC_{Vpeak}	temperature coefficient of peak output voltage	T_{amb} = –40 °C to +150 °C	[1][2]	–0.25	–0.29	–0.33	%/K
R_{bridge}	bridge resistance		[1][3]	2.7	3.2	3.7	kΩ
$TC_{Rbridge}$	temperature coefficient of bridge resistance	T_{amb} = –40 °C to +150 °C	[1][4]	0.28	0.32	0.35	%/K
V_{offset}	offset voltage	per supply voltage; see Figure 2	[1]	–2	-	+2	mV/V
$TC_{Voffset}$	temperature coefficient of offset voltage	per supply voltage; T_{amb} = –40 °C to +150 °C; see Figure 2	[1][5]	–4	-	+4	(μV/V)/K
FH	hysteresis of output voltage	see Figure 3	[1][6]	0	0.05	0.18	%FS
k	amplitude synchronism		[7]	99.5	100	100.5	%
TC_k	temperature coefficient of amplitude synchronism	T_{amb} = –40 °C to +150 °C	[8]	–0.01	-	+0.01	%/K
Δα	angular inaccuracy		[9]	0	0.05	0.1	deg

[1] Applicable for bridge 1 and bridge 2.

[2] $$TC_{Vpeak} = 100 \times \frac{V_{peak}(at\ 150\ °C) - V_{peak}(at\ -40\ °C)}{V_{peak}(at\ 25\ °C) \times (150\ °C - (-40\ °C))}$$

[3] Bridge resistance between pin 4 to pin 8, pin 3 to pin 7, pin 1 to pin 5 and pin 2 to pin 6.

[4] $$TC_{Rbridge} = 100 \times \frac{R_{bridge}(at\ 150\ °C) - R_{bridge}(at\ -40\ °C)}{R_{bridge}(at\ 25\ °C) \times (150\ °C - (-40\ °C))}$$

[5] $$TC_{Voffset} = \frac{V_{offset}(at\ 150\ °C) - V_{offset}(at\ -40\ °C)}{150\ °C - (-40\ °C)}$$

[6] $$FH_1 = 100 \times \left| \frac{V_{O1}(67.5°)135° \rightarrow 45° - V_{O1}(67.5°)45° \rightarrow 135°}{2 \times V_{peak1}} \right|$$

$$FH_2 = 100 \times \left| \frac{V_{O2}(22.5°)90° \rightarrow 0° - V_{O2}(22.5°)0° \rightarrow 90°}{2 \times V_{peak2}} \right|$$

[7] $$k = 100 \times \frac{V_{peak1}}{V_{peak2}}$$

[8] $$TC_k = 100 \times \frac{k(at\ 150\ °C) - k(at\ -40\ °C)}{k(at\ 25\ °C) \times (150\ °C - (-40\ °C))}$$

[9] $\Delta\alpha = |\alpha_{real} - \alpha_{meas}|$; V_{offset} = 0 V; inaccuracy of angular measurement due to deviations from ideal sinusoidal characteristics, calculated from the third and fifth harmonics of the spectrum V_O.

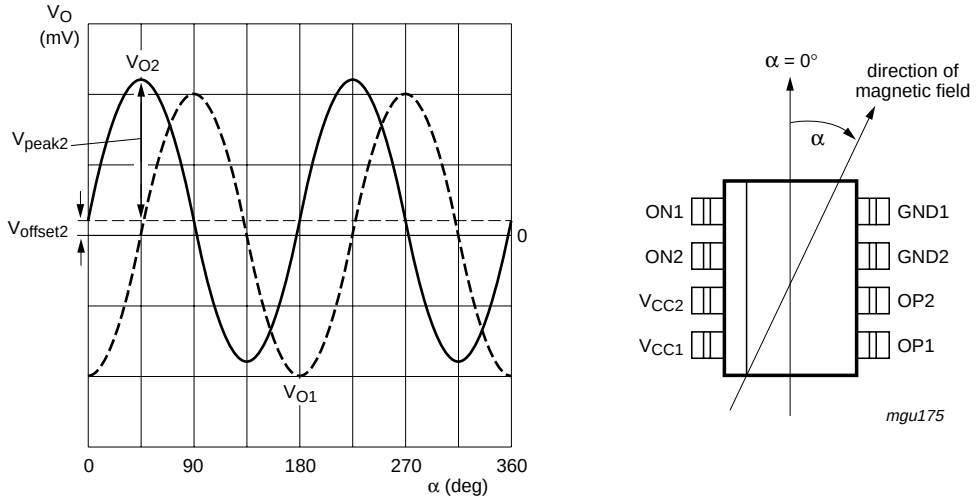


Fig 2. Output signals related to the direction of the magnetic field

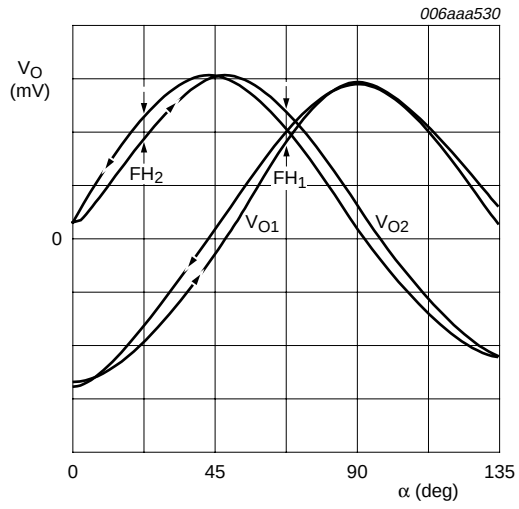


Fig 3. Definition of hysteresis

8. Package outline

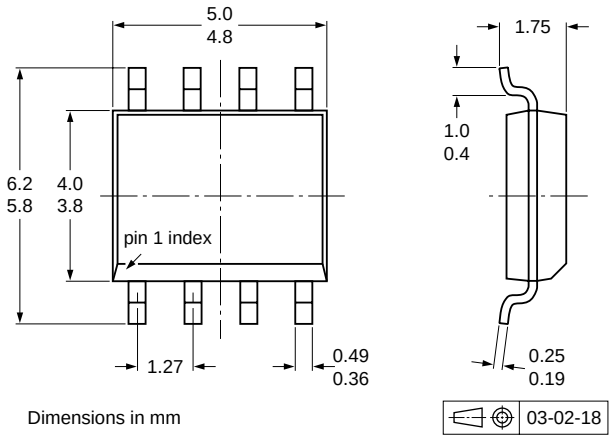


Fig 4. Minimized package outline SOT96-1

9. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
KMZ43T_4	20080326	Product data sheet	-	KMZ43T_3
Modifications:	• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate.			
KMZ43T_3	20030915	Product specification	-	KMZ43T_2
KMZ43T_2	20030326	Preliminary specification	-	KMZ43_1
KMZ43_1	20000824	Objective specification	-	-

10. Legal information

10.1 Data sheet status

Document status[1][2]	Product status[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nxp.com.

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