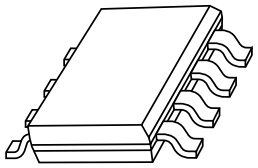
DATA SHEET



KMZ43T
Magnetic field sensor

Preliminary specification
Supersedes data of 2000 Aug 24

2003 Mar 26

Philips
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Magnetic field sensor KMZ43T

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, which enclose an angle of 45°.

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 Fig.3). Unlike the KMZ41[1], which needs a saturation field strength of 100 kA/m, the KMZ43 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 DC and 1 MHz.

(1) The KMZ41 delivers a +sin(2α) and a –cos(2α) signal.

PINNING

PIN	SYMBOL	DESCRIPTION
1	$-V_{O1}$	output voltage bridge 1
2	$-V_{O2}$	output voltage bridge 2
3	V_{CC2}	supply voltage bridge 2
4	V_{CC1}	supply voltage bridge 1
5	$+V_{O1}$	output voltage bridge 1
6	$+V_{O2}$	output voltage bridge 2
7	GND2	ground 2
8	GND1	ground 1

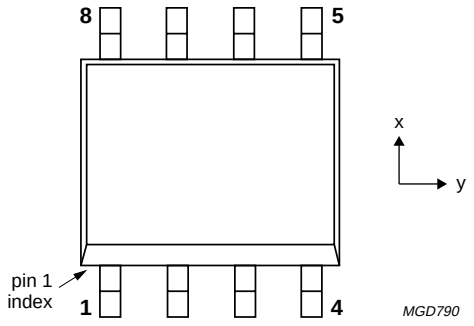


Fig.1 Simplified outline SOT96-1.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT
V_{CC1}	operating voltage bridge 1	–	5	9	V
V_{CC2}	operating voltage bridge 2	–	5	9	V
S	sensitivity (α_2 = 0°; α_1 = 135°)	2.1	2.35	2.6	mV/°
V_{offset}	offset voltage per supply voltage	–2	–	+2	mV/V
R_{bridge}	bridge resistance per bridge	2.5	3	3.5	kΩ

CIRCUIT DIAGRAM

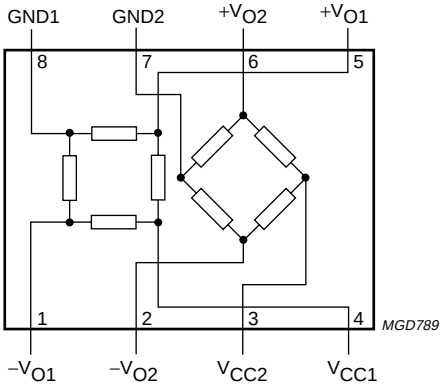


Fig.2 Simplified circuit diagram.

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CC1}	operating voltage bridge 1		–	9	V
V_{CC2}	operating voltage bridge 2		–	9	V
P_{tot}	total power dissipation	$V_{CC1} = V_{CC2} = 9$ V; $R_{bridge} = 3$ kΩ	–	54	mW
T_{stg}	storage temperature		–65	+150	°C
T_{amb}	operating temperature		–40	+150	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	VALUE	UNIT
$R_{th\ j\text{-}a}$	thermal resistance from junction to ambient	155	K/W

CHARACTERISTICS

T_{amb} = 25 °C and $H_{rotation}$ = 25 kA/m; V_{CC1} = 5 V; V_{CC2} = 5 V; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{CC1}	supply voltage bridge 1		–	5	9	V
V_{CC2}	supply voltage bridge 2		–	5	9	V
V_{offset}	offset voltage per supply voltage	see Fig.3	–2	0	+2	mV/V
ω	operating angular velocity		0	–	1	MHz
k	amplitude synchronism	note 9	99.5	100	100.5	%
TC_k	temperature coefficient of amplitude synchronism	T_{amb} = –40 to +150 °C; note 10	–0.01	0	–0.01	%/K
$\Delta\alpha$	angular inaccuracy	note 11	0	0.05	0.1	°
Per bridge						
S	sensitivity	open circuit; note 1				
		α_1 = 135° (bridge 1)	2.1	2.35	2.6	mV/°
		α_2 = 0° (bridge 2)	2.1	2.35	2.6	mV/°
TC_S	temperature coefficient of sensitivity	T_{amb} = –40 to +150 °C; note 2	0.25	0.29	0.33	%/K
V_{peak}	peak output voltage	note 3; see Fig.3	60	67	75	mV
TC_{Vpeak}	temperature coefficient of peak output voltage	T_{amb} = –40 to +150 °C; note 4	–0.25	–0.29	–0.33	%/K
R_{bridge}	bridge resistance	note 5	2.5	3	3.5	kΩ
$TC_{Rbridge}$	temperature coefficient of bridge resistance	T_{amb} = –40 to +150 °C; note 6	0.28	0.32	0.35	%/K
$TC_{Voffset}$	temperature coefficient of offset voltage	T_{amb} = –40 to +150 °C; note 7; see Fig.3	–4	0	+4	(μV/V)/K
FH	hysteresis of output voltage	note 8	0	0.03	0.1	%FS
			-	40	–	μV
THD	total harmonic distortion	note 12	–65	–50	–35	dB

Notes

1. Sensitivity changes with angle due to sinusoidal output.
2. $TC_S = 100 \times \frac{S_{T2} - S_{T1}}{S_{T1} \times 190°C}$ where T_1 = –40 °C; T_2 = 150 °C.
3. $V_{peak} = |(V_{out\ max} - V_{offset})|$. Periodicity of V_{peak}: sin(2α) and cos(2α) respectively.
4. $TC_{Vpeak} = 100 \times \frac{V_{Vpeak(T2)} - V_{peak(T1)}}{V_{peak(T1)} \times 190°C}$ where T_1 = –40 °C; T_2 = 150 °C.
5. Bridge resistance between pins 8 and 4, pins 7 and 3, pins 5 and 1, and pins 6 and 2.
6. $TC_{Rbridge} = 100 \times \frac{R_{bridge(T2)} - R_{bridge(T1)}}{R_{bridge(T1)} \times 190°C}$ where T_1 = –40 °C; T_2 = 150 °C.

7. $TC_{Voffset} = \frac{V_{offset(T_2)} - V_{offset(T_1)}}{190°C}$ where $T_1 = -40$ °C; $T_2 = 150$ °C.

8. $FH_1 = 100 \times \left| \frac{V_{O1(67.5°)\ 135° \Rightarrow 45°} - V_{O1(67.5°)\ 45° \Rightarrow 135°}}{2 \times V_{peak1}} \right|$.

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

9. $k = 100 \times \frac{V_{peak1}}{V_{peak2}}$.

10. $TC_k = 100 \times \frac{k_{T2} - k_{T1}}{k_{T1} \times 190°C}$ where $T_1 = -40$ °C; $T_2 = 150$ °C.

11. $\Delta\alpha = |\alpha_{real} - \alpha_{measured}|$ without offset voltage influences due to deviations from ideal sinusoidal characteristics.

12. THD = sum of all output signals with a periodicity of 4α, 6α, 8α, 10α, 12α, 14α, 16α and 18α.

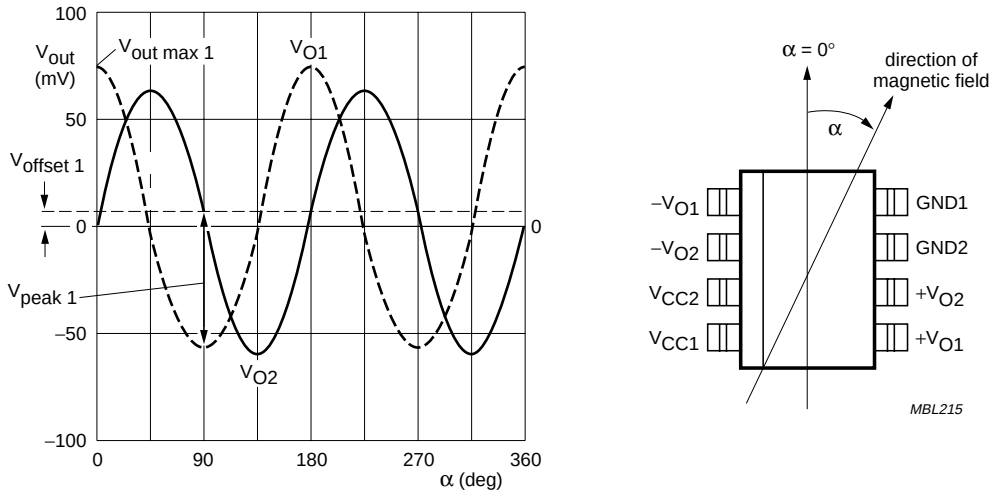
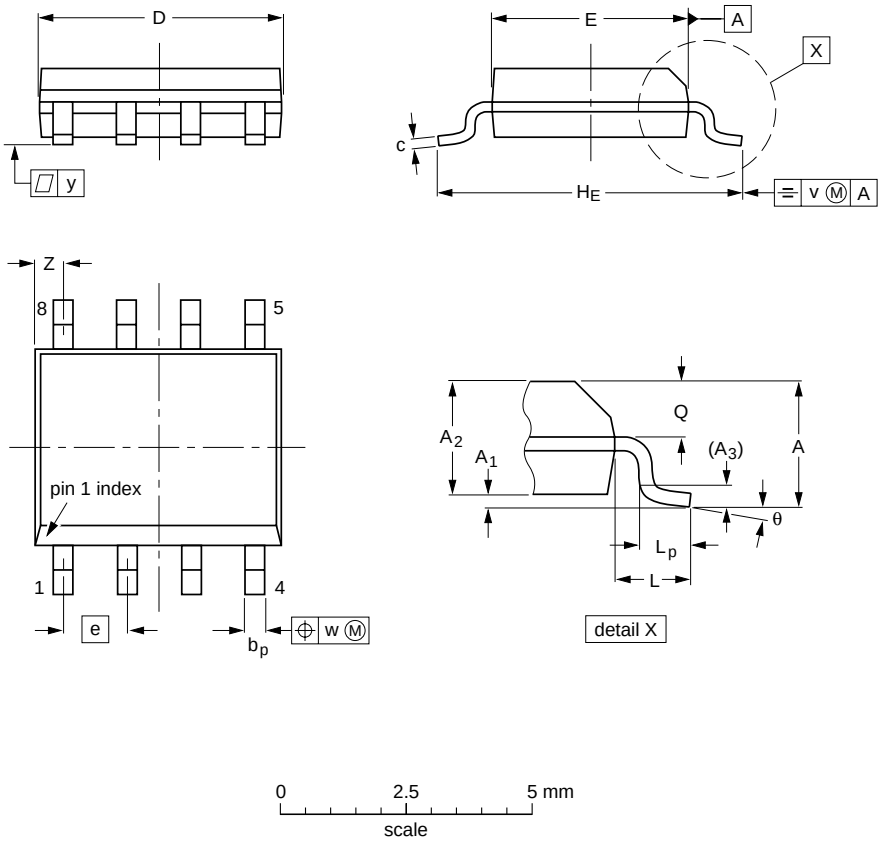


Fig.3 Output signals related to the direction of the magnetic field.

PACKAGE OUTLINE

SO8: plastic small outline package; 8 leads; body width 3.9 mm **SOT96-1**



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(2)}$	e	H_E	L	L_p	Q	v	w	y	$Z^{(1)}$	θ
mm	1.75	0.25 0.10	1.45 1.25	0.25	0.49 0.36	0.25 0.19	5.0 4.8	4.0 3.8	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8^o 0^o
inches	0.069	0.010 0.004	0.057 0.049	0.01	0.019 0.014	0.0100 0.0075	0.20 0.19	0.16 0.15	0.05	0.244 0.228	0.041	0.039 0.016	0.028 0.024	0.01	0.01	0.004	0.028 0.012	

Notes

1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.
2. Plastic or metal protrusions of 0.25 mm (0.01 inch) maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT96-1	076E03	MS-012				~~99-12-27~~ 03-02-18

DATA SHEET STATUS

LEVEL	DATA SHEET STATUS(1)	PRODUCT STATUS(2)(3)	DEFINITION
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