

KMZ41 Magnetic field sensor Rev. 6 — 18 November 2010

**Product data sheet** 

## 1. Product profile

## 1.1 General description

The KMZ41 is a sensitive magnetic field sensor, employing the magneto-resistive effect of thin film permalloy. The sensor contains two galvanically separated Wheatstone bridges, which enclose an angle of 45 degrees.

A rotating magnetic field strength > 40 kA/m (recommended field strength > 100 kA/m) in the surface parallel to the chip (x-y plane) will deliver two independent sinusoidal output signals, one following a  $\cos(2\alpha)$  and the second following a  $\sin(2\alpha)$  function.

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

### 1.2 Features and benefits

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

## 1.3 Quick reference data

### Table 1. Quick reference data

 $T_{amb} = 25$  °C and  $H_{ext} = 100$  kA/m,  $V_{CC} = 5$  V unless otherwise specified.

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
V <sub>CC</sub>	supply voltage		<u>[1]</u> _	5	9	V
V <sub>peak</sub>	peak voltage	see Figure 2	[1] 73	81	89	mV
V <sub>offset</sub>	offset voltage	per supply voltage; see <u>Figure 2</u>	<u>[1]</u> –2	-	+2	mV/V
R <sub>bridge</sub>	bridge resistance		[1][2] 2.0	2.5	3.0	kΩ

[1] Applicable for bridge 1 and bridge 2.

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



**Magnetic field sensor** 

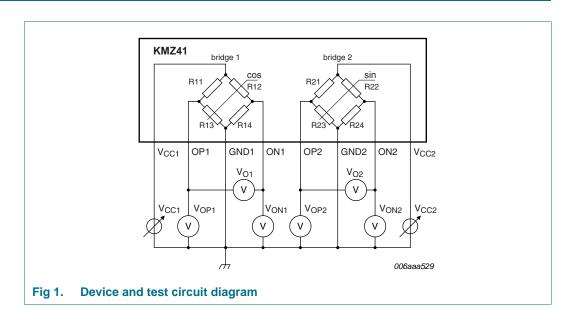
# 2. Pinning information

Table	e 2. Pinning		
Pin	Symbol	Description	Simplified outline
1	ON1	output voltage bridge 1	
2	ON2	output voltage bridge 2	8 <u> </u>
3	V <sub>CC2</sub>	supply voltage bridge 2	↓ ↓ v
4	V <sub>CC1</sub>	supply voltage bridge 1	1日日日4 mgd790
5	OP1	output voltage bridge 1	mga790
6	OP2	output voltage bridge 2	
7	GND2	supply voltage bridge 2	
8	GND1	supply voltage bridge 1	

# 3. Ordering information

Table 3. Ordering information					
Type number	Package	,			
	Name	Description	Version		
KMZ41	SO8	plastic small outline package; 8 leads; body width 3.9 mm	SOT96-1		

# 4. Circuit diagram



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## Magnetic field sensor

# 5. Limiting values

Symbol	Parameter	Conditions	Min	Max	Unit
V <sub>CC</sub>	supply voltage		<u>[1]</u> -	9	V
H <sub>ext</sub>	external magnetic field strength		40	-	kA/m
T <sub>amb</sub>	ambient temperature		-40	+150	°C
T <sub>stg</sub>	storage temperature		-65	+150	°C

[1] Applicable for bridge 1 and bridge 2.

# 6. Thermal characteristics

Table 5.	Thermal characteristics			
Symbol	Parameter	Conditions	Тур	Unit
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient		155	K/W

### Magnetic field sensor

## 7. Characteristics

### Table 6. Characteristics

 $T_{amb} = 25 \text{ °C}$  and  $H_{ext} = 100 \text{ kA/m}$ ,  $V_{CC} = 5 \text{ V}$  unless otherwise specified.

Symbol	Parameter	Conditions		Min	Тур	Max	Unit
V <sub>CC</sub>	supply voltage		<u>[1]</u>	-	5	9	V
V <sub>peak</sub>	peak voltage	see Figure 2	<u>[1]</u>	73	81	89	mV
TCV <sub>peak</sub>	temperature coefficient of peak voltage	$T_{amb} = -40 \text{ °C to } +150 \text{ °C}$	<u>[1][2]</u>	-0.38	-0.41	-0.44	%/K
R <sub>bridge</sub>	bridge resistance		<u>[1][3]</u>	2.0	2.5	3.0	kΩ
TCR <sub>bridge</sub>	temperature coefficient of bridge resistance	$T_{amb} = -40 \text{ °C to } +150 \text{ °C}$	<u>[1][4]</u>	0.31	0.33	0.35	%/K
V <sub>offset</sub>	offset voltage	per supply voltage; see <u>Figure 2</u>	<u>[1]</u>	-2	-	+2	mV/V
TCV <sub>offset</sub>	temperature coefficient of offset voltage	per supply voltage; $T_{amb} = -40 \text{ °C to +150 °C};$ see <u>Figure 2</u>	<u>[1][5]</u>	-2	-	+2	(μV/V)/K
FH	hysteresis of output voltage	see Figure 3	[1][6]	0	0.01	0.04	%FS
k	amplitude synchronism		[7]	99	100	101	%
TCk	temperature coefficient of amplitude synchronism	$T_{amb}$ = -40 °C to +150 °C	<u>[8]</u>	-0.005	0	+0.005	%/K
Δα	angular inaccuracy		[9]	0	0.1	0.25	deg

[1] Applicable for bridge 1 and bridge 2.

[2] 
$$TCV_{peak} = 100 \times \frac{V_{peak}(at \ 150 \ ^\circ C) - V_{peak}(at \ -40 \ ^\circ C)}{V_{peak}(at \ 25 \ ^\circ C) \times (150 \ ^\circ C - (-40 \ ^\circ C))}$$

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

$$[4] \quad TCR_{bridge} = 100 \times \frac{R_{bridge}(at \ 150 \ ^\circ C) - R_{bridge}(at \ -40 \ ^\circ C)}{R_{bridge}(at \ 25 \ ^\circ C) \times (150 \ ^\circ C - (-40 \ ^\circ C))}$$

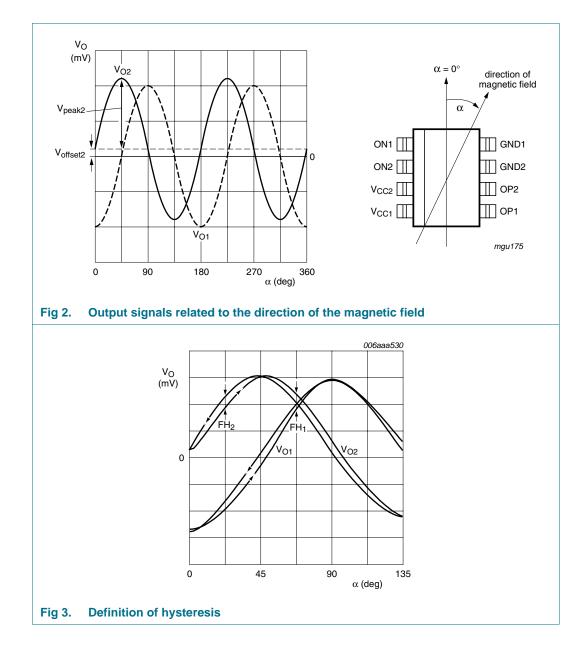
$$[5] \quad TCV_{offset} = \frac{V_{offset}(at \ 150 \ ^{\circ}C) - V_{offset}(at \ -40 \ ^{\circ}C)}{150 \ ^{\circ}C - (-40 \ ^{\circ}C)}$$

$$[6] \quad FH_1 = 100 \times \left| \frac{V_{O1}(67.5^\circ)135^\circ \to 45^\circ - V_{O1}(67.5^\circ)45^\circ \to 135^\circ}{2 \times V_{peak1}} \right|$$
$$FH_2 = 100 \times \left| \frac{V_{O2}(22.5^\circ)90^\circ \to 0^\circ - V_{O2}(22.5^\circ)0^\circ \to 90^\circ}{2 \times V_{peak2}} \right|$$

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

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

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

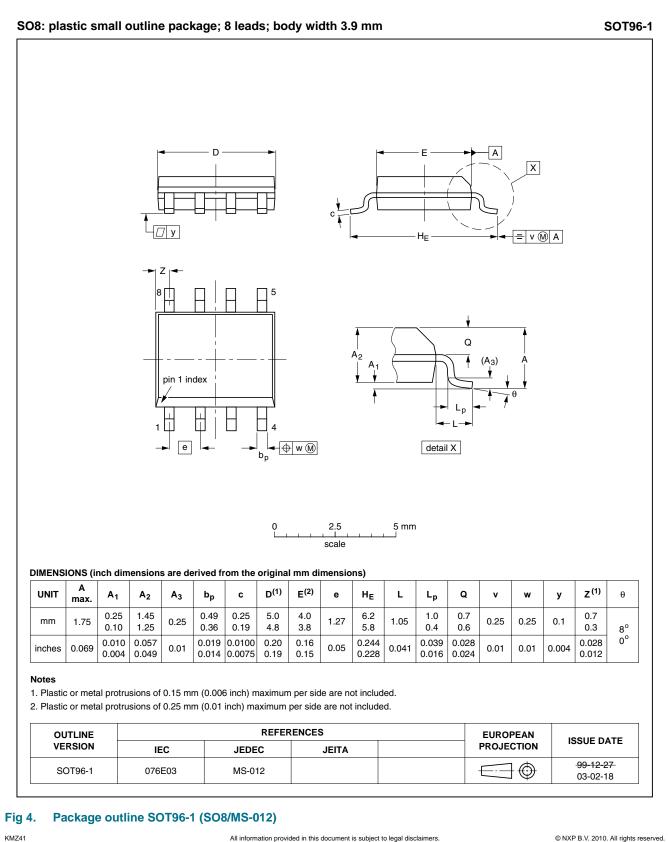


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#### **Package outline** 8.



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## 9. Packing information

### Table 7. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.[1]

Type number	Package	Description	Packing quantity
			2500
KMZ41	SOT96-1	8 mm pitch, 12 mm tape and reel	-118

[1] 12NC ordering code: 9340 372 10118. For further information and the availability of packing methods, see Section 12.

## **10. Revision history**

### Table 8.Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
KMZ41 v.6	20101118	Product data sheet	CPCN201007013F	KMZ41_5
KMZ41_5	20061127	Product data sheet	-	KMZ41_4

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Document status[1][2]	Product status <sup>[3]</sup>	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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Date of release: 18 November 2010 Document identifier: KMZ41