

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	Typ	Max	Unit
V_{CC}	supply voltage		[1] -	5	9	V
V_{peak}	peak voltage	see Figure 2	[1] 73	81	89	mV
V_{offset}	offset voltage	per supply voltage; see Figure 2	[1] -2	-	+2	mV/V
R_{bridge}	bridge resistance		[1][2] 2.0	2.5	3.0	k Ω

[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.



2. Pinning information

Table 2. Pinning

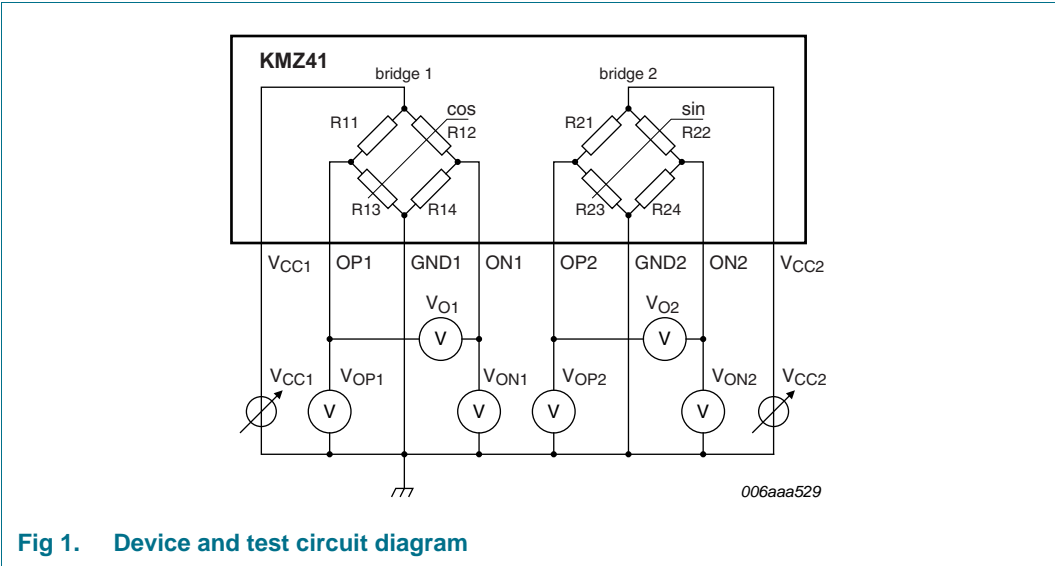
Pin	Symbol	Description	Simplified outline
1	ON1	output voltage bridge 1	
2	ON2	output voltage bridge 2	
3	V _{CC2}	supply voltage bridge 2	
4	V _{CC1}	supply voltage bridge 1	
5	OP1	output voltage bridge 1	
6	OP2	output voltage bridge 2	
7	GND2	supply voltage bridge 2	
8	GND1	supply voltage bridge 1	

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



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		40	-	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

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CC}	supply voltage		[1] -	5	9	V
V_{peak}	peak voltage	see Figure 2	[1] 73	81	89	mV
TCV_{peak}	temperature coefficient of peak voltage	$T_{amb} = -40\text{ }^{\circ}\text{C}$ to $+150\text{ }^{\circ}\text{C}$	[1][2] -0.38	-0.41	-0.44	%/K
R_{bridge}	bridge resistance		[1][3] 2.0	2.5	3.0	k Ω
TCR_{bridge}	temperature coefficient of bridge resistance	$T_{amb} = -40\text{ }^{\circ}\text{C}$ to $+150\text{ }^{\circ}\text{C}$	[1][4] 0.31	0.33	0.35	%/K
V_{offset}	offset voltage	per supply voltage; see Figure 2	[1] -2	-	+2	mV/V
TCV_{offset}	temperature coefficient of offset voltage	per supply voltage; $T_{amb} = -40\text{ }^{\circ}\text{C}$ to $+150\text{ }^{\circ}\text{C}$; see Figure 2	[1][5] -2	-	+2	($\mu\text{V/V}$)/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	$T_{amb} = -40\text{ }^{\circ}\text{C}$ to $+150\text{ }^{\circ}\text{C}$	[8] -0.005	0	+0.005	%/K
$\Delta\alpha$	angular inaccuracy		[9] 0	0.1	0.25	deg

[1] Applicable for bridge 1 and bridge 2.

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

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

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

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

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

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

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

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

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

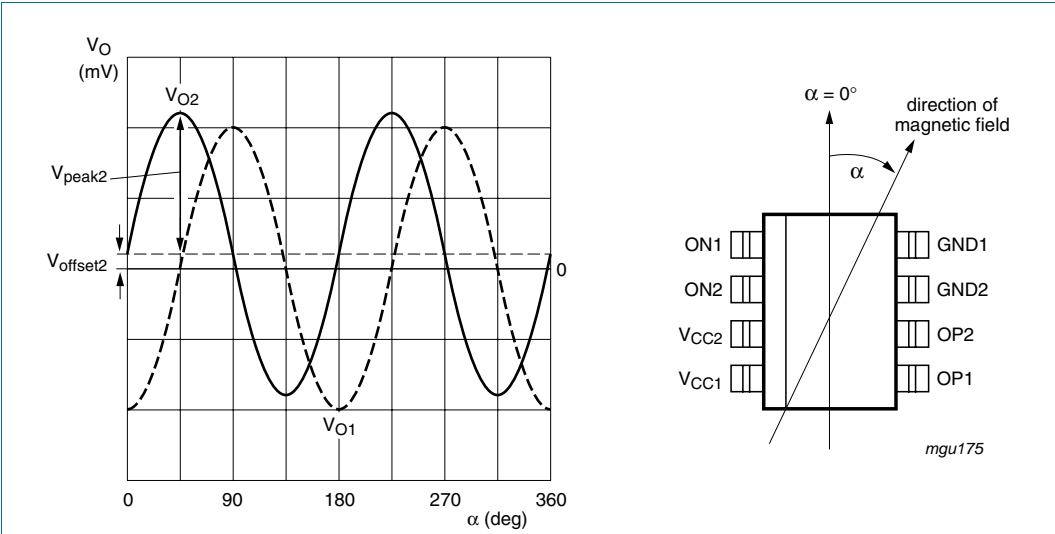


Fig 2. Output signals related to the direction of the magnetic field

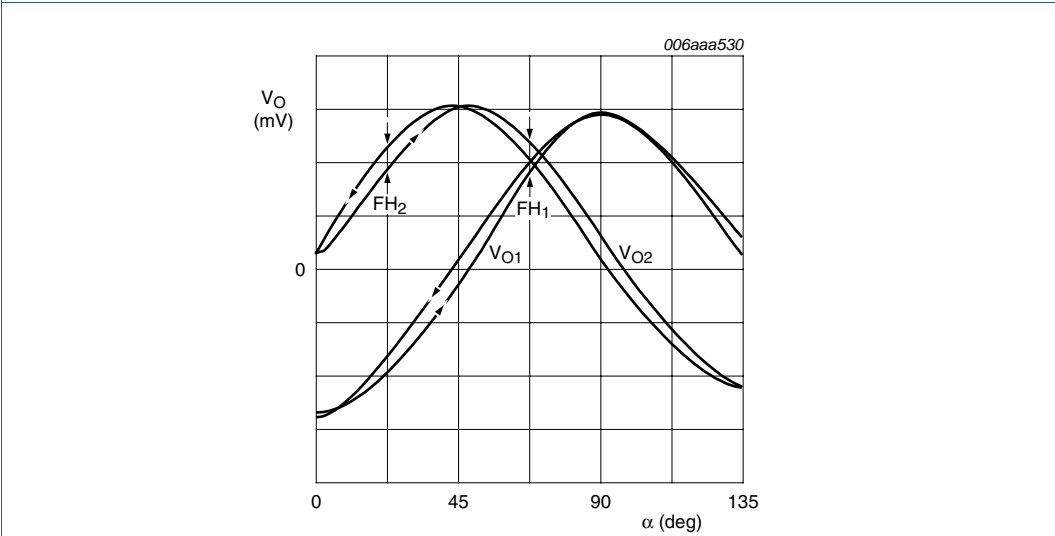


Fig 3. Definition of hysteresis

8. Package outline

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

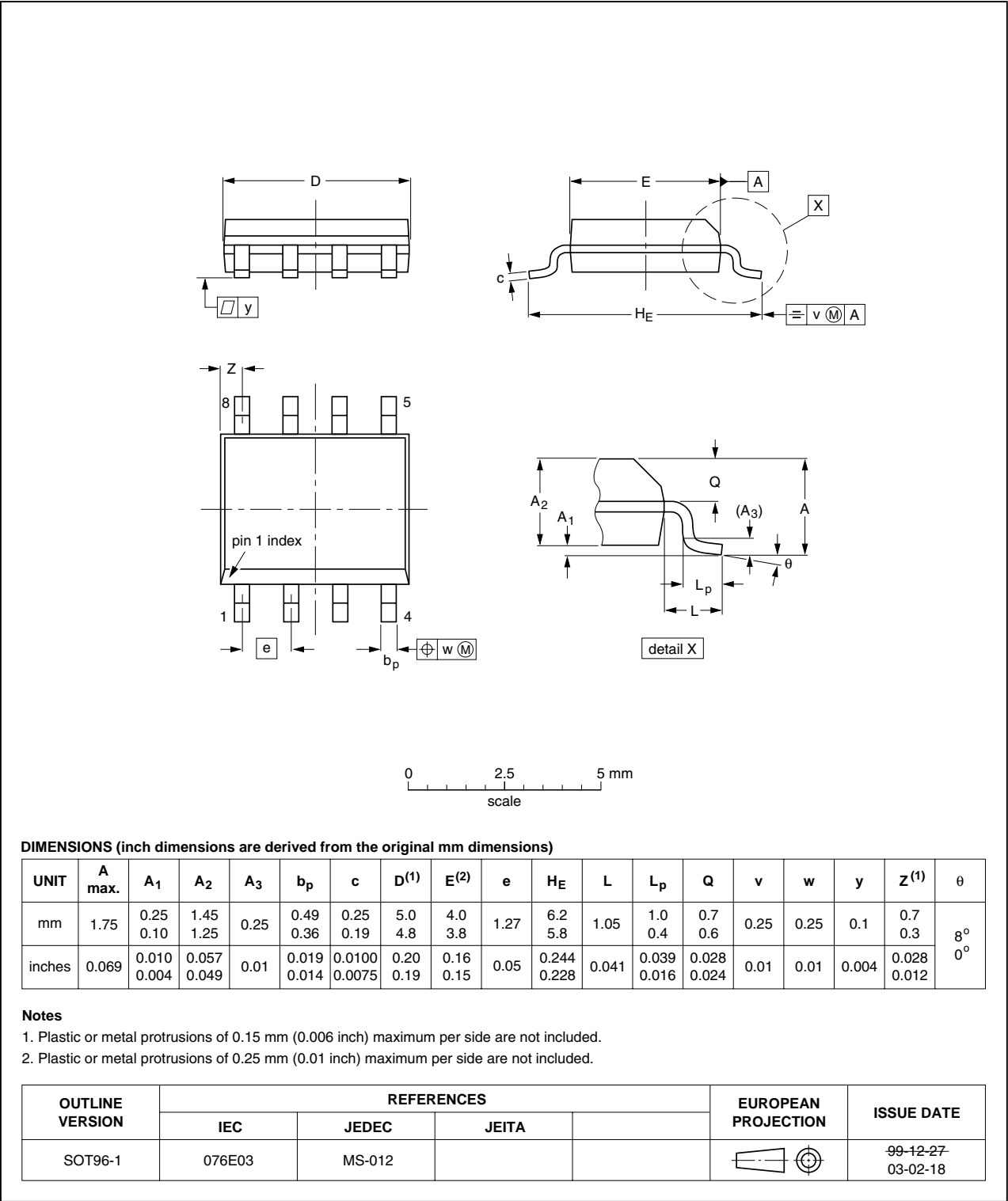


Fig 4. Package outline SOT96-1 (SO8/MS-012)

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

11. Legal information

11.1 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.
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13. Contents

1	Product profile	1
1.1	General description	1
1.2	Features and benefits	1
1.3	Quick reference data	1
2	Pinning information	2
3	Ordering information	2
4	Circuit diagram	2
5	Limiting values	3
6	Thermal characteristics	3
7	Characteristics	4
8	Package outline	6
9	Packing information	7
10	Revision history	7
11	Legal information	8
11.1	Data sheet status	8
11.2	Definitions	8
11.3	Disclaimers	8
11.4	Trademarks	9
12	Contact information	9
13	Contents	10

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