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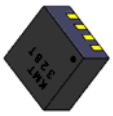
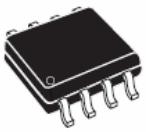
KMT32B Magnetic Angle Sensor

TDFN SO8 SM8

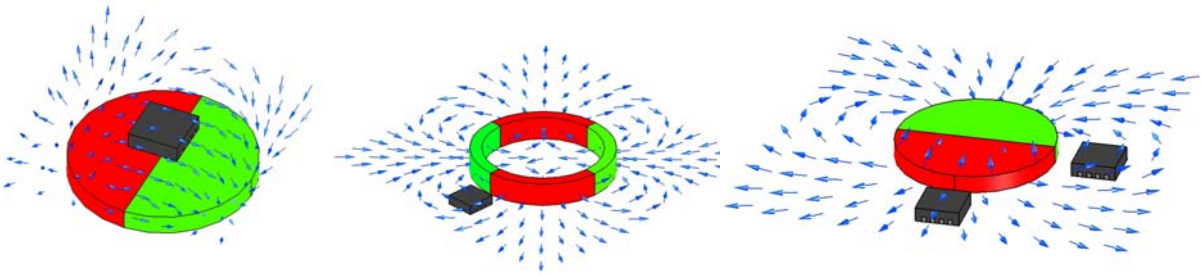





- **AMR Sensor with 180° Period**
- **Moderate Field Strength**
- **High Accuracy**
- **TDFN Package**
- **Various Packages Available**

DESCRIPTION

The KMT32B is a magnetic field sensor based on the anisotropic magnetoresistance effect, i.e. it is sensing the **magnetic field direction** independently on the magnetic field strength for applied field strengths H>25 kA/m. The sensor contains two parallel supplied Wheatstone bridges, which enclose a sensitive angle of 45 degrees.



A rotating magnetic field in the surface parallel to the chip (x-y plane) will deliver two independent sinusoidal output signals, one following a cos(2α) and the second following a sin(2α) function, α being the angle between sensor and field direction (see Figure 2).

FEATURES

- Contactless Angular Position
- SMD Package
- Design Optimized Linearity
- Low Cost
- High Accuracy
- High Rotational Speed up to 30,000 rpm
- Extended Operating Temperature Range (-40 °C to +150 °C, +160°C on request)
- Low Power
- RoHS Compliant (lead free)
- Ideal for Harsh Environments due to Magnetic Sensing

APPLICATIONS

- Absolute and Incremental Angle
- Angle Measurement
- Motor Motion Control
- Robotics
- Camera Positioning
- Potentiometer Replacement
- Automotive

KMT32B Magnetic Angle Sensor

CHARACTERISTIC VALUES

Parameter	Symbol	Condition	Min	Typ	Max	Unit
A. Operating Limits						
max. supply voltage	$Vcc_{,max}$				10	V
max. current (single bridge)	$Icc_{,max}$				4	mA
operating temperature	T_{op}		-40		+150	°C
storage temperature	T_{st}		-40		+150	°C
B. Sensor Specifications (T=25 °C)						
Supply voltage	Vcc			5		V
Resistance (single bridge)	R_b		2400	3000	3600	Ω
Output signal range	$\Delta V_n/Vcc$	Condition A, B	16	20		mV/V
Offset voltage	Voff/Vcc	Condition A, B	-1	0	+1	mV/V
angular inaccuracy	$\Delta\alpha$	Condition A, B		0.05	0.2	deg
angular hysteresis	$\Delta\alpha H$	Condition A, B			0.1	deg
C. Sensor Specifications						
TC of amplitude	TCSV	Condition A, C	-0.36	-0.32	-0.28	%/K
TC of resistance	TCBR	Condition A, C	+0.27	+0.32	+0.37	%/K
TC of offset	TCVoff	Condition A, C	-4	0	+4	µV/V/K

Stress above one or more of the limiting values may cause permanent damage to the device. Exposure to limiting values for extended periods may affect device reliability.

MEASUREMENT CONDITIONS

Parameter	Symbol	Unit	Condition
A. Set Up Conditions			
ambient temperature	T	°C	T = 23±5 °C (unless otherwise noted)
supply voltage	*Vcc*	V	Vcc = 5 V
applied magnetic field	H	kA/m	H = 25 kA/m
B. Sensor Specifications (T=25 °C, 360° turn , H=25 kA/m , Vo_{max}>0, Vo_{min}<0)			
Output signal range	$\Delta V_n/Vcc$	mV/V	$\Delta V_n/Vcc = (Vo_{max} - Vo_{min})/Vcc$
Offset voltage	Voff/Vcc	mV/V	$Voff = (Vo_{max} + Vo_{min})/Vcc$
angular inaccuracy	$\Delta\alpha$	deg	$\Delta\alpha = MAX\lvert\alpha_0-\alpha\rvert$ max. angular difference between actual value α_0 and measured angle; offset voltage error contributions not included
angular hysteresis	$\Delta\alpha H$	deg	$\Delta\alpha H = MAX\lvert\alpha_{left\ turn} - \alpha_{right\ turn}\rvert$ max. angular difference between left and right turn

KMT32B Magnetic Angle Sensor

MEASUREMENT CONDITIONS

Parameter	Symbol	Unit	Condition
C. Sensor Specifications (T=-25°C, +125°C)			
ambient temperatures	T	°C	T_1 = -25 °C, T_0 = +25 °C, T_2 = +125 °C
TC of amplitude	*TCSV*	%/K	$TCV = \frac{1}{(T_2 - T_1)} \cdot \frac{\frac{\Delta Vn}{Vcc}(T_2) - \frac{\Delta Vn}{Vcc}(T_1)}{\frac{\Delta Vn}{Vcc}(T_1)} \cdot 100\%$
TC of resistance	*TCBR*	%/K	$TCR = \frac{1}{(T_2 - T_1)} \cdot \frac{R(T_2) - R(T_1)}{R(T_1)} \cdot 100\%$
TC of offset	*TCVoff*	µV/(VK)	$TCVoff = \frac{Voff(T_2) - Voff(T_1)}{(T_2 - T_1)}$

BLOCK DIAGRAM

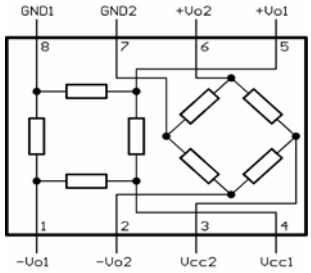
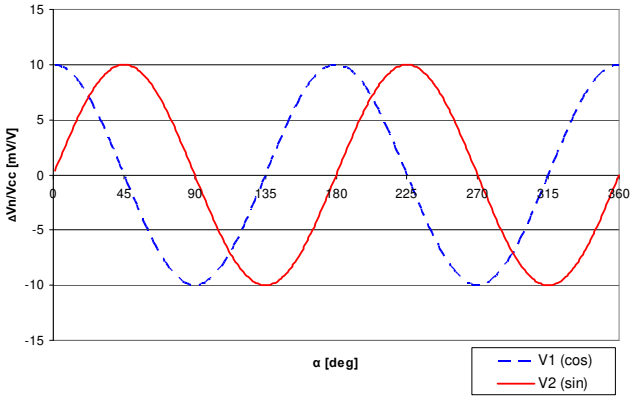


Figure 1: Circuit Diagram

The KMT32B magnetic field sensor is suited for high precision angle measurement applications under low field conditions (regularly H_0 = 25 kA/m, with reduced accuracy applicable down to H_0 = 8 kA/m; beware of earth's magnetic field!).

TYPICAL PERFORMANCE CURVES



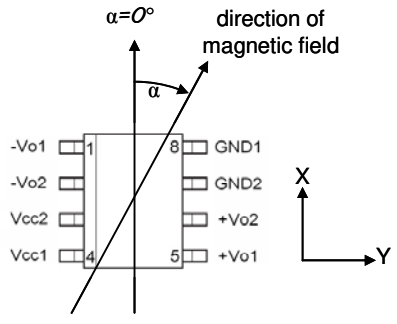
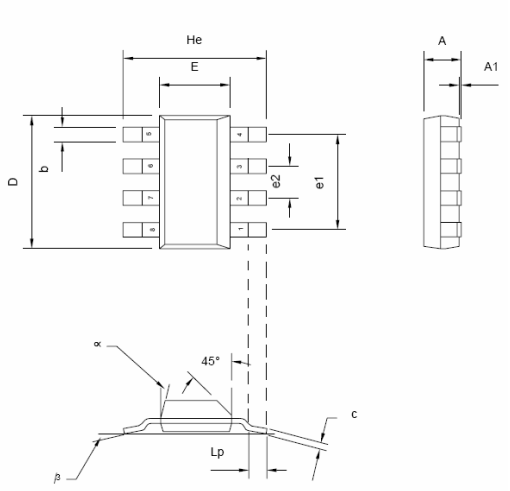


Figure 2: Characteristic curves for KMT32B

KMT32B Magnetic Angle Sensor

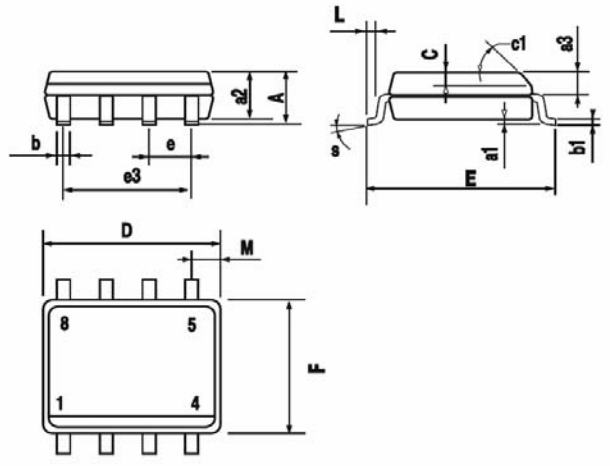
PACKAGES

SM8



Dim	Millimetres			Inches		
	Min	Typ	Max	Min	Typ	Max
A	–	–	1.7	–	–	0.067
A1	0.02	–	0.1	0.0008	–	0.004
b	–	0.7	–	–	0.028	–
c	0.24	–	0.32	0.009	–	0.013
D	6.3	–	6.7	0.248	–	0.264
E	3.3	–	3.7	0.130	–	0.145
e1	–	4.59	–	–	0.180	–
e2	–	1.53	–	–	0.060	–
He	6.7	–	7.3	0.264	–	0.287
Lp	0.9	–	–	0.035	–	–
α	–	–	15°	–	–	15°
β	–	10°	–	–	10°	–

SO8

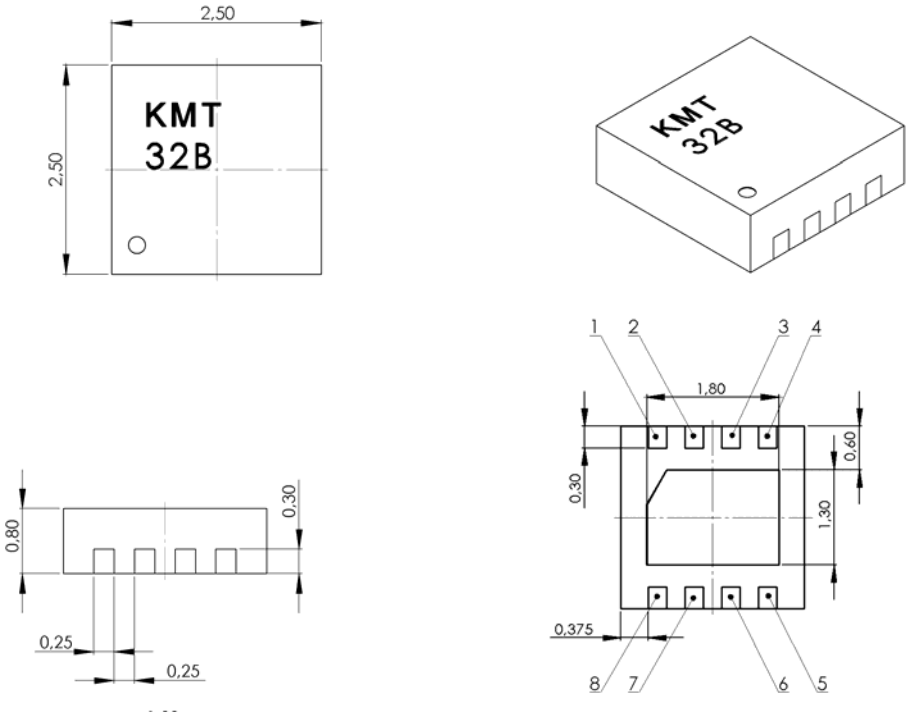


DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.75			0.069
a1	0.1		0.25	0.004		0.010
a2			1.65			0.065
a3	0.65		0.85	0.026		0.033
b	0.35		0.48	0.014		0.019
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.020
c1	45° (typ.)					
D (1)	4.8		5.0	0.189		0.197
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		3.81			0.150	
F (1)	3.8		4.0	0.15		0.157
L	0.4		1.27	0.016		0.050
M			0.6			0.024
S	8° (max.)					

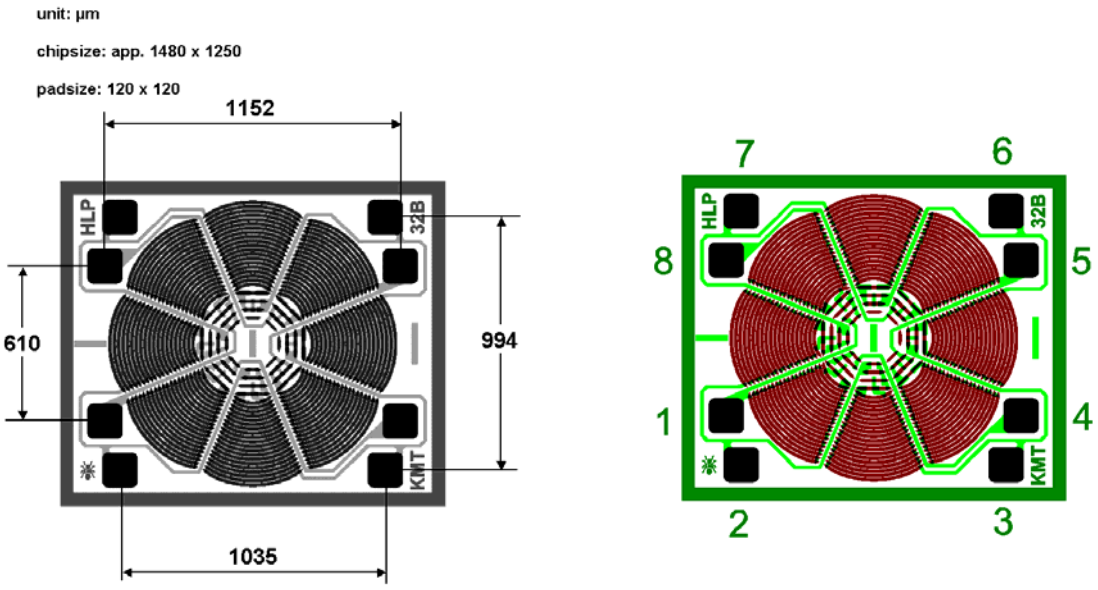
KMT32B Magnetic Angle Sensor

PACKAGES

TDFN8



DIE



KMT32B Magnetic Angle Sensor

Pin assignment:

Pin	Symbol	Function
1	-Vo1	negative output Bridge 1
2	-Vo2	negative output Bridge 2
3	Vcc2	positive supply voltage Bridge 2
4	Vcc1	positive supply voltage Bridge 1
5	+Vo1	positive output Bridge 1
6	+Vo2	positive output Bridge 2
7	GND2	negative supply voltage Bridge 2
8	GND1	negative supply voltage Bridge 1

The bottom plate is designated to be a heat sink. It has no electrical connection to any pin.
The sensitive area is positioned in the center of the housing.

ORDERING CODE

Device	Package	Part Number
KMT32B/SM	SM8	G-MRCO-014
KMT32B/SO	SO8	G-MRCO-015
KMT32B/TD	TDFN8	G-MRCO-016
KMT32B	Die	G-MRCH-011

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