



KMY22



KMY20



KMZ20

KMY_KMZ

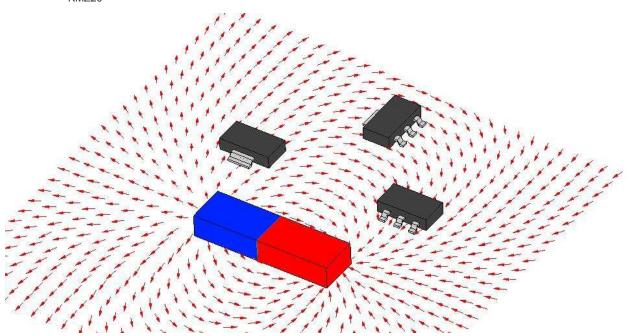
Linear Magnetic Field Sensors

SPECIFICATIONS

- AMR sensor
- Very high sensitivity
- Almost no hysteresis
- Various applications
- Available with internal magnet
- Available in several packages

Due to its featured properties - high sensitivity and almost no hysteresis - the **KMY** / **KMZ** sensors are used in a wide range of applications, like magnetic field measurement, revolution counters, proximity detecting, and position measurement.

An uniaxial linear magnetic field will generate a linear output within the specified magnetic field range.



FEATURES

- Output proportional to magnetic field strength with very high sensitivity
- Very small hysteresis
- Large operating temperature range, from -40°C up to +150 °C
- Highly reliable
- With / without internal magnet

APPLICATIONS

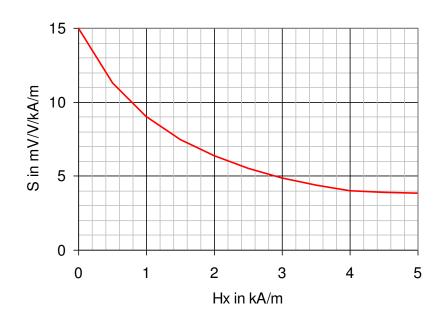
- Detection of very weak magnetic fields, like earth magnetic field, or field generated by small magnetic particles
- Detection of objects that distort non-local magnetic fields
- Revolution measurement on ferromagnetic gears
- · Contactless switch
- Contactless displacement / position sensor

DESCRIPTION

An uniaxial linear magnetic field (in y-direction) will generate a linear output within the specified magnetic field range. The sensor is available in two types: the KMY 20 M, KMY 21 M and KMZ 20 M sensor types contain intrinsic magnets which provide an auxiliary magnetic field (in x-direction) at the sensor die which prevents magnetic domains from flipping irregularly.

If the dies MR174B or the components KMY22, KMY20S or KMZ20S are used, the auxiliary field has to be provided by the user. The dependence of the sensitivity with auxiliary field strength is depicted in the figure aside.

Figure 1: Sensitivity dependence on auxiliary field strength



Auxiliary Field Dependence

Auxiliary field strengths below Hx<1.5 kA/m are not recommended, as small disturbances may flip the magnetization domains. Sometimes, the magnetic conditions in the application may provide enough Hx bias field stabilization. MEAS Germany can provide advice for customer specific magnet arrangements.

If a bias field Hx is not applied or Hx is less than 2.5 kA/m, the sensor may be used only in a limited field range Hy, depending on the present total bias field Hx,tot. In this case, it is strongly recommended to 'premagnetize' the sensor, i.e. align all magnetic domains consistently, prior to the measurement.

Hx,tot is the sum of all acting magnetic fields in x direction at the sensor die.

Do not use the sensor outside the safe operating area. Leaving the save operating area can destroy an existing premagnetization and therefore will lead to unreproducible sensor signals.



Figure 2: Safe operating area

CHARACTERISTIC VALUES / SENSOR SPECIFICATIONS

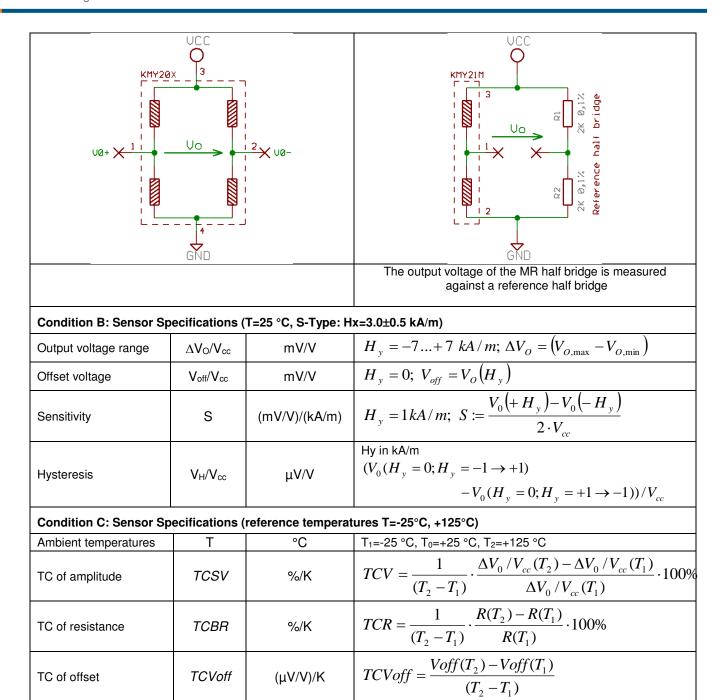
Parameter	Symbol	Condition	Min	Тур	Max	Unit
Operating Limits						
max. supply voltage	V _{cc,max}				10	V
max. current	I _{cc,max}				9	mA
operating temperature	Top		-40		+150	°C
storage temperature	T _{st}		-40		+150	°C
General Sensor Specific	ations					
TC of amplitude	TCSV	Condition A, C		-0.35		%/K
TC of resistance	TCBR	Condition A, C		+0.35		%/K
TC of offset	TCVoff	Condition A, C	-4	0	+4	μV/V/K
Sensor Specifications K	MY 20 S, KM	Z 20 S, KMY 22 (T=25 °C	C, Hx=3 kA/m e	xternally)		
Supply voltage	V _{cc}	Condition A, B		5		V
Bridge resistance	R _b	Condition A, B	1200	1700	2200	Ω
Output signal range	$\Delta V_0/V_{cc}$	Condition A, B	16	20	24	mV/V
Offset voltage	V _{off} /V _{cc}	Condition A, B	-1	0	+1	mV/V
Sensitivity	S	Condition A, B	3.7	4.7	5.7	mV/V/kA/m

Hysteresis	V _H /V _{cc}	Condition A, B	-	-	50	μV/V		
Sensor Specifications KMY 20 M, KMZ 20 M (T=25 °C, Hx=1.5±0.5 kA/m internally)								
Supply voltage	Vcc	Condition A, B	lition A, B 5			V		
Bridge resistance	Rb	Condition A, B	1200	1700	2200	Ω		
Output signal range	$\Delta V_0/V_{cc}$	Condition A, B	16	20	24	mV/V		
Offset voltage	V _{off} /V _{cc}	Condition A, B	-1.5	0	+1.5	mV/V		
Sensitivity	S	Condition A, B	4	5.5	7	mV/V/kA/m		
Hysteresis	V _H /V _{cc}	Condition A, B	-	-	50	μV/V		
Sensor Specifications KN	IY 21 M (T=2	25 °C, Hx=2.5±1.0 kA/m inte	ernally)			•		
Supply voltage	Vcc	Condition A, B		5		V		
Bridge resistance	Rb	Condition A, B	1100	1500	1900	Ω		
Output signal range	$\Delta V_0/V_{cc}$	Condition A, B	8	9.5	12	mV/V		
Offset voltage	V _{off} /V _{cc}	Condition A, B	48	50	52	%Vcc		
Sensitivity	S	Condition A, B	2.05	2.50	3.10	mV/V/kA/m		
Hysteresis	V _H /V _{cc}	Condition A, B	-	-	50	μV/V		

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				
Condition A: Set Up Conditions							
Ambient temperature	Т	°C	23±5 Measurement results are extrapolated to 25°C by using the given temperature coefficients				
Supply voltage	V _{cc}	V	5				
Output voltage $V_O \ V_O/V_{cc} \ mV/V$			$\begin{array}{c} V_{O=}(V_{0+} \mbox{-} V_{0-}) \\ \mbox{Output voltages are also given independently on supply} \\ \mbox{voltage: example: Vo/Vcc=}(V_{0+} \mbox{-} V_{0-})/Vcc; \\ \mbox{measure MR half bridge against reference half bridge} \end{array}$				
Reference half bridge			2* 2 kΩ 0.1% (KMY21M only)				
for full bridge sensors (KMY20S, KMY20M, KMY22, KMZ20S, KMZ20M)			for half bridge sensors (KMY 21 M)				



SENSOR MODELS

KMY 20 / KMY 22 / KMZ 20

The KMY and KMZ sensors are highly sensitive magnetic field sensors which utilize the anisotropic magneto resistance effect. The KMY 20 and KMZ 20 sensors contain a Wheatstone bridge.

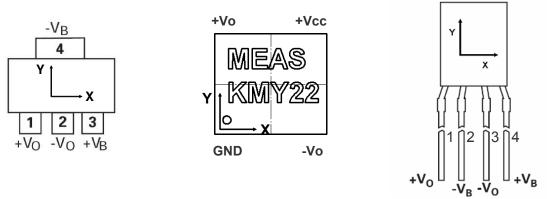


Figure 3: Pad annotation and definition of field direction for KMY & KMZ

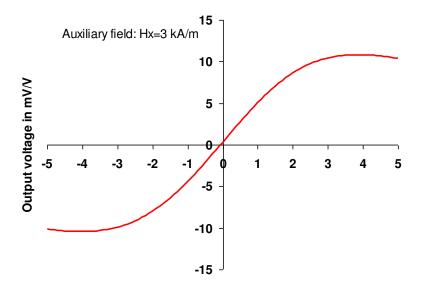
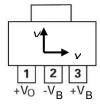


Figure 4: Characteristic output curve of KMY 20 S / KMY 22 / KMZ 20 S for an auxiliary field strength of Hx=3 kA/m

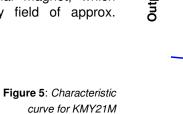
Field Strength Hy in kA/m

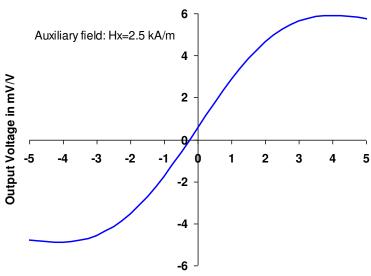
KMY 21

In contrast to the KMY20 sensor products, the **KMY 21 M** consists of a half bridge, making the sensor well suited for dynamic measurements.



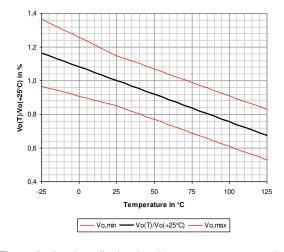
It contains an internal magnet, which provides an auxiliary field of approx. 2.5 kA/m.

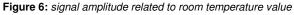




External Field Hy in kA/m

TEMPERATURE DEPENDENCIES





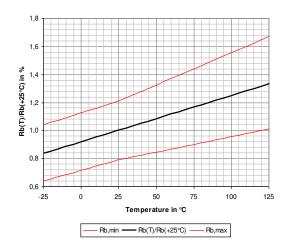
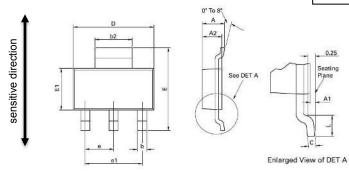


Figure 7: bridge resistance related to room temperature value

PACKAGES

SOT223

Recommended solder reflow process for all packages according to IPC/JEDEC J-STD-020D (Pb-Free Process)



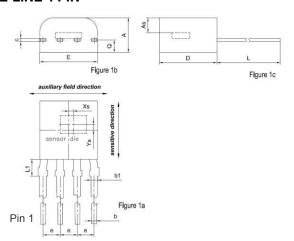
DIM Millimet	neters	Inches		DIM	Millimeters		Inches		
	Max	Min	Max		Min	Max	Min	Max	
Α	10	1.80	-	0.071	е	2.30	BSC	0.090	5 BSC
A1	0.02	0.10	0.0008	0.004	e1	4.60	BSC	0.181	BSC
b	0.66	0.84	0.026	0.033	E	6.70	7.30	0.264	0.287
b2	2.90	3.10	0.114	0.122	E1	3.30	3.70	0.130	0.146
С	0.23	0.33	0.009	0.013	L	0.90	120	0.355	
D	6.30	6.70	0.248	0.264	2	-	-	- 5	

Note: Controlling dimensions are in millimeters. Approximate dimensions are provided in inche

Milimeter

NOM. 1.25

E-LINE 4 PIN



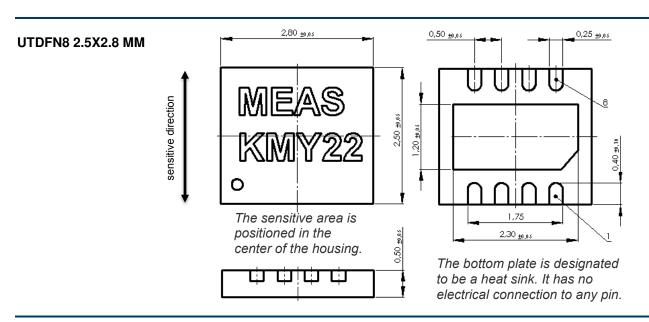
DIE POS.	KMZ20S	KMZ20M	tolerances	KMZ20S	KMZ20M	tolerances	
Xs	+0.05	+0.05	+/-0.10	+0.002	+0.002	+/-0.004	
Ys	+0.50	+0.50	+/-0.10	+0.02	+0.02	+/- 0.004	
As	1.05	1.05	+/-0.10	0.041	0.041	+/-0.004	
		Millmeter		Inches			
DIM	min.	typ.	max.	min.	typ.	max.	
DIM A	min. 2.4	typ.	max. 2.8	min. 0.094	typ.	max. 0.110	
		typ.			typ.		
Α	2.4	typ.	2.8	0.094	typ.	0.110	
A b	2.4 0.35	typ.	2.8 0.48	0.094 0.0138	typ.	0.110 0.0189	
A b b1	2.4 0,35 0.45	typ.	2.8 0.48 0.60	0.094 0.0138 0.0178	typ.	0.110 0.0189 0.024	

1.3

0.043

Inches

0.051



ORDERING CODE

DEVICE	DIE	PACKAGE	INTERNAL MAGNET	PART NUMBER
KMY20 S	full bridge	SOT-223	NO	G-MRCO-006
KMY20 M	full bridge	SOT-223	YES	G-MRCO-001
KMY21 M	half bridge	SOT-223	YES	G-MRCO-011
KMZ20 S	full bridge	E-Line	NO	G-MRCO-007
KMZ20 M	full bridge	E-Line	YES	G-MRCO-003
KMY22	full bridge	UTDFN8	NO	on request

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