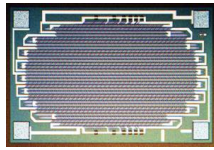
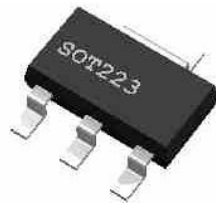


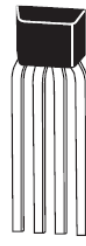
KMY/KMZ Linear Magnetic Field Sensors



DIEs (MR174B,MRHB)



KMY20M

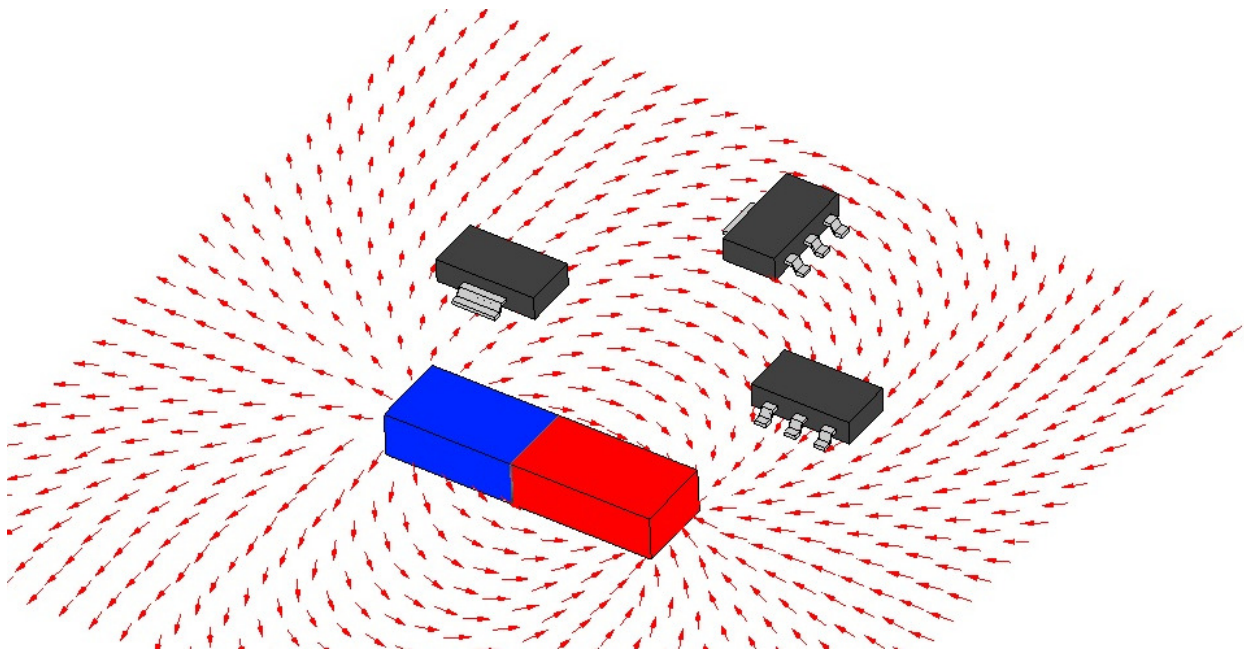


E-Line
KMZ20M

- AMR sensor
- Very high sensitivity
- Almost no hysteresis
- Various applications
- Available with internal magnet
- Available packaged or as dies

DESCRIPTION

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 sensor

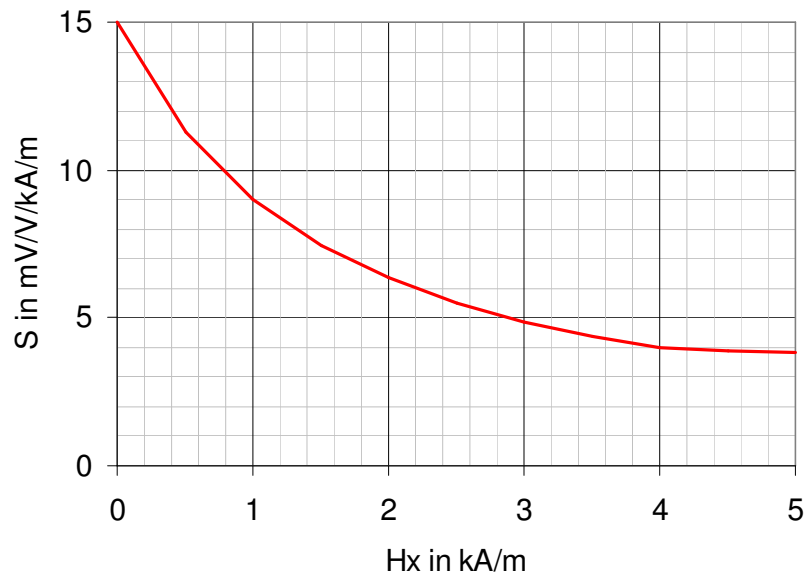
KMY/KMZ Linear Magnetic Field Sensors

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** 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.

Auxiliary Field Dependence

If the dies **MR174B** and **MRHB** or the **KMY 20 S / KMZ 20 S** 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.



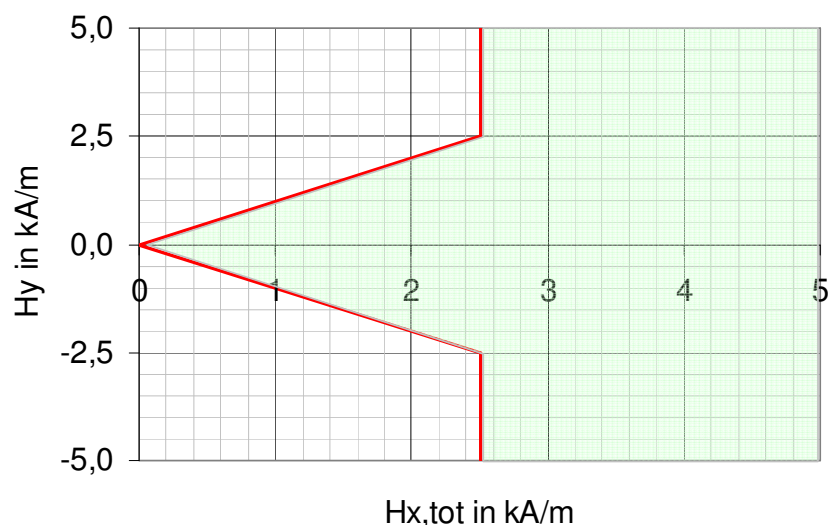
Auxiliary field strengths below $H_x < 1.5$ kA/m are not recommended, as small disturbances may flip the magnetization domains. Sometimes, the magnetic conditions in the application may provide enough H_x bias field stabilization.

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

$H_{x,tot}$ 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 safe operating area can destroy an existing premagnetization and therefore will lead to unreproducible sensor signals.

Safe Operating Area



KMY/KMZ Linear Magnetic Field Sensors

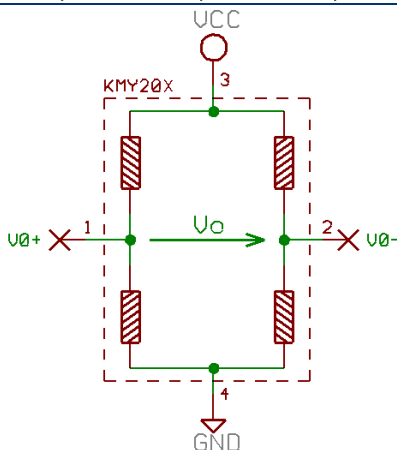
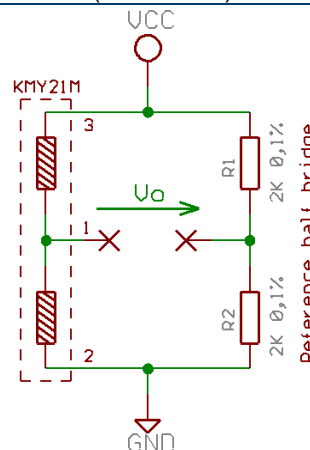
CHARACTERISTIC VALUES / SENSOR SPECIFICATIONS

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Operating Limits						
max. supply voltage	$V_{cc,max}$				10	V
max. current	$I_{cc,max}$	SOT223			9	mA
		E-Line			9	mA
operating temperature	T_{op}	SOT223, E-Line	-40		+150	°C
storage temperature	T_{st}	SOT223, E-Line	-40		+150	°C
General 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
Sensor Specifications KMY 20, KMZ 20 (T=25 °C, Hx=3 kA/m)						
Supply voltage	V_{cc}	Condition A, B		5		V
Bridge resistance	R_b	Condition A, B	1200	1700	2200	Ω
Output signal range	$\Delta V_o/V_{cc}$	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 21 M (T=25 °C, Hx=2.5 kA/m)						
Supply voltage	V_{cc}	Condition A, B		5		V
Bridge resistance	R_b	Condition A, B	1100	1500	1900	Ω
Output signal range	$\Delta V_o/V_{cc}$	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.

KMY/KMZ Linear Magnetic Field Sensors

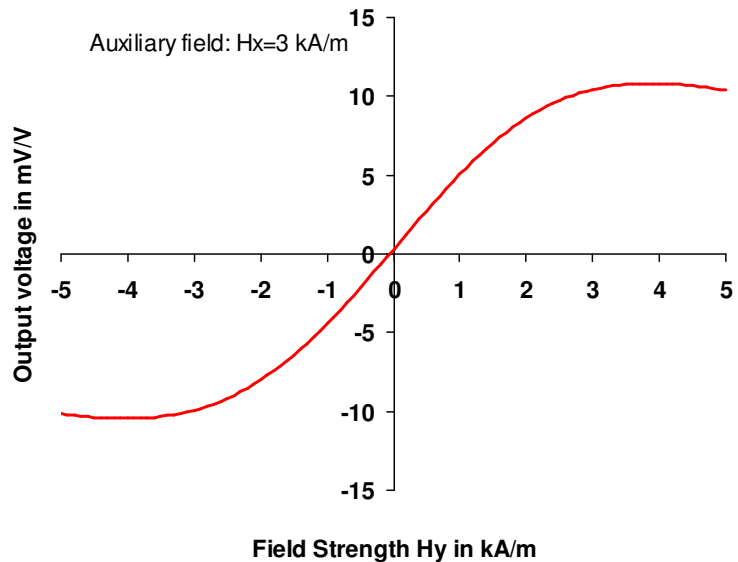
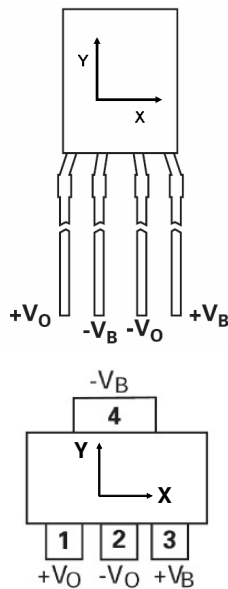
MEASUREMENT CONDITIONS

Parameter	Symbol	Unit	Condition
Condition A: Set Up Conditions			
Ambient temperature	T	°C	23±5
Supply voltage	V _{cc}	V	5
Output voltage	V _O V _O /V _{cc}	mV mV/V	V _O =(V _{O+} -V _{O-}) output voltages are also given independently on supply voltage: example: V _o /V _{cc} =(V _{O+} -V _{O-})/V _{cc} measure MR half bridge against reference half bridge
Reference half bridge			2* 2 kΩ 0.1%
for full bridge sensors (KMY 20 S, KMY 20 M, KMZ 20 S, KMZ 20 M)			for half bridge sensors (KMY 21 M)
			
			The output voltage of the MR half bridge is measured against a reference half bridge
Condition B: Sensor Specifications (T=23±5 °C, H _x =3.0±0.5 kA/m)			
Output voltage range	ΔV _O /V _{cc}	mV/V	$H_y = -7 \dots +7 \text{ kA/m}; \Delta V_O = (V_{O,\text{max}} - V_{O,\text{min}})$
Offset voltage	V _{off} /V _{cc}	mV/V	$H_y = 0; V_{\text{off}} = V_O(H_y)$
Sensitivity	S	(mV/V)/(kA/m)	$H_y = 1 \text{ kA/m}; S := \frac{V_0(+H_y) - V_0(-H_y)}{2 \cdot V_{cc}}$
Hysteresis	V _H /V _{cc}	μV/V	Hy in kA/m (V ₀ (H _y = 0; H _y = -1 → +1) - V ₀ (H _y = 0; H _y = +1 → -1))/V _{cc}
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	$TCV = \frac{1}{(T_2 - T_1)} \cdot \frac{\Delta V_0 / V_{cc}(T_2) - \Delta V_0 / V_{cc}(T_1)}{\Delta V_0 / V_{cc}(T_1)} \cdot 100\%$
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/V)/K	$TCV_{\text{off}} = \frac{V_{\text{off}}(T_2) - V_{\text{off}}(T_1)}{(T_2 - T_1)}$

KMY/KMZ Linear Magnetic Field Sensors

SENSOR MODELS

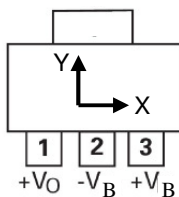
KMY 20 / KMZ 20



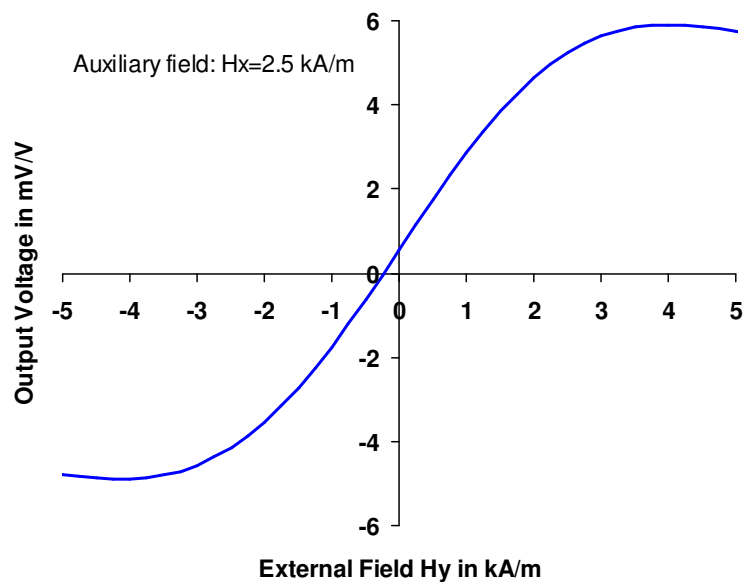
The KMY and KMZ sensors are highly sensitive magnetic field sensors which utilize the anisotropic magneto resistance effect. The KMY 20 and KMZ 20 sensors contain a Wheatstone bridge.

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.

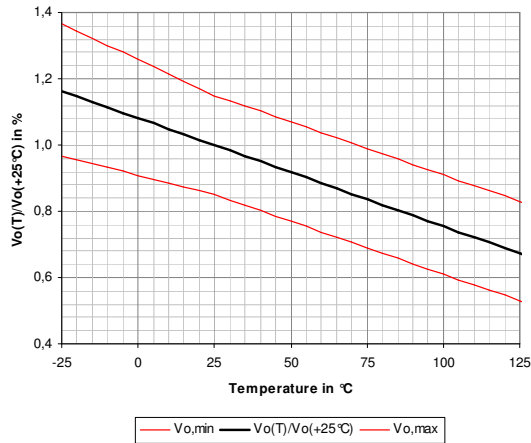


It contains an internal magnet, which provides an auxiliary field of approx. 2.5 kA/m.

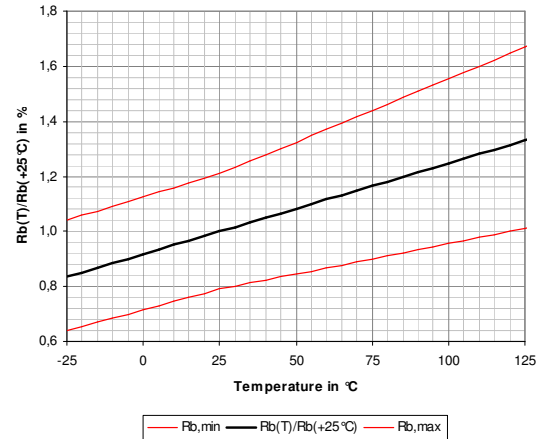


KMY/KMZ Linear Magnetic Field Sensors

TEMPERATURE DEPENDENCIES



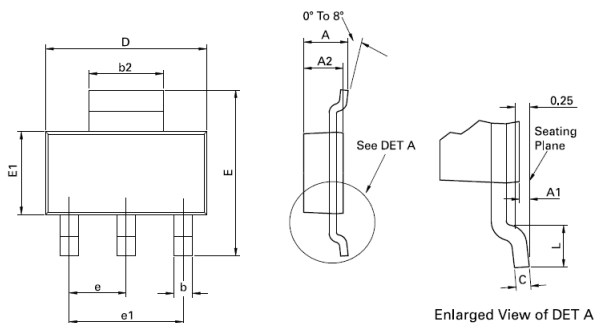
signal amplitude related to room temperature value



bridge resistance related to room temperature value

PACKAGES

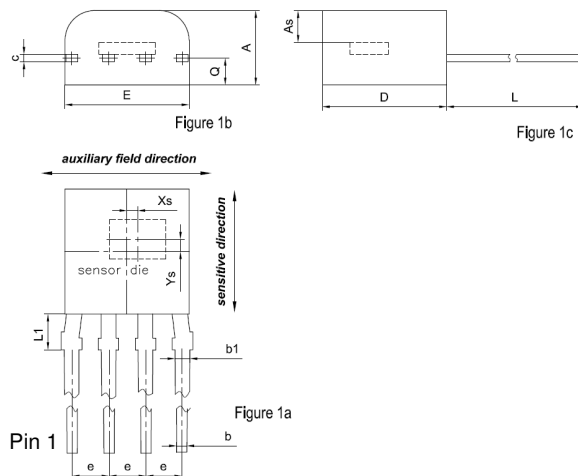
SOT223



DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min	Max	Min	Max		Min	Max	Min	Max
A	-	1.80	-	0.071	e	2.30 BSC		0.0905 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
C	0.23	0.33	0.009	0.013	L	0.90	-	0.355	-
D	6.30	6.70	0.248	0.264	-	-	-	-	-

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

E-LINE 4 PIN



DIE POS.	Millimeter			Inches		
	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

DIM	Millimeter			Inches		
	min.	typ.	max.	min.	typ.	max.
A	2.4		2.8	0.094		0.110
b	0.35		0.48	0.0138		0.0189
b1	0.45		0.60	0.0178		0.024
c	0.25		0.35	0.0098		0.0138
D	4.0		4.4	0.157		0.173
E	3.8		4.4	0.150		0.173
L	12.0		14.0	0.472		0.551
e	NOM. 1.25			NOM. 0.049		
L1	1.1		1.3	0.043		0.051

DIE LAYOUT AND DIMENSIONS ON REQUEST.

KMY/KMZ Linear Magnetic Field Sensors

ORDERING CODE

DEVICE	DIE	PACKAGE	INTERNAL MAGNET	PART NUMBER
MR174B	full bridge	wafer	n/a	G-MRCH-002
MRHB	half bridge	wafer	n/a	G-MRCH-009
KMY 20 S	full bridge	SOT-223	NO	G-MRCO-006
KMY 20 M	full bridge	SOT-223	YES	G-MRCO-001
KMY 21 M	half bridge	SOT-223	YES	G-MRCO-011
KMZ 20 S	full bridge	E-Line	NO	G-MRCO-007
KMZ 20 M	full bridge	E-Line	YES	G-MRCO-003

ORDERING INFORMATION

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