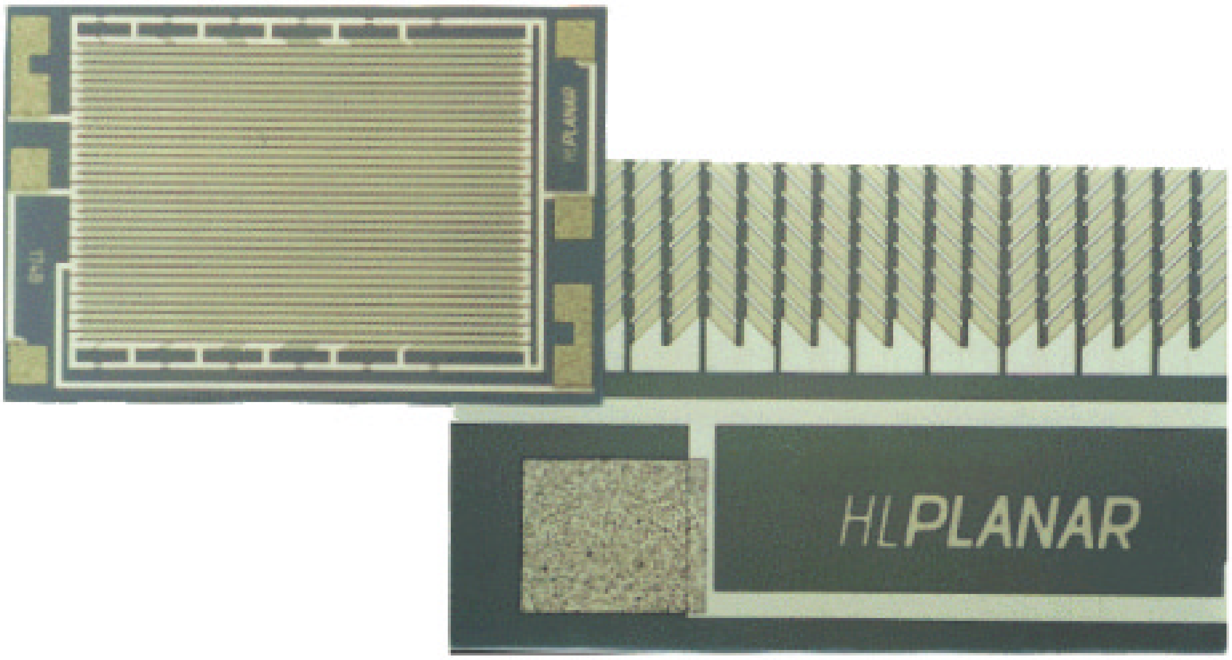
HL PLANAR TECHNIK

Magnetic Field Sensors
KMY 20 S / KMZ 20 S



Function principle

Magnetoresistive materials can change their resistivity in an external magnetic field. The variation of the resistivity is determined by the rotation of magnetisation with respect to the direction of the current flow. Permalloy ($Ni_{81}Fe_{19}$) is commercially used as magnetoresistive material. The relative change of resistivity is 2-3 % for this material. The high sensitive and small size magnetoresistive sensors consist of chip 174B covered with thin film permalloy stripes. These stripes form a Wheatstone bridge, whose output voltage is proportional to the magnetic field component H_y.

Characteristic

The bridge imbalance is a value for the magnetic field component H_y in the plane of the chip. It is of advantage to apply an auxiliary field H_x = 3 kA/m which avoids flipping of the magnetisation of the stripes caused by disturbing magnetic fields. A perpendicular field H_x is necessary to stabilize sensor operation. This can be done by using a small permanent magnet. See information for KMZ 20 M1 / KMY 20 M. Magnetic fields vertical to the chip surface have no influence on the output voltage.

Sensors in thin film technology

HL-Planartechnik GmbH

Hauert 13, D - 44 227 Dortmund, Tel.: +49 (0) 231/97400, Fax.: +49 (0) 231/974020

Internet: http://www.hlplanar.com   E-Mail: service@hlplanar.de

Technical data

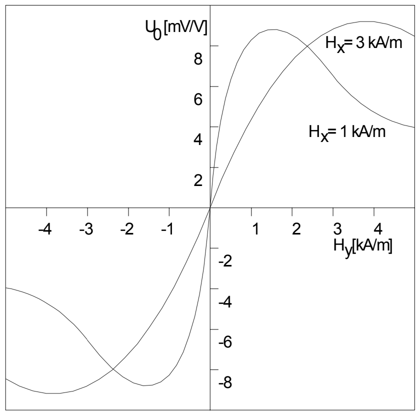
Absolute maximum ratings			
Parameter	**Symbol**	**Unit**	**Value**
Supply voltage	V_B	V	12
Total power dissipation	P_{to}	mW	120
Operating temperature range	T_{amb}	°C	-40 ... + 125
Storage temperature range	T_{stg}	°C	-65 ... +150

Electrical characteristics (T_{amb}= 25°C, H_x = 3 kA/m)			
Parameter	**Symbol**	**Unit**	**Value**
Bridge resistance	R_B	kOhm	1.4 .. 2.0
Open circuit sensitivity	S_V	(mV/V)/(kA/m)	4.7 ± 1.0
Output voltage range	$\Delta V_O/V_B$	mV/V	20.0 ± 4.0
Hysteresis of output voltage	$V_{O\,H}/V_B$	µV/V	≤ 50
Offset voltage	V_{OFF}/V_B	mV/V	≤ ± 1.0

Temperature coefficients (- 25 °C < T_{amb} < 125 °C) of			
Parameter	**Symbol**	**Unit**	**Value**
Bridge resistance	T_{CBR}	%/K	0.30 ± 0.05
Open circuit sensitivity (V_B = const)	T_{CSV}	%/K	-0.30 ± 0.05
(I_B = const)	T_{CSI}	%/K	0.00 ± 0.05
Offset voltage	T_{COFF}	(µV/V)/K	≤ ± 3

Applications

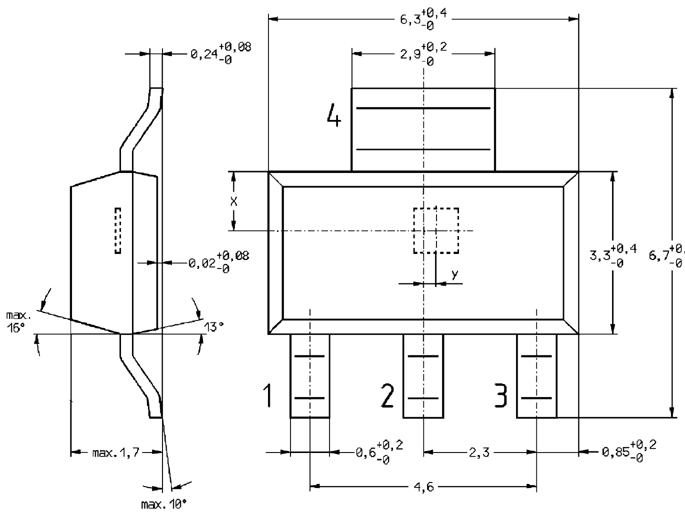
- detection of weak magnetic fields, e.g. earth magnetic field
- contactless mechanical switch
- displacement measurement with high resolution
- revolution speed detection on ferromagnetic gear wheels
- contactless angle measurement
- galvanically seperated current measurement

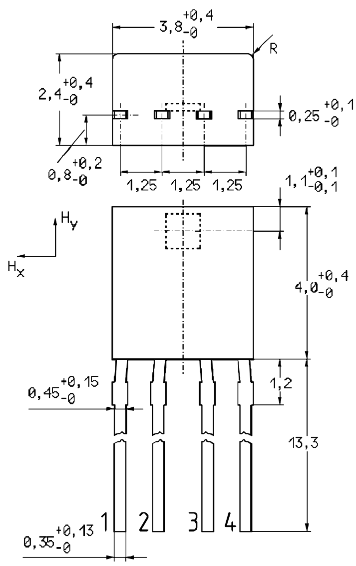


Output voltage versus field component H_y for different stabilizing magnetic fields H_x

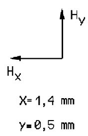
Housing of KMY 20: SOT-223-S

Housing of KMZ 20: E-Line 4-Pin





SOT-223-S	
1: $+V_O$ 2: $-V_O$	V_O: Output voltage
3: $+V_B$ 4: $-V_B$	V_B: Supply voltage



metric dimensions

E-Line 4-Pin	
1: $+V_O$ 3: $-V_O$	V_O: Output voltage
2: $-V_B$ 4: $+V_B$	V_B: Supply voltage

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