

Magnetic field sensor

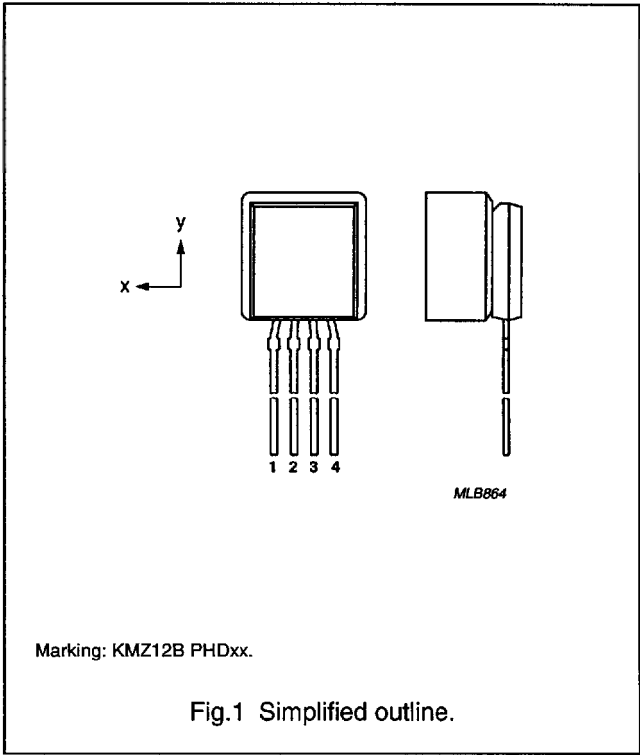
KM110B/4

DESCRIPTION

The KM110B/4 is a sensitive magnetic field sensor, employing the magnetoresistive effect of thin-film permalloy. The combination of a magnetoresistive sensor with a Ferroxdure FXD100 magnet and a special 30° magnetization enables the sensor to be used as a revolution sensor or proximity detector. The offset voltage of the KM110B/4 is magnetically trimmed during the magnetization process. The strength of the magnetic field caused by the Ferroxdure FXD100 magnet in the different sensor directions is typically: $H_x = 7 \text{ kA/m}$ (auxiliary field and measured at the centre of the magnetoresistive bridge). $H_z = 17 \text{ kA/m}$ (perpendicular to the sensor surface). H_y is zero due to the trimming process.

PINNING

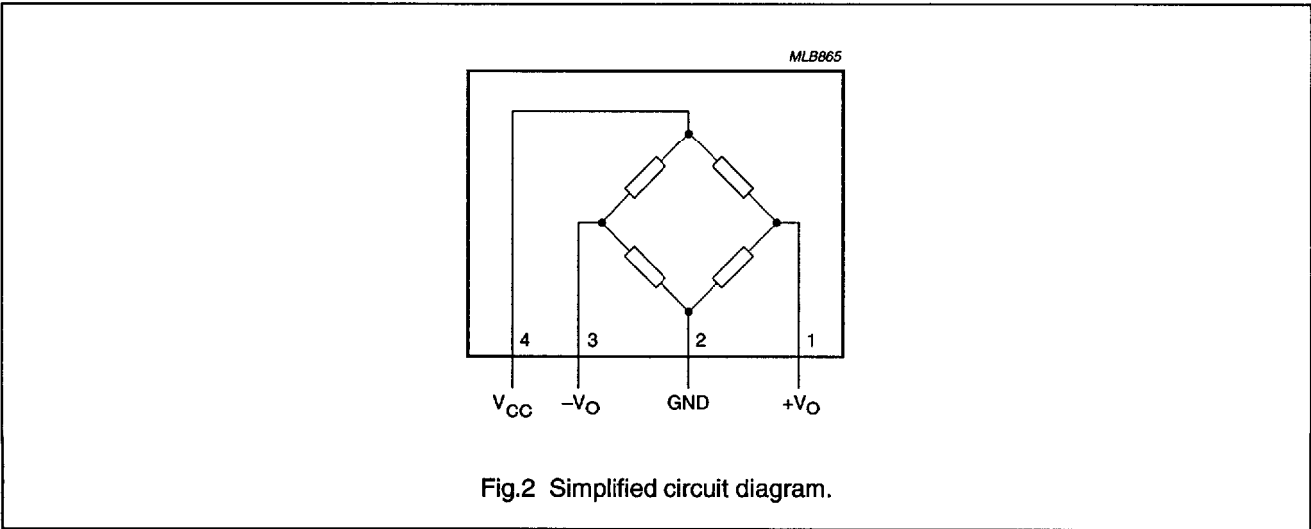
PIN	SYMBOL	DESCRIPTION
1	$+V_O$	output voltage
2	GND	ground
3	$-V_O$	output voltage
4	$+V_{CC}$	supply voltage



QUICK REFERENCE DATA

SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT
V_{CC}	DC supply voltage	–	5	–	V
T_{bridge}	bridge operating temperature	–40	–	+150	°C
R_{bridge}	bridge resistance	1.6	2.1	2.6	k Ω
V_{offset}	offset voltage	–0.5	–	+0.5	mV/V

CIRCUIT DIAGRAM



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LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CC}	DC supply voltage		–	12	V
P_{tot}	total power dissipation	up to $T_{amb} = 130\text{ °C}$	–	120	mW
H_D	external disturbing field	see note 1	–	32	kA/m
T_{stg}	storage temperature		–40	+150	°C
T_{bridge}	bridge operating temperature	see note 2	–40	+150	°C
$T_{bridge\ peak}$	peak bridge operating temperature	max. 3 times ≤ 1 h during lifetime; see notes 2 and 3	–	190	°C

Notes

1. It is not permitted to press two sensors together against the magnetic forces, due to their own magnetic field ($H \geq 50\text{ kA/m}$ close to the magnetic poles).
2. Maximum operating temperature of the thin-film permalloy.
3. Maximum temperature gradient: 5 °C/minute .

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	VALUE	UNIT
$R_{th\ j-a}$	thermal resistance from junction to ambient in free air	180	K/W

CHARACTERISTICS

 $T_{bridge} = 25\text{ °C}$; $V_{CC} = 5\text{ V}$ unless otherwise specified.

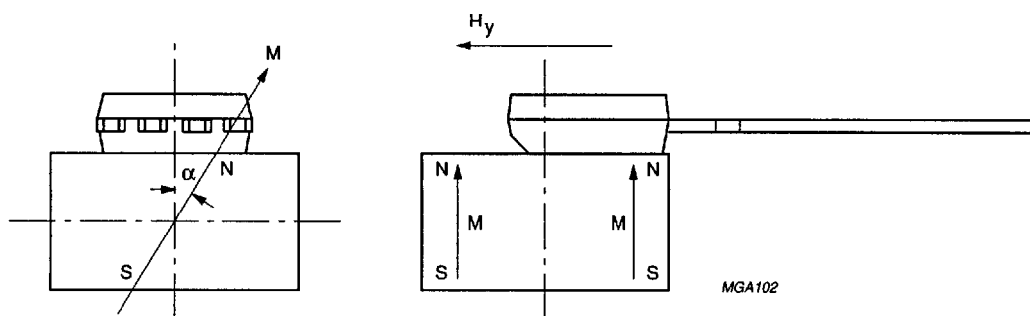
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
R_{bridge}	bridge resistance		1.6	2.6	k Ω
V_{offset}	offset voltage	notes 1 and 4	–0.5	+0.5	mV/V
S	sensitivity	notes 2 and 4	1.5	2.2	$\frac{mV/V}{kA/m}$
f_{oper}	operating frequency	note 3	0	1	MHz
TCV_{offset}	temperature coefficient of offset voltage	$T_{bridge} = -25\text{ to }+100\text{ °C}$; note 1	–5	+5	($\mu V/V$)/K
TCR_{bridge}	temperature coefficient of bridge resistance	$T_{bridge} = -25\text{ to }+100\text{ °C}$	–	0.4	%/K
TCS	temperature coefficient of sensitivity	$T_{bridge} = -25\text{ to }+100\text{ °C}$	0.25	0.31	%/K

Notes

1. Measured in an environment without external fields and ferromagnetic materials.
2.
$$S = \frac{(V_O \text{ at } H_y = 1.6\text{ kA/m}) - (V_O \text{ at } H_y = 0)}{1.6 \times V_{CC}}$$
3. Only sensor bridge response. When sensing high speed rotation, the operating frequency may be reduced due to eddy current effects.
4. The sensitivity increases and decreases linear with the supply voltage, thus the static output voltage is directly proportional to the supply voltage.

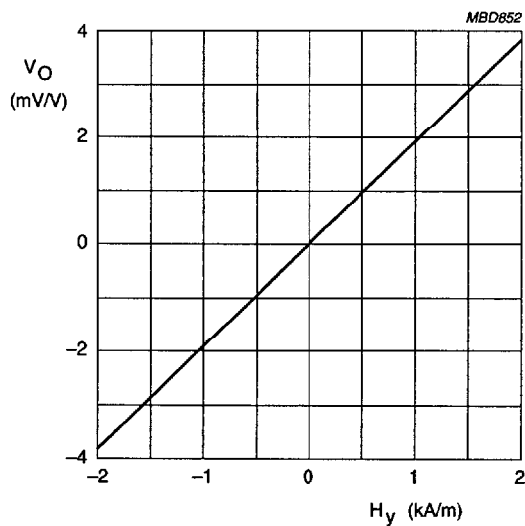
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M = direction of magnetization.
N, S = magnetic poles.

Fig.3 Principle of magnetization.



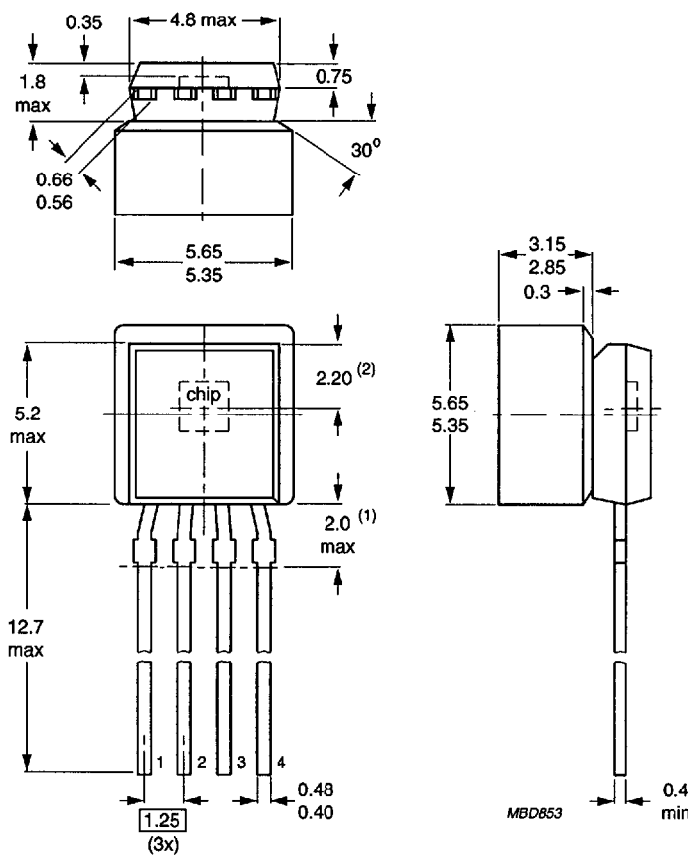
$V_{\text{offset}} = 0$.

Fig.4 Output signal as a function of the magnetic field strength.

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PACKAGE OUTLINE



Dimensions in mm.

(1) Terminal dimensions uncontrolled within this area.

(2) Position of sensor chip.

Fig.5 Outline of the KM110B/4.