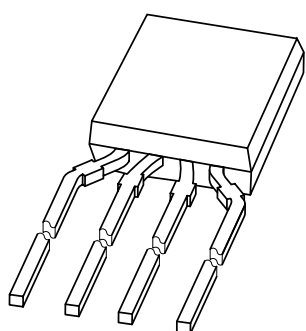


DATA SHEET



KMZ10A1 Magnetic field sensor

Product specification
Supersedes data of 1996 Nov 14
File under Discrete Semiconductors, SC17

1998 Apr 06

Magnetic field sensor

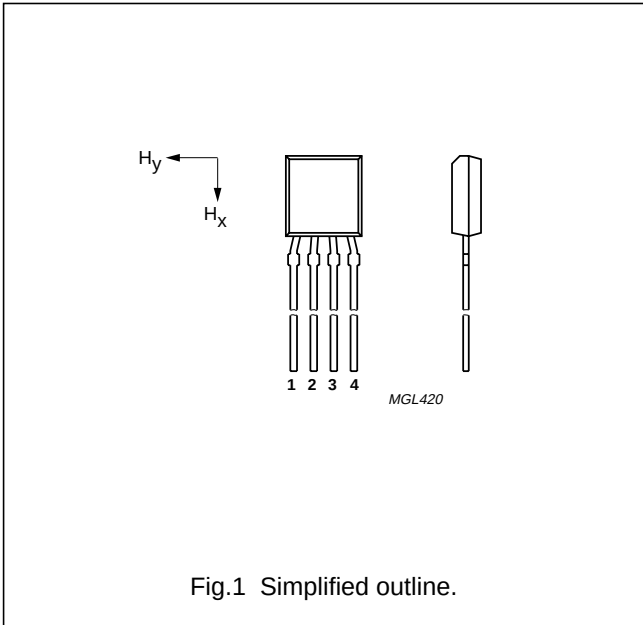
KMZ10A1

DESCRIPTION

The KMZ10A1 is an extremely sensitive magnetic field sensor, employing the magnetoresistive effect of thin-film permalloy. Its properties enable this sensor to be used in a wide range of applications such as navigation, current and earth magnetic field measurement etc. The special arrangement of the sensing chip allows the construction of coils for switching the auxiliary field (H_x) along the length axis of the sensor. The sensor can be operated at any frequency between DC and 1 MHz.

PINNING

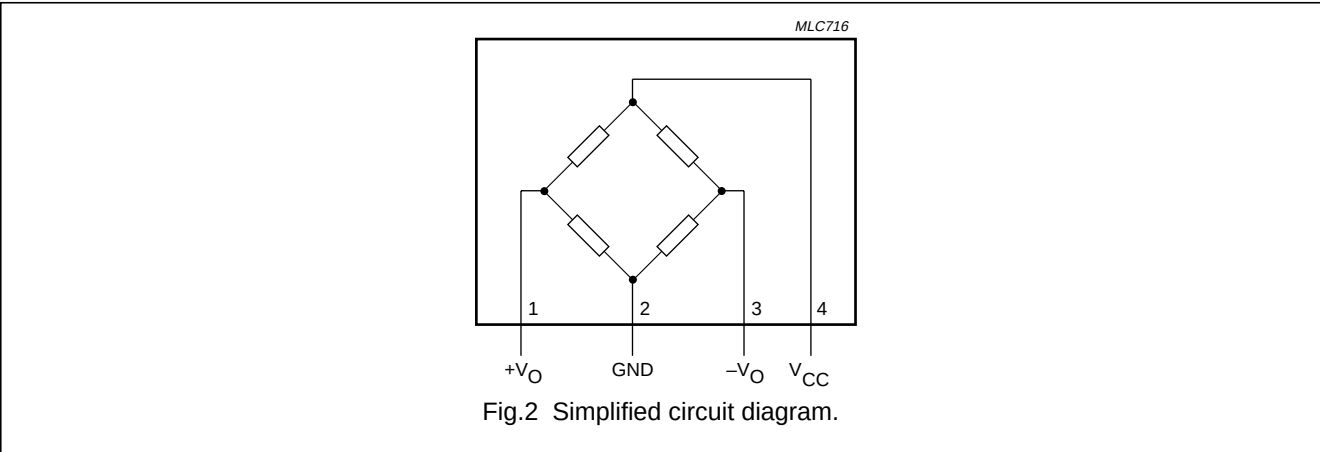
PIN	SYMBOL	DESCRIPTION
1	$+V_O$	output voltage
2	GND	ground
3	$-V_O$	output voltage
4	V_{CC}	supply voltage



QUICK REFERENCE DATA

SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT
V_{CC}	DC supply voltage	–	5	–	V
H_y	magnetic field strength	–0.5	–	+0.5	kA/m
H_x	auxiliary field	–	0.5	–	kA/m
S	sensitivity	–	14	–	$\frac{mV/V}{kA/m}$
S_s	sensitivity (with switched H_x)	–	22	–	$\frac{mV/V}{kA/m}$
R_{bridge}	bridge resistance	0.85	–	1.75	k Ω
V_{offset}	offset voltage	–1.5	–	+1.5	mV/V

CIRCUIT DIAGRAM



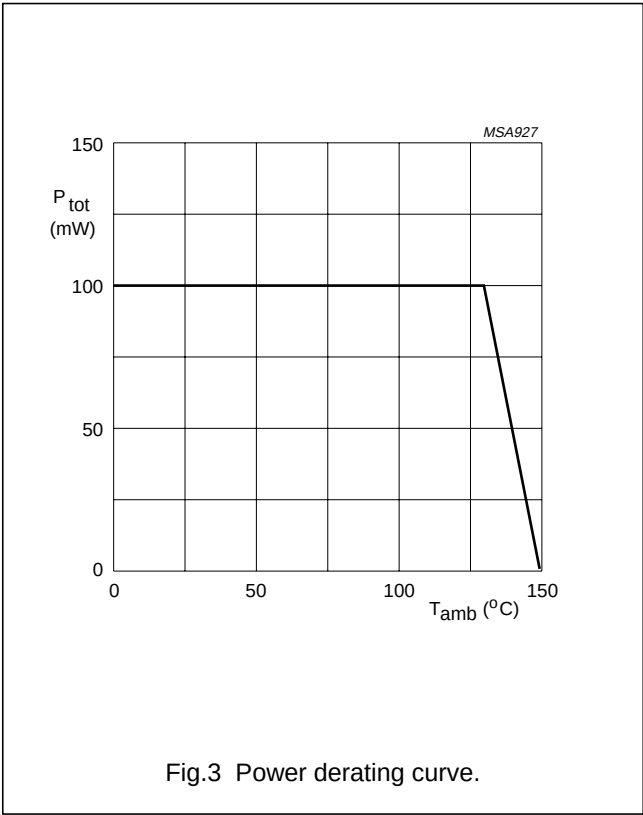
Magnetic field sensor

KMZ10A1

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V _{CC}	DC supply voltage		–	9	V
P _{tot}	total power dissipation	up to T _{amb} = 132 °C	–	100	mW
T _{stg}	storage temperature		–65	+150	°C
T _{bridge}	bridge operating temperature		–40	+150	°C



Magnetic field sensor

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THERMAL CHARACTERISTICS

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

CHARACTERISTICS

$T_{amb} = 25\text{ °C}$ and $H_x = 0.5\text{ kA/m}$ unless otherwise specified; see notes 1 and 2.

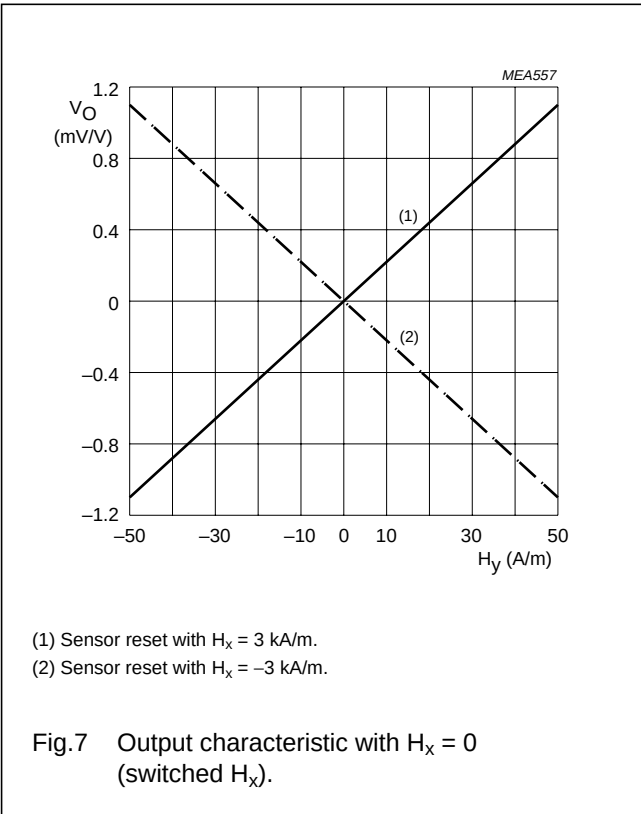
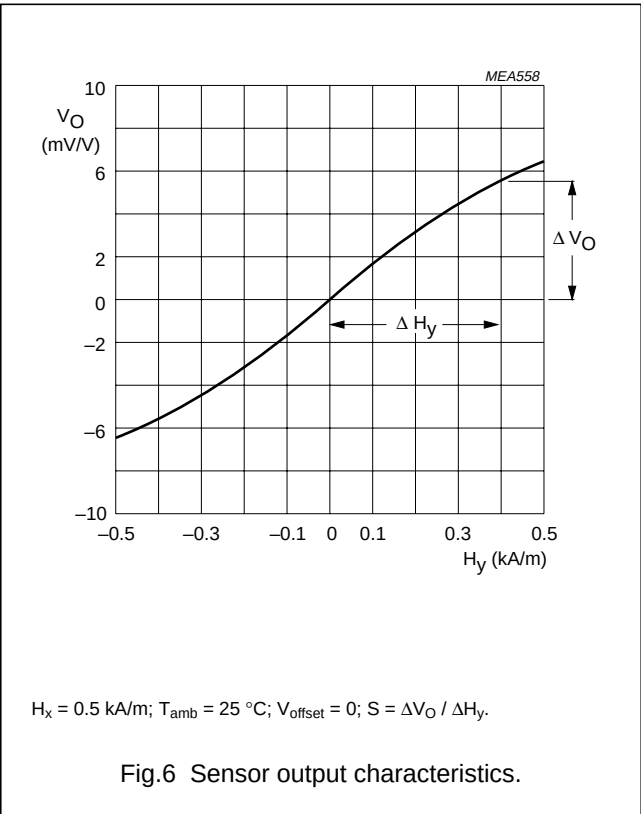
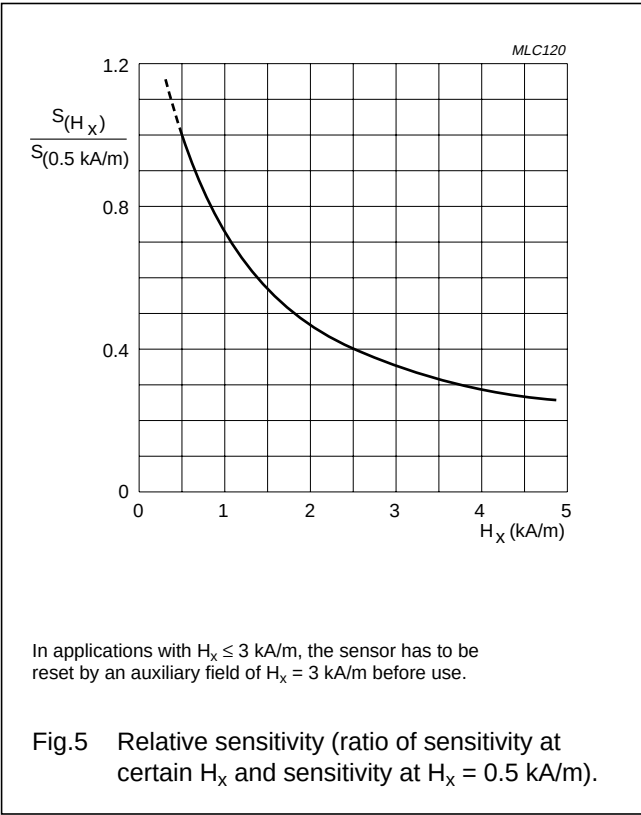
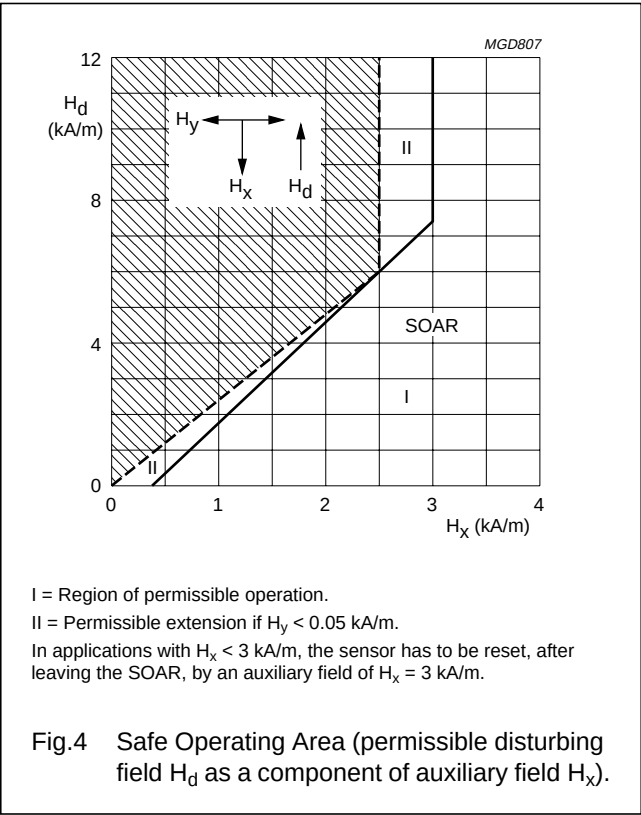
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{CC}	DC supply voltage		–	5	–	V
H_y	operating range	note 2	–0.5	–	+0.5	kA/m
S	sensitivity	open circuit; notes 2 and 3	11	–	17	$\frac{mV/V}{kA/m}$
TCV_O	temperature coefficient of output voltage at constant supply voltage	$V_{CC} = 5\text{ V};$ $T_{amb} = -25\text{ to }+125\text{ °C}$	–	–0.4	–	%/K
VCV_O	temperature coefficient of output voltage at constant supply current	$I_B = 3\text{ mA};$ $T_{amb} = -25\text{ to }+125\text{ °C}$	–	–0.15	–	%/K
R_{bridge}	bridge resistance		0.85	–	1.75	k Ω
TCR_{bridge}	temperature coefficient of bridge resistance	$T_j = -25\text{ to }+125\text{ °C}$	–	0.25	–	%/K
V_{offset}	offset voltage		–1.5	–	+1.5	mV/V
TCV_{offset}	offset voltage drift	$T_{bridge} = -25\text{ to }+125\text{ °C}$	–6	–	+6	$\frac{\mu V/V}{K}$
FL	linearity deviation of output voltage	$H_y = 0\text{ to } \pm 0.25\text{ kA/m}^{-1}$	–	–	0.8	%·FS
		$H_y = 0\text{ to } \pm 0.4\text{ kA/m}^{-1}$	–	–	2.5	%·FS
		$H_y = 0\text{ to } \pm 0.5\text{ kA/m}^{-1}$	–	–	4.0	%·FS
FH	hysteresis of output voltage		–	–	0.5	%·FS
f	operating frequency		0	–	1	MHz
Characteristics with $H_x = 0$ (switched H_x, see note 4); $V_{CC} = 5\text{ V}$						
H_y	operating range	note 2	–0.05	–	+0.05	kA/m
S_s	sensitivity	slope between $H_y = 0$ and $H_y = 40\text{ A/m}$	14	–	27	$\frac{mV/V}{kA/m}$

Notes

- Before first operation or after operation outside the SOAR (Fig.4) the sensor has to be reset by application of an auxiliary field $H_x = 3\text{ kA/m}$.
- No disturbing field (H_d) allowed; for stable operation under disturbing conditions see Fig.4 (SOAR) and see Fig.5 for decrease of sensitivity.
- Sensitivity measured as $\Delta V_O / \Delta H_y$ between $H_y = 0$ and $H_y = 0.4\text{ kA/m}$.
- See application information.

Magnetic field sensor

KMZ10A1

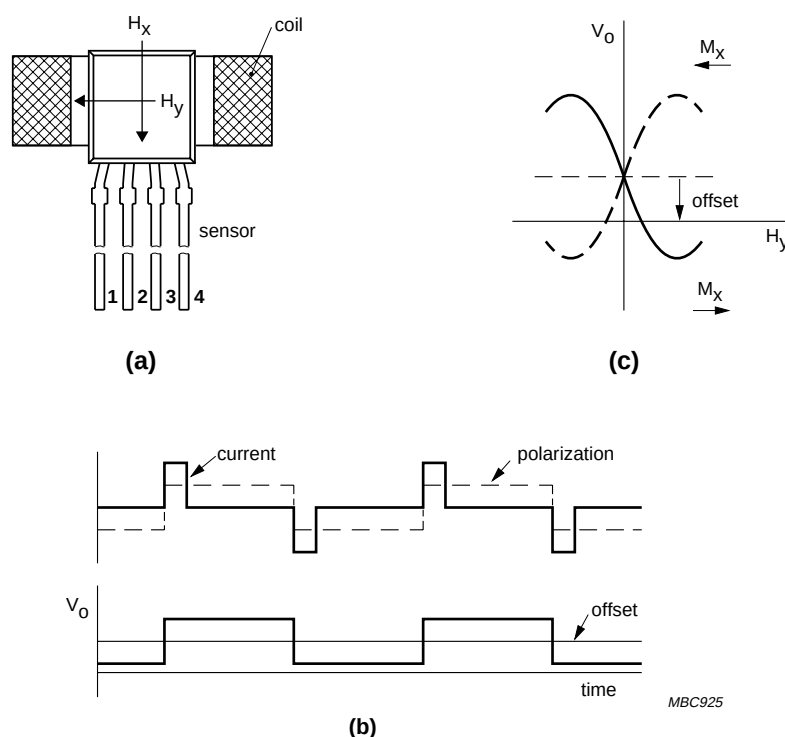


Magnetic field sensor

KMZ10A1

APPLICATION INFORMATION

A problem with measuring weak magnetic fields is that precision is limited by drift in both the sensor and amplifier offset. In these instances, it is possible to take advantage of the 'flipping' characteristics of the KMZ10 series to generate an output that is independent of offset. The sensor, located in a coil connected to a current pulse generator producing magnetic field pulses periodically reversed by alternate positive and negative going current pulses, is continually flipped from its normal to its reversed polarity and back again. The polarity of the offset however, remains unchanged, so the offset itself can be eliminated by passing the output signal through a filter circuit.



- (a) Set-up.
 (b) Pulse diagram.
 (c) Sensor output characteristics.

Fig.8 Measuring weak magnetic fields with the KMZ10A1.

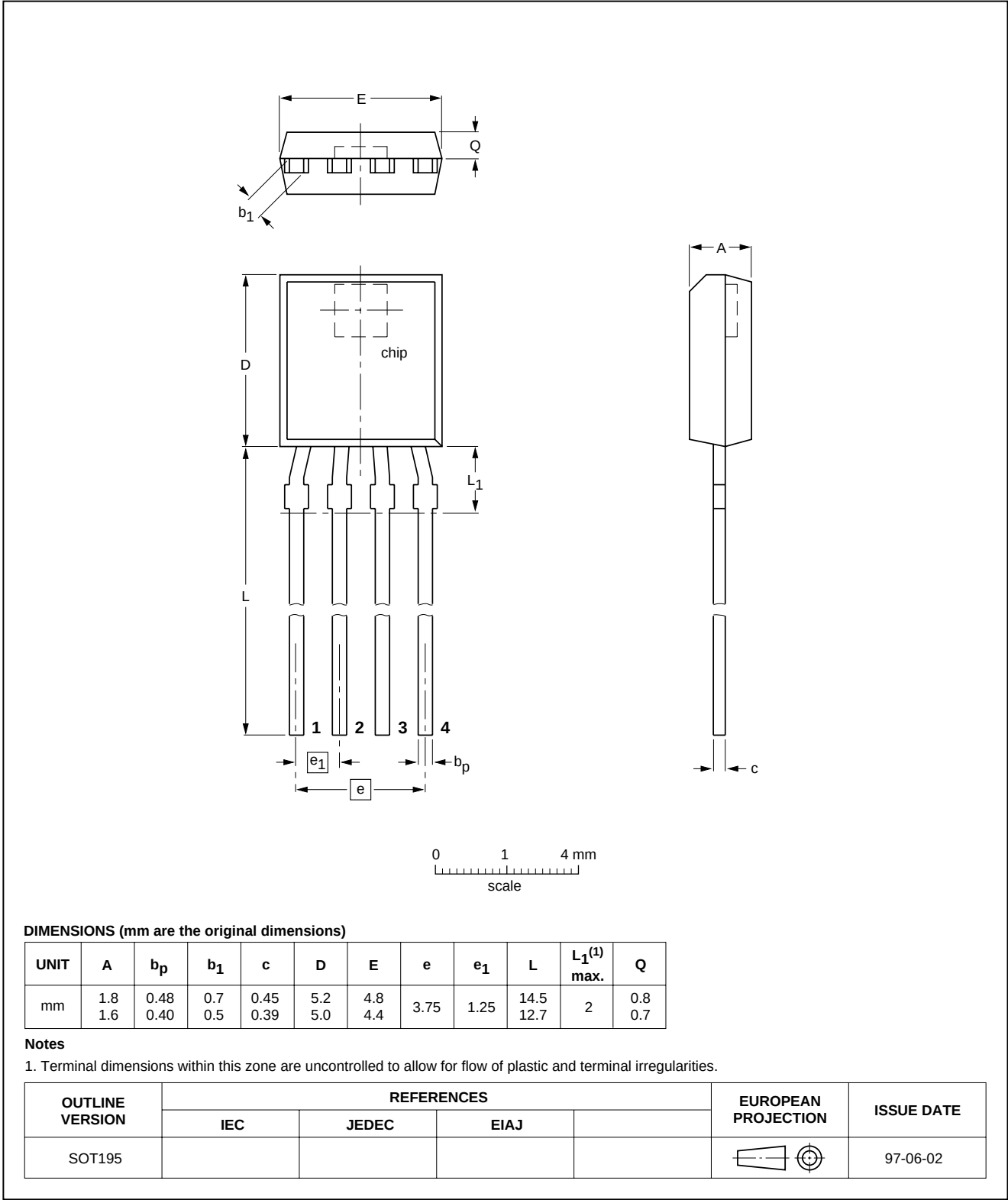
Magnetic field sensor

KMZ10A1

PACKAGE OUTLINE

Plastic single-ended flat package; 4 in-line leads

SOT195



Magnetic field sensor

KMZ10A1

DEFINITIONS

Data Sheet Status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

LIFE SUPPORT APPLICATIONS

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.

Magnetic field sensor

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NOTES

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NOTES

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NOTES

Philips Semiconductors – a worldwide company

Argentina: see South America

Australia: 34 Waterloo Road, NORTH RYDE, NSW 2113,
Tel. +61 2 9805 4455, Fax. +61 2 9805 4466

Austria: Computerstr. 6, A-1101 WIEN, P.O. Box 213, Tel. +43 160 1010,
Fax. +43 160 101 1210

Belarus: Hotel Minsk Business Center, Bld. 3, r. 1211, Volodarski Str. 6,
220050 MINSK, Tel. +375 172 200 733, Fax. +375 172 200 773

Belgium: see The Netherlands

Brazil: see South America

Bulgaria: Philips Bulgaria Ltd., Energoproject, 15th floor,
51 James Bourchier Blvd., 1407 SOFIA,
Tel. +359 2 689 211, Fax. +359 2 689 102

Canada: PHILIPS SEMICONDUCTORS/COMPONENTS,
Tel. +1 800 234 7381

China/Hong Kong: 501 Hong Kong Industrial Technology Centre,
72 Tat Chee Avenue, Kowloon Tong, HONG KONG,
Tel. +852 2319 7888, Fax. +852 2319 7700

Colombia: see South America

Czech Republic: see Austria

Denmark: Prags Boulevard 80, PB 1919, DK-2300 COPENHAGEN S,
Tel. +45 32 88 2636, Fax. +45 31 57 0044

Finland: Sinikalliontie 3, FIN-02630 ESPOO,
Tel. +358 9 615800, Fax. +358 9 61580920

France: 51 Rue Carnot, BP317, 92156 SURESNES Cedex,
Tel. +33 1 40 99 6161, Fax. +33 1 40 99 6427

Germany: Hammerbrookstraße 69, D-20097 HAMBURG,
Tel. +49 40 23 53 60, Fax. +49 40 23 536 300

Greece: No. 15, 25th March Street, GR 17778 TAVROS/ATHENS,
Tel. +30 1 4894 339/239, Fax. +30 1 4814 240

Hungary: see Austria

India: Philips INDIA Ltd, Band Box Building, 2nd floor,
254-D, Dr. Annie Besant Road, Worli, MUMBAI 400 025,
Tel. +91 22 493 8541, Fax. +91 22 493 0966

Indonesia: PT Philips Development Corporation, Semiconductors Division,
Gedung Philips, Jl. Buncit Raya Kav.99-100, JAKARTA 12510,
Tel. +62 21 794 0040 ext. 2501, Fax. +62 21 794 0080

Ireland: Newstead, Clonskeagh, DUBLIN 14,
Tel. +353 1 7640 000, Fax. +353 1 7640 200

Israel: RAPAC Electronics, 7 Kehilat Saloniki St, PO Box 18053,
TEL AVIV 61180, Tel. +972 3 645 0444, Fax. +972 3 649 1007

Italy: PHILIPS SEMICONDUCTORS, Piazza IV Novembre 3,
20124 MILANO, Tel. +39 2 6752 2531, Fax. +39 2 6752 2557

Japan: Philips Bldg 13-37, Kohnan 2-chome, Minato-ku, TOKYO 108,
Tel. +81 3 3740 5130, Fax. +81 3 3740 5077

Korea: Philips House, 260-199 Itaewon-dong, Yongsan-ku, SEOUL,
Tel. +82 2 709 1412, Fax. +82 2 709 1415

Malaysia: No. 76 Jalan Universiti, 46200 PETALING JAYA, SELANGOR,
Tel. +60 3 750 5214, Fax. +60 3 757 4880

Mexico: 5900 Gateway East, Suite 200, EL PASO, TEXAS 79905,
Tel. +9-5 800 234 7381

Middle East: see Italy

Netherlands: Postbus 90050, 5600 PB EINDHOVEN, Bldg. VB,
Tel. +31 40 27 82785, Fax. +31 40 27 88399

New Zealand: 2 Wagener Place, C.P.O. Box 1041, AUCKLAND,
Tel. +64 9 849 4160, Fax. +64 9 849 7811

Norway: Box 1, Manglerud 0612, OSLO,
Tel. +47 22 74 8000, Fax. +47 22 74 8341

Pakistan: see Singapore

Philippines: Philips Semiconductors Philippines Inc.,
106 Valero St. Salcedo Village, P.O. Box 2108 MCC, MAKATI,
Metro MANILA, Tel. +63 2 816 6380, Fax. +63 2 817 3474

Poland: Ul. Lukiska 10, PL 04-123 WARSZAWA,
Tel. +48 22 612 2831, Fax. +48 22 612 2327

Portugal: see Spain

Romania: see Italy

Russia: Philips Russia, Ul. Usatcheva 35A, 119048 MOSCOW,
Tel. +7 095 755 6918, Fax. +7 095 755 6919

Singapore: Lorong 1, Toa Payoh, SINGAPORE 319762,
Tel. +65 350 2538, Fax. +65 251 6500

Slovakia: see Austria

Slovenia: see Italy

South Africa: S.A. PHILIPS Pty Ltd., 195-215 Main Road Martindale,
2092 JOHANNESBURG, P.O. Box 7430 Johannesburg 2000,
Tel. +27 11 470 5911, Fax. +27 11 470 5494

South America: Al. Vicente Pinzon, 173, 6th floor,
04547-130 SÃO PAULO, SP, Brazil,
Tel. +55 11 821 2333, Fax. +55 11 821 2382

Spain: Balmes 22, 08007 BARCELONA,
Tel. +34 3 301 6312, Fax. +34 3 301 4107

Sweden: Kottbygatan 7, Akalla, S-16485 STOCKHOLM,
Tel. +46 8 5985 2000, Fax. +46 8 5985 2745

Switzerland: Allmendstrasse 140, CH-8027 ZÜRICH,
Tel. +41 1 488 2741 Fax. +41 1 488 3263

Taiwan: Philips Semiconductors, 6F, No. 96, Chien Kuo N. Rd., Sec. 1,
TAIPEI, Taiwan Tel. +886 2 2134 2865, Fax. +886 2 2134 2874

Thailand: PHILIPS ELECTRONICS (THAILAND) Ltd.,
209/2 Sanpavuth-Bangna Road Prakanong, BANGKOK 10260,
Tel. +66 2 745 4090, Fax. +66 2 398 0793

Turkey: Talatpasa Cad. No. 5, 80640 GÜLTEPE/ISTANBUL,
Tel. +90 212 279 2770, Fax. +90 212 282 6707

Ukraine: PHILIPS UKRAINE, 4 Patrice Lumumba str., Building B, Floor 7,
252042 KIEV, Tel. +380 44 264 2776, Fax. +380 44 268 0461

United Kingdom: Philips Semiconductors Ltd., 276 Bath Road, Hayes,
MIDDLESEX UB3 5BX, Tel. +44 181 730 5000, Fax. +44 181 754 8421

United States: 811 East Arques Avenue, SUNNYVALE, CA 94088-3409,
Tel. +1 800 234 7381

Uruguay: see South America

Vietnam: see Singapore

Yugoslavia: PHILIPS, Trg N. Pasica 5/v, 11000 BEOGRAD,
Tel. +381 11 625 344, Fax. +381 11 635 777

For all other countries apply to: Philips Semiconductors,
International Marketing & Sales Communications, Building BE-p, P.O. Box 218,
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Internet: <http://www.semiconductors.philips.com>

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