

iC-SM2L

LINEAR AMR SENSOR (2 mm)



Rev B2, Page 1/7

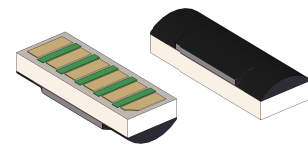
FEATURES

- ◆ Magneto resistive position sensor based on the AMR effect
- ◆ Strong field sensor for 2 mm N/S pole pitch
- ◆ One sine/cosine cycle per pole width (averaged using a pair of N/S poles)
- ◆ High interpolation due to a sine signal with few harmonics
- ◆ Low saturation field strength
- ◆ High amplitude consistency with changes in distance
- ◆ Resistant to strong magnetic fields
- ◆ Not sensitive to external homogenous magnetic fields
- ◆ Small SMT capable package

APPLICATIONS

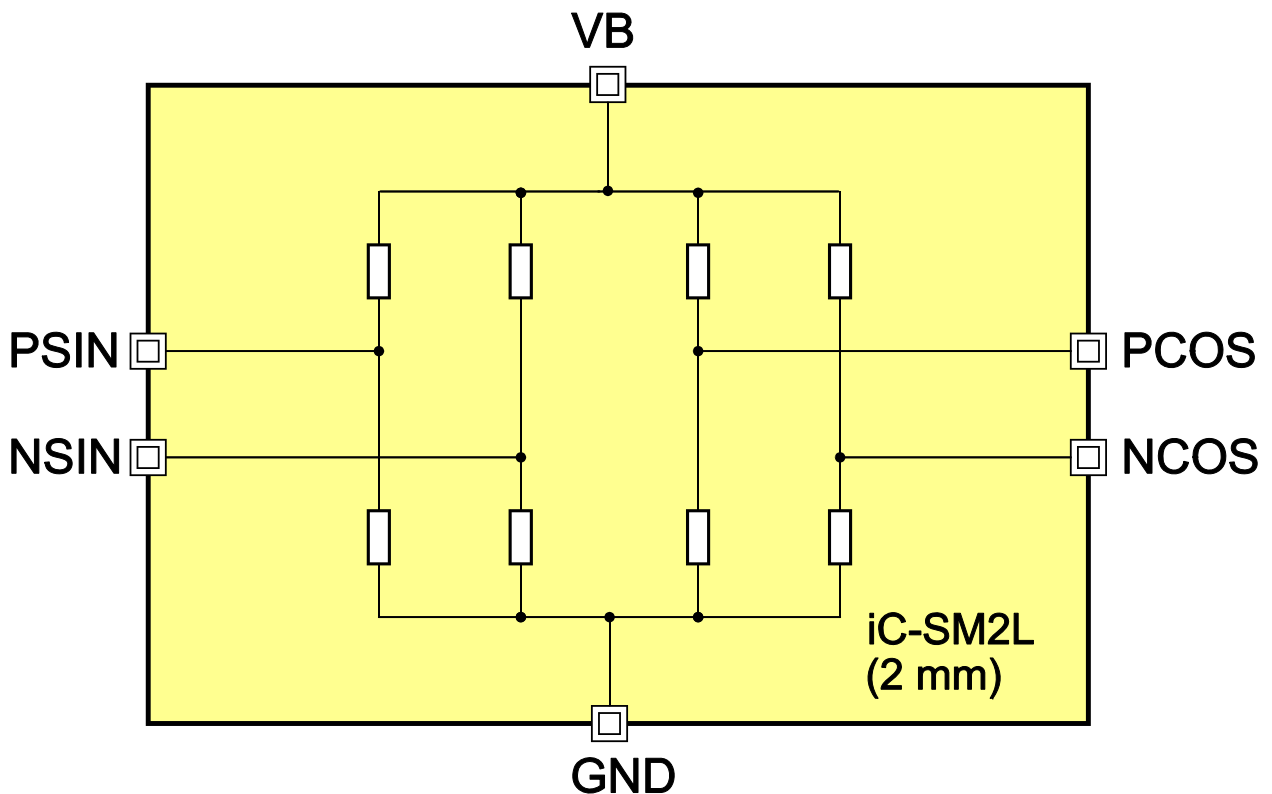
- ◆ Linear position sensing
- ◆ Length measuring systems
- ◆ Off-axis hollow shaft rotary encoders

PACKAGES



LGA SM2C
7.6 mm x 2.8 mm x 1.8 mm
RoHS compliant

BLOCK DIAGRAM



iC-SM2L

LINEAR AMR SENSOR (2 mm)



Rev B2, Page 2/7

DESCRIPTION

iC-SM2L is a linear position sensor which operates on the AMR effect (anisotropic magneto resistance) and has been designed to work with magnetic scales which have a N/S pole pitch of 2 mm.

When the Sensor is moved along a magnetic scale with a N/S pole pitch of 2 mm the two Wheatstone bridges generate differential sinusoidal output voltages (PSIN - NSIN) and (PCOS - NCOS) phase-shifted at 90°. One sine/cosine cycle averaged using a pair of N/S poles is thus produced for a pole

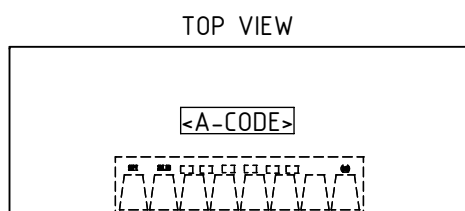
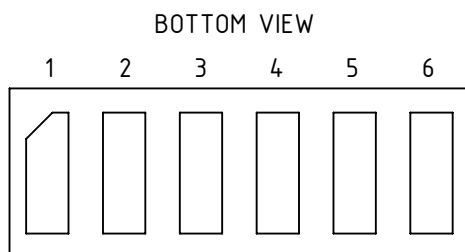
width. The absolute magnetic field strength must be large enough for the sensor to go into saturation and for the magnetization of iC-SM2L's resistor stripes to assume the direction of the outer magnetic fields.

The amplitudes of the differential output voltages are largely independent of the magnetic field strength and thus not sensitive to changes in distance.

iC-SM2L is resistant to strong magnetic fields and not sensitive to external homogenous magnetic fields.

PACKAGING INFORMATION

PIN CONFIGURATION



PIN FUNCTIONS

No.	Name	Function
1	NCOS	Inverted Cosine Output
2	PCOS	Noninverted Cosine Output
3	VCC	Supply Voltage
4	GND	Ground
5	NSIN	Inverted Sine Output
6	PSIN	Noninverted Sine Output

IC top marking: <A-CODE> = assembly code (subject to changes).

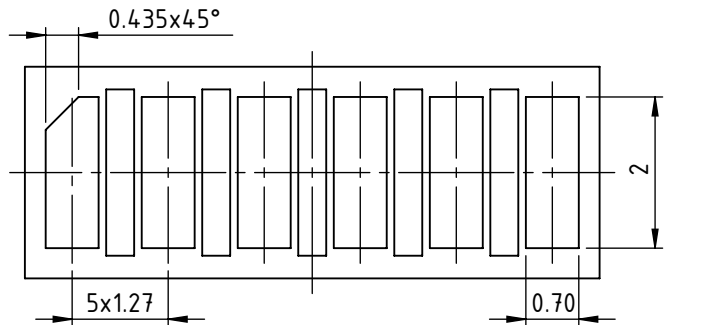
iC-SM2L

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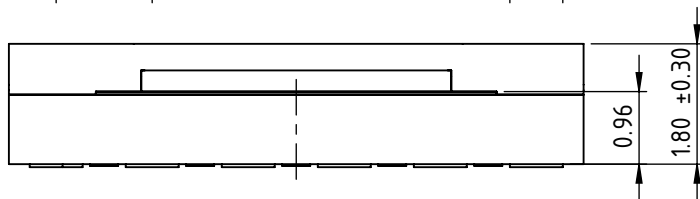


Rev B2, Page 3/7

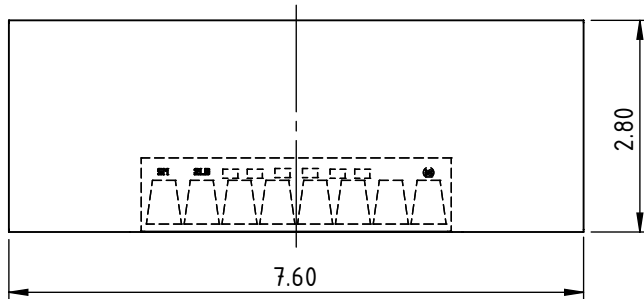
PACKAGE DIMENSIONS



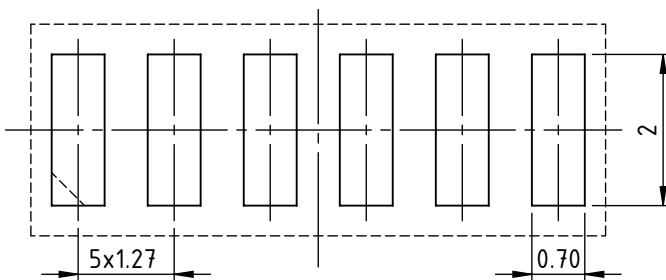
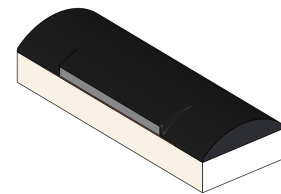
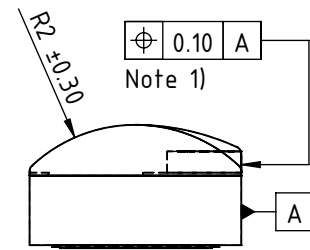
BOTTOM



SIDE



TOP



RECOMMENDED
PCB-FOOTPRINT

Note 1):

- Caution: Do not touch exposed sensor edge.
- Sensor edge can be set back or overhang by up to 0.05 mm vs. substrate edge.

All dimensions given in mm. General tolerances according to ISO-2768-mK
Position tolerance of sensor pattern: ± 0.20 mm / $\pm 1^\circ$ (with respect to backside pads).

iC-SM2L

LINEAR AMR SENSOR (2 mm)



Rev B2, Page 4/7

ABSOLUTE MAXIMUM RATINGS

These ratings do not imply operating conditions; functional operation is not guaranteed. Beyond these ratings device damage may occur.

Item No.	Symbol	Parameter	Conditions			Unit
				Min.	Max.	
G001	V()	Voltage at VB		-10	10	V
G002	V()	Voltage at PSIN, NSIN, PCOS, NCOS		-10	10	V
G003	I()	Current in VB		-11	11	mA
G004	I()	Current in PSIN, NSIN, PCOS, NCOS		-11	11	mA
G005	Tj	Junction Temperature		-40	125	°C
G006	Ts	Chip Storage Temperature		-40	125	°C

THERMAL DATA

Operating conditions: VB = 5V ±10 %

Item No.	Symbol	Parameter	Conditions				Unit
				Min.	Typ.	Max.	
T01	Ta	Operating Ambient Temperature Range	package LGA SM2C (extended temperature range of -40 to 125 °C available on request)	-20		90	°C
T02	Ts	Storage Temperature Range	package LGA SM2C	-30		110	°C
T03	Tl	Soldering Peak Temperature	package LGA SM2C $t_{pk} < 20$ s, convection reflow $t_{pk} < 20$ s, vapour phase TOL (time on label) 8 h; please refer to customer information file No. 7 for details			260 230	°C °C

All voltages are referenced to ground unless otherwise stated.

All currents flowing into the device pins are positive; all currents flowing out of the device pins are negative.

ELECTRICAL CHARACTERISTICS

Operating Conditions:

$V_B = 5\text{ V} \pm 10\%$, $T_j = -40 \dots 125\text{ }^\circ\text{C}$, $|H_{\text{ext}}| > 25\text{ kA/m}$ at the bottom edge of the sensor, unless otherwise noted

Item No.	Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Total Device							
001	V_B	Permissible Supply Voltage V_B		-8		8	V
002	$I()$	Supply Current in V_B	PSIN, NSIN, PCOS, NCOS open	3.4		6.2	mA
003	$R()$	Bridge Resistance of one sine/cosine bridge	$T_j = 25\text{ }^\circ\text{C}$	1.8		2.6	k Ω
004	$TC(R)$	Bridge Resistance Temperature Coefficient		0.27	0.32	0.37	%/K
005	V_{pk}	Amplitude of Differential Output Voltages		8		20	mV/V
006	$TC(V_{pk})$	Amplitude Temperature Coefficient		-0.4		-0.25	%/K
007	V_{os}	Diff. Output Offset Voltage	$H_{\text{ext}} = 0\text{ kA/m}$ at the bottom edge of the sensor	-2		2	mV/V
008	$TC(V_{os})$	Offset Voltage Temperature Coefficient		-3		3	$\mu\text{V/V/K}$
009	V_{rel}	Relative Change in Amplitude	distance bottom edge of the sensor to the magnetic scale: 0 ... 1.5 mm	-5		5	%
010	AA_{abs}	Absolute Angle Accuracy	without offset voltage, distance bottom edge of the sensor to the magnetic scale: 0.5 mm	-1		1	DEG

APPLICATION INFORMATION

iC-SM2L is placed vertically above a magnetic scale with an equal distribution of N/S pole pairs.

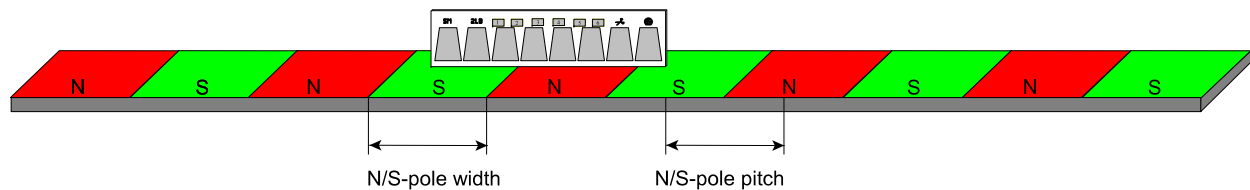


Figure 1: Placement of the iC-SM2L to a magnetic scale

APPLICATION INFORMATION: Handling



Figure 2: Handling instruction: **NOT OK.**

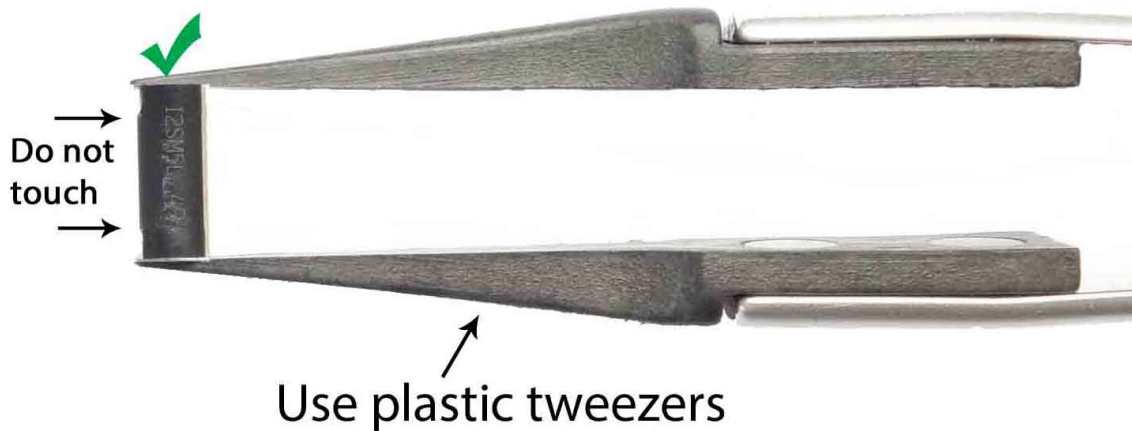


Figure 3: Handling instruction: **OK.**

REVISION HISTORY

Rel	Rel.Date	Chapter	Modification	Page
B1	14-07-04		Datasheet replaces former iC-SM2L datasheet release A2 and package datasheet LGA SM2C release A3.	all

Rel	Rel.Date	Chapter	Modification	Page
B2	14-10-14		All package Figures updated	1 - 3

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iC-SM2L

LINEAR AMR SENSOR (2 mm)



Rev B2, Page 7/7

ORDERING INFORMATION

Type	Package	Options	Order Designation
iC-SM2L	6-pin LGA SM2C, 7.6 mm x 2.8 mm, thickness 1.8 mm RoHS compliant		iC-SM2L LGA SM2C

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