

iC-SM5L

LINEAR AMR SENSOR (5 mm)

preliminary



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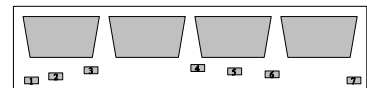
FEATURES

- ◆ Magneto resistive position sensor based on the AMR effect
- ◆ Strong field sensor for 5 mm N/S pole pitch
- ◆ 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

APPLICATIONS

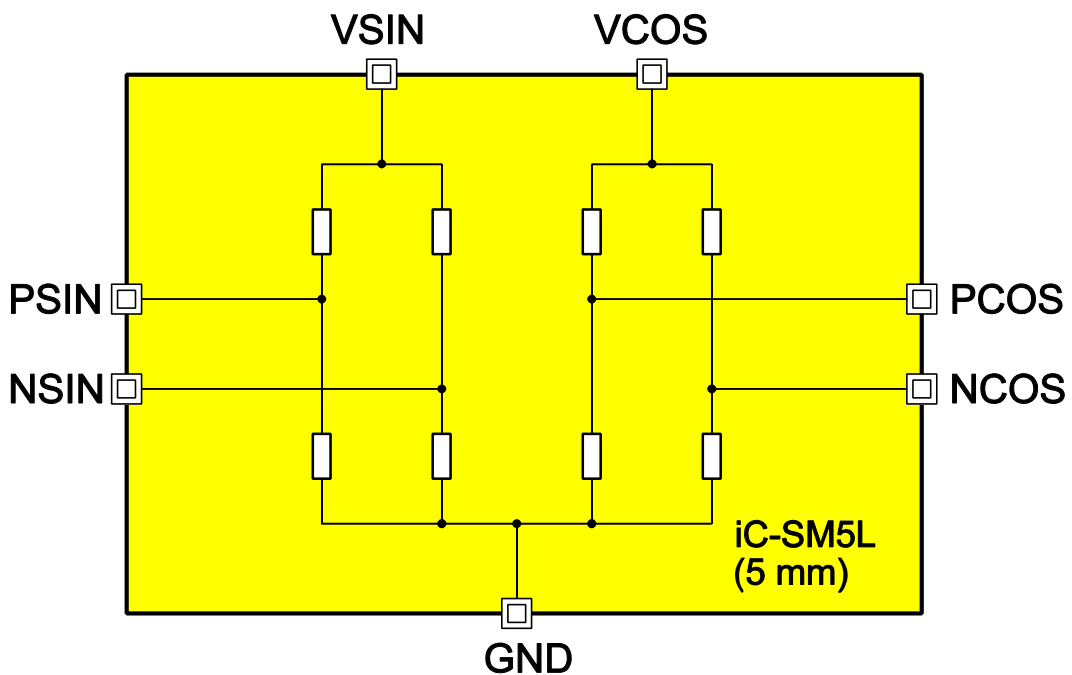
- ◆ Linear position sensing
- ◆ Length measuring systems

CHIP



5.10 mm x 1.24 mm

BLOCK DIAGRAM



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DESCRIPTION

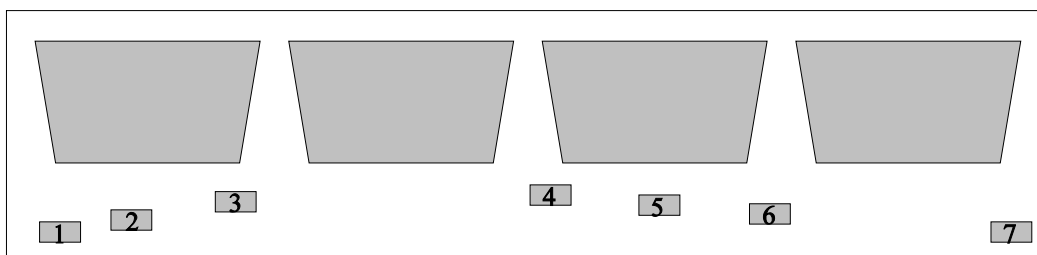
iC-SM5L is a linear position sensor which operates on the AMR effect (anisotropic magneto resistance) and has been designed to work with magnetic scales which have a N/S pole pitch of 5 mm.

When the sensor is moved along a magnetic scale with a N/S pole pitch of 5 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-SM5L'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-SM5L is resistant to strong magnetic fields and not sensitive to external homogenous magnetic fields.

CHIP LAYOUT



PAD FUNCTIONS

Nr.	Name	Function
1	VCOS	Supply Voltage Cosine Bridge
2	NCOS	Output Cosine -
3	NSIN	Output Sine -
4	GND	Ground
5	VSIN	Supply Voltage Sine Bridge
6	PSIN	Output Sine +
7	PCOS	Output Cosine +

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ABSOLUTE MAXIMUM RATINGS

Values beyond which damage may occur; device operation is not guaranteed.

Item	Symbol	Parameter	Conditions	Fig.			Unit
					Min.	Max.	
G001	VB	Voltage at VSIN, VCOS			-10	10	V
G002	V()	Voltage at PSIN, NSIN, PCOS, NCOS			-10	10	V
G003	I(VB)	Current in VSIN, VCOS			-10	10	mA
G004	I()	Current in PSIN, NSIN, PCOS, NCOS			-10	10	mA
TG1	Tj	Operating Junction Temperature			-40	125	°C
TG2	Ts	Storage Temperature Range			-40	125	°C

THERMAL DATA

Operating Conditions: VSIN = 5 V ± 10 %, VCOS = 5V ± 10 %

Item	Symbol	Parameter	Conditions	Fig.				Unit
					Min.	Typ.	Max.	
T1	Ta	Operating Ambient Temperature Range (extended range on request)			-40		85	°C

All voltages are referenced to ground unless otherwise noted.

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

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ELECTRICAL CHARACTERISTICS

Operating Conditions:

$V_{SIN} = 5V \pm 10\%$, $V_{COS} = 5V \pm 10\%$, $T_j = -40 \dots 85\text{ }^\circ\text{C}$, $|H_{ext}| > 25\text{ kA/m}$ at the bottom edge of the sensor, unless otherwise noted

Item	Symbol	Parameter	Conditions	T _j °C	Fig.				Unit	
						Min.	Typ.	Max.		
Total Device										
001	VB	Permissible Supply Voltages VSIN, VCOS	VB = VSIN = VCOS			-10		10		V
002	I(VB)	Supply Current in VSIN, VCOS	PSIN, NSIN, PCOS, NCOS open VSIN connected to VCOS			5		10		mA
003	R()	Sensor resistance (sine and cosine bridge)	VSIN connected to VCOS	25		1	1.5	2		kΩ
004	TC(R)	Bridge Resistance Temperature Drift				0.29	0.33	0.37		%/K
005	Vpk	Amplitude of Differential Output Voltages			1	8		20		mV/V
006	TC(Va)	Amplitude Temperature Drift				-0.37	-0,33	-0.29		%/K
007	Vos	Offset Voltage	H _{ext} = 0 kA/m at the bottom edge of the sensor		1	-3		3		mV/V
008	TC(Vos)	Offset Voltage Temperature Drift				-3		3		μV/VK
009	Vrel	Relative Change in Amplitude	distance bottom edge of the sensor to the magnetic scale: 0 ... 2.5 mm			-5		5		%
010	AAabs	Absolute Angle Accuracy	without offset voltage, distance bottom edge of the sensor to the magnetic scale: 1 mm		1	-1		1		DEG

APPLICATIONS INFORMATION

iC-SM5L is placed vertically above a magnetic scale with an equal distribution of pairs of N/S poles.

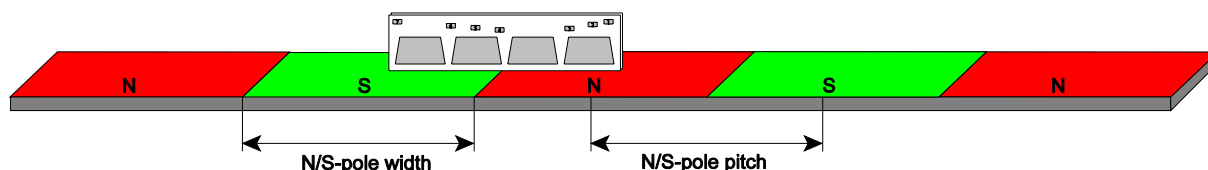


Figure 1: Placement of the iC-SM5L to a magnetic scale

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Type	Package	Order designation
iC-SM5L		iC-SM5L CHIP

For information about prices, terms of delivery, options for other case types, etc., please contact:

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