Data Sheet
Magnetic Length Sensors
MLS1000, MLS2000, MLS5000

Measurement Specialties/HL Planartechnik GmbH
Hauert 13,44227 Dortmund,Germany
Tel: +49(0)231 97400, Fax: +49(0)231 974020
E-Mail: service@hlplanar.de

Measurement Specialties/Asian Headquarters
F1.6-5A,Tian An Development Compound,Shenzhen,China
Tel: +86 010 84775648, Fax: +86 010 58949029
E-Mail:sales@sensorway.cn
Http://www.sensorway.cn

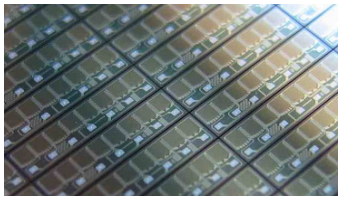
FEATURES

- sin- / cos-output signals suitable for signal evaluation by standard-ASIC's
- high precision
- insensitive to air gap fluctuations
- highly reliable
- low interference field sensitivity

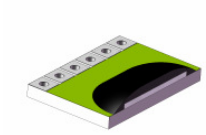
APPLICATIONS

- measuring positions, movements, velocities
- angular measurement using polewheels

PACKAGES



die



small hybride

large hybride

GENERAL DESCRIPTION

Sliding the MLS-Sensors along a magnetic scale will produce a sine and a cosine output signal as a function of the position. In order to deliver satisfying results, the magnetic sensor material must be saturated. For common scales this condition will be achived as long as the air gap between sensor edge and magnetic scale surface does not exceed half of the pole pitch. As the sensor principle is based on the anisotropic magnetoresistance effect, the signal amplitudes are nearly independent on the magnetic field strength and therefore on air gap variations. In addition, some sensor types integrate over more than one pole in order to improve sensor performance. The sensor detects a magnetic gradient field and is thus almost insensitive to homogenous stray fields.

Precise displacement values will be archived by using a sine/cosine decoder. The maximal obtainable precision depends on the distance sensor – magnetic scale and on the accuracy of the magnetic scale. Values of <1% of the pole pitch are common.

The MLS-sensors consists of two magnetoresistive wheatstone bridges, generating two phase-shifted signals by means of a lateral offset. MLS-sensors will only cooperate well together with polestripes meeting their design-polepitch.

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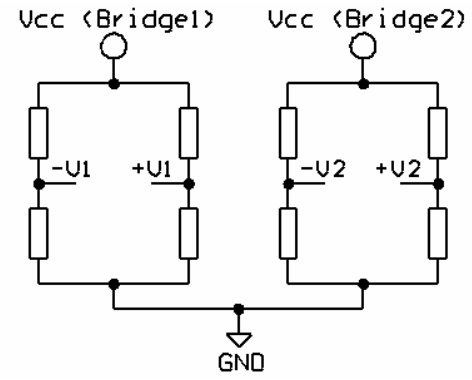
CIRCUIT DIAGRAM



On MLS1000 and MLS2000-chips the supply voltage lines of both bridges are connected on chip-level to a common supply voltage contact.

CHARACTERISTIC VALUES

PARAMETER	SYMBOL	CONDITION	TYPE	MIN	TYP	MAX	UNIT
A. Operating Limits							
max. supply voltage	$V_{cc,max}$					10	V
max. current (both bridges)	$I_{cc,max}$		MLS1000 MLS2000/5000			5 10	mA
operating temperature	T_{op}			-40		+85	°C
storage temperature	T_{st}			-40		+125	°C
B. Sensor Specifications (T=25 °C)							
Supply voltage	V_{cc}				5		V
Resistance (both bridges)	R_b		MLS1000 MLS2000/5000	2000 1000	3000 1500	4000 2000	Ω
Output signal range	$\Delta V_n/V_{cc}$	Condition A, B		16	20		mV/V
Offset voltage	$V_{n\ off}$	Condition A, B		-1	0	+1	mV/V
C. Sensor Specifications							
TC of amplitude	*TCSV*	Condition A, C		-0.36	-0.32	-0.28	%/K
TC of resistance	*TCBR*	Condition A, C		+0.27	+0.32	+0.37	%/K
TC of offset	*TCVoff*	Condition A, C		-4	0	+4	µV/V/K

N = 1;2 (bridge number)

Stress above one or more of the limiting values may cause permanent damage to the device. Exposure to limiting values for extended periods may affect device reliability.

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MEASUREMENT CONDITIONS

PARAMETER	SYMBOL	UNIT	CONDITION
A. Set Up Conditions			
ambient temperature	T	℃	T = 23±5 ℃ (unless otherwise noted)
supply voltage	V_{cc}	V	Vcc = 5 V
applied magnetic field	H	kA/m	H > 10 kA/m
B. Sensor Specifications (T=25 ℃, 360° turn , H=25 kA/m , Vo_{max}>0, Vo_{min}<0)			
output signal range	$\Delta V_n / V_{cc}$	mV/V	$\Delta V_n / V_{cc} = (V_{n\ max} - V_{n\ min}) / V_{cc}$
signal offset	$V_{off\ n}$	mV/V	$V_{off\ n} = (V_{n\ max} + V_{n\ min}) / V_{cc}$
C. Sensor Specifications (T=-25℃, +125℃)			
ambient temperatures	T	℃	T_1 = -25 ℃, T_0 = +25 ℃, T_2 = +125 ℃
TC of amplitude	*TCSV*	%/K	$TCV = \frac{1}{(T_2 - T_1)} \cdot \frac{\frac{\Delta V_n}{V_{cc}}(T_2) - \frac{\Delta V_n}{V_{cc}}(T_1)}{\frac{\Delta V_n}{V_{cc}}(T_1)} \cdot 100\%$
TC of resistance	*TCBR*	%/K	$TCR = \frac{1}{(T_2 - T_1)} \cdot \frac{R_n(T_2) - R_n(T_1)}{R_n(T_1)} \cdot 100\%$
TC of offset	*TCVoff*	µV/(VK)	$TCVoff_n = \frac{Voff_n(T_2) - Voff_n(T_1)}{(T_2 - T_1)}$

n = 1;2 (bridge number)

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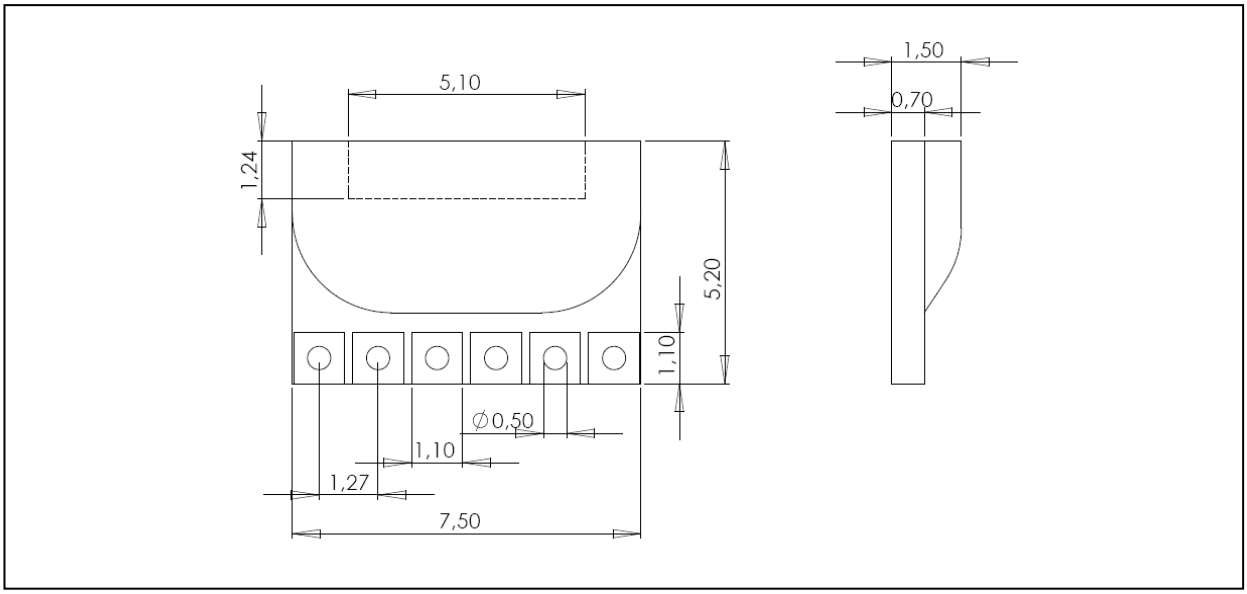
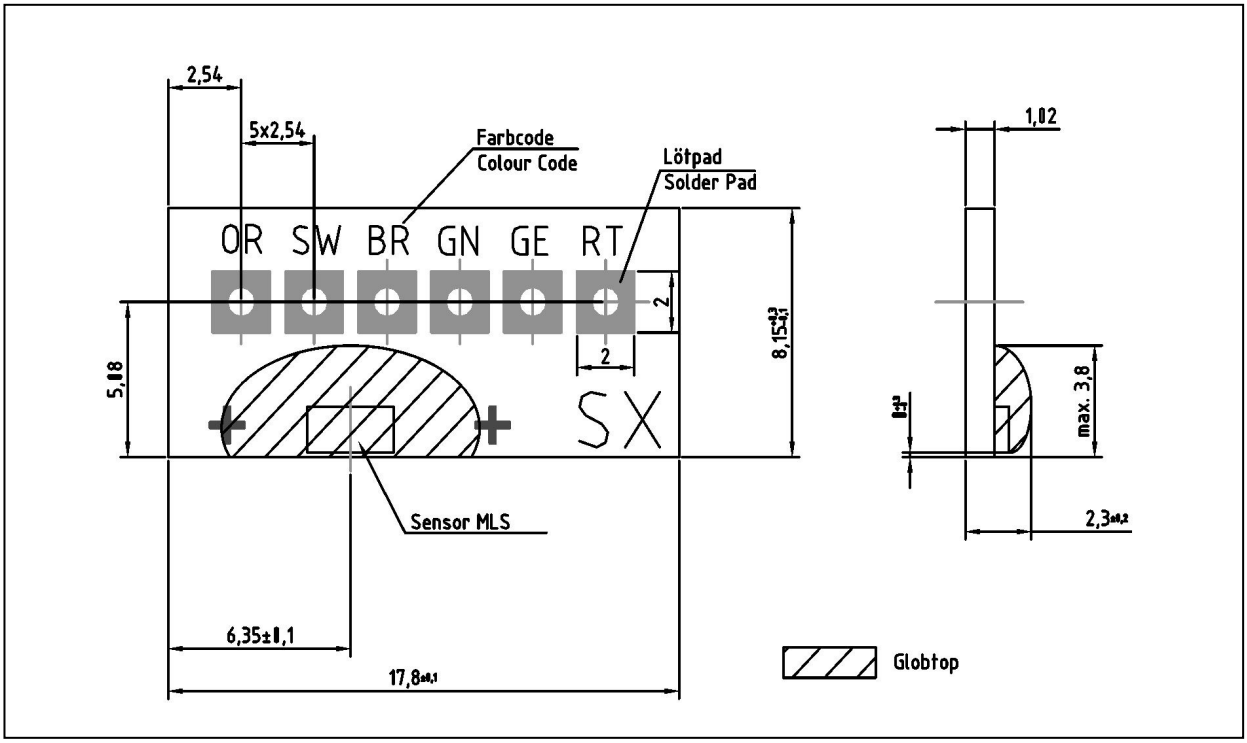
PACKAGES

HK (HYBRIDE SMALL)



HS (HYBRIDE LARGE)



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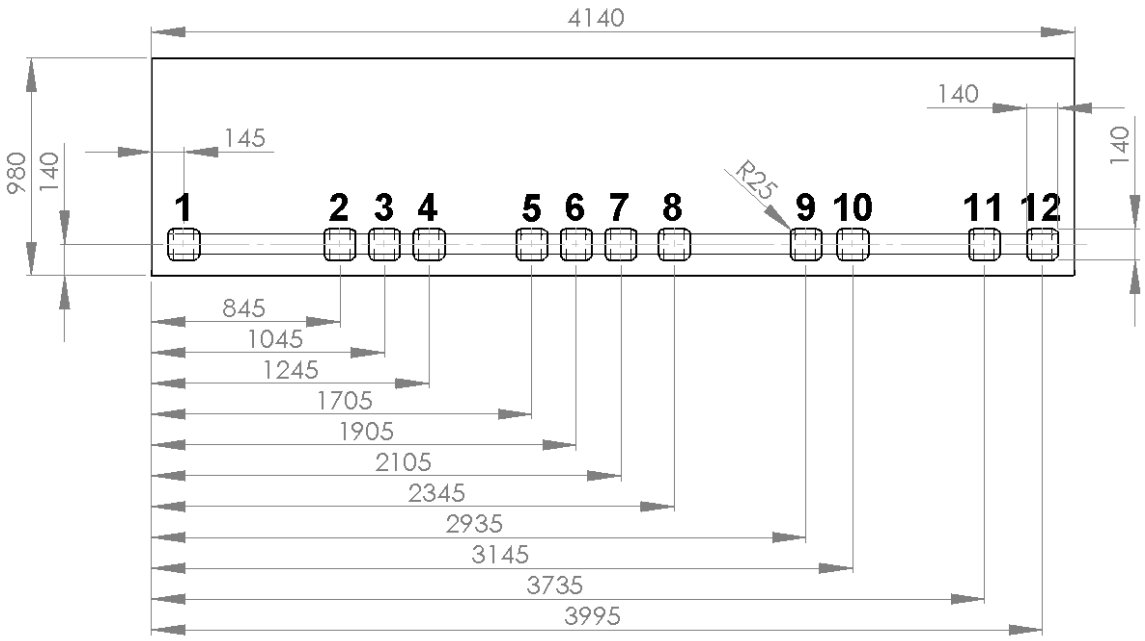
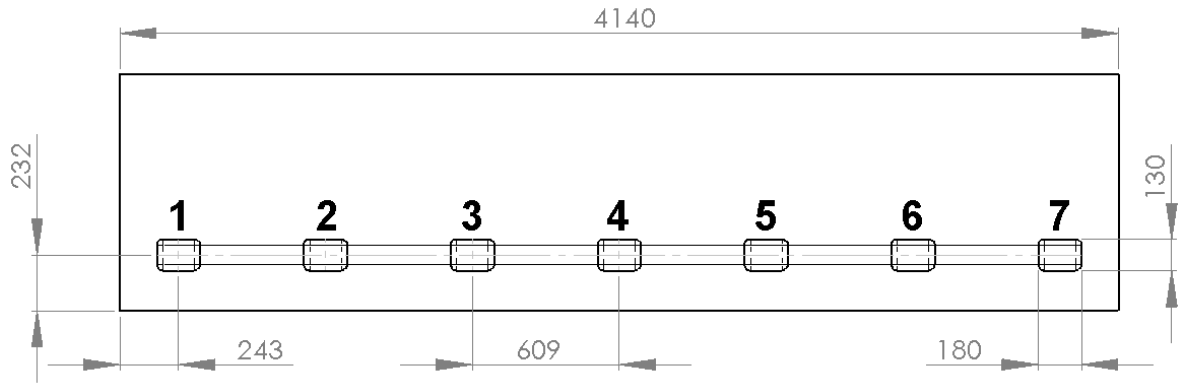
DIE

MLS 1000



MLS 2000



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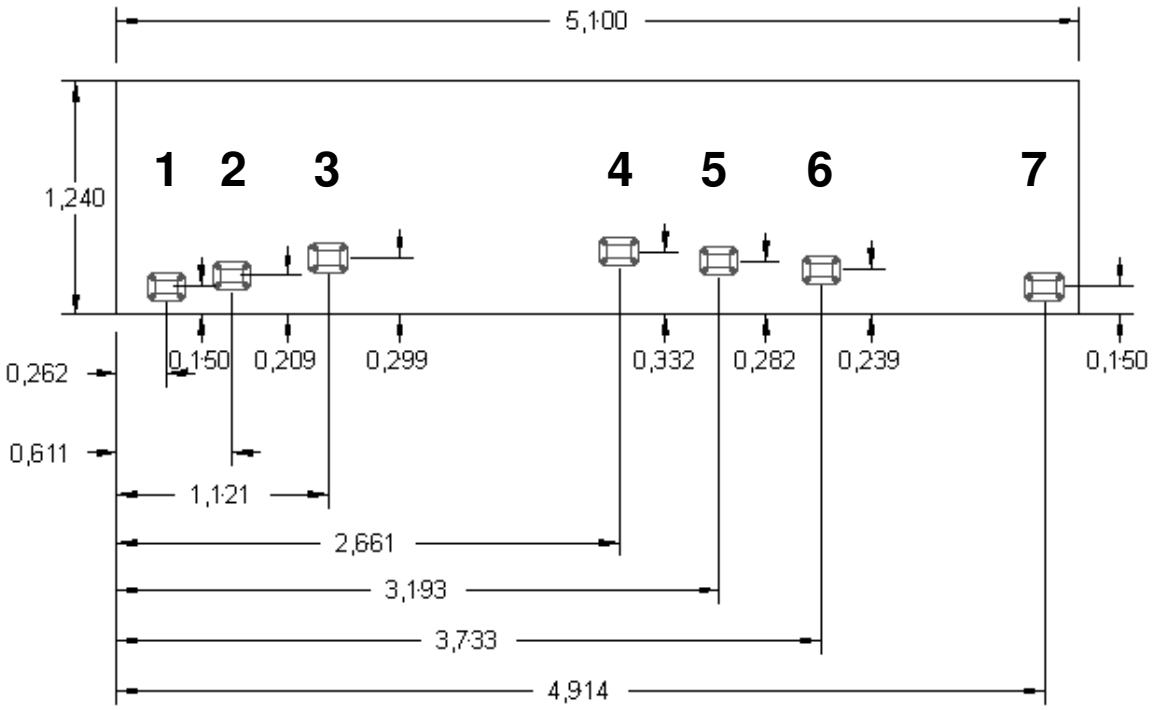
MLS 5000



Pin	MLS1000 (Die)	MLS2000 (Die)	MLS5000 (Die)
1	Vcc	-V2	Vcc (bridge 2)
2	-V1	-V1	-V2
3	+V1	-V2	-V1
4	-V1	GND	GND
5	-V2	Vcc	Vcc (bridge 1)
6	+V2	+V1	+V1
7	-V2	+V2	+V2
8	R1	-	-
9	R1	-	-
10	R2	-	-
11	R2	-	-
12	GND	-	-

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AVAILABLE TYPES, OUTLINES AND ORDERING CODES

	MLS1000	MLS2000	MLS5000
Die	MLS1000	MLS2000	MLS5000 G-MRCH-017
Hybride Large (HS)	-	MLS2000HS	MLS5000HS G-MRCO-012
Hybride Small (HK)	-	MLS2000HK	MLS5000HK G-MRCO-013

SENSOR WAY 赛斯维测控技术 Measurement Technology
北京赛斯维测控技术有限公司
北京市朝阳区望京西路48号
金隅国际C座1002
电话：＋86 010 8477 5646
传真：＋86 010 5894 9029
邮箱：sales@sensorway.cn
http://www.sensorway.cn

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This data sheet contains target specifications for product development which my be subject to changes without notice.