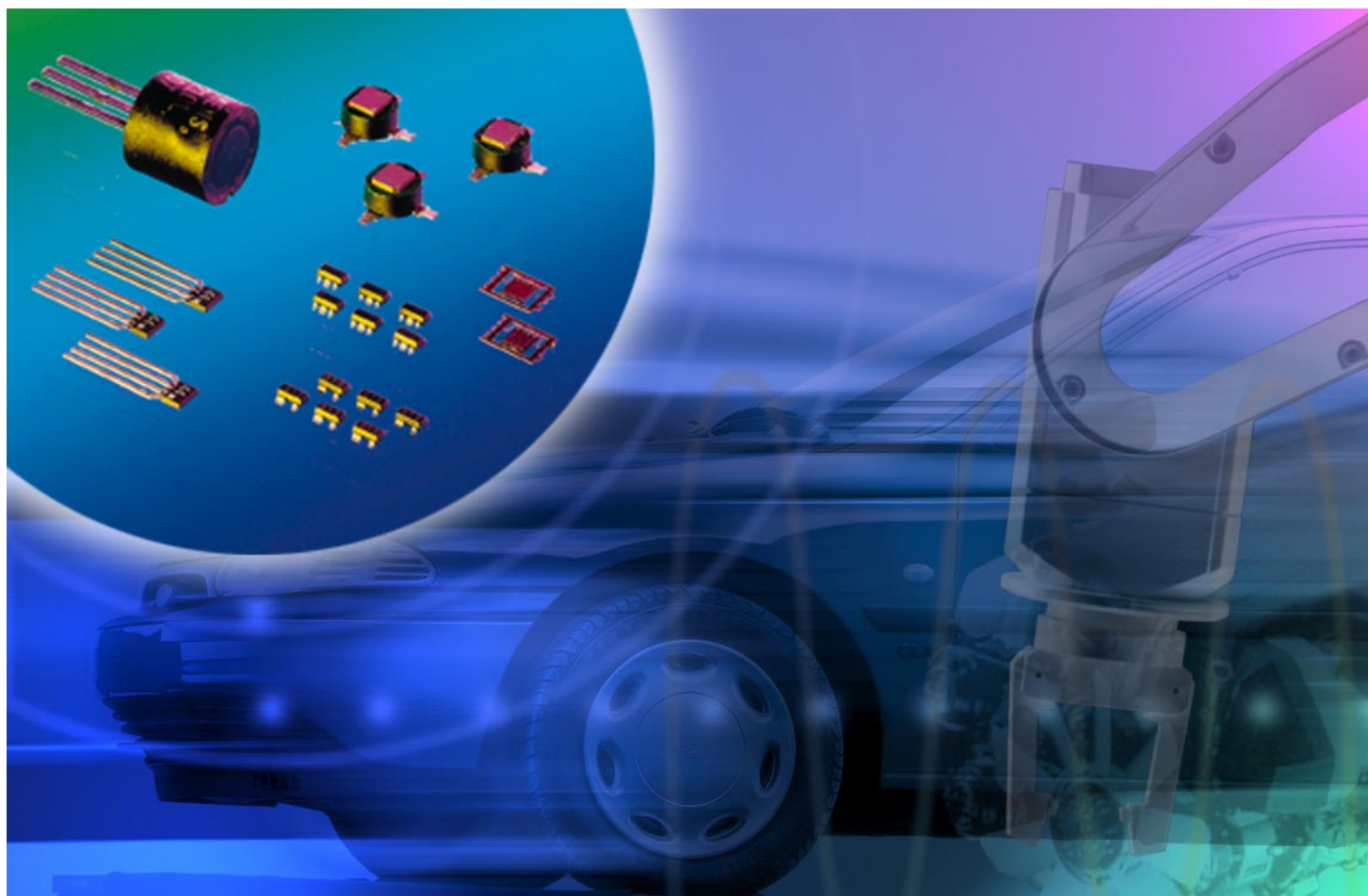




Magnetic Sensors

GaAs Hall Sensors

Magneto Resistors

Linear GaAs Hall Sensors

Applications

- **Position sensors**
- **Distance measurement**
- **Contactless potentiometers**
- **Current sensors**
- **Control of brushless DC motors**

Features

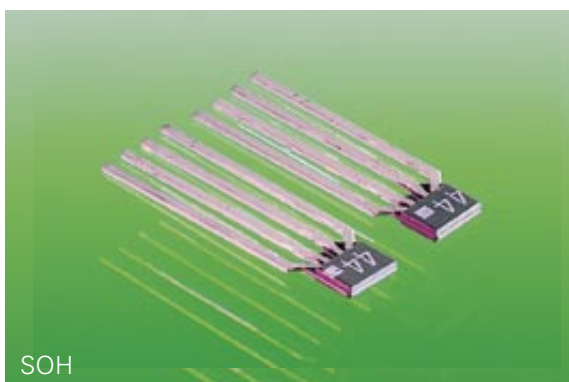
- **Excellent linearity**
- **Wide temperature range**
- **SMT technology**
- **Ultra-flat package for small air gaps (SOH)**

Gallium arsenide as a semiconductor base material proves excellent accuracy and temperature stability for a wide range of applications.

Siemens Semiconductor group has a long experience in using GaAs as material for Hall sensors. Therefore we can offer a perfected program of different packages and chip technologies - from low-cost standard SMD to state-of-the-art devices with unique performance characteristics.

Wide operating temperatures, outstanding linearity and the absence of aging effects make these parts most commendable for automotive and industrial applications.

Type	Package	Operating temperature [°C]	Linearity $B = 0 \dots 0,5 T$ [FL]	Open-circuit sensitivity
KSY 13	SOT-143 (SMT)	-40/+150	—	190 ... 290 V/AT
KSY 14	SOH (Ultraflat)	-40/+175	$\leq \pm 0.2 \%$	190 ... 260 V/AT
KSY 44	SOH (Ultraflat)	-40/+175	$\leq \pm 0.2 \%$	150 ... 230 V/AT
KSY 16	MW-6 (SMT)	-40/+150	$\leq \pm 0.2 \%$	190 ... 260 V/AT
KSY 46	MW-6 (SMT)	-40/+150	$\leq \pm 0.2 \%$	150 ... 230 V/AT



Magneto Resistors

Indium Antimonide Material

Applications

- Encoders
- Rotational sensors
- Longitudinal measurement
- Robotics
- Linear position sensing

Features

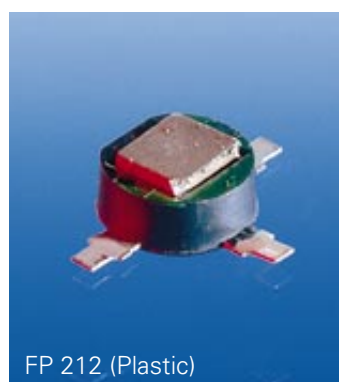
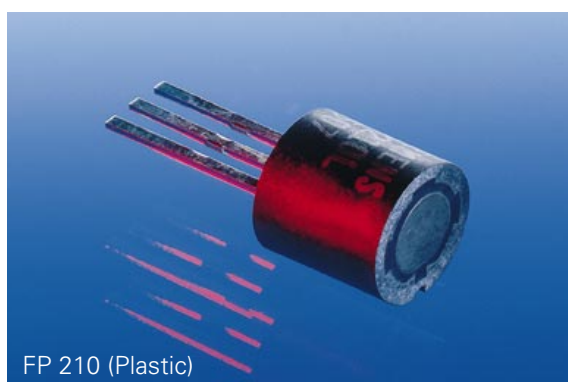
- High sensitivity
- High resolution
- Wide temperature range
- Optimised for gear-wheel sensing

InSb-Magneto Resistors are mainly used for gear-wheel sensing. Provided with a suitable biasing magnet, output signals with a peak-to-peak voltage up to 2 V can be generated without amplification. This extremely high sensitivity in addition with operating temperatures up to 175 °C makes InSb-devices first choice for most demanding applications.

Double-differential systems like FP 410 produce two sinewave signals, which also allows to determine direction of movements with one device. Highest resolution can be achieved with FP 420 L 90 and FP 425 L 90, as the lay-out of the semiconductor has specifically been designed for gear-wheel modules 0.3 or 0.5 resp. The substrate of these two devices is Silicon - also supporting accuracy by avoiding undesired magnetic influences of the carrier material.

Type	Package	Biasing magnet included	Operating temperature [°C]	
FP 210 D/L *	Plastic	Yes	–40/+140	Differential system
FP 212 D/L *	Plastic	Yes	–40/+140	Differential system
FP 410 L 4x80FM	TAB	No	–40/+175	Double differential
FP 412 D/L *	TAB	No	–40/+175	Differential system
FP 420 L 90B	TAB	No	–40/+175	Double differential
FP 425 L 90	TAB	No	–40/+175	Double differential

* D- and L-material possible: Different doping of semiconductor material results in different sensitivity and temperature dependence



Application Notes

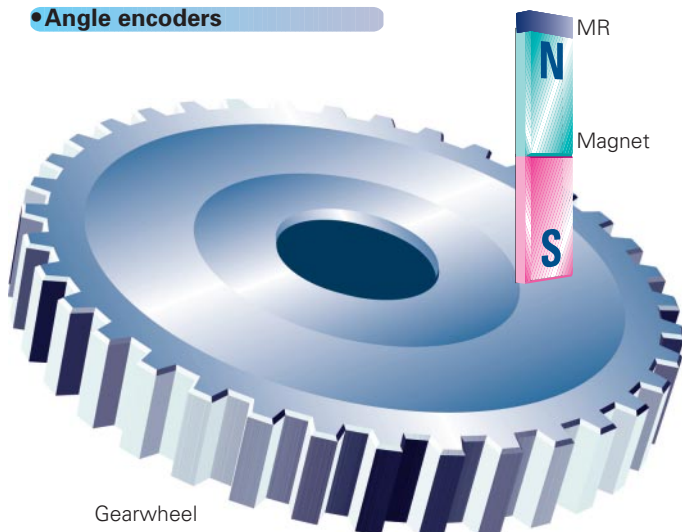
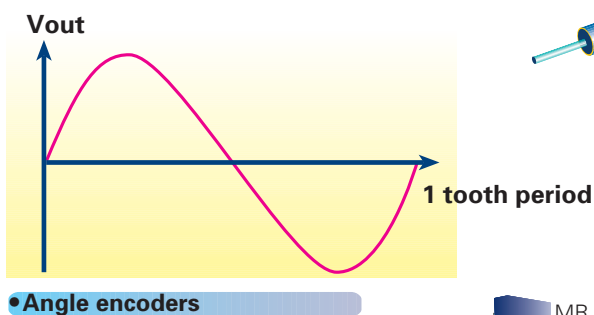
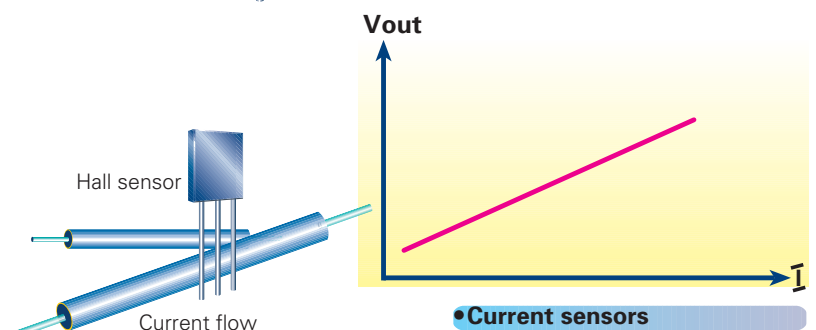
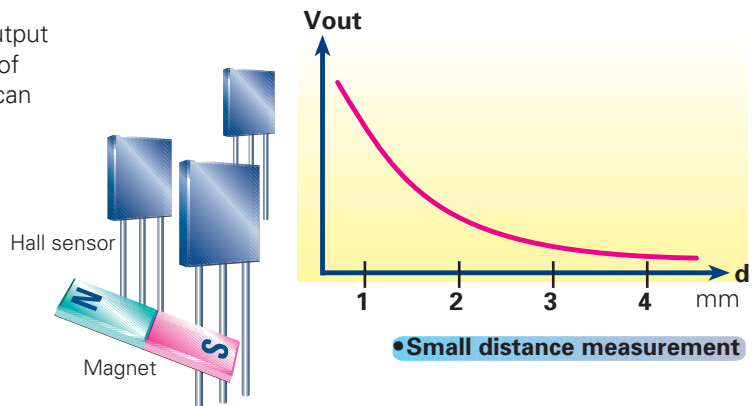
Linear Hall Elements and Magneto Resistors

The basic effect is change of resistance (MRs) or output voltage (Hall elements, depending on the influence of magnetic fields. With suitable set-up these effects can ideally be used for:

- **Position sensors**
- **Current sensors**
- **Angle encoders**
- **Rotational sensors**
- **and many other applications**

Applying magnetic semiconductor sensors provides some major advantages for many applications:

- **Contactless operation**
- **No wear and tear**
- **No degradation effects measurable with InSb-MRs and GaAs Hall devices**
- **Operating temperatures from -40°C to 175°C possible**
- **Insensitive to dirt**



These characteristics make our parts first choice especially for automotive and industrial applications.

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Giant-Magneto-Resistive Devices (GMR)

New!

Applications

- **Position sensor for magnetised targets**
 - Angle encoder
 - Rotation
 - Joysticks
 - Potentiometers
 - Small distance measurement

Features

- **Output signal insensitive to airgap deviations**
- **Big airgaps possible (up to 25 mm!)**
- **High sensitivity at low magnetic fields**

These brand-new devices are based on the magneto-resistive effects of metallic multi layers. The resistance effect has been improved by factor 3 to 5, compared to conventional MR-devices (Permalloy).

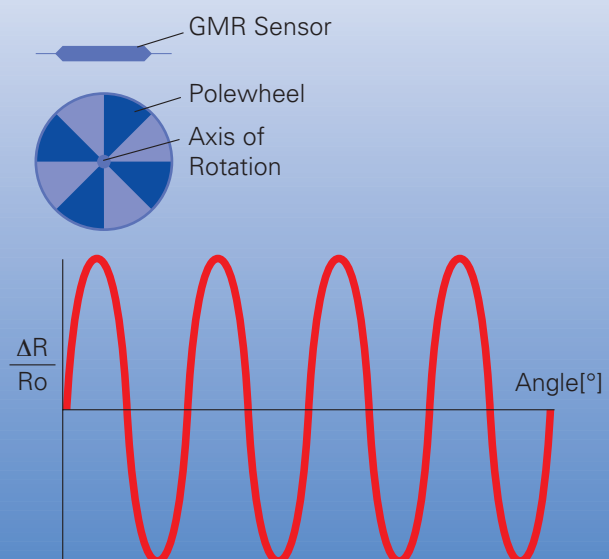
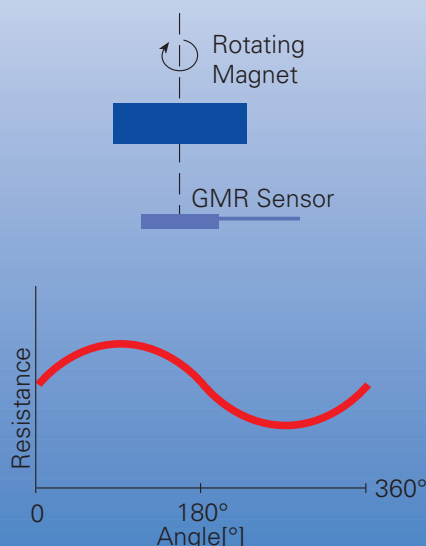
The chip technology has especially been developed for position sensing of magnetised targets. Well-known disadvantages of all kinds of magnetic sensors like Hall elements and conventional MRs have always been the limitation in airgaps and high dependency of the output signal on mechanical alignment tolerances. By utilising the unique features of the GMR, many applications in automotive, industrial and consumer industry can be realised much easier and cheaper than in the past.

GMR's are available in either MW-6 package (SMT) or SOH (ultra-flat).

Preliminary data	GMR
Operating temperature	–40/150 °C max
Supply current	5 mA max
Magnetic field ¹⁾	15 kA/m max
Basic resistance R_0	> 700 Ω
Magnetoresistive effect	
$H_{ROT} = 5 \dots 10 \text{ kA/m}$	> 4 %
TC of magnetoresistive effect	–0.27 ... 0.23 %/K

¹⁾ larger fields may reduce the MR-effect irreversibly!

Operating Modes



Global PartnerChip for Systems on Silicon

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