Giant Magneto Resistive Position Sensor

GMR B6

Version 1.0

Data Sheet

This angle sensor is based on the <u>G</u>iant <u>M</u>agneto <u>R</u>esistive (GMR) technology. It is outstanding for the huge tolerances it offers to the user in assembly.

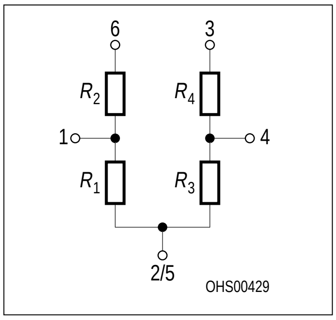
Features

- GMR sensor in SMD package
- **Sensitive to the direction**, not to the intensity of the magnetic field
- Constant T_C of basic resistance R and magneto resistance ΔR

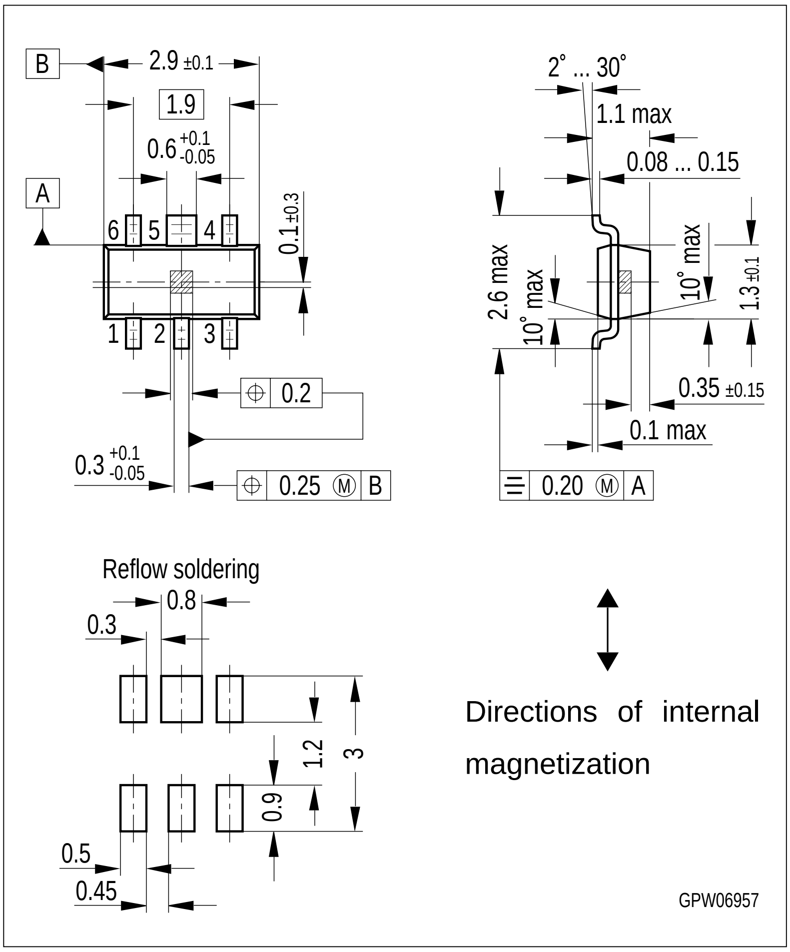
Applications

- Rotation and linear sensing with large airgaps
- Angle encoders
- Contactless potentiometers
- Incremental encoders

Pin Configuration



6, 3	supply
5 (= 2)	ground
1, 4	GMR bridge access



Dimensions in mm

Type	Marking	Ordering Code
◆ GMR B6	B	Q62705-K5004

◆ new type

The GMR B6 is an angle sensor based on sputtered metallic multilayer technology. 4 resistors are monolithically integrated on 1 chip. They can be used as a fullbridge or, if 2 external resistors are added, as 2 halfbridges. The outstanding feature of this magnetic sensor is the fact, that it is **sensitive to the orientation of the magnetic field** and not to its intensity as long as the field is in a range between 5 … 15 kA/m. **This means, the signal output of this sensor is independent of the sensor position relative to the magnet in lateral, axial or rotational direction in the range of several millimeters.** Optimum results are achieved by using magnetic targets like permanent magnets or magnetic pole-wheels. **There is no need for a biasing magnet!** Due to the linear change of both, basic and field dependent part of the resistance vs. temperature, simple and efficient electronic compensation of T_C (R, ΔR) is possible.

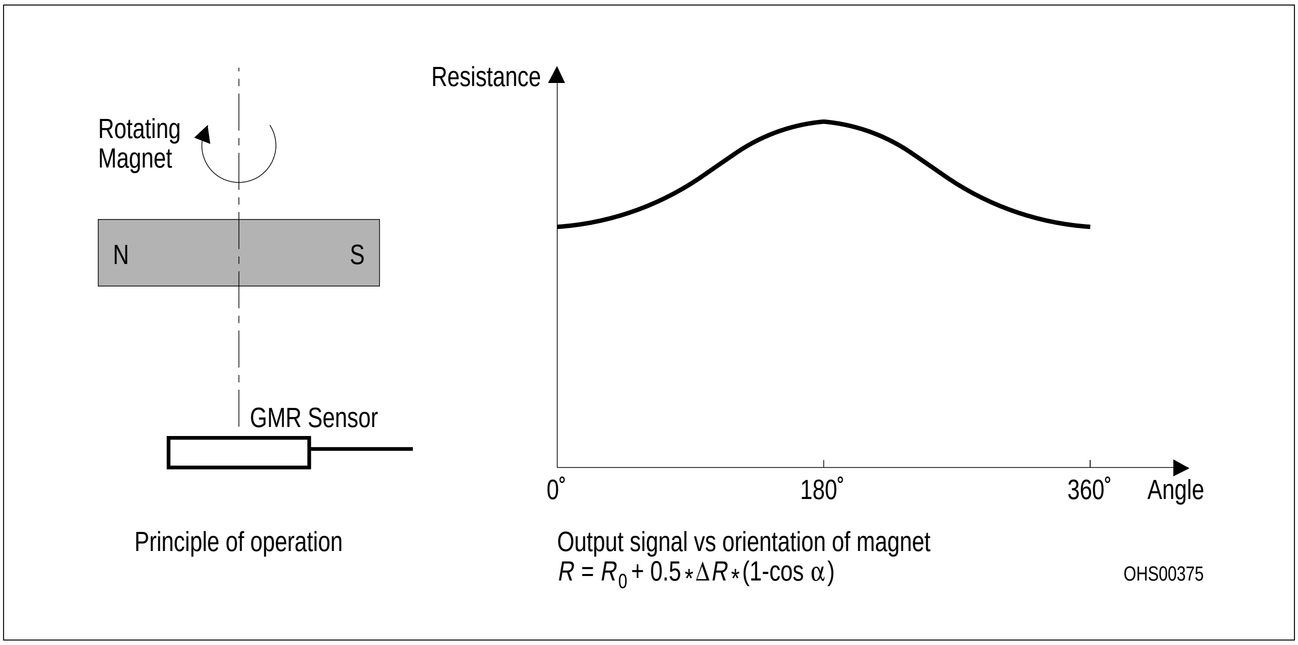


Figure 1

Maximum Ratings

Parameter	Symbol	Value	Unit
Operating temperature	T_A	– 40 … + 150	°C
Storage temperature	T_{stg}	– 50 … + 150	°C
Supply voltage	V_1	7	V
Thermal conductivity	G_{thC} A	> 4	mW/K
Magnetic field [1)]	H_{rot}	< 15	kA/m

[1)] larger fields may reduce the magnetoresistive effect irreversibly

Characteristics (T_A = 25 °C)

Parameter	Symbol	Value	Unit
Nominal supply voltage	V_{1N}	5	V
Basic resistance	R_0	> 700	Ω
Magnetoresistive effect H_{rot} = 5 ... 15 kA/m	$\Delta R/R_0$	> 4	%
Output signal fullbridge	V_{OUT}	> 40	mV/V
Offset voltage	$\|V_0\|$	< 4	mV/V
Temperature coefficient of basic resistance	TC_{R0}	+ 0.09 … + 0.12	%/K
Temperature coefficient of magnetoresistance	$TC_{\Delta R}$	– 0.12 … – 0.09	%/K
Temperature coefficient of magnetoresistive effect	$TC_{\Delta R/R0}$	– 0.27 … – 0.23	%/K
Hysteresis at H_{rot} = 10 kA/m	Hys	< 2	degrees

Application Hints

The application mode of the GMR position sensor is preferably as a bridge or halfbridge circuit. In every case this type of circuit compensates for the T_C of the resistance value R_0. To compensate for the T_C of the GMR effect $\Delta R/R_0$, if there is the necessity, is left to the application circuit and can be done for example with a NIC circuit. When operated over a complete 360° turn, a total signal of ≈ 20 mV/V is achieved at 25 °C with a halfbridge. The output signal is doubled to of ≈ 40 mV/V when a fullbridge circuit is used. In the case of linear position sensing, the electrical circuit remains unchanged.