

Giant Magneto Resistive Position Sensor

GMR S 4

Version 1.0

Data Sheet

This angle sensor is based on the brand new **Giant Magneto Resistive (GMR)** technology. It is outstanding for the huge tolerances it offers to the user in assembly.

Features

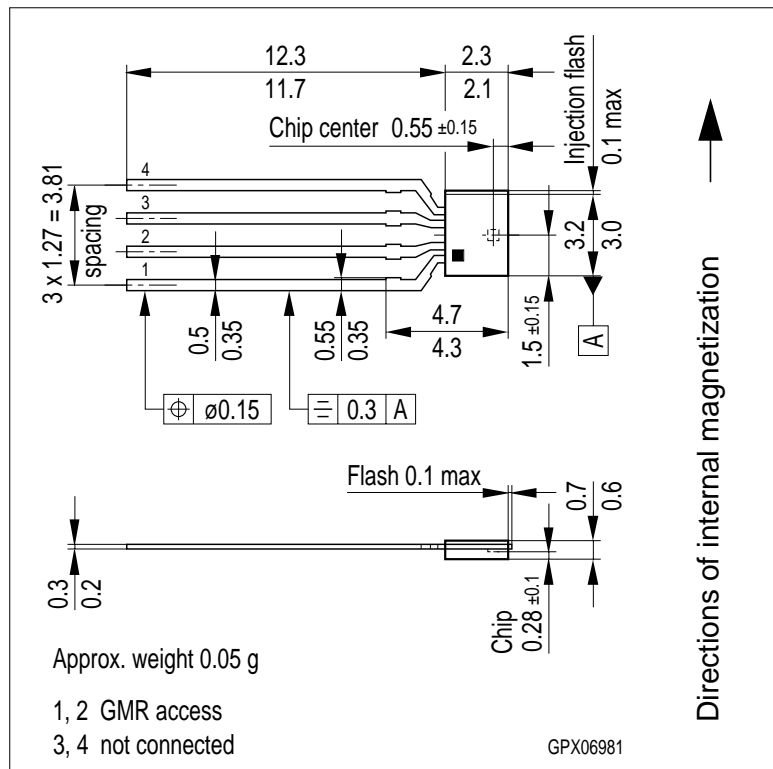
- GMR sensor on copper leadframe
- **Sensitive to the direction**, not to the intensity of the magnetic field
- Constant T_C of basic resistance R and magneto resistance ΔR

Applications

- Rotation sensing with large air gaps according to sketch below
- Angle encoders
- Contactless potentiometers

Pin Configuration

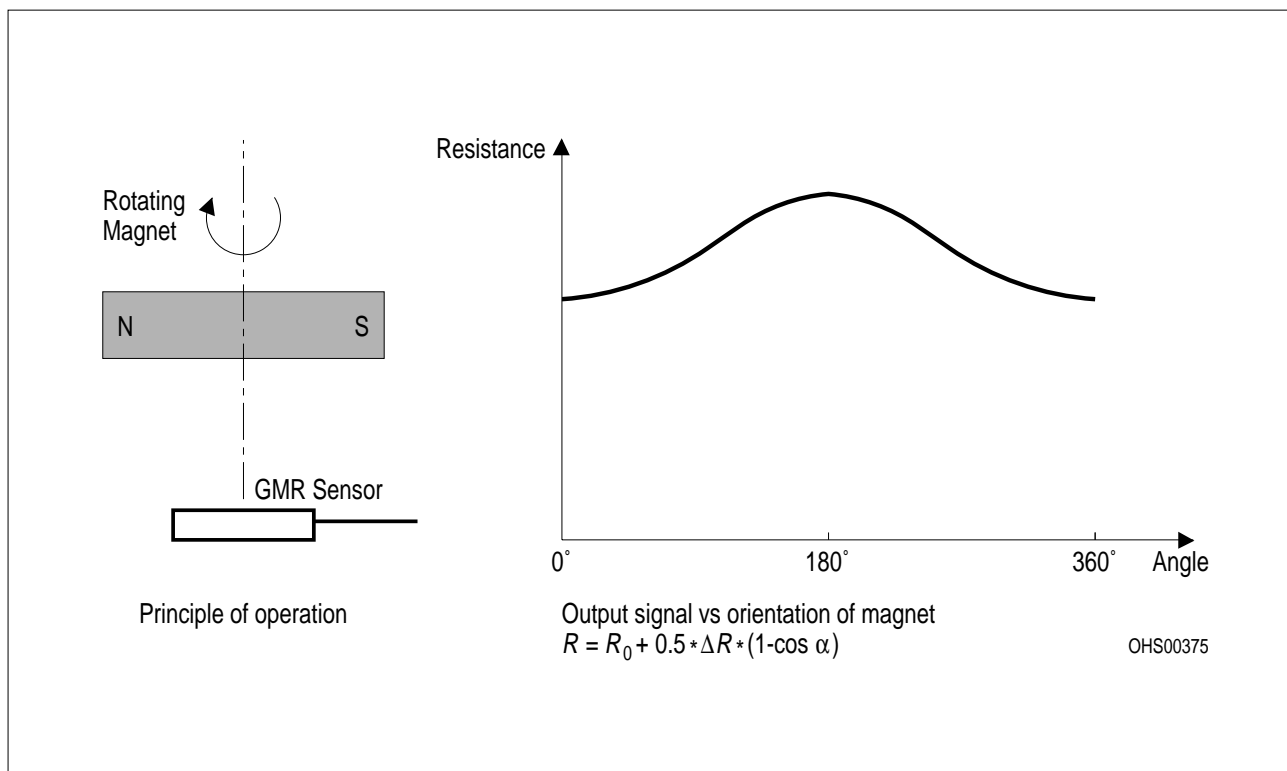
1, 2	supply voltage terminals
3, 4	not connected



Type	Marking	Ordering Code
◆ GMR S 4	■	Q62705-K5002

◆ new type

The GMR S 4 is an angle sensor based on sputtered metallic multilayer technology. 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.



Maximum Ratings

Parameter	Symbol	Value	Unit
Operating temperature	T_A	- 40 ... + 150	°C
Storage temperature	T_{stg}	- 50 ... + 150	°C
Supply current	I_1	5	mA
Thermal conductivity	$G_{thC A}$ $G_{thC C}$	> 2.2 > 5	mW/K mW/K
Magnetic field ¹⁾	H_{rot}	< 15	kA/m

¹⁾ larger fields may reduce the magnetoresistive effect irreversibly

Characteristics ($T_A = 25\text{ °C}$)

Parameter	Symbol	Value	Unit
Nominal supply current	I_{1N}	4	mA
Basic resistance	R_0	> 700	Ω
Magneto-resistive effect $H_{rot} = 5 \dots 15\text{ kA/m}$	$\Delta R/R_0$	≈ 4	%
Temperature coefficient of basic resistance	TC_{R0}	+ 0.09 ... + 0.12	%/K
Temperature coefficient of magneto-resistance	$TC_{\Delta R}$	- 0.12 ... - 0.09	%/K
Temperature coefficient of magneto-resistive effect	$TC_{\Delta R/R0}$	- 0.27 ... - 0.23	%/K
Hysteresis at $H_{rot} = 10\text{ kA/m}$	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 $\approx 20\text{ mV/V}$ is achieved at 25 °C with a halfbridge. The output signal is doubled when a fullbridge circuit is used. In the case of linear position sensing, the electrical circuit remains unchanged.