Giant Magneto Resistive Position Sensor
GMR C6

Version 1.0
Preliminary

**This angle sensor is based on the Giant Magneto Resistive (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
- Providing both sine and cosine signals from 1 chip
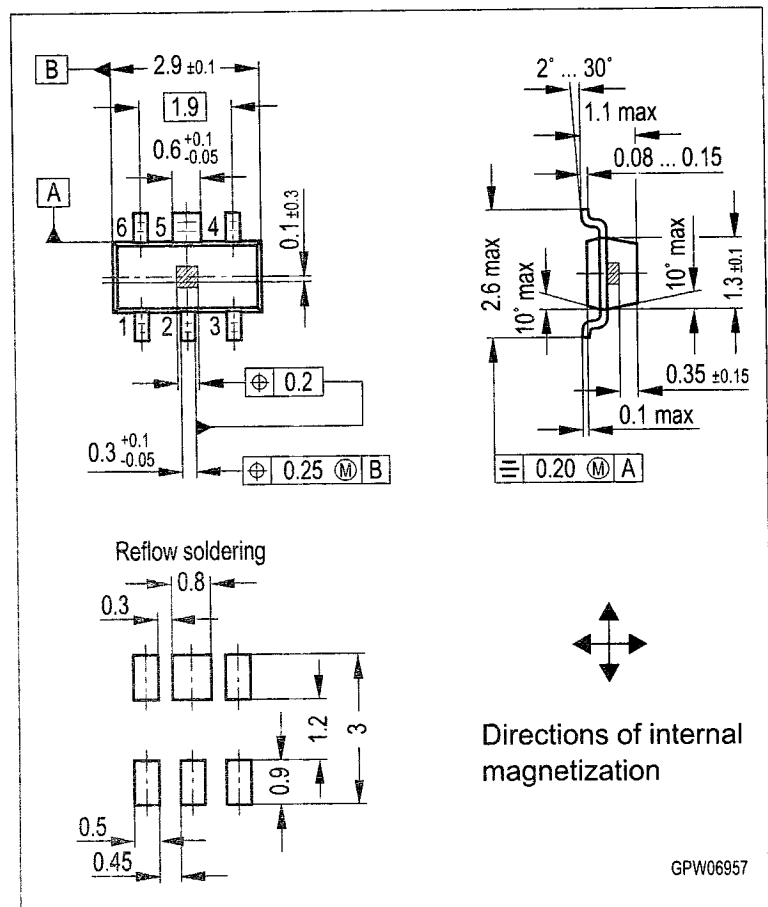- Constant T_C of R and ΔR

Applications
- Rotation and linear sensing with large air gaps
- Angle encoders
- Contactless potentiometers
- Incremental encoders

Pin Configuration*

Reflow soldering

Directions of internal magnetization

GPW06957
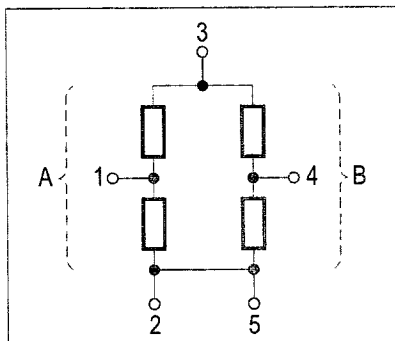
Dimensions in mm

3, 5 (= 2)	supply
1, 4	GMR bridge access
6	not connected

*) Beware: This is the correct pin configuration. The pin configuration of GMR application note (10.98) is not actual anymore.

Type	Marking	Ordering Code
GMR C6[1]	C	Q62705-K5005

[1] GMR technology is qualified, GMR C6 is in qualification.

The GMR C6 is an angle sensor based on sputtered metallic multilayer technology. 4 resistors are monolithically integrated on 1 chip. Providing two halfbridges, if 2 external resistors are added. 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 millimetres. 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.
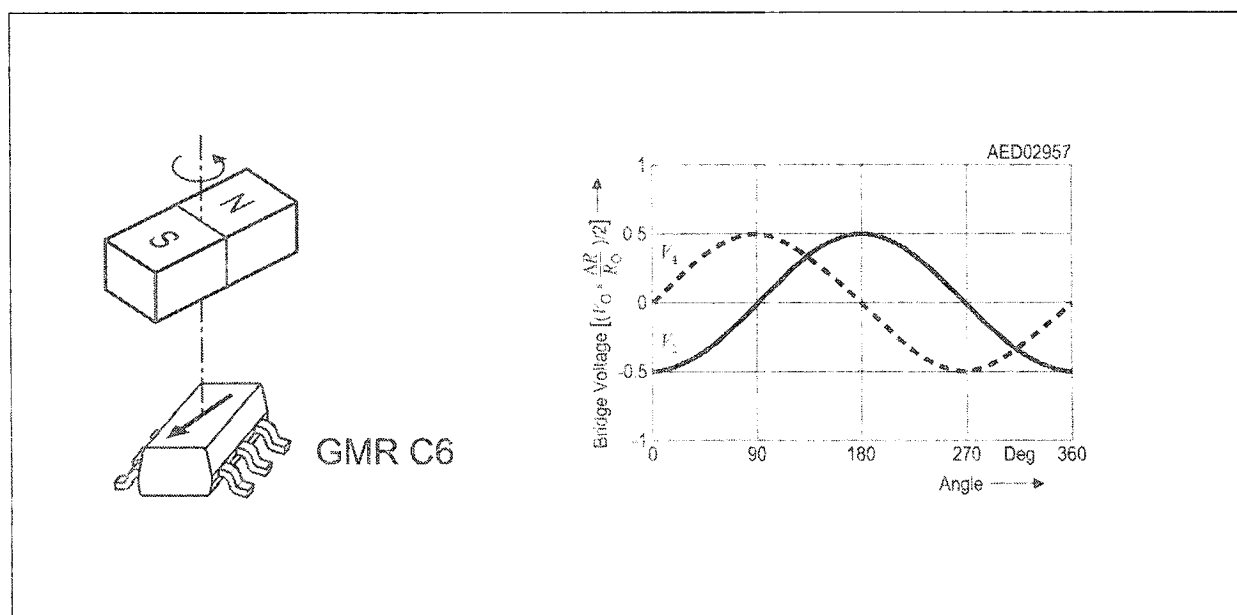

Figure 1 Output Voltage of Half Bridges (V_1, V_4) as a Function of the Magnetic Field Orientation

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 halfbridge @ V_{1N} = 5 V	V_{OUT}	> 100	mV
Offset voltage per halfbridge @ V_{1N} = 5 V	$|V_0|$	< 8	mV
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

Application Hints

The application mode of the GMR position sensor is preferably as a bridge or halfbridge circuit. This 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, two total signals of > 20 mV/V are achieved at 25 °C with two halfbridges. In the case of linear position sensing, the electrical circuit remains unchanged, also providing two phaseshifted signals (i.e.sine and cosine).