SIEMENS

Differential Magnetoresistive Sensor   **FP 212 D 250-22**
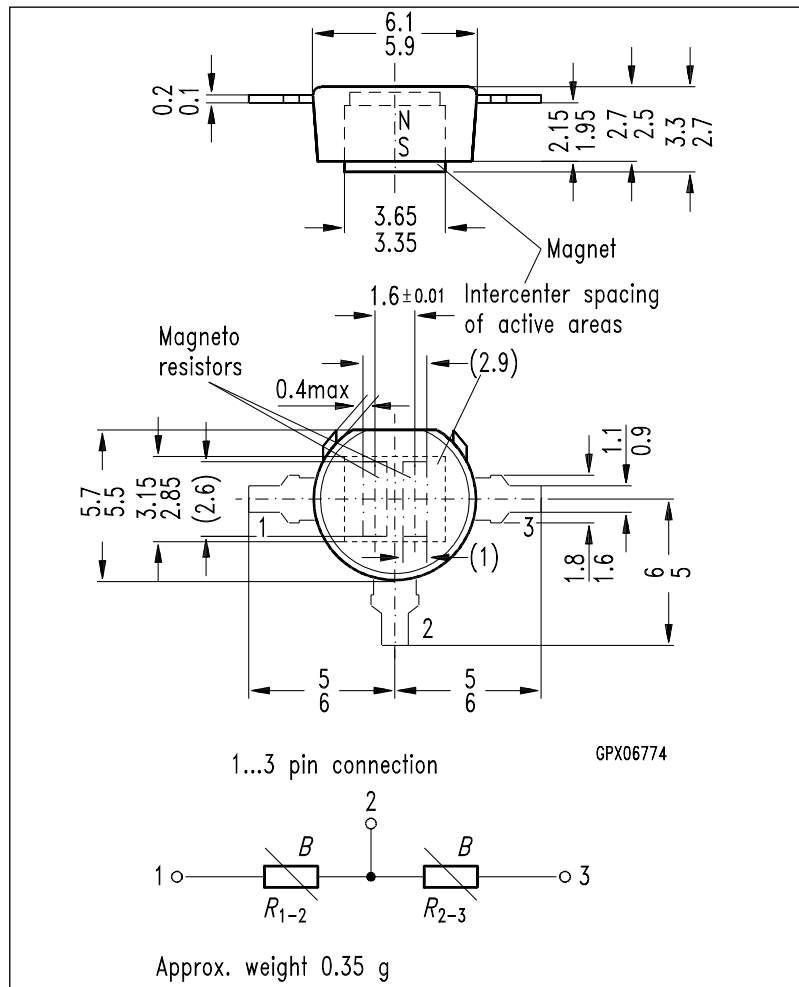
Features

- High output voltage
- High operating temperature
- Robust plastic housing
- Signal amplitude is speed independent
- Biasing magnet build in
- Marking green

Typical applications

- Detection of speed
- Detection of position
- Detection of sense of rotation
- Angle encoder
- Linear position sensing

Dimensions in mm

Type	Ordering Code
FP 212 D 250-22	Q65212-D2504

The differential magnetoresistive sensor FP 212 D 250-22 consists of two series coupled magneto resistors (D-type InSb/NiSb semiconductor resistors whose value can be magnetically controlled) which are mounted onto an insulated ferrite substrate. The sensor is encapsulated in a plastic package and has three connecting terminals. The basic resistance of the total system is $2 \times 250\ \Omega$. A permanent magnet which supplies a biasing magnetic field is fixed on the base of the sensor.

Maximum ratings

Parameter	Symbol	Value	Unit
Operating temperature	T_A	$-40/+140$	°C
Storage temperature	T_{stg}	$-40/+150$	°C
Power dissipation[1]	P_{tot}	450	mW
Supply voltage[2]	V_{IN}	10	V
Insulation voltage between terminals and magnet	V_I	>60	V
Thermal conductivity (when soldered)	G_{thA}	≥ 5	mW/K

Characteristics (T_A = 25 °C)

Nominal supply voltage	$V_{IN\,N}$	5	V
Total resistance, ($\delta = \infty$, $I \leq 1$ mA) air gap ($\delta = \infty$)	$R_{1\text{-}3}$	1000…1600	Ω
Center symmetry[3] ($\delta = \infty$)	M	≤ 10	%
Offset voltage[4] (at $V_{IN\,N}$ and $\delta = \infty$)	V_0	≤ 130	mV
Open circuit output voltage[5] (at $V_{IN\,N}$ and $\delta = 0.2$ mm)	$V_{out\,pp}$	>1100	mV
Cut-off frequency	f_c	>20	kHz

Measuring arrangements

By approaching a soft iron part close to the sensor a change in its resistance is obtained. The potential divider circuit of the magneto resistor causes a reduction in the temperature dependence of the output voltage V_{OUT}.

1) Corresponding to diagram $P_{tot} = f(T_A)$
2) Corresponding to diagram $V_{IN} = f(T_A)$
3)
$$M = \frac{R_{1-2} - R_{2-3}}{R_{1-2}} \times 100\% \text{ for } R_{1\text{-}2} > R_{2\text{-}3}$$
4) Corresponding to measuring circuit in **Fig. 2**
5) Corresponding to measuring circuit in **Fig. 2** and arrangement as shown in **Fig. 1**

2. Linear distance measurement

To convert small distances into a proportional electric signal, a small soft iron part of definite width (e.g. $b = 1.8$ mm) is moved over the face of the sensor.

Proportional signals for distances up to 1.5 mm can be obtained in this way. The sinusoidal output signal gives a voltage proportional to distance in the zero crossover region (see **Fig. 3**).
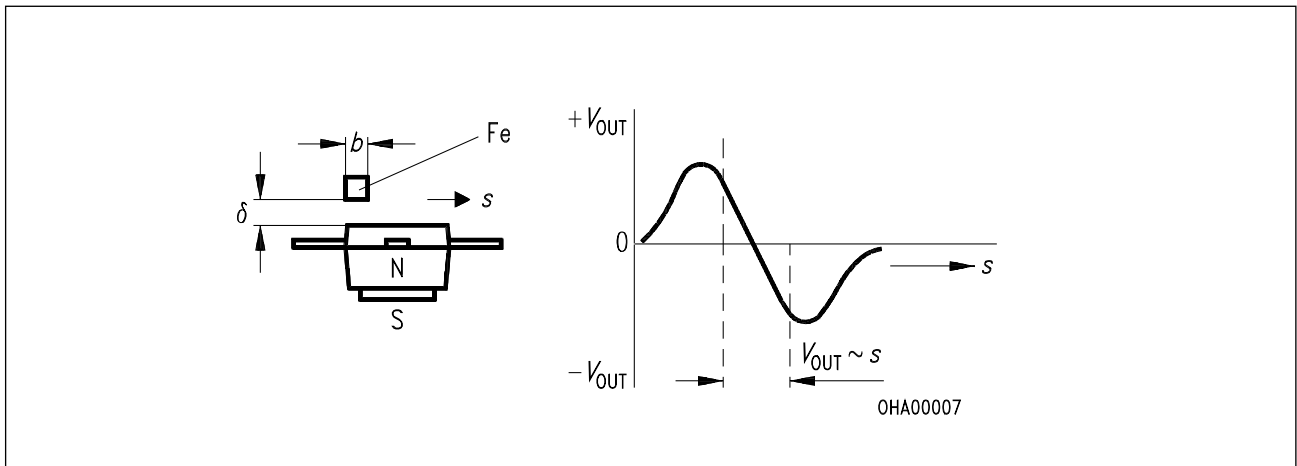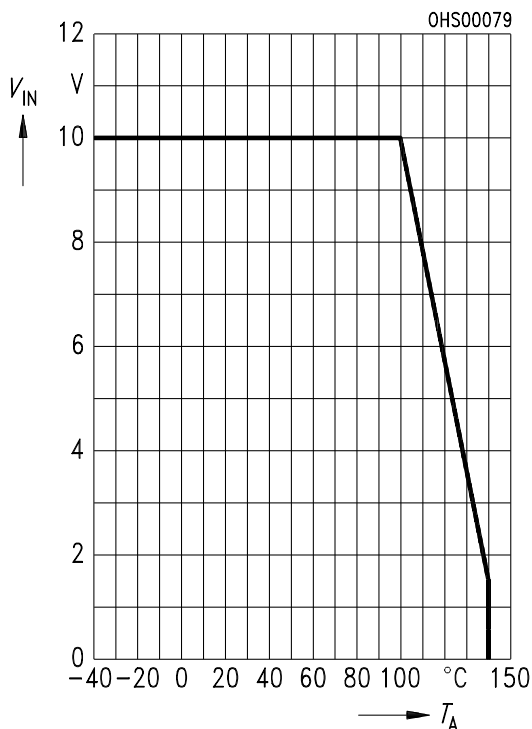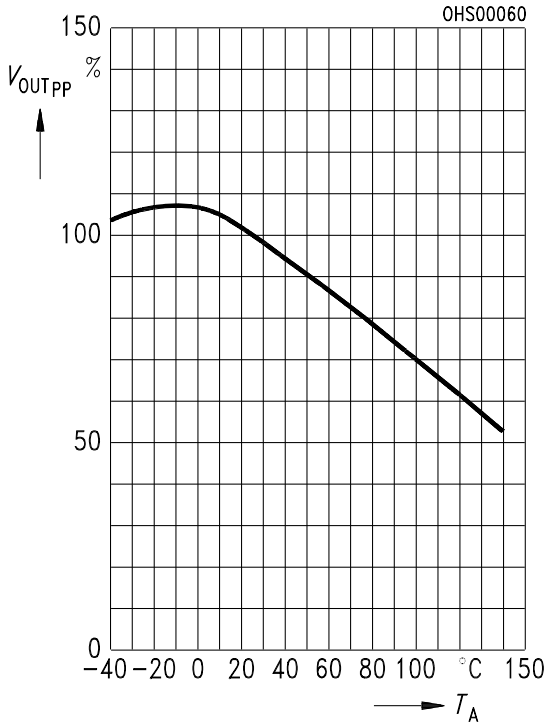

Fig. 3
Arrangement for analogue application

Maximum supply voltage versus temperature
$V_{IN} = f(T_A)$

Output voltage (typical) versus temperature $V_{\mathrm{OUTpp}} = f(T_A)$, $\delta = 0.2$ mm
V_{OUTpp} at $T_A = 25\,^{\circ}\mathrm{C} \triangleq 100\%$

Output voltage (typical) versus airgap $V_{\mathrm{OUTpp}} = f(\delta)$, $T_A = 25\,^{\circ}\mathrm{C}$
V_{OUTpp} at $\delta = 0.2$ mm $\triangleq 100\%$
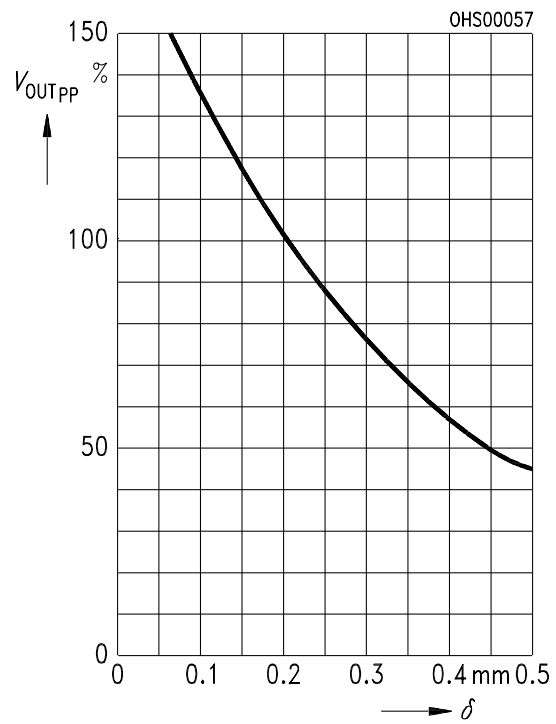
Total resistance (typical) versus temperature $R_{1\text{-}3} = f(T_A)$, $\delta = \infty$
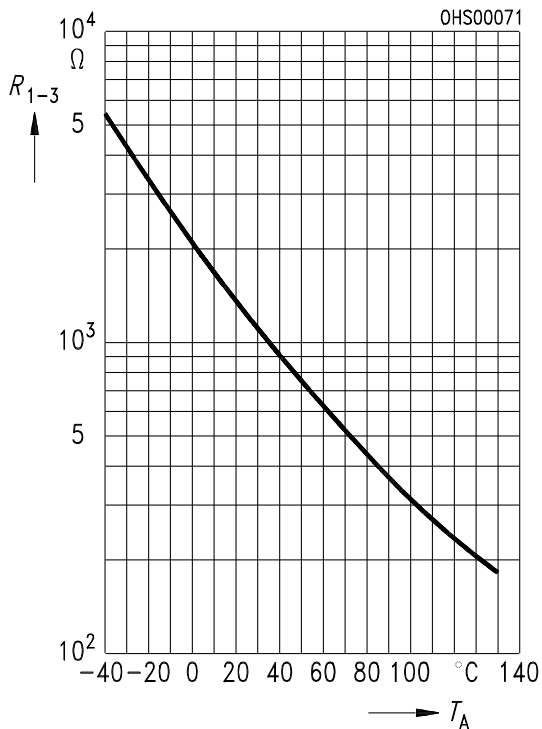
Max. power dissipation versus temperature $P_{\mathrm{tot}} = f(T_A)$, $\delta = \infty$