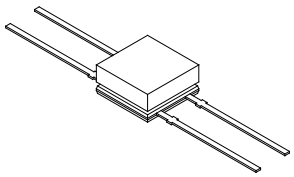
SONY

DM-231

Magnetoresistance Element

M-118 (Plastic)



Description

DM-231 a magnetic sensor using magnetoresistance effect is composed of ferromagnetic material deposited by evaporation on a silicon substrate. It is suitable for angle of rotation detection.

Features

- Low magnetic field and high sensitivity: bridge type stands for large output voltage
  150 mVp-p (Min.) at V_{CC}=5 V, H=14400 A/m
- Fitted with bias magnet: stable output.
- High reliability: Achieved through silicon nitride protective film.

Structure

Ferromagnetic thin film circuit (With ferrite magnet)

Applications

- Non-contact angle of rotation detection.
- Contactless potentiometer.

Absolute Maximum Ratings (Ta=25 °C)

• Supply voltage	V_{CC}	10	V
• Storage temperature	Tstg	–30 to +100	°C

Recommended Operating Conditions

• Supply voltage	V_{CC}	5	V
• Operating temperature	Topr	–20 to + 75	°C

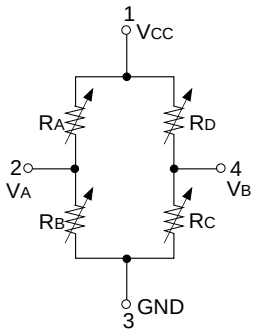
Electrical Characteristics

Ta=25 °C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Output voltage	V_O	V_{CC}=5 V , H=14400 A/m (Peak) AC magnetic field θ =0 °	150			mVp-p
Midpoint potential	V_A, V_B	V_{CC}=5 V , H=0 A/m	2.475		2.525	V
Midpoint potential difference/Output voltage	$\frac{\lvert V_A - V_B \rvert}{V_O}$	V_{CC}=5 V , H=0 A/m			15	%
Total resistance	R_T	H=14400 A/m (Peak) AC magnetic field θ =0 °	500	650	800	Ω

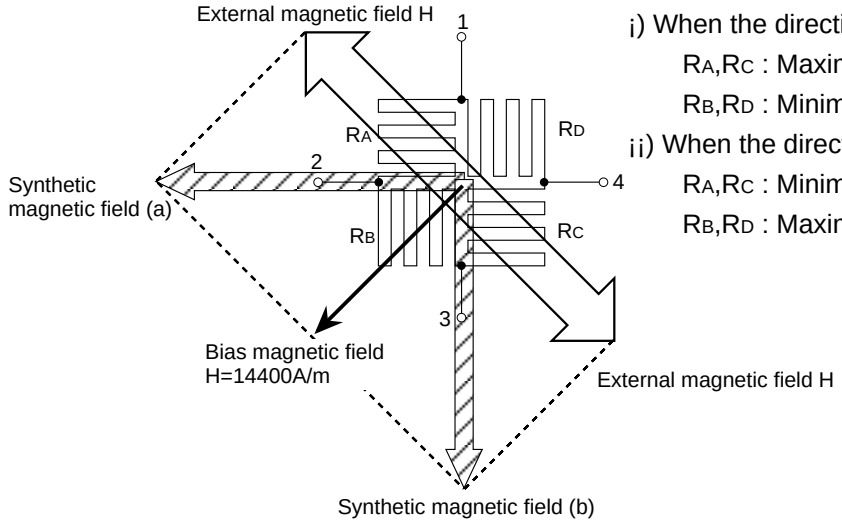
E88Z12C5X-TE

Equivalent Circuit



Basic Performance

1) Operation principle



Various resistances change according to the direction of the combnied bias and external magnetic field.

¡) When the direction of the synthetic magnetic field is (a),

R_A,R_C : Maximum resistance

R_B,R_D : Minimum resistance

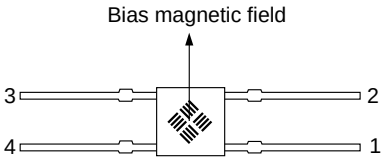
¡¡) When the direction of the synthetic magnetic field is (b),

R_A,R_C : Minimum resistance

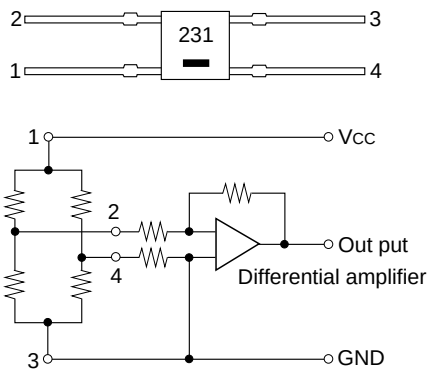
R_B,R_D : Maximum resistance

∗ Device internal structure

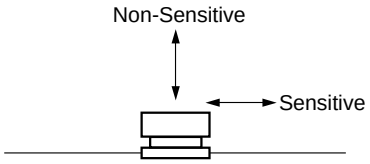
(Back of mark face)



2) Power supply pin and output pin



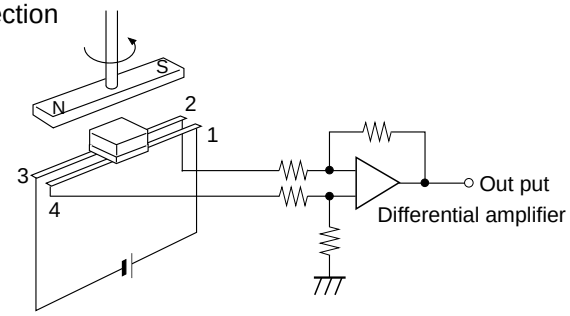
3) Sensitivity direction

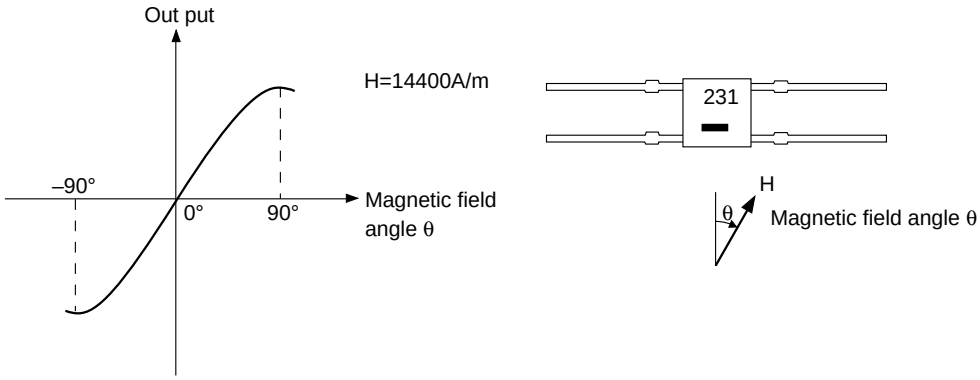


The ferromagnetic magnetoresistance element differs from the semiconductor magnetoresistance element and hole element in that it responds only to the magnetic field within the element's surface. It is not sensitive to the magnetic field perpendicular to the element.

Basic Application

Rotation angular detection

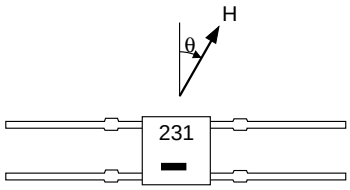


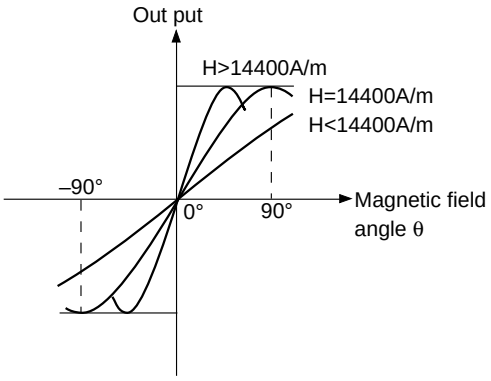


Handling precautions

1) Most suitable magnetic field intensity

When the external magnetic field is at H=14400A/m, rotation angle can be detected most effectively.





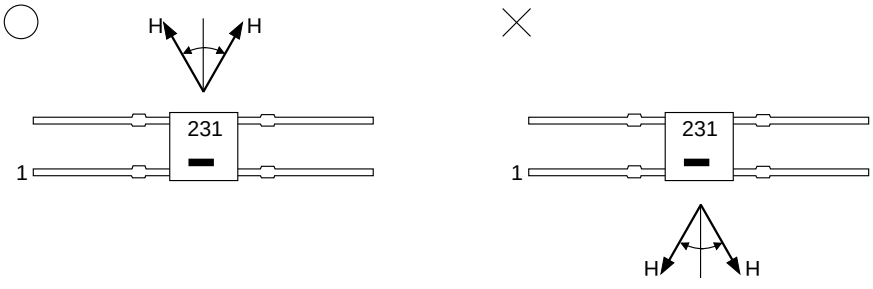
Whe the external magnetic field H<14400A/m, output voltage shrinks.

When the external magnetic field H>14400A/m, the detection angle range shrinks.

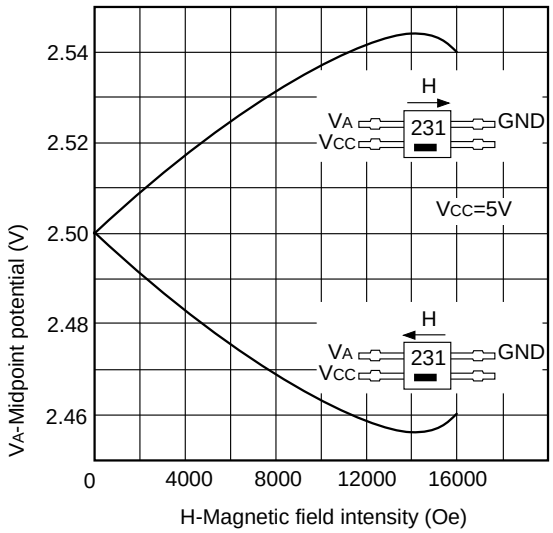
Whe the external magnetic field H<14400A/m, the detection angle range becomes larger. In regions other than -90° to +90°, the magnetic field combined with the bias magnetic field, shrinks down, which is not advisable. Also, when the range to be detected is smaller than -90° to +90° it is more advantageous to turn to H>14400A/m.

2) External magnetic field direction

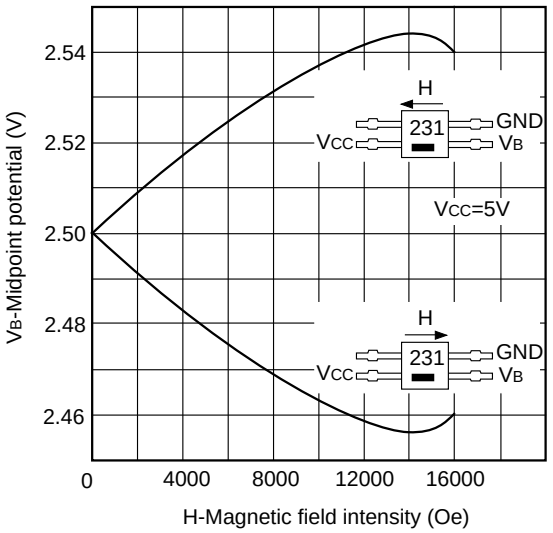
With regards to the bias magnetic field, usage at other than ±90° should be avoided. That causes a decrease in the combined magnetic field intensity, that is not recommended.



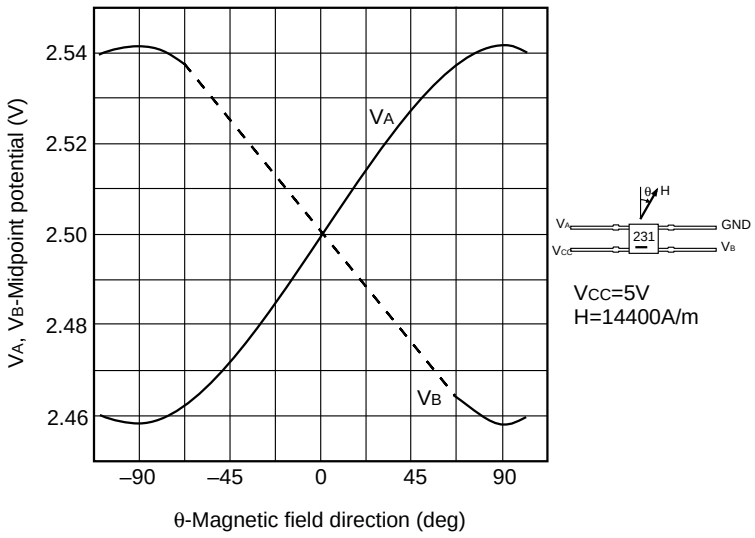
Midpoint potential vs. Magnetic field Intensi ty (1)



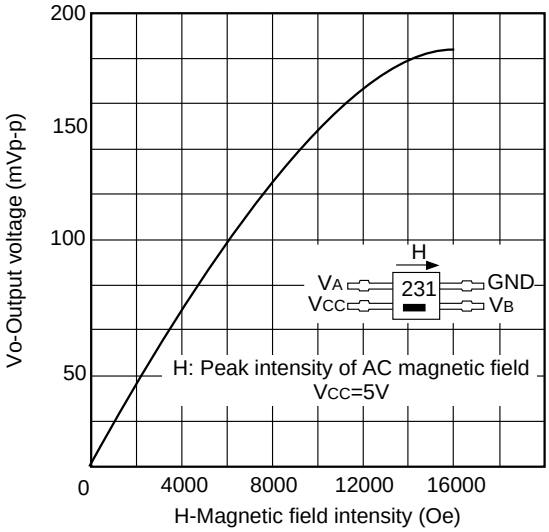
Midpoint potential vs. Magnetic field Intensity (2)



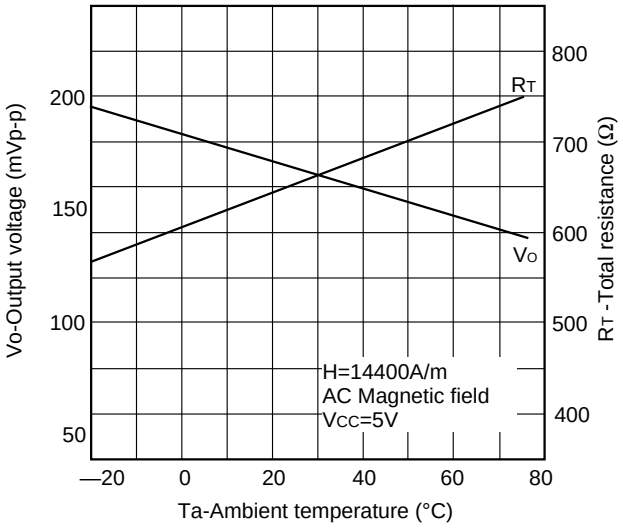
Midpoint potential vs. Magnetic field direction



Output voltage vs. Magnetic field intensity

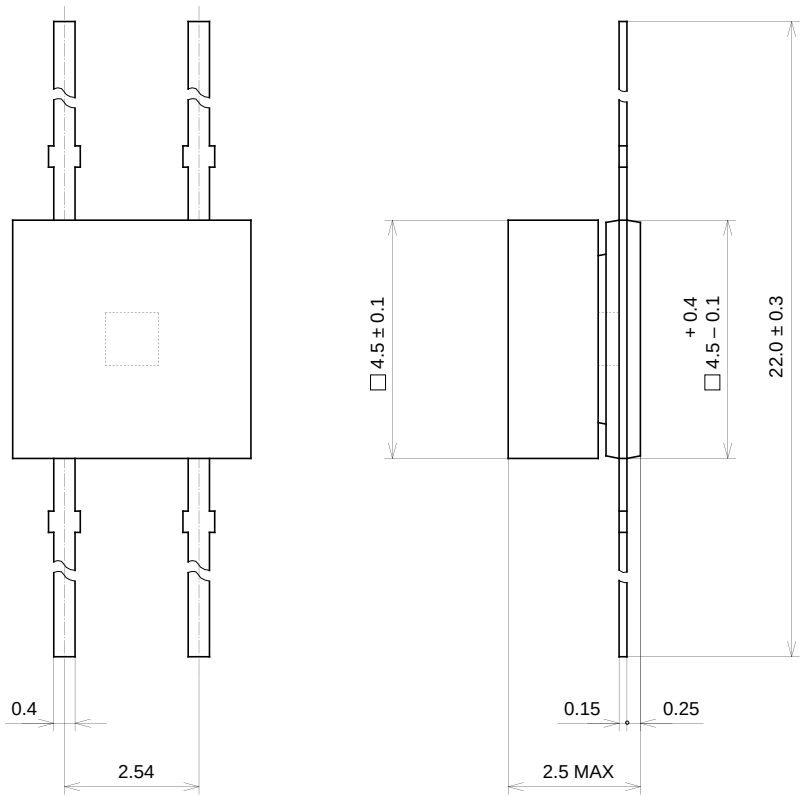


Temperature characteristics



Package Outline Unit : mm

M-118



SONY CODE	M-118
EIAJ CODE	————
JEDEC CODE	————

PACKAGE WEIGHT	0.2g