

1. Scope

This document is applied to a magnetic sensor operating to ON/OFF when the sensor detects the magnetic field.

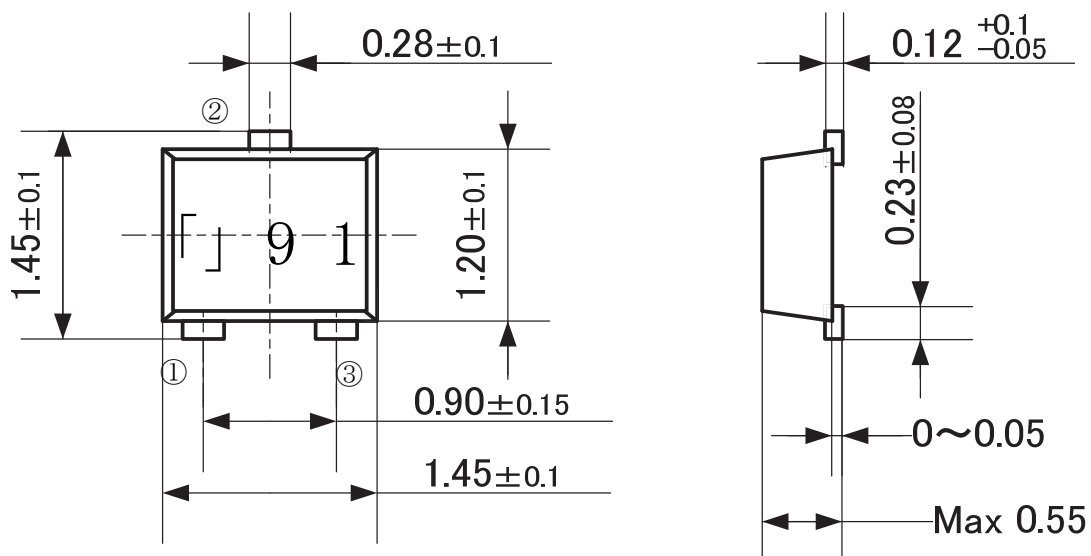
1. Part number

- 2-1 Part description      Magnetic Sensor
- 2-2 Murata part number    MRMS541E

2. Dimensions and schematics

3-1 Dimensions

3-1-1 Package outline drawing      (Unit :mm)

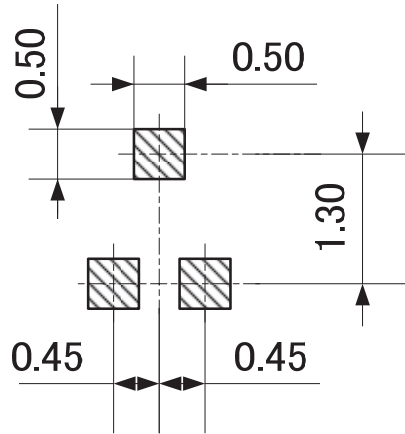


①:Vcc ②:Gnd ③:Out

3-1-2 Marking example

(E.g.)	「」 9 1	I	Control code...One alphabetic character
	↓ ↓ ↓	II	Manufactured year...The last digit of the year
	I II III	III	Manufactured month..
			Jan to Sep : 1 to 9
			Oct to Dec : X, Y, Z

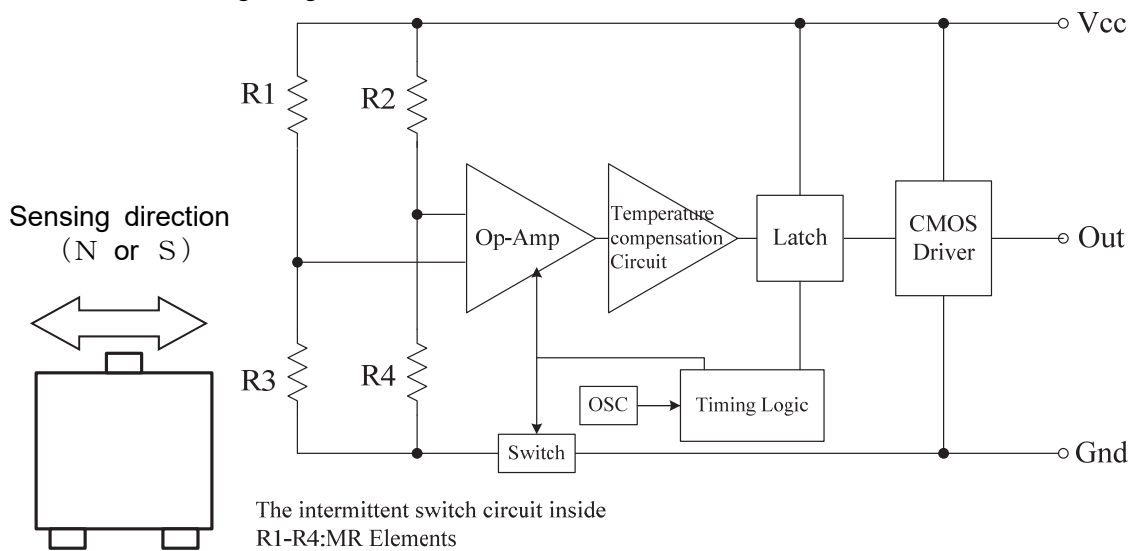
3-1-3 Reference mount pad (Unit:mm)



NOTE1) Please evaluate your soldering paset condition and reflow condition with our product being mounted to your product.

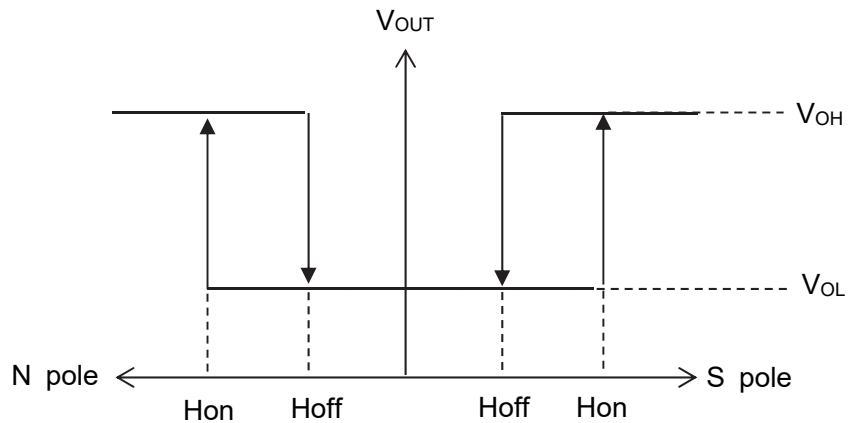
NOTE2) Please make sure the sensing direction of the sensor (see the item 3-2) and your magnetic field direction to the sensor.

3-2 Block wiring diagram



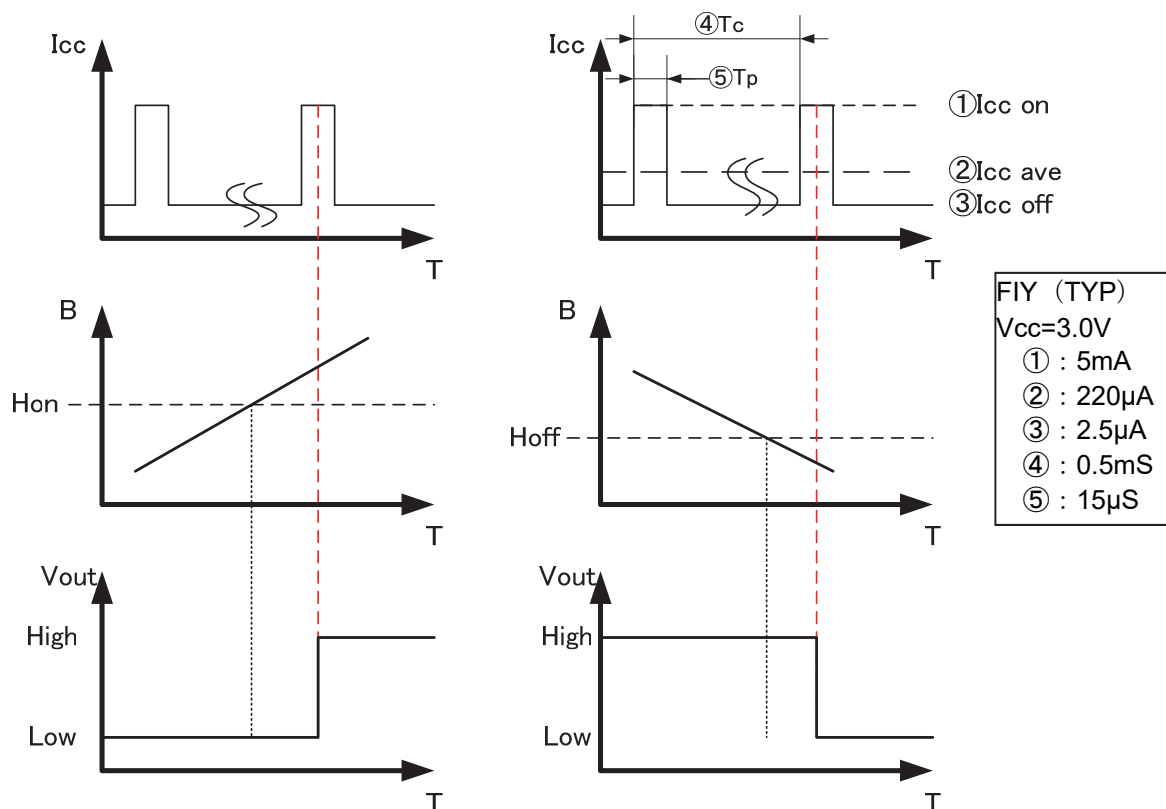
3-3 Magnetic electric conversion characteristic

ON/OFF switched depending on the intensity of the magnetic field. (Positive logic)



## 3-4 Timing diagram

The sensor has intermittence operating circuit.



NOTE1) AMR element is driven by the intermittent switch circuit shown in item 3-2.

The timing of Vout change is subject to the period of Icc on.

NOTE2) Please consider the change speed of the operating magnetic field against the intermittent operation in your design process.

## 3-5 Electric characteristics/ absolute maximum rating (Ta=+25°C±3°C Vcc=3V)

	Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
1	Supply voltage	V <sub>cc</sub>	—	2.4	3.0	3.8	V
2	Absolute max. supply voltage	—	—	—	—	6	V
3	Current consumption	I <sub>cc</sub>	—	—	220	310	µA
4	Operating magnetic field	H <sub>on</sub>	—	1.5	—	2.7	mT
		H <sub>off</sub>	—	0.9	—	—	
5	Frequency response	—	—	1.0	2.0	—	kHz
6	Output Voltage	V <sub>OH</sub>	No Load	2.7	—	—	V
		V <sub>OL</sub>	No Load	—	—	0.3	V
7	Operating temp. range	—	—	-40	—	+85	°C
8	Storage temp. range	—	—	-40	—	+125	°C

NOTE1) Each specification represents the standardized figures tested independently.

NOTE2) When switching the sensor output from L to H, please make sure that the magnetic flux density applied to the sensor becomes higher than above stated operating magnetic field (H<sub>on</sub>) in your designing process.

NOTE3) When switching the sensor output from H to L, please make sure that the magnetic flux density applied to the sensor becomes lower than above stated operating magnetic field (H<sub>off</sub>) in your designing process.

NOTE4) As the above stated operating magnetic field is defined based on  $V_{cc}=3.0V$ , please be advised that such operating magnetic field may vary under the condition of  $V_{cc}$  not equal to 3.0V. Therefore, please make sure to consider extra allowance in terms of the magnetic design, especially when the operating magnetic field is not defined at  $V_{cc}=3.0V$ .

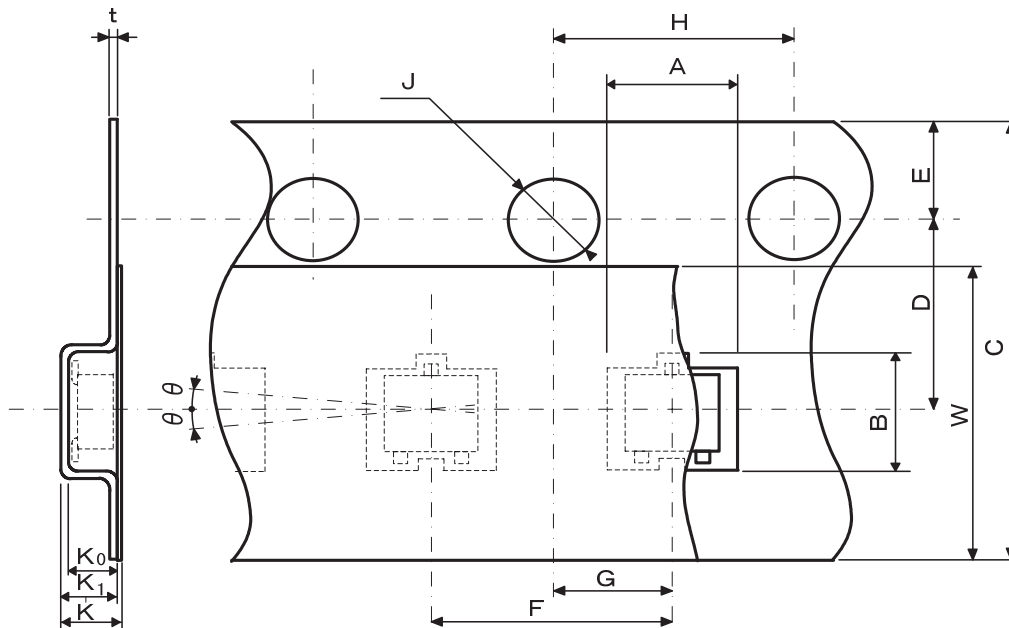
### 3. Packing specification

#### 4-1 Packing information

Form of packing	Reel dimension	Pcs per reel
Tape & reel	$\phi 180$	3000pcs

#### 4-2 Taping specifications

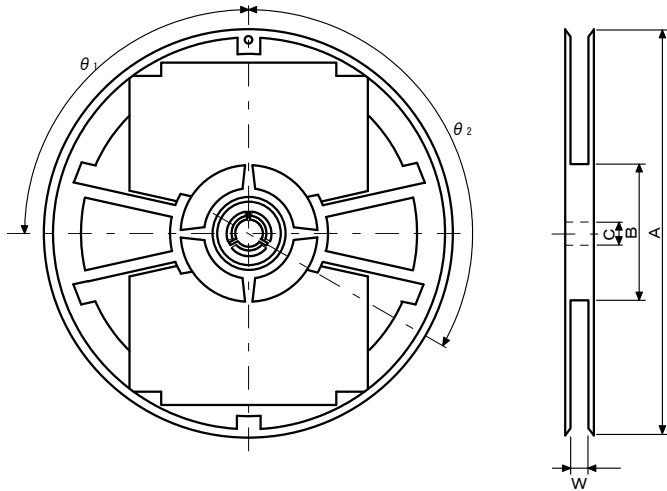
##### 4-2-1 Taping dimensions



Unit:mm

Parameter	Symbol	Size/ Angle	Parameter	Symbol	Size/ Angle	
Pocket	Length	A	Dist. Between center lines	L direction	G	$2.0\pm 0.05$
	Width	B		W direction	D	$3.5\pm 0.05$
	Depth	$K_0$	Cover tape	Width	W	$5.5^{+0.3}_0$
	Pitch	F	Carrier tape	Width	C	$8.0\pm 0.1$
Feed hole	Diameter	J		Thickness	T	$0.18\pm 0.05$
	Pitch	H		Depth	$K_1$	$0.93\pm 0.1$
	Position	E	Device	Tilt	$\theta$	$10^\circ\text{MAX}$
Overall thickness	K	$0.98\pm 0.1$				

4-2-2 Reel dimensions...EIAJ PRV08B compliant



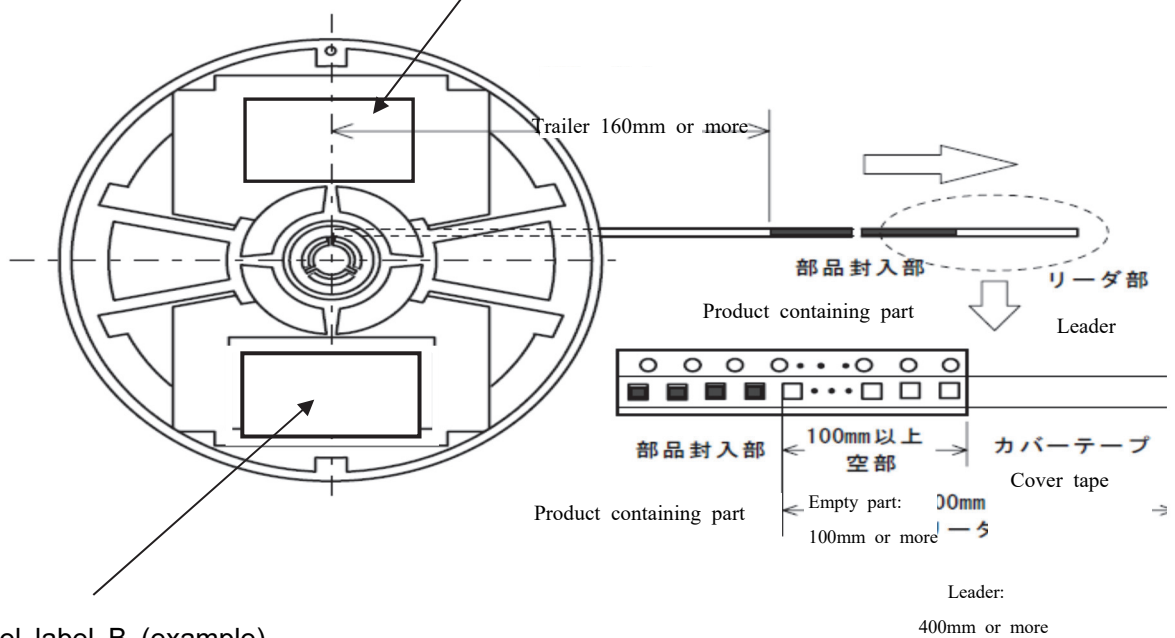
Unit: mm

Item	Symbol	Dim/Angle
Flange	Diameter	A $\phi 178 \pm 2$
	Dis. between flanges	W $9 \pm 0.5$
Hub	Diameter	B $\phi 60 \pm 1$
	Hub slit position	$\theta_1$ $90^\circ$
	Spindle hole diam.	C $\phi 13 \pm 0.5$
	Key slit position	$\theta_2$ $120^\circ$
Marking	Labeled on one side of flange	

4-2-3 Start/End of taping



Reel label A (example)



Reel label B (example)

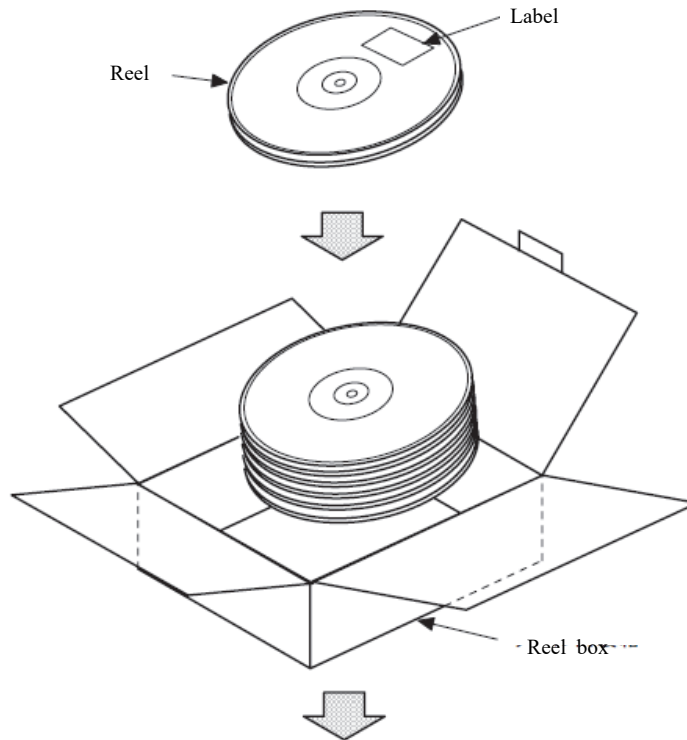


4-2-4 Other notes

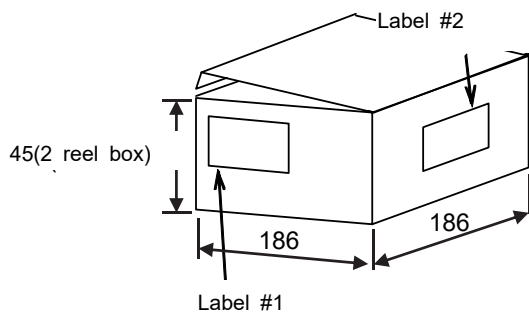
Continuously missing device shall not exceed 2 pcs.

Peeling strength of the cover tape: 0.1 to 0.7N.

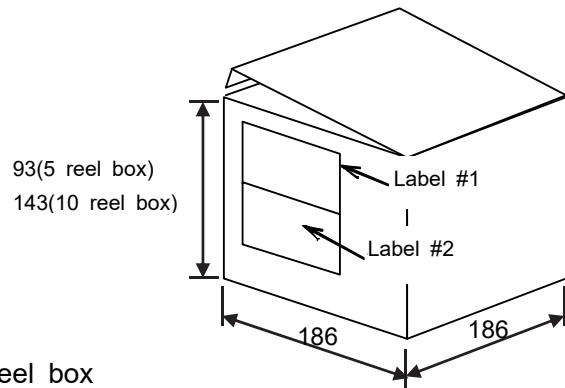
4-3 Outer packing specifications



<1 reel or 2 reels>



<3 reels and more>



- 1 to 2 reels: Packed in 2 reel box
- 3 to 5 reels: Packed in 5 reel box
- 6 to 10 reels: Packed in 10 reel box

\*When the box is not filled with reels, antistatic buffer material will be used to avoid product from moving inside box.

\*Unit: mm, Tolerance: +/- 5mm

発注者 <CUST.>	株式会社 村田製作所	1L
受渡場所名 <DELIVERY POINT>		
物品番号 <TRANS. NO.>		
品名コード <PART NO.>	( )	
品名 <PART NAME>		
入数/荷点数量 <QTY/TOTAL QTY>		単位 <UNITS> PC
発注者用備考 <CUSTOMER'S REMARKS>		包装個数 <PACKAGE COUNT>

Label #1 (example)



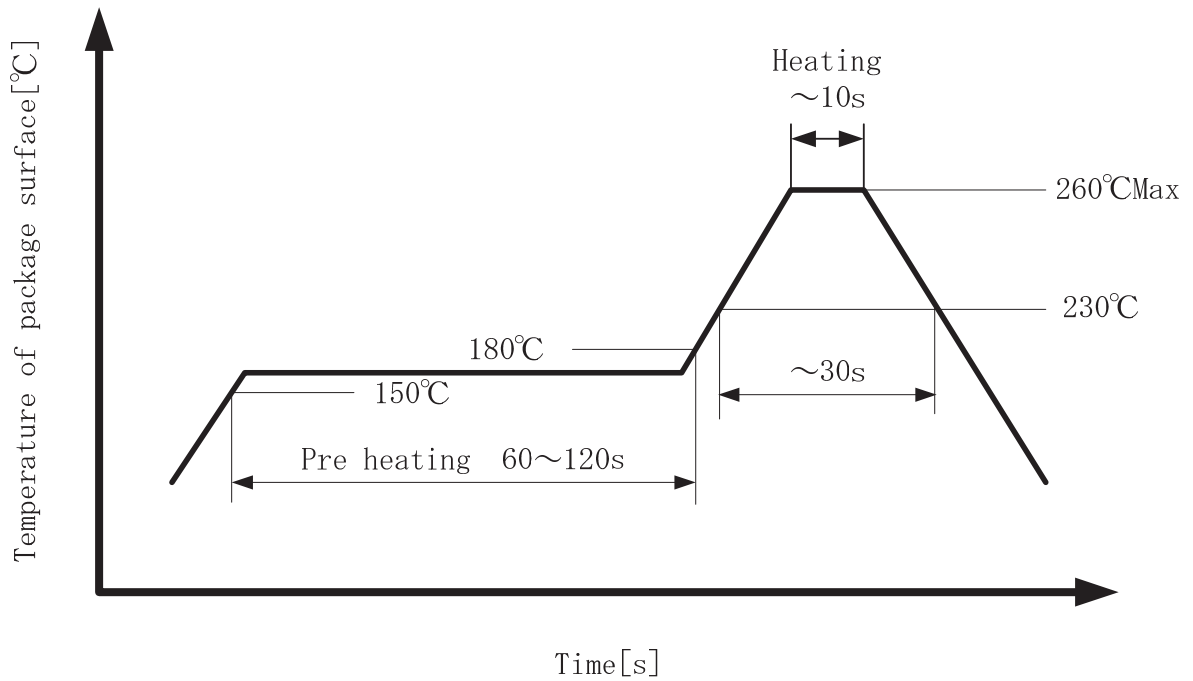
Label #2 (example)

Material

Reel packing box: Cardboard

4. Mounting condition

5-1 Reflow condition, hand soldering condition



Cycle of reflow : 3times or less

Soldering iron by hand : 350 +/- 5 °C, within 3 sec / each terminal

5-2 MSL

MSL(Moisture Sensitivity Level): equal to MSL1

## 6. Reliability test

No.	Reliability test	Test conditions	Judgment criteria
1	High temp. storage	+125°C 500h No-load	<p>It shall be tested after being kept in a room over 2hours and Vcc=3.0V.</p> <ul style="list-style-type: none"> <li>• Output voltage Hi:2.7V or above Lo:0.3V or less</li> <li>• Using current 310 <math>\mu</math> A or less</li> </ul>
2	High temp. load	+105°C 500h Load voltage 5.5V	
3	Low temp. storage	-40°C 500h No-load	
4	High temp, high humidity load	+85°C 85%RH 500h Load voltage 5.5V	
5	Thermal shock	-55 °C /30 min $\leftrightarrow$ +125 °C /30min (vapor phase) 500 cycle, no-load	
6	Vibration	Apply vibration [Max amplitude: 1.5mm, frequency: 10 to 55Hz, 1 cycle minute, 3 directions, 2h in each direction (total 6h )]	
7	Shock test	Unpacked condition, X, Y, Z direction, 1470m/s <sup>2</sup> , 5 times/each	
8	Drop test	100g dummy load, Height: 150cm, on the concrete, 6 sides, 10 times/each	
9	Solder heat resistance	Pretreatment: +85°C, 85%RH, 168h Reflow condition: Max. 260°C & 230°C, 30 sec, times of reflow: 3	
10	Electrostatic resistance	Machine Model Condition: 200pF, Resistance: 0 $\Omega$ , +/-200V Human Body Model Condition: 100pF, Resistance: 1.5k $\Omega$ , +/-2kV	
11	Solder ability	Solder temp.: +230°C, Time: 3 sec immersion	90% and more terminal surface covered with solder
12	Electrode sticking tendency	5N(510gf), 4 directions, 10 sec	No external abnormality found.
13	Bending cycle	Glass epoxy PCB, t=1.6, Speed: 5mm/min, 90mm span, bending range $\pm$ 1mm, 1500 cycle	No terminal fracture, loosening found.
14	Bending limit	Glass epoxy PCB, t=1.6, 90mm span, bending range $\pm$ 7mm.	



## 7. ⚠ Caution

### 7-1 Limitation of applications

Please avoid using this product for the applications listed below which require especially high reliability in order to prevent defects that might directly cause damage to the third party's life, body, or property.

When this product is used for the applications listed below, we shall not be liable for any claims on the product.

- ① Aircraft equipment
- ② Aerospace equipment
- ③ Undersea equipment
- ④ Generating plant equipment
- ⑤ Medical equipment
- ⑥ Transportation equipment (vehicles, trains, ships, etc.)
- ⑦ Traffic signal equipment
- ⑧ Disaster prevention/ crime prevention equipment
- ⑨ Data processing equipment
- ⑩ Application of similar complexity and/or reliability requirements to the applications listed above.

### 7-2 Fail-safe

Be sure to provide appropriate fail-safe function on your product to prevent a second damage that may be caused by the abnormal function or the failure of our product.

## 8. Caution for use

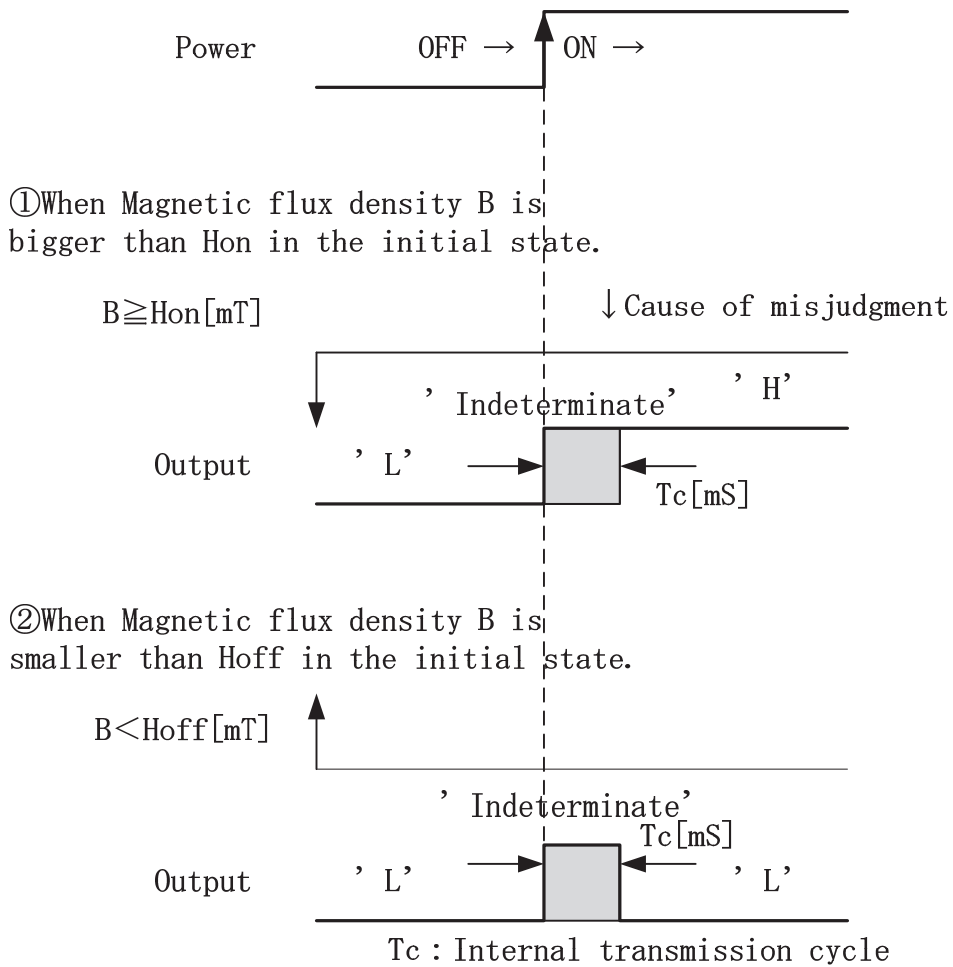
### 8-1 Handling

- This product may be degraded by electrostatic discharge. It is necessary to take anti-static precautions when handling.

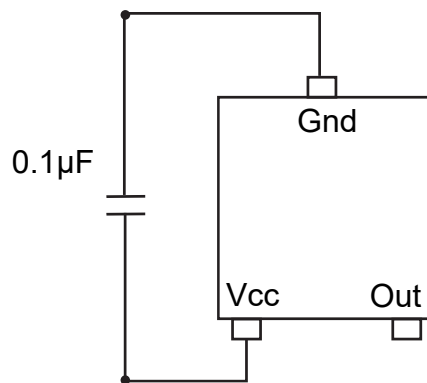
### 8-2 Design

- Please thoughtfully evaluate this product for the magneto-variation of the magnet used along with this product, otherwise this product may result in the miss-operation or the non-operation.
- Sensor miss-operation or non-operation may occur due to the influence of the magnetic noise from surrounding devices such as motor. Please make sure there is no influence of the magnetic noise in designing process.
- Please be careful about a magnetic body (Iron, Nickel, etc.) and a magnetic noise immunity that may affect the magnetism of a magnet.
- Please do not supply inverse voltage or excess voltage to this product. If applied, this product may be damaged and electrically destroyed.
- Please design your product not to be affected by stress of the resin due to heat shrink.

- Sensor output (Vout) is not stable at power on to the sensor. After power on, it needs about 4 times of Tc showed on item 3-4 to make it stable.



- It is effective to make the Vcc and GND line wide and short or to adopt multi-layer PCB for switching noise protection. In addition, please place a bypass capacitor near the sensor.



### 8-3 Storage condition

- Recommended storage conditions are listed below.  
Temperature: +5 to +30°C  
Humidity : 70%(RH)% and lower  
\*Desiccator storage or storage in N<sub>2</sub> atmosphere is recommended.

- Allowable storage time of the product is one year from the date of delivery. Please take account of the storage conditions listed above. Please also use the product as soon as possible after opening the product packing to avoid the deterioration of solder ability.
- Please avoid the water, chemical solvent, or oil.
- Please avoid the corrosive gas (Cl<sub>2</sub> H<sub>2</sub>S, NH<sub>3</sub> NO<sub>2</sub>, NO<sub>3</sub> etc.)
- Please avoid the strong vibration or shock.

#### 8-4 Mounting

- Please mount this product under standard reflow condition. Otherwise this product may be damaged.
- Please do not apply excessive load to the terminals. Also, please do not bend the terminals.
- Please do not apply excessive bending stress to the product by bending the PCB or by similar handling as it may change the sensor sensitivity.
- Please make sure the mounting state of the sensor after mounting it. Depend on your application, mounting error may cause the sensor miss operation.

#### 9. Note

- Make sure that your product has been evaluated in view of your specifications with our product being mounted to your product.
- Not to use our product deviating from the agreed specification.
- We consider it not appropriate to include any terms and conditions with regard to the business transaction in the product specifications, drawings or other technical documents. Therefore, if your technical documents above include such terms and conditions such as warranty clause, product liability clause, or intellectual property infringement liability clause, they will be deemed to be invalid.