| Magnetic Switch MRUS74S Data Sheet | |
|---|---|
| Reference Only | Sensor Products Division |

1. Scope

  This data sheet is applied to the magnetic switch MRUS74S.


2. Part number

2-1  Part Description      Magnetic Switch

2-2  Murata Part Number   MRUS74S


3.  Dimensions and Schematics

3-1  Dimensions



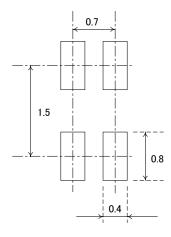Coplanarity : less than 0.1mm(includiong under reflow condition)

Dimension


(E.g.)    「」1 3      □ .  Control code...One alphabetic character

          ↓↓↓      □ .  Manufactured year...The last digit of the year

          □ □ □      □ .  Manufactured month..
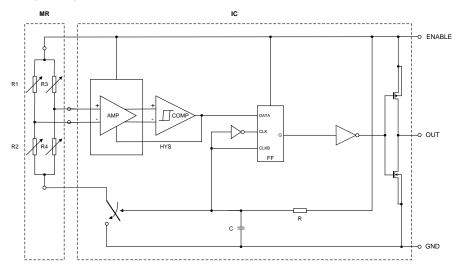
                Jan to Sep : 1 to 9
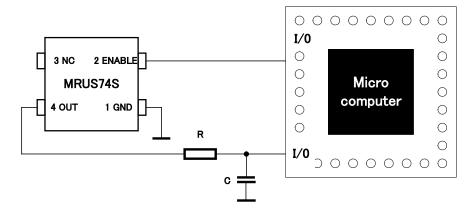
                Oct to Dec : X, Y, Z


Marking Example

0.7

1.5

0.8

0.4

<u>Reference mount pad</u>
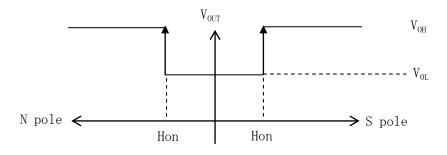
## 3-2 Block wiring diragram

MR

IC

ENABLE

R1  R3

R2  R4

AMP

COMP

HYS

DATA

CLK

CLKB

Q

FF

OUT

C

R

GND

## 3-3 Example of Enable control

| 3 NC | 2 ENABLE |
| MRUS74S | |
| 4 OUT | 1 GND |

R

C

I/O

Micro computer

I/O
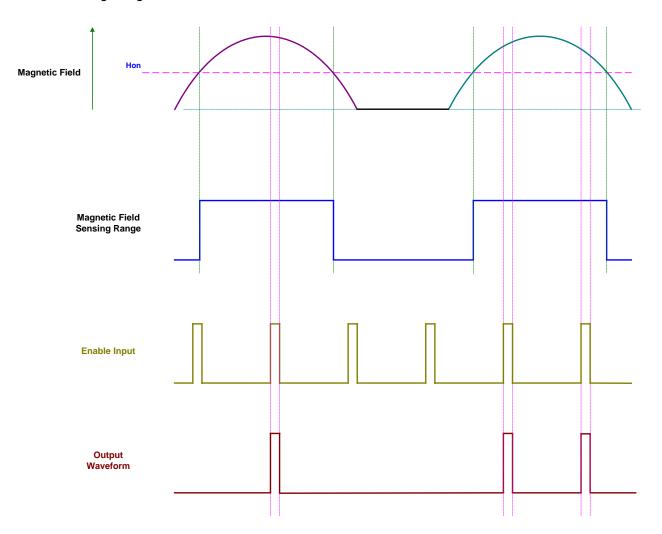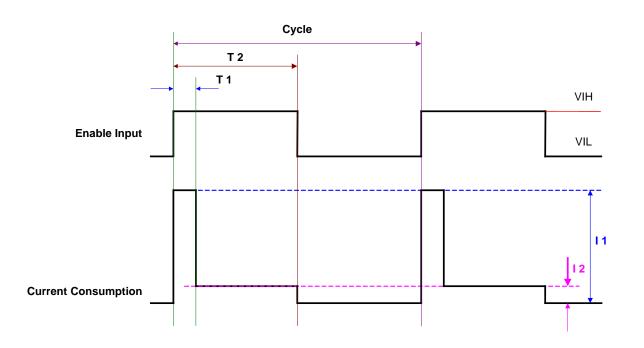
## 3-4 Magnetic electric conversion characteristic

$V_{OUT}$

$V_{OH}$

$V_{OL}$

N pole

S pole

Hon

Hon

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## 3-5 Timing Diagram

**Magnetic Field**

Hon

**Magnetic Field
Sensing Range**

**Enable Input**

**Output
Waveform**

**Cycle**

**T 2**

**T 1**

**Enable Input**

VIH

VIL

**Current Consumption**

I 1

I 2

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3-6    Electric Characteristics/ Absolute Maximum Rating (Ta=+25$^{o}$C  V$_{IH}$=3.0V)

| | Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| 1 | Enable Voltage | V$_{IH}$ | — | 2.0 | - | 3.6 | V |
| 2 | Enable voltage rising time (10 – 90%) | Tr | — | — | — | 500 | ns |
| 3 | Enable current consumption | I$_{IH}$ | Peak | — | 1.5 | 2.5 | mA |
| 4 | Enable frequency | F | — | — | 10 | 30 | kHz |
| 5 | Enable pulse width | — | — | 3 | 30 | — | μs |
| 6 | Operating magnetic field | H$_A$ | — | 1.0 | 1.8 | 2.5 | mT |
| 7 | Hi level output | — | V$_{IH}$=3.0V | 2.7 | — | — | V |
| 8 | Lo level output | — | | — | — | 0.6 | V |
| 9 | Operating temp. range | — | — | -40 | — | +105 | $^{o}$C |
| 10 | Storage temp. range | — | — | -40 | — | +125 | $^{o}$C |
| 11 | Absolute max. supply voltage | — | — | — | — | 6.0 | V |

NOTE1)    Each specification is defined by testing above items individually.
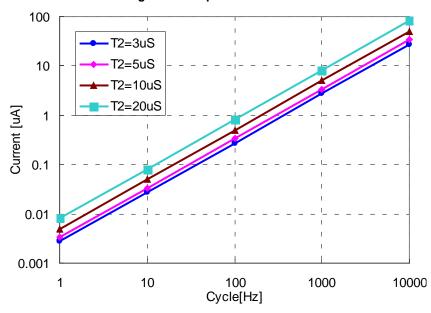
NOTE2)    When shifting the sensor output from L to H, please make sure the magnetic field applied to the sensor becomes higher than the above operating magnetic field (Hon) through your designing.

NOTE3)    Sensitivity selection of this product is performed at V$_{IH}$ =3.0V. Operating magnetic field can possibly change when applying the voltage other than 3.0V. Please consult with us for technical assistance when you consider the supply voltage other than 3.0V, as a special attention needs to be given in the design.

● Average current consumption (Simulated data)
Condition:  VIH=3.0V,VIL=0V,Ta=25$^{o}$C
T1, I1, I2 depends on MR sensor: T1=1.5μs, I1=1500μA, I2=320μA
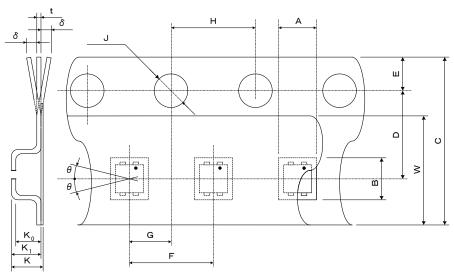
**Average Consumption Current of MRUS74S**



3-7    Packing information

| Form of packing | Reel dimension | Pcs per reel |
|---|---|---|
| Tape & reel | φ180 | 3000pcs |

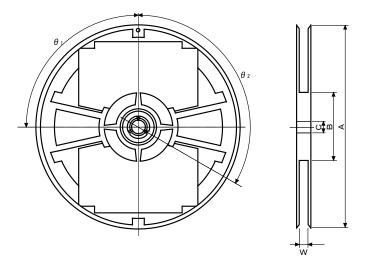Murata Manufacturing Co., LTD.

## 3-8  Taping specifications
### 3-8-1   Taping dimensions
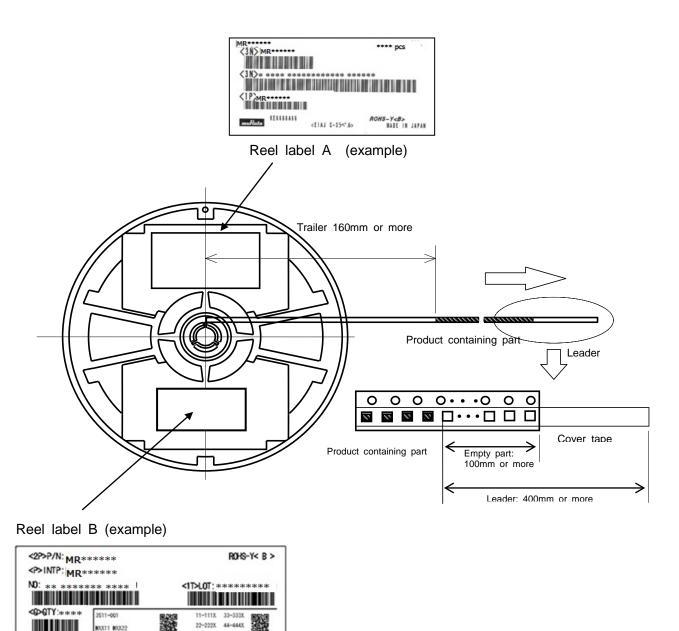


Unit:mm

| Parameter | | Symbol | Size/Angle | Parameter | | Symbol | Size/Angle |
|---|---|---|---|---|---|---|---|
| Pocket | Length | A | 1.75±0.05 | Dist. Between center lines | L direction | G | 2.0±0.05 |
| | Width | B | 2.00±0.05 | | W direction | D | 3.5±0.05 |
| | Depth | $K_0$ | 0.85±0.05 | Cover tape | Width | W | $5.5^{+0.3}_{-0}$ |
| | Pitch | F | 4.0±0.1 | Carrier tape | Width | C | 8.0±0.2 |
| Feed hole | Diameter | J | $\varphi 1.5^{+0.1}_{-0}$ | | Thickness | t | 0.20±0.05 |
| | Pitch | H | 4.0±0.1 | | Depth | $K_1$ | 1.05±0.1 |
| | Position | E | 1.75±0.1 | Device | Tilt | θ | 30°MAX |
| Overall thickness | | K | 1.03±0.1 | | | | |

### 3-8-2   Reel dimensions...EIAJ PRV08B compliant
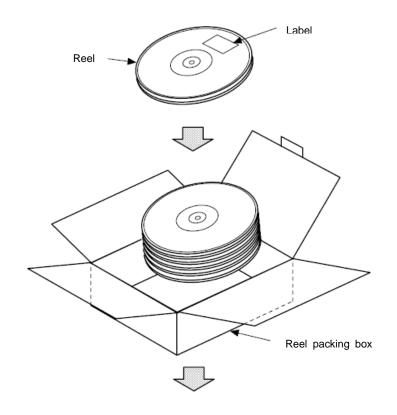


Unit: mm

| Item | Symbol | Dim/Angle |
|---|---|---|
| Diameter | A | φ178±2 |
| Dis. between flanges | W | 9±0.5 |
| Diameter | B | φ60±1 |
| Hub slit position | θ1 | 90° |
| Spindle hole diam. | C | φ13±0.5 |
| Key slit position | θ2 | 120° |
| Marking | Labeled on one side of flange | |

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### 3-8-3 Start/End of taping

MR******
<3N> MR******                          **** pcs.
<3N>* **** ************ ******
<1P>MR******

muRata  KE6666A66  <EIAJ C-054 A>  ROHS-Y<B>  MADE IN JAPAN

Reel label A (example)



Trailer 160mm or more

Product containing part

Leader

Product containing part

Empty part:
100mm or more

Cover tape

Leader: 400mm or more

Reel label B (example)

<2P>P/N: MR******                ROHS-Y< B >
<P>INTP: MR******
NO: ** ******** ****  |       <1T>LOT: *********
<Q>QTY:****   3511-001          11=111X  33=333X
              MUX11 MUX22        22=222X  44=444X

### 3-8-4 Other notes
Continuously missing device shall not exceed 2 pcs.
Peeling strength of the cover tape: 0.1 to 0.7N.

## 3.9 Outer packing specifications
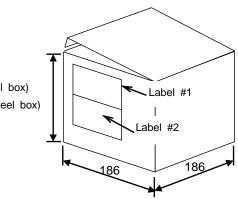
Label

Reel

Reel packing box

**<1 reel or 2 reels>**

Label #2

45(2 reel box)

186    186

Label #1

**<3 reels and more>**

93(5 reel box)
143(10 reel box)

Label #1

Label #2

186    186

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

Label #1 (example)          Label #2 (example)
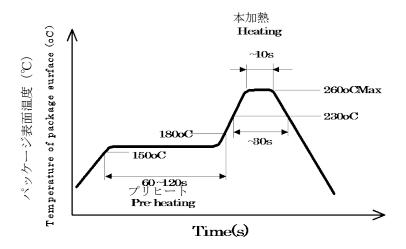
Material
   Reel packing box: Cardboard

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4. Mounting condition
4-1　Reflow condition, Hand soldering condition

本加熱
Heating

~10s

260oCMax

230oC

180oC

~30s

150oC

60~120s
プリヒート
Pre heating

Time(s)

パッケージ表面温度（℃）
Temperature of package surface (oC)

リフロー回数：３回以内
手はんだ条件：３５０±５℃、３秒以内／１端子

Times of reflow: 3　or less
Hand soldering condition: 350+/-5oC, within 3 sec/each terminal

4-2　Other
MSL(Moisture Sensitivity Level): equal to MSL1

5. Reliability test

| No. | Reliability test | Test conditions | Judgment criteria |
|---|---|---|---|
| 1 | High temp. storage | +125$^o$C 500h No-load | Satisfy the parameter 7 and 8 in 3-6. |
| 2 | Low temp. storage | -40 $^o$C 500h No-load | |
| 3 | High temp, high humidity load | +85 $^o$C 85%RH 500h Load voltage 1.8V | |
| 4 | Vibration | Apply vibration [Max amplitude:1.5mm, frequency: 10 to 55Hz, 1 cycle minute, 3 directions, 2h in each direction (total 6h )] | |
| 5 | Thermal shock | -55 $^o$C/30 min⇔+125 $^o$C/30min (vapor phase) 500 cycle, no-load | |
| 6 | Solder heat resistance | Pre treatment:+85 $^o$C, 85%RH, 168h Reflow condition: Max. 260 $^o$C &230 $^o$C, 30 sec, times of reflow: 3 | |
| 7 | Solderability | Solder temp.:+230 $^o$C, Time: 3 sec immersion | 90% and more terminal surface covered with solder |
| 8 | Electrostatic resistance | Machine Model Condition:200pF,Resistance:0Ω, +/-200V | Satisfy the parameter 7 and 8 in 3-6. |
| | | Human Body Model Condition:100pF, Resistance: 1.5kΩ, +/-2kV | |
| 9 | Electrode sticking tendency | 5N(510gf), 4 directions, 10 sec | Satisfy the parameter 7 and 8 in 3-6. No external abnormality found. |
| 10 | Drop test | 100g dummy load, Height:150cm, on the concrete, 6 sides, 10 times/each | Satisfy the parameter 7 and 8 in 3-6. |
| 11 | Shock test | Unpacked condition, X, Y, Z direction, 1470m/s$^2$, 5 times/each | |
| 12 | Bending cycle | Glass epoxy PCB (FR-4), t=1.0, Speed:5mm/min, 90mm span, 1mm bend to + and − side, 1500 cycle | No terminal fracture, loosening found. |
| 13 | Bending limit | Glass epoxy PCB (FR-4), t=1.0, 90mm span, bend 7mm to + and −side. | |

# 6. ⚠CAUTION

## 6-1 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.

## 6-2 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.

## 7. CAUTION FOR USE

### 7-1  HANDLING

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

### 7-2  DESIGN

・ Please thoughoutly 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 magneti 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.

・ 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.

### 7-3  Storage condition

・ Recommended storage conditions are listed below.

Temperature :  +5 to +30$^{o}$C

Humidity    :  70%(RH)% and lower

*Desiccator storage or storage in $N_2$ 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 solderability.

・ Please avoid the water, chemical solvent, or oil.

・Please avoid the corrosive gas ($Cl_2$ $H_2S$, $NH_3$ $NO_2$, $NO_3$ etc.)

・ Please avoid the strong vibration or shock.

### 7-4  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.

8. ⚠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.