



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of "Quality Parts,Customers Priority,Honest Operation,and Considerate Service",our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



# TOKIN Sensors



## Vol. 14



- All specifications in this catalog and production status of products are subject to change without notice. Prior to the purchase, please contact TOKIN for updated product data.
- Please request for a specification sheet for detailed product data prior to the purchase.
- Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.

# CONTENTS

Thermal Reed Switch TRS™ .....	4
TRS Series Approved by UL, CSA, and VDE .....	11
Thermal Guard OHD™ .....	12
Alternating Current Sensor .....	15
Alternating Current Sensor (Snap-on Type) .....	17
Zero-Phase Current Transformer ZCT .....	18
Magnetic Direct Current Sensor MDCS™ .....	20
Magnetic Type Proximity Switches TMRS™ Series .....	24
Inquiries .....	29



- All specifications in this catalog and production status of products are subject to change without notice. Prior to the purchase, please contact TOKIN for updated product data.
- Please request for a specification sheet for detailed product data prior to the purchase.
- Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.

# INTRODUCTION

Advances in LSIs, microcomputers and power devices enable ever more efficient use of energy, finer control and greater ease of use. In this way industry is promoting consumer appliances with increasingly sophisticated "intelligent" functions. And with these developments there is a burgeoning need for advanced, highly reliable sensors with capabilities corresponding to the human's five senses.

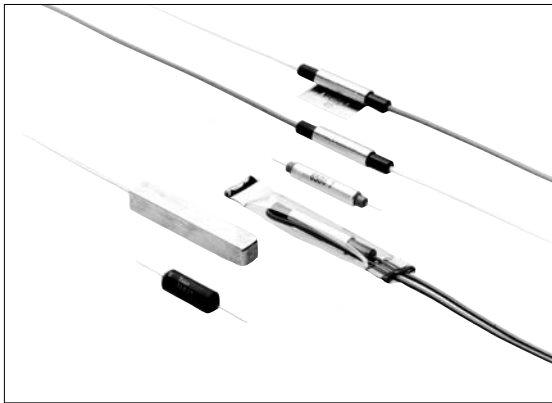
TOKIN seeks to commercialize creative products fusing new material technologies with new applications, developing and commercializing a broad range of sensor devices based on outstanding materials technologies covering properties such as magnetism, piezoelectronics and optics.

This catalog introduces different kinds of sensors, including thermosensors, current sensors and magnetic sensors. Besides the items shown here we also offer an extensive line of sensor-related products and are continually developing new sensors, so please feel free to ask us about anything you might need. We look forward to being able to serve you.



- All specifications in this catalog and production status of products are subject to change without notice. Prior to the purchase, please contact TOKIN for updated product data.
- Please request for a specification sheet for detailed product data prior to the purchase.
- Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.

# Thermal Reed Switch TRS™



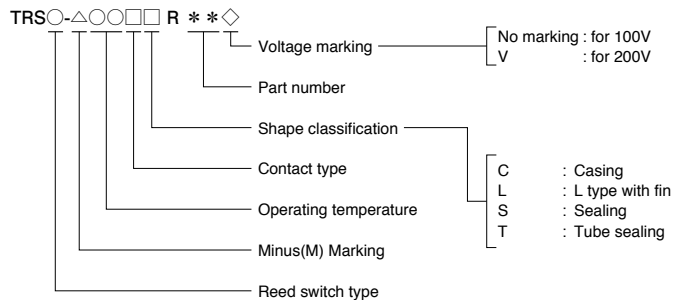
## Outline

TOKIN led the world in recognizing and realizing the potential of ferrite's Curie temperature. The result is Thermorite™, a temperature-sensing magnetic material. Ever since the introduction of this product, TOKIN has reigned as the top manufacturer of Curie-temperature-utilizing control devices, developing many products with new functions. Among these, the Thermal Reed Switch (TRS™) is the chief product, with patents in the United States and Japan. Its superiority as a highly reliable, precise temperature-sensitive switch ideal for promoting energy conservation has been attested to by the International Relay Association. There are already more than 400 million in use, and with the addition of TRS™ varieties approved by UL, CSA and other safety standards, the lineup just keeps getting better.

## Features

- High reliability (long product lifetime)
- Excellent temperature accuracy ( $\pm 2.5^{\circ}\text{C}$ ,  $\pm 1^{\circ}\text{C}$ )
- Wide range of operating temperature available ( $-10^{\circ}\text{C}$  to  $+130^{\circ}\text{C}$ )
- Excellent environmental resistance (contacts are encased in a glass tube)

## Markings



## Electrical Characteristics

Reed switch type	For 100 V					For 200 V	
	TRS06-	TRS1	TRS3-	TRS5-	TRS6-	TRSS-	TRS1-
Maximum opening/closing voltage (V)	110 AC·DC	140 AC 200 DC	140 AC 200 DC	140 AC 200 DC	140 AC	264 AC	220 AC
Maximum opening/closing current (A)	0.3 AC·DC	0.5 AC·DC	0.5 AC·DC	0.55 AC·DC	0.65 AC	0.275 AC	0.045 AC
Maximum opening/closing power (W)	6 AC·DC	10 AC·DC	35 AC 10 DC	60.5 AC 10 DC	72 AC	60.5 AC	10 AC

\* Please refer to pages 6 to 7 as rated values vary depending on product types (shape classification).



- All specifications in this catalog and production status of products are subject to change without notice. Prior to the purchase, please contact TOKIN for updated product data.
- Please request for a specification sheet for detailed product data prior to the purchase.
- Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.

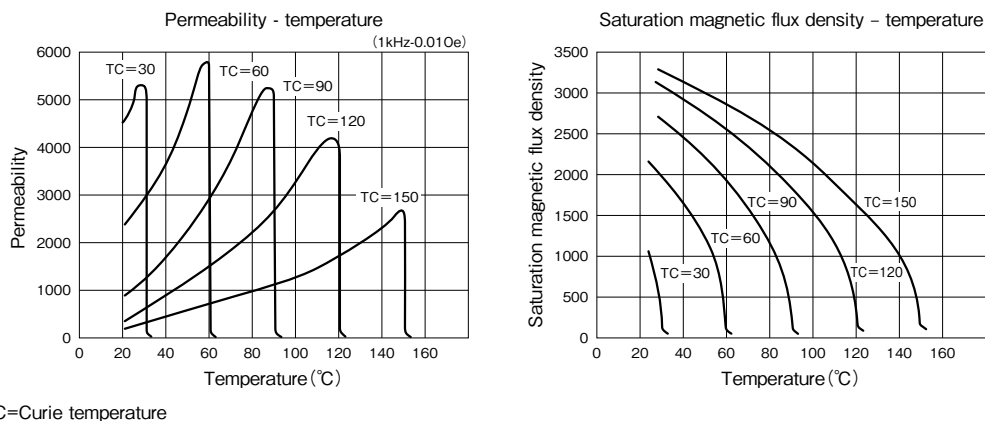
**Structures and Principles of Operation**

Thermal Reed Switches (TRS™) are temperature-sensing switches composed of a magnet and a temperature-sensing soft ferromagnetic substance called Thermorite™. This material's saturation magnetic flux density decreases as the temperature increases, and it turns into a paramagnetic substance at the Curie temperature.

**Temperature sensing ferrite (Thermorite®)**

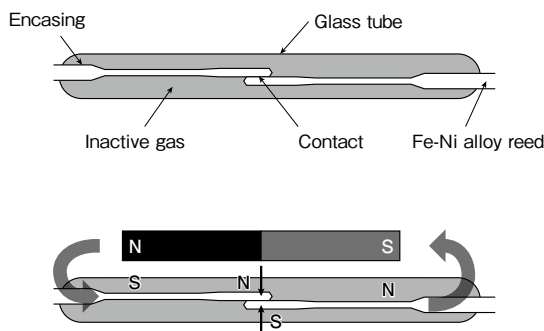
- ◆ Our self-developed Thermorite is temperature sensing ferrite utilizing Curie-temperature, where ferrites lose its magnetic property. Thermorite changes its magnetic property rapidly at Curie-temperature.
- ◆ Features of Thermorite as temperature sensing material.
  - (1) Curie-temperature do not vary as time advances, because it depends on compounding ratio.
  - (2) Arbitrary shape available as ceramics.
  - (3) Stable against moist or hazardous gas.

Thermal property of Thermorite



**Structure of reed switch**

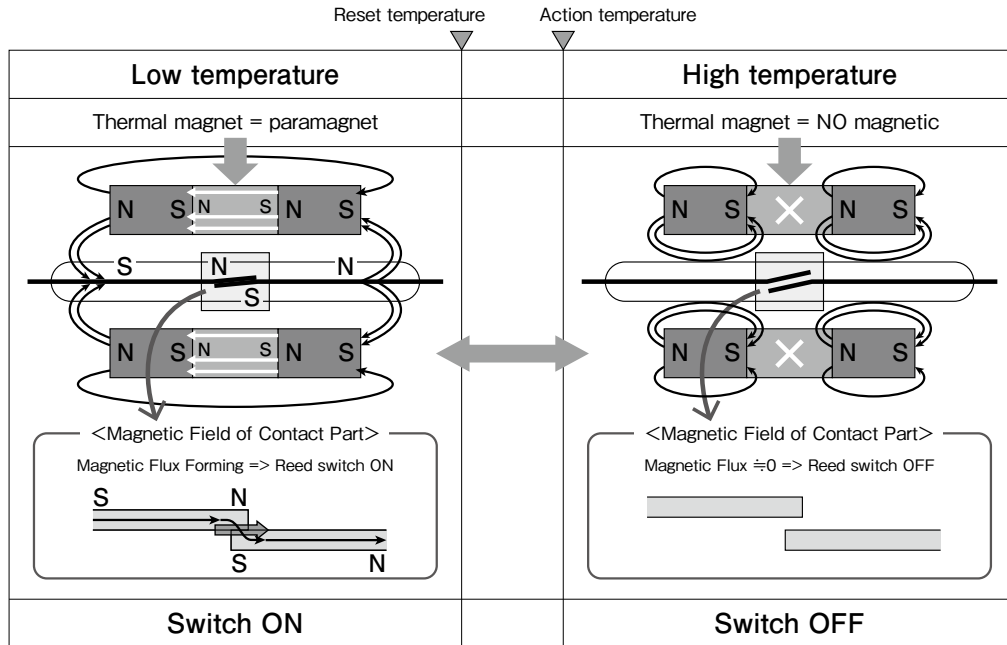
- ◆ Reed switch is contact switch comprised of a pair of Fe-Ni alloy reeds encased in glass tube with inactive gas. The reeds are switched on or off by magnetic field of permanent magnet or magnet coil.
- ◆ Long lifetime, High environmental resistance because of protected contact by glass encasing.
- ◆ Reeds in glass tube become magnetized with magnetic field, and then two reeds contact and connect each other (switch on). And then magnetic field disappears, the reeds separate and disconnect (switch off).



● All specifications in this catalog and production status of products are subject to change without notice. Prior to the purchase, please contact TOKIN for updated product data.  
 ● Please request for a specification sheet for detailed product data prior to the purchase.  
 ● Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.

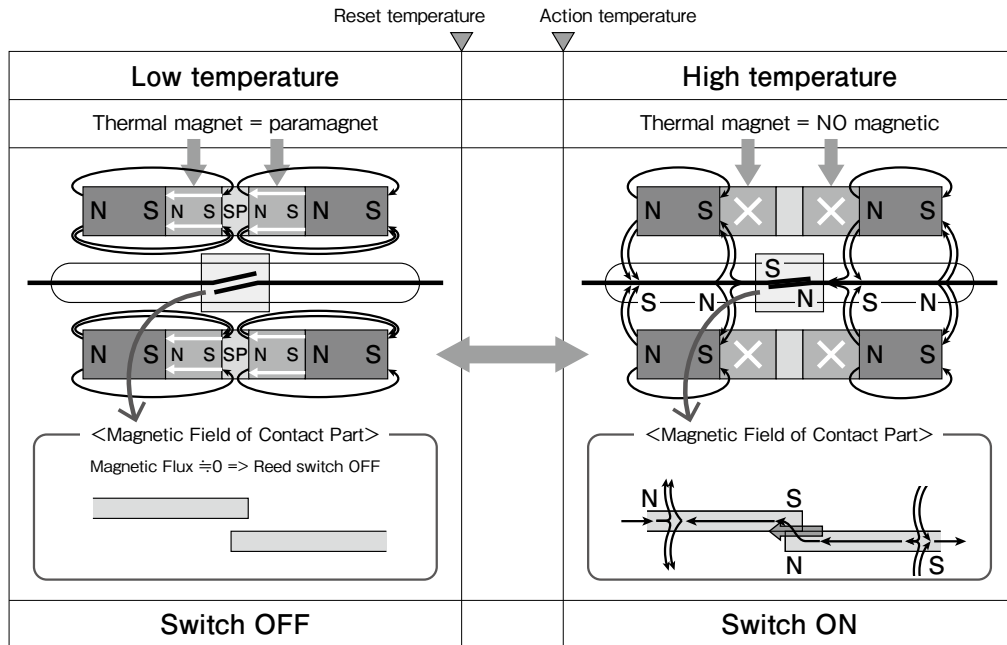
**TRS principle : Break (B) type**

( ■: Permanent magnet   ■: Thermorite®   ■: Reed switch contact area )



**TRS principle : Make (M) type**

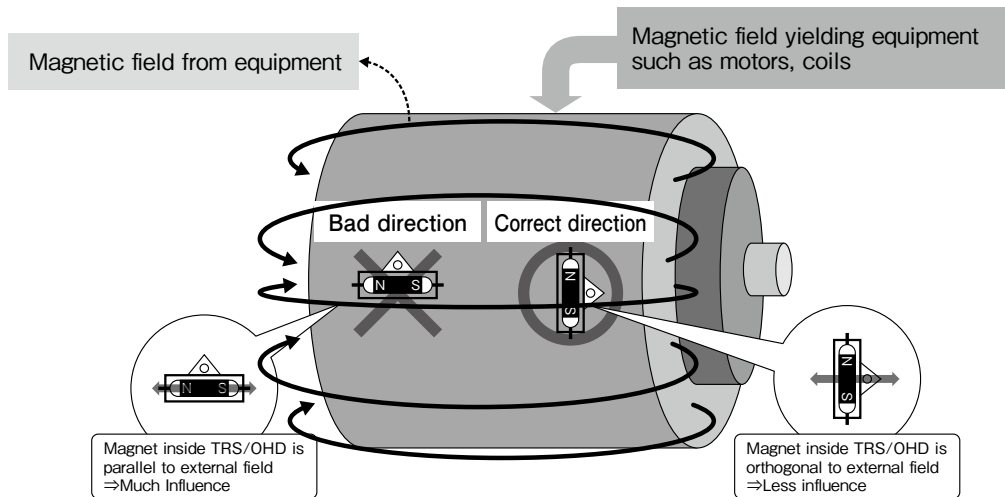
( ■: Permanent magnet   ■: Thermorite®   ■: Gapspace (SP)   ■: Reed switch contact area )



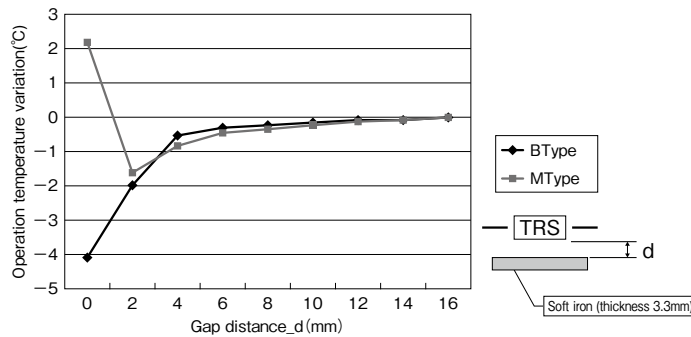
- All specifications in this catalog and production status of products are subject to change without notice. Prior to the purchase, please contact TOKIN for updated product data.
- Please request for a specification sheet for detailed product data prior to the purchase.
- Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.

**External magnetic field**

TRS/OHD installation direction in external magnetic field



**Ferromagnetic material influence**



Note: Above figures are for reference only and are not guaranteed values.

**Before Using Thermal Reed Switch (TRS™)**

- Please ask for a copy of specification and check the contents thoroughly before the actual use.
- Please contact us before deciding your specifications.
- Do not use in close proximity to strongly magnetized parts.
- Do not use if dropped or strongly shocked.
- Do NOT use with greater load than specified.

When installing these switches in circuits prone to producing surge voltage (inductive load) or rush current (in lamps and motors), an appropriate switch type should be used, or a contact point protection circuit added.

- Avoid stress (especially torsion) in case of additional processing.
- Each reed switch has a specific resonance frequency. Please contact us when an oscillation is added.



● All specifications in this catalog and production status of products are subject to change without notice. Prior to the purchase, please contact TOKIN for updated product data.  
 ● Please request for a specification sheet for detailed product data prior to the purchase.  
 ● Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.



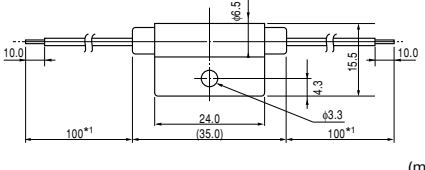
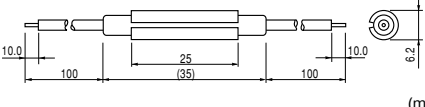
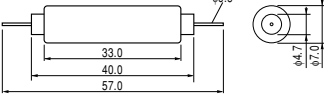
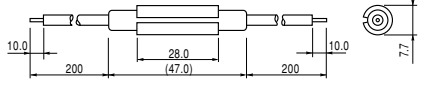
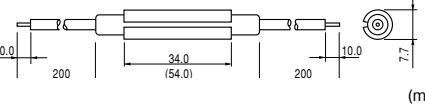
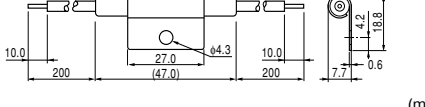
## Temperature sensors supported specifications by type

○ : Supported    × : Not supported

Series	Shape	Supported specifications	Operating temperature range	Operating temperature precision (Does not include measurement error)	Certifications	Break (B)	Make (M)
TRS®	Compact Type	TRS06-**BLR001 TRS06-**BCR001	30 ~ 130°C	± 5°C	—	○	×
	CType	TRS1-**MCR00V, 01V TRS3-**MCR00, 01 TRS5-**BCR00, 00V, 01, 01V	0 ~ 120°C	± 2.5°C	—		○
	LType	TRS1-**MLR00V TRS3-**MLR00 TRS5-**BLR00, 00V	0 ~ 130°C	± 2.5°C	—		○
	SType (Sealing)	TRS1-**MSR00V, 01EV TRS3-**MSR00, 01E TRS5-**BSR00, 00V, 01E, 01EV	-10 ~ 100°C	± 2.5°C	—		○
	TType (Tube sealing)	TRS1-**MTR01V TRS3-**MTR01 TRS5-**BTR01, 01V	-10 ~ 60°C	± 2.5°C	—		○
	Mold TRS Type	M-TRS5-**B	-10 ~ 130°C	± 2.5°C	—		×
	Approved by UL	TRS5-**BCR01U, 01VU TRS5-**BLRU, VU	Shape A : 0 ~ 120°C Shape B : 0 ~ 130°C	± 2.5°C	UL		×
	Approved by CSA	TRS5-**BLRU, XU	Shape B : 0 ~ 129°C	± 2.5°C	CSA		×
OHD™	OHD1	OHD1-**B, M	5°C increments between 30°C and 130°C (the standard temperature range is 35°C to 120°C)	± 5°C	UL CSA TUV	○	○
	OHD3	OHD3-**B, M					○
	OHD5R	OHD5R-**B					×



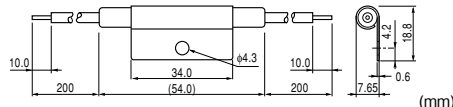
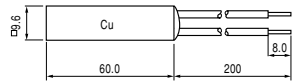
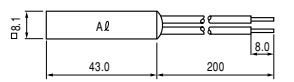
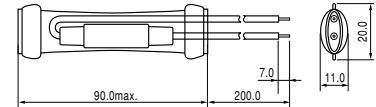
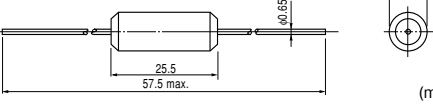
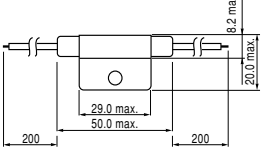
- All specifications in this catalog and production status of products are subject to change without notice. Prior to the purchase, please contact TOKIN for updated product data.
- Please request for a specification sheet for detailed product data prior to the purchase.
- Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.

	Part Number / Shape / Dimensions	Operating temperature range <sup>1</sup>	Operating temperature precision <sup>3</sup>	Differential Temperature <sup>4</sup>	Application(s)	Features
Compact Type	<ul style="list-style-type: none"> <li>● TRS06-○ BLR001</li> </ul>  <ul style="list-style-type: none"> <li>● TRS06-○ BCR001</li> </ul> 	30°C to 130°C	± 5°C		Power supplies Recharge temperature detection	Compact
	<ul style="list-style-type: none"> <li>● TRS5-○ BCR01</li> <li>● TRS5-○ BCR01V</li> <li>● TRS1-○ MCR01V</li> <li>● TRS3-○ MCR01</li> </ul>  <ul style="list-style-type: none"> <li>● TRS5-○ BCR00, 00V</li> </ul>  <ul style="list-style-type: none"> <li>● TRS3-○ MCR00, TRS1-○ MCR00V</li> </ul> 					
L Type (Break Type)	<ul style="list-style-type: none"> <li>● TRS5-○ BLR00</li> <li>● TRS5-○ BLR00V</li> </ul> 	0°C to 130°C	± 2.5°C		Rice cookers Hot water heaters Thermos-type hot water heaters	General-purpose

\*1 Please consult us before you determine specifications.  
 \*2 Please contact us with questions regarding operating temperature precision.  
 \*3 Operating temperature precision does not include measurement error.  
 \*4 Difference between operating temperature and return temperature.  
 \*5 All specifications comply with RoHS directive.



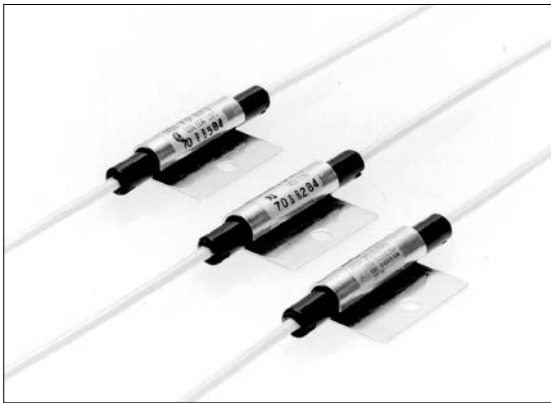
● All specifications in this catalog and production status of products are subject to change without notice. Prior to the purchase, please contact TOKIN for updated product data.  
 ● Please request for a specification sheet for detailed product data prior to the purchase.  
 ● Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.

<p><b>L Type (Make Type)</b></p>	<p>● TRS3-○○MLR00, TRS1-○○MLR00V</p>  <p>(mm)</p>	<p>0°C to 130°C</p> <p>± 2.5°C</p>		<p>Power supplies Computers &amp; peripherals</p>	<p>General-purpose</p>
<p><b>S Type<sup>1)</sup></b></p>	<p>● TRS5-○○BSR00, 00V ● TRS3-○○MSR00, TRS1-○○MSR00V</p>  <p>● TRS5-○○BSR01E, 01EV ● TRS3-○○MSR01E, TRS1-○○MSR01EV</p>  <p>(mm)</p>	<p>-10°C to 100°C</p> <p>± 2.5°C</p>		<p>Air-conditioners Freezers Vending machines Refrigerators Anti-freeze heaters</p>	<p>Humidity-and moisture-resistant</p>
<p><b>T Type<sup>1)</sup></b></p>	<p>● TRS5-○○BTR01, 01V ● TRS3-○○MTR01, TRS1-○○MTR01V</p>  <p>(mm)</p>	<p>-10°C to 60°C</p> <p>± 2.5°C</p>	<p>10°C max.</p>		
<p><b>Mold TRS Type</b></p>	<p>● M-TRS5-○○B</p>  <p>(mm)</p>	<p>-10°C to 130°C</p> <p>± 2.5°C</p>		<p>Anti-freeze heaters Aquarium heaters</p>	<p>Molded plastic</p>
<p><b>Approved by UL, CSA</b></p>	<p>● TRS5-○○BLRU</p>  <p>(mm)</p>	<p>0°C to 130°C</p> <p>± 2.5°C</p>		<p>Photocopiers Rice cookers</p>	<p>Satisfies overseas safety standards-UL, CSA</p>





- All specifications in this catalog and production status of products are subject to change without notice. Prior to the purchase, please contact TOKIN for updated product data.
- Please request for a specification sheet for detailed product data prior to the purchase.
- Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.

# TRS™ Series Approved by UL, CSA, and VDE



## Specifications

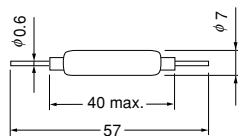
Recognized by:	Model	Max.Make/Break Current	Max.Make/Break Voltage	Max.Make/Break Power	Shape No.	Set Operating Temperature Range (°C)	Operating Temperature precision (°C)	Differential Temperature (°C) <sup>1</sup>
	BCR Series TRS5-○○○BCR01U	0.5A	140V AC	50W AC	A	0~120	±2.5	10 max.
	TRS5-○○○BCR01VU	0.275A	264V AC	60.5W AC				
	BLR Series TRS5-○○○BLR U	0.5A	140V AC	50W AC	B	0~130	±2.5	10 max.
	TRS5-○○○BLR VU	0.275A	264V AC	60.5W AC				
	BLR Series TRS5-○○○BLR U	0.5A	120V AC	50W AC	B	0~129	±2.5	10 max.
	TRS5-○○○BLR XU	0.25A	240V AC	60W AC				

UL : File No.E67648  
CSA : File No.LR50414-2

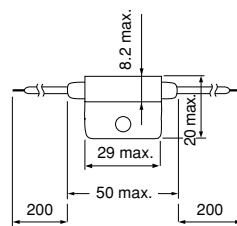
<sup>1</sup>No values specified in the international safety standard.  
\*○○○ indicates the operating temperature

## Shape and Dimensions

● A



● B

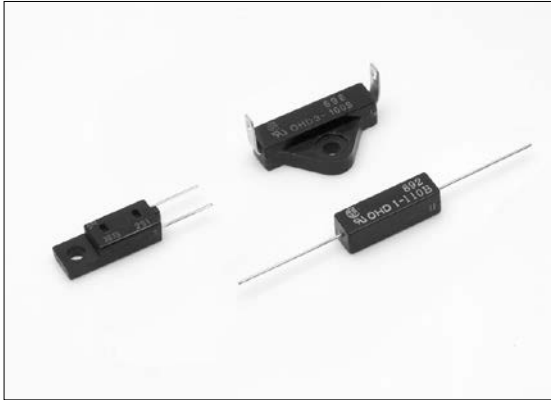


[mm]



- All specifications in this catalog and production status of products are subject to change without notice. Prior to the purchase, please contact TOKIN for updated product data.
- Please request for a specification sheet for detailed product data prior to the purchase.
- Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.

# Thermal Guard OHD™



## Outline

The thermal guard “OHD™” is developed for thermal problem countermeasures and safety standard conformity that are becoming increasingly important for electronic devices in recent years.

## Features

- Extremely simple circuit design (as no adjustment needed).
- Reliable ON-OFF operation (special temperature-sensitive materials and highly-reliable switches give reproducible, reliable ON-OFF action).
- Usable with extremely low (0.1 mW or lower) signals to high power (6 W) levels, making them ideal as built-in overheating detectors in electronic circuits. (OHD5R- ○○B have a maximum rating of 1 W.)
- High-speed response (three times higher than previous TOKIN products).
- Compact, light and easy to handle.
- Dust-proof, explosion-proof, and corrosion-proof.
- Wide range of operating temperatures available (in 5 °C increments from 30 to 130 °C)






## Applications

- Monitoring overheating of power transistors and power modules in power supplies, OA equipment and other electronic appliances.
- Atmospheric temperature detection and overheating monitoring in room heaters, gas hot water heaters, PPCs, amplifiers, motors, HDDs, FDDs and other general appliances.



- All specifications in this catalog and production status of products are subject to change without notice. Prior to the purchase, please contact TOKIN for updated product data.
- Please request for a specification sheet for detailed product data prior to the purchase.
- Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.

**Specifications**

Product name	Features	Contact shape	Electrical Characteristics	Set operating temperature range <sup>*1</sup>	Operating temperature precision <sup>*2</sup>	Differential temperature
OHD1- 	 General-purpose	B:Break M:Make	Maximum opening/closing voltage 110 V AC/DC Maximum opening/closing current 0.3 A AC/DC Maximum opening/closing power 6 W AC/DC Minimum opening/closing current 0.1mA/1V,DC	Fixed in 5°C increments from 30°C to 130°C	± 5°C	10°C max.
OHD3- 			Maximum opening/closing voltage 30 V.DC Maximum opening/closing current 0.1 A DC Maximum opening/closing power 1 W DC Minimum opening/closing current 0.1mA/1V,DC			
OHD5R- 	 Compact radial type	B:Break				

UL : E67648  
 CSA : LR50414  
 TUV : OHD1 · 3 R 9750955  
 OHD5R R 9750944

\*1 Please consult us before you determine specifications.  
 \*2 Operating temperature precision does not include measurement error.

Product name	Contact Resistance	Insulation Withstand Voltage	Insulation Resistance	Remarks
OHD1-3	150mΩ max.	2500VAC/1min. or 3000VAC/1sec (Between terminals and mounting resin surface)	DC500V-100MΩ min. (Between terminals and mounting resin surface)	Compliance to RoHS directive
OHD5R	300mΩ max.	1500VAC/1min. or 1800VAC/1sec (Between terminals and mounting resin surface)	DC500V-100MΩ min. (Between terminals and mounting resin surface)	Compliance to RoHS directive

**Standard Temperature Specifications**

Product name	Standard temperature specification
OHD3-B	35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 120°C
OHD3-M	35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 120°C
OHD5R-B	35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 120°C

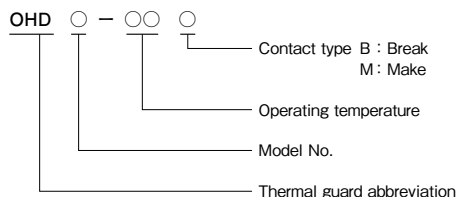
\* Please ask separately except standard temperature specification

**Standard package unit**

Product name	Standard package unit (pcs.)
OHD1-B, M	1,200
OHD3-B, M	1,000
OHD5R-B	700

\* Please inquire regarding quantities below the standard package unit.

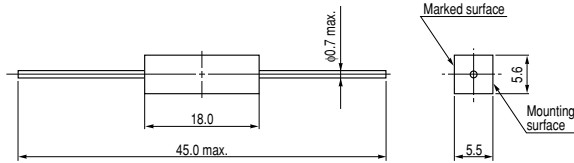
**Markings**



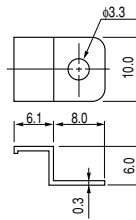
- All specifications in this catalog and production status of products are subject to change without notice. Prior to the purchase, please contact TOKIN for updated product data.
- Please request for a specification sheet for detailed product data prior to the purchase.
- Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.

## Shape and Dimensions

### ● OHD1

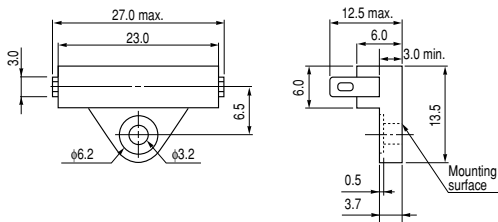


### ● OHD1 mounting bracket

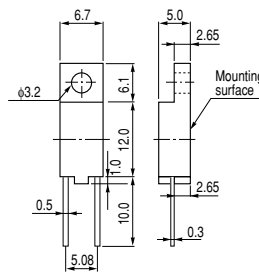


\*Mounting brackets exclusively for the OHD1 type are provided optionally (at separate cost).

### ● OHD3



### ● OHD5R



(mm)

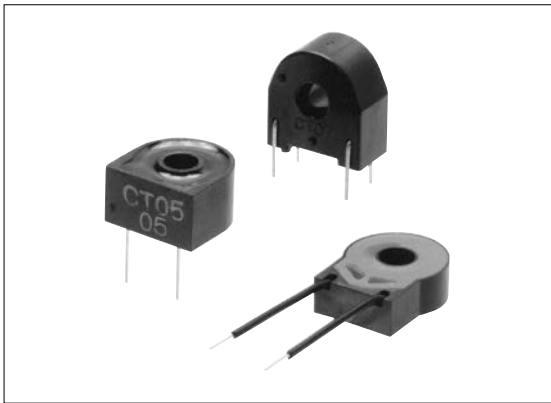
### Before Using Thermal Guard OHD™

- Please ask for a copy of specification and check the contents thoroughly before the actual use.
- Do not use OHD™ under mechanical weight load.
- Do NOT use with greater load than specified.
- Do not affix in close proximity to strongly magnetized parts and avoid using in a magnetic field.
- Do not use if dropped or strongly shocked.
- The OHD1 and OHD5R are designed to be inserted into printed circuit boards. OHD3 type is reed wire soldered type.



- All specifications in this catalog and production status of products are subject to change without notice. Prior to the purchase, please contact TOKIN for updated product data.
- Please request for a specification sheet for detailed product data prior to the purchase.
- Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.

# Alternating Current Sensor



## Outline

This series of compact current transformers (current sensors) can be used for detecting very low current levels and overcurrent protection in electronic appliances.

## Features

- High sensitivity (detection of low current) and high performance.
- Compact, lightweight.
- Mountable on printed circuit boards.

## Applications

- Overcurrent detection in microcomputer-controlled equipment.
- Current detection in electric refrigerators, air conditioners and electromagnetic cookers.

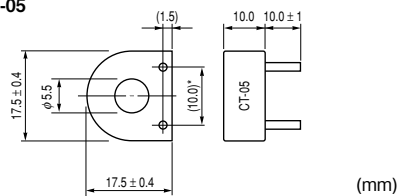
## Specifications

Product name	CT-05	CT-06	CT-07
Core	Permalloy	Permalloy	Permalloy
Lead wires	φ 0.6 mm Pin connectors	Polyethylene sheath φ 0.5 mm single wire	φ 0.8 mm Pin connectors
Materials	Phenolic resin case, epoxy-filled	Phenolic resin case, silicon-filled	Phenolic resin case, epoxy-filled
Remarks	Compliance to RoHS directive	Compliance to RoHS directive	Compliance to RoHS directive

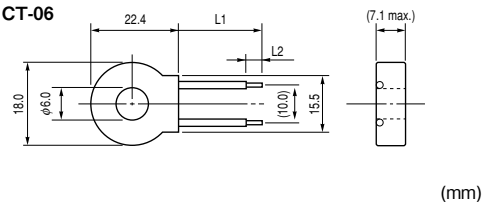
- Notes:)
- (1) The CT-05 has 500<sup>T</sup> as standard.
  - (2) In the standard lineup there are three types of CT-06, depending on differences in secondary windings.
  - (3) In the standard lineup there are two types of CT-07, depending on differences in secondary windings.

## Shape and Dimensions

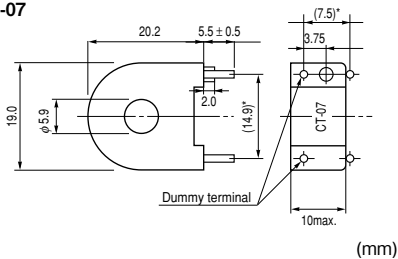
### ● CT-05



### ● CT-06



### ● CT-07



Product name	L1(±5)	L2(±2)
CT-06-50	56.0	4.0
CT-06-75		
CT-06-100	85.0	5.0

- \* Tolerance ±0.3  
\* Pin root diameter.

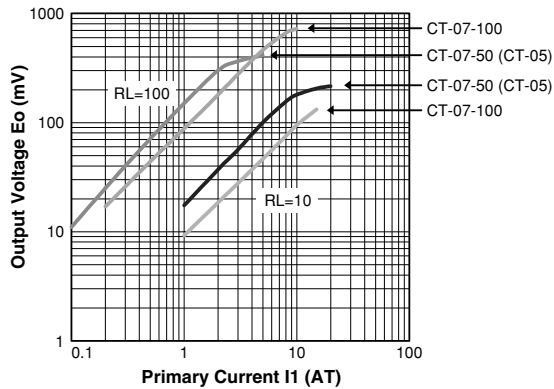


- All specifications in this catalog and production status of products are subject to change without notice. Prior to the purchase, please contact TOKIN for updated product data.
- Please request for a specification sheet for detailed product data prior to the purchase.
- Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.

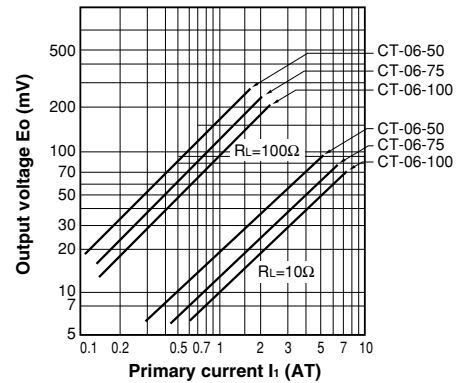


## Output Characteristics

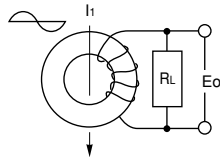
### ● CT-05, CT-07 AC output characteristics (example)



### ● CT-06 AC output characteristics (example)



### ● Measuring circuit



$I_1$  : Primary current (AT)  
 $R_L$  : Load resistance ( $\Omega$ )  
 $E_o$  : Output voltage (mV rms)

### Before Using Alternating Current Sensor

- The core may be damaged if applied with a strong impact. Carefully avoid dropping or applying any other strong impacts.
- Preliminary study is needed with regard to heating by current conduction.
- Do not use the current transformer opened between secondary output terminals.  
In the worst case, heat build-up in the magnetic core may occur, resulting in damages to the parts by the melting of coil due to this heat.



- All specifications in this catalog and production status of products are subject to change without notice. Prior to the purchase, please contact TOKIN for updated product data.
- Please request for a specification sheet for detailed product data prior to the purchase.
- Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.

# Alternating Current Sensor (Snap-on Type) C/CT-1216 [RoHS Compliant]



### Outline

This clamp-on current sensor can be used to measure currents in live wires.

### Features

- Compact, slim.
- High performance from its unique design
- Flat temperature characteristics
- Flame retardant

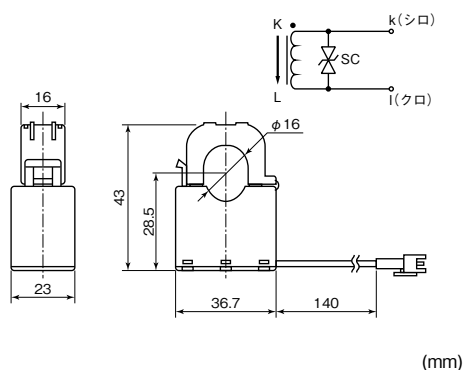
### Applications

- xEMS current measurement
- High performance distribution boards
- Industrial machineries

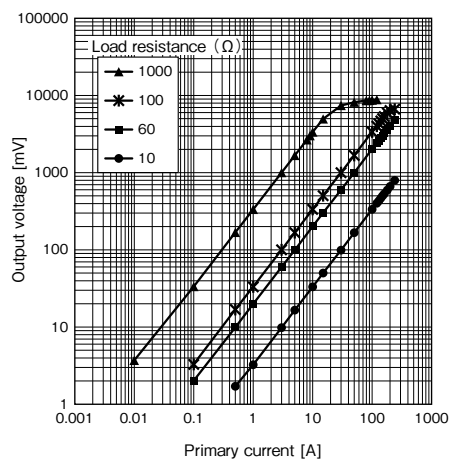
### Specifications

Item	Unit	Specifications	Comments
Rated current	Arms	120	50Hz/60Hz
Applicable current	Arms	0.1 ~ 120	50Hz/60Hz
Output voltage	mV	1000+/- 20	Io=50A RL=60Ω f=50Hz
Current transformation ratio		3000	
Output protection	V	7.5 V	
Insulation resistance	MΩ	≥ 100	DC500V
Operating temperature range	°C	-20 ~ +60	
Storage temperature range	°C	-20°C ~ +80°C	

### Shape and Dimensions

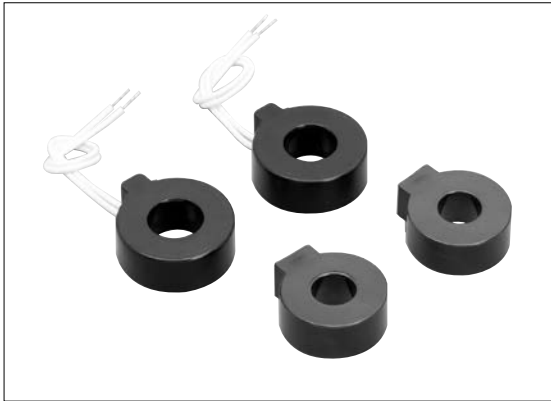


### Output Characteristics



- All specifications in this catalog and production status of products are subject to change without notice. Prior to the purchase, please contact TOKIN for updated product data.
- Please request for a specification sheet for detailed product data prior to the purchase.
- Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.

# Zero-Phase Current Transformers ZCT



**Outline**

The ZCT Series of compact molded-type zero-phase current transformers is ideal for improving the sensitivity, compactness and light weight of electric shock prevention earth leakage breakers.

**Features**

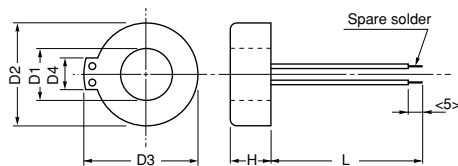
- High sensitivity.
- Compact and light weight.
- Laminated iron core type.

**Applications**

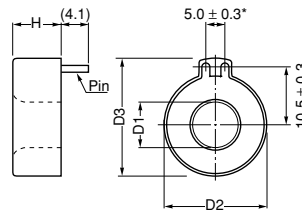
- Electric shock prevention earth leakage breakers.
- Short circuit relays.

**Shape and Dimensions**

● MR-1、2、3、4



● MR-1-P5



Product name	Each part's dimensions (mm)					
	D1 (min)	D2 (max)	D3 (max)	D4	H (max)	L (± 3.0)
MR-1	7.2	19.3	22.4	(5.0)	8.3	45.0
MR-2	8.9	21.8	24.7	(5.0)	8.3	80.0
MR-3	11.0	28.0	30.5	(6.0)	10.5	67.0
MR-4	16.5	32.0	34.5	(7.0)	10.8	67.0
MR-1-P5	7.4	19.3	21.8	(8.0)	8.5	—

Pin :  $\phi 0.8$  mm Pin connectors.  
 \* Pin root diameter.

**Specifications**

Product name	Output voltage (mV) min.	Temperature characteristics (-20°C~80°C) (%)	Overinput characteristics (After DC5A input) (%) max.	Measurement conditions	Remarks
MR-1	8	± 10	10	f=60Hz R=300Ω I <sub>o</sub> =22.5 mA	Compliance to RoHS directive
MR-2					
MR-3					
MR-4					
MR-1-P5					

Notes1: We can accommodate other specifications as well, so please ask if required.  
 Notes2: As rated current may vary depending on mounting condition, it is necessary to check its value after the actual mounting on to the component.

R : Load resistance  
 I<sub>o</sub> = I<sub>o</sub> : Detection current



- All specifications in this catalog and production status of products are subject to change without notice. Prior to the purchase, please contact TOKIN for updated product data.
- Please request for a specification sheet for detailed product data prior to the purchase.
- Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.

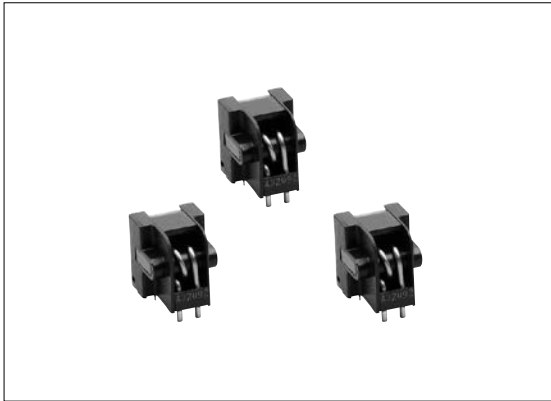
**Before Using Zero-Phase Current Transformers ZCT**

- Strong shocks such as from being dropped may change the characteristics. Take care to avoid any subjecting the transformers to physical shocks.
- Do not use the current transformer opened between secondary output terminals.  
In the worst case, heat build-up in the magnetic core may occur, resulting in damages to the parts by the melting of coil due to this heat.
- ZCT can be used as current transformer. In this case, please request us for data.



- All specifications in this catalog and production status of products are subject to change without notice. Prior to the purchase, please contact TOKIN for updated product data.
- Please request for a specification sheet for detailed product data prior to the purchase.
- Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.

# Magnetic Direct Current Sensor MDCS™



## Outline

Magnetic direct current sensors (MDCS™) use a magnetic substance and hole device for magnetic detection of direct current. They detect all currents (DC, AC and pulse), and the output voltage varies in proportion to the strength of the current measured.

## Features

- Detection of both direct currents and alternating currents (including pulse currents)
- Fluctuations in output from changes in the power supply voltage and the ambient temperature are small.
- Excellent linearity of measured current and the converted power output
- The measured current and the secondary output side are insulated.

## Applications

- Inverter-based home appliances (Air-conditioners etc.)
- General-purpose inverters
- AC variable-speed drive and servo drive
- Industrial machines • UPS • DC motor control
- FAX and other multifunction telephone series (THS Series)

Item	Marking	Rated value and conditions (Ta=25°C)													
		Amplifier built-in type													
		Single power supply operating type (Magnetic proportion system)													
		LA12													
Model		10V21	12V21 <sup>*1</sup>	15V21	20V21	24V21 <sup>*1</sup>	25V21	30V21	32V21	36V21 <sup>*1</sup>	40V21	48V21	50V21	60V21	
Rated current (A)	IcL1	±10	±12	±15	±20	±24	±25	±30	±32	±36	±40	±48	±50	±60	
Primary side windings (Turn)	—	6	6	4	3	3	2	2	2	2	2	2	2	1	
Scope of measurement	—	0 to 100% of rated current (IcL1)													
Power supply voltage (V)	Vcc	+12 ±5%													
	Vee	—													
Consumption current (mA) max.	—	40													
Output voltage (V)	Vh	+2.000 ±0.060 (at IcL1, RL = 10KΩ)													
Residual voltage (V)	Voff	±2.500 ±0.060 (at 0A, RL = 10KΩ)													
Hysteresis (mV) max.	Vhys	60													
Power supply voltage variation (mV) max.	—	30 (Vcc = +12V ±5%)													
Vh temperature characteristics (%/°C)	—	±0.15													
Voff temperature characteristics (mV/°C)	—	±4													
Pulse response (μs) max.	Tp	20 (di/dt = 100AT/μs)													
Linearity (%)	g	-2 to 2													
Insulation withstand voltage	—	AC2000V / 1min. (Between wire and terminals)													
Insulation resistance	—	500MΩ / DC500V (Between wire and terminals)													
Operating temperature range (°C)	Ta	-10 to +75													
Storage temperature range (°C)	Ts	-15 to +80													

\*1 Sample delivery for this model may take extra time.



- All specifications in this catalog and production status of products are subject to change without notice. Prior to the purchase, please contact TOKIN for updated product data.
- Please request for a specification sheet for detailed product data prior to the purchase.
- Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.

● THS56,56F,65,63F

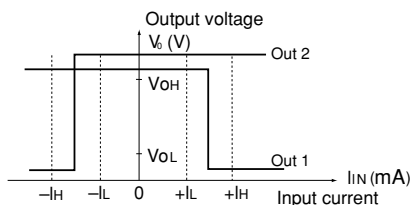
Electrical Characteristics (Ta=25°C , Vcc=+5V)

Item		Marking	Conditions	Rating			Comments
				min.	typ.	max.	
Sensitivity current (mA)	56,65	I <sub>L</sub>	Ta=+5°C~+45°C	2		15	
		I <sub>H</sub>					
	56F,63F	I <sub>L</sub>		5		10	
		I <sub>H</sub>					
Primary side input current (mA)	56,56F,63F,65	I <sub>in</sub>		-120		120	
Input direct current resistance (Ω)	56	R <sub>in</sub>	Ta=-10°C~+70°C	2.5	3.5	4.5	
	56F,63F,65			2.5	3.9	5.0	
Input inductance (mH)	56	L <sub>in</sub>	Ta=-10°C~+70°C	0.8	1.0	1.2	-10°C~+70°C
	56F,63F,65			0.8	1.1	1.4	
Output voltage (V)		V <sub>OH</sub>	R <sub>L</sub> =10kΩ	3.5			
		V <sub>OL</sub>			0.1	0.8	
Response (μS)		ton-off	R <sub>L</sub> =∞		60		
Power supply voltage (V)		V <sub>CC</sub>		+4.5		+5.5	
Consumption current (mA)	56,56F,65	I <sub>CC</sub>			10		
	63F				12		
Effect of external magnetic field (mA)	56,56F,63F,65	I <sub>in</sub> offset	I <sub>in</sub> =0 B=1×10 <sup>-3</sup> T		3		
"Analog" out put	Loss (dB)	56,65	I <sub>in</sub> =0~120mA 1kHz,600Ω	30	34	38	
		56F		30	33	36	
		63F		-2	0	2	
	S/N (dB)	15					
	63F						

**Maximum Rating**

Item	Marking	Rating	Comments
Power supply voltage (V)	V <sub>CC</sub>	7.0	
Primary side input current (A)	I <sub>in</sub>	0.5	10sec. max.
Withstand voltage between (kVAC) min.		2.2	60sec. 50Hz RH=65±5%
Operating temperature range (°C)	T <sub>opt.</sub>	-10~+70	
Storage temperature range (°C)	T <sub>stg.</sub>	-20~+80	

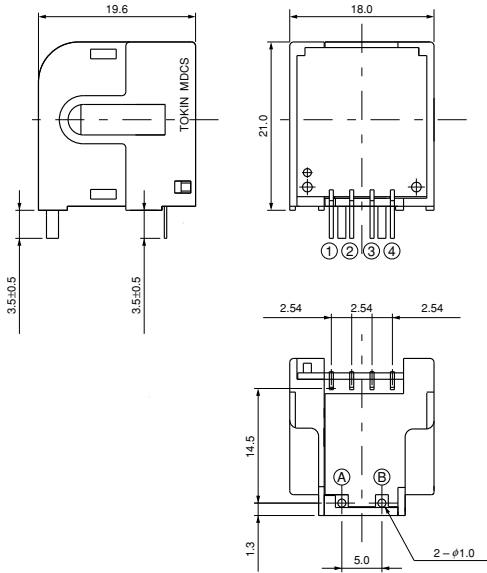
**Input Current - Output Voltage Characteristics**



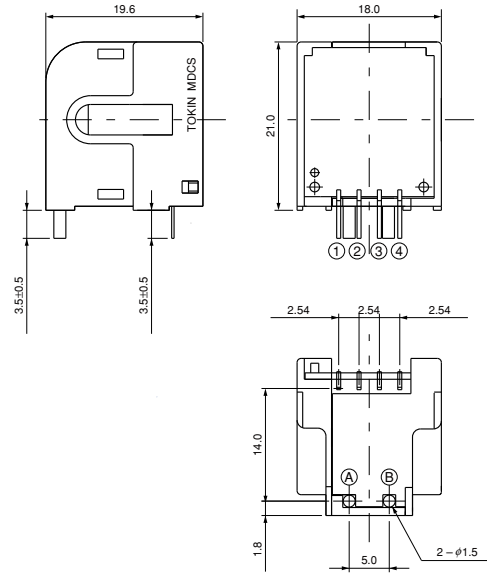
- All specifications in this catalog and production status of products are subject to change without notice. Prior to the purchase, please contact TOKIN for updated product data.
- Please request for a specification sheet for detailed product data prior to the purchase.
- Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.

## Shape and Dimensions

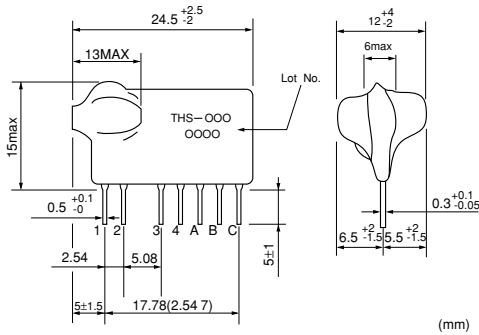
### ● LA12-10V21 to LA12-24V21



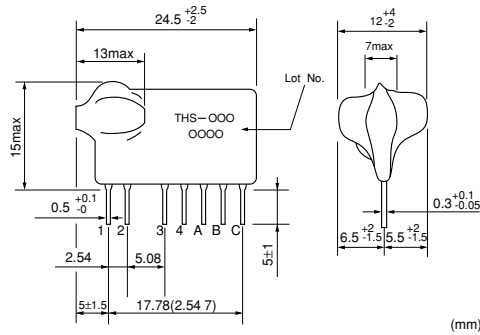
### ● LA12-25V21 to LA12-60V21



### ● THS-56,56F,65



### ● THS-63F



Pin number	LA12	THS56,56F,65,63F
1	NC	(Coil input)
2	GND (Ground pin)	(Coil input)
3	Vcc (+12V)	GND (Ground pin)
4	Vout (Output voltage pin)	"Analog" output
A	(Measured current ⊕pin)	OUT2
B	(Measured current ⊖pin)	OUT1
C	-	Vcc (+5V)



- All specifications in this catalog and production status of products are subject to change without notice. Prior to the purchase, please contact TOKIN for updated product data.
- Please request for a specification sheet for detailed product data prior to the purchase.
- Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.

**Before Using Magnetic Direct Current Sensor MDCS™**

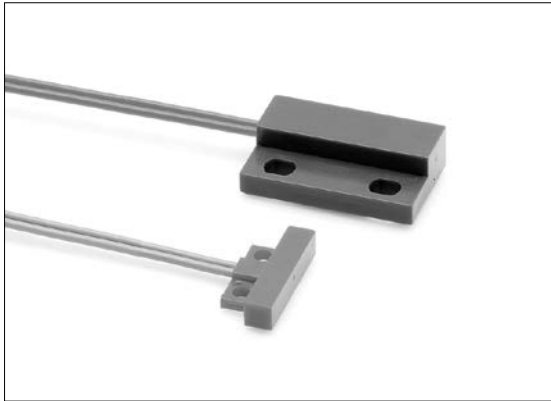
- Strong physical shocks could damage cores. Be careful not to drop or apply other strong impact.
- These products are heat resistant up to 260°C for 10 seconds. Be careful not to exceed this amount when soldering. Use a low-corrosion type flux when soldering.
- Because the circuit uses ICs, application of strong static electricity could cause damage. Take static electricity precautions when handling.
- Because these products are magnetic current detectors, application of strong external magnetic fields could cause their characteristics to change. Limit ambient magnetic fields to 50e or less.



- All specifications in this catalog and production status of products are subject to change without notice. Prior to the purchase, please contact TOKIN for updated product data.
- Please request for a specification sheet for detailed product data prior to the purchase.
- Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.



# Magnetic Type Proximity Switches TMRS™ Series



**Outline**

TOKIN's highly reliable magnetic non-contact switches are the result of combining reed switches and magnets, made possible by the contact technology, magnetic circuit technology and plastic molding technology developed through the production of 300 million temperature switches (TMRS™ Series).

**Applications**

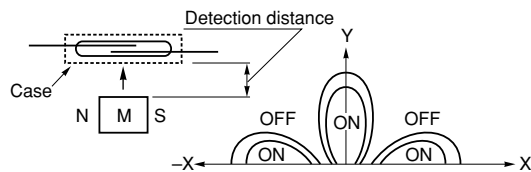
- Position detection (air cylinders, automatic doors, etc.)
- Rotation detection

**Features**

- Sealed resin-molded structure makes for easy handling and mechanical strength.
- The contacts are encased in glass for excellent resistance to dust and corrosion.

**Operation Characteristics**

- Normally open type



When drive magnet M approaches, the reed switch contacts close and the circuit comes on.

**Specifications**

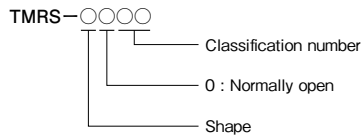
	Product name	Features	Electrical characteristics	Life time
TMRS Series	TMRS-3020	Compact wire harness	Maximum switching voltage 110V AC/DC Maximum switching current 0.5A AC/DC Maximum switching power 10W AC/DC	DC 12V 5mA (R) 10 <sup>7</sup> times
	TMRS-4001	General wire harness		



● All specifications in this catalog and production status of products are subject to change without notice. Prior to the purchase, please contact TOKIN for updated product data.  
● Please request for a specification sheet for detailed product data prior to the purchase.  
● Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.

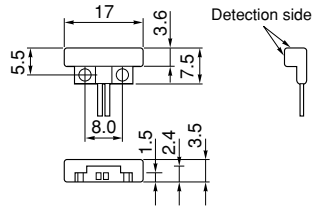
**Markings**

● Switch

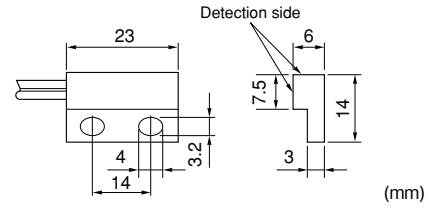


**Shape and Dimensions**

● TMRS-3020



● TMRS-4001



- All specifications in this catalog and production status of products are subject to change without notice. Prior to the purchase, please contact TOKIN for updated product data.
- Please request for a specification sheet for detailed product data prior to the purchase.
- Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.