# Sensors

Magnetic Sensors	—— 2
Geomagnetic Sensors	<u> </u>
Humidity Sensors	— 11
Pressure Sensors	— 16
Resistive Position Sensors	— 21

# **Magnetic Sensors**

# List of Varieties

Series	HGDE*/HGDF*	HGAR	HGDVST	HGPRDT	
Photo		- Report		C. C.	
Package specifications	MAP type SOT23 type	DFN type MSOP type TSSOP8 type TSSOP16 type	SOT23 type		
Type	Switching (Surface mount)	Angle (Surface mount)	Switching (Surface mount)	Encoder (Surface mount)	
Dimensions (mm)	1.3×0.9×0.525 2.9×2.8×1.1	1.8×1.05×0.65 2.95×4.0×1.1 3.0×4.9×1.1 5.0×6.4×1.1	2.9×2.8×1.1		
Function	Dual polarity/Dual output Dual polarity/Single output Single polarity/Single output	Sin/Cos output Sin/Cos output x2	Single polarity/Single output	2-phase alternating output Alternating output/ Direction of rotation output	
Operating magnetic field	1.3mT 2.0mT 3.0mT	10 to 120mT 20 to 60mT	Hoff typ. 1.4mT Hon typ. 2.0mT	Hoff: -0.8mT Typ Hon: +0.8mT Typ	
Drive voltage	Typ. 1.8V (1.6V min. to 3.6V max.) Typ. 5V (4.5V min. to 5.5V max.)	5.5V max.	3 to 30V	12V Typ. (3 to 30V)	
Current consumption	3μA Ave (at VDD=1.8V) Typ. 1.65mA (at VDD=5V)	-	2.5mA Max. (at VDD=12V)	1.6mA Typ. (at VDD=12V)	
Operating temperature range	-10°C to +85°C -40°C to +85°C	-40°C to +105°C -40°C to +150°C	-40°C to +140°C (at VDD=9V)		
Automotive	_	0	•	•	



<sup>•</sup> Indicates applicability to all products in the series, while  $\bigcirc$  indicates applicability to some products in the series.

# Switching Output Type

## **HGDE\*/HGDF\* Series**

#### High reliability with a compact, thin profile based on magnetic sensing device technology.



■Type:Switching (Surface mount)

Applications: Game: Virtual/augmented reality

Healthcare: Healthcare equipment, Nursing care equipment,

Analysis, test equipment

Home: Major home appliances

Audio\_TV: Visual, Audio, Pro audio, Cameras

Mobile: Notebooks, peripherals

#### ■ Product List

Products No.	Package specifications	Function	Operating magnetic field	Drive voltage	Current consumption	Size (mm)	Automotive	Drawing No.
HGDESM013A	MAP type	Single polarity/Single output	1.3mT	Typ. 1.8V (1.6V min. to 3.6V max.)	3μA Ave (at VDD=1.8V)	1.3×0.9×0.525	_	
HGDEPM013A	MAP type	Dual polarity/Single output	1.3mT	Typ. 1.8V (1.6V min. to 3.6V max.)	3μA Ave (at VDD=1.8V)	1.3×0.9×0.525	_	
HGDEDM013A	MAP type	Dual polarity/Dual output	1.3mT	Typ. 1.8V (1.6V min. to 3.6V max.)	3μA Ave (at VDD=1.8V)	1.3×0.9×0.525	_	1
HGDESM023A	MAP type	Single polarity/Single output	2.0mT	Typ. 1.8V (1.6V min. to 3.6V max.)	3μA Ave (at VDD=1.8V)	1.3×0.9×0.525	_	
HGDESM033A	MAP type	Single polarity/Single output	3.0mT	Typ. 1.8V (1.6V min. to 3.6V max.)	3μA Ave (at VDD=1.8V)	1.3×0.9×0.525	_	
HGDEST021B	SOT23 type	Single polarity/Single output	2.0mT	Typ. 1.8V (1.6V min. to 3.6V max.)	3μA Ave (at VDD=1.8V)	2.9×2.8×1.1	_	2
HGDEPT021B	SOT23 type	Dual polarity/Single output	2.0mT	Typ. 1.8V (1.6V min. to 3.6V max.)	3μA Ave (at VDD=1.8V)	2.9×2.8×1.1	_	_
HGDFST021B	SOT23 type	Single polarity/Single output	2.0mT	Typ. 5V (4.5V min. to 5.5V max.)	Typ. 1.65mA (at VDD=5V)	2.9×2.8×1.1	_	3
HGDFPT021B	SOT23 type	Dual polarity/Single output	2.0mT	Typ. 5V (4.5V min. to 5.5V max.)	Typ. 1.65mA (at VDD=5V)	2.9×2.8×1.1	_	J

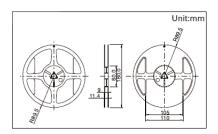
#### ⚠Note

- 1. This catalog shows only outline specifications. When using the products, please obtain formal specifications for supply.
- 2. Please place purchase orders per minimum order unit (integer).
- 3. High and low sensitivity types also available. Please contact us for details.
- 4. Some products can be provided halogen-free. Please contact us for details.

#### ■ Packing Specifications

#### Taping

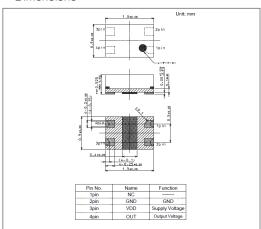
Numb	per of packages	(pcs.)	Tape width	Export package
1 reel	1 case / Japan	1 case / export packing	(mm)	measurements (mm)
3,000	3,000	45,000	8	210 x 210 x 230



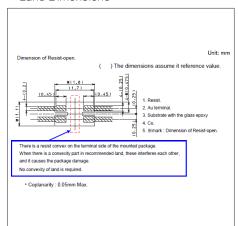
# Switching Output Type HGDE\*/HGDF\* Series

#### Drawing No.1

#### ■ Dimensions

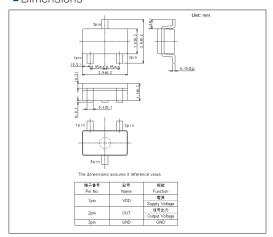


#### ■ Land Dimensions

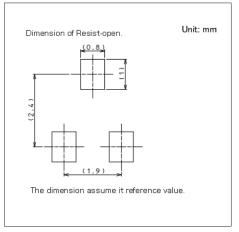


#### Drawing No.2

#### ■ Dimensions

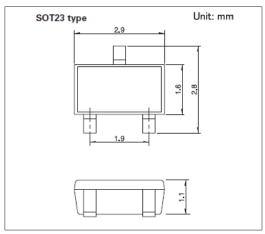


#### ■ Land Dimensions

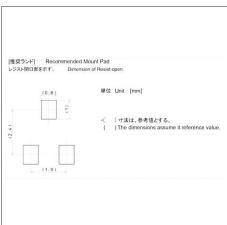


#### **Drawing No.3**

#### ■ Dimensions



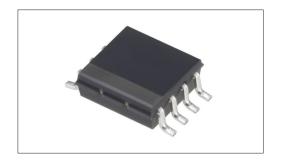
#### ■ Land Dimensions



# Analog Linear Output Type

## **HGAR Series**

#### High output suitable for high-resolution absolute angle and position detection.





\*Please check the product list for compatible products

■ Type: Angle (Surface mount)

Applications: Energy\_Industrial: Robots, drones, Industrial equipment, Converters

Game: Virtual/augmented reality

Healthcare: Healthcare equipment, Nursing care equipment,

Analysis, test equipment

Automotive: Navigation/audio systems, HVAC, Shifter, Steering

#### ■ Product List

Products No.	Products No. Package specifications Function  HGARPS011A TSSOP8 type Sin/Cos outp		Operating magnetic field	Drive voltage	Size (mm)	Automotive	Drawing No.
HGARPS011A			10 to 120mT	5.5V max.	3.0×4.9×1.1	•	1
HGARPS001A	TSSOP16 type	Sin/Cos output x2	10 to 120mT	5.5V max.	5.0×6.4×1.1	•	2
HGARAP001A	AP001A MSOP type Sin/Cos outpu		20 to 60mT	5.5V max.	2.95×4.0×1.1	•	3
HGARAN008A	DFN type	Sin/Cos output	20 to 60mT	5.5V max.	1.8×1.05×0.65	_	4

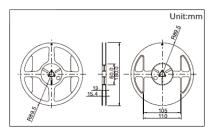
#### ⚠Note

- 1. This catalog shows only outline specifications. When using the products, please obtain formal specifications for supply.
- 2. Place your purchase order in N minimum package units (N: integer).

#### ■ Packing Specifications

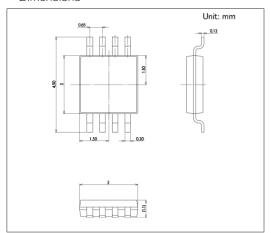
Taping

	Numb	per of packages	(pcs.)	Tape width	Export package	
Products No.	1 reel	1 case / Japan	1 case / export packing	(mm)	measurements (mm)	
HGARPS011A	3,000	3,000	21,000	12	378×381×276	
HGARPS001A	2,500	2,500	10,000	12	284×224×278	
HGARAP001A	3,000	3,000	3,000	12	210 x 210 x 230	
HGARAN008A	3,000	3,000	3,000	8	210 x 210 x 230	

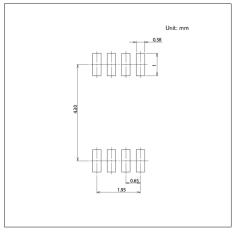


#### Drawing No.1

Dimensions



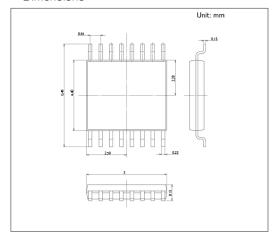
#### ■ Land Dimensions



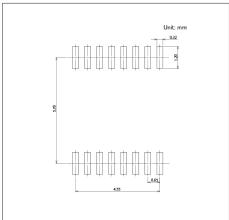
# Analog Linear Output Type **HGAR Series**

#### Drawing No.2

■ Dimensions

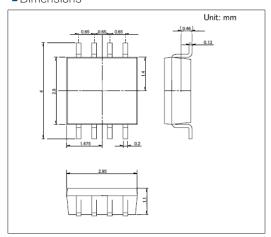


■ Land Dimensions

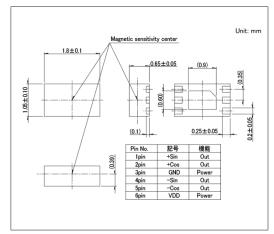


#### Drawing No.3

■ Dimensions



#### **Drawing No.4**



# Switching Output Type

## **HGDVST Series**

#### Magnetic switch with wide operating voltage range and compact package.





■ Type: Switching (Surface mount)

Applications: Game: Virtual/augmented reality

Healthcare: Healthcare equipment, Nursing care equipment,

Analysis, test equipment

Home: Major home appliances

Audio\_TV:Visual,Audio,Pro audio,Cameras

Automotive: Shifter, Navigation/audio systems, HVAC

#### ■ Product List

Products No.	Package specifications	Function	Operating Drive voltage magnetic field		Current consumption	Current consumption Size (mm)		Drawing No.
HGDVST022A	SOT23 type	Single polarity/Single output	Hon typ. 2.0mT Hoff typ. 1.4mT	3 to 30V	2.5mA Max. (at VDD=12V)	2.9×2.8×1.1	•	1

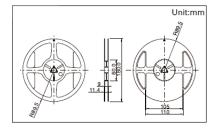
#### ⚠Note

- 1. This catalog shows only outline specifications. When using the products, please obtain formal specifications for supply.
- 2. Place your purchase order in N minimum package units (N: integer).

#### ■ Packing Specifications

#### Taping

Numb	Number of packages (pcs.)			Export package
1 reel	1 case / Japan	1 case / export packing	Tape width (mm)	measurements (mm)
3,000	3,000	3,000	8	210 x 210 x 230

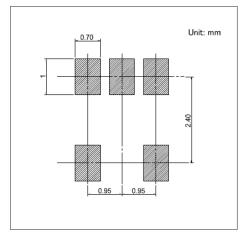


#### Drawing No.1

#### ■ Dimensions

# Unit: mm (0.95)

#### ■ Land Dimensions



## Incremental Encode Output Type

## **HGPRDT Series**

Incorporates dual-phase output in a small package, contributing to miniaturization and design flexibility of encoder systems.



Automotive

■Type:Encoder (Surface mount)

Applications: Automotive: Navigation/audio systems, HVAC, Tailgate, Power Windows, Steering

#### ■ Product List

Products No.	Package specifications	Function	Operating magnetic field	Drive voltage	Current consumption	Size (mm)	Automotive	Drawing No.
HGPRDT006A	SOT23 type	Alternating output/ Direction of rotation output	Hon: +0.8mT Typ Hoff: -0.8mT Typ	12V Typ. (3 to 30V)	1.6mA Typ. (at VDD=12V)	2.9×2.8×1.1	•	1
HGPRDT007A	SOT23 type	2-phase alternating output	Hon: +0.8mT Typ Hoff: -0.8mT Typ	12V Typ. (3 to 30V)	1.6mA Typ. (at VDD=12V)	2.9×2.8×1.1	•	

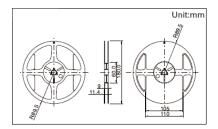
#### ⚠Note

- 1. This catalog shows only outline specifications. When using the products, please obtain formal specifications for supply.
- 2. Place your purchase order in N minimum package units (N: integer).

#### ■ Packing Specifications

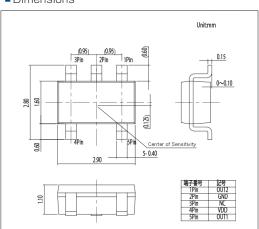
Taping

Numb	er of packages	(pcs.)	Tape width	Export package
1 reel	1 case / Japan	1 case / export packing	(mm)	measurements (mm)
3,000	3,000	45,000	8	210 x 210 x 230

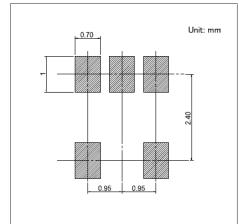


#### Drawing No.1

#### ■ Dimensions



#### ■ Land Dimensions



# **Geomagnetic Sensors**

# List of Varieties

Ser	ies	HSCD
Ph		
Ту	pe	Electric compass
Dimensio	1.6×1.6×0.65 8pin LGA	
Operating	AVDD: Drive voltage	+1.7 to +3.6V
voltage	DVDD_io: Drive voltage	+1.65 to AVDD
Operating m	agnetic field	±2.4mT
Current co	nsumption	3μA typ. (standby) 60μA typ. (active)
Operating tem	perature range	-40℃ to +85℃
Inter	I <sup>2</sup> C	
Autor	notive	_

# Geomagnetic Type **HSCD Series**

#### High azimuth accuracy and low current consumption.



■ Type: Electric compass

Applications: Mobile: Smartphones, tablets, Headsets, wearables Energy\_Industrial: Robots, drones, Industrial equipment, Converters

> Game:Home handheld consoles,Virtual/augmented reality Healthcare:Healthcare equipment,Nursing care equipment, Analysis, test equipment

Audio\_TV:Visual,Audio,Pro audio,Cameras

#### ■ Product List

Products No.	Measurement	Interface ——		Operating voltage		Size (mm)	Automotive	Drawing
Fibuucts No.	range	interrace	AVDD: Drive voltage	DVDD_io: Drive voltage	Current consumption	Size (IIIII)	Automotive	No.
HSCDTD008A	±2.4mT	Ι²C	+1.7 to +3.6V	+1.65 to AVDD	$60\mu A$ typ. (active) $3\mu A$ typ. (standby)	1.6×1.6×0.65 8pin LGA	_	1

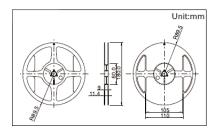


- 1. This catalog shows only outline specifications. When using the products, please obtain formal specifications for supply.
- 2. Place your purchase order in N minimum package units (N: integer).
- 3. Azimuth accuracy (margin of error) may be influenced by environmental conditions and other devices.

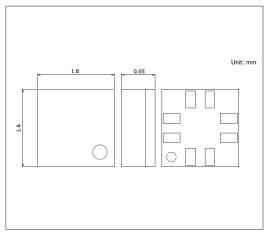
#### ■ Packing Specifications

#### Taping

Numb	er of packages	(pcs.)	Tape width	Export package
1 reel	1 case / Japan	1 case/ export packing	(mm)	measurements (mm)
3,000	3,000	45,000	8	210×210×230



#### Drawing No.1



# **Humidity Sensors**

# List of Varieties

Series	HSHCA (SMD)	HSHCA (Connector)		
Photo				
Type	Surface mount	Connector pre-mounted on PCB		
Mounting method	Surface mount	Connector		
Dimensions (mm)	2.0×2.0×0.88 2.5×2.2×1.0	24.0×16.0 30.0×13.0		
Humidity range	O to 10	00%RH		
Operating temperature range	-10°C to +85°C -20°C to +85°C	-20°C to +60°C -20°C to +85°C -25°C to +85°C		
Supply voltage	1.8V ±5% 2.2 to +3.6V	2.15 to 5.5V 2.5 to 5.5V 4.75 to 5.25V		
Automotive	-	_		

## **Humidity Sensor**

## **HSHCA (SMD) Series**

#### Accurately detects humidity up to 100% in a compact package.



#### ■Type:Surface mount

 ${\bf Applications:} {\bf Mobile:} {\bf Smartphones, tablets,} {\bf Headsets, wearables}$ 

Game: Virtual/augmented reality

Healthcare: Healthcare equipment, Nursing care equipment,

Analysis, test equipment

Home: Major home appliances, Office equipment

#### ■ Product List

	Products No.	Features	Humidity range	Operating temprature	Supply voltage	Size (mm)	Automotive	Drawing No.
Н	ISHCAA006A	Humidity sensor with analog output	0 to 100%RH	-10℃ to +85℃	2.2 to +3.6V	2.5×2.2×1.0	_	1
Н	ISHCAL001B	I <sup>2</sup> C digital output and temperature measurement function	0 to 100%RH	-20℃ to +85℃	1.8V ±5%	2.0×2.0×0.88	_	2

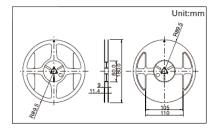
#### ⚠Note

- 1. This catalog shows only outline specifications. When using the products, please obtain formal specifications for supply.
- 2. Please place purchase orders per minimum order unit (integer).

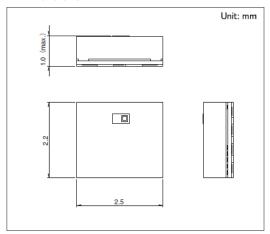
#### ■ Packing Specifications

#### Taping

Numb	er of packages	(pcs.)	Tape width	Export package
1 reel	1 case / Japan	1 case / export packing	(mm)	measurements (mm)
3,000	3,000	45,000	8	210×210×230

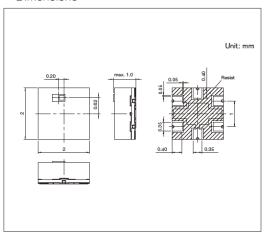


#### Drawing No.1



# Humidity Sensor HSHCA (SMD) Series

#### Drawing No.2



#### **Humidity Sensor**

# **HSHCA** (Connector) Series

Connector-type design equipped with a compact humidity sensor, easy to use in various locations.



■Type:Connector pre-mounted on PCB

Applications: Game: Virtual/augmented reality

Healthcare: Healthcare equipment, Nursing care equipment,

Analysis, test equipment

Home: Major home appliances, Office equipment

Energy\_Industrial:Industrial equipment

#### ■ Product List

Products No.	Products No. Features		Operating temprature	Supply voltage	Size (mm)	Automotive	Drawing No.
HSHCAA114A With moisture-resistant co		0 to 100%RH	-20℃ to +60℃	4.75 to 5.25V	30.0×13.0	_	1
HSHCAL101B	I <sup>2</sup> C digital output and temperature measurement function	0 to 100%RH	-20℃ to +85℃	2.5 to 5.5V	24.0×16.0	_	2
HSHCAD140A	I <sup>2</sup> C digital output and temperature measurement function	0 to 100%RH	-25℃ to +85℃	2.15 to 5.5V	24.0×16.0	_	3

#### ⚠Note

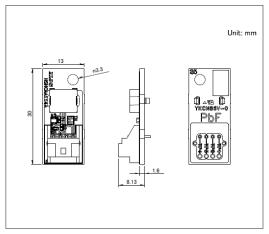
- 1. This catalog shows only outline specifications. When using the products, please obtain formal specifications for supply.
- 2. Please place purchase orders per minimum order unit (integer).

#### ■ Packing Specifications

#### Tray

Products No.	Number of pa	ackages(pcs.)	Export package measurements
Products No.	1 case / Japan	1 case / export packing	(mm)
HSHCAA114A	1,000	1,000	360×240×307
HSHCAL101B HSHCAD140A	1,000	1,000	360×240×252

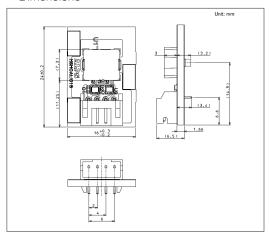
#### Drawing No.1



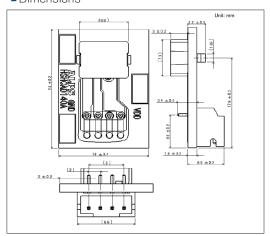
# Humidity Sensor HSHCA (Connector) Series

#### Drawing No.2

#### ■ Dimensions



#### Drawing No.3



## List of Varieties

Series	HSPPAR	HSPPAD (Water-proof)	HSFPAR		
Photo					
Type	Atmospheric pressure detection	Atmospheric pressure detection, Depth of water detection	Load detection		
Water-proof -		•	_		
Mounting method	Surface mount				
Dimensions (mm)	2.5×2.5×0.7	3.1×3.1×2.6	1.5×0.85×0.68 2.0×1.6×0.66		
Interface	Differential voltage	l <sup>2</sup> C	_		
Operating temperature range	-20°C to +85°C	-40°C to	o +85°C		
Supply voltage	-	1.7 to 3.6V	1.5 to 3.6V		
Automotive	_	_	_		



● Indicates applicability to all products in the series, while ○ indicates applicability to some products in the series.

#### **MEMS Pressure Sensor**

## **HSPPAR Series**

#### Compact type expanding application possibilities.



- Type: Atmospheric pressure detection
- Mounting method: Surface mount

Applications: Mobile: Smartphones, tablets, Headsets, wearables,

Notebooks, peripherals

Energy\_Industrial: Robots, drones, Industrial equipment,

Converters

Game: Virtual/augmented reality

Healthcare: Healthcare equipment, Nursing care equipment,

Analysis, test equipment

Home: Major home appliances

#### ■ Product List

Products No.	Function	Features	Interface	Pressure measurement range	Operating temperature range	Size (mm)	Automotive	Drawing No.
HSPPAR003D	Atmospheric pressure detection	Pressure sensor element contained within housing	Differential voltage	500 to 1100hPa	-20°C to +85°C	2.5×2.5×0.7	_	1

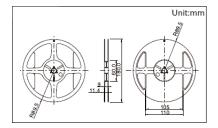
#### Note

- 1. This catalog shows only outline specifications. When using the products, please obtain formal specifications for supply.
- 2. Place your purchase order in N minimum package units (N: integer).

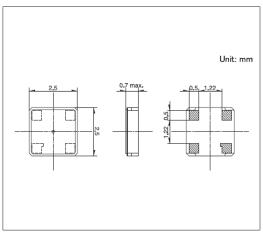
#### ■ Packing Specifications

#### Taping

Numb	er of packages	(pcs.)	Tape width	Export package measurements (mm)		
1 reel	1 case / Japan	1 case / export packing	(mm)			
3,000	3,000	45,000	8	210×210×230		



#### **Drawing No.1**



#### **MEMS Pressure Sensor**

# HSPPAD (Water-proof Type) Series

Water-proof piezoresistive design, suitable for water depth detection.



- Type: Atmospheric pressure detection, Depth of water detection
- Mounting method: Surface mount

Applications:Infrastructure:Smart meters

Healthcare: Healthcare equipment, Nursing care equipment,

Analysis, test equipment

Mobile: Headsets, wearables

#### ■ Product List

Products No.	Function	Features	Interface	Pressure measurement range	Operating temperature range	Size (mm)	Automotive	Drawing No.
HSPPAD143C	Atmospheric pressure detection, Depth of water detection (Water-proof)	Water-proof pressure sensor, output range 300 to 2000hPa	IsC	300 to 2000hPa	-40°C to +85°C	3.1×3.1×2.6	-	
HSPPAD147A	Atmospheric pressure detection, Depth of water detection (Water-proof)	Water-proof pressure sensor, output range 30 to 750kPa	IsC	30 to 750kPa	-40°C to +85°C	3.1×3.1×2.6	1	1
HSPPAD148A	Atmospheric pressure detection, Depth of water detection (Water-proof)	Water-proof pressure sensor, output range 30 to 3200kPa	IsC	30 to 3200kPa	-40°C to +85°C	3.1×3.1×2.6	_	

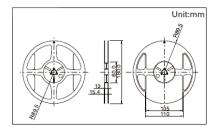
#### Note

- 1. This catalog shows only outline specifications. When using the products, please obtain formal specifications for supply.
- 2. Place your purchase order in N minimum package units (N: integer).

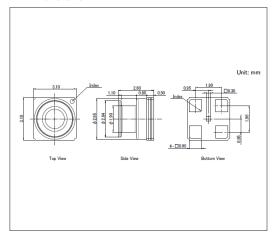
#### ■ Packing Specifications

#### Taping

Numb	er of packages	ages(pcs.) Export package				
1 reel	1 case / Japan	1 case / export packing	(mm)	measurements (mm)		
500	500	5,000	12	210×210×230		



#### **Drawing No.1**



#### Force Sensor

## **HSFPAR Series**

#### High-sensitivity load detection in a compact package.



- Type: Load detection
- Mounting method: Surface mount

Applications: Mobile: Smartphones, tablets, Headsets, wearables,

Notebooks, peripherals

Game: Virtual/augmented reality

Healthcare: Healthcare equipment, Nursing care equipment,

Analysis, test equipment

#### ■ Product List

Products No.	Function	Features	Force range	Operating temperature range	Supply voltage	Size (mm)	Automotive	Drawing No.
HSFPAR004A	Load detection	High-sensitivity load detection with a compact package	0 to 8N	-40℃ to +85℃	1.5 to 3.6V	2.0×1.6×0.66	_	1
HSFPAR007A	Load detection	High-sensitivity load detection with a compact package	0 to 8N	-40℃ to +85℃	1.5 to 3.6V	1.5×0.85×0.68	_	2

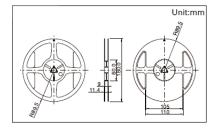
#### Note

- 1. This catalog shows only outline specifications. When using the products, please obtain formal specifications for supply.
- 2. Please place purchase orders for taping products per minimum order unit (1 reel or a case).

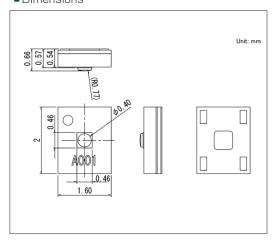
#### ■ Packing Specifications

#### Taping

Numb	per of packages	(pcs.)	Tape width	Export package	
1 reel	1 case / Japan	1 case/ export packing	(mm)	measurements (mm)	
3,000	3,000	45,000	8	210×210×230	

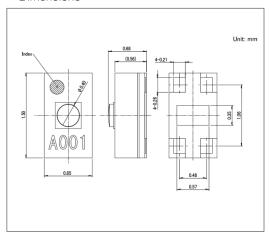


#### Drawing No.1



# Force Sensor HSFPAR Series

#### Drawing No.2



# **Resistive Position Sensors**

## List of Varieties

Ser	ies	RDC50	RDC90	RD6R1A	RDC10	RD7	
Pho	oto		•				
Control part	orientation	Horizontal Vertical	Vertical	-	Vertical	Horizontal Vertical	
Ту	pe		Rotary	Linear			
Termina	al style	Insertion Reflow	Reflow	Connector terminal	Inse	rtion	
Dimensions (mm)		11.0×3.9×13.5 11.0×12.0×2.2 11.0×12.0×2.75 11.0×12.0×3.5	11.0×13.7×3.2	20.6×32.5×3.6	6.5×17.3×2.1 6.9×23.5×2.9 6.9×31.5×2.9 6.9×41.5×2.9 6.9×56.5×3.0 6.9×96.7×3.45	9.0×15.8×3.7 10.0×5.0×15 10.0×5.0×19.0 10.0×15.0×4.5 10.0×18.0×5.0	
Total resistance		4.7kΩ 10kΩ	3.3kΩ 10kΩ	3.8kΩ	10kΩ	2.2kΩ 4.7kΩ 5kΩ 10kΩ	
Effective ele	ctrical range	150° 333.3°	80° 260°	320°	-		
Linearity gua	rantee range	140° 320°	60° 244°	310°	9.2mm 12mm 20mm 30mm 45mm 85mm	6mm 7mm 9mm	
Line	arity	±2%	±3%	±2%	±0.5% ±1%	±1%	
Operatir	ng force		-		0.25N max. 2N max.		
Rotation	al torque	2mN·n	n max.	100mN·m	_		
Electrical performance	Total resistance tolerance	±31	0%	±20%	±30%	±20%	
	Rated voltage		5V	DC		_	
	Cold		-40℃ 168h		-40°C 240h	-40℃ 96h	
Environmental test	Dry heat	120°C	168h	85°C 168h	80°C 240h 85°C 240h 90°C 240h	105℃ 96h	
	Damp heat	60°C, 90 to 9	95%RH 96h	80°C, 90 to 95%RH 96h	60°C, 90 to 95%RH 240h	40°C, 90 to 95%RH 96h	
Auton	notive	•	•	•	0	•	

#### ⚠Note

lacktriangle Indicates applicability to all products in the series, while  $\bigcirc$  indicates applicability to some products in the series.

Compact, high-precision, and high-heat-resistant design, suitable for all position detection needs.





#### ■ Type: Rotary

Applications: Energy\_Industrial: Robots, drones, Industrial equipment
Healthcare: Healthcare equipment, Nursing care equipment
Analysis, test equipment: Analysis, test equipment
Home: Major home appliances, Office equipment
Audio\_TV: Visual, Audio
Automotive: Navigation/audio systems, HVAC

#### ■ Product List

Products No.	Control part orientation	Mounting method	Linearity guarantee range	Linearity	Total resistance	Operating life (cycles)	Dimensions (mm)	Automotive	Drawing No.
RDC501051A	Vertical	Manual, DIP	320°	±2%	1 OkΩ	1,000,000	11.0×12.0×3.5	•	1
RDC501052A	Vertical	Manual, DIP	320°	±2%	1 OkΩ	1,000,000	11.0×12.0×3.5	•	2
RDC502012A	Horizontal	Manual, DIP	320°	±2%	1 OkΩ	1,000,000	11.0×3.9×13.5	•	3
RDC503051A	Vertical	Reflow	320°	±2%	1 OkΩ	1,000,000	11.0×12.0×2.75	•	4
RDC503052A	Vertical	Reflow	320°	±2%	1 OkΩ	1,000,000	11.0×12.0×2.75	•	5
RDC503051A	Vertical	Reflow	140°	±2%	4.7kΩ	1,000,000	11.0×12.0×2.75	•	4
RDC506018A	Vertical	Reflow (Low-profile)	320°	±2%	1 OkΩ	1,000,000	11.0×12.0×2.2	•	6
RDC506A03A	Vertical	Reflow (Low- profile, Long- life, Without case hole)	320°	±2%	10kΩ	2,000,000	11.0×12.0×2.2	•	7

#### ⚠Note

- 1. This catalog shows only outline specifications. When using the products, please obtain formal specifications for supply.
- 2. Please place purchase orders per minimum order unit (integer).

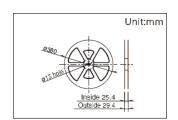
#### ■ Packing Specifications

Tray

Products No.	Number of pa	ackages(pcs.)	Export package measurements
Floudets No.	1 case / Japan	1 case / export packing	(mm)
RDC501051A RDC501052A	1,500 3,000		526×370×191
RDC502012A	1,600	1,600	370×280×92

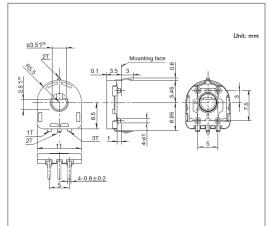
#### Taping

	Numb	er of packages	(pcs.)	Tape width	Export package
Products No.	1 reel	1 case / Japan	1 case / export packing	(mm)	measurements (mm)
RDC503051A RDC503052A RDC503051A	1,300	3,900	3,900	24	415×407×135
RDC506018A RDC506A03A	1,200	3,600	3,600	24	415×407×135

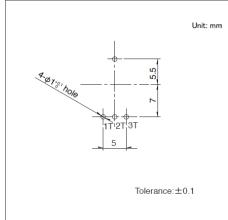


#### Drawing No.1

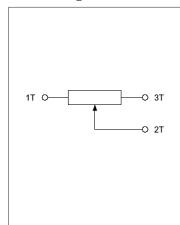
#### ■ Dimensions



#### ■ Mounting Hole Dimensions



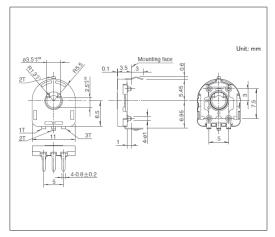
■ Circuit Diagram



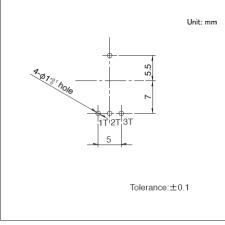
Viewed from mounting side

#### Drawing No.2

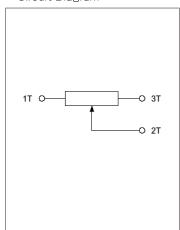
#### ■ Dimensions



#### ■ Mounting Hole Dimensions



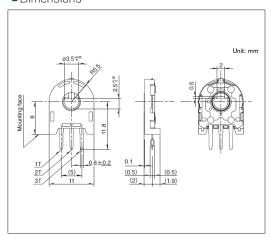
■ Circuit Diagram



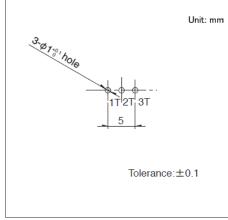
Viewed from mounting side

#### Drawing No.3

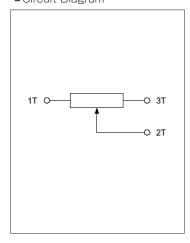
#### ■ Dimensions



#### ■ Mounting Hole Dimensions



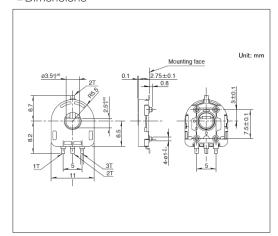
■ Circuit Diagram



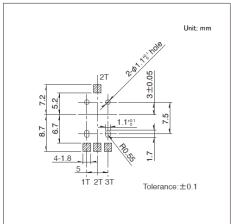
Viewed from mounting side

#### Drawing No.4

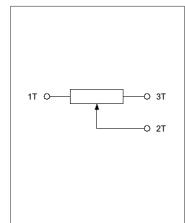
#### ■ Dimensions



#### ■ Mounting Hole Dimensions



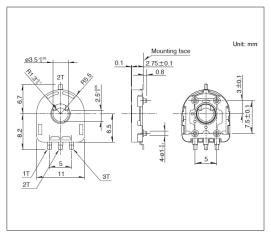
■ Circuit Diagram



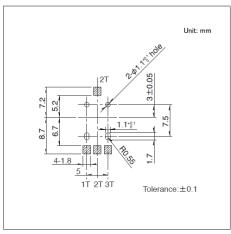
Viewed from mounting side

#### **Drawing No.5**

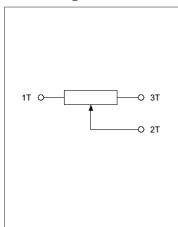
#### ■ Dimensions



#### ■ Mounting Hole Dimensions



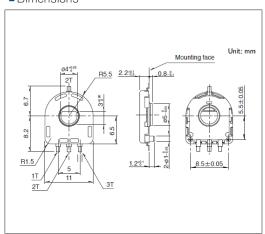
■ Circuit Diagram



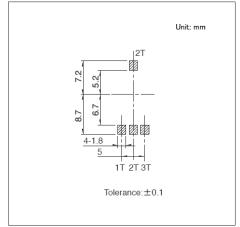
Viewed from mounting side

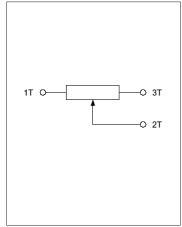
#### **Drawing No.6**

#### ■ Dimensions



#### ■ Land Dimensions

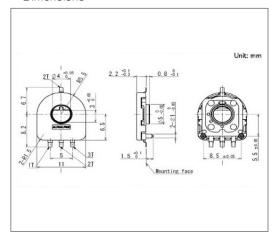




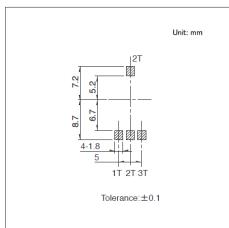
Viewed from mounting side

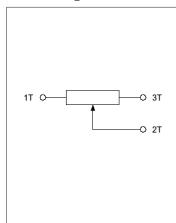
#### Drawing No.7

Dimensions



■ Land Dimensions





Viewed from mounting side

# Compact Long-life Rotary Type RDC90 Series

#### 10 million operation cycles in a compact design.





#### ■ Type: Rotary

Applications:Energy\_Industrial:Robots, drones,Industrial equipment
Home:Major home appliances,Office equipment
Navigation/audio systems, HVAC:Navigation/audio systems,
HVAC

#### ■ Product List

Products No.	Control part orientation	Mounting method	Linearity guarantee range	Linearity	Total resistance	Operating life (cycles)	Dimensions (mm)	Automotive	Drawing No.
RDC9010006	Vertical	Reflow (Long-life)	60°	±3%	3.3kΩ	10,000,000	11.0×13.7×3.2	•	1
RDC9010007	Vertical	Reflow (Long-life)	244°	±3%	1 OkΩ	10,000,000	11.0×13.7×3.2	•	ı

#### ⚠Note

- 1. This catalog shows only outline specifications. When using the products, please obtain formal specifications for supply.
- 2. Please place purchase orders per minimum order unit (integer).

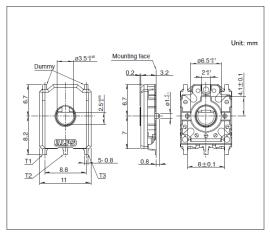
#### ■ Packing Specifications

Tray

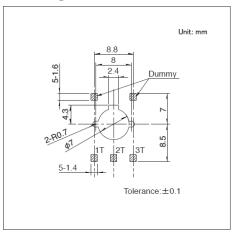
Number of pa	ckages(pcs.)	Export package measurements
1 case / Japan	1 case / export packing	(mm)
1,960	1,960	300×240×270

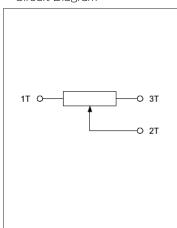
#### Drawing No.1

■ Dimensions



■ Mounting Hole Dimensions





Viewed from mounting side

# Rotary Type RD6R1A Series

#### Long-life sensor compliant with absolute linearity specifications.





■ Type: Rotary

Applications: Automotive: Navigation/audio systems, HVAC

#### ■ Product List

Products No.	Mounting method	Linearity guarantee range	Linearity	Total resistance	Operating life (cycles)	Dimensions (mm)	Automotive	Drawing No.
RD6R1A0008	Connector type	310°	±2%	3.8kΩ	500,000	20.6×32.5×3.6	•	1



- 1. This catalog shows only outline specifications. When using the products, please obtain formal specifications for supply.
- 2. Please place purchase orders per minimum order unit (integer).

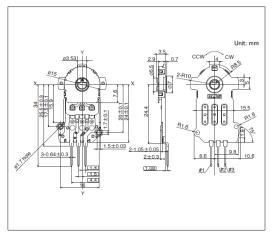
#### ■ Packing Specifications

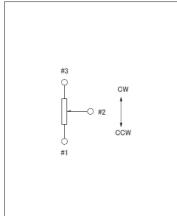
Tray

Number of pa	ckages(pcs.)	Export package measurements
1 case / Japan	1 case / export packing	(mm)
1,800	1,800	540×360×250

#### Drawing No.1

#### ■ Dimensions





# Linear Type RDC10 Series

#### High-precision (±0.5% relative linearity) space-saving design, contributing to set miniaturization.





\*Please check the product list for compatible products

■Type:Linear

Applications: Energy\_Industrial: Robots, drones

Game: Home handheld consoles, Virtual/augmented reality Healthcare: Healthcare equipment, Analysis, test equipment Nursing care equipment: Nursing care equipment Home: Major home appliances, Office equipment Automotive: Navigation/audio systems, HVAC

#### ■ Product List

Products No.	Control part orientation	Travel (mm)	Linearity guarantee range	Linearity	Total resistance	Operating life (cycles)	Dimensions (mm)	Automotive	Drawing No.
RDC1010A12	Vertical	10	9.2mm	±0.5%	10kΩ	50,000	6.5×17.3×2.1	_	1
RDC1014A09	Vertical	14	12mm	±0.5%	10kΩ	200,000	6.9×23.5×2.9	•	
RDC1022A05	Vertical	22	20mm	±0.5%	10kΩ	200,000	6.9×31.5×2.9	•	2
RDC10320RB	Vertical	32	30mm	±0.5%	10kΩ	200,000	6.9×41.5×2.9	•	۷
RDC1047A03	Vertical	47	45mm	±0.5%	1 OkΩ	200,000	6.9×56.5×3.0	•	
RDC1087A01	Vertical	87	85mm	±1%	10kΩ	100,000	6.9×96.7×3.45	_	3



- 1. This catalog shows only outline specifications. When using the products, please obtain formal specifications for supply.
- 2. Please place purchase orders per minimum order unit (integer).
- 3. RDC1014, RDC1022, RDC1032 and RDC1047 Series are available in different varieties to product line.

#### ■ Packing Specifications

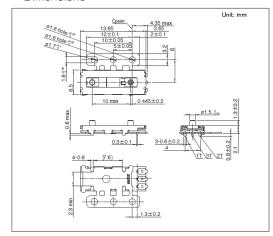
Tray

Products No.	Number of pa	ckages(pcs.)	Export package measurements
Froducts No.	1 case / Japan	1 case / export packing	(mm)
RDC1010A12	980	2,940	360×270×230
RDC1014A09	2,400	4,800	508×374×272
RDC1022A05	2,100	4,200	508×374×302
RDC10320RB	900	1,800	540×360×205
RDC1047A03	1,000	2,000	508×374×272
RDC1087A01	540	540	540×360×130

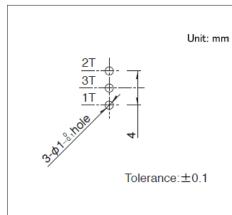
# Linear Type RDC10 Series

#### Drawing No.1

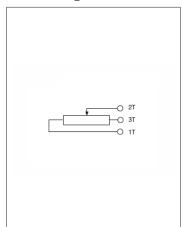
■ Dimensions



■ Mounting Hole Dimensions

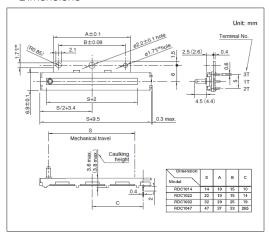


■ Circuit Diagram

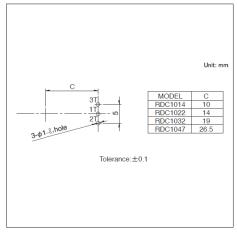


#### Drawing No.2

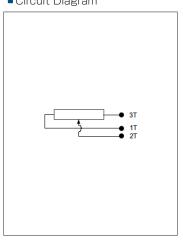
■ Dimensions



■ Mounting Hole Dimensions

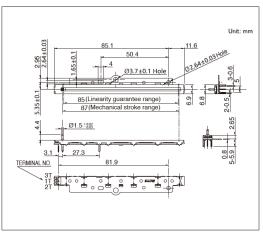


■ Circuit Diagram

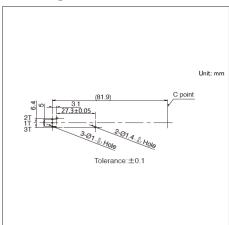


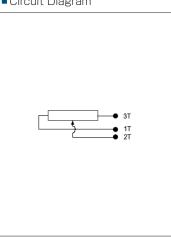
#### **Drawing No.3**

■ Dimensions



■ Mounting Hole Dimensions





Resistive Position Sensors

# Linear Type (Exclusively Used to Detect the Angle of Vehicle Head Lights) RD7 Series

#### High-precision, space-saving design dedicated to headlight angle detection.



Automotive

■ Type: Linear

Applications: Automotive: Headlights

#### ■ Product List

= 1 Toddot Elot									
Products No.	Control part orientation	Travel (mm)	Linearity guarantee range	Linearity	Total resistance	Operating life (cycles)	Dimensions (mm)	Automotive	Drawing No.
RD708A029A	Horizontal	8	6mm	±1%	4.7kΩ	100,000	10.0×5.0×15	•	1
RD7081015A	Vertical	8	7mm	±1%	5kΩ	100,000	10.0×15.0×4.5	•	2
RD7091008A	Vertical	9	7mm	±1%	5kΩ	100,000	9.0×15.8×3.7	•	3
RD712A028A	Horizontal	12	9mm	±1%	2.2kΩ	100,000	10.0×5.0×19.0	•	4
RD7121008A	Vertical	12	9mm	±1%	10kΩ	100,000	10.0×18.0×5.0	•	5

#### ⚠Note

- 1. This catalog shows only outline specifications. When using the products, please obtain formal specifications for supply.
- 2. For Linearity, various specifications will be available, depending on the applications. Please consult with us when lacing your orders.
- 3. Please place purchase orders per minimum order unit (integer).

#### ■ Packing Specifications

#### Tray

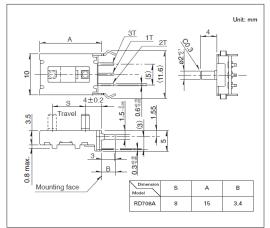
Products No.	Number of pa	ackages(pcs.)	Export package measurements (mm)	
Flouucts No.	1 case / Japan	1 case / export packing		
RD708A029A RD712A028A	2,000	4,000	527×363×215	
RD7081015A	1,500	3,000	507×363×216	
RD7091008A	1,800	3,600	508×364×192	
RD7121008A	1,800	3,600	507×363×216	

Linear Type (Exclusively Used to Detect the Angle of Vehicle Head Lights)

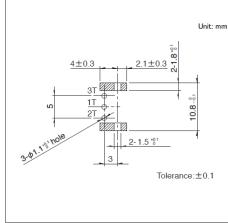
#### **RD7 Series**

#### Drawing No.1

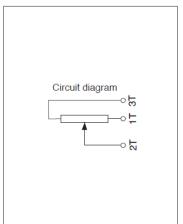
■ Dimensions



■ Mounting Hole Dimensions



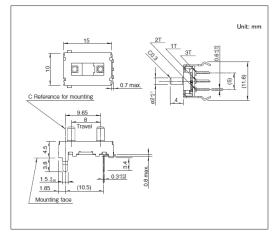
■ Circuit Diagram



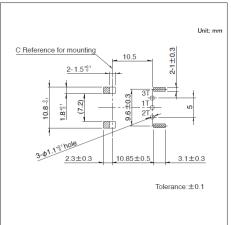
Viewed from mounting side Do not wire the shaded area

#### Drawing No.2

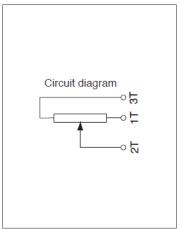
■ Dimensions



■ Mounting Hole Dimensions



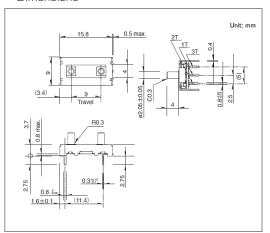
■ Circuit Diagram



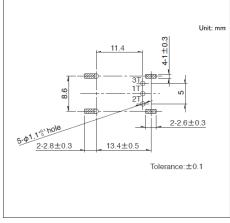
Viewed from mounting side Do not wire the shaded area

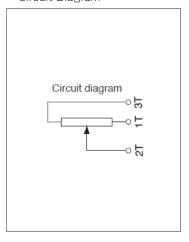
#### Drawing No.3

■ Dimensions



■ Mounting Hole Dimensions





Viewed from mounting side Do not wire the shaded area

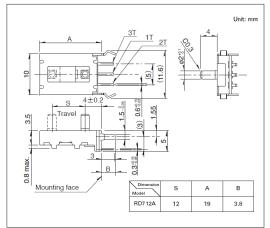


Linear Type (Exclusively Used to Detect the Angle of Vehicle Head Lights)

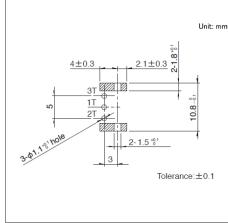
#### **RD7 Series**

#### Drawing No.4

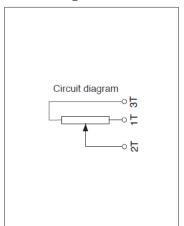
■ Dimensions



■ Mounting Hole Dimensions



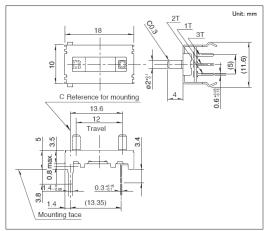
■ Circuit Diagram



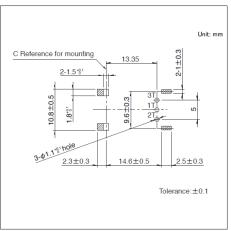
Viewed from mounting side Do not wire the shaded area

#### Drawing No.5

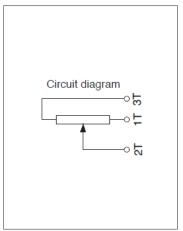
■ Dimensions



■ Mounting Hole Dimensions



■ Circuit Diagram



Viewed from mounting side Do not wire the shaded area

## **Resistive Position Sensors / Soldering Conditions**

#### ■ Reference for Manual Soldering

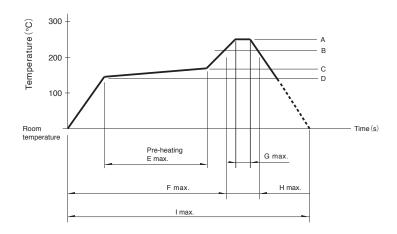
Series	Tip temperature	Soldering time		
RDC50, RDC90	350±5℃	3 <sup>+1</sup> <sub>0</sub> s		
RDC10, RD7	350°C max.	3s max.		

#### ■ Reference for Dip Soldering

	Prehe	eating	Dip so		
Series	Soldering surface temperature	Heating time	Soldering temperature	Soldering time	No. of solders
RDC501, RDC502	100 to 150℃	1 min. max.	260±5℃	10±1s	1 time
RD7	100°C max.	1 min. max.	260°C max.	5s max.	1 time

#### ■ Example of Reflow Soldering Condition

- 1. Cleaning sensors should not be attempted.
- 2. Type of solder to be used Use cream solder that contains 10 to 15 wt % flux.
- 3. Number of solder applications apply solder only once
- 4. Recommended reflow conditions



Series	А	В	С	D	E	F	G	н	1	No. of reflows
RDC503 RDC506	250℃	230℃	180℃	150℃	2min.	_	5s	40s	4min.	1 time
RDC90	255℃	230℃	_	_	_	2min.	10s	1 min.	4min.	1 time

#### ⚠Note

- 1. When using an infrared reflow oven, solder may not always be applied as intended.

  Be sure to use a hot air reflow oven or a type that uses infrared rays in combination with hot air.
- 2. The temperatures given above are the maximum temperatures at the terminals of the sensor when employing a hot air reflow method. The temperature of the PC board and the surface temperature of the sensor may vary greatly depending on the PC board material, its size and thickness. Ensure that the surface temperature of the sensor does not rise to 250°C or greater.
- 3. Conditions vary to some extent depending on the type of reflow bath used. Be sure to give due consideration to this prior to use.

#### **Resistive Position Sensors / Cautions**

#### Use of Chemicals

The sensors make use of synthetic resins, therefore avoid use in environments where there is a strong presence of gases from chemicals such as ammonia, amines, alkaline aqueous solutions, aromatic hydrocarbons, ketones, esters and halogenated hydrocarbons.

#### Measures to Deal with Noise Problems

While data is being received from the sensor, on rare occasions, penetrating external noise may cause interference with the outputs.

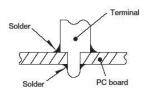
To minimize the probability of this phenomenon pay attention to the following when you program the relevant software

ex)

- · Receiving of data should always be repeated a number of times to ensure that you obtain a mean value.
- · Have the system determine when/how to invalidate any data received in error.
- · When doubt occurs let the system receive the subject data again and reconfirm that you have eliminated the anomaly.

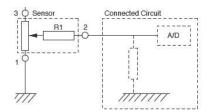
#### Soldering

Avoid wiring and soldering that causes the solder to seep through to the top of the PC board (as illustrated). This can lead to a contact failure in the terminal section. If solder seepage is unavoidable, please consult with us.



#### Connection Impedance

Resistive position sensors are constructed in a way that contact resistance (R1 below) occurs within the sensor. To reduce the effect of contact resistance (R1), set the impedance within the circuit connected to the output terminal to greater than 1M  $\Omega$ .



#### **Dew Condensation**

Avoid using the sensor where dew or water vapor might be caused to condense on the surface of the resistor - deterioration of insulation or shorting may occur.

#### Storage

- 1. Store the products as delivered, at a normal temperature and humidity, without direct sunshine and corrosive gas ambient. Use them at an earliest possible timing, not later than six months upon receipt.
- 2. After breaking the seal, keep the products in a plastic bag to shut out ambient air, store them in the same environment as above, and use them up as soon as possible.
- 3. Do not stack too many switches.