

# SENSORS

## PIEZOELECTRIC VIBRATING GYROSCOPE

### ENV-05D SERIES



Murata Electronics' new rotational angular velocity sensor combines Murata's equilateral triangle prism vibrating unit with a revolutionary mounting technology for the piezoelectric ceramic element that produces 100 times the precision of other vibration gyroscopes.

#### APPLICATIONS

- Navigation systems
- Platform positioning and stabilizing
- Car electronics: accident history recorder, dead reckoning, theft

retrieval, unmanned vehicles

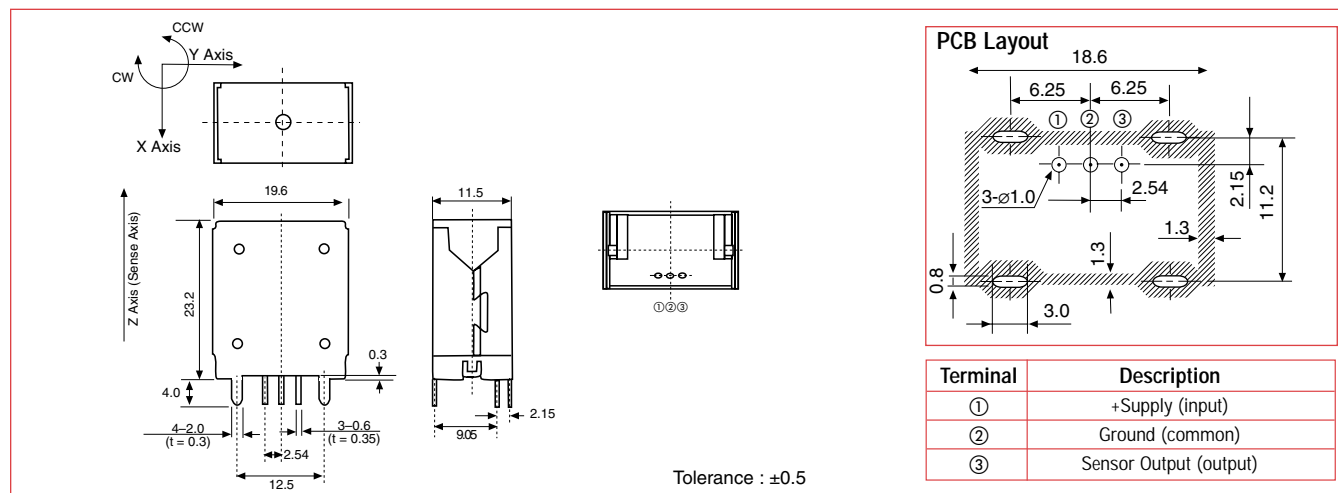
- Satellite antenna positioning
- Office automation
- Factory automation
- Mayday system
- Construction equipment

Note: This product is not approved for military and avionics.

#### BENEFITS

- Low price
- Low drift
- Low noise
- Compact
- Fast response
- Precision detection

#### DIMENSIONS: mm



#### SPECIFICATIONS

Characteristics	Symbol	Condition	Min.	Std.	Max.	Unit
Supply voltage	Vcc		+4.5	+5.0	+5.5	VDC
Current consumption	Icc	at Vcc = 5.0VDC	—	—	15	mA
Maximum angular velocity	Omax.		-60	—	+60	deg/s
Output	Vo	Angular velocity = 0 at -30 ~ 80°C	2.100	2.500	2.900	VDC
Scale factor	Sv	at -10 ~ 60°C	23.0	25.0	27.0	mV/deg/s
		at -30 ~ 80°C	21.7	25.0	28.3	
Asymmetry CW & CCW			—	—	3	deg/s
Temperature coefficient		-10 ~ 60°C	—	—	±5	%FS
Scale factor		-30 ~ 80°C	—	—	±10	
Drift		-30 ~ 80°C	—	—	9	deg/s
Start up		Measure Vo after 5 seconds	—	—	±1	deg/s/10 min.
Noise level		12kHz noise	—	—	10	mVp-p
Linearity		in the maximum angular velocity range	—	—	0.5	%FS
Response		Phase delay: 90deg	—	10	—	Hz
Dependence on Supply Voltage			0.8	—	1.2	
Output			0.8	—	1.2	
Scale factor			—	—	—	
Operating Temperature Range	Topr		-30	—	80	°C
Storage Temperature Range	Tstg		-40	—	85	°C
Weight			—	—	20	g
Dimension			11.5(D) x 19.6(W) x 23.2(H) mm			

Unless otherwise specified, ambient temperature TA = 25 ± 5°C, Vcc = 5.0VDC. Use a sensor output load resistance of 100k ohm or more.

#### OLD PART NUMBERING SYSTEM

ENV-05 Model Name	F	XX	643	MURATA	JAPAN
FB: with wires pigtail	SUFFIX	LOT	MANUFACTURING	COUNTRY	
F: PCB mount	52=Standard	NUMBER	NUMBER	COMPANY OF ORIGIN	

#### NEW PART NUMBERING SYSTEM

EN	C-03JA	-02	□
PRODUCT ID	TYPE	INDIVIDUAL SPECIFICATION CODE	PACKAGING

\* Global Part Number shows only an example which might be different from actual part number.  
 \* Any other definitions than "Product ID" might have different digit number from actual Global Part Number.

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# SENSORS

## PIEZOELECTRIC VIBRATING GYROSCOPE

### ENC SERIES



This angular velocity sensor employs the principle that a Coriolis force results if an angular velocity is applied to a vibrating object. Murata's unique ceramic bimorph vibrating unit is used as the sensor element unit, thereby enabling piezoelectric ceramics to be used for both excitation and detection. The use of this unit simplifies equipment structure and circuit configuration, thus making it possible to provide outstanding performance.

This sensor can be used for positional control and posture control of a moving object requiring high-precision measurements.

#### FEATURES

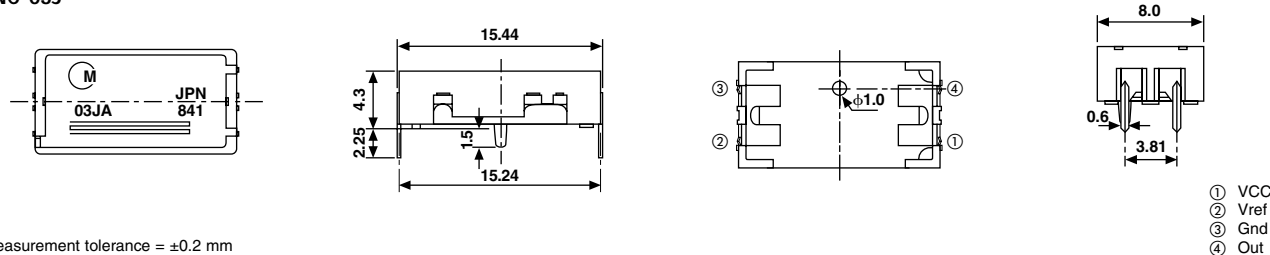
- Ultra small and ultra lightweight
- Quick response
- Low driving voltage, low current consumption
- Reliable feature achieved by a built in AGC circuit

#### APPLICATIONS

- Detecting hand movement involved in video and still camera
- Detecting vibrations in various vibration free table and isolators
- Detecting the own movement

#### DIMENSIONS: mm

ENC-03J



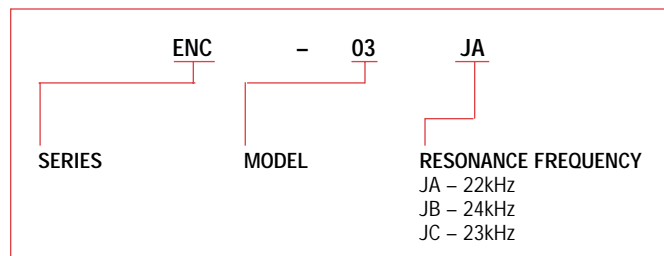
#### SPECIFICATIONS

Characteristics	Symbol	Condition	Min.	Std.	Max.	Unit
Supply voltage	Vcc		+2.7	+3.0	+5.5	VDC
Current consumption	I <sub>sup</sub>	at Vcc = +3.0V	2.5	3.2	4.5	mA
Comparative voltage	Vref	at -5 ~ +75°C	+1.25	+1.35	+1.45	VDC
Static output (Bias)	V <sub>0</sub>	angular velocity = 0 at -5 ~ +75°C	Vref - 0.55	Vref	Vref + 0.55	VDC
Angular velocity range	$\omega$ max.			+300		deg/s
Scale factor	Sv		-20%	0.67	+20%	mV/deg/s
Temperature coefficient of Scale factor		Reference: Ta at -5 ~ +75°C	-20	—	+10	%FS
Resonance frequency						
– version ENC-03JA	f <sub>a</sub>		—	22	—	kHz
– version ENC-03JB	f <sub>b</sub>		—	24	—	kHz
– version ENC-03JC	f <sub>c</sub>		—	23	—	kHz
Resonance frequency disparity	f <sub>a</sub> – f <sub>b</sub>	at -5 ~ +75°C	500	—	—	kHz
Linearity		in the maximum angular velocity range	-5	—	+5	%FS
Response		Phase delay: 90deg		DC p 50		Hz
Operating Temperature Range	Topr		-5	—	+75	°C
Storage Temperature Range	Tstg		-30	—	+85	°C
Weight			—	—	1.0	g

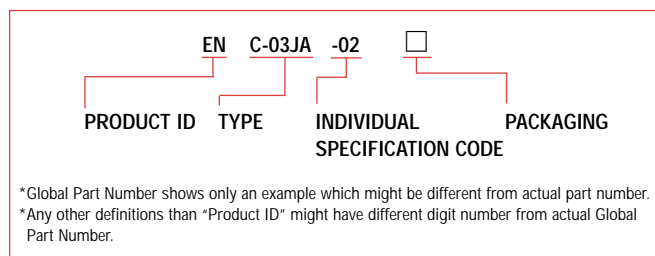
All typical values.

Unless otherwise specified, ambient temperature Ta = 25  $\pm$  5°C, Vcc = 3.0VDC. Use a sensor output load resistance of 50kV or more. Comparative voltage (Vref) is grounded with condenser of 4.7mF.

#### OLD PART NUMBERING SYSTEM



#### NEW PART NUMBERING SYSTEM



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This series of piezo shock detectors allows internal mounting due to its size.

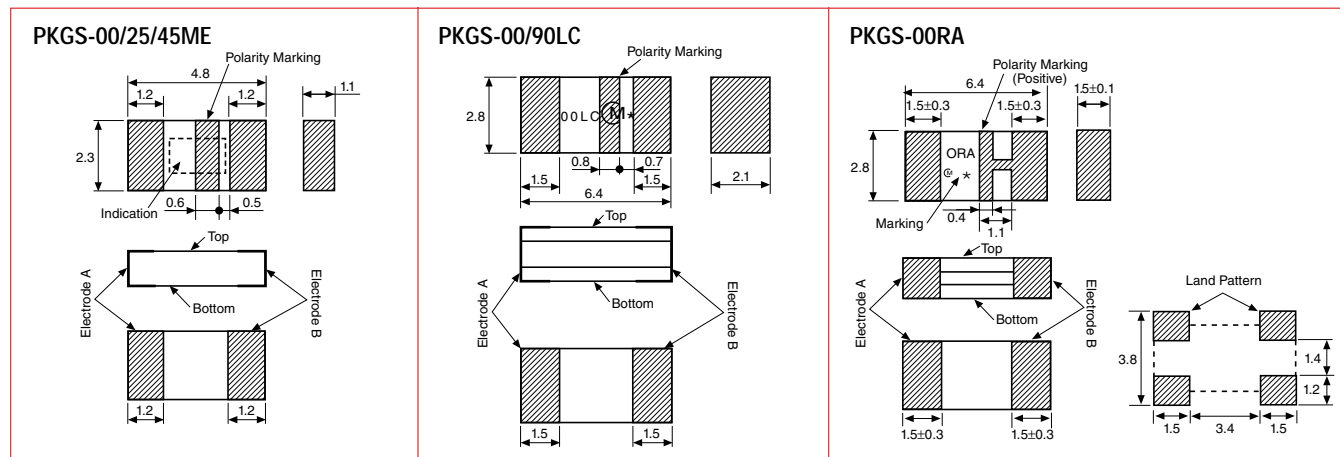
#### FEATURES

- Small size, low-profile, high-sensitivity and excellent shock resistance
- Reflow solderable SMD type
- Possible to be supplied in a tape and reel
- Wide measurement frequency band due to high resonant frequency and large capacitance

#### APPLICATIONS

- Detection of shock to protect small HDD from damaging the data
- Shock detection and protection of home appliances, audio-visual equipment, industrial equipment, etc.
- Burglar alarm systems
- Other general applications requiring measurement of acceleration

#### DIMENSIONS: mm

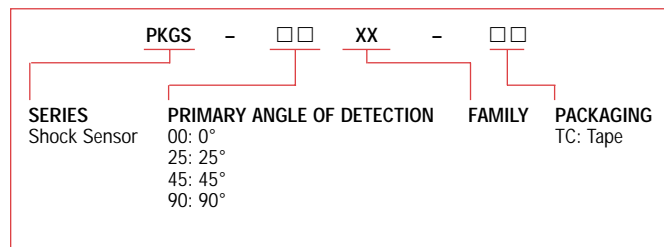


#### SPECIFICATIONS

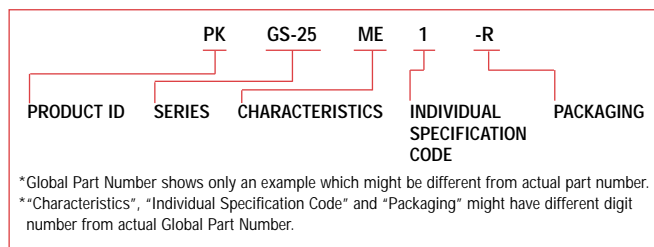
Part Number	Primary Axis Inclined Angle	Voltage Sensitivity (Primary Axis Direction)	Capacitance	Insulation Resistance	Resonant Frequency	Non-Linearity	Shock Resistance	Operating and Storage Temperature Range
PKGS-00ME	0°	0.85mV/G ± 15%	160pF ± 20%	500MΩ min.	30kHz (typ.)	1% (typ.)	1500G	-40 ~ +85°C
PKGS-25ME	25°	0.85mV/G ± 15%	170pF ± 20%		20kHz (typ.)			
PKGS-45ME	45°	0.89mV/G ± 15%	210pF ± 20%		30kHz (typ.)			
PKGS-00LC	0°	2.10mV/G ± 10%	420pF ± 20%					
PKGS-90LC	90°	2.10mV/G ± 10%	420pF ± 20%					
PKGS-00RA	0°	0.77mV/G ± 15%	760pF ± 20%					-40 ~ +125°C

Note: 1G = 9.8m/s<sup>2</sup>

#### OLD PART NUMBERING SYSTEM



#### NEW PART NUMBERING SYSTEM

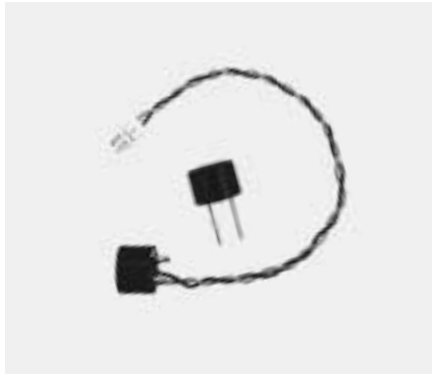


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# SENSORS

## ULTRASONIC SENSORS

### MA40 SERIES



#### MA40 SERIES OPEN TYPE FEATURES

- Small size: 10 and 16
- Combined types
- High SPL types
- Low voltage/current types

#### APPLICATIONS

- Burglar alarms
- Object detection devices
- Distance measurement devices

#### MA40E SERIES WATERPROOF TYPE FEATURES 40kHz Sensors

- Waterproof
- Many types leaded/not
- Short ringing time
- Directive models

#### APPLICATIONS

- Rear backing sonar
- Corner sonar

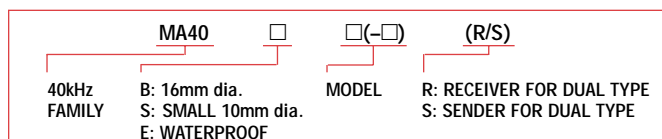
#### DIMENSIONS: mm

OPEN	MA40S4R/S 	MA40B8R/S 	MA40S5 	MA40B7 
	MA40E7S-1 	MA40MF14-1B 	MA40E7R/S 	MA40E8-2 

#### SPECIFICATIONS

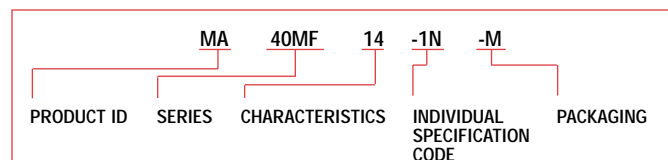
Part Number	MA40E7R/S	MA40S4R/S	MA40B8R/S	MA40B7	MA40E7S-1	MA40S5	MA40E8-2	MA40MF14-1B
Construction	Waterproof type	Open structure type			Waterproof type	Open structure type	Waterproof type	
Using Method	Receiver and Transmitter (Dual use) type				Combined use type			
Nominal Frequency (kHz)	40							
Overall Sensitivity (dB)	—	—	—	-45 <sup>+4</sup> <sub>-5</sub>	—	-50 ± 4	—	—
Sensitivity (dB)	-74 min.	-63 ± 3	-63 ± 3	—	-72 min.	—	-85 min.	-87 min.
Sound Pressure (dB)	106 min.	120 ± 3	120 ± 3	—	106 min.	—	106 min.	103 min.
Directivity (deg)	100	80	50	44	75	70	75	110 x 50
Capacitance (pF)	2200 ± 20%	2550 ± 20%	2000 ± 20%	2000 ± 20%	2200 ± 20%	2550 ± 20%	2800 ± 20%	4000 ± 20%
Operating Temp. Range(°C)	-30 ~ +85	-40 ~ +85	-30 ~ +85			-40 ~ +85	-30 ~ +85	
Detectable Range (m)	0.2 ~ 3	0.2 ~ 4	0.2 ~ 6	0.2 ~ 4	0.2 ~ 3	0.2 ~ 2.5	0.2 ~ 1.5	0.2 ~ 1.5
Resolution (mm)	9							
Dimension (mm)	18φ x 12h	9.9φ x 7.1h	16φ x 12h	16φ x 12h	9.9φ x 7.1h		14φ x 8h	
Weight (g)	4.5	0.7	2.0	2.0	4.5	0.7	2.4	2.4
Allowable Input Voltage (Vp-p) (Rectangular wave)	85 (40kHz) Pulse width 0.4ms Interval 100ms	20 (40kHz) Continuous signal	40 (40kHz) Continuous signal	100 (40kHz) Pulse width 0.4ms Interval 100ms	100Vpp Pulse width 0.4ms Interval 100ms	60 (40kHz) Pulse width 0.4ms Interval 100ms	160 (40kHz) Pulse width 0.8ms Interval 60ms	160Vpp Pulse width 0.8ms Interval 60ms
Packaging Quantity (Pcs.)	90	540	150	150	90	540	80	150

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# SENSORS

## PYROELECTRIC INFRARED SENSORS

### IRA SERIES



Our pyroelectric infrared sensors exhibit high sensitivity and reliable performance made possible by Murata's ceramic technology.

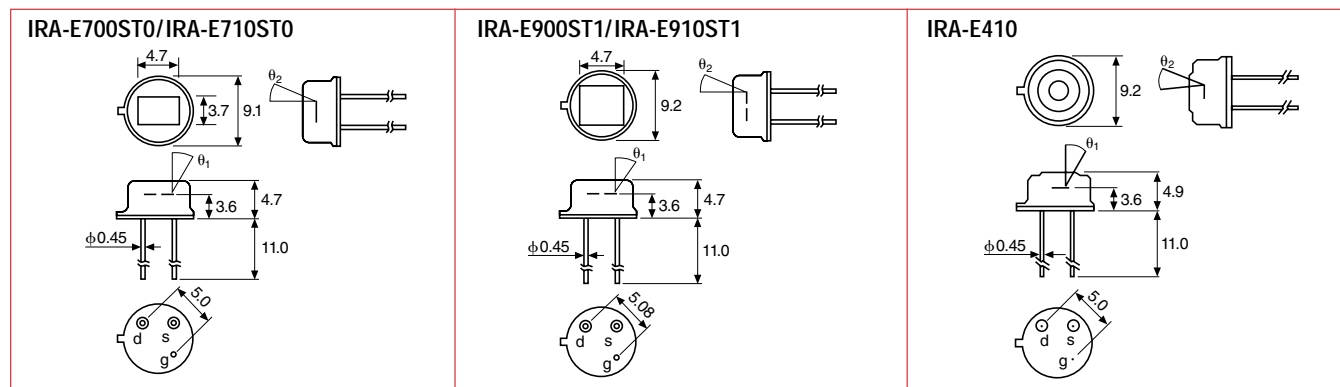
#### FEATURES

- Precisely detects infrared emissions from the human body
- Designed to prevent malfunction due to external light
- E710 and 910 with immunity to RFI
- New gold plated pins

#### APPLICATIONS

- Burglar alarms
- Human detection devices
- Switches
- Lighting appliances
- Household appliances
- Toys
- Measure temperature
- Flame detection

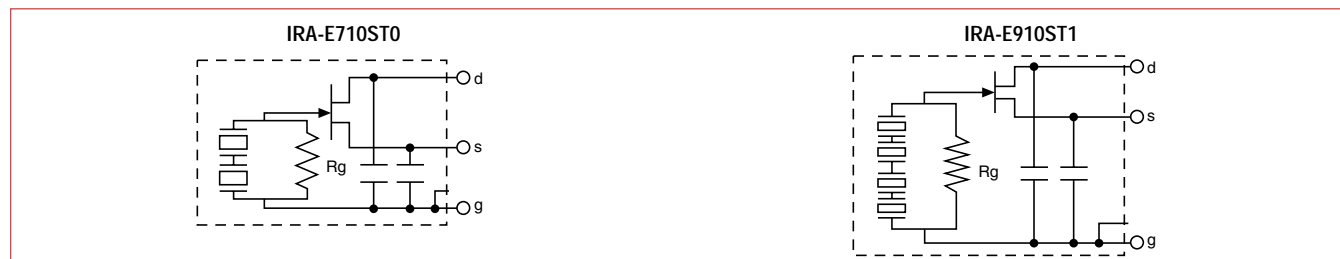
#### DIMENSIONS: mm



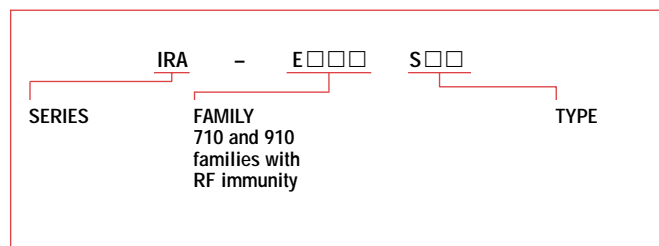
#### SPECIFICATIONS

IRA Family	Part Number	Element Type	Optical Wavelength Range	Field of View	Operating Temperature Range	Applications
E400	IRA-E410QW1	Single	4.3μm band pass	17° x 17°	-25 ~ +55°C	Flame detection
	IRA-E410ST1		5 ~ 20μm high pass			Burglar alarms, light controls
	IRA-E410S1		1 ~ 20μm			Temperature measurement
E700	IRA-E700ST0	Dual	5 ~ 14μm long pass	45° x 45°	-40 ~ +70°C	Burglar alarms, appliances, Burglar alarms with RFI immunity
	IRA-E710ST0					
E900	IRA-E900ST1	Quad	5 ~ 14μm	41° x 41°	-25 ~ +55°C	Burglar alarms, light control appliances with RFI immunity
	IRA-E910ST1					

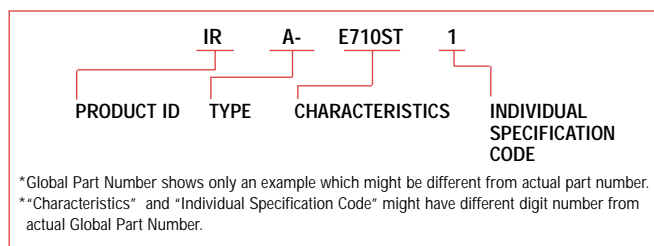
#### DIAGRAM



#### OLD PART NUMBERING SYSTEM



#### NEW PART NUMBERING SYSTEM



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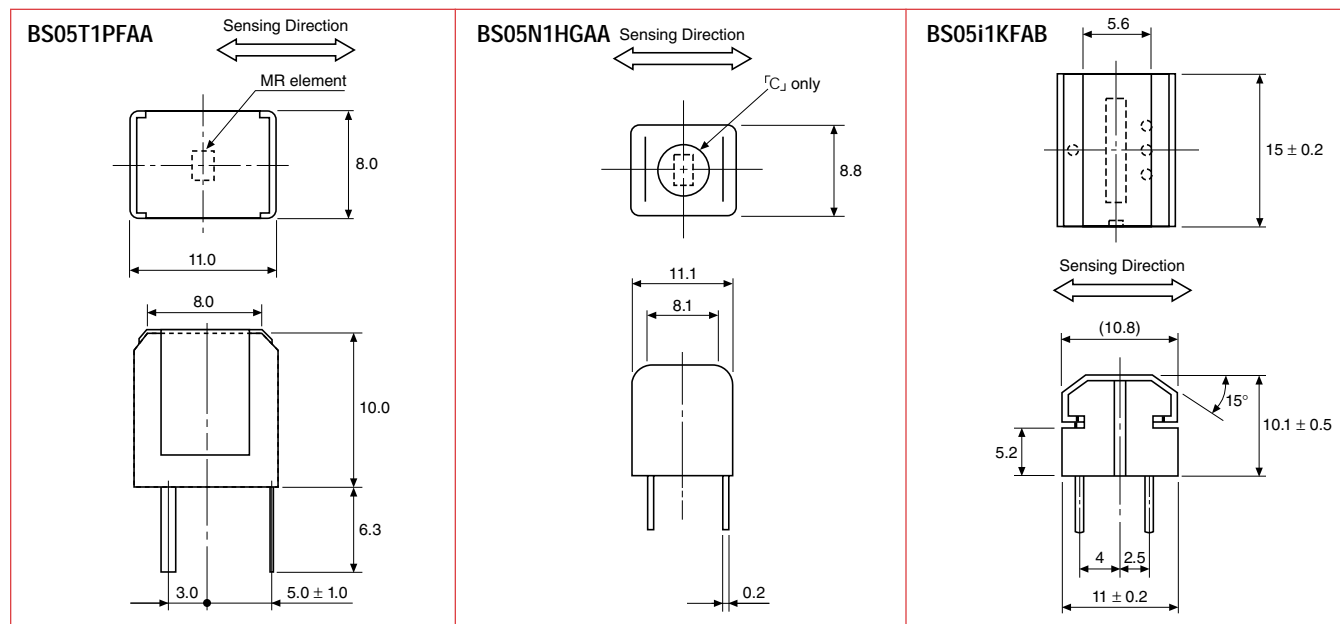
### FEATURES

- High sensitivity and excellent gap characteristics
- Output voltage is independent of scanning speed.
- Compact size and light weight make them ideal for downsizing.
- Low cost is achieved by BS05N Series due to its simple structure.
- BS05N1HGAA has superior noise immunity against induced noise originated from motors and transformers.

### APPLICATIONS

- Bank note validators
- Magnetic ink document readers
- Magnetic tape readers
- Magnetic gear detectors

### DIMENSIONS: mm



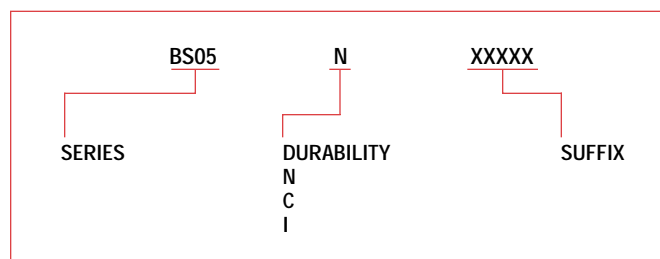
### SPECIFICATIONS

Part Number	Supply Voltage (Vcc) V	Total Resistance (at 25°C) KΩ	Output Voltage (at 25°C) mV (rms)	Detection Width (mm)	Resolution (mm)	Operating Temperature (°C)
BS05N1HGAA	5.0 ± 0.5	0.5 ~ 6	235 min.*	3	0.75	-20 ~ +60
BS05T1PFAA	5.0 ± 0.5	0.5 ~ 6	400 min.*	1.5	0.75	-20 ~ +60
BS05i1KFAB	5.0 ± 0.5	0.6 ~ 15	0.3 ~ 0.8†	10	0.75	-20 ~ +60

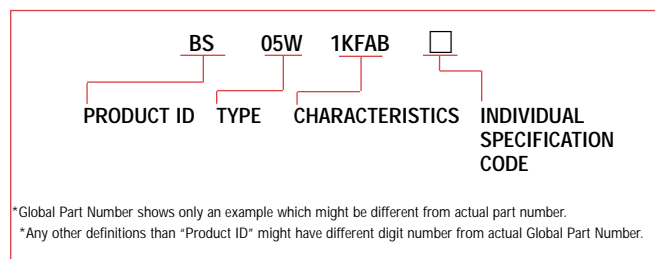
\*Per Murata's test procedure (gain: approx. 1,100, AC current method)

†Per Murata's test procedure (direct reading of test pattern)

### OLD PART NUMBERING SYSTEM



### NEW PART NUMBERING SYSTEM



\*Available as standard through authorized Murata Electronics Distributors.

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