

GYROSTAR® SPECIFICATION (for reference)

Jan.6.2003

PRODUCT ENGINEERING SECTION
SENSOR MODULE DEPARTMENT
CIRCUIT MODULE PRODUCTS DIVISION

1 Scope

This product specification is applied to gyro sensor used for electronic apparatus for home use.

Please contact us before using any of the product in the applications not described above.

2 Part number

ENC-03MA-R

ENC-03MB-R

3 Structurally characteristics

External dimension : Shown in Fig.1

Weight : 1.0g MAX.

Materials	Metal cap	: Nickel silver
	Base	: Glass Epoxy Base
	Terminals	: Au plated
	Adhesive	: Epoxy resin : Electrically conductive adhesive

Indication

Manufacturing company

Country of origin

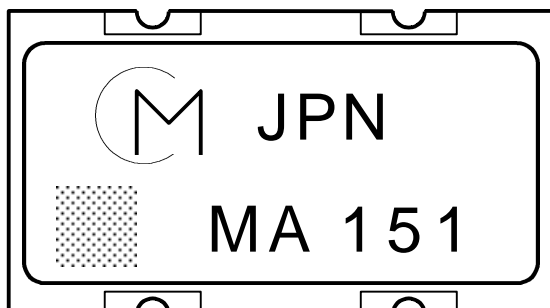
Model name

Lot number

Direction mark



4 Terminals



Terminal	Symbol	Descriptions
1	Vref	Reference voltage
2	GND	Ground
3	+Vcc	Supply voltage
4	OUT	Sensor output

5 Maximum ratings (unless otherwise specified, ambient temp. = +25°C)

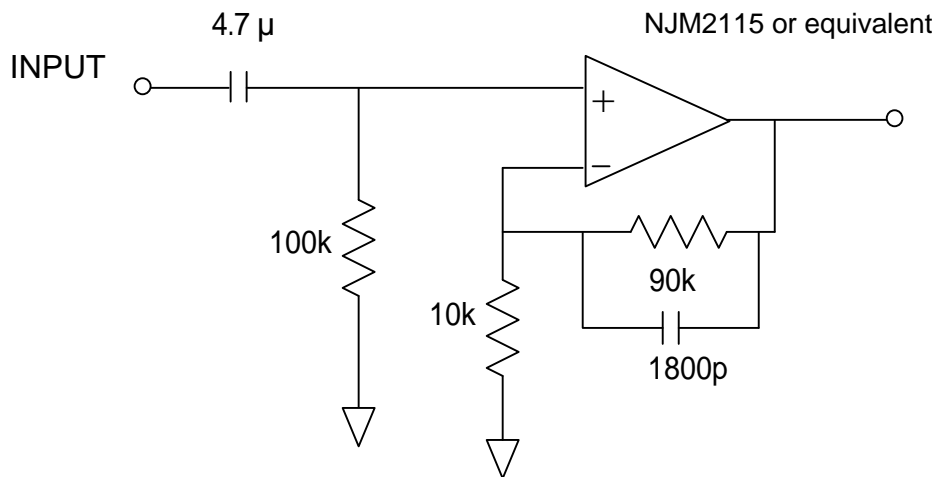
Items	Symbols	Conditions	Max ratings	Units
Supply voltage	Vcc max		+7.0	VDC
Max. current consumption	I _{sup} max	at Vcc = +3.0V	5.0	mA
Operating temp. range	T _{opr}		-5~+75°C	°C
Storage temp. range	T _{stg}		-30~+85°C	°C

6. Characteristics(Unless otherwise specified, ambient temperature $T_a = 25 \pm 5^\circ\text{C}$, $V_{cc} = +3.0\text{ VDC}$
 Use a sensor output load resistance of 50k or more. Comparative voltage (V_{ref}) is grounded with
 capacitor of $4.7\mu\text{F}$.)

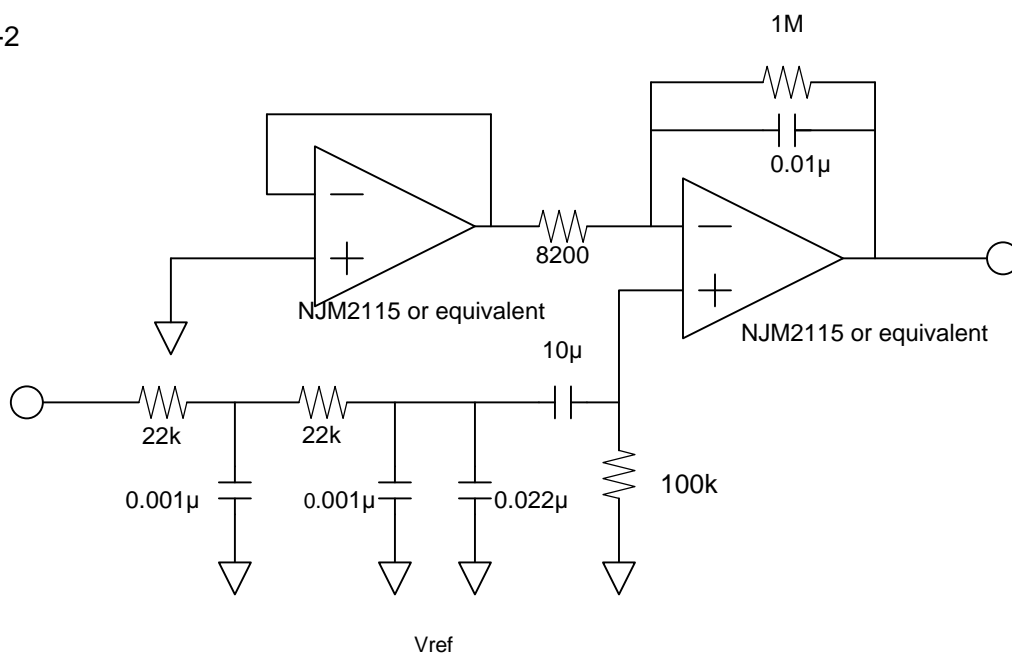
Characteristics	Symbol	Conditions	MIN.	STD.	MAX.	Units
Supply voltage	V_{cc}		+2.70	+3.00	+5.25	VDC
Current consumption	I_{sup}	at $V_{cc} = +3.0\text{V}$	2.5	3.2	4.5	mA
Comparative voltage	V_{ref}	at $-5 \sim +75^\circ\text{C}$	+1.20	+1.35	+1.50	VDC
Static output (Bias)	V_0	angular velocity = 0 at $-5 \sim +75^\circ\text{C}$	$V_{ref} - 0.6$	V_{ref}	$V_{ref} + 0.6$	VDC
Scale factor	S_v	with external measurement circuit (7-1) at 90deg/s ($\pm 2\text{ rad/s}$)	0.48	0.60	0.72	V
Temp. coefficient of scale factor		Reference : T_a at $-5 \sim +75^\circ\text{C}$	-20	-	+10	%FS
Resonance frequency - version ENC-03MA - version ENC-03MB	f_a f_b		- -	22.4 25	- -	kHz kHz
Linearity		in the maximum angular velocity range	-5	-	+5	%FS
Response		Phase delay : 90deg	50	-	-	Hz
Noise		with external measurement circuit (7-2)	-	-	20	mVp-p

7 Measurement circuit

7-1

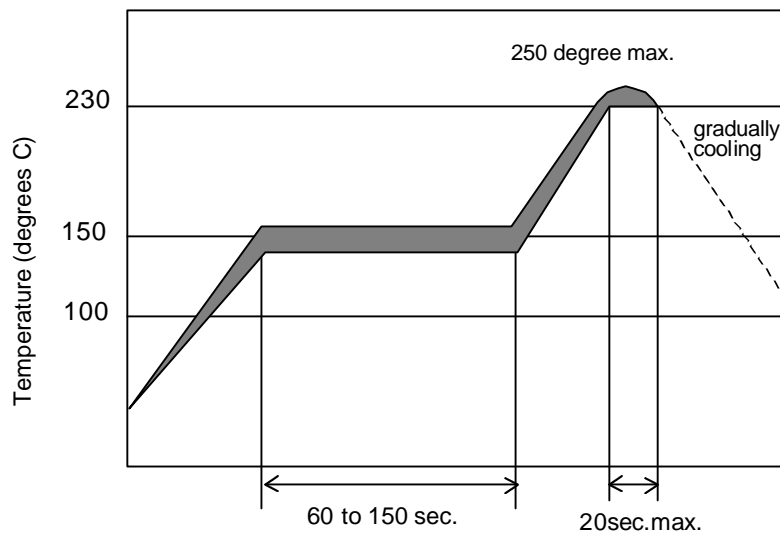


7-2



8. Reflow soldering condition

Following figure shows temperature profile when reflow soldering. Maximum temperature is 250 degree. It can be applied up to 2 times .



9. Reliability test

9-1 Test conditions

Ambient temp. = 25 ± 3 , relative humidity = $65 \pm 5\%RH$

9-2 Mechanical test

9-2-1 Shock test

Shock is applied to the samples with $4900m/s^2$ (500G) MAX., 1ms., half sine wave for 6 directions of $\pm X, \pm Y, \pm Z$ each axis. After the above, there should be no visible damage and the measured values shall be met Table 2.

9-2-2 Vibration test (Sweeping vibration endurance test)

Samples are tested under the following test conditions. After the above, there should be no visible damage and the measured values shall be met Table 2.

Frequency	: 10 to 55Hz
Direction	: X,Y,Z
Vibration amplitude	: 1.5mmp-p
Sweeping period	: 1min.
Testing time	: 2 hours each directions

9-3 Environment test

9-3-1 High temperature exposure test

Samples are kept in $+85 \pm 2$ chamber for 1000 ± 48 hours. Then stored at room condition for minimum 24 hours. After the above, there should be no visible damage and the measured values shall be met Table2.

9-3-2 Low temperature exposure test

Samples are kept in -40 ± 4 chamber for 1000 ± 48 hours. Then stored at room condition for minimum 24 hours. After the above, there should be no visible damage and the measured values shall be met Table2.

9-3-3 High temperature and high humid operation test

Samples are kept in 60 ± 2 , 90 to 95% RH chamber for 1000 ± 48 hours. Applied voltage must be regulated. Then stored at room condition for minimum 24 hours. After the above, there should be no visible damage and the measured values shall be met Table2.

9-3-4 Heat shock test

Samples are subjected to 24 heat cycles as shown in Table1. Then stored at room condition for minimum 24 hours. After the above, there should be no visible damage and the measured values shall be met Table2.

Table1 Heat shock test condition

Step	Temperature	Time
1	-40 ± 3	30 min.
2	Room temp.	5s. Max.
3	$+85 \pm 2$	30min.
4	Room temp.	5s. Max.

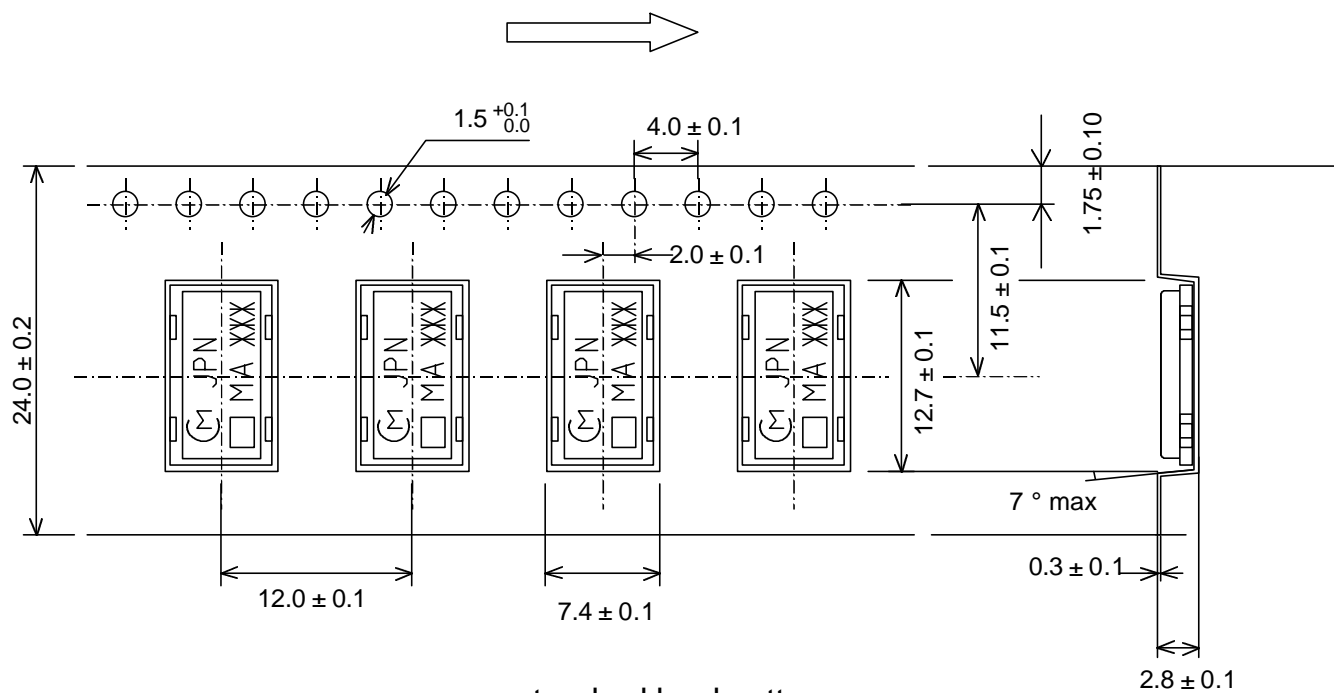
Table2 Judgement criteria of reliability test

Items	Judgement criteria
Scale factor	Initial $\pm 10\%$ MAX.
Null output	Initial $\pm 0.27V$ MAX.

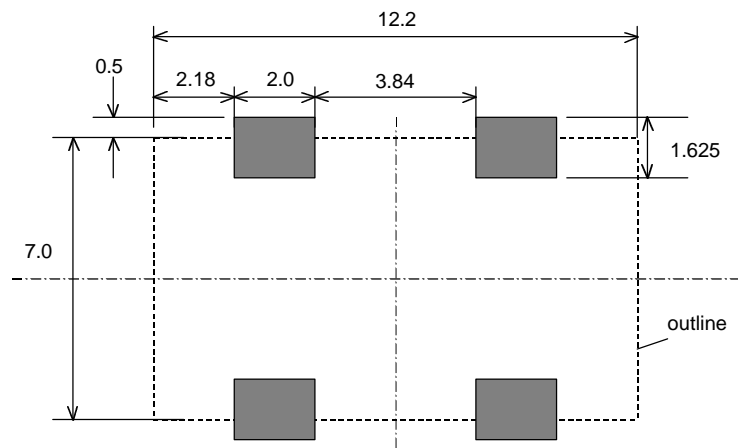
9 . Packing Style
9 - 1

		StyleA 1500pcs	StyleB 3000pcs	StyleC 6000pcs
		1REEL	2REEL	4REEL
cardboard box	4reels	-	-	1
	2reels	-	1	-
	1reel	1	-	-
cardboard screen		-	-	1
label		1	1	1
cushion		4	6	12
anti-static bag		1	2	4

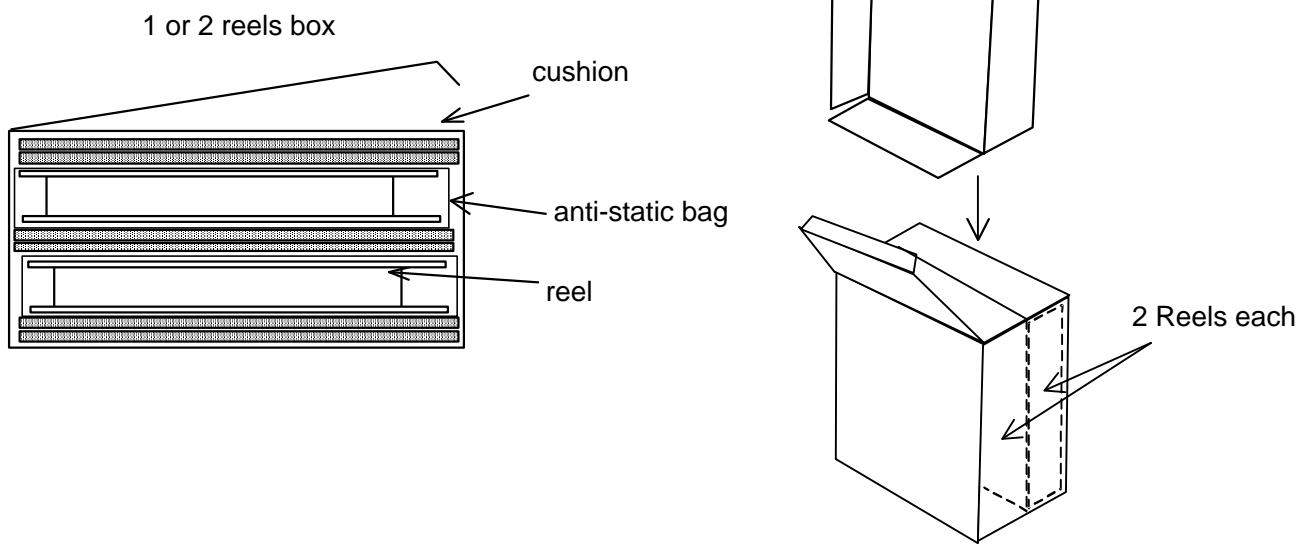
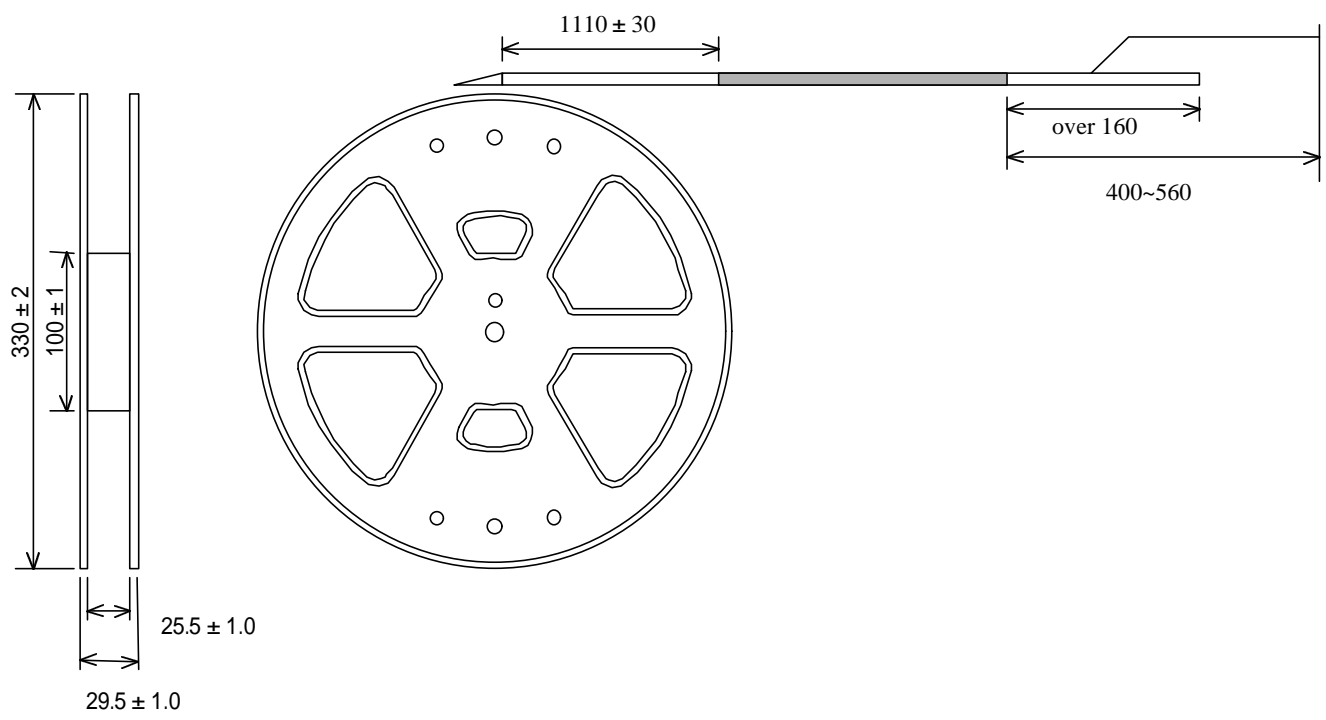
(Emboss tape)



standard land pattern



(Reel)



9-2 Packages are recycled. Please return them after use.

CAUTION

- 1) Incorrect handling may affect the sensor characteristics. Please note the following precautions:
 - A. Do not subject the sensor to shocks which exceed the rated limit.
 - B. Do not install or store the sensor in a location where condensation is likely to form on it.
 - C. Do not install or store the sensor in a location where water may splash directly on it.
 - D. Do not install or store the sensor in a location in which it is likely to be exposed to salt water or corrosive vapor.
- 2) Precision electronic parts, such as ICs, are used for the sensor; therefore, it is necessary to take anti-electrostatic precautions when handling.
- 3) Do not wash the sensor, as it is not water-resistant.
- 4) The sensor has electric circuit lines on their back. Do not mount the sensor on the electric circuit line arranged on the circuit board.
- 5) Do not disassemble.

Limitation of Applications

- 1) Please contact us before using our products for the applications listed below which require especially high reliability for the prevention of defects which might directly cause damage to the third party's life, body or property.
 - (1) Aircraft equipment (2) Aerospace equipment (3) Undersea equipment
 - (4) Medical equipment (5) Transportation equipment (automobiles, trains, ships, etc)
 - (6) Traffic signal equipment (7) Disaster prevention / crime prevention equipment
 - (8) Data-processing equipment (9) Applications of similar complexity or with reliability requirements to the applications listed in the above.
- 2) Be sure to provide an appropriate fail-safe function on your product to prevent a second damage that may be caused by the abnormal function or the failure of our product.

Note

1. Please make sure that your product has been evaluated and confirmed against your specifications when our product is mounted to your product.
2. All the items and parameters in this product specification have been prescribed on the premise that our product is used for the purpose, under the condition and in the environment agreed upon between you and us. You are requested not to use our product deviating from such agreement.
3. Please return one duplicate of this product specification to us with your receipt signature. If the duplicate is not returned by 3 months after our submission, this product specification will be deemed to have been received by you.
4. We consider it not appropriate to include other terms and conditions for transaction warranty in product specifications, drawings or other technical documents. Therefore, if your technical documents as above include such terms and conditions as warranty clause, product liability clause, or intellectual property infringement liability clause, we will not be able to accept such terms and conditions unless they are based on the governmental regulation or they are stated in a separate contract agreement.

Fig.1 Dimension

All dimensions are in "mm"

With no assignment, measurement tolerance = +/-0.2mm

