

Data Sheet

TAG201N0020

R E V I S I O N S

No.	DATE	P A G E	DESCRIPTION	DS'D	CH'D	APP'D

ED'N No.	. .
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DS' D A.Abe	DATE '12.08.02	MODEL No. TAG201N0020	TITLE Data Sheet									
CH' D T.Imamura	DWG NO.	3	4	5	6	7	8	9	10	11	12	SHEET
APP' D M.Yachi	S P C 0 0 4 9 5 6 W 0 0											1 / 8

Data Sheet

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2. Parts number
3. Mechanical characteristics
4. Ratings
5. Electrical characteristics
6. Measurement circuit
7. Assembly recommendation
8. Instructions

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1. Scope

This specification is applied to the angular rate sensor.

2. Parts number

2-1. Tamagawa Seiki parts number
TAG201N0020

3. Mechanical characteristics

3-1. Dimension

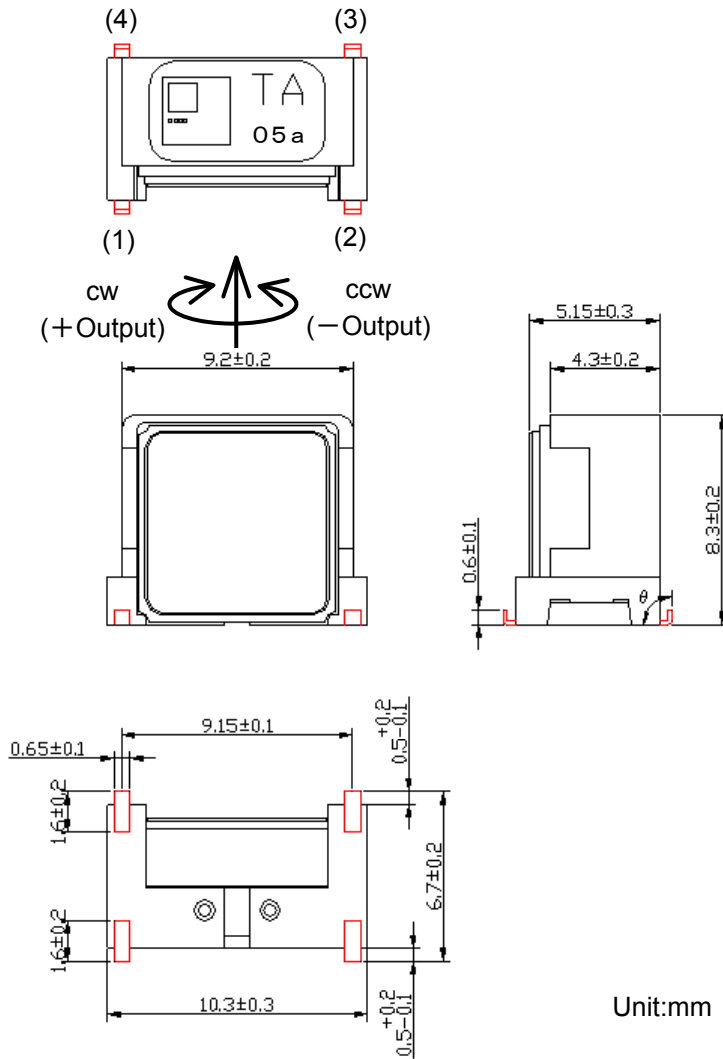


Figure-1. Dimension

3-2. Terminal Configurations

Table-1. Terminal Configurations

No	Terminal name	Description
(1)	Vout	Rate sensor output
(2)	Vcc	Power supply voltage
(3)	TS	Temperature sensor output (Not connected in case of nonuse)
(4)	GND	Ground

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3-3. Marking

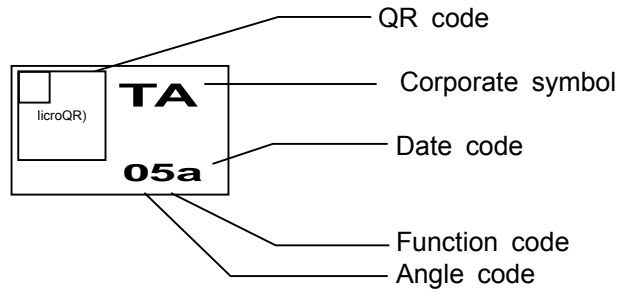


Figure-2. Marking

4. Ratings

4-1. Absolute maximum ratings

Table-2. Absolute maximum ratings

No.	Parameter	Specification	Unit	Note.
1	Supply voltage	-0.3 to +7.0	V	
2	Operating temperature range	-40 to +85	°C	
3	Storage temperature range	-40 to +85	°C	
4	Mechanical shock	200	G	1 time to X-, Y-, Z-axis each, unpowered.

4-2. Operating conditions

Table-3. Operating conditions

No.	Parameter	Specification			Unit	Conditions
		MIN	TYP	MAX		
1	Supply voltage range	4.75	5	5.25	V	
2	Measurement range	-100		100	° /sec	
3	Frequency response	-7		-2	dB	f=20Hz
4	Start up time			0.7	sec	25°C ± 2°C

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5. Electrical characteristics

5-1. Rate sensor output

The following conditions are adopted, unless otherwise specified.

- ① Temperature : 25°C±2°C
- ② Vcc:5V±0.01V

Table-4. Electrical characteristics

No.	Parameter	Specification			Unit	Conditions
		MIN	TYP	MAX		
1	Supply current			6	mA	
2	Maximum output voltage	Vcc - 0.3			V	
3	Minimum output voltage			0.3	V	
4	Nominal bias	2.35	2.5	2.65	V	Ta= -40 to +85°C
		2.3	2.5	2.7	V	
5	Bias drift after power on	-15		15	mV	0.7sec to 15minutes
6	Scale factor	19.0	20.0	21.0	mV/° /sec	Ta= -40 to +85°C
		18.5	20.0	21.5	mV/° /sec	
7	Scale factor symmetry	-1.0		1.0	%	
8	Linearity	-0.5		0.5	%Fs	
9	Cross axis sensitivity	-5		5	%	Ta= -40 to +85°C
10	Output noise			5	mVpp/5s	Ta= -40 to +85°C
11	Ratiometric error for bias	-20	0	20	%	Start-up from 0.7s~ Vcc:4.75V to 5.25V
12	Ratiometric error for scale factor	-20	0	20	%	Start-up from 0.7s~ Vcc:4.75V to 5.25V

Table-5. Electrical characteristics (Variation with temperature)

No.	Parameter	Specification			Unit	Conditions
		MIN	TYP	MAX		
13	Bias variation with temperature (Max-Min)			8	° /sec	Ta= -40 to +85°C
14	Bias variation with temperature	-8		8	mV/2.5°C	Ta= -40 to +85°C
		-20		20	mV/7.5°C	Ta= -40 to +85°C
15	Scale factor variation with temperature	-3.0		3.0	%	Ta= -40 to +85°C

Note:

- Bias variation with temperature assumes it the measurement at case of the temperature rise.
- Load impedance of 100kΩ and 0.1 μF to be connected between terminals Vout and GND in parallel.

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5-2. Temperature sensor output

Table-6. Temperature sensor output

No.	Parameter	Specification			Unit	Conditions
		MIN	TYP	MAX		
1	Temperature sensor output	1.33	1.4	1.47	V	Ta=25°C
2	Temperature sensor scale factor	-3.6	-3.8	-4.0	mV/°C	Ta= -40 to +85°C

Note:

- Temperature sensor output is not ratiometric on supply voltage.

<Definition of the term>

- ① Measurement range ; Angular rate measuring range for guarantee of performance
- ② Maximum output voltage ; Output voltage at input angular rate of +500 ° /sec
- ③ Minimum output voltage ; Output voltage at input angular rate of -500 ° /sec
- ④ Nominal bias ; Output voltage at input angular rate of 0 ° /sec
- ⑤ Bias drift after power on ; Maximum value of drift of bias during turned on state of applying electric power supply, where noise under 10mV is excluded.
- ⑥ Scale factor ; Ratio of the output voltage versus the rotating angular rate being applied.
- ⑦ Scale factor symmetry ; A typical value of asymmetry of sensitivity defined as a ratio of the sensitivity applying plus value of a specified input voltage to minus value of a specified input voltage.
- ⑧ Linearity ; $((Sv\omega - Sv_{max}) / (Sv_{max} \times \omega_{max})) \times \omega \times 100$ Linearity of CW direction, in the same as CCW direction.
 $Sv\omega$; Scale factor when angular rate is ω
 ω_{max} ; Maximum angular rate
 Sv_{max} ; Scale factor at ω_{max}
- ⑨ Cross axis sensitivity ; Maximum value of sensitivity of cross axis
- ⑩ Output noise ; Output noise at stable state operation.
- ⑪ Ratiometric error for bias ; Maximum value of error of bias applying voltage fluctuation caused by operating instability of applying electric power supply.
 $\{V0(Vcc)/V0(5V) - (Vcc/5)\} / (Vcc/5 - 1) \times 100$ (%)
- ⑫ Ratiometric error for scale factor ; Maximum value of error of sensitivity applying voltage fluctuation caused by operating instability of applying electric power supply.
 $\{Sv(Vcc)/Sv(5V) - (Vcc/5)\} / (Vcc/5 - 1) \times 100$ (%)
- ⑬ Bias variation with temperature ; Maximum value of standard bias under a specified variation in temperature.
- ⑭ Scale factor variation with temperature ; Minimum and maximum value of standard s ensitivity under a specified variation in temperature

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6. Measurement circuit

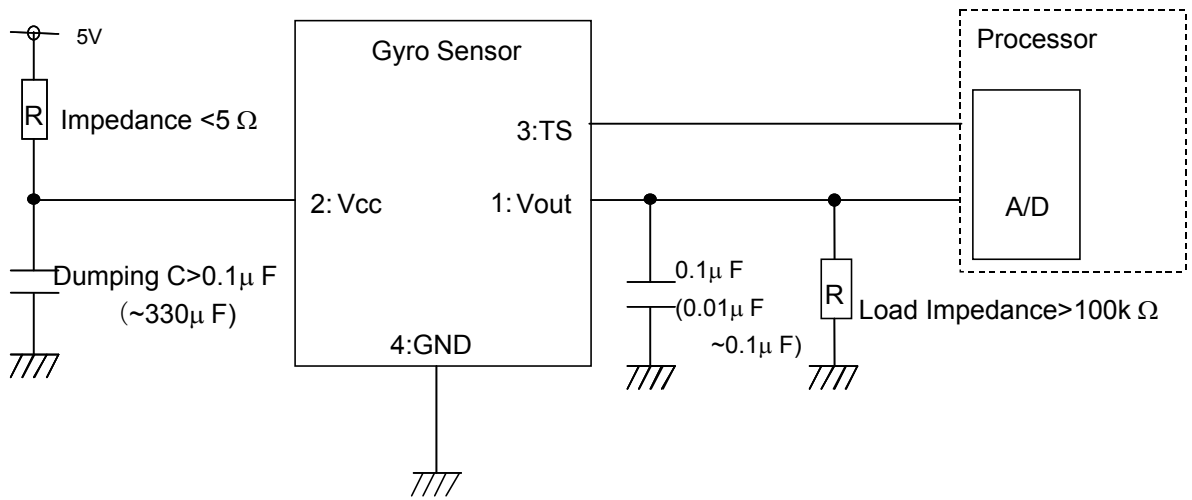


Figure-3. Measurement circuit

Note:

- To decrease the ripple voltage of the supply voltage, recommend to use the capacitor of large capacitance in order to avoid such phenomena.
- High impedance of Vout and TS terminal is needed.
(Please attach the load resistance more than 100k Ω if needed.)

7. Assembly recommendation

7-1. Assembly recommendation

7-1-1. Soldering temperature profile of reflow

- (1) 170~190°C : within 120sec
- (2) 200°C or higher : within 80sec
- (3) 220°C or higher : within 60sec
- (4) Peak temperature : 245°C, within 40sec

Where used solder is Sn-3Ag-0.5Cu

[Measurement point: Board surface]

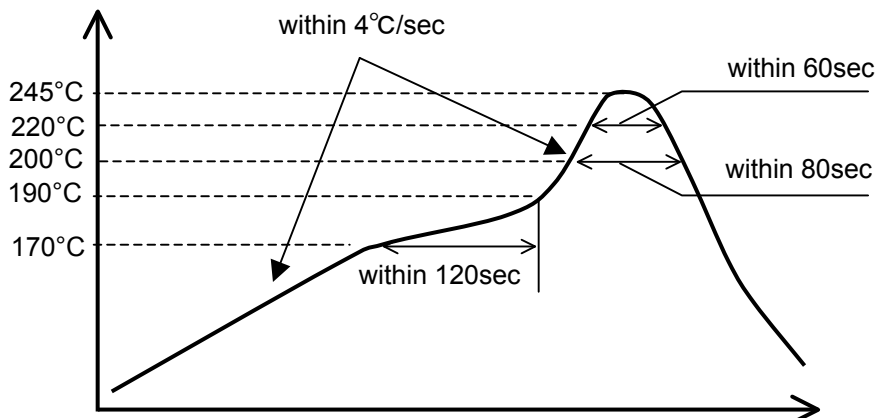


Figure-4. Reflow soldering

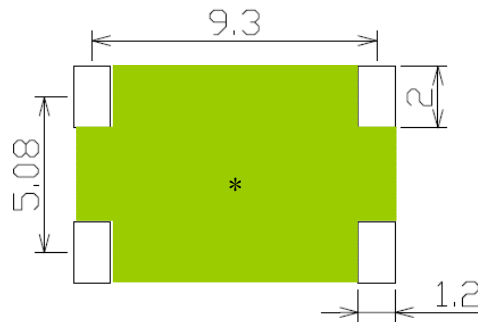
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7-1-2. Soldering temperature profile of iron

At 1 lead Temperature: Lower than 300°C Time: within 3s

7-2. Recommended footprint



*) Solder resist

Figure-5. Recommended footprint

8. Instructions

8-1. This product uses Bi-CMOS IC inside. Against static electricity discharge is needed.

8-2. Connected correctly is needed.

8-3. Reflow soldering applied only once.

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