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For Car Navigation

***XV-8000CB***

***Application Manual***

**EPSONTOYOCOM CORPORATION**

Product Marketing Dev..

Sales Engineering Team

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  - /Power stations and related /fire work equipment and security equipment
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- This manual is not the delivery specifications. Please do the taking exchanging of the specifications formally when you use this product as our company.

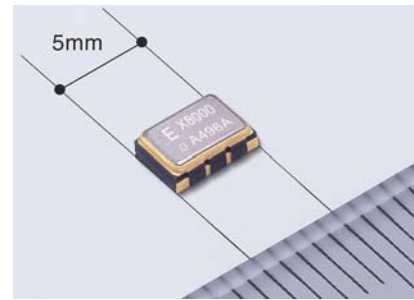
Ultra small package Gyro Sensor for GPS solution

Under development

## XV-8000CB/JG Specifications

Ultra Small Package size SMD(5.0 x 3.2 x 1.3 mm)  
5V operating voltage (ratio metric output)

High stability using with crystal element  
Lead(Pb)-free : Lead free completely



### Recommended Application

Vehicle navigation systems

### 1) Absolute maximum rating

Item	Symbol	Specifications			Remarks
		Min.	Typ.	Max.	
Input Voltage	$V_{IN}$	-0.3V		+7.3V	
Storage Temperature	$T_{STG}$	-40°C		+85°C	

### 2) Operating condition

Item	Symbol	Specifications			Remarks
		Min.	Typ.	Max.	
Supply Voltage	$V_{DD}$	4.75V	5.0V	5.25V	VSS=0V
Operating Temperature	$T_{OPR}$	-40°C		+85°C	
Output current				TBD	

### 3) Electrical characteristics

Item	Symbol	Specifications			Remarks
		Min.	Typ.	Max.	
Drive Frequency	$f_d$		50.3kHz		
Scale factor	$S_o$		25mV/deg/s		
Initial scale factor accuracy	$S_p$			+/-4%	Ta=+25°C
Scale factor temperature sensitivity	$S_{pt}$			+/-3.5%	Based +25°C, VDD=5.0V
0 point output	$V_o$		1/2VDD		Ta=+25°C
0 point output variation with temperature	$V_{ot}$			+/-10%	Based +25°C, VDD=5.0V
Rate range	$I$	-60deg/s		+60deg/s	
Non linearity	$NI$			+/-0.5% FS	Ta=+25°C
Band width	$BW$		10Hz		Phase delay angle 90°
Cross axes	$OS$			+/-5.0%	Ta=+25°C
Current consumption	$I_{op}$		4mA		Vo: output No load condition
Output noise	$rN$		3mV p-p		
Activation time	$T_{act}$			500ms	Ta=+25°C, VDD=5.0V

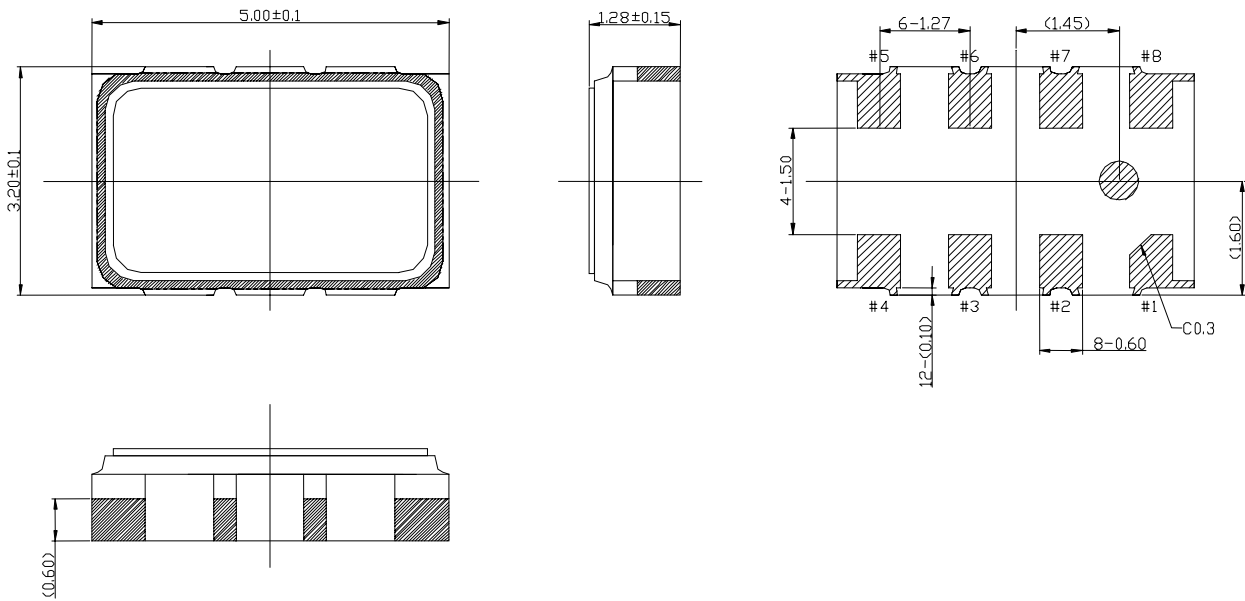
### 4) Temperature sensor

Item	Symbol	Specifications			Remarks
		Min.	Typ.	Max.	
Temperature output voltage	$V_{TEMP}$		1.76V		Ta=+25°C
Output precision	$T_{ACR}$			+/-5°C	Ta=+25°C No Load
Temperature sensitivity	$V_{SE}$		-6.7mV/°C		Ta=+25°C

In this product, the temperature sensor output terminal exists.

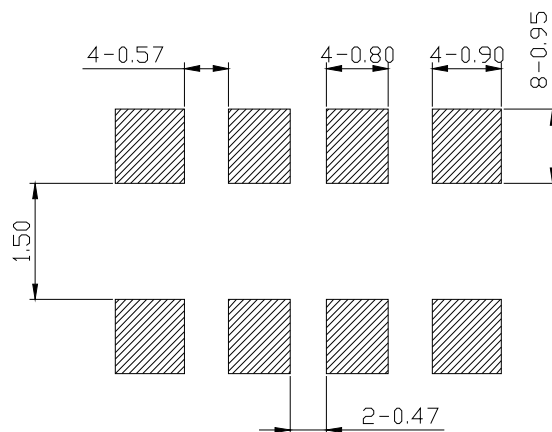
## 5) External dimensions/Footprint

### XV-8000CB external dimensions



Pin No	Pin name	I/O	Function
1	NC	-	EPSON test pin. Please do not connect this pin.
2	GND	-	GND pin
3	VDD	-	Operating Voltage pin
4	NC	-	EPSON test pin. Please do not connect this pin.
5	NC	-	EPSON test pin. Please do not connect this pin.
6	Vout	Output	Output angular rate
7	Vtemp	Output	Temp. Sensor output. (Please do not connect this pin when you do not use this terminal.)
8	NC	-	EPSON test pin. Please do not connect this pin.

### XV-8000CB Footprint (recommended)

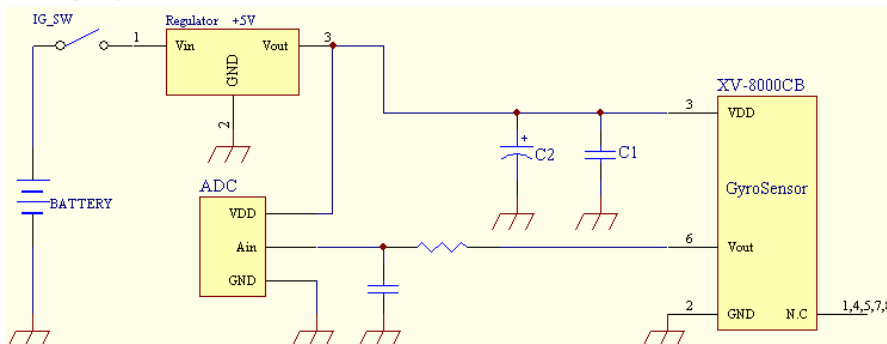


Pin No	Pin name	I/O	Function
1	NC	-	EPSON test pin. Please do not connect this pin.
2	GND	-	GND pin
3	VDD	-	Operating Voltage pin
4	NC	-	EPSON test pin. Please do not connect this pin.
5	NC	-	EPSON test pin. Please do not connect this pin.
6	Vout	Output	Output angular rate
7	Vtemp	Output	Temp. Sensor output. (Please do not connect this pin when you do not use this terminal.)
8	NC	-	EPSON test pin. Please do not connect this pin.

## XV-8000JG Footprint (recommended)

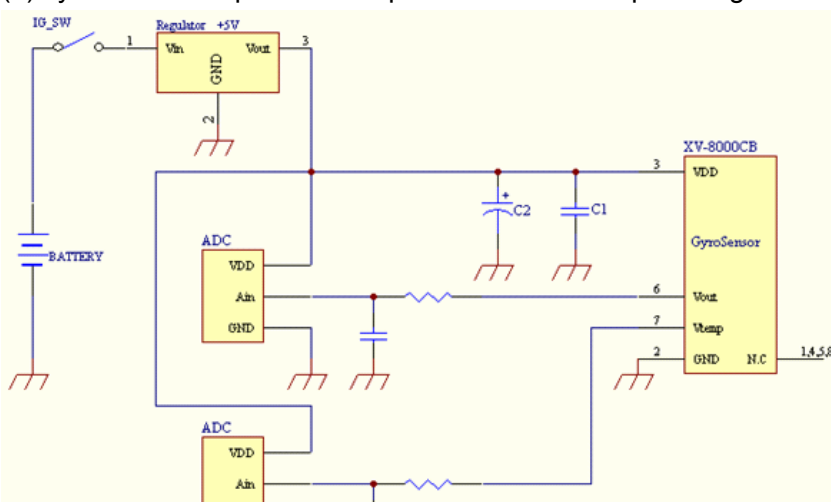
### 6) Recommended circuit example

#### (1) Only using Gyro sensor output



- (1) C1: Bypass capacitor. We will recommend the sensor terminal to arrange the capacitor of 0.1 $\mu$ F or more that the high frequency characteristic is good near than possible. Moreover, it is necessary to connect the terminal GND of these capacitors with an analog playground by using the beer.
- (2) C2: Power supply voltage back up capacitor. The power supply backup capacitor is not built into in the sensor. Please put the capacitor. Moreover, please arrange the electrolytic capacitor of 100 $\mu$ F from 47 $\mu$ F as a backup capacitor of VDD.
- (3) Please share and use the power supply(5.0V) when you process the output signal of the sensor with the A/D converter.
- (4) Please do not connect NC pin.

#### (2) Gyro sensor output and Temperature sensor output using



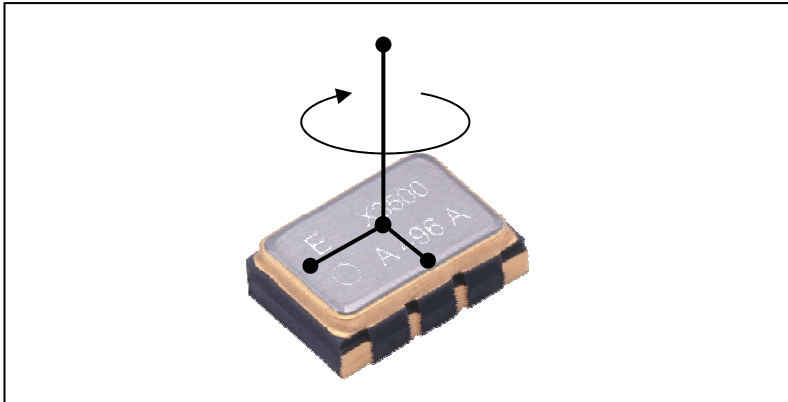
- (1) C1: Bypass capacitor. We will recommend the sensor terminal to arrange the capacitor of  $0.1\mu\text{F}$  or more that the high frequency characteristic is good near than possible. Moreover, it is necessary to connect the terminal GND of these capacitors with an analog playground by using the beer.
- (2) C2: Power supply voltage back up capacitor. The power supply backup capacitor is not built into in the sensor. Please put the capacitor. Moreover, please arrange the electrolytic capacitor of  $100\mu\text{F}$  from  $47\mu\text{F}$  as a backup capacitor of VDD.
- (3) Please share and use the power supply( $5.0\text{V}$ ) when you process the output signal of the sensor with the A/D converter.
- (4) Please do not connect NC pin.
- (5) Please use the load resistance for Vtemp. output terminal with  $2\text{M}\Omega$  or more.  
(Please inquire about the characteristic of the temperature sensor. )

This circuit doesn't agree the characteristic of the Gyro sensor.

When used unavoidably in your company, be sure to confirm before use in your company.

## 7) About detection axis

Detect direction is shown as in the following figure. Please mount carefully to detect direction.



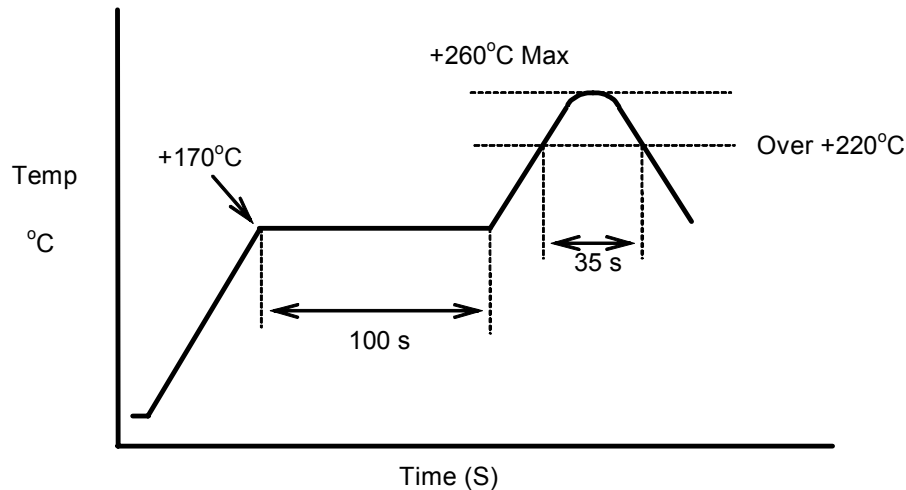
## 8) Reflow profile

Heat testment condition of reflow oven

Preheating temperature:  $+170\text{ }^{\circ}\text{C}$       Preheating time:  $100\text{ s}$

Heating temperature:  $+220\text{ }^{\circ}\text{C}$       Heating time :  $35\text{ s}$

Peak temperature must not exceed  $+260\text{ }^{\circ}\text{C}$ .



## 9) Handling precautions

EPSONTOYOCOM gyro sensor is using quartz crystal parts. Please handle and please pay attention to the next point

### 1. Handling our gyro sensor

(1) This crystal product is designed in consideration of shock resistance. However, it may be destroyed by the conditions of a shock. In case product is dropped, and too much shock are added, please be sure to check the characteristic.

(2) If too much shock is added when a crystal product is mounted automatically, it will lead to change or degradation of the characteristic (In the case of product adsorption, chucking, and substrate mounting) Therefore, please set up the conditions that a shock is small if possible. Please be sure to test before use in your company, and check that there is no influence in the characteristic. Please confirm similarly at the time of condition change. Please be careful after mounting for a crystal product to collide neither with a machine object nor other substrates at the time of mounting.

(3) This product contains the circuit that protects static electricity destruction. However, if static electricity is added superfluously, IC may break. Therefore, packing and the container to carry should use a conductive thing. Moreover, a soldering iron and a measurement circuit should use a thing without high-voltage leak, and work should take the measures against static electricity.

(4) Please do not use it under the environment where the short-circuit between terminals of condensing is generated.

(5) Please keep a gyro sensor by normal temperature and normal moisture. Refer to the packing standard document for the management method of a packing state.

### 2. About washing

(1) Ultrasonic washing may lead to destruction of a crystal. Our company cannot guarantee it. When used unavoidably in your company, be sure to confirm before use in your company.

### 3. About soldering

- (1)Reflow is to 2 times. Please use soldering iron, when there is a soldering mistake. In this case, 350 degrees C or less and the conditions for less than 3 seconds are required.
- (2)We will recommend the substrate to be designed by the footprint that our recommends.

### 4. About Gyro sensor layout

- (1)This product has the noise of the same frequency as drive frequency. Therefore, it is necessary to remove in a suitable filter circuit.
- (2) Please confirm the vibration absorption the influence, when there is a resonance point in the place where the sensor is installed or an excessive vibration joins the sensor.
- (3)Another high level signal line may cause irregular output, Please take care to design output line is as short as possible, and also keeps high level signal source away from this device.
- (4)Even if this sensor approaches and operates, it does not interfere in it in sound. However, it may interfere by the common impedance of a power supply. Please be sure to check in your company.
- (5)Please do not arrange the Gyro sensor in the place where a rapid temperature change is generated.

### 5. Other

- (1)This Product is the designed one in the car navigation usage.
- (2)These products are intended for general use in electronic equipment. When using them in specific applications that require extremely high reliability, such as the applications stated below, you must obtain permission from EPSONTOYOCOM in advance.

- /Space equipment (artificial satellites, rockets, etc.)
- /Transportation vehicles and related (automobiles, aircraft, trains, vessels, etc.)
- /Medical instruments to sustain life /Submarine transmitters
- /Power stations and related /fire work equipment and security equipment
- /Traffic control equipment /and others requiring equivalent reliability.

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