

# BEI GYROCHIP™ II

Micromachined Angular Rate Sensor



## Applications

- Platform Stabilization
- Short Term Navigation
- GPS Augmentation
- Camera Stabilization
- Instrumentation
- Robotics
- Autonomous Vehicle Control

## Description

The BEI GyroChip II is a compact, rugged, solid-state inertial sensor used to measure angular rotation rates. It features a monolithic quartz sensing element, internal power regulation and DC input/high-level DC output operation. Two versions are available. The +12 Vdc version features a high-level 0 to +5 Vdc output, integral POWER-SAVE mode, and operation from standard battery power. The  $\pm 15$  Vdc version provides a high-level bipolar output of  $\pm 5$  Vdc, and is designed for use with conventional double-sided power supplies.

## Features

- Solid-State
- Compact, Lightweight Design
- Wide Temperature Range
- High Reliability
- DC Input/High-Level DC Output
- Internal Power Regulation
- POWER SAVE Mode (+12 Vdc Version)

## Operation

The BEI GyroChip™ II utilizes a one piece, micromachined, vibrating quartz tuning fork sensing element. Applying the Coriolis effect, a rotational motion about the sensor's input axis produces a DC voltage proportional to the rate of rotation. Use of piezoelectric quartz material simplifies the active element, resulting in exceptional stability over temperature and product life.

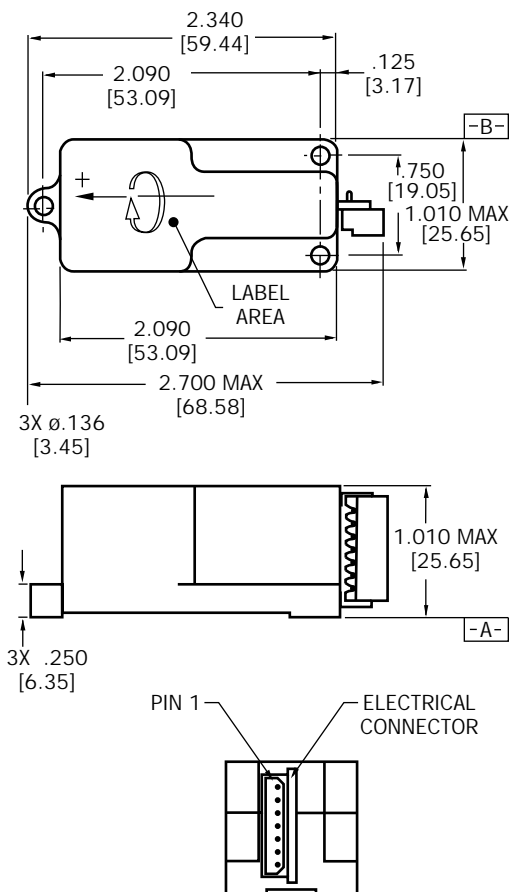


**BEI** SYSTRON DONNER INERTIAL DIVISION  
BEI TECHNOLOGIES, INC.

For applications assistance or more information on any of  
Systron Donner Inertial Division's micromachined inertial sensors,  
Call 1-800-227-1625.

# BEI GYROCHIP™ II

## Micromachined Angular Rate Sensor



### NOTES:

1. GYROCHIP™ II IS SUPPLIED WITH A MATING CONNECTOR (MOLEX P/N 5264-7 OR EQUIV.).
2. ANGULAR RATE APPLIED AS SHOWN WILL PRODUCE A MORE POSITIVE OUTPUT.
3. UNIT OF MEASURE IN INCHES/[MM].
4. POWER IS DISCONNECTED FROM INTERNAL CIRCUITS APPLYING 5 Vdc  $\pm$ 1 V TO POWER SAVE INPUT.
5. BUILT-IN-TEST ACTIVATED BY GROUNDING PIN 7 CAUSES AN INCREASE IN RATE OUTPUT (PIN 5) OF 0.5 Vdc NOMINAL.
6. BUILT-IN-TEST ACTIVATED BY GROUNDING PIN 7 CAUSES AN INCREASE IN RATE OUTPUT (PIN 5) OF 1.0 Vdc NOMINAL.

QRS14-00XXX-102	
Connector Pin	Assignment
1	Power and Signal Ground
2	+Vdc Input
3	POWER SAVE <sup>4</sup>
4	No Connection, Leave Open
5	Rate Output
6	No Connection, Leave Open
7	Built-in-Test <sup>5</sup>

QRS14-00XXX-103	
Connector Pin	Assignment
1	-Vdc Input
2	+Vdc Input
3	Power Ground
4	Signal Ground
5	Rate Output
6	No Connection, Leave Open
7	Built-in Test <sup>5</sup>

### PARAMETER

### SUMMARY SPECIFICATIONS

Part Number	QRS14-0XXXX-102**	QRS14-0XXXX-103**
<b>Power Requirements</b>		
Input Voltage	+9 to +18 Vdc	$\pm$ 9 to $\pm$ 18 Vdc
Input Current	<20 mA	<40 mA (each supply)
<b>Performance</b>		
Standard Ranges	$\pm$ 50, 100, 200, 500, 1000°/sec	
Full Range Output (Nominal)	0 to +5 Vdc	$\pm$ 5 Vdc
Scale Factor Calibration (at 22°C)	$\pm$ 2% of value	
Scale Factor over Temperature (Dev. from 22°C)	$\leq$ 0.06%/°C	
Bias Calibration (at 22°C)	+2.5 $\pm$ 0.045 Vdc	0.0 $\pm$ 0.075 Vdc*
Bias Variation over Temperature (Dev. from 22°C)	<3.0°/sec*	
Short Term Bias Stability (100 sec at const. temp)	$\leq$ 0.05°/sec	
Long Term Bias Stability (1 year)	$\leq$ 1.0°/sec	
G Sensitivity	$\leq$ 0.06°/sec/g	
Start-Up Time	<1.0 sec	
Bandwidth (-90°)	>50 Hz	
Non-Linearity	$\leq$ 0.05% of F.R.	
Threshold/Resolution	$\leq$ 0.004°/sec*	
Output Noise (DC to 100Hz)	$\leq$ 0.05°/sec/ $\sqrt{\text{Hz}}$ *	$\leq$ 0.02°/sec/ $\sqrt{\text{Hz}}$ *
Operating Life	10 years, typical	

### Environments

Operating Temperature	-40°C to +85°C
Storage Temperature	-55°C to +100°C
Vibration Operating	4 g <sub>rms</sub> 20 Hz to 2 kHz random
Vibration Survival	10 g <sub>rms</sub> 20 Hz to 2 kHz random
Shock	200 g

### Weight

$\leq$ 50 grams

\*Values indicated for  $\pm$ 100°/sec range.

\*\*"XXXX" designates  $\pm$  range.



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