HIGH PERFORMANCE GYRO

SAR150 **PRODUCT BRIEF**

FEATURES

- **Up to ±1500°/s input range**
- **Horizontal or vertical mounting**
- **50°/h in-run bias stability**
- **0.65°/√h angular random walk**
- **0.03°/s/g linear acceleration effect**
- **5000g shock capability**
- **Sensor and ASIC automotive qualified according to AEC-Q100**



DESCRIPTION

The SAR150 gyro contains a ButterflyGyro™ MEMS die and a BiCMOS mixed mode ASIC, housed in a rigid custom ceramic LCC package to accommodate both horizontal and vertical mounting. The sensor is factory-calibrated and compensated for temperature effects to provide high-accuracy digital output over a broad temperature range.

Input ranges

SAR150 angular rate sensor is offered with standard full-scale input ranges of 400°/s, 250°/s or 100°/s. For custom requirements, it can also be offered with non-standard ranges up to 1500°/s.

Reliability and robustness

By utilizing a unique sealed cavity technology, the vibrating masses of the sensor are contained within the low-pressure hermetic environment needed for creating low dynamic damping and high Q factors, without any degradation over lifetime of the device whatever the environmental conditions.

A closed-loop force feedback operation with electrostatic tuning of excitation and detection frequencies, as well as perfect mechanical and electrical balancing of the vibrating masses, results in exceptionally low shock and vibration sensitivity.

Interface

An SPI interface of the device enables easy and effective communication to the appliation. Serial data bus frequencies up to 8.5MHz are supported, and the angular rate data output format is 12-bit 2's complement at a maximum sampling rate of 2000SPS.

Self diagnostics

A number of functions are available through the digital SPI interface of the device, including advanced self diagnostics.

A status register contains rate overflow information (recoverable error), excitation and detection loop diagnosis bits, a supply voltage information bit etc. In case of any irregularities detected, a specific error code is reported. This error code cannot be misinterpred as valid sensor data.

Applications

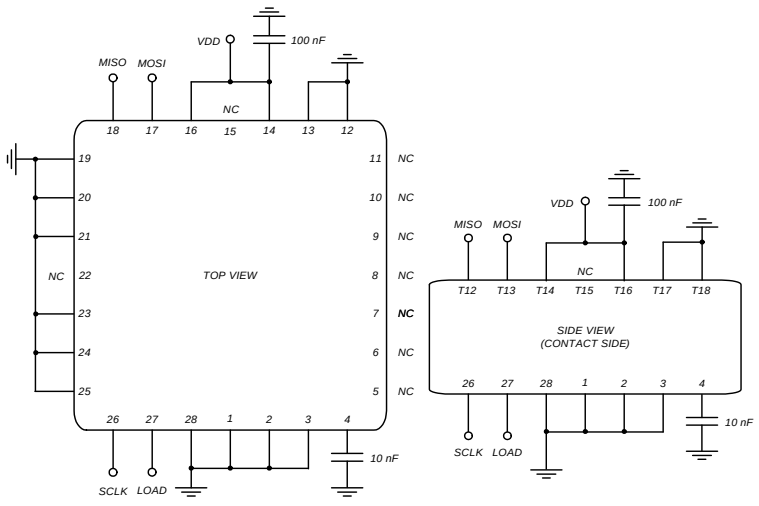
SAR150 is a product with high bias and scale factor stability, designed for demanding applications. It is highly rugged, consumes only 50mW and offers the best value of any gyro product in its class of performance.

The device is ideal for platform stabilization (e.g. antennas, cameras, etc.), robot head positioning, borehole surveys, inertial navigation systems (INSs), smart munitions, train applications, aircraft instruments, unmanned aerial vehicles (UAVs), autonomous underwater vehicles (AUVs), agricultural machines, space applications, etc.

SPECIFICATIONS

Parameter		Min	Nom	Max	Unit
Weight			1.5		g
Functional characteristics					
Input range (ΩFSI)			±400		°/s
			±250		°/s
			±100		°/s
Operating temperature		-40		90	°C
Power supply		4.45	5.0	5.5	V
Supply current				17	mA
Start-up time			90		ms
Maximum sampling frequency			2000		SPS
Storage temperature		-55		125	°C
Dynamic overload			5000		°/s
Mechanical shock				5000	g
Angular rate measurements					
Word length			12		bit
Scale factor	±400°/s (ΩFSI)		0.25		°/s/LSB
	±250°/s (ΩFSI)		0.25		°/s/LSB
	±100°/s (ΩFSI)		0.10		°/s/LSB
Scale factor temperature accuracy			±0.5		%
Bias temperature accuracy			±0.5		°/s
Sensitivity accuracy			±1		%
In-run bias stability			50		°/h
ARW	±400°/s (ΩFSI)		0.80		°/√h
	±250°/s (ΩFSI)		0.75		°/√h
	±100°/s (ΩFSI)		0.65		°/√h
Bandwidth (-3dB)			50		Hz
Non-linearity			0.1		%FS
Linear acceleration effect				0.01	°/s/g
Temperature measurements					
Word length			8		bit
Scale factor			1		°C/LSB
Accuracy			±2		°C
SPI interface					
Datarate				8.5	Mbit/s

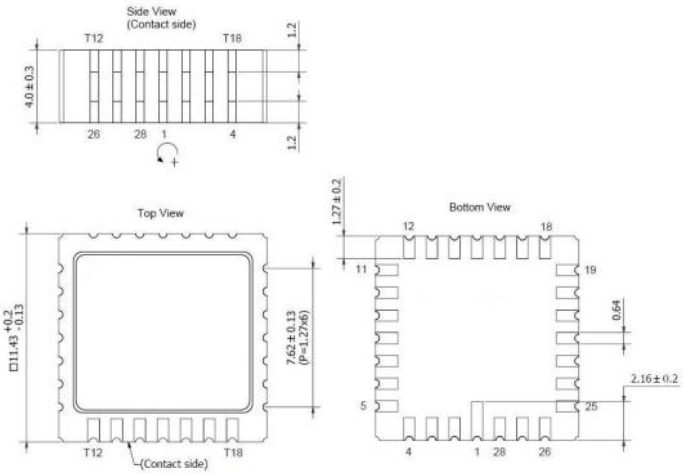
ELECTRICAL CONNECTIONS



HORIZONTAL MOUNT VERTICAL MOUNT

MECHANICAL DIMENSIONS

All dimensions in mm. The sensitive axis is indicated with arrow and sign.



PIN OUT

Horizontal mount	Veritical mount	Pin name	Comment
1	1	GND	Connect to ground
2	2	AVSS	Connect to ground
3	3	-	Connect to ground
4	4	REFV	Connect a 10 nF low ESR de-coupling capacitor between this pin and ground
5	-	-	NC
6	-	-	NC
7	-	-	NC
8	-	-	NC
9	-	-	NC
10	-	-	NC
11	-	-	NC
12	T18	-	Connect to ground
13	T17	-	Connect to ground
14	T16	AVDD	Connect to +5 VDC [1]
15	T15	-	NC
16	T14	VDD	Connect to +5 VDC [1]
17	T13	MOSI	SPI data input
18	T12	MISO	SPI data output
19	-	-	Connect to ground
20	-	-	Connect to ground
21	-	-	Connect to ground
22	-	-	NC
23	-	-	Connect to ground
24	-	-	Connect to ground
25	-	-	Connect to ground
26	26	SCLK	SPI clock
27	27	LOAD	SPI load
28	28	VSS	Connect to ground

1) Connect these pins together as close as possible to the package, and from there to ground via a 100nF low ESR decoupling capacitor.

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