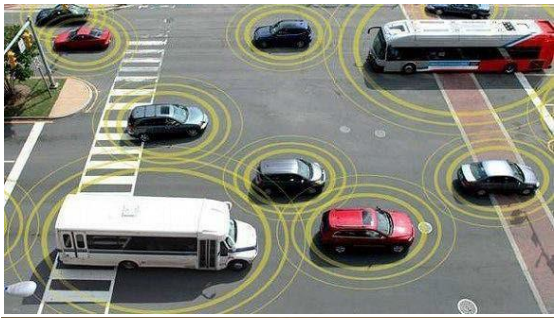
# Gyro100-1 Series

## MEMS Gyroscope

# Technical Manual

V3.0

## Introduction

Gyro100-1 is a high-precision and small-size micromechanical gyroscope based on MEMS technology. The product is independently designed, from the manufacturing process to the product packaging and testing to achieve localization, the working temperature range of the gyroscope is -40°C to +85°C, the storage temperature is -55°C to +125°C, and small-volume ceramics are used. The package has the characteristics of high precision, wide range, large impact resistance, wide applicable temperature range, and full digital output. This gyroscope integrates temperature compensation function and uses SPI bus to read and write data.

## Main Feature

- Small size：11×11×2.5mm
- 24-bit digital output
- Working temperature range: -40 °C~ +85°C
- Range：100°/s

## Application

- Inertial navigation
- Attitude Heading Reference System (AHRS)
- UAV flight control
- Integrated navigation
- Angular velocity measurement
- Dynamic inclinometer

# Technical index

## Performance index

| | | |
|---|---|---|
| 量程（Measurement Range） | 100 | deg/s |
| 输出精度（Resolution） | 24bit | bits |
| 数据输出率(Data Rate) | 2K | Hz |
| 延时（Group delay） | <50 | ms |
| 相位延时（@3DB） | / | deg |
| 带宽（Bandwidth (-3dB)） | 12 | Hz |
| 标度因子（Scale Factor at 25°C） | 80000 | lsb/deg/s |
| 标度因子重复性（Scale Factor Repeatability ）（1σ ） | <100 | ppm |
| 标度因子温漂（Scale Factor VS Temperature ）（1σ ） | <300 | ppm |
| 刻度因子非线性（Scale Factor Non-Linearity）（1σ ） | <300 | ppm |
| 零偏稳定性(Bias Instability) | <0.02 | deg/hr |
| 零偏稳定性(Bias stability @10s) | <0.1 | deg/hr |
| 零偏稳定性(Bias stability @1s) | <0.3 | deg/hr |
| 角随机游走（Angular Random Walk） | <0.005 | °/ √h |
| 零偏温漂（Bias error over temperature）（1σ ） | 3 | deg/Hr |
| 零偏温漂（Bias temperature variations, calibrated）（1σ ） | <0.3 | deg/Hr |
| 零偏重复性（Bias Run-Run）（1σ ） | <0.1 | deg/hr |
| 宽带噪声（Noise Peak to Peak） | <0.005 | deg/s |
| G值灵敏度(g Sensitivity) | <1 | °/hr/g |
| 振动整流误差(VRE) | <1 | °/hr/g（rms） |
| 上电时间（Startup Time） | 750 | Ms |
| 驱动轴频率（Sensor Resonant Frequency） | 10.5-13.5K | hz |
| 重量Weight | 1 | g |
| 尺寸 Dimension | 11×11×2.5 | mm |

## Environment, Power and Physical

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|---|---|
| 冲击(带电)（Shock (operating)） | 500g，1ms |
| 抗冲击（不带电）Shock (survival) | 10000g，10ms |
| 振动（带电）Vibration Operating | 18grms，筛选谱 |
| 工作温度Operating Temperature | -40~85 ℃ |
| 电源电压(Supply voltage) | 5±0.25V |
| 电流(Current consumption) | 45ma |

# ESD Prevention Recommendations

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|---|---|
|  | **ESD**<br><br>Live components and circuit boards may discharge without detection. Although this product has proprietary protection circuitry, the device may be damaged when exposed to high energy ESD. Therefore, proper ESD precautions should be taken to avoid device degradation or loss of functionality. |

1. Environmental control: All areas for the manufacture, production, operation, turnover, and storage of electrostatic sensitive devices belong to the electrostatic protection area. It is recommended to control the temperature and humidity. Temperature: 20~30°C, relative humidity (RH): 40~75%.
2. Anti-static signs: Anti-static work areas should have anti-static signs to warn anyone who is in contact with electrostatic sensitive devices that electrostatic protection must be carried out when operating the devices.
3. Anti-static floor: An anti-static floor should be laid in the anti-static work area, and the surface resistance and grounding resistance should be monitored regularly.
4. Grounding control: Electrically connect a conductive part of various equipment and instruments in the anti-static work area to the grounding body through a conductor, and check regularly to ensure that it is well grounded.
5. Anti-static workbench: The surface of the anti-static workbench should be made of static dissipative materials or laid with anti-static mats and effectively grounded. All electrostatic devices that touch it will be slowly and safely discharged through the distributed resistance of its surface to the ground. arrived.
6. Personnel: All personnel entering the anti-static area must wear anti-static work clothes, anti-static work shoes or anti-static shoe covers, and those who touch static-sensitive devices should also wear anti-static wrists. Conduct regular ESD protection training and lectures to enhance the awareness of ESD protection for all personnel.
7. Anti-static packaging: The materials used in the production, storage and transportation of electrostatic sensitive devices, components, and products must be anti-static materials.

## Installation reference

High-performance MEMS gyroscopes are high-precision test equipment. In order to achieve the best design results, it is recommended to consider the following aspects when installing devices on the PCB:

1. In order to evaluate and optimize the placement of sensors on the PCB, it is recommended to consider the following aspects and use additional tools during the design phase:

➢ Regarding heat;

➢ Regarding mechanical stress: bending measurements and/or finite element simulations;

➢Regarding the robustness of impact: After soldering the PCB of the target application in the recommended way, perform a drop test.

2. It is recommended to maintain a reasonable distance between the sensor mounting location on the PCB and the critical points described below (the exact value of "reasonable distance" depends on many customer-specific variables and must therefore be determined on a case-by-case basis):

➢It is generally recommended to minimize the PCB thickness (recommendation: 1.6~2.0mm), because the inherent stress of the thin PCB board is small;

➢It is not recommended to place the sensor directly under the button or close to the button, because there will be mechanical stress;

➢ It is not recommended to place the sensor near a hot spot with extremely high temperature (such as a controller or graphics chip), which will heat the PCB board, which will cause the temperature of the sensor to rise.