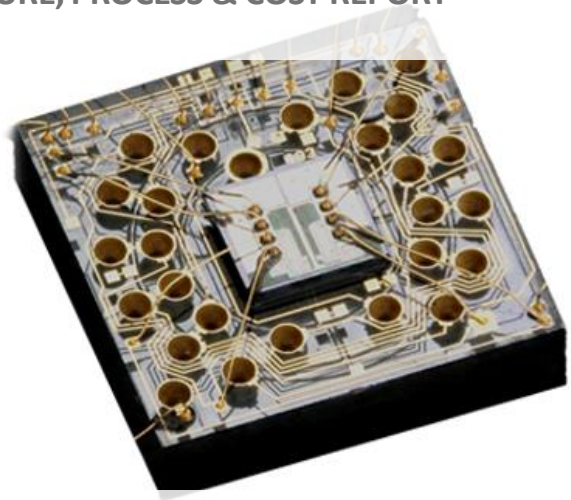
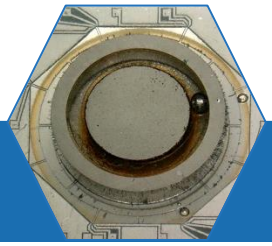
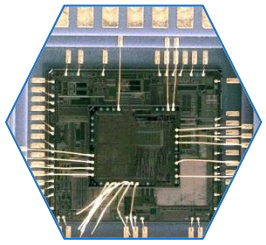


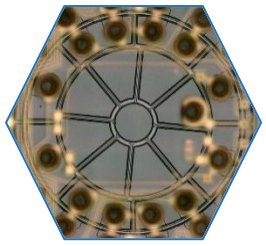




Silicon Sensing Systems Gyroscope Design Comparison

Technical and cost comparison of the technologies integrated by Silicon Sensing in its piezoelectric, capacitive and inductive gyroscopes.





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Founded in 1998, Silicon Sensing is now a world leader in high-end Inertial Measurement Unit (IMU) technology. During the last six years, Silicon Sensing, which is a joint venture between Sumitomo Precision Products and UTC Aerospace Systems, has upgraded its portfolio and added two new technologies to implement its gyroscope MEMS. This report highlights the inductive, capacitive and piezoelectric Vibration Structure Gyroscope (VSG) technologies from Silicon Sensing.

The report studies three components. The CMS300 is dedicated to automotive applications. The CRG20 is for automotive and industrial applications. The SGH03 is found in the CHR02 module, a tactical grade gyroscope. These represent the three main Silicon Sensing technologies and markets.

Silicon Sensing has a broad range of products from simple axis gyroscopes and accelerometers up to IMU modules. Its market applications are mainly high-end with aeronautic, military, marine but also the IMU for the high-growth Advanced Driver Assistance System (ADAS) automotive market. All the products integrate a VSG but the drive technology is very different between them.

Silicon Sensing has developed three different technologies to create the vibration in the oscillating ring. Today, they are optimized for different markets and applications.

This report studies metallic and ceramic package technologies, with and without vacuum seal and integrated circuit (IC) die. Every gyro is calibrated for different application grades, like automotive or aeronautic. The gyroscopes are laser trimmed after manufacturing to enhance their accuracy.

This full reverse costing study has been conducted to provide insights into technology data, the manufacturing cost and selling price of three Silicon Sensor technology platforms. The specific platforms are the VSG3Qmax, latest iteration of the inductive drive VSG, the capacitive drive VSG and the latest technology the piezoelectric drive VSG.

The report contains a detailed comparative physical analysis with process descriptions and a comparative manufacturing cost analysis between the three gyroscopes. A teardown, a bill of material, cost and selling price estimation of each IMU selected is also available.

COMPLETE TEARDOWN WITH

- Detailed photos of the gyroscopes
- Die floor plan analysis
- Precise measurements
- Materials analysis
- Manufacturing process flow
- Supply chain evaluation
- Comparison of gyroscope technologies
- Manufacturing cost analysis

TABLE OF CONTENTS

Overview/Introduction
- Executive Summary
- Reverse Costing Methodology

Company Profile

Physical Analysis
- Summary of the Physical Analysis
- CMS300 – piezoelectric Gyroscope
  - ✓ Package views
  - ✓ Die overview and dimensions
  - ✓ Die process
  - ✓ Die cross-section
  - ✓ Die process characteristics
- CRG20-01 – Capacitive Gyroscope
  - ✓ Package views
  - ✓ Package cross-section
  - ✓ Die overview and dimensions
  - ✓ Die process
  - ✓ Die cross-section
  - ✓ Die process characteristics
- SGH03-13L03 – Inductive Gyroscope
  - ✓ Package views
  - ✓ Package cross-section
  - ✓ Die overview and dimensions
  - ✓ Die process
  - ✓ Die cross-section

Die Process Characteristics Manufacturing Process
- CMS300 – piezoelectric Gyroscope
  - ✓ Global overview
  - ✓ ROIC wafer
  - ✓ Microbolometer wafer
  - ✓ Process flow
- CRG20-01 – Capacitive Gyroscope
- SGH03-13L03 – Inductive Gyroscope

Cost Analysis
- Yield Explanations and Hypotheses
- CMS300 – Piezoelectric Gyroscope
  - ✓ Gyroscope MEMS wafer and die cost
  - ✓ BOM cost
  - ✓ Package cost
  - ✓ Component cost
- CRG20-01 – Capacitive Gyroscope
- SGH03-13L03 – Inductive Gyroscope

AUTHORS

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RELATED ANALYSES

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Comparison of different accelerometers and gyroscopes from Analog Devices integrated in high-end IMUs.

May 2021 - EUR 6,490*

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High-end inertial sensors are still the backbone of systems that will enable autonomous transportation and the new space industry despite COVID-19.

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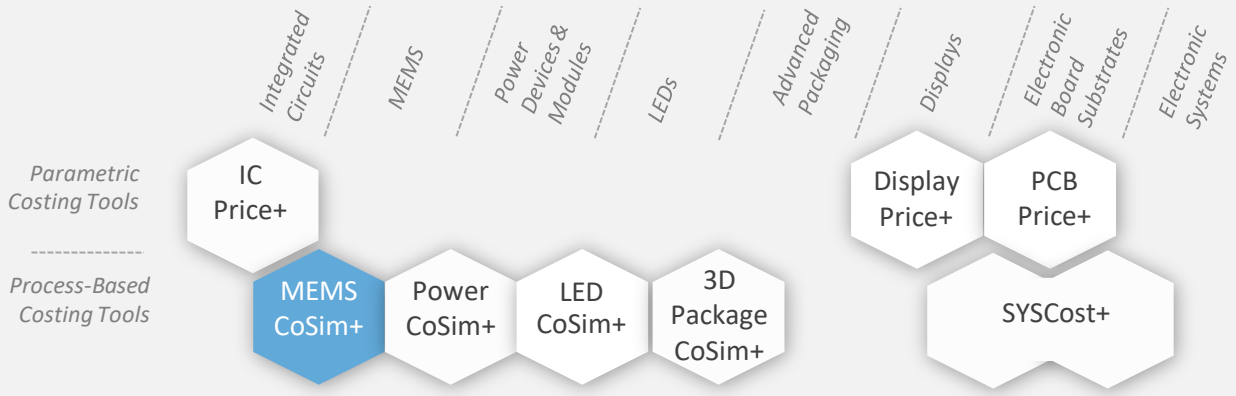
COSTING TOOLS



Our analysis is performed with our costing tool MEMS CoSim+.

System Plus Consulting offers powerful costing tools to evaluate the production cost and selling price from single chip to complex structures.

MEMS CoSim+
Cost simulation tool to evaluate the cost of any MEMS process or device.

WHAT IS A REVERSE COSTING®?

Reverse Costing® is the process of disassembling a device (or a system) in order to identify its technology and calculate its manufacturing cost, using in-house models and tools.

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