

# MEMS Sensors & Actuators

## 2019 Patenting Activity

*What is driving recent MEMS IP activities?*

### REPORT OUTLINE

- MEMS 2019 Patenting Activity
- June 2020
- Ref.: KM20005
- PDF > 80 slides
- Excel file > 4,350 patents
- € 2,990 for a multi-user license



### REPORT'S KEY FEATURES:

- **Overview of the most recent patents** published in 2019 by MEMS players.
- **Main patent applicants.**
- **Main MEMS technologies and devices analyzed:**
  - Inertial sensors (accelerometers, gyroscopes, IMUs)
  - Microphones
  - Microspeakers
  - Ultrasonic sensors
  - Gas sensors
  - Pressure sensors
  - Micromirrors
  - MEMS Packaging
- **IP dynamics and trends** of the different MEMS devices.
- **Comparison of recent IP and market activities.**
- **Noticeable 2019 patents** from main players.
- **Excel database** containing all patents analyzed in the report, including technology and application segmentation.

### RELATED REPORTS

- [LiDAR for Automotive Patent Landscape \(2018\)](#)
- [Miniaturized Gas Sensors Patent Landscape \(2018\)](#)
- [iPhone X Proximity Sensor and Flood Illuminator – Patent to Product Mapping \(2018\)](#)

### A stable IP landscape with new opportunities and increasing competition

MEMS sensors and actuators are key components in numerous applications. Indeed, electronic devices need to be more and more connected to the real world in order to provide better experiences to the customer. Sensing and interacting with the environment is therefore becoming critical, especially in the automotive, consumer and industrial markets. Indeed, autonomous vehicles, AR/VR and industry 4.0 require the use of numerous sensors to realize their dreams.

According to Yole Développement, **the market will exhibit +8.3% growth in value and +11.9% growth in units**, with consumer still having the greatest share (over 60%) from 2019 to 2024. This growth rate is below previous rates, however, and the automotive and consumer markets are levelling off. As growth slows down, competition between the different players is getting tougher and tougher, since the cake is not as big. On the M&A front, MEMS-related acquisitions declined during the last year, reflecting the weaker, general semiconductor-related M&As and a consolidation of the business. Furthermore, there were no significant new entrants, and existing players struggled to compete against one another.

In this context, this **MEMS Sensors & Actuators 2019 Patenting Activity** report aims to **decipher the recent patenting activities and related R&D developments of MEMS players**. This report also tracks **weak signals** in order to find **new applications** or **new R&D directions** that are currently being investigated, as well as **newcomers** entering the landscape.

The patents published in 2019 confirm the slight decrease that we can see at market level. Indeed, even if the number of patents remains quite significant, most of the IP segments have remained stable. This is the case for **inertial sensors**, **micro mirrors** or **pressure sensors**. However, despite this general trend, some recent developments of MEMS for new applications seem promising. For instance, patents in 2019 confirm the strong activity related to **piezoelectric MEMS dedicated to automotive** (headlamp, head-up display, etc.) or **consumer applications** (fingerprint sensors, voice machine interface).

2019 is also marked by the **strong patenting activity of Chinese players**. Indeed, Chinese players filed over 60% of the patents published in 2019 and even led most of the MEMS devices. This strong activity could be a sign of the significant investments that Chinese companies have made to boost their competitiveness and challenge major European and US companies.

Main patent assignees for patents first published in 2019

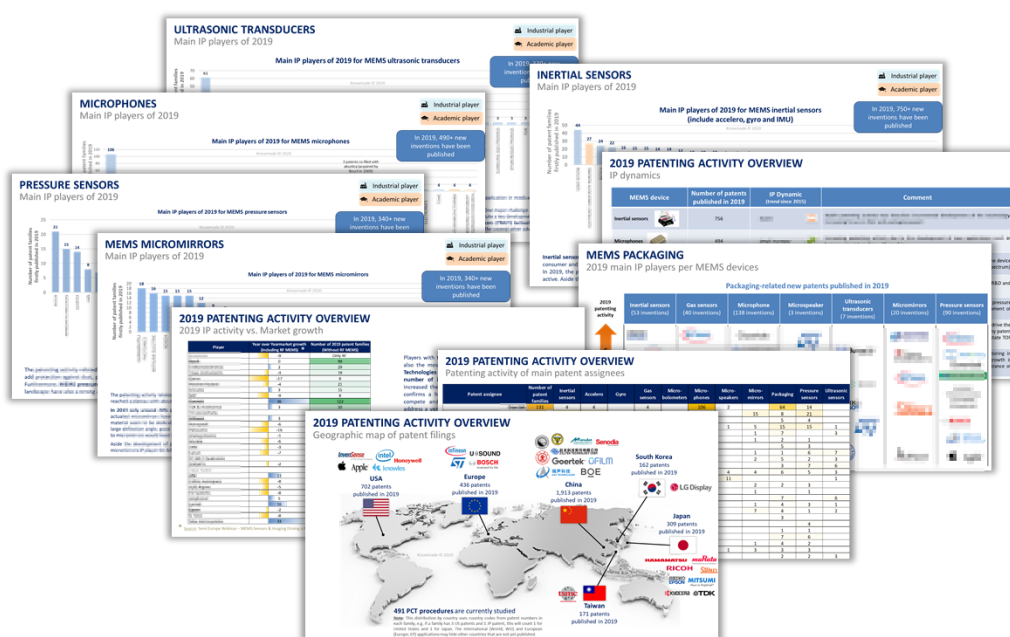
Inertial sensors	Gas sensors	Microphone	Microspeaker	Ultrasonic transducers	Micromirrors	Pressure sensors
SEIKO EPSON	MicroJet MicroJet Technology Co., Ltd.	Goertek	Xinwei acoustics technology	OFILM	HAMAMATSU	BOSCH Invented for life
BOSCH Invented for life	Infineon	瑞声科技 AAC TECHNOLOGIES	Aofei Acoustics Technology Co.	BOE	RICOH	Infineon
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KYOCERA					muRata	
Senodia						
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## Who are the main IP players and what are their 2019 patenting activities?

This report provides a detailed picture of the **patents published in 2019** for MEMS sensors and actuators, including **inertial sensors** (accelero, gyro, IMUs), **microphones**, **microspeakers**, **ultrasonic sensors**, **pressure sensors**, **micromirrors**, **microbolometers**, **gas sensors**, etc.

We have selected and analyzed over 3,000 inventions specifically related to **MEMS transducers**, **MEMS devices** and **MEMS packaging**. All other patents related to materials, wafer manufacturing, driver circuits and systems have been excluded.

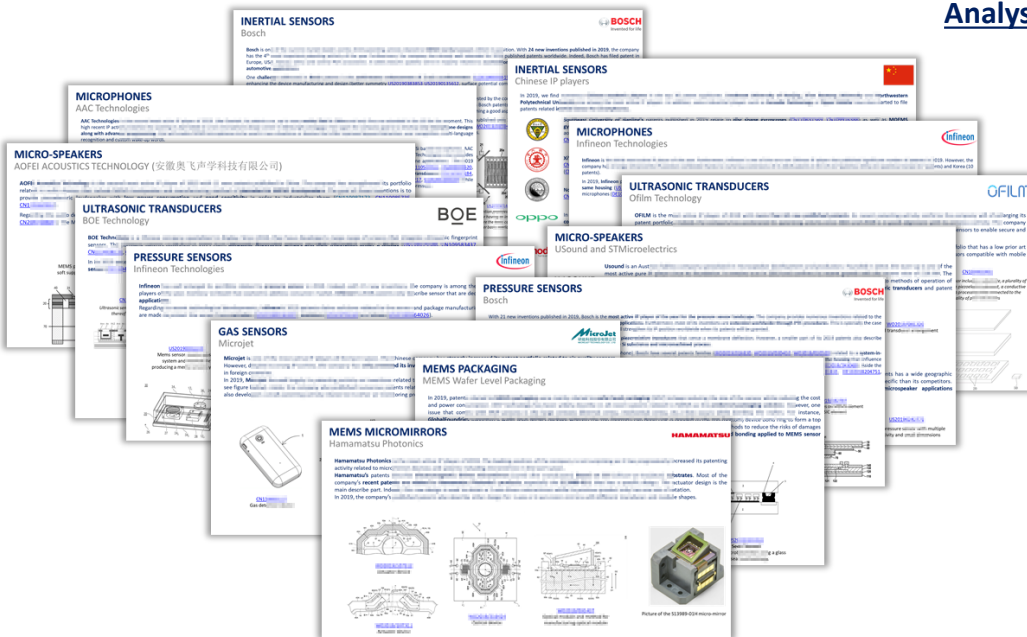
The report provides an **overview of the most recent patents published in 2019 by MEMS players for each MEMS technology and device**. For each player, we highlight and provide information about their **recent and future technology developments**. A comparison between their **2019 market position** and their **2019 patenting activity** is also provided.



## Analysis of main technology developments

This report provides a detailed analysis of the **technologies developed by the main IP players**. A detailed description of the **most noticeable patents published in 2019** is also provided.

Knowmade **highlights any change in the players' activities** as well as an analysis of **new applications/technologies and their related challenges**, thus giving an understanding of the current main IP drivers and potential future markets.



## Report's main assets

### Understanding the key players' recent IP and current technology development

There are more than 1,000 patent applicants involved in the MEMS 2019 patent landscape. This report reveals the most active IP players for all types of MEMS devices. A detailed analysis of their 2019 patents and their related challenges and applications is provided.

### Identifying the opportunities

This report gives an overview of the current dynamics and technologies. Opportunities and inventions linked to new applications are analyzed. It also provides a detailed analysis of the technology described in the patents. For each segment we identify the new technological approach for the different targeted markets.

### Useful Excel patent database

This report also includes an Excel database of the 4,350 patents and patent applications analyzed in this study. This useful patent database allows for multi-criteria searches and includes patent publication numbers, hyperlinks to the original documents, priority date, title, abstract, patent assignees, patent's current legal status, and technological and application segments.

**COMPANIES MENTIONED IN THIS REPORT (NON-EXHAUSTIVE LIST)**

Goertek, Bosch, Microjet Technology, Infineon Technologies, Seiko Epson, Southeast University Nanjing, Xi'an Jiaotong University, Tsinghua University, Invensense, STMicroelectronics, Aofei Acoustic Technology, Nanjing University of Science & Technology, Northwestern University, Wuhan University, North University of China, Murata Manufacturing, Hewlett Packard Development, AAC Technologies, SMIC, Senodia Technologies, Memsensing Microsystems, Huazhong University of Science & Technology, Apple, TDK, Texas Instruments, Hamamatsu Photonics, University of Electronic Science & Technology of China, Mitsumi Electric, ZillTek Technology, Cea, TSMC, Stanley Electric, Knowles Electronics, Silan, Beijing University of Technology, Shanghai Institute of Microsystem & Information Technology Chinese Academy of Sciences, Nanjing University of Posts & Telecommunications, Analog Devices, Kyocera, Denso, and more.

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Scope of the segment			

**AUTHORS****Dr. Paul Leclaire**

Paul works for Knowmade in the field of MEMS and Sensors. He holds a PhD in Micro & Nanotechnology from the University of Lille (France), in partnership with the IEMN of Villeneuve-d'Ascq and the CRHEA-CNRS of Sophia-Antipolis.

**Contact:** paul.leclaire@knowmade.fr

**Dr. Nicolas Baron**

Nicolas is CEO and co-founder of Knowmade. He manages the development and strategic orientations of the company and personally leads the Semiconductor & Electronics Department. He holds a PhD in Physics from the University of Nice Sophia-Antipolis, and a Master of Intellectual Property Strategies and Innovation from the European Institute for Enterprise and Intellectual Property (IEEPI Strasbourg), France.

**Contact:** nicolas.baron@knowmade.fr

**ABOUT KNOWMADE**

**Knowmade** is a Technology Intelligence and IP Strategy consulting company specialized in analysis of patents and scientific information. The company helps innovative companies and R&D organizations to understand the competitive landscape, follow technology trends, and find out opportunities and threats in terms of technology and patents.

**Knowmade's** analysts combine their strong technology expertise and in-depth knowledge of patents with powerful analytics tools and methodologies to turn patents and scientific information into business-oriented report for decision makers working in R&D, Innovation Strategy, Intellectual Property, and Marketing. Our experts provide prior art search, patent landscape analysis, scientific literature analysis, patent valuation, IP due diligence and freedom-to-operate analysis. In parallel the company proposes litigation/licensing support, technology scouting and IP/technology watch service.

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## MEMS Sensors & Actuators: 2019 Patenting Activity

Patent Landscape Analysis – June 2020

Ref.: KM20005

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BIC/SWIFT: CCBPFRPPMAR

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