

MEMS pressure sensors: much more than “business as usual”¹

The automotive market is still driving revenues for MEMS pressure sensors – but for how long?

OUTLINE:

- **Market forecasts:**
After a slight drop in 2020, the global MEMS² pressure market is expected to grow at US\$2.2 billion in 2026, with a 4% CAGR₂₀₁₉₋₂₀₂₆³.
Automotive is the biggest market segment with roughly \$1 billion in 2026, with a 3.4% CAGR₂₀₁₉₋₂₀₂₆.
The 2nd biggest market segment is the consumer sector. It is expected to reach \$0.5 billion in 2026.
Markets to watch are industrial and medical, showing the most important growth between 2019 and 2026 with 6.1% and 4% CAGR respectively.
- **Technology trends:**
MEMS pressure sensors are a mature technology that currently dominates the low-pressure market segment – under 10 bars.
Piezoresistive is and will remain the main MEMS technology for the next five years.
- **Supply chain:**
The top three MEMS pressure sensor players, Robert Bosch, TE Connectivity and Infineon Technologies, are already well-established and technologically advanced. TE Connectivity and Amphenol were in an acquisition spree in the last 3 years.
Market leaders differ for each market., while many players are present across various markets.

“Pressure sensors are widely used throughout the industry across numerous applications.” asserts **Dimitrios Damianos, Technology & Market Analyst at Yole Développement (Yole)**. *“In the last couple of decades, automotive has been one of the main sectors to drive demand*

¹ Extracted from: MEMS Pressure Sensors - Technology and Market Trends 2021, Yole Développement, 2021

² MEMS: Micro-Electro-Mechanical Systems

³ CAGR: Compound Annual Growth Rate

for these devices. The development of new systems in conventional internal combustion engine vehicles, as well as hybrid electric vehicles, is demanding complex control systems”.

Many different sensing technologies have been used so far for measuring pressure in automotive, industrial, defense & aerospace and other harsh environments. Examples include strain gauges on metal substrates, plus capacitive and piezo-resistive sensors using ceramic materials that are used to sense pressures of several tens or hundreds of bars. But for pressure levels below the 5-10 bar mark their sensing elements become relatively big and expensive. This is where MEMS pressure sensors have strongly penetrated.

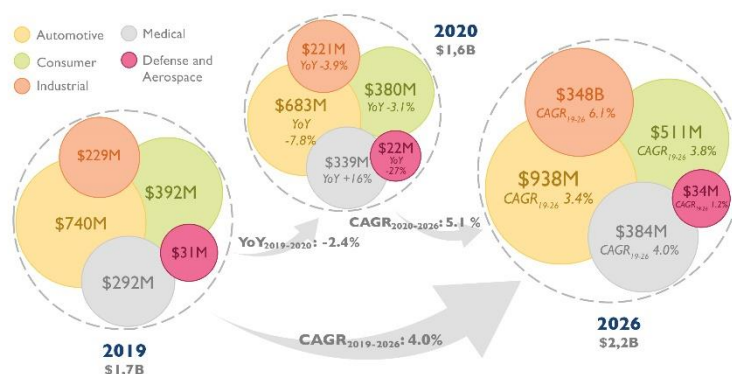
Released today, the [MEMS Pressure Sensors - Technology and Market Trends 2021 report](#) summarizes the status of the MEMS pressure sensor industry in a thorough manner, taking into account the trends for each application and market separately. Focus of this version is green mobility and electrification, that has significant implications for the future of MEMS pressure sensors. Spanning from market forecasts, to market trends to technology trends, this study also delivers an in-depth understanding of the ecosystem, supply chain and main players’ strategies.

What are the economic and technological challenges of the MEMS pressure sensors industry? What are the key drivers? Who are the companies to watch?

Yole presents today its vision of the MEMS pressure sensors industry.

2019-2026 MEMS pressure sensor market dynamics

(Source: MEMS Pressure Sensors - Technology and Market Trends 2021 report, Yole Développement, 2021)



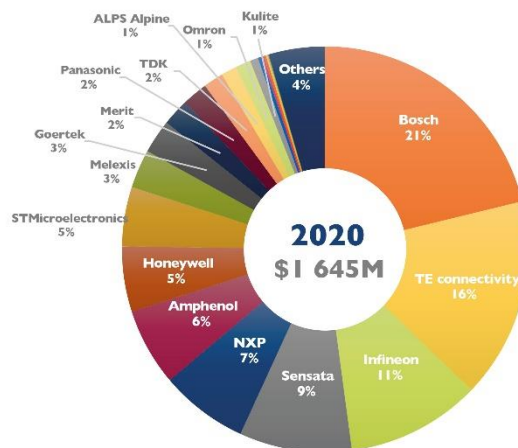
As analyzed by Yole’s team in the new [MEMS Pressure Sensors - Technology and Market Trends 2021 report](#), the global pressure MEMS market amounted to US\$1,685 million in 2019, expected to slightly drop to US\$1,645million in 2020 due to COVID-19 ebbs and flows. By 2026, the whole market is expected to grow to US\$2,214 million, at a 4% CAGR. According to **Jérôme Mouly, Team Lead Analyst in the Sensing & Actuating team within the Photonics & Sensing Division at Yole**: “During recent years, miniaturization, low power, and cost effectiveness have allowed the consumer market to grow significantly, mainly due to

the use of pressure MEMS barometers and altimeters in smartphones, drones, e-cigarettes and consumer white goods. This technology will continue gaining traction by other use-cases, such as 911 e-calls now that all US smartphones must integrate a pressure sensor, for exact altitude positioning, higher attachment rate in smartphones, wearables applications and e-cigarettes”.

Miniaturization of pressure MEMS has allowed their use in invasive medical applications like blood pressure monitoring. Other niche medical markets like catheters, inflating device monitoring for cardiovascular applications that are invasive and require high accuracy, low-cost sensors, are fully using the advantages of MEMS technologies and could foster broader use in the medical market.

2020 MEMS pressure sensor players revenues (\$M)

(Source: MEMS Pressure Sensors - Technology and Market Trends 2021 report, Yole Développement, 2021)



The industrial market is also interesting to follow. Because we are at the verge of Industry 4.0 and factory automation, process control and smart meters could present good growth opportunities.

Defense & aerospace pressure MEMS comprise less than 5% of the total pressure MEMS market, growing only slowly and gradually replacing older technologies.

Finally, in the automotive market pressure MEMS continue to grow thanks to the evolution towards greener driving and increased autonomy levels that demand enhanced safety. TPMS⁴ and China 6 regulations will cause the DPF⁵ and GPF⁶, EVAP⁷, EGR⁸ and TPMS applications to grow in the future. However, one risk is imminent. The recent acceleration of battery EV⁹ could mean the slow-down of pressure sensors in the traditional ICE¹⁰ powertrain. But new applications could emerge, such as thermal runaway monitoring in battery cells, promising significant growth.

⁴ TPMS: Tire Pressure Monitoring Systems

⁵ DPF: Diesel Particulate Filter

⁶ GPF: Gasoline Particulate Filter

⁷ EVAP: Evaporative Emissions Control Systems

⁸ EGR: Exhaust Gas Recirculation

⁹ EV: Electric Vehicles

¹⁰ ICE: Internal Combustion Engine

For the moment and in the next 5-10 years to come at least, powertrain pressure MEMS will keep growing modestly. However, the big question arises is what happens beyond the next decade as the classic ICE powertrain dies.

This will have significant implications for the players involved. Up until now, pressure MEMS, being a historically stable market, has not experienced any dramatic changes in its player landscape, besides some recent mergers and acquisitions. In the past two years big players like Amphenol and TE Connectivity were hungry to strengthen their pressure MEMS portfolios and synergies.

*“Today’s top three pressure MEMS players – Bosch, TE Connectivity and Infineon – are already well established and technologically advanced, operating with large economies of scale” says **Dimitrios Damianos**. “They occupy almost half of the US\$1,645 million total market. Bosch and Infineon were consistently leaders in the past. Bosch has a strong presence in the automotive and consumer market, and Infineon is mainly in the automotive market. TE Connectivity has climbed up the rankings due to the acquisitions of SMI and First Sensor, acquiring significant capabilities for pressure MEMS in medical and industrial markets. Now TE Connectivity has a diversified portfolio.”*

But with the decline in ICE vehicles further in the horizon, there is a risk for automotive pressure MEMS players losing a significant amount of powertrain pressure business. Luckily, the main stakeholders active in this domain have time to assess the situation and react. Therefore, decisions must be taken soon. Will companies target new markets away from automotive? Or will they look for new applications and novel use-cases? Will they redirect their strategy towards other types of sensors or systems? Or will they make acquisitions, leading to market and power consolidation?

All year long, *Yole Développement* publishes numerous MEMS and sensors-related reports and monitors. In addition, experts realize various key presentations and organize key conferences.



In this regard, do not miss the MEMS Engineer Forum 2021. **Dimitrios Damianos** will present “What will be the opportunities for MEMS in the new normal?” on April 21, 2021 and **Eric Mounier, PhD, Director of Market Research at Yole Développement** the panel discussion: “MEMS contribute to Smart Society resilient to Pandemic” on April 22, 2021. Register now on [i-Micronews!](#)

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About our analysts

Dimitrios Damianos, Ph.D., is a Technology & Market Analyst, part of the Photonics & Sensing division at Yole Développement (Yole). Based on solid technical expertise in imaging, sensing, display, lighting, and photonics, Dimitrios oversees the day-to-day production of valuable technology & market reports and custom consulting projects. Dimitrios also serves as a member of the Custom Project Business Development division (CPBD), supporting the development of strategic projects and following Yole's leading customers within the semiconductor industry. Dimitrios plays a key role in the expansion of Yole's market & technical knowledge, maintaining long-term relationships with key accounts and ensuring their expectations are met. Dimitrios regularly presents and delivers keynotes at international conferences and exhibitions. He has also authored and co-authored several technical & market reports as well as scientific papers in international peer-reviewed journals. Dimitrios holds a BSc in Physics and an MSc in Photonics, both from the University of Patras (GR), and a Ph.D. in Optics & Microelectronics from the University of Grenoble-Alpes (FR).

Jérôme Mouly is Team Lead Analyst in the Sensing & Actuating team within the Photonic & Sensing Division at Yole Développement (Yole). Jérôme manages the expansion of the technical expertise and market know-how of the team. He actively supports and assists in the development of a dedicated collection of market & technology reports as well as custom consulting projects. He has conducted more than 100 marketing and technological analyses for industrial groups, start-ups, and institutes in the field of MEMS and sensing technologies. Jérôme has been also deeply engaged in Yole's finance activities with a dedicated focus on the commercial exploitation of smart system technologies and access to funding opportunities. Jérôme is regularly involved in international conferences, with presentations and keynotes. Jérôme Mouly earned a Master of Physics degree from the University of Lyon (FR).

About the report

MEMS Pressure Sensors - Technology and Market Trends 2021

Healthy growth is expected for the pressure MEMS market in the next five years, but uncertainty comes after 2026, due to the transition to EVs, eventually exerting pressure to sensor manufacturers. – Performed by Yole Développement

Companies cited:

Alps Alpine, Altria, Amphenol, APM, Autochips, Baolong, BAT, BMW, Bosch, CF Sensor, Continental, Danfoss, Delphi, Denso, SMI (Elmos), First Sensor, Fuji Electric, GEDruck, Goertek, Hamilton Medical, Hiway, Honeywell, Infineon, Invensense, JTI, Juul, Kistler, Keller, Kulite, Medtronic, Meggit, Melexis, Memscap, MEMSensing Microsystems, Merit Sensor, Merit Medical, MT Microsystems, Murata, Nano-MEMS, Navinfo, Nextnav, NXP, OMB Warehouse, Omron, Onkar, Panasonic, Philip Morris International, Philips Healthcare, QST, Rohm, Schraeder, Senasic, Sensata, Sensirion, ShuangQiao Sensors, STMicroelectronics, Syrik, TDK, TE Connectivity, Teledyne, Tesla, Tire Safeguard, Thales, Toyota, TPMS Warehouse, Visture, Volkswagen, X-Fab, and more...

Related reports:

- [Status of the MEMS Industry 2020](#)
- [Wearables in Consumer and Medical Applications 2020](#)
- [Power Electronics for E-Mobility 2021](#)
- [Infineon DPS310 Capacitive Pressure Sensor](#)
- [MEMS Pressure Sensor Comparison 2018](#)

About Yole Développement

Founded in 1998, Yole Développement (Yole) has grown to become a group of companies providing marketing, technology and strategy consulting, media and corporate finance services, reverse engineering and reverse costing services and well as IP and patent analysis. With a strong focus on emerging applications using silicon and/or micro manufacturing, the Yole group of companies has expanded to include more than 80 collaborators worldwide... [More](#)

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