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EV Group Advances 300-mm MEMS Manufacturing with Next-Generation GEMINI® Automated Production Wafer Bonding System

Platform incorporates newly designed high-force bond chamber that ensures excellent bond quality and yield across larger wafer surfaces

ST. FLORIAN, Austria, March 18, 2025—EV Group (EVG), a leading provider of innovative process solutions and expertise serving leading-edge and future semiconductor designs and chip integration schemes, today unveiled the next-generation version of its GEMINI® automated production wafer bonding system for 300-mm wafers. Based on the global industry standard for high-volume-manufacturing (HVM) wafer bonding, the new GEMINI equipment platform includes a newly designed high-force bond chamber that ensures excellent bond quality and yield for MEMS devices built on larger wafers. EVG has already delivered several GEMINI systems built on the new equipment platform to multiple leading MEMS manufacturers.

According to Yole Group, the MEMS market is set to grow from US$14.6 billion in 2023 to US$20 billion in 2029 (1). This growth is largely driven by inertial sensors, microphones, and new generations of MEMS, including microspeakers, which are increasingly used in smartwatches, True Wireless Stereo (TWS) earbuds, and other consumer wearable devices. Many MEMS devices need to be protected from the external environment or can operate only under controlled atmosphere or vacuum. Metal-based wafer bonding (Eutectic, Transient-Liquid-Phase and Thermo-compression) plays an essential role in the manufacture of these MEMS devices by enabling hermetic sealing and pressure or vacuum encapsulation.

MEMS manufacturers have begun to transition from 200-mm to 300-mm production lines to achieve economies of scale and meet growing market demand for MEMS devices, as well as to support new device integration schemes such as CMOS-MEMS integration, and the production of MEMS devices with larger footprint, such as ultrasonic MEMS and micromirrors. However, migrating to 300-mm wafers requires significantly higher bond forces compared to 200-mm wafers to ensure the same bond pressure over a much larger surface area.

EVG's next-generation GEMINI system for 300-mm wafers exceeds the specifications required for 300-mm MEMS manufacturing – meeting the needs of both current and future MEMS device generations. An integrated modular HVM system for aligned wafer bonding, the GEMINI platform features up to four bond chambers with adjustable bond force (up to 350 kN), high vacuum (down to 5×10^{-6} mbar) and overpressure capability (2000 mbar abs.). It also maintains the industry-leading capabilities of the previous-generation platform, including fully automated optical alignment, full flexibility with customizable module configurations and support for a wide range of bonding processes.

"EVG has more than 30 years of experience providing production wafer bonding systems for the MEMS industry. Working closely with our customers and partners, we can see key trends and inflection points in this market very early on, and plan accordingly," stated Dr. Thomas Glinsner, corporate technology director at EV Group. "Our next-generation GEMINI wafer bonding system is a prime example of EVG putting our long-term vision and experience into action. The result is the first wafer bonder of its kind for the MEMS industry, which helps our customers to stay on their technology roadmaps and bring innovative and exciting new MEMS devices and end-products to market."

Product Availability
EVG is now accepting orders for the next-generation GEMINI automated production wafer bonding system, and is offering product demonstrations at EVG's headquarters. For more information, please visit https://www.evgroup.com/products/bonding/permanent-bonding-systems/gemini

Reference
(1) Source: Status of the MEMS Industry 2024, Yole Intelligence, June 2024

About EV Group (EVG)
EV Group (EVG) provides innovative process solutions and expertise that serve leading-edge and future semiconductor designs and chip integration schemes. The company's vision of being the first in exploring new techniques and supporting next-generation applications of micro- and nanofabrication technologies enables customers to successfully commercialize new product ideas. EVG's high-volume-manufacturing-ready products, which include wafer bonding, lithography, thin-wafer processing and metrology equipment, enable advances in semiconductor front-end scaling, 3D integration and advanced packaging, as well as in other electronics and photonics applications. More information about EVG is available at www.EVGroup.com.

Contacts:
Clemens Schütte
Director, Marketing and Communications
EV Group
Tel: +43 7712 5311 0
E-mail: Marketing@EVGroup.com

David Moreno
Principal
Open Sky Communications
Tel: +1.415.519.3915
E-mail: dmoreno@openskypr.com

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