Wafer Level Packaging reaches new heights…¹

Quarterly Market Monitor

MARKET DYNAMICS:

- WLP² market expected to surpass $5B threshold by 2023.
- The WLP package market will grow at 5.2% as it finds more applications in Mobile/Consumer/IoT³ segment and driven by 5G deployment.
- WLCSP⁴ remains a mainstream and cost-effective form factor: Q4 2019 was a record quarter as demand recovery seen by OSATs⁵. And 2020 outlook remains positive.
- FO⁶ package market will reach more than US$2B by 2025. Fan-out finds increased heterogenous applications such as Apple APU⁷ package on InFO-PoP and upcoming InFO-AiP devices.

2020 – 2025 WLCSP OUTLOOK

Revenue slightly increased in 2019 due to the new generation of smartphones & to the wearable/IoT ecosystem

“Number of WLCSP packages exceeded 29 billion units in 2019 and many players continue to add capacity and capability in key geographies”, announces Vaibhav Trivedi, Technology & Market Analyst, Advanced Packaging at Yole Développement (Yole). But what are the main market drivers?

First, PMICs⁸, audio-Codecs and connectivity modules lead WLCSP package growth as more devices adopt this platform. In addition, 5G, and IoT remain drivers as WLCSP package count is expected to increase to support high bandwidth applications.

In parallel, the Deca M-Series continues to gain momentum in “fan-in” form as Qualcomm starts adoption with growing need for package side protection and enhanced board reliability.

Finally, WLCSP packages will play a critical role in RF package eco-system as many wire bond parts are expected to be converted to flip chip form factors driving additional growth.

In this dynamic context, the 2020-2025 outlook remains strong and robust as new adoption of WLCSP form factors gains wide adoption in all smartphone/luxury phones.

¹ Extracted from Advanced Packaging Quarterly Market Monitor, Yole Développement, March 2020
² WLP: Wafer Level Packaging
³ IoT: Internet of Things
⁴ WLCSP: Wafer Level Chip Scale Packaging
⁵ OSAT: Outsourced Semiconductor Assembly and Test
⁶ FO: Fan-Out
⁷ APU: Application Processor Unit
COMPANY FOCUS
TSMC goes “all-in”…
TSMC announced unprecedented $1.5B CapEx investment in 2020 for advanced packaging business specifically geared toward SoIC, InFO variants, and the CoWoS product line, with an estimated $300M for the InFO (PoP/AiP/OS/MS) product line. TSMC started manufacturing Apple APUs on InFO platform in 2016, disrupting the supply chain as substrate suppliers and OSATs lost this Apple APU business to TSMC. TSMC continues to “bite” into traditional OSAT business for Apple APU PoP assembly and AiP module for 5G Apple phones with its InFO product line. TSMC started this journey in 2015 when it invested ~$585M to start-up a new InFO line for Apple application processors. In 2020, TSMC’s advanced packaging CapEx is expected to triple (3x) compared to 2015, to $1.5B. With this strong momentum, TSMC is expected to double its advanced packaging revenue in the next few years as a result of 5G deployment and the need for heterogeneous integration using a wafer level platform… More on i-Micronews.

WHAT’S NEXT?
The bright future of FO
FO packaging continues to be adopted in high-density applications and high-performance computing, while WLCSP package becomes the mainstream “work horse” for smartphone & consumer applications.
FO packaging began several years ago with limited application, but it has now found a critical role and rightful place in the high-end packaging sector as a mature, reliable package technology. In fact, TSMC’s InFO form-factors brought FO technology to new heights in 2015/2016 when Apple launched its A10 with InFO-PoP. FO packages are primarily used in the mobile and consumer segments, with some proliferation in automotive radar. FO packaging is expected to gain wider adoption as 5G, AI, and autonomous driving take flight in the coming years - and revenue stemming from FO packaging is expected to reach $2.5B by 2025.
The WLCSP packaging market also found a new “M-series” product which provides side mold protection with greater BLR performance. It has been adopted by a major customer. HDFO remains a key growth driver in the FO packaging market…

Yole’s Advanced Packaging Quarterly Market Monitors will be published every beginning of March (Q1), June (Q2), September (Q3) and December (Q4). The aim of Yole’s team is to give a closer look at the main markets and players. In addition to WLCSP and FO, the Advanced Packaging Quarterly Market Monitor will soon cover 2.5/3D and FC packaging.
Yole’s analysts invite you to follow our activities on i-Micronews, especially during this complex period due to the impact of Covid-19.
Stay tuned to i-Micronews to get further info. about our Advanced Packaging activities!

Press contacts
Sandrine Leroy, Director, Public Relations, leroy@yole.fr
About the Advanced Packaging team at Yole Développement

Vaibhav Trivedi is a Senior Technology & Market analyst at Yole Développement (Yole) working with the Semiconductor & Software division. Based in the US, he is a member of Yole's advanced packaging team and contributes to analysis of ever-changing advanced packaging technologies. Vaibhav has 17+ years of field experience in semiconductor processing and semiconductor supply chain, specifically on memory and thermal component sourcing and advanced packaging such as SiP and WLP. Vaibhav has held multiple technical and commercial lead roles at various semiconductor corporations prior to joining Yole. Vaibhav holds a Bachelor of Science in Chemical Engineering, and Master of Science of Material Science from University of Florida in addition to an MBA from Arizona State University.

Favier Shoo is a Technology and Market Analyst in the Semiconductor & Software division at Yole Développement, part of Yole Group of Companies. Based in Singapore, Favier is engaged in the development of technology & market reports as well as the production of custom consulting reports. During 7 years at Applied Materials as a Customer-Application-Technologist in the advanced packaging market space, Favier developed a deep understanding of the supply chain and core business values. As an acknowledged expert in this field, Favier has provided training and held numerous technical review sessions with industry players. In addition, he has obtained 2 patents. Prior to that, Favier worked at REC Solar as a Manufacturing Engineer to maximize production capacity. Favier holds a Bachelor in Materials Engineering (Hons) and a Minor in Entrepreneurship from Nanyang Technological University (NTU) (Singapore). Favier was also the co-founder of a startup company where he formulated business goals, revenue models and marketing plans.

Santosh Kumar is currently working as Principal Analyst and Director Packaging, Assembly & Substrates, Yole Korea. Based in Seoul, Santosh is involved in the market, technology and strategic analyses of the microelectronic assembly and packaging technologies. His main interest areas are advanced IC packaging technology including equipment & materials. He is the author of several reports on fan-out / fan-in WLP, flip chip, and 3D/2.5D packaging. Santosh Kumar received the Bachelor’s and Master’s Degree in Engineering from the Indian Institute of Technology (IIT), Roorkee and University of Seoul respectively. He has published more than 40 papers in peer reviewed journals and has obtained 2 patents. He has presented and given talks at numerous conferences and technical symposiums related to advanced microelectronics packaging.

Emilie Jolivet is Director of the Semiconductor & Software Division at Yole Développement, part of Yole Group of Companies, where her specific interests cover package & assembly, semiconductor manufacturing, memory and software & computing fields. Based on her valuable experience in the semiconductor industry, Emilie manages the expansion of the technical and market expertise of the Semiconductor and Software Team. The team interacts daily with leading companies allowing semiconductor & software analysts to collect a large amount of data and integrate their understanding of the evolution of the market with technology breakthroughs. In addition, Emilie's mission focusses on the management of business relationships with semiconductor leaders and the development of market research and strategy consulting activities inside the Yole group. Emilie Jolivet holds a Master’s degree in Applied Physics specializing in Microelectronics from INSA (Toulouse, France). After an internship in failure analysis at Freescale (France), she was an R&D engineer for seven years in the photovoltaic business where she co-authored several scientific articles. Enriched by this experience, she graduated with an MBA from IAE Lyon and then joined EV Group (Austria) as a business development manager in 3D & Advanced Packaging before joining Yole Développement in 2016.

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 as well as reverse engineering and
reverse costing services. 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

For more information and images, please visit i-Micronews

###