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Embedded die: from incubation to high volume production

Embedded Die Packaging: Technology and Market Trends 2017 report – Yole Développement – December 2016

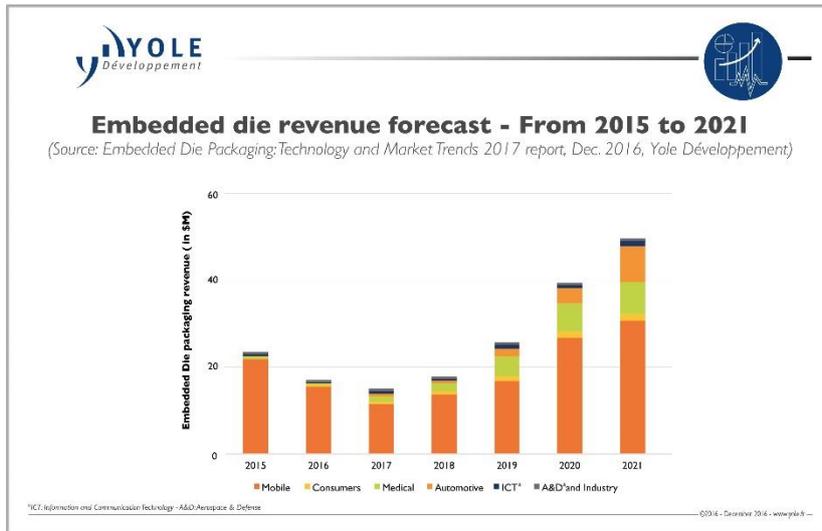
LYON, France – December 15, 2016: Embedded die in substrate platform has its own history and adoption scheme compared to other advanced packaging platforms, explains [Yole Développement \(Yole\)](#). Indeed while the first significant volume of embedded die in IC¹ package substrate came from DC/DC² converters in smartphones, penetration in other market segments of interest to embedded die such as automotive, medical or aerospace was simply delayed due to much longer qualification times and regulatory approval cycles. Furthermore, embedded die platforms are showing different drivers compared to competing solutions...

The embedded die platform has been incubated and brewed for years patiently waiting for the right moment to appear on the scene in considerable volume. It seems we are finally nearing the point of inflection – from incubation to volume, comments Yole's Advanced Packaging & Semiconductor Manufacturing team.

[Embedded Die Packaging: Technology & Market Trends 2017](#) contains a full segmentation of the embedded die platform including embedded die in IC package substrate, rigid board and flexible board and the related drivers. This report proposes a detailed analysis of market revenue and unit forecasts per segments such as mobile, automotive, medical, consumer, ICT and industrial. Yole's analysts review detailed splits per product within each market segment. These estimations are based on industry developments and likelihood of further success of the Embedded Die platform.

“In 2015, an estimated 94% of the US\$23.5 million embedded die packaging market was recorded in the highly competitive mobile segment,” announces **Emilie Jolivet, Technology & Market Analyst within Advanced Packaging & Semiconductor Manufacturing team at Yole**. 2016 exhibited a revenue decline, expected to last through 2017, due to production decline of camera modules in mobile phones utilizing the embedded die packaging platform. Going forward, the

¹ IC : Integrated Circuit
² DC : Direct Current



embedded die market is expected to drastically change with product launches in the automotive, medical, ICT³, consumer and industrial segments. By 2021 non-mobile share of the US\$ 49.7 million embedded die packaging market will rise from 6% to 36% of the total revenue. Automotive and medical markets offer a promising opportunity for the embedded die technology rising from

scratch to a combined US\$15.5 million packaging revenue. Certain products in the medical domains are in the final stages of long awaited regulatory approvals while the automotive market could be more disruptive with 5-10 times higher revenues, depending on big player adoption rates.

For the first time, in a dedicated technology & market report, the “More than Moore” market research & strategy consulting company Yole treats the embedded die in PCB⁴ platform as a standalone topic covering both embedding in an IC package substrate, rigid boards and flexible boards. In addition, Yole’s analysts detail the advanced embedded interconnects such as MCEP[®] developed by Shinko or Intel’s solution named EMIB[®]. When advanced embedded interconnects are included, the embedded die packaging revenue rises an order of magnitude.

As announced, in terms of applications, the limited products/one market image is expected to change significantly. The embedded die technology has been known to the high reliability markets such as medical, aerospace and automotive for years. However cycle times and especially regulatory approvals follow much different and longer schemes than in the consumer sector. A variety of products is expected to arrive on the market in the near future. A trend from low cost to high value embedded die packaging is on the horizon.

- The automotive sector is forecasted with highest revenue and unit growth with CAGR⁵ values from 2015 to 2021 of 246% and 239%, respectively and first volumes expected already in 2017. The high growth is expected from the adoption of embedded die in 48V power converters, motor control units, camera modules, distance sensors and lighting modules.

³ ICT : Information & Communication Technologies

⁴ PCB : Printed Circuit Board

⁵ CAGR : Compound Annual Growth Rate

- Following the automotive market, the high value lower unit count medical market is forecasted to exhibit a CAGR of 84%. The products associated include hearing aids, pacemakers, neurostimulation and endoscopic cameras.

In combination with products from other market segments, the overall embedded die packaging revenue CAGR is estimated at 13% and unit CAGR at 25% by 2021. However, although non-mobile products are expected to gain speed, the mobile segment is likely to maintain leadership by 2021 due to several RF and power management units adopting embedded die resulting in a mobile segment revenue CAGR of 9%.

Looking ahead, the adoption of embedded die in new markets is expected to propel the embedded die platform from 2018 onwards to the long awaited higher volumes and growth slopes.

A detailed description of the embedded die report is available on [i-micronews.com, advanced packaging reports section](https://www.micronews.com/advanced-packaging-reports-section).



About [Embedded Die Packaging: Technology and Market Trends 2017](#) report:

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Emilie Jolivet is a Technology & Market Analyst, in the Advanced Packaging and Semiconductor Manufacturing team, at Yole Développement the “More than Moore” market research and strategy consulting company. She holds a master’s degree Applied Physics specialized in Microelectronics from INSA Toulouse. After an internship in failure analysis in Freescale, she took the position of R&D engineer for 7 years in photovoltaic business and co-authored several scientific articles. Strong for this experience, she graduated from a master in Business Administration at IAE Lyon and then joined EV Group as a business development manager in 3D & Advanced Packaging before joining Yole Développement in 2016.

▪ Companies cited in the report:

AMS, Amkor, Apple, ASE, AT&S, AVX, Bosch, Continental, Daimler, DNP, Dyconex, Flip-Chip International, Ford, Fujikura, GaN Systems, General Electric, Hightec, Hofmann Leiterplatten, Huawei, Ibiden, Infineon, Intel, J-devices, KOA, kyocera, Maxim, Microsemi, Murat, Nanium, On Semiconductor, Oticon, Panasonic, Panasonic Avionics, Plessey, Qorvo, Qualcomm, Rohm, Samsung Electro-Mechanics, Sarda Technology, Schweizer, Shinko, Soundchip, St Jude Medical, ST microelectronics, Starkey, Taiyo Yuden, TCL, TDK-EPCOS, Texas Instruments, Thales, TransSiP, TSMC, Unimicron, UTAC, Valeo, Vishay, Wata Electronic and many more...

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Founded in 1998, Yole Développement has grown to become a group of companies providing marketing, technology and strategy consulting, media and corporate finance services. With a strong focus on emerging applications using silicon and/or micro manufacturing, the Yole Développement group has expanded to include more than 50 collaborators worldwide covering MEMS, Compound Semiconductors, LED, Displays, Image Sensors, Optoelectronics, Microfluidics & Medical, Advanced Packaging, Manufacturing, Nanomaterials, Power Electronics and Batteries & Energy Management.

The “More than Moore” company Yole, along with its partners System Plus Consulting, Blumorpho and KnowMade, support industrial companies, investors and R&D organizations worldwide to help them understand markets and follow technology trends to grow their business.

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