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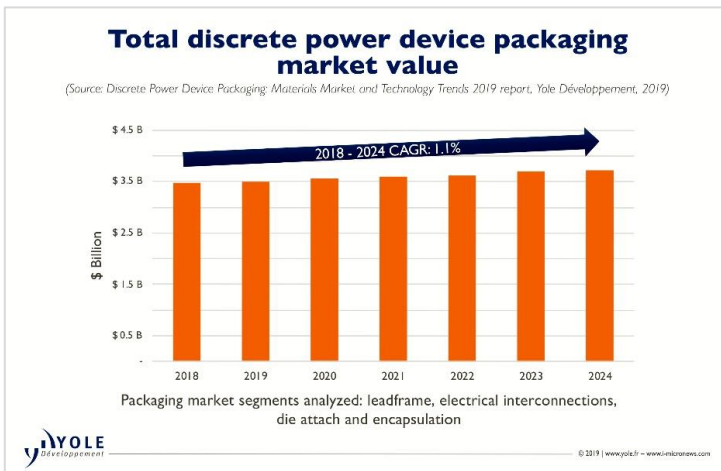
## 分立功率器件封装，缓慢发展的大市场

摘自：《分立功率器件封装：材料市场与技术趋势报告》，Yole Développement, 2019 - 《功率分立器件封装对比》，System Plus Consulting, 2018

法国里昂讯—2018年5月28日：2018年分立功率器件市场价值近135亿美元，从2018年到2024年间的年均复合增长率为2.9%。

[Yole Développement \(Yole\)](#) 肯定地认为该产业无疑已是地位稳固，发展成熟。因此，分立功率器件市场的发展也紧跟全球功率电子产业的上升态势。

与此同时，Yole 的分析师们宣称，仅封装部分的市场价值为37亿美元，同期年均复合增长率为1.1%。“分立功率器件封装产业仍存在商业机遇，尤其是对材料供应商和封装企业而言”，Yole 的功率电子与电池领域首席分析师 **Milan Rosina** 博士评述道。



包括 Yole Développement 和 [System Plus Consulting](#) 在内的 Yole 企业集团今天发布了《[分立功率器件封装：材料市场与技术趋势](#)》和《[功率分立器件封装对比](#)》两篇专题报告，提出对分立功率器件封装产业的全局分析。

分立功率器件产业的关键特性和需求包括单一器件成本低、产品和供应商选择范围广，以及使用经过验证的高度标准化产品和技术，包括封装技术。

“实际上，用于分立功率器件的封装技术，包括引线框架、芯片粘接、电性互连和封装，应该具备上述特性”，Yole 的功率电子与材料领域技术与市场分析师 **Shalu Agarwal** 博士解释道：“新型封装技术意味着可接受的额外成本，这就难以满足器件整合商对大规模标准化产品和低成本的要求。”

在这样的形势下，针对不同封装解决方案的市场增长和市场规模组合就产生了具有许多不同变量的复杂结果，这些变量包括器件需求量变化、芯片尺寸、封装类型和所用的互连方法、顺应微缩趋势的器件尺寸、每一封装器件中的半导体内容等等。这些因素中有的有助于市场增长，有的则会促使市场缩水，使得市场态势相当持平。因此分立功率器件封装市场的走势将十分平缓，但在2018年到2024年间仍将有所增长。

由于业界越来越多地采用铜制弹片来取代传统导线和引线带楔焊键合，封装领域的主要创新将在电性互连层面实现。

“其实在器件层面采用新材料和开拓新市场能促使生产制造商寻求新型封装技术解决方案。这些创新技术来自功率电子以外的领域，如 MEMS 和先进封装，这也能推动旧的供应链进行自我调节”，System Plus 半导体器件部经理 Elena Barbarini 称。

分立器件制造商（如英飞凌、安森美半导体、罗姆半导体和富士电机）可以自主生产功率器件，也可以将封装外包给 OSAT 厂商。器件制造商和 OSAT 都希望为客户提供创新封装解决方案。一般来说，在技术应用的初期，创新型产品是由内部制造的。

一旦这些产品的需求量变得重要起来，器件制造商就会向其他公司发放技术许可，或选用有庞大产能的 OSAT 厂商。芯片粘接材料、环氧树脂模塑化合物和互连材料通常都来自同样的材料供应商，他们也将这些解决方案提供给其他市场。由于低成本和高产量这两项因素的重要性，引线框架主要由大量亚洲材料供应商提供。

随着应用领域要求的提升（例如电动汽车中的热循环能力）、器



件尺寸的缩小和器件封装设计复杂性的增加，器件封装企业越来越多地寻求能够提供特定解决方案并在大规模量产中确保严密的角度与尺寸容差的制造商。

“像安靠、日月光、嘉盛和优特半导体（UTAC）这样的先进封装企业在智能手机和微电子应用中各种复杂器件的封装方面经验丰富”，Yole 的 Milan Rosina 说道：“对他们而言，功率电子，尤其是中低功率

范围内的产品，的确是一个将自己现有的先进封装解决方案转移到功率器件的大好机遇，也能借此扩大其产品和客户组合。”

先进封装解决方案的最高附加值不在于“相当简单”的分立器件，而在于那些与驱动器、多器件等集成在一起的器件。但先进封装中向功率器件转型的趋势依然值得关注，这样才不会错过分立功率器件封装领域中不断增长的商机。

Yole 的分立功率器件封装报告纵览主要应用领域、市场驱动因素和未来趋势，也对每个封装组件进行了深入分析，并审视了分立功率器件供应链。最后，Yole 的分析师们概括了不断变化的商业模式、与其他产业的协作，以及新加入者的机遇。

**System Plus Consulting** 的报告是对当前分立功率器件封装解决方案的详尽分析。分析师们提供了全面的技术评述，并从物理、生产制造和成本角度做了细致分析。成本模拟所用的工艺流程专门针对导线键合元件、导线/引线带楔焊键合元件、使用弹片和导线的元件和仅适用弹片桥接的元件。

欢迎访问 [i-micronews.com](http://i-micronews.com) 网站的**功率电子报告专区**，获得由 Yole 企业集团发布的功率电子报告完整系列。

Yole 企业集团宣布将参加两场重要的功率电子产业专题大会：**SIA PARIS**（2019年6月12-13日在巴黎举行）和6月13日在丹麦奥尔堡（Aalborg）举行的**第7届 CORPE 论坛**。欢迎届时光临，与我们的专家会面，畅谈最新创新动向和市场态势！

**ABOUT THE REPORTS:**

- [Discrete Power Device Packaging: Materials Market and Technology Trends 2019](#)

*Despite the transition to SiP, SoC, and power modules, discrete device packaging still represents a big opportunity especially for materials suppliers.* - Produced by Yole Développement

**Companies cited in the report:**

Ackotec Plating Ltd., Alpha Assembly Solutions, ABB, Alpha and Omega Semiconductor, Analog Devices, Amkor, ASE, Chang Wah Technology, Carsem, Cree, Delo, Diodes, Dialog- Semiconductor, Danfoss, Furukawa Electric, Fuji Electric, Hitachi, Heraeus, Henkel, Indium Corporation, Infineon, IXYS, Jentech Precision, JinLin Technology, Jinan Jingheng, Yamada Electronics Precision Technology Co., KCC, Kenly Precision Industrial Co. Ltd, Kyocera, and more ...

- [Power Discrete Packaging Comparison 2018](#)

*A cost-oriented overview of evolutionary trends in power discrete packages, from mW to kW* – Produced by System Plus Consulting

Through physical analyses, including chemical opening, cross-sections, and various measurements, this report tries to summarize the state of the art of packaging power semiconductors at a discrete level. With a cost-oriented viewpoint, we reveal the hidden details that make the difference between over 20 types of packages, ranging from mW to kW designs...

**About the authors:**

- **Shalu Agarwal**, PhD. is an Analyst specializing in Power Electronics & Materials at Yole Développement (Yole). Based on Seoul, Shalu is engaged in the development of technology & market reports as well as the production of custom consulting studies, within the Power & Wireless Division.  
Shalu has more than 10 years' experience in Electronic Material Chemistry. Before joining Yole, she worked as a project manager and research professor in the field of electronic materials, batteries and inorganic chemistry.  
Shalu Agarwal received her master's and Ph.D. degree in Chemistry from the Indian institute of Technology (IIT) Roorkee (India).
- As Head of Department Devices at System Plus Consulting, **Elena Barbarini** is in charge of costing analyses for MEMS, IC and Power Semiconductors. She has a deep knowledge of Electronics R&D and Manufacturing environment. Before System Plus Consulting, she worked as R&D researcher and project manager in the field of semiconductors manufacturing and assembling. Elena holds a Master in Nanotechnologies and a PhD in Power Electronics.
- **Milan Rosina**, PhD, is Principal Analyst, Power & Wireless / Batteries, at Yole Développement (Yole), within the Power & Wireless division. He is engaged in the development of the market, technology and strategic analyses dedicated to innovative materials, devices and systems. His main areas of interest are EV/HEV, renewable energy, power electronic packaging and batteries.  
Milan has 20 years of scientific, industrial and managerial experience involving equipment and process development, due diligence, technology, and market surveys in the fields of renewable energies, EV/HEV, energy storage, batteries, power electronics, thermal management, and innovative materials and devices. He received his PhD degree from Grenoble Institute of Technology (Grenoble INP) in France.
- Milan Rosina previously worked for the Institute of Electrical Engineering in Slovakia, Centrotherm in Germany, Fraunhofer IWS in Germany, CEA LETI in France, and utility company ENGIE in France.
- **Véronique Le Troadec** has joined System Plus Consulting as a laboratory engineer. Coming from Atmel Nantes, she has extensive knowledge in failure analysis of components and in deprocessing of integrated circuits.

**ABOUT YOLE GROUP OF COMPANIES**

**System Plus Consulting** specializes in the cost analysis of electronics, from semiconductor devices to electronic systems. Created more than 20 years ago, System Plus Consulting has developed a complete range of services, costing tools and reports to deliver in-depth production cost studies and estimate the objective selling price of a product.

System Plus Consulting engineers are experts in Integrated Circuits - Power Devices & Modules - MEMS & Sensors - Photonics – LED - Imaging – Display - Packaging - Electronic Boards & Systems. Through hundreds of analyses performed each year, System Plus Consulting offers deep added-value reports to help its customers understand their production processes and determine production costs. Based on System Plus Consulting's results, manufacturers are able to compare their production costs to those of competitors. System Plus Consulting is a sister company of Yole Développement. More info on [www.systemplus.fr](http://www.systemplus.fr) and on [LinkedIn](#) and [Twitter](#).



Founded in 1998, Yole Développement 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 covering MEMS and image sensors, Compound Semiconductors, RF Electronics, Solid-state lighting, Displays, software, Optoelectronics, Microfluidics & Medical, Advanced Packaging, Manufacturing, Nanomaterials, Power Electronics and Batteries & Energy Management. The “More than Moore” market research, technology and strategy consulting company Yole Développement, along with its partners System Plus Consulting, PISEO and KnowMade, support industrial companies, investors and R&D organizations worldwide to help them understand markets and follow technology trends to grow their business. . For more information, visit [www.yole.fr](http://www.yole.fr) and follow Yole on [LinkedIn](#) and [Twitter](#).

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