即时发布：

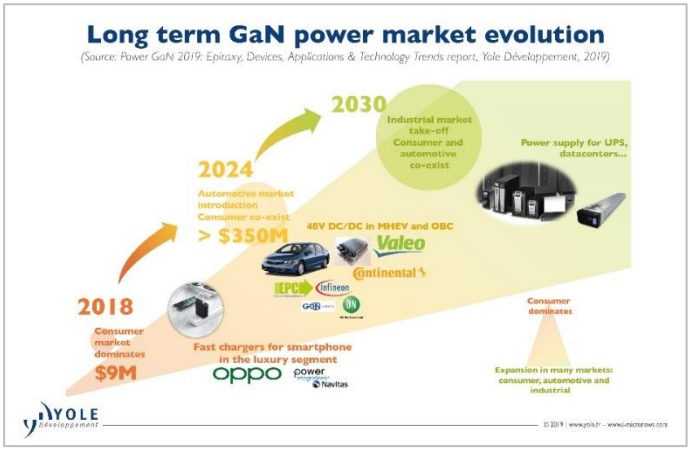
GaN 功率器件实现首个重大里程碑

摘自以下报告：

- 《2019 氮化镓功率器件：外延、期间、应用和技术趋势》报告，Yole Développemen，2019
- 《中压氮化镓高电子迁移率晶体管 vs 超结 MOS 场效应管对比》，System Plus Consulting，2019
- 《Power Integrations 的蓝宝石衬底 GaN 高电子迁移率晶体管功率集成电路》报告，System Plus Consulting，2019
- 《氮化镓功率器件专利态势》，Knowmade，2019

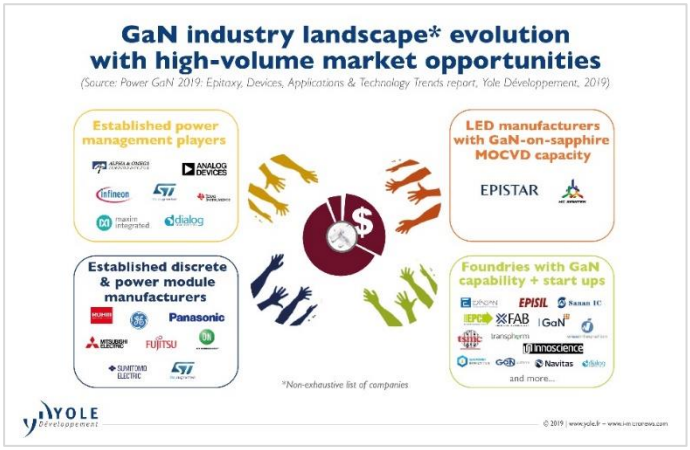
法国里昂讯—2019 年 12 月 11 日：氮化镓开始进入主流市场，这点已成事实。没错，几周前，System Plus Consulting 团队发布了一份逆向工程与成本分析报告，《Power Integrations 的蓝宝石衬底 GaN HEMT 功率 IC》，该报告让功率电子产业惊喜地发现，GaN 已在 Anker 的一款墙插式充电器得以应用。

“除了 Anker 及其基于 GaN 的创新型充电器，目前我们能清楚地观察到功率电子与化合物半导体行业的一种转变”，**Yole Développement (Yole)公司的技术与市场分析师 Ezgi Dogmus 说道。**



领先厂商 OPPO 和 Power Integrations 都在这一市场中重新洗牌。包括 Yole 和 System Plus Consulting 在内的 Yole 企业集团有幸与 Power Integrations 的市场营销副总裁 Doug Bailey 进行交流，并就 GaN 的采用进行讨论。您可以在 i-Micronews.com 网站上阅读本次采访的内容《GaN 开始跻身主流……——与 Power Integrations 访谈记录》。

Yole 与 System Plus Consulting 都大力参与了功率 GaN 产业分析，每一天都在密切协作以深入了解市场及其态势。两家公司跟踪创新动态，评估其对市场的影响并分析领先厂商的策略。他们的目标是获得行业转型的全面概况。本月，Yole 和 System Plus Consulting 自豪地宣布了两份与 GaN 技术相关的专门报告，分别是《2019 氮化镓功率器件：外延、器件、应用和技术趋势》和 《中压氮化镓 HEMT vs 超结 MOS 场效应管对比》。这两份报告都是 Yole 与 System Plus Consulting 技术与市场专长巧妙结合的力作。



那么目前形势如何呢？氮化镓功率器件市场有多大？它将如何发展？氮化硅还是硅，蓝宝石衬底上的氮化镓、硅基氮化镓……哪种技术将成为全球主导？而哪家公司将赢得最大的一块馅饼呢？Yole 和 System Plus Consulting 的分析师们今天将带您一起对该产业进行相关解读，并发布这两份技术与市场报告。

“在过去十年里，GaN 功率市场主要是由高端高性能的应用推动的，在系统层面提供高频开关、低导通电阻和较小的封装尺寸”，Yole 的 Ezgi Dogmus 称：*“但在 2019 年，GaN 功率市场发生了变化……”* 如今 GaN 正在进入主流消费应用领域！在多款二级市场充电器采用 GaN 后，中国 OEM 厂商 Oppo 也宣布在其新推出的 Reno Ace 旗舰款手机所配的 65W 原装快充充电器中采用 GaN HEMT 器件。这是 GaN 功率器件首次进入大规模智能手机市场，而且有可能真正改变 GaN 功率市场。

除了令人兴奋的消费市场，GaN 也吸引了多家 OEM 和一级供应商的注意力，如汽车行业的法雷奥和大陆集团。的确，对于轻度混合动力汽车中的新兴 48V DC/DC 电源和电动汽车中的车载充电器，GaN 让人很感兴趣。像 EPC 和 Transphorm 这样的厂商已经获得了 AEC 资格认证，而 GaN Systems 公司已获得 BMW i Ventures 的投资，预期将在明年获得资格认证。

GaN 也可望打入工业和电信供电应用领域，包括数据通信、基站、UPS 和工业激光雷达应用。过去几年中，Eltek、台达电子（Delta）和 BelPower 几家公司最先开始小规模采用基于 GaN 的供电技术。Yole 期望在此之后，并不遥远的将来，数据中心将从日趋成熟的 GaN 器件和成本竞争力获益，并产生不断增长的效率要求，这将让 GaN 实现更广的市场渗透。

总体来说，由于 GaN 在 Oppo 的原装快充充电器中被采用，与 Yole 的 2018 年 GaN 功率器件技术与市场报告及其提出的两个市场应用场景相比，今年的市场预期比 2018 年预测所依据的情况要光明得多。Yole 的功率与无线业务团队预测，主要受此类消费型快充应用的驱动，GaN 功率业务将以从 2018 年到 2024 年间 85% 的 CAGR 增长，截止到 2024 年将达到 3.5 亿美元。

在所有基于 GaN 的供电应用中，原装快充充电器或许能成为 GaN 功率器件市场的致胜应用程序。在过去两年间，主要来自纳维达斯（Navitas）和 Power Integrations 两家公司的 SoC 和 SiP 已进入至少 50 个二级市场快充品牌，包括 Ravpower、Anker 和 Aukey。

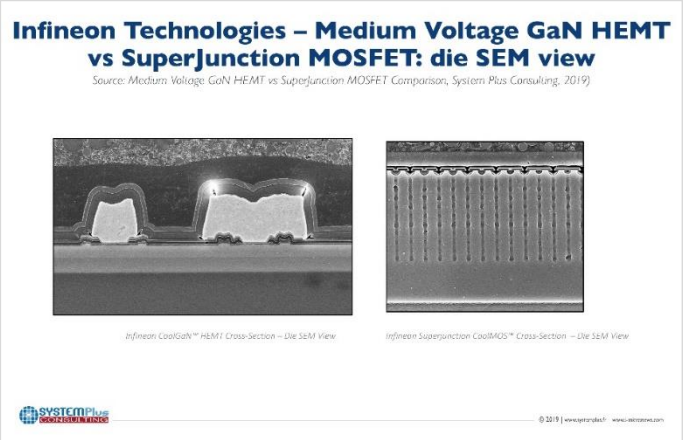
如前所述，今年最重大的发展成果之一就是 Oppo 在其高端型号手机的 65W 原装快充充电器中采用了 GaN HEMT。此外，就在最

近，领先 OEM 三星公司也对基于 GaN 技术的高功率快速充电器显示了兴趣，在其手机配件中采用了 45W 快充。在这个巨大的市场中还有哪些可能的 GaN 应用市场场景呢？

在 Yole，分析师们预测来自中国的 OEM 挑战者们将不断增加，比如新兴 5G 豪华智能手机领域的 Oppo、Vivo 和小米，这将需要显著的技术区分度。Oppo 的 SuperVOOC 2.0 充电器就以更短的充电时间和更小的体积满足了这些需求。也有其他中国 OEM 宣布推出功率很高的快充（超过 100W），而且有可能在未来几年采用 GaN 器件。伴随着这些前瞻性成就，整个 GaN 器件市场预期理应超过 Yole 此前公布的市场预估。

在更为乐观的情况下，随着中国 OEM 纷纷部署高功率快速充电器，GaN 也可能被其他其他厂商用于原装充电器中。例如，2019 年第 4 季度，领先 OEM 三星公司就在其 45W 配件快充中采用了 GaN HEMT 器件。这对 GaN 而言是个大好消息。鉴于此，一旦 GaN 实现了高度成熟和市场接受度，以及相对于 SiMOS 场效应管的成本竞争力，就可望在消费应用领域实现更大的市场扩张。

System Plus Consulting 深入研究了 GaN 的竞争态势，并与超结 MOS 场效应管技术进行了重要对比。超结技术在 1998 年由英飞凌公司首次投入商用。今天，新的厂商正在进入这一市场，但传统厂商或是尽可能降低生产成本，或是引入不同的技术，以此保持领先优势。硅超结 MOS 场效应管的改进将让这些器件依然能在市场上占有一席之地，并促使它们向标准化和普及化发展。



“在 600/650V 功率器件等级，硅基 GaN HEMT 是超结 MOS 场效应管的有力竞争对手”，**System Plus Consulting 的 Amine Allouche** 说道：*“它们的确能带来新的性能，比如更高的开关频率、更高的功率密度和越来越有竞争力的制造成本……”*

欢迎访问网站 i-Micronews.com，获取来自 System Plus Consulting、Knowmade 和 Yole 的 GaN 功率器件系列报告。

ABOUT THE REPORTS:

Power GaN 2019: Epitaxy, Devices, Applications & Technology Trends

First design-win for GaN HEMTs in the high-volume smartphone fast charging market - Performed by Yole Développement

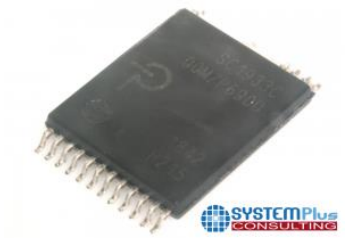
Companies cited in the report:

Aixtron, Allos, Alpha & Omega, Amec, Amkor, Apple, ASE, AT&S, BMW, Coorstek, Delta Electronics, Dialog Semiconductors, Dowa, Efficient Power Conversion, Egtronics, Enkris, Energous, EpiGaN, Episil, Epistar, Evatran, Exagan, Fairchild, Finsix, Ford, Fuji Electric, GaN Systems, GaN Power, Gener8, Huawei, Imec, Infineon, IQE, LG Electronics, Jedec, Kyma… and more

Medium Voltage GaN HEMT vs SuperJunction MOSFET Comparison

A high added-value comparison of medium voltage GaN HEMTs vs Superjunction MOSFETs from 14 manufacturers including technology & costs analyses. - Performed by System Plus Consulting

The report includes detailed pictures of device structures, details on manufacturing processes and materials, comparison of electrical performance, and cost breakdown analysis of the process.



GaN-on-Sapphire HEMT Power IC by Power Integrations

The unique device with GaN-on-Sapphire technology in Anker's PowerPort Atom PD 1 wall charger. – Performed by System Plus Consulting, 2019

In this report, System Plus Consulting presents a deep teardown analysis of the SC1933C. Detailed optical and Scanning Electron Microscope pictures and cross-sections with energy-dispersive X-ray analysis are included to reveal Power Integrations' technical choices at the microscopic level of the IC and HEMT designs.

Power GaN Patent Landscape

Which patent owners are ready to dominate the GaN power market in coming years? – Performed by Knowmade

In the report we detail the IP landscape related to GaN-on-Silicon and GaN-on-Sapphire. The GaN-on-Silicon patent landscape is characterized by the presence of numerous GaN pure-play companies and numerous Chinese new entrants. In the GaN-on-Sapphire patent landscape, Power Integrations is the best-known player. However, numerous other players have also developed IP related to GaN-on-Sapphire for power applications, including CorEnergy, Powdec and Seoul Semiconductor.

About the authors:

- As a Technology & Market Analyst, Compound Semiconductors, **Ezgi Dogmus**, PhD is member of the Power & Wireless division at Yole Développement (Yole).
  She is daily contributing to the development of these activities with a dedicated collection of market & technology reports as well as custom consulting projects.
  Prior Yole, Ezgi was deeply involved in the development of GaN-based solutions at IEMN (Lille, France).
  Ezgi also participated in numerous international conferences and has authored or co-authored more than 12 papers.
  Upon graduating from University of Augsburg (Germany) and Grenoble Institute of Technology (France), Ezgi received her PhD in Microelectronics at IEMN (France).
- **Hong Lin**, PhD, is a Principal Analyst, Compound Semiconductors at Yole Développement (Yole), within the Power & Wireless division. Since 2013, Hong has been involved in analyzing the compound semiconductor market (including SiC, GaN, GaAs, InP, engineered substrates and other emerging materials) with dedicated technical, strategic, market and financial analyses.

Prior to Yole, she worked as an R&D Engineer at Newstep Technologies. Her mission was to oversee the development of cold cathodes made by plasma-enhanced chemical vapor deposition for visible and UV lamp applications based on nanotechnology.
Dr Hong Lin holds a PhD in physics and chemistry of materials from the University of Pierre & Marie Curie (Paris VI, France).

- **Ana Villamor**, PhD serves as a Technology & Market Analyst, Power Electronics & Compound Semiconductors within the Power & Wireless division at Yole Développement (Yole). She is involved in many custom studies and reports focused on emerging power electronics technologies at Yole Développement, including device technology and reliability analysis (MOSFET, IGBT, HEMT, etc). In addition, Ana is leading the quarterly power management market updates released in 2017.
  Previously Ana was involved in a high-added value collaboration related to SJ Power MOSFETs, within the CNM research center for the leading power electronic company ON Semiconductor. During this partnership and after two years as Silicon Development Engineer, she acquired a relevant technical expertise and a deep knowledge of the power electronic industry.
  Ana is author and co-author of several papers as well as a patent. She holds an Electronics Engineering degree completed by a Master and PhD. in micro and nano electronics from Universitat Autonoma de Barcelona (SP).
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- **Véronique Le Troadec** has joined System Plus Consulting as a laboratory engineer. She holds a Master degree in Microelectronics from the University of Nantes.
- **Nicolas Baron**, PhD. is CEO and co-founder of Knowmade. He manages the development and strategic orientation of the company and personally leads the Semiconductor department. He holds a PhD in Physics from the University of Nice Sophia-Antipolis, and a Master of Intellectual Property Strategies and Innovation from the European Institute for Enterprise and Intellectual Property (IEEPI) in Strasbourg, France.

ABOUT YOLE GROUP OF COMPANIES

Specialized in the analysis of patents and scientific information, Knowmade provides technology intelligence and IP strategy consulting services. The company supports the business development of R&D organizations, industrial companies, and investors by helping them understand the competitive landscape, follow the technology trends, and discern opportunities and threats in terms of technology and patents.
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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 covering MEMS & Sensors - Imaging - Medical Technologies - Compound Semiconductors - RF Electronics - Solid State Lighting - Displays - Photonics - Power Electronics - Batteries & Energy Management - Advanced Packaging - Semiconductor Manufacturing - Software & Computing - Memory and more...

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 and follow Yole on LinkedIn and Twitter.

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