

GaN 和 GaAs 市场将如何增长及竞争?

2021 年 2Q – 复合半导体季度别市场监测器, 模块 I&II

自 Q1 以来发生了什么样的变化?

- 用于电力电子的 SiC¹ 和 GaN²:
用于下一代 高级 EV³ 款的 SiC: 主逆变器, OBC⁴ 和 DC/DC 转换器的汽车设计的胜利正在加速中.
领先的 SiC 公司们正期待着在即将到来的季度中用于高容量平台的几个新设计的胜利...
而且, SiC 还继续渗透到工业和交通应用领域.
全球 SiC 生态系的投资, 容量扩展及新导入还在持续中...
中国公司们继续采用 GaN 急速充电器作为一种技术差异.
GaN 公司们因赢得了多想设计大奖, 享受着稳定的增长.
基于 GaN 的解决方案是为数据通信, 电信和汽车市场开发的.
GaN 也在 Q1-2I 展示了几项值得注意的投资.
- RF⁵ 电子器件:
5G Pas⁶ 自 H2-20 后, 开始大力推动 GaAs⁷ RF 市场: 2020 年, 手机解决方案的主要开发是基于 5G 的.
GaAs 供应链: IDM⁸s, epihouses 和 铸造厂报道了反应市场动态的 Q1-2I 的强劲收入
随着 5G 手机在 Q4-20 季度开始在智能手机市场的渗透不断增加, GaAs RF 市场仍然受到手机应用的强劲推动, 特别是在中国/亚洲, 北美和欧洲.
GaN RF 行业在 H1-2I 的商业可视性方面面临了不确定性. 这与华为受到的限制有关.

¹ SiC: Silicon Carbide 碳化硅

² GaN: Gallium Nitride 氮化镓

³ EV: Electric Vehicle 电动车

⁴ OBC: On-Board Charger 车载充电机

⁵ RF: Radio Frequency 电磁频率

⁶ PAs: Power Amplifier 功率放大器

⁷ GaAs: Gallium Arsenide 砷化镓

⁸ IDM: Integrated Device Manufacturer 集成器件制造商

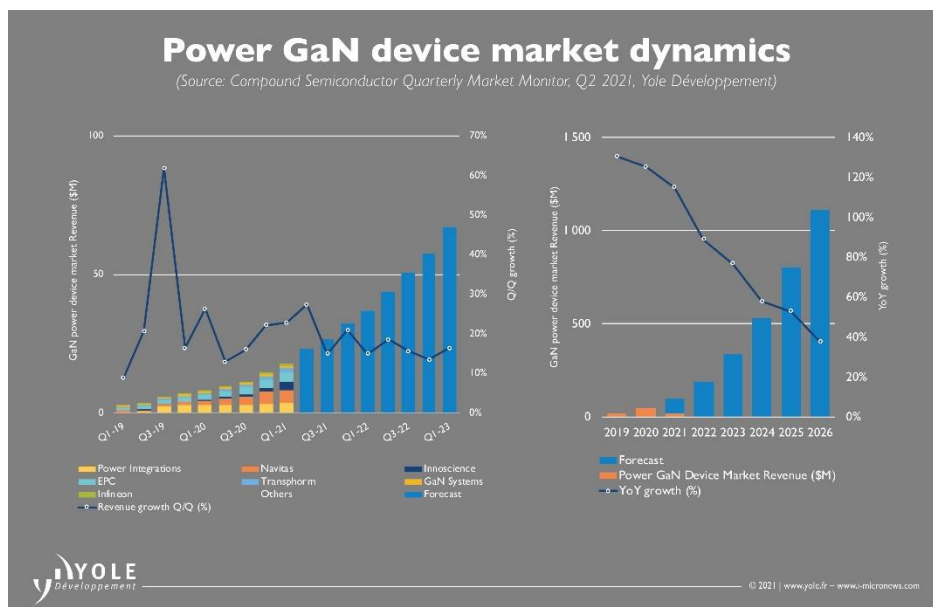
RF GaN IDM, 特别是 Qorvo, 继续在新兴 5G 基础设施市场中取得了新设计的成功.5G 电信基础设施一直是 GaN RF 的杀手级应用之一. GaN 预计在未来几年也将进入 5G 手机市场. 业界应密切关注接下来的几个季度...

电力用 GaN 仍然持有浮力

Yole Développement (Yole)的团队领导分析师 **Ezgi Dogmus** 博士 写道“GaN 电力设备的收入预计将从 2020 年不到 5000 万美元增长到 2026 年 10 亿美元以上, 而 RF GaN 市场也有望在同一个期间内从 8 亿 9100 万美元大幅度的增长到 25 亿美元以上” “同时 RF GaAs bare die 市场规模预计到 2026 年将增长到 40 亿美元”

但是, 随着新进入者在 GaN 市场上忙着吸引市场的注意力和为 RF GaN 行业推出的新增产能, 久经考验的 RF GaAs 行业是否能维持市场的领先地位?

在 2019 年至 2020 年季度别收入的增长率下降后, 从 2020 年 2 季度开始稳步上升, 许



多行业参与者充分利用了市场的复兴.

早在 2018 年, 基于爱尔兰的 GaN 半导体开发商 Navitas Semiconductor 把 GaN IC⁹ 用在了 GaNFast 智能手机快速充电器中, 且 2020 年底开始更多的行业都跟随了这一趋势. Navitas 最近与美国 Live Oak Acquisition Corp 联手签署了达到 10 亿 4000 万美元的 SPAC¹⁰ 合约, 并且上市.

⁹ IC: Integrated Circuit 集成电路

¹⁰ SPAC: Special Purpose Acquisition Company 特殊目的收购公司

Yole 的技术及市场分析家 **Ahmed Ben Slimane** 博士表示“这一关键行业的发展紧随着 2020 年上市的基于美国企业的 Transphorm 公司的脚步,” 他还补充到: “现在 Navitas 正在快速增加向戴尔, 联想, LG 和小米 等公司的 GaN 充电器出货量.”

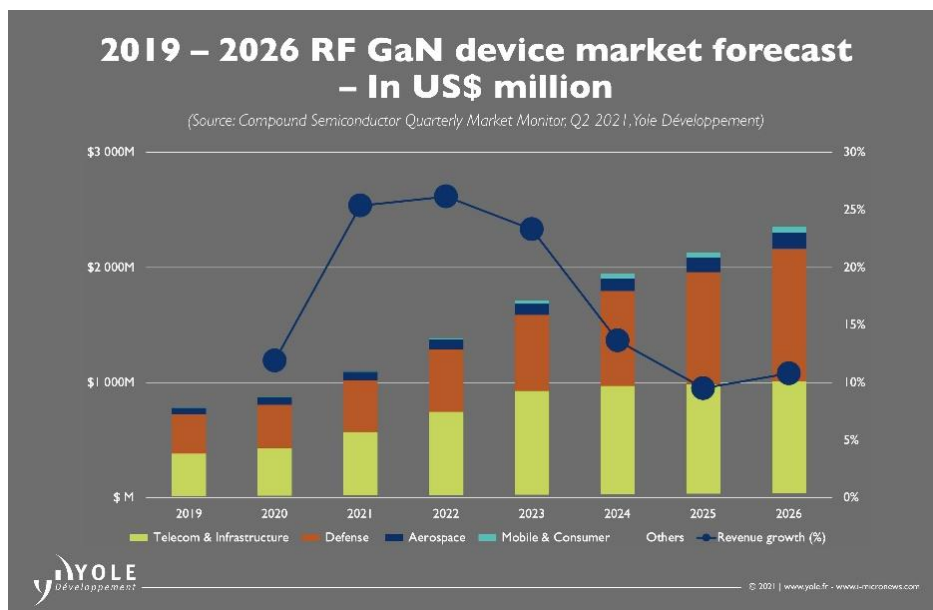
该公司还打算将其产品组合从快速充电器扩展到数据通信, 电信, 电动车, 工业, 能源以及其他应用上, 并提升市场信任度.

另一个积极的举措是, 基于美国的 power IC 事业的 Power Integrations 最近发布了新型 Anker Nano II 快速充电器中采用的高密度 AC-DC 转换器的 MinE-CAP IC. 针对小型充电器和适配器的 IC 将 AC-DC 转换器的体积缩小了 40%, 提高了效率, 更为重要的是增加了器件中 GaN 的原价比重, 这些因素能帮助提高 Integration 的 GaN 市场占有率...

RF GaN 的增长

随着 RF GaN 市场持续聚集推动力, 5G 电信和基础设施通过可贯穿基站, 远程无线电头和 MIMO 有源天线系统的高功率, 高宽带的 GaN 组件, 仍然是该市场的核心驱动.

事实上, Yole 预测该市场将于 2026 年超过 10 亿美元, 并占整个市场的 42%.



与此同时, 国防产业也利用预计到 2026, 能占整个市场 48%的应用推动增长. GaN 被广泛的用在 AESA 雷达机载系统的轻量级传输/接收模组上, 也用于固定卫星通信中.

新应用包括手机和移动卫星通信. 困难的 GaN 认证可能阻碍卫星通信采用这项技术, 但这可能会改变. 例如, 欧洲航天局目前正在与 Airbus 等公司合作, 联手开发用于天线的 GaN 功率放大器. 这种项目能促进 GaN 在宇宙应用的采用.

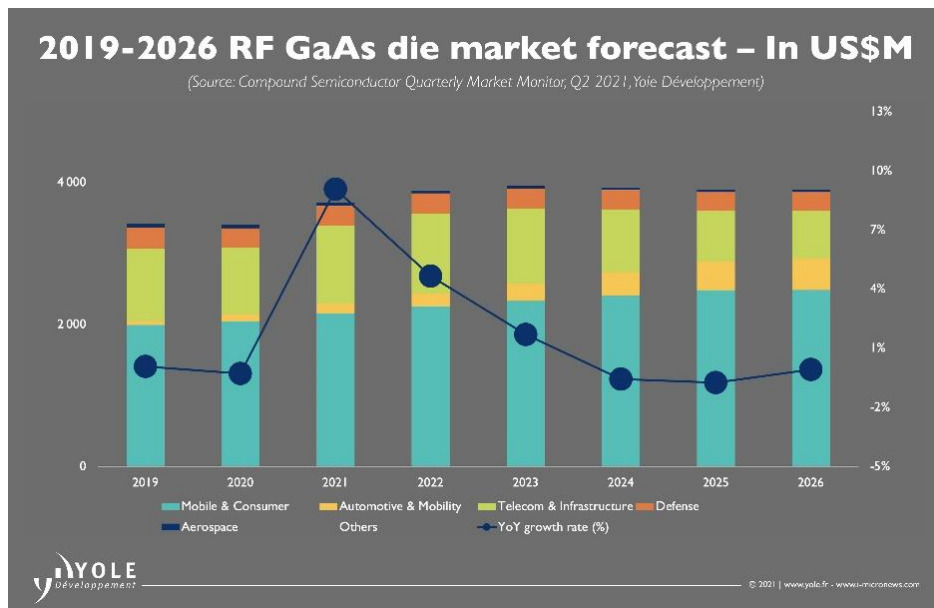
不过，在 RF GaN 市场，许多人关心的是这项技术何时才能真正的进入到消费者手机中。Yole 的技术及市场分析师 **Poshun Chiu** 说道“两年前 STMicroelectronics 透露，它正在开发用于手机的基于 GaN-on-silicon 的功率放大器，现在有另一个主要产业的参与者表示了类似的兴趣。”“考虑到这些市场动向，Yole 预测从 2022 年起，GaN 功率放大器将被采用于移动及消费类应用中。”

技术选择

Yole 的化合物半导体和新兴基板部的技术和市场分析师 **Selsabil Sejl** 博士断言“GaN-on-SiC 一直是 RF GaN 行业的领先光源，已经在 20 多年前推出，现在在 RF 功率应用方面可与 LDMOS 和 GaAs 匹敌。”“事实上，我们的数据表明，GaN-on-SiC 将从 2020 年的 8 亿 8600 万美元增长到 2026 年的 22 亿美元，CAGR¹¹ 为 17%。”

RF GaAs 坚持

RF GaAs 怎么样？尽管在电信和基础设施等高功率和高频应用方面面临着与 GaN 和



SiGe¹² 的竞争，但 RF GaAs 目前以相当大的优势占据着市场的最大份额，而且这一数字还将继续增长。

¹¹ CAGR: Compound Annual Growth Rate 复合年增长率

¹² SiGe: Silicon Germanium 锗硅

随着苹果 2020 年推出了支持 5G 的 iPhone 12 手机, GaAs 的需求再次上升, 业界验证的复合半导体是 sub-6GHz 大功率放大器的核心构造因素. 智能手机制造商的手机连接随着 WiFi 6 和 WiFi 6E 的推出, 在不断推动着 RF GaAs 的需求. Yole 预测从现在起到 2023 年, RF GaAs 市场将增长到近 40 亿美元. 不过在电信和基础设施领域中, GaAs 的市场份额预计因 GaN 和 SiGe 等竞争技术而有所减少...

请确认我们的化合物半导体和新兴基板团队为 [i-Micronews](#) 撰写的 [完整的文章](#). 本文详细介绍了从 [Quarterly Market Monitor, Q2 2021](#) 中提取的 2 季度结果.

Aim of the [Compound Semiconductor Quarterly Market Monitor](#) is to provide an in-depth coverage of rapidly changing market dynamics and main players' status and strategy. The market research and strategy consulting company is publishing its analysis every beginning of March (Q1), June (Q2), September (Q3) and December (Q4), with two modules:

- *Module I: GaN and SiC for power electronics applications*
- *Module II: GaAs and GaN for RF electronics applications*
- *Module III: GaAs and InP Optoelectronics (to be released in Q3-21)*

Stay tuned to [i-Micronews](#) to get further information about our Compound Semiconductor & Power electronics activities!

[复合半导体季度市场监测](#) 的目的是深入报道快速变化的市场动态和主要参与者的地位和战略. 市场研究和战略咨询公司将于每年 3 月初 (第一季), 6 月 (第二季), 9 月 (第三季) 和 12 月 (第四季) 发布其分析报告, 将包括 2 个模块:

- *模块 I: 用于电力电子应用的 GaN 和 SiC*
- *模块 II: 用于 RF 电子应用的 GaAs 和 GaN*
- *模块 III: GaAs 和 InP 光电学 (将于 21 年 3 季度发布)*

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联络方式

Sandrine Leroy, Director, Public Relations, sandrine.leroy@yole.fr

Marion Barrier, Officer, Public Relations, marion.barrier@yole.fr

Le Quartz, 75 Cours Emile Zola – 69100 Villeurbanne – Lyon – France – +33472830189

www.yole.fr - www.i-micronews.com – [LinkedIn](#) – [Twitter](#)

About the compound semiconductor & emerging substrates team at Yole Développement

Ezgi Dogmus, PhD, is Team Lead Analyst in Compound Semiconductor & Emerging Substrates activity within the Power & Wireless Division at Yole Développement (Yole). She is managing the expansion of the technical expertise and the market know-how of the company. In addition, Ezgi actively assists and supports the development of dedicated collection of market & technology reports, monitor as well as custom consulting projects. Prior to Yole, Ezgi worked as a process development engineer for GaN-based RF and power solutions at IEMN (Lille, France). Ezgi has authored or co-authored more than twelve papers. After graduating from University of Augsburg (Germany) and Grenoble Institute of Technology (France), Ezgi received her PhD. in Microelectronics at IEMN (France).

Ahmed Ben Slimane, PhD, is a Technology & Market Analyst, specialized in Compound Semiconductors and Emerging Substrates at Yole Développement (Yole). As part of the Power & Wireless team, Ahmed is contributing to the development of dedicated collection of compound semiconductors market & technology reports and monitor. Previously, he worked as an epitaxy (MBE/MOCVD) & fabrication process engineer for GaAs-based photovoltaic applications at TOTAL and IPVF (Paris-Saclay, France). Ahmed also completed his PhD in Material Engineering from KAUST (Saudi Arabia), where his mission was focused on GaN-based microstructures for flexible solid-state lighting. During his career, Ahmed Ben Slimane proposed lot of presentations towards an international audience. He authored/co-authored more than 20 publications in the semiconductor field and submitted a patent on the III-V hetero-structure for PV industry. Ahmed obtained his Master Degree in Electronics Engineering from INPG (Grenoble, FR).

Poshun Chiu is a Technology & Market Analyst specializing in Compound Semiconductor and Emerging Substrates at Yole Développement (Yole). As a member of the Power Electronics & Wireless division at Yole, Poshun focuses on power, RF, and opto-electronics. He is engaged in the development of technology and market reports and is also involved in custom projects. Before joining Yole, Poshun had 9 years' experience in R&D and product management at Epistar (TW & CHN). He is the author or co-author of more than 10 patents in solid-state-lighting. Poshun was also engaged in the development and evaluation of novel applications of process technology and components based on relevant semiconductor material systems Poshun received an MSc degree in Microelectronics from National Cheng Kung University (TW) and an MBA from IESEG School of Business (FR).

Selsabil Sejlil, PhD, is a Technology & Market Analyst, specialized in Compound Semiconductors and Emerging Substrates at Yole (Yole). As part of the Power & Wireless team, Selsabil is contributing to the development of dedicated collection of compound semiconductors market & technology reports and monitor. Previously, she worked as an Integration Engineer for SOI products at SOITEC (Grenoble, France). She also worked in CEA as a process development engineer for 5G applications. Selsabil obtained her PhD. in Material Science from Claude Bernard University (Lyon, France) in collaboration with STMicroelectronics (Tours, France), where her works explored and optimized all the facets of the complete manufacturing of power electronic devices, with a focus on the optimization of SiC epitaxy. During her career, Selsabil SEJIL authored/co-authored more than 8 publications in the semiconductor field. Selsabil was graduated from University Paris Sud with a master's degree in NanoSciences (Orsay, France).

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, 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... [More](#)

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