

MOSFET 行业：中国争相扩大市场份额¹

中国企业希望通过增加投资和提高设备性能来扩大市场份额。

大纲:

- 市场预测:
到 2026 年, MOSFET² 市场规模将达到 94 亿美元, 2020 年至 2026 CAGR³、年间的复合年增长率将达到 3.8%。
COVID-19 大流行对 MOSFET 市场产生了强烈影响, 尤其是 2020 年市场规模为 28 亿美元的消费类市场。
在不同政府的推动下, EV⁴(电动汽车)和电动汽车充电应用预计将以高复合年增长率增长。
- 技术趋势:
MOSFET 器件是成熟的硅器件, 可靠性高。它们以高产量大批量生产。过去几年, 中国制造商在技术上取得了进步。
先进的栅极 MOSFET 元件开始在 >200V 的应用中更具吸引力, 甚至可能与 SJ MOSFET 竞争。
- 供应链:
领先的 MOSFET 制造商位于欧洲、美国和日本, 受到中国的大力推动。
由于 2020 年 MOSFET 市场受到 COVID-19 危机的影响, 自 2019 年以来, 顶级参与者的排名没有显著变化。
主要的 MOSFET 参与者还涉及其他电力电子技术, 例如 IGBT⁵、GaN⁶ 或 SiC⁷。

Yole Développement (Yole) 电力电子与化合物半导体部门技术与市场分析师 Ana Villamor 博士断言 “硅 MOSFET 是非常广泛的中低功率应用中的关键组件”

¹ Extracted from:

- [Silicon MOSFET market and technology trends report](#), Yole Développement, 2021
- [Automotive Low-Voltage Si MOSFET Comparison 2021 report](#), System Plus Consulting, 2021

² MOSFET: Metal Oxide Semiconductor Field-Effect Transistor.

³ CAGR: Compound Annual Growth Rate

⁴ EV: Electric Vehicle

⁵ IGBT: Insulated Gate Bipolar Transistor

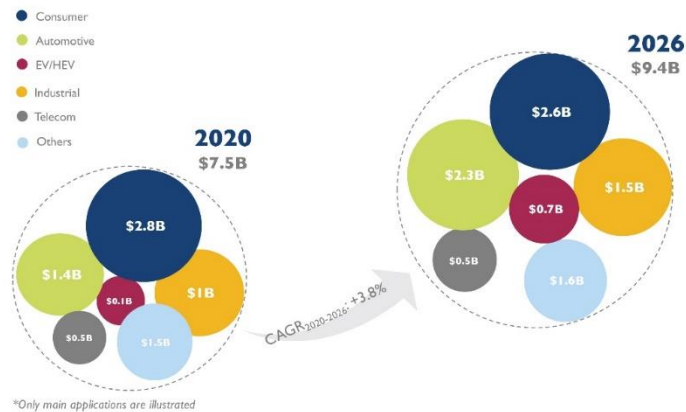
⁶ GaN: Gallium Nitride

⁷ SiC: Silicon Carbide

“2020 年，硅 MOSFET 市场价值 75 亿美元。在 Yole，我们预计 2020-2026 CAGR⁸(年的复合年增长率)为 3.8%，其中大部分收入来自消费者和汽车市场。”

2020-2026 silicon MOSFET market segment value

(Source: Silicon MOSFET Market and Technology Trends 2021 report, Yole Développement, 2021)



总的来说，由于对计算和消费电子产品的高需求，2021 年对于 MOSFET 来说是令人印象深刻的一年，从 COVID-19 中大幅复苏。

如今，消费市场贡献了 37% 的硅 MOSFET 收入，使其成为最大的部门。

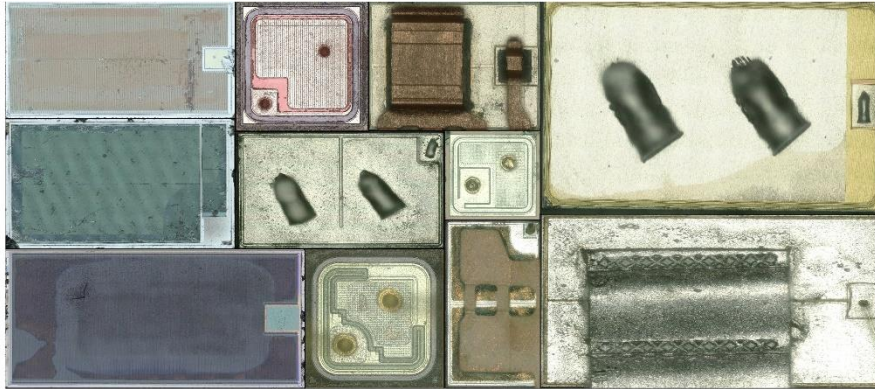
由于越来越多地采用辅助系统和电气化，包括电动汽车在内的汽车将推动对硅功率 MOSFET 的需求。辅助电机驱动升压低压 MOSFET，而电气化则对 DC/DC 转换器或车载充电器系统中包含的高压 MOSFET 进行升压。目前，这两个部分合计占 MOSFET 市场的 21%。到 2026 年，它们将增加到 32%。

System Plus Consulting 的技术与成本分析师 **Amine Allouche** 解释说：“事实上，一些政府针对 2050 年碳中和的新环境法规有利于加快车辆电气化。”“而电力电子是这一转变的关键技术。硅 MOSFET 受益于成熟的基础设施和工艺。与此同时，新一代设备即将上市。除了性能改进之外，由于 12 英寸硅晶圆的过渡，硅 MOSFET 管芯成本将进一步降低，这将使它们的成本更具竞争力。”

⁸ CAGR: Compound Annual Growth Rate

Die design comparison of automotive qualified Si MOSFETS

(Source : Automotive Low-Voltage Si MOSFET Comparison 2021 report, System Plus Consulting, 2021)



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当然，MOSFET 在许多其他应用中也发挥着重要作用……

Yole 今天发布的硅 MOSFET 市场和技术趋势报告([Silicon MOSFET Market & Technology Trends report](#))有助于了解整个电力电子生态系统、其最新创新和领先公司的战略。

Yole 的合作伙伴 System Plus Consulting 也为了解 MOSFET 市场和技术发展做出了贡献。这家逆向工程和成本计算公司提供了一份专门的报告，以深入研究 MOSFET 技术和组件制造商的战略：[2021 年汽车低压硅 MOSFET 比较报告\(Automotive Low-Voltage Si MOSFET Comparison 2021 report.\)](#)。

在这个生态系统中，英飞凌科技凭借其庞大的 MOSFET 产品组合和众所周知的 CoolMOS 技术保持领先地位。在 MOSFET 排名中，安森美以 13% 的市场份额⁹，排名第二，在低压汽车细分市场处于领先地位。

而中国球员呢？

事实上，它们在 MOSFET 市场中并不是很明显，因为它是高度技术驱动的，”然而，在 Yole，我们开始看到吉林华微、士兰微电子或华润微等厂商的产品组合中有不少 MOSFET 产品……

正如 Yole 的硅 MOSFET 报告所详述，中国占硅 MOSFET 销售额的 38%。除了不同应用对硅 MOSFET 的需求不断增长之外，中国政府也在推动国内制造。

“因此，中国企业对制造能力进行投资也就不足为奇了，”米兰罗西娜博士断言。Yole 电力电子与电池部首席分析师。“像 HHGrace 和 CanSemi 这样的代工厂已经投资了 300mm 设备，以应对 MOSFET 和其他功率组件的更高产量，并已开始生产。”

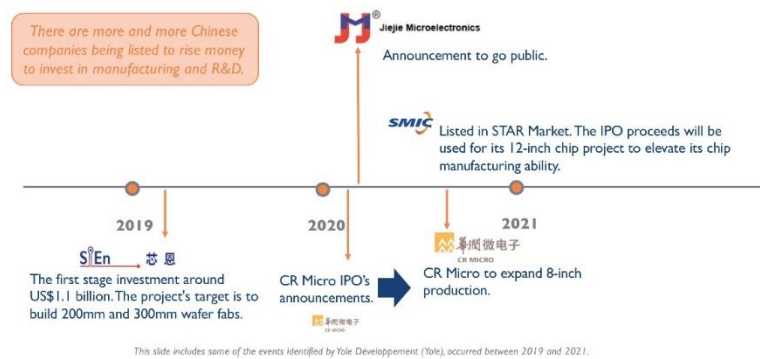
⁹ Including all MOSFETs

然而，这并不是中国推动 300mm 的结束。SiEn 正在建造 300mm 晶圆厂，以及 CRMicro 和 Nexperia。事实上，华润微最近通过 IPO¹⁰ 筹集资金，并已经扩大了其 200mm 产品线。

捷杰微电子和中芯国际等其他公司也遵循同样的模式。他们都想把筹集的资金投资到制造能力上。

2019-2021 IPO and expansion of silicon MOSFET production capacity in China

(Source: Silicon MOSFET Market and Technology Trends 2021 report, Yole Développement, 2021)



然而，这不仅仅是对制造基地的投资.....

中国企业也在通过收购获得市场份额。自中美贸易战开始以来，中资企业的交易并不简单。例如，参见 Nexperia-Newport, UK、Wafer Fab 或 Magnachip-Wise Road Capital 收购。中国制造商也在投资技术知识。

五年前，人们认为中国产品在超级结 MOSFET 等高端组件方面的性能低于欧洲、日本或美国制造商。然而，这种情况正在改变。一些中国公司可以实现与主要 MOSFET 厂商类似的业绩。

总而言之，中国制造商正在竞相抢占 MOSFET 市场的很大一部分。

Yole 和 System Plus Consulting 全年都发布了大量电力电子和化合物半导体报告。

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¹⁰ IPO : Initial Public Offering

Press contacts

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

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About our analysts

Milan Rosina, PhD, is Principal Analyst, Power Electronics and 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.

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.

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.

She holds an Electronics Engineering degree completed by a Master and PhD. in micro and nano electronics from Universitat Autònoma de Barcelona (SP).

Abdoulaye Ly is a Technology & Market Analyst specializing in Electronic Power Systems at Yole Développement (Yole). As part of the Power Electronics & Wireless division at Yole, Abdoulaye's expertise is focused on power electronics system design.

Abdoulaye graduated with a technical degree in 2014 from Bethune University Institute of Technology and in 2017 received an electrical engineering degree from Grenoble Institute of Technology.

Amine Allouche serves as a Technology & Cost Analyst, Power Electronics, at System Plus Consulting, part of Yole Développement. He collaborates closely with the laboratory team, and together they define the objectives of the analyses and determine the related methodologies... Amine's aim is to determine the technology choices made by the leading companies.

Amine holds a master's degree in Micro & Nanotechnologies with a focus on integrated systems from Grenoble's Polytechnic Institute (France). He also graduated from the Ecole Polytechnique Fédérale de Lausanne (EPFL) (Lausanne, Switzerland) and the Politecnico di Torino (Italy).

Tom Herve has joined System Plus Consulting as a Microelectronic Laboratory Technician in order to strengthen the laboratory team. In 2020, Tom was graduated from the University of Blois where he obtained a technical degree (DUT) in Physical Measurements. He previously worked on different subject among which precipitation of zinc oxide.

About the reports

Silicon MOSFET market and technology trends 2021

MOSFET market is expected to reach \$9.4B by 2026. Chinese companies want to grow their market share by increasing investment and improving device performance. – Performed by Yole Développement

Companies cited:

Alpha & Omega Semiconductor, Amkor, ASMC, Bosch, Central Semiconductor, Comchip, CR Micro, Daco Semiconductor, Danfoss, Diodes Incorporated, Episil, Fuji Electric, Global Wafers, HHGrace, Infineon, Littelfuse, Magnachip, Microchip, Mikron, Mitsubishi Electric, Macmic, Newport Wafer Fab, Nexperia, Nuvoton, NXP, Okmetic, onsemi...

Automotive Low-Voltage Si MOSFET Comparison 2021

Exhaustive technology and cost comparisons of 11 AEC-Q101 Si MOSFETs from Infineon, ON Semiconductor, STMicroelectronics, Toshiba, Nexperia, Rohm, Diodes Incorporated, and Taiwan Semiconductor. – Performed by System Plus Consulting.

Related reports:

- [IGBT Market & Technology Trends](#)
- [DC Charging for Plug-In Electric Vehicles 2021](#)
- [Power Electronics for E-Mobility 2021](#)
- [Status of the Power Electronics Industry](#)

About System Plus Consulting

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... [More](#)

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