

Global Atomically Thin 2D Semiconductor Transistors Supply, Demand and Key Producers, 2026-2032

<https://marketpublishers.com/r/G61EA7B500EFEN.html>

Date: June 2026

Pages: 113

Price: US\$ 4,480.00 (Single User License)

ID: G61EA7B500EFEN

Abstracts

The global Atomically Thin 2D Semiconductor Transistors market size is expected to reach \$ 200 million by 2032, rising at a market growth of 42.2% CAGR during the forecast period (2026-2032).

Atomically thin 2D semiconductor transistors are field-effect transistors and integrated devices in which atomically thin two-dimensional materials serve as the channel, sensing layer, or other critical functional layers. Typical material systems include transition-metal dichalcogenides such as MoS₂, WS₂ and WSe₂, graphene, h-BN, black phosphorus and other van der Waals materials. The technology leverages atomic-scale thickness, strong electrostatic gate control, dangling-bond-free surfaces and heterogeneous integration to modulate carrier transport or surface-charge response. This study focuses on 2D-FETs, GFETs, 2D semiconductor prototype chips, research-grade transistor chips and process services used in post-silicon CMOS scaling, monolithic 3D integration, low-power edge computing, molecular and biosensing, photodetection and flexible electronics. Key technical modules include high-quality 2D material growth and transfer, low-resistance contacts, gate dielectric integration, 300mm-compatible processing, low-temperature BEOL integration, device modeling and small-scale transistor array fabrication.

According to our research, atomically thin 2D semiconductor transistors should not be treated as a mature, revenue-heavy component market today. The current industry is better understood as an emerging technology stack formed by advanced logic research, early GFET commercialization, 2D material supply and engineering validation platforms. The strategic rationale is clear: as silicon transistor scaling approaches electrostatic, power and cost limits, atomically thin channel materials may provide better gate control and new integration options for post-silicon CMOS and monolithic 3D architectures.

However, the gap between laboratory demonstrations and high-volume manufacturing remains substantial. Contact resistance, gate dielectric integration, material uniformity, defect control, thermal budgets and 300mm process compatibility are still decisive bottlenecks. Therefore, this report adopts a narrow revenue scope that includes GFET devices, 2D-FET prototype chips, 2D material MPW and direct process services, rather than broadly counting all 2D materials or all advanced semiconductor revenue.

From a supply-side perspective, the global ecosystem is forming a clear three-layer structure. The first layer consists of advanced logic platforms that will determine whether 2D material transistors can be incorporated into future leading-edge logic roadmaps. The second layer is made up of companies that have begun to generate commercial products or services around GFETs, 2D material integration, MPW runs, and sensor applications. The third layer includes material and research-tool suppliers that provide wafers, samples, crystals, thin films, test substrates, and related prototyping inputs for universities, corporate R&D teams, and early-stage device development. This explains why the current revenue base remains small while the strategic importance is high. The key competitive variables are not only sales volume, but also material quality, integration compatibility, device repeatability and the ability to connect with CMOS design and process ecosystems.

From the demand side, near-term purchases are led by semiconductor R&D teams, universities, national laboratories, sensor developers and pilot-line users. Medium-term growth will likely come from GFET molecular and biosensors, low-power edge-AI prototypes, 2D material MPW services and BEOL-compatible heterogeneous integration. China's publicly disclosed 2D semiconductor demonstration line and 2029 mass-production target indicate that regional industrial policy is beginning to move from academic validation toward process platforms and prototype chips. Nevertheless, the market before 2030 should still be modeled conservatively. If 300mm integration, low-temperature deposition, gate stack engineering and low-resistance contacts progress faster than expected, the market could move from research-grade demand to engineering-validation and small-batch application demand; otherwise, it will remain a specialized R&D and sensing niche for longer.

This report studies the global Atomically Thin 2D Semiconductor Transistors demand, key companies, and key regions.

This report is a detailed and comprehensive analysis of the world market for Atomically Thin 2D Semiconductor Transistors, and provides market size (US\$ million) and Year-

over-Year (YoY) growth, considering 2025 as the base year. This report explores demand trends and competition, as well as details the characteristics of Atomically Thin 2D Semiconductor Transistors that contribute to its increasing demand across many markets.

Highlights and key features of the study

Global Atomically Thin 2D Semiconductor Transistors total market, 2021-2032, (USD Million)

Global Atomically Thin 2D Semiconductor Transistors total market by region & country, CAGR, 2021-2032, (USD Million)

U.S. VS China: Atomically Thin 2D Semiconductor Transistors total market, key domestic companies, and share, (USD Million)

Global Atomically Thin 2D Semiconductor Transistors revenue by player, revenue and market share 2021-2026, (USD Million)

Global Atomically Thin 2D Semiconductor Transistors total market by Type, CAGR, 2021-2032, (USD Million)

Global Atomically Thin 2D Semiconductor Transistors total market by Application, CAGR, 2021-2032, (USD Million)

This report profiles major players in the global Atomically Thin 2D Semiconductor Transistors market based on the following parameters - company overview, revenue, gross margin, product portfolio, geographical presence, and key developments. Key companies covered as a part of this study include Graphenea S.A., Paragraf Limited, AMO GmbH, VTT Technical Research Centre of Finland Ltd, CDimension, Melexis NV, Grolltex, Inc., Archer Materials Limited, Grapheal SAS, LayerLogic AB, etc.

This report also provides key insights about market drivers, restraints, opportunities, new product launches or approvals.

Stakeholders would have ease in decision-making through various strategy matrices used in analyzing the world Atomically Thin 2D Semiconductor Transistors market

Detailed Segmentation:

Each section contains quantitative market data including market by value (US\$ Millions), by player, by regions, by Type, and by Application. Data is given for the years 2021-2032 by year with 2025 as the base year, 2026 as the estimate year, and 2027-2032 as the forecast year.

Global Atomically Thin 2D Semiconductor Transistors Market, By Region:

United States

China

Europe

Japan

South Korea

ASEAN

India

Rest of World

Global Atomically Thin 2D Semiconductor Transistors Market, Segmentation by Type:

Advanced 2D-FET R&D / Pilot Devices

GFET Chips and Sensor Devices

2D Material Device MPW / Prototyping Services

2D Semiconductor Prototype ICs

Research-grade Test Structures and Substrates

Other / Unclassified Product Forms

Global Atomically Thin 2D Semiconductor Transistors Market, Segmentation by Channel Material:

TMD-based 2D Transistors

Graphene Field-Effect Transistors

h-BN / Insulator-enabled 2D Devices

Black Phosphorus and Other 2D Semiconductors

Hybrid / Other Low-dimensional Devices

Global Atomically Thin 2D Semiconductor Transistors Market, Segmentation by Device Architecture:

Planar 2D-FET

Top-gated / Dual-gated 2D-FET

GAA 2D-FET

2D-CFET / Stacked 2D Devices

GFET Sensor Device

Other Experimental Architectures

Global Atomically Thin 2D Semiconductor Transistors Market, Segmentation by Application:

Advanced Logic Scaling

Monolithic 3D Integration

Molecular and Biosensing

Optoelectronics and Photonics

Companies Profiled:

Graphenea S.A.

Paragraf Limited

AMO GmbH

VTT Technical Research Centre of Finland Ltd

CDimension

Melexis NV

Grolltex, Inc.

Archer Materials Limited

Grapheal SAS

LayerLogic AB

Yuanjiwei Technology (Shanghai) Co., Ltd.

imec

Commissariat à l'énergie atomique et aux énergies alternatives (CEA)

IHP – Leibniz Institute for High Performance Microelectronics

Key Questions Answered

1. How big is the global Atomically Thin 2D Semiconductor Transistors market?
2. What is the demand of the global Atomically Thin 2D Semiconductor Transistors market?
3. What is the year over year growth of the global Atomically Thin 2D Semiconductor Transistors market?
4. What is the total value of the global Atomically Thin 2D Semiconductor Transistors market?
5. Who are the Major Players in the global Atomically Thin 2D Semiconductor Transistors market?

6. What are the growth factors driving the market demand?

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