

# Semiconductor Metrology & Inspection Equipment: Global Market 2027-2037

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## Abstracts

The semiconductor metrology and inspection (M&I) equipment market sits at the heart of modern chip manufacturing, providing the measurement and defect-detection capabilities that make advanced process control possible. As device architectures grow more complex, three-dimensional, and heterogeneous, the ability to see, measure, and characterize structures—both on the surface and buried beneath multiple layers—has become a decisive factor in achieving acceptable yields. Metrology and inspection are increasingly described as a potential bottleneck in advanced chip manufacturing, with process-control intensity rising in step with each new node and packaging innovation.

Demand is propelled by the evolution of advanced logic, DRAM, high-bandwidth memory, EUV lithography, and advanced packaging. Inspection requirements are intensifying as defect sensitivity climbs and as the industry transitions toward gate-all-around transistors, high-aspect-ratio memory, and bonding-related failure modes that are no longer visible at the surface. In parallel, metrology is expanding to address tighter overlay budgets, growing materials complexity, and the need for precise control of surface, shape, and topography. Advanced packaging—encompassing hybrid bonding, panel-level packaging, and glass substrates—is emerging as a major growth driver, multiplying the number of critical control points across the process flow.

The supplier ecosystem remains concentrated among established players in North America, Europe, and Japan, where most of the value creation and roadmap leadership resides. At the same time, China is accelerating efforts to build a domestic M&I ecosystem, contributing to a more diversified and dynamic supply chain. Competition is shifting beyond hardware toward application know-how, software, data analytics, hybrid metrology, and service capabilities. Across the field, continued innovation in optical, e-beam, X-ray, surface-probe, and computational techniques—often combined through

data fusion—is reshaping the competitive landscape and enabling the next wave of semiconductor innovation.

A comprehensive 2027–2037 analysis of the global semiconductor metrology and inspection equipment market, covering forecasts, segments, technologies, device-class requirements, the supplier ecosystem, regional dynamics including China, competitive market shares, and detailed profiles of leading and emerging equipment vendors.

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