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Global IC Design Fault Detection ? Classification (FDC) Software Supply, Demand and Key Producers, 2026-2032

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Abstracts

The global IC Design Fault Detection ? Classification (FDC) Software market size is expected to reach $ 1090 million by 2032, rising at a market growth of 10.3% CAGR during the forecast period (2026-2032).

IC Design Fault Detection ? Classification (FDC) Software is a category of equipment engineering and process control industrial software for semiconductor manufacturing, assembly and test, and other high-precision manufacturing environments. Its core objective is to continuously collect equipment sensor data, process parameters, event logs, recipe context, and lot information during wafer, chip, package, or test production, and to cleanse, align, model, monitor, and alarm high-frequency data such as temperature, pressure, gas flow, RF power, vacuum status, motor status, chamber status, process time, and equipment events. By doing so, it provides early warning before equipment drift, process excursions, component degradation, recipe abnormalities, sensor anomalies, or batch-level yield losses occur. This type of software is typically delivered as an FDC module, equipment engineering system, advanced process control platform, CIM/MES extension module, or smart manufacturing analytics platform. Key technologies include real-time trace data acquisition, univariate and multivariate statistical modeling, SPC rules, dimensionality reduction methods such as PCA and PLS, machine learning anomaly detection, automatic feature extraction, fault model libraries, alarm prioritization, root cause localization, OCAP linkage, MES and EAP integration, and cross-fab data management. Typical customers include foundries, IDMs, memory manufacturers, power semiconductor manufacturers, compound semiconductor fabs, advanced packaging facilities, outsourced assembly and test providers, and semiconductor equipment makers. Primary users include equipment engineers, process engineers, yield engineers, automation engineers, and

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manufacturing operations teams. Commercial delivery commonly includes software licenses, site subscriptions, modular deployment, project implementation, interface adaptation, model tuning, annual maintenance, and multi-fab replication. Its value is concentrated in reducing unplanned downtime, lowering scrap and rework, improving overall equipment effectiveness, shortening excursion response cycles, enhancing process stability, and supporting AI-driven yield improvement.

The industrial value of IC design Fault Detection ? Classification (FDC) Software is expanding from standalone anomaly alarming to a foundational control capability for semiconductor manufacturing quality, equipment efficiency, and yield security. As AI chips, advanced logic, memory, power semiconductors, compound semiconductors, and advanced packaging lines continue to expand, process tools generate rapidly growing volumes of temperature, pressure, flow, vacuum, RF power, chamber status, motion component, recipe context, lot information, and event log data during production. Traditional manual inspection and after-the-fact statistics are no longer sufficient to identify subtle drift in time. By collecting equipment trace data in real time and combining rule thresholds, statistical process control, multivariate modeling, machine learning anomaly detection, and fault classification mechanisms, this type of software can generate early warnings before equipment failure, process excursions, sensor miscalibration, component degradation, and batch-level yield losses expand. Its core value is not limited to detecting abnormalities, but lies in integrating equipment status, process stability, excursion response, maintenance planning, and yield improvement into a unified data closed loop, helping foundries, assembly and test facilities, and semiconductor equipment makers reduce unplanned downtime, lower scrap and rework, improve overall equipment effectiveness, and support more stable production ramp-up.

The competitive landscape of IC design Fault Detection ? Classification (FDC) Software will shift from standalone FDC functionality toward platform, intelligence, and system integration capabilities. Semiconductor manufacturing sites usually operate equipment from different brands, generations, and interface protocols, so software suppliers must not only collect data and build alarm models, but also support SECS/GEM, EDA Interface A, MES, EAP, SCADA, SPC, APC, YMS, and database systems, while connecting data from front-end manufacturing, assembly and test, metrology and inspection, equipment maintenance, and yield analysis. Suppliers with capabilities in real-time trace management, historical data traceability, low-false-alarm detection, root cause assistance, model version management, cross-tool migration, and multi-fab replication will be better positioned to enter the core manufacturing systems of large fabs and assembly and test facilities. As AI and machine learning capabilities mature,

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FDC software will further converge with predictive maintenance, virtual metrology, run-to-run control, energy optimization, digital twins, and large-model-assisted root cause analysis, evolving from an equipment engineering tool into an important component of the semiconductor smart manufacturing data platform. Long-term supplier barriers will come from the combined accumulation of algorithmic capability, semiconductor process knowledge, field implementation experience, interface adaptation capability, and continuous operational support.

The market outlook for IC design Fault Detection ? Classification (FDC) Software is broadly positive, driven mainly by global wafer fab equipment investment growth, advanced packaging expansion, mature-node upgrades, localization substitution, and the transformation of manufacturing data into strategic assets. New fabs typically build CIM, MES, EAP, SPC, APC, and FDC manufacturing software systems in parallel, while legacy lines improve equipment transparency through equipment engineering system upgrades, SECS/GEM modernization, EDA Interface A access, and FDC module enhancement. The assembly and test segment, characterized by large equipment fleets, fast cycle times, and long chains of abnormality impact, will also become an important incremental scenario for equipment health monitoring software. Regionally, suppliers in the United States, Europe, Japan, and China each have accumulated capabilities in manufacturing analytics, equipment interfaces, industrial automation, and semiconductor CIM, while demand is mainly concentrated in semiconductor manufacturing bases such as mainland China, Taiwan, South Korea, Japan, the United States, Singapore, Malaysia, and Europe. Over the medium to long term, as AI chips and advanced packaging drive the construction of more complex production lines, FDC software is expected to shift from an optional efficiency improvement tool to a necessary system for ensuring production stability, yield security, and equipment asset utilization, with growth potential above that of traditional equipment management software.

Report Scope

This report studies the global IC Design Fault Detection ? Classification (FDC) Software demand, key companies, and key regions.

This report is a detailed and comprehensive analysis of the world market for IC Design Fault Detection ? Classification (FDC) Software, 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 IC Design Fault Detection ? Classification (FDC) Software that contribute to its increasing demand across many markets.

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Highlights and key features of the study

Global IC Design Fault Detection ? Classification (FDC) Software total market, 2021-2032, (USD Million)
Global IC Design Fault Detection ? Classification (FDC) Software total market by region & country, CAGR, 2021-2032, (USD Million)
U.S. VS China: IC Design Fault Detection ? Classification (FDC) Software total market, key domestic companies, and share, (USD Million)
Global IC Design Fault Detection ? Classification (FDC) Software revenue by player, revenue and market share 2021-2026, (USD Million)
Global IC Design Fault Detection ? Classification (FDC) Software total market by Monitoring Object, CAGR, 2021-2032, (USD Million)
Global IC Design Fault Detection ? Classification (FDC) Software total market by Application, CAGR, 2021-2032, (USD Million)

This report profiles major players in the global IC Design Fault Detection ? Classification (FDC) Software 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 INFICON, PDF Solutions, Inc., Applied Materials, Inc., camLine GmbH, Yokogawa Electric Corporation, eInnoSys, Inc., Semitronix Corporation, GETECH, FA Software Co., Ltd., Synopsys, Inc., 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 IC Design Fault Detection ? Classification (FDC) Software market

Detailed Segmentation:

Each section contains quantitative market data including market by value (US$ Millions), by player, by regions, by Monitoring Object, 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 IC Design Fault Detection ? Classification (FDC) Software Market, By Region:

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United States

China

Europe

Japan

South Korea

ASEAN

India

Rest of World

Global IC Design Fault Detection ? Classification (FDC) Software Market, Segmentation by Monitoring Object:

Front-End Process Equipment Monitoring Software

Assembly and Test Equipment Monitoring Software

Facility Auxiliary Equipment Monitoring Software

Equipment Communication Interface Monitoring Software

Cross-Line Equipment Fleet Monitoring Software

Equipment Engineering Data Platform Software

Other

Global IC Design Fault Detection ? Classification (FDC) Software Market, Segmentation by Analysis Method:

Rule and Threshold Monitoring Software

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Univariate Statistical Monitoring Software

Multivariate Statistical Modeling Software

Machine Learning Anomaly Detection Software

Deep Learning Fault Classification Software

Hybrid Physics and Data Modeling Software

Adaptive Online Learning Software

Other

Global IC Design Fault Detection ? Classification (FDC) Software Market, Segmentation by Integration Interface:

SECS/GEM Interface Software

EDA Interface A Interface Software

MES Integration Software

EAP Integration Software

SCADA Integration Software

APC Integration Software

SPC Integration Software

YMS Integration Software

Database Integration Software

Global IC Design Fault Detection ? Classification (FDC) Software Market, Segmentation

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by Application:

- Equipment Fault Early Warning
- Process Drift Identification
- Abnormal Lot Interception
- Equipment Maintenance Optimization
- Root Cause Analysis Assistance
- Yield Loss Prevention
- Other

Companies Profiled:

- INFICON
- PDF Solutions, Inc.
- Applied Materials, Inc.
- camLine GmbH
- Yokogawa Electric Corporation
- eInnoSys, Inc.
- Semitronix Corporation
- GETECH
- FA Software Co., Ltd.
- Synopsys, Inc.

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Key Questions Answered

1. How big is the global IC Design Fault Detection ? Classification (FDC) Software market?
2. What is the demand of the global IC Design Fault Detection ? Classification (FDC) Software market?
3. What is the year over year growth of the global IC Design Fault Detection ? Classification (FDC) Software market?
4. What is the total value of the global IC Design Fault Detection ? Classification (FDC) Software market?
5. Who are the Major Players in the global IC Design Fault Detection ? Classification (FDC) Software market?
6. What are the growth factors driving the market demand?

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