PRODUCT BRIEF

Intel® Xeon® Processor D-1529 for Industrial 61508 Certification
Manufacturing Functional Safety

Accelerating Functional Safety Certification

Intel® Xeon® processor D-1529 for industrial 61508 certification. A functional safety solution for industrial agility.

Intel brings its leadership and innovation in digital technology platforms to the industrial safety market.

Global manufacturers, and energy and transportation companies are building out more complex systems to capture Industry 4.0 value. These systems require robust functional safety solutions to meet evolving safety standards, and protect the environment, people, products, and company brand.

An increasing number of industrial control systems require **IEC 61508** and other related safety certifications. These systems are becoming more complex. As a consequence, industrial manufacturers are challenged to meet certification requirements for safety-critical applications when time-to-market agility is critical in obtaining a competitive advantage.

A First for Industry

Intel brings its leadership and innovation in digital technology platforms to the industrial safety market with the release of the Intel® Xeon® processor D-1529 for industrial 61508 certification solution. This solution brings added advantages of high performance, scalability, reliability, and security.

Manufacturers can now rely on the Intel Xeon processor D-1529 (when paired with the Intel functional safety software) for safety critical applications and workflows, such as those integrating robotics, security, and control and automation systems. The solution meets IEC 61508 safety certification requirements, while ensuring robust availability and reliability. The supporting safety certification documents contain high levels of traceability and verification, improving operational and safety evaluation insight.

The solution provides a tightly integrated package comprised of hardware and software, including standardized Intel® silicon, the Intel® Software Test Library (Intel® STL), and certification documentation. All designed to help accelerate development of safety-certified systems.

Delivering a Safe and Secure Embedded Software Portfolio

Wind River, an Intel company, supports the Intel Xeon processor D-1529 for industrial 61508 certification with a comprehensive portfolio of software products enabling safe, secure, and reliable functional safety solutions. VxWorks*, the Wind River real-time operating system (RTOS), sets the standard for a scalable, future-proof, safe, and secure operating environment for industrial connected devices. Additionally, VxWorks security and safety products deliver a broad set of features to efficiently and effectively protect devices, data, and intellectual property, and deliver advanced time and space partitioning capabilities to provide reliable, interference-free consolidation of multiple applications with different criticality levels onto a single hardware platform.

The Wind River Simics virtual development environment provides the access, automation, and collaboration tools required for agile development practices. The Simics model of the Intel Xeon processor D-1529 enables a shorter path to certification through improved test efficiency and pre-silicon availability enabling faster time to market.

Accelerate Certification with High Performance and Lower Total Cost of Ownership (TCO)

Intel® IoT technologies and reference designs are helping customers integrate functional safety across industrial solutions. These innovations support platform consolidation—creating smaller, more efficient solutions using less power, while increasing performance and lowering system lifecycle management costs and TCO. Accelerate time to certification and system deployment with Intel's commercial-off-the-shelf (COTS) certification documentation.

With Intel functional safety solutions, manufacturers can reduce the cost of ownership, and OEMs, and SIs can speed time to certification of IEC 61508 SIL 2 systems.

Enabling Mixed-Criticality Workloads

The Intel Xeon processor D-1529 brings built-in virtualization capabilities— robustly separating the consolidated safety and non-safety applications on a shared compute platform. This enables mixed safety-criticality workloads from multiple teams and suppliers to execute safe and non-safe applications—such as robotic controls, security monitors, and human machine interfaces (HMI)—and IT applications can run securely on the same platforms.

The solution is a safety architecture conceived in compliance with IEC 61508 for use as input for safety microcontroller devices and to support safety functions up to SIL 2.

Optimized Diagnostics

The Intel Xeon processor D-1529 for industrial 61508 certification has robust diagnostics from the silicon to simulation to recommended test labs (RTL). The Intel® D-1529 Software Test Library (Intel® STL) enables off-line and online software diagnostics, software validation, and fault injection, increasing safety coverage. Intel STL helps manufacturing facilities maximize the benefits of Intel hardware features. Intel optimization helps ensure any negative impact on overall system performance is minimized. Intel software diagnostics also allow additional safety coverage, while flexible APIs simplify use of diagnostic functions.

End-to-End Smart Manufacturing

Through IoT solutions, intelligence is added to industrial systems by securely connecting devices and embedded computing sensors in smart factories to provide real-time visibility into personnel, equipment, transactions, and conditions. These new sources of data are turned into immediate actionable intelligence that can unlock operational efficiency across the manufacturing process, optimize production, and increase worker safety. This can translate into real business value, including faster time to market, reduced downtime, increased quality, fewer safety incidents, increased operational efficiency, and better asset utilization.

The Intel® IoT Platform is a reference model based on open standards-based Intel technologies that are designed to scale easily to meet changing business requirements. Our collaboration with a diverse ecosystem of leading providers of device, data center, analytics, cloud, and IoT technologies enables a broad range of secure, interoperable, multivendor solutions.

The Advantage of Integrated Functional Safety

Intel delivers a functional safety silicon platform integrated with a failure mode and effects analysis (FMEA) tool, diagnostic software, and validation and fault detection capabilities. With the combination of Intel software and the Intel Xeon processor D-1529 for industrial 61508 certification, industry has a holistic solution to help safeguard workers and support productive, manageable operations. Now you can get the performance and reliability of Intel architecture with the functional safety for today's and tomorrow's manufacturing facilities.

Look for more functional safety products from Intel and our ecosystem partners coming soon—providing the combination of scalability and reuse to transform businesses meeting safety requirements and protect investments.

Intel Xeon Processor D-1529 for Industrial 61508 Certification Features at a Glance

Human safety—making sure electronic systems do not harm human life—is the primary focus of the IEC 61508 safety standard. Intel helps ensure the security, availability, and reliability necessary to establish a technology foundation that improves worker safety.

FEATURES	BENEFITS
Standardized functional safety solutions	• Reduces total cost of ownership (TCO) and certification time of IEC 61508 systems with standardized solutions • Enables consolidation, driving higher reliability and reduced management costs • Provides a rich ecosystem offering functional safety modules in standard form factors
Mixed criticality systems and storage	• Allows consolidated solutions with mixed criticality workloads—safe and non-safe—to run together on a shared computer platform • Enables microprocessor execution of both safety-critical and non-safety-related functionality - Safety-related functionality has two redundant channels - Resources can be shared across safety-related and non-safety-related functionality
Reuse and scale	• Intel® architecture allows reuse and scalability • Scale application as safety attach rate increases • Reuse previous safety software during platform migration and refresh cycles • Allows faster certification times and accelerates time to market • Reduce development time; fewer and lower cost development cycles
High-performance CPU	• Powered by Intel® Xeon® processor D-1529 for industrial 61508 certification for exceptional performance to support near-real-time insight and complex workloads
System monitoring and diagnostics	• Windowed watchdog performs system diagnostics, including analyzing diagnostic results from the processing unit • Diagnostic monitors the CPU and signals dangerous detected faults to watchdog • Software diagnostics invoked from safety applications • PSU and clock monitor tracks system-level power and clocks • Status reporting interfaces to external systems to report system status
Thermal fault management	• Over voltage/current detection, processor temperature reporting, thermal failure indication
Machine checking	• Dynamic error detection and reporting on correctable and uncorrectable issues
Exception handling	• Programmable error exceptions, software-generated exceptions, machine check exceptions
IIO PCIe advanced error reporting	• Detect and log errors within coherency interfaces (e.g., PCIe*, DMI2, IIO core logic, VT-d) • Map errors to signaling
PCH error logic	• PCI error logic • SATA* and AHCI diagnostics

Intel® Xeon® Processor D-1529 for Industrial 61508 Certification Specifications

CPU	Intel® Xeon® processor D-1529 for industrial 61508 certification (14nm)
Cores	4
L1 cache	32K data, 32K instructions per core
L2 cache	256K per core
LLC cache	1.5 MB per core with Intel® Resource Director Technology (Intel® RDT)
Frequency	1.3 GHz
TDP	20W
Memory	DDR4 up to 1600 MT/s Two channels (2 DIMMs/channel)
Safety Fusing	Intel® Software Test Library (operates on safety SKU)
Reliability	Industrial extended temp use condition: • 10-year reliability at 100% activity • -40°C to 85°C operating temperature range
PCI-E*	x24 PCIe Gen3 (locked at Gen2 speeds) with up to 6 controllers
Integrated I/O	x4 USB 2.0 and x2 SATA 3
Legacy I/O	SPI for boot flash, SMBus, UART LPC, GPIO, 8259, I/O APIC, 8254 timer, RTC
Technologies	VT-x2, VT-d, core RAPL, PECI over SMBUS
Package	1667 Ball FCBGA Ball pitch: 0.7 mm minimum (variable) Dimension: 37.5 mm x 37.5 mm

Where to Get More Information

For more information, visit **intel.com/industrial-functional-safety-d1529**.

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