Product Brief

Intel Atom® Processors x7000RE Series for Edge

Deploy Ruggedized Edge Appliances without Compromise

Get to market fast with industrial-class compute tuned for deep learning inference powered by the Intel Atom® processors x7000RE Series.

Bring intelligence to the industrial edge with up to 2x the cores and up to 2x the graphics base frequency of the Intel Atom® processors x6000RE Series in a power-efficient 6W–12W BGA package. The Intel Atom processors x7000RE Series simplifies your path to deploying AI where you need it most, in challenging environments and hard-to-reach places on the factory floor. Integrated graphics, built-in AI capabilities, and ecosystem-enabled camera modules help accelerate your time to deployment for computer vision solutions, while Industrial use conditions[1] and time-sensitive features help ensure durability and smooth operation. Long-life availability[2] extends the value of computer vision equipment, with longer durations between upgrades and refreshes and a steady supply of replacements.

What's new

- Up to eight E-cores—up to 2x more cores and up to 2x the processor base frequency vs. the Intel Atom® processors x6000RE Series
- Intel® UHD Graphics with up to 32 execution units (EUs) and up to 2x higher graphics base frequency vs. the Intel Atom processor x6000RE Series
- Deep learning inference capabilities, including integrated Intel UHD Graphics, Intel® Deep Learning Boost (Intel® DL Boost), Intel® Advanced Vector Extensions 2 (Intel® AVX2) with INT8 support, and OpenVINO™ toolkit (validation to be completed in 2024) support
- 6th Generation Intel® Image Processing Unit (Intel® IPU6) with ecosystem-enabled cameras simplify design and development of computer vision solutions
- LPDDR5, DDR5, and DDR4 memory with support for In-Band Error Correction Code (IBECC) memory enhance multitasking

Consolidate appliances with more performance in a small footprint

The Intel Atom processors x7000RE Series empowers manufacturers to deploy compute resources where they're needed most for key Industry 4.0 applications and benefit from high uptime to boost productivity and low power consumption to help meet efficiency goals. Up to eight Efficient-cores (E-cores) deliver greater performance in a small footprint to help drive hardware consolidation. LPDDR5/DDR5/DDR4 memory with support for In-Band Error Correction Code (IBECC) memory helps achieve reliable multitasking, while up to 9x PCIe lanes allow for modular platform expansion for add-in accelerator cards.

Simplify AI deployments with a purpose-built processor

Manufacturers need to deploy computer vision solutions fast to stay competitive in advancing global markets, and the Intel Atom processors x7000RE Series is designed specifically for this purpose. Intel® Deep Learning Boost (Intel® DL Boost), Intel® Advanced Vector Extensions 2 (Intel® AVX2) with INT8 support, and OpenVINO™ help boost the performance of industrial edge applications with AI capabilities. In addition, the 6th Generation Intel® Image Processing Unit (Intel® IPU6) delivers high image quality, which, combined with ecosystem-enabled camera modules, helps simplify computer vision solution design and speeds time to market for device manufacturers.

Excel in high-value Industry 4.0 use cases with industrial-grade[1] hardware

The Intel Atom processors x7000RE Series delivers the qualities that industrial solution providers are looking for and that their customers need. Industrial use conditions with Extended Temperature[1] ranges help ensure uptime in harsh conditions of extreme hot or cold, vibration, and shock. Intel® Time-Coordinated Computing (Intel® TCC) and Time-Sensitive Networking (TSN) enable predictable, smooth operation for latency-bound workloads and high-value use cases such as robotics. And long-life availability[2] helps extend the life cycle of appliances in hard-to-reach areas, driving more value from your investments.

Intel Atom® processors x7000RE Series

PERFORMANCE

Up to **1.49x** (est.)
faster single-thread performance[3]
vs. Intel Atom® processors x6000RE Series

Up to **1.61x** (est.)
faster multithread performance[3]
vs. Intel Atom processors x6000RE Series

GRAPHICS

Up to **5.15x**
faster graphics performance[3]
vs. Intel Atom processors x6000RE Series

Up to **9.83x**
higher performance in image classification[3]
vs. Intel Atom processors x6000RE Series

For workloads and configurations, visit intel.com/PerformanceIndex: Intel Atom® Processors. Results may vary.

Key features

Performance and efficiency
- Intel® 7 process node
- Up to eight E-cores
- 6W–12W processor base power for fanless designs
- Soldered-down BGA package

Memory and I/O
- LPDDR5 4800 MT/s, DDR5 4800 MT/s, or DDR4 3200 MT/s
- Support for In-Band Error Correction Code (IBECC) memory
- Up to 9x PCIe 3.0 lanes

Connectivity
- 2x SATA Gen 3.2 ports, up to 4x USB 3.2 Gen 2 ports, USB Type-C
- 1x 2.5GbE Intel® Ethernet
- Intel® Wi-Fi, Bluetooth, 5G platform solutions

Graphics, imaging, and AI capabilities
- Intel UHD Graphics with up to 32 execution units (EUs) and up to 2x higher graphics base frequency compared to the Intel Atom processor x6000RE Series
- Intel Deep Learning Boost (Intel DL Boost)
- Intel AVX2 with INT8 support
- 6th Generation Intel Image Processing Unit (Intel IPU6)

Flexible Industry 4.0 deployments
- Intel Time-Coordinated Computing (Intel TCC) and Time-Sensitive Networking (TSN)
- Ecosystem-enabled camera modules

Longevity, investment, and value
- Long-life availability of up to 10 years[2]
- Embedded and Industrial use conditions at Extended Temperature[1]

Security capabilities
- Intel® Boot Guard
- Intel® Platform Firmware Resilience
- Intel® Platform Trust Technology

Software and OS support
- OpenVINO™ toolkit
- Intel® oneAPI support for AI inference
- Windows 10 IoT Enterprise 2021 Long-Term Service Channel (LTSC)
- Linux, Celadon (Android) in VM (community support)
- Support for Zephyr RTOS, Wind River VxWorks, and BlackBerry QNX
- KVM hypervisor and Real-Time Hypervisor (Real-Time Systems GmbH)
- Intel® Slim Bootloader, UEFI/BIOS

Use cases

INDUSTRIAL

Enable Industry 4.0 automation with power-efficient performance, integrated graphics and deep learning inference capabilities, and industrial-grade durability. Solution providers can speed their time to market for computer vision deployments with ecosystem-enabled camera modules.

Applications: AI automated tending, sorting, picking, palletizing, warehouse AMR, in-line visual inspection for quality control, ruggedized industrial PC.

- Up to 2x the cores and graphics base frequency compared to the Intel Atom processors x6000RE Series condense more compute in a small, efficient footprint that supports fanless designs.
- Deep learning inference capabilities, including integrated Intel UHD Graphics, Intel DL Boost, Intel AVX2 with INT8 support, and OpenVINO toolkit support, enable cost-efficient computer vision applications.
- Intel TCC and TSN enable latency-bounded Industry 4.0 workloads like robotics, while Industrial use conditions[1] help ensure high uptime.

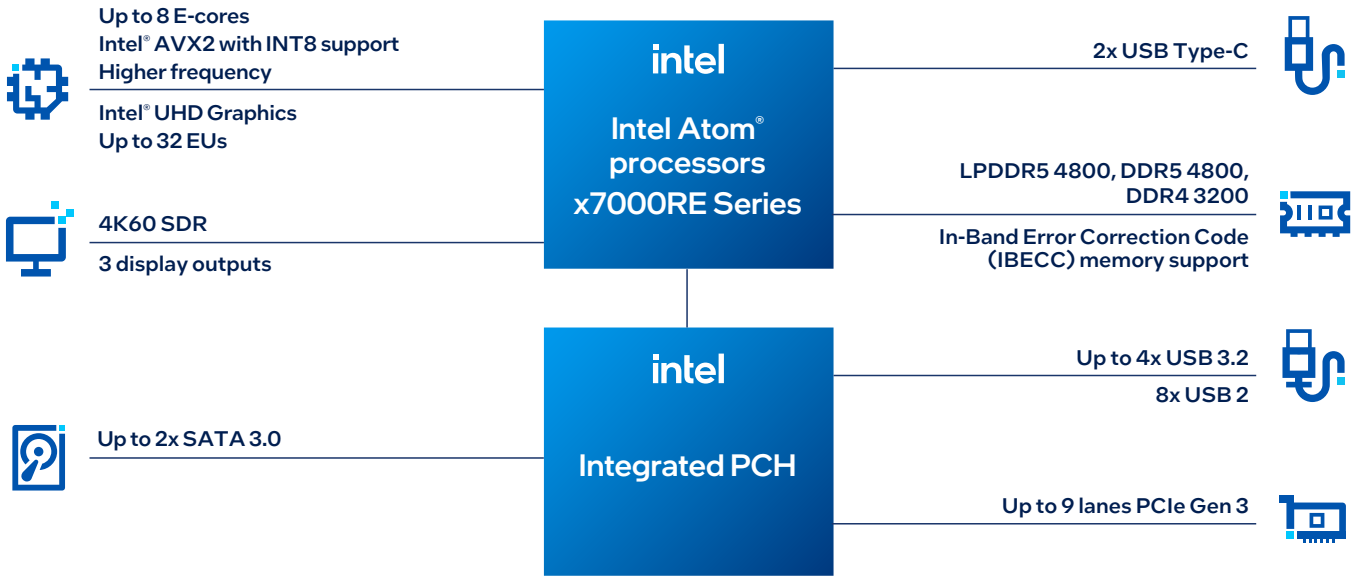
SMART CITIES

Support onboard devices for city fleet management and enable computer vision for digital safety and emerging adjacent use cases that use AI and graphics capabilities in combination with ecosystem-enabled camera modules.

Applications: Embedded and single-board computers; network video recorders; autonomous mobile robots (AMRs) for security, wayfinding, and delivery; and video analytics for smart communities, road and traffic management, parking, and smart city AI and sustainability.

- Up to eight cores in a power-efficient 6W–12W BGA package deliver condensed compute in a durable form factor that also supports fanless designs.
- Deep learning inference capabilities, including integrated Intel UHD Graphics, Intel DL Boost, Intel AVX2 with INT8 support, and OpenVINO toolkit support, enable cost-efficient computer vision applications.
- Long-life availability[2] helps maximize the value of investments with longer durations between refreshes or upgrades for devices in the field.

Processor block diagram



Note: Processor die and PCH are in a single package.

Software overview

CATEGORY	OPERATING SYSTEMS/SDKs/ BOOT LOADERS	IMPLEMENTATION	DISTRIBUTION AND SUPPORT
Operating systems[a]	Windows[b] 10 IoT Enterprise LTSC 2021	Intel, Microsoft	Intel, Microsoft
	Ubuntu[c], RHEL[c], WR Linux[c]	Canonical Ltd., Red Hat and Wind River Systems	Distributed and supported by commercial Linux vendors; Intel provides the preproduction overlays for Ubuntu and upstream kernel drivers
	Celadon CiV (Android optimized for IA)	Intel	Celadon open-source community, ISV partners
RTOS	VxWorks, QNX	Wind River, BlackBerry	Wind River, BlackBerry QNX
	Zephyr[d] RTOS	Intel	Zephyr open-source community
Hypervisors	KVM[c]	KVM	KVM open-source community
	Real-Time Hypervisor[c]	Real-Time Systems GmbH	Real-Time Systems GmbH
Boot Firmware[e]	UEFI/BIOS and Intel® FSP	Intel	Intel® BIOS Vendors (IBV)
	Slim Bootloader and Intel FSP	Intel	Bootloader ecosystem and SBL community
SDKs	Intel® oneAPI (Base[f] and IoT Toolkits)	Intel	Intel
	OpenVINO™ toolkit (validation to be completed in 2024)	Intel	Intel

a. Not all features are supported in all operating systems.
b. Includes EFLOW (Azure IoT Edge for Linux on Windows).
c. Supported by Intel via the upstreaming to open-source community. Adoption into individual Linux distributions/hypervisors is dependent upon the OS/HV vendors.
d. Planned post PV.
e. Legacy boot is not supported. Customers should work with their BIOS vendors for enabling/validating legacy BIOS features.
f. Intel® OneAPI base toolkit includes video processing libraries (VPL), formerly Intel® Media SDK.

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SKU	Use Condition	Temperature	TDP	CPU			GPU			Intel® TCC	TSN GbE
				Core Count	Processor Base Frequency	Max Turbo Frequency	EU Count	Graphics Base Frequency	Graphics Max Frequency		
Intel Atom® processor x7211RE	Embedded, Industrial, and Communication	Extended Temperature	6	2	1.0 GHz	3.2 GHz	16	400 MHz	1.0 GHz	Yes	Yes
Intel Atom® processor x7213RE			9	2	2.0 GHz	3.4 GHz	16	600 MHz	1.0 GHz	Yes	Yes
Intel Atom® processor x7433RE			9	4	1.5 GHz	3.4 GHz	32	600 MHz	1.0 GHz	Yes	Yes
Intel Atom® processor x7835RE			12	8	1.3 GHz	3.6 GHz	32	800 MHz	1.2 GHz	Yes	Yes

Note: Communication use condition is enveloped by Industrial use condition.

Get to market fast with industrial-class, deep learning inference.

Learn more about Intel Atom® processors x7000RE Series at intel.com/atomx7000re.

Notices and disclaimers

1. Industrial use conditions of up to 10 years, up to 100 percent active, no turbo, Extended Temperature (-40°C to 105°C).
2. Intel does not commit or guarantee product availability or software support by way of road map guidance. Intel reserves the right to change road maps or discontinue products, software, and software support services through standard EOL/PDN processes. Contact your Intel account rep for additional information.
3. Performance varies by use, configuration, and other factors. Learn more at intel.com/PerformanceIndex: Intel Atom® processors. Results may vary.

Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates. See backup for configuration details. No product or component can be absolutely secure.

Your costs and results may vary.

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