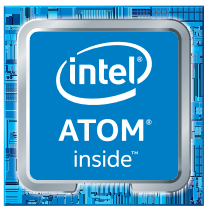
PRODUCT BRIEF

Internet of Things
Intel Atom® Processor C3000 Series

Expanding Intelligence and Flexibility at the Edge

Scalable, dense-compute SoC for demanding IoT workloads



From the factory floor to the energy grid, airplanes to supply chains, the sensors, controls, gateways, and other connected devices of Internet of Things (IoT) are driving the next industrial revolution. As IoT continues its explosive growth, the need for intelligent devices for more specialized applications is also growing exponentially.

Industrial, energy, aerospace, robotics, public sector, and other customers with demanding IoT workloads want new ways to easily extract value from their data, reduce their time to market, and innovate connected technologies quickly and efficiently. Moreover, they increasingly require reliable IoT solutions that bring maximum performance and greater capabilities to an ever-expanding array of challenging locations and operating conditions.

The Intel Atom® processor C3000 series extends low-power Intel® architecture into new segments and accelerates IoT innovation across a wide range of demanding environments and use cases. With high performance per watt, low thermal design power (TDP) of 9.5W, and up to 20 configurable high-speed input/output (HSIO) lanes, and pin-to-pin compatibility, this new system-on-a-chip (SoC) family delivers next-generation, multicore performance and scalability for a broad variety of low-power, high-density, and fanless designs.

Multicore scalability

With the Intel Atom processor C3000 series, customers are able to scale performance and achieve workload consolidation in situations and use cases that require very low power, high density, and high I/O integration. Designed in an FCBGA 34mm x 28mm compact form factor, this SoC-based CPU is manufactured on Intel's optimized 14nm process technology, available from 2 to 12 cores from 1.6 to 2.0 GHz, and includes up to 256 GB DDR4 2133 MHz ECC (SODIMM, UDIMM, or RDIMM) of addressable memory.

UP TO
2.3X
BETTER PERFORMANCE THAN PREVIOUS GENERATION INTEL ATOM® SOC[1]

Design flexibility

Industry 4.0 and IoT applications present many opportunities for automation and control providers. The Intel Atom C3000 series offers system builders a robust and flexible technology platform for industrial, automation, and energy applications. Its four integrated Ethernet controllers enable the next level of bandwidth-intensive industrial implementations. Plus, up to 20 lanes of configurable high-speed input/output (HSIO)—including up to 16 lanes of PCIe Gen 3, x16 SATA* 3.0, x4 USB 3.0 and fixed eMMC—allow greater customization, including dedicated functional safety channels and support for next-generation storage expandability.

Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. For more complete information visit intel.com/performance.

Leading performance per watt

This new generation of Intel Atom processors delivers up to 2.3x better compute performance than the previous generation.[1] Plus, its low TDP—from 9.5W to 24W—allows customers to apply this improved performance to high-density, low-power use cases and fanless designs. In addition, support for industrial ambient operation temperature enables effective operation in temperatures ranging from -40°C up to +85°C.

Server-grade safeguards

Optional Intel® QuickAssist Technology (Intel® QAT) provides accelerated security and networking capabilities—including up to 20 Gbps cryptography and up to 20 Gbps compression—enabling edge devices to quickly and more securely process data while freeing up compute cycles for other tasks.

The Intel Atom processor C3000 series also supports Reliability, Availability, and Serviceability (RAS) features, including error-correcting code (ECC) memory and platform-level error management and resilience. In addition, built-in hardware virtualization with Intel® Virtualization Technology (Intel® VT) enhances security and extends network functions virtualization (NFV) to the network edge.

Customizable manageability

Integrated Innovation Engine enables developers of next-generation autonomous and cognitive IoT systems to create custom firmware that adds manageability and security features to solutions without the cost, space, or power required for baseboard management controllers (BMC). In addition, Intel's ecosystem of ODM and ISV partners offers IE applications that allow customers to integrate additional hardware-based features without needing to create custom firmware themselves.

Versatile solutions for IoT innovation

The Intel Atom processor C3000 series' powerful combination of leading performance/watt and integrated technologies enables the next level of Industry 4.0 and other IoT applications. It provides a robust and flexible platform to scale industrial process and energy applications, allowing customers to efficiently expand IoT technologies into a broad range of high-density, low-power, and high-I/O use cases. Plus, with 15-year production availability, the platform is built to protect today's IoT investments and keep delivering value into the future.

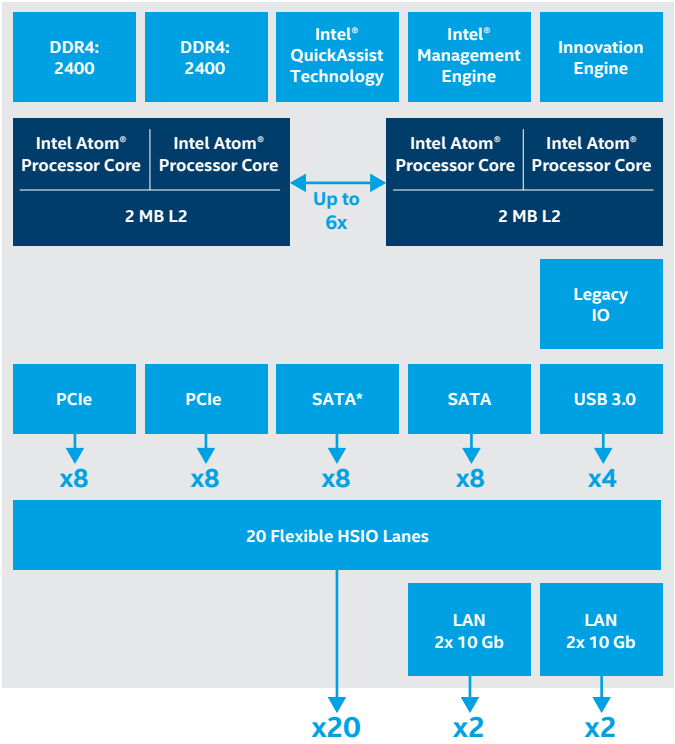


Figure 1. Typical Intel Atom® SoC C3000 series configuration

INTEL ATOM® PROCESSOR C3000 SERIES FOR IOT

NETWORK EDGE DESIGN FLEXIBILITY

Thermal design power (TDP)	9.5 watts to 24 watts
Core count	2 to 12 cores
Cache size	8 cores or fewer: L2 is 2 MB/core More than 8 cores: L2 is 2 MB/core pair
Memory support	Up to 2 channels of DDR4
Maximum memory capacity	Up to 256 GB
PCI Express* 3.0 ports	Up to 16 lanes Extra capacity and flexibility for storage and networking connections Up to double the I/O bandwidth of prior-generation PCIe[2,3]
Serial ATA 3.0 (SATA 3.0)	Up to 16 lanes Faster data access, system startups, and application load times Doubles data throughput versus previous generation for faster hard drive performance[2,4]
USB 3.0	Up to 4 high-speed USB
Integration Engine	Enables custom security and manageability firmware integration

SAFEGUARDS TO PROTECT YOUR DATA

Reliability, Availability, and Serviceability (RAS) features	Helps ensure consistent performance
Support for error-correcting (ECC) memory	Better data integrity and system reliability through automatic data correction

RESPONSIVE PERFORMANCE

Intel® QuickAssist Technology (Intel® QAT)	Enable high-performance security and compression acceleration on standard platform solutions
Integrated Intel® Ethernet	Up to four 10 GbE connections Extensive compatibility, broad product selection, performance, and acceleration Easy installation and reliability, worldwide availability, and world-class support

INTEL ATOM® PROCESSOR C3000 SERIES FOR IOT

SKU	CPU CORES	SPEED	POWER	HIGH-SPEED INPUT/OUTPUT (HSIO)	MEMORY SUPPORT (UP TO 256 GB DDR4)	INTEGRATED INTEL® ETHERNET	INTEGRATED INTEL® QUICKASSIST TECHNOLOGY (INTEL® QAT)	EXTENDED AMBIENT OPERATION TEMPERATURE (ETEMP)
Intel Atom® processor C3808	12	2.0 GHz	24W	Up to 20	2 CH: 2133 MHz	4 x 10 GbE	Up to 20 Gbps	From -40°C up to +85°C
Intel Atom® processor C3708	8	1.7 GHz	17W	20	2 CH: 2133 MHz	4 x 10 GbE	Up to 10 Gbps	From -40°C up to +85°C
Intel Atom® processor C3508	4	1.6 GHz	11.5W	8	2 CH: 1866 MHz	4 x 2.5 GbE	Up to 5 Gbps	From -40°C up to +85°C
Intel Atom® processor C3308	2	1.6 GHz	9.5W	6	1 CH: 1866 MHz	4 x 2.5 GbE	Up to 5 Gbps	From -40°C up to +85°C

SUPPORTED SOFTWARE

OS TYPE	OPERATING SYSTEM[5] (TARGETED FOR SUPPORT)	SUPPORT[6]	DISTRIBUTION	BIOS
Linux*	Red Hat Enterprise Linux* 7.3, 7.4	Red Hat	Red Hat	American Megatrends Inc.
	SUSE* Linux Enterprise Server 12 SP3	SUSE, open source	SUSE	
	Ubuntu* 16.04, 16.10, 17.04 LTS	Canonical, open source	Canonical	
	Yocto* Linux 2.1	Intel, open source	Yocto Project*	
	CentOS* 7.3	Open source	Open source	
	Wind River Linux WRL8, WRL9	Wind River	Wind River	Insyde Software
Windows*	Microsoft Windows* Server 2016 (including Nano Server), Server 2012 R2	Intel, Microsoft	Microsoft	Phoenix Technologies
VMM	Linux KVM (RHEL 7.3, 7.4)	Open source	Open source	BYOSOFT
	Microsoft Windows* Hyper-V	Microsoft	Microsoft	
	Xen* 4.9	Linux* Foundation, open source	Linux* Foundation, open source	

For more information on the Intel Atom® processor C3000 series, visit intel.com/atom.

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1. Up to 2.3x compute performance improvement vs. Intel Atom® processor C2000. Old: 1-node, 1 x Intel Atom® processor C2750 on Edisonville with 32 GB total memory on Red Hat Enterprise Linux* 7.0 kernel 3.10.0- 123 using (no software). Data source: request number: 103, benchmark: SPECint*_rate_base2006, score: 103 higher is better. New: 1- node, 1 x Intel Atom® processor C3955 on Harrisonville with 64 GB total memory on Ubuntu* 16.04 LTS kernel 4.4.0-31-generic using SPECint_rate_base2006. Data source: Intel internal measurement, score: 246. Higher is better.
2. Results have been estimated or simulated using internal Intel analysis or architecture simulation or modeling, and provided to you for informational purposes. Any differences in your system hardware, software or configuration may affect your actual performance.
3. Eight gigatransfers (GT) per second and 128b/130b encoding in PCIe* 3.0 specification enables double the interconnect bandwidth over the PCIe 2.0 specification. Source: pcisig.com/news_ room/ November_18_2010_Press_Release/.
4. The SATA 3.x specification enables double the data rate (from 3 GB/s to 6 GB/s) of that enabled by the SATA* 2.x specification. Source: sata-io.org/technology/6Gbdetails.asp.
5. This is the OS list that is tested internally and does not reflect the OS vendor support for these exact release versions. Please contact respective OS vendor(s) for the release version numbers and support. Several software patches will be upstreamed and will be picked up over time. These will be required to enhance platform support.
6. Intel only provides support for our tools, patches, and utilities on the OS. Actual OS support should come from the OS vendor.

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