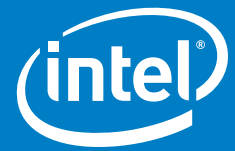


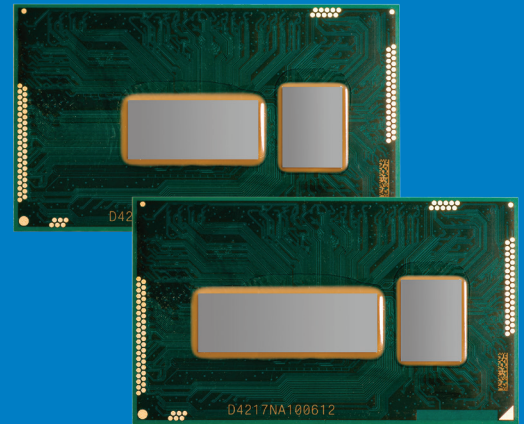
Platform Brief

Ultra Low-Power 5th Generation
Intel® Core™ Processors (U-Processor
Line) for the Internet of Things



5th Generation Intel® Core™ Processors based on the Mobile U-Processor Line

(Intel® Core™ i7-5650U Processor,
Intel® Core™ i5-5350U Processor,
Intel® Core™ i3-5010U Processor
Intel® Celeron® Processor 3765U)



Game-changing innovation fueled by high-performing, securely managed embedded devices

Product Overview

The Internet of Things (IoT) offers tremendous new business opportunities. Organizations can integrate real-time intelligence, control, and interactivity into almost any process to improve how they engage with customers, treat patients, optimize operations, and run factories. The 5th generation Intel® Core™ processor (U-processor line) is engineered to drive high capability and value into IoT usage models by enabling high-quality user experiences with devices that are small, efficient, manageable, and secure.

This low power, multi-chip package (MCP) combines a 64-bit, multicore processor and a platform controller hub (PCH) onto a common package substrate to deliver PC-class performance, HD graphics, and high quality sound for space- and power-constrained embedded applications. Built on Intel's industry-leading 14nm process technology, this MCP is compatible with platforms based on 4th generation Intel Core processors.

These platforms support dual-channel DDR3L up to 1600 MHz and LPDDR3 up to 1866 MHz. They support fast connectivity and flexibility with integrated next-generation I/O technologies such as PCI Express* Gen 2.0, SATA 6 Gbps, and USB 3.0 with Intel® Flex I/O, I²C* and UART. A thermal design power (TDP) of 15W (CPU+PCH) is configurable down to 9.5W on select SKUs.

These 5th generation Intel Core processors offer numerous advancements over the 4th generation Intel Core processors. The addition of the four Intel Broadwell New Instructions (PREFETCHW, RDSEED, ADCX, ADOX) streamline the cryptographic process and provide a robust random number generator resulting in very secure cryptographic methods.

An updated audio DSP core provides the “horsepower” for Intel® Smart Sound Technology which includes support for MP3/AAC decode, Waves*/DTS* post processing, and Wake on Voice.

Intel® Dynamic Platform and Thermal Framework enables robust platform power and thermal management by allowing operating system and application awareness of power and thermal conditions.

Intel® Rapid Storage Technology now includes support for PCIe based SSD storage.¹

Intel® vPro™ technology is enabled on the 5th gen Intel® Core™ i7 and Intel® Core™ i5 processors when running Intel vPro technology-based firmware. It delivers intelligent security to support operating system-absent manageability and down-the-wire security even when the system is powered off, the operating system is unresponsive, or the software agents are disabled.

Platform Highlights

Intel® HD Graphics 5500 and 6000: Supports high end media and graphics capabilities and performance.

Intel® Quick Sync Video 2.0: Blazing fast decode and transcode performance and frees up the CPU for other tasks.

Intel® Advanced Vector Extensions 2 (Intel® AVX2): Accelerates integer/matrix compute performance for signal and image processing applications.

Intel Broadwell New Instructions: New instructions for efficient and secure cryptographic performance.

Intel® Dynamic Platform and Thermal Framework: Ability to fine tune thermal management policy using multiple system devices and policy parameters.

Intel® Flex I/O: Allows user to assign up to four SATA 6Gbps ports, up to six PCI Express* Gen 2.0 devices across 12 lanes (2x4, 4x1) and up to four USB 3.0 ports, based on configuration needs.

I²C* and UART: Delivers additional I/O capabilities for peripherals such as sensors and GPS.

Intel® Turbo Boost Technology 2.0: Runs applications faster by using available thermal headroom to run at higher frequencies.

Intel® Hyper-Threading Technology: Simultaneous multi-threading helps boost performance for parallel, multi-threaded applications.

Intel® vPro™ Technology: Delivers hardware support for vital security and management functions with Intel® Active Management Technology, Intel® Virtualization Technology, and Intel® Trusted Execution Technology.

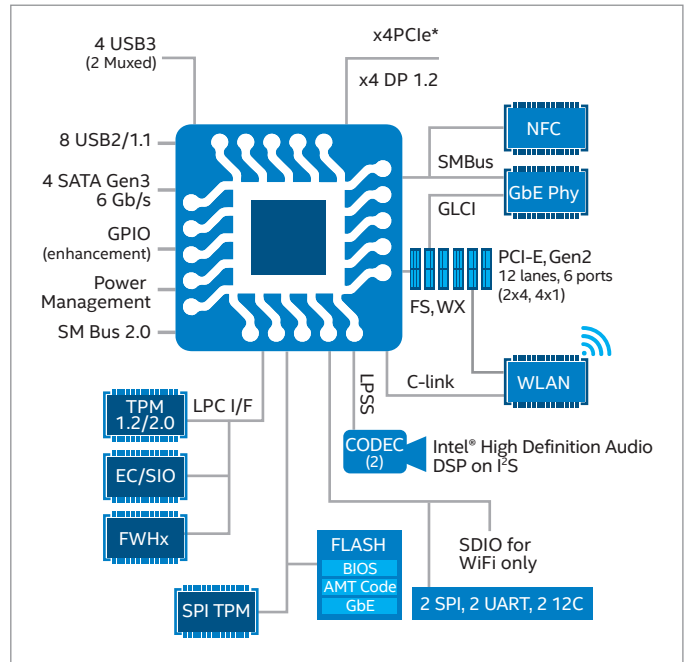


Figure 1. Block diagram.

BIOS

American Megatrends*

Insyde Software*

Nanjing Byosoft*

Phoenix Technologies*

SOFTWARE SUPPORT OVERVIEW

OS VENDER	OPERATING SYSTEM	DISTRIBUTION	SUPPORT
Microsoft*	Windows* 8.1u (64 bit)	Microsoft	Intel/Microsoft
	Windows Embedded Industry 8.1 (64 bit)		
	Windows 7 (32/64 bit)		
	Windows 7 (POS ready 7 & WES7) (32/64 bit)		
Linux*	Windows 10 (64 bit)	Open source	Intel/Microsoft
	Fedora* (19 or later) Distribution (64 bit)		
	Ubuntu* SuSe Enterprise,* Redhat* Enterprise (64-bit)		
Wind River*	Yocto* Tool-based Embedded Linux Distribution (64 bit)	Yocto project Community	
	VxWorks* (RTOS) (64 bit)	Wind River Systems	

5TH GENERATION INTEL® CORE™ PROCESSORS (U-PROCESSOR LINE) AT A GLANCE

FEATURES	BENEFITS
Key Embedded Support	
Extended life cycle product support	<ul style="list-style-type: none"> Protects system investment by enabling extended product availability for embedded customers.
Ecosystem support	<ul style="list-style-type: none"> From modular components to market-ready systems, Intel and the 250+ global member companies of the Intel® IoT Solutions Alliance (iotsolutionsalliance.intel.com/) provide the performance, connectivity, manageability, and security developers need to create smart, connected systems.
Platform Compatibility	
Compatible with 4th generation Intel® Core™ processor-based platforms	<ul style="list-style-type: none"> Enables reuse of 4th generation Intel® Core™ processor-based platform chassis, thermal solution, and board investments.
Built-In Visuals	
Intel® HD Graphics 5500/6000	<ul style="list-style-type: none"> Delivers enhanced visual experiences, with stunning 3D performance, the addition of ultra HD 4K support. Provides repartitioned display architecture, allowing three independent displays and hybrid multi-monitor configurations. Integrated processor graphics help minimize power consumption while maximizing performance for decoding, encoding, and transcoding workloads with hardware acceleration of video codecs.
Intel® Quick Sync Video 2.0	<ul style="list-style-type: none"> Improved ability to decode and transcode simultaneous video streams for edge devices, including medical imaging and video surveillance functions.
Graphics hardware and software features	<ul style="list-style-type: none"> Graphics hardware accelerated codec support for low CPU load and power during Media encode and decode. Support for VP8 and HEVC codecs for decode. Additional VDBOX unit added for fast media transcode performance on Intel® HD Graphics 6000. Continued support for Direct X* 11.2 & OpenGL* 4.3.
Security	
Intel Broadwell New Instructions ²	<ul style="list-style-type: none"> Helps protect media, data, and assets from loss. Four additional instructions streamline the cryptographic process and provide a robust random number generator resulting in very secure cryptographic methods.
Intel® Platform Protection Technology with BIOS Guard	<ul style="list-style-type: none"> Protects Flash from modification without platform manufacturer authorization.
Intel® Boot Guard	<ul style="list-style-type: none"> Prevents repurposing of the platform to run unauthorized software. Protects against execution of boot block level malware. Added level of platform security based on hardware.
Performance	
Intel® Advanced Vector Extensions 2 (Intel® AVX2)	<ul style="list-style-type: none"> Supports faster performance on digital signal and image processing workloads of compute-intensive applications such as radar detection, hurricane command centers, ruggedized navigation systems, and remote medical image processing.
Intel® Turbo Boost Technology ¹ 2.0	<ul style="list-style-type: none"> Boosts performance for specific workloads by increasing processor frequency.
Intel® Hyper-Threading Technology ¹	<ul style="list-style-type: none"> Enables simultaneous multi-threading within each processor core, up to two threads per core; reduces computational latency, making optimal use of every clock cycle.
Intel® Smart Cache Technology	<ul style="list-style-type: none"> Large on-die shared Last-Level Cache reduces latency to data, improving performance and power efficiency.
Power Efficiency	
Intel® Dynamic Platform and Thermal Framework	<ul style="list-style-type: none"> Automated energy efficiency to reduce power consumption.
Automated low-power states	<ul style="list-style-type: none"> Adjusts system power consumption based on real-time processor loads.
Fully Integrated Voltage Regulator	<ul style="list-style-type: none"> Simplifies power delivery by integrating legacy power delivery onto processor package/die.
Intel® vPro™ Technology¹ (Intel® Core™ i7-5650U processor and Intel® Core™ i5-5350U processor platforms paired with Intel vPro technology-based firmware support)	
Intel® Active Management Technology ³ 10.0	<ul style="list-style-type: none"> 10.0 version of Intel's remote management and maintenance capabilities enables vendors to roll back firmware image; remote host capabilities help ease provisioning of end devices.
Intel® Virtualization Technology ¹	<ul style="list-style-type: none"> Speeds transfer of platform control and movement of data between the virtual machine monitor (VMM) and other platform agents (including guest OSs and I/O devices). By lowering the workload on the VMM, this technology addresses many embedded system design challenges, like migrating legacy software, increasing real-time performance, and making applications more secure.
Intel® Trusted Execution Technology ²	<ul style="list-style-type: none"> Protects embedded devices and virtual environments against rootkit and other system-level attacks. Using an industry-standard TPM 2.0 to store keys and other protected data, this portion of Intel® vPro™ technology boots the BIOS, operating system, and software into a "trusted" execution state, verifying the integrity of the virtual machine and protecting the platform from unauthorized access.

5TH GENERATION INTEL® CORE™ PROCESSORS (U-PROCESSOR LINE) FOR INTERNET OF THINGS

PROCESSOR NUMBER ^A	CORES/ THREADS	CORE FREQUENCY (GHZ)		INTEL® SMART CACHE	THERMAL DESIGN POWER	PACKAGE	INTEL® AES NEW INSTRUCTIONS	INTEL® ADVANCED VECTOR EXTENSIONS ¹	GRAPHICS
		BASE FREQUENCY	1 CORE TURBO (MAX)						
Intel® Core™ i7-5650U Processor	2/4	2.2	3.2	4 MB	15 W (9.5 W cTPD)	BGA1168	Yes	Yes	Intel® HD Graphics 6000
Intel® Core™ i5-5350U Processor	2/4	1.8	2.9	3 MB	15 W (9.5 W cTPD)	BGA1168	Yes	Yes	Intel® HD Graphics 6000
Intel® Core™ i3-5010U Processor	2/4	2.1	N/A	3 MB	15 W (10 W cTDP)	BGA1168	Yes	Yes	Intel® HD Graphics 5500
Intel® Celeron® Processor 3765U	2/2	1.9	N/A	2 MB	15 W (10 W cTDP)	BGA1168	No	No	Intel® HD Graphics

INTEL® vPRO™ TECHNOLOGY¹

PROCESSOR NUMBER ^A	INTEL® TURBO BOOST TECHNOLOGY 2.0	INTEL® HYPER-THREADING TECHNOLOGY	INTEL® VIRTUALIZATION TECHNOLOGY	INTEL® ACTIVE MANAGEMENT TECHNOLOGY 10.0	INTEL® TRUSTED EXECUTION TECHNOLOGY	ERROR CORRECTING CODE
Intel® Core™ i7-5650U Processor	Yes	Yes	Yes	Yes ³	Yes	No
Intel® Core™ i5-5350U Processor	Yes	Yes	Yes	Yes ³	Yes	No
Intel® Core™ i3-5010U Processor	No	Yes	Yes	No	No	No
Intel® Celeron® Processor 3765U	No	No	Yes	No	No	No

PROCESSOR NUMBER^A

INTEGRATED CHIPSET FEATURES

Intel® Core™ i7-5650U/i5-5350U/i3-5010U Processors/Intel® Celeron® Processor 3765U	2 to 4 SATA 6 Gbps; 8 USB 2.0 ports; 2 or 4 USB 3.0 ports; up to 6 PCI Express* x1 Gen 2.0 devices across 12 lanes; two I ² C*/two UART
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Learn more: intel.com/iot

^A Intel® processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families. Go to: http://www.intel.com/products/processor_number for details.

¹ Intel technologies may require enabled hardware, specific software, or services activation. Check with your system manufacturer or retailer.

² No computer system can be absolutely secure. Intel does not assume any liability for lost or stolen data or systems or any damages resulting from such losses.

³ Intel® AMT should be used by a knowledgeable IT administrator and requires enabled systems, software, activation, and connection to a corporate network. Intel AMT functionality on mobile systems may be limited in some situations. Your results will depend on your specific implementation. Learn more by visiting Intel® Active Management Technology.

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Drivers available at: downloadcenter.intel.com (enter chipset name).

Performance results are based on certain tests measured on specific computer systems. Any difference in system hardware, software or configuration will affect actual performance. Configurations: [describe config + what test used + who did testing]. For more information go to <http://www.intel.com/performance>.

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