PLATFORM BRIEF

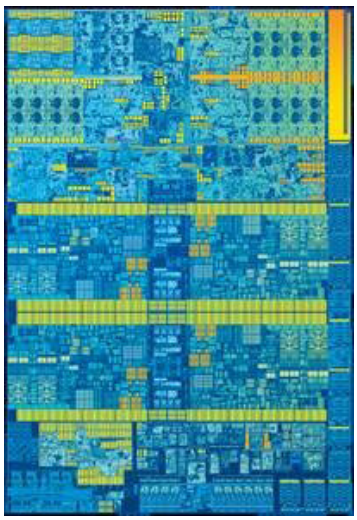
6th Generation Intel® Core™ Mobile Processor Family

Internet of Things

6th Generation Intel® Core™ Processors Based on the Mobile U-Processor for IoT Solutions

(Intel® Core™ i7-6600U, i5-6300U, and i3-6100U Processors)

Harness the Performance, Features, and Edge-to-Cloud Scalability to Build Tomorrow's IoT Solutions Today



Product Overview

Intel is proud to announce its 6th generation Intel® Core™ processor family featuring ultra low-power, 64-bit, multicore processors built on the latest 14 nm technology. Designed for small form-factor applications, this multichip package (MCP) integrates a low-power CPU and platform controller hub (PCH) onto a common package substrate.

The 6th generation Intel Core processor family offers dramatically higher CPU and graphics performance, a broad range of power and features scaling the entire Intel product line, and new, advanced features that boost edge-to-cloud Internet of Things (IoT) designs in a wide variety of markets. These processors run at 15W thermal design power (TDP) and are ideal for small, energy-efficient, form-factor designs, including digital signage, point-of-sale terminals, and medical tablets.

A third power state, known as "active idle" or S0ix, is an extremely low-power active state that wakes up almost instantly, yet uses much less power than previous generation processors. While incorporating advanced technology like S0ix, 6th generation Intel Core processors remains software-compatible with previous processors.

Stunning Visual Performance

The 6th generation Intel Core processors utilize the new Gen9 graphics engine, which improves graphic performance by up to 34 percent.[1] The improvements are demonstrated through faster 3-D graphics performance and rendering applications at low power. Video playback is also faster and smoother thanks to the new multiplane overlay capability. The new generation offers up to three independent audio streams and displays, Ultra HD 4K support, and workload consolidation for lower BOM costs and energy output.

Users will also enjoy enhanced high-density streaming applications and optimized 4K videoconferencing with accelerated 4K hardware media codecs HEVC (8-bit), VP8, VP9, and VDENC encoding, decoding, and transcoding. Together, the stunning visual performance enhancements add up to more immersive computing experiences.

Power-Efficient Performance

The new 6th gen Intel Core processors make a powerful difference on the efficiency front as well. The improved technology promises up to 21 percent faster CPU[2] and up to 34 percent faster graphics[1]—all at the same or similar TDP as the prior generation.[3]

The 6th gen Intel® Core™ i5 and Intel® Core™ i7 processors come with Intel® Turbo Boost Technology[4] 2.0 for that extra burst of performance, and Intel® Hyper-Threading Technology[5] so each processor core can work on two tasks simultaneously. Other important features include Intel® Advanced Vector Extensions 2 (Intel® AVX2), which provides optimized instructions to drive enhanced performance on floating point–intensive apps,[6] and Intel® Ready Mode Technology[7] for PCIe* storage for improved data reliability and greater levels of performance, responsiveness, and expandability.

Broad Design Range

In addition to stunning visuals and efficient performance, the 6th generation Intel Core processor offers broad product coverage from Intel Core i3 to Intel Core i7. It also provides multiple operating system (OS) choices that scale from dynamic new tablets to low-power systems requiring greater productivity and graphics—perfect for low-power retail and medical devices.

Operating system support ranges from small footprint real-time operating systems (RTOSs) to feature-rich OSs to optimize choice, flexibility, and OS investment protection. Take advantage of the 15W TDP, and a ball grid array (BGA) package that enables space-constrained or purpose-built designs.

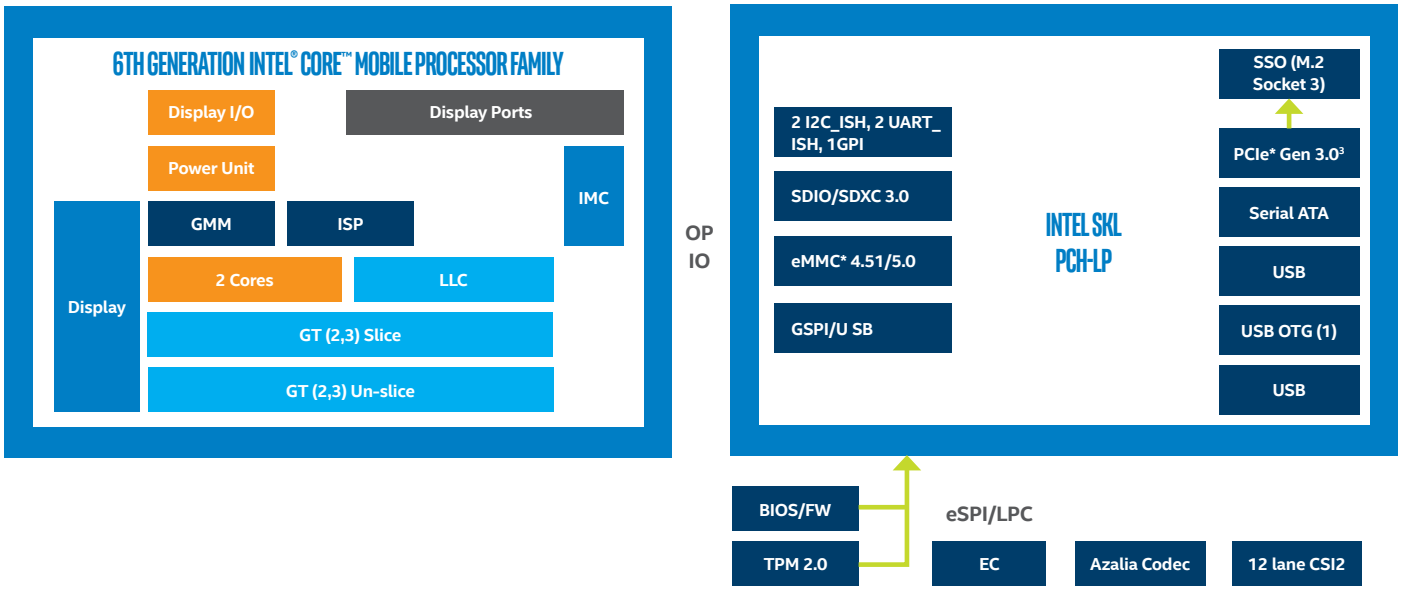
The new 6th generation Intel Core processors enable more flexible designs with configurable I/O offering additional high-speed ports compared to the previous generation. Enhancements include:

- New storage options such as Gen 3 PCIe, eMMC* 5.0, SDXC 3.0
- PCIe lanes that operate at Gen 3 speeds
- Improved audio capabilities
- An integrated sensor hub
- Greater flexibility with I2C, SSIC
- Support for imaging capabilities with CSI2

Advanced Security and Manageability

New 6th generation Intel Core processors protect IoT systems and data at rest and in flight through hardware- and software-based security hardening. Keep increasingly connected devices more secure and enhance the firmware trusted platform module (TPM) with Intel® Platform Trust Technology (Intel® PTT), Intel® Software Guard Extensions (Intel® SGX) to protect data while in use, Intel® Memory Protection Extensions (Intel® MPX) to protect memory from buffer-overload attacks, and Intel® Boot Guard to securely boot machines.

Intel® vPro™ technology[8] allows you to remotely configure, diagnose, isolate, and repair an infected PC—even if it is turned off. In addition to helping secure the IT environment, hardware-based KVM Remote Control enables you to address issues remotely by seeing what users see.



KEY FEATURES

INTEL® BUILT-IN VISUALS

NEW Gen9 graphics with embedded D-RAM: Supports the latest graphics APIs DirectX* 12 and OpenGL* 4.5 for improved 3-D rendering performance at low power.

NEW Accelerated 4K hardware media codecs: Enhances high-density streaming applications and optimized 4K videoconferencing with HEVC (8-bit), VP8, VP9, and VDENC encoding, decoding, and transcoding.

Intel® HD Graphics: Plays high-definition (HD) video with exceptional clarity; permits viewing and editing of even the smallest image details.

Intel® Quick Sync Video: Delivers excellent videoconferencing capability, fast video conversion, and fast video editing and authoring.

Ultra HD 4K support: Provides stunning display resolutions,[9] now up to 4096x2304 pixels, and supports performance across three independent displays with audio.

Multiplane overlay: Enables faster, smoother, higher-quality video playback and improved 3-D graphics.

Intel® Clear Video HD technology: Provides visual quality and color fidelity enhancements for spectacular HD media playback.

Intel® Iris™ Graphics (GT3e): Offers a broad range of 3-D rendering capability options that fit low-, medium-, and high-performance applications.

PERFORMANCE

Intel® Advanced Vector Extensions 2 (Intel® AVX2): Provides optimized instructions to deliver enhanced performance on floating point–intensive apps, adding 256-bit integer instructions and new instructions for fused multiply add (FMA), which delivers better performance on media and floating-point computations.

Intel® Turbo Boost Technology[4] 2.0: Dynamically increases the processor's frequency, as needed, by taking advantage of thermal and power headroom when operating below specified limits.

Intel® Hyper-Threading Technology[5]: Delivers two processing threads per physical core. Highly threaded applications can get more work done in parallel, completing tasks sooner.

NEW Faster memory performance: Offers new DDR4 memory support, including new support for DDR4 1.2V up to 2133, 64GB max capacity with 8GB density.

Intel® Ready Mode Technology[7]: Provides quick access to your PC with applications that are up-to-date and constantly connected.

NEW Additional HSIO: Increases flexibility from 18 to 26 total HSIO ports,[10] from up to eight PCIe 2.0 to 20 PCIe* 3.0 ports,[10] and from up to six USB 3.0 to 10 USB 3.0 ports.[10]

Intel® Smart Cache: Dynamically allocates shared cache to each processor core, based on workload, reducing latency and improving performance.

KEY FEATURES

SECURITY

Intel® Identity Protection Technology (Intel® IPT) with multifactor authentication (MFA): Provides enhanced security by verifying the boot portion of the boot sequence, protects your one-time password (OTP) credentials and PKI certificates, and adds a layer of encrypted second-factor authentication for online transactions.

Intel® Advanced Encryption Standard New Instructions (Intel® AES-NI)[11]: Offers a fast, secure AES engine for a variety of encryption apps, including whole-disk encryption, file-storage encryption, conditional access of HD content, Internet security, and VoIP. Consumers benefit from protected Internet and email content, plus fast, responsive disk encryption.

Intel® OS Guard: Protects the OS kernel and prevents use of malicious data or attack code located in areas of memory marked as user mode pages from taking over or compromising the OS kernel. Intel OS Guard is not application-specific and protects the kernel from any application.

NEW **Intel® Platform Trust Technology (Intel® PTT) with BIOS Guard:** Safeguards credential storage and key management, while helping reduce BOM cost and board space.

NEW **Intel® Software Guard Extensions (Intel® SGX):** Allows application developers to protect sensitive data from unauthorized access or modification by rogue software running at higher privilege levels;[12] secures data while in use in a Windows* or Linux* environment.

Intel® Data Protection Technology (Intel® DPT) with Intel® Boot Guard: Prevents unauthorized software and malware takeover of boot blocks critical to a system's function, thus providing added level of platform security based on hardware.

NEW **Intel® Memory Guard Extensions (Intel® MPX):** Identifies errant pointer usage which, if left undetected, puts an application at risk of data corruption or malicious attack via buffer overruns and overflows. By adding extensions to the underlying architecture, Intel® MPX achieves improved performance over software based solutions.

Intel® Secure Key[6]: Generates high-quality keys for cryptographic (encryption and decryption) protocols, and provides quality entropy that is highly sought after for added security.

BIOS Guard: Augments existing chipset-based BIOS flash protection capabilities targeted to address the increasing malware threat to BIOS flash storage; protects from modification without platform manufacturer authorization, helps defend the platform against low-level denial of service (DOS) attacks, and restores BIOS to a known good state after an attack.

VMCS shadowing: Allows a Virtual Machine Manager (VMM) running in a guest (nested virtualization) to access a shadow VMCS memory area using the normal VMRead/VMWrite instructions, reducing overhead for a more natural and responsive user experience and allowing users to take control of their personal and professional data and apps while being protected by game-changing security.

Boot integrity: Enables hardware-based boot integrity of the Initial Boot Block (IBB) module before launch; helps prevent repurposing of the platform to run unauthorized software and boot block-level malware.

POWER EFFICIENCY

Integrated Memory Controller: Supports DDR4 and offers stunning memory read/write performance through efficient prefetching algorithms, lower latency, and higher-memory bandwidth when compared to previous generations.

Intel® Power Optimization and processor c-states: Increases periods of silicon sleep state across the platform ingredients—including the CPU, chipset, and third-party system components—to reduce power.

Intel® Intelligent Power Technology: Reduces power consumption through automated energy efficiency.

Automated low-power states: Adjusts system power consumption based on real-time processor loads.

S0ix: System S0 power management states enable the CPU of a connected standby system to enter the deepest C10 state by turning the supply off and turning the external VR to 0V; display is off and device and applications are suspended.

KEY FEATURES

INTEL® VPRO™ TECHNOLOGY (ONLY INTEL® CORE™ I5 AND INTEL® CORE™ I7 PROCESSORS)

Intel® Active Management Technology (Intel® AMT): Remotely monitors, maintains, updates, upgrades, and repairs PCs through hardware and firmware technology for remote out-of-band management.

Intel® Trusted Execution Technology (Intel® TXT)[13]: Protects embedded devices and virtual environments against rootkit and other system-level attacks. Using an industry-standard TPM 1.2 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.

Intel® Virtualization Technology[14]: Allows one hardware platform to function as multiple "virtual" platforms; offers improved manageability by limiting downtime and maintaining productivity by isolating computing activities into separate partitions.

SUSTAINABILITY

Green technology: Manufactured with lead-free and halogen-free component packages.

Conflict-free: Products do not contain conflict minerals (tin, tantalum, tungsten, and/or gold) that directly or indirectly finance or benefit armed groups in the Democratic Republic of the Congo (DRC) or adjoining countries.

SOFTWARE OVERVIEW

The following independent operating system and BIOS vendors provide support for these platforms.

OS VENDOR	OPERATING SYSTEM (TARGETED FOR SUPPORT)	DISTRIBUTION	SUPPORT	BIOS
Microsoft	Windows* 10 (64b)	Microsoft	Microsoft	American Megatrends Inc. Insyde Software Phoenix Technologies Byosoft
	Windows* 8.1 Au (64b)	Microsoft	Microsoft	
	Windows* Embedded Industry 8.1 (64b)	Microsoft	Microsoft	
	Windows* 7 Pro (32/64b)	Microsoft	Microsoft	
	Windows* POS ready 7 and WES7* (32/64b)	Microsoft	Microsoft	
Linux*	Fedora* Distribution (64b)	Open Source		
	Ubuntu*, SUSE*, Red Hat Enterprise (64b)	Canonical Ltd.*, Attachmate Group, Red Hat, and Open Source		
Google	Chromium* (Chrome*) (64b)	The Chromium Projects*	Google	

Not all features are supported. Contact your local Intel representative for more information.

6TH GENERATION INTEL® CORE™ PROCESSORS (U-PROCESSOR LINE) FOR INTERNET OF THINGS SOLUTIONS

	CORE FREQUENCY (GHz)							
PROCESSOR NUMBER	CORES/ THREADS	BASE FREQUENCY	1 CORE TURBO (MAX)	INTEL® SMART CACHE	THERMAL DESIGN POWER	PACKAGE	INTEL® AES-NI	INTEL® AVX
Intel® Core™ i7-6600U processor	2C/4T	2.6 GHz	3.4 GHz	4MB	15W	BGA1356	Yes	Intel® AVX2
Intel® Core™ i5-6300U processor	2C/4T	2.4 GHz	2.9 GHz	3MB	15W	BGA1356	Yes	Intel® AVX2
Intel® Core™ i3-6100U processor	2C/4T	2.3 GHz	2.3 GHz	3MB	15W	BGA1356	Yes	Intel® AVX2

			INTEL® VPRO™ TECHNOLOGY			
PROCESSOR NUMBER	INTEL® TURBO BOOST TECH 2.0	INTEL® HYPER-THREADING TECH	INTEL® VIRTUALIZATION TECH	INTEL® ACTIVE MANAGEMENT TECH 11.0	INTEL® TRUSTED EXECUTION TECH	ERROR-CORRECTING CODE
Intel® Core™ i7-6600U processor	Yes	Yes	Yes	Yes	Yes	No
Intel® Core™ i5-6300U processor	Yes	Yes	Yes	Yes	Yes	No
Intel® Core™ i3-6100U processor	No	Yes	Yes	No	No	No

INTEL® CHIPSETS FOR INTERNET OF THINGS SOLUTIONS

PROCESSOR NUMBER	INTEGRATED CHIPSET FEATURES
Intel® Core™ i7-6600U/i5-6300U/ i3-6100U processor	Up to three SATA (6 Gbps); up to 10 USB ports (6 USB 3.0); up to six PCIe* gen 3.0 devices across 12 lanes; 6 I2C; 3 UART

intel.com/iot

1. Measured by Intel on systems with Intel® Core™ i7-6600U processor and Intel® Core™ i7-5600U processor using 3DMark11.
2. Measured by Intel on systems with Intel® Core™ i7-6600U processor and Intel® Core™ i7-5600U processor using SPECfp2006 (1-copy).
3. Based on industry-standard cooling solutions. Actual TDP may vary.
4. Requires a system with Intel® Turbo Boost Technology. Intel® Turbo Boost Technology and Intel® Turbo Boost Technology 2.0 are only available on select Intel® processors. Consult your system manufacturer. Performance varies depending on hardware, software, and system configuration. For more information, visit http://www.intel.com/go/turbo.
5. Available on select Intel® Core™ processors. Requires an Intel® HT Technology-enabled system. Consult your PC manufacturer. Performance will vary depending on the specific hardware and software used. For more information, including details on which processors support HT Technology, visit http://www.intel.com/info/hyperthreading.
6. Intel® Advanced Vector Extensions (Intel® AVX) are designed to achieve higher throughput to certain integer and floating-point operations. Due to varying processor power characteristics, utilizing AVX instructions may cause, a) some parts to operate at less than the rated frequency and, b) some parts with Intel® Turbo Boost Technology 2.0 to not achieve any or maximum turbo frequencies. Performance varies depending on hardware, software, and system configuration and you should consult your system manufacturer for more information. Intel® Advanced Vector Extensions refers to Intel® AVX, Intel® AVX2 or Intel® AVX-512. For more information on Intel Turbo Boost Technology 2.0, visit http://www.intel.com/go/turbo.
7. Intel technologies' features and benefits depend on system configuration and may require enabled hardware, software or service activation. Performance varies depending on system configuration. Check with your system manufacturer or retailer or learn more at www.intel.com.
8. Intel® vPro™ Technology is sophisticated and requires setup and activation. Availability of features and results will depend upon the setup and configuration of your hardware, software and IT environment. To learn more visit: http://www.intel.com/technology/vpro.
9. On eDP/DP at 24bpp and 60Hz.
10. Actual number of ports available may vary by processor number and system configuration. Please refer to the specifications corresponding to the processor number of interest or consult your system vendor for more information.
11. Intel® AES-NI requires a computer system with an AES-NI-enabled processor, as well as non-Intel software to execute the instructions in the correct sequence. AES-NI is available on select Intel® processors. For availability, consult your reseller or system manufacturer. For more information, see http://software.intel.com/en-us/articles/intel-advanced-encryption-standard-instructions-aes-ni/.
12. No computer system can be absolutely secure. Intel technologies may require enabled hardware, specific software, or services activation. Check with your system manufacturer or retailer.
13. No computer system can provide absolute security under all conditions. Intel® Trusted Execution Technology (Intel® TXT) requires a computer with Intel® Virtualization Technology, and Intel TXT-enabled processor, chipset, BIOS, Authenticated Code Modules and an Intel TXT-compatible measured-launched environment (MLE). Intel TXT also requires the system to contain a trusted platform module (TPM) v1.s. For more information, visit http://www.intel.com/technology/security.
14. Intel® Virtualization Technology requires a computer system with an enabled Intel® processor, BIOS, and virtual machine monitor (VMM). Functionality, performance or other benefits will vary depending on hardware and software configurations. Software applications may not be compatible with all operating systems. Consult your PC manufacturer. For more information, visit http://www.intel.com/go/virtualization.

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