



DESKTOP-CALIBER PERFORMANCE ON-THE-GO

NEW 9TH GEN INTEL® CORE™ H-SERIES MOBILE PROCESSORS



Introducing the NEW 9th Gen Intel® Core™ mobile processor family – the most powerful generation of Intel® Core™ mobile processors. Take mobile gaming and content creation to the next-level with amazing single- and multi-threaded performance, new Intel® Optane™ memory H10 with Solid State Storage, and Intel® Wi-Fi 6 AX200 (Gig+).

Whether you're a gamer looking for amazing AAA game play, even while recording and streaming, or you're a creator ready to do more creating with less time waiting, this new generation of processors is up to the task.

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The 9th Gen Intel® Core™ mobile processor takes enthusiast laptop performance to a whole new level. The new Intel® Core™ i9-9980HK delivers world-class performance with up to 5.0 GHz¹ with Intel® Turbo Boost 2.0 Technology, 8 cores and 16 threads with Intel® Hyper-Threading Technology, and 16MB of smart cache to conquer the most demanding workloads. Want to reach for even greater levels of performance? — the Intel® Core™ i9-9980HK is fully unlocked and can be overclocked for even more performance.³



**CONQUER
THE MOST
DEMANDING
WORKLOADS**

PREMIUM PERFORMANCE, MOBILITY OPTIMIZED

9th Gen Intel® Core™ mobile processors power the ultimate laptops for gamers and creators with intelligent performance optimization via features like Intel® Thermal Velocity Boost and Intel® Dynamic Tuning.

- Intel® Thermal Velocity Boost (Intel® TVB) is a feature supported on the Intel® Core™ i9-9980HK, Intel® Core™ vPro™ i9-9880H, and Intel® Xeon® E-2286M which opportunistically and automatically increases clock frequency by up to 200 MHz if the processor is at a temperature of 50°C or lower and turbo power budget is available.
- Intel® Dynamic Tuning is a powerful software toolkit that enables laptop manufacturers to extract the highest performance from the 9th Gen Intel® Core™ mobile processor by monitoring variables such as system temperature, fan speed, power source (AC or DC), usage mode, current processor state, etc, and dynamically adjust processor power to maximize performance within the unique thermal constraints of their system.

GAME ON A WHOLE NEW LEVEL

PLAY ON HIGH SETTINGS IN ANY SETTING

9th Gen Intel® Core™ mobile processors enable amazing AAA game play, even while recording and streaming.

Intel® Optane™ memory M10 accelerates launching and loading of games off an HDD data drive while new Intel® Optane™ memory H10 with solid state storage, fuses Optane™ memory M10 with up to 1TB of QLC 3D NAND to supercharge your laptop storage, combining responsiveness and high-capacity in a single boot drive.

New Intel® Wi-Fi 6 AX200 (Gig+) is a game-changing Wi-Fi solution, amazingly fast downloads and smooth streaming with low wireless latency and extraordinary wireless security so you can drop the cable and game wirelessly fast and reliably throughout your home.





CREATIVITY WITHOUT LIMITS

9th Gen Intel® Core™ mobile processors power incredibly fast video and photo editing to tackle heavyweight creative tasks on the go. Unlock your creative potential with the power you need to create, edit, and share. Let your creativity flow as the 9th Generation Intel® Core™ mobile processor renders and encodes in the background so you don't miss a beat. Minimize the wait time between inspiration and creation with Intel® Optane™ memory with exceptionally fast loading of your most used applications and project files.



**LET
YOUR
CREATIVITY
FLOW**

ULTRA-HIGH DEFINITION ENTERTAINMENT

Laptop computers based on the 9th Generation Intel® Core™ mobile processors integrate advanced media technologies that bring premium, high-quality content to your PC, including:

- HEVC 10-bit encode/decode, VP9 10-bit decode:
 - Delivering smooth streaming of premium 4K UHD entertainment to your PC from leading online providers.
 - Providing full-screen immersive viewing experiences with 4K video and 360-degree viewing.
- High Dynamic Range (HDR) and Rec. 2020 (Wide Color Gamut) for life-like luminescence to provide enhanced image and video viewing experiences.

A SCALABLE PORTFOLIO OF PROCESSORS



SCALABLE PORTFOLIO OF PROCESSORS

A 9th Generation Intel® Core™ mobile processor is a great investment in your mobile experiences – whether for gaming, creating, entertainment, or general purpose computing – wherever your life takes you.

From the bar-raising performance of the 9th Generation Intel® Core™ i9-9980HK processor with up to 5GHz and 16-way multitasking to great premium performance options down the stack, our latest generation of mobile processors offers a range of options for all your mobile computing needs.

HARDWARE BASED SECURITY¹ FEATURES

9th Generation Intel® Core™ mobile processors integrate hardware level technologies that help strengthen the protection of your enabled security² software. Hardware-based security features help you experience online and offline activities with added peace of mind, enabled by features that include:

- Intel® Software Guard Extensions (Intel® SGX)² to help applications protect your system and your data.
- Intel® BIOS Guard and Intel® Boot Guard to help protect your system during startup.

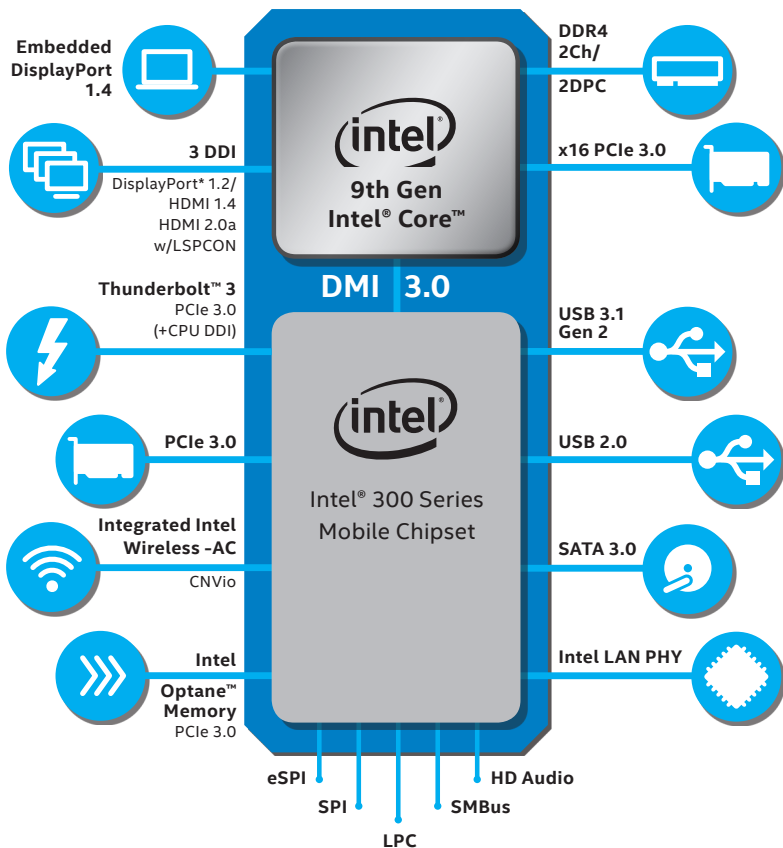
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9TH GEN INTEL® CORE™ H-SERIES MOBILE PROCESSOR FEATURES AT A GLANCE

FEATURES ¹	BENEFITS
Intel® Turbo Boost Technology 2.0	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Delivers two processing threads per physical core. Highly threaded applications can get more work done in parallel, completing tasks sooner.
Intel® Smart Cache	<ul style="list-style-type: none"> • Dynamically allocates shared cache to each processor core, based on workload, reducing latency and improving performance.
Integrated Memory Controller	<ul style="list-style-type: none"> • Offers stunning memory read/write performance through efficient pre-fetching algorithms, lower latency, and higher memory bandwidth.
Intel® UHD Graphics	<ul style="list-style-type: none"> • Play 4K UHD videos with exceptional clarity, view and edit even the smallest details of photos, and play today's modern games.
Intel® Quick Sync Video	<ul style="list-style-type: none"> • Delivers excellent video conferencing capability, fast video conversion, online sharing, and fast video editing and authoring.
Processor Core/Memory/ Graphics Overclocking ³	<ul style="list-style-type: none"> • When unlocked processors are paired with select chipset SKUs, processor core, graphics, and memory can be set to run at frequencies above the specification frequency of the processor resulting in higher performance.³
PCI Express* 3.0 Interface	<ul style="list-style-type: none"> • Offers up to 8 GT/s for fast access to peripheral devices with up to 16 lanes.⁵ The lanes can be configured as 1x16, 2x8, or 1x8 and 2x4 depending on motherboard designs.
Intel® Optane™ Memory Support	<ul style="list-style-type: none"> • Smart memory technology that accelerates computers' responsiveness. It accesses your computer's frequently used documents, pictures, videos and applications quickly and remembers them after you power off — enabling you to create, game, and produce with less waiting.
Intel® Power Optimizer and Processor C-States	<ul style="list-style-type: none"> • Intel® Power Optimizer increases periods of silicon sleep state across the platform ingredients, including the processor, chipset, and third-party system components, to reduce power. Processor C-states (C8-C10) provide low idle power.
Intel® Virtualization Technology	<ul style="list-style-type: none"> • 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.
VMCS Shadowing	<ul style="list-style-type: none"> • 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. This technology reduces overhead for a more natural and responsive user experience. It also allows users to take control of their personal and professional data and apps while helping increase protections by game-changing security features.
Intel® Advanced Encryption Standard New Instructions (Intel® AES-NI)	<ul style="list-style-type: none"> • A set of instructions that can be used to accelerate a variety of encryption apps, including whole disk encryption, file storage encryption, conditional access of 4K UHD content, Internet security, and VoIP. Consumers benefit from increased internet and email content protection, plus fast, responsive disk encryption.
Intel® Transactional Synchronization Extensions (Intel® TSX)	<ul style="list-style-type: none"> • A set of instructions focused on enterprise-level multi-threaded performance scaling, making parallel operations more efficient via improved control of software threads and locks. This offers performance benefits for enterprise-level big data analytics/business intelligence and visualization apps, which involve multi-user collaboration.
Intel® Advanced Vector Extensions 2 (Intel® AVX2) ⁴	<ul style="list-style-type: none"> • A set of 256-bit instructions to deliver enhanced performance on floating point- and integer-intensive apps. Includes instructions for FMA (Fused Multiply Add) which can deliver better performance on media and floating point computations, including face recognition, professional imaging, high-performance computing, consumer video and imaging, compression, and encryption.

9TH GEN INTEL® CORE™ H-SERIES MOBILE PROCESSOR FEATURES AT A GLANCE

FEATURES ¹	BENEFITS
Intel® Software Guard Extensions (Intel® SGX)	<ul style="list-style-type: none"> A collection of instructions, APIs, libraries, and tools to help protect select code and data from disclosure or modification through the use of enclaves, which are more protected areas of execution in memory.
Intel® BIOS Guard	<ul style="list-style-type: none"> An augmentation of existing chipset-based BIOS flash protection capabilities targeted to address the increasing malware threat to BIOS flash storage. It helps protect the BIOS flash from modification without platform manufacturer authorization, helps defend the platform against low-level DOS (denial of service) attacks, and helps restore BIOS to a known good state after an attack.
Intel® Boot Guard	<ul style="list-style-type: none"> Hardware-based boot integrity protection that helps prevent unauthorized software and malware takeover of boot blocks critical to a system's function, thus providing added level of platform security based on hardware. Configurable boot types include: <ul style="list-style-type: none"> Measured Boot – measures the initial boot block into the platform storage device such as a trusted platform module (TPM) or Intel® Platform Trust Technology. Verified Boot – cryptographically verifies the platform initial boot block using the boot policy key.
Intel® OS Guard	<ul style="list-style-type: none"> A hardware-based security feature that protects the OS (operating system) kernel. OS Guard helps prevent 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. OS Guard is not application-specific and protects the kernel from any application.
Intel® Identity Protection Technology	<ul style="list-style-type: none"> Protect your one-time-password (OTP) credentials and public key infrastructure (PKI) certificates and add a layer of encrypted, second factor authentication for online transactions.
Intel® Secure Key	<ul style="list-style-type: none"> A hardware-based security feature that helps protect the OS (operating system) kernel. OS Guard helps prevent use of malicious data or attack code located in areas of memory marked as user mode pages



9TH GEN INTEL® CORE™ MOBILE PROCESSOR OVERVIEW

9TH GEN INTEL® CORE™ H-SERIES MOBILE PROCESSOR COMPARISONS¹

	9 TH GEN INTEL® CORE™ i9 MOBILE PROCESSORS	9 TH GEN INTEL® CORE™ i7 MOBILE PROCESSORS	9 TH GEN INTEL® CORE™ i5 MOBILE PROCESSORS
Maximum Processor Frequency (GHz)	Up to 5.0 ¹	Up to 4.6	Up to 4.3
Number of Processor Cores/Threads	8/16	6/12	4/8
Intel® Turbo Boost Technology 2.0	Yes	Yes	Yes
Intel® Hyper-Threading Technology	Yes	No	No
Intel® Smart Cache Size (MB)	16	12	8
Memory Type support	DDR4-2666	DDR4-2666	DDR4-2666
Number of Memory Channels	2	2	2
Intel® UHD Graphics	630	630	630
Graphics Dynamic Frequency (MHZ)	Up to 1250	Up to 1150	Up to 1100
Intel® Quick Sync Video	Yes	Yes	Yes
CPU/Graphics/Memory Overclocking ³	Yes (with i9-9980HK)	Partial (with i7-9850H)	No
Intel® Optane™ Memory Support	Yes	Yes	Yes
Intel® Virtualization Technology	Yes	Yes	Yes
Intel® Thermal Velocity Boost	Yes	No	No
Intel® AES-NI	Yes	Yes	Yes
Intel® TSX	Yes	Yes	Yes
Intel® AVX2 ⁴	Yes	Yes	Yes
Intel® SGX	Yes	Yes	Yes
Intel® BIOS Guard	Yes	Yes	Yes
Intel® Boot Guard	Yes	Yes	Yes
Intel® OS Guard	Yes	Yes	Yes
Intel® Identity Protection Technology	Yes	Yes	Yes

For more information on the new 9th Gen Intel® Core™ mobile processors, visit www.intel.com/products/mobile/processors.

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 www.intel.com/benchmarks.

- 1 Includes the effect of Intel® Thermal Velocity Boost (Intel® TVB), a feature that opportunistically and automatically increases clock frequency above single-core and multi-core Intel® Turbo Boost Technology frequencies based on how much the processor is operating below its maximum temperature and whether turbo power budget is available. The frequency gain and duration is dependent on the workload, capabilities of the processor and the processor cooling solution.
- 2 Intel technologies' features and benefits depend on system configuration and may require enabled hardware, software or service activation. Performance varies depending on system configuration. No computer system can be absolutely secure. Check with your system manufacturer or retailer or learn more at intel.com.
- 3 Altering clock frequency or voltage may damage or reduce the useful life of the processor and other system components, and may reduce system stability and performance. Product warranties may not apply if the processor is operated beyond its specifications. Check with the manufacturers of system and components for additional details.
- 4 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>.
- 5 Actual number of lanes 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.

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