



Product Brief

# Intel<sup>®</sup> Core<sup>™</sup> Ultra<sup>™</sup> Processors

Intel<sup>®</sup> Core<sup>™</sup> Ultra Processors are optimized for premium thin and powerful laptops, featuring 3D performance hybrid architecture, advanced AI capabilities, and available with built-in Intel<sup>®</sup> Arc<sup>™</sup> GPU.<sup>1,2</sup> Created using the new Intel 4 process, Intel<sup>®</sup> Core<sup>™</sup> Ultra processors deliver an optimal balance of performance and power efficiency for gaming, content creation, and productivity on the go.

## Next-Gen Performance Hybrid

Intel continues to innovate with improvements to its revolutionary performance hybrid architecture. Intel® Core™ Ultra processors feature 3D performance hybrid architecture, combining two core microarchitectures on a single processor chip.<sup>1</sup> Each core type is purpose-built for specific kinds of tasks, leading to supercharged performance paired with a battery that lasts.

Performance-cores are optimized for lightly and single-threaded workloads like performance and gaming, while Efficient-cores are optimized for scaling highly threaded workloads. The newest core type, Low-power Efficient-cores, are designed for scalable multithreaded performance and offloading background tasks. Meanwhile, Intel® Thread Director prioritizes and manages distribution of workloads, sending tasks to optimized cores.<sup>3</sup>

Intel® Core™ Ultra processors also feature a suite of Intel's cutting-edge performance tools and services. Intel® Adaptive Boost is designed to increase gaming and multi-core performance by intelligently boosting the processor to run faster than its rated frequency as power, heat, and workload allow. Intel® Turbo Boost Max Technology 3.0 directs critical workloads to them as power, heat, and workload allow.<sup>4</sup>

## Immersive Experiences

Intel® Core™ Ultra processors are designed to deliver immersive experiences wherever you go, featuring discrete-level graphics, best-in-class connectivity,<sup>5</sup> and enhanced media technology.

With an Intel® Arc™ GPU built-in, AI powers advanced creation and gameplay. Enjoy the high performance needed for accelerated content creation and immersive high-resolution gaming, even while on the go. Combine this with AV1 encode and decode, HDMI 2.1,<sup>15</sup> DisplayPort 2.1, support for four simultaneous 4K displays, a new audio DSP, and you get visual and audio experiences worthy of the premium title!

Immersion also means easy and reliable connection with peripherals and the internet! Integrated Thunderbolt™ 4 technology lets you connect multiple displays, storage, charging, and other peripherals while support for Intel® Wi-Fi 7 and Intel® Wi-Fi 6E, and Bluetooth 5.4 and 5.3 delivers supercharged wireless performance and enables seamless, immersive online gameplay. Intel® Double Connect Technology enhances your Wi-Fi gaming experience by simultaneously connecting over two Wi-Fi bands and prioritizing gaming traffic on the faster band!

## Accelerating AI Innovation

Whether you're working, collaborating, creating, or playing, Intel® Core™ Ultra processors deliver three dedicated engines (CPU, GPU, and NPU) to help unlock the power of AI, create immersive graphics experiences, and enable high-performance low-power processing.

Intel® AI Boost is an integrated AI engine for low-power AI acceleration and CPU/GPU off-load, while Intel® Gaussian & Neural Accelerator processes AI speech and audio applications while simultaneously freeing up CPU resources for overall system performance and responsiveness.

Intel is working with leading industry ISVs to optimize your experience with AI. With AI tools and laptops powered by Intel® Core™ Ultra processors, you can be your own digital artist, writer, or musician!

- Generate an image of whatever is on your mind in a couple of keystrokes.
- Remix your favorite song with just a few simple clicks and text entries, or separate the vocals and create a quick karaoke hit.
- Make your photos more vibrant with intelligent lighting correction that amplifies every detail.
- Dramatically enhance boring photos by adding a more colorful sky or dropping in a mysterious fog, all with remarkable detail and realism.

## Intel vPro® Platform

Intel Core Ultra notebooks based on the Intel vPro platform change how businesses use, secure, and manage devices.

The commercial PC market is propelled by premium computing solutions that drive user productivity and help service organizations protect and maintain devices. Intel® Core™ Ultra processors shape the future of commercial computing in four major ways:

- A holistic approach to power-efficiency that benefits mobile/hybrid work.
- AI-optimized architecture that supports new user experiences and the next wave of commercial applications.
- New platform protections that reduce the attack surface of PCs.
- A new way for cloud services and tools to interact with PCs and leverage deeper telemetry to help inform device management decisions.

These four advancements represent inflection points impacting all future commercial PC offerings.

Laptops that feature Intel® Core™ Ultra processors and meet Intel vPro® Evo™ Edition design requirements employ the latest power-efficiency guidelines, resulting in cooler and quieter devices with longer battery life and consistent responsiveness whether running off AC or battery power.

Intel® Core™ Ultra processors further elevate mobile collaboration with support for AI-assisted background blur, noise suppression, eye tracking, and picture framing. In addition, scores of commercial apps and AI features further enhance the user experience for common content creation and productivity tasks.

The integrated AI engine on Intel® Core™ Ultra processors is designed to make security software more powerful and efficient at detecting anomalies that signal potential security breaches.

Intel® Core™ Ultra processors also feature a security engine that is used to authenticate select system firmware, providing a new platform protection mechanism that will scale across silicon generations.

Finally, this platform introduces the Intel® Innovation Platform Framework (Intel® IPF) as the new in-band management interface for Intel vPro® platform enabled laptops. Intel® IPF provides device management software with a new way to interact with Intel vPro® platform features.

## Intel® Evo™ Platform

Engineered to do it all—that's a laptop evolved.



Intel® Evo™ laptops powered by Intel® Core™ Ultra processors deliver a no-compromise premium mobile experience by verifying that each laptop design meets the premium standards you desire. We are continually adding innovative features that evolve the laptop experience. Intel spent thousands of hours studying the way people use their laptops in real life and then collaborated with leading PC makers to co-engineer, optimize, and verify these laptop designs. To obtain the Intel® Evo™ brand seal of approval, laptop designs must pass rigorous testing around performance, battery life, connectivity, audio & visual quality, size, weight, and more. And to ensure an evolving laptop experience, innovative features are continuously built in and introduced for the first time through Intel® Evo™ laptops. The result is a sleek and stylish premium laptop that delivers cutting-edge innovation and the ideal combination of world-class performance, outstanding graphics, and ultimate mobility with features like fast-charging & long-lasting battery, consistent responsiveness on battery, instant wake, and best-in-class connectivity.<sup>5</sup>

Intel® Unison™ software has an intuitive one-time setup that's fast, easy, and does not require an email or cloud account to set up and use. Intel® Unison™ software is flexible, letting you connect your choice of PC and phone or tablet (Android or iOS) to do file transfers, photo sharing, text messaging, phone calls, and notifications all from your PC without waking up your phone.<sup>7</sup>

## Intel® Core™ Ultra Processors: Features at a Glance

Feature	Benefit
3D Performance Hybrid Architecture <sup>1</sup>	Integrates two core microarchitectures onto a single chip, prioritizing and distributing workloads to optimize performance.
Intel® Thread Director <sup>3</sup>	Optimizes workloads by helping the OS scheduler intelligently distribute workloads to the optimal cores.
Intel® AI Boost / Intel® NPU	Integrated AI engine for low-power AI acceleration and CPU/GPU off-load.
Intel® Arc™ GPU <sup>2</sup>	With an Intel® Arc™ GPU built-in, AI powers advanced creation and gameplay. Enjoy the high performance needed for accelerated creation and immersive high-resolution gaming, even while on the go.
Intel® Graphics	Intel® Graphics powers the everyday media and display capabilities of mobile systems, bringing new capabilities such as AV1 encode/decode.
Intel® Smart Cache	CPU memory caching method for sharing among P-cores, E-cores, and processor graphics if applicable.
Endurance Gaming Mode <sup>6</sup>	Dynamic Performance and Power management deliver longer battery life without compromising gameplay.
Intel® Deep Learning Boost	Intel® Deep Learning Boost significantly accelerates inference performance for deep-learning workloads optimized to use VNNI and DP4a.
Intel® Adaptive Boost Technology	Intelligently boosts the processor to run faster than its rated frequency as power, heat, and workload allow.
Intel® Turbo Boost Technology 2.0	Intel® Turbo Boost Technology 2.0 accelerates processor and graphics performance for peak loads, automatically allowing processor cores to run faster than the rated operating frequency if they're operating below power, current, and temperature specification limits.
Intel® Turbo Boost Max Technology 3.0 <sup>4</sup>	Identifies the processor's fastest cores and directs critical workloads to them as power, heat, and workload allow.
Intel® Speed Shift Technology	Intel® Speed Shift Technology is an energy efficient method of frequency control by the hardware rather than relying on OS control.
Intel® Unison™ Software <sup>7</sup>	Intel® Unison™ software seamlessly connects your PC and devices for a universal, easy to use experience.
Intel® Adaptix™ Dynamic Tuning Technology <sup>8</sup>	Intel® Adaptix™ Suite allows PC engineers or end users to achieve the best possible experience with optimized performance, extended battery life, and power efficiency.
Intel® Intelligent Display Technology <sup>9</sup>	Combining ecosystem display panel innovation with Intel® software to deliver battery life boost, enhanced visual experience, and sustainability benefits.
Intel® Connectivity Performance Suite	Use all your PC's networking technologies simultaneously for great connected experiences.
Intel® Dynamic Power Share <sup>14</sup>	Dynamically shifts power between CPU and GPU to optimize platform thermals and unleash amazing performance.
Intel® Gaussian & Neural Accelerator 3.5 (GNA 3.5)	Designed to process AI speech and audio applications such as neural noise cancellation while simultaneously freeing up CPU resources for overall system performance and responsiveness.
Thunderbolt™ 4 Technology Support (USB 4 Compliant)	Universal cable connectivity for a simple, reliable connection that provides incredible performance.
Intel® Wi-Fi 6E (Gig+) Support	Integrated wireless for 6 GHz connections. Wi-Fi 6E-enabled devices can take advantage of the newer 6 GHz frequency band for further improved connectivity.
Discrete Wi-Fi 7 (5 Gig) Support <sup>10</sup>	The next step in the evolution of wireless connectivity is improving speed, responsiveness, and reliability.

## Intel® Core™ Ultra Processors: SKU Comparison—H Series

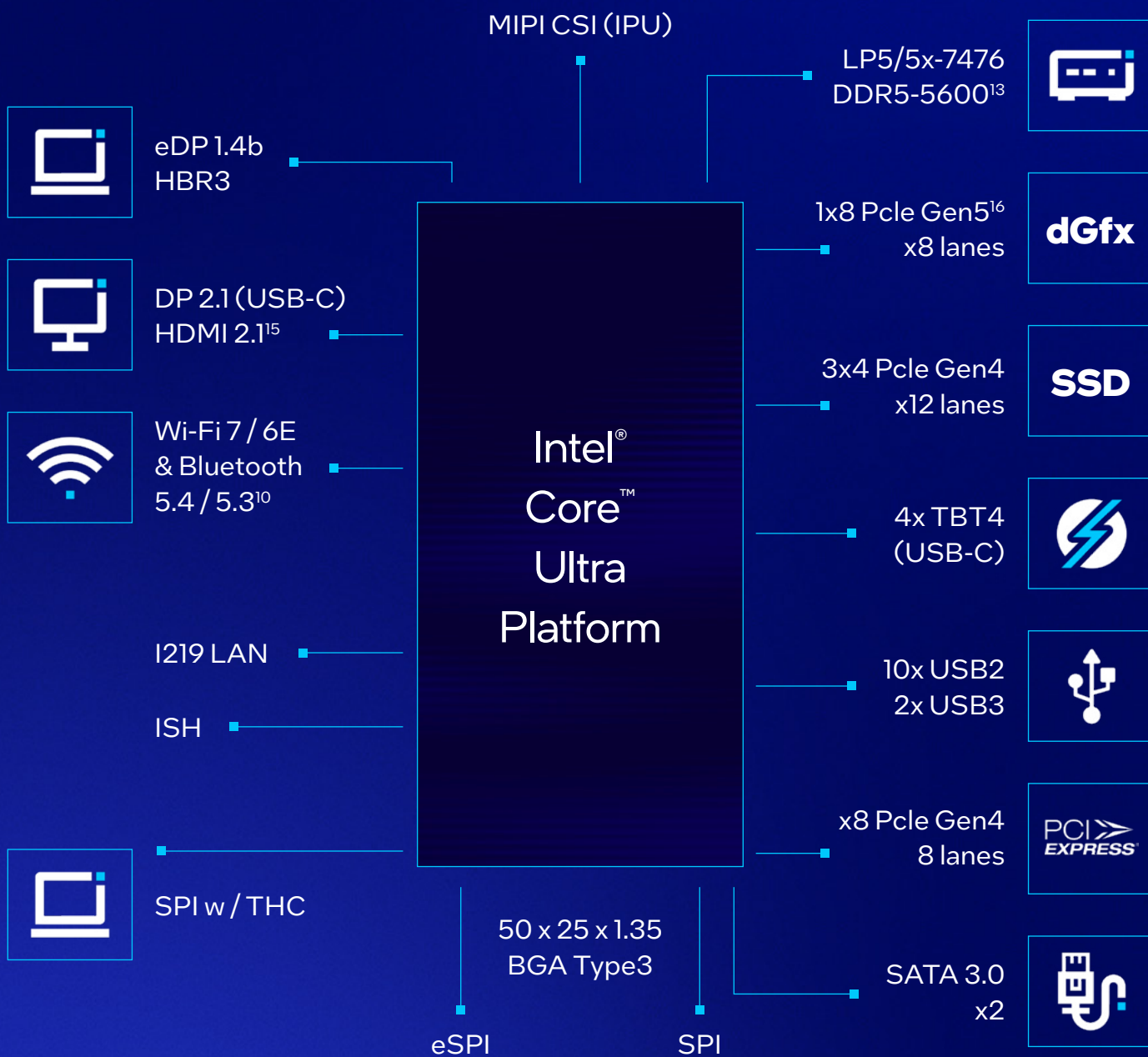
	Intel® Core™ Ultra 7 processor 165H	Intel® Core™ Ultra 7 processor 155H	Intel® Core™ Ultra 7 processor 135H	Intel® Core™ Ultra 7 processor 125H
Processor Cores <sup>11</sup>	16 (6+8+2)	16 (6+8+2)	14 (4+8+2)	14 (4+8+2)
Processor Threads	22	22	18	18
Intel® Smart Cache (LLC)	24 MB	24 MB	18 MB	18 MB
P-core Max Turbo Frequency <sup>12</sup>	Up to 5.0 GHz	Up to 4.8 GHz	Up to 4.6 GHz	Up to 4.5 GHz
E-core Max Turbo Frequency <sup>12</sup>	Up to 3.8 GHz	Up to 3.8 GHz	Up to 3.6 GHz	Up to 3.6 GHz
Processor Graphics	Intel® Arc™ GPU			
Graphics Max Frequency	Up to 2.3 GHz	Up to 2.25 GHz	Up to 2.2 GHz	Up to 2.2 GHz
X <sup>e</sup> -cores	8	8	8	7
Neural Processor	Intel® AI Boost			
Neural Compute Engines	2x Gen3			
Total PCIe Lanes	1 (x8) Gen 5 + 3 (x4) Gen 4 + 8 (x1, x2, x4) Gen4 Configurable			
Max Memory Speeds <sup>13</sup>	DDR5-5600   LPDDR5/x-7467			
Max Memory Capacity	64 GB (LP5)   96 GB (DDR5)			
Processor Max Turbo Power	64W, 115 W			
Processor Base Power	28W			



## Intel® Core™ Ultra Processors: SKU Comparison—U Series

	Intel® Core™ Ultra 7 processor 165U	Intel® Core™ Ultra 7 processor 155U	Intel® Core™ Ultra 5 processor 135U	Intel® Core™ Ultra 5 processor 125U
Processor Cores <sup>11</sup>	12 (2+8+2)	12 (2+8+2)	12 (2+8+2)	12 (2+8+2)
Processor Threads	14	14	14	14
Intel® Smart Cache (LLC)	12 MB	12 MB	12 MB	12 MB
P-core Max Turbo Frequency <sup>12</sup>	Up to 4.9 GHz	Up to 4.8 GHz	Up to 4.4 GHz	Up to 4.3 GHz
E-core Max Turbo Frequency <sup>12</sup>	Up to 3.8 GHz	Up to 3.8 GHz	Up to 3.6 GHz	Up to 3.6 GHz
Processor Graphics	Intel® Graphics			
Graphics Max Frequency	Up to 2.0 GHz	Up to 1.95 GHz	Up to 1.9 GHz	Up to 1.85 GHz
X <sup>e</sup> -cores	4	4	4	4
Neural Processor	Intel® AI Boost			
Neural Compute Engines	2x Gen3			
Total PCIe Lanes	3 (x4) Gen 4 + 8 (x1, x2, x4) Gen4 Configurable			
Max Memory Speeds <sup>13</sup>	DDR5-5600   LPDDR5/x-7467			
Max Memory Capacity	64 GB (LP5)   96 GB (DDR5)			
Processor Max Turbo Power	57 W			
Processor Base Power	15 W			

# Intel® Core™ Ultra Platform



## Notices & Disclaimers

- 3D Performance Hybrid Architecture:** Performance hybrid architecture combines two core microarchitectures, Performance-cores (P-cores) and Efficient-cores (E-cores), on a single processor die first introduced on 12th Gen Intel® Core™ processors. Select 12th Gen and newer Intel® Core™ processors do not have performance hybrid architecture, only P-cores or E-cores, and may have the same cache size. See [ark.intel.com](https://ark.intel.com) for SKU details, including cache size and core frequency.
  - Intel® Arc™ GPUs:** Intel® Arc™ GPUs only available on select H-series Intel® Core™ Ultra processor-powered systems with at least 16 GB dual-channel memory. OEM enablement required. Check with OEM or retailer for system configuration details.
  - Intel® Thread Director:** Built into the hardware, Intel® Thread Director is provided only in performance hybrid architecture configurations of 12th Gen or newer Intel® Core™ processors; OS enablement is required. Available features and functionality vary by OS.
  - Intel® Turbo Boost Max Technology 3.0:** Available on H-series Intel® Core™ Ultra 7 and H-series Intel® Core™ Ultra 9 processors. See [ark.intel.com](https://ark.intel.com) for details.
  - Best-in-class Connectivity:** Intel® Wi-Fi 7 (5 Gig) & Intel® Wi-Fi 6E (Gig+) products enable the fastest possible maximum speed for typical laptop Wi-Fi products. Thunderbolt™ 4 technology is the fastest port currently available on a laptop, at 40 Gb/s, as compared to other laptop I/O connection technologies, including eSATA, USB, and IEEE 1394 Firewire. Performance varies by use, configuration, and other factors. See [www.intel.com/PerformanceIndex](https://www.intel.com/PerformanceIndex) (connectivity) for details.
  - Endurance Gaming Mode:** Intel® Arc™ Control, Endurance Gaming Software (installable with Intel® Arc™ Control), Intel® Graphics Driver (installable with Intel® Arc™ Control and Intel® Dynamic Tuning Technology with EPO and EG Policy enabled).
  - Intel® Unison™ Solution:** Intel® Unison™ solution is currently available for eligible Intel® Evo™ designs on Windows-based PCs powered by 12th Gen Intel® Core™ CPU or newer and only pairs with Android- or iOS-based phones and tablets. All devices must run a supported OS version. See [intel.com/performance-evo](https://intel.com/performance-evo) for details, including setup requirements. Results may vary.
  - Intel® Adaptix™ Dynamic Tuning Technology:** Performance varies by use, configuration, and other factors. Learn more at [www.intel.com/PerformanceIndex](https://www.intel.com/PerformanceIndex).
  - Intel® Intelligent Display Technology:** Intel® Core™ Ultra processors enable Intel® Intelligent Display capabilities. System requirements must include compatible TCON and display panel.
  - Wi-Fi 7:** Wi-Fi 7 is subject to regional availability and operation requires use of Intel® Wi-Fi 7 (5 Gig) products in conjunction with operating systems and routers/APs/Gateways that support Wi-Fi 7. Learn more at <https://www.intel.com/performance-wireless>.
  - P-cores, E-cores, and Low-power E-Cores:** Processor cores listed first are the total number of cores in the processor. The number of Performance-cores, Efficient-cores, and Low-power E-cores are listed in parentheses (P+E+LPE).
  - P-core and E-core Frequencies:** The frequency of cores and core types varies by workload, power consumption and other factors. Visit <https://www.intel.com/content/www/us/en/architecture-and-technology/turbo-boost/turbo-boost-technology.html> for more information.
  - Memory Speed:** For latest memory configurations and speeds, refer to [ark.intel.com](https://ark.intel.com). DDR5 top speed enabled with specific DIMMs, other DIMMs may operate with one speed bin lower and different SAGV points. (1SPC, 1DPC, 1R).
  - Intel® Dynamic Power Share:** Please work through Intel's Customer Engineering and Account teams to explore enabling options. Contact your Intel representative.
  - HDMI 2.1:** Includes Fixed Rate Link (FRL) mode with support up to 12 Gbps.
  - PCIe Gen5:** 1x8 PCIe Gen5 available on Intel® Core™ Ultra Platform (H Series) only.
- Performance varies by use, configuration, and other factors. Learn more at [www.intel.com/PerformanceIndex](https://www.intel.com/PerformanceIndex).
- All features may require software purchase, subscription, or enablement by a software or platform provider, or may have specific configuration or compatibility requirements. Details at [www.intel.com/PerformanceIndex](https://www.intel.com/PerformanceIndex). Results may vary.
- Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates. See [intel.com/Evo](https://intel.com/Evo) for additional details.
- All versions of the Intel vPro® platform require an eligible Intel® processor, a supported operating system, Intel LAN and/or WLAN silicon, firmware enhancements, and other hardware and software necessary to deliver the manageability use cases, security features, system performance, and stability that define the platform. See [www.intel.com/PerformanceIndex/vPro](https://www.intel.com/PerformanceIndex/vPro) for details.
- Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates. No product or component can be absolutely secure.
- Your costs and results may vary.
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