intel.

Product Brief

Intel® Core™ Ultra Desktop Processors (Series 2)

Intel® Core™ Ultra desktop processors (series 2) are the ultimate desktop and entry workstation platform, engineered to unlock new levels of intelligent performance for the most demanding daily tasks.

Featuring:

| Enthusiast-level performance per watt. | New NPU for AI performance. | Maximized connectivity & peripherals. |

Enthusiast-Level Power per Watt

These processors are desktop powerhouses, featuring up to 24 cores with new P-core and E-core architecture, along with new overclocking[1] features and performance technologies.

Built for Real-World Performance

Up to

8

**Next-Gen
P-Cores**

Up to

5.7 GHz

**Max Turbo
Frequency[2]**

Optimized for AI and single- or limited-threaded application performance.

Up to

16

**Next-Gen
E-Cores**

Up to

4.6 GHz

**Max Turbo
Frequency[2,3]**

Optimized for modern multi-tasking and multi-core performance per watt.

**Intel® Thread
Director[4]**

Optimizes workloads by helping the OS scheduler intelligently distribute workloads to the optimal cores.

Architecture Features

NEXT-GEN	P-core architecture
NEXT-GEN	E-core architecture
NEW	Integrated neural processing unit (NPU)
NEW	X^e LPG graphics architecture[5]
UPGRADED	I/O
UPGRADED	Graphics architecture[5]
INCREASED	CPU PCIe 5.0 lanes
INTEGRATED	Thunderbolt™ 4 technology

Platform Features

UPGRADED	Memory support (DDR5-6400)[6]
NEW	Discrete Thunderbolt™ 5 port support with 80/120 Gbps bandwidth
ADDITIONAL	PCIe 4.0 capable ports
NEW	Core and memory overclocking features[1]
NEW	Intel® Gaussian and Neural Accelerator 3.5
UPGRADED	Intel® Deep Learning Boost DP4A

Powerful Overclocking and Optimization Technology[1]

Overclocking tuning controls have been resynthesized for Intel® Core™ Ultra desktop processors (Series 2)! New MCP designs provide opportunities to overclock die-to-die interfaces, while ratio granularity now offers 16.6 GHz increments for expert overclockers to maximize every bit of performance. Dual BCLK tuning gives users the ability to tune the compute and SoC die independently, while new OEM-defined voltage limits help prevent users from exceeding specified thresholds.

Intel® eXtreme Memory Profile features DDR5 memory overclocking, while Intel® eXtreme Tuning Utility brings real-time CPU tuning, memory tuning, and performance monitoring.

New NPU for AI Performance

Neural nets are the new apps, and the AI accelerators in Intel® Core™ Ultra processors are designed to efficiently speed up the matrix multiplications at the heart of these neural networks.

NEW Integrated NPU and X^e LPG Graphics[5]
for AI Acceleration

NEW NPU
(Neural Processing Unit)

Up to
13 TOPS[7]

NEW X^e LPG Graphics
Architecture GPU[5]

Featuring Up To
4 Xe Cores

Up to
36 Total Platform TOPS[7]

Intel® Core™ Ultra Processors
The Foundation of the AI PC

GPU
High Throughput

Ideal for AI-accelerated digital content creation.

+

NPU
Low Power

Ideal for sustained AI workloads and AI offload for battery life.

+

CPU
Fast Response

Ideal for low-latency AI workloads.

Leading the AI PC Transition

The AI PC is your customers' gateway into the age of AI, featuring Intel® hardware, software, and technology that is purpose-built for AI workloads.

AI PCs use Intel® Core™ Ultra processors, with the CPU, GPU, and NPU working together for optimal performance, efficiency, and security.

Featuring:[8]

NEW Support for AI-Enhanced Security

- McAfee
- Microsoft Defender
- Bufferzone
- Trend Micro
- Xcitium

NEW Support for Client-Optimized LLMs

- Microsoft Phi-2
- Day0 Phi-3 Support
- LLaMa2-7B
- Day0 LLaMa3-8B Support
- Mistral-7B
- Qwen 7B (PRC)
- ChatGLM3 6B (PRC)

Broadest App Enablement

- Target 100+ ISV Applications
- Target 300+ AI Features for Productivity, Creativity, and Collaboration

NEW Support for Local Personal Assistants

- Acer Sidekick
- Lenovo AI Now
- +More in Pipeline

Featuring Best-In-Class Wired Connectivity[9]

An AI PC is a connected PC, offering next-gen Wi-Fi and Bluetooth, the latest Thunderbolt™ technology, and numerous PCIe lanes.

Integrated Wi-Fi 6E + Bluetooth® 5.3 Support
Delivering supercharged Wi-Fi performance and the advancements of Bluetooth LE Audio to desktop.

Discrete Intel® Wi-Fi 7[10] + Bluetooth® 5.4 Support
The next stage in the evolution of wireless connectivity, Wi-Fi 7, is helping provide extreme speed, responsiveness, and reliability. Intel's next-generation Bluetooth provides an extended range and quality for an enhanced user experience.

Intel® Connectivity Performance Suite[11]
Acts as your built-in IT expert by continuously optimizing your Wi-Fi connection and prioritizing your business-critical applications.

Intel® Unison™ Software[12]
Allows users to transfer files and photos, extend the screen, or share keyboard and mouse controls between a PC & tethered tablet or phone.

Thunderbolt™ 5 Technology
Best-in-class wired connectivity solution for gamers and creators, with up to 120 Gbps of transmit bandwidth, dual 6K video capability, and 2x more bandwidth for external SSD and other tools.

Thunderbolt™ 4 Technology
Integrated Thunderbolt™ 4 technology offers the simplest, most reliable cable solution available for connecting to a wide variety of accessories while providing outstanding performance.

Thunderbolt™ Share[13]
Offers users an easy, fast, and efficient way to do more with two PCs by sharing screens, keyboard, mouse, storage, and files with the speed of Thunderbolt™ technology.

Expanded I/O
Up to 20 PCIe 5.0 lanes and increased chipset PCIe 4.0 lanes.

Intel® Killer™ Networking
Delivers supercharged performance and enables seamless, immersive gameplay.

Features at a Glance

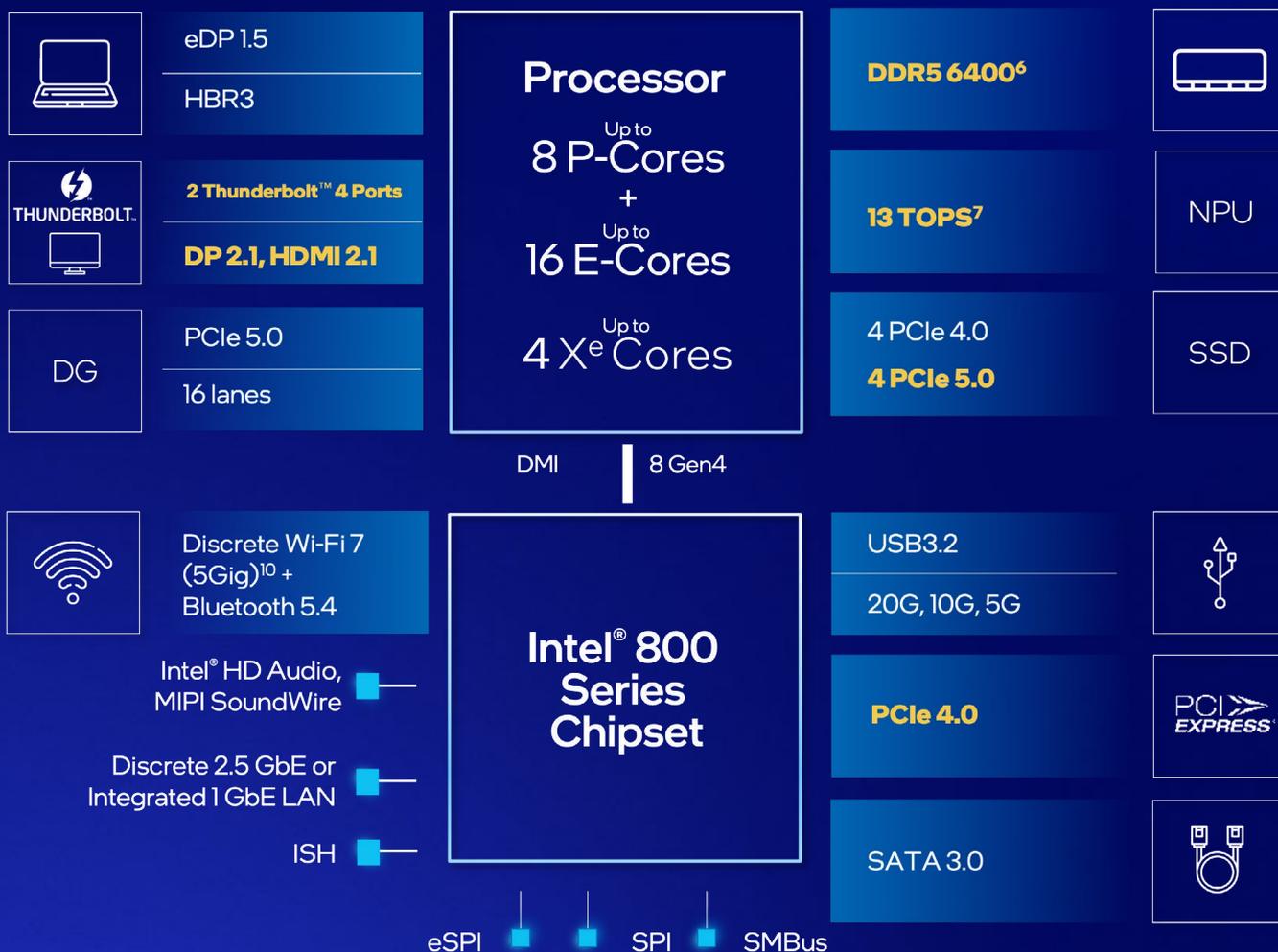| Feature	Benefit
Performance Hybrid Architecture[14]	Integrates two all-new core microarchitectures into a single die, prioritizing and distributing workloads to optimize performance.
Intel® Thread Director[4]	Optimizes workloads by helping the OS scheduler intelligently distribute workloads to the optimal cores.
NPU	A neural processing unit is a processor built for handling AI & machine learning tasks. Select Intel® Core™ Ultra processors include a CPU, a GPU, and an NPU.
TOPS[7]	Trillions of operations per second. A calculated technical specification of the theoretical maximum an AI accelerator can achieve if it is 100% efficient with software and workload.
Intel® Graphics Featuring X^e LPG Graphics Architecture[5]	A purpose-built graphics architecture optimized for lower wattage and higher performance per watt. Rich media and intelligent graphics capabilities enable amplified visual complexity, enhanced 3D performance, and faster image processing.
Intel® Smart Cache	CPU memory caching method for sharing among P-cores, E-cores, and processor graphics if applicable.
Intel® eXtreme Tuning Utility (Intel® XTU)[1]	A precision toolset for tuning and overclocking, featuring processor overclocking, so that new and experienced users can get more from their unlocked processors.
Intel® eXtreme Memory Profile (Intel® XMP) 3.0[1]	Allows users to overclock compatible DDR5 memory modules to enhance the gaming features built into PCs with Intel® Core™ Ultra processors.
Intel® Speed Shift Technology	Gives your CPU finer control over its frequency, allowing a fast jump up to its maximum clock speed.
Intel® Turbo Boost Max Technology 3.0	Identifies the processor's fastest cores and directs critical workloads to them as power, heat, and workload allow.
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® Dynamic Tuning Technology[15]	Power optimization tools that intelligently adapt power policies based on usage mode and temperature, with a new policy that determines and directs application resource optimization in real time.

Features at a Glance

Feature	Benefit
Intel® Application Optimization[15]	A software policy within Intel® Dynamic Tuning Technology (DTT) that determines and directs application resource optimization in real-time.
Intel® Deep Learning Boost	Significantly accelerates inference performance for deep-learning workloads optimized to use VNNI.
Intel® Thermal Velocity Boost	Opportunistically and automatically increases clock frequency of select Intel® Core™ Ultra Desktop processors by up to 100 MHz if the processor is at a temperature of 70°C or lower and turbo power budget is available.
Intel® Adaptive Boost Technology	Intelligently boosts the processor to run faster than its rated frequency as power, heat, and workload allow.
Intel® Gaussian and Neural Accelerator 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™ 5 Technology	Next-generation universal cable connectivity for a simple, reliable connection that provides incredible performance.
Thunderbolt™ 4 Technology	An Intel-developed connectivity standard that delivers power, data, and a video signal over a single connection. The Thunderbolt™ technology certification establishes mandatory minimum requirements for cables, PCs, and accessories to help ensure greater reliability and interoperability across devices and vendors.
Thunderbolt™ Share[13]	Unlocks ultra-fast PC-to-PC connectivity experiences.
Discrete Wi-Fi 7 Support[10]	The next step in the evolution of wireless connectivity, helping provide extreme speed, responsiveness, and reliability.
Intel® Connectivity Performance Suite[11]	A software solution that improves PC networking performance by creating a personalized network experience based on each user's unique situation, automatically prioritizes high-priority traffic over lower-priority traffic.

SKU Chart

Processor Brand String with Number[16]	Intel® Core™ Ultra 9 Processor 285K	Intel® Core™ Ultra 7 Processor 265K	Intel® Core™ Ultra 7 Processor 265KF	Intel® Core™ Ultra 5 Processor 245K	Intel® Core™ Ultra 5 Processor 245KF
Processor Cores (P+E)[17]	24 (8+16)	20 (8+12)	20 (8+12)	14 (6+8)	14 (6+8)
Processor Threads	24	20	20	14	14
Intel® Smart Cache (L3, MB)	36	30	30	24	24
Total L2 Cache	40	36	36	26	26
Intel® Thermal Velocity Boost Frequency (GHz)[2]	Up to 5.7	Up to 5.5	Up to 5.5	Up to 5.2	Up to 5.2
Intel® Turbo Boost Max Technology 3.0 Frequency (GHz)[2]	Up to 5.6	Up to 5.5	Up to 5.5	0	0
P-Core Max Turbo Frequency (GHz)[2]	Up to 5.5	Up to 5.4	Up to 5.4	Up to 5.2	Up to 5.2
E-Core Max Turbo Frequency (GHz)[2,3]	Up to 4.6				
P-Core Base Frequency (GHz)	3.7	3.9	3.9	4.2	4.2
E-Core Base Frequency (GHz)[3]	3.2	3.3	3.3	3.6	3.6
Unlocked[1]	Yes				
Processor Graphics[5]	Intel® Graphics		n/a	Intel® Graphics	n/a
CPU PCIe Lanes	24				
Maximum Memory Speed (MT/s)[6]	DDR5-6400				
Memory Channels	2				
Maximum Memory Capacity[6]	192				
Processor Base Power (W)	125				
Maximum Turbo Power (W)	250	250	250	159	159
Reliability, Availability & Serviceability[18]	Enabled	Enabled	Disabled	Enabled	Disabled
Intel® SIPP[19]	Yes	Yes	No	Yes	No
Intel® ISM[18,20]	Yes				
Boxed	Yes				

Package Platform

New Features

eDP 1.5		DDR5 6400[6]
HBR3		
2 Thunderbolt™ 4 Ports	**Processor**	**13 TOPS[7]**
DP 2.1, HDMI 2.1	Up to	
PCIe 5.0	**8 P-Cores**	4 PCIe 4.0
16 lanes	+	**4 PCIe 5.0**

Processor

Up to
8 P-Cores
+
Up to
16 E-Cores
Up to
4 Xe Cores

DMI | 8 Gen4

Intel® 800 Series Chipset

Discrete Wi-Fi 7 (5Gig)[10] + Bluetooth 5.4	USB3.2
	20G, 10G, 5G
Intel® HD Audio, MIPI SoundWire	**PCIe 4.0**
Discrete 2.5 GbE or Integrated 1 GbE LAN	SATA 3.0
ISH	

eSPI   SPI   SMBus

DG

NPU

SSD

THUNDERBOLT.

PCI EXPRESS

Notices & Disclaimers

1. Overclocking: Altering clock frequency or voltage may void any product warranties and reduce stability, security, performance, and life of the processor and other components. Check with system and component manufacturers for details.

2. Boost Frequencies: Intel® Turbo Boost Max Technology 3.0, and Intel® Thermal Velocity Boost are only available on Performance-cores.

3. E-Core Frequencies: Efficient-core frequencies are lower to optimize power usage. The frequency of cores and core types varies by workload, power consumption, and other factors. Visit https://www. intel.com/content/www/us/en/gaming/resources/turbo-boost.html for more information.

4. 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.

5. Intel® Graphics / Xe LPG Graphics Architecture: Available only on Intel® Core™ Ultra desktop processors (Series 2) that feature integrated graphics.

6. Memory Support: Maximum memory speeds are associated with 1 DIMM per Channel (1DPC) configurations. Additional DIMM loading on any channel may impact maximum memory speed. Up to DDR5-6400 MT/s 1DPC CUDIMM 1Rx8, 1Rx16, 2Rx8. Maximum memory capacity is achievable with 2DPC configurations. For additional 2DPC configuration details, refer to the Arrow Lake-S and Arrow Lake-HX Processor External Design Specification (EDS), Doc ID 729037.

7. TOPS: All TOPS are "up to" and approximate until final IP frequency defined, different SKUs with different frequency & power targets will have different TOPS.

8. AI Features: AI features may require software purchase, subscription, or enablement by a software or platform provider, or may have specific configuration or compatibility requirements. Details at intel.com/AIPC Results may vary.

9. Best-In-Class Wired Connectivity: See site for details: https://edc. intel.com/content/www/us/en/products/performance/benchmarks/ wired/.

10. Discrete Wi-Fi 7: While Wi-Fi 7 is backward compatible with previous generations, new Wi-Fi 7 features require PCs configured with Intel® Wi-Fi 7 solutions, PC OEM enabling, operating system support, and use with appropriate Wi-Fi 7 routers/APs/gateways. 6 GHz Wi-Fi 7 may not be available in all regions. Performance varies by use, configuration, and other factors. For details on performance claims, learn more at www.Intel.com/performance-wireless.

11. Intel® Connectivity Performance Suite: The Intel® Connectivity Performance Suite (ICPS) software application requires Microsoft Windows 11 operating system and enables automated network traffic prioritization and connection optimization for Intel PC platforms configured with Intel® Wi-Fi 7 (Gig+) products.

12. Intel® Unison™ Solution: Intel® Unison™ solution is currently available for Intel® Evo™ designs on Windows-based PCs powered by 13th Gen Intel® Core™ or newer CPU and only pairs with Android- or iOS-based phones and tablets; all devices must run a supported OS version. See intel. com/performance-evo for details.

13. Thunderbolt™ Share: Thunderbolt™ Share is required to be installed on both PCs. See the release notes via intel.com for supported hardware, what is new, bug fixes, and known issues.

14. 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 for SKU details, including cache size and core frequency.

15. Intel® Dynamic Tuning Technology / Intel® Application Optimization: Performance varies by use, configuration, and other factors. Learn more at www.Intel.com/PerformanceIndex.

16. Processor Numbers: Intel® processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families.

17. Processor Cores: Processor cores listed first are the total number of cores in the processor. The number of Performance-cores and the number of Efficient-cores are listed in parentheses (P+E).

18. Reliability, Availability, Serviceability / Intel® Standard Manageability (ISM): When paired with the eligible Intel® W880 Series chipset SKU, a motherboard with supporting hardware and software, and potential service activation.

19. Intel® Stable IT Platform Program (SIPP): Eligible for Intel® Stable IT Platform Program (Intel® SIPP) starting with Arrow Lake-S Commercial platform availability.

20. Intel® Standard Manageability: When paired with the eligible Intel® Q880 Series chipset SKU, a motherboard with supporting hardware and software, and potential service activation.

Performance varies by use, configuration, and other factors. Learn more at intel.com/performanceindex.

Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates. See backup for configuration details. Results that are based on systems and components as well as results that have been estimated or simulated using an Intel Reference Platform (an internal example new system), internal Intel analysis or architecture simulation or modeling are provided to you for informational purposes only. Results may vary based on future changes to any systems, components, specifications, or configurations.

No product or component can be absolutely secure. Your costs and results may vary. Intel technologies may require enabled hardware, software, or service activation.

All Intel® Evo™ branded designs are verified based on specific hardware and other requirements and must meet demanding thresholds for key mobile user experiences. Details at www.intel.com/performance-evo.

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 for details.

AI features may require software purchase, subscription, or enablement by a software or platform provider, or may have specific configuration or compatibility requirements. Details at intel.com/AIPC.

Intel is committed to the continued development of more sustainable products, processes, and supply chain as we strive to prioritize greenhouse gas reduction and improve our global environmental impact. Where applicable, environmental attributes of a product family or specific SKU will be stated with specificity. Refer to Intel Corporate Responsibility Report 2022-2023 or visit www.Intel.com/2030goals for further information.