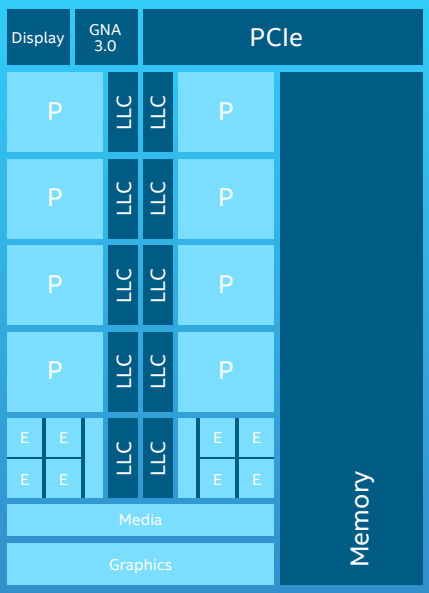
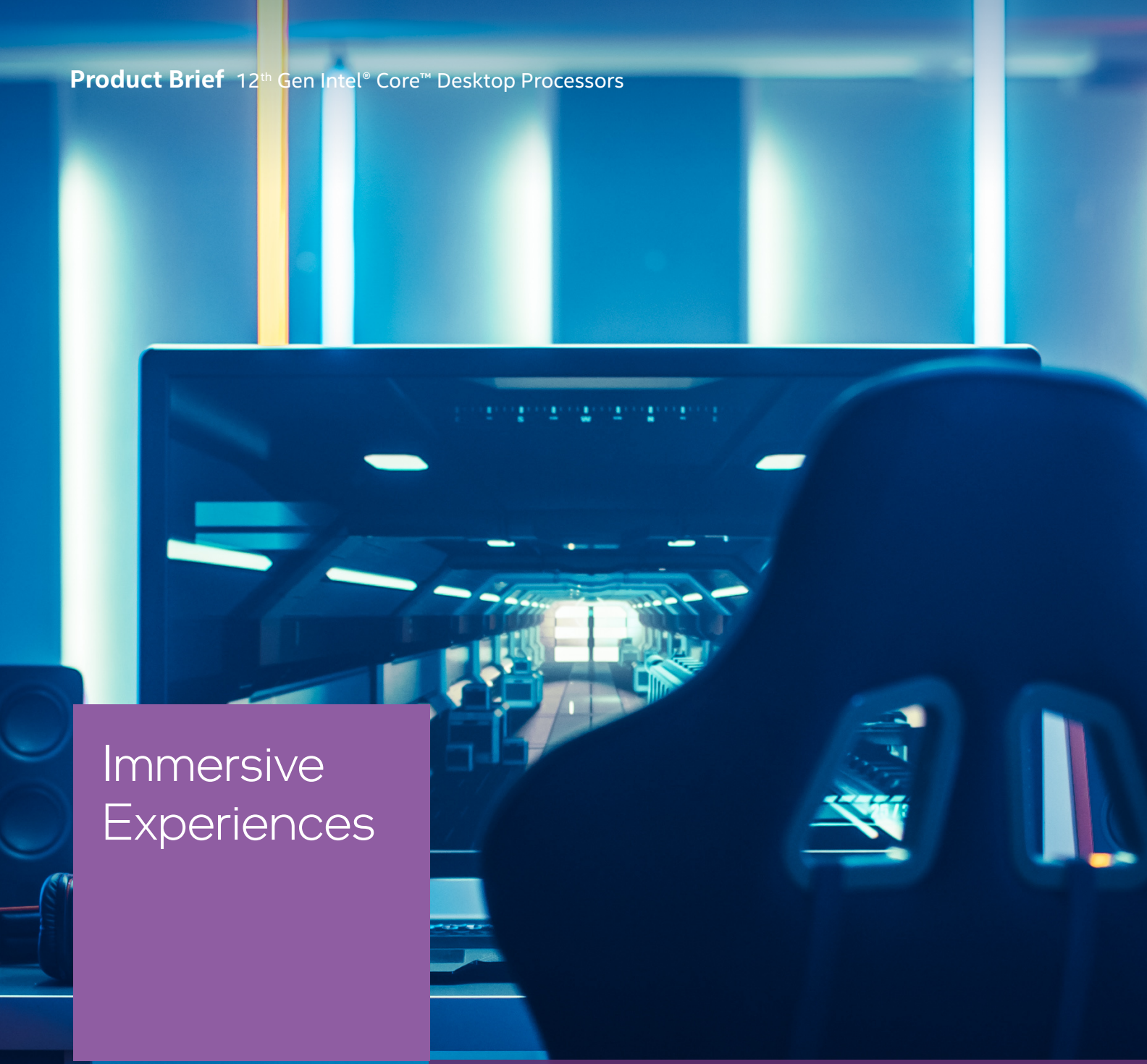
12th Gen Intel® Core™ Desktop Processors

The 12th Gen Intel® Core™ desktop processor redefines x86 architecture performance. Introducing our new performance hybrid architecture, combining Performance-cores with Efficient-cores to elevate gaming, productivity, and creation. These breakthrough processors intelligently optimize workloads and pave the way for future leaps in processor design. Enjoy the full range of the latest platform innovations like industry first PCIe 5.0 readiness and DDR5 memory. With Intel® UHD graphics immerse yourself in a visually stunning experience with up to 8K HDR support and the ability to view 4 simultaneous 4K displays. 12th Gen Intel® Core™ desktop processors bring all the features you need to game, work, and create like never before.

Breakthrough Core Technology



In a game-changing advance for core performance, 12th Gen Intel® Core™ desktop processors power a revolutionary approach to the x86 architecture. Its Performance-cores—or "P-cores"—are optimized for single & lightly-threaded performance, while its Efficient-cores—or "E-cores"—are optimized for scaling highly-threaded workloads. Intel® Thread Director helps to monitor and analyze performance data in real-time to seamlessly place the right application thread on the right core and optimize performance per watt.[1] That means gamers, creators, and professionals can harness both intelligence and power to enhance the experiences that matter most.



Immersive Experiences

Whether you're delving into the latest gaming titles or focusing on advanced professional applications, 12th Gen Intel® Core™ Desktop processors enable you to immerse without interruptions. Intel® UHD Graphics driven by Xe Architecture invite you to take a deep-dive into vivid new experiences with enhanced visual support for up to 8K HDR video in billions of colors and up to 4 simultaneous 4K displays. 12th Gen Intel® Core™ desktop processors are capable of canceling out interruptions with enhanced Gaussian & Neural Accelerator 3.0 (GNA) for more efficient noise suppression and background blurring on video. For elite gaming, world-class productivity, free flowing creation, and more, 12th Gen Intel® Core™ desktop processors enable deep immersion and focus.

Accelerating Platform Innovation

Tap into the latest platform technologies that drive incredible gaming, workflow, and creation. Our 12th Gen Intel® Core™ desktop processors offer up to 20 lanes (16 PCIe 5.0 and 4 PCIe 4.0) to drive optimal discrete graphics and storage performance by enabling higher bandwidth connection points. DDR5 brings fast speeds up to 4800 MT/s, this allows for increased memory bandwidth speeds compared to previous generations that use DDR4 3200 MT/s memory.[2] Fine tune both compute power and performance with unlocked 12th Gen Intel® Core™ desktop processors that have overclocking capabilities and Advanced Tuning support via Intel® Extreme Tuning Utility (XTU).[3] With these and other platform enhancements you'll be able to work, game, and create with impressive control and confidence.

12TH GEN INTEL® CORE™ DESKTOP PROCESSORS: FEATURES AT A GLANCE

FEATURE	BENEFIT
Performance Hybrid Architecture	Performance hybrid architecture, combining Performance-cores (P-cores) and Efficient-cores (E-Cores) to deliver balanced single-thread and multi-threaded real-world performance.
Intel® Thread Director[1]	Optimizes workloads by helping the OS scheduler intelligently distribute workloads to the optimal cores.
PCIe 5.0 up to 16 Lanes	Offers readiness for up to 32 GT/s for fast access to peripheral devices and networking with up to 16 PCI Express 5.0 lanes.
PCIe 4.0 up to 4 Lanes	Offers up to 16 GT/s for fast access to peripheral devices and networking with up to 4 PCI Express 4.0 lanes.
Up to DDR5 4800 MT/s[2]	This industry first memory technology supports fast frequencies and high bandwidth and throughput leading to enhanced workflow and productivity.
Up to DDR4 3200 MT/s[2]	Supports faster frequencies and higher bandwidth and throughput leading to enhanced workflow and productivity.
L3 and L2 Cache	Increased shared Intel® Smart Cache (L3) and L2 cache sizes deliver large memory capacity and reduced latency for fast game loading and smooth frame rates.
Intel® Deep Learning Boost	Accelerates AI inference to improve performance for deep learning workloads.
Gaussian & Neural Accelerator 3.0 (GNA 3.0)	IProcesses AI speech and audio applications such as neural noise cancellation while simultaneously freeing up CPU resources for overall system performance and responsiveness.
Intel® Turbo Boost Max Technology 3.0	Identifies the processor's fastest cores and directs critical workloads to them.
Intel® UHD Graphics driven by Xe Architecture	Rich media and intelligent graphics capabilities enable amplified visual complexity, enhanced 3D performance, and faster image processing.
Overclocking Features and Capabilities	When paired with the Intel® Z690 chipset, processor P-cores, E-cores, graphics, and memory can be set to run at frequencies above the processor specification resulting in higher performance.

12TH GEN INTEL® CORE™ DESKTOP PROCESSORS COMPARISONS

	Intel® Core™ **i9-12900K & i9-12900KF**[4]	Intel® Core™ **i7-12700K & i7-12700KF**[4]	Intel® Core™ **i5-12600K & i5-12600KF**[4]
Max Turbo Frequency [GHz]	Up to 5.2	Up to 5.0	Up to 4.9
Intel® Turbo Boost Max Technology 3.0 Frequency [GHz]	Up to 5.2	Up to 5.0	n/a
Single P-core Turbo Frequency [GHz]	Up to 5.1	Up to 4.9	Up to 4.9
Single E-core Turbo Frequency [GHz]	Up to 3.9	Up to 3.8	Up to 3.6
P-core Base Frequency [GHz]	3.2	3.6	3.7
E-core Base Frequency [GHz]	2.4	2.7	2.8
Processor Cores (P-cores + E-cores)	16 (8P + 8E)	12 (8P + 4E)	10 (6P + 4E)
Intel® Hyper-Threading Technology[5]	Yes	Yes	Yes
Total Processor Threads	24	20	16
Intel® Thread Director[1]	Yes	Yes	Yes
Intel® Smart Cache (L3) Size [MB]	30	25	20
Total L2 Cache Size [MB]	14	12	9.5
Max Memory Speed [MT/s]	Up to DDR5 4800 Up to DDR4 3200	Up to DDR5 4800 Up to DDR4 3200	Up to DDR5 4800 Up to DDR4 3200
Number of Memory Channels	2	2	2
CPU PCIe 5.0 Lanes	16	16	16
CPU PCIe 4.0 Lanes	4	4	4
Enhanced Intel® UHD Graphics driven by Xᵉ Architecture	Intel® UHD Graphics 770	Intel® UHD Graphics 770	Intel® UHD Graphics 770
Graphics Dynamic Frequency [MHz]	Up to 1550	Up to 1500	Up to 1450
Processor P-core/E-core/Graphics/ Memory Overclocking[3]	Yes	Yes	Yes
Intel® Quick Sync Video	Yes	Yes	Yes
Intel® Deep Learning Boost (Intel® DL Boost)	Yes	Yes	Yes
Intel® Advanced Vector Extensions 2 (Intel® AVX2)	Yes	Yes	Yes
Intel® Gaussian and Neural Accelerator (GNA) 3.0	Yes	Yes	Yes
Intel® Virtualization Technology (Intel® VT-x / VT-d)	Yes	Yes	Yes
Mode-based Execution Control (MBEC)	Yes	Yes	Yes
Intel® Threat Detection Technology (Intel® TDT)	Yes	Yes	Yes
Intel® Control-Flow Enforcement Technology (Intel® CET)	Yes	Yes	Yes
Intel® Advanced Encryption Standard New Instructions (Intel® AES-NI)	Yes	Yes	Yes
Intel® BIOS Guard	Yes	Yes	Yes
Intel® Boot Guard	Yes	Yes	Yes
Intel® OS Guard	Yes	Yes	Yes
Intel® Advanced Programmable Interrupt Controller Virtualization (Intel® APIC-v)	Yes	Yes	Yes
Intel® Secure Key	Yes	Yes	Yes
Intel® Platform Trust Technology (Intel® PTT)	Yes	Yes	Yes

Notices & Disclaimers

[1]Intel® Thread Director is designed into 12th Gen Intel® Core™ processors and helps supporting operating systems to more intelligently channel workloads to the right core. No user action required. See intel.com for details.

[2]Based on memory bandwidth results using Intel® Memory Latency Checker Tool v3.9a System A: Core i9-12900K on Asus Z690 TUF DDR4 Motherboard. 2x16GB G.Skill TridentZ 3200Mhz CL14 RAM System B: Core i9-12900K on Asus Z690 Prime-P DDR5 Motherboard. 2x16GB SK.Hynix 4400Mhz CL40 RAM.

[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]Processor names with an 'F' suffix do not have processor graphics and require a discrete graphics solution. Without processor graphics the processor display output ports will not function.

[5]Intel® Hyper-Threading Technology is only available on P-cores.

Performance varies by use, configuration and other factors. Learn more at www.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. No product or component can be absolutely secure.

Your costs and results may vary.
Intel technologies may require enabled hardware, software or service activation.

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.

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