

# Product Brief

13th Gen Intel® Core™ Processors  
For Edge Deployments



## Get More Performance and More Processor Choices for the Edge

The 13th Gen Intel® Core™ processor lineup for the edge delivers higher performance<sup>1</sup> and features both mainstream and embedded IoT processor-chipset combinations.



Not only can solution providers and their customers benefit from higher single-thread, multithread, graphics, and AI performance,<sup>1</sup> but they also benefit from platform flexibility in the latest 13th Gen Intel® Core™ processor platform for the IoT edge. This generation provides access to a full lineup of 13th Gen Intel Core processors and Platform Controller Hubs (PCHs) that run the IoT software stack. 13th Gen is also LGA socket compatible with the prior generation, enabling businesses to easily upgrade their systems. You can provide more L2 and L3 cache, up to DDR5-5600 memory, and PCIe 5.0 connectivity, with Intel® Time Coordinated Computing (Intel® TCC) and Intel vPro®-eligible support on select SKUs.

### Run more simultaneous apps, workloads, and connected devices

13th Gen Intel Core processors for the IoT edge are the top choice to maximize performance, memory, and I/O in edge deployments. Up to 24 cores and up to 32 threads with performance hybrid architecture<sup>2</sup> on Intel® 7 process technology drive fast single- and multithread performance. Performance hybrid architecture<sup>2</sup> is available on Intel® Core™ i9, i7, and now i5 SKUs, providing more access to this efficiency-boosting design innovation. This generation also features more L2 and L3 cache on select SKUs, enabling finer control over workload prioritization.

### Drive consolidation and support advanced applications with DDR5-5600 memory and PCIe 5.0

Up to DDR5-5600 memory and up to PCIe 5.0 connectivity mean providers can engineer powerful next-generation solutions capable of supporting emerging use cases and preparing for future ones. Up to 16 lanes of PCIe 5.0 and four lanes of PCIe 4.0 on the CPU enable configurations with more external accelerators or plugin cards per socket. The PCH options include up to 12 lanes of PCIe 4.0 and up to 16 lanes of PCIe 3.0 for additional expansion flexibility. 13th Gen Intel Core processor-based systems can move and process high volumes of data fast, with greater I/O density to support hardware consolidation and cost-efficient deployments.

### What's new

- Performance hybrid architecture<sup>2</sup> with Intel® Thread Director<sup>3</sup> available in Intel® Core™ i9 and i7 processors, and additionally in Intel® Core™ i5 processors
- Up to DDR5-5600 memory with continued support for DDR4-3200 memory
- Socket compatible with 12th Gen Intel® Core™ processors for an easy upgrade path

### 13th Gen Intel® Core™ processors

Estimated performance compared to 12th Gen Intel® Core™ processors

Up to

**1.04x**

**faster single-thread performance**  
vs. 12th Gen Intel Core processors<sup>1</sup>

Up to

**1.34x**

**faster multithread performance**  
vs. 12th Gen Intel Core processors<sup>1</sup>

Up to

**1.25x**

**faster CPU image classification inference performance**  
vs. 12th Gen Intel Core processors<sup>1</sup>

1. Compared to 12th Gen Intel® Core™ processors for IoT. See backup for configuration details. Results may vary.

## Accelerate video processing for visual experiences, video walls, and graphics-intensive apps

Integrated graphics create new opportunities for visually rich experiences and graphics-enhanced controls while reducing dependency on discrete graphics hardware. 13th Gen Intel Core processors featuring Intel® UHD Graphics 770 driven by Intel® X<sup>e</sup> architecture<sup>4</sup>—with up to 32 graphics execution units (EUs)—deliver fast graphics performance. Four display pipes of 4K60 HDR video, up to three multiformat codec (MFX) engines—up to 2x video decode and 1x video encode—and Genlock and Pipelock support video walls, digital signage, and processing for multiple video streams.

## Support real-time-capable deployments, embedded use conditions, and Wi-Fi 6E<sup>4</sup>

Several of the featured technologies in the 13th Gen platform are designed to support industrial and telecommunications applications that demand more reliability, bounded-latency workloads, and robust wireless connectivity. Select SKUs of 13th Gen Intel Core processors support Intel TCC and Time-Sensitive Networking (TSN) capability with integrated, real-time-capable 2x 2.5GbE connections. Select SKUs also bring support for embedded use conditions and discrete Intel® Wi-Fi 6E connectivity and are Intel vPro eligible for flexible deployments. These featured technologies are especially useful where wired connections or physical access to a device is otherwise inconvenient or costly.

## Boost intelligence for AI operations with hardware acceleration

AI builders have come to rely on hardware-enabled AI acceleration powered by Intel® Deep Learning Boost (Intel® DL Boost) with VNNI, and this generation continues to deliver on this proven innovation. In combination with high core counts and integrated graphics, 13th Gen Intel Core processors provide fast image classification performance. Support for the Intel® Distribution of OpenVINO™ toolkit also brings greater optimization for AI training and inference workloads, making it easier to develop and deploy AI projects with fast time to value.

## Help protect workloads with integrated security capabilities at the hardware level

For Windows devices, 13th Gen Intel Core processors support Intel® Total Memory Encryption (Intel® TME), which delivers end-to-end encryption for workloads at rest and in flight, including critical IP such as credentials and keys in memory. Intel® Boot Guard also helps enable a root of trust by verifying platform integrity on startup and helps prevent below-the-OS attacks.

## Maximize the value of investments while minimizing the impact of software updates

IoT SKUs support Windows 10 IoT Enterprise 2021 Long-Term Servicing Channel (LTSC) and EFLOW to help reduce the impact of software updates with longer, more-convenient intervals between releases. To help ensure supply chain stability through lengthy certification cycles, select SKUs also feature IoT long-life availability.<sup>5</sup>



## Key features

### Performance

- Performance hybrid architecture<sup>2</sup> with Intel® Thread Director<sup>3</sup> available in Intel Core i9 and i7 processors, and additionally in Intel Core i5 processors
- Intel Thread Director<sup>3</sup> optimizes performance for concurrent workloads across the cores
- Up to 24 cores and up to 32 threads
- Up to 36 MB Intel® Smart Cache
- Processor base power between 35W and 65W

### Intel UHD Graphics

- Intel UHD Graphics 770 driven by Intel X<sup>e</sup> architecture with up to 32 graphics execution units (EUs)<sup>4</sup>
- HDMI 2.0b integrated, HDMI 2.1 via DP to HDMI protocol converter
- Up to four concurrent 4K60 HDR displays or one 8K60 HDR display
- Up to three MFX engines
- E2E compression
- SR-IOV for integrated graphics
- Genlock and Pipelock video synchronization for Windows

### Memory and I/O

- Up to DDR5-5600 and up to DDR4-3200 memory
- Up to 16x lanes PCIe 5.0 and up to 4x lanes PCIe 4.0 on the CPU
- Up to 12x lanes PCIe 4.0 and up to 16x lanes PCIe 3.0 on the PCH

### Accelerated AI

- Up to 32 graphics EUs for parallel AI workload processing
- Intel DL Boost with VNNI accelerates AI inferencing workloads
- Fully supported by the Intel Distribution of OpenVINO toolkit for optimized, cross-architecture deep learning inference

### Security and manageability

- Intel Total Memory Encryption (Windows only) delivers end-to-end encryption, including credentials and keys in memory
- Intel Boot Guard enables a root of trust by verifying boot integrity
- Intel® Converged Security and Management Engine version 16.1
- Support for Intel vPro eligible on select SKUs

### Software

- Support for Windows 10 IoT Enterprise 2021 LTSC and EFLOW
- Yocto Project Linux, Ubuntu, Red Hat Enterprise, and Wind River Linux
- Celadon (Android) in VM (community support)
- KVM and ACRN hypervisor (community support)
- Real-Time Systems (RTS) hypervisor
- Intel® oneAPI toolkit, Intel Distribution of OpenVINO toolkit, Intel® In-Band Manageability
- Intel® Slim Bootloader, UEFI BIOS



## Key features, continued

### Flexible deployments

- Socketed LGA package for flexible/compact designs
- Embedded use conditions available on select SKUs
- Long-life availability<sup>5</sup> on select SKUs to support ongoing validation and certification in key markets
- Time-Sensitive Networking capable<sup>4</sup> with integrated 2x 2.5GbE

### Connectivity

- Optional discrete component with two Thunderbolt™ 4/USB4 ports
- Up to eight DMI 4.0 lanes
- Integrated 2x 2.5Gb Ethernet LAN
- Integrated Intel® Wi-Fi 5 (802.11ac) and support for discrete Intel Wi-Fi 6E with embedded use conditions<sup>4</sup>



## Use cases

### Retail, banking, education, hospitality

**Applications:** Video walls, digital signage, AI-driven in-store advertising, and interactive flat panel displays (IFPDs)

- Support for four 4K displays or one 8K display for digital signage reduces the dependency on discrete GPUs and gives businesses a cost-effective means to reach customers who are returning to brick-and-mortar locations.
- 13th Gen Intel Core processors provide fast graphics performance for visually rich advertising.
- Intel DL Boost and the Intel Distribution of OpenVINO toolkit improve AI efficiency on lower-power platforms, allowing for smaller form factors in retail.
- IFPDs support remote learning with 4K student gallery views and AI-driven teacher cameras with automatic pan, tilt, and zoom.

### Industrial

**Applications:** AI-based industrial process control (AIPC), industrial PCs, human-machine interfaces (HMIs) to machine control

- Fast image classification performance supports machine vision use cases for process and quality control on the factory floor.
- Performance hybrid architecture,<sup>2</sup> more cores and cache, PCIe 5.0, and DDR5 memory drive platform consolidation with multiple accelerators or add-in cards supported per socket.
- Real-time-capable, integrated 2x 2.5GbE connectivity enables Time-Sensitive Networking and Intel TCC for critical workloads.<sup>5</sup>
- Four 4K displays or one 8K display deliver rich graphical interfaces for HMI.

### Healthcare

**Applications:** Ultrasound imaging, medical carts, endoscopy, clinical devices

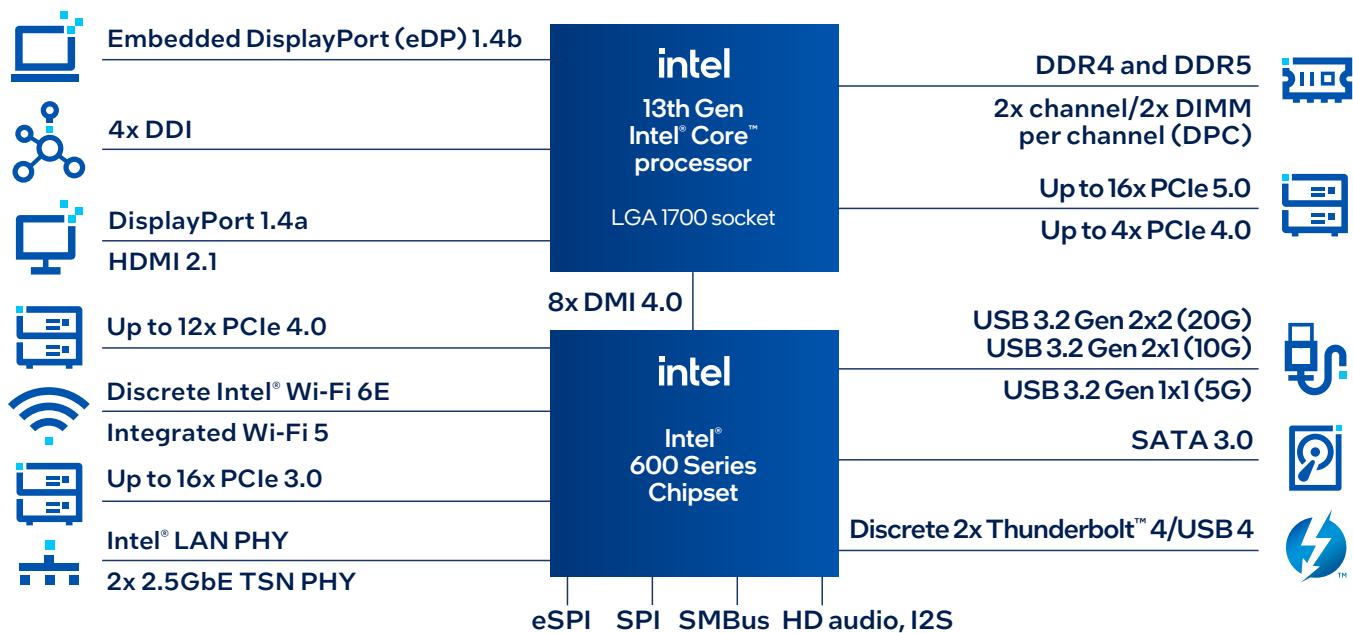
- Up to 24 cores and up to 32 threads with performance hybrid architecture<sup>2</sup> support more devices, more apps, and more multitasking per processor.
- Intel DL Boost and the Intel Distribution of OpenVINO toolkit improve AI-driven tools to support more-efficient inferencing for assistance in diagnostics and medical procedures.
- Long-life availability<sup>5</sup> ensures consistent supply for repairs, for maintenance, and to drive value from long certification cycles.

### Vision, cities, and transportation

**Applications:** Network video recorder (NVR) with AI box, roadside units (RSUs)

- More cores, threads, and PCIe 5.0 bandwidth help move and process more video and other sensor (e.g., lidar) data for smart intersections and digital safety deployments.
- Support more video streams with four display pipes, up to three MFX engines (up to 2x video decode and 1x video encode), and Intel UHD Graphics 770 driven by Intel X<sup>e</sup> architecture.<sup>4</sup>
- Fast image classification performance enables AI analytics for video/other sensor streams at the edge.
- Flexible expansion with up to 16x lanes of PCIe 5.0 and 4x lanes of PCIe 4.0 on the CPU and up to 12x lanes of PCIe 4.0 and 16x lanes of PCIe 3.0 on the PCH allows for more hardware consolidation by adding more video capture cards and AI accelerators per socket.

## Platform block diagram



Not all features are supported in every operating system.  
Not all features are available on all SKUs.

IOTG approval is required for MIPI camera/IPU support.  
IOTG approval is required for Thunderbolt™ 4 support.  
Please contact your Intel representative.

## Software overview

CATEGORY	OPERATING SYSTEMS/SDKS/ BOOT LOADERS	IMPLEMENTATION	DISTRIBUTION AND SUPPORT
Operating systems	Windows 10 IoT Enterprise 2021 LTSC	Intel	Intel, Microsoft
	Ubuntu, Red Hat Enterprise, WR Linux <sup>a</sup>	Canonical Ltd., Red Hat, and Wind River Systems	Distributed and supported by commercial Linux vendors, Intel upstream kernel drivers
	Yocto Project BSP tool-based embedded Linux distribution	Intel	Intel, Yocto Project community, Linux ISVs
	Celadon (Android) in VM	Intel	Celadon community, ISV partners
RTOS	Wind River VxWorks, QNX	Wind River, BlackBerry	Wind River, BlackBerry QNX
	Zephyr RTOS	Intel	Zephyr project community
Hypervisors <sup>a</sup>	KVM, ACRN	KVM, ACRN community	KVM, ACRN community
	RTS Hypervisor	Real-Time Systems	Real-Time Systems
Boot loaders <sup>b</sup>	UEFI/BIOS and Intel® Firmware Support Package (Intel® FSP)	Intel	Intel, IBVs
	Slim Bootloader and Intel FSP	Intel	Bootloader ecosystem and SBL community
SDK	Intel® oneAPI Video Processing Library (oneVPL)	Intel	Intel
	Intel® Distribution of OpenVINO™ toolkit	Intel	Intel
	Intel® oneAPI Toolkits	Intel	Intel
	Intel® In-Band Manageability	Intel	Intel

Not all features are supported in every operating system. Refer to Intel's IoT Solutions Community for partner contact information.

a. Supported by Intel via the upstreaming to open source community. Adoption into individual Linux distributions/hypervisors is dependent upon the OS/HV vendors.

b. Legacy boot is not supported for Windows, Linux. Customers should work with their BIOS vendors for enabling/validating legacy BIOS features.

## Processor lineup

CPU Part Number	CPU Category	Validated Chipset	Processor Cores (P+E) <sup>A</sup>	Processor Threads	Intel® Smart Cache (L3)	Processor Base Power	Single P-core Turbo Freq <sup>B</sup>	Single E-core Turbo Freq <sup>B</sup>	P-core Base Freq <sup>B</sup>	E-core Base Freq <sup>B</sup>	Graphics Execution Units (EUs)	ECC	Premium I/O	Real Time
Intel® Core™ i9-13900E	IoT	R680E/W680 Q670E/Q670 H610E/H610	24 (8+16)	32	36 MB	65W	Up to 5.2 GHz	Up to 4.0 GHz	1.8 GHz	1.3 GHz	32 EU	Yes	Yes	Yes <sup>D</sup>
												No	Yes	No
												No	No	No
Intel® Core™ i9-13900TE <sup>C</sup>	IoT	R680E/W680 Q670E/Q670 H610E/H610	24 (8+16)	32	36 MB	35W	Up to 5.0 GHz	Up to 3.9 GHz	1.0 GHz	0.8 GHz	32 EU	Yes	Yes	Yes <sup>D</sup>
												No	Yes	No
												No	No	No
Intel® Core™ i9-13900 <sup>C</sup>	Mainstream	R680E/W680 Q670E/Q670 H610E/H610	24 (8+16)	32	36 MB	65W	Up to 5.6 GHz	Up to 4.2 GHz	2.0 GHz	1.5 GHz	32 EU	Yes	Yes	No
												No	Yes	No
												No	No	No
Intel® Core™ i7-13700E	IoT	R680E/W680 Q670E/Q670 H610E/H610	16 (8+8)	24	30 MB	65W	Up to 5.1 GHz	Up to 3.9 GHz	1.9 GHz	1.3 GHz	32 EU	Yes	Yes	Yes <sup>D</sup>
												No	Yes	No
												No	No	No
Intel® Core™ i7-13700TE	IoT	R680E/W680 Q670E/Q670 H610E/H610	16 (8+8)	24	30 MB	35W	Up to 4.8 GHz	Up to 3.6 GHz	1.1 GHz	0.8 GHz	32 EU	Yes	Yes	Yes <sup>D</sup>
												No	Yes	No
												No	No	No
Intel® Core™ i7-13700	Mainstream	R680E/W680 Q670E/Q670 H610E/H610	16 (8+8)	24	30 MB	65W	Up to 5.2 GHz	Up to 4.1 GHz	2.1 GHz	1.5 GHz	32 EU	Yes	Yes	No
												No	Yes	No
												No	No	No
Intel® Core™ i7-13700T	Mainstream	R680E/W680 Q670E/Q670 H610E/H610	16 (8+8)	24	30 MB	35W	Up to 4.9 GHz	Up to 3.6 GHz	1.4 GHz	1.0 GHz	32 EU	Yes	Yes	No
												No	Yes	No
												No	No	No
Intel® Core™ i5-13500E	IoT	R680E/W680 Q670E/Q670 H610E/H610	14 (6+8)	20	24 MB	65W	Up to 4.6 GHz	Up to 3.3 GHz	2.4 GHz	1.5 GHz	32 EU	Yes	Yes	Yes <sup>D</sup>
												No	Yes	No
												No	No	No
Intel® Core™ i5-13500TE	IoT	R680E/W680 Q670E/Q670 H610E/H610	14 (6+8)	20	24 MB	35W	Up to 4.5 GHz	Up to 3.1 GHz	1.3 GHz	1.1 GHz	32 EU	Yes	Yes	Yes <sup>D</sup>
												No	Yes	No
												No	No	No
Intel® Core™ i5-13500	Mainstream	R680E/W680 Q670E/Q670 H610E/H610	14 (6+8)	20	24 MB	65W	Up to 4.8 GHz	Up to 3.5 GHz	2.5 GHz	1.8 GHz	32 EU	Yes	Yes	No
												No	Yes	No
												No	No	No
Intel® Core™ i5-13500T	Mainstream	R680E/W680 Q670E/Q670 H610E/H610	14 (6+8)	20	24 MB	35W	Up to 4.6 GHz	Up to 3.2 GHz	1.6 GHz	1.2 GHz	32 EU	Yes	Yes	No
												No	Yes	No
												No	No	No
Intel® Core™ i5-13400E	IoT	R680E/W680 Q670E/Q670 H610E/H610	10 (6+4)	16	20 MB	65W	Up to 4.6 GHz	Up to 3.3 GHz	2.4 GHz	1.5 GHz	24 EU	Yes	Yes	Yes <sup>D</sup>
												No	Yes	No
												No	No	No
Intel® Core™ i5-13400	Mainstream	R680E/W680 Q670E/Q670 H610E/H610	10 (6+4)	16	20 MB	65W	Up to 4.6 GHz	Up to 3.3 GHz	2.5 GHz	1.8 GHz	24 EU	No	Yes	No
												No	Yes	No
												No	No	No
Intel® Core™ i3-13100E	IoT	R680E/W680 Q670E/Q670 H610E/H610	4 (4+0)	8	12 MB	65W	Up to 4.4 GHz	—	3.3 GHz	—	24 EU	Yes	Yes	Yes <sup>D</sup>
												No	Yes	No
												No	No	No
Intel® Core™ i3-13100TE	IoT	R680E/W680 Q670E/Q670 H610E/H610	4 (4+0)	8	12 MB	35W	Up to 4.1 GHz	—	2.4 GHz	—	24 EU	Yes	Yes	Yes <sup>D</sup>
												No	Yes	No
												No	No	No
Intel® Core™ i3-13100	Mainstream	R680E/W680 Q670E/Q670 H610E/H610	4 (4+0)	8	12 MB	65W	Up to 4.5 GHz	—	3.4 GHz	—	24 EU	No	Yes	No
												No	Yes	No
												No	No	No
Intel® Core™ i3-13100T	Mainstream	R680E/W680 Q670E/Q670 H610E/H610	4 (4+0)	8	12 MB	35W	Up to 4.2 GHz	—	2.5 GHz	—	24 EU	No	Yes	No
												No	Yes	No
												No	No	No

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

E suffix = NEX/IoT corp/mainstream embedded road map SKU

TE suffix = NEX/IoT low-power embedded road map SKU

A. Processor cores listed first are the total number of cores in the processor followed by the number of Performance-cores and number of Efficient-cores in parentheses (P+E).

B. 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 [intel.com/content/www/us/en/architecture-and-technology/turbo-boost/turbo-boost-technology](https://www.intel.com/content/www/us/en/architecture-and-technology/turbo-boost/turbo-boost-technology) for more information.

C. Intel® Core™ i9-13900 and Intel® Core™ i9-13900TE are offered for five years' availability on NEX/IoT road map. For extended availability of Intel Core i9-13900 and Intel Core i9-13900TE, please contact your local Intel representative for Supplemental Product Support (SPS) consideration.

D. Real-time capable when used with R680E chipset.

For product specifications, please refer to [ark.intel.com](https://ark.intel.com).

Learn more about 13th Gen Intel Core processors at [intel.com/13thgencore-iot](https://intel.com/13thgencore-iot).



**Notices and disclaimers**

1. Performance varies by use, configuration, and other factors. Learn more at [edc.intel.com/content/www/us/en/products/performance/benchmarks/internet-of-things](https://edc.intel.com/content/www/us/en/products/performance/benchmarks/internet-of-things).
2. Performance hybrid architecture combines two new core microarchitectures, Performance-cores (P-cores) and Efficient-cores (E-cores), on a single processor die. Select 13th Gen Intel® Core™ processors (certain 13th Gen Intel® Core™ i3 processors and lower) do not have performance hybrid architecture, only P-cores.
3. Built into the hardware, Intel® Thread Director is provided only in performance hybrid architecture configurations of 13th Gen Intel® Core™ processors; OS enablement is required. Available features and functionality vary by OS.
4. Available on select SKUs.
5. Intel does not commit or guarantee product availability or software support by way of road map guidance. Intel reserves the right to change road maps or discontinue products, software, and software support services through standard EOL/PDN processes. Contact your Intel account rep for additional information.

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.

Not all features are available on all SKUs.

Not all features are supported in every operating system.

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Your costs and results may vary.

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