AAEON Solutions
with Intel® 5th Generation Core™ Processors:
Four Things You Must Know

The pursuit of technology integration is all about introducing new capabilities while improving existing ones. No where is this rule more apparent than in the integrated circuit industry. As famously observed by Gordon E. Moore, co-founder of Intel® Corporation, the number of transistors in an integrated circuit doubles approximately every two years. This observation, accompanied by an increasingly advanced manufacturing process, has brought the modern world evermore powerful microprocessors in smaller and smaller package sizes.

Number of Transistors in an IC doubles every two years

In 2015, Intel launched their 5th Generation CoreTM Processors, the first series of processors made on the 14nm manufacturing process. Similar to previous launches, the latest lineup of processors improved upon the offerings of their predecessors. AAEON, in tandem with the latest technological developments, will soon be unveiling solutions powered by these new processors.

As with every new product, it is important to ask some fundamental questions such as,"what are the enhancements of this new technology?", "how is this applicable to my business?", hence the purpose and value of this white paper.

Here are the four things you need to know about these technologies on designing and implementing your applications, today and tomorrow.
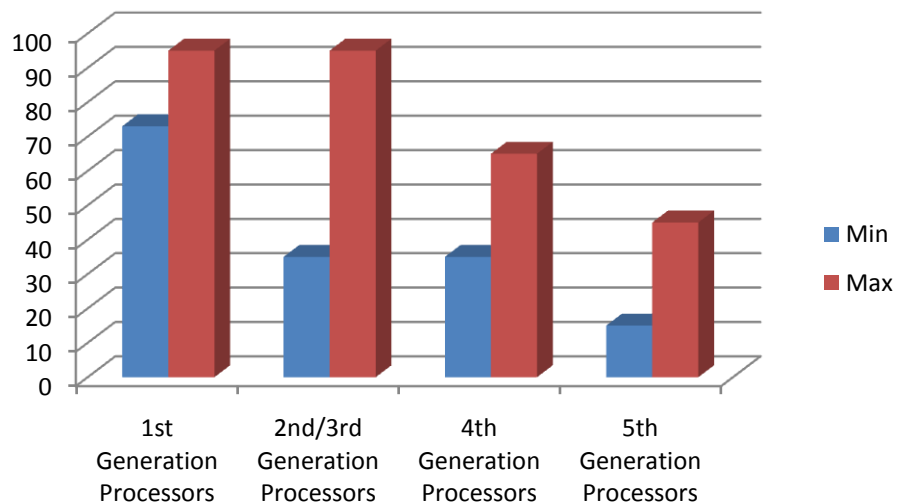
1. It's Energy Efficient

In addition to the die shrink, energy requirement is another area that sees a "downward" trend in microprocessors. The 21st century sees not only an ever-present demand for compactness and faster processing power, but also a requirement for processors to do it in a way that presents minimal impact to the environment.

With this idea in mind, all 5th Generation Core™ Processors are designed with refined trigate transistor technology (introduced in 22nm processors) that helped them become one of the most energy efficient processors in computing. Regardless of desktop or server-grade processors, TDP (Thermal Design Power) for all processors ranges from 15W – 45W, while delivering twice the performance over its 22nm predecessors, making them ideal for applications that require 24/7 operation.

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Thermal Design Power (W)

Legend: ■ Min ■ Max

Categories: 1st Generation Processors, 2nd/3rd Generation Processors, 4th Generation Processors, 5th Generation Processors

2. It Goes Beyond HD

UHD, or Ultra High Definition, is a display resolution of 3840 x 2160 pixels in 16:9 aspect ratio. It contains four times as many pixels than the mainstream FHD, or Full High Definition resolution, which measures 1920 x 1080 in 16:9 aspect ratio. With UHD video content becoming increasingly available, the need for hardware to render this content effectively is imminent.

In addition, current media-heavy applications like digital signage, billboards and video walls often require the simultaneous/independent operation of more than one display device. When the content to be shown involves high resolution videos, it can prove taxing for the processor if it is not powerful enough to process the content into a presentable form (eg. smooth and stable playback).

Capable of processing a single display with UHD content at 60Hz

For this purpose, all 5th Generation Processors are designed with new graphic technologies to handle UHD contents. The processor is now capable of processing a single display with UHD content at 60Hz or three simultaneous/independent displays with 2k resolution or FHD contents (albeit at a lower frequency). Gamers can also benefit from the 20% performance boost when running 3D games.

4KULTRA HD

3. It's Compact

In the past, two additional IC's called the Northbridge and Southbridge were required to aid the processor in handling different computing tasks: The former, being connected directly to the CPU, was responsible for all high-performance tasks such as communication between the CPU and GPU and Memory interface, while the latter, being connected instead to the Northbridge, handled all I/O related tasks such as USBs and audio functions.

Faster processing speeds, saving space on the board while enchancing overall performance

As the components were mounted separately in different areas of the motherboard, the printed circuit board real estate had to be large enough to not only fit these individual components but also had to accommodatethe space required to route all of the inter-device signals. Data transmission between these components to the CPU was dependent on (and limited by) the bus that connects them together. As CPU speed increased, this inter-device transmission became more prone to bottlenecks as the buses are pushed to their limits, leading to system slowdown and inefficiency.

Since 2011, with the introduction of the Intel® 4th Generation Processors, the Northbridge, with its high-performance tasks such as graphics and memory ,was integrated into the CPU die itself which completely solved the issue of slower data transmission as data is directly processed within the CPU without the need for an external interconnect. The 5th Generation Processors carried on this trend and refined the process even further at faster processing speeds, saving space on the board while enhancing the overall performance capabilities.

Besides the integration of the Northbridge, the 5th Generation Processors support integrated dual-port 10GbE Intel® Ethernet MAC, eliminating the need for a separate chipset.

Designed to support the latest DDR4 SDRAM, up to 128GB

When it comes to computing for todays applications, Developers are always looking for higher processing speeds and access to larger amounts of memory. As mentioned in point #2, the dawn of UHD multimedia contents dictate that future PCs are going to be tasked with delivering a significant amount of processing power and manageability of greater resources so that said contents can be displayed in its full glory. In addition, the need for multi-tasking software applications of increasing complexity has also called for an expansion of supported system memory with every new generation.

Speed and Memory Size are complimentary factors in reaching the goals of applications now and in the future. Increases in the bandwidth of expansion interfaces and connectivity options is driving the demand for the performance enhancements of the technology currently being unleashed.

To fulfill these requirements, the newest iteration of Intel's Core Processors are designed to support the latest DDR4 SDRAM, up to 128GB, a volume that will provide the necessary headroom for most applications today. The support for DDR4 memory will also contribute to lowering a system's overall energy usage as it runs on 1.2V standard with low voltage options planned for 1.05V, compared to DDR3's 1.5V.

Furthermore, for the 5th Generation Processors, PCI-E lane support has been enhanced with support for up to 24 Gen3 PCI-E lanes and 8 Gen2 PCI-E lanes, a configuration which allows more expansion hardware to be installed, such as network adaptors in a network appliance and Enterprise class solid-state storage in increasingly large densities.

Conclusion

Incorporating all of the new features available in the latest hardware is a critical requirement to competitive participation in many of todays demanding markets. Through leveraging of the full potential of the newest processors, AAEON will continue bringing the highest quality and technologically advanced products to market.

About AAEON

AAEON is a leading manufacturer of advanced industrial and embedded computing platforms. Committed to innovative engineering, AAEON provides integrated solutions, hardware and services for premier OEM/ODMs and system integrators worldwide. Reliable and high quality computing platforms include industrial motherboards and systems, industrial displays, rugged tablets, PC/104 modules, PICMG half-size and full-size boards and COM modules, embedded SBCs, embedded controllers and related accessories. AAEON also offers customized end-to-end services from initial product conceptualization and product development on through to volume manufacturing and after-sales service programs. AAEON is a GSA contract holder (#GS-35F-0470Y) serving the Federal, State & Local government sectors. AAEON is also an Associate member of the Intel® Internet of Things Solutions Alliance.From modular components to market-ready systems, Intel and the 250+ global member companies of the Intel Internet of Things Solutions Alliance provide scalable, interoperable solutions that accelerate deployment of intelligent devices and end-to-end analytics. Close collaboration with Intel and each other enables Alliance members to innovate with the latest technologies, helping developers deliver first-in-market solutions.