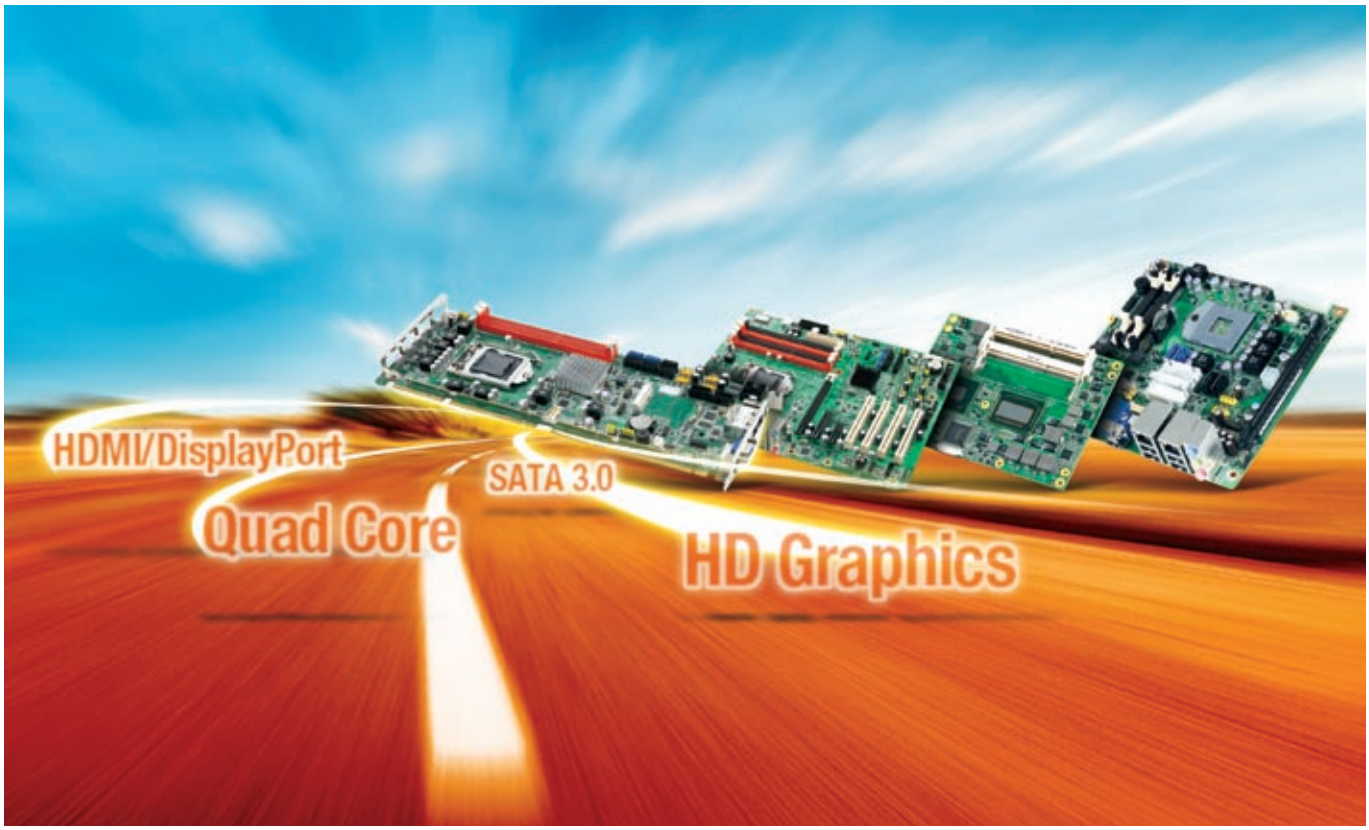
Superior Performance with 2nd Gen Intel® Core™ i7 Processors

By James Wang, Product Manager, Advantech



Intel, the worldwide leading vendor of embedded chip solutions, has just announced the introduction of its 2nd generation Core™ i7 processor (code named Sandy Bridge) plus its corresponding peripheral I/O chipset (code named Cougar Point). For signage, gaming, and imaging applications, the processing and graphics performance of the latest i7, combined with flexible I/O, will satisfy many designers' requirements and provide end-users with a richer experience. For Industrialautomation systems, it is common to interact with multiple generations of technologies like low speed RS-232 and high speed Giga-bit LAN. Sandy Bridge's latest Dynamic Turbo Boost technology can balance the requirements of performance and power consumption. Based on these advantages, it's worth taking a look into what benefits and state-of-the-art technologies we can expect from Intel.

New CPU Micro Architecture

The latest Sandy Bridge processors represent the "tock" in Intel's "tick-tock" development roadmap, they are a major refinement of their CPU micro architecture on 32nm technology. Sandy Bridge processors bring extraordinary performance growth and lower power consumption over last year's Core i3, i5 and i7 chips and feature nearly a billion transistors in each chip. The new 256-bit instruction set of Intel's called Advance Vector Extension (AVX) provides almost double floating point computing capacity which benefits 3D gaming, scientific and medical image processing, digital signage, and other applications that need a large amount of signal processing. Also, new control algorithms for the CPU and graphics improve energy management to allow short bursts of power greater than TDP for more performance, another significant upgrade to their Turbo Boost technology. It also is a first platform that has a Quad Core CPU implemented on a BGA that meets deep embedded requirements for a more reliable solution with very high stability.

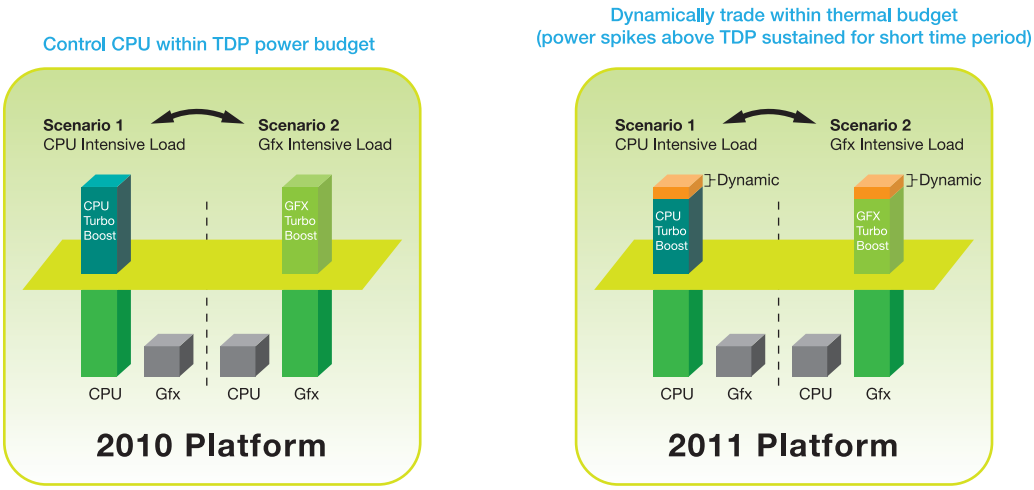


Figure 1. Dynamic Turbo Boost

Integrated Graphics Core on 32 nm Process

Intel Sandy Bridge processor integrates a powerful graphics core into a monolithic 32nm process die and brings better performance with more efficiency. With up to 2x improvement in 3D graphics performance over previous generation Westmere, this is a competitive entry level solution. There are significantly improved graphics over the previous generation with Direct X10.1 & OpenGL 3.0 which will improve gaming realism, and hardware acceleration is supported on both decode and encode cycles making transcoding between different video formats much easier.

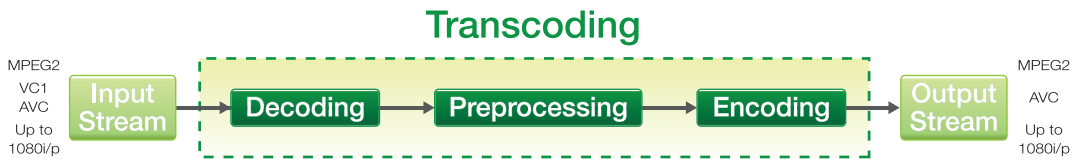


Figure 2. New Hardware Encode function for Transcoding

Enhanced Display

Intel Sandy Bridge contains a dedicated embedded Display Port (eDP) on the CPU which enables newer switchable graphics models. Switchable Graphics is a function that switches display control to the integrated graphics chipset controller for longer battery usage, and switches to discrete graphics control for performance while using external AC power. Using the dedicated eDP port can lower platform average power about 200-300mW, lower BOM cost on connectors, cabling, and filters, and reduce EMI due to data scrambling and embedded clock errors. A wide range of display interfaces like VGA, LVDS, SDVO, HDMI, DVI, DP and eDP are supported, with additional features like dual HDMI/DP with HDCP and independent premium audio.

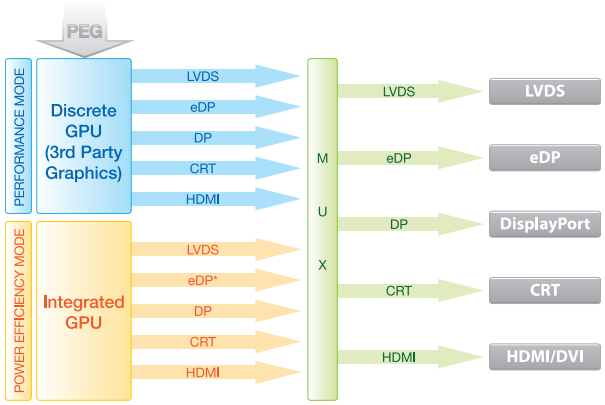


Figure 3. Switchable Graphics

PCI Express Gen2 5 GT/s Support

For functional extension to PCI Express, Sandy Bridge supports PCI Express Gen2 5 GT/s that offers double speed from the previous generation. More integrated controllers (4 for PGA and workstation skus and 3 for others) can support various configurations if customers need to connect to multiple devices which process higher bandwidths.

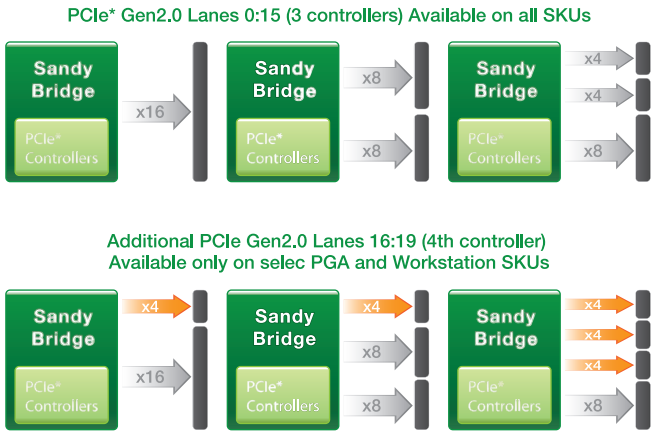


Figure 4. Sandy Bridge PCIe Configure Variations

New Features for Platform Controller Hub

The new Cougar Point Platform Controller Hub (PCH) comes in a smaller package, has less pin count, but still has richer and more advanced features that improve flexibility and data throughput.

SATA Gen3 and Intel RST 10.0 Supported

Cougar Point supports up to six SATA ports, including 2 x Gen 3 ports which double the Gen 2 interface rate up to 6 Gb/s (600MB/s). In addition to these SATA ports, the latest Intel Rapid Storage Technology 10.0 (Intel RST 10.0) provides improved power management capabilities to allow the interface to be powered down during idle periods while providing very fast recovery times.

Integrated Clock Generator

Full clock integration in Cougar Point not only reduces BOM costs since eliminating CK505 and its peripheral components, but also takes advantage of PCB space saving, and enables aggressive power management by the chipset to allow different PLLs and clock dividers to be statically shut down to save power.

Intel AMT 7.0

With backward compatibility to run AMT 6.0 on new platforms, AMT 7.0 improves on host based provisioning and local host configuration. Host based provisioning allows an easy way to activate AMT parameters for clients. Local host configuration introduces a new concept that partitions Intel AMT functions into realms and interfaces and allows management configuration local setting at activated AMT PCs.

Feature	Intel Ibex Peak (Q57/HM55)	Intel Cougar Point (QM67/HM65)
Package Size	25 x 27 mm, 1071 balls	25 x 25 mm, 989 balls
PCI-Express	Gen 2 (2.5GT/s)	Gen 2 (5 GT/s)
SATA	6 SATA 3 Gb/s Ports	2 SATA 6 Gb/s Ports 4 SATA 3 Gb/s Ports
Clocking	CK505	Full Clock Integrated
PCI	4 ports	No PCI supported (External Bridge available)
Manageability	Intel AMT 6.0	Intel AMT 7.0
PAVP	PAVP 1.5	PAVP 2.0

Table 1. I/O Function Comparison from New to Previous

Advantech Solutions

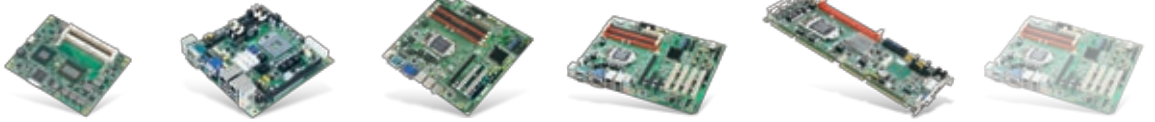
As a premier member of the Intel® Embedded Alliance, Advantech works in parallel developing embedded solutions in various form factors to provide our partners with cutting edge technologies that save development effort while achieving the highest performance.

Based on the Intel Core i7 processor and Intel® QM67 chipset, Advantech is releasing a COM-Express Basic module—SOM-5890 (95 x125 mm), that is compliant with the newly released PICMG COM.0 R2.0 type 6 specification. With extraordinary processor performance, SOM-5890 supports DDR3 memory up to 1333 MB/s with ECC/non-ECC versions, SATA Gen3 (6Gb/s), PCI Express Gen2 (5Gb/s), and integrated HDMI/DVI/DisplayPort display interfaces that use independent pins other than PEG ports. With great performance and rich graphic interface, it is suitable for high processing demands, graphic intensive tasks, and multi-display applications.

Utilizing the Intel Core i7 processor and Intel® Q67 chipset, Advantech developed a new series of embedded platforms in various form factors that include: Industrial Motherboards, PICMG 1.3 SHB, and ATX based server-grade motherboards. Advantech's MicroATX motherboard—AIMB-581 (244 x 244 mm), ATX motherboard—AIMB-781 (304.8 x 244 mm), and the PICMG 1.3 SBC—PCE-5126 (338.58 x 126.39 mm) feature intelligent performance, power efficiency, and integrated Intel HD graphics with DX10.1 support. All of these products provide superb all-round performance, expandability, and versatility for media-demanding applications. ASMB-220 is a sub-entry UP industrial server board targeting industrial control, automation equipment and surveillance DVR applications.

Advantech will also be introducing a new industrial motherboard called AIMB-272, capable of SATA RAID 0, 1, 5 & 10 to ensure reliable storage and system protection for network-intensive applications, which brings top performance with power saving to the Mini-ITX motherboard class. To meet the rising demand for embedded solutions, especially in signage, kiosks, image processing, and gaming applications, Advantech dedicated resources to research, develop, and provide embedded solutions using state-of-the-art technologies that our customers can adopt and apply in a rapidly changing world. Intel Sandy Bridge incorporates all the properties and functions needed for today's embedded applications; it combines excellent computing and graphics performance with maximum I/O flexibility, and helps our customers to keep ahead of a fast changing game.

Coming Soon



Model Name	SOM-5890	AIMB-272	AIMB-581	AIMB-781	PCE-5126	ASMB-781
Form Factor	COM-Express R2.0, Type 6	Mini-ITX	MicroATX	ATX	PICMG 1.3 SHB	ATX
Dimension	95 x 125 mm	170 x 170 mm	244 x 244 mm	304.8 x 244 mm	338.58 x 126.39 mm	304.8 x 244 mm
Processor	Intel Core i7/ i5	Intel Core i7/ i5/i3	Intel Core i7/ i5/i3	Intel Core i7/ i5/i3	Intel Core i7/i5/i3	Intel Core i3
Chipset	QM67	QM67	Q67	Q67/B65	Q67/B65	-
Memory	Dual Channel up to 16GB	Dual Channel up to 8GB	Dual Channel up to 16GB	Dual Channel up to 16GB	Dual Channel up to 8GB	Dual Channel up to 32GB
Special Features	PCI-Express Gen2 (5 GT/s), SATA Gen3 (6Gb/s) HDMI/DVI/DP Interface, Advantech iManager 2.0	PCI-Express Gen2 (5 GT/s), SATA Gen3 (6Gb/s) PECI 3.0, CFast, Intel AMT 7.0, Intel vPro	PCI-Express Gen2 (5 GT/s), SATA Gen3 (6Gb/s) USB 3.0, PECI 3.0, Intel AMT 7.0, Intel vPro	PCI-Express Gen2 (5 GT/s) SATA Gen3 (6Gb/s) Intel AMT 7.0 Intel vPro PECI 3.0 TPM 1.2 (optional)	PCI-Express Gen2 (5 GT/s) SATA Gen3 (6Gb/s) Intel AMT 7.0 Intel PCEI 3.0 TPM 1.2 (optional)	IPMI ECC/Non-ECC DDR3 memory 2 x PCIe x16 expansion slot SATA Gen3 (6Gb/s) Intel AMT 7.0 Intel PCEI 3.0 TPM 1.2 (optional)
Target Marketing	Medical, Gaming, Digital Signage	Medical, Gaming, Digital Signage, Military	Medical, Gaming, Digital Survillance	MA, Medical, Digital Surveillance, DVR	MA, Medical, Digital Surveillance, DVR	MA, Medical, Digital Surveillance

Advantech Intel Sandy Bridge Series-Based Solutions