

Manageability

Power  
Optimized

Integration

Performance

## EMBEDDED INTEL® CORE™ PROCESSOR SOLUTIONS



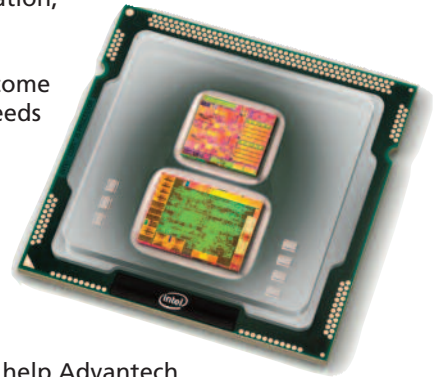
### Advantech Products With New Intel Core Processors

- Based on Intel Core i3, Core i5 and Core i7 processors
- Mobile versions and desktop/performance versions
- Dual or quad core versions available
- Base clocks speeds from 1.06GHz to 3.33GHz
- TurboBoost technology in most processors
- DDR3 memory up to 1,333MHz speed
- Thermal Design Power from 18 to 95 watts
- Integrated graphics in most chips means only two chips instead of three
- Improved graphics with full HD acceleration
- Dual HDMI and DisplayPort support available
- ECC memory support available
- Active Management Technology 6.0 support in most chips

## Piketon and Calpella: The Next Gen of Intel® Core™ Processor Platforms

While Intel's Core 2 Duo and earlier processors remain valuable and reliable workhorses for many applications, a next generation of embedded Intel Core processors provide higher performance, newer technology, better integration, improved efficiency, and smaller package sizes.

The new Intel Core i3, Core i5 and Core i7 processors come in numerous versions with two or four cores, clock speeds ranging from 1.06 to 3.33 GHz, maximum power dissipation of 18 to 95 watts, different process technologies, different degrees of integration and different complementing chipsets. In this document we're explaining the new Intel processors, how they and their chipsets are divided into the "Piketon" (desktop) and "Calpella" (mobile) families, and how they are being used in a variety of new Advantech products that will help Advantech partners bring new solutions to market quickly and efficiently.

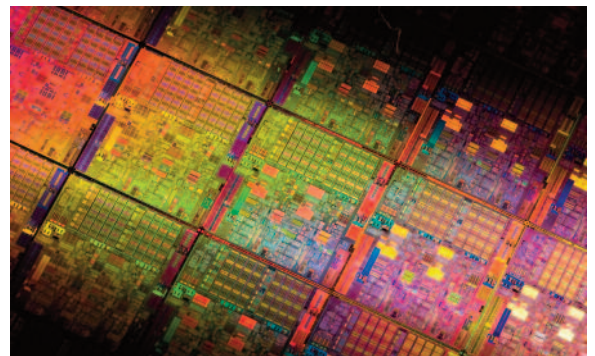


### What Is the Difference Between Core i3, Core i5 and Core i7 Processors?

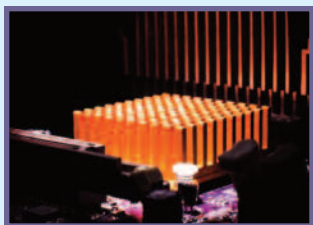
While the difference between Intel's older Core 2 Solo and Core 2 Duo processors was pretty obvious, differentiating between the Core i3, Core i5 and Core i7 chips can be a bit confusing. By and large, they represent Intel's "good," "better," and "best" processor solutions in any given category. Core i3 processors, for example, do not have the clever Intel TurboBoost feature that provides extra performance via automatic overclocking. Core i7 processors generally have more cache and support more special Intel features than Core i5 and Core i3 processors. There is, however, a significant degree of overlap both in functionality and performance, and specific project requirements will drive processor selection much more so than in the past.

As of the publication of this document in January of 2010, there are about three dozen new Core processors. Making things easier is that only about a dozen of them have been designated as embedded processors. These were especially chosen for their suitability for embedded applications (packaging, structural integrity, small package size, error correcting code memory, system uptime, etc.) and differentiated by the 7-year extended life cycle product support needed for most embedded projects.

Note, though, that Intel does distinguish between desktop-oriented "Piketon" platforms that use either two core 32nm "Clarkdale" processors or four core 45nm "Lynnfield" processors, and mobile "Calpella" platforms that use two core 32nm "Arrandale" processors with lower thermal design powers.



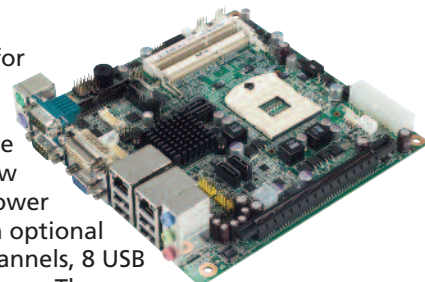
## EMBEDDED INTEL® CORE™ PROCESSOR SOLUTIONS



## "Calpella" Low Power Solutions

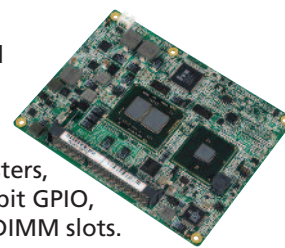
### AIMB-270 Mini-ITX

The Mini ITX AIMB-270 industrial motherboard is designed for embedded projects that have power saving requirements but still need the performance of the new Intel Core processors. Available with standard voltage Intel mobile Core i5 or Core i7 processors with integrated graphics and the new QM57 chipset, these systems have modest thermal design power (35 watts), offer dual display capability (DVI/LVDS/VGA) with optional second DVI, a PCIe x16 and a mini-PCIe slot, 4 SATA II 300 channels, 8 USB 2.0, 6 RS-232, dual gigabit Ethernet, Watchdog Timer, and more. They are perfect for use in the ARK-6610/6620/6622 chassis.



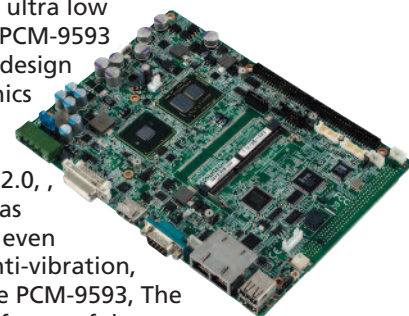
### SOM-5788

The SOM-5788 is a COM Express CPU module that can be configured with a wide variety of standard voltage, low voltage, and ultra low voltage mobile Core i5 or Core i7 processors with integrated graphics and the Mobile Intel QM57 chipset. Despite their small size (3.74 x 4.92 inches), the SOM-5788 supports six PCIe x1, four PCI masters, four 300 MB/s SATA II channels, PATA (UMDA 100), eight USB 2.0, 8-bit GPIO, HD audio, Watchdog Timer and up to 8GB of DDR3 RAM in two SODIMM slots.



### PCM-9593

For embedded applications that require a low voltage or ultra low voltage 5.25-inch single board computer, the Advantech PCM-9593 offers advanced Intel Core i7 solutions with low thermal design powers of just 18-25 watts. The SBC has integrated graphics and supports a variety of HDMI, DVI, LVDS and VGA display devices. The system comes with dual mini-PCIe expansion slots, three 300 MB/s SATA II channels, six USB 2.0, , SIR, I2C, HD audio, 16-bit GPIO, Watchdog Timer, as well as extensive legacy support (four RS-232, parallel, PS/2, and even optional IrDA). Wide-range power input (9V~32V DC), anti-vibration, anti-shock design, and wide temperature range make the PCM-9593, The PCM-9593 is available on a project basis only, the heart of powerful, economical embedded solutions.



These new boards and modules offer comprehensive Advantech Software API support with Watchdog Timers, GPIO, SMBUS, and hardware monitor support, and IC2 and brightness control in the PCM-9593 and SOM-5788. The systems also support Advantech eSOS, Flash Lock, Embedded Security ID and BIOS Flash.



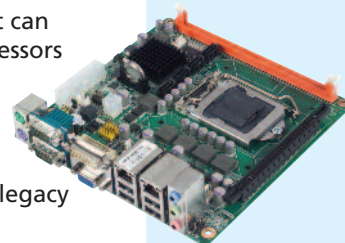
## Embedded 2010 Intel® Core™ Processors

Platform	CPU code	Processor	Cores	Threads	nm	TDP	Voltage	Cache	Base Speed	Max speed	Max speed	I/G Turbo Boost	Hyper Threading	ECC Support	Max Mem Speed Mhz	Max Mem Size	AMT6	Chipset
Piketon	Lynnfield	i5-750	4	4	45	95	S	8MB	2.66GHz	3.20GHz	NA	yes	no	no	1333	16GB	no	Q57
Piketon	Lynnfield	i7-860	4	8	45	95	S	8MB	2.80GHz	3.46GHz	NA	yes	yes	no	1333	16GB	yes	Q57
Piketon	Clarkdale	i3-540	2	4	32	73	S	4MB	3.06GHz	3.06GHz	733MHz	no	yes	no	1333	16GB	no	Q57
Piketon	Clarkdale	i5-660	2	4	32	73	S	4MB	3.33GHz	3.60GHz	733MHz	yes	yes	no	1333	16GB	yes	Q57
Calpella	Arrandale	i5-520M	2	4	32	35	S	3MB	2.40GHz	2.93GHz	766MHz	yes	yes	no	1066	8GB	yes	QM57
Calpella	Arrandale	i5-520E	2	4	32	35	S	3MB	2.40GHz	2.93GHz	766MHz	yes	yes	yes	1066	8GB	yes	QM57
Calpella	Arrandale	i7-620M	2	4	32	35	S	4MB	2.66GHz	3.33GHz	766MHz	yes	yes	no	1066	8GB	yes	QM57
Calpella	Arrandale	i7-610E	2	4	32	35	S	4MB	2.53GHz	3.20GHz	766MHz	yes	yes	yes	1066	7GB	yes	QM57
Calpella	Arrandale	i7-620LE	2	4	32	25	LV	4MB	2.00GHz	2.80GHz	566MHz	yes	yes	yes	1066	8GB	yes	QM57
Calpella	Arrandale	i7-620UE	2	4	32	18	ULV	4MB	1.06GHz	2.13GHz	500MHz	yes	yes	yes	800	8GB	yes	QM57

### “Piketon” Scalable/Performance Solutions

#### AIMB-280 Mini-ITX

The Advantech AIMB-280 is a Mini ITX (6.7 x 6.7 inches) industrial motherboard that can accommodate a variety of high-performance Intel Core i3, Core i5, and Core i7 processors as well as older Pentium technology, making available single, dual or quad core processing. The AIMB-280 supports up to 4GB of DDR3 RAM with speeds of 800, 1066 or 1333MHz in a single U-DIMM slot. The board supports dual displays (DVI and VGA), has dual Gigabit Ethernet and there is a PCIe x16 (Gen 2) expansion slot and a Watchdog Timer. A total of four SATA 300 channels, eight USB 2.0 ports, two legacy serial ports as well as legacy PS/2 ports provide excellent connectivity.



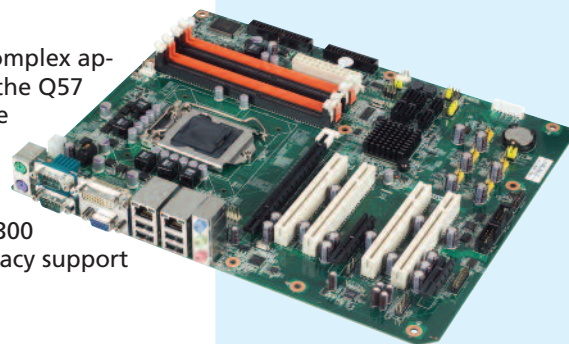
#### AIMB-580 MicroATX

The AIMB-580 MicroATX (9.6 x 9.6 inches) industrial motherboard is available with a variety of powerful single, dual or quad core Intel Core i3, Core i5, Core i7 and Pentium processors. Four standard DIMM sockets accommodate up to 16GB of DDR3 RAM with speeds of up to 1333MHz and reaching up to 21GB/s memory dual-channel bandwidth. The board supports dual displays (DVI and VGA), dual Gigabit Ethernet and provides a total of four expansion slots (2 PCI, 1 PCIe x4, and 1 PCIe x16 Gen 2). A total of 6 SATA 300, software RAID support, 10 USB 2.0 ports, HD audio, AMT 6.0, optional TPM 1.2 as well as extensive legacy support (floppy, parallel, serial, PS/2) make the AIMB-580 board a perfect choice for projects such as video surveillance systems and other high-end industrial applications.



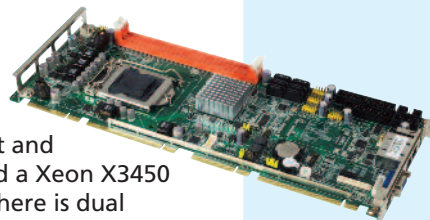
#### AIMB-780 ATX

The AIMB-780 is a full-size ATX (12 x 9.6 inches) industrial motherboard for complex applications that require maximum expansion capabilities. It comes with either the Q57 Express chipset and Piketon-class Intel Core i3/Core i5/Core i7 processors or the 3450 chipset and a Xeon X3450 processor. There are four full DIMM slots for up to 16GB of 800/1066/1333MHz DDR3 memory, dual display support (DVI and VGA), dual Gigabit Ethernet, software RAID support, and a total of seven expansion slots (4 PCI, 1 PCIe x1, 1 PCIe x4, and 1 PCIe x16). There are 6 SATA 300 channels, 14 USB 2.0, HD audio, AMT 6.0, optional TPM 1.2, and extensive legacy support (floppy, parallel, serial, PS/2).



#### PCE-5125 System Host Board

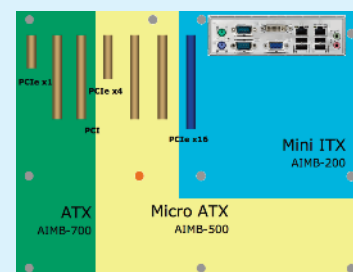
The PCE-5125 is a high-performance system host board that's perfect for server-grade solutions (via the Advantech PCE-7000 series backplanes) or graphics-oriented systems (via the PCE-5000 series backplanes). Depending on the requirements, the PCE-5125 SHB comes with the Q57 Express chipset and Piketon-class Intel Core i3/Core i5/Core i7 processors or the 3450 chipset and a Xeon X3450 processor. It supports up to 8GB of DDR3 memory in two full DIMM slots. There is dual display (DVI and VGA) support, six SATA 300 channels, 9 USB 2.0, as well as extensive legacy interface support.



These new boards and modules also support Advantech Software API technology (Watchdog Timers, hardware monitor support, s GPIO, SMBUS support for some boards) and eSOS, Flash Lock, Embedded Security ID and BIOS Flash utilities.



#### Board Standards: Relative Size





## EMBEDDED INTEL® CORE™ PROCESSOR SOLUTIONS

### The Intel Q57 and QM57 Chipsets

The Intel Q57 and Mobile Intel QM57 Express chipsets are used with the "Piketon" and "Calpella" platforms, respectively. The QM57, when combined with one of the "Arrandale" low power CPUs, provides very good graphics, memory and I/O performance as well as remote management capabilities. The combination is aimed at mobile embedded applications, retail and transaction solutions, gaming and industrial automation. The Intel Q57 Express chipset, when combined with one of the powerful Clarkdale or Lynnfield CPU, provides security and always-available manageability for high-performance systems in industrial control and automation, retail, gaming, imaging, digital signage, etc. Intel Rapid Recovery Technology allows booting off a clone to quickly get systems back online. Active Management Technology 6.0 provides advanced IT management. Both chipsets support Intel vPro technology (remote management, flexible virtualization and enhanced security capabilities) and fast dual-channel DDR3 memory. Both support six eSATA ports; 14 USB ports; eight PCIe Express I/O ports, 4 PCI Bus masters, three total digital display interface ports, one VGA and LVDS, Intel HD audio, etc.

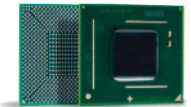
#### For more information:

www.advantech.com  
ECGInfo@advantech.com  
1-800-866-6008

## Low Power and Performance Platforms

### 2010 Low Power Platform

The "Arrandale" CPUs offered in Advantech's "Calpella"-class products include a variety of Intel's new Core i3, Core i5, and Core i7 processors. These processors, which use 32nm lithography, are essentially successors of the Core 2 Duo CPUs and come in standard, low voltage, and ultra low voltage versions at various processor clock speeds. Arrandale processors are fully software compatible with older IA-32 systems.



What's different? A lot. As a first in this class of Intel CPUs, the memory controller and fairly powerful integrated graphics with HD hardware acceleration are now part of the processor, eliminating the need for a conventional Front Side Bus and thus the "Northbridge" part of the chipset. These processors are capable of driving multi monitors in any combination of Display Port, HDMI, DVI and VGA, and even offer dual simultaneous HDMI support. If integrated graphics are not needed, they can be turned off via BIOS. Arrandale supports two audio streams instead of just one and adds Dolby TrueHD and DTS-HD audio support.

Arrandale processors have two cores just like the Core 2 Duos, but the new chips use Intel's HyperThreading technology that enables virtual cores. As far as the OS is concerned, it is then dealing with a four core processor. In addition, while the Core 2 Duo chips only had L1 and L2 cache, the new chips also have 3 or 4MB of shared L3 cache, providing further performance enhancements. DDR3 RAM supports speeds up to 1,333MHz, and "TurboBoost" automatically allows processor cores to run faster (in 133MHz steps) than the base clock frequency if the CPU is operating below power, current, and temperature specification limits. In essence, if the system detects non or underutilized cores/parts of the processor it boosts clock speed so that the busy parts run faster without exceeding overall temperature and voltage limits.

The new embedded Intel Core processors range from ultra low voltage models with a base clock frequency of 1.06GHz and a Thermal Design Power of 18 watts to low voltage models with base clock frequency up to 2.0 GHz and TDPs of 25 watts, and standard voltage models with base clock frequencies as high as 2.66GHz and 35 watt TDP.

### 2010 Scalable/Performance Platform

The CPUs offered in Advantech's "Piketon"-class products also include a variety of Intel's new Core i3, Core i5, and Core i7 processors. However, unlike the "Arrandale" versions of those new Core processors, "Piketon" systems use standard voltage, higher-powered versions of the chips that include 45nm technology "Lynnfield" versions of the chips (4 cores, no integrated graphics) as well as newer 32nm "Clarkdale" versions (2 cores, integrated graphics). These are performance-oriented processors with TDP ratings of 73 to 95 watts.

In terms of performance, initial benchmarks of all new Core processors show a 30-60% performance increase over equivalent Core 2 Duo processors at roughly the same TDP levels. Performance of the integrated graphics processor is about 1.5 times that of the predecessor GM45 platform, with better 3D performance, HD hardware acceleration, post processing, audio and other improvements.