Axiomtek 6th Generation Intel® Core (Skylake) Embedded Board & SoM White Paper

Axiomtek introduces new embedded boards featuring 6th generation Intel® Core™ processor (Skylake) and latest Intel® Xeon® processors

Intel® has officially announced the full product SKU line-up for its 6th generation Intel® Core™ processor family, which is built on Intel's newest wave of 14nm processors and delivers enhanced performance and new immersive experiences at the lowest power levels ever. These processors also support the broadest range device designs – from the ultra-mobile compute sticks, to 2-in-1s and huge high-definition all-in-one desktops, to new mobile workstations.

6th Generation Intel® Core™ Processor Family and Intel® Xeon® Processors for Mobile Workstations – Intel's Best Processors Ever

The 6th Generation Intel® Core™ processor family and Intel® Xeon® processors for mobile workstations are Intel's newest wave of 14nm processors. Along with the Intel® 100 series and Intel® CM236 chipsets, they deliver a leap in performance and power efficiency, providing stunning visuals, and enabling amazing user experiences when paired with Windows® 10. These are Intel's best processors ever, setting a new standard of computing with 2.5x better productivity performance, 3x longer battery life, and 30x better 3D graphics performance when compared to a 5-year-old notebook PC. The 6th generation Intel® Core™ processor family (codename: Skylake) is Intel's most scalable processor family ever, enabling a diverse range of form factors to meet every lifestyle and work style.

The Skylake architecture, being used in 6th generation Intel® Core™ and Intel® Xeon® processors, delivers high processor and graphics performance, high-resolution video playback, and seamless responsiveness for fanless systems with low power usage while retaining the capability to scale up to the most powerful mobile workstations and desktop systems. The result is immersive experiences with up to 40% better graphics performance (versus the previous generation graphics) and a power-sipping 4K video playback capability. The Intel® Skylake architecture makes it possible to realize a stunning improvement in energy efficiency–up to 60% for some SKUs–while enabling higher levels of performance.

6th Generation Intel® Core™ Processors Based on the Mobile U-Processor for IoT Solutions

6th generation Intel® Core™ processor family featuring ultra low-power, 64-bit, multi-core processors built on the latest 14 nm technology. Designed for small form-factor applications, this multichip package (MCP) integrates a low-power CPU and platform controller hub (PCH) onto a common package substrate. The 6th generation Intel® Core™ processor family offers a dramatically higher CPU with improved graphics performance, a broad range of power and features scaling the entire Intel® product line, and new advanced features that boost edge-to-cloud Internet of Things (IoT) designs in a wide variety of markets. These processors run at 15W thermal design power (TDP) and are ideal for

small, energy-efficient, form-factor designs, including digital signage, point-of-sale terminals, and medical tablets.

Key Benefits of The 6th Generation Intel® Core^{TM} Processor Family Include:

- **Stunning Visual Performance**

  New Intel® 500 Series graphics deliver up to 40% better graphics performance and 20% faster 4K transcode plus dedicated hardware support for 4K playback enables a great 4K experience at a fraction of the power of previous generation systems. Processor resources are also freed up so users can interact with the system more smoothly. 6th generation Intel® Core^{TM} processors support enhanced game playability including DirectX 12 games that will run fast on PCs with long battery life and that run efficiently in terms of low processor utilization.

- **Power-Efficient Performance**

  The new 6th generation Intel® Core^{TM} processors make a powerful difference on the efficiency front as well. Intel® continues to drive battery life improvements and the 6th generation Intel® Core^{TM} processor family and Intel® Xeon® processors continue to deliver power efficiency savings. For example, Intel® tests show up to 60% lower power consumption for the high-performance 6th generation Intel® Core^{TM} H-series processors (45W) and the benefit is more performance without sacrificing battery life.

- **Advanced Security and Manageability**

  The new 6th generation Intel® Core^{TM} processors protect IoT systems and data at rest and in flight through hardware and software-based security hardening. Keep increasingly connected devices more secure and enhance the firmware trusted platform module (TPM) with Intel® Platform Trust Technology (Intel® PTT), Intel® Software Guard Extensions (Intel® SGX) to protect data while in use, Intel® Memory Protection Extensions (Intel® MPX) to protect memory from buffer overload attacks, and Intel® Boot Guard to securely boot machines. Intel® vPro™ technology8 allows you to remotely configure, diagnose, isolate, and repair an infected PC—even if it is turned off. In addition to helping secure the IT environment, hardware-based KVM Remote Control enables you to address issues remotely by seeing what users see.

Intel® Has Partnered with Microsoft for The Best Windows® 10 Experiences:

Intel® has partnered with Microsoft to optimize Windows® 10 experiences on 6th Generation Intel® Core-powered systems and devices. Intel's platform innovations together with Windows® 10 create new experiences that help people have more secure PCs while removing the hassle of remembering and typing passwords, managing their lives without ever having to touch a keyboard and mouse, enjoy stunning 4K video content, and enable new levels of performance.

Axiomtek Unveils New Embedded Boards with 6th Generation Intel® Core™ Processor Family

Axiomtek is pleased to announce the latest new product families equipped with 6th generation Intel® Core™ processors. These products include COM Express modules CEM500 and CEM501, pico-ITX motherboard PICO500; 3.5" CAPA embedded board CAPA500, mini-ITX motherboard MANO500, ATX industrial motherboard IMB500 and PICMG 1.3 Full size CPU card SHB140.

The CEM500 features Intel® Xeon® and 6th generation Intel® Core™ i7/i5/i3 processors (H-series) which has memory support up to 32 GB of DDR4-2133, ECC/non-ECC memory and also support for the 4K resolution standards. With outstanding computing performance, low power consumption, wide temperature range, and seismic design, the rugged basic-size SoM (system on module) drives Internet of Things innovation and is ideal for graphics-intensive and rich I/O applications such as telecommunication, medical imaging, digital signage, gaming, military, and networking.

CEM500 – COM Express Type 6 Basic Module

- Intel® QM/HM170 or CM236 chipset
- Supports two DDR4-2133 SO-DIMMs max up to 32GB
- Supports max. up to 24 lanes of PCIe Gen.3.0
- Supports four USB 3.0 and eight USB 2.0
- Supports four SATA III

CEM500

CEM501 equips with 6th generation Intel® Core™ i7/i5/i3 processor (U-series) with configurable 15W TDP. Its memory support is up to 32 GB of DDR4-2133 and provides advanced processing and high graphics performance combined with cool and efficient operation. The rugged and powerful CEM501 is an ideal solution for telecommunications, medical imaging, transportation, Internet of Things-related applications, automated optical inspection (AOI), digital signage, gaming machines, military, and networking.

CEM501 – COM Express Type 6 Compact Module

- Based on Intel® Gen 9 LP graphic core architecture
- Two DDR4-2133 SO-DIMMs max up to 32GB
- Supports max. up to six lanes of PCIe Gen3.0
- Supports four USB 3.0 and eight USB 2.0 ports
- Supports three SATA III

PICO500, an extreme compact pico-ITX motherboard, supports the latest 14nm 6th generation Intel® Core™ i7/i5/i3 and Celeron® processors (codename: Skylake-U). The tiny PICO500 is equipped with one DDR4 SO-DIMM with up to 16GB memory capacity. Integrated with Intel® HD graphic engine, the Pico-ITX motherboard supports HDMI and 18/24-bit dual channel LVDS that delivers a whole new level of Ultra HD 4K visual experiences.

PICO500 – Pico-ITX Compact Motherboard

- Pico-ITX small form factor with rich I/O and advanced features
- One DDR4 SO-DIMM supports up to 16GB memory capacity
- One USB 2.0 port and one Gigabit LAN port
- One Full-size Mini PCI Express Card with mSATA supported
- Wide range temperature support from -20°C to +70°C (-4°F to +158°F) with active thermal solution
- Intel® AMT 11 supported (Intel® Active Management Technology)

PICO500

MANO500 is based on the new 14nm 6th generation Intel® Core™ i7/i5/i3 and Pentium® processors in the LGA1151 package. It features the new Intel® H110 express chipset with DDR4 2133MHz memory support. Its three SATA 6G ports, four USB 3.0 ports, and two RS-232/422/485 ports provide robust storage and I/O options. Users also can increase board functionality with PCIe x16 slot and PCI Express Mini Card slot. The high quality MANO500 allows the connection of up to four display interfaces via HDMI, VGA, DisplayPort, and LVDS/ Embedded DisplayPort (eDP), making it an ideal solution for gaming, workstation, digital signage, medical and other IoT and M2M applications.

MANO500 - Mini-ITX motherboard

- Two DDR4-2133 MHz max up to 16GB
- PCIe x16 Gen 2 support
- One mSATA and SIM card slots supported
- Three SATA-600 and one mSATA interfaces
- Four USB 3.0 ports and six USB 2.0 ports
- Two Gigabit Ethernet ports
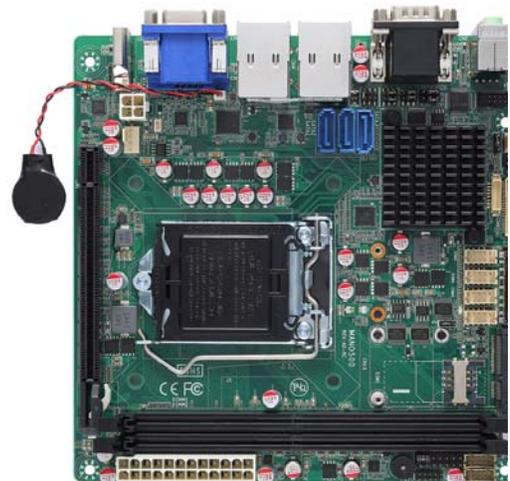
MANO500

The **SHB140** PICMG 1.3 single board computer is based on the 14nm 6th Generation Intel® Core™ i7/i5/i3 processors in the LGA1151 package with Intel® Q170 Express chipset (codename: Skylake). The high performance SHB-based CPU card comes with two DDR4-2133 MHz up to 16GB and six SATA-600 ports with RAID 0/1/10/5. Combined high-bandwidth PCI Express for frame grabbing and conventional PCI expansion for motion capture, the SHB140 is an optimum solution for machine vision and automation applications. This high performance PICMG 1.3 slot CPU card also features an integrated Intel® AMT 11 and TPM 1.2 for higher security and easier maintenance.

SHB140 – PICMG 1.3 Full size CPU card

- Intel® Q170 chipset
- Two DDR4 un-buffered DIMM supports max up to 16GB memory
- Intel® AMT 11 and TPM (optional) supported
- PCIe Gen 3 at 8GT/s supported
- Two USB 3.0 ports, SATA3 supported

SHB140

Technical Support by Axiomtek

The Axiomtek design guide for COM Express® carrier boards serves as a general guide for carrier board designs. The design guide focuses on maximum flexibility to accommodate a range of COM Express® Modules. The Axiomtek COM Express® design guide explores the requirements of the COM Express® specification and provides recommendations on how to design COM Express® Baseboards to support features of Axiomtek COM Express® Modules.

The carrier board design guide provides schematic examples and information on standard I/O interfaces, connections, and routing. The guide also offers ideas to maximize the design potential of COM Express® carrier boards to accommodate all Axiomtek COM Express® Modules.

The COM Express® Module user guide documents provide specifications and features for an individual COM Express® Module. You can find all user manuals, design guides, mechanical drawings and other technical documents for COM Express® Modules on the Axiomtek Technical Portal (ATP) Website.

Axiomtek's ATP website: http://atp.axiomtek.com.tw/atp/.
Axiomtek's global website: www.axiomtek.com.

About Axiomtek

Axiomtek Co. Ltd. is one of the world's leading designers/manufacturers of PC-based industrial computer products. From our roots as a turnkey systems integrator specializing in data acquisition and control systems, Axiomtek has mirrored the PC evolution in various industries by shifting our focus toward the design and manufacture of PC-based industrial automation solutions.

Axiomtek Co., Ltd. established in 1990, has more than 60 distributor partners globally. Axiomtek offers Industrial PCs (IPC), Single Board Computers and System on Modules (slot CPU card, small form factor embedded boards & SoM), Fanless & Rugged Embedded System (eBOX, tBOX and rBOX), Industrial Firewall Platform, Industrial IoT Gateway Solution, EtherCAT Master Controller, Touch Panel Computers (TPC), Medical PCs (MPC), Human Machine Interface (HMI), Digital Signage and Players (DS), Industrial Network and Network Appliances (NA).

As an associate member of the Intel® Internet of Things Solutions Alliance, Axiomtek continuously develops and delivers cutting edge solutions based on the latest Intel® platforms.