# COM Express

**ADLINK**
**We Know COM Express**

## Focus on your Core Competency

A Computer-On-Module (COM) provides a convenient solution for OEMs that need computing functionality but are not interested in investing the time and resources into designing a single board computer. There are several COM standards, one of the more popular being COM Express (also referred to as COM.0). COM Express modules contain the CPU, memory, common peripherals (USB, SATA) and an I/O interface (PCI and PCI Express). OEMs that use COM Express modules design a carrier board that contains any required I/O interfaces not found on the COM Express module as well as connectors for external I/O. A COM based solution allows an OEM to focus on their core competency and not the design and maintenance of a single board computer.

A COM Express based solution with a custom carrier board offers several advantages:

- The carrier can contain more rugged types of connectors for external I/O. It is not limited to traditional connectors such as USB, Ethernet, and video.
- The carrier can contain value added silicon such as FPGAs or other types of peripherals. Placing these devices on the carrier eliminates the need for traditional PCI Express or PCI expansion cards and the mechanics associated with them.
- The CPU function is decoupled from the I/O so that different processors can be used for different applications, ranging from low power and cost Atom™ based compute modules to Core™ i7 or other high performance multicore processor modules.
- The design and maintenance of the compute module no longer becomes a task for the OEM.
- The use of industry standard modules brings with it availability from multiple vendors which provides alternative solutions.

## The COM Express Standard – Adaptable to Your Specific Needs

COM Express was developed and is maintained by PICMG (PCI Industrial Computer Manufacturers Group). COM Express was released in the summer of 2005 and is the most widely used COM standard. The standard defines the physical size, interconnect, and thermal interface for a COM. The original COM Express specification was written to support peripherals that were available at the time of release – including USB 2.0, SATA, PATA, Ethernet, VGA, LVDS, SDVO, PCI, and PCI Express Gen 1. Several pinout types were defined by PICMG with each one having a specific combination of peripherals, expansion interfaces and connector layout. The most widely used COM Express module is a type 2, followed by type 1. The table on the following page shows the features for modules defined in revision 1 of the COM Express specification.

## COM.0 Rev. 2.0 – Future Proof

In 2009, PICMG formed a subcommittee to update the COM Express specification based on the changes in peripherals used in modern systems. This included support for Super Speed USB 3.0, PCI Express Gen 2 signaling, as well as additional video interfaces such as DVI, HDMI and DisplayPort. The spec update created two new types to support the I/O changes: type 6 and 10. Backwards compatibility with existing type 2 and 1 modules was a main objective of the specification update.

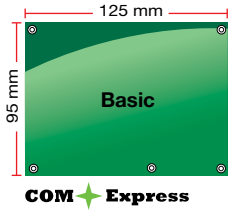
### COM Express pinout types and supported features

| Types | PCI Express Lanes | PEG/ SDVO | PCI | IDE Ports | SATA Ports | LAN Ports | USB 2.0 / USB 3.0 | Display Interfaces |
|---|---|---|---|---|---|---|---|---|
| Type 1 AB connector | Up to 6 | – | – | – | 4 | 1 | 8 / 0 | VGA, LVDS |
| Type 2 AB/CD connectors | Up to 22 | 1/2 | 32-bit | 1 | 4 | 1 | 8 / 0 | VGA, LVDS, PEG/SDVO |
| Type 3 AB/CD connectors | Up to 22 | 1/2 | 32-bit | – | 4 | 3 | 8 / 0 | VGA, LVDS, PEG/SDVO |
| Type 6 AB/CD connectors | Up to 24 | 1/NA | – | – | 4 | 1 | 8 / 4 | VGA, LVDS,PEG, 3x DDI |
| Type 10 AB connector | Up to 4 | –/1 | – | – | 2 | 1 | 8 / 0 | 1x DDI |

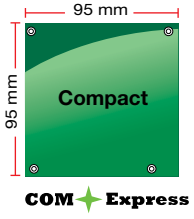
☐ Rev. 1 Pinouts ■ Rev. 2 Pinouts

## The Right Size for the Right Job

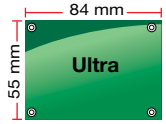
The COM Express specification also defines three module sizes: the Compact Module, Basic Module and the Extended Module. A fourth "Ultra" size module supporting only type 1 and type 10 pinouts has been presented to PICMG for inclusion in a future release of the specification.




**Basic** **125 x 95**
Type 2/6 compatible pinout




**Compact** **95 x 95**
Type 2/6 compatible pinout




**Ultra** **84 x 55**
Type 1/10 compatible pinout

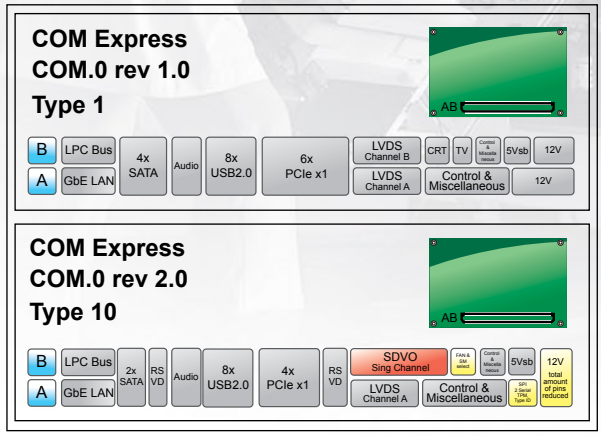
## ADLINK – We Know COM Express

Although many companies develop COM Express modules, most are not actively involved in the development of the COM Express specification. In contrast, ADLINK has heavily invested in the development and maintenance of the PICMG COM Express specification over the years. ADLINK recently chaired the PICMG subcommittee that was tasked with defining the specification update known as COM Express COM.0 Revision 2.0. As a leading participant in the creation of the specification, ADLINK is in a unique position to influence its direction. By doing so, ADLINK has a deep understanding of the meaning and intention of the specification and applies this knowledge in the design of our COM Express products.

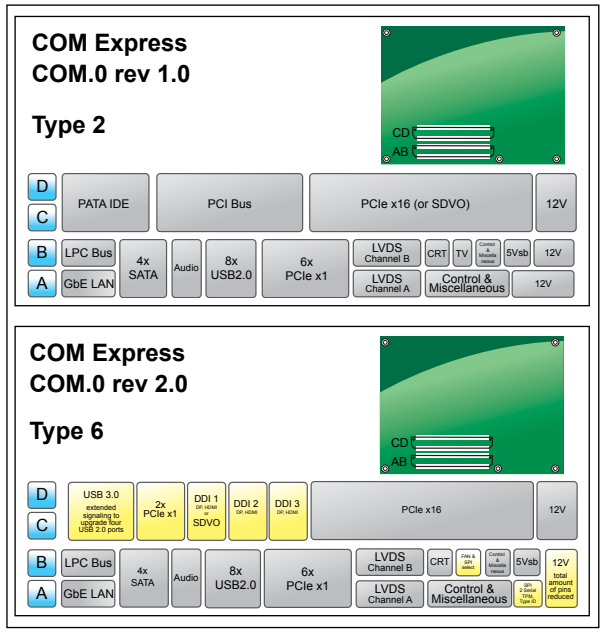
## New with COM.0 Rev. 2.0 – Type 6 and Type 10 Pinouts

The release of COM Express™ COM.0 Revision 2.0 brings Computer-on-Modules in line with current and future technology trends by providing for the latest graphics interfaces (DisplayPort/DVI/HDMI), PCI Express Gen 2, and SuperSpeed USB 3.0. The new Type 6 pinout is based on the popular Type 2 pinout, but with legacy functions replaced by Digital Display Interfaces (DDI), additional PCI Express lanes, and reserved pins for future technologies. The new Type 10 pinout is based on the Type 1 pinout with only the A-B connector that is used in the "Ultra" form factor. The Type 10 pinout provides additional flexibility for developers by freeing up pins reserved for SATA and PCIe for future technologies and using the second LVDS channel, VGA and TV-out pins to support SDVO (via DDI). Both of the new Type 6 and Type 10 pinouts support the SPI Interface, which was unavailable in COM.0 Rev. 1.0.

### COM Express Type 1 vs. Type 10 comparison




### COM Express Type 2 vs. Type 6 comparison



# COM Applications


# Embedded from A to Z

## The Economics of Modularity

Reusability is key to protection of your investment. Computer-On-Module offer it all, from reusable design, scalability and fast time to the market to a lower total cost of ownership.

## Green because we care

We provide lead-free designs not only to satisfy future regulatory standards but also to reflect our real concern about the environment – an environment that has to be shared by all of us. Proof of ADLINK's commitment is with ISO-14001 certification. ISO-14001, the international environmental management standard is a voluntary initiative aimed at improving company environmental performance.

## Expertise for Carrier Board Design Support

With product divisions that are front runners in fields such as: Data Acquisition, Test and Measurement, AdvancedTCA, CompactPCI and Video Surveillance, ADLINK can offer you a broad portfolio of technical knowledge to assist you in your application specific carrier board projects.

## Firmware Support (BIOS)

Adding active components to the carrier boards usually requires a BIOS modification. We offer a whole team of BIOS engineers who can extend and tune the firmware on our boards to let them behave exactly the way you want. We use the AMIBIOS8® provides us with excellent embedded functions such as: custom logo, OEM CMOS defaults, flat panel control, serial port console redirection, CMOS backup and trusted core support.

## Drivers and BSP

All modules come standard with BSP's for Windows CE, Windows XP Embedded, Linux, and VxWorks. Support for additional components on your application specific carrier board under the above operating systems can be developed on request.

## Longevity is Designed in

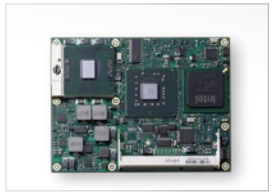
ADLINK's COM modules represent an optimized Total Cost of Ownership. They have longevity designed in by only using components from the embedded roadmaps of strategic suppliers that are backed by value-added technical services such as life cycle management, revision control and end-of-life (EOL) support.

## Manufacturing and Quality

ADLINK has its own SMT production line that supports the production of leadfree products. ADLINK has been ISO-9001 certified since Many 1999. ADLINK also adheres to 6 Sigma, a set of statistics and methods for improving everything a company does, from designing, manufacturing to service. By applying the rigorous practices of 6 Sigma, we've been approved by industry-leading partners, and achieved breakthroughs in quality performance to deliver better services to our customers.

# Selection Guide

## COM Express™

| | Basic (125 x 95 mm) | | | |
|---|---|---|---|---|
| | Type 6 | | Type 2 | |
| |  |  |  |  |
| | Express-HR | Express-CB/CBE | Express-MV | Express-MG |
| **CPU Type** | Intel® Core™ i7/i5 (Sandy Bridge) up 2.53 GHz with 6 MB L3 cache | Intel® Core™ i7/i5/i3 (Arrandale) up 2.53 GHz with 4 MB L2 cache | Intel® Core™2 Duo (Penryn) up 2.26 GHz with 6 MB L2 cache | Intel® Core™2 Duo (Penryn) up 2.53 GHz with 6 MB L2 cache |
| CPU Package | BGA1288 | BGA1288 | BGA956 | PGA478 |
| CPU Models / Speeds | Core™ i7 (quad core): i7-2715QE; Core™ i7 (dual core): i7-2655LE, i7-2610UE, i5-2515E | Core™ i3/i5/i7 (Arrandale) i7-610E 620LE 620UE i5-520E i3-330E Celeron® M P4505 | Celeron® M 722, 723 Core™2 Duo (Penryn) SP9300, SL9400, SL9380, SU9300 | Celeron® M 575, T3100 (dual core) Core™2 Duo (Penryn) T9400, P8400 |
| FSB Speed | 1333/1066 | 1066/800 | 1066/800 | 1066/800 |
| **Main Chipset** | Intel® PCH QM67 | Intel® PCH QM57 | Intel® GS45 with ICH9M (SFF) | Intel® GM45 with ICH9M |
| **System Memory** | 16 GB (max), dual channel | 8 GB (max), dual channel | 8 GB (max), dual channel | 8 GB (max), dual channel |
| Memory Type | DDR3 non ECC at 1333 | DDR3 non ECC (CB) or ECC (CBE) | DDR3 at 1066/800/667 | DDR3 at 1066/800/667 |
| Soldered Memory | - | - | - | - |
| Socket Memory | Max 16 GB on two 200-pin SODIMM | Max 8 GB on two 200-pin SODIMM | Max 8 GB on two 200-pin SODIMM | Max 8 GB on two 200-pin SODIMM |
| **Cache (L2)** | L2 depends on processor type 3MB, 4MB or 6MB | L2 depends on processor type 2MB, 3MB or 4MB | L2 depends on processor type 1MB, 3MB or 6MB | L2 depends on processor type 1MB, 3MB or 6MB |
| **BIOS Type** | AMI EFI, American Megatrend | AMI EFI, American Megatrend | AMIBIOS®8, American Megatrend | AMIBIOS®8, American Megatrend |
| BIOS Features | Serial Console redirection EEPROM CMOS backup, USB boot/legacy, PXE support | Serial Console redirection EEPROM CMOS backup, USB boot/legacy, PXE support | Serial Console redirection EEPROM CMOS backup, USB boot/legacy, PXE support | Serial Console redirection EEPROM CMOS backup, USB boot/legacy, PXE support |
| BIOS Flash | 8 Mbit Flash SPI | 8 Mbit Flash SPI | 8 Mbit Flash SPI | 8 Mbit Flash SPI |
| **Graphics Controller** | HD Graphics 3000 | GMA HD with 12 execution units | Intel® GMA X4500 at 533/320 MHz | Intel® GMA X4500 at 533 MHz |
| Graphics Memory | Max 829 MB UMA | Max 829 MB UMA | Max 829 MB UMA | Max 829 MB UMA |
| Integrated Display Support | CRT (QXGA) single/dual 18/24-bit LVDS (UXGA) 3 DDI ports for HDMI/DVI/DP & SDVO | CRT (QXGA) single/dual 18/24-bit LVDS (UXGA) | CRT (QXGA) single/dual 18/24-bit LVDS (UXGA) TV-out (PAL/NTSC/HDTV) | CRT (QXGA) single/dual 18/24-bit LVDS (UXGA) TV-out (PAL/NTSC/HDTV) |
| External Graphics Bus | PCIe x16 Graphics port | PCIe x16 Graphics port | PCIe x16 Graphics port or SDVO port | PCIe x16 Graphics port or SDVO port |
| Compatibillity | OpenGL 3.0, DirectX 10.1 | OpenGL 2.1, DirectX 10 | OpenGL 2.0, DirectX 10 | OpenGL 2.0, DirectX 10 |
| **Parallel ATA (IDE)** | one channel, one device | one channel, one device | one channel, one device | one channel, one device |
| **Serial ATA** | two SATA 3 Gb/s, two SATA 6 Gb/s | four SATA 3 Gb/s | three SATA 3 Gb/s | three SATA 3 Gb/s |
| Matrix Storage Support | Yes | Yes | optional | optional |
| **Ethernet** | integrated Intel GbE (10/100/1000) | integrated Intel GbE (10/100/1000) | integrated Intel® GbE (10/100/1000) | integrated Intel® GbE (10/100/1000) |
| **USB** | 8 ports USB 2.0 | 8 ports USB 2.0 | 8 ports USB 2.0 | 8 ports USB 2.0 |
| **Audio** | Intel® HD Audio | Intel® HD Audio | Intel® HD Audio | Intel® HD Audio |
| **Watchdog** | Yes | Yes | Yes | Yes |
| **TPM** | Yes, Ver. 1.2 | Yes, Ver. 1.2 | Yes, Ver. 1.2 | Yes, Ver. 1.2 |
| **PCI Express Support** | 6x PCI-Express x1 (or 1 x4) PCIe two x8, x4 or x1 (on PEG) | 6x PCI-Express x1 (or 1 x4) PCI-Express x8, x4 or x1 (on PEG) | 5x PCI-Express x1 (or 1 x4) PCI-Express x8, x4 or x1 (on PEG) | 5x PCI-Express x1 (or 1 x4) PCI-Express x8, x4 or x1 (on PEG) |
| **PCI Suport** | 4x PCI rev. 2.3, 32-bit, 33MHz | 4x PCI rev. 2.3, 32-bit, 33MHz | 4x PCI rev. 2.3, 32-bit, 33MHz | 4x PCI rev. 2.3, 32-bit, 33MHz |
| **LPC Support** | Yes | Yes | Yes | Yes |
| **Management Bus** | I²C, SMBus | I²C, SMBus | I²C, SMBus | I²C, SMBus |
| **Power** | 12V only (AT), 12V and 5Vsb (ATX) | 12V only (AT), 12V and 5Vsb (ATX) | 12V only (AT), 12V and 5Vsb (ATX) | 12V only (AT), 12V and 5Vsb (ATX) |
| Power States | S0 S1 S3 S4 S5 | S0 S1 S3 S4 S5 | S0, S1, S3, S4, S5 | S0, S1, S3, S4, S5 |
| Power Consumption | TBD | 21 W with Core™ i7-620UE at 1.2 GHz and 2 GB memory typical | 18 W with Core™ 2 Duo SU9300 at 1.2 GHz and 2 GB memory typical | 23 W with Core™ 2 Duo P8400 at 2.26 GHz and 2 GB memory typical |
| **Operating Temperature** | 0°C ~ +60°C | 0°C ~ +60°C | 0°C ~ +60°C | 0°C ~ +60°C |
| Extended Temperature | TBD | selected modules: -20°C ~ +70°C | selected modules: -20°C ~ +70°C | - |
| **Compatibillity** | PICMG COM.0 R2.0, Type 6 | PICMG COM.0 R2.0, Type 2 | PICMG® COM Express™ R1.0, Type 2 | PICMG® COM Express™ R1.0, Type 2 |
| **Dimensions** | Basic Form Factor (95x125 mm) | Basic Form Factor (95x125 mm) | Basic Form Factor (95x125 mm) | Basic Form Factor (95x125 mm) |
| **Solid State Disk on Module** | optional SATA SSD 4~16 GB | optional SATA SSD 4~16 GB | - | - |
| **BSP & Software Support** | Windows® XP/Xpe, Windows® 7 Linux® 2.6.x, AIDI library | Windows® XP/Xpe, Vista, Windows® 7 Linux® 2.6.x, AIDI library | Windows® XP/Xpe, Windows® Vista, Windows® 7, Windows® CE, Linux® 2.6.x, AIDI library | Windows® XP/Xpe, Windows® Vista, Windows® 7, Windows® CE, Linux® 2.6.x, AIDI library |
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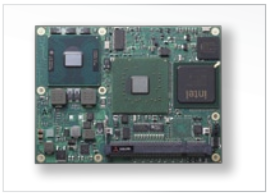
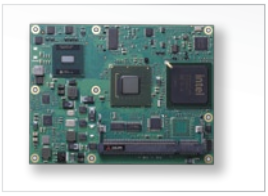
# Selection Guide

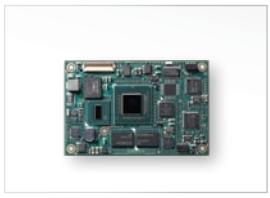
## COM Express™

**Basic (125 x 95 mm)**

**Type 2**

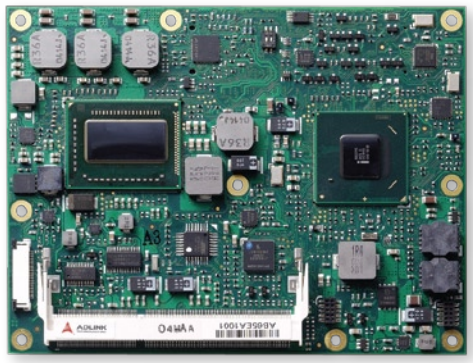





| | Express-MC800 | Express-NR | Express-AT | Express-IA533 |
|---|---|---|---|---|
| **CPU Type** | Intel® Core™2 Duo (Merom) up 2.2 GHz with 4 MB L2 cache | Intel® Core™2 Duo (Merom/Yonah) up to 2.2 GHz with 4MB L2 cache | Intel® Atom™ up to 1.6 GHz with 512 KB L2 cache | Intel® Pentium® M Intel® Celeron® M (3xx series) |
| CPU Package | PPGA478 (socket-P) or PBGA479 | µFC-PGA (socket-M) or µFC-BGA | µFC-BGA | µFC-PGA (socket) or µFC-BGA |
| CPU Models / Speeds | Celeron® M 550 (socket) Core™2 Duo (Meron) U7500, L7500 Core™2 Duo T7500 (socket) | Celeron® M 423, 440/530 Core™2 Duo L7400, U7500, U2500 Core™2 Duo T7400 (socket) | Intel® Atom™ N270 at 1.6 GHz | Celeron® M: 600MHz up to 1.5GHz Pentium® M: 1.1GHz up to 2.0GHz |
| FSB Speed | 800/667/533 | 667/533 | 533 | 533/400 |
| **Main Chipset** | Intel® GME965 with ICH8M | Intel® 945GME with ICH7M | Intel® 945GSE with ICH7M | Intel® 915GM with ICH6-M |
| **System Memory** | 4 GB (max), dual channel | 4 GB (max), dual channel | 2 GB (max), single channel | 2 GB (max), dual channel |
| Memory Type | DDR2 at 667/533 | DDR2 at 667/533 | DDR2 at 533 | DDR2 at 400/533 |
| Soldered Memory | - | - | - | 512MB soldered onboard |
| Socket Memory | Max 4 GB on two 200-pin SODIMM | Max 4 GB on two 200-pin SODIMM | Max 2 GB on single 200-pin SODIMM | Max 1 GB on 200-pin SODIMM |
| **Cache (L2)** | L2 depends on processor type 2MB or 4MB | L2 depends on processor type 1MB, 2MB or 4MB | L2 cache 512 KB | L2 depends on processor type 0KB, 512KB, 1MB or 2MB |
| **BIOS Type** | AMIBIOS®8, American Megatrend | AMIBIOS®8, American Megatrend | AMIBIOS®8, American Megatrend | Phoenix® Award |
| BIOS Features | Serial Console redirection EEPROM CMOS backup, USB boot/legacy, PXE support | Serial Console redirection EEPROM CMOS backup, USB boot/legacy, PXE support | Serial Console redirection EEPROM CMOS backup, USB boot/legacy, PXE support | Serial Console redirection EEPROM CMOS backup, USB boot/legacy, PXE support |
| BIOS Flash | 8 Mbit Flash SPI | 8 Mbit Flash SPI | 8 Mbit Flash SPI | FWH, 4 Mbit Flash |
| **Graphics Controller** | Intel® GMA X3100 | Intel® GMA 950 | Intel® GMA 950 | Intel® GMA 900 |
| Graphics Memory | Max 384 MB UMA | Max 256 MB UMA | Max 256 MB UMA | Max 128 MB UMA |
| Integrated Display Support | CRT (QXGA) single/dual 18/24-bit LVDS (UXGA) TV-out (PAL/NTSC/HDTV) | CRT (QXGA) single/dual 18/24-bit LVDS (UXGA) TV-out (PAL/NTSC/HDTV) | CRT (QXGA) single/dual 18/24-bit LVDS (UXGA) TV-out (PAL/NTSC/HDTV) | CRT (QXGA) Dual channel 18-bit LVDS (UXGA) TV-out (PAL/NTSC/HDTV) optional |
| External Graphics Bus | PCIe x16 Graphics Port, or dual SDVO ports | PCIe x16 Graphics Port, or dual SDVO ports | Single SDVO port | PCIe x16 Graphics Port, or dual SDVO ports |
| Compatibillity | OpenGL 2.0, DirectX 10 | OpenGL 1.4, DirectX* 9.0c | OpenGL 1.4, DirectX* 9.0c | OpenGL 1.4, DirectX* 9.0 |
| **Parallel ATA (IDE)** | one channel, two devices | one channel, two devices | one channel, two devices | one channel, two devices |
| **Serial ATA** | three SATA 3 Gb/s | two SATA 1.5 Gb/s | two SATA 1.5 Gb/s | two SATA 1.5 Gb/s |
| Matrix Storage Support | optional (ICH8EM) | optional (ICH7MDH) | - | - |
| **Ethernet** | integrated Intel® GbE (10/100/1000) | Intel® 82573 GbE Ethernet (10/100/1000) | Realtek RTL8111C GbE (10/100/1000) | Marvell Yukon GbE (10/100/1000) |
| **USB** | 8 ports USB 2.0 | 8 ports USB 2.0 | 8 ports USB 2.0 | 6 ports USB 2.0 |
| **Audio** | Intel® HD Audio | Intel® HD Audio and AC'97 | Intel® HD Audio and AC'97 | Intel® HD Audio and AC'97 |
| **Watchdog** | Yes | Yes | Yes | Yes |
| **TPM** | Yes, Ver. 1.2 | Yes, Ver. 1.2 | Yes, Ver. 1.2 | - |
| **PCI Express Support** | 5x PCI-Express x1 (or 1 x4) PCI-Express x8, x4 or x1 (on PEG) | 5x PCI-Express x1 (or 1 x4) PCI-Express x1 (on PEG) | 3x PCI-Express x1 (optional 5 PCI Express x1) | 3x PCI-Express x1 1x PCI-Express x1 (on PEG) |
| **PCI Suport** | 4x PCI rev. 2.3, 32-bit, 33MHz | 4x PCI Ver. 2.3, 32-bit, 33MHz | 4x PCI Ver. 2.3, 32-bit, 33MHz | 4x PCI rev. 2.3, 32-bit, 33MHz |
| **LPC Support** | Yes | Yes | Yes | Yes |
| **Management Bus** | I²C, SMBus | I²C, SMBus | I²C, SMBus | I²C, SMBus |
| **Power** | 12V only (AT), 12V and 5Vsb (ATX) | 12V only (AT), 12V and 5Vsb (ATX) | 12V only (AT), 12V and 5Vsb (ATX) | 12V only (AT), 12V and 5Vsb (ATX) |
| Power States | S0, S1, S3, S4, S5 | S0, S1, S3, S4, S5 | S0, S1, S3, S4, S5 | S0, S1, S3, S4, S5 |
| Power Consumption | 19 W with Core™2 Duo U7500 at 1.06 GHz and 2 GB memory typical | 16 W with Core™2 Duo U7500 at 1.06 GHz and 1 GB memory typical | 9 W with Atom® N270 at 1.6GHz and 1 GB DDR2 typical | 12 W with Celeron® M 373 at 1.0 GHz and 512 MB DDR2 typical |
| **Operating Temperature** | 0°C ~ +60°C | 0°C ~ +60°C | 0°C ~ +60°C | 0°C ~ +60°C |
| Extended Temperature | - | selected modules: -20°C ~ +70°C | selected modules: -20°C ~ +70°C | - |
| **Compatibillity** | PICMG® COM Express™ R1.0, Type 2 | PICMG® COM Express™ R1.0, Type 2 | PICMG® COM Express™ R1.0, Type 2 | PICMG® COM Express™ R1.0, Type 2 |
| **Dimensions** | Basic Form Factor (95x125 mm) | Basic Form Factor (95x125 mm) | Basic Form Factor (95x125 mm) | Basic Form Factor (95x125 mm) |
| **Solid State Disk on Module** | - | - | optional PATA SSD 512 MB up to 4 GB | - |
| **BSP & Software Support** | Windows® XP/Xpe, Windows® Vista Linux® 2.6.x, AIDI library | Windows® XP/Xpe, Windows® Vista Windows® CE, Linux® 2.6.x, AIDI library | Windows® XP/Xpe, Windows® Vista Windows® CE, Linux® 2.6.x, AIDI library | Windows® XP/Xpe Linux® 2.6.x, AIDI library |
| **Page Number** | 1-15 | 1-17 | 1-19 | 1-21 |

| | Compact (95 x 95 mm) | | Ultra (84 x 55 mm) | |
|---|---|---|---|---|
| | Type 2 | | Type 10 | Type 1 |
| |  |  |  |  |
| | Express-LPC | Express-ATC | nanoX-TC | nanoX-ML |
| **CPU Type** | Single / Dual Intel® Atom™ up to 1.8 GHz with 1 MB L2 cache | Intel® Atom™ up to 1.6 GHz with 512 KB L2 cache | Intel® Atom™ Processor E6xx from 600 MHz up to 1.6 GHz | Intel® Atom™ Processor Z5xx from 1.1 GHz up to 1.6 GHz |
| CPU Package | FCBGA559 | PBGA437 | FC-BGA 676 | BGA 441 |
| CPU Models / Speeds | Atom™ N455 at 1.66 GHz<br>Atom™ D425 at 1.8 GHz<br>Atom™ D525 at 1.8 GHz (dual core) | Intel® Atom™ N270 at 1.6 GHz | E680 at 1.6 GHz, E660 at 1.3 GHz,<br>E640 at 1.1 GHz, E620 at 600 MHz | Intel® Atom™ Z530 at 1.6 GHz<br>Intel® Atom™ Z510 at 1.1 GHz |
| FSB Speed | - | 533 | - | 533/400 |
| **Main Chipset** | ICH8M | Intel® 945GSE with ICH7M | Intel® PCH EG20T (extended temp) | Intel® SCH US15W |
| **System Memory** | 4 GB (max), single channel | 2 GB (max), single channel | 2 GB (max), single channel | 1 GB (max), single channel |
| Memory Type | DDR3 at 667/800 | DDR2 533 | DDR2 400/533 | DDR2 400/533 |
| Soldered Memory | - | - | 512 MB up 2 GB DDR2 at 800 MHz | 512 MB or 1 GB DDR2 466/533 MHz |
| Socket Memory | Max 4 GB on two 200-pin SODIMMs | Max 2 GB on single 200-pin SODIMM | - | - |
| **Cache (L2)** | L2 cache 512 KB (N455/D425)<br>L2 cache 1 MB (D525) | L2 cache 512 KB | L2 cache 512 KB | L2 cache 512 KB |
| **BIOS Type** | AMIBIOS®8, American Megatrend | AMIBIOS®8, American Megatrend | AMI EFI, American Megatrend | AMIBIOS®8, American Megatrend |
| BIOS Features | Serial Console redirection<br>EEPROM CMOS backup,<br>USB boot/legacy, PXE support | Serial Console redirection<br>EEPROM CMOS backup,<br>USB boot/legacy, PXE support | Serial Console redirection<br>EEPROM CMOS backup,<br>USB boot/legacy, PXE support | Serial Console redirection<br>EEPROM CMOS backup,<br>USB boot/legacy, PXE support |
| BIOS Flash | 8 Mbit Flash SPI | 8 Mbit Flash SPI | 8 Mbit Flash SPI | FWH, 8 Mbit Flash |
| **Graphics Controller** | Intel® GMA 3150 | Intel® GMA 950 | Intel® GMA 600 | Intel® GMA 500 |
| Graphics Memory | Max 384 MB UMA | Max 256 MB UMA | Max 64 MB UMA | Max 256 MB UMA |
| Integrated Display Support | CRT (QXGA) 2048x1536<br>single 18 LVDS (WXGA) 1366x768 | CRT (QXGA)<br>single/dual 18/24-bit LVDS (UXGA)<br>TV-out (PAL/NTSC/HDTV) | 18/24-bit LVDS max 1280x768@60Hz<br>Encode : MPEG4, H.263, H.264;<br>Decode : MPEG2/4, VC1, WMV9, H.264 | single channel 18/24-bit LVDS (WXGA)<br>supports HDTV/DHD decode and<br>MPEG, H.264, hardware decoding |
| External Graphics Bus | - | Single SDVO port | Single SDVO max 1920x1080@50Hz | Single SDVO port |
| Compatibillity | OpenGL 1.5, DirectX 9.0c | OpenGL 1.4, DirectX* 9.0c | OpenGL 2.1, DirectX 9.0c | OpenGL 2.0, DirectX 9.0c |
| **Parallel ATA (IDE)** | one channel, two devices | one channel, two devices | - | one channel, one device |
| **Serial ATA** | two SATA 1.5 Gb/s | two SATA 1.5 Gb/s | two SATA 1.5 Gb/s | one SATA 1.5 Gb/s |
| Matrix Storage Support | - | - | - | - |
| **Ethernet** | Intel® 82583V GbE (10/100/1000) | Realtek RTL8111C GbE (10/100/1000) | integrated Intel GbE (10/100/1000) | Realtek RTL8111C GbE (10/100/1000) |
| **USB** | 6 ports USB 2.0 | 6 ports USB 2.0 | 6 ports USB 2.0, 1 client port | 8 ports USB 2.0 |
| **Audio** | Intel® HD Audio | Intel® HD Audio and AC'97 | Intel® HD Audio | Intel® HD Audio |
| **Watchdog** | Yes | Yes | Yes | Yes |
| **TPM** | Yes | Yes | Yes | Yes |
| **PCI Express Support** | 5x PCI-Express x1 | 3x PCI-Express x1<br>(optional 5 PCI Express x1) | 3x PCIe x1<br>(optional 4x PCIe without PCH EG20T) | 1x PCIe x1<br>(optional 2x PCIe without LAN function) |
| **PCI Suport** | 4x PCI rev. 2.3, 32-bit, 33MHz | 4x PCI rev. 2.3, 32-bit, 33MHz | - | - |
| **LPC Support** | Yes | Yes | Yes | Yes |
| **Management Bus** | I²C, SMBus | I²C, SMBus | I²C, SMBus | I²C, SMBus |
| **Power** | 12V only (AT), 12V and 5Vsb (ATX) | 12V only (AT), 12V and 5Vsb (ATX) | 4.75V – 14V wide range (5Vsb optional for ATX function) | 4.75V – 14V wide range (5Vsb optional for ATX function) |
| Power States | S0 S1 S3 S4 S5 | S0, S1, S3, S4, S5 | S0 S1 S3 S4 S5 | S0, S1, S3, S4, S5 |
| Power Consumption | 8 W with Atom® N455<br>at 1.66 GHz and 1 GB DDR3 typical | 9 W with Atom® N270<br>at 1.6GHz and 1 GB DDR2 typical | 4.5 W with E620 at 600 MHz and<br>512 MB DDR2 typical | 5 W with Atom®Z510 at 1.1 GHz and<br>512 MB DDR2 typical |
| **Operating Temperature** | 0°C ~ +60°C | 0°C ~ +60°C | 0°C ~ +60°C | 0°C ~ +60°C |
| Extended Temperature | selected modules : -20°C ~ +70°C | selected modules: -20°C ~ +70°C | -40°C ~ +85°C (with CPU "T" versions) | selected modules: -20°C ~ +70°C |
| **Compatibillity** | PICMG® COM Express™ R2.0, Type 2 | PICMG® COM Express™ R1.0, Type 2 | PICMG® COM Express™ R2.0, Type 10 | PICMG® COM Express™ R1.0, Type 1 |
| **Dimensions** | Compact Form Factor (95x95 mm) | Compact Form Factor (95x95 mm) | Ultra Form Factor (84x55 mm) | Ultra Form Factor (84x55 mm) |
| **Solid State Disk on Module** | optional SSD 4 GB up to 8 GB | optional SSD 4 GB up to 8 GB | TBD | optional SSD 1 GB up to 8 GB |
| **BSP & Software Support** | Windows® XP/Xpe, Windows® Vista<br>Windows® CE, Linux® 2.6.x, AIDI library | Windows® XP/Xpe, Windows® Vista<br>Windows® CE, Linux® 2.6.x, AIDI library | Windows® XP/Xpe, Windows® CE,<br>Win7 Embedded, Linux®, AIDI library | Windows® XP/Xpe, Windows® CE,<br>Linux®, AIDI library |
| **Page Number** | 1-23 | 1-25 | 1-31 | 1-33 |

# Express-HR

## COM Express™ Type 6 Module with Intel® Core™ i7/i5 processor and QM67 Chipset



### Features

- Intel® Quad or Dual Core™ i7/i5 Processor
- Intel® QM67 Chipset
- Up to 16GB Dual Channel DDR3 SDRAM at 1333MHz
- Three Digital Display Interfaces (DDI) for DisplayPort /HDMI/DVI/SDVO
- Seven PCIe x1, one PCIe x16 (Gen2) for graphics (or general purpose x8/4/1)
- Two SATA 3 Gb/s, two SATA 6 Gb/s, Gigabit LAN, eight USB 2.0

## Specifications

### Core System

| | |
|---|---|
| CPU | **Sandy Bridge 32 nm process, BGA type** |
| | Intel® Core™ i7-2715QE 2.1 GHz (3.0 GHz Turbo), 6MB L3 cache, 45W |
| | Intel® Core i7-2655LE 2.2 GHz (2.9 GHz Turbo), 4MB L3 cache, 25W |
| | Intel® Core™ i7-2610UE 1.5 GHz (2.4 GHz Turbo), 4MB L3 cache, 17W |
| | Intel® Core™ i5-2515E 2.5 GHz (3.2 GHz Turbo), 3MB L3 cache, 35W |
| Memory | Dual channel non-ECC 1066/1333 MHz DDR3 memory up to 16 GB in dual stacked SODIMM socket |
| Chipset | Intel® Mobile QM67 Express Chipset |
| L3 Cache | 6MB (i7-2715QE), 4MB(i7-2655LE and i7-2610UE), 3MB (i5-2515E) |
| BIOS | AMI EFI with CMOS backup in 16 Mbit SPI BIOS |
| Hardware Monitor | Supply voltages and CPU temperature |
| Debug Interface | XDP SFF-26 extension for ICE debug |
| Watchdog Timer | Programmable timer range to generate RESET |
| Expansion Busses | PCI Express x16 (Gen2) bus for discrete graphics solution or general purpose PCI Express (2 x8 or 1 x8 with 2 x4) or Embedded DisplayPort (eDP) |
| | 8 PCI Express x1: Lanes 0/1/2/3/4/5/6 are free, lane 7 is occupied by GbE |
| | LPC bus, SMBus (system) , I²C (user) |

### Video

| | |
|---|---|
| Integrated in Processor | HD Graphics 3000 at 650–1300 MHz |
| Integrated Video | DirectX 10.1 and OpenGL 3.0 |
| Feature Support | Intel Clear Video HD Technology |
| | Advanced Scheduler 2.0, 1.0, XPDM support |
| | DirectX Video Acceleration (DXVA) support for full AVC/VC1/ MPEG2 hardware decode |
| CRT Interface | Analog CRT support with 300 MHz DAC |
| | Analog monitor support up to QXGA (2048 x 1536) and CRT hot plug |
| LVDS Interface | Dual channel 18/24-bit LVDS |
| Digital Display Interface | Three DDI ports supporting HDMI / DVT / DisplayPort or SDVO |

### Audio

| | |
|---|---|
| Chipset | Integrated on Intel® PCH QM67 |
| Audio Codec | On Express-BASE6 (ALC888) |

### LAN

| | |
|---|---|
| Chipset | Intel® Gigabit LAN PHY WG82579LM |
| Interface | 10/100/1000 Mbps Ethernet |

### Multi I/O

| | |
|---|---|
| Chipset | Integrated on QM67 |
| USB | Supports up to eight ports USB 2.0 |
| SATA | Supports two SATA ports at 6 Gb/s and two ports at 3 Gb/s with support for RAID 0,1,5,10 |
| SSD | Optional SATA based Solid State Disk 8/16/32 GB |

### Super I/O

| | |
|---|---|
| | Connected to LPC bus on carrier if needed |

### TPM

| | |
|---|---|
| Chipset | Infineon SLB9635TT1.2 |
| Type | TPM 1.2 |

### Power Specifications

| | |
|---|---|
| Input Power | AT mode (12 V +/- 5%) and ATX mode (12 V and 5 Vsb +/- 5%) |
| Power States | Supports S0, S1, S3, S4, S5 |
| Power Consumption | TBD |
| Smart Battery Support | Yes |

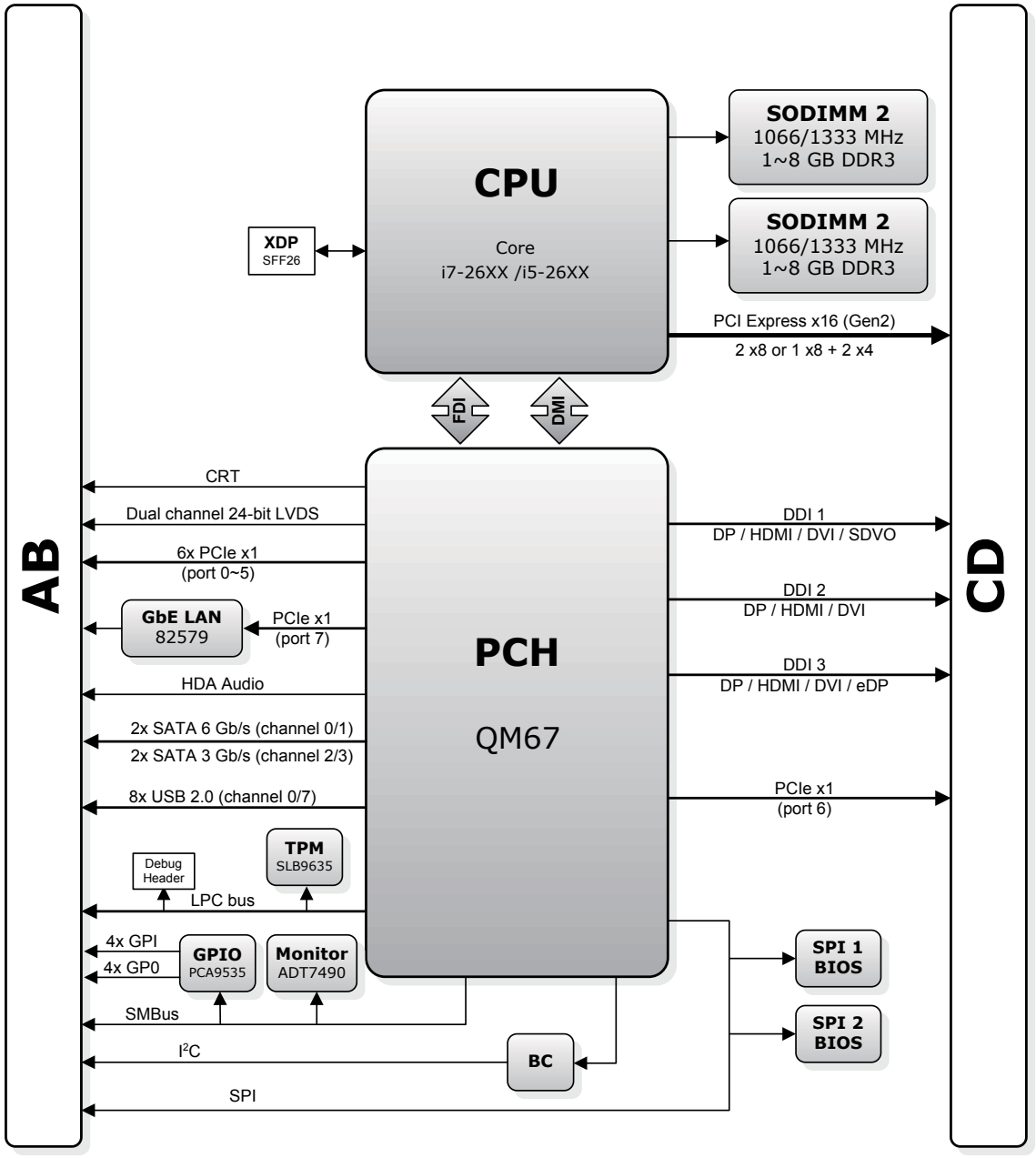
### Mechanical and Environmental

| | |
|---|---|
| Operating Temp | 0°C to 60°C |
| Storage Temp | -20°C to 80°C |
| Humidity | 90% at 60°C |
| Shock | 15G peak-to-peak, 11ms duration, non-operating |
| Vibration | Non-operating: 1.88Grms, 5-500Hz, each axis |
| | Operating: 0.5Grms, 5-500Hz, each axis |
| Compatibility | COM Express Type 6, Basic form factor 125mm x 95mm |
| Certification | CE, FCC, HALT |

### Operating Systems

| | |
|---|---|
| Standard Support | Windows® XP(e) / Windows® 7 |
| | Linux® |
| Extended Support (BSP) | Embedded XP support package |
| | Linux® 2.6.x BSP |
| | VxWorks 6.x |
| | AIDI Library for Windows® and Linux® |

## Functional Diagram




## Ordering Information

### Modules

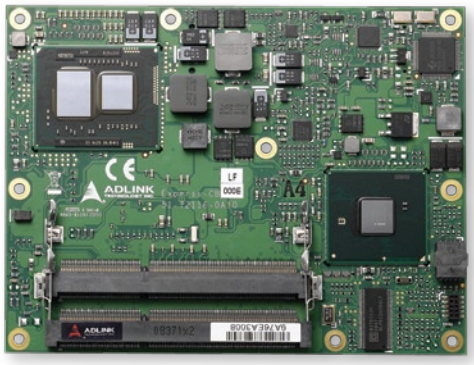
| Model Number | Description/Configuration |
|---|---|
| **Express-HR-i7-2715QE** | COM Express™ Type 6 module with Intel® Core i7-2715QE SV processor at 2.1GHz with QM67 chipset |
| **Express-HR-i7-2655LE** | COM Express™ Type 6 module with Intel® Core i7-2655LE LV processor at 2.2GHz with QM67 chipset |
| **Express-HR-i7-2610UE** | COM Express™ Type 6 module with Intel® Core i7-2610UE ULV processor at 1.5 GHz with QM67 Chipset |
| **Express-HR-i5-2515E** | COM Express™ Type 6 module with Intel® Core i5-2515E SV processor at 2.5 GHz with QM67 Chipset |

### Accessories

| Model Number | Description/Configuration |
|---|---|
| **Passive Heatsinks** | |
| THSH-HR-BL | High Profile Heatsink for Express-HR with threaded standoffs |
| **Heat Spreaders** | |
| HTS-HR-RL | Heatspreader for Express-HR with threaded standoffs |
| **Heatsink with Active Cooling** | |
| THSFH-HR-BL | High Performance Heatsink with Fan for Express-HR with threaded standoffs |

# Express-CB/CBE

## COM Express™ Module with Intel® Core i7/i5/i3 Processor and QM57 Chipset



## Features

- Intel® Core™ i7/i5/i3 Processor
- Intel® QM57 chipset
- Up to 8 GB Dual Channel DDR3 SDRAM at 1066 MHz (optional ECC)
- Six PCIe x1, one PCIe x16 for graphics (or general purpose x8/4/1)
- 18/24-bit LVDS and Embedded DisplayPort
- SATA 3 Gb/s IDE (PATA), Gigabit LAN, USB 2.0

## Specifications

### Core System

| | |
|---|---|
| CPU | **Arrandale BGA type** |
| | Intel® Core™ i7-610E Processor (4M Cache, 2.53 GHz) 35 W |
| | Intel® Core™ i5-520E Processor (3M Cache, 2.40 GHz) 35 W |
| | Intel® Core™ i7-620LE Processor (4M Cache, 2.00 GHz) 25 W |
| | Intel® Core™ i7-620UE Processor (4M Cache, 1.06 GHz) 18 W |
| | Intel® Core™ i3-330E Processor (3M Cache, 2.13 GHz) 35W |
| | Intel® Celeron® Processor P4505 (2M Cache, 1.86 GHz) 35 W |
| Memory | Dual channel 800/1066 MHz DDR3 memory up to 8 GB in dual stacked SODIMM socket; ECC memory for CBE series only |
| Chipset | Intel® Mobile QM57 |
| L2 Cache | 2 MB (Celeron® M), 4/3 MB (Intel® Core™ i7 / i5) |
| BIOS | AMI EFI with CMOS backup in 16 Mbit SPI BIOS |
| Hardware Monitor | Supply voltages and CPU temperature |
| Watchdog Timer | Programmable timer ranges to generate RESET |
| Expansion Busses | PCI Express x16 bus for discrete graphics solution or general purpose PCI Express (2 x8 or 2 x4 or 2 x1) or Embedded Display Port (eDP) |
| | 7 PCI Express x1: Lanes 0/1/2/3/4/5 are free, lane 6 is occupied by GbE; can be optionally configured as 1 x4 (on 0/1/2/3) and 2 x1 (4/5) |
| | 32-bit PCI: PCI Rev. 2.3 at 33MHz, supporting 4 bus masters |
| | LPC bus, SMBus (system) , I²C (user) |

### Video

| | |
|---|---|
| Integrated in Processor | Gen 5.75 with 12 execution units |
| Integrated Video Feature Support | DirectX 10 and OpenGL 2.1 |
| | Intel® Dynamic Video Memory Technology (Intel® DVMT 5.0) |
| | Video capture via x1 concurrent PCI Express port |
| | PAVP (Protected Audio-Video Path) support for Protected Intel HD Audio Playback |
| | High performance MPEG-2 decoding |
| | WMV9 (VC-1) and H.264 (AVC) support |
| | Hardware acceleration for MPEG2 VLD/iDCT |
| | Microsoft DirectX 10 support |
| | OpenGL 2.1 support |
| | Blu-ray support @ 40 Mb/s |
| | Hardware motion compensation |
| | Intermediate Z in classic rendering |
| CRT Interface | Analog CRT support by 300 MHz DAC |
| | Analog monitor support up to QXGA ( 2048 X 1536) |
| LVDS Interface | Single / Dual channel 18- or 24-bit panels |

### Audio

| | |
|---|---|
| Chipset | Integrated on Intel® PCH QM57 |
| Audio Codec | On carrier (ALC888) |

### LAN

| | |
|---|---|
| Chipset | Integrated on QM57 with 82577LM PHY |
| Interface | 10/100/1000 Mbps Ethernet |

### Multi I/O

| | |
|---|---|
| Chipset | Integrated on Intel® PCH QM57 |
| USB | Supports up to eight ports USB v. 2.0 |
| SATA | Four ports SATA 3 Gb/s with optional support for RAID 0,1,5,10 |
| SSD | Optional SATA based Solid State Disk 8/16/32 GB |
| PATA | SATA to PATA bridge on SATA channel 1, Master only |

### Super I/O

| | |
|---|---|
| | Connected to LPC bus on carrier if needed |

### TPM

| | |
|---|---|
| Chipset | Infineon SLB9635TT1.2 |
| Type | TPM 1.2 |

### Power Specifications

| | |
|---|---|
| Input Power | AT mode (12 V +/- 5%) and ATX mode (12 V and 5 Vsb +/- 5%) |
| Power States | Supports S0, S1, S3, S4, S5 |
| Power Consumption | 21 W with Core™ i7-620UE at 1.2 GHz and 2 GB memory typical |
| Smart Battery Support | Yes |

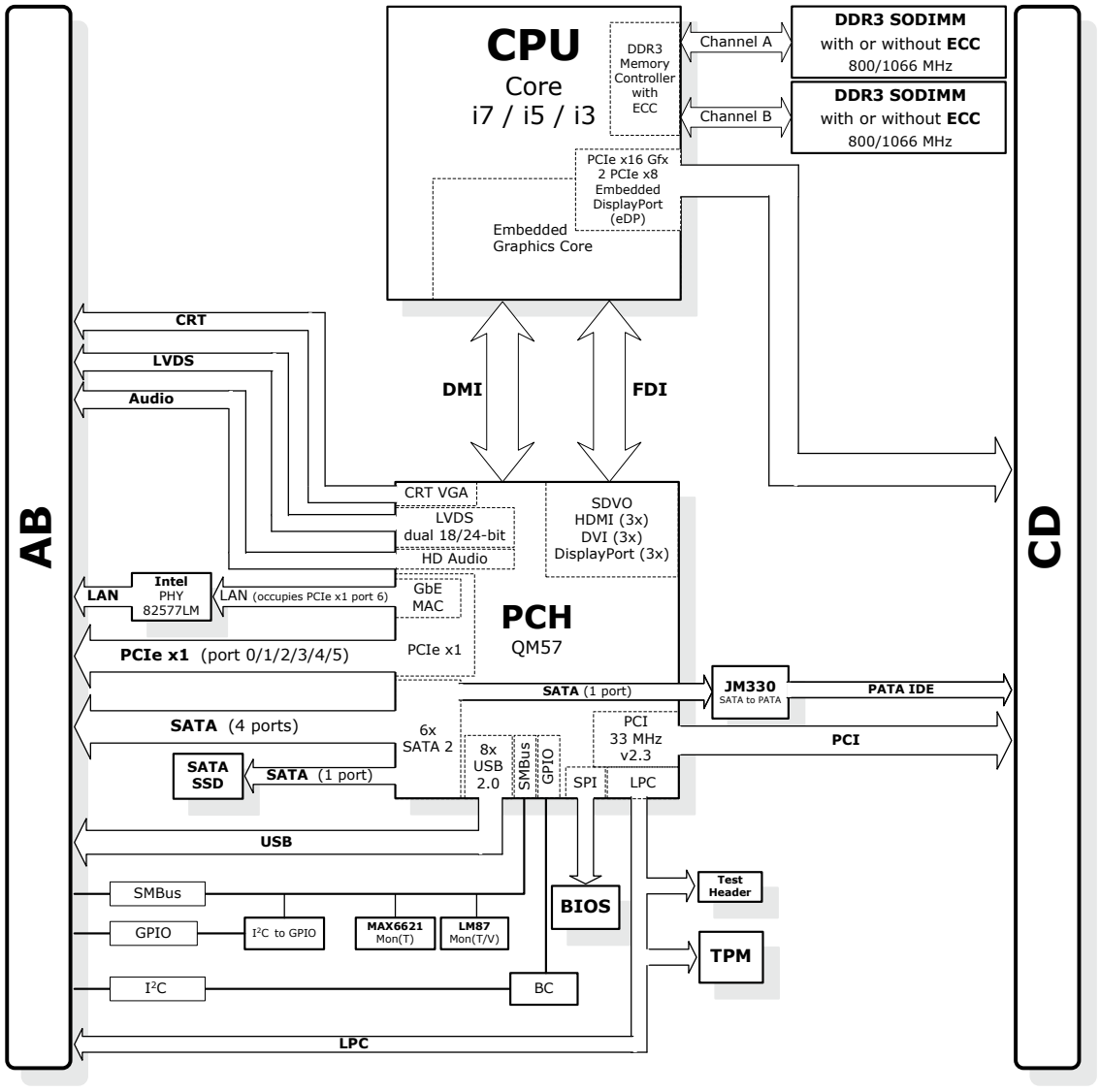
### Mechanical and Environmental

| | |
|---|---|
| Operating Temp | 0°C to 60°C |
| Storage Temp | -20°C to 80°C |
| Humidity | 90% at 60°C |
| Shock | 15G peak-to-peak, 11ms duration, non-operation |
| Vibration | Non-operating: 1.88 Grms, 5-500 Hz, each axis |
| | Operating: 0.5 Grms, 5-500 Hz, each axis |
| Compatibility | COM Express™ Type 2, Basic form factor 125 mm x 95 mm |
| Certification | CE, FCC |

### Operating Systems

| | |
|---|---|
| Standard Support | Windows® XP(e) / Vista / Windows® 7 |
| | Linux® |
| Extended Support (BSP) | Embedded XP support package |
| | Linux® 2.6.x BSP |
| | Vxworks 6.x BSP |
| | AIDI Library for Windows® and Linux® |

## Functional Diagram




## Ordering Information

### Modules

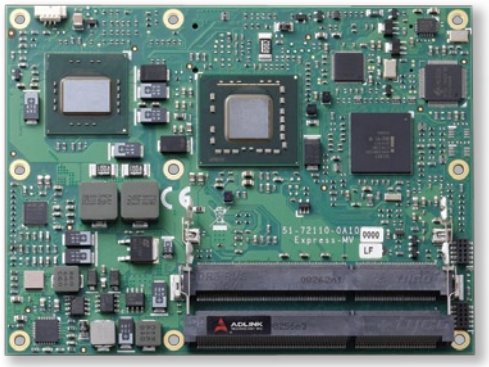
| Non-ECC Model Number | ECC Model Number | Description/Configuration |
|---|---|---|
| **Express-CB-i7-610E** | **Express-CBE-i7-610E** | COM Express™ module with Intel® Core i7-610E SV processor at 2.53 GHz with QM57 chipset |
| **Express-CB-i5-520E** | **Express-CBE-i5-520E** | COM Express™ module with Intel® Core i5-520 SV processor at 2.4 GHz with QM57 chipset |
| **Express-CB-i7-620LE** | **Express-CBE-i7-620LE** | COM Express™ module with Intel® Core i7-620LE LV processor at 2.0 GHz with QM57 chipset |
| **Express-CB-i7-620UE** | **Express-CBE-i7-620UE** | COM Express™ module with Intel® Core i7-620UE ULV processor at 1.07 GHz with QM57 chipset |
| **Express-CB-i7-P4505** | **Express-CBE-i7-P4505** | COM Express™ module with Intel® Celeron® P4505 SV processor at 1.86 GHz with QM57 chipset |
| **Express-CB-i3-330E** | **Express-CBE-i3-330E** | COM Express™ module with Intel® Core i3-330E SV processor at 2.13 GHz with QM57 chipset |

### Accessories

| Model Number | Description/Configuration |
|---|---|
| **Heat Spreaders** | |
| HTS-CB-B | Heatspreader with threaded standoffs for Express-CB/CBE |
| **Heatsink with Active Cooling** | |
| THSF-CB-B | Heatsink with fan and threaded standoffs for Express-CB/CBE |

# Express-MV

## COM Express™ Module with Intel® Core™2 Duo Processor and GS45 / ICH9M-SFF Chipset



## Features

- Intel® Core™2 Duo processor (up to 2.26 GHz)
- Intel® GS45 and ICH9M-SFF chipset
- Dual SODIMM for up to 8 GB DDR3 at 1066 MHz
- Five PCIe x1, one PCIe x16 for graphics (or general purpose x8, x4 or x1)
- Single/dual channel 18/24-bit LVDS and TV-out (SDTV and HDTV)
- SATA 3 Gb/s, IDE (PATA), Gigabit LAN, USB 2.0

## Specifications

### Core System

| | |
|---|---|
| CPU | **Penryn SFF BGA type** |
| | Intel® Core™2 Duo SP9300, FSB 1066, 2.26 GHz with 6MB L2 cache, 25 Watt |
| | Intel® Core™2 Duo SL9400, FSB 1066, LV 1.86 GHz with 6MB L2 cache, 17 Watt |
| | Intel® Core™2 Duo SU9300, FSB 800, ULV 1.2 GHz with 3MB L2 cache, 10 Watt |
| | Intel® Celeron® M 722, FSB 800, ULV 1.2GHz with 1MB L2 cache, 5.5 Watt |
| Memory | Dual stacked SODIMM sockets supporting dual channel memory, up to 8 GB of non-ECC, 800/1066 MHz DDR3 |
| Chipset | Intel® GS45 Express Graphics Memory Controller Hub SFF (Small Form Factor) and Intel® I/O Controller Hub ICH9M-SFF |
| BIOS | AMIBIOS®8 with CMOS backup in 16 Mbit SPI Flash |
| Hardware Monitor | Supply voltages and CPU temperature |
| Watchdog Timer | Programmable timer ranges to generate RESET |
| Expansion Busses | Graphics PCI Express x16 bus for SDVO/HDMI/DisplayPort or general purpose PCI Express (x8 / x4 / x1) |
| | 6 PCI Express x1: 0/1/2/3/4 are free, 5 is occupied by GbE; 0/1/2/3 x1 can be optionally configured as 1 x4 |
| | 32-bit PCI 2.3 at 33MHz, supporting 4 bus masters |
| | LPC, SMBus, I²C |

### Video

| | |
|---|---|
| Chipset | GS45 GMCH integrated Mobile Intel® Graphics Media Accelerator 4500MHD with core render clock 533 MHz @ 1.05-V core voltage or 266 MHz @ 1.025 L.P. Mode |
| Integrated Video | Intel® Dynamic Video Memory Technology (Intel® DVMT 5.0) |
| Feature Support | Video capture via x1 concurrent PCI Express port |
| | PAVP (Protected Audio-Video Path) support for Protected Intel® HD Audio Playback |
| | High performance MPEG-2 decoding |
| | WMV9 (VC-1) and H.264 (AVC) support |
| | Hardware acceleration for MPEG2 VLD/iDCT |
| | Microsoft DirectX 10 support |
| | Blu-ray support @ 40 Mb/s |
| | Hardware motion compensation |
| | Intermediate Z in classic rendering |
| CRT Interface | Analog CRT support by 300MHz DAC |
| | Analog monitor support up to QXGA, supports CRT hot plug |
| LVDS Interface | Single / Dual channel 18/24-bit at 25~112 MHz |
| TV-out | NTSC/PAL up to 1024x768 resolution supported HDTV 480p/720p/1080i/1080p modes supported (without Macrovision) |

### Audio

| | |
|---|---|
| Chipset | Integrated on Intel® ICH9M |
| Audio Codec | HDA codec on carrier |
| HDMI | Audio routed to HDMI interface |

### LAN

| | |
|---|---|
| Chipset | Integrated on Intel® ICH9M with Intel® 82567LM PHY |
| Interface | 10/100/1000 Mbps Ethernet |

### Multi I/O

| | |
|---|---|
| Chipset | Integrated on Intel® ICH9M |
| USB | Supports up to eight ports USB v. 2.0 |
| SATA | Four ports SATA 3 Gb/s with (optional) support for RAID 0,1,5,10 |
| PATA | SATA to PATA JM20330 controller on SATA channel 3, Master only |

### Super I/O

| | |
|---|---|
| | Connected to LPC bus on carrier if needed |

### TPM

| | |
|---|---|
| Chipset | Infineon SLB9635TT1.2 |
| Type | TPM 1.2 |

### Power Specifications

| | |
|---|---|
| Input Power | AT mode (12 V +/- 5%) and ATX mode (12 V and 5 Vsb +/- 5%) |
| Power States | Supports S0, S1, S3, S4, S5 |
| Power Consumption | 18 W (with Core™2 Duo SU9300 at 1.2 GHz and 2 GB memory typical) |

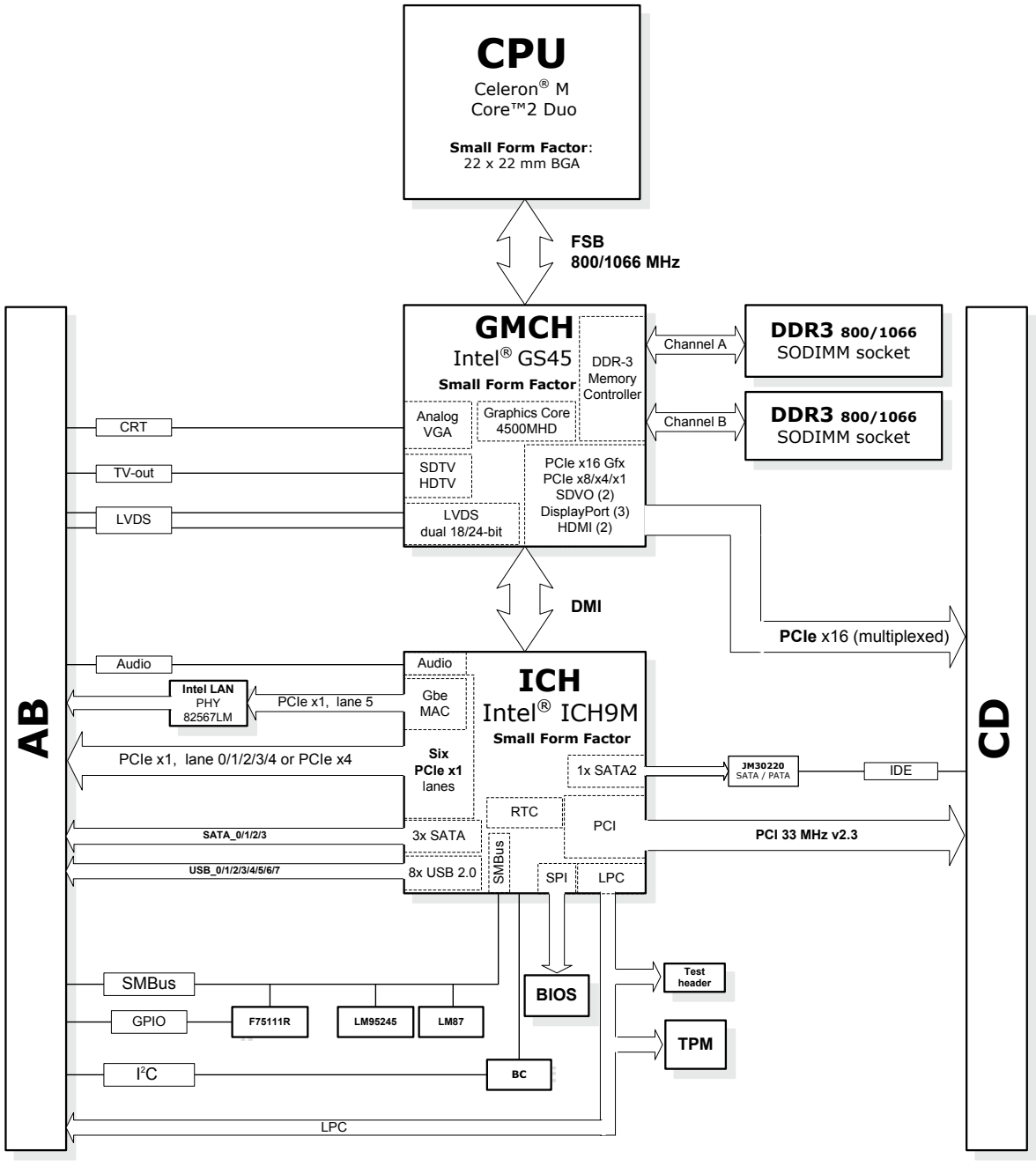
### Mechanical and Environmental

| | |
|---|---|
| Operating Temp. | 0°C to 60°C |
| Storage Temp. | -20°C to 80°C |
| Humidity | 90% at 60°C |
| Shock | 15G peak-to-peak, 11ms duration, non-operation |
| Vibration | Non-operating: 1.88 Grms, 5-500 Hz, each axis<br>Operating: 0.5 Grms, 5-500 Hz, each axis |
| Form Factor | COM Express™ Type 2, Basic form factor, 95 mm x 125 mm |
| Certifications | CE, FCC |

### Operating Systems

| | |
|---|---|
| Standard Support | Windows® XP 32/64-bit |
| | Windows® Vista 32/64-bit |
| | Windows® Server 2003/2008 |
| | Linux® 2.6.x |
| Extended Support | Embedded XP BSP |
| | Linux® 2.6.x BSP |
| | WinCE 6.0 BSP |
| | AIDI Library for Win32, WinCE and Linux® |

## Functional Diagram




## Ordering Information

### Modules

| Model Number | Description/Configuration |
|---|---|
| **Express-MV-SP9300** | COM Express™ Module with Intel® Core™2 Duo processor SP9300 at 2.26 GHz |
| **Express-MV-SL9400** | COM Express™ Module with LV Intel® Core™2 Duo processor SL9400 at 1.86 GHz |
| **Express-MV-SU9300** | COM Express™ Module with ULV Intel® Core™2 Duo processor SU9300 at 1.20 GHz |
| **Express-MV-722** | COM Express™ Module with ULV Intel® Celeron® M processor 722 at 1.20 GHz |

### Accessories

| Model Number | Description/Configuration |
|---|---|
| **Heat Spreaders** | |
| HTS-MV-B | Heatspreader for Express-MV (BGA CPU) with threaded standoffs |
| **Passive Heatsinks** | |
| THS-MV-BL | Low Profile Heatsink for Express-MV (BGA CPU) with threaded standoffs for bottom mounting with long cooling fins (incl screws for 5 and 8 mm btb) |
| **Heatsink with Active Cooling** | |
| THSF-MV-B | High Performance Heatsink with Fan for Express-MV (BGA CPU) with threaded standoffs |

# Express-MG

## COM Express™ Module with Intel® Core™2 Duo Processor and GM45 / ICH9M Chipset

## Features

- Intel® Core™2 Duo processor (up to 2.53 GHz)
- Intel® GM45 and ICH9M chipset
- Dual SODIMM for up to 8 GB DDR3 at 1066 MHz
- Five PCIe x1, one PCIe x16 for graphics (or general purpose x8, x4 or x1)
- Single/dual channel 18/24-bit LVDS and TV-out (SDTV and HDTV)
- SATA 3 Gb/s, IDE (PATA), Gigabit LAN, USB 2.0

## Specifications

### Core System

| | |
|---|---|
| CPU | **Socket P** |
| | Intel® Core™2 Duo T9400, FSB 1067, 2.53 GHz with 6-MByte L2 cache, 35 Watt |
| | Intel® Core™2 Duo P8400, FSB 1067, 2.26 GHz with 3-MByte L2 cache, 25 Watt |
| | Intel® Dual Celeron® M T3100, FSB 800, 1.90 GHz with 1-MByte L2 cache, 35 Watt |
| | Intel® Celeron® M 575, FSB 667, 2.00 GHz with 1-MByte L2 cache, 31 Watt |
| Memory | Two SODIMM sockets (one on top, one on bottom) supporting dual channel memory, up to 8 GB of non-ECC, 800/1067 MHz DDR3 |
| Chipset | Intel® GM45 Express Graphics Memory Controller Hub and Intel® I/O Controller Hub 82801IEM (ICH9M-E) |
| L2 Cache | 1 MB (Celeron® M), 6/3 MB (Core™2 Duo) |
| BIOS | AMIBIOS®8 with CMOS backup in 16 Mbit SPI Flash |
| Hardware Monitor | Supply voltages and CPU temperature |
| Watchdog Timer | Programmable timer ranges to generate RESET |
| Expansion Busses | Graphics PCI Express x16 bus or SDVO/HDMI/DisplayPort or general purpose PCI Express (x8/x4/x1) |
| | 6 PCI Express x1: Lanes 0/1/2/3/4 are free, lane 5 is occupied by GbE LAN; lanes 0/1/2/3 x1 can be optionally configure as 1 x4 |
| | 32-bit PCI: PCI Rev. 2.3 at 33MHz, supporting 4 bus masters |
| | LPC bus, SMBus (system), I²C (user) |

### Video

| | |
|---|---|
| Chipset | GM45 GMCH integrated Mobile Intel® Graphics Media Accelerator X4500 with core render clock 533-MHz @ 1.05 Vcore |
| Integrated Video | Intel® Dynamic Video Memory Technology (Intel® DVMT 5.0) |
| Feature Support | Video capture via x1 concurrent PCI Express port |
| | PAVP (Protected Audio-Video Path) support for Protected Intel® HD Audio Playback |
| | High performance MPEG-2 decoding |
| | WMV9 (VC-1) and H.264 (AVC) support |
| | Hardware acceleration for MPEG2 VLD/iDCT |
| | Microsoft DirectX 10 support |
| | OpenGL 2.1 support |
| | Blu-ray support @ 40 Mb/s |
| | Hardware motion compensation |
| | Intermediate Z in classic rendering |
| CRT Interface | Analog CRT support by 300-MHz DAC |
| | Analog monitor support up to QXGA and support for CRT hot plug |
| LVDS Interface | Single / Dual channel 18- or 24-bit panels |
| TV-out | NSTC/PAL up to 1024x768 resolution supported HDTV 480p/720p/1080i/1080p modes supported (without Macrovision) |

### Audio

| | |
|---|---|
| Chipset | Integrated on Intel® I/O Controller Hub 9 Mobile (ICH9M) |
| Audio Codec | On carrier (ALC888) |
| HDMI | Audio routed to HDMI interface |

### LAN

| | |
|---|---|
| Chipset | Integrated on ICH9M with Intel 82567LM PHY |
| Interface | 10/100/1000 Mbps Ethernet |

### Multi I/O

| | |
|---|---|
| Chipset | Integrated on Intel® I/O Controller Hub 9 Mobile (ICH9M) |
| USB | Supports up to eight ports USB v. 2.0 |
| SATA | Four ports SATA 3 Gb/s with optional support for RAID 0,1,5,10 |
| PATA | SATA to PATA JM330 controller on SATA channel 3, Master only (can be removed to free up fourth SATA channel) |

### Super I/O

| | |
|---|---|
| | Connected to LPC bus on carrier if needed |

### TPM

| | |
|---|---|
| Chipset | Infineon SLB9635TT1.2 |
| Type | TPM 1.2 |

### Power Specifications

| | |
|---|---|
| Input Power | AT mode (12 V +/- 5%) and ATX mode (12 V and 5 Vsb +/- 5%) |
| Power States | Supports S0, S1, S3, S4, S5 |
| Power Consumption | 23 W (with Core™2 Duo P8400 at 2.26 GHz and 2 GB memory, typical) |
| Smart Battery Support | Yes |

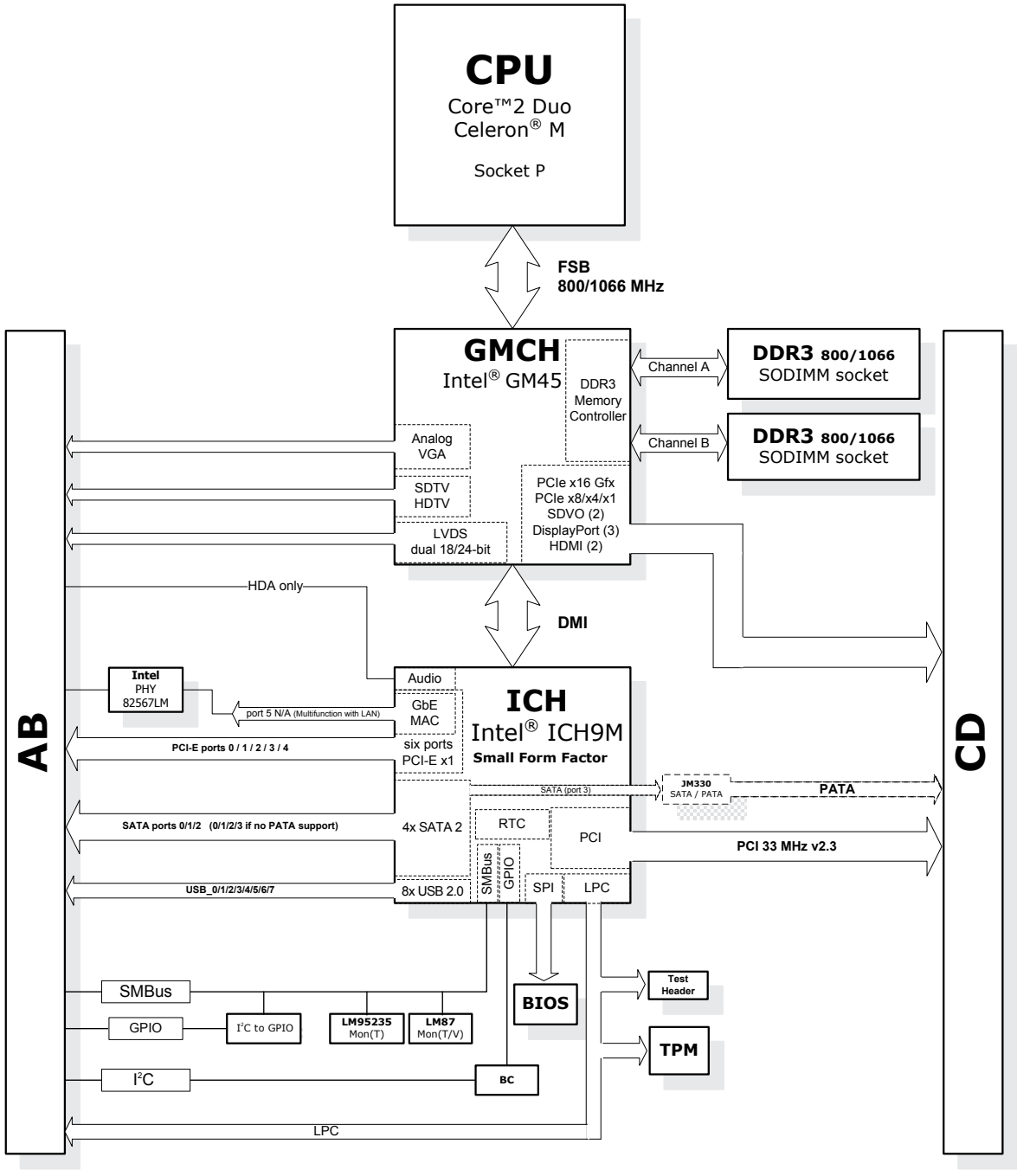
### Mechanical and Environmental

| | |
|---|---|
| Operating Temp | 0°C to 60°C |
| Storage Temp | -20°C to 80°C |
| Humidity | 90% at 60°C |
| Shock | 15G peak-to-peak, 11ms duration, non-operation |
| Vibration | Non-operating: 1.88 Grms, 5-500 Hz, each axis |
| | Operating: 0.5 Grms, 5-500 Hz, each axis |
| Compatibility | COM Express™ Type 2, Basic form factor 125 mm x 95 mm |
| Certification | CE, FCC |

### Operating Systems

| | |
|---|---|
| Standard Support | Windows® XP(e) / Vista / Windows® 7 |
| | Linux® |
| Extended Support (BSP) | Embedded XP support package |
| | Linux® 2.6.x BSP (with Xorg OpenGL setup instructions) |
| | Vxworks 6.x BSP (on request) |
| | AIDI Library for Windows® and Linux® |

## Functional Diagram




## Ordering Information

### Modules

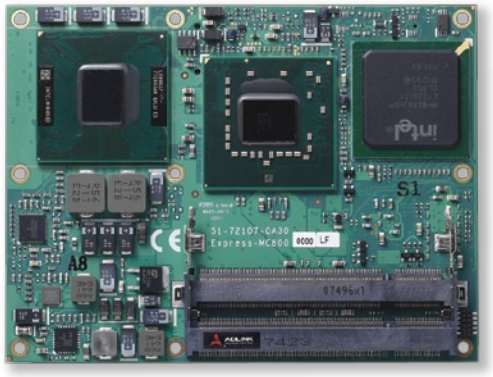
| Model Number | Description/Configuration |
|---|---|
| **Express-MG-S** | COM Express™ Module with socket type for Intel® Core™2 Duo processor with GM45 and ICH9M chipset |
| **Express-MG-S/T9400** | COM Express™ Module with socket type Intel® Core™2 Duo processor T9400 at 2.53 GHz |
| **Express-MG-S/P8400** | COM Express™ Module with socket type Intel® Core™2 Duo processor P8400 at 2.26 GHz |
| **Express-MG-S/T3100** | COM Express™ Module with socket type Intel® Dual Core Celeron® processor T3100 at 1.90 GHz |
| **Express-MG-S / 575** | COM Express™ Module with socket type Intel® Celeron® processor 575 at 2.00 GHz |

### Accessories

| Model Number | Description/Configuration |
|---|---|
| **Heat Spreaders** | |
| HTS-MG-S | Heatspreader for Express-MG (socket CPU) with threaded standoffs |
| **Passive Heatsinks** | |
| THS-MG-S | Low Profile Heatsink for Express-MG (socket CPU) with threaded standoffs |
| **Heatsink with Active Cooling** | |
| THSF-MG-S | High Performance Heatsink with FAN for Express-MG (socket CPU) with threaded standoffs |

# Express-MC800

## COM Express™ Module with Intel® Core™2 Duo Processor and GME965 / ICH8-M Chipset



## Features

- Intel® Core™2 Duo processor (up to 2.2 GHz)
- Intel® GME965 / ICH8M chipset
- Dual SODIMM for up to 4 GB DDR2 at 800MHz
- Five PCIe x1, one PCIe x16 graphic (or x8)
- Dual-channel 24-bit LVDS, TV-out
- SATA 3 Gb/s, PATA, Gigabit LAN, USB 2.0

## Specifications

### Core System

| | |
|---|---|
| CPU | **Socket P type** |
| | Intel® Core™2 Duo T7500, FSB 800, 2.2 GHz with 4MB L2 cache, 34 W |
| | Intel® Celeron® M 550, FSB 533, 2.0 GHz, with 1MB L2 cache 27 W |
| | **BGA type** |
| | Intel® Core™2 Duo T7500, FSB 800, 2.2 GHz with 4MB L2 cache, 34 W |
| | Intel® Core™2 Duo L7500, FSB 800, LV 1.5 GHz with 4MB L2 cache, 17 W |
| | Intel® Core™2 Duo U7500, FSB 533, ULV 1.06 GHz with 2MB L2 cache, 10 W |
| Memory | Dual stacked SODIMM sockets supporting dual channel memory, up to 4 GB of non-ECC, 533/667 MHz DDR2 |
| Chipset | Intel® GME965 GMCH and ICH8-M |
| BIOS | AMIBIOS®8 with CMOS backup in 8 Mbit SPI BIOS |
| Hardware Monitor | Supply voltages and CPU temperature |
| Watchdog Timer | Programmable timer ranges to generate RESET |
| Expansion Busses | 6 PCI Express x1 (0 – 4 free, 5 occupied by GbE), optional configurable as x4 |
| | Graphics PCI Express x16 or PCI Express x8/x4/x1, or SDVO digital video bus |
| | 32-bit PCI 2.3 at 33MHz, supporting 6 bus masters |
| | LPC, SMBus, I²C |

### Video

| | |
|---|---|
| Chipset | GME965 integrated Mobile Intel® GMA X3100 |
| CRT Interface | Analog CRT support up to 2048 x1536 at 60 Hz, 32-bpp |
| LVDS Interface | Single / Dual channel 18/24-bit at 25~112 MHz |
| TV-out | NTSC/PAL up to 1024x768 resolution, HDTV 480p/720p/1080i/1080p modes supported (without Macrovision) |

### Audio

| | |
|---|---|
| Chipset | Integrated on Intel® ICH8-M |
| Audio Codec | HDA codec on carrier |

### LAN

| | |
|---|---|
| Chipset | ICH8-M integrated GbE MAC with Intel® 82566 PHY |
| Interface | 10/100/1000 Mbps with Wake-on-LAN and Alert on LAN support |

### Multi I/O

| | |
|---|---|
| Chipset | Intel® ICH8-M |
| IDE (PATA) | Single channel IDE with Ultra ATA 100/66/33 support |
| SATA | Three ports SATA 3 Gb/s |
| USB | Up to eight ports USB 2.0 |

### Super I/O

Connected to LPC bus on carrier if needed

### TPM

| | |
|---|---|
| Chipset | Infineon SLB9635TT1.2 |
| Type | TPM 1.2 |

### Power Specifications

| | |
|---|---|
| Input Power | AT mode (12 V) and ATX mode (12 V and 5 Vsb) |
| Power States | Supports S0, S1, S3, S4, S5 |
| Power Consumption | 19 W (with Core™2 Duo U7500 at 1.06 GHz and 2 GB memory, typical) |

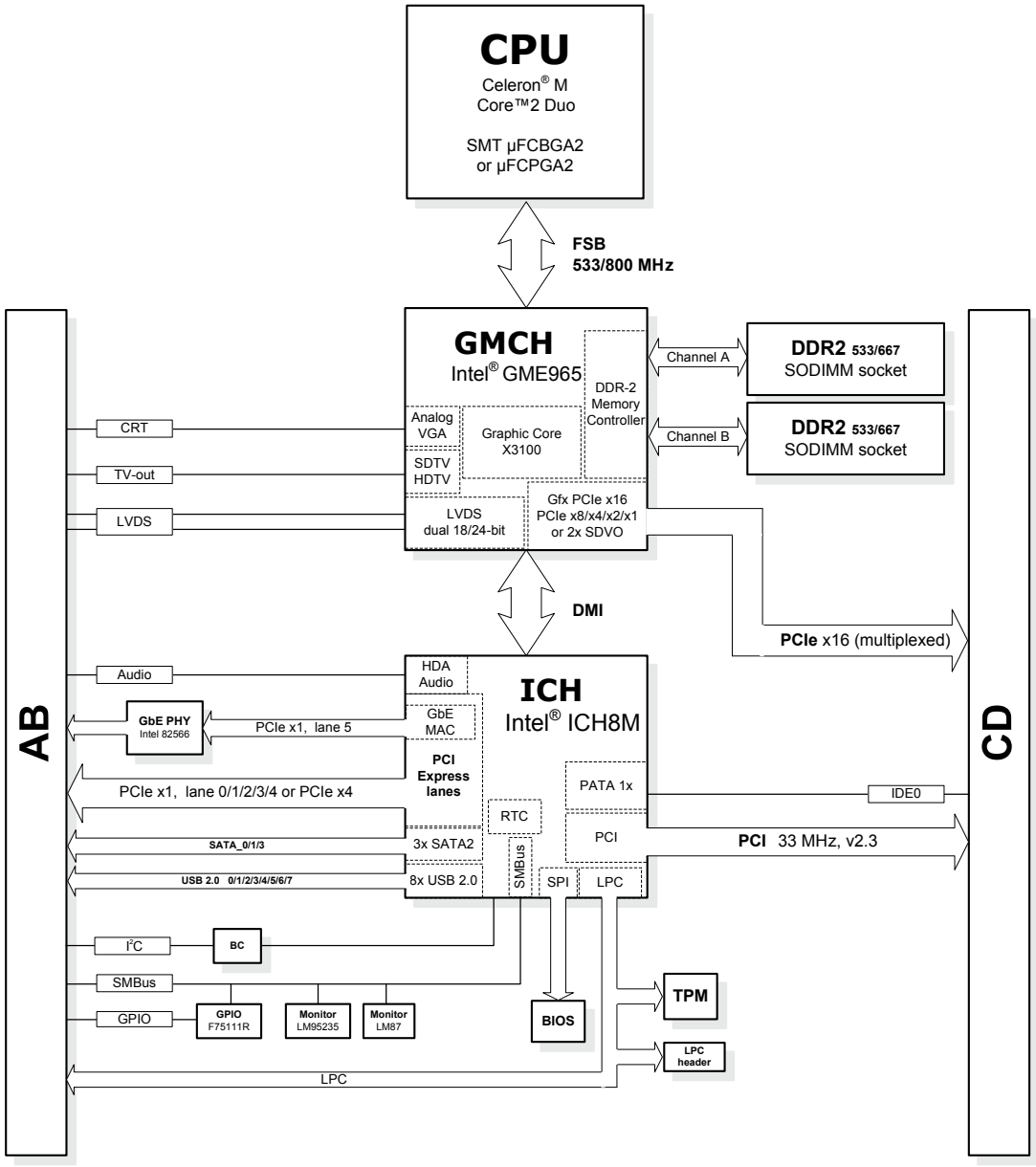
### Mechanical and Environmental

| | |
|---|---|
| Operating Temp. | 0°C to 60°C |
| Storage Temp. | 20°C to 80°C |
| Humidity | 90% at 60°C |
| Shock | 15G peak-to-peak, 11ms duration, non-operation |
| Vibration | Non-operating: 1.88 Grms, 5-500 Hz, each axis |
| | Operating: 0.5 Grms, 5-500 Hz, each axis |
| Form Factor | COM Express™ Type 2, Basic form factor, 95 mm x 125 mm |
| Certifications | CE, FCC |

### Operating Systems

| | |
|---|---|
| Standard Support | Windows® XP 32/64-bit |
| | Windows® Vista 32/64-bit |
| | Windows® Server 2003 |
| | Linux® 2.6.x |
| Extended Support | Embedded XP BSP |
| | Linux® 2.6.x BSP |
| | AIDI Library for Win32, WinCE and Linux® |

## Functional Diagram




## Ordering Information

### Modules

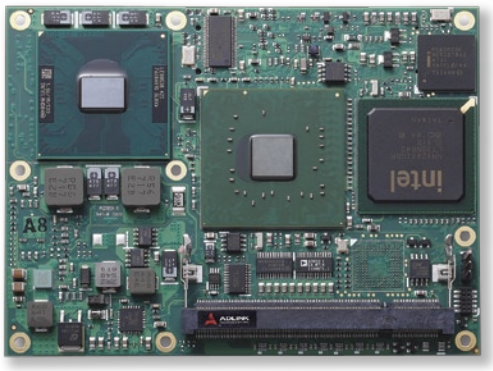
| Model Number | Description/Configuration |
|---|---|
| **Express-MC800-S** | COM Express™ Module with socket for Celeron® M or Core™2 Duo processor (for Intel® Core™2 Duo T7500 processor at 2.2 GHz or Intel® Celeron® M 550 processor at 2.0 GHz) |
| **Express-MC800-L7500** | COM Express™ Module with LV Intel® Core™2 Duo L7500 processor at 1.6 GHz |
| **Express-MC800-U7500** | COM Express™ Module with ULV Intel® Core™2 Duo U7500 processor at 1.06 GHz |

### Accessories

| Model Number | Description/Configuration |
|---|---|
| **Heat Spreaders** | |
| HTS-MC800-B | Heatspreader for Express-MC800 (BGA CPU) with threaded standoffs |
| **Passive Heatsinks** | |
| THS-MC800-B | Low Profile Heatsink for Express-MC800 (BGA CPU) with threaded standoffs |
| THSH-MC800-B | High Heatsink for Express-MC800 (BGA CPU) with threaded standoffs |
| **Heatsink with Active Cooling** | |
| THSF-MC800-S | High Performance Heatsink with Fan for Express-MC800 (socket CPU) with threaded standoffs |

# Express-NR

## COM Express™ Module with Intel® Core™2 Duo Processor and 945GME / ICH7-M Chipset



## Features

- Intel® Core™2 Duo processor (up to 2.1 GHz)
- Intel® 945GME / ICH7-M chipset
- Dual SODIMM for up to 4 GB DDR2 at 667 MHz
- One PCIe® x16, five PCIe® x1 (or one x4)
- Single/dual 18/24-bit LVDS, TV-out
- SATA, PATA, Gigabit LAN, USB 2.0

## Specifications

### Core System

| | |
|---|---|
| CPU | **Merom Core socket type** |
| | Intel® Core™2 Duo T7400, 2.16GHz with 4MB L2 cache, 34 W |
| | Intel® Celeron® M 530, 1.73GHz with 1MB L2 cache, 27 W |
| | **Merom Core BGA type** |
| | Intel® Core™2 Duo L7400, 1.5 GHz with 4MB L2 cache, 17 W |
| | Intel® Core™2 Duo U7500, 1.06 GHz with 2MB L2 cache, 10 W |
| | **Yonah Core socket type** |
| | Intel® Core™ Duo T2500, 2.0 GHz with 2MB L2 cache, 31 W |
| | Intel® Celeron® M 440, 1.86 GHz with 1MB L2 cache, 27 W |
| | **Yonah Core BGA type** |
| | Intel® Core™ Duo L2400, 1.66GHz with 2MB L2 cache, 15 W |
| | Intel® Core™ Duo U2500, 1.2 GHz with 2MB L2 cache, 9 W |
| | Intel® Celeron® M 423, 1.06GHz with 1MB L2 cache, 5.5 W |
| Memory | Dual SODIMM sockets supporting dual channel memory, up to 4 GB of non-ECC, 533/667 MHz DDR2 |
| Chipset | Intel® 945GME Express Graphics Memory Controller Hub |
| | Intel® I/O Controller Hub 7 Mobile (ICH7-M DH) |
| BIOS | AMIBIOS®8 with CMOS backup in 8 Mbit SPI BIOS |
| Hardware Monitor | Supply voltages and CPU temperature |
| Watchdog Timer | Programmable timer ranges to generate RESET |
| Expansion Busses | 6 PCI Express x1 (0 – 4 free, 5 occupied by GbE LAN), optional configurable as x4 |
| | Graphics PCI Express x16, or SDVO digital video bus |
| | 32-bit PCI 2.3 at 33MHz, supporting 6 bus masters |
| | LPC, SMBus, I²C |

### Video

| | |
|---|---|
| Chipset | 945GME GMCH integrated graphics supports dual independent displays |
| CRT Interface | Analog VGA support up to 2048 x1536 resolution |
| LVDS Interface | Single / Dual channel 18/24-bit |
| TV-out | NTSC/PAL up to 1024x768 resolution, HDTV 480p/720p/1080i/1080p modes supported (without Macrovision) |

### Audio

| | |
|---|---|
| Chipset | Integrated on Intel® ICH7-M DH |
| Audio Codec | HDA (Azalia) or AC'97 codec on carrier |

### LAN

| | |
|---|---|
| Chipset | PCIe type Intel® 82573L |
| Interface | 10/100/1000 Mbps |

### Multi I/O

| | |
|---|---|
| Chipset | Intel® ICH7-M |
| IDE (PATA) | Single channel IDE with UDMA 100 support |
| SATA | Three SATA 1.5 Gb/s ports |
| USB | Up to eight USB 2.0 ports |

### Super I/O

Connected to LPC bus on carrier if needed

### TPM

| | |
|---|---|
| Chipset | Infineon SLB9635TT1.2 |
| Type | TPM 1.2 |

### Power Specifications

| | |
|---|---|
| Input Power | AT mode (12 V) and ATX mode (12 V and 5 Vsb) |
| Power States | Supports S0, S1, S3, S4, S5 |
| Power Consumption | 16 W typical (with Core™2 Duo U7500 and 1 GB memory) |

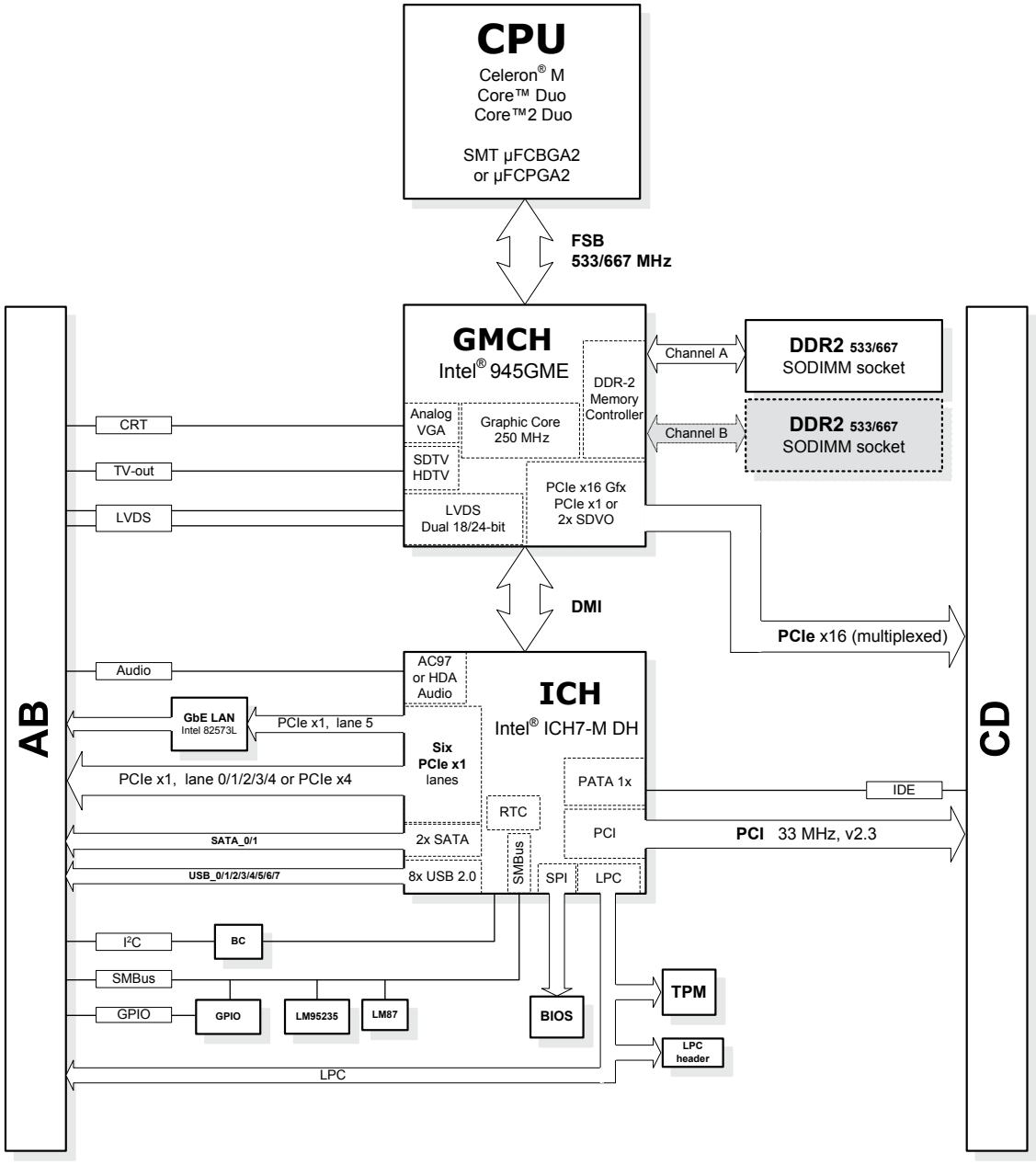
### Mechanical and Environmental

| | |
|---|---|
| Operating Temp. | 0°C to 60°C |
| Storage Temp. | -20°C to 80°C |
| Humidity | up to 90% at 60°C |
| Shock | 15G peak-to-peak, 11ms duration, non-operation |
| Vibration | Non-operating: 1.88 Grms, 5-500 Hz, each axis |
| | Operating: 0.5 Grms, 5-500 Hz, each axis |
| Form Factor | COM Express™ Type 2, Basic form factor, 95 mm x 125 mm |
| Certifications | CE, FCC |

### Operating Systems

| | |
|---|---|
| Standard Support | Windows® XP 32/64-bit |
| | Windows® Vista 32/64-bit |
| | Windows® Server 2003 |
| | Linux® 2.6.x |
| Extended Support | Embedded XP BSP |
| | WinCE BSP |
| | Linux® 2.6.x BSP |
| | AIDI Library for Win32, WinCE and Linux® |

## Functional Diagram




## Ordering Information

### Modules

| Model Number | Description/Configuration |
|---|---|
| **Express-NR-S** | COM Express™ Module with socket for Celeron® M / Core™ Duo / Core™2 Duo processor (for Intel® Core™2 Duo T7400 processor at 2.16 GHz or Intel® Celeron® M 440 processor at 1.86 GHz) |
| **Express-NR-L7400** | COM Express™ Module with LV Intel® Core™2 Duo L7400 processor at 1.5 GHz |
| **Express-NR-L2400** | COM Express™ Module with LV Intel® Core™ Duo L2400 processor at 1.66 GHz |
| **Express-NR-U7500** | COM Express™ Module with ULV Intel® Core™2 Duo U7500 processor at 1.06 GHz |
| **Express-NR-423** | COM Express™ Module with ULV Intel® Celeron® M 423 processor at 1.06 GHz |

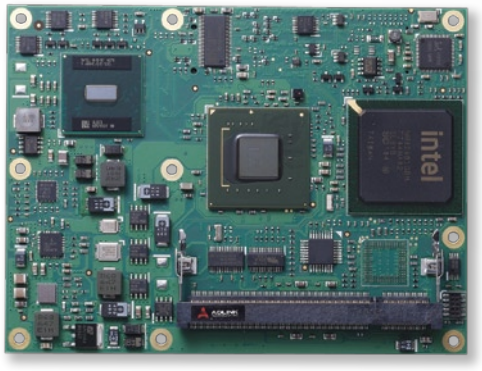
### Accessories

| Model Number | Description/Configuration |
|---|---|
| **Heat Spreaders** | |
| HTS-NR-B | Heatspreader for Express-NR (BGA CPU) with threaded standoffs |
| **Passive Heatsinks** | |
| THS-NR-B | Low Profile Heatsink for Express-NR (BGA CPU) with threaded standoffs |
| THSH-NR-B | High Heatsink for Express-NR (BGA CPU) with threaded standoffs |
| **Heatsink with Active Cooling** | |
| THSF-NR-S | High Performance Heatsink with Fan for Express-NR (socket CPU) with threaded standoffs |

# Express-AT

## COM Express™ Module with Intel® Atom™ Processor N270 and 945GSE/ICH7-M Chipset





### Features

- Intel® Atom™ processor N270 at 1.6 GHz
- Intel® 945GSE / ICH7-M chipset
- SODIMM for up to 2 GB DDR2 at 533 MHz
- Three PCIe x1 (optional 4 x1 or 1 x4)
- High resolution CRT, single/dual 18-bit LVDS and TV-out (SDTV and HDTV)
- SATA, IDE (PATA), Gigabit LAN, USB 2.0
- Optional 512MB~8GB IDE-based Solid State Disk

## Specifications

### Core System

| | |
|---|---|
| CPU | **BGA type** |
| | Intel® Atom™ N270, FSB 533, 1.6 GHz with 512 KB L2 cache, 2.5 W, on-die primary 32-kB instruction cache and 24 KB write-back data cache |
| | Hyper-Threading support (2-threads) |
| | Advanced gunning transceiver logic (AGTL+) bus driver technology |
| | Enhanced Intel® SpeedStep® Technology |
| | Source synchronous double-pumped (2x) Address |
| | Source synchronous quad-pumped (4x) Data |
| | C0 - C4 low power states supported |
| Memory | Single SODIMM socket memory, up to 2 GB of non-ECC, 400/533 MHz DDR2 |
| Chipset | Intel® 945GSE Express Graphic Memory Controller Hub and Intel® I/O Controller Hub 7 Mobile (ICH7-M) |
| BIOS | AMIBIOS®8 with CMOS backup in 8 Mbit SPI BIOS |
| Hardware Monitor | Supply voltages and CPU temperature |
| Watchdog Timer | Programmable timer ranges to generate RESET |
| Expansion Busses | 4 PCI Express x1 (0/1/2 are free, 3 is occupied by GbE LAN) optionally configured as x4 |
| | Serial Digital Video Out (SDVO) |
| | 32-bit PCI 2.3 at 33MHz, supporting 4 bus masters |
| | LPC, SMBus, I²C |

### Video

| | |
|---|---|
| Chipset | Intel® Graphics Media Accelerator 950 integrated into 945GSE GMCH supporting dual independent displays |
| CRT Interface | Analog CRT support up to 1600 x 1200 |
| LVDS Interface | Single / Dual channel 18-bit (optional 24-bit on carrier through SDVO) |
| TV-out | NTSC/PAL up to 1024x768 resolution supported, HDTV 480p/720p/1080i/1080p modes supported (without Macrovision) |

### Audio

| | |
|---|---|
| Chipset | Integrated on Intel® I/O Controller Hub 7 Mobile (ICH7-M) |
| Audio Codec | HDA (Azalia) or AC'97 codec on carrier |

### LAN

| | |
|---|---|
| Chipset | PCIe x1 Realtek RTL8111C |
| Interface | 10/100/1000 Mbps |

### Multi I/O

| | |
|---|---|
| Chipset | Intel® ICH7-M |
| IDE (PATA) | Single IDE channel with UDMA100 with optional 512MB - 8GB IDE-based Solid State Disk |
| SATA | Two port SATA 1.5 Gb/s |
| USB | Up to eight ports USB 2.0 |

### Super I/O

Connected to LPC bus on carrier if needed

### TPM

| | |
|---|---|
| Chipset | Infineon SLB9635TT1.2 |
| Type | TPM 1.2 |

### Power Specifications

| | |
|---|---|
| Input Power | AT mode (12 V) and ATX mode (12 V and 5 Vsb) |
| Power States | Supports S0, S1, S3, S4, S5 |
| Power Consumption | 9 W typical (with Atom™ N270 and 1 GB memory) |

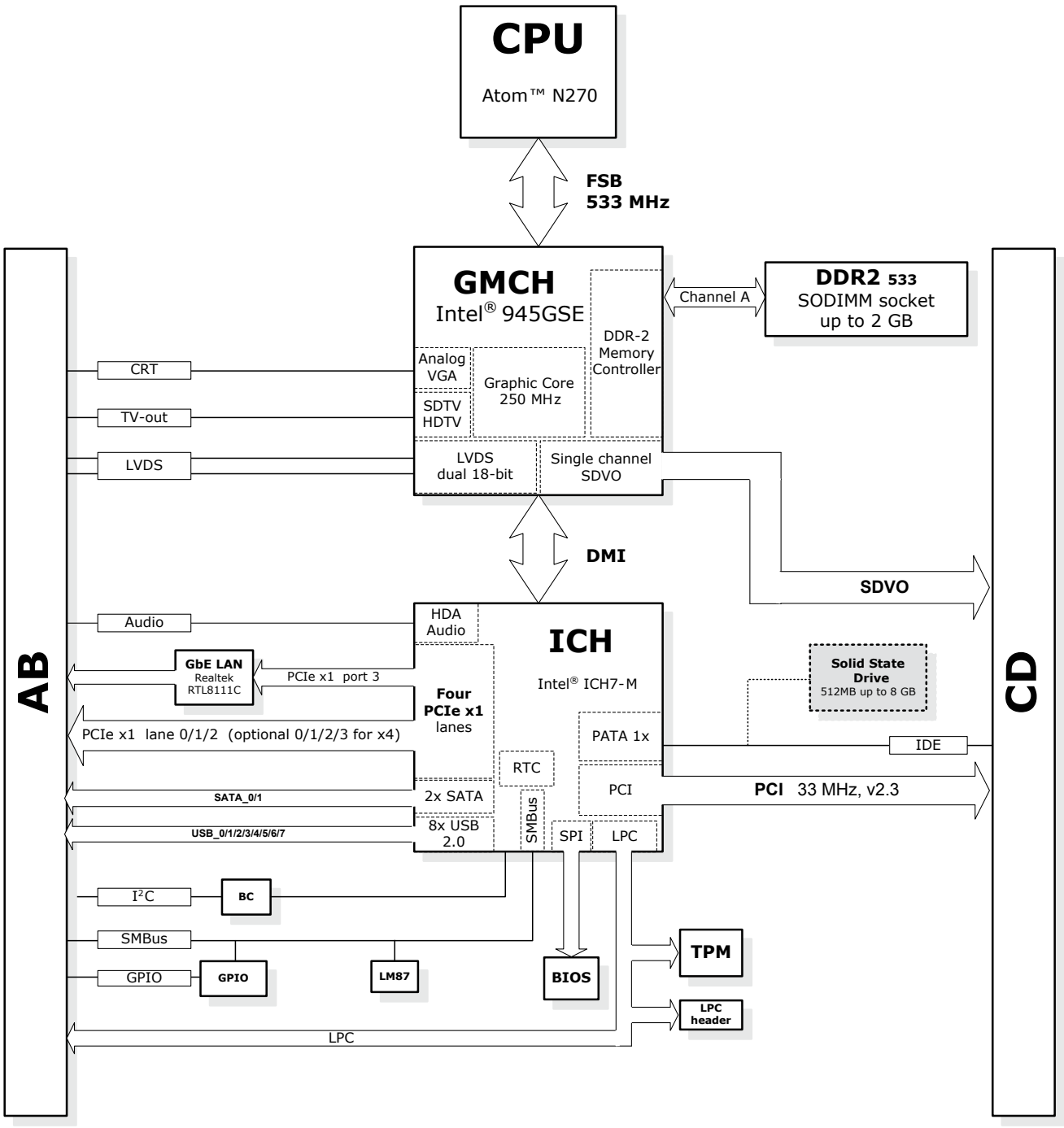
### Mechanical and Environmental

| | |
|---|---|
| Operating Temp. | 0°C to 60°C |
| Storage Temp. | -20°C to 80°C |
| Humidity | Up to 90% at 60°C |
| Shock | 15G peak-to-peak, 11ms duration, non-operation |
| Vibration | Non-operating: 1.88 Grms, 5-500 Hz, each axis |
| | Operating: 0.5 Grms, 5-500 Hz, each axis |
| Form Factor | COM Express™ Type 2, Basic form factor, 95 mm x 125 mm |
| Certifications | CE, FCC |

### Operating Systems

| | |
|---|---|
| Standard Support | Windows® XP 32-bit |
| | Windows® Vista 32-bit |
| | Linux® 2.6.x |
| Extended Support | Embedded XP BSP |
| | WinCE BSP |
| | Linux® 2.6.x BSP |
| | AIDI Library for Win32, WinCE and Linux® |

## Functional Diagram




## Ordering Information

### Modules

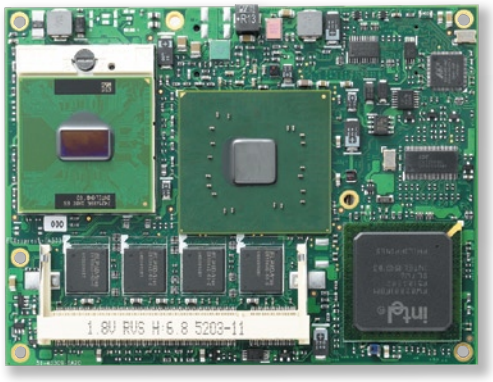
| Model Number | Description/Configuration |
|---|---|
| **Express-AT-N270** | COM Express™ module with Intel® Atom™ N270 processor at 1.6 GHz |
| **Express-AT-N270-4G** | COM Express™ module with Intel® Atom™ N270 processor at 1.6 GHz 4GB SSD Solid State Disk |

### Accessories

| Model Number | Description/Configuration |
|---|---|
| **Heat Spreaders** | |
| HTS-CAT-B | Heatspreader for Express-AT (BGA CPU) with threaded standoffs |
| **Passive Heatsinks** | |
| THS-CAT-B | Low Profile Heatsink for Express-AT (BGA CPU) with threaded standoffs |

# Express-IA533

## COM Express™ Module with Intel® Pentium® M Processor and 915GME/ICH6-M Chipset



## Features

- Intel® Pentium® M Processor up to 2.1 GHz
- Intel® 915GME Express chipset
- Dual-Channel DDR2 533 MHz
- Three PCI Express® x1 lanes and one PCI Express® x16 Graphics lane
- Onboard Gigabit Ethernet
- SATA, USB 2.0, LVDS, SDVO

## Specifications

### Core System

| | |
|---|---|
| CPU | **Socket 479 type** |
| | Intel® Pentium® M 760, 2.0 GHz, with 2MB L2 cache |
| | Intel® Pentium® M 745, 1.8 GHz, with 2MB L2 cache |
| | **BGA type** |
| | Intel® Pentium® M 738, 1.4 GHz, with 2MB L2 cache |
| | Intel® Celeron® M 373, 1.0 GHz, with 1MB L2 cache |
| Memory | 400/533 MHz DDR2, non-ECC, unbuffered |
| | Channel A: SO-DIMM socket for DDR2 memory, max 1 GB |
| | Channel B: soldered DDR2 memory, max 512 MB |
| Chipset | Intel® 915GME Express Graphic Memory Controller Hub and Intel® I/O Controller Hub 6 Mobile (ICH6-M) |
| BIOS | Phoenix AWARD BIOS in 1 MB FWH with console redirection and CMOS EEPROM backup |
| Hardware Monitor | Supply voltages and CPU temperature |
| Watchdog Timer | Programmable timer ranges to generate RESET |
| Expansion Busses | Four PCI Express x1 lanes (one occupied by GbE LAN) |
| | Six 32-bit PCI 2.3 Masters at 33/66 MHz |
| | Low Pin Count (LPC) interface for Super I/O on carrier |
| | SMBus 2.0 interface support |

### Video

| | |
|---|---|
| Chipset | 915GME GMCH integrated chipset supports dual independent displays |
| CRT Interface | Analog CRT support up to 2048 x1536 |
| LVDS Interface | Dual channel 18-bit |
| Graphic Expansion busses | One PCI Express® x16 Graphics port |
| | Two Serial DVO ports (multiplexed with PCI Express® x16) |

### Audio

| | |
|---|---|
| Chipset | Integrated on Intel® ICH6-M |
| Audio Codec | Optional AC'97 codec on carrier |

### LAN

| | |
|---|---|
| Chipset | Yukon-EC 88E8053 PCIe Gigabit Ethernet Controller |
| Interface | Triple speed 10/100/1000BASE-T IEEE 802.3 compliant with fully integrated ASF 2.0 functionality |

### Multi I/O

| | |
|---|---|
| Chipset | Intel® ICH6-M |
| IDE (PATA) | One Ultra ATA 100/66/33 IDE port |
| SATA | Two SATA 1.5 Gb/s ports |
| USB | Up to eight USB 2.0 ports, supports legacy KB / Mouse |

### Super I/O

| | |
|---|---|
| | Connected to LPC bus on carrier if needed |

### TPM

| | |
|---|---|
| Chipset | Infineon SLB9635TT1.2 |
| Type | TPM 1.2 |

### Power Specifications

| | |
|---|---|
| Input Power | AT mode (12 V) and ATX mode (12 V and 5 Vsb) |
| Power States | Supports S0, S1, S3, S4, S5 |
| Power Consumption | 18 W typical (with Pentium® M 738 and 1 GB memory) |

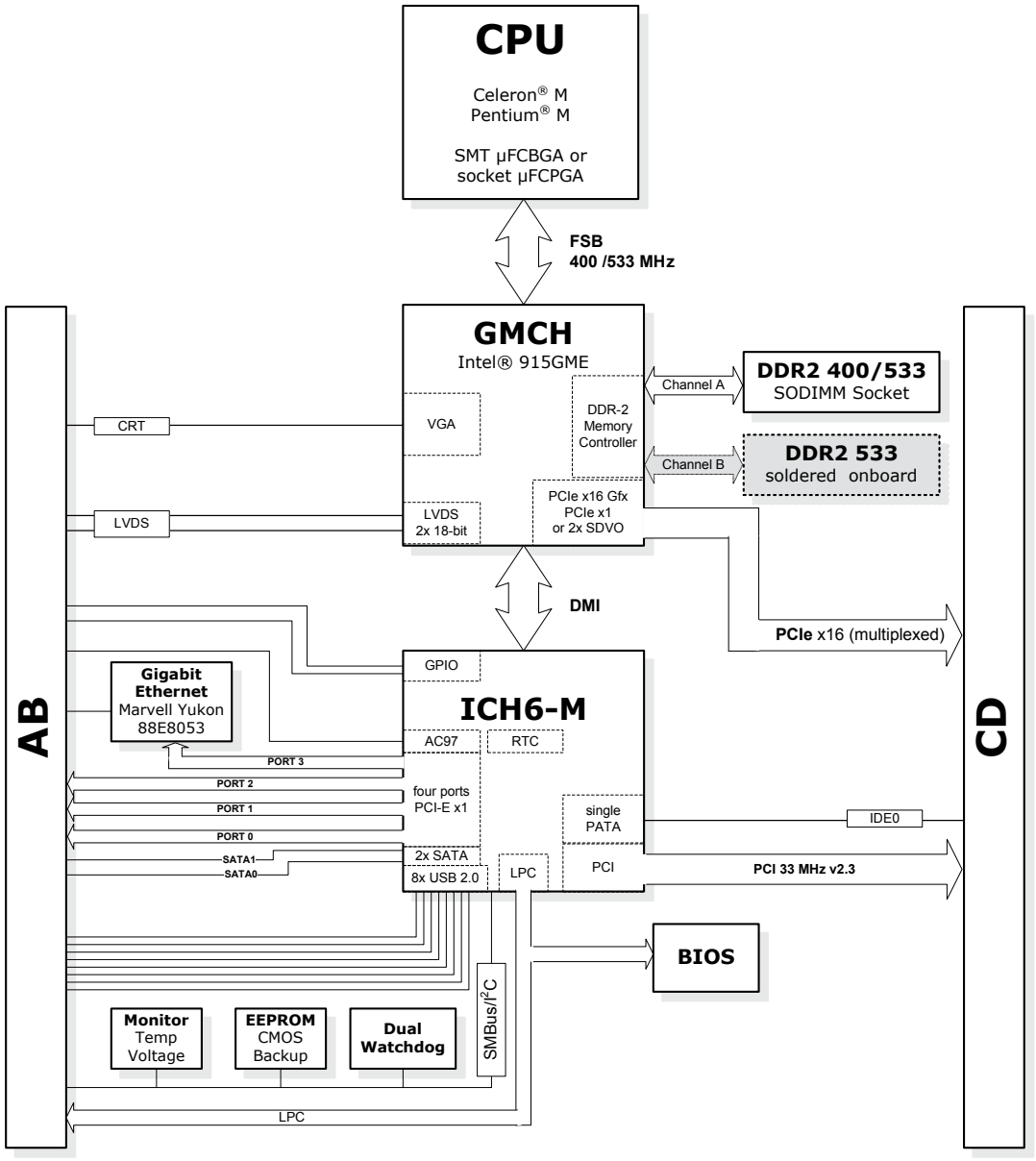
### Mechanical and Environmental

| | |
|---|---|
| Operating Temp. | 0°C to 60°C |
| Storage Temp. | -20°C to 80°C |
| Humidity | Up to 90% at 60°C |
| Shock | 15G peak-to-peak, 11ms duration, non-operation |
| Vibration | Non-operating: 1.88 Grms, 5-500 Hz, each axis |
| | Operating: 0.5 Grms, 5-500 Hz, each axis |
| Form Factor | COM Express™ Type 2, Basic form factor, 95 mm x 125 mm |
| Certifications | CE, FCC |

### Operating Systems

| | |
|---|---|
| Standard Support | Windows® XP 32-bit |
| | Linux® 2.6.x |
| Extended Support | Embedded XP BSP |
| | Linux® 2.6.x BSP |
| | AIDI Library for Win32 and Linux® |

## Functional Diagram




## Ordering Information

### Modules

| Model Number | Description/Configuration |
|---|---|
| **Express-IA533-S/0** | COM Express module with socket for Intel® Celeron®/ Pentium® M processor |
| **Express-IA533-760/0** | COM Express module with Intel Pentium® M 760 at 2.0GHz |
| **Express-IA533-745/0** | COM Express module with Intel Pentium® M 745 at 1.8GHz |
| **Express-IA533-738/0** | COM Express module with Intel Penium® M 738 at 1.4GHz |
| **Express-IA533-373/0** | COM Express module with Intel Celeron® M 373 at 1GHz |

Note: All models optional soldered memory

### Accessories

| Model Number | Description/Configuration |
|---|---|
| **Heat Spreaders** | |
| HTS-IA533-B | Heatspreader for Express-IA533 (BGA CPU) with threaded standoffs |
| **Passive Heatsinks** | |
| THS-IA533-B | Low Profile Heatsink for Express-IA533 (BGA CPU) with threaded standoffs |
| **Heatsink with Active Cooling** | |
| THSF-IA533-S | High Performance Heatsink with Fan for Express-IA533 (socket CPU) with threaded standoffs |

# Express-LPC

## Compact COM Express™ Module with Single/Dual Core Intel® Atom™ Processor and ICH8M Chipset

## Features

- Single/Dual Core Atom™ processor at 1.8 GHz
- Intel® I/O Controller Hub 8 Mobile
- Up to 4 GB DDR3 SDRAM at 800 MHz
- Five free PCIe x1 lanes (optional PCIe x4)
- CRT and LVDS support
- SATA 3 Gb/s, IDE (PATA), Gigabit LAN, USB 2.0

DDR3

## Specifications

### Core System

| | |
|---|---|
| CPU | **Intel® Atom™ Processor** |
| | N455: Single Core Intel® Atom™ processor 1.66 GHz at 6.5 W |
| | D425: Single Core Intel® Atom™ processor 1.80 GHz at 10 W |
| | D525: Dual Core Intel® Atom™ processor 1.80 GHz at 13 W |
| | N570: Dual Core Intel® Atom™ processor 1.66 GHz at 8.5 W |
| Memory | Dual SODIMM sockets support up to 4 GB of non-ECC 667/800 MHz DDR3 memory |
| Chipset | Intel® I/O Controller Hub 8 Mobile (ICH8-M) |
| L2 Cache | 1 MB for D525, 512KB for N455 & D425 |
| BIOS | AMIBIOS® 8 with CMOS backup in 16 Mbit SPI BIOS supports SPI BIOS on carrier (COM.0 R2.0) |
| Hardware Monitor | Supply voltages and CPU temperature |
| Debug Interface | XDP SFF-26 extension for ICE debug |
| Embedded Features | Instant on with Intel Bootloader support, OEM BIOS settings, Board Info & Statistics, ACPI 3.0, Smart Battery Management support, Watchdog with programmable timer ranges |
| Expansion Busses | 6 PCI Express x1: 0/1/2/3/4 are free, 5 is occupied by GbE; 0/1/2/3 x1 can be optionally configured as 1 x4 |
| | 32-bit PCI: PCI rev. 2.3 at 33MHz, supporting 4 bus masters |
| | LPC bus, SMBus (system), $I^2C$ (user) |

### Video

| | |
|---|---|
| GPU Core | Integrated in CPU with Gen3.5+ GFX Core and render core frequency at 200 MHz (N455) and 400 MHz (D425/D525) |
| Integrated Video Feature Support | Intel® Dynamic Video Memory Technology 4.0 support |
| | DirectX 9 compliant Pixel Shader v2.0 |
| | 400 MHz render clock frequency |
| | 2 display ports: LVDS and RGB |
| | Intel® Clear Video Technology |
| | MPEG2 Hardware Acceleration, ProcAmp |
| CRT Interface | Analog RGB display, resolution up to 2048x1536@ 60 Hz |
| LVDS Interface | Single 18-bit channel, resolution up to 1366x768, 18bpp |

### Audio

| | |
|---|---|
| Chipset | Integrated in Intel® I/O Controller Hub 8 Mobile (ICH8M) |
| Audio Codec | On carrier (ALC888) |

### LAN

| | |
|---|---|
| Chipset | Intel® 82583V Gigabit Ethernet Controller |
| Interface | 10/100/1000 Mbps Ethernet |

### Multi I/O and Storage

| | |
|---|---|
| Chipset | Intel® I/O Controller Hub 8 Mobile (ICH8M) |
| USB | Supports up to eight ports USB 2.0 |
| SATA | Three ports SATA 3 Gb/s |
| IDE (PATA) | Single IDE channel (UDMA100) with optional 4GB ~ 8GB IDE-based Solid State Drive |

### Super I/O

BIOS support for legacy free or legacy with two types of Super I/O (Winbond W83627HG and W83627DHG)

### TPM

| | |
|---|---|
| Chipset | Infineon SLB9635TT1.2 |
| Type | TPM 1.2 |

### Power Specifications

| | |
|---|---|
| Input Power | AT mode (12 V +/- 5%) and ATX mode (12 V and 5 Vsb +/- 5%) |
| Power States | Supports S0, S1, S3, S4, S5 |
| Power Consumption | 10 W (with N455 CPU and 2 GB memory typical) |
| Smart Battery Support | Yes |

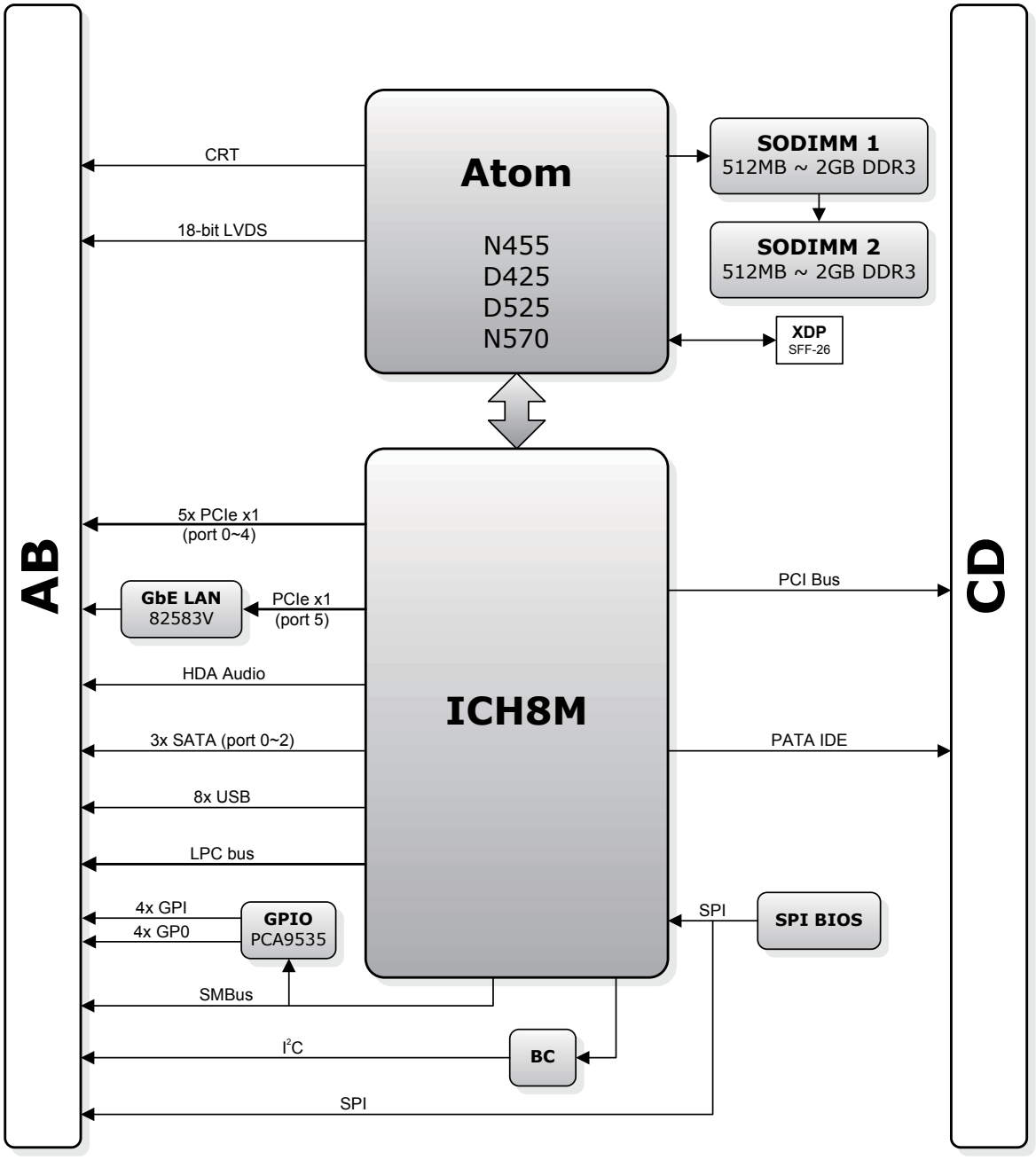
### Mechanical and Environmental

| | |
|---|---|
| Operating Temp | 0°C to 60°C |
| Storage Temp | -20°C to 80°C |
| Humidity | 90% at 60°C |
| Shock | 15G peak-to-peak, 11ms duration, non-operating |
| Vibration | Non-operating: 1.88 Grms, 5-500 Hz, each axis |
| | Operating: 0.5 Grms, 5-500 Hz, each axis |
| Compatibility | COM Express™ Type 2, COM.0 R2.0 |
| | Compact form factor 95 mm x 95 mm |
| Certification | CE, FCC |

### Operating Systems

| | |
|---|---|
| Standard Support | Windows® XP(e) / Vista, Windows® 7 |
| | Linux® |
| Extended Support (BSP) | Embedded XP / 2009 support package |
| | Linux® 2.6.x BSP |
| | VxWorks 6.x BSP |
| | AIDI Library for Windows® and Linux® |

## Functional Diagram




## Ordering Information

### Modules

| Model Number | Description/Configuration |
|---|---|
| **Express-LPC-N455** | Compact COM Express™ Module with Intel® Atom™ Single Core Low Voltage Processor N455 at 1.66 GHz |
| **Express-LPC-D425** | Compact COM Express™ Module with Intel® Atom™ Single Core Processor D425 at 1.80 GHz |
| **Express-LPC-D525** | Compact COM Express™ Module with Intel® Atom™ Dual Core Processor D525 at 1.80 GHz |
| **Express-LPC-N570** | Compact COM Express™ Module with Intel® Atom™ Dual Core Low Voltage Processor N570 at 1.66 GHz |

### Accessories

| Model Number | Description/Configuration |
|---|---|
| Heat Spreaders | |
| **HTS-LPC-B** | Heatspreader for Express-LPC with threaded standoffs |
| Passive Heatsinks | |
| **THS-LPC-B** | Low Profile Heatsink for Express-LPC with threaded standoffs |
| Active Heatsinks | |
| **THSF-LPC-B** | Heatsink with Fan for Express-LPC with threaded standoffs |

# Express-ATC

## Compact COM Express™ Module with Intel® Atom™ Processor N270 and 945GSE/ICH7-M Chipset

### Features

- Intel® Atom™ processor N270 at 1.6 GHz
- Intel® 945GSE/ICH7-M chipset
- SODIMM for up to 2 GB DDR2 at 533 MHz
- Three PCIe x1 (optional 4 x1 or 1 x4)
- High resolution CRT, single/dual 18-bit LVDS and TV-out (SDTV and HDTV)
- SATA, IDE (PATA), Gigabit LAN, USB 2.0
- Optional 1GB ~ 8GB IDE-based Solid State Drive

## Specifications

### Core System

| | |
|---|---|
| CPU | **BGA type** |
| | Intel® Atom™ N270, FSB 533, 1.6 GHz with 512 KB L2 cache, 2.5 W, on-die primary 32-kB instruction cache and 24 KB write-back data cache |
| | Hyper-Threading support (2-threads) |
| | Advanced gunning transceiver logic (AGTL+) bus driver technology |
| | Enhanced Intel SpeedStep® Technology |
| | Source synchronous double-pumped (2x) Address |
| | Source synchronous quad-pumped (4x) Data |
| | C0 - C4 low power states supported |
| Memory | Single SODIMM socket up to 2 GB of non-ECC, 400/533 MHz DDR2 memory |
| Chipset | Intel® 945GSE Express Graphic Memory Controller Hub and Intel® I/O Controller Hub 7 Mobile (ICH7-M) |
| BIOS | AMIBIOS®8 with CMOS backup in 8 Mbit SPI BIOS |
| Hardware Monitor | Supply voltages and CPU temperature |
| Watchdog Timer | Programmable timer ranges to generate RESET |
| Expansion Busses | 4 PCI Express x1 (0/1/2 are free, 3 is occupied by GbE LAN) optionally configured as one PCIe x4 |
| | Serial Digital Video Out (SDVO) |
| | 32-bit PCI 2.3 at 33MHz, supporting 4 bus masters |
| | LPC, SMBus, I²C |

### Video

| | |
|---|---|
| Chipset | Intel® Graphics Media Accelerator 950 integrated into 945GSE GMCH supporting dual independent displays |
| CRT Interface | Analog CRT support up to 1600 x 1200 |
| LVDS Interface | Single / Dual channel 18-bit (optional 24-bit on carrier through SDVO) |
| TV-out | NTSC/PAL up to 1024x768 resolution supported, HDTV 480p/720p/1080i/1080p modes supported (without Macrovision) |

### Audio

| | |
|---|---|
| Chipset | Integrated on Intel® I/O Controller Hub 7 Mobile (ICH7-M) |
| Audio Codec | HDA (Azalia) or AC'97 codec on carrier |

### LAN

| | |
|---|---|
| Chipset | PCIe x1 Realtek RTL8111C |
| Interface | 10/100/1000 Mbps |

### Multi I/O

| | |
|---|---|
| Chipset | Intel® ICH7-M |
| IDE (PATA) | Single IDE channel with UDMA100 with optional 1GB ~ 8GB IDE-based Solid State Drive |
| SATA | Two ports SATA 1.5 Gb/s |
| USB | Up to eight ports USB 2.0 |

### Super I/O

Connected to LPC bus on carrier if needed

### TPM

| | |
|---|---|
| Chipset | Infineon SLB9635TT1.2 |
| Type | TPM 1.2 |

### Power Specifications

| | |
|---|---|
| Input Power | AT mode (12 V) and ATX mode (12 V and 5 Vsb) |
| Power States | Supports S0, S1, S3, S4, S5 |
| Power Consumption | 9 W typical (with Atom™ N270 and 1 GB memory) |

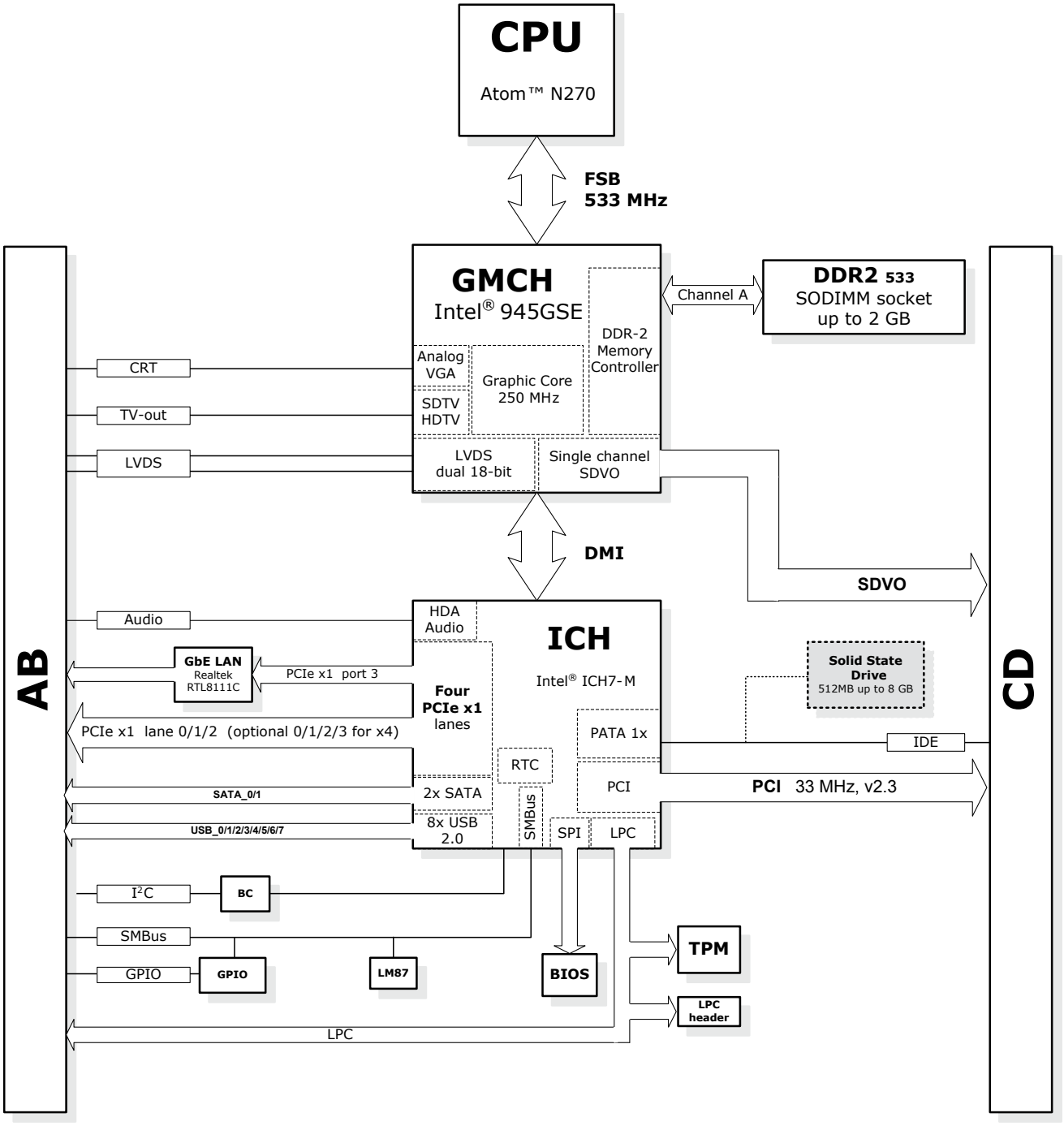
### Mechanical and Environmental

| | |
|---|---|
| Operating Temp. | 0°C to 60°C |
| Storage Temp. | -20°C to 80°C |
| Humidity | Up to 90% at 60°C |
| Shock | 15G peak-to-peak, 11ms duration, non-operation |
| Vibration | Non-operating: 1.88 Grms, 5-500 Hz, each axis |
| | Operating: 0.5 Grms, 5-500 Hz, each axis |
| Form Factor | COM Express™ Type 2, Compact form factor, 95 mm x 95 mm |
| Certifications | CE, FCC |

### Operating Systems

| | |
|---|---|
| Standard Support | Windows® XP 32-bit |
| | Windows® Vista 32-bit |
| | Linux® 2.6.x |
| Extended Support | Embedded XP BSP |
| | WinCE BSP |
| | Linux® 2.6.x BSP |
| | AIDI Library for Win32, WinCE and Linux® |

## Functional Diagram




## Ordering Information

### Modules

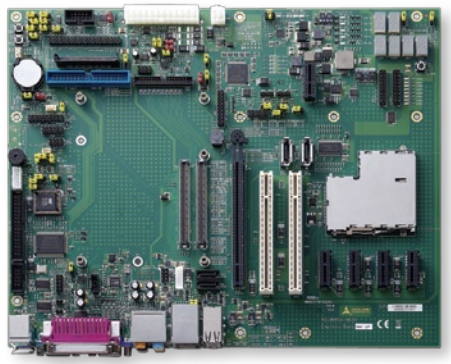
| Model Number | Description/Configuration |
|---|---|
| **Express-ATC-N270** | Compact COM Express™ module with Intel® Atom™ N270 processor at 1.6 GHz |
| **Express-ATC-N270-4G** | Compact COM Express™ module with Intel® Atom™ N270 processor at 1.6 GHz with 4GB SSD Solid State Disk |
| **Express-ATC-N270-8G** | Compact COM Express™ module with Intel® Atom™ N270 processor at 1.6 GHz with 8GB SSD Solid State Disk |

### Accessories

| Model Number | Description/Configuration |
|---|---|
| **Heat Spreaders** | |
| HTS-ATC-B | Heatspreader for Express-ATC (BGA CPU) with threaded standoffs |
| **Passive Heatsinks** | |
| THS-ATC-B | Low Profile Heatsink for Express-ATC (BGA CPU) with threaded standoffs |

# Express-BASE

## COM Express™ Reference Carrier Board in ATX Form Factor



## Features

- Five PCI Express® x1 slots
- PCI Express x16 Graphic slot / SDVO slot
- Two Legacy 32-bit PCI slots
- Dual LPC BIOS, single step execution
- LPC Super I/O (enable/disable)
- CF Card or Express Card
- Integrated POST Code
- ATX / AT or Battery Powered

## Specifications

### Form Factor

| | |
|---|---|
| Core Module Interface | PICMG® COM Express™ Revision 2.0 |
| | Supports Type 1 and Type 2 Basic form factor modules |
| Dimensions | 305 mm x 244 mm (AT/ATX) |
| Expansion Busses | Two 32-bit PCI™ v2.3 slots |
| | Five PCI Express® x1 slots |
| | One PCI Express x16 / SDVO slot |
| | LPC bus header |

### BIOS / Debug

| | |
|---|---|
| POST LEDs | Onboard diagnostics for BIOS POST code data and address on LPC bus |
| | Allows single step BIOS execution |
| Secondary BIOS | Onboard sockets for secondary LPC & SPI BIOS |

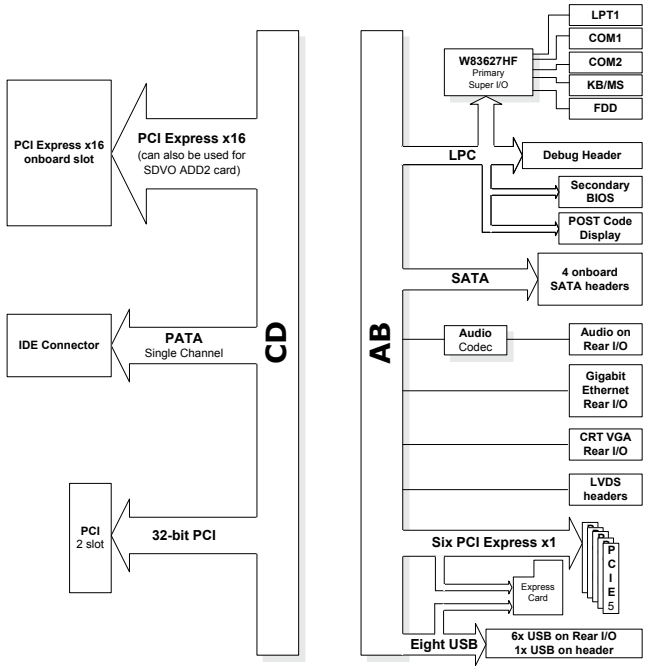
### Active Components

| | |
|---|---|
| Audio | ALC880 High Definition Audio Codec |
| Super I/O | Winbond WF83627HG on LPC |

### Connectors

| | |
|---|---|
| COM Express™ | Two x 220-pin (Type 2) |
| CRT | DB15 on Rear I/O panel for VGA/CRT displays |
| LVDS | Two onboard headers supporting dual channel LVDS |
| Audio | Mic/Line-in/Speakers on rear I/O panel, Mic/Line-in on header, S/PDIF on header |
| PATA IDE | One 40-pin header |
| SATA IDE | Four SATA connectors |
| PCIe Mini Card | One socket onboard |
| LAN | 10/100/1000BASE-T compatible RJ45 on rear I/O panel |
| USB 2.0 | Four + two on rear I/O panel, two on header and one through Mini Express Card |
| Serial Port | One DB-9 on rear I/O panel, one header onboard |
| Parallel Port | One DB-25 on rear I/O panel |
| FDD | 34-pin header |
| Smart Battery | One header for Smart Battery management communications (connects to ADLINK BattMan board) |
| KB/Mouse | Two 6-pin mini DIN (on rear I/O panel) |
| Digital I/O | 8-pin header |
| Feature Connectors | SMBus, I²C, module control signals, flat panel control signals |
| Miscellaneous | Reset, Power LED, HDD LED, Buzzer |
| Power | Standard ATX connector |
| Switches | Onboard RESET button and ATX mini switch |

## Functional Diagram




## Ordering Information

### Carrier

| Model Number | Description/Configuration |
|---|---|
| **Express-BASE** | COM Express™ Reference Carrier Board in ATX form factor |

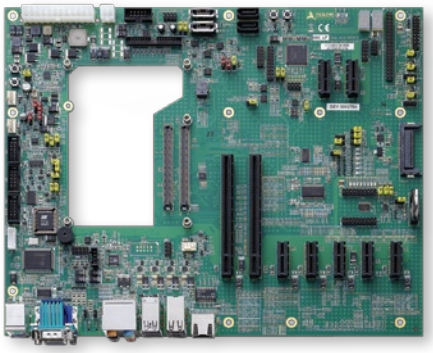
### COM Express Carrier Design Guide

Provides detailed information on designing your own custom carrier board for COM Express modules.

Download from the Express-BASE product webpage at *www.adlinktech.com*

# Express-BASE6

## COM Express™ Type 6 Reference Carrier Board in ATX Form Factor



## Features

- Seven PCI Express x 1 slots
- PCI Express x16 / SDVO slot
- Supports three Digital Display Interfaces (DDI) with HDMI/DVI/DisplayPort output
- LPC based Super I/O
- Dual BIOS (SPI and LPC)
- Conforms to COM Express™ Carrier Design Guide

## Specifications

### Form Factor

| | |
|---|---|
| Core Module Interface | PICMG® COM Express™ Revision 2.0 |
| | Supports Type 6 Basic form factor modules |
| Dimensions | 305 mm x 244 mm (ATX) |
| Expansion Busses | Seven PCI Express x1 slots |
| | One PCI Express Mini Card slot |
| | One PCI Express x16 / SDVO slot |

### BIOS / Debug

| | |
|---|---|
| POST LEDs | Onboard diagnostics for BIOS POST code data and address on LPC bus |
| Secondary BIOS | Onboard sockets for secondary LPC & SPI BIOS |

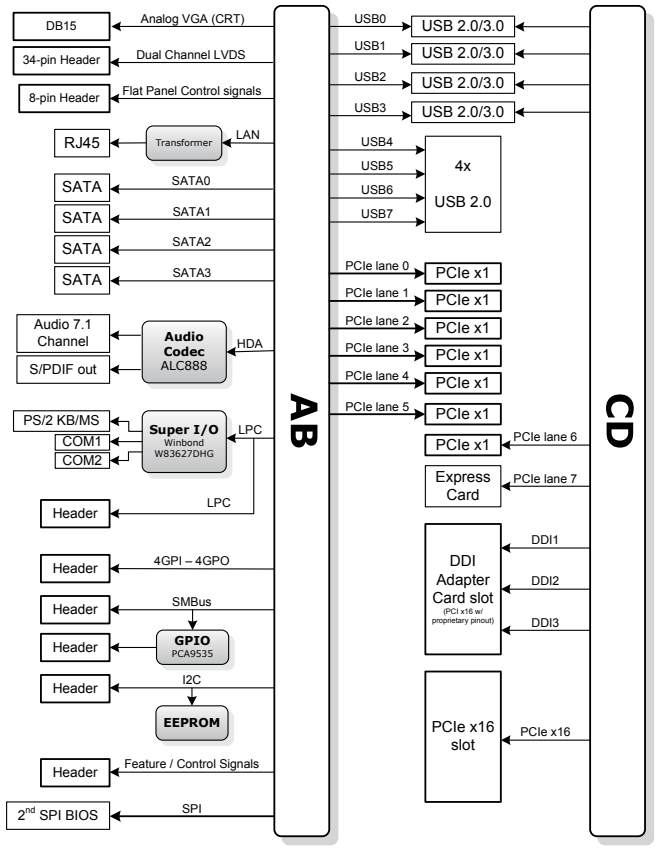
### Active Components

| | |
|---|---|
| Audio | Realtek ALC888 High Definition Audio Codec |
| Super I/O | Winbond WF83627DHG on LPC bus |
| Digital I/O | I²C to GPIO bridge PCA9535 |

### Connectors

| | |
|---|---|
| COM Express™ | Two x 220-pin (Type 6) |
| CRT | DB15 on Rear I/O panel for VGA/CRT display |
| LVDS | Onboard 34-pin header |
| Digital Display Interface | Supports three DDI ports to HDMI/DVI/DIsplayPort output by adapter card (PCIe x16 slot with proprietary pinout) |
| Flat Panel Control | Onboard 8-pin header |
| Audio | Mic/Line-in/Line-out on I/O panel |
| SATA | Four SATA connectors |
| PCIe Mini Card | One socket onboard |
| LAN | 10/100/1000BASE-T compatible RJ45 on I/O panel |
| USB 2.0 | Four USB 2.0 on I/O panel, |
| | Four USB 2.0/3.0 on I/O panel |
| Serial Port | One DB-9 on I/O panel |
| | One onboard 10-pin header |
| Smart Battery | One 10-pin header for Smart Battery management communications (connects to ADLINK BattMan board) |
| LPC Debug | Onboard 20-pin header |
| KB/Mouse | Two 6-pin mini DIN (on rear I/O panel) |
| Feature Connectors | SMBus, I²C, module control signals |
| Miscellaneous | Reset, Power LED, HDD LED, Buzzer |

## Functional Diagram




## Ordering Information

### Modules

| Model Number | Description/Configuration |
|---|---|
| **Express-BASE6** | COM Express Type 6 Reference Carrier Board in ATX form factor |

### COM Express Carrier Design Guide

Provides detailed information on designing your own custom carrier board for COM Express modules.

Download from the Express-BASE6 product webpage at *www.adlinktech.com*

# Starter Kit - COM Express

This Computer-on-Module Starter Kit gets you going with Carrier Board Design and Software Verification in no time

## Includes

- COM Express™ Module
- CPU, Memory
- Express-BASE Reference Carrier Board
- Thermal Solution (heatspreader and heatsink)
- Schematics, Design Guide, and User Manuals
- ADLINK USB stick with Documentation, Drivers, BSPs, Libraries

The Starter Kit consists of a COM Express™ core module with ATX size reference carrier board that offers one PCI Express graphics slot x16 , four PCI Express x1 slot, two PCI slots, Serial ATA, SDVO, CRT, LVDS, TV-out, USB 2,0, Gigabit LAN, and Super I/O. All necessary cables are included.

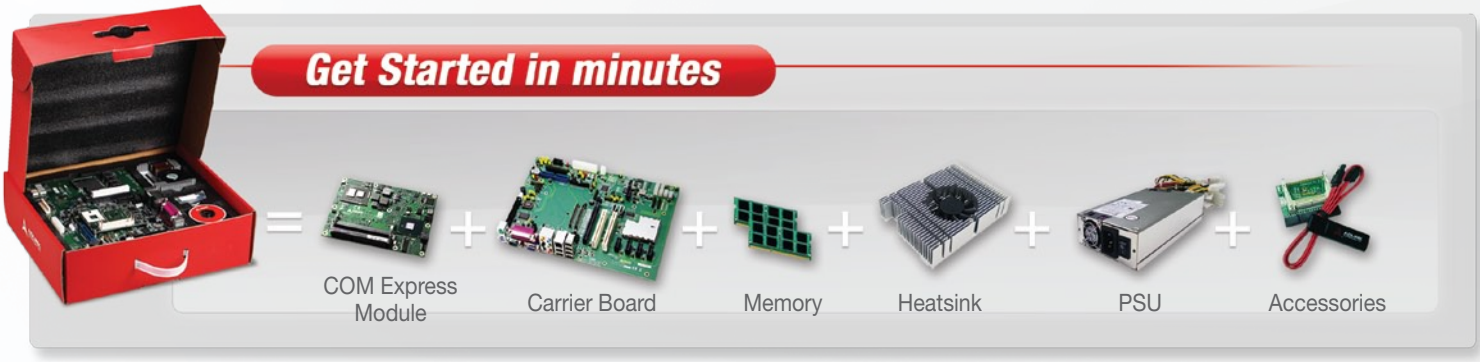
## Contents

### Standard Items

- Express-BASE reference carrier board
- Accessory kit:
  - IDE cable
  - SATA cable
  - TV out cable
  - CF adapter
  - PCI 2-slot riser card
  - USB Stick with documentation, drivers, libraries, and BSP for Linux®, WinCE, Embedded XP
  - Carrier Design Guide and product manuals

### Optional Items

- COM Express™ module of your choice
- Socket-type CPU of your choice
- Memory of your choice
- Thermal solution of your choice (heatspreader, heatsink)



## How to order Starter Kit – COM Express

ADLINK provides a “tailor made” Starter Kit service. We let you choose your preferred core module and thermal solution to suit your specific application development needs.


## ADLINK also provides a set of Engineering Test Tools to save you time and expedite your application development

BattMan Smart Battery Management Reference System

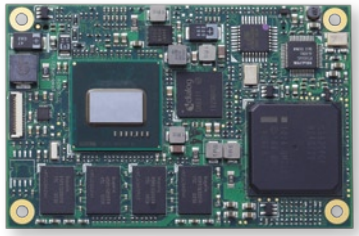

Please refer to page 9-39 for detailed information

Flat Panel Transfer Board

Please refer to page 9-39 for detailed information

# nanoX-TC

## Ultra size COM Express™ Type 10 Pinout Compatible Module with Intel® Atom™ Processor E6xx and EG20T PCH



## Features

- Intel® Atom™ Processor E6xx from 600 MHz up to 1.6 GHz
- Up to 2 GB soldered DDR2 SDRAM at 800 MHz
- 24-bit LVDS and SDVO support
- 4x PCI Express x1 lanes
- Optional Intel® Platform Controller Hub EG20T for USB, LAN, SDIO, Serial & CAN bus and SATA
- COM Express™ COM.0 R2.0 Type 10 Pinout
- Ultra form factor 84 x 55 mm
- Operation at 0°C to +70°C or -40°C to +85°C

## Specifications

### Core System

| | |
|---|---|
| CPU | Intel® Atom™ E680 / E680T*, 1.6 GHz, 3.9 W TDP |
| | Intel® Atom™ E660 / E660T*, 1.3 GHz, 3.3W TDP |
| | Intel® Atom™ E640 / E640T*, 1.0 GHz, 3.3W TDP |
| | Intel® Atom™ E620 / E620T*, 600 MHz, 2.7W TDP |
| | (* T versions support -40°C to +85°C wide operating temperature range) |
| | All processors support Intel® Hyper-Threading and Intel® Virtualization Technology |
| L2 cache | 512 KB on all processors |
| Memory | Soldered 512 MB, 1 or 2 GB DDR2 at 800 MHz |
| BIOS | License-free bootloader or AMI UEFI BIOS |
| Hardware Monitor | Supply voltages and CPU temperature |
| Debug Interface | XDP SFF-26 extension for ICE debug |
| Embedded Features | Instant on with Intel Bootloader support, OEM BIOS settings, Board Info & Statistics, ACPI 3.0, Smart Battery Management support, Watchdog with programmable timer ranges |
| Expansion Busses | 4 PCI Express x1 (0/1/2/3, port 3 is optionally used for EG20T PCH; no PCIe x4 support) |
| | LPC Bus, SMBus (system) , I²C (user) |
| | 4 GPI and 4 GPO (shared with SDIO on optional EG20T) |
| | SPI (supports BIOS only) |

### Video

| | |
|---|---|
| 2D/3D Graphic Engine | Integrated in Intel® Atom™ Processor E6xx |
| Decoding | MPEG2, MPEG4, VC1, WMV9, H.264 and DivX |
| Encoding | MPEG4, H.264 (baseline at L3) |
| LVDS Interface | Single channel 18- or 24-bit pixel color depths with maximum resolution of up to 1280x768 @ 60 Hz. Pixel clock rate between 19.75 MHz (minimum) and 80 MHz (maximum). |
| SDVO | Serial digital video output supporting devices for DVI, TV-out, analog CRT. Maximum resolution of up to 1280x1024 @ 85 Hz and pixel clock rate up to 160 MHz. |

### Audio

| | |
|---|---|
| High Definition Audio | Integrated in Intel® Atom™ Processor E6xx |
| Characteristics | Multi-channel audio stream, 32-bit sample depth, sample rate up to 192 kHz |
| Audio Codec | On carrier (standard support for ALC888) |

### Multi I/O and Storage

| | |
|---|---|
| Chipset | Integrated in Intel® PCH EG20T |
| USB | Six USB 1.1/2.0 host ports and one USB 1.1/2.0 client port |
| SATA | Two ports supporting SATA 1.5 Gb/s and 3 Gb/s |
| SDIO port | SDIO/MMC supporting SDHC speed class 6 (shared with GPIO) |
| SDIO storage | TBD |
| Serial and CAN | One RS-232 (RX/TX) and one CAN (AX/RX) port (optional 2x RS-232 w/o CAN) |

### LAN

| | |
|---|---|
| GbE MAC | Integrated in Intel® EG20T PCH |
| PHY | Realtek RTL8211CL |
| Speed | 10/100/1000 Mbps |

### Power Specifications

| | |
|---|---|
| Input Power | 4.75 V – 21 V wide range, supports AT mode and ATX mode (with additional 5 Vsb) |
| Power States | Supports S0, S1, S3, S4, S5 |
| Power Consumption | 5W at 5V typical, 3W idle |
| Smart Battery Support | Yes |

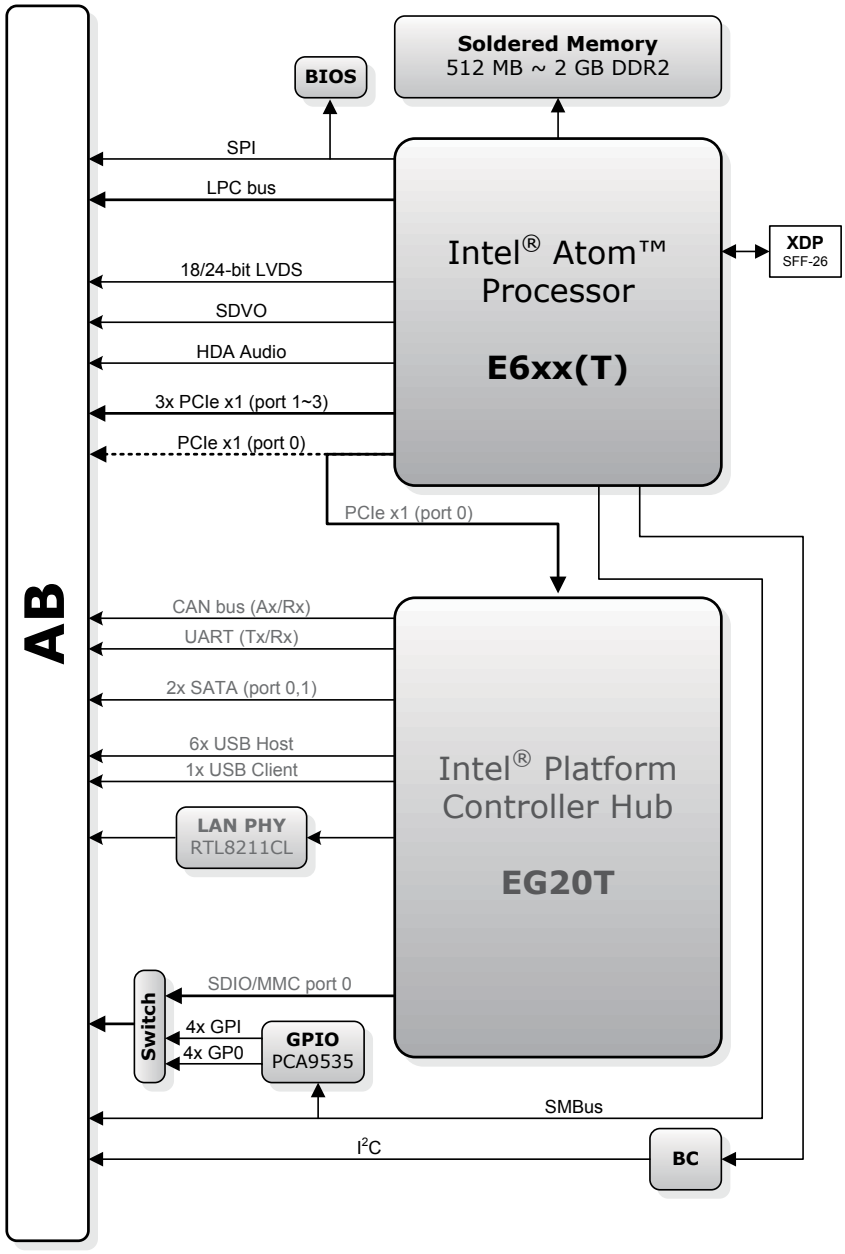
### Mechanical and Environmental

| | |
|---|---|
| Operating Temp | 0°C to 70°C or industrial grade -40°C to 85°C |
| Storage Temp | -20°C to 80°C or industrial grade -40°C to 85°C |
| Humidity | 90% at 60°C |
| Shock | 15G peak-to-peak, 11ms duration, non-operation |
| Vibration | Non-operating: 1.88 Grms, 5-500 Hz, each axis |
| | Operating: 0.5 Grms, 5-500 Hz, each axis |
| Compatibility | PICMG COM Express™ COM.0 R2.0 Type 10 |
| Mechanical | Ultra size 84 mm x 55 mm (3.3" x 2.17") |
| Certification | CE, FCC, HALT |

### Operating Systems

| | |
|---|---|
| Standard Support | Windows® XP / Windows® 7 |
| | Linux® |
| Extended Support (BSP) | Embedded XP |
| | WinCE 6.0 |
| | Linux® / Moblin |
| | VxWorks 6.x |
| | QNX |
| | AIDI Library |

## Functional Diagram




## Ordering Information

### Modules

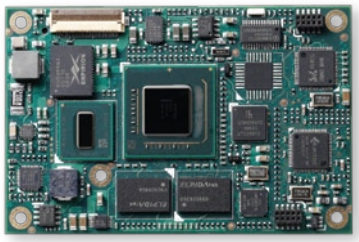
| Model Number | Description |
|---|---|
| **nanoX-TC-E680-1G** | Intel® Atom™ E680 processor at 1.6GHz with PCH EG20T |
| **nanoX-TC-E680T-1G** | Intel® Atom™ E680T processor at 1.6GHz with PCH EG20T, Industrial grade temperature range from -40°C to 85°C |
| **nanoX-TC-E660-1G** | Intel® Atom™ E660 processor at 1.3GHz with PCH EG20T |
| **nanoX-TC-E660T-1G** | Intel® Atom™ E660T processor at 1.3GHz with PCH EG20T, Industrial grade temperature range from -40°C to 85°C |
| **nanoX-TC-E640-1G** | Intel® Atom™ E640 processor at 1.1GHz with PCH EG20T |
| **nanoX-TC-E640T-1G** | Intel® Atom™ E640T processor at 1.1GHz with PCH EG20T, Industrial grade temperature range from -40°C to 85°C |
| **nanoX-TC-E620-1G** | Intel® Atom™ E620 processor at 600 MHz with PCH EG20T |
| **nanoX-TC-E620T-1G** | Intel® Atom™ E620T processor at 600 MHz with PCH EG20T, Industrial grade temperature range from -40°C to 85°C |

### Accessories

| Model Number | Description |
|---|---|
| **Heat Spreaders** | |
| HTS-nXTC-B | Heatspreader for nanoX-TC with threaded standoffs for bottom mounting |
| HTS-nXTC-BT | Heatspreader for nanoX-TC with throughole standoffs for top mounting |
| **Passive Heatsinks** | |
| THS-nXTC-B | Multidirectional Heatsink for nanoX-TC with threaded standoffs for bottom mounting |

# nanoX-ML

## Ultra size COM Express™ Type 1 Pinout Compatible Module with Intel® Atom™ Processor Z5xx and US15W Chipset



### Features

- Intel® Atom™ Processor Z530/Z510
- Intel® System Controller Hub US15W
- One PCIe x1 (opt. 2 without LAN)
- 18/24-bit LVDS and SDVO
- GbE LAN, SATA, USB 2.0, SDIO, LPC
- AMIBIOS®8 BIOS
- Solid State Disk: 1 GB up to 8 GB
- Ultra Compact 84 x 55 mm footprint

## Specifications

### Core System

| | |
|---|---|
| CPU | Intel® Atom™ processor Z530 at 1.6 GHz with 533 MHz FSB, 2.3 watts TDP, supports Hyper-Threading |
| | Intel® Atom™ processor Z510 at 1.1 GHz with 400 MHz FSB, 2.0 watts TDP |
| Memory | Soldered 512/1024 MB non-ECC, unbuffered 400/533 MHz DDR2 |
| Chipset | Intel® System Controller Hub US15W |
| BIOS | AMIBIOS®8 with CMOS backup in 8 Mbit LPC Flash |
| Hardware Monitor | Supply voltages and CPU temperature |
| Watchdog Timer | Programmable timer ranges to generate RESET |
| Expansion Busses | Two PCI Express x1 |
| | LPC bus |
| | SMBus / I²C |

### Video

| | |
|---|---|
| Chipset | GMA 500 integrated on Intel® on System Controller Hub US15W |
| Features | Ultra low power integrated 3D graphics core with full HD HW video decode engine and dual independent display support |
| CRT Interface | Analog VGA not supported |
| LVDS Interface | Single channel 18/24-bit at 25~112 MHz |
| SDVO | May be used for any external display device (HDMI/DVI, analog TV, VGA/CRT and LVDS); includes EDID and EDID-less support, and a 160 MHz pixel clock |

### Audio

| | |
|---|---|
| Chipset | Integrated on Intel® System Controller Hub US15W |
| Type | Supports Intel® High Definition Audio codec on carrier board |

### LAN

| | |
|---|---|
| Chipset | Realtek RTL8111C PCI Express Gigabit Ethernet Controller |
| Interface | 10/100/1000 Mbps with Wake-on-LAN and Alert on LAN support |

### Multi I/O

| | |
|---|---|
| IDE (PATA) | Single channel IDE with UDMA (33/66/100) connects to onboard Solid State Disk of 1 GB up to 8 GB |
| SATA | PATA to SATA bridge |
| | One SATA port |
| USB | Eight USB 2.0 ports capable of transfers up to 480 MB/s; one port optionally configurable as USB client |

### Power Specifications

| | |
|---|---|
| Input Power | 4.75V ~ 14V wide range input support, with optional 5Vsb for ATX support |
| Power States | Supports S0, S1, S3, S4, S5 |
| Power Consumption | 5 W (with Atom Z510 and 512 MB memory, typical) |

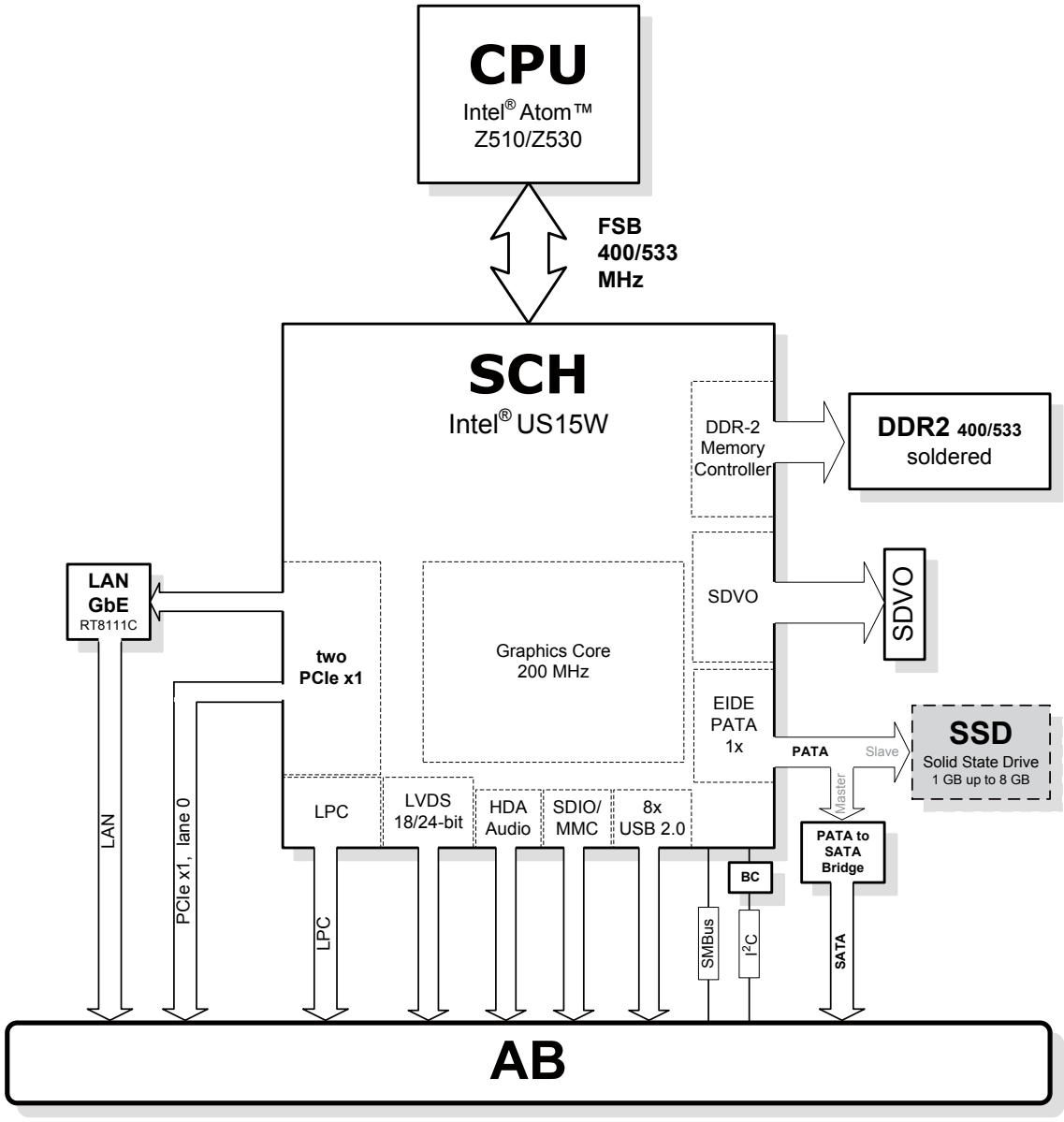
### Mechanical and Environmental

| | |
|---|---|
| Operating Temp. | 0°C to 60°C |
| Storage Temp. | -20°C to 80°C |
| Humidity | 10% to 90%, storage: 5% to 95% (non condensing) |
| Shock | 15G peak-to-peak, 11ms duration, non-operation |
| Vibration | Non-operating: 1.88 Grms, 5-500 Hz, each axis |
| | Operating: 0.5 Grms, 5-500 Hz, each axis |
| Compatibility | PICMG COM Express™ COM.0 Type 1 |
| Mechanical | Ultra size 84 mm x 55 mm (3.3" x 2.17") |
| Certifications | CE, FCC |

### Operating Systems

| | |
|---|---|
| Standard Support | Windows® XP 32-bit |
| | Windows® Vista 32-bit |
| | Linux® 2.6.26 and up |
| Extended Support | Embedded XP BSP |
| | WinCE BSP |
| | Linux® 2.6.x BSP |
| | AIDI I²C Library for Win32, WinCE and Linux® |

## Functional Diagram




## Ordering Information

### Modules

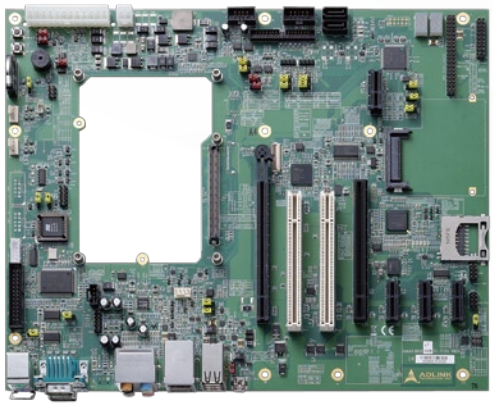
| Model Number | Description |
|---|---|
| **nanoX-ML-51/512-0** | Ultra COM Express™ Type 1 compatible module with Intel® Atom™ processor Z510 at 1.1 GHz and 512 MB DDR2 |
| **nanoX-ML-53/512-0** | Ultra COM Express™ Type 1 compatible module with Intel® Atom™ processor Z530 at 1.6 GHz and 512 MB DDR2 |
| **nanoX-ML-51-512/4G** | Ultra COM Express™ Type 1 compatible module with Intel® Atom™ Processor Z510 at 1.1 GHz, 512 MB memory and 4 GB SSD storage |
| **nanoX-ML-53-512/4G** | Ultra COM Express™ Type 1 compatible module with Intel® Atom™ Processor Z530 at 1.6 GHz, 512 MB memory and 4 GB SSD storage |
| **nanoX-ML-51-1024/4G** | Ultra COM Express™ Type 1 compatible module with Intel® Atom™ Processor Z510 at 1.1 GHz, 1GB memory and 4 GB SSD storage |
| **nanoX-ML-53-1024/4G** | Ultra COM Express™ Type 1 compatible module with Intel® Atom™ Processor Z530 at 1.6 GHz, 1GB memory and 4 GB SSD storage |

### Accessories

| Model Number | Description |
|---|---|
| **Heat Spreaders** | |
| HTS-nML-B | Heatspreader for nanoX-ML (BGA CPU) with threaded standoffs |
| **Passive Heatsinks** | |
| THS-nML-B | Low profile Heatsink for nanoX-ML (BGA CPU) with threaded standoffs |

# nanoX-BASE

## COM Express™ Type 1 Reference Carrier Board with onboard PCIe-to-PCI Bridge



## Features

- Six PCI Express® x1 (5 slots, 1 PCIe Mini Card slot)
- PCIe-to-PCI bridge, two PCI™ slots
- SDVO ADD2 card slot
- LPC based Super I/O (enable/disable)
- SDIO/MMC support, multiplexed on GPIO
- Dual BIOS (both LPC and SPI)
- Compatible with PICMG® COM Express™ Carrier Design Guide

## Specifications

### Form Factor

| | |
|---|---|
| Core Module Interface | PICMG® COM Express™ Revision 1.0 |
| | Supports Type 1 Basic and Ultra form factor modules |
| Dimensions | 305 mm x 240 mm (AT/ATX) |
| Expansion Busses | Five PCI Express® x1 slots |
| | Two 32-bit PCI™ v2.3 slots |
| | One PCI Express® Mini Card slot |
| | One SDVO ADD2 slot |
| | LPC bus header |

### BIOS / Debug

| | |
|---|---|
| POST LEDs | Onboard diagnostics for BIOS POST code data and address on LPC bus |
| Secondary BIOS | Onboard sockets for secondary LPC & SPI BIOS |

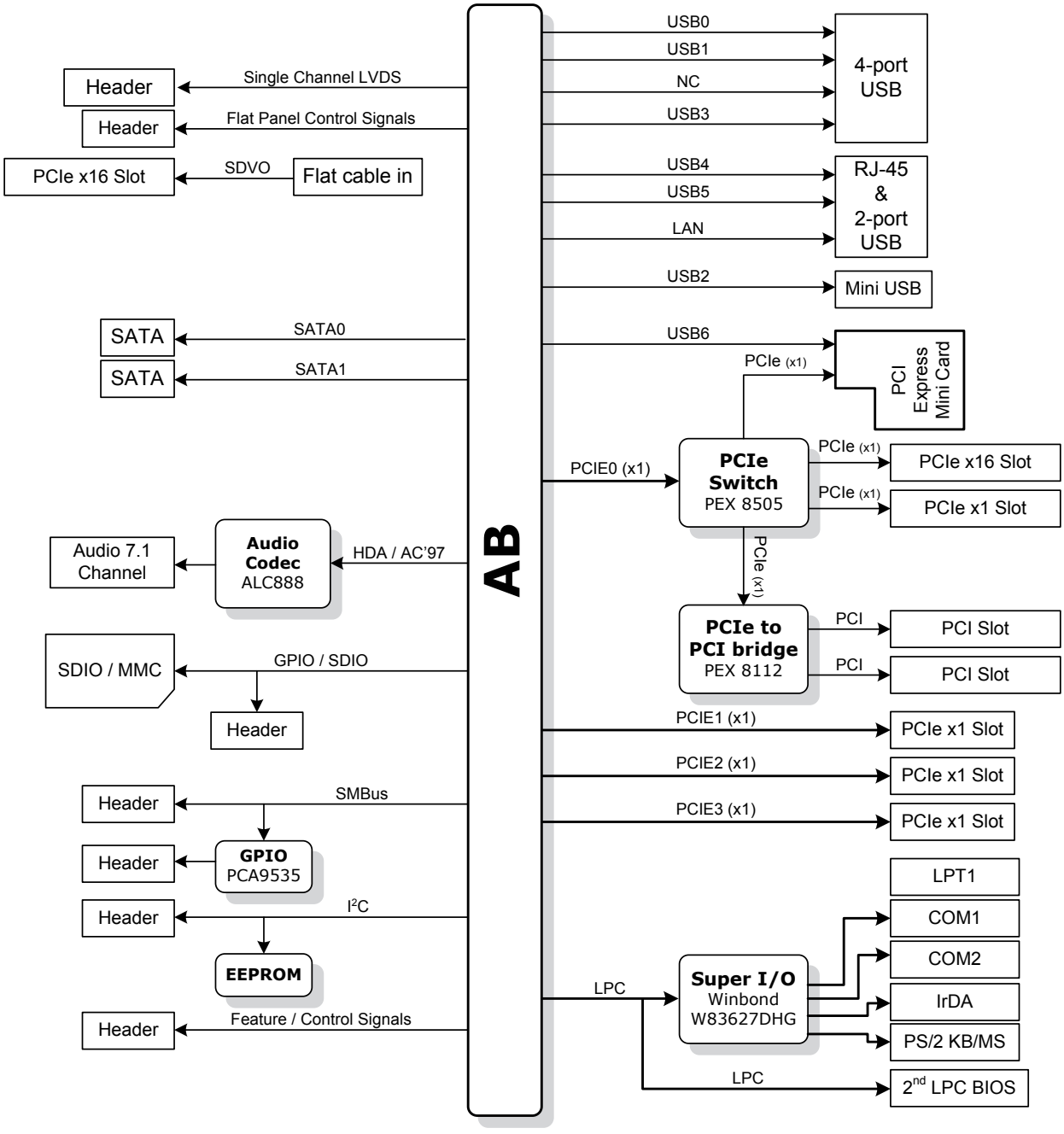
### Active Components

| | |
|---|---|
| PCI Express Switch | PLX PEX8505 switch with PCIE0 input from module |
| PCI Express to PCI Bridge | PLX PEX8112 bridge with PCIe x1 input from PEX8505 switch |
| Super I/O | Winbond WF83627DHG on LPC bus |
| Audio Codec | Realtek ALC888 High Definition Audio Codec |
| Digital I/O | I²C to GPIO bridge PCA9535 |

### Connectors

| | |
|---|---|
| COM Express™ | Connector AB only, one 220-pin (Type 1) |
| LVDS | Onboard 34-pin header |
| Audio | Mic/Line-in/Line-out on I/O panel |
| SATA | Two SATA connectors |
| PCIe Mini Card | One socket onboard (USB + PCIe x1) |
| LAN | 10/100/1000BASE-T compatible RJ45 on I/O panel |
| USB 2.0 | Five on I/O panel, one Mini-USB (client only) and one through PCIe Mini Card |
| Serial Port | Two DB-9 on I/O panel |
| Parallel Port | One header onboard |
| Smart Battery | One header for Smart Battery management communications (connects to ADLINK BattMan board) |
| KB/Mouse | Two 6-pin mini DIN (on rear I/O panel) |
| SDIO/MMC | SD socket for bootable storage or function extension |
| Feature Connectors | SMBus, I²C, module control signals, flat panel control signals |
| Miscellaneous | Reset, Power LED, HDD LED, Buzzer |
| Power | Standard ATX connector |
| Switches | Onboard RESET button and ATX mini switch |

## Functional Diagram




## Ordering Information

### Carrier

| Model Number | Description |
|---|---|
| **nanoX-BASE** | COM Express™ Type 1 Reference Carrier Board with onboard PCIe to PCI bridge |

# Starter Kit - nanoX

This Computer-on-Module Starter Kit gets you going with Carrier Board Design and Software Verification in no time


## Includes

- COM Express™ Type 1 core module
- Thermal solution (heatspreader or heatsink)
- nanoX-BASE Reference Carrier Board
- LVDS flat panel evaluation kit
- Schematics, Design Guide, and User Manuals
- ADLINK USB stick with Documentation, Drivers, BSPs, Libraries

The nanoX Starter Kit consists of a COM Express™ Type 1 core module with ATX size reference carrier board that provides four PCI Express x1 slots, one PCI Express x16 slot (x1 link), two PCI slots, an SDVO/ADD2 slot, one PCIe Mini Card slot, one SDIO/MMC slot, USB 2.0, Gigabit LAN and Super I/O. ADLINK also provides additional development tools including a verified 10.1" LVDS panel, LVDS-to-TTL conversion board, ADD2 DVI card, power supply, thermal solution and cabling accessories.

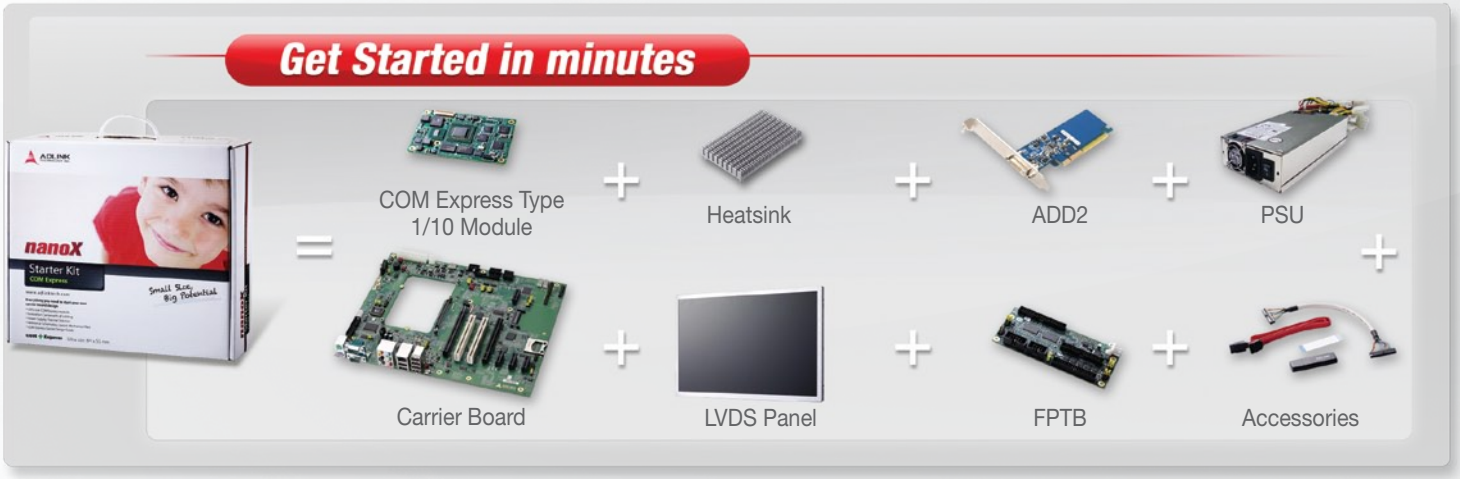
## Contents

### Standard Items

- nanoX-BASE reference carrier board
- 10.1" (1024 x 600) LVDS flat panel
- SDVO to DVI adapter
- Flat panel transfer board
- ATX power supply
- Accessory kit:
  - LVDS flat panel cabling
  - SATA, SDVO, USB cables
  - Power cord
  - USB stick with documentation, drivers, libraries, and BSP for Linux, Embedded XP
  - Carrier Design Guide and product manuals

### Optional Items

- COM Express Type 1 core module of your choice
- Thermal solution of your choice (heatspreader or heatsink)



## How to order Starter Kit – nanoX

ADLINK provides a “tailor made” Starter Kit service. We let you choose your preferred core module and thermal solution to suit your specific application development needs.


## ADLINK also provides a set of Engineering Test Tools to save you time and expedite your application development

BattMan Smart Battery Management Reference System


Please refer to page 9-39 for detailed information

LPC POST Debug Card

Please refer to page 9-40 for detailed information

# Engineering Test Tools

Useful time saving tools to expedite your application development

## BattMan Smart Battery Management Reference System


The BattMan Smart Battery Management Reference System supports two Smart Batteries and provides ATX power for COM Express mobile embedded systems. The BattMan system allows developers to easily implement battery power in COM Express based applications requiring high mobility.

Contents

- BattMan module
- Two Smart Batteries
- Power adapter and cabling
- USB disk with BattMan board reference schematic, drivers and documentation

### Ordering Information

| Model Number | Description/Configuration |
|---|---|
| **StarterKit-Battman** | Smart Battery Reference Platform for COM Express™ modules (includes two Smart Batteries) |

## Flat Panel Transfer Board

The Flat Panel Transfer Board (FPTB) supports prototyping and verification of LVDS and TTL flat panel displays with Express-BASE and nanoX-BASE carrier boards and is equipped with an LVDS-to-TTL converter to allow users to implement TTL displays with COM Express systems that support LVDS only. Onboard PWM circuitry supports backlight control for LVDS and TTL displays.

### Ordering Information

| Model Number | Description/Configuration |
|---|---|
| **FPTB** | Flat Panel Transfer Board for LVDS-to-TTL signal conversion |
| **LCD 10.1" TFT** | HannStar 10.1" LVDS flat panel display (HSD100IFW1-A00) |
| **LVDS 30P to 34P+8P cable** | LVDS cable to connect HannStar HSD100IFW1-A00 LVDS flat panel display to FPTB, Express-BASE, or nanoX-BASE |
| **LVDS cable for FPTB** | FPTB LVDS-to-LVDS cable |

Note: Included in the Starter Kit - nanoX.

## PCIe x16 MXM Carrier Board

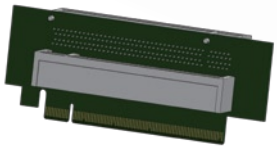
ADLINK's PCIe x16 MXM carrier boards allow for discrete PCIe graphics expansion using a Mobile PCI Express Module (MXM). The MXM carrier board series supports MXM-II and MXM-III graphics modules, allowing developers to evaluate, prototype and verify MXM graphics modules before full integration into the custom carrier board design.

### Ordering Information

| Model Number | Description/Configuration |
|---|---|
| **MXM2CR** | PEG x16 MXM-II carrier board (w/o MXM graphics module) |
| **MXM3CR** | PEG x16 MXM-III carrier board (w/o MXM graphics module) |
| **MXM3-E4690** | MXM-III module based on ATI Radeon™ E4690 GPU |

## PCIe x16-to-two-x8 Adapter Card

The ADLINK PCIe x16-to-two-x8 adapter card allows the use of two PCIe x8 add-on cards from a single PCIe x16 slot.

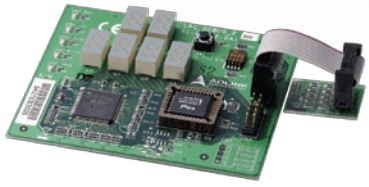


### Ordering Information

| Model Number | Description/Configuration |
|---|---|
| **P16TO28** | PCIe x16-to-two-x8 adapter card |

## LPC POST Debug Board

LPC POST debug board with secondary LPC BIOS and POST status LED. Can be easily connected to the LPC debug port on the Computer-on-Module to monitor BIOS POST status. A single step switch is provided for BIOS debug verification.



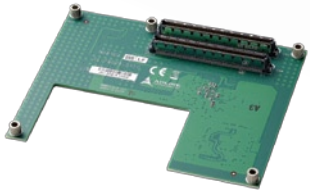
### Ordering Information

| Model Number | Description/Configuration |
|---|---|
| **LPC_DEBUG_2** | LPC POST debug board with secondary LPC BIOS |

## COM-T6T2 Adapter Board

COM Express Type 6 to Type 2 Conversion

The COM-T6T2 adapter board allows COM Express Type 6 modules to be backwards compatible with Type 2 carrier boards. A SATA-to-PATA converter and PCIe-to-PCI bridge are onboard to provide signal conversion to the required COM Express Type 2 interfaces. The SDVO port is rerouted to correspond with the Type 2 pin definition (no PCIe x16).



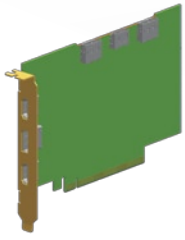
### Ordering Information

| Model Number | Description/Configuration |
|---|---|
| **COM-T6T2** | COM Express Type 6 to Type 2 adapter card (w/ SDVO) |

## T6-DDI Video Adapter Card

COM Express Type 6 DDI to HDMI/DVI/DisplayPort

The T6-DDI Video Adapter Card provides connector access to COM Express Type 6 module Digital Display Interface (DDI) outputs. HDMI, DVI and DisplayPort outputs are provided. The T6-DDI is installed on the ADLINK Express-BASE6 Type 6 carrier board using a PCIe x16 slot with proprietary pinout.



### Ordering Information

| Model Number | Description/Configuration |
|---|---|
| **T6-DDI** | COM Express Type 6 DDI-to-HDMI/DVI/DisplayPort adapter card |