



# 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.

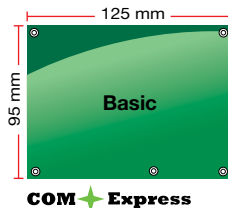
## COM Express pinout types and supported features

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

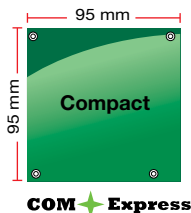
□ Rev. 1 Pinouts   ■ Rev. 2 Pinouts

## The Right Size for the Right Job

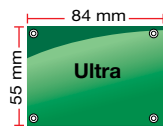
The COM Express specification also defines three module sizes: the Compact Module, Basic Module and the Extended Module. A fourth "Ultra" size module supporting only type 1 and type 10 pinouts has been presented to PICMG for inclusion in a future release of the specification.



**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 refining 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 COM.0 rev 1.0 Type 1**

B	LPC Bus	4x SATA	Audio	8x USB2.0	6x PCIe x1	LVDS Channel B	CRT	TV	5Vsb	12V
A	GbE LAN					LVDS Channel A		Control & Miscellaneous		12V

**COM Express COM.0 rev 2.0 Type 10**

B	LPC Bus	2x SATA	RS VD	Audio	8x USB2.0	4x PCIe x1	RS VD	SDVO Sing Channel	DDI 1 (DVI-out)	DDI 2 (DVI-out)	DDI 3 (DVI-out)	Control & Miscellaneous	5Vsb	12V
A	GbE LAN							LVDS Channel A				Control & Miscellaneous		total amount of pins reduced

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

**COM Express COM.0 rev 1.0 Type 2**






D	PATA IDE		PCI Bus		PCIe x16 (or SDVO)		12V			
C										
B	LPC Bus	4x SATA	Audio	8x USB2.0	6x PCIe x1	LVDS Channel B	CRT	TV	5Vsb	12V
A	GbE LAN					LVDS Channel A		Control & Miscellaneous		12V

**COM Express COM.0 rev 2.0 Type 6**

D	USB 3.0 extended signaling to upgrade four USB 2.0 ports	2x PCIe x1	DDI 1 (DVI-out) SDVO	DDI 2 (DVI-out)	DDI 3 (DVI-out)	PCIe x16		12V		
C										
B	LPC Bus	4x SATA	Audio	8x USB2.0	6x PCIe x1	LVDS Channel B	CRT	TV	5Vsb	12V
A	GbE LAN					LVDS Channel A		Control & Miscellaneous		total amount of pins reduced

## COM Applications

Computer-On-Modules

DataComm	Gaming	Transport	Medical	Instrument
<ul style="list-style-type: none"> <li>▶ Routers</li> <li>▶ Firewalls</li> <li>▶ Filtering</li> <li>▶ Storage</li> </ul>	<ul style="list-style-type: none"> <li>▶ Latteries</li> <li>▶ Slot Machines</li> <li>▶ Game Consoles</li> </ul>	<ul style="list-style-type: none"> <li>▶ Board Computers</li> <li>▶ Navigation</li> <li>▶ GSM Stations</li> <li>▶ Car Info Systems</li> </ul>	<ul style="list-style-type: none"> <li>▶ Information Support Systems</li> <li>▶ Monitoring</li> <li>▶ Mobile Computing</li> </ul>	<ul style="list-style-type: none"> <li>▶ Robotics</li> <li>▶ Measurement</li> <li>▶ Control</li> <li>▶ Surveillance</li> </ul>
				
<ul style="list-style-type: none"> <li>● Gaming and Entertainment</li> <li>● Medical Equipment</li> <li>● Storage</li> <li>● Communications</li> </ul>	<ul style="list-style-type: none"> <li>● Transport</li> <li>● Government</li> <li>● Retail and Advertising</li> </ul>	<ul style="list-style-type: none"> <li>● Industrial Automation</li> <li>● Test and Measurement</li> <li>● Consumer Devices</li> </ul>		

## 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



	Express-HR	Express-CB/CBE	Express-MV	Express-MG
<b>CPU Type</b>	Intel® Core™ i7/i5 (Sandy Bridge) up to 2.53 GHz with 6 MB L3 cache	Intel® Core™ i7/i5/i3 (Arrandale) up to 2.53 GHz with 4 MB L2 cache	Intel® Core™2 Duo (Penryn) up to 2.26 GHz with 6 MB L2 cache	Intel® Core™2 Duo (Penryn) up to 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
<b>Main Chipset</b>	Intel® PCH QM67	Intel® PCH QM57	Intel® GS45 with ICH9M (SFF)	Intel® GM45 with ICH9M
<b>System Memory</b>	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
<b>Cache (L2)</b>	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
<b>BIOS Type</b>	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
<b>Graphics Controller</b>	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
Compatibility	OpenGL 3.0, DirectX 10.1	OpenGL 2.1, DirectX 10	OpenGL 2.0, DirectX 10	OpenGL 2.0, DirectX 10
<b>Parallel ATA (IDE)</b>	one channel, one device	one channel, one device	one channel, one device	one channel, one device
<b>Serial ATA</b>	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
<b>Ethernet</b>	integrated Intel GbE (10/100/1000)	integrated Intel GbE (10/100/1000)	integrated Intel® GbE (10/100/1000)	integrated Intel® GbE (10/100/1000)
<b>USB</b>	8 ports USB 2.0	8 ports USB 2.0	8 ports USB 2.0	8 ports USB 2.0
<b>Audio</b>	Intel® HD Audio	Intel® HD Audio	Intel® HD Audio	Intel® HD Audio
<b>Watchdog</b>	Yes	Yes	Yes	Yes
<b>TPM</b>	Yes, Ver. 1.2	Yes, Ver. 1.2	Yes, Ver. 1.2	Yes, Ver. 1.2
<b>PCI Express Support</b>	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)
<b>PCI Support</b>	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
<b>LPC Support</b>	Yes	Yes	Yes	Yes
<b>Management Bus</b>	I²C, SMBus	I²C, SMBus	I²C, SMBus	I²C, SMBus
<b>Power</b>	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
<b>Operating Temperature</b>	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	-
<b>Compatibility</b>	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
<b>Dimensions</b>	Basic Form Factor (95x125 mm)	Basic Form Factor (95x125 mm)	Basic Form Factor (95x125 mm)	Basic Form Factor (95x125 mm)
<b>Solid State Disk on Module</b>	optional SATA SSD 4~16 GB	optional SATA SSD 4~16 GB	-	-
<b>BSP &amp; Software Support</b>	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
<b>CPU Type</b>	Intel® Core™2 Duo (Merom) up to 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 (Merom) 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
<b>Main Chipset</b>	Intel® GME965 with ICH8M	Intel® 945GME with ICH7M	Intel® 945GSE with ICH7M	Intel® 915GM with ICH6-M
<b>System Memory</b>	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
<b>Cache (L2)</b>	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
<b>BIOS Type</b>	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
<b>Graphics Controller</b>	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
Compatibility	OpenGL 2.0, DirectX 10	OpenGL 1.4, DirectX® 9.0c	OpenGL 1.4, DirectX® 9.0c	OpenGL 1.4, DirectX® 9.0
<b>Parallel ATA (IDE)</b>	one channel, two devices	one channel, two devices	one channel, two devices	one channel, two devices
<b>Serial ATA</b>	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)	-	-
<b>Ethernet</b>	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)
<b>USB</b>	8 ports USB 2.0	8 ports USB 2.0	8 ports USB 2.0	6 ports USB 2.0
<b>Audio</b>	Intel® HD Audio	Intel® HD Audio and AC'97	Intel® HD Audio and AC'97	Intel® HD Audio and AC'97
<b>Watchdog</b>	Yes	Yes	Yes	Yes
<b>TPM</b>	Yes, Ver. 1.2	Yes, Ver. 1.2	Yes, Ver. 1.2	-
<b>PCI Express Support</b>	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)
<b>PCI Support</b>	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
<b>LPC Support</b>	Yes	Yes	Yes	Yes
<b>Management Bus</b>	I²C, SMBus	I²C, SMBus	I²C, SMBus	I²C, SMBus
<b>Power</b>	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
<b>Operating Temperature</b>	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	-
<b>Compatibility</b>	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
<b>Dimensions</b>	Basic Form Factor (95x125 mm)	Basic Form Factor (95x125 mm)	Basic Form Factor (95x125 mm)	Basic Form Factor (95x125 mm)
<b>Solid State Disk on Module</b>	-	-	optional PATA SSD 512 MB up to 4 GB	-
<b>BSP &amp; Software Support</b>	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
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	Compact (95 x 95 mm)		Ultra (84 x 55 mm)	
	Type 2		Type 10	Type 1
	<b>Express-LPC</b>	<b>Express-ATC</b>	<b>nanoX-TC</b>	<b>nanoX-ML</b>
<b>CPU Type</b>	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
<b>CPU Package</b>	FCBGA559	PBGA437	FC-BGA 676	BGA 441
<b>CPU Models / Speeds</b>	Atom™ N455 at 1.66 GHz Atom™ D425 at 1.8 GHz 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, E640 at 1.1 GHz, E620 at 600 MHz	Intel® Atom™ Z530 at 1.6 GHz Intel® Atom™ Z510 at 1.1 GHz
<b>FSB Speed</b>	-	533	-	533/400
<b>Main Chipset</b>	ICH8M	Intel® 945GSE with ICH7M	Intel® PCH EG20T (extended temp)	Intel® SCH US15W
<b>System Memory</b>	4 GB (max), single channel	2 GB (max), single channel	2 GB (max), single channel	1 GB (max), single channel
<b>Memory Type</b>	DDR3 at 667/800	DDR2 533	DDR2 400/533	DDR2 400/533
<b>Soldered Memory</b>	-	-	512 MB up to 2 GB DDR2 at 800 MHz	512 MB or 1 GB DDR2 466/533 MHz
<b>Socket Memory</b>	Max 4 GB on two 200-pin SODIMMs	Max 2 GB on single 200-pin SODIMM	-	-
<b>Cache (L2)</b>	L2 cache 512 KB (N455/D425) L2 cache 1 MB (D525)	L2 cache 512 KB	L2 cache 512 KB	L2 cache 512 KB
<b>BIOS Type</b>	AMIBIOS®8, American Megatrend	AMIBIOS®8, American Megatrend	AMI EFI, American Megatrend	AMIBIOS®8, American Megatrend
<b>BIOS Features</b>	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
<b>BIOS Flash</b>	8 Mbit Flash SPI	8 Mbit Flash SPI	8 Mbit Flash SPI	FWH, 8 Mbit Flash
<b>Graphics Controller</b>	Intel® GMA 3150	Intel® GMA 950	Intel® GMA 600	Intel® GMA 500
<b>Graphics Memory</b>	Max 384 MB UMA	Max 256 MB UMA	Max 64 MB UMA	Max 256 MB UMA
<b>Integrated Display Support</b>	CRT (QXGA) 2048x1536 single 18 LVDS (WXGA) 1366x768	CRT (QXGA) single/dual 18/24-bit LVDS (UXGA) TV-out (PAL/NTSC/HDTV)	18/24-bit LVDS max 1280x768@60Hz Encode : MPEG4, H.263, H.264; Decode : MPEG2/4, VC1, WMV9, H.264	single channel 18/24-bit LVDS (WXGA) supports HDTV/DHD decode and MPEG, H.264, hardware decoding
<b>External Graphics Bus</b>	-	Single SDVO port	Single SDVO max 1920x1080@50Hz	Single SDVO port
<b>Compatibility</b>	OpenGL 1.5, DirectX 9.0c	OpenGL 1.4, DirectX® 9.0c	OpenGL 2.1, DirectX 9.0c	OpenGL 2.0, DirectX 9.0c
<b>Parallel ATA (IDE)</b>	one channel, two devices	one channel, two devices	-	one channel, one device
<b>Serial ATA</b>	two SATA 1.5 Gb/s	two SATA 1.5 Gb/s	two SATA 1.5 Gb/s	one SATA 1.5 Gb/s
<b>Matrix Storage Support</b>	-	-	-	-
<b>Ethernet</b>	Intel® 82583V GbE (10/100/1000)	Realtek RTL8111C GbE (10/100/1000)	integrated Intel GbE (10/100/1000)	Realtek RTL8111C GbE (10/100/1000)
<b>USB</b>	6 ports USB 2.0	6 ports USB 2.0	6 ports USB 2.0, 1 client port	8 ports USB 2.0
<b>Audio</b>	Intel® HD Audio	Intel® HD Audio and AC'97	Intel® HD Audio	Intel® HD Audio
<b>Watchdog</b>	Yes	Yes	Yes	Yes
<b>TPM</b>	Yes	Yes	Yes	Yes
<b>PCI Express Support</b>	5x PCI-Express x1	3x PCI-Express x1 (optional 5 PCI Express x1)	3x PCIe x1 (optional 4x PCIe without PCH EG20T)	1x PCIe x1 (optional 2x PCIe without LAN function)
<b>PCI Support</b>	4x PCI rev. 2.3, 32-bit, 33MHz	4x PCI rev. 2.3, 32-bit, 33MHz	-	-
<b>LPC Support</b>	Yes	Yes	Yes	Yes
<b>Management Bus</b>	I²C, SMBus	I²C, SMBus	I²C, SMBus	I²C, SMBus
<b>Power</b>	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)
<b>Power States</b>	S0 S1 S3 S4 S5	S0, S1, S3, S4, S5	S0 S1 S3 S4 S5	S0, S1, S3, S4, S5
<b>Power Consumption</b>	8 W with Atom® N455 at 1.66GHz and 1 GB DDR3 typical	9 W with Atom® N270 at 1.6GHz and 1 GB DDR2 typical	4.5 W with E620 at 600 MHz and 512 MB DDR2 typical	5 W with Atom®Z510 at 1.1 GHz and 512 MB DDR2 typical
<b>Operating Temperature</b>	0°C ~ +60°C	0°C ~ +60°C	0°C ~ +60°C	0°C ~ +60°C
<b>Extended Temperature</b>	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
<b>Compatibility</b>	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
<b>Dimensions</b>	Compact Form Factor (95x95 mm)	Compact Form Factor (95x95 mm)	Ultra Form Factor (84x55 mm)	Ultra Form Factor (84x55 mm)
<b>Solid State Disk on Module</b>	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
<b>BSP &amp; Software Support</b>	Windows® XP/Xpe, Windows® Vista Windows® CE, Linux® 2.6.x, AIDL library	Windows® XP/Xpe, Windows® Vista Windows® CE, Linux® 2.6.x, AIDL library	Windows® XP/Xpe, Windows® CE, Win7 Embedded, Linux®, AIDL library	Windows® XP/Xpe, Windows® CE, Linux®, AIDL library
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### 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	<p><b>Sandy Bridge 32 nm process, BGA type</b></p> <p>Intel® Core™ i7-2715QE 2.1 GHz (3.0 GHz Turbo), 6MB L3 cache, 45W</p> <p>Intel® Core i7-2655LE 2.2 GHz (2.9 GHz Turbo), 4MB L3 cache, 25W</p> <p>Intel® Core™ i7-2610UE 1.5 GHz (2.4 GHz Turbo), 4MB L3 cache, 17W</p> <p>Intel® Core™ i5-2515E 2.5 GHz (3.2 GHz Turbo), 3MB L3 cache, 35W</p>
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	<p>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)</p> <p>8 PCI Express x1: Lanes 0/1/2/3/4/5/6 are free, lane 7 is occupied by GbE</p> <p>LPC bus, SMBus (system) , I<sup>2</sup>C (user)</p>

#### Video

Integrated in Processor	HD Graphics 3000 at 650-1300 MHz
Integrated Video	DirectX 10.1 and OpenGL 3.0
Feature Support	<p>Intel Clear Video HD Technology</p> <p>Advanced Scheduler 2.0, 1.0, XPDM support</p> <p>DirectX Video Acceleration (DXVA) support for full AVC/VC1/ MPEG2 hardware decode</p>
CRT Interface	<p>Analog CRT support with 300 MHz DAC</p> <p>Analog monitor support up to QXGA (2048 x 1536) and CRT hot plug</p>
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

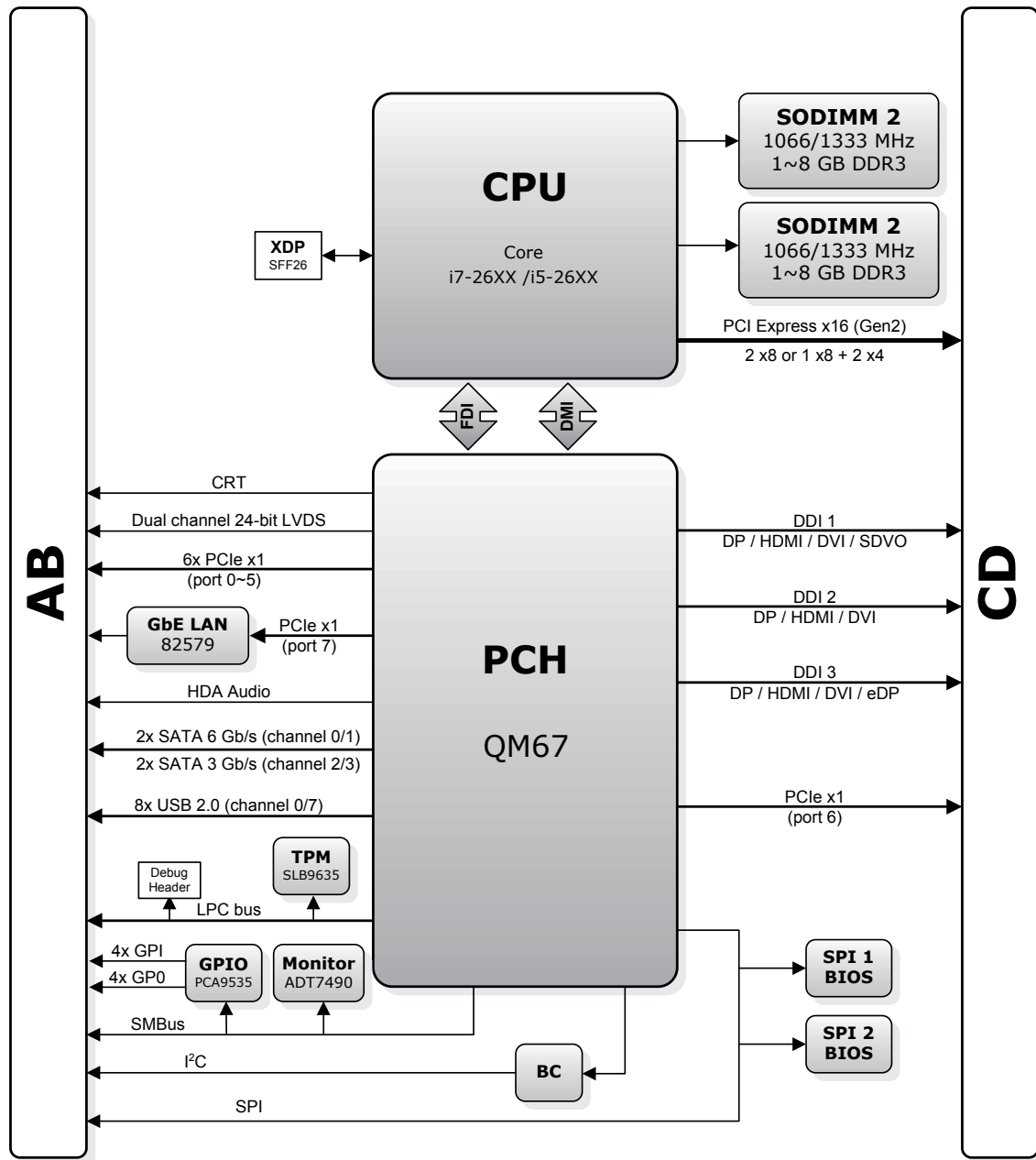
#### Mechanical and Environmental

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	<p>Non-operating: 1.88Grms, 5-500Hz, each axis</p> <p>Operating: 0.5Grms, 5-500Hz, each axis</p>
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)	<p>Embedded XP support package</p> <p>Linux® 2.6.x BSP</p> <p>VxWorks 6.x</p> <p>AIDI Library for Windows® and Linux®</p>

## Functional Diagram



## Ordering Information

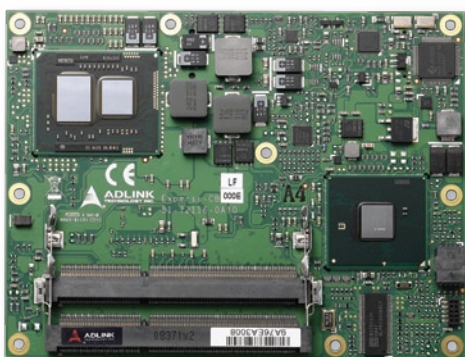
### Modules

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
<b>Passive Heatsinks</b>	
THSH-HR-BL	High Profile Heatsink for Express-HR with threaded standoffs
<b>Heat Spreaders</b>	
HTS-HR-RL	Heatspreader for Express-HR with threaded standoffs
<b>Heatsink with Active Cooling</b>	
THSFH-HR-BL	High Performance Heatsink with Fan for Express-HR with threaded standoffs





### 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	<b>Arrandale BGA type</b> 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 Buses	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), I <sup>2</sup> C (user)

#### Video

Integrated in Processor	Gen 5.75 with 12 execution units
Integrated Video	DirectX 10 and OpenGL 2.1
Feature Support	Intel® Dynamic Video Memory Technology (Intel® DVM 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

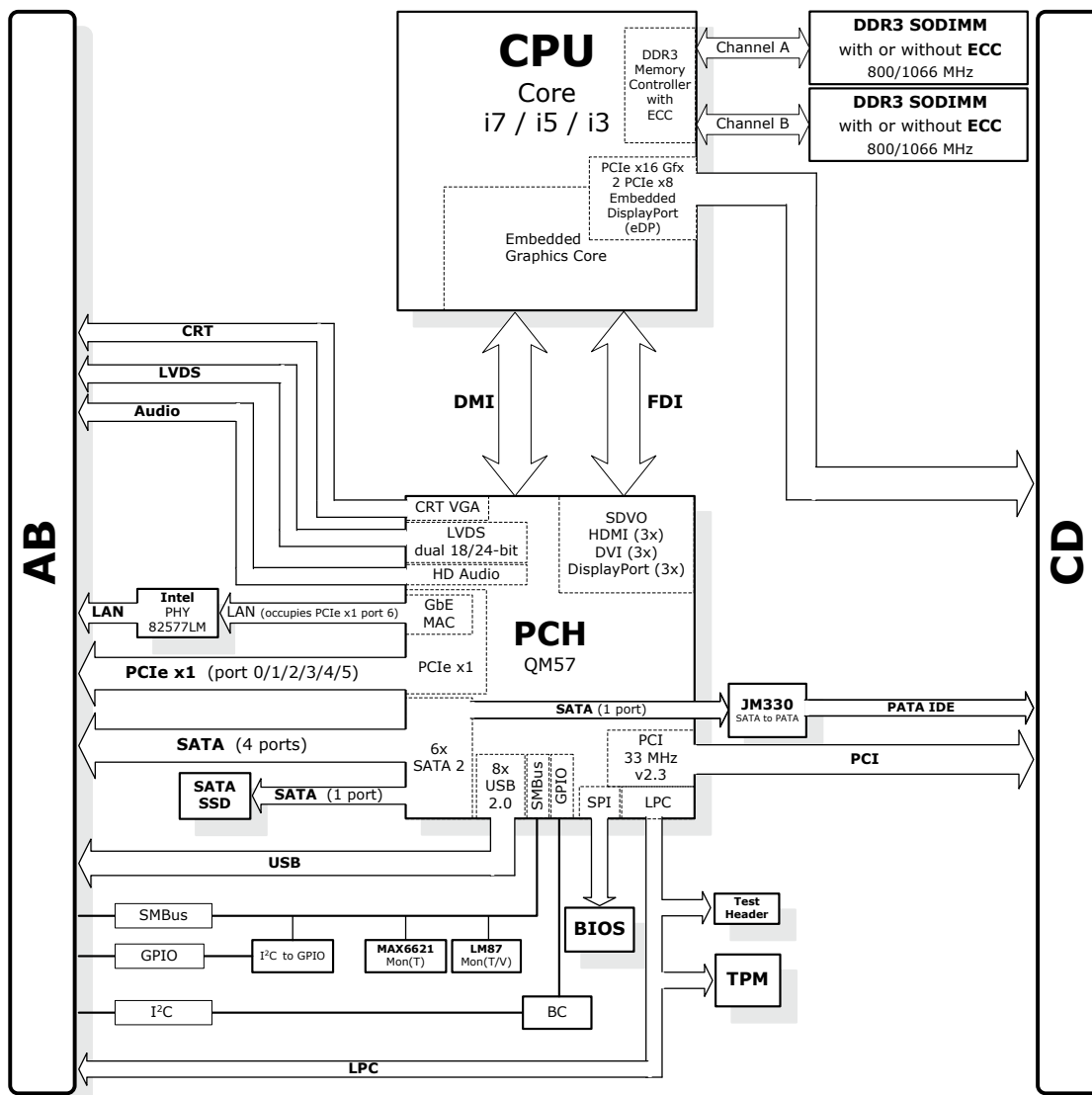
#### Mechanical and Environmental

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



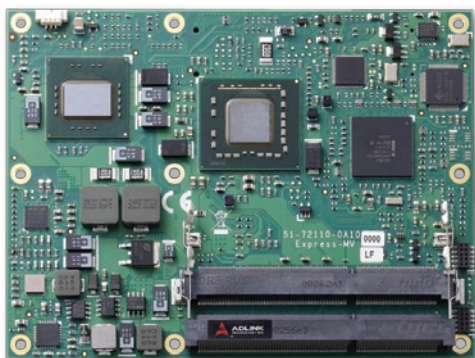
## Ordering Information

### 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
<b>Heat Spreaders</b>	
HTS-CB-B	Heatspreader with threaded standoffs for Express-CB/CBE
<b>Heatsink with Active Cooling</b>	
THSF-CB-B	Heatsink with fan and threaded standoffs for Express-CB/CBE



### 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	<p><b>Penryn SFF BGA type</b></p> <p>Intel® Core™2 Duo SP9300, FSB 1066, 2.26 GHz with 6MB L2 cache, 25 Watt</p> <p>Intel® Core™2 Duo SL9400, FSB 1066, LV 1.86 GHz with 6MB L2 cache, 17 Watt</p> <p>Intel® Core™2 Duo SU9300, FSB 800, ULV 1.2 GHz with 3MB L2 cache, 10 Watt</p> <p>Intel® Celeron® M 722, FSB 800, ULV 1.2GHz with 1MB L2 cache, 5.5 Watt</p>
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	<p>Graphics PCI Express x16 bus for SDVO/HDMI/DisplayPort or general purpose PCI Express (x8 / x4 / x1)</p> <p>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</p> <p>32-bit PCI 2.3 at 33MHz, supporting 4 bus masters</p> <p>LPC, SMBus, I<sup>2</sup>C</p>

#### 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 Feature Support	<p>Intel® Dynamic Video Memory Technology (Intel® DVMT 5.0)</p> <p>Video capture via x1 concurrent PCI Express port</p> <p>PAVP (Protected Audio-Video Path) support for Protected Intel® HD Audio Playback</p> <p>High performance MPEG-2 decoding</p> <p>WMV9 (VC-1) and H.264 (AVC) support</p> <p>Hardware acceleration for MPEG2 VLD/IDCT</p> <p>Microsoft DirectX 10 support</p> <p>Blu-ray support @ 40 Mb/s</p> <p>Hardware motion compensation</p> <p>Intermediate Z in classic rendering</p>
CRT Interface	<p>Analog CRT support by 300MHz DAC</p> <p>Analog monitor support up to QXGA, supports CRT hot plug</p>
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)

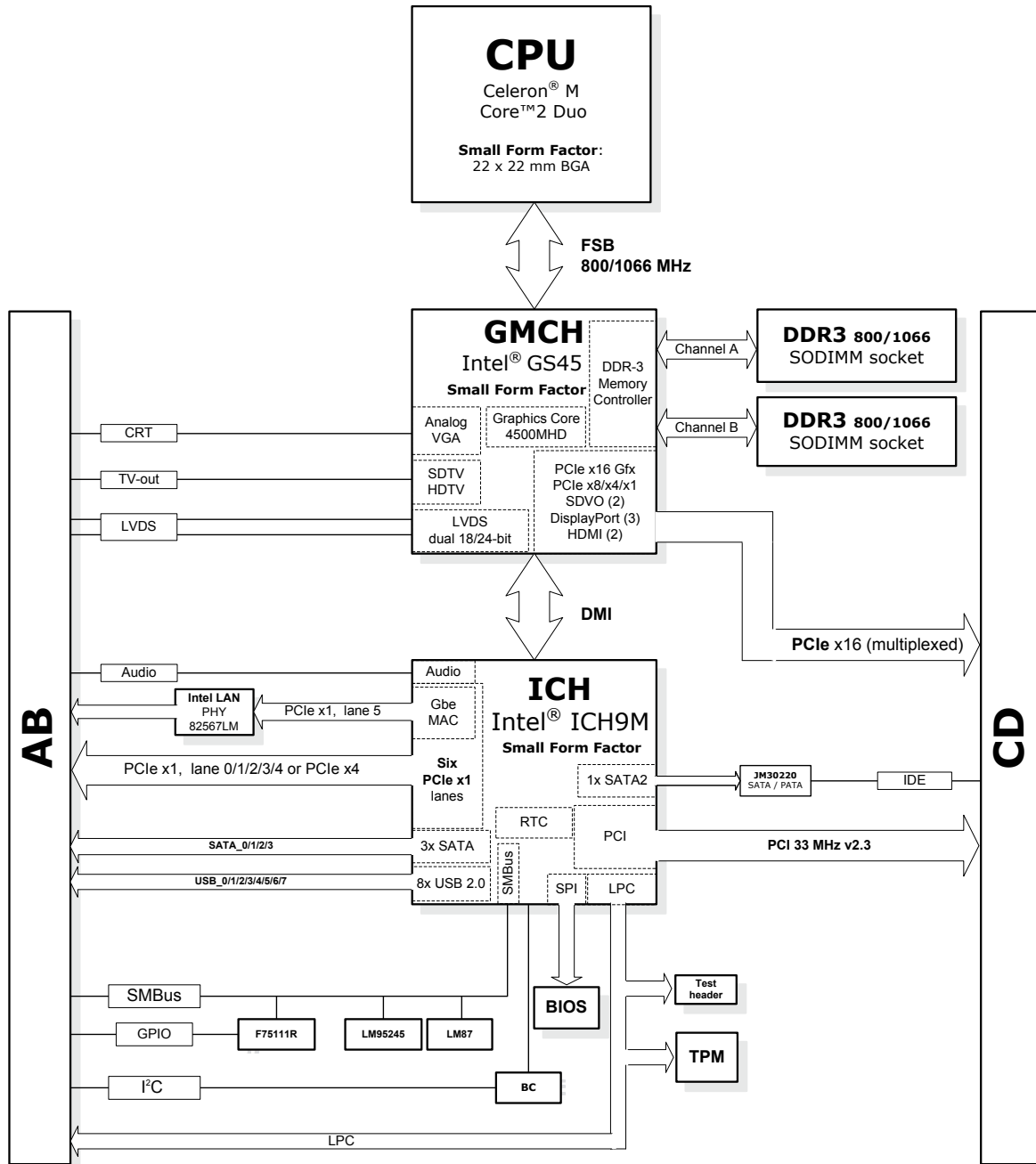
#### Mechanical and Environmental

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

## Functional Diagram



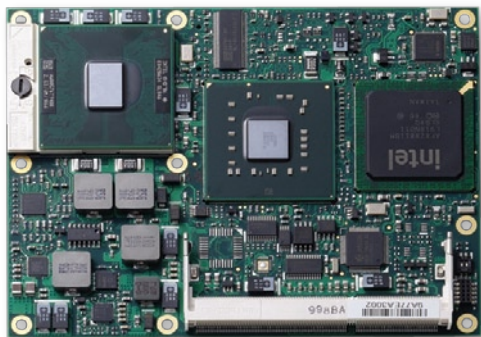
## Ordering Information

### 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
<b>Heat Spreaders</b>	
HTS-MV-B	Heatspreader for Express-MV (BGA CPU) with threaded standoffs
<b>Passive Heatsinks</b>	
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)
<b>Heatsink with Active Cooling</b>	
THSF-MV-B	High Performance Heatsink with Fan for Express-MV (BGA CPU) with threaded standoffs



### 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	<b>Socket P</b> 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

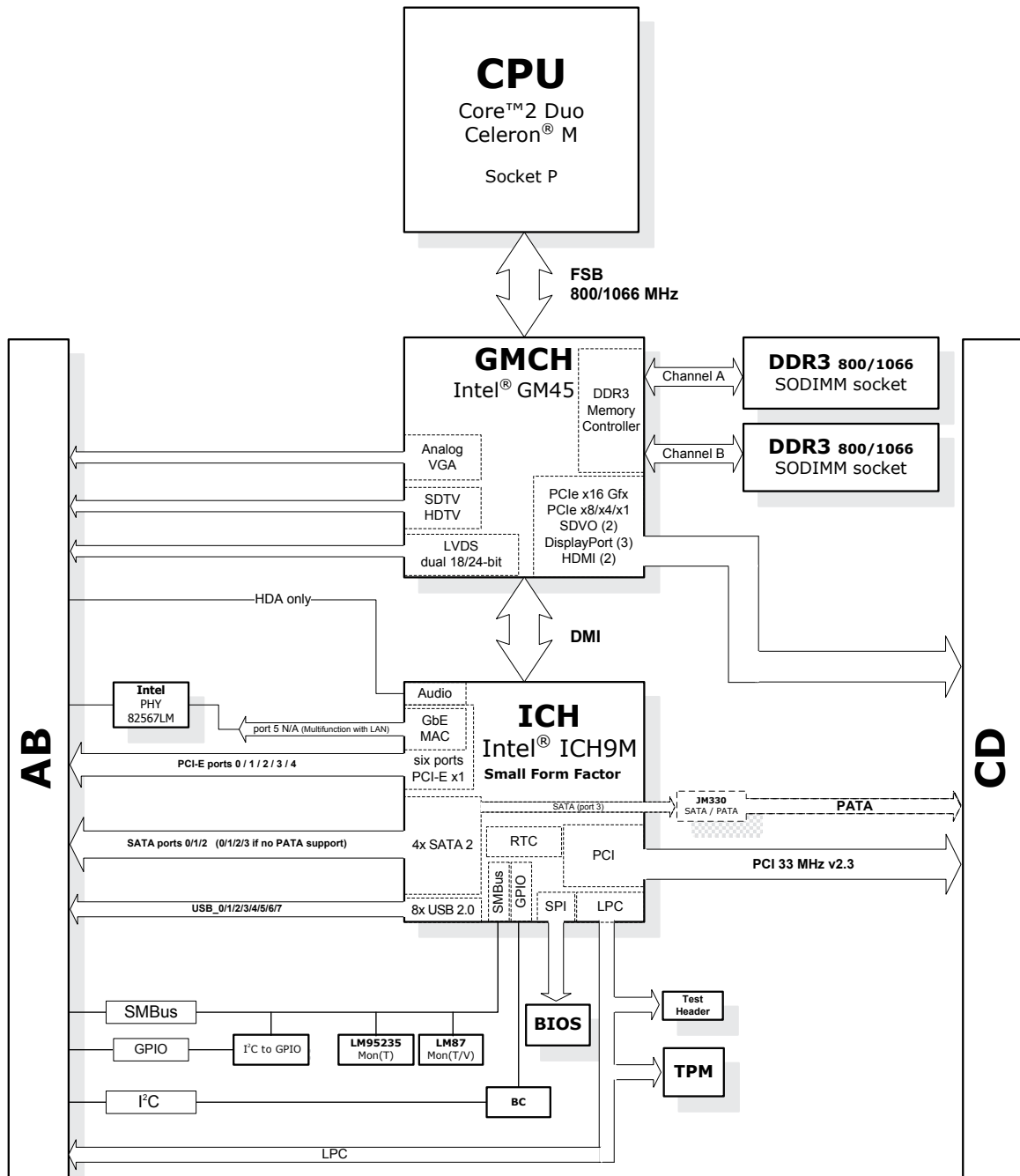
#### Mechanical and Environmental

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



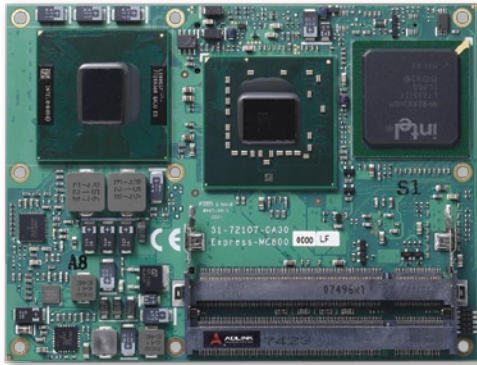
## Ordering Information

### Modules

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

### Accessories

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



### 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	<p><b>Socket P type</b></p> <p>Intel® Core™2 Duo T7500, FSB 800, 2.2 GHz with 4MB L2 cache, 34 W</p> <p>Intel® Celeron® M 550, FSB 533, 2.0 GHz, with 1MB L2 cache 27 W</p> <p><b>BGA type</b></p> <p>Intel® Core™2 Duo T7500, FSB 800, 2.2 GHz with 4MB L2 cache, 34 W</p> <p>Intel® Core™2 Duo L7500, FSB 800, LV 1.5 GHz with 4MB L2 cache, 17 W</p> <p>Intel® Core™2 Duo U7500, FSB 533, ULV 1.06 GHz with 2MB L2 cache, 10 W</p>
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)

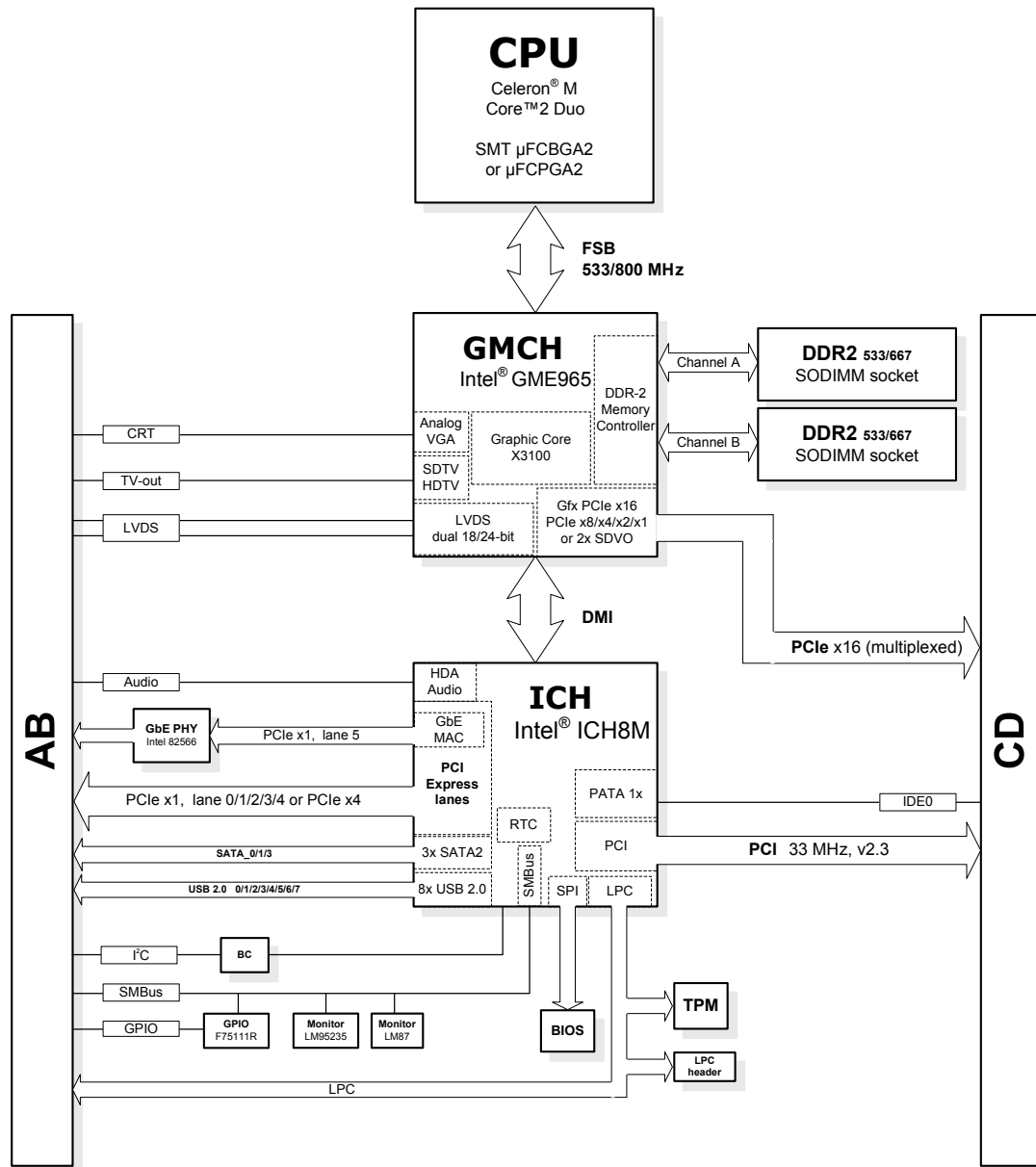
#### Mechanical and Environmental

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
Extended Support	Linux® 2.6.x Embedded XP BSP Linux® 2.6.x BSP AIDI Library for Win32, WinCE and Linux®

## Functional Diagram



## Ordering Information

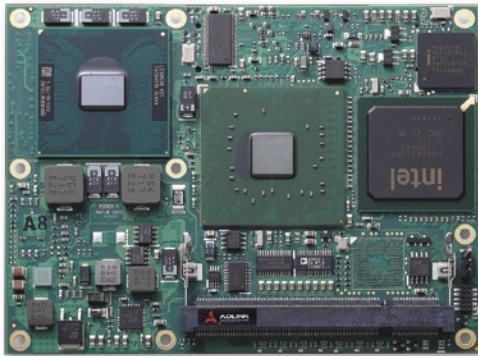
### Modules

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
<b>Heat Spreaders</b>	
HTS-MC800-B	Heatspreader for Express-MC800 (BGA CPU) with threaded standoffs
<b>Passive Heatsinks</b>	
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
<b>Heatsink with Active Cooling</b>	
THSF-MC800-S	High Performance Heatsink with Fan for Express-MC800 (socket CPU) with threaded standoffs





### 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	<p><b>Merom Core socket type</b></p> <p>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</p> <p><b>Merom Core BGA type</b></p> <p>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</p> <p><b>Yonah Core socket type</b></p> <p>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</p> <p><b>Yonah Core BGA type</b></p> <p>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</p>
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)

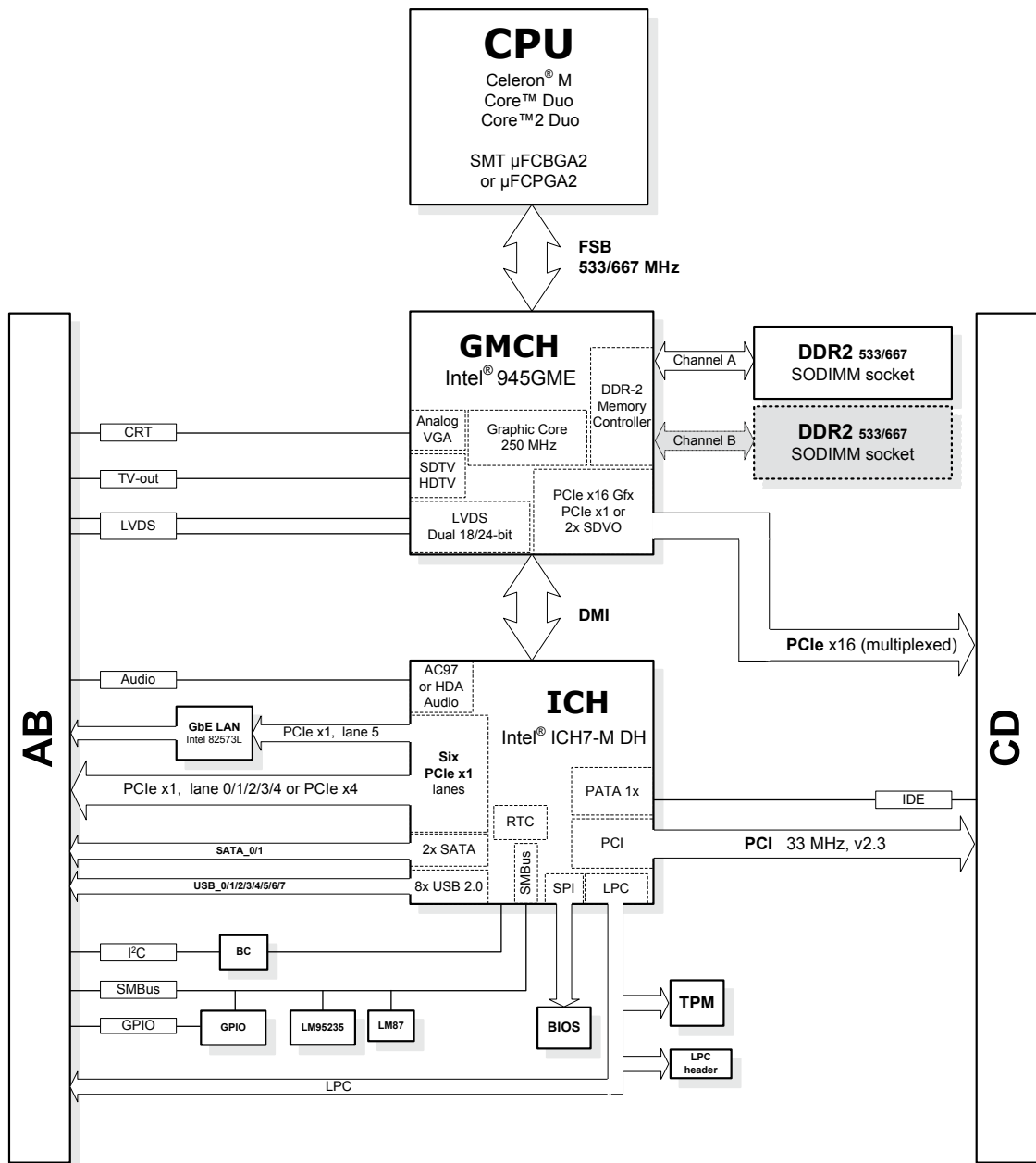
#### Mechanical and Environmental

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



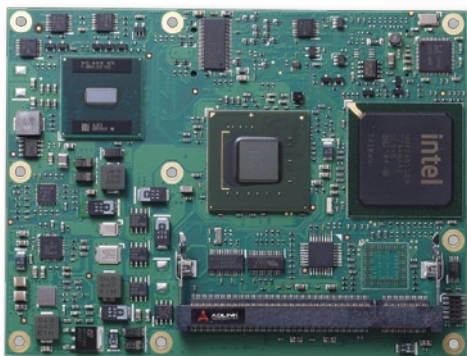
## Ordering Information

### 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
<b>Heat Spreaders</b>	
HTS-NR-B	Heatspreader for Express-NR (BGA CPU) with threaded standoffs
<b>Passive Heatsinks</b>	
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
<b>Heatsink with Active Cooling</b>	
THSF-NR-S	High Performance Heatsink with Fan for Express-NR (socket CPU) with threaded standoffs



### 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	<p><b>BGA type</b></p> <p>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</p> <p>Hyper-Threading support (2-threads)</p> <p>Advanced gunning transceiver logic (AGTL+) bus driver technology</p> <p>Enhanced Intel® SpeedStep® Technology</p> <p>Source synchronous double-pumped (2x) Address</p> <p>Source synchronous quad-pumped (4x) Data</p> <p>C0 - C4 low power states supported</p>
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, I <sup>2</sup> C

#### 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)

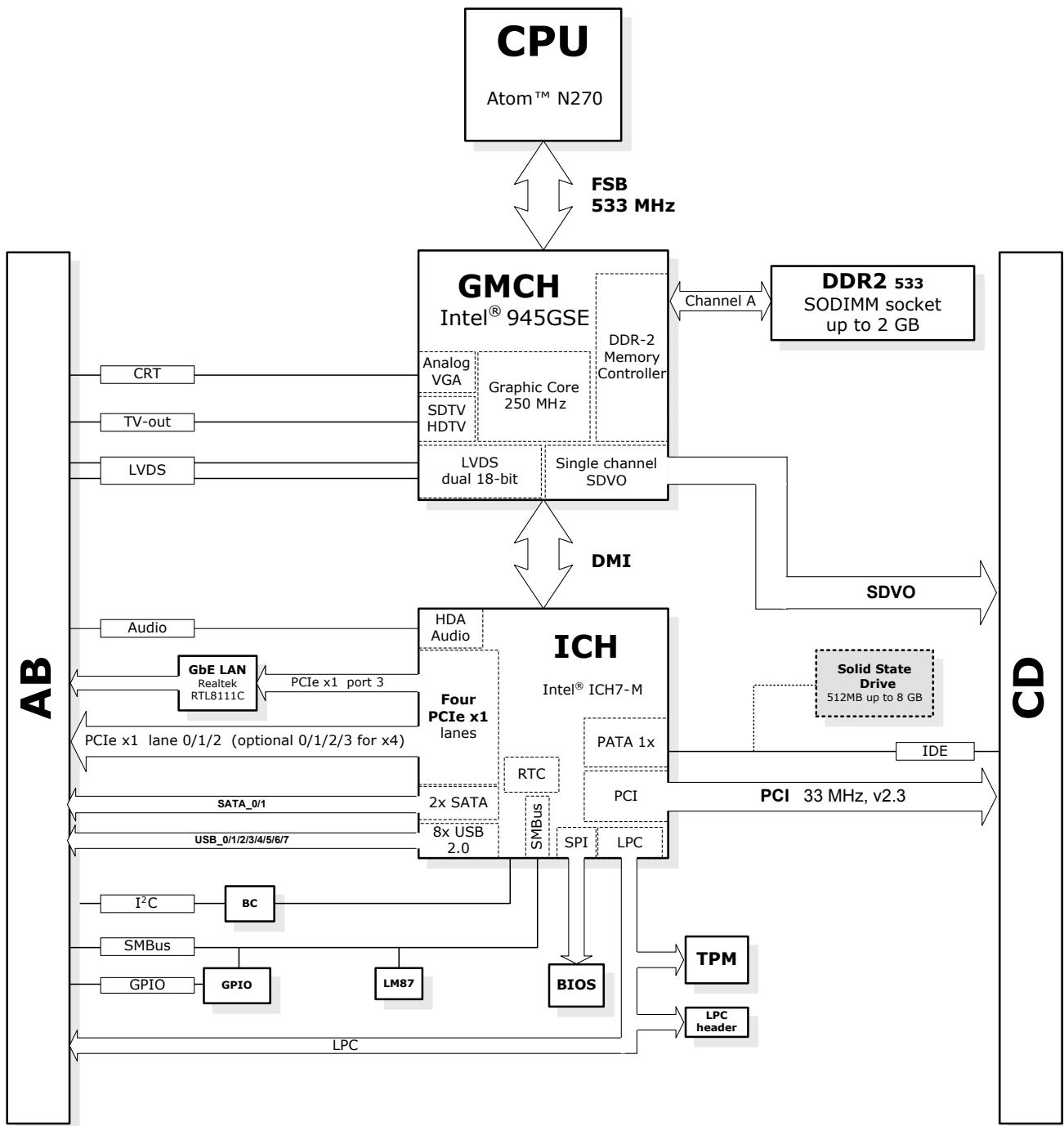
#### Mechanical and Environmental

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

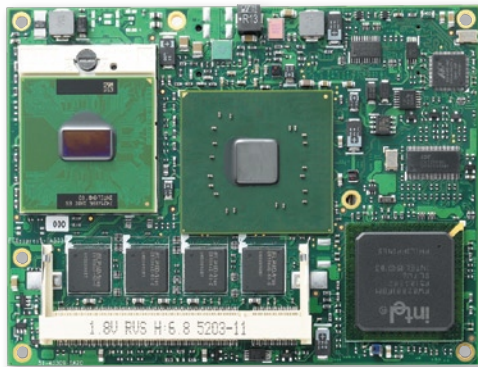
Model Number	Description/Configuration
Express-AT-N270	COM Express™ module with Intel® Atom™ N270 processor at 1.6 GHz
Express-AT-N270-4G	COM Express™ module with Intel® Atom™ N270 processor at 1.6 GHz 4GB SSD Solid State Disk

### Accessories

Model Number	Description/Configuration
<b>Heat Spreaders</b>	
HTS-CAT-B	Heatspreader for Express-AT (BGA CPU) with threaded standoffs
<b>Passive Heatsinks</b>	
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	<b>Socket 479 type</b> Intel® Pentium® M 760, 2.0 GHz, with 2MB L2 cache Intel® Pentium® M 745, 1.8 GHz, with 2MB L2 cache <b>BGA type</b> 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)

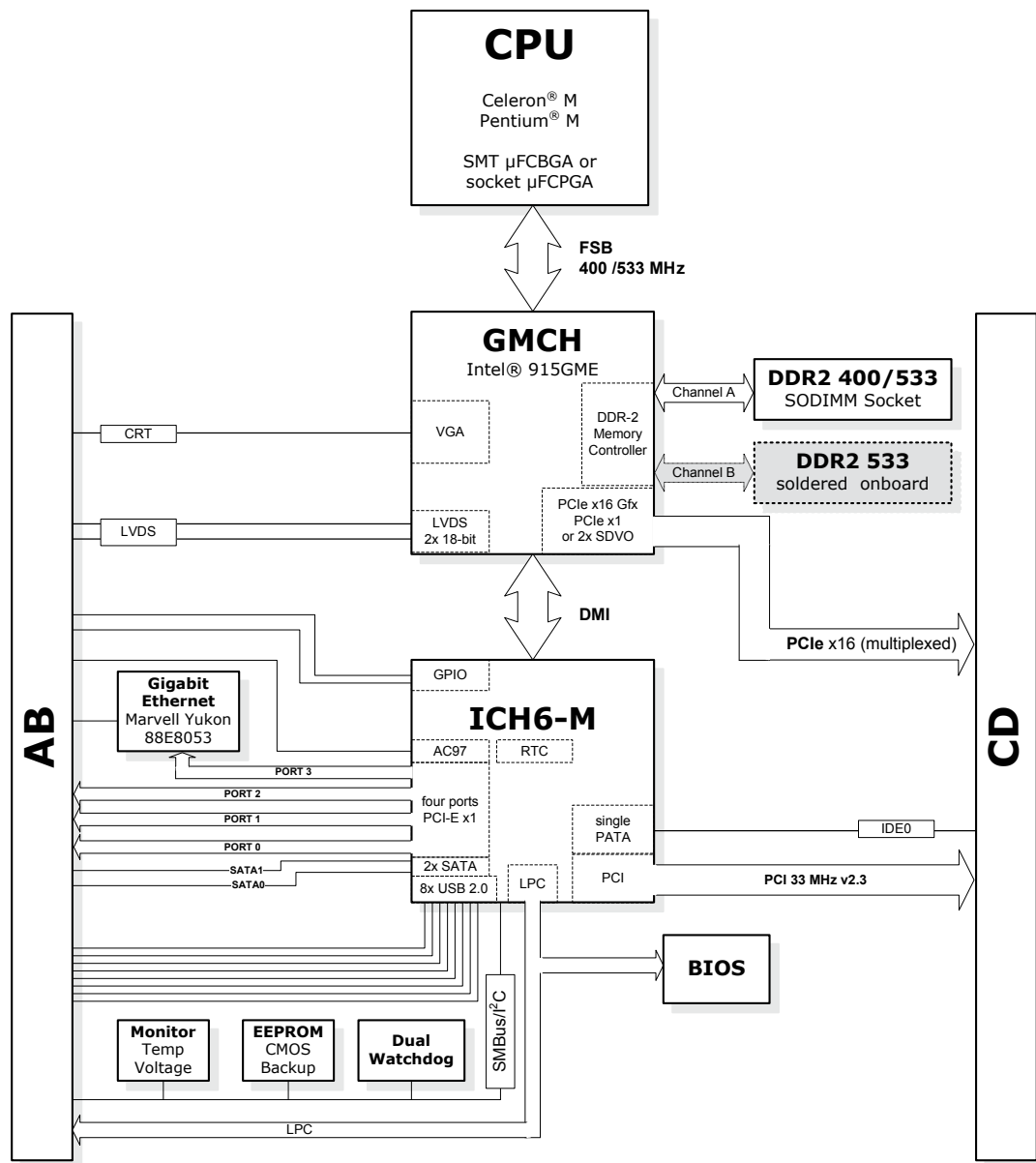
### Mechanical and Environmental

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 Pentium® 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
<b>Heat Spreaders</b>	
HTS-IA533-B	Heatspreader for Express-IA533 (BGA CPU) with threaded standoffs
<b>Passive Heatsinks</b>	
THS-IA533-B	Low Profile Heatsink for Express-IA533 (BGA CPU) with threaded standoffs
<b>Heatsink with Active Cooling</b>	
THSF-IA533-S	High Performance Heatsink with Fan for Express-IA533 (socket CPU) with threaded standoffs



### 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



### 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 <sup>2</sup> C (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	Intel® Dynamic Video Memory Technology 4.0 support
Feature 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

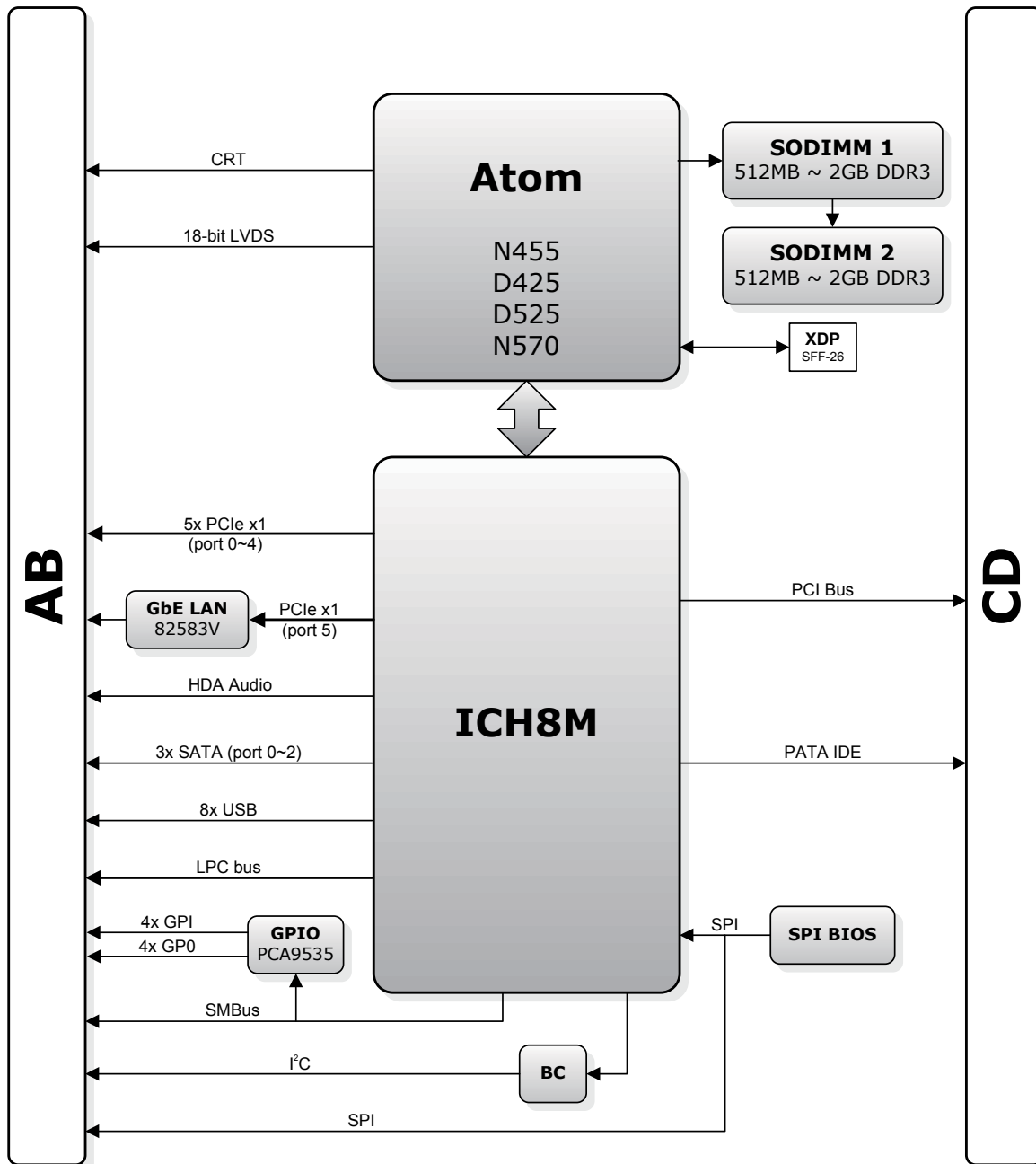
#### Mechanical and Environmental

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
<b>Heat Spreaders</b>	
HTS-LPC-B	Heatspreader for Express-LPC with threaded standoffs
<b>Passive Heatsinks</b>	
THS-LPC-B	Low Profile Heatsink for Express-LPC with threaded standoffs
<b>Active Heatsinks</b>	
THSF-LPC-B	Heatsink with Fan for Express-LPC with threaded standoffs





### 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	<p><b>BGA type</b></p> <p>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</p> <p>Hyper-Threading support (2-threads)</p> <p>Advanced gunning transceiver logic (AGTL+) bus driver technology</p> <p>Enhanced Intel SpeedStep® Technology</p> <p>Source synchronous double-pumped (2x) Address</p> <p>Source synchronous quad-pumped (4x) Data</p> <p>C0 - C4 low power states supported</p>
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)

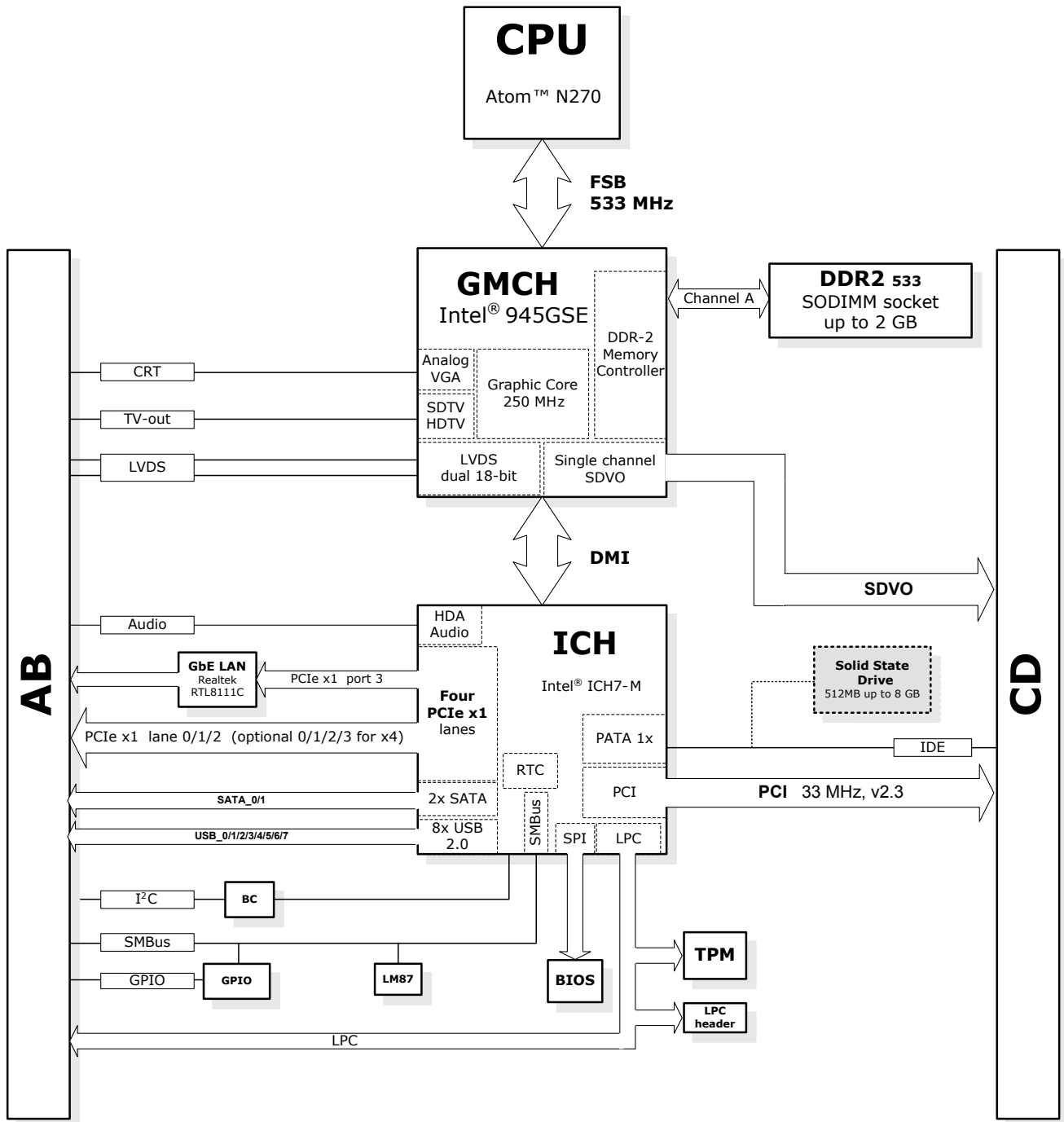
#### Mechanical and Environmental

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



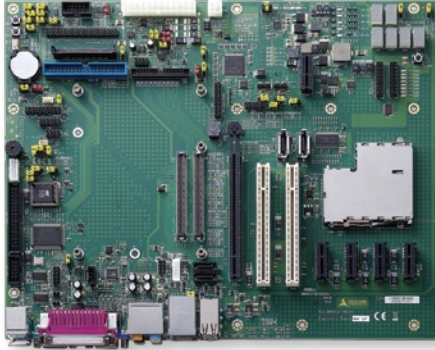
## Ordering Information

### 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
<b>Heat Spreaders</b>	
HTS-ATC-B	Heatspreader for Express-ATC (BGA CPU) with threaded standoffs
<b>Passive Heatsinks</b>	
THS-ATC-B	Low Profile Heatsink for Express-ATC (BGA CPU) with threaded standoffs



### 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

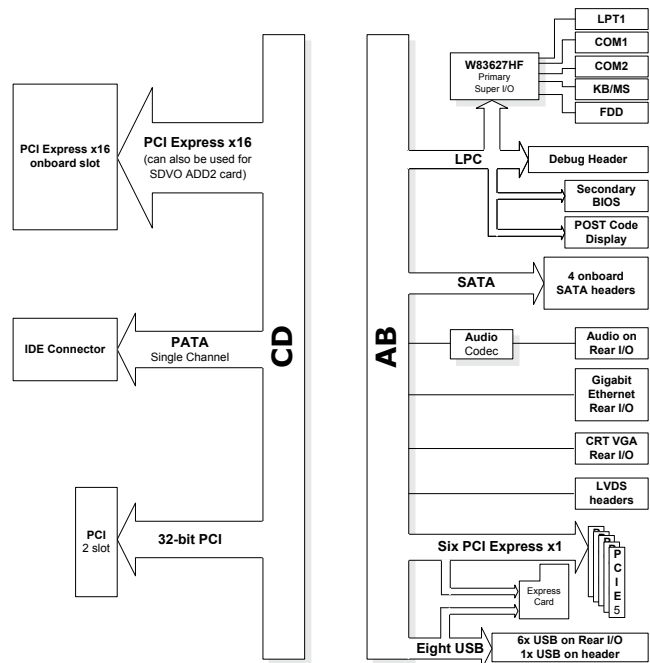
#### Active Components

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

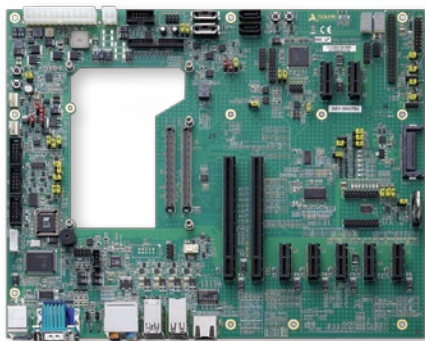
#### Carrier

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

### COM Express Carrier Design Guide Express

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](http://www.adlinktech.com)



### 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

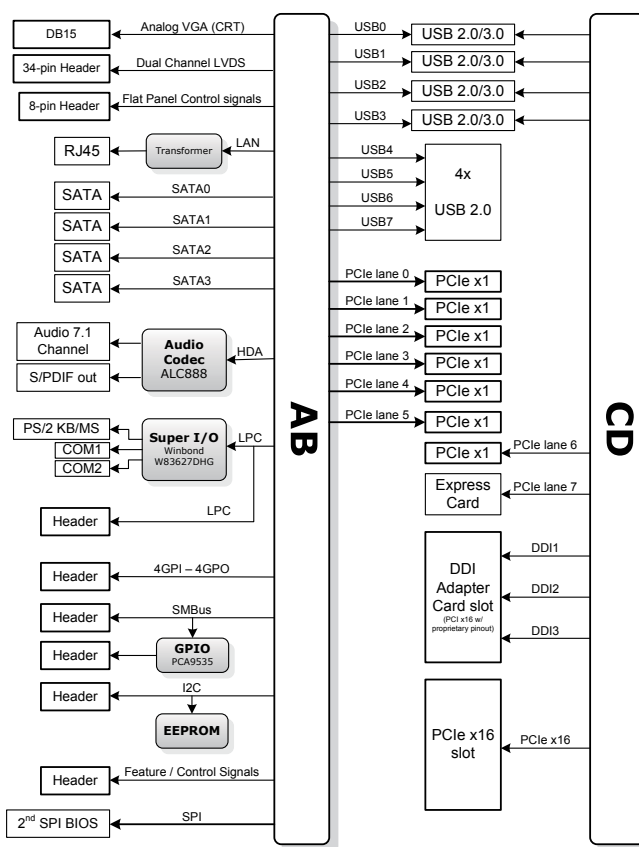
#### Active Components

Audio	Realtek ALC888 High Definition Audio Codec
Super I/O	Winbond WF83627DHG on LPC bus
Digital I/O	I <sup>2</sup> C 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, I <sup>2</sup> C, 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 COM Express

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](http://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)



**Get Started in minutes**



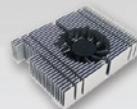
COM Express Module



Carrier Board



Memory



Heatsink



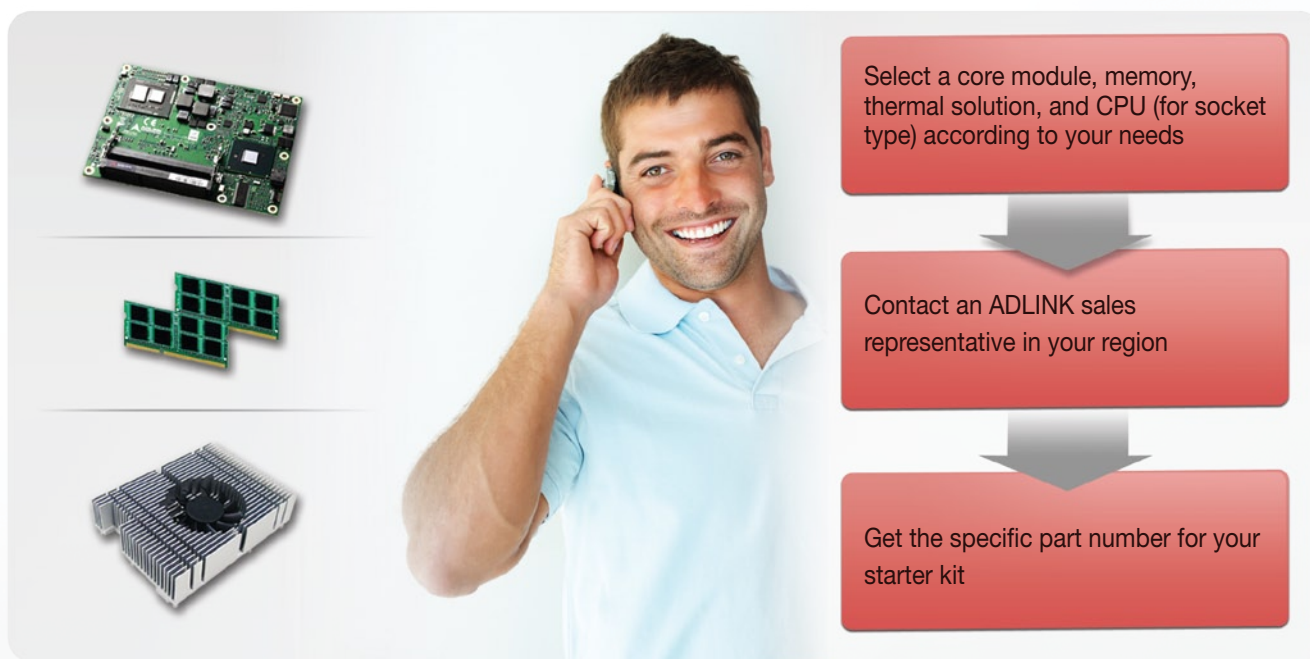
PSU



Accessories

## 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



### 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 boot-loader 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 Boot-loader 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), I <sup>2</sup> C (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

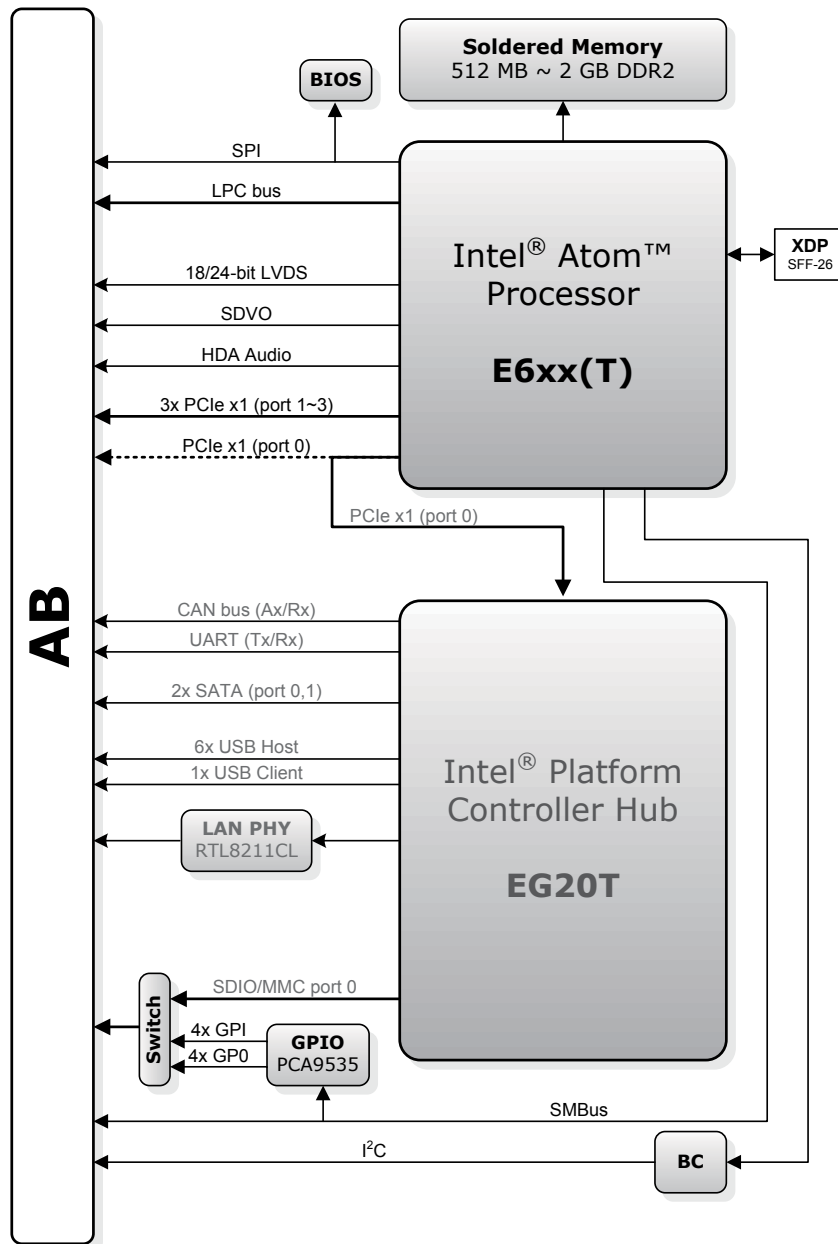
#### Mechanical and Environmental

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

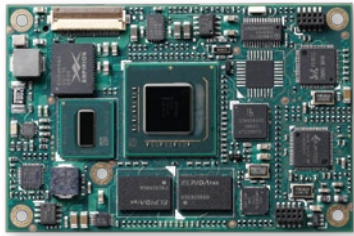
### Modules

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
<b>Heat Spreaders</b>	
HTS-nXTC-B	Heatspreader for nanoX-TC with threaded standoffs for bottom mounting
HTS-nXTC-BT	Heatspreader for nanoX-TC with throughhole standoffs for top mounting
<b>Passive Heatsinks</b>	
THS-nXTC-B	Multidirectional Heatsink for nanoX-TC with threaded standoffs for bottom mounting





## 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 Buses	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)

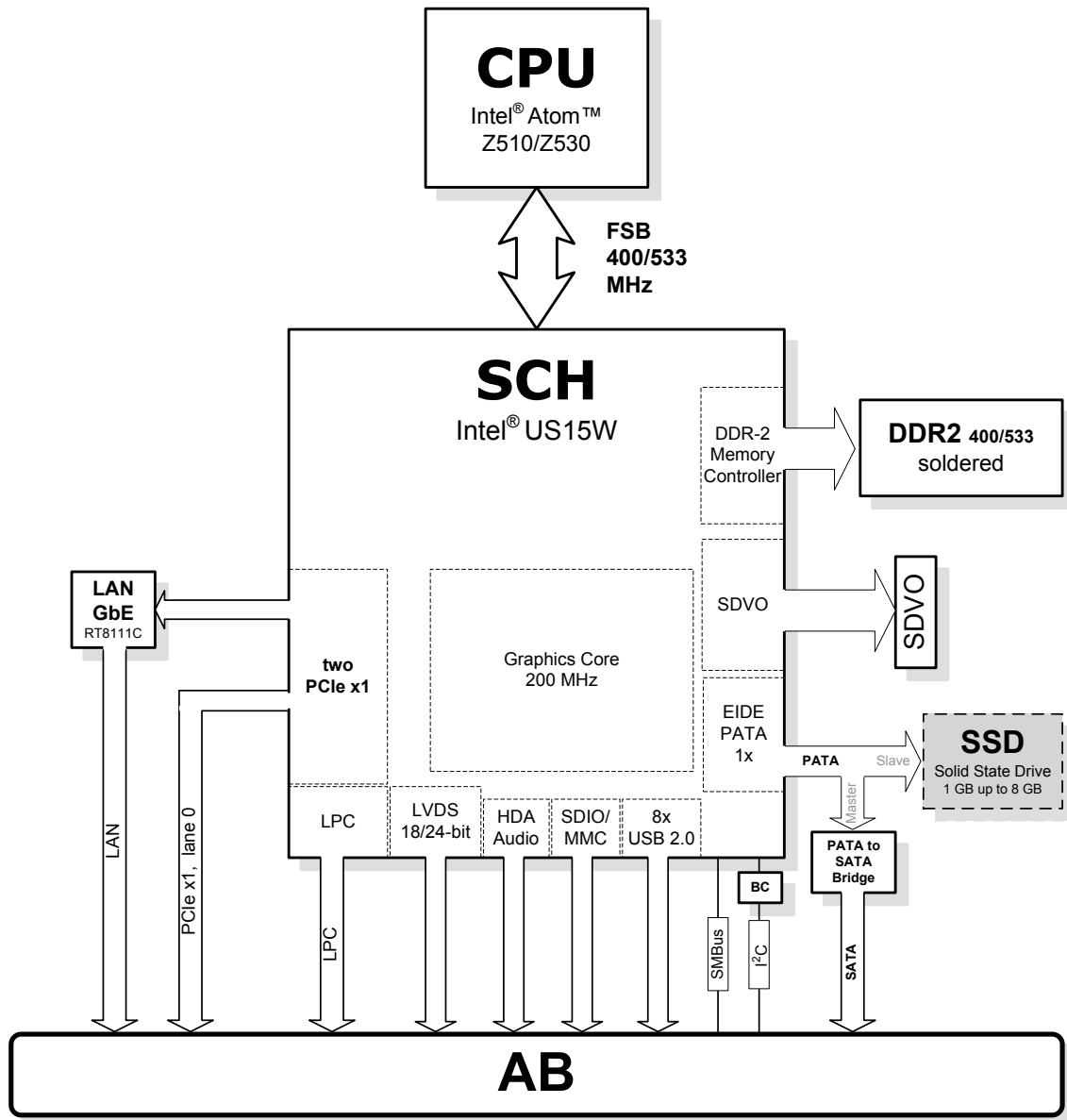
### Mechanical and Environmental

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



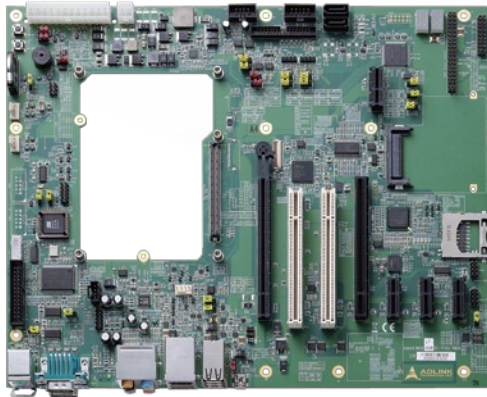
## Ordering Information

### 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
<b>Heat Spreader</b>	
HTS-nML-B	Heatspreader for nanoX-ML (BGA CPU) with threaded standoffs
<b>Passive Heatsinks</b>	
THS-nML-B	Low profile Heatsink for nanoX-ML (BGA CPU) with threaded standoffs



### 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 Buses	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

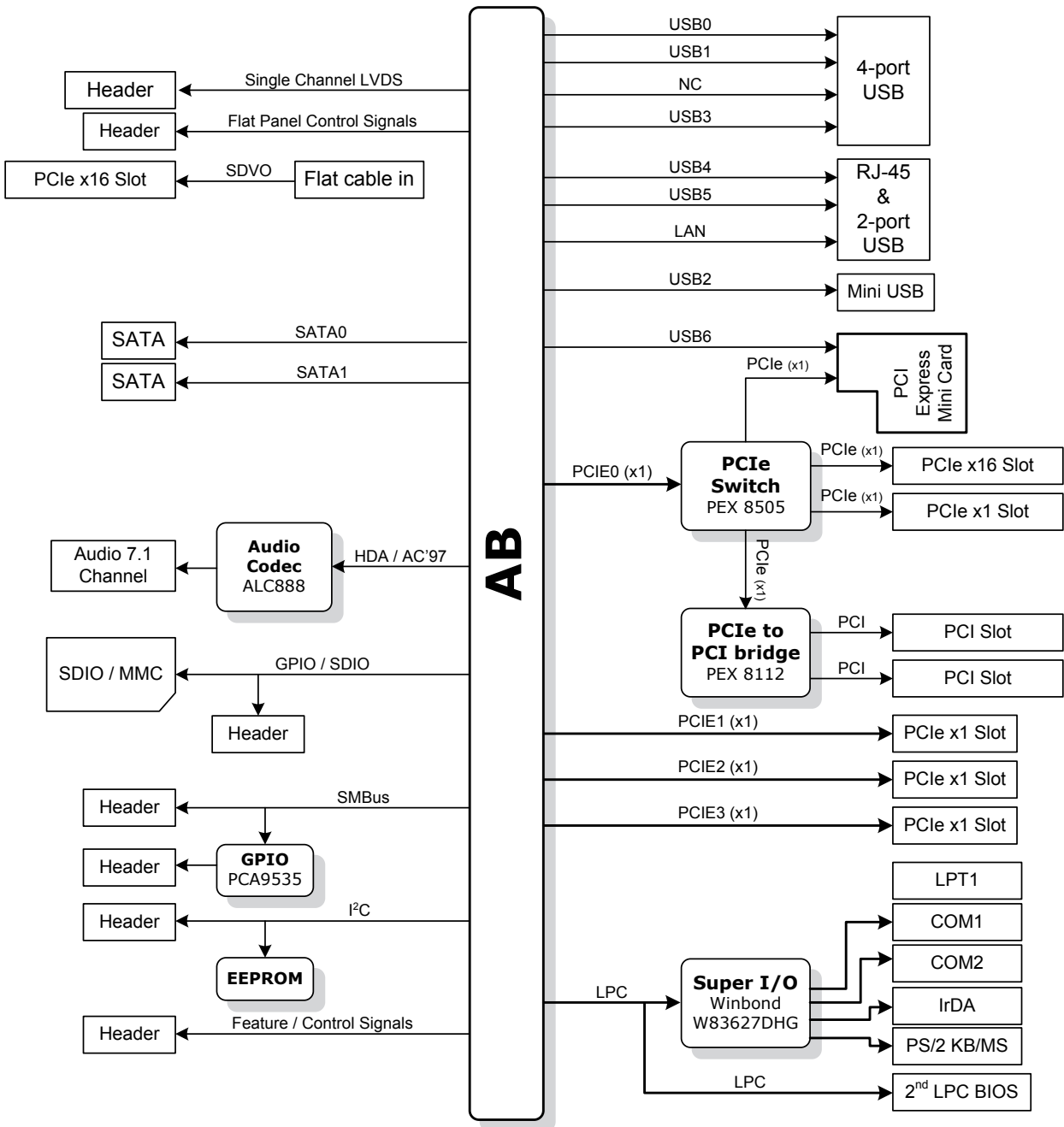
#### Active Components

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

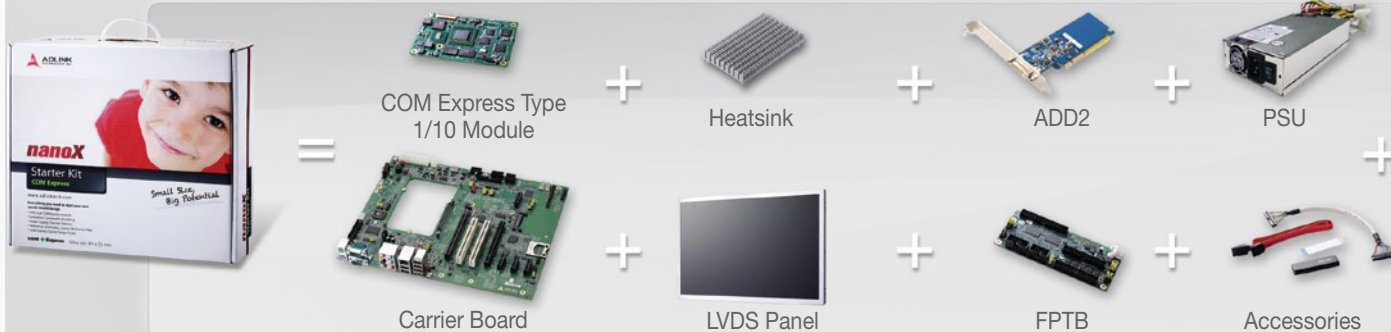
### Standard Items

- 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

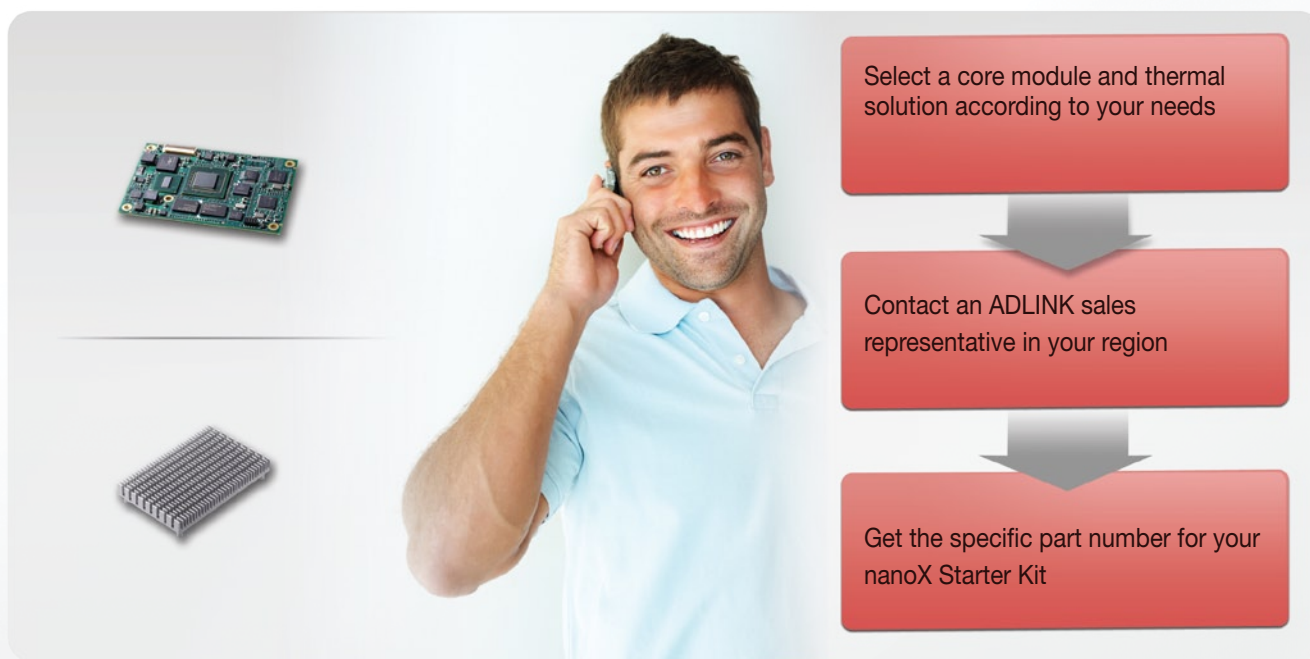
- COM Express Type 1 core module of your choice
- Thermal solution of your choice (heatspreader or heatsink)

## Get Started in minutes



## 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

## 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
<b>StarterKit-Battman</b>	Smart Battery Reference Platform for COM Express™ modules (includes two Smart Batteries)

## Flat Panel Transfer Board



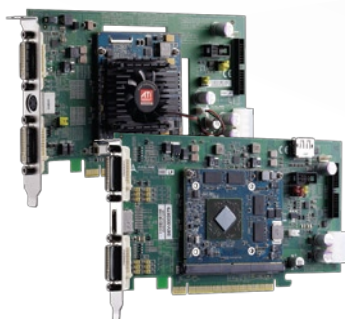
The Flat Panel Transfer Board (FPTB) supports prototyping and verification of LVDS and TTL flat panel displays with Express-BASE and nanoX-BASE carrier boards and is equipped with an LVDS-to-TTL converter to allow users to implement TTL displays with COM Express systems that support LVDS only. Onboard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

### Ordering Information

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

Note: Included in the Starter Kit - nanoX.

## PCIe x16 MXM Carrier Board



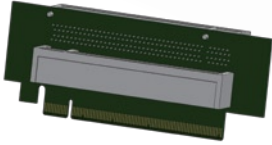
ADLINK's PCIe x16 MXM carrier boards allow for discrete PCIe graphics expansion using a Mobile PCI Express Module (MXM). The MXM carrier board series supports MXM-II and MXM-III graphics modules, allowing developers to evaluate, prototype and verify MXM graphics modules before full integration into the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

### Ordering Information

Model Number	Description/Configuration
<b>MXM2CR</b>	PEG x16 MXM-II carrier board (w/o MXM graphics module)
<b>MXM3CR</b>	PEG x16 MXM-III carrier board (w/o MXM graphics module)
<b>MXM3-E4690</b>	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.

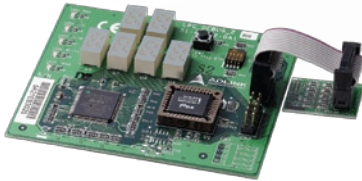


### Ordering Information

Model Number	Description/Configuration
P16T028	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.

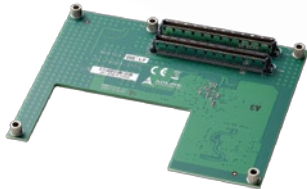


### Ordering Information

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).

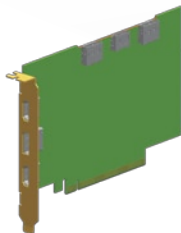


### Ordering Information

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





## Стандарт Электрон Связь

Мы молодая и активно развивающаяся компания в области поставок электронных компонентов. Мы поставляем электронные компоненты отечественного и импортного производства напрямую от производителей и с крупнейших складов мира.

Благодаря сотрудничеству с мировыми поставщиками мы осуществляем комплексные и плановые поставки широчайшего спектра электронных компонентов.

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Осуществляем поставки продукции под контролем ВП МО РФ на предприятия военно-промышленного комплекса России , а также работаем в рамках 275 ФЗ с открытием отдельных счетов в уполномоченном банке. Система менеджмента качества компании соответствует требованиям ГОСТ ISO 9001.

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С нами вы становитесь еще успешнее!

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