

EUROCOM 500

COM Express module

Atom CPU

- Low-Power COM Express platform with Atom CPU and US15 W chip set
- With parallel PCI for expansion

→ advanced

III Features

- Atom Processor with 1.1 or 1.6 GHz clock
- Chip set US15W
- On-chip graphics and memory controller
- 1 or 2 GB memory
- Gigabit Ethernet controller on-board
- Additional PCI interface 33 MHz / 32 bit
- One PCI Express expansion port
- Solid state mass storage: SD card or SSD on-board
- Serial ATA
- COM Express Base form factor
- Low-power operation 10 W, 6 W typical
- Industrial temperature range optional

III Overview

ELTEC's EUROCOM 500 COM Express module uses Intel's Atom low-power CPU Z5x0 in the Embedded Menlow XL platform. This platform has a single-chip System Controller Hub (SCH) chip (i.e. the chip set), responsible for the complete I/O functionality, controlling memory, graphics, and I/O.

The Atom CPU and the US15W chip set with their low power consumption are very appealing for embedded applications. However, the I/O functionality does not make it easy to use it this way. This is especially true for using the Atom for upgrades of COM Express applications. To make the Atom CPU usable with the COM Express form factor, ELTEC made some additions to the hardware: the popular COM Express Type 2 uses by definition parallel PCI as well as Gigabit Ethernet, and many existing applications have made use of these features. So, ELTEC decided to include these features to its EUROCOM 500 module.

A PCI Express-to-PCI Express switch is used to attach both the PCI bridge and the Gigabit Ethernet interface on the module. Additional connectivity for

Gigabit Ethernet (1000BaseTx) is supplied with an on-board controller.

The module is intended for use with Windows XP as well as Linux operating systems. It is tailored for low-power operation, using only 6 W typical, which makes cooling without rotating fans possible.

III Platform Features

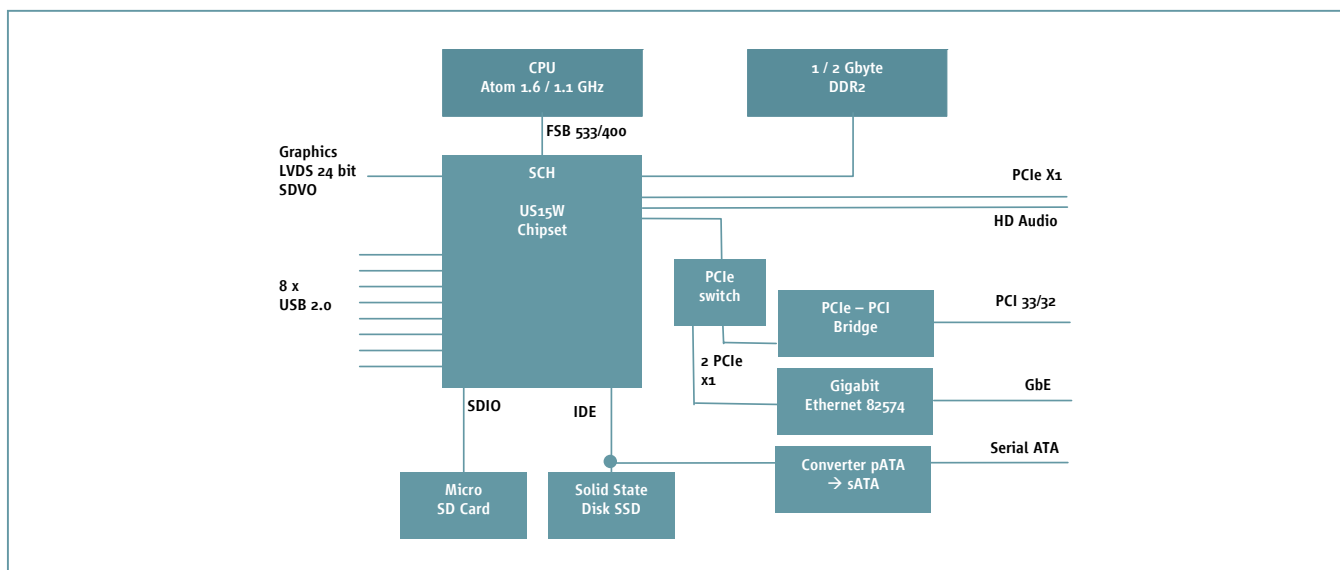
The major features of the Platform, as it is defined by Intel, are listed here for reference:

- System Controller Hub US15W (Poulsbo XL)
- 64-bit DDR2 RAM @400 MHz: max. 2GB (8 devices), 1GB optional, soldered to board
- Integrated 3D Graphics Core, 200 MHz
- Full HD HW Video Decode Engine
- Graphics Display (Single, Clone and Dual Independent)
- 18 or 24 bit single channel LVDS (112 MPixel/s max.)
- SDVO Intel Graphics Media Accelerator 500 (160 Mpixel/s max.)
- RTC on-chip
- Parallel ATA interface (UDMA 100/66/33)
- Intel High Definition Audio (with external audio codec)
- BIOS boot from Serial EEPROM, 1 MByte (FPGA-based Firmware Hub/LPC)

These features are supported by the CPU and the US15W chip set. Not all of them are available on the COM Express module (see below for a list of supported features). However, for customer-specific designs, all features of the platform can be made available.

III CPU

The EUROCOM 500 CPU is Intel's Atom processor, clocked at 1.6 or 1.1 GHz, it has one CPU core. It consumes a maximum power of 2.2 W (resp. 2.0 W). Front side bus speed is 400 resp. 533 MHz, the 2nd level cache has 512 kBytes. Since many speed-increasing technologies of today's CPUs have been sacrificed to save power, the Atom CPU must be clocked faster than comparable CPUs.



Estimations about the CPU speed needed for an application should be made with benchmarks.

III Memory

Main memory of the board consists of 1 or 2 Gbytes of DDR-2 memory, accessed with 64 bit data in parallel. Boot code is stored in a 1 MByte Flash chip, attached at the low-pin count bus LPC. This flash memory can be updated in the field.

III Graphics

The chip set SCH contains an internal 3-D graphics core, clocked at 200 MHz. Graphics memory is a part of main memory (shared memory design). SDVO graphics output is connected through a standard converter on the base board to VGA or HDMI, maximum dot clock is 160 MHz. SDVO digital graphics output is supported on the EUROCOM 500, as well as LVDS. The chip set additionally contains a HDTV decoder, designed for DVD playback applications.

III Mass storage

A Solid State Disk (SSD - Intel Z-P140 with 2 Gbyte capacity) attached to the parallel ATA port can be fitted for on-module file storage. The chip set-internal SDIO signals are routed to an on-module micro SD card connector. The conversion from parallel to serial ATA is done on the EUROCOM 500 module, one SATA port is routed to the COM Express connector.

III Peripherals on-board

In addition to the peripherals contained in the chip set, ELTEC included these interfaces on the COM module:

- Ethernet: 10/100/1000 GbE PCI Express controller (Intel 82574)
- Mass storage: microSD Card slot
- Solid state disk

III Additional PCI interface

To make the Atom/US15W platform usable for COM Express designs, and to make the low-power features of the Atom processor available for the well-established COM Express platform, the parallel PCI bus was interfaced to the chip set. One of the PCI Express x1 ports of the chip set is routed to a PCI Express switch with two x1 down-stream ports. One of these two ports is connected to a bridge, converting the signals to the PCI bus with 33 MHz and 32 bits parallel data. The other port is connected to a Gigabit Ethernet controller. The two x1 ports have to share the bandwidth of the single x1 up-stream port; this does not pose a problem, since both Ethernet and PCI can make use only of half the bandwidth of a single x1 PCI Express port.

III COM Express Pin-out Type 2 Interface Signals

The COM Express connector on the EUROCOM 500 is of pin-out type 2. Basically, this type is meant for use on carriers with IDE and up to 22 PCI Express lanes, multiplexed with digital graphics SDVO signals.

Following is a list of all signal groups in the COM Express. If signals are not supported on the EUROCOM 500, see notes in parentheses.

- 8 USB 2.0 ports; 4 shared over-current lines (8 USB supported)
- Up to 4 Serial ATA or SAS ports (one supported)
- Support pins for up to 2 ExpressCards (not supported)
- 24-bit LVDS graphics
- Analog VGA (not supported)
- TV Out: Composite Video, S-Video, Component Video (not supported)
- SDVO, pins shared with PCI Express Graphics
- AC '97 digital audio interface for external CODEC
- Single Gigabit Ethernet interface with integrated PHY
- LPC interface
- 8 GPIO pins (not supported)
- 32 bit PCI interface, 33 MHz/32 Bit
- IDE port for legacy ATA devices (not supported)
- 22 PCI Express 1.0 lanes (only one x1 port supported)

III Carrier board

ELTEC's established base board MODB-230 can be used for evaluating the COM Express board in a PC-like environment. The baseboard supports the following features:

- Audio Codec for High-definition audio
- Super I/O LPC47M107S
- I/O connectors:
 - 3 USB 2.0
 - Serial ATA
- 2 PCI Express slots (x16 resp. x8 mechanically, compatible with x1 boards, x1 electrically)
- 1 SDVO port, connected to one x16 PCI Express port. SDVO converter board to analog VGA or HDMI can be installed here.

III Software

The EUROCOM 500 uses a General Software BIOS made specifically for the US15W platform. It offers all the standard features with additional boot from USB and the possibility for field upgrades (reprogramming the on-board BIOS flash device with new content). Fast boot times have been taken care of.

III Operating Systems

Most x86 operating systems can be used. However, changes in the graphics architecture should be taken into account. These operating systems are supported:

- Windows XP and Windows XP Embedded
- Linux
- OSADL real-time Linux.

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III Specification

Thermal / Mechanical

Dimensions: COM Express Base: 95 mm * 125 mm.

5 Mounting holes for M2,5.

Operating Temperature Range:

- Commercial 0..+70 °C
- Industrial -40 .. +85 °C (optional)

COM Express 1.0 interface Type 2, dual 220 pin connectors, 440 pins total.

Maximum module input power capability 18 W:

- +12V primary power supply input
- +5V standby and 3.3V RTC power supply inputs

COM Express usage

The following signals are present on the COM Express connector:

- 8 USB 2.0 ports; 4 shared over-current lines
- 1 Serial ATA
- 24-bit LVDS graphics
- SDVO, pins shared with PCI Express Graphics
- High-definition digital audio interface for external CODEC
- Single Gigabit Ethernet interface with integrated PHY
- LPC interface
- 32 bit PCI interface, 33 MHz/32 Bit
- 1 PCI Express x1 1.0 lane

Documentation

Free Internet

Please contact your local sales office for detailed information.

