

# CoreExpress®-ECO

## Next Generation Computer-On-Module

### Features

Intel® Atom™ Processor

512 MB, 1 GB, 2 GB SDDR2 soldered RAM

2 PCI Express Lanes

SDIO/MMC

SMBus

GMBus/DDC

LPC bus

2 Graphics Ports (LVDS & SDVO)

HD Audio

8 USB 2.0

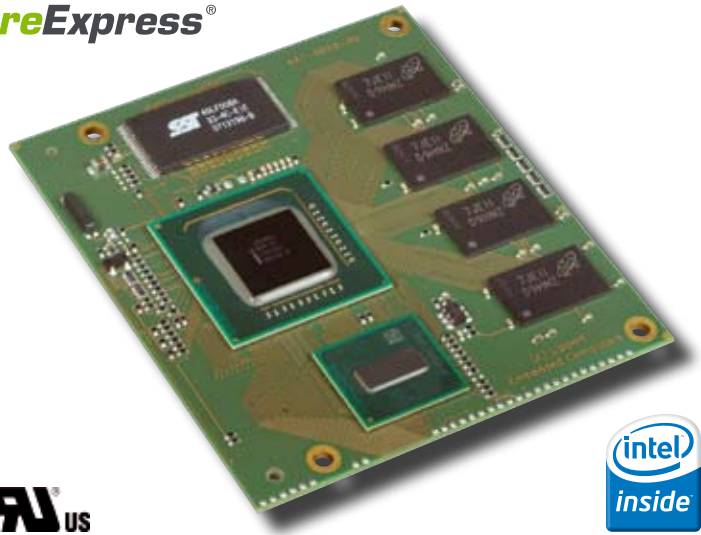
IDE

Award BIOS

Only 58 mm x 65 mm and 28 grams

5 V only supply, 5 Watts

Extended temp. range -40 °C ... +85 °C (opt)



The CoreExpress-ECO is a Computer on Module (COM) implementation in a 58 mm x 65 mm format. It is based on the CoreExpress specification, a no-compromise new development that leaves the traditional PC interfaces behind.

CoreExpress modules are legacy-free, meaning they come with digital interfaces only; when an application requires analog signals, these can easily be implemented on the carrier board. The tiny module size stems from today's advanced chip technology that not only reduces the required space but also allows for very low power processors. The low power requirements lead to minimum cooling efforts, decreasing the total dimensions further, when compared to existing solutions.

The CoreExpress-ECO utilizes an Intel Atom processor and related Intel System Controller Hub US15W. The processor's advanced micro-architecture retains the popular X86 programming model. Multiple threads improve responsiveness delivering a better user experience.

The computer module comes completely with up to 2 GB of SDDR2 RAM soldered to the board, graphics, MPEG2/4 support, LVDS and SDVO display ports, as well as HD audio streams. Two PCI Express lanes are available for external I/O and graphics. There are eight USB 2.0 ports, IDE, SDIO/MMC interface, SMBus, and LPC bus available for even further expansion. All these signals are made available on a tiny 220 pin connector.

CoreExpress-ECO features the LiPPERT Enhanced Management Technology (LEMT) based on an integrated system management controller (SMC). It handles the power sequencing and other housekeeping tasks, and provides a protected flash area for miscellaneous user information.

An Developer's kit is available to assist in the development of customer designed carriers. It contains a CoreExpress-ECO module on an EPIC carrier board, a LCD module and power supply. Additionally, a "best practices" manual is included, detailing how to design an application specific carrier board for the CoreExpress-ECO. All necessary cables and full technical documentation are also included in the kit.

Supported operating systems are Windows, VxWorks, QNX, and Linux.

LiPPERT is an independent design house and manufacturer that develops and builds special customer specific solutions. Please ask for a specific quotation.

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BY ADLINK

# CoreExpress®-ECO

## Technical Specifications



**Board Format** CoreExpress® 58 mm x 65 mm

**Processor** Intel® Atom™ Z530 processor@ 1,6 GHz or  
Intel® Atom™ Z510 processor @ 1,1 GHz  
45 nm process  
512K L2 cache  
533 MT/s FSB  
USFF uFCBGA8, 13x14mm, 0.6mm pitch,  
447 pins

**Core logic** Intel System Controller Hub  
US15W (SCH)  
65 nm process  
USFF uFCBGA3, 22x22mm, 0.6mm pitch,  
1249 pins

**RAM** 512 MB, 1 GB, 2 GB SDDR2, 533 MHz.  
Soldered on board

**PCI Express** 2 root ports Spec. Rev. 1.0a (2 lanes x 1)  

- Each port supports 2.5 Gb/s bandwidth in each direction
- Low power "L-states" are supported
- Hot-plug is supported
- External x1 graphics devices are supported (internal GD must be disabled)
- Only SDVO or external graphics can be used at one time

**HD Audio** High Definition Audio Controller supports  
4 audio streams; 2 in, 2 out  

- 1.8 V and 3.3 V I/O is supported
- Docking is supported
- Each stream can obtain up to 16 channels

**SDIO/MMC** Integrated Secure Digital I/O (SDIO) or  
Multimedia Card (MMC) Controller.  
Supports SDIO Rev. 1.1 and MMC Rev.  
4.0. SDIO/MMC interface permits x1 and  
x4 I/O read/write modes.  
SDHC supported

**SMBus** Compatible with most I2C devices and  
SMBus Spec. 1.0 for system management.  
2 MByte serial EEPROM on board

**GMBus/DDC** I2C for display control

**LPC** Supports LPC 1.1 spec

### Graphics

Integrated graphics device (IGD) includes  
LVDS and SDVO display ports for simultane-  
ous independent operation of 2 displays.

- LVDS interface supports pixel color depth of 18 and 24 bits,
- Max. pixel clock 112 MHz (equates to 1376x768 @85 Hz)
- SDVO max. pixel clock 160 MHz (equates to 1280x1024 @85 Hz)
- SDVO for any external device HDMI/DVI, Analog, VGA/CRT, LVDS

Full hardware acceleration for:

- H.264 baseline profile L3, main profile 4.1 and high profile L4.1
- MPEG2 main profile high level
- MPEG4 simple profile L3, advanced simple profile L5
- VC1 all profiles up to L3
- WMV9 simple profile medium level
- WMV9 main profile high level
- SD/HD TV broadcast up to 1080i

### USB

- USB 1.1 with 3 UHCI controllers,
- 2 USB 1.1 ports per controller (port 0-5)
- USB 2.2 with 1 EHCI controller with 8 ports, ports 6 & 7 must be internal only to meet USB spec requirements
- Debug port lives on Port 0  
Port 2 can be USB client port,  
USB On-The-Go is not supported  
USB client connect signal (USBCC/GPIOSUS3) may be used to detect host/client connection

### PATA (IDE)

- 1 port supports 2 devices (master/slave) with the following modes :
- PIO Modes 0, 1, 2, 3, 4
  - Single-word DMA Modes 0, 1, 2
  - Multi-word DMA Modes 0, 1, 2
  - Ultra-DMA Modes 0, 1, 2, 3, 4, 5
  - Up to 100 MBytes/s in UDMA-100 mode

### Operating temperature

0 °C ... +60 °C (commercial)  
-20 °C ... +60 °C (industrial)  
-40 °C ... +85 °C (extended, optional)

### Power

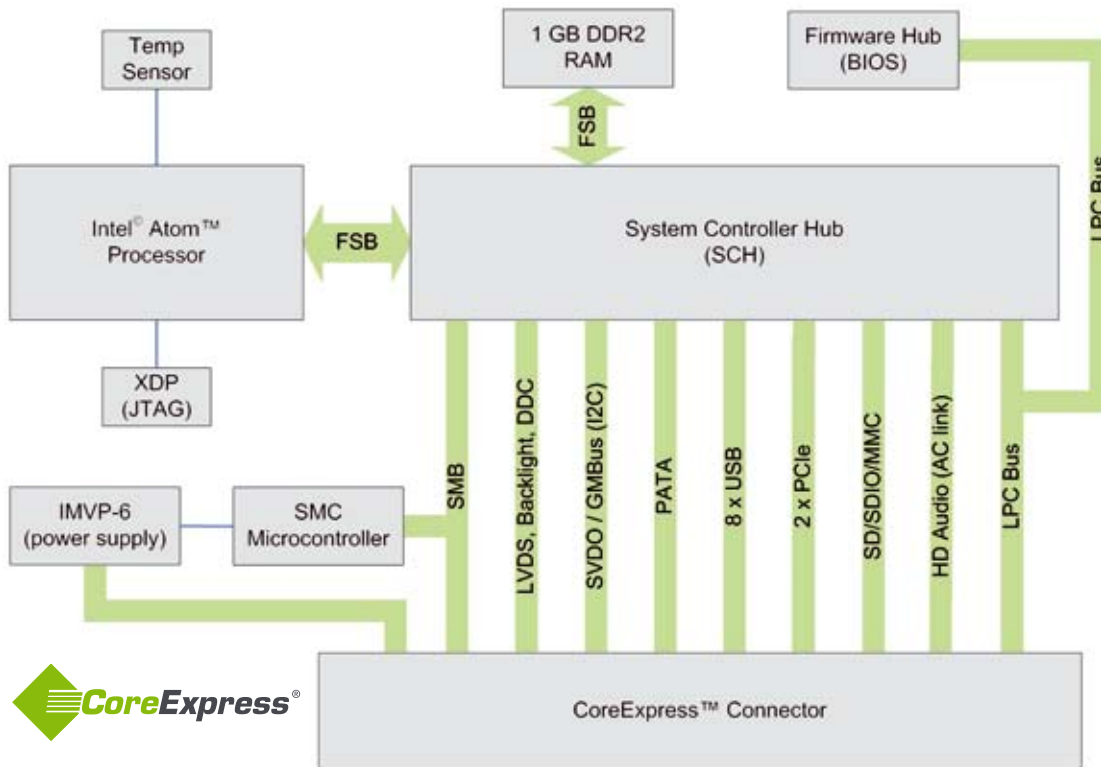
+5 V +/- 5%,  
~5 Watts @1.6GHz and with 1 GB RAM

### BIOS

Award BIOS  
1 MByte firmware hub (FWH)

**UL Certificate Number** 20090826-E329059

## Block Diagram



## LEMT Functions (implemented in SMC, accessible via SMBus; excerpt)

<b>Total operating hours counter</b>	Counts the number of hours the module has been run in minutes
<b>On-time counter</b>	Indicates the amount of time since last power on in seconds
<b>Power cycles counter</b>	Counts how often the module has been powered on
<b>Watchdog timer</b>	Set / Reset / Disable / Trigger Watchdog Timer
<b>System restart reason</b>	Power loss / Watchdog / External Reset
<b>Fail-safe-BIOS support</b>	In case of a boot failure, hardware signals tell external logic to boot from a Fail-Safe-BIOS
<b>Flash area</b>	1024 bytes of Flash area for customer data
<b>Protected flash area</b>	128 Bytes. Keys, ID's, etc. can be stored in a write- and clear-protectable region
<b>Board identity</b>	Vendor ID / board ID / serial number

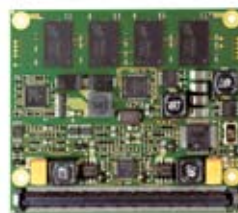
Check [www.CoreExpress.com](http://www.CoreExpress.com) for news and updates of the CoreExpress® specification.

# CoreExpress®-ECO

Next Generation Computer-On-Module



CoreExpress-ECO on EPIC carrier



CoreExpress-ECO,  
bottom view



CoreExpress-ECO,  
top view



CoreExpress-ECO  
with heatsink



WIND RIVER

Check [www.lippertembedded.com](http://www.lippertembedded.com) for the most up-to-date information about the CoreExpress-ECO.  
Check [www.CoreExpress.com](http://www.CoreExpress.com) for news and updates of the CoreExpress specification.

## Ordering Information

Ordering Number	Description
<i>t13-0002-10</i>	CoreExpress-ECO, 1.6 GHz, 1 GB RAM, without heatsink
<i>t13-0004-10</i>	CoreExpress-ECO, 1.1 GHz, 1 GB RAM, without heatsink
<i>808-0005-10</i>	Developer's Kit CoreExpress-ECO with Intel Atom 1.6 GHz, 1 GB RAM, 0°...50 °C Operating system: Windows XP Embedded (Developer's Version)
<i>808-0006-10</i>	Developer's Kit, CoreExpress-ECO with Intel Atom 1.6 GHz, 1 GB RAM, 0°...50 °C Operating system: Linux
<i>808-0007-10</i>	Developer's Kit, CoreExpress-ECO with Intel Atom 1.6 GHz, 1 GB RAM, 0°...50 °C Operating system: QNX
<i>808-0010-10</i>	Developer's Kit, CoreExpress-ECO with Intel Atom 1.6 GHz, 1 GB RAM, 0°...50 °C Operating system: VxWorks 6.8
<i>865-0020-10</i>	Heat sink, passive, for CoreExpress-ECO

**Note:** **t** denotes the temperature range. Substitute with 7 for commercial, 8 for industrial and 9 for extended temperature range  
Other processor and memory configurations are available on request.

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