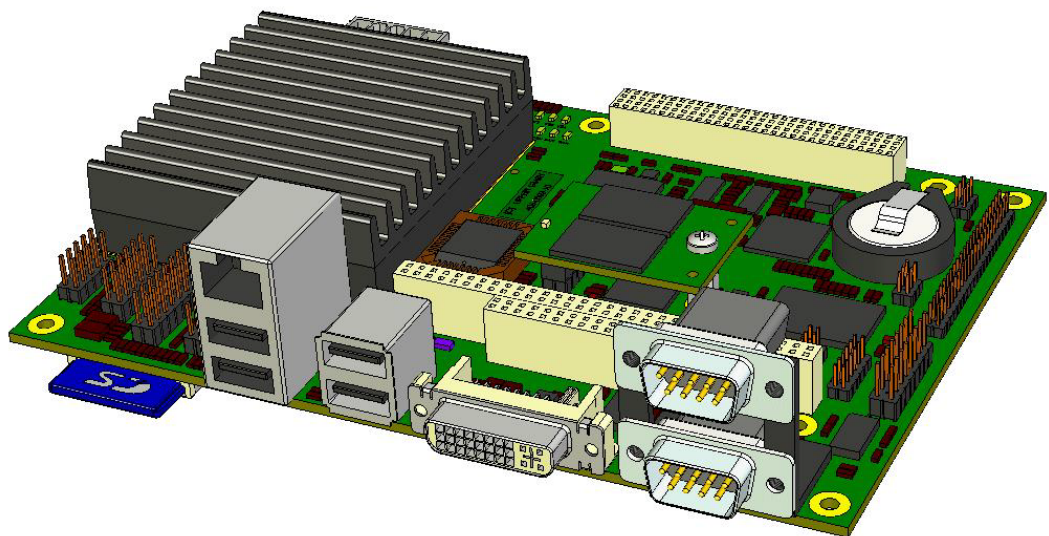


# EPIC CoreExpress® Carrier

## For CoreExpress - Modules

### Technical Manual



# ***Technical Manual EPIC CoreExpress® Carrier***

LiPPERT Document: TME-CEM-EPIC-R1V4.doc Revision 1.4

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# 1 Overview

## 1.1 Introduction

CPU modules like LIPPERT's **CoreExpress®-ECO** require a carrier board to operate. A carrier board usually features connectors for the modules I/O signals and provides power to the processor modules. **CoreExpress** modules are used to build flexible single board computer solutions and offer OEMs fast time-to-market while reducing development cost. Like integrated circuits, they provide OEMs with significant freedom in meeting form-fit-function requirements.

The **EPIC CoreExpress® Carrier** board described in this document is a carrier board for the CoreExpress-ECO module. It provides the standard interfaces as listed below

### Features

- 8x USB 2.0
- PATA (IDC44) and Compact Flash Adapter
- LVDS for displays, either single channel 18/24 bits with backlight power
- DVI connector
- AC97 High Definition Audio with line-in, line-out, mic-in, surround, side-surround, and center
- 2x UART for RS232/RS485
- 10/100Mbit LAN
- ATX compatible power supply connector
- SD-Card slot
- SDIO connector
- Mini PCI Express Card slot
- PC104 (with limitations !) and PC104/Plus connector
- 2K Serial EEPROM
- Additional PLCC32 BIOS Socket for Rescue BIOS

In addition to these interfaces, the EPIC CoreExpress® Carrier holds a backup battery.

## Block Diagram

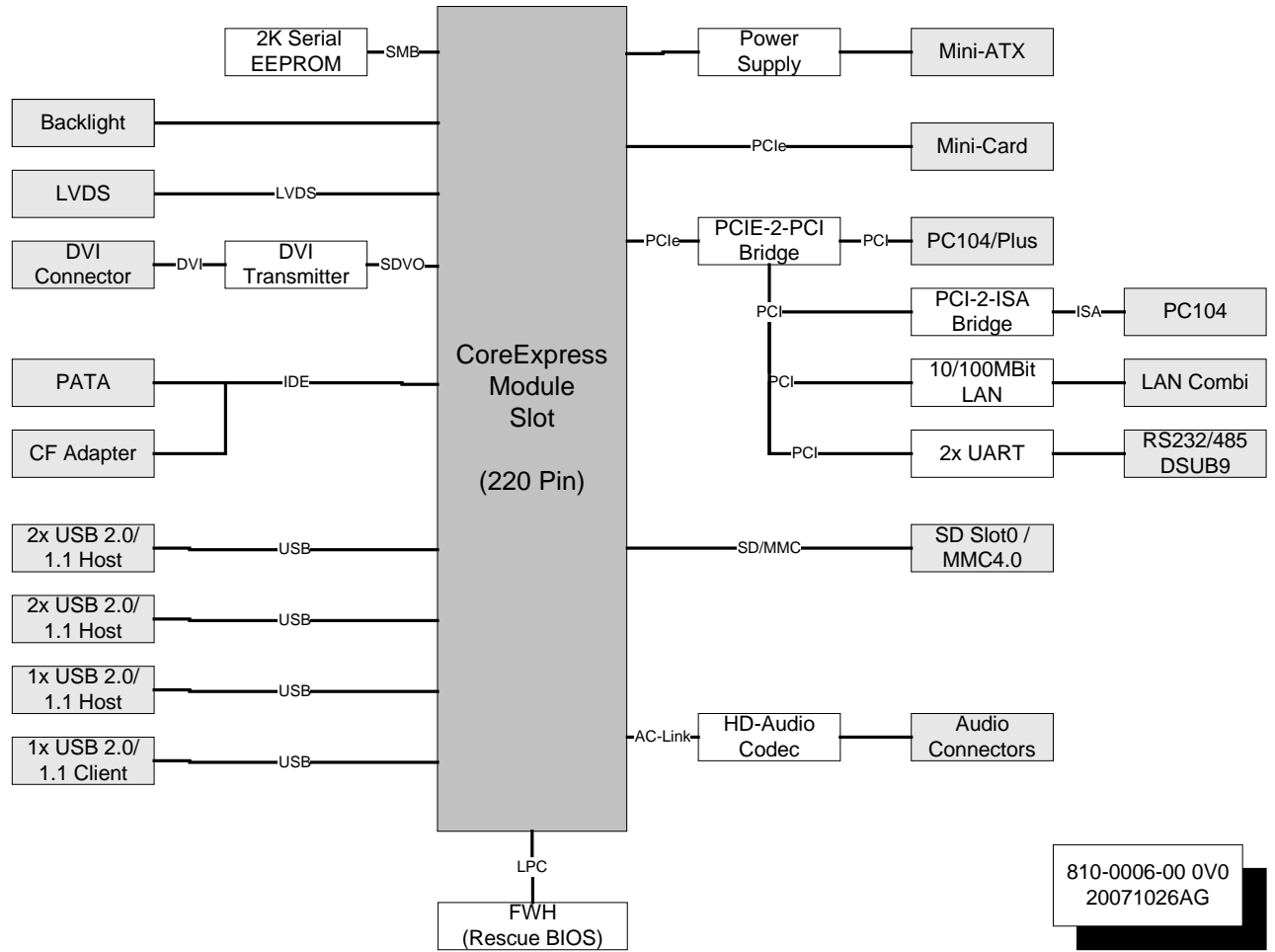


Figure 1: Block Diagram

## 1.2 Ordering Information

### EPIC CoreExpress® Carrier Models

Order number	Description
810-0007-10	EPIC CoreExpress-ECO Carrier, -20°C .. +60°C

## 1.3 Technical Data

### Electrical

Supply voltages: +12V DC /x.xA (depends on external LVDS inverter, PC/104Plus)  
-12V DC /x.xA (depends on PC/104Plus)  
+5V DC /WinXP idle ~1.0A , BurnIn-test ~1,6A , S3 ~200 mA  
+5V DC Sby/WinXP idle ~120mA , BurnIn-test ~120mA, S3~30mA  
+ 3,3V DC (not used)

Supply voltage ripple: ±5 %

### Environmental

Temperature range: -20 ... +60 °C (optional -40 ... +85 °C)

Storage temperature: -40 ... +85 °C

Temperature change: max. 10 K / 30 minutes

Humidity (relative): 10 ... 90 %

Pressure: 450 ... 1100 hPa

### Mechanical

Dimensions (LxW): 115 mm x 165 mm (4.53 " x 6.5 ")

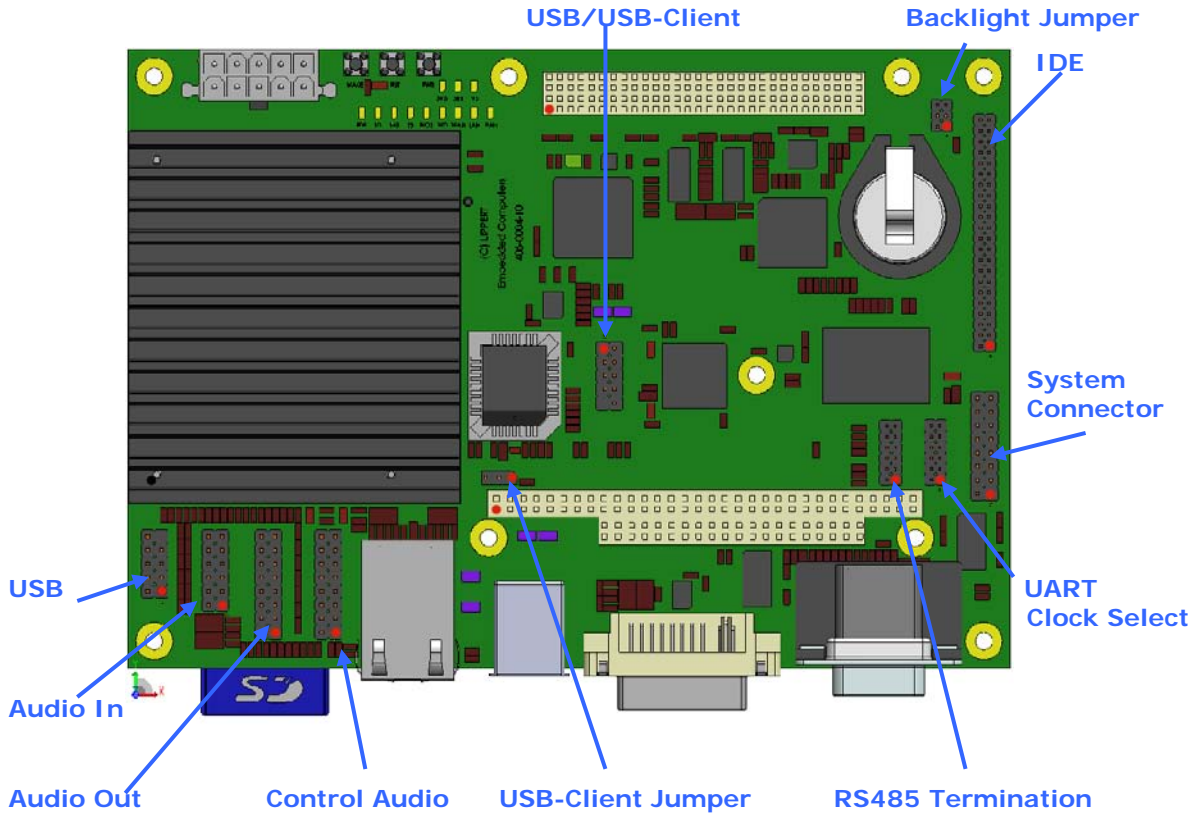
Height: 40 mm

Weight: approx. 170 g

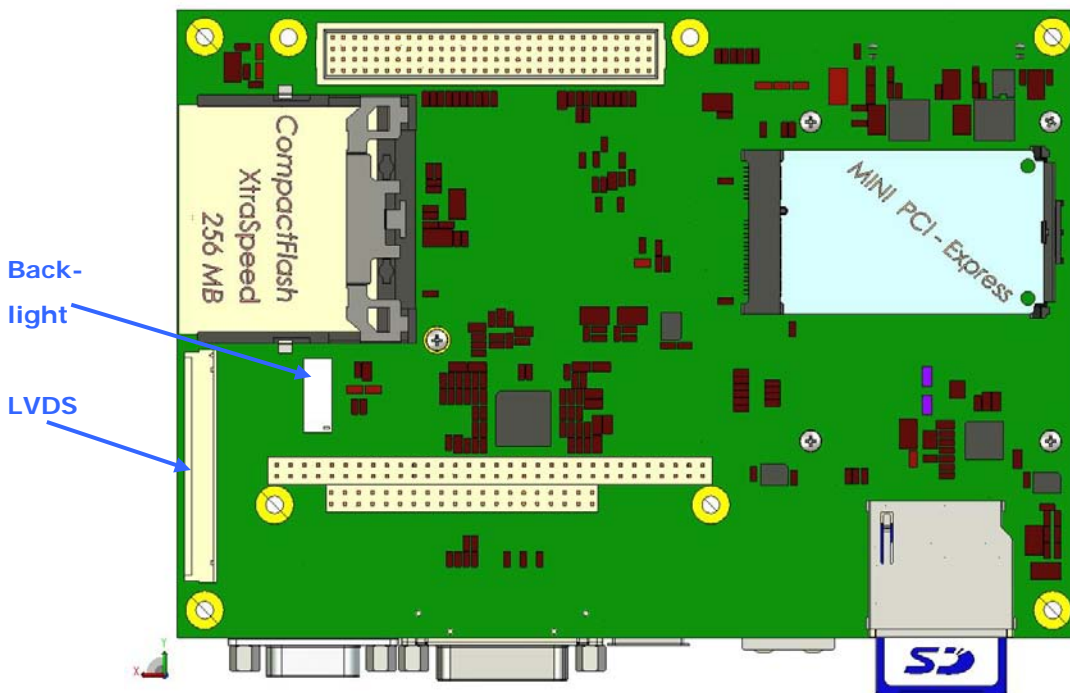
## 2 Getting Started

### 2.1 Connector And Jumper Locations

Top Side:



Bottom Side:



## 2.2 Hardware Setup

Installing the **EPIC CoreExpress® Carrier** is very straightforward. Unpack the board using the usual electrostatic discharge (ESD) precautions.



**Attention:** *Before you touch the board, make sure that you have discharged yourself and your gear towards a grounded terminal. Damages due to ESD are usually not immediately visible and will only show up later as failures in the field.*

---

Carefully place the CoreExpress module on the connector and press gently until it is firmly seated. Affix the module using 4 screws to the **EPIC CoreExpress® Carrier**. If applicable, mount your cooling device.



**Attention:** *Never operate the CoreExpress-ECO module without suitable cooling devices. Failing this will most surely destroy the processor chip.*

---

Connect a DVI display at the DVI connector or an LVDS display at the LVDS connector and keyboard and mouse to the USB connectors. Add a suitable hard drive and/or a CD drive to the configuration, connect a standard ATX supply and switch on the power.

You should now see the BIOS messages and, if applicable, the usual operating system startup.

The **EPIC CoreExpress® Carrier** is mounted into an enclosure using the mounting holes provided.



**Note** *It is strongly recommend using plastic instead of metal spacers to mount the board. With metal spacers, there is a possible danger to create a short circuit with the components located around the mounting holes.  
This can damage the board!*

---

### 3 Carrier Board Description

#### 3.1 Power connector

The on board power supply generates all necessary voltages from the ATX compliant power supply unit. To use a standard ATX 1.3 compliant power supply unit, an adapter is delivered with the board.

ATX supplies will be supported via an adapter cable.

Connector type: MOLEX 39299106, 10 Pin ATX-Power connector (X24)

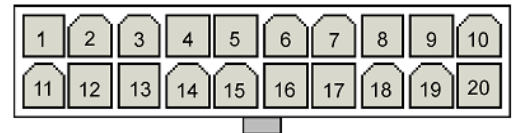
Pin	Signal	Pin	Signal
6	+ 5V DC Standby	1	Power Switch ON
7	+ 5V DC	2	GND
8	+ 5V DC	3	GND
9	- 12V DC	4	+ 12V DC
10	GND	5	+ 3,3V DC



#### Power Connector at adapter cable:

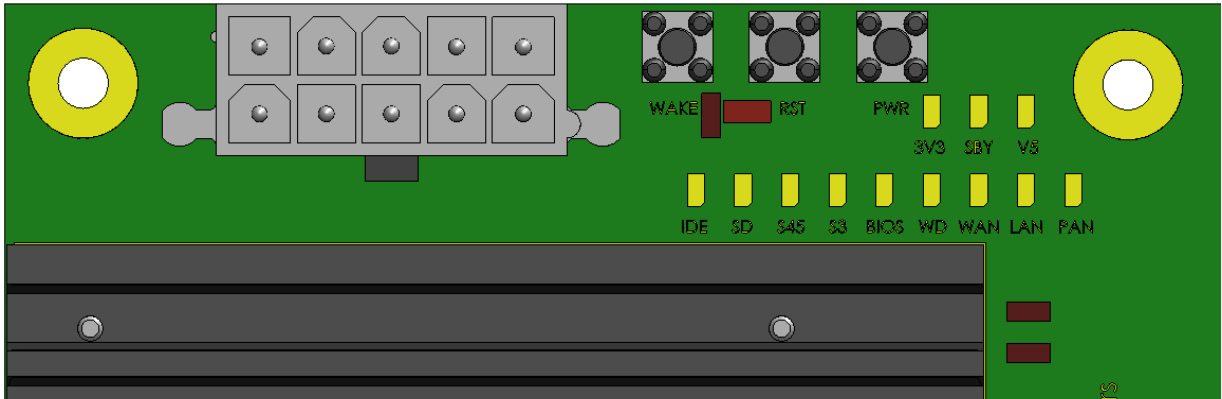
Connector type: MOLEX 39299202 (ATX Spec)

Pin	Signal	Pin	Signal
11	n.c.	1	+3,3 V
12	-12 V	2	n.c.
13	GND	3	GND
14	Power Switch ON	4	n.c.
15	n.c.	5	n.c.
16	n.c.	6	n.c.
17	GND	7	n.c.
18	n.c.	8	n.c.
19	+5 V	9	+5 V (stand by)
20	+5 V	10	+12 V



### 3.2 Power Button, Reset Button, Status LED's

The buttons and LED are located near the power connector on top side of the board.



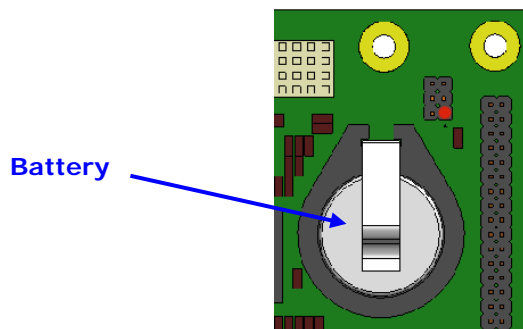
To facilitate problem solving, the **EPIC CoreExpress® Carrier** provides LED indicators for the following conditions:

- IDE : IDE accesses
- SD : SD Slot accesses
- S45 : lit, if S4 or S5 mode
- S3 : lit, if S3 mode
- BIOS : lit, if the bios on the carrier board is used instead of bios on the module
- WD : off, if watchdog was triggered
- WAN : WAN-LED signal from Mini PCI Express socket
- LAN : LAN-LED signal from Mini PCI Express socket
- PAN : PAN-LED signal from Mini PCI Express socket
- 3V3 : 3.3V power supplies is working
- SBY : 5 Volt standby is working
- V5 : 5 Volt always is working

### 3.3 Backup Battery

There is a changeable battery on board, used to power the real-time clock if the power supply is switched off.

Battery Type: CR2032, 3 Volts

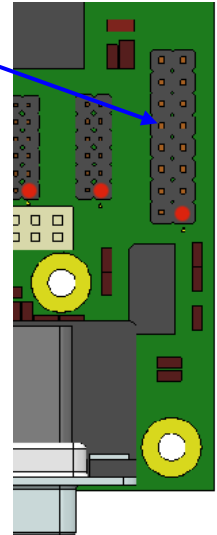


### 3.4 System connector

Connector Type: IDC16 pin header 2.54 mm (X23)

System Connector (X23)

Pin	Signal	Pin	Signal
1	Power-LED	2	GND
3	Power Button	4	GND
5	Reset Button	6	GND
7	IDE LED+	8	IDE LED-
9	EEPROM Write protect	10	GND
11	Bios disable#	12	Bios disable-
13	WDOUT#	14	not connected
15	Wake button	16	GND



**Power LED:** connect a LED between pin 1 and pin 2 for power indication.

**Power button:** connect a push button switch between pin 3 and pin 4 for power button function

**Reset button:** connect a push button switch between pin 5 and pin 6 for power button function

**IDE LED:** connect a LED between pin 7 and pin 8 for power indication

**Bios disable#:** Jumper between pin 11 and pin 12 selects between Bios on CoreExpress module (jumper off) and bios on EPIC CoreExpress Carrier (jumper on). Default is bios on EPIC CoreExpress Carrier (jumper on).



**Note** Bios on EPIC CoreExpress Carrier supports LVDS display with 1280x800 resolution as primary display output. Bios on CoreExpress module supports DVI as primary display output. With this jumper the customer can easily select between DVI or LVDS output.

**EEPROM Write protect:** Jumper between pin 9 and pin 10 enables write access to the onboard serial PROM at the SMBUS. Default is disabled write access (jumper off).

**WDOUT#:** this signal will go low on a Watchdog timeout event

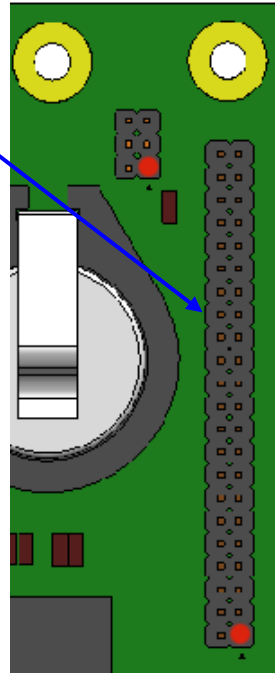
**Wake button:** connect a push button switch between Pin 15 and Pin 16 for power button function

### 3.5 IDE interface

Connector Type: IDC44, 2mm (X7)

Parallel ATA Pins			
Pin	Function	Pin	Function
1	Reset#	2	GND
3	Data 7	4	Data 8
5	Data 6	6	Data 9
7	Data 5	8	Data 10
9	Data 4	10	Data 11
11	Data 3	12	Data 12
13	Data 2	14	Data 13
15	Data 1	16	Data 14
17	Data 0	18	Data 15
19	GND	20	Key
21	DDRQ	22	GND
23	I/O Write#	24	GND
25	I/O Read#	26	GND
27	IOCHRDY	28	Cable Select
29	DDACK#	30	GND
31	IRQ	32	No Connect
33	Addr 1	34	DMA66_Detect
35	Addr 0	36	Addr 2
37	ChipSelect1#	38	ChipSelect3#
39	Activity	40	GND
41	+5V	42	+5V
43	GND	44	GND

IDE-Connector (X7)



**Note:** The compact flash socket is shared with the IDE connector. If a compact flash is plugged in this socket, only one more IDE device can be used on the IDE connector. This IDE device must be set as master device.

### 3.6 Compact Flash

Connector Type: Compact Flash socket for type I and type II compact flash cards

The onboard compact flash socket is shared with the IDE interface. A mass storage device in the compact flash socket is always **slave** IDE device in the system.



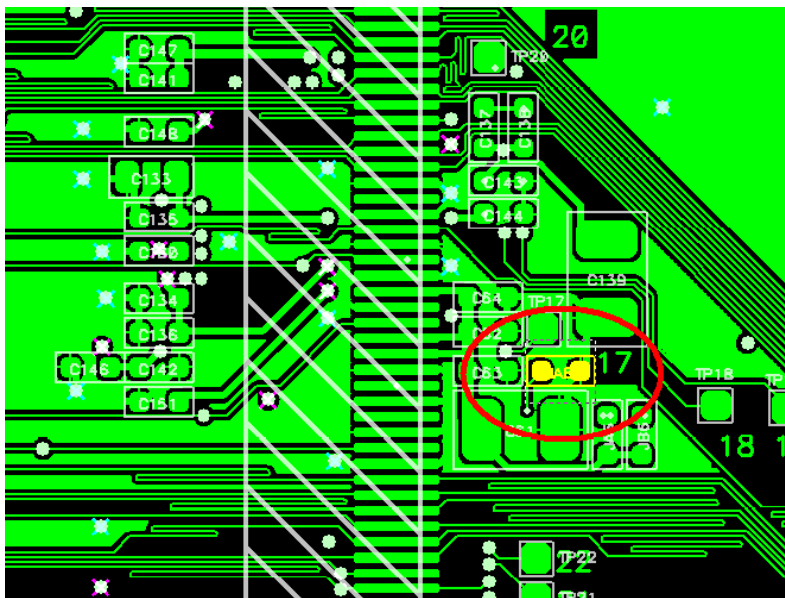
**Note:** *If a compact flash is plugged in this socket, only one more IDE device can be used on the IDE connector. This IDE device must be set as master device.*

#### Configure compact flash socket into master mode

To set the **master** mode the CSEL signal at the compact flash socket must be tied to ground. The carrier is prepared for a 0R0 pull down resistor (size 0603).

Soldering only according to **IPC A610 D class II** specification.

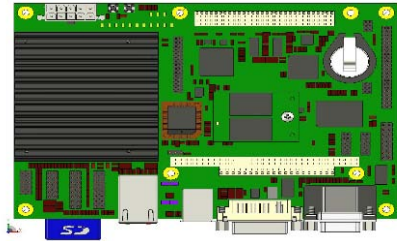
**Location:** behind compact flash socket



**slave:** empty (default)  
**master:** soldered 0R0 resistor

### 3.7 SD Card Slot

SD card slot on bottom side is configured for using standard SD Cards.



### 3.8 Mini PCI Express Slot

MiniPCI Express slot on bottom side is configured for using standard MiniPCI Express cards. The slot uses one PCIExpress lane and USB Port H of the CoreExpress module

Three status LEDs on the top side of the board show the status of the slot signals WAN,LAN,PAN



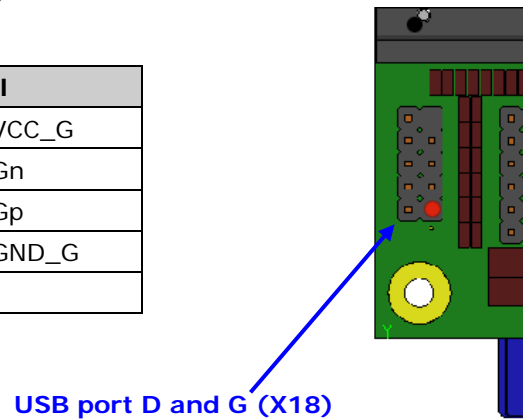
**Note** USB Port H is also located on the On Board USB for uDOC. It can only be used either by a Mini PCI Express board or by an uDOC.

---

### 3.9 USB Pin Header

Connector Type: IDC10 pin header 2.54 mm (X18)

Pin	Signal	Pin	Signal
1	USB_VCC_D	2	USB_VCC_G
3	USB_Dn	4	USB_Gn
5	USB_Dp	6	USB_Gp
7	USB_GND_D	8	USB_GND_G
9	Key	10	N.C.

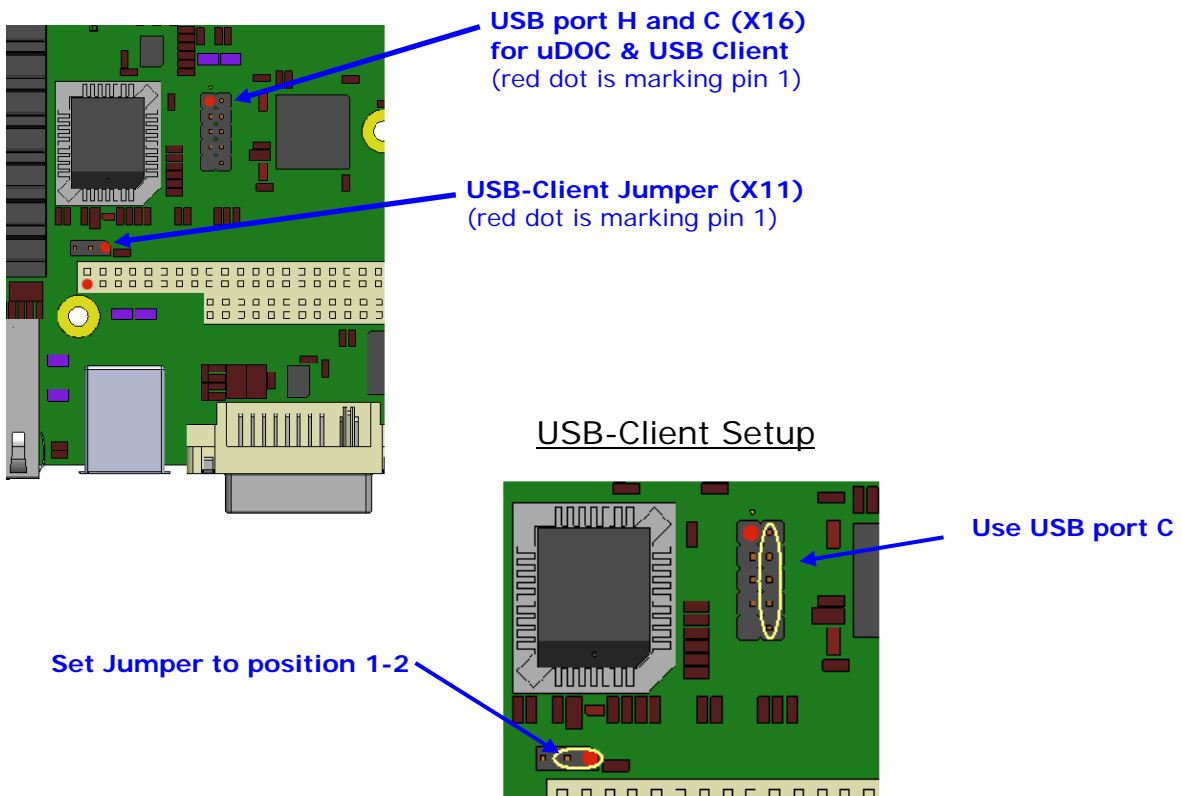


**Note** USB port G does only support USB 2.0 devices.

### 3.10 On Board USB for uDOC/USB client

The on board USB connector is prepared to use the uDOC as mass storage device. The connector uses USB ports C and H, the uDOC will only use USB port H.

Also a standard USB usage for both ports is possible by using an adapter cable.



Connector type: IDC10 pin header 2.54 mm (X16)

Pin	Signal	Pin	Signal
1	USB_VCC_H	2	USB_VCC_C or USB_Client_power_detect
3	USB_Hn	4	USB_Cn
5	USB_Hp	6	USB_Cp
7	USB_GND_H	8	USB_GND_C
	Key	10	N.C.



**Note** USB port H does only support USB 2.0 devices. This port is also located on the Mini PCI Express connector. It can only be used either by a Mini PCI Express board or by the uDOC

USB port C can also work in client mode. The mode can be enabled/disabled in BIOS setup in menu item **INTEGRATED PERIPHERALS-> ONBOARD DEVICE -> USB CLIENT CONTROLLER**.

Depending on the mode the functionality of pin 2 can be changed by setting a jumper near the PC/104 bus to support USB-Client mode.

Connector type: IDC3 pin header 2.00 mm (X11)

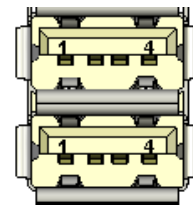
Jumper on	Signal
1-2	USB_Client_power_detect (Client mode)
2-3	USB_VCC_C (default, Host mode)

### 3.11 USB connectors

Two standard stacked USB connectors are located on the board, one of them combined with the Ethernet RJ45 connector.

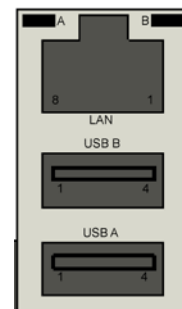
**Order:** USB\_B (top), USB\_A (bottom)

Pin	Signal
1	USB_VCC_N
2	USB_Nn
3	USB_Np
4	USB_GND_N

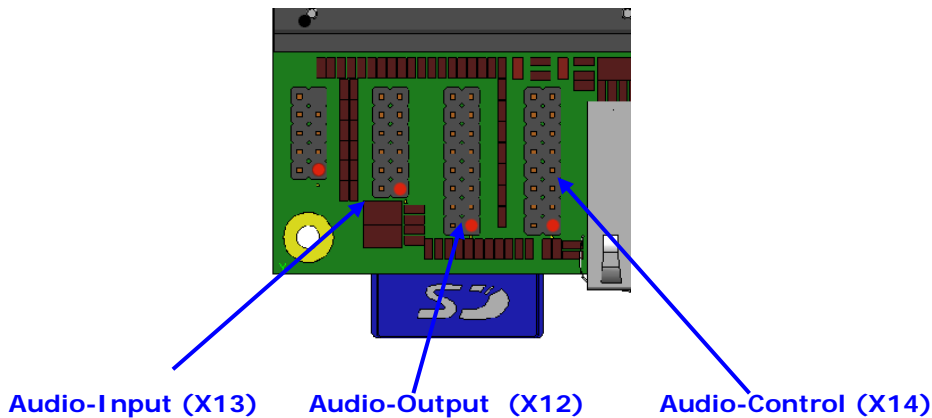


**Order:** USB\_F (top), USB\_E (bottom)

Pin	Signal
1	USB_VCC_N
2	USB_Nn
3	USB_Np
4	USB_GND_N



### 3.12 Audio Pin Header



The **EPIC CoreExpress® Carrier** provides a high definition audio standard "Azalia" codec on the AC97 bus. It complies with the Intel® Azalia specification.



**Note**    *The AZALIA codec is not compatible with the AC97 specification!*

---

It enables a much better audio experience than AC97. Azalia has a number of things built in with it: a more stable setup audio and also has Dolby. Importantly, it further delivers very good power management, supporting C3 and C4 states in the processor. As a result, the audio mode saves up to a 50 percent in power consumption.

Its features include

- Support for 15 input and 15 output streams at a time
- Sample rate support ranging from 6 kHz to 192 kHz.
- Support for 8-, 16-, 20-, 24-, and 32-bit sample resolution per stream.
- Up to 16 channels per stream.
- 48-Mbps outbound link transfer rate per SDO.
- 24-Mbps inbound transfer rate per SDI.
- Support for striping on optional higher order SDO link pins to double or quadruple available outbound bandwidth.
- Support for multi-SDI codecs to increase available inbound link bandwidth.
- Audio codecs, modem codecs, and vendor defined codecs are all supported.
- Command/Response codec communication mechanism for extensibility and flexibility.
- Support for system wake generation from all codecs types.
- Support for codec interrupt generation through Unsolicited Responses.
- Extensive, fine grained power management control in the codec.
- Audio codecs support advanced jack detection and jack sensing for device discoverability and jack retasking.

### Audio-Input

Connector Type: IDC12 pin header 2.54 mm (X13)

Pin	Signal	Pin	Signal
1	MIC_1_LEFT	2	MIC_1_RIGHT
3	SENSE_MIC_1	4	GND_AUDIO
5	LINE_1_LEFT	6	LINE_1_RIGHT
7	SENSE_LINE_1	8	GND_AUDIO
9	CD_IN_LEFT	10	CD_IN_RIGHT
11	n.c.	12	CD_IN_GND

### Audio-Output

Connector Type: IDC16 pin header 2.54 mm (X12)

Pin	Signal	Pin	Signal
1	FRONT_LEFT	2	FRONT_RIGHT
3	SENSE_FRONT	4	GND_AUDIO
5	CENTER	6	LFE
7	SENSE_CENTER	8	GND_AUDIO
9	SURROUND_LEFT	10	SURROUND_LEFT
11	SENSE_REAR	12	GND_AUDIO
13	SIDE_SURROUND_LEFT	14	SIDE_SURROUND_LEFT
15	SENSE_SIDE	16	GND_AUDIO

### Audio-Control

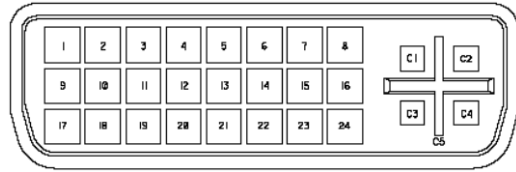
Connector Type: IDC16 pin header 2.54 mm (X14)

Pin	Signal	Pin	Signal
1	DIGITAL_VOL_UP	2	GND
3	DIGITAL_VOL_DOWN	4	SPDIF_OUT
5	DIGITAL_VOL_MUTE	6	3.3 VOLT
7	SPDIF_IN	8	EXT_VOL_CONTROL
9	LINE2_LEFT	10	SENSE_B
11	LINE2_RIGHT	12	SENSE_MIC2
13	MIC2_LEFT	14	SENSE_LINE2
15	MIC2_RIGHT	16	GND_AUDIO

### 3.13 DVI connector

Connector type: DVI-D, female (X10)

Pin	Signal
1	TMDS Data 2-
2	TMDS Data 2+
3	TMDS Data 2/4 Shield
4	Not connected
5	Not connected
6	DDC Clock
7	DDC Data
8	Not connected
9	TMDS Data 1-
10	TMDS Data 1+
11	TMDS Data 1/3 Shield
12	Not connected
13	Not connected
14	+5 V Power
15	GND
16	Hot Plug Detect
17	TMDS Data 0-
18	TMDS Data 0+
19	TMDS Data 0/5 Shield
20	Not connected
21	Not connected
22	TMDS Clock Shield
23	TMDS Clock +
24	TMDS Clock -
C1	Not connected
C2	Not connected
C3	Not connected
C4	Not connected
C5	GND

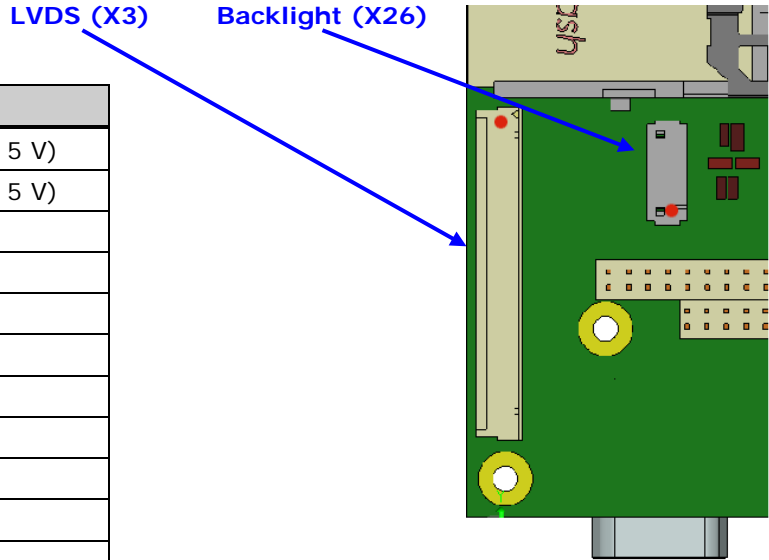


**Note** The EPIC CoreExpress Carrier's BIOS supports LVDS display with 1280x800 pixels resolution as primary display output. The CoreExpress module's BIOS supports DVI as primary display output. See "system connector" for selecting between BIOS on module or on carrier.

### 3.14 LVDS connector

Connector type: DF14-30P-1.25H (Hirose) (X3)

Pin	Signal
1	Display voltage (3.3 V or 5 V)
2	Display voltage (3.3 V or 5 V)
3	GND
4	GND
5	TXA3 -
6	TXA3 +
7	TXACLK -
8	TXACLK +
9	GND
10	TXA2 -
11	TXA2 +
12	TXA1 -
13	TXA1 +
14	TXA0 -
15	TXA0 +
16	GND
17	n.c.
18	n.c.
19	n.c.
20	n.c.
21	GND
22	n.c.
23	n.c.
24	n.c.
25	n.c.
26	n.c.
27	n.c.
28	GND
29	DDC-CLK
30	DDC-DATA



For setting the display voltage to 3.3V or 5V refer to backlight jumper section on next page



**Note** The EPIC CoreExpress Carrier's BIOS supports LVDS display with 1280x800 pixels resolution as primary display output. The CoreExpress module's BIOS supports DVI as primary display output. See "system connector" for selecting between BIOS on module or on carrier.

### 3.15 Backlight connector

Connector type: Hirose DF13 8 pin (X26)

Pin	Signal
1	+12 V DC, max. 1A
2	+12 V DC, max. 1A
3	+5 V DC, max. 1A
4	+5 V DC, max. 1A
5	Signal: Backlight enable (level: 3.3 V)
6	Switched Inverter Voltage, max. 1A (refer to "Backlight Jumper" below)
7	GND
8	GND

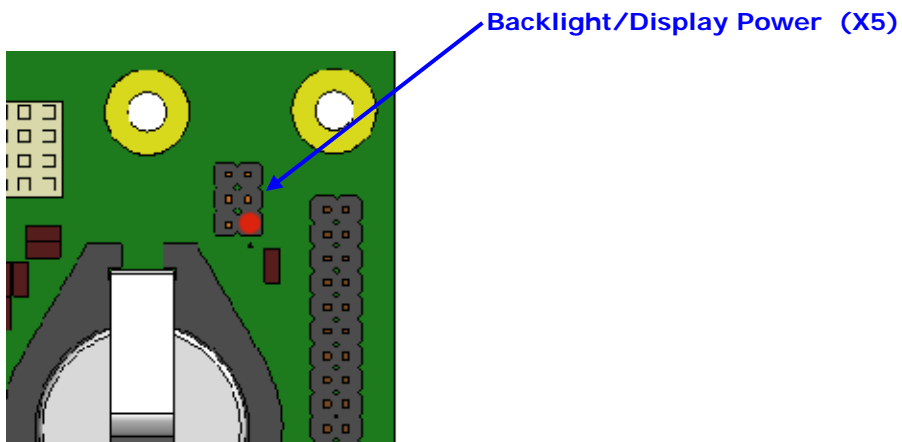
#### Backlight/Display Power Jumper

Connector type: IDC6 jumper 2.00 mm. (X5)

A jumper between 1-3 or 3-5 to selects the display voltage.  
A jumper between 2-4 or 4-6 to selects the backlight voltage.

Pin	Signal name	Pin	Signal name
6	+5V DC	5	+5V DC
4	Inverter voltage	3	Display voltage
2	+12V DC	1	+3.3V DC

**Default setup** is 3.3V for LVDS display and 12V for the inverter.



### 3.16 Ethernet Controller

Ethernet Source: Intel 82551IT Fast Ethernet Controller

The 82551IT provides excellent performance by offloading TCP, UDP and IP checksums and supports TCP segmentation off-load for operations such as Large Send. The 82551IT provides an extended operating temperature in addition to all of the same capabilities and features as the 82551ER to address applications requiring a wider operating temperature range.

Its optimized 32-bit interface and efficient scatter-gather bus mastering capabilities enable the 82551IT to perform high speed data transfers over the PCI bus. This capability accelerates the processing of high level commands and operations, which lowers CPU utilization. Its architecture enables data to flow efficiently from the bus interface unit to the 3 KB Transmit and Receive FIFO's. In addition, multiple priority queues are provided to prevent data underruns and overruns.

The 82551IT includes both a MAC and PHY. It also has a simple interface to the analog front end, which allows cost effective designs requiring minimal board real estate. The 82551IT is pin compatible with the 82559 family of controllers and is offered with software that provides backwards compatibility with previous 8255xER controllers.

#### 10/100Mbit Ethernet/USB Combi Connector

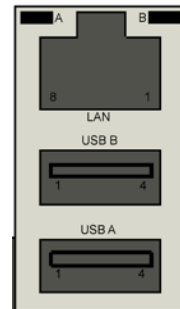
Ethernet

LAN LED

LED	Signal	Color
A	Link	Green
B	Activity	Orange

LAN

Pin	Signal
1	Transmit +
2	Transmit -
3	Receive +
4	N.C.
5	N.C.
6	Receive -
7	N.C.
8	N.C.



### 3.17 Serial Ports

By using a PCI UART IC (MCS9835) the board supports two serial ports. The UARTs are compatible to the standard 16C550. Both serial ports are located at the I/O panel as standard DSUB9 male connectors. Serial port 1 is the bottom, Serial port 2 is the top connector

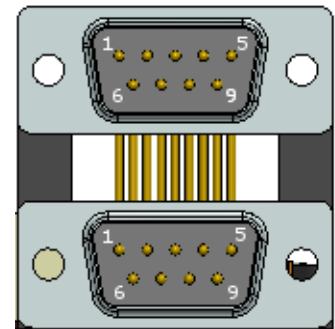
The ports either work in **RS232** or **RS485** mode selectable by jumper (see below).

Termination resistors for RS485 Mode can be set with Jumpers on pin header RS485 Termination (see below).

**Connector type: D-SUB9, male**

Pin assignment:

Pin	RS232 Signal	RS485 Signal	Pin	RS232 Signal	RS485 Signal
1	DCD	Not used	6	DSR	RXD+
2	RXD	RXD-	7	RTS	TXD+
3	TXD	TXD-	8	CTS	Not used
4	DTR	Not used	9	Not used	Not used
5	GND	GND			



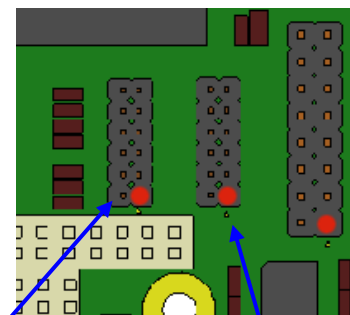
**Clock selection for UART 1 and UART 2, Jumper 2.0mm (X22)**

Jumper on Pin	UART 1 clock input	UART 2 clock input	maximum baud rate
1	1.8432 MHz (default)		115200
2	3.6864 MHz		230400
3	7.3728 MHz		460800
4		7.3728 MHz	460800
5		3.6864 MHz	230400
6		1.8432 MHz (default)	115200

#### Tristate Control of RS485 transmitter

The RS485 transmitter can be enabled or disabled by the handshake signal RTS, which may necessary in RS485/RS422 Data Transmission applications.

The RTS line is connected to the RS-485 driver enable such that setting the RTS line to a high (logic 1) state enables the RS-485 driver. Setting the RTS line low (logic 0) puts the driver into tristate. This in effect disconnects the driver from the bus, allowing other nodes to transmit over the same wire pair.



RS485 Termination (X21)

UART Clock(X22)

## RS485 Termination, Jumper 2.0mm (X21)

Jumper on Pin	Jumper ON	Jumper OFF	default
1	enable 120 ohm termination resistor between TxD- and TxD+ on COM-port 1	disable 100 ohm termination resistor between TXD- and TXD+ on COM-port 1	Off
2	enable 120 ohm termination resistor between RxD- and RxD+ on COM-port 1	disable 100 ohm termination resistor between RxD- and RxD+ on COM-port 1	off
3	select RS485/RS422 mode on COM-port 1	select RS232 mode on COM-port 1	off
4	enable 120 ohm termination resistor between TxD- and TxD+ on COM-port 2	disable 100 ohm termination resistor between TXD- and TXD+ on COM-port 2	off
5	enable 120 ohm termination resistor between RxD- and RxD+ on COM-port 2	disable 100 ohm termination resistor between RxD- and RxD+ on COM-port 2	off
6	select RS485/RS422 mode on COM-port 2	select RS232 mode on COM-port 2	off

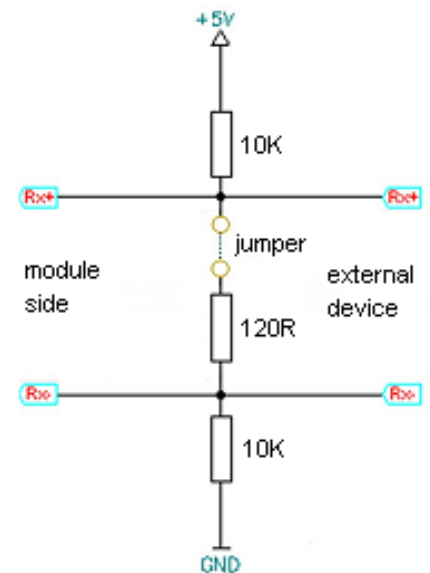
Use 2 mm jumpers to terminate lines correctly.

There are two jumpers for each serial port necessary.

When the jumper is set, the differential pairs (e.g. RX+ and RX-) are terminated with 120Ω between them.

Additionally, positive/negative receive lines are pulled up/down with 10kΩ to 5V/GND in order to protect the transceivers of the board from overvoltage.

It is recommended to protect the ports of the external device in the same way!



**Caution:** Termination Resistors **must not** be used in RS232 Mode. Otherwise, the serial ports will not work.

## 3.18 Serial EEPROM

The board contains a serial EEPROM 24C02 at the SMBus for customer purpose. The serial EEPROM uses SMB address **A8h** for read and **A9h** for write accesses. The write protection can be selected with a jumper at the system connector. As default the serial EEPROM is write protected.

### 3.19 PC/104-Plus Bus Interface

The PC/104 bus is a modification of the industry standard (ISA) PC bus specified in IEEE P996.

Pin	A	B	C	D
1	GND	Reserved	+5 V	AD00
2	VI/O	AD02	AD01	+5 V
3	AD05	GND	AD04	AD03
4	C/BE0#	AD07	GND	AD06
5	GND	AD09	AD08	GND
6	AD11	VI/O	AD10	M66EN
7	AD14	AD13	GND	AD12
8	+3.3 V	C/BE1#	AD15	+3.3 V
9	SERR#	GND	SBO#	PAR
10	GND	PERR#	+3.3 V	SDONE
11	STOP#	+3.3 V	LOCK#	GND
12	+3.3 V	TRDY#	GND	DEVSEL#
13	FRAME#	GND	IRDY#	+3.3 V
14	GND	AD16	+3.3 V	C/BE2#
15	AD18	+3.3 V	AD17	GND
16	AD21	AD20	GND	AD19
17	+3.3 V	AD23	AD22	+3.3 V
18	IDSEL0	GND	IDSEL1	IDSEL2
19	AD24	C/BE3#	VI/O	IDSEL3
20	GND	AD26	AD25	GND
21	AD29	+5 V	AD28	AD27
22	+5 V	AD30	GND	AD31
23	REQ0#	GND	REQ1#	VI/O
24	GND	REQ2#	+5 V	GNT0#
25	GNT1#	VI/O	GNT2#	GND
26	+5 V	CLK0	GND	CKL1
27	CLK2	+5 V	CLK3	GND
28	GND	INTD#	+5 V	RST#
29	+12 V	INTA#	INTB#	INTC#
30	-12 V	REQ3#	GNT3#	GND



**Note:** All VIO pins are connected to +5V.

The voltages +3.3V, +5V, 12V and -12 V are not generated by the onboard power supply but routed from the Micro ATX Connector. Their maximum current is limited to 1.0 amp each.

## 3.20 PC/104 Bus Interface

The PC/104 bus is a modification of the industry standard (ISA) PC bus specified in IEEE P996. The following table shows the pin assignment of the PC/104 connector.

Due to chipset limitations only the following ISA bus resources are useable:

- I/O accesses 8 Bit or 16 Bit to I/O address range **1000h to 2000h**
- IRQ: the used IRQ must be reserved in Bios setup - PCI/PnP setup of the CoreExpress-ECO to ISA.



**Caution:** Memory accesses or I/O accesses to other I/O addresses are not supported by the carrier board

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**Note:** -5 V on the PC/104 connector are not supported on this board.

Pin	D	C
0	GND	GND
1	MEMCS16#	SBHE#
2	IOCS16#	LA23
3	IRQ10	LA22
4	IRQ11	LA21
5	IRQ12	LA20
6	IRQ15	LA19
7	IRQ14	LA18
8	DACK0#	LA17
9	DRQ0	MEMR#
10	DACK5#	MEMW#
11	DRQ5	SD8
12	DACK6#	SD9
13	DRQ6	SD10
14	DACK7#	SD11
15	DRQ7	SD12
16	+5V	SD13
17	MASTER#	SD14
18	GND	SD15
19	GND	n.c. (KEY)

Pin	A	B
1	IOCHCK#	GND
2	D7	RESET
3	D6	+5V
4	D5	IRQ9
5	D4	n.c.
6	D3	DRQ2
7	D2	-12V
8	D1	n.c.
9	D0	+12V
10	IOCHRDY	n.c. (KEY)
11	AEN	SMEMW#
12	A19	SMEMR#
13	A18	IOW#
14	A17	IOR#
15	A16	DACK3#
16	A15	DRQ3
17	A14	DACK1#
18	A13	DRQ1
19	A12	REFRESH#
20	A11	SYSCLK
21	A10	IRQ7
22	A9	IRQ6
23	A8	IRQ5
24	A7	IRQ4
25	A6	IRQ3
26	A5	DACK2#
27	A4	TC
28	A3	BALE
29	A2	+5V
30	A1	OSC
31	A0	GND
32	GND	GND

## 4 Troubleshooting

**PROBLEM:** The system will not come up at all, the display is blank.

First steps if the Board does not boot:

- Check the status LED's on the board. Are all voltages properly available?
- Check the power connectors to the board, monitor and additional devices.
- Check whether the CoreExpress module is correctly seated and all PCB connectors are fully inserted.
- Are all cables plugged on the correct connector and in the correct orientation? The board may not boot if some of the cables are not plugged in correctly!
- Check the power supply. Is the supply voltage correct for the board? If you are not sure, read the manual. Try plugging in a different power supply or multi-meter to check the power a wrong supply voltage can easily FRY a computer and other electrical devices.
- Is your display ok? Is the monitor powered on? Is the monitor's video cable plugged into the video connector? Double-check the brightness and contrast settings. Plug the monitor into another computer if possible to verify the monitor isn't the problem.
- Remove all additional devices from the system. Only the processor board, power supply, monitors and the keyboard should remain in the system.
- Assure your cooling measures work correctly and keep the processor at a reasonable temperature.
- If all else has failed, replace the CPU Board itself.
- If system comes up then check the BIOS setup and reboot.

The following should be the first steps if the Board does not boot:

If you need to send the board to LiPPERT for repair, be sure you get a Return Materials Acceptance number (RMA) first.

Please have a look in Appendix C (Getting Help).

## Appendix A, Further Resources

[www.lippertembedded.com](http://www.lippertembedded.com)

Manufacturer of the **EPIC CoreExpress® Carrier** and the CoreExpress processor module

[www.CoreExpress.com](http://www.CoreExpress.com)

The CoreExpress home page

[www.sff-sig.org](http://www.sff-sig.org)

CoreExpress open specification home page

[www.intel.com](http://www.intel.com)

Manufacturer of the used CPU and Chipset.

[www.smbus.org](http://www.smbus.org)

SMBus is the System Management Bus defined by Intel.

[www.pc104.org](http://www.pc104.org)

The EPIC specification's home page

## Appendix B, Contact Information

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## Appendix C, Getting Help

Should you have technical questions that are not covered by the respective manuals, please contact our support department at [support@lippertembedded.com](mailto:support@lippertembedded.com) .

Please allow one working day for an answer!

Technical manuals as well as other literature for all LiPPERT products can be found in the *Products* section of LiPPERT's website [www.lippertembedded.com](http://www.lippertembedded.com). Simply locate the product in question and follow the link to its manual.

### Returning Products for Repair

To return a product to LiPPERT for repair, you need to get a Return Material Authorization (RMA) number first.

Please print the RMA Request Form from <http://www.lippertembedded.com/service/repairs.html> fill in the blanks and fax it to +49 621 4321430. We'll return it to you with the RMA number.

**Deliveries without a valid RMA number are returned to sender at his own cost!**

LiPPERT has a written Warranty and Repair Policy, which can be retrieved from <http://www.lippertembedded.com/service/warranty.html>

It describes how defective products are handled and what the related costs are. Please read this document carefully before returning a product.

## Appendix D, Revision History

Filename	Date	Edited by	Change
TME-CEM-EPIC-R0V0	2008-05-09	M. Fellhauer	First draft
TME-CEM-EPIC-R0V1	2008-05-21	PK	Some formatting
TME-CEM-EPIC-R0V2	2008-02-27	M. Fellhauer	Mechanical dimension corrected
TME-CEM-EPIC-R1V0	2008-08-13	PK MF	- Connector locations added - Jumper descriptions - various improvements Released
TME-CEM-EPIC-R1V1	2009-01-14	AG  MF	- Compact flash socket master/slave - introduction/features corrected - USB uDOC /Client corrected
TME-CEM-EPIC-R1V2	2009-05-08	AG	- more pin 1 markings - manual for PCB 1V0 - USB numbering CoreExpress conform - USB Client improved - some pictures improved
TME-CEM-EPIC-R1V3	2009-08-24	PK	Phone numbers and links corrected
TME-CEM-EPIC-R1V4	2009-11-23	AG	-ISA limitations -Supply voltages, more details
	2010-03-24	MF	- Removed notes about confidential information - included link to SFF-SIG homepage