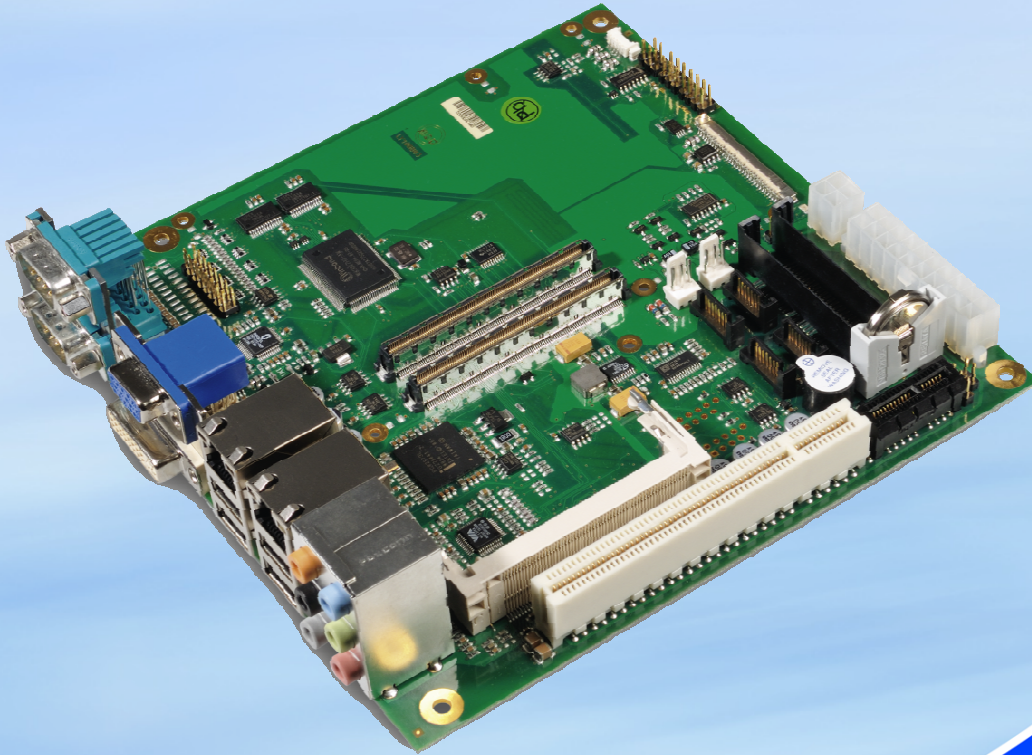


# User's Manual



**CX-MB-IP1**

**MSC COM Express™ Carrier Type 2**

Rev. 1.1  
February 10, 2009



**MICROCOMPUTERS · SYSTEMS · COMPONENTS · VERTRIEBS GMBH**

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MSC Vertriebs GmbH

## Important Information

This product is not an end user product. It was developed and manufactured for further processing by trained personnel.

## EMC Rules

This unit has to be installed in a shielded housing. If not installed in a properly shielded enclosure, and used in accordance with the instruction manual, this product may cause radio interference in which case the user may be required to take adequate measures at his or her own expense.

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# 1 General Information

## 1.1 Revisions and Modifications

Revision	Date		Comment
1.0	January 14, 2009	KSE	First release
1.1	February 10, 2009	KSE	Positioning of J0502 changed, J0601 removed

## 1.2 Reference Documents

- [1] COM Express Module Base Specification  
COM Express Revision 1.0  
Last update: July 10th, 2005
- [2] ATX Specification  
atx2\_21.pdf  
Version 2.2  
<http://www.formfactors.org>
- [3] PCI Local Bus Specification Rev. 2.1  
PCI21.PDF  
Last update: June 1st, 1995  
<http://www.pcisig.com>
- [4] JILI Specification  
Jilim120.pdf  
Last update: April 7th, 2003  
<http://www.jumpotec.de/product/data/jili/index.html>
- [5] Digital Video Interface DVI  
dvi\_10.pdf  
Rev. 1.0 April 2nd, 1999  
<http://www.ddwg.org/>
- [6] ATA/ATAPI-6 Specification  
d1410r3b.pdf  
<http://www.t13.org/>
- [7] CF+ & CF Specification Rev. 3.0  
cfspc3\_0.pdf  
<http://www.compactflash.org/>
- [8] Serial ATA Specification  
Serial ATA 1.0 gold.pdf  
Last update: August 29th, 2002 Rev.1.0  
<http://www.sata-io.org/>
- [9] IEEE Std. 802.3-2002  
802.3-2002.pdf  
<http://www.ieee.org>
- [10] Universal Bus Specification  
usb\_20.pdf  
Last update: April 27th, 2000  
<http://www.usb.org>

## 1.3 Definitions and Abbreviations

COM	Computer-On-Module
RTC	Real Time Clock
ATX	Advanced Technology Extended
PCI	Peripheral Component Interconnect
IDE	Integrated Drive Electronics
EIDE	Enhanced Integrated Drive Electronics
CF	Compact Flash
ATA	Advanced Technology Attachment
ATAPI	Advanced Technology Attachment with Packet Interface
SATA	Serial Advanced Technology Attachment
USB	Universal Serial Bus
PEG	PCI express Graphics
GPIO	General Purpose Input / Output
LVDS	Low Voltage Differential Signaling
JILI	JUMPtect Intelligent LVDS Interface
LAN	Local Area Network
VGA	Video Graphics Array
LPC	Low Pin Count
POST	Power on self test
SMBus	System Management Bus
MDI	Medium Dependent Interface

## 2 Introduction

### 2.1 Product Description

COM Express modules are compact, highly integrated Single Board Computers.

Typically a COM Express module consists of CPU, chipset, memory, video controller, Ethernet controller, BIOS flash and EIDE-, SATA- and USB controller. Interface controllers (e.g. for PCMCIA) or connectors (e.g. RJ45) are implemented on the base board on to which the COM Express module can be mounted via one or two 220-pin SMD-connectors. In addition to the power supply signals for PCIe-, PCI-bus, EIDE, SATA, USB, LPC etc. are also present on these connectors.

The type of interfaces that are routed from the COM Express module to the base board depends on the type of module that is used. The COM Express specification defines five different types which differ in number and pin assignment of the module connectors.

Thanks to the standardized mechanics and interfaces the system can be scaled arbitrarily. In spite of the modular concept the systems design is very flat and compact.

COM Express modules require a base-board for their operation.

The base board described below acts as a carrier board for the COM Express modules.

### 2.2 Features

- Interface for COM Express module type 2 up to basic form factor
- 1 PCI slot 32Bit v2.1
- 1 Mini PCI slot
- 1 PCIe x1 slot
- VGA interface
- DVI-D interface
- LVDS interface
- J130 connector
- High Definition Audio
  - LineIn
  - LineOut
  - Microphone
  - Center / LFE
  - Surround
  - Side
- 2 Compact flash interface Spec. v3.0
- 4 SATA channels
- 8 USB2.0 ports
- 1 LAN interface max. 1GBit (from COM Express Module)
- 1 LAN interface max. 1GBit (on carrier board)

- Pin header for 8 GPIOs
- SuperIO WinBond W83627THF
  - 2x COM ports
  - 1x Parallel Port
  - fan control and fan speed monitoring
- Hardware monitoring (Temperature sensor, voltage sensor etc)
- Power supply via ATX connector
- Serial EEPROM on I<sup>2</sup>C-Bus
- Beeper

Note : Support for all above features will also depend on the COM Express module being used. Not all modules support the maximum number of interfaces.

## 2.3 Block Diagram

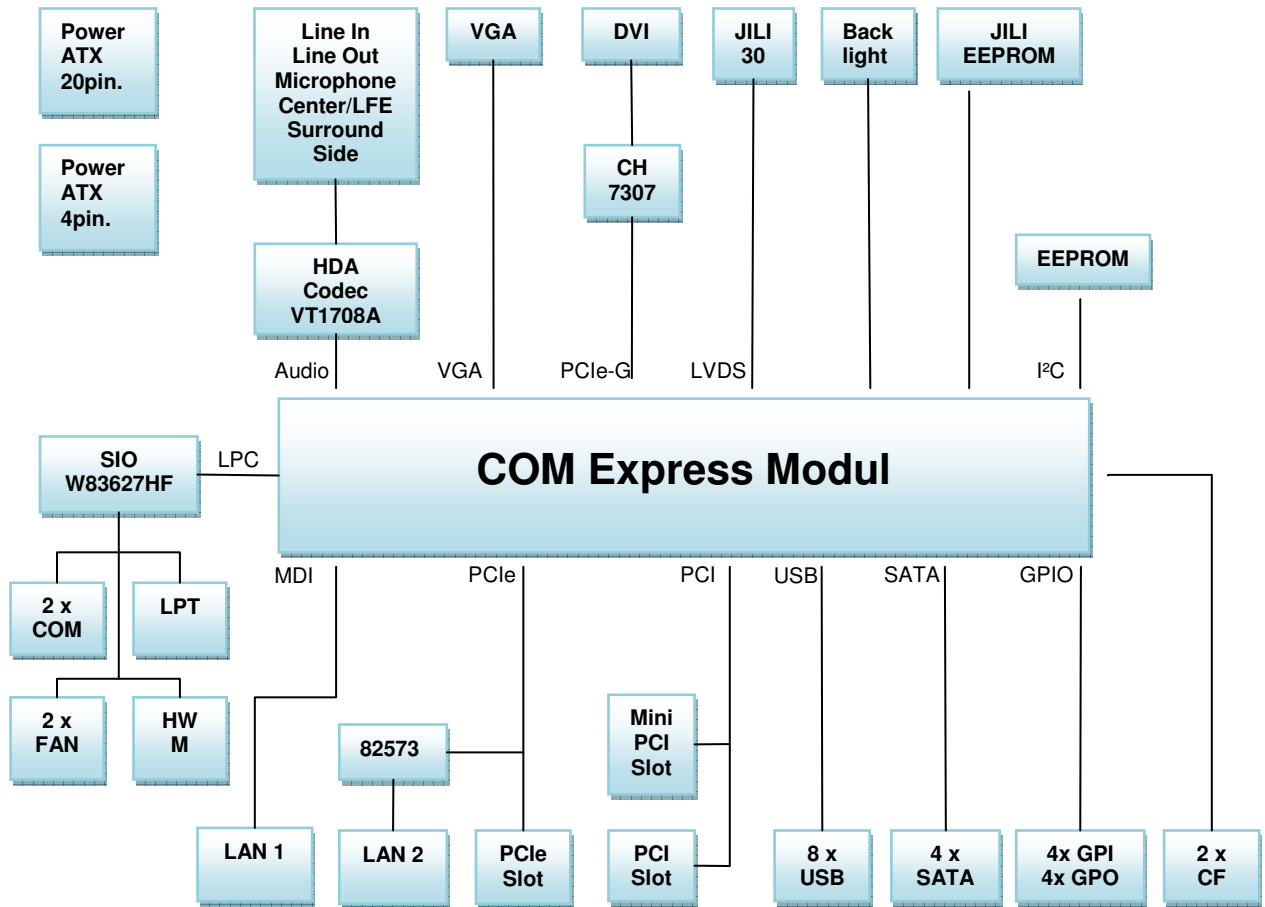


Figure 1 Block Diagram Carrier Board

## 2.4 Positioning of the Connectors and Jumpers

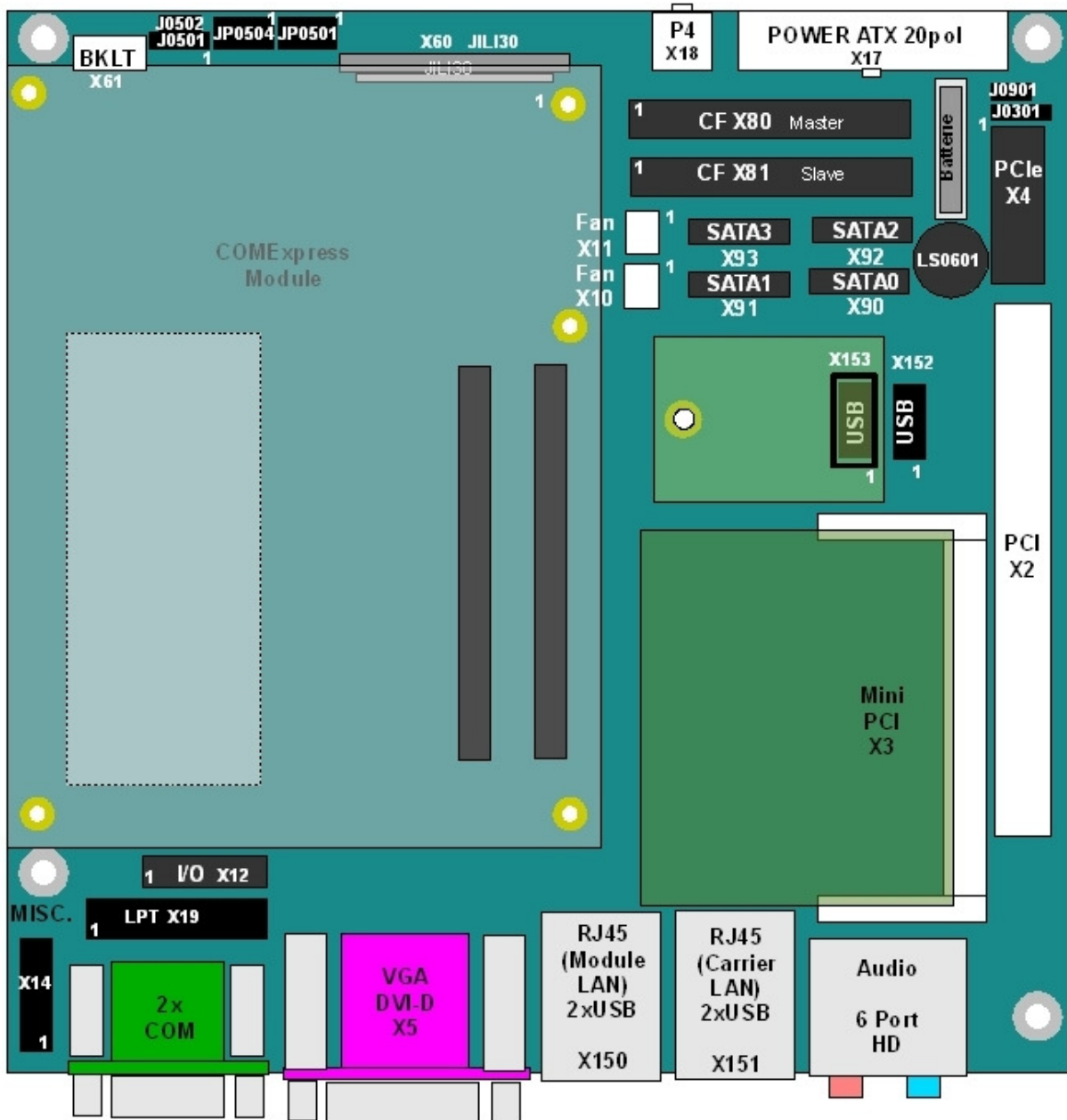


Figure 2 Positioning of the Connectors and Jumpers

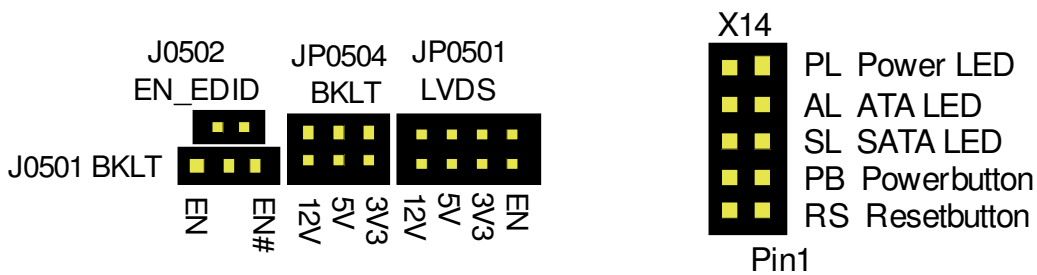


Figure 3 Jumper Details

## 3 Mechanics

### 3.1 Dimensions

Dimension: 170 mm x 170 mm

Width: 1.6 mm +/-10%

## 4 Hardware

### 4.1 Plug-in Position of the COM Express module

Sockets for COM Express type 2 modules are available on the carrier board.

Following form factors are supported:

- Compact module (Industry consortium formfactor)
- Basic module

#### Specification:

- Reference: X1
- Pinout: Refer to COM Express specification for type 2 module [1]

Row A		Row B	
A1	GND	B1	GND
A2	GBE0_MDI3-	B2	GBE0_ACT#
A3	GBE0_MDI3+	B3	LPC_FRAME#
A4	GBE0_LINK100# n.c.	B4	LPC_AD0
A5	GBE0_LINK1000#	B5	LPC_AD1
A6	GBE0_MDI2-	B6	LPC_AD2
A7	GBE0_MDI2+	B7	LPC_AD3
A8	GBE0_LINK#	B8	LPC_DRQ0#
A9	GBE0_MDI1-	B9	LPC_DRQ1# n.c.
A10	GBE0_MDI1+	B10	LPC_CLK
A11	GND	B11	GND
A12	GBE0_MDI0-	B12	PWRBTN#
A13	GBE0_MDI0+	B13	SMB_CK
A14	GBE0_CTREF	B14	SMB_DAT
A15	SUS_S3#	B15	SMB_ALERT# n.c.
A16	SATA0_TX+	B16	SATA1_TX+
A17	SATA0_TX-	B17	SATA1_TX-
A18	SUS_S4#	B18	SUS_STAT# n.c.
A19	SATA0_RX+	B19	SATA1_RX+
A20	SATA0_RX-	B20	SATA1_RX-
A21	GND	B21	GND
A22	SATA2_TX+	B22	SATA3_TX+
A23	SATA2_TX-	B23	SATA3_TX-
A24	SUS_S5#	B24	PWR_OK
A25	SATA2_RX+	B25	SATA3_RX+
A26	SATA2_RX-	B26	SATA3_RX-
A27	BATLOW# n.c.	B27	WDT n.c.
A28	ATA_ACT#	B28	AC_SDIN2 n.c.
A29	AC_SYNC	B29	AC_SDIN1 n.c.
A30	AC_RST#	B30	AC_SDIN0
A31	GND	B31	GND
A31	GND	B31	GND
A32	AC_BITCLK	B32	SPKR

A33	AC_SDOOUT	B33	I2C_CK
A34	BIOS_DISABLE#	B34	I2C_DAT
A35	THRMTRIP# n.c.	B35	THRM# n.c.
A36	USB6-	B36	USB7-
A37	USB6+	B37	USB7+
A38	USB_6_7_OC#	B38	USB_4_5_OC#
A39	USB4-	B39	USB5-
A40	USB4+	B40	USB5+
A41	GND	B41	GND
A42	USB2-	B42	USB3-
A43	USB2+	B43	USB3+
A44	USB_2_3_OC#	B44	USB_0_1_OC#
A45	USB0-	B45	USB1-
A46	USB0+	B46	USB1+
A47	VCC_RTC	B47	EXCD1_PERST# n.c.
A48	EXCD0_PERST#	B48	EXCD1_CPPE# n.c.
A49	EXCD0_CPPE#	B49	SYS_RESET#
A50	LPC_SERIRQ	B50	CB_RESET#
A51	GND	B51	GND
A52	PCIE_TX5+ n.c.	B52	PCIE_RX5+ n.c.
A53	PCIE_TX5- n.c.	B53	PCIE_RX5- n.c.
A54	GPI0	B54	GPO1
A55	PCIE_TX4+ n.c.	B55	PCIE_RX4+ n.c.
A56	PCIE_TX4- n.c.	B56	PCIE_RX4- n.c.
A57	GND	B57	GPO2
A58	PCIE_TX3+ n.c.	B58	PCIE_RX3+ n.c.
A59	PCIE_TX3- n.c.	B59	PCIE_RX3- n.c.
A60	GND	B60	GND
A61	PCIE_TX2+ n.c.	B61	PCIE_RX2+ n.c.
A62	PCIE_TX2- n.c.	B62	PCIE_RX2- n.c.
A63	GPI1	B63	GPO3
A64	PCIE_TX1+	B64	PCIE_RX1+
A65	PCIE_TX1-	B65	PCIE_RX1-
A66	GND	B66	WAKE0#
A67	GPI2	B67	WAKE1#
A68	PCIE_TX0+	B68	PCIE_RX0+
A69	PCIE_TX0-	B69	PCIE_RX0-
A70	GND	B70	GND
A71	LVDS_A0+	B71	LVDS_B0+
A72	LVDS_A0-	B72	LVDS_B0-
A73	LVDS_A1+	B73	LVDS_B1+
A74	LVDS_A1-	B74	LVDS_B1-
A75	LVDS_A2+	B75	LVDS_B2+
A76	LVDS_A2-	B76	LVDS_B2-
A77	LVDS_VDD_EN	B77	LVDS_B3+
A78	LVDS_A3+	B78	LVDS_B3-
A79	LVDS_A3-	B79	LVDS_BKLT_EN
A80	GND	B80	GND
A81	LVDS_A_CK+	B81	LVDS_B_CK+
A82	LVDS_A_CK-	B82	LVDS_B_CK-
A83	LVDS_I2C_CK	B83	LVDS_BKLT_CTRL
A84	LVDS_I2C_DAT	B84	VCC_5V_SBY
A85	GPI3	B85	VCC_5V_SBY
A86	KBD_RST#	B86	VCC_5V_SBY

A87	KBD_A20GATE	B87	VCC_5V_SBY
A88	PCIE0_CK_REF+	B88	RSVD
A89	PCIE0_CK_REF-	B89	VGA_RED
A90	GND	B90	GND
A91	RSVD	B91	VGA_GRN
A92	RSVD	B92	VGA_BLU
A93	GPO0	B93	VGA_HSYNC
A94	RSVD	B94	VGA_VSYNC
A95	RSVD	B95	VGA_I2C_CK
A96	GND	B96	VGA_I2C_DAT
A97	VCC_12V	B97	TV_DAC_A n.c.
A98	VCC_12V	B98	TV_DAC_B n.c.
A99	VCC_12V	B99	TV_DAC_C n.c.
A100	GND	B100	GND
A101	VCC_12V	B101	VCC_12V
A102	VCC_12V	B102	VCC_12V
A103	VCC_12V	B103	VCC_12V
A104	VCC_12V	B104	VCC_12V
A105	VCC_12V	B105	VCC_12V
A106	VCC_12V	B106	VCC_12V
A107	VCC_12V	B107	VCC_12V
A108	VCC_12V	B108	VCC_12V
A109	VCC_12V	B109	VCC_12V
A110	GND	B110	GND

**Table 1 COMExpress Connector Rows A and B**

Row C		Row D	
C1	GND	D1	GND
C2	IDE_D7	D2	IDE_D5
C3	IDE_D6	D3	IDE_D10
C4	IDE_D3	D4	IDE_D11
C5	IDE_D15	D5	IDE_D12
C6	IDE_D8	D6	IDE_D4
C7	IDE_D9	D7	IDE_D0
C8	IDE_D2	D8	IDE_REQ
C9	IDE_D13	D9	IDE_IOW#
C10	IDE_D1	D10	IDE_ACK#
C11	GND	D11	GND
C12	IDE_D14	D12	IDE_IRQ
C13	IDE_IORDY	D13	IDE_A0
C14	IDE_IOR#	D14	IDE_A1
C15	PCI_PME#	D15	IDE_A2
C16	PCI_GNT2# n.c.	D16	IDE_CS1#
C17	PCI_REQ2# n.c.	D17	IDE_CS3#
C18	PCI_GNT1# n.c.	D18	IDE_RESET#
C19	PCI_REQ1# n.c.	D19	PCI_GNT3#
C20	PCI_GNT0#	D20	PCI_REQ3#
C21	GND	D21	GND
C22	PCI_REQ0#	D22	PCI_AD1
C23	PCI_RESET#	D23	PCI_AD3
C24	PCI_AD0	D24	PCI_AD5
C25	PCI_AD2	D25	PCI_AD7
C26	PCI_AD4	D26	PCI_C/BE0#

C27	PCI_AD6	D27	PCI_AD9
C28	PCI_AD8	D28	PCI_AD11
C29	PCI_AD10	D29	PCI_AD13
C30	PCI_AD12	D30	PCI_AD15
C31	GND	D31	GND
C31	GND	D31	GND
C32	PCI_AD14	D32	PCI_PAR
C33	PCI_C/BE1#	D33	PCI_SERR#
C34	PCI_PERR#	D34	PCI_STOP#
C35	PCI_LOCK#	D35	PCI_TRDY#
C36	PCI_DEVSEL#	D36	PCI_FRAME#
C37	PCI_IRDY#	D37	PCI_AD16
C38	PCI_C/BE2#	D38	PCI_AD18
C39	PCI_AD17	D39	PCI_AD20
C40	PCI_AD19	D40	PCI_AD22
C41	GND	D41	GND
C42	PCI_AD21	D42	PCI_AD24
C43	PCI_AD23	D43	PCI_AD26
C44	PCI_C/BE3#	D44	PCI_AD28
C45	PCI_AD25	D45	PCI_AD30
C46	PCI_AD27	D46	PCI_IRQC#
C47	PCI_AD29	D47	PCI_IRQD#
C48	PCI_AD31	D48	PCI_CLKRUN#
C49	PCI_IRQA#	D49	PCI_M66EN
C50	PCI_IRQB#	D50	PCI_CLK
C51	GND	D51	GND
C52	PEG_RX0+ n.c.	D52	PEG_TX0+ n.c.
C53	PEG_RX0- n.c.	D53	PEG_TX0- n.c.
C54	TYPE0#	D54	PEG_LANE_RV#
C55	PEG_RX1+ n.c.	D55	PEG_TX1+ n.c.
C56	PEG_RX1- n.c.	D56	PEG_TX1- n.c.
C57	TYPE1#	D57	TYPE2#
C58	PEG_RX2+ n.c.	D58	PEG_TX2+ n.c.
C59	PEG_RX2- n.c.	D59	PEG_TX2- n.c.
C60	GND	D60	GND
C61	PEG_RX3+ n.c.	D61	PEG_TX3+ n.c.
C62	PEG_RX3- n.c.	D62	PEG_TX3- n.c.
C63	RSVD	D63	RSVD
C64	RSVD	D64	RSVD
C65	PEG_RX4+ n.c.	D65	PEG_TX4+ n.c.
C66	PEG_RX4- n.c.	D66	PEG_TX4- n.c.
C67	RSVD	D67	GND
C68	PEG_RX5+ n.c.	D68	PEG_TX5+ n.c.
C69	PEG_RX5- n.c.	D69	PEG_TX5- n.c.
C70	GND	D70	GND
C71	PEG_RX6+ n.c.	D71	PEG_TX6+ n.c.
C72	PEG_RX6- n.c.	D72	PEG_TX6- n.c.
C73	SDVO_DATA	D73	SDVO_CLK
C74	PEG_RX7+ n.c.	D74	PEG_TX7+ n.c.
C75	PEG_RX7- n.c.	D75	PEG_TX7- n.c.
C76	GND	D76	GND
C77	RSVD	D77	IDE_CBLID#
C78	PEG_RX8+ n.c.	D78	PEG_TX8+ n.c.
C79	PEG_RX8- n.c.	D79	PEG_TX8- n.c.

C80	GND	D80	GND
C81	PEG_RX9+ n.c.	D81	PEG_TX9+ n.c.
C82	PEG_RX9- n.c.	D82	PEG_TX9- n.c.
C83	RSVD	D83	RSVD
C84	GND	D84	GND
C85	PEG_RX10+ n.c.	D85	PEG_TX10+ n.c.
C86	PEG_RX10- n.c.	D86	PEG_TX10- n.c.
C87	GND	D87	GND
C88	PEG_RX11+ n.c.	D88	PEG_TX11+ n.c.
C89	PEG_RX11- n.c.	D89	PEG_TX11- n.c.
C90	GND	D90	GND
C91	PEG_RX12+ n.c.	D91	PEG_TX12+
C92	PEG_RX12- n.c.	D92	PEG_TX12-
C93	GND	D93	GND
C94	PEG_RX13+ n.c.	D94	PEG_TX13+
C95	PEG_RX13- n.c.	D95	PEG_TX13-
C96	GND	D96	GND
C97	RSVD	D97	PEG_ENABLE# n.c.
C98	PEG_RX14+	D98	PEG_TX14+
C99	PEG_RX14-	D99	PEG_TX14-
C100	GND	D100	GND
C101	PEG_RX15+ n.c.	D101	PEG_TX15+
C102	PEG_RX15- n.c.	D102	PEG_TX15-
C103	GND	D103	GND
C104	VCC_12V	D104	VCC_12V
C105	VCC_12V	D105	VCC_12V
C106	VCC_12V	D106	VCC_12V
C107	VCC_12V	D107	VCC_12V
C108	VCC_12V	D108	VCC_12V
C109	VCC_12V	D109	VCC_12V
C110	GND	D110	GND

**Table 2 COMExpress Connector Rows C and D**

## 4.2 PCI Slots

A single 32-bit PCI slot is provided according to PCI specification v2.1.

Note : The number of PCI slots can be expanded using appropriate riser cards.

In addition a mini PCI slot is also provided on the base board.

The signal assignment for slot 0 and slot 1 is defined in the COM Express specification.

- INTA#, INTB#, INTC# and INTD#
- REQ[0/3]#
- GNT[0/3]#
- IDSEL1: AD20
- IDSEL2: AD21
- IDSEL4: AD23

PCI Slot	Reference
PCI Slot 0	X2
PCI Slot 1	X3

**Table 3 Assignment PCI slot to connector reference**

### Specification:

- Reference: X2
- Pinout: Refer to PCI specification V2.1 [3]

Pin	Signal	Pin	Signal
A1	TRST#	B1	-12V
A2	12V	B2	TCK
A3	TMS	B3	GND
A4	TDI	B4	TDO
A5	5V	B5	5V
A6	INTA#	B6	5V
A7	INTC#	B7	INTB#
A8	5V	B8	INTD#
A9	IDSEL 2 (AD21)	B9	PRSNT1#
A10	5V	B10	RSVD
A11	RSVD	B11	PRSNT2#
A12	GND	B12	GND
A13	GND	B13	GND
A14	3V3	B14	RSVD
A15	RST#	B15	GND
A16	5V	B16	CLK
A17	GNT0#	B17	GND
A18	GND	B18	REQ0#
A19	PME#	B19	5V
A20	AD30	B20	AD31
A21	3V3	B21	AD29

A22	AD28	B22	GND
A23	AD26	B23	AD27
A24	GND	B24	AD25
A25	AD24	B25	3V3
A26	IDSEL1 (AD20)	B26	C/BE3#
A27	3V3	B27	AD23
A28	AD22	B28	GND
A29	AD20	B29	AD21
A30	GND	B30	AD19
A31	AD18	B31	3V3
A32	AD16	B32	AD17
A33	3V3	B33	C/BE2#
A34	FRAME#	B34	GND
A35	GND	B35	IRDY#
A36	TRDY#	B36	3V3
A37	GND	B37	DEVSEL#
A38	STOP#	B38	GND
A39	3V3	B39	LOCK#
A40	SMBCLK	B40	PERR#
A41	SMBDAT	B41	3V3
A42	GND	B42	SERR#
A43	PAR	B43	3V3
A44	AD15	B44	C/BE1#
A45	3V3	B45	AD14
A46	AD13	B46	GND
A47	AD11	B47	AD12
A48	GND	B48	AD10
A49	AD09	B49	GND
Key			
A52	C/BE0#	B52	AD08
A53	3V3	B53	AD07
A54	AD06	B54	3V3
A55	AD04	B55	AD05
A56	GND	B56	AD03
A57	AD02	B57	GND
A58	AD00	B58	AD01
A59	5V	B59	5V
A60	REQ64#	B60	ACK64#
A61	5V	B61	5V
A62	5V	B62	5V

Table 4 Pin out PCI

**Specification:**

- Reference: X3
- Pinout: Mini PCI TYP IIIB

Pin	Signal	Pin	Signal
1	TIP n.c.	2	RING n.c.
3	8PMJ-3 n.c.	4	8PMJ-1 n.c.
5	8PMJ-6 n.c.	6	8PMJ-2 n.c.
7	8PMJ-7 n.c.	8	8PMJ-4 n.c.
9	8PMJ-8 n.c.	10	8PMJ-5 n.c.
11	LED1 GRNP n.c.	12	LED2 YELP n.c.
13	LED1 GRNN n.c.	14	LED2 YELN n.c.
15	CHSGND	16	RSVD
17	INTB# (IRQA#)	18	5V
19	3V3	20	INTA# (IRQD#)
21	RSVD	22	RSVD
23	GND	24	3V3
25	CLK	26	RESET#
27	GND	28	3V3
29	REQ3#	30	GNT3#
31	3V3	32	GND
33	AD31	34	PME#
35	AD29	36	RSVD
37	GND	38	AD30
39	AD27	40	3V3
41	AD25	42	AD28
43	RSVD	44	AD26
45	C/BE3#	46	AD24
47	AD23	48	IDSEL4 (AD23)
49	GND	50	GND
51	AD21	52	AD22
53	AD19	54	AD20
55	GND	56	PAR
57	AD17	58	AD18
59	C/BE2#	60	AD16
61	IRDY#	62	GND
63	3V3	64	FRAME#
65	CLKRUN#	66	TRDY#
67	SERR#	68	STOP#
69	GND	70	3V3
71	PERR#	72	DEVSEL#
73	C/BE1#	74	GND
75	AD14	76	AD15
77	GND	78	AD13
79	AD12	80	AD11
81	AD10	82	GND
83	GND	84	AD9
85	AD8	86	C/BE0#
87	AD7	88	3V3
89	3V3	90	AD6
91	AD5	92	AD4

93	RSVD	94	AD2
95	AD3	96	AD0
97	5V	98	RSVD WIP5 n.c.
99	AD1	100	RSVD WIP5 n.c.
101	GND	102	GND
103	AC SYNC n.c.	104	M66EN
105	AC SDATA IN n.c.	106	AC SDATA OUT n.c.
107	AC BIT CLK n.c.	108	AC CODEC ID0# n.c.
109	AC CODEC ID1# n.c.	110	AC RESET n.c.
111	MOD AUDIO MON n.c	112	RSVD
113	AUDIO GND	114	GND
115	SYS AUDIO OUT n.c.	116	SYS AUDIO IN n.c.
117	SYS AUDIO OUT GND	118	SYS AUDIO IN GND
119	AUDIO GND	120	AUDIO GND
121	RSVD	122	MPCIAT# n.c.
123	5V	124	3V3

**Table 5 Pin out Mini PCI**

### 4.3 PCI Express x1 Slots

Note the PCIe x1 slot can only be used when a riser card is installed – eg using CX-MB-IP-RC1 riser card.

PCIe Lane	References
PCIe Lane 0	X4

**Table 6 Assignment PCIe Lane to connector reference**

#### Specification:

- References: X4
- Pinout: Refer to PCI express specification

Pin	Signal	Pin	Signal
A1	PRSNT1#	B1	12V
A2	12V	B2	12V
A3	12V	B3	12V
A4	GND	B4	GND
A5	JTAG_TCK n.c.	B5	SMB_CLK
A6	JTAG_TDI n.c.	B6	SMB_DAT
A7	JTAG_TDO n.c.	B7	GND
A8	JTAG_TMS n.c.	B8	3V3
A9	3V3	B9	JTAG_RST# n.c.
A10	3V3	B10	3V3_AUX
A11	PE_RST#	B11	WAKE#
KEY			
A12	GND	B12	RSVD
A13	REFCLK+	B13	GND
A14	REFCLK-	B14	PET_p0
A15	GND	B15	PET_n0
A16	PER_p0	B16	GND
A17	PER_n0	B17	PRSNT2#
A18	GND	B18	GND

**Table 7 Pin out PCI Express**

## 4.4 VGA Interface

### Specification:

- References: X5
- Pinout: Refer to Table 8

Pin	Signal name	Function
1	RED	Signal red
2	GREEN	Signal green
3	BLUE	Signal blue
4	RSVD	reserved
5	GND	Ground digital
6	RGND	Ground red
7	GGND	Ground green
8	BGND	Ground blue
9	+5V	+5V VDC
10	SGND	Ground Synchronisation
11	ID0	Monitor ID Bit 0 (optional)
12	SDA	DDC Data
13	HSYNC	Horizontal Sync.
14	VSYNC	Vertical Sync.
15	SCL	DDC Clock

**Table 8 Pinout VGA Interface**

## 4.5 DVI-D Interface

### Specification:

- References: X5
- Pinout: Refer to Table 9

Pin	Signal name	Function
1	TMDS D2-	T.M.D.S. Data channel 2-
2	TMDS D2+	T.M.D.S. Data channel 2+
3	SHIELD 2/4	Shield connected to Ground
4	TMDS D4- n.c.	reserved
5	TMDS D4+ n.c.	reserved
6	DDC CLK	DDC Clock
7	DDC DATA	DDC Data
8	VSYNC n.c.	Analog Vertical Sync.
9	TMDS D1-	T.M.D.S. Data channel 1-
10	TMDS D1+	T.M.D.S. Data channel 1+
11	SHIELD 1/3	Shield connected to Ground
12	TMDS D3- n.c.	reserved
13	TMDS D3+ n.c.	reserved
14	+5V	+5V VDC
15	GND	Ground
16	HPDET	Hot Plug Detect
17	TMDS D0-	T.M.D.S. Data channel 0-
18	TMDS D0+	T.M.D.S. Data channel 0+
19	SHIELD 0/5	Shield connected to Ground
20	TMDS D5- n.c.	reserved
21	TMDS D5+ n.c.	reserved
22	CLK SHIELD	Clock Shield connected to Ground
23	TMDS CLK+	T.M.D.S. Clock channel -
24	TMDS CLK-	T.M.D.S. Clock channel +
C1	RED n.c.	Analog RED
C2	GREEN n.c.	Analog GREEN
C3	BLUE n.c.	Analog BLUE
C4	HSYNC n.c.	Analog Horizontal Sync.
C5	GND	Analog Ground

**Table 9 Pinout DVI-D Interface**

## 4.6 LVDS-Interface

Any LCD display can be connected via a JILI30 connector.

Two 24 bit LVDS channels are present on this 30-pin connector.

### Specification:

- References: X60
- Connector: JAE FI-X30SSL-HF
- Pinout: Refer to Table 10 "JILI30" according to JILI specification [4]

Pin	Signal name	Function
1	LVDS_A0-	LVDS Negative data signal (-)
2	LVDS_A0+	LVDS Positive data signal (+)
3	LVDS_A1-	LVDS Negative data signal (-)
4	LVDS_A1+	LVDS Positive data signal (+)
5	LVDS_A2-	LVDS Negative data signal (-)
6	LVDS_A2+	LVDS Positive data signal (+)
7	VSS	Ground
8	LVDS_A_CK-	LVDS Negative clock signal (-)
9	LVDS_A_CK+	LVDS Positive clock signal (+)
10	LVDS_A3-	LVDS Negative data signal (-)
11	LVDS_A3+	LVDS Positive data signal (+)
12	LVDS_B0-	LVDS Negative data signal (-)
13	LVDS_B0+	LVDS Positive data signal (+)
14	VSS	Ground
15	LVDS_B1-	LVDS Negative data signal (-)
16	LVDS_B1+	LVDS Positive data signal (+)
17	VSS	Ground
18	LVDS_B2-	LVDS Negative data signal (-)
19	LVDS_B2+	LVDS Positive data signal (+)
20	LVDS_B_CK-	LVDS Negative clock signal (-)
21	LVDS_B_CK+	LVDS Positive clock signal (+)
22	LVDS_B3-	LVDS Negative data signal (-)
23	LVDS_B3+	LVDS Positive data signal (+)
24	GND	Ground
25	LVDS I2C DAT	I <sup>2</sup> C Data
26	VDD EN	Display power enable signal
27	LVDS I2C CK	I <sup>2</sup> C Clock
28	VCC LCDSW	Switched Power Supply (Voltage depend on JP0501)
29	VCC LCDSW	Switched Power Supply (Voltage depend on JP0501)
30	VCC LCDSW	Switched Power Supply (Voltage depend on JP0501)

**Table 10 Pinout JILI30 LVDS-Interface**

### 4.6.1 LVDS EEPROM

To store configuration data for the LCD, a serial EEPROM is connected to the signals LVDS\_I2C\_CK and LVDS\_I2C\_DAT.

To avoid conflicts with configuration EEPROMs on the LCD panel connected via the JILI30 connector, this EEPROM allocates an unused address space. It can be configured to use the standard address with using jumper J0502. (See section 4.19 Jumper settings)

### 4.6.2 Backlight Inverter Interface

The supply voltage of the backlight can be adjusted using jumper JP0504.

(See section 4.19 Jumper settings)

Set jumper J0501 depending on the backlight inverter in use.

If the inverter needs a low active start signal, jumper J0501 has to be set to low (pin1 connected to pin2).

If the inverter needs a high active start signal, jumper J0501 has to be set to high (pin2 connected to pin3).

Brightness of the backlight inverter is controlled via the LVDS-BKLT-CTRL signal.

As the LVDS-BKLT-CTRL signal of the COM Express module is supplied a PWM signal by current chipsets. This signal is integrated and then limited to the maximum allowable voltage of the backlight inverter via a voltage divider.

Control voltage: 0...3V

A value of 0V corresponds to maximum brightness.

#### Specification:

- References: X61
- Connector: Molex 53261-0590
- Pinout: Refer to Table 11

Pin	Signal name	Function
1	VCC	Power supply backlight (max. 1A)
2	GND	Ground
3	BLON#	Backlight On
4	VCON	Brightness control
5	GND	Ground

**Table 11 Pinout Backlight**

## 4.7 High Definition Audio

A VIA VT1008A HDA codec is connected to the AC link of the COM Express module.

Following LF signals are provided by the HDA codec:

- Stereo LineIn
- Stereo LineOut
- Stereo Microphone
- Mono Center / Mono LFE
- Stereo Surround
- Stereo Side

### Specification:

- References: X7
- Pinout: Refer to Table 12

Con	colour	Function
1	light blue	Line In
2	lime	Line Out
3	pink	Microphone
4	orange	Center / LFE
5	black	Surround
6	grey	Side

**Table 12 Pinout HD Audio**

## 4.8 IDE Interface

Two compact flash card sockets, type I/II, are provided on one IDE channel. One socket is Master and one is Slave device.

The compact flash interface supports True IDE mode according to compact flash specification rev. 3.0.

Inter alia the compact flash specification rev. 3.0 supports the UDMA mode.

### Specification:

- References: X80 / X81
- Pinout: Refer to specification "CF+ & CF specification rev. 3.0" [7, page 24, table 4]

X80 Master socket

X81 Slave socket

IDE-Harddisks can be used with a Compact Flash to IDE adapter board, like ADA-COMPACTFLASH-ATA-IDE40 from ES&S.

## 4.9 SATA-Interface

Up to four SATA drives can be connected to the SATA interfaces.

Note : Depending on the COM Express module used, not all SATA ports are available.

SATA Channel	References
SATA 0	X90
SATA 1	X91
SATA 2	X92
SATA 3	X93

**Table 13 Assignment SATA Channel to Connector Reference**

### Specification SATA signal connector:

- References: X90 – X93
- Pinout: Refer to Specification SATA [8, page 46, table 3]

## 4.10 USB Topology

Eight USB ports are provided by the COM Express module.

To extend the existing 4 ports on the board up to 8 ports adaptor cables must be connected to the headers (X152, X153).

The exact assignment of each port is defined in the following table:

USB-Port	References	Description
USB0	X150	Combi-connector 1x LAN 2x USB
USB1	X150	Combi-connector 1x LAN 2x USB
USB2	X151	Combi-connector 1x LAN 2x USB
USB3	X151	Combi-connector 1x LAN 2x USB
USB4	X153	Pinheader
USB5	X153	Pinheader
USB6	X152	Pinheader
USB7	X152	Pinheader

**Table 14 Assignment USB Ports**

### 4.10.1 USB Power Supply

The power supplies are protected by USB power switches.

The USB power switches have the following functions:

- The output current is limited to 500mA per port
- A signal to detect overcurrent is generated for each pair of ports as below.
- USB0 and USB1 have one common signal to detect overcurrent
- USB2 and USB3 have one common signal to detect overcurrent
- USB4 and USB5 have one common signal to detect overcurrent
- USB6 and USB7 have one common signal to detect overcurrent

### 4.10.2 USB Ports at Combi-connector

**Specification:**

- References: X150 / X151
- Pinout: according to USB specification 2.0 [10]

### 4.10.3 USB Ports at Pinheader

**Specification:**

- References: X152 / X153
- Connector: Pinheader 2x4/5 keyed
- Pinout: Refer to Table 15

Pin	Function	Function	Pin
1	VCC	VCC	2
2	USB-	USB-	4
3	USB+	USB+	6
4	GND	GND	8
5	n.c.	code	10

**Table 15 Pinout USB Pinheader**

A USB-Flash module can be installed at X153.  
 MICRON™: MTFDCAE002SAF-181 RealSSD eUSB 2GB  
 Intel™: Z-U130 Value Solid State Drive 1 GB

## 4.11 Ethernet

The base board can be connected to a local area network with a 10/100/1000 Ethernet interface.

One Ethernet is driven from the COM Express module. (X150)

The second Ethernet port is driven by an Intel 82573L controller, on the carrier board. (X151)

### Specification:

- References: X150 / X151
- Pinout: Refer to IEEE Std. 802.3 [9, section three, page 225]

## 4.12 GPIO

The COM Express module provides four general purpose outputs and four general purpose inputs.

### Specification:

- References: X12
- Connector: 16pin 2,54mm pin header
- Pinout: Refer to Table 16

Pin	Signal	Pin	Signal
1	GPI0	2	GND
3	GPI1	4	GND
5	GPI2	6	GND
7	GPI3	8	GND
9	GPO0	10	GND
11	GPO1	12	GND
13	GPO2	14	GND
15	GPO3	16	GND

**Table 16 Pinout GPIO connector**

## 4.13 ATX Connector

A standard ATX connector with additional 4-pin ATX12V connector power the system.

### Specification ATX connector:

- References: X17
- Pinout: Refer to ATX specification V2.2 [2]

### Specification ATX12V connector:

- References: X18
- Pinout: Refer to ATX specification V2.2 [2]

## 4.14 SuperIO

The Winbond LPC SuperIO W83627THF is integrated on the base board.

### Interfaces supported by the SuperIO

- 2 RS232 COM Ports
- 1 Parallel Port
- 2 fan interfaces
- Voltage monitoring
- 2 temperature monitors

### 4.14.1 COM Ports

#### Characteristics of the COM ports:

- RS232 standard
- RS232 transceiver ESD protected +/- 15kV
- EMC improvement by using EMI filters in the signal lines

#### Specification:

- References: X16
- Pinout: Refer to Table 17  
(COM1: lower Jack, COM2 upper Jack)

Pin	Signal name	Function
1	DCD#	Data Carrier Detect
2	RXD	Receive Data
3	TXD	Transmit Data
4	DTR#	Data Terminal Ready
5	GND	Ground
6	DSR#	Data Set Ready
7	RTS#	Request To Send
8	CTS#	Clear To Send
9	RI#	Ring Indicator

**Table 17 Pinout COM Ports**

#### 4.14.2 Parallel Port

##### Specification:

- References: X19
- Connector: 26pin 2mm pin header
- Pinout: Refer to Tables 18

Pin	Signal name	Function	Pin
1	STB#	AFD#	2
3	PD0	ERR#	4
5	PD1	INIT#	6
7	PD2	SLIN#	8
9	PD3	GND	10
11	PD4	GND	12
13	PD5	GND	14
15	PD6	GND	16
17	PD7	GND	18
19	ACK#	GND	20
21	BUSY	GND	22
23	PE	GND	24
25	SLCT	VCC n.c.	26

**Table 18 Pinout Parallel Port**

### 4.14.3 Fan interface

Two PWM controlled fan interfaces are integrated on the base board. They are located near the COM Express module.

Reading of the tacho signal and control of the fan speed is done by the SuperIO.

#### Specification:

- References: X10 – X11
- Connector: Molex 22-04-1031

Pinout: Refer to Table 19

Pin	Signal name	Function
1	GND	Ground
2	PWM	PWM signal
3	TACHO	Tacho signal

**Table 19 Pinout Fan Interface**

### 4.14.4 SuperIO Hardware Monitor

Various voltages and temperatures can be monitored by hardware integrated in the SuperIO.

#### Monitored voltages

- VBAT
- 3.3V
- 12V
- 5V

#### Measured temperatures

- 2 ambient temperatures  
The temperature is measured with a thermistor.

## 4.15 Serial EEPROM at I2C-Bus

For testing purposes a serial EEPROM (4kBit) is connected to the I2C bus. To avoid address conflicts, the address can be selected with pulldown resistors. (4.20.1)

## 4.16 Battery

The RTC on the COM Express module is backed-up with a socketed battery on the base board.

<b>Type of battery:</b>	2032
<b>Battery socket:</b>	Renata VBH2032-1
<b>Rated Capacity:</b>	220 mAh on 15kOhm to 2.0V at 21 °C
<b>Operating Temp. Range:</b>	-40 °C to 60 °C

## 4.17 Beeper

A piezo signal generator is implemented for acoustic warning signals.

**Type:** Digisound F/DGX05P

## 4.18 Miscellaneous

The COM Express module provides standard motherboard connections for power on, reset, power LED and ATA/SATA activity LEDs.

### Specification:

- References: X14
- Connector: CAB 1002-161-010
- Pinout: Refer to Table 20

Pin	Signal	Pin	Signal	Function
1	SYS RESET#	2	GND	Reset Button
3	PWRBTN	4	GND	Power Button
5	ATA ACT#	6	330R to 3,3V	SATA LED
7	LED ATA#	8	330R to 3,3V	ATA LED
9	GND	10	330R to 3,3V	Power LED

**Table 20 Pinout Miscellaneous connector**

## 4.19 Jumper settings

### 4.19.1 PCI I/O voltage Jumper J0301

PCI VCCIO	Pins to close
+3,3 V	2-3
+5,0 V	1-2

If no Jumper is installed, the VCCIO plane is powered by 3V over a diode. (default)

### 4.19.2 Display voltage Jumper JP0501

Function	Pins to close
+12,0 V / 3 A	7-8
+5,0 V / 3 A	5-6 (default)
+3,3 V / 1 A	3-4
Power always on*	1-2

\*not switched by LVDS\_VDD\_EN# signal

### 4.19.3 Backlight power Jumpers JP0504

Voltage	Pins to close
+12,0 V / 1A	5-6 (default)
+5,0 V / 1A	3-4
+3,3 V / 1A	1-2

### 4.19.4 Backlight polarity Jumper J0501

Function	Pins to close
LVDS_BKLT_EN	2-3 (default)
LVDS_BKLT_EN#	1-2

### 4.19.5 EDID EEPROM address select Jumper J0502

Function	J0502
Wrong address (disabled)	Removed (default)
Correct address (enabled)	Installed

### 4.19.6 No ATX Jumper J0901

Function	J0901
no ATX	closed

Disables ATX-Functionality

## 4.20 Resistor settings

### 4.20.1 I<sup>2</sup>C EEPROM pull down resistors

resistor	Address
R0608	A2 low
R0609	A1 low
R0610	A0 low