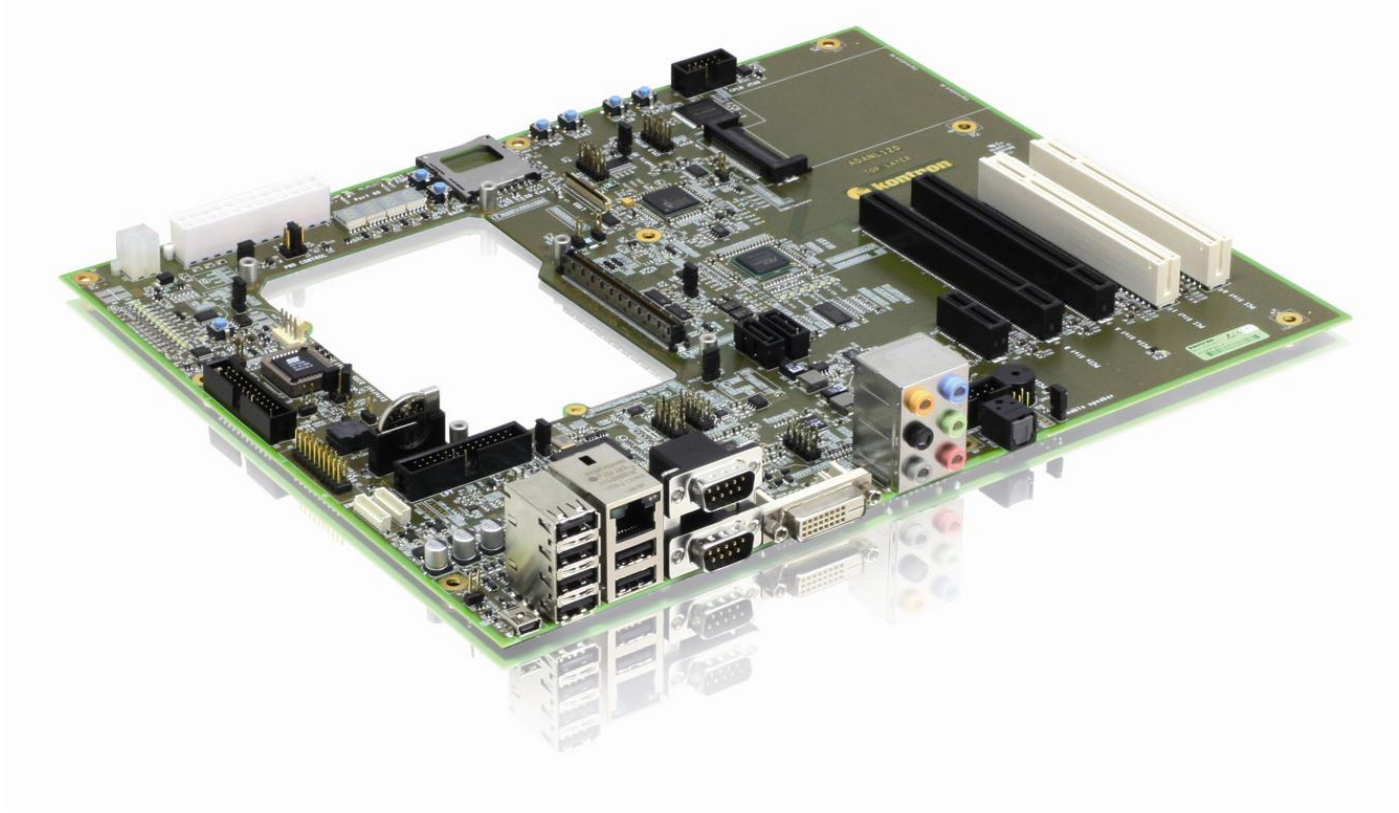
kontron

# » Kontron User's Guide «



## COM Express® Eval Type 10

Document Revision 141

If it's embedded, it's Kontron.

# » Table of Contents «

# 1 User Information

## 1.1 About This Document

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Please consult our Web site at http://www.kontron.com/support for the latest product documentation, utilities, drivers and support contacts. Consult our customer section http://emdcustomersection.kontron.com for the latest BIOS downloads, Product Change Notifications and additional tools and software. In any case you can always contact your board supplier for technical support.

# 2 Introduction

The COM Express® COM.0 Rev. 2.0 Evaluation carrier board for Type 1 and Type 10 modules is designed to allow embedded application developers to get up and running quickly on the COM Express® mini platform, giving them a head start on the total system design. Simply select a Type 1 or Type 10 COM Express® CPU module, then Plug & Go. The Kontron COM Express® Eval Type 10 is an evaluation backplane for COM Express® Computer-on-Modules following the PICMG COM.0 specification Rev 1.0 or Rev 2.0 with pin-out Type 1 or Type 10.

## Ordering Information

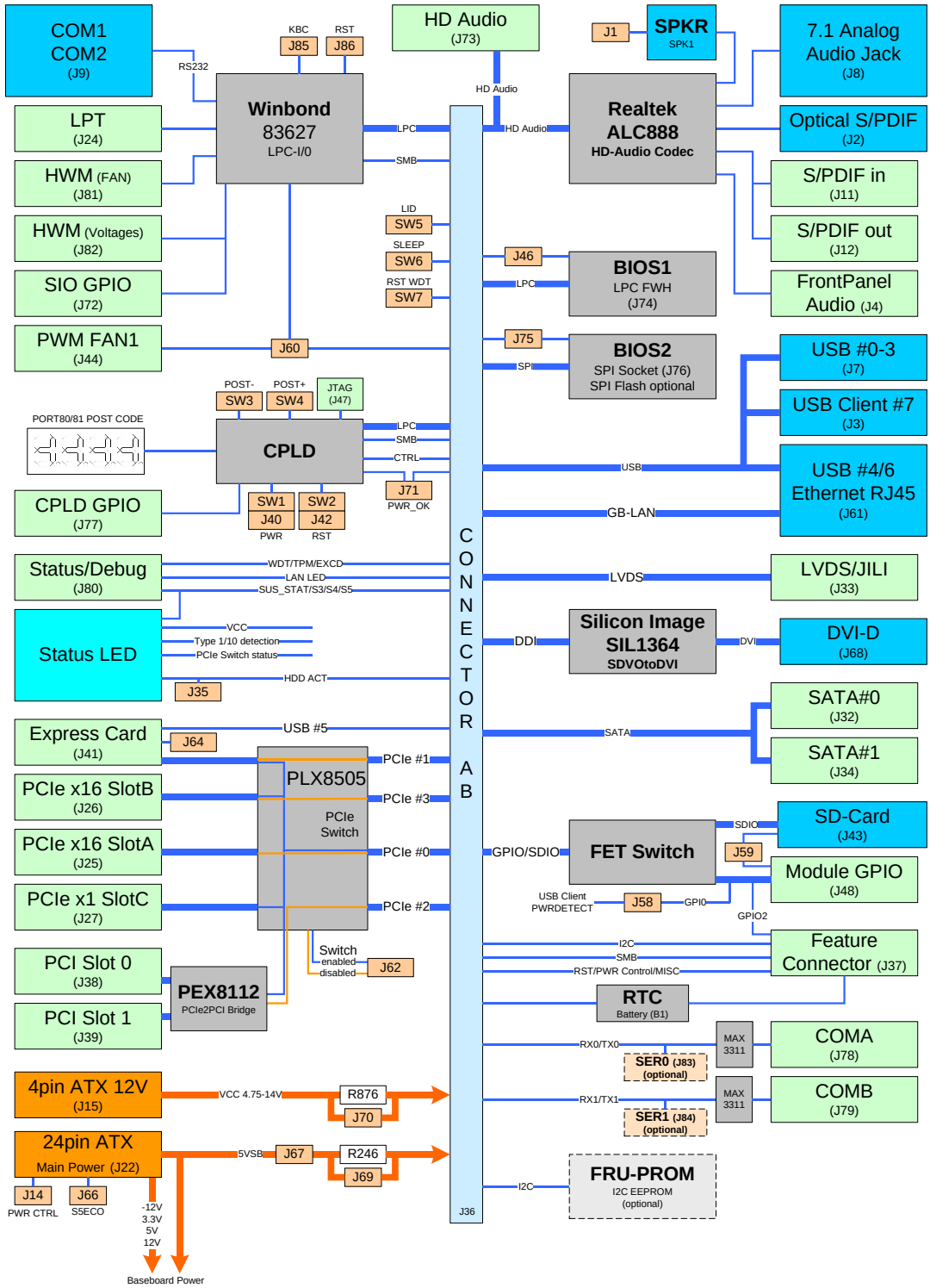
| Article | Part-No. | Description |
|---|---|---|
| nanoETXexpress Evaluation Board | 34101-0000-00-0<br>EOL -> | nanoETXexpress Evaluation Board COM.0 Rev1.0 Type1<br>Note: Product is EOL and no longer available. Please contact your local sales or support if documentation for this baseboard is needed. |
| COM Express® Eval Type 10 | 34101-0000-00-1 | Evaluation Board COM.0 Rev2.0 Type10/Type1 |

# 3 Specification

## 3.1 Functional Specification

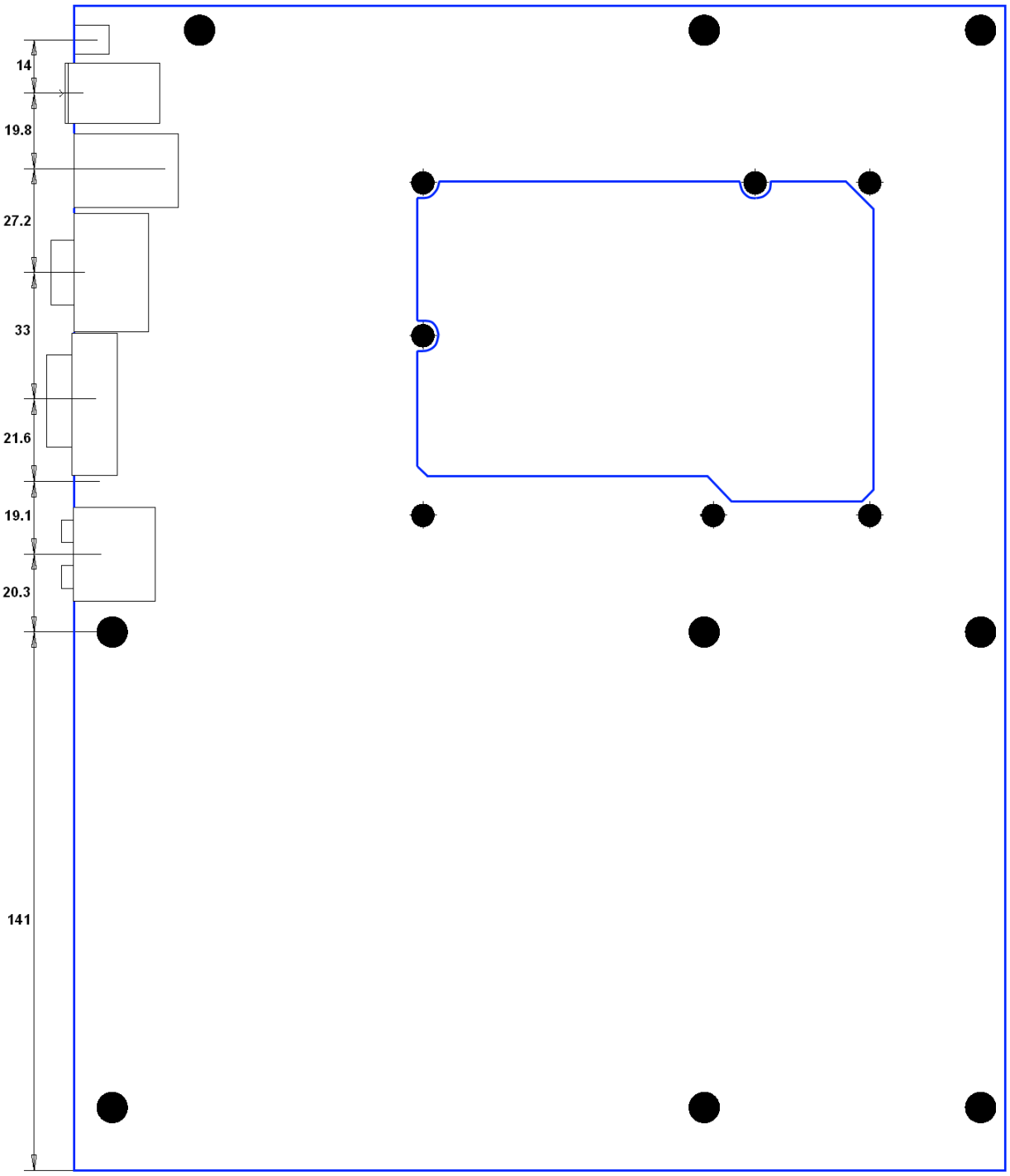
- COM Express® COM.0 Rev 2.0 baseboard compatible to Type 10 and Type 1 pin-out based modules
- ATX EPS (20pin + 4pin) power connector
- PLX8112 PCIe2PCI Bridge
- PLX8505 PCIe Switch
- 2 x PCI
- 2 x PCIexpress x16 (electrically x1)
- 1 x PCIexpress x1
- 1 x Express Card
- 2 x SATA
- LVDS (40pin JILI FFC40 connector)
- 1 x DVI-D (SIL1364 SDVOtoDVI)
- 1x Ethernet RJ45
- 6 x USB 2.0/1.1
- 1 x USB Client
- LPC Firmware Hub and SPI Flash support for external BIOS
- Kontron feature connector
- Front panel connectors (HDD Act., Reset and Power Switch)
- Status LED
- SD-Card Socket
- GPIO pin header for module GPIO and Winbond LPC-I/O GPIO
- 4 digit Port 80/81 POST code display with POST code control
- LID and SLEEP support
- Power Control functions (Power Button override, module single supply, power consumption measurements)
- Realtek ALC888/ALC886 HDAudio Codec
  - 7.1 Analog Audio Jack
  - Optical S/PDIF output
  - Digital S/PDIF input/output
  - Front Panel HD Audio connector
- Winbond 83627HFJ LPC-I/O
  - LPT pin-header
  - COM1/COM2 DSUB9 rear panel connector
  - PWM FAN and Hardware Monitor connectors (FAN/Voltage)

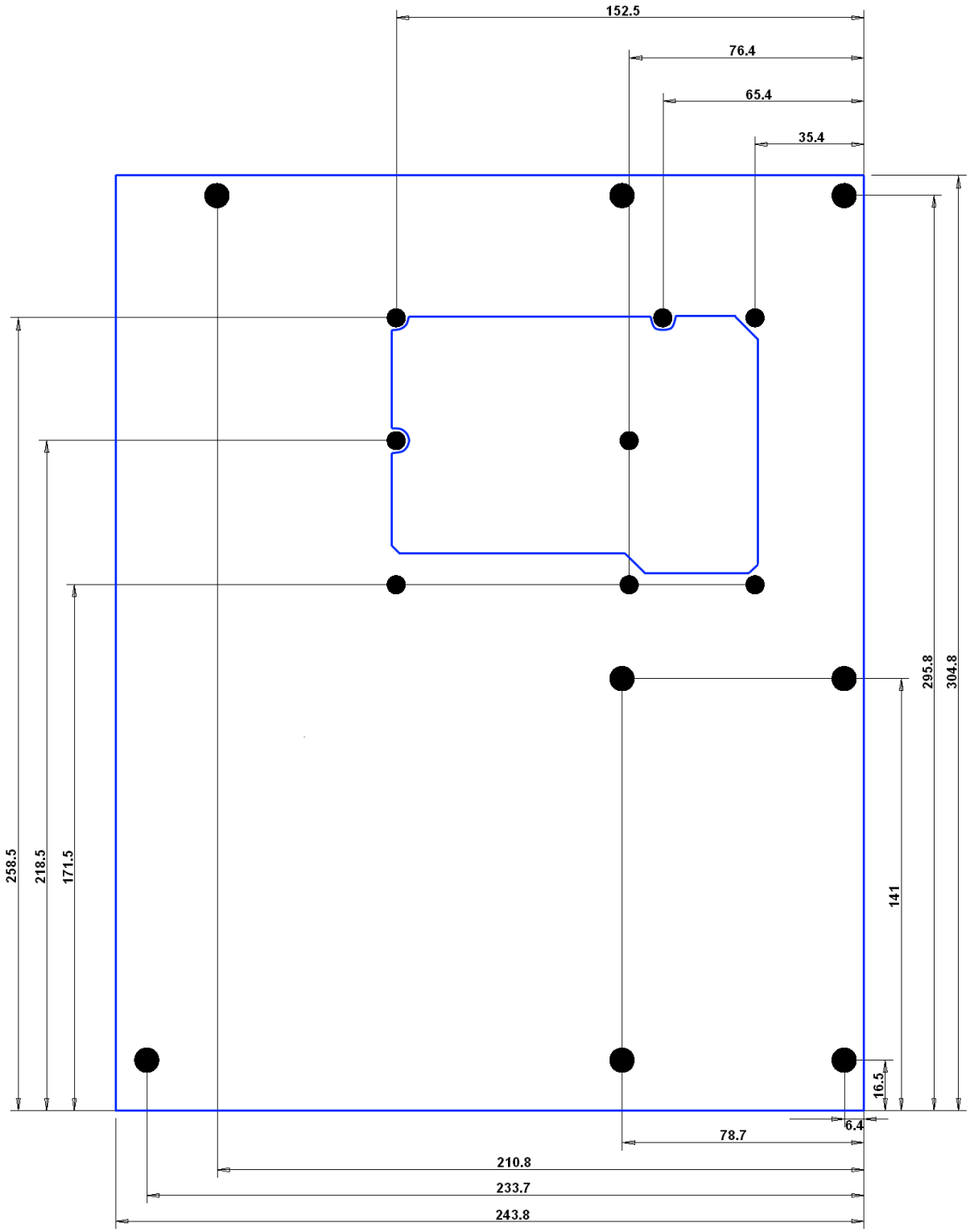
## 3.2 Block Diagram



## 3.3 Mechanical Specification

- » Size: 243.8mm x 304.8mm
- » max height on top: 34.7mm (Connector J8)
- » PCB thickness: 1.4mm ±10%




152.5
76.4
65.4
35.4
295.8
304.8
258.5
218.5
171.5
141
16.5
6.4
78.7
210.8
233.7
243.8

## 3.4 Electrical Specification

### Supply Voltage

» ATX Main Power 24pin

» ATX_12V P4 connector (wide range input depends on module specification)

### Power Supply Rise time

» The input voltages shall rise from ≤10% of nominal to within the regulation ranges within 0.1ms to 20ms.

» There must be a smooth and continuous ramp of each DC input voltage from 10% to 90% of its final set-point following the ATX specification

### Supply Voltage Ripple

» Maximum 100 mV peak to peak 0-20MHz

## 3.5 Environmental Specification

### Ambient temperature

» Operating: 0 to +60 °C

» Non-operating: -30 to +85 °C

### Humidity

» Operating: 10% to 90% (non condensing)

» Non operating: 5% to 95% (non condensing)

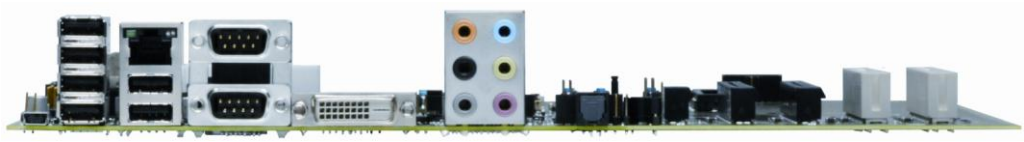
## 3.6 MTBF

The following MTBF (Mean Time Between Failures) values were calculated using a combination of manufacturer's test data, if the data was available, and a Bellcore calculation for the remaining parts. The Bellcore calculation used is "Method 1 Case 1". In that particular method the components are assumed to be operating at a 50 % stress level in a 40° C ambient environment and the system is assumed to have not been burned in. Manufacturer's data has been used wherever possible. The manufacturer's data, when used, is specified at 50° C, so in that sense the following results are slightly conservative. The MTBF values shown below are for a 40° C in an office or telecommunications environment. Higher temperatures and other environmental stresses (extreme altitude, vibration, salt water exposure, etc.) lower MTBF values.

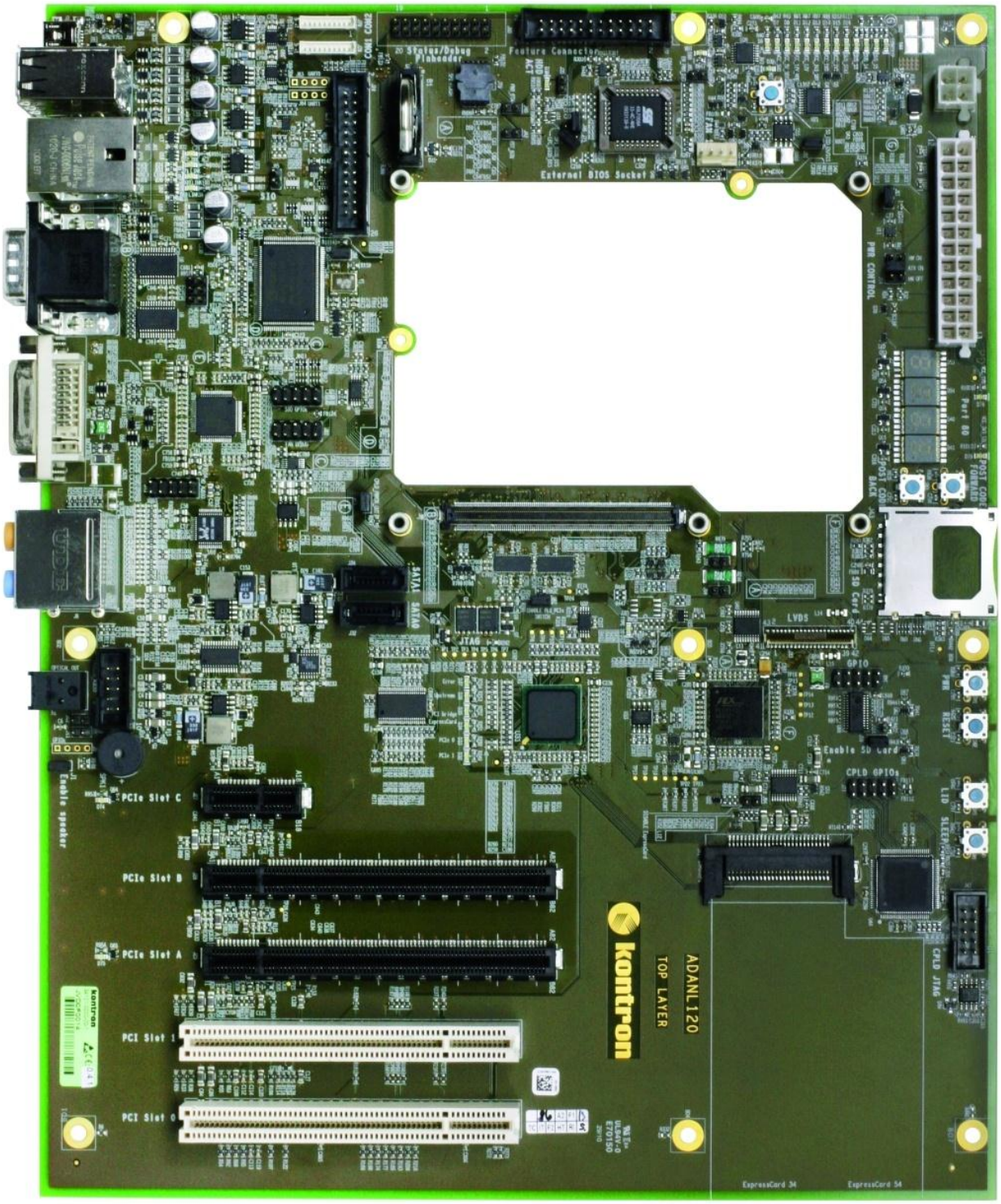
» System MTBF: **tbd** hours

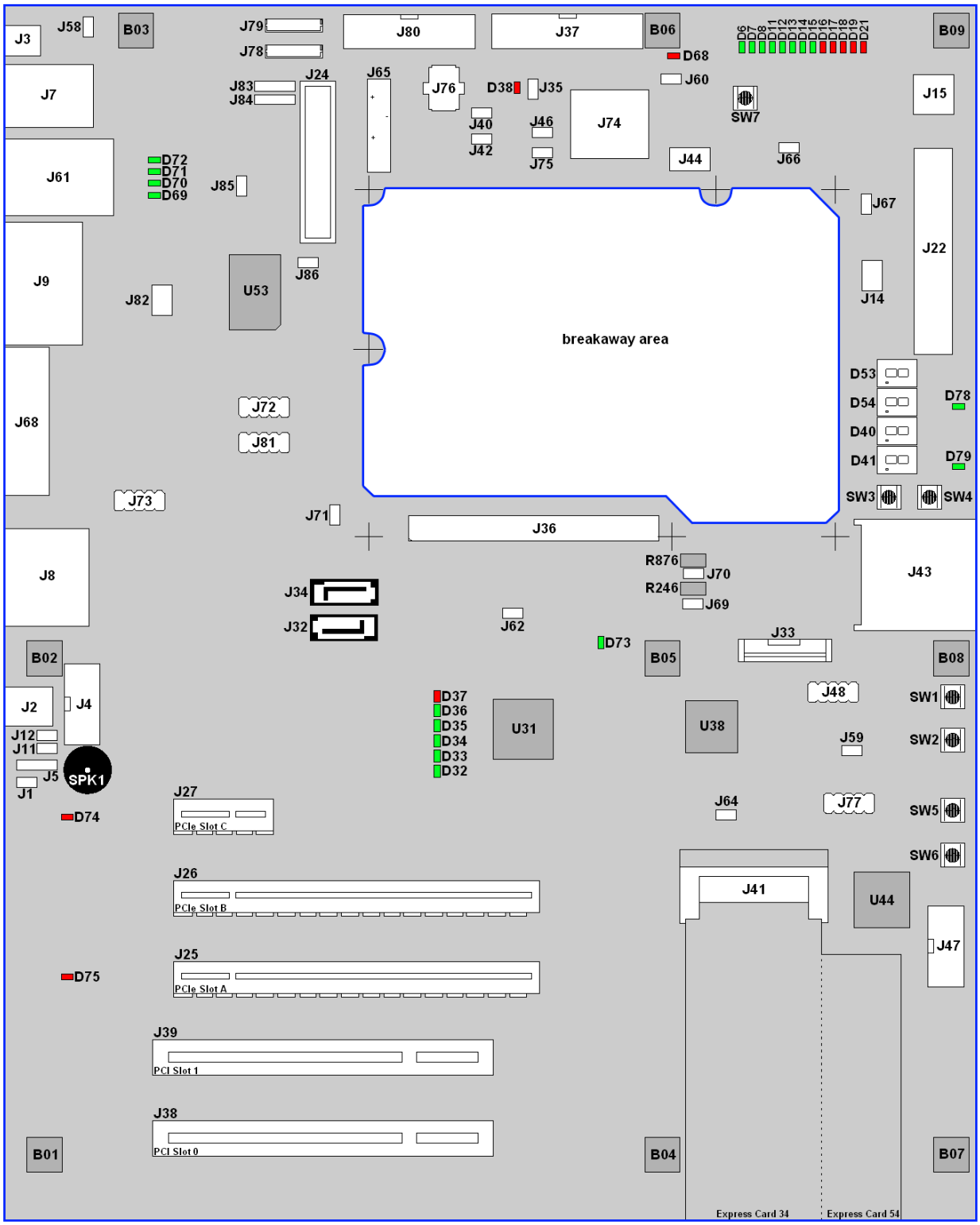
# 4 Connector Layout

## 4.1 Rear Panel



## 4.2 Connector Locations




J3
J58
B03
J79
J78
J80
J37
B06
B09
D6
D7
D8
D11
D12
D13
D14
D15
D16
D17
D18
D19
D21
D68
J7
J83
J84
J24
J65
J76
D38
J35
J60
SW7
J15
J40
J42
J46
J75
J74
J44
J66
J61
D72
D71
D70
D69
J85
J67
J22
J9
J86
U53
J82
J14
breakaway area
D53
D54
D40
D41
D78
D79
J68
J72
J81
SW3
SW4
J73
J71
J36
J43
J8
R876
J70
R246
J69
J34
J32
J62
D73
J33
B02
B05
B08
J2
J4
D37
D36
D35
D34
D33
D32
U31
U38
J48
SW1
J59
SW2
J12
J11
J5
J1
SPK1
J27
PCIe Slot C
D74
J64
J77
SW5
SW6
J26
PCIe Slot B
J41
U44
J47
J25
PCIe Slot A
D75
J39
PCI Slot 1
J38
PCI Slot 0
B01
B04
B07
Express Card 34
Express Card 54

## 4.3 Component overview

| Connector | Short Description |
|---|---|
| B01-B09 | Baseboard mounting holes |
| D6 | Status LED: VCC 3.3V |
| D7 | Status LED: VCC 5V |
| D8 | Status LED: VCC 5V SBY |
| D11 | Status LED: VCC 12V Module |
| D12 | Status LED: VCC 12V |
| D13 | Status LED: VCC 3.3V SBY |
| D14 | Status LED: VCC 1.0V |
| D15 | Status LED: VCC 1.5V |
| D16 | Status LED: SUS_STAT# |
| D17 | Status LED: SUS_S3# |
| D18 | Status LED: SUS_S4# |
| D19 | Status LED: SUS_S5# |
| D21 | Status LED: THRMTRIP |
| D32 | Status LED: PCIe Switch Lane 4 good (PCIe Slot C) |
| D33 | Status LED: PCIe Switch Lane 3 good (PCIe Slot B) |
| D34 | Status LED: PCIe Switch Lane 2 good (Express Card) |
| D35 | Status LED: PCIe Switch Lane 1 good (PCIe2PCI Bridge) |
| D36 | Status LED: PCIe Switch Lane 0 good (Uplink) |
| D37 | Status LED: PCIe Switch Error |
| D38 | Status LED: HDD activity |
| D40/41 | PORT80 POST code display |
| D53/54 | PORT81 POST code display |
| D68 | Status LED: WDT active |
| D69 | Status LED: GBLAN Activity |
| D70 | Status LED: GBLAN Link |
| D71 | Status LED: GBLAN Link 100 |
| D72 | Status LED: GBLAN Link 1000 |
| D73 | Status LED: Type10 detection |
| D74 | Status LED: PCIe Switch disabled (PCIe Slot C inactive) |
| D75 | Status LED:  PCIe Switch enabled (PCIe Slot A inactive) |
| D78 | Status LED: VCC 1.8V |
| D79 | Status LED: VCC 3.3V for Silicon Image SIL1364 |
| J1 | Enable/Disable onboard speaker |
| J2 | Optical S/PDIF out |
| J3 | USB Client connector |
| J4 | Front Panel HDAudio connector |
| J5 | HD Audio GPIO / Digital Microphone |
| J7 | USB #0-3 |
| J8 | 7.1 Analog Audio Jack |
| J9 | SIO COM1/COM2 |
| J11 | S/PDIF input |
| J12 | S/PDIF output |
| J14 | ATX_PS_ON Override |
| J15 | ATX_12V 4pin P4 Power Connector |

| | |
|---|---|
| J22 | ATX 24pin Main Power Connector |
| J24 | LPT |
| J25 | PCIexpress Slot A (x16, electrically x1) |
| J26 | PCIexpress Slot B (x16, electrically x1) |
| J27 | PCIexpress Slot C (x1) |
| J32 | SATA0 |
| J33 | LVDS FFC40 |
| J34 | SATA1 |
| J35 | HDD Activity |
| J36 | COM Express® AB connector for Type1/Type10 Computer-on-Modules |
| J37 | Kontron Feature Connector |
| J38 | PCI Slot0 |
| J39 | PCI Slot 1 |
| J40 | Power Button Front Panel connector |
| J41 | Express Card |
| J42 | ResetButton Front Panel connector |
| J43 | SD-Card socket |
| J44 | PWM FAN1 (SIO or Module) |
| J46 | Enable external BIOS0 from LPC FWH |
| J47 | CPLD JTAG |
| J48 | Module GPIO |
| J58 | Enable/Disable USB Client Power Detect to GPI0 |
| J59 | SDCard/GPIO selection |
| J60 | Enable SIO PWM FAN/Module PWM FAN to FAN1 connector |
| J61 | USB #4 / USB #6 and Ethernet RJ45 |
| J62 | Enable/Disable PLX8505 PCIexpress switch |
| J64 | Disable/Enable Express Card |
| J65 | RTC Battery |
| J66 | Disable/Enable S5EC0 |
| J67 | Enable/Disable 5V Standby to module |
| J68 | DVI-D (SDVO2DVI) |
| J69 | Module 5VSB measurement point |
| J70 | Module VCC measurement point |
| J71 | Enable/Disable CPLD PWR_OK |
| J72 | SIO GPIO |
| J73 | HDAudio Connector for external codecs |
| J74 | LPC FirmwareHub for external BIOS |
| J75 | Enable external BIOS1 from SPI Flash |
| J76 | SPI Flash for external BIOS |
| J77 | CPLD GPIO |
| J78 | RS232 COMA from module (RX/TX only) |
| J79 | RS232 COMB from module (RX/TX only) |
| J80 | Status/Debug pin-header |
| J81 | SIO HWM: FAN |
| J82 | SIO HWM: Voltages |
| J83 | SER0 from module (RX/TX only) |
| J84 | SER1 from module (RX/TX only) |
| J85 | Enable/Disable SIO KBC |
| J86 | Enable/Disable Winbond LPC-I/O |
| J92 | LID |

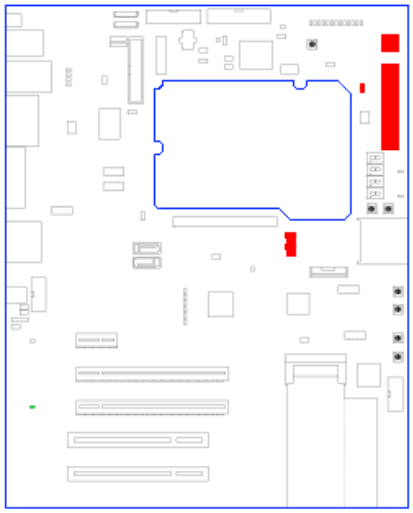
| | |
|---|---|
| SPK1 | Speaker |
| SW1 | Power button |
| SW2 | Reset button |
| SW3 | POST Code back |
| SW4 | POST Code foward |
| SW6 | SLEEP |
| SW7 | Reset WDT Latch |
| U31 | PEX8505 PCIe Switch |
| U38 | PLX8112 PCIe2PCI Bridge |
| U44 | Altera CPLD |
| U53 | Winbond 83627 LPC-I/O |

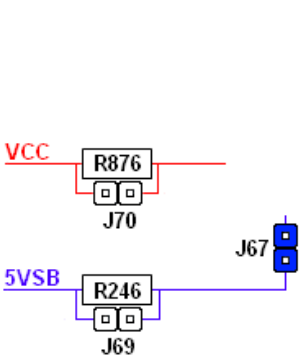
# 5 Connectors and Features

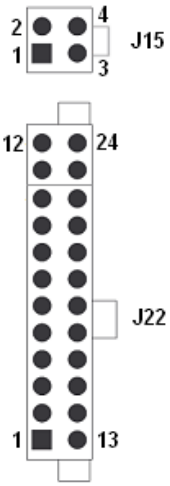
## 5.1 Power supply

### 5.1.1 ATX connector

The COM Express® Eval Type 10 power supply follows the ATX 2.x specification and the baseboard should be supplied by connecting an ATX PSU with 24pin ATX and 4pin ATX_12V supply cable in correct orientation. The 4pin ATX_12V connector mainly supplies power to the module over 0R resistor R876 and allows powering the module directly in specified wide range power input. The module additionally is supplied with 5V standby voltage over 0R resistor R246. Standby voltage can easily be disconnected by opening jumper J67 to drive the module in single supply mode. Use connector J70 and J69 for current measurements.






| Pin | ATX Main Power | Pin | ATX Main Power |
|---|---|---|---|
| 1 (Orange) | +3.3V | 13 (Orange/Brown) | +3.3V / +3.3V sense |
| 2 (Orange) | +3.3V | 14 (Blue) | -12V |
| 3 (Black) | GND | 15 (Black) | GND |
| 4 (Red) | +5V | 16 (Green) | Power on |
| 5 (Black) | GND | 17 (Black) | GND |
| 6 (Red) | +5V | 18 (Black) | GND |
| 7 (Black) | GND | 19 (Black) | GND |
| 8 (Grey) | PWR_OK | 20 | No connection |
| 9 (Purple) | +5VSB | 21 (Red) | +5V |
| 10 (Yellow) | +12V | 22 (Red) | +5V |
| 11 (Yellow) | +12V | 23 (Red) | +5V |
| 12 (Orange) | +3.3V | 24 (Black) | GND |

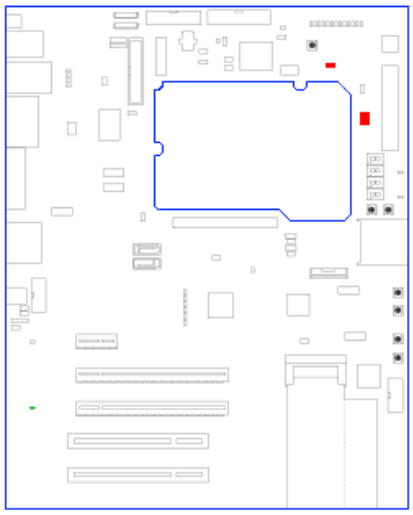
| Pin | ATX_12V | Pin | ATX_12V |
|---|---|---|---|
| 1 (Black) | GND | 3 (Yellow) | Module VCC (12V nominal) |
| 2 (Black) | GND | 4 (Yellow) | Module VCC (12V nominal) |

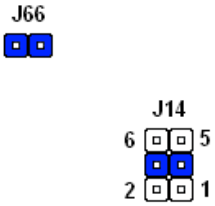
### 5.1.2 PS_ON override & S5 Eco

With PS_ON override jumper J14 it is possible to switch off the ATX power supply manually. Jumper J66 should be opened to test module S5Eco or single supply mode.

In S5Eco mode all baseboard components (including status LED) are disconnected from standby voltages in S5 state. 5VSB supply to the module can be disconnected separately with jumper J67.

Note: If S5Eco mode is enabled only power button SW1 is supported to power-on the system.

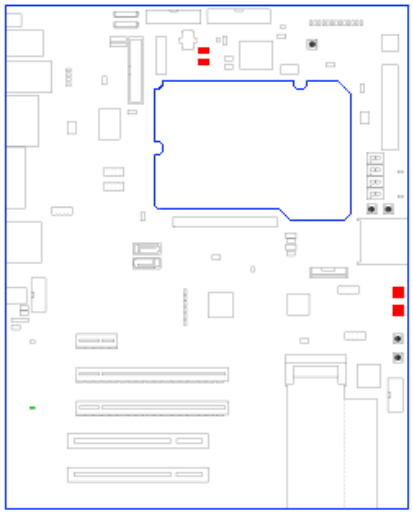


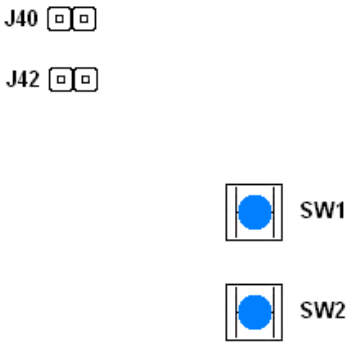



| J14 Jumper position | Function |
|---|---|
| 1-2 | Power Supply OFF |
| 3-4 (default) | Power Supply controlled by PS_ON signal |
| 5-6 | Power Supply always ON |

### 5.1.3 Reset and Power button

The COM Express® Eval Type 10 provides an onboard Reset Button (SW1) and Power Button (SW2). To connect a front panel button from your chassis use J40 (Power) or J42 (Reset).

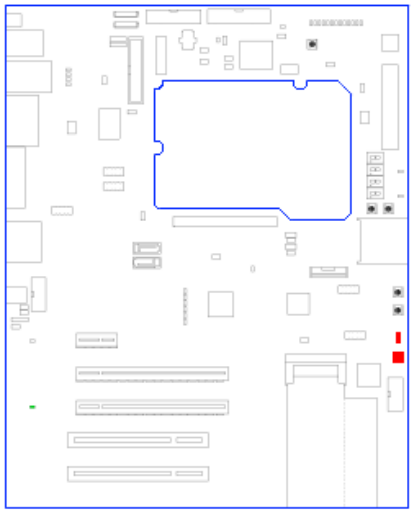


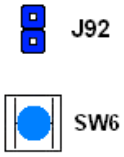



| Connector | Function |
|---|---|
| J40 | Power Button |
| SW1 | |
| J42 | Reset Button |
| SW2 | |

### 5.1.4 LID and Sleep

The specification update for PICMG COM.0 modules to revision 2.0 implements new signals for LID and Sleep. The low active signals can be simulated by switch 5 and 6 similar to notebook functionality of closing the lid or pressing the sleep button.

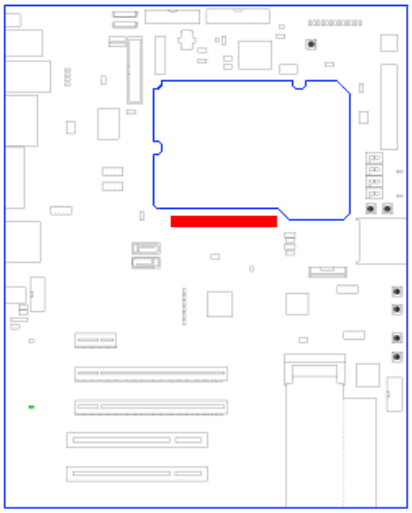





| Connector | Function |
|---|---|
| J92 | LID |
| SW6 | Sleep |

## 5.2 COM Express® connector

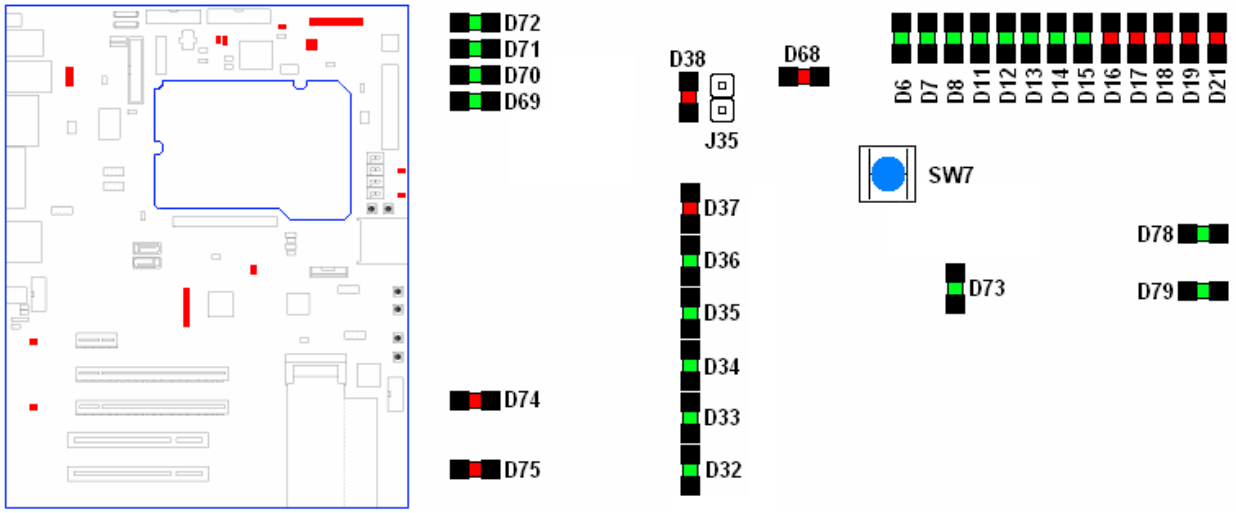
The COM Express® Eval Type 10 is an evaluation backplane for Type 1 or Type 10 based Computer-on-Modules. Both types are module pin-outs based on one connectors with 2 rows (Row A and B) with 220 pins overall. Please refer to your module documentation for detailed pin-out descriptions.




Note: The Type 1 or Type 10 pin-out is compatible to Type 2. It's possible to drive Computer-on-Modules based on pin-out Type 2 on this evaluation baseboard without functionality of second COM Express® connector CD (PEG, IDE, PCI).

## 5.3 Status LED

The onboard main status and voltage LED D6-D21 indicates the current power state of the module and if all voltages are working correctly. Some additional status LED shows active or inactive slots and signals. See table below for detailed information.

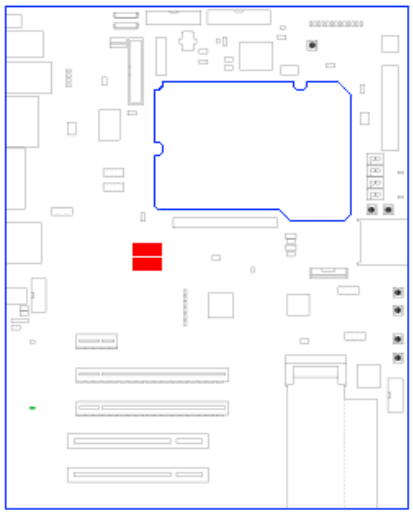


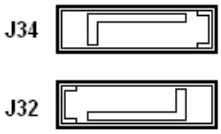

A front panel HDD LED can be connected HDD Activity connector J35. D68 indicates an active watchdog trigger WDT. The output is buffered and the switch SW7 resets the Latch.

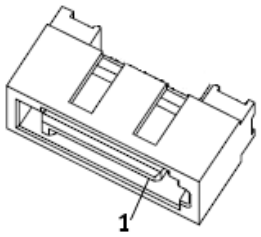
| LED | Description | LED | Description |
|---|---|---|---|
| D6 | VCC 3.3V | D34 | PLX PCIe Switch Lane 2 good (Express Card) |
| D7 | VCC 5V | D35 | PLX PCIe Switch Lane 1 good (PCIe2PCI Bridge) |
| D8 | VCC 5V SBY | D36 | PLX PCIe Switch Lane 0 good (Uplink) |
| D11 | VCC 12V Module | D37 | PLX PCIe Switch Error |
| D12 | VCC 12V | D38 | HDD activity |
| D13 | VCC 3.3V SBY | D68 | latched WDT |
| D14 | VCC 1.0V | D69 | GBLAN Activity |
| D15 | VCC 1.5V | D70 | GBLAN Link 10 |
| D16 | SUS_STAT# | D71 | GBLAN Link 100 |
| D17 | SUS_S3# | D72 | GBLAN Link 1000 |
| D18 | SUS_S4# | D73 | Type10 detection |
| D19 | SUS_S5# | D74 | PLX PCIe Switch disabled (PCIe Slot C inactive) |
| D21 | THRMTRIP | D75 | PLX PCIe Switch enabled (PCIe Slot A inactive) |
| D32 | PLX PCIe Switch Lane 4 good (PCIe Slot C) | D78 | VCC 1.8V |
| D33 | PLX PCIe Switch Lane 3 good (PCIe Slot B) | D79 | VCC 3.3V for Silicon Image SIL1364 |

## 5.4 Serial ATA

The COM Express® Type 10 pin-out specification according to COM.0 specification revision 2.0 defines 2 SATA ports. The COM Express® Eval Type 10 provides two 7-pin SATA data connectors as standard 1.27mm Pitch Serial ATA High Speed Header with Locking Latch.





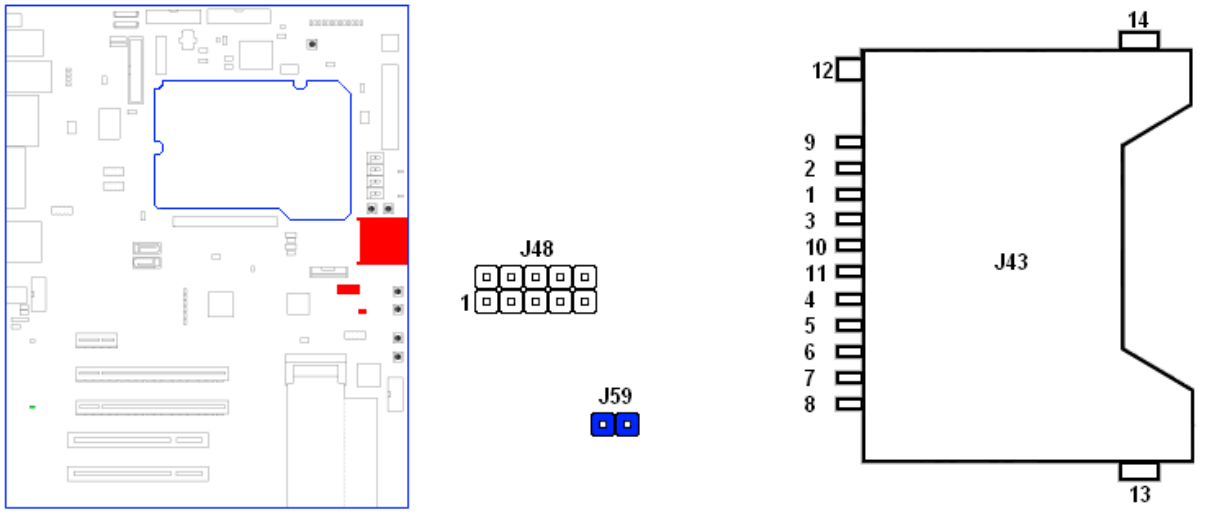

| SATA Pin | Signal |
|---|---|
| 1 | Ground |
| 2 | Transmit + |
| 3 | Transmit - |
| 4 | Ground |
| 5 | Receive - |
| 6 | Receive + |
| 7 | Ground |

| Connector | SATA Port |
|---|---|
| J32 | SATA #0 |
| J34 | SATA #1 |

## 5.5 SD-Card / Module GPIO

The SD-Card standard is a standard for removable memory storages designed and licensed by the SD Card Association (http://sdcard.org). The card form factor, electrical interface and protocol are all part of the SD Card specification. COM Express® Type 1 and Type 10 pin-out based modules may provide a SDIO interface shared with GPIO signals. Therefore on COM Express® Eval Type 10 a SD-Card connector is available. Please check the documentation of your module if SDIO is supported and how to enable.

Close configuration jumper J59 (default) to enable SD-Card Slot J43 or open J59 to enable GPIO pin-header J48.




| SD-Card J43 PIN | Description | SD-Card J43 PIN | Description |
|---|---|---|---|
| 1 | DAT3/CD - Data Line 3/Card Detection | 8 | DAT1 - Data Line 1 |
| 2 | CMD - Command/Response | 9 | DAT2 - Data Line 2 |
| 3 | VSS 1 - Supply Voltage - GND | 10 | Card Detect |
| 4 | VDD - Supply Voltage - 3.3V | 11 | Write Protect |
| 5 | CLK - Clock | 12 | COM (GND) |
| 6 | VSS2 - Supply Voltage - GND | 13 | Shield Ground 0 |
| 7 | DAT0 - Data Line 0 | 14 | Shield Ground 1 |

| GPIO J48 PIN | Description | GPIO J48 Pin | Description |
|---|---|---|---|
| 1 | VCC 3.3V | 2 | GPO0 / SD_CLK |
| 3 | GPI0 / SD_DATA0 | 4 | GPO1 / SD_CMD |
| 5 | GPI1 / SD_DATA1 | 6 | GPO2 / SD_WP |
| 7 | GPI2 / SD_DATA2 | 8 | GPO3 / SD_CD# |
| 9 | GPI3 / SD_DATA3 | 10 | GND |

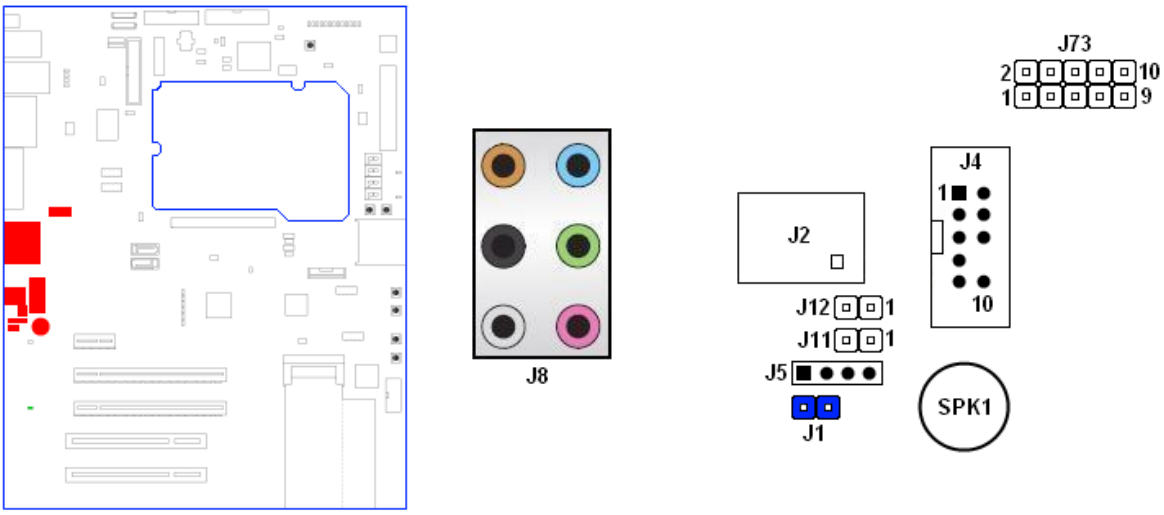
Note1: A SD-Card is detected if Card Detect is at low level. The write protection is active (read only) if SD_WP is at high level.

Note2: The switching circuitry which selects GPIO or SDIO interface may influence the signal quality of SDIO which results in detection or boot issues with some fast SD/SDHC cards. Therefore it's recommended to reduce SDIO interface speed to 24MHz in module's BIOS if supported

## 5.6 High Definition Audio

The COM Express® Eval Type 10 provides HDAudio via Realtek ALC888/ALC886 High Definition Audio Codec supporting analog, optical and digital audio connections.

The onboard buzzer SPK1 can be disabled by opening jumper J1 (default closed). Optical S/PDIF for Toslink connection is available on rear panel connector J2.




### Audio Connector J8 - Speaker Configuration

The Audio Connector J8 on COM Express® Eval Type 10 is a full featured analog audio jack for speaker configuration up to 8-channel.

| J8 | 2-channel | 4-channel | 6-channel | 8-channel |
|---|---|---|---|---|
| Orange | - | - | Center/Subwoofer | Center/Subwoofer |
| Black | - | Rear Speaker | Side Speaker | Rear Speaker Out |
| Gray | - | - | - | Side Speaker Out |
| Blue | Line In | Line In | Line In | Line In |
| Green | Line Out | Front Speaker | Front Speaker | Front Speaker |
| Pink | Mic In | Mic In | Mic In | Mic In |

Note1: In addition to the default speaker settings, the analog audio Jacks can be reconfigured to perform different functions via the Realtek HDAudio Driver Software which is available on Kontron website. Only microphones still must be connected to the default pink jack.

Note2: Audio is only supported with HD Audio compatible COM Express® Modules.

## Front Panel Audio Connector J4

The front panel audio connector J4 allows connecting a chassis front panel audio with analog microphone input and stereo speaker output.

| Pin | Description |
|---|---|
| 1 | MIC2-L |
| 2 | GND |
| 3 | MIC2-R (MIC Power) |
| 4 | PRESENCE# |
| 5 | LINE2-R (LineOut-R) |
| 6 | MIC2-JD |
| 7 | SENSE |
| 8 | Key Pin |
| 9 | Line2-L (LineOut-L) |
| 10 | LINE2-JD |

## Digital Audio Connectors J5/J11/J12

Digital audio inputs and outputs are available on connector J11 (S/PDIF input), J12 (S/PDIF output) and microphone connection on J5.

| Pin | J5 (HDA GPIO / Dig. MIC) | J11 (S/PDIF in) | J12 (S/PDIF out) |
|---|---|---|---|
| 1 | HDA_GPIO0 / DMIC-CLK | SPDIF_II | SPDIF_OUT |
| 2 | HDA_GPIO1 / DMIC-DATA | GND | GND |
| 3 | PWR_3.3V | - | - |
| 4 | GND | - | - |

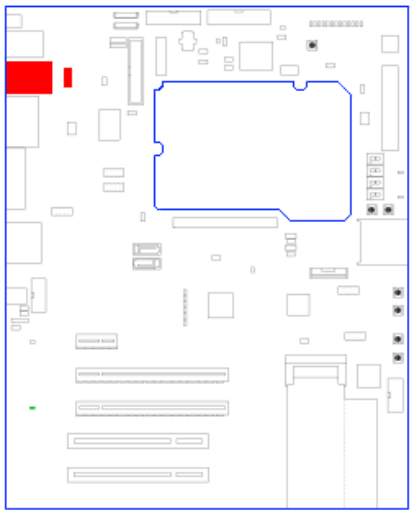
## Codec connector J73

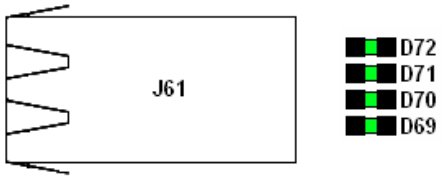
Connector J73 allows access to HD Audio interface to connect external HDAudio codec additional to the onboard Realtek ALC888/ALC886.

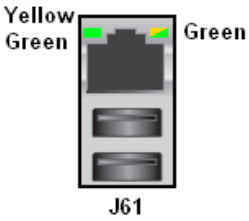
| Pin | Description | Pin | Description |
|---|---|---|---|
| 1 | HDA_BITCLK | 2 | GND |
| 3 | GND | 4 | HDA_SDIN1 |
| 5 | HDA_SDIN0_R (default n.c.) | 6 | HDA_SDIN2 |
| 7 | GND | 8 | HDA_SYNC |
| 9 | HDA_SDOUT | 10 | HDA_RST# |

## 5.7 Ethernet

The COM Express® Eval Type 10 provides a RJ45/Dual USB Combo with a single RJ45 in combination with 2 USB ports (USB 4/6). Ethernet Connector J61 with integrated magnetics and LED is configured to support modules with Gigabit Ethernet controller only. Modules with 10/100 MBit Ethernet controller are not supported.





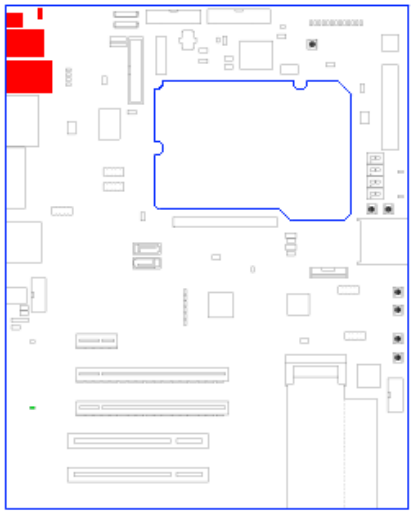

### J61 LED function

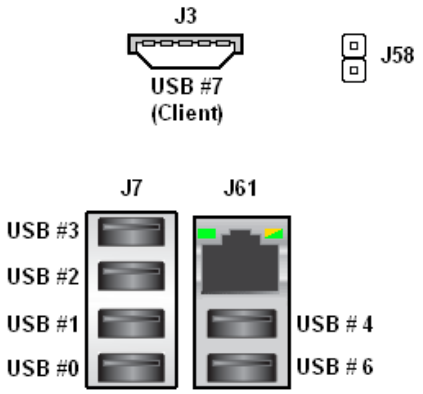
| Function | J61 Left LED | J61 Right LED | Status LED |
|---|---|---|---|
| Activity | Green | - | D69 |
| Link10 | - | Off | D70 |
| Link100 | - | Yellow | D71 |
| Link1000 | - | Green | D72 |

## 5.8 USB

The COM Express® module's USB ports 0 to 3 are available on rear panel connector J7. USB port 5 is used on Express Card connector. The COM Express® Eval Type 10 provides USB port 4 and 6 on RJ45/USB Combo connector J61.

Additionally USB7 is available on USB mini-A connector J3 as non-powered connector for USB client functionality. Check the documentation of your module if USB client on Port #7 is supported and J3 can be used. J58 allows connecting USB Client Power to GPI0 to use it as detection input for custom USB Client driver software.



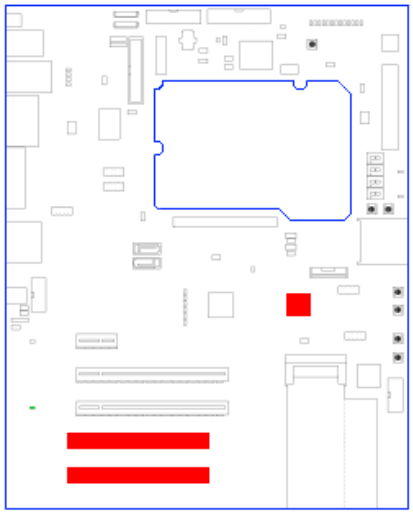


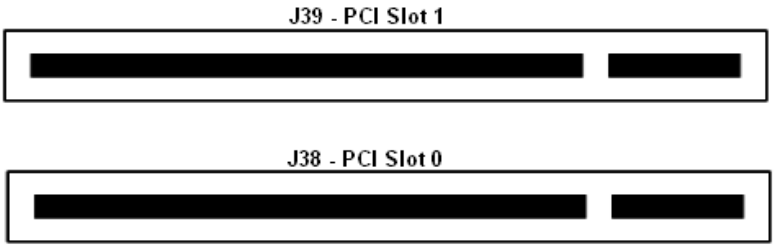

| USB Client connectorJ3 - Pin | J3 Function |
|---|---|
| 1 | USB Client Power detect |
| 2 | USB7- |
| 3 | USB7+ |
| 4 | n.c. |
| 5 | GND |
| 6-9 | Shield GND |

## 5.9 PCI

The mini size COM Express® form factor for Type 1 and Type 10 pin-out based modules does not specify an interface for PCI. Therefore on COM Express® Eval Type 10 a PLX8112 PCIexpress to PCI switch (U38) is used to provide two PCI Slots following the PCI 2.x specification.

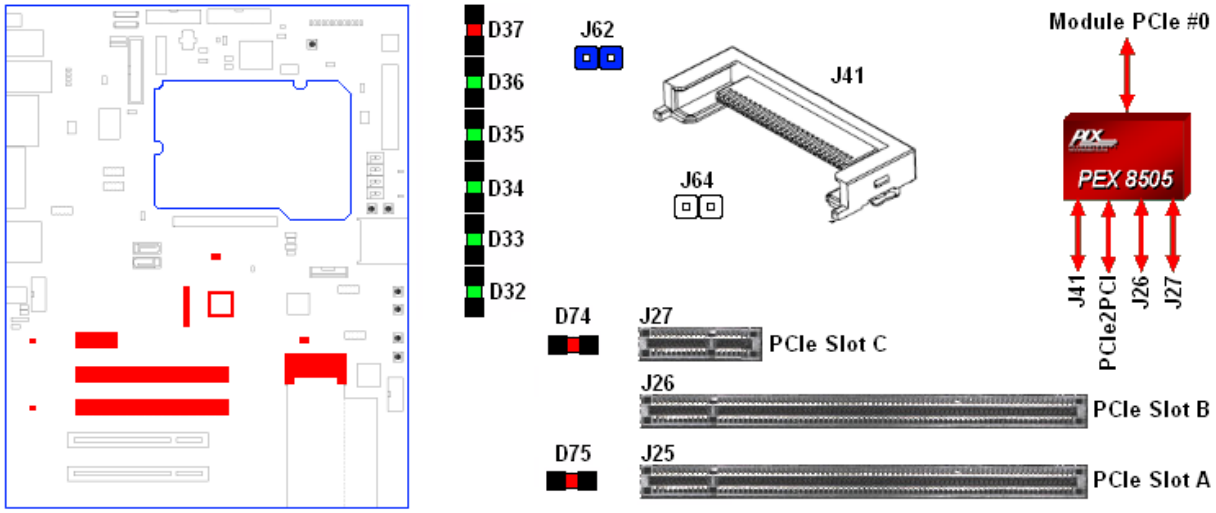
Both PCI slots are enabled when the PCIexpress switch is active. If the PCIe switch is disabled a module with at least 3 PCIexpress lanes is required to enable J38/J39.





## 5.10 PCIexpress and Express Card

The COM Express® Eval Type 10 provides one PCIexpress x1 port, two PCIexpress x16 ports (electrically x1) and one Express Card Slot in different configuration. To allow usage of multiple PCIexpress connectors and PCI the PEX8505 PCIexpress switch (U31) is connected to module's PCIexpress Lane #0.




### PCIe switch enabled

If PEX8505 PCIe switch is enabled (J62 closed, default) the following routing is active

| Computer-on-Module | PCIe switch PEX8505 | Connector |
|---|---|---|
| PCIe Lane #0 | PCIe Lane #0: Uplink | - |
| - | PCIe Lane #1 | Express Card J41 |
| - | PCIe Lane #2 | PCIe2PCI Bridge |
| - | PCIe Lane #3 | PCIe Slot B J26 |
| - | PCIe Lane #4 | PCIe Slot C J27 |

The PCIexpress Slot A (J25) is disabled in this configuration and marked by red LED D75.

| Note: | Module PCI Express lanes #1 -#3 are not connected if PCIe switch is enabled |
|---|---|

### PCIe switch disabled

If PEX8505 PCIe switch is disabled (J62 open) the following routing is active

| Computer-on-Module | Connector |
|---|---|
| PCIe Lane #0 | PCIe Slot A J25 |
| PCIe Lane #1 | Express Card J41 |
| PCIe Lane #2 | PCIe2PCI Bridge |
| PCIe Lane #3 | PCIe Slot B J26 |

The PCIexpress Slot C (J27) is disabled in this configuration and marked by red LED D74.

## PCIexpress status LED

The PCIexpress status LED D32-D37 shows active devices on available PCIexpress ports and if the PCIe switch is working correctly

| LED | Description |
|---|---|
| D32 | PCIe Switch Lane 4 good (PCIe Slot C) |
| D33 | PCIe Switch Lane 3 good (PCIe Slot B) |
| D34 | PCIe Switch Lane 2 good (Express Card) |
| D35 | PCIe Switch Lane 1 good (PCIe2PCI Bridge) |
| D36 | PCIe Switch Lane 0 good (Uplink) |
| D37 | PCIe Switch Error |
| D74 | PCIe Switch disabled (PCIe Slot C inactive) |
| D75 | PCIe Switch enabled (PCIe Slot A inactive) |

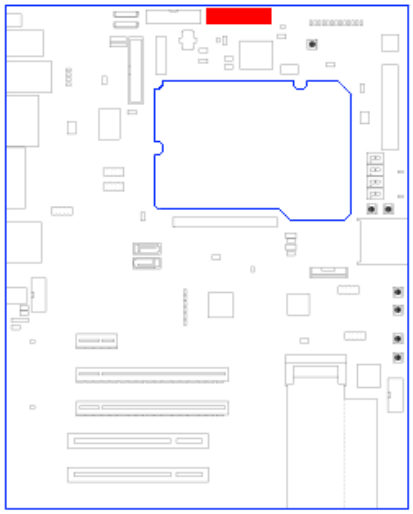
## Express Card

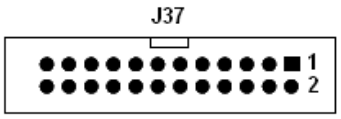
The Express Card Slot J41 in combination with USB #5 allows 1.3A on 3.3V, 275mA on AuxPower and 650mA on 1.5V continuous Card Power with pin-out in table below. Close configuration jumper J64 to disable the Express Card slot

| Pin | J41 Signal | Pin | J41 Signal |
|---|---|---|---|
| 1 | GND | 14 | 3.3VS_1 |
| 2 | USB_D- | 15 | 3.3VS_0 |
| 3 | USB_D+ | 16 | CLKREQ# |
| 4 | CPUSB# | 17 | CPPE# |
| 5 | NC | 18 | REFCLK- |
| 6 | NC | 19 | REFCLK+ |
| 7 | SMB_CLK | 20 | GND |
| 8 | SMB_DATA | 21 | PERN0 |
| 9 | 1.5V_2 | 22 | PERP0 |
| 10 | 1.5V_1 | 23 | GND_1 |

## 5.11 Kontron Feature connector

The Kontron Feature connector provides additional interfaces such as I2C, SMBus or Power Control Signals. See the table below for detailed pin-out description



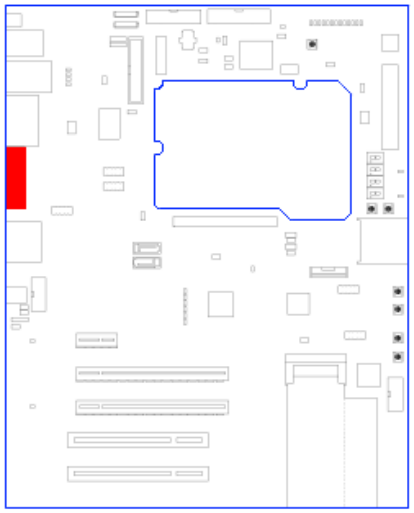


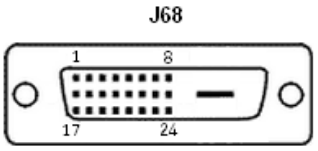

| Pin | Signal | Level | Signal Description |
|---|---|---|---|
| 1 | PWR_+5V | 5V power | +5V UL-protected with inductor (600R@100MHz, 1A) |
| 2 | GPO2 | 3.3V-O | General-purpose power management event output |
| 3 | #BATLOW | 3.3V-I | Battery low input. May be driven low by external circuitry to signal that the system battery is low, or may be used to signal some other external power management event. |
| 4 | GPI2 | 3.3V-I | General-purpose power management event input |
| 5 | #SYS_RESET | 3.3V-I | This input may be driven low by external circuitry in order to reset the power management logic |
| 6 | WDT | 3.3V-O | Indicating that a Watchdog Timeout Event has occurred (non buffered module output) |
| 7 | LPC_SERIRQ | 3.3V-I | Serial interrupt request. This pin is used to support the serial interrupt protocol. |
| 8 | - | - | Not connected |
| 9 | I2C_DAT | 3.3V-IO | Data line of I2C-Bus |
| 10 | #SMB_ALERT | 3.3V-I | System Management Bus Alert input. May be driven low by SMB devices in order to signal an event on the SM Bus |
| 11 | I2C_CLK | 3.3V-O | Clock line of I2C-Bus |
| 12 | SMB_DAT | 3.3V-IO | Clock and data line of SM-Bus. |
| 13 | SMB_CLK | 3.3V-O | |
| 14 | - | - | Not connected |
| 15 | #WAKE1 | 3.3V-I | Low driven general purpose wake-up signal |
| 16 | VCC_RTC | 3V-I | 3V backup cell input. Should be connected to a 3V backup cell for RTC operation and storage register non-volatility in the absence of system power. (VBATT = 2.4 – 3.3V) |
| 17 | #THRM | 3.3V-I | Input from off-module temperature sensor indicating an over temperature situation |
| 18 | GND | GND | Ground |
| 19 | PWR_OK | 3.3V-I | High active input indicating that power from the power supply is ready. It can also be used as low active reset input signal. |
| 20 | GND | GND | Ground |
| 21 | #PWRBTN | 3.3V-I | Power Button Input. This input is used to support the ACPI Power Button function. |

| | | | |
|---|---|---|---|
| 22 | GND | GND | Ground |
| 23 | #ATA_ACT | 3.3V-O | Low active output signal, which indicates activity on IDE interfaces. |
| 24 | #CB_RESET | 3.3V-O | Low active Reset output from module to carrier board |

## 5.12 DVI-D

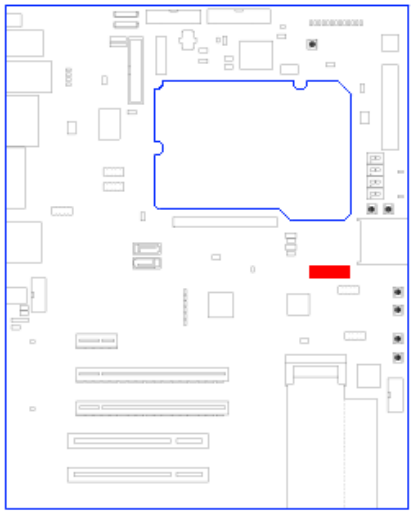
On COM Express® Eval Type 10 the DVI output is available through a Silicon Image SiL1364/A SDVO to single link DVI PanelLink Transmitter. Check your module documentation if SDVO is available on DDI interface defined for Type 10 pin-out based modules.

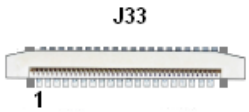




## 5.13 LVDS

The 40-pin JILI LVDS panel connector J33 allows connecting a flat panel directly to the module's dual channel LVDS output. Check your module documentation for available BIOS configurations for this flat panel output.



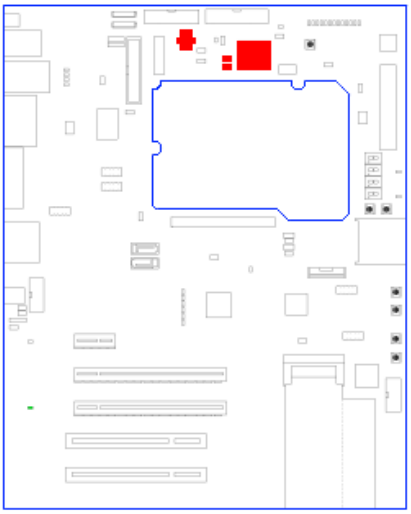


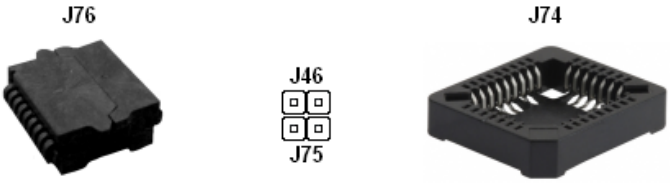

| Pin | LVDS Signal | Pin | LVDS Signal |
|---|---|---|---|
| 1 | NC | 21 | LCDDO13 |
| 2 | LCDDO0 | 22 | DETECT# (GND) |
| 3 | LCDDO1 | 23 | LCDDO14 |
| 4 | ENAVDD | 24 | LCDDO15 |
| 5 | LCDDO2 | 25 | GND |
| 6 | LCDDO3 | 26 | LCDDO16 |
| 7 | NC | 27 | LCDDO17 |
| 8 | LCDDO4 | 28 | GND |
| 9 | LCDDO5 | 29 | LCDDO18 |
| 10 | GND | 30 | LCDDO19 |
| 11 | LCDDO6 | 31 | +5V |
| 12 | LCDDO7 | 32 | +5V |
| 13 | GND | 33 | +5V |
| 14 | LCDDO8 | 34 | +5V |
| 15 | LCDDO9 | 35 | BLON# |
| 16 | JILI_DAT | 36 | GND |
| 17 | LCDDO10 | 37 | GND |
| 18 | LCDDO11 | 38 | +12V |
| 19 | JILI_CLK | 39 | +12V |
| 20 | LCDDO12 | 40 | +12V |

## 5.14 External BIOS

The COM Express® Eval Type 10 supports external boot. By closing Jumper J46 the module's onboard BIOS is disabled and the system will boot from an external Firmware Hub in U43 PLCC socket J74.

For modules supporting SPI boot the COM Express® Eval Type 10 provides a SPI socket J76 for an optional available SPI Flash. SPI is part of COM.0 Specification Rev 2.0 and external SPI boot can be enabled by closing Jumper J75. Please check the documentation of your module if SPI is supported and which SPI Flash size is required.






### Booting from external BIOS:

» Close Jumper J46 to boot from the baseboard's LPC Firmware

» Close Jumper J75 to boot from the baseboard's SPI Flash

### Flashing the external BIOS:

» Prepare a bootable USB flash drive and save BIOS and flash utility in the root folder

Please check Application Note KEMAP046 avialble at Kontron's customer section for more details

» Open J46/J75 to boot from the module's BIOS

» Power on the system and boot from our USB flash drive

» Close J46 to enable the LPC FWH or close J75 to enable the SPI Flash

» Execute the BIOS update command (e.g. afudos.exe bios.rom /P /B /N /C /X)

» Reboot your system if flash procedure has finished

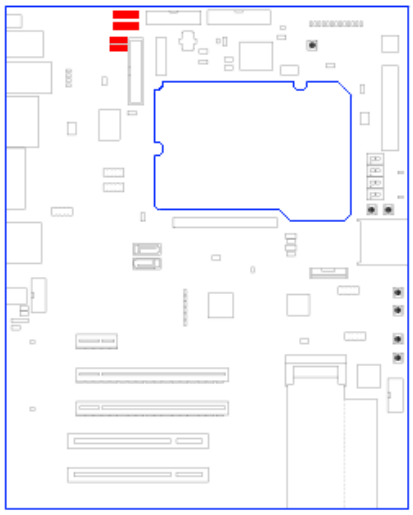
» Your system should now start from external BIOS

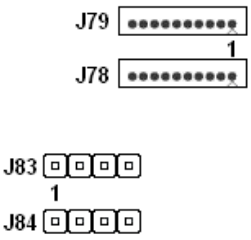
Note: Please check module documentation if external boot from LPC FWH and/or SPI Flash is supported

Warning: Do not close both jumpers at the same time

## 5.15 Serial Interface

The PICMG COM.0 specification revision 2.0 defines two optional 2-pin serial interfaces on COM Express® connector pins A98/A99 and A101/A102 formerly used for 12V VCC input. Both new interfaces are available directly on optional pin-header J83 and J84.



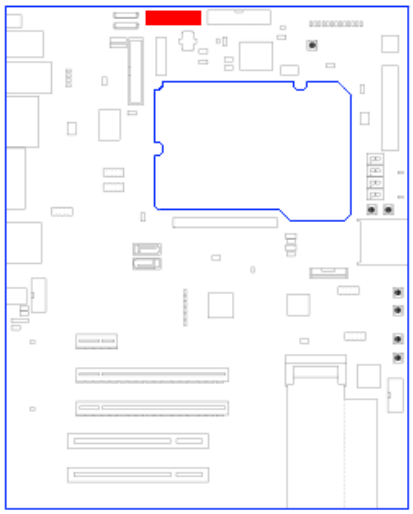


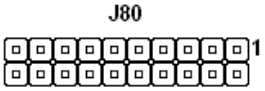

J78 and J79 allow both interfaces to be used as 2-pin RS232 interfaces COMA and COMB with Kontron Adapter cable KAB-DSUB9-3. Please check the documentation of your module if this interface is supported and how to configure.

| Pin | J78 (COMA) | J79 (COMB) | J83 (SER0, A98/99) | J84 (SER1, A101/102) |
|---|---|---|---|---|
| 1 | n.c. | n.c. | +5V | +5V |
| 2 | n.c. | n.c. | SER0_TX | SER1_TX |
| 3 | RX0 | RX1 | SER0_RX | SER1_RX |
| 4 | n.c. | n.c. | GND | GND |
| 5 | TX0 | TX1 | - | - |
| 6 | n.c. | n.c. | - | - |
| 7 | n.c. | n.c. | - | - |
| 8 | n.c. | n.c. | - | - |
| 9 | GND | GND | - | - |
| 10 | +5V | +5V | - | - |

## 5.16 Status & Debug Connector

For debugging and measurements some important status signals are available on pin-header J80 for direct access.

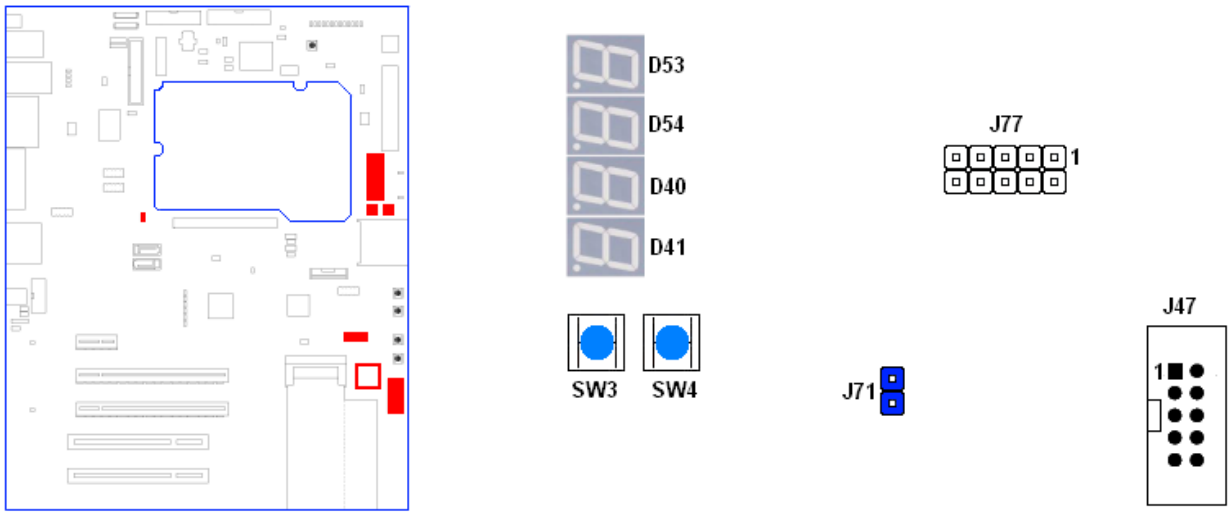





| Pin | Description | Pin | Description |
|---|---|---|---|
| 1 | +3.3V SBY | 2 | GND |
| 3 | TPM_PP | 4 | SUS_STAT# |
| 5 | WDT_LATCHED | 6 | SUS_S3# |
| 7 | RST_WDT_L# | 8 | SUS_S4# |
| 9 | SPKR | 10 | SUS_S5# |
| 11 | EXCD0_CPPE# | 12 | GBE0_ACT# |
| 13 | EXCD0_PERST# | 14 | GBE0_LINK100# |
| 15 | EXCD1_CPPE# | 16 | GBE0_LINK1000# |
| 17 | EXCD1_PERST# | 18 | GBE0_LINK# |
| 19 | +3.3V | 20 | GND |

## 5.17 CPLD & POST-Code Display

Power Management control, 4 digits LPC/PCI Port 80/81 Post Code and additional GPIOs are implemented in onboard Altera CPLD (U44).




### Port 80/81 POST Code display

The 7-segment display D53/D54 for Port 81 and D40/41 for Port 80 shows BIOS status codes during boot-up process. Last 8 check codes are stored automatically and can be controlled by switch SW3 (Post Code step backward) and switch SW4 (Post code step forward). Pressing SW3 and SW4 simultaneously returns to newest POST code.

The POST Code display also shows current Suspend state:

- S3 -> POST code "_ _ _ 3"
- S4 -> POST code "_ _ _ 4"
- S5 -> POST code "_ _ _ 5"

### Power Good J71

The Power Good output generated by the CPLD must be high level to allow the module to start. Some modules may provide direct power-on support if VCC gets connected and PWR_OK (COM Exress pin B24) is open or at high level. To test this functionality configuration jumper J71 can be opened to disconnect Power Good.

## J77 - CPLD I/O Port

The I/O Port J77 provides 8 I/O ports directly from the CPLD without any functionality in default configuration.

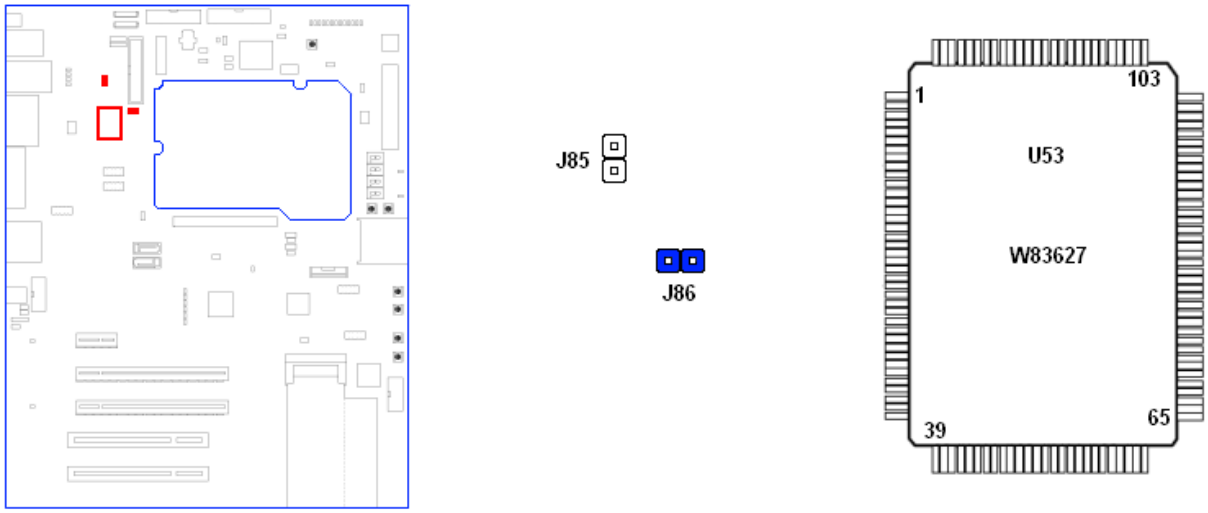
| J7 pin | Function | J7 pin | Function |
|---|---|---|---|
| 1 | VCC 3.3V SBY | 2 | GND |
| 3 | CPLD_IO_PIN64 | 4 | CPLD_IO_PIN66 |
| 5 | CPLD_IO_PIN67 | 6 | CPLD_IO_PIN68 |
| 7 | CPLD_IO_PIN69 | 8 | CPLD_IO_PIN70 |
| 9 | CPLD_IO_PIN71 | 10 | CPLD_IO_PIN72 |

## J47 - CPLD JTAG Connector

| J7 pin | Function | J7 pin | Function |
|---|---|---|---|
| 1 | TCK (PD 1K0) | 2 | GND |
| 3 | TDO (PU 1K0 3.3VSBY) | 4 | 3.3V SBY |
| 5 | TMS (PU 1K0 3.3VSBY) | 6 | n.c. |
| 7 | n.c. | 8 | n.c. |
| 9 | TDI (PU 1K0 3.3VSBY) | 10 | GND |

## 5.18 Winbond 83627 Super-I/O

A Winbond 83627HFJ Super-I/O controller (U53) is connected to module's LPC bus to offer legacy interfaces like RS232 and parallel ports additionally to temperature, FAN and voltage monitoring features. The default SIO LPC address is 2Eh.

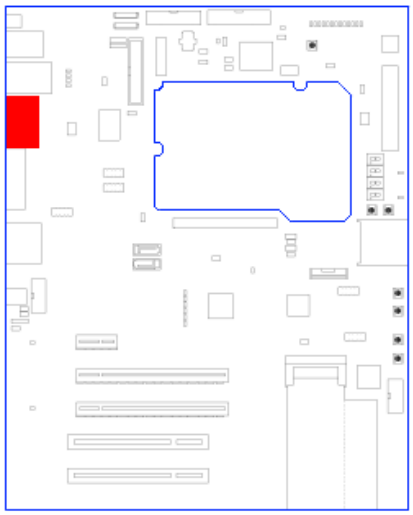


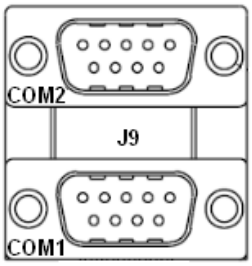

The configuration jumpers J85 enables the SIO keyboard controller when closed. Open J86 to hold the Super-I/O in reset to simulate a legacy free backplane.

| Note: | A LPC Super-I/O controller requires BIOS support. Please check the documentation of your module if the Winbond 83627 is supported. |
|---|---|

### 5.18.1 RS232

With Winbond 83627 LPC-I/O two serial ports are supported. Both COM ports can be configured in module BIOS setup if Super-I/O support is implemented.

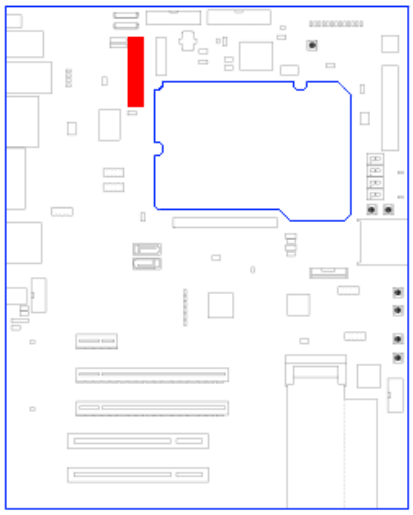


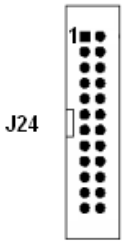



| Pin | Signal |
|---|---|
| 1 | DCD |
| 2 | RX |
| 3 | TX |
| 4 | DTR |
| 5 | GND |
| 6 | DSR |
| 7 | RTS |
| 8 | CTS |
| 9 | RI |

### 5.18.2 LPT

The Winbond 83627 LPC-I/O supports one parallel port available on baseboard's pin header J24. Use the optional available KAB-DSUB25-1 cable adapter to access the LPT port and check to module BIOS to configure the port resources.

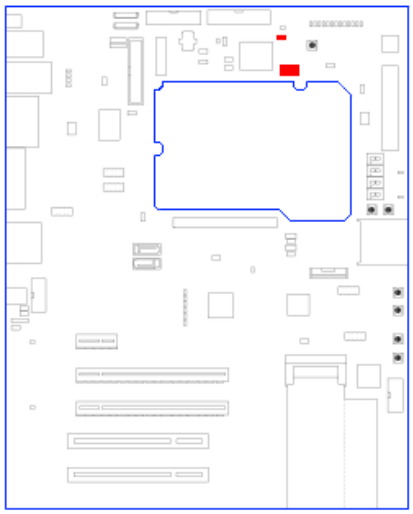


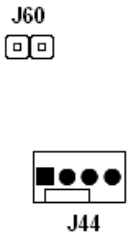



| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 1 | #STB | 2 | #AFD |
| 3 | PD0 | 4 | #ERROR |
| 5 | PD1 | 6 | #INIT |
| 7 | PD2 | 8 | #SLCTIN |
| 9 | PD3 | 10 | GND |
| 11 | PD4 | 12 | GND |
| 13 | PD5 | 14 | GND |
| 15 | PD6 | 16 | GND |
| 17 | PD7 | 18 | GND |
| 19 | #ACK | 20 | GND |
| 21 | BUSY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

### 5.18.3 FAN

The COM Express® Eval Type 10 provides one 4-pin PWM FAN connector directly controlled by the LPC-I/O PWM output 1. If configuration jumper J60 is open (default) the PWM FAN J44 is controlled by the module FAN output specified in COM.0 revision 2.0 specification if supported by the module.

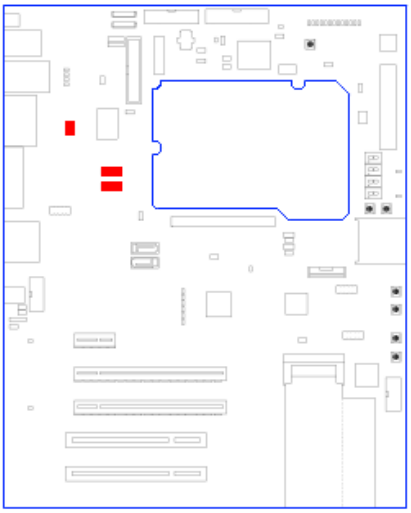


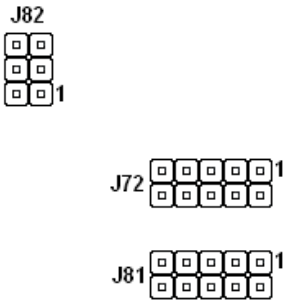



| Pin | J50 on COM Express® Eval Type 10 |
|---|---|
| 1 | GND |
| 2 | +12V |
| 3 | Sense |
| 4 | Control (PWM) |

### 5.18.4 SIO Debug connectors

For debugging Winbond 83627 LPC-I/O GPIOs and FAN/Voltage interfaces are available via pin-header.






| Pin | J72 - GPIO | J81 - FAN | J82 - Voltage |
|---|---|---|---|
| 1 | +5V | +3.3V | SIO HWM IN - VCOREA |
| 2 | GND | GND | SIO HWM IN - 12V |
| 3 | SIO GP10 / JOAYABTN0 | Module FAN_PWMOUT# | SIO HWM IN - VCOREB |
| 4 | SIO GP11 / JOYBBTN0 | Module FAN_TACHIN | SIO HWM IN - -5V |
| 5 | SIO GP12 / JOYAX | SIO HWM OUT - FANPWM1 | SIO HWM IN - 3.3V |
| 6 | SIO GP13 / JOYBX | SIO HWM IN - FANIO1 | GND |
| 7 | SIO GP14 / JOYBY | SIO HWM OUT - FANPWM2 | - |
| 8 | SIO GP15 / JOYAY | SIO HWM IN - FANIO2 | - |
| 9 | SIO GP16 / JOYBBTN1<br>SIO GP20 / MDRX | SIO HWM OUT - FANPWM3 | - |
| 10 | SIO GP17 / JOYABTN1<br>SIO IRQIN / MDTX0 | SIO HWM IN - FANIO3 | - |

Note: Check the module's BIOS how to enable the baseboard hardware monitor for monitoring voltages and fan revolutions via JIDA32/K-Station or in BIOS HWM setup page.

SIO GPIOs are not accessible via JIDA interface.

## 5.19 FRU-PROM (I2C EEPROM)

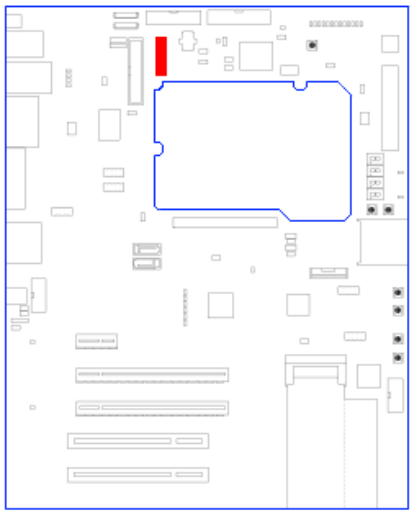
Following the new COM Express® specification the COM Express® Eval Type 10 provides an I2C EEPROM. The FRU-PROM (Field Replacable Unit; U76) at I2C address 07h can be used to store user specific data or baseboard configuration settings.

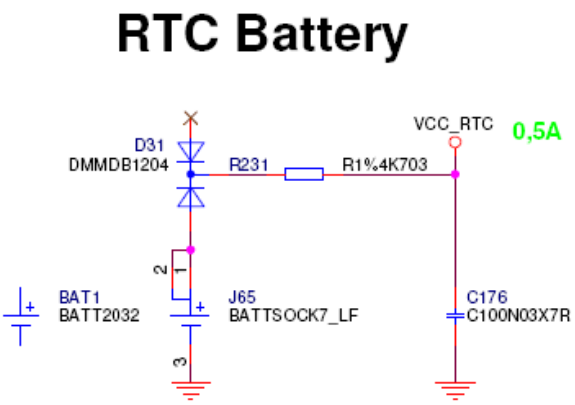
## 5.20 SM Bus Devices

The COM Express® Evaluation Board Type 10 uses 2 chips that are connected to the SM Bus of the module at the following addresses:

| Chip | SM Bus Address |
|---|---|
| Clock Buffer IDT ICS9DB801C | 0x6e/0xdc |
| PCIe switch PLX PEX 8505AA | 0x3f/0x7e |

# 6 Battery Information






## English:

| | |
|---|---|
| CAUTION: | Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions. |

## Deutsch:

| | |
|---|---|
| VORSICHT: | Explosionsgefahr bei unsachgemäßem Austausch der Batterie. Ersatz nur durch denselben oder einen vom Hersteller empfohlenen gleichwertigen Typ. Entsorgung gebrauchter Batterien nach Angaben des Herstellers. |

## French:

| | |
|---|---|
| ATTENTION: | Risque d'explosion avec l'échange inadéquat de la batterie. Remplacement seulement par le même ou un type équivalent recommandé par le producteur. L'évacuation des batteries usagées conformément à des indications du fabricant. |

## Danish:

| | |
|---|---|
| ADVARSEL: | Lithiumbatteri – Eksplosionsfare ved fejlagtig Håndtering. Udskifting må kun ske med batteri af samme fabrikant og type. Lever det brugte batteri tilbage til leverandøren. |

## Finnish:

| | |
|---|---|
| VAROITUS: | Paristo voi rãjähtãã, jos se on virheellisesti asennettu. Vaihda paristo ainoastaanlaltevalmistajan suosittelmaan tyyppiln. Havita kaytetty paristo valmistajan ohjeiden mukaisesti. |

## Spanish:

| | |
|---|---|
| Precaución: | Peligro de explosión si la batería se sustituye incorrectamente. Sustituya solamente por el mismo o tipo equivalente recomendado por el fabricante. Disponga las baterías usadas según las instrucciones del fabricante. |

| | |
|---|---|
| Note: | The battery of this product is not considered to be accessible by the end user. Therefore the safety instructions are only given in English, German, French, Danish, Finish and Spanish language.<br><br>If the battery of this product however is accessible by the end user, it is in the responsibility of the Kontron customer to give the corresponding safety instructions in the required language(s). |

# 7 Module Single Supply and Wide Range

The Computer-on-Module power is supplied directly from ATX_12V connector J15. Kontron modules are capable of working in a wide range voltage input and therefore it's possible to connect module VCC on J15 parallel to ATX supply J22 for the baseboard.

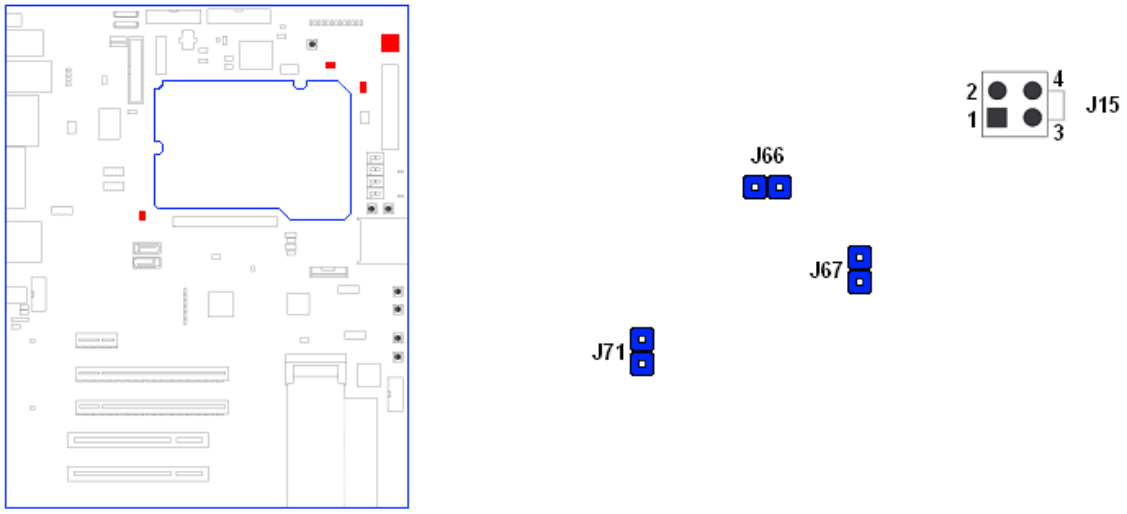
Please check the documentation of your product if a wide range voltage input is supported. Kontron Computer-on-Modules usually supports:

» COM Express® modules in mini size form factor:

4.75V to 14V

» COM Express® modules in compact and basic size form factor

8.5V to 18V




Additionally Kontron modules support single supply operation without standby voltage. To enable module single supply mode open jumper:

» J66 to enable Baseboard's S5Eco mode

» J67 to disconnect 5VSB from the module

» J71 to disconnect Power Good (PWR_OK)

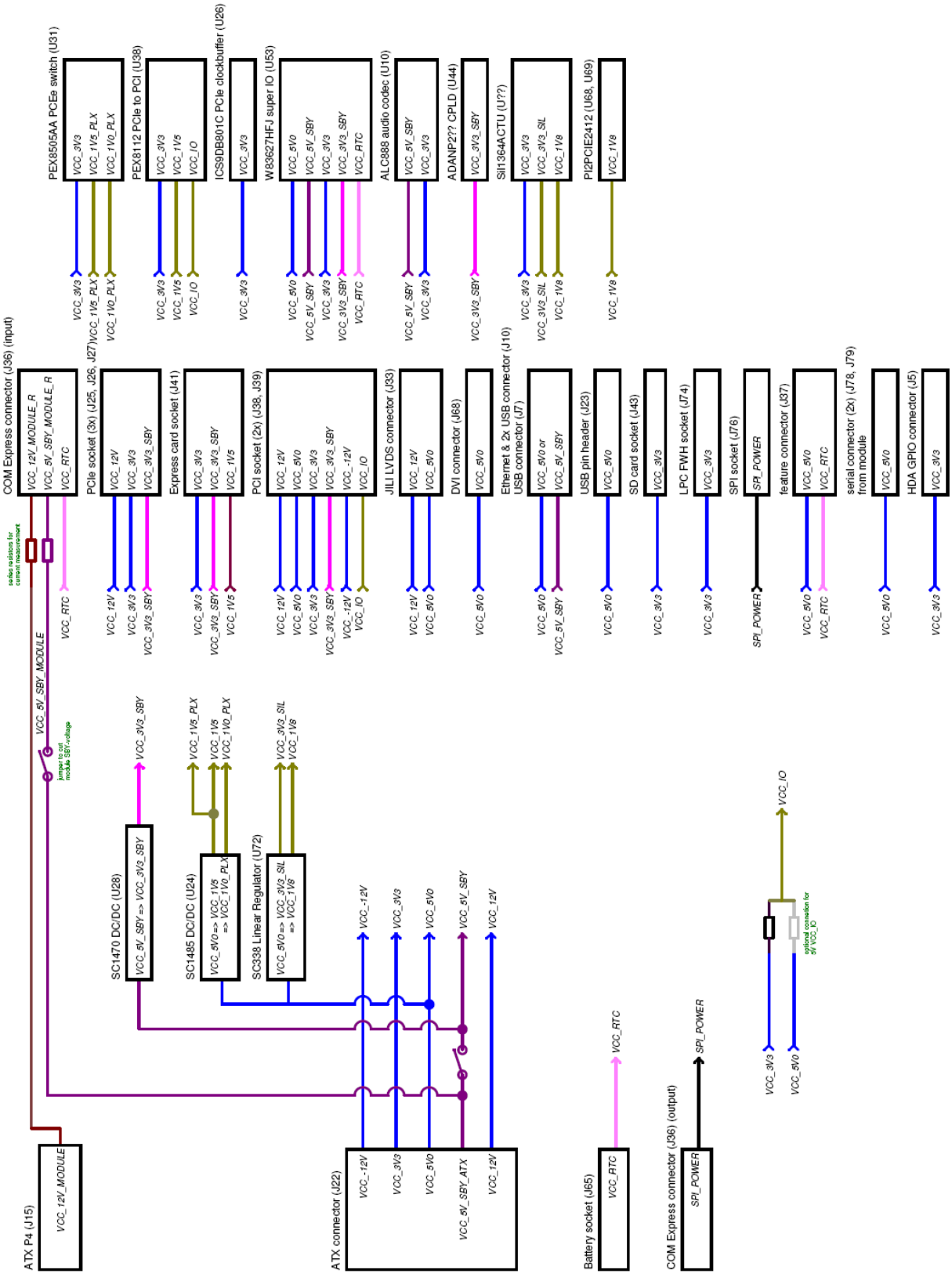
# 8 Compatibility Matrix

The COM Express® Eval Type 10 supports Computer-on-Modules following PICMG COM.0 Revision 1.0 pin-out Type 1 or COM.0 revision 2.0 pin-out Type 10.

See table below wich features are supported by Kontron's COM Express® mini form factor modules:

| Con | Feature | COMe-mSP1 | COMe-mTT10 | COMe-mCT10 |
|---|---|---|---|---|
| J15 | ATX 12V Power | 4.75V - 14V | 4.75V - 14V | 4,75-14V |
| J25 | PCIexpress Slot A | if PCIe Switch is disabled | if PCIe Switch is disabled | if PCIe Switch is disabled |
| J26 | PCIexpress Slot B | if PCIe Switch is enabled | if PCIe Switch is enabled | if PCIe Switch is enabled |
| J27 | PCIexpress Slot C | if PCIe Switch is disabled | if PCIe Switch is disabled | if PCIe Switch is disabled |
| J41 | ExpressCard | YES, but USB#5 is USB 2.0 only | YES | YES |
| J38 | PCI Slot0 | if PCIe Switch is enabled | YES | if PCIe Switch is disabled |
| J39 | PCI Slot 1 | if PCIe Switch is enabled | YES | if PCIe Switch is enabled |
| J41 | Express Card | if PCIe Switch is enabled | YES | if PCIe Switch is disabled |
| J34 | SATA1 | on variants without onboard LAN | YES | YES |
| J61 | USB #4 / USB #6<br>Ethernet RJ45 | USB 2.0 only | No USB #6 | YES |
| J44 | PWM FAN (SIO/Module) | SIO YES / Modoule NO | SIO YES / Module optional | SIO YES / Module YES |
| J68 | DVI-D (SDVO2DVI) | Optional | YES | NO |
| J74 | LPC FWH for external BIOS | YES | NO | NO |
| J76 | SPI Flash for external BIOS | NO | YES | YES |
| J78 | RS232 COMA from module | NO | YES | Optional |
| J79 | RS232 COMB from module | NO | YES | Optional |
| J83 | SER0 from module | NO | YES | Optional |
| J84 | SER1 from module | NO | YES | Optional |
| J92 | LID | NO | Optional | YES |
| SW6 | SLEEP | NO | Optional | YES |

# 9 Power Distribution



# 10 Security Advice

To protect the external power lines to peripheral devices the customer has to take care about:

- The wires to the external device have the right diameter to withstand the max. available current

- The housing of the external device fulfils the fire protection requirements of IEC/EN 60950.

# 11 Document Revision History

| Revision | Date | Edited by | Changes |
|---|---|---|---|
| 0.10_prelim | 08.10.08 | PRO | Initial Release for nanoETXexpress Eval Board COM.0 revision 1.0 Type 1 |
| 110 | 11.10.2010 | PRO | Updated to redesign variant 34101-0000-00-1<br>nanoETXexpress Eval Board COM.0 revision 2.0 Type 1/Type 10 |
| 120 | 04.11.2010 | PRO | Added speed limitation for SDIO<br>Updated supported features by nETXe-SP |
| 130 | 04.11.2010 | PRO | Updated Product name |
| 140 | 13.07.2011 | UMA | Updated ® and ™, changed LID button to LID jumper, changed “ALC888” to “ALC888/ALC886”, added SM Bus addresses |
| 141 | 07.03.2011 | UMA | Renaming from ETXexpress® to COM Express® an ultra to mini, removed typo at KAB-DSUB9-3 |

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