» Kontron User's Guide «

COM Express Type 2
Evaluation Carrier

Document Revision 1.01

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1 User Information

1.1 About This Document

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1.4 Standards

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1.5   Warranty

This Kontron product is warranted against defects in material and workmanship for the warranty period from the date of shipment. During the warranty period, Kontron will at its discretion decide to repair or replace defective products.

Within the warranty period, the repair of products is free of charge as long as warranty conditions are observed.

The warranty does not apply to defects resulting from improper or inadequate maintenance or handling by the buyer, unauthorized modification or misuse, operation outside of the product's environmental specifications or improper installation or maintenance.

Kontron will not be responsible for any defects or damages to other products not supplied by Kontron that are caused by a faulty Kontron product.

1.6   Technical Support

Technicians and engineers from Kontron and/or its subsidiaries are available for technical support. We are committed to making our product easy to use and will help you use our products in your systems.

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® Evaluation carrier board for Type 2 modules is designed to allow embedded application developers to get up and running quickly on the COM Express® basic and compact form factors, giving them a head start on the total system design. Simply select a pin-out Type 2 COM Express CPU module, then Plug & Go. The Kontron COM Express® Eval Type 2 is an evaluation backplane for COM Express® Computer-on-Modules following the PICMG COM.0 specification with pin-out Type 2.

Ordering Information

Article	Part-No.	Description
COM Express® Type 2 Evaluation Carrier	38104-0000-00-1	Evaluation Board COM.0 pin-out Type 2

3   Specification

3.1   Functional Specification

» **COM Express® baseboard compatible to Type 2 pin-out based modules**

» **ATX EPS (20pin + 4pin) power connector**

» **1x PEG x16 slot**

» **1x PCI Express x4 slots**

» **1x PCI Express x1 slot multiplexed with Express card 0**

» **2x PCI standard slots + 1x mini PCI socket**

» **4 x SATA**

» **1x LVDS/JILI FFC 40 connector**

» **1x VGA**

» **1x 1x 10/100/1000 MBit LAN; RJ45 connector**

» **4x USB 2.0 (standalone connectors)**

» **2x USB 2.0 shared with GBE connector (USB 4 and 5)**

» **1x USB 2.0 (USB 7) on Express Card**

» **1x USB 2.0 (USB 6) on miniPCI Expres**

» **Feature Connector (MARS Compatible)**

» **LPC Firmware Hub and SPI Flash support for external BIOS**

» **Front panel features (HDD Act., Reset and Power Switch)**

» **IDE support**

» **Compact Flash support**

» **SIO**

» **Status LED**

» **GPIO 10-pin header**

» **4 digit Port 80/81 POST code display with POST code control**

» **No LID and SLEEP support**

» **Power Control functions (Power Button override, module single supply, power consumption measurements)**

» **Realtek ALC886 HD-Audio**

> » **Audio Jack 6 in 1**

» **PWM FAN and Hardware Monitor connectors (FAN/Voltage)**

3.2   Block Diagram
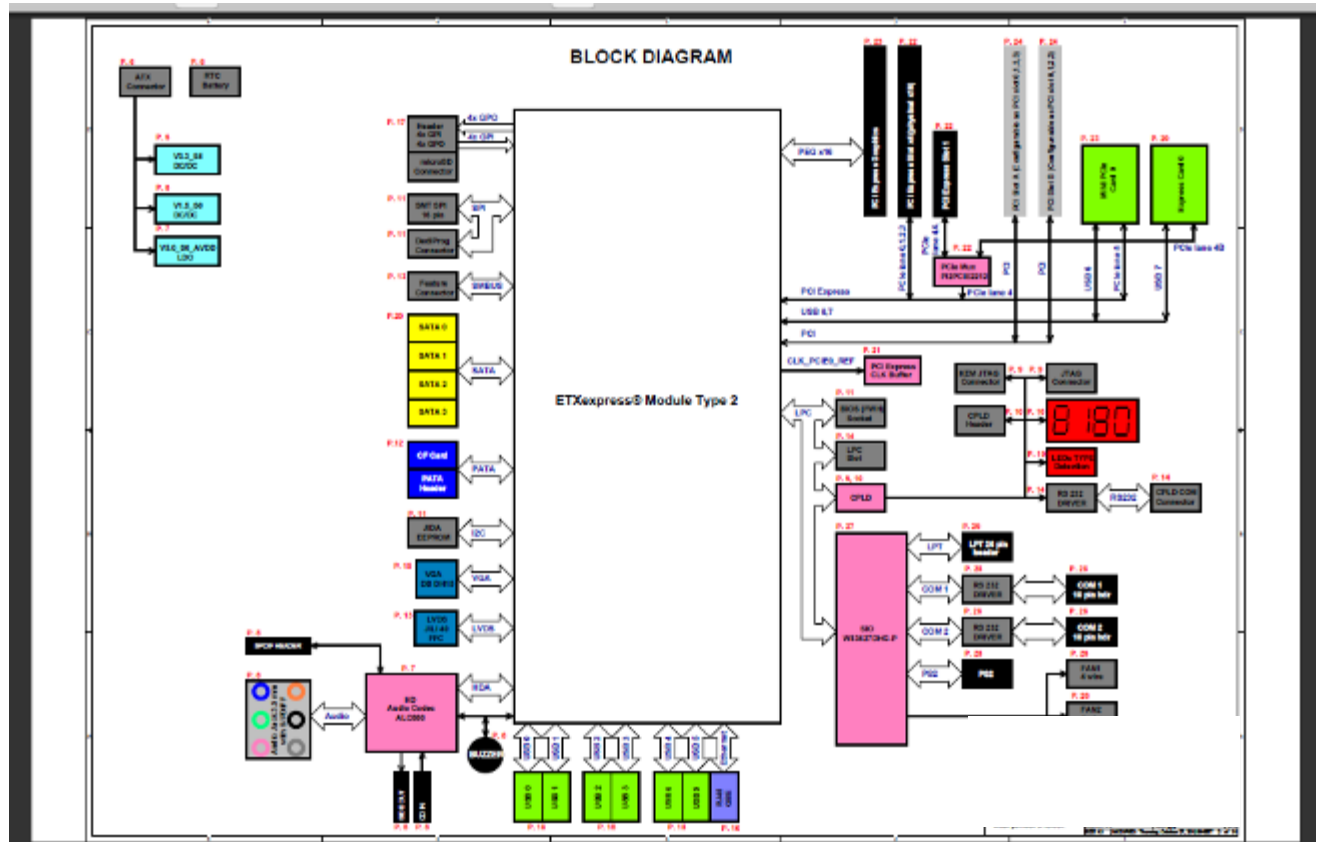
3.3   Mechanical Specification

» **Size:**   243.8mm x 304.8mm

» **max height on top:**   3.81mm (Connector J7)

» **PCB thickness:**   1.55mm ±10%

3.4　Electrical Specification

Supply Voltage

» ATX Main Power 24pin

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: 264194 hours @ 40°C

4 Connector Layout

4.1 Rear Panel

4.2 Connector Locations

4.3 Component overview

Connector	Short Description
BT1	RTC Battery Socket
D29	HDD Activity LED
D30, D31, D32, D33, D34, D35, D36, D37	Module Type LEDs
D61, D62, D63, D64	POST Code Port 0x81 and Port 0x80
J1	VGA
J4, J5	2x Dual USB 3.0
J6A	Gigabit Ethernet
J6B	Dual USB 2.0
J7	5x Audio Jack + SPDIF
J11, J65	Internal Audio (CD in, Side)
J14	SMBus Header
J16	S\PDIF Header
J17	I2C Header
J18, J19, J26, J29	SATA Ports
J20	LPC Slot
J22	PCIe x1
J23	PCIe x4
J25	PCIe Graphics
J27, J28	BIOS Disable Jumpers
J31A	COM Express AB Connector
J31B	COM Express CD Connector
J32	SPI Flash Dediprog Connector
J36	LVDS
J39, J43	2x Fan Header
J38	Fan Power
J46	MicroSD Card
J47	Express Card
J49	PCIe Mini Card
J50	Feature Connector (MARS Compatible)
J54	ATC Connector (4-pin)
J55	ATX Connector (24-pin)
J56	GPIO Connector
J71	CompactFlash
J72	IDE
J73, J74	PCI 32 bit 3.3V /5V Card Slots A & B
J75	COM1
J76	COM2
J77	Parallel port
J79	Keyboard / Mouse
J80	SIO GPIO Header

Connector	Short Description
SW3	Reset Button
SW4	Power Button
SPK1	PC Buzzer
U3	Audio Codec VR
U4	Super I/O
U12	Audio Codec
U20	PCIe Clock Buffer
U21	Firmware Hub Socket
U22	SPI Flash
U28A, U28B	EPM1270F256 CPLD
U29	Express Card Power
U38	SD Card / GPIO Switch
U41	FRU EEPROM
U42	V3.3_S5 DC/DC
U45	V1.5_S0 DC/DC
U56	PCI Clock Buffer

5 Connectors and Features

5.1 Power supply

5.1.1 ATX connector

The COM Express® Eval Type 2 power supply follows the ATX 2.x specification and the baseboard should be supplied by connecting an ATX PSU with 24-pin ATX (J55) and 4-pin ATX_12V (J54) supply cable in correct orientation. The 4-pin ATX_12V connector mainly supplies power to the module.

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

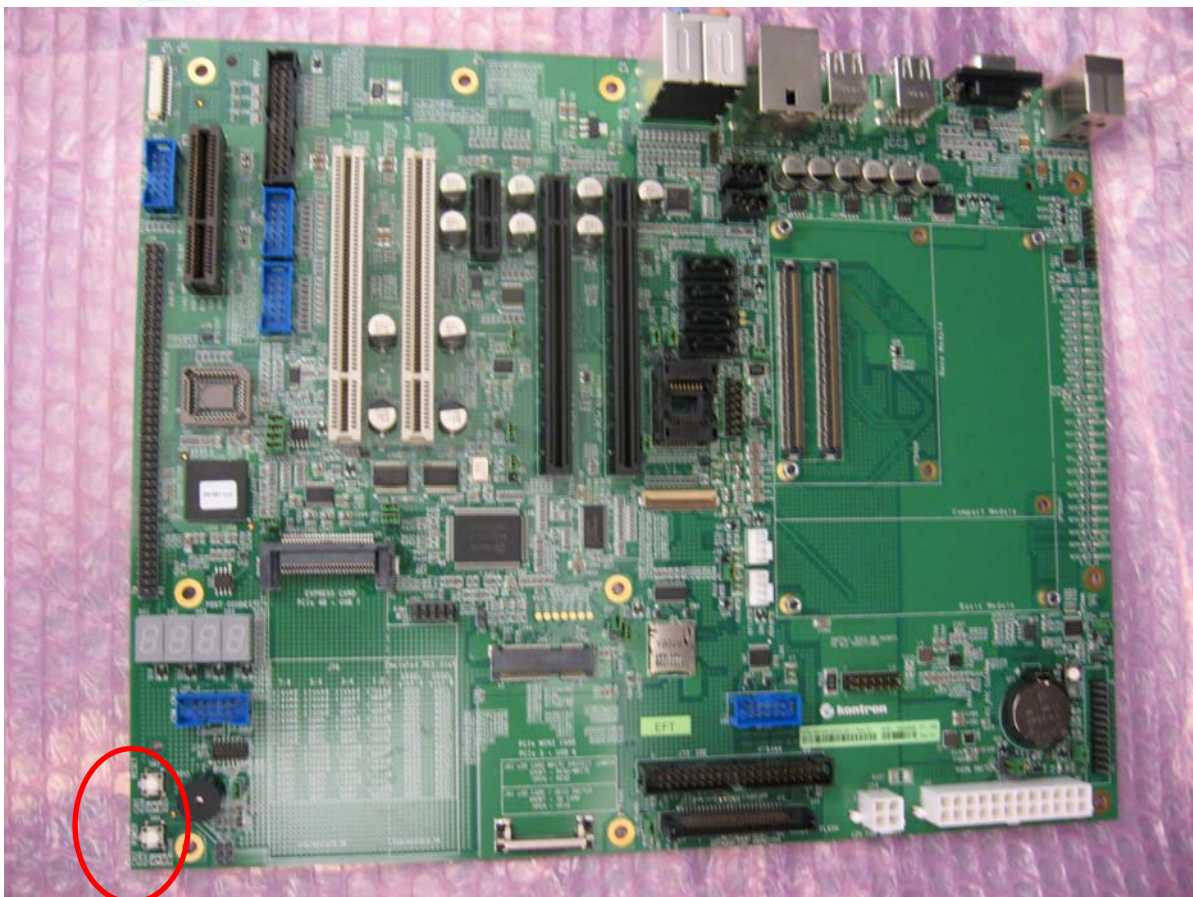| Pin	ATX_12V	Pin	ATX_12V
1 (Black)	GND	3 (Yellow)	Module VCC (12V nominal)
2 (Black)	GND	4 (Yellow)	Module VCC (12V nominal)

5.1.2 Reset and Power button

The COM Express® Eval Type 6 provides an onboard Reset Button (SW3) and Power Button (SW4).

Connector	Function
SW4	Power Button
SW3	Reset Button

5.2   COM Express® connector

The COM Express® Eval Type 6 is an evaluation carrier board for Type 6 based Computer-on-Modules. The type 6 module pin-out is based on two connectors with 2 rows (Row A and B and Row C and D) with 440 pins overall (220 pins for each of the two connectors). Please refer to your module documentation for detailed pin-out descriptions.
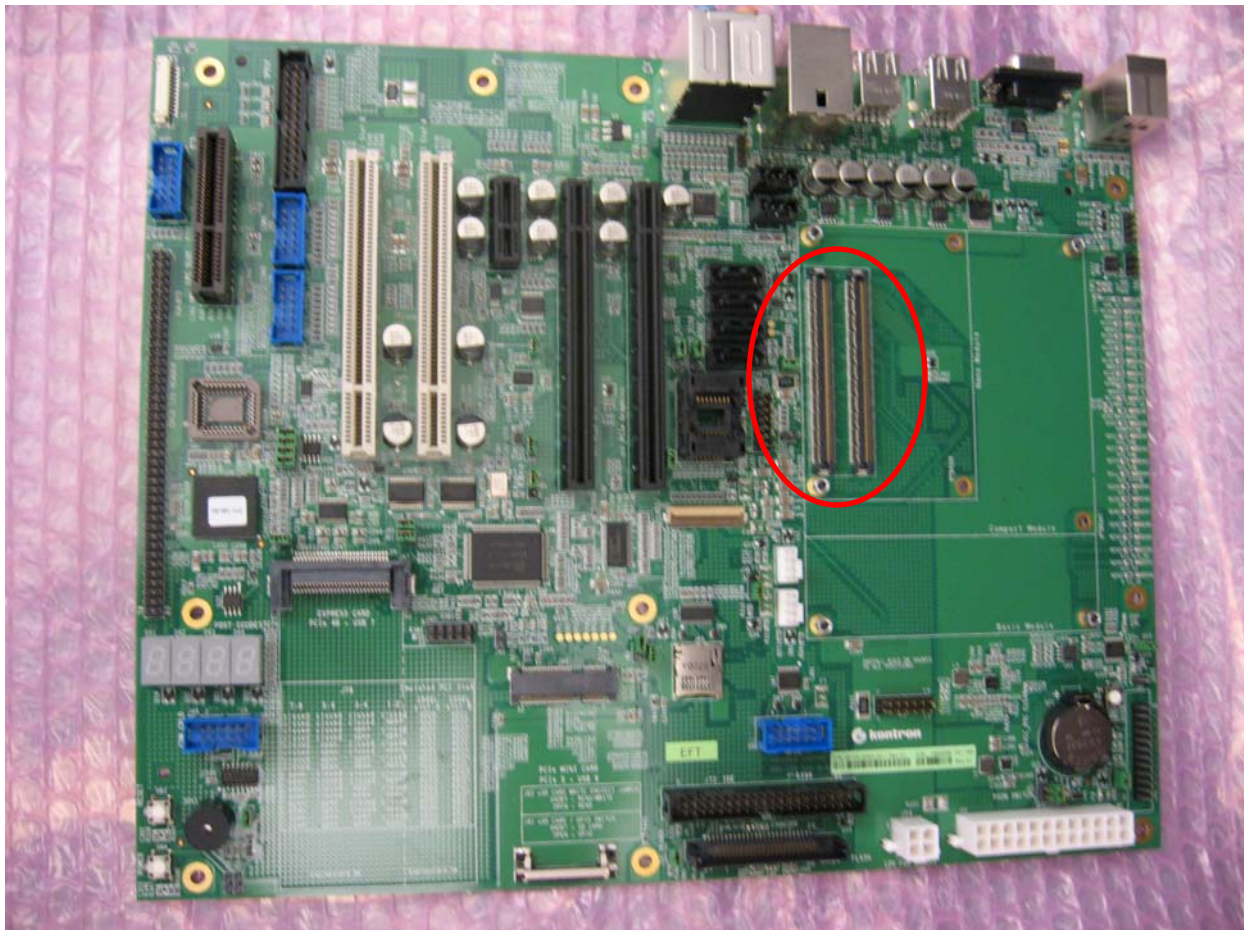
5.3   Serial ATA

The COM Express® Eval Type 6 provides 4 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
J18	SATA #0
J19	SATA #1
J26	SATA #2
J29	SATA #3

5.4   Storage and GPIO

This carrier board supports connections for various storage media including CompactFlash and microSD. Also available is connection for GPIO. Consult your module manual for what GPIO it is enabled to communicate with.
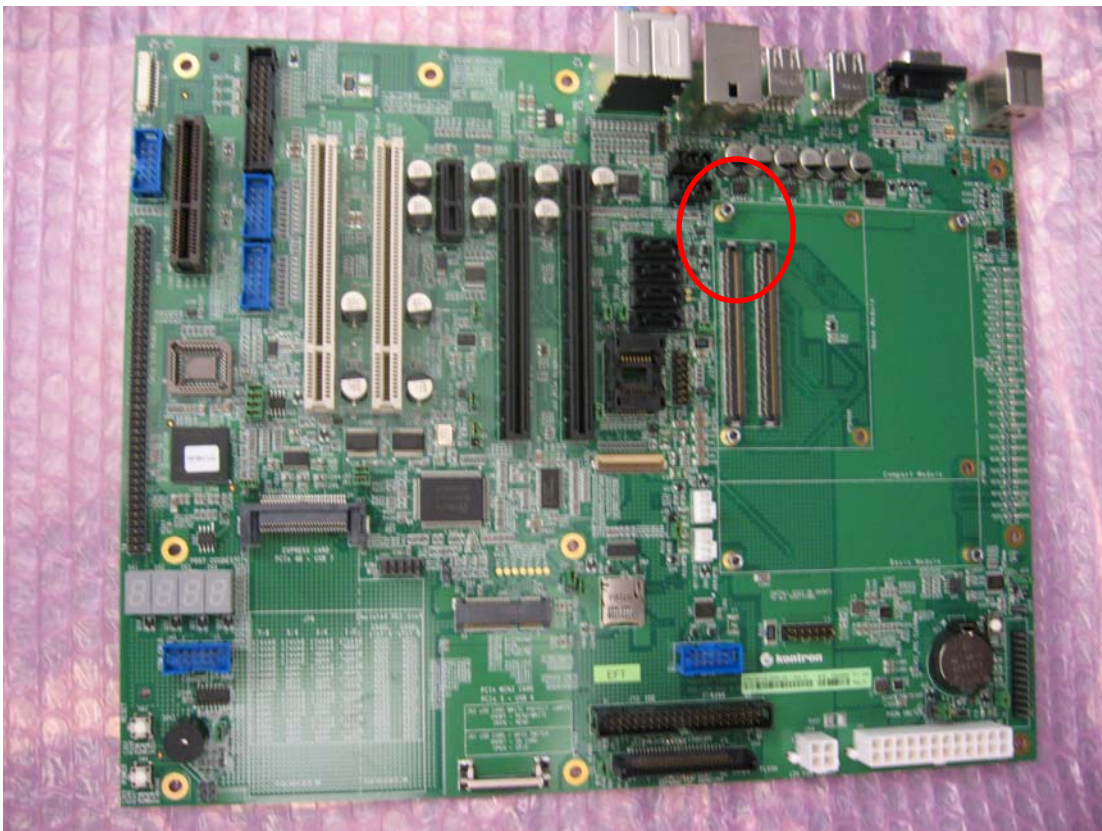
GPIO J48 PIN	Description	GPIO J48 Pin	Description
1	VCC 3.3V	2	GPO0 / SD_CLK
3	GPI0 / SD_DATA0	4	GPO1 / SD_CMD
5	GPI1 / SD_DATA1	6	GPO2 / SD_WP
7	GPI2 / SD_DATA2	8	GPO3 / SD_CD#
9	GPI3 / SD_DATA3	10	GND

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 (J41: short jumper = SD card; open jumper = GPIO) 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
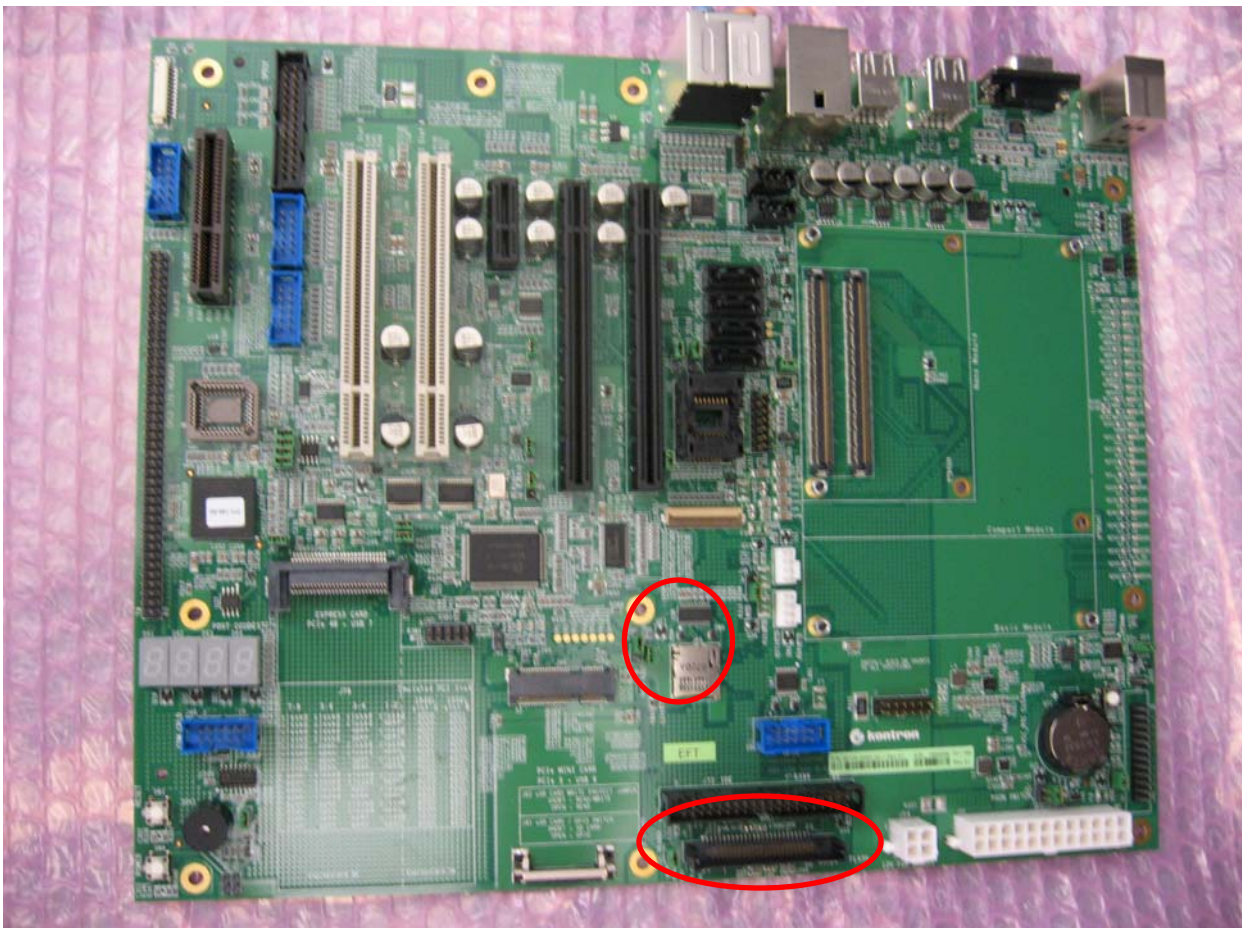
5.5   High Definition Audio

The COM Express® Eval Type 2 provides HDAudio via Realtek ALC886 High Definition Audio Codec supporting analog, optical and digital audio connections.
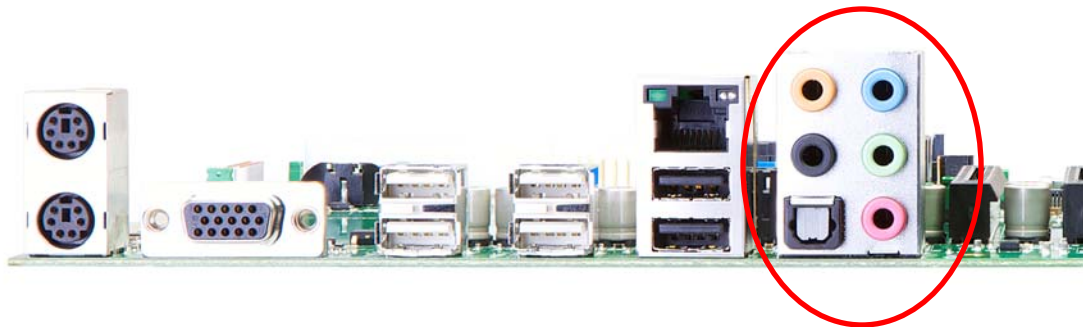
Audio Connector J7 - Speaker Configuration

The Audio Connector J7 on the COM Express® Evaluation Board is a 5x Audio Jack plus SPDIF. Arrangement is as follows

Orange: Center	Blue: Line-In
Black: Rear	Green: Front
SPDIF	Pink: Mic

| Note1: |
|---|
| Audio is only supported with HD Audio compatible COM Express® Modules. |

5.6   Ethernet

The COM Express® Eval Type 2 provides a RJ45/Dual USB Combo with a single RJ45 in combination with 2 USB ports (USB 4/6). Ethernet Connector J6 with integrated magnetics and LED is configured to support modules with10/100/1000.

J6 LED function

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

5.7   USB

The COM Express® module's USB ports 0 to 5 are available on rear panel connectors J4, J5, and J6. USB port 6 is used on Express Card connector and USB port 7 is used for the miniPCI Express card connector. The COM Express® Eval Type 2 provides USB up to 8 ports with 2 on RJ45/USB Combo connector J6, 4 as standalone (J4, J5), 1 shared with Mini PCIe and 1 shared with the ExpressCard.
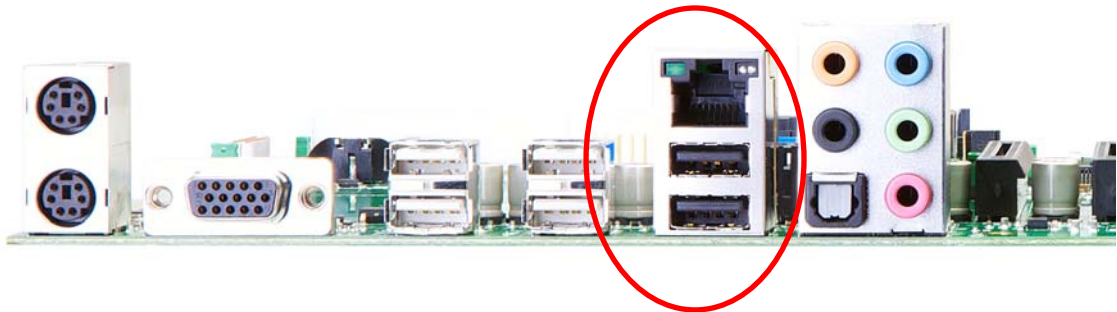
5.8   PCI

The COM Express® Eval Type 2 supports 32 bit PCI
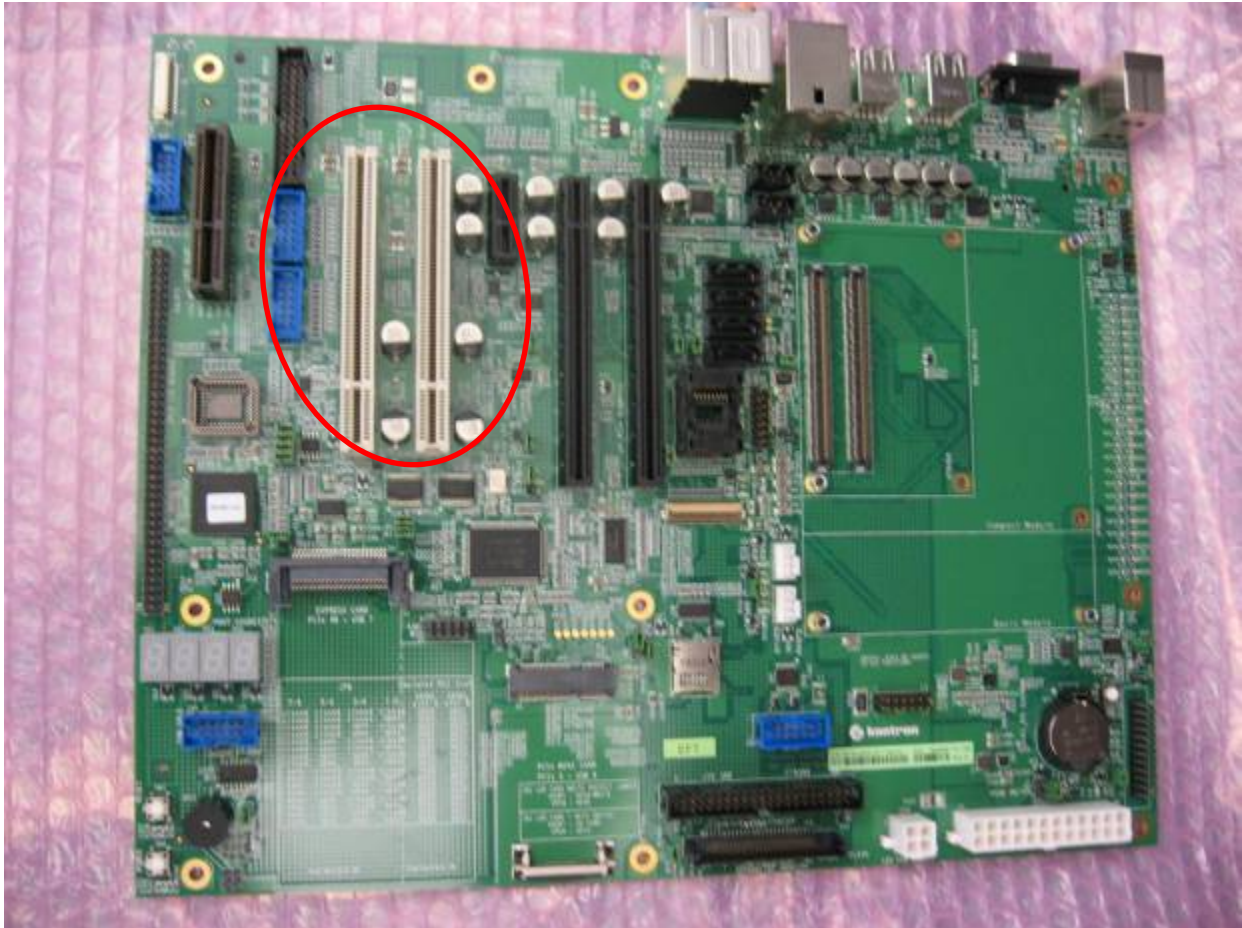
5.9   PCIexpress and Express Card

The COM Express® Eval Type 2 provides one x4, one x1 PCIexpress x1 slots, one Express Card Slot, and one Mini PCIe.

Connector	Function
J25	PCIe Graphics
J23	PCIe x4 (0-3)
J22, J47	PCIe x1 (4) or Express Card (multiplexed by J63: open = Express Card; closed =PCIe x1 connector), Express Card (supports 34 and 54)/ PCIe 4 / USB 7
J49	PCIe Mini Card / PCIe (5) / USB 6

Express Card

The Express Card Slot J47 in combination with USB #7 allows 1.3A on 3.3V, 275mA on AuxPower and 650mA on 1.5V continuous Card Power with pin-out in table below.

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

5.10   MARS connector

The MARS connector (J50) provides additional interfaces for Smart Battery Power Control Signals.

5.11 VGA

On COM Express® Eval Type 2 the VGA output (J1).

5.12 LVDS

The 40-pin JILI LVDS panel connector J36 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	LCDD013
2	LCDD00	22	DETECT# (GND)
3	LCDD01	23	LCDD014
4	ENAVDD	24	LCDD015
5	LCDD02	25	GND
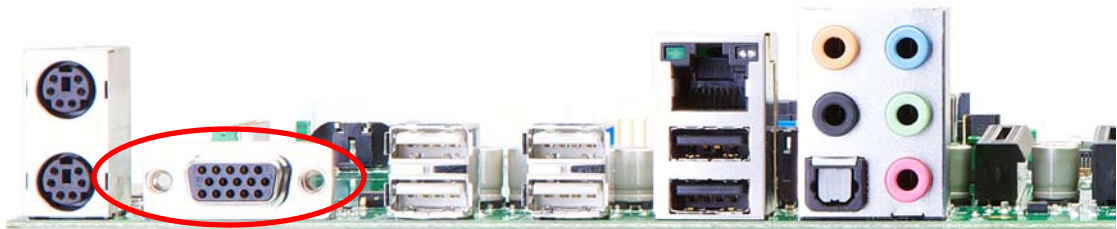
6	LCDD03	26	LCDD016
7	NC	27	LCDD017
8	LCDD04	28	GND
9	LCDD05	29	LCDD018
10	GND	30	LCDD019
11	LCDD06	31	+5V
12	LCDD07	32	+5V
13	GND	33	+5V
14	LCDD08	34	+5V
15	LCDD09	35	BLON#
16	JILI_DAT	36	GND
17	LCDD010	37	GND
18	LCDD011	38	+12V
19	JILI_CLK	39	+12V
20	LCDD012	40	+12V
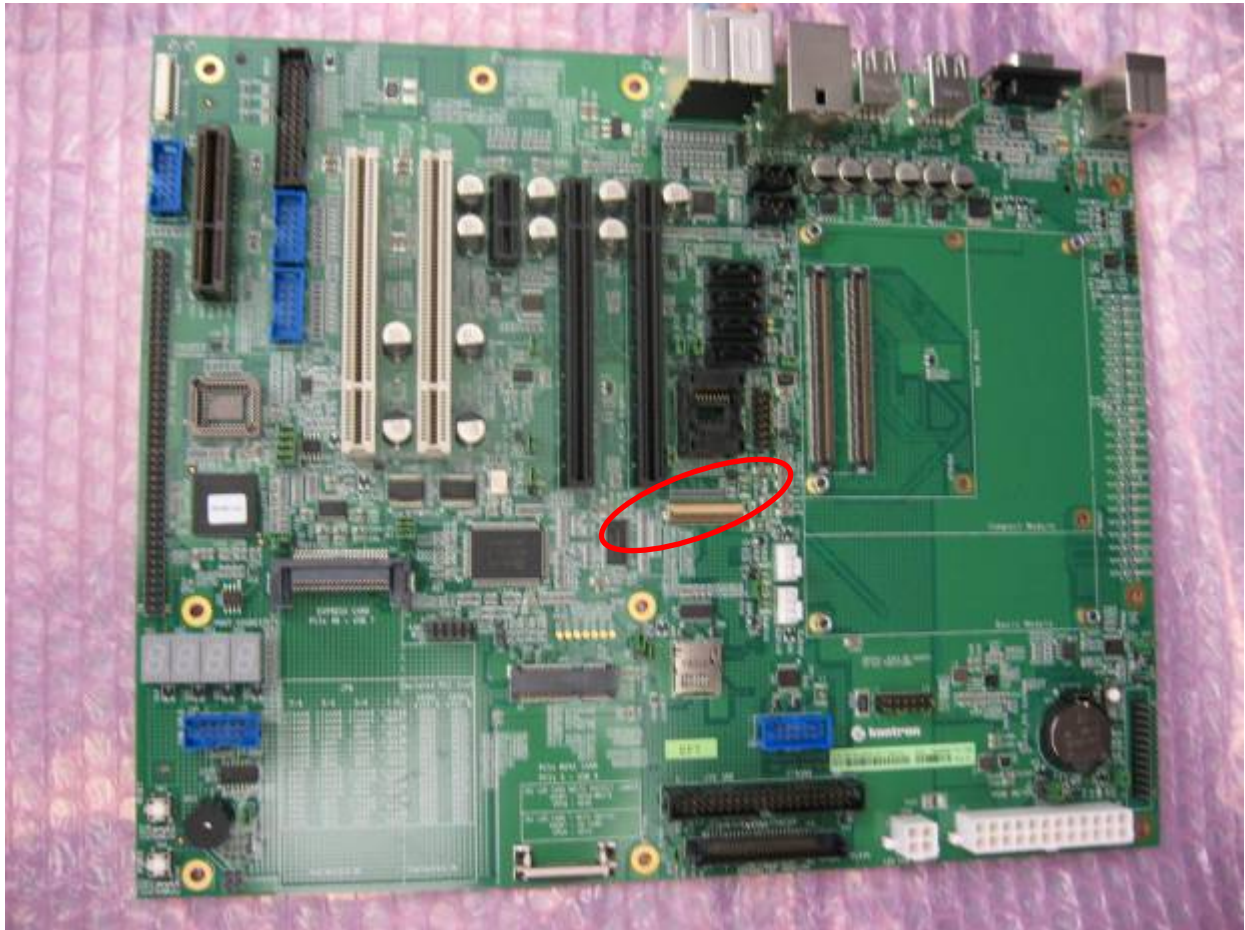
5.13   External BIOS

The COM Express® Eval Type 2 supports external boot. By closing Jumper J27 the module's onboard BIOS is disabled and the system will boot from an external Firmware Hub in U21 PLCC socket.

For modules supporting SPI boot the COM Express® Eval Type 2 provides a SPI socket U22 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 J27. Please check the documentation of your module if SPI is supported and which SPI Flash size is required.

Booting from external BIOS:

» **Close Jumper J27 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 J27 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

5.14   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 (U28).

Port 80/81 POST Code

The 7-segment display D63/D64 for Port 81 and D61/62 for Port 80 shows BIOS status codes during boot-up process.

5.15   FAN

The COM Express® Eval Type 2 provides two 4-pin (J39, J43) fan connectors.

5.16   FRU-PROM (I2C EEPROM)

Following the new COM Express® specification, the COM Express® Eval Type 2 provides an I2C EEPROM. The FRU-PROM (Field Replacable Unit; U41) at I2C address 0xAF. The default setting is write protected. This is for Kontron factory use and not recommended for non-Kontron modification.

6   Battery Information
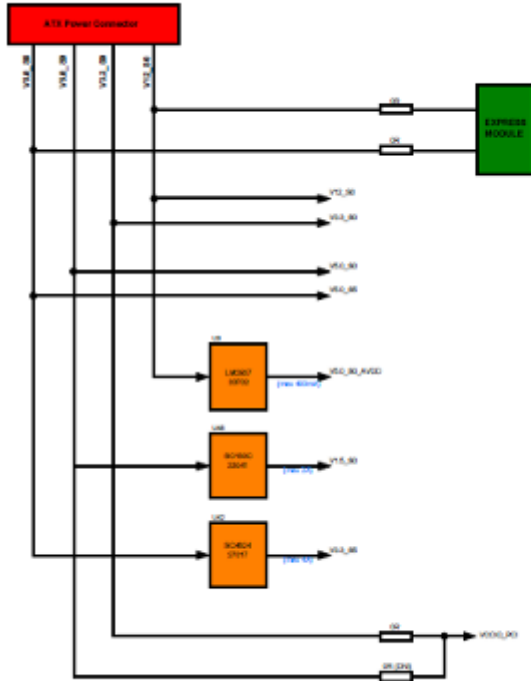

RTC Battery Socket
with VCC RTC clear button
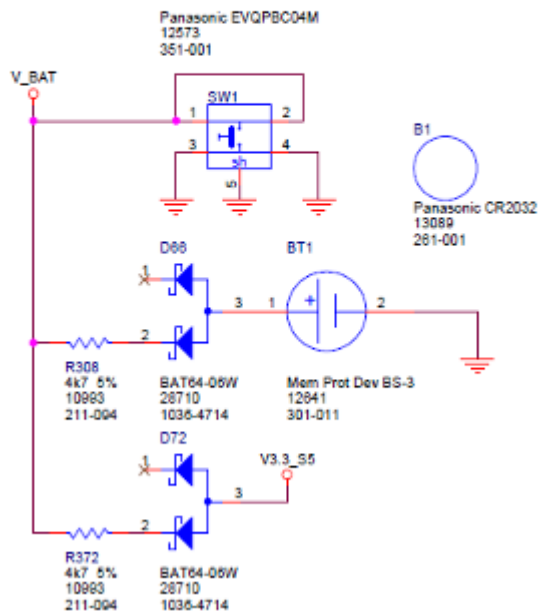
CAUTION:	**Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.**

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

7   Power Distribution

8   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 maximum available current**

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

9 LED Indicators

For user convenience, Kontron has included some LED indicators along the side of the board design. These are noted in the chart below and circled in the picture of the carrier board included at the end of this section.

LED	Function
D29	Hdd Activity
D30	Module Rev 2
D31	Module Type 1
D32	Module Type 2
D33	Module Type 3
D34	Module Type 4
D35	Module Type 5
D36	Module Type 6
D37	Module Type 10
D38	Watchdog
D39	THRMTRIP#
D40	SUS_S5#
D42	SUS_S4#
D43	SUS_S3#
D44	SUS_STAT#
D45	V3.3_S5
D46	V5.0_S5
D47	V1.5_S0
D48	V3.3_S0
D49	V5.0_S0
D50	V12_AUX_S0
D51	V12_S0
D54	V-12_S0
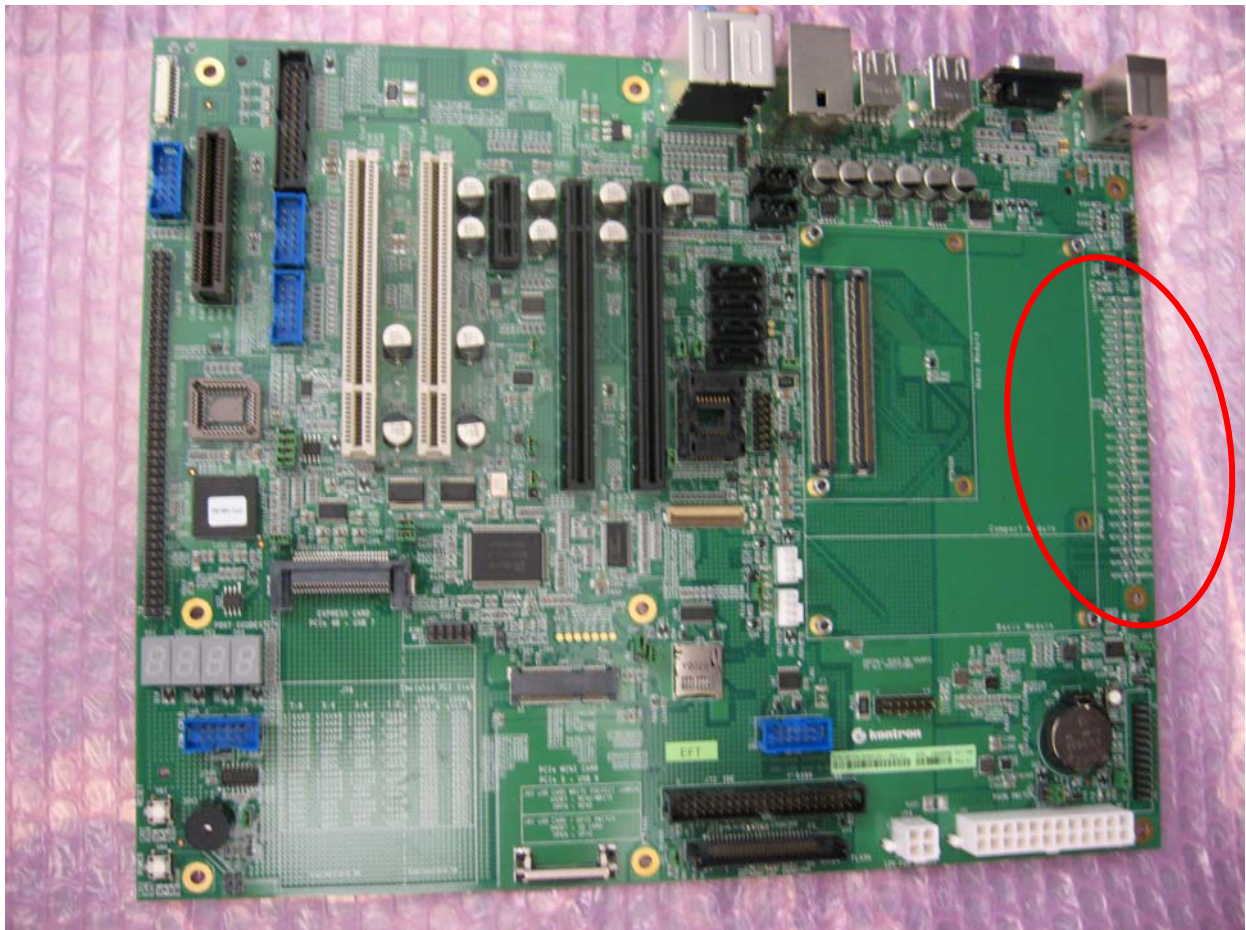
10   Document Revision History

Revision	Date	Edited by	Changes
1.0	22 Jun 2012	CVG	Initial release
1.01	5 Jul 2012	NYP	Update, multiple sections (1,2, 3, 4,5,9, 10) due to engineering input

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