Document status: Preliminary

COM Carrier Board Datasheet

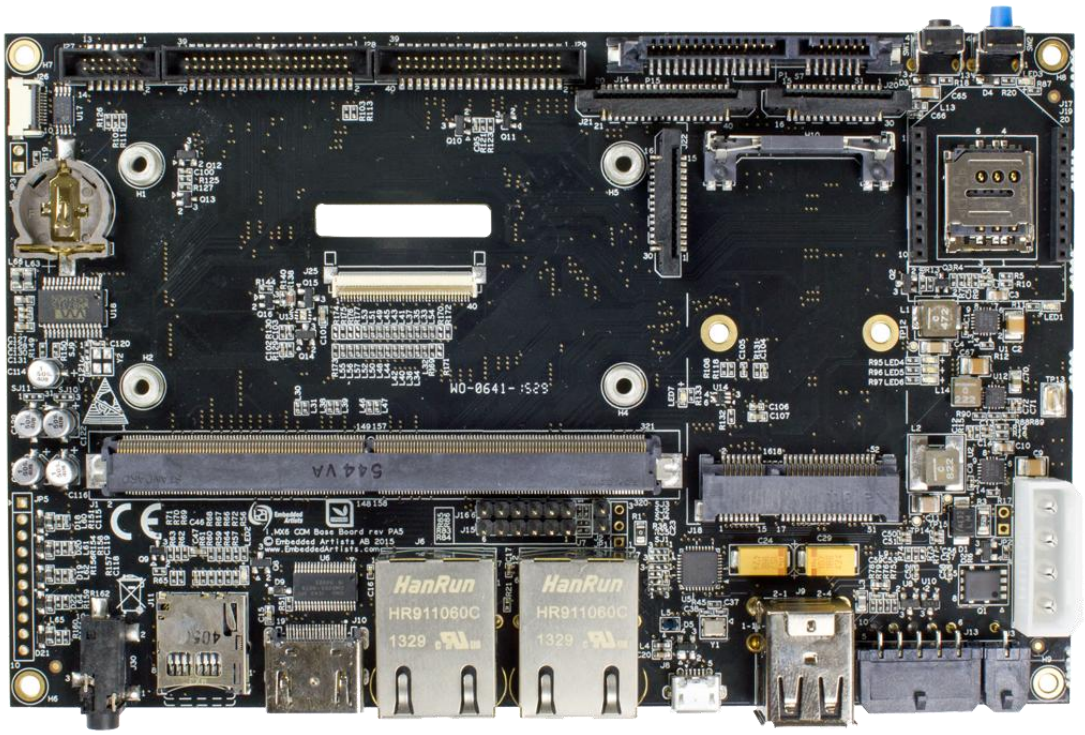

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Table of Contents

1 Document Revision History

Revision	*Date*	*Description*
PA1	2015-11-04	First version.
PA2	2015-11-27	Added information about expansion connector.
PA3	2016-01-13	Added known issue on XBee interface (J17)
A	2016-05-16	Added information about rev B board. Updated UART, SPI and I2C channels to alphanumeric numbering.
A1	2016-07-18	Added information about rev C board.
A2	2017-04-13	Added information about rev D board. Corrected spelling error.
A3	2017-04-21	Moved PCIe clock notes to separate document.

2 Introduction

This document is a datasheet that specifies and describes the *COM Carrier Board* mainly from a hardware point of view. Software related issues are not addressed.

2.1 EACOM Overview

The *COM Carrier Board* is part of the EACOM board infrastructure. EACOM is a board standard defined by Embedded Artists and is the core design around an i.MX 6/7 SoC. An EACOM board typically includes, besides the i.MX 6/7 SoC, external DDR3L and FLASH memories, power management and Ethernet PHYs.

An EACOM based system solution has the following overall physical structure:

- **EACOM board**, containing the core design that encapsulate a lot of the complexity of a modern, high-performance ARM SoC design.
- **Carrier board** that implements the needed interfaces in the specific solution. The carrier board also typically contains the powering solution and creates the mechanical entity that shall be mounted in a box, or similar. The carrier board is typically a simpler design (i.e., less complex) than the EACOM board. The carrier board can be a ready-to-go design, like the *COM Carrier Board* described in this datasheet, or it is a custom specific design.
  A standard, ready-to-go carrier board, is suitable for low volume applications where the cost for developing a custom specific carrier board can be saved.

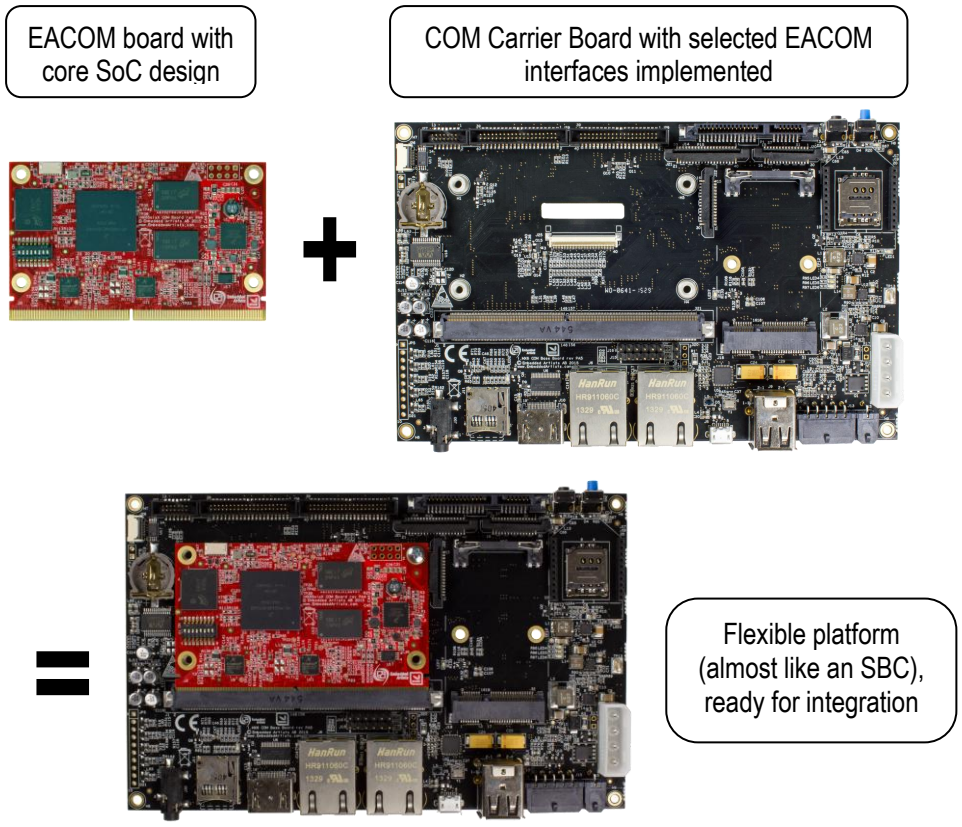

Figure 1 – EACOM Board Plus Carrier Board Equals Single Board Computer (SBC)

The combination of an EACOM board and accompanying carrier board is very much like a Single Board Computer (SBC), but more flexible. The carrier board can be a much better fit for each specific application than a standard SBC. Normal design updates are more likely to be on the carrier board,

which is simpler to update than a complete SBC would be. Upgrading a design for more execution power or more memory is as easy as changing EACOM board, as opposed to redesigning an SBC.

2.2 COM Carrier Board Overview

The *COM Carrier Board* is a base board that implements a large part of interfaces that the EACOM standard defines. It is a ready-to-go carrier board that can be integrated directly into end products. The board offers a good mix of features and allows projects with lower volume to save considerable development time by using this general carrier board. Example applications where the *COM Carrier Board* is ideal are:

- Industrial applications like factory, process and building automation
- Test and measurement equipment
- Telematics and gateway applications

Since all relevant EACOM interfaces are implemented, the *COM Carrier Board* is used as base for Developer's Kits that exists for different EACOM boards. Currently the board is compatible with the following EACOM boards:

- iMX6 UltraLite COM Board
- iMX6 SoloX COM Board
- iMX6 Quad / Dual / DualLite COM Board
- iMX7 Solo / Dual (u)COM Board

The COM Carrier Board has the following feature highlights:

Connectors for External Interfaces **Note** that all interfaces/ functions are not supported by all EACOM boards.	Connector to EACOM board, MXM3, 314-pos connector with 5 mm standoffs for EACOM board
	Dual 10/100/1000 Mbps Gigabit Ethernet RJ45 connectors
	USB OTG interface with ESD production
	Dual USB Host interfaces (via USB Hub) with ESD production
	HDMI connector with ESD production
	uSD/MMC connector (MMC is in parallel with uSD, so either one can be used but not both)
	Dual CAN transceivers with ESD protection and optional termination, accessible via Molex Micro-Fit 3.0 connectors
	Audio codec with line out 3.5mm audio jack connector (with internal connector for microphone and line input and headphone output)
Internal Interfaces **Note** that all interfaces/ functions are not supported by all EACOM boards.	Connector to EACOM board, MXM3, 314-pos connector with 5 mm standoffs
	SATA connector
	UART connectors (compatible with FTDI cables)
	XBee™ compatible interface connector
	Mini PCIe connector for half and full-size cards, including SIM card holder and USB interface
	FPC connectors for serial and parallel camera interface and VADC/serial display output (MIPI)
	Dual LVDS connectors

	Rev A: Parallel 18-bit RGB interface for 7" LCD solutions **Rev B (and later revisions)**: Generic 24-bit parallel RGB display interface
	Expansion connectors for many EACOM Board signals
Powering	12V (+-30%) supply voltage, either via internal ATX connector or via external Molex Micro-Fit 3.0 connector
	Reverse polarity protection
	Internal 3.3V/4A and 5V/3A (and 3.3V/3A for PCIe) DC/DC converters with high efficiency
	Rev A: Coin cell battery holder (CR1220 size) for EACOM board RTC **Rev B (and later revisions)**: Built-in battery charger
Dimensions	165 x 104 mm (same size as typical 7 inch LCDs)
	Five M3 holes for mounting and grounding
Environment	0 - 60° Celsius
	5 - 90% relative humidity, non-condensing
Other	On/Off and Reset pushbuttons
	Input current measurement

2.3 COM Carrier Board RF-Interfaces

EACOM boards do not integrated (on-board) RF interfaces. Nor does the *COM Carrier Board*. Instead the **design philosophy is to have multiple interfaces** that will allow a broad range of RF solutions to be easily integrated. This solution is believed to be much more flexible and cost effective.

There are multiple interfaces that can be used to connect to an RF module, see table below.

Hardware Interface	RF technology (examples of typical modules)
Mini PCIe interface	WLAN, GPS, Cellular
SDIO via MMC (4-bit databus)	WLAN, NFC
XBee™ interface	WLAN, ISM, BTLE, GPS, Zigbee
USB Host interface	WLAN, Cellular, BT(LE), NFC
SPI interface	WLAN, BT(LE), ISM, Zigbee, NFC
UART interface	WLAN, GPS, Cellular, BT(LE), NFC

2.4 Software

There are different Linux Board Support Packages (BSPs) for each combination of an *EACOM Board* and the *COM Carrier Board*. The BSPs are setup to support the interface and GPIO usage on the *COM Carrier Board*. Precompiled images are available. Embedded Artists works with partners that can provide support for other operating systems (OS). For more information contact Embedded Artists support.

This document has a hardware focus and does not cover software development. See other documents, related to the specific EACOM board that is used, for more information about software development.

2.5 EACOM Interfaces

The table below lists the interfaces that are specified in the EACOM specification (see separate document for details) and what is supported by the *COM Carrier Board*. Note that different EACOM boards may not implement all interfaces in the EACOM specification.

Interface	EACOM specification	COM Carrier Board
UART	3 ports (two 4 wire and one 2 wire)	3x internal connectors for FTDI cables (only TX/RX). UART-B connected to internal XBee connector. Internal expansion connectors also carry the UART interface signals.
SPI	2 ports	Internal expansion connectors carry the SPI interface signals.
I2C	3 ports	Internal expansion connectors carry the I2C interface signals.
SD/MMC	2 ports (one 4 databits and one 8 databits)	External uSD and SD/MMC connectors in parallel (one at a time can be used). 4-bit databus.
Parallel LCD	24 databits and CLK/HS/VS/DE	**Rev A**: Internal connector carrying 18 databits+control. Connector has common pinning for 7" LCDs. **Rev B (and later revisions)**: Generic 24-bit parallel RGB display interface
LCD support	LCD power ctrl, Backlight power/contrast control, touch panel ctrl (RST and IRQ)	Signals used to control parallel display (LCD) interface.
LVDS LCD	2 ports (18/24 bit LVDS data)	2x internal connectors.
HDMI (TDMS)		External connector.
Parallel Camera		Internal FPC connector.
Serial Camera	CSI, 4 lane	Internal FPC connector.
Gigabit Ethernet	2 ports	2x external connectors supporting Gigabit as well as 10/100 Mbps speed.
Mini PCIe	1 port, 1 lane	Internal connector, supporting half and full length boards. 1 port, 1 lane.
SATA		Internal 22 pos connector; combined *SATA Data* and *SATA Power* connector.
USB	1 USB3.0 OTG 1 USB3.0 Host 1 USB2.0 Host	1x external USB2.0 OTG connector 3 port internal USB2.0 hub with; 2x external USB2.0 Host connector and 1x internal USB2.0 Host internal to mPCIe connector
SPDIF	1 TX/RX port	Not supported.
CAN	2 ports	2x external interface connectors.

I2S/SSI/AC97	1 port (4 wire synchronous plus MCLK)	Audio codec with external line out connector and an internal connector for mic/line in/heaphone out.
Analog audio	Stereo output	Not supported.
GPIO	9 pins	Used to control different interfaces on the board.
PWM	1 pin	Used by internal display interfaces.
ADC	8 inputs	Connected to internal expansion connector.
Type specific	39 pins	A few pins are connected to internal expansion connector.

2.6 Reference Documents

For details about specific behavior of each interface, see the NXP's Datasheets and Reference Manuals for the respective iMX6/7 SoC mounted on the EACOM board that is used.

The following documents are external industry standard reference documents and should also be consulted when applicable:

- eMMC (Embedded Multi-Media Card) the eMMC electrical standard is defined by JEDEC JESD84-B45 and the mechanical standard by JESD84-C44 (www.jedec.org)
- GbE MDI (Gigabit Ethernet Medium Dependent Interface) defined by IEEE 802.3. The 1000Base-T operation over copper twisted pair cabling is defined by IEEE 802.3ab (www.ieee.org)
- The I2C Specification, Version 2.1, January 2000, Philips Semiconductor (now NXP) (www.nxp.com)
- I2S Bus Specification, Feb. 1986 and Revised June 5, 1996, Philips Semiconductor (now NXP) (www.nxp.com)
- JTAG (Joint Test Action Group) defined by IEEE 1149.1-2001 - IEEE Standard Test Access Port and Boundary Scan Architecture (www.ieee.org)
- MXM3 Graphics Module Mobile PCI Express Module Electromechanical Specification, Version 3.0, Revision 1.1, © 2009 NVIDIA Corporation (www.mxm-sig.org)
- PCI Express Specifications (www.pci-sig.org)
- SD Specifications Part 1 Physical Layer Simplified Specification, Version 3.01, May 18, 2010, © 2010 SD Group and SD Card Association (Secure Digital) (www.sdcard.org)
- SPDIF (aka S/PDIF) (Sony Philips Digital Interface) - IEC 60958-3
- SPI Bus – “Serial Peripheral Interface” – de-facto serial interface standard defined by Motorola. A good description may be found on Wikipedia (http://en.wikipedia.org/wiki/Serial_Peripheral_Interface_Bus)
- USB Specifications (www.usb.org)

3 Interface and Function Description

This chapter lists details about all different interfaces and functions on the *COM Carrier Board*.

Note that all EACOM boards may not support all interfaces and/or functions on the *COM Carrier Board*. It is the features of the specific iMX SoC that is mounted on the used EACOM board that dictates what interfaces and functions that are supported. The iMX SoC datasheets and reference manuals from NXP shall always be consulted for details about different interfaces and functions.

Figure 2 below illustrates the main external interface connectors. They are all located on the same pcb edge to simplify boxed solutions. There are some minor differences on components placement between the different board revisions, but the external connectors are placed at the same locations.

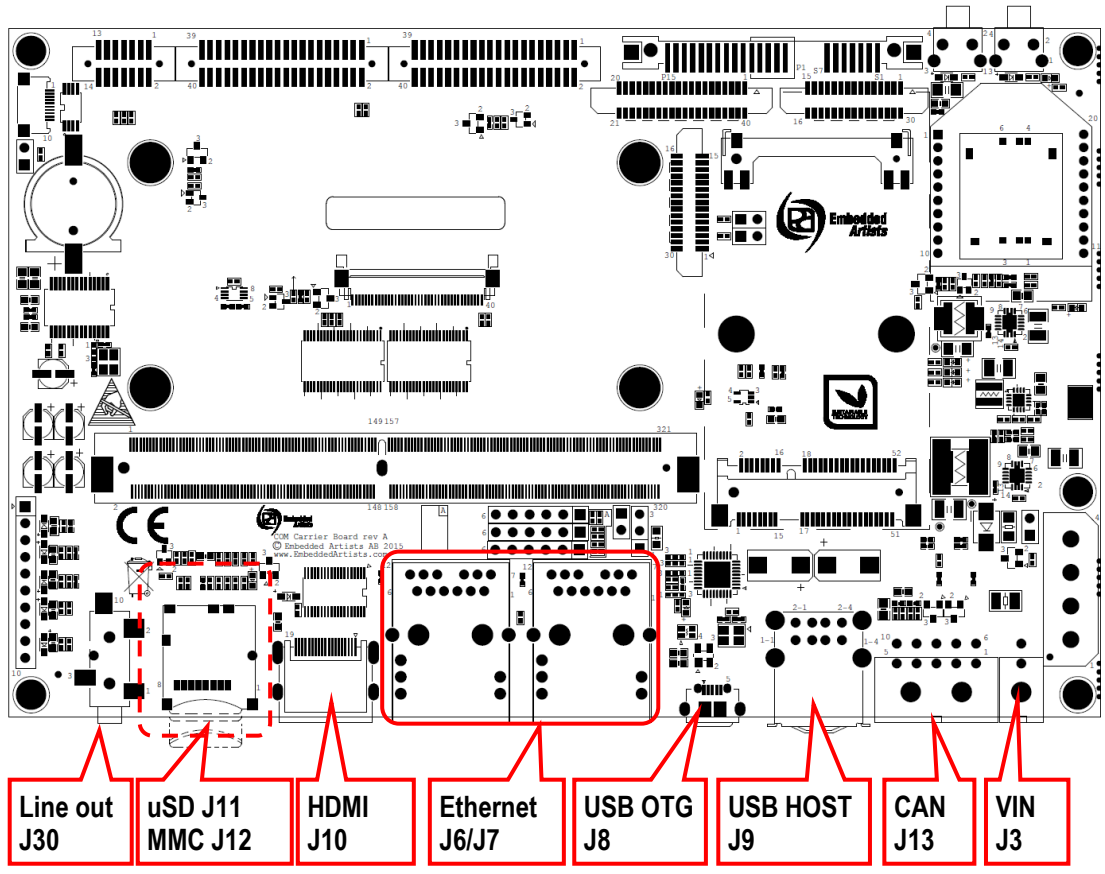

Figure 2 – COM Carrier Board, Main External Interface Connectors

The MMC connector (J12) is mounted on the bottom side under the uSD (J11) connector. The position is illustrated with the dotted line.

Figure 3 below illustrates the main internal interface connectors. There are two LVDS connectors on the bottom side. Their position is illustrated with the dotted line.

There are two types of internal interface connectors:

- Interface connectors where it is possible to **mount additional hardware**, like PCIe, SIM card holder, XBee interface connector and coin cell battery holder. Obviously the MXM3 connector for EACOM boards is also in this category.
- Interface connectors where it is possible to **access additional interfaces** but the hardware to interface must be placed on a separate board. Examples of these connectors are serial display connector, parallel camera connector, serial camera connector, power supply (ATX) connector, audio expansion connector, expansion connectors, parallel (RGB) display connector and LVDS connectors.

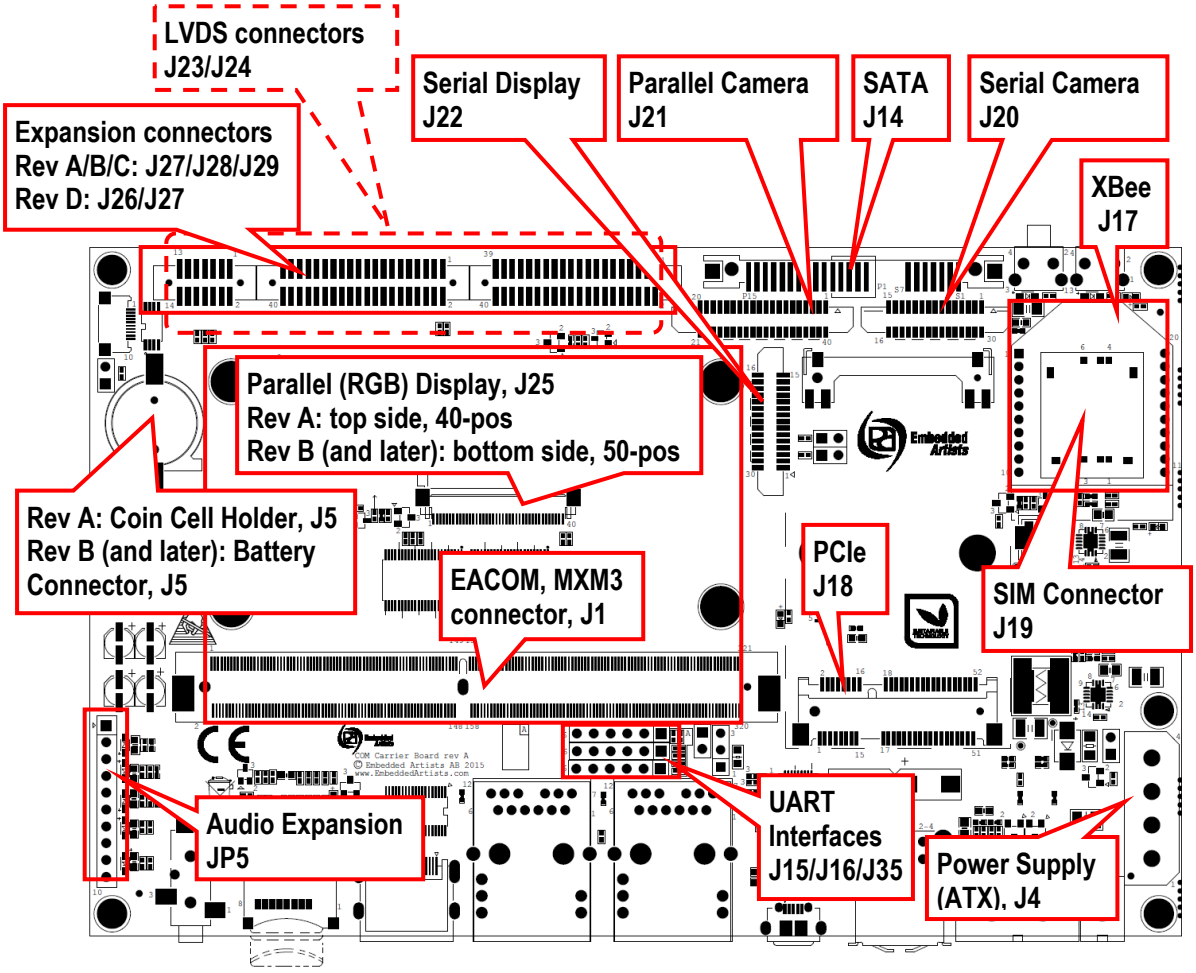

Figure 3 – COM Carrier Board, Main Internal Connectors

3.1 Power Supplies

The input voltage to the *COM Carrier Board* is 12V nominal (input range is 7-17V). There is reverse voltage protection on the input supply. There are two connectors, one external (J3) and one internal (J4), to connect the 12V. On the internal connector (J4), a 4-pos ATX Molex connector is used. The (ATX) standard for the connector has both +12V and +5V. Only the +12V supply is used to power the *COM Carrier Board*.

It is possible to measure the input current on the 12V supply via a 50 milliOhm series resistor. JP2 is connected across this series resistor. 1A input current will result in 50mV across JP2.

Figure 4 illustrates the location of the two input connectors and JP2.

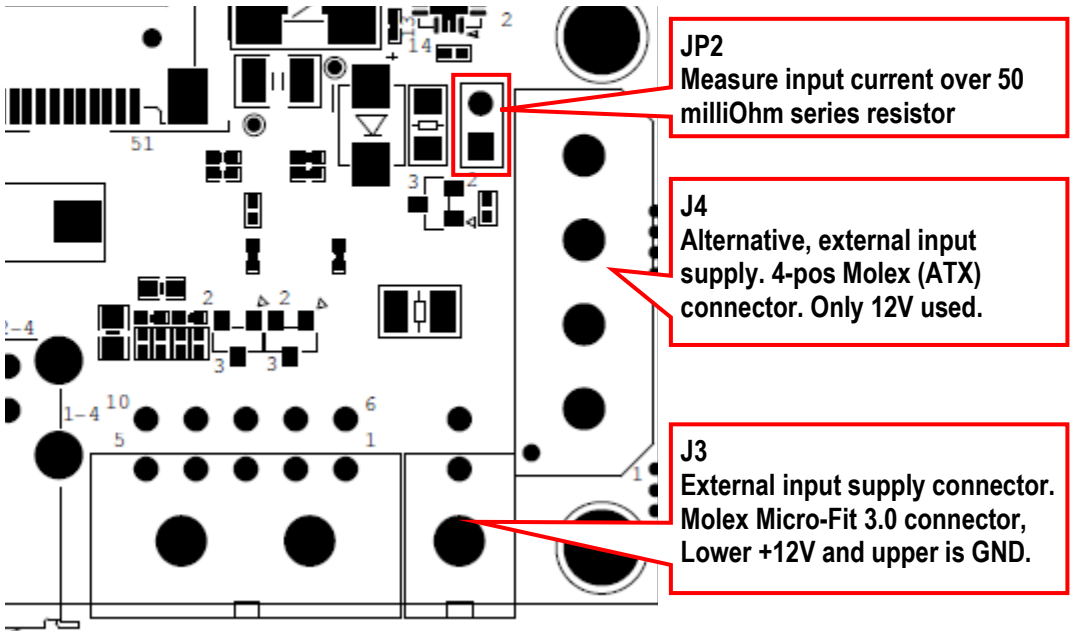

Figure 4 – COM Carrier Board, Power Supply Connectors

There are multiple DC/DC power supplies on the *COM Carrier Board*:

- 3.3V / 4A to power EACOM board and the *COM Carrier Board*. The 3.3V supply to the *COM Carrier Board* is enabled when signal PERI_PWR_EN is high.
- 5V / 3A to power the following interfaces: USB Host, HDMI, CAN, SATA, LVDS/RGB BL and expansion connectors. The 5V supply is enabled when signal PERI_PWR_EN is high.
- 3.3V / 3A (and 1.5V / 1A) to the mini PCIe interface. The supply is enabled when signal PERI_PWR_EN is high.

Figure 5 illustrates the power supply chain on the board.

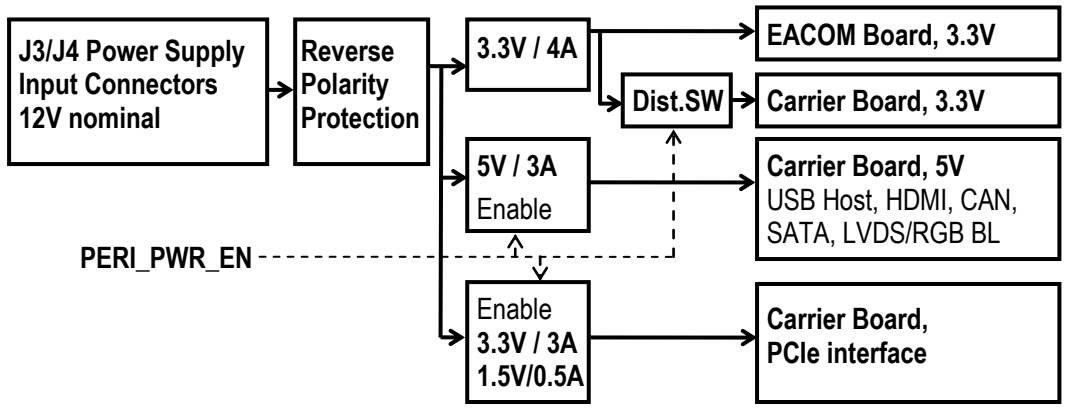

Figure 5 – COM Carrier Board, Power Supply Chain

4-pos ATX connector, J4, is 0015244449 from Molex.

2-pos connector J3 is Molex Micro-Fit 3.0 connector 0430450200.

3.1.1 VBAT Supply, COM Carrier Board rev A

EACOM boards have a VBAT input that powers an internal RTC on the boards. Figure 6 illustrates the location of the coin cell battery holder, J5, which can hold a CR1216/1220 sized coin cell.

It is possible to measure VBAT current via a 1Kohm series resistor. JP3 is connected across this series resistor. 100uA input current will result in 100mV across JP3.

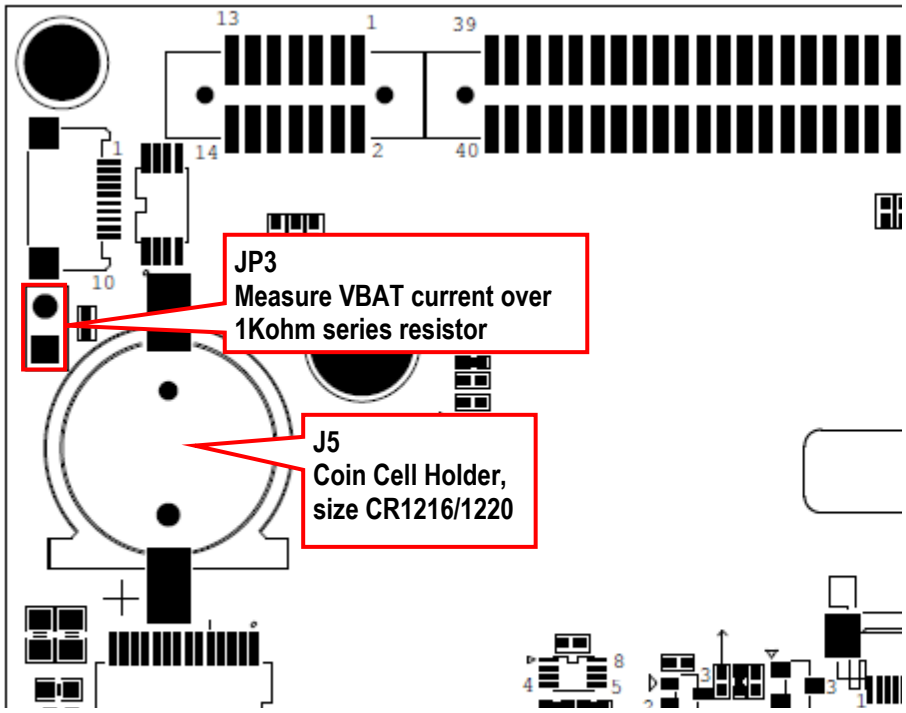

Figure 6 – COM Carrier Board rev A, VBAT Coin Cell Holder Connector

3.1.2 VBAT Supply, COM Carrier Board rev B (and later revisions)

EACOM boards have a VBAT input that powers an internal RTC on the boards. The *COM Carrier Board* rev B contains an on-board Li-Ion / Li-Polymer battery charger MCP73831T-2ACI/OT from Microchip. For exact details about the battery charger, see the MCP73831T-2ACI/OT datasheet.

Charging is set to 4.2V/50mA and input voltage is +5V.

Figure 7 illustrates the location of the external Li-Ion / Li-Polymer battery connector, J5, which is B2B-PH-SM4-TB, a 2mm pitch connector from JST. LED7 is a charge status indicator LED.

It is possible to measure VBAT current via a 1Kohm series resistor. JP3 is connected across this series resistor. 100uA input current will result in 100mV across JP3.

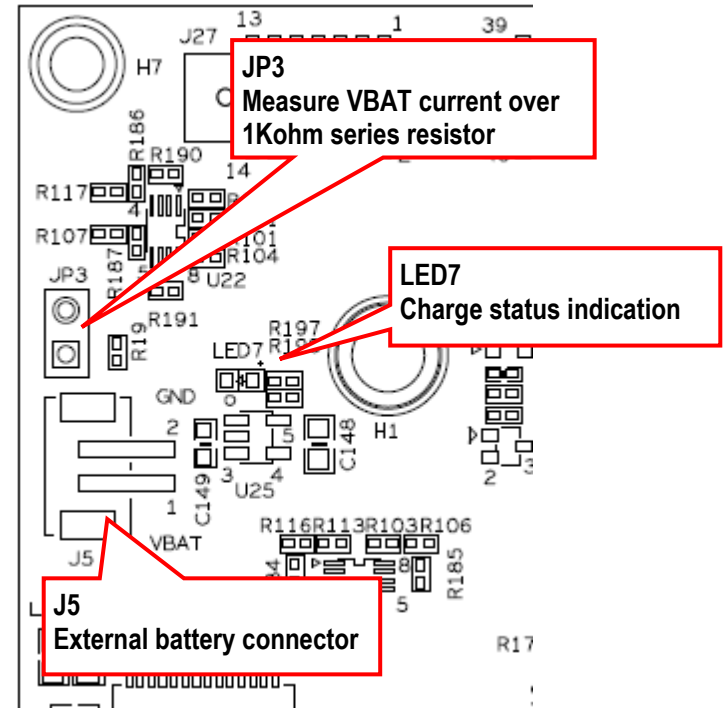

Figure 7 – COM Carrier Board rev B/C, VBAT Coin Cell Holder Connector

Battery connector, J5, is B2B-PH-SM4-TB from JST.

3.1.3 Grounding

There are five mounting holes on the *COM Carrier Board*. All holes shall typically be connected to ground, via a screw. One of the holes, the lower right corner (see Figure 3) is ground for the external connectors' metal cases (USB OTG, USB Host, 2xEth, HDMI). This ground connection will improve ESD protection. The mounting hole in the lower left corner (see Figure 3) is ground for the audio line output.

3.2 Ethernet Interfaces

EACOM boards have up to two Ethernet interfaces (Gigabit and 10/100Mbps). There are two Gigabit and 10/100Mpbs capable Ethernet interface connectors on the *COM Carrier Board*. These connectors are also known as 1000 Base-T RJ45 connectors with integrated transformers. Figure 8 illustrates the location of the two connectors. J6 is located to the left and is Ethernet interface #1. J7 is located to the right and is Ethernet interface #2.

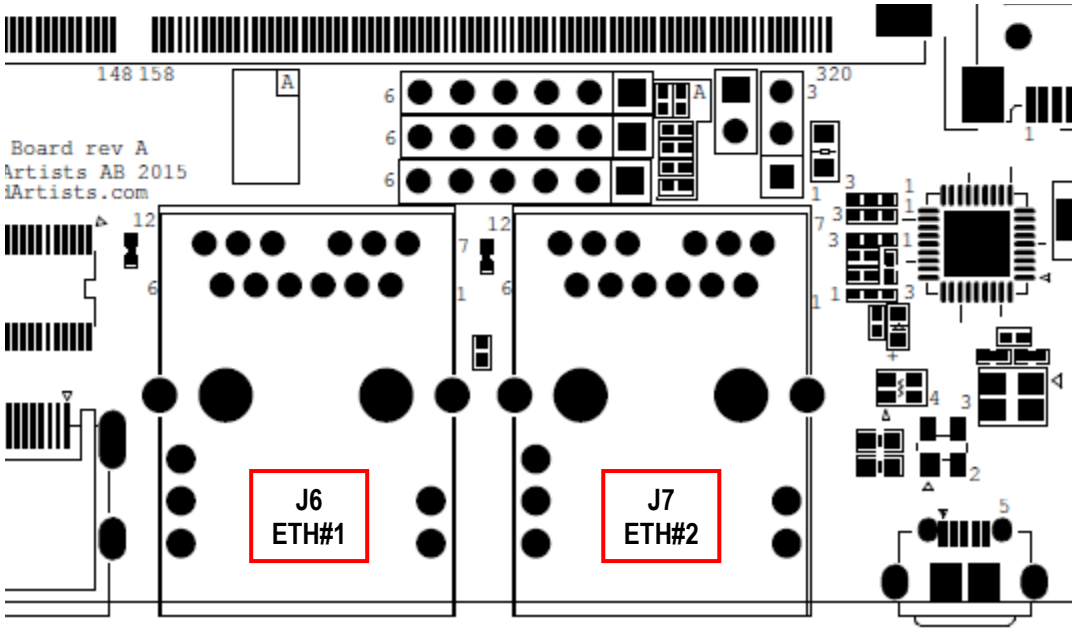

Figure 8 – COM Carrier Board, Dual Ethernet Connectors

There are three LEDs on the RJ45 connectors. These are connected to the activity, 100M link and 1000M link signals from the EACOM board.

Ethernet connectors, J6 and J7, are L829-1J1T-43 from Bel Fuse Inc.

3.3 USB OTG Interfaces

EACOM boards have one USB3.0 OTG interface. The *COM Carrier Board* implements a USB2.0 OTG interface that is accessed via J8, see Figure 9 below. J8 is a micro-AB USB connector.

An USB3.0 interface is backward compatible with USB2.0. The pins that are specific for USB 3.0 are just left unconnected and are for future upgrade.

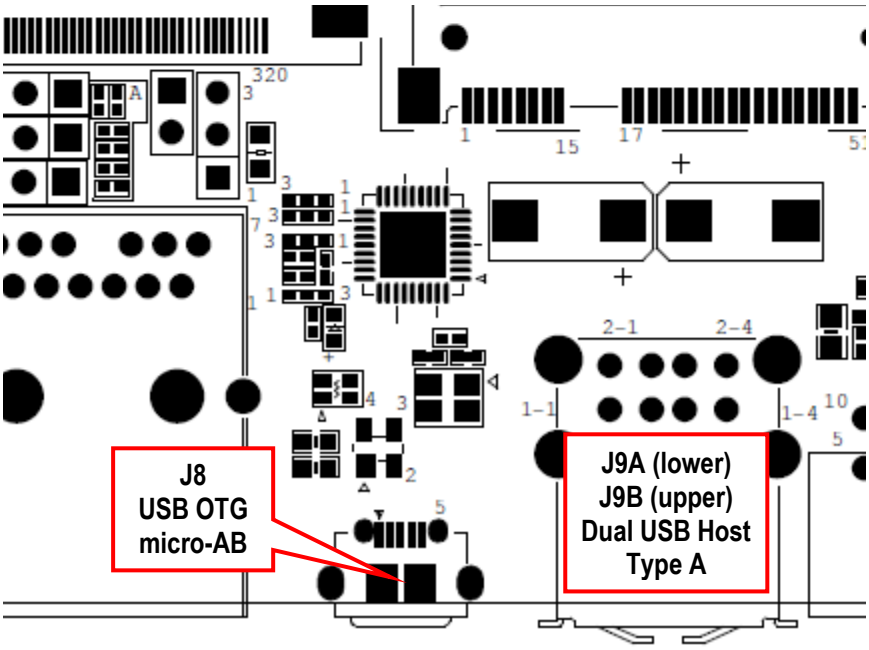

Figure 9 – COM Carrier Board, USB OTG and USB HOST

USB OTG micro-AB connector, J8, is ZX62D-AB-5P8 from Hirose.

3.4 Dual USB Host Interfaces

EACOM boards have two USB3.0 Host interfaces, one USB3.0 (primary, #1) and one USB2.0 (secondary, #2). The *COM Carrier Board* connects a 3-port USB hub to the (primary, #1) USB3.0 Host interface. The USB hub has USB2.0 interface to the EACOM board. USB 3.0 is backward compatible with USB 2.0. The pins that are specific for USB 3.0 are just left unconnected.

Two of the Host ports are available as external USB2.0 Host interfaces (J9A/J9B connector). The third port is connected to the mini PCIe interface connector. Some mini PCIe cards use the USB channel instead of the PCIe interface to communicate. This is for example common for cellular RF modems.

Figure 9 above illustrates the location of the two USB2.0 Host ports, J9A and J9B.

Dual USB Host connector, J9, is 1002-004-01010 from CNC Tech.

3.5 HDMI Interface

EACOM boards have one HDMI interface. The *COM Carrier Board* implements one HDMI interface connector, with associated ESD protection, that can be accessed via connector J10. Figure 10 illustrates the location of the HDMI (J10) connector. It is a female/receptacle, type A (full size) connector.

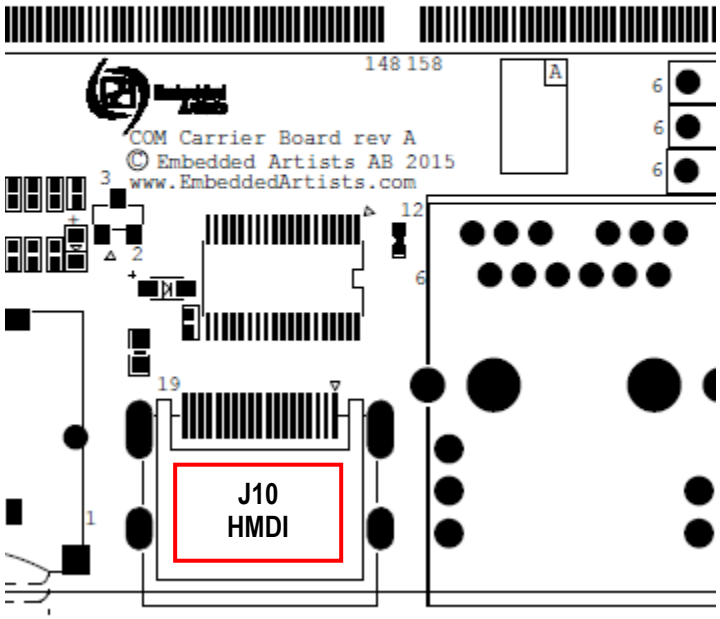

Figure 10 – COM Carrier Board, HDMI Connector

Note that the HDMI interface is not working properly on COM Carrier Board rev A. It function correctly on subsequent revisions of the board.

3.6 uSD/MMC Interfaces

EACOM boards have one 4-bit SD/MMC interface and one 8-bit SD/MMC interface. The *COM Carrier Board* implements the 4-bit SD/MMC interface. The 8-bit interface is left completely unconnected.

Note that there are two different connectors in parallel, one uSD and one SD/MMC. Only one at a time can be used.

Power to the memory card interfaces are controlled by signal GPIO_28 (active high). LED2 is on when power to the memory card is on. Card detect is input via signal GPIO_29 (active low).

Figure 11 illustrates the location of the uSD connector (J11) and the MMC connector (J12).

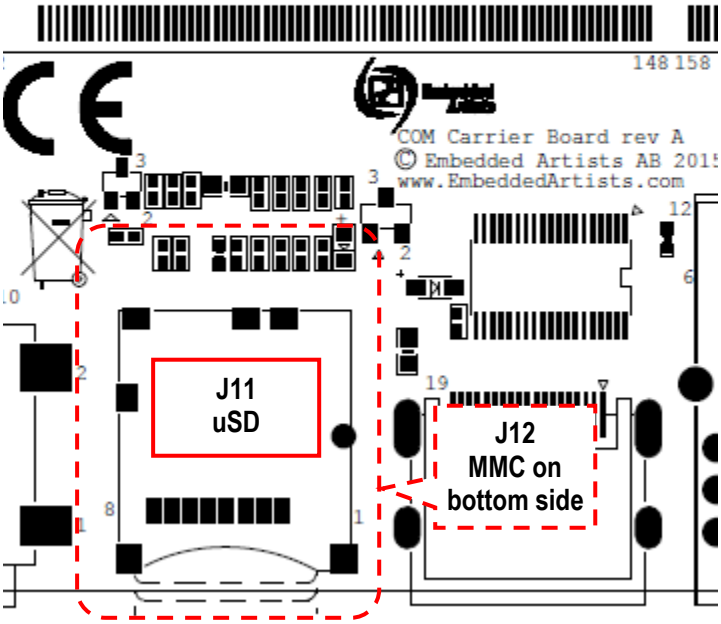

Figure 11 – COM Carrier Board, uSD/MMC Connectors

uSD connector, J11, is 502570-0893 from Molex.

SD connector, J12, is SDDMF-0T901B002 from Kingfont.

3.7 CAN Interfaces

EACOM boards have two CAN interfaces. The *COM Carrier Board* implements these two interfaces with CAN transceivers and ESD protection.

The two CAN channels are accessed via a 10-position Molex Micro-Fit 3.0. Position 1-5 (channel #1) are on the lower row and position 6-10 (channel #2) are on the upper row:

Connector Pin	Signal	Note
1	GND	
2	CAN1L	Data signal (L) for channel #1
3	CAN1L termination	Connect to pin 2 to enable termination
4	CAN1H	Data signal (H) for channel #1
5	CAN1H termination	Connect to pin 4 to enable termination
6	GND	
7	CAN2L	Data signal (L) for channel #2
8	CAN2L termination	Connect to pin 7 to enable termination
9	CAN2H	Data signal (H) for channel #2
10	CAN2H termination	Connect to pin 9 to enable termination

The CAN transceivers have a standby mode that is controlled by GPIO_31. A low level activates the transceivers and a high level place them in a standby/inactive mode.

Figure 12 illustrates the location of the 10-position Molex Micro-Fit 3.0 connector (J13).

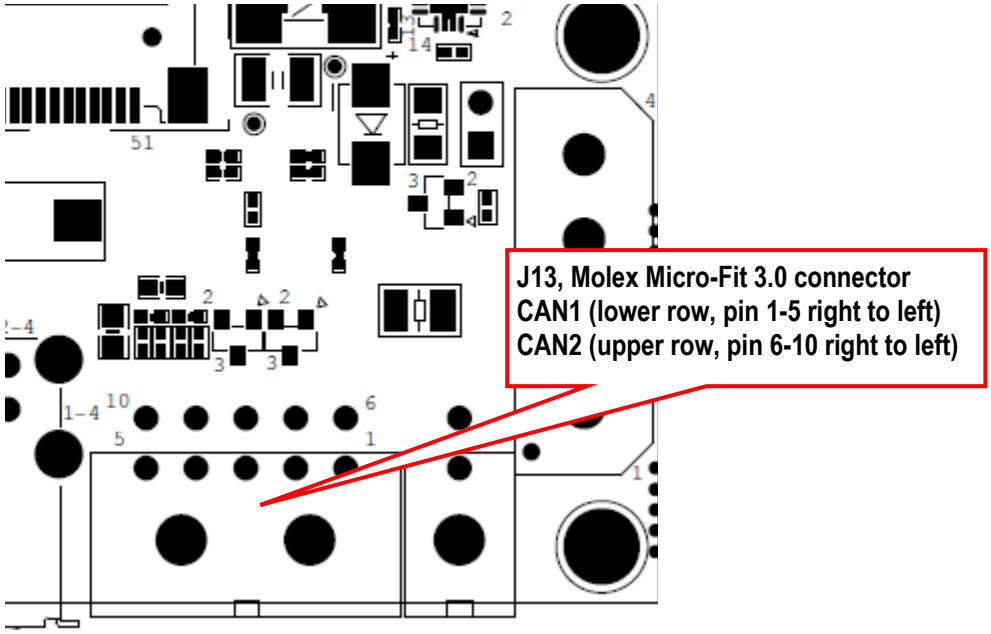

Figure 12 – COM Carrier Board, CAN Interface Connector

Connector J13 is Molex Micro-Fit 3.0 connector 0430451000.

3.8 SATA Interface

EACOM boards have one internal SATA interface. The *COM Carrier Board* implements this interface via connector J14.

The SATA connector consists of two parts, one *SATA Data* connector (with 7 positions) and one *SATA Power* connector (with 15 positions). The *SATA Power* connector has +5V power supply connected, which is the most common supply voltage. The +12V supply is left unconnected (as well as the now depreciated +3.3V supply).

The SATA connector, J14, is 1735284-3 from TE Connectivity/AMP Connectors. Figure 13 illustrates the location of the SATA connector (J14).

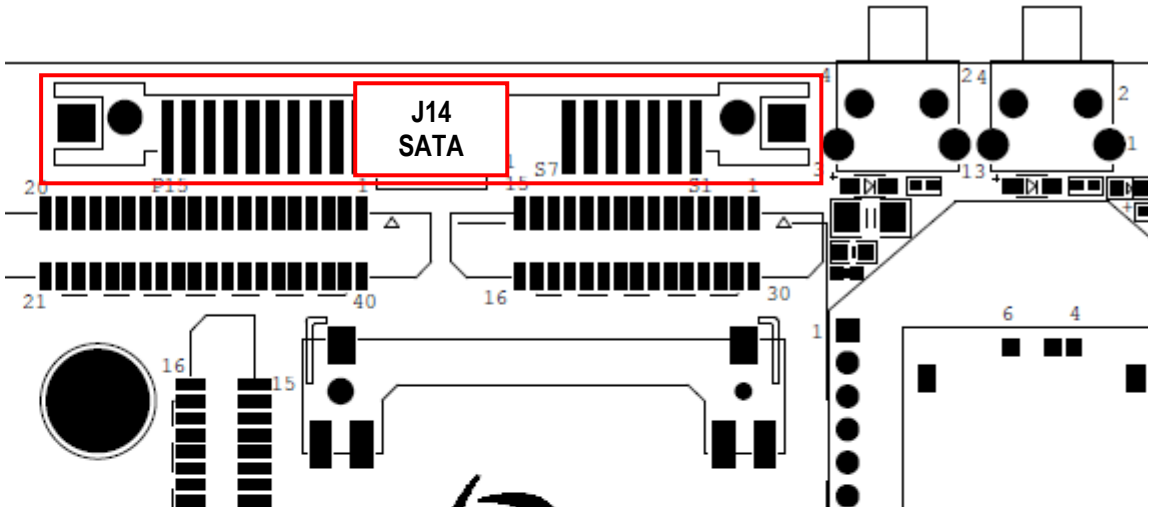

Figure 13 – COM Carrier Board, SATA Interface Connector

3.9 UART Interfaces

EACOM boards have three UART interfaces. The *COM Carrier Board* gives access to these three interfaces via 6-pos connectors that are compatible with FTDI's UART-to-USB bridge cables (model: TTL-232R-3V3 and TTL-232R-RPi). Only RX/TX is connected, not RTS/CTS.

J35 connected to EACOM UART channel A. J15 connected to EACOM UART channel B. J16 connected to EACOM UART channel C. Note that UART channel B is also connected to XBee interface, see section 3.10 . These interfaces cannot be used simultaneous.

Figure 14 illustrates the location of the UART connectors (J15, J16, J35).

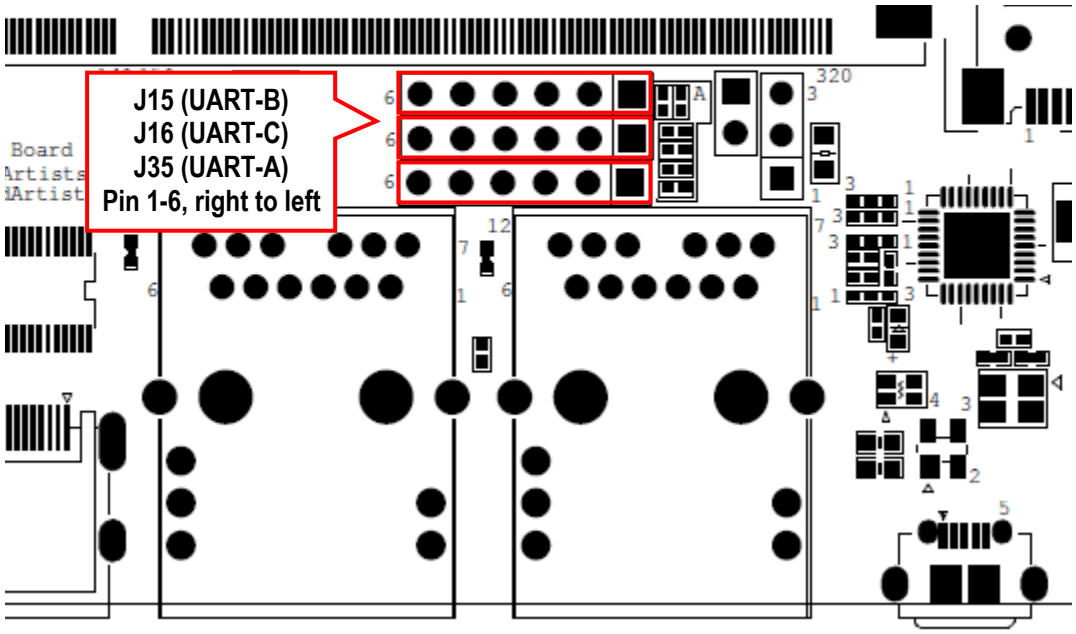

Figure 14 – COM Carrier Board, UART Interface Connectors

3.10 XBee Compatible Interface

The *COM Carrier Board* implements one XBee compatible interface that is connected to UART channel B and part of UART channel A (as GPIO signals). Note that UART channel B is also connected to FTDI-compatible connector J15. These interfaces cannot be used simultaneous.

XBee Signal	XBee Connector Pin	EACOM Signal	Note
DIN	3	UART-B_TXD	UART-B used as UART channel with hardware flow control. Note that flow control signals must be GPIOs on rev A boards.
DOUT	2	UART-B _RXD	
CTS	12	UART-B _CTS on rev A boards UART-B _RTS on rev B/C boards	
RTS	4	UART-B _RTS on rev A boards UART-B _CTS on rev B/C boards	
CD	4	UART-A_RTS	Used as GPIO
DTR	9	UART-A_CTS	Used as GPIO
ON	13	GPIO_6	Used as GPIO
RESET	5	RESET_OUT on rev A boards CSI_DATA02 on rev B/C boards	

Figure 15 illustrates the location of the XBee connector (J17).

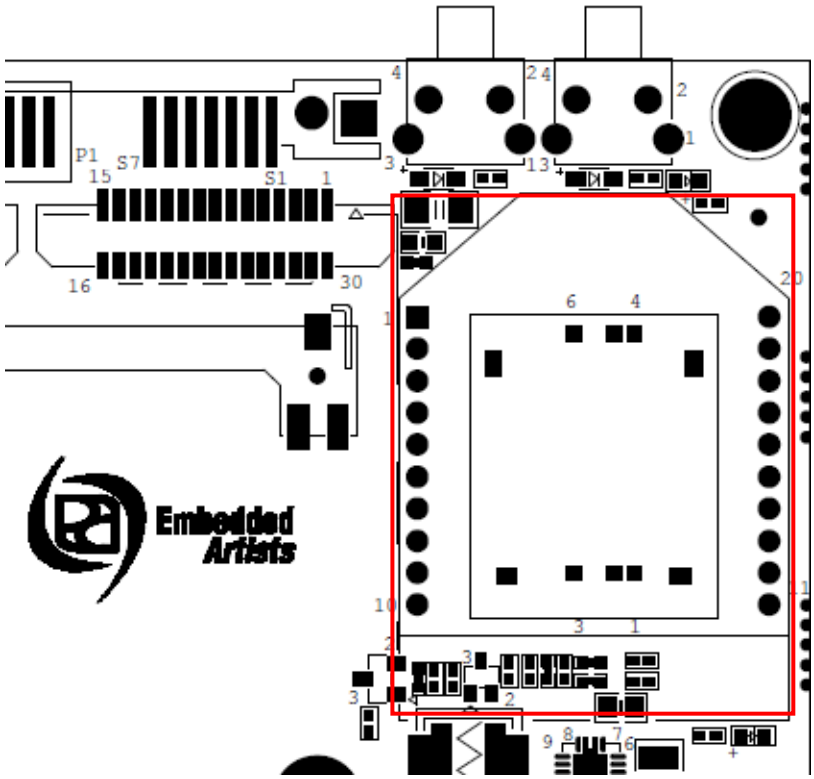

Figure 15 – COM Carrier Board, XBee Interface Connector

3.11 PCIe Interface

EACOM boards have a PCIe interface. The *COM Carrier Board* implements one mini PCIe interface. Both half and full size mini PCIe boards are supported in connector J18. There are a couple of GPIO signals that are used to implement the interface and also USB, I2C and SIM card interfaces:

- The Wake# signal (pin 1 on the mini PCIe connector, J18) is controlled by GPIO_0.
- The PERST# signal (pin 22 on the mini PCIe connector, J18) is controlled by GPIO_1.
- The W_DISABLE# signal (pin 20 on the mini PCIe connector, J18) is controlled by GPIO_30.
- There is a USB Host interface connected, to support PCIe boards that use the USB interface instead of PCIe to communicate.
- I2C interface, connected to I2C channel C
- SIM card holder, J19, is connected to the mini PCIe connector, J18, to support cellular modems.

Further, there are three LEDs (LED4, LED5, LED6) that are connected to the mini PCIe connector in a standard way, signaling: WWAN, WLAN and WPAN, respectively.

There is a 3.3V / 3A power supply that is dedicated to the mini PCIe. Signal PERI_PWR_EN controls the power supply. 1.5V / 500mA is generated from the 3.3V supply.

Figure 16 illustrates the location of the mini PCIe connector (J18) and associated SIM card connector (J19).

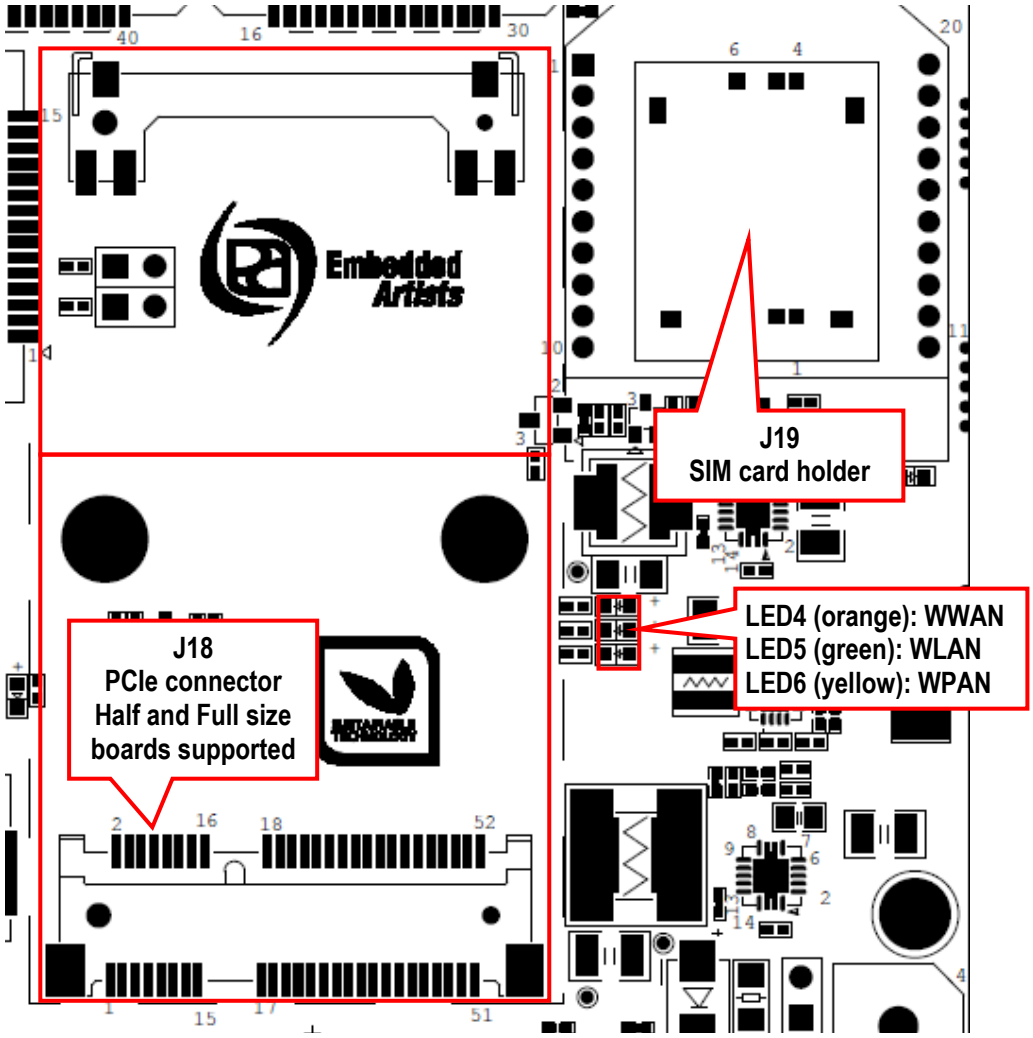

Figure 16 – COM Carrier Board, mini PCIe and SIM Card Connector

3.12 Serial Camera Interface

EACOM boards have one serial camera interface (MIPI CSI-2). The *COM Carrier Board* implements this interface with a 15 position, 1mm pitch FPC connector (J20). The FPC connector, J20, is 1-1734248-5 from TE Connectivity. Two data lanes (besides the clock) are supported by the connector. Figure 17 illustrates the location of J20.

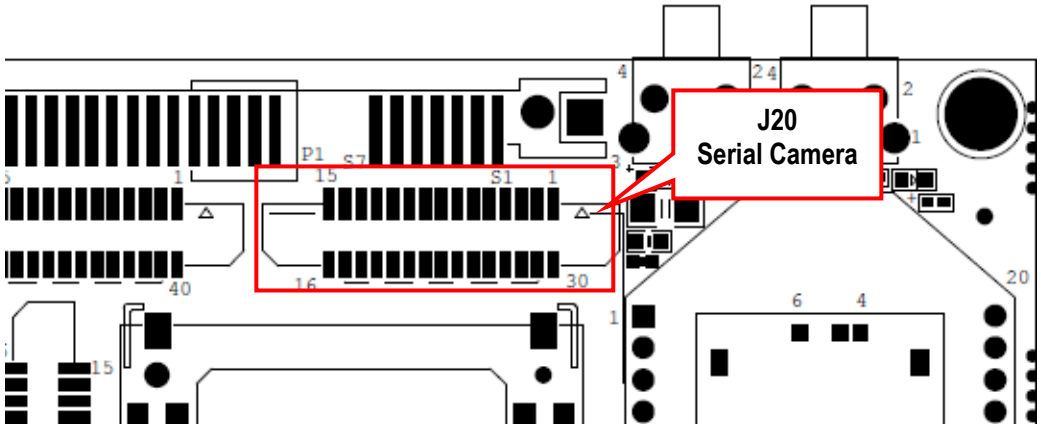

Figure 17 – COM Carrier Board, Serial Camera Interface Connector

The 15 position FPC connector (J20) is compatible with the RPi camera connector and has the following pinning:

J20 position	EACOM position	Signal
1		GND
2	S137/279	CSI_D0M
3	S138/281	CSI_D0P
4		GND
5	S134/273	CSI_D1M
6	S135/275	CSI_D1P
7		GND
8	S140/285	CSI_CLK0M
9	S141/287	CSI_CLK0P
10		GND
11	S113/231	SCAM_DATA, GPIO_32
12	S112/229	SCAM_CLK, GPIO_33
13	S47/93	SCAM_I2C_SCL, indirectly I2C-A_SCL
14	S46/91	SCAM_I2C_SDA, indirectly I2C-A_SDA
15		+3.3V, controlled by signal PERI_PWR_EN

3.13 Parallel Camera Interface

EACOM boards have one parallel camera interface. The *COM Carrier Board* implements this interface with a 20 position, 1mm pitch FPC connector (J21). The FPC connector, J21, is 2-1734248-0 from TE Connectivity. Figure 18 illustrates the location of J21.

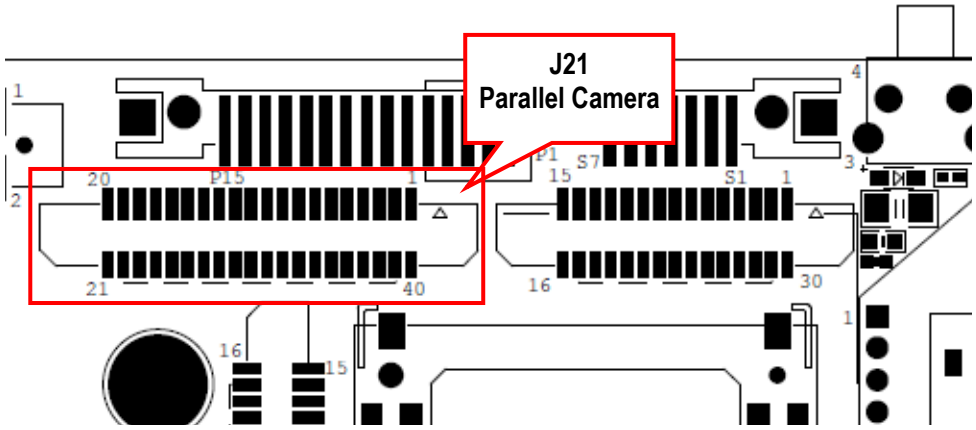

Figure 18 – COM Carrier Board, Parallel Camera Interface Connector

The different iMX6/7 SoC typically supports many different input formats on the parallel camera interface. See the reference manual for the specific SoC used on the EACOM board for details.

The 20 position FPC connector (J21) has the following pinning:

J21 position	EACOM position	Signal
1		GND
2	S126/257	CSI_DATA7
3	S125/255	CSI_DATA6
4	S124/253	CSI_DATA5
5	S123/251	CSI_DATA4
6	S122/249	CSI_DATA3
7	S121/247	CSI_DATA2
8	S120/245	CSI_DATA1
9	S119/243	CSI_DATA0
10		GND
11	S117/239	CSI_PIXCLK
12	S116/237	CSI_MCLK
13	S115/235	CSI_VSYNC
14	S114/233	CSI_HSYNC
15		GND
16	P143/294	RESET_OUT
17	S47/93	PCAM_I2C_SCL, indirectly I2C-A_SCL
18	S46/91	PCAM_I2C_SDA, indirectly I2C-A_SDA
19		+3.3V, controlled by signal PERI_PWR_EN
20		+3.3V, controlled by signal PERI_PWR_EN

3.14 High Speed Serial: Serial Display (MIPI-DSI) or VADC Interface

EACOM boards have type specific pins that are not dedicated to a specific interface, but rather to iMX SoC type specific interfaces. The *COM Carrier Board* implements an interface for six (serial) high-speed signals with a 15 position, 1mm pitch FPC connector (J22). The FPC connector, J22, is 1-1734248-5 from TE Connectivity. Figure 19 illustrates the location of J22. This connector carries signals that on some EACOM boards (iMX6 Quad / Dual / DualLite, iMX7 Dual / Solo) are used for a serial display interface (MIPI-DSI, two lanes). On another EACOM board (iMX6 SoloX) the signals are used for Video ADC inputs.

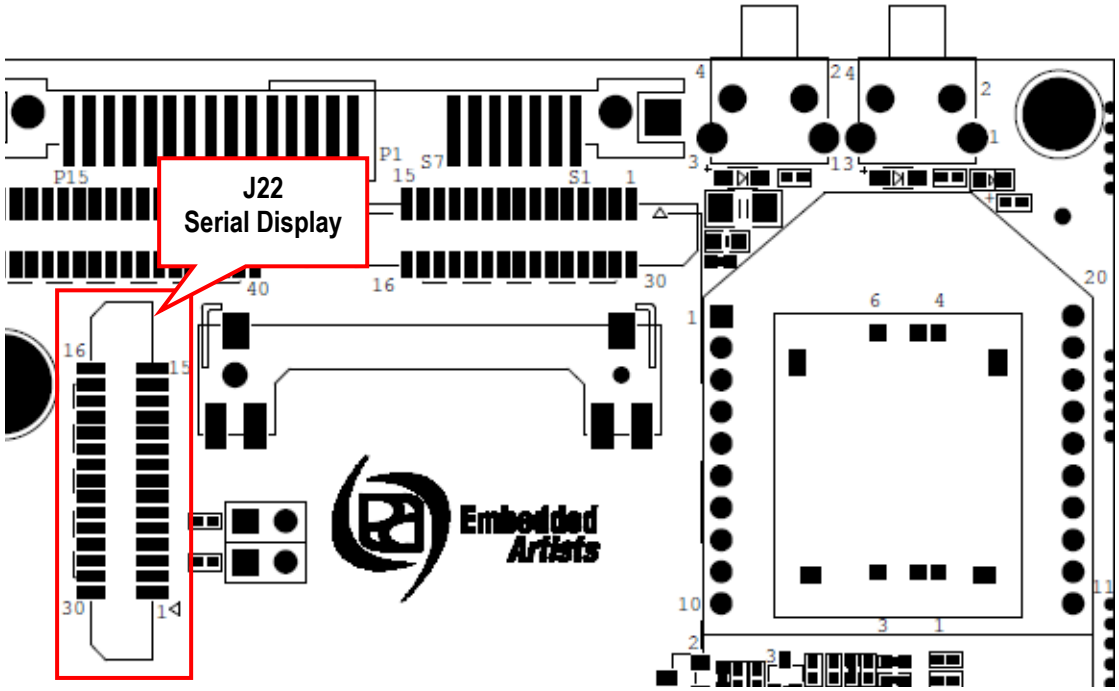

Figure 19 – COM Carrier Board, Serial Display (DSI/MIPI) Interface Connector

The 15 position FPC connector (J22) has the following pinning:

J22 position	EACOM position	Signal
1		GND
2	S96/197	Type specific, DSI_DN1 / ADC1_IN1 **If using DSI_DN1 on COM Carrier Board, rev A/B contact Embedded Artists for a rework instruction**.
3	S97/199	Type specific, DSI_DP1 / ADC1_IN0 **If using DSI_DN1 on COM Carrier Board, rev A/B contact Embedded Artists for a rework instruction.**
4		GND
5	S102/209	Type specific, DSI_CN / VADC_IN1
6	S103/211	Type specific, DSI_CP / VADC_IN0
7		GND
8	S99/203	Type specific, DSI_DN0 / VADC_IN3
9	S100/205	Type specific, DSI_DP0 / VADC_IN2

10	GND
11	Not connected
12	Not connected
13	GND
14	+3.3V, controlled by signal PERI_PWR_EN
15	+3.3V, controlled by signal PERI_PWR_EN

3.15 LVDS Interfaces

EACOM boards have two LVDS interfaces. The *COM Carrier Board* implements these two interfaces via connectors J23 and J24. Figure 20 illustrates the location of these connectors on the bottom side.

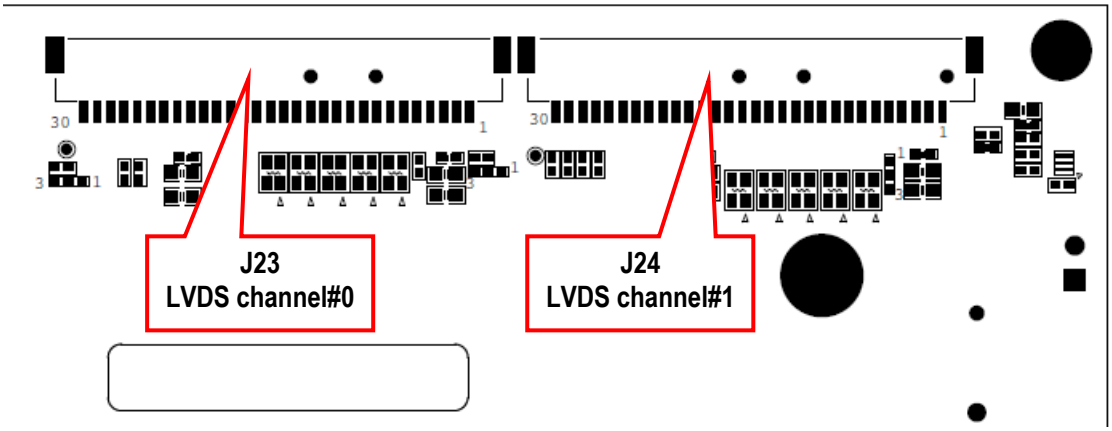

Figure 20 – COM Carrier Board, LVDS Interface Connectors on Bottom Side

18-bit color depth is supported by default since three (of the four) data pairs are available on the connectors. For 24-bit color depth, the fourth data pair can be made available by removing the I2C channel for reading EDID information.

The 30 position connector (J23) has the following pinning:

J23 position	EACOM position	Signal
1	S54/107	Display enable signal (active high), controlled by signal DISP_PWR_EN
2, 3, 4		+3.3V, controlled by signal PERI_PWR_EN
5	P138/284	Backlight contrast control, controlled by signal PWM_1
6	S49/97 (rev A) S47/93 (rev B) (S33/65)	LVDS0_I2C_SCL_EDID, connected to I2C-B_SCL (on rev A), connected to I2C-A_SCL (on rev B) Can alternatively be connected to LVDS0_DATA3_N
7	S48/95 (rev A) S46/91 (rev B) (S32/63)	LVDS0_I2C_SDA_EDID, connected to I2C-B_SDA (on rev A), connected to I2C-A_SDA (on rev B) Can alternatively be connected to LVDS0_DATA3_P
8	S42/83	LVDS0_DATA0_N
9	S41/81	LVDS0_DATA0_P

10		GND
11	S39/77	LVDS0_DATA1_N
12	S38/75	LVDS0_DATA1_P
13		GND
14	S36/71	LVDS0_DATA2_N
15	S35/69	LVDS0_DATA2_P
16		GND
17	S45/89	LVDS0_CLK_N
18	S44/87	LVDS0_CLK_P
19		GND
20, 21, 24, 25, 26	indirectly S55/109	Backlight power supply, +5V, controlled by signal BL_PWR_EN
22, 23		GND
27	S49/97 (rev A) S47/93 (rev B)	Touch controller I2C channel, LVDS0_I2C_SCL_TCH, connected to I2C-B_SCL (rev A), connected to I2C-A_SCL (rev B)
28	S48/95 (rev A) S46/91 (rev B)	Touch controller I2C channel, LVDS0_I2C_SDA_TCH, connected to I2C-B_SDA (rev A), connected to I2C-A_SDA (rev B)
29	S53/105	Touch controller interrupt signal, connected to signal TP_IRQ
30		Not connected

The 30 position connector (J24) has the following pinning:

J24 position	EACOM position	Signal
1	P116/240	Display enable signal (active high), controlled by signal GPIO_3
2, 3, 4		+3.3V, controlled by signal PERI_PWR_EN
5	P138/284	Backlight contrast control, controlled by signal PWM_1
6	S51/101 (S18/35)	LVDS1_I2C_SCL_EDID, connected to I2C-C_SCL Can alternatively be connected to LVDS1_DATA3_N
7	S50/99 (S17/33)	LVDS1_I2C_SDA_EDID, connected to I2C-C_SDA Can alternatively be connected to LVDS1_DATA3_P
8	S27/53	LVDS1_DATA0_N
9	S26/51	LVDS1_DATA0_P
10		GND
11	S24/47	LVDS1_DATA1_N

12	S23/45	LVDS1_DATA1_P
13		GND
14	S21/41	LVDS1_DATA2_N
15	S20/39	LVDS1_DATA2_P
16		GND
17	S30/59	LVDS1_CLK_N
18	S29/57	LVDS1_CLK_P
19		GND
20, 21, 24, 25, 26	indirectly P115/238	Backlight power supply, +5V, controlled by signal GPIO_4
22, 23		GND
27	S51/101	Touch controller I2C channel, LVDS1_I2C_SCL_TCH, connected to I2C-C_SCL
28	S50/99	Touch controller I2C channel, LVDS1_I2C_SDA_TCH, connected to I2C-C_SDA
29	P114/236	Touch controller interrupt signal, connected to signal GPIO_5
30		Not connected

LVDS interface connectors , J23 and J24, are DF19G-30P-1H(56) from Hirose.

3.16 Rev A: Parallel (RGB) Display Interface

EACOM boards have one 24-bit parallel (RGB) display interface. The *COM Carrier Board* rev A implements this interface along with a resistive touch controller, AR1021 from Microchip.

Figure 21 illustrates the location of the 40 position FPC connector (J25). On the bottom side there is also a 4 position FPC connector (J36) for the resistive touch panel.

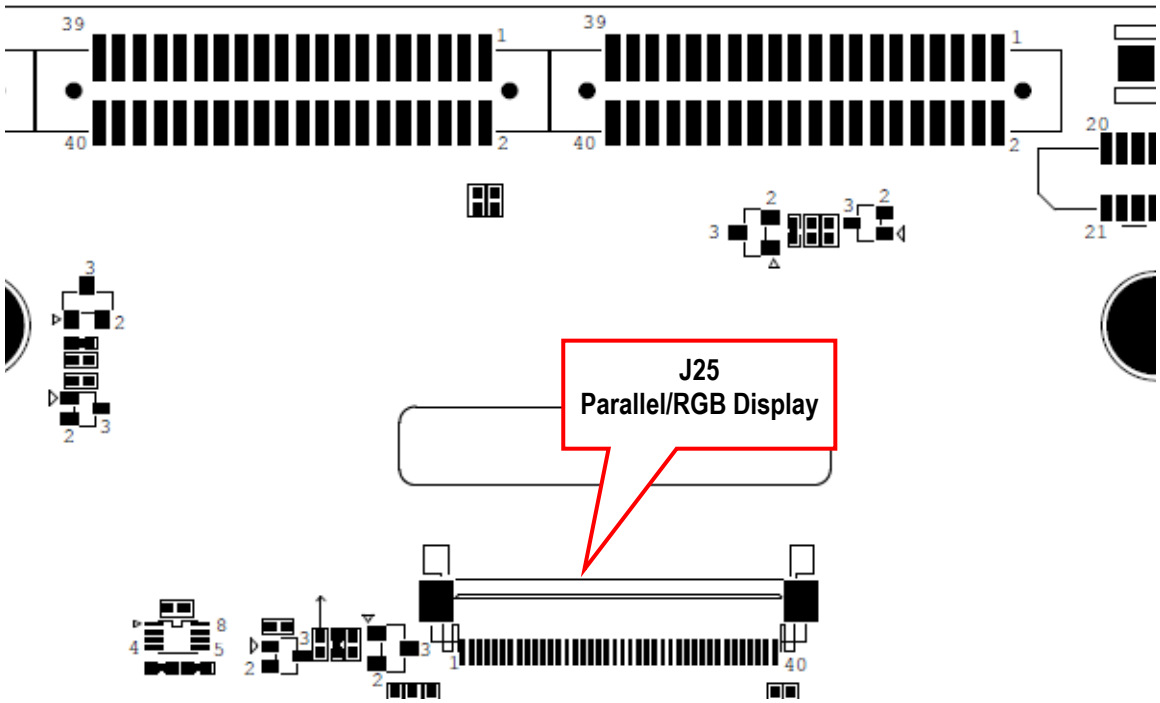

Figure 21 – COM Carrier Board rev A, Parallel (RGB) Display Interface Connector

The 40 position FPC connector (J25) has a pinning that is common for many 7 inch LCDs and supports 18-bit color depth (6 bits per color). J25 has the following pinning:

J25 position	EACOM position	Signal
1, 2	indirectly S55/109	Backlight power supply, +5V, controlled by signal BL_PWR_EN
3	S56/111	Backlight contrast control, controlled by signal BL_CONTRAST_PWM
4,5		Ground for backlight power supply
6, 7	indirectly S54/107	+3.3V power supply to LCD, controlled by signal DISP_PWR_EN
8		LCD mode control. Set high as default. High = DE mode (HSYNC/VSYNC not used by LCD) Low = HV mode (DEN signal not used by LCD)
9	S87/179	LCD data enable signal (DEN)
10	S86/177	LCD vertical sync signal (VS), also called frame sync
11	S85/175	LCD horizontal sync signal (HS), also called line sync
12, 16, 20, 24,		GND

28, 32, 36, 38		
13	S82/169	LCD data signal, Blue7 (MSB)
14	S81/167	LCD data signal, Blue6
15	S80/165	LCD data signal, Blue5
17	S79/163	LCD data signal, Blue4
18	S78/161	LCD data signal, Blue3
19	S77/159	LCD data signal, Blue2 (LSB)
21	S73/145	LCD data signal, Green7 (MSB)
22	S72/143	LCD data signal, Green6
23	S71/141	LCD data signal, Green5
25	S70/139	LCD data signal, Green4
26	S69/137	LCD data signal, Green3
27	S68/135	LCD data signal, Green2 (LSB)
29	S65/129	LCD data signal, Red7 (MSB)
30	S64/127	LCD data signal, Red6
31	S63/125	LCD data signal, Red5
33	S62/123	LCD data signal, Red4
34	S61/121	LCD data signal, Red3
35	S60/119	LCD data signal, Red2 (LSB)
37	S83/171	LCD pixel clock signal
39		LCD left/right control pin, set high as default
40		LCD up/down control pin, set low as default

Because of portability, the *EACOM Board specification* defines a 24-bit parallel LCD interface. Even though only 18 bits are used, the LCD interface shall be setup for 24-bit mode. The two lower bits in each color is just discarded.

Due to EMI consideration, it is recommended not to run the parallel (RGB) display interface at too high pixel clock rate. Having many signals in parallel that switch as high clock rate will generate a considerable amount of EMI. LVDS, HDMI and DSI are better interface choices for high resolution displays.

3.17 Rev B (and later revisions): Parallel (RGB) Display Interface

EACOM boards have one 24-bit parallel (RGB) display interface that is made available on J25. Figure 22 illustrates the location of the 50 position FPC connector (J25) on the bottom side of the board.

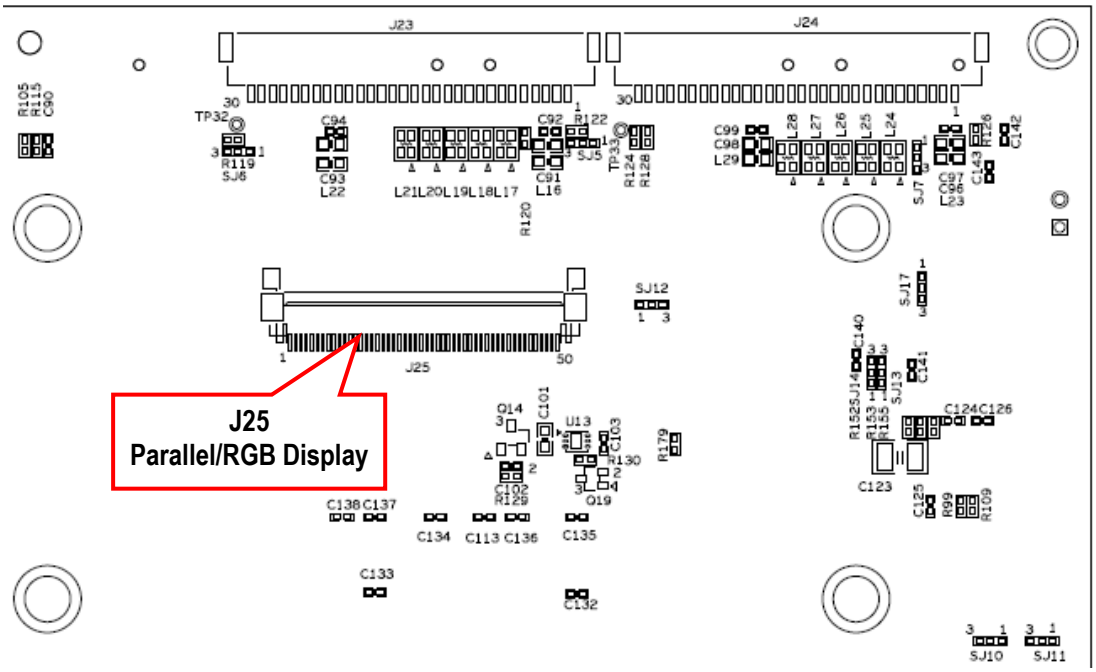

Figure 22 – COM Carrier Board rev B, Parallel (RGB) Display Interface Connector

The 50 position FPC connector (J25) has all 24 bits available. It has the following pinning:

J25 position	EACOM position	Signal
1, 2	Indirectly S55/109	Backlight power supply, +5V, controlled by signal BL_PWR_EN
3	S56/111	Backlight contrast control, controlled by signal BL_CONTRAST_PWM
4,5		Ground for backlight power supply
6	S83/171	LCD pixel clock signal
7		GND
8	S87/179	LCD data enable signal (DEN)
9	S86/177	LCD vertical sync signal (VS), also called frame sync
10	S85/175	LCD horizontal sync signal (HS), also called line sync
11		GND
12	S82/169	LCD data signal, Blue7 (MSB)
13	S81/167	LCD data signal, Blue6
14	S80/165	LCD data signal, Blue5
15		GND
16	S79/163	LCD data signal, Blue4
17	S78/161	LCD data signal, Blue3
18	S77/159	LCD data signal, Blue2

19		GND
20	S76/157	LCD data signal, Blue1
21	S75/149	LCD data signal, Blue0 (LSB)
22	S73/145	LCD data signal, Green7 (MSB)
23		GND
24	S72/143	LCD data signal, Green6
25	S71/141	LCD data signal, Green5
26	S70/139	LCD data signal, Green4
27		GND
28	S69/137	LCD data signal, Green3
29	S68/135	LCD data signal, Green2
30	S67/133	LCD data signal, Green1
31		GND
32	S66/131	LCD data signal, Green0 (LSB)
33	S65/129	LCD data signal, Red7 (MSB)
34	S64/127	LCD data signal, Red6
35		GND
36	S63/125	LCD data signal, Red5
37	S62/123	LCD data signal, Red4
38	S61/121	LCD data signal, Red3
39		GND
40	S60/119	LCD data signal, Red2
41	S59/117	LCD data signal, Red1
42	S58/115	LCD data signal, Red0 (LSB)
43		GND
44	S47/93	LCD_I2C_SCL, indirectly I2C-A_SCL
45	S46/91	LCD_I2C_SDA, indirectly I2C-A_SDA
46		+3.3V, controlled by signal PERI_PWR_EN
47	S52/103	TP_RST-GPIO
48	S122/249	CSI_DATA03-TP_IRQ_LCD
49,50	indirectly S54/107	+3.3V power supply to LCD, controlled by signal DISP_PWR_EN

Because of portability, the *EACOM Board specification* defines a 24-bit parallel LCD interface. Even though only 16 or 18 bits are used, the LCD interface shall be setup for 24-bit mode. The lower bits (in each color) that are not used are just discarded.

Due to EMI consideration, it is recommended not to run the parallel (RGB) display interface at too high pixel clock rate. Having many signals in parallel that switch as high clock rate will generate a considerable amount of EMI. LVDS and HDMI are better interface choices for high resolution displays.

Parallel RGB display interface connector, J25, is XF2W-5015-1A from Omron.

3.18 Expansion Connectors

See chapter 4 for more information about expansion.

3.19 Audio Codec

EACOM boards have one line out interface. The *COM Carrier Board* implements this interface via an audio codec, WM8731. The line out signal is available as an external connector (J30) while the microphone, line input and headphone output signals are available on internal connector JP5. Figure 23 illustrates the location of the line out connector (J30) and the internal audio expansion connector (JP5).

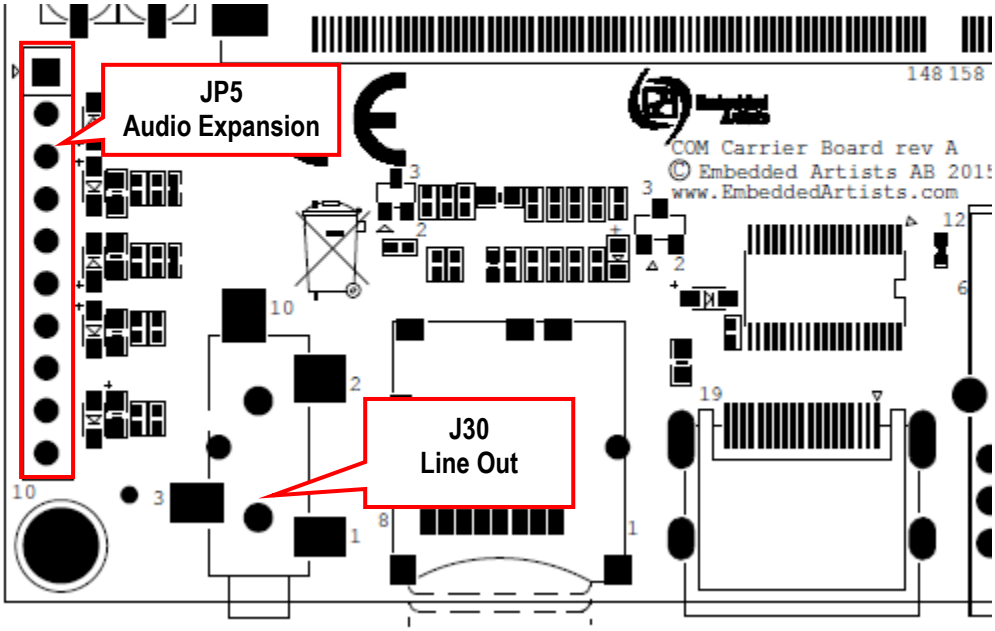

Figure 23 – COM Carrier Board, Audio Line Out Interface Connector

J30 is a 3.5 mm (1/8", mini plug) stereo phone jack.

The internal audio expansion connector, JP5, has the following pinning:

JP5 pin	Signal
1	Microphone input
2	Ground
3	Line input, left channel
4	Line input, right channel
5	Ground
6	Line output, left channel (same signal as on J30)
7	Line output, right channel (same signal as on J30)
8	Ground
9	Headphone output, left channel
10	Headphone output, right channel

The digital interface (EACOM signals) to the audio codec use the following signals:

EACOM pin	EACOM Signal
S5/9	AUD_RXD
S7/13	AUD_TXD
S6/11	AUD_TXC
S4/7	AUD_TXFS
S8/15	AUD_MCLK
S47/93	AUD_I2C_SCL, indirectly I2C1_SCL
S46/91	AUD_I2C_SDA, indirectly I2C1_SDA

Note that EACOM specifies a digital audio interface that runs with **synchronous** transmit and receive sections (meaning that transmit and receive share the clock and frame synchronization signals). The audio codec is I2S master meaning that the codec generates bit clock and frame synchronization signals. The MCLK clock is generated on the EACOM board side.

The stereo phone jack, J30, is SJ-3524-SMT from CUI Inc..

4 Expansion Possibilities

4.1 Expansion Connectors on Revision D

There are two internal expansion connectors on the *COM Carrier Board*, see Figure 24 below for their location on the board. The expansion connectors are 50-position, 0.5mm pitch FPC connectors. They can be used to create customer add-on boards that implements customer specific interfaces. The UART, SPI and I2C interfaces are available as well as ADC inputs. Most type specific EACOM pins are also available.

Note that many of the signals on the expansion connectors has alternative functions also. They can be the EACOM-defined function but also for example GPIOs. See the COM board datasheet for details about alternative functions for each pin on the expansion connectors.

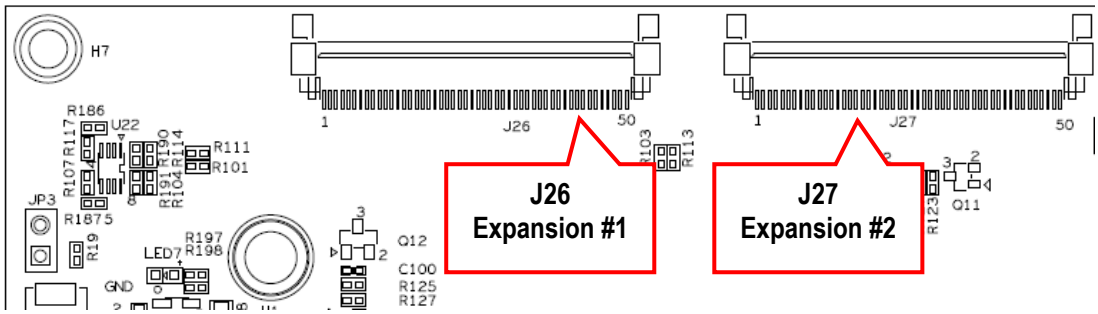

Figure 24 – COM Carrier Board, Expansion Connectors on rev D Boards

The expansion connectors, J26 and J27, are XF2W-5015-1A from Omron. The 50mm long, 50 position, 0.5mm pitch FPC is Molex 0151660537.

There is also an accompanying break-out board that gives easy access to the 2x50 signals in a 25x4, 100 mil pitch matrix. This break-out board can be used for prototyping. There are also four optional LEDs that can be controlled by GPIO signals on the expansion connectors.

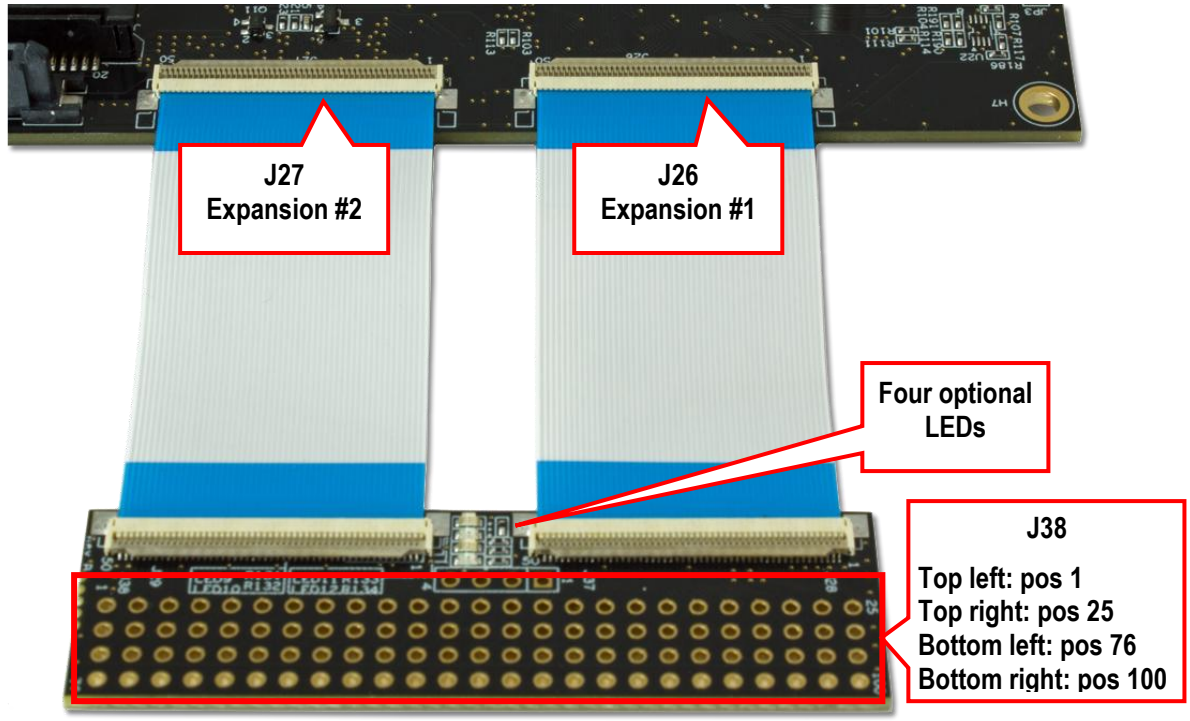

Figure 25 – COM Carrier Board, Expansion Breakout Board

The tables below list the signals available on the two expansion connectors, J26 and J27.

J26 pin	J38 pin on break out board	EACOM pin	EACOM Signal	Notes	iMX6 UltraLite COM pinning	iMX6 SoloX COM pinning	iMX6 Quad COM pinning	iMX7 Dual COM pinning
1, 3, 5, 7, 9, 15, 26, 40			Ground					
2	50	S97/199	AIN0	Signal also available at J22	GPIO1_IO01-ADC_IN1	ADC1_IN0	DSI_D1P	MIPI_DSI_D1_P (uCOM) ADC1_IN0 (COM)
4	25	S96/197	AIN1	Signal also available at J22	GPIO1_IO02-ADC_IN2	ADC1_IN1	DSI_D1M	MIPI_DSI_D1_N (uCOM) ADC1_IN1 (COM)
6	75	S95/195	AIN2		GPIO1_IO03-ADC_IN3-SD1_CD	ADC1_IN2	EIM_AD15	ADC1_IN0 (uCOM) ADC1_IN2 (COM)
8	49	S94/193	AIN3		GPIO1_IO04-ADC_IN4	ADC1_IN3	EIM_AD09	ADC1_IN1 (uCOM) ADC1_IN3 (COM)
10	24	S93/191	AIN4		Not connected	ADC2_IN0	EIM_AD08	ADC1_IN2 (uCOM) ADC2_IN0 (COM)
11	74	S92/189	AIN5		Not connected	ADC2_IN1	EIM_AD07	ADC1_IN3 (uCOM) ADC2_IN1 (COM)
12	48	S91/187	AIN6		Not connected	ADC2_IN2	EIM_AD06	Not connected (uCOM) ADC2_IN2 (COM)
13	23	S90/185	AIN7		Not connected	ADC2_IN3	CSI0_HSYNC	Not connected (uCOM) ADC2_IN3 (COM)
14	73	S89/182	ADC_VREFH		VDDA_ADC_3P3	ADC_VREFH	CSI0_PIXCLK	Not connected (uCOM) VDDA_ADC_1P8 (COM)
16, 17	84, 85, 97		+5V power supply	Controlled by signal PERI_PWR_EN				
18, 19	87, 94, 95		+3.3V power supply	Controlled by signal PERI_PWR_EN				
20	47	S51/101	I2C-C_SCL	See chapter 5	Not connected	KEY_COL4	KEY_COL3	I2C3_SCL
21	22	S50/99	I2C-C_SDA	See chapter 5	Not connected	KEY_ROW4	KEY_ROW3	I2C3_SDA
22	71	S49/97	I2C-B_SCL	See chapter 5	UART5_TX-I2C2_SCL	GPIO1_IO02	GPIO_5	I2C2_SCL
23	46	S48/95	I2C-B_SDA	See chapter 5	UART5_RX-I2C2_SDA	GPIO1_IO03	GPIO_6	I2C2_SDA
24	21	S47/93	I2C-A_SCL	See chapter 5	UART4_TX-I2C1_SCL	GPIO1_IO00	CSI0_DATA09	I2C1_SCL
25	46	S46/91	I2C-A_SDA	See chapter 5	UART4_RX-I2C1_SDA	GPIO1_IO01	CSI0_DATA08	I2C1_SDA
27	45	P141/290	PERI_PWR_EN					
28	20	P142/292	RESET_IN					
29	69	P143/294	RESET_OUT					
30	44	S10/19	SPDIF_IN		Not connected	ENET2_COL	GPIO_16	Not connected
31	19	S11/21	SPDIF_OUT		JTAG_MOD-SPDIF_OUT	ENET1_RX_CLK	ENET_RX_DATA0	Not connected
32	68	P119/246	SPI-B_SSEL		Not connected	QSPI1B_SS0_B	SD1_DATA1	ECSPI2_SS0
33	43	P120/248	SPI-B_MOSI		Not connected	QSPI1B_DATA0	SD1_CMD	ECSPI2_MOSI
34	18	P121/250	SPI-B_MISO		Not connected	QSPI1B_DATA1	SD1_DATA0	ECSPI2_MISO
35	67	P122/252	SPI-B_CLK		Not connected	QSPI1B_SCLK	SD1_CLK	ECSPI2_SCLK
36	42	P123/254	SPI-A_SSEL		NAND_MREADY-ECSPI3_SS0	QSPI1A_SS0_B	EIM_RW	ECSPI1_SS0
37	17	P124/256	SPI-A_MOSI		NAND_NCE1-ECSPI3_MOSI	QSPI1A_DATA0	EIM_CS1_B	ECSPI1_MOSI
38	66	P125/258	SPI-A_MISO		NAND_CLE-ECSPI3_MISO	QSPI1A_DATA1	EIM_OE_B	ECSPI1_MISO
39	41	P126/260	SPI-A_CLK		NAND_NCE0-ECSPI3_SCLK	QSPI1A_SCLK	EIM_CS0_B	ECSPI1_SCLK
41	16	P128/264	UART-C_RXD	Connected to UART header: J16	UART3_RX	KEY_ROW3	CSI0_DATA11	UART3_RXD

42	65	P129/266	UART-C_TXD	Connected to UART header: J16	UART3_TX	KEY_COL3	CSI0_DATA19	UART3_TXD
43	40	P130/268	UART-B_RXD	Connected to UART header: J15 and XBee socket: J17	UART2_RX	SD1_DATA0	CSI0_DATA15	UART2_RXD
44	15	P131/270	UART-B_CTS	Connected to XBee socket: J17	UART2_CTS-CAN2_TX	SD1_DATA2	CSI0_DATA19	SAI2_RXD
45	64	P132/272	UART-B_RTS	Connected to XBee socket: J17	UART2_RTS-CAN2_RX	SD1_DATA3	CSI0_DATA18	SAI2_TXD
46	39	P133/274	UART-B_TXD	Connected to UART header: J15 and XBee socket: J17	UART2_TX	SD1_DATA1	CSI0_DATA14	UART2_TXD
47	14	P134/276	UART-A_RXD	Connected to UART header: J35	UART1_RX	GPIO1_IO05	CSI0_DATA13	UART1_RXD
48	63	P135/278	UART-A_CTS	Connected to XBee socket: J17	UART1_CTS	GPIO1_IO07	CSI0_DATA17	SAI2_TXFS
49	38	P136/280	UART-A_RTS	Connected to XBee socket: J17	UART1_RTS-SD1_CD	GPIO1_IO06	CSI0_DATA16	SAI2_TXC
50	13	P137/282	UART-A_TXD	Connected to UART header: J35	UART1_TX	GPIO1_IO04	CSI0_DATA12	UART1_TXD

J27 pin	J38 pin on break out board	EACOM pin	EACOM Signal	Notes	iMX6 UltraLite COM pinning	iMX6 SoloX COM pinning	iMX6 Quad COM pinning	iMX7 Dual COM pinning
1,2	84, 85, 97		+5V power supply	Controlled by signal PERI_PWR_EN				
3, 4	87, 94, 95		+3.3V power supply	Controlled by signal PERI_PWR_EN				
5, 6, 7, 8, 16, 24, 32, 40, 48, 49, 50			Ground					
9	37	S19/37	GPIO_42		Not connected	Not connected	NAND_CLE	GPIO1_IO02
10	12	S34/67	GPIO_41		Not connected	Not connected	EIM_ADDR25	ENET1_CRS
11	61	S105/215	GPIO_40		Not connected	Not connected	EIM_AD10	Not connected (uCOM) SNVS_TAMPER8 (COM)
12	36	S106/217	GPIO_39		Not connected	Not connected	EIM_AD05	Not connected (uCOM) SNVS_TAMPER7 (COM)
13	11	S107/219	GPIO_38		SNVS_TAMPER9	Not connected	EIM_AD04	Not connected (uCOM) SNVS_TAMPER6 (COM)
14	60	S108/221	GPIO_37		SNVS_TAMPER8	Not connected	EIM_AD03	Not connected (uCOM) SNVS_TAMPER5 (COM)
15	35	S109/223	GPIO_36		SNVS_TAMPER7	Not connected	EIM_AD02	Not connected (uCOM) SNVS_TAMPER4 (COM)
17	10	S110/225	GPIO_35		SNVS_TAMPER6-ENET2_INT	Not connected	EIM_AD01	Not connected (uCOM) SNVS_TAMPER3 (COM)
18	59	S111/227	GPIO_34		SNVS_TAMPER5-ENET1_INT	Not connected	EIM_AD00	SD1_WP
19	34	P92/192	GPIO_27		EXT_ENET1_TX_CLK	Not connected	KEY_ROL1	EPDC_PWRSTAT
20	9	P93/194	GPIO_26		EXT_ENET1_TXEN	Not connected	KEY_ROW0	EPDC_PWRCOM
21	58	P94/196	GPIO_25		EXT_ENET1_TXD1	Not connected	KEY_COL1	EPDC_SDOE
22	33	P95/198	GPIO_24		EXT_ENET1_TXD0	Not connected	KEY_COL0	EPDC_SDLE
23	8	P96/200	GPIO_23		EXT_ENET1_RXER	Not connected	NAND_DATA07	EPDC_SDCLK
25	57	P97/202	GPIO_22		EXT_ENET1_CRS_DV	Not connected	NAND_DATA06	EPDC_D15
26	32	P98/204	GPIO_21		EXT_ENET1_RXD1	Not connected	NAND_DATA05	EPDC_D14
27	7	P99/206	GPIO_20		EXT_ENET1_RXD0	Not connected	NAND_DATA04	EPDC_D13
28	56	P100/208	GPIO_19		EXT_ENET_MDC	Not connected	NAND_DATA03	EPDC_D12
29	31	P101/210	GPIO_18		EXT_ENET_MDIO	Not connected	NAND_DATA02	EPDC_D11

30	6	P102/212	GPIO_17		EXT_ENET2_CRS_DV	Not connected	NAND_DATA01	EPDC_D10
31	55	P103/214	GPIO_16		EXT_ENET2_RXER	Not connected	NAND_DATA00	EPDC_D09
33	30	P104/216	GPIO_15		EXT_ENET2_RXD1	Not connected	NAND_CS3	EPDC_D08
34	5	P105/218	GPIO_14		EXT_ENET2_RXD0	Not connected	EIM_DATA31	EPDC_D07_CONN
35	54	P106/220	GPIO_13		EXT_ENET2_TX_CLK	Not connected	EIM_DATA30	EPDC_D06_CONN
36	29	P107/222	GPIO_12		EXT_ENET2_TXEN	Not connected	EIM_DATA29	EPDC_D05_CONN
37	4	P108/224	GPIO_11		EXT_ENET2_TXD1	Not connected	EIM_DATA28	EPDC_D04_CONN
38	53	P109/226	GPIO_10		EXT_ENET2_TXD0	Not connected	EIM_DATA27	EPDC_D03_CONN
39	28	P110/228	GPIO_9		BOOT_MODE1	Not connected	EIM_DATA26	EPDC_D02_CONN
41	3	P111/230	GPIO_8		BOOT_MODE0	Not connected	EIM_DATA25	EPDC_D01_CONN
42	52	P112/232	GPIO_7		Not connected	Not connected	EIM_DATA24	EPDC_D00_CONN
43	27	P113/234	GPIO_6	Connected to XBee socket: J17	NAND_NWP	Not connected	EIM_DATA23	UART3_CTS
44	2	P114/236	GPIO_5	Connected to LVDS1 interface connector: J24	Not connected	Not connected	EIM_EB3_B	EPDC_BDR1
45	51	P115/238	GPIO_4	Connected to LVDS1 interface connector: J24	Not connected	Not connected	EIM_LBA_B	EPDC_BDR0
46	26	P116/240	GPIO_3	Connected to LVDS1 interface connector: J24	Not connected	Not connected	EIM_DATA20	UART3_RTS-ETH_PHY_PPS
47	1	P117/242	GPIO_2	Connected to SATA interface connector: J14	Not connected	Not connected	EIM_DATA19	GPIO1_IO08

4.2 Expansion Connectors on Revision A/B/C

There are three internal expansion connectors on the *COM Carrier Board*, see Figure 26 below for their location on the board.

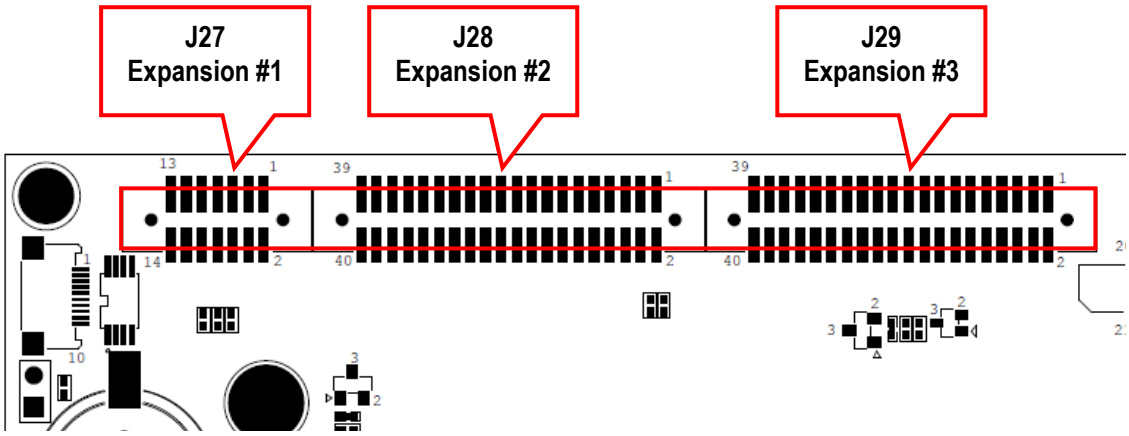

Figure 26 – COM Carrier Board, Expansion Connectors on rev A/B/C Boards

The expansion connectors are dual row, 50 mil pitch male connectors. They can be used to create customer add-on boards that implements customer specific interfaces. The UART, SPI and I2C interfaces are available as well as ADC inputs. Most type specific EACOM pins are also available.

There are many connector options, for example for the 40-pos connectors: Amphenol FCI 20021321-00040T4LF (smt connector) and 20021311-00040T4LF (through hole connector). Example of cable assemblies are Samtec Inc. FFSD-20-D-02.00-01-N and Harwin Inc. M50-9102042 and M50-9012042.

Note that many of the signals on the expansion connectors has alternative functions also. They can be the EACOM-defined function but also for example GPIOs. See the COM board datasheet for details about alternative functions for each pin on the expansion connectors.

The tables below list the signals available on the three expansion connectors, J27, J28 and J29.

J27 pin	EACOM pin	Signal	Notes	iMX6 UltraLite COM pinning	iMX6 SoloX COM pinning	iMX6 Quad COM pinning	iMX7 Dual COM pinning
1, 2, 11		Ground					
3	S97/199	AIN0	Signal also available at J22	GPIO1_IO01-ADC_IN1	ADC1_IN0	DSI_D1P	MIPI_DSI_D1_P (uCOM) ADC1_IN0 (COM)
4	S96/197	AIN1	Signal also available at J22	GPIO1_IO02-ADC_IN2	ADC1_IN1	DSI_D1M	MIPI_DSI_D1_N (uCOM) ADC1_IN1 (COM)
5	S95/195	AIN2		GPIO1_IO03-ADC_IN3-SD1_CD	ADC1_IN2	EIM_AD15	ADC1_IN0 (uCOM) ADC1_IN2 (COM)
6	S94/193	AIN3		GPIO1_IO04-ADC_IN4	ADC1_IN3	EIM_AD09	ADC1_IN1 (uCOM) ADC1_IN3 (COM)
7	S93/191	AIN4		Not connected	ADC2_IN0	EIM_AD08	ADC1_IN2 (uCOM) ADC2_IN0 (COM)
8	S92/189	AIN5		Not connected	ADC2_IN1	EIM_AD07	ADC1_IN3 (uCOM) ADC2_IN1 (COM)
9	S91/187	AIN6		Not connected	ADC2_IN2	EIM_AD06	Not connected (uCOM) ADC2_IN2 (COM)
10	S90/185	AIN7		Not connected	ADC2_IN3	CSI0_HSYNC	Not connected (uCOM) ADC2_IN3 (COM)
12	S89/182	ADC_VREFH		VDDA_ADC_3P3	ADC_VREFH	CSI0_PIXCLK	Not connected (uCOM)

			VDDA_ADC_1P8 (COM)
13	+3.3V power supply	Controlled by signal PERI_PWR_EN	
14	+5V power supply	Controlled by signal PERI_PWR_EN	

J28 pin	EACOM pin	Signal	Notes	iMX6 UltraLite COM pinning	iMX6 SoloX COM pinning	iMX6 Quad COM pinning	iMX7 Dual COM pinning
1, 2, 13, 14, 23, 24, 30		Ground					
3	P137/282	UART-A_TXD	Connected to UART header: J35	UART1_TX	GPIO1_IO04	CSI0_DATA12	UART1_TXD
4	P136/280	UART-A_RTS	Connected to XBee socket: J17	UART1_RTS-SD1_CD	GPIO1_IO06	CSI0_DATA16	SAI2_TXC
5	P135/278	UART-A_CTS	Connected to XBee socket: J17	UART1_CTS	GPIO1_IO07	CSI0_DATA17	SAI2_TXFS
6	P134/276	UART-A_RXD	Connected to UART header: J35	UART1_RX	GPIO1_IO05	CSI0_DATA13	UART1_RXD
7	P133/274	UART-B_TXD	Connected to UART header: J15 and XBee socket: J17	UART2_TX	SD1_DATA1	CSI0_DATA14	UART2_TXD
8	P132/272	UART-B_RTS	Connected to XBee socket: J17	UART2_RTS-CAN2_RX	SD1_DATA3	CSI0_DATA18	SAI2_TXD
9	P131/270	UART-B_CTS	Connected to XBee socket: J17	UART2_CTS-CAN2_TX	SD1_DATA2	CSI0_DATA19	SAI2_RXD
10	P130/268	UART-B_RXD	Connected to UART header: J15 and XBee socket: J17	UART2_RX	SD1_DATA0	CSI0_DATA15	UART2_RXD
11	P129/266	UART-C_TXD	Connected to UART header: J16	UART3_TX	KEY_COL3	CSI0_DATA19	UART3_TXD
12	P128/264	UART-C_RXD	Connected to UART header: J16	UART3_RX	KEY_ROW3	CSI0_DATA11	UART3_RXD
15	P126/260	SPI-A_CLK		NAND_NCE0-ECSPI3_SCLK	QSPI1A_SCLK	EIM_CS0_B	ECSPI1_SCLK
16	P125/258	SPI-A_MISO		NAND_CLE-ECSPI3_MISO	QSPI1A_DATA1	EIM_OE_B	ECSPI1_MISO
17	P124/256	SPI-A_MOSI		NAND_NCE1-ECSPI3_MOSI	QSPI1A_DATA0	EIM_CS1_B	ECSPI1_MOSI
18	P123/254	SPI-A_SSEL		NAND_MREADY-ECSPI3_SS0	QSPI1A_SS0_B	EIM_RW	ECSPI1_SS0
19	P122/252	SPI-B_CLK		Not connected	QSPI1B_SCLK	SD1_CLK	ECSPI2_SCLK
20	P121/250	SPI-B_MISO		Not connected	QSPI1B_DATA1	SD1_DATA0	ECSPI2_MISO
21	P120/248	SPI-B_MOSI		Not connected	QSPI1B_DATA0	SD1_CMD	ECSPI2_MOSI
22	P119/246	SPI-B_SSEL		Not connected	QSPI1B_SS0_B	SD1_DATA1	ECSPI2_SS0
25	S11/21	SPDIF_OUT		JTAG_MOD-SPDIF_OUT	ENET1_RX_CLK	ENET_RX_DATA0	Not connected
26	S10/19	SPDIF_IN		Not connected	ENET2_COL	GPIO_16	Not connected
27	P143/294	RESET_OUT					
28	P142/292	RESET_IN					
29	P141/290	PERI_PWR_EN					
31	S47/93	I2C-A_SCL	See chapter 5	UART4_TX-I2C1_SCL	GPIO1_IO00	CSI0_DATA09	I2C1_SCL
32	S46/91	I2C-A_SDA	See chapter 5	UART4_RX-I2C1_SDA	GPIO1_IO01	CSI0_DATA08	I2C1_SDA
33	S49/97	I2C-B_SCL	See chapter 5	UART5_TX-I2C2_SCL	GPIO1_IO02	GPIO_5	I2C2_SCL

34	S48/95	I2C-B_SDA	See chapter 5	UART5_RX-I2C2_SDA	GPIO1_IO03	GPIO_6	I2C2_SDA
35	S51/101	I2C-C_SCL	See chapter 5	Not connected	KEY_COL4	KEY_COL3	I2C3_SCL
36	S50/99	I2C-C_SDA	See chapter 5	Not connected	KEY_ROW4	KEY_ROW3	I2C3_SDA
37,39		+3.3V power supply	Controlled by signal PERI_PWR_EN				
38, 40		+5V power supply	Controlled by signal PERI_PWR_EN				

J29 pin	EACOM pin	Signal	Notes	iMX6 UltraLite COM pinning	iMX6 SoloX COM pinning	iMX6 Quad COM pinning	iMX7 Dual COM pinning
1	P117/242	GPIO_2	Connected to SATA interface connector: J14	Not connected	Not connected	EIM_DATA19	GPIO1_IO08
2	P116/240	GPIO_3	Connected to LVDS1 interface connector: J24	Not connected	Not connected	EIM_DATA20	UART3_RTS-ETH_PHY_PPS
3	P115/238	GPIO_4	Connected to LVDS1 interface connector: J24	Not connected	Not connected	EIM_LBA_B	EPDC_BDR0
4	P114/236	GPIO_5	Connected to LVDS1 interface connector: J24	Not connected	Not connected	EIM_EB3_B	EPDC_BDR1
5	P113/234	GPIO_6	Connected to XBee socket: J17	NAND_NWP	Not connected	EIM_DATA23	UART3_CTS
6	P112/232	GPIO_7		Not connected	Not connected	EIM_DATA24	EPDC_D00_CONN
7	P111/230	GPIO_8		BOOT_MODE0	Not connected	EIM_DATA25	EPDC_D01_CONN
8	P110/228	GPIO_9		BOOT_MODE1	Not connected	EIM_DATA26	EPDC_D02_CONN
9	P109/226	GPIO_10		EXT_ENET2_TXD0	Not connected	EIM_DATA27	EPDC_D03_CONN
10	P108/224	GPIO_11		EXT_ENET2_TXD1	Not connected	EIM_DATA28	EPDC_D04_CONN
11	P107/222	GPIO_12		EXT_ENET2_TXEN	Not connected	EIM_DATA29	EPDC_D05_CONN
12	P106/220	GPIO_13		EXT_ENET2_TX_CLK	Not connected	EIM_DATA30	EPDC_D06_CONN
13	P105/218	GPIO_14		EXT_ENET2_RXD0	Not connected	EIM_DATA31	EPDC_D07_CONN
14	P104/216	GPIO_15		EXT_ENET2_RXD1	Not connected	NAND_CS3	EPDC_D08
15, 16, 29		Ground					
17	P103/214	GPIO_16		EXT_ENET2_RXER	Not connected	NAND_DATA00	EPDC_D09
18	P102/212	GPIO_17		EXT_ENET2_CRS_DV	Not connected	NAND_DATA01	EPDC_D10
19	P101/210	GPIO_18		EXT_ENET_MDIO	Not connected	NAND_DATA02	EPDC_D11
20	P100/208	GPIO_19		EXT_ENET_MDC	Not connected	NAND_DATA03	EPDC_D12
21	P99/206	GPIO_20		EXT_ENET1_RXD0	Not connected	NAND_DATA04	EPDC_D13
22	P98/204	GPIO_21		EXT_ENET1_RXD1	Not connected	NAND_DATA05	EPDC_D14
23	P97/202	GPIO_22		EXT_ENET1_CRS_DV	Not connected	NAND_DATA06	EPDC_D15
24	P96/200	GPIO_23		EXT_ENET1_RXER	Not connected	NAND_DATA07	EPDC_SDCLK
25	P95/198	GPIO_24		EXT_ENET1_TXD0	Not connected	KEY_COL0	EPDC_SDLE
26	P94/196	GPIO_25		EXT_ENET1_TXD1	Not connected	KEY_COL1	EPDC_SDOE
27	P93/194	GPIO_26		EXT_ENET1_TXEN	Not connected	KEY_ROW0	EPDC_PWRCOM
28	P92/192	GPIO_27		EXT_ENET1_TX_CLK	Not connected	KEY_ROL1	EPDC_PWRSTAT
30	S111/227	GPIO_34		SNVS_TAMPER5-ENET1_INT	Not connected	EIM_AD00	SD1_WP
31	S110/225	GPIO_35		SNVS_TAMPER6-ENET2_INT	Not connected	EIM_AD01	Not connected (uCOM) SNVS_TAMPER3 (COM)
32	S109/223	GPIO_36		SNVS_TAMPER7	Not connected	EIM_AD02	Not connected (uCOM) SNVS_TAMPER4 (COM)

33	S108/221	GPIO_37		SNVS_TAMPER8	Not connected	EIM_AD03	Not connected (uCOM) SNVS_TAMPER5 (COM)
34	S107/219	GPIO_38		SNVS_TAMPER9	Not connected	EIM_AD04	Not connected (uCOM) SNVS_TAMPER6 (COM)
35	S106/217	GPIO_39		Not connected	Not connected	EIM_AD05	Not connected (uCOM) SNVS_TAMPER7 (COM)
36	S105/215	GPIO_40		Not connected	Not connected	EIM_AD10	Not connected (uCOM) SNVS_TAMPER8 (COM)
37	S34/67	GPIO_41		Not connected	Not connected	EIM_ADDR25	ENET1_CRS
38	S19/37	GPIO_42		Not connected	Not connected	NAND_CLE	GPIO1_IO02
39		+3.3V power supply	Controlled by signal PERI_PWR_EN				
40		+5V power supply	Controlled by signal PERI_PWR_EN				

4.3 I2C Channel Isolation

I2C channel A has an isolation buffer (U16) that block unpowered devices on the *COM Carrier Board* from affecting/blocking I2C communication. This happens during every startup when the EACOM board is booting but the carrier board is still not enabled. Such buffers can also be needed on I2C channel B (and later revisions), depending on what is connected to these interfaces.

5 I2C Interfaces

EACOM specifies three I2C interfaces and these are available, and used, on the *COM Carrier Board*. Their usage is listed in the tables below.

Note that I2C channel A is also used internally on the EACOM boards, typically for PMIC and internal E2PROM communication. Check EACOM datasheet to get list of I2C devices connected to I2C channel A complete.

I2C channel A	8-bit I2C address	7-bit I2C address	Max speed
Audio codec WM8731	0x34/0x35 (0.0.1.1.0.1.0.RW)	0x1A (0.0.1.1.0.1.0)	400 kHz
Resistive Touch screen controller AR1021 **Present on rev A boards but not on rev B (and later revisions) boards.**	0x9A/0x9B (1.0.0.1.1.0.1.RW)	0x4D (1.0.0.1.1.0.1)	400 kHz
64kbit EPROM (currently not used)	0xAC/0xAD (1.0.1.0.1.1.0.RW)	0x56 (1.0.1.0.1.1.0)	400 kHz
Serial Camera Interface on J20			
Parallel Camera Interface on J21			
Possible capacitive touch controller connected to J26			

I2C channel B	8-bit I2C address	7-bit I2C address	Max speed
LVDS0 interface on J23, EDID information			
LVDS0 interface on J23, touch controller			
I2C channel on HDMI connector, J10			

I2C channel C	8-bit I2C address	7-bit I2C address	Max speed
LVDS1 interface on J24, EDID information			
LVDS1 interface on J24, touch controller			
I2C interface to PCIe interface on J18			

6 Using Multiple Display Interfaces

It is possible to use several of the display interfaces simultaneous. The first restriction is what the iMX SoC used on the EACOM board supports. The second restriction is what the *COM Carrier Board* supports in individual control of the different display interfaces. The table below lists the possible conflicts that can be caused by pin usage:

Signal(s)	RGB interface	LVDS0 interface	LVDS1 interface	HDMI interface
Display enable/pwr	DISP_PWR_EN	DISP_PWR_EN	GPIO_3	-
Backlight pwr	BL_PWR_EN	BL_PWR_EN	GPIO_4	-
Backlight contrast	BL_CONTRAST_PWM	PWM_1	PWM_1	-
I2C Touch ctrl	I2C-A	I2C-B	I2C-C	I2C-B
Touch ctrl IRQ	CSI_DATA03	TP_IRQ	GPIO_5	-
I2C EDID	-	I2C-B (rev A) I2C-A (rev B)	I2C-C	I2C-B

Possible contentions are:

- Signal DISP_PWR_EN controls both LVDS0 and RGB interfaces. LVDS0 has an option to have signal LCD_DISPL_EN controlling the display enable/power signal.
- Signal BL_PWR_EN controls both LVDS0 and RGB interfaces.
- Signal PWM_1 controls both LVDS0, LVDS1 and RGB interfaces. LVDS1 has an option to have signal SPI-B_SSEL controlling the contrast.
- I2C channel B is used for both LVDS0 and HDMI interface. If the same I2C address are used on both interfaces there will be problem. This is for example true for reading EDID information

7 Technical Specification

7.1 Absolute Maximum Ratings

All voltages are with respect to ground, unless otherwise noted. Stress above these limits may cause malfunction or permanent damage to the board.

Symbol	Description	Min	Max	Unit
VIN	Main input supply voltage	-1	16	V
VBAT	Coin cell voltage	-0.3	3.6	V
VIO	Vin/Vout (OVDD + 0.3)	-0.5	3.4	V

7.2 Recommended Operating Conditions

All voltages are with respect to ground, unless otherwise noted.

Symbol	Description	Min	Typical	Max	Unit
VIN	Main input supply voltage Ripple with any frequency content	9	12	15 100	V mV
VBAT	Coin cell voltage	2.8	3.3	3.6	V

7.3 Electrical Characteristics

For DC electrical characteristics, see EACOM board datasheet, used iMX SoC datasheets and individual component (used on the *COM Carrier Board*) datasheets.

It is possible to set the internal VDD operating point (OVDD) for the iMX SoC on some EACOM boards. It is typically in the region between 3.1-3.3V. OVDD affects absolute maximum VIO voltage.

7.4 Power Consumption

There are many factors that determine power consumption of the *COM Carrier Board* together with an EACOM board. Therefore, no single consumption number is published. General system and communication activity along with externally connected devices, like USB Devices, RF-modules (mini PCIe cards, XBee modules, etc.) and displays all have a big impact on power consumption.

Always measure current consumption in the real system, in all different operating conditions, to get accurate numbers. Observe the peak power consumption. Add at least 30% margin (preferably more) to the external 12V power supply that feeds the system.

7.5 Mechanical Dimensions

Dimension	Value (±0.5 mm)	Unit
Board width	165	mm
Board height	104	mm
Maximum top side height	16	mm
Maximum bottom side height	3.5	mm
PCB thickness	1.6	mm
Mounting hole diameter (x5)	3.1	mm
Module weight	136 ±5 gram	gram

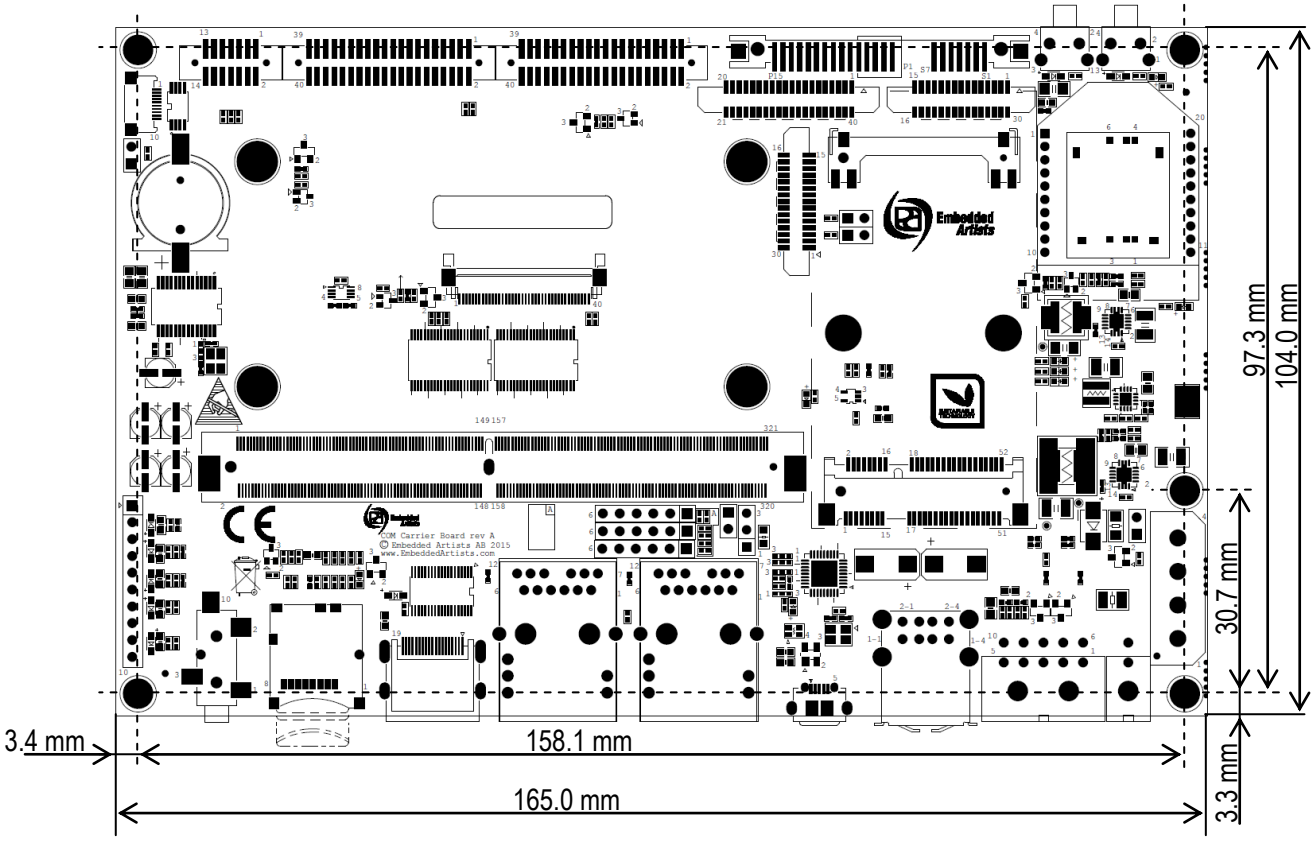

Figure 27 –COM Carrier Board Mechanical Outline

7.5.1 Module Assembly Hardware

The *COM Carrier Board* has four M3 threaded stand-offs (5 mm high) for securing the EACOM board.

6-8 mm M3 screws shall be used.

7.6 Environmental Specification

7.6.1 Operating Temperature

Ambient temperature (T_A)

Parameter	Min	Max	Unit
Operating temperature range	0	70[1]	°C
Storage temperature range	-40	85	°C

[1] Typically limited by EACOM board and associated thermal management solution.

7.6.2 Relative Humidity (RH)

Parameter	Min	Max	Unit
Operating: 0°C ≤ T_A ≤ 70°C, non-condensing	10	90	%
Non-operating/Storage: -40°C ≤ T_A ≤ 85°C, non-condensing	5	90	%

7.7 Product Compliance

Visit Embedded Artists' website at http://www.embeddedartists.com/product_compliance for up to date information about product compliances such as CE, RoHS2, Conflict Minerals, REACH, etc.

8 Functional Verification and RMA

There are separate documents that present a number of functional tests that can be performed on the *COM Carrier Board* to verify correct operation on the different interfaces. There is one separate document for each EACOM board that the *COM Carrier Board* supports. Note that these tests must be performed with a precompiled kernel from Embedded Artists.

The tests can also be done to troubleshoot a board that does not seem to operate properly. It is strongly advised to read through the list of tests and actions that can be done before contacting Embedded Artists. The different tests can help determine if there is a problem with the *COM Carrier Board*, or not. For return policy, please read Embedded Artists' General Terms and Conditions document (http://www.embeddedartists.com/sites/default/files/docs/General_Terms_and_Conditions.pdf).

The different interfaces are implemented by the combination of an EACOM board and the *COM Carrier Board*. It is this combination that is tested. If an interface fail a test then it might not be possible to pin point the error to the EACOM board or to the *COM Carrier Board*, unless the EACOM board that is mounted on the *COM Carrier board* is replaced with another EACOM board. Either the failing interface follow the EACOM board or the *COM Carrier board* and that makes it possible to locate the possible error to a single board.

9 Things to Note

This chapter presents a number of issues and considerations that users must note.

9.1 Only Use Board Support Package (BSP) from Embedded Artists

Different EACOM boards use multiple on-board interfaces for the internal design, for example PMIC, eMMC flash, (Q)SPI flash, Ethernet and watchdog. Only use the BSP that is delivered by Embedded Artists (or official BSPs from our partners). Do not change interface initialization and/or pin assignment for the on-board interfaces. Changing BSP settings can result in permanent board failure, both on the *COM Carrier Board* and on the EACOM board.

Note that Embedded Artists does not replace damaged COM Carrier Boards because of improper interface initialization and/or improper pin assignment.

Similarly, if custom modifications are done to the DTS file (for example when designing expansion boards), make sure the DTS file is still EACOM compatible when using the *COM Carrier board*.

9.2 Integration - Contact Embedded Artists

It is strongly recommended to contact Embedded Artists at an early stage in your project. A wide range of support during evaluation and the design-in phase are offered, including but not limited to:

- Developer's Kit to simplify evaluation
- Custom Carrier board design, including 'ready-to-go' standard carrier boards
- Display solutions
- Mechanical solutions
- Schematic review of customer carrier board designs
- Driver and application development

The *COM Carrier Board* targets a wide range of applications, such as:

- Industrial controllers and HMI systems
- Home automation and facility management
- Audiovisual equipment
- Instrumentation and measuring equipment
- Vending machines
- Industrial automation
- HVAC Building and Control Systems
- Smart Grid and Smart Metering
- HMI/GUI solutions
- Smart Toll Systems
- Connected vending machines
- Digital signage
- Point-of-Sale (POS) applications
- Data acquisition

- Communication gateway solutions
- Connected real-time systems
- Portable systems
- ...and much more

For more harsh use and environments, and where fail-safe operation, redundancy or other strict reliability or safety requirements exists, always contact Embedded Artists for a discussion about suitability.

There are application areas that the *COM Carrier Board* is not designed for (and such usage is strictly prohibited), for example:

- Military equipment
- Aerospace equipment
- Control equipment for nuclear power industry
- Medical equipment related to life support, etc.
- Gasoline stations and oil refineries

If not before, **it is essential to contact Embedded Artists before production begins**. In order to ensure a reliable supply for you, as a customer, we need to know your production volume estimates and forecasts. Embedded Artists can typically provide smaller volumes of the *COM Carrier Board* directly from stock (for evaluation and prototyping), but **larger volumes need to be planned**.

The more information you can share with Embedded Artists about your plans, estimates and forecasts the higher the likelihood is that we can provide a reliable supply to you of the *COM Carrier Board*.

9.3 ESD Precaution when Handling COM Carrier Board

Please note that the *COM Carrier Board* come without any case/box and all components are exposed for finger touches – and therefore extra attention must be paid to ESD (electrostatic discharge) precaution, for example use of static-free workstation and grounding strap. Only qualified personnel shall handle the product.

Make it a habit always to first touch the metal surface of the Ethernet or USB connectors for a few seconds with both hands before touching any other parts of the boards. That way, you will have the same potential as the board and therefore minimize the risk for ESD.

In general touch as little as possible on the boards in order to minimize the risk of ESD damage.

Note that Embedded Artists does not replace boards that have been damaged by ESD.

9.4 EMC / ESD

The *COM Carrier Board* has been developed according to the requirements of electromagnetic compatibility (EMC). Nevertheless depending on the target system, additional anti-interference measurement may still be necessary to adherence to the limits for the overall system. This is for example true when connecting a display solution or an external power supply to the *COM Carrier Board*.

ESD protection has in general been implemented on the *COM Carrier Board*, but it is **strongly advised to verify that the protection is adequate for the specific operating conditions for the board**.

9.5 Input Voltage

Many power supplies require a minimum load to regulate the output voltage to within specification. Low load can result in increased output voltage. If too high it can potentially damage the *COM Carrier Board*. Make sure the external 12V power supply (that power the *COM Carrier Board*) can handle (near) zero-load while still maintaining regulation and keeping the output voltage within specification.

9.6 VBAT Current

VBAT current is relatively high on the first generation EACOM boards, in the region of 100-200uA. On *COM Carrier Boards* rev A, a typical CR1220 coin cell battery will discharge fully within 1-2 days. In next generation EACOM boards the VBAT current will be reduced but it will still be possible to full discharge coin cell batteries if the system is unpowered for a longer period of time.

COM Carrier Board rev B (and later revisions) has been redesigned to support a rechargeable battery solution.

Note that EACOM boards do not need VBAT voltage to startup. VBAT is only needed to keep the iMX6/7 on-chip RTC running in case the main input voltage supply is removed.

9.7 HDMI Interface Not Working on Rev A Boards

The HDMI interface (J10) is not functional due to a layout error. This is corrected on subsequent revisions of the board (rev B and later revisions).

9.8 Limited Functionality on XBee Interface on Rev A Boards

The reset signal to the XBee interface (J17, pin 5) is connected to signal RESET_OUT. This signal is active (low pulse) before the XBee interface is powered (supply PERI_3V3). This will be a problem if the RF-module connected to the XBee interface (J17) requires an explicit reset pulse after power-up.

On rev B (and later revisions) boards, the reset signal to the XBee interface (J17, pin 5) is controlled by signal CSI_DATA02-XBEE_RST.

Flow control signals (UART-B_RTS/CTS) are switched on rev A boards. Hardware flow control to the XBee module can therefore not be used.

On rev B (and later revision) boards, the RTS/CTS connection with UART-B signals is correct.

9.9 Difference Between COM Carrier Board Revisions

As mentioned at a few places in this document, there are a few differences between the different board revisions.

Below, all **updates between rev B and rev A** are listed:

- Added Li-Ion / Li-Polymer Battery Charger and removed coin cell battery.
- The start/stop voltages of the main 3.3V DC/DC power supply (U1) is changed to 5.5/5.0V (was 4.5/4.0V before).
- HDMI interface is functioning.

- Added back-powering protection on UART interfaces.
- Improved control over XBee interface, corrected RTS/CTS connections.
- Connected LVDS#0 interface to I2C-A instead of I2C-B channel.
- Created generic 50-pos parallel RGB display interface connector (by combining J25 and J26 into J25). Removed resistive touch panel controller.
- Corrected SJ9.
- Corrected debug adapter.

Below, all **updates between rev C and B** are listed:

- Connect onoff-button to GPIO_12 (onoff-handling in Android for i.MX 6Quad/Dual/DualLite).
- R176/R177 mounted (LCD_HSYNC/LCD_VSYNC signals available on J25).
- Added controlled discharge resistor on uSD interface (was passive 1.5Kohm before).
- Added I2C channel connection to J22 (MIPI-DSI interface).
- Added isolation resistors R204/R205, useful when MIPI-DSI interface is used.
- R93/R94 mounted (50 ohm termination resistors on PCIe clock).

Below, all **updates between rev D and C** are listed:

- Changed expansion connectors to two 50-pos 0.5mm pitch FPC connectors.
- Added breakout expansion board for simplified access to expansion connector signals (via 100 mil pitch matrix on breakout board).
- Added 100MHz PCIe reference clock generator for PCIe interface on iMX7 Dual (u)COM Board. See section **Fel! Hittar inte referenskälla.**how to enable the clock generator.

10 Custom Design

This document specify the standard *COM Carrier Board* design. Embedded Artists offers many custom design services. Contact Embedded Artists for a discussion about different options and services.

Examples of custom design services are:

- Different or modified interfaces.
- Different mounting options, for example remove some interface.
- Redesign carrier board for custom pinning *COM boards*.
- Different input supply voltage range.
- Different mechanical dimensions (or connector positions), for example to fit custom boxed solution.
- Single Board Computer solutions, where the core design of a *COM Board* is integrated together with selected interfaces or a carrier board.

Embedded Artists also offers a range of services to shorten development time and risk, such as:

- Display solutions
- Mechanical solutions

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