iMX RT1166 Developer's Kit
User Guide
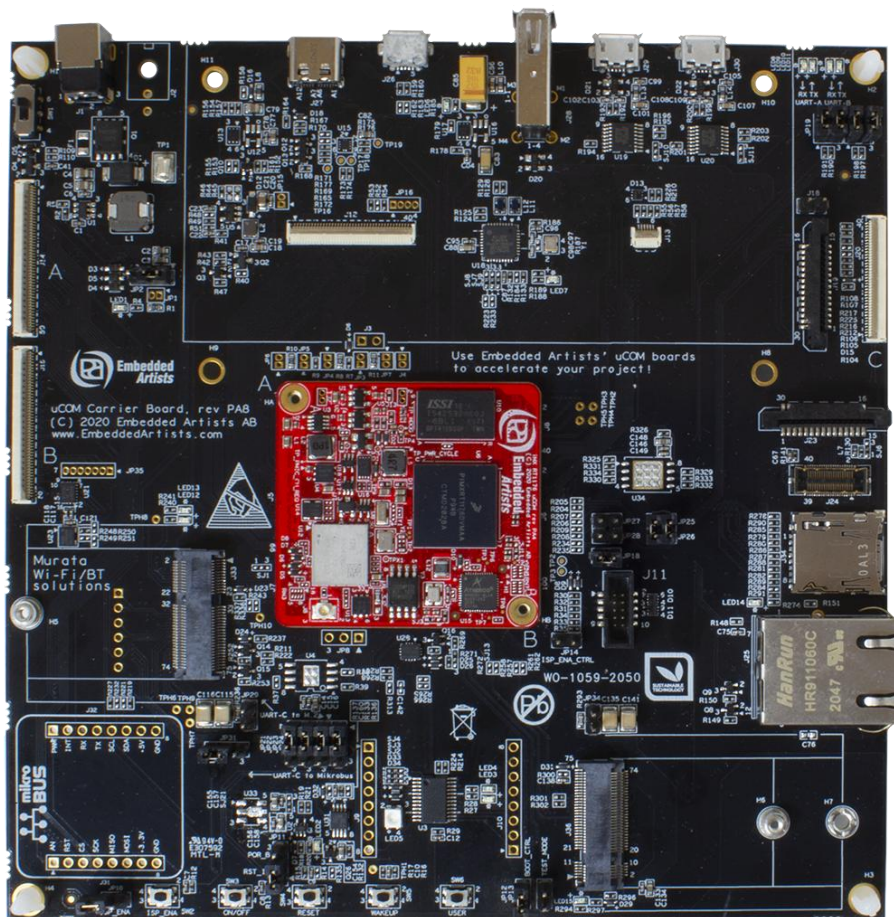
Get Up-and-Running Quickly and
Start Developing Your Application On Day 1!

Embedded Artists

Embedded Artists AB

Rundelsgatan 14
211 36 Malmö
Sweden

https://www.EmbeddedArtists.com

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1 Document Revision History

Revision	Date	Description
PA1	2021-12-17	Initial release.

2 Getting Started

This chapter contains information about how to get acquainted with the *iMX RT1166 Developer's Kit*. **Please read this chapter first before you start using the board - it will be well spent time!**

First of all, thank you for buying Embedded Artists' *iMX RT1166 Developer's Kit* based on NXP's ARM Cortex-M7/M4 i.MX RT1166 Crossover MCU. **You will get up-and-running quickly!**

- Section 2.1 contains a list of what is included in the *iMX RT1166 Developer's Kit*.

- Section 2.2 together with Figure 17 in chapter 3 gives an overview presentation of the hardware and the interfaces and connectors available.

- Section 2.3 describes how to mount the display.

- Section 2.4 describes how to connect the USB cable, install the UART-to-USB driver and power-up the board the first time.

- Section 2.5 presents an alternative powering solution via the USB console interfaces.

- Section 2.6 - 2.10 describes important handling and care issues.

- Chapter 3 presents the *uCOM Carrier Board* and where to find more information about the hardware design of it.

To get started with program development and program download/flashing, see document *iMX RT Developer's Kit Program Development Guide*.

2.1   iMX RT1166 Developer's Kit Content

- One *iMX RT1166 uCOM* board mounted on one *uCOM Carrier board*, see Figure 1 below.

- One 100/10Mbps Ethernet adapter

- One MIPI-to-HDMI adapter

- One 40 pos, 0.5 mm pitch, 50 mm long flat cable

- One 4.3 inch 480x272px LCD with capacitive touch panel, including mounting kit

- One 12V supply

- One micro-B to A USB cable

- One MCU-Link debug interface

For program development you can optionally use another debug probe (than MCU-Link), like MCU-Link Pro, ULINK, J-LINK or LPC-Link2, and a program development environment, like MCUXpresso, Keil uVision or IAR Embedded Workbench. For more information about program development, see document *iMX RT Developer's Kit Program Development Guide*.

2.2   Hardware Overview

Figure 1 below illustrates the top side of the *uCOM Carrier board*. Some key components, relevant to get started, have been marked in the picture.
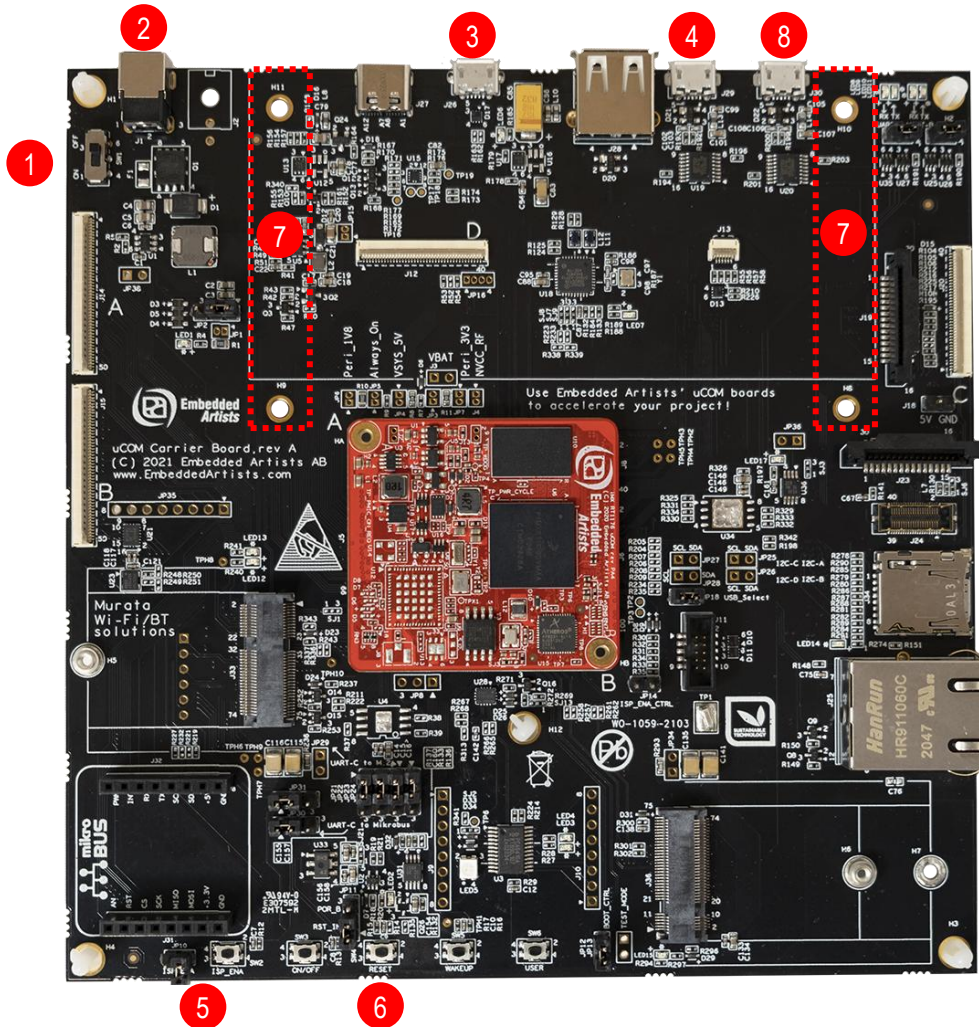
1. ON/OFF switch (instead of having to plug in/out the 12V power supply barrel connector).

2. 12V power supply input, 12V/2-3A DC, via a 2.1mm power jack. The center position is the positive terminal.

3. USB OTG connector - this USB interface can, together with a PC application, be used to program the flash memory of the *iMX RT1166 uCOM board*.

4. UART-to-USB bridge - this gives access to the console UART for the Cortex-M7 core of the i.MX RT1166 MCU.

5. ISP Enable push-button (and jumper, left of button) - pressing this button (or shorting jumper) while the board power up will place the i.MX RT1166 is ISP mode (typically used for programming the *iMX RT1166 uCOM board* flash memory).

6. Reset push-button - a press will generate a power cycle (in default behavior).

7. Mounting holes for the display.

8. Second UART-to-USB bridge - this gives access to the console UART for the Cortex-M4 of the i.MX RT1166 MCU.

Figure 17 in chapter 3 gives a slightly more detailed presentation of all interfaces and connectors on the board.

2.3   Mounting the LCD

If you are going to work with a display application and use the parallel RGB interface, when continue with mounting the LCD. Follow the instructions in this section of the document.

If you are going to work with the second Ethernet interface (via the Ethernet Adapter), then do not mount the LCD.

Begin with mounting the two 3D-printed display mounts. Each of them have two M3 screws. Remove the screws from the mounts. Place the mounts as illustrated in the picture below.
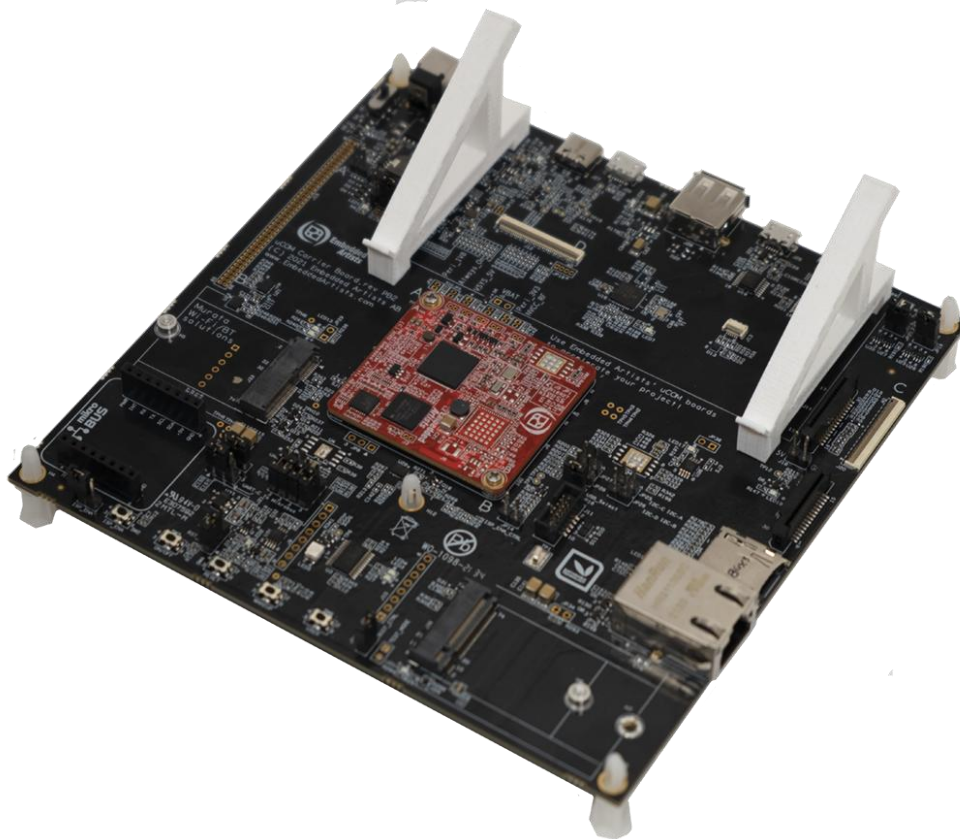
Figure 2 – uCOM Carrier Board with LCD Mounts

Use the screws to fasten the mounts form the bottom side, as illustrated in the picture below. Do not tighten the screws too much.
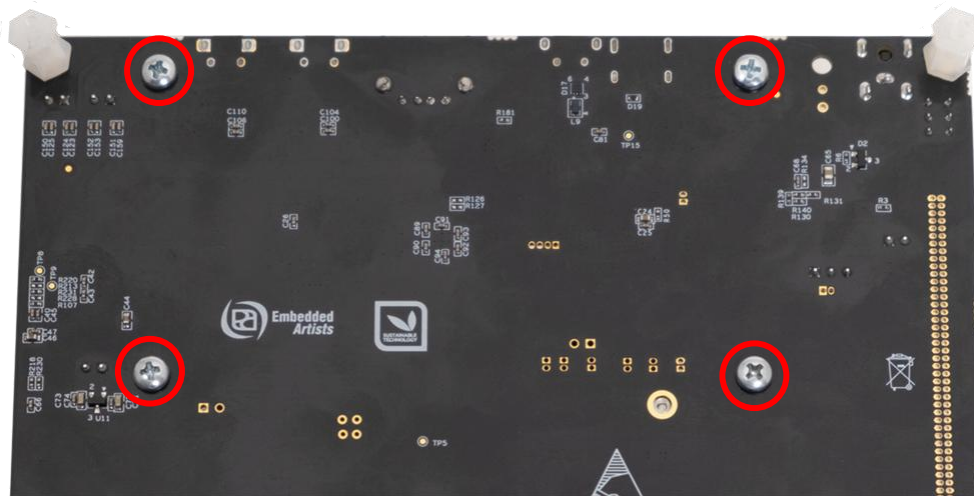
Figure 3 – Screws for LCD Mounts on Bottom Side of uCOM Carrier Board

Next, place the LCD behind the mounts, as illustrated in the picture below. This position makes it easier to connect the two flat cables to the LCD. Make sure the locks on the flat cable connector on the uCOM Carrier Board are open before inserting the two flat cables from the LCD.

Lock the connector by pushing down in both ends (right and left) simultaneous

Figure 4 – Placement of LCD to Connect Flat Cables

Remove the protection over the four double-sided tapes and carefully place the LCD in the mounts.
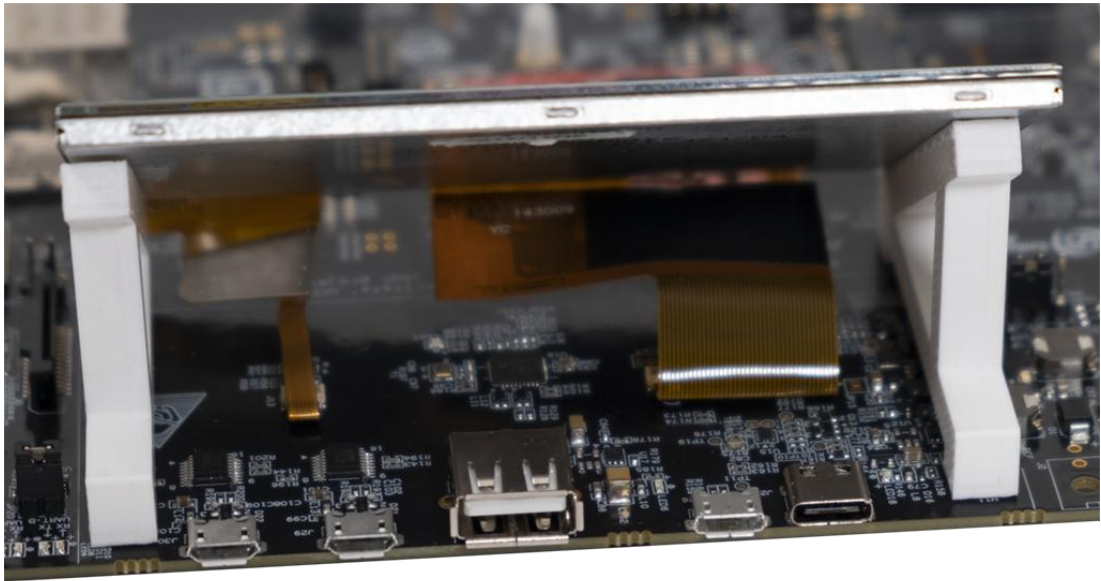
Figure 5 – Placing LCD on Mounts

The picture illustrates how it will look like from the side. Between the mounts and the LCD, there isthe double-sided tape.

Figure 6 – Side View of LCD Mount

Make sure the flat cable for the capacitive touch panel is carefully bent over the mounts.

Flat cable shall be bend carefully over the mount. It shall not be stuck or jammed in-between the mount and LCD.

Figure 7 – Side View of LCD Mount

In the end, it will look like the picture below illustrates.

Figure 8 – LCD Mounted on uCOM Carrier Board

2.4   Connecting - Get Started

It is recommended to visit the Getting Started with uCOM Developer's Kit landing page:

https://www.embeddedartists.com/getting-started-with-ucom-developers-kit/

2.4.1   Console

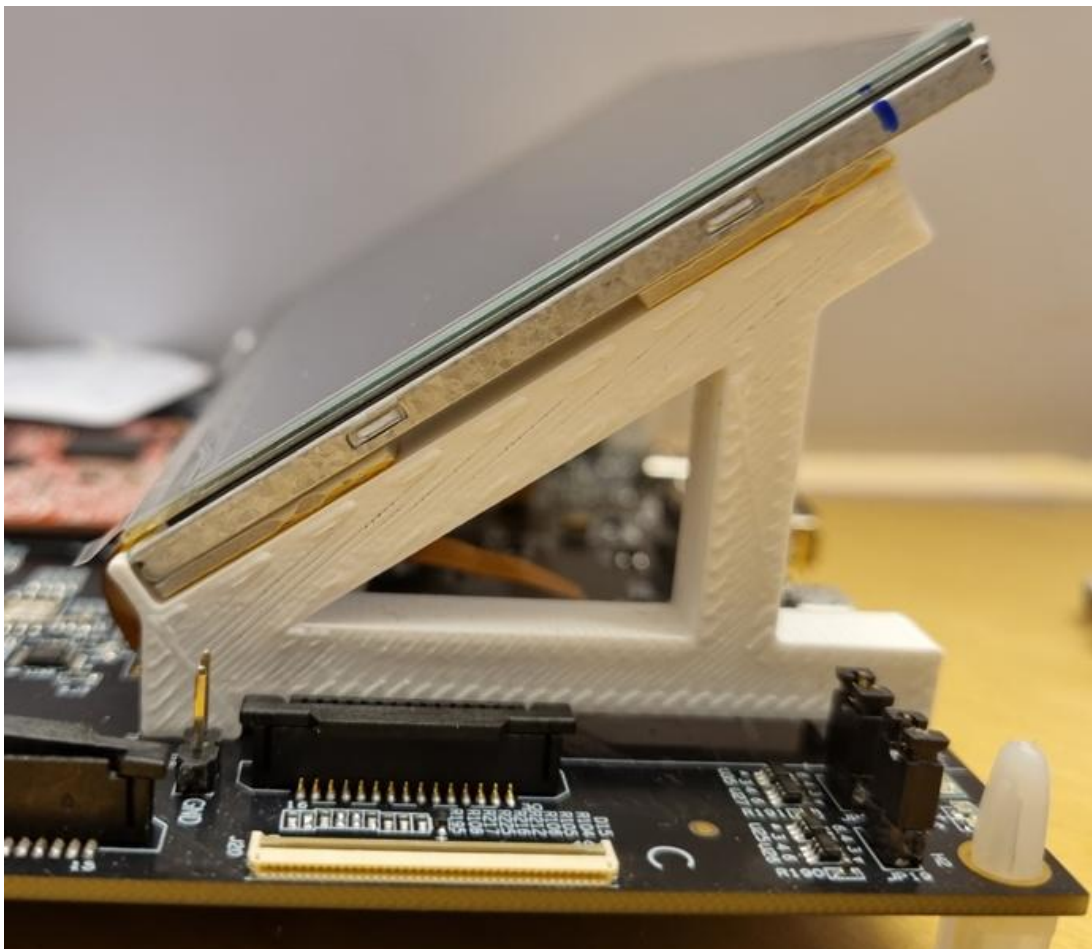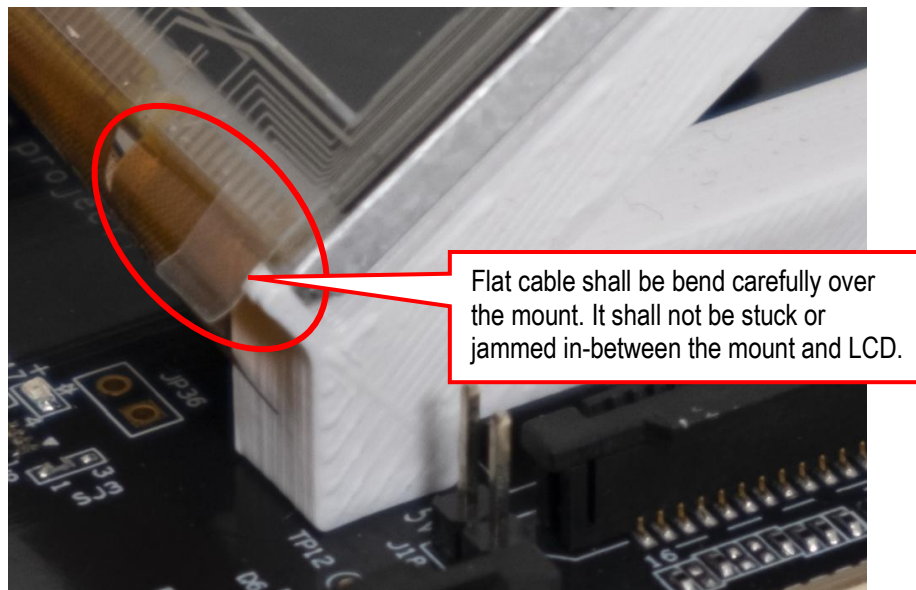Begin by connecting the micro-B USB connector to position 1) in Figure 1 above. Connect the other end of the USB cable to the PC.

Meanwhile the PC will typically install a driver automatically for the UART-to-USB bridge that creates a Virtual COM port, if it is not already installed. If you have problems the drivers can be downloaded from the links below:

http://www.ftdichip.com/Drivers/VCP.htm
http://www.ftdichip.com/Support/Documents/InstallGuides.htm

When the driver has been installed, a new COM port will listed under "Ports" in the Device Manager as shown in Figure 9. Please note that the actual port number will most likely be different on your computer.
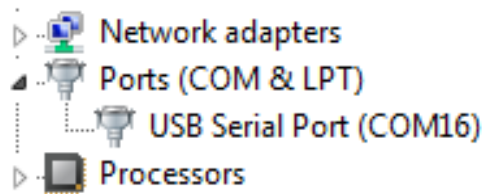

Figure 9 – Virtual COM port shown in device manager

The next step is to open a terminal application and attached it to the Virtual COM port that has just been created. The baud rate should be **115200**.

Some development environments/IDEs have a built-in terminal application that can be used. Sometimes it is better to have a terminal application with more features. For increased flexibility, we recommend using any of the two alternative terminal applications presented in the following sub-sections.

2.4.2   Tera Term Terminal Emulation Application

We recommend that you use **Tera Term** which can be downloaded and installed from either of the links below.

https://ttssh2.osdn.jp/index.html.en
http://sourceforge.jp/projects/ttssh2/releases/

Launch *Tera Term*. The first time it launches, it will show you the following dialog. Select the serial option. Assuming the USB cable is connected to the *uCOM Carrier Board*, there should be a COM port automatically populated in the list.

Figure 10 – Tera Term New Connection Window
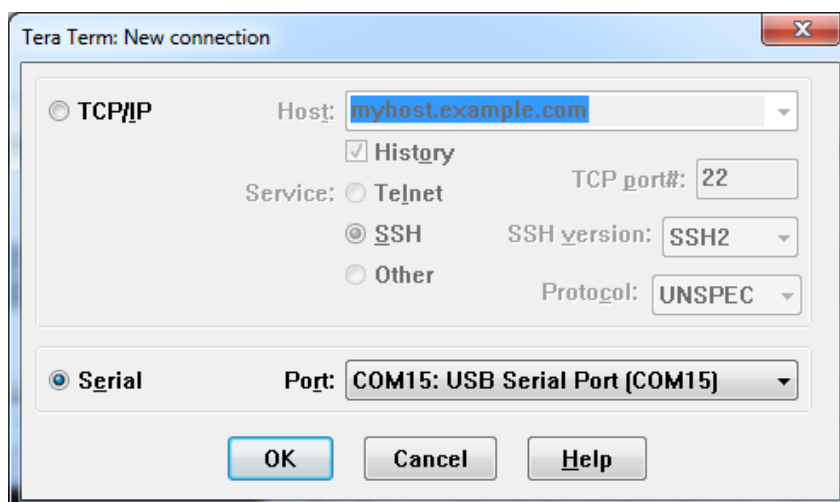
Configure the serial port settings (using the COM port number identified earlier) to 115200 baud rate, 8 data bits, no parity and 1 stop bit. To do this, go to Setup → Serial Port and change the settings.
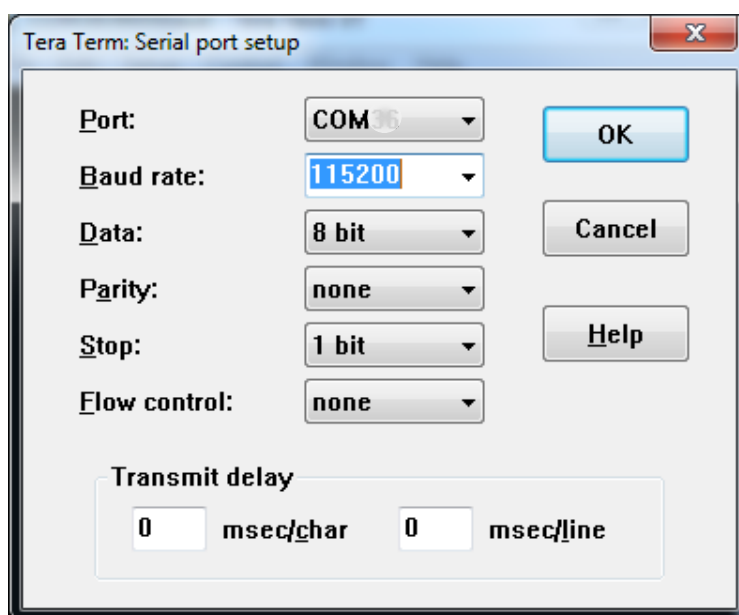

Figure 11 – Tera Term Serial Port Setup

Verify that the connection is open. If connected, *Tera Term* will show something like below in its title bar.
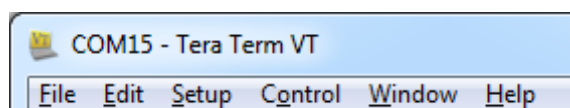

Figure 12 – Tera Term Menu

2.4.3   PuTTY terminal emulation application

Alternatively you can use **PuTTY**. It is another commonly used terminal emulation application. PuTTY can be downloaded and installed from the link below.

http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html

Launch PuTTY by either double clicking on the *.exe file you downloaded or from the Start menu, depending on the type of download you selected.

In the window that launches, select the Serial radio button and enter the COM port number that you determined earlier. Also enter the baud rate, in this case 115200.
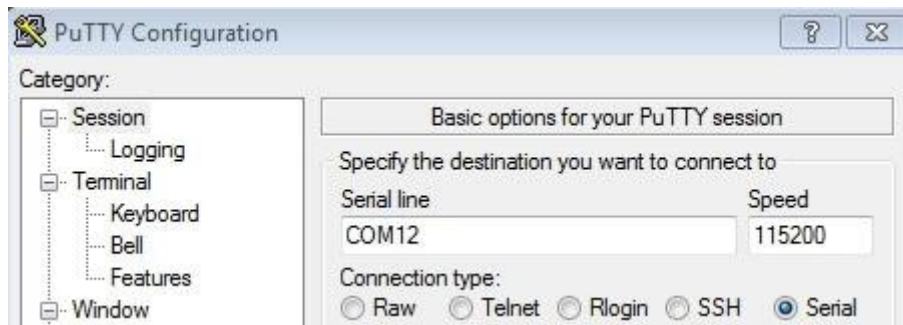
Figure 13 – PuTTY New Session Configuration

Click Open to open the serial connection. Assuming the FTDI cable is connected and you entered the correct COM port, the terminal window will open. If the configuration is not correct, PuTTY will alert you.

2.4.4   Powering

The 12V power supply comes with plug adapters for different countries. Select the plug used in your country and attach it to the power supply. Connect the 2.1mm male barrel jack to the *uCOM Carrier board* (2 in the picture below).

Set the Power on/off switch (1 in the picture) to On state and the board will now power up.
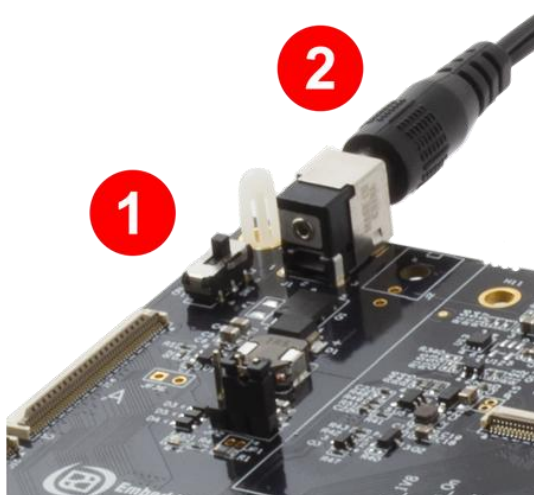
Figure 14 – 12V Power Supply input

2.4.5 Console output

The pre-loaded demo application will output a greeting message on the console. Verify that you can see this text in the terminal application.

2.5 Alternative Powering

The board is normally powered from the 12V input supply voltage. The board can also be powered via the console USB interfaces, J29 and J30. Power selector JP2 must be placed in the 2-3 position for this alternative supply source.

Note that this setup will not always work because the power consumption of the entire board can be higher than what a PC/laptop can provide. This might also be true for a powered USB hub.

The 12V supply input is needed when running USB Host application that require powering external USB devices.

See Figure 15 below where to locate JP2 (rev A boards to the left and rev PB2 to the right).

Powering Selector
JP2
Right (1-2): Power via 12V input supply, default
Left (2-3):   Power from USB consoles (J29 and J30)
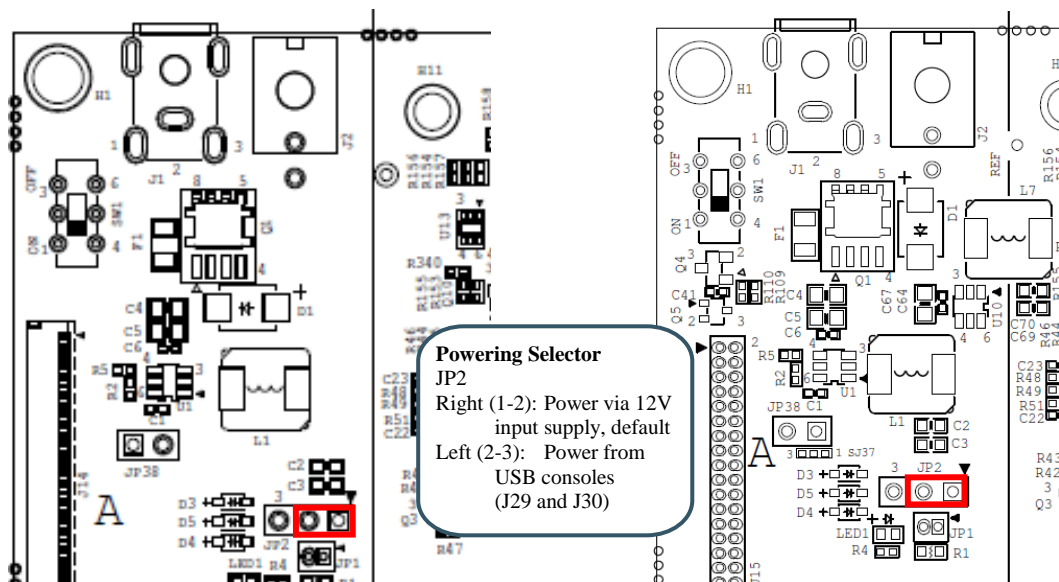
Figure 15 – Location of Powering Selector, JP2

2.6 ESD Precaution

Please note that the *iMX RT1166 uCOM Board* and *uCOM 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.

Make it a habit always to first touch the metal surface of one of the USB, SD or Ethernet 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.

Never touch directly on the *iMX RT1166 uCOM Board* and in general as little as possible on the *uCOM Carrier Board*. The push-buttons on the *uCOM Carrier Board* have grounded shields to minimize the effect of ESD.

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

2.7   Note uCOM Orientation when Mounting

Normally, the iMX RT1166 uCOM board should never be removed/unmounted from the uCOM Carrier Board. If it has been removed and it's time to mount it again, note that it is possible to mount the uCOM board with incorrect orientation. Doing that will damage the uCOM board beyond repair and can also damage the carrier board. The picture below illustrates how to identify the correct orientation of the iMX RT1166 uCOM.

Always match the "A" and "B" marking on the uCOM with the "A" and "B" on the *Carrier Board*.
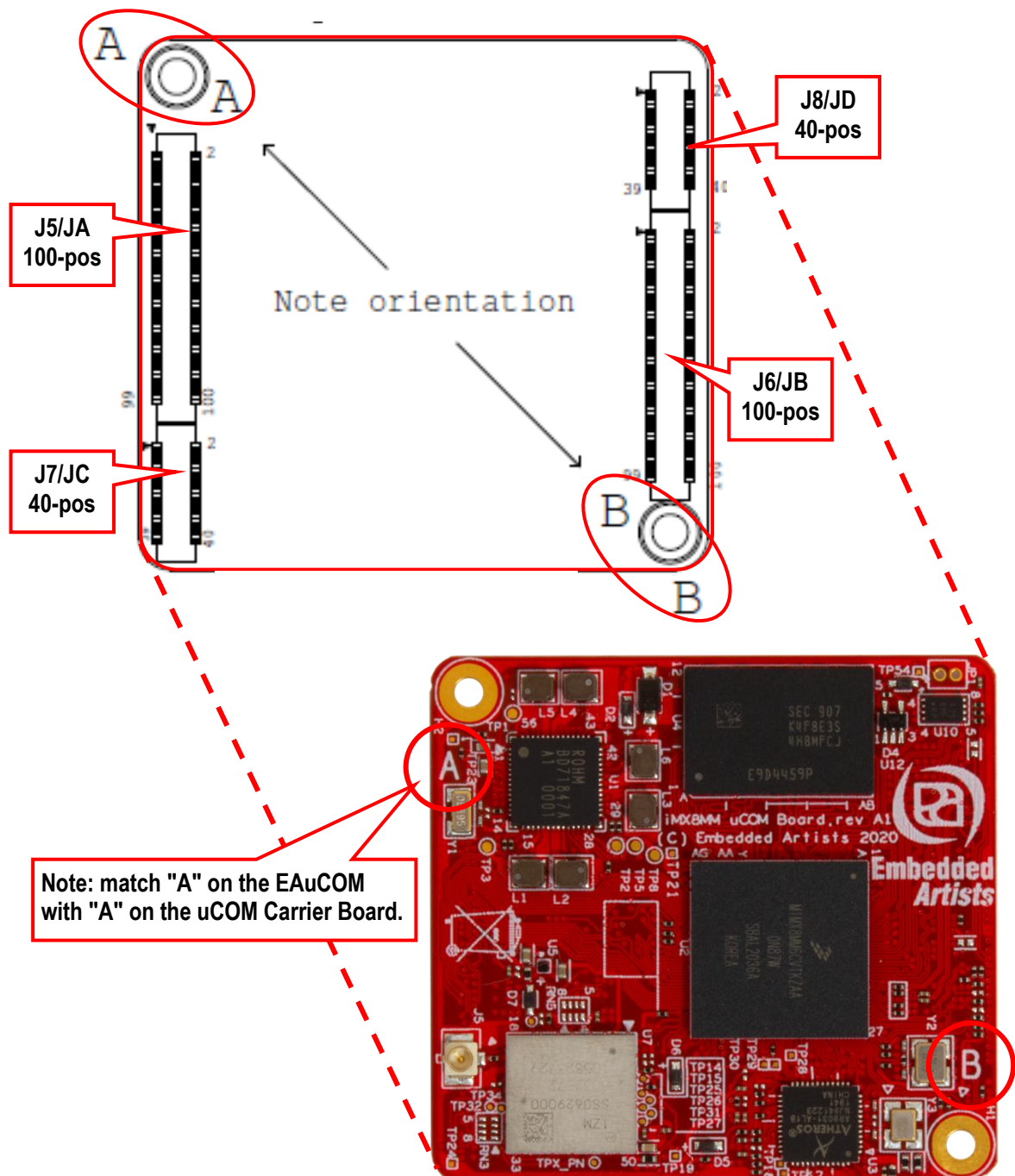

Figure 16 – Orientation of iMX RT1166 uCOM Board when Mounted on the uCOM Carrier Board

2.8   General Handling Care

Handle the *iMX RT1166 uCOM Board* and *uCOM Carrier Board* with care. The boards are not mounted in a protective case/box and are not designed for rough physical handling. Connectors can wear out after excessive use. The *uCOM Carrier Board* is designed for prototyping use, and not for integration into an end-product.

Also handle the *iMX RT1166 uCOM board* with great mechanical care. **Only remove/unmount it from the *uCOM Carrier board* if absolutely needed.** Only use small movements and small force. Do not insert a screwdriver between the uCOM board and *uCOM Carrier board* and bend without having first watched the Youtube clip we have published about this:
https://www.youtube.com/watch?v=-a1UGi_rrLM, title "How to mount and unmount the uCOM board"

2.9   OTP Fuse Programming

The i.MX RT1166 MCU has on-chip OTP fuses that can be programmed, see NXP documents *IMXRT1160RM, i.MX RT1160 Processor Reference Manual* for details. Once programmed, there is no possibility to reprogram them.

iMX RT1160 uCOM Boards are delivered with BT_FUSE_SEL = 1. No other OTP fuse has been programmed. It is completely up to the COM board user to decide if OTP fuses shall be programmed and in that case, which ones.

Just programming BT_FUSE_SEL = 1 will set the boot device to the on-board QSPI flash. It is possible to specify another boot mode by programming the BOOT_CFG1[7:0] and BOOT_CFG2[3:0] fuses.

Note that Embedded Artists does not replace iMX RT1166 uCOM Boards because of wrong OTP programming. It's the user's responsibility to be absolutely certain before OTP programming and not to program the fuses by accident.

2.10   CE Assessment

The *iMX RT1166 Developer's Kit* (consisting of the *iMX RT1166 uCOM Board* and *uCOM Carrier Board*) is CE marked. See separate *CE Declaration of Conformity* document.

The *iMX RT1166 Developer's Kit* is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

EMC emission test has been performed on the *iMX RT1166 Developer's Kit*. Standard interfaces like Ethernet, USB, serial have been in use. General expansion connectors where internal signals are made available (for example processor pins) have been left unconnected. Connecting other devices to the product via the general expansion connectors may alter EMC emission. It is the user's responsibility to make sure EMC emission limits are not exceeded when connecting other devices to the general expansion connectors of the *iMX RT1166 Developer's Kit*.

Due to the nature of the *iMX RT1166 Developer's Kit* – an evaluation board not for integration into an end-product – fast transient immunity tests and conducted radio-frequency immunity tests have not been executed. Externally connected cables are assumed to be less than 3 meters. The general expansion connectors where internal signals are made available do not have any other ESD protection than from the chip themselves. Observe ESD precaution.

Note that the *iMX RT1166 uCOM* board is classified as a component and is hence not CE marked separately. It can perform different functions in different integrations and it does not have a direct function. It is therefore not in the scope of the CE Directive. An end product, where a *uCOM Board* is integration into, is however very likely to need CE marking.

3 uCOM Carrier Board Design

There is a separate *uCOM Carrier Board datasheet* that covers peripherals, general design and features of the *uCOM Carrier Board*. There is also a separate document on how to set the jumpers in the default state for the *iMX RT1166 Developer's Kit*. The *uCOM Carrier Board* schematic can be downloaded in pdf format and is recommended to available when working with the *iMX RT1166 Developer's Kit*.

The picture below gives an overview of the *uCOM Carrier Board* design. Note that there are different revisions of the design but at the overview level they are all the same.
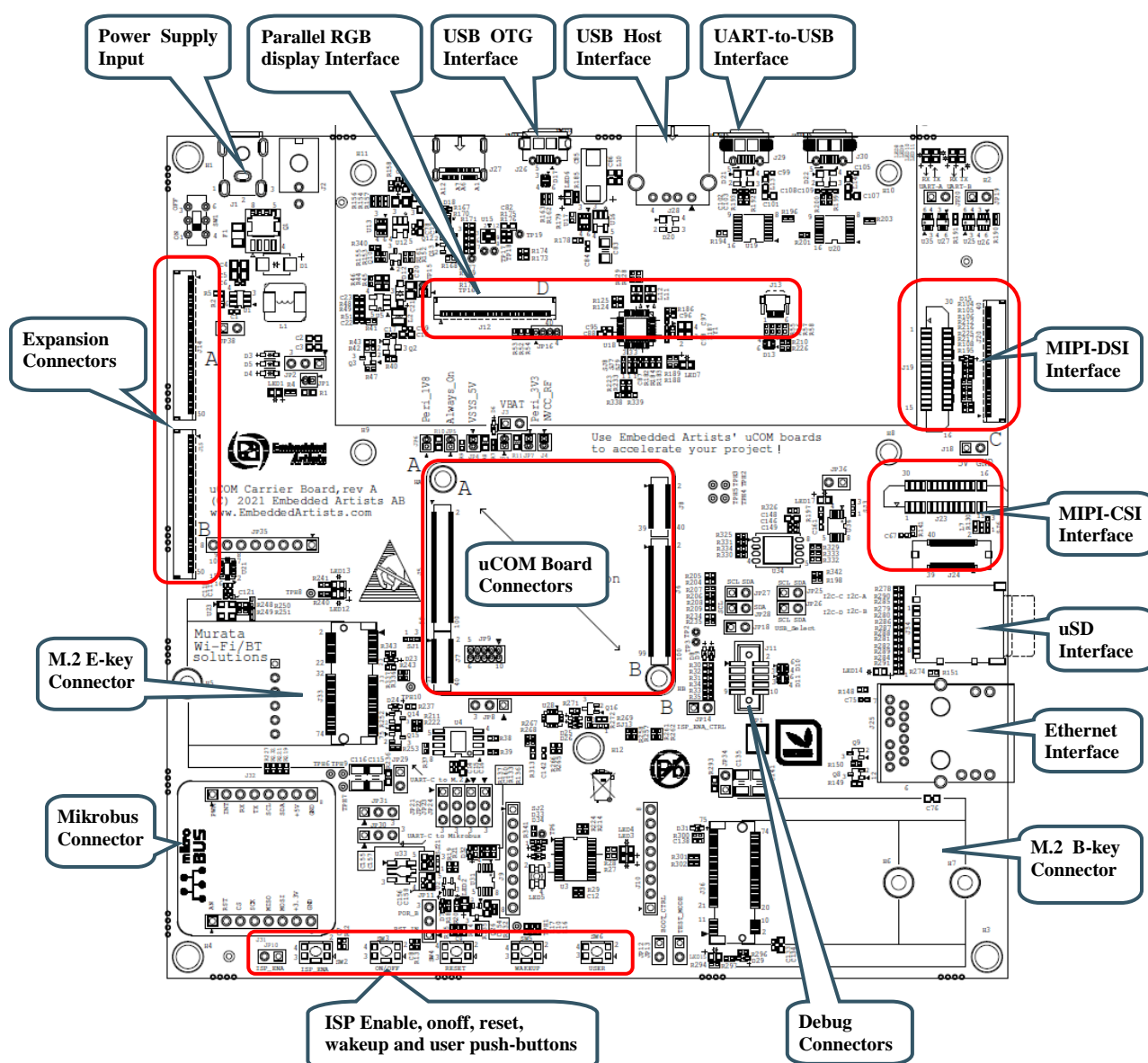

Figure 17 – Overview of uCOM Carrier Board

The *uCOM Carrier Board datasheet* contains information about how to connect the 100/10Mbps Ethernet Adapter, the MIPI-DSI to HDMI Adapter and the RK055HDMIPI4M display (NXP's 5.5 inch 720x1280 pixel LCD in portrait mode with direct MIPI-DSI interface).

3.1   Ethernet Interface Adapter

There is a 100/10Mbps Ethernet Adapter for the i.MX RT1166 uCOM boards. It is based on the KSZ8081RNB Ethernet-Phy. The adapter also includes the 24AA025E48T-I/OT I2C-E2PROM with an EUI-48 (MAC address) number. The Ethernet connector, J16, is HY931168C from Hanrun, or equivalent.

The picture below illustrates how the Ethernet adapter is connected to J12. Note that J12 is the parallel RGB display interface connector. It is identified on the uCOM Carrier Board with a "D". It is not possible to connect a parallel RGB LCD while the Ethernet adapter is connected. They are mutually exclusive.

Note that there are two 40-pos FPC connectors on the Ethernet adapter, J17 and J37. J17 is the connector closest to the PCB edge and J37 is the other connector (inside the PCB). **Use the J37 connector for the iMX RT1166 uCOM board.** Do not use J17, the inner connector (it is for the iMX RT1064 uCOM board). Note that four jumper cables are also needed to connect the adapter.

J16, RJ45 connector with integrated magnetics

100/10 Mbps Ethernet Adapter

These four cables are needed for iMX RT1166 uCOM

J37, mount the flat cable in this connector!

J17, closest to PCB edge Do not use this connector!

Parallel RGB connector J12, Connector "D"

JP38

JP27

Detailed view of JP37 and JP39 on the Ethernet adapter
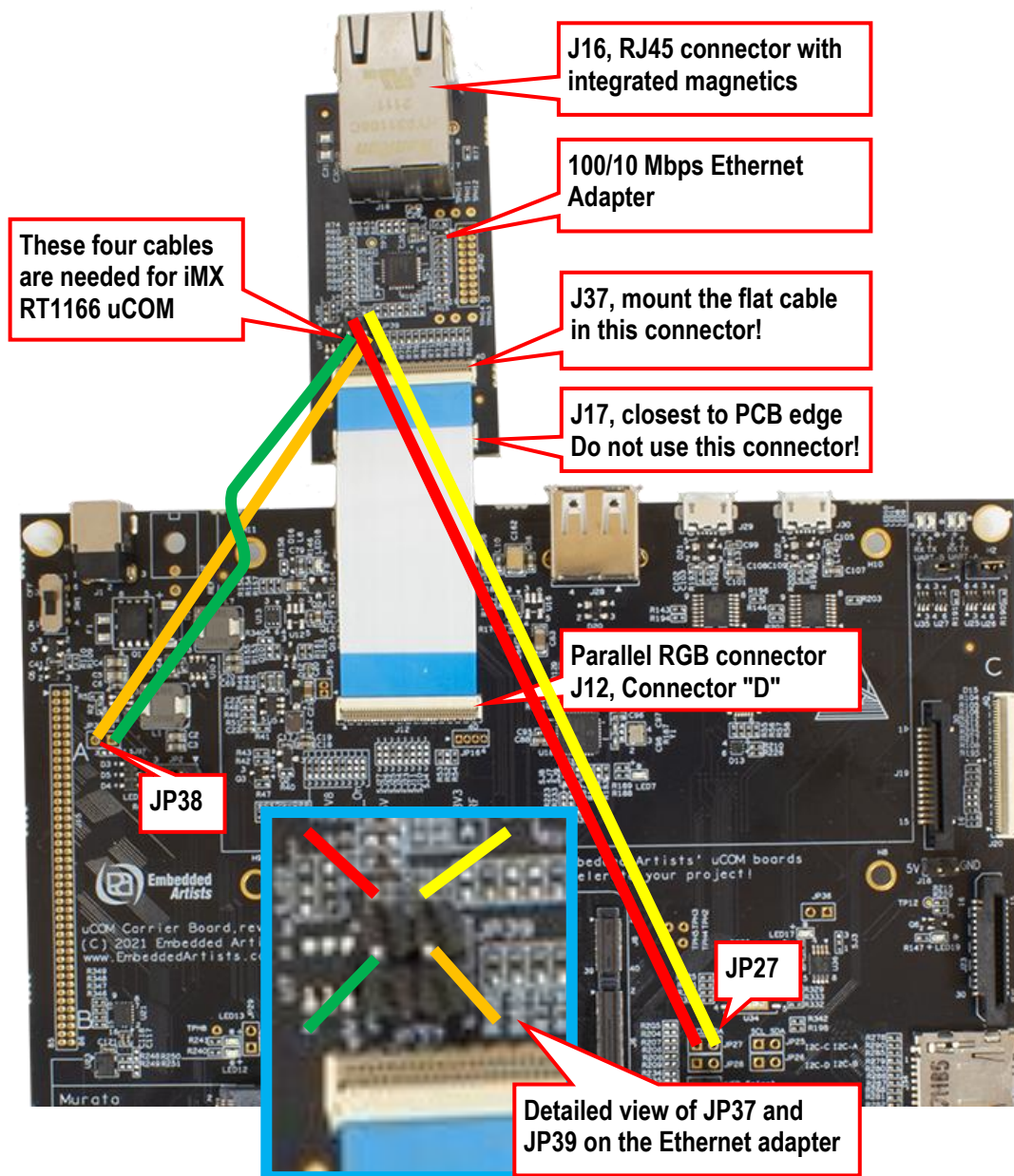
Figure 18 – uCOM Carrier Board rev PB2, Ethernet Interface Adapter

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