MicroDev Open Frame USR Manual 1.0.8
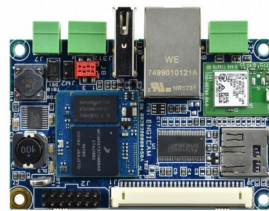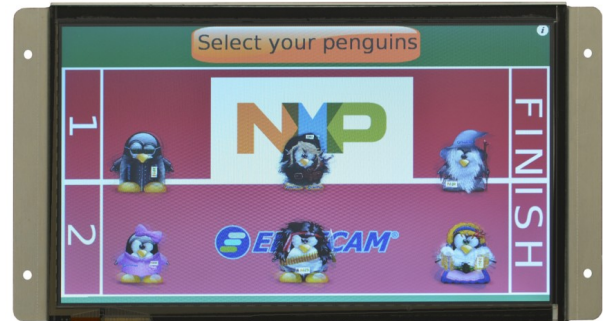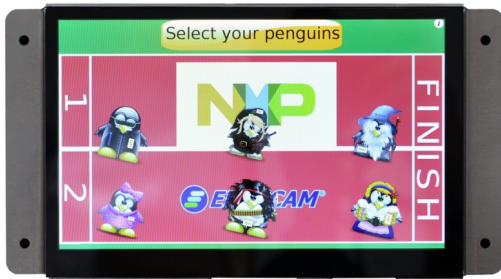
***** Revision History *****

DATE	REVISION	CHANGE DESCRIPTION
08/01/18	1.0.0	Release
30/05/18	1.0.1	Added Open Frame specifications. Added Ordering information
18/01/19	1.0.2	Modified power supply connection chapter, added ordering code information
07/03/19	1.0.3	General enhancement
16/04/19	1.0.4	Replaced the specs of the new display and updated ordering codes
25/06/19	1.0.5	Updated Product compliance chapter for rechargeable battery mounting option
31/01/20	1.0.6	Added in standard code OpenFrame equipped with uGEA MX6ULL (512MB NAND & 512MB DDR3)
20/03/20	1.0.7	Order Codes upgraded
17/04/20	1.0.8	Updating the order options

Table of Contents

1. Cable Map Overview

This document is an overview about cable connecting map of MicroDev board system.
It describes the connector and the interface unit available to user, and it specifies the electrical characteristic of the signals.
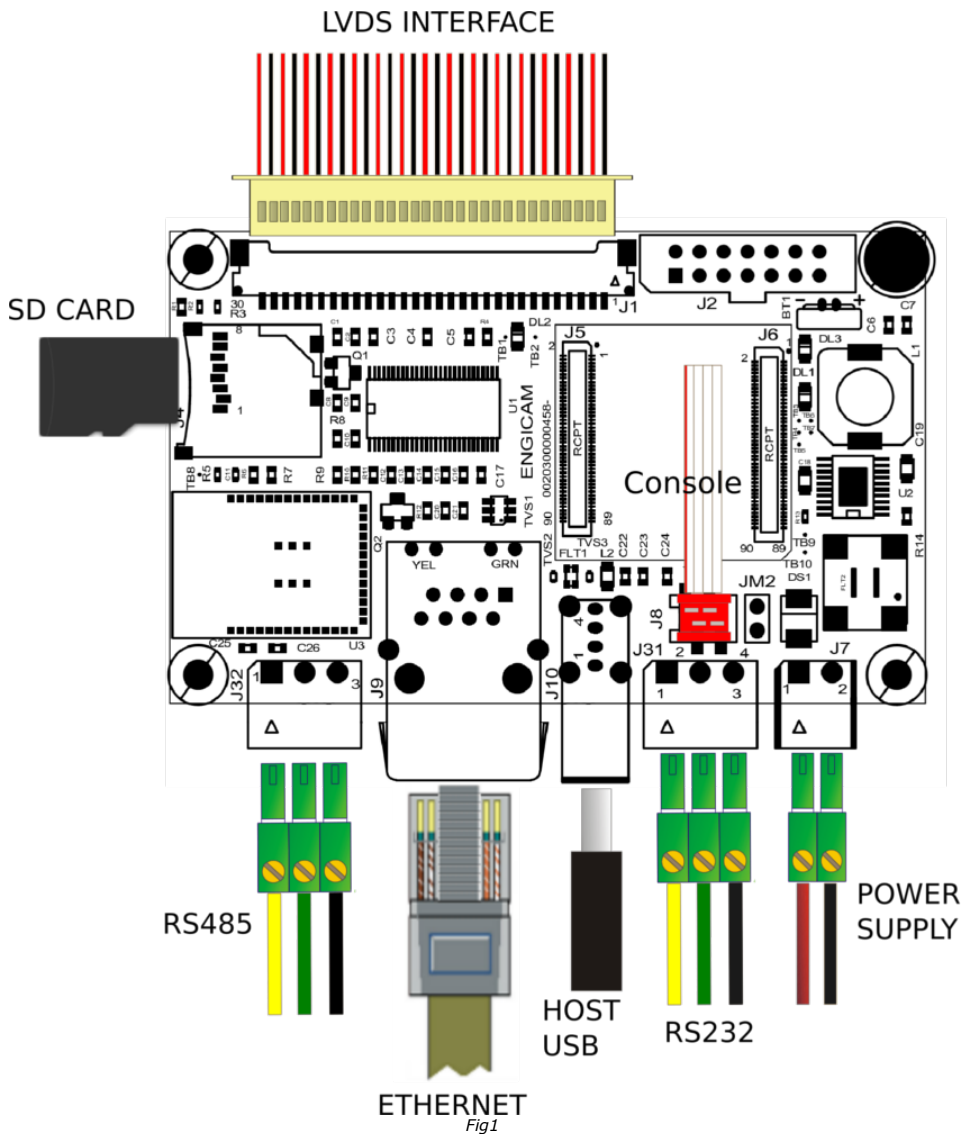

Fig1

The figure1 shows the whole wiring map and its join connectors.
This document will try to analyse all type of used connections to help the user's start up.

2. Ordering Information

Following we provide the ordering informations and the description for the Basic technical specifications:
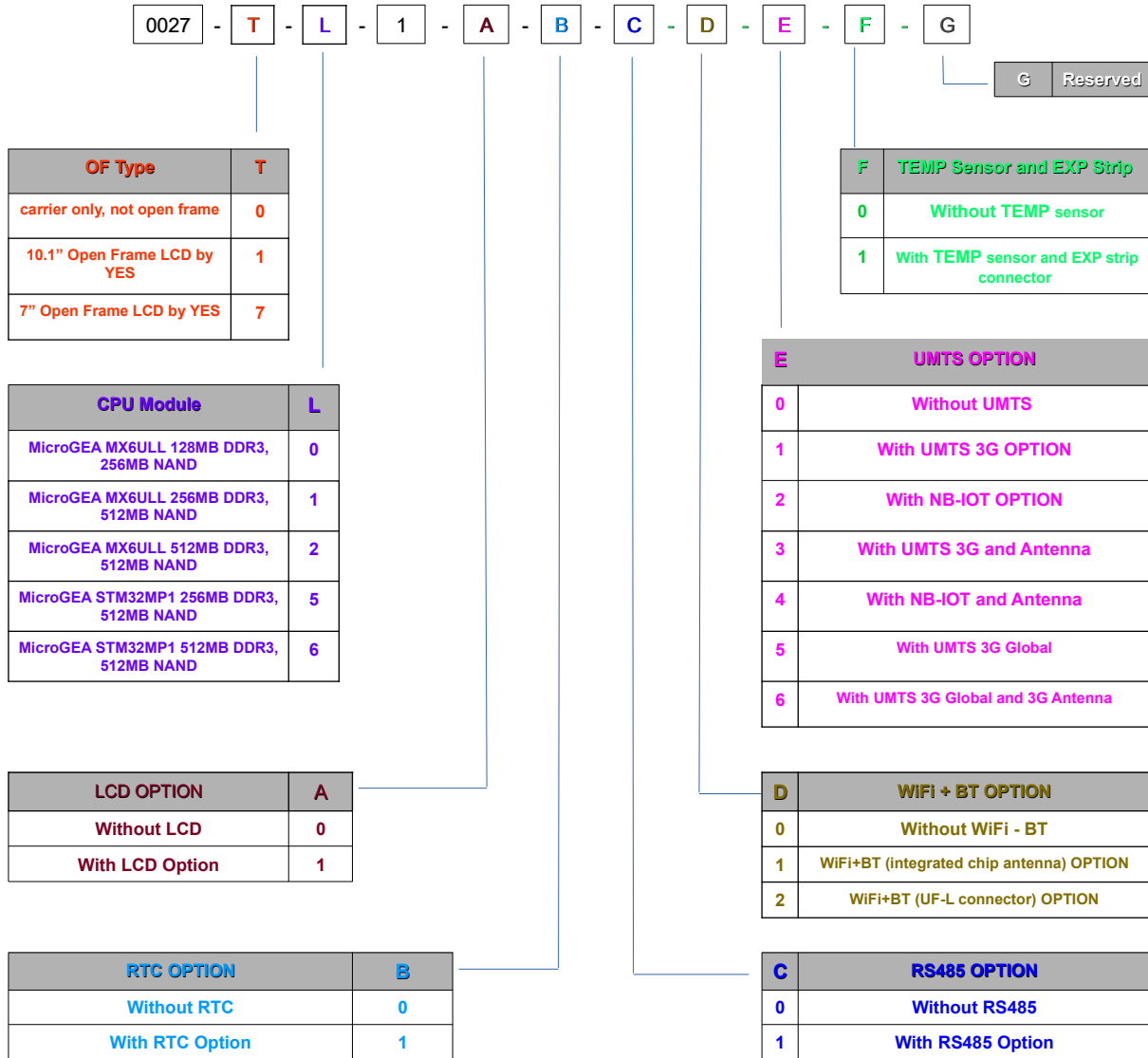
Ordering Code	MOQ	Description	Operating temperature range °C
00277211010000	1	MicroDev 7" Open Frame (MicroGEA MX6ULL 800MHz, 512MB DDR3, 512MB NAND, Ethernet, 2xRS232, 1XUSB, 1xSD, Industrial, 7" LCD 1024x600 with PCAP, RS485)	-40 to +85 *
00277211111010	1	MicroDev 7" Open Frame FULL NO-UMTS (MicroGEA MX6ULL 800MHz, 512MB DDR3,512MB NAND, Ethernet,2xRS232, 1XUSB, 1xSD, Industrial, LCD i/f, RTC, RS485, WiFi+BT, Temp sensor, Exp. Connector, 7" LCD 1024x600 with PCAP)	-40 to +85 *
0027121101000A	1	MicroDev 10.1" Open Frame (MicroGEA MX6ULL 800MHz, 512MB DDR3, 512MB NAND, Ethernet, 2xRS232, 1XUSB, 1xSD, Industrial, 10.1" LCD 1024x600 with PCAP, RS485)	-40 to +85 *
00277011010000	1	MicroDev 7" Open Frame (MicroGEA MX6ULL 800MHz, 128MB DDR3, 256 NAND, Ethernet, 2xRS232, 1XUSB, 1xSD, Industrial, 7" LCD 1024x600 with PCAP, RS485)	-40 to +85 *
00277011111010	1	MicroDev 7" Open Frame FULL NO-UMTS (MicroGEA MX6ULL 800MHz, 128MB DDR3,256 NAND, Ethernet,2xRS232, 1XUSB, 1xSD, Industrial, LCD i/f, RTC, RS485, WiFi+BT, Temp sensor, Exp. Connector, 7" LCD 1024x600 with PCAP)	-40 to +85 *
0027101101000B	-	MicroDev 10.1" Open Frame (MicroGEA MX6ULL 800MHz, 128MB DDR3, 256 NAND, Ethernet, 2xRS232, 1XUSB, 1xSD, Industrial, 10.1" LCD 1024x600 with PCAP, RS485)	-40 to +85 *
00257000012570	1	MicroDev 7" Open Frame rear enclosure option	-
00257000012580	1	MicroDev 10.1" Open Frame rear enclosure option	-

Table 1

*   LCD 7" components excluded (range -20; +60 °C)
*   LCD 10.1" components excluded (range -20; +70 °C)

The main order codes, shown in the table above, could be modified following the structure below:

0027 - **T** - **L** - **1** - **A** - **B** - **C** - **D** - **E** - **F** - G

G	Reserved

OF Type	T
carrier only, not open frame	0
10.1" Open Frame LCD by YES	1
7" Open Frame LCD by YES	7

F	TEMP Sensor and EXP Strip
0	Without TEMP sensor
1	With TEMP sensor and EXP strip connector

CPU Module	L
MicroGEA MX6ULL 128MB DDR3, 256MB NAND	0
MicroGEA MX6ULL 256MB DDR3, 512MB NAND	1
MicroGEA MX6ULL 512MB DDR3, 512MB NAND	2
MicroGEA STM32MP1 256MB DDR3, 512MB NAND	5
MicroGEA STM32MP1 512MB DDR3, 512MB NAND	6

E	UMTS OPTION
0	Without UMTS
1	With UMTS 3G OPTION
2	With NB-IOT OPTION
3	With UMTS 3G and Antenna
4	With NB-IOT and Antenna
5	With UMTS 3G Global
6	With UMTS 3G Global and 3G Antenna

LCD OPTION	A
Without LCD	0
With LCD Option	1

D	WiFi + BT OPTION
0	Without WiFi - BT
1	WiFi+BT (integrated chip antenna) OPTION
2	WiFi+BT (UF-L connector) OPTION

RTC OPTION	B
Without RTC	0
With RTC Option	1

C	RS485 OPTION
0	Without RS485
1	With RS485 Option

Ordering Code nomenclature

Note*: the codes **not** included in the Table 1 have a MOQ of 500 pieces*

3. HW Compatibility with modules

The following table shows the modules available with the MicroDev Open Frame

Modules	Microdev Open Frame 10.1"	Microdev Open Frame 7"
MicroGEA MX6ULL	Compliant	Compliant
MicroGEA STM32MP1	Compliant	Compliant

Table 2

4. Carrier Board Specifications

In this chapter are described the informations about the carrier board. These specifications include the descriptions of all the available peripheral assembled on the board and the code or the family of any mating connectors for each interface

4.1 Mechanical informations

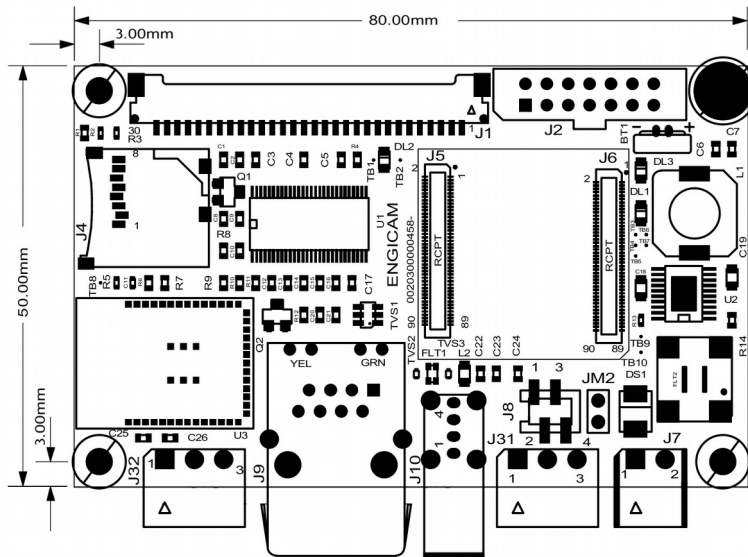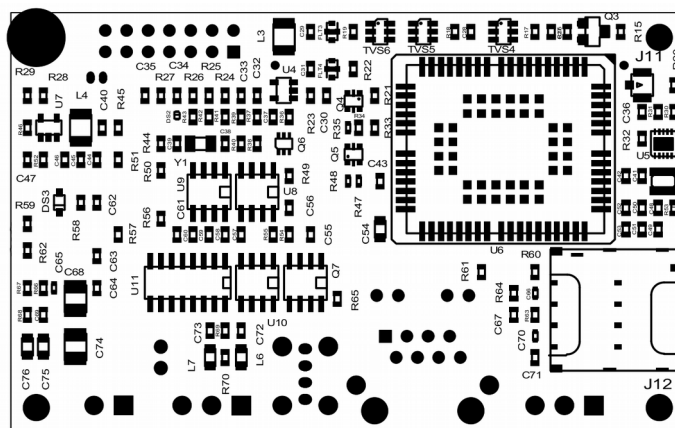In the following picture is reported the drawing and the size of the carrier board.

Fig2

Fig3

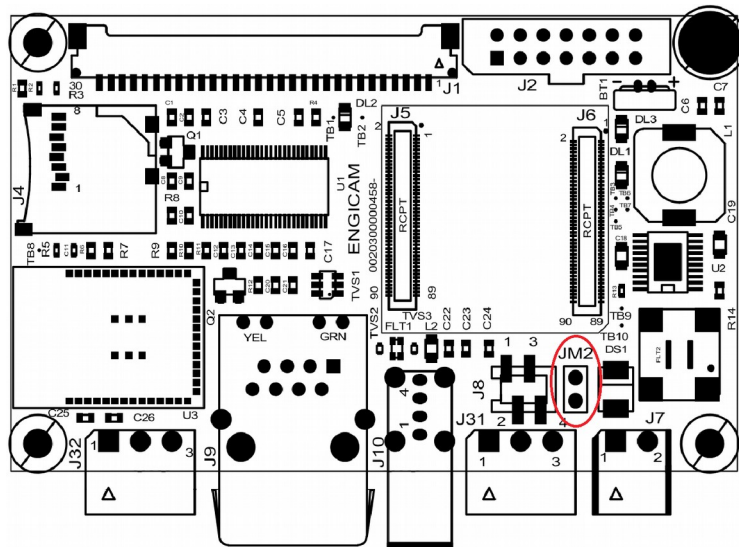**Note**: all the unit reported measure are in mm

4.2 Boot Mode

Fig4

The MicroDev board is equipped with a jumper that allows to choose the boot source

Jumper JM2	Action
Close	Boot from SD
Open	Boot from NAND

Table 3

Note: For further details refers also to MicroGEA HW manual

4.3 Micro SD Connections

The MicroDev board has a Micro SD switch detected connector (J4). It uses both micro SD standard type card and SD High Capacity type card

Fig5
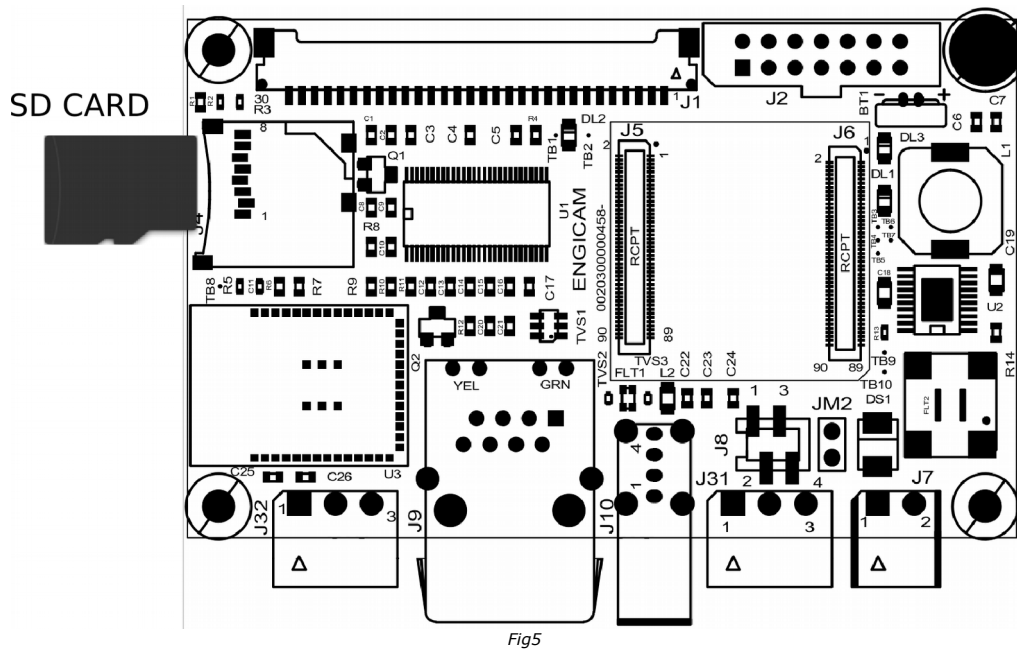
Micro SD card features are:

- Capacity: variable from 32 MB to 32 GB
- Length: 15 mm
- Depth:11 mm
- Height: 1 mm
- Voltage supply 2,7 V 3,6 V
- Slot: TransFlash
- MTBF: 1.000.000 h/e

4.4 RS 485 & RS 232 Connections

The following figure represents the connections of the RS485 and RS232 signals. Both RS485, and RS232 are connected through a terminal male connector (Phoenix code MC 1.5/3-G-3.5-1844223 90° or compliant) mounted on PCB and referenced J31, J32.
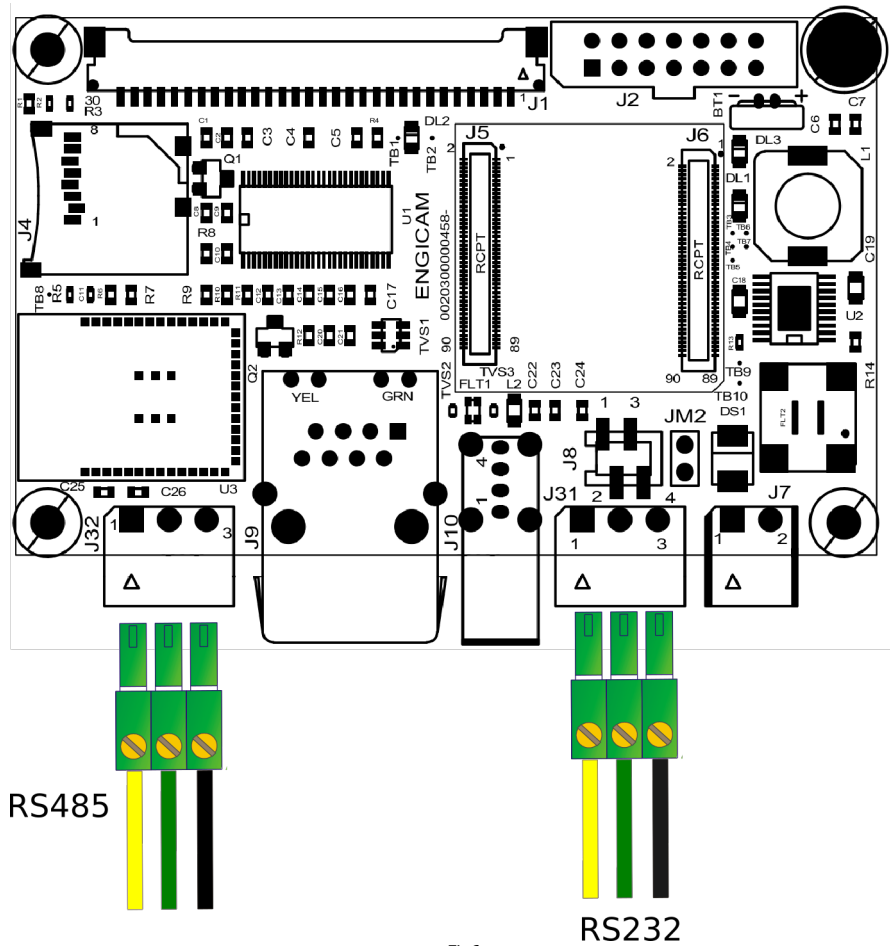

Fig6

The table shows the wiring map of female connector Mors Phoenix Contact MC1.5/3-G-3.5, 3 poles (or compliant) used for RS485 (UART2).

J32

Pin number	Signal Name	Function Description	Voltage reference
1	RS485 P	Non Inverting Receiver In/Driver Out	RS485 Standard
2	RS485 N	Inverting Receiver In/Driver Out	RS485 Standard
3	GND	Power Signal	-

Table 2

The table shows the wiring map of female connector Mors Phoenix Contact MC1.5/3-G-3.5, 3 poles (or compliant) used for RS232 (UART5).

J31

Pin number	Signal Name	Function Description	Voltage reference
1	TX	Transmit Signal Output	RS232 Standard
2	RX	Receive Signal Input	RS232 Standard
3	GND	Power Signal	-

Table 3

Note: Do NOT use the UART5 on connector J31 as Linux console

4.5 USB Connections
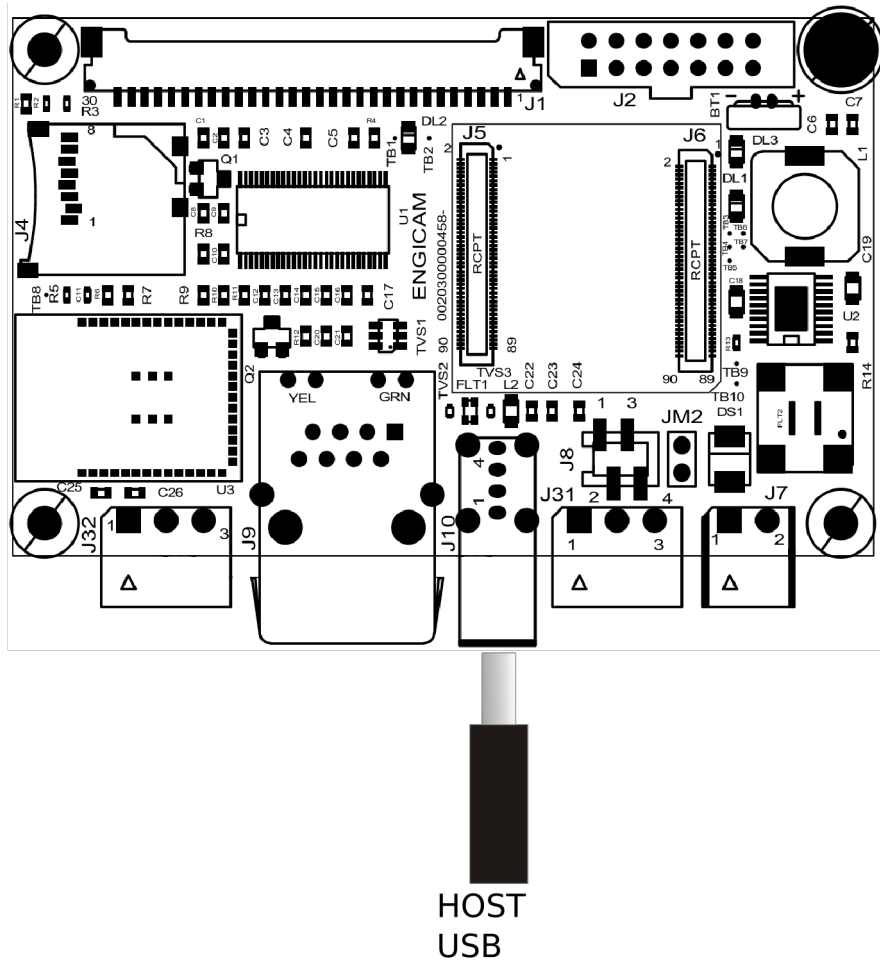
4.5.1 USB HOST

HOST
USB

Fig7

The USB HOST signal is connected by standard type A USB connector. The following table shows the electrical connection of the USB standard interface (USB type A plug)

Pin number	Signal Name	Function Description	Voltage reference
1	VBUS	Power Signal	Standard USB
2	DM	Data N	Standard USB
3	DP	Data P	Standard USB
4	GND	Power Signal	Standard USB

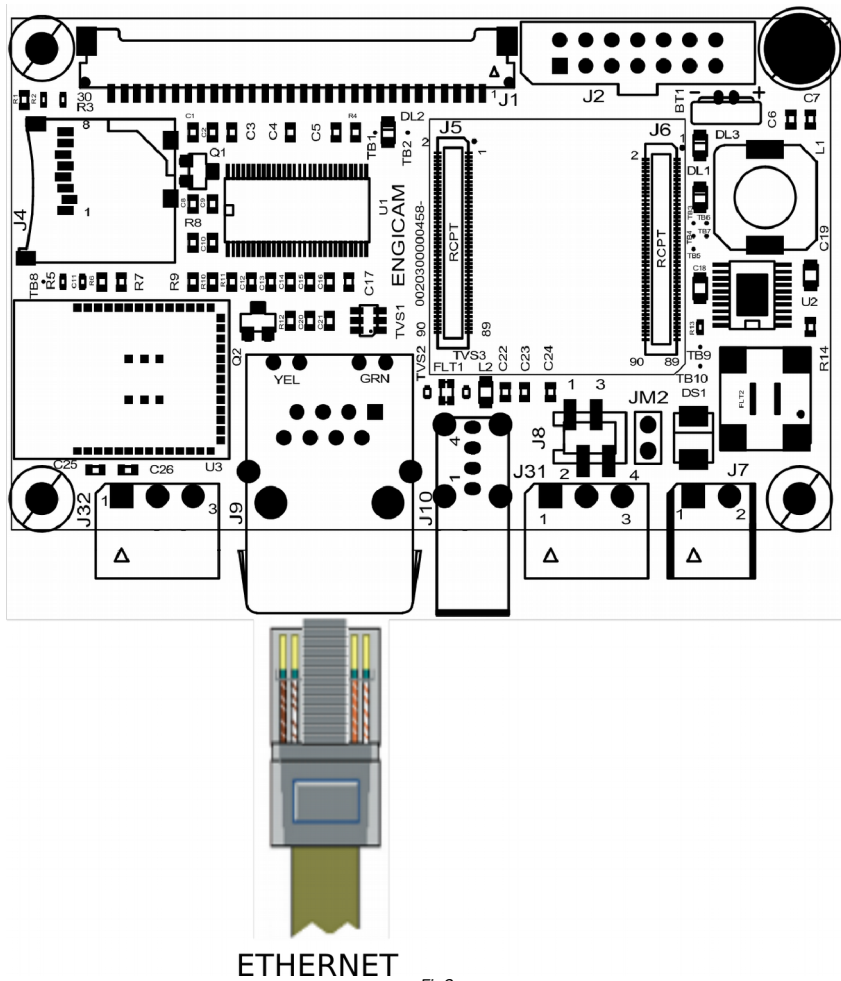Table 4

4.6 Ethernet Connections

ETHERNET
Fig8

The figure represents the Ethernet 10/100 connection. This connection uses a RJ45 standard plug (8 wires) and the following table shows the wiring map.

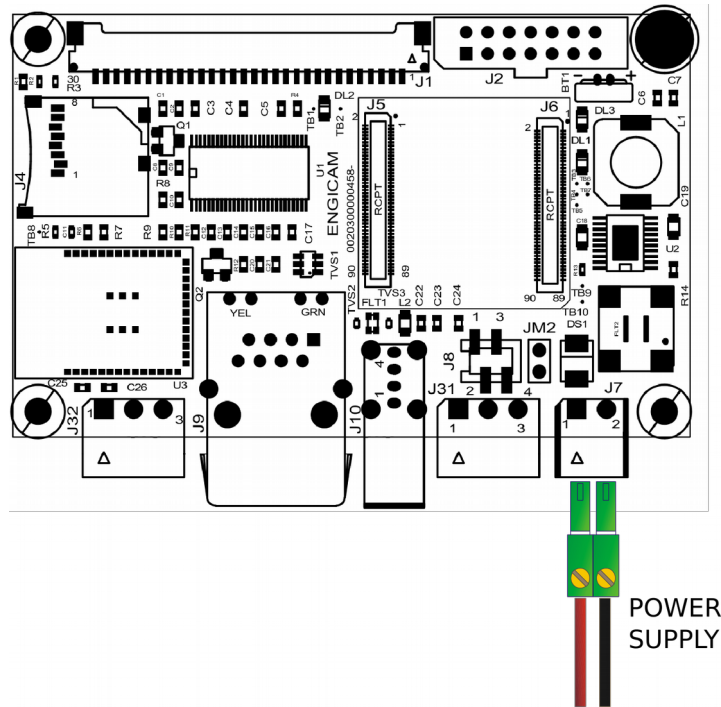| Pin number	Signal Name	Function Description	Voltage reference
1	TX+	Transmit positive signal	Standard Ethernet
2	TX-	Transmit negative signal	Standard Ethernet
3	RX+	Receive positive signal	Standard Ethernet
4	NC	-	-
5	NC	-	-
6	RX-	Receive negative signal	Standard Ethernet
7	NC	-	-
8	NC	-	-

Table 5

4.7 Power Supply Connections

Fig9

The figure shows the power supply connection. The board receives a typical input DC voltage of +12V. J7 is Phoenix MC 1.5/2-G-3.5 1844210 90° positions p.3.5mm male connector, linked as follows:

Pin number	Signal Name	Function Description	Voltage Min	Voltage Typ	Voltage Max
1	+VIN	Power Signal	+7V	12V	+40V
2	GND	Power Signal		-	

Table 6

The following table reports the carrier and open frame 7" and 10.1" current consumption.

Open Frame	Current @ +12V	Current @ +24V
MicroDev Carrier Board	110 mA	60 mA
7" Open Frame YES	400 mA	210 mA
10.1" Open Frame YES	420 mA	215 mA

Table **7**
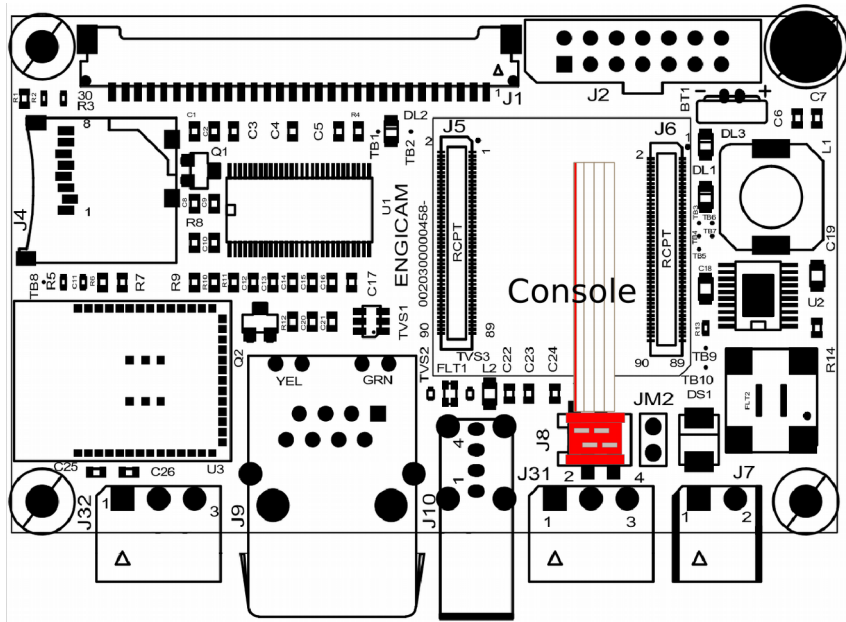
4.8 Linux Console Debug Connections

Fig10

When Linux OS is installed on the board's module, the UART1 is used as console. The connector used is a vertical MicroMatch 3.0 2x2 poles; in the following table is shown the electrical features:

Pin number	Signal Name	Function Description	Voltage reference
1	TX	Transmit Signal	Standard RS232
2	RX	Receive Signal	Standard RS232
3	NC	-	-
4	GND	Power Signal	-

Table 8

The default communications settings is shown in following table

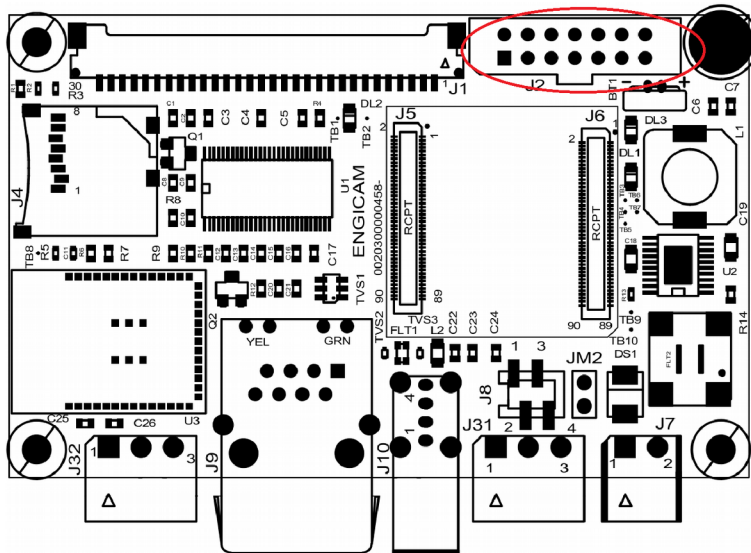| Console Default Settings	
Baud rate	115200
Data length	8 bit
Parity	none
Stop	1bit

4.9 Expansion Connector

Fig11

The MicroDev is provided of Expansion connector (STRIP 2x7 poles, 2.54mm pitch referenced J3) which allows to connect the following module's pins:

Pin Number	Pin on Module Connector A	Pin on Module Connector B	Description	Voltage reference
1	7	-	UART4_TXD	+3,3V
2	9	-	UART4_RXD	+3,3V
3	-	-	GND	-
4	88	-	CAN1_TX	+3,3V
5	90	-	CAN1_RX	+3,3V
6	-	-	+5V	-
7	6	-	USB_EXT_DP if R43 is mounted, NC otherwise [1]	USB Standard
8	4	-	USB_EXT_DN if R26 is mounted NC, otherwise [1]	USB Standard
9	-	-	+3,3V	-
10	-	35	I2C4_SCL	+3,3V
11	-	43	I2C4_SDA	+3,3V
12	-	-	GND	-
13	53	-	Spare GPIO	+3,3V
14	55	-	Spare GPIO	+3,3V

Table 9

[1] The USB_EXT signals are shared also with CPT signals of the display connector and UMTS control interface. The enable of the 3 different interfaces is available by mounting or removing the couple of resistor R24, R41; R26, R43; R25, R42 .In the standard assembly mode the resistors R24 and R41 are mounted and only the CPT is available on the board.
If the resistors R26, R43 are mounted only the UMTS interface is provided.
If the couple R25, R42 is mounted only the USB on the expansion connector is available.

4.10 Wi-Fi + Bluetooth Interface (optional)

MicroDev board is equipped with **Sterling-LWB™ 2.4 GHz Wi-Fi® and Bluetooth® Smart Ready Multi-Standard Module.** This module is based upon the **Broadcom 4343W** chipset, and supports IEEE 802.11 b/g/n, BT 2.1+EDR, and BLE 4.1 wireless connectivity. The module comes in three configurations to best address specific applications, and features an industrial temperature rating (-40° to +85° C) and an industry-leading breadth of certifications and antenna options.
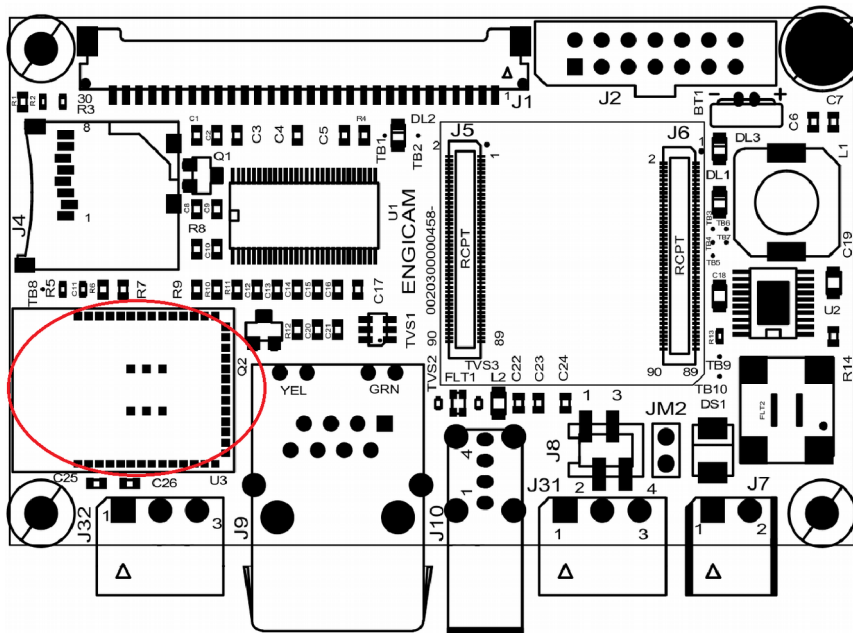

Fig12

The Wi-Fi interface is managed using the SDIO2 bus

B Connector	Name	Pin Name on i.MX	GPIO Capable	Voltage
79	SD2_D0	CSI_DATA00	Y	+3,3V
77	SD2_D1	CSI_DATA01	Y	+3,3V
83	SD2_D2	CSI_DATA02	Y	+3,3V
81	SD2_D3	CSI_DATA03	Y	+3,3V
87	SD2_CMD	CSI_HSYNC	Y	+3,3V
85	SD2_CLK	CSI_VSYNC	Y	+3,3V

Table 10

The Bluetooth interface is managed using the PAD of the UART 8 on the iMX processor.

B Connector	Signal Name	Pin Name on i.MX	GPIO Capable	Voltage
53	UART8_CTS (Output)	ENET2_TX_CLK	Y	+3,3V
41	UART8_RTS (Input)	ENET2_RX_ER	Y	+3,3V
57	UART8_TXD	ENET2_TX_DATA1	Y	+3,3V
45	UART8_RXD	ENET2_TX_EN	Y	+3,3V

Table 11
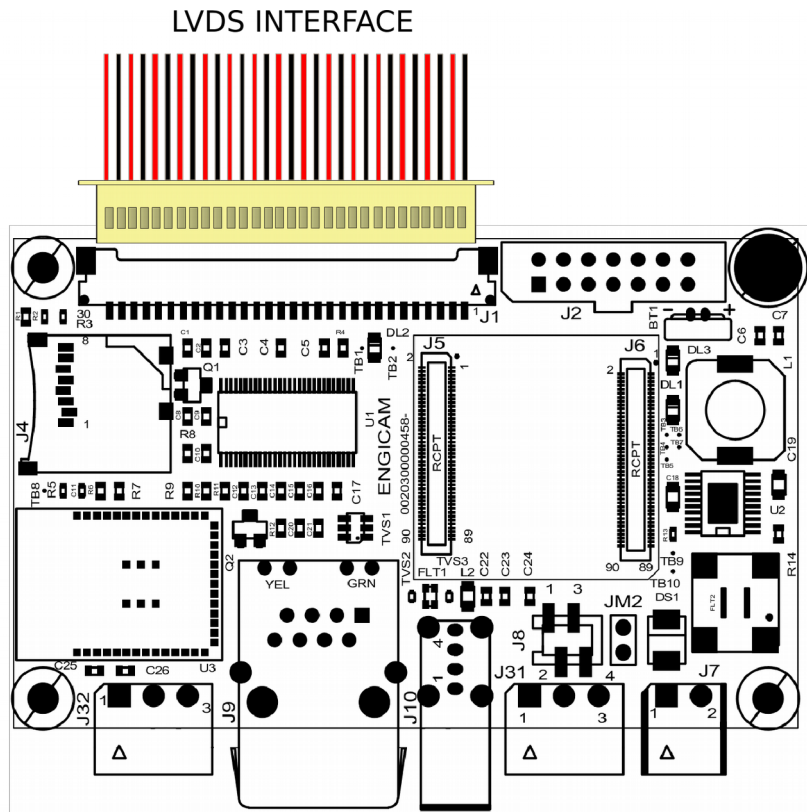
4.11 LVDS Interface

LVDS INTERFACE

Fig13

The board connector, reference J1, mates with the cable connector code DF14-30S-1.25C (HIROSE) or compliant

Pin number	Signal Name	Function Description	Voltage reference
1	GND	Power PIN	-
2	+3V3_LCD	Power PIN	-
3	+3V3_LCD	Power PIN	-
4	+5V	Power PIN	-
5	+5V	Power PIN	-
6	Vin_FLT	Power PIN	(see Chapter 2.6)
7	NC	-	-
8	LVDS0_TX0_N	LVDS Interface's Signals	+2,5V
9	LVDS0_TX0_P	LVDS Interface's Signals	+2,5V
10	GND	Power PIN	-
11	LVDS0_TX1_N	LVDS Interface's Signals	+2,5V
12	LVDS0_TX1_P	LVDS Interface's Signals	+2,5V
13	GND	Power PIN	-
14	LVDS0_TX2_N	LVDS Interface's Signals	+2,5V

Pin number	Signal Name	Function Description	Voltage reference
15	LVDS0_TX2_P	LVDS Interface's Signals	+2,5V
16	GND	Power PIN	-
17	LVDS0_CLK_N	LVDS Interface's Signals	+2,5V
18	LVDS0_CLK_P	LVDS Interface's Signals	+2,5V
19	GND	Power PIN	-
20	LVDS0_TX3_N	LVDS Interface's Signals	+2,5V
21	LVDS0_TX3_P	LVDS Interface's Signals	+2,5V
22	GND	Power PIN	-
23	LCD_BKL_PWM	PWM (Display Contrast)	+3,3V
24	I2C2_SCL	I2C SCL Signal	+3,3V
25	I2C2_SDA	I2C SDA Signal	+3,3V
26	GPIO1_T_CONTROL	General Purpose IO	+3,3V
27	USB_DISP_DP	USB interface if R41 is mounted NC otherwise [3]	Standard USB
28	USB_DISP_DN	USB nterface if R24 is mounted NC otherwise [3]	Standard USB
29	U/D#	Vertical inversion (selectable by board pull-up/down) [1]	+3,3V
30	8/6 BIT	selectable by board pull-up/down [2]	+3,3V

Table 12

The LVDS connector is designed to manage the CTP with both USB and I2C interfaces. To use the USB interface pay attention on note number [3]

[1]   U/D# Signal is controlled by:
      R1, 5,6K Ohm pull-up resistor (Mounted on the standard PCB configuration)
      R2, 100K Ohm pull-down resistor (Not Mounted)

[2]   Spare Pin Signal is controlled by:
      R15, 5,6K Ohm pull-up resistor (Mounted on the standard PCB configuration)
      R3, 100K Ohm pull-down resistor (Not Mounted)

[3]   The USB_DISP signals are shared also with expansion connector and with CPT signals of the display connector . The enable of the 3 different interfaces is available by mounting or removing the couple of resistor R24, R41; R26, R43; R25, R42 .In the standard assembly mode the resistors R24 and R41 are mounted and the only CPT is available on the board.
      If the the resistors R26, R43 are mounted only the UMTS interface is provided.
      If the couple R25, R42 is mounted only the USB on the expansion connector is available .

4.12 UMTS interface (optional)

The MicroDev carrier board is equipped with an (optional) embedded 3G wireless communication module, supports GSM/GPRS/EDGE and UMTS/HSDPA/HSUPA networks. The module offers a maximum data rate of 7.2Mbps on downlink and 5.76Mbps on uplink in HSPA mode.
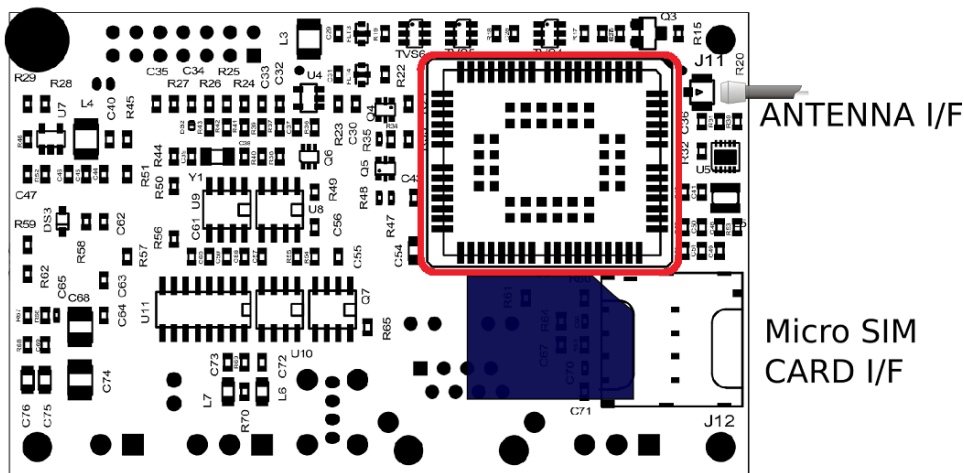

Fig14

The UMTS interface is managed using the USB_OTG bus and some committed signals

PIN number A Connector	Name	Pin Name on i.MX	GPIO Capable	Voltage
4	USB_OTG_DN [1]	USB_OTG1_DN	N	USB Standard
6	USB_OTG_DP [1]	USB_OTG1_DP	N	USB Standard

Table 13

PIN number on Connector		Name	Pin Name on i.MX	GPIO Capable	Voltage
A	B				
34	-	UMTS_EN	GPIO_IO02	Y	+3,3V
36	-	UMTS_RESET	UART3_RX_DATA	Y	+3,3V
38	-	UMTS_ON	SNVS_TAMPER5	Y	+3,3V
40	-	UMTS_STATUS	SNVS_TAMPER4	Y	+3,3V
-	70	UMTS_STOP	CSI_DATA05	Y	+3,3V

Table 14

[1] The USB_DISP signals are shared also with expansion connector and UMTS control interface. The enable of the 3 different interfaces is available by mounting or removing the couple of resistor R24, R41; R26, R43; R25, R42 .In the standard assembly mode the resistors R24 and R41 are mounted and only the CPT is available on the board.
If only the the resistors R26, R43 are mounted only the UMTS interface is provided.
If the couple R25, R42 is mounted only the USB on the expansion connector is available.

4.13 Temperature Sensor

The MicroDev carrier board is provided with a LM75AD temperature sensor managing by the I2C1 interface
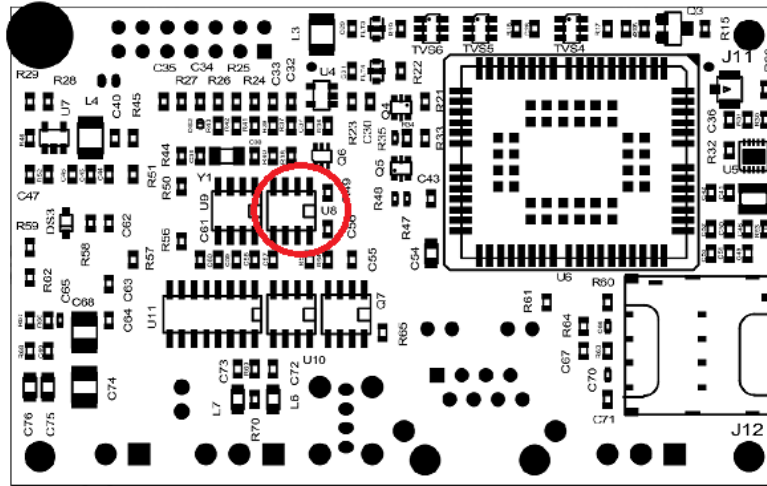

Fig15

PIN number B Connector	Name	Pin Name on i.MX	GPIO Capable	Voltage
62	I2C_SCL	CSI_PIXCLK	Y	+3,3V
64	I2C_SDA	CSI_MCLK	Y	+3,3V

Table 15

5. MicroDev 7" Open Frame assembly plan

This chapter want to be a guide and illustrate the method to installing an Open-Frame in a customised system. First of all it will be specified the methodologies of insertion, of installation and the mechanical dimensions useful to the user to determinate the space requirements to design a custom product containing the MicroDev Open-Frame.

To help you to achieve the best results will be described the size and dimensions with their tolerances, this will allow the integration of Open-Frame, that will interact with any system through its visual interface and its touchscreen.

Therefore the attention of the user will be focus on the possibility of adjust the positioning through the tolerances left on the constraints and the use of appropriate screws. In this way the user will be able to place the Open-Frame within its system ensuring accuracy and reproducibility of the production process.

5.1 MicroDev Open Frame 7" Overall Dimensions

In the following picture is reported the drawing with the size of the OF. This can be useful to calculate the encumbrance area and the fixing points to consider during the system designing.
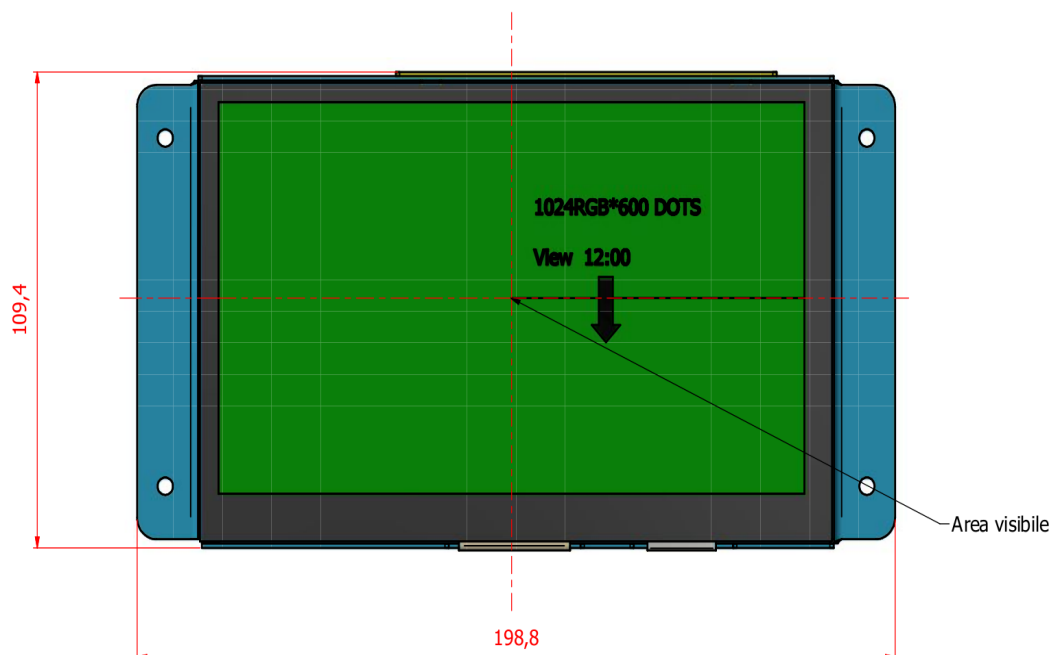
The pictures below show the maximum size of the Open-Frame system also in its depth (in which are considered also the dimensions of carter that cover the PCB and its components assembled).


Those can be useful to calculate and consider the volume necessary to place or to integrate the Open-Frame within another system and to design a suitable mounting points.

5.2 Positioning and Balancing

In this chapter it will be explained to the user how positioning the Open-Frame and how to centre the display in a mechanical window. In the following figure you'll find the spacing between the fixing hole and the centre of the *display's visible area*. Based on following measure you can find the position compared to the four fixing hole.

Area visibile 153.6X90
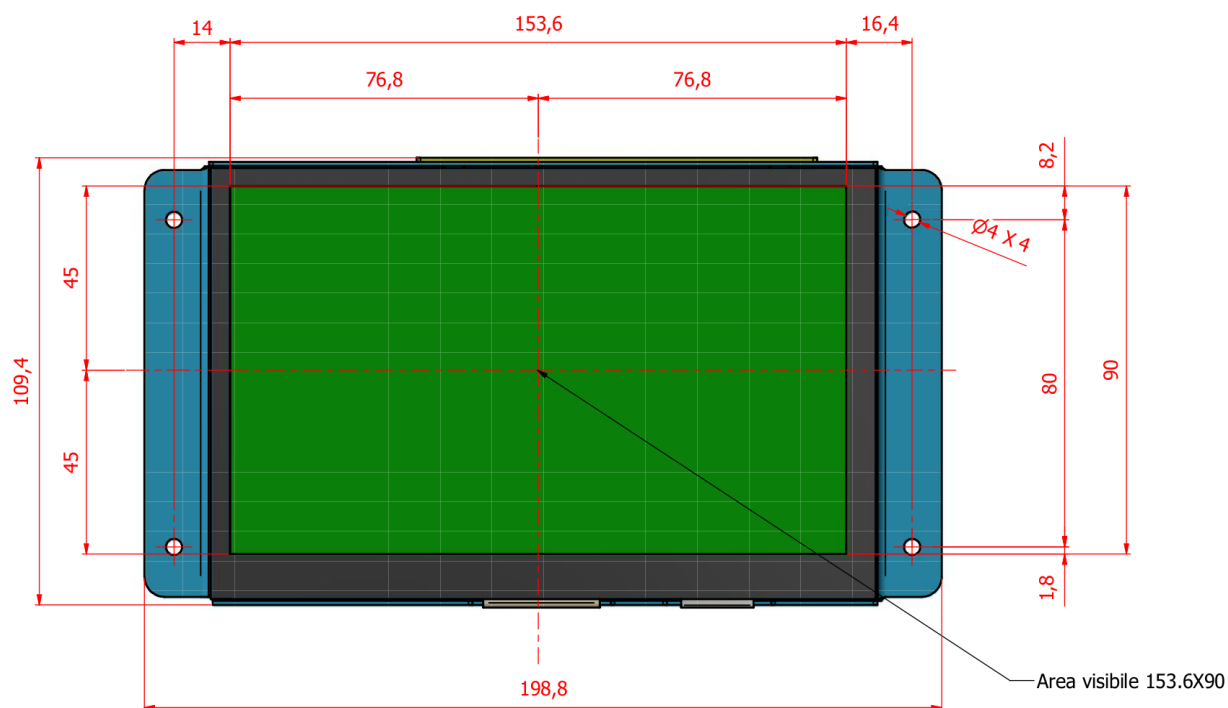
It's possible to use the smaller screws to have a more flexible constraint during the centring of the Open-Frame within the system. In this way you'll have more tolerance on the centring the display (also considering drilling tolerances). if you use threaded PEM reducing the size of diameter).

Warning:
for any doubt about the positioning do not hesitate to contact Engicam support

5.3 General specifications for display 7"

In the table are shown the displays' specifications driven by uDev carrier board:

YTC700TLAG-05-201C	7 "
Operating temperature range	-20; +60 °C
Size	7 inch
Luminance	350 cd/mq
Colour	16.2M
Resolution	1024 (RGB) x 600
View Angles	TYP: T 50 Deg, B, L, R 70 Deg
Interface	LVDS

Table 18

The following picture is reports the drawing with the size of the display. This can be useful to determinate the encumbrance viewing area and the multiple active area to consider during the system designing.
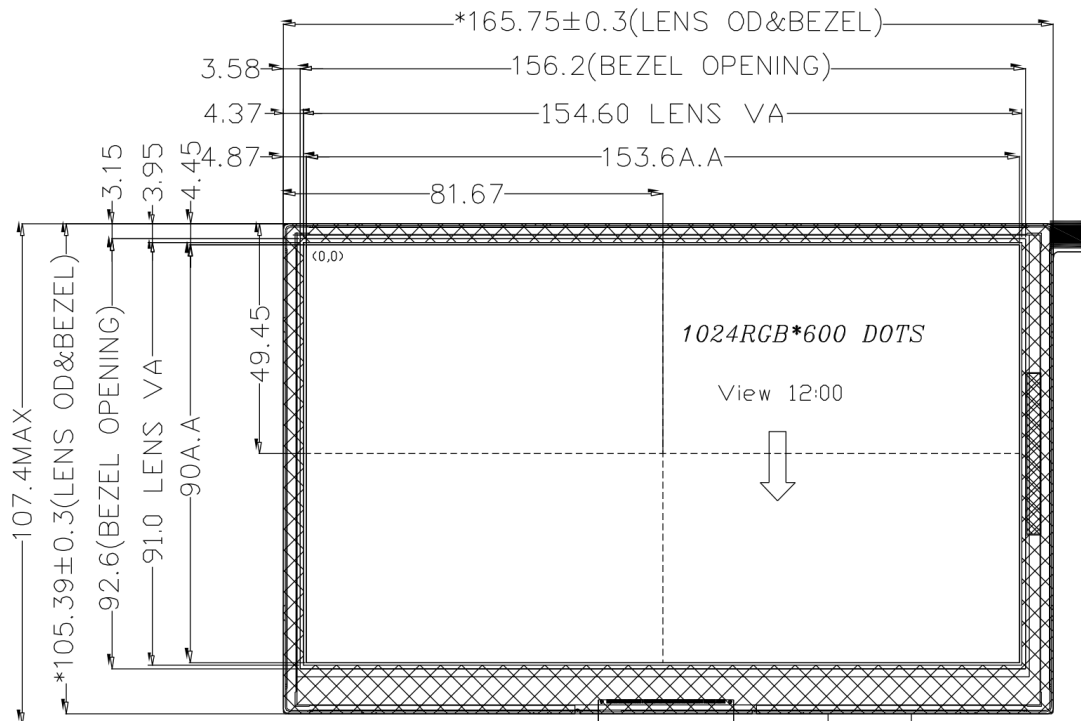
Note: all the unit reported measure are in mm

6. MicroDev 10.1" Open Frame assembly plan

This chapter want to be a guide and illustrate the method to installing an Open-Frame in a customised system. First of all it will be specified the methodologies of insertion, of installation and the mechanical dimensions useful to the user to determinate the space requirements to design a custom product containing the MicroDev Open-Frame.

To help you to achieve the best results will be described the size and dimensions with their tolerances, this will allow the integration of Open-Frame, that will interact with any system through its visual interface and its touchscreen.

Therefore the attention of the user will be focus on the possibility of adjust the positioning through the tolerances left on the constraints and the use of appropriate screws. In this way the user will be able to place the Open-Frame within its system ensuring accuracy and reproducibility of the production process.

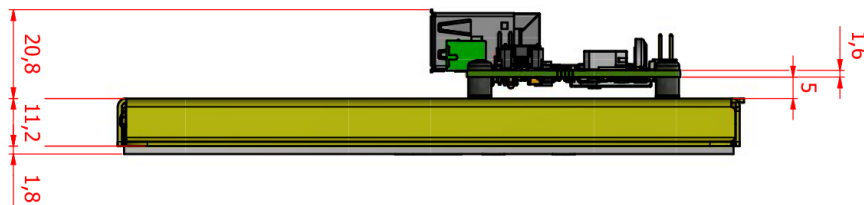## 6.1 MicroDev Open Frame 10.1" Overall Dimensions

In the following picture is reported the drawing with the size of the OF. This can be useful to calculate the encumbrance area and the fixing points to consider during the system designing.
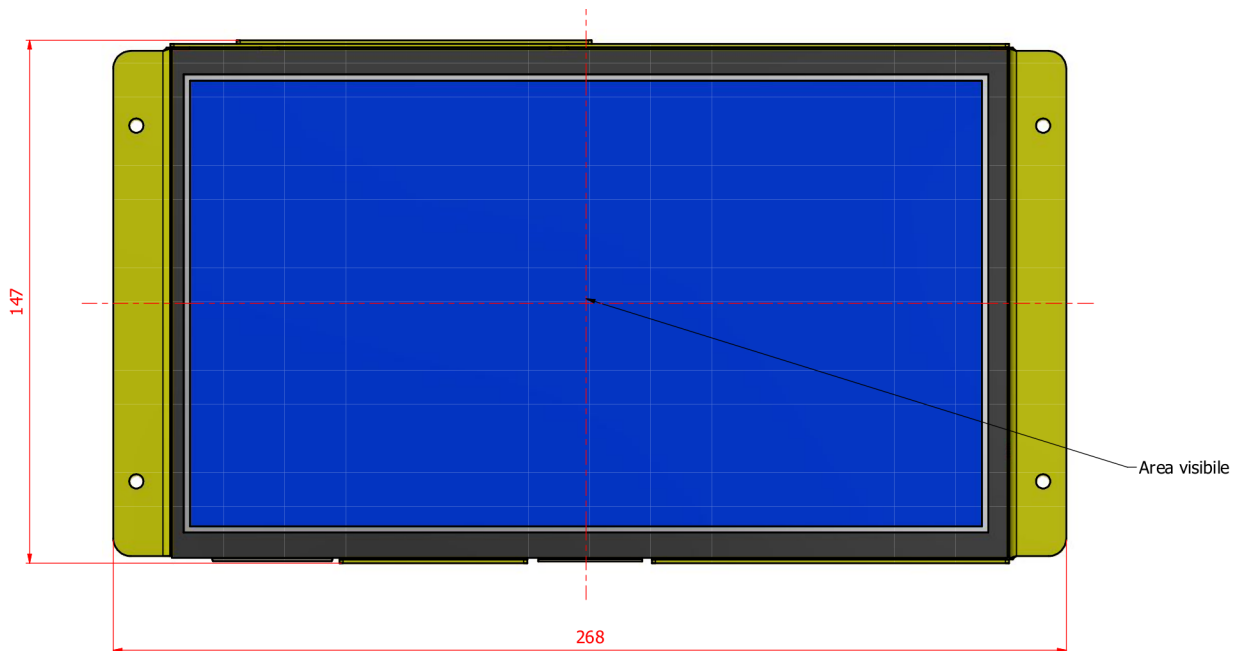
The pictures below show the maximum size of the Open-Frame system also in its depth (in which are considered also the dimensions of carter that cover the PCB and its components assembled).


Those can be useful to calculate and consider the volume necessary to place or to integrate the Open-Frame within another system and to design a suitable mounting points.

6.2 Positioning and Balancing

In this chapter it will be explained to the user how positioning the Open-Frame and how to centre the display in a mechanical window. In the following figure you'll find the spacing between the fixing hole and the centre of the _display's visible area_. Based on following measure you can find the position compared to the four fixing hole.

Area visibile 222.72X125.28
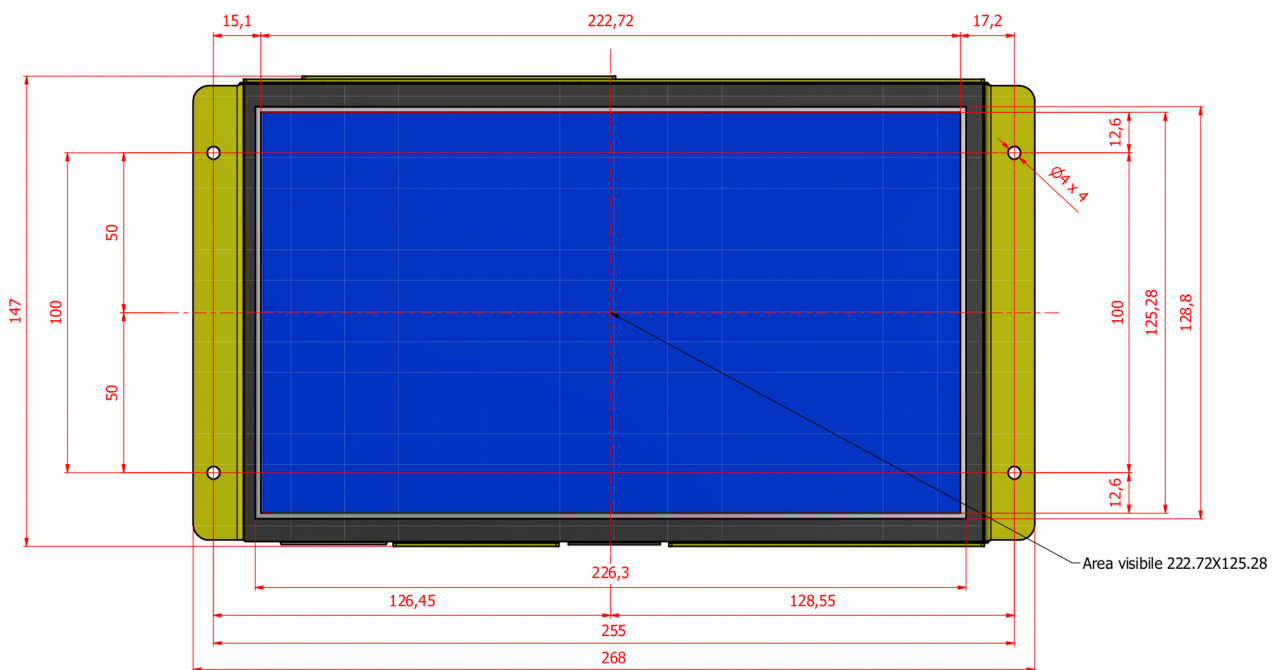
It's possible to use the smaller screws to have a more flexible constraint during the centring of the Open-Frame within the system. In this way you'll have more tolerance on the centring the display (also considering drilling tolerances). if you use threaded PEM reducing the size of diameter).

Warning:
_for any doubt about the positioning do not hesitate to contact Engicam support_

6.3 General specifications for display 10.1"

In the table are shown the displays' specifications driven by uDev carrier board:

YTCA10TLAA-09-100C-V1	10.1"
Operating temperature range	-20; +70 °C
Size	10.1 inch
Luminance	340 cd/mq
Colour	16.2M
Resolution	1024 (RGB) x 600
View Angles	TYP: T 50 Deg, B, L, R 70 Deg
Interface	LVDS

Table 18

The following picture is reports the drawing with the size of the display. This can be useful to determinate the encumbrance viewing area and the multiple active area to consider during the system designing.
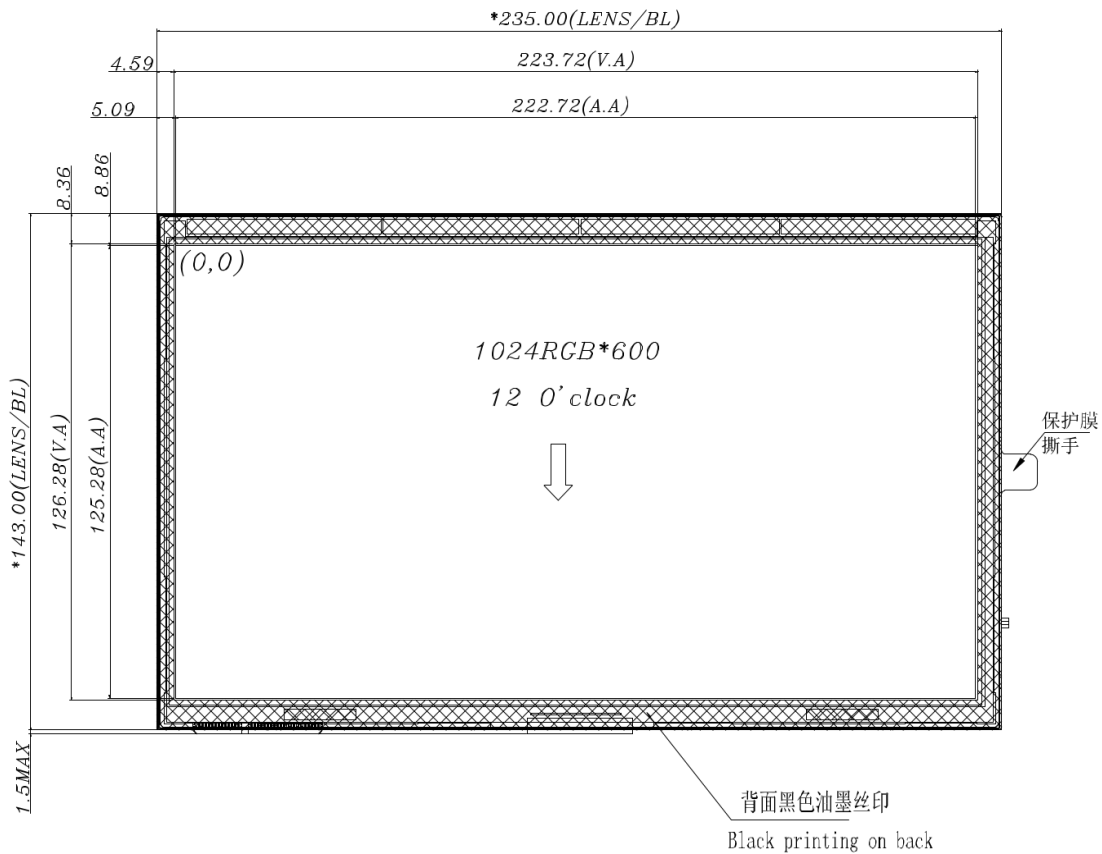
Note: all the unit reported measure are in mm

7. Product Compliance

In order to respect own internal policy regarding the environmental regulations and safety laws, Engicam in this chapter confirms the compliant, when applicable, of its own products to the rules ROHS and REACH and to the recognized hazards.

Warning!
When the MS621FE-FL11E Rechargeable Battery is mounted instead of the Supercap, the following elements included into the SVHC list must be declared:

- **1,2-dimethoxyethane, ethylene glycol dimethyl ether (EGDME)**

8. On-line Support

We offer an on-line support to allow the customer to stay updated on the development of software release and on the enhancement of the documentation.

Following is shown the references for ENGICAM on-line support.

8.1 Support

ENGICAM Product Experts are available to answer questions via email:

support@engicam.com

8.2 Disclaimer