

Ixora

Datasheet



Revision History

Date	Doc. Rev.	Board Version	Changes
09-Sept-13	Rev. 1.0	V1.0	Initial Release: Preliminary Version.
04-Oct-13	Rev. 1.1	V1.0	Corrected the USB signal name in the section 3.14.1 on page 29.
10-Oct-13	Rev. 1.2	V1.0	Small correction in the Fig.1 – Ixora Hardware Architecture.
14-Oct-13	Rev. 1.3	V1.0	Picture updated; Correction in the section 3.14.2 title – Mini-SIM Card Holder.
21-Oct-13	Rev. 1.4	V1.0	Correction in the section 3.10.4 on page 23: pin 21 is LVDS1_A_TX0_N.
29-Oct-13	Rev. 1.5	V1.0	Fig.2 on page 9 updated with the pin one position; Fig.3 on page 10 updated.
26-May-14	Rev. 1.6	V1.0	Section 1.2.6, Quick-Start Instructions: section name changed to Quick-Start Instructions from Installation. Minor corrections. Section 2.1, Connector Locations: added battery holder and recommended battery type details. Section 3.1, Apalis Module (X1): added comments regarding MXM SnapLock, Spacers and Screw Size (M3). Section 3.15, Real-Time Clock (RTC): added section for RTC details.
22-Sept-14	Rev. 1.7	V1.0	Section 1.2.6, Quick-Start Instructions: Recommended external power supply rating has been updated to 24W. Section 5, Temperature Range: Added Operating Temperature Range (T_{ambient}) and Storage Temperature Range (T_{storage}).
02-Dec-14	Rev. 1.8	V1.0	Section 1.2.5, Power Supply and Section 3.2, Power Supply Connectors: Added comments that the connector X3 is not assembled by default.

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1. Introduction

Ixora is a carrier board for the Apalis family of system-on-modules. Ixora was designed to provide access to some of the most important features supported by the Apalis family.

The major part of the standard interfaces, which are supported by the Apalis modules, are exposed on the Ixora carrier board through a combination of real-world connector interfaces, card slot and 2.54mm pitch pin headers.

The real world connectors, LEDs, push buttons are all placed on the board edge in a way that easily allows having a boxed version of the Ixora carrier board.

1.1. Reference Documents

For detailed technical information about suitable computer modules, please refer to the documents listed below.

1.1.1 Apalis Computer Modules

An overview of the Apalis product family:

<http://www.toradex.com/products/apalis-arm-computer-modules/apalis-t30>

1.1.2 Push button On/Off controller datasheet

<http://cds.linear.com/docs/en/datasheet/2954fb.pdf>

1.1.3 Toradex Developer Website - Carrier Board Design

<http://developer.toradex.com/hardware-resources/arm-family/carrier-board-design>

1.2. Features

1.2.1 Overview

The Ixora Carrier Board provides the following features and communication interfaces:

- 1x USB 2.0
- 2x USB 3.0 port
- USB 2.0 OTG Micro-AB connector (shared) for host and host/client
- RJ45 Ethernet (10/100/1000 Mbit)
- 1x microSD 4 Bit
- 1x mSATA
- Mini PCIe with SIM card connector
- Digital (TDMS) interface on HDMI connector
- Dual channel LVDS interface (up to 24 bit colour)
- Unified TFT Interface with built in resistive touch for direct LCD panel connection
- Analog audio I/O on 3.5mm stereo jack
- S/PDIF I/O on header
- Line IN on header
- 3x RS232 Serial Interfaces
- 2x I2C, 1x SPI, 4x PWM, 4x Analog inputs, 8xGPIOs
- 2x CAN 2.0B Interface (up to 1Mbit/s)
- Real-time clock with battery backup
- Resistive touch screen connector 4/5-wire
- GPIO Controlled LEDs
- 10 bit Parallel Camera Interface
- FAN connector

1.2.2 User Interface

Ixora provides HDMI video output through an HDMI connector.

LCD panels can be directly connected through the digital RGB interface port. To simplify the connection of certain LCD panels, there is an on-board dedicated connector for the EDT Unified TFT Interface. This interface supports a 4-wire resistive touch interface on the same connector. A variety of LCD panels, with integrated touch support for evaluation purposes, are available from the Toradex Webshop.

Ixora also features a dual channel LVDS interface for direct connection of LCD panels which support 18/24-bit, single/dual channel LVDS interfaces.

Furthermore, Ixora provides On/Off, reset, and restore-to-default buttons to go along with GPIO-controlled and feature status indication LEDs.

Audio input and output is available on standard 3.5mm jacks and 2.54mm pitch pin header.

1.2.3 Communication

Commonly used communication functions are fully implemented on Ixora and include: 10/100/1000Mb Ethernet, 1x USB 2.0 Host, 2x USB 3.0, OTG micro AB (shared), 3x RS232, and 2x CAN 2.0b interface. Ixora also features high speed interfaces such as PCIe on a mini-PCIe slot which is equipped with the SIM Card holder, and Serial ATA available on an mSATA slot.

The Parallel Camera Interface provides an easy way for interfacing CMOS and CCD sensors.

The Micro SD Card is connected to a 4bit SDIO interface which can be used to add storage devices or provide extra functionality to the system.

1.2.4 Block Diagram

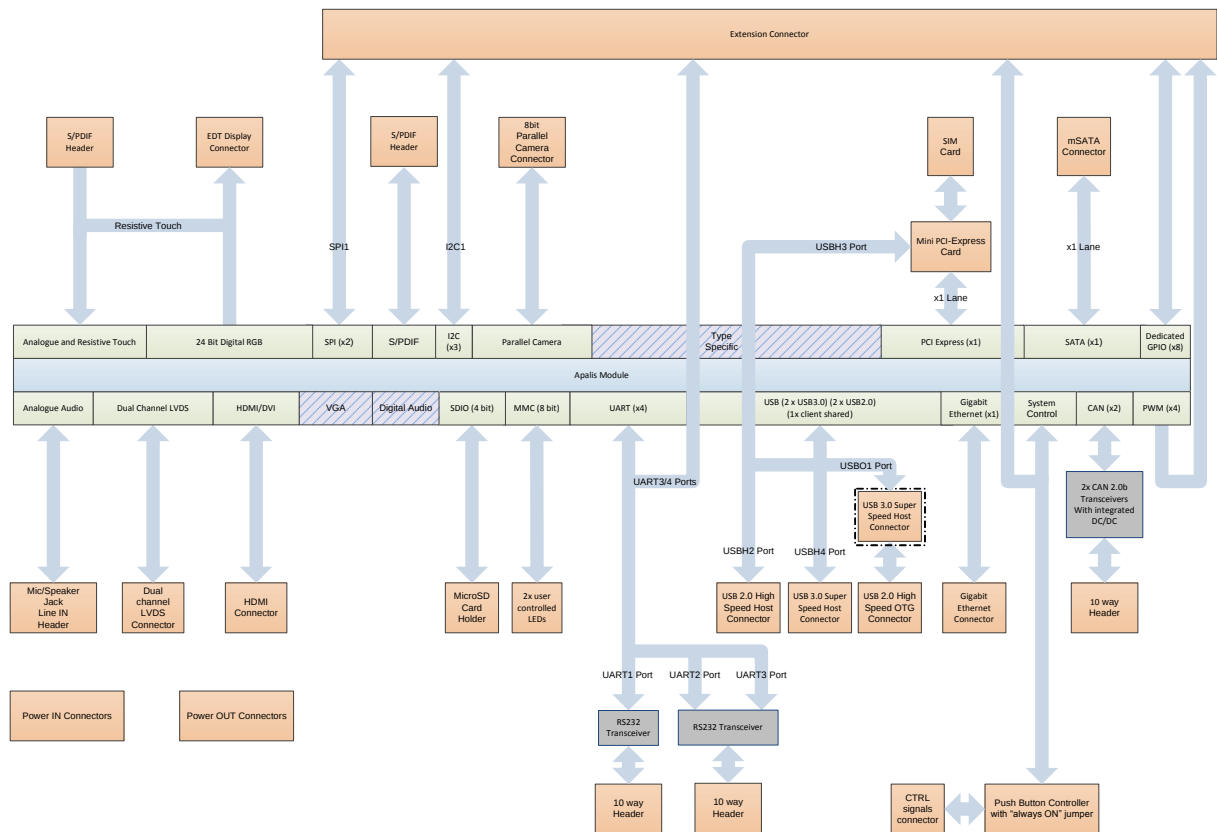


Fig.1 Ixora Hardware Architecture

1.2.5 Power Supply

Ixora provides two methods of supplying power to the board:

- The connector X2, which is a standard 5.5mm power jack barrel connector which is widely used in consumer electronic devices.
- The connector X3, which is a pluggable, dual-pin male screw type Phoenix terminal block which is widely used in industrial applications. This connector is not assembled by default.

Both the connectors have a wide input voltage range of 7-27V DC.

The connectors X2 and X3 are directly connected to the power output connector X4, to the FAN connector X6 and to the LVDS connector X19. For this reason, when the 12V voltage supply is required on these connectors, the input voltage must be 12V +/-10%.

The on-board power supply provides the following supplies (maximum power).

5V / 5A	(25W)
3.3V / 5A	(16.5W)

The supply is protected against reverse input voltage polarity and short circuits.

1.2.6 Quick-Start Instructions

Perform the following steps to quick-start the Ixora carrier board:

1. Insert an Apalis Module in the MXM3 socket X1 on Ixora.
2. Connect a monitor or a display by using one of the several video output ports provided by the board (HDMI connector recommended).
3. Connect a keyboard and a mouse to the available USB host ports.
4. Connect an external power supply to the board by using connectors X2, X3 (7-27V, 24W recommended)
5. Turn on the external power supply.
6. Push down the power button SW1 on Ixora and the pre-installed operating system boots.

For a detailed documentation of the software as well as for the newest boot loader and software images please refer to the Toradex Developer Website: <http://developer.toradex.com>

2. Ixora Physical Drawings

2.1. Connector Locations

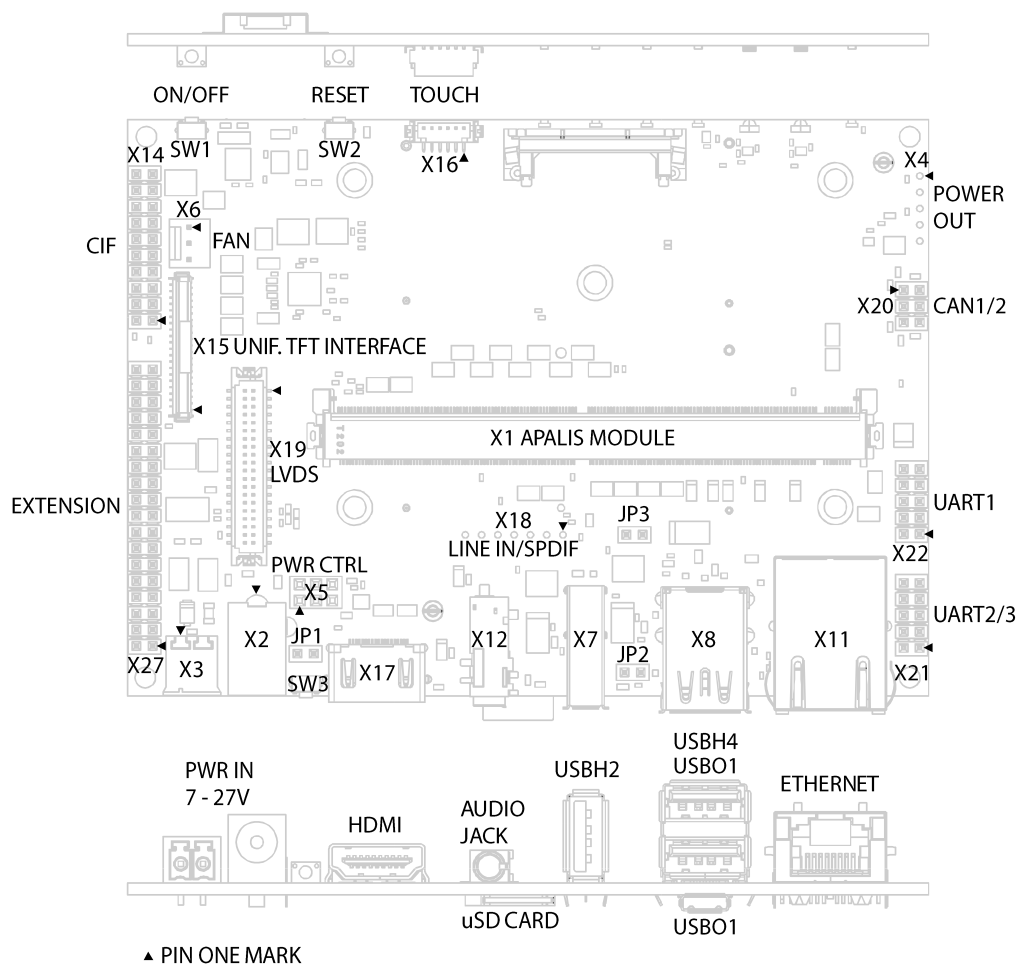


Fig.2 Ixora connectors – Top Side

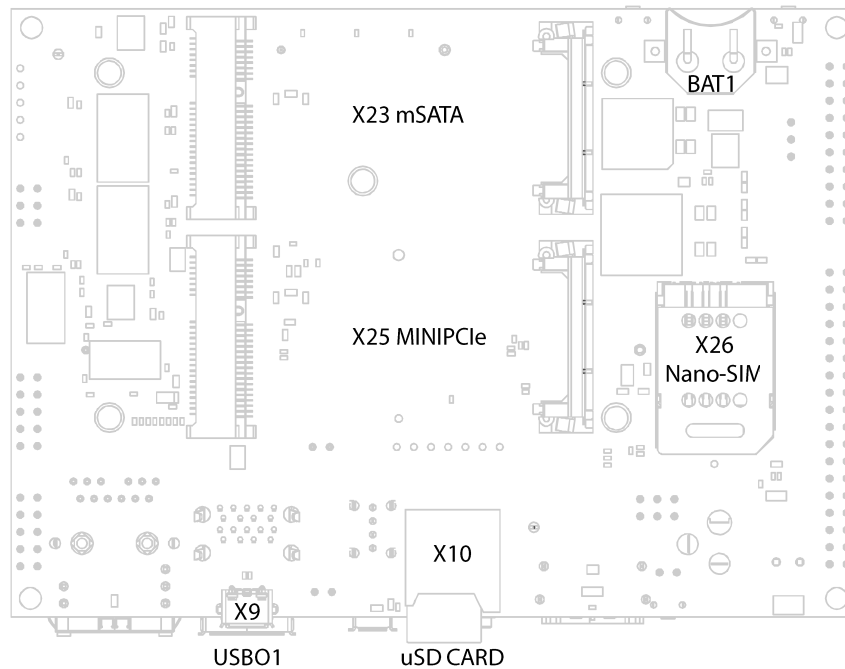


Fig.3 Ixora connectors – Bottom Side

Ref	Description	Remarks
X1	Apalis MXM3	
X2	Power IN	
X3	Power IN	
X4	Power OUT	
X5	Power CTRL	
X6	FAN Connector	
X7	USB HOST	USBH2
X8	USB HOST SS	TOP: USBH4 – BOTTOM:USB01 (Shared with X9)
X9	USB OTG	USB01 (High Speed shared with X8)
X10	Micro SD Card Holder	
X11	Gigabit Ethernet	
X12	Audio IN/OUT jack	
X14	Parallel Camera Header	
X15	Unified TFT Interface	
X16	Touch-Screen Connector	
X17	HDMI Connector	
X18	Line IN – S/PDIF Header	
X19	LVDS Connector	
X20	CAN Header	
X21	RS232 Header	RS232-2 – RS232-3
X22	RS232 Header	RS232-1
X23	mSATA	
X25	Mini PCIe	
X26	Micro-SIM	
X27	Extension Header	
BAT1	12mm Battery holder	Supported batteries: CR1216, BR1220, CL1225

2.2. Mechanical Drawing

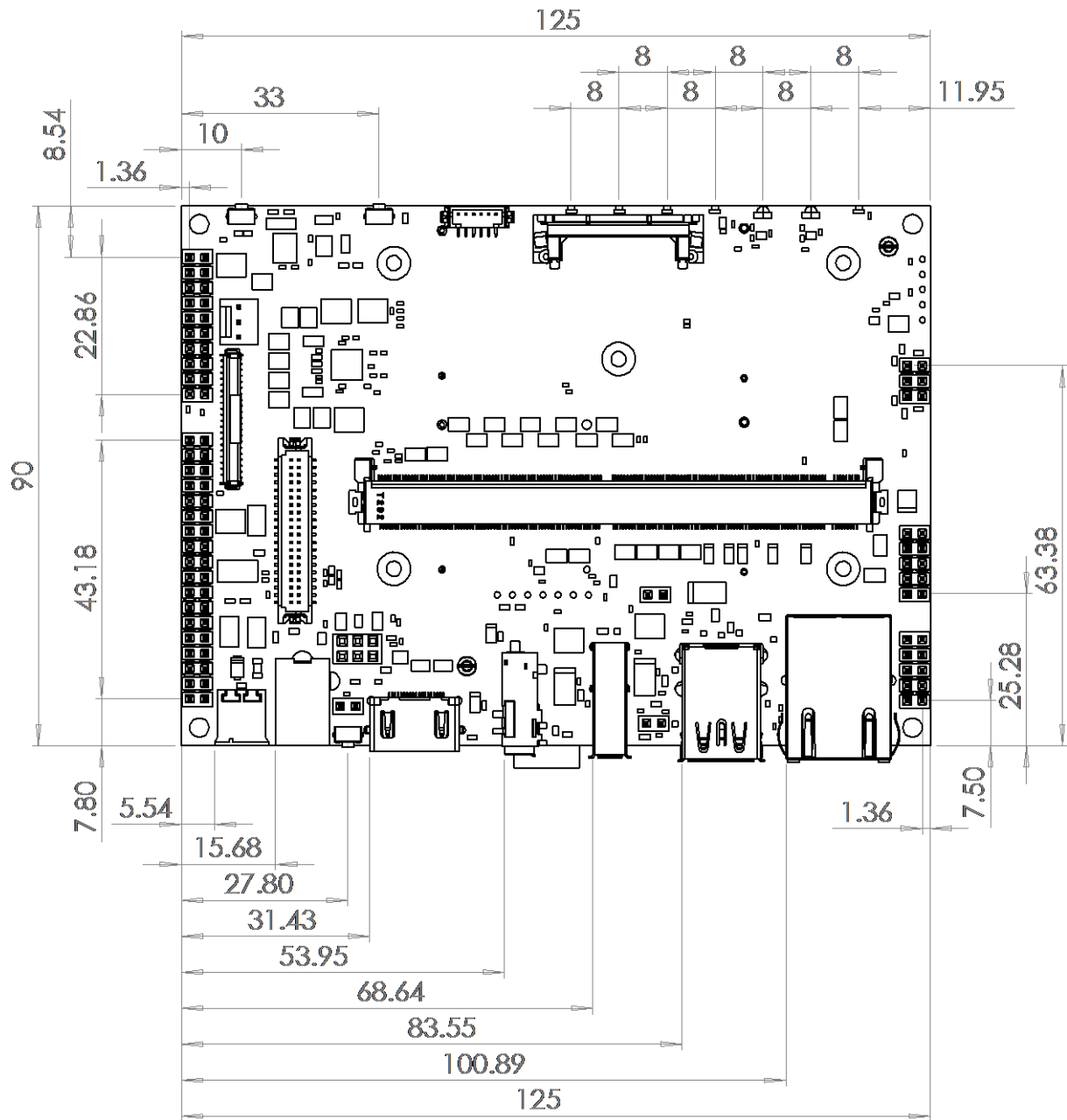


Fig.4 Ixora dimensions – Top Side

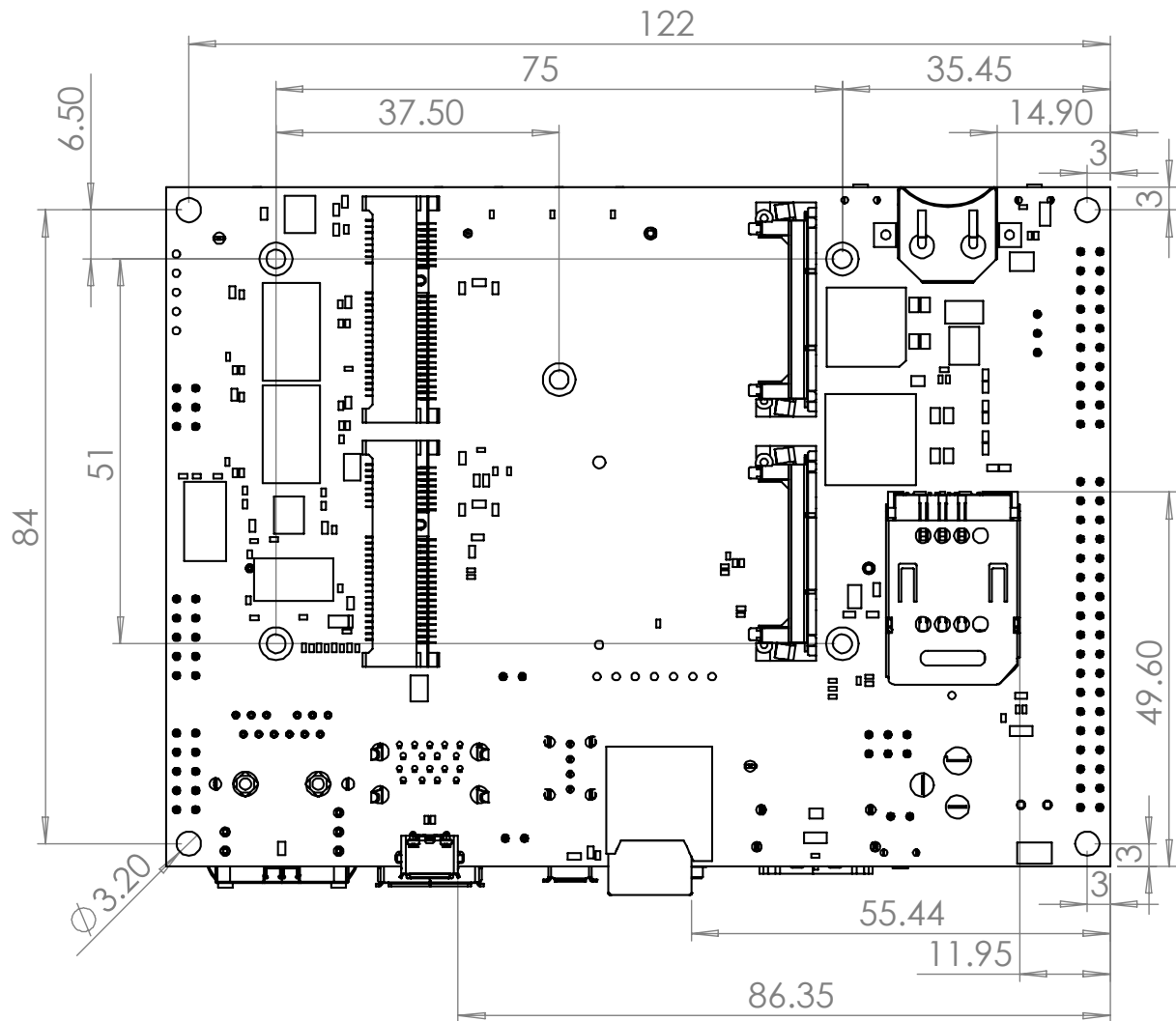


Fig.5 Ixora dimensions – Bottom Side

3. Ixora Connectors

3.1. Apalis Module (X1)

Type: MXM3 321 pin Socket.

Manufacturer: JAE - MM70-314-310B1.

For the pin-out of the Apalis module, please refer to the applicable Apalis module datasheet.

MXM SnapLock and Spacers are available on Ixora for fixing the Apalis module with the carrier board. It is recommended to use M3 size screws to fasten Apalis module with the Spacers.

3.2. Power Supply Connectors

As previously mentioned, Ixora provides two methods of supplying power to the board: the connector X2 which is a standard 5.5mm power jack, and X3, a dual pin male screw type terminal block connector. The connector X3 is not assembled in the default product.

3.2.1 Barrel Power Supply Connector (X2)

Type: SWC RAPC722X

Pin No.	Signal Name
1	PWR_IN
2	GND_IN

3.2.2 Phoenix Terminal Block Power Supply Connector (X3)

Type: TE Connectivity 284512-2, NA

Pin No.	Signal Name
1	GND_IN
2	PWR_IN

3.2.3 Power OUT Header (X4)

Type: 1x5Pin Header Male, 2.54mm, NA

Pin No.	Signal Name	Remarks
1	+3.3V_SW	
2	GND	
3	+5V_SW	
4	GND	
5	V_SUPPLY_FILT_SW	

Please note that the pin numbered five is not regulated because it is directly connected to the power supply connectors X2 and X3.

3.3. Power CTRL

Power control of Ixora is implemented using a Linear LTC2954 Pushbutton On/Off controller and with the signal POWER_ENABLE_MOCI, which is used to enable the peripheral power supplies.

For information about the signals provided by the controller LTC2954 please refer to the datasheet. For more information regarding the power up sequence which is implemented on the board please refer to the document “Apalis Carrier Board Design Guide”.

The Power CTRL connector X5 allows the Reset and Power Button control signals to be accessed externally.

The switches SW1 and SW2 have been assigned the ON/OFF and Reset function, respectively. The SW3 is, by default, connected to pin 160 of the MXM3 connector and can be used to activate particular functionalities such as factory default restore. By disassembling resistor R91 and assembling resistor R90, SW3 will be routed to pin 63 which is, for the Apalis T30 module, the Recovery Mode pin.

Assembling jumper JP1 will configure the board in the “Always On” behaviour mode i.e. Ixora will start without waiting for the Power On button to be pushed.

In addition, pin 3 of the connector X5 can be used to override the Pushbutton controller. The following table shows the behaviour of the board according to the level of the PWR_CTRL signal:

PWR_CTRL Level	Function
0V	The Pushbutton controller is working normally
3.3V	Ixora is Always On when power is applied

3.3.1 Power CTRL (X5)

Type: 2 x 3Pin Header Female, 2.54mm

Pin No.	Signal Name	IO Type	Voltage	Pullup/Pulldown
1	PWR_BTN#	I		100k to +1.9V
2	GND	PWR		
3	PWR_CTRL	I	+3.3V max	100k to GND
4	INT#	I		10k to +3.3V
5	FORCE_OFF#	I		100k to +3.3V
6	RESET_MICO#	IO	+3V3	

3.4. FAN Connector

Ixora provides a FAN connector, X6. The voltage which is available at this connector is connected to the V_SUPPLY_FILT voltage using a transistor which is controlled by 3.3V_SW or, optionally, using the GPIO8 signal for software control.

An assembly option determines this configuration:

Resistor assembled	Active
R36	3.3V_SW enabled
R35	GPIO8 enabled

Please note that this voltage is not regulated because it is the same voltage that has been provided on the connectors X2 or X3.

3.4.1 FAN Connector (X6)

Type: 3 Pin Header with friction lock

Pin No.	Signal Name	IO Type
1	GND	PWR
2	V_FAN_UNREG	PWR
3	NC	Not connected

3.5. USB

Ixora has 1x USB 2.0 host interface (X7), as well as a USB 2.0 OTG interface available on a Micro-AB connector (X9).

The USB 2.0 part of the USB OTG interface is shared with the dual stacked USB 3.0 type A connector X8, which can be used with the modules that support USB Super Speed interface.

By using the jumper JP2, it is possible to determine whether the interface USB01 is used as an OTG interface through the connector X9 or as a Host interface available on the bottom part of the connector X8.

The Jumper JP2 is basically used to connect the signal USB01_ID signal to GND: the USB01_ID signal enables the VCC_USB01 voltage in the same way as when the port X9 is used as HOST.

When the VCC_USB01 is enabled, the bottom part of the connector X8 or X9 is used as HOST.

For this reason, special attention needs to be paid to this jumper when the connector X9 has to be used as CLIENT.

In order to give an indication that the voltage VCC_USB01 is enabled, LED3 has been installed on the board.

The following table summarizes the jumper JP2 configuration.

JP2 Connection	X8 – X9 Configuration
CLOSED	The connectors X8 (bottom) and X9 are configured as HOST
OPEN	The connector X8 (bottom) is not powered. The connector X9 is used as OTG

3.5.1 USB Host (X7)

Type: USB-Type A

Pin No.	Signal Name
1	VCC_USBH2
2	USBH2_D_CON_N
3	USBH2_D_CON_P
4	GND_USBH2

3.5.2 USB Host SS (X8)

Type: Dual stacked USB Type B

Pin	Description	Remarks
U1	VCC_USBH4	
U2	USBH4_D_CON_N	USB 2.0
U3	USBH4_D_CON_P	USB 2.0
U4	GND_USBH4	
U5	USBH4_SSRX_N	USB 3.0
U6	USBH4_SSRX_P	USB 3.0
U7	GND_USBH4	
U8	USBH4_SSTX_N	USB 3.0
U9	USBH4_SSTX_P	USB 3.0
L1	VCC_USBO1	
L2	USBO1_D_CON_N	USB 2.0
L3	USBO1_D_CON_P	USB 2.0
L4	GND_USBO1	
L5	USBO1_SSRX_N	USB 3.0
L6	USBO1_SSRX_P	USB 3.0
L7	GND_USBO1	
L8	USBO1_SSTX_N	USB 3.0
L9	USBO1_SSTX_P	USB 3.0

3.5.3 USB Client (X9)

Type: USB Type B

Pin No.	Signal Name
1	VCC_USBO1
2	USBO1_D_CL_N
3	USBO1_D_CL_P
4	USBO1_ID
5	GND_USBO1

3.6. SD Card / MMC

Ixora features a 4bit SDIO interface through a micro SD card holder. The hardware supported card detect function is implemented.

3.6.1 Micro SD Card Holder (X10)

Type: Micro SD Card Holder AMPENOL 101-00581-59

Pin No.	Signal Name	IO Type	Voltage	Pullup/Pulldown
1	SD1_D2	IO	+3V3	68k to +3V3
2	SD1_D3	IO	+3V3	68k to +3V3
3	SD1_CMD	I	+3V3	33k to +3V3
4	+3V3	PWR		
5	SD1_CLK	I	+3V3	
6	GND	PWR		
7	SD1_D0	IO	+3V3	68k to +3V3
8	SD1_D1	IO	+3V3	68k to +3V3
CD1/2	SD1_CD	O	+3.3V	100k to +3V3

3.7. Ethernet

Ixora provides an RJ45 connector with integrated magnetics for 10/100/1000Mb Ethernet.

3.7.1 Ethernet (X11)

Type: RJ-45 BEL L829-1J1T-43

Pin	Signal Name	I/O Type	Voltage	Pull-up/Pull-down
1	ETH1_CTREF_2			
2	ETH1_MDI2_N	IO	3V3	
3	ETH1_MDI2_P	IO	3V3	
4	ETH1_MDI1_P	IO	3V3	
5	ETH1_MDI1_N	IO	3V3	
6	ETH1_CTREF_1			
7	ETH1_CTREF_3			
8	ETH1_MDI3_P	IO	3V3	
9	ETH1_MDI3_N	IO	3V3	
10	ETH1_MDI0_N	IO	3V3	
11	ETH1_MDI0_P	IO	3V3	
12	ETH1_CTREF_0			
13	ETH1_ACT_C		3V3	
14	3.3V_SW	PWR	3V3	
15	ETH1_LINK_GB			
16	3.3V_SW	PWR	3V3	
17	ETH1_LINK_C			

3.8. Audio

Ixora offers one analogue audio interface which is provided by the Apalis Module. It is available on the connector X12. This connector is a standard jack for active loudspeakers or headphones and microphone input.

In addition, Ixora features the Line IN and S/PDIF IN and OUT interfaces on a non-assembled 7-pin header.

3.8.1 Audio Jack (X12)

Type: 3.5mm Jack Cui SJ-43516-SMT

Pin No.	Signal Name	IO Type	Voltage	Pullup/Pulldown
1	AGND	PWR		
2	AAP1_HP_AC_L	O	+3V3	
3	AAP1_HP_AC_R	O	+3V3	
4	AAP1_MICIN	I	+3V3	
5	AAP1_HP_AC_L	O	+3V3	
6	AAP1_HP_AC_R	O	+3V3	

3.8.2 Line IN – S/PDIF Header (X18)

Type: 1x7Pin Header Male, 2.54mm, NA

Pin No.	Signal Name	IO Type	Voltage	Pullup/Pulldown
1	5V_SW	PWR		
2	SPDIF1_IN	I	+3V3	
3	SPDIF1_OUT	O		
4	GND	PWR		
5	AGND	PWR		
6	AAP1_LIN_L	I	+3V3	
7	AAP1_LIN_R	I		

3.9. Parallel Camera Interface

The Parallel Camera Interface on connector X14 is intended for applications requiring image capture capability from CMOS or CDD image sensors. This interface supports a wide variety of operating modes, data widths, formats, and clocking schemes. For details, please see the relevant Apalis module datasheet.

3.9.1 Parallel Camera (X14)

Type: 2x10Pin Header Male, 2.54mm

Pin No.	Signal Name	IO Type	Voltage	Pullup/Pulldown
1	+3.3	PWR		
2	+3.3	PWR		
3	CAM1_MCLK	IO	+3V3	
4	CAM1_PCLK	IO	+3V3	
5	CAM1_HSYNC	IO	+3V3	
6	CAM1_VSYNC	IO	+3V3	
7	CAM1_D0	IO	+3V3	
8	CAM1_D1	IO	+3V3	
9	CAM1_D2	IO	+3V3	
10	CAM1_D3	IO	+3V3	
11	CAM1_D4	IO	+3V3	
12	CAM1_D5	IO	+3V3	
13	CAM1_D6	IO	+3V3	
14	CAM1_D7	IO	+3V3	
15	I2C_CAM1_SCL	IO	+3V3	1.8k to +3V3
16	I2C_CAM1_SDA	IO	+3V3	1.8k to +3V3
17	CAM1_D8	IO	+3V3	
18	CAM1_D9	IO	+3V3	
19	GND	PWR		
20	GND	PWR		

3.10. Display

Ixora provides many options for connecting LCD panels and monitors, with the following three interfaces supported:

- 24 bit digital RGB
- Dual Channel 24 bit LVDS
- HDMI

Toradex provides a range of different tools and utilities to help with the easy configuration of different LCD panels. For details please refer to: <http://developer.toradex.com>

3.10.1 Unified TFT Interface (X15)

This RGB display interface uses the EDT Unified TFT Display Interface pin out, for which there are a wide variety of displays of different sizes and resolutions available. These displays are connected to Ixora directly via a 40 way FFC.

The EDT Unified TFT Interface also features a resistive touch screen interface on the same FFC, providing support for displays which have integrated touch.

For further information about this interface and the available LCD panels, please refer to the Toradex developer website:

<http://developer.toradex.com/knowledge-base/edt-unified-interface-display-family>

Connector type: Hirose FH12-40S-0.5SV(55)

Pin	Signal Name	I/O Type	Voltage
1	GND	PWR	
2	GND	PWR	
3	+3.3V_SW	PWR	+3.3V
4	+3.3V_SW	PWR	+3.3V
5	BKL1_ON	O	+3.3V
6	PWM_BKL1	O	+3.3V
7	RESET_MOC1_EDT#	O	+3.3V
8	LCD1_B7	O	+3.3V
9	LCD1_B6	O	+3.3V
10	LCD1_B5	O	+3.3V
11	LCD1_B4	O	+3.3V
12	LCD1_B3	O	+3.3V
13	LCD1_B2	O	+3.3V
14	GND	PWR	
15	LCD1_G7	O	+3.3V
16	LCD1_G6	O	+3.3V
17	LCD1_G5	O	+3.3V
18	LCD1_G4	O	+3.3V
19	LCD1_G3	O	+3.3V
20	LCD1_G2	O	+3.3V
21	GND	PWR	
22	LCD1_R7	O	+3.3V
23	LCD1_R6	O	+3.3V
24	LCD1_R5	O	+3.3V
25	LCD1_R4	O	+3.3V

Pin	Signal Name	I/O Type	Voltage
26	LCD1_R3	O	+3.3V
27	LCD1_R2	O	+3.3V
28	LCD1_PCLK	O	+3.3V
29	GND	PWR	
30	LCD1_HSYNC	O	+3.3V
31	LCD1_VSYNC	O	+3.3V
32	LCD1_DE	O	+3.3V
33	LCD1_CONF1: Connected to 3.3V or GND via assembly option. The default assembly is GND	O	+3.3V/GND
34	LCD1_CONF2: Connected to 3.3V or GND via assembly option. The default assembly is GND	O	+3.3V/GND
35	GND	PWR	
36	+3.3V_SW	PWR	+3.3V
37	AN1_TSPY	O	+3.3V
38	AN1_TSMX	O	+3.3V
39	AN1_TSMY	O	+3.3V
40	AN1_TSPX	O	+3.3V

3.10.2 Generic Touch-Screen (X16)

Part number: Hirose DF13C-6P-1.25V(51)

Pin No.	Signal Name	IO Type	IO Type	Pullup/Pulldown
1	GND	PWR		
2	AN1_TSMY	O	+3V3	
3	AN1_TSPY	O	+3V3	
4	AN1_TSMX	O	+3V3	
5	AN1_TSPX	O	+3V3	
6	AN1_TSWIP	O	+3.3V	

3.10.3 HDMI Connector (X17)

Connector type: FCI 10029449-111RLF

Pin	Signal Name	Description
1	HDMI1_TXD2_P	The negative HDMI output number 2
2	GND	
3	HDMI1_TXD2_P	The positive HDMI output number 2
4	HDMI1_TXD1_P	The positive HDMI output number 1
5	GND	
6	HDMI1_TXD1_N	The negative HDMI output number 1
7	HDMI1_TXD0_P	The positive HDMI output number 0
8	GND	
9	HDMI1_TXD0_N	The negative HDMI output number 0
10	HDMI1_TXC_P	The positive HDMI Clock signal
11	GND	
12	HDMI1_TXC_N	The negative HDMI Clock signal
13	HDMI1_CEC	HDMI CEC signal

Pin	Signal Name	Description
14	NC	Not connected
15	I2C2_DDC_SCL_HDMI	HDMI EDID Clock signal
16	I2C2_DDC_SDA_HDMI	HDMI EDID Data signal
17	GND	
18	HDMI_VDISP	
19	HDMI1_HPD	HDMI Hot Plug signal

3.10.4 LVDS Connector (X19)

Connector type: Hirose DF13A-40DP-1.25V(55)

Pin	Signal Name	Description
1	LVDS1_A_TX3_P	The positive odd LVDS output number 3
2	GND	
3	LVDS1_A_TX3_N	The negative odd LVDS output number 3
4	LVDS1_B_CLK_N	The negative even LVDS Clock signal
5	GND	
6	LVDS1_B_CLK_P	The positive even LVDS clock signal
7	LVDS1_A_TX2_P	The positive odd LVDS output number 2
8	GND	
9	LVDS1_A_TX2_N	The negative odd LVDS output number 2
10	LVDS1_B_TX0_N	The negative even LVDS output number 0
11	GND	
12	LVDS1_B_TX0_P	The positive even LVDS output number 0
13	LVDS1_A_TX1_P	The positive odd LVDS output number 1
14	GND	
15	LVDS1_A_TX1_N	The negative odd LVDS output number 1
16	LVDS1_B_TX1_N	The negative even LVDS output number 1
17	GND	
18	LVDS1_B_TX1_P	The positive even LVDS output number 1
19	LVDS1_A_TX0_P	The positive odd LVDS output number 0
20	GND	
21	LVDS1_A_TX0_N	The negative odd LVDS output number 0
22	LVDS1_B_TX2_N	The negative even LVDS output number 2
23	GND	
24	LVDS1_B_TX2_P	The positive even LVDS output number 2
25	LVDS1_A_CLK_P	The positive odd LVDS Clock signal
26	GND	
27	LVDS1_A_CLK_N	The negative odd LVDS Clock signal
28	LVDS1_B_TX3_N	The negative even LVDS output number 3
29	GND	
30	LVDS1_B_TX3_P	The positive even LVDS output number 3
31	LVDS1_SEL_1	Configurable pin
32	LVDS1_3.3V_SW	3.3V power supply
33	LVDS1_SEL_2	Configurable pin
34	LVDS1_5V_SW	5V power supply
35	PWM_BKL1	Back Light intensity signal
36	NC	Not connected
37	BKL1_ON	Back Light enable signal
38	NC	Not connected
39	LVDS1_12V_SW_UNREG	12V power supply
40	LVDS1_12V_SW_UNREG	12V power supply

Toradex provides a range of different tools and utilities to help with the easy configuration of different LCD panels. For details please refer to: <http://developer.toradex.com>

By using the assembly option, it is possible to configure the values of the pins 31 and 33 of the connector X19. The following table shows how these voltages can be changed.

Resistor Assembled	SEL1 Value (pin 31)
R97	3.3V_SW
R98	5V_SW
R99	100KR to GND

Resistor Assembled	SEL2 Value (pin 33)
R100	3.3V_SW
R101	5V_SW
R102	100KR to GND

3.11. CAN

Ixora uses the Microchip ADM3053BRWZ signal and power CAN transceiver to implement two CAN 2.0b interfaces in conjunction with the two CAN interfaces on the Apalis module. The CAN ports are electrically isolated from the system power supply.

The CAN interfaces are available on the header X20.

The following table shows the pin-out of the header X20.

3.11.1 CAN Header (X20)

Type: 2x3Pin Header Male, 2.54mm

Pin No.	Signal Name	IO Type	Voltage	Pullup/Pulldown
1	CAN1_L	IO	+5V	
2	CAN1_H	IO	+5V	
3	CAN1_GND_ISO	PWR		
4	CAN2_GND_ISO	PWR		
5	CAN2_H	IO	+5V	
6	CAN2_L	IO	+5V	

3.12. UART Interfaces

Ixora features 4 UART interfaces that are connected to the following connectors:

- UART 1 to the connector X22 through an RS232 transceiver.
- UART 2 to the connector X21 through an RS232 transceiver.
- UART 3 to the connector X21 through an RS232 transceiver and to the connector X27.
- UART 4 to the connector X27.

It is possible to disconnect the signal UART3_RXD from the RS232 IC12 transceiver by disassembling the jumper JP3. In addition, it is possible to put the transceiver IC12 in high impedance status by forcing to zero, the value of the GPIO connected to pin 164 of the MXM3 connector.

One of these two configurations is required when the interface UART3 need to be used at the TTL level on the connector X27.

3.12.1 RS232 Header (X21)

Type: 2x5Pin Header Male, 2.54mm

Pin No.	Signal Name
1	UART3_RS232_RXD
2	NC
3	UART2_RS232_RXD
4	UART2_RS232_RTS
5	UART2_RS232_TXD
6	UART2_RS232_CTS
7	UART3_RS232_TXD
8	NC
9	GND

3.12.2 RS232 Header (X22)

Type: 2x5Pin Header Male, 2.54mm

Pin No.	Signal Name
1	UART1_RS232_DCD
2	UART1_RS232_DSR
3	UART1_RS232_RXD
4	UART1_RS232_RTS
5	UART1_RS232_TXD
6	UART1_RS232_CTS
7	UART1_RS232_DTR
8	UART1_RS232_RI
9	GND

3.13. SATA

Ixora supports the Serial ATA (SATA) interface on the Apalis module and allows peripherals such as mSATA SSDs to be connected.

3.13.1 mSATA (X23)

Type: mini PCIe Card Holder and latch: Molex 67910-5700, 48099-5701.

Pin	Signal Name	Description
1	NC	Not connected
2	3.3V_MSATA1	PWR
3	NC	Not connected
4	GND	PWR
5	NC	Not connected
6	1.5V_MSATA1	PWR
7	NC	Not connected
8	NC	Not connected
9	GND	PWR
10	NC	Not connected
11	NC	Not connected
12	NC	Not connected
13	NC	Not connected
14	NC	Not connected
15	GND	PWR
16	NC	Not connected
17	NC	Not connected
18	GND	PWR
19	NC	Not connected
20	NC	Not connected
21	GND	PWR
22	NC	Not connected
23	SATA1_MSATA_RX_P	I
24	3.3V_MSATA1	PWR
25	SATA1_MSATA_RX_N	I
26	GND	PWR
27	GND	PWR
28	1.5V_MSATA1	PWR
29	GND	PWR
30	SATA1_MSATA_SCL	I2C CLK
31	SATA1_MSATA_TX_N	O
32	SATA1_MSATA_SDA	IO
33	SATA1_MSATA_TX_P	O
34	GND	PWR
35	GND	PWR
36	NC	Not connected
37	GND	PWR
38	NC	Not connected

Pin	Signal Name	Description
39	3.3V_MSATA1	PWR
40	GND	PWR
41	3.3V_MSATA1	PWR
42	NC	Not connected
43	NC	Not connected
44	NC	Not connected
45	NC	Not connected
46	NC	Not connected
47	NC	Not connected
48	1.5V_MSATA1	PWR
49	SATA1_MSATA_ACT#	
50	GND	PWR
51	SATA1_MSATA_PREDET#	
52	3.3V_MSATA1	PWR

For further information regarding the mSATA interface, please refer to Serial ATA Specification Rev. 3.1 Gold

3.14. PCIe

Ixora supports the PCI Express interface on the Apalis module and allows Mini PCIe devices to be connected.

By changing the value of the GPIO connected to pin 144 of the MXM3 connector, it is possible to disable the wireless capabilities of the mini PCIe card assembled in the connector X25. In particular, the wireless is disabled when this signal voltage is zero.

3.14.1 Mini PCIe (X25)

Type: mini PCIe Card Holder and latch: Molex 67910-5700, 48099-5701.

Pin	Signal Name	Description
1	PCIE1_B_WAKE#	
2	3.3V_PCIE1_B	PWR
3	NC	Not connected
4	GND	PWR
5	NC	Not connected
6	1.5V_PCIE1_B	PWR
7	NC	Not connected
8	PCIE1_B_UIM_PWR	
9	GND	PWR
10	PCIE1_B_UIM_DATA	
11	PCIE1B_CLK_N	
12	PCIE1_B_UIM_CLK	
13	PCIE1B_CLK_N	
14	PCIE1_B_UIM_RESET	
15	GND	PWR
16	PCIE1_B_UIM_VPP	
17	NC	Not connected
18	GND	PWR
19	NC	Not connected
20	PCIE1_B_WDISABLE#	
21	GND	PWR
22	RESET_MOCI#	
23	PCIE1B_RX_N	I
24	3.3V_PCIE1_B	PWR
25	PCIE1B_RX_P	I
26	GND	PWR
27	GND	PWR
28	1.5V_MSATA1	PWR
29	GND	PWR
30	PCIE1_B_SMCLK	I2C CLK
31	PCIE1B_TX_N	O
32	PCIE1_B_SMDAT	IO
33	PCIE1B_TX_P	O
34	GND	PWR
35	GND	PWR

Pin	Signal Name	Description
36	USBH3_D_N	
37	GND	PWR
38	USBH3_D_P	
39	3.3V_PCIE1_B	PWR
40	GND	PWR
41	3.3V_PCIE1_B	PWR
42	PCIE1_B_WWLAN#	
43	GND	PWR
44	PCIE1_B_WLAN#	
45	NC	Not connected
46	PCIE1_B_WPAN#	
47	NC	Not connected
48	1.5V_MSATA1	PWR
49	NC	Not connected
50	GND	PWR
51	NC	Not connected
52	3.3V_PCIE1_B	PWR

3.14.2 Mini-SIM Card Holder (X26)

Type: Molex 47023-0001.

Pin	Signal Name	Description
1	PCIE1_UIM_PWR	
2	PCIE1_UIM_RESET	
3	PCIE1_UIM_CLK	
5	GND	PWR
6	PCIE1_UIM_VPP	
7	PCIE1_UIM_DATA	

3.15. Real-Time Clock (RTC)

The Ixora carrier board uses the STMicroelectronics, M41T0M6 chip as external RTC. A battery holder (BAT1) is available on the Ixora carrier board for RTC power backup.

Supported batteries: CR1216, BR1220, CL1225

3.16. Extension Header (X27)

Connector type: 2x18 Pin Header Male, 2.54mm

Pin	Signal Name	I/O Type	Voltage	Pull-up/Pull-down
1	RESET_MICO#	I	+3.3V	
2	POWER_ENABLE_MOCI	O	+3.3V	
3	WAKE1_MICO#	I	+3.3V	
4	RESET_MOCI#	O	+3.3V	
5	I2C1_SDA	I/O	+3.3V	4.7K to 3.3V
6	I2C1_SCL	I/O	+3.3V	4.7K to 3.3V
7	GND	PWR		
8	SPI1_CLK	I/O	+3.3V	
9	SPI1_CS	I/O	+3.3V	
10	SPI1_MISO	I	+3.3V	
11	SSP_MOSI	O	+3.3V	
12	+5V_SW	PWR	+5V	
13	GPIO1	I/O	+3.3V	
14	GPIO2	I/O	+3.3V	
15	GPIO3	I/O	+3.3V	
16	GPIO4	I/O	+3.3V	
17	GPIO5	I/O	+3.3V	
18	GPIO6	I/O	+3.3V	
19	GPIO7	I/O	+3.3V	
20	GPIO8	I/O	+3.3V	
21	GND	PWR		
22	AN1_ADC0	I	+3.3V	
23	AN1_ADC1	I	+3.3V	
24	AN1_ADC2	I	+3.3V	
25	AN1_TSWIP_ADC3	I	+3.3V	
26	AGND	PWR		
27	UART3_RXD	I	+3.3V	
28	UART3_TXD	O	+3.3V	
29	3.3V_SW	PWR	+3.3V	
30	UART4_RXD	I	+3.3V	
31	UART4_TXD	O	+3.3V	
32	GND	PWR		
33	PWM1	O	+3.3V	
34	PWM2	O	+3.3V	
35	PWM3	O	+3.3V	
36	PWM4	O		

3.17. LEDs

Ixora features nine LEDs as indication for the status of some of the interfaces available on board. Two of these LEDs are dual colour ones and can be controlled by using Apalis module GPIOs.

The following picture shows the position of the LEDs on Ixora.

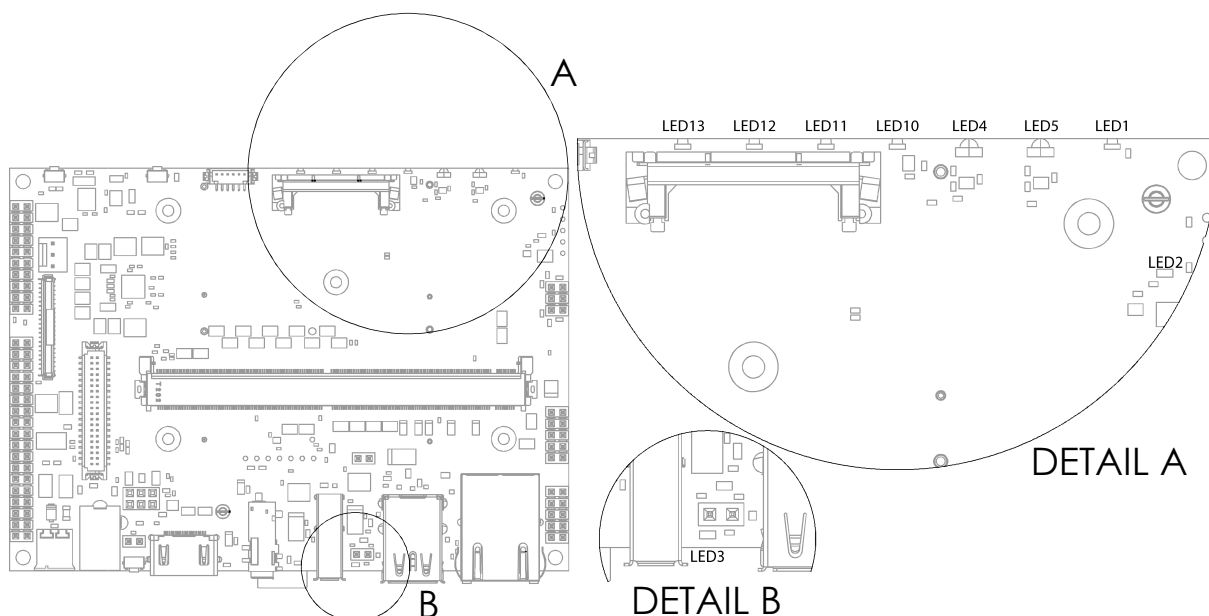


Fig.6 Ixora LEDs position

LED No.	Signal Name
LED1	The 3.3_SW voltage is available
LED2	The signal RESET_MOCI# is low therefore the module is reset
LED3	The VCC_USBO1 voltage is available therefore the bottom part of the connector X8 is used as HOST.
LED4_RED	Dual colour LED. This LED is RED when the signal on the pin 146 of the MXM3 connector is high.
LED4_GREEN	Dual colour LED. This LED is GREEN when the signal on the pin 162 of the MXM3 connector is high.
LED5_RED	Dual colour LED. This LED is RED when the signal on the pin 156 of the MXM3 connector is high.
LED5_GREEN	Dual colour LED. This LED is GREEN when the signal on the pin 152 of the MXM3 connector is high.
LED10	This LED indicates that the mSATA device is active.
LED11	Mini PCIe status indicator: WLAN
LED12	Mini PCIe status indicator: WWLAN
LED13	Mini PCIe status indicator: WPAN

4. Assembly Options

This section describes the assembly options that can be used to configure different features and functional options.

The following table lists all the assembly options that have been described in the previous pages of this document.

Solution Selected	Assembly Option	Section n.	PCB side
SEL1 to LVDS_3.3V_SW	Disassemble R98 and R99 and assemble R97	3.10.4	Top
SEL1 to LVDS_5V	Disassemble R97 and R99 and assemble R98	3.10.4	Top
SEL1 to GND	Disassemble R97 and R98 and assemble R99	3.10.4	Top
SEL2 to LVDS_3.3V_SW	Disassemble R101 and R102 and assemble R100	3.10.4	Top
SEL2 to LVDS_5V	Disassemble R100 and R102 and assemble R101	3.10.4	Top
SEL2 to GND	Disassemble R100 and R101 and assemble R102	3.10.4	Top
SW3 used for Recovery Mode	Disassemble the resistor R91 and assemble R90	2.2.11	Top
FAN enabled by the 3.3V_SW	Disassemble the resistor R35 and assemble R36	2.2.11	Top

4.1. Ixora Assembly Options - Top

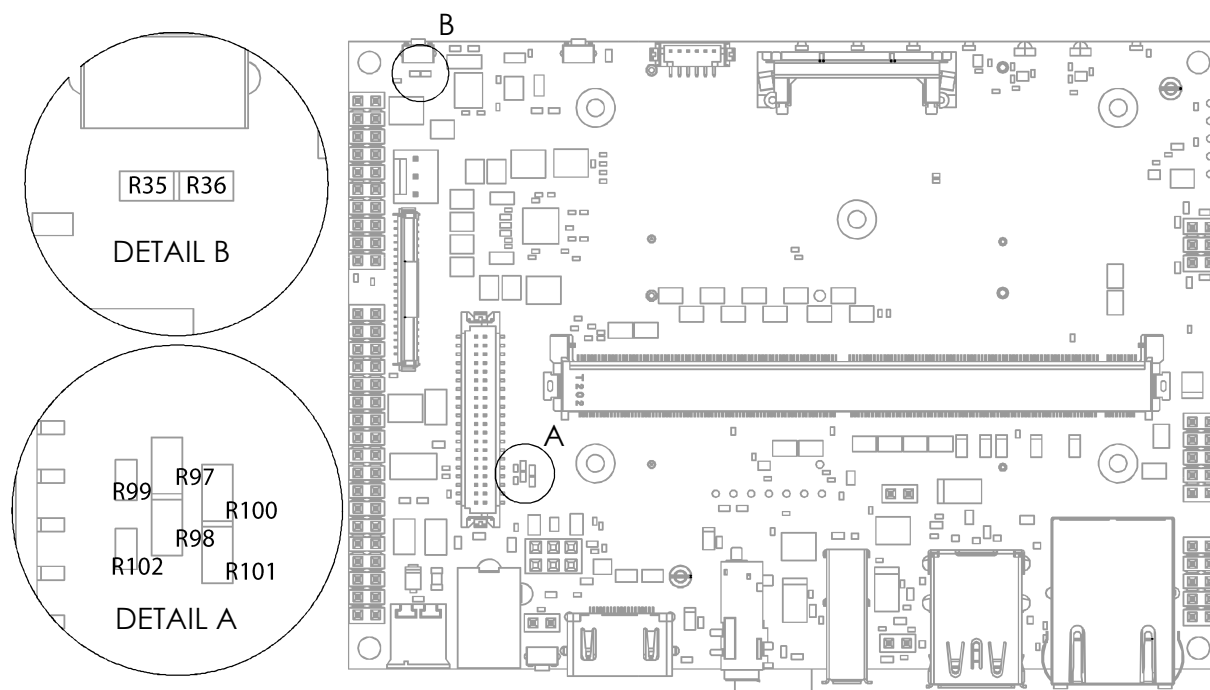


Fig.7 Ixora Assembly Options – Top Side

4.2. Ixora Assembly Options - Bottom

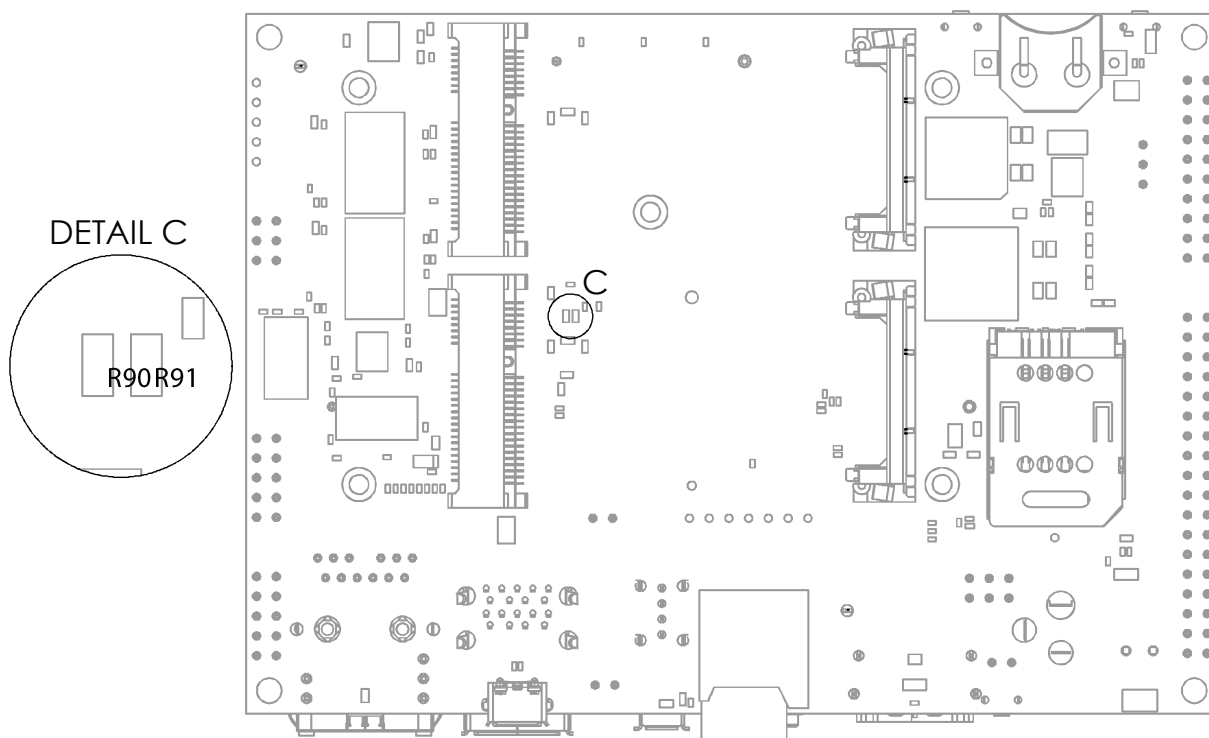


Fig.8 Ixora Assembly Options – Bottom Side

5. Temperature Range

5.1. Operating Temperature Range (T_{ambient})

- -20 °C to +70 °C.

5.2. Storage Temperature Range (T_{storage})

- -20 °C to +70 °C.

6. RoHS Compliance

Ixora complies with the European Union's Directive 2002/95/EC: "Restrictions of Hazardous Substances".

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