



# Technical Specification iLCD Linux

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## **iLCD Linux Specification**

Version 1.1

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Welcome to the iLCD Linux documentation document. Here you will find information regarding the intelligent LCD Linux series. Our vision in creating this series was to provide our customers with a compact, scalable and powerful computer with a short time-to-market and high quality displays.

The panels come with a built-in operating system that we developed using the Yocto Project and which can be further configured by our customers. Please visit our documentation page for more information regarding our software infrastructure.

Should any questions remain unanswered please don't hesitate to contact us via [support@demmel.com](mailto:support@demmel.com) or via +43-1-689470-0

## Features

### 1.1 i.MX8M Plus Series

This page provides an overview of the processor specifications, for more details please refer to the [reference manual published by NXP](#).

#### 1.1.1 System on a Module (SOM)

| Item            | Default                         | Additional Options |
|-----------------|---------------------------------|--------------------|
| Processor       | i.MX8M-Plus                     |                    |
| RAM             | 2 GB LPDDR4 (32-bit channel)    | 1 GB, 4 GB, 8 GB   |
| Flash           | 16 GB eMMC                      | 8 GB, 32 GB, 64 GB |
| EEPROM          | 8 kbit/ 2-wire I <sup>2</sup> C |                    |
| External Memory | Micro SD socket                 |                    |
| Real Time Clock | ultra-low-power AM1805 RTC      |                    |
| Co-processor    | ARM Cortex-M7, 800Mhz           |                    |
| GPU             | GC7000UL GPU                    |                    |

#### 1.1.2 Connectivity

| Item             | Default               | Additional Options         |
|------------------|-----------------------|----------------------------|
| USB              | USB 3.0 (Type A) host | USB 2.0 (Type C) device 1) |
| Ethernet         | 10/100/1000 Mbit/s    |                            |
| Serial           | 3x UART 5Mbit/s       |                            |
| I <sup>2</sup> C | 5x I <sup>2</sup> C   |                            |
| SPI              | 2x SPI                |                            |

### 1.1.3 Processor Maximum Ratings

| Item                     | Symbol | Minimum | Maximum | Unit |
|--------------------------|--------|---------|---------|------|
| Supply Voltage           | VCC    | -0.3    | 5.5     | V    |
| Input Voltage            | VIN    | -0.3    | 3.3     | V    |
| Operating Temperature 2) | TOPR   | 02)     | 70      | °C   |
| Storage Temperature      | TSTR   | -40     | 85      | °C   |
| Humidity 3)              |        | 10      | 90      | %RH  |

1) See [USB-C Port (USB-C)] for instructions on using USB-C as device 2) Optional: -20°C 3) Temp. 60°C, 90% RH MAX. 4) Temp. 60°C, absolute humidity shall be less than 90% RH at 60°C

**Note:** The ground connection to the display should be as stable as possible. Especially for iLCDs with projected capacitive touch panel the ground connection to the display and the power supply is crucial for an error-free function. If it is not possible or not wanted to connect the power supply with protective earth, this shall be done via a 20 nF capacitor.

## 1.2 i.MX93 Series

This page provides an overview of the processor specifications, for more details please refer to the [reference manual published by NXP](#).

### 1.2.1 System on a Module (SOM)

| Item            | Default                              | Additional Options                   |
|-----------------|--------------------------------------|--------------------------------------|
| Processor       | i.MX9352, dual-core 1.7GHz, with NPU | i.MX9331, single-core 1.7GHz, no NPU |
| RAM             | 1 GB LPDDR4 (32-bit channel)         | 512 MB, 2 GB                         |
| Flash           | 16 GB eMMC                           | 8 GB, 32 GB, 64 GB                   |
| EEPROM          | 8 kbit/ 2-wire I <sup>2</sup> C      |                                      |
| External Memory | Micro SD socket                      |                                      |
| Real Time Clock | ultra-low-power AM1805 RTC           |                                      |
| Co-processor    | ARM Cortex-M33, 250 MHz              |                                      |

### 1.2.2 Connectivity

| Item             | Default               | Additional Options         |
|------------------|-----------------------|----------------------------|
| USB              | USB 3.0 (Type A) host | USB 2.0 (Type C) device 1) |
| Ethernet         | no Ethernet           | 10/100/1000 Mbit/s         |
| WiFi & Bluetooth | -                     | NXP 88W8997 chipset        |
| Serial           | UART                  |                            |

### 1.2.3 Processor Maximum Ratings

| Item                     | Symbol | Minimum | Maximum | Unit |
|--------------------------|--------|---------|---------|------|
| Supply Voltage           | VCC    | -0.3    | 5.5     | V    |
| Input Voltage            | VIN    | -0.3    | 3.3     | V    |
| Operating Temperature 2) | TOPR   | 02)     | 70      | °C   |
| Storage Temperature      | TSTR   | -40     | 85      | °C   |
| Humidity 3)              |        | 10      | 90      | %RH  |

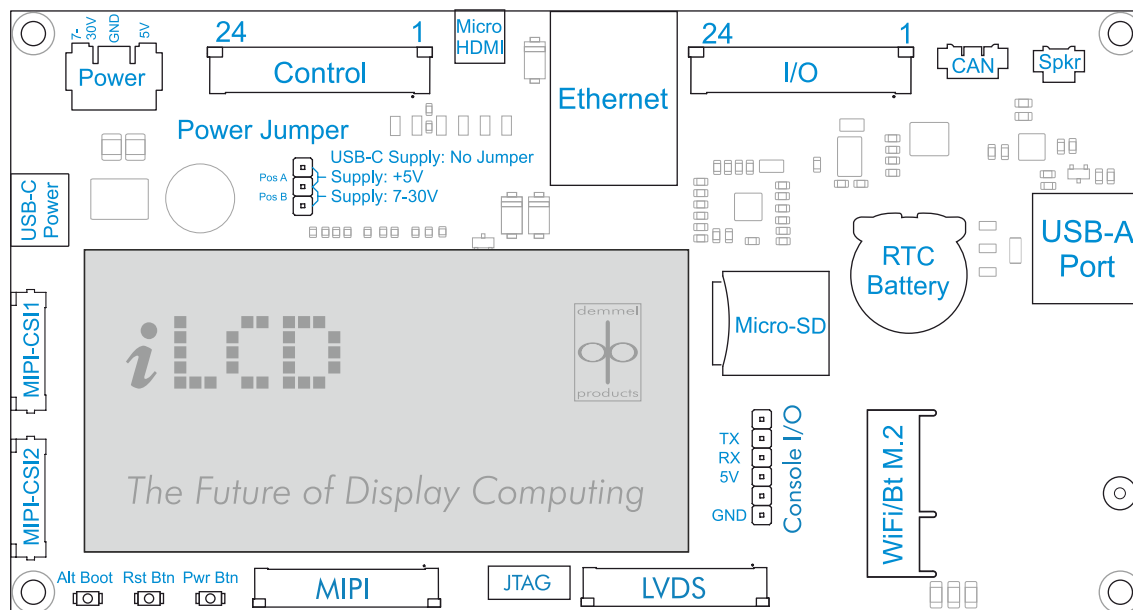
Notes:

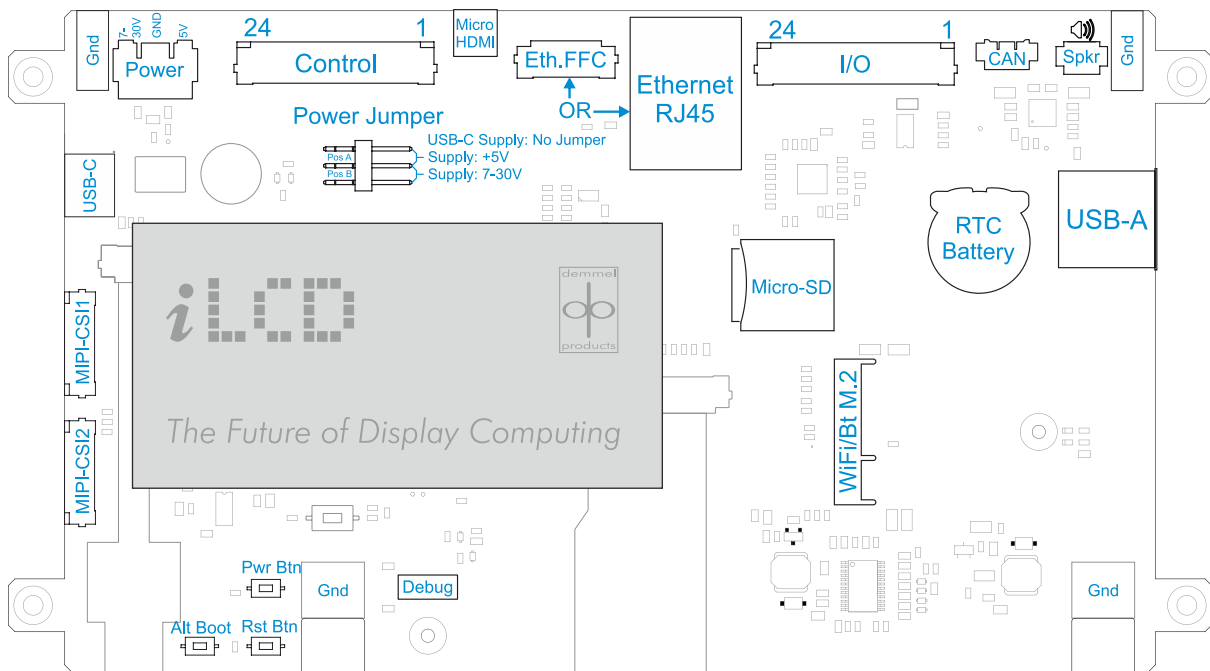
1) See [USB-C Port (USB-C)] for instructions on using USB-C as device 2) Optional: -20°C 3) Temp. 60°C, 90% RH MAX.

**Note:** The ground connection to the display should be as stable as possible. Especially for iLCDs with projected capacitive touch panel the ground connection to the display and the power supply is crucial for an error-free function. If it is not possible or not wanted to connect the power supply with protective earth, this shall be done via a 20 nF capacitor.

## 1.3 Circuit Board

The following descriptions refer to the connectors displayed in the this image.





## DPP-LMB-8P connectors

### 1.3.1 Power Connector (Power)

The iLCD panels can either be supplied via USB-C or via the Power Connector or via specific pins on the Control connector. In order to select a power supply, the *Power Jumper* (page 6) must be set to the required position. A matching male cable connector (DPA-C-PWR) for the power connector can be purchased from demmel products.

| Pin# | PinName | Primary Function Description |
|------|---------|------------------------------|
| 1    | 7-30V   | 7-30 Volt power supply       |
| 2    | GND     | Ground                       |
| 3    | 5V      | 5 Volt power supply          |

**Danger:** Only one voltage source may be connected at any given time. Incorrect connection will cause module damage. 10.1" and larger panels cannot be reliably supplied with 5V.

### 1.3.2 USB-C Port (USB-C)

This port can be used as a 5V power source for the iLCD panel or as a USB device. In order to use this port as a USB device, please keep the following instructions in mind: Since both the M.2 Bluetooth functionality and the USB-C connector rely on the same data line, only one or the other may be used at any given time.

By default, device function is enabled on the USB-C connector but once the DPA-AX200 module is plugged in this function is automatically deactivated. For customers who require the USB-C port as device as well as WiFi functionality, there is the possibility of forcing the internal USB switch accordingly via software or by adding a resistor to the PCB. Please contact us for further details.



### 1.3.3 Power Jumper (Power Jumper)

Using this jumper you may determine which power source to use. There are three settings: If there is no jumper, the default setting is to use the 5V USB-C power supply (*USB-C Port (USB-C)* (page 5)) or to supply power using the Control connector.

#### Default Position

In this position the power connector (Power) is disengaged



#### Position A

In the following position power is supplied by the 5V pin of the power connector.



#### Position B

In the following position power is supplied by the 7-30V pin of the power connector.



### 1.3.4 Control Port (Control)

Connection to the control port is made via a 24-pin FFC/FPC cable with 1.0 mm pitch. The FFC/FPC connector on the board is a top-contact model.

Please note that the processor i.MX8M Plus enables wide-ranging configuration of the pinout. The following table therefore serves as a guideline to the use of the pins on the control port, but doesn't currently offer a comprehensive summary of all configuration options. If you have further questions please consult the processor reference manual. We are also happy to offer support.

The column Main Function lists the pin functions which are guaranteed to work on the respective pin. The *i.MX 8M Plus Pad* column lists the pins according to their names as listed in the processor reference manual by NXP and in the Linux device tree. For user convenience the GPIO Pin column shows the pin assignment of the GPIO pins. The final column illustrates which of the pins are compatible with our iLCD JPro series.

| Pin# | Main Function | i.MX 8M Plus Pad   | GPIO Pin   | JPro Compatible |
|------|---------------|--------------------|------------|-----------------|
| 1    | VIN 1)        |                    |            | Yes             |
| 2    |               |                    |            | No              |
| 3    |               |                    |            | No              |
| 4    | GND           |                    |            | Yes             |
| 5    | UART1_RX      | UART1_RXD          | GPIO5_IO22 | Yes             |
| 6    | UART1_TX      | UART1_TXD          | GPIO5_IO23 | Yes             |
| 7    | UART1_CTS     | SAI2_TXFS          | GPIO4_IO24 | Yes             |
| 8    | SDA           | I2C5_SDA/SAI5_MCLK | GPIO3_IO25 | Yes             |
| 9    | SCL           | I2C5_SCL/SAI5_RXD0 | GPIO3_IO21 | Yes             |
| 10   | ALERT 2)      | HDMI_HPD           | GPIO3_IO29 | Yes             |
| 11   | SCK           | ECSPi2_SCLK        | GPIO5_IO10 | Yes             |
| 12   | MISO          | ECSPi2_MISO        | GPIO5_IO12 | Yes             |
| 13   | MOSI          | ECSPi2_MOSI        | GPIO5_IO11 | Yes             |
| 14   | SSEL          | ECSPi2_SS0         | GPIO5_IO13 | Yes             |
| 15   | PWM3_OUT      | I2C3_SDA           | GPIO5_IO19 | Yes             |
| 16   | PWM4_OUT      | I2C3_SCL           | GPIO5_IO20 | Yes             |
| 17   | GPIO5_IO4 3)  | SPDIF_RX           | GPIO5_IO04 | Yes             |
| 18   | ON_OFF 4)     | SWPWRBTN           |            | Yes             |
| 19   | RESET         | PB_RESET           |            | Yes             |
| 20   | VBATT         | VCOIN              |            | Yes             |
| 21   | VIN 1)        |                    |            | Yes             |
| 22   | VIN 1)        |                    |            | Yes             |
| 23   | GND           |                    |            | Yes             |
| 24   | GND           |                    |            | Yes             |

1) iLCD Linux modules may be supplied via the Control port with a maximum of 5 Volts. When using this option please connect the power supply to ALL THREE “VIN” Pins. This is not recommended for panels larger than 7.0 inches. 2) This function is only available when the HDMI port is not in use. 3) This function may interfere with the on board LEDs 4) Pulling this pin to ground acts as a power ON/OFF switch

### 1.3.5 Input/Output Port (I/O)

Connection to the I/O port is made via a 24-pin FFC/FPC cable with 1.0 mm pitch. The FFC/FPC connector on the board is a top-contact model.

Please note that the processor i.MX8M Plus enables wide-ranging configuration of the pinout. The following table therefore serves as a guideline to the use of the pins on the I/O port, but doesn't currently offer a comprehensive summary of all configuration options. If you have further questions please consult the processor reference manual. We are also happy to offer support.

The column Main Function lists the pin functions which are guaranteed to work on the respective pin. The i.MX 8M Plus Pad column lists the pins according to their names as listed in the processor reference manual by NXP and in the Linux device tree. For user convenience the GPIO Pin column shows the pin assignment of the GPIO pins. The final column illustrates which of the pins are compatible with our iLCD JPro series.

| Pin# | Main Function | i.MX 8M Plus Pad | GPIO Pin   | JPro Compatible |
|------|---------------|------------------|------------|-----------------|
| 1    | CAN1_RX 1)    | SAI2_TXC         | GPIO4_IO25 | Yes             |
| 2    | CAN1_TX 1)    | SAI2_RXC         | GPIO4_IO22 | Yes             |
| 3    | CAN2_TX       | SAI2_MCLK        | GPIO4_IO27 | Yes             |
| 4    | CAN2_TX       | SAI2_TXD0        | GPIO4_IO26 | Yes             |
| 5    | SPDIF_TX      | SPDIF_TX         | GPIO5_IO03 | Yes             |
| 6    | SAI3_RXD      | SAI3_RXD         | GPIO4_IO30 | Yes             |
| 7    | I2C4_SCL      | I2C4_SCL         | GPIO5_IO20 | Yes             |
| 8    | SAI1_MCLK     | SAI1_MCLK        | GPIO4_IO20 | Yes             |
| 9    | SAI3_RXFS     | SAI3_RXFS        | GPIO4_IO28 | Yes             |
| 10   | SD1_RESET_B   | SD1_RESET_B      | GPIO2_IO10 | Yes             |
| 11   | UART4_RXD     | UART4_RXD        | GPIO5_IO28 | Yes             |
| 12   | UART4_TXD     | UART4_TXD        | GPIO5_IO29 | Yes             |
| 13   | GPIO          | SPDIF_EXT_CLK    | GPIO5_IO05 | Yes             |
| 14   | GPIO          | SAI1_TXD0        | GPIO4_IO12 | Yes             |
| 15   | GPIO 2)       | HDMI_CEC         | GPIO3_IO28 | Yes             |
| 16   | GPIO 2)       | HDMI_DDC_SDA     | GPIO3_IO27 | Yes             |
| 17   | GPIO 2)       | HDMI_DDC_SCL     | GPIO3_IO26 | Yes             |
| 18   | GPIO          | SAI3_RXC         | GPIO4_IO29 | Yes             |
| 19   | GPIO          | SD2_RESET_B      | GPIO2_IO19 | Yes             |
| 20   | GPIO          | SPDIF_TX         | GPIO5_IO03 | Yes             |
| 21   | UART3_TXD     | UART3_RXD        | GPIO5_IO26 | Yes             |
| 22   | UART3_RXD     | UART3_TXD        | GPIO5_IO27 | Yes             |
| 23   | 3V3_PER       |                  |            | Yes             |
| 24   | GND           |                  |            | Yes             |

1) This function is only available when the physical on-board CAN bus is not in use. 2) This function is only available when the HDMI port is not in use.

### 1.3.6 Low Voltage Differential Signaling (LVDS)

LVDS uses differential signaling, which allows it to run on low voltages. Connection to the LVDS in port is made via a 40-pin FFC/FPC cable with 0.5 mm pitch. The FFC/FPC connector on the board is a top-contact model.

| Pin# | PinName           | Primary Function Description                                 |
|------|-------------------|--|
| 1    | LVDS SPARE        | Spare line currently not connected                           |
| 2-4  | VCC               | 3.3V power supply  |
| 5    | LVDS DISP Reset   | Display reset 1)   |
| 6    | LVDS DISP Disable | Display disable 2)   |
| 7    | GND               |  |
| 8    | LVDS D0 N         | Differential pair 0 for data transmission to the display     |
| 9    | LVDS D0 P         | Differential pair 0 for data transmission to the display     |
| 10   | GND               |  |
| 11   | LVDS D1 N         | Differential pair 1 for data transmission to the display     |
| 12   | LVDS D1 P         | Differential pair 1 for data transmission to the display     |
| 13   | GND               |  |
| 14   | LVDS D2 N         | Differential pair 2 for data transmission to the display     |
| 15   | LVDS D2 P         | Differential pair 2 for data transmission to the display     |
| 16   | GND               |  |
| 17   | LVDS CLK N        | Differential Pair for clock line transmission to the display |
| 18   | LVDS CLK P        | Differential Pair for clock line transmission to the display |
| 19   | GND               |  |

continues on next page

Table 1 – continued from previous page

| Pin#  | PinName        | Primary Function Description                                     |
|-------|----------------|--|
| 20    | LVDS D3 N      | Differential pair 3 for data transmission to the display         |
| 21    | LVDS D3 P      | Differential pair 3 for data transmission to the display         |
| 22    | GND            |  |
| 23    | LCDS PCAP SCL  | I <sup>2</sup> C interface for PCAP – clock                      |
| 24    | LCDS PCAP SDA  | I <sup>2</sup> C interface for PCAP – data                       |
| 25    | GND            |  |
| 26    | LCDS PCAP INT  | I <sup>2</sup> C interface for PCAP – interrupt                  |
| 27    | LCDS PCAP RES  | I <sup>2</sup> C Interface for PCAP – reset 3)                   |
| 28    | GND            |  |
| 29    | SYS SCL        | Backup I <sup>2</sup> C interface – clock 4)                     |
| 30    | SYS SDA        | Backup I <sup>2</sup> C interface – data 4)                      |
| 31-33 | LVDS BL GND    | GND pin for 5V supply of backlight, connected to GND.            |
| 34-36 | LVDS BL HV VCC | High voltage power supply for backlight 5)                       |
| 37    | LVDS BL PWM    | PWM line for setting the brightness of the display backlight. 6) |
| 38-40 | LVDS BL VCC    | 5V power supply for backlight 5)                                 |

1) Pull to GND to reset the display. Must be applied on or after power up of VCC for > 50ms, but is not connected/used on all models. Can be left open during normal operation or tied to 3.3V. 2) Pull to GND to enable the display. When left open or tied to 3.3V the display is disabled. 3) Pull to GND to reset the PCAP. Must be applied on or after power up of VCC for > 50ms. Can be left open during normal operation or tied to 3.3V. 4) This I<sup>2</sup>C bus has no dedicated purpose and may be used for additional devices such as sensors. 5) Depending on the size of the display, it uses either the 5V pin or the high voltage pin for voltages between 7V and 30V in order to minimize current. 6) When left open or tied to GND, backlight is disabled. Can be tied to 3V3 for maximum brightness.

### 1.3.7 HDMI (Micro HDMI)

This micro HDMI port can be used as a video output with a maximum resolution of 1080p60 or 1920x1080 pixels and a frame rate of 60 frames per second. It can also function as a audio output.

### 1.3.8 USB-A Port (USB-A Port)

This USB 3.0 port acts as USB host. This means that it can be used to connect devices such as USB mass storage devices, HMI devices etc.

### 1.3.9 Ethernet (Eth. FFC or Ethernet RJ45)

iLCD Linux panels come in two distinct forms: The standard version DPP-LHC70 has an FFC connector, which can be connected to an external PCB with RJ45 connector (DPA-ETH-i.MX) via a Flex PCB. Alternatively, the DPP-LHC70-8P -G comes with the RJ45 connector mounted directly on the PCB.

**Warning:** Please be careful when handling the mounted RJ45 connector as the solder connecting it to the PCB may come loose if treated with too much force

### 1.3.10 CAN-Bus Port (CAN)

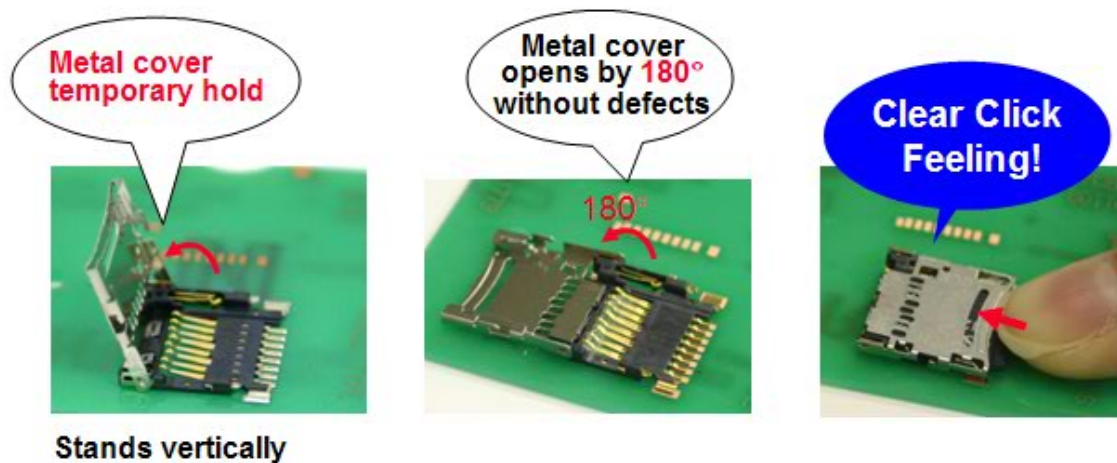
This is the controller area network connector. A cable with a matching plastic connector is available from demmel products. See DPA-C-CAN on our accessories page for more details.

### 1.3.11 Battery Backup for Real Time Clock (RTC Battery)

This is a holder for a CR1220 battery as a backup power supply for the real time clock.

### 1.3.12 MicroSD Connector (Micro-SD)

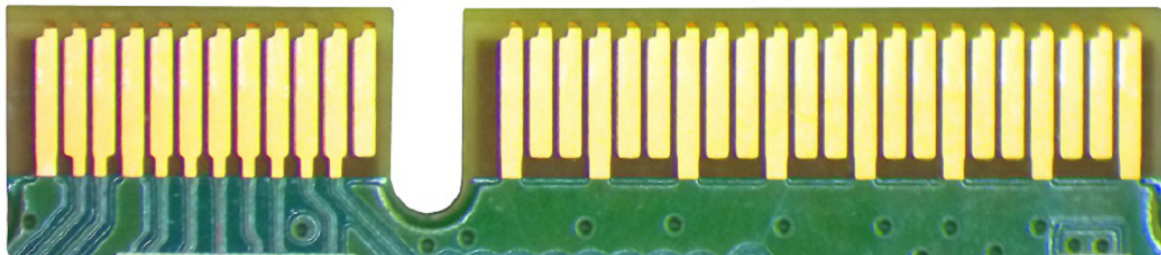
All iLCD panels have a MicroSD card holder on-board. Please note that MicroSD, MicroSDHC and MicroSDXC are supported. To insert a MicroSD card, slide the connector in the direction of the OPEN-arrow engraved in the metal plate and lift it. Insert the card with the contact area facing down, then fold the connector back in and push carefully in the direction of the LOCK-arrow until it makes a click sound.



### 1.3.13 M.2 Connector (WiFi/Bt M.2)

An external WiFi Module may be added to the iLCD Linux panel via this connector, which conforms to the M.2 Key-E standard. Suitable modules can be purchased from demmel products as. The M.2 connector so far has only been tested with the AX200.

## 12 Pins



### 1.3.14 MIPI Camera Serial Interface (MIPI-CSIx)

The Camera Serial Interface (CSI) is a specification of the Mobile Industry Processor Interface (MIPI) Alliance. It is a high-speed, bidirectional protocol primarily intended for image and video transmission between cameras and hosts within a multi-layered, peer-to-peer, UniPro-based M-PHY device network.

iLCD Linux panels conform to the CSI-2 standard with four lanes. MIPI-CSI1 and MIPI-CSI2 can be used simultaneously.

### 1.3.15 Speaker Port (Spkr)

The speaker output may be connected directly to a 4 or 8 Ohm speaker to play audio, while 8 Ohm is recommended. A cable with a matching connector is available from demmel products. See DPA-C-SPKR on our accessories page for more details.

### 1.3.16 JTAG (JTAG)

This port is found on the iLCD Linux Debug Board (DPA-DBG) and on the iLCD Linux Mainboard (*DPP-LMB-8P* (page 14)). This port connects to a SEGGER Microcontroller J-Link In-Circuit Debugger. Its main purpose is to debug the ARM Cortex M7 microcontroller, which is typically used for RTOS applications.

### 1.3.17 Debug Port (Debug)

This is the port for connecting the iLCD Linux Debug Board (DPA-DBG). By default the serial Linux console is accessed via this port.

### 1.3.18 Power Button (Pwr Btn)

This push button can be used to turn the panel off or on, depending on the current state.

### 1.3.19 Reset Button (Rst Btn)

This push button causes the panel to reboot.

### 1.3.20 Alternative Boot Button (Alt Boot)

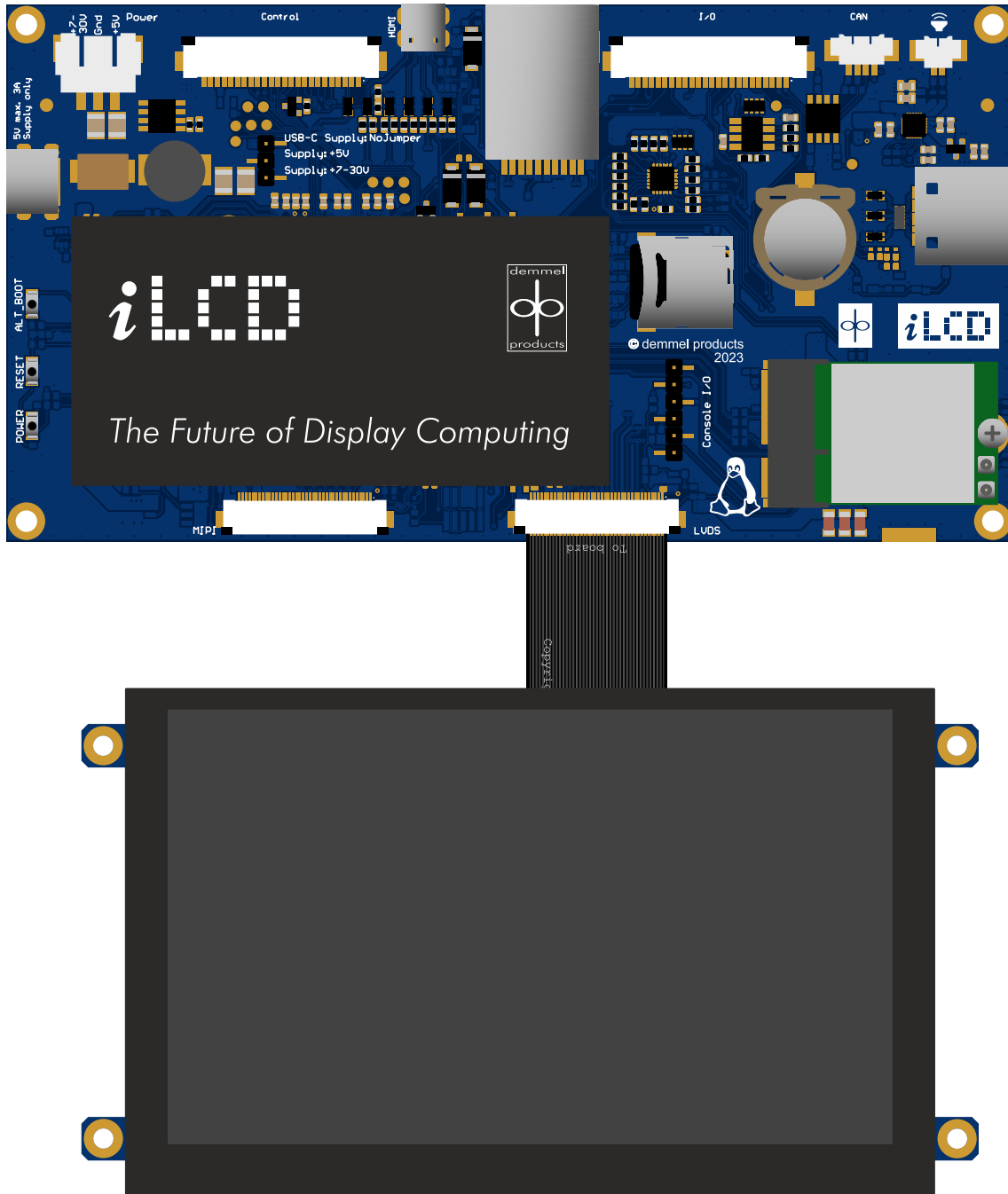
Holding this button down during boot-up causes the processor to boot from the SD card rather than from eMMC.

Our iLCD Linux series of powerful display computers offer a wide range of functions and customization options to suit our customers' needs. There are currently two Systems on a Module (SOMs) to choose from: the i.MX8M Plus and the i.MX93, both from NXP Semiconductors. The i.MX8M Plus SOM is the more powerful of the pair, especially with regard to 3D and video processing, while the i.MX93 comes with a lower pricetag. Which series constitutes the better choice is highly dependent on your requirements. Please feel free to [get in touch](#) for a free consultation.

## Part 2

### Mainboard

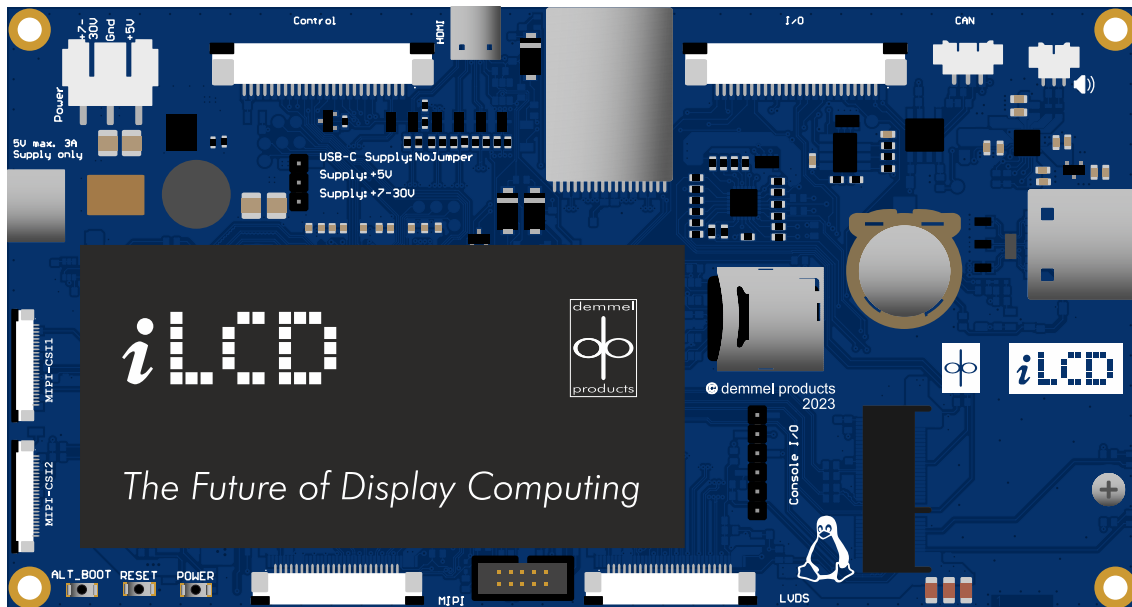
The iLCD Linux Mainboard (DPP-LMB) allows for more flexibility than the bonded solution. It can be connected to any display of the Pure-X series using a simple interface panel, one for each available size. We call these interface panels DPP-XHC50, where the number 50 stands for the size of the display in inches. The following graphic illustrates this relationship.



Mainboard with 5" display



## 2.1 DPP-LMB-8P



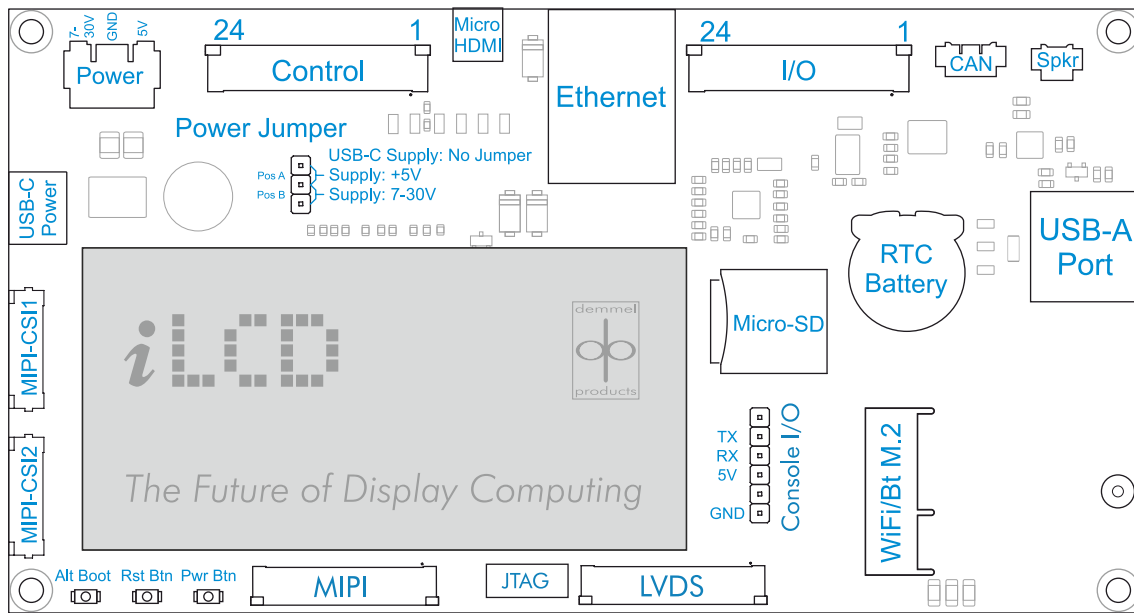
### 2.1.1 Electrical Characteristics

This table lists the current consumption of the DPP-LMB-8P without a connected display.

| Item                               | Symbol | Min. | Typ. | Max. | Unit |
|------------------------------------|--------|------|------|------|------|
| Supply Voltage (USB-C)             | VCC    | 4.5  | 5.0  | 5.25 | V    |
| Supply Voltage (Power, 5V)         | VCC    | 4.5  | 5.0  | 5.4  | V    |
| Supply Voltage (Power, 7-30V)      | VCC    | 6    | -    | 32   | V    |
| Input Voltage H Level 1)           | VIH    | 2.4  | -    | 3.3  | V    |
| Input Voltage L Level 1)           | VIL    | 0.0  | -    | 0.8  | V    |
| Output current for digital outputs | IOUT   |      |      | 3.5  | mA   |
| Vbatt current                      | IVbatt |      | 1    |      | μA   |
| Current consumption @ VCC = 5V     | ICC    |      | 630  | 800  | mA   |
| Current consumption @ VCC = 5V 2)  | ICC    |      | 1000 | 1200 | mA   |
| Current consumption @ VCC = 7V     | ICC    |      | 480  | 700  | mA   |
| Current consumption @ VCC = 7V 2)  | ICC    |      | 650  | 800  | mA   |
| Current consumption @ VCC = 30V    | ICC    |      | 130  | 150  | mA   |
| Current consumption @ VCC = 30V 2) | ICC    |      | 180  | 200  | mA   |

1) For digital inputs only 2) Demanding Application running

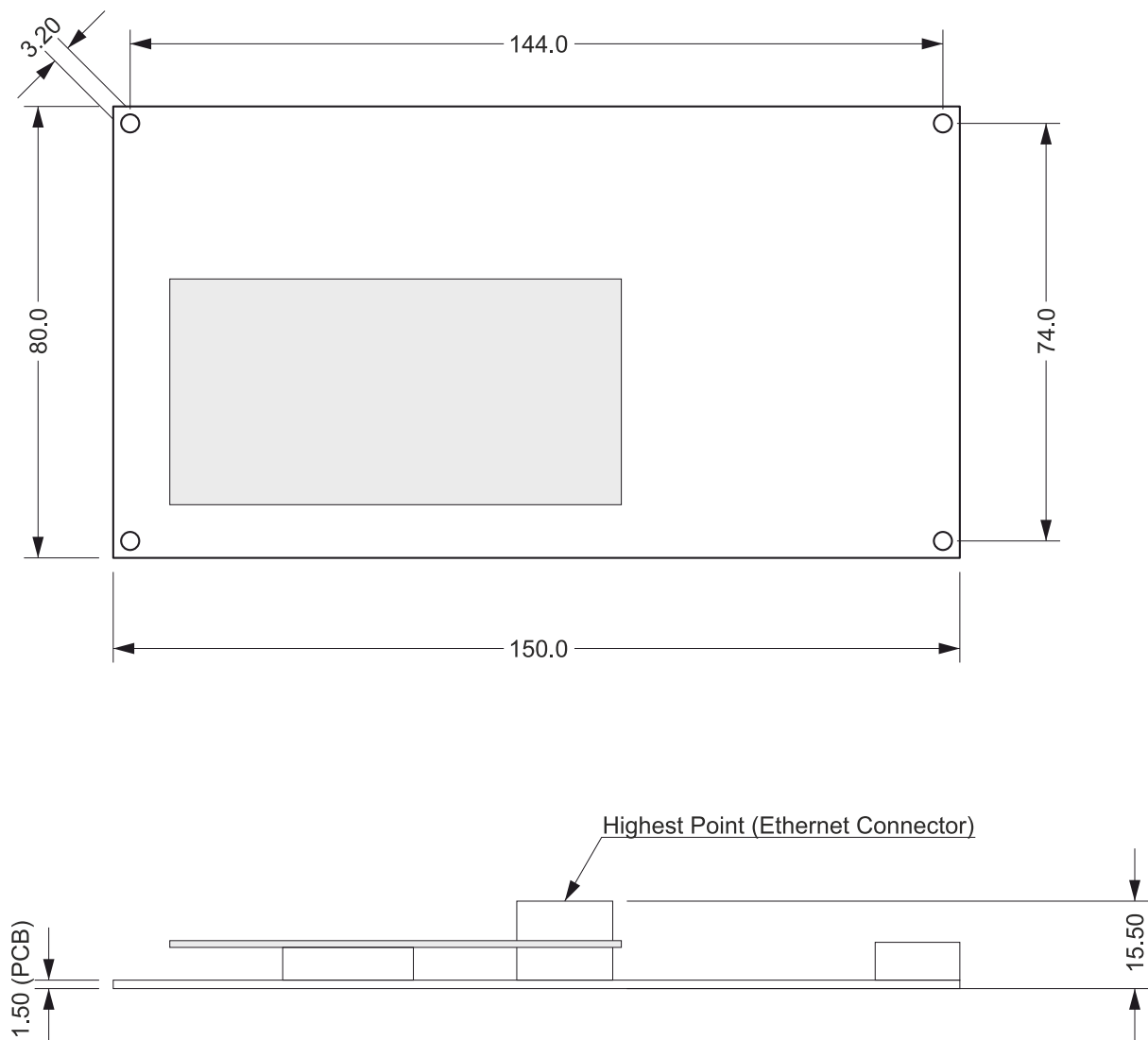
## 2.1.2 Circuit Board



### Linux Mainboard connectors

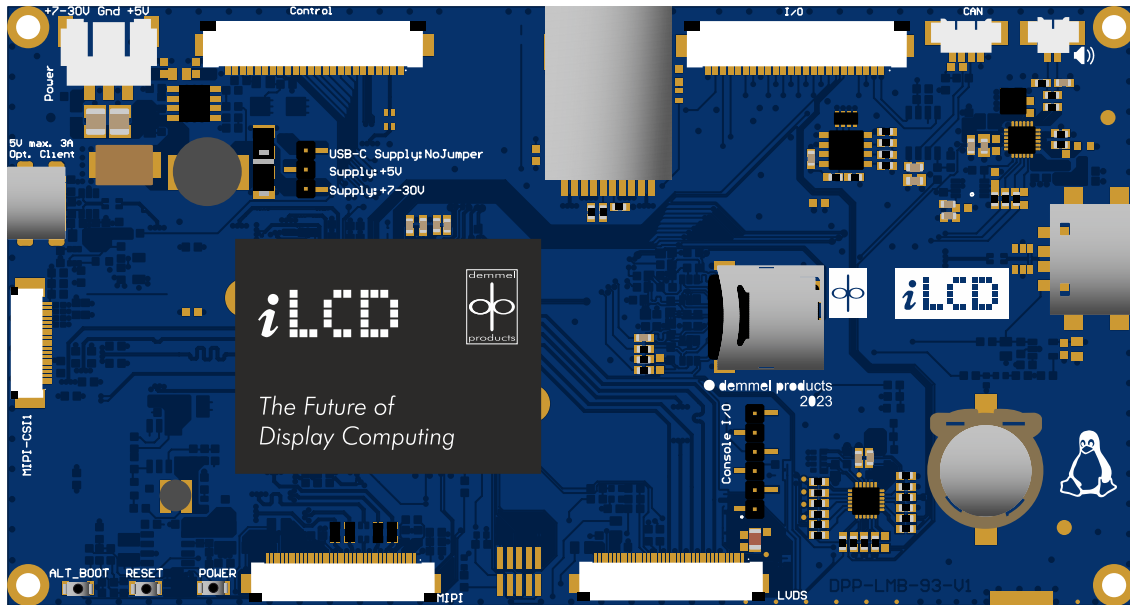
For more details on connectors shown, see [Circuit Board](#) (page 4)

### 2.1.3 Mechanical Specification



Linux Mainboard dimensions in mm

## 2.2 DPP-LMB-93



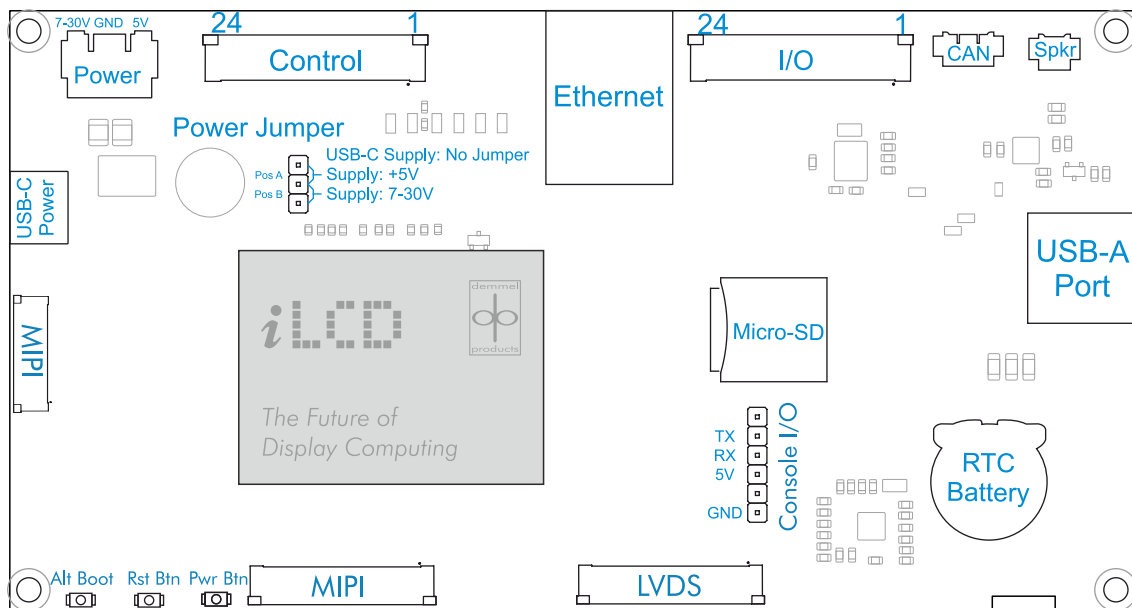
### 2.2.1 Electrical Characteristics

This table lists the current consumption of the DPP-LMB-93 without a connected display.

| Item                               | Symbol | Min. | Typ. | Max. | Unit |
|------------------------------------|--------|------|------|------|------|
| Supply Voltage (USB-C)             | VCC    | 4.5  | 5.0  | 5.25 | V    |
| Supply Voltage (Power, 5V)         | VCC    | 4.5  | 5.0  | 5.4  | V    |
| Supply Voltage (Power, 7-30V)      | VCC    | 6    | -    | 32   | V    |
| Input Voltage H Level 1)           | VIH    | 2.4  | -    | 3.3  | V    |
| Input Voltage L Level 1)           | VIL    | 0.0  | -    | 0.8  | V    |
| Output current for digital outputs | IOUT   |      |      | 3.5  | mA   |
| Vbatt current                      | IVbatt |      | 1    |      | μA   |
| Current consumption @ VCC = 5V     | ICC    |      | 630  | 800  | mA   |
| Current consumption @ VCC = 5V 2)  | ICC    |      | 1000 | 1200 | mA   |
| Current consumption @ VCC = 7V     | ICC    |      | 480  | 700  | mA   |
| Current consumption @ VCC = 7V 2)  | ICC    |      | 650  | 800  | mA   |
| Current consumption @ VCC = 30V    | ICC    |      | 130  | 150  | mA   |
| Current consumption @ VCC = 30V 2) | ICC    |      | 180  | 200  | mA   |

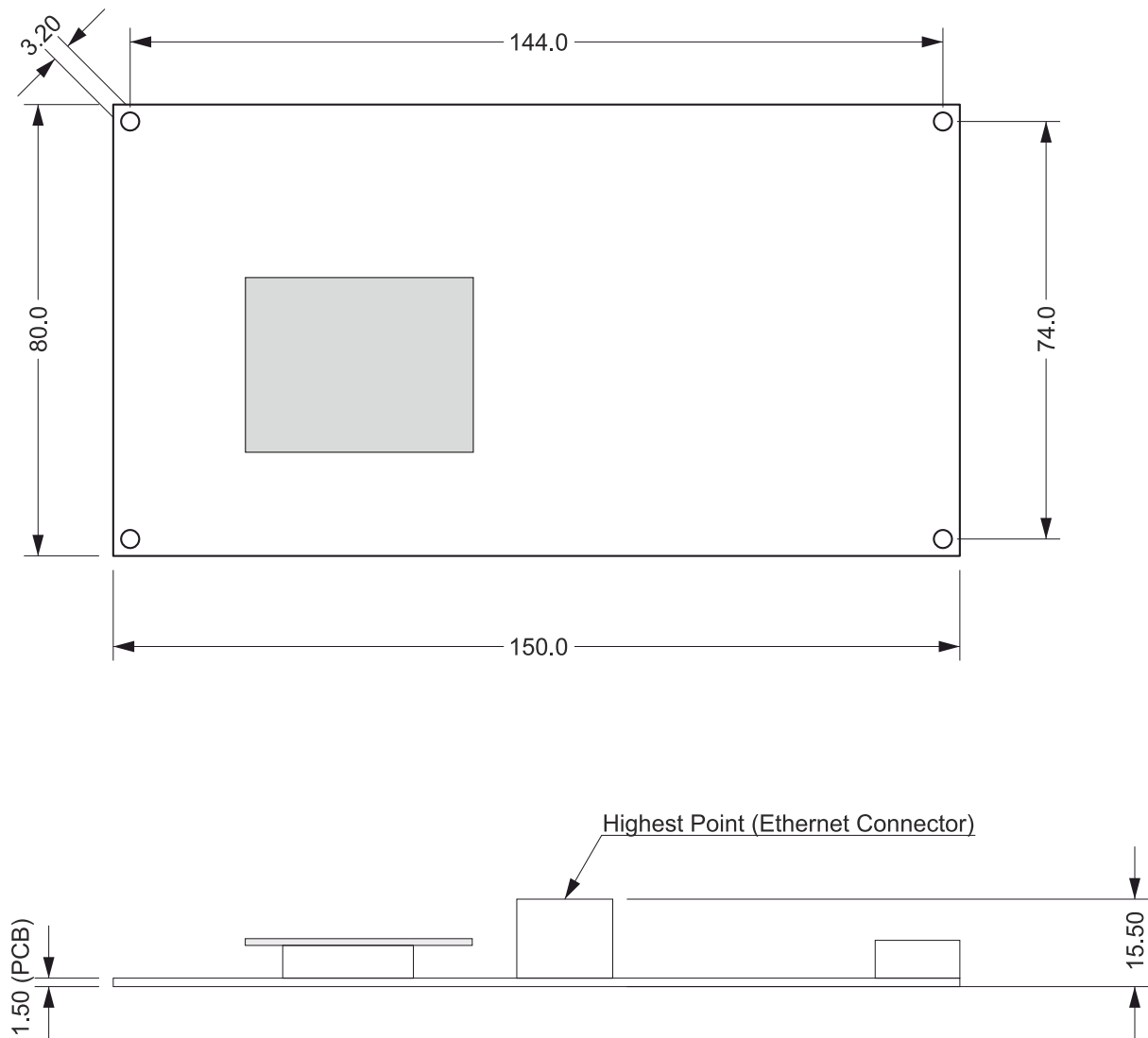
Notes: 1) For digital inputs only 2) Demanding Application running

## 2.2.2 Circuit Board



For more details on connectors shown, see [Circuit Board](#) (page 4)

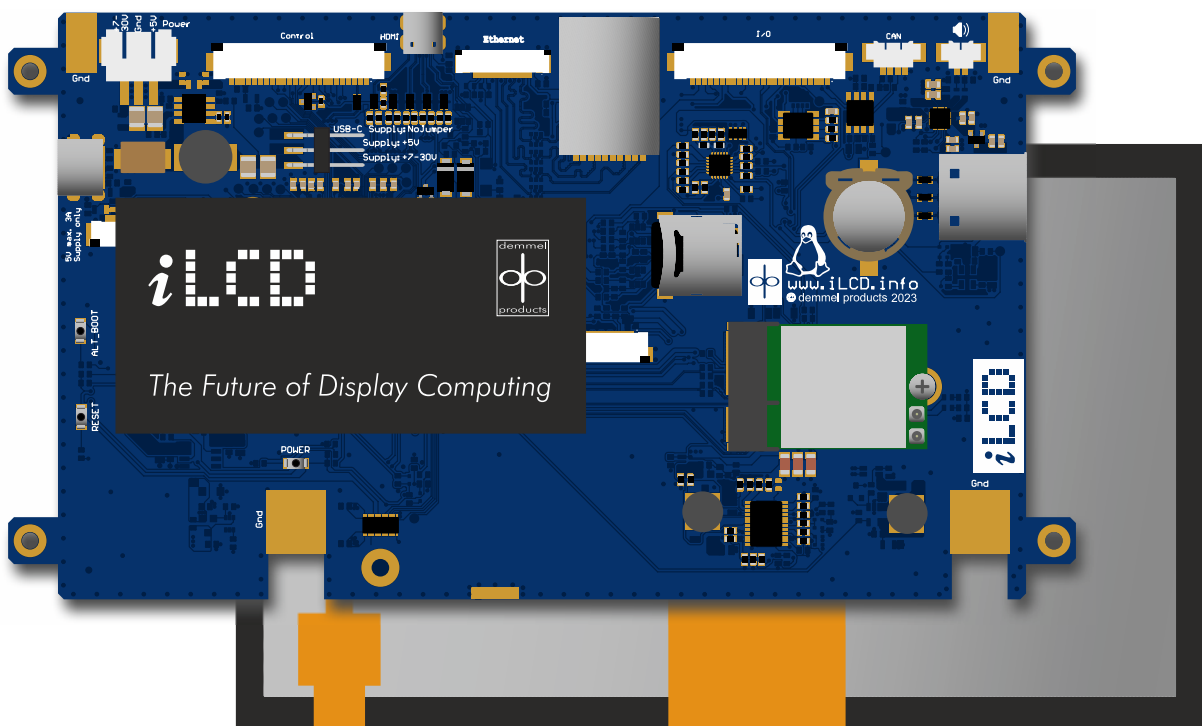
### 2.2.3 Mechanical Specification



Linux Mainboard dimensions in mm

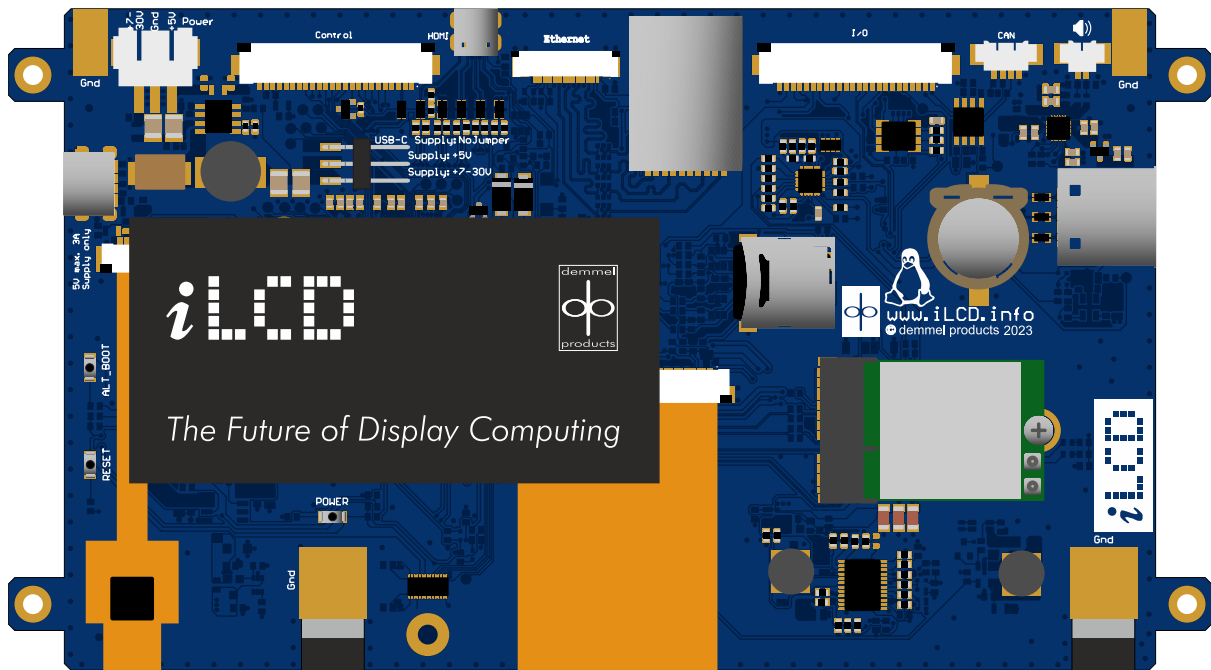
## Bonded Solution

What we mean by “bonded solution” is that, as in our previous series of intelligent displays, the PCB containing all the connectors and electronics is glued permanently to the back of the display, such as with the DPP-LHC70-8P shown below. Please keep in mind that the same model can be ordered with custom cover glass without the mounting brackets as part of our LCD Pure Series.



This series combines the advantages of intelligent displays with the utility of having an operating system known from Panel-PC solutions. The convenient mounting brackets allow for a snug connection with your housing. Form and function are united in this design.

## 3.1 DPP-LHC70-8P



### 3.1.1 LCD

| Item                | DPP-LHC70-8P                                 |
|---------------------|--|
| Screen Size         | 7.0 inch                                     |
| Display Resolution  | 1024 x RGB x 600 dots                        |
| Active Area         | 154.21 (H) x 85.92 (V) mm                    |
| Display Mode        | Normally black / Transmissive                |
| Pixel Arrangement   | RGB-Strip                                    |
| Display Color       | 16.7 M (Display) / 64k (Controller)          |
| Backlight 1)        | 27 white LEDs, typical lifetime 50.000 hours |
| Brightness typ.     | 1000 cd/m2                                   |
| Contrast ratio typ. | 800  |
| Viewing Direction   | ALL O'clock                                  |
| Touch Screen        | PCAP 5 Fingers                               |

Note:

1) Brightness decreased to be 50% of the initial value. Life time; mean time before failure at normal temperature (25°C) and normal humidity (60%)



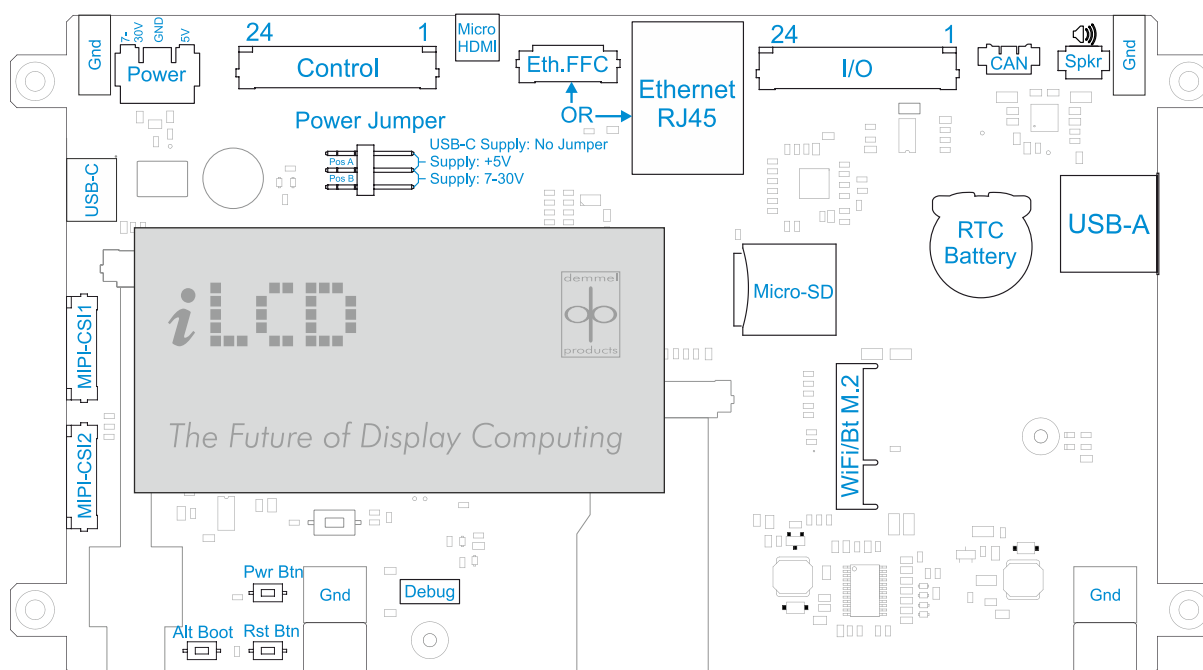
### 3.1.2 Electrical Characteristics

These specifications show the requirements regarding input voltages and currents. Minimum and maximum currents are based on the default setup of the iLCD Linux panels as they are delivered to customers. The actual current consumption may vary depending on your hardware and software configuration.

| Item   | Sym-<br>bol | Min.      | Typ.       | Max.         | Unit |
|--|-------------|-----------|------------|--------------|------|
| Supply Voltage (USB-C)                                 | VCC         | 4.5       | 5.0        | 5.25         | V    |
| Supply Voltage (Power, 5V)                             | VCC         | 4.5       | 5.0        | 5.4          | V    |
| Supply Voltage (Power, 7-30V)                          | VCC         | 6         | -          | 32           | V    |
| Input Voltage H Level 1)                               | VIH         | 2.4       | -          | 3.3          | V    |
| Input Voltage L Level 1)                               | VIL         | 0.0       | -          | 0.8          | V    |
| Output current for digital outputs                     | IOUT        |           |            | 3.5          | mA   |
| Vbatt current  | IVbatt      |           | 1          |              | μA   |
| Current consumption with display+backlight @ VCC = 5V  | ICC         | 550<br>2) | 1000<br>3) | 1750<br>4)5) | mA   |
| Current consumption with display+backlight @ VCC = 7V  | ICC         | 400<br>2) | 750 3)     | 1400<br>4)5) | mA   |
| Current consumption with display+backlight @ VCC = 30V | ICC         | 100<br>2) | 200 3)     | 350 4)5)     | mA   |

1) For digital inputs only 2) Backlight intensity 0,2%, CPU idle 3) Backlight intensity 100%, CPU idle 4) GPU running demanding Application 5) CPU running stress test

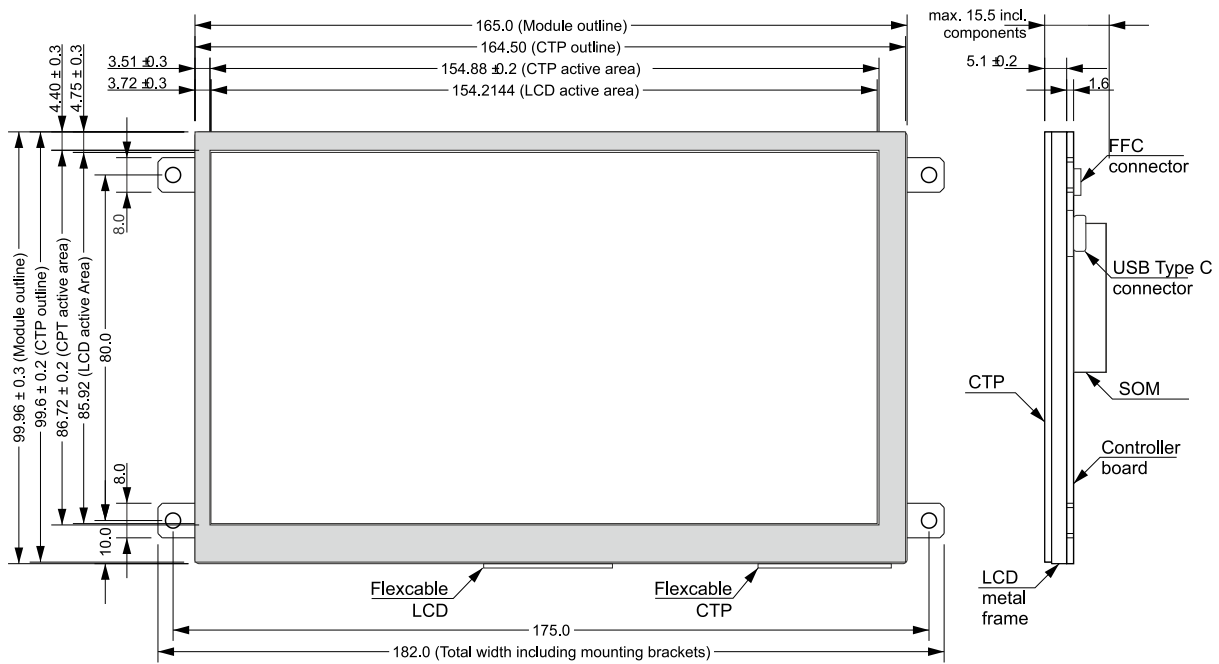
### 3.1.3 Circuit Board



#### DPP-LHx70-8P connectors

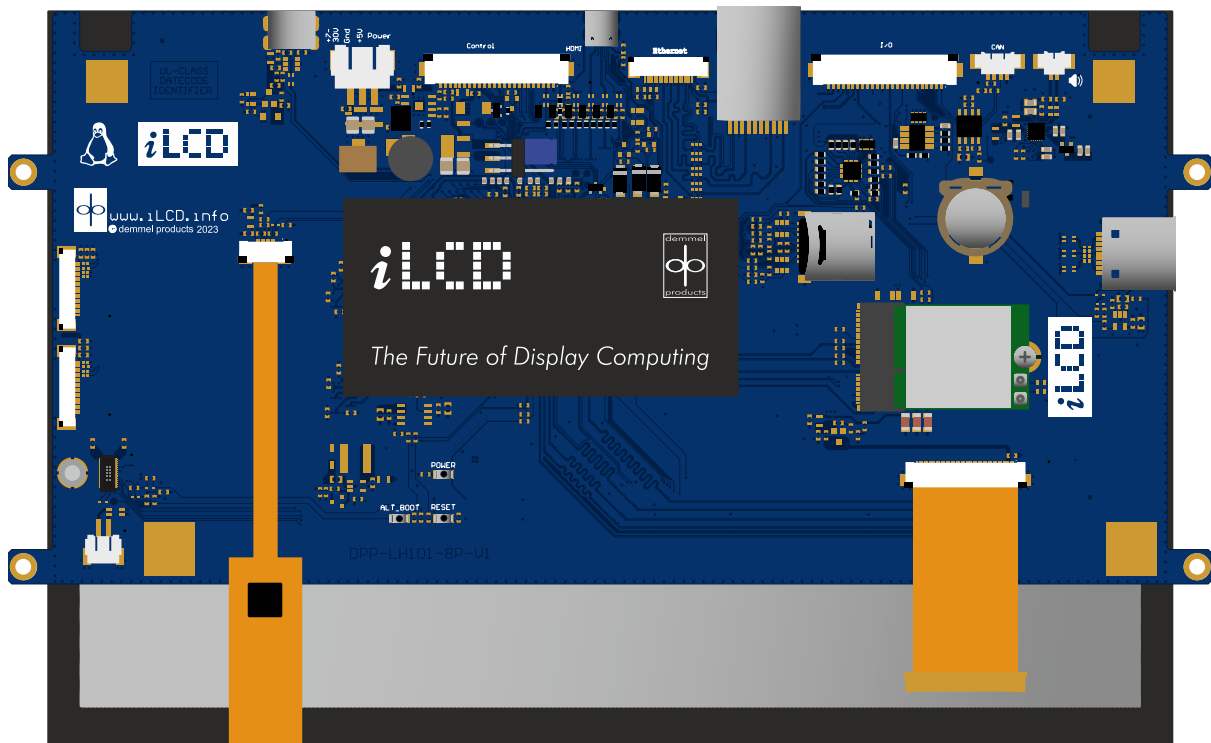
For more details on connectors shown, see [Circuit Board](#) (page 4)

### 3.1.4 Mechanical Specification



DPP-LHx70-8P dimensions in mm

### 3.2 DPP-LHC101-8P



### 3.2.1 LCD

| Item                | DPP-LHC101-8P                                |
|---------------------|--|
| Screen Size         | 10.1 inch                                    |
| Display Resolution  | 1280 × RGB × 800 dots                        |
| Active Area         | 216.96 (H) × 135.60 (V) mm                   |
| Display Mode        | Normally black / Transmissive                |
| Pixel Arrangement   | RGB-Strip                                    |
| Display Color       | 16.7 M (Display) / 64k (Controller)          |
| Backlight 1)        | 42 white LEDs, typical lifetime 50.000 hours |
| Brightness typ.     | 1000 cd/m <sup>2</sup>                       |
| Contrast ratio typ. | 1000   |
| Viewing Direction   | ALL O'clock                                  |
| Touch Screen        | PCAP 5 Fingers                               |

1) Brightness decreased to be 50% of the initial value. Life time; mean time before failure at normal temperature (25°C) and normal humidity (60%)

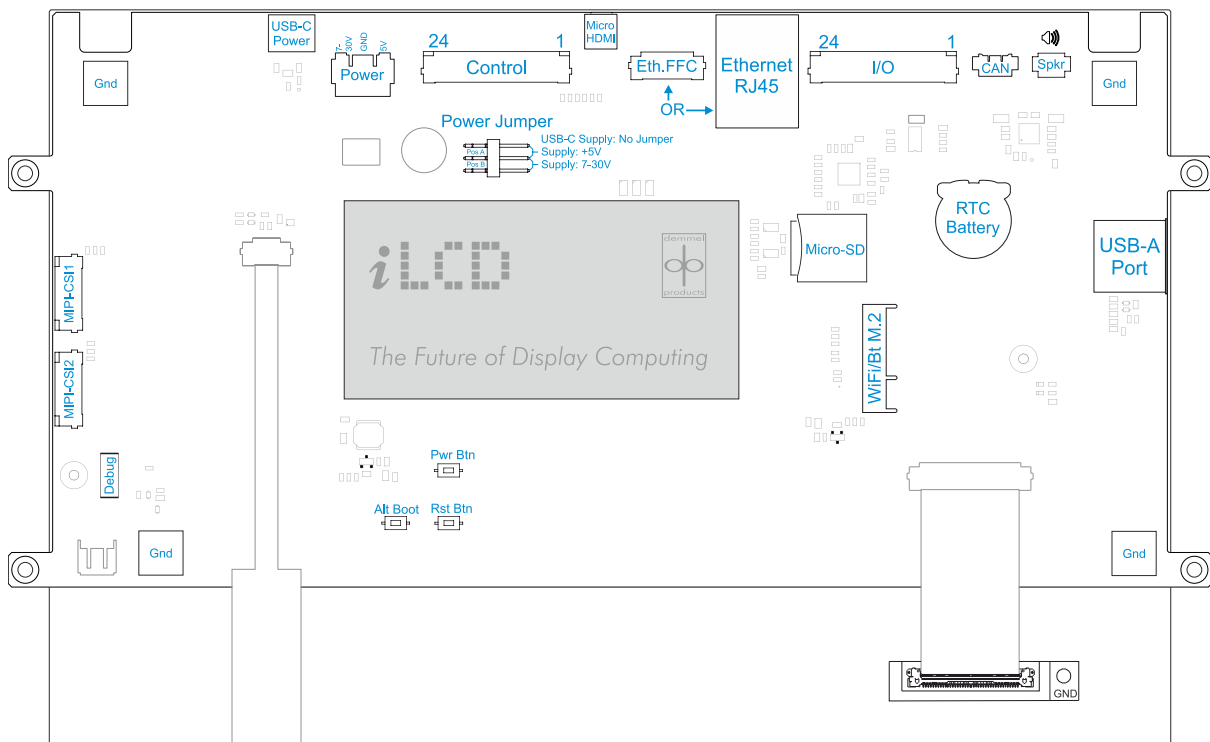
### 3.2.2 Electrical Characteristics

These specifications show the requirements regarding input voltages and currents. Minimum and maximum currents are based on the default setup of the iLCD Linux panels as they are delivered to customers. The actual current consumption may vary depending on your hardware and software configuration.

| Item   | Sym-<br>bol | Min.      | Typ.       | Max.         | Unit |
|--|-------------|-----------|------------|--------------|------|
| Supply Voltage (USB-C)                                 | VCC         | 4.5       | 5.0        | 5.25         | V    |
| Supply Voltage (Power, 5V)                             | VCC         | 4.5       | 5.0        | 5.4          | V    |
| Supply Voltage (Power, 7-30V)                          | VCC         | 6         | -          | 32           | V    |
| Input Voltage H Level 1)                               | VIH         | 2.4       | -          | 3.3          | V    |
| Input Voltage L Level 1)                               | VIL         | 0.0       | -          | 0.8          | V    |
| Output current for digital outputs                     | IOUT        |           |            | 3.5          | mA   |
| Vbatt current  | IVbatt      |           | 1          |              | μA   |
| Current consumption with display+backlight @ VCC = 5V  | ICC         | 700<br>2) | 2200<br>3) | 3000<br>4)5) | mA   |
| Current consumption with display+backlight @ VCC = 7V  | ICC         | 500<br>2) | 1600<br>3) | 2300<br>4)5) | mA   |
| Current consumption with display+backlight @ VCC = 30V | ICC         | 130<br>2) | 400 3)     | 550 4)5)     | mA   |

1) For digital inputs only 2) Backlight intensity 0,2%, CPU idle 3) Backlight intensity 100%, CPU idle 4) GPU running demanding Application 5) CPU running stress test

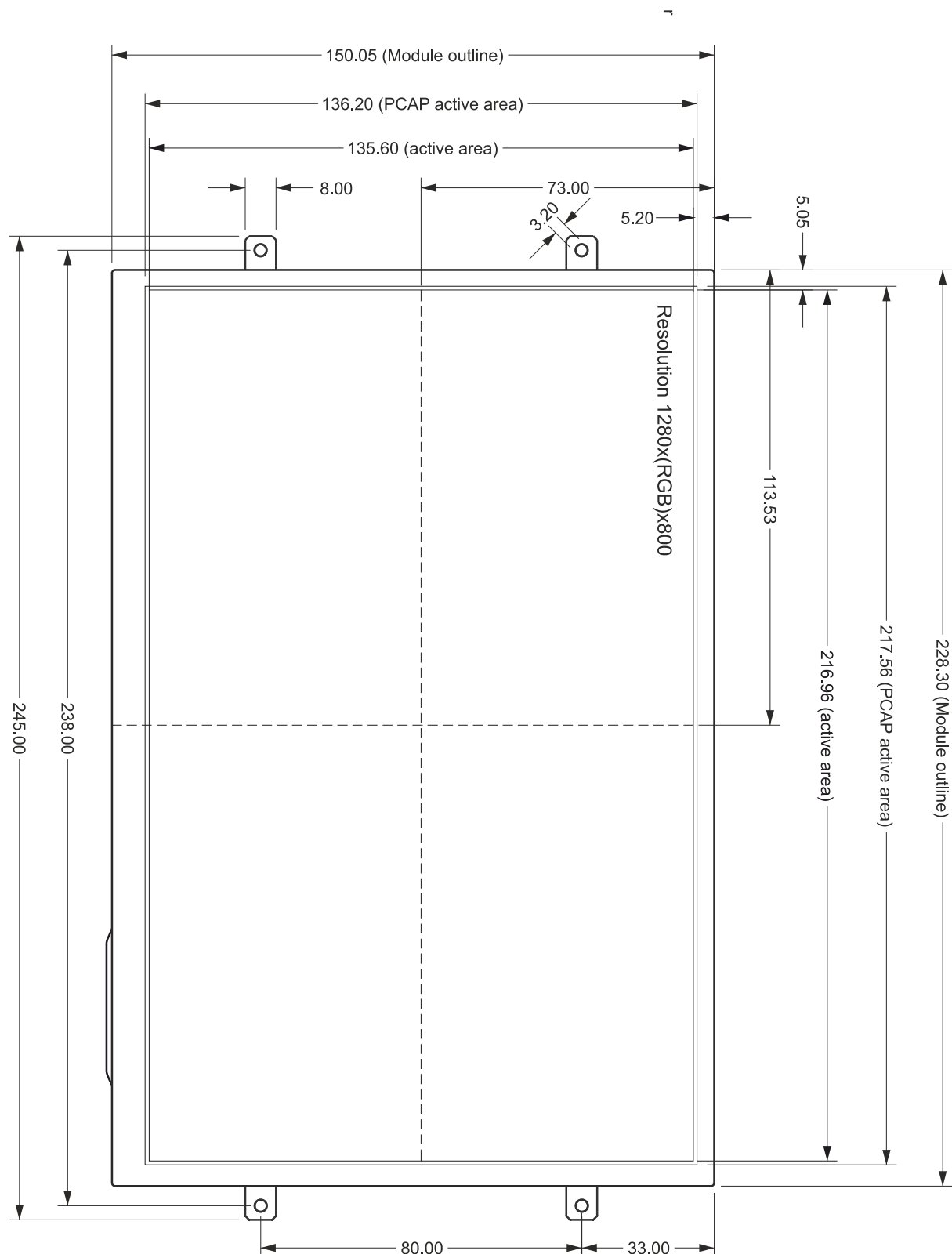
### 3.2.3 Circuit Board

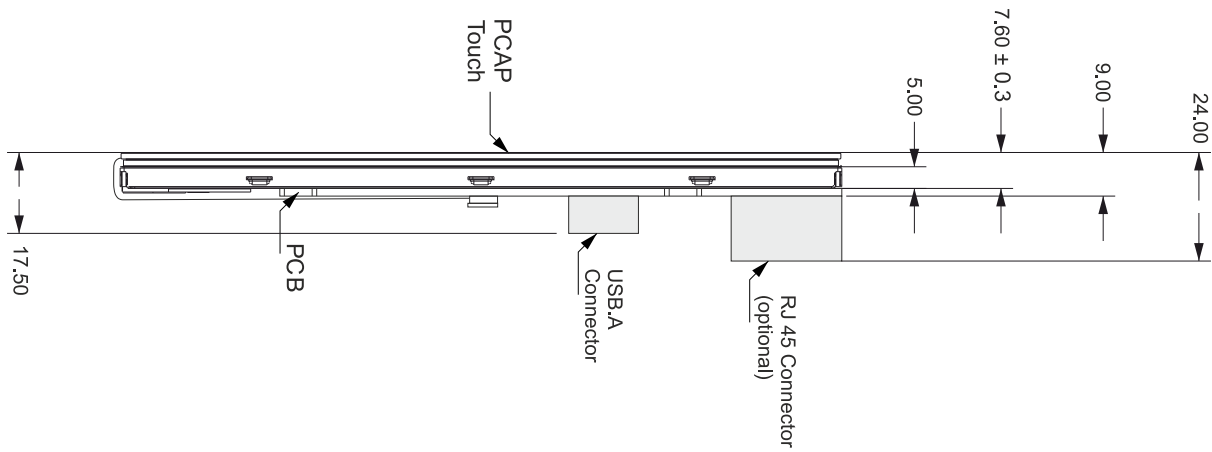


#### DPP-LHx101-8P connectors

For more details on connectors shown, see [Circuit Board](#) (page 4)

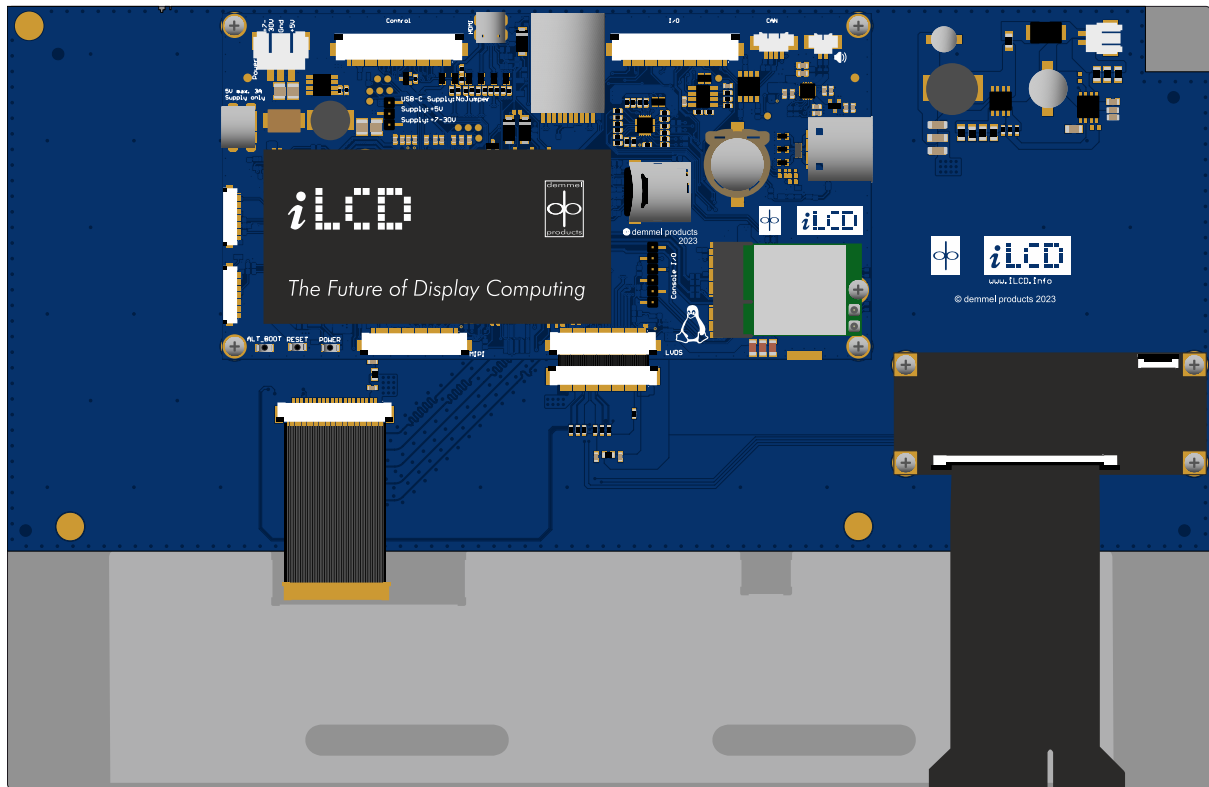
### 3.2.4 Mechanical Specification





DPP-LHx101-8P dimensions in mm

### 3.3 DPP-LHC121-8P



### 3.3.1 LCD

| Item                | DPP-LHC121-8P                             |
|---------------------|---|
| Screen Size         | 12.1 inch                                 |
| Display Resolution  | 1280 x RGB x 800 dots                     |
| Active Area         | 261.12 (H) x 163.20 (V) mm                |
| Display Mode        | Normally black / Transmissive             |
| Pixel Arrangement   | 1P2D                                      |
| Display Color       | 16.7 M (Display) / 64k (Controller)       |
| Backlight 1)        | white LEDs, typical lifetime 50.000 hours |
| Brightness typ.     | 1000 cd/m <sup>2</sup>                    |
| Contrast ratio typ. | 1200                                      |
| Viewing Direction   | ALL O'clock                               |
| Touch Screen        | PCAP 5 Fingers                            |

1) Brightness decreased to be 50% of the initial value. Life time; mean time before failure at normal temperature (25°C) and normal humidity (60%)

### 3.3.2 Electrical Characteristics

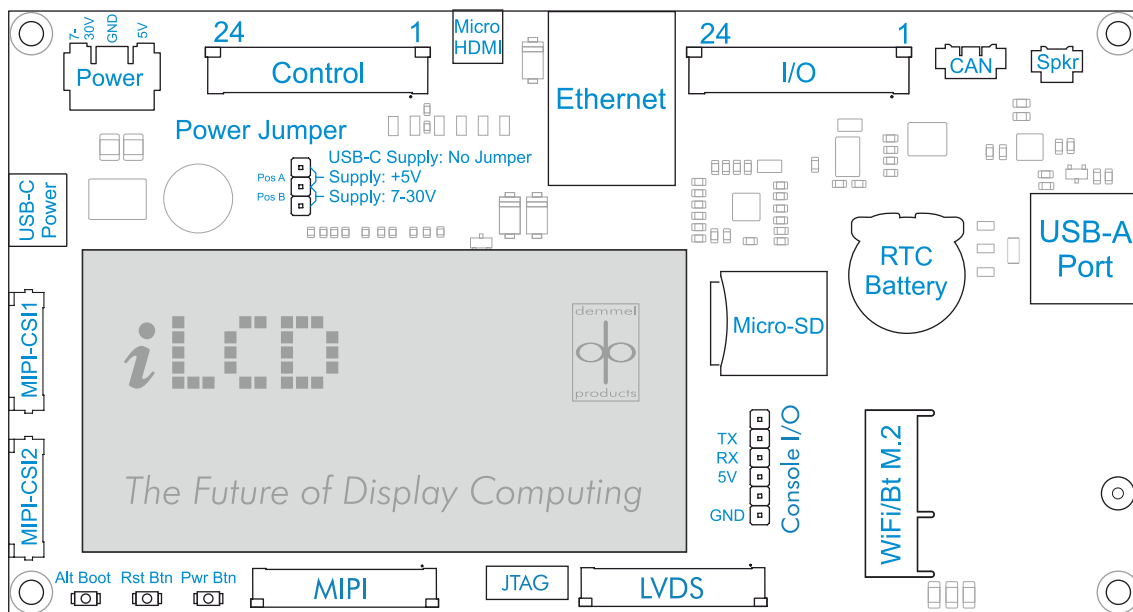
These specifications show the requirements regarding input voltages and currents. Minimum and maximum currents are based on the default setup of the iLCD Linux panels as they are delivered to customers. The actual current consumption may vary depending on your hardware and software configuration.

**Danger:** The DPP-LHx121-8P and larger models do not work under 10V. This due to the current requirements of the backlight.

| Item   | Sym-<br>bol | Min.      | Typ.       | Max.         | Unit |
|--|-------------|-----------|------------|--------------|------|
| Supply Voltage (USB-C)                                 | VCC         | -         | -          | -            | V    |
| Supply Voltage (Power, 5V)                             | VCC         | -         | -          | -            | V    |
| Supply Voltage (Power, 7-30V)                          | VCC         | 10        | -          | 32           | V    |
| Input Voltage H Level 1)                               | VIH         | 2.4       | -          | 3.3          | V    |
| Input Voltage L Level 1)                               | VIL         | 0.0       | -          | 0.8          | V    |
| Output current for digital outputs                     | IOUT        |           |            | 3.5          | mA   |
| Vbatt current  | IVbatt      |           | 1          |              | μA   |
| Current consumption with display+backlight @ VCC = 5V  | ICC         | -         | -          | -            | mA   |
| Current consumption with display+backlight @ VCC = 10V | ICC         | 500<br>2) | 1700<br>3) | 2300<br>4)5) | mA   |
| Current consumption with display+backlight @ VCC = 30V | ICC         | 180<br>2) | 600 3)     | 600 4)5)     | mA   |

1) For digital inputs only 2) Backlight intensity 0,2%, CPU idle 3) Backlight intensity 100%, CPU idle 4) GPU running demanding Application 5) CPU running stress test

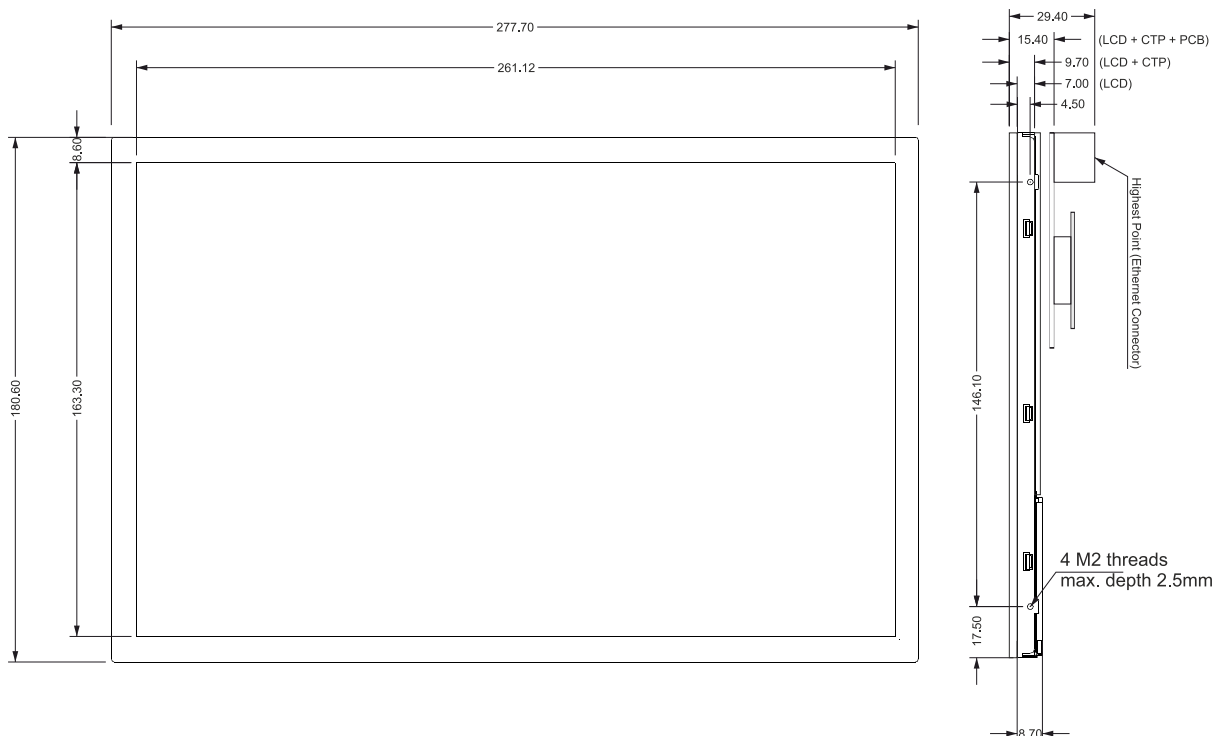
### 3.3.3 Circuit Board



#### DPP-LHx121-8P connectors

For more details on connectors shown, see [Circuit Board](#) (page 4)

### 3.3.4 Mechanical Specification



#### DPP-LHx121-8P dimensions in mm