Technical Specification
iLCD Linux

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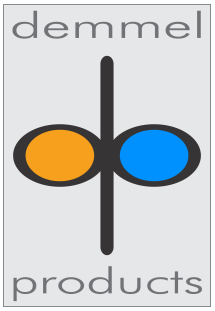


iLCD Linux Specification

Version 1.0

Mar 18, 2024

Contents

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 or via +43-1-689470-0

Part 1

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 I²C	
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	
I²C	5x I²C	
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 I²C	
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

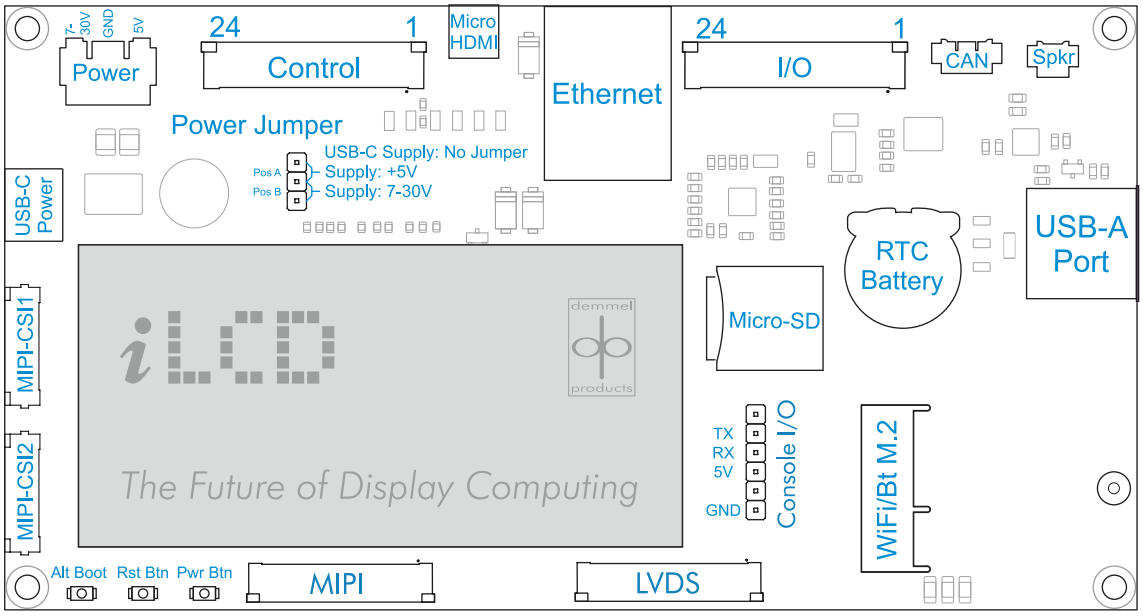
Notes:

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 (Power Jumper)] 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.

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. 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

continues on next page

Table 1 – continued from previous page

Pin#	PinName	Primary Function Description
18	LVDS CLK P	Differential Pair for clock line transmission to the display
19	GND	
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	I²C interface for PCAP – clock
24	LCDS PCAP SDA	I²C interface for PCAP – data
25	GND	
26	LCDS PCAP INT	I²C interface for PCAP – interrupt
27	LCDS PCAP RES	I²C Interface for PCAP – reset 3)
28	GND	
29	SYS SCL	Backup I²C interface – clock 4)
30	SYS SDA	Backup I²C 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 I²C 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)

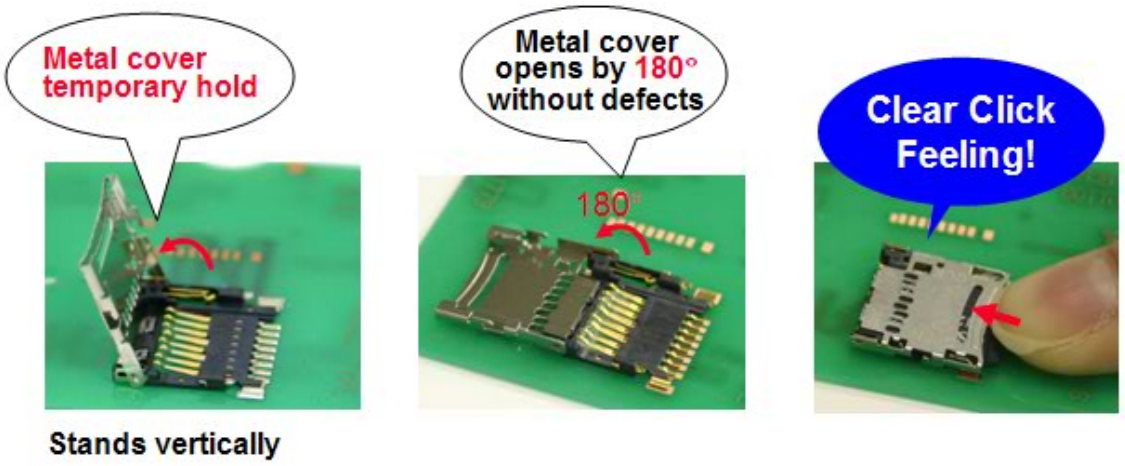
This is the controller area network connector. A cable with a matching plastic connector is available from demmel products. See DPA-C-CAN on our accessories page for more details.

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.

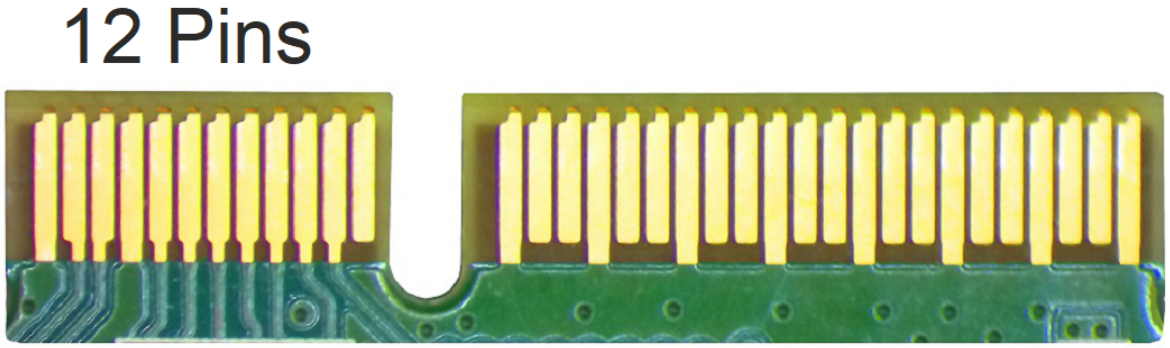
1.3.12 MicroSD Connector (Micro-SD)

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.



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 pagefor more details.

1.3.16 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.

1.3.17 Power Button (Pwr Btn)

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

1.3.18 Reset Button (Rst Btn)

This push button causes the panel to reboot.

1.3.19 Alternative Boot Button (Alt Boot)

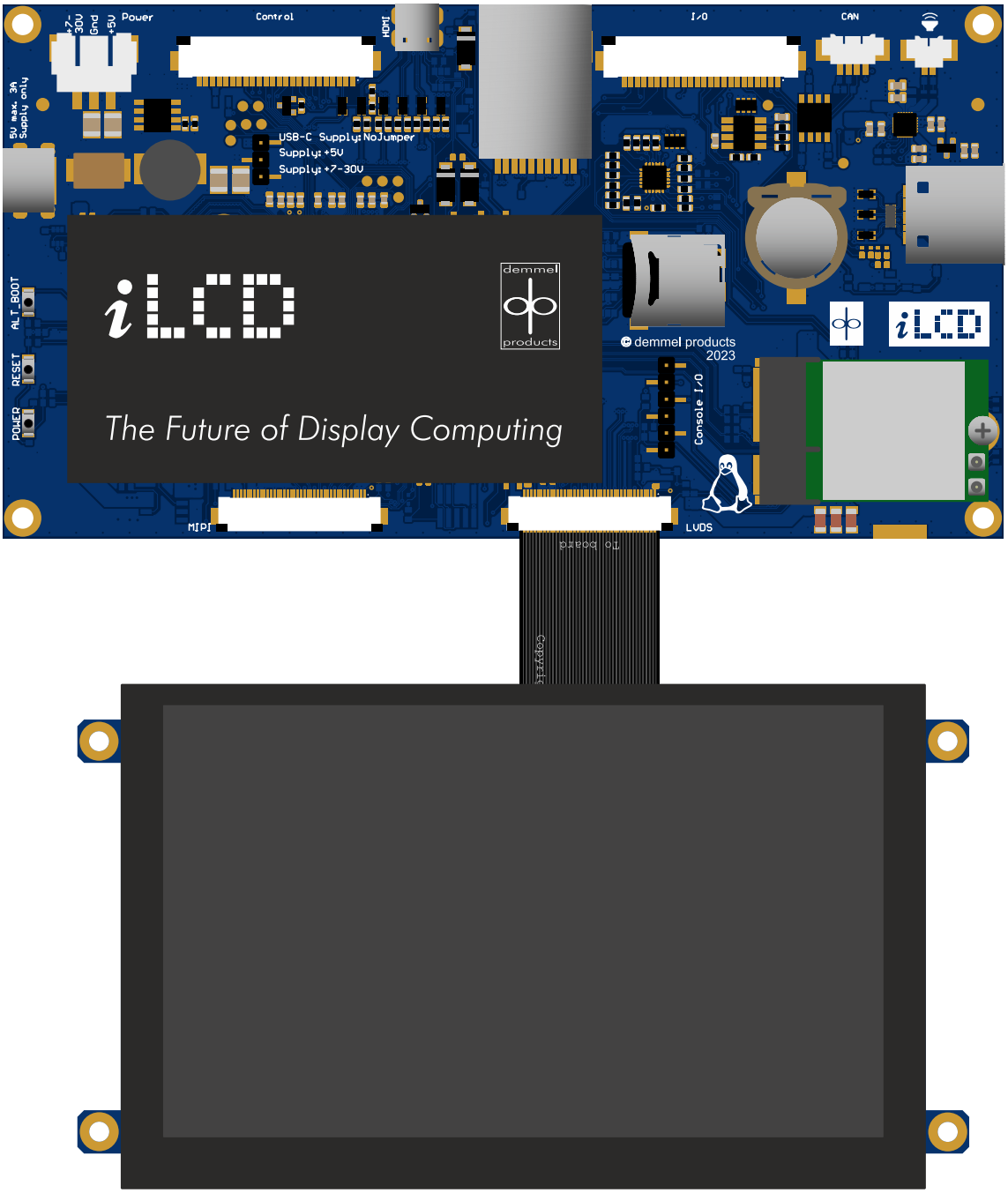
Holding this button down during boot-up causes the processor to boot from the SD card rather than from eMMC.

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

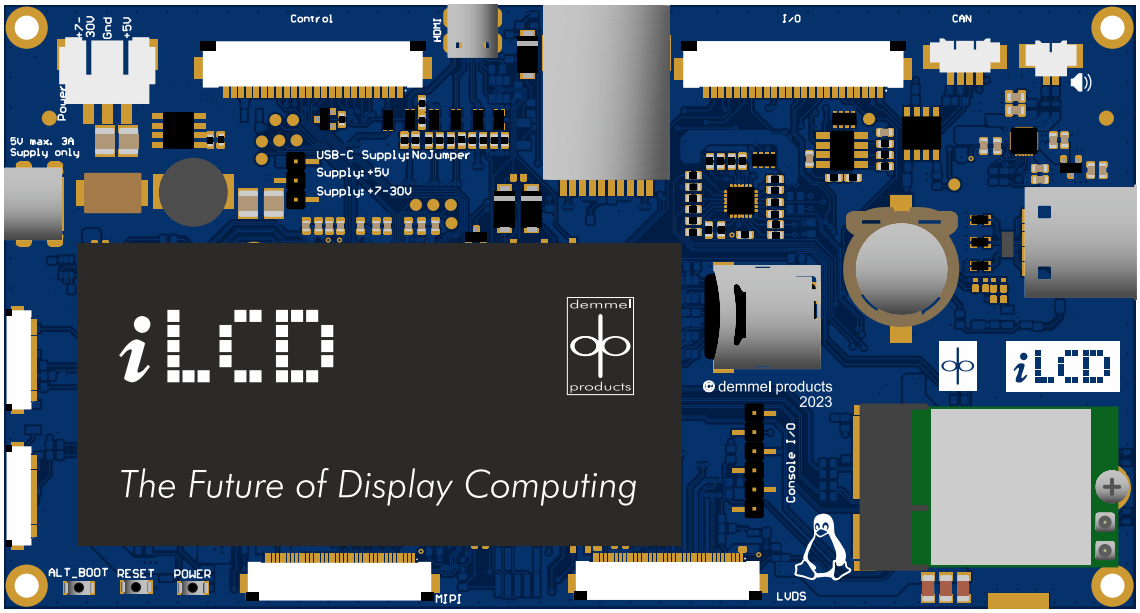
Mainboard

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 Mainboard (i.MX8M Plus)



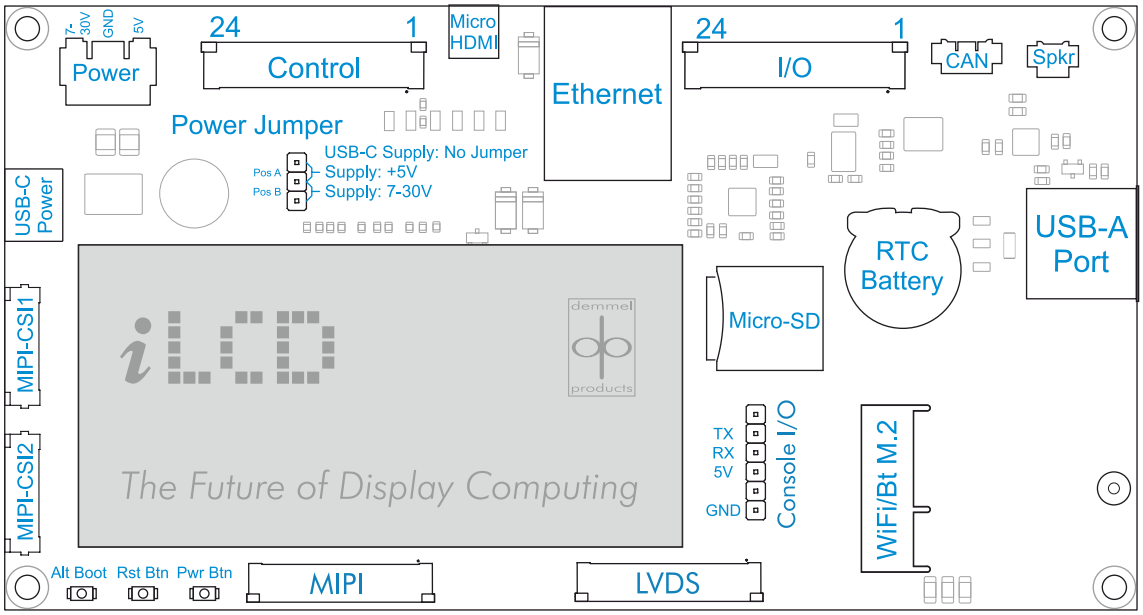
2.1.1 Electrical Characteristics

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

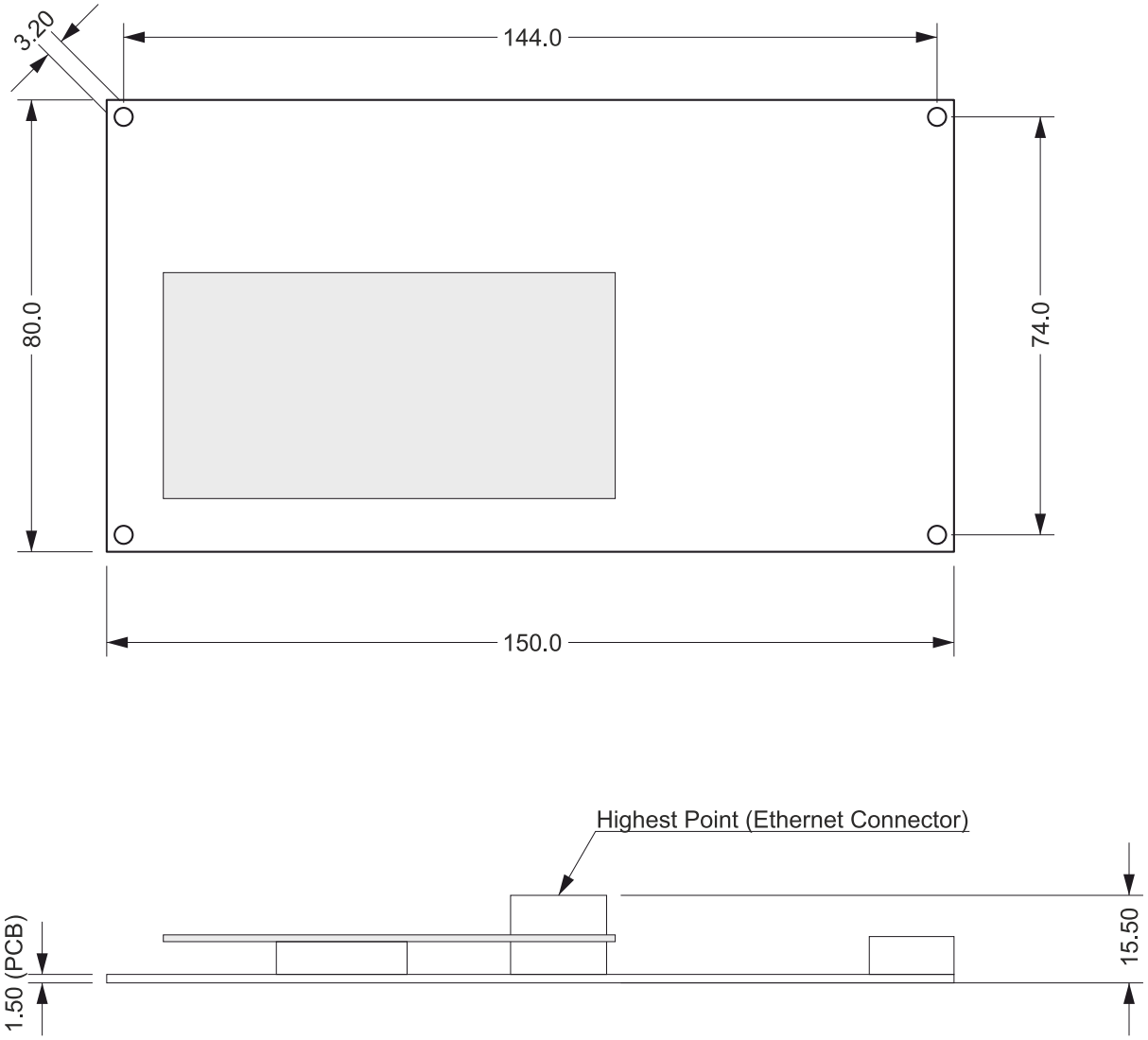
2.1.2 Circuit Board



Linux Mainboard connectors

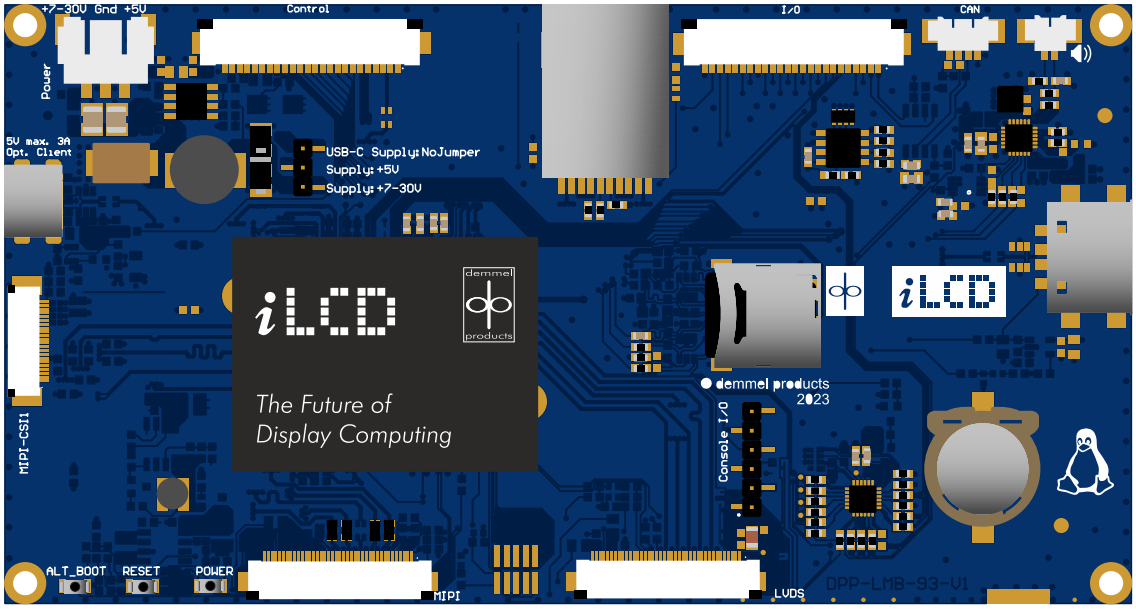
For more details on connectors shown, see *Circuit Board* (page 4)

2.1.3 Mechanical Specification



Linux Mainboard dimensions in mm

2.2 Mainboard (i.MX93)



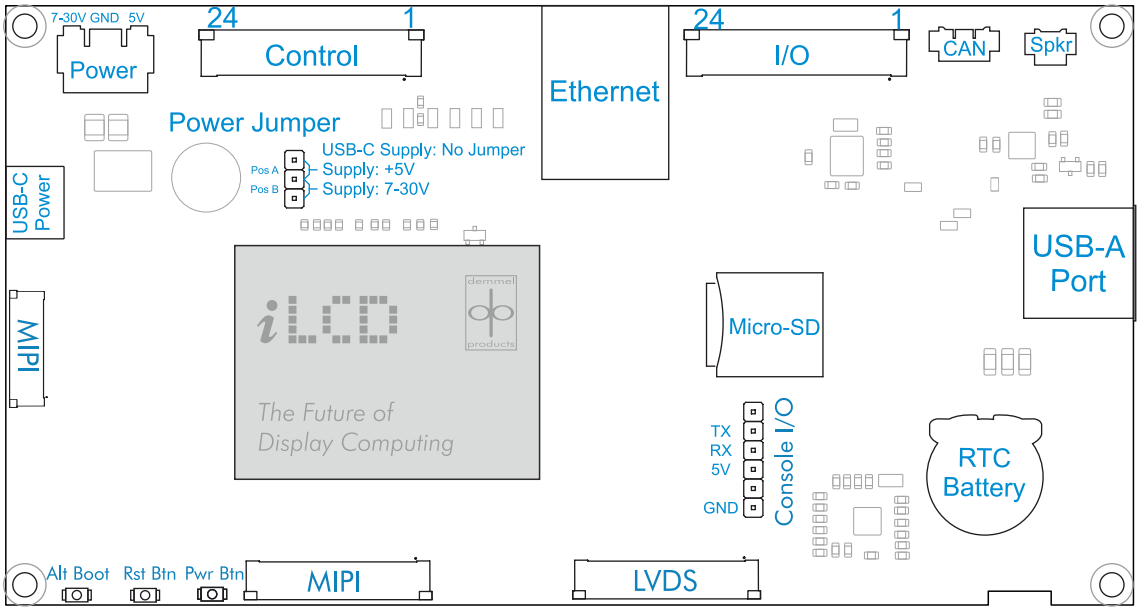
2.2.1 Electrical Characteristics

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

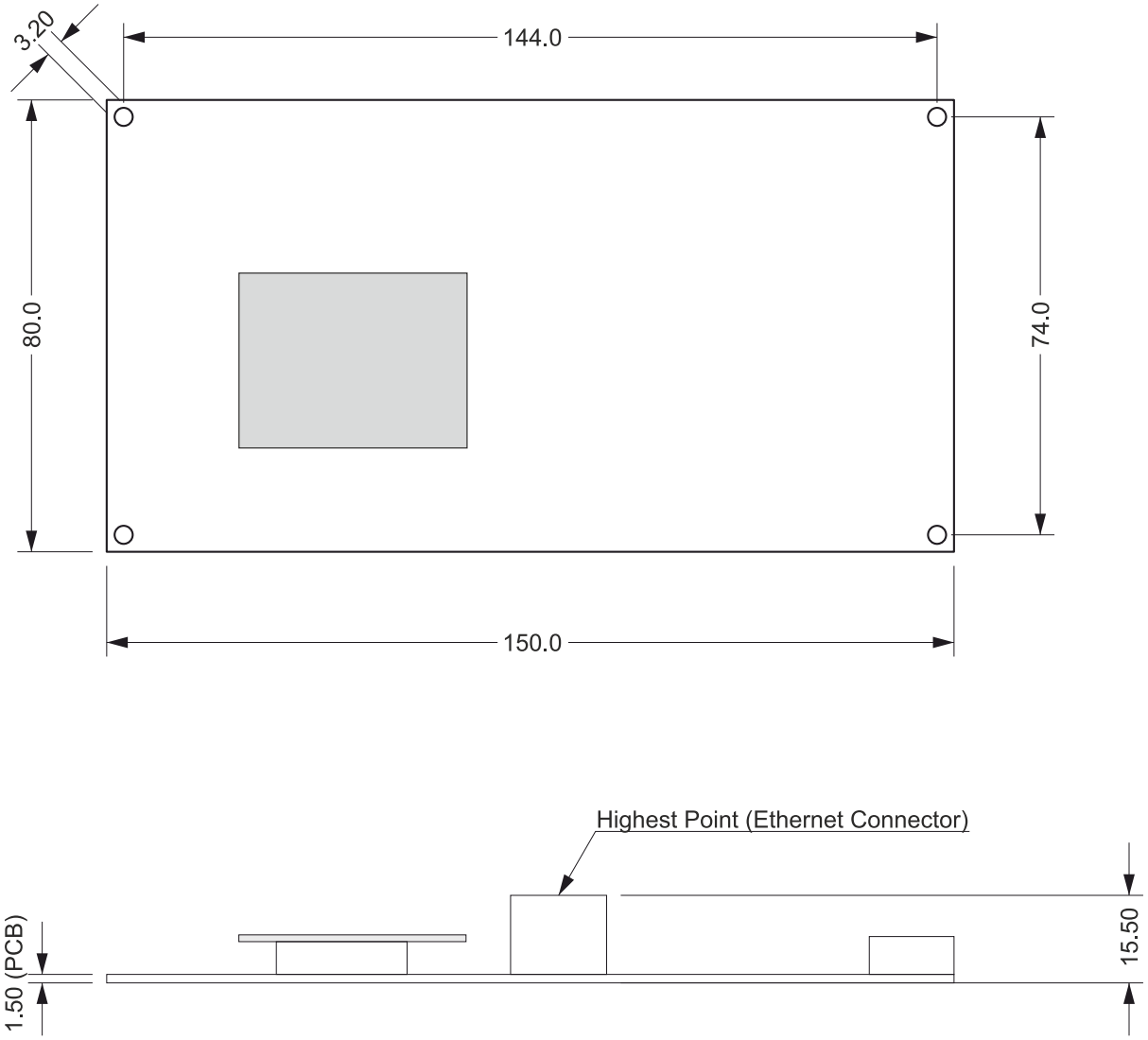
Notes: 1) For digital inputs only 2) Demanding Application running

2.2.2 Circuit Board



For more details on connectors shown, see *Circuit Board* (page 4)

2.2.3 Mechanical Specification

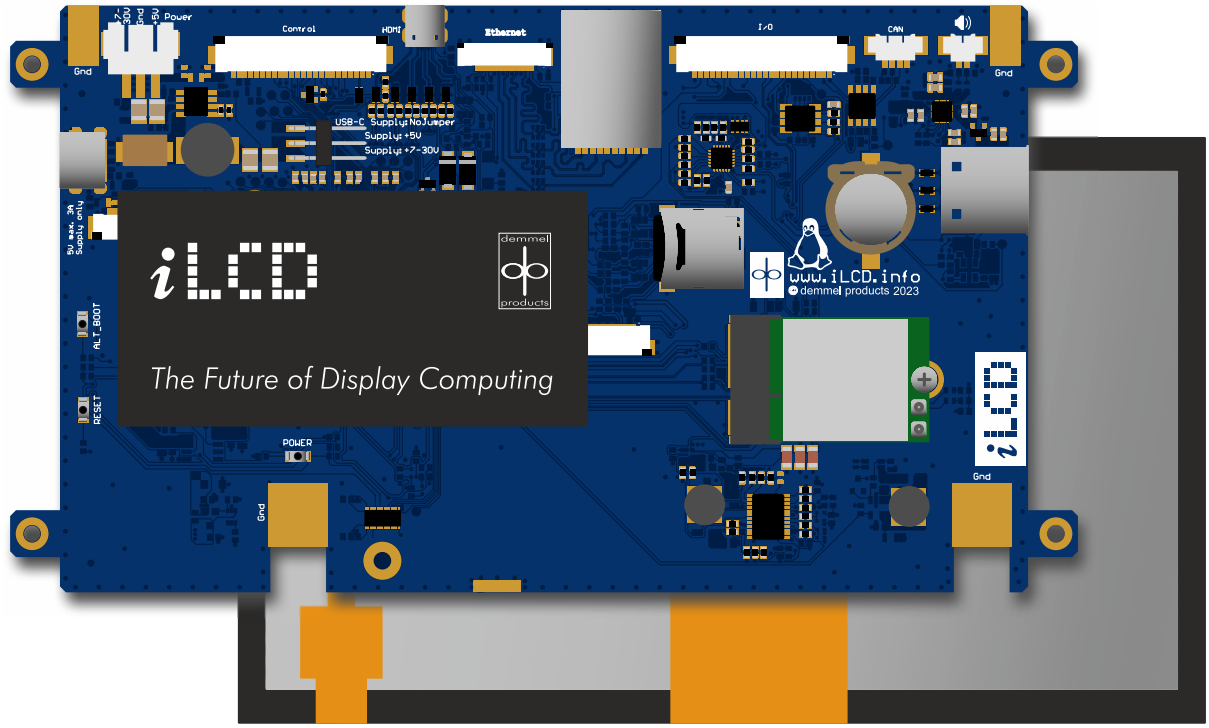


Linux Mainboard dimensions in mm

Part 3

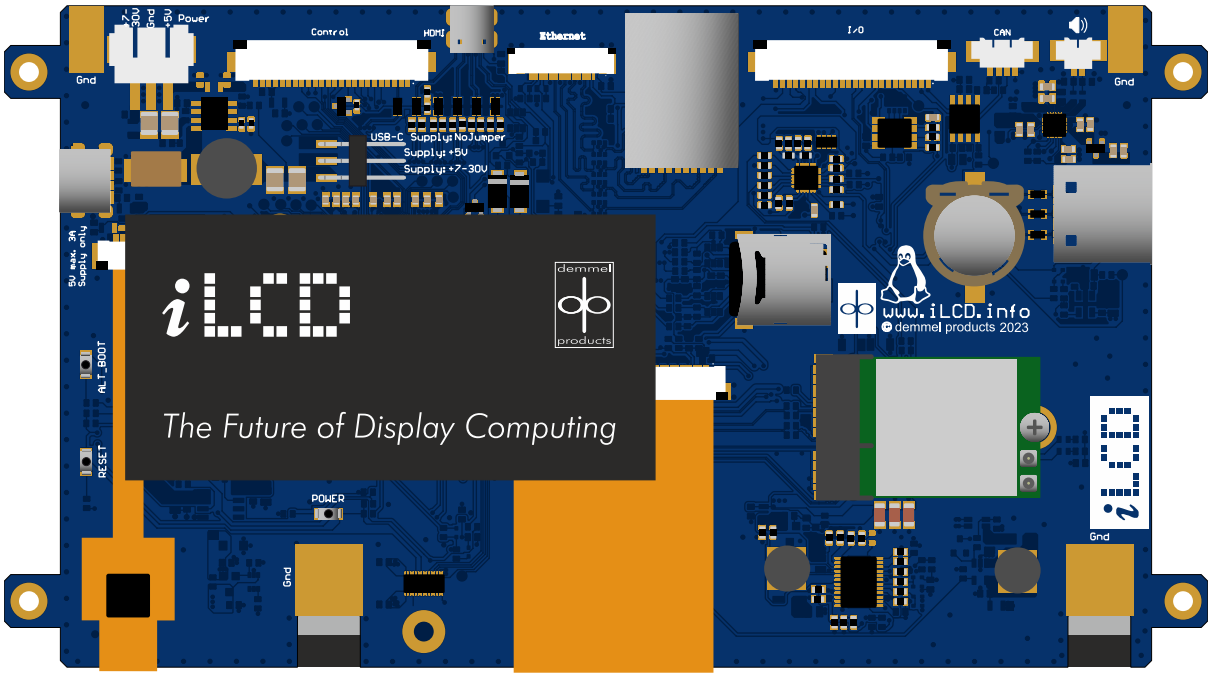
Bonded Solution

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%)

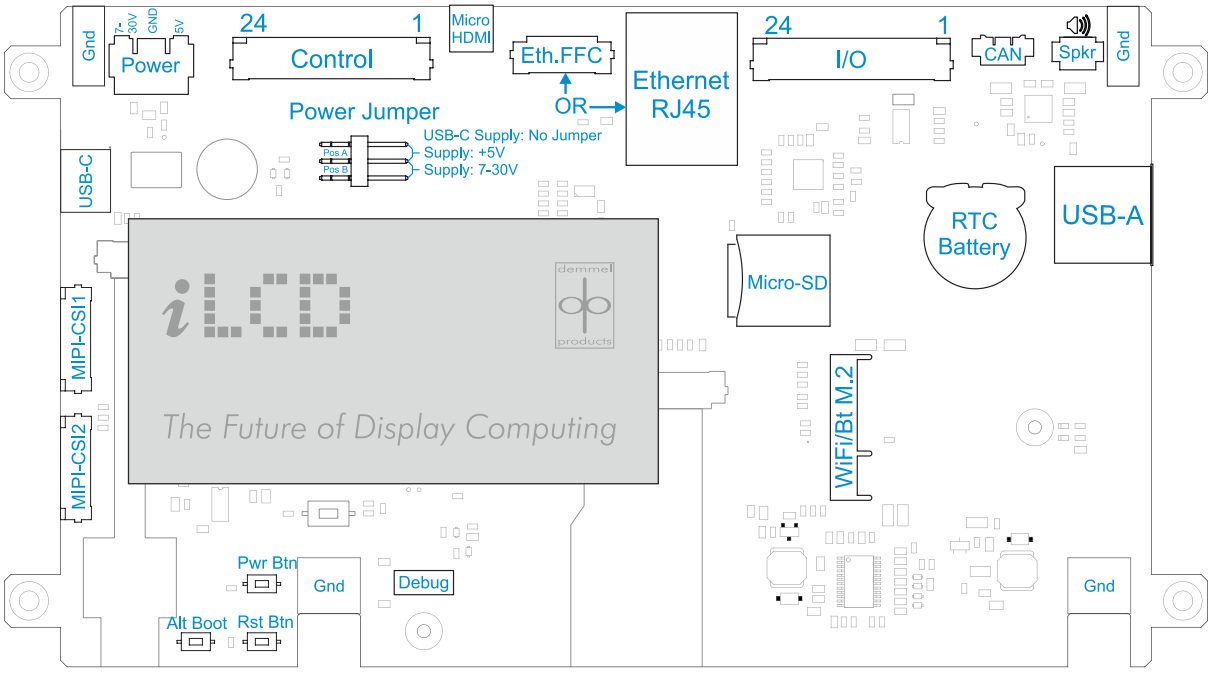
3.1.2 Electrical Characteristics

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-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 2)	1000 3)	1750 4)5)	mA
Current consumption with display+backlight @ VCC = 7V	ICC	400 2)	750 3)	1400 4)5)	mA
Current consumption with display+backlight @ VCC = 30V	ICC	100 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

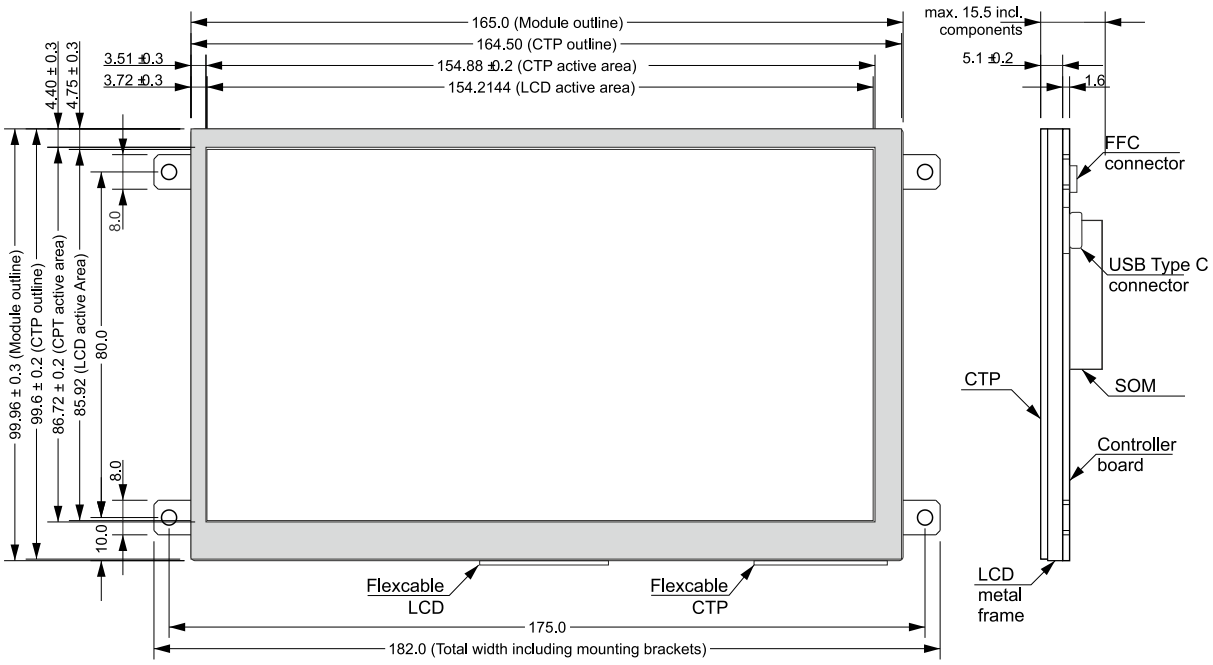
3.1.3 Circuit Board



DPP-LHx70-8P connectors

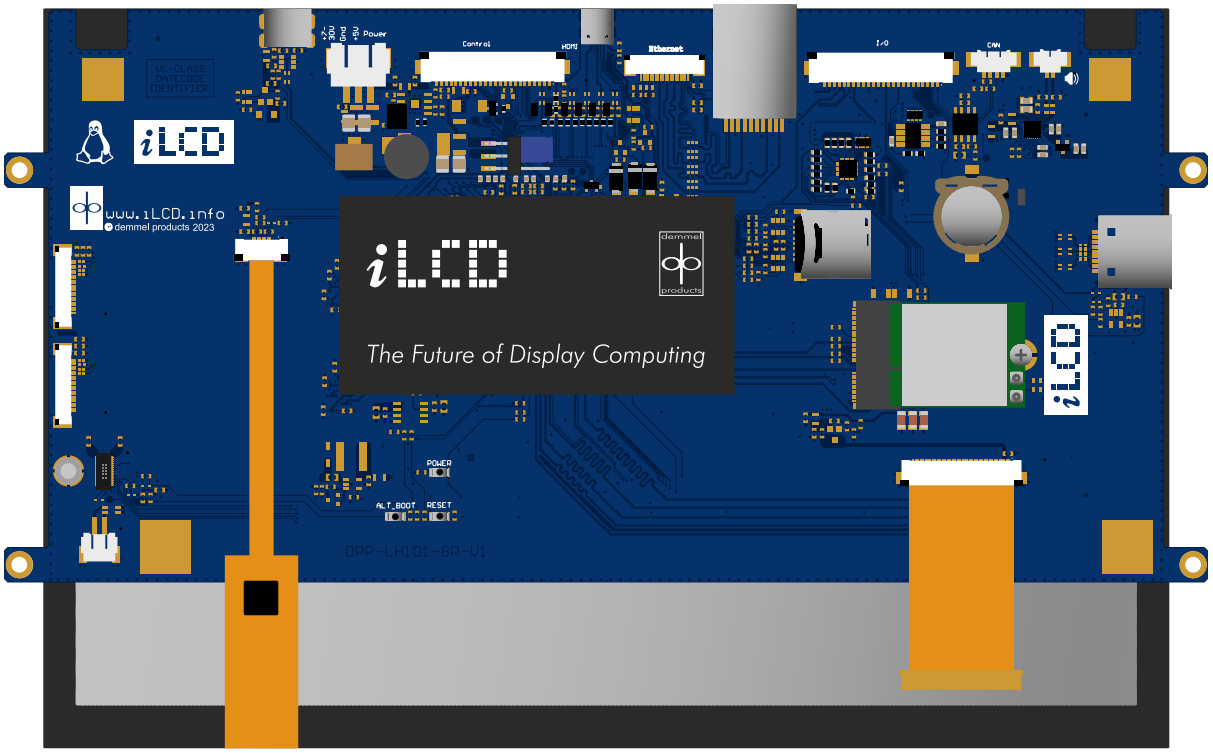
For more details on connectors shown, see *Circuit Board* (page 4)

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 x RGB x 800 dots
Active Area	216.96 (H) x 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/m2
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%)

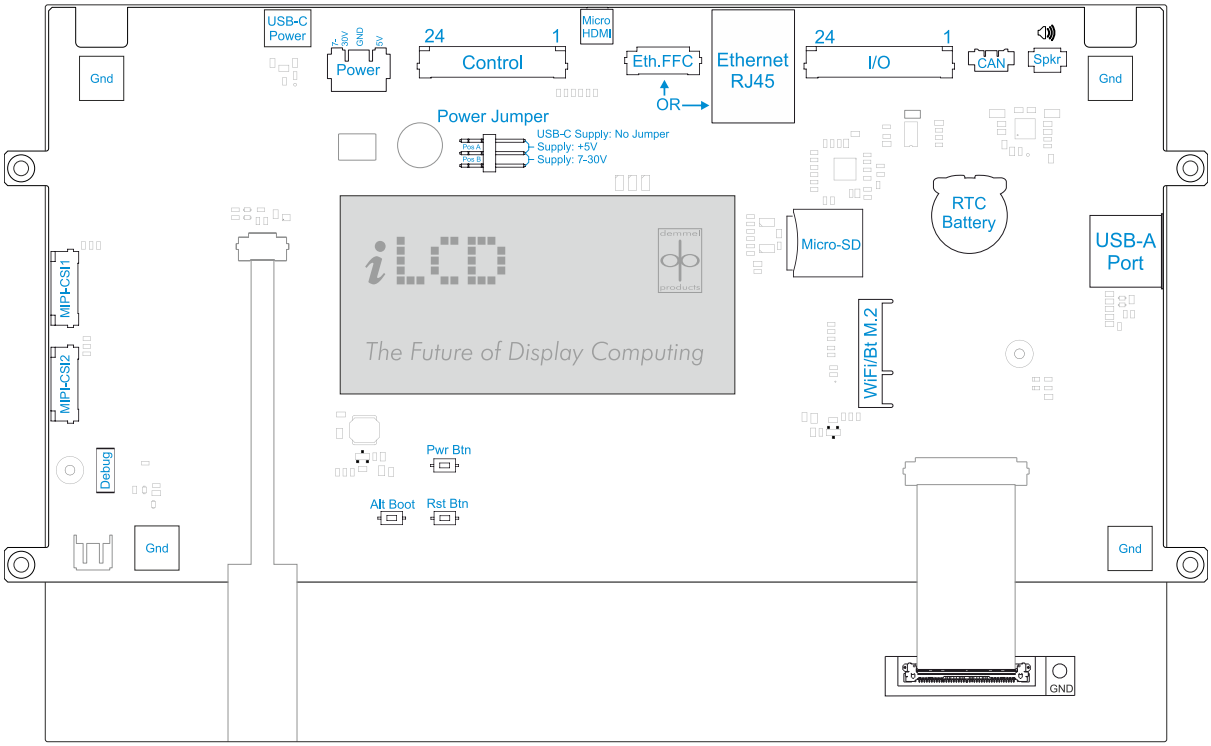
3.2.2 Electrical Characteristics

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-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 2)	2200 3)	3000 4)5)	mA
Current consumption with display+backlight @ VCC = 7V	ICC	500 2)	1600 3)	2300 4)5)	mA
Current consumption with display+backlight @ VCC = 30V	ICC	130 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

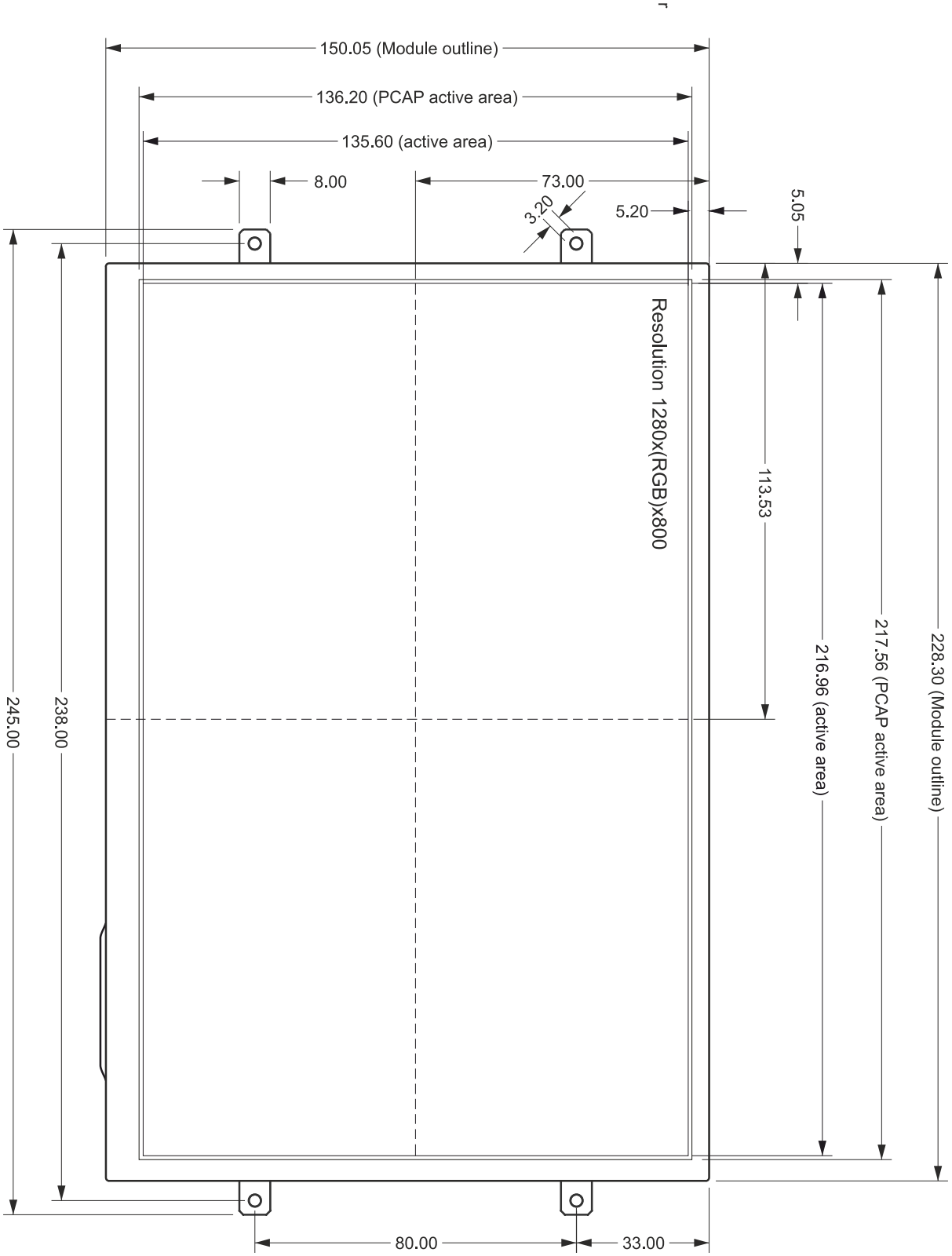
3.2.3 Circuit Board

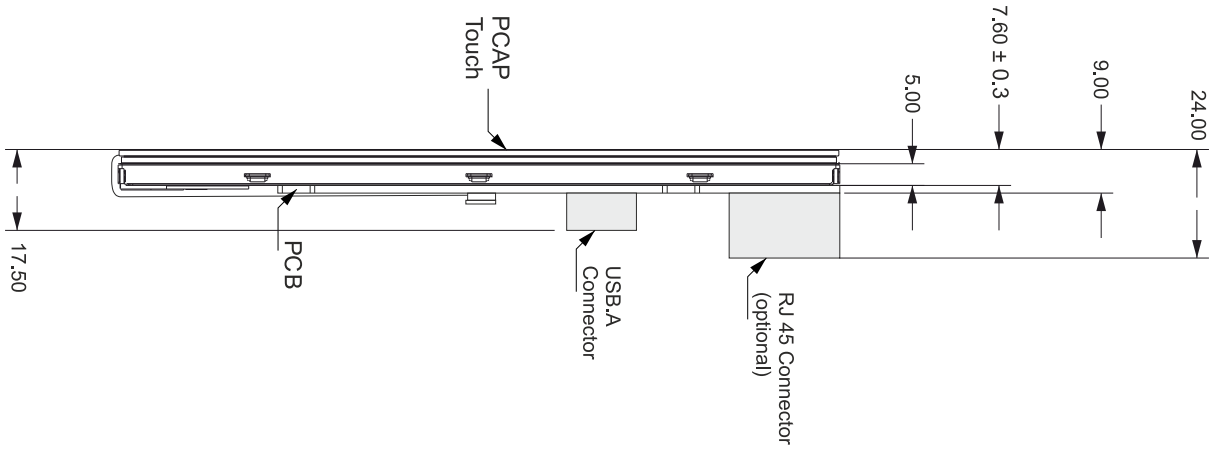


DPP-LHx101-8P connectors

For more details on connectors shown, see *Circuit Board* (page 4)

3.2.4 Mechanical Specification





DPP-LHx101-8P dimensions in mm