



Next Generation Intelligent LCDs

Technical Specification

DPP-LHC70-iMX
iLCD Linux Accessories

Version 1.2
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DPP-LHC70-iMX

LCD

Item	DPP-LHC70-iMX
Screen Size	7.0 inch
Display Resolution	1024 x RGB x 600 dots
Active Area	154.21 (H) x 85.92 (V) mm ²
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/m ²
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%)

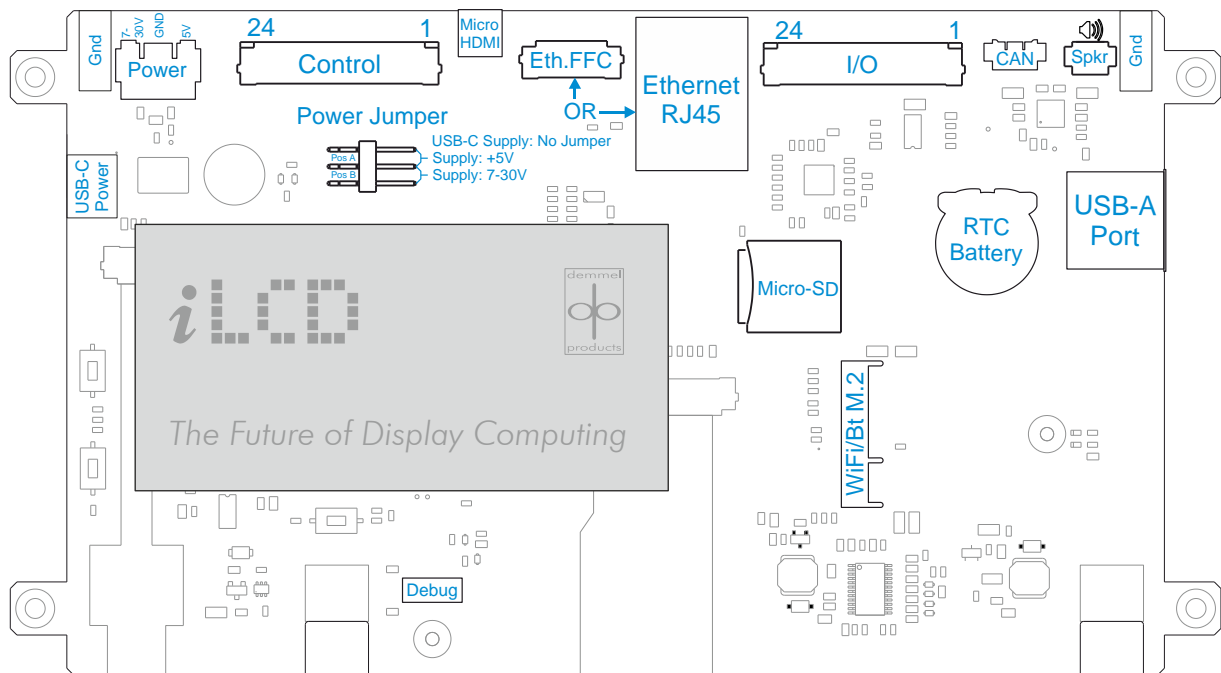
Electrical Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage (USB-C)	V _{CC}	4.5	5.0	5.25	V
Supply Voltage (Power, 5V)	V _{CC}	4.5	5.0	5.4	V
Supply Voltage (Power, 7-30V)	V _{CC}	6	-	32	V
Input Voltage H Level ¹⁾	V _{IH}	2.4	-	3.3	V
Input Voltage L Level ¹⁾	V _{IL}	0.0	-	0.8	V
Output current for digital outputs	I _{OUT}			3.5	mA
Vbatt current	I _{Vbatt}		1		μA
Current consumption display on, backlight off @ V _{CC} = 5V ²⁾³⁾	I _{CC}		750		mA
Current consumption with display+backlight @ V _{CC} = 5V ²⁾³⁾⁴⁾⁵⁾	I _{CC}		1300	1600	mA
Current consumption with display+backlight @ V _{CC} = 7V ²⁾³⁾⁴⁾⁵⁾	I _{CC}		1000	1200	mA
Current consumption with display+backlight @ V _{CC} = 30V ²⁾³⁾⁴⁾⁵⁾	I _{CC}		250	300	mA

Notes:

- ¹⁾ For digital inputs only
²⁾ No I/O ports active
³⁾ All pixel set to white color
⁴⁾ Backlight intensity 100%
⁵⁾ Demanding Application running

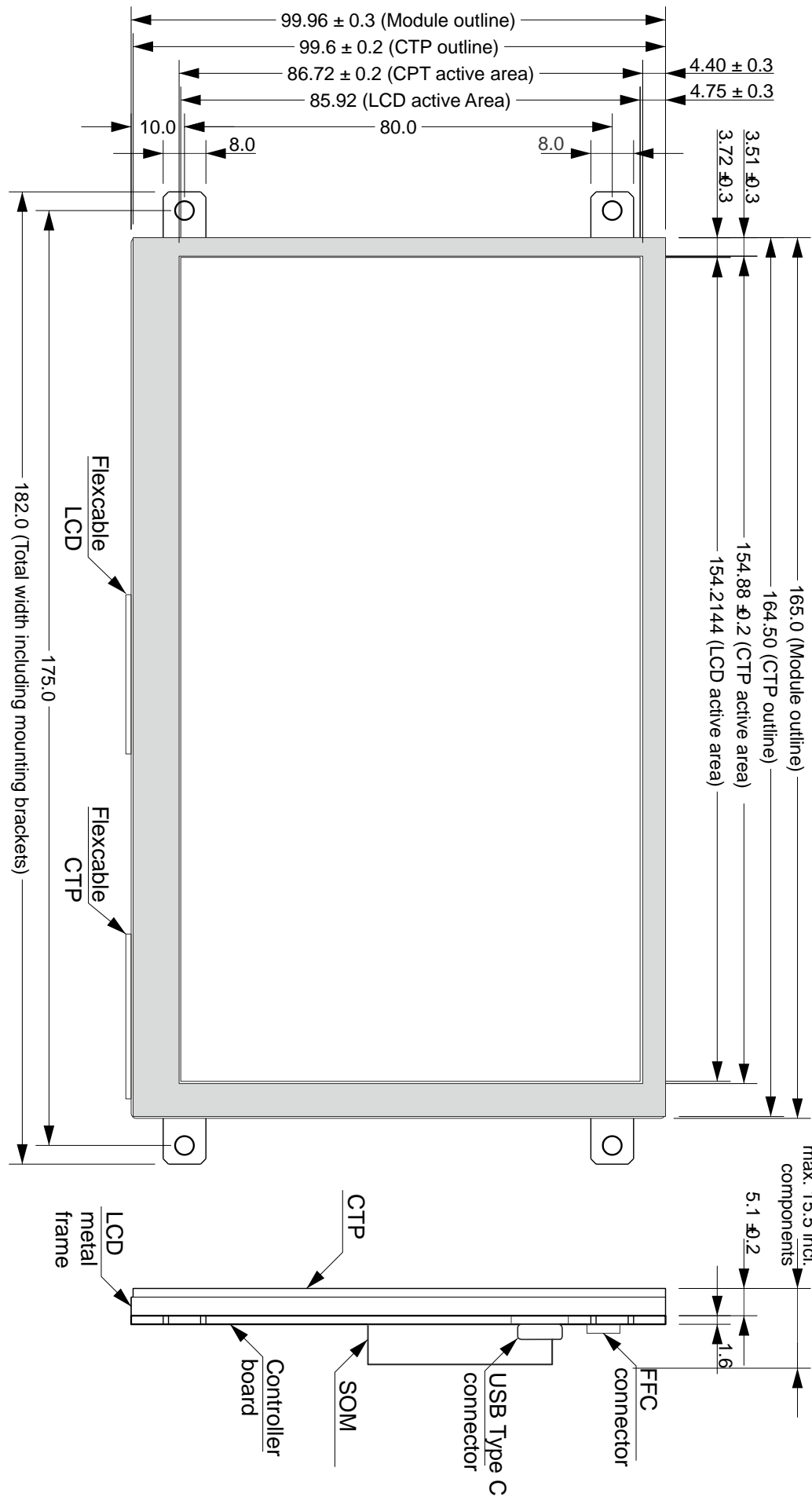
Circuit Board



DPP-LHC70-iMX connections (view from PCB side), see Module Function Description

Mechanical Specification

Item	DPP-LHC70-iMX	Unit
Module Dimension (without mounting brackets)	160.0 x 99.96±0.3	mm
Module Dimension (incl. mounting brackets)	182.0 x 99.96±0.3	mm
Total Module Thickness	15.5	mm



Memory

Item	Properties	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 ² C	
External Memory	Micro SD socket	
RTC	ultra-low-power AM1805 real time clock	

Connectivity

Item	Properties	Additional Options
USB	USB 3.0 (Type A) host	USB 2.0 (Type C) device (next release)
Ethernet	10/100/1000 Mbit/s	
Serial	UART	

Maximum Ratings & Power Supply

Item	Symbol	Minimum	Maximum	Unit
Supply Voltage	V _{CC}	-0.3	5.5	V
Input Voltage	V _{IN}	-0.3	3.3	V
Operating Temperature ¹⁾	T _{OPR}	0 ³⁾	70	°C
Storage Temperature	T _{STR}	-40	85	°C
Humidity ²⁾		10	90	%RH

Notes:

- ¹⁾ Lifetime of backlight LEDs will be decreased for temperatures $\geq 50^{\circ}\text{C}$
- ²⁾ Temp. $\leq 60^{\circ}\text{C}$, 90% RH MAX.
Temp. $\geq 60^{\circ}\text{C}$, absolute humidity shall be less than 90% RH at 60°C
- ³⁾ Optionally -20°C

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 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.

Note: The mounting brackets on the iLCD panels are also connected with the PCB's GND plane.

Module Function Description

Power Connector (Power)

The iLCD panels can either be supplied via USB-C or the Power Connector. In order to select a supply voltage, 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. See Accessories for more information.

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

WARNING! Only one voltage source may be connected at any given time. Incorrect power supply connections will cause module damage.

USB-C Port (USB-C Power)

This port is solely for powering the iLCD Linux panel. When using this function please ensure the power supply matches the required current requirements of the board. In our next release this port will be configurable as a USB device.

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 or to supply power using the Control connector. 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.



WARNING! Deviation from the settings described may lead to module damage.

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, we are 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 previous 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_SSO	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

Note:

- 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

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, we are 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 previous 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

Note:

¹⁾ This function is only available when CAN bus is not in use.

²⁾ This function is only available when the HDMI port is not in use.

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.

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-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 inadequate force

CAN-Bus Port (CAN)

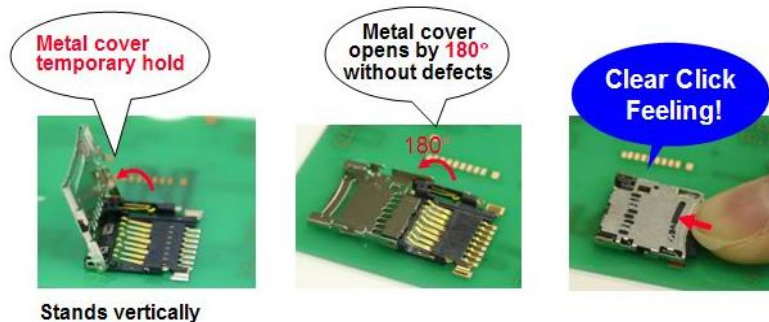
This is the controller area network connector. A cable with a matching plastic connector is available from demmel products. See DPA-C-CAN for more details.

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.

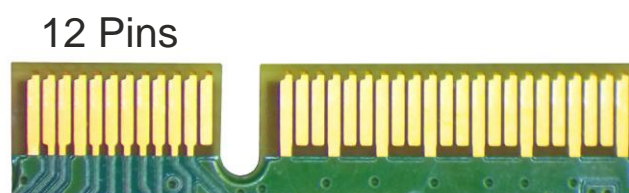
MicroSD Connector (Micro-SD)

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.



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. The M.2 connector so far has only been tested with the AX200.



M.2 Key-E Connector

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 for more details.

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.

Accessories

DPA-C-PWR

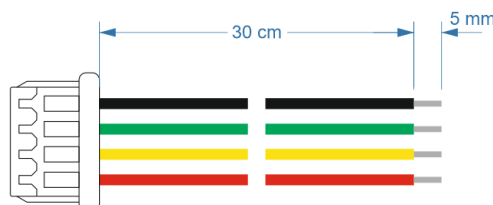
This custom-made JST XHP-3 equivalent connector fits the power connector on the iLCD Linux modules. Please contact us for custom lengths. The cables themselves are 22 AWG.



demmel products power connector (DPA-C-PWR)

DPA-C-CAN

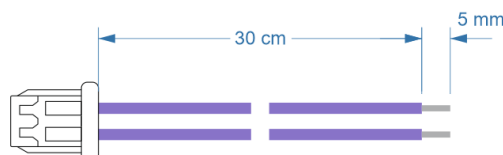
This custom-made Molex 53261-0471 connector fits the CAN connector on the iLCD Linux modules. The cable color coding conforms to the regular CAN-Bus standard. The cables themselves are 28 AWG.



demmel products CAN connector (DPA-C-CAN)

DPA-C-SPKR

This custom-made Molex 53261-0271 connector fits the audio connector on the iLCD Linux modules. The two purple wires can be connected to any 4 to 8 Ohm speaker. The cables themselves are 28 AWG.



demmel products speaker connector (DPA-C-SPKR)

DPA-AX200

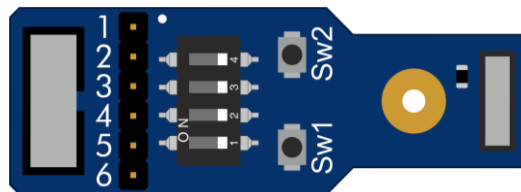
This third party module can be purchased from demmel products for convenience. It uses Intel's AX200 chip and is capable of WiFi 6 at both 2.4 and 5GHz and Bluetooth 5.0. It connects to the panel via the M.2 Key E standard. The screw needed to fasten the module to the iLCD panel as well as 2 antennae are included with every delivery.



AX200 Wifi and Bluetooth module (DPA-AX200)

DPA-DBG

This Debug connector is necessary to access the serial Linux console. It connects to the Debug port on the bonded iLCD Linux panels and can be fastened by a screw which is included in the delivery. The numbers next to the jumpers detailed here indicate the pin numbers. Notice the white dot next to pin 1. A suitable cable with serial to USB converter is contained in the delivery.

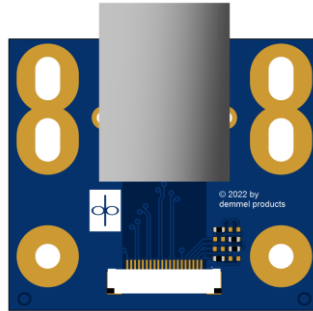


demmel products debug board (DPA-DBG)

Pin #	Primary Function Description
1	Ground
2	nc
3	5 Volt power supply
4	UART_RX
5	UART_TX
6	nc

DPA-ETH-i.MX

This expansion board features an RJ45 connector that can be linked to the FFC Ethernet port on the iLCD module via a Flex PCB.



demmel products RJ45 expansion board (DPA-ETH-i.MX)

5V Power Supply

We are happy to provide a 5V power supply suitable for iLCD Linux boards with a USB-C cable.

Quality Standards

Dust Particles

The TFT display modules are assembled under clean room conditions. The following table specifies the allowed number and size of particles incorporated.

Dimension (Diameter D)	Acceptance (Qty N)
$D \leq 0.25 \text{ mm}$	Ignored
$0.25 \leq D \leq 0.50$	$N \leq 5$
$D \geq 0.50$	0
Total	$N \leq 5$
Dimension (Diameter D)	Acceptance (Qty N)

Pixel Failures

For our iLCD Panels we deploy A-grade TFT display modules. We accept a maximum of sub-pixel failures as follows:

Defect Type	Acceptance (Qty N)
Bright Dots	$N = 0$
Dark Dots	$N \leq 3$
Total	$N \leq 3$

Assembly

Treatment of the Touch Panel Tail

The touch panel is connected to the iLCD processor via an FPC tail. It is mounted already on iLCDs with touch functionality. In order to guarantee correct function and to prevent physical damages, please observe the following notes when taking out the iLCD panels from the package and during manufacturing:

- Do not exert lateral or shearing forces on the tail. This can happen when fitting the iLCD panel into a housing through a narrow aperture.
- Do not crease, twist or pull the tail.
- Do not touch the tail conductors.

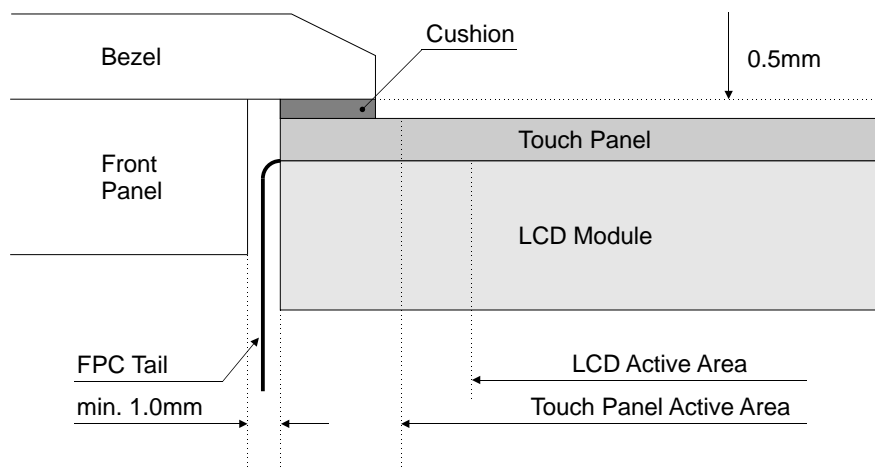
Treatment of the FFC Tail

The FFC cable connects the iLCD to the application electronics.

- The FFC cable bending radius must be ≥ 3 mm.
- Do not exert lateral or shearing forces on the FFC cable.
- Do not crease or twist the FFC cable.

iLCD Rear Mount Integration

One integration method is mounting the iLCD behind a bezel with a rectangular cut out. Rubber or foamed rubber gaskets (cushion) hereby ensure a balancing of tolerances and an environmental sealing. The bezel edge shall be positioned between the LCD Active Area and the View Area. If the bezel edge touches the LCD Active Area, it may press the resistive touch panel unintentionally and cause activation. A gap of approximately 0.5 mm is needed between the bezel and the top electrode. It may cause unexpected activation if the gap is too narrow. There shall be a distance from the panel edge of minimum 1.0 mm for TPC tail protection.



Compliance with EU Regulation

demmel products gmbh declares compliance with the applicable RoHS directive and REACH regulation:

- Restriction of the use of certain Hazardous Substances (RoHS), directive 2011/65/EU
- Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), regulation EC No 1907/2006

We provide the declarations of conformity for each of our products upon request – please contact us.

Revision History

Date	Rev. #	Revision Details
June 1, 2022	1.0	Initial release
August 22, 2022	1.1	Product name corrected
March 8, 2022	1.2	Replaced V1, added Accessories

If you find any errors in this document, please contact demmel products at support@demmel.com