Next Generation Intelligent LCDs

Technical Specification

DPP-CTS2432

DPP-CTS2440

DPP-CxP3224A

DPP-x43

DPP-Sx43

DPP-Hx50

DPP-x57

DPP-x70

DPP-Cx1060A

DPP-C102

Version 2.3

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demmel products gmbh ■ An der Hoelle 31 ■ A-1100 Vienna/Austria
Phone +43-1-6894700-0 ■ Fax+43-1-6894700-40 ■ Email: office@demmel.com ■ Web: www.demmel.com

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General Description

The iLCD modules are intelligent LCD panels which allow the user to carry out all graphic and font needs via an easy and comfortable way without having to deal with pixel addressing, low level functions or hardware details. Controlling the screen contents is done either via a serial port, I^2C port, SPI port, USB or with an optional board via Ethernet.

DPP-CTS2432

LCD

Item	DPP-CTS2432
Screen Size	2.8 inch
Display Resolution	240 x RGB x 320 dots
Dot Pitch	0.06 (H) x 0.18 (V) mm
Active Area	43.2 (H) x 57.6 (V) mm
Display Mode	Normally white / Transmissive
Pixel Arrangement	RGB-Strip
Display Color	262 k (Display) / 64k (Controller)
Backlight [1])	White LED, typical lifetime 20.000 hours
Brightness typ.	300 cd/m^2
Contrast ratio typ.	400
Viewing Direction	6 O'clock
Touch Screen	4-wire resistive

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%)

Features

Item	DPP-CTS2432
Connectivity	USB 2.0 / 1 x RS232 3.3V / I^2C / SPI
Keyboard	matrix scanning for up to 128 keys
Outputs	up to 16 outputs/LEDs (on/off/blink with user selectable blink frequency) [1])
Inputs	up to 16 [1])
ADC	up to 4 (12 bit with range of 0 .. 3.0V) [1])
Relays/PWM	up to 2 [1])
Real-Time Clock	Yes
Flash Memory	2 Mbyte for fonts, graphics, macros and text templates
iLCD controller	DPC3050 operating at 100 MHz

Note:
[1]) Fully customizable assignments of inputs, outputs, ADCs, Relays, PWMs and keyboard columns

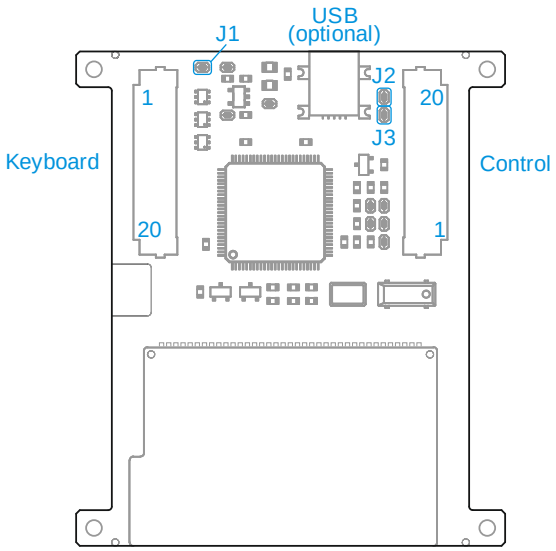
Electrical Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	V_{CC}	3.2	5.0	5.25	V

Item	Symbol	Min.	Typ.	Max.	Unit
Input Voltage H Level [1][2]	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}		28		µA
Current consumption display switched off @ V_{CC} = 5V [3]	I_{CC}		70		mA
Current consumption display on, backlight off @ V_{CC} = 5V [3][4]	I_{CC}		71		mA
Current consumption with display+backlight @ V_{CC} = 5V [3][4][5]	I_{CC}		185		mA

Notes:
[1]) For digital inputs only
[2]) Digital inputs are 5-volt tolerant
[3]) No I/O ports active
[4]) All pixel set to white color
[5]) Backlight intensity 100%

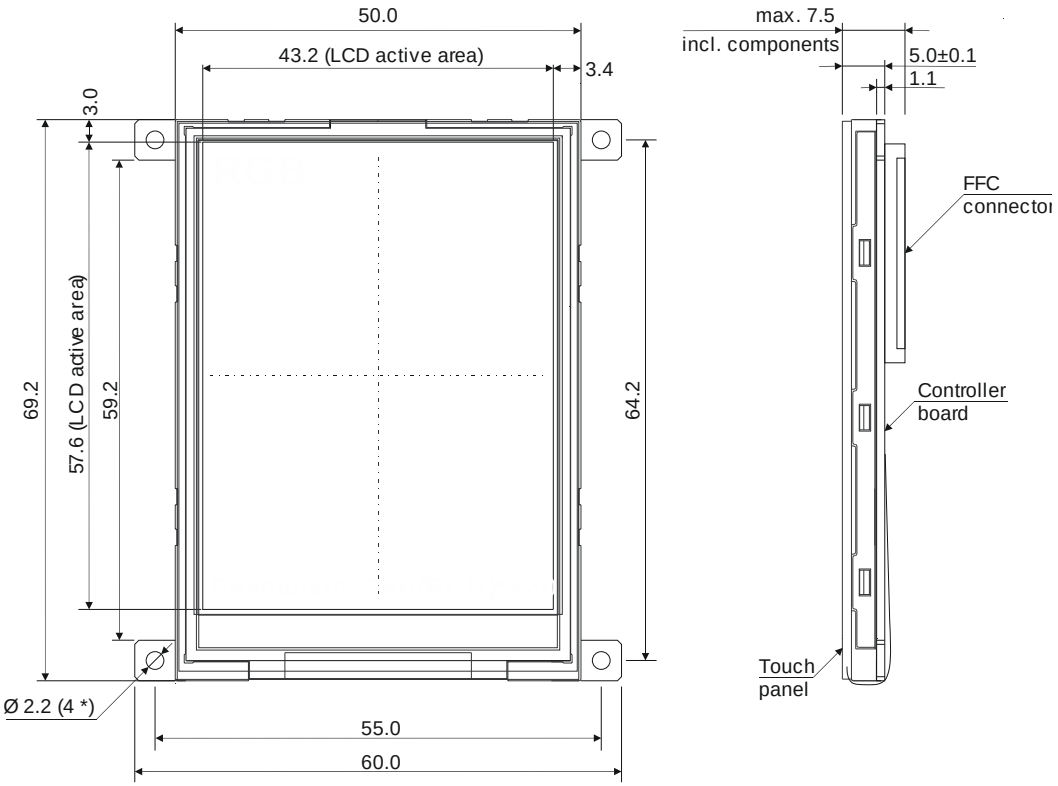
Circuit Board (Ports)



DPP-CTS2432 connections (view from PCB side) See Pin Descriptions

Mechanical Specification

Item	DPP-CTS2432	Unit
Module Dimension (without mounting brackets)	50.0 x 69.2	mm
Module Dimension (incl. mounting brackets)	60.0 x 69.2	mm
Total Module Thickness	7.5	mm



DPP-CTS2440

LCD

Item	DPP-CTS2440
Screen Size	3.0 inch
Display Resolution	240 x RGB x 400 dots
Dot Pitch	0.0545 (H) x 0.1635 (V) mm
Active Area	39.24 (H) x 65.40 (V) mm
Display Mode	Normally white / Transmissive
Pixel Arrangement	RGB-Strip
Display Color	262 k (Display) / 64k (Controller)
Backlight [1])	White LED, typical lifetime 20.000 hours
Brightness typ.	250 cd/m^2
Contrast ratio typ.	400
Viewing Direction	3 O'clock
Touch Screen	4-wire resistive

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%)

Features

Item	DPP-CTS2440
Connectivity	USB 2.0 / 1 x RS232 3.3V / I^2C / SPI
Keyboard	matrix scanning for up to 128 keys
Outputs	up to 16 outputs/LEDs (on/off/blink with user selectable blink frequency) [1)]
Inputs	up to 16 [1)]
ADC	up to 4 (12 bit with range of 0 .. 3.0V) [1)]
Relays/PWM	up to 2 [1)]
Real-Time Clock	Yes
Flash Memory	2 MByte for fonts, graphics, macros and text templates
iLCD controller	DPC3050 operating at 100 MHz

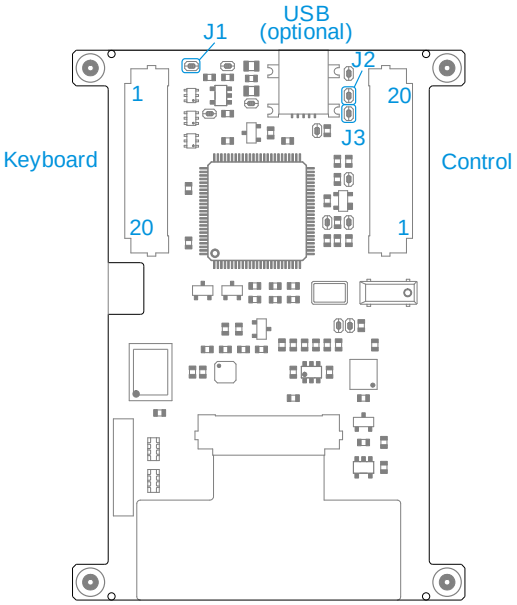
Note:
[1]) Fully customizable assignments of inputs, outputs, ADCs, Relays, PWMs and keyboard columns

Electrical Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	V_{CC}	3.2	5.0	5.25	V
Input Voltage H Level [1)][2)]	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}		28		µA
Current consumption display switched off @ V_{CC} = 5V [3)]	I_{CC}		76		mA
Current consumption display on, backlight off @ V_{CC} = 5V [3)][4)]	I_{CC}		76		mA
Current consumption with display+backlight @ V_{CC} = 5V [3)][4)][5)]	I_{CC}		260		mA

Notes:
[1]) For digital inputs only
[2]) Digital inputs are 5-volt tolerant
[3]) No I/O ports active
[4]) All pixel set to white color
[5]) Backlight intensity 100%

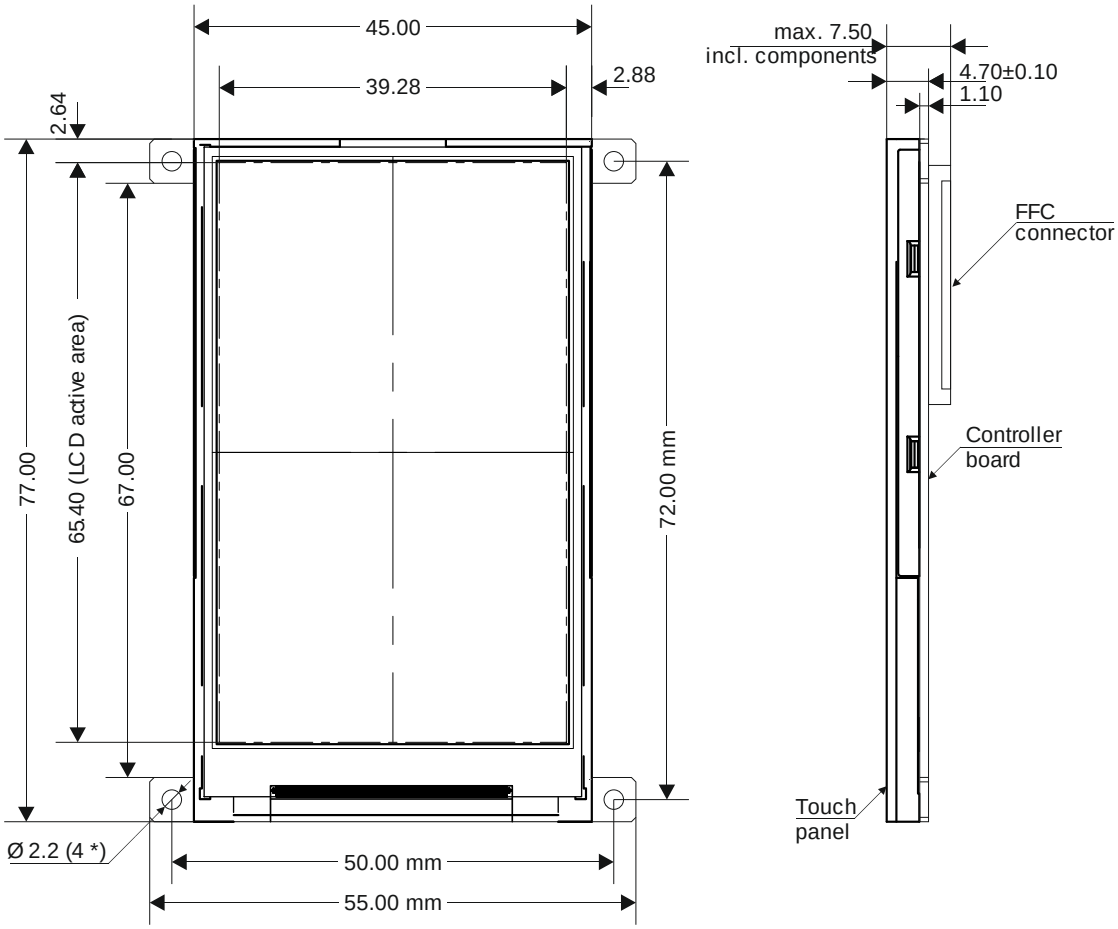
Circuit Board



DPP-CTS2440 connections (view from PCB side) See Pin Descriptions

Mechanical Specification

Item	DPP-CTS2440	Unit
Module Dimension (without mounting brackets)	45.0 x 77.0	mm
Module Dimension (incl. mounting brackets)	55.0 x 77.0	mm
Total Module Thickness	7.5	mm



DPP-CxP3224A

LCD

Item	DPP-CP3224A	DPP-CTP3224A
Screen Size	3.5 inch	
Display Resolution	320 x RGB x 240 dots	
Dot Pitch	0.073 (H) x 0.219 (V) mm	
Active Area	70.08 (H) x 52.56 (V) mm	
Display Mode	Normally white / Transmissive	
Pixel Arrangement	RGB-Strip	
Display Color	16.7 M (Display) / 64k (Controller)	
Backlight [1])	White LED, typical lifetime 20.000 hours	
Brightness typ.	600 cd/m²	480 cd/m²
Contrast ratio typ.	350	
Viewing Direction	6 O'clock	
Touch Screen	No	4-wire resistive

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%)

Features

Item	DPP-CxP3224A
Connectivity	USB 2.0 / 1 x RS232 3.3V / I^2C / SPI / Ethernet with optional board
Keyboard	matrix scanning for up to 128 keys
Outputs	up to 16 outputs/LEDs (on/off/blink with user selectable blink frequency) [1)]
Inputs	up to 16 [1)]
ADC	up to 4 (12 bit with range of 0 ... 3.3V) [1)]
DAC	1(10 bit with range of 0 ... 3.3V)
Relays/PWM	up to 2 [1)]
Real-Time Clock	Yes
Flash Memory	128 MByte for fonts, graphics, macros and text templates
RAM	8 Mbyte RAM for frame buffer and for screen saving
iLCD controller	DPC3090 operating at 120 MHz

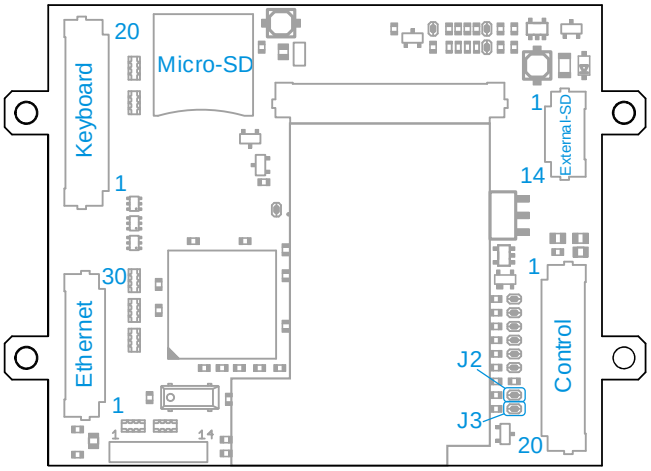
Note:
[1]) Fully customizable assignments of inputs, outputs, ADCs, Relays, PWMs and keyboard columns

Electrical Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	V_{CC}	4.75	5.0	5.25	V
Input Voltage H Level [1)][2)]	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
DAC output voltage	V_{DAC}	0.0	-	3.3	V
DAC output current	I_{DAC}	-	-	0.7	µA
Vbatt current	I_{Vbatt}		1		µA
Current consumption display switched off @ V_{CC} = 5V [3)]	I_{CC}		122		mA
Current consumption display on, backlight off @ V_{CC} = 5V [3)][4)]	I_{CC}		142		mA
Current consumption with display+backlight @ V_{CC} = 5V [3)][4)][5)]	I_{CC}		248		mA

Notes:
[1]) For digital inputs only
[2]) Digital inputs are 5-volt tolerant
[3]) No I/O ports active, Firmware Version 4.05 and newer
[4]) All pixel set to white color
[5]) Backlight intensity 100%

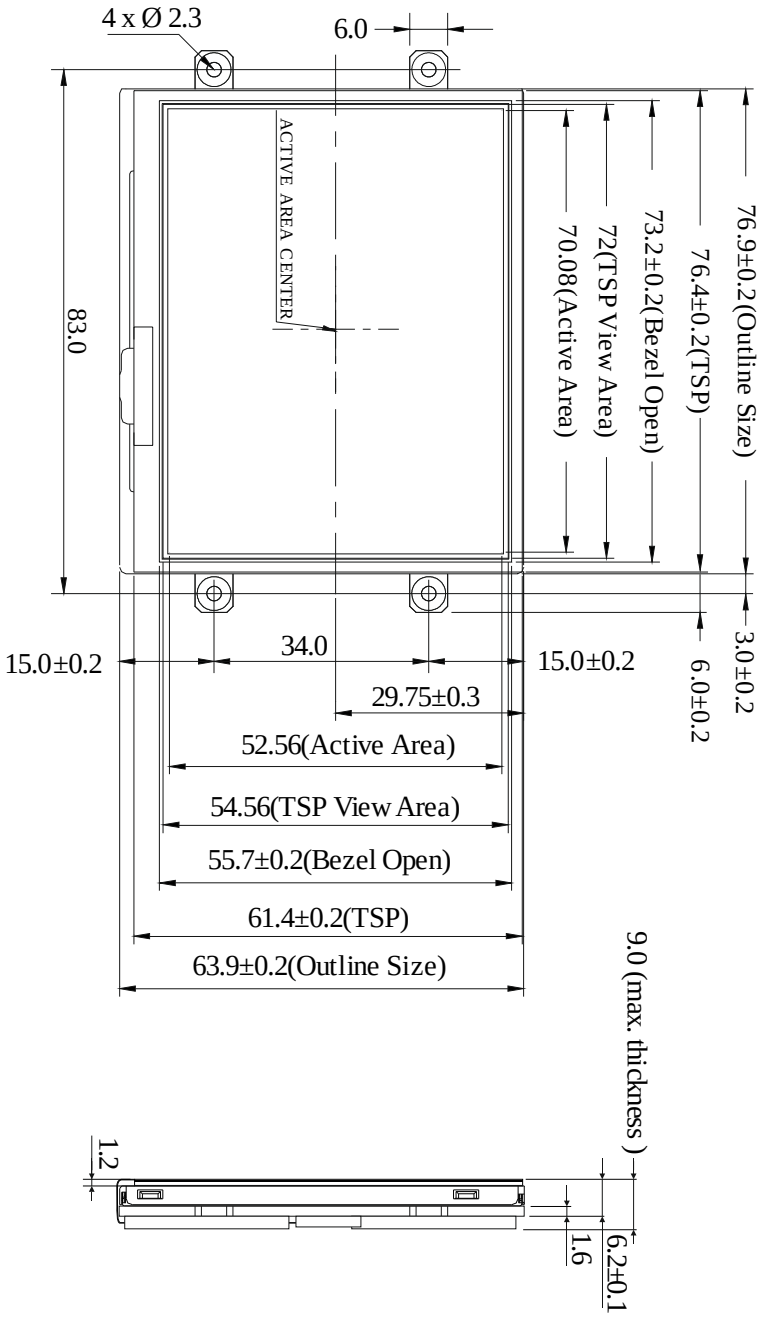
Circuit Board



DPP-CxP3224A connections (view from PCB side) See Pin Descriptions

Mechanical Specification

Item	DPP-CP3224A	DPP-CTP3224A	Unit
Module Dimension (without mounting brackets)	76.9 x 63.9		mm
Module Dimension (incl. mounting brackets)	89.0 x 63.9		mm
Total Module Thickness	7.8	9.0	mm



DPP-x43

LCD

Item	DPP-43	DPP-T43
Screen Size	4.3 inch	
Display Resolution	480 x RGB x 272 dots	
Dot Pitch	0.066 (H) x 0.198 (V) mm	
Active Area	95.04 (H) x 53.856 (V) mm	
Display Mode	Normally white / Transmissive	
Pixel Arrangement	RGB-Strip	
Display Color	16.7 M (Display) / 64k (Controller)	
Backlight [1])	White LED, typical lifetime 20.000 hours	

Item	DPP-43	DPP-T43
Brightness typ.	500 cd/m^2	400 cd/m^2
Contrast ratio typ.	500	
Viewing Direction	6 O'clock	
Touch Screen	No	4-wire resistive

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%)

Features

Item	DPP-x43
Connectivity	USB 2.0 / 1 x RS232 3.3V / I^{2}C / SPI / Ethernet with optional board
Keyboard	matrix scanning for up to 128 keys
Outputs	up to 16 outputs/LEDs (on/off/blink with user selectable blink frequency) [1])
Inputs	up to 16 [1])
ADC	up to 4 (12 bit with range of 0 .. 3.3V) [1])
DAC	1(10 bit with range of 0 ... 3.3V)
Relays/PWM	up to 2 [1])
Real-Time Clock	Yes
Flash Memory	128 MByte for fonts, graphics, macros and text templates
RAM	8 MByte RAM for frame buffer and for screen saving
iLCD controller	DPC3090 operating at 120 MHz

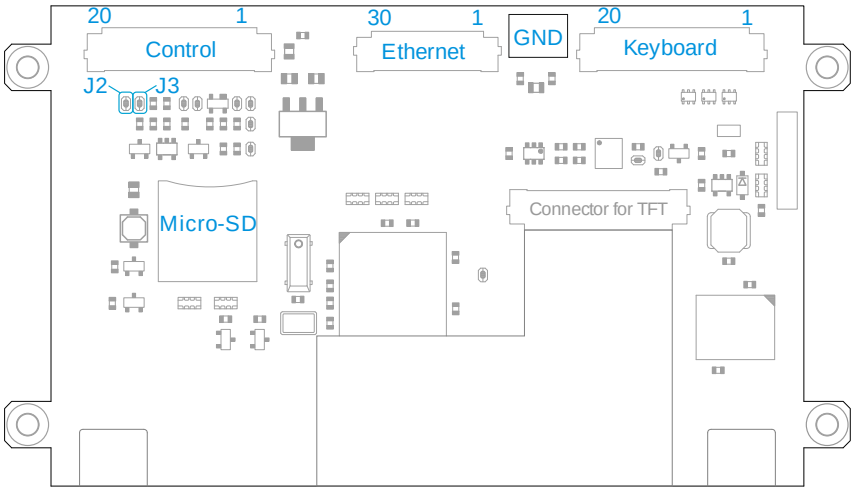
Note:
[1]) Fully customizable assignments of inputs, outputs, ADCs, Relays, PWMs and keyboard columns

Electrical Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	V_{CC}	4.75	5.0	5.25	V
Input Voltage H Level [1])[2])	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
DAC output voltage	V_{DAC}	0.0	-	3.3	V
DAC output current	I_{DAC}	-	-	0.7	µA
Vbatt current	I_{Vbatt}		1		µA
Current consumption display switched off @ V_{CC} = 5V [3])	I_{CC}		120		mA
Current consumption display on, backlight off @ V_{CC} = 5V [3])[4])	I_{CC}		145		mA
Current consumption with display+backlight @ V_{CC} = 5V [3])[4])[5])	I_{CC}		275		mA

Notes:
[1]) For digital inputs only
[2]) Digital inputs are 5-volt tolerant
[3]) No I/O ports active
[4]) All pixel set to white color
[5]) Backlight intensity 100%

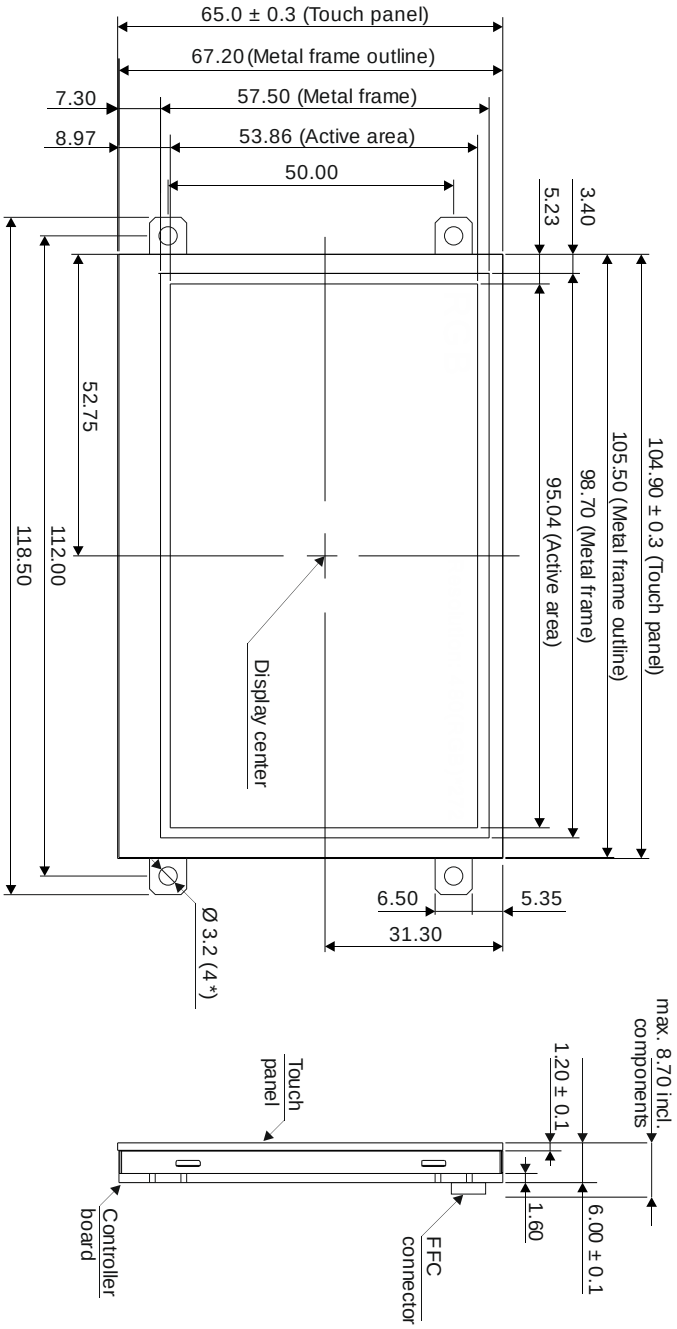
Circuit Board



DPP-x43 connections (view from PCB side) See Pin Descriptions

Mechanical Specification

Item	DPP-43	DPP-T43	Unit
Module Dimension (without mounting brackets)	105.5 x 67.2		mm
Module Dimension (incl. mounting brackets)	118.5 x 67.2		mm
Total Module Thickness	7.5	8.7	mm



DPP-Sx43

LCD

Item	DPP-S43	DPP-ST43	DPP-SC43
Screen Size	4.3 inch		
Display Resolution	480 x RGB x 272 dots		
Dot Pitch	0.066 (H) x 0.198 (V) mm		
Active Area	95.04 (H) x 53.856 (V) mm		
Display Mode	Normally white / Transmissive		
Pixel Arrangement	RGB-Strip		
Display Color	16.7 M (Display) / 64k (Controller)		

Item	DPP-S43	DPP-ST43	DPP-SC43
Backlight [1])	White LED, typical lifetime 20.000 hours		
Brightness typ.	1000 cd/m^2	1000 cd/m^2	1000 cd/m^2
Contrast ratio typ.	500		
Viewing Direction	6 O'clock		
Touch Screen	No	4-wire resistive	Projected capacitive

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%)

Features

Item	DPP-Sx43
Connectivity	USB 2.0 / 1 x RS232 3.3V / I^{2}C / SPI / Ethernet with optional board
Keyboard	matrix scanning for up to 128 keys
Outputs	up to 16 outputs/LEDs (on/off/blink with user selectable blink frequency) [1])
Inputs	up to 16 [1])
ADC	up to 4 (12 bit with range of 0 .. 3.3V) [1])
DAC	1(10 bit with range of 0 ... 3.3V)
Relays/PWM	up to 2 [1])
Real-Time Clock	Yes
Flash Memory	128 MByte for fonts, graphics, macros and text templates
RAM	8 MByte RAM for frame buffer and for screen saving
iLCD controller	DPC3090 operating at 120 MHz

Note:
[1]) Fully customizable assignments of inputs, outputs, ADCs, Relays, PWMs and keyboard columns

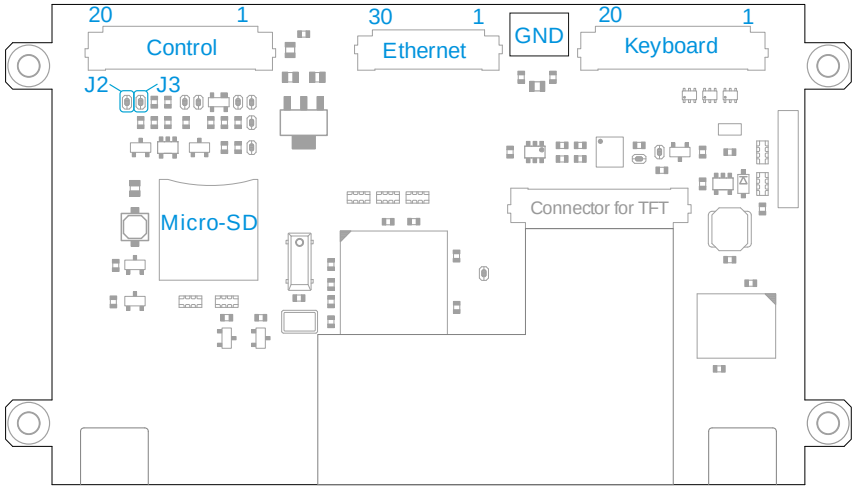
Electrical Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	V_{CC}	4.75	5.0	5.25	V
Input Voltage H Level [1])[2])	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
DAC output voltage	V_{DAC}	0.0	-	3.3	V
DAC output current	I_{DAC}	-	-	0.7	µA
Vbatt current	I_{Vbatt}		1		µA
Current consumption display switched off @ V_{CC} = 5V [3])	I_{CC}		t.b.d.		mA
Current consumption display on, backlight off @ V_{CC} = 5V [3])[4])	I_{CC}		t.b.d.		mA
Current consumption with display+backlight @ V_{CC} = 5V [3])[4])[5])	I_{CC}		t.b.d.		mA

Notes:
[1]) For digital inputs only
[2]) Digital inputs are 5-volt tolerant

[3]) No I/O ports active
[4]) All pixel set to white color
[5]) Backlight intensity 100%

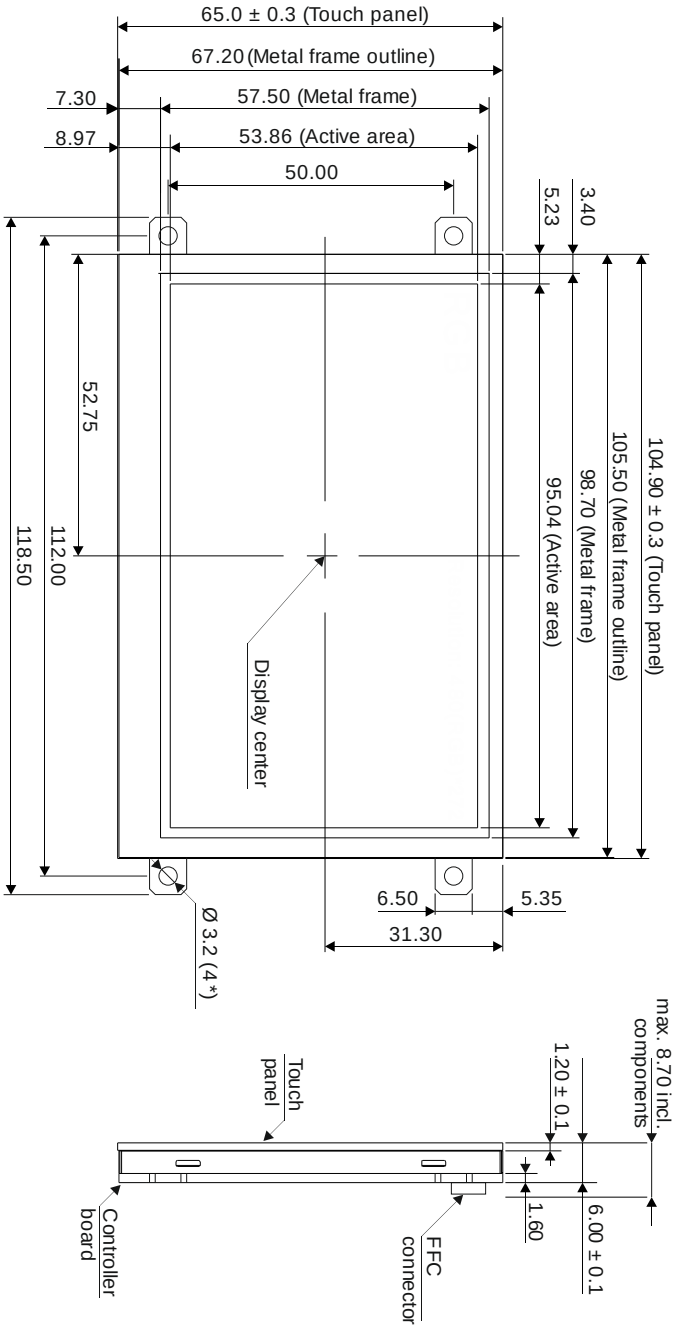
Circuit Board



DPP-Sx43 connections (view from PCB side) See Pin Descriptions

Mechanical Specification

Item	DPP-S43	DPP-ST43	DPP-SC43	Unit
Module Dimension (without mounting brackets)	105.5 x 67.2			mm
Module Dimension (incl. mounting brackets)	118.5 x 67.2			mm
Total Module Thickness	7.5	8.7	t.b.d.	mm



DPP-Hx50

LCD

Item	DPP-H50	DPP-HT50	DPP-HC50
Screen Size	5.0 inch		
Display Resolution	800 x RGB x 480 dots		
Dot Pitch	0.045 (H) x 0.135 (V) mm		
Active Area	108.00 (H) x 64.80 (V) mm		
Display Mode	Normally white / Transmissive		
Pixel Arrangement	RGB-Strip		
Display Color	16.7 M (Display) / 64k (Controller)		

Item	DPP-H50	DPP-HT50	DPP-HC50
Backlight [1])	White LED, typical lifetime 20.000 hours		
Brightness typ.	600 cd/m^2	500 cd/m^2	600 cd/m^2
Contrast ratio typ.	600		
Viewing Direction	6 O'clock		
Touch Screen	No	4-wire resistive	Projected capacitive

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%)

Features

Item	DPP-Hx50
Connectivity	USB 2.0 / 1 x RS232 3.3V / I^{2}C / SPI / Ethernet with optional board
Keyboard	matrix scanning for up to 128 keys
Outputs	up to 16 outputs/LEDs (on/off/blink with user selectable blink frequency) [1])
Inputs	up to 16 [1])
ADC	up to 4 (12 bit with range of 0 .. 3.3V) [1])
DAC	1(10 bit with range of 0 ... 3.3V)
Relays/PWM	up to 2 [1])
Real-Time Clock	Yes
Flash Memory	128 MByte for fonts, graphics, macros and text templates
RAM	8 MByte RAM for frame buffer and for screen saving
iLCD controller	DPC3090 operating at 120 MHz

Note:
[1]) Fully customizable assignments of inputs, outputs, ADCs, Relays, PWMs and keyboard columns

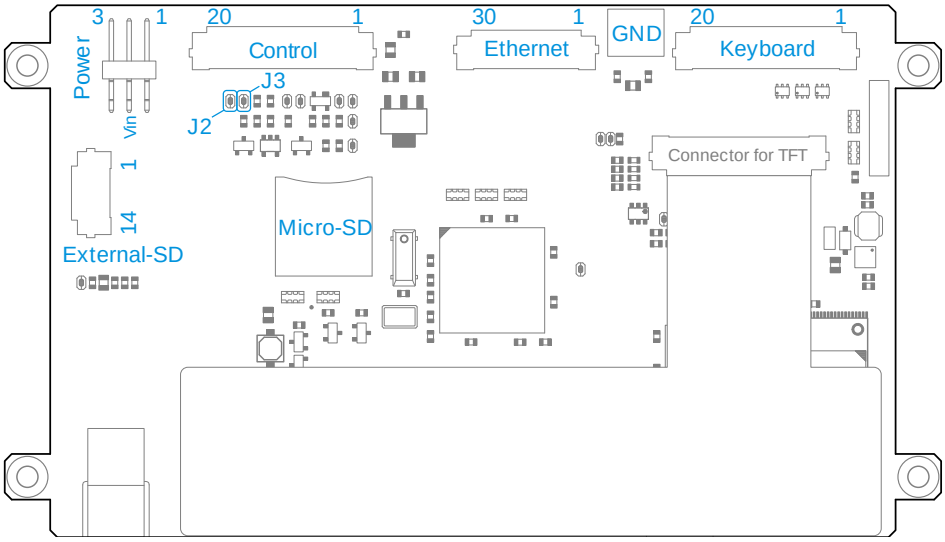
Electrical Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	V_{CC}	4.75	5.0	5.25	V
Input Voltage H Level [1])[2])	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
DAC output voltage	V_{DAC}	0.0	-	3.3	V
DAC output current	I_{DAC}	-	-	0.7	µA
Vbatt current	I_{Vbatt}		1		µA
Current consumption display switched off @ V_{CC} = 5V [3])	I_{CC}		121 / 155[6])		mA
Current consumption display on, backlight off @ V_{CC} = 5V [3])[4])	I_{CC}		189 / 225[6])		mA
Current consumption with display+backlight @ V_{CC} = 5V [3])[4])[5])	I_{CC}		508 / 545[6])		mA

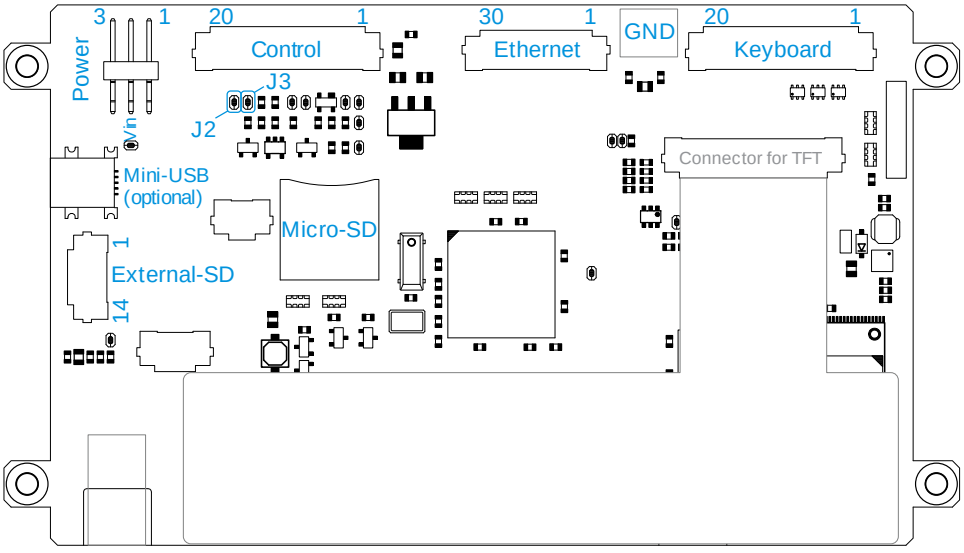
Notes:
[1]) For digital inputs only
[2]) Digital inputs are 5-volt tolerant

[3]) No I/O ports active
[4]) All pixel set to white color
[5]) Backlight intensity 100%
[6]) DPP-HC50

Circuit Board



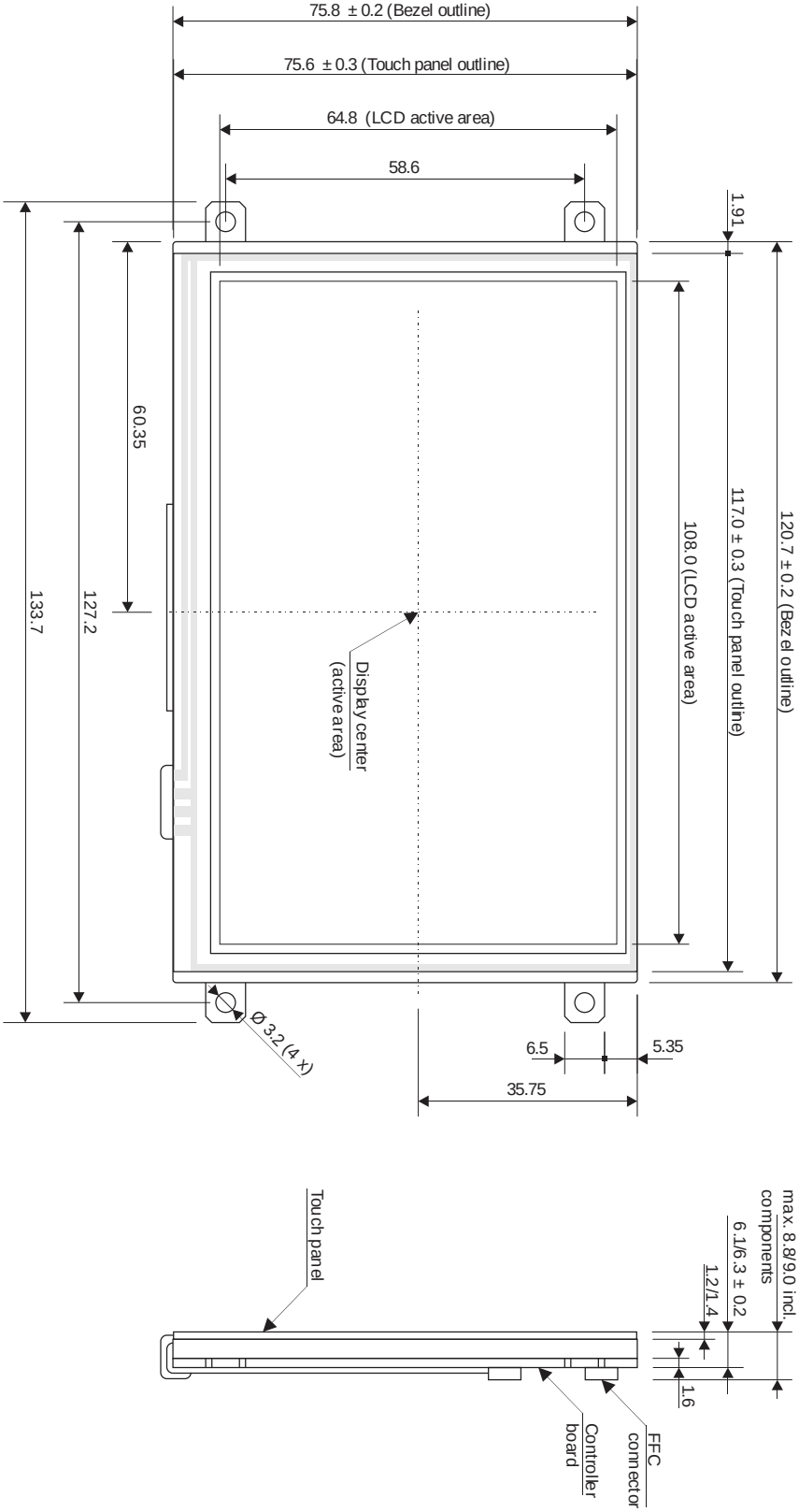
DPP-Hx50 (V1 and V2) connections (view from PCB side) See Pin Descriptions



DPP-Hx50 (V3 and newer) connections (view from PCB side) See Pin Descriptions

Mechanical Specification

Item	DPP-H50	DPP-HT50	DPP-HC50	Unit
Module Dimension (without mounting brackets)	120.7 x 75.8			mm
Module Dimension (incl. mounting brackets)	133.7 x 75.8			mm
Total Module Thickness	7.6	8.8	9.0	mm


75.8 ± 0.2 (Bezel outline)
75.6 ± 0.3 (Touch panel outline)
64.8 (LCD active area)
58.6
1.91
60.35
133.7
127.2
108.0 (LCD active area)
117.0 ± 0.3 (Touch panel outline)
120.7 ± 0.2 (Bezel outline)
Display center
(active area)
Ø 3.2 (4 x)
6.5
5.35
35.75
Touch panel
max. 8.8/9.0 incl. components
6.1/6.3 ± 0.2
1.2/1.4
1.6
Controller board
FFC connector

DPP-x57

LCD

Item	DPP-57	DPP-T57	DPP-C57
Screen Size	5.7 inch		
Display Resolution	640 x RGB x 480 dots		
Dot Pitch	0.0588 (H) x 0.1764 (V) mm		
Active Area	112.896 (H) x 84.672 (V) mm		
Display Mode	Normally white / Transmissive		
Pixel Arrangement	RGB-Strip		
Display Color	262 k (Display) / 64k (Controller)		
Backlight [1])	White LED, typical lifetime 20.000 hours		
Brightness typ.	350 cd/m^2	300 cd/m^2	350 cd/m^2
Contrast ratio typ.	500		
Viewing Direction	6 O'clock		
Touch Screen	No	4-wire resistive	Projected capacitive

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%)

Features

Item	DPP-x57
Connectivity	USB 2.0 / 1 x RS232 3.3V / I^{2}C / SPI / Ethernet with optional board
Keyboard	matrix scanning for up to 128 keys
Outputs	up to 16 outputs/LEDs (on/off/blink with user selectable blink frequency) [1])
Inputs	up to 16 [1])
ADC	up to 4 (12 bit with range of 0 .. 3.3V) [1])
DAC	1(10 bit with range of 0 ... 3.3V)
Relays/PWM	up to 2 [1])
Real-Time Clock	Yes
Flash Memory	128 MByte for fonts, graphics, macros and text templates
RAM	8 MByte RAM for frame buffer and for screen saving
iLCD controller	DPC3090 operating at 120 MHz

Note:
[1]) Fully customizable assignments of inputs, outputs, ADCs, Relays, PWMs and keyboard columns

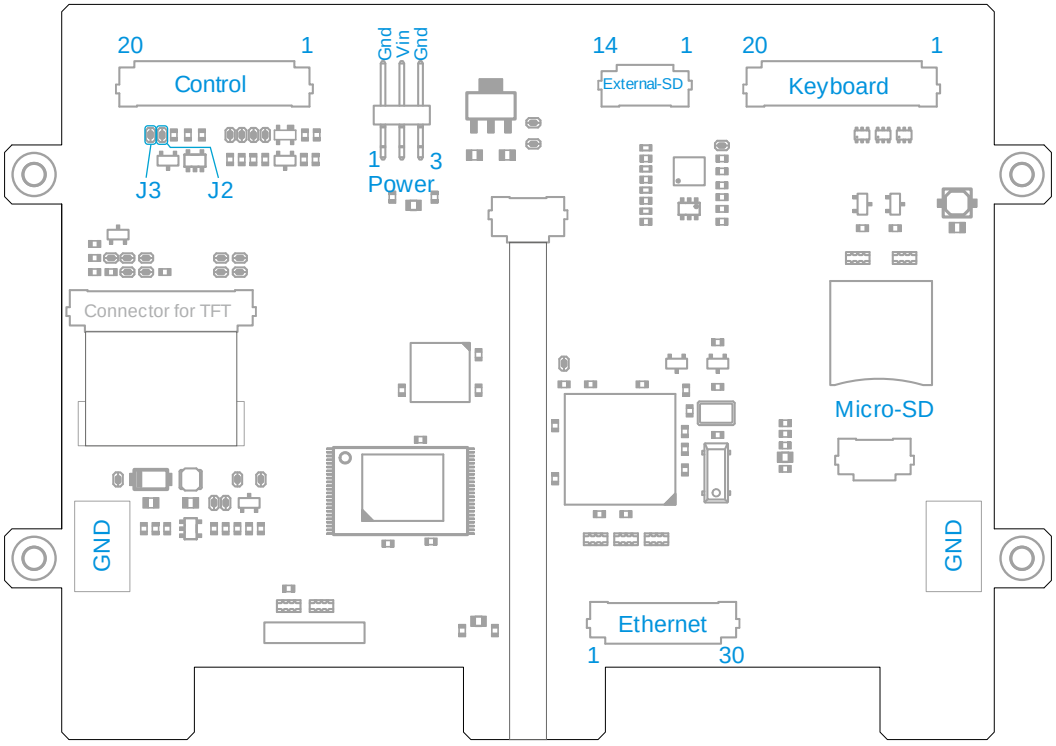
Electrical Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	V_{CC}	4.75	5.0	5.25	V
Input Voltage H Level [1])[2])	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
DAC output voltage	V_{DAC}	0.0	-	3.3	V

DAC output current	I_{DAC}	-	-	0.7	µA
Vbatt current	I_{Vbatt}		1		µA
Current consumption display switched off @ V_{CC} = 5V [3])	I_{CC}		120 / 155[6])		mA
Current consumption display on, backlight off @ V_{CC} = 5V [3])[4])	I_{CC}		270 / 305[6])		mA
Current consumption with display+backlight @ V_{CC} = 5V [3])[4])[5])	I_{CC}		630 / 665[6])		mA

Notes:
[1]) For digital inputs only
[2]) Digital inputs are 5-volt tolerant
[3]) No I/O ports active
[4]) All pixel set to white color
[5]) Backlight intensity 100%
[6]) DPP-C57

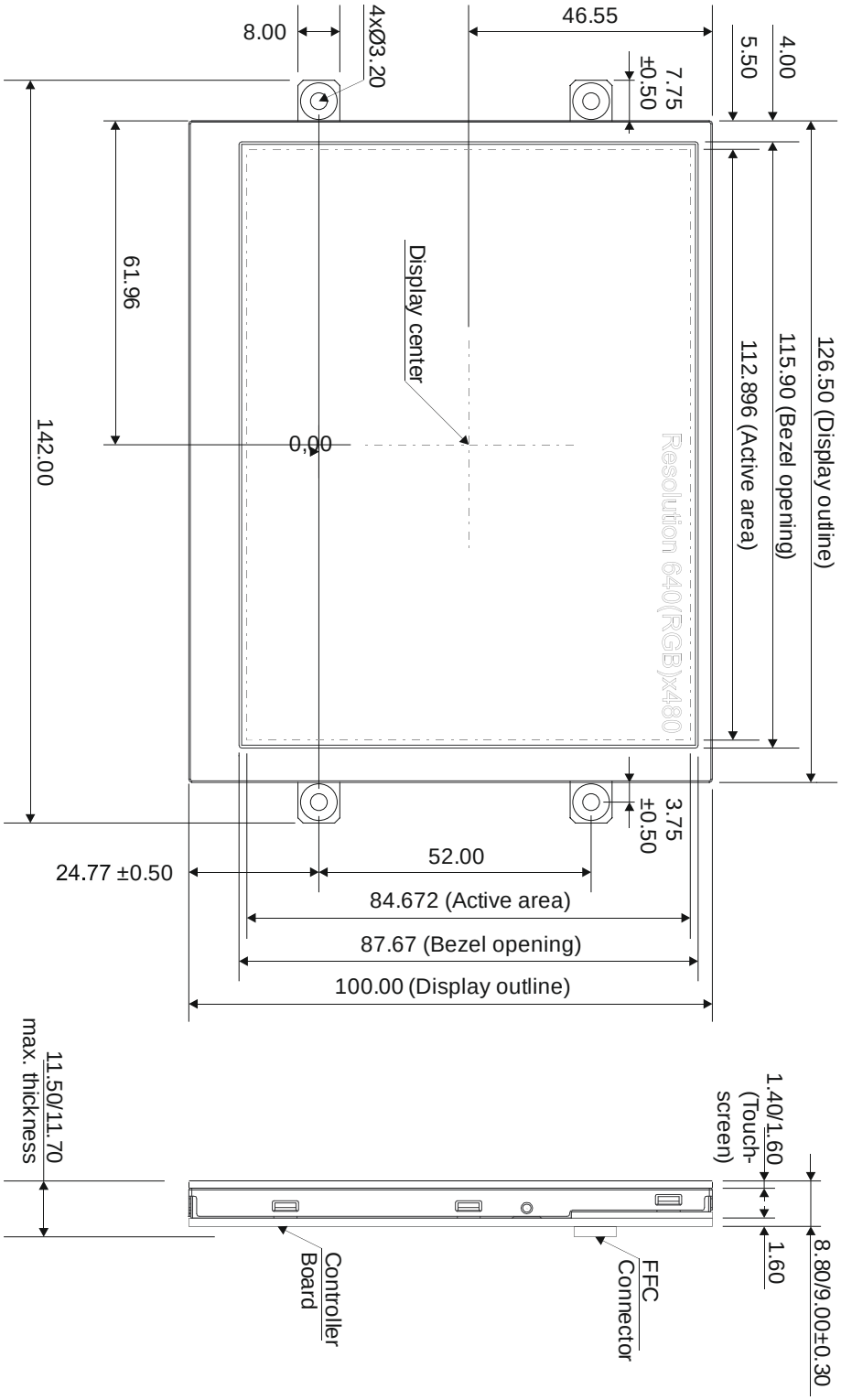
Circuit Board



DPP-x57 connections (view from PCB side) See Pin Descriptions

Mechanical Specification

Item	DPP-57	DPP-T57	DPP-C57	Unit
Module Dimension (without mounting brackets)	126.5 x 100.0			mm
Module Dimension (incl. mounting brackets)	142.0 x 100.0			mm
Total Module Thickness	10.1	11.5	11.7	mm



DPP-x70

LCD

Item	DPP-70	DPP-T70	DPP-C70
Screen Size	7.0 inch		
Display Resolution	800 x RGB x 480 dots		
Dot Pitch	0.0635 (H) x 0.1905 (V) mm		

Item	DPP-70	DPP-T70	DPP-C70
Active Area	152.4 (H) x 91.44 (V) mm		
Display Mode	Normally white / Transmissive		
Pixel Arrangement	RGB-Strip		
Display Color	262 k (Display) / 64k (Controller)		
Backlight [1])	White LED, typical lifetime 20.000 hours		
Brightness typ.	350 cd/m^2	300 cd/m^2	350 cd/m^2
Contrast ratio typ.	500		
Viewing Direction	6 O'clock		
Touch Screen	No	4-wire resistive	Projected capacitive

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%)

Features

Item	DPP-x70
Connectivity	USB 2.0 / 1 x RS232 3.3V / I^{2}C / SPI / Ethernet with optional board
Keyboard	matrix scanning for up to 128 keys
Outputs	up to 16 outputs/LEDs (on/off/blink with user selectable blink frequency) [1])
Inputs	up to 16 [1])
ADC	up to 4 (12 bit with range of 0 .. 3.3V) [1])
DAC	1(10 bit with range of 0 ... 3.3V)
Relays/PWM	up to 2 [1])
Real-Time Clock	Yes
Flash Memory	128 MByte for fonts, graphics, macros and text templates
RAM	8 MByte RAM for frame buffer and for screen saving
iLCD controller	DPC3090 operating at 120 MHz

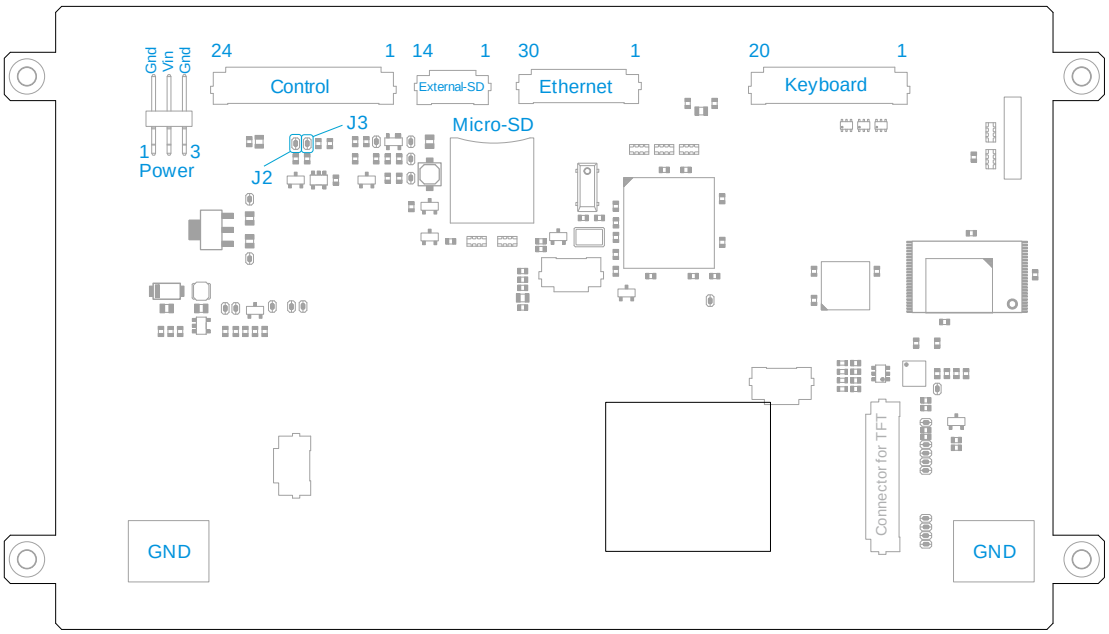
Note:
[1]) Fully customizable assignments of inputs, outputs, ADCs, Relays, PWMs and keyboard columns

Electrical Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	V_{CC}	4.75	5.0	5.25	V
Input Voltage H Level [1])[2])	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
DAC output voltage	V_{DAC}	0.0	-	3.3	V
DAC output current	I_{DAC}	-	-	0.7	µA
Vbatt current	I_{Vbatt}		1		µA
Current consumption display switched off @ V_{CC} = 5V [3])	I_{CC}		120 / 155[6])		mA
Current consumption display on, backlight off @ V_{CC} = 5V [3])[4])	I_{CC}		270 / 305[6])		mA
Current consumption with display+backlight @ V_{CC} = 5V [3])[4])[5])	I_{CC}		765 / 800[6])		mA

Notes:
[1]) For digital inputs only
[2]) Digital inputs are 5-volt tolerant
[3]) No I/O ports active
[4]) All pixel set to white color
[5]) Backlight intensity 100%
[6]) DPP-C70

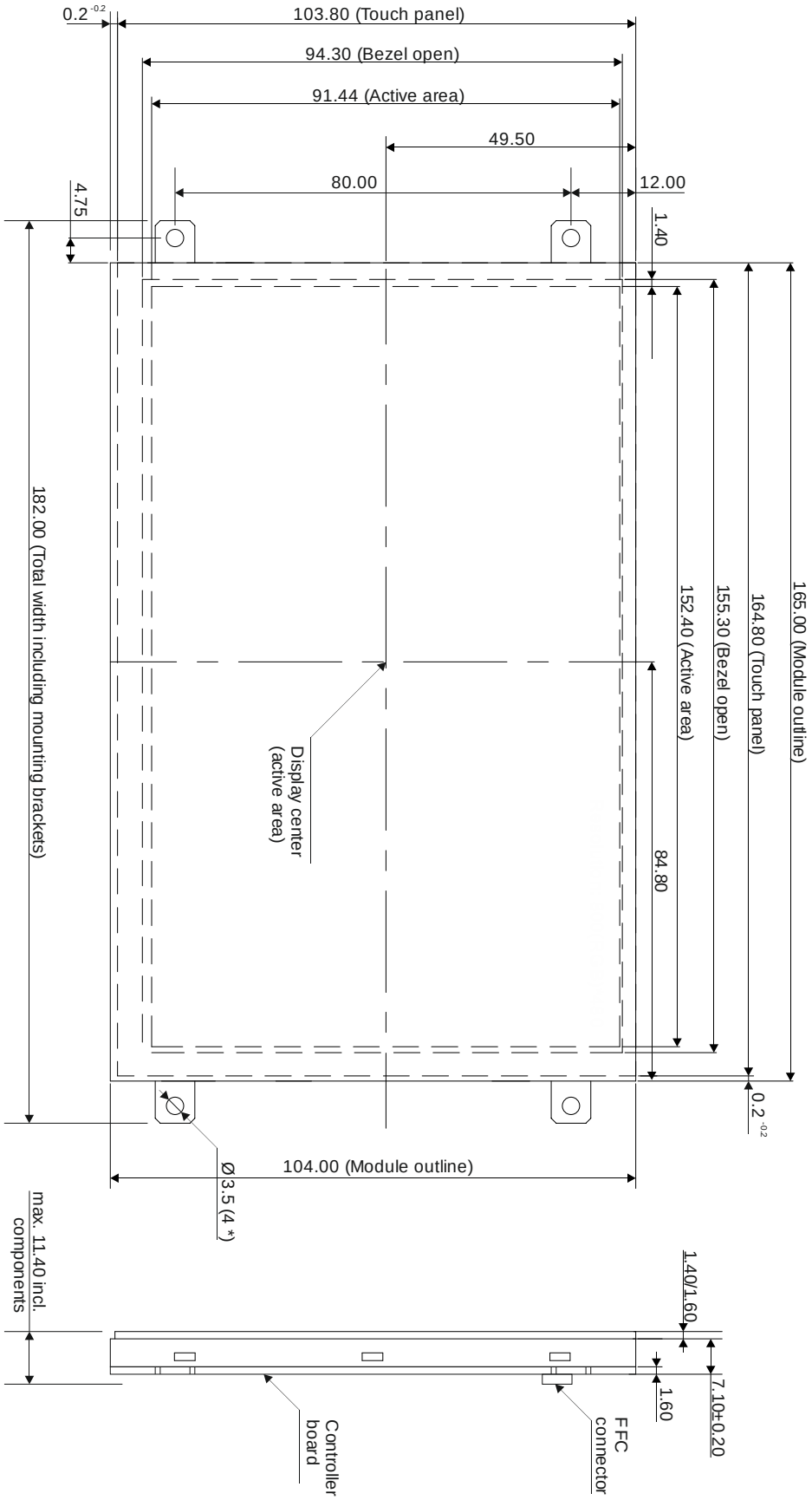
Circuit Board



DPP-x70 connections (view from PCB side) See Pin Descriptions

Mechanical Specification

Item	DPP-70	DPP-T70	DPP-C70	Unit
Module Dimension (without mounting brackets)	165.0 x 104.0			mm
Module Dimension (incl. mounting brackets)	182.0 x 104.0			mm
Total Module Thickness	9.8	11.2	11.4	mm


0.2 -0.2
103.80 (Touch panel)
94.30 (Bezel open)
91.44 (Active area)
49.50
80.00
12.00
4.75
1.40
182.00 (Total width including mounting brackets)
165.00 (Module outline)
164.80 (Touch panel)
155.30 (Bezel open)
152.40 (Active area)
84.80
Display center (active area)
0.2 -0.2
104.00 (Module outline)
Ø3.5 (4 *)
max. 11.40 incl. components
1.40/1.60
7.10±0.20
1.60
Controller board
FFC connector

DPP-Cx1060A / DPP-C102

LCD

Item	DPP-C1060A	DPP-CT1060A	DPP-C102
Screen Size	10.2 inch		
Display Resolution	1024 x RGB x 600 dots		
Dot Pitch	0.0725 (H) x 0.2088 (V) mm		
Active Area	222.72 (H) x 125.28 (V) mm		
Display Mode	Normally white / Transmissive		
Pixel Arrangement	RGB-Strip		
Display Color	16.7 M (Display) / 64k (Controller)		
Backlight [1])	White LED, typical lifetime 20.000 hours		
Brightness typ.	400 cd/m^2	300 cd/m^2	400 cd/m^2
Contrast ratio typ.	500		
Viewing Direction	6 O'clock		
Touch Screen	No	4-wire resistive	Projected capacitive

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%)

Features

Item	DPP-Cx1060A / DPP-C102
Connectivity	USB 2.0 / 1 x RS232 3.3V / I^{2}C / SPI / Ethernet with optional board
Keyboard	matrix scanning for up to 128 keys
Outputs	up to 16 outputs/LEDs (on/off/blink with user selectable blink frequency) [1])
Inputs	up to 16 [1])
ADC	up to 4 (12 bit with range of 0 .. 3.3V) [1])
DAC	1(10 bit with range of 0 ... 3.3V)
Relays/PWM	up to 2 [1])
Real-Time Clock	Yes
Flash Memory	128 MByte for fonts, graphics, macros and text templates
RAM	8 MByte RAM for frame buffer and for screen saving
iLCD controller	DPC3090 operating at 120 MHz

Note:
[1]) Fully customizable assignments of inputs, outputs, ADCs, Relays, PWMs and keyboard columns

Electrical Characteristics

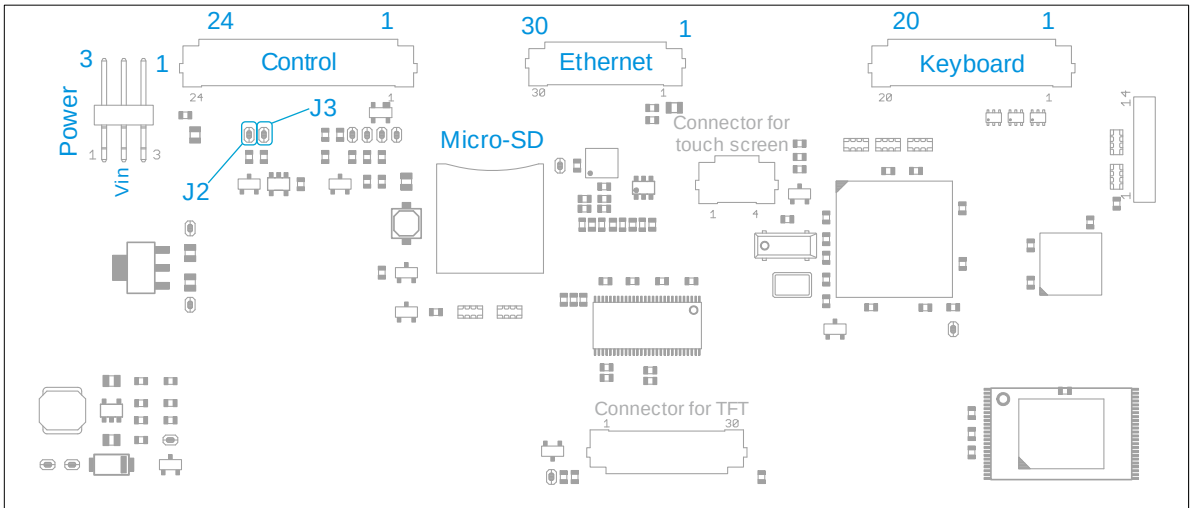
Item	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	V_{CC}	4.75	5.0	5.25	V
Input Voltage H Level [1])[2])	V_{IH}	2.4	-	3.3	V
Input voltage L Level [1])	V_{IL}	0.0	-	0.8	V
Output current for digital outputs	I_{OUT}			3.5	mA
DAC output voltage	V_{DAC}	0.0	-	3.3	V

DAC output current	I_{DAC}	-	-	0.7	µA
Vbatt current	I_{Vbatt}		1		µA
Current consumption display switched off @ V_{CC} = 5V [3])	I_{CC}		130		mA

Item	Symbol	Min.	Typ.	Max.	Unit
Current consumption display on, backlight off @ V_{CC} = 5V [3])[4])	I_{CC}		230		mA
Current consumption with display+backlight @ V_{CC} = 5V [3])[4])[5])	I_{CC}		1150		mA

Notes:
[1]) For digital inputs only
[2]) Digital inputs are 5-volt tolerant
[3]) No I/O ports active, Firmware Version 4.05 and newer
[4]) All pixel set to white color
[5]) Backlight intensity 100%

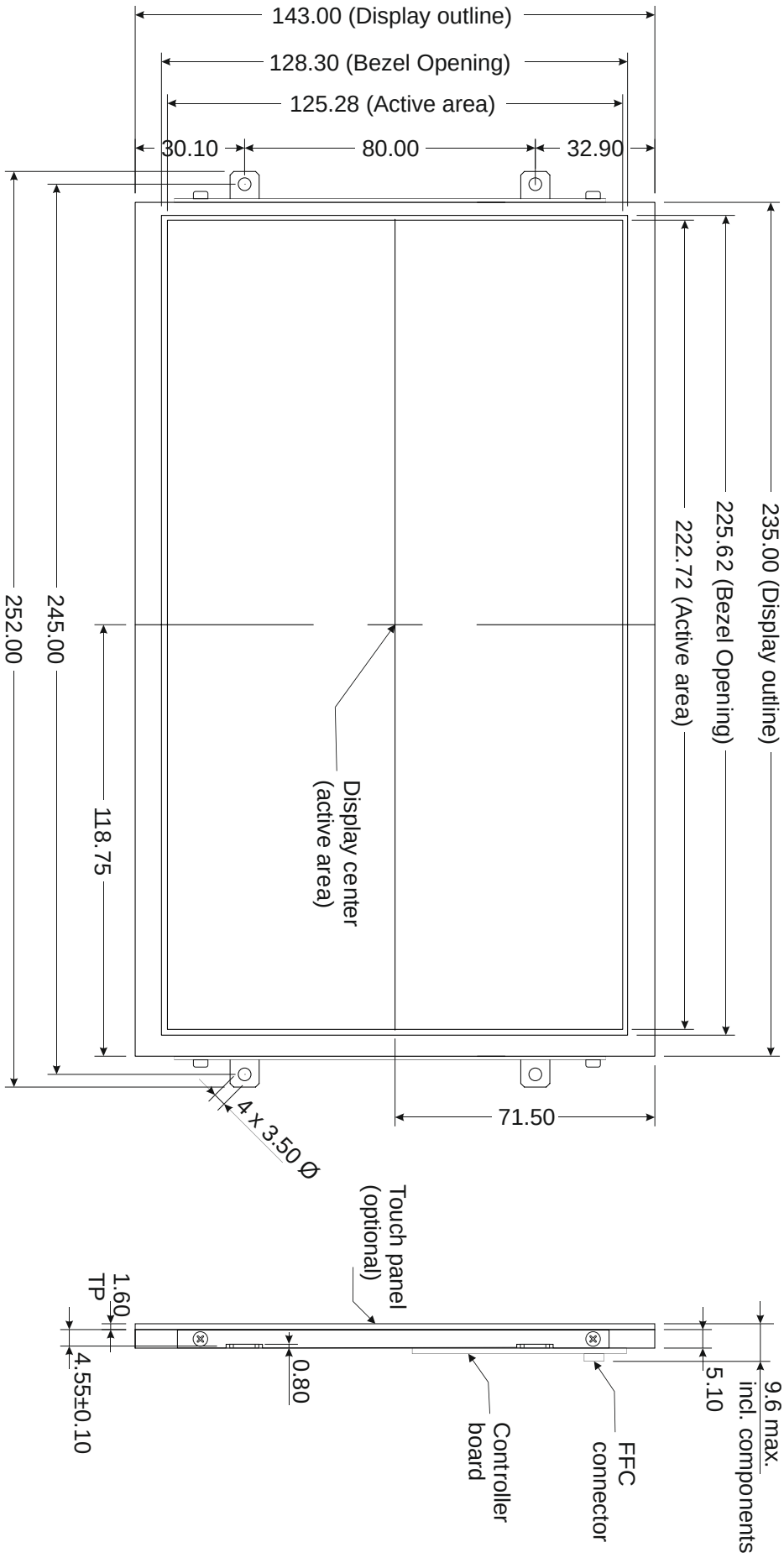
Circuit Board



DPP-Cx1060A / DPP-C102 connections (view from PCB side) See Pin Descriptions

Mechanical Specification

Item	DPP-C1060A	DPP-CT1060A	DPP-C102	Unit
Module Dimension (without mounting brackets)	235.0 x 143.0			mm
Module Dimension (incl. mounting brackets)	252.0 x 143.0			mm
Total Module Thickness	8.0	9.6		mm


143.00 (Display outline)
128.30 (Bezel Opening)
125.28 (Active area)
30.10
80.00
32.90
252.00
245.00
118.75
Display center
(active area)
235.00 (Display outline)
225.62 (Bezel Opening)
222.72 (Active area)
71.50
4 x 3.50 Ø
Touch panel
(optional)
1.60
TP
4.55±0.10
0.80
Controller
board
FFC
connector
5.10
9.6 max.
incl. components

Common Features

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}	-20	70	°C
Storage Temperature	T_{STR}	-20	80	°C
Humidity [2])		10	90	%RH

Notes:
[1]) Lifetime of backlight LEDs will be decreased for temperatures ≥ 50°C
[2]) Temp. ≤ 60°C, 90% RH MAX.
Temp. ≥ 60°C, absolute humidity shall be less than 90% RH at 60°C

The ground connection to the display should be as good as possible. Especially for iLCDs with projected capacitive touch panel the ground connection to the display and the power supply is crucial for a trouble-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.

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 ≤ 0.25 mm	Ignored
0.25 ≤ D ≤ 0.50	N ≤ 5
D ≥ 0.50	0
Total	N ≤ 5

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 ≤ 3
Total	N ≤ 3

Durability of the resistive touch panels

The typical life time of a touch panel applied in the industry is equivalent to at least 1,000,000 touches with the fingertip.

Deployment of hard and/or sharp objects – like fingernails, ballpoint pens or keys – impairs the touch panel's cover sheet. In this case, the pressing force and the accuracy of the pressure point my decrease ahead of time. Additionally, hard and/or sharp objects can damage the touch panel mechanically.

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.

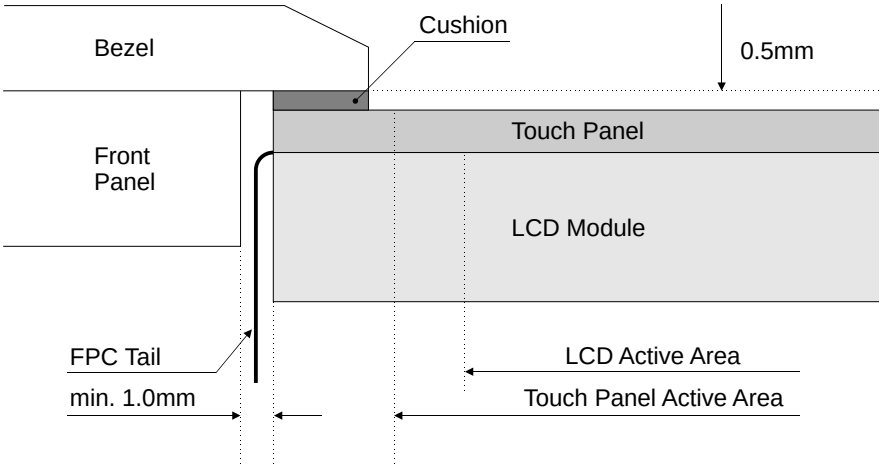
Treatment of the FFC Tail

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 unintendedly 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.



Helpful examples of detailed touch screen integration guides can be found on the web via a search for "resistive touch screen panel integration guide en pdf".

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.

Module Function Description

Important Information about USB and Serial Ports

The above mentioned modules contain a USB and two 3V3 serial ports. Serial port 1 and USB port is available on the FFC connector by default.

The USB port is implemented in two ways:

- HID device requiring no extra drivers, as all major operating systems use this system-driver for supporting mice and keyboards
- WinUSB device which requires an additional driver and is faster

Setting Baud rates deviating from 115200 Baud can be done via the "Set Baud Rate" command (see the iLCD Command Set documentation) for the serial port currently in use until the next power up or reboot of the iLCD panel. In order to permanently change the Baud rate, go to the iLCD Manager XE's "Settings" page, check the "Hardware Settings" checkbox and set the Baud rate of Serial Port 1. After downloading this new setup data via the USB port to the iLCD panel, the Baud rate is changed automatically according to the new setting, a message box appears.

The Baud rate of the Serial Port 0 can be set in the same way. In case of any misconfiguration possibly further disabling the communication via the serial port, the evaluation board's "Erase" jumper can be set during power up (pulling the RX1 port low) to completely erase the flash user data. The default value of 115200 Baud is reset on both serial ports and the user data has to be re-written via the iLCD Manager XE.

The serial port 0 is not connected to the FFC connector of the board by default. If you need to have this option installed, please contact demmel products for instructions about how to adapt your hardware. If installed, serial port 0 uses the D+ and D- pins of the "Control" FFC connector and the USB port is not available anymore. The serial port 1 is always connected to the FFC connector and can be disabled via the iLCD Manager XE.

General Information about Port Pins

Most port pins can be used as outputs (push/pull or pull down only outputs), as keyboard column outputs or as digital inputs besides of their primary function. The assignment of these port pins must be done once via the iLCD Manager XE under the "Settings page" after checking the "I/O Settings" checkbox. The names of the pins described below refer to the primary function only, the notes show the alternative functionality.

As the DPC3050 (for DPP-CTS2432 and DPP-CTS2440 models only) / DPC3090 iLCD controller is working with a power supply of 3/3.3V (a voltage-regulator for this voltage is on-board allowing the board to work with single 5V supply), push/pull outputs have a voltage swing of 0V ... 3/3.3V. Pull down outputs and digital inputs are 5V tolerant (with some exceptions, see the comments below) allowing to work with 5V systems as well.

Pin Descriptions

Power Connector (Power)

The DPP-Hx50, the DPP-x57, the DPP-x70 and the DPP-Cx1060A iLCD panels can either be supplied via the Power Connector or via the Control Port. For the DPP-x70 and the DPP-Cx1060A iLCD panels the 24-pin Control Port, all three GND pins must be connected and all three VCC pins must be connected to not exceed the maximum allowed current per pin of the FFC/FPC connector. All other iLCD panels do have a lower operating current thus requiring only a 20-pin Control Port connector.

Pin #	Pin Name	Direc-tion	Primary Function Description
1	GND [1])	-	Ground pin
2	VCC [2])	-	5V (optionally 3.3V) power supply
3	GND [1])	-	Ground pin

Note:
[1]) The GND pin is connected to pin 4, 23 and 24 of the Control Port FFC/FPC connector.
[2]) The VCC pin is connected to pin 1, 21 and 22 of the Control Port FFC/FPC connector.

WARNING! Reversed power supply connections (Vcc and Gnd) made to the iLCD module or invalid power supply voltage greater than 5.5V (3.3/3.6V when using a 3/3.3V variant) will cause module damage.

Control Port (Control)

Connection to the control port is made via a 20-pin or a 24-pin (DPP-x70 and DPP-Cx1060A models only) FFC/FPC cable with 1.0 mm pitch. The FFC/FPC connector on the board is a top-contact model. Please note, that smaller color iLCD panels do have a 20-pin FFC/FPC connector only. The additional 4 pins of the 24-pin FFC/FPC connector for the larger models are used due to the higher operating current only and contain VCC and GND pins only.

If one wants to connect an evaluation kit of the smaller color iLCD panels to the 24-pin FFC/FPC connector, this can be done by using a 20-pin FFC/FPC cable, if the cable is orientated at pin 1 (pin 21 ~ 24 kept free then) and a 5V power supply is applied to the Power port then. The Vsel jumper of the evaluation board must be removed in this case!

Please note that the pin names of the serial port connections are seen from the driving PC / application side, that means a pin with name TX is in fact the output of the PC and an input of the iLCD panel. "Direction" is valid only when the primary function is enabled.

Pin #	Pin Name	Direc-tion	Primary Function Description
1	VCC [10])	-	5V (optionally 3/3.3V) power supply
2 [1])	USB-	In/Out	USB-, can be directly connected to pin 2 of a USB-Jack B

Pin #	Pin Name	Direc-tion	Primary Function Description
3 [2])	USB+	In/Out	USB+, can be directly connected to pin 3 of a USB-Jack B
4	GND	-	Ground pin
5	TX1 [3])	In	Serial port 1, transmit line from PC, receive input of iLCD controller. Can be used for RS422/RS485 in conjunction with ALERT pin
6	RX1 [3])[8])	Out	Serial port 1, receive line to PC, transmit output of iLCD controller. Can be used for RS422/RS485 in conjunction with ALERT pin
7	CTS	Out	Output to avoid input buffer overflow, connect to RS232 driver's CTS of the PC. Common for both serial ports.
8	SDA [4])[7])	In/Out	I^2C data pin. Note, that there is no pull up resistor on the iLCD panel, so an external resistor may be necessary depending on the I^2C bus structure.
9	SCL [4])[7])	In/Out	I^2C clock pin. Note, that there is no pull up resistor on the iLCD panel, so an external resistor may be necessary depending on the I^2C bus structure.
10	ALERT [3])	Out	Output pin to indicate I^2C data availability (= low) to the I^2C master. When using the RS422/RS485 mode on the second serial port, pin goes low during data transmit.
11	SCK [3])	In	Clock for SPI
12	MISO [3])	Out	Serial output line for SPI
13	MOSI [3])	In	Serial input line for SPI
14	SSEL [3])[6])	In/Out	Must be tied to GND when using SPI
15	REL0	Out	Relay output 0 / PWM0 output
16	REL1	Out	Relay output 1 / PWM1 output
17	GP0 [5])[12])	In/Out	General purpose I/O pin 0. Use serial resistor when driving a LED. / DAC
18	GP1 [5])	In/Out	General purpose I/O pin 1. Use serial resistor when driving a LED.
19	I/O5 [3])[9]) RESET	In/Out In/Out	Digital I/O pin /RESET – Pulling this pin low resets the iLCD module
20	Vbatt	-	Backup input voltage for real-time clock, should be between 2.5V and 3.3V
21	VCC [10])	-	5V (optionally 3.3V) power supply
22	VCC [10])	-	5V (optionally 3.3V) power supply
23	GND [11])	-	Ground pin
24	GND [11])	-	Ground pin

Pins configurable in the iLCD Manager XE I/O Settings are bold

Note:

[1]) Alternatively TX0, see "Important Information about USB and Serial Ports"

[2]) Alternatively RX0, see "Important Information about USB and Serial Ports"

[3]) This pin can be used as a digital input, a push/pull or pull down output or a keyboard column output when the primary function is not enabled.

[4]) This pin can be used as a digital input, a pull down output or keyboard column output when the primary function is not enabled.

[5]) This pin can be used as a digital input, an analog input, a push/pull or pull down output or a keyboard column output. The voltage on this pin is not allowed to exceed 3/3.3V, even if it is used as a digital input or a pull-down output.

[6]) When using SPI, this pin must be used as SSEL for selecting the SPI via attaching a low signal.

[7]) When using the I^2C port, this pin must be terminated with a resistor (usually 3k3) to 3/3.3V or 5V when the iLCD panel is the last device on the I^2C bus. Please note, that the evaluation board has this pull-up resistor populated on the board.

[8]) When pulling low this pin via a 1k resistor during power-up, the flash memory's user data is erased.

[9]) The functionality of this pin depends on the setting of Jumper J2 and J3. When configured as /RESET pin, the board's internal power up reset signal can be seen on this pin as well.
[10]) Connect all VCC pins together in case you supply the iLCD panel via the FFC/FPC connector. VCC is connected to Pin 2 of the Power Connector as well. This pin is available DPP-x70 and DPP-Cx1060A only.
[11]) Connect all GND pins together in case you supply the iLCD panel via the FFC/FPC connector. GND is connected to Pin 1 and 3 of the Power Connector as well. This pin is available on DPP-x70 and DPP-Cx1060A only.
[12])This pin can be used as Digital Analog Converter (DAC) in addition. This function is available for DPC3090 only.

WARNING! Reversed power supply connections (Vcc and Gnd) made to the iLCD module or invalid power supply voltage greater than 5.5V (3.3/3.6V when using a 3/3.3V variant) will cause module damage.

Keyboard Port (Keyboard)

Connection to the keyboard port is made via a 20-pin FFC/FPC cable with 1.0 mm pitch. The FFC/FPC connector on the board is a top-contact model.

Pin #	Pin Name	Direc-tion	Primary Function Description
1	KBR0	In	Keyboard row 0
2	KBR1	In	Keyboard row 1
3	KBR2	In	Keyboard row 2
4	KBR3	In	Keyboard row 3
5	KBR4	In	Keyboard row 4
6	KBR5	In	Keyboard row 5
7	KBR6	In	Keyboard row 6
8	KBR7	In	Keyboard row 7
9	KBC0 [1])	Out	Keyboard column 0, optionally I/O pin
10	KBC1 [1])	Out	Keyboard column 1, optionally I/O pin
11	KBC2 [1])	Out	Keyboard column 2, optionally I/O pin
12	KBC3 [1])	Out	Keyboard column 3, optionally I/O pin
13	KBC4 [1])	Out	Keyboard column 4, optionally I/O pin
14	KBC5 [1])	Out	Keyboard column 5, optionally I/O pin
15	KBC6 [1])	Out	Keyboard column 6, optionally I/O pin
16	KBC7 [1])	Out	Keyboard column 7, optionally I/O pin
17	KBC8 [1])	Out	Keyboard column 8, optionally I/O pin
18	GP2 [2])	In/Out	General purpose I/O pin 0. Use serial resistor when driving a LED.
19	GP3 [2])	In/Out	General purpose I/O pin 1. Use serial resistor when driving a LED.
20	I/O6 [1])	In/Out	Digital I/O pin

Pins configurable in the iLCD Manager XE I/O Settings are bold

Note:

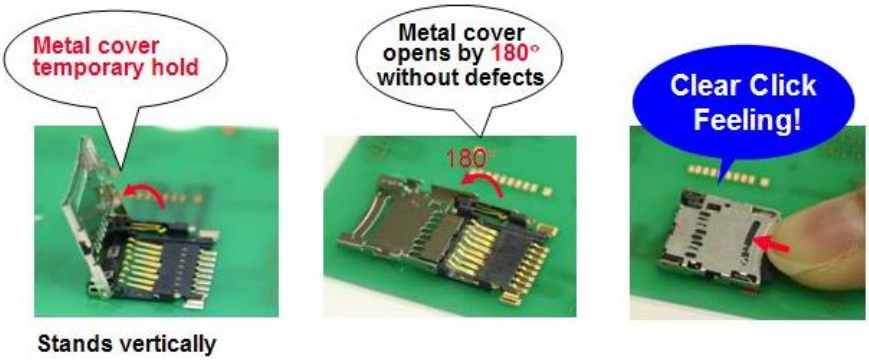
[1]) This pin can be used as a digital input, a push/pull or pull down output or a keyboard column output when the primary function is not enabled.

[2]) This pin can be used as a digital input, an analog input, a push/pull or pull down output or a keyboard column output. The voltage on this pin is not allowed to exceed 3.3V, even if it is used as a digital input or a pull-down output.

MicroSD Connector (Micro-SD)

All iLCD panels except the two smallest models (DPP-CTS2432 and DPP-CTS2440) have a MicroSD card holder on-board. A MicroSD card with up to 32 GBytes may be inserted for memory extension. Please note that MicroSD and MicroSDHC are supported. demmel products' DPA-SD-EXT-N accessory board can be used to connect an External SD Card Connector. For this purpose, a PCB with the shape of a MicroSD card is included in this accessory.

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.



External SD Card Connector (External SD)

The External SD Card Connector provides the option to connect a standard SD card to the iLCD display. demmel products' DPA-SD-EXT and DPA-SD-EXT-N boards are available to interface to the External SD Card Connector or to the MicroSD card holder for iLCD panels without an External SD Card Connector.

Jumper J1 (J1)

If jumper J1 is set (= soldered) the frame ground of the display is connected to GND, otherwise the frame ground is not connected.

iLCD panels not having the jumper J1, have the frame ground connected to GND.

Jumper J2 and J3 (J2 and J3)

If jumper J2 is set (= soldered) and jumper J3 is open, pin 19 of the control port is connected to I/O5.
If jumper J2 is open and jumper J3 is set (= soldered), pin 19 of the control port is connected to RESET.

Please note, that the default configuration has jumper J2 set and jumper J3 open.

Contrast and Gamma Value Setting

Please be informed that most of the panels described in this document do not need to set the contrast and the gamma values, as these values are set to the optimum values by the TFT panel producer. So setting the contrast and the gamma values via software on the actual models does not have any effect, the iLCD Manager XE does not even offer to modify these values. Your application may issue the "Get Fixed LCD Contrast/Gamma" command to know if your iLCD panel needs to have set the contrast and gamma values.

Please see the iLCD Command Set documentation describing the common command set available for all iLCD modules.

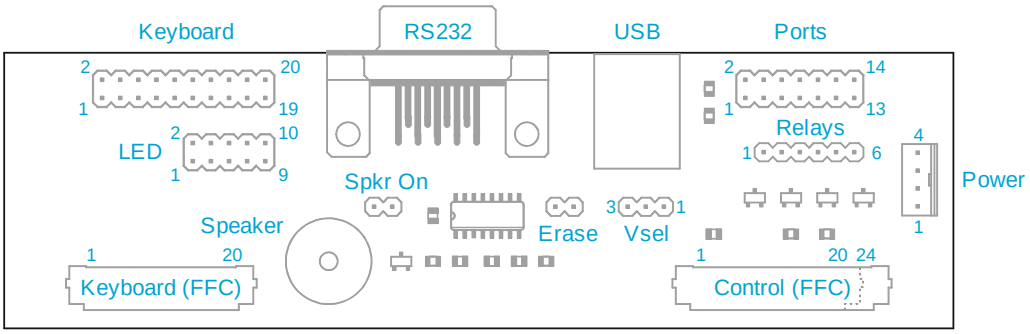
Evaluation Board

To make it easier to use and program the iLCD panels, a universal evaluation board has been designed. The iLCD panel is connected to the evaluation board via two FFC cables (2 x 24-pin or 1 x 20-pin and 1 x 24-pin) and contains the following parts:

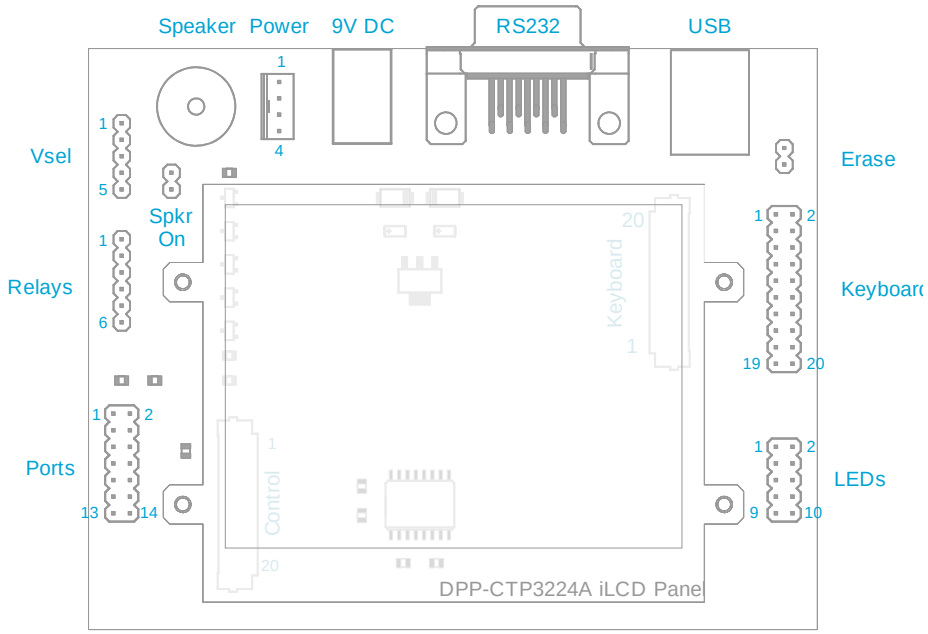
- RS232 Sub-D 9-pin connector + RS232 driver IC
- USB Jack (type B)

- Power supply connector
- Speaker
- Terminal pins for relays, keyboard, ports and LEDs + interface electronic

Connectors and Jumpers



Universal evaluation board connector and jumper locations



DPP-CTP3224A evaluation board connector and jumper locations

Control Connector to iLCD (Control (FFC))

This 20-pin or 24-pin (when intended to be used for DPP-x70 or DPP-Cx1060A) connector must be connected to the iLCD panel with the corresponding FFC connector. Please note, that the 20/24-pin FFC cable enclosed with the evaluation kit must be inserted with the contact surface upwards as the FFC connector is a top-contact model. The same is true for the FFC connector on the iLCD panel itself. As the board is intended to be used with the parts showing upwards when it is connected with the iLCD panel (display surface showing upwards as well), the FFC cable has the contact surface on the opposite sides on the two ends to accomplish a correct connection between evaluation board and iLCD panel.

Keyboard Connector to iLCD (Keyboard (FFC))

This 20-pin connector can be connected to the iLCD panel with the corresponding FFC connector. Please see the chapter above for learning how to insert the FFC cable.

Power Supply Connector (Power)

This connector applies the 5V power supply to the iLCD module if there is no USB port connected to the module. The connector used for this connection is the same as the power supply connector for a 3 ½" floppy disk drive, and has the same pinning.

Please note, that all iLCD panels mentioned in this document are available in a 3/3.3V variant optionally as well. If you connect an iLCD panel with 3/3.3V supply to the evaluation board, you must use 3/3.3V instead of the 5V supply, otherwise the iLCD panel would be damaged! Supplying the board plus the iLCD panel via USB port is not possible in this case!

The evaluation board itself can be operated with 3V up to 5V without having to change any settings.

Pin	Description
1	Not connected
2	Ground
3	Ground
4	V_{CC} (+5V / +3/3.3V)

AC/DC Power Adapter Connector (9V DC)

This connector can be used as an alternative to the Power Supply Connector when the iLCD module is not powered via the USB port. An unregulated power supply with 9V to 12V DC can be connected to the jack, the middle contact must be connected to the positive voltage. This input is safe against reverse polarity.

Power Supply Configuration Connector (Vsel)

Only one jumper is allowed to be set to select the power source for the iLCD module as follows:

Universal Evaluation Board		
Jumper Location		Description
Pin	Pin	
1	2	Supply via Power (V_{CC})
2	3	Supply via the USB port

DPP-CTP3224A Evaluation Board		
Jumper Location		Description
Pin	Pin	
1	2	Enables the power supply connector's pin 4 (V_{CC})
2	3	Enables supplying the iLCD module via the USB port
3	4	Enables supplying the iLCD module via the USB port
4	5	Enables the power supply connector's pin 1 (V_{UNREG}) and/or the power jack

Please note, that the DPP-x70 and DPP-Cx1060A iLCD panels can not be supplied via the USB port, as the USB port allows to draw a maximum of 500 mA only, which is exceeded by the DPP-x70 and DPP-Cx1060A iLCD panels. Trying to draw more than 500 mA from a USB port may damage your PC!

Serial Port Connector (RS232)

This 9-pin Sub-D female connector allows the driving application or PC to send and receive data from and to the iLCD module via standard RS232 signals. The pinning matches the standard layout of a PC's serial port.

The pins are connected with the iLCD's serial port 1, please see the note "Important Information about USB and Serial Ports"

Pin On Sub-D	Direction	Description
1	-	Not connected
6	-	Not connected
2	Out	RX - data sent from the iLCD module to the controlling application / PC
7	In	RTS – not in use, but connected to the iLCD's RS232 driver
3	In	TX – data sent from the controlling application / PC to the iLCD module
8 [1])	Out	CTS – iLCD's output for hardware flow control
4	-	Not connected
9	-	Not connected
5	-	Signal ground

Note:

[1]) See iLCD Command Set documentation about why you should connect this pin and when it is not necessary to use hardware flow control.

USB Connector (USB)

This connector enables you to connect iLCD's USB port to a USB port on a PC via a standard USB cable.

Pin	Direction	Description
1	-	Vcc +5V
2	In/Out	USB-
3	In/Out	USB+
4	-	Ground

General Port Connector (Ports)

This connector enables you to connect the I^2C port and some other signals described below. "Direction" is valid only when the primary function is enabled.

Pin #	Pin Name	Direc-tion	Primary Function Description
1	VCC	-	3/3.3/5V power supply
2	SDA [4])	In/Out	I^2C data pin. Note, that there is no pull-up resistor on the iLCD panel itself, but the evaluation board contains a 3k3 pull-up resistor.
3	RX [1])	Out	Serial port 0, receive line to PC, transmit output of iLCD controller.
4	SCL [4])	In/Out	I^2C clock pin. Note, that there is no pull-up resistor on the iLCD panel itself, but the evaluation board contains a 3k3 pull-up resistor.
5	TX [1])	In	Serial port 0, transmit line from PC, receive input of iLCD controller
6	ALERT [3])	Out	Output pin to indicate I^2C data availability (= low) to the I^2C master. When using the RS422/RS485 mode on the second serial port, pin goes low during data transmit.
7	CTS [2])	Out	Output to avoid input buffer overflow, connect to CTS of the PC. Common for both serial ports.
8	SSEL [3])[5])	In/Out	Must be tied to GND when using SPI
9	I/O5 [3])[6]) RESET	In/Out In/Out	Digital I/O pin /RESET – Pulling this pin low resets the iLCD module
10	SCK [3])	In	Clock for SPI
11	GND	-	Ground pin
12	MISO 3)	Out	Serial output line for SPI
13	Vbatt	-	Backup input voltage for real-time clock, should be between 2.5V and 3.3V
14	MOSI 3)	In	Serial input line for SPI

Note:

[1]) This pin should not be connected when the USB+ and USB- are connected to these pins.

[2]) The digital CTS output connected to this pin is connected to the CTS port driver of primary RS232 port internally. This means that the iLCD's hardware flow control pin CTS is common for both RS232 ports.

[3]) This pin can be used as a digital input, a push/pull or pull down output or a keyboard column output when the primary function is not enabled.

[4]) This pin can be used as a digital input, a pull down output or keyboard column output when the primary function is not enabled.

[5]) When using SPI, this pin must be used as SSEL for selecting the SPI via attaching a low signal.

[6]) The functionality of this pin depends on the setting of Jumper J2 and J3 on the iLCD panel. If configured as /RESET pin, the board's internal power up reset signal can be seen on this pin as well.

General Purpose I/O Connector (LEDs)

Depending on the settings in the iLCD Manager XE, the I/O ports can be a digital input, a push/pull or a pull-down output or an ADC input.

Pin	Name	Direc-tion	Description
1	VCC	-	5V (optionally 3/3.3V) power supply
2	I/O5 [1])[3]) RESET	In/Out In/Out	Digital I/O pin /RESET – Pulling this pin low resets the iLCD module
3	I/O6 [1])	In/Out	Digital I/O pin
4	GP0 [2]) [4])	In/Out	General purpose I/O pin 0. Use serial resistor when driving a LED. / DAC
5	N/C	-	Not connected
6	GP1 [2])	In/Out	General purpose I/O pin 1. Use serial resistor when driving a LED.
7	N/C	-	Not connected
8	GP2 [2])	In/Out	General purpose I/O pin 0. Use serial resistor when driving a LED.
9	GND	-	Ground pin
10	GP3 [2])	In/Out	General purpose I/O pin 1. Use serial resistor when driving a LED.

Note:

[1]) This pin can be used as a digital input, a push/pull or pull down output or a keyboard column output.

[2]) This pin can be used as a digital input, an analog input, a push/pull or pull down output or a keyboard column output. The voltage on this pin is not allowed to exceed 3/3.3V, even if it is used as a digital input or a pull-down output.

[3]) The functionality of this pin depends on the setting of Jumper J2 and J3 on the iLCD panel. If configured as /RESET pin, the board's internal power up reset signal can be seen on this pin as well.

[4]) This pin can be used as Digital Analog Converter (DAC) in addition. This function is available for DPC3090 only.

Keyboard Connector (Keyboard)

Pin	Name	Direction	Description
1	KBR0	In	Keyboard row 0
2	KBR1	In	Keyboard row 1
3	KBR2	In	Keyboard row 2
4	KBR3	In	Keyboard row 3
5	KBR4	In	Keyboard row 4
6	KBR5	In	Keyboard row 5
7	KBR6	In	Keyboard row 6
8	KBR7	In	Keyboard row 7
9	KBC0 [1])	Out	Keyboard column 0, optionally I/O pin
10	KBC1 [1])	Out	Keyboard column 1, optionally I/O pin
11	KBC2 [1])	Out	Keyboard column 2, optionally I/O pin
12	KBC3 [1])	Out	Keyboard column 3, optionally I/O pin
13	KBC4 [1])	Out	Keyboard column 4, optionally I/O pin
14	KBC5 [1])	Out	Keyboard column 5, optionally I/O pin
15	KBC6 [1])	Out	Keyboard column 6, optionally I/O pin
16	KBC7 [1])	Out	Keyboard column 7, optionally I/O pin
17	KBC8 [1])	Out	Keyboard column 8, optionally I/O pin
18	I/O5 [1])[2]) RESET	In/Out In/Out	Digital I/O pin /RESET – Pulling this pin low resets the iLCD module
19	I/O6 [1])	In/Out	Digital I/O pin
20	GND	-	Ground pin

Note:

[1]) This pin can be used as a digital input, a push/pull or pull down output or a keyboard column output when the primary function is not enabled.

[2]) The functionality of this pin depends on the setting of Jumper J2 and J3 on the iLCD panel. If configured as /RESET pin, the board's internal power up reset signal can be seen on this pin as well.

Relays Connector (Relays)

The two relays, which may be connected to the iLCD board, can be supplied using up to 24V. The iLCD module contains a diode for any of the two relays outputs to protect the switching transistor against reverse voltage. To enable the diodes to protect the transistors, the relay supply voltages must be connected to the board too.

Pin	Direction	Description
1	-	Relay 1 positive supply voltage
2	Out	Relay 1 output (minus pin of relay)
3	-	Ground
4	Out	Relay 0 output (minus pin of relay)
5	-	Relay 0 positive supply voltage
6	-	Vcc +5V (optionally 3/3.3V)

Relay 0 can also be used to drive a speaker or buzzer and relay 1 can be used to generate a pulse-width modulated output voltage. Please have a look to the iLCD Command Set documentation to learn more about how to control these output ports in this case.

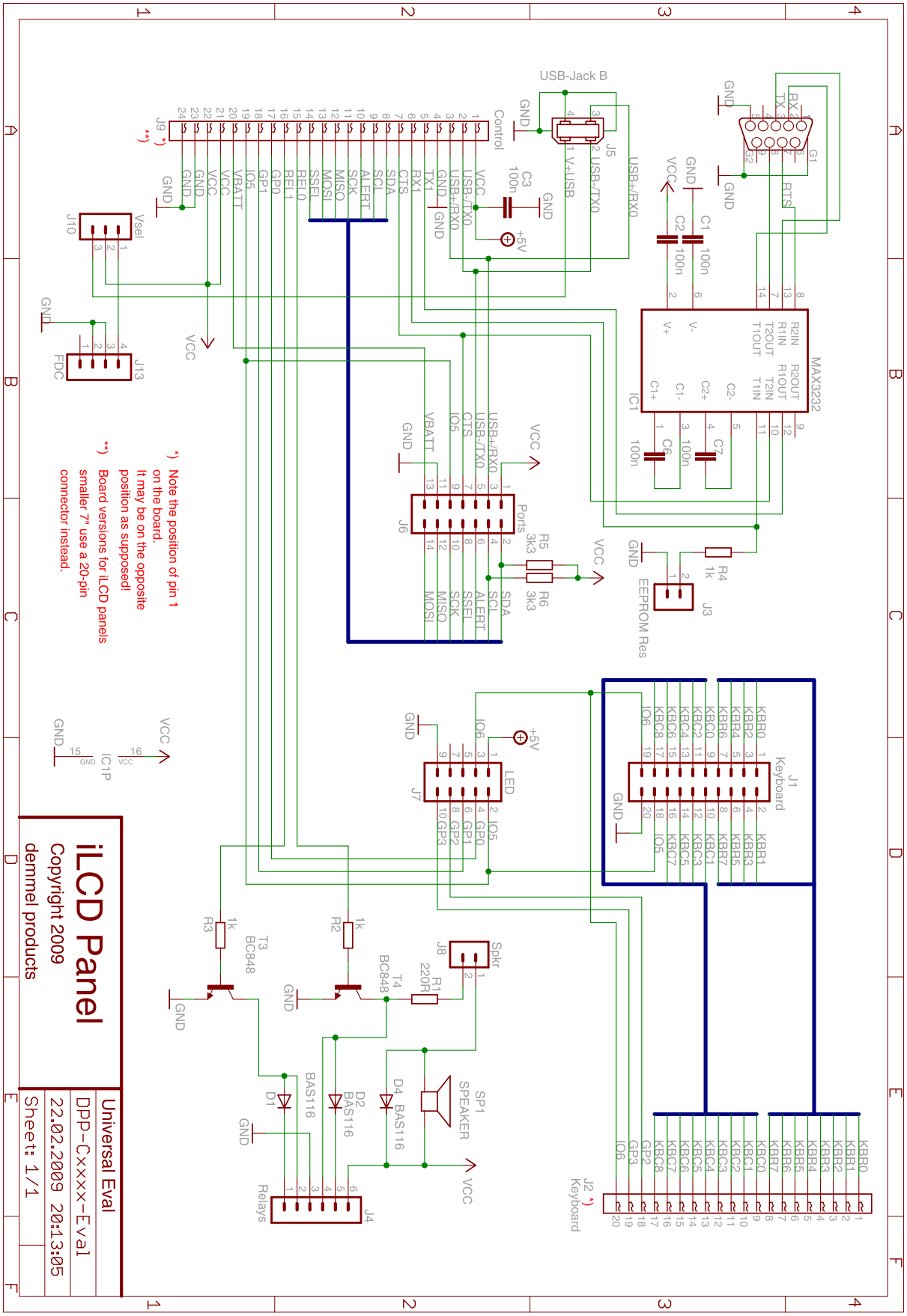
Speaker-On Jumper (Spkr On)

When a jumper is connected to this connector, the Relay 0 output is connected to the evaluation board's speaker via a resistor.

Erase Jumper (Erase)

When a jumper is connected to this connector, the iLCD module erases all user data from the Flash memory at boot time. A corresponding message is shown on the LCD. Please remove the jumper after startup to avoid consecutive erasing of Flash contents at the next startup.

Schematic Evaluation Board



Revision History

Date	Rev. #	Revision Details
October 27, 2020	2.3	Added description for DPP-Sx43
April 30, 2019	2.2	DAC functionality added
July 10, 2017	2.1	Added description for DPP-C102
January 22, 2015	2.0	Reordered content, removed obsolete iLCDs
November 25, 2014	1.13	Added description for DPP-HC50, DPP-C57, DPP-C70
October 6, 2014	1.12	Added description for DPP-x43, DPP-x57 and DPP-x70, Quality and Assembly chapters
February 17, 2014	1.11	Added description for DPP-Hx50
November 21, 2013	1.10	Added Vsel Table for universal evaluation board, highlighting configurable pins in control connector and keyboard connector tables, added DPP-Cx8048A version
March 27, 2013	1.9	Updated current consumption for DPP-CxP3224A and DPP-Cx1060A (firmware version 4.05 and newer), Added Vbatt current consumption
January 25, 2013	1.8	Added description for DPP-CxP3224A
September 26, 2012	1.7	Added description for DPP-Cx1060A
August 8, 2011	1.6	Changes of chapter "Important Information about USB and Serial Ports"
May 13, 2011	1.5	Added new board versions for DPP-Cx4827, DPP-Cx6448 and DPP-Cx1060
September 16, 2010	1.4	Added description for DPP-CTS2440 and DPP-Cx6448
February 22, 2010	1.3	Added description for DPP-CTS2432 and DPP-CxP3224-2
September 28, 2009	1.2	Added description for DPP-CT3224-2
February 23, 2009	1.1	Added description for DPP-Cx4827
October 26, 2008	1.0	Initial release

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