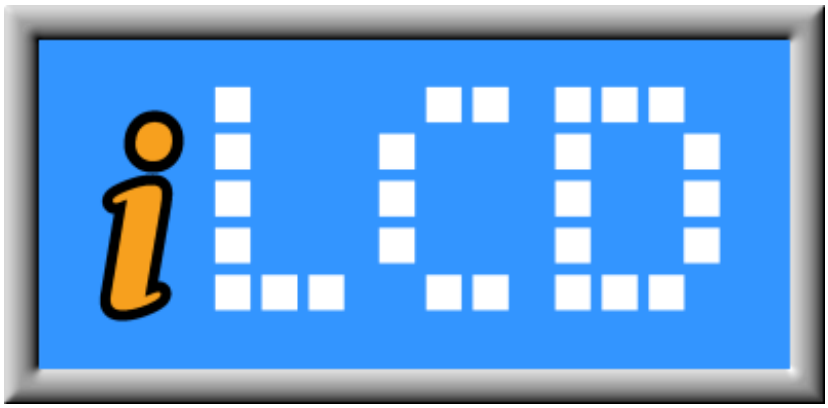

Next Generation Intelligent LCD Panels

DPP-D12864 Series Specification

Version 1.1
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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 or via USB.

Numbering System

Example:

DP	P	-	D12864	G	3	2	0	1	0	-	B	F	H
1	2	3	4	5	6	7	8	9	10	11	12	13	14

Description:

No.	Description	Explanation	
1	Brand	demmel products	
2	Product	P = iLCD Panel	
3	Separator		
4	Format	D12864 = 128 x 64 dots, DIP version	
5	Display Type	B = Chip on board /w pin headers	G = Chip on glass /w FCC connector Z = Chip on board /w FCC connector
6	ILCD Controller	1 = DPC1010 3 = DPC1030	5 = DPC1050
7	Control ports [1])	0 = 5 Volt serial + I^2C 1 = RS-232 port	2 = USB port 4 = RS-422/RS-485 port
8	I/O Ports [1])	0 = No I/O ports 1 = General purpose I/O	2 = ATX power outputs 4 = Relay outputs
9	Options [1])	0 = No options 1 = Keyboard inputs	2 = Micro power reference 2.5 Volt 4 = Micro power reference 4.0 Volt
10	Power Supply [1])	0 = Jumper only 1 = Floppy disk power supply	2 = Built in regulator
11	Separator [2])		
12	LCD manufacturer [2])	B = Bolymin	E = EDT
13	LCD Color [2])	G = STN/gray Y = STN/yellow green	B = STN/blue F = FSTN
14	Backlight type/color [2])	L = LED array/yellow green H = LED edge/white R = LED array/red G = LED edge/yellow-green	D = LED edge/blue E = EL/white B = EL/blue C = CCFL/white

Note:
1. The resulting number is calculated by adding the options' numbers.
2. These positions are omitted when the numbering system is used for iLCD controller boards.

Features

Display Specific Data

Item	DPP-D12864xxxxxx-BFH	DPP-D12864xxxxxx-BBH
LCD Controlle	SED1565	
Display Format	Transflective and positive type graphic LCD 128 x 64 dot-matrix	
Display Mode	Black/White Mode FSTN	Negative Blue STN
Backlight	White LED	
Viewing Direction	6 O'clock	

Electrical Specific Data

Item	All models
Connectivity	USB 1.1 / 2 x RS-232 5 Volt / I^2C
I/O Ports	4 general purpose ports (8 bit ADC 0..5 Volt or digital input or LED output),2 LED outputs, keyboard with max. 32 keys, 2 relays outputs, application reset switch out

Mechanical Specification

Item	Specification	Unit
Module Dimension	72.5 x 48.0	mm
View Area	68.0 x 36.0	mm
Dot Size	0.47 x 0.47	mm
Dot Pitch	0.50 x 0.50	mm

Maximum Ratings

Item	Symbol	Minimum	Maximum	Unit
Supply Voltage	V_{CC}	-0.3	5.5	V
Input Voltage	V_{IN}	-0.3	V_{CC} + 0.3	V
Operating Temperature	T_{OPR}	-20	70	°C
Storage Temperature	T_{STR}	-30	70	°C
Humidity			90	%RH

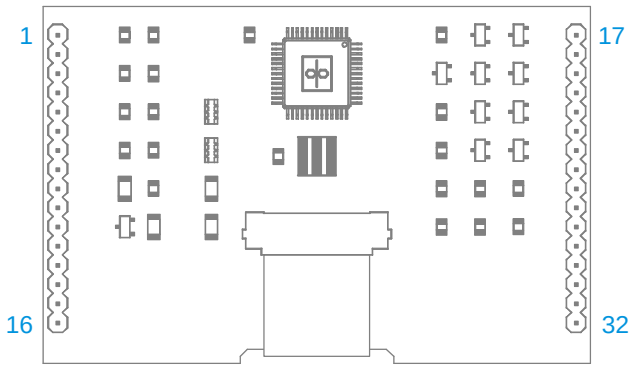
Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply Voltage	V_{CC}	-	4.75	5.0	5.25	V
Input Voltage H Level [1])	V_{IH}	-	0.7 V_{CC}	-	V_{CC}	V
Input voltage L Level [1])	V_{IL}	-	0.0	-	0.8	V
Current Consumption	I_{DD}	No ports active, B/L off		45		mA
B/L LED Current Consumption	I_{LED}	V_{CC} = 5V		40		mA

Note:
1. For digital inputs only

Module Function Description

Pin Descriptions



DPP-D12864 pins (view from P.C.B. side)

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.

Pin	Name	Direc-tion	Description
1	USB-	In/Out	USB-, can be directly connected to pin 2 of a USB-Jack B
2	USB+	In/Out	USB+, can be directly connected to pin 3 of a USB-Jack B
3	TX	In	Serial port 0, transmit line from PC, receive input of iLCD controller
4	RX/Erase	Out	Serial port 0, receive line to PC, transmit output of iLCD controller. When tied to GND at startup: Flash memory erase
5	TX1	In	Serial port 1, transmit line from PC, receive input of iLCD controller. Can be used for RS-422/RS-485 in conjunction with ALERT pin
6	RX1	Out	Serial port 1, receive line to PC, transmit output of iLCD controller. Can be used for RS-422/RS-485 in conjunction with ALERT pin
7	CTS	Out	Output to avoid input buffer overflow, connect to CTS of the PC. Common for both serial ports.
8	SDA	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	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	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	GND	-	Ground pin
12	GP0	In/Out	General purpose I/O pin 0. Use 220R serial resistor when driving a LED.
13	GP1	In/Out	General purpose I/O pin 1. Use 220R serial resistor when driving a LED.
14	GP2	In/Out	General purpose I/O pin 2. Use 220R serial resistor when driving a LED.
15	GP3	In/Out	General purpose I/O pin 3. Use 220R serial resistor when driving a LED.
16	/RESET	In/Out	Power on reset. Goes low on power up.
17	VCC	-	5 Volt power supply
18	KBR0	In	Keyboard row 0
19	KBR1	In	Keyboard row 1
20	KBR2	In	Keyboard row 2
21	KBR3	In	Keyboard row 3
22	KBR4	In	Keyboard row 4
23	KBR5	In	Keyboard row 5
24	KBR6	In	Keyboard row 6
25	KBR7	In	Keyboard row 7
26	KBC0	Out	Keyboard column 0
27	KBC1	Out	Keyboard column 1
28	KBC2	Out	Keyboard column 2, optionally LED4 output pin
29	KBC3	Out	Keyboard column 3, optionally LED5 output pin
30	WD_RES	Out	Watch dog output, can be used to reset the application in case of malfunction. Goes low when watchdog hits.
31	REL0	Out	Relay output 0 / PWM0 output
32	REL1	Out	Relay output 1 / PWM1 output

WARNING! Reversed power supply connections (Vcc and Gnd) made to the iLCD module or invalid power supply voltage greater than 5.5 Volt will cause module damage.

Command Set

Please see the extra document "iLCD Commands" which describes the common command set available for all iLCD modules.

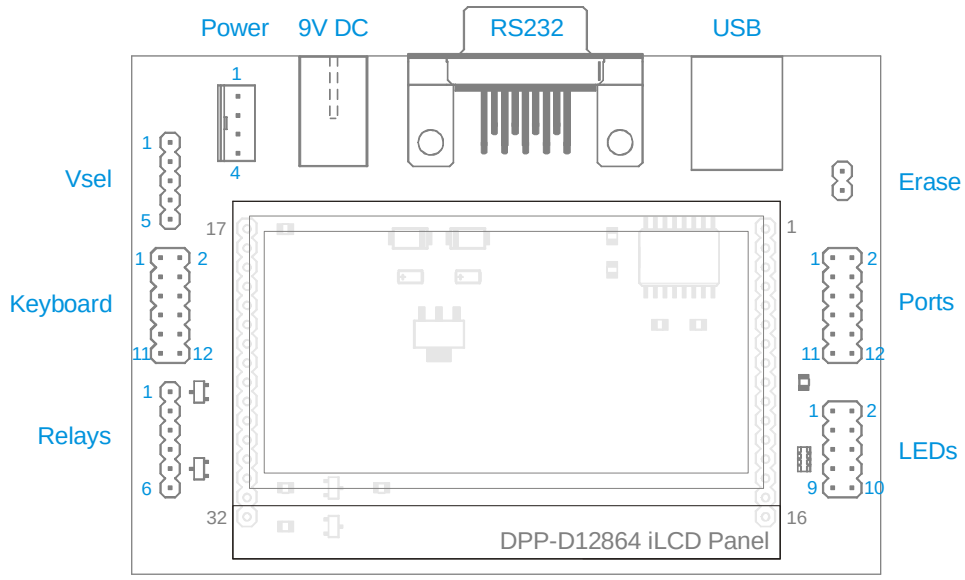
Evaluation Board

To make it easier to use and program the DPP-12864D DIP-panel, an evaluation board has been designed. The DPP-12864D directly plugs into the evaluation board which contains the following parts:

- RS-232 Sub-D 9-pin connector + RS-232 driver IC
- USB Jack (type B)
- Power supply jack + 5 Volt regulator
- Terminal pins for relays, keyboard, ports and LEDs + interface electronic

Connectors and Jumpers

This section describes and illustrates the connectors and jumpers of the evaluation board for the DPP-D12864 iLCD panel.



DPP-D12864 evaluation board connector and jumper locations

Power Supply Connector (Power)

This connector applies the 5 Volt 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.

Pin	Description
1	V_{UNREG} Unregulated power supply 6 … 12 Volt (save against reverse polarity)
2	Ground
3	Ground
4	V_{CC} (+5 Volt)

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 9 to 12 Volt DC can be connected to the jack, the middle contact must be connected to the positive voltage. This input is save 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:

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

Serial Port Connector (RS232)

This p-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.

Pin On Sub-D	Direc-tion	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	Out	CTS – iLCD's output for hardware flow control [1])
4	-	Not connected
9	-	Not connected
5	-	Signal ground

Note:
1. See iLCD's command description about why you should connect this pin and when it is not necessary to use hardware flow control.

General Port Connector (Ports)

This connector enables you to connect the second RS232 port (**5 Volt signals only, no standard RS232 signal level of ± 9 Volt**), the I^2C, and some other signals described below.

Pin	Direc-tion	Description
1	-	Vcc (+5 Volt)
2	In/Out	I^2C Data [1])
3	Out	RX1 - data sent from the iLCD module to the controlling application / PC
4	In/Out	I^2C Clock [1])
5	In	TX1 - data sent from the controlling application / PC to the iLCD module
6	Out	I^2C Alert – signals unexpected data to be sent to the application (e.g. a keystroke)
7	Out	CTS - iLCD's output for hardware flow control – see iLCD's command description [2])
8	-	DO NOT USE THIS PIN
9	In/Out	/RESET – Pulling this pin low resets the iLCD module [3])
10	-	DO NOT USE THIS PIN
11	-	Ground
12		DO NOT USE THIS PIN

Note:
1. This pin has no pull-up resistor on the iLCD board. To match the I^2C specification, it might be necessary to add e.g. a 3k3 resistor.
2. The 5 Volt 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. The board's internal power up reset signal can be seen on this pin as well.

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	Direc-tion	Description
1	-	Vcc +5 Volt
2	In/Out	USB-
3	In/Out	USB+
4	-	Ground

General Purpose I/O Connector (LEDs)

Depending on the settings in the iLCD's setup software the four general purpose I/O ports can be a digital input, a LED output or an ADC input.

Pin	Direc-tion	Description
1	-	Vcc +5 Volt
2	Out	LED 4 (Power LED)
3	Out	LED 5
4	In/Out	LED 0 output / ADC 0 input / General purpose input 0 [1])
5	-	Reserved for future use – DO NOT USE THIS PIN
6	In/Out	LED 1 output / ADC 1 input / General purpose input 1 [1])
7	-	Reserved for future use – DO NOT USE THIS PIN
8	In/Out	LED 2 output / ADC 2 input / General purpose input 2 [1])
9	-	Ground
10	In/Out	LED 3 output / ADC 3 input / General purpose input 3 [1])

Note:
1. The functionality of this pin is set via the iLCD's setup software.

Please note that LED 4 and LED 5 share the same controller outputs as column 2 and 3 of the keyboard. Although there is no visual effect when using LEDs, there are short glitches on the corresponding outputs when the keyboard is scanned, therefore it is not recommended to use this outputs for something other than LEDs. If column 2 / 3 of the keyboard is in use, LED 4 / 5 should not be turned on, as pressing a key can collide with iLCD's internal display processing routines.

Keyboard Connector (Keyboard)

The iLCD module supports up to 32 keys, which are connected in a matrix with 4 columns and 8 rows. The scan code / key code sent by the iLCD module can be set via the setup software for any of the 32 keys.

Pin	Direc-tion	Description
1	In	Row 0
2	In	Row 1
3	In	Row 2
4	In	Row 3

5	In	Row 4
6	In	Row 5
7	In	Row 6
8	In	Row 7
9	Out	Column 0
10	Out	Column 1
11	Out	Column 2
12	Out	Column 3

Please note that LED 4 and LED 5 share the same controller outputs as column 2 and 3 of the keyboard. Although there is no visual effect when using LEDs, there are short glitches on the corresponding outputs when the keyboard is scanned, therefore it is not recommended to use this outputs for something other than LEDs. If column 2 / 3 of the keyboard is in use, LED 4 / 5 should not be turned on, as pressing a key can collide with iLCD's internal display processing routines.

Relays Connector (Relays)

The two relays, which may be connected to the iLCD board, can be supplied using up to 24 Volts. 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.

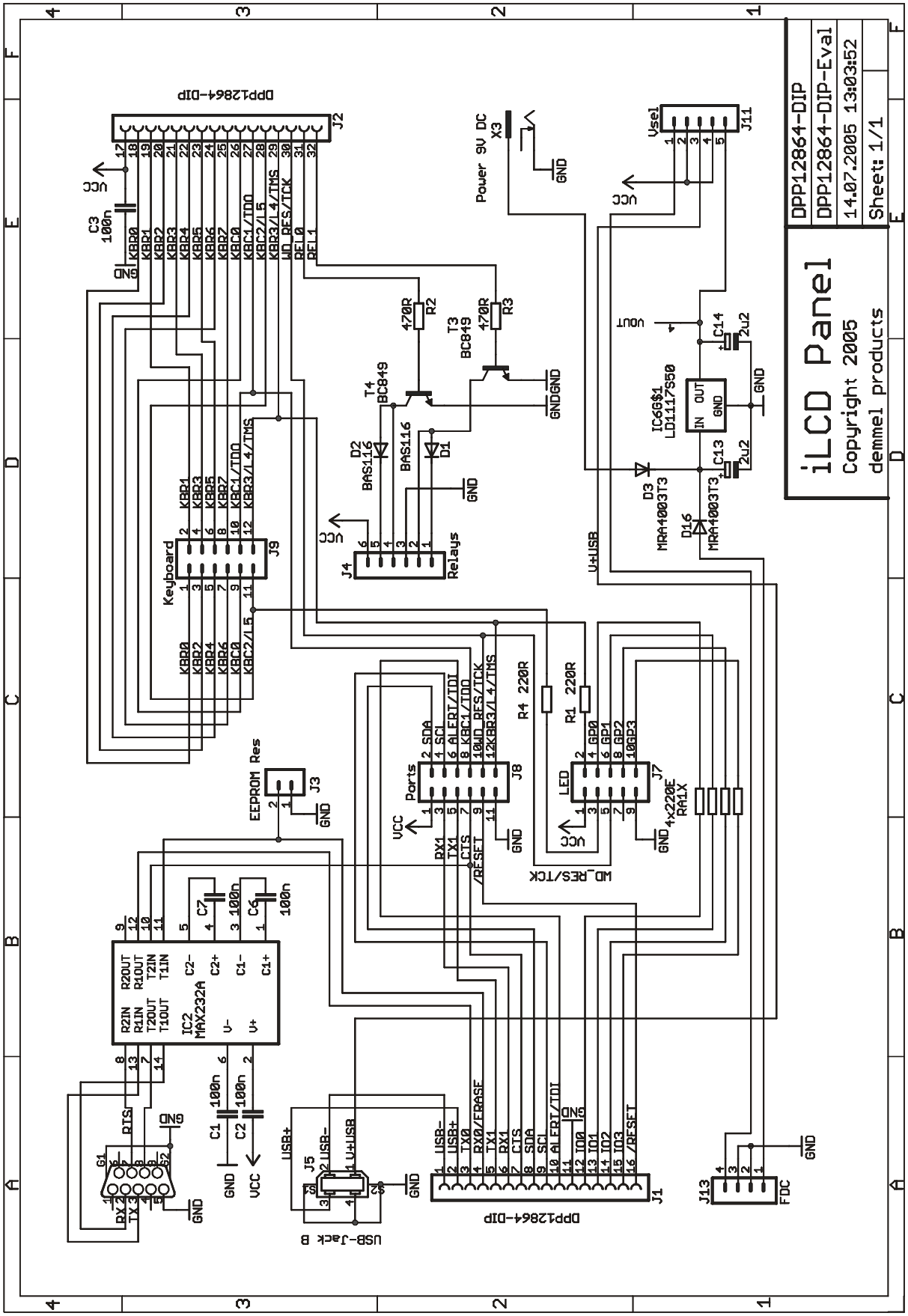
Pin	Direc-tion	Description
1	-	Relay 1 positive supply voltage
2	Out	Relay 1 output (minus pin of relay)
3	-	Ground
4	Out	Relay 0 output (minus pin of relay)
5	-	Relay 0 positive supply voltage
6	-	Vcc +5 Volt

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 extra document "iLCD Commands" to learn more about how to control these output ports in this case.

Erase Jumper (Erase)

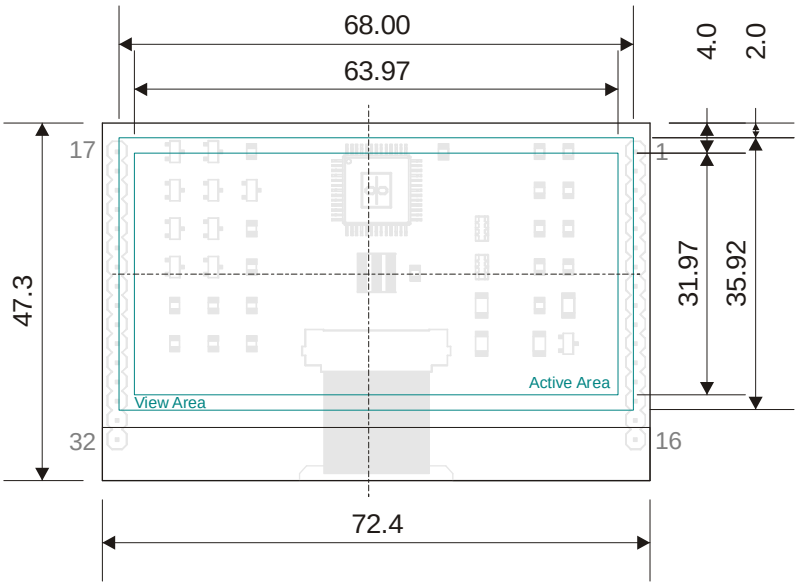
When a jumper is connected to this connector, the iLCD module erases all user data from the Flash memory at boot time. A corresponding message is shown on the LCD. Please remove the jumper after startup to avoid consecutive erasing of Flash contents at the next startup.

Schematic Evaluation Board



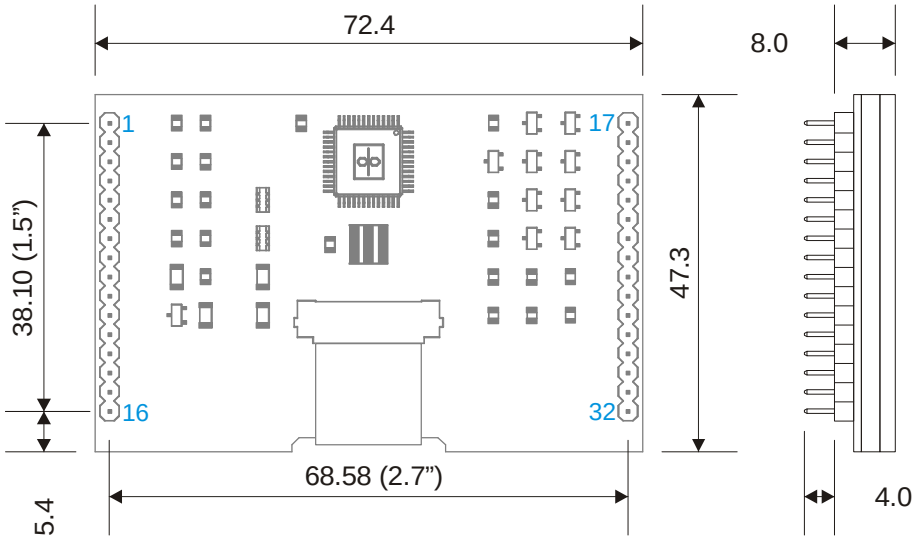
Outline Dimensions

View from display side



Unit: mm Scale: 1 : 1

View from P.C.B. side



Unit: mm Scale: 1: 1

Revision History

Date	Rev. #	Revision Details
January 12, 2009	1.1	Modified temperature range according to new display used now
July 15, 2005	1.0	First Issue

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