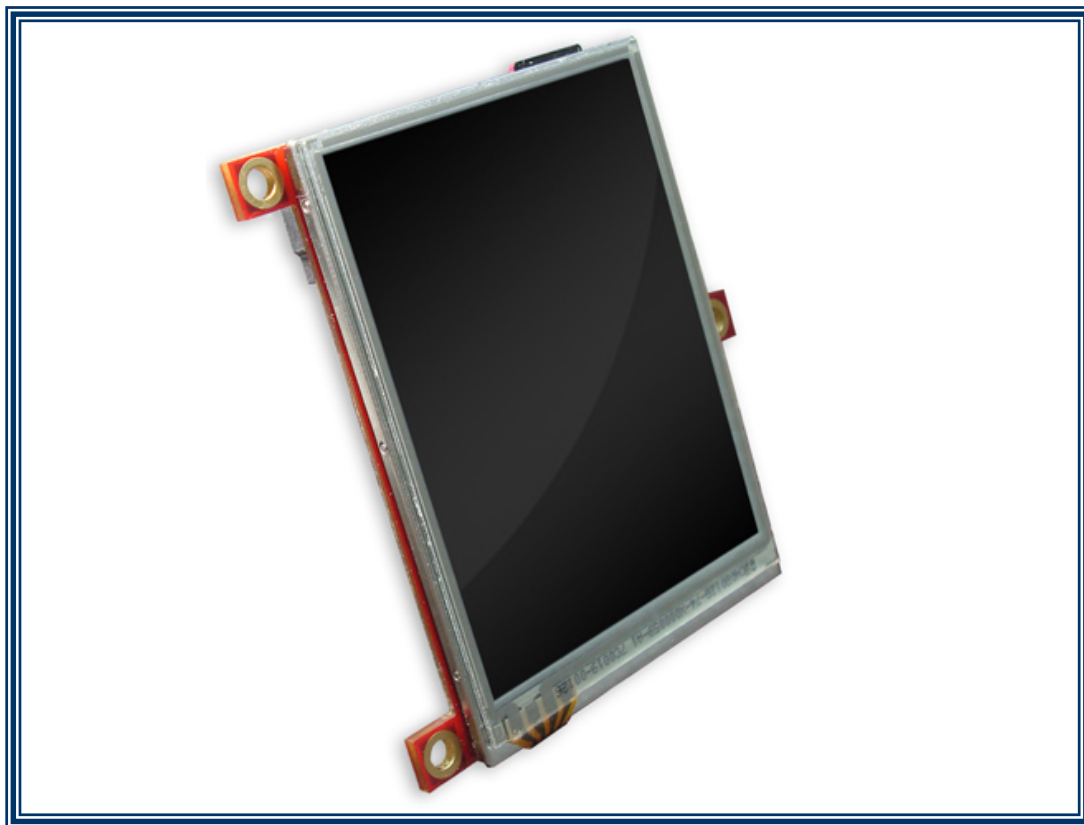


MicroOLED

μ OLED-3202X-P1 USERS MANUAL

(4DGL Platform Only)

Revision 1.0



4D Systems



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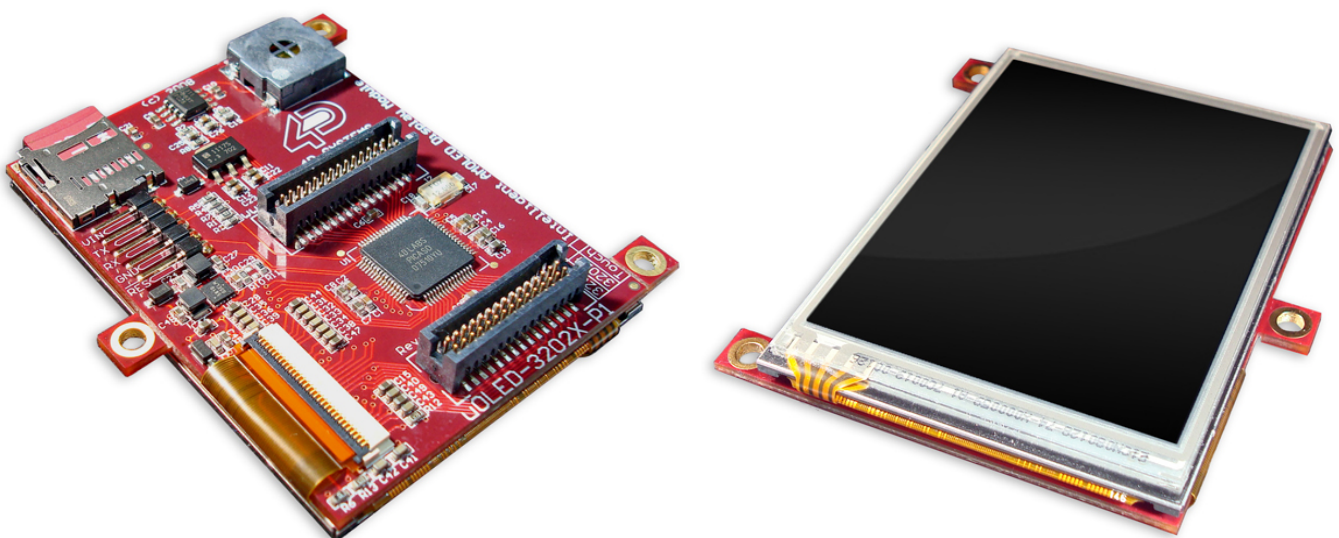


1 Introduction

The **μOLED-3202X-P1** series are a compact and cost effective all in one 'SMART' display modules using the latest state of the art Active Matrix OLED (AMOLED) technology with an embedded **PICASO-GFX** graphics controller that delivers 'stand-alone' functionality to any project. The 'easy to learn and use' 4D Graphics Language (**4DGL**) with vast built in library functions will allow rapid application development.

4DGL is a graphics oriented programming language, allowing the developer to write applications in a high level syntax similar to popular languages such as BASIC, C and Pascal and run it directly on the PICASO-GFX processor embedded in the **μOLED-3202X-P1** modules.

4DGL allows the user to take complete control of all available resources on that hardware platform such as the Serial Port, Graphics AMOLED Display, μSD memory card, I/O pins, etc. This eliminates the need for an external host controller/processor to drive the **μOLED-3202X-P1** modules via serial commands. It provides the user complete control over the hardware module allowing them to quickly develop powerful applications.





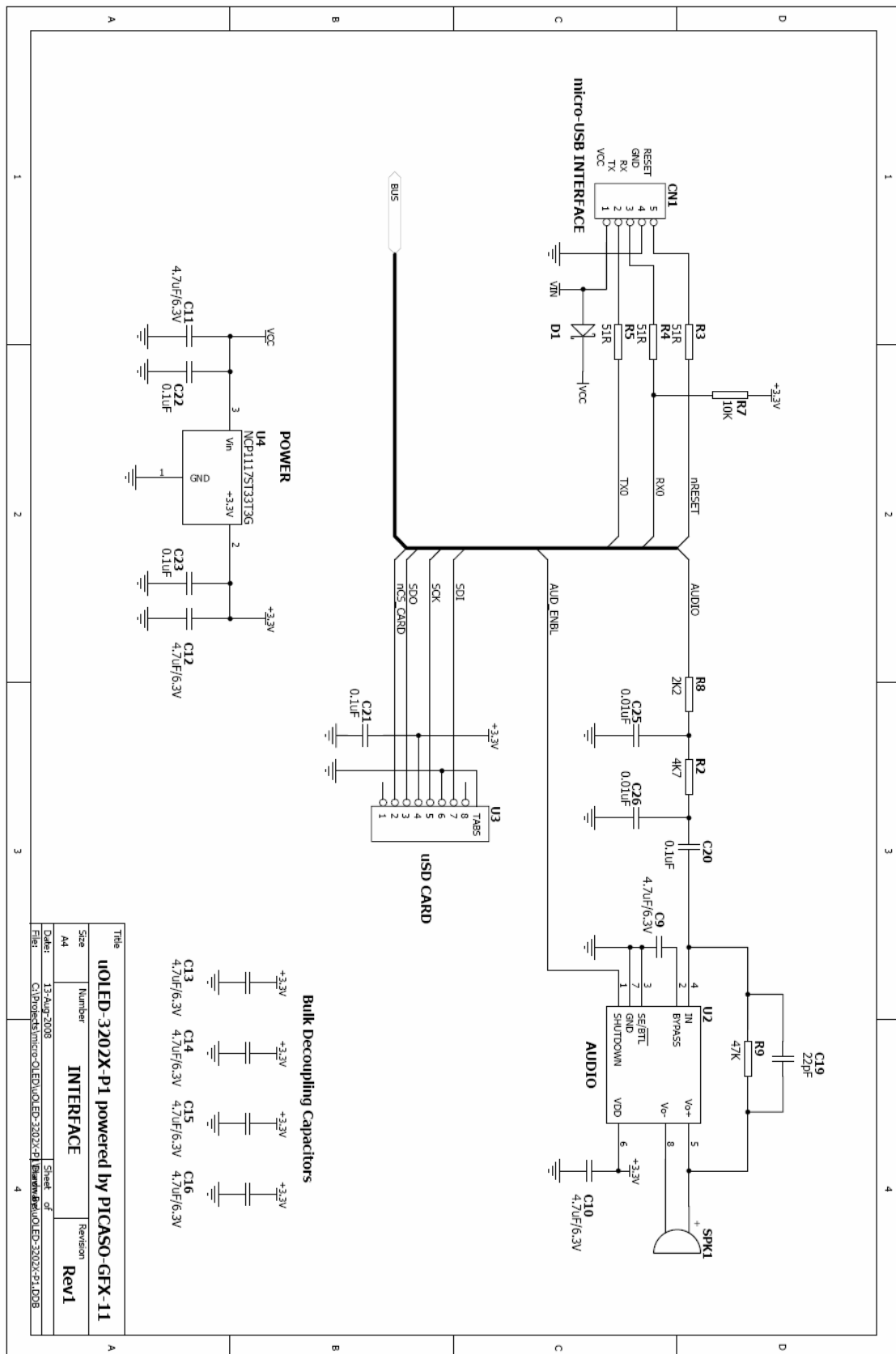
2 Features

The **μOLED-3202X-P1** series of modules are aimed at being integrated into a variety of different applications via a wealth of features designed to facilitate any given functionality quickly and cost effectively and thus reduce 'time to market'. These features are as follows:

- There are 4 modules in the **μOLED-3202X-P1** series:
 - **μOLED-32024-P1** :
 - Diagonal : 2.4"
 - Screen Outline : 42.0 x 52.6 mm
 - Active Area: 36.7 x 49.0 mm
 - **μOLED-32024-P1T** :
 - Same as **μOLED-32024-P1** but with resistive touch screen.
 - **μOLED-32028-P1** :
 - Diagonal : 2.83"
 - Screen Outline : 49.1 x 67.3 mm
 - Active Area : 43.2 x 57.6 mm
 - **μOLED-32028-P1T** :
 - Same as **μOLED-32028-P1** but with resistive touch screen.
- QVGA 240 x RGB x 320 pixel resolution with 256, 65K or 262K true to life colours enhanced AMOLED screen.
- Near 180 degree viewing angle.
- All modules use the same controller board. PCB Size: 49.1 x 67.3 x 11.0mm.
- Easy 5 pin user interface (VCC, TX, RX, GND, RESET) to any 4D micro-USB module such as the **μUSB-MB5** or the **μUSB-CE5**.
- Voltage supply from 4.5V to 5.5V, current @ 90mA nominal when using a 5.0V supply source.
- Onboard micro-SD (**μSD**) memory card adaptor with full FAT16 file support for storing and executing 4DGL programs, files, icons, images, animations, video clips and audio wave files. 64Mb to 2Gig μSD memory cards can be purchased separately.

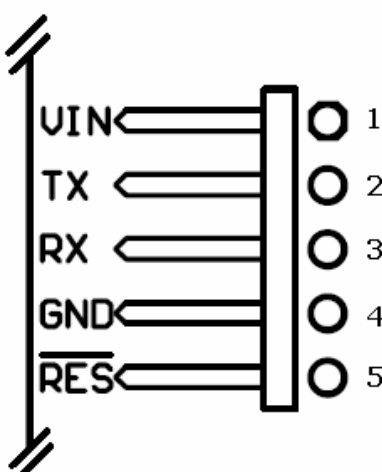


- Powered by the fully integrated **PICASO-GFX** Graphics Processor (PICASO-GFX chip is also available for OEM volume users).
- Built in extensive 4DGL graphics and system library functions. For all available features and functions under the 4DGL programming language please visit the 4DGL web page <http://www.4dsystems.com.au/developers/>
- 2 x 30 pin headers for I/O expansion and future plug-in daughter boards.
- Audio amplifier with a tiny 8 Ohms speaker for sound generation and wave file playback.
- Mechanical support via mounting tabs which can be snapped off.





4 User Interface Pin Description

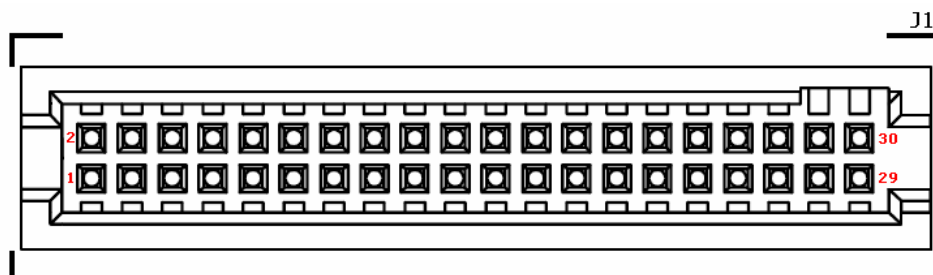
Power, Serial and micro-USB Interface			
Pin	Function	Description	
1	VIN	Main Power Supply input 4.5Volts to 5.5Volts. Nominal @ 5Volts.	
2	TX	Serial Transmit Pin (Data Out), COM0 TX. CMOS levels 0V to 3.3V	
3	RX	Serial Receive Pin (Data In), COM0 RX. CMOS levels 0V to VIN.	
4	GND	Ground.	
5	RES	External RESET signal for the module and PICASO chip. Pull this pin Low for 20µsec or longer to Reset the module. Not required for normal usage.	



5 Expansion Ports Pin Description

EXPANSION PORT J1 (for future 4D add-on modules)

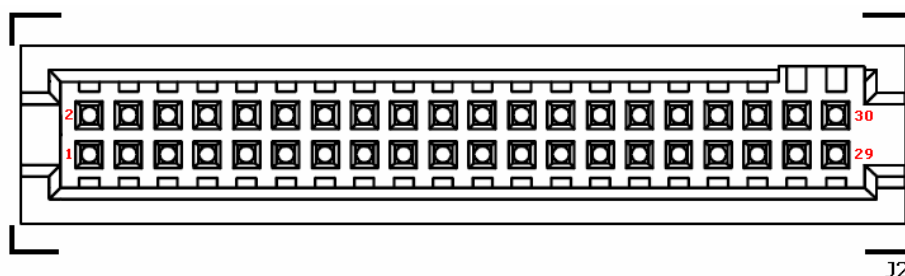
Pin	Label	Description
1	FIO2	Factory IO2 pin. (Reserved, do not use).
2	FIO1	Factory IO1 pin. (Reserved, do not use).
3	FIO3	Factory IO3 pin. (Reserved, do not use).
4	XR	4-Wire resistive touch screen right signal. (Reserved, do not use).
5	FIO4	Factory IO4 pin. (Reserved, do not use).
6	YU	4-Wire resistive touch screen top signal. (Reserved, do not use).
7	RS	Display register select signal. (Reserved, do not use).
8	SCK	SPI serial clock output for external SD card use only.
9	nCS_OLED	OLED chip select signal. (Reserved, do not use).
10	SDI	SPI serial data input for external SD card use only.
11	nRD_OLED	OLED read strobe signal. (Reserved, do not use).
12	SDO	SPI serial data output for external SD card use only.
13	nWR_OLED	OLED write strobe signal. (Reserved, do not use).
14	nRESET	Master RESET. Pull this pin Low for 20μsec or longer to Reset the module.
15	GND	Ground.
16	nCS_CARD	SD memory card chip select for external SD card use only.
17	IO7	General Purpose Input Output 7 pin.
18	3.3V	Regulated 3.3 Volts output, available current max 400mA.
19	IO6	General Purpose Input Output 6 pin.
20	D5	OLED data bus bit 5. (Reserved, do not use).
21	IO5	General Purpose Input Output 5 pin.
22	D4	OLED data bus bit 4. (Reserved, do not use).
23	IO4	General Purpose Input Output 4 pin.
24	D3	OLED data bus bit 3. (Reserved, do not use).
25	IO3	General Purpose Input Output 3 pin.
26	D2	OLED data bus bit 2. (Reserved, do not use).
27	IO2	General Purpose Input Output 2 pin.
28	D1	OLED data bus bit 1. (Reserved, do not use).
29	CS_VHI	OLED DC-DC circuit enable signal. (Reserved, do not use).
30	D0	OLED data bus bit 0. (Reserved, do not use).





EXPANSION PORT J2 (for future 4D add-on modules)

Pin	Label	Description
1	YD	4-Wire resistive touch screen bottom signal. (Reserved, do not use).
2	D6	OLED data bus bit 6. (Reserved, do not use).
3	XL	4-Wire resistive touch screen left signal. (Reserved, do not use).
4	D7	OLED data bus bit 7. (Reserved, do not use).
5	AUDIO	Pulse width modulated Audio output from PICASO. This pin is also input to the onboard audio amplifier.
6	VCC	Main Power Supply input 4.5Volts to 5.5Volts. Nominal @ 5Volts.
7	AUDIO_ENBL	Logic Low will enable the audio amplifier, logic High will disable it.
8	D8	OLED data bus bit 8. (Reserved, do not use).
9	IO10	General Purpose Input Output 10 pin.
10	D9	OLED data bus bit 9. (Reserved, do not use).
11	IO9	General Purpose Input Output 9 pin.
12	D10	OLED data bus bit 10. (Reserved, do not use).
13	IO8	General Purpose Input Output 8 pin.
14	D11	OLED data bus bit 11. (Reserved, do not use).
15	GND	Ground.
16	3.3V	Regulated 3.3 Volts output, available current max 400mA.
17	GND	Ground.
18	3.3V	Regulated 3.3 Volts output, available current max 400mA.
19	N.C.	No Connect.
20	D12	OLED data bus bit 12. (Reserved, do not use).
21	SCL	I2C clock output.
22	D13	OLED data bus bit 13. (Reserved, do not use).
23	SDA	I2C bi-directional data.
24	D14	OLED data bus bit 14. (Reserved, do not use).
25	nRESET_OLED	OLED Reset signal. (Reserved, do not use).
26	D15	OLED data bus bit 15. (Reserved, do not use).
27	RX0	Asynchronous serial port 0 receive pin. COM0 Rx.
28	TX1	Asynchronous serial port 1 transmit pin. COM1 Tx.
29	TX0	Asynchronous serial port 0 transmit pin. COM0 Tx.
30	RX1	Asynchronous serial port 1 receive pin. COM1 Rx.

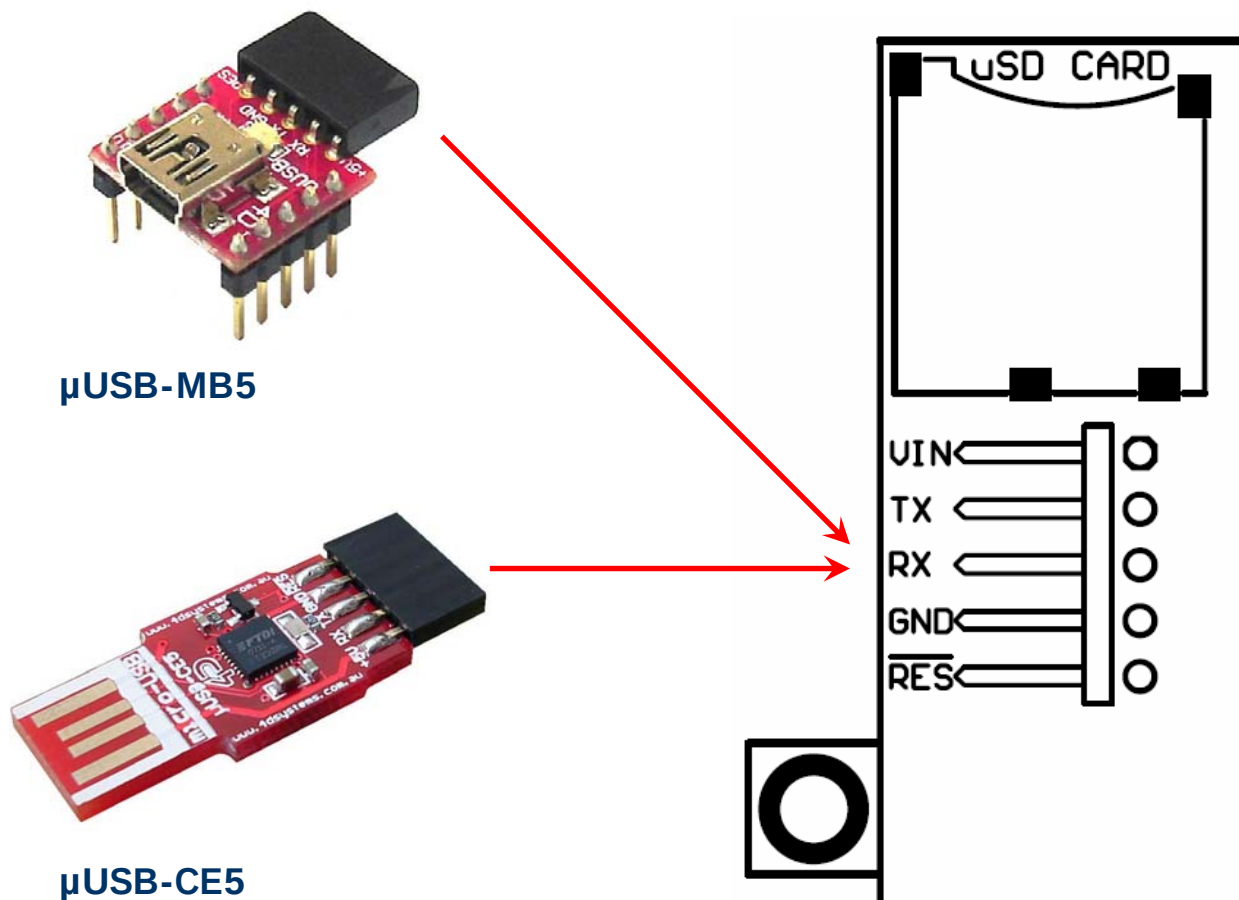




6 USB to Serial Interface - microUSB

The μ OLED-3202X-P1 module is required to be interfaced to a PC for uploading the PICASO-GFX chip with user application **4DGL** code. Using a standard USB cable and any one of the 4D Systems micro-USB modules (μ USB-MB5 or μ USB-CE5) as shown below, a PC to μ OLED-3202X-P1 connection can be achieved simply.

The micro-USB interface is also used for **PmmC** (Personality module micro Code) uploads. The PmmC allows the latest Operating System and **4DVM** (4D Virtual Machine) upgrades for the PICASO-GFX chip. The micro-USB module (optional extra), simply connects to the μ OLED-3202X-P1 module and captures the USB data and converts it into serial CMOS level (0 to 3.3V) data. The micro-USB modules and drivers are available from your local 4D distributor. This is an optional extra product and is not included with the module.





8 Specifications and Ratings

Symbol	Characteristic	Min	Typ	Max	Units
V _{IN}	Supply voltage	4.5	5.0	5.5	Volts
I	Current	70	90	190	mA
T _{OP}	Operating temperature	-10	--	70	deg C
T _{STO}	Storage temperature	-30	--	85	deg C
T _{PU}	Power-up delay	900	1000	1100	msec
V _{TX}	TX pin Voltage Out	0.4	3.0	3.3	Volts
V _{RX}	RX pin Voltage In	0	2.4	V _{in}	Volts
V _{IOIL}	Input Low Voltage on any I/O pin	0	--	0.7	Volts
V _{IOIH}	Input High Voltage on any I/O pin	2.6	--	3.3	Volts
V _{IOOL}	Output Low Voltage on any I/O pin	0	--	0.4	Volts
V _{IOOH}	Output High Voltage on any I/O pin	2.6	--	3.3	Volts
L	Luminance	50	--	250	Cd/m ²
VA	Viewing Angle	160	170	179	degrees
Cr	Contrast Ratio	5000:1	10000:1	-	-
L _{TOP}	Operational Life Time @30% power consumption to half intensity	20,000	--	--	hours



9 Available Models and Order Codes

- **μOLED-32024-P1 :**
 - o Diagonal : 2.4"
 - o Screen Outline : 42.0 x 52.6 mm
 - o Active Area: 36.7 x 49.0 mm
- **μOLED-32024-P1T :**
 - o Same as μOLED-32024-P1 but with resistive touch screen.
- **μOLED-32028-P1 :**
 - o Diagonal : 2.83"
 - o Screen Outline : 49.1 x 67.3 mm
 - o Active Area : 43.2 x 57.6 mm
- **μOLED-32028-P1T :**
 - o Same as μOLED-32028-P1 but with resistive touch screen.

NOTE!

Both the 2.4" and the 2.83" screens use the same controller board which is designed to the dimensions of the 2.83" display. The 2.4" display on the μOLED-32024-P1 and the μOLED-32024-P1T modules will appear smaller on the larger controller board.



10 Related Products and Tools

▪ **µUSB-MB5**

- micro-USB module, USB to Serial Bridge, Silabs CP2102
- Standard USB miniB connector
- 10 pin header provides the following signals:
 - 5V, 3.3V, GND, Tx, Rx, Suspend,
 - DTR, CTS, RTS, GND
- 5 Volts supply @ 500mA, 3.3 Volts supply @ 100mA
- Additional flow control signals, DTR, CTS, RTS
- Available with an additional 5 pin header for the µOLED interface
www.4dsystems.com.au/prod.php?id=18



▪ **µUSB-CE5**

- micro-USB module, USB to Serial Bridge, FTDI Chipset
- Plugs directly into USB port
- 5 pin header provides the following signals:
 - 5V, Rx, Tx, GND, Reset
- 5 Volts supply @ 500mA
www.4dsystems.com.au/prod.php?id=19



▪ **PmmC File for the µOLED-3202X-P1 modules**

The latest PmmC system files for the modules can be downloaded from the individual product pages at:

www.4dsystems.com.au/products.php

▪ **PmmC Loader PC Software Tool (free download)**

Latest version of **PmmC-Loader** software tool can be downloaded from:

www.4dsystems.com.au/downloads/PmmC-Loader/Software/Windows/

and the User Guide can be found here:

www.4dsystems.com.au/downloads/PmmC-Loader/Docs/Pdf/

▪ **4DGL Workshop (free download)**

This is the IDE plus editor plus compiler for all 4DGL user applications. Everything is provided in a single package to write, compile and download 4DGL application code into the µOLED-3202X-P1 modules.

www.4dsystems.com.au/developers

▪ **4D Graphics Composer (free download)**

The GC allows downloading of images/animations/movie clips into the micro-SD memory card which can then be recalled and used within 4DGL user application code.

www.4dsystems.com.au/downloads/Graphics_Composer/



11 Precautions

- Avoid having a White Background. The more pixels that are lit up, the more the display module will consume current. A full white screen will have the highest power consumption.
- Avoid having to display the same image/object on the screen for lengthy periods of time. This will cause a burn-in or 'image-sticking' effect which is a common occurrence with most types of display technologies and even more so with AMOLEDs. Blank the screen after a while or dim it very low by adjusting the contrast. Better still; implement a screen saver feature.
- For further information refer to:
http://data.4dsystems.com.au/downloads/micro-OLED/Docs/4D_AMOLED_Presentation.pdf



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