



4D SYSTEMS
TURNING TECHNOLOGY INTO ART

**Arduino Display Module Pack
Featuring 2.4" Serial Display Module
uLCD-24-PTU-AR**

DATASHEET

Document Date: 23rd January 2013
Document Revision: 1.1

Contents

| | |
|---|----------|
| 1. Description..... | 3 |
| 2. Advanced Hardware Options | 4 |
| 3. Arduino Serial Library Functions..... | 5 |
| 4. Specifications and Ratings..... | 8 |
| 5. Legal Notice..... | 9 |
| 6. Contact Information | 9 |

1. Description

The 4D Systems Arduino Display Module Pack (uLCD-24-PTU-AR) is made up of a uLCD-24-PTU Display Module specifically customised for the Arduino.

The Pack comprises of:

- Customised uLCD-24-PTU Display Module
- 4D Arduino Adaptor Shield
- 5 way Female-Female Cable

The Arduino Display Module Pack enables an Arduino user to quickly connect the 4D Arduino Adaptor Shield to their Arduino, connect the 5 way cable between the Adaptor and the Display Module, and be connected in seconds to start programming their new 4D Systems Display.

The uLCD-24-PTU-AR has a comprehensive range of serial commands ready to be received from the Arduino, to draw primitives such as lines, rectangles, circles and text, to displaying images, playing sound and logging data to uSD card.

Communication to the Display Module is performed via the Arduino's serial port (RX and TX).

A single digital on the Arduino (D2) is utilised for an external reset for the display.

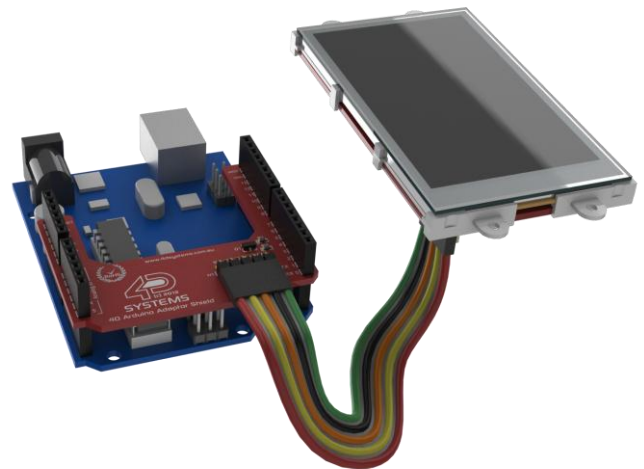
Power for the display is supplied from the Arduino's 5V bus. No external power is required for the Display Module as all power is supplied from the Arduino, via the Adaptor Shield.

For a detailed listing of the serial commands available, please refer to the Appendix section of this document.

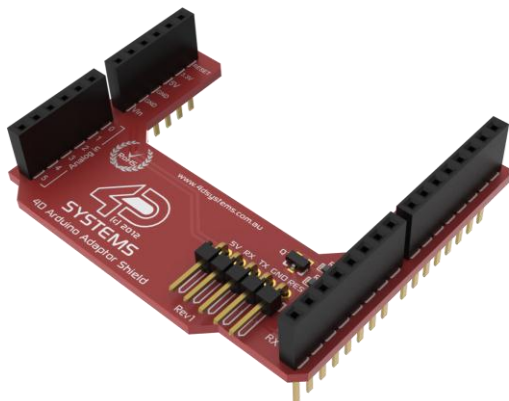
4D Arduino Adaptor Shield



The uLCD-24-PTU Display Module



Arduino Display Module Pack connected together
(Note: Arduino not included in Pack)



2. Advanced Hardware Options

The display module (uLCD-24-PTU) is a very capable and powerful piece of hardware, which can be reconfigured beyond the boundaries of the Arduino.

With the use of the 4D Systems Workshop4 IDE Software, the display module can be configured and programmed independently of the Arduino environment.

If a user wishes to investigate the capabilities of the uLCD-24-PTU and reconfigure the display module, please refer to the Datasheet for the uLCD-24-PTU, available from the 4D systems website, www.4dsystems.com.au. The user can freely change back to the configuration the module was shipped in if desired, all via the Workshop4 IDE Software.

To take advantage of the 4D Systems Workshop4 Software, a 4D Programming Cable is required, which can be purchased from the 4D Systems website, or from a 4D Systems distributor.

3. Arduino Serial Library Functions

The following is a list of Arduino functions available to use with the 4D Systems Arduino Serial Library.

For detailed information on each of these functions, please refer to the Arduino Library itself available from the samples menu of the 4D Systems Workshop 4 Software or from the 4D Systems Github Repository. Please also refer to the product page and to the Application Notes, available from the 4D Systems website, www.4dsystems.com.au

Graphics Functions:

- gfx_Cls()
 - gfx_ChangeColour(oldColour, newColour)
 - gfx_Circle(x, y, radius, colour)
 - gfx_CircleFilled(x, y, radius, colour)
 - gfx_Line(x1, y1, x2, y2, colour)
 - gfx_Rectangle(x1, y1, x2, y2, colour)
 - gfx_RectangleFilled(x1, y1, x2, y2, colour)
 - gfx_Polyline(n, vx, vy, colour)
 - gfx_Polygon(n, vx, vy, colour)
 - gfx_Triangle(x1, y1, x2, y2, x3, y3, colour)
 - gfx_Orbit(angle, distance)
 - gfx_PutPixel(x, y, colour)
 - gfx_GetPixel(x, y)
 - gfx_MoveTo(xpos, ypos)
 - gfx_LineTo(xpos, ypos)
 - gfx_SetClipRegion()
 - gfx_Ellipse(x, y, xrad, yrad, colour)
 - gfx_EllipseFilled(x, y, xrad, yrad, colour)
 - gfx_Button(state, x, y, buttonColour, textColour, font, textWidth, textHeight, text)
 - gfx_Panel(state, x, y, width, height, colour)
 - gfx_Slider(mode, x1, y1, x2, y2, colour, scale, value)
 - gfx_ScreenCopyPaste(xs, ys, xd, yd, width, height)
 - gfx_TriangleFilled(x1, y1, x2, y2, x3, y3, colr)
 - gfx_PolygonFilled(n, vx, vy, colr)
 - gfx_Get(mode)
 - gfx_ClipWindow(x1, y1, x2, y2)
 - gfx_Set(function, value)
- gfx_Set shortcuts:**
- gfx_BGcolour(colour)
 - gfx_Clipping(mode)
 - gfx_TransparentColour(colour)
 - gfx_Transparency(mode)
 - gfx_FrameDelay(delay)
 - gfx_ScreenMode(delay)
 - gfx_OutlineColour(colour)
 - gfx_Contrast(value)
 - gfx_LinePattern(pattern)
 - gfx_BevelWidth(mode)
 - gfx_BevelShadow(value)

Touch Screen Functions:

- touch_DetectRegion(x1, y1, x2, y2)
- touch_Set(mode)
- touch_Get(mode)

Text and String Functions:

- charwidth('char')
- charheight('char')
- _putstr(pointer)
- txt_Set(function, value)

txt_Set shortcuts:

- txt_FGcolour(colour)
- txt_BGcolour(colour)
- txt_FontID(id)
- txt_Width(multiplier)
- txt_Height(multiplier)
- txt_Xgap(pixelcount)
- txt_Ygap(pixelcount)
- txt_Opacity(mode)
- txt_Bold(mode)
- txt_Italic(mode)
- txt_Inverse(mode)
- txt_Underlined(mode)
- txt_Attributes(value)
- txt_Wrap(value)

Image Control Functions:

- img_SetPosition(handle, index, xpos, ypos)
- img_Enable(handle, index)
- img_Disable(handle, index)
- img_Darken(handle, index)
- img_Lighten(handle, index)
- img_SetWord(handle, index, offset, word)
- img_GetWord(handle, index, offset)
- img_Show(handle, index)
- img_SetAttributes(handle, index, value)
- img_ClearAttributes(handle, index, value)
- img_Touched(handle, index)

Media Functions (SD/SDHC memory Card):

- media_Init()
- media_SetAdd(HIword, LOword)
- media_SetSector(HIword, LOword)
- media_RdSector(Destination_Address)
- media_WrSector(Source_Address)
- media_ReadByte()
- media_ReadWord()
- media_WriteByte(byte_val)
- media_WriteWord(word_val)
- media_Flush()
- media_Image(x, y)
- media_Video(x, y)
- media_VideoFrame(x, y, frameNumber)

Serial (UART) Communications Functions:

- setbaud(rate)

FAT16 File Functions:

- file_Error()
- file_Count(filename)
- file_Dir(filename)
- file_FindFirst(fname)
- file_FindNext()
- file_Exists(fname)
- file_Open(fname, mode)
- file_Close(handle)
- file_Read(destination, size, handle)
- file_Seek(handle, HiWord, LoWord)
- file_Index(handle, Hisize, Losize, recordnum)
- file_Tell(handle, &HiWord, &LoWord)
- file_Write(Source, size, handle)
- file_Size(handle, &HiWord, &LoWord)
- file_Image(x, y, handle)
- file_ScreenCapture(x, y, width, height, handle)
- file_PutC(char, handle)
- file_GetC(handle)
- file_PutW(word, handle)
- file_GetW(handle)
- file_PutS(source, handle)
- file_GetS(*String, size, handle)
- file_Erase(fname)
- file_Rewind(handle)
- file_LoadFunction(fname.4XE)
- file_Run(fname..4XE, arglistptr)
- file_Exec(fname..4XE, arglistptr)
- file_LoadImageControl(fname1, fname2, mode)
- file_Mount()
- file_Unmount()
- file_PlayWAV

Sound Control Functions:

- Snd_Volume(var)
- Snd_Pitch(pitch)
- Snd_BufSize(var)
- Snd_Stop()
- Snd_Pause()
- Snd_Continue()
- Snd_Playing()

Timer Functions:

- sys_Sleep(units)

4. Specifications and Ratings

RECOMMENDED OPERATING CONDITIONS

| Parameter | Conditions | Min | Typ | Max | Units |
|-----------------------|------------|-----|-----|-----|-------|
| Supply Voltage (VCC) | | 4.5 | -- | 5.5 | V |
| Operating Temperature | | -10 | -- | +70 | °C |

ORDERING INFORMATION

Order Code: uLCD-24-PTU-AR

Package: 138mm x 100mm x 30mm

Packaging: Module sealed in antistatic foam padded 4D Systems Box

5. Legal Notice

Proprietary Information

The information contained in this document is the property of 4D Systems Pty. Ltd. and may be the subject of patents pending or granted, and must not be copied or disclosed without prior written permission.

4D Systems endeavours to ensure that the information in this document is correct and fairly stated but does not accept liability for any error or omission. The development of 4D Systems products and services is continuous and published information may not be up to date. It is important to check the current position with 4D Systems. 4D Systems reserves the right to modify, update or make changes to Specifications or written material without prior notice at any time.

All trademarks belong to their respective owners and are recognised and acknowledged.

Disclaimer of Warranties & Limitation of Liability

4D Systems makes no warranty, either expressed or implied with respect to any product, and specifically disclaims all other warranties, including, without limitation, warranties for merchantability, non-infringement and fitness for any particular purpose.

Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications.

In no event shall 4D Systems be liable to the buyer or to any third party for any indirect, incidental, special, consequential, punitive or exemplary damages (including without limitation lost profits, lost savings, or loss of business opportunity) arising out of or relating to any product or service provided or to be provided by 4D Systems, or the use or inability to use the same, even if 4D Systems has been advised of the possibility of such damages.

4D Systems products are not fault tolerant nor designed, manufactured or intended for use or resale as on line control equipment in hazardous environments requiring fail – safe performance, such as in the operation of nuclear facilities, aircraft navigation or communication systems, air traffic control, direct life support machines or weapons systems in which the failure of the product could lead directly to death, personal injury or severe physical or environmental damage ('High Risk Activities'). 4D Systems and its suppliers specifically disclaim any expressed or implied warranty of fitness for High Risk Activities.

Use of 4D Systems' products and devices in 'High Risk Activities' and in any other application is entirely at the buyer's risk, and the buyer agrees to defend, indemnify and hold harmless 4D Systems from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any 4D Systems intellectual property rights.

6. Contact Information

For Technical Support: support@4dsystems.com.au

For Sales Support: sales@4dsystems.com.au

Website: www.4dsystems.com.au

Copyright 4D Systems Pty. Ltd. 2000-2012.