DATASHEET

4D SYSTEMS

TURNING TECHNOLOGY INTO ART

Raspberry Pi Display Module Pack

Featuring a 3.2” Display Module

uLCD-32-PTU-PI

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1. Description

The 4D Systems 3.2" Pi Display Module Pack (uLCD-32-PTU-PI) is made up of a uLCD-32-PTU Display Module specifically customised for the Raspberry Pi.

The Pack comprises of:

- uLCD-32-PTU Display Module
- 4D Serial Pi Adaptor
- 5 way Female-Female Cable

The Raspberry Pi Display Module Pack enables a Raspberry Pi user to quickly connect the 4D Serial Pi Adaptor to their Raspberry Pi, 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 display module can be programmed in a number of ways, using the 4D Systems Workshop 4 IDE Software. By default the display module will come loaded with the Serial application. Please refer to the next section of this document for alternative configuration options.

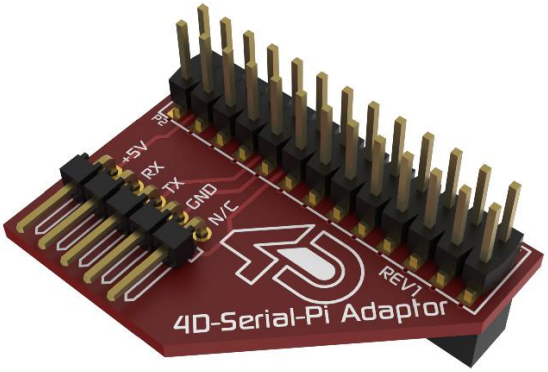
The uLCD-32-PTU has a comprehensive range of serial commands ready to be received from the Raspberry Pi, to draw primitives such as lines, rectangles, circles and text, to displaying images, playing sound and logging data to uSD card.

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

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

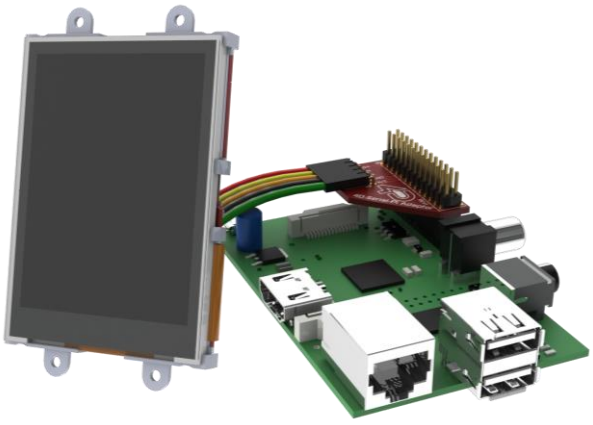
For a detailed listing of the serial commands available, please refer to the Appendix section of this document.

NOTE (*): Raspberry Pi remains the property of the Raspberry Pi Foundation. All references to the words 'Raspberry Pi' are Trademarks of the Raspberry Pi Foundation, and all references to 4D Systems modules/adaptors with the Raspberry Pi are based on compatibility with the Raspberry Pi Hardware, and do not indicate ownership of or to the Raspberry Pi in any way.



4D Serial Pi Adaptor

The uLCD-32-PTU Display Module



Raspberry Pi Display Module Pack connected (Note: Raspberry Pi NOT included)

2. Advanced Hardware Options

The display module (uLCD-32-PTU) is a very capable and powerful piece of hardware, which can be reconfigured beyond the boundaries of the Serial Environment, which is what is loaded on the module when shipped.

With the use of the 4D Systems Workshop4 IDE Software, the display module can be configured and programmed, which enables the user to utilise the display module in more ways than what is possible when using it in the Serial configuration.

If a user wishes to investigate the capabilities of the uLCD-32-PTU and reconfigure the display module, please refer to the Datasheet for the uLCD-32-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 Workshop 4 Software, a 4D Programming Cable is required, which can be purchased from the 4D Systems website, or from a 4D Systems distributor. Depending on what the user requires, a micro-SD card may also be required. Please refer to the datasheet for the uLCD-32-PTU for more information, along with information on the Starter Kits which is also available, which includes both the Programming Cable and a micro-SD card.

If the uLCD-32-PTU display module is programmed to be used with the ViSi-Genie environment, 4D Systems has created a library for the Raspberry Pi specific for the ViSi-Genie environment. Please refer to the uLCD-32-PTU-PI product page on the website for more information, along with the link for the 4D Systems Github repository where this library is located for download.

If the uLCD-32-PTU display module is programmed to be used with the Serial environment, 4D Systems have created a C library which is included with Workshop 4, but also available to be downloaded from the 4D Systems Github repository. This library is a generic C library, so not specific to the Raspberry Pi, however can easily be ported as all source code is included in the repository. An alternative is to not use the library at all, and utilise the raw commands which can be sent from any host controller. Please refer to the Workshop 4 product page, and download the Serial command set document for more information.

3. C Library Functions (For use with the Serial/SPE Environment)

The following is a list of the library functions available to use with the 4D Systems C Serial Library, which is a generic C library which can be ported to run on the Raspberry Pi. The C Serial library is compatible with the display module supplied with this Pack when the display module is configured with the Serial Environment from the Workshop4 IDE. This listing below is **not** relevant if using the ViSi-Genie Environment.

For detailed information on each of these functions, please refer to the 'Picaso Serial Command Set Reference Manual' Document, available from the Workshop 4 product page on 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-32-PTU-PI
Package: 138mm x 100mm x 30mm
Packaging: Module sealed in antistatic foam padded 4D Systems Box

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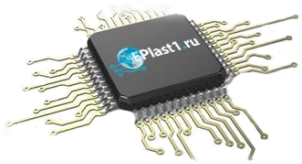

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