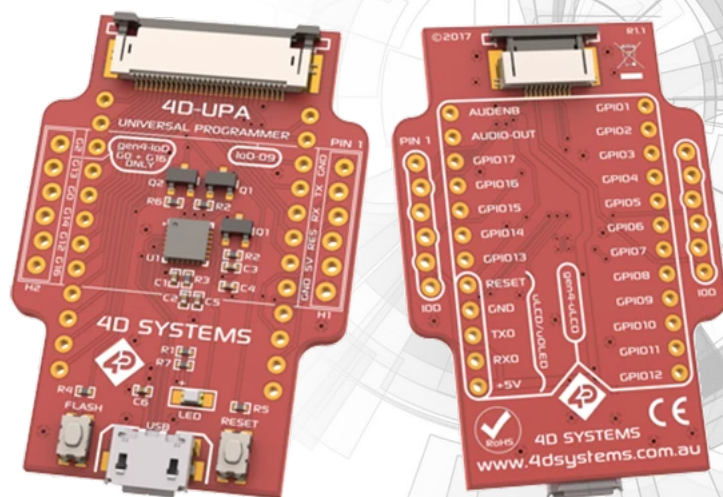


4D-UPA



Datasheet

Revision 1.13

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Content may change at any time. Please refer to the resource centre for latest documentation.

Contents

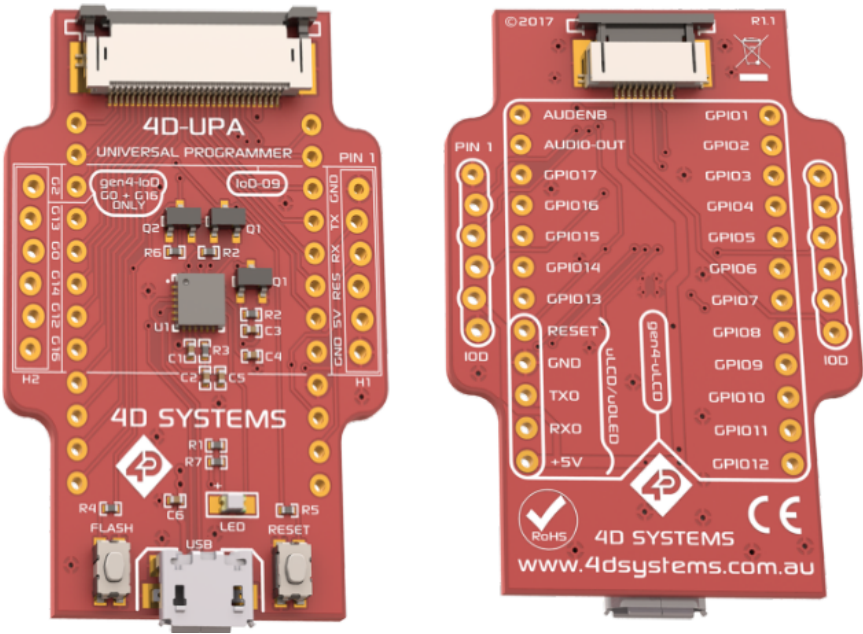
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1. Description

This datasheet covers the 4D-UPA (Universal Programming Adaptor) which is compatible with multiple 4D display modules. It is included in most Starter Kit (SK) packs but can be sold separately and is a quick and easy way to interface to the 4D display modules.

The 4D-UPA (Universal Programmer Adaptor) is a universal programmer designed to replace all current 4D programmers, such as the uUSB-PA5, uUSB-PA5-II, gen4-PA, gen4-IoD-PA, and the 4D Programming Cable. It can be used for programming gen4-uLCD display modules, gen4-IoD display modules, IoD-09TH display modules, PIXXI-LCD modules, uLCD and uOLED display modules, as well as the gen4-ESP32 display modules. It can also be used for interfacing with a breadboard for prototyping, or interfacing with virtually any host. Some older products are still best suited for other 4D programmers, so they may be included in some Starter Kits instead of this 4D-UPA - consult the Product Page of the Starter Kit in question.

The 4D-UPA has a 30-way FFC connector at the top of the module, for connecting to gen4-uLCD-xx display modules and PIXXI-LCD modules. On the opposite side is a 10-way FFC connector, for connecting to gen4-IoD-xx display modules. Located centrally in the larger rectangular outline, are pads associated with the gen4-uLCD-xx, and gen4-ESP32-xx modules. These break out all the signals which come to/from the modules. 5 of the signals are the universal 4D RESET/GND/TX/RX/5V signals, these are located together to enable interfacing/programming of the uLCD and uOLED display modules, such as the uLCD-43DT and uOLED-128G2. The outer 2 sets of 6 holes are for mounting and programming the IoD-09TH display module. The IoD-09TH pads are slightly offset, enabling a simple 'friction fit' interface to the 4D-UPA, no soldering or headers are required - although headers can be soldered if needed.



4D-UPA Pin Mapping (REV 1.3 and under)				
4D-UPA	DIABLO-16	PICASO	PIXXI-LCD	PIXXI-44
GPI01	PA3	I01	I01 / I07	I01
GPI02	PA2	I02	I02 / I06	I02
GPI03	PA1	I03	I03 *	I03
GPI04	PA0	I04	I04 *	I04
GPI05	PA9	BUS5	I05 *	I05
GPI06	PA8	BUS4	-	I06
GPI07	PA7	BUS3	-	I07
GPI08	PA6	BUS2	-	I012
GPI09	PA5	BUS1	-	I013
GPI010	PA4	BUS0	-	I014
GPI011	PA10	BUS6	-	I015
GPI012	PA11	BUS7	-	I016
GPI013	PA12	I05	-	I017
GPI014	PA13	RX1	-	I018
GPI015	PA14	TX1	-	I06
GPI016	PA15	I2C-SCL	-	I07
GPI017	N/C	I2C-SDA	-	N/C

4D-UPA Pin Mapping (REV 1.4 and above)

4D-UPA	DIABLO16	PICASO	PIXXILCD	PIXXI-44	ESP32	ESP32-RGB / ESP32-90	ESP32-QSPI
GPI01	PA3	I01	I01 / I07	I01	GPI017	I2C-SDA	I2C-SDA
GPI02	PA2	I02	I02 / I06	I02	GPI018	I2C-SCL	I2C-SCL
GPI03	PA1	I03	I03 [*]	I03	GPI016	EXT-GPI00	GPI01
GPI04	PA0	I04	I04 [*]	I04	GPI015	EXT-GPI01	GPI014
GPI05	PA9	BUS5	I05 [*]	I05	GPI048	EXT-GPI02	GPI015
GPI06	PA8	BUS4	-	I06	GPI047	EXT-GPI03	GPI016
GPI07	PA7	BUS3	-	I07	GPI038	EXT-GPI04	GPI021
GPI08	PA6	BUS2	-	I012	GPI039	EXT-GPI05	GPI038
GPI09	PA5	BUS1	-	I013	GPI040	EXT-GPI06 [*]	GPI039
GPI010	PA4	BUS0	-	I014	GPI06	EXT-GPI07 [*]	GPI040
GPI011	PA10	BUS6	-	I015	GPI05	GPI038/SPI-CS	GPI045
GPI012	PA11	BUS7	-	I016	GPI03	GPI011/uSD-MOSI	GPI046
GPI013	PA12	I05	-	I017	GPI045	GPI012/uSD-SCLK	GPI047
GPI014	PA13	RX1	-	I018	GPI046	GPI013/uSD-MISO	GPI048
GPI015	PA14	TX1	-	I06	GPI020 [*]	GPI020 [*]	GPI020 [*]
GPI016	PA15	I2C-SCL	-	I07	GPI019 [*]	GPI019 [*]	GPI019 [*]
GPI017	N/C	I2C-SDA	-	N/C	GPI011 [*]	N/C	N/C
GPI018	AUDIO-OUT	AUDIO-OUT	-	AUDIO-OUT	GPI00	GPI00	GPI00
GPI019	AUDENB	AUDENB	-	AUDENB	3V3-OUT	3V3-OUT	3V3-OUT
GPI020	RESET	RESET	RESET	RESET	EN-RST	EN-RST	EN-RST

Note

- The PIXXI-LCD column is for all PIXXI-LCD devices (both PIXXI-28 and PIXXI-44) which have a 15-way FFC, and connect to the 4D-UPA via the 15-to-30 FPC cable. For PIXXI-28 modules, these use I01/I02 and sometimes more, depending on the module. For PIXXI-44 modules, use I06/I07.
- The PIXXI-44 column is for PIXXI-44 devices which feature a 30-way FFC natively. I06/I07 is repeated to bring the I2C-compatible pins into the same position as the DIABLO modules
- For ESP32 products, the pins marked with a * mean the hardware needs to be modified in order to gain this connection. Please refer to the ESP32 display product datasheet for more information.
- The 4D-UPA REV 1.4 is when compatibility with the ESP32 product lines was added. It adds a switch on the back of the board, to toggle between ESP32 mode and uLCD mode (uLCD mode is for all core 4D products such as GOLDELOX, PICASO, DIABLO-16, PIXXI-28 and PIXXI-44). It will be noticed that in REV 1.4, more GPIO names are present on the 4D-UPA itself. This is simply due to extra pins being required for the ESP32 line of products, so signals which were just passed through typically, now have different usages depending which module is connected, and also the position of the switch on the rear of the module.

The Flash and RESET buttons (shown as ESP-RESET on REV 1.3 and higher boards) are for the gen4-IOD, IOD-09 and ESP32 range's of products only. They have no impact or effect on gen4-uLCD, uLCD, uOLED or PIXXI-LCD products.

The 4D-UPA uses the Silicon Labs CP2104 USB to Serial Bridge IC. More information about this can be found on the Silicon Labs website. A link to the driver is available on our website.

- USB 2.0 compliant Full Speed 12Mbps maximum speed.
- Hardware or Xon/Xoff handshaking supported, 300bps to 2Mbps
- UART supports 5, 6, 7, 8 data bits, 1, 1.5, 2 stop bits, odd/even/mark/space and no parity
- Supports Windows 2000 and above, MAC (OSX-8 and above) and Linux (2.4 kernel and above)
- USB powered
- -10 to +60 degrees Celsius temp range

2. Programming Modes

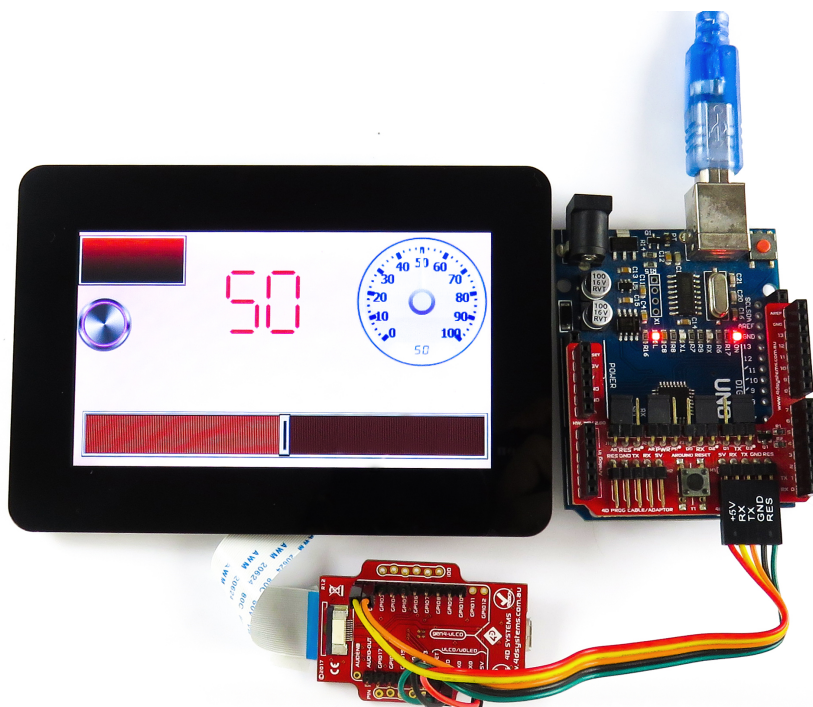
The following pictures show how to connect the 4D-UPA to various hardware and display modules.



Connection of an IoD-09TH Display module to 4D-UPA with a micro-USB Cable



*Typical connection of gen4 display module
(gen4-uLCD-43DCT-CLB) to 4D-UPA*



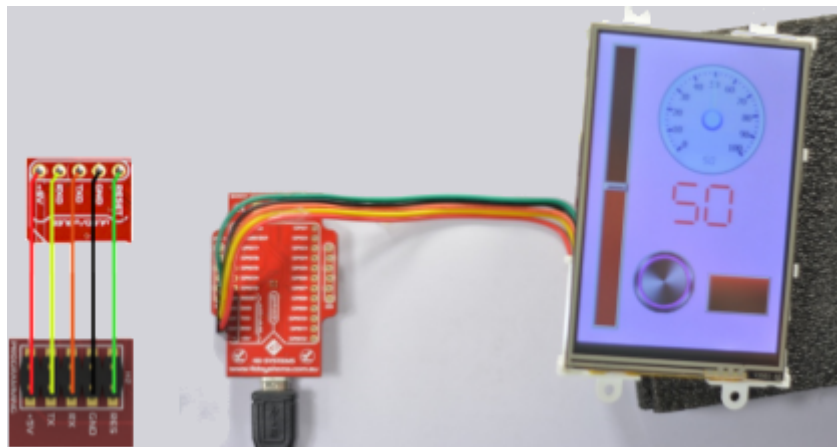
gen4 display (gen4-uLCD-43DCT-CLB), connected to the 4D-UPA using a 30-way FFC cable, and Jumper wires connecting to the Arduino Adaptor Shield, on top of an Arduino. This is using GPIO1 and GPIO2 pins, mapped through to being a different UART/COM port on the gen4 display (Diablo processor), so as not to cause a conflict with the USB chip on the UPA.

If you are connecting another device (such as an Arduino - shown in the previous [Figure](#)) to the 5-way interface pins on the 4D-UPA, while you are also connecting a 4D Display module to the 30-way FFC, the connection to the other device (Arduino for example) uses the UART0 serial port on the gen4 display. This is also used by the USB controller to program the gen4 display module. Therefore, each time you program to the display module, the 5-way cable needs to be disconnected from the other device (Arduino for example) so the serial UART will not have conflicts and fail.

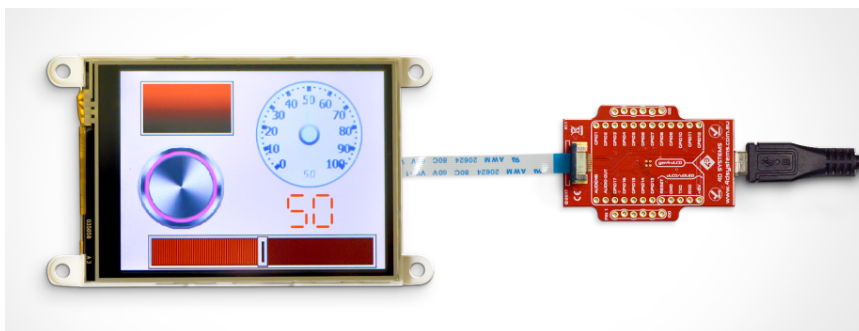
Alternatively, you can wire to other GPIO pins on the 4D-UPA separately, to use the UART1/2/3 etc (as is available on selected gen4 display modules) which will help avoid this conflict because you used a separate UART. Adjustments to the settings in Workshop4 to use comms to a different UART are required.

The ViSi-Genie Settings were changed for the previous set-up to work.

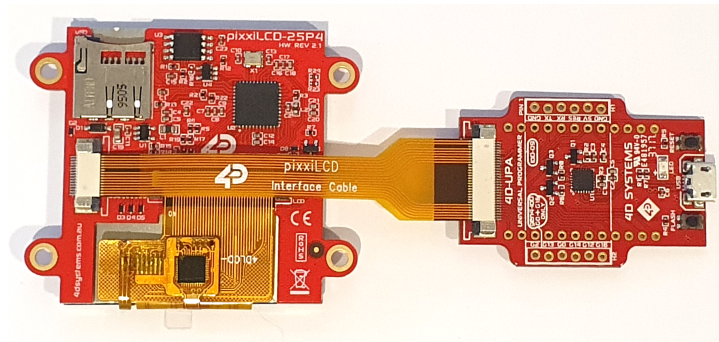
Arduino	Compiler	Designer	Editor	Environment	Generated Files	Genie	License	Serial	Shortcuts	Updates	Visi	Warnings
Default Baud Rate		9600		Note: 200,000 baud is a reliable baud rate match for 4D Systems displays to the Arduino. Due to accumulated inherent baud rate error percentages in both systems, other rates above 56,000 are not reliable.								
Default Sound Buffer		1024										
Comms Port		<input type="radio"/> 0 <input checked="" type="radio"/> 1		Diablo com1 Pins RX Pin PA2 TX Pin PA3		Default com port for new Genie Projects. COM0 is always on fixed pins, as is COM1 for Picasso. For Diablo you need to specify pins when using COM1.						
Maximum String Length		75		Each addition byte of string length uses 3 bytes of RAM. This is for 'normal' strings and should be doubled for Unicode strings. i.e. If you use unicode strings set value to max unicode string length * 2								
<input type="checkbox"/> List objects by Alias name first.												
Mounting... message		Mounting...\n					These strings can only contain ASCII characters. They can also include the \n newline sequence.					
Drive not mounted... message		Drive not mounted...										



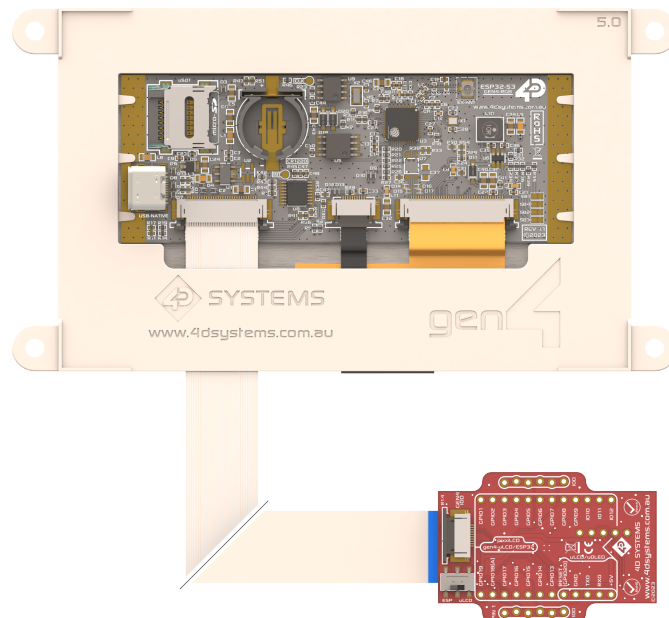
4D-uLCD Display (uLCD-35DT) connected to the 4D-UPA.



gen4-loD Display (gen4-loD-32T) connected to the 4D-UPA



PIXXILCD-25P4 Display connected to the 4D-UPA using the PIXXI-LCD FFC cable



*Typical connection of ESP32 based display modules
(gen4-ESP32-50CT) to 4D-UPA (REV1.4+)*

3. FFC Cable information

The FFC cables supplied by 4D Systems (included with products) have the following specifications:

For gen4-uLCD, uLCD-90, gen4-ESP32 and ESP32-90 products:

30 Pin Flexible Flat Cable, 150mm Long, 0.5mm (0.02") pitch

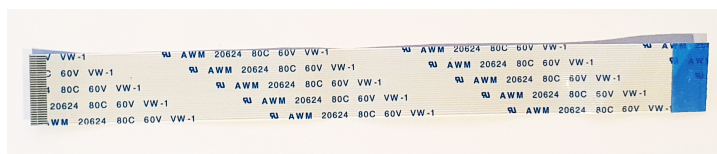
Cable Type: AWM 20624 80C 60V VW-1

Heat Resistance 80 Degrees Celsius

Connections on the opposite side at each end (Type B)

Note

Some different length cables are available by contacting 4D Systems sales directly



For gen4-IoD products:

10 Pin Flexible Flat Cable, 150mm Long, 0.5mm (0.02") pitch

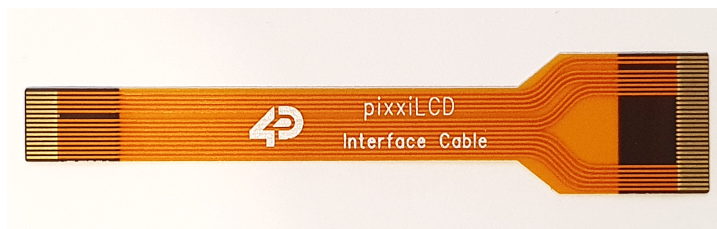
Cable Type: AWM 20624 80C 60V VW-1

Heat Resistance 80 Degrees Celsius

Connections on the opposite side at each end (Type B)

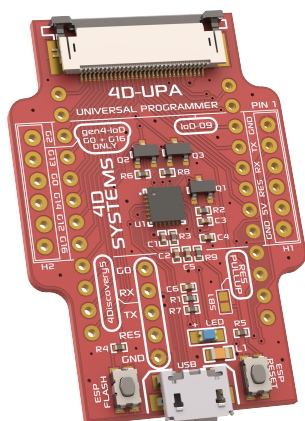
For PIXXI-LCD products:

PIXXI-LCD products use a custom FPC (not FFC) which converts the 30-way from the 4D-UPA into 15-way, for connecting to the PIXXI-LCD display modules. These are custom designed and have no standard replacement option off the shelf. For replacements, please contact 4D Systems Sales.

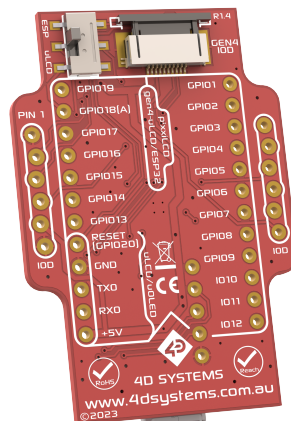


4. gen4-ESP32 / ESP32-90 Detail

To use a 4D-UPA with the gen4-ESP32 or ESP32-90 product lines, only REV 1.4 or higher versions of the 4D-UPA are compatible, as this is where compatibility was added in.



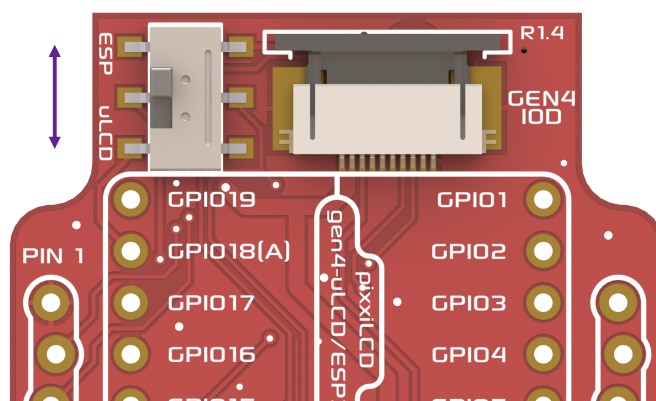
4D-UPA REV 1.4 Front



4D-UPA REV 1.4 Back

On the back side of the 4D-UPA REV 1.4 is a switch, which is used to select between **uLCD mode** (traditional mode, same as all 4D-UPA's prior to REV 1.4), or **ESP mode** (the new mode for ESP32 products). Simply switch the selection to the type of module being programmed, and it reconfigures how the 30-way FFC connector handles the modules being connected.

- gen4-uLCD-XX, uLCD, uOLED, PIXI-LCD modules - use **uLCD mode**.
- gen4-ESP32, ESP32-90 modules - use **ESP mode**.



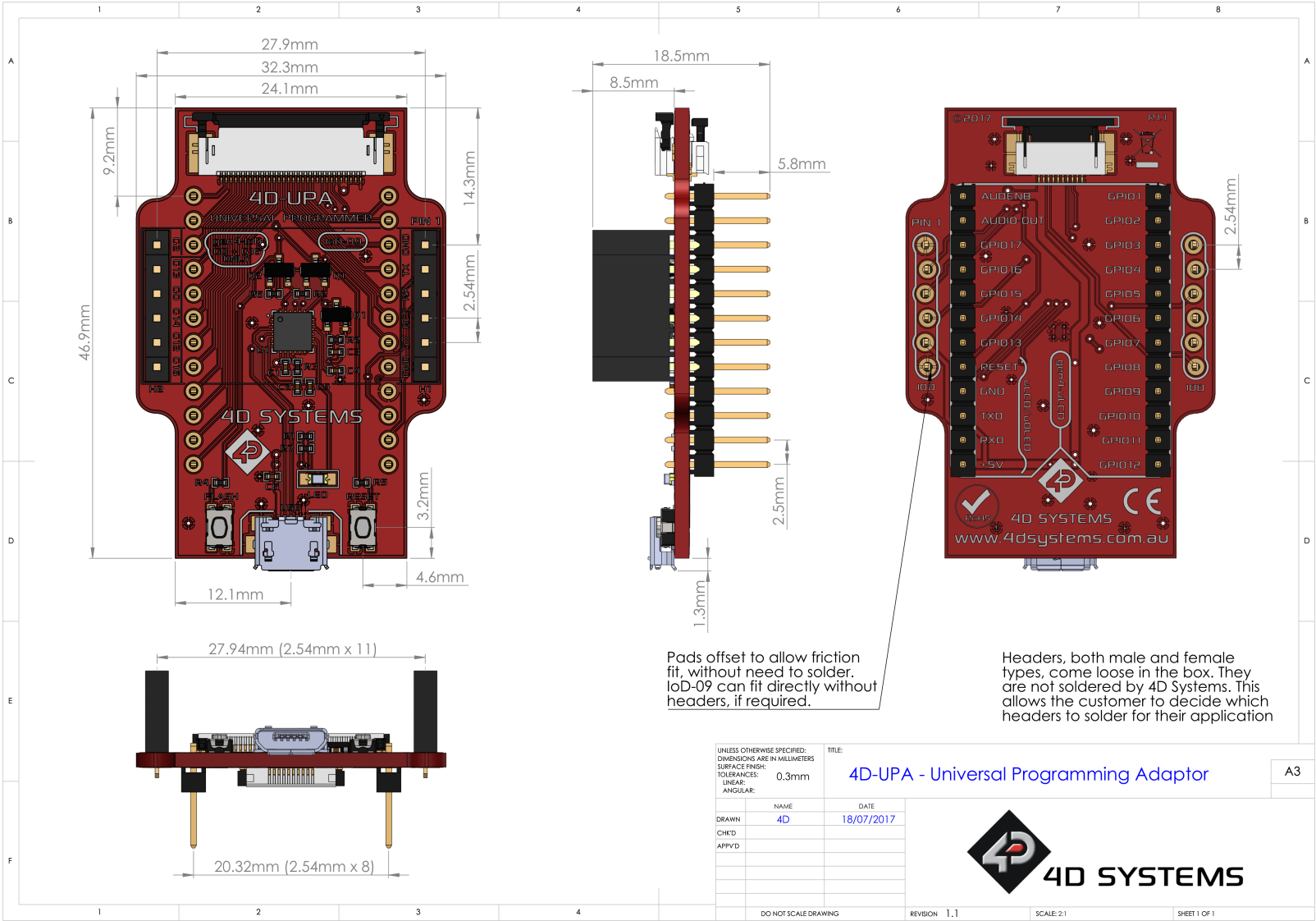
Note

Please note, the 4D-UPA REV 1.4 Switch affects the 30-way FFC connector, GPIO18(A) pad and RESET (GPIO20) pad, it does not affect the 10-way Gen4-IoD connector, or the IoD-09 pads. It does change the function of the GPIO18(A) marked pad (from AUDENB for uLCD mode, to G0 for ESP mode), as well as the RESET pad (marked as GPIO20, from RESET for uLCD mode, to ESP-RESET for ESP mode).

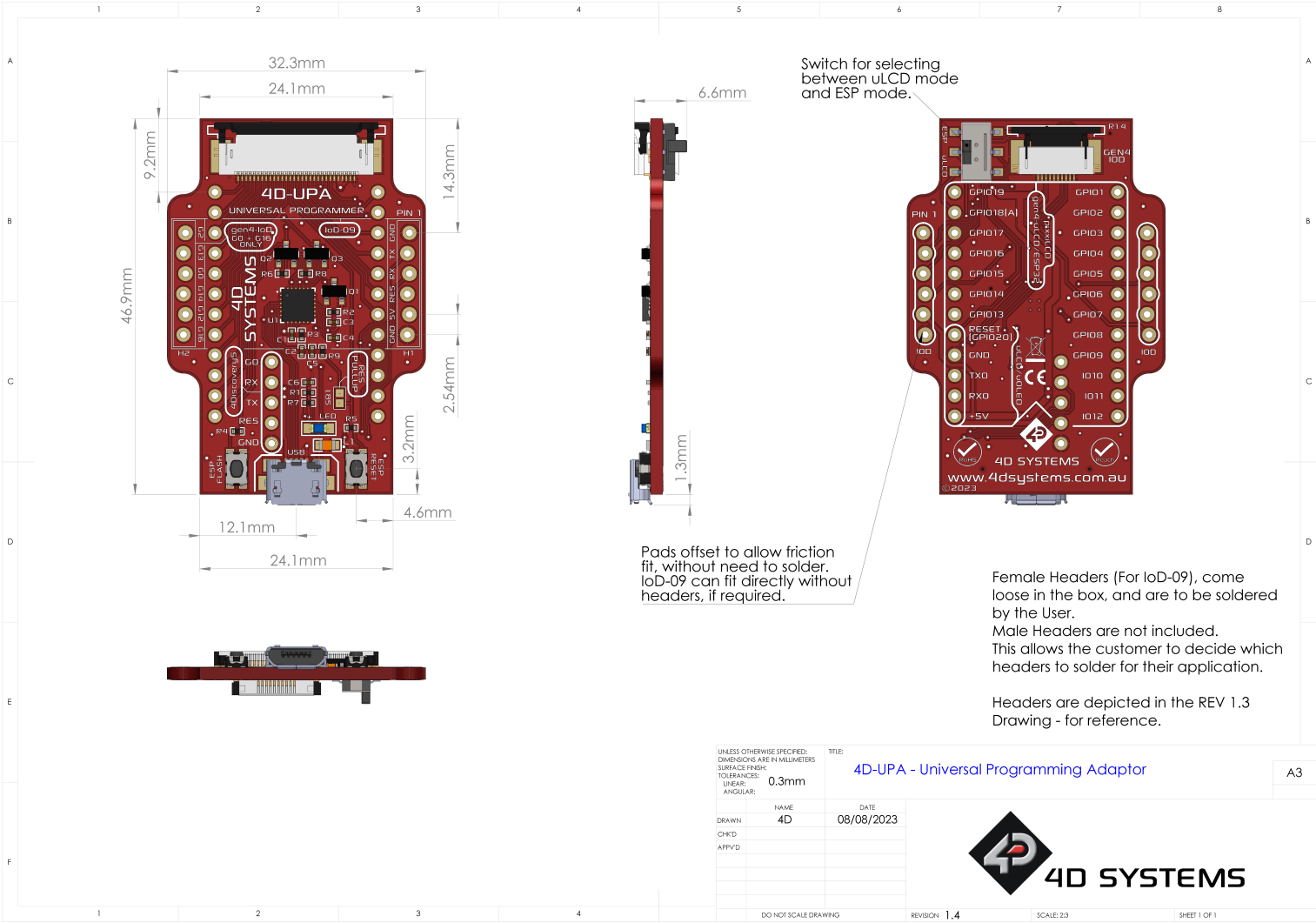
The ESP32 modules require a different type of RESET signal, and a G0 signal (via DTR and RTS), for programming the ESP32 processor. This is the reason for this change. When in uLCD mode (selector switch), functionality is identical to previous versions of the 4D-UPA.

5. Mechanical Dimensions

5.1. Revision 1.3 and under

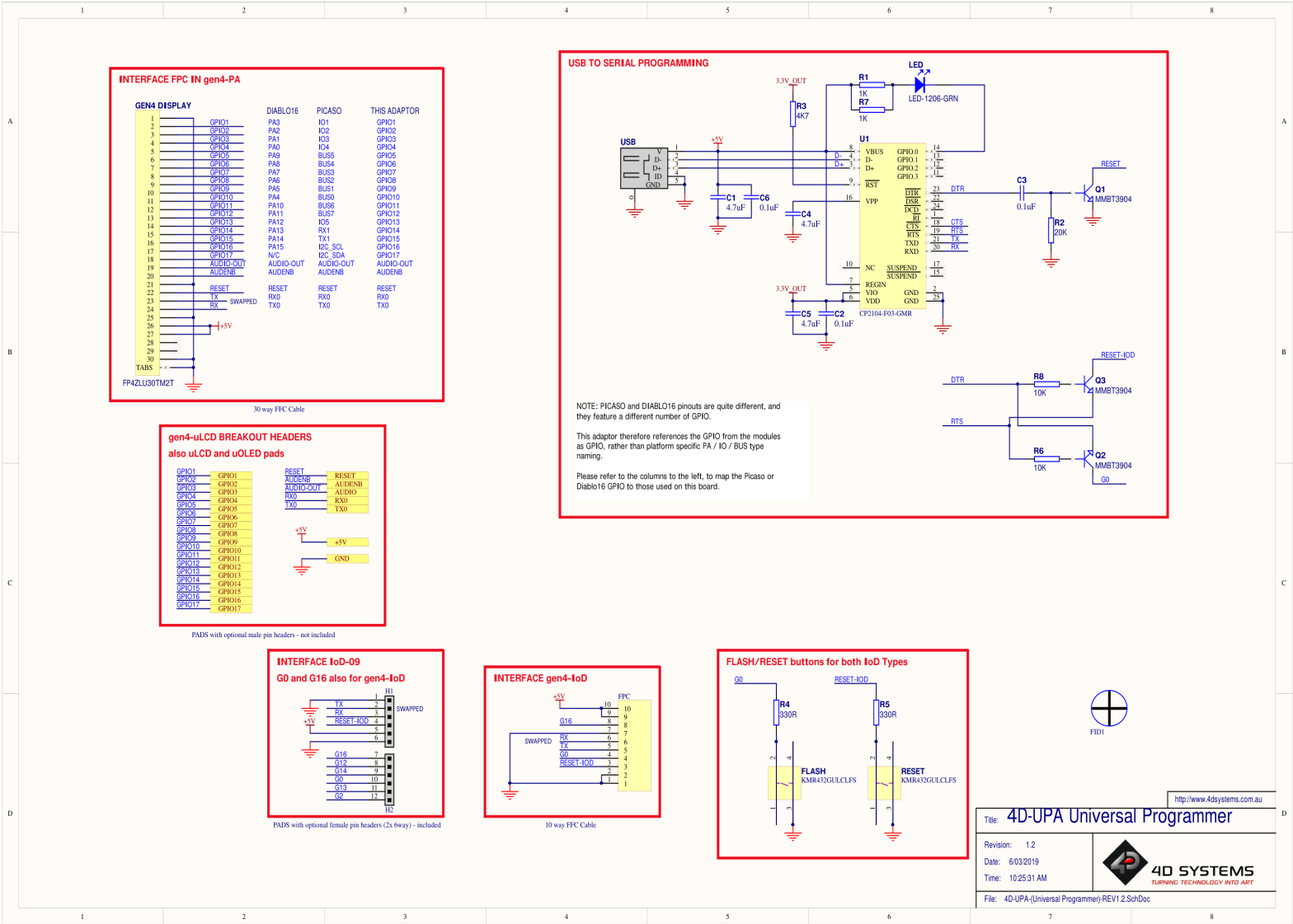


5.2. Revision 1.4



6. Schematic Diagram

6.1. Revision 1.2



INTERFACE FPC

GEN4 DISPLAY	DIABLO16	PICASO	PixxiLCD (via 15-to-30)	PIXXI-44	THIS ADAPTOR
1	GPIO1	PA3	IO1	IO1	GPIO1
2	GPIO2	PA2	IO2	IO2 or IO6	GPIO2
3	GPIO3	PA1	IO3	IO3*	GPIO3
4	GPIO4	PA0	IO4	IO4	GPIO4
5	GPIO5	PA9	IO5*	IO5	GPIO5
6	GPIO6	PA8	BUS4	N/C	GPIO6
7	GPIO7	PA7	BUS3	N/C	GPIO7
8	GPIO8	PA6	BUS2	N/C	GPIO8
9	GPIO9	PA5	BUS1	N/C	GPIO9
10	GPIO10	PA4	BUS0	N/C	GPIO10
11	GPIO11	PA10	BUS6	N/C	GPIO11
12	GPIO12	PA11	BUS7	N/C	GPIO12
13	GPIO13	PA12	IO5	N/C	GPIO13
14	GPIO14	PA13	RX1	N/C	GPIO14
15	GPIO15	PA14	TX1	N/C	GPIO15
16	GPIO16	PA15	I2C_SCL	N/C	GPIO16
17	GPIO17	N/C	I2C_SDA	N/C	GPIO17
18	AUDIO-OUT	AUDIO-OUT	N/C	AUDIO-OUT	AUDIO-OUT
19	AUDENB	AUDENB	N/C	AUDENB	AUDENB
20					
21	RESET	RESET	RESET	RESET	RESET
22	TX	RX0	RX0	RX0	RX0
23	RX	TX0	TX0	TX0	TX0
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* Not all PIXXI modules have all GPIO available. Check individual product Datasheets

30 way FFC Cable

USB TO SERIAL PROGRAMMING

6.3. Revision 1.4



7. Revision History

Hardware Revision

Revision Number	Date	Description
1.2	31/08/2017	Initial Public Release Version
1.3	29/04/2020	- Minor PCB fixes and improvements - Addition of automatic Flash/uSD card hardware selection
1.4	10/07/2023	Added compatibility for ESP32 product lines - Switch added to rear of PCB to switch between ESP32 and uLCD (regular) modes

Datasheet Revision

Revision Number	Date	Description
1.0	13/09/2017	Initial Draft
1.1	16/11/2017	Updated the Mechanical Dimensions
1.2	20/11/2017	Formatting change
1.3	29/11/2017	Formatting change
1.4	09/04/2018	Addition of headers
1.5	05/03/2019	Cosmetic Changes to 4D-UPA Datasheet
1.6	17/12/2020	Minor changes and addition of REV 1.3 hardware information
1.7	23/06/2021	Minor addition of references to PIXXI-44 IO numbering, as it's different from PIXXI-28 numbering when mapping to GPIO labels on the UPA. Added images of FPCs.
1.8	28/10/2021	Minor addition regarding Flash and Reset buttons, into the main description
1.9	08/07/2022	Updated Schematic REV 1.3 to add in PIXXI-44 column, to reflect addition to the gen4-uLCD family for the P4 range. No change to the 4D-UPA itself, just the mapping to PIXXI-44 modules.
1.10	20/12/2022	Modified datasheet for web-based documentation
1.11	14/08/2023	REV 1.4 information added (ESP32 compatibility)
1.12	06/03/2024	Updated formatting for resource centre redesign
1.13	03/05/2024	Fixed conflicting names in Rev 1.4 schematic diagram Added discussion regarding the switch for ESP32/uLCD programming in schematic Added gen4-ESP32-QSPI column in pin map table

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