USB +5V Power

FTDI FT230XS

+3.3V Power
8 signals from
FT230XS
UEXT-like connector

USB connectors :
Both micro-USB
and USB type A

USB to UART adapter
System Reference Manual

UAB_UART_adapter_SRM for Board v0.2
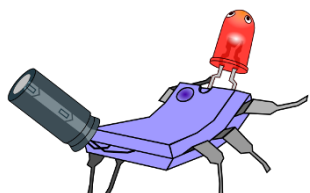**March 28, 2017 - Doc rev 0.2a**
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Table des matières

1   Introduction

You are reading the **System Reference Manual** for the USB-UART adpater.
This adapter is a simple USB to UART adapter which has more features than usual USB to UART adapters (which makes it not that simple, though for most applications, it will only be a simple USB to UART adapter).
This manual covers the board use and design.

The USB-UART adpater uses the FT230XS chip from FTDI [1] and can thus be used for more than simple USb to UART applications as all four CBUS programmable pins are available on the 10 pins (2x5), 2.54mm pitch connector.
Note that these other uses need specific communication / interface with the FTDI chip, which is supported by FTDI, not by Techno-Innov.

This document will only describe the use as an USB to UART adapter and the electrical and mechanical specifications.

In this document the USB-UART adpater will be referred as **the adapter**.

2   Licenses

2.1   Documentation license

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It is written in LaTeX and the PDF version is generated using pdflatex.

2.2   Hardware license

The USB-UART adpater hardware and schematics are under Creative Commons CC BY-SA 3.0 License.
You can produce your own original or modified version of the USB-UART adpater, and use it however you like, even sell it for profit.

2.3   Software license

Techno-Innov made no particular software for this product (aside from an internal tool based on libFTDI for Linux in order to flash serial numbers in production). Refer to FTDI [2] or the libFTDI project [3] for licences about their respective provided softwares.

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1. http://www.ftdichip.com/Products/ICs/FT230X.html
2. http://www.ftdichip.com/
3. https://www.intra2net.com/en/developer/libftdi/

3   Hardware

3.1   Dimensions
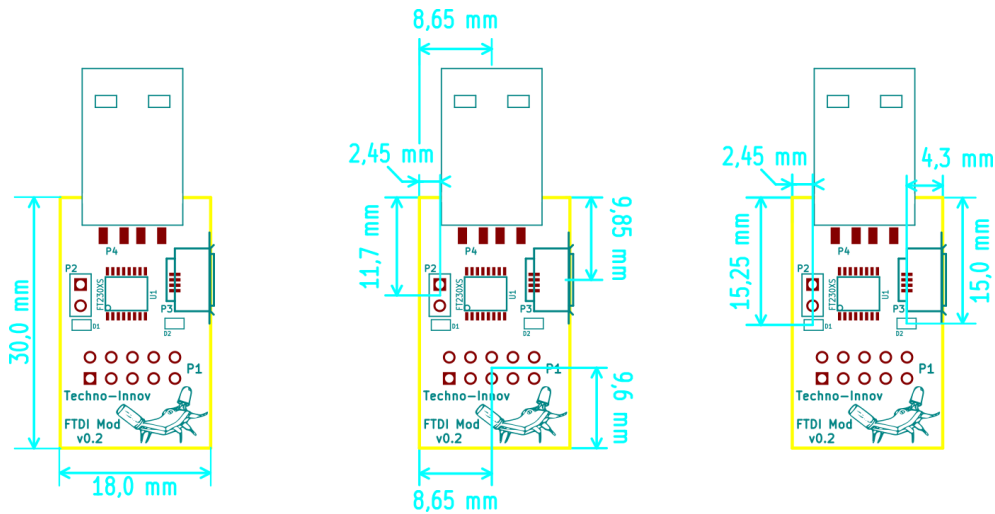
Fig 1 – USB to UART Adapter

The figure 1 gives the different dimensions and the positions of the main elements (connectors and leds) of the adapter.

3.2   Connectors

The module has two 2.54mm pitch headers numbered P1 and P2, and two USB connectors numbered P3 and P4. Refer to figure 2 for connectors position and to table 1 for a short description. Detailed description of the signals found on each connector pin follow.
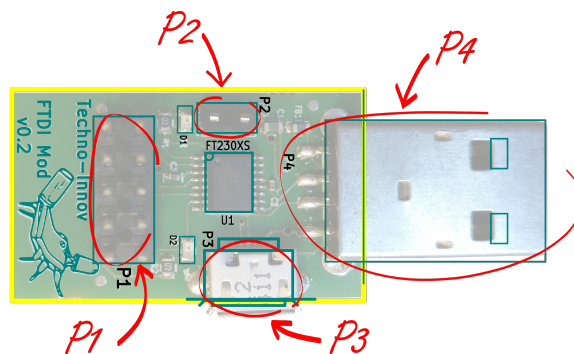

Fig 2 – Module Connectors

Name	Description
P1	10 pins, 2.54mm pitch header. Provides +3.3V, ground, UART and 6 other pins from FT230XS chip.
P2	2 pins, 2.54mm pitch header. +5V and ground input.
P3	microUSB AB female connector.
P4	USB A male connector.

TABLE 1 – Module Connectors Description

3.2.1 P1 Connector

P1 connector is a standard 2.54mm (0.1 inch) pitch header, with 2 rows of 5 pins each, and can be populated using either male or female header, and mounted either on top or on bottom side of the board.
P1 connector provides access to +3.3V, Ground, UART Rx and Tx, and 6 pins from the FT230XS bridge.
These pins are organised in a way similar to the UEXT[4] connector specified by Olimex.
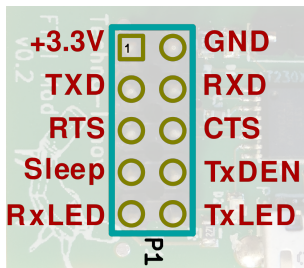
Fig 3 – P1 Connector

Pin #	Description	FT230XS Pin
1	+3.3V : +3.3 Volt	3, 10
2	GND : Ground	5, 13
3	UART Tx	1
4	UART Rx	4
5	RTS	2
6	CTS	6
7	Sleep	16
8	TxDEN	15
9	RxLED	14
10	TxLED	7

TABLE 2 – P1 Connector Pinout

Note : Some P1 pins can provide different functions depending on the FT230XS configuration. Refer to the FT230XS documentation from FTDI for full documentation of the alternate functions.

3.2.2 P2 Connector
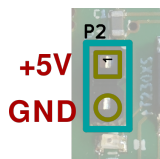
Fig 4 – P2 Connector

Pin #	Description	FT230XS Pin
1	+5V : +5V from USB	12
2	GND : Ground	5, 13

TABLE 3 – P2 Connector Pinout

P2 connector is a standard 2.54mm (0.1 inch) pitch header, with 2 pins, and can be populated using either male or female header, and mounted either on top or on bottom of the board.
P2 connector provides access to +5V and Ground from the USB cable.
Note : This power supply goes through the Ferrite Bead, and thus cannot deliver high currents.

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4. https://en.wikipedia.org/wiki/UEXT

3.2.3   P3 Connector

P3 is a female microUSB-AB port.
Refer to the Universal Serial Bus (USB)[5] page on Wikipedia for pinout and more information on the USB bus and connectors.
Note : P3 and P4 must NEVER be both connected at the same time, or it may damage your computer USB ports.

3.2.4   P4 Connector

P4 is a male USB-A port.
Refer to the Universal Serial Bus (USB)[6] page on Wikipedia for pinout and more information on the USB bus and connectors.
Note : P3 and P4 must NEVER be both connected at the same time, or it may damage your computer USB ports.

4   Electronics

The USB-UART adpater has been created using KiCad[7] EDA software suite for the creation of the schematics and printed circuit boards.

See page 9 in the annexes for the full schematics. The sources for the schematics are available for download from the FTDI Adapter page[8] on Techno-Innov.fr.
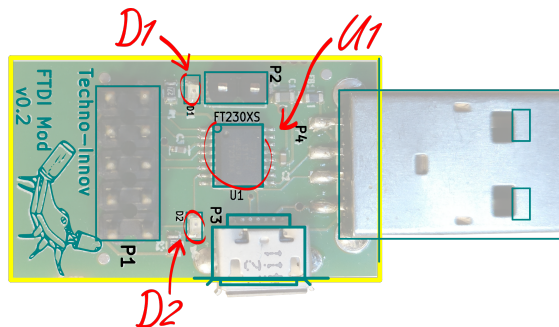
Fig 5 – FTDI Adapter Main Components

Name	Description
U1	FTDI FT230XS USB to UART bridge.
D1	Orange led : FTDI Tx activity..
D2	Green led : FTDI Rx activity.

TABLE 4 – Main Components Description

The USB to UART bridge is made by a FTDI FT230XS chip. It provides a 3.3V regulated voltage for the module and is well supported on most operating systems so there is usually no configuration required to use it as a serial line on the host development system, removing the need of any additional power source or of specific hardware.

5. http://fr.wikipedia.org/wiki/Universal_Serial_Bus
6. http://fr.wikipedia.org/wiki/Universal_Serial_Bus
7. http://www.kicad-pcb.org/display/KICAD/
8. http://www.techno-innov.fr/technique-ftdi-adapter/

The FTDI chip controls two "activity" leds for Rx (D2, the green one) and Tx (D1, orange one) data over the serial link.

For easy use of the USB to UART adapter, we chose to provide two different USB connectors (P3 and P4). This choice makes it easy to use in most configurations.
Note : P3 and P4 must NEVER be both connected at the same time, or it may damage your computer USB ports.

5   Software

Techno-Innov made no particular software for this product (aside from an internal tool based on libFTDI for Linux in order to flash serial numbers in production). Refer to FTDI [9] or the libFTDI project [10] for licences about their respective provided softwares.

6   Board revisions history

6.1   v01

This board revision has not been sold.
First prototype version.

6.2   v02

Actual version sold as of writting of this documentation.

7   Annexes

7.1   Schematics

The board schematics and PCB layout have been created using KiCad [11] EDA software suite. You can download the sources on the FTDI adapter page [12] on Techno-Innov.fr.

(See on next pages)

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9. http://www.ftdichip.com/
10. https://www.intra2net.com/en/developer/libftdi/
11. http://www.kicad-pcb.org/display/KICAD/
12. http://www.techno-innov.fr/technique-ftdi-adapter/

UEXT Connector

P1 — UEXT

1		2	UART_RX
3		4	I2C_SDA
5		6	SPI_MOSI
7		8	SPI_CS
9		10	

UART_TX
I2C_SCL
SPI_MISO
SPI_CLK

+3.3V

DGND

Note : UEXT female connector
mounted on bottom

FTDI USB to UART Adapter

+5V from USB

P2 CONN_2

+5V

DGND

+3.3V

R1 270 0603
R2 270 0603

D1 LED 0603
D2 LED 0603

Rx and Tx leds
Choose two different colors

U1 — FT230XS — SSOP-16

1	TxD	UART_TX
4	RxD	UART_RX
2	RTS	I2C_SCL
6	CTS	I2C_SDA
16	Sleep	SPI_MISO
15	TxDEN	SPI_MOSI
14	RxLED	SPI_CLK
7	TxLED	SPI_CS

+3.3V

3V3out 10
VCC 12
VCCIO 3

+5V

USBDM 9
USBDP 8
Reset 11

GND 13
GND 5

DGND

C3 0402 100nF

DGND

C2 0402 100nF
C1 0603 10uF

DGND

FB1 0603
Ferrite Bead

USB_5V

USBDM
USBDP

microUSB type AB
female

P3 MUSB

1	+V
2	D-
3	D+
4	ID
5	GND

P4

| 1 |
| 2 |
| 3 |
| 4 |

USB

USB Type A male

DGND

MIRE_RONDE   MIRE_RONDE
Mire   Mire
M0   M1

MIRE_RONDE
Mire
M2

Bottom copper layer

Bottom copper layer

Top copper layer

Top copper layer

Top silk-screen

Top silk-screen

Techno—Innov

Sheet:
File: Module_FTDI_Prog.kicad_pcb

Title: **Module FTDI_Prog**

Size: A4 | Date: 19/09/2013

KiCad E.D.A. kicad 4.0.5+dfsg1—4

Rev: 0.2

Id: 1/1

7.2   BOM

7.2.1   Block version

Part Description	Ref	Module	Nb	Vendor	Vendor ref	Farnell
USB Bridge						
FT230XS USB to UART	U1	16SSOP	1	FTDI	FT230XS	2081321
Led resistors 270 Ohms	R1, R2	0603	2	Multicomp	MC0063W06031%270R	9330917
Decoupling capacitors 100nF	C2, C3	0402	2	Multicomp	MCCA000050	1758896
Filter capacitor 10µF	C1	0603	1	TDK	C1608X5R0J106M	2112705
SMD chip bead	FB1	0603	1	TDK	MMZ1608R601A	1669700
Tx Led - Orange	D1	0603	1	Vishay	VLMO1300-GS08	2251473
Rx Led - Green	D2	0603	1	Vishay	VLMG1300-GS08	2251461
USB Type A male	P4	SMD	1	Multicomp	MC32605	1696546
microUSB Type AB female	P3	SMD	1	MOLEX	47590-0001	1568022
GPIO Connectors						
Female headers GPIO (10 pins)	P1	2,54mm	1	MULTICOM	2214S-10SG-85	1593490
Male headers GPIO (10 pins)	P1	2,54mm	1	MULTICOM	2213S-10G	1593442
Male headers +5V Power (2 pins)	P2	2,54mm	1	Fischer	SL1.025.36Z	9729038

TABLE 5 – BOM by functional block

Note : Components used on Board may change for functionnally equivalent references without prior notice

7.3   Document revision History

Version	Date	Author	Information
0.2a	March 28, 2017	Nathaël Pajani	Initial revision

7.4   Disclaimer

The USB-UART adpater is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. The entire risk as to the quality and performance of the USB-UART adpater is with you. Should the USB-UART adpater prove defective, you assume the cost of all necessary servicing, repair or correction.