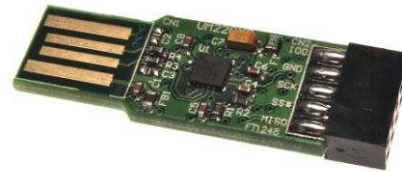


Future Technology Devices International Ltd

Datasheet

UMFT201XB, UMFT220XB, UMFT230XB Breakout Modules



USB to I²C/UART/FT1248 breakout modules

1 Introduction

UMFT201XB, UMFT220XB, and UMFT230XB breakout modules utilize FTDI's FT201XQ, FT220XQ, and FT230XQ chips, respectively, to convert USB to serial or parallel interfaces. These modules support the following popular interfaces:

- UMFT201XB bridges from USB to I²C IC.
- UMFT220XB bridges from USB to a user chosen, parallel bit interface, FTDI's FT1248/SPI. Note: 2 out of the 4 I/O lines are available for this module.
- UMFT230XB bridges from USB to UART IC.

1.1 Features

This hardware is a low cost breakout board form-factor that converts USB2.0 Full-Speed to a serial interface and connects the serial signals to a 2.54mm (0.1") pitch 10pin female receptacle. The boards do not use a USB connector, but instead the modules plug directly into the USB host connector and the pads of the PCB makes electrical contact with the electrical contacts of the USB connector.

All serial interfaces on these modules operate at +3.3V voltage levels, however all I/Os are 5V tolerant.

2 Driver Support

Royalty-Free VIRTUAL COM PORT (VCP) DRIVERS for:

- Windows 7 32,64-bit
- Windows Vista
- Windows XP 32,64-bit
- Windows XP Embedded
- Windows CE.NET 4.2 , 5.0 and 6.0
- MAC OS OS-X
- Linux 3.0 and greater
- Android

Royalty-Free D2XX Direct Drivers (USB Drivers + DLL S/W Interface):

- Windows 7 32,64-bit
- Windows Vista
- Windows XP 32,64-bit
- Windows XP Embedded
- Windows CE.NET 4.2, 5.0 and 6.0
- MAC OS OS-X
- Linux 3.0 and greater
- Android

The drivers listed above are all available to download for free from www.ftdichip.com. Various 3rd Party Drivers are also available for various other operating systems - visit www.ftdichip.com for details.

Use of FTDI devices in life support and/or safety applications is entirely at the user's risk, and the user agrees to defend, indemnify and hold harmless FTDI from any and all damages, claims, suits or expense resulting from such use.

3 Ordering Information

Module	Interface	Features
UMFT201XB	I ² C	USB to I ² C with four control bus lines, 3.3V power out (with a 50mA current limit) and fused 5V. Standard option, connector fitted to CN2.
UMFT201XB-NC	I ² C	USB to I ² C with four control bus lines, 3.3V power out (with a 50mA current limit) and fused 5V. No connector option, no connector is fitted to CN2.
UMFT201XB-WE	I ² C	USB to I ² C with four control bus lines, 3.3V power out (with a 50mA current limit) and fused 5V. Wire ended option, 6" flying leads fitted to CN2.
UMFT220XB	4-bit FT1248	USB to FT1248 uses 2 FT1248 I/O lines, 3.3V power out (with a 50mA current limit) and fused 5V. Standard option, connector fitted to CN2.
UMFT220XB-NC	4-bit FT1248	USB to FT1248 uses 2 FT1248 I/O lines, 3.3V power out (with a 50mA current limit) and fused 5V. No connector option, no connector is fitted to CN2.
UMFT220XB-WE	4-bit FT1248	USB to FT1248 uses 2 FT1248 I/O lines, 3.3V power out (with a 50mA current limit) and fused 5V. Wire ended option, 6" flying leads fitted to CN2.
UMFT230XB	Basic UART	USB to UART with four control bus lines, 3.3V power out (with a 50mA current limit) and fused 5V. UART rate can be up to 3 Mega Baud. Standard option, connector fitted to CN2.
UMFT230XB-NC	Basic UART	USB to UART with four control bus lines, 3.3V power out (with a 50mA current limit) and fused 5V. UART rate can be up to 3 Mega Baud. No connector option, no connector is fitted to CN2.
UMFT230XB-WE	Basic UART	USB to UART with four control bus lines, 3.3V power out (with a 50mA current limit) and fused 5V. UART rate can be up to 3 Mega Baud. Wire ended option, 6" flying leads fitted to CN2.

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4 Signals and Configurations

For all three modules, CN1 connects directly to a USB host or HUB port, or can be connected to a USB extension cable. This connects the USB data signals, 5V USB Bus power and GND. When connecting these modules to a USB host or HUB the USB signal pads should be facing upwards, and when connecting to vertical connector the USB signal pad should be facing right. If the module is plugged in the wrong way, no contact will be made between PCB and HUB, no damage will occur from plugging the module in upside down.

4.1 UMFT-XB Module Pin Outs

Pin	FTUM201XBUMFT201XB	FTUM220XBUMFT220XB	FTUM230XBUMFT230XB
1	SCL	IO0	TXD
2	VBUS	VBUS	VBUS
3	GND	GND	GND
4	RESET	RESET#	RESET#
5	SDA	SCK	RXD
6	3V3	3V3	3V3
7	CB0	SS#	RTS#
8	CB2	CB3	CB0
9	CB1	MISO	CTS#
10	CB3	IO1	CB1

Table 4.1 Module PinOut List

4.2 Signal Descriptions

Pin No.	Name	Type	Description
1	VBUS	PWR	5V power input USB port. For a low power USB bus powered design, up to 100mA can be sourced from the 5V supply on the USB bus. A maximum of 500mA can be sourced from the USB bus in a high power USB bus powered design.
2	D-	Signal	Negative USB data signal
3	D+	Signal	Positive USB data signal
4	GND	PWR	Module Ground Supply

Table 4.2 CN1 PinOut Description

4.3 UMFT201XB CN2 Signal Descriptions

Pin No.	Name	Type	Description
1	<u>SCL</u>	Input	I2C clock input
2	VBUS	PWR Output	5V Power output USB port.
3	GND	PWR	Module Ground Supply
4	RST#	Input	Can be used by an external device to reset the FT201X. If not required can be left unconnected, or pulled up to VCCIO.
5	<u>SDA</u>	I/O	I2C bi-directional data line
6	3V3	Output	3.3V output from integrated LDO regulator. This pin is decoupled to ground on the module PCB with a 10nF capacitor. The prime purpose of this pin is to provide the internal 3.3V supply to the USB transceiver cell.
7	CB0	I/O	Configurable CBUS I/O Pin. Function of this pin is configured in the device internal MTP ROM. Factory Default pin Function is PWREN#. See CBUS Signal Options, Table 4.6
8	CB1	I/O	Configurable CBUS I/O Pin. Function of this pin is configured in the device internal MTP ROM. Factory Default pin Function is SLEEP#. See CBUS Signal Options, Table 4.6
9	CB2	I/O	Configurable CBUS I/O Pin. Function of this pin is configured in the device internal MTP ROM. Factory Default pin Function is Tristate. See CBUS Signal Options, Table 4.6
10	CB3	I/O	Configurable CBUS I/O Pin. Function of this pin is configured in the device internal MTP ROM. Factory Default pin Function is Tristate. See CBUS Signal Options, Table 4.6

Table 4.3 I²C Module Pin Out Description

4.4 UMFT220XB CN2 Signal Descriptions

Pin No.	Name	Type	Description
1	<u>IO0</u>	I/O	FT1248 Bi-Directional data bit 0
2	VBUS	PWR Output	5V Power output USB port.
3	GND	PWR	Module Ground Supply
4	RST#	Input	Can be used by an external device to reset the FT220X. If not required can be left unconnected, or pulled up to VCCIO.
5	<u>SCK</u>	Input	FT1248 Clock input from FT1248 interface master
6	3V3	Output	3.3V output from integrated LDO regulator. This pin is decoupled to ground on the module PCB with a 10nF capacitor. The prime purpose of this pin is to provide the internal 3.3V supply to the USB transceiver cell.
7	<u>SS#</u>	Input	FT1248 Chip select input to enable the device interface. Active low logic.
8	CB3	I/O	Configurable CBUS I/O Pin. Function of this pin is configured in the device internal MTP ROM. Factory Default pin Function is PWREN#. See CBUS Signal Options, Table 4.6
9	<u>MISO</u>	Output	Master In Serial Out. Used to provide status information to the FT1248 interface master.

Pin No.	Name	Type	Description
10	IO1	I/O	FT1248 Bi-Directional data bit 1

Table 4.4 FT1248 Module Pin Out Description

4.5 UMFT230XB CN2 Signal Descriptions

Pin No.	Name	Type	Description
1	TXD	Output	UART Transmit Asynchronous Data Output.
2	VBUS	PWR Output	5V Power output USB port.
3	GND	PWR	Module Ground Supply
4	RST#	Input	Can be used by an external device to reset the FT230X. If not required can be left unconnected, or pulled up to VCCIO.
5	RXD	Input	UART Receiving Asynchronous Data Input.
6	3V3	Output	3.3V output from integrated LDO regulator. This pin is decoupled to ground on the module PCB with a 10nF capacitor. The prime purpose of this pin is to provide the internal 3.3V supply to the USB transceiver cell.
7	RTS#	Output	UART Request to Send Control Output / Handshake Signal.
8	CB0	I/O	Configurable CBUS I/O Pin. Function of this pin is configured in the device internal MTP ROM. Factory Default pin Function is PWREN#. See CBUS Signal Options, Table 4.6
9	CTS#	Input	UART Clear To Send Control Input / Handshake Signal.
10	CB1	I/O	Configurable CBUS I/O Pin. Function of this pin is configured in the device internal MTP ROM. Factory Default pin Function is SLEEP#. See CBUS Signal Options, Table 4.6

Table 4.5 UART Module Pin Out Description

4.6 CBUS Signal Options

CBUS Signal Option	Available On CBUS Pin***	Description
TRI-STATE	CBUS0, CBUS1, CBUS2, CBUS3	IO Pad is tri-stated
DRIVE_1	CBUS0, CBUS1, CBUS2, CBUS3	Output a constant 1
DRIVE_0	CBUS0, CBUS1, CBUS2, CBUS3	Output a constant 0
TXDEN	CBUS0, CBUS1, CBUS2, CBUS3	Enable transmit data for RS485 (Only in UMFT230XB)
PWREN#	CBUS0, CBUS1, CBUS2, CBUS3	Output is low after the device has been configured by USB, then high during USB suspend mode. This output can be used to control power to external logic P-Channel logic level MOSFET switch. Internal drive configuration consists of an open drain to GND with no pull-up, specially designed for battery charging applications.*
TXLED#	CBUS0, CBUS1, CBUS2, CBUS3	Transmit data LED drive – pulses low when transmitting data via USB.
RXLED#	CBUS0, CBUS1, CBUS2, CBUS3	Receive data LED drive – pulses low when receiving data via USB.

CBUS Signal Option	Available On CBUS Pin***	Description
TX&RXLED#	CBUS0, CBUS1, CBUS2, CBUS3	LED drive – pulses low when transmitting or receiving data via USB.
SLEEP#	CBUS0, CBUS1, CBUS2, CBUS3	Goes low during USB suspend mode. Typically used to power down an external TTL to RS232 level converter IC in USB to RS232 converter designs.
CLK24MHz	CBUS0, CBUS1, CBUS2, CBUS3	24 MHz Clock output.**
CLK12MHz	CBUS0, CBUS1, CBUS2, CBUS3	12 MHz Clock output.**
CLK6MHz	CBUS0, CBUS1, CBUS2, CBUS3	6 MHz Clock output.**
GPIO	CBUS0, CBUS1, CBUS2, CBUS3	CBUS bit bang mode option. Allows up to 4 of the CBUS pins to be used as general purpose I/O. Configured individually for CBUS0, CBUS1, CBUS2 and CBUS3 in the internal MTP ROM. A separate application note, AN232R-01 , available from FTDI website (www.ftdichip.com) describes in more detail how to use CBUS bit bang mode.
BCD_Charger	CBUS0, CBUS1, CBUS2, CBUS3	Battery charge Detect, indicates when the device is connected to a dedicated battery charger host. Active high output.
BCD_Charger#	CBUS0, CBUS1, CBUS2, CBUS3	Inverse of BCD Charger
BitBang_WR#	CBUS0, CBUS1, CBUS2, CBUS3	Synchronous and asynchronous bit bang mode WR# strobe output.
BitBang_RD#	CBUS0, CBUS1, CBUS2, CBUS3	Synchronous and asynchronous bit bang mode RD# strobe output.
I2C_TXE#	CBUS0, CBUS1, CBUS2, CBUS3	Transmit buffer empty, used to indicate to I2C master device status of the FT201X transmit buffer
I2C_RXF#	CBUS0, CBUS1, CBUS2, CBUS3	Receive buffer full, used to indicate to I2C master device status of FT201X receive buffer
VBUS_Sense	CBUS0, CBUS1, CBUS2, CBUS3	Input to detect when VBUS is present.
Time_Stamp	CBUS0, CBUS1, CBUS2, CBUS3	Toggle signal which changes state each time a USB SOF is received

Table 4.6 CBUS Configuration Control

For further information on CBUS options, please refer to the relevant x-chip datasheet.

* PWREN# must be used with a 10kΩ resistor pull up.

**When in USB suspend mode the outputs clocks are also suspended.

***The number of CBUS pins available varies for the three different modules.

4.7 Configuring the MTP ROM

The IC on each of the modules contains an embedded MTP memory that can be used to specify the functions of the CBUS pins, the current drive on each signal pin, current limit for the USB bus and the descriptors of the device. For details on using the MTP ROM/EEPROM programming utility FT_PROG, please see the [FT_PROG User Guide](#).

When programming the MT memory please note:

- i) The Max Bus Power setting of the MTP ROM should specify the maximum current to be drawn from the USB host/hub when enumerated. For high-powered USB devices the current limit when enumerated is between 100mA and 500mA, for low-powered USB devices the current limit is 100mA.

5 Module Dimensions

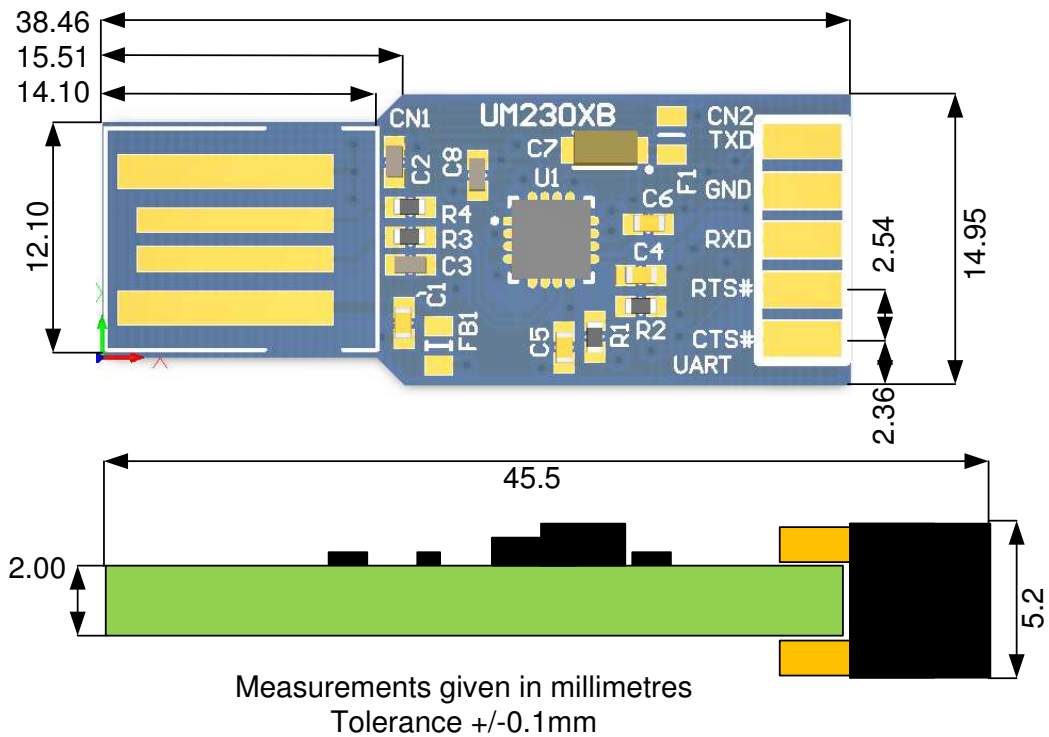


Figure 5.1 UMFT-XB Module Dimensions

The UMFT201XB, UMFT220XB and UMFT230XB modules are mechanically identical. Figure 5.1 Uses UMFT230 to illustrate the mechanical details.

6 UMFT-XB-WE Module Wire Connections

6.1 UMFT201XB-WE Wire Connections

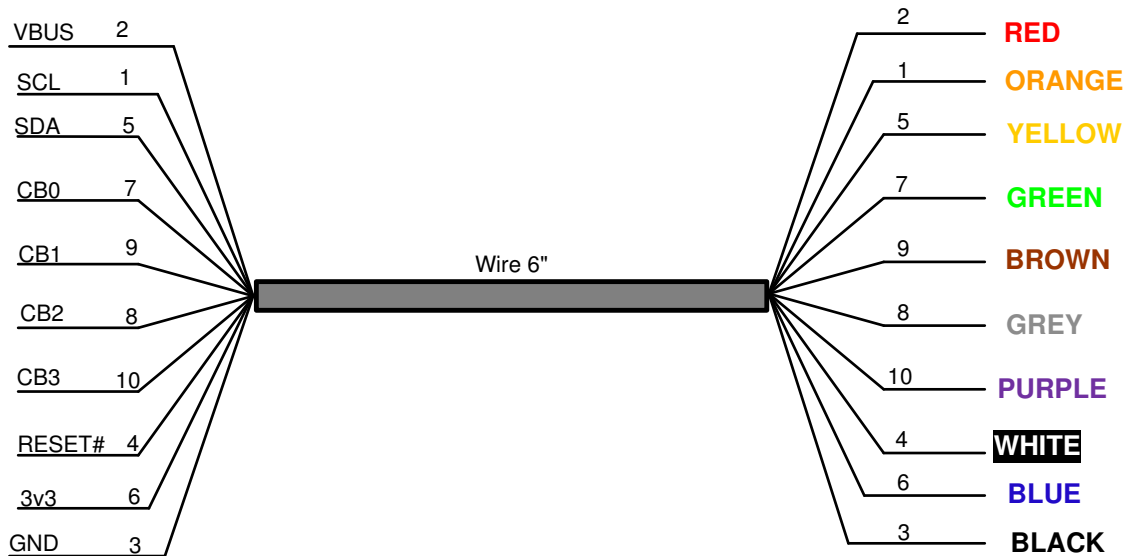


Figure 6.1 UMFT201XB-WE Wire Connections (numbers refer to pad numbers on the PCB)

Figure 6.1 illustrates the -WE product as a cable. This is only for illustration purposes. The wire ended product consists of individual wires – not a cable

6.2 UMFT220XB-WE Wire Connections

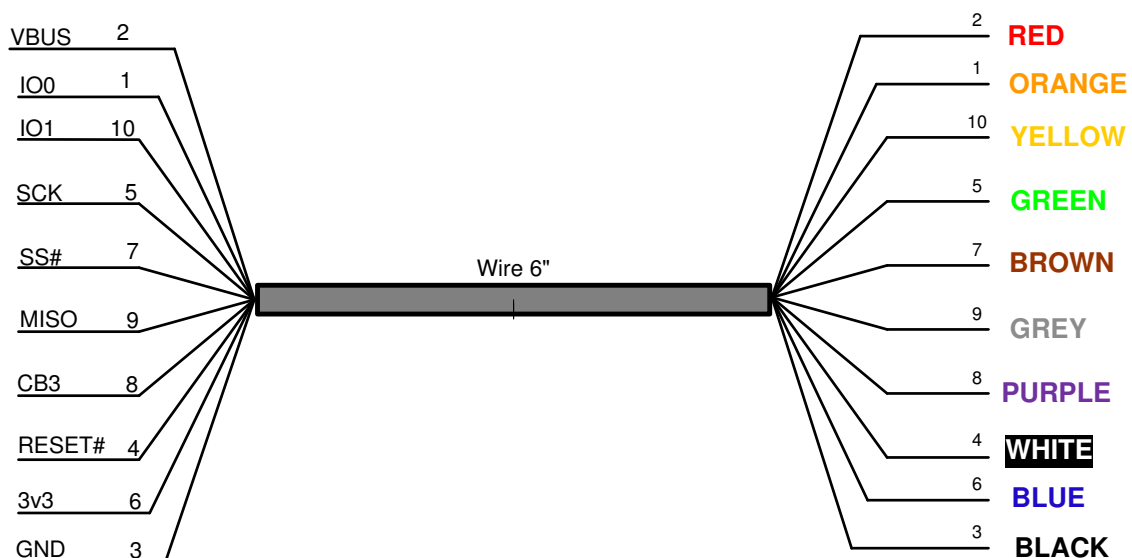


Figure 6.2 UMFT220XB-WE Wire Connections (numbers refer to pad numbers on the PCB)

Figure 6.2 illustrates the -WE product as a cable. This is only for illustration purposes. The wire ended product consists of individual wires – not a cable

6.3 UMFT230XB-WE Wire Connections

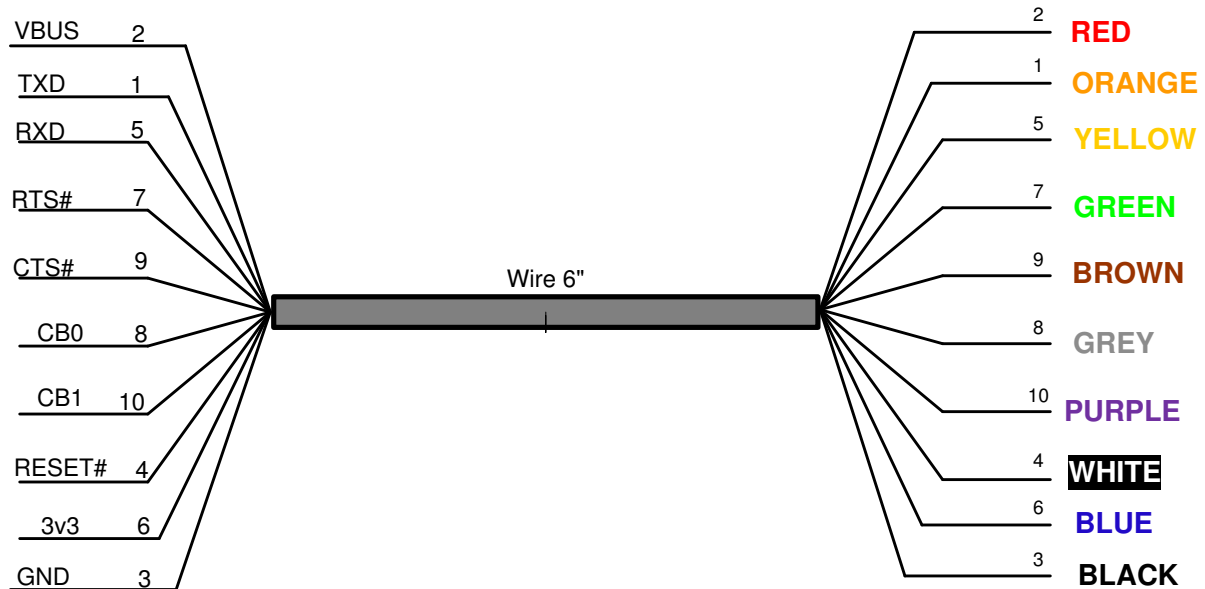


Figure 6.3 UMFT230XB-WE Wire Connections (numbers refer to pad numbers on the PCB)

Figure 6.3 illustrates the -WE product as a cable. This is only for illustration purposes. The wire ended product consists of individual wires – not a cable

7 Module Circuit Schematics

7.1 UMFT201XB Schematic

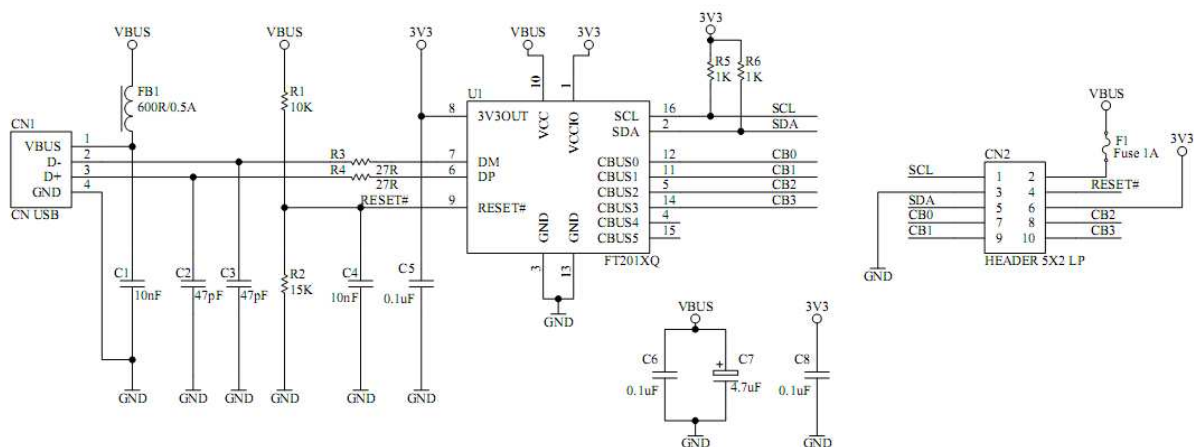


Figure 7.1 UMFT201XB Circuit Schematic

7.2 UMFT220XB Schematic

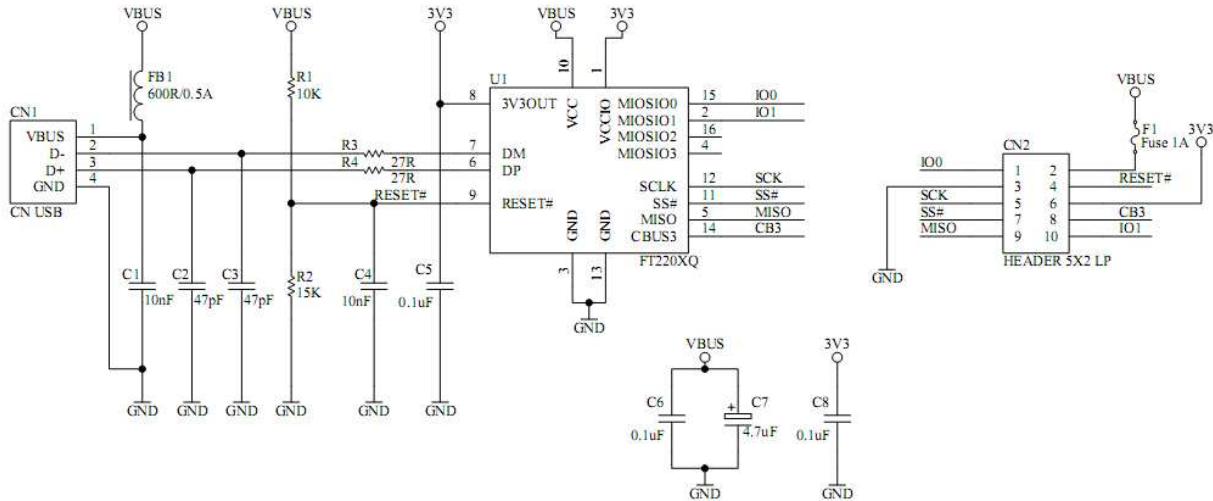


Figure 7.2 UMFT220XB Circuit Schematic

7.3 UMFT230XB Schematic

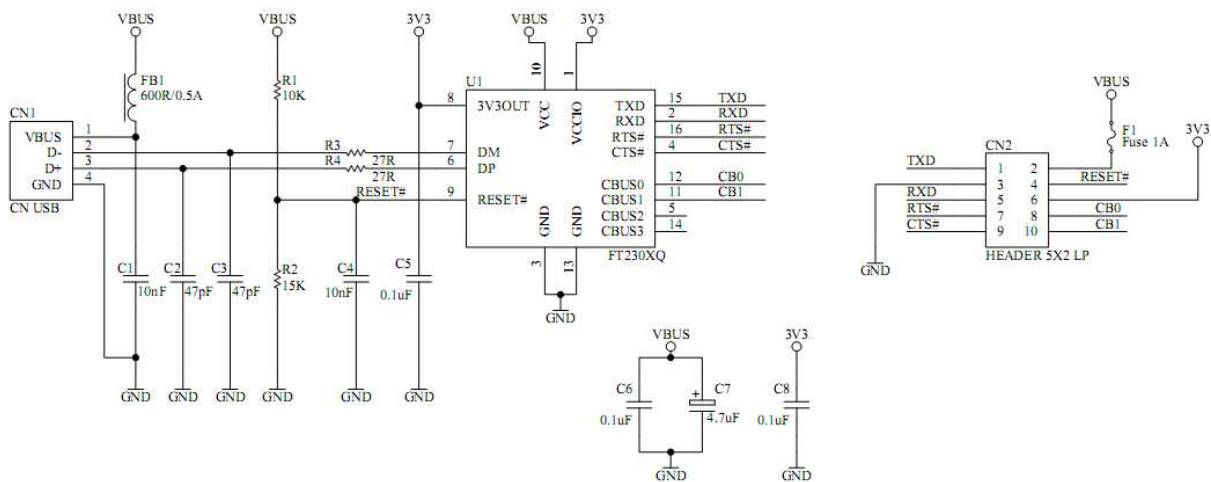


Figure 7.3 UMFT230XB Circuit Schematic

8 Environmental Compliances

The UMFT-XB modules exclusively use lead free components, and are fully compliant with European Union directive 2002/95/EC.

9 Internal MTP ROM Configuration

Following a power-on reset or a USB reset the FT-X chips will scan its internal MTP ROM and read the USB configuration descriptors stored there. The default values programmed into the internal MTP ROM in the FT201/220/230XB modules is shown in Table 9.1.

Parameter	Value	Notes
USB Vendor ID (VID)	0403h	FTDI default VID (hex)
USB Product UD (PID)	6015h	FTDI default PID (hex)
Serial Number Enabled?	Yes	
Serial Number	See Note	A unique serial number is generated and programmed into the MTP ROM during final test of the FT201/220/230XB modules.
Pull down I/O Pins in USB Suspend	Disabled	Enabling this option will make the device pull down on the UART interface lines when the power is shut off (PWREN# is high).
Manufacturer Name	FTDI	
Product Description	UMFT201XB / UMFT220XB / UMFT230XB	
Max Bus Power Current	90mA	
Power Source	Bus Powered	
Device Type	FT201X / FT220X / FT230X	FT201X = 0x03, FT220X = 0x02, FT230X = 0x00
USB Version	0200	Returns USB 2.0 device description to the host. Note: The device is a USB 2.0 Full Speed device (12Mb/s).
Remote Wake Up	Enabled	Taking RI# low will wake up the USB host controller from suspend.
High Current I/Os	Disabled	Enables the high drive level on the serial and CBUS I/O pins.
Load VCP Driver	Enabled	Makes the device load the VCP driver interface for the device.
UMFT201XB-01 CBUS0	GPIO	
UMFT201XB-01 CBUS1	GPIO	
UMFT201XB-01 CBUS2	GPIO	
UMFT201XB-01 CBUS3	GPIO	
UMFT220XB-01 CBUS3	Tristate	
UMFT230XB-01 CBUS0	GPIO	

Parameter	Value	Notes
UMFT230XB-01 CBUS1	GPIO	

Table 9.1 Default Internal MTP ROM Configuration

The internal MTP ROM in the FT-X chip can be programmed over USB using the utility program FT_PROG. FT_PROG can be downloaded from the www.ftdichip.com. Users who do not have their own USB vendor ID but who would like to use a unique Product ID in their design can apply to FTDI for a free block of unique PIDs. Contact [FTDI Support](mailto:support1@ftdichip.com) (support1@ftdichip.com) for this service.

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Appendix B: Revision History

Document Title: UMFT201XB, UMFT220XB and UMFT230XB
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