Introducing the FT-X Series

of USB2.0 Full Speed

Peripheral Solutions

USB MADE EASY

Introducing the FT-X Chip Series

- 13 chip/package options to optimize your design when you need to quickly and easily add a USB port into your system.

- FTDI provides a wide selection of OS support:
  - Windows, Android, Mac OS, and Linux.

- Offering a wide selection of IO bridges including: Basic UART, Full Handshake UART, FIFO, I²C, SPI, and FTDI's FT1248 interface.
  - I²C to USB bridge in 10 pin DFN package.

- Low power, small device footprints, and abundant features minimizes PCB real estate and lowers overall system costs.

FT-X Series has IT all !!

FTDI Chip

FTDI USB Peripheral Series Strategy

- Extension of FTDI's product mission:
  - Future Technology Devices International (FTDI) specialises in the design and supply of silicon and software solutions for the Universal Serial Bus (USB). FTDI offers a **simple** route to USB migration / integration by combining easy to implement IC devices with **proven ready-to-use**, **royalty-free** USB firmware and driver software.
- FTDI offers the **widest selection** of USB chips for USB peripherals.
  - Familiar FT232R and FT245R for ease-of-use and fast time-to-market.
  - USB2 Hi-Speed solutions, with single and multi-channel options FT232H / FT2232H / FT4232H.
  - FT-X Series offering is the PREMIERE cost / benefit profile for USB2.0 Full Speed solutions in the market.

Whatever your USB design need,
FTDI can meet it !!!

USB Peripheral / Device Solutions
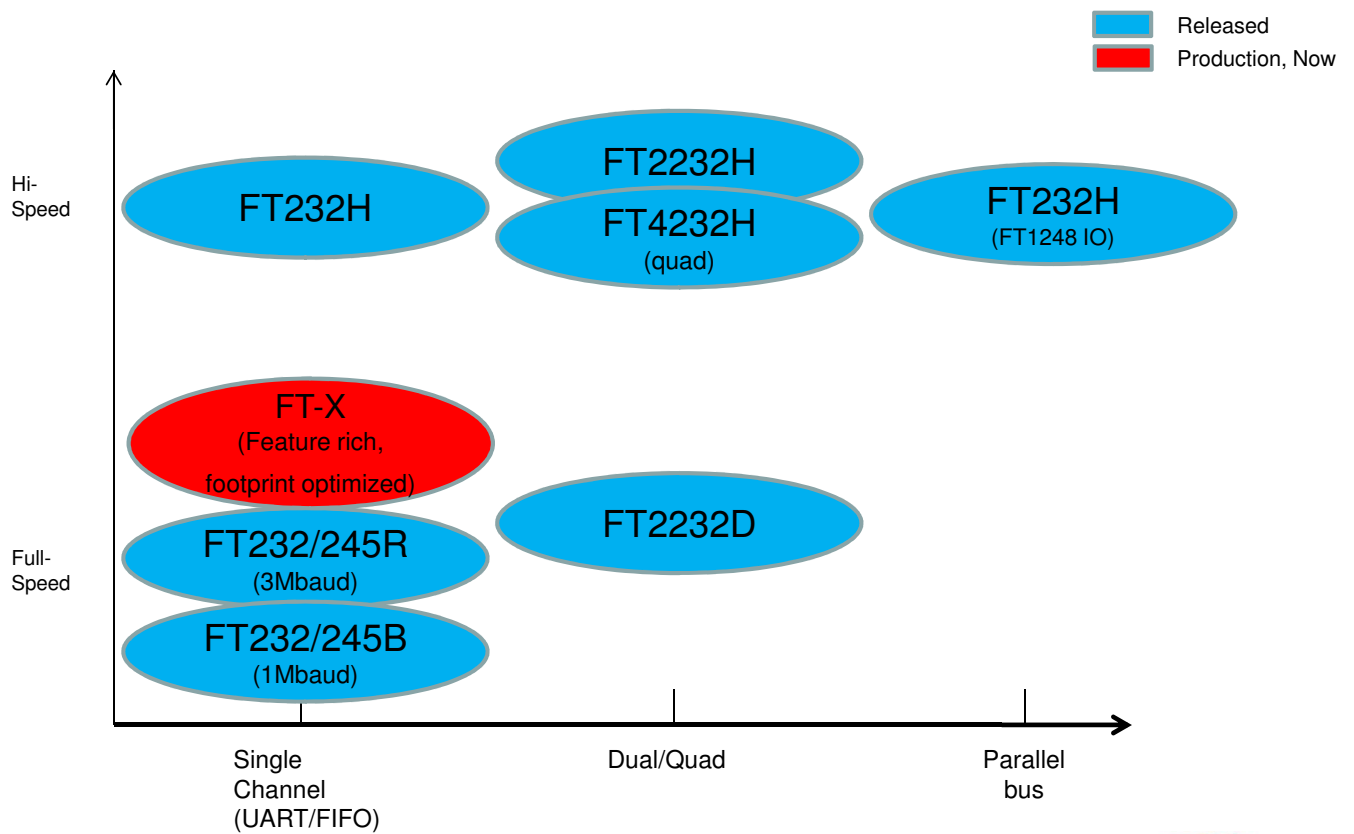
FT-X Series – Meet the Family

Part Number	Pins	Package	Description
FT231XS	20	SSOP	Full Handshake UART Interface
FT231XQ	20	QFN	Full Handshake UART Interface
FT230XS	16	SSOP	Basic UART Interface
FT230XQ	16	QFN	Basic UART Interface
FT221XS	20	SSOP	8bit SPI/FT1248 Interface
FT221XQ	20	QFN	8bit SPI/FT1248 Interface
FT220XS	16	SSOP	4bit SPI/FT1248 Interface
FT220XQ	16	QFN	4bit SPI/FT1248 Interface
FT201XS	16	SSOP	I²C Interface
FT201XQ	16	QFN	I²C Interface
FT200XD	10	DFN	I²C Interface
FT240XS	24	SSOP	8bit FIFO Interface
FT240XQ	24	QFN	8bit FIFO Interface

FTDI
Chip

FT-X Series Features

- X-Chip Factor provides the extra elements/features that add value:
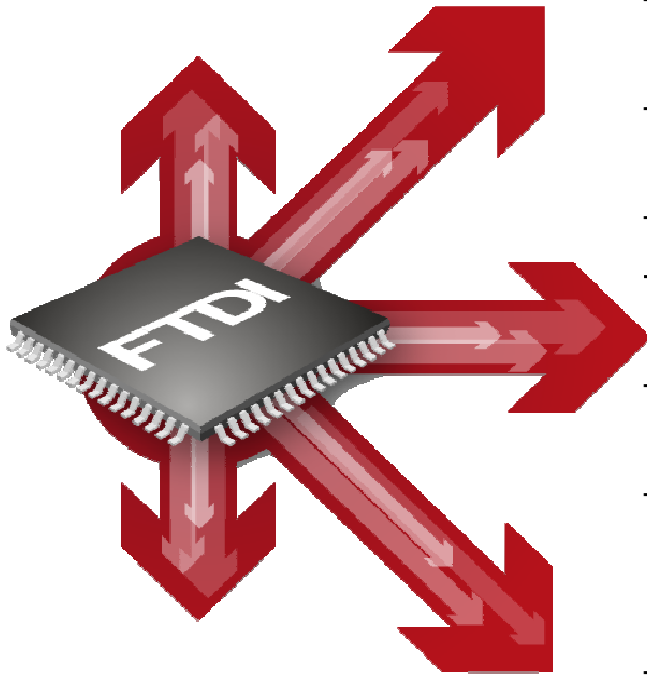
  - Battery charger detection to enable higher current, faster charging.
  - Extensive clocking features; internal clock generation and external clock out.
  - Internal 3V3 level converter.
  - Integrated crystal and MTP memory to save board space and maximize flexibility.
  - Extended temperature range support, -40° to +85°C.
  - Low power consumption:
    - 8mA active (typical)
    - 125uA suspend (typical)
  - Input/ output voltage support, 1.8V to 3.3V, with 5V tolerance.

FTDI Chip

FT-X Series Support, Breakout Modules

- Breakout modules, such as the USB to I^2C, UMFT200XD, provide the simplest method to connect to a USB host, and interface directly into your system via the appropriate IO.

  - 4 PCB traces slot directly into a USB Host (A Port)
  - USB protocol engine and interface bridge integrated into FT-X Series silicon devices
  - Interface connector provided for system integration
 - Choice of module per interface required
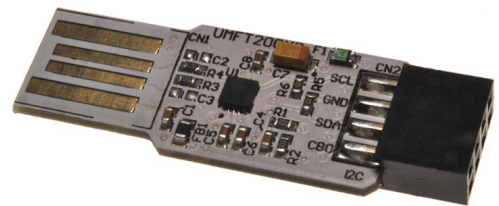
Module	Interface
UMFT201XB	I^2C
UMFT200XD	I^2C
UMFT220XB	FT1248
UMFT230XB	UART

FT-X Series Support, Evaluation Modules

- Evaluation modules are larger than breakout modules, and provide access to all pins.

    – Manufactured in DIP form factor (0.3" wide).
    – Easy to integrate into system boards for thorough prototyping, system emulation, and check-out.
    – USB protocol engine and interface bridge integrated into FT-X Series silicon devices.
   – Choice of module per interface required.
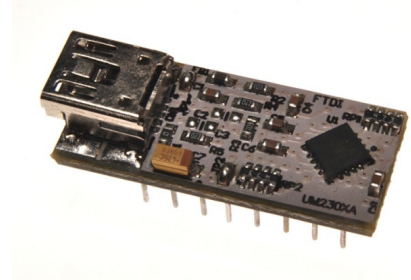
Module	Interface
UMFT201XA	I^2C
UMFT220XA	FT1248 (4 bit)
UMFT221XA	FT1248 (8 bit)
UMFT230XA	Basic UART
UMFT231XA	Full UART
UMFT240XA	FIFO

FTDI Chip

UMFT231XC - Battery Charging Detection (BCD)

- Development board provides for USB to UART bridge functionality as well as battery charging detection (BCD), and battery charging via LTC4053.

  - FT231X device supports BCD to simplify and optimize battery charging in portable systems.
    - Detects Dedicated Charging Port (DCP) or Standard Downstream Port (SDP,) enabling selection of higher battery charging current, 1.8A or .5A.
    - CBUS pins enable control of charging rate.
    - Complete sleep and suspend capabilities.
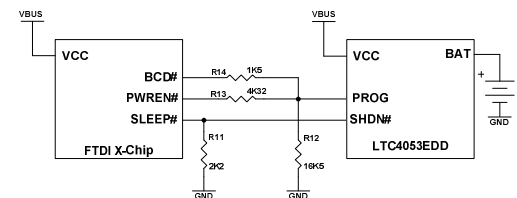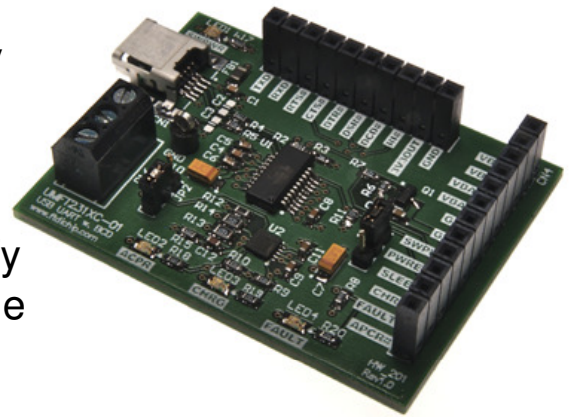
FT-X enables optimal battery charging !

FTDI Drivers Architecture
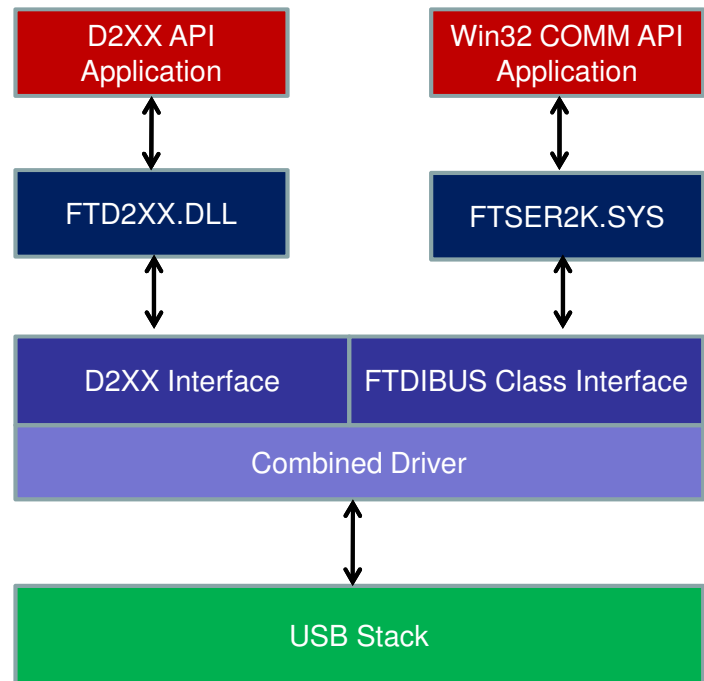
FTDI provides two alternative software interfaces for USB controllers.

COM Port Application

One interface provides a Virtual COM Port (VCP) which appears to the system as a legacy COM port. Legacy applications should work with VCP drivers with minimal modification.

D2XX API

The second interface, D2XX, is provided via a proprietary DLL (FTD2XX.DLL). The D2XX interface provides special functions to optimize performance and improve flexibility.
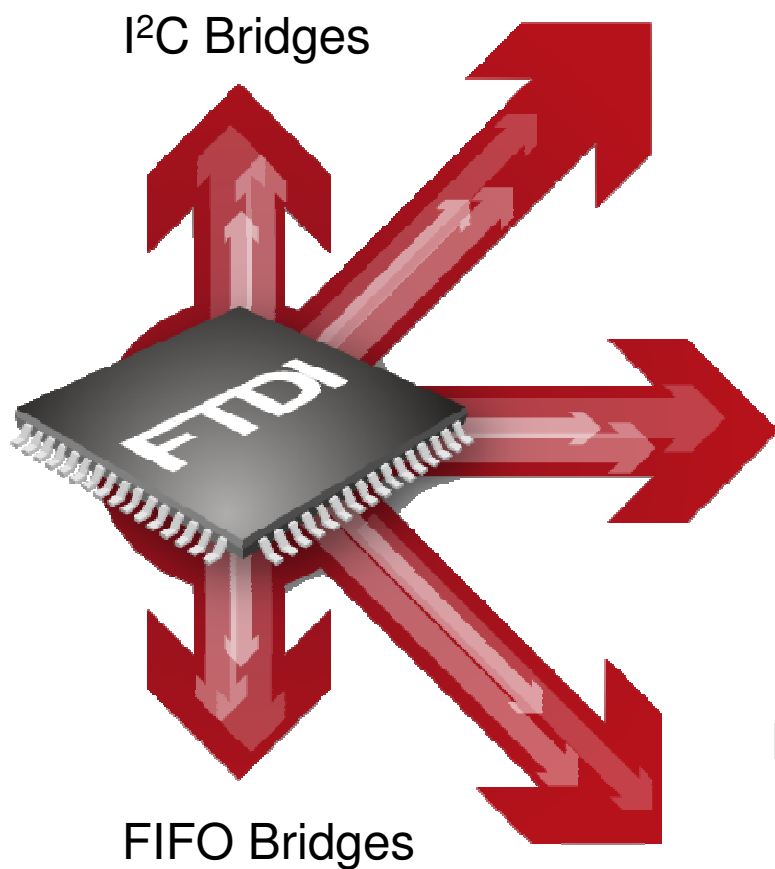
D2XX API Application	Win32 COMM API Application
FTD2XX.DLL	FTSER2K.SYS
D2XX Interface	FTDIBUS Class Interface
Combined Driver	
USB Stack	

FTDI Chip

Experience the X Chip Factor !

FT-X Series

I²C Bridges

World-Class Feature Set:
- Low power
- Battery Charger Detection
- Internal Regulator
- Extended clocking
- MTP memory
- Extended Temperature support

UART Bridges

Flexible FT1248 Interface

FIFO Bridges

FTDI Chip

FT-X Series – Meet the Family

	FT-X Series						
Device	**FT200XD**	**FT201X**	**FT220X**	**FT221X**	**FT230X**	**FT231X**	**FT240X**
Description	I²C slave to USB 2.0 Full Speed	I²C slave to USB 2.0 Full Speed	SPI/FT1248 (4-bits) to USB 2.0 Full Speed	SPI/FT1248 (8-bits) to USB2.0 Full Speed	Basic UART to USB 2.0 Full Speed	Full UART to USB 2.0 Full Speed	FIFO to USB 2.0 Full Speed
Performance	3.4 Mbits/sec	3.4 Mbits/sec	.5 MByte/sec	1 MByte/sec	3 Mbaud	3 MBaud	1 Mbyte/sec
CBUS Pins *	1	6	1	1	4	4	2
Clock Oscillator	Internal	Internal	Internal	Internal	Internal	Internal	Internal
EE/MTP Memory	Internal	Internal	Internal	Internal	Internal	Internal	Internal
Packages	10-pin DFN	16-pin SSOP/ 16-pin QFN	16-pin SSOP/ 16-pin QFN	20-pin SSOP/ 20-pin QFN	16-pin SSOP/ 16-pin QFN	20-pin SSOP/ 20-pin QFN	24-pin SSOP/ 24-pin QFN

* Configurable as GPIO, LED drivers, or clock signals

- All devices, -40 to 85 ºC
- All devices IO, 1.8V to 3.3V (5V tolerant)
- All devices, 8 mA (active-typical), 125 uA (suspend-typical)

FTDI Chip

FT200XD/FT201X - USB for 'those tight spots'

With FTDI's I^{2}C solutions, designers can maximize performance while minimising space and power.

- USB to I^{2}C Slave bridge with speeds up to 3.4Mbit/s.
  - FT200XD is 10 pin DFN package – smallest solution.
  - FT201X is 16 pin QFN/SSOP packages – more GPIO lines.
- Low power – typically 8mA active / 125uA suspend.
- Configurable CBUS pins for BCD, driving LED, clock-out, or GPIO.
- USB Battery Charger Detection function.
- Internal 2KB, MTP can be reprogrammed via both USB and I^{2}C I/F.
- FTDI Chip-ID security feature.
- VCC, 5V (single-supply) or 3.3V.
  - Internal regulator for 3.3V supplies.
 - Supports Bus-Powered (5V) or Self-Powered (3.3V).

FT200XD/FT201X USB to I²C Slave Converter

FT200XD/FT201X supports standard I²C data rates such as 100 kbit/s standard mode (SM), 400 kbit/s fast mode (FM), 1 Mbit/s Fast mode plus (FM+), and 3.4 Mbit/s High Speed mode (HS).

FT200XD has 1 CBUS pin and FT201X has 6 CBUS pins
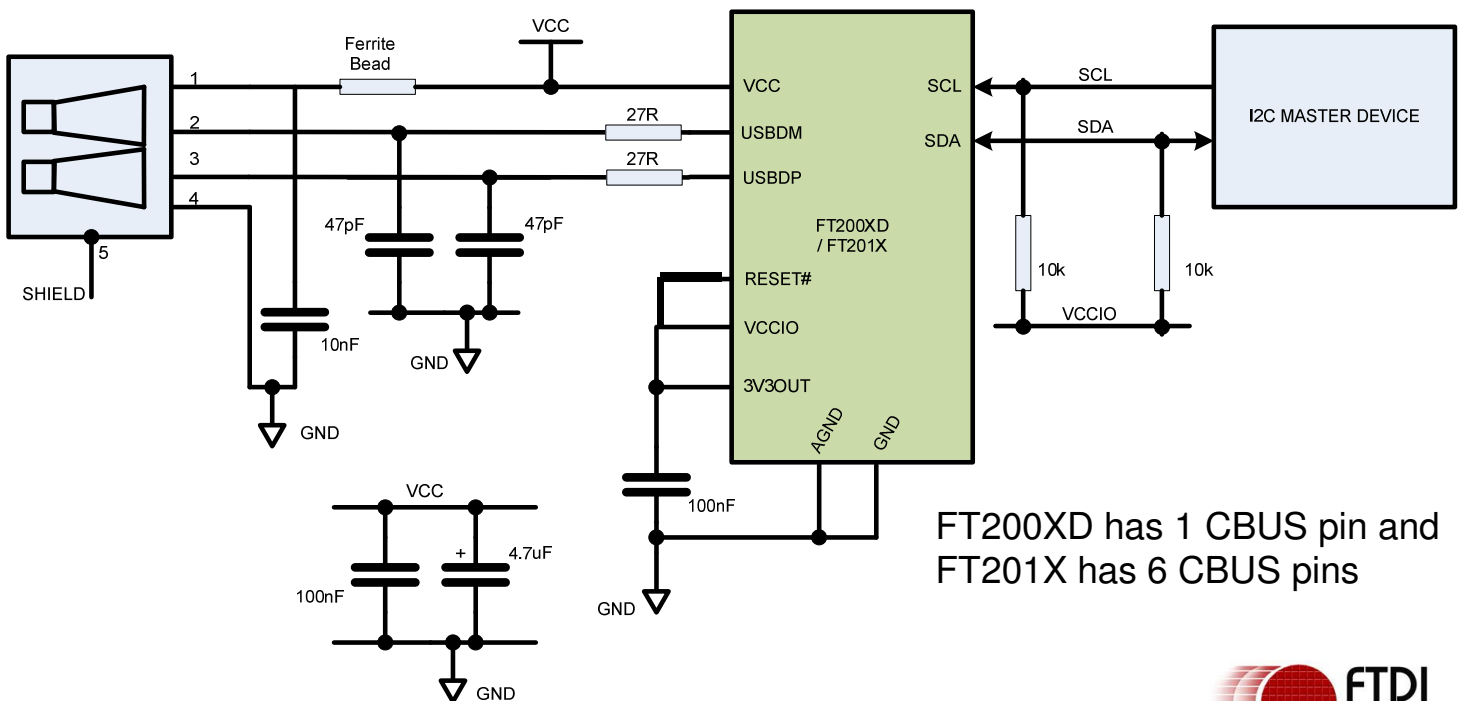
FT220X / FT221X USB to FT1248 Interface

- FT1248 interface is a synchronous serial / parallel interface.
  - Provides for flexibility depending upon IO constraints.
  - Allows for pin usage / bus performance trade-offs.
- Flexible interface may be 1, 2, 4, or 8 bits wide.
  - 1 ,2, or 4 bit interface for FT220X in 16 pin packages.
  - Extended 8 bit wide for FT221X in 20 pin packages.
- FT220/221X contains the complete FT-X Series feature set.
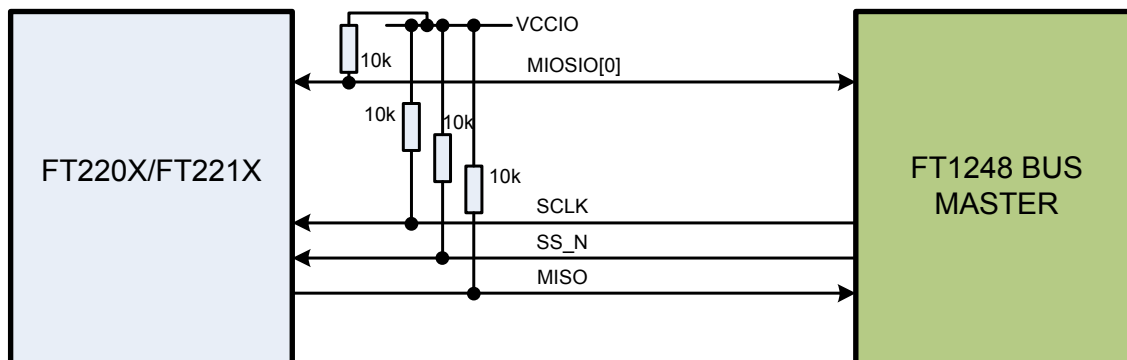
FT220X / FT221X Advantages

- Optimal pin / performance choices when IO considerations appear.
  - FT220X – 16 pin SSOP/QFN options 1, 2, or 4 bit wide interface.
  - FT221X – 20 pin SSOP/QFN options – 1, 2, 4, or 8 bit wide interface.
- Functions similar to SPI slave.
- Low power option – typically 8mA active / 125uA suspend.
- Configurable CBUS pins for BCD, driving LED, clock-out, or GPIO.
- USB Battery Charger Detection function.
- Internal 2KB, MTP could be reprogrammed via USB or FT1248.
- FTDI Chip-ID security feature.
- 1.8V to 3.3V IO (5V Tolerant).
- VCC, 5V (single-supply) or 3.3V.

  - Internal regulator for 3.3V supplies.
  - Supports Bus-Powered (5V) or Self-Powered (3.3V).
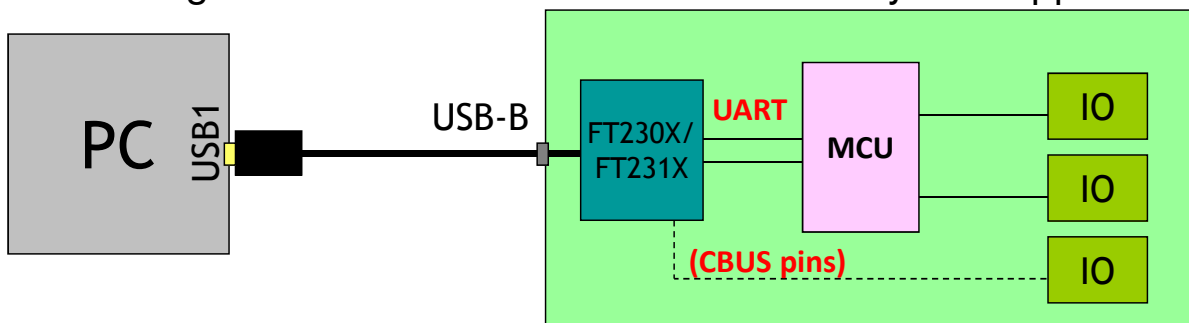
FTDI Chip

FT230X/FT231X USB to UART Converters

Experience FTDI's World-Class, leadership UART solutions !

- USB to RS232/422/485 Cable or Adaptors
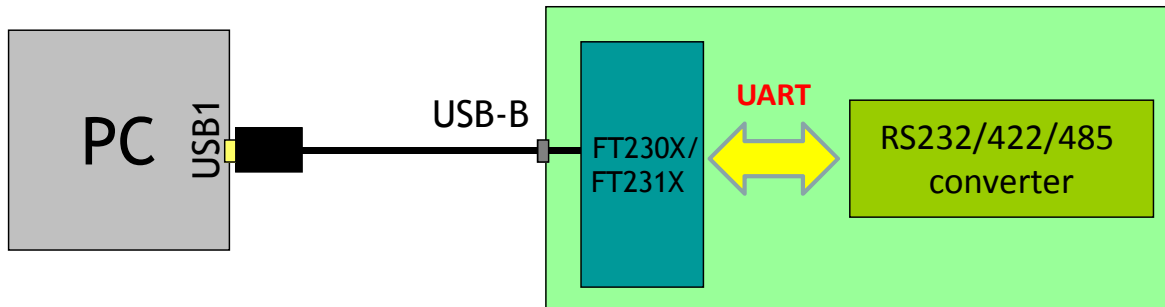
- Integrate UART interface into embedded system application

FT230X / FT231X Advantages

- Match your UART configuration to minimize PCB area / system cost.
  - FT230X – 16 pin SSOP/QFN options – RXD/TXD/RTS/CTS only.
  - FT231X – 20 pin SSOP/QFN options – full modem control.
- Up to 3M Baud data rates.
- Low power option – typically 8mA active / 125uA suspend.
- Configurable CBUS pins for BCD, driving LED, clock-out, or GPIO.
- USB Battery Charger Detection function.
- Internal 2KB, MTP could be reprogrammed via USB.
- FTDI Chip-ID security feature.
- 1.8V to 3.3V IO (5V Tolerant).
- VCC, 5V (single-supply) or 3.3V.
  - Internal regulator for 3.3V supplies.
  - Supports Bus-Powered (5V) or Self-Powered (3.3V).
- .

FTDI Chip

USB-Duo maximizes your system

- FTDI USB Duo package provides complete function for a single price.

- FTDI's X chip factor provides optimal USB functionality with an extended feature set.
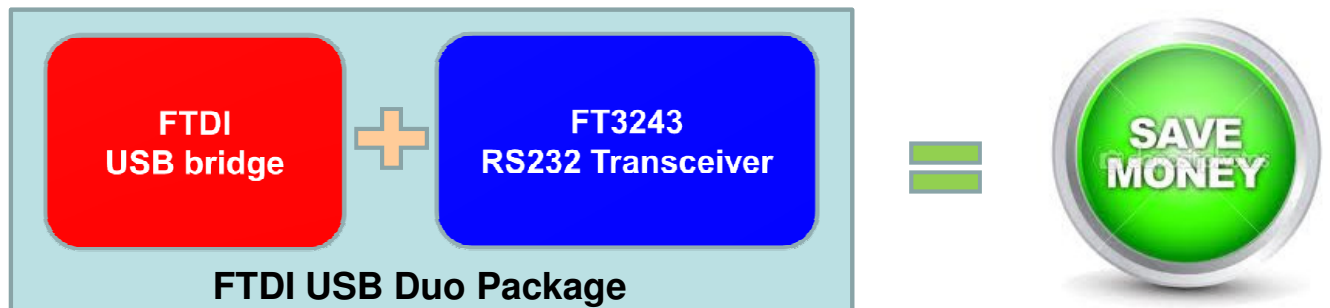
FTDI USB-Duo

- FTDI provides a USB to RS232 total solution
  - Bundling a USB bridge controller and RS232 Transceiver IC

- The solution maximizes functionality and optimizes system price

- Integrated crystal and MTP to reduce BOM cost and PCB size

- FTDI provides Royal Free Driver Supported for both Virtual COM Port (VCP) and D2XX options.

USB Host — USB — USB-B — FT230X/FT231X ⟷ UART ⟷ FT3243S ⟷ RS232
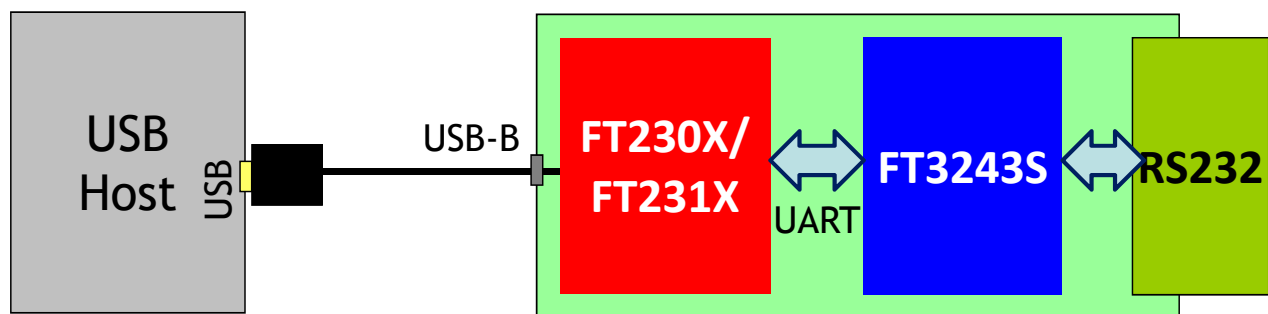
Best Benefit for Price, Functions and PCB size

FTDI Chip

FT3243S Low power 3.3V RS232 Transceiver

- Meets or Exceeds the EIA/TIA-232F and CCITT V.28/V.24 specification for VCC at +3.3V ±10% and +5V ±10% Operations

- Interoperable with EIA/TIA-232 and adheres to EIA/TIA-562 down to a +2.7V power source

- Low quiescent current – 0.5mA typ., 1mA max. Low shutdown current (where applicable) - 1µA; typical, 10µA max.

- Guaranteed data rate 250kbps

- Proprietary Switch-Capacitor Regulated Voltage Converters (patent pending)

- 28 Pins SSOP package

- Extended -40°C to 85°C; industrial operating temperature range.

- Latch-up Free and 15KV ESD Protection for RS-232 I/O's

- Drop-in Replacements for MAX3243E, ICL3243E, ISL4243E, ZT2343E, ST3243E and SP3243E

FTDI Chip

FT240X USB to FIFO Converter

The FT240X is a USB to parallel FIFO interface which can be integrated into embedded system application easily.

The Data transfer rates can up to 1Mbyte / second
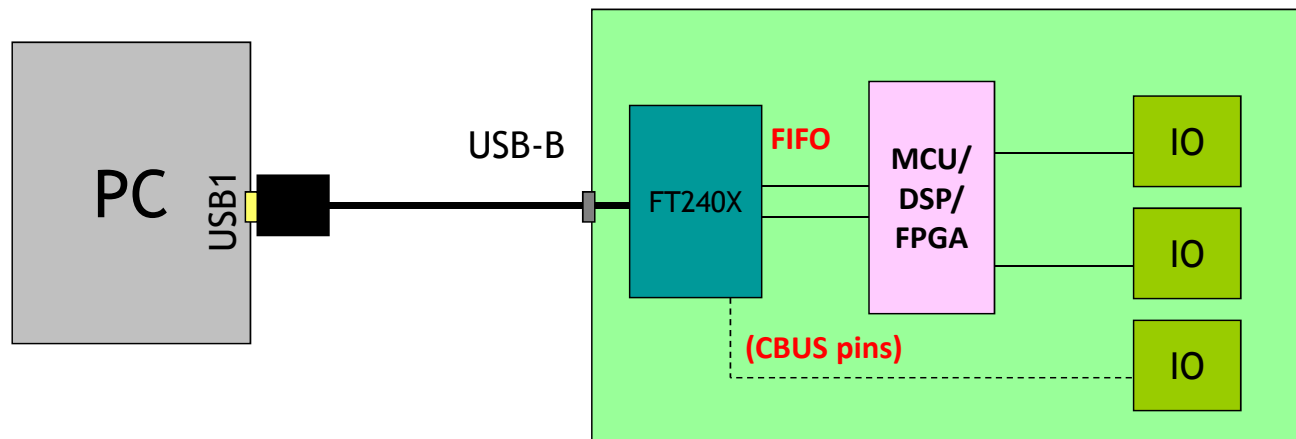
FT240X Advantages

- Reduced pin count for space critical designs.
    - FT240X – 24 pin SSOP/QFN options – 8-bit wide FIFO.
- 1MByte/s data rates.
- Low power option – typically 8mA active / 125uA suspend.
- Configurable CBUS pins for BCD, driving LED, clock-out, or GPIO.
- USB Battery Charger Detection function.
- FTDI Chip-ID security feature.
- 1.8V to 3.3V IO (5V Tolerant).
- Internal 2KB, MTP could be reprogrammed via USB.
- VCC, 5V (single-supply) or 3.3V.
    - Internal regulator for 3.3V supplies.
    - Supports Bus-Powered (5V) or Self-Powered (3.3V).

FTDI Chip

FT-X Series Enables Optimal Battery Charging
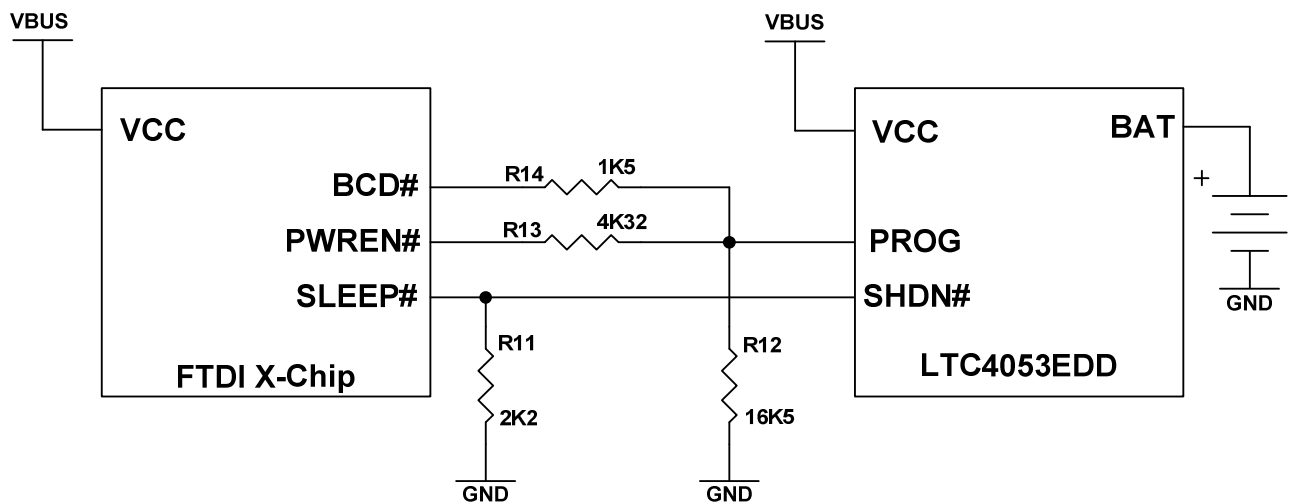
- Detects DCP (Dedicated Charging Port) or SDP (Standard Downstream Port), enabling selection of higher battery charging current, 1.8A or .5A.
- CBUS pins enable control of charging rate
- Complete sleep and suspend capabilities

FTEX Development Modules

- Rapid prototyping
- Limited development
- Maximum Flexibility

Breakout Module (USB trace connections plug PCB direct into host port)	Evaluation Modules (Mini-B USB connector, with DIP PCB insert)	Battery Charging Evaluation Board
UMFT200XD	UMFT201XA	UMFT231XC
UMFT201XB	UMFT220XA	
UMFT220XB	UMFT221XA	
UMFT230XB	UMFT230XA	
	UMFT231XA	
	UMFT240XA	

FTDI Chip

FTDI Web Resources

Visit www.ftdichip.com

- Drivers : Newest VCP and D2XX driver

- Data Sheets : FTDI Data Sheets for production released chips are available

- Application Notes : Application notes for basic and advanced development

- Technical Notes : Providing application background and system design considerations

- Software Utilities : Beneficial programs for design creation and manufacturing support

- Software Examples : Sample example code to assist in the development
- FAQs : Useful Frequently Asked Questions

FTDI Contact

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FTDI are ISO9001:2008 certified.

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