

# 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, I<sup>2</sup>C, SPI, and FTDI's FT1248 interface.
  - I<sup>2</sup>C 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 !!**



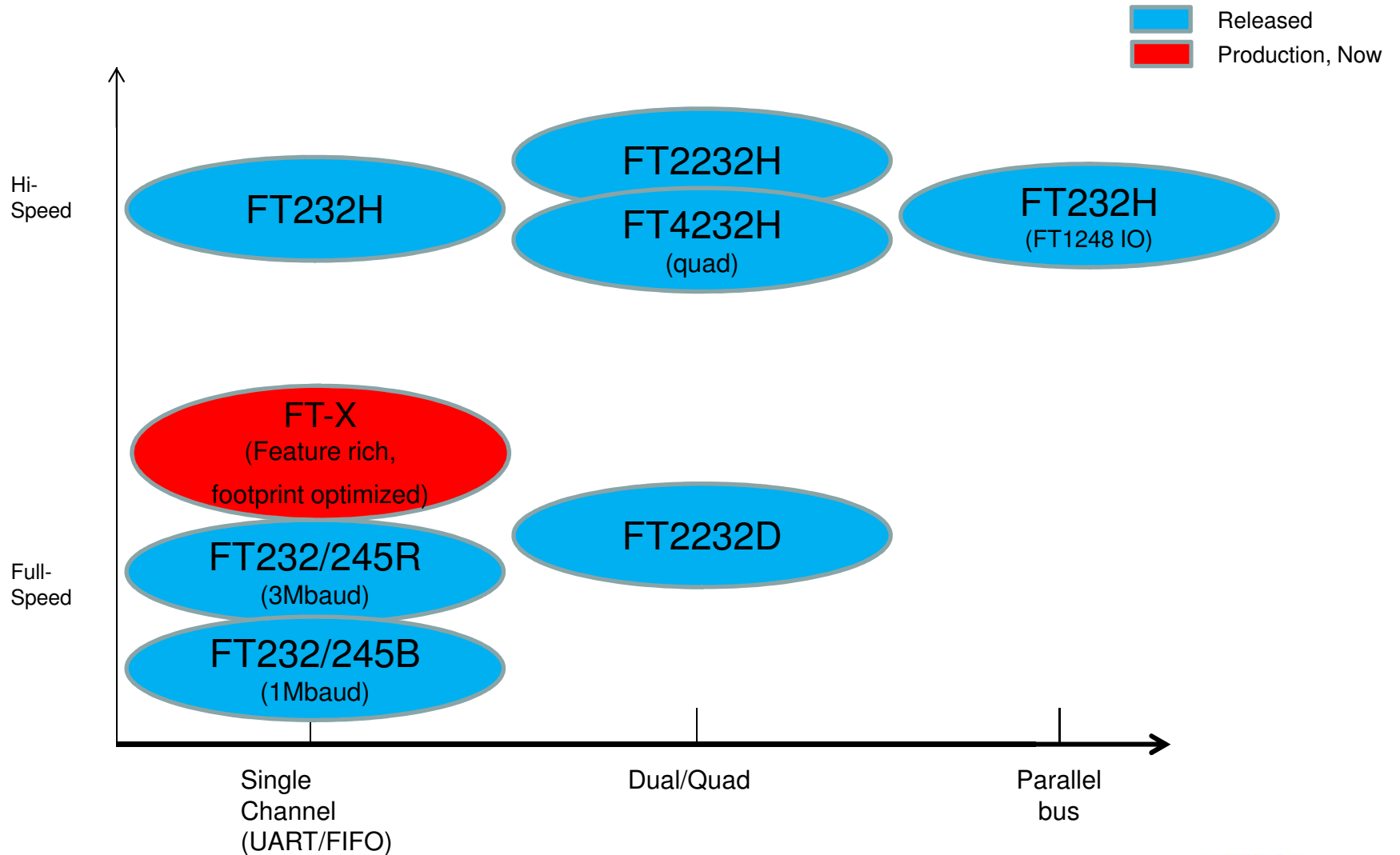
# FTDI USB Peripheral Series Strategy

- 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

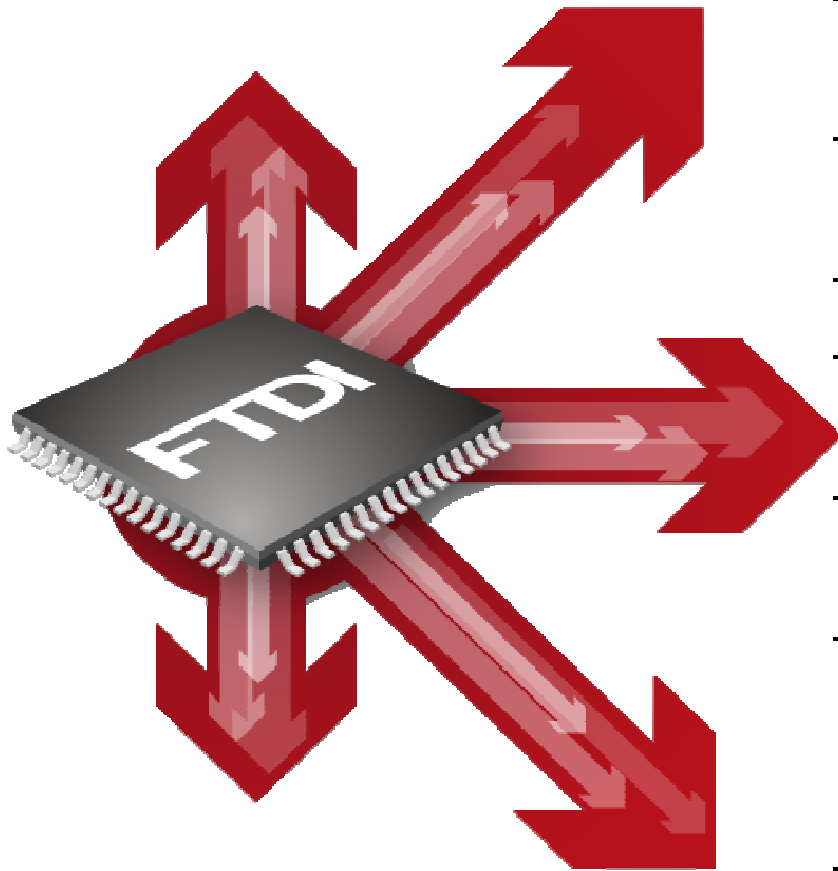


# FT-X Series – Meet the Family

Part Number	Pins	Package	Description
<b>FT231XS</b>	20	SSOP	Full Handshake UART Interface
<b>FT231XQ</b>	20	QFN	Full Handshake UART Interface
<b>FT230XS</b>	16	SSOP	Basic UART Interface
<b>FT230XQ</b>	16	QFN	Basic UART Interface
<b>FT221XS</b>	20	SSOP	8bit SPI/FT1248 Interface
<b>FT221XQ</b>	20	QFN	8bit SPI/FT1248 Interface
<b>FT220XS</b>	16	SSOP	4bit SPI/FT1248 Interface
<b>FT220XQ</b>	16	QFN	4bit SPI/FT1248 Interface
<b>FT201XS</b>	16	SSOP	I <sup>2</sup> C Interface
<b>FT201XQ</b>	16	QFN	I <sup>2</sup> C Interface
<b>FT200XD</b>	10	DFN	I <sup>2</sup> C Interface
<b>FT240XS</b>	24	SSOP	8bit FIFO Interface
<b>FT240XQ</b>	24	QFN	8bit FIFO Interface

# FT-X Series Features

- X-Chip Factor provides the extra elements/features that add value:

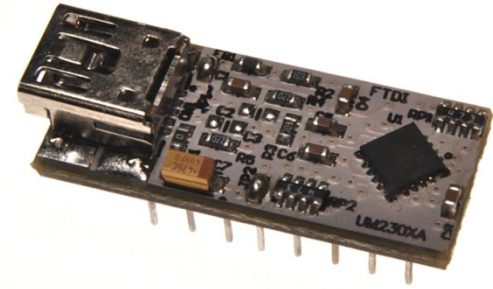


- Battery charger detection to enable higher current, faster charging.
- Extensive clocking features; internal clock generation and external clock out.
- Internal 3V3 level converter.
- Integrated crystal and MTP memory to save board space and maximize flexibility.
- Extended temperature range support, -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.



# 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.

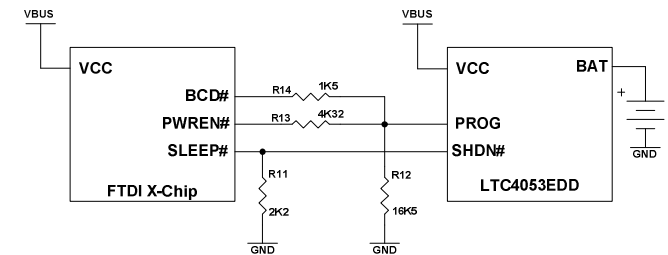


Module	Interface
UMFT201XA	I <sup>2</sup> C
UMFT220XA	FT1248 (4 bit)
UMFT221XA	FT1248 (8 bit)
UMFT230XA	Basic UART
UMFT231XA	Full UART
UMFT240XA	FIFO



# 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

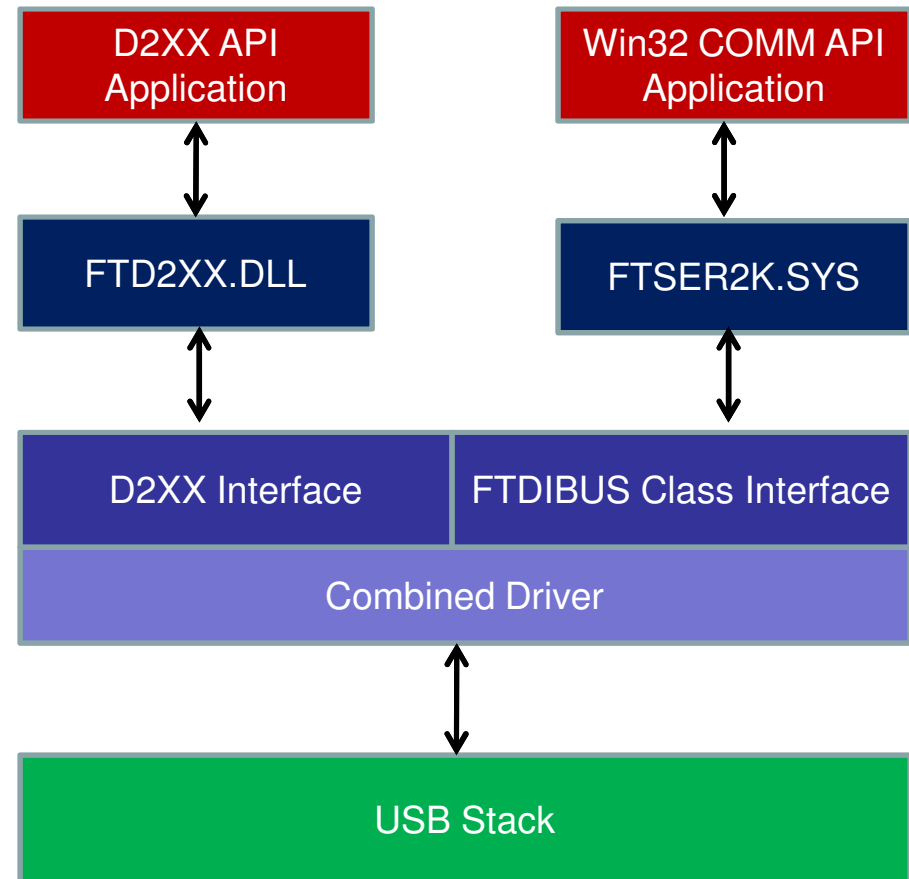
FTDI provides two alternative software interfaces for USB controllers.

## 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.

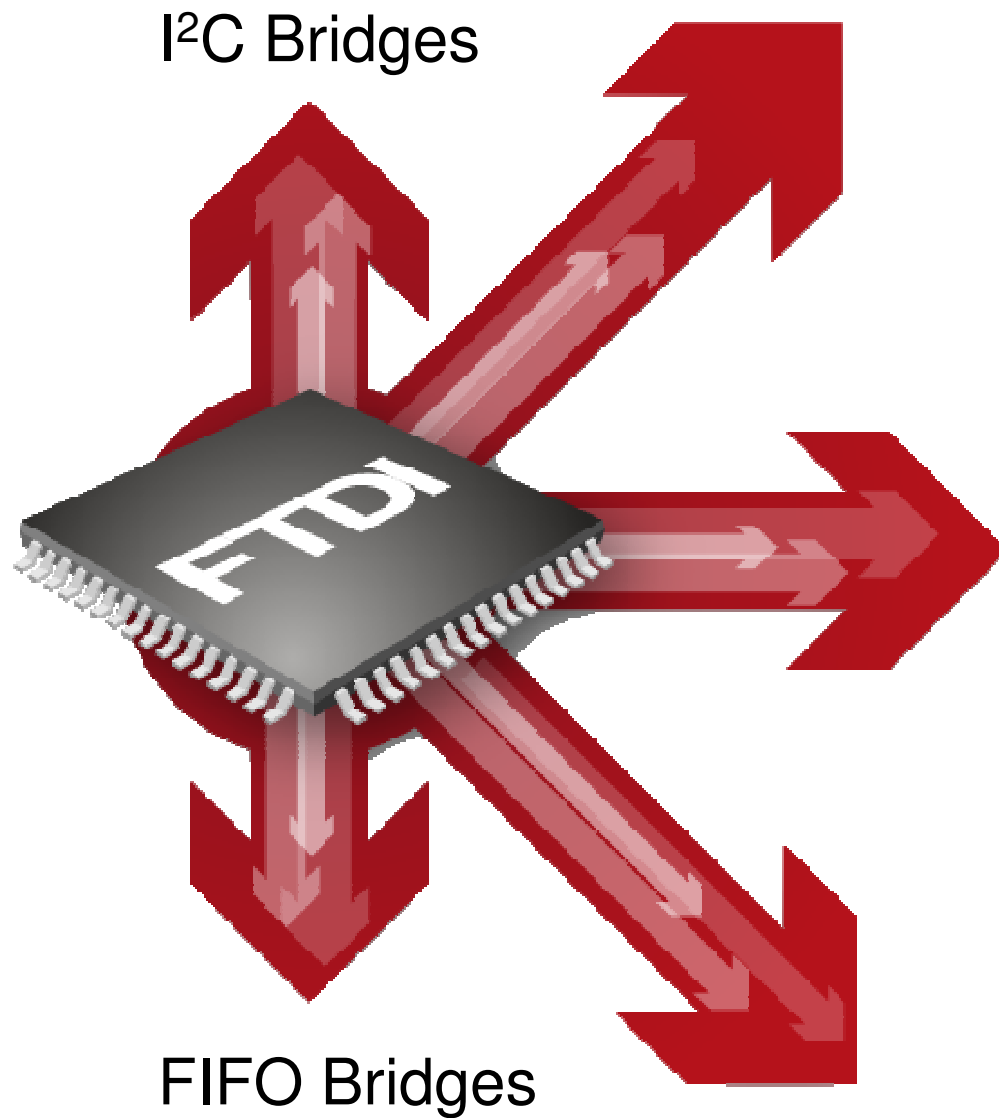




Experience the X Chip Factor !



# FT-X Series



I<sup>2</sup>C 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



# FT-X Series – Meet the Family

	FT-X Series						
Device	FT200XD	FT201X	FT220X	FT221X	FT230X	FT231X	FT240X
Description	I <sup>2</sup> C slave to USB 2.0 Full Speed	I <sup>2</sup> C 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 °C
- All devices IO, 1.8V to 3.3V (5V tolerant)
- All devices, 8 mA (active-typical), 125 uA (suspend-typical)



# FT200XD/FT201X - USB for 'those tight spots'

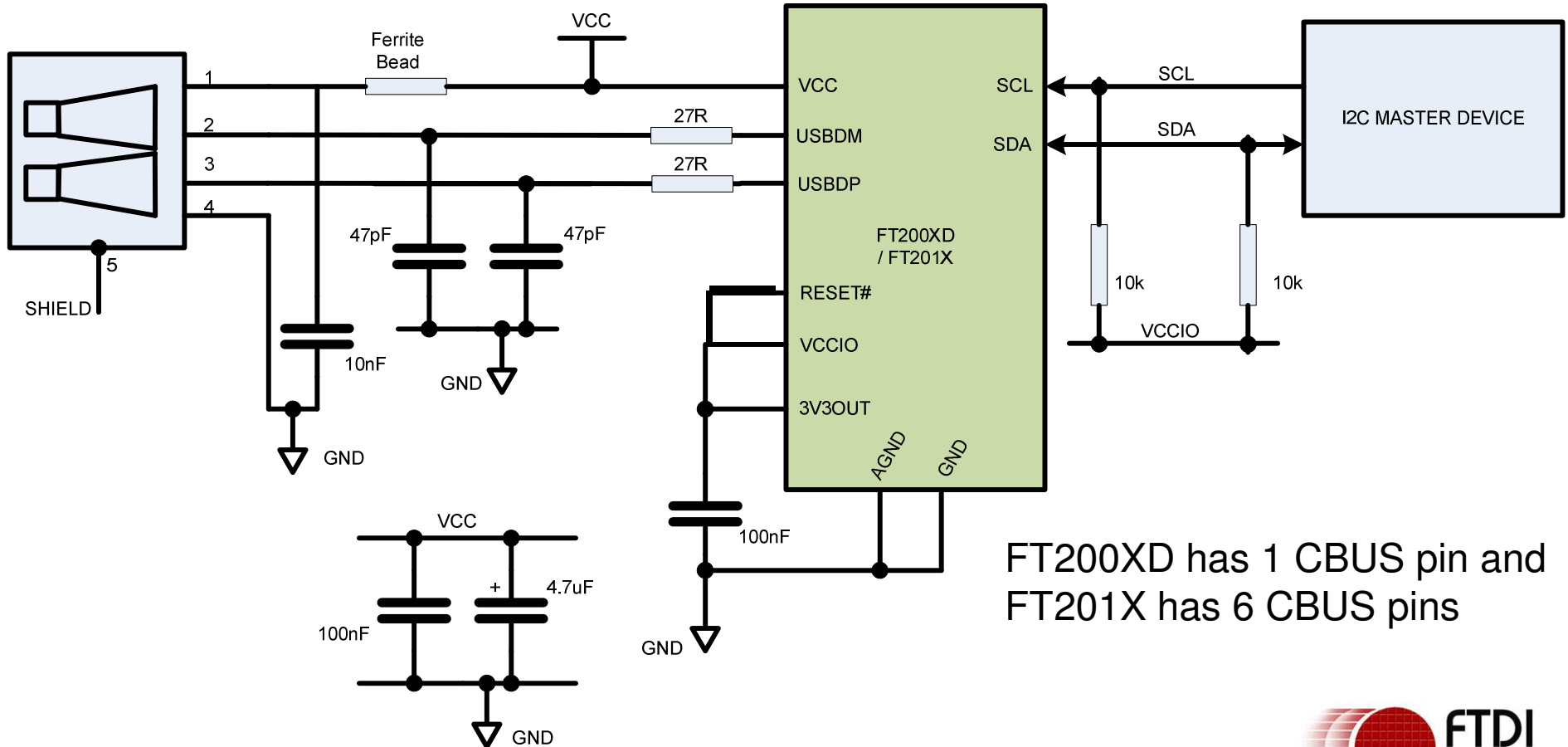
With FTDI's I<sup>2</sup>C solutions, designers can maximize performance while minimising space and power.

- USB to I<sup>2</sup>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<sup>2</sup>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 I<sup>2</sup>C Slave Converter

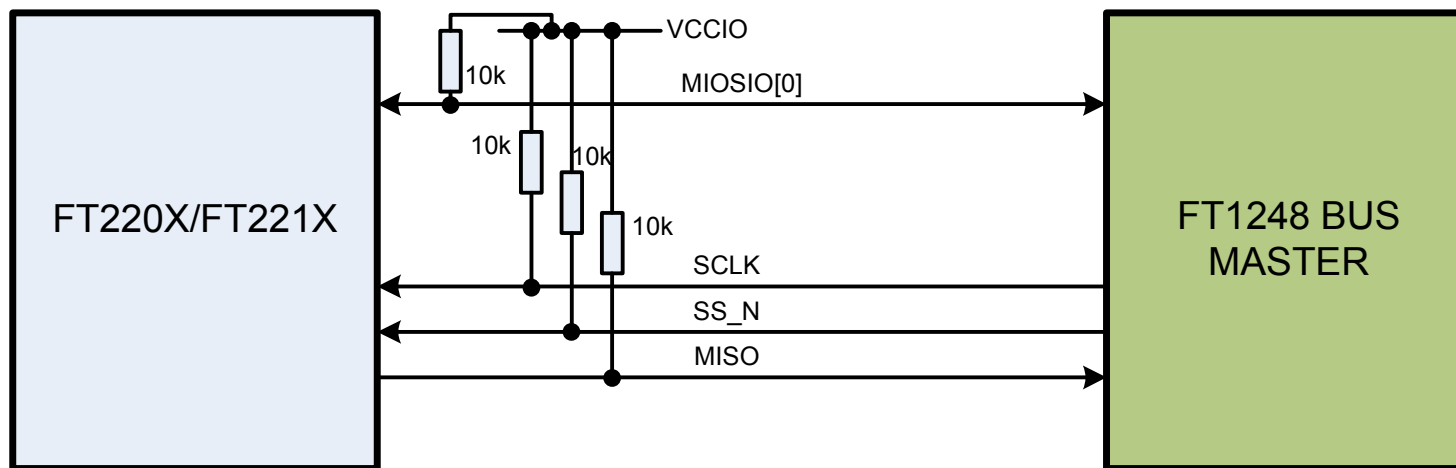
FT200XD/FT201X supports standard I<sup>2</sup>C data rates such as 100 kbit/s standard mode (SM), 400 kbit/s fast mode (FM), 1 Mbit/s Fast mode plus (FM+), and 3.4 Mbit/s High Speed mode (HS).



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

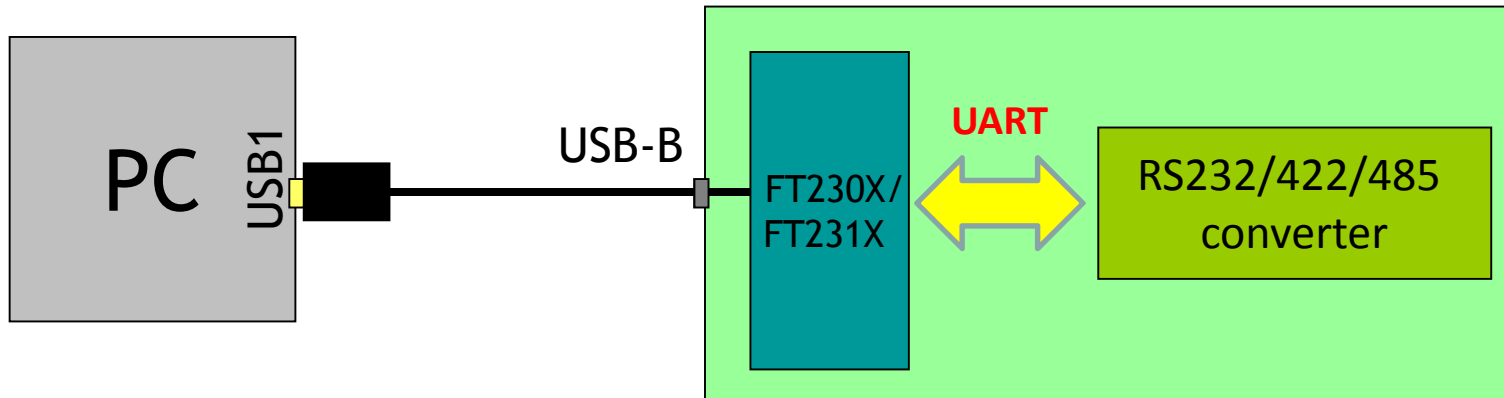
- Optimal pin / performance choices when IO considerations appear.
  - FT220X – 16 pin SSOP/QFN options 1, 2, or 4 bit wide interface.
  - FT221X – 20 pin SSOP/QFN options – 1, 2, 4, or 8 bit wide interface.
- Functions similar to SPI slave.
- Low power option – typically 8mA active / 125uA suspend.
- 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).



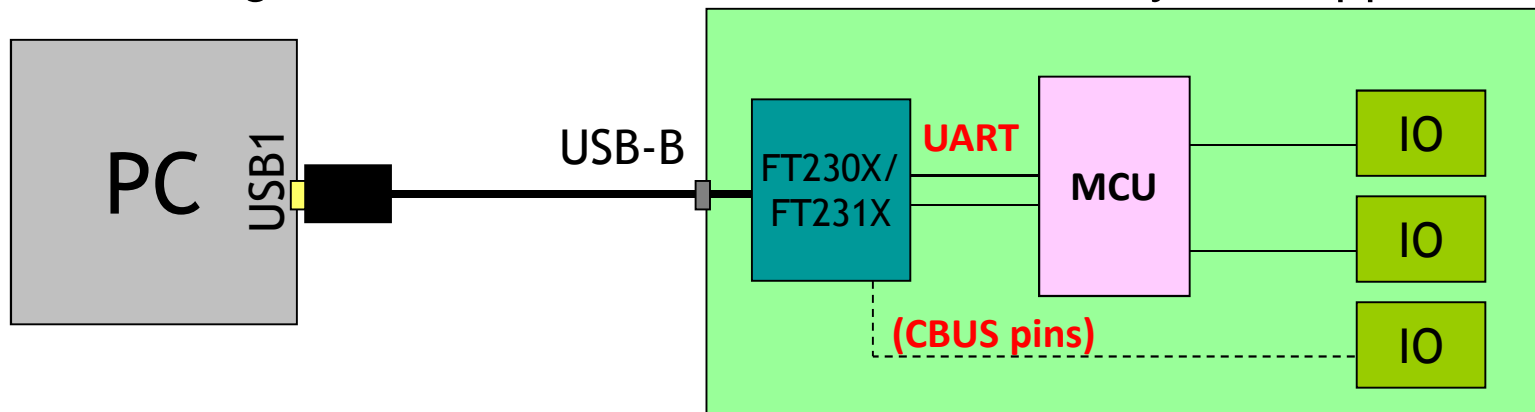
# FT230X/FT231X USB to UART Converters

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

- USB to RS232/422/485 Cable or Adaptors



- Integrate UART interface into embedded system application



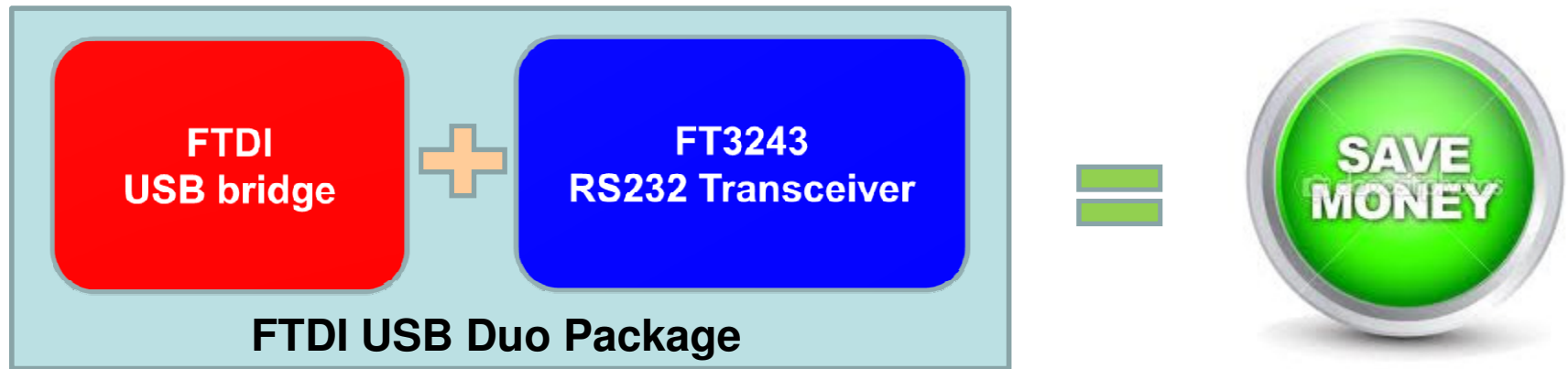
# FT230X / FT231X Advantages

- 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).



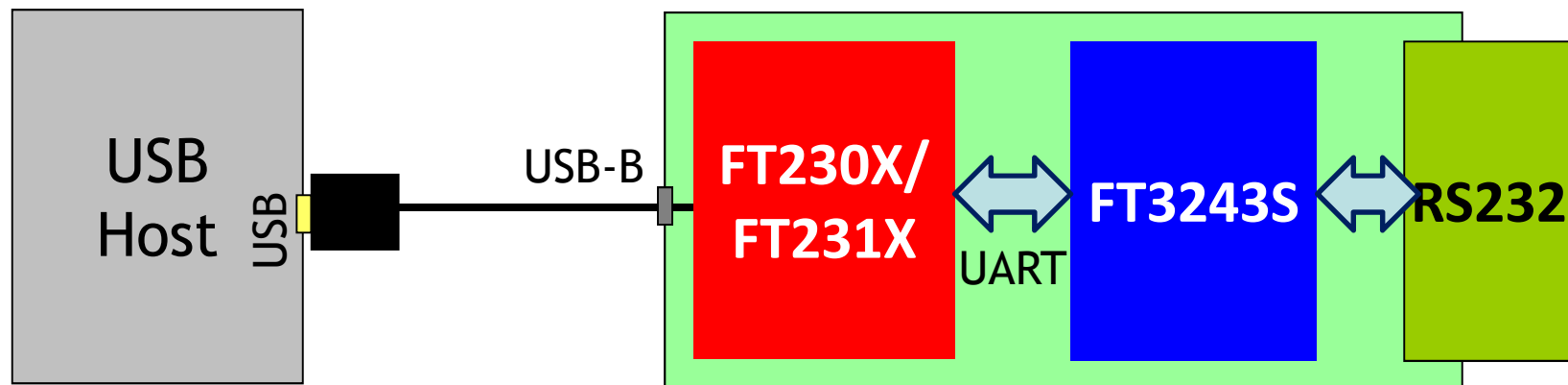
# USB-Duo maximizes your system

- 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.



Best Benefit for **Price**,  
**Functions** and **PCB size**

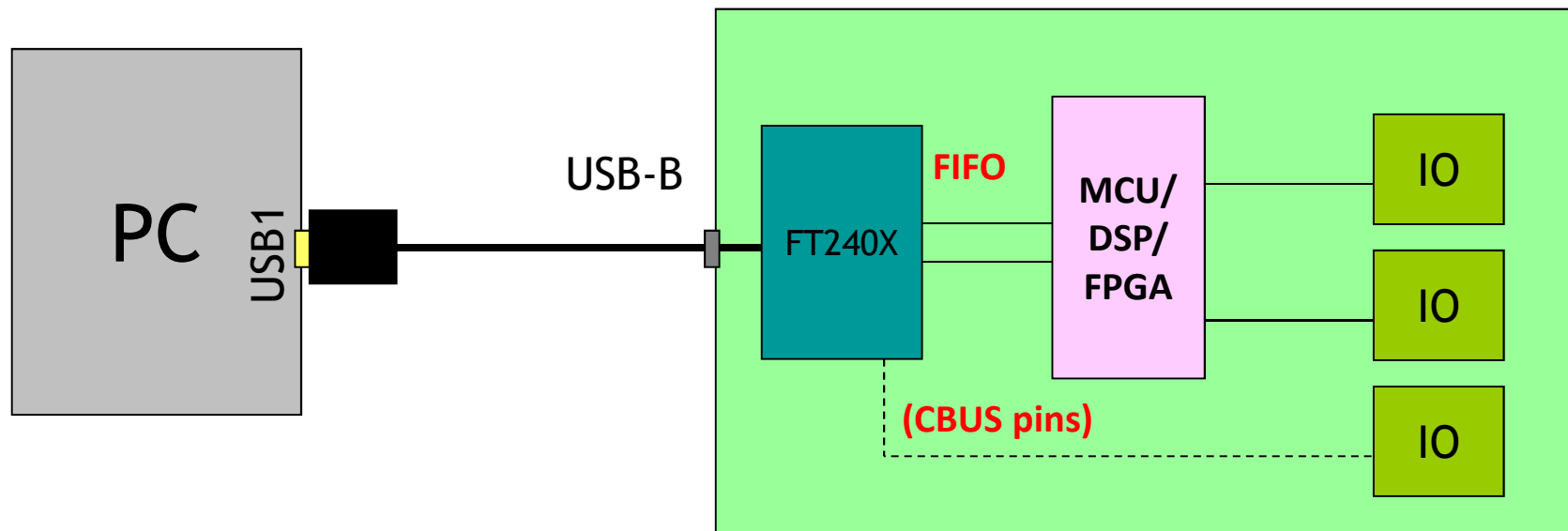
# FT3243S Low power 3.3V RS232 Transceiver

- Meets or Exceeds the EIA/TIA-232F and CCITT V.28/V.24 specification for VCC at +3.3V  $\pm 10\%$  and +5V  $\pm 10\%$  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) - 1 $\mu$ A; typical, 10 $\mu$ A 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

# 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



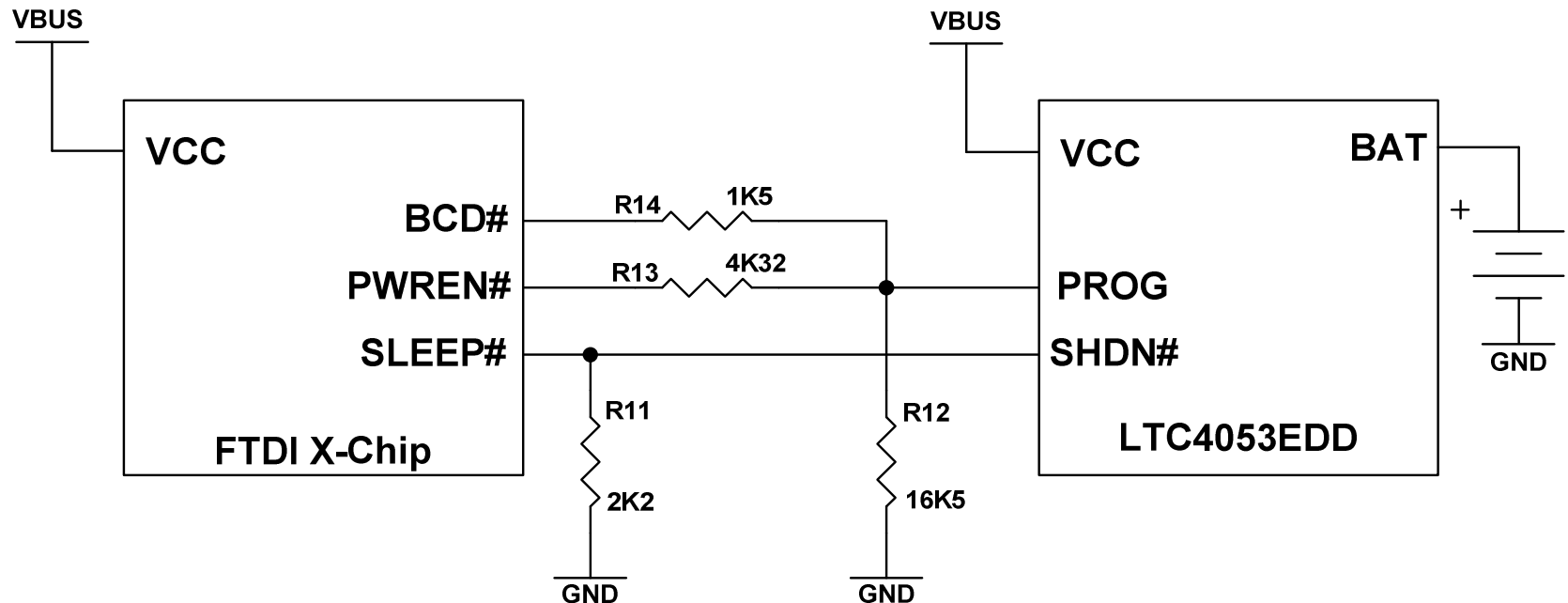
# FT240X Advantages

- 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).





# 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

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

# FTDI Web Resources

Visit [www.ftdichip.com](http://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

Future Technology Devices International Limited - <http://www.ftdichip.com>

FTDI are ISO9001:2008 certified.

## EMEA

[sales1@ftdichip.com](mailto:sales1@ftdichip.com)

[support1@ftdichip.com](mailto:support1@ftdichip.com)

+44 (0) 141 429 2777

## China

[cn.sales@ftdichip.com](mailto:cn.sales@ftdichip.com)

[cn.support@ftdichip.com](mailto:cn.support@ftdichip.com)

+86 (21) 62351596

## Americas

[us.sales@ftdichip.com](mailto:us.sales@ftdichip.com)

[us.support@ftdichip.com](mailto:us.support@ftdichip.com)

+1 (503) 547-0988

## APAC

[tw.sales1@ftdichip.com](mailto:tw.sales1@ftdichip.com)

[tw.support1@ftdichip.com](mailto:tw.support1@ftdichip.com)

+886-2-8797 1330

## Headquarters

Unit 1, 2 Seaward Place,  
Centurion Business Park,  
Glasgow  
G41 1HH  
United Kingdom

## China Office

Room 408, 317 Xianxia Road,  
ChangNing District,  
Shanghai, P.R. China

## Americas Office

7235 NW Evergreen  
Parkway  
Suite 600  
Hillsboro, OR 97124-5803  
USA

## Taiwan Office

2F, No. 516, Sec. 1, NeiHu  
Road, Taipei 114, Taiwan

