

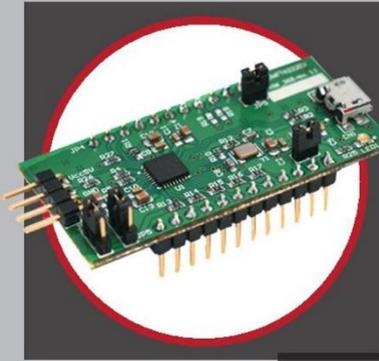


FTDI Chip

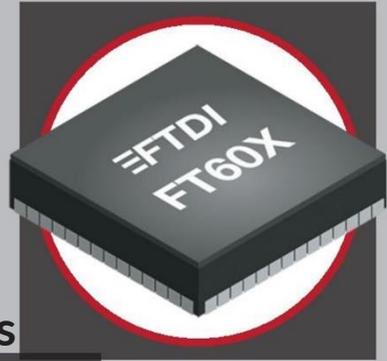
USB Solutions

The USB Bridging Solution Specialist

Modules



ICs



Cables



www.ftdichip.com

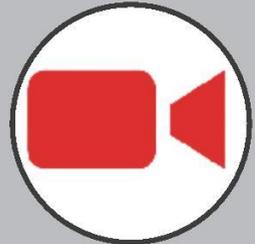
 FTDI - Design Made Easy

 @FTDIchip

USB AS *EASY* AS 123

FTDI Chip develops innovative silicon solutions that enhance interaction with today's technology. When a designer needs to add a USB port, rest assured that FTDI Chip has a full range of USB solutions to get the job done.

The Universal Serial Bus (USB) interface is now established as the de-facto interface for connecting systems with a reliable, low-cost digital link. USB has expanded beyond PC usage, and can now be found in all market segments, including Industrial, Medical, Consumer, Communications, Networking, and more. Enabling designers to implement USB quickly into a design, FTDI Chip provides total solutions including silicon chips, development tools, application notes, and software support. Expertise in USB bridges provides seamless integration for a variety of interfaces such as UART, FIFO, I2C, SPI, PWM and GPIO, where the bridge converts the signalling and protocol from the selected interface to USB. USB solutions are delivered in packages as small as 10 pin DFN (3x3mm); in modules that can be inserted into boards for development and production; or in cables that bridge USB to numerous interfaces. Whenever your development or product needs USB, check out FTDI Chip (www.ftdichip.com) for complete solutions that can shorten your design time, while providing robust system implementations.



Extensive USB Portfolio

Whether your design needs silicon chips, cables, or modules, check out FTDI Chip's large portfolio of USB and system level products.



Peripheral Or Host

USB connectivity designs are constructed from two distinct functional capabilities: a host and a device/peripheral type. As part of the total solution, FTDI Chip is able to offer both types of capabilities. With over 30 USB peripheral chips offered in 5 product families, designers can choose the device which best matches their system need. On the USB host side, the FT311D targets the Android ecosystem and joins the Vinculum family which provides system level capabilities with its micro-controller capability, USB host, and USB peripheral support.

Speed

FTDI Chip devices are aimed at full, high and super speed solutions. SuperSpeed USB 3.0 provides the greatest level of data throughput, while hi-speed and full speed devices continue to be a robust, growing market where matching system needs with device features can provide the optimum USB implementation.

Advanced Features

To conserve PCB area and offer additional system value, FTDI Chip adds unique features to enhance USB functionality, like battery charging detection which enables faster charging. FTDI Chip also offers devices linking one USB port to 1, 2, or 4 application interfaces without requiring a USB hub. Save space, power, and system cost when EEPROM (MTP) memory, or unique clocking features are utilized in your system design.



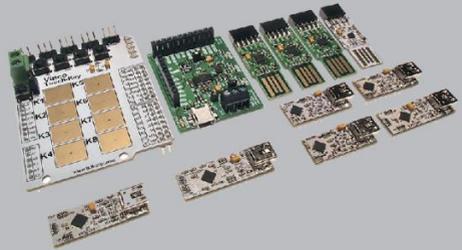
Software

Drivers for most major operating systems such as Windows, MAC OS, Android and Linux are available for free download thus allowing for easy integration with minimum development effort.



The Vinculum family of host controllers is also supported with free, precompiled firmware as well as a free toolchain for designers wishing to tailor the firmware to their specific requirements.

Modules



Development modules are available to enable rapid design development. The modules are available in a variety of mechanical formats to allow easy bread-boarding or immediate access to the bridge interfaces. Additionally application modules are available which provide specific system functionality.

Cables

Similar to the module solutions are a range of cables offering TTL, RS232, RS422 or RS485 level interfaces. These cables can be used for development purposes or as accessories for accessing existing products over USB..



USB 3.0 SUPER SPEED

BRIDGE SOLUTION (FT600 SERIES)

The FT600 is the first release in a brand new SuperSpeed series from FTDI Chip. The device provides a USB3.0 SuperSpeed to FIFO bridge, which provides up to 5Gbps of bandwidth. With optional 16 and 32 bit FIFO interfaces, the FT600 enables connectivity for numerous applications including high resolution cameras and displays, multifunction printers and much more. The device supports Link Power Management (LPM) to enable greater power savings, and also supports Suspend and Remote Wakeup signaling. Moreover, the device provides Battery Charge Detection (BCD) and is supported on major operating systems including Windows, Linux and Mac.

This innovative new product is available in two space saving packages – 56QFN and 76QFN.

Part Number	Application Interface	Channels	Configurable IO Pins	Package	USB Class
FT600Q	16 bit FIFO	1 / 2 / 4	2	QFN56	D3xx
FT601Q	32 bit FIFO	1 / 2 / 4	2	QFN76	D3xx
FT602Q	32 bit FIFO	1 / 2 / 4	2	QFN76	UVC

Applications that need to transfer data over USB at faster rates benefit from the FT600:

- Multi Function Printers
- Scanners
- High resolution video cameras
- High resolution displays
- Professional still image cameras
- Data acquisition systems that require high bandwidth
- FPGA & MCU development boards that require high bandwidth connectivity



USB 2.0 HI-SPEED BRIDGE SOLUTION

H Chip Series

Fast, flexible, multi-channel USB bridges

Part Number	Application Interface	Channels	Clocking	EEPROM	Data Throughput	Package
FT232H	UART ASYNC FIFO SYNC FIFO MPSSE	1	External (12MHz)	External	12MBaud 8 Mbyte/s 40MByte/s 30Mbit/s	48 QFN 48 LQFP
FT232ZH	UART ASYNC FIFO SYNC FIFO MPSSE x2	2	External (12MHz)	External	12MBaud 8 Mbyte/s 40MByte/s 30Mbit/s	64 QFN 64 LQFP 56 VQFN
FT4232H	UART MPSSE x2	4	External (12MHz)	External	12MBaud 30Mbit/s	64 QFN 64 LQFP 56 VQFN
FT4232HA	UART MPSSE x2	4	External (12MHz)	External	12MBaud 30Mbit/s	64 QFN
FT4222H	SPI/I2C (Master/Slave) GPIO	4 Channel SPI slave selection	External (12MHz)	Internal OTP	Upto 27Mbps	32 VQFN

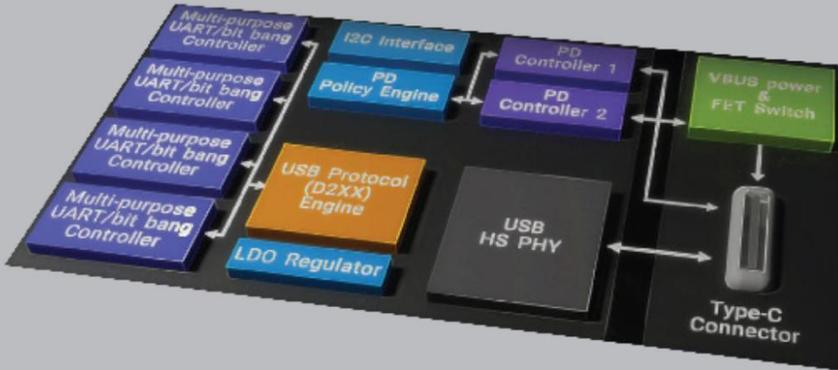
- IO Levels 3.3V (5V tolerant)
- Typical operating current 70mA
- Extended Temperature Range: -40°C to +85°C
- FT4232HA is Automotive grade
Extended Temperature Range: -40°C to +105°C

In addition to the higher data rates these devices offer, (upto 40Mbytes/s) when compared to full speed solutions, the Hi-Speed series also offers a range of multi-channel interfacing. The benefits of a multi channel bridge is that the system BOM is reduced by taking away the need for a USB hub chip. Additionally, each channel of the device appears to the host PC as a separate device enabling each channel to be independently configured for different modes, e.g. UART, MPSSE or FIFO and with different parameters such as 4 UARTS all operating with different baud rates.

For portable or battery operated devices the FT4222H also offers support for battery charger detection, enabling higher charge currents to be requested thus reducing battery charge times.

POWER DELIVERY SERIES

HI-SPEED USB BRIDGE with ENHANCED POWER DELIVERY



The Power Delivery series has up to two Type-C/PD ports, with PD1 port supporting both power sink and source roles (Initial Sink), and PD2 port only supporting a power sink port role.

Both PD ports support 5V, 9V, 12V, 15V and 20V PDO profiles, and these profiles are configurable through the external EEPROM at power-up or reset. PD1 port shares the same Type-C connector with USB data, and PD2 port is power port only without USB data.

Part Number	Application Interface	Channels	Power Delivery Ports	EEPROM	Data Throughput (Max)	Package
FT232HP	UART ASYNC FIFO SYNC FIFO MPSSE	1	1	External	12MBaud 8MByte/s 40MByte/s 30Mbit/s	56 QFN
FT233HP	UART ASYNC FIFO SYNC FIFO MPSSE	1	2	External	12MBaud 8MByte/s 40MByte/s 30Mbits	64 QFN
FT2232HP	UART ASYNC FIFO SYNC FIFO MPSSE x2	2	1	External	12MBaud 8MByte/s 40MByte/s 30Mbits	68 QFN
FT2233HP	UART ASYNC FIFO SYNC FIFO MPSSE x2	2	2	External	12MBaud 8MByte/s 40MByte/s 30Mbit/s	76 QFN
FT4232HP	UART MPSSE x2	4	1	External	12MBaud 30Mbit/s	68 QFN
FT4233HP	UART MPSSE x2	4	2	External	12MBaud 30Mbit/s	76 QFN

- IO Levels 3.3V (5V tolerant)
- Typical operating current 70mA
- Extended Temperature Range: -40°C to +85°C

In addition to the higher data rates these devices offer, (up to 40Mbytes/s) when compared to full speed solutions, the Hi-speed series also offers a range of multi-channel interfacing. The benefit of a multi-channel bridge is that the system BOM is reduced by removing the need for a USB hub chip.

Additionally, each channel of the device appears to the host PC as a separate device enabling each channel to be independently configured for different modes, e.g. UART, MPSSE or FIFO and with different parameters such as 4 UARTS all operating with different baud rates.

USB 2.0 FULL SPEED BRIDGE SOLUTION

X Chip Series

Optimised for small footprint, low power and battery charger detection.

Part Number	Application Interface	Channels	Configurable CBUS Pins	MTP Memory	Data Throughput	Package
FT200XD	I ² C	1	1	Internal	3.4Mbit/s	10 DFN
FT201XQ	I ² C	1	7	Internal	3.4Mbit/s	16 QFN
FT201XS						16 SSOP
FT220XQ	4-Bit SPI/ FT1248	1	1	Internal	500kByte/s	16 QFN
FT220XS						16 SSOP
FT221XQ	8-Bit SPI/ FT1248	1	1	Internal	1MByte/s	20 QFN
FT221XS						20 SSOP
FT230XQ	Basic UART	1	4	Internal	3MBaud	16 QFN
FT230XS						16 SSOP
FT231XQ	Full Handshake UART	1	4	Internal	3MBaud	20 QFN
FT231XS						20 SSOP
FT234XD	Basic UART	1	1	Internal	3MBaud	12 DFN
FT240XQ	8-bit FIFO	1	2	Internal	1MByte/s	24 QFN
FT240XS						24 SSOP

- IO Levels 1.8V to 3.3V (5V tolerant)
- Typical operating current 8mA
- Battery Charger Detection
- Internal data buffering: TX – 512 bytes, RX – 512 bytes
- Internally generated clocking – No external crystal required. (when VCC >4.0V).
- Extended Temperature Range: -40°C to +85°C

The X-chip series for full speed USB bridge solutions is the latest generation in full speed USB bridging technology, offering the widest range of interface options all backed up with robust driver support on Windows, Linux, MAC OSX and WinCE.

USB 2.0 FULL SPEED BRIDGE SOLUTION

R Chip Series

Optimised for minimal external components on a PCB design. It is not recommended for new design.

Part Number	Application Interface	Channels	Configurable CBUS Pins	EEPROM	Data Throughput	Package
FT232RL	UART	1	5	Internal	3MBaud	28 SSOP
FT232RQ						32 QFN
FT245RL	8-bit FIFO	1	0	Internal	1MByte/s	28 SSOP
FT245RQ						32 QFN

- IO Levels 1.8V to 5V
- Typical operating current 15mA
- Internal data buffering: TX - 128 bytes, RX - 256 bytes
- Internally generated clocking - No external crystal required.
- Extended Temperature Range: -40°C to +85°C

The R chip solution offers a highly integrated solution combining USB protocol handling, internal clock control and EEPROM capabilities in one IC package.

USB 2.0 FULL SPEED BRIDGE SOLUTION

RN Chip Series

Optimised for minimal external components on a PCB design.

Part Number	Application Interface	Channels	Configurable CBUS Pins	EEPROM	Data Throughput	Package
FT232RNL	UART	1	5	Internal	3MBaud	28 SSOP
FT232RNQ						32 QFN
FT245RNL	8-bit FIFO	1	0	Internal	1MByte/s	28 SSOP
FT245RNQ						32 QFN

To improve our supply efficiency on the popular R-Series, FTDI has launched the RN-Series which are designed / manufactured according to the R-Series specification.

The RN-series are drop in pin-compatible replacements for the equivalent R-Series in nearly 100% of all design cases.

The RN chip solution offers a highly integrated solution combining USB protocol handling, internal clock control and EEPROM capabilities in one IC package.

Any Migrating problem please refer to [AN_560](#).

USB 2.0 FULL SPEED BRIDGE SOLUTION

FT120T

Flexible, programmable bridges with in-built DMA engines.

Part Number	Application Interface	Endpoints Supported	Selectable Endpoints	Battery Charger Detection	Data Throughput	Package
FT120	Parallel (MCU)	6	Bulk Isochronous Interrupt	NO	Upto 1MByte/s	28 TSSOP

- IO Levels 3.3V to 5V
- Typical operating current 7mA
- Extended Temperature Range: -40°C to +85°C

While the other USB bridge devices focus on a fixed vendor USB class with silicon and host driver support both supplied and configured for maximum compatibility and efficiency the FT120T allows for something a little different.

The FT120T provides a fully configurable device controlled by an external MCU allowing the device to be identified as a variety of USB device classes such as BOMs, HID, CDC etc thus enabling generic pre-loaded system drivers to access the USB port.

Applications:

- Printers
- Industrial Control
- FPGA USB expansion ports

HID CLASS USB SOLUTIONS

USB devices are not all the same. The descriptors for a device categorise the devices into different classes.

Classes include mass storage (for memory devices), CDC (for communication devices e.g. wireless dongles), printer, audio and HID (Human Interface Devices such as a keyboard) classes. FTDI's traditional USB bridge devices use a special vendor class, as USB to Serial is not strictly covered by the standard classes. This is why FTDI also offer free dedicated drivers for their devices.

However as the Internet of Things evolves and more and more devices are connecting on a variety of different embedded systems a market is emerging which is more suited to a standard class of device such as HID. The key benefit to the end user is that it is more likely a standard class driver will exist for these many platforms as opposed to vendor class drivers.

Selecting HID as the standard bridge class FTDI has developed the FT260 Full speed HID class device enabling USB to bridge with I2C Master, UART or GPIO peripherals. This opens up access to many sensor applications critical in a smart connected world.

Part Number	Application Interface	Channels	Configurable IO Pins	Package
FT260Q	I2C, UART, GPIO	1 / 2	14	QFN28
FT260S	I2C, UART, GPIO	1 / 2	14	SSOP28

- Standard USB device class requires no custom drivers
- Configurable interface selection for UART, I2C or both
- Wide IO voltage supporting from 1.8V to 3.3V output and 1.8V to 5V input
- Battery Charger Detection supported
- Provide internal E-Fuse for some basic configuration and external EEPROM for future settings
- Internally generated clock – NO external crystal required.



USB HOST SOLUTIONS

As mobility accelerates, the need for host support in tablets, handsets, and consumer equipment becomes critical to enable USB connections. FTDI Chip is expanding its USB host solutions with a focus on: Android Open Accessories Initiative, add-on USB host capability for USB2.0 Hi-Speed, and continued support for system level solutions that include USB technology (16 bit micro-controller, USB host, and USB device capabilities).

Integrated circuits that provide USB host ports in a system solution are provided in the Vinculum family of devices. The Vinculum II (VNC2) provides ample hardware support including 16 bit microcontroller, USB host and device capabilities, embedded flash memory, and extensive interface options. In addition, the VNC2 has an extensive suite of application ROM design files, and a toolchain for developing application specific designs.

	VNC2	FT311D	FT312D
Description	Programmable USB 2.0 Host/Device Controller	ANDROID USB Host	ANDROID USB Host
USB Speed	Full (12Mbps) / Low speed (1.5Mbps)	Full-Speed (12Mbps)	Full-Speed (12Mbps)
USB Transfer Types	Bulk, Interrupt, Isochronous	Bulk	Bulk
No. of USB ports	2	1	1
No. of external channels	Flexible	1	1
Supported External Interfaces	ASYNCFIFO, SYNC FIFO, UART, 2x SPI SLAVE, 1x SPI MASTER, GPIO, PWM, DEBUG PORT	GPIO, PWM, UART, I ² C Master, SPI Master, SPI Slave	UART
Core	16/32-bit Harvard MCU Core		
Internal Memory	16kB RAM 256kB FLASH	-	512B-Rx, 256B-Tx
Data rates	Up to 6MBaud	Up to 1MBaud	Up to 1MBaud
Configuration Storage	Internal flash	-	-
Clocking	12MHz Crystal	12MHz Crystal	12MHz Crystal
Operating temp.	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C
Core supply	1.8V	1.8V	1.8V
IO Supply	3.3V	3.3V	3.3V
Packages	32/48 LQFP and QFN	32 LQFP and QFN	32 LQFP and QFN

Android Host (FT311D)



The FT311D IC is designed to specifically host Android platforms that support Android Open Accessories Mode (Android 3.1 onwards). This chip will enumerate and enable an Android platform to provide a bridge to a variety of platforms selectable from 3 GPIO lines. The interfaces include GPIO, UART, PWM, I2C Master, SPI Master and SPI slave. Packaged in 32 pin QFN or LQFP options the device offers a small, reliable bridge to allow Android devices such as mobile phones or tablets to communicate with peripheral hardware over USB. The device does not require any drivers to be loaded on the Android platform and draws no power from the Android USB port as the FT311D is the USB host.

To support the FT311D host chip, FTDI is offering a development kit and GPIO interface

board to jump-start engineers' designs and provide easy access and integration into users' end systems.



With this fixed function, bridged host chip, designers can quickly and easily add USB functionality into products and connect to the expanding Android ecosystem.

USB2.0 Hi-Speed Host Solution FT312D

The FT312D is a USB 2.0 Full Speed host IC specifically targeted at providing access to peripheral hardware from an Android platform with a USB device port. The device will bridge the USB port to a UART interface via the Android Open Accessory protocol.

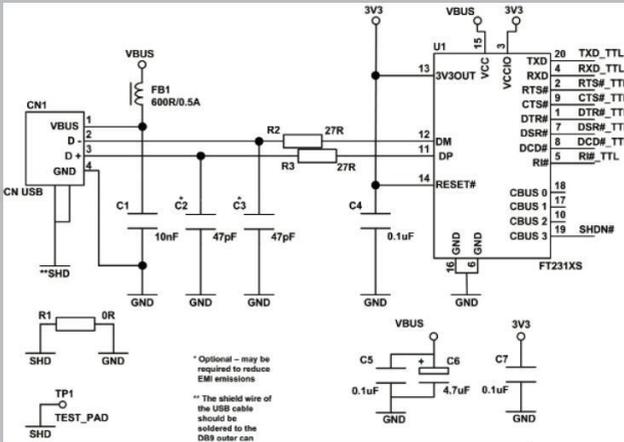


USB2.0 connection providing full access to the accessory.
 (Usually, the Android Accessory port would be on the Android device)

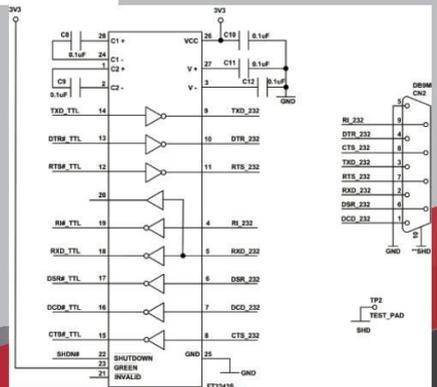
USB TO RS232 DESIGN

The simplest and most common use of FTDI devices is for the purpose of bridging USB ports to a UART peripheral interface. The UART interface may operate at 1.8V to 5V in which case it is possible to realize the design with only one IC such as the FT231X which will handle all the protocol translation on chip. If the design is connecting to either RS232, RS422, RS485 then the design will require an additional transceiver to convert the FT231X UART signals to the appropriate levels.

	TTL UART	RS232	RS422	RS485
Signal Swing	0V to 3V3/5V	+/-5V to +/-15V	+/-2V	+/-1.5V
Termination	Single ended	Single Ended	Differential	Differential
Transmission length	~2m	~15m	~1200m	~1200m
No of transmitters/receivers on a line	1 Driver 1 Receiver	1 Driver 1 Receiver	1 Driver 10 Receiver	32 Driver 32 Receiver



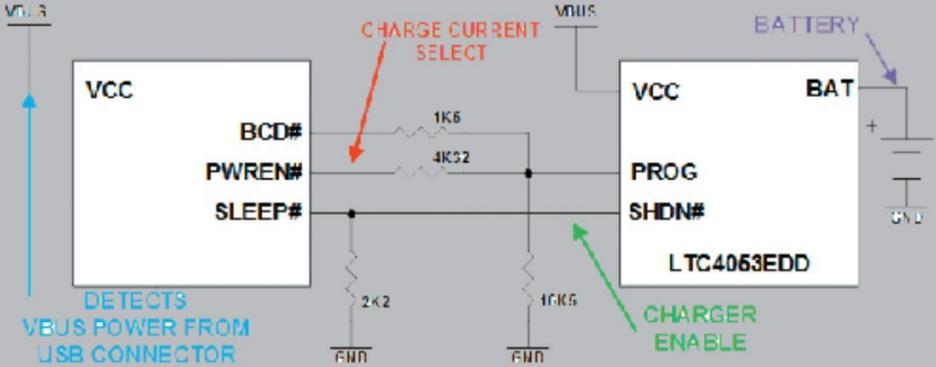
It is possible for the design to simply use RXD and TXD signals but with FTDI solutions the option to implement full modem control is also provided.



BATTERY CHARGER DETECTION

FTDI X Chips, FT4222H, FT260 and FT60X

Simplified charging circuit that support different mode for charging current adjustments.



VBUS	BCD#	PWREN#	*SLEEP#	CHG CURRENT
0V	LOGIC 0	LOGIC 0	LOGIC 0	0 - IN SHUTDOWN
5V Dedicated Charger	LOGIC 0	LOGIC 1	LOGIC 1	1.1A
5V Standard Downstream Port (Enumerated)	LOGIC 1	LOGIC 0	LOGIC 1	0.44A

Charge current is determined by the resistance to gnd on the prog pin of the LTC4053

More information in [Application Note 175](#): Battery charger detection over usb with FT-X devices.

DEVICE DRIVER SUPPORT

Developing a USB solution is a two step process

1. The silicon required to translate the different protocols.
2. The drivers to communicate with the silicon.

FTDI offers among the most comprehensive range of OS supporting drivers on the market, thus facilitating one hardware solution to run on multiple platforms .

Drivers from FTDI can create virtual COM ports to allow legacy apps to control the USB device while talking to a UART interface or bus level drivers offering extended device control.

WINDOWS CERTIFIED	OTHERS
Windows 11 (64 bit)	Linux
Windows 10 (32/64bit)	MAC OSX
Windows 8.1 (32/64 bit)	Windows CE (Version 4.2 and greater)
Windows 8 (32/64 bit)	Windows RT
Windows 7 (32/64 bit)	Android*
Windows Server 2012 R2 x64	
Windows Server 2008 R2 x64	

*Android OS is supported though a JAVA interface, J2xx offering similar functionality to the bus level driver used on the other OS.

+Virtual COM Port drivers are shipped as part of the MAC OSX and Linux OS. As such this is often the simplest driver to use on these OS as to use the bus driver requires the VCP driver to first be disabled.

+Drivers for Windows must be installed by the user. However VCP and bus level drivers are supplied in a combined driver and can be installed together. 3 installation options are provided by FTDI.

1. Windows update will install drivers if the PC is connected to the internet and the device is plugged in. This is perhaps the simplest for most users.
2. Windows provides a setup wizard that will start automatically if the device is plugged in and windows update is not used. This allows the most user control over the installation and setup.
3. A setup exe which automates the installation for non networked PCs. This 3rd option is a hybrid of options 1 and 2.

DEVICE DRIVER SUPPORT

D3XX Drivers

FTDI provides a new D3XX USB driver for FT600/FT601 SuperSpeed USB ICs. D3XX implements a proprietary protocol different from D2XX in order to maximize USB 3.0 bandwidth. Application software can access the USB device through a series of DLL function calls.

OPERATING SYSTEM	X86 (32-Bit)	X64 (64-Bit)	ARM	MIPS	APPLICATION LIBRARY
Windows*	1.3.0.4	1.3.0.4	-	-	1.3.0.4
Linux	1.0.0	1.0.0	ARM v6 (Hard Float) ARM v7 (Hard Float) ARM v8	-	
MAC OS X	0.5.21	0.5.21	-	-	
Android	0.5.21	0.5.21	-	-	

*Windows supported OS includes Win 7, 8, 8.1, 10

DEVELOPMENT MODULES

USB HOST SUPPORT

UMFT311EV



Description: FT311 host development module connects to an Android USB device port. This development system enables the bridge from SPI master, SPI slave, I2C, UART, GPIO, and PWM to a USB host port.

USB connector: 1x Type-A

VINCO



Description: Arduino inspired form factor for VNC2 development. Based on VNC2-64L and includes additional 10-bit ADC

USB connector: Type A and mini-B
Notes: May be used with Arduino or VNC2 shields

VNC2 Debugger/Programmer



Description: VNC2 Programmer/debugger module for use with the IDE development tools

USB connector: Mini-B
Notes: Used to load and debug firmware in VNC2 devices, via the debug pin

V2DIP1-32



Description: 32 pin VNC2-32L based development modules with single USB connector. The modules are targeted for prototyping with the VNC2 and for application integration to enable USB capability within a finished product design.

USB connector: One host Type A
Notes: Requires VNC2 programming module

V2DIP2-48



Description: 48 pin VNC2-48L based development modules with dual USB connector. The modules are targeted for prototyping with the VNC2 and for application integration to enable USB capability within a finished product design.

USB connector: Two host Type A
Notes: Requires VNC2 programming module

V2DIP2-32



Description: 32 pin VNC2-32L based development modules with dual USB connector. The modules are targeted for prototyping with the VNC2 and for application integration to enable USB capability within a finished product design.

USB connector: Two host Type A
Notes: Requires VNC2 programming module

V2DIP1-48



Description: 48 pin VNC2-48Q based development modules with single USB connector. The modules are targeted for prototyping with the VNC2 and for application integration to enable USB capability within a finished product design.

USB connector: One host Type A
Notes: Requires VNC2 programming module

H-CHIP SERIES SUPPORT

USB2.0 Hi-Speed support with multi-channel capabilities

<p>FT4232H Hi-SpeedSerial/Hub</p>	<p>UMFT4222EV</p>	<p>UMFT4222H PROG</p>	<p>FT2232H-56 Mini-Module</p>	<p>FT4232H-56 Mini-Module</p>
				
<p>Chip:FT4232HL USBconnector: TypeA FormFactor:36pin0.6" wideDIPwithoneUSB upstreamconnector andtwodownstream connectors Application: USBtoUART, MPSSEoraUSBhub. May act asanexpansiondevice toVNC2USBhost</p>	<p>Chip:FT4222H USBconnector:TypeA FormFactor: Standard 20.2mm(0.8") wide24pin DIPsocket. Pinsareona 2.60mm(0.1") pitch Application: USBtoSPI/I2Cmaster/slave</p>	<p>Chip: FT4222H USBconnector: TypeA FormFactor: 42.38mmx 41.23mmboardmounted withcomponentsand connectors Application: For Programmingthe FT4222-HICdescriptors</p>	<p>Chip: FT2232H-56Q USBconnector: MicroB FormFactor: Two26 pin doublerowheaders Application: USBtoUART, ASYNCFIFO, SYNCFIFO, or MPSSE x 2</p>	<p>Chip: FT4232H-56Q USBconnector: MicroB FormFactor: Two26 pin doublerowheaders Application: USBtoUART, ASYNCFIFO, SYNCFIFO, or MPSSE x 2</p>

<p>UM232H-B</p>	<p>UM232H</p>	<p>FT2232H MiniModule</p>	<p>FT4232H MiniModule</p>
			
<p>Chip:FT232HL USBconnector: PCBtracksonly FormFactor: Breakout module Application: USBtoUART, ASYNCFIFO, SYNCFIFO, orMPSSE</p>	<p>Chip:FT232HL USBconnector: Mini-B FormFactor: 28pin0.6" wideDIP Application: USBtoUART, ASYNCFIFO, SYNCFIFO, orMPSSE</p>	<p>Chip: FT2232HL USBconnector: Mini-B FormFactor: Two26pindouble rowheaders Application: USBtoUART, ASYNCFIFO, SYNCFIFO, or MPSSE x 2</p>	<p>Chip:FT4232HL USBconnector: Mini-B FormFactor: Two26pindouble rowheaders Application: USBtoUARTor MPSSE x 2</p>

X-CHIP SERIES SUPPORT

An advanced USB2.0 Full Speed Family with optimized power, footprint and feature set

<p>UMFTxxxXB*</p>  <p>Description: Breakout Module Supported IC's: FT200XD, FT201XQ, FT220XQ, FT230XQ USB connector: PCB track only</p>	<p>UMFTxxxXA*</p>  <p>Description: 0.3" wide development Supported IC's: FT201XS, FT220XS, FT221XS, FT230XS, FT231XS, FT240XS USB connector: Mini-B</p>	<p>UMFTxxxXE*</p>  <p>Description: 0.6" wide development Supported IC's: FT201XS, FT221XS, FT231XS, FT240XS USB connector: Mini-B</p>	<p>UMFT231XC</p>  <p>Description: Battery Charger Detection Module Supported IC's: FT231XS USB connector: Mini-B</p>
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* 'xxx' correlates to the numbers of the supported part types

R-CHIP SERIES SUPPORT

FTDI Chip's popular USB2.0 Full Speed Family

<p>UM232R</p>  <p>Chip: FT232RL USB connector: Type B Form Factor: 24pin, 0.6" wide DIP Application: USB to UART</p>	<p>MM232R</p>  <p>Chip: FT232RQ USB connector: Type B Form Factor: 16pin, 0.1" pitch Application: USB to UART</p>	<p>UB232R</p>  <p>Chip: FT232RQ USB connector: Type B Form Factor: 8 contacts, 0.1" pitch Application: USB to UART</p>	<p>EVAL232R</p>  <p>Chip: FT232RL USB connector: Type B Form Factor: USB to DB9 converter Application: USB to RS232</p>	<p>USB-Key</p>  <p>Chip: FT232RL USB connector: Type A Form Factor: Dongle Application: ChipID</p>	<p>UM245R</p>  <p>Chip: FT245RL USB connector: Type B Form Factor: 24pin, 0.6" wide DIP Application: USB to FIFO</p>
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FT12 SERIES SUPPORT

Inspired by the D12, industry standard, with value-added features and footprints

<p>UMFT12XEV</p>  <p>Description: Development system with LPC1114 micro-controller for use with daughter-cards for system development</p>	<p>UMFT120DC</p>  <p>Chip: FT120T USB connector: Micro-B Footprint: 28pin, 0.8" wide DIP</p>
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LOW COST DEVELOPMENT MODULES

<p>LC231X</p>  <p>Chip: FT231XQ USB connector: Micro-B Form Factor: One 6pin, double rows, 7pin header Application: USB to UART</p>	<p>LC234X</p>  <p>Chip: FT234XD USB connector: Micro-B Form Factor: One 6pin header with one right angle socket and one right angle pin header Application: USB to UART</p>
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DEVELOPMENT MODULES

- FT60x-CHIP SERIES SUPPORT

An advanced USB3.0 Super Speed Family with multichannel support

UMFT600A	UMFT600X	UMFT601A	UMFT601X	UMFT602A-B	UMFT602X-B
					
<p>Chip:FT600Q</p> <p>USBConnector:USB 3.0micro-Bconnector toUSBhost</p> <p>Application connector:HSMC connector toexternal FIFOmaster</p> <p>Application:USBto multi-channelFIFO(16 bitswide)</p>	<p>Chip:FT600Q</p> <p>USBConnector:USB 3.0micro-Bconnector toUSBhost</p> <p>Application connector:FMC connector toexternal FIFOmaster</p> <p>Application:USBto multi-channelFIFO(16 bitswide)</p>	<p>Chip:FT601Q</p> <p>USBConnector:USB 3.0micro-Bconnector toUSBhost</p> <p>Application connector:HSMC connector toexternal FIFOmaster</p> <p>Application:USBto multi-channelFIFO(32 bitswide)</p>	<p>Chip:FT601Q</p> <p>USBConnector:USB 3.0micro-Bconnector toUSBhost</p> <p>Application connector:FMC connector toexternal FIFOmaster</p> <p>Application:USBto multi-channelFIFO(32 bitswide)</p>	<p>Chip:FT602Q-B</p> <p>USBConnector: Micro-USB3.0</p> <p>Application connector:HSMC connector toexternal FIFOmaster</p> <p>Application:USBUCV Class custommulti-channel FIFO(32bitswide)</p>	<p>Chip:FT602Q-B</p> <p>USBConnector: Micro-USB3.0</p> <p>Applicationconnector: FMCconnector to externalFIFOmaster</p> <p>Application:USBUCV Class custommulti-channel FIFO(32bitswide)</p>

FT260 HID Class Series Support

Full Speed HID Class devices ideal for USB sensors and no driver installation required

UMFT260EV1A	UMFTPD3A
	
<p>Chip:FT260</p> <p>USBConnector:micro-B</p> <p>Applicationconnector:</p> <p>Formfactor:24pin0.8"wideDIP</p> <p>Application:HIDclassUSBtoUART orI2CBridge</p>	<p>Description:Programmermodule tolinkFT_PROGwiththeFT260 orFT4222devices.Provides programming,voltagestoaccess onchipOTPforupdatingdevice descriptors.</p>

CABLE SOLUTIONS

USB TO
LEGACY RS232
CONVERTER CABLES



Premium USB to Legacy RS232 Converter

	PARTNUMBER	IOLEVELS
	US232R-10	
	US232R-100	RS232
	US232R-500	
	UT232R-200	RS232
USB-Serial Converter	UT232R-500	RS232
Chipi-x	CHIPI-X10	RS232

USB TO LEGACY
RS232 OR RS-485 OR
RS485 CONVERTER
CABLES



RS232 Converter

RS422 Converter

RS485 Converter

	PARTNUMBER	IOLEVELS
	USB-RS232-WE-1800-BT_00	
	USB-RS232-WE-1800-BT_33	
	USB-RS232-WE-1800-BT_50	
RS232 Converter	USB-RS232-WE-5000-BT_00	RS232
	USB-RS232-WE-5000-BT_33	
	USB-RS232-WE-5000-BT_50	
	USB-RS422-WE-1800-BT	
RS422 Converter	USB-RS422-WE-5000-BT	RS422
	USB-RS485-WE-1800-BT	
RS485 Converter	USB-RS485-WE-5000-BT	RS485

USB to I2C/SPI/JTAG



Type A USB to 10 single pole receptades

	PARTNUMBER	IOLEVELS
	C232HM-EDHSL-0	5V
	C232HM-DDHSL-0	3.3V

USB TO TTL
SERIAL CABLES



Type A USB to wire end TTL Serial



Type A USB to SIP Connector



Type A USB to 3.5mm Audio Jack

	PARTNUMBER	IOLEVELS
	TTL-232RG-VREG1V8-WE	1.8V
	TTL-232RG-VREG3V3-WE	3.3V
	TTL-232RG-VSW3V3-WE	3.3V
	TTL-232RG-VSW5V-WE	5V
	TTL-232RG-VIP-WE	1.8Vto5.25V
	TTL-232R-3V3-WE	3.3V
	TTL-232R-5V-WE	5V
	TTL-234X-3V3-WE	3.3V
	TTL-234X-5V-WE	5V
	TTL-232R-5V	5V
	TTL-232R-3V3	3.3V
	TTL-232R-3V3-2MM	3.3V
	TTL-234X-3V3-2MM	3.3V
	TTL-234X-3V3	3.3V
	TTL-234X-5V	5V
	TTL-232R-5V-AJ	5V
	TTL-232R-3V3-AJ	3.3V
	TTL-234X-3V3-AJ	3.3V
	TTL-234X-5V-AJ	5V
	C232HD-EDHSP-0	5V
	C232HD-DDHSP-0	3.3V

FTDI Chip's instant USB converter cables provide connectivity options from USB to RS232, RS422, or RS485 and TTL based signalling interfaces. The cables feature integrated electronics assemblies by using FTDI Chip's ICs, to provide an easy-to-use USB conversion. Custom cable versions are available upon request.

MAX BAUD RATE	RX/TX LED	CABLE LENGTH	CABLE TERMINATION	TEMPERATURE RANGE	NOTES
1 Mbaud	RX/TX LED	10cm	DB9	-20°C to +80°C	Retaining nut on DB9 connector.
		1m			
		5m			
1 Mbaud	-	2m	DB9	-20°C to +80°C	Thumb screw on DB9 connector.
		5m			
250k Baud	-	10cm	DB9	-40°C to +85°C	

POWER OUTPUT PIN	MAX BAUD RATE	RX/TX LED	CABLE LENGTH	CABLE TERMINATION	TEMPERATURE RANGE	NOTES
0V	1 Mbaud	RX/TX LED	1.8m	Wire ended	-40°C to +85°C	Option of transparent or black USB connector.
3.3V			1.8m			
5V			1.8m			
0V			5m			LEDs for visual indication of traffic on the cable.
3.3V			5m			
5V			5m			
0V	3 Mbaud	RX/TX LED	1.8m	Wire ended	-40°C to +85°C	Also available as PCB.
5V			5m			
0V	3 Mbaud	RX/TX LED	1.8m	Wire ended	-40°C to +85°C	
5V			5m			

POWER OUTPUT PIN	MAX BAUD RATE	RX/TX LED	CABLE LENGTH	CABLE END	TEMPERATURE RANGE	NOTES
1.8V@100mA	3 Mbaud	RX/TX LED	1.8m	Wire ended	-40°C to +85°C	LEDs for visual indication of traffic on the cable.
3.3V@250mA						
3.3V@50mA						
5V@450mA						Transparent USB connector.
1.8V to 5.25V						
5V@75mA						
5V@75mA	-	Available as PCB.				
5V@75mA	-					
5V@75mA	-					
5V@75mA	3 Mbaud	-	1.8m	Single in line socket	-40°C to +85°C	0.1" pitch
5V@75mA						2mm pitch, for VMUSIC2 and VDRIVE2
-	3 Mbaud	-	1.8m	Audio Jack	-40°C to +85°C	Tip- Tx Ring- Rx, Sleeve- Ground

1 adj. logic threshold level (from external supply)

* All cables are powered from the host USB port, except TTL-232RG-VIP-WE
 All cables use FTDI royalty free drivers - available on Windows, MAC, Linux, and WinCE
 All cables FCC/CE/UKCA approved • Custom cable options on request subject to MOQ/NRE



ABOUT FTDI CHIP

FTDI Chip develops innovative silicon solutions that enhance interaction with today's technology. The company prides itself on its existence as a USB bridging solution specialist, and applies this principle by supporting engineers with highly sophisticated, feature-rich, robust and simple-to-use products. This enables creation of electronic designs with higher performance, fewer peripheral components, lower power budgets and diminished board real estate.

FTDI Chip's long-established, continuously expanding Universal Serial Bus (USB) product line

boasts such universally recognized product brands as the ubiquitous R-Chip, X-Chip, Vinculum, and H-Series.

FTDI Chip is a fab-less semiconductor company, partnered with the world's leading foundries. The company is headquartered in Glasgow, UK, with research and development facilities located in Glasgow, Singapore and Taipei (Taiwan), plus regional sales and technical support sites in Glasgow, Taipei, Tigard (Oregon, USA) and Shanghai (China).



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