

**Future Technology Devices International Ltd.**

## **Technical Note TN\_107**

### **FTDI Chipset Feature Comparison**

**Document Reference No.: FT\_000108**

**Version 1.0**

**Issue Date: 2008-12-08**

This technical note compares several FTDI devices and highlights their main features in order to gain better understanding which one is the best option for each customer application.

**Future Technology Devices International Limited (FTDI)**

Unit1, 2 Seaward Place, Centurion Business Park,, Glasgow G41 1HH United Kingdom

Tel.: +44 (0) 141 429 2777 Fax: + 44 (0) 141 429 2758

E-Mail (Support): [support1@ftdichip.com](mailto:support1@ftdichip.com) Web: <http://www.ftdichip.com>

Copyright © 2008 Future Technology Devices International Limited

---

<b>1</b>	<b>Introduction.....</b>	<b>2</b>
<b>2</b>	<b>Chipset summary .....</b>	<b>3</b>
2.1	FT232BL USB UART (USB - Serial) IC .....	3
2.2	FT245BL USB FIFO (USB - Parallel) IC .....	3
2.3	FT232R USB UART (USB - Serial) IC.....	3
2.4	FT245R USB FIFO (USB - PARALLEL FIFO) IC .....	3
2.5	FT2232D Dual USB UART/FIFO IC.....	4
2.6	FT2232H Dual High Speed USB to Multipurpose UART/FIFO IC .....	4
2.7	FT4232H Quad High Speed USB to Multipurpose UART/MPSSSE IC .....	4
<b>3</b>	<b>Chipset comparison tables .....</b>	<b>5</b>
3.1	FT232/FT245BL vs FT232/FT245R.....	5
3.2	FT2232H vs FT4232H.....	5
3.3	FT2232D (Full Speed) and FT2232H (High Speed).....	6
<b>4</b>	<b>Contact Information.....</b>	<b>7</b>
<b>5</b>	<b>Appendix – Block Diagrams .....</b>	<b>8</b>
5.1	Terms description .....	8
5.2	Links to datasheets .....	8
5.3	FT2232H Block Diagram .....	9
5.4	FT4232H Block Diagram .....	10
<b>6</b>	<b>Appendix B - Revision History .....</b>	<b>11</b>
	<b>Revision Record Sheet.....</b>	<b>12</b>

## **1 Introduction**

This technical note compares several chipsets from the FT232/FT245BL, FT232/FT245RL family and the FT4232H/FT2232H USB dual and quad High Speed USB to Multipurpose UART/MPSSE devices.

Tables in section 3 highlight the important features of each chipset, making it easy to choose the most suitable solution for each application. A detailed block diagram of the FT2232H and FT4232H can be found in Appendix.

## 2 Chipset summary

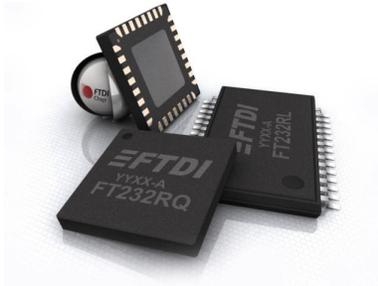
### 2.1 FT232BL USB UART (USB - Serial) IC

The FT232BL is the lead free version of the 2<sup>nd</sup> generation of FTDI's popular USB UART I.C. This device not only adds extra functionality to its FT8U232AM predecessor and reduces external component count, but also maintains a high degree of pin compatibility with the original, making it easy to upgrade or cost reduce existing designs as well as increasing the potential for using the device in new application areas.

### 2.2 FT245BL USB FIFO (USB - Parallel) IC

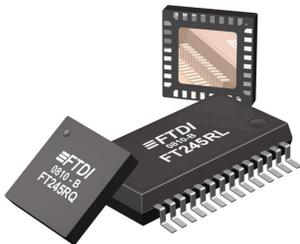
The FT245BL is the lead free version of the 2<sup>nd</sup> generation of FTDI's popular USB FIFO I.C. This device not only adds extra functionality to its FT8U245AM predecessor and reduces external component count, but also maintains a high degree of pin compatibility with the original, making it easy to upgrade or cost reduce existing designs as well as increasing the potential for using the device in new application areas.

### 2.3 FT232R USB UART (USB - Serial) IC



The FT232R is a USB to serial UART Interface. It is a single chip USB to asynchronous serial data interface solution, with a unique USB FTDIChip-ID™ feature, synchronous and asynchronous bit bang interface options and is USB 2.0 Full Speed compatible.

### 2.4 FT245R USB FIFO (USB - PARALLEL FIFO) IC



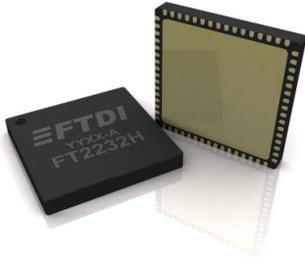
The FT245R is a USB to parallel FFIO interface. It is a single chip USB to parallel FIFO bidirectional data interface solution, with a unique USB FTDIChip-ID™ feature, synchronous and asynchronous bit bang interface options and is USB 2.0 Full Speed compatible.

---

## 2.5 FT2232D Dual USB UART/FIFO IC

The FT2232D is an updated version of FTDI's 3rd generation USB UART / FIFO IC family. This device features two Multi-Purpose UART / FIFO controllers which can be configured individually in several different modes. As well as a UART interface, FIFO interface and Bit-Bang IO modes of the 2nd generation FT232BM and FT245BM devices, the FT2232D offers a variety of additional new modes of operation, including a Multi-Protocol Synchronous Serial Engine (MPSSE) interface which is designed specifically for synchronous serial protocols such as JTAG, I<sup>2</sup>C, and SPI bus.

## 2.6 FT2232H Dual High Speed USB to Multipurpose UART/FIFO IC



The FT2232H is FTDI's 5th generation of USB devices. The FT2232H is a dual channel USB 2.0 High Speed (480Mb/s) to UART/FIFO IC. It has the capability of being configured in a variety of industry standard serial or parallel interfaces.

## 2.7 FT4232H Quad High Speed USB to Multipurpose UART/MPSSE IC



The FT4232H is FTDI's 5<sup>th</sup> generation of USB devices. The FT4232H is a quad channel USB 2.0 High Speed (480Mb/s) to UART/MPSSE ICs. The device features 4 interfaces. Two of these have an option to independently configure an MPSSE engine. This allows the FT4232H to operate as two UART/Bit-Bang ports plus two MPSSE engines used to emulate JTAG, SPI, I<sup>2</sup>C, Bit-bang or other synchronous serial modes.

### 3 Chipset comparison tables

#### 3.1 FT232/FT245BL vs FT232/FT245R

The following table highlights and compares the features of technology BL and R generation of devices.

FUNCTION	FT232BL	FT 232R	FT245BL	FT245R
USB UART	✓	✓		
FT245 ASYNC FIFO			✓	✓
ASYNC Bit-Bang	✓	✓	✓	
SYNC Bit-Bang		✓		✓
CBUS Bit-Bang		✓		
External Components	12	2	12	2

#### 3.2 FT2232H vs FT4232H

The following table highlights and compares the features of FT2232H and FT4232H.

FUNCTION	FT2232H		FT4232H			
	Channel A	Channel B	Channel A	Channel B	Channel C	Channel D
USB UART	✓	✓	✓	✓	✓	✓
FT245 SYNC FIFO	✓					
FT245 ASYNC FIFO	✓	✓				
MPSSE	✓	✓	✓	✓		
SPI	✓	✓	✓	✓		
I2C	✓	✓	✓	✓		
JTAG	✓	✓	✓	✓		
Custom Serial	✓	✓	✓	✓		
SYNC Bit-Bang	✓	✓	✓	✓	✓	✓
ASYNC Bit-Bang	✓	✓	✓	✓	✓	✓
CPU Style FIFO Interface	✓	✓				
Fast Serial Interface		✓				
Host Bus Emulation	✓ combines both channels					

### 3.3 FT2232D (Full Speed) and FT2232H (High Speed)

	FT2232D	FT2232H
General		
USB Bus Speed	12 MHz FULL SPEED	480 MHz HIGH SPEED
Package	48 pin LQFP	64 pin QFN or 64 pin LQFP
Power Supply	5.0V (30mA) core, 3.3V IO	1.8V core (70mA), 3.3V IO/PHY
Voltage Regulator Output	3.3V	1.8V
Buffer Sizes	TX: 128 bytes/channel RX: 384 bytes/channel	TX: 4096 bytes/channel RX: 4096 bytes/channel
I/O Drive strength	2,8mA	2,4,8,16mA
Slew Rate control	No	Yes
Modes of operation	Asynchronous serial UART interface, asynchronous FIFO interface, asynchronous and synchronous bit-bang modes, fast serial interface, host bus emulation, MPSSE and CPU FIFO Mode.	Asynchronous serial UART interface, asynchronous and synchronous FIFO interface, asynchronous and synchronous bit-bang modes, fast serial interface, host bus emulation, MPSSE and CPU FIFO Mode.
RS232/422/485		
RS232 Baud rate Max	3 MegaBaud	12 MegaBaud
Multi Protocol Synchronous Serial Engines		
No. of MPSSE Engines	1	2
MPSSE Max Clock rate	6 MHz	30 MHz
Total I/O pins	12 per channel	16 per channel
FT245 FIFO interface		
Max Data Rate (Async)	<1 MegaByte/Sec	TBD
Max Data Rate (Sync)	n/a	> 25 MegaBytes/Sec

## 4 Contact Information

### Head Office – Glasgow, UK

Future Technology Devices International Limited  
Unit 1, 2 Seaward Place, Centurion Business Park  
Glasgow G41 1HH  
United Kingdom

Tel: +44 (0) 141 429 2777  
Fax: +44 (0) 141 429 2758

E-mail (Sales) [sales1@ftdichip.com](mailto:sales1@ftdichip.com)  
E-mail (Support) [support1@ftdichip.com](mailto:support1@ftdichip.com)  
E-mail (General Enquiries) [admin1@ftdichip.com](mailto:admin1@ftdichip.com)  
Web Site URL <http://www.ftdichip.com>  
Web Shop URL <http://www.ftdichip.com>

### Branch Office – Taipei, Taiwan

Future Technology Devices International Limited (Taiwan)  
4F, No 18-3, Sec. 6 Mincyuan East Road  
Neihu District  
Taipei 114  
Taiwan, R.O.C.  
Tel: +886 (0) 2 8791 3570  
Fax: +886 (0) 2 8791 3576

E-mail (Sales) [tw.sales1@ftdichip.com](mailto:tw.sales1@ftdichip.com)  
E-mail (Support) [tw.support1@ftdichip.com](mailto:tw.support1@ftdichip.com)  
E-mail (General Enquiries) [tw.admin1@ftdichip.com](mailto:tw.admin1@ftdichip.com)  
Web Site URL <http://www.ftdichip.com>

### Branch Office – Hillsboro, Oregon, USA

Future Technology Devices International Limited (USA)  
7235 NW Evergreen Parkway, Suite 600  
Hillsboro, OR 97123-5803  
USA  
Tel: +1 (503) 547 0988  
Fax: +1 (503) 547 0987

E-Mail (Sales) [us.sales@ftdichip.com](mailto:us.sales@ftdichip.com)  
E-Mail (Support) [us.admin@ftdichip.com](mailto:us.admin@ftdichip.com)  
Web Site URL <http://www.ftdichip.com>

### Distributor and Sales Representatives

Please visit the Sales Network page of the FTDI Web site for the contact details of our distributor(s) and sales representative(s) in your country.

Vinculum is part of Future Technology Devices International Ltd. Neither the whole nor any part of the information contained in, or the product described in this manual, may be adapted or reproduced in any material or electronic form without the prior written consent of the copyright holder. This product and its documentation are supplied on an as-is basis and no warranty as to their suitability for any particular purpose is either made or implied. Future Technology Devices International Ltd will not accept any claim for damages howsoever arising as a result of use or failure of this product. Your statutory rights are not affected. This product or any variant of it is not intended for use in any medical appliance, device or system in which the failure of the product might reasonably be expected to result in personal injury. This document provides preliminary information that may be subject to change without notice. No freedom to use patents or other intellectual property rights is implied by the publication of this document. Future Technology Devices International Ltd, Unit 1, 2 Seaward Place, Centurion Business Park, Glasgow G41 1HH United Kingdom. Scotland Registered Number: SC136640

## 5 Appendix – Block Diagrams

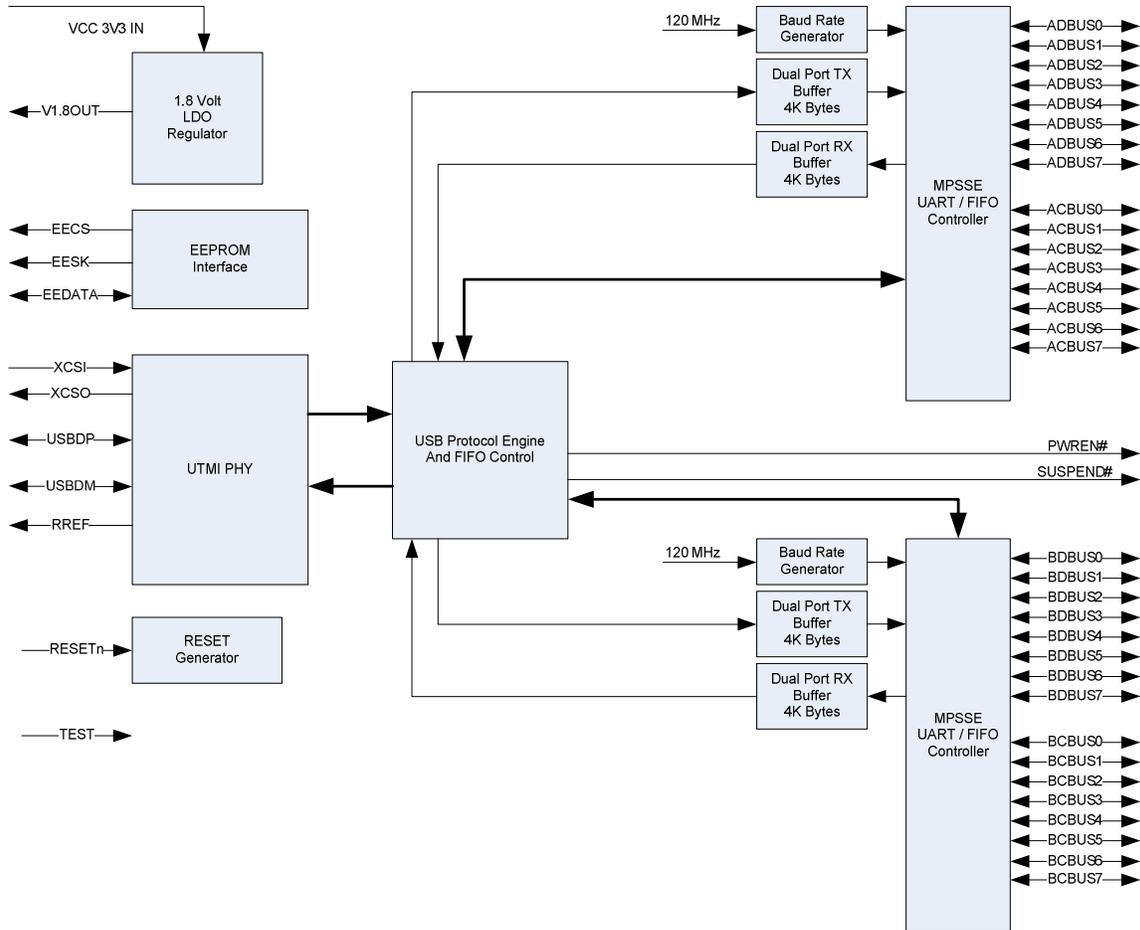
### 5.1 Terms description

Terms	Description
USB UART	RS232 UART interface
FT245 FIFO	FT245 style synchronous or asynchronous FIFO interface
SPI, I <sup>2</sup> C, JTAG, Custom Serial	Supported serial interfaces configured using MPSSE
Bit-Bang modes	Parallel IO (similar to GPIO).
CPU-Style FIFO Interface	CPU-style FIFO interface mode which allows a CPU to interface to USB
Fast Serial Interface	High-speed optical bi-directional isolated serial data transfer
Host Bus Emulation Interface	Combine channel A and channel B to be configured as a host bus emulation interface mode which emulates a standard 8048 or 8051 MCU host

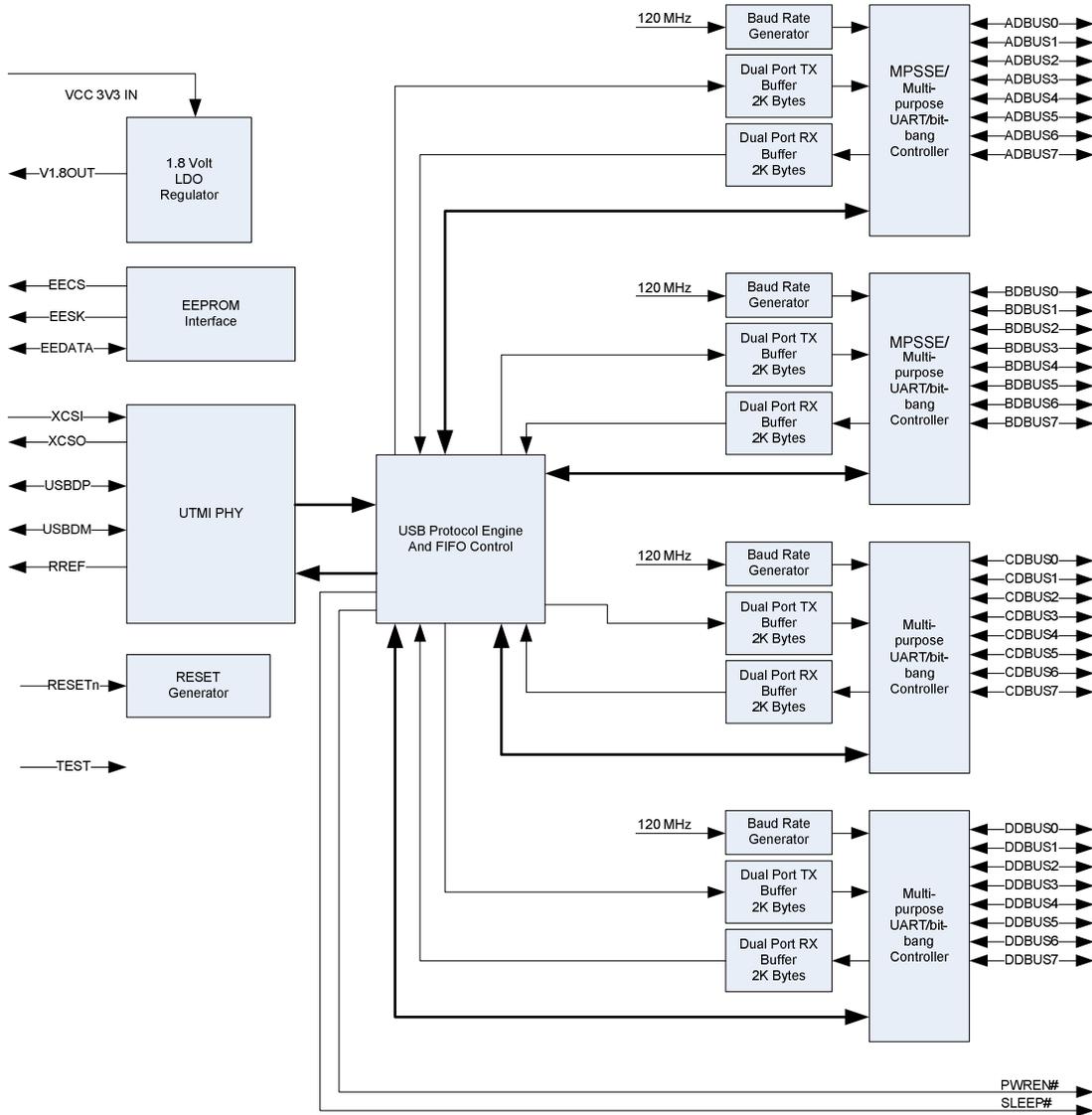
### 5.2 Links to datasheets

Chipset	Web link to datasheet
FT232BL	<a href="http://www.ftdichip.com/Documents/DataSheets/DS_FT232BL.pdf">http://www.ftdichip.com/Documents/DataSheets/DS_FT232BL.pdf</a>
FT245BL	<a href="http://www.ftdichip.com/Documents/DataSheets/DS_FT245BL.pdf">http://www.ftdichip.com/Documents/DataSheets/DS_FT245BL.pdf</a>
FT232R	<a href="http://www.ftdichip.com/Documents/DataSheets/DS_FT232R.pdf">http://www.ftdichip.com/Documents/DataSheets/DS_FT232R.pdf</a>
FT245R	<a href="http://www.ftdichip.com/Documents/DataSheets/DS_FT245R.pdf">http://www.ftdichip.com/Documents/DataSheets/DS_FT245R.pdf</a>
FT2232D	<a href="http://www.ftdichip.com/Documents/DataSheets/DS_FT2232D.pdf">http://www.ftdichip.com/Documents/DataSheets/DS_FT2232D.pdf</a>
FT2232H	<a href="http://www.ftdichip.com/Documents/DataSheets/DS_FT2232H_V110.pdf">http://www.ftdichip.com/Documents/DataSheets/DS_FT2232H_V110.pdf</a>
FT4232H	<a href="http://www.ftdichip.com/Documents/DataSheets/DS_FT4232H_V110.pdf">http://www.ftdichip.com/Documents/DataSheets/DS_FT4232H_V110.pdf</a>

### 5.3 FT2232H Block Diagram



## 5.4 FT4232H Block Diagram



## **6 Appendix B - Revision History**

Revision History

Version 1.00 Initial Release

9<sup>th</sup> December, 2008