

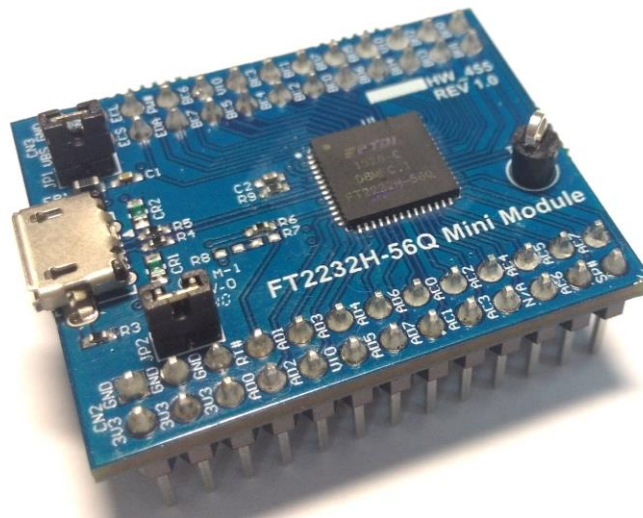
Future Technology Devices International Ltd.

FT2232H-56Q Mini Module

USB Hi-Speed FT2232H Evaluation

Module

Datasheet



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1 Introduction

The FT2232H-56Q Mini Module is a USB-serial/FIFO development module in the FTDI product range which utilizes the FT2232H-56Q USB Hi-Speed dual-port bridge chip which handles all the USB signalling and protocols. It is ideal for development purposes to quickly prove functionality of adding USB to a target design. The FT2232H datasheet, is available at <http://www.ftdichip.com/Products/ICs/FT2232H.html>.

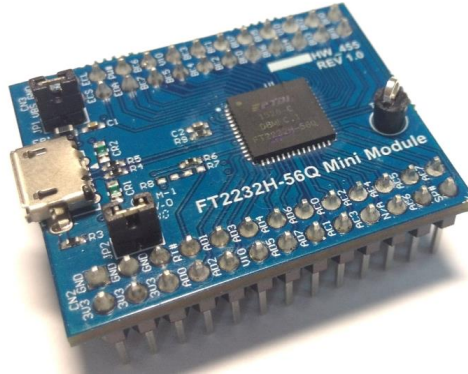


Figure 1.1 FT2232H-56Q Mini Module

The FT2232H-56Q Mini Module is a USB 2.0 High Speed (480Mb/s) to UART/MPSSE IC. The device features two interfaces that can be configured for asynchronous or synchronous serial or parallel FIFO interfaces. The two channels can also be independently configured to use an MPSSE engine. This allows the two ports of the FT2232H-56Q to operate independently as UART/Bit-Bang ports or MPSSE engines used to emulate JTAG, SPI, I²C, Bit-bang or other synchronous serial modes. All components used, including the FT2232H-56Q are Pb-free (RoHS compliant).

The FT2232H-56Q Mini Module connects the signals of the FT2232H-56Q IC to two 26-pin dual-row headers which allow easy connection PCB header sockets and ribbon cables.

The FT2232H-56Q Mini Module requires USB device drivers, available free from <http://www.ftdichip.com>, which are used to make the FT2232H-56Q on the Mini Module appear as two virtual COM ports (VCP). This then allows the user to communicate with the USB interface via a standard PC serial emulation port (TTY). Another FTDI USB driver, the D2XX driver, can also be used with application software to directly access the FT2232H-56Q on the Mini Module through a DLL. This is illustrated in Figure 1.2.

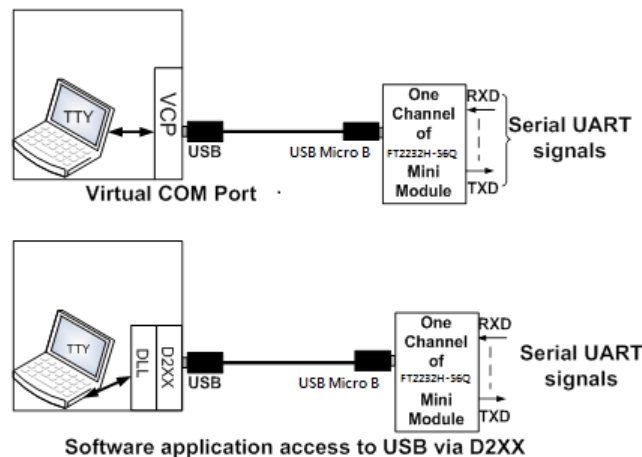


Figure 1.2 Using the FT2232H-56Q Mini Module

Device Drivers for the FT2232H-56Q Mini Module are available free from <http://www.ftdichip.com>.

1.1 USB Compliant

The FT2232H-56Q Mini Modules are fully compliant with the USB 2.0 specification.



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2 Typical Applications

- Rapid USB integration into existing electronic systems.
- Prototyping platform for USB interface on new systems.
- USB to multi-port JTAG, SPI and I²C interfaces (Two Multi-Protocol Synchronous Serial Engines – MPSSE – available with the FT2232H)
- USB to multi-port asynchronous serial interfaces (up to 2 ports available).

2.1 Driver Support

Royalty free VIRTUAL COM PORT (VCP) DRIVERS for...

- Windows 10 32,64-bit
- Windows 8/8.1 32,64-bit
- Windows 7 32,64-bit
- Windows Vista and Vista 64-bit
- Windows XP and XP 64-bit
- Windows 98, 98SE, ME, 2000, Server 2003, XP, Server 2008 and server 2012 R2
- Windows XP Embedded
- Windows CE 4.2, 5.0 and 6.0
- Mac OS 8/9, OS-X
- Linux 2.4 and greater

Royalty free D2XX Direct Drivers (USB Drivers + DLL S/W Interface)

- Windows 10 32,64-bit
- Windows 8/8.1 32,64-bit
- Windows 7 32,64-bit
- Windows Vista and Vista 64-bit
- Windows XP and XP 64-bit
- Windows 98, 98SE, ME, 2000, Server 2003, XP, Server 2008 and server 2012 R2
- Windows XP Embedded
- Windows CE 4.2, 5.0 and 6.0
- Linux 2.4 and greater
- Android(J2xx)

The drivers listed above are all available to download for free from www.ftdichip.com.

2.2 Features

The FT2232H-56Q Mini Module has the following feature:

- USB 2.0 Hi-Speed compatible
- Reduced development time
- Rapid integration into existing systems
- USB powered – no external power supply needed
- Based on the USB Hi-Speed FT2232H device
- Entire USB protocol handled by USB module
- Small USB Micro B connector common on many commercial devices
- Asynchronous Serial data transfer rates from 300 baud to 12 Mbaud at TTL levels
- Synchronous Serial (MPSSE) data rates of up to 30Mbps on JTAG, SPI and I²C
- Support for USB suspend and resume
- UHCI / OHCI / EHCI host controller compatible
- -40°C to +85°C operating temperature range
- On board jumper for FT2232H-56Q configuration mode, USB power configuration and VIO source selection
- The FT2232H-56Q is the QFN-56 pin package.

3 Electrical Details

The electrical details and connections to the FT2232H-56Q Mini Module are shown in Figure 3.1 and tables 3.1 and 3.2.

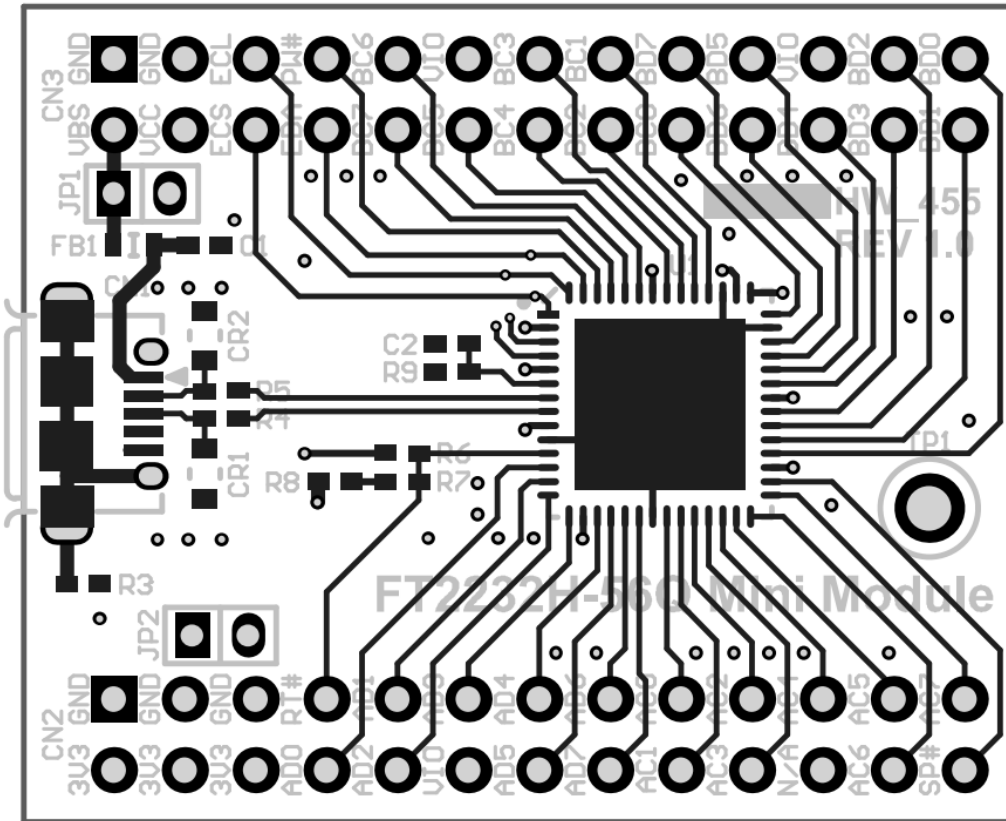


Figure 3.1 FT2232H-56Q Mini Module Electrical Connections (Top View)

| Connector Pin | Name | Description |
|---------------|--------|-------------------------------------|
| CN2-1 | GND | 0V Power pin |
| CN2-2 | V3V3 | 3.3V DC generated from VCC (output) |
| CN2-3 | GND | 0V Power pin |
| CN2-4 | V3V3 | 3.3V DC generated from VCC (output) |
| CN2-5 | GND | 0V Power pin |
| CN2-6 | V3V3 | 3.3V DC generated from VCC (output) |
| CN2-7 | RESET# | FT2232H-56Q RESET# pin |
| CN2-8 | AD0 | FT2232H-56Q AD0 pin |
| CN2-9 | AD1 | FT2232H-56Q AD1 pin |
| CN2-10 | AD2 | FT2232H-56Q AD2 pin |
| CN2-11 | AD3 | FT2232H-56Q AD3 pin |

| Connector Pin | Name | Description |
|---------------|----------|---|
| CN2-12 | VIO | Connected to all FT2232H-56Q VCCIO pins (input) |
| CN2-13 | AD4 | FT2232H-56Q AD4 pin |
| CN2-14 | AD5 | FT2232H-56Q AD5 pin |
| CN2-15 | AD6 | FT2232H-56Q AD6 pin |
| CN2-16 | AD7 | FT2232H-56Q AD7 pin |
| CN2-17 | AC0 | FT2232H-56Q AC0 pin |
| CN2-18 | AC1 | FT2232H-56Q AC1 pin |
| CN2-19 | AC2 | FT2232H-56Q AC2 pin |
| CN2-20 | AC3 | FT2232H-56Q AC3pin |
| CN2-21 | AC4 | FT2232H-56Q AC4 pin |
| CN2-22 | N/A | 0 |
| CN2-23 | AC5 | FT2232H-56Q AC5 pin |
| CN2-24 | AC6 | FT2232H-56Q AC6 pin |
| CN2-25 | AC7 | FT2232H-56Q AC7 pin |
| CN2-26 | SUSPEND# | FT2232H-56Q SUSPEND# pin |

Table 3.1 FT2232H-56Q Mini Module Connection – CN2

| Connector Pin | Name | Description |
|---------------|--------|--|
| CN2-1 | GND | 0V Power pin |
| CN2-2 | VBUS | USB VBUS power pin (output) |
| CN2-3 | GND | 0V Power pin |
| CN2-4 | VCC | +5V Power pin (input) used to generate V3V3, VPLL and VUSB |
| CN2-5 | CLK | FT2232H-56Q EECLK pin |
| CN2-6 | CS | FT2232H-56Q EECS pin |
| CN2-7 | PWREN# | FT2232H-56Q PWREN# |
| CN2-8 | DATA | FT2232H-56Q EEDATA pin |
| CN2-9 | BC6 | FT2232H-56Q BC6 pin |
| CN2-10 | BC7 | FT2232H-56Q BC7 pin |
| CN2-11 | VIO | Connected to all FT2232H-56Q VCCIO pins (input) |

| Connector Pin | Name | Description |
|---------------|------|---|
| CN2-12 | BC5 | FT2232H-56Q BC5 pin |
| CN2-13 | BC3 | FT2232H-56Q BC3 pin |
| CN2-14 | BC4 | FT2232H-56Q BC4 pin |
| CN2-15 | BC1 | FT2232H-56Q BC1 pin |
| CN2-16 | BC2 | FT2232H-56Q BC2 pin |
| CN2-17 | BD7 | FT2232H-56Q BD7 pin |
| CN2-18 | BC0 | FT2232H-56Q BC0 pin |
| CN2-19 | BD5 | FT2232H-56Q BD5 pin |
| CN2-20 | BD6 | FT2232H-56Q BD6 pin |
| CN2-21 | VIO | Connected to all FT2232H-56Q VCCIO pins (input) |
| CN2-22 | BD4 | FT2232H-56Q BD4 pin |
| CN2-23 | BD2 | FT2232H-56Q BD2 pin |
| CN2-24 | BD3 | FT2232H-56Q BD3 pin |
| CN2-25 | BD0 | FT2232H-56Q BD0 pin |
| CN2-26 | BD1 | FT2232H-56Q BD1 pin |

Table 3.2 FT2232H-56Q Mini Module Connection – CN3

In most cases, the FT2232H-56Q pin is connected directly to the associated pin on CN2 or CN3.

The FT2232H-56Q Mini Module allows configuration with both USB Bus-powered designs and USB Self-powered designs:

USB Bus-powered:

- 1) **JP1 is connected VBUS to VCC (CN3, pin 1 to CN3, pin 3).** This connection takes the power from the USB bus (VBUS) and connects it to the voltage regulator input on the FT2232H-56Q Mini Module. The voltage regulator, in turn, provides V3V3, VPLL and VUSB power inputs to the FT2232H-56Q chip.
- 2) **JP2 is connected V3V3 to VIO (CN2, pins 1, 3 & 5 to CN2, pins 11 and CN3, pins 12 & 22).** This connection provides the correct 3.3VDC operating voltage for VCCIO on the FT2232H-56Q chip.
- 3) Connected to jumper JP1 pin 1 in order to supply power for FT2232H-56Q chip from the USB port.
- 4) External 3.3V regulator output. Connected to jumper JP2 pin 2 in order to supply the VIO voltage with 3.3V tolerance.

USB Self-Powered:

- 1) **Remove the JP1 and JP2 jumper.**
- 2) **Leave VBUS (CN3, pin 1) unconnected.**

- 3) Connect an external 5.0VDC power supply to VCC (5.0VDC to CN3, pin 3).** This connection takes power from an external power supply and connects it to the voltage regulator input on the FT2232H-56Q Mini Module. See the FT2232H data sheet for allowable VCC input voltage ranges.
- 4) Connect V3V3 to VIO (CN2, pins 1, 3 & 5 to CN2, pins 11 and CN3, pins 12 & 22).** This connection provides the correct 3.3VDC operating voltage for VCCIO on the FT2232H-56Q chip.
- 5) Use FT_Prog to change the USB power descriptor to "Self-Powered".** This setting indicates to the host system that the USB Host port does not need to supply power to the device. FT_PROG is a utility provided by FTDI to program various features of the FT-series USB client ICs. FT_PROG is available through the [Utilities](#) section of the [FTDI web site](#).

4 Mechanical details

The mechanical details of the FT2232H-56Q Mini Module are shown in Figure 4.1:

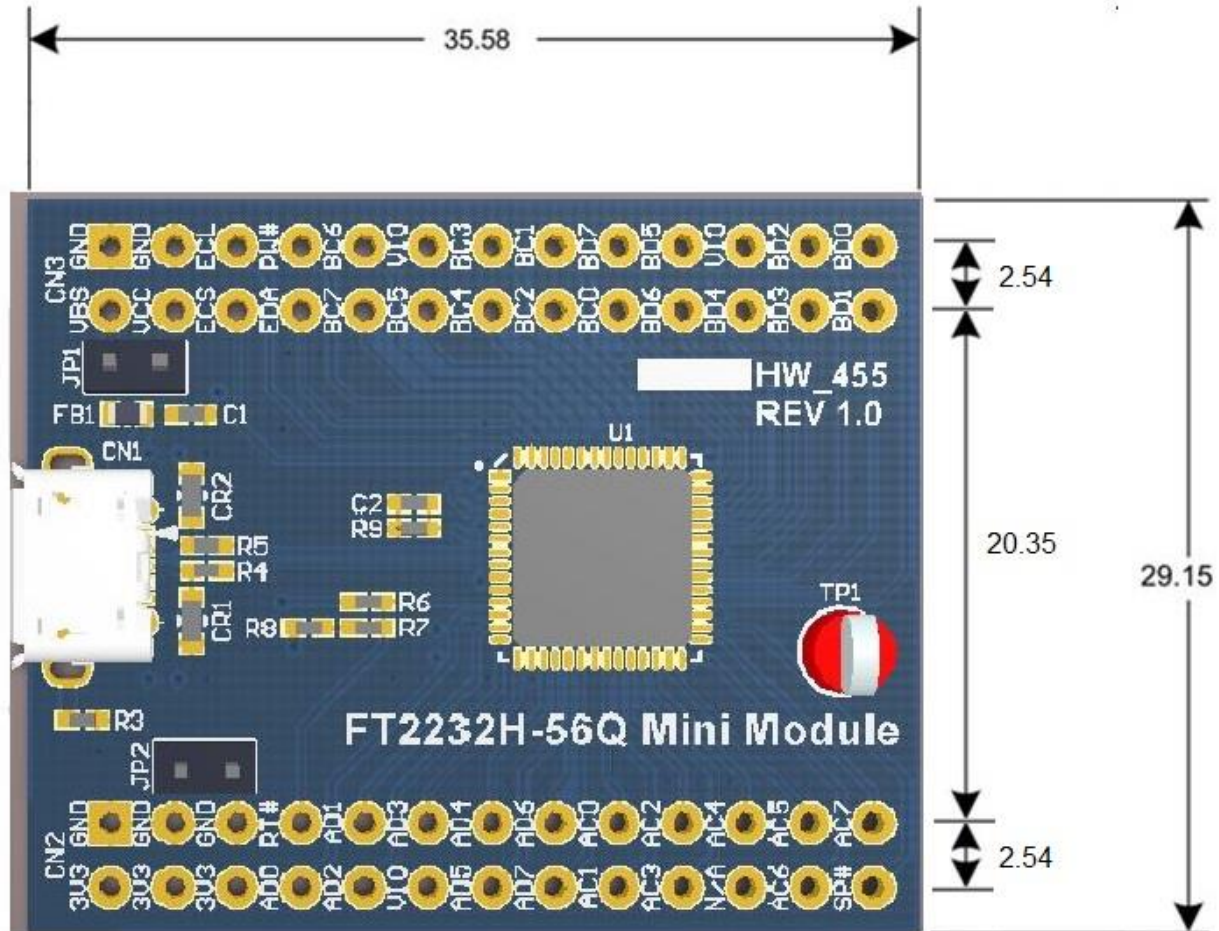


Figure 4.1 FT2232H-56Q Mini Module Dimensions

All dimensions are in millimetres.

The headers CN2 and CN3 are mounted to the bottom of the PCB. The overall height below the PCB is 8.5mm, with a body which exposes 6.0mm of the pins. The pins are 0.025 inch square.

The Micro-B USB connector has a height of 2.8mm.

5 Schematic Diagram

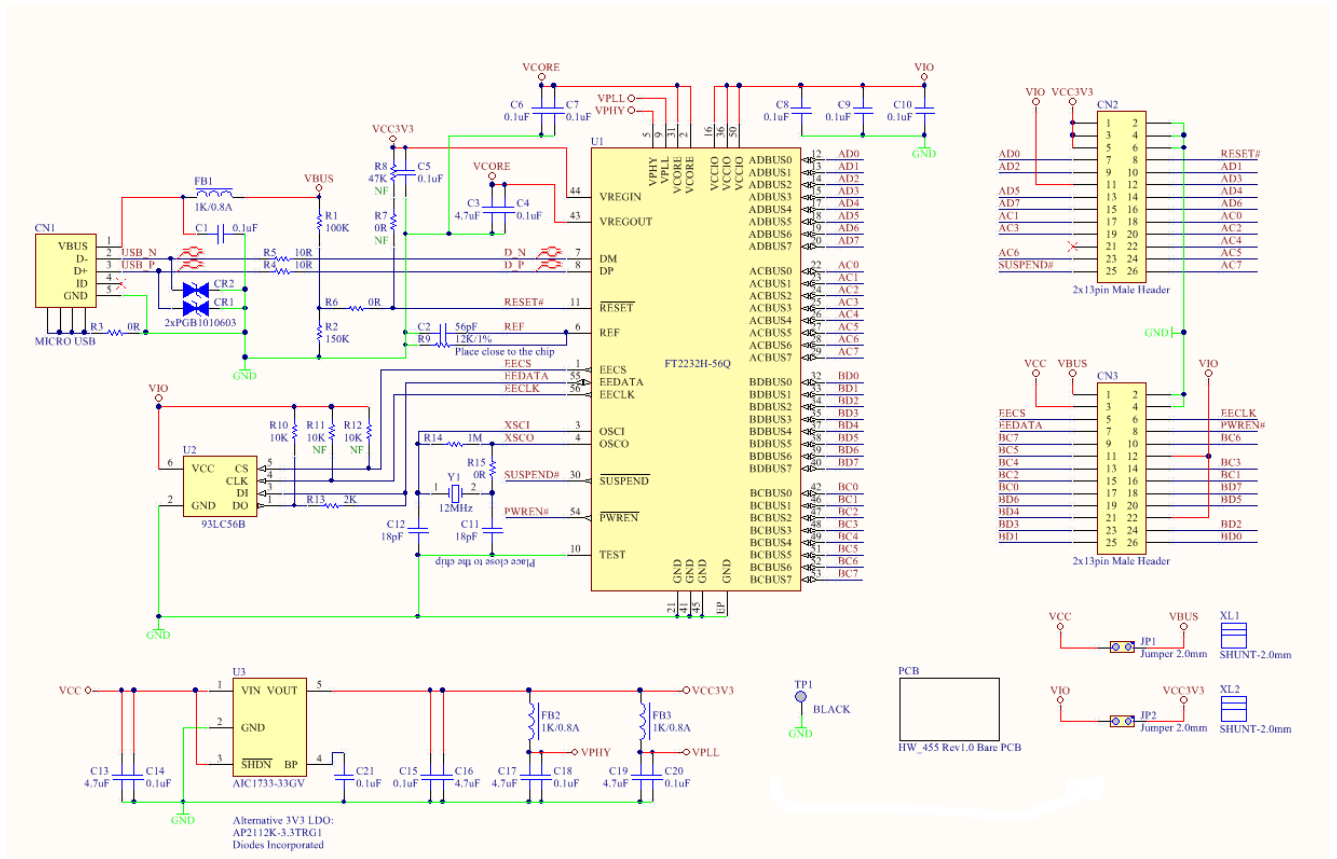


Figure 5.1 FT2232H-56Q Mini Module Schematic

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Appendix A – References

Document References

FT_PROG Utility

http://www.ftdichip.com/Support/Utilities.htm#FT_Prog

Acronyms and Abbreviations

| Terms | Description |
|--------|---|
| DLL | Dynamic Link Library |
| EEPROM | Electrically Erasable Programmable Read Only Memory |
| EHCI | Extensible Host Controller Interface |
| FIFO | First In First Out |
| IC | Integrated Circuit |
| I2C | Inter-Integrated Circuit |
| JTAG | Joint Test Action Group |
| MPSSE | Multi-Protocol Synchronous Serial Engines |
| OHCI | Open Host Controller Interface |
| PCB | Printed Circuit Board |
| RoHS | Restriction of Hazardous Substances Directive |
| SPI | Serial Peripheral Interface |
| UART | Universal Asynchronous Receiver/Transmitter |
| UHCI | Universal Host Controller Interface |
| USB | Universal Serial Bus |
| VBUS | Virtual BUS |
| VCC | Voltage at the Common Collector |
| VCP | Virtual COM Ports |

Appendix B –List Table and List Figures

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Appendix C – FT2232H EEPROM Configuration

The FT2232H-56Q Mini Module utilizes an EEPROM which contains the USB configuration descriptors for the FT2232H-56Q. When the Mini Module is plugged into a PC or a USB reset is performed, the PC will read these descriptors. The default values stored into the EEPROM are defined in Table 6.1.

| Parameter | Value | Notes |
|-----------------------------------|----------------------------|--|
| USB Vendor ID (VID) | 0403h | FTDI default VID (hex) |
| USB Product ID (PID) | 6010h | FTDI default PID (hex) |
| Serial Number Enabled? | Yes | |
| Serial Number | See Note | A unique serial number is generated and programmed into the EEPROM during device final test. |
| 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 | FT2232H-56Q Mini Module | |
| Max Bus Power Current | 500mA | |
| Power Source | Bus Powered | |
| Device Type | FT2232H | |
| USB Version | 0200 | Returns USB 2.0 device description to the host. Note: The device is being a USB 2.0 Full Speed device (12Mb/s) as opposed to a USB 2.0 High Speed device (480Mb/s). |
| Remote Wake Up | Enabled | Taking RI# low will wake up the USB host controller from suspend. |
| High Current I/Os | Enabled | Enables the high drive level on the UART and CBUS I/O pins. |
| Load VCP Driver | Disabled | Makes the device load the VCP driver interface for the device. |

Table 6.1 Default Internal EEPROM Configuration

The EEPROM on the FT2232H-56Q Mini Module can be re-programmed over USB using the utility program FT_PROG. FT_PROG can be downloaded from http://www.ftdichip.com/Support/Utilities.htm#FT_PROG. 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 for this service.

Appendix D – Revision History

Document Title: FT2232H-56Q Mini Module Datasheet
Document Reference No.: FT_001274
Clearance No.: FTDI# 490
Product Page: <http://www.ftdichip.com/Products/>
Document Feedback: [Send Feedback](#)

| Revision | Changes | Date |
|----------|---|------------|
| 1.0 | Initial Release | 2016-03-15 |
| 1.1 | Updated tables 3.1 and 3.2. Added additional measurements to table 4.1. | 2018-05-08 |