

**Future Technology Devices International Ltd.**

**FT4232HA Mini Module**

**USB Hi-Speed Evaluation Module**

**Datasheet**

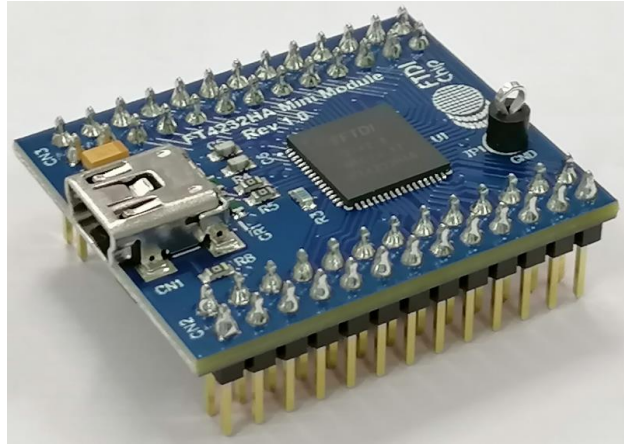
**Version 1.0**

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## 1 Introduction

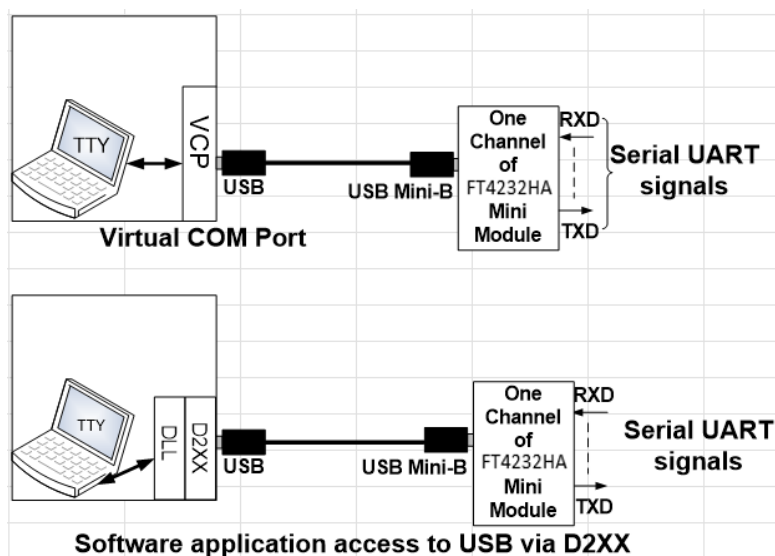
The FT4232HA Mini Module is a USB-serial/FIFO development module in the FTDI product range which utilizes the FT4232HA USB Hi-Speed four-port bridge chip which handles all the USB signalling and protocols. It is ideal for development purposes to quickly prove functionality of adding USB to a target design. The [FT4232HA](http://www.ftdichip.com) is available at <http://www.ftdichip.com>.



**Figure 1.1 - FT4232HA Mini Module**

The FT4232HA on the Mini Module is FTDI's 5th generation of USB devices. The FT4232HA is a USB 2.0 High Speed (480Mb/s) to UART/MPSSE IC that is automotive qualified for AEC temperature grade 2. The device features four interfaces that can be configured for asynchronous or synchronous serial. Two of these have an option to independently configure an MPSSE engine. This allows the FT4232HA 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. All components used, including the FT4232HA are Pb-free (RoHS compliant). The FT4232HA Mini Module connects the signals of the FT4232HA IC to two 26-pin dual-row headers which allow easy connection to PCB header sockets and ribbon cables.

The FT4232HA Mini Module requires USB device drivers, available free from <http://www.ftdichip.com>, which are used to make the FT4232HA on the Mini Module appear as a four 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 FT4232HA on the Mini Module through a DLL. This is illustrated in the Figure 1.2.



**Figure 1.2 Using the FT4232HA Mini Module**

Device Drivers for the FT4232HA Mini Module are available free from <http://www.ftdichip.com>.

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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 I<sup>2</sup>C interfaces (Two Multi-Protocol Synchronous Serial Engines – MPSSE – available with the FT4232HA)
- USB to multi-port asynchronous serial interfaces (up to 4 ports available).
- Four independent ports available, two of which may be configured for MPSSE mode.

### 2.1 Driver Support

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

- Windows 11,64-bit
- Windows 10 32,64-bit
- Windows 8/8.1 32,64-bit
- Windows 7 32,64-bit
- Windows Server 2008 and server 2012 R2
- Windows CE 4.2, 5.0 and 6.0
- Mac OS
- Linux 2.4 or later

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

- Windows 11,64-bit
- Windows 10 32,64-bit
- Windows 8/8.1 32,64-bit
- Windows 7 32,64-bit
- Windows Server 2008 and server 2012 R2
- Windows CE 4.2, 5.0 and 6.0
- Mac OS
- Linux 2.4 or later
- Android (J2xx)

The drivers listed above are all available to download for free from [www.ftdichip.com](http://www.ftdichip.com). Various 3rd Party Drivers are also available for various other operating systems - see [www.ftdichip.com](http://www.ftdichip.com) for details.

### 2.2 Features

The FT4232HA Mini Module has the following features:

- 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 FT4232HA device
- Entire USB protocol handled by USB module
- Small USB Type Mini-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 I<sup>2</sup>C
- Support for USB suspend and resume
- UHCI / OHCI / EHCI host controller compatible
- -40°C to +85°C operating temperature range

### 3 Electrical Details

The electrical details and connections to the FT4232HA Mini Module are shown in Figure 3.1 and tables 3.1 and 3.2.

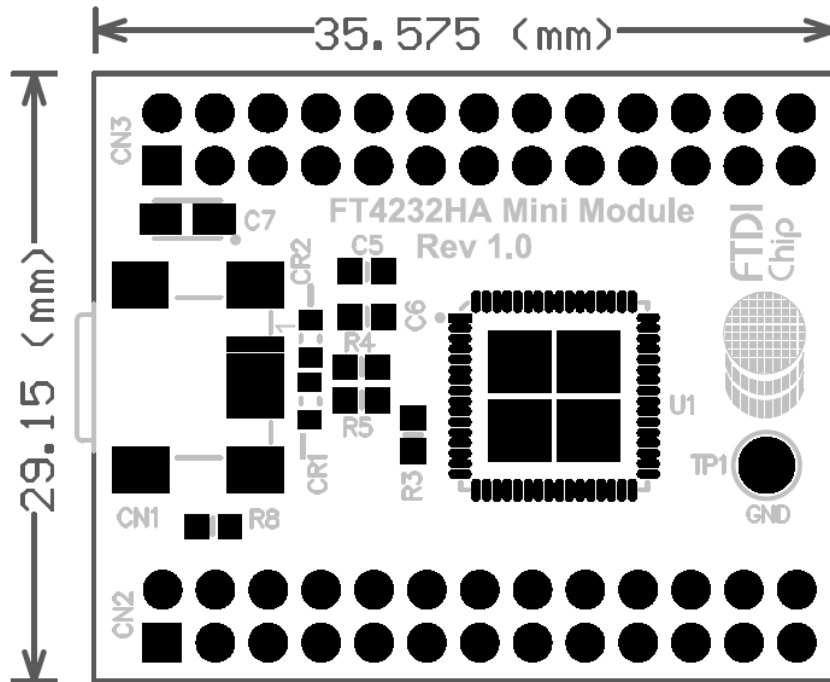


Figure 3.1 FT4232HA Mini Module Electrical Connections (Top View)

| Connector Pin | Name     | Description                                  |
|---------------|----------|--|
| CN2-1         | VCC3V3   | 3.3VDC generated from VCC (output)           |
| CN2-2         | GND      | 0V Power pin                                 |
| CN2-3         | VCC3V3   | 3.3VDC generated from VCC (output)           |
| CN2-4         | GND      | 0V Power pin                                 |
| CN2-5         | VCC3V3   | 3.3VDC generated from VCC (output)           |
| CN2-6         | GND      | 0V Power pin                                 |
| CN2-7         | AD0      | FT4232HA AD0 pin                             |
| CN2-8         | RESET#   | FT4232HA RESET# pin                          |
| CN2-9         | AD2      | FT4232HA AD2 pin                             |
| CN2-10        | AD1      | FT4232HA AD1 pin                             |
| CN2-11        | VIO      | Connected to all FT4232HA VCCIO pins (input) |
| CN2-12        | AD3      | FT4232HA AD3 pin                             |
| CN2-13        | AD5      | FT4232HA AD5 pin                             |
| CN2-14        | AD4      | FT4232HA AD4 pin                             |
| CN2-15        | AD7      | FT4232HA AD7 pin                             |
| CN2-16        | AD6      | FT4232HA AD6 pin                             |
| CN2-17        | BD1      | FT4232HA BD1 pin                             |
| CN2-18        | BD0      | FT4232HA BD0 pin                             |
| CN2-19        | BD3      | FT4232HA BD3pin                              |
| CN2-20        | BD2      | FT4232HA BD2 pin                             |
| CN2-21        | VIO      | Connected to all FT4232HA VCCIO pins (input) |
| CN2-22        | BD4      | FT4232HA BD4 pin                             |
| CN2-23        | BD6      | FT4232HA BD6 pin                             |
| CN2-24        | BD5      | FT4232HA BD5 pin                             |
| CN2-25        | SUSPEND# | FT4232HA SUSPEND# pin                        |
| CN2-26        | BD7      | FT4232HA BD7 pin                             |

Table 3.1 FT4232HA Mini Module Connection – CN2

| Connector Pin | Name   | Description   |
|---------------|--------|---|
| CN3-1         | VBUS   | USB VBUS power pin (output)                                   |
| CN3-2         | GND    | 0V Power pin  |
| CN3-3         | VCC    | +5V Power pin (input) used to generate VCCV3V3, VPLL and VPHY |
| CN3-4         | GND    | 0V Power pin  |
| CN3-5         | CS     | FT4232HA EECS pin   |
| CN3-6         | CLK    | FT4232HA EECLK pin  |
| CN3-7         | DATA   | FT4232HA EEDATA pin   |
| CN3-8         | PWREN# | FT4232HA PWREN#   |
| CN3-9         | DD7    | FT4232HA DD7 pin  |
| CN3-10        | DD6    | FT4232HA DD6 pin  |
| CN3-11        | DD5    | FT4232HA DD5 pin  |
| CN3-12        | VIO    | Connected to all FT4232HA VCCIO pins (input)                  |
| CN3-13        | DD4    | FT4232HA DD4 pin  |
| CN3-14        | DD3    | FT4232HA DD3 pin  |
| CN3-15        | DD2    | FT4232HA DD2 pin  |
| CN3-16        | DD1    | FT4232HA DD1 pin  |
| CN3-17        | DD0    | FT4232HA DD0 pin  |
| CN3-18        | CD7    | FT4232HA CD7 pin  |
| CN3-19        | CD6    | FT4232HA CD6 pin  |
| CN3-20        | CD5    | FT4232HA CD5 pin  |
| CN3-21        | CD4    | FT4232HA CD4 pin  |
| CN3-22        | VIO    | Connected to all FT4232HA VCCIO pins (input)                  |
| CN3-23        | CD3    | FT4232HA CD3 pin  |
| CN3-24        | CD2    | FT4232HA CD2 pin  |
| CN3-25        | CD1    | FT4232HA CD1 pin  |
| CN3-26        | CD0    | FT4232HA CD0 pin  |

**Table 3.2 FT4232HA Mini Module Connection – CN3**

The FT4232HA pin is connected directly to the associated pin on CN2 or CN3.

The FT4232HA Mini Module allows configuration with both USB Bus-powered designs and USB Self-powered designs:

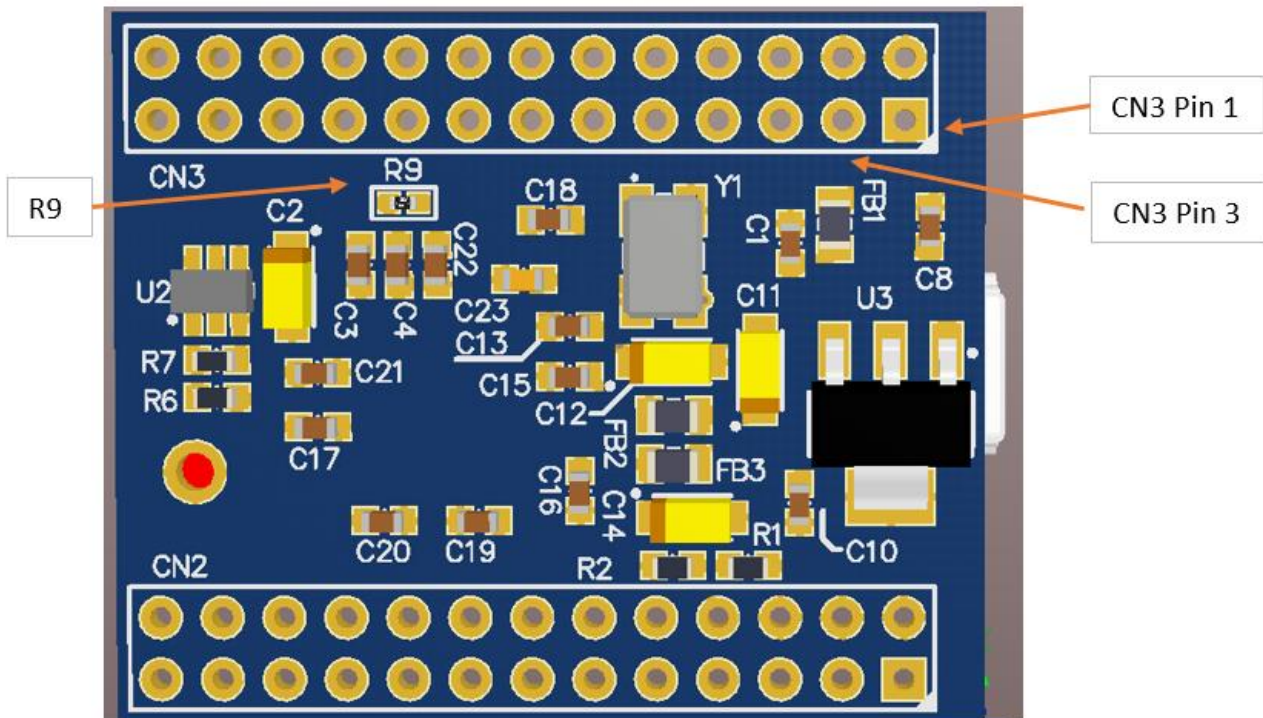
**USB Bus-powered:**

- 1) Connect 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 FT4232HA Mini Module. The voltage regulator, in turn, provides VCC3V3, VPLL and VPHY power inputs to the FT4232HA chip.
- 2) Short R9 to connect VCC3V3 (CN2, pin 1, 3, 5) to VIO (CN2, pins 11 & 21 and CN3, pins 12 & 22).** This connection provides 3.3VDC operating voltage for VCCIO on the FT4232HA chip.

**USB Self-Powered:**

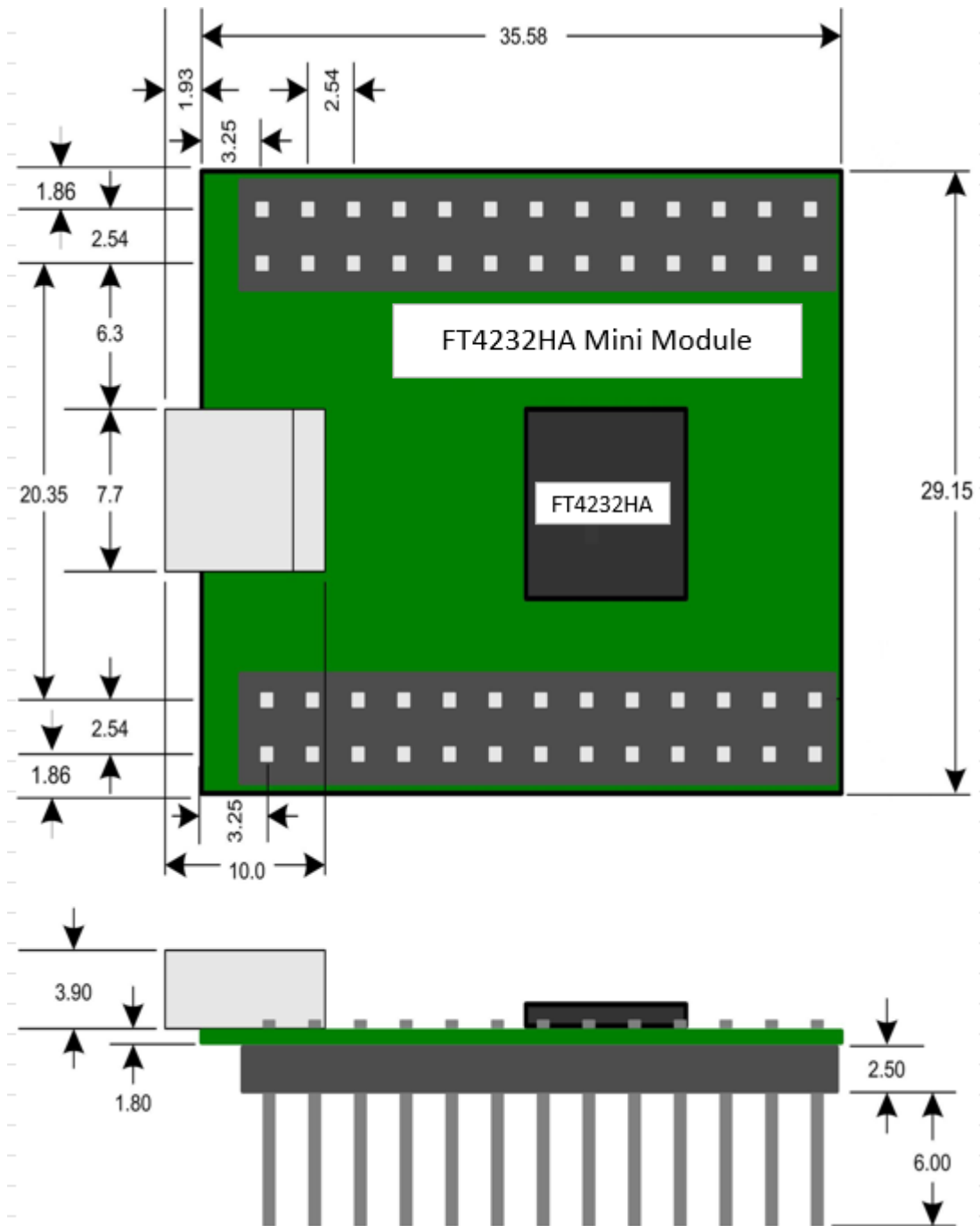
- 1) Leave VBUS (CN3, pin 1) unconnected.**
- 2) Connect an external 5.0VDC power supply to VCC (5.0VDC to CN3, pin 3).** This connection takes power from an external power supply and connects it to the voltage regulator input on the FT4232HA Mini Module. See the [FT4232HA datasheet](#) for allowable VCC input voltage ranges.
- 3) Short R9 to connect VCC3V3 (CN2, pin 1, 3, 5) to VIO (CN2, pins 11 & 21 and CN3, pins 12 & 22).** This connection provides 3.3VDC operating voltage for VCCIO on the FT4232HA chip.
- 4) 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](#).

**Note:** Failure to connect all power pins can cause issues with operation.



## 4 Mechanical details

The mechanical details of the FT4232HA Mini Module are shown in Figure 4.1:



**Figure 4.1 FT4232HA Mini Module Dimensions**

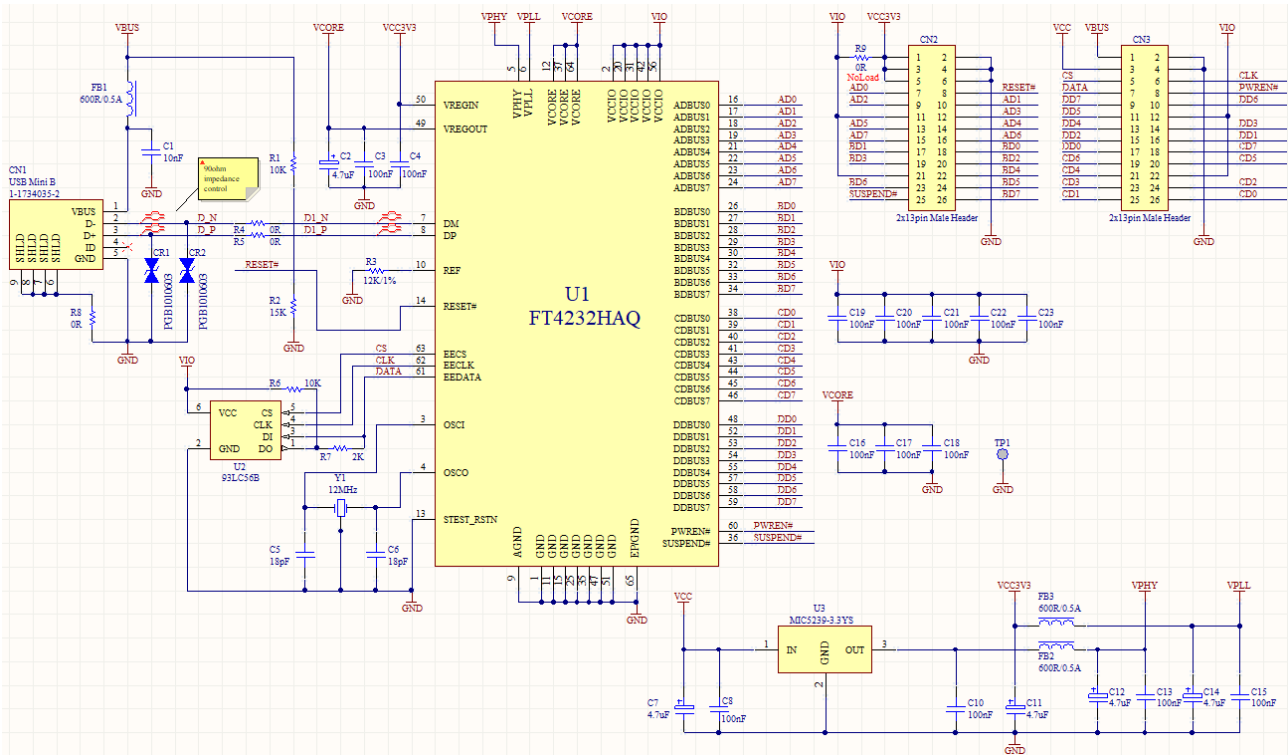
All dimensions are in millimetres.

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 mini-B USB connector has a height of 3.9mm.



## 5 Schematic Diagram



**Figure 5.1 FT4232HA Mini Module Schematic**

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## Appendix A – FT4232HA EEPROM Configuration

The FT4232HA Mini Module utilizes an EEPROM which contains the USB configuration descriptors for the FT4232HA. 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 0.1.

| Parameter                         | Value          | Notes  |
|-----------------------------------|----------------|--|
| USB Vendor ID (VID)               | 0403h          | FTDI default VID (hex)   |
| USB Product UD (PID)              | 6048h          | FTDI default PID (hex)   |
| Bcd Device                        | 0x3600         |  |
| 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 in USB suspend mode (PWREN# is high).                                       |
| Manufacturer Name                 | FTDI           |  |
| Product Description               | FT4232HA       |  |
| Max Bus Power Current             | 500mA          |  |
| Power Source                      | Bus Powered    |  |
| Device Type                       | FT4232HA       |  |
| USB Version                       | 0200h          | Returns USB 2.0 device description to the host. Note: The device is be a USB 2.0 Full Speed device (12Mb/s) as opposed to a USB 2.0 High Speed device (480Mb/s). |
| Remote Wake Up                    | Disable        | Taking RI# low will wake up the USB host controller from suspend.  |
| RI RS485                          | Disable        | Enables TXDEN signal for RS485 buses.  |
| High Current I/Os                 | Disable        | Enables the high drive level on the UART and CBUS I/O pins.  |
| IO Slew                           | Disabled       | Slow slew rate if enabled  |
| Schmitt Trigger for Input pin     | Normal trigger | Schmitt trigger for input pin if enabled   |
| Load VCP Driver                   | Enable         | Makes the device load the VCP driver interface for the device.   |

**Table 0.1 Default Internal EEPROM Configuration**

The EEPROM on the FT4232HA Mini Module can be re-programmed over USB using the utility program [FT\\_PROG](#) which can be downloaded from [www.ftdichip.com](http://www.ftdichip.com). 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 B – References

### Document References

[FT4232HA](#)

[FT\\_PROG](#)

[Utilities](#)

[FT4232HA datasheet](#)

### Acronyms and Abbreviations

| Terms  | Description   |
|--------|---|
| DLL    | Dynamic Link Library                                |
| EHCI   | Enhanced Host Controller Interface                  |
| EEPROM | Electrically Erasable Programmable Read-Only Memory |
| FIFO   | First In First Out                                  |
| IC     | Integrated Circuit                                  |
| I2C    | Inter Integrated Circuit                            |
| JTAG   | Joint Test Action Group                             |
| MPSSE  | Multi-Protocol Synchronous Serial Engine            |
| OHCI   | Open Host Controller Interface                      |
| PCB    | Printed Circuit Board                               |
| SPI    | Serial Peripheral Interface                         |
| TTL    | Transistor-Transistor Logic                         |
| USB    | Universal Serial Bus                                |
| UART   | Universal Asynchronous Receiver Transmitter         |
| UHCI   | Universal Host Controller Interface                 |
| VCP    | Virtual COM Port                                    |

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## Appendix C – List of Tables and Figures

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## Appendix D - Revision History

Document Title: FT4232HA Mini Module Datasheet  
Document Reference No.: FT\_001519  
Clearance No.: FTDI#570  
Product Page: <https://ftdichip.com/product-category/products/>  
Document Feedback: [Send Feedback](#)

| Revision    | Changes         | Date       |
|-------------|-----------------|------------|
| Version 1.0 | Initial Release | 04-03-2022 |

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