

FTDI Chip

VA800A-SPI

USB 2.0 Hi-Speed to MPSSE SPI Module



1 Introduction

The **USB2.0 Hi-Speed to MPSSE SPI Module, VA800A-SPI**, is a small electronic circuit board, utilising the FTDI FT232H.

The 10 pin connector on the module fits directly to the FTDI VM800B and VM800C graphic display modules. This allows direct control of the EVE FT800 devices with an SPI interface from a USB host.

All USB signalling and protocols are handled on the module.

For full details of the FT232H IC, consult the FT232H datasheet, [DS_FT232H](#).

1.1 Features

- USB 2.0 Hi-Speed (480Mbps/Second) and Full Speed (12Mbps/Second) compatible
- Entire USB protocol handled on the chip – No USB-specific firmware programming required
- USB Type B micro connector
- USB bus powered
- Synchronous Serial (MPSSE) data rates of up to 30Mbps on SPI
- 1kByte receive and transmit buffers for high data throughput
- 3.3V Level IO
- Power indicator LED
- SPI SS# active indicator LED
- Adjustable receive buffer timeout
- Support for USB suspend and resume
- Low operating and USB suspend current
- Low USB bandwidth consumption
- UHCI / OHCI / EHCI host controller compatible
- -40°C to +85°C operating temperature range
- FTDI's FTDI Chip's royalty-free D2XX drivers eliminate the requirement for USB driver development in most cases

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2 Description

The **USB2.0 Hi-Speed to MPSSE SPI Module** is a small electronic circuit board, utilising the FT232H. This device handles all the USB signalling and protocols. The module provides a fast, simple way to connect devices with 3.3 Volt digital interface to USB. For full details of the IC, consult the FT232H datasheet, [DS_FT232H](#).

The integrated FT232H device incorporates a command processor called the Multi-Protocol Synchronous Serial Engine (MPSSE). The purpose of the MPSSE command processor is to communicate with devices which use synchronous protocols (such as JTAG, SPI or I²C) in an efficient manner. Full details are available in the [MPSSE application note - AN_108](#).

The module is terminated by ten female pin headers which can be interfaced to a male header. Pin signals are compliant with CMOS logic at 3.3 volts.

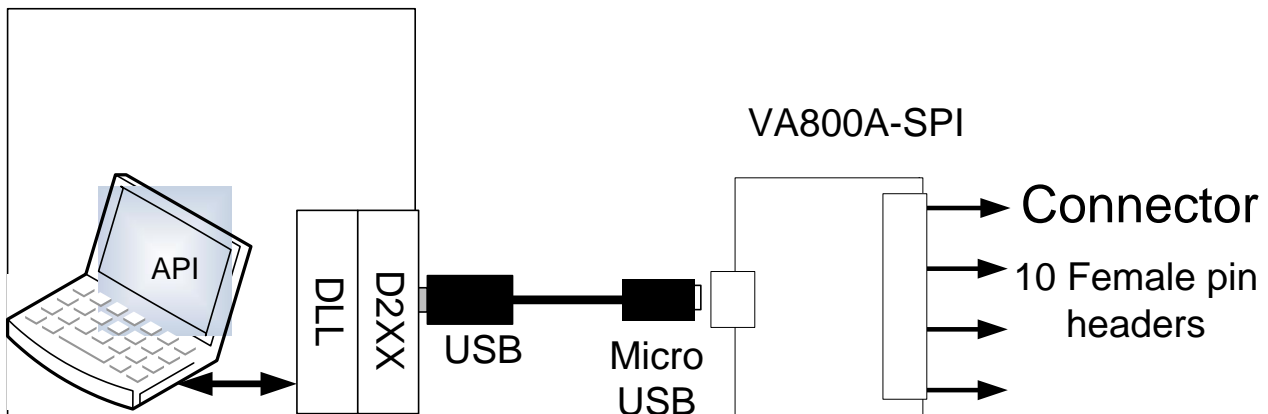
The FT232H is a single channel USB 2.0 Hi-Speed (480Mb/s) to UART/FIFO IC. It can be configured in a variety of industry standard serial or parallel interfaces at up to 30Mbps, such as MPSSE - JTAG, SPI, I²C.

The VA800A-SPI MPSSE module is configured for SPI only. The 10 pin connector fits to the VM800B and VM800C graphic display modules directly.

The module is powered from a USB host port and is USB2.0 Hi-Speed compatible.

The VA800A-SPI MPSSE module requires USB device drivers, available free from <http://www.ftdichip.com>. The D2XX driver is used with application software to directly access the FT232H in the module through a DLL. This is illustrated in the Figure 2-1

The VA800A-SPI MPSSE module uses the FTDI's FT232H USB to serial IC device.



Software application access to USB via D2XX

Figure 2-1 Using the VA800A-SPI MPSSE module

2.1 Ordering Information

The following Table 2-1 gives details of the available VA800A-SPI MPSSE modules.

| Part Number | Description | End Connector | Cable details |
|-------------|-------------------|--------------------------------|---------------|
| VA800A-SPI | USB to SPI module | Single row, receptacle x 10 | N.A. |

Table 2-1 VA800A-SPI MPSSE module Descriptions and Part Numbers

Note 1: The VCC power output signal is 5.0V. The source of 5.0V is the USB VBUS input, which is switched onto the power output signal.

2.2 Certifications

The FTDI VA800A-SPI MPSSE modules are fully RoHS compliant. At the time of writing this datasheet the modules were being CE and FCC tested.

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3 Typical Applications

- Controlling the EVE series of graphics controllers
- USB to SPI interfaces
- Rapid USB integration into existing electronic systems
- Prototyping platform for USB interface on new systems

3.1 Driver Support

Royalty free D2XX *Direct Drivers*

(USB Drivers + DLL S/W Interface)

- Microsoft Windows 8 and 8 - 64-bit
- Microsoft Windows 7 and Windows 7 64-bit
- Microsoft Windows Vista and Vista 64-bit
- Microsoft Windows XP and XP 64-bit
- Microsoft Windows 2000, Server 2003, XP and Server 2008
- Microsoft Windows CE 4.2, 5.0 and 6.0
- Linux 2.6.32 or later

The drivers listed above are all available to download for free from <http://www.ftdichip.com/Drivers/D2XX.htm>

4 VA800A-SPI MPSSE module connection & Mechanical Details

Figure 4-1 VA800A-SPI MPSSE module layout Shows the VA800A-SPI MPSSE module layout. The module is 29mm x 32mm is dimension.

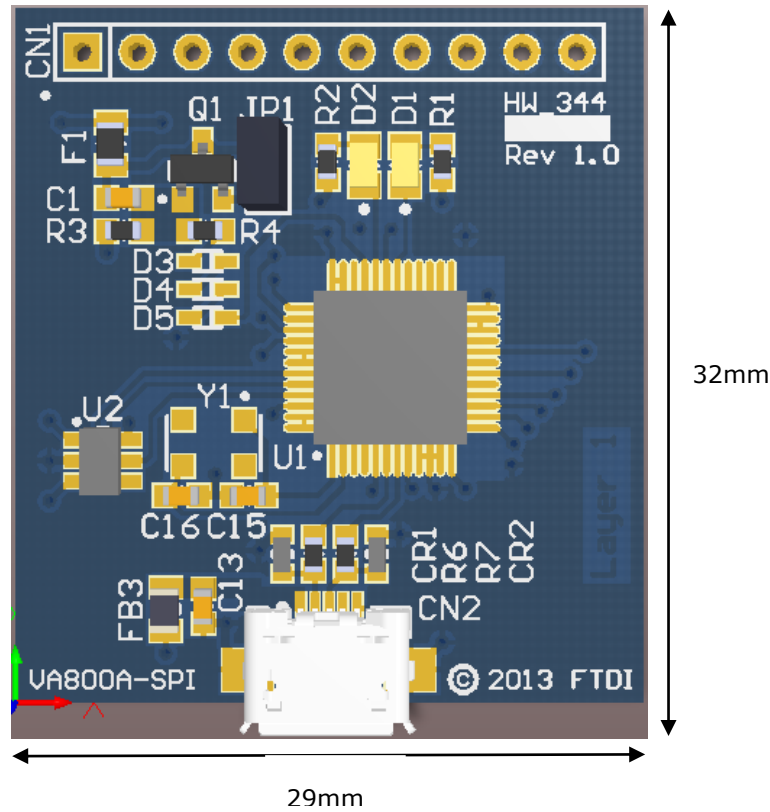


Figure 4-1 VA800A-SPI MPSSE module layout

The following Table 4-1 shows the module signals for these signals on the VA800A-SPI MPSSE module.

| Pin No. | Name | Type | Description |
|---------|------|------|---|
| CN1-1 | SCLK | O | SPI Clock input |
| CN1-2 | MOSI | O | Master Out Slave in |
| CN1-3 | MISO | I | Master In Slave out |
| CN1-4 | CS# | O | Chip select , active low |
| CN1-5 | INT# | I | Interrupt |
| CN1-6 | PD# | O | Active low, SPI device power down output. |
| CN1-7 | 5V | P | 5V power supply |
| CN1-8 | -- | -- | NC |
| CN1-9 | GND | P | Ground |
| CN1-10 | GND | P | Ground |

Table 4-1 VA800A-SPI MPSSE module Connections (numbers refer to pad numbers on the PCB)

4.1 VA800A-SPI MPSSE module Electrical Parameters

| Parameter | Description | Minimum | Typical | Maximum | Units | Conditions |
|----------------|-----------------------------|---------|---------|---------|-------|------------|
| VCC | Output Power Voltage | 4.75 | 5 | 5.25 | V | |
| I _o | Output Power Current | - | - | 400 | mA | |
| T | Operating Temperature Range | -40 | | +85 | °C | |

Table 4-2 VA800A-SPI MPSSE Operating Parameters

4.1.1 VA800A-SPI MPSSE module I/O Characteristics

| Parameter | Description | Minimum | Typical | Maximum | Units | Conditions |
|-----------------|--|---------|---------|---------|-------|---|
| V _{oh} | Output Voltage High | 2.40 | 3.14 | | V | I _{oh} = +/-2mA I/O Drive strength* = 4mA |
| | | | 3.20 | | V | I/O Drive strength* = 8mA |
| | | | 3.22 | | V | I/O Drive strength* = 12mA |
| | | | 3.22 | | V | I/O Drive strength* = 16mA |
| V _{ol} | Output Voltage Low | | 0.18 | 0.40 | V | I _{ol} = +/-2mA I/O Drive strength* = 4mA |
| | | | 0.12 | | V | I/O Drive strength* = 8mA |
| | | | 0.08 | | V | I/O Drive strength* = 12mA |
| | | | 0.07 | | V | I/O Drive strength* = 16mA |
| V _{il} | Input low Switching Threshold | | - | 0.80 | V | LVTTTL |
| V _{ih} | Input High Switching Threshold | 2.00 | - | | V | LVTTTL |
| V _t | Switching Threshold | | 1.50 | | V | LVTTTL |
| V _{t-} | Schmitt trigger negative going threshold voltage | 0.80 | 1.10 | - | V | |
| V _{t+} | Schmitt trigger positive going threshold voltage | | 1.60 | 2.00 | V | |
| R _{pu} | Input pull-up resistance | 40 | 75 | 190 | KΩ | V _{in} = 0 |
| R _{pd} | Input pull-down resistance | 40 | 75 | 190 | KΩ | V _{in} = V _{CCIO} |

| Parameter | Description | Minimum | Typical | Maximum | Units | Conditions |
|-----------|----------------------------------|---------|---------|---------|-------|-----------------|
| Iin | Input Leakage Current | 15 | 45 | 85 | μA | Vin = 0 |
| Ioz | Tri-state output leakage current | | ±10 | | μA | Vin = 5.5V or 0 |

Table 4-3 VA800A-SPI MPSSE module I/O Pin Characteristics

* The I/O drive strength and slow slew-rate are configurable in the EEPROM.

The I/O pins are +3.3v cells, which are +5V tolerant

5 Module PCB Circuit Schematic

The circuit schematics for the small electronic board, utilising the FTDI FT232H, are shown in Figure 5-1 .

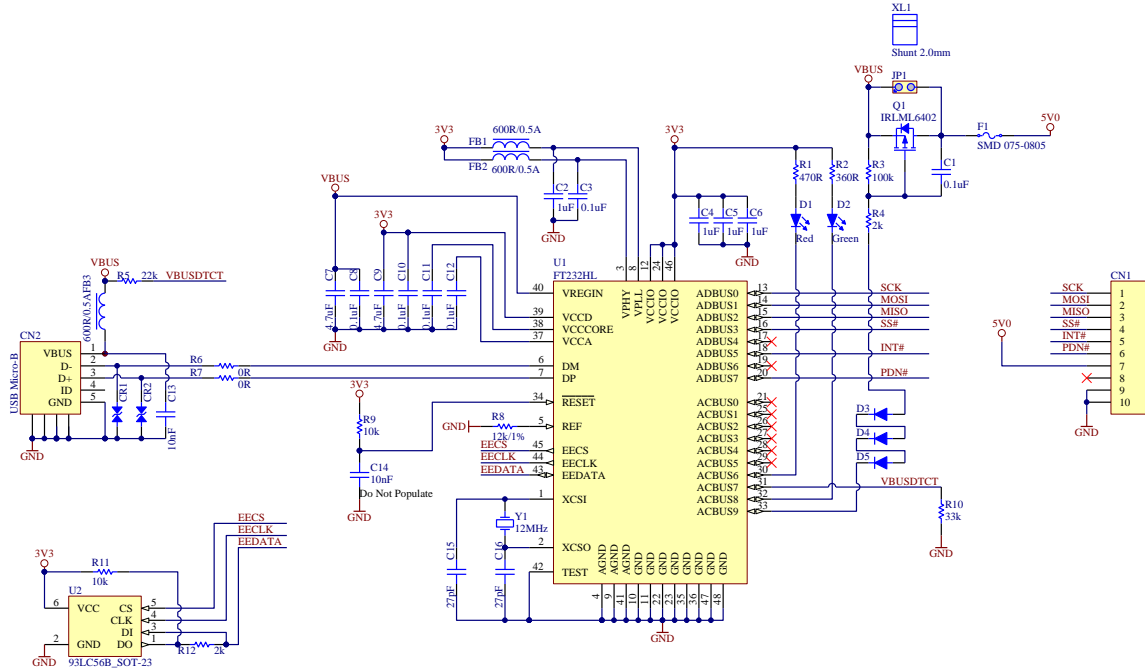


Figure 5-1 Circuit Schematic of VA800A-SPI

6 Contact Information

Head Quarters – Singapore

Bridgetek Pte Ltd
178 Paya Lebar Road, #07-03
Singapore 409030
Tel: +65 6547 4827
Fax: +65 6841 6071

E-mail (Sales) sales.apac@brtchip.com
E-mail (Support) support.apac@brtchip.com

Branch Office – Taipei, Taiwan

Bridgetek Pte Ltd, Taiwan Branch
2 Floor, No. 516, Sec. 1, Nei Hu Road, Nei Hu District
Taipei 114
Taiwan, R.O.C.
Tel: +886 (2) 8797 5691
Fax: +886 (2) 8751 9737

E-mail (Sales) sales.apac@brtchip.com
E-mail (Support) support.apac@brtchip.com

Branch Office - Glasgow, United Kingdom

Bridgetek Pte. Ltd.
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) sales.emea@brtchip.com
E-mail (Support) support.emea@brtchip.com

Branch Office – Vietnam

Bridgetek VietNam Company Limited
Lutaco Tower Building, 5th Floor, 173A Nguyen Van
Troï,
Ward 11, Phu Nhuan District,
Ho Chi Minh City, Vietnam
Tel : 08 38453222
Fax : 08 38455222

E-mail (Sales) sales.apac@brtchip.com
E-mail (Support) support.apac@brtchip.com

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Appendix A - Module EEPROM Configuration

Each VA800A-SPI MPSSE module is controlled by the FTDI FT232H IC. This FT232H device contains an EEPROM which contains the USB configuration descriptors for that device. When the module is plugged into a PC or a USB reset is performed, the PC will read these descriptors. The default values stored into the internal EEPROM are defined in the following table –

| Parameter | Value | Notes |
|------------------------|-------------|---|
| USB Vendor ID (VID) | 0403h | FTDI default VID (hex) |
| USB Product UD (PID) | 6014h | 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. |
| Manufacturer Name | FTDI | |
| Product Description | See note | VA800A-SPI |
| Max Bus Power Current | 500mA | Includes power available from the module plus power required for the FT232H |
| Power Source | Bus Powered | |
| Device Type | FT232H | |
| USB Version | 0200 | Returns USB 2.0 device description to the host. Note: The device is a USB 2.0 Hi-Speed device (480Mb/s). |
| Remote Wake Up | Disabled | 500uA suspend limit when in this state |
| High Current I/Os | Enabled | Enables the high drive level on the CBUS I/O pins. |
| Invert TXD | Disabled | Signal on this pin becomes TXD# if enable. |
| Invert RXD | Disabled | Signal on this pin becomes RXD# if enable. |
| Invert RTS# | Disabled | Signal on this pin becomes RTS if enable. |
| Invert CTS# | Disabled | Signal on this pin becomes CTS if enable. |

Default Internal EEPROM Configuration

Note:

The internal EEPROM in the module can be re-programmed over USB using the utility program FT_PROG. Both can be downloaded from www.ftdichip.com.

Appendix B - List of Figures and Tables

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Appendix C – Revision History

Document Title: VA800A-SPI Datasheet
Document Reference No.: BRT_000005
Clearance No.: BRT#009
Product Page: <http://brtchip.com/product>
Document Feedback: [DS_VA800A-SPI](#)

| Revision | Changes | Date |
|-------------|--|------------|
| Version 1.0 | Initial Release | 2013-10-24 |
| Version 1.1 | Dual branding to reflect the migration of the product to the Bridgetek name – logo changed, copyright changed, contact information changed | 2016-09-13 |

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