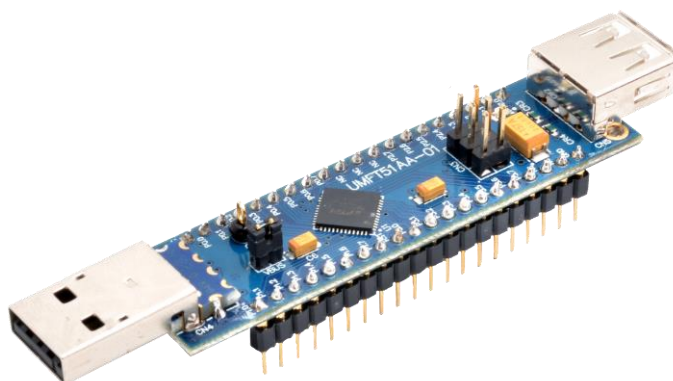


Future Technology Devices International

Datasheet

UMFT51AA 8051 Compatible Module



UMFT51AA is an FT51A DIP module that is compatible with an 8051 microcontroller.

1 Introduction

The UMFT51AA is a development module for FTDI's FT51AQ, one of the devices from FTDI's range of microcontrollers with USB interface bridging features integrated. FT51A is a MCU series which includes the following features: USB client and USB hub interfaces, 8051 core, 8-bit ADC, UART, SPI, I²C, 245 FIFO and PWM.

The UMFT51AA is a module which is designed to plug into a standard 0.6" wide 40 pin DIP socket.

All components used, including the FT51AQ are Pb-free (RoHS compliant).

1.1 Features

The UMFT51AA is built with a FT51AQ; many of the features of the FT51AQ can be utilized with this module. For a full list of the FT51A's series features refer to the FT51A datasheet which can be found by clicking [here](#).

In addition to the features listed in the FT51A datasheet, the UMFT51AA has the following features:

- PCB assembly module is designed to fit a standard 15.24mm (0.6") wide 40 pin DIP socket. Pins are on a 2.54mm (0.1") pitch. This module is a drop in replacement for an 8051 microcontroller.
- An on board USB type A socket and plug allow modules to be connected to a PC via a standard A extension cable or directly. This module is also capable of cascading several modules by utilizing the USB hub feature.
- Debugger interface header used for debugging and programming the FT51AQ. Designed for operation with the FTPD-1 programmer / debugger module. See the [FTPD-1 datasheet](#) for details about this module.
- Onboard jumper for configuring the FT51AA to be in self powered or USB powered modes.

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Table of Contents

| | | |
|---|---|-----------|
| 1 | Introduction | 1 |
| 1.1 | Features..... | 1 |
| 2 | Driver Support | 3 |
| 3 | Ordering Information | 4 |
| 4 | UMFT51AA Signals and Configurations..... | 5 |
| 4.1 | UMFT51AA Pin Out..... | 5 |
| 4.2 | Signal Descriptions | 6 |
| 4.3 | I/O Pin Feature Options..... | 8 |
| 5 | Module Configurations | 9 |
| 5.1 | Jumper Configuration Options | 9 |
| 5.2 | Programming Firmware to the Flash ROM..... | 9 |
| 6 | Module Dimensions | 10 |
| 7 | UMFT51AA Module Circuit Schematic | 11 |
| 8 | Contact Information..... | 13 |
| Appendix A – References | | 14 |
| Document References | | 14 |
| Acronyms and Abbreviations..... | | 14 |
| Appendix B – List of Figures and Tables..... | | 15 |
| List of Figures | | 15 |
| List of Tables..... | | 15 |
| Appendix C – Revision History | | 16 |

2 Driver Support

Driver support for the FT51A USB Device Firmware Updater (DFU) is available as part of the [FT51A SDK](#) and is available for the following OS:

- Windows 10 32,64-bit
- Windows 8.1 32,64-bit
- Windows 8 32,64-bit
- Windows 7 32,64-bit
- Linux 3.0 and greater

3 Ordering Information

| Module Code | Utilised IC Code | Description |
|-------------|------------------|----------------------------|
| UMFT51AA-01 | FT51AQ | 8051 compatibility module. |

Other modules in the FT51A range:

| Module Code | Utilised IC Code | Description |
|-------------|------------------|-------------------------------|
| UMFT51-EVM | FT51AQ | FT51A demonstration platform. |

4 UMFT51AA Signals and Configurations

4.1 UMFT51AA Pin Out

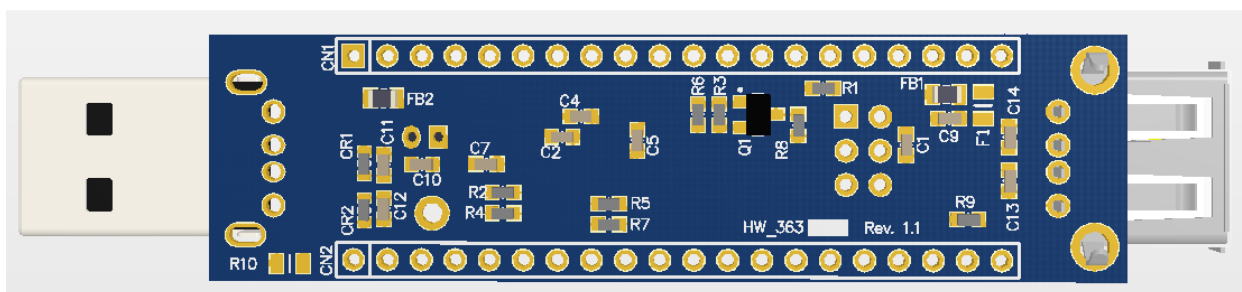
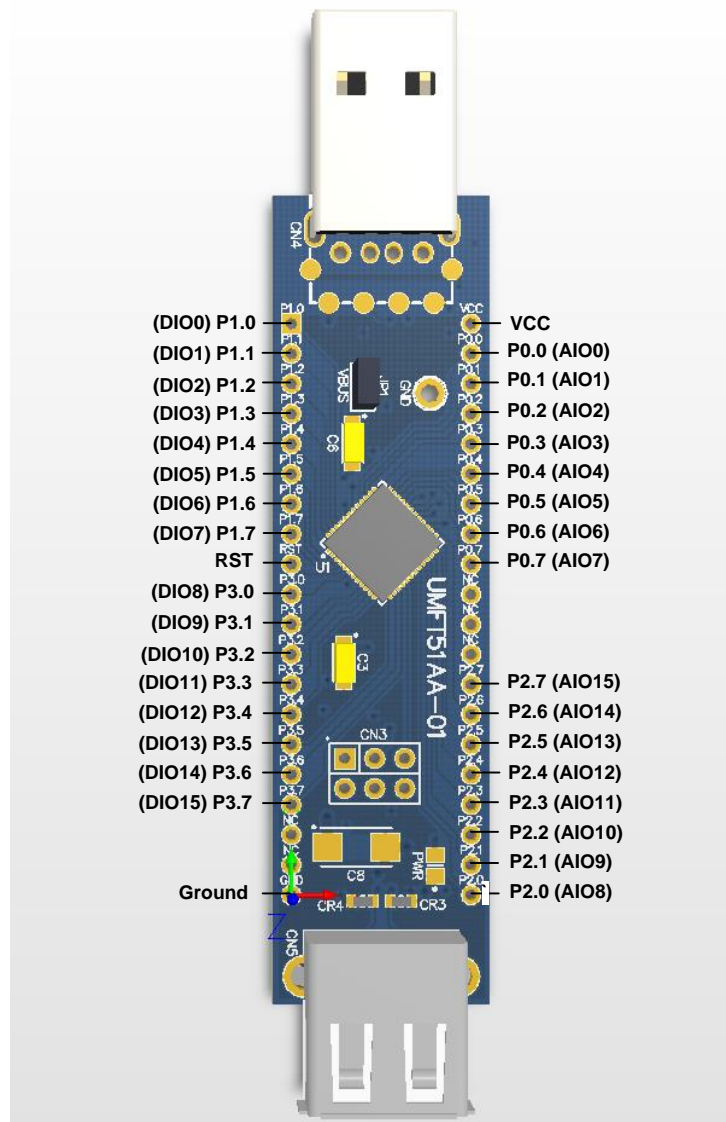


Figure 4.1 – Module Pin Out

Figure 4.1 illustrates the signals available on the DIL pins. The top image shows the pinout when the module is viewed from the top. The bottom image shows what signals are available when viewed from the bottom.

4.2 Signal Descriptions

| Pin No. | Name | Type | Description |
|------------------|--------|---------------|---|
| CN1-1 to CN1-8 | Port 1 | I/O Signals | Port 1 pins, P1.0 to P1.7 (DIO0 to DIO7). All FT51A digital functions can be mixed to these pins; however ADC features are not available for these pins. These pins are 5 volt tolerant. |
| CN1-10 to CN1-17 | Port 3 | I/O Signals | Port 3 pins, P3.0 to P3.7 (DIO8 to DIO15). All FT51A digital functions can be mixed to these pins; however ADC features are not available for these pins. These pins are 5 volt tolerant. |
| CN2-21 to CN2-13 | Port 2 | I/O Signals | Port 2 pins, P2.0 to P2.7 (AIO8 to AIO15). ADC features are available for these pins however these pins are not suitable for high frequency data transfers such as SPI. These pins are not 5 volt tolerant . |
| CN2-2 to CN2-9 | Port 0 | I/O Signals | Port 0 pins, P2.0 to P0.7 (AIO8 to AIO15). ADC features are available for these pins however these pins are not suitable for high frequency data transfers such as SPI. These pins are not 5 volt tolerant . |
| CN1-9 | RST | Reset Pin | Active high reset. |
| CN1-20 | GND | Ground | Ground 0 volts. |
| CN2-1 | VCC5V | Power | 5 volt power input when JP1 is open, 5 volt power output when JP1 is closed and connected to upstream USB port. |
| CN1-18 to CN1-19 | NC | Not Connected | Floating pin. |
| CN2-10 to CN2-12 | NC | Not Connected | Floating pin. |

Table 4.1 – Module Pin Out Description

| Pin No. | Name | Type | Description |
|---------|------|--------|--|
| CN4-1 | VBUS | Power | 5 volt power input. To enable bus power mode close JP1 |
| CN4-2 | DM | Signal | USB Data - from upstream device |
| CN4-3 | DP | Signal | USB Data + from upstream device |
| CN4-4 | GND | Ground | 0 volt ground. |

Table 4.2 – Upstream USB Port Pin Out Description

| Pin No. | Name | Type | Description |
|---------|------|--------|---------------------------------|
| CN5-1 | VBUS | Power | 5 volt power output. |
| CN5-2 | DM | Signal | USB Data - to downstream device |
| CN5-3 | DP | Signal | USB Data + to downstream device |
| CN5-4 | GND | Ground | 0 volt ground. |

Table 4.3 – Downstream USB Port Pin Out Description

| Pin No. | Name | Type | Description |
|-----------------|--------|---------------|--|
| CN3-1 and CN3-4 | NC | Not Connected | Floating pin. |
| CN3-2 | VCC5V | Power | 5 volt power input. (Protected by zenor diode.) |
| CN3-3 | RESET# | Signal | Active low reset input from the FTPD-1 debugger/programmer |
| CN3-5 | DBG | Signal | Debugger data line, single line half-duplex UART. |
| CN3-6 | GND | Ground | 0 volt ground. |

Table 4.4 – Debugger Port Pin Out Description

4.3 I/O Pin Feature Options

The following features can be configured using the FT51A's multiplexer to bring signal to the available pins.

| FT51A IO Signal Option | Available On Pin | Description |
|-------------------------|---------------------|--|
| GPIO | DIO0-15 and AIO0-15 | General purpose IO |
| ADC | AIO0-15 | 8-bit analog to digital converter |
| UART | DIO0-15 | UART interface. Data rates up to 6 Mbaud. |
| SPI Master | DIO0-15 | SPI master interface. Clock frequency up to 24MHz |
| SPI Slave | DIO0-15 | SPI slave interface |
| 245 FIFO | DIO0-15 | 8 bit parallel data interface with handshake. Data rates up to 7MB/s. |
| I ² C Master | DIO0-15 | I ² C interface. Data rates up to 3.4Mb/s |
| I ² C Slave | DIO0-15 | I ² C interface |
| PWM | DIO0-15 and AIO0-15 | Pulse Width Modulation output. |
| BCD Detect | DIO0-15 and AIO0-15 | Indicates a dedicated charger port has be detect on the upstream USB port. |

Table 4.5 – I/O Signal Options

5 Module Configurations

5.1 Jumper Configuration Options

| Solder Link No. | Setting | Status | Description |
|-----------------|---------|-------------|---|
| JP1 | Opened | Non-Default | Self-Powered mode. This setting removes the connection between VBUS and VCC5V. For self-powered operation 5V power is received from CN2-1. |
| JP1 | Closed | Default | Bus-Powered mode. This setting creates a connection between VBUS and VCC5V. For bus-powered operations 5V power will be output on CN2-1 when the module is connected to an upstream USB port. |

Table 5.1 – Jumper JP1 Modes

Warning: There should never be more than one power output supplying power to the same net at any one time. Closing JP1 will cause a direct short between two different power supplies, when a self-powered set-up is applied and the USB bus is connected resulting in the potential for damage to the module and other connected circuitry.

5.2 Programming Firmware to the Flash ROM

The FT51A can be programmed using the FTPD-1. CN3 is a dedicated port that can interface with the FTPD-1.

A list of available examples (at time of writing) is shown below and source code can be found in 'C:\Users\Username\Documents\FTDI\FT51A_SDK\version\examples' after installing the FT51A SDK:

- AN_344_FT51A_DFU_Sample
- AN_345 FT51A Keyboard Sample
- AN_346 FT51A Mouse Sample
- AN_347 FT51A Test and Measurement Sample
- AN_348 FT51A FT800 Sensors Sample
- AN_349 FT51A FT800 Spaced Invaders Sample
- AN_351 FT51A Compatibility Module
- AN_354 FT51A Standalone Demo Application

Users can develop their own custom applications using the SDK.

6 Module Dimensions

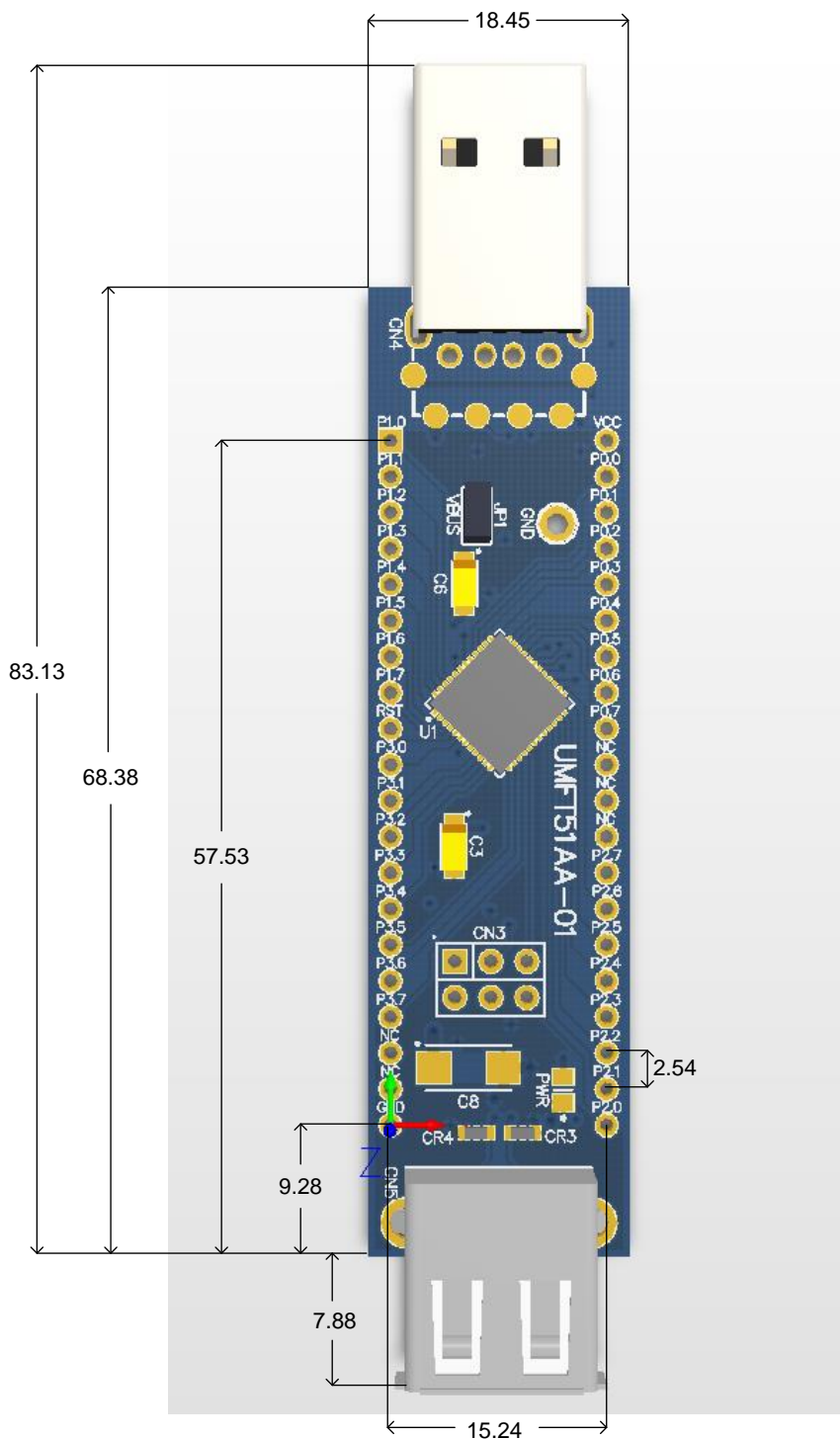
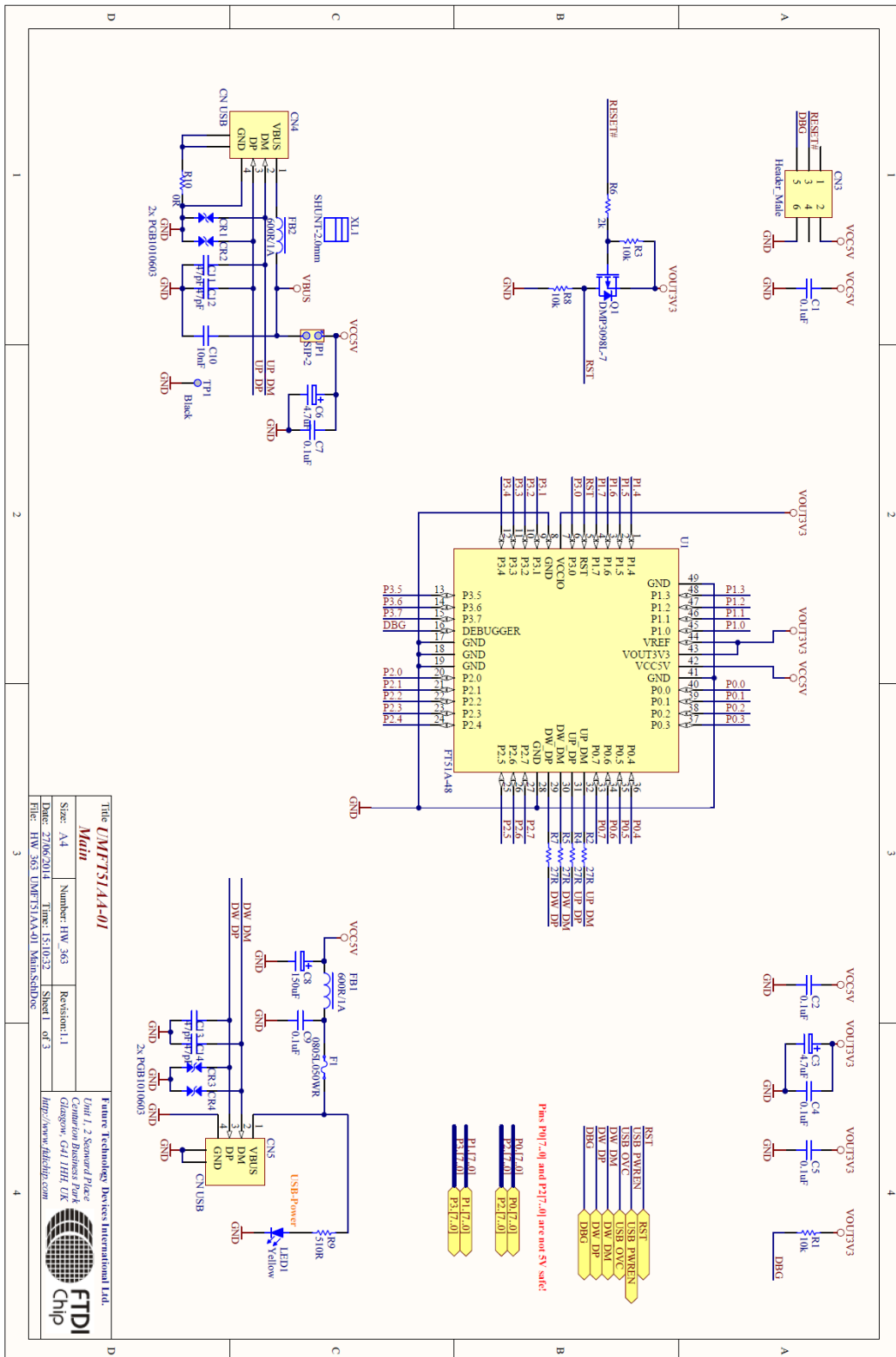



Figure 6.1 – UMFT51AA Module Dimensions

All dimensions are given in millimetres.

The UMFT51AA module exclusively uses lead free components, and is fully compliant with European Union directive 2002/95/EC.

7 UMFT51AA Module Circuit Schematic



| | | | |
|-------------------------------------|----------------|---|--|
| Title: UMFT51AA-01 | | Future Technology Devices International Ltd. | |
| Main | | Unit 1, 2 Kenwood Place | |
| Size: A4 | Number: HW_363 | Centurion Business Park | |
| Date: 27/06/2014 | Revision: 1.1 | Gatwick, GU1 1TH, UK | |
| File: HW_363 UMFT51AA-01 MainSCHDoc | Sheet 1 of 3 | http://www.ftdi.com | |
| | |  | |

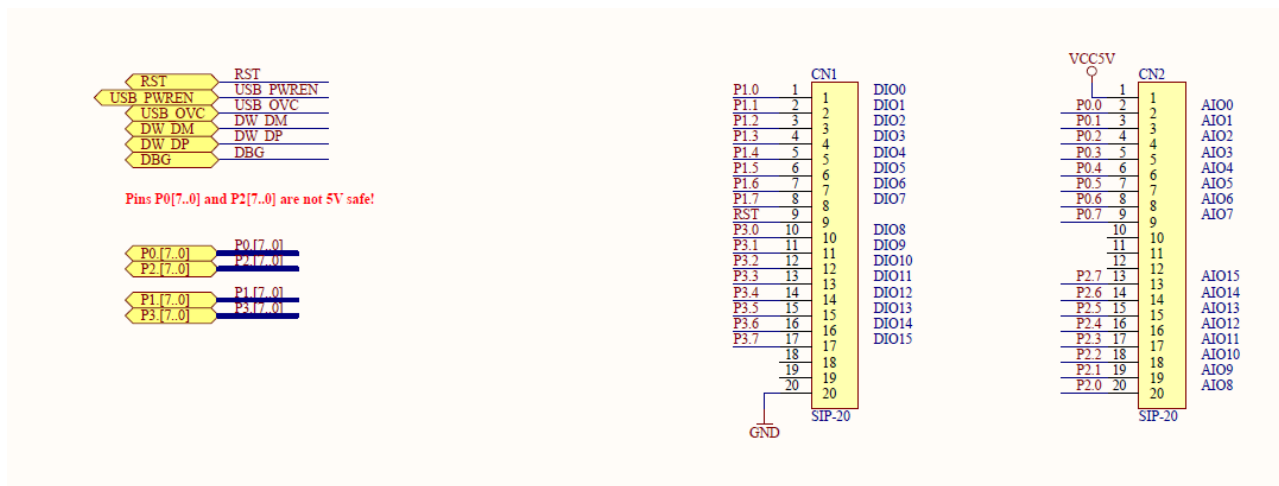


Figure 7.1 – Module Circuit Schematic

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Appendix A – References

Document References

[FT51A Datasheet](#)

[AN_289 FT51A programmers Guide](#)

[FTPD-1 Datasheet](#)

[AN_344 FT51A DFU Sample](#)

[AN_345 FT51A Keyboard Sample](#)

[AN_346 FT51A Mouse Sample](#)

[AN_347 FT51A Test and Measurement Sample](#)

[AN_348 FT51A FT800 Sensors Sample](#)

[AN_349 FT51A FT800 Spaced Invaders Sample](#)

[AN_352 FT51A Installation Guide](#)

Acronyms and Abbreviations

| Terms | Description |
|------------------|------------------------------|
| ADC | Analog to digital conversion |
| I ² C | Inter integrated Circuit |
| LCD | Liquid Crystal Display |
| LED | Light Emitting Diode |
| MCU | Micro Controller Unit |
| SPI | Serial Peripheral Interface |
| USB | Universal Serial Bus |

Appendix B – List of Figures and Tables

List of Figures

| | |
|---|----|
| Figure 4.1 – Module Pin Out | 5 |
| Figure 6.1 – UMFT51AA Module Dimensions | 10 |
| Figure 7.1 – Module Circuit Schematic | 12 |

List of Tables

| | |
|---|---|
| Table 4.1 – Module Pin Out Description..... | 6 |
| Table 4.2 – Upstream USB Port Pin Out Description | 6 |
| Table 4.3 – Downstream USB Port Pin Out Description | 7 |
| Table 4.4 – Debugger Port Pin Out Description | 7 |
| Table 4.5 – I/O Signal Options | 8 |
| Table 5.1 – Jumper JP1 Modes | 9 |

Appendix C – Revision History

Document Title: UMFT51AA-01 Datasheet
Document Reference No.: FT_001141
Clearance No.: FTDI# 479
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Document Feedback: [Send Feedback](#)

| Revision | Changes | Date |
|-------------|-----------------|------------|
| Version 1.0 | Initial Release | 2015-11-18 |

Revision History

Revision history (internal use only, please clearly state all changes here before saving the file)

| Revision | Date YYYY-MM-DD | Changes | Editor |
|-----------------|----------------------------|---|---------------|
| Draft | 2014-07-11 | Initial Datasheet Created | John Quinn |
| Draft | 2014-11-28 | Reviewed, edited, and commented. Not recommended for release at this stage | G Lunn |
| 1.0 | 2015-11-09 | Reviewed and major edits Closed what comments I could | G Lunn |
| 1.0 | 2015-11-10 | Reviewed. Some changes made. | D Paterson |
| 1.0 | 2015-11-13 | Reviewed and recommend for approval | G Lunn |
| 1.0 | 2015-11-18 | Minor formatting; Approved LCE | L Subramanian |