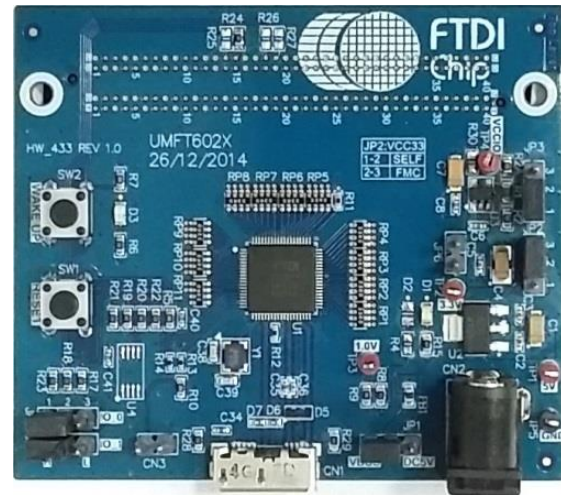


# Future Technology Devices International Ltd

## UMFT602A/ UMFT602X



The UMFT602A/X is an evaluation/development module with either HSMC or FMC (LPC) connectors for interfacing FTDI's FT602 32bit FIFO bus to USB 3.1 GEN 1 USB video class (UVC) bridge IC with external hardware. The UMFT602A/X allows for bridging a FIFO bus to a USB3.0 host and evaluating the functionality of the FT602.

As a daughter card, the UMFT602A/X must work with a FIFO master board which has either a HSMC or FMC connector. There are 2 models which provide different FIFO bus interfaces with 32bit data width.

The modules are designed such that they can plug into most FPGA development platforms supplied by vendors such as Xilinx or Altera. Refer to [Ordering Information](#) for module options.

The UMFT602A/X supports 2 parallel slave FIFO bus protocols (Multi-Channel FIFO / 245 Synchronous FIFO) with a data "burst" rate of up to 400MB/s. For a full list of the FT602's features refer to the [FT602 datasheet](#).

The UMFT602A/X module has the following features:

- Supports USB 3.1 GEN 1 Super Speed (5Gbps)/USB 2.0 High Speed (480Mbps) transfer
- UVC 1.1, Raw YUV422
- Up to 4 video input channels. One I2C bus master interface for video source device configuration
- Supports multi voltage I/O: 1.8V, 2.5V and 3.3V
- High speed connector for FIFO bus : FMC(Field Programmable Mezzanine Card) or HSMC (High Speed Mezzanine Card)
- FMC connector is compatible with most Xilinx FPGA reference design boards
- HSMC is compatible with most Altera FPGA reference design boards
- Multi powered options: external DC powered, BUS powered, FMC/HSMC powered
- Hardware Reset
- Micro-USB3.0 receptacle

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## 1 Ordering Information

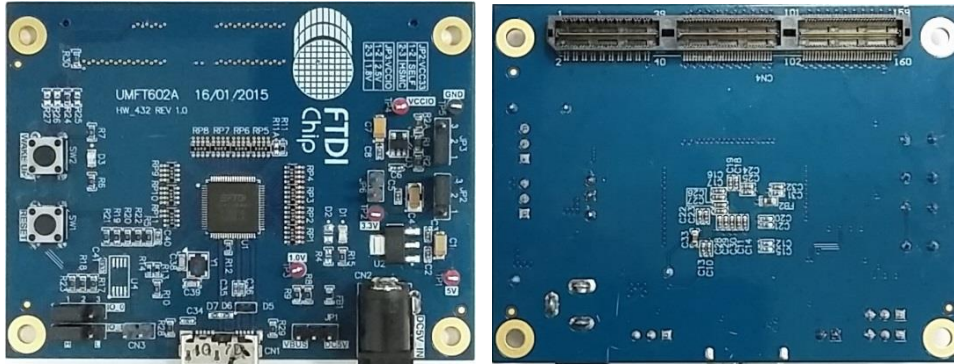
| Part No. | Description                                   |
|----------|-----------------------------------------------|
| UMFT602A | 32 Bit FIFO bus, HSMC connector               |
| UMFT602X | 32 Bit FIFO bus, FMC(Low Pin Count) connector |

**Table 1.1 UMFT60xx Ordering Information**

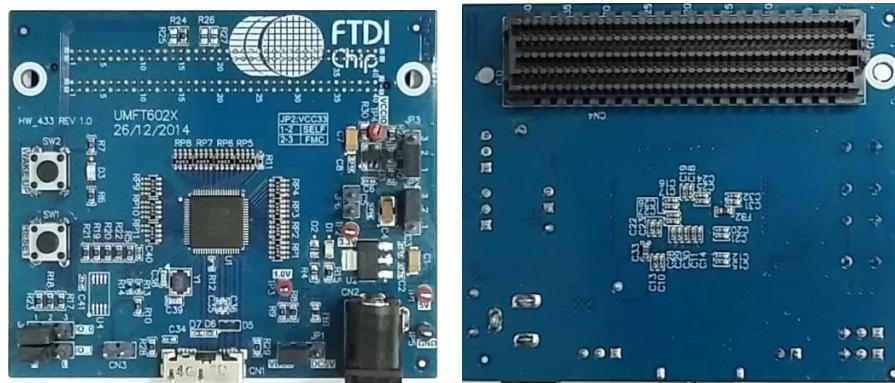
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## 2 Hardware Description



**Figure 2-1 UMFT602A Module Top and Bottom View**



**Figure 2-2 UMFT602X Module Top and Bottom View**

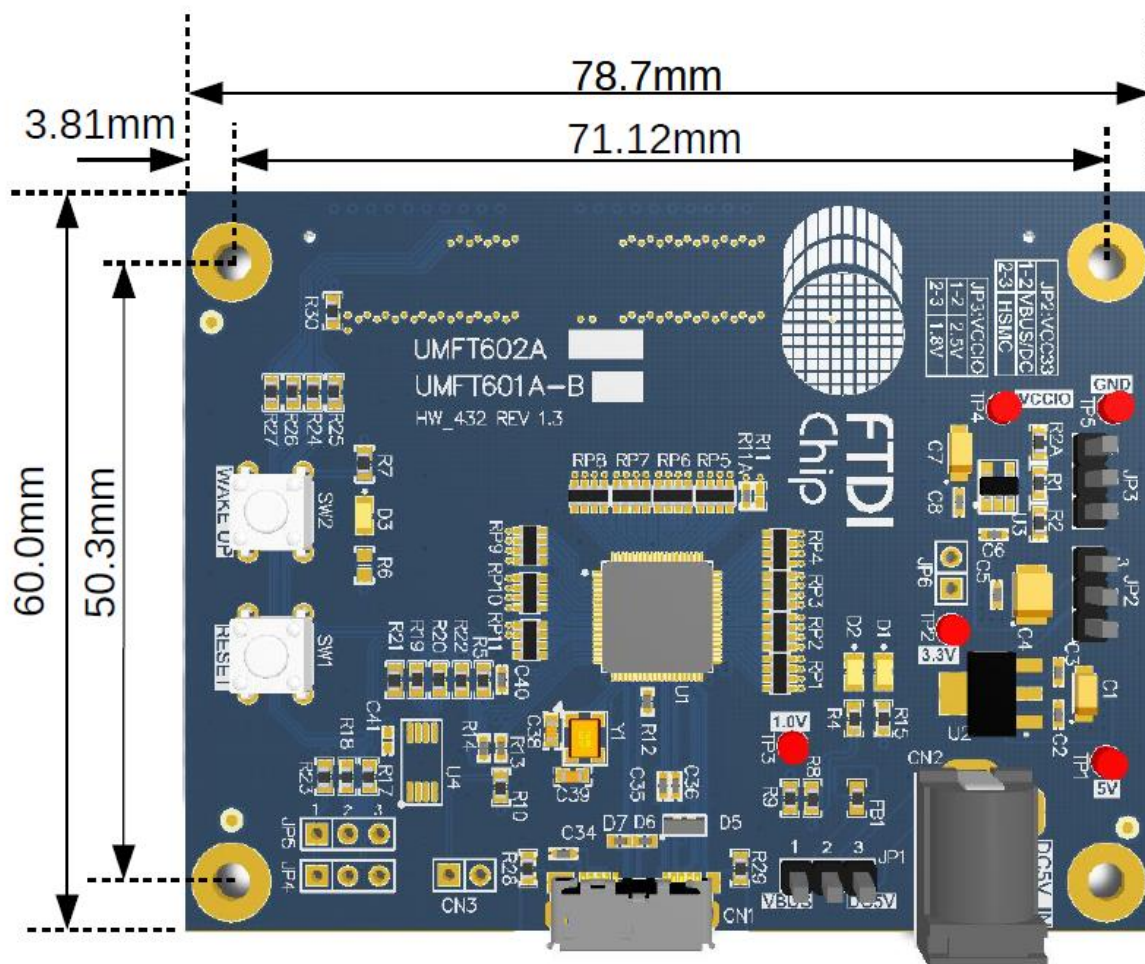
The main functions of the UMFT602A/X module are as follows:

- Provides Multi-channel FIFO mode and 245 Synchronous FIFO mode Protocols.
- YUV422 uncompressed format is supported.
- FIFO clock: 100MHz, driven by FT602.
- High speed FIFO bus interface: FMC (Low Pin Count) and HSMC optional. See [Ordering Information](#).
- Jumpers selection allowing powered options: VBUS-powered, External DC-powered, FIFO master board-powered.
- Multi voltage VCCIO option: 1.8V, 2.5V, 3.3V, default is 2.5V.
- Hardware reset and System wake up.

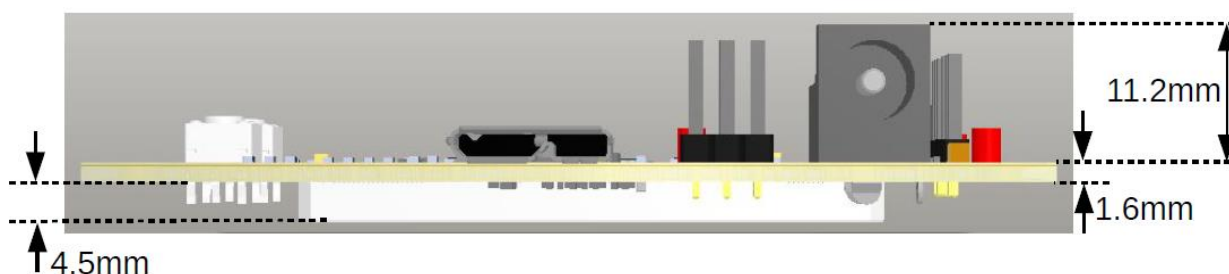
## 2.1 Physical Description

The UMFT602A and UMFT602X modules dimensions are illustrated in Figure 2.5 to Figure 2.8.

### 2.1.1 Dimensions

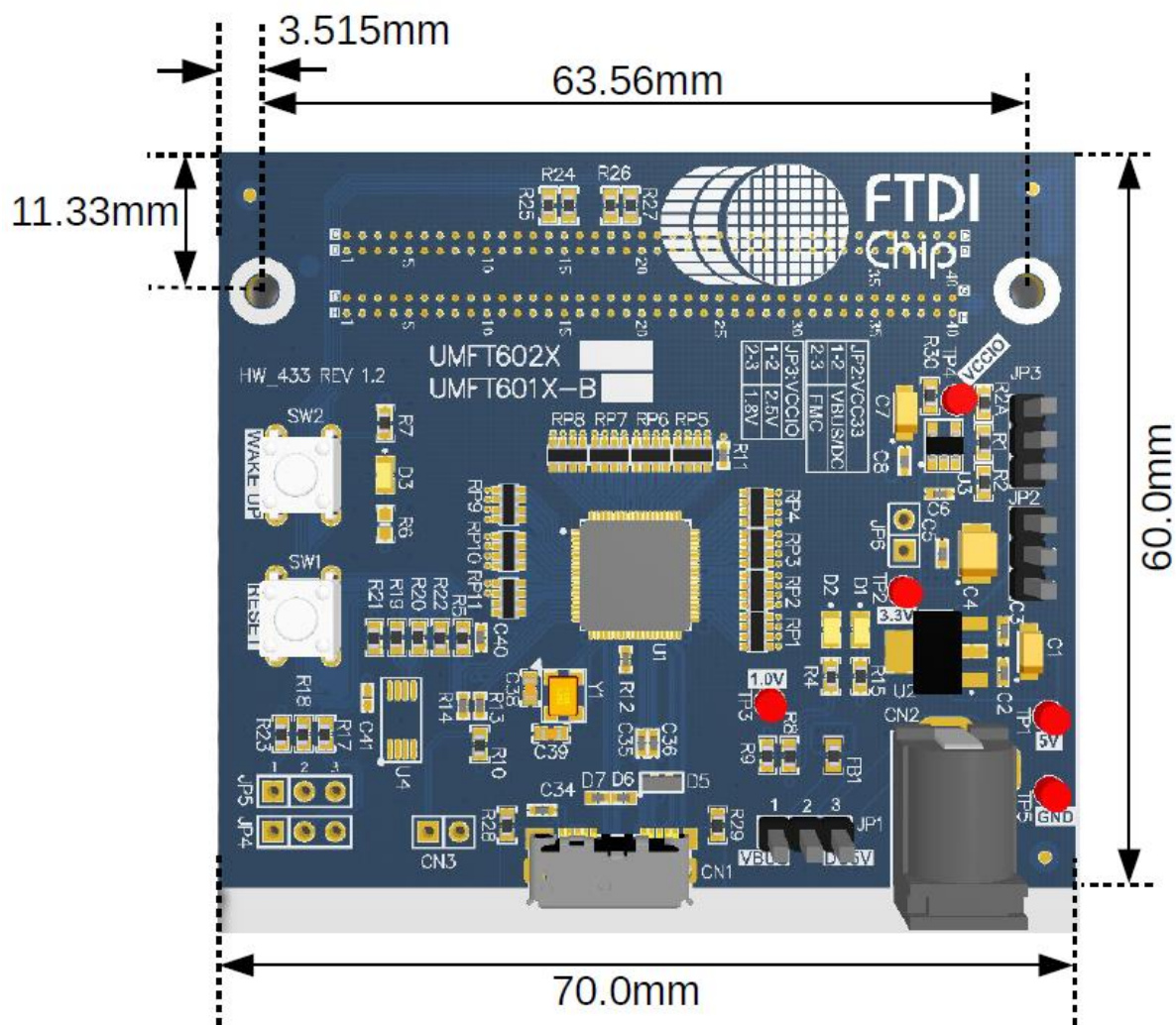


**Figure 2-3 UMFT602A Dimensions (Top view)**

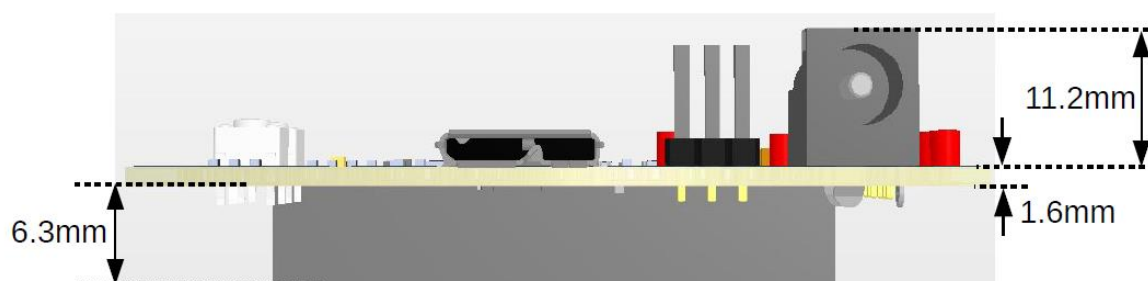


**Figure 2-4 UMFT602A Dimensions (Side view)**

±0.10mm Tolerance



**Figure 2-5 UMFT602X Dimensions (Top view)**



### Figure 2-6 UMFT602X Dimensions (Side view)

±0.10mm Tolerance

## 2.2 Connectors, Jumpers and Push Buttons

Connectors, jumpers and push buttons are described in the following sections.

### 2.2.1 CN1 - Micro USB3.0 Receptacle

| Pin No. | Name  | Type | Description                                       |
|---------|-------|------|---------------------------------------------------|
| 1       | VBUS  | P    | 5V DC power supply                                |
| 2       | D-    | IO   | USB D- line                                       |
| 3       | D+    | IO   | USB D+ line                                       |
| 4       | ID    | IO   | OTG identification(N.C.)                          |
| 5       | GND   | P    | Ground                                            |
| 6       | SSTX- | O    | Super Speed USB transmitter differential pair (-) |
| 7       | SSTX+ | O    | Super Speed USB transmitter differential pair(+)  |
| 8       | GND   | P    | Ground                                            |
| 9       | SSRX- | I    | Super Speed USB receiver differential pair (-)    |
| 10      | SSRX+ | I    | Super Speed USB receiver differential pair (+)    |

**Table 2.1 CN1 - Micro USB3.0 Pin-out**

### 2.2.2 CN2 – POWER JACK 2.1MM

Optional external DC 5V input.

| Pin No. | Name | Type | Description     |
|---------|------|------|-----------------|
| 1       | 5V   | P    | 5V power supply |
| 2       | GND  | P    | Ground          |
| 3       | GND  | P    | Ground          |

**Table 2.2 CN2 – POWER JACK 2.1MM**

### 2.2.3 JP1 – External/VBUS Powered Selection

Select whether the module power is supplied by an external DC 5V or VBUS. Note this setting must be chosen in conjunction with the JP2 setting. Default is open. <sup>[Note]</sup>

| Jumper position | Description           |
|-----------------|-----------------------|
| Short pin 1-2   | Select VBUS Power     |
| Short pin 2-3   | Select external DV 5V |

**Table 2.3 JP1 – 5V input Options**

## 2.2.4 JP2 – VCC33 Selection

Select whether the module main power is supplied by DC5V or the FIFO master board DC3.3V. <sup>[Note]</sup>

| Jumper position | Description                                  |
|-----------------|----------------------------------------------|
| Short pin 1-2   | Select powered by external DV5V or VBUS      |
| Short pin 2-3   | Select powered by FIFO master Board(default) |

**Table 2.4 JP3 – VCC33 Option**

## 2.2.5 JP3, JP6– VCCIO Selection

Select the IO voltage level. <sup>[Note]</sup>

| Jumper position |       | Description         |
|-----------------|-------|---------------------|
| JP3             | JP6   |                     |
| Short pin 1-2   | Open  | VCCIO=2.5V(default) |
| Short pin 2-3   | Open  | VCCIO=1.8V          |
| Open            | Short | VCCIO=3.3V          |

**Table 2.5 JP3 – VCCIO Option**

**Note:** Refer to section [4 Hardware setup guide](#) for more details on power configuration options and jumpers positions.

JP6 is not fitted on the PCB.

## 2.2.6 SW1, SW2 – Push Buttons for Reset and Remote Wake Up

SW1 – Reset, module hardware reset, mapped to FMC/HSMC connector, can be used for FIFO master reset. Drive low when press down.

SW2 – FT602 device Wake Up, driven low when pressed down. This pin mapped is to the FMC/HSMC connector, and is normally used for I<sup>2</sup>C interrupt.

## 2.2.7 CN4 – FMC / HSMC FIFO bus interface connector

### 2.2.7.1 FMC connector configurations- UMFT602X Module

| FMC Pin#/Name | UMFT602X<br>U1: FT602 Pin#/Name |
|---------------|---------------------------------|
| C14/LA10_P    | 16 /INT_N/Wake Up_N             |
| C15/LA10_N    | 15 /RESET_N                     |
| C18/LA14_P    | 17 /I2C_SCL                     |
| C19/LA14_N    | 18 /I2C_SDA                     |

| <b>FMC Pin#/Name</b> | <b>UMFT602X<br/>U1: FT602 Pin#/Name</b> |
|----------------------|-----------------------------------------|
| C22/LA18_P_CC        | 68 /D_CLK (FIFO bus clock,FT602 output) |
| C26/LA27_P           | 62 /DATA18                              |
| C27_LA27_N           | 60 /DATA16                              |
| D14/LA09_P           | 8 /BE_N_3                               |
| D15/LA09_N           | 7 /BE_N_2                               |
| D20/LA17_P_CC        | 76 /DATA31                              |
| D21/LA17_N_CC        | 75 /DATA30                              |
| D23/LA23_P           | 70 /DATA25                              |
| D24/LA23_N           | 69 /DATA24                              |
| D26/LA26_P           | 63 /DATA19                              |
| D27/LA26_N           | 61 /DATA17                              |
| G6/LA00_P_CC         | 13 /RESERVE3                            |
| G7/LA00_N_CC         | 12 /RESERVE2                            |
| G12/LA08_P           | 11 /WR_N                                |
| G13/LA08_N           | 10 /RESERVE1                            |
| G21/LA20_P           | 74 /DATA29                              |
| G22/LA20_N           | 73 /DATA28                              |
| G24/LA22_P           | 67 /DATA23                              |
| G25/_LA22_N          | 65 /DATA21                              |
| G27/LA25_P           | 57 /DATA15                              |
| G28/LA25_N           | 55 /DATA13                              |
| G30/LA29_P           | 53 /DATA11                              |
| G31/LA29_N           | 51 /DATA9                               |
| G33/LA31_P           | 47 /DATA7                               |
| G34/LA31_N           | 45 /DATA5                               |
| G36/LA33_P           | 43 /DATA3                               |
| G37/LA33_N           | 41 /DATA1                               |
| H13/LA07_P           | 9 /RXF_N                                |

| <b>FMC Pin#/Name</b> | <b>UMFT602X<br/>U1: FT602 Pin#/Name</b> |
|----------------------|-----------------------------------------|
| H14/LA07_N           | 8 /TXE_N                                |
| H19/LA15_P           | 5 /BE_N_1                               |
| H20/LA15_N           | 4 /BE_N_0                               |
| H22/LA19_P           | 72 /DATA27                              |
| H23/LA19_N           | 71 /DATA26                              |
| H25/LA21_P           | 66 /DATA22                              |
| H26/LA21_N           | 64 /DATA20                              |
| H28/LA24_P           | 56 /DATA14                              |
| H29/LA24_N           | 54 /DATA12                              |
| H31/LA28_P           | 52 /DATA10                              |
| H32/LA28_N           | 50 /DATA8                               |
| H34/LA30_P           | 46 /DATA6                               |
| H35/LA30_N           | 44 /DATA4                               |
| H37/LA32_P           | 42 /DATA2                               |
| H38/LA32_N           | 40 /DATA0                               |

**Table 2.6 CN4 – FMC connector configuration for FIFO bus**

#### 2.2.7.2 CN4 – HSMC connector configurations-UMFT602A Module

| <b>HSMC<br/>Pin#/Name</b> | <b>UMFT602A<br/>U1: FT602 Pin#/Name</b> |
|---------------------------|-----------------------------------------|
| 40 /CLKIN0                | 68 /D_CLK (FIFO bus clock,FT602 output) |
| 41 /D0                    | 40 /DATA0                               |
| 42 /D1                    | 60 /DATA16                              |
| 43 /D2                    | 41 /DATA1                               |
| 44 /D3                    | 61 /DATA17                              |
| 47 /D4                    | 42 /DATA2                               |
| 48 /D5                    | 62 /DATA18                              |
| 49 /D6                    | 43 /DATA3                               |

| <b>HSMC<br/>Pin#/Name</b> | <b>UMFT602A<br/>U1: FT602 Pin#/Name</b> |
|---------------------------|-----------------------------------------|
| 50 /D7                    | 63 /DATA19                              |
| 53 /D8                    | 44 /DATA4                               |
| 54 /D9                    | 64 /DATA20                              |
| 55 /D10                   | 45 /DATA5                               |
| 56 /D11                   | 65 /DATA21                              |
| 59 /D12                   | 46 /DATA6                               |
| 60 /D13                   | 66 /DATA22                              |
| 61 /D14                   | 47 /DATA7                               |
| 62 /D15                   | 67 /DATA23                              |
| 65 /D16                   | 50 /DATA8                               |
| 66 /D17                   | 69 /DATA24                              |
| 67 /D18                   | 51 /DATA9                               |
| 68 /D19                   | 70 /DATA25                              |
| 71 /D20                   | 52 /DATA10                              |
| 72 /D21                   | 71 /DATA26                              |
| 73 /D22                   | 53 /DATA11                              |
| 74 /D23                   | 72 /DATA27                              |
| 77 /D24                   | 54 /DATA12                              |
| 78 /D25                   | 73 /DATA28                              |
| 79 /D26                   | 55 /DATA13                              |
| 80 /D27                   | 74 /DATA29                              |
| 83 /D28                   | 56 /DATA14                              |
| 84 /D29                   | 75 /DATA30                              |
| 85 /D30                   | 57 /DATA15                              |
| 86 /D31                   | 76 /DATA31                              |
| 101 /D40                  | 4 /BE_N_0                               |
| 102 /D41                  | 8 /TXE_N                                |
| 103 /D42                  | 5 /BE_N_1                               |

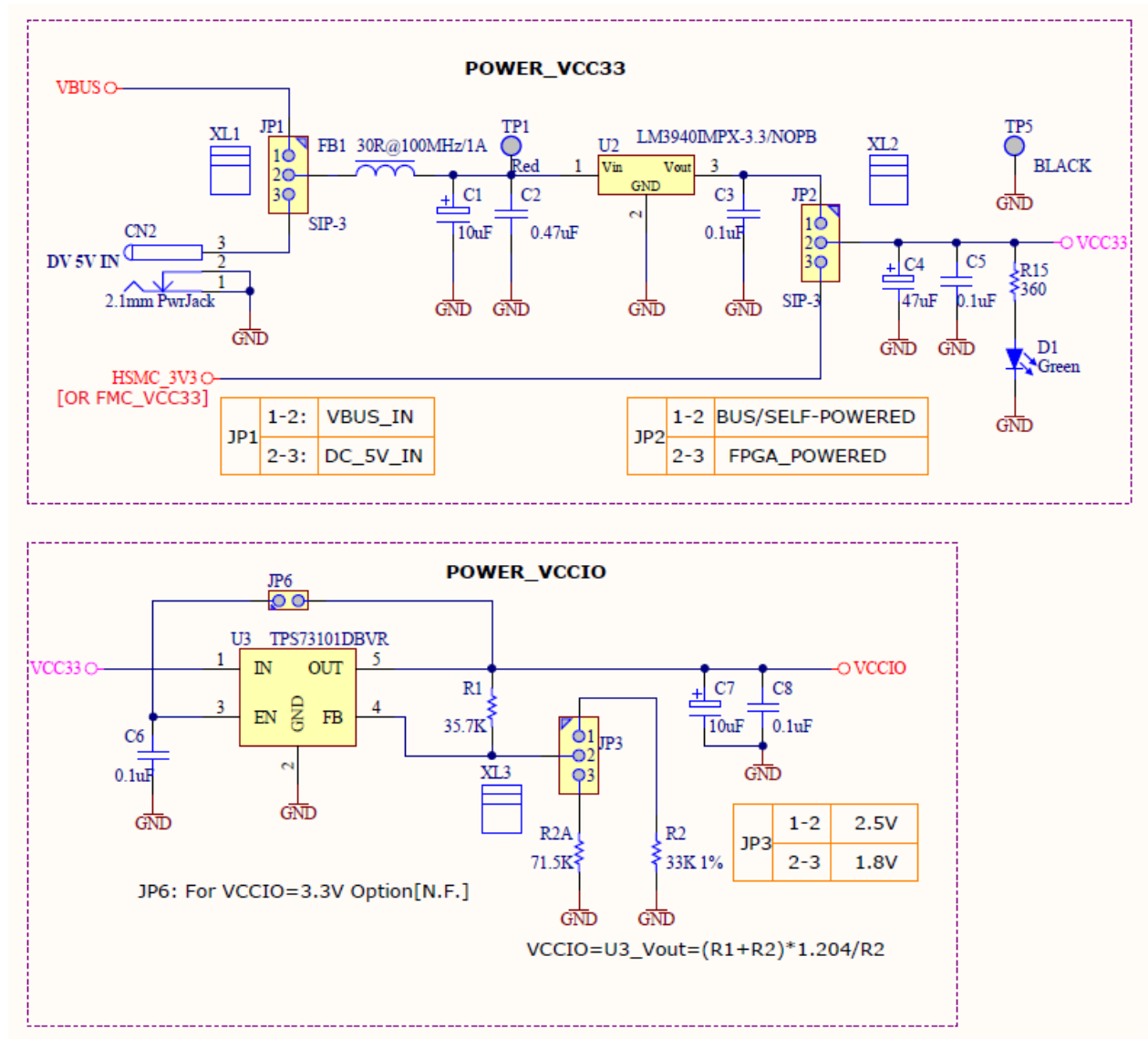
| HSMC<br>Pin#/Name | UMFT602A<br>U1: FT602 Pin#/Name |
|-------------------|---------------------------------|
| 104 /D43          | 9 /RXF_N                        |
| 107 /D44          | 7 /BE_N_2                       |
| 108 /D45          | 10 /RESERVE1                    |
| 109 /D46          | 8 /BE_N_3                       |
| 110 /D47          | 11 /WR_N                        |
| 113 /D48          | 18 /I2C_SDA                     |
| 114 /D49          | 12 /RESERVE2                    |
| 115 /D50          | 17 /I2C_SCL                     |
| 116 /D51          | 13 /RESERVE3                    |
| 119 /D52          | 15 /RESET_N                     |
| 121 /D54          | 16 / INT_N/Wake up_N            |

**Table 2.7 CN4 – HSMC connector configuration for FIFO bus**

**Note:** Refer to the [FT602 device datasheet](#) section 3 for details of the device pin out and signal descriptions.

The reserved pins (Pin10, Pin12, and Pin13) are connected to the FIFO master via the FMC/HSMC connector, the FIFO master IOs whose connect to these pins should be configured to pull up in the normal operation.

### 3 Board Schematics



**Figure 3-1 Schematics: Power Supply for UMFT602A/UMFT602X**

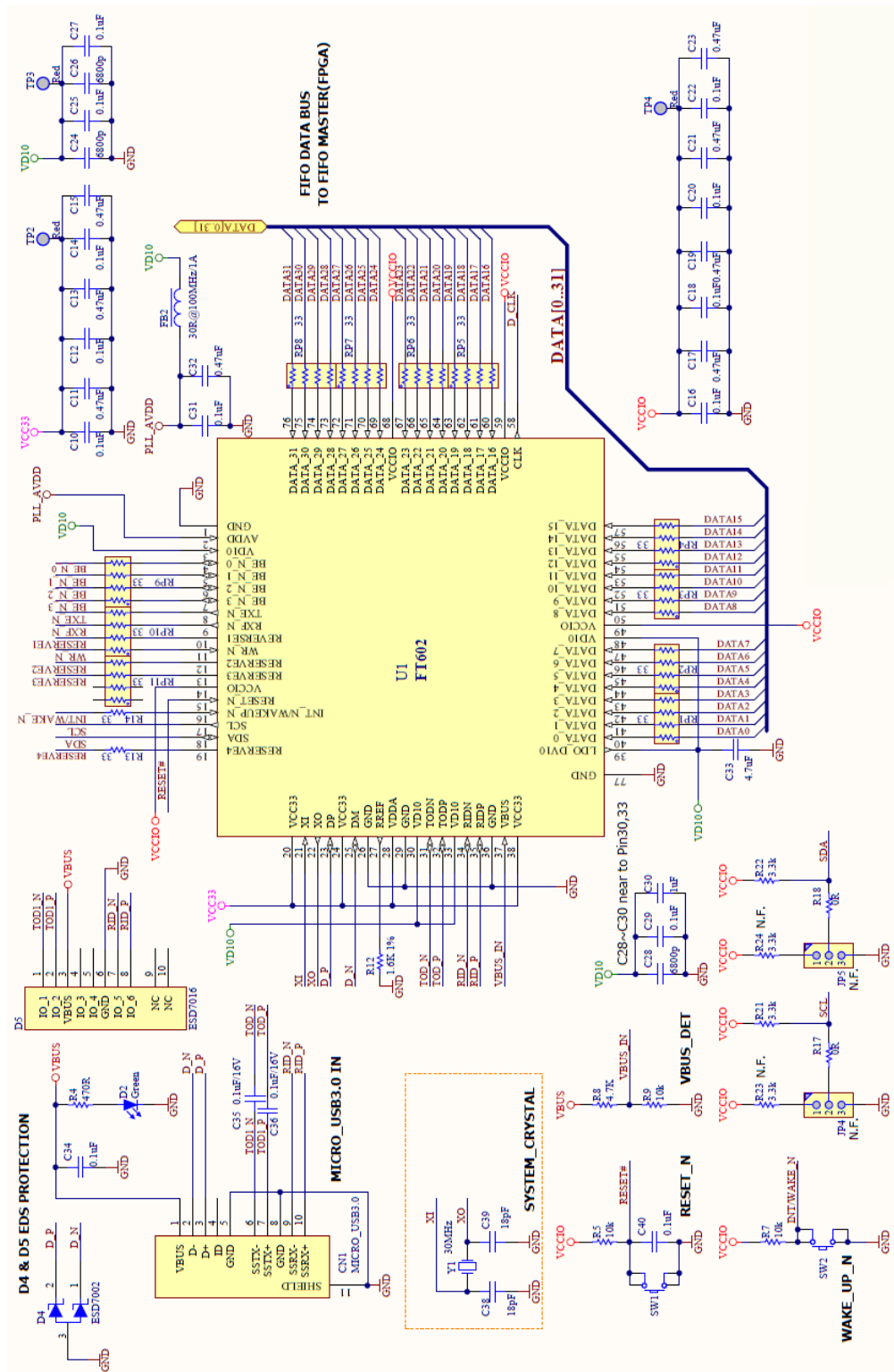
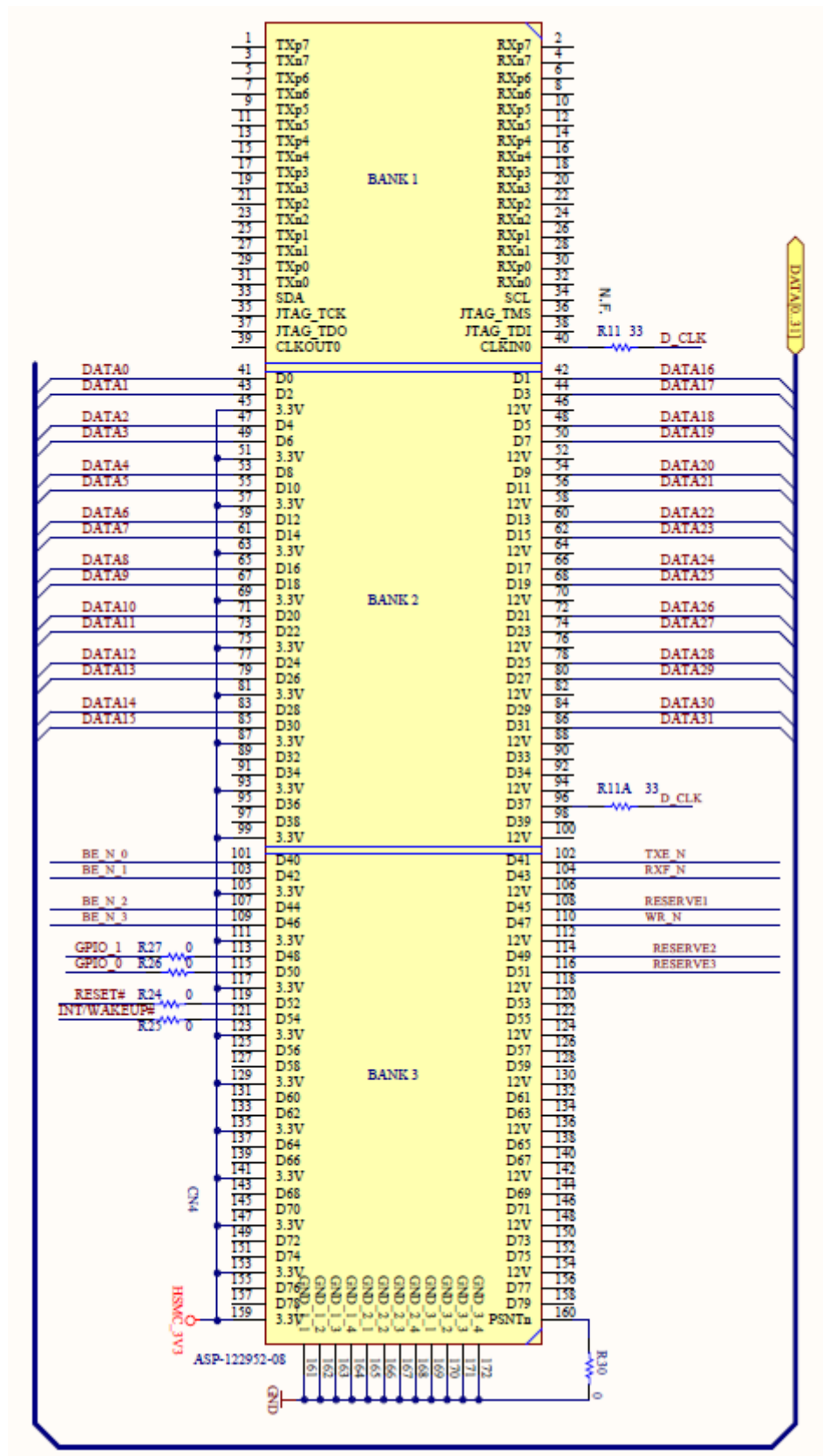


Figure 3-2 Schematics: FIFO TO USB3.0 UVC Bridge\_UMFT602A/UMFT602X



**Figure 3-3 Schematics: HSMC\_UMFT602A**

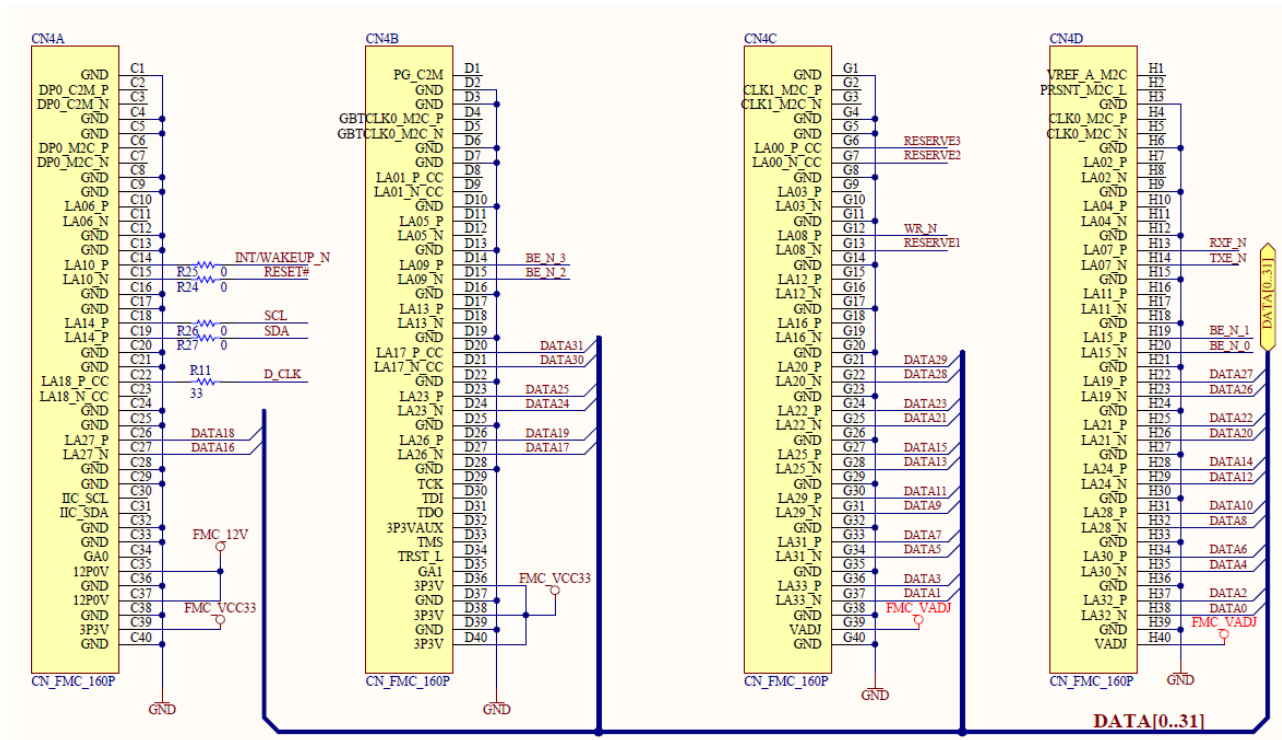


Figure 3-4 Schematics: FMC\_UMFT602X

## 4 Hardware Setup Guide

### 4.1 Power Configuration

There are 3 methods of powering the UMFT602A/UMFT602X module.

- 1) FIFO master board Power (3.3V)-Connect the UMFT602A/UMFT602X board to the FIFO master board that has the standard configuration HSMC female or FMC (LPC or HPC) connector. This method is the default setting and is recommended.
- 2) USB Power (5V) - Connect USB power by micro-USB3.0 or micro-USB2.0 cable to CN1.
- 3) DC IN (5V) - Connect DC 5V to CN2.

The following table summarizes how to power the UMFT60xx module using the various methods.

| Power Method                                     | CN1 | CN2  | JP1          | JP2           | JP3 and JP6                                                                  |
|--------------------------------------------------|-----|------|--------------|---------------|------------------------------------------------------------------------------|
| FIFO master board Power(Default and Recommended) | -   | N.C. | Open         | Short pin 2-3 | Follow FIFO master IO voltage.<br>Default:<br>JP3 short pin1-2<br>VCCIO=2.5V |
| USB Power                                        | 5V  | N.C. | Short pin1-2 | Short pin1-2  |                                                                              |
| DC IN(5V)                                        | -   | 5V   | Short pin2-3 | Short pin1-2  |                                                                              |

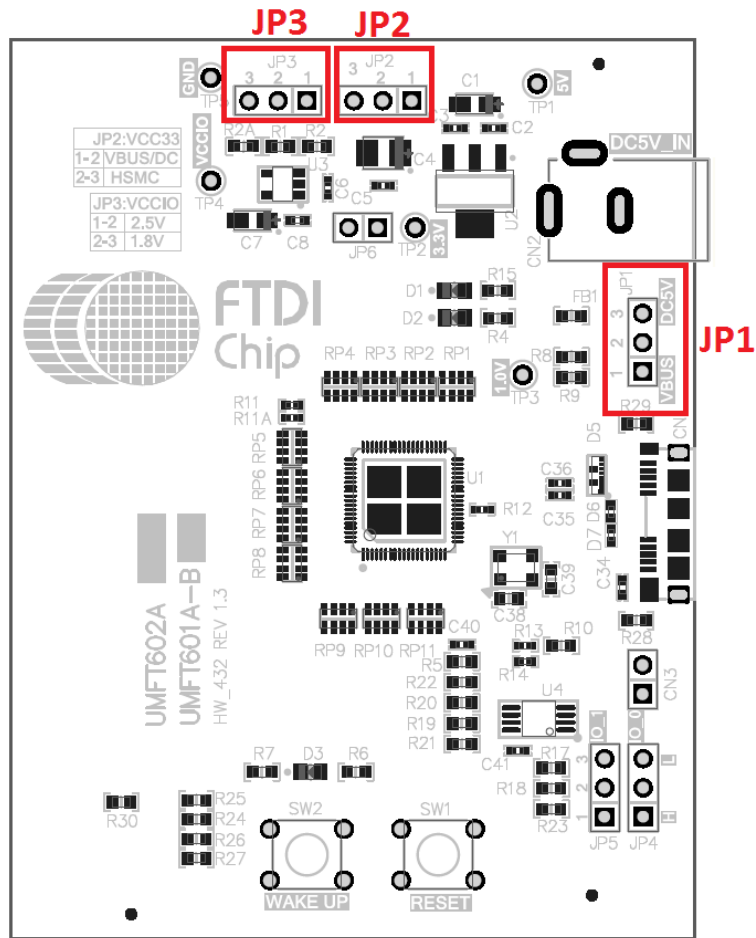
**Table 4.1 Board Power Configuration**

### 4.2 Jumpers Default Position

| Jumper           | JP1  | JP2 | JP3 |
|------------------|------|-----|-----|
| Default Position | Open | 2-3 | 1-2 |

**Table 4.2 Jumpers Default Position**

Figure 4.1 shows the Jumpers' locations on the PCBs.



**Figure 4-1 Jumpers Locations**

### 4.3 Power Consumption

| Parameter    | Description                  | Minimum | Typical | Maximum | Units | Conditions                                     |
|--------------|------------------------------|---------|---------|---------|-------|------------------------------------------------|
| $I_{VCC\_1}$ | VCC Operating Supply Current | -       | 195     | -       | mA    | Function Mode                                  |
| $I_{VCC\_2}$ | VCC Operating Supply Current | -       | 7.0     | -       | mA    | Suspend Mode                                   |
| $I_{VBUS1}$  | VBUS Operating Current       | -       | 0.34    | -       | mA    | DC/HSMC/FMC Powered, Function and Suspend Mode |
| $I_{VBUS2}$  | VBUS Operating Current       | -       | 191     | -       | mA    | VBUS-Powered Powered, Function Mode            |
| $I_{VBUS3}$  | VBUS Operating Current       | -       | 7.3     | -       | mA    | VBUS-Powered Powered, Suspend Mode             |

**Table 4.3 Power Consumption**

## 5 Contact Information

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### Distributor and Sales Representatives

Please visit the Sales Network page of the [FTDI Web site](http://ftdichip.com) for the contact details of our distributor(s) and sales representative(s) in your country.

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## Appendix A – References

### Document References

FT602 datasheet: [DS\\_FT602Q](#)

FT60X PCB Layout Guidelines: [AN\\_430\\_FT60X\\_PCB\\_Layout\\_Guidelines](#)

[FT602\\_Chip\\_Configuration\\_Utility](#)

### Acronyms and Abbreviations

| Terms | Description                       |
|-------|-----------------------------------|
| FIFO  | First In First Out                |
| FMC   | Field Programmable Mezzanine Card |
| HPC   | High Pin Count                    |
| HSMC  | High Speed Mezzanine Card         |
| IO    | Input Output                      |
| LPC   | Low Pin Count                     |
| USB   | Universal Serial Bus              |

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## Appendix C – Revision History

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