Future Technology Devices International Ltd.

DS_FT311D_Development_Module: UMFT311EV

(USB Android Host Module)

The FT311D Development Module is a development module which utilises the FT311D IC to develop USB accessories connecting to Android platforms via Android Open Accessory mode. It is a Full Speed USB host specifically targeted at providing access to peripheral hardware from an Android platform with a USB device port. The FT311D IC will bridge the USB port to any one of the six user selectable interface types like GPIO, UART, PWM, I2C Master, SPI Master, SPI Slave and has the following advanced features:

- Based on single chip USB Android Host FT311D IC.
- Entire USB protocol handled on the chip.
- Any one of the six user selectable interface types:- GPIO, UART, PWM, I2C Master, SPI Master, SPI Slave Interface options selectable via 3 mode select pins.
- 7 GPIO lines interface option
- USB error indicator pin
- Basic UART interface with RXD, TXD, RTS, CTS, TX_ACTIVE pins option.
- 4 PWM channels option.
- I^2C Master interface option.
- SPI Slave interface option supporting modes 0, 1, 2 and 3 with MSB/LSB options
- SPI Master interface option supporting modes 0, 1, 2 and 3 with MSB/LSB options.
- Suitable for use on any Android platform supporting Android Open Accessory Mode (Typically 3.1 onwards, however some platforms may port Open Accessory Mode to version 2.3.4)
- 12MHz external crystal.
- Standard USB Host connector to connect with Android USB Slave device.
- +5V Single Supply Operation.
- USB 2.0 Full Speed compatible.
- Extended operating temperature range; -40 to +85ºC.
- Board dimensions: 68.58mm x 55.38mm x 14.00mm (L x W x H).
- Reduce development time.
- Rapid integration into existing systems.

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1 Typical Applications

- Connecting Android phones to USB accessories
- Connecting Android tablets to USB accessories
- Controlling instrumentation from Android devices.
- Home automation via Android devices
- Data logging from USB accessories
- Connecting printing devices to Android devices

1.1 Part Numbers

Part Number	Description
UMFT311EV	Development module for FT311D

Table 1.1 : Part Numbers

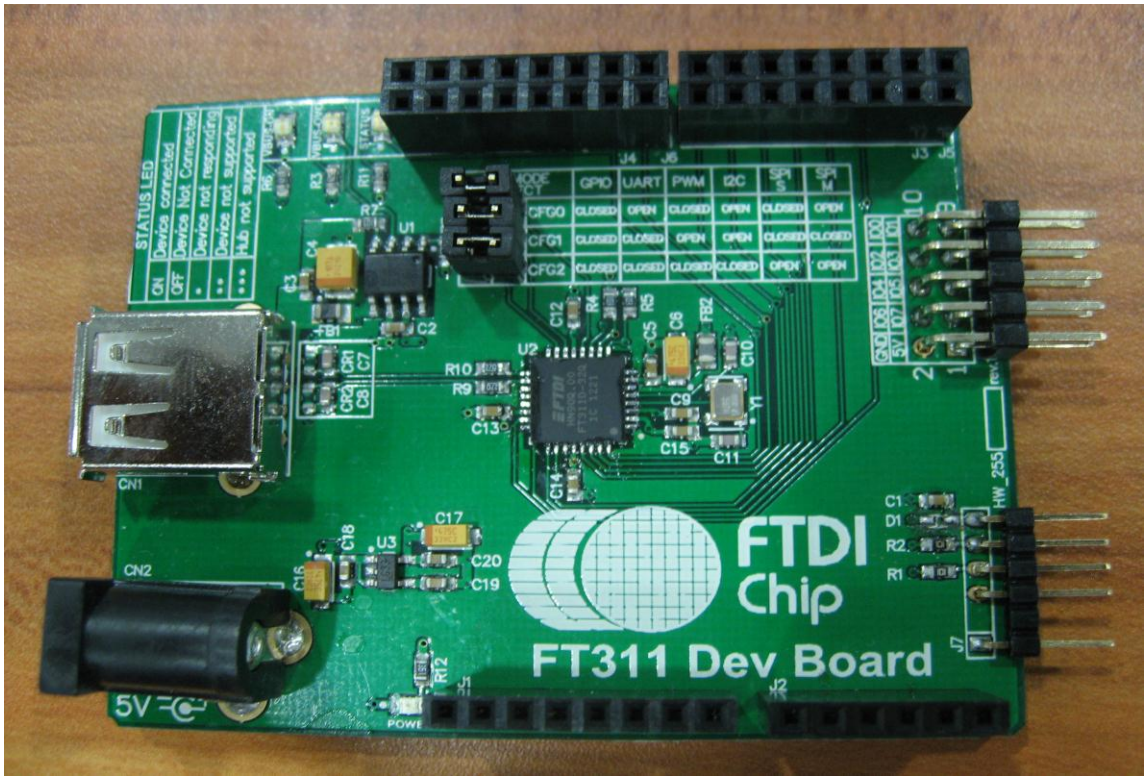

Figure 1.1 : FT311D Development Module: UMFT311EV

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2 FT311D Development Module Block Diagram

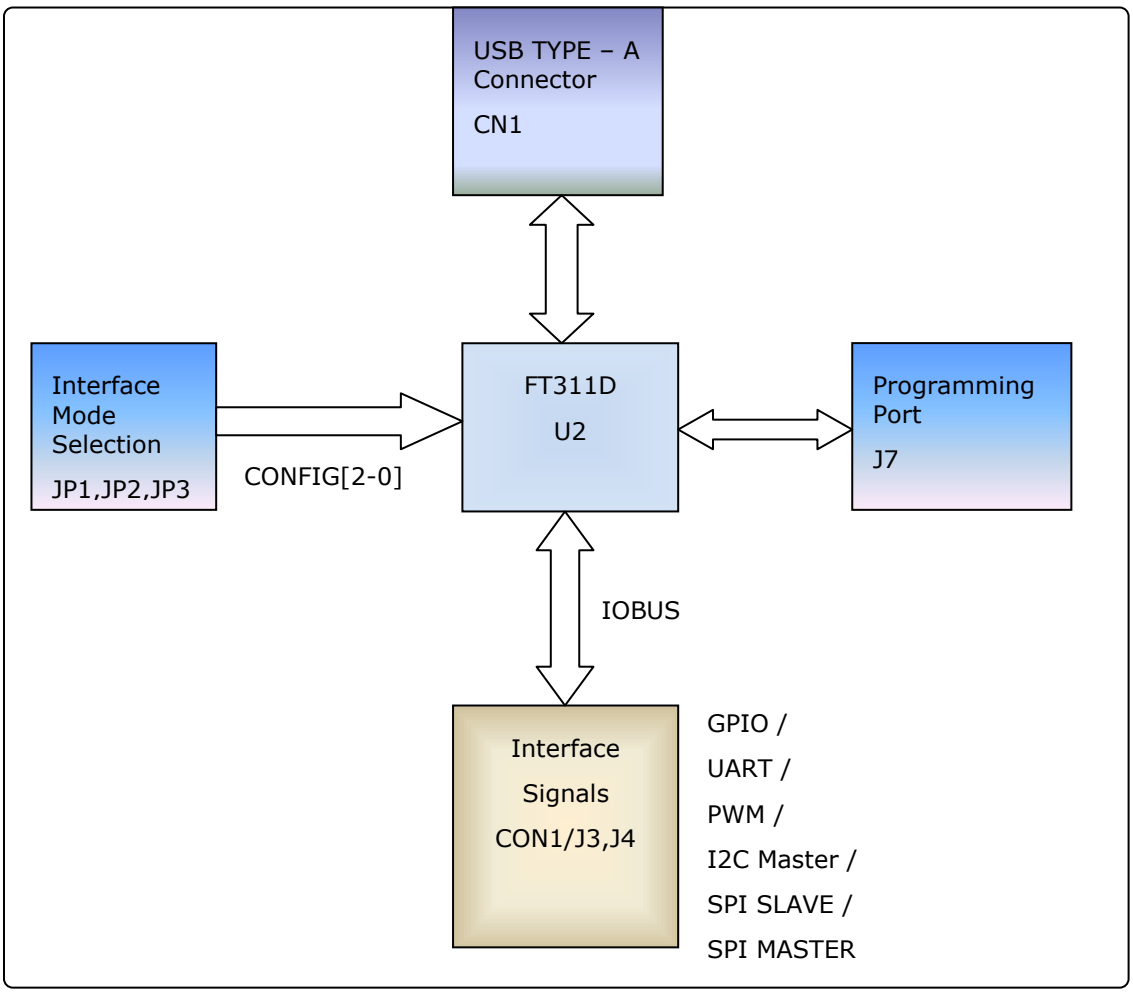

Figure 2.1 : FT311D Development Module Block Diagram

For a description of each function please refer to Section 3.

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3 Function Description

The FT311D Development Module is intended for use as a hardware platform to enable easy evaluation of FTDI's FT311D Android Open Accessory USB Host controller. The FT311D Development Module includes all the necessary components required by a user to begin developing Android Open Accessory applications based on the FT311D device. The FT311D Development Module behaves like a bridge between an Android device and the various I/O available. Selection of various modes is performed using CONFIG[2:0] pins as shown in the Table 4.2.

3.1 Key Features

Easy to use Android Open Accessory Module translating the USB Device port of the android tablet into any one of the six selectable interfaces like GPIO, UART, PWM, I^2C Master, SPI Slave or SPI Master.

- Selection of interface mode using jumpers JP1, JP2 and JP3
- USB Type-A connector CN1 for connecting to Android USB slave peripherals.
- IO port connectors CON1 / J3 and J4 used for the interface signals based on the selected interface mode.

3.2 Functional Block Descriptions

The following paragraphs describe each function within the FT311D Development Module. Please refer to the block diagram shown in Error! Reference source not found.Error! Reference source not found.**Error! Reference source not found.**.

Interface Mode Selection

Interface Mode selection is done using CONFIG[2:0] pins. Refer to chapter 4 for the details.

USB Host

USB Host port at CN1 is used for connecting the Android Open Accessory device. The USB host port does not support other USB device classes.

Interface Signals

The interface signals at CON1 are based on the mode selected by the Interface Mode Selection.

Programming Port

The Programming Port at J7 is used for re-programming the FT311D device with new ROM file.

(NOTE: This is unlikely to be required as the module is delivered ready to use).

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3.2.1 FT311D Development Module Layout

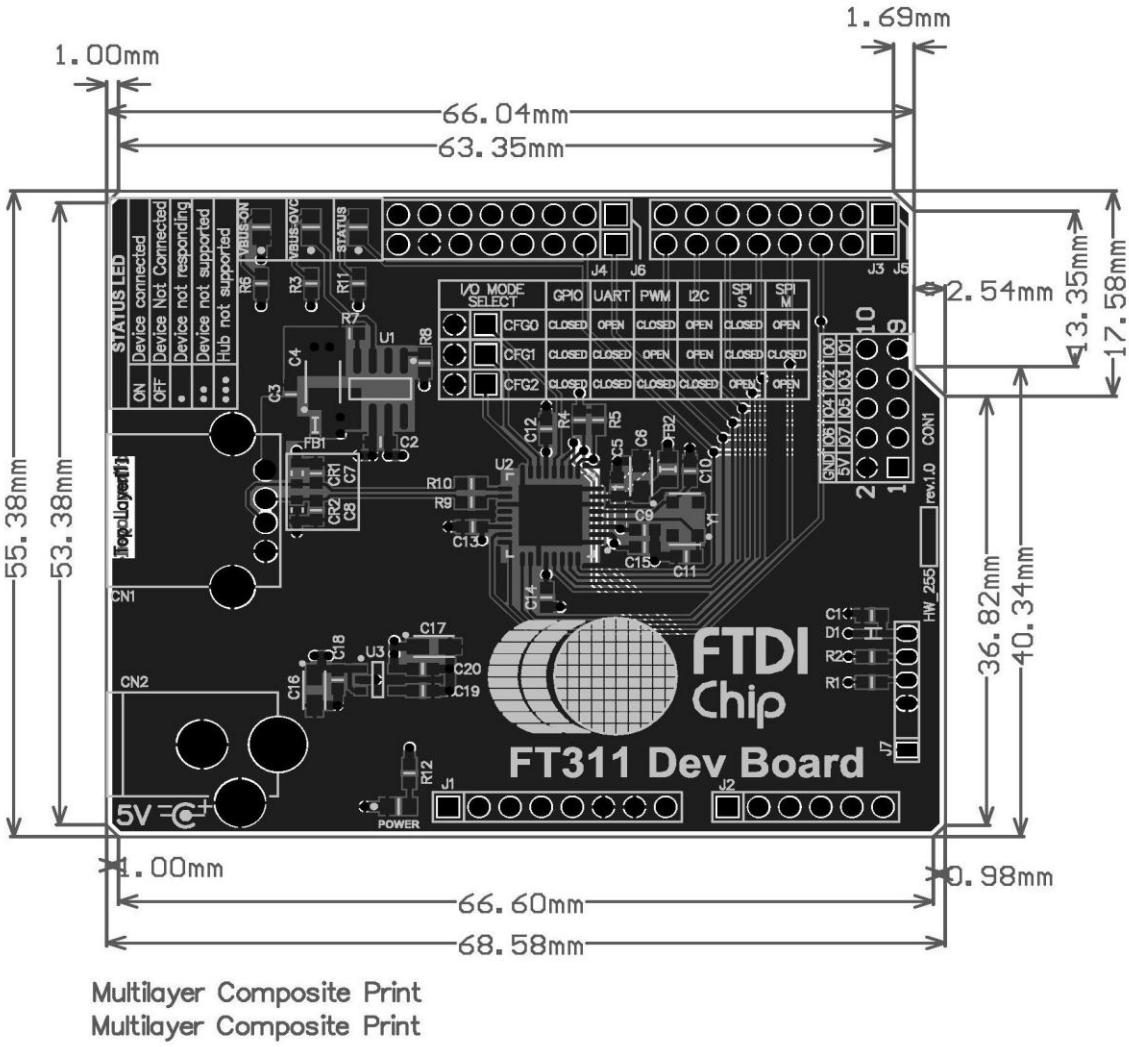

Figure 3.1 : FT311D Development Module Layout

Note: This is not compatible with Vinco electrically. The placement of the the pin headers are similar to the Vinco headers.

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4 Detailed Description of Interface

The defined operation of the FT311D IC is configured using 3 GPIO pins, as shown in the table 4.1. These GPIO pins define the interface mode required which in turn defines the IO signalling available on the module connector CON1. This information is available in the FT311D Datasheet

Signal Name	Jumper selection	FT311D pin Number	I/O Type	Description
CONFIG2	JP1	15	Input	Configuration input 2
CONFIG1	JP2	14	Input	Configuration input 1
CONFIG0	JP3	12	Input	Configuration input 0

Table 4.1 : Pins used in interface mode selection

CONFIG2 or CONFIG1 or CONFIG0 is at logic 1 when the corresponding jumper is not present and at logic 0 when the corresponding jumper is present.

4.1 Interface Mode selection

The interface mode selection is done using the CONFIG[2-0] pins. The CONFIG[2:0] pins have to be set at this value before the chip is powered on.

Interface Mode	Selection of Interface Mode		
	CONFIG2	CONFIG1	CONFIG0
GPIO	0	0	0
UART	0	0	1
PWM	0	1	0
I2C Master	0	1	1
SPI Slave	1	0	0
SPI Master	1	0	1

Table 4.2 : Selection of Mode

4.1.1 GPIO Mode

In the GPIO mode the GPIO signals are available at the connector CON1, J3 and J4 as shown in the table 4.3 below.

Signal Name	Connector CON1	Connector J3, J4	FT311D pin Number	I/O Type	Description
GPIO(0)	CON1 -10	J3-3	23	IO	GPIO data bit 0, bidirectional
GPIO(1)	CON1 -9	J3-4	24	IO	GPIO data bit 1, bidirectional
GPIO(2)	CON1 -8	J3-5	25	IO	GPIO data bit 2, bidirectional

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GPIO(3)	CON1 -7	J3-6	26	IO	GPIO data bit 3, bidirectional
GPIO(4)	CON1 -6	J3-7	29	IO	GPIO data bit 4, bidirectional
GPIO(5)	CON1 -5	J3-8	30	IO	GPIO data bit 5, bidirectional
GPIO(6)	CON1 -4	J4-1	31	IO	GPIO data bit 6, bidirectional

Table 4.3 : GPIO mode

4.1.2 UART Mode

In the UART mode the UART signals are available at the connector CON1 and J3 as shown in the table 4.4 below.

Signal Name	Connector CON1	Connector J3	FT311D pin Number	I/O Type	Description
UART_TXD	CON1 -10	J3-3	23	Output	Transmit data
UART_RXD	CON1 -9	J3-4	24	Input	Receive data
UART_RTS#	CON1 -8	J3-5	25	Output	Request to Send Control Output / Handshake signal.
UART_CTS#	CON1 -7	J3-6	26	Input	Clear to Send Input / Handshake signal.
UART_TX_ACTIVE	CON1 -6	J3-7	29	Output	Enable transmit data for RS485 designs

Table 4.4 : UART mode

Note: # - Denotes active low signal

4.1.3 PWM Mode

In the PWM mode the PWM signals are available at the connector CON1 and J3 as shown in the table 4.5 below.

Signal Name	Connector CON1	Connector J3	FT311D pin Number	I/O Type	Description
PWM(0)	CON1 -10	J3-3	23	Output	PWM channel 0
PWM(1)	CON1 -9	J3-4	24	Output	PWM channel 1
PWM(2)	CON1 -8	J3-5	25	Output	PWM channel 2
PWM(3)	CON1 -7	J3-6	26	Output	PWM channel 3

Table 4.5 : PWM mode

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4.1.4 I2C Master Mode

In the I2C Master mode the I2C Master signals are available at the connector CON1 and J3 as shown in the table 4.6 below.

Signal Name	Connector CON1	Connector J3	FT311D pin Number	I/O Type	Description
I2C_CLK	CON1 -10	J3-3	23	Output	I2C clock
I2C_DATA	CON1 -9	J3-4	24	IO	I2C Data

Table 4.6 : I2C Master mode

4.1.5 SPI Slave

In the SPI Slave mode the SPI Slave signals are available at the connector CON1, J3 and J4 as shown in the table 4.7 below.

Signal Name	Connector CON1	Connector J3, J4	FT311D pin Number	I/O Type	Description
SPI_S_SS#	CON1 -7	J3-6	26	Input	SPI slave chip select
SPI_S_CLK	CON1 -6	J3-7	29	Input	SPI CLK Input
SPI_S_MOSI	CON1 -5	J3-8	30	Input	SPI Master out slave in
SPI_S_MISO	CON1 -4	J4-1	31	Output	SPI Master in slave out

Table 4.7 : SPI Slave mode

Note: # - Denotes active low signal

4.1.6 SPI Master

In the SPI Master mode the SPI Master signals are available at the connector CON1, J3 and J4 as shown in the table 4.8 below.

Signal Name	Connector CON1	Connector J3, J4	FT311D pin Number	I/O Type	Description
SPI_M_SS#	CON1 -7	J3-6	26	Output	SPI slave chip select
SPI_M_CLK	CON1 -6	J3-7	29	Output	SPI CLK Output
SPI_M_MOSI	CON1 -5	J3-8	30	Output	SPI Master out slave in
SPI_M_MISO	CON1 -4	J4-1	31	Input	SPI Master in slave out

Table 4.8 : SPI Master mode

Note: # - Denotes active low signal

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5 Schematics

Schematic for the FT311D Development Module is shown in the figure below.

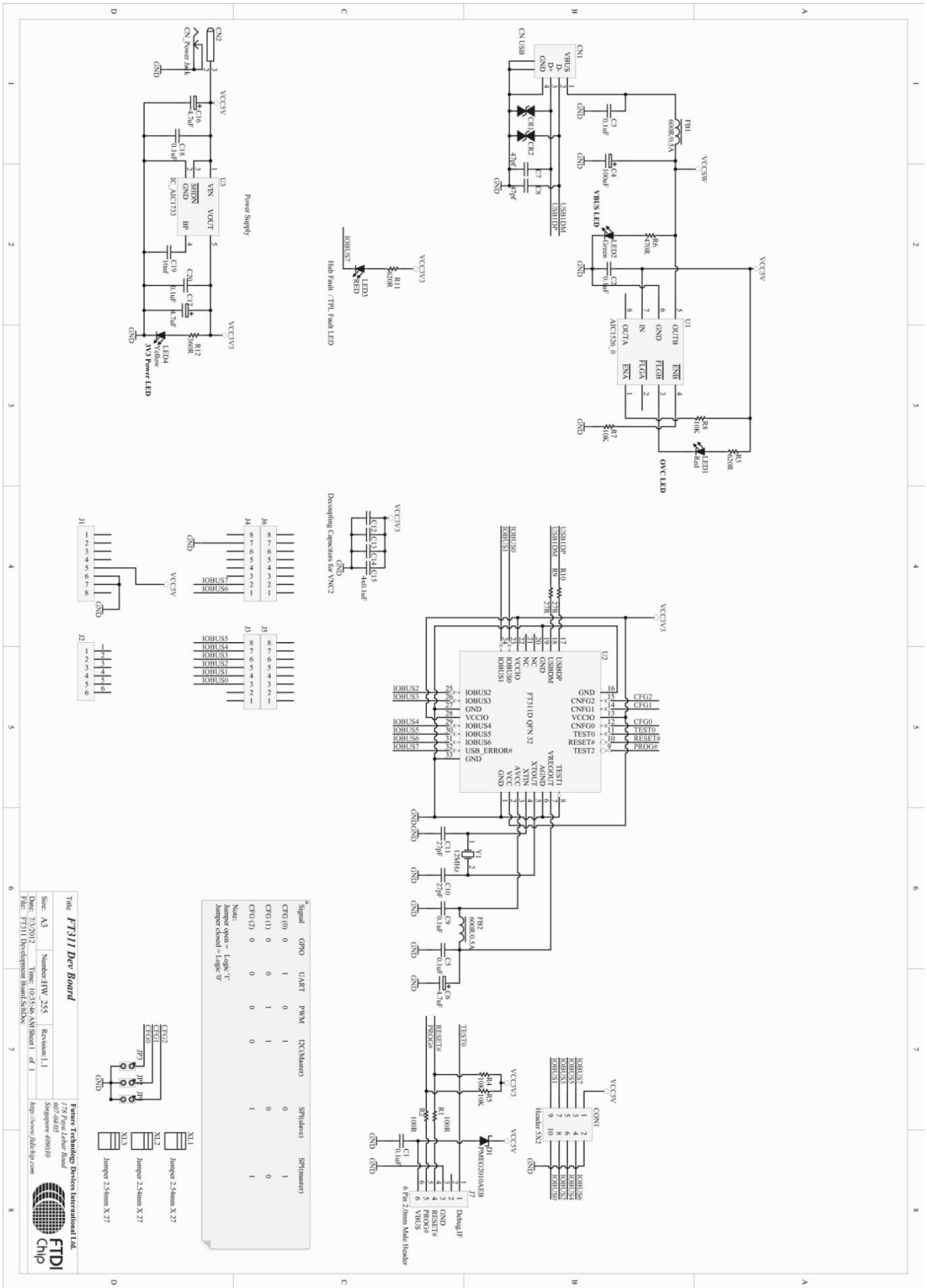

Figure 5.1 : FT311D Development Module Schematics

6 Absolute Maximum Ratings

The absolute maximum ratings for FT311D Development Module are shown in

Parameter	Value	Unit
Storage Temperature	-65°C to 150°C	Degrees C
Ambient Temperature (Power Applied)	-40°C to 80°C	Degrees C.
Recommended Operating Temperature	0°C to 55°C	Degrees C.
Vcc Supply Voltage	0 to +5.25	V
DC Input Voltage - All other Inputs	-0.5 to +3.3	V

. These are in accordance with the Absolute Maximum Rating System (IEC 60134). Exceeding these may cause permanent damage to the device.

Parameter	Value	Unit
Storage Temperature	-65°C to 150°C	Degrees C
Ambient Temperature (Power Applied)	-40°C to 80°C	Degrees C.
Recommended Operating Temperature	0°C to 55°C	Degrees C.
Vcc Supply Voltage	0 to +5.25	V
DC Input Voltage - All other Inputs	-0.5 to +3.3	V

Table 6.1 : Absolute Maximum Ratings

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Appendix A – References

Useful Application Notes

FT311D Datasheet

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Appendix C - Revision History

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