FUSB303B Evaluation Board User's Manual

FUSB303BGEVBUM

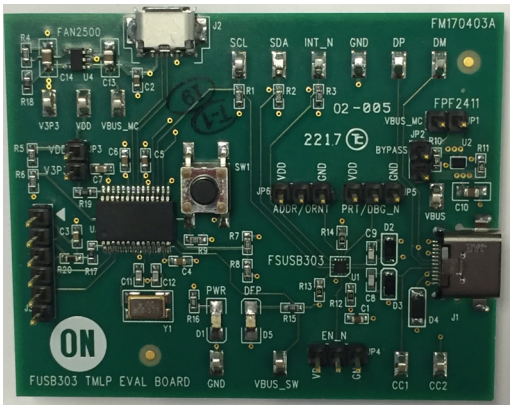

Figure 1. FUSB303B Evaluation Board

Introduction

The FUSB303B evaluation board and included software allows customers a complete platform to evaluate the Type−C™ interface detection solution the FUSB303B provides. The evaluation board is designed for both stand−alone operation and connection to test equipment for specific testing requirements. With a single connection to a PC and using the FUSB303B GUI (Graphical User Interface), or with just a power supply, the evaluation board can be configured and function as a Source, Sink, or DRP device with Accessory detection support.

Description

The FUSB303B device is a fully autonomous USB Type−C™ controller optimized for 15 W or less applications. The FUSB303B offers CC logic detection for Source Port role, Sink Port role, DRP Port role, and accessory detection support, as well as Dead Battery support as defined in USB−C specifications. The FUSB303B features configurable I^2C address to support multiple ports per system or it can operate autonomously configured by just pins. The FUSB303B features ultra−low power during operation and an ultra−thin, 12 Lead QFN package.

Features

- Fully Autonomous USB Type−C™ Port Controller
- Supports USB Type−C™ Specification Release 1.2
- Source, Sink, and DRP Port role Configuration with Optional Accessory Support
- Try.SRC and Try.SNK modes for Preferring Source Role or Sink Role Respectively
- V_{DD} Operating Range: 2.7 V – 5.5 V
- Typical Low Power Operation: I_{CC} < 10 μA
- GPIO and I^2C Configurable
- Dead Battery Support (Sink Port role when No Power Applied)
- 4 kV HBM ESD Protection for Connector Pins
- Small Packaging: 12 Lead QFN (1.6 mm x 1.6 mm x 0.375 mm)

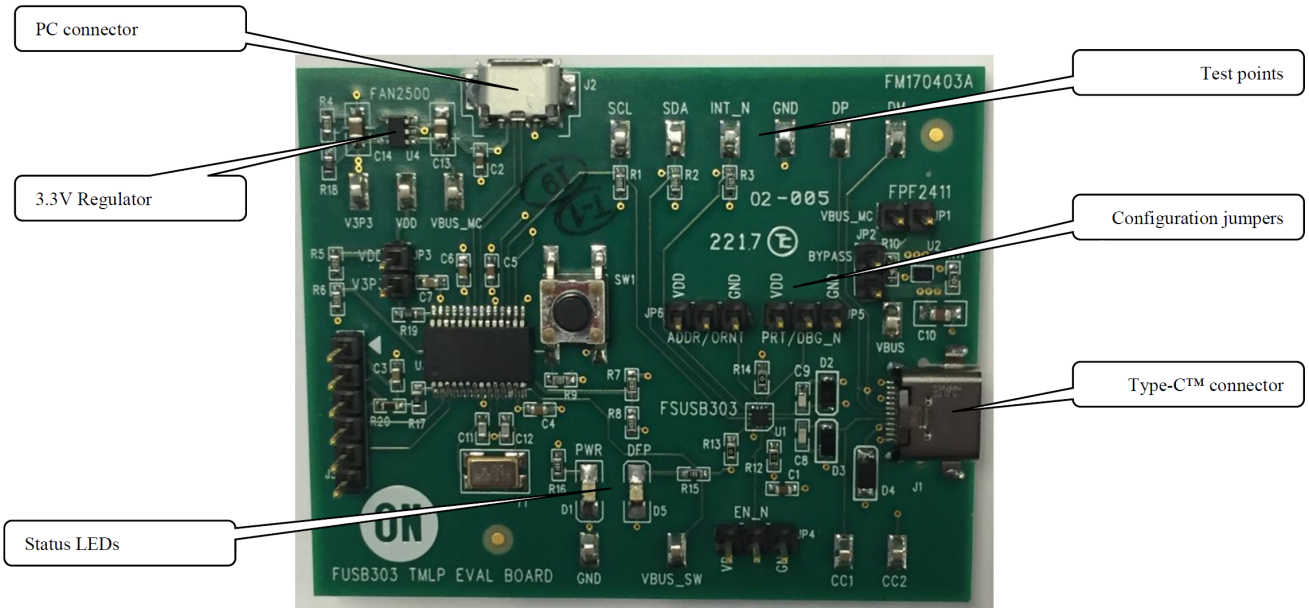

Figure 2. Evaluation Board Layout

APPLICATIONS INFORMATION

Power Configuration

The FUSB303B evaluation board is designed to be powered from just the PC connection or powered externally based on testing requirements.

Power Supplied From Board

The FUSB303B can fully operate from the VBUS input of the micro−B USB receptacle J2. To operate the evaluation board, the USB power should be provided to the board over the micro−B USB connector. Then, the on−board regulator generates VDD, which is 3.3V for the device supply. Once valid USB power is provided, the indicator LED, “PWR”, will be turned on.

I²C Communication

Communication with the FUSB303B, when in I²C mode, is done through I²C accesses. The evaluation board allows for different ways of connecting I²C masters to the FUSB303B.

Direct I²C Connection

Customers that want to directly control their I²C masters to the evaluation board can connect the I²C master signals to the SCL, SDA, and INT_N test points. The evaluation board has 10 kΩ pull−ups to VDD, which is 3.3 V, on each of these signals.

PC I²C Connection

The evaluation board uses a PIC32MX250F128 microcontroller as an I²C master to control the FUSB303B when it is configured as an I²C slave. This is the communication method used by the FUSB303B GUI. By connecting the PC to the micro−B USB receptacle, J2, the evaluation board automatically powers the microcontroller and connects the I²C master to the FUSB303B.

Type−C™ Signal Connections

The FUSB303B evaluation board allows different ways of connecting to another Type−C™ device or controlling the signals of the Type−C™ receptacle based on the type of testing that is required.

CC Pins

The Type−C™ CC1 and CC2 pins are directly connected to the Type−C™ receptacle, J1, on the board. There is also a test point for each pin that can be used to connect the CC pins externally. Note that the FUSB303B evaluation board contains the minimum cReceiver capacitance specified in the USB PD specification for the CC pins which is 200 pF. This capacitance is C8 and C9 in the schematic.

VBUS

VBUS is used differently based on the Type−C™ port type. As a device/UFP port, VBUS is directly connected to the Type−C™ receptacle, J1, and the VBUS test point located near J1. As a host/DFP port, VBUS can be supplied to the receptacle, J1, and controlled by the FUSB303B device. When connected to a PC, VBUS is supplied from the micro−B USB connection. The FUSB303B controls an on−board load switch, the FPF2411 or U2, for enabling of VBUS to the Type−C™ receptacle, J1.

VCONN

VCONN is not supplied nor managed on the evaluation board.

USB2.0 and SBU

The USB2.0 and SBU signals are left open in the Type−C™ connector and no connections on the board.

Table 1. STATUS LEDS

LED ID	LED Name	Description
D1	PWR	VDD is supplied to FUSB303B and microcontroller
D5	DFP	FUSB303B is Source Port role

Table 2. CONFIGURATION JUMPERS

Jumper ID	Jumper Name	Description
JP1	VBUS_MC	Connects VBUS to FPF2411 load switch
JP2	BYPASS	Bypasses the FPF2411 load switch
JP3	VDD/V3P3	Connects V3P3 supply to VDD rail (for FUSB303B VDD, I^2C pull−ups, and GPIO pull−ups)
JP4 (Note 1)	EN_N	Configures FUSB303B EN_N Input When JP6 = HI or LO (I^2C mode) • EN_N is ignored When JP6 = float (GPIO mode) • Float = FUSB303B disabled • HI = FUSB303B disabled (not required because of internal pullup) • LO = FUSB303B enabled
JP5 (Note 1)	PRT/DBG_N	Configures the FUSB303B PORT/DEBUG_N input When JP6 = HI or LO (I^2C mode) • PRT/DBG_N is ignored When JP6 = float (GPIO mode) • Float = port type is DRP • HI = port type is SRC only • LO = port type is SNK only
JP6 (Note 1)	ADDR/ORNT	Configures the FUSB303B ADDR/ORIENT input When JP6 = HI or LO (I^2C mode) • LO = I^2C 7−bit address is 21h (42h >> 1) • HI = I^2C 7−bit address is 31h (62 >> 1) When JP6 = float (GPIO mode) • GPIO mode; no I^2C access

1. Refer to FUSB303B datasheet for more details on these signals

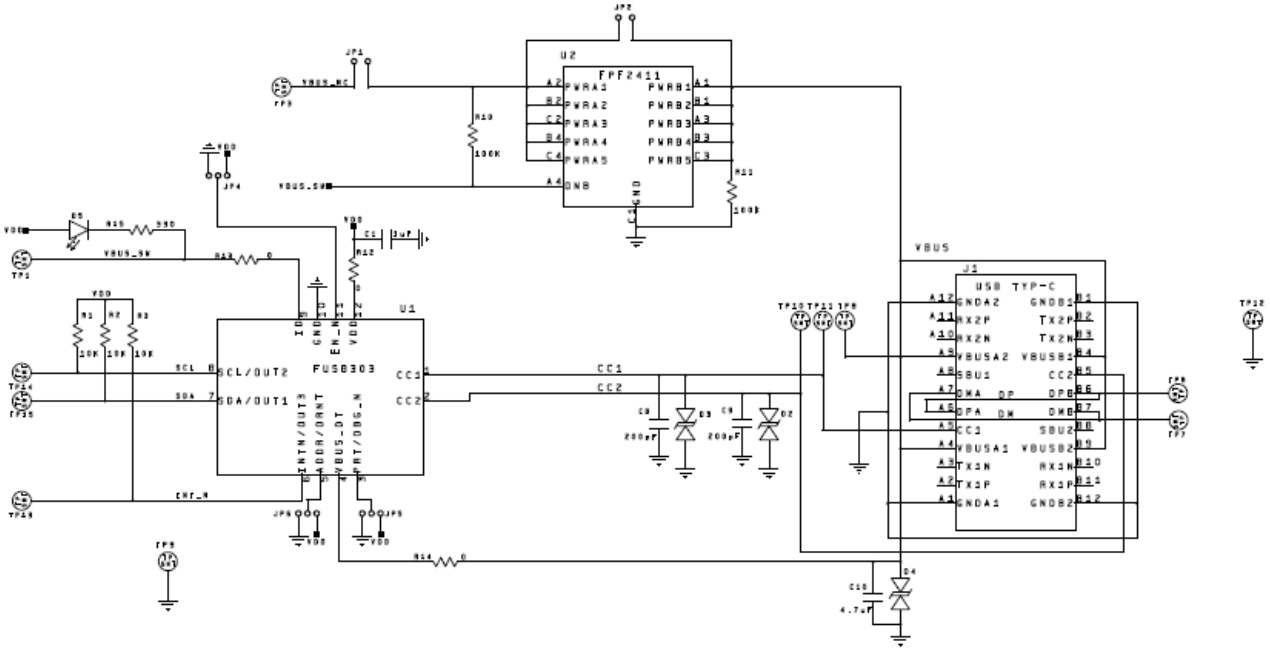

Figure 3. FUSB303B Evaluation Board FM170403A Schematic (1/2)

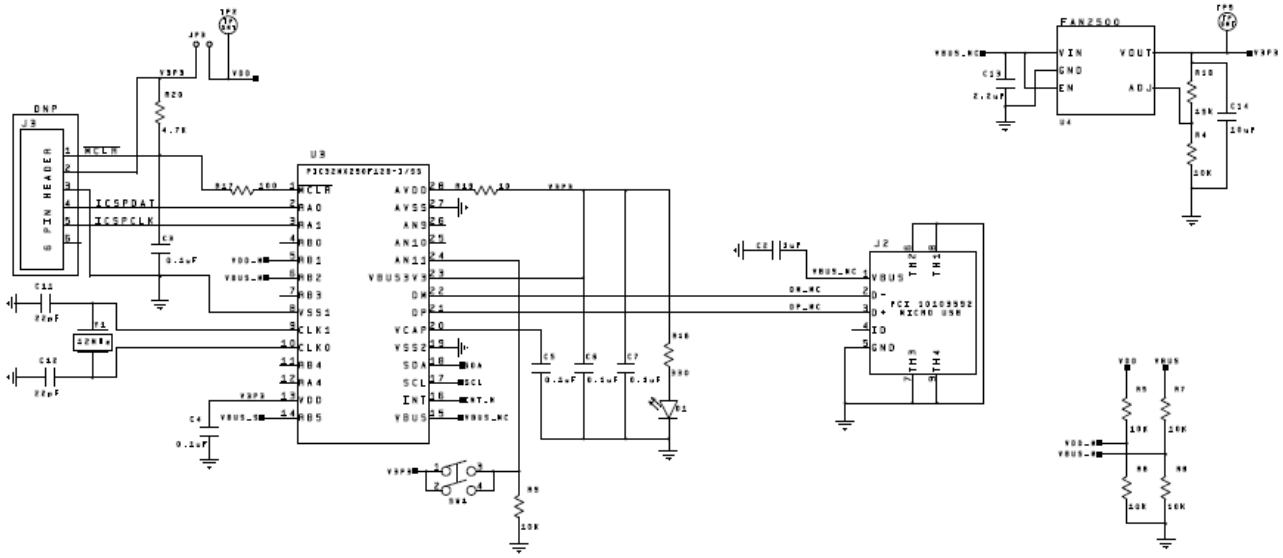

Figure 4. FUSB303B Evaluation Board FM170403A Schematic (2/2)

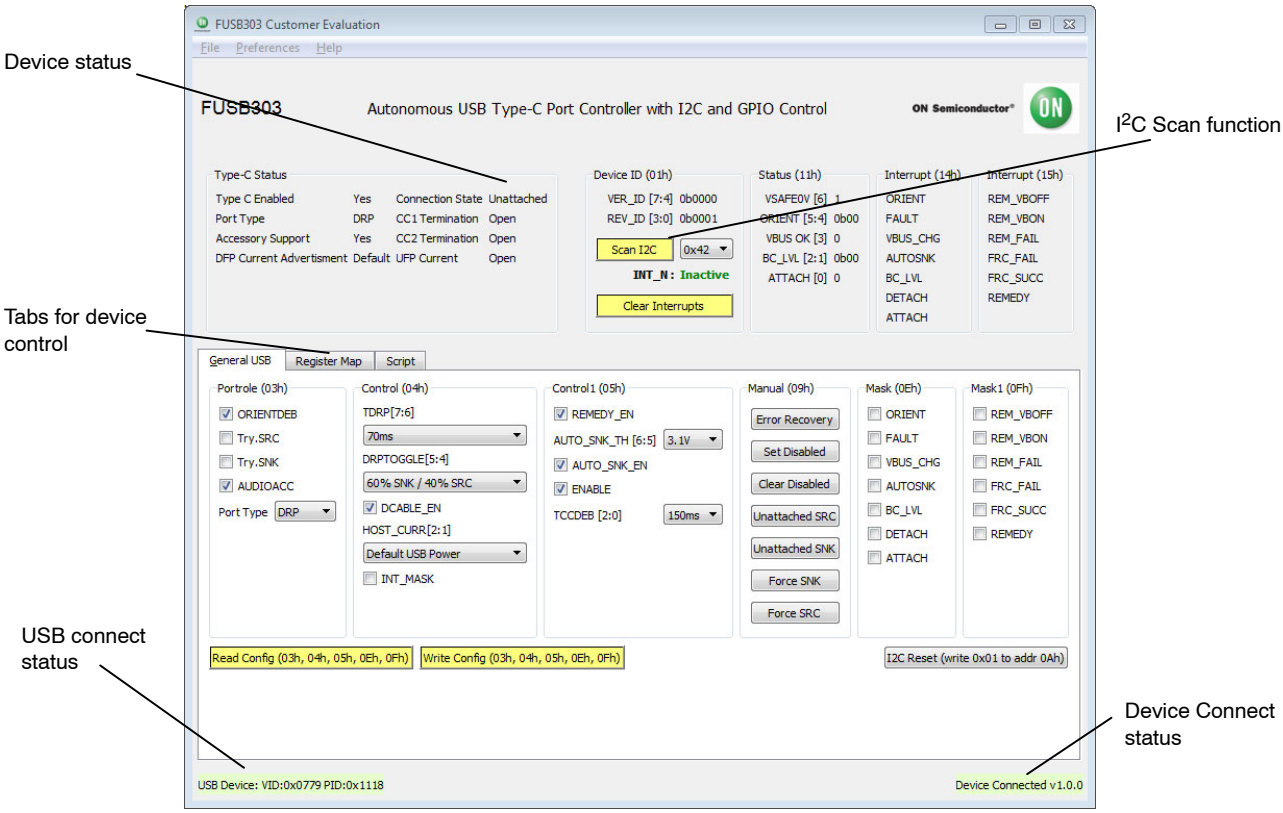

Figure 5. FUSB303B GUI Layout

GUI Installation

The FUSB303B GUI requires no special installation procedure. After requesting and receiving the download link for the GUI, download the archived GUI. Then extract the GUI file to an installation location on the PC.

GUI Startup

Double−click on the FUSB303B GUI executable to run the program. Plug the STD−A end of the USB cable into the USB port of your PC. Plug the micro−B end of the USB cable into the GUI interface, J2, on the evaluation board.

The “PWR” LED will illuminate if properly connected. Wait for the USB port to connect with a message in the lower left hand corner of the GUI that states “USB Device: VID: 0x0779 PID: 0x1118” highlighted in green. If the message background remains red and states “Disconnected”, then there is a connection problem.

Automatic FUSB303B EVB I²C Address Detection

Before connecting the FUSB303B EVB to the GUI, the GUI will display a message in the lower right hand corner that states “No Device” highlighted in red. When the FUSB303B EVB is connected to the PC, the GUI will scan the FUSB303B EVB for its I2C address. Then the GUI will change the message in the lower right hand corner to state “Device Connected: v1.0.0” highlighted in green (possibly a different version number if the EVB firmware gets updated in the future). If the EVB is not detected, try clicking the “Scan I²C” button in the top, middle of the GUI (Figure 4) to see if this resolves the I²C address and connects.

GUI Dropdown Menus

- File
  - Click “Exit” to quit
- Preferences
  - Click “Auto Poll” to have the GUI constantly poll the FUSB303B EVB status
- Help
  - Click “About” to see the version of the GUI

FUSB303B EVB Status

When in “Auto Poll” mode, the FUSB303B GUI will constantly poll the FUSB303B EVB for various status and information. This information is displayed in the Type−C Status, Device ID, Status, and Interrupt sections across the top of the GUI.

General USB Tab

This tab allows you to read the current configuration of the FUSB303B with the Read Config button. It also allows you to change the configuration of the FUSB303B with the Write Config button. And the I2C Reset button allows you to reset the FUSB303B to its default configuration. Each section of the General tab correlates to a register of the FUSB303B and is described in the Register Definitions section of the FUSB303B datasheet.

Register Map Tab

This tab allows you to read or write any value to any register in the FUSB303B. When performing a register write, the selected register/registers is/are read back again to confirm the write action. So the write button actually performs a write then read function.

Script Tab

This tab enables the use of scripts to configure the FUSB303B. Scripts can be added through the GUI using the editing window on the left of the tab. This edit window allows for normal copying and pasting to or from any text file if you want to save or copy your scripts from external files. Each line of the script should be formatted as follows:

Command, port, I²C addr, # bytes, register addr, data1, …, dataN, optional comment

The *Command* is: “r” or “w”

The *port* is always 0

The *I²C addr* is either 0x42, 0x4A, 0x62, or 0x6A

The *# bytes* is the number of bytes to read or write

The *register addr* is the starting register address

The *data1* through *dataN* are for writing values to registers

And *optional comment* is just informational

Each field can be separated with a space (“ ”), a comma (“,”), or a semicolon (“;”).

An example of reading from 3 consecutive registers:

r 0 0x42 3 0x04 ; read 3 bytes starting at PORTROLE

An example of writing to 2 consecutive registers:

w 0 0x42 2 0x0E 0x22 0x55 ; write 2 bytes starting at MASK

The Execute button will run all the lines of the script.

The Step button will execute the highlighted line.

The Loop feature will loop the entire script up to 99 times. Setting Loop count to 0 will loop indefinitely.

Results of the executed script are shown in the box on the right side of the tab. These results can be copied and pasted to an external file.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:
Technical Library: www.onsemi.com/design/resources/technical−documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support
For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales