FUSB251GEVB

FUSB251 - Type-C CC and SBU Protection IC Evaluation Board User's Manual

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EVAL BOARD USER'S MANUAL

APPLICATIONS BOARD DIAGRAM

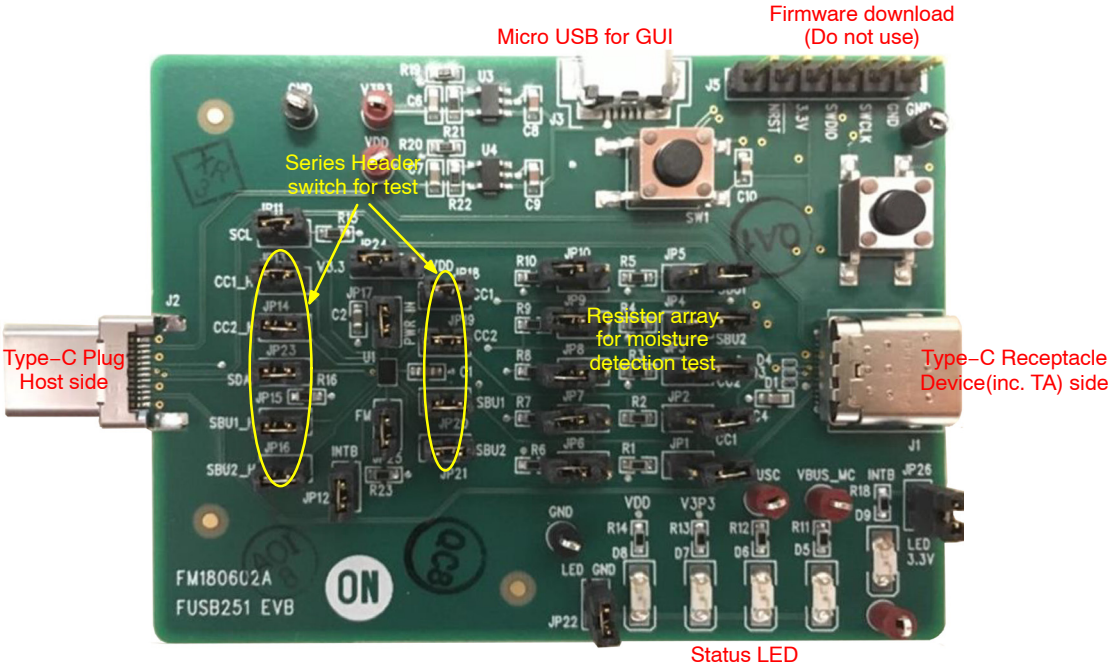


Figure 1. Applications Board Diagram

Power Configuration

The FUSB251 evaluation board was designed to get power from PC connection or powered externally based on the testing requirements. VBUS from micro−USB(J3) generates V3P3 through the regulator(U3) and also VDD is generated by U4. So, in case separate external power is needed on the VDD, connect to the middle pin of JP24 which is FUSB251 VDD pin connected. JP24 is located upper of FUSB251.

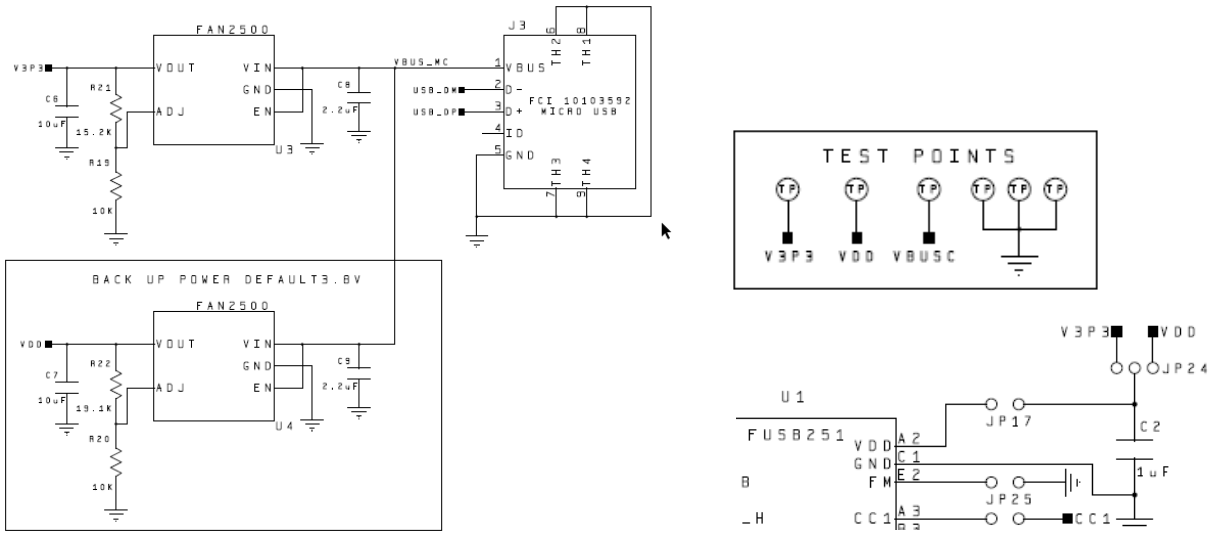


Figure 2.

Micro USB Connector and LED

The FUSB251 can fully operate from the VBUS input of the micro−B USB receptacle J3. To operate the evaluation board in this mode, just connect micro USB connector to J3, then V3P3 LED will be turned on. Also, VDD and VBUS_MC LED will be turned on. JP22 header in below schematics was prepared for turning off LED if it's not needed. VBUSC is turned on when Vbus in Type−C port has voltage.

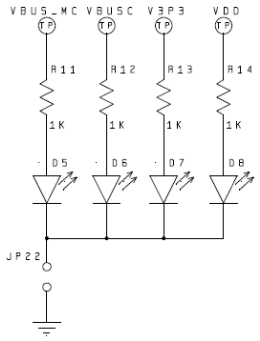


Figure 3.

FUSB251 Peripheral Block

The FUSB251 reference schematics is in below. CC1/2 connect to Type−C receptacle which will connect to devices (ie. DRP, Charger or Sink device), CC1/2_H face to host system (Type−C plug connector in this EVB). SBU is the same. FM (Factory Mode) pin can be left open or tie to GND. If it's left open (float) by removing header pin of JP25, the FM to SBU1 switch path is closed automatically after Power on reset or Device reset. SBU2 switch path will be open in the case. If FM pin connects to GND, SBU1/2 switch are closed to SBU1/2_H in default after device reset. The CAP pin is for IEC ESD protection, please add 0.1 μF or 1 μF capacitor. 50 volt rating capacitor is recommended because CAP pin is internally connected to CC and SBU through diode and there can be large voltage spike over 40 volt on top of 20 volt DC in case of surge event. INTB is open drain output which needs an external pull up (ex. 4.7 kΩ) to V3P3, same on SCL/SDA. Many header pins next to FUSB251 have to be populated

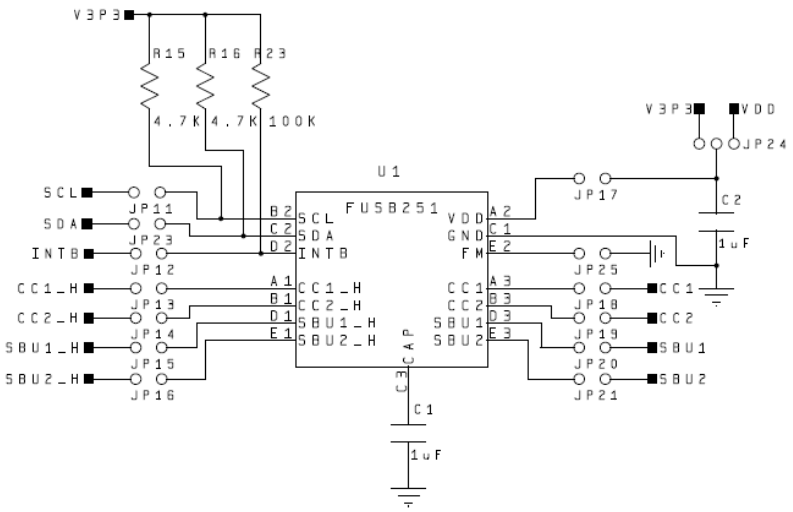


Figure 4.

Moisture Detection Test

As mentioned above, CC1/2 are for Type−C connector side (it connects to Type−C receptacle in this EVB), CC1/2_H face to Type−C/PD controller (Type−C plug in this EVB. In the board, other than CC1/2 and SBU1/2, all other signals such as DP/DM and SS signals are directly connected between Type−C receptacle and plug J1 and J2. Also, VBUS directly connects each other but there is VBUSC TP to monitor VBUS during moisture test.

For moisture detection test, there are test resistors between CC1/2, SBU1/2 and GND. Each CC and SBU signal path can be connected to the other signals through the resistor as well as GND. If real moisture test is needed, do not populate header pins from JP1 to JP10. Then, CC1/2 and SBU1/2 signals directly connect to Type−C receptacle (J1). The resistor value in the board is 300 kΩ as an moisture example.

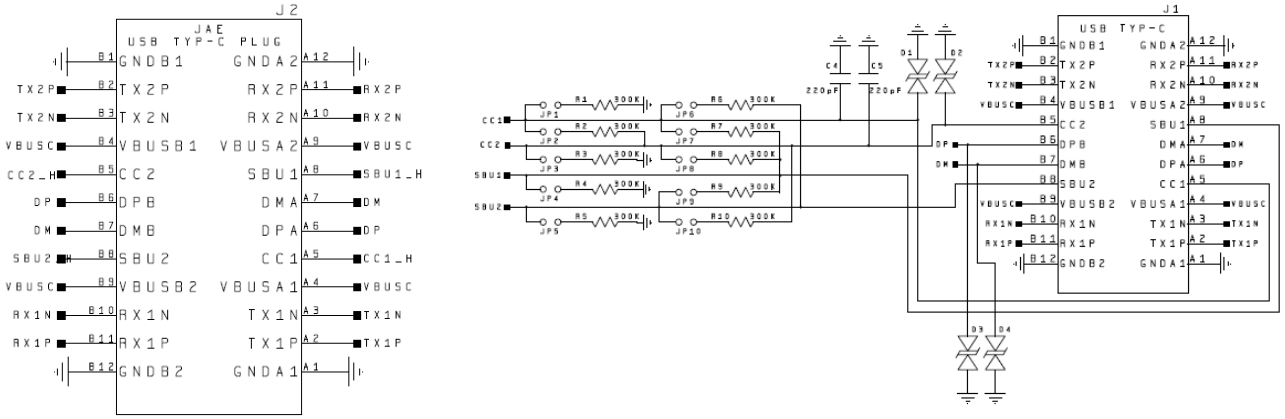


Figure 5.

I²C Communication

PC communication with the FUSB251 is done through I²C access. The evaluation board allows different ways of connecting I²C masters to the FUSB251.

Direct I²C Connection

Customers who want to directly connect their I²C masters to the evaluation board, they can connect the I²C master signals to the SCL, SDA and INTB test points. To do that, JP11, JP23 and JP12 header pins have to be unpopulated.

PC I²C Connection

The evaluation board has a STM32F072CB micro−controller on bottom side as an I²C master to control the FUSB251. This is the communication method used by the FUSB251 GUI. By connecting the PC to the micro−B USB receptacle J3, the evaluation board automatically powers the microcontroller and connects the I²C master to the FUSB251.

Full Schematics

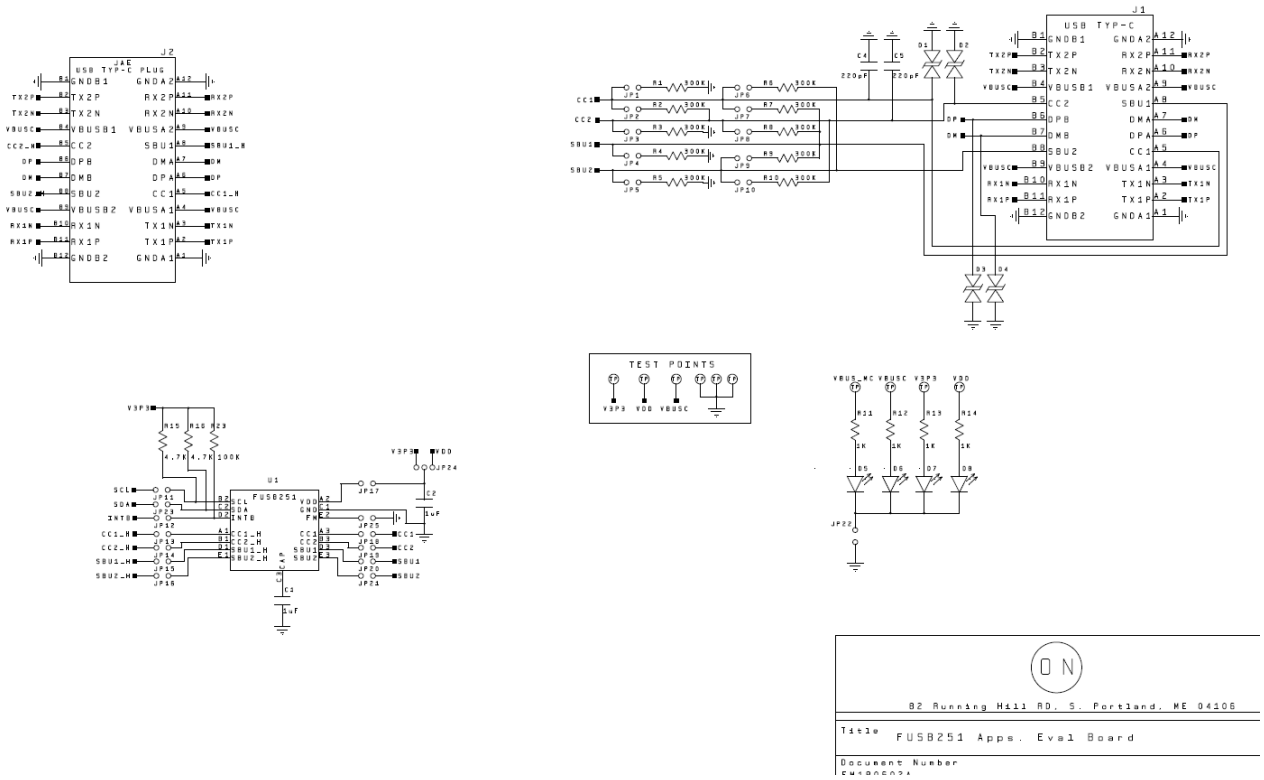


Figure 6.

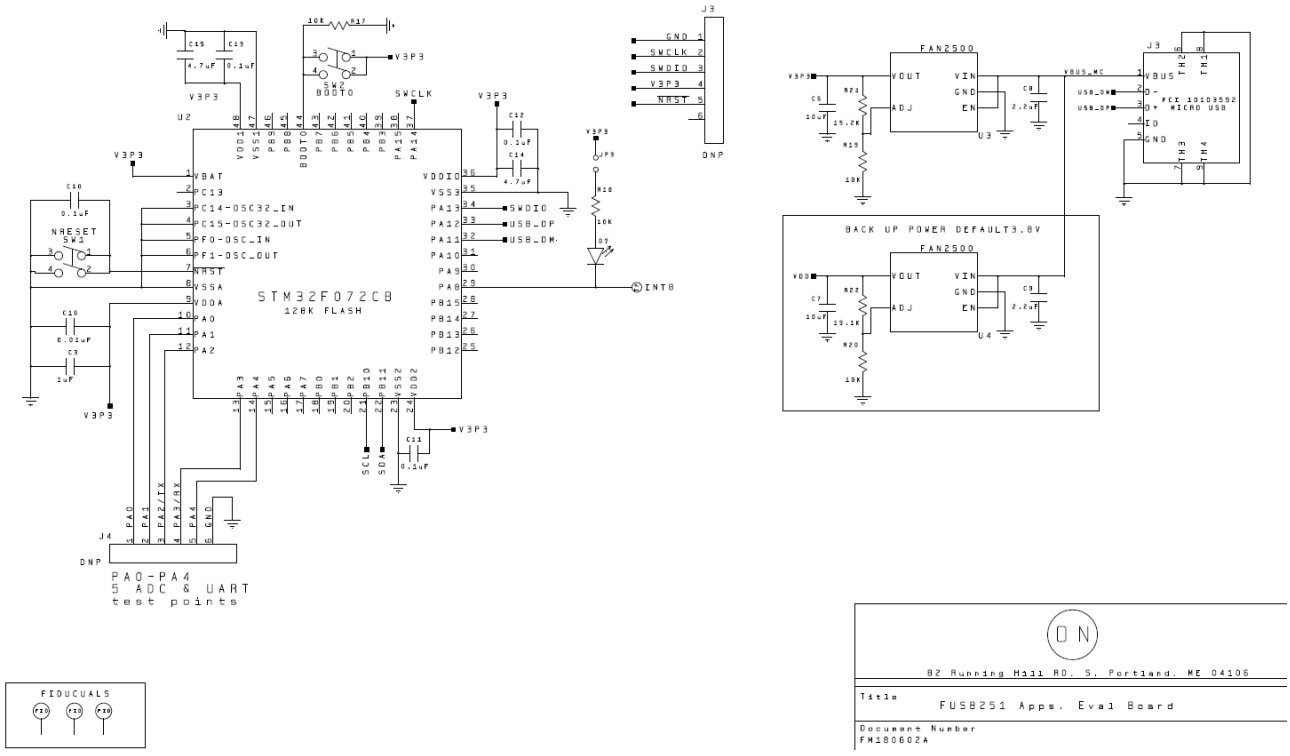


Figure 7.

FUSB251 Evaluation Platform GUI Configuration

GUI Installation

1. Locate and run the file “FUSB251_GUI.exe”. This file itself is an executable file and does not install additional software.
2. Plug the Micro−B end of the USB Cable into the GUI Interface J3 on the Evaluation Board. V3P3, VDD and VBUS_MC LEDs will illuminate if properly connected.
3. 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” and the message background should be green. And the right corner, there will be version number with device connection information, “Device Connected v4.0.0”.

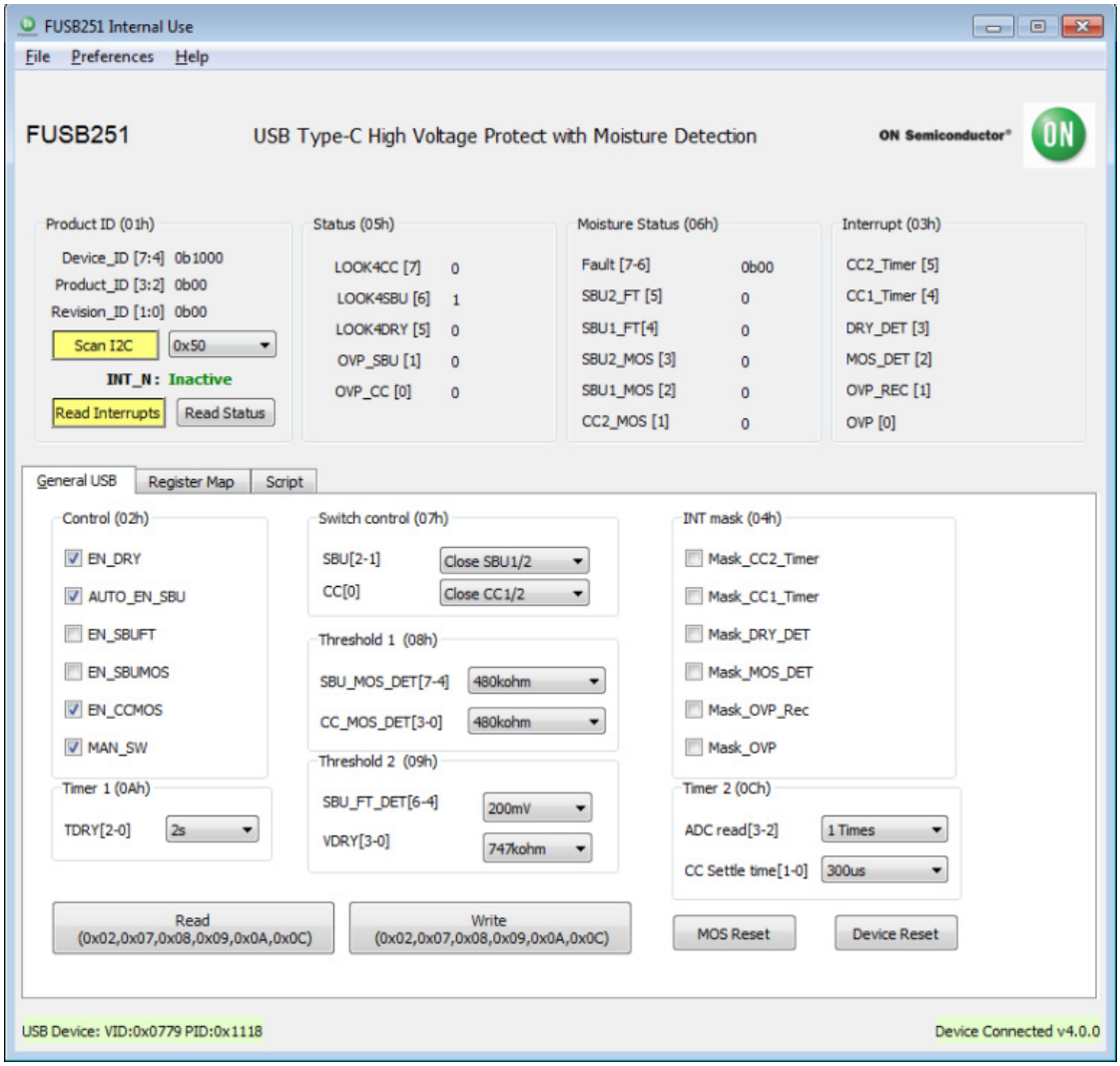
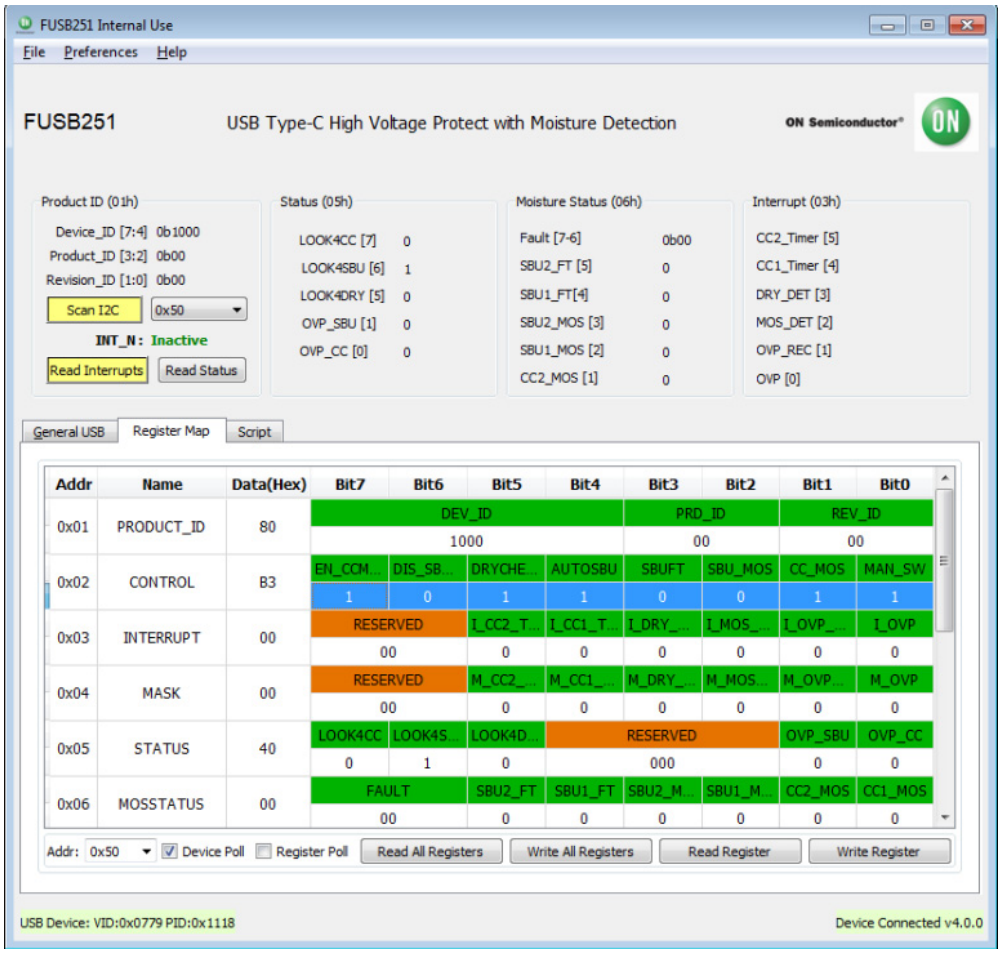


Figure 8.

GUI Control

1. Moisture detection can be enabled by setting the checkbox in the Control group or writing the bits directly in the register map. Once moisture detection is enabled, the Status is updated. For example, If CC moisture detection is enabled, LOOK4CC bit will be enabled in the Status. And then if Type−C accessory is attached without moisture, the Status will change to LOO4SBU and Interrupt will occur with Timer expire by CC toggle stop, CC moisture detection stops and transits to SBU float voltage detection.
2. If moisture is detected during CC or SBU moisture detection, moisture status is updated in the MOS Status depending on moisture location. Also Status register is updated because there is no further monitoring on moisture, and if Auto_DRY_EN was enabled, the status will change to LOOK4DRY. Interrupt register will be set as well as INTB falling low. INTB will go high again by reading the Interrupt register.
3. When moisture was detected and later, if DRY condition is detected, to restart moisture detection, disable all moisture detections and set the moisture detection again. The other way is using MOS Reset, setting MOS Reset bit will reset moisture detection state machine and re−start by enable the moisture detection.



Addr	Name	Data(Hex)	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0x01	PRODUCT_ID	80	DEV_ID				PRD_ID		REV_ID	
			1000				00		00	
0x02	CONTROL	B3	EN_CCM...	DIS_SB...	DRYCHE...	AUTOSBU	SBUFT	SBU_MOS	CC_MOS	MAN_SW
			1	0	1	1	0	0	1	1
0x03	INTERRUPT	00	RESERVED		I_CC2_T...	I_CC1_T...	I_DRY_...	I_MOS_...	I_OVP_...	I_OVP
			00		0	0	0	0	0	0
0x04	MASK	00	RESERVED		M_CC2_...	M_CC1_...	M_DRY_...	M_MOS...	M_OVP...	M_OVP
			00		0	0	0	0	0	0
0x05	STATUS	40	LOOK4CC	LOOK4S...	LOOK4D...	RESERVED			OVP_SBU	OVP_CC
			0	1	0	000			0	0
0x06	MOSSTATUS	00	FAULT		SBU2_FT	SBU1_FT	SBU2_M...	SBU1_M...	CC2_MOS	CC1_MOS
			00		0	0	0	0	0	0

Figure 9.

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