FTMSTRV3

FTDI Master Module Version 3 Manual

Document Information

Info	Content
Keywords	FTDI, Isolation, SPI, I2C, UART,
Abstract	This manual describes the hardware and usage of the FTMSTRV3 module.

Revision History

Revision	Date	Description
1.1	11/14/2019	Updated headers and tags
1.0	9/26/2018	First publication.

Table of Contents

1 Introduction

The FTMSTRV3 module is a tool designed to facilitate isolated PC to EVKIT communication over SPI, I2C, or UART. The module provides USB to SPI, I2C and UART translation using the FTDI FT2232D IC. Both data and power isolation are also provided. The module allows for both Host and DUT power options.

1.1 Package Contents

The following are included with the FTMSTRV3:

- FTMSTRV3 PCB

1.2 Safety Warning

WARNING

Lethal voltage and fire ignition hazard

The non-insulated high voltages that are present when operating this product, constitute a risk of electric shock, personal injury, death and/or ignition of fire.

This product is intended for evaluation purposes only. It shall be operated in a designated test area by personnel qualified according to local requirements and labor laws to work with non-insulated mains voltages and high-voltage circuits. This product shall never be operated unattended.

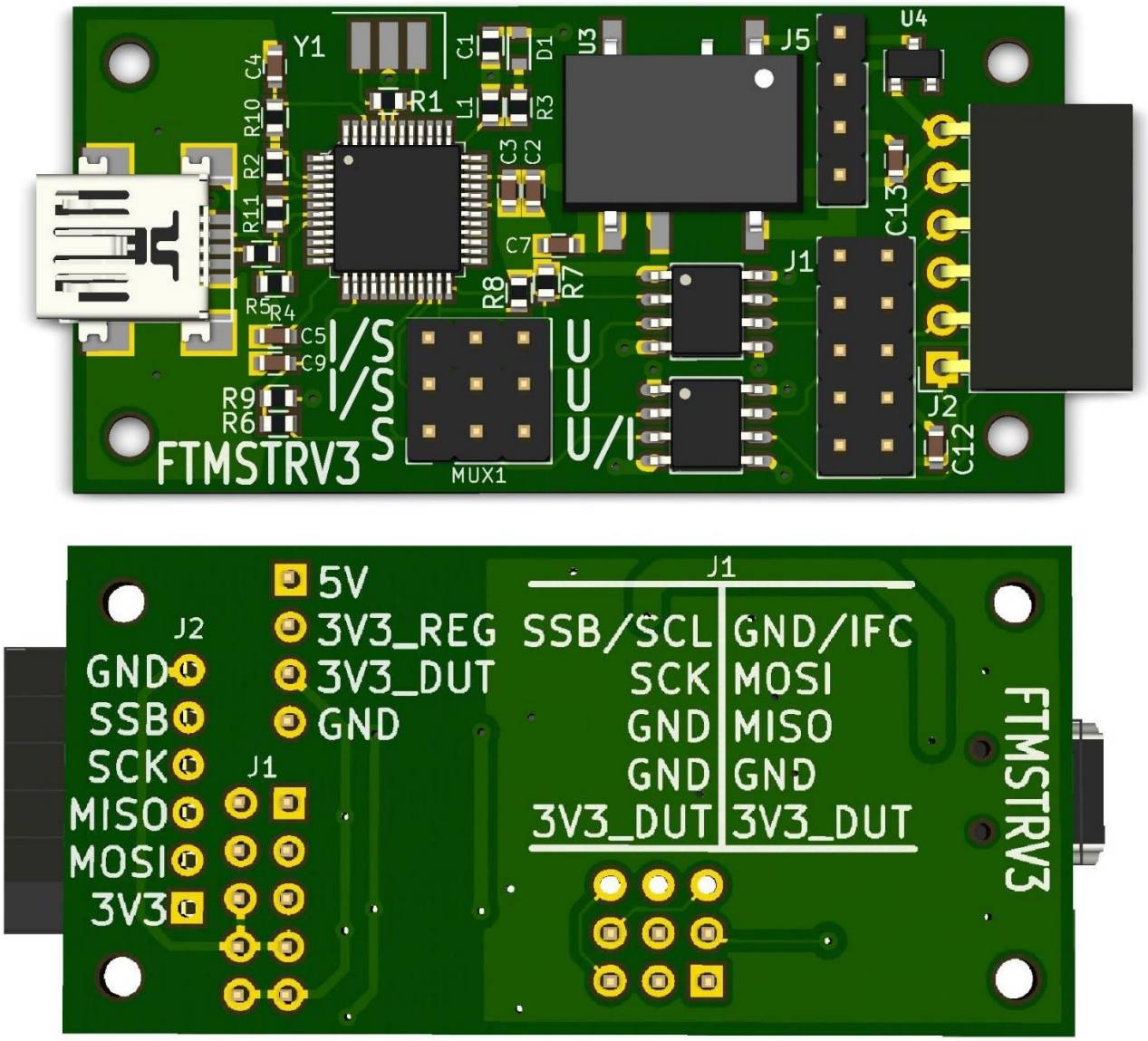
The FTMSTRV3 should not be handled while the DUT is connected to live systems. The PCB has several exposed areas that could pose a danger to the user when connected to live systems. While the PCB provides functional isolation to protect the connected USB device from damage under normal operating conditions in accordance with the minimum isolation rating of the populated isolation components, it is not intended to provide safety guarantees in surge or out of range conditions.

1.3 System Requirements

- Available USB port
- System with support for FTDI FT2232D devices.

2 Usage

Error! Reference source not found. shows the basic connections of the 78M6610+PSU Evaluation Kit for use with external equipment. The shunt adaptor board consists of the host side components necessary for the evaluation environment that would be replaced by the target system. This host board provides a USB serial UART controller, serial interface DC/DC power isolator, a current shunt, and AC wiring terminals.



2.1 Isolation

The following The following figure illustrates the rough isolation areas of the module. The PCB maintains a minimum clearance distance between traces/metal on either side of the isolation domains of 4mm.

Table 1: Isolation Related Components

MFG	MPN	Description
CUI	PDS1-S5-S5-M	DC-DC CONVERTER 5V 1W
Analog Devices	ADUM1201ARZ	DGTL ISO 2.5KV GEN PURP 8SOIC
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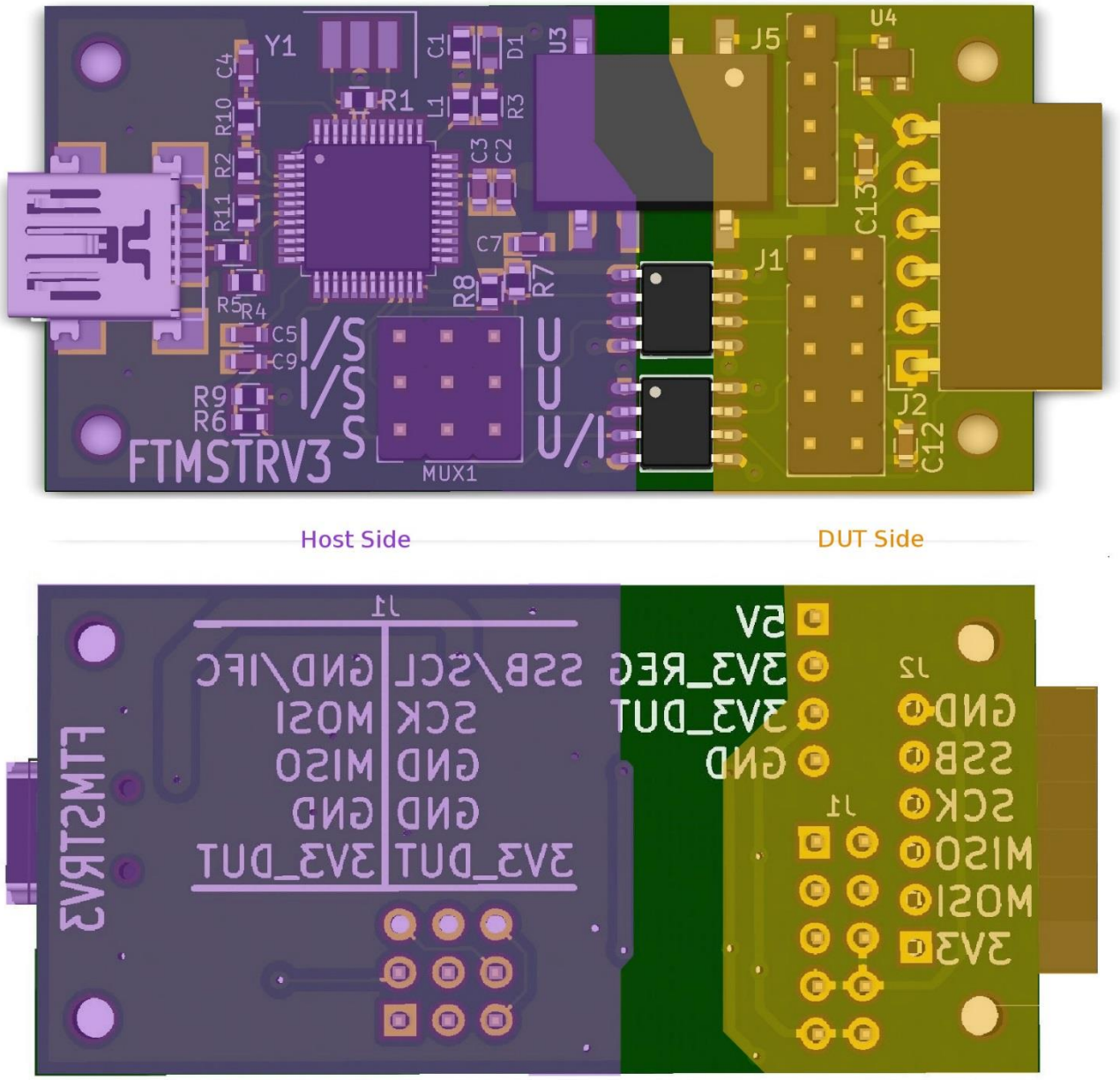
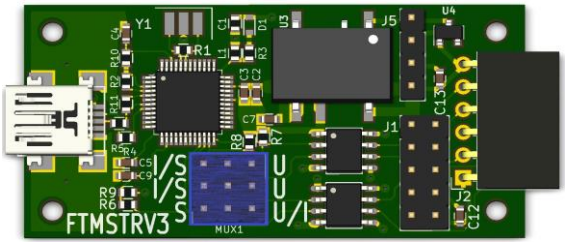
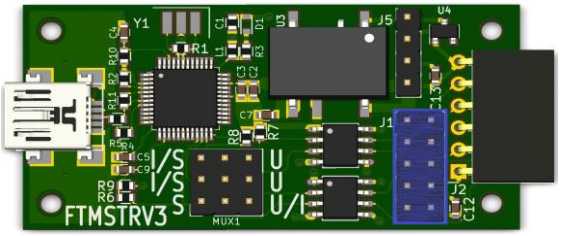
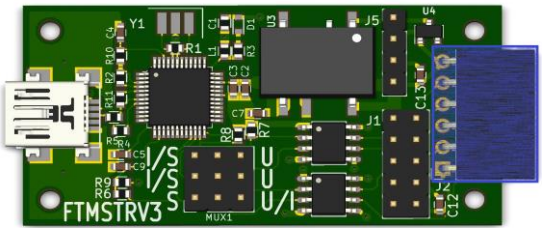
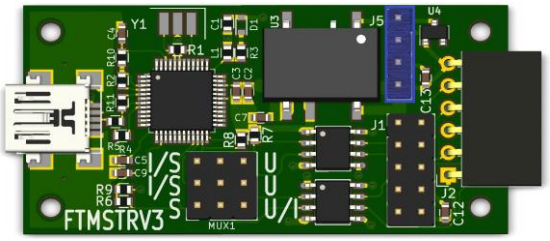


2.2 Jumpers and Connectors

The following tables describe the jumpers and their setting for different configurations.

Table 2: Jumper Description/Location

Reference	Description	Side of Isolation	Location
MUX1	FTDI DIO Multiplexer	Host/USB	
J1	FTMSTRV2 compatible Communication connector	DUT	
J2	EM Essentials Communication connector	DUT	
J5	DUT Power Connector/Jumper	DUT	

2.2.1 MUX1

MUX1 provides a signal multiplexing function to properly map the FTDI FT2232D pins to the fixed function and direction isolation signals. MUX1 is configured as three rows of three (1-3,4-6,7-9) of which the middle pins (2,5,8) connect directly to the isolator ICs while the outside pins (1,3,4,6,7,9) connect to the FTDI IC.

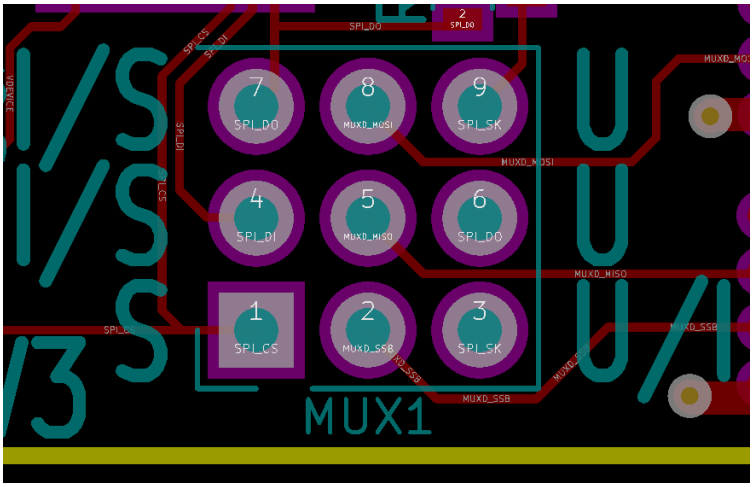
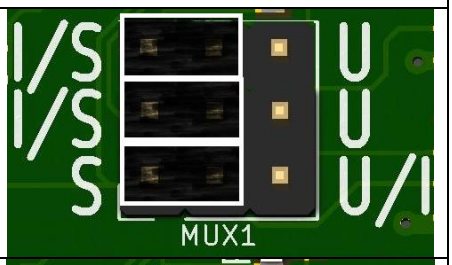
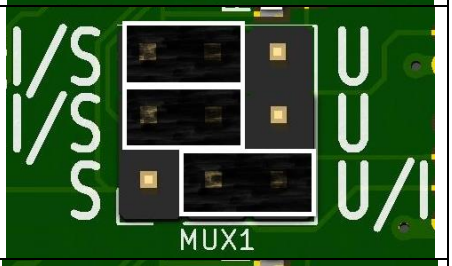
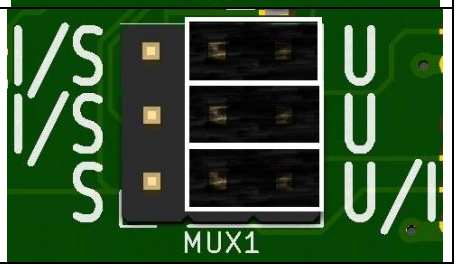


Table 3: MUX1 Jumpers

Mode	Jumper Row 1-3	Jumper Row 4-6	Jumper Row 7-9	Jumper Positions
SPI	1-2	4-5	7-8	
I2C	2-3	4-5	7-8	
UART	2-3	5-6	8-9	

2.2.2 J1

J1 is provided to provide backward compatibility to the J2 connector on the FTMSTRV2.

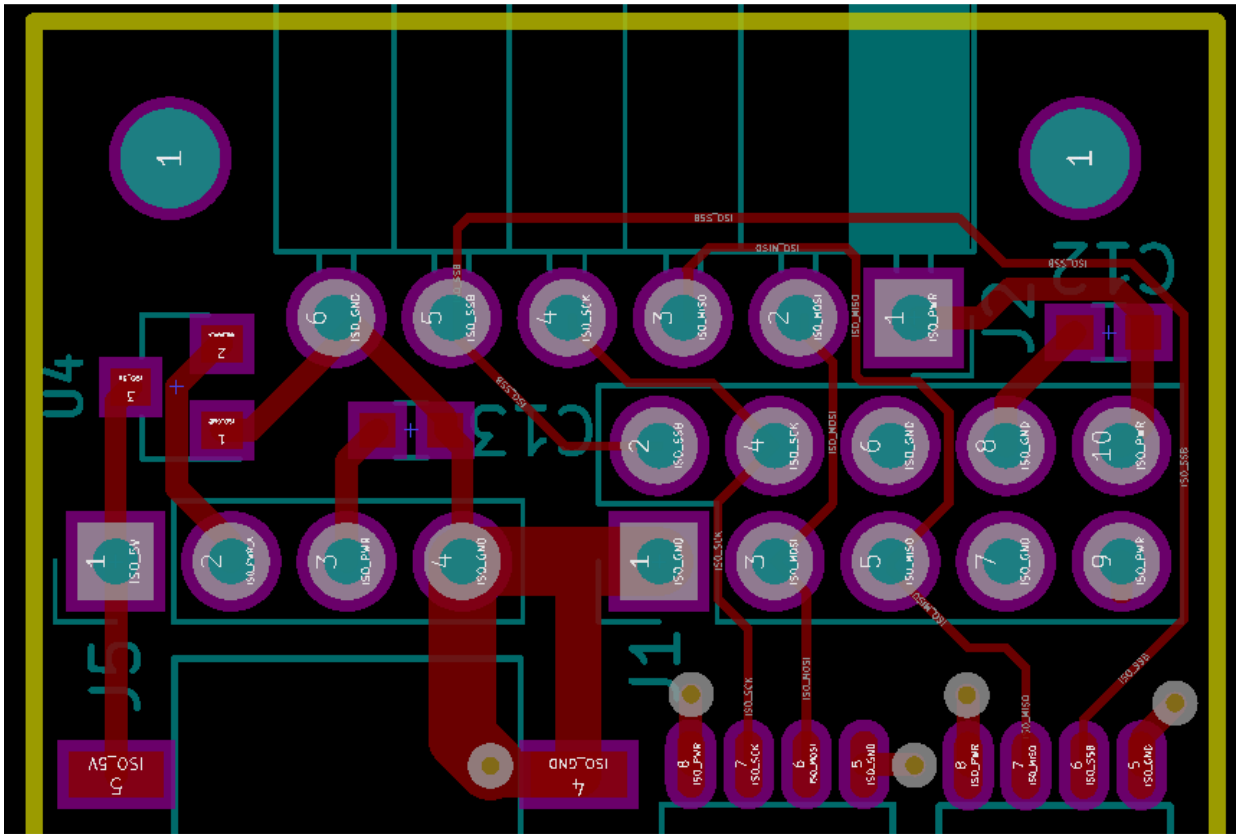


Table 4: J1 Details

FTMSTRV3 Pin #	FTMSTRV3 Pin Name	FTMSTRV2 Name	SPI Mode	I2C Mode	UART Mode
J1.1	ISO_GND	IFC0	GND	GND	GND
J1.2	ISO_SSB	TCSEL	SSB	SCK	-
J1.3	ISO_MOSI	TMOSI	MOSI	SDAI	DUT RX
J1.4	ISO_SCK	TSCLK	SCK	-	-
J1.5	ISO_MISO	TMISO	MISO	SDAO	DUT TX
J1.6	ISO_GND	GND	GND	GND	GND
J1.7	ISO_GND	GND	GND	GND	GND
J1.8	ISO_GND	GND	GND	GND	GND
J1.9	ISO_PWR	GND	VCC	VCC	VCC
J1.10	ISO_PWR	GND	VCC	VCC	VCC

2.2.3 J2

J2 provides a communication interface for Silergy EVKITs.

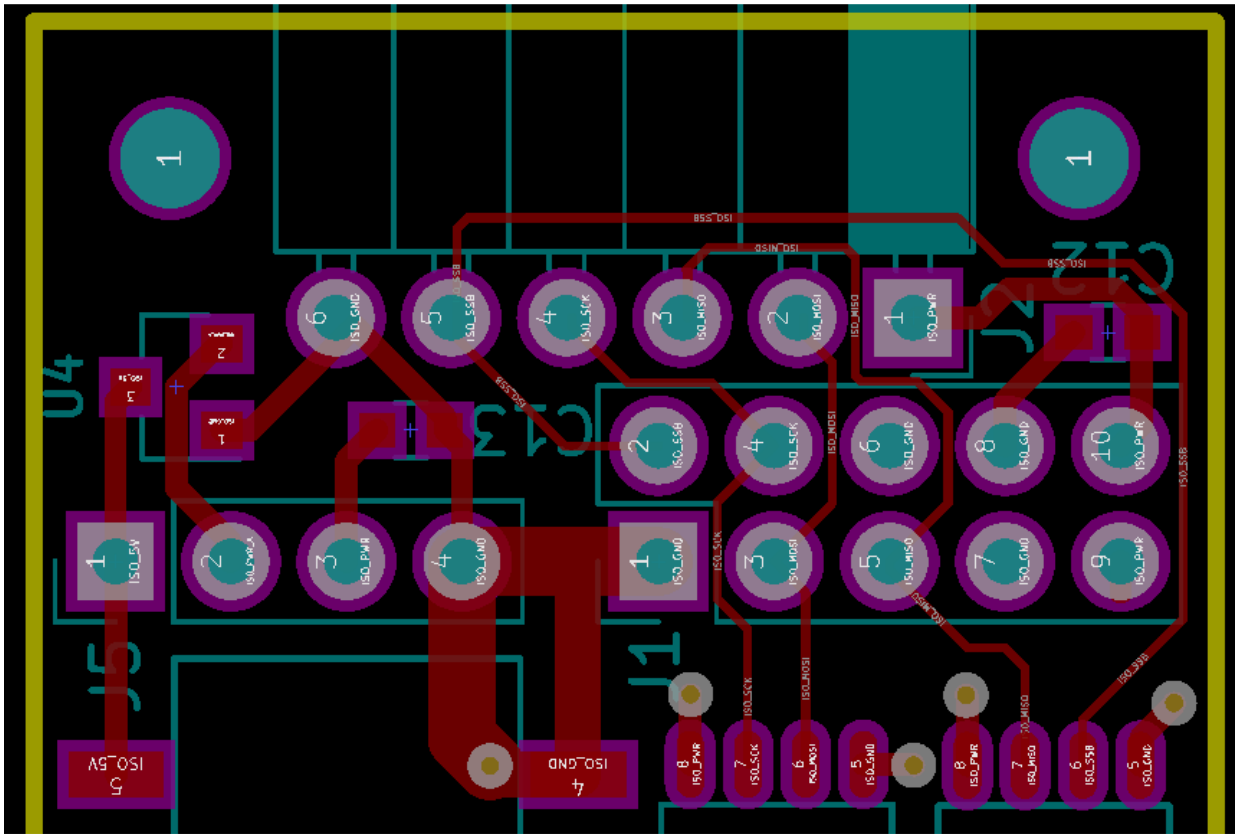


Table 5: J2 Details

FTMSTRV3 Pin #	FTMSTRV3 Pin Name	SPI Mode	I2C Mode	UART Mode
J2.1	ISO_PWR	VCC	VCC	VCC
J2.2	ISO_SSB	SSB	SCK	-
J2.3	ISO_MOSI	MOSI	SDAI	DUT RX
J2.4	ISO_SCK	SCK	-	-
J2.5	ISO_MISO	MISO	SDAO	DUT TX
J2.6	ISO_GND	GND	GND	GND

2.2.4 J5

J5 provides the flexibility to use either a DUT or isolated host supply to power the isolation interface. It also gives access to the local GND and unregulated isolated 5V.

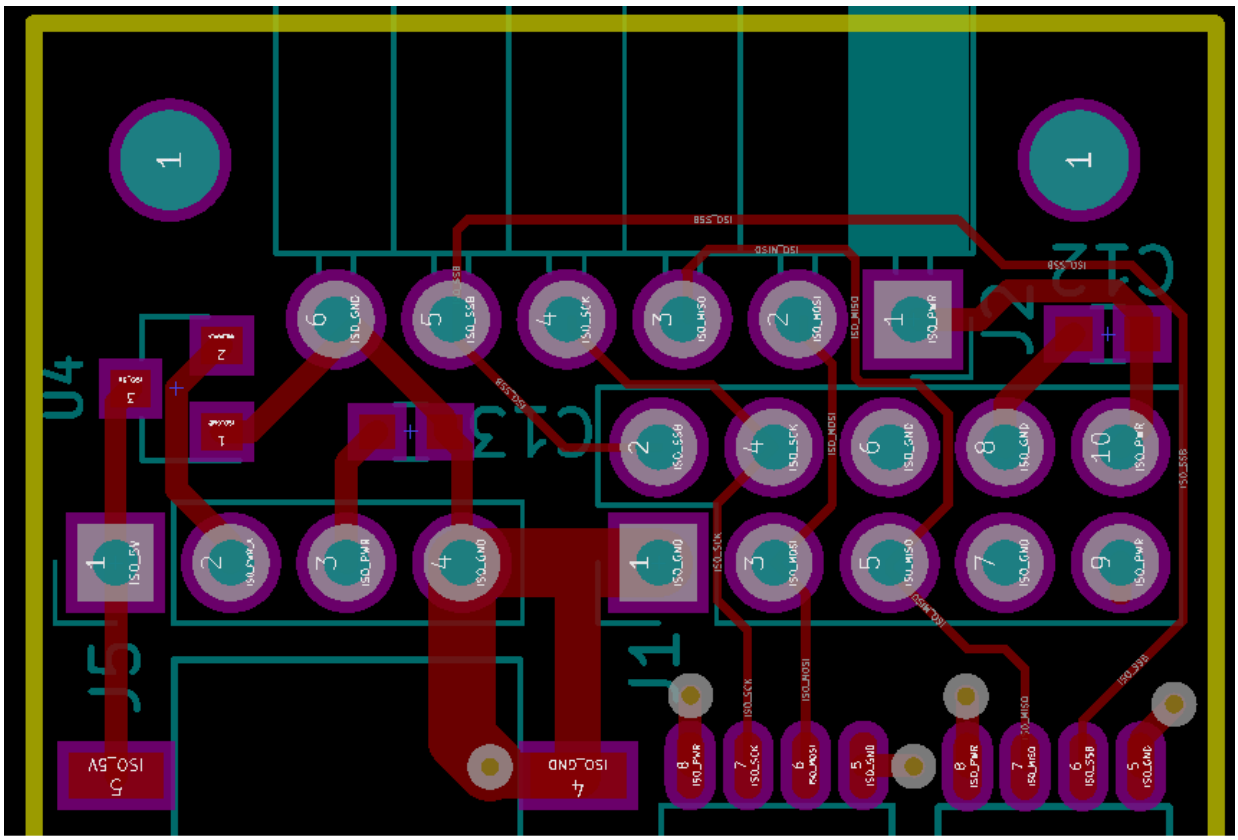
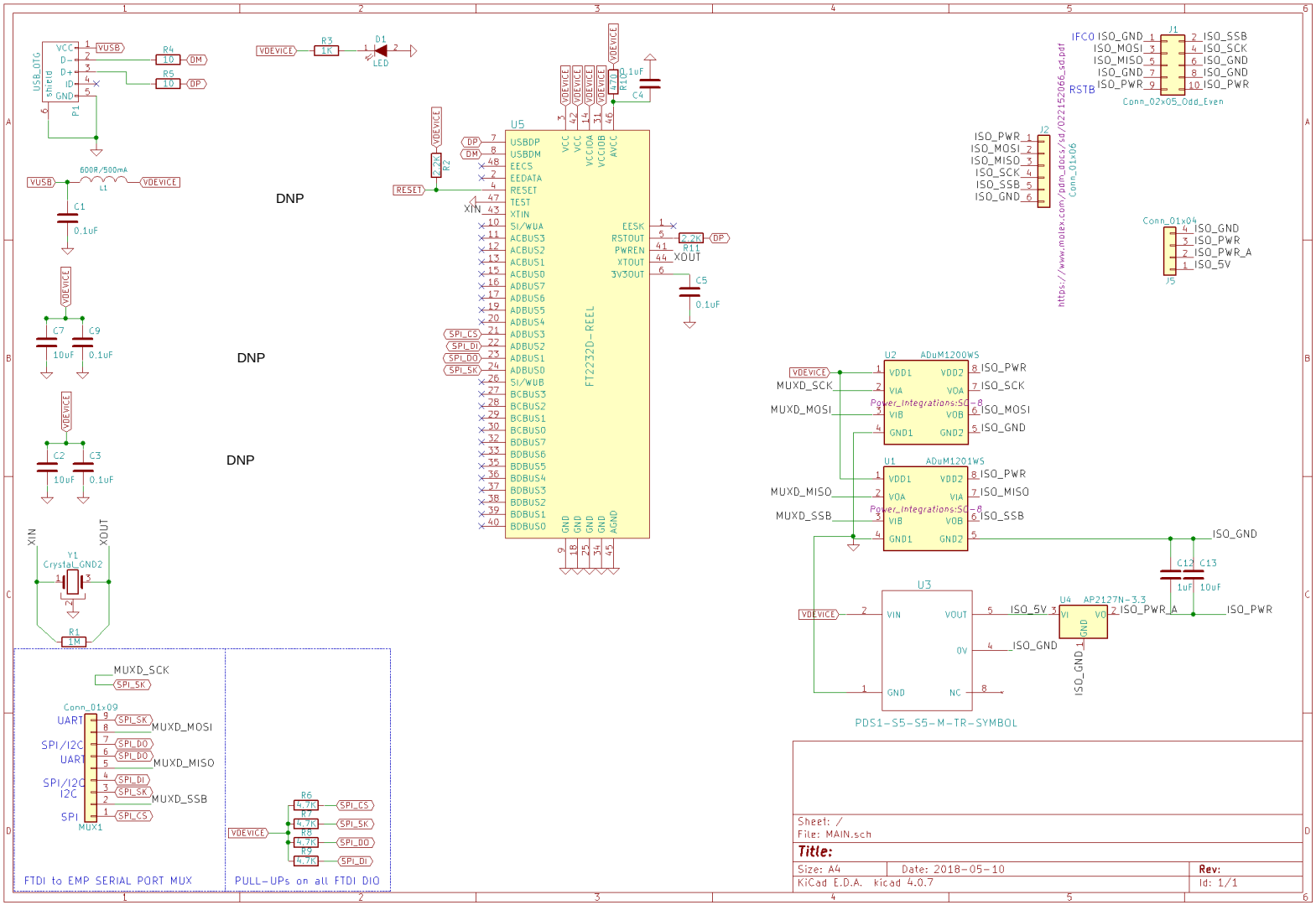


Table 6: J5 Details

FTMSTRV3 Pin #	FTMSTRV3 Pin Name	Description
J5.1	ISO_5V	Isolated 5V Supply from PDS1
J5.2	ISO_PWR_A	Isolated, Regulated 3.3V Supply derived from IS0_5V
J5.3	ISO_PWR	DUT/Data Isolation Power
J5.4	ISO_GND	DUT/Data Isolation ground

3 Hardware Design

3.1 Schematics

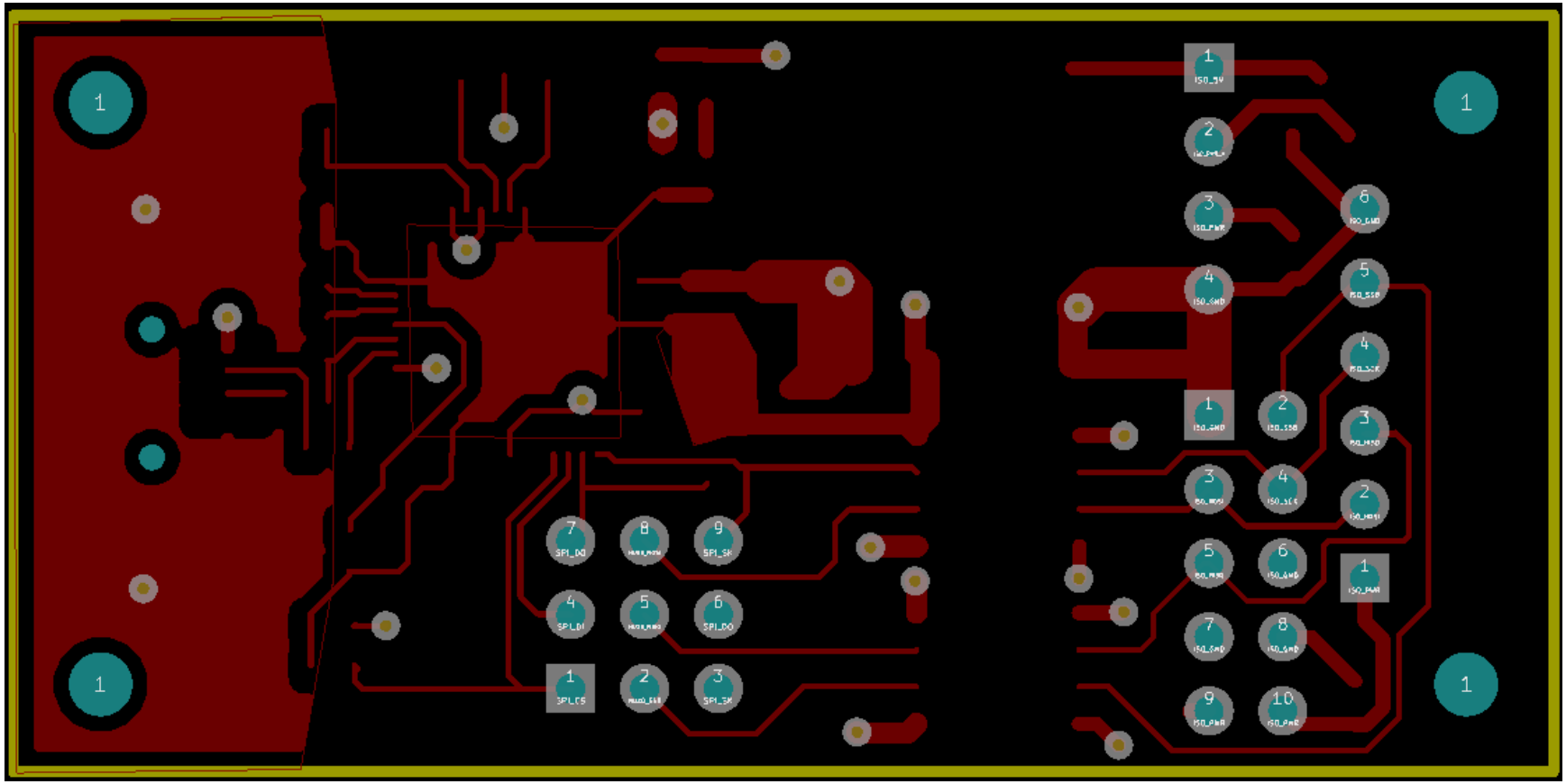


3.2 Bill of Materials

Reference	Value	Size	Description	Manufacturer	MPN
R4	10	0603	RES 10 OHM 1/10W 5% 0603 SMD	Panasonic	ERJ-3GEYJ100V
R5	10	0603	RES 10 OHM 1/10W 5% 0603 SMD	Panasonic	ERJ-3GEYJ100V
R3	169	0603	RES SMD 169 OHM 1% 1/10W 0603	Panasonic	ERJ-3EKF1690V
R10	470	0603	RES 470 OHM 1/10W 5% 0603 SMD	Panasonic	ERJ-3GEYJ471V
C1,C3,C4,C5,C9	0.1u	0603	CAP CER 0.1UF 25V X7R 0603	Murata	GRM188R71E104KA01D
C12	1u	0603	CAP CER 1UF 10V X5R 0603	Murata	GRM188R61A105KA61J
C2,C7,C13	10u	0603	CAP CER 10UF 6.3V 20% X5R 0603	Murata	GRM188R60J106ME47D
R11	2.2K	0603	Rc Series, 2.2 Kohm, 100 Mw, - 1%, 50 V, 0603	Yageo	RC0603FR-072K2L
R2	2.2K	0603	Rc Series, 2.2 Kohm, 100 Mw, - 1%, 50 V, 0603	Yageo	RC0603FR-072K2L
R6,R7,R8,R9	4.7K	0603	RES SMD 4.7K OHM 5% 1/10W 0603	Bourns	CR0603-JW-472GLF
R1	1M	0603	RES 1M OHM 1/10W 5% 0603 SMD	Panasonic	ERJ-3GEYJ105V
D1			LED RED CLEAR CHIP SMD	Lite-On	LTST-C190KRKT
J1			CONN HEADER 10POS .100 STR TIN	Amphenol FCI	67997-410HLF
J2			CONN RECEPT 6POS .100 R/A PCB	Molex	22152066
J5			CONN HEADER 4 POS 2.54	Wurth Electronics Inc.	61300411121
L1			Ferrite Beads Multi-Layer 600Ohm 25% 100MHz 500mA 380mOhm DCR 0603 Automotive Paper T/R	Murata	BLM18AG601SN1D
MUX1			.025" SQ. TERMINAL STRIPS	Samtec Inc	TSW-103-07-G-T
P1			CONN MINI USB RCPT RA TYPE B SMD	EDAC Inc.	690-005-299-043
U1			[Analog Devices] ADUM1201ARZ Interface Isolator	Analog Devices	ADUM1201ARZ
U2			DGTL ISO 2.5KV GEN PURP 8SOIC	Analog Devices	ADUM1200ARZ-RL7
U3			DC DC CONVERTER 5V 1W	CUI	PDS1-S5-S5-M
U4			IC REG LINEAR 3.3V 330MA SOT23	Diodes Incorporated	AP2127N-3.3TRG1
U5			IC USB FS DUAL UART/FIFO 48-LQFP	FTDI	FT2232D-REEL
Y1			CER RES 6.0000MHZ 15PF SMD	Murata	CSTCR6M00G53Z-R0

3.3 Layout

3.3.1 FCu



3.3.2 BCu