



CrossLink-NX-33 Voice and Vision Machine Learning Board

Evaluation Board User Guide

FPGA-EB-02054-1.0

September 2022

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Acronyms in This Document

A list of acronyms used in this document.

Acronym	Definition
CMOS	Complementary Metal-Oxide Semiconductor
CSI-2	Camera Serial Interface
DDR	Double Data Rate
DSI	Display Serial Interface
FTDI	Future Technology Devices International
GPIO	General Purpose Input/Output
I ² C	Inter-Integrated Circuit
I ² S	Inter-IC Sound
JTAG	Joint Test Action Group
LDO	Low Dropout
LED	Light Emitting Diode
LVDS	Low-Voltage Differential Signaling
MIPI	Mobile Industry Processor Interface
ML	Machine Learning
MSPI	Master SPI
PMOD	Peripheral Module
SMA	SubMiniature version A
SPI	Serial Peripheral Interface
SSPI	Slave SPI
VIP	Video Interface Platform
VTT	Tracking Termination Voltage

1. Introduction

This document describes the Lattice Semiconductor CrossLink™-NX-33 Voice and Vision Machine Learning Board. The board's key component is the CrossLink-NX-33 FPGA, which receives input from a low-resolution camera and two microphones, and sends video output over USB3. This board is ideal for machine learning applications and features one PMOD (Peripheral Module) connector for off board support.

The content of this user guide includes descriptions of onboard settings, connectors, programming circuit, a complete set of schematics, and bill of materials for the CrossLink-NX-33 Voice and Vision Machine Learning Board.

The key features of the CrossLink-NX-33 Voice and Vision Machine Learning Board include:

- CrossLink-NX-33 FPGA (LIFCL-33-USG84)
 - MIPI CSI-2 receiver (Soft D-PHY) interface for high resolution camera data
 - I²S interface for audio data from two microphones
 - SPI flash configuration
 - General Purpose Input/Output
- Board Resources
 - Cypress CYUSB3014 for Video Output to PC over USB3
 - One PMOD connector expansion header available
- Programming Circuit
 - From programming software through USB/FTDI interface (JTAG or SPI)
 - From onboard Flash
 - SPI external programmer through header

[Figure 1.1](#) and [Figure 1.2](#) show the top and bottom views of the CrossLink-NX-33 Voice and Vision Machine Learning Board and its key components.

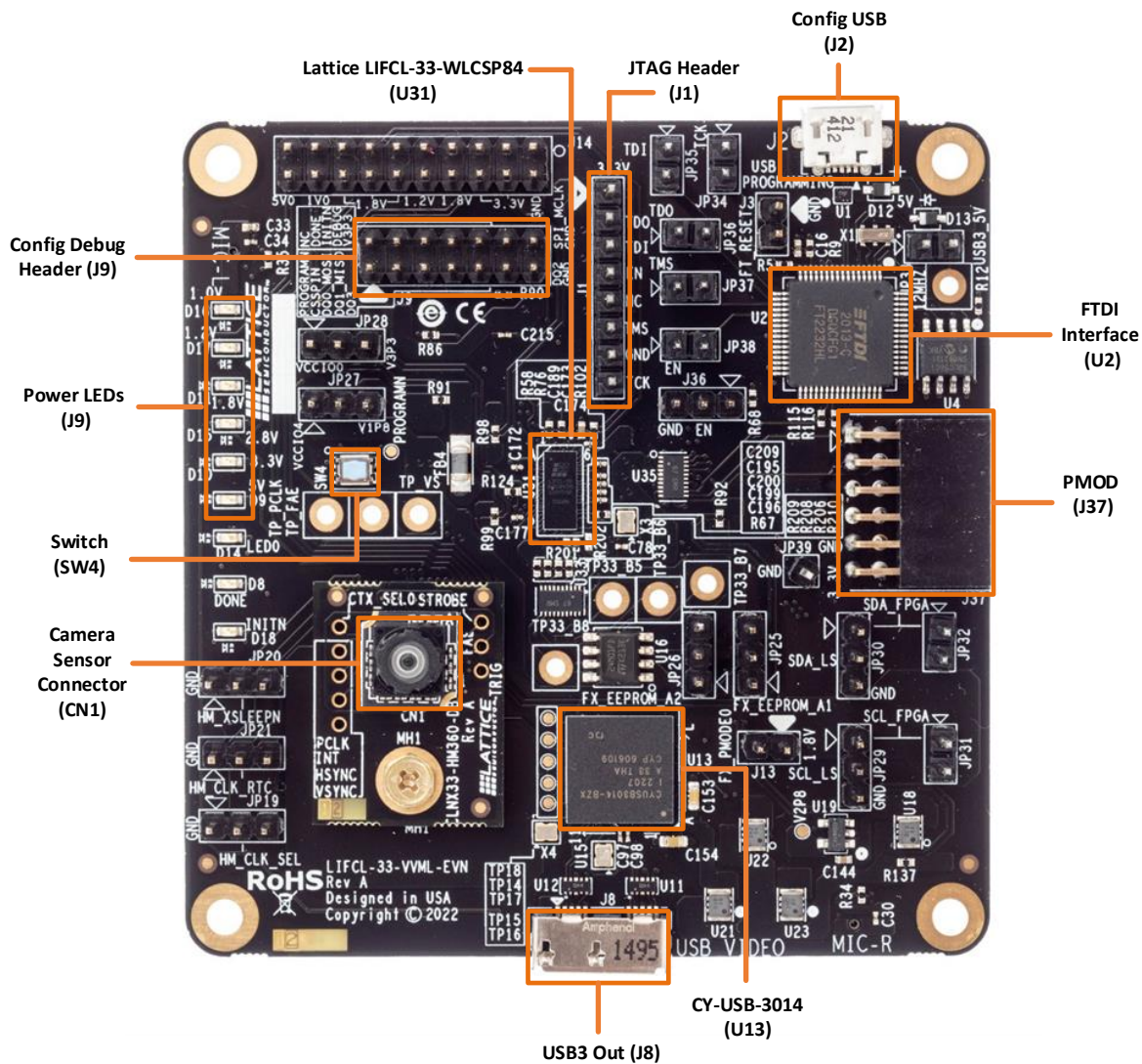


Figure 1.1. Top View of CrossLink-NX-33 Voice and Vision Machine Learning Board

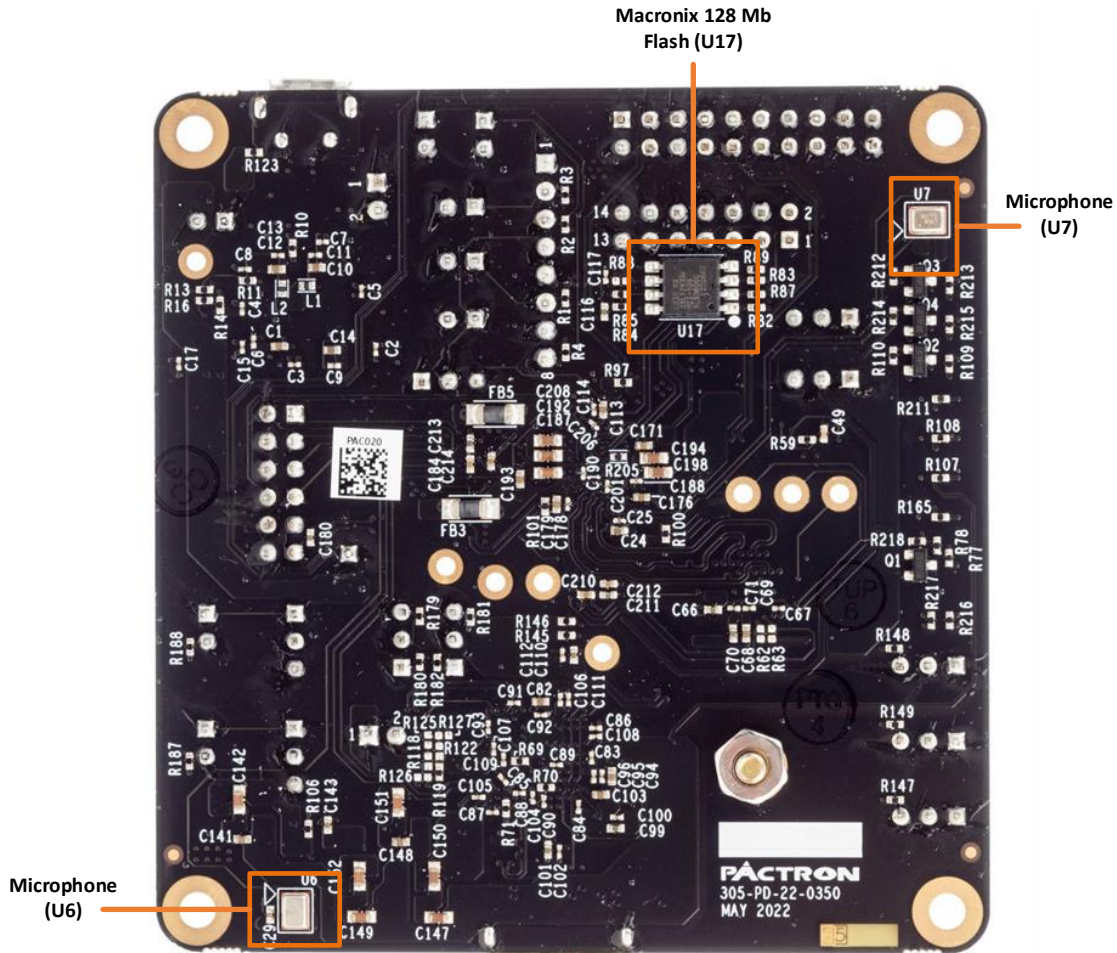


Figure 1.2. Bottom View of CrossLink-NX-33 Voice and Vision Machine Learning Board

1.1. Further Information

The following references provide detailed information on the CrossLink-NX-33 Voice and Vision Machine Learning Board and the CrossLink-NX-33 FPGA device:

- [Appendix A. CrossLink-NX-33 Voice and Vision Machine Learning Board Schematics](#)
- [Appendix B. CrossLink-NX-33 Voice and Vision Machine Learning Board Bill of Materials](#)
- www.latticesemi.com/boards for more information on boards and kits
- [CrossLink-NX 33 Family Data Sheet \(FPGA-DS-02104\)](#) for details on the CrossLink-NX-33 FPGA.

2. Headers and Jumpers

Table 2.1 lists the headers and jumpers as shown in Figure 1.1 and Figure 1.2.

Table 2.1. Headers and Test Connectors

Part	Description	Settings (Default first)
J1	JTAG Header	—
J3	FTDI Reset Jumper	Open (active FTDI) / Closed (reset FTDI)
J9	Configuration Debug Header	—
J13	USB3 Chip Mode	Open (FX_PMODE0=HiZ)/Short (FX_PMODE0=V3P3)
J14	Current Measurement Headers	—
J36	JTAG_EN - LIFCL-33 (U31)	1-2
J37	PMOD Header	—
JP19	HM_CLK_SEL, Camera Sensor Configuration Signal	2-3
JP20	HM_XSLEEPN, Camera Sensor Configuration Signal	2-3
JP21	HM_CLK_RTC, Camera Sensor Configuration Signal	1-2
JP25	FX_EEPROM_A1, FX EEPROM Address Configuration	1-2
JP26	FX_EEPROM_A2, FX EEPROM Address Configuration	1-2
JP27	Power Source for 19.2 MHz Oscillator (X3)	2-3
JP28	Power Source for SPI Flash (U17)	2-3
JP29	I ² C through PMOD Header	1-2
JP30	I ² C through PMOD Header	1-2
JP31	I ² C Pull-Up	Open
JP32	I ² C Pull-Up	Open
JP33	12 MHz Oscillator Jumper	Open
JP34	FTDI_TCK Connection to FTDI Device (U2)	Closed
JP35	FTDI_TDI Connection to FTDI Device (U2)	Closed
JP36	FTDI_TDO Connection to FTDI Device (U2)	Closed
JP37	FTDI_TMS Connection to FTDI Device (U2)	Closed
JP38	JTAG_EN Connection to FTDI Device (U2)	Open

3. Board Programming

3.1. Programming Circuit

CrossLink-NX-33 can be programmed with USB through the FTDI/JTAG interface using Lattice Radiant™ programmer software, or by an external programmer connected to Header J9.

Figure 3.1 shows the programming block of CrossLink-NX-33 Voice and Vision Machine Learning board.

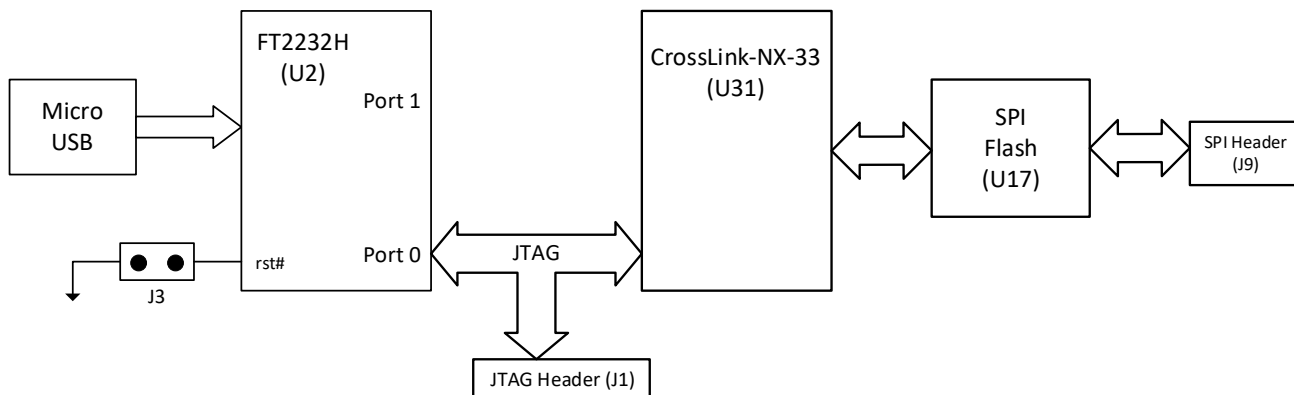


Figure 3.1. Programming Block

The FTDI/JTAG interface is used to program both CrossLink-NX-33 and SPI Flash Memory (Macronix MX25L12833 128 Mb).

3.2. Programming the Board

This section describes the procedure for programming a pattern to the SRAM (volatile) configuration memory of CrossLink-NX-33. The CrossLink-NX-33 can be programmed through the JTAG, I²C, or SPI interfaces. This section focuses on JTAG programming through the USB/FTDI interface. For details on the other configuration modes, refer to the [sysCONFIG Usage Guide for Nexus Platform \(FPGA-TN-02099\)](#).

The board is programmed using the Lattice Radiant Programmer software, which can be started as a stand-alone tool or from a Lattice Radiant project.

To program the board:

1. Power ON the board by connecting the USB cable.
2. Start a programming project by launching the tool and initiating a board scan, as shown in Figure 3.2.

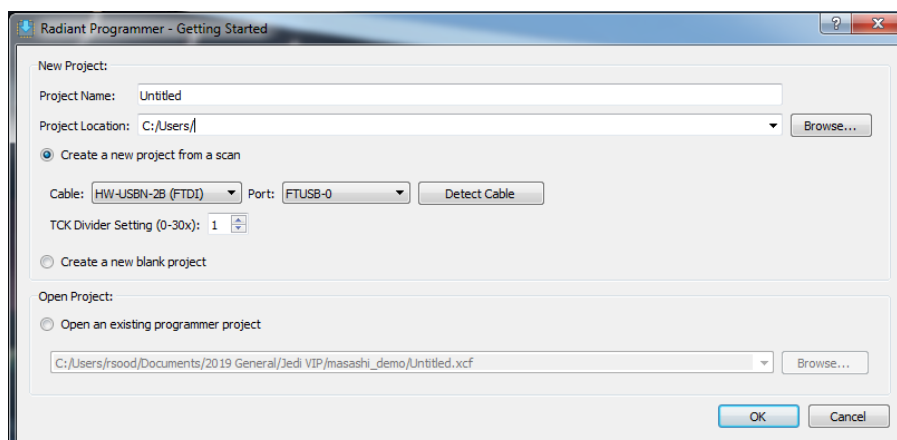


Figure 3.2. Starting Programmer

- When the board is successfully scanned, the window shown in Figure 3.3 opens. This interface allows the user to enter the file name.

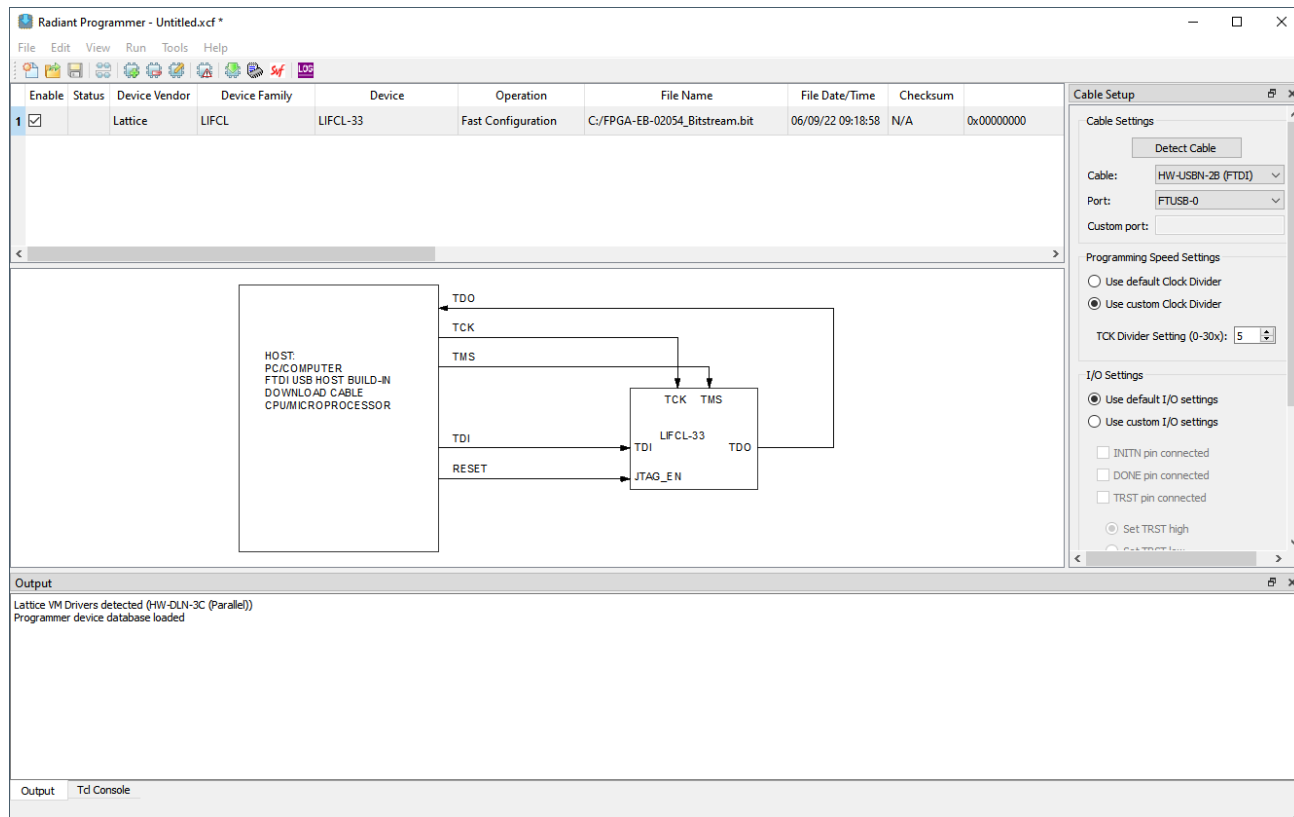


Figure 3.3. Lattice Radiant Programmer – Fast Configuration

- Double-click on the **Operation** field and select the appropriate programming mode. In this example, **Fast Configuration** of the SRAM array through JTAG is selected.

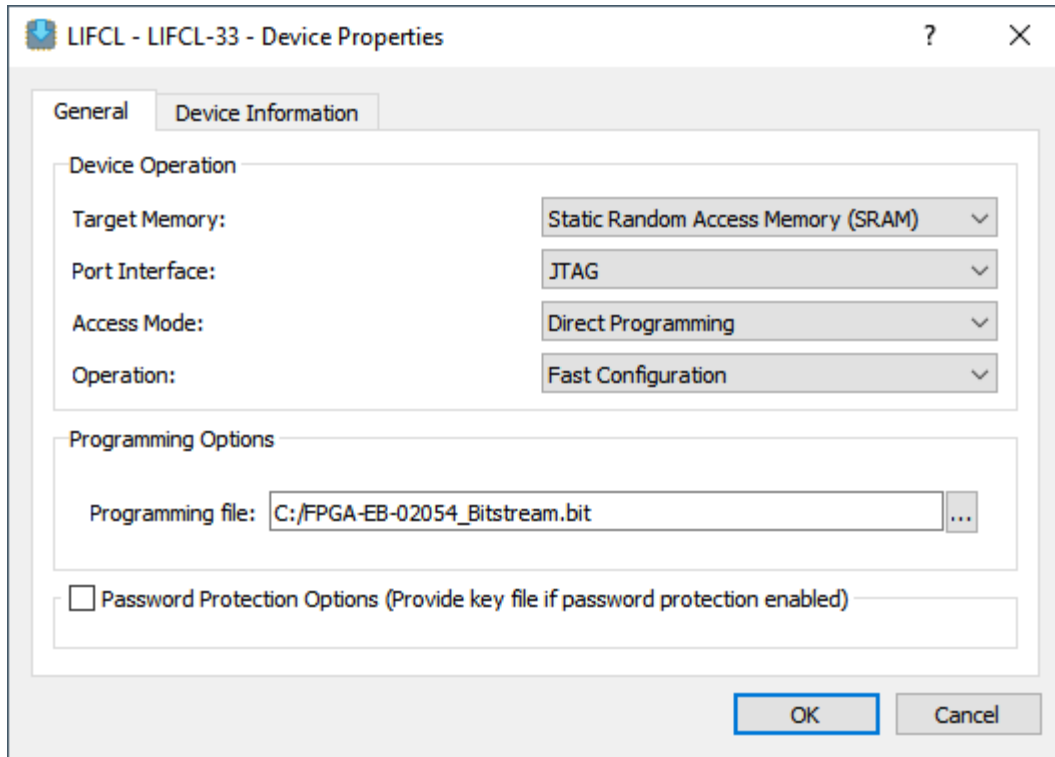


Figure 3.4. Entering Programming Mode

5. Click the **Program** button to configure the CrossLink-NX-33 on the board.
6. Check the **Output** console at the bottom of Lattice Radiant Programmer for the result of the programming. You should see **Operation: Successful** as shown in Figure 3.5.

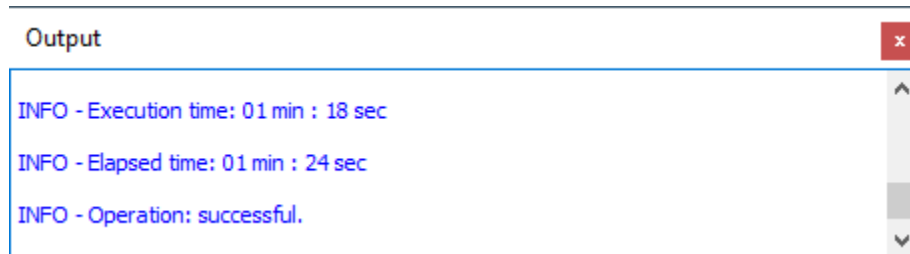


Figure 3.5. Lattice Radiant Programmer Output Window

4. CrossLink-NX-33 Interface Support

The CrossLink-NX-33 Voice and Vision Machine Learning board supports various onboard interfaces and external interfaces. The sections below describe key onboard interfaces supported on CrossLink-NX-33 Voice and Vision Machine Learning board.

4.1. Camera Sensor Interface

Figure 4.1 shows the block diagram of the camera sensor interface. A daughter board (CLNX33-HM360-DB) with the Himax HM0360 camera sensor can be connected to CN1 to be used as an input source. The CN1 connector supports up to two MIPI data lanes. The camera sensor can be configured using I²C interface from the CrossLink-NX-33.

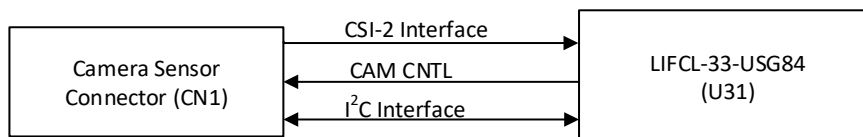


Figure 4.1. Camera Sensor Interface

4.2. Microphone Sensor Interface

Figure 4.2 shows the block diagram of the microphone sensor interface. The microphone sensors are Knowles SPH0645LM4H. There are two sensors on opposite sides of the board. The sensors share the I²S bus to the CrossLink-NX-33, which is the I²S master.

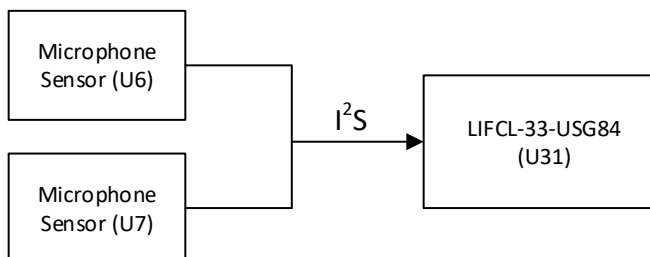


Figure 4.2. Microphone Sensor Interface

4.3. Video Out Interface

Figure 4.3 shows the block diagram of the video out interface. The video data from the CrossLink-NX-33 is sent to the CYUSB3014, which processes the data and sends it out through the USB3.

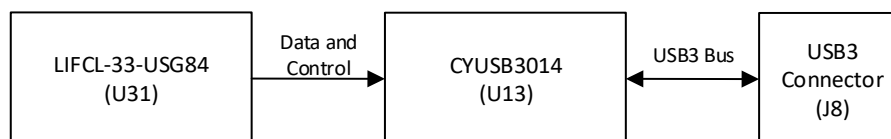


Figure 4.3. Video Out Interface

5. Power Supply

The power supply to the CrossLink-NX-33 Voice and Vision Machine Learning Board is provided from the J2 or J8 USB connectors. If either or both USB ports are connected to a powered cable, the board powers up.

Figure 5.1 shows the power supply block of CrossLink-NX-33 Voice and Vision Machine Learning Board. The 5 V is supplied through the USB, and then board converters create the remaining 3.3 V, 2.8 V, 1.8 V, 1.2 V, and 1.0 V supplies required by the board components. Each I/O and core voltage rail on the board is accessible by a test point on the board.

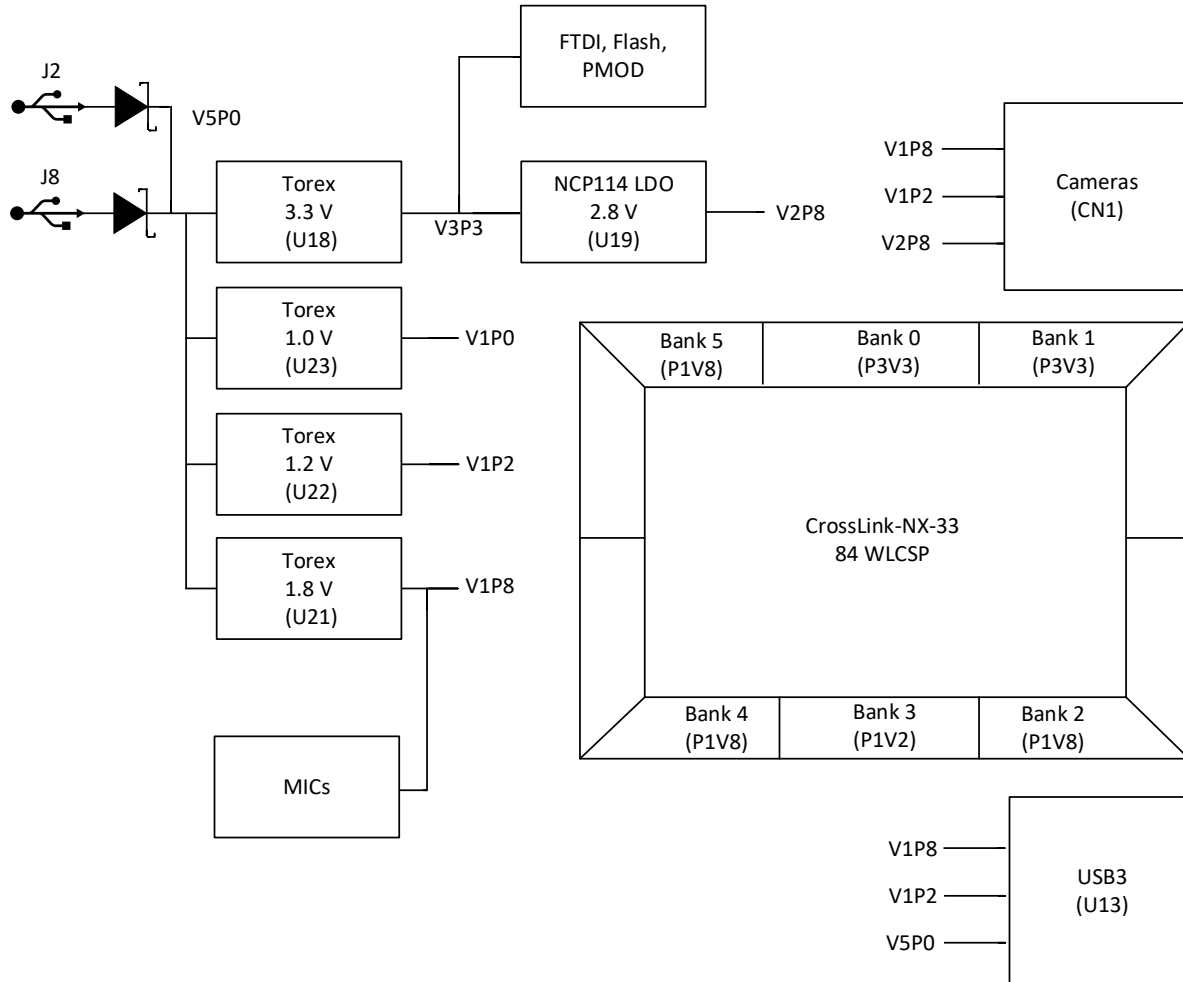


Figure 5.1. Power Supply Block

Table 5.1 lists the board voltage rails, including rail source voltage, voltage on net, LED, and LED color.

Table 5.1. Device Power Rail Summary

Voltage Rail	Source Rail	Voltage on Net (V)	Status LED	LED Color
V5P0	USB	5.0	D9	Green
V3P3	V5P0	3.3	D10	Green
V2P8	V3P3	2.8	D15	Green
V1P8	V5P0	1.8	D11	Green
V1P2	V5P0	1.2	D17	Green
V1P0	V5P0	1.0	D16	Green

6. CrossLink-NX-33 I/O Ball Mapping to Connectors

Table 6.1. Camera Sensor Connector Pin Mapping

CN1		
Pin Num	Net/Test Point Name	Ball Num
1	—	—
2	HM_CN	L4
3	HM_CP	M4
4	GND	—
5	HM_XSLEEPN	—
6	HM_XSDN	N4
7	GND	—
8	HM_D1N	N3
9	HM_D1P	P3
10	GND	—
11	HM_D0N	L5
12	HM_D0P	M5
13	GND	—
14	HM_CLK_SEL	—
15	TP_PCLK	—
16	GND	—
17	GND	—
18	V2P8	—
19	TP_FAE	—
20	HM_MCLK	L1
21	TP_VS	—
22	HM_SDA	P5
23	HM_SCL	N5
24	HM_CLK_RTC	—
25	V1P2	—
26	V1P8	—
27	GND	—
28	GND	—
29	V2P8	—
30	GND	—

Table 6.2. PMOD Connector Pin Mapping

PMOD0 (J37)		
Pin Number	Net Name	Ball Number
1	PMOD0_1	B6
2	PMOD0_2	B5
3	PMOD0_3	C5
4	PMOD0_4	C6
5	GND	—
6	V3P3	—
7	PMOD0_7	D6
8	PMOD0_8	D5
9	PMOD0_9_USBP	F2
10	PMOD0_10_USBM	G2
11	GND	—
12	V3P3	—

Table 6.3. CYUSB3014 Pin Mapping

CYUSB3014 (U13)			CYUSB3014 (U13)		
Pin Name/Num	Net Name	Ball Num	Pin Name/Num	Net Name	Ball Num
PCLK_CLK	FX_PCLK	L2	SSTX-	USB3_SSTXN	J8.6
RESETN	FX_RSTN	H1	SSTX+	USB3_SSTXP	J8.7
CTL0_SLCSN	—	—	D+	USB3_DP	J8.3
CTL1_SLWRN	—	—	D-	USB3_DN	J8.2
CTL2_SLOEN	—	—	FSLC0	GND	—
CTL3_SLRDN	—	—	FSLC1	GND	—
CTL4_FLAGA	—	—	FSLC2	V1P8	—
CTL5_FLAGB	—	—	CLKIN	MSTCLK_FX3	X4.3
CTL6_GPIO	—	—	CLKIN_32	CLK_32MHZ	U15.3
CTL7_PKTENDN	—	—	TDI	—	TP14
CTL8_GPIO	—	—	TDO	—	TP15
CTL9_GPIO	—	—	TRSTN	—	TP16
CTL10_GPIO	—	—	TMS	—	TP17
CTL11_A1	FX_LV	K2	TCK	—	TP18
CTL12_A0	FX_FV	N2	O60_CHGDET	—	—
INTN_CTL15	—	—	PMODE0	FX_PMODE0	—
GPIO_I2SCLK	—	—	PMODE1	FX_PMODE1	—
GPIO_I2SSD	—	—	PMODE2	FX_PMODE2	—
GPIO_I2SWS	—	—	R_USB2	GND	—
SPISCK_UARTRTS_GPIO	—	—	R_USB3	GND	—
SPISSN_UARTCTS_GPIO	—	—	NC	—	—
SPIMISO_UARTTX_GPIO	FX_SPIMISO_UARTTX	U2.38	VBATT	V5P0	—
SPIMOSI_UARTRX_GPIO	FX_SPIMOSI_UARTRX	U2.39	VBUS	V5P0	—
GPIO_I2SMCLK	—	—	AVDD	V1P2	—
GPIO	—	—	CVDDQ	V1P8	—
I2C_SCL	FX_I2C_SCL	U16.6	U3TXVDDQ	V1P2	—
I2C_SDA	FX_I2C_SDA	U16.5	U3RXVDDQ	V1P2	—
DQ0	FX_D0	P1	VDD-1:VDD-8	V1P2	—
DQ1	FX_D1	N1	VIO1-1:VIO5	V1P8	—
DQ2	FX_D2	K1	VSS1:VSS14	GND	—
DQ3	FX_D3	H3	AVSS	GND	—
DQ4	FX_D4	G3	U3VSSQ	GND	—
DQ5	FX_D5	P2			
DQ6	FX_D6	J2			
DQ7	FX_D7	H2			
DQ8	FX_D8	L6			
DQ9	FX_D9	G5			
DQ10	FX_D10	H6			
DQ11	FX_D11	J6			
DQ12	FX_D12	G4			
DQ13	FX_D13	H4			
DQ14	FX_D14	H5			
DQ15	FX_D15	J4			
DQ16:DQ31	—	—			
XTALIN	—	—			

CYUSB3014 (U13)			CYUSB3014 (U13)		
Pin Name/Num	Net Name	Ball Num	Pin Name/Num	Net Name	Ball Num
XTALOUT	—	—			
OTG_ID	USB_OTG	USB3:OTG			
SSRX-	USB3_SSRXN	USB3:SSRX-			
SSTX+	USB3_SSRXP	USB3_SSRX+			

7. Status Indicators

The LED status indicators on the board show the application status. [Table 7.1](#) lists the status LED I/O map.

Table 7.1. Status LED I/O Map

Net Name	LED	Connector/Pin	Color
LED0	D14	B1	Blue

8. Input Switches and Pushbuttons

[Table 8.1](#) lists all the input switches and pushbuttons. This board has one 4 input slider switch and five pushbuttons.

Table 8.1. Switch and Pushbutton I/O Map

Net Name	Component	Connector/Pin
PROGRAMN	SW4	A3

9. Ordering Information

This board is included as part of a kit, and not available as a separate item. The part number in [Table 9.1](#) is for reference only, so it is clear which board is described in this document. Visit www.latticesemi.com/boards for the latest ordering information.

Table 9.1. Reference Part Number

Description	Ordering Part Number
CrossLink-NX-33 Voice and Vision Machine Learning Board	LIFCL-33-VVML-EVN

References

For more information, refer to [CrossLink-NX 33 Family Data Sheet \(FPGA-DS-02104\)](#).

Technical Support Assistance

Submit a technical support case through www.latticesemi.com/techsupport.

Appendix A. CrossLink-NX-33 Voice and Vision Machine Learning Board Schematics


<h3>CrossLink-NX-33 Voice and Vision Machine Learning Board LIFCL-33-VVML-EVN Rev - A</h3>																						
<ul style="list-style-type: none"> 01 - Title Page 02 - Block Diagram 03 - FTDI, USB2 Interface 04 - HiMAX Camera Connector, MICs, USB3 05 - USB3 Connector & Interface 06 - USB3, PMOD Connector 07 - Flash, JTAG, LED, USB3, PMOD 08 - Power 09 - Power Diagram 	<p>COMPONENT DEFAULTS:</p> <p>Resistors: 0402</p> <p>Ferrite beads: 0402</p> <p>Capacitors:</p> <table style="width: 100%; border: none;"> <tr> <td style="padding-right: 20px;">0.1uF</td> <td style="padding-right: 20px;">>= 10 V</td> <td>0201</td> </tr> <tr> <td><= 4.7 uF</td> <td>>= 10 V</td> <td>0402</td> </tr> <tr> <td>10 uF</td> <td>= 10 V</td> <td>0402</td> </tr> <tr> <td>10 uF</td> <td>> 10 V</td> <td>0603</td> </tr> <tr> <td>22 uF</td> <td>>= 10 V</td> <td>0603</td> </tr> </table>	0.1uF	>= 10 V	0201	<= 4.7 uF	>= 10 V	0402	10 uF	= 10 V	0402	10 uF	> 10 V	0603	22 uF	>= 10 V	0603						
0.1uF	>= 10 V	0201																				
<= 4.7 uF	>= 10 V	0402																				
10 uF	= 10 V	0402																				
10 uF	> 10 V	0603																				
22 uF	>= 10 V	0603																				
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Figure A.1. Title Page

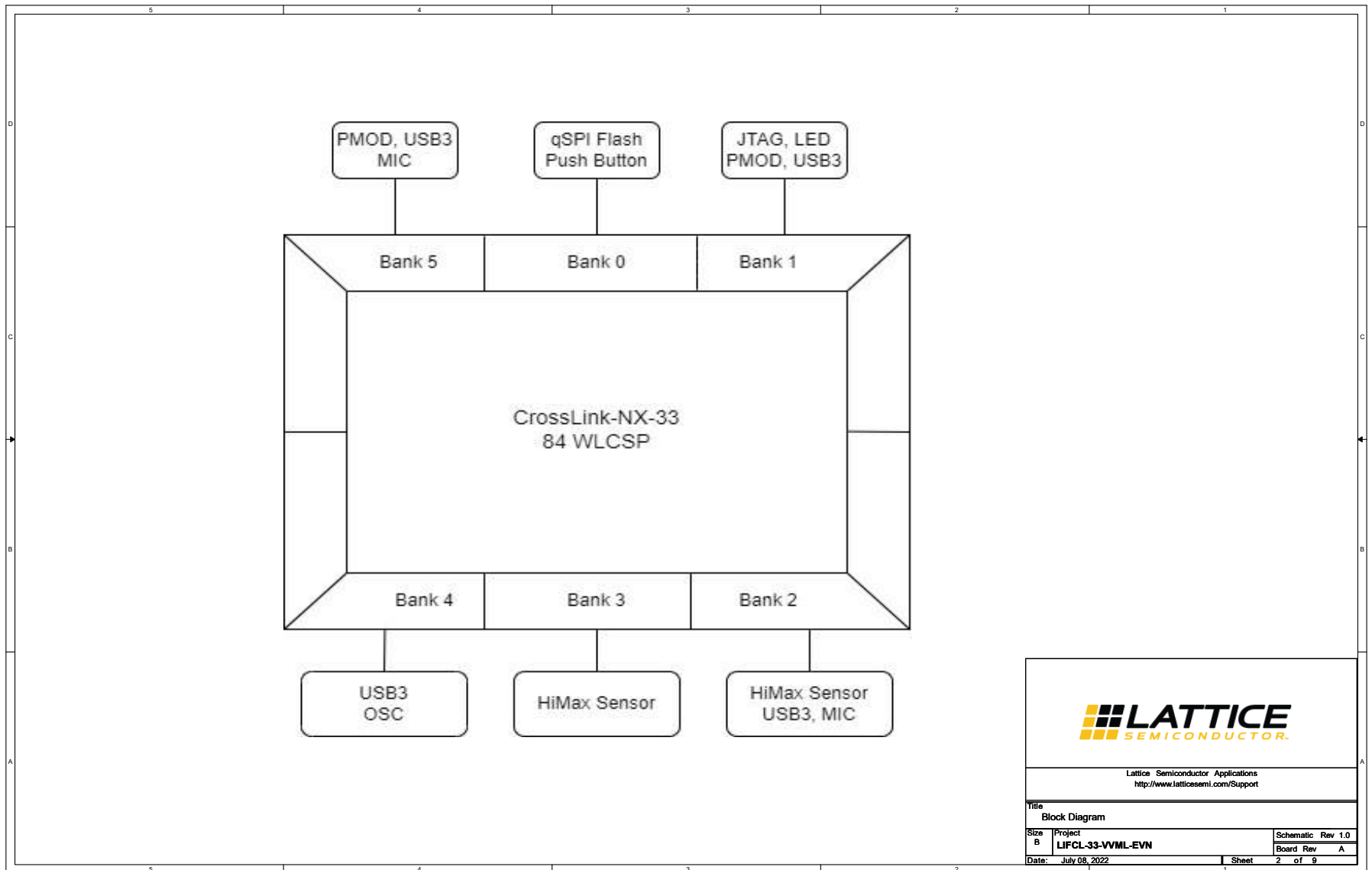


Figure A.2. Block Diagram

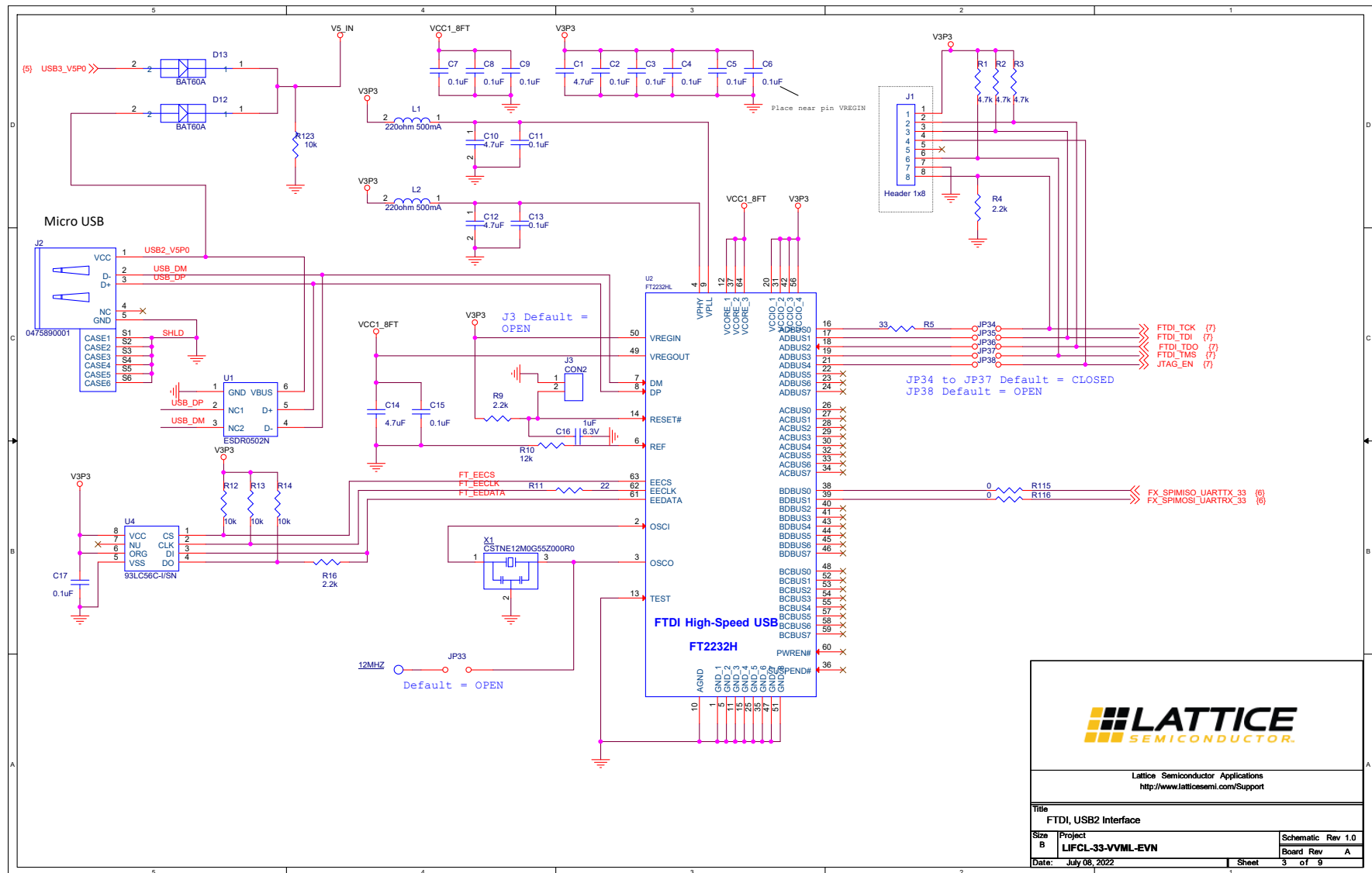


Figure A.3. FTDI, USB2 Interface

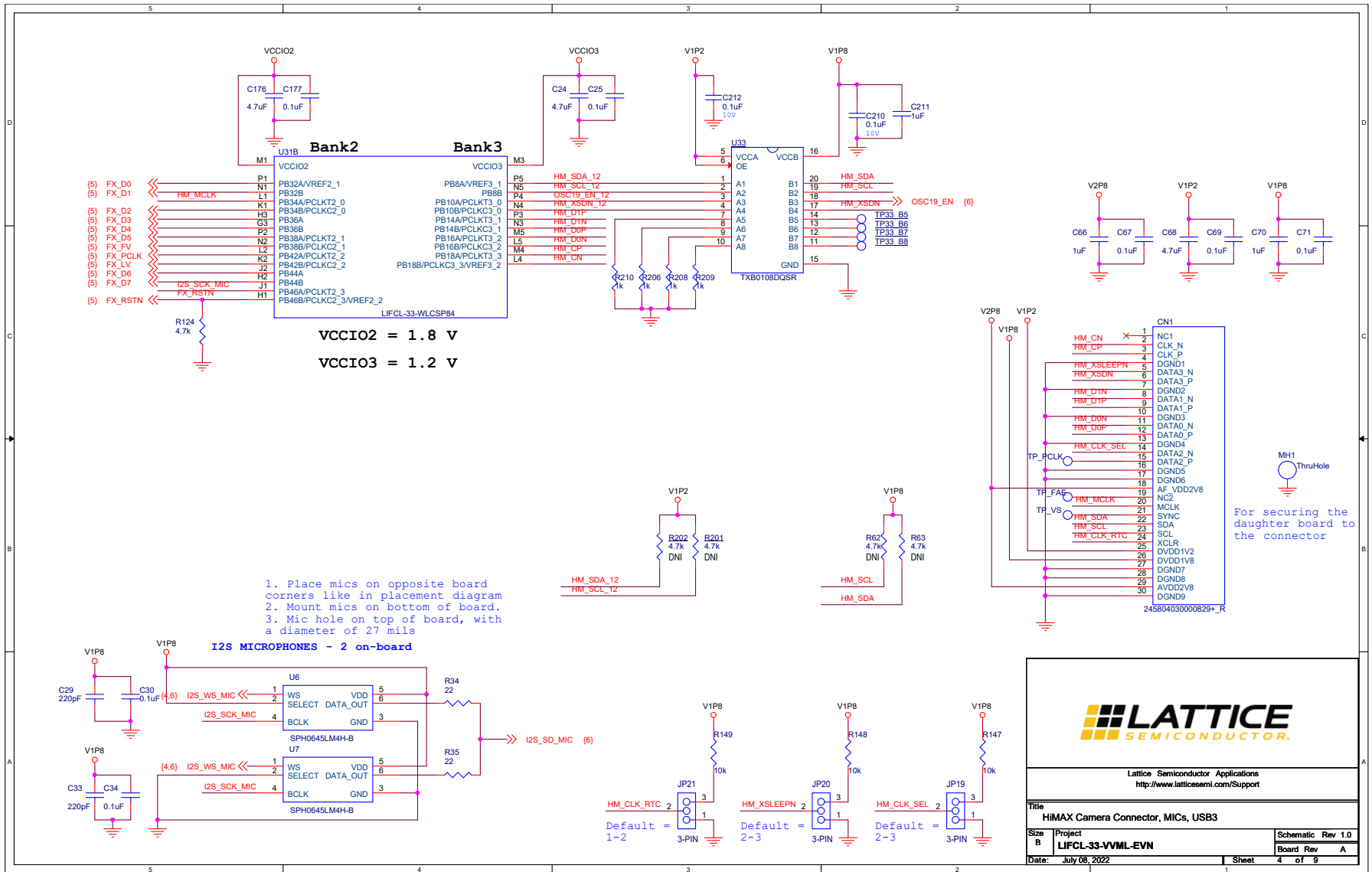


Figure A.4. HiMAX Camera Connector, MICs, USB3

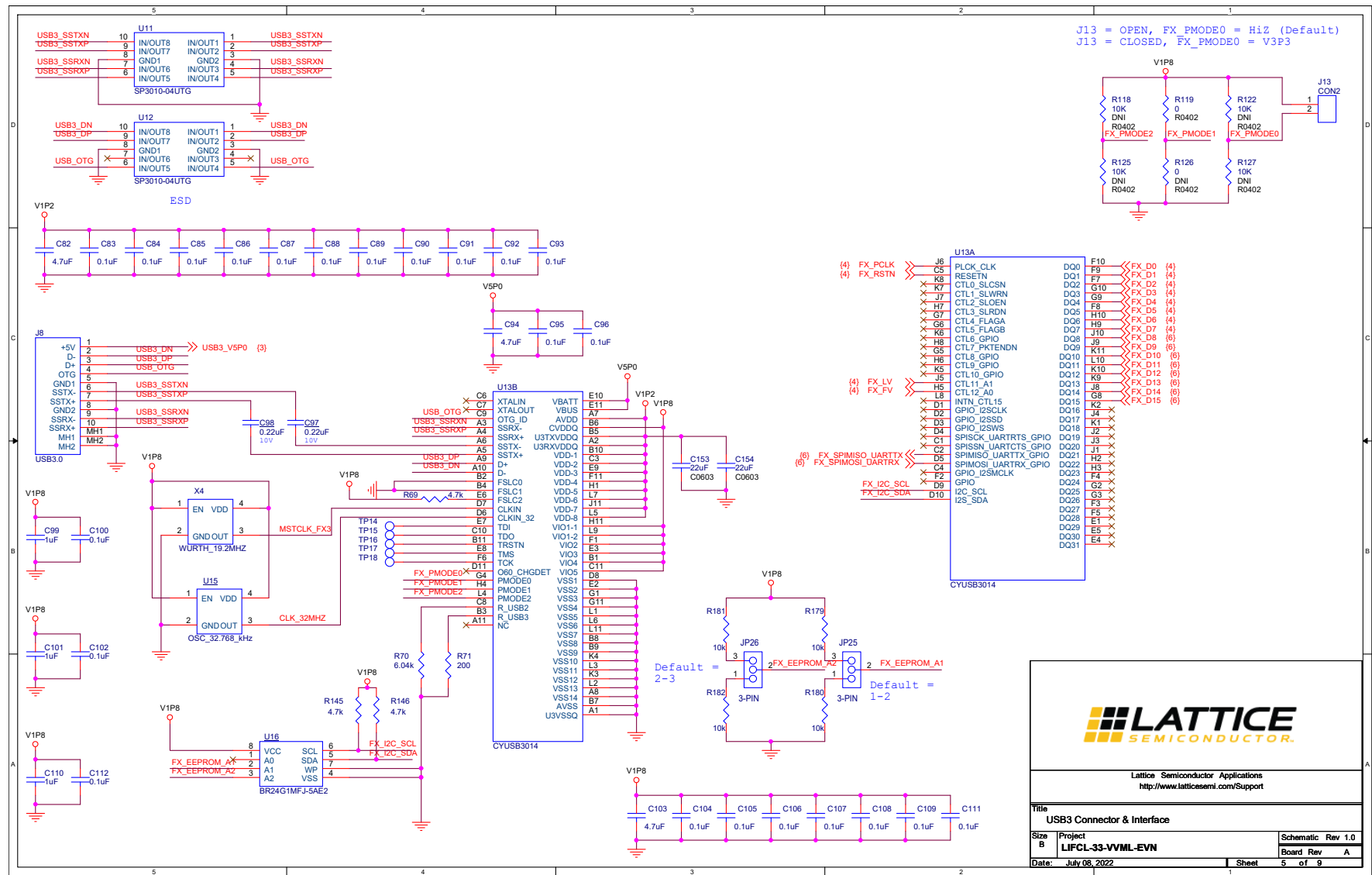


Figure A.5. USB3 Connector and Interface

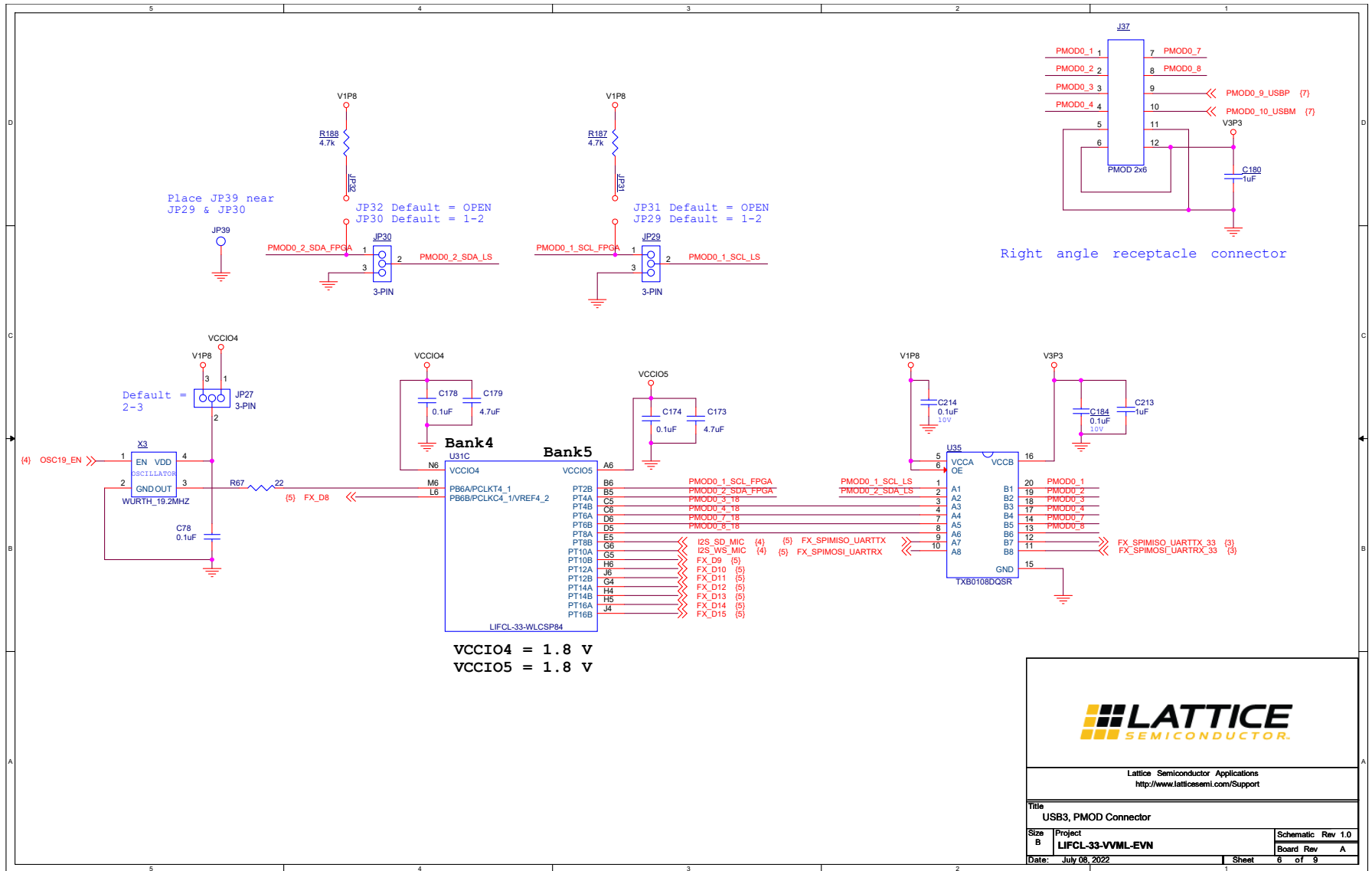


Figure A.6. USB3, PMOD Connector

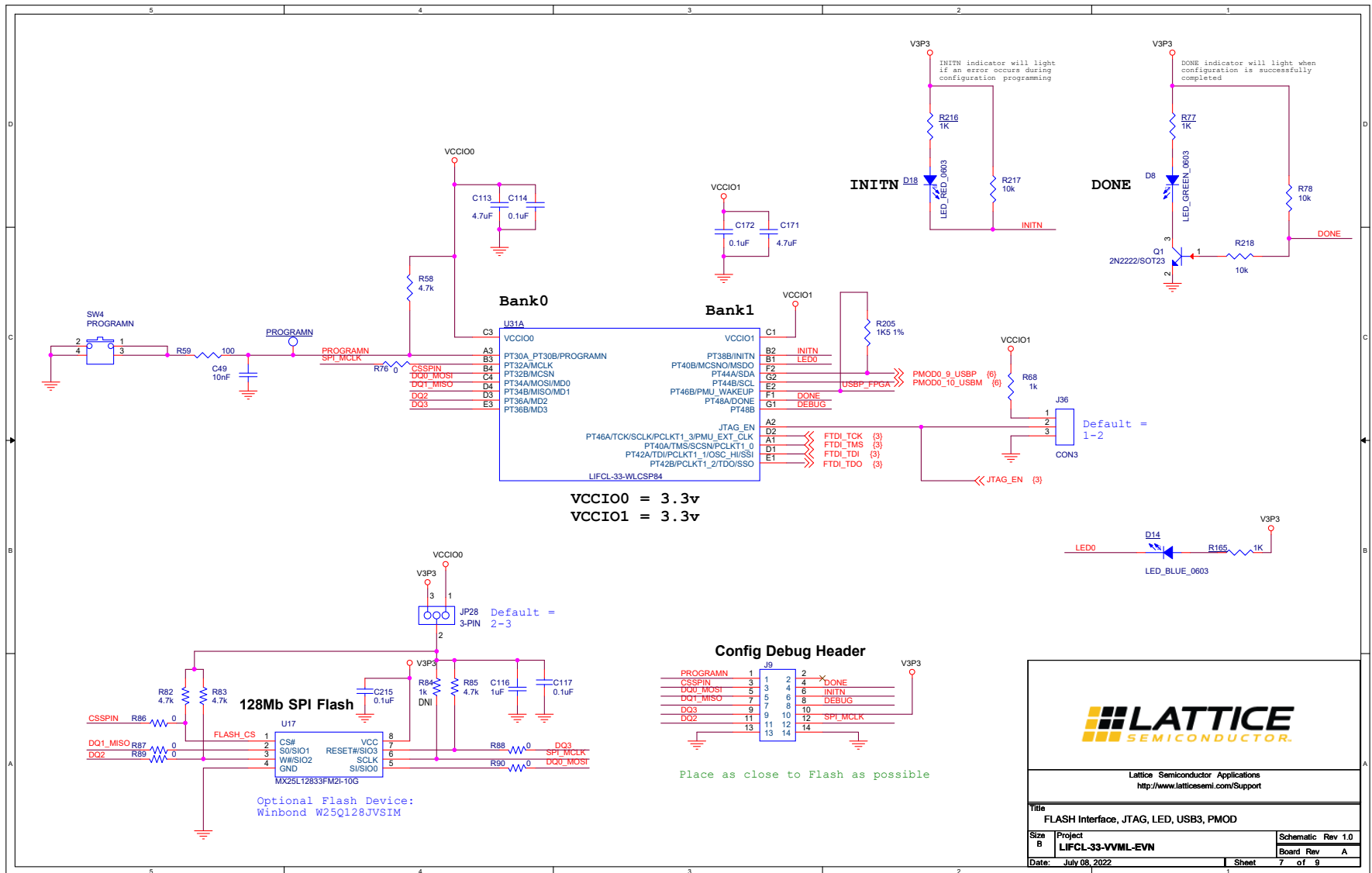


Figure A.7. FLASH Interface, JTAG, LED, USB3, PMOD

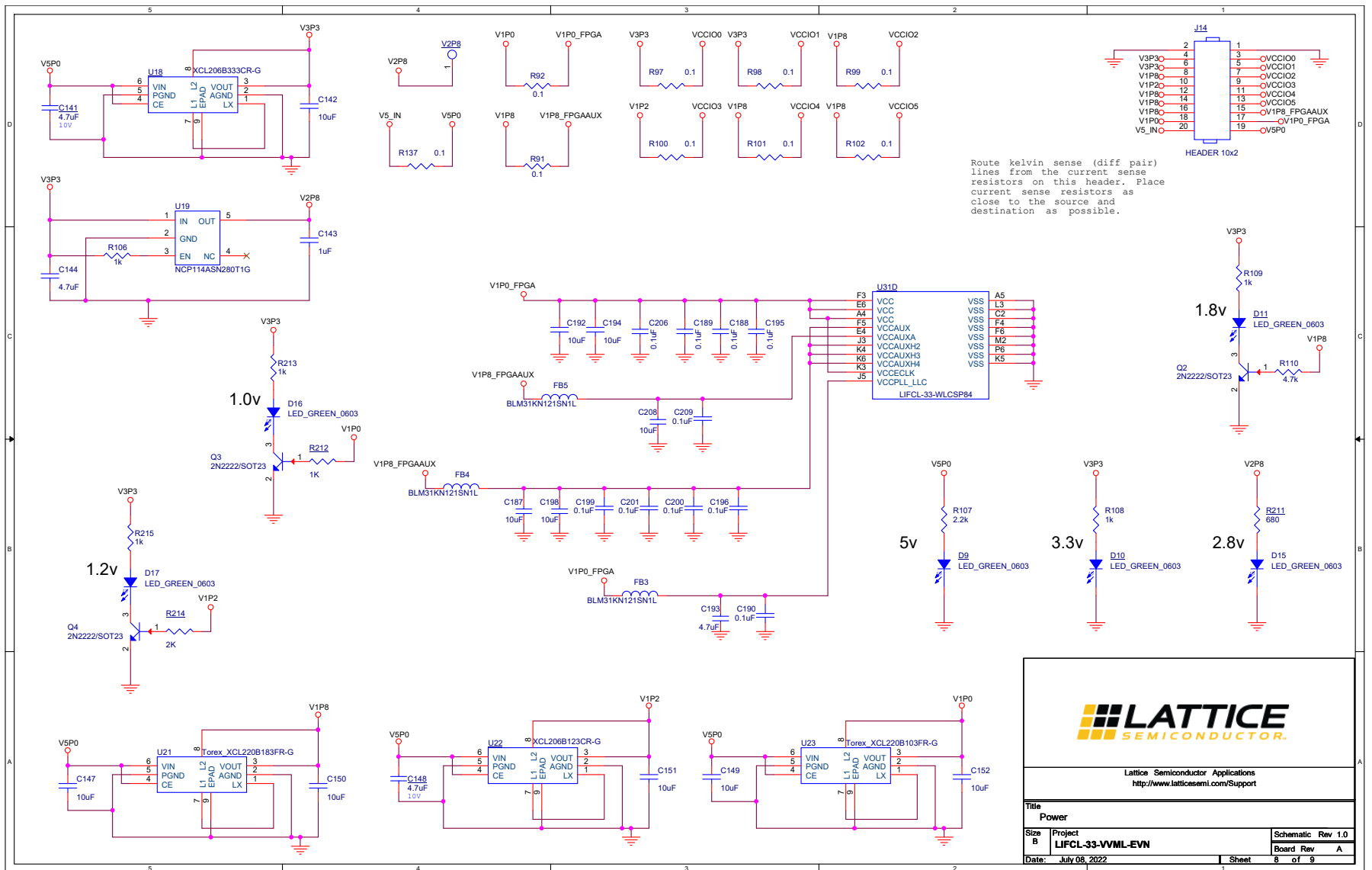


Figure A.8. Power

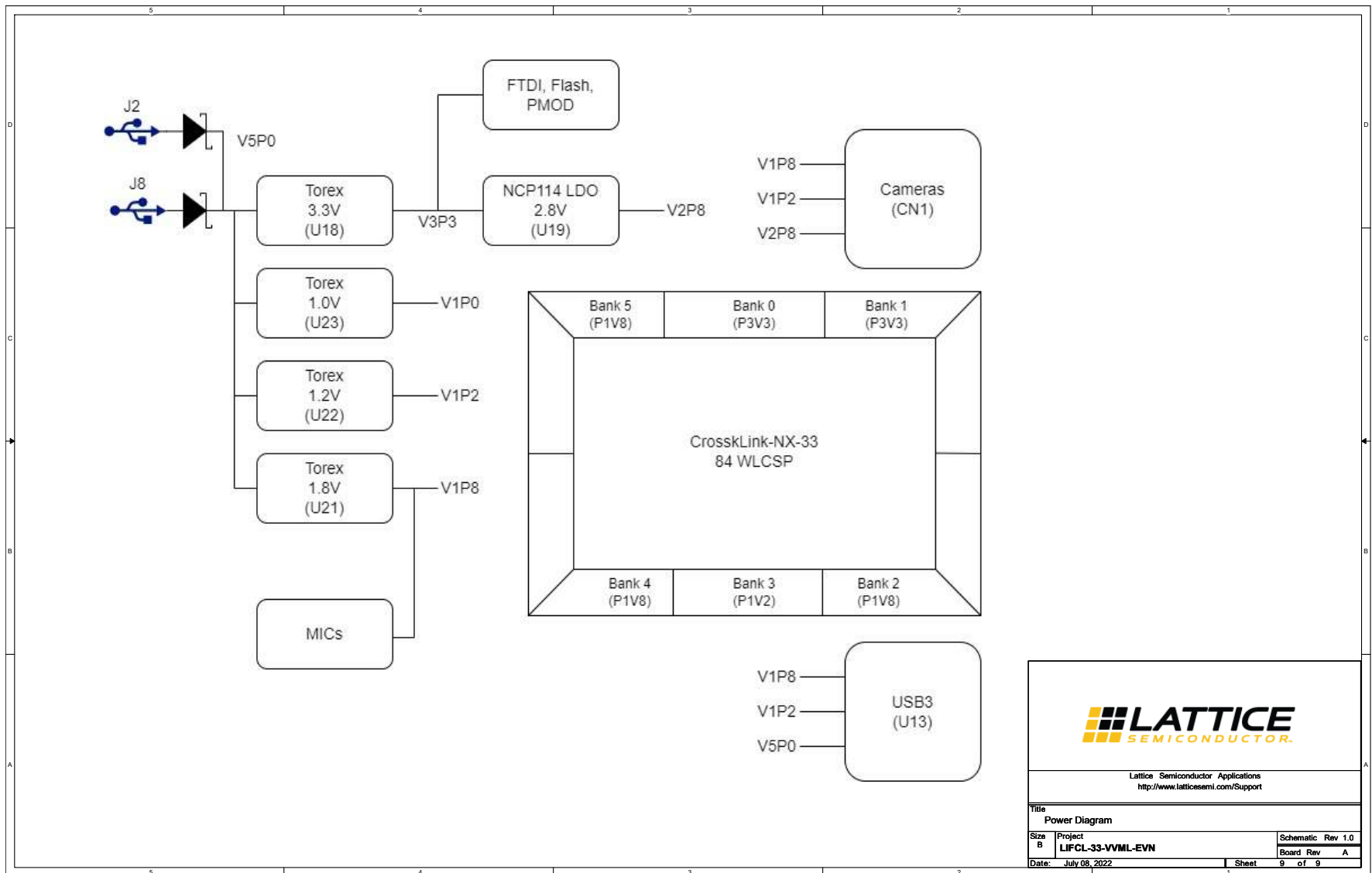


Figure A.9. Power Diagram

Appendix B. CrossLink-NX-33 Voice and Vision Machine Learning Board Bill of Materials

Item	Reference	Qty	Value	PCB Footprint	Comments	Manufacturer Part Number	Manufacturer	Description
1	CN1	1	245804030000829+_R	CONN_2X15_245804	—	245804030000829+	Kyocera Avx	CONN RCPT 30 POS SMD
2	C1,C10,C12,C14,C24,C68,C82,C94,C103,C113,C144,C171,C173,C176,C179,C193	16	4.7uF	C0402	—	C1005X5R1A475K050BC	TDK	CAP CER 4.7UF 10V X5R 0402
3	C2,C3,C4,C5,C6,C7,C8,C9,C11,C13,C15,C17,C30,C34,C67,C69,C71,C78,C83,C84,C85,C86,C87,C88,C89,C90,C91,C92,C93,C95,C96,C100,C102,C104,C105,C106,C107,C108,C109,C111,C112,C117,C215	43	0.1uF	C0201	—	C0603X5R1C104K030BC	TDK	CAP CER 0.1UF 16V X5R 0201
4	C16,C66,C70,C99,C101,C110,C116,C143,C180,C211,C213	11	1uF	C0402	—	EMK105BJ105KVHF	Taiyo Yuden	CAP CER 1UF 16V X5R 0402
5	C25,C114,C172,C174,C177,C178,C188,C189,C190,C195,C196,C199,C200,C201,C206,C209	16	0.1uF	c0201_chamfer	—	C0603X5R1C104K030BC	TDK	CAP CER 0.1UF 16V X5R 0201
6	C29,C33	2	220pF	C0402	—	C0402C221J5GACAUTO	KEMET	CAP CER 220PF 50V NPO 0402
7	C49	1	10nF	C0402	—	C1005X5R1E103K050BA	TDK	CAP CER 10000PF 25V X5R 0402
8	C97,C98	2	0.22uF	C0201	—	GRM033R61A224KE90D	Murata Electronics	CAP CER 0.22UF 10V X5R 0201
9	C141,C148	2	4.7uF	C0402	—	C1005X5R1A475K050BC	TDK	CAP CER 4.7UF 10V X5R 0402
10	C142,C150,C151,C152,C187,C192,C194,C198,C208	9	10uF	C0603	—	C1608X5R1C106M080AB	TDK Corporation	CAP CER 10UF 16V X5R 0603
11	C147,C149	2	10uF	C0603	—	C1608X5R1C106M080AB	TDK Corporation	CAP CER 10UF 16V X5R 0603
12	C153,C154	2	22uF	C0603	—	CL10A226MQ8NRNC	Samsung Electro-Mechanics	CAP CER 22UF 6.3V X5R 0603
13	C184,C210,C212,C214	4	0.1uF	C0402	—	GRM155R61H104KE14D	Murata Electronics	CAP CER 0.1UF 50V X5R 0402

Item	Reference	Qty	Value	PCB Footprint	Comments	Manufacturer Part Number	Manufacturer	Description
14	D8,D9,D10,D11,D15,D16,D17	7	LED_GREEN_0603	APT1608	—	APT1608CGCK	Kingbright	LED GREEN CLEAR CHIP SMD
15	D12,D13	2	BAT60A	SOD323_BAT60A	—	BAT60AE6327HTSA1	Infineon Technologies	DIODE SCHOTTKY 10V 3A SOD323-2
16	D14	1	LED_BLUE_0603	APT1608	—	APT1608QBC/D	Kingbright	LED BLUE CLEAR CHIP SMD
17	D18	1	LED_RED_0603	APT1608	—	APT1608SURCK	Kingbright	LED RED CLEAR CHIP SMD
18	FB3,FB4,FB5	3	BLM31KN121SN1L	BLM41P	—	BLM31KN121SN1L	Murata Electronics	FERRITE BEAD 120 OHM 1206 1LN
19	JP19,JP20,JP25,JP26,JP27,JP28	6	3-PIN	HDR254M-1X3	Default : Pin 2&3	—	—	Regular 100Mil Header
20	JP21,JP29,JP30	3	3-PIN	HDR254M-1X3	Default : Pin 1&2	—	—	Regular 100Mil Header
21	JP31,JP32,JP33,JP38	4	2 Pin Jumper	HDR_1X2_2228	—	22-28-4020	Molex	Headers & Wire Housings 2C HEADER
22	JP34,JP35,JP36,JP37	4	2 Pin Jumper	HDR_1X2_2228	Default : Pin 1&2	22-28-4020	Molex	Headers & Wire Housings 2C HEADER
23	JP39	1	Tpoint	HDR_TH_1X1	—	PRE001SAAN-RC	Sullins	CONN HEADER VERT 1POS
24	J1	1	Header 1x8	hdr_amp_87220_8_1x8_100	—	22284081	Molex	CONN HEADER 8POS .100 VERT TIN
25	J2	1	475890001	MOLEX_47589-0001	—	475890001	Molex	CONN RCPT MICRO USB AB 5P SMD RA
26	J3,J13	2	CON2	CON2	—	61300211121	Würth Elektronik	CONN HEADER VERT 2POS 2.54MM
27	J8	1	USB3.0	USB3_MicroB_Typ e3	—	GSB343K33HR	Amphenol	CONN RCPT USB3.0 MICRO B SMD R/A
28	J9	1	Header_2	Header_2x7	Regular 100Mil Header	—	—	—
29	J14	1	HEADER 10x2	HDR_10X2_PP010	—	PRPC010DAAN-RC	Sullins Connector Solutions	CONN HEADER VERT 20POS 2.54MM
30	J36	1	CON3	HDR1X3	Default : Pin 1&2	—	—	Regular 100Mil Header
31	J37	1	PMOD 2x6	skt_sullins_PP062LJBN-RC	—	PPPC062LJBN-RC	Sullins	CONN HDR 12POS 0.1 GOLD PCB R/A
32	L1,L2	2	220ohm 500mA	FB0402	—	MPZ1005S221ET000	TDK Corporation	FERRITE BEAD 220 OHM 0402 1LN
33	MH1	1	ThruHole	MTG125	DNL	—	—	—

Item	Reference	Qty	Value	PCB Footprint	Comments	Manufacturer Part Number	Manufacturer	Description
34	TP14,TP15,TP16,TP17,TP18,PROGRAMN,V2P8	7	TestPoint	tp35_smd	DNL	—	—	—
35	Q1,Q2,Q3,Q4	4	2N2222/SOT23	MMBT2222ALT-1	—	MMBT2222ALT1HTSA1	Infineon Technologies	TRANS NPN 40V 0.6A SOT-23
36	R1,R2,R3,R58,R69,R82,R83,R85,R110,R124,R145,R146,R187,R188	14	4.7k	R0402	—	RC0402FR-074K7L	Yageo	RES SMD 4.7K OHM 1% 1/16W 0402
37	R4,R9,R16,R107	4	2.2k	R0402	—	RC0402FR-072K2L	Yageo	RES SMD 2.2K OHM 1% 1/16W 0402
38	R5	1	33	R0402	—	RC0402FR-0733RL	Yageo	RES SMD 33 OHM 1% 1/16W 0402
39	R10	1	12k	R0402	—	RC0402FR-0712KL	Yageo	RES SMD 12K OHM 1% 1/16W 0402
40	R11,R34,R35,R67	4	22	R0402	—	RC0402FR-0722RL	Yageo	RES SMD 22 OHM 1% 1/16W 0402
41	R12,R13,R14,R78,R123,R147,R148,R149,R179,R180,R181,R182,R217,R218	14	10k	R0402	—	RC0402FR-0710KL	Yageo	RES SMD 10K OHM 1% 1/16W 0402
42	R59	1	100	R0402	—	RC0402FR-07100RL	Yageo	RES SMD 100 OHM 1% 1/16W 0402
43	R62,R63,R201,R202	4	4.7k	R0402	DNL	RC0402FR-074K7L	Yageo	RES SMD 4.7K OHM 1% 1/16W 0402
44	R68,R106,R108,R109,R206,R208,R209,R210,R213,R215	10	1k	R0402	—	RC0402FR-071KL	Yageo	RES SMD 1K OHM 1% 1/16W 0402
45	R70	1	6.04k	R0402	—	RC0402FR-076K04L	Yageo	RES SMD 6.04K OHM 1% 1/16W 0402
46	R71	1	200	R0402	—	RC0402FR-07200RL	Yageo	RES SMD 200 OHM 1% 1/16W 0402
47	R76,R86,R87,R88,R89,R90,R115,R116	8	0	R0402	—	RC0402JR-070RL	Yageo	RES SMD 0 OHM JUMPER 1/16W 0402
48	R77,R165,R212,R216	4	1K	R0402	—	RC0402FR-071KL	Yageo	RES SMD 1K OHM 1% 1/16W 0402
49	R84	1	1k	R0402	DNL	RC0402FR-071KL	Yageo	RES SMD 1K OHM 1% 1/16W 0402
50	R91,R92,R97,R98,R99,R100,R101,R102,R137	9	0.1	R0402	—	ERJ-2BSFR10X	Panasonic Electronic Components	RES 0.1 OHM 1% 1/6W 0402

Item	Reference	Qty	Value	PCB Footprint	Comments	Manufacturer Part Number	Manufacturer	Description
51	R118,R122,R125,R127	4	10K	R0402	DNL	RC0402FR-0710KL	Yageo	RES SMD 10K OHM 1% 1/16W 0402
52	R119	1	0	R0402	—	RC0402JR-070RL	Yageo	RES SMD 0 OHM JUMPER 1/16W 0402
53	R126	1	0	R0402	DNL	RC0402JR-070RL	Yageo	RES SMD 0 OHM JUMPER 1/16W 0402
54	R205	1	1K5 1%	402	—	ERJ-2RKF1501X	Panasonic	RES SMD 1.5K OHM 1% 1/10W 0402
55	R211	1	680	R0402	—	ERJ-2GEJ681X	Panasonic	RES SMD 680 OHM 5% 1/10W 0402
56	R214	1	2K	R0402	—	CRCW04022K00JNED	Vishay Dale	RES SMD 2K OHM 5% 1/16W 0402
57	SW4	1	PROGRAMN	4psmd_switch	—	434153017835	Würth	SWITCH TACTILE SPST-NO 0.05A 12V
58	12MHZ,TP33_B5,TP33_B6,TP33_B7,TP33_B8,TP_VS,TP_PCLK,TP_FAE	8	T POINT R	TP	DNL	—	—	—
59	U1	1	ESDR0502N	ESDR0502N	—	ESDR0502NMUTBG	ON Semiconductor	TVS DIODE 5.5VWM 6UDFN
60	U2	1	FT2232HL	tqfp64_0p5_12p2x12p2_h1p6	—	FT2232HL	FTDI	IC USB HS DUAL UART/FIFO 64-LQFP
61	U4	1	93LC56C-I/SN	so8_50_244	—	93LC56C-I/SN	Microchip	IC EEPROM 2KBIT SPI 3MHZ 8SOIC
62	U6,U7	2	SPH0645LM4H-B	SPH0645LM4H-B	—	SPH0645LM4H-B	Knowles	CRAWFORD MIC DGT I2S BOTTOM PORT
63	U11,U12	2	SP3010-04UTG	UDFN10_SP3010-04UTG	—	SP3010-04UTG	Littelfuse Inc.	TVS DIODE 6V 12.3V 10UDFN
64	U13	1	CYUSB3014	121BGA	—	CYUSB3014-BZXI	Cypress	IC ARM9 USB CONTROLLER 121FBGA
65	U15	1	OSC_32.768_kHz	SMD_ASAK2	—	ASAK2-32.768KHZ-LRS-T	Abrakon LLC	XTAL OSC XO 32.7680KHZ LVC MOS
66	U16	1	BR24G1MFJ-5AE2	SOP-J8	—	BR24G1MFJ-5AE2	Rohm Semiconductor	1MB, IC BUS, HIGH SPEED WRITE
67	U17	1	MX25L12833FM2I-10G	SO8_MX25L12833FM2I10G	Alternate PN : W25Q128JV SIM	MX25L12833FM2I-10G	Macronix	IC FLASH 128MBIT 104MHZ 8SOP

Item	Reference	Qty	Value	PCB Footprint	Comments	Manufacturer Part Number	Manufacturer	Description
68	U18	1	XCL206B333CR-G	CL-205-02	—	XCL206B333CR-G	Torex Semiconductor Ltd	DC DC Converter 3.3V
69	U19	1	NCP114ASN280T1G	TSOP5_NCP114ASN280T1G	—	NCP114ASN280T1G	ON Semiconductor	IC REG LINEAR 2.8V 300MA 5TSOP
70	U21	1	Torex_XCL220B183FR-G	XCL220B123FR-G	Alternate PN : XCL206B183CR-G	XCL220B183FR-G	Torex Semiconductor Ltd	DC DC CONVERTER 1.8V
71	U22	1	XCL206B123CR-G	CL-205-02	—	XCL206B123CR-G	Torex Semiconductor Ltd	DC DC Converter 1.2V
72	U23	1	Torex_XCL220B103FR-G	XCL220B123FR-G	—	XCL220B103FR-G	Torex Semiconductor Ltd	DC DC CONVERTER 1V 1A
73	U31	1	LIFCL-33-WLCSP84	LIFCL_33_WLCSP84	Customer Supplied	—	—	—
74	U33,U35	2	TXB0108DQSR	USON20	—	TXB0108DQSR	TI	IC TRNSLTR BIDIRECTIONAL 20USON
75	X1	1	CSTNE12M0G55Z000R0	OSC_CSTNE12M0G55Z000R0	—	CSTNE12M0G55Z000R0	Murata Electronics	CERAMIC RES 12.0000MHZ 33PF SMD
76	X3,X4	2	WURTH_19.2MHZ	4-SMD	—	830208217009	Würth Elektronik	XTAL OSC XO 19.2000MHZ CMOS
77	Shunt for headers	14	SPC02SYAN	—	—	SPC02SYAN	Sullins Connector Solutions	CONN JUMPER SHORTING GOLD FLASH
78	LIFCL-33-VVML-EVN BOARD REVA PCB	1	—	—	—	305-PD-22-0350	PACTRON	

Revision History

Revision 1.0, September 2022

Section	Change Summary
All	Initial release.



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