

UDP MOTHERBOARD USER'S GUIDE

1. Introduction

The Unified Development Platform (UDP) provides a development and demonstration platform for Silicon Laboratories microcontrollers and the Silicon Laboratories software tools, including the Silicon Laboratories Integrated Development Environment (IDE).

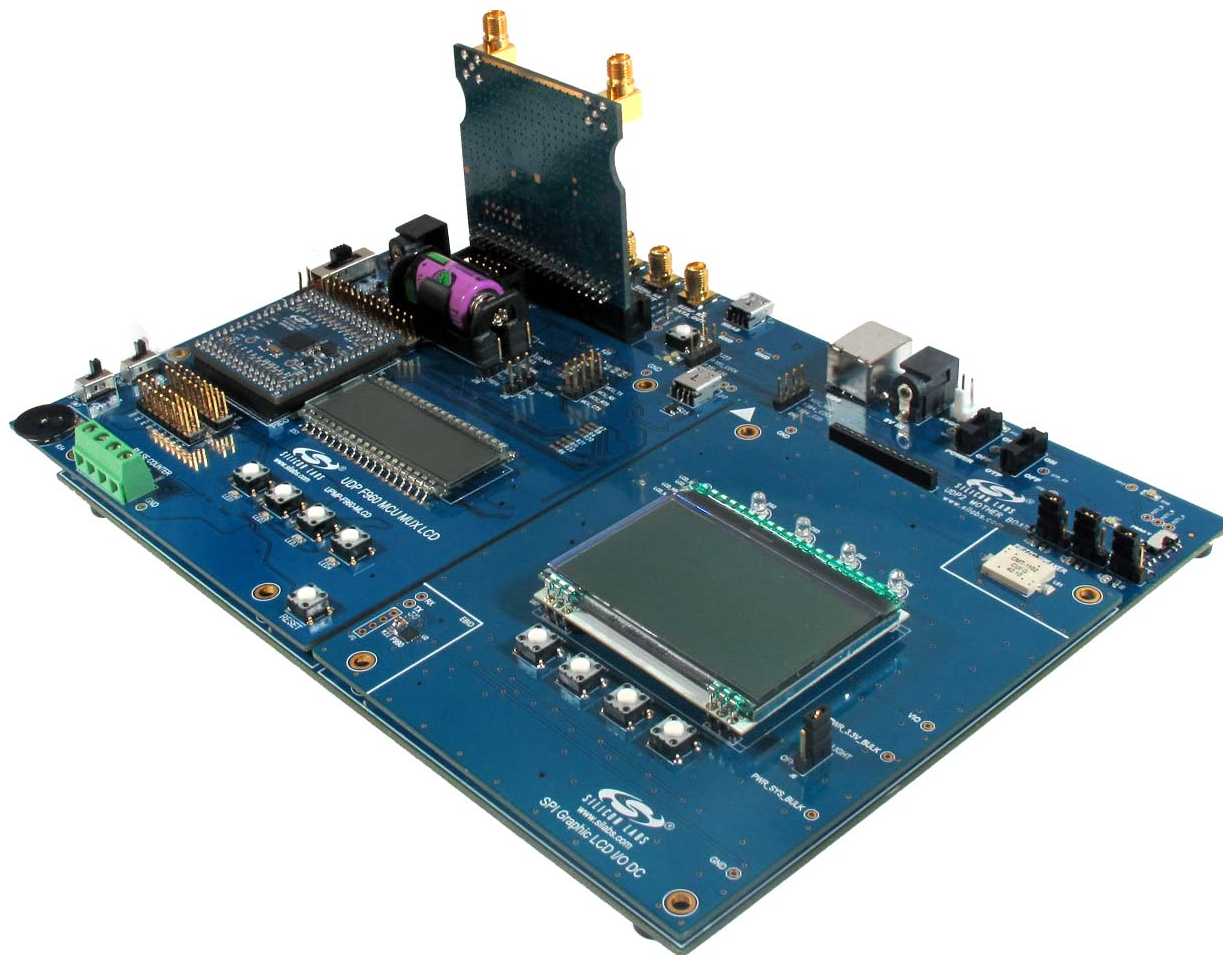


Figure 1. Unified Development Platform

UDP Motherboard

2. Relevant Documents

This document provides a hardware overview for the Unified Development Platform (UDP) system motherboard. Additional information on the UDP system can be found in the documents listed in this section.

2.1. Daughter Card User's Guides

The MCU card User's Guides, I/O card User's Guides, and Radio Card User's Guides contain information specific to the boards received in the kit. These User's Guides can be found at www.silabs.com.

3. Unified Development Platform Overview

The UDP motherboard accepts four types of boards: the target MCU card, the I/O expander card, the radio card, and the EZLink card. The motherboard can be used with an MCU card alone without an I/O card, radio card, or EZLink card.

3.1. UDP Motherboard Overview

The motherboard connects the MCU card, I/O expander, and radio cards together. In addition, the motherboard provides extra access points to the MCU card to add peripherals to the system. The motherboard provides USB connectivity with a Silicon Labs CP2105 USB-to-Dual-UART bridge and a Silicon Labs C8051F384 8051 USB MCU. The motherboard can be powered from USB, an AC adapter, or a battery pack with the capability to vary the power supply and measure the current consumption of the target MCU board. Finally, the motherboard provides RF measurement circuitry for radio development.

Figure 2 shows the UDP motherboard. A detailed discussion of the board is available in 6. "UDP Motherboard," on page 9.

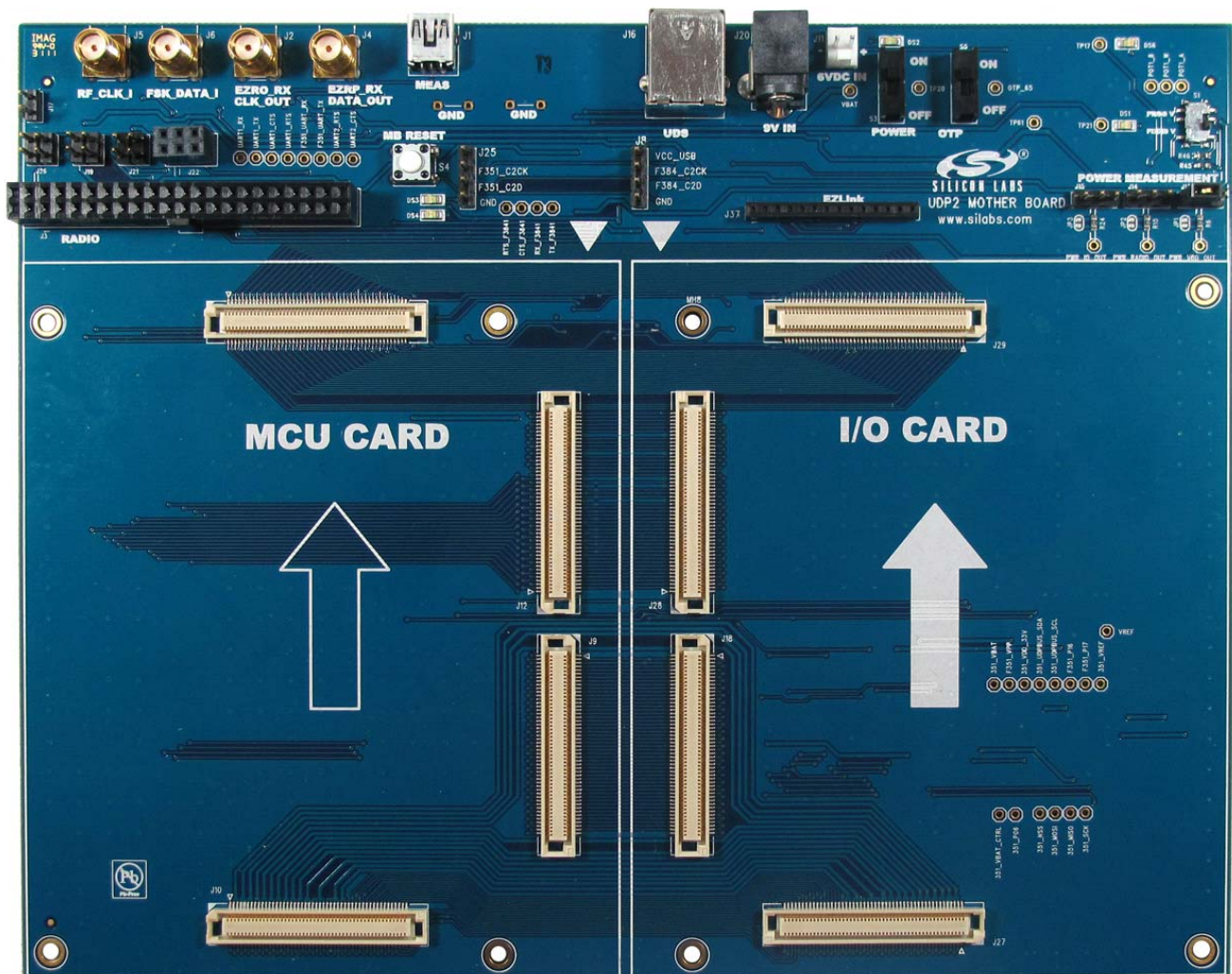


Figure 2. Unified Development Platform Motherboard

UDP Motherboard

3.2. MCU Cards Overview

The target MCU cards enable application development on the desired MCU. The card connects to the MCU Card expansion slot in the UDP motherboard and provides complete access to the MCU resources. Each expansion board has a unique ID that can be read out of an EEPROM or MCU on the board, which enables software tools to recognize the connected hardware and automatically select the appropriate firmware image. The target MCU card can also be detached from the UDP and used alone as a development or demonstration tool.

Each MCU card has a separate User's Guide that describes the details of the board's features. Figure 3 shows an example MCU card.

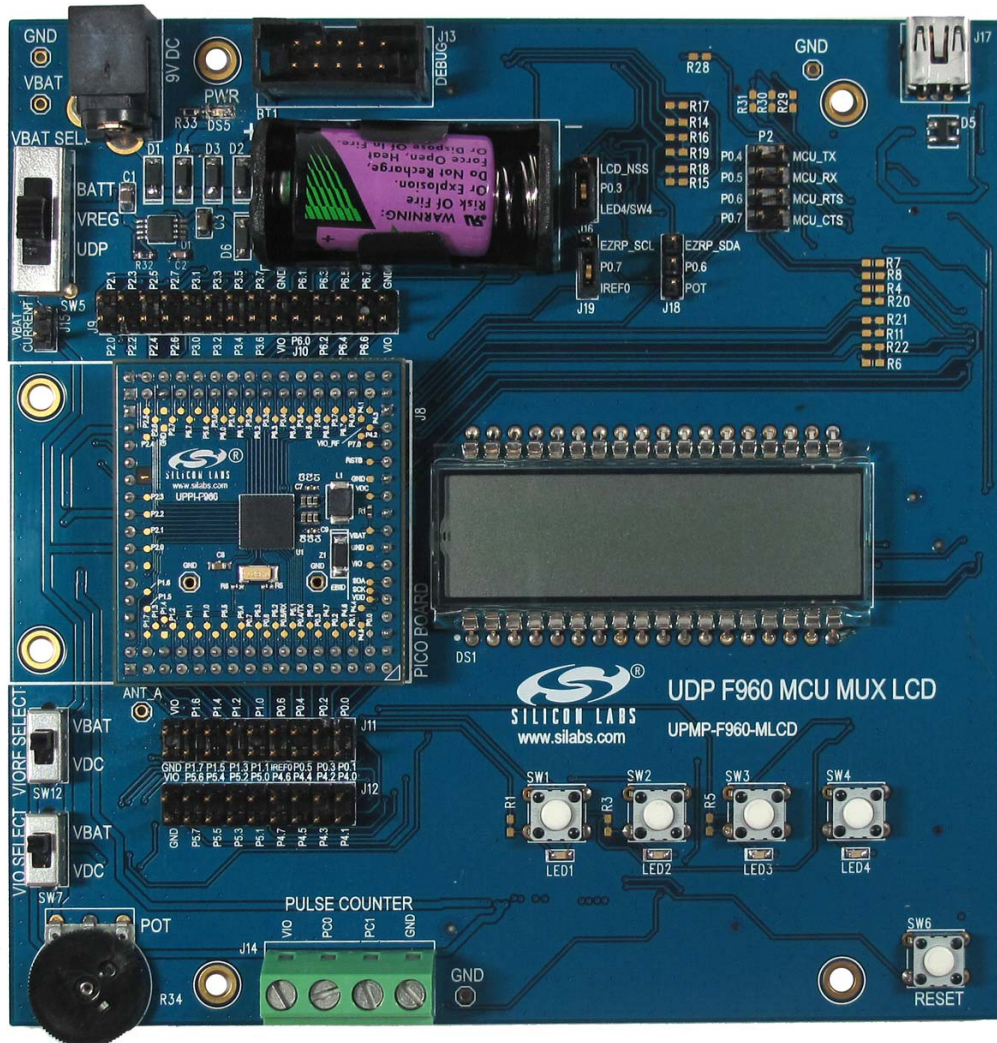


Figure 3. Unified Development Platform Example MCU Card

3.3. I/O Cards Overview

The I/O cards add peripherals to the MCU cards to enable specific code development. The card connects to the I/O card expansion slot in the UDP motherboard. Each expansion board has a unique ID that can be read out of an EEPROM or MCU on the board, which enables software tools to recognize the connected hardware and automatically select the appropriate firmware image.

Each I/O card has a separate User's Guide that describes the details of the board's features. Figure 4 shows an example I/O card.

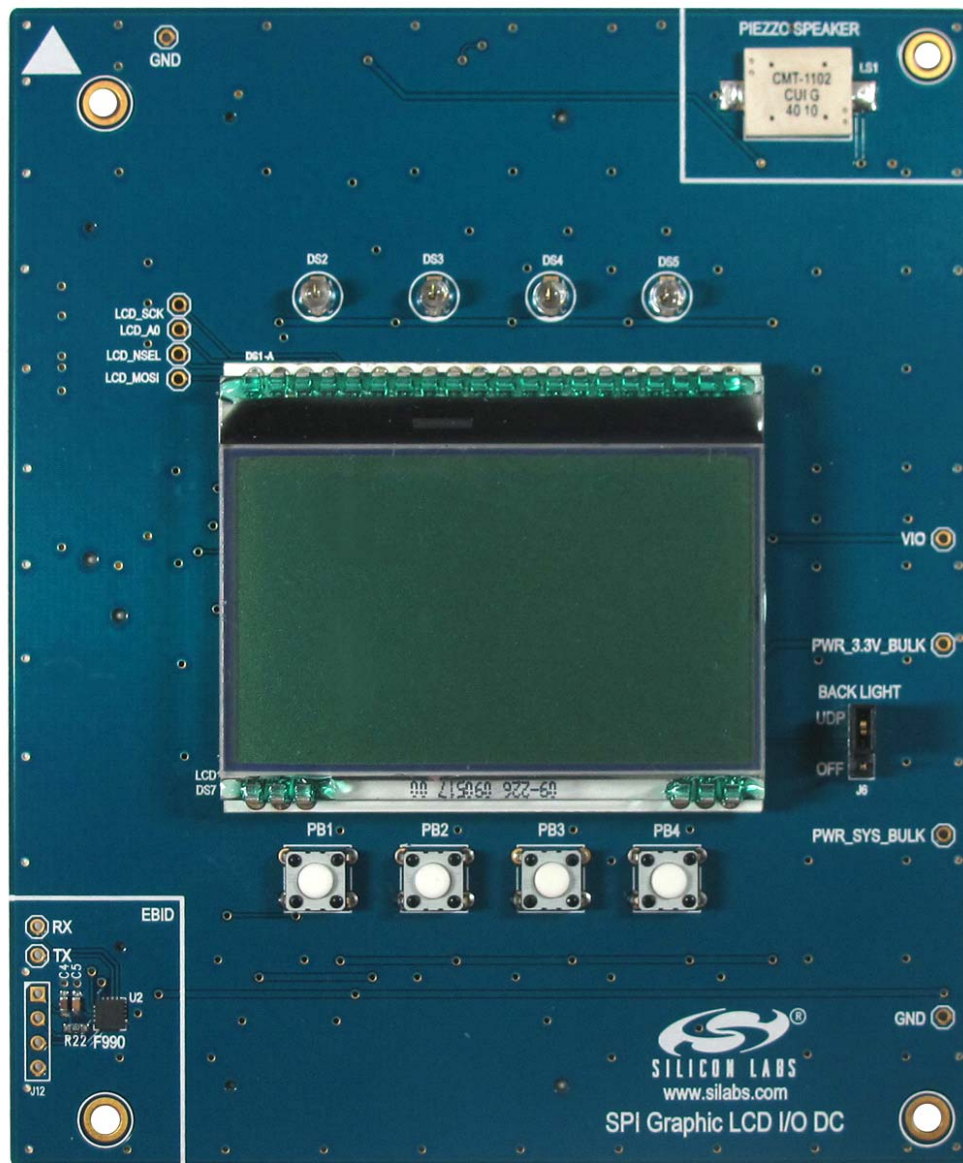


Figure 4. Unified Development Platform Example I/O Card

UDP Motherboard

3.4. Radio Cards Overview

The UDP system supports wireless development and evaluation capability using the radio and EZLink cards. The cards connect to the radio card and EZLink slots in the UDP motherboard.

Each radio and EZLink card has a separate User's Guide that describes the details of the board's features. Figure 5 shows an example radio card, and Figure 6 shows an example EZLink card.

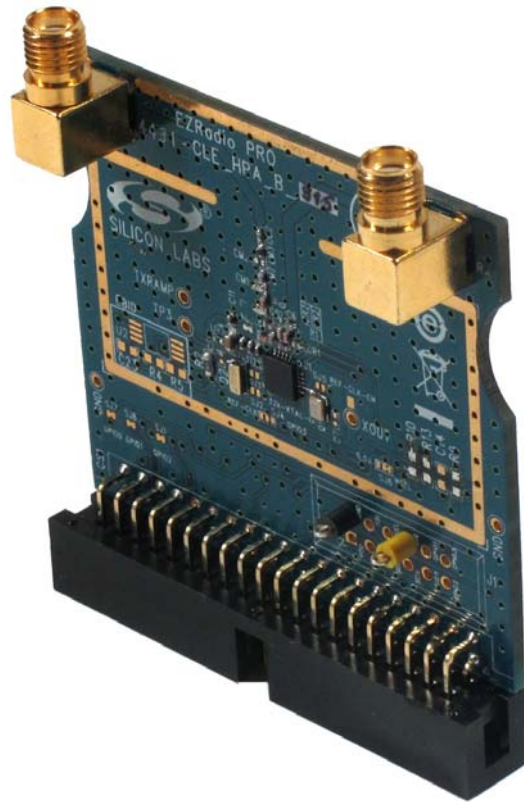


Figure 5. Unified Development Platform Example Radio Card

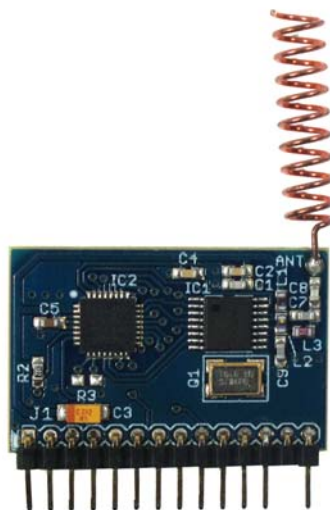


Figure 6. Unified Development Platform Example EZLink Card

4. Hardware Setup

Refer to Figure 7 for a diagram of the hardware configuration.

1. Connect the MCU card to the UDP motherboard slot.
2. (Optional) Connect the I/O card to the UDP motherboard slot.
3. (Optional) Connect a radio card to the radio card slot in the UDP motherboard.
4. (Optional) Connect an EZLink card to the EZLink card slot in the UDP motherboard.
5. Connect the USB Debug Adapter ribbon cable to the debug connector on the MCU card.
6. Connect one end of the USB cable to the USB connector on the USB Debug Adapter.
7. Connect the other end of the USB cable to a USB Port on the PC.
8. Connect the ac/dc power adapter to power jack J20 on the UDP motherboard. The board can also be powered from the J16 USB or J1 mini USB connectors.
9. Move the S3 power switch on the UDP motherboard to the ON position.

Notes:

- Use the Reset button in the IDE to reset the target when connected using a USB Debug Adapter.
- Remove power from the motherboard and the USB Debug Adapter before connecting or disconnecting the ribbon cable from the MCU card. Connecting or disconnecting the cable when the devices have power can damage the device and/or the USB Debug Adapter.
- The MCU card can be used alone without the motherboard. However, the motherboard must be powered if an MCU card is connected.

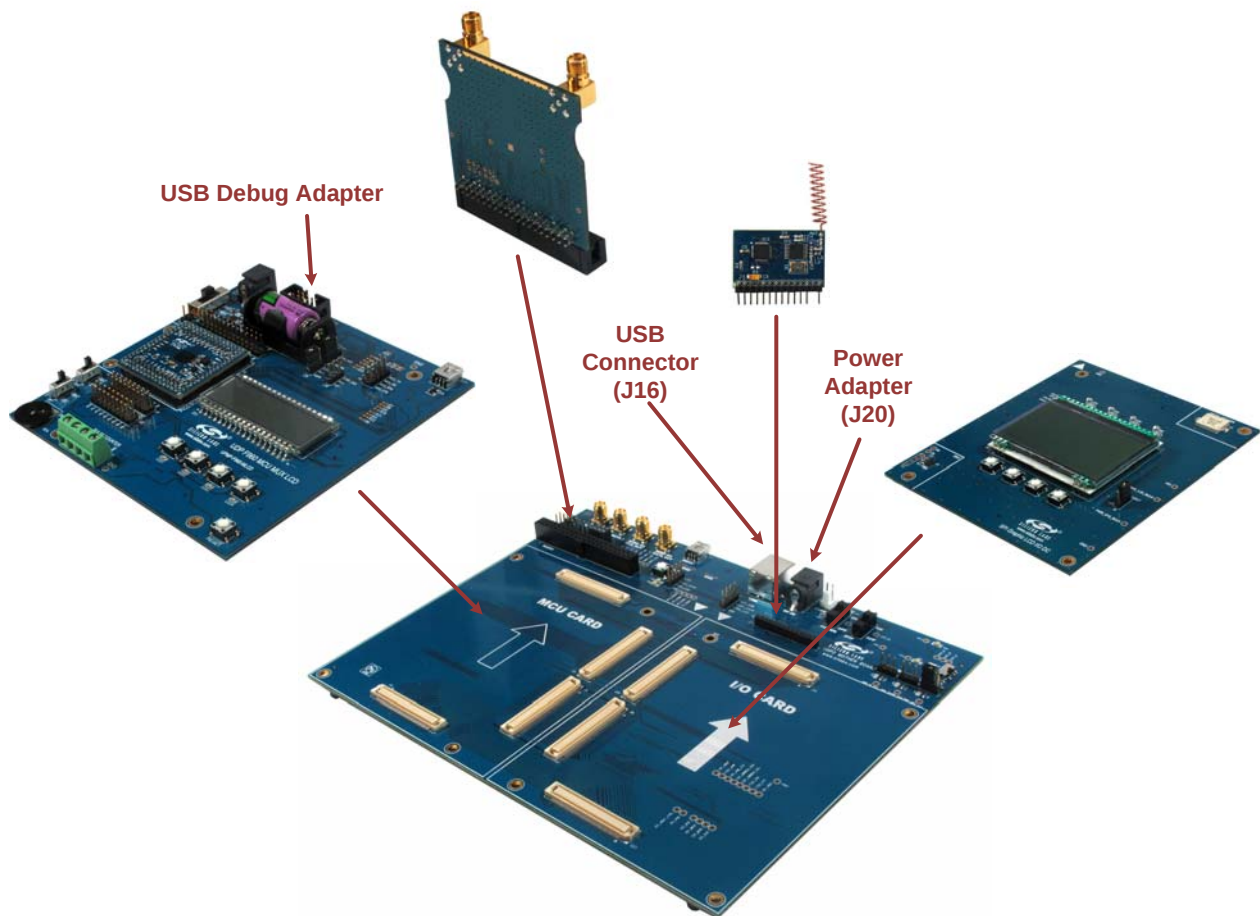


Figure 7. Hardware Setup using the Unified Development Platform

5. CP210x USB to UART VCP Driver Installation

The UDP motherboard includes a Silicon Labs CP2105 USB-to-Dual-UART Bridge Controller. Device drivers for the CP2105 need to be installed before the PC software can read the power measurement data from the MEAS J1 USB connector. If the "Install CP210x Drivers" option is selected during installation, a driver "unpacker" utility will launch.

1. Follow the steps to copy the driver files to the desired location. The default directory is *C:\SiLabs\MCU\CP210x*.
2. The final window will give an option to install the driver on the target system. Select the "Launch the CP210x VCP Driver Installer" option if you are ready to install the driver.
3. If selected, the driver installer will now launch, providing an option to specify the driver installation location. After pressing the "Install" button, the installer will search your system for copies of previously installed CP210x Virtual COM Port drivers. It will let you know when your system is up to date. The driver files included in this installation have been certified by Microsoft.
4. If the "Launch the CP210x VCP Driver Installer" option was not selected in step 3, the installer can be found in the location specified in step 2, by default *C:\SiLabs\MCU\CP210x\Windows_2K_XP_S2K3_Vista*. At this location, run *CP210xVCPIInstaller.exe*.
5. To complete the installation process, connect the included USB cable between the host computer and the MEAS USB connector (J1) on the UDP motherboard. Windows will automatically finish the driver installation. Information windows will pop up from the taskbar to show the installation progress.
6. If needed, the driver files can be uninstalled by selecting "Silicon Labs CP210x USB to UART Bridge Driver Removal" option in the "Add or Remove Programs" window.

6. UDP Motherboard

All UDP Development Kits include an MCU card for evaluation and preliminary software development. Some kits also include a UDP motherboard, I/O expansion card, or radio card. Numerous input/output (I/O) connections are provided to facilitate prototyping using the motherboard. The motherboard includes four sections: motherboard control, power measurement, variable power control, and card slots.

6.1. Motherboard Control

The UDP motherboard includes a Silicon Labs C8051F384 MCU for board management. This controller reads the electronic board IDs (EBIDs) from the cards, initiates power measurements, and controls the variable power supply. Figure 8 shows the placement of the C8051F384 on the UDP motherboard.

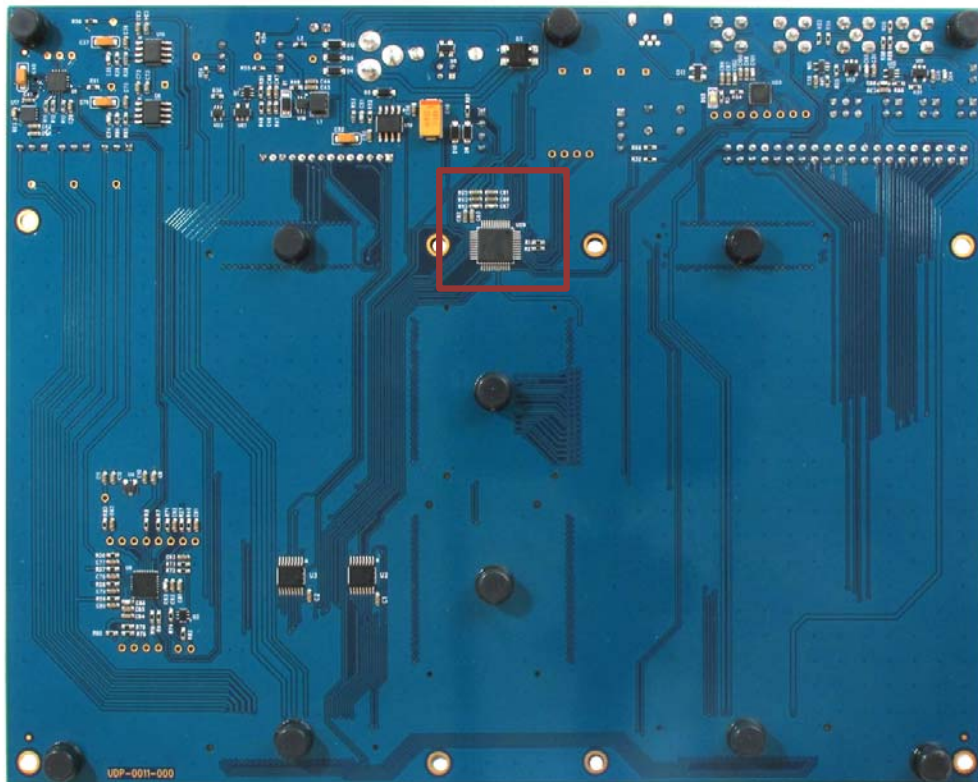


Figure 8. UDP Motherboard Control Hardware

The board control includes the following components:

U20	Silicon Labs C8051F384 MCU
J16	USB connector

UDP Motherboard

6.2. Power Measurement

The power measurement circuitry on the UDP motherboard consists of a Silicon Labs C8051F351 MCU that measures both input voltage and current consumption of the MCU card, I/O expander, and radio card.

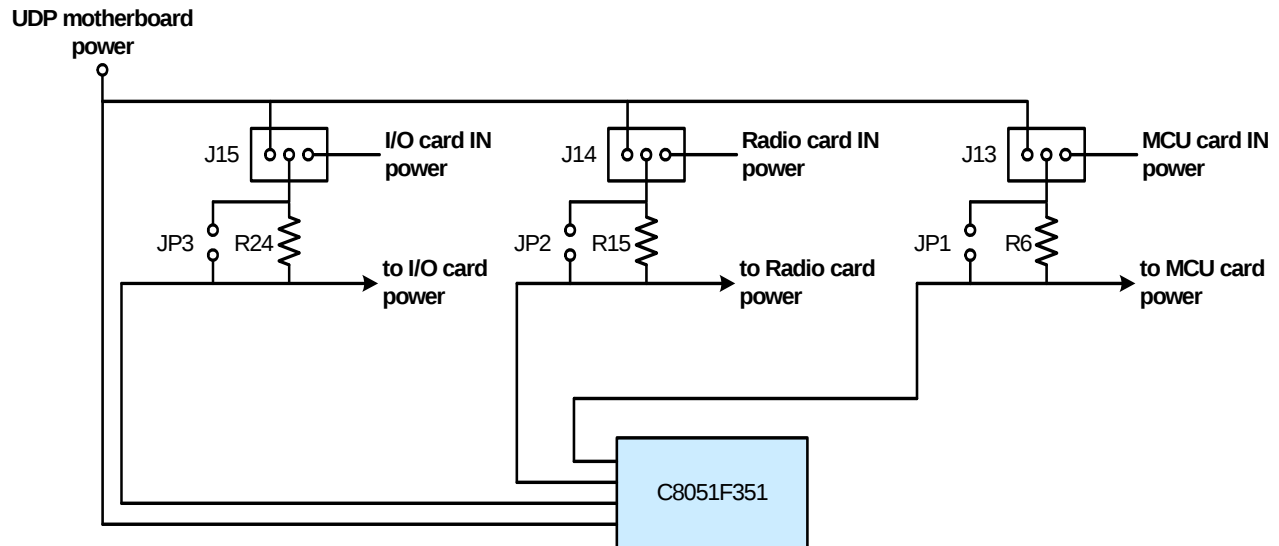


Figure 9. Power Measurement Diagram

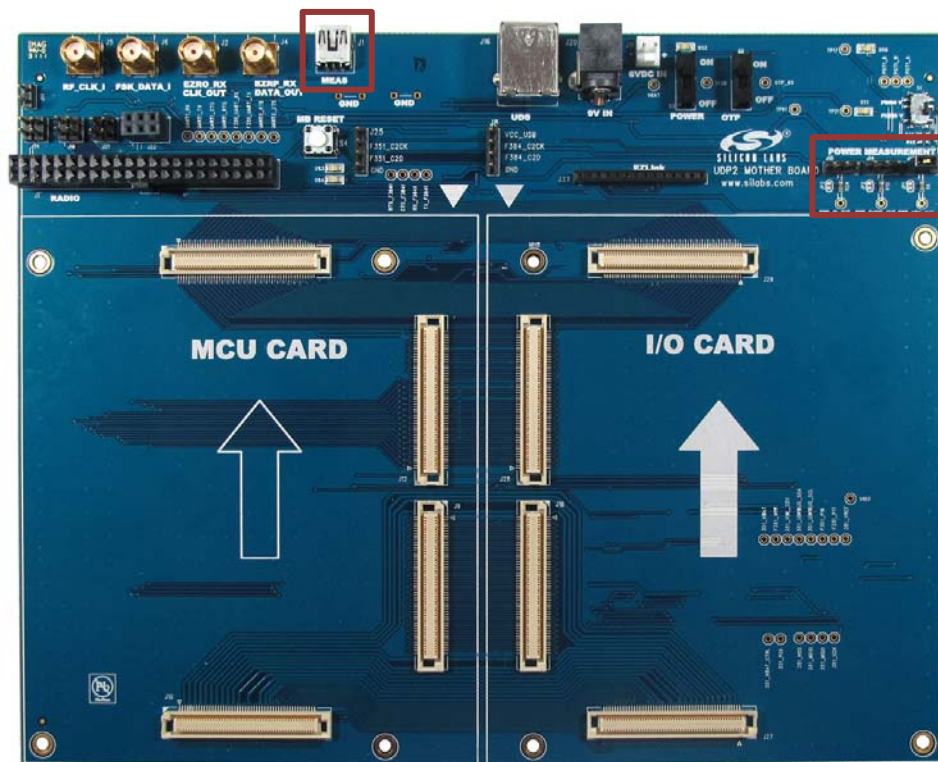


Figure 10. UDP Power Measurement Hardware (Top)

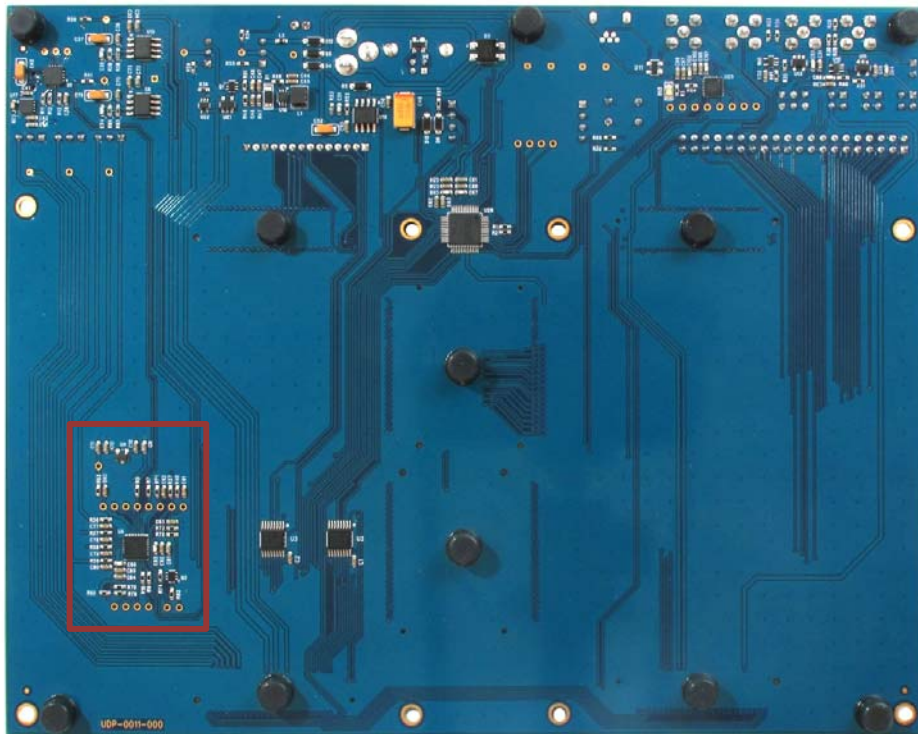


Figure 11. UDP Power Measurement Hardware (Bottom)

The JP1, JP2, and JP3 components are not populated by default. Use these landing pads to bypass the power measurement circuitry, if desired.

The power measurement hardware includes the following components:

J15	Power selection jumper for the I/O card
R24	Power measurement resistor for the I/O card
JP3	Bypass pads for the I/O card
J14	Power selection jumper for the radio card
R15	Power measurement resistor for the radio card
JP2	Bypass pads for the radio card
J13	Power selection jumper for the MCU card
R6	Power measurement resistor for the MCU card
JP1	Bypass pads for the MCU card
U9	C8051F351 power measurement MCU
J1	Power measurement mini USB port (MEAS)

The C8051F351 MCU connects to the C8051F384 board control MCU, which can initiate a voltage or current measurement. The 'F351 outputs the measurements using the J1 (MEAS) mini USB port. To use this interface, install the CP2105 USB-to-Dual-UART device drivers as described in 5. "CP210x USB to UART VCP Driver Installation," on page 8.

UDP Motherboard

6.3. Power Control

The UDP motherboard supports four power options and variable power control. Control power to the board using the power switch (S3).

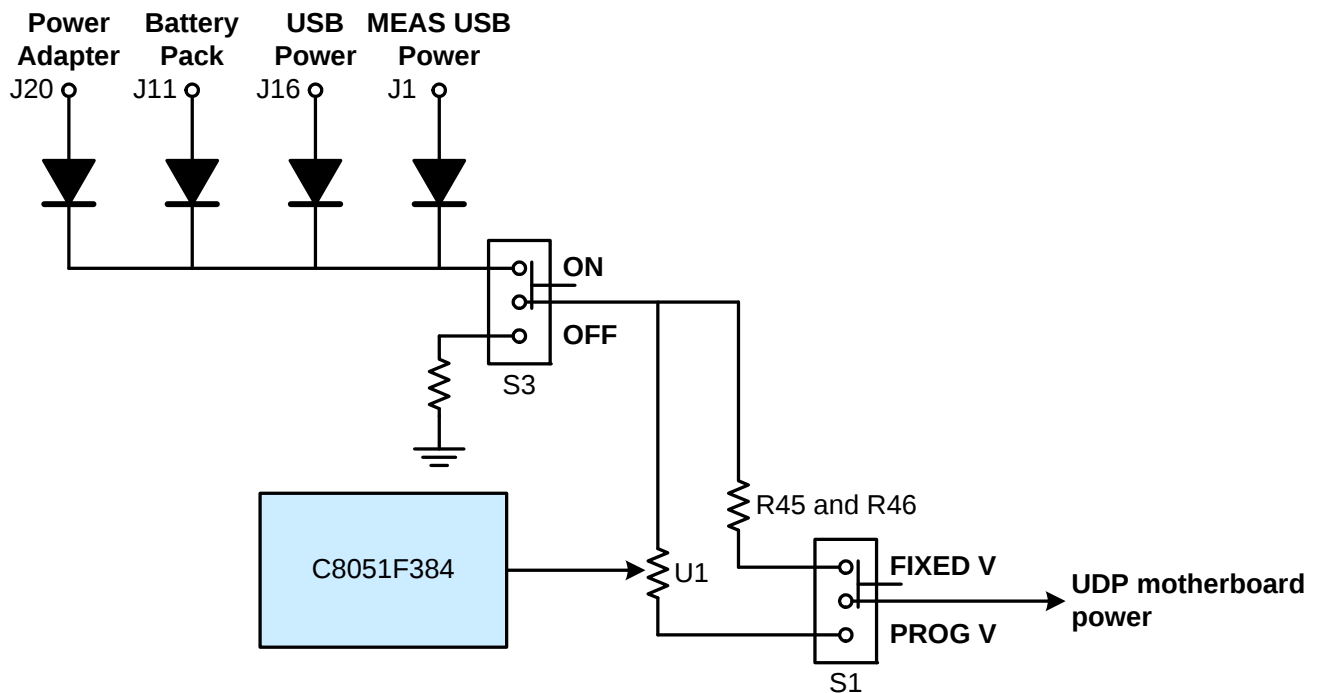


Figure 12. Variable Power Control Diagram

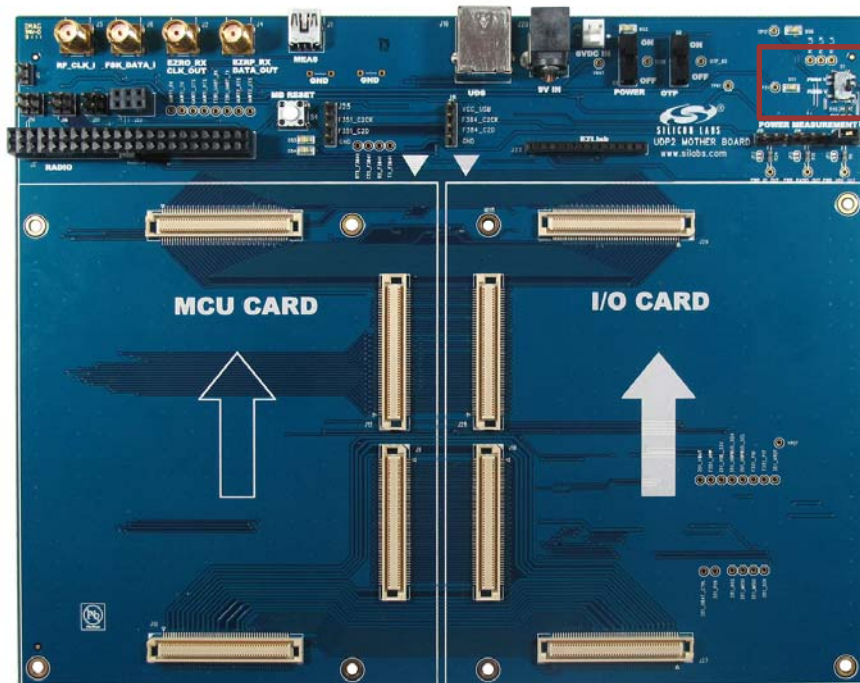


Figure 13. Variable Power Control Hardware - Top

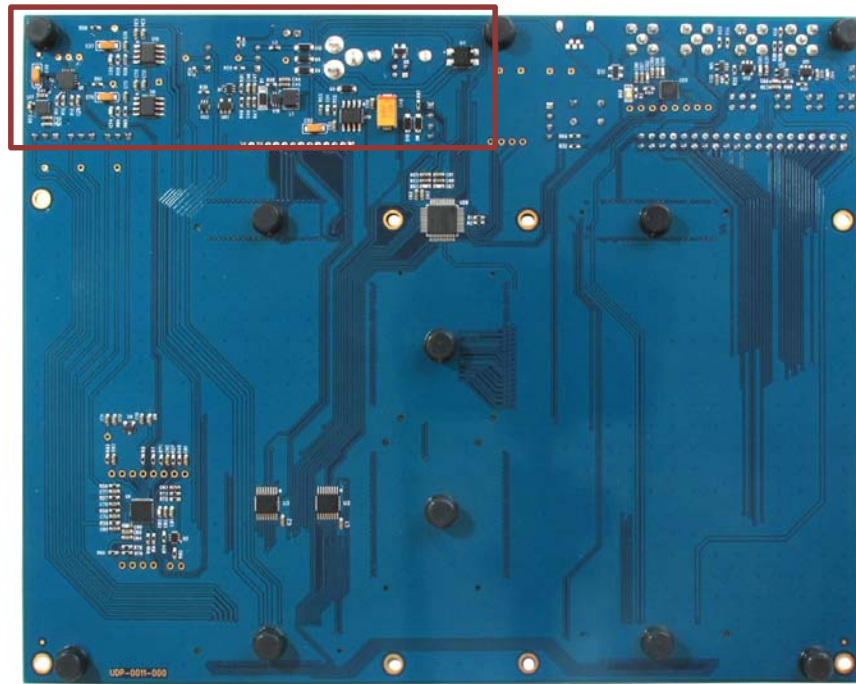


Figure 14. Variable Power Control Hardware - Bottom

The UDP motherboard can be powered from the J20 power adapter, J11 battery pack connector, J16 USB connector, or J1 MEAS mini USB connector. All four power sources are ORed together using reverse-biased diodes (D2, D4, D5, D12), eliminating the need for headers to choose between the sources. The S3 switch connects these power sources to the board. The S1 switch selects between the fixed or programmable voltage, which is controlled by the C8051F384 board control MCU through the U1 digital potentiometer.

If a UDP motherboard has an MCU, I/O, or radio card installed, the motherboard must be powered by one of these sources.

The power control hardware consists of the following components:

J20	Power adapter connector
J11	Battery Pack connector
J16	USB connector
J1	MEAS mini USB power measurement connector
S3	Master power switch
S1	Fixed or programmable power switch
U1	Digital potentiometer
R45, R46	Fixed power voltage divider
U20	C8051F384 motherboard control MCU

6.3.1. OTP Programming Power

The UDP motherboard can provide the VPP programming voltage required by some Silicon Labs MCUs for OTP EPROM programming. The OTP power switch (S5) switches this programming voltage on or off.

UDP Motherboard

6.4. Card Slots

The card slots allow MCU cards, I/O expanders, and radio cards to connect to the UDP motherboard. Figure 15 shows the location of the card slots on the UDP motherboard.

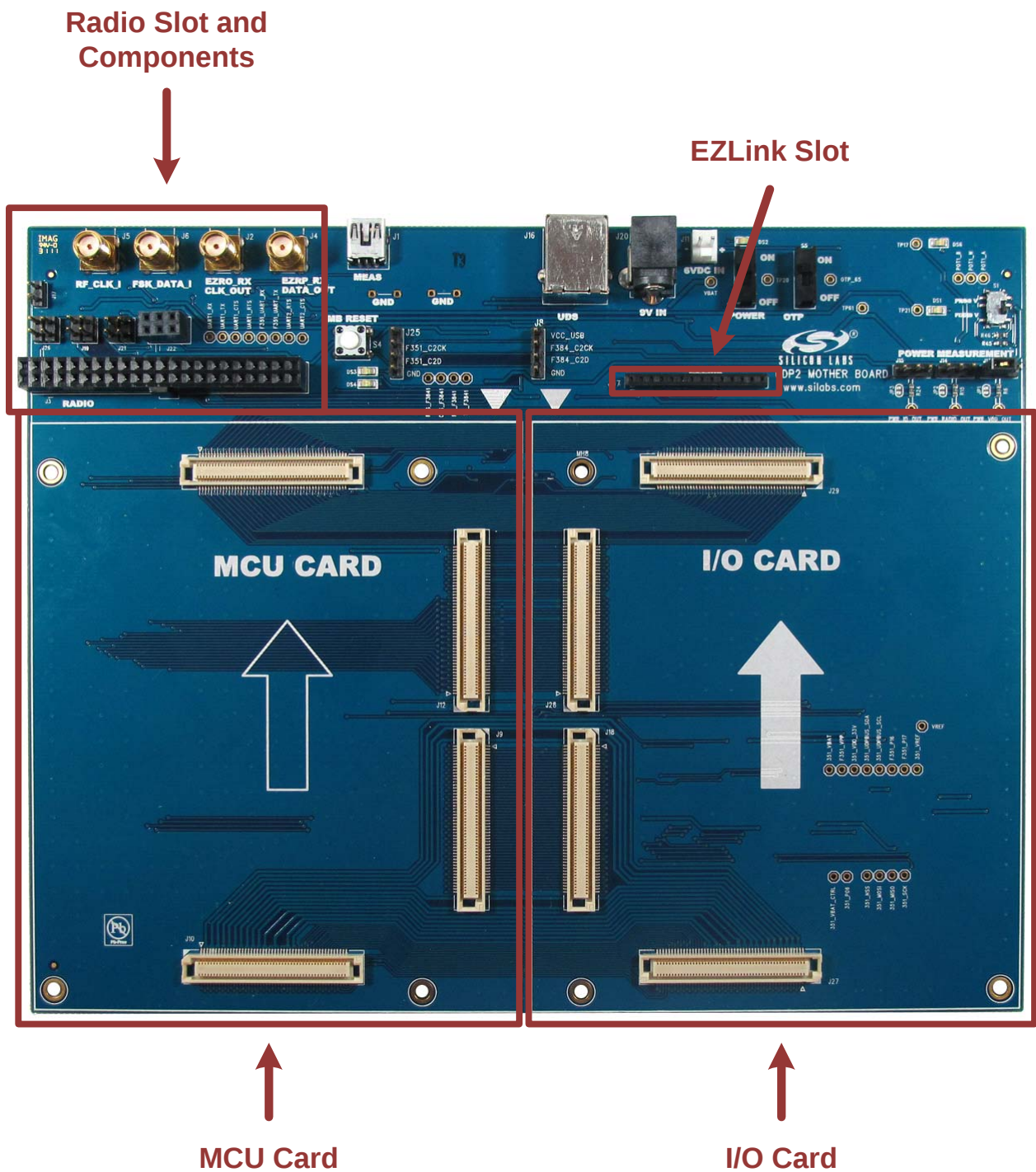


Figure 15. UDP Motherboard Card Slots

6.4.1. MCU and I/O Card Slots

The MCU and I/O card slots each have four connectors with 100 pins each. These 400 pins are directly tied to each other, so the I/O card is a mirror image of the MCU card connections. These signals are named and designed to support a wide variety of features and applications, but not all of these connections must be made for every MCU and I/O card. The MCU cards and I/O cards are designed so that a maximum number of functions are shared between each card. This allows a particular type of I/O card to be shared amongst all MCU cards that connect to the same signals.

The MCU card slot includes the following components:

J7	MCU card connector H1
J9	MCU card connector H2
J10	MCU card connector H3
J12	MCU card connector H4

The I/O card slot includes the following components:

J29	I/O card connector H1
J18	I/O card connector H2
J27	I/O card connector H3
J28	I/O card connector H4

Both the MCU and I/O card headers connect to the same signals as described in Table 4, Table 5, Table 6, and Table 7 in the Appendix.

UDP Motherboard

6.4.2. Radio and EZLink Cards

The radio card slot and area includes the following components:

J3	Radio card slot
J26, J19, J21	Radio power headers
J17	50 Ω termination for EZRadio calibrated oscillator
J5, J6, J2, J4	Precision radio data and clock connectors

Table 1. Radio Card Slot Pin Descriptions

Pin #	Description	Pin #	Description
1	SPI_MOSI_EZR	2	EZR_DTO
3	SPI_SCK_EZR	4	EZR_VDI
5	SPI_NSS3_EZR	6	EZR_RESET
7	EZR_NFFS	8	EZR_ARSSI
9	EZR_VDI	10	EZR_FFIT
11	EZR_GPIO0	12	EZRP_NIRQ
13	EZRP_SDN	14	EZRP_NIRQ
15	EZR_GPIO1	16	SPI_MISO_EZR
17	EBID_POWER	18	EZR_POWER
19	EBID_POWER	20	EZR_POWER
21	GND	22	EZR_GPIO2
23	GND	24	EZR_GPIO3
25	EZRP_CLK_IN	26	EBID_MOSI
27	GND	28	EBID_MISO
29	EZRP_TX_DATA_IN	30	EBID_SCK
31	GND	32	EBID_NSS
33	EZRO_RX_CLK_OUT	34	EZR_GPIO4
35	GND	36	VPP_POWER
37	EZRP_RX_DATA_OUT	38	I2C_SDA_EZR
39	GND	40	I2C_SCL_EZR

When connecting the radio card to the board, the key hole in the card's connector should match the key on the J3 connector.

The radio power headers control the power for the radio card and the electronic board ID (EBID) device on the radio card. The J21 jumpers must be populated to power the radio card. The J26 block selects a 5 V supply for the radio EBID, and the J19 block selects a 3.3 V supply for the radio EBID. Most applications should populate the J19 block and leave the J21 block unpopulated with jumpers. These jumpers must be populated as shown in Figure 16 or Figure 17 to power the radio card and radio EBID.



Figure 16. Radio Power Headers Diagram (EBID Powered by 3.3 V)



Figure 17. Radio Power Headers Diagram (EBID Powered by 5 V)

The J17 jumper is intended for use with EZRadio and provides a 50 Ω termination when using the J5 clock input with an input oscillator.

The J6 connector provides an input for the radio transmit data. The J2 connector is an input connector for the radio receiver clock, and J4 is an output for the radio receiver data.

The EZLink slot is intended for Silicon Labs EZLink cards. The EZLink card should be oriented such that pin 13 on the connector lines up with the missing pin on the EZLink card, as shown in Figure 18.

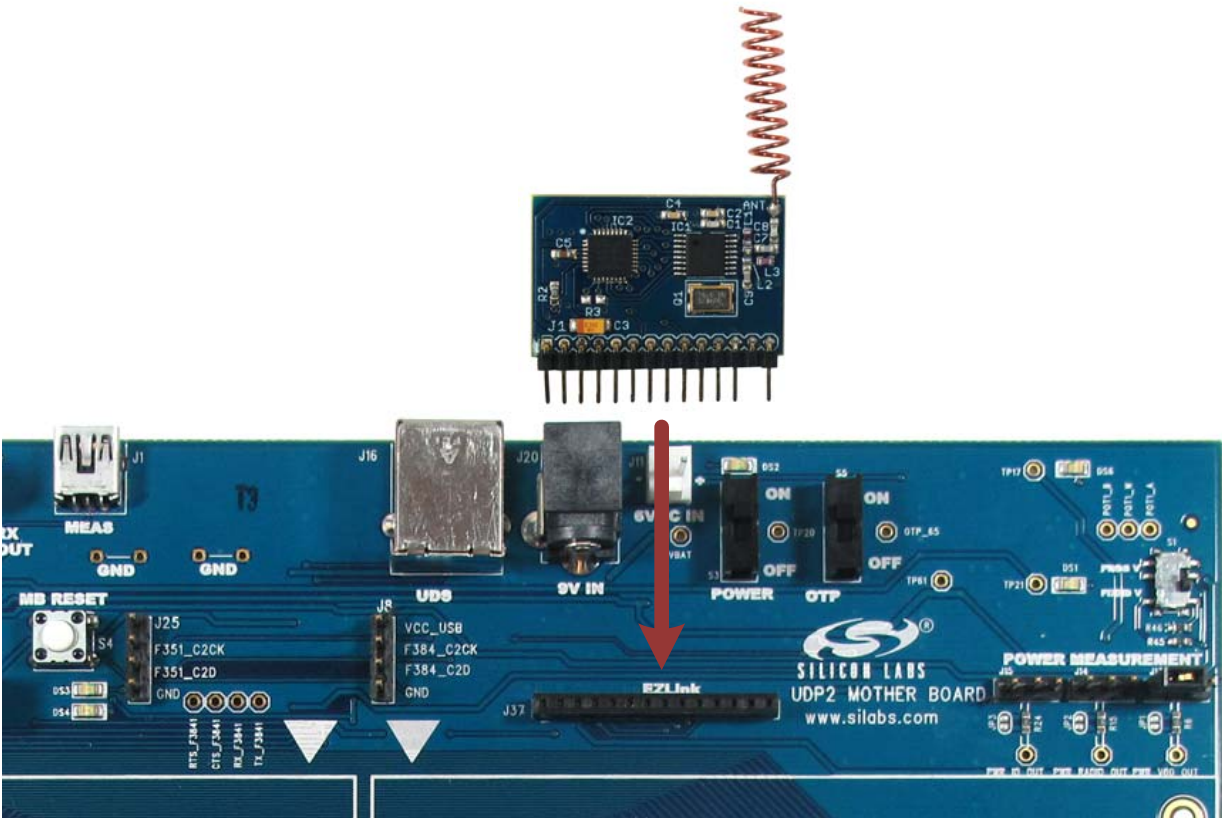


Figure 18. EZLink Slot Orientation

UDP Motherboard

6.5. Switches and LEDs

The MB RESET switch (S4) is connected to the reset pin of the C8051F384 board controller MCU on the UDP motherboard. Pressing this switch resets the motherboard, but does not reset any hardware on the MCU, I/O, or radio cards.

The six power LEDs on the USB motherboard serve as indicators. The 3.8 V and 3.3 V regulators have red LEDs that indicate the presence of power at the output of the regulators. A red USB Power LED on the back of the motherboard turns on when a USB cable is plugged into the MEAS mini USB connector. A green LED connects to the output of the S3 switch and indicates when the motherboard has power. Finally, green and red LEDs connect to the C8051F384 port pins for general-purpose notifications.

Table 2. Motherboard Switch and LED Descriptions

Description	I/O
S4	Motherboard Reset
Red LED (DS1)	Motherboard Power (3.8 V)
Green LED (DS2)	Motherboard Power
Green LED (DS3)	C8051F384-Controlled LED
Red LED (DS4)	C8051F384-Controlled LED
Red LED (DS5)	MEAS USB VBUS
Red LED (DS6)	Motherboard Power (3.3 V)

6.6. UDP Motherboard Shorting Blocks: Factory Defaults

The UDP motherboard comes from the factory with pre-installed shorting blocks on several headers. Figure 19 shows the positions of the factory default shorting blocks.

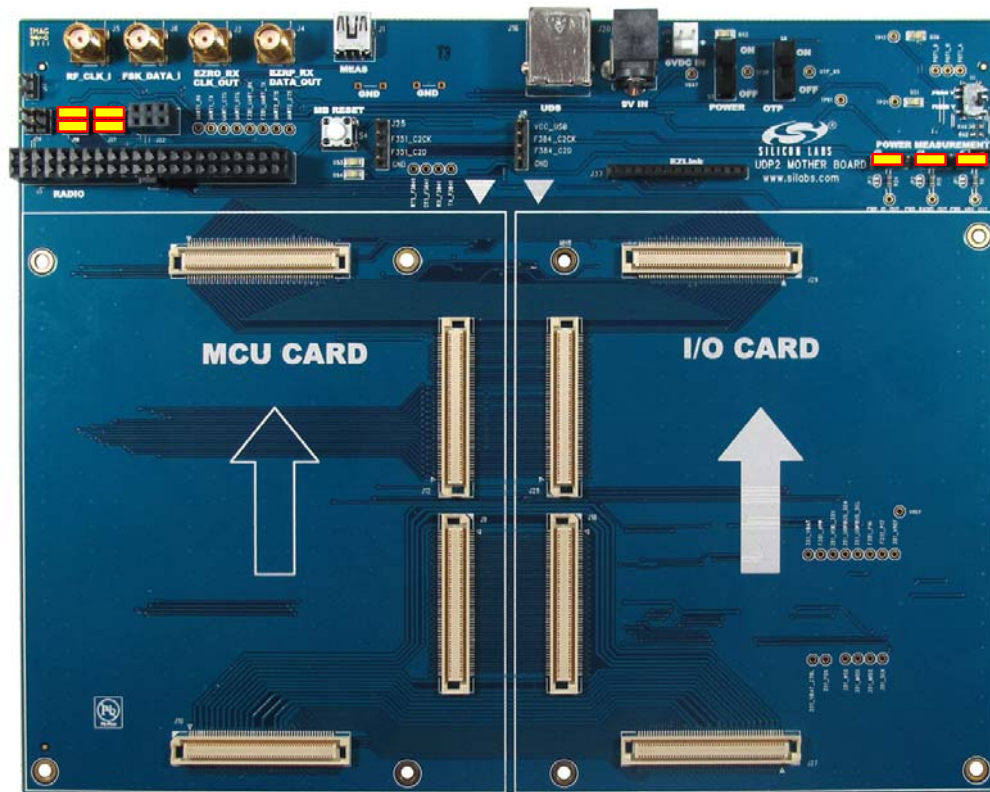
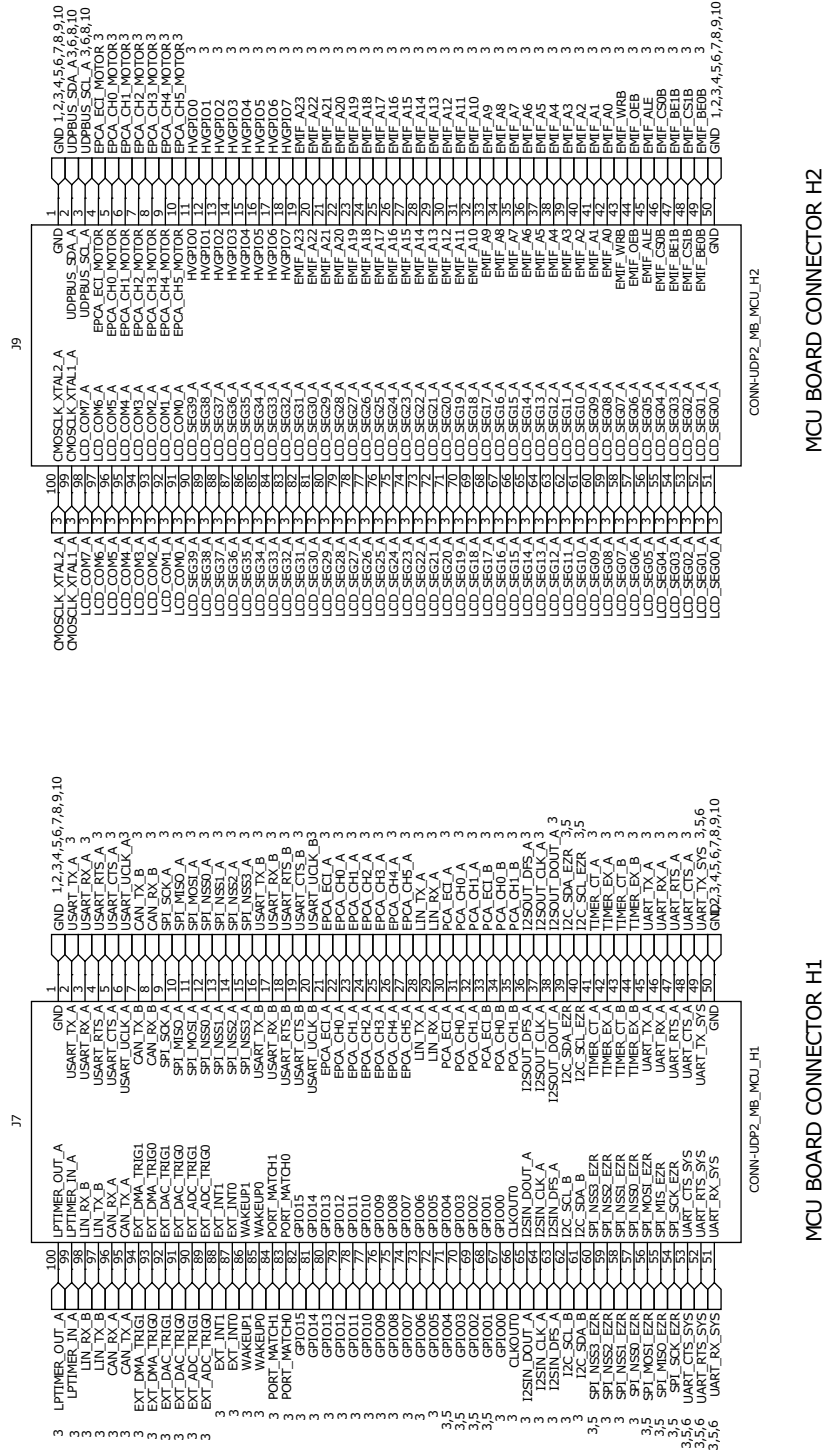


Figure 19. UDP Motherboard Shorting Blocks: Factory Defaults

7. Schematics



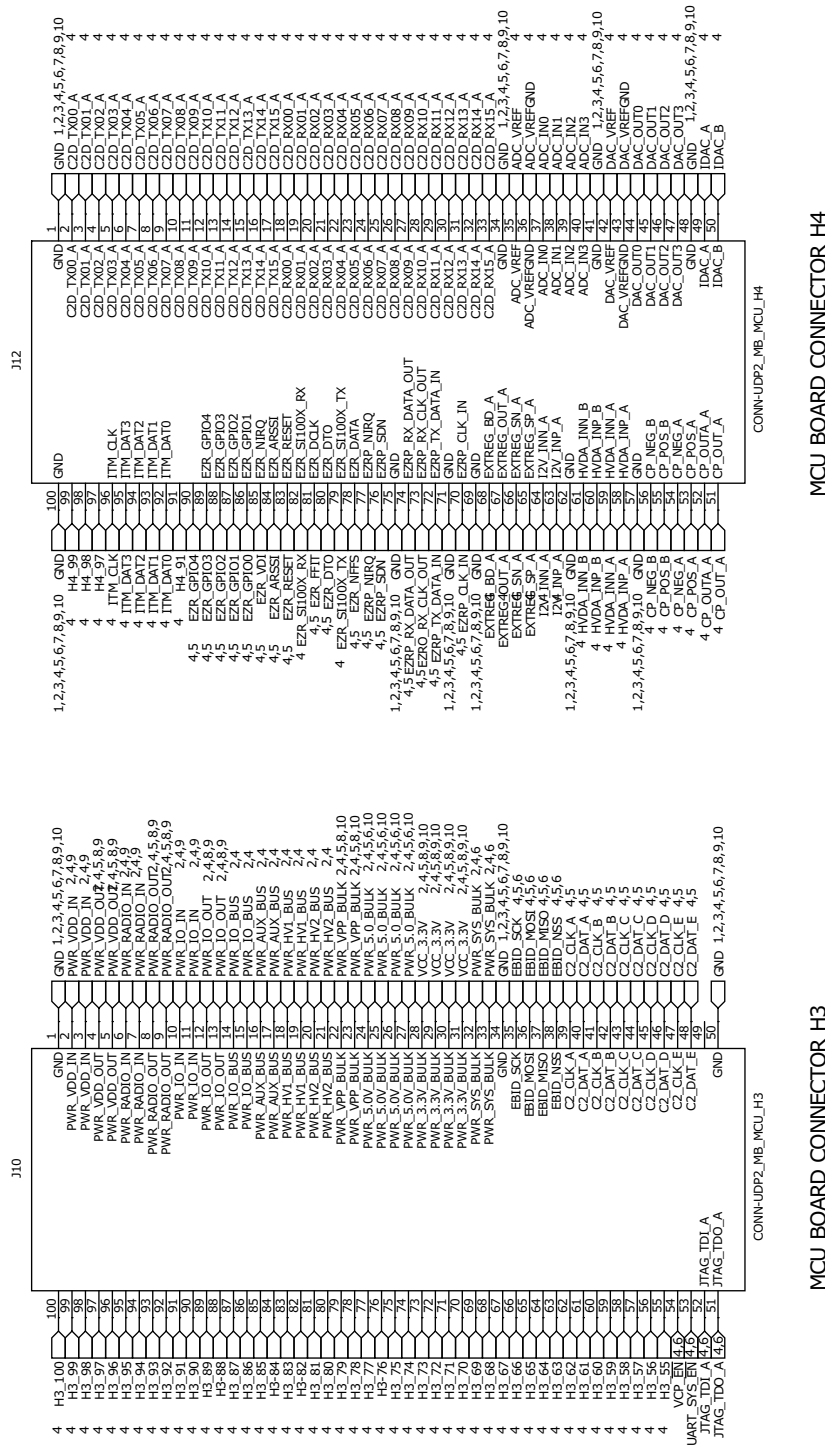


Figure 21. Unified Development Platform Motherboard Schematic (2 of 10)

IO BOARD CONNECTOR H2

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Figure 23. Unified Development Platform Motherboard Schematic (4 of 10)

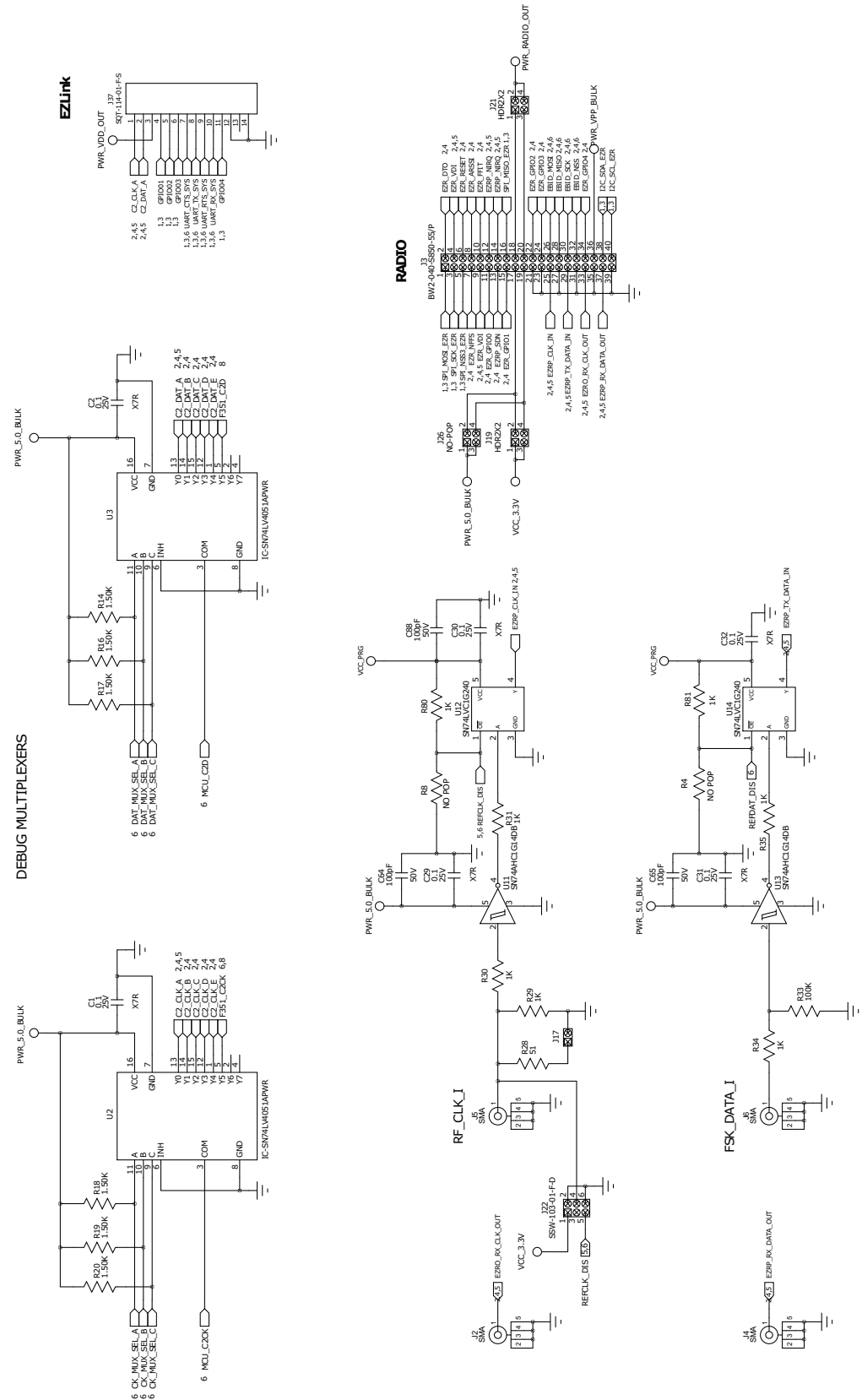


Figure 24. Unified Development Platform Motherboard Schematic (5 of 10)

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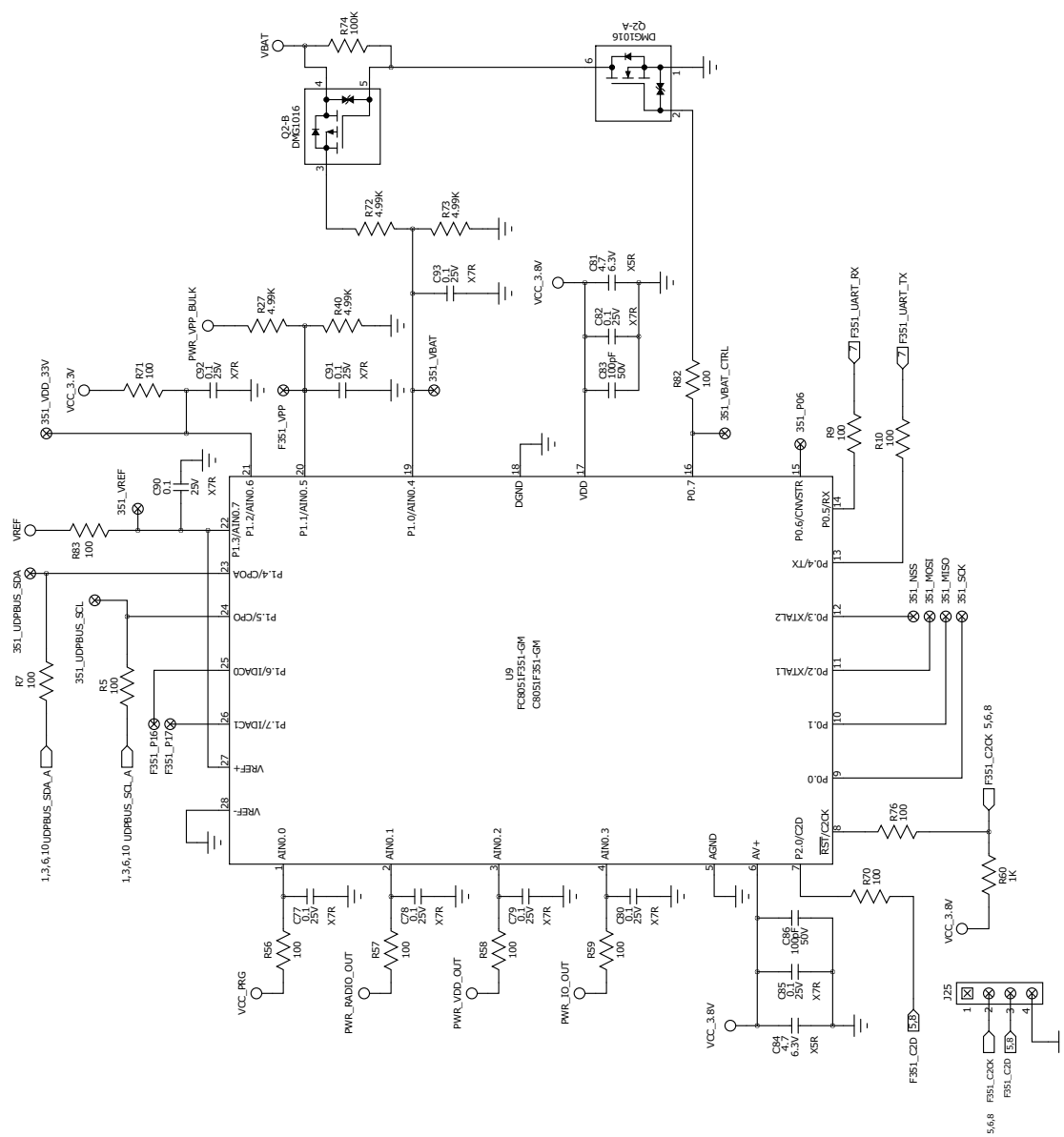


Figure 27. Unified Development Platform Motherboard Schematic (8 of 10)

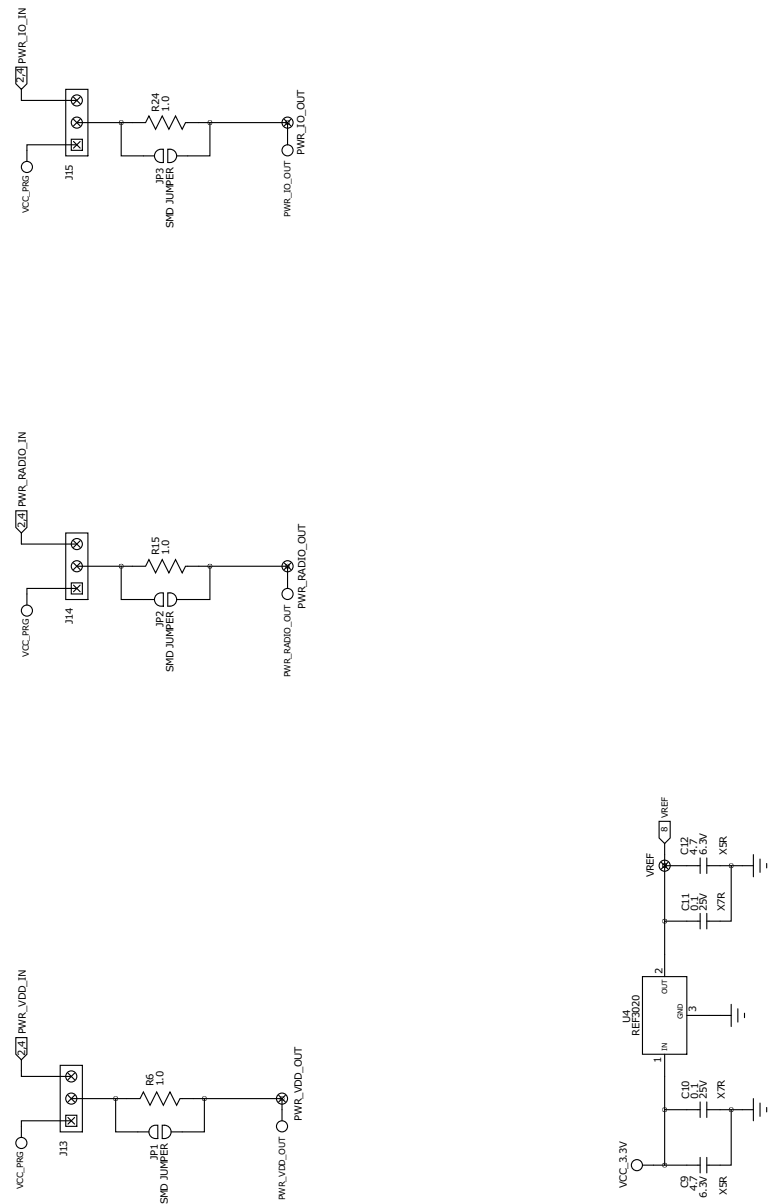


Figure 28. Unified Development Platform Motherboard Schematic (9 of 10)

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8. Bill of Materials

Table 3. Unified Development Motherboard Bill of Materials

Reference	Part Number	Manufacturer	Description
U9	C8051F351-GM	Silicon Labs	MCU, 8 k ISP Flash, RoHS
U20	C8051F384-GM	Silicon Labs	IC, MCU, TQFP48-7X7mm, RoHS
C39	06035C103KAT2A	AVX Corporation	CAP, CERAMIC, 0.01 μ F (10000PF), 50V, 10%, X7R, 0603, OR EQ, RoHS
C1-2, C10-11, C29-33, C36, C38, C41-42, C45, C47, C50, C53, C58, C60, C62, C72, C75, C77-80, C82, C85, C90-93, C98	GRM188R71E104KA01D	Murata Electronics North America	CAP, CERM, 0.1 μ F, 25V, 10%, X7R, 0603, OR EQ, RoHS
C64-67, C83, C86, C88, C101	06035A101JAT2A	AVX Corporation	CAP, 100pF 50V, 5%, C0G, CERAMIC, 0603, OR EQ, RoHS
C48	ECJ-1VB0J106M	Panasonic - ECG	CAP, 10 μ F, X5R, 0603, 6.3V , 20%, OR EQ, RoHS
C46	ECJ-1VC1H181J	Panasonic - ECG	CAP CERAMIC, 180PF, NPO, 0603, 50V, $\pm$ 5%, OR EQ, RoHS
C37, C40, C52, C76	T494A226M010AT	Kemet	CAP, TANT, 22 μ F, 10V, 10%, 3216, OR EQ, RoHS
C9, C12, C34, C43-44, C59, C61, C63, C73, C81, C84, C100	ECJ-1VB0J475M	Panasonic - ECG	CAP, CER, 4.7 μ F, 6.3V, 20%, X5R, 0603 OR EQ, RoHS
C35, C51, C74	GRM1885C1H471JA01D	Murata Electronics North America	CAP, CER, 470pF, 50V, 5%, C0G, 0603, OR EQ, RoHS
C49	B45196H4476K409	Kemet	CAP, TANT, 47 μ F, 20V, 10%, SMD 7343, OR EQ, RoHS
J20	RAPC722X	Switchcraft Inc.	CONN, POWERJACK MINI.08" RA PC MNT, RoHS
J2, J4-6	901-143	Amphenol-RF Division	CONN, SMA, RECEPTACLE, RT ANG, PCB MNT, GOLD, OR EQ RoHS
J11	P25101-02	TKP	CONN, HDR, POLORIZED, 2.54MM PITCH, RoHS
J7, J9, J10, J12, J18, J27-29	FX8-100S-SV(21)	Hirose Electric Co Ltd	CONN, RECEPT, 100POS, .6MM, GOLD, SMD, RoHS
J3	BW2-040-S850-55/P	E-tec Interconnect Ltd.	HDR, FEMALE, 2X20, 2.54MM (0.1"), OR EQ, RoHS

UDP Motherboard

Table 3. Unified Development Motherboard Bill of Materials (Continued)

Reference	Part Number	Manufacturer	Description
U25	CP2105-F01-GM	Silicon Labs	MCU, SINGLE CHIP USB TO DUAL UART BRIDGE QFN24, RoHS
D1	MBR0520L	Fairchild Semiconductor	DIODE SCHOTTKY 0.5A 20V, SOD123, RoHS
D6, D11	SP0503BAHTG	Littelfuse Inc	TVS AVAL DIODE ARRAY, 3 CH, SOT143, ROHS or EQ
D2, D4-5, D9-10, D12	STPS0540Z	STMicroelectronics	DIO, SCHOTTKY, 0.5A, 40V, SOD-123, OR EQ, RoHS
J22	SSW-103-01-F-D	Samtec	CONN, SKT, 2X3, 0.1" CTR, GOLD, OR EQ, RoHS
J17	PBC02SAAN	Sullins Connector Solutions	STAKE HEADER, 1X2, 0.1"CTR, GOLD, OR EQ, RoHS
J13-15	PBC03SAAN	Sullins Connector Solutions	STAKE HEADER, 1X3, 0.1" CTRS, OR EQ, RoHS
J8, J25	PBC04SAAN	Sullins Connector Solutions	STAKE HEADER, 1X4, 0.1" CTRS, OR EQ, RoHS
J19, J21, J26	PBC02DAAN	Sullins Connector Solutions	STAKE HEADER, 2X2, 0.1"CTR, GOLD, OR EQ, RoHS
Q1-2	DMG1016UDW-7	Diodes Inc	MOSFET, DUAL, N+P, 20V, 1.07A, SOT-363, OR EQ, RoHS
D3	MB2S	Fairchild Semiconductor	IC, RECT BRIDGE, 0.5A, 200V, 4SOIC, ROHS or EQ
U1	MCP4651T-503E/ML	Microchip Technology	IC, DIGITAL POT, 50K 256TAPS, 16-QFN, OR EQ, RoHS
U4	REF3020AIDBZR	Texas Instruments	IC, VOLT REF, 2.048V, LP, SOT-23, OR EQ, RoHS
U11, U13	SN74AHC1G14DBVR	Texas Instruments	IC, SCHMITT TRG, INV GATE, SOT23-5, OR EQ, RoHS
U2-3	SN74LV4051APWR	Texas Instruments	IC, MUX/DEMUX, 8X1, TSSOP16, RoHS
U12, U14	SN74LVC1G240DCKR	Texas Instruments	IC, INVRTR, 1-INPUT. SC70-5. OR EQ, RoHS
U21	SN74LVC1G07DBVR	Texas Instruments	IC, BUFFER/DIVIDER, NON-INV, SOT-23-5. OR EQ, RoHS
U18	TPS61040DRVR	Texas Instruments	IC, LED DRVR, WHT BCKLGT, 6-SON, OR EQ, RoHS
U17	TPS73601DRBR	Texas Instruments	IC, LDO REG, 400MA, ADJ-V, 8-SON. OR EQ, RoHS
U6, U15, U19	TL5209DR	Texas Instruments	IC, LDO REGULATOR, 500mA, Lo-Noise, SO-8, OR EQ, RoHS
L2	BLM18AG601SN1D	Murata Electronics North America	INDUCTOR, FERRITE BEAD, 100MHZ, 600 Ω , 500 mA, 0603 SMD, RoHS
L1	LQH43CN100K03L	Murata Electronics North America	IND, 10 μ H 10% 650MA 1812, OR EQ, RoHS
JP1-3	N/A	PCB	JUMPER, SMD, 2P, 38x38, BULLET PAD
DS2-3	LTST-C170KGKT	Lite-On Inc	LED, GREEN CLEAR, 0805 SMD, OR EQ, RoHS

UDP Motherboard

Table 3. Unified Development Motherboard Bill of Materials (Continued)

Reference	Part Number	Manufacturer	Description
DS1, DS4-6	LTST-C170KRKT	Lite-On Inc	LED, RED CLEAR, 0805 SMD, OR EQ, RoHS
R6, R15, R24	CRCW06031R00FKEAHP	Vishay/Dale	RES, WW, 1.0 Ω , 1/4W, 1%, 0603, OR EQ, RoHS
R14, R16-20	ERJ-3EKF1501V	Panasonic - ECG	RES 1.50K Ω , SMT, 0603, 1/10W, $\pm 1\%$, OR EQ, RoHS
R5, R7, R9-10, R56-59, R70-71, R76, R82-83	ERJ-3EKF1000V	Panasonic - ECG	RES, 100 Ω , 1/10W, 1%, 0603, OR EQ, RoHS
R33, R49, R74	ERJ-3EKF1003V	Panasonic - ECG	RES, 100 k Ω , 1/10W, 1%, 0603, OR EQ, RoHS
R11-13, R51	ERJ-3EKF1002V	Panasonic - ECG	RES, EQ. 10.0 k Ω , SMT, 0603, 1/10W, $\pm 1\%$, OR EQ, RoHS
R1-2, R26, R29-31, R34-35, R52, R55, R60, R67, R80-81, R84	ERJ-3EKF1001V	Panasonic - ECG	RES, 1.00 k Ω , 1/10W, 1%, 0603, OR EQ, RoHS
R65	ERJ-3EKF2431V	Panasonic - ECG	RES, 2.43 k Ω , 1/10W, 1%, 0603, OR EQ, RoHS
R46	ERJ-3EKF2002V	Panasonic - ECG	RES, 20 k Ω , 1/10W, 1%, 0603, OR EQ, RoHS
R38, R53	RC0603FR-073KL	Yageo	RES, 3.00 k Ω , 1/10W, 1%, 0603, OR EQ, RoHS
R3, R32, R41, R50, R69	ERJ-3EKF3300V	Panasonic - ECG	RES, 330 Ω , 1/10W, 1%, 0603, OR EQ, RoHS
R47	RG1608P-334-B-T5	Susumu	RES, 330 k Ω , 1/10W, 0.1%, 0603, OR EQ, RoHS
R45	ERJ-3EKF3482V	Panasonic - ECG	RES, 34.8 k Ω , 1/10W, 1%, 0603, OR EQ, RoHS
R27, R39-40, R66, R72-73	ERJ-3EKF4991V	Panasonic - ECG	RES, 4.99 k Ω , 1/10W, 1%, 0603, OR EQ, RoHS
R28	ERJ-3EKF51R0V	Panasonic - ECG	RES, 51 Ω , 1/10W, 1%, 0603, OR EQ, RoHS
R28	ERJ-3EKF51R0V	Panasonic - ECG	RES, 51 Ω , 1/10W, 1%, 0603, OR EQ, RoHS
R54	ERJ-3EKF5600V	Panasonic - ECG	RES, 560 Ω , 1/10W, 1%, 0603, OR EQ, RoHS
R48	RG1608P-7682-B-T5	Susumu	RES, 76.8 k Ω , 1/10W, 0.1%, SMT, 0603, OR EQ, RoHS
R4, R8	NO POP		RES, NO POP, SMT, 0603, OR EQ, RoHS
J37	SQT-114-01-F-S	Samtec	CONN, RCPT, 14 X 1, 0.2 MM OC, GOLD, OR EQ, RoHS
S3, S5	EG1218	E-Switch	SPDT SWITCH

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Table 3. Unified Development Motherboard Bill of Materials (Continued)

Reference	Part Number	Manufacturer	Description
S4	EVQ-PAD04M	Panasonic - ECG	SWITCH, LIGHT TOUCH, 130GF, 6MM SQ, RoHS
S1	SSSS820201	Alps	SWITCH SLIDE, SMT, RoHS
J16	61729-0010BLF	FCI	CONN, USB RCPT, TYPE B, OR EQ, RoHS
J1	54819-0519	Molex Inc	CONN, USB MINI RECEPT, 5POS RT ANG, TYPE B OR EQ, RoHS

APPENDIX—MCU AND I/O CARD H1 PIN DESCRIPTIONS

Table 4. MCU and I/O Card H1 Pin Descriptions (J7 and J29)

MCU Card Pin	I/O Card Pin	Signal Name	Description
1	100	GND	
2	99	USART_TX_A	USART A transmit
3	98	USART_RX_A	USART A receive
4	97	USART_RTS_A	USART A hardware handshaking
5	96	USART_CTS_A	USART A hardware handshaking
6	95	USART_UCLK_A	USART A clock
7	94	CAN_TX_B	
8	93	CAN_RX_B	
9	92	SPI_SCK_A	SPI A clock
10	91	SPI_MISO_A	SPI A master-in, slave-out
11	90	SPI_MOSI_A	SPI A master-out, slave-in
12	89	SPI_NSS0_A	SPI A slave select 0
13	88	SPI_NSS1_A	SPI A slave select 1
14	87	SPI_NSS2_A	SPI A slave select 2
15	86	SPI_NSS3_A	SPI A slave select 3
16	85	USART_TX_B	USART B transmit
17	84	USART_RX_B	USART Breceive
18	83	USART_RTS_B	USART B hardware handshaking
19	82	USART_CTS_B	USART B hardware handshaking
20	81	USART_UCLK_B	USART B clock
21	80	EPCA_ECI_A	EPCA A external clock input
22	79	EPCA_CH0_A	
23	78	EPCA_CH1_A	
24	77	EPCA_CH2_A	
25	76	EPCA_CH3_A	
26	75	EPCA_CH4_A	
27	74	EPCA_CH5_A	
28	73	LIN_TX_A	
29	72	LIN_RX_A	
30	71	PCA_ECI_A	PCA A external clock input
31	70	PCA_CH0_A	
32	69	PCA_CH1_A	
33	68	PCA_ECI_B	PCA B external clock input
34	67	PCA_CH0_B	
35	66	PCA_CH1_B	
36	65	I2SOUT_DFS_A	I2S A transmitter word select (WS)

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Table 4. MCU and I/O Card H1 Pin Descriptions (J7 and J29)

MCU Card Pin	I/O Card Pin	Signal Name	Description
37	64	I2SOUT_CLK_A	I2S A transmitter clock (SCK)
38	63	I2SOUT_DOUT_A	I2S A transmitter data (SD)
39	62	I2C_SDA_EZR	EZRadio I2C data
40	61	I2C_SCL_EZR	EZRadio I2C clock
41	60	TIMER_CT_A	
42	59	TIMER_EX_A	
43	58	TIMER_CT_B	
44	57	TIMER_EX_B	
45	56	UART_TX_A	UART A transmit
46	55	UART_RX_A	UART A receive
47	54	UART_RTS_A	UART A hardware handshaking
48	53	UART_CTS_A	UART A hardware handshaking
49	52	UART_TX_SYS	System UART transmit
50	51	GND	
51	50	UART_RX_SYS	System UART receive
52	49	UART_RTS_SYS	System UART hardware handshaking
53	48	UART_CTS_SYS	System UART hardware handshaking
54	47	SPI_SCK_EZR	EZRadio SPI clock
55	46	SPI_MISO_EZR	EZRadio SPI master-in, slave-out
56	45	SPI_MOSI_EZR	EZRadio SPI master-out, slave-in
57	44	SPI_NSS0_EZR	EZRadio SPI slave select 0
58	43	SPI_NSS1_EZR	EZRadio SPI slave select 1
59	42	SPI_NSS2_EZR	EZRadio SPI slave select 2
60	41	SPI_NSS3_EZR	EZRadio SPI slave select 3
61	40	I2C_SDA_B	I2C B data
62	39	I2C_SCL_B	I2C B clock
63	38	I2SIN_DFS_A	I2S A receiver word select (WS)
64	37	I2SIN_CLK_A	I2S A receiver clock (SCK)
65	36	I2SIN_DOUT_A	I2S A receiver data (SD)
66	35	CLKOUT0	clock
67	34	GPIO00	General purpose I/O 0
68	33	GPIO01	General purpose I/O 1
69	32	GPIO02	General purpose I/O 2
70	31	GPIO03	General purpose I/O 3
71	30	GPIO04	General purpose I/O 4
72	29	GPIO05	General purpose I/O 5
73	28	GPIO06	General purpose I/O 6

Table 4. MCU and I/O Card H1 Pin Descriptions (J7 and J29)

MCU Card Pin	I/O Card Pin	Signal Name	Description
74	27	GPIO07	General purpose I/O 7
75	26	GPIO08	General purpose I/O 8
76	25	GPIO09	General purpose I/O 9
77	24	GPIO10	General purpose I/O 10
78	23	GPIO11	General purpose I/O 11
79	22	GPIO12	General purpose I/O 12
80	21	GPIO13	General purpose I/O 13
81	20	GPIO14	General purpose I/O 14
82	19	GPIO15	General purpose I/O 15
83	18	PORT_MATCH0	
84	17	PORT_MATCH1	
85	16	WAKEUP0	MCU low-power wakeup input signal 0
86	15	WAKEUP1	MCU low-power wakeup input signal 1
87	14	EXT_INT0	External interrupt 0
88	13	EXT_INT1	External interrupt 1
89	12	EXT_ADC_TRIG0	External ADC trigger 0
90	11	EXT_ADC_TRIG1	External ADC trigger 1
91	10	EXT_DAC_TRIG0	External DAC trigger 0
92	9	EXT_DAC_TRIG1	External DAC trigger 1
93	8	EXT_DMA_TRIG0	External DMA trigger 0
94	7	EXT_DMA_TRIG1	External DMA trigger 1
95	6	CAN_TX_A	
96	5	CAN_RX_A	
97	4	LIN_TX_B	
98	3	LIN_RX_B	
99	2	LPTIMER_IN_A	
100	1	LPTIMER_OUT_A	

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Table 5. MCU and I/O Card H2 Pin Descriptions (J9 and J18)

MCU Card Pin	I/O Card Pin	Signal Name	Description
1	100	GND	
2	99	UDPBUS_SDA_A	UDP motherboard I2C A data
3	98	UDPBUS_SCL_A	UDP motherboard I2C A clock
4	97	EPCA_ECI_MOTOR	Motor EPCA external clock input
5	96	EPCA_CH0_MOTOR	
6	95	EPCA_CH1_MOTOR	
7	94	EPCA_CH2_MOTOR	
8	93	EPCA_CH3_MOTOR	
9	92	EPCA_CH4_MOTOR	
10	91	EPCA_CH5_MOTOR	
11	90	HVGPI00	High Drive I/O 0
12	89	HVGPI01	High Drive I/O 1
13	88	HVGPI02	High Drive I/O 2
14	87	HVGPI03	High Drive I/O 3
15	86	HVGPI04	High Drive I/O 4
16	85	HVGPI05	High Drive I/O 5
17	84	HVGPI06	High Drive I/O 6
18	83	HVGPI07	High Drive I/O 7
19	82	EMIF_A23	EMIF muxed AD23m pin (non-muxed A15)
20	81	EMIF_A22	EMIF muxed AD22m pin (non-muxed A14)
21	80	EMIF_A21	EMIF muxed AD21m pin (non-muxed A13)
22	79	EMIF_A20	EMIF muxed AD20m pin (non-muxed A12)
23	78	EMIF_A19	EMIF muxed AD19m pin (non-muxed A11)
24	77	EMIF_A18	EMIF muxed AD18m pin (non-muxed A10)
25	76	EMIF_A17	EMIF muxed AD17m pin (non-muxed A9)
26	75	EMIF_A16	EMIF muxed AD16m pin (non-muxed A8)
27	74	EMIF_A15	EMIF muxed AD15m pin (non-muxed A7)
28	73	EMIF_A14	EMIF muxed AD14m pin (non-muxed A6)
29	72	EMIF_A13	EMIF muxed AD13m pin (non-muxed A5)
30	71	EMIF_A12	EMIF muxed AD12m pin (non-muxed A4)
31	70	EMIF_A11	EMIF muxed AD11m pin (non-muxed A3)
32	69	EMIF_A10	EMIF muxed AD10m pin (non-muxed A2)
33	68	EMIF_A9	EMIF muxed AD9m pin (non-muxed A1)
34	67	EMIF_A8	EMIF muxed AD8m pin (non-muxed A0)
35	66	EMIF_A7	EMIF muxed AD7m pin (non-muxed D7)
36	65	EMIF_A6	EMIF muxed AD6m pin (non-muxed D6)
37	64	EMIF_A5	EMIF muxed AD5m pin (non-muxed D5)

Table 5. MCU and I/O Card H2 Pin Descriptions (J9 and J18)

MCU Card Pin	I/O Card Pin	Signal Name	Description
38	63	EMIF_A4	EMIF muxed AD4m pin (non-muxed D4)
39	62	EMIF_A3	EMIF muxed AD3m pin (non-muxed D3)
40	61	EMIF_A2	EMIF muxed AD2m pin (non-muxed D2)
41	60	EMIF_A1	EMIF muxed AD1m pin (non-muxed D1)
42	59	EMIF_A0	EMIF muxed AD0m pin (non-muxed D0)
43	58	EMIF_WRB	EMIF write signal
44	57	EMIF_OEB	EMIF output enable
45	56	EMIF_ALE	EMIF address latch enable
46	55	EMIF_CS0B	EMIF chip select 0
47	54	EMIF_BE1B	EMIF output byte enable 1
48	53	EMIF_CS1B	EMIF chip select 1
49	52	EMIF_BE0B	EMIF output byte enable 0
50	51	GND	
51	50	LCD_SEG00_A	
52	49	LCD_SEG01_A	
53	48	LCD_SEG02_A	
54	47	LCD_SEG03_A	
55	46	LCD_SEG04_A	
56	45	LCD_SEG05_A	
57	44	LCD_SEG06_A	
58	43	LCD_SEG07_A	
59	42	LCD_SEG08_A	
60	41	LCD_SEG09_A	
61	40	LCD_SEG10_A	
62	39	LCD_SEG11_A	
63	38	LCD_SEG12_A	
64	37	LCD_SEG13_A	
65	36	LCD_SEG14_A	
66	35	LCD_SEG15_A	
67	34	LCD_SEG16_A	
68	33	LCD_SEG17_A	
69	32	LCD_SEG18_A	
70	31	LCD_SEG19_A	
71	30	LCD_SEG20_A	
72	29	LCD_SEG21_A	
73	28	LCD_SEG22_A	
74	27	LCD_SEG23_A	

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Table 5. MCU and I/O Card H2 Pin Descriptions (J9 and J18)

MCU Card Pin	I/O Card Pin	Signal Name	Description
75	26	LCD_SEG24_A	
76	25	LCD_SEG25_A	
77	24	LCD_SEG26_A	
78	23	LCD_SEG27_A	
79	22	LCD_SEG28_A	
80	21	LCD_SEG29_A	
81	20	LCD_SEG30_A	
82	19	LCD_SEG31_A	
83	18	LCD_SEG32_A	
84	17	LCD_SEG33_A	
85	16	LCD_SEG34_A	
86	15	LCD_SEG35_A	
87	14	LCD_SEG36_A	
88	13	LCD_SEG37_A	
89	12	LCD_SEG38_A	
90	11	LCD_SEG39_A	
91	10	LCD_COM0_A	
92	9	LCD_COM1_A	
93	8	LCD_COM2_A	
94	7	LCD_COM3_A	
95	6	LCD_COM4_A	
96	5	LCD_COM5_A	
97	4	LCD_COM6_A	
98	3	LCD_COM7_A	
99	2	CMOSCLK_XTAL1_A	MCU XTAL1 pin for external oscillators
100	1	CMOSCLK_XTAL2_A	MCU XTAL2 pin for external oscillators

Table 6. MCU and I/O Card H3 Pin Descriptions (J10 and J27)

MCU Card Pin	I/O Card Pin	Description	Description
1	100	GND	
2	99	PWR_VDD_IN	Power input for powering the MCU card from a power source other than the UDP motherboard
3	98	PWR_VDD_IN	Power input for powering the MCU card from a power source other than the UDP motherboard
4	97	PWR_VDD_OUT	Power input for the MCU card
5	96	PWR_VDD_OUT	Power input for the MCU card
6	95	PWR_RADIO_IN	Power input for powering the radio card from a power source other than the UDP motherboard
7	94	PWR_RADIO_IN	Power input for powering the radio card from a power source other than the UDP motherboard
8	93	PWR_RADIO_OUT	Power input for the radio card
9	92	PWR_RADIO_OUT	Power input for the radio card
10	91	PWR_IO_IN	Power input for powering the I/O card from a power source other than the UDP motherboard
11	90	PWR_IO_IN	Power input for powering the I/O card from a power source other than the UDP motherboard
12	89	PWR_IO_OUT	Power input for the I/O card
13	88	PWR_IO_OUT	Power input for the I/O card
14	87	PWR_IO_BUS	Connects power from the MCU card to the radio and I/O cards
15	86	PWR_IO_BUS	Connects power from the MCU card to the radio and I/O cards
16	85	PWR_AUX_BUS	Connects power from the MCU card to the radio and I/O cards
17	84	PWR_AUX_BUS	Connects power from the MCU card to the radio and I/O cards
18	83	PWR_HV1_BUS	General purpose high power bus 1
19	82	PWR_HV1_BUS	General purpose high power bus 1
20	81	PWR_HV2_BUS	General purpose high power bus 2
21	80	PWR_HV2_BUS	General purpose high power bus 2
22	79	PWR_VPP_BULK	VPP programming voltage
23	78	PWR_VPP_BULK	VPP programming voltage
24	77	PWR_5.0_BULK	5.0 V power from the UDP motherboard
25	76	PWR_5.0_BULK	5.0 V power from the UDP motherboard
26	75	PWR_5.0_BULK	5.0 V power from the UDP motherboard
27	74	PWR_5.0_BULK	5.0 V power from the UDP motherboard
28	73	VCC_3.3V	3.3 V power from the UDP motherboard
29	72	VCC_3.3V	3.3 V power from the UDP motherboard

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Table 6. MCU and I/O Card H3 Pin Descriptions (J10 and J27) (Continued)

MCU Card Pin	I/O Card Pin	Description	Description
30	71	VCC_3.3V	3.3 V power from the UDP motherboard
31	70	VCC_3.3V	3.3 V power from the UDP motherboard
32	69	PWR_SYS_BULK	3.3 V power supply for EBID devices
33	68	PWR_SYS_BULK	3.3 V power supply for EBID devices
34	67	GND	
35	66	EBID_SCK	EBID SPI clock
36	65	EBID_MOSI	EBID SPI master-out, slave in
37	64	EBID_MISO	EBID SPI master-in, slave-out
38	63	EBID_NSS	EBID SPI slave select
39	62	C2_CLK_A	MCU card C2 clock, JTAG TCK, Serial Wire SWCLK
40	61	C2_DAT_A	MCU card C2 data, JTAG TMS, Serial Wire SWDIO
41	60	C2_CLK_B	MCU card EBID C2 clock
42	59	C2_DAT_B	MCU card EBID C2 data
43	58	C2_CLK_C	MCU card UPPI C2 clock
44	57	C2_DAT_C	MCU card UPPI C2 data
45	56	C2_CLK_D	I/O card EBID C2 clock
46	55	C2_DAT_D	I/O card EBID C2 data
47	54	C2_CLK_E	I/O support EBID C2 clock
48	53	C2_DAT_E	I/O support EBID C2 data
49	52	nc	no connect
50	51	GND	
51	50	JTAG_TDO_A	JTAG interface A data out (TDO), Serial Wire SWO
52	49	JTAG_TDI_A	JTAG interface A data in (TDI)
53	48	VCP_EN	Selects the USB-to-USART motherboard path
54	47	UART_SYS_EN	Selects the USB-to-USART motherboard path
55	46	H3_55	General purpose signal
56	45	H3_56	General purpose signal
57	44	H3_57	General purpose signal
58	43	H3_58	General purpose signal
59	42	H3_59	General purpose signal
60	41	H3_60	General purpose signal
61	40	H3_61	General purpose signal
62	39	H3_62	General purpose signal
63	38	H3_63	General purpose signal
64	37	H3_64	General purpose signal
65	36	H3_65	General purpose signal
66	35	H3_66	General purpose signal

Table 6. MCU and I/O Card H3 Pin Descriptions (J10 and J27) (Continued)

MCU Card Pin	I/O Card Pin	Description	Description
67	34	H3_67	General purpose signal
68	33	H3_68	General purpose signal
69	32	H3_69	General purpose signal
70	31	H3_70	General purpose signal
71	30	H3_71	General purpose signal
72	29	H3_72	General purpose signal
73	28	H3_73	General purpose signal
74	27	H3_74	General purpose signal
75	26	H3_75	General purpose signal
76	25	H3_76	General purpose signal
77	24	H3_77	General purpose signal
78	23	H3_78	General purpose signal
79	22	H3_79	General purpose signal
80	21	H3_80	General purpose signal
81	20	H3_81	General purpose signal
82	19	H3_82	General purpose signal
83	18	H3_83	General purpose signal
84	17	H3_84	General purpose signal
85	16	H3_85	General purpose signal
86	15	H3_86	General purpose signal
87	14	H3_87	General purpose signal
88	13	H3_88	General purpose signal
89	12	H3_89	General purpose signal
90	11	H3_90	General purpose signal
91	10	H3_91	General purpose signal
92	9	H3_92	General purpose signal
93	8	H3_93	General purpose signal
94	7	H3_94	General purpose signal
95	6	H3_95	General purpose signal
96	5	H3_96	General purpose signal
97	4	H3_97	General purpose signal
98	3	H3_98	General purpose signal
99	2	H3_99	General purpose signal
100	1	H3_100	General purpose signal

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Table 7. MCU and I/O Card H4 Pin Descriptions (J12 and J28)

MCU Card Pin	I/O Card Pin	Description	Description
1	100	GND	
2	99	C2D_TX00_A	Capacitive Sensing output 0
3	98	C2D_TX01_A	Capacitive Sensing output 1
4	97	C2D_TX02_A	Capacitive Sensing output 2
5	96	C2D_TX03_A	Capacitive Sensing output 3
6	95	C2D_TX04_A	Capacitive Sensing output 4
7	94	C2D_TX05_A	Capacitive Sensing output 5
8	93	C2D_TX06_A	Capacitive Sensing output 6
9	92	C2D_TX07_A	Capacitive Sensing output 7
10	91	C2D_TX08_A	Capacitive Sensing output 8
11	90	C2D_TX09_A	Capacitive Sensing output 9
12	89	C2D_TX10_A	Capacitive Sensing output 10
13	88	C2D_TX11_A	Capacitive Sensing output 11
14	87	C2D_TX12_A	Capacitive Sensing output 12
15	86	C2D_TX13_A	Capacitive Sensing output 13
16	85	C2D_TX14_A	Capacitive Sensing output 14
17	84	C2D_TX15_A	Capacitive Sensing output 15
18	83	C2D_RX00_A	Capacitive Sensing input 0
19	82	C2D_RX01_A	Capacitive Sensing input 1
20	81	C2D_RX02_A	Capacitive Sensing input 2
21	80	C2D_RX03_A	Capacitive Sensing input 3
22	79	C2D_RX04_A	Capacitive Sensing input 4
23	78	C2D_RX05_A	Capacitive Sensing input 5
24	77	C2D_RX06_A	Capacitive Sensing input 6
25	76	C2D_RX07_A	Capacitive Sensing input 7
26	75	C2D_RX08_A	Capacitive Sensing input 8
27	74	C2D_RX09_A	Capacitive Sensing input 9
28	73	C2D_RX10_A	Capacitive Sensing input 10
29	72	C2D_RX11_A	Capacitive Sensing input 11
30	71	C2D_RX12_A	Capacitive Sensing input 12
31	70	C2D_RX13_A	Capacitive Sensing input 13
32	69	C2D_RX14_A	Capacitive Sensing input 14
33	68	C2D_RX15_A	Capacitive Sensing input 15
34	67	GND	
35	66	ADC_VREF	ADC voltage reference
36	65	ADC_VREFGND	ADC VREF ground
37	64	ADC_IN0	

Table 7. MCU and I/O Card H4 Pin Descriptions (J12 and J28) (Continued)

MCU Card Pin	I/O Card Pin	Description	Description
38	63	ADC_IN1	
39	62	ADC_IN2	
40	61	ADC_IN3	
41	60	GND	
42	59	DAC_VREF	DAC voltage reference
43	58	DAC_VREFGND	DAC voltage reference ground
44	57	DAC_OUT0	
45	56	DAC_OUT1	
46	55	DAC_OUT2	
47	54	DAC_OUT3	
48	53	GND	
49	52	IDAC_A	IDAC A output
50	51	IDAC_B	IDAC B output
51	50	CP_OUT_A	Comparator A synchronous output
52	49	CP_OUTA_A	Comparator A asynchronous output
53	48	CP_POS_A	Comparator A positive input
54	47	CP_NEG_A	Comparator A negative input
55	46	CP_POS_B	Comparator B positive input
56	45	CP_NEG_B	Comparator B negative input
57	44	GND	
58	43	HVDA_INP_A	High Voltage Differential Amplifier A positive input
59	42	HVDA_INN_A	High Voltage Differential Amplifier A negative input
60	41	HVDA_INP_B	High Voltage Differential Amplifier B positive input
61	40	HVDA_INN_B	High Voltage Differential Amplifier B negative input
62	39	GND	
63	38	I2V_INP_A	Current-to-Voltage converter A input 0
64	37	I2V_INN_A	Current-to-Voltage converter A input 1
65	36	EXTREG_SP_A	External Voltage Regulator SP input
66	35	EXTREG_SN_A	External Voltage Regulator SN input
67	34	EXTREG_OUT_A	External Voltage Regulator OUT output
68	33	EXTREG_BD_A	External Voltage Regulator base drive output
69	32	GND	
70	31	EZRP_CLK_IN	Radio card clock input (SMA connector)
71	30	GND	
72	29	EZRP_TX_DATA_IN	Radio card transmit data input (SMA connector)
73	28	EZRO_RX_CLK_OUT	Radio card receive clock output (SMA connector)
74	27	EZRP_RX_DATA_OUT	Radio card receive data output (SMA connector)

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Table 7. MCU and I/O Card H4 Pin Descriptions (J12 and J28) (Continued)

MCU Card Pin	I/O Card Pin	Description	Description
75	26	GND	
76	25	EZRP_SDN	Radio card peripheral shutdown
77	24	EZRP_NIRQ	Radio card peripheral interrupt status
78	23	EZR_NFFS	
79	22	EZR_SI100X_TX	Radio card Si100x transmit
80	21	EZR.DTO	
81	20	EZR_FFIT	
82	19	EZR_SI100X_RX	Radio card Si100x receive
83	18	EZR_RESET	Radio card reset
84	17	EZR_ARSSI	
85	16	EZR_VDI	
86	15	EZR_GPIO0	Radio card general purpose I/O 0
87	14	EZR_GPIO1	Radio card general purpose I/O 1
88	13	EZR_GPIO2	Radio card general purpose I/O 2
89	12	EZR_GPIO3	Radio card general purpose I/O 3
90	11	EZR_GPIO4	Radio card general purpose I/O 4
91	10	H4_91	General purpose signal
92	9	ITM_DAT0	
93	8	ITM_DAT1	
94	7	ITM_DAT2	
95	6	ITM_DAT3	
96	5	ITM_CLK	
97	4	H4_97	General purpose signal
98	3	H4_98	General purpose signal
99	2	H4_99	General purpose signal
100	1	GND	

NOTES:

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