



**EVB-USB4715
Evaluation Kit
User's Guide**

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Preface

NOTICE TO CUSTOMERS

All documentation becomes dated, and this manual is no exception. Microchip tools and documentation are constantly evolving to meet customer needs, so some actual dialogs and/or tool descriptions may differ from those in this document. Please refer to our web site (www.microchip.com) to obtain the latest documentation available.

Documents are identified with a “DS” number. This number is located on the bottom of each page, in front of the page number. The numbering convention for the DS number is “DSXXXXA”, where “XXXX” is the document number and “A” is the revision level of the document.

For the most up-to-date information on development tools, see the MPLAB® IDE online help. Select the Help menu, and then Topics to open a list of available online help files.

INTRODUCTION

This chapter contains general information that will be useful to know before using the EVB-USB4715. Items discussed in this chapter include:

- [Document Layout](#)
- [Conventions Used In This Guide](#)
- [Warranty Registration](#)
- [The Microchip Web Site](#)
- [Development Systems Customer Change Notification Service](#)
- [Customer Support](#)
- [Document Revision History](#)

DOCUMENT LAYOUT

This document describes how to use the EVB-USB4715 as a demonstration platform optimized for portable applications. The manual layout is as follows:

- **Chapter 1. “Overview”** – Shows a brief description of the EVB-USB4715
- **Chapter 2. “Getting Started”** – Provides information about setup and operation of the EVB-USB4715.
- **Chapter 3. “Hardware Configuration”** – Includes information about the hardware configuration of the EVB-USB4715.
- **Appendix A. “Schematics”** – This appendix shows the EVB-USB4715 schematics.
- **Appendix B. “Bill of Materials”** – This appendix includes the EVB-USB4715 Bill of Materials.
- **Appendix C. “PCB Silk Screens”** – This appendix includes the EVB-USB4715 PCB silk screen images.

CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

DOCUMENTATION CONVENTIONS

Description	Represents	Examples
Arial font:		
Italic characters	Referenced books	<i>MPLAB® IDE User's Guide</i>
	Emphasized text	...is the <i>only</i> compiler...
Initial caps	A window	the Output window
	A dialog	the Settings dialog
	A menu selection	select Enable Programmer
Quotes	A field name in a window or dialog	"Save project before build"
Underlined, italic text with right angle bracket	A menu path	<u><i>File>Save</i></u>
Bold characters	A dialog button	Click OK
	A tab	Click the Power tab
N'Rnnnn	A number in verilog format, where N is the total number of digits, R is the radix and n is a digit.	4'b0010, 2'hF1
Text in angle brackets < >	A key on the keyboard	Press <Enter>, <F1>
Courier New font:		
Plain Courier New	Sample source code	#define START
	Filenames	autoexec.bat
	File paths	c:\mcc18\h
	Keywords	_asm, _endasm, static
	Command-line options	-Opa+, -Opa-
	Bit values	0, 1
	Constants	0xFF, 'A'
Italic Courier New	A variable argument	<i>file.o</i> , where <i>file</i> can be any valid filename
Square brackets []	Optional arguments	mcc18 [options] <i>file</i> [options]
Curly brackets and pipe character: { }	Choice of mutually exclusive arguments; an OR selection	errorlevel {0 1}
Ellipses...	Replaces repeated text	var_name [, var_name...]
	Represents code supplied by user	void main (void) { ... }

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- **Emulators** – The latest information on Microchip in-circuit emulators. This includes the MPLAB REAL ICE and MPLAB ICE 2000 in-circuit emulators.
- **In-Circuit Debuggers** – The latest information on the Microchip in-circuit debuggers. This includes MPLAB ICD 3 in-circuit debuggers and PICkit 3 debug express.
- **MPLAB IDE** – The latest information on Microchip MPLAB IDE, the Windows Integrated Development Environment for development systems tools. This list is focused on the MPLAB IDE, MPLAB IDE Project Manager, MPLAB Editor and MPLAB SIM simulator, as well as general editing and debugging features.
- **Programmers** – The latest information on Microchip programmers. These include production programmers such as MPLAB REAL ICE in-circuit emulator, MPLAB ICD 3 in-circuit debugger and MPLAB PM3 device programmers. Also included are nonproduction development programmers such as PICSTART Plus and PIC-kit 2 and 3.

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- Field Application Engineer (FAE)
- Technical Support

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Technical support is available through the web site at:

<http://www.microchip.com/support>

DOCUMENT REVISION HISTORY

Revisions	Section/Figure/Entry	Correction
DS50002679B (05-21-20)	Figure 1-1	Enhanced the graphic.
	Chapter 2. "Getting Started"	Rearranged the order of sections.
	Figure A-1 to Figure A-6	Updated the diagrams.
	Figure A-7	Added the figure.
	Table B-1	Updated the Bill of Materials table.
	All	Minor text changes throughout
DS50002679A (October 2017)	Initial release	

Chapter 1. Overview

1.1 EVB-USB4715 OVERVIEW

The EVB-USB4715 is a demonstration and evaluation platform that provides the necessary requirements and interface options for evaluating the USB4715, a 4-port High Speed (HS) USB Smart Hub on a 4-layer RoHS-compliant Printed Circuit Board (PCB). The EVB-USB4715 will allow the user to gain an understanding of the product and accelerate the integration of the USB4715 into the user's design. The USB4715 is compliant with USB 2.0 High-Speed (HS), Full-Speed (FS), and Low-Speed (LS) USB signaling. The evaluation platform supports four downstream ports: two USB 2.0 ports with USB Type-C® connectors and two standard Type-A USB 2.0 ports. The EVB-USB4715 platform also supports battery charging on all four ports (maximum of 10A* at any one time). The EVB-USB4715 is configured for operation through internal default settings and supports custom configurations through SMBus or through the external 16-Mbit SPI Flash device. The EVB-USB4715 supports FlexConnect role reversal for any of the four downstream ports with the upstream port. The EVB-USB4715 demonstrates driver compatibility with Microsoft® Windows® 10, Windows 8.x, Windows 7, Windows XP, Mac® OS X 10.4+, and Linux® hub drivers.

See [Section 1.2 “Features”](#) for more information.

Note: *Requires a 12V, 85W supply.

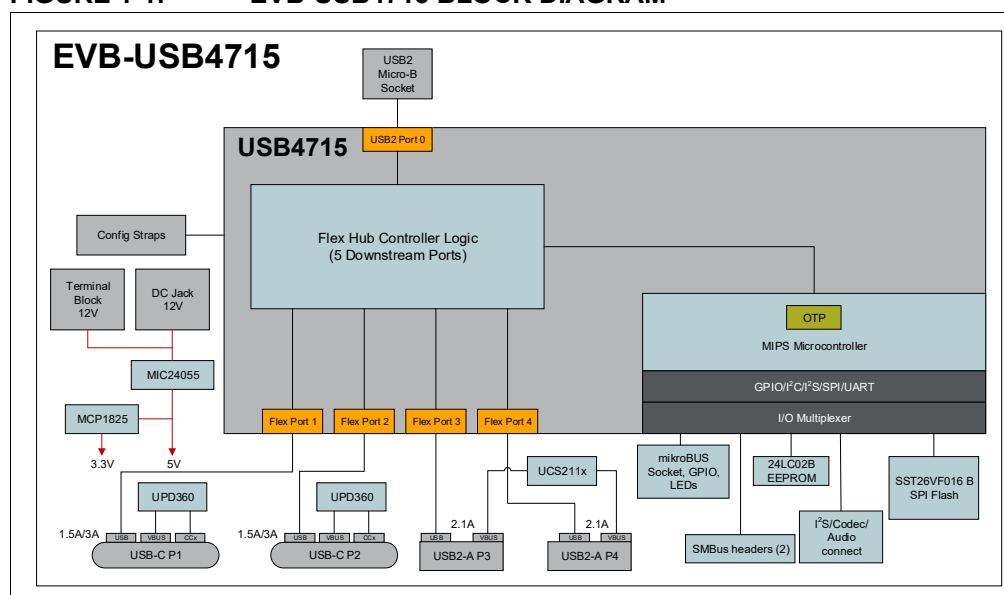
1.2 FEATURES

- Microchip's PortSwap, PHYBoost, and VariSense™ technologies
- USB4715 in a 48-pin QFN RoHS-compliant package
- USB 2.0 compliant (High Speed (HS), Full Speed (FS), and Low Speed (LS) operations)
- 5V-tolerant USB pins
- Self-powered operation
- USB 2.0 micro-AB upstream port
- Four Downstream USB ports:
 - Two Type-C USB 2.0 downstream ports
 - Two Type-A USB 2.0-Only downstream ports
- Individual port power and overcurrent sense support on all downstream ports
- Battery charging capability on all downstream ports with battery charging select shunts J1 and J20 (BC1.2 or SE1, 2.1A maximum per port)
- On-board SPI Flash for external downloadable firmware
- Operation from a single voltage (+12.0V, regulated) external power supply
- On-board 25 MHz crystal or external clock input
- Single on-board +5.2V, 10A regulator
- Single on-board +3.3V, 0.5A regulator
- Port Power LED indicators
- Port Connection indicators (in CONFIG3)
- SPI Flash activity blue LED indicator

- Reset red LED indicator
- Green LED indicators for 3.3V supply
- Terminal block connector for use with an external bench supply
- Barrel connector for use with a Microchip 12V power supply
- Configurable downstream ports to removable or non-removable with select shunts J1 and J21
- Bridge peripheral functions:
 - USB-to-UART (CDC)
 - USB-to-I²S Audio Codec
 - USB-to-SMBus
 - USB-to-SPI

1.3 BLOCK DIAGRAM

FIGURE 1-1: EVB-USB4715 BLOCK DIAGRAM



1.4 REFERENCES

Concepts and materials available in the following documents may be helpful when reading this document. Visit www.microchip.com for the latest documentation.

- *USB4715 Data Sheet* (www.microchip.com/DS00002514)
- *USB-IF, Battery Charging Specification. Revision 1.2. December 7, 2010*
- *USB-IF, Type-C Cable and Connector Specification. Revision 1.1. April 3, 2015*

1.5 ACRONYMS AND DEFINITIONS

ACRONYMS AND DEFINITIONS

Acronym	Definition
BC1.2	Latest USB-IF specified USB battery charging standard
CDP	Charging Downstream Port. A BC1.2-compliant port that allows simultaneous USB data and USB charging.
DCP	Dedicated Charging Port. A BC1.2-compliant port that is only capable of USB charging (no data).
DFP	Downstream Facing Port
EVB	Evaluation Board
HS	USB 2.0 High-Speed
OTP	One-Time Programmable Memory
SDP	Standard Downstream Port. A standard USB port with no high-current battery charging capabilities.
SE1	Type of Battery Charging (non-USB compliant) that sets the USB D+/D- to specific DC voltages to communicate charging capability.
Type-C	Reversible USB Connector
UFP	Upstream Facing Port
USB-IF	USB Integrators Forum. Collection of corporate sponsored members responsible for developing USB specifications.

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Chapter 2. Getting Started

2.1 INTRODUCTION

The Microchip EVB-USB4715 is designed for flexible configuration solutions. It can be configured via default internal register settings, via downloadable external firmware to an on-board SPI Flash, through SMBus, or through the on-board configuration switches.

Microchip provides a comprehensive software programming tool, MPLAB® Connect, for configuring USB4715 functions, registers, and OTP memory. When configured with the default internal register settings, the device operates as a USB 2.0 hub with four USB ports and Microchip's standard Vendor ID (VID), Product ID (PID), or Device ID (DID) settings.

For additional information on the MPLAB Connect programming tool, refer to Software Libraries within the Microchip USB4715 product page (www.microchip.com/USB4715).

2.2 KIT CONTENTS

The EVB-USB4715 evaluation kit includes the basic equipment necessary for evaluation. The items included in the kit are:

- EVB-USB4715 Evaluation Board
- 12V Power Supply
- USB cable, A to micro-B

2.3 QUICK START

To quickly start using the board, perform the following steps:

1. Connect the included 12V power supply to the barrel connector on the EVB-USB4715 (**J11**).
2. Using a USB Type-A plug to USB micro-B plug cable, connect the EVB-USB4715 to a USB host via the upstream "Port 0" USB micro-B socket (**J4**).
You may now connect devices to any of the downstream ports to enumerate and use those devices with the USB host.
3. Connect a shunt to jumper "VBUS_DET" (**J4**).
4. Slide the "ON/OFF" switch (**SW2**) to "ON".
5. Launch the MPLAB Connect software on your USB host or manipulate the included hardware configuration options (see section **Chapter 3. "Hardware Configuration"**) to perform additional configuration or to evaluate specific features.

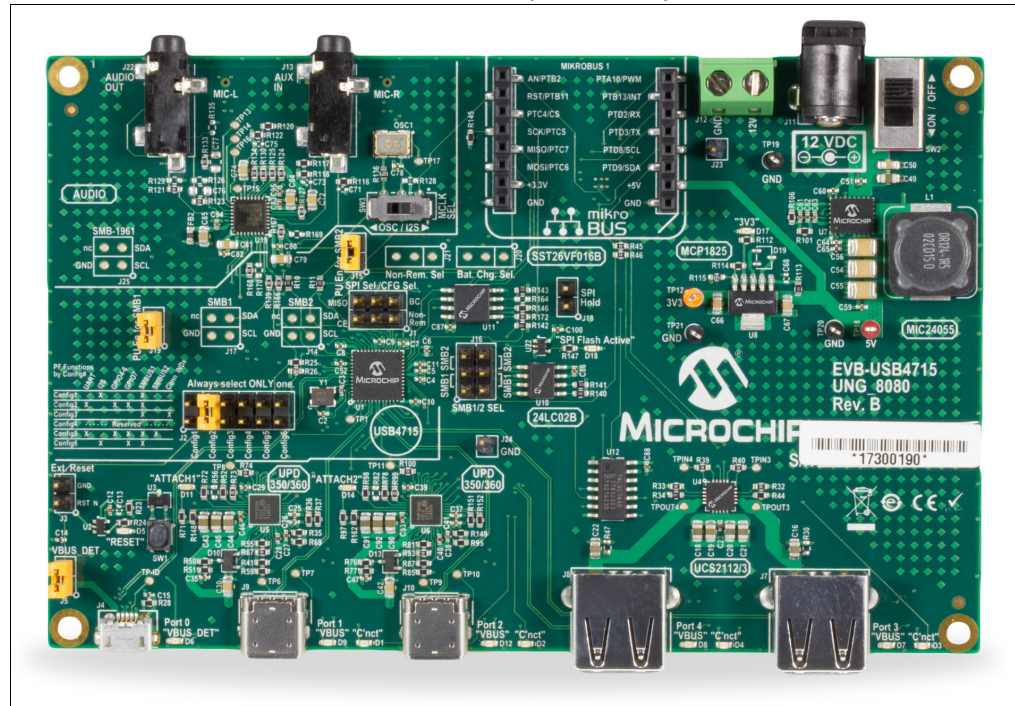
NOTES:

Chapter 3. Hardware Configuration

3.1 HARDWARE CONFIGURATION OPTIONS

Figure 3-1 shows the top view of the EVB-USB4715.

FIGURE 3-1: EVB-USB4715 REV B (TOP VIEW)



3.1.1 Configuration

3.1.1.1 EXTERNAL SPI FLASH

Upon power-up, the USB4715 first looks for an external SPI ROM device and a valid signature in the Flash. If one is found, the external ROM is enabled and code execution is initiated from the external SPI ROM device.

To select the SPI device, install a shunt to short **J18**. Install shunts to pins 2-3 and 5-6 of **J1**. When code is executing from an SPI ROM device, a blue LED (**D18**) illuminates.

- Note 1:** CFG_BC_EN and CFG_NON-REM options are deselected when a shunt is installed on **J1**. When operating in SPI mode, the code executing from the SPI ROM device handles all the configuration.
- 2:** If the SPI Flash is not properly programmed or has an invalid signature, the USB4715 reverts to internal default settings even if the SPI ROM is selected.

3.1.1.2 SMBUS2

If an SPI Flash device is not found, the firmware checks if SMBus2 is enabled.

To select SMBus2 configuration:

1. Leave **J18** open to disconnect the SPI ROM and shunt pins 9-10 of **J2** to select the CONFIG5 option from the CFG_STRAP header.
2. Connect a shunt to pins 1-2 of **J15** to connect the SMBus2 pull-up resistors. The SMBus2 signals may be accessed at **J14**, pins 1 and 3 (pin 2 is ground).

If CONFIG5 is selected and SMBus2 is enabled (that is, SMBus2 clock and data are pulled up), the USB4715 will wait indefinitely for data from the SMBus2 interface and will not enumerate to the USB host until the special USB_ATTACH command is sent.

3.1.1.3 INTERNAL DEFAULT CONFIGURATION WITH STRAPPING OPTIONS

When the USB4715 does not detect a valid SPI Flash image or SMBus2 configuration upon power-up, the USB4715 uses internal default register settings. It also sets the VID, PID, DID, and Language ID, and additional settings from the internal ROM code.

If configuration is not done through SPI or SMBus2, additional configuration is available through two hardware straps: CFG_BC_EN and CFG_NON-REM. The controls are configured by selecting one of six resistor values for each pin. The EVB-USB4715 demonstrates two of the six possible resistor values for each of CFG_BC_EN and CFG_NON-REM. These straps are read by the USB4715 device at power-on to determine the default configuration of the device.

To select the CFG_BC_EN and CFG_NON-REM modes, shunts must be connected to **J20** and **J21** headers.

To use the battery charging options, connect a shunt to pins 4-5 of **J1**. For CFG_NON-REM options, connect a shunt to pins 1-2 of **J1**. Connect a shunt to **J20** to select the desired CFG_BC_EN option, and connect a shunt to **J21** to select the desired CFG_NON-REM option.

TABLE 3-1: BATTERY CHARGING OPTIONS (CFG_BC_EN, J20)

Shunt Position	Configuration
1-2	Ports 1-4 are BC1.2 enabled.
2-3	Port 1 is BC1.2 enabled.

TABLE 3-2: NON-REMOVABLE PORT OPTIONS (CFG_NON-REM, J21)

Shunt Position	Configuration
1-2	All ports are removable.
2-3	Port 1 is non-removable.

3.1.2 Power Source - Self Powered

The EVB-USB4715 only supports self-powered operation, and is powered through one +12.0V regulated 'wall wart' external power supply. The power supply plugs into the 2.5 mm connector **J11** on the board. Alternatively, an external voltage can be supplied to the screw terminal **TERM_BLOCK_2P (J12)**. The +12.0V feeds a 10A regulator that outputs +5.2V to devices on the board and also supplies the +3.3V regulator.

CAUTION

The supplied 12.0V external power supply cannot support simultaneous battery charging on all downstream ports. Use a higher power supply if the required test use case exceeds the power capability of the supply. Failure to heed to this warning could result in damage to the 12.0V external power supply.

3.1.3 Downstream Port Power Control

USB power to the four downstream ports is controlled via port power controllers with auto-discharge function.

The two downstream Type-C ports are capable of up to 3A of USB Type-C battery charging. Downstream port 1 is configured for 3A charging by default. The two downstream USB Type-A ports are capable of up to 2.1A of USB battery charging.

3.1.4 USB Type-C® Ports

The EVB-USB4715 has two Type-C ports, and these are USB 2.0 HS ports. The USB Type-C ports utilize the Microchip UPD360 Type-C port controller in order to detect USB Type-C attachment and plug orientation. The UPD360 monitors the voltage on the USB Type-C CC wires in order to detect USB Type-C attach events. The downstream ports 1 and 2 use UPD360s configured for 3A operation by default.

3.1.5 LED Indicators

[Table 3-3](#) describes the LED indicators included on the EVB-USB4715.

TABLE 3-3: LED INDICATOR DESCRIPTIONS

Ref. Des.	Label	Description
D1	"C'nct3"	PORT3 is connected (enumerated).
D2	"C'nct2"	PORT2 is connected (enumerated).
D3	"C'nct1"	PORT1 is connected (enumerated).
D4	"C'nct4"	PORT4 is connected (enumerated).
D5	"RESET"	The RST_N signal is asserted.
D6	"PORT0 VBUS"	Illuminates when 5V to upstream PORT0 VBUS is present.
D7	"PORT3 VBUS"	Illuminates when 5V to upstream PORT3 VBUS is present.
D8	"PORT4 VBUS"	Illuminates when 5V to upstream PORT4 VBUS is present.
D9	"PORT1 VBUS"	Illuminates when 5V to upstream PORT1 VBUS is present.
D11	"ATTACH1"	Illuminates when a device is detected by CC signals on PORT1.
D12	"PORT2 VBUS"	Illuminates when 5V to upstream PORT2 VBUS is present.
D14	"ATTACH2"	Illuminates when a device is detected by CC signals on PORT2.
D17	"3V3"	Indicates 3.3V is present from the 3.3V voltage regulator.
D18	"SPI Flash Active"	Indicates SPI Flash memory activity.

3.1.6 Switches

Table 3-4 describes the switches included on the EVB-USB4715.

TABLE 3-4: SWITCH DESCRIPTIONS

Ref. Des.	Label	Description
SW1	"RESET"	Momentary push-button switch to assert RST_N
SW2	"ON/OFF"	Connects or disconnects the 12 VDC supply
SW3	"OSC/I2S"	Selects the clock source for the audio codec. The default selection is I ² S.

3.1.7 Connector Descriptions

Table 3-5 describes the connectors included on the PCB.

TABLE 3-5: USB4715 CONNECTOR DESCRIPTIONS

Ref. Des.	Type	Label	Description
J1	2x3 Header	"SPI_DI/CFG_BC_EN" "SPI_CEn/ CFG_NON_REM"	Selects between SPI memory capability and BC/NON_REM capability. For SPI, connect pins 2-3 and 5-6. For BC, connect pins 4-5. For NON_REM, connect pins 1-2.
J2	2x6 Header	"CFG_STRAP1"	Selects the CONFIGx configuration mode for EVB-USB4715 if no valid SPI memory image was detected. CONFIG1: I ² S CONFIG2: UART, GPIO 4-6 CONFIG3: CONN_INDx CONFIG4: (Reserved) CONFIG5: UART, GPIO 4-7, SMBus2 CONFIG6: I ² S, GPIO 7
J3	2x1 Header	"Ext.Reset"	Connection for an external reset switch
J4	USB2 Micro-AB Connector	"PORT0"	Upstream USB2 connection
J5	1x2 Header	"VBUS_DET"	Connects VBUS from host to VBUS_DET
J7	USB2 Type-A Connector	"PORT3"	Downstream Port 3 USB connection
J8	USB2 Type-A Connector	"PORT4"	Downstream Port 4 USB connection
J9	USB Type-C Connector	"PORT1"	Downstream Port 1 connection
J10	USB Type-C Connector	"PORT2"	Downstream Port 2 connection
J11	Barrel Jack	"12VDC"	12 VDC supply connection (center pin positive)
J12	2-pin terminal block	—	Alternative 12 VDC supply connection. Pin 1 is positive.
J13	Audio Jack, 3.5mm	"AUX IN"	Audio input for I ² S codec
J14	2x2 Header	"SMB2"	Connection for SMBus2 (slave)
J15	1x2 Header	"SMB2 PU"	Connects the pull-up resistors for SMBus2

TABLE 3-5: USB4715 CONNECTOR DESCRIPTIONS (CONTINUED)

Ref. Des.	Type	Label	Description
J16	2x3 Header	"SMB1/SMB2"	Selects SMBus1 or SMBus2 to the EEPROM. No connection if EEPROM is unused.
J17	2x2 Header	"SMB1"	Connection for SMBus1 (master, bridge)
J18	1x2 Header	"HOLD"	Disables the SPI memory when shunted
J19	1x2 Header	"SMB1 PU"	Connects the pull-up resistors for SMBus1
J20	1x2 Header	"Battery Charging Select"	See Table 3-1 .
J21	1x2 Header	"Non-Removable Select"	See Table 3-2 .
J22	Audio Jack, 3.5mm	"AUDIO OUT"	Audio output from the I ² S
J23	1x1 Header	"GND"	Ground
J24	1x1 Header	"GND"	Ground
J25	2x2 Header	"SMB-1961"	SMBus1 connection for the audio codec

3.1.8 Test Points

[Table 3-6](#) describes the test points included on the EVB-USB4715. A header may be permanently installed on the through-hole test points if needed.

TABLE 3-6: USB4715 TEST POINT DESCRIPTIONS

Ref. Des.	Type	Description
TP1	Test Pad	PRT_CTL_GANG
TP6	Test Pad	PORT1 CC1
TP7	Test Pad	PORT1 CC2
TP8	Test Pad	PRTCTL1
TP9	Test Pad	PORT2 CC1
TP10	Test Pad	PORT2 CC2
TP11	Test Pad	PRTCTL2
TP12	Test Loop (Orange)	3.3V regulator output
TP13	Test Pad	Audio Codec LOUTP
TP14	Test Pad	Audio Codec LOUTN
TP15	Test Pad	Audio Codec ROUTP
TP16	Test Pad	Audio Codec ROUTN
TP17	Test Pad	Audio Codec Oscillator Output Enable
TP18	Test Loop (Red)	5V regulator output. Nominally 5.2V
TP19	Test Loop (Black)	Ground
TP20	Test Loop (Black)	Ground
TP21	Test Loop (Black)	Ground

NOTES:

Appendix A. Schematics

A.1 INTRODUCTION

This appendix shows the EVB-USB4715 schematics.

FIGURE A-1: EVB-USB4715 SCHEMATIC (PAGE 1)

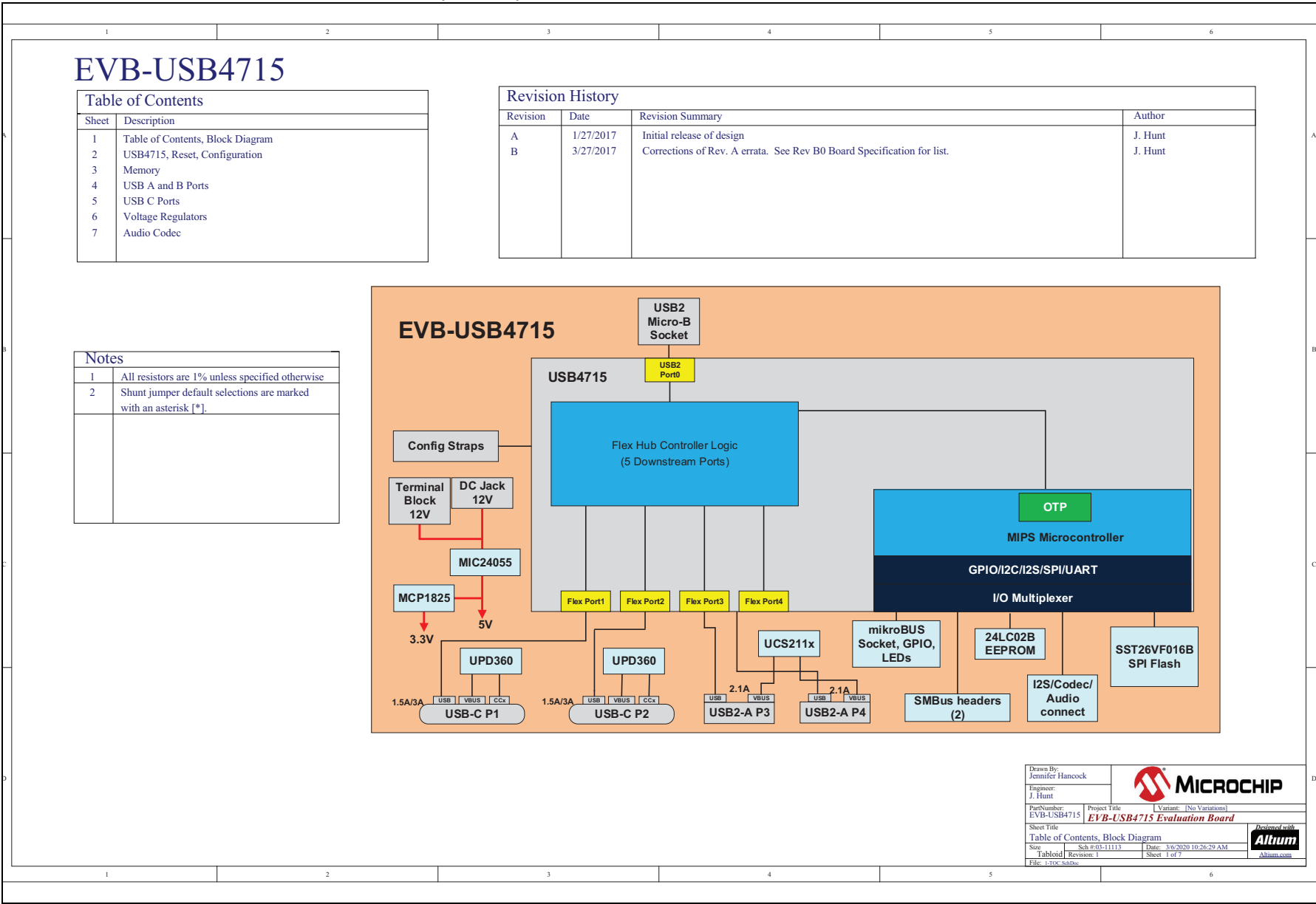


FIGURE A-2: EVB-USB4715 SCHEMATIC (PAGE 2)

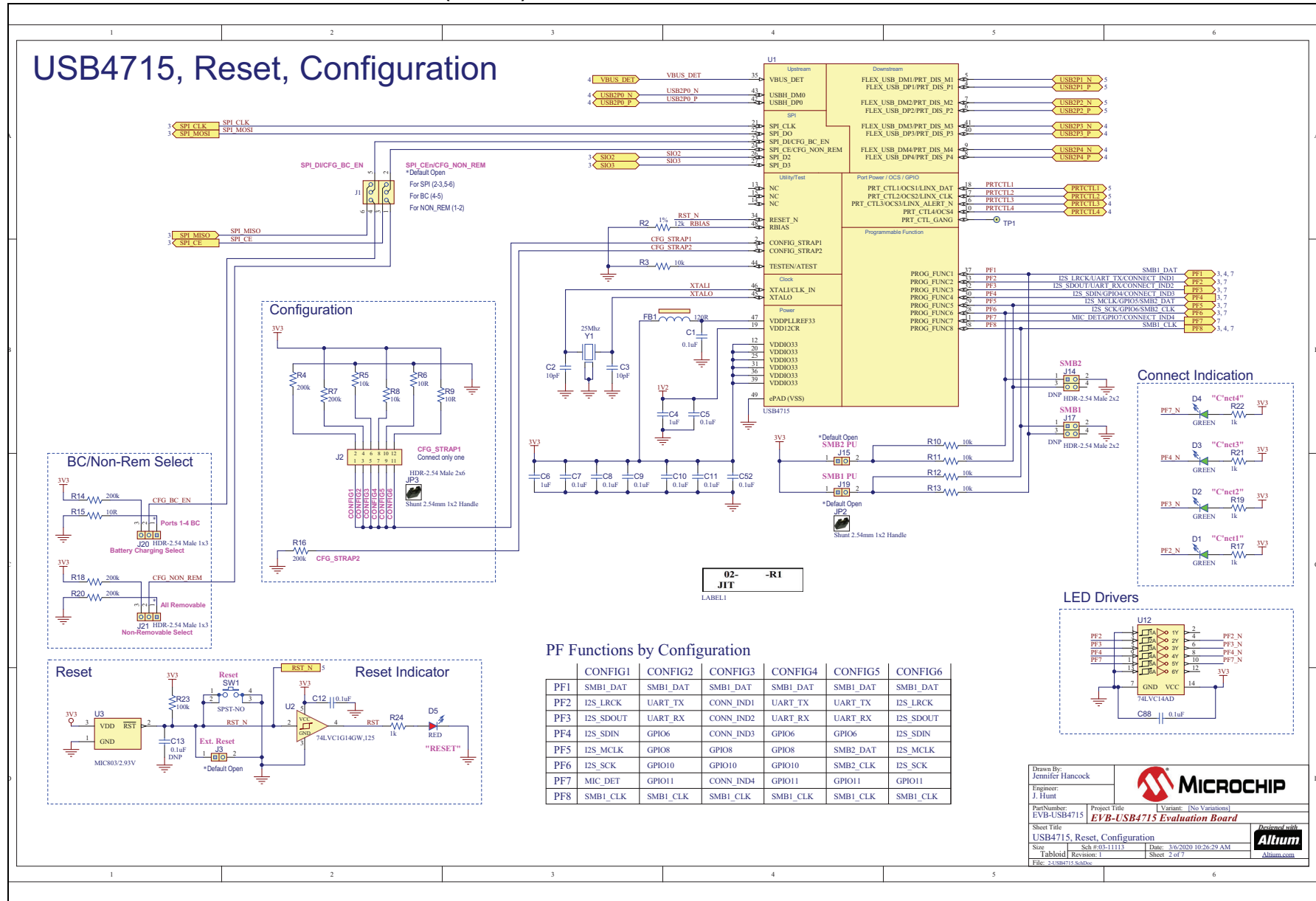


FIGURE A-3: EVB-USB4715 SCHEMATIC (PAGE 3)

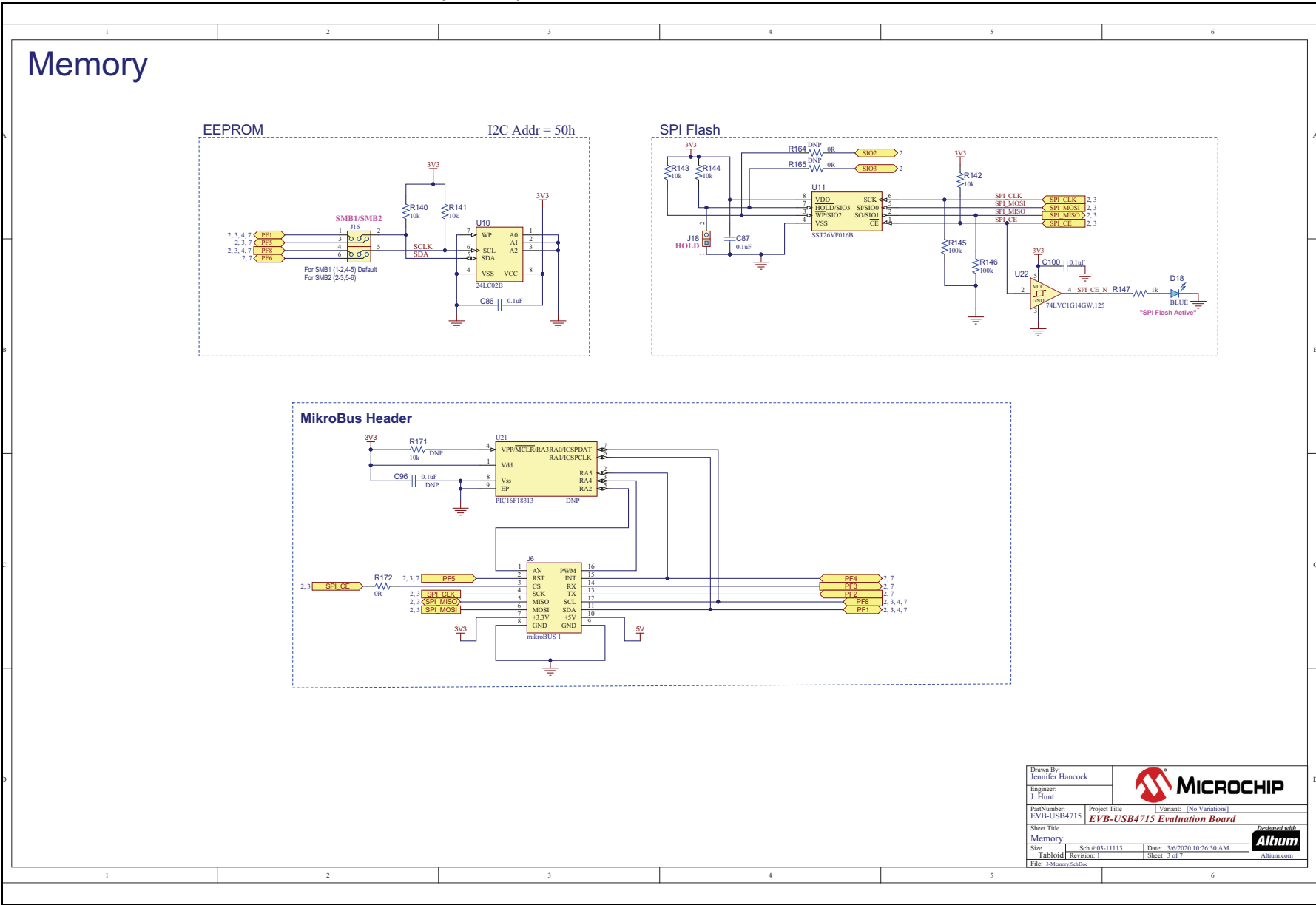


FIGURE A-4: EVB-USB4715 SCHEMATIC (PAGE 4)

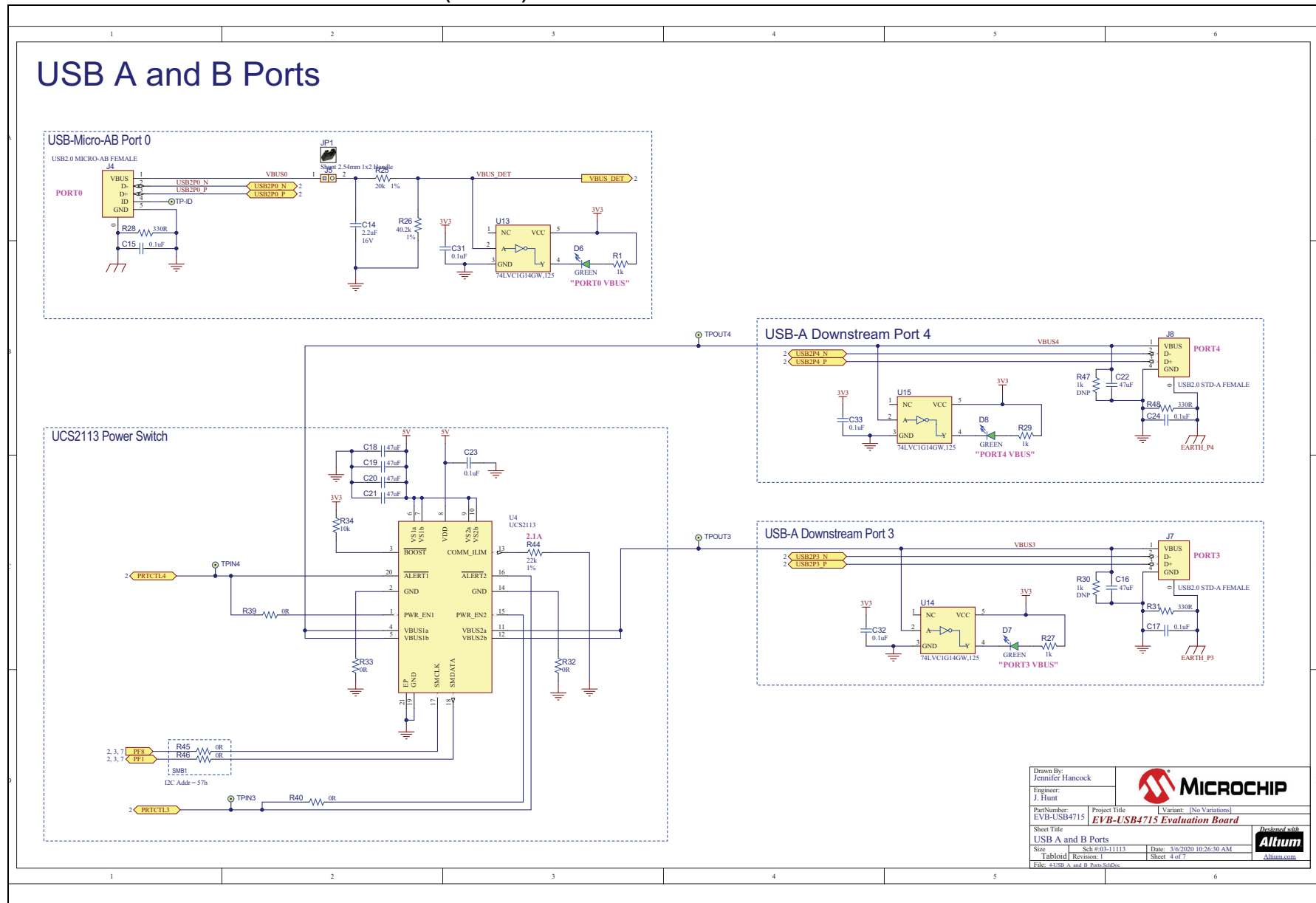


FIGURE A-5: EVB-USB4715 SCHEMATIC (PAGE 5)

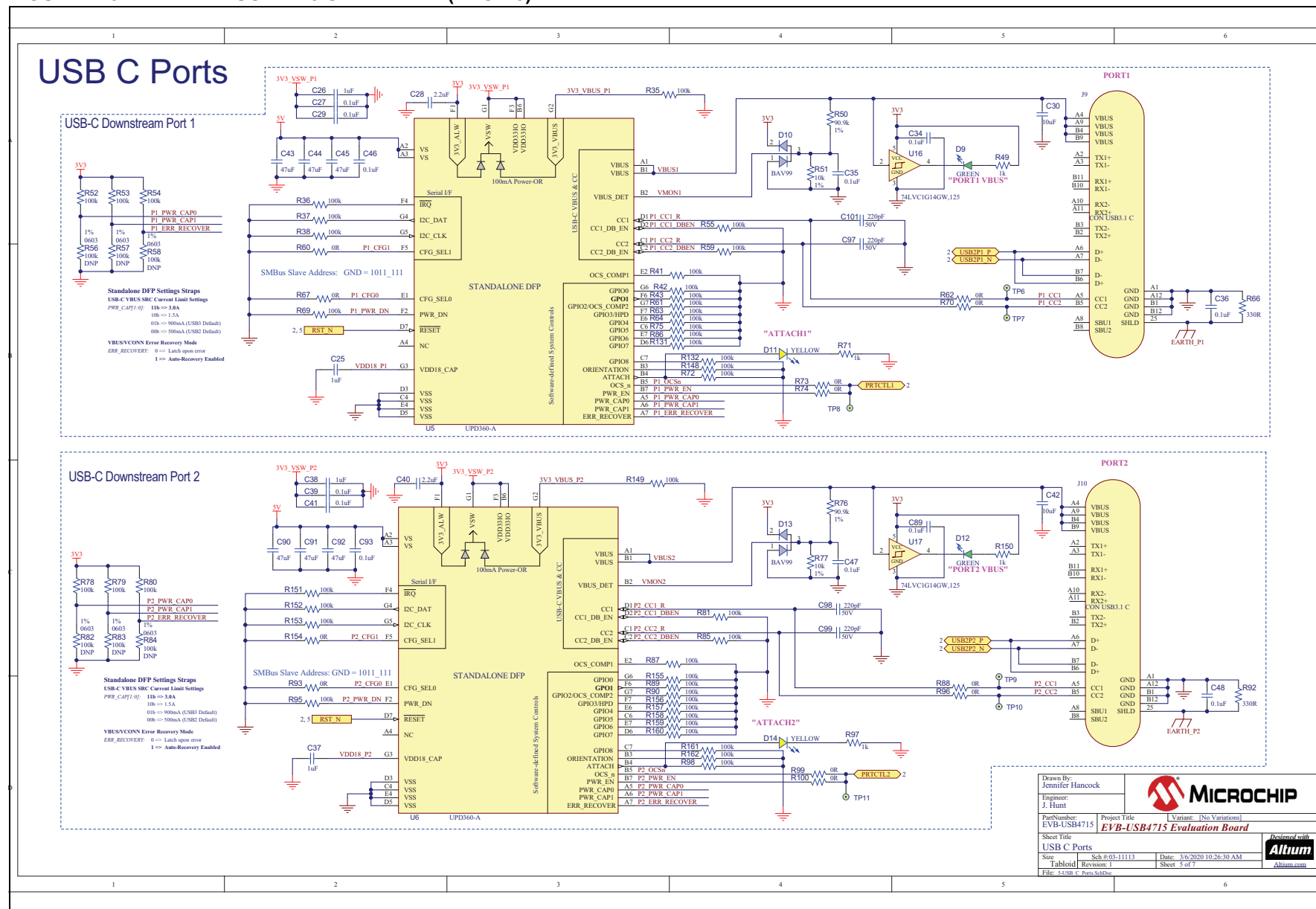
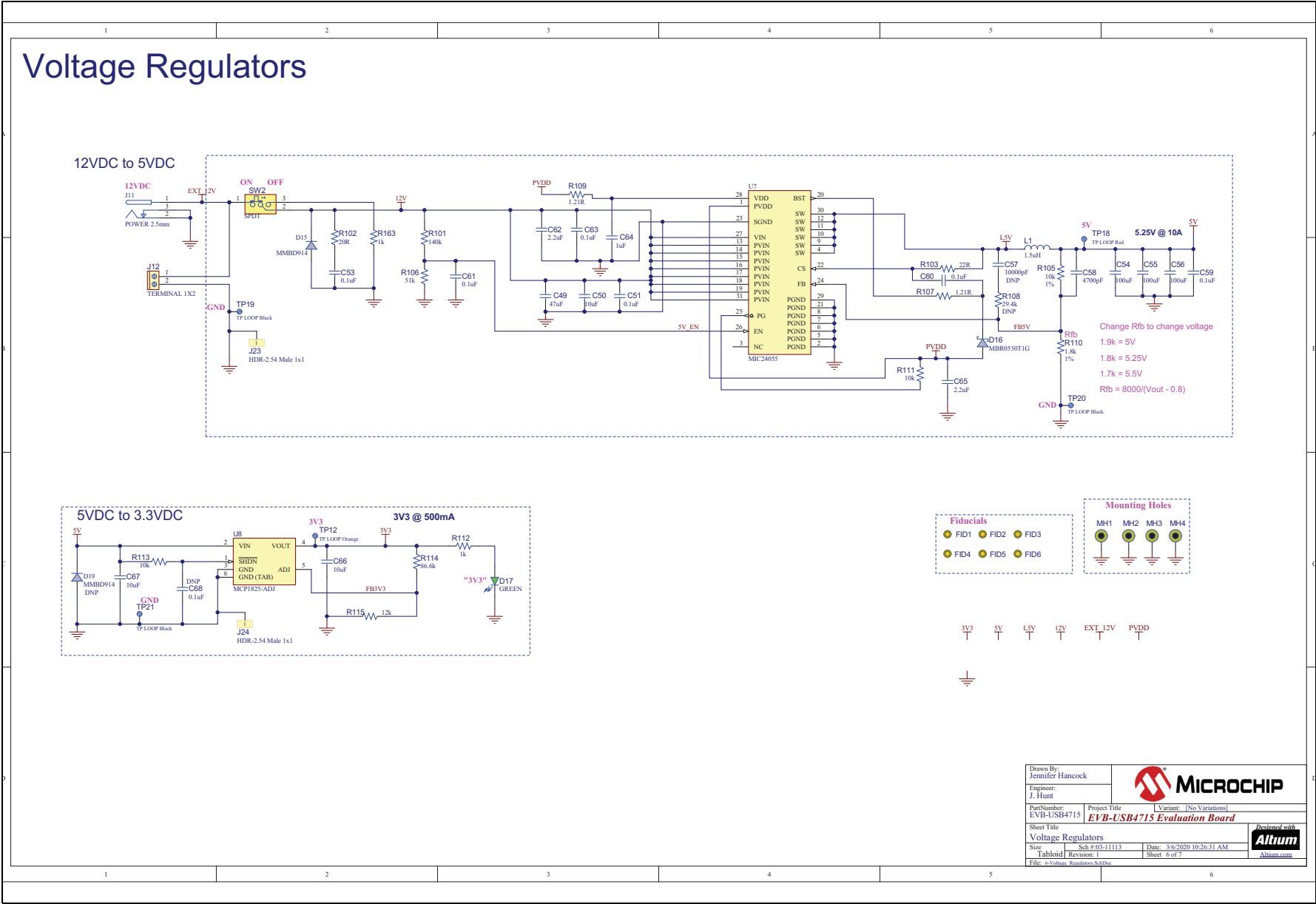
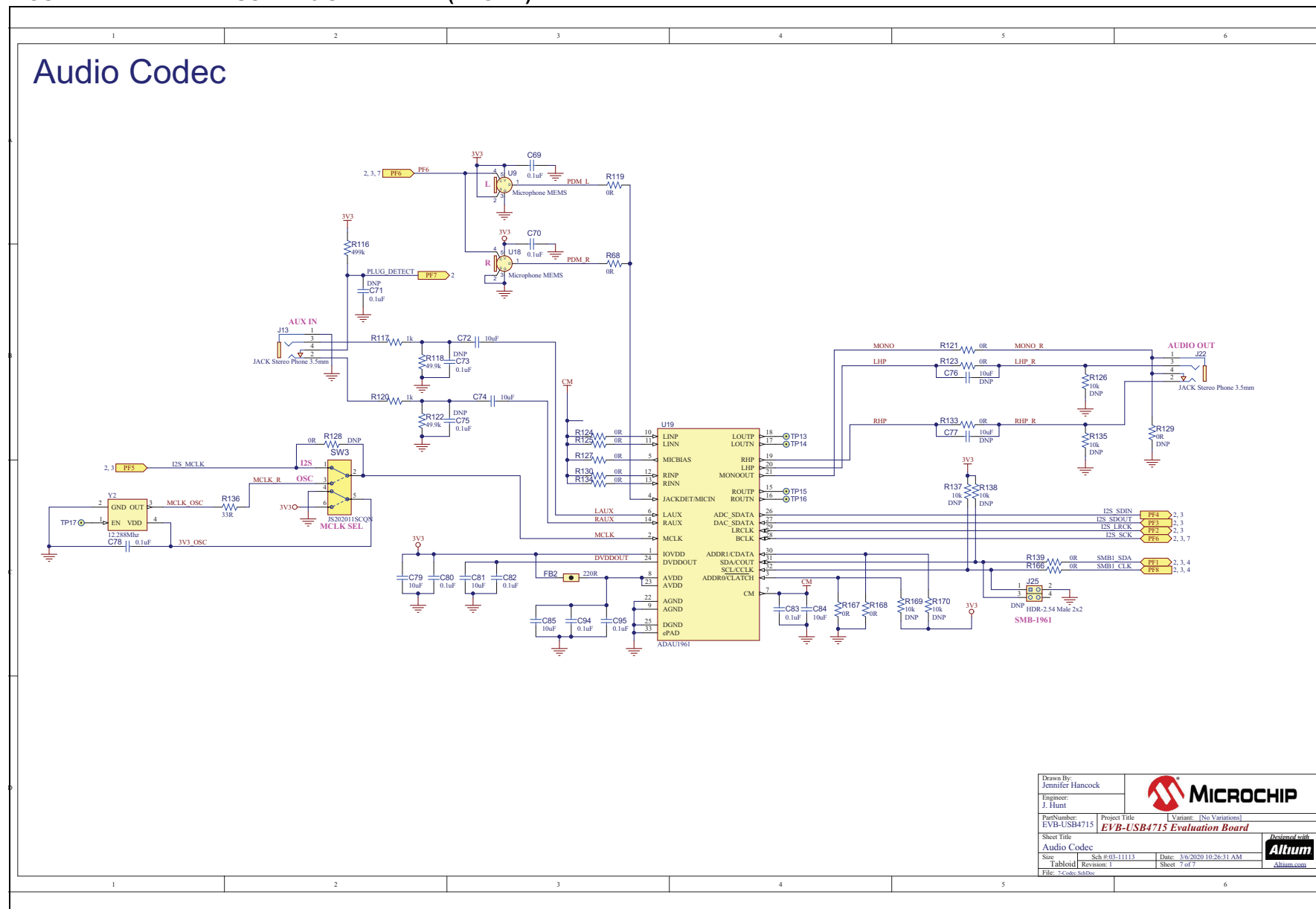


FIGURE A-6: EVB-USB4715 SCHEMATIC (PAGE 6)



EVB-USB4715 Evaluation Kit User's Guide



Appendix B. Bill of Materials

B.1 INTRODUCTION

This appendix contains the EVB-USB4715 Evaluation Bill of Materials (BOM).

TABLE B-1: EVB-USB4715 BILL OF MATERIALS

Item	Qty	Reference	Description	Populated	Manufacturer	Manufacturer Part Number
1	46	C1, C5, C7, C8, C9, C10, C11, C12, C15, C17, C23, C24, C27, C29, C31, C32, C33, C34, C35, C36, C39, C41, C46, C47, C48, C51, C52, C53, C59, C60, C61, C63, C69, C70, C78, C80, C82, C83, C86, C87, C88, C89, C93, C94, C95, C100	CAP CER 0.1uF 16V 10% X7R SMD 0402	Yes	Murata	GRM155R71C104KA88D
2	2	C2, C3	CAP CER 10pF 50V 5% NP0 SMD 0402	Yes	Murata	GRM1555C1H100JZ01D
3	7	C4, C6, C25, C26, C37, C38, C64	CAP CER 1uF 10V 10% X5R SMD 0402	Yes	Murata Electronics North America	GRM155R61A105KE15D
4	5	C14, C28, C40, C62, C65	CAP CER 2.2uF 16V 10% X5R SMD 0402	Yes	TDK Corporation	C1005X5R1C225K050BC
5	13	C16, C18, C19, C20, C21, C22, C43, C44, C45, C49, C90, C91, C92	CAP CER 47uF 6.3V 20% X5R SMD 0805	Yes	Taiyo Yuden	JMK212BJ476MG-T
6	11	C30, C42, C50, C66, C67, C72, C74, C79, C81, C84, C85	CAP CER 10uF 16V 10% X5R SMD 0805	Yes	Wurth Electronics Inc	885012107014
7	3	C54, C55, C56	CAP CER 100uF 10V 20% X5R SMD 1210	Yes	Murata Electronics North America	GRM32ER61A107ME20L
8	1	C58	CAP CER 4700pF 16V 10% X7R SMD 0402	Yes	Murata Electronics North America	GRM155R71C472KA01D
9	4	C97, C98, C99, C101	CAP CER 220pF 50V 5% NP0 SMD 0402	Yes	Murata Electronics North America	GRM1555C1H221JA01D
10	10	D1, D2, D3, D4, D6, D7, D8, D9, D12, D17	DIO LED GREEN 2V 30mA 35mcd Clear SMD 0603	Yes	Lite-On Inc	LTST-C191KGKT
11	1	D5	DIO LED RED 2V 30mA 2mcd Clear SMD 0603	Yes	Lite-On	LTST-C190EKT
12	2	D10, D13	DIO RECTARR BAV99 1.25V 200mA 70V SOT-23-3	Yes	Fairchild	BAV99
13	2	D11, D14	DIO LED YELLOW 2.2V 25mA 3.4mcd Diffuse SMD 0603	Yes	Stanley Electric Co	AY1111C-TR
14	1	D15	DIO RECT MMBD914LT1G 1V 10mA 100V SMD SOT-23-3	Yes	ON Semiconductor	MMBD914LT1G
15	1	D16	DIO SCTKY MBR0530T1G 430mV 500mA 30V SOD-123	Yes	Diodes Incorporated	B0530W-7-F
16	1	D18	DIO LED BLUE 2.8V 20mA 15mcd Clear SMD 0603	Yes	Lite-On	LTST-C193TBKT-5A
17	1	FB1	FERRITE 600mA 120R SMD 0603	Yes	TDK Corporation	MMZ1608B121CTAH0
18	1	FB2	FERRITE 500mA 220R SMD 0603	Yes	Murata	BLM18AG221SN1D
19	2	J1, J16	CON HDR-2.54 Male 3x2 Gold 5.84MH TH VERT	Yes	Samtec Inc.	TSW-102-07-G-T
20	1	J2	CON HDR-2.54 Male 2x6 Gold 5.84MH TH VERT	Yes	Samtec	TSW-106-07-G-D
21	5	J3, J5, J15, J18, J19	CON HDR-2.54 Male 1x2 Gold 5.84MH TH VERT	Yes	FCI	77311-118-02LF
22	1	J4	CON USB2.0 MICRO-AB FEMALE SMD R/A	Yes	JAE Electronics	DX4R205JJAR1800
23	2	J6	SOCKET mikroBUS HOST DIP 16 TH	Yes	3M	963108-2000-AR-PR

TABLE B-1: EVB-USB4715 BILL OF MATERIALS (CONTINUED)

Item	Qty	Reference	Description	Populated	Manufacturer	Manufacturer Part Number
24	2	J7, J8	CON USB2.0 STD-A FEMALE TH R/A	Yes	TE Connectivity AMP Connectors	292303-1
25	2	J9, J10	CON USB3.0 TYPE-C FEMALE SMD R/A	Yes	Advanced-Connectek Inc.	NBR25-AK5322
26	1	J11	CON POWER 2.5mm 5.5mm SWITCH Slotted TH R/A	Yes	CUI Inc	PJ-002B
27	1	J12	CON TERMINAL 5.08mm 1X2 Female 16-30AWG 13.5A TH RA	Yes	TE Connectivity	282836-2
28	2	J13, J22	CON JACK Stereo Phone 3.5mm Black Female Switch SMD R/A	Yes	CUI Inc.	SJ-3524-SMT-TR
29	3	J14, J17, J25	CON HDR-2.54 Male 2x2 Gold 5.84MH TH VERT	DNP	Samtec	TSW-102-07-G-D
30	2	J20, J21	CON HDR-2.54 Male 1x3 AU 5.84MH TH VERT	Yes	Samtec Inc.	TSW-103-07-G-S
31	2	J23, J24	CON HDR-2.54 Male 1x1 Gold 5.84MH TH VERT	Yes	TE Connectivity	5-146280-1
32	3	JP1, JP2, JP3	MECH HW JUMPER 2.54mm 1x2 w/ Handle	Yes	TE Connectivity AMP Connectors	880584-4
33	1	L1	INDUCTOR 1.5uH 19.5A 20% SMD L12.1W11.4H9.5	Yes	Wurth Electronics Inc	7443320150
34	1	LABEL1				
35	17	R1, R17, R19, R21, R22, R24, R27, R29, R49, R71, R97, R112, R117, R120, R147, R150, R163	RES TKF 1k 1% 1/10W SMD 0603	Yes	Panasonic	ERJ-3EKF1001V
36	2	R2, R115	RES TKF 12k 1% 1/10W SMD 0603	Yes	Yageo	RC0603FR-0712KL
37	16	R3, R5, R8, R10, R11, R12, R13, R34, R105, R111, R113, R140, R141, R142, R143, R144	RES TKF 10k 1% 1/10W SMD 0603	Yes	ROHM	MCR03EZPFX1002
38	6	R4, R7, R14, R16, R18, R20	RES TKF 200k 1% 1/10W SMD 0603	Yes	Panasonic	ERJ-3EKF2003V
39	3	R6, R9, R15	RES TKF 10R 1% 1/10W SMD 0603	Yes	Panasonic	ERJ-3EKF10R0V
40	47	R23, R35, R36, R37, R38, R41, R42, R43, R52, R53, R54, R55, R59, R61, R63, R64, R69, R72, R75, R78, R79, R80, R81, R85, R86, R87, R89, R90, R95, R98, R131, R132, R145, R146, R148, R149, R151, R152, R153, R155, R156, R157, R158, R159, R160, R161, R162	RES TKF 100k 1% 1/10W SMD 0603	Yes	Panasonic	ERJ-3EKF1003V
41	1	R25	RES TKF 20k 1% 1/10W SMD 0603	Yes	Panasonic	ERJ-3EKF2002V
42	1	R26	RES TKF 40.2k 1% 1/10W SMD 0603	Yes	Yageo	RC0603FR-0740K2L
43	5	R28, R31, R48, R66, R92	RES TKF 330R 1% 1/10W SMD 0603	Yes	Panasonic	ERJ-3EKF3300V

TABLE B-1: EVB-USB4715 BILL OF MATERIALS (CONTINUED)

Item	Qty	Reference	Description	Populated	Manufacturer	Manufacturer Part Number
44	33	R32, R33, R39, R40, R45, R46, R60, R62, R67, R68, R70, R73, R74, R88, R93, R96, R99, R100, R119, R121, R123, R124, R125, R127, R130, R133, R134, R139, R154, R166, R167, R168, R172	RES TKF 0R 1/10W SMD 0603	Yes	Panasonic	ERJ-3GSY0R00V
45	1	R44	RES TKF 22k 1% 1/10W SMD 0603	Yes	Panasonic	ERJ-3EKF2202V
46	2	R50, R76	RES TKF 90.9k 1% 1/10W SMD 0603	Yes	Panasonic	ERJ-3EKF9092V
47	2	R51, R77	RES TF 10k 1% 1/16W SMD 0603	Yes	TE Connectivity Passive Product	CPF0603F10KC1
48	1	R101	RES TKF 140k 1% 1/10W SMD 0603	Yes	Panasonic	ERJ-3EKF1403V
49	1	R102	RES TF 20R 1% 1/16W SMD 0603	Yes	Stackpole Electronics Inc	RNCP0603FTD20R0
50	1	R103	RES TKF 22R 1% 1/10W SMD 0603	Yes	Panasonic Electronic Components	ERJ-3EKF22R0V
51	1	R106	RES TKF 51k 1% 1/10W SMD 0603	Yes	Panasonic	ERJ-3EKF5102V
52	2	R107, R109	RES TKF 1.21R 1% 1/10W SMD 0603	Yes	Vishay Dale	CRCW06031R21FKEA
53	1	R110	RES TKF 1.8k 1% 1/10W SMD 0603	Yes	Panasonic	ERJ-3EKF1801V
54	1	R114	RES TKF 86.6k 1% 1/10W SMD 0603	Yes	Panasonic Electronic Components	ERJ-3EKF8662V
55	1	R116	RES TKF 499k 1% 1/10W SMD 0603	Yes	Panasonic	ERJ-3EKF4993V
56	2	R118, R122	RES TKF 49.9k 1% 1/10W SMD 0603	Yes	Panasonic	ERJ-3EKF4992V
57	1	R136	RES TKF 33R 1% 1/10W SMD 0603	Yes	ROHM	MCR03EZPFX33R0
58	1	SW1	SWITCH TACT SPST 16V 50mA PTS810 SJM 250 SMTR LFS SMD	Yes	C&K Components	PTS810 SJM 250 SMTR LFS
59	1	SW2	SWITCH SLIDE SPDT 120V 6A 1101M2S3CQE2 TH	Yes	C&K Components	1101M2S3CQE2
60	1	SW3	SWITCH SLIDE DPDT 6V 300MA JS202011CQN TH	Yes	C&K Components	JS202011CQN
61	1	TP12	CON TP LOOP Orange TH	Yes	Keystone Electronics	5003
62	1	TP18	MISC, TEST POINT MULTI PURPOSE MINI RED	Yes	Keystone	5000
63	3	TP19, TP20, TP21	MISC, TEST POINT MULTI PURPOSE MINI BLACK	Yes	Keystone	5001
64	1	U1	IC INTERFACE USB4715 USB 2.0 4 Port Hub Controller VQFN-48	Yes	Microchip Technology	USB4715T-I/Y9X
65	7	U2, U13, U14, U15, U16, U17, U22	74LVC1G14GW,125 SCHMITT-TRG INVERTER	Yes	NXP	74LVC1G14GW,125
66	1	U3	MCHP ANALOG SUPERVISOR 2.93V MIC803-29D4VM3-TR SOT-23-3	Yes	Microchip Technology	MIC803-29D4VM3-TR
67	1	U4	MCHP INTERFACE USB Power Controller UCS2113-1-V/G4 QFN-20	Yes	Microchip	UCS2113-1-V/G4
68	2	U5, U6	MCHP INTERFACE USB I2C UPD360-A/6H BGA-44	Yes	Microchip Technology	UPD360-A/6HX
69	1	U7	y	Yes	Microchip Technology	MIC24055YJL-TR

TABLE B-1: EVB-USB4715 BILL OF MATERIALS (CONTINUED)

Item	Qty	Reference	Description	Populated	Manufacturer	Manufacturer Part Number
70	1	U8	MCHP ANALOG LDO ADJ MCP1825T-ADJE/DC SOT-223-5	Yes	Microchip	MCP1825T-ADJE/DC
71	1	U9, U18	SENSOR ACOUSTIC MICROPHONE MEMS OMNIDIRECTIONAL 100Hz to 80kHz SMD 3.5x2.65x1.1	Yes	Knowles	SPH0641LU4H-1
72	1	U10	MCHP MEMORY SERIAL EEPROM 2k I2C 24LC02B/SN SOIC-8	Yes	Microchip	24LC02BT/SN
73	1	U11	MCHP MEMORY SERIAL FLASH 16M 104MHz SST26VF016B-104I/SM SOIJ-8	Yes	Microchip Technology	SST26VF016B-104I/SM
74	1	U12	IC BUFFER 74LVC14AD,118 SOIC-14	Yes	Nexperia USA Inc.	74LVC14AD,118
75	1	U19	IC AUDIO ADAU1961WBCPZ STEREO CODEC QFN-32	Yes	Analog Devices Inc.	ADAU1961WBCPZ
76	1	U21	MCHP MCU 8-BIT 32MHz 3.5kB 256B PIC16F18313-I/RF UDFN-8	DNP	Microchip	PIC16F18313-I/RF
77	1	Y1	CRYSTAL 25MHz 10pF SMD ABM8G	Yes	Abrakon LLC	ABM8G-25.000MHZ-B4Y-T
78	1	Y2	OSCILLATOR 12.288MHz 3.3V SMD L5.0W3.2H1.3	Yes	Abrakon LLC	ASFL1-12.288MHZ-EC-T

NOTES:

C.1 INTRODUCTION

This appendix shows the top and bottom silk screen images of EVB-USB4715.

FIGURE C-1: EVB-USB4715 TOP SILK SCREEN IMAGE

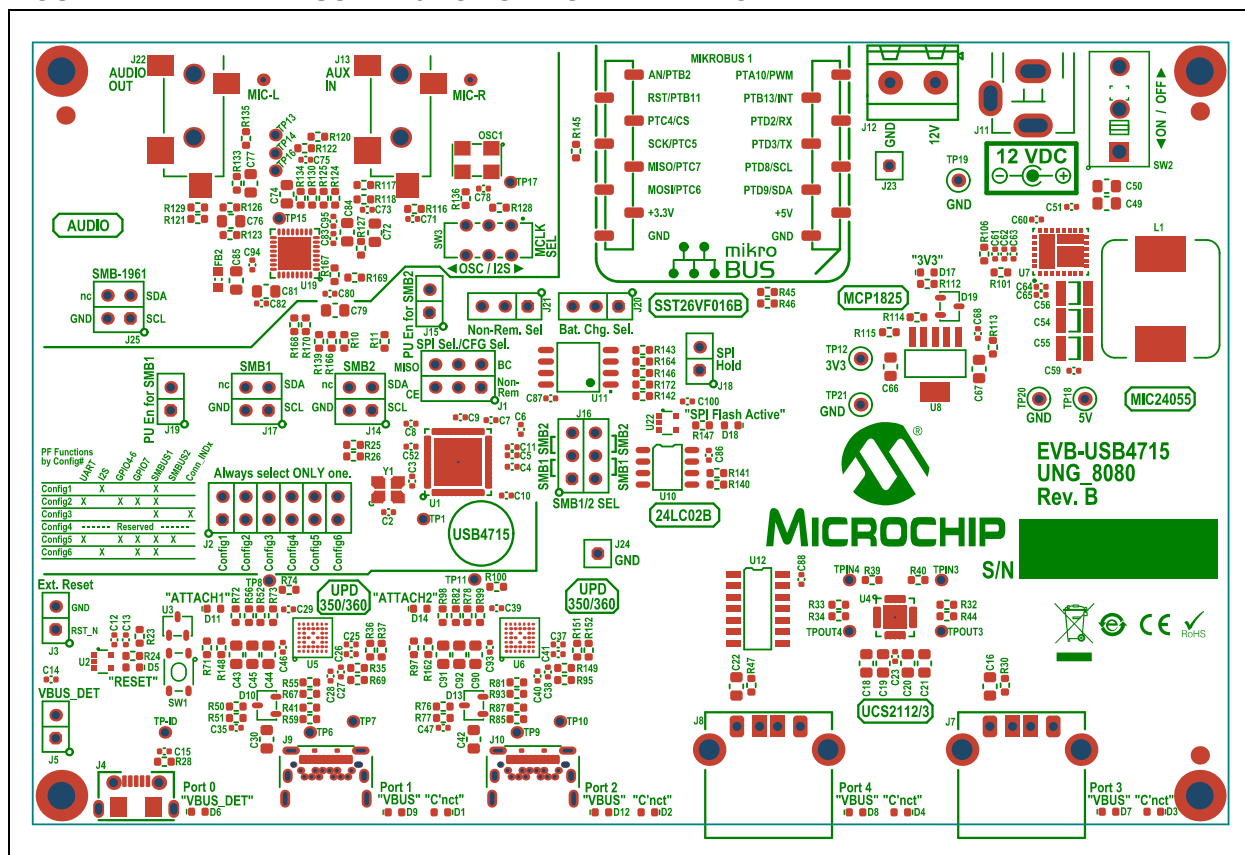
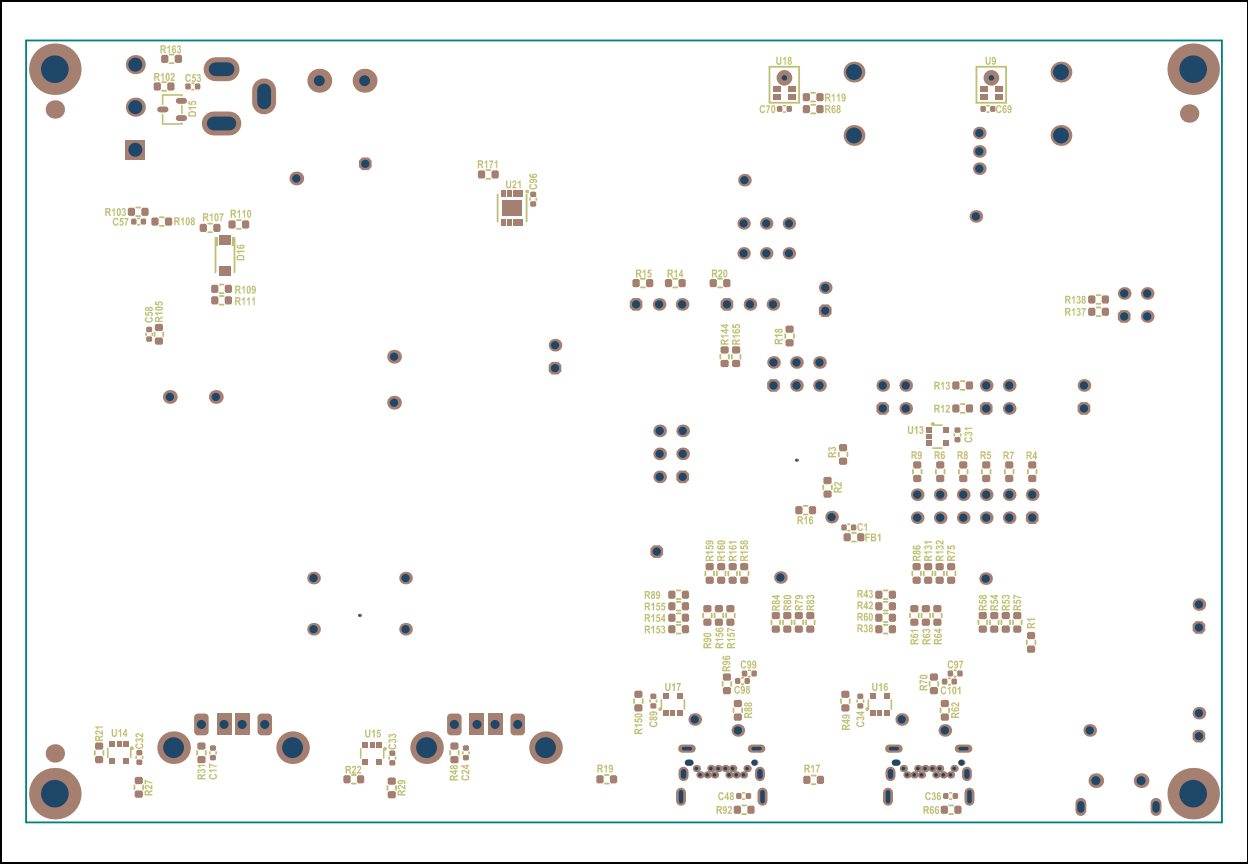


FIGURE C-2: EVB-USB4715 BOTTOM SILK SCREEN IMAGE



NOTES:

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Fax: 39-0331-466781

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Tel: 31-416-690399
Fax: 31-416-690340

Norway - Trondheim
Tel: 47-7288-4388

Poland - Warsaw
Tel: 48-22-3325737

Romania - Bucharest
Tel: 40-21-407-87-50

Spain - Madrid
Tel: 34-91-708-08-90
Fax: 34-91-708-08-91

Sweden - Gothenberg
Tel: 46-31-704-60-40

Sweden - Stockholm
Tel: 46-8-5090-4654

UK - Wokingham
Tel: 44-118-921-5800
Fax: 44-118-921-5820