EVB-USB7052N 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 "DSXXXXXA", where "XXXXX" 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-USB7052N Evaluation Kit User's Guide. Items discussed in this chapter include:

- Document Layout
- Conventions Used in this Guide
- Warranty Registration
- The Microchip Website
- Development Systems Customer Change Notification Service
- Customer Support
- Document Revision History

DOCUMENT LAYOUT

This document describes how to use the EVB-USB7052N Evaluation Kit as a demonstration platform optimized for portable applications. The manual layout is as follows:

- **Chapter 1. "Overview"** – This chapter shows a brief description of the EVB-USB7052N Evaluation Kit.
- **Chapter 2. "Getting Started"** – This chapter provides information about setup and operation of the EVB-USB7052N Evaluation Kit.
- **Chapter 3. "Hardware Configuration"** – This chapter includes information about the hardware configuration of the EVB-USB7052N Evaluation Kit.
- **Appendix A. "Schematics"** – This appendix shows the EVB-USB7052N schematics.
- **Appendix B. "Bill of Materials"** – This appendix includes the EVB-USB7052N Bill of Materials (BOM).
- **Appendix C. "Silk Screens"** – This appendix includes the EVB-USB7052N silk screens.

CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

DOCUMENTATION CONVENTIONS

Description	Represents	Examples
Arial font:		
Italic characters	Referenced books	*MPLAB® IDE User's Guide*
	Emphasized text	...is the *only* 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	*File>Save*
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	*`file`*`.o`, where *`file`* can be any valid filename
Square brackets [ ]	Optional arguments	`mcc18 [options]` *`file`* `[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) { ... }`

WARRANTY REGISTRATION

Please complete the enclosed Warranty Registration Card and mail it promptly. Sending the Warranty Registration Card entitles users to receive new product updates. Interim software releases are available at the Microchip website.

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- **General Technical Support** – Frequently Asked Questions (FAQs), technical support requests, online discussion groups, Microchip consultant program member listing
- **Business of Microchip** – Product selector and ordering guides, latest Microchip press releases, listing of seminars and events, listings of Microchip sales offices, distributors and factory representatives

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The Development Systems product group categories are:

- **Compilers** – The latest information on Microchip C compilers, assemblers, linkers and other language tools. These include all MPLABCC compilers; all MPLAB assemblers (including MPASM™ assembler); all MPLAB linkers (including MPLINK™ object linker); and all MPLAB librarians (including MPLIB™ object librarian).
- **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 non-production development programmers such as PICSTART® Plus and PICkit 2 and 3.

CUSTOMER SUPPORT

Users of Microchip products can receive assistance through several channels:

- Distributor or Representative
- Local Sales Office
- Field Application Engineer (FAE)
- Technical Support

Customers should contact their distributor, representative or field application engineer (FAE) for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in the back of this document.

Technical support is available through the web site at:
http://www.microchip.com/support

DOCUMENT REVISION HISTORY

Revisions	Section/Figure/Entry	Correction
DS50003393A (08-31-22)	Initial Release	

Chapter 1. Overview

1.1 INTRODUCTION

The EVB-USB7052N Evaluation Kit is a demonstration and evaluation platform that provides the necessary requirements and interface options for evaluating the EVB-USB7052N, which is a four-port High-Speed (HS) USB smart hub on a four-layer RoHS-compliant Printed Circuit Board (PCB). This allows the user to gain an understanding of the product and accelerate the integration of the EVB-USB7052N into the user's design.

The EVB-USB7052N is compliant with USB 3.2 Gen 1 on the upstream port and on downstream ports 1 to 3. The EVB-USB7052N is also compliant with the USB 2.0 HS, Full-Speed (FS), and Low-Speed (LS) USB signaling.

The evaluation platform supports four downstream ports: Two USB Type-C® Gen 1 ports, one USB Type-A Gen 1 port, and one USB 2.0 port. The EVB-USB7052N platform also supports battery charging on all four downstream ports (maximum of 10A [Note 1] at any one time). The EVB-USB7052N supports FlexConnect role reversal for any of the downstream ports with the upstream port.

The EVB-USB7052N has four configurations for operation through internal default settings and supports custom configurations through I^2C or through the external 16-Mbit SPI Flash device.

The EVB-USB7052N demonstrates driver compatibility with Microsoft® Windows® 10, Windows 8.x, Windows 7, Windows XP, Mac OS® X 10.4+, and Linux® hub drivers.

For more information about EVB-USB7052N, see **Section 1.2 "Features"**.

Note 1: Requires a 12V, 85W supply.

1.2 FEATURES

Below are the features of the EVB-USB7052N Evaluation Kit:

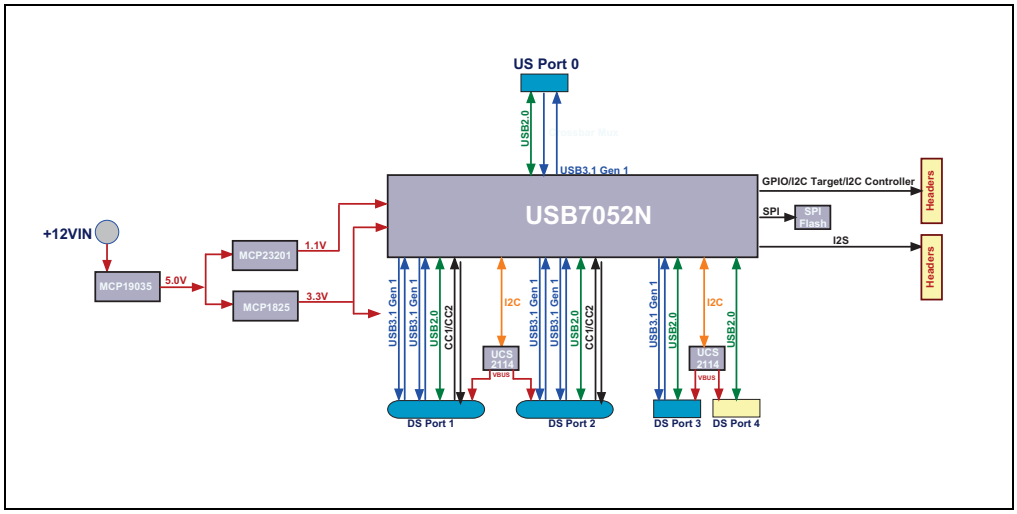
- Microchip's PortSwap, PHYBoost™, and VariSense™ technologies
- EVB-USB7052N in a 100-pin QFN RoHS-compliant package
- USB 3.2 compliant (Gen 1 operation)
- USB 2.0 compliant (HS, FS, and LS operation)
- 5V-tolerant USB pins
- Self-powered operation
- USB Gen 1 Type-µB upstream port
- Four Downstream USB ports:
  - Three Gen 1 downstream ports (Two USB Type-C® and one Type-A)
  - One USB 2.0-only downstream port
- All downstream ports support individual port power and overcurrent sense.
- All downstream ports can be enabled for battery charging with the battery charging select shunts J14 and J16. (BC1.2 or SE1, 2.1A maximum per port)
- Onboard SPI Flash for external downloadable firmware
- Operates from a single voltage (+12.0V, regulated) external power supply

- Onboard 25 MHz crystal or oscillator input
- Single onboard +5.2V, 15A regulator
- Single onboard +3.3V, 0.5A regulator
- Single onboard +1.2V, 2A regulator
- Port Power LED indicators
- SPI Flash activity blue LED indicator
- Reset red LED indicator
- Green LED indicators for 5V, 3.3V, and 1.2V regulator outputs
- Terminal block connector for use with an external 12 VDC bench supply
- Barrel connector for use with a Microchip 12V power supply
- Removable or non-removable downstream port options can be configured with select shunt on J17.
- Bridge peripheral functions:
  - USB-to-UART (CDC)
  - USB-to-I^{2}S™ Audio Codec
  - USB-to-I^{2}C

1.3 BLOCK DIAGRAM

Figure 1-1 shows the block diagram of EVB-USB7052N.

FIGURE 1-1: EVB-USB7052N 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.

- *AN2932 USB-to-GPIO Bridging with Microchip USB72xx Hubs*
- *AN2935 Configuration of USB7202/USB7206/USB725x*
- *AN2936 USB-to-UART Bridging with Microchip USB7202, USB7250, USB7251, USB7252 Hubs, and USB7052N*
- *AN3020 USB-to-SPI Bridging with Microchip USB72xx Hubs*
- *AN3240 USB-to-I2C Bridging with Microchip USB720x and USB725x Hubs Application Note*

1.5 ACRONYMS AND DEFINITIONS

TABLE 1-1: ACRONYMS AND DEFINITIONS

Acronym	Definition
BC1.2	The latest USB-IF specified USB battery charging standard
CDP	Charging Downstream Port, a BC1.2-compliant port allows simultaneous USB data and USB charging
DCP	Dedicated Charging Port, a BC1.2-compliant port which is only capable of USB charging (no data)
DFP	Downstream Facing Port
EVB	Evaluation Board
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
USB-IF	USB Integrators Forum, a collection of corporate sponsored members responsible for developing USB specifications
Gen 1	USB Specification 3.2 Gen 1

NOTES:

Chapter 2. Getting Started

2.1 INTRODUCTION

The Microchip EVB-USB7052N is designed for flexible configuration solutions. It can be configured via default internal register settings, via a downloadable external firmware to an onboard SPI Flash (OTP memory), via SMBus, or via the onboard configuration switches. When configured with the default internal register settings, the device operates as a USB 3.2 Gen 1 hub with one upstream Gen 1 port, two downstream facing Type-C Ports Gen 1, one Type-A downstream Gen 1 port, and one downstream USB 2.0 port, with Microchip's standard VID/PID/DID settings.

Microchip provides a comprehensive software programming tool, MPLAB® Connect Configurator (MPLABCC), for configuring EVB-USB7052N functions, registers, and OTP memory. The EVB-USB7052N requires MPLABCC version 2.1.0 or greater.

For additional information on the MPLABCC programming tool, refer to Software Libraries within the Microchip USB7052N product page at https://www.microchip.com/en-us/product/USB7052N.

2.2 KIT CONTENTS

The EVB-USB7052N Evaluation Kit includes the basic equipment necessary for evaluation. The items included in the kit are:

- EVB-USB7052N Evaluation Board
- Type-A to Type-µB USB cable

2.3 QUICK START

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

1. Connect a 12V power supply to the barrel connector (J20) or the terminal block (J19) on the EVB-USB7052N.
2. Using a Type-A to Type-µB USB cable, connect the EVB-USB7052N to a USB host via the upstream "Port 0" USB Type-B socket (J22).

Devices may now be connected to any of the downstream ports to enumerate and use those devices with the USB host.

To perform additional configuration or evaluate specific features, launch the MPLABCC software on your USB host or manipulate the included hardware configuration options detailed in the next sections.

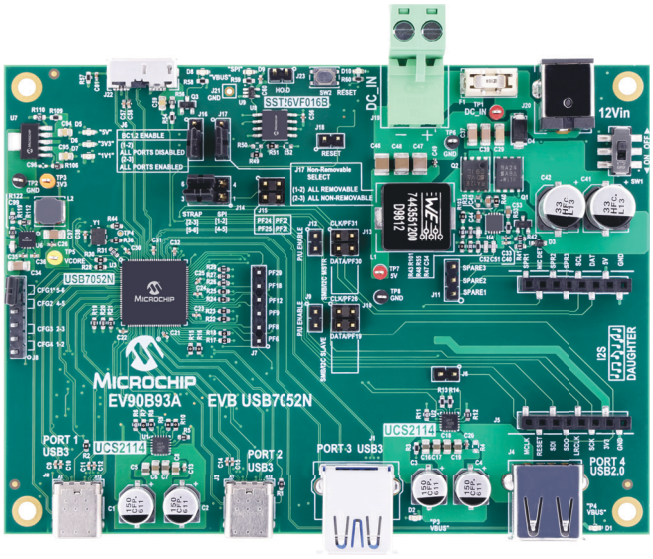
NOTES:

Chapter 3. Hardware Configuration

3.1 HARDWARE CONFIGURATION OPTIONS

Figure 3-1 shows the top view of the EVB-USB7052N.

FIGURE 3-1: EVB-USB7052N R1 (TOP VIEW)



3.1.1 Configuration

3.1.1.1 EXTERNAL SPI FLASH

Upon power-up, the EVB-USB7052N first looks for an external SPI Flash Memory 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 Flash Memory device.

To enable operation from the SPI device, install shunts to pins 1 and 2 as well as 4 and 5 of J14. When code is executing from an SPI Flash Memory device, a blue LED "SPI-ACTIVE" (D9) illuminates.

Note 1:	CFG_BC_EN and CFG_NON_REM options are deselected when SPI shunts are installed on J14. When operating in SPI mode, all configuration is handled by the code executing from the SPI Flash Memory device.
2:	If the SPI Flash is not properly programmed or has an invalid signature, the EVB-USB7052N reverts to internal defaults even if the SPI Flash Memory is selected.

3.1.1.2 INTERNAL DEFAULT CONFIGURATIONS WITH STRAPPING OPTIONS

When the EVB-USB7052N does not detect a valid SPI Flash image and does not look for SMBus configuration upon power-up, the EVB-USB7052N uses internal default register settings. It also sets the Vendor ID, Product ID, Language ID, Device ID, and additional settings from the internal ROM code.

If configuration is not done through SPI or SMBus, additional configuration is available through two functions: CFG_BC_EN and CFG_NON_REM. The controls are configured by selecting one of the six resistor values for each pin. The EVB-USB7052N demonstrates two of the six possible resistor values for each of CFG_BC_EN and CFG_NON_REM. These straps are sensed by the EVB-USB7052N device at power-on to determine the resultant configuration of the device.

To select the CFG_BC_EN and CFG_NON_REM modes, shunts must be connected to the J16 and J17 headers.

To use the battery charging strap options, connect a shunt to pins 2 and 3 of J14 and connect a shunt to J16 as specified in Table 3-1. For the NON_REM strap options, connect a shunt to J17 as shown in Table 3-2.

TABLE 3-1: BATTERY CHARGING OPTIONS (CFG_BC_EN – J16)

J16 Shunt Position	(J14 is shunted pins 2 and 3.)
2 and 3	All ports are BC 1.2-enabled.
1 and 2	All downstream ports are BC1.2-disabled.

TABLE 3-2: NON-REMOVABLE PORT OPTIONS (CFG_NON-REM – J17)

J17 Shunt Position	(J14 is shunted pins 5 and 6.)
2 and 3	All ports are non-removable.
1 and 2	All ports are removable.

3.1.2 Default Jumper Positions

The default jumper positions in EVB-USB7052N are shown in Table 3-3.

TABLE 3-3: EVB-USB7052N DEFAULT JUMPER POSITIONS

Jumper No.	Shunted Pins
J5	N/A (I2S™ Daughter Card)
J6	Do not install
J7	Do not install
J8	Pin 5 and pin 6 (CFG1)
J9	Do not install
J10	Do not install
J11	Do not install
J12	Do not install
J13	Do not install
J14	Pin 2 and pin 3 Pin 5 and pin 6
J15	Do not install
J16	Pin 2 and pin 3 (BC1.2 enabled all ports)
J17	Pin 1 and Pin 2 (ALL ports removable)
J18	Do not install

TABLE 3-3: EVB-USB7052N DEFAULT JUMPER POSITIONS (CONTINUED)

Jumper No.	Shunted Pins
J21	N/A
J23	Do not install

3.1.3 Power Source – Self Powered

The EVB-USB7052N only supports self-powered operation. Power is supplied through one +12.0V regulated external power supply. The power supply is connected to the 2.5 mm connector J1 on the board. Alternatively, an external voltage can be supplied to the screw terminal “12V” (J2). The +12.0V feeds a 15A regulator that outputs +5.2V (nominal) across the board and supplies the +3.3V regulator and the 1.2V 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.

3.1.4 Downstream Port Power Control

The EVB-USB7052N downstream facing ports are controlled via port power controllers with auto discharge functionality. All downstream ports support BC 1.2 battery charging.

The downstream USB Type-C® port is capable of up to 3A of current at 5V. The downstream USB Type-A ports are capable of up to 2.1A at 5V.

3.1.5 USB Type-C® Ports

The EVB-USB7052N has two USB 3.2 Gen 1 PHYs for each Type-C port. This eliminates the need for an external multiplexer. The EVB-USB7052N also features integrated Type-C control signal (CC) detection to determine when and in what orientation a USB Type-C attach has been made. It powers only the USB 3.2 Gen 1 PHY needed for USB communication. To reduce power, the EVB-USB7052N powers down unused USB 3.2 Gen 1 PHYs. In case no USB Type-C® attach is detected, both USB 3.2 Gen 1 PHYs associated with that port are powered down.

3.1.6 LED Indicators

Table 3-4 describes the LED indicators on the EVB-USB7052N.

TABLE 3-4: EVB-USB7052N LED INDICATORS

Ref. Des.	Label	Description
D1	PORT 4 VBUS	Illuminates when 5V to upstream PORT4 VBUS is present
D2	PORT 3 VBUS	Illuminates when 5V to upstream PORT3 VBUS is present
D5	5V	Illuminates when 5V is present from the 5V voltage regulator
D6	3V3	Illuminates when 3.3V is present from the 3.3V voltage regulator
D7	1V1	Illuminates when 1.1V is present from the 1.1V voltage regulator
D8	PORT 0 VBUS	Illuminates when 5V to upstream PORT0 VBUS is present
D9	SPI-ACTIVE	Indicates SPI Flash Memory activity
D10	RESET	The RST_N signal is asserted.

3.1.7 Switches

Table 3-5 describes the switches on the EVB-USB7052N.

TABLE 3-5: EVB-USB7052N SWITCHES

Ref. Des.	Label	Description
SW2	RESET	Momentary push-button switch to assert RST_N
SW1	ON/OFF	Connects or disconnects the 12 VDC supply

3.1.8 Connector Descriptions

Table 3-6 describes the connectors included in the PCB.

TABLE 3-6: EVB-USB7052N CONNECTORS

Ref. Des.	Type	Label	Description
J1	USB Type-A Connector	PORT3	Downstream Type-A Gen 1 Port 3 USB connection
J2	USB Type-C® Connector	PORT1	Downstream Type-C Gen 1 Port 1 USB connection
J3	USB Type-C® Connector	PORT2	Downstream Type-C Gen 1 Port 2 USB connection
J4	USB Type-A Connector	PORT4	Downstream Type-A USB 2.0 Port 4 USB connection
J5	1x16 Header	—	Audio Codec Socket
J6	2x1 Header	—	Debug Header for I^2S™ RESET
J7	6x1 Header	—	Debug Header
J8	6x1 Header	CFG1 CFG2 CFG3 CFG4	CFG Header
J9	1x2 Header	PU	Pull-up resistors, Target I^2C
J10	2x2 Header	I2S_CLK I2S_DAT	Hub Target I^2S Header
J11	1x3 Header	—	Audio Codec (Spare)
J12	1x2 Header	PU	Pull-up resistor, Controller I^2C
J13	2x2 Header	MSTR_I2C_CLK MSTR_I2C_DAT	Hub Controller I^2C Header
J14	6x2 Header	CFG_STRAP	Configuration Options Header
J15	2x2 Header	PF24 PF22 PF25 PF21	SPI data pins provided for debugging SPI memory
J16	1x3 Header	BC SELECT	See Table 3-1.
J17	1x3 Header	NON-REM SELECT	All ports removable. Connect pins 1 to 2. For NON_REM, connect pins 2 to 3.
J18	2x1 Header	Ext.Reset	Connection for an external Reset switch
J19	2-pin terminal block	—	Alternative 12 VDC supply connection. Pin 1 is positive.

TABLE 3-6: EVB-USB7052N CONNECTORS (CONTINUED)

Ref. Des.	Type	Label	Description
J20	Barrel Jack	12VDC	12 VDC supply connection (center pin positive)
J21	1x1 Header	GND	Circuit ground
J22	USB Type-µB Connector	PORT0	Downstream Type-µB Gen 1 Port 0 USB connection
J23	1x2 Header	HOLD	When shunted, this disables the SPI memory.
J24	1x2 Terminal Plug	—	For External Power Supply

3.1.9 Test Points

Table 3-7 describes the test points on the EVB-USB7052N. A header may be permanently installed on the through-hole test points if needed.

TABLE 3-7: EVB-USB7052N TEST POINTS

Ref. Des.	Type	Description
TP1	Test Pad	DC_IN
TP2	Test Loop (BLACK)	GND
TP3	Test Loop (Orange)	3V3
TP4	Test Pad	XTALO
TP5	Test Loop (Yellow)	1V1
TP6	Test Loop (BLACK)	GND
TP7	Test Loop (Red)	5V
TP8	Test Loop (BLACK)	GND

NOTES:

Appendix A. Schematics

A.1 INTRODUCTION

This appendix shows the EVB-USB7052N Evaluation Kit schematics.

FIGURE A-1: EVB-USB7052N PART A

EVB-USB7052N

Table of Contents

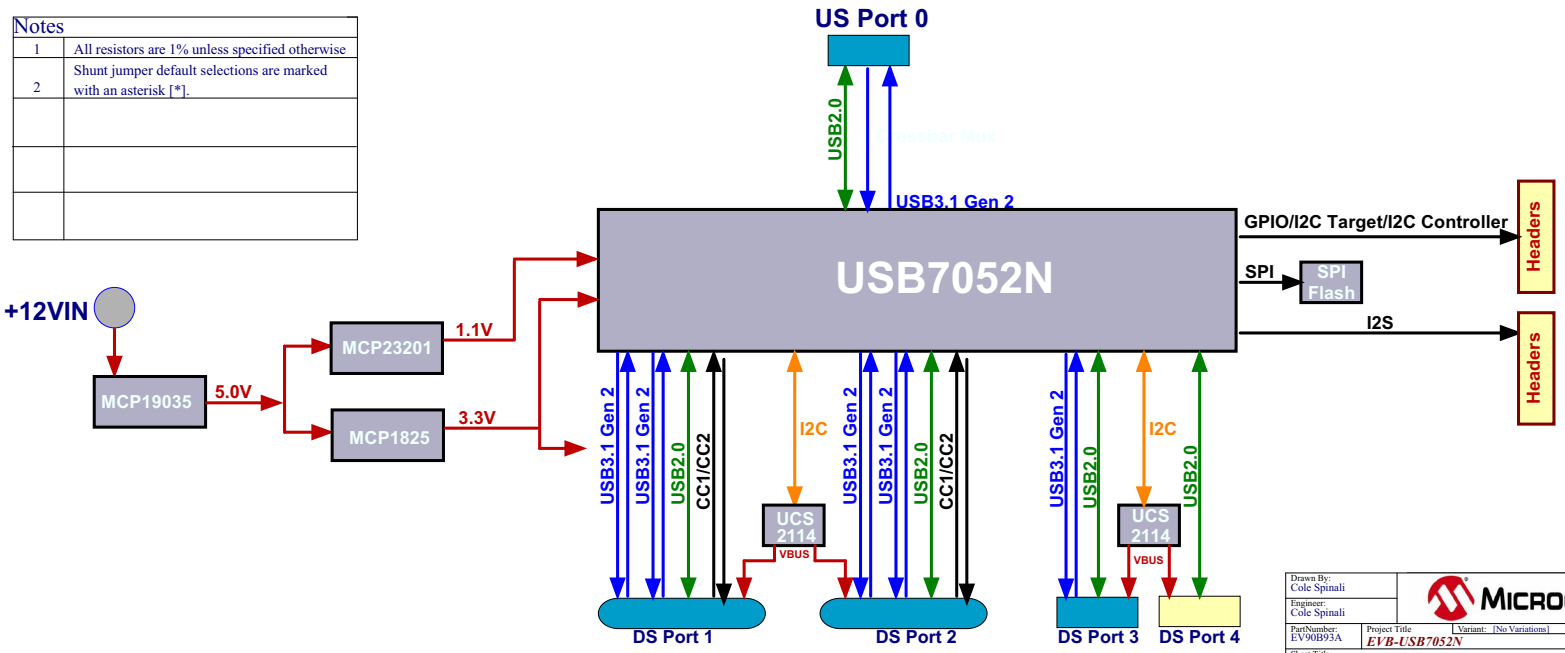
Sheet	Description
1	Table of Contents, Block Diagram
2	USB7052N
3	USB Type-uB Upstream, SPI, I2S
4	USB (Type-C) Downstream Ports 1-2
5	USB (Type-A) Downstream Ports 3-4
6	Voltage Regulators

Revision History

Revision	Date	Revision Summary	Author
0.9	10/19/2021	pre-release version	Cole Spinali

Notes

1	All resistors are 1% unless specified otherwise
2	Shunt jumper default selections are marked with an asterisk [*].



Drawn By: Cole Spinali		MICROCHIP
Engineer: Cole Spinali		
PartNumber: EV90B93A	Project Title: *EVB-USB7052N*	Variant: [No Variations]
Sheet Title: Table of Contents and Block Diagram		Designed with Altium
Size: Tabloid	SCH #: 03-00413 Rev:1 Date: 5/26/2022 PCB #: 04-11520 Rev:1 Sheet 1 of 6	Altium.com
File: EV90B93A-1-TOC.SchDoc		

FIGURE A-2: EVB-USB7052N PART B

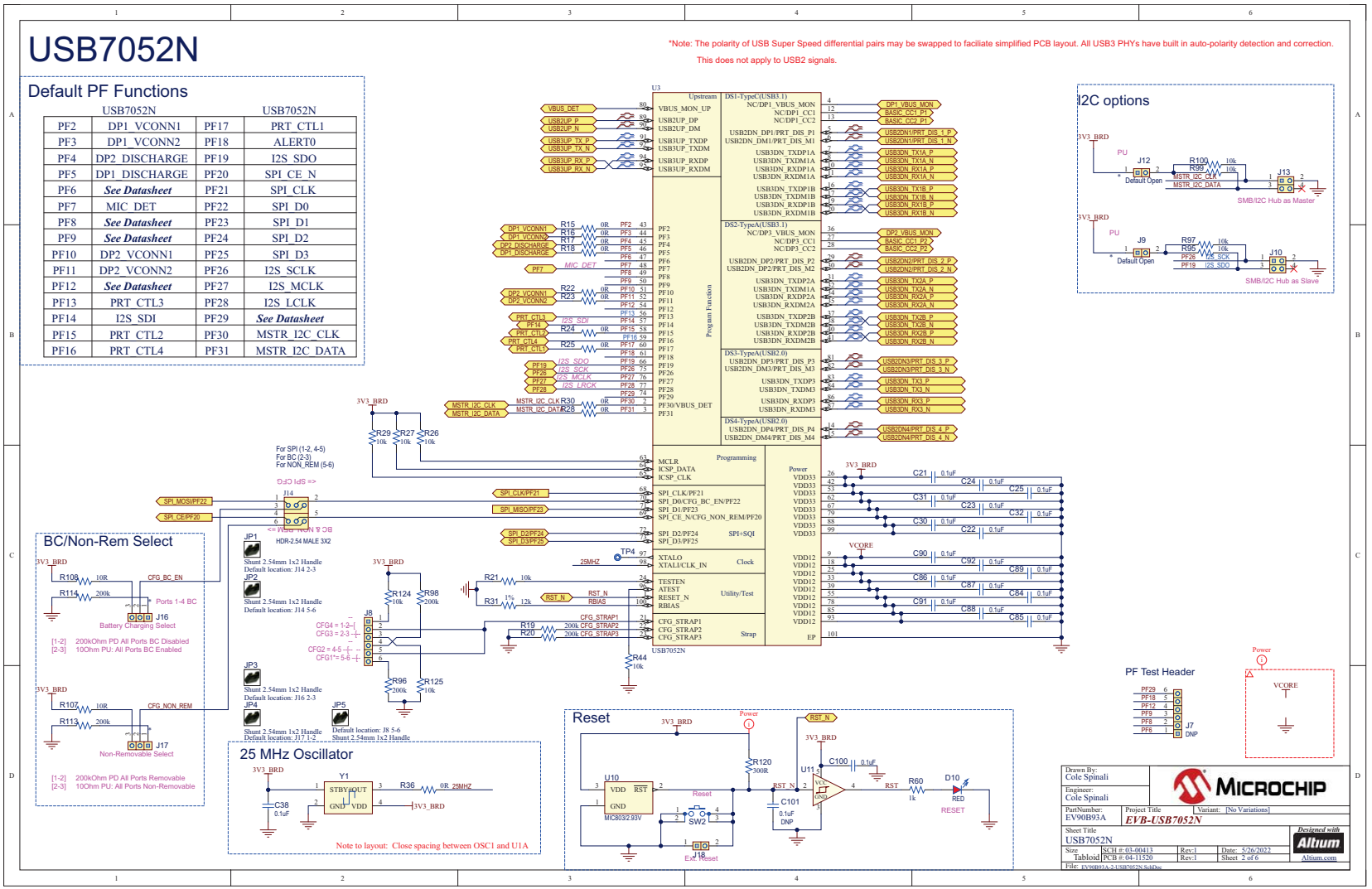


FIGURE A-3: USB7052N USB-B UPSTREAM, SPI, I2S™, LED, GP INDICATORS

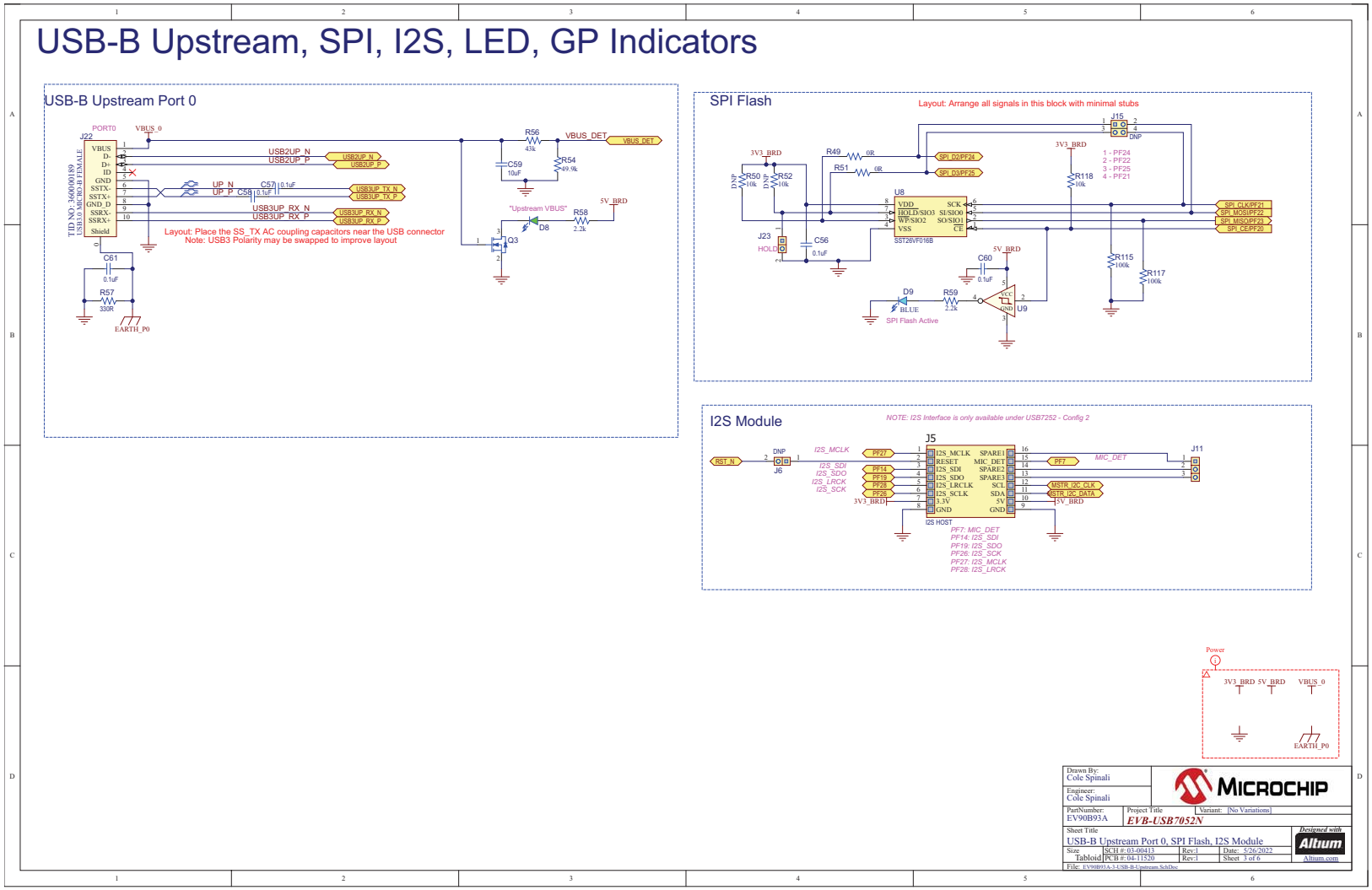


FIGURE A-4: EVB-USB7052N USB A PORTS AND POWER SWITCH

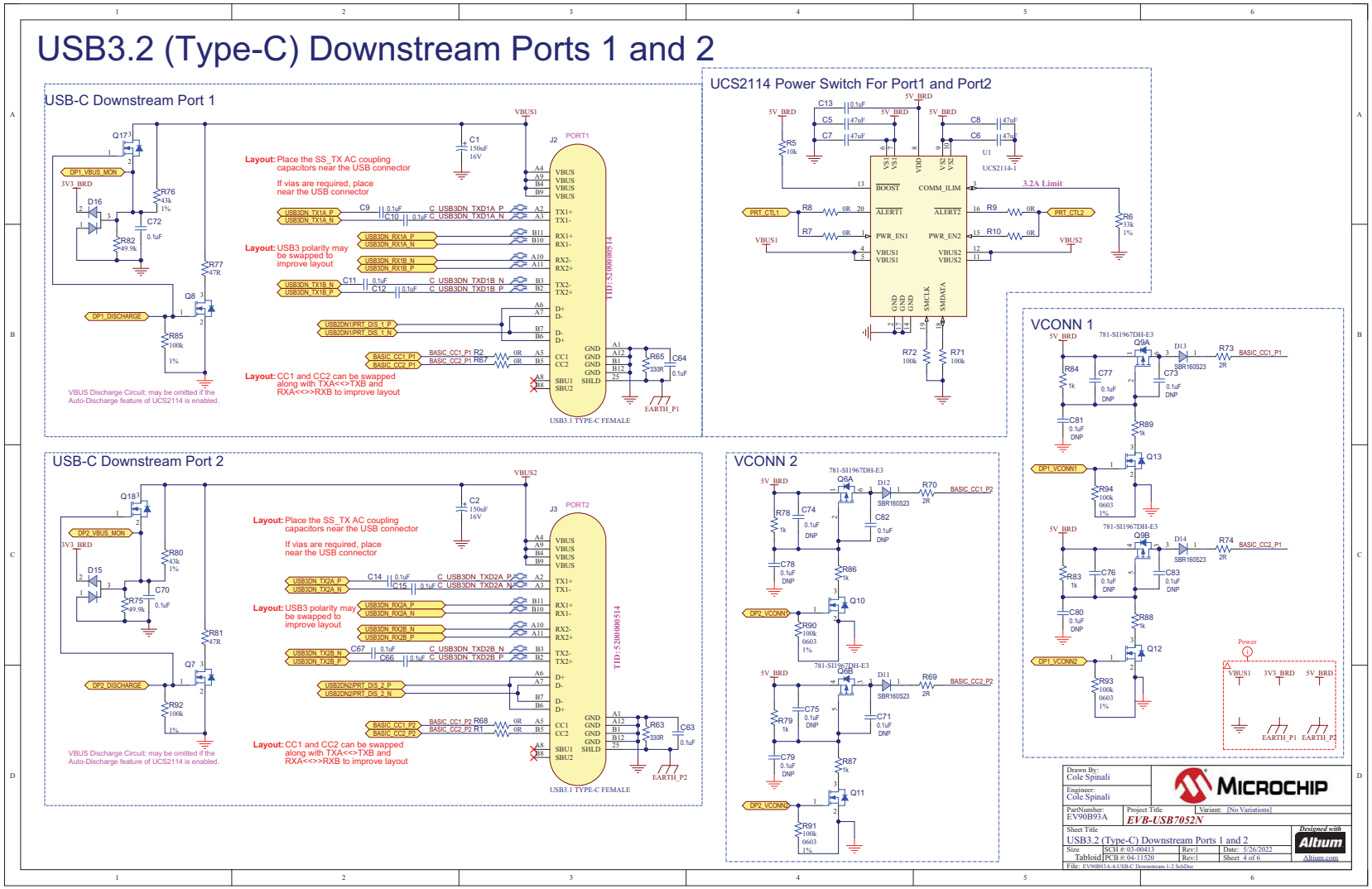


FIGURE A-5: EVB-USB7052N USB C PORTS AND POWER SWITCH

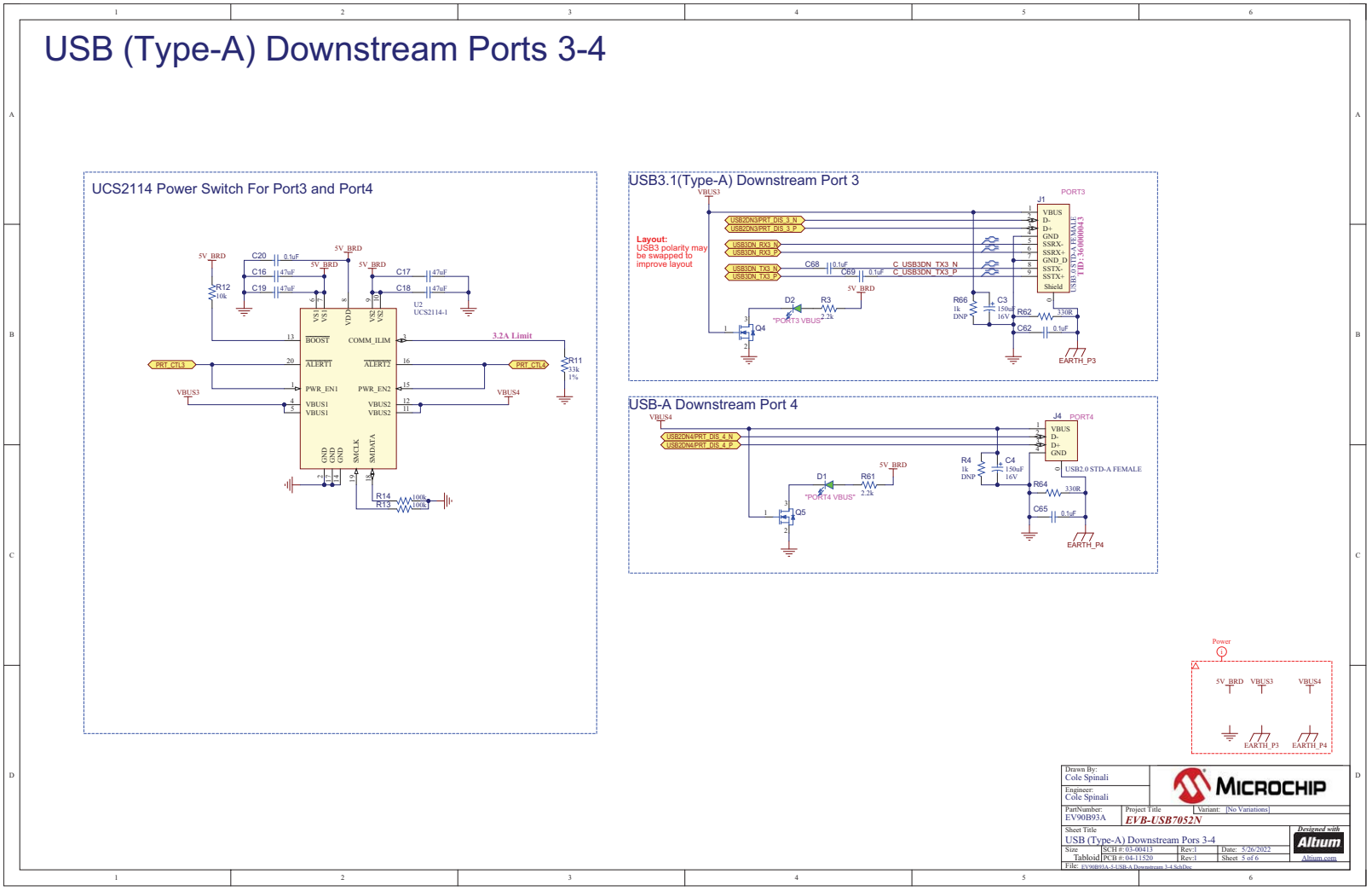
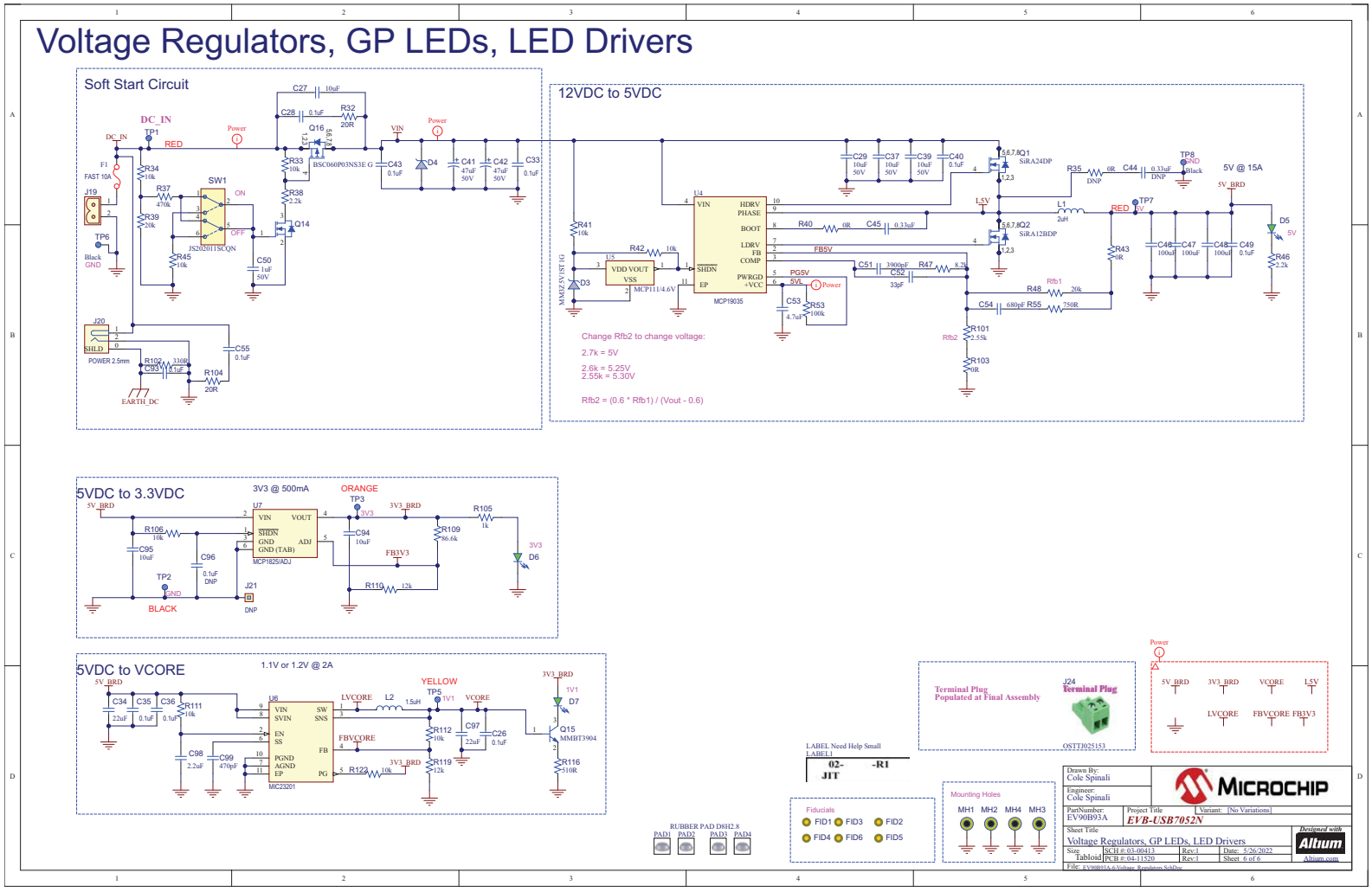


FIGURE A-6: EVB-USB7052N VOLTAGE REGULATORS, LEDS, LED DRIVERS



NOTES:

Appendix B. Bill of Materials

B.1 INTRODUCTION

This appendix contains the EVB-USB7052N Evaluation Kit Bill of Materials (BOM).

TABLE B-1: EVB-USB7052N BILL OF MATERIALS (BOM)

Item	Quantity	Designator	Description	Populate	Manufacturer	Manufacturer Part Number
1	4	C1, C2, C3, C4	CAP ALU 150uF 16V 20% SMD D8	Yes	Panasonic Electronic Components	EEE-FPC151XAP
2	8	C5, C6, C7, C8, C16, C17, C18, C19	CAP CER 47uF 6.3V 20% X5R SMD 0805	Yes	Taiyo Yuden	JMK212BJ476MG-T
3	52	C9, C10, C11, C12, C13, C14, C15, C20, C21, C22, C23, C24, C25, C26, C28, C30, C31, C32, C33, C35, C36, C38, C40, C43, C49, C55, C56, C57, C58, C60, C61, C62, C63, C64, C65, C66, C67, C68, C69, C70, C72, C84, C85, C86, C87, C88, C89, C90, C91, C92, C93, C100	CAP CER 0.1uF 35V 10% X7R SMD 0402	Yes	TDK Corporation	CGA2B3X7R1V104K050BB
4	4	C27, C59, C94, C95	CAP CER 10uF 16V 10% X5R SMD 0805	Yes	Wurth Electronics Inc	885012107014
5	3	C29, C37, C39	CAP CER 10uF 50V 10% X5R SMD 1206	Yes	Arrow Electronics	GRT31CR61H106ME01L
6	2	C34, C97	CAP CER 22uF 10V 10% X7R SMD 1206	Yes	Samsung Electro-Mechanics America, Inc	CL31B226KPHNNNE
7	2	C41, C42	CAP ALUM 47uF 50V 20% SMD F	Yes	KEMET	EDT476M050A9MAA
8	1	C44	CAP CER 0.33uF 50V 20% X7R AEC-Q200 SMD 0603	DNP	TDK Corporation	CGA3E3X7R1H334K080AB
9	1	C45	CAP CER 0.33uF 50V 20% X7R AEC-Q200 SMD 0603	Yes	TDK Corporation	CGA3E3X7R1H334K080AB
10	3	C46, C47, C48	CAP CER 100uF 10V 20% X5R SMD 1210	Yes	Taiyo Yuden	LMK325BJ107MM-T
11	1	C50	CAP CER 1uF 50V 10% X5R SMD 0603	Yes	Taiyo Yuden	LMK107BJ105KA-T
12	1	C51	CAP CER 3900pF 50V 5% C0G SMD 0603	Yes	TDK	C1608C0G1H392J080AA
13	1	C52	CAP CER 33pF 50V 5% NP0 SMD 0603	Yes	KEMET	C0603C330J5GACTU
14	1	C53	CAP CER 4.7uF 16V 10% X5R SMD 0603	Yes	TDK Corporation	C1608X5R1C475K080AC
15	1	C54	CAP CER 680pF 50V 5% NP0 SMD 0603	Yes	KYOCERA AVX	06035A681GAT2A
16	14	C71, C73, C74, C75, C76, C77, C78, C79, C80, C81, C82, C83, C96, C101	CAP CER 0.1uF 35V 10% X7R SMD 0402	DNP	TDK Corporation	CGA2B3X7R1V104K050BB
17	1	C98	CAP CER 2.2uF 10V 10% X5R 0402	Yes	Murata	GRM155R61A225KE95D
18	1	C99	CAP CER 470pF 25V 5% NP0 SMD 0603	Yes	AVX	06033A471JAT2A
19	6	D1, D2, D5, D6, D7, D8	DIO LED GREEN 2V 30mA 35mcd Clear SMD 0603	Yes	Lite-On Inc	LTST-C191KGKT
20	1	D3	DIODE ZENER 5.1V 200MW SOD323	Yes	ON Semiconductor	MM3Z5V1ST1G
21	1	D4	TVS DIODE 15.3VWM 32.3VC SMA	Yes	STMicroelectronics STMicroelectronics	SMA6T18AY
22	1	D9	DIO LED BLUE 2.8V 20mA 15mcd Clear SMD 0603	Yes	Lite-On	LTST-C193TBKT-5A
23	1	D10	DIO RED 2V 20mA 54mcd CLEAR SMD 0603	Yes	Lite-On Inc.	LTST-C191KRKT

TABLE B-1: EVB-USB7052N BILL OF MATERIALS (BOM) (CONTINUED)

Item	Quantity	Designator	Description	Populate	Manufacturer	Manufacturer Part Number
24	4	D11, D12, D13, D14	DIO SBAR SBR160S23-7 SBR 530mV 900mA 60V SMD SOT23-3	Yes	Diodes Incorporated	SBR160S23-7
25	1	D15	DIO RECTARR BAV99 1.25V 200mA 70V SOT-23-3	Yes	Diodes Inc.	BAV99-7-F
26	1	D16	DIO RECTARR BAV99 1.25V 200mA 70V SOT-23-3	Yes	Diodes Inc.	BAV99-7-F
27	1	F1	RES FUSE 10A 125VAC/VDC FAST SMD 2-SMD	Yes	Littelfuse Inc.	0154010.DR
28	1	J1	CON USB3.0 STD-A FEMALE TH R/A	Yes	Wurth Electronics Inc	692121030100
29	2	J2, J3	CON USB3.1 TID TYPE-C Female SMD R/A	Yes	Amphenol Commercial Products	12401610E4#2A
30	1	J4	CON USB2.0 STD-A FEMALE TH R/A	Yes	TE Connectivity AMP Connectors	292303-1
31	1	J5	SOCKET I2S HOST DIP 16 TH	Yes	Sullins	NPTC081KFXC-RC
32	1	J6	CON HDR-2.54 Male 1x2 Gold 5.84MH TH VERT	DNP	FCI	77311-118-02LF
33	1	J7	CON HDR-2.54 Male 1x6 Tin 5.84MH TH VERT	DNP	Sullins	PEC06SAAN
34	1	J8	CON HDR-2.54 Male 1x6 Tin 5.84MH TH VERT	Yes	Sullins	PEC06SAAN
35	4	J9, J12, J18, J23	CON HDR-2.54 Male 1x2 Gold 5.84MH TH VERT	Yes	FCI	77311-118-02LF
36	2	J10, J13	CON HDR-2.54 Male 2x2 Gold 5.84MH TH VERT	Yes	Samtec	TSW-102-07-G-D
37	3	J11, J16, J17	CON HDR-2.54 Male 1x3 Gold 5.84MH TH VERT	Yes	FCI	68000-103HLF
38	1	J14	CON HDR-2.54 Male 3x2 Gold 5.84MH TH VERT	Yes	Samtec Inc.	TSW-102-07-G-T
39	1	J15	CON HDR-2.54 Male 2x2 Gold 5.84MH TH VERT	DNP	Samtec	TSW-102-07-G-D
40	1	J19	CON TERMINAL 5.08mm 1X2 Male 20A TH RA	Yes	On Shore Technology Inc.	OSTOQ025351
41	1	J20	CON POWER 2.5mm 5.5mm TH R/A	Yes	CUI Inc.	PJ-063BH
42	1	J21	CON HDR-2.54 Male 1x1 Gold 5.84MH TH VERT	DNP	TE Connectivity	5-146280-1
43	1	J22	CON USB3.0 MICRO-B FEMALE SMD R/A	Yes	Hirose Electric Co Ltd	ZX360D-B-10P(30)
44	1	J24	MECH HW CON TERM BLOCK 1X2 MALE	Yes	On Shore Technology Inc.	OSTTJ025153
45	5	JP1, JP2, JP3, JP4, JP5	MECH HW JUMPER 2.54mm 1x2 w/ Handle	MECH	TE Connectivity AMP Connectors	880584-4
46	1	L1	INDUCTOR 2uH 23A 20% SMD L12.8W12.8H6.2	Yes	Wurth Electronics Inc.	7443551200
47	1	L2	INDUCTOR 1.5uH 3A 20% SMD L5W5H2.2	Yes	Murata Electronics North America	LQH5BPN1R5NT0L
48	1	LABEL1	LABEL, ASSY W/REV LEVEL (SMALL MODULES) PER MTS-0002	MECH		
49	4	PAD1, PAD2, PAD3, PAD4	MECH HW RUBBER PAD Cylindrical flat top D8H2.8 Black	MECH	3M	SJ5376
50	1	Q1	TRANS FET N-CH SiRA24DP-T1-GE3 25V 60A 62.5W PPAK SO-8	Yes	Vishay / Siliconix	SIRA24DP-T1-GE3
51	1	Q2	TRANS FET N-CH SiRA12BDP-T1-GE3 30V 60A 38W PPAK SO-8	Yes	Vishay Siliconix	SIRA12BDP-T1-GE3

TABLE B-1: EVB-USB7052N BILL OF MATERIALS (BOM) (CONTINUED)

Item	Quantity	Designator	Description	Populate	Manufacturer	Manufacturer Part Number
52	12	Q3, Q4, Q5, Q7, Q8, Q10, Q11, Q12, Q13, Q14, Q17, Q18	TRANS FET N-CH 2N7002-7-F 60V 170mA 370mW SOT-23-3	Yes	Nexperia	NX138BKS
53	2	Q6, Q9	TRANS FET DUAL P+P FDG6316P 12V 0.7A 0.270R 0.3R SC-88	Yes	Vishay	SI1967DH-T1-E3
54	1	Q15	TRANS BJT NPN MMBT3904 40V 200mA 310mW SOT-23-3	Yes	Diodes Incorporated	MMBT3904-7
55	1	Q16	TRANS FET P-CH BSC060P03NS3E G -30V -100A 83W PG-TDSON-8	Yes	Infineon Technologies	BSC060P03NS3EGATMA1
56	24	R1, R2, R7, R8, R9, R10, R15, R16, R17, R18, R22, R23, R24, R25, R28, R30, R36, R40, R43, R49, R51, R67, R68, R103	RES TKF 0R 1/10W SMD 0603	Yes	NIC Components, Panasonic	NRC06Z0TRF, ERJ-3GSY0R00V
57	6	R3, R38, R46, R58, R59, R61	RES TKF 2.2k 1% 1/10W SMD 0603	Yes	Panasonic	ERJ-3EKF2201V
58	2	R4, R66	RES TKF 1k 1% 1/10W SMD 0603	DNP	Panasonic	ERJ-3EKF1001V
59	23	R5, R12, R21, R26, R27, R29, R33, R34, R41, R42, R44, R45, R95, R97, R99, R100, R106, R111, R112, R118, R122, R124, R125	RES TKF 10k 1% 1/10W SMD 0603	Yes	ROHM	MCR03EZPFX1002
60	2	R6, R11	RES TKF 33k 1% 1/10W SMD 0603	Yes	Panasonic	ERJ-3EKF3302V
61	13	R13, R14, R53, R71, R72, R85, R90, R91, R92, R93, R94, R115, R117	RES TKF 100k 1% 1/10W SMD 0603	Yes	Panasonic	ERJ-3EKF1003V
62	6	R19, R20, R96, R98, R113, R114	RES TKF 200k 1% 1/10W SMD 0603	Yes	Panasonic	ERJ-3EKF2003V
63	3	R31, R110, R119	RES TKF 12k 1% 1/10W SMD 0603	Yes	Yageo	RC0603FR-0712KL
64	2	R32, R104	RES TKF 20R 1% 1/10W SMD 0603	Yes	Panasonic	ERJ-3EKF20R0V
65	1	R35	RES TKF 0R 1/10W SMD 0603	DNP	Panasonic	ERJ-3GSY0R00V
66	1	R37	RES TKF 470k 1% 1/10W SMD 0603	Yes	Vishay	CRCW0603470KFKEA
67	2	R39, R48	RES TKF 20k 1% 1/10W SMD 0603	Yes	Panasonic, Yageo	ERJ-3EKF2002V, 9C06031A2002FKHFT
68	1	R47	RES TKF 8.2k 1% 1/10W SMD 0603	Yes	Panasonic	ERJ-3EKF8201V
69	2	R50, R52	RES TKF 10k 1% 1/10W SMD 0603	DNP	ROHM	MCR03EZPFX1002
70	3	R54, R75, R82	RES TKF 49.9k 1% 1/10W SMD 0603	Yes	Panasonic	ERJ-3EKF4992V
71	1	R55	RES TKF 750R 1% 1/10W SMD 0603	Yes	Vishay	CRCW0603750RFKEA
72	3	R56, R76, R80	RES TKF 43k 1% 1/10W SMD 0603	Yes	Stackpole Electronics, Inc	RMCF0603FT43K0
73	6	R57, R62, R63, R64, R65, R102	RES TKF 330R 1% 1/10W SMD 0603	Yes	Panasonic	ERJ-3EKF3300V
74	10	R60, R78, R79, R83, R84, R86, R87, R88, R89, R105	RES TKF 1k 1% 1/10W SMD 0603	Yes	Panasonic	ERJ-3EKF1001V
75	4	R69, R70, R73, R74	RES TKF 2R 1% 1/4W SMD 0603	Yes	Yageo	RC0603FR-07470KL

TABLE B-1: EVB-USB7052N BILL OF MATERIALS (BOM) (CONTINUED)

Item	Quantity	Designator	Description	Populate	Manufacturer	Manufacturer Part Number
76	2	R77, R81	RES TKF 47R 1% 1/10W SMD 0603	Yes	ROHM	MCR03EZPFX47R0
77	1	R101	RES TKF 2.55k 1% 1/10W SMD 0603	Yes	Yageo	RC0603FR-072K55L
78	2	R107, R108	RES TKF 10R 1% 1/10W SMD 0603	Yes	Panasonic	ERJ-3EKF10R0V
79	1	R109	RES TKF 86.6k 1% 1/10W SMD 0603	Yes	Panasonic Electronic Components	ERJ-3EKF8662V
80	1	R116	RES TKF 510R 5% 1/10W SMD 0603	Yes	Panasonic	ERJ-3GSYJ511V
81	1	R120	RES TKF 300R 1% 1/10W SMD 0603	Yes	Yageo	RC0603FR-07300RL
82	1	SW1	SWITCH SLIDE DPDT 6V 300mA JS202011SCQN SMD	Yes	C&K	JS202011SCQN
83	1	SW2	SWITCH TACT SPST 16V 50mA PTS810 SJM 250 SMTR LFS SMD	Yes	C&K Components	PTS810 SJM 250 SMTR LFS
84	1	TP1	MISC, TEST POINT MULTI PURPOSE MINI RED	Yes	Keystone	5000
85	1	TP2	MISC, TEST POINT MULTI PURPOSE MINI BLACK	Yes	Keystone	5001
86	1	TP3	CON TP LOOP Orange TH	Yes	Keystone Electronics	5003
87	1	TP5	MISC, TEST POINT PC MINI, 0.040" D YELLOW	Yes	Keystone	5004
88	2	TP6, TP8	MISC, TEST POINT MULTI PURPOSE MINI BLACK	Yes	Keystone	5001
89	1	TP7	MISC, TEST POINT MULTI PURPOSE MINI RED	Yes	Keystone	5000
90	2	U1, U2	MCHP INTERFACE USB Pwr Controller w/Auto Dischg UCS2114 QFN-20	Yes	Microchip Technology	UCS2114-1-V/LX
91	1	U3	MCHP INTERFACE USB 3.1 4 PORT CTLR HUB VQFN-100	Yes	Microchip Technology	USB7252/KDX
92	1	U4	MCHP ANALOG PWM CONTROLLER 600kHz MCP19035-BAABE/MF DFN-10	Yes	Microchip	MCP19035-BAABE/MF
93	1	U5	MCHP ANALOG VOLTAGE DETECTOR 4.75V MCP111T-475E/TT SOT-23-3	Yes	Microchip Technology	MCP111T-475E/TT
94	1	U6	MCHP ANALOG SWITCHER Buck 0.95V to 3.6V 2A MIC23201YML-TR MLF-10	Yes	Microchip Technology	MIC23201YML-TR
95	1	U7	MCHP ANALOG LDO ADJ MCP1825T-ADJE/DC SOT-223-5	Yes	Microchip	MCP1825T-ADJE/DC
96	1	U8	MCHP MEMORY SERIAL FLASH 16M 104MHz SST26VF016B-104I/SM SOIJ-8	Yes	Microchip Technology	SST26VF016B-104I/SM
97	2	U9, U11	74LVC1G14GW,125 SCHMITT-TRG INVERTER	Yes	NXP	74LVC1G14GW,125
98	1	U10	MCHP ANALOG SUPERVISOR 2.93V MIC803-29D4VM3-TR SOT-23-3	Yes	Microchip Technology	MIC803-29D4VM3-TR
99	1	Y1	MCHP CLOCK OSCILLATOR SINGLE 25MHZ DSC1001CI2-025.0000 CDFN-4	Yes	Microchip Technology	DSC1001CI2-025.0000

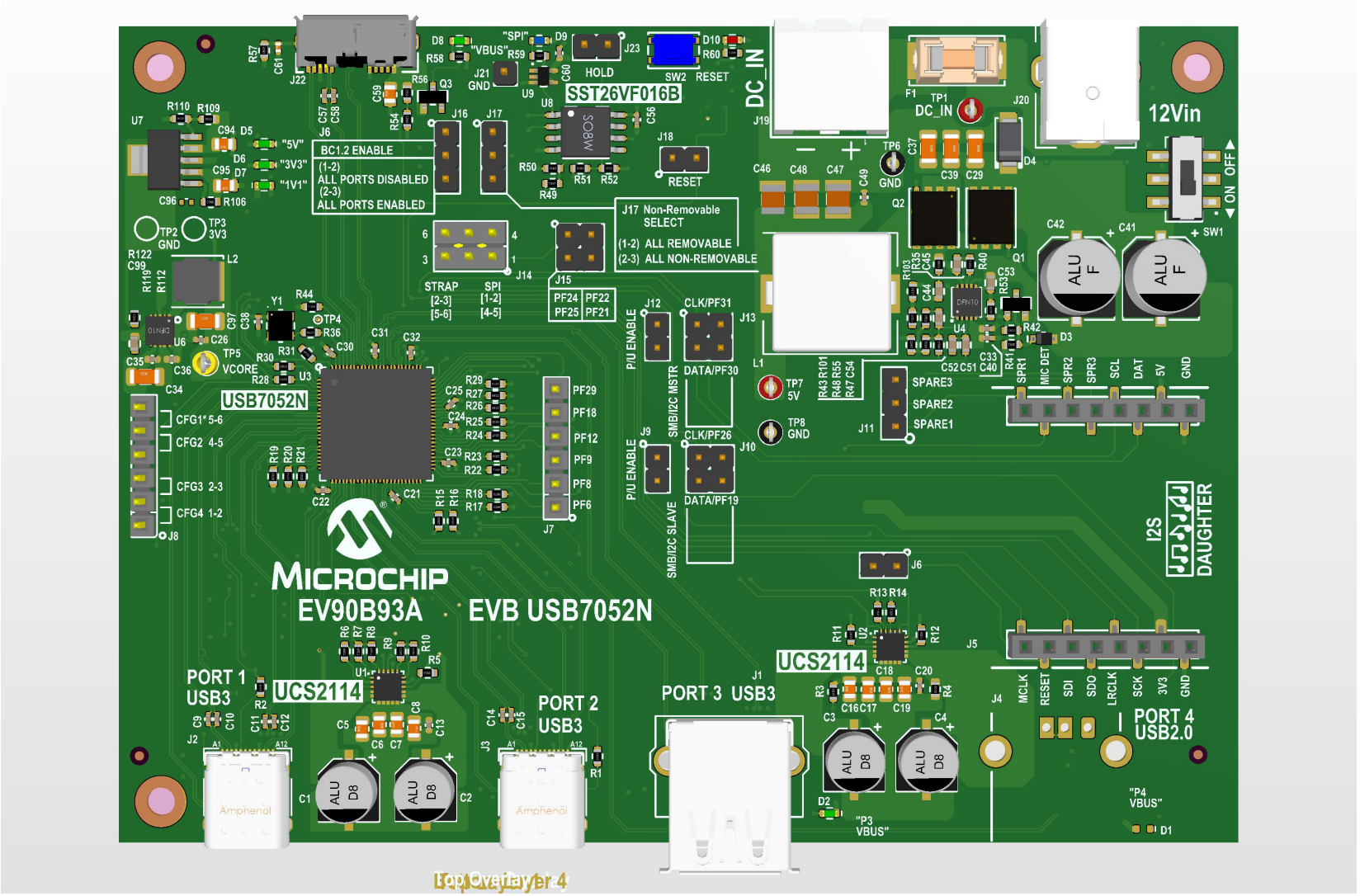
NOTES:

Appendix C. Silk Screens

C.1 INTRODUCTION

This appendix shows the top and bottom silk screen images of the EVB-USB7052N Evaluation Kit.

FIGURE C-1: USB7052N TOP SILK SCREEN IMAGE



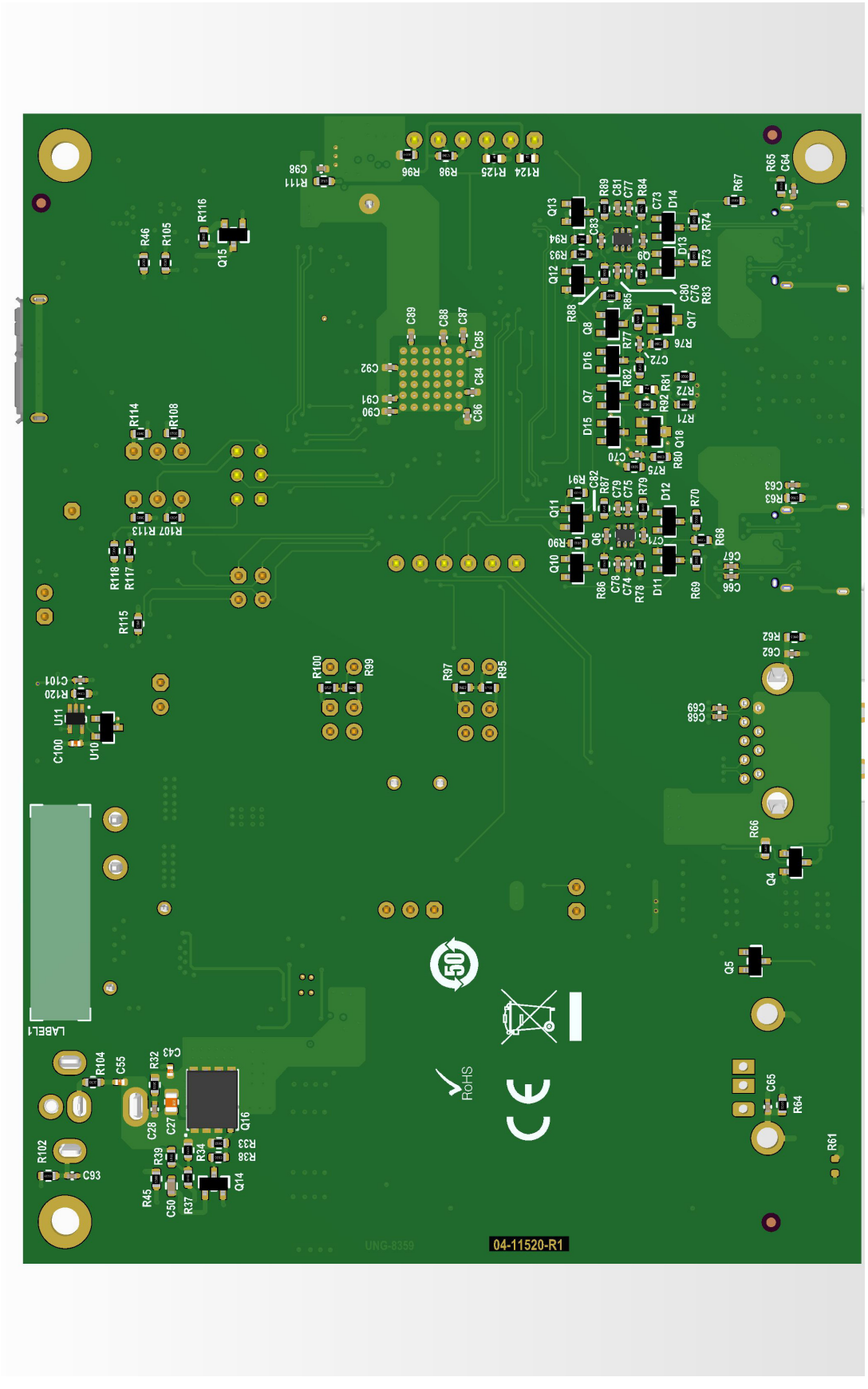


FIGURE C-2: USB7052N TOP SILK SCREEN IMAGE

Worldwide Sales and Service

AMERICAS

Corporate Office
2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 480-792-7200
Fax: 480-792-7277
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http://www.microchip.com/support
Web Address:
www.microchip.com

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Tel: 678-957-9614
Fax: 678-957-1455

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Tel: 512-257-3370

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Tel: 774-760-0087
Fax: 774-760-0088

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Tel: 630-285-0071
Fax: 630-285-0075

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Tel: 317-536-2380

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Tel: 919-844-7510

New York, NY
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Fax: 905-695-2078

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China - Chengdu
Tel: 86-28-8665-5511

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China - Hangzhou
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Tel: 852-2943-5100

China - Nanjing
Tel: 86-25-8473-2460

China - Qingdao
Tel: 86-532-8502-7355

China - Shanghai
Tel: 86-21-3326-8000

China - Shenyang
Tel: 86-24-2334-2829

China - Shenzhen
Tel: 86-755-8864-2200

China - Suzhou
Tel: 86-186-6233-1526

China - Wuhan
Tel: 86-27-5980-5300

China - Xian
Tel: 86-29-8833-7252

China - Xiamen
Tel: 86-592-2388138

China - Zhuhai
Tel: 86-756-3210040

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Tel: 91-80-3090-4444

India - New Delhi
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India - Pune
Tel: 91-20-4121-0141

Japan - Osaka
Tel: 81-6-6152-7160

Japan - Tokyo
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Korea - Seoul
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Tel: 60-3-7651-7906

Malaysia - Penang
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Taiwan - Taipei
Tel: 886-2-2508-8600

Thailand - Bangkok
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Vietnam - Ho Chi Minh
Tel: 84-28-5448-2100

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Fax: 43-7242-2244-393

Denmark - Copenhagen
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Fax: 45-4485-2829

Finland - Espoo
Tel: 358-9-4520-820

France - Paris
Tel: 33-1-69-53-63-20
Fax: 33-1-69-30-90-79

Germany - Garching
Tel: 49-8931-9700

Germany - Haan
Tel: 49-2129-3766400

Germany - Heilbronn
Tel: 49-7131-72400

Germany - Karlsruhe
Tel: 49-721-625370

Germany - Munich
Tel: 49-89-627-144-0
Fax: 49-89-627-144-44

Germany - Rosenheim
Tel: 49-8031-354-560

Israel - Ra'anana
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Italy - Milan
Tel: 39-0331-742611
Fax: 39-0331-466781

Italy - Padova
Tel: 39-049-7625286

Netherlands - Drunen
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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