



MICROCHIP

**UTC2000
Evaluation Kit
User's Guide**

Note the following details of the code protection feature on Microchip devices:

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as "unbreakable."

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip's code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION, INCLUDING BUT NOT LIMITED TO ITS CONDITION, QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR PURPOSE. Microchip disclaims all liability arising from this information and its use. Use of Microchip devices in life support and/or safety applications is entirely at the buyer's risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights unless otherwise stated.

Trademarks

The Microchip name and logo, the Microchip logo, dsPIC, FlashFlex, flexPWR, JukeBlox, KEELOQ, KEELOQ logo, Kleer, LANCheck, MediaLB, MOST, MOST logo, MPLAB, OptoLyzer, PIC, PICSTART, PIC³² logo, RightTouch, SpyNIC, SST, SST Logo, SuperFlash and UNI/O are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

The Embedded Control Solutions Company and mTouch are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Analog-for-the-Digital Age, BodyCom, chipKIT, chipKIT logo, CodeGuard, dsPICDEM, dsPICDEM.net, ECAN, In-Circuit Serial Programming, ICSP, Inter-Chip Connectivity, KleerNet, KleerNet logo, MiWi, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, MultiTRAK, NetDetach, Omniscient Code Generation, PICDEM, PICDEM.net, PICKit, PICTail, RightTouch logo, REAL ICE, SQI, Serial Quad I/O, Total Endurance, TSHARC, USBCheck, VariSense, ViewSpan, WiperLock, Wireless DNA, and ZENA are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

Silicon Storage Technology is a registered trademark of Microchip Technology Inc. in other countries.

GestIC is a registered trademarks of Microchip Technology Germany II GmbH & Co. KG, a subsidiary of Microchip Technology Inc., in other countries.

All other trademarks mentioned herein are property of their respective companies.

© 2015, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

ISBN: 9781632776044

QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
== ISO/TS 16949 ==

Microchip received ISO/TS-16949:2009 certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona; Gresham, Oregon and design centers in California and India. The Company's quality system processes and procedures are for its PIC® MCUs and dsPIC® DSCs, KEELOQ® code hopping devices, Serial EEPROMs, microperipherals, nonvolatile memory and analog products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001:2000 certified.

Object of Declaration: EVK-UTC2000

EU Declaration of Conformity

Manufacturer: Microchip Technology Inc.
2355 W. Chandler Blvd.
Chandler, Arizona, 85224-6199
USA

This declaration of conformity is issued by the manufacturer.

The development/evaluation tool is designed to be used for research and development in a laboratory environment. This development/evaluation tool is not a Finished Appliance, nor is it intended for incorporation into Finished Appliances that are made commercially available as single functional units to end users under EU EMC Directive 2004/108/EC and as supported by the European Commission's Guide for the EMC Directive 2004/108/EC (8th February 2010).

This development/evaluation tool complies with EU RoHS2 Directive 2011/65/EU.

This development/evaluation tool, when incorporating wireless and radio-telecom functionality, is in compliance with the essential requirement and other relevant provisions of the R&TTE Directive 1999/5/EC and the FCC rules as stated in the declaration of conformity provided in the module datasheet and the module product page available at www.microchip.com.

For information regarding the exclusive, limited warranties applicable to Microchip products, please see Microchip's standard terms and conditions of sale, which are printed on our sales documentation and available at www.microchip.com.

Signed for and on behalf of Microchip Technology Inc. at Chandler, Arizona, USA


Derek Carlson
VP Development Tools

12-Sep-14
Date

NOTES:

Table of Contents

Preface	7
Introduction.....	7
Document Layout	8
Conventions Used in this Guide	9
Warranty Registration.....	9
The Microchip Web Site	9
Customer Support	9
Document Revision History	9
 Chapter 1. Overview	
1.1 UTC2000 Overview and Features	11
1.2 Features	11
1.3 General Description	12
1.4 References	13
1.5 Definitions.....	13
 Chapter 2. Getting Started	
2.1 Contents of the Kit	14
2.2 Bring-Up	14
2.2.1 Setup and Requirements	14
2.2.2 EVB-UTC2000-DFP Legacy Charging Operation	14
2.2.3 1.5 A Charging Operation	14
2.2.3 3.0 A Charging Operation	14
 Chapter 3. Hardware Configuration	
3.1 Hardware Description	17
3.1.1 Power Source	17
3.1.2 LED Indicators for the EVB-UTC2000-DFP	18
3.1.3 Switches on the EVB-UTC2000-DFP.....	18
3.1.4 Connector Descriptions for the EVB-UTC2000-DFP	19
3.1.5 Test Points on the EVB-UTC2000-DFP	20
3.1.6 LED Indicators for the EVB-UTC2000-UFP	20
3.1.7 Switches on the EVB-UTC2000-UFP.....	20
3.1.8 Connector Descriptions for the EVB-UTC2000-UFP	20
3.1.9 Test Points on the EVB-UTC2000-UFP	21
 Appendix A. UTC2000 Schematics	25
 Appendix B. UTC2000 BOMs	29
 Appendix B. UTC2000 PCB Silk Screens	36
 Worldwide Sales and Service	37

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 UTC2000 Evaluation Kit User's Guide. Items discussed in this chapter include:

- Document Layout EVK-UTC2000
- Conventions Used in this Guide
- Warranty Registration
- The Microchip Web Site
- Customer Support
- Document Revision History

DOCUMENT LAYOUT EVK-UTC2000

This document describes how to use the UTC2000 Evaluation Kit as a demonstration platform optimized for portable applications. The manual layout is as follows:

- **Chapter 1. “Overview”** – Shows a brief description of the UTC2000 Evaluation Kit
- **Chapter 2. “Getting Started”** – Provides information about set-up and operation of the UTC2000 Evaluation Kit.
- **Chapter 3. “Hardware Configuration”** – Includes information about the hardware configuration of the UTC2000 Evaluation Kit.
- **Appendix A. “UTC2000 Schematics”**
- **Appendix B. “EVK-UTC2000 BOM”**
- **Appendix C. “EVK-UTC2000 PCB Silk Screens”**

Note: USB Type-C™ and USB-C™ are trademarks of USB Implementation Forum.

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) { ... }

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 web site.

THE MICROCHIP WEB SITE

Microchip provides online support via our web site at www.microchip.com. This web site is used as a means to make files and information easily available to customers. Accessible by using your favorite Internet browser, the web site contains the following information:

- **Product Support** – Data sheets and errata, application notes and sample programs, design resources, user's guides and hardware support documents, latest software releases and archived software
- **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

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

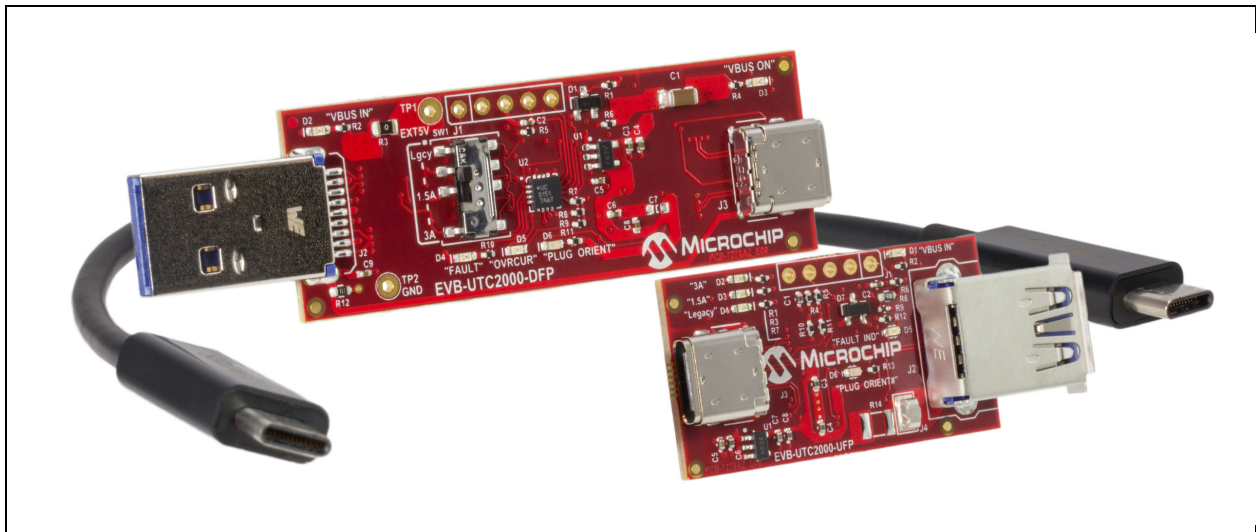
Revision	Section/Figure/Entry	Correction
DS50002399A (07-30-15)		Initial Release of Document

Chapter 1. Overview

1.1 UTC2000 EVALUATION KIT OVERVIEW AND FEATURES

The UTC2000 Evaluation Kit is intended to demonstrate the form factor and reversibility of the USB Type-C™ cable operation as enabled by the UTC2000 basic Type-C controller. The kit includes a downstream facing port board, an upstream facing port board, and a USB Type-C cable, as shown in [Figure 1-1](#). A basic USB Type-C connection can be demonstrated with a standard USB 2.0 or USB 3.1 Gen 1 host port, the UTC2000 EVK and any USB 2.0 or USB 3.1 Gen 1 device. See [Section 1.2 “Features”](#) for more information.

FIGURE 1-1: UTC2000 EVALUATION KIT



1.2 FEATURES

- EVB-UTC2000-DFP converts any USB Type-A port to a USB Type-C port
- EVB-UTC2000-UFP converts any USB device to a USB Type-C device
- Compatible with USB 2.0 and USB 3.1 Gen 1 host ports and devices
- Supports basic USB Type-C 5V charging at:
 - Legacy 500mA (USB 2.0)/900mA (USB 3.1 Gen 1)
 - 1.5A
 - 3.0A
- LED status indicators on the downstream facing port (DFP) board include:
 - 5V board supply indicators
 - “Overcurrent” and “Fault” indicators
 - Plug orientation
- LED status indicators on the upstream facing port (UFP) board include:
 - 5 V board supply indicator
 - Legacy, 1.5A, 3.0A charging detecting indicators

- DP3T switch on DFP board for legacy, 1.5A, 3.0A charging mode selection
- Reversible USB Type-C receptacle
- USB 3.1 passive Type-C Cable

1.3 GENERAL DESCRIPTION

FIGURE 1-2: EVB-UTC2000-DFP BLOCK DIAGRAM

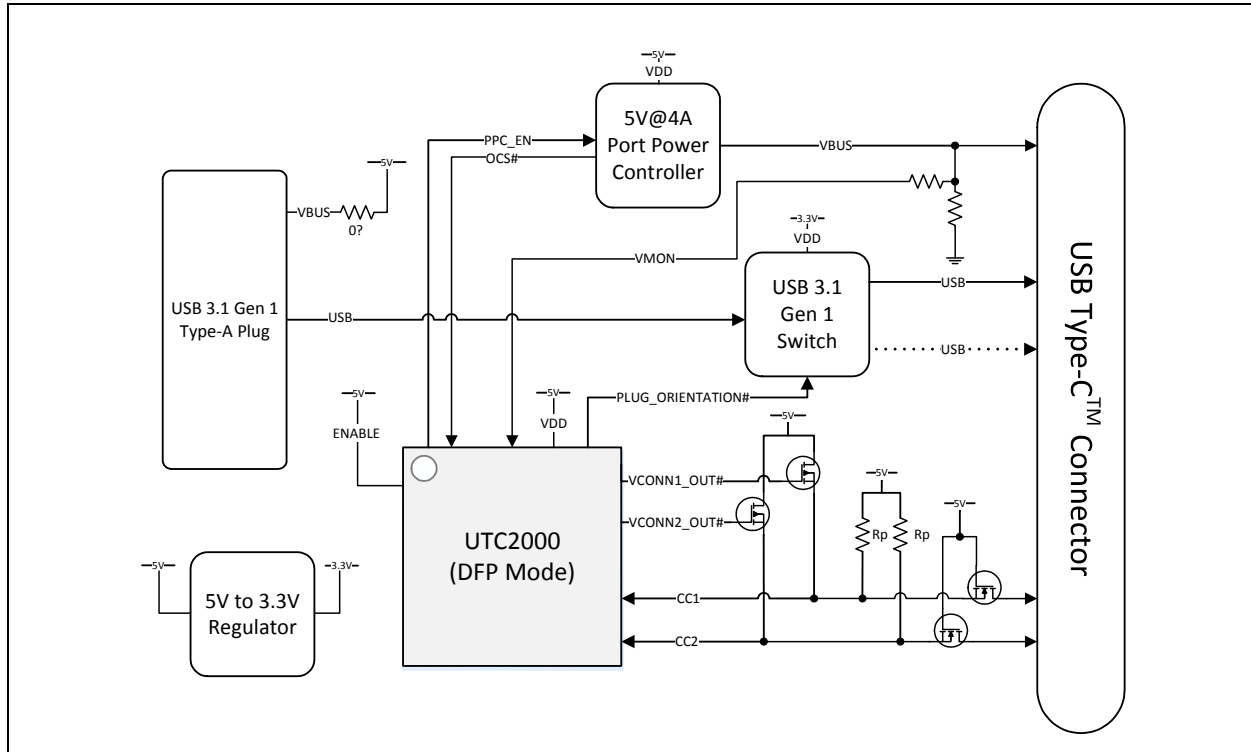
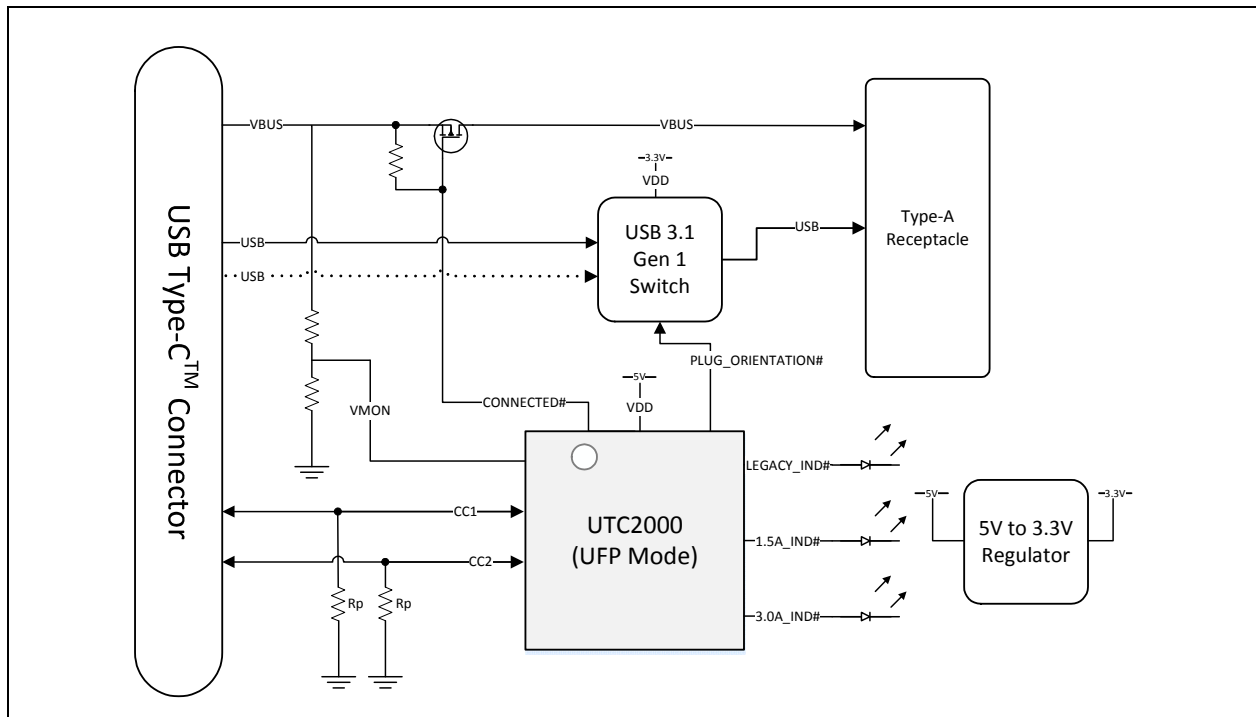


FIGURE 1-3: EVB-UTC2000-UFP BLOCK DIAGRAM



1.4 REFERENCES

- *USB Type-C™ Specification*
- *UTC2000 Data Sheet*
- *Introduction to USB Type-C™ Application Note*
(<http://ww1.microchip.com/downloads/en/AppNotes/00001953A.pdf>)
- *Basic USB Type-C™ Upstream Facing Port Implementation*
(<http://ww1.microchip.com/downloads/jp/AppNotes/jp574170.pdf>)

1.5 DEFINITION

- **DFP** - Downstream Facing Port
- **EVB** - Evaluation Board
- **EVK** - Evaluation Kit
- **UFP** - Upstream Facing Port

Chapter 2. Getting Started

2.1 CONTENTS OF THE KIT

The UTC2000 Evaluation kit includes the basic equipment necessary for evaluation. The items include in the kit are:

1. **EVB-UTC2000-DFP Evaluation Board**
2. **EVB-UTC2000-UFP Evaluation Board**
3. **USB Type-C Cable**

2.2 BRING-UP AND TESTING

2.2.1 Setup and Requirements

- **EVB-UTC2000-DFP:** Before use, slide SW1 to the legacy charging mode. To use, simply insert the device into any USB Type-A USB 2.0 or USB 3.1 Gen 1 host port. Any USB Type-C device may now be connected to the USB Type-C port. The reversibility of the USB Type-C cable can be demonstrated by connecting it in the opposite direction.
- **EVB-UTC2000-UFP:** To use, connect to any USB Type-C host or hub port. If there is no native USB Type-C host available, the EVB-UTC2000-DFP board may be used. Insert a USB 2.0 or USB 3.1 Gen 1 device into the Type-A receptacle(J2) of the EVB-UTC2000-UFP. The device may then be used normally.

2.2.2 EVB-UTC2000-DFP Legacy Charging Operation

The EVB-UTC2000-DFP board is configured to Legacy 500mA (USB2.0)/900mA(USB3.1 Gen1) charging mode by default. Ensure that SW1 is in the "Lgcy" position. The switch will select 56 k Ω CC1/CC2 Rp pull-up resistors and set the CFG_SEL voltage to the appropriate level.

When connecting the EVB-UTC2000-DFP board to the EVB-UTC2000-UFP while in Legacy charging mode, the "Legacy" charging capability LED indicator (D4) on the EVB-UTC2000-UFP will be illuminated.

2.2.3 1.5 A Charging Operation

The EVB-UTC2000-DFP is designed to plug in and operate from any legacy USB Type-A port. In order to protect your computer from possible overcurrent issues, 1.5A and 3.0A modes have been disabled by default.

In order to test 1.5A charging mode, please perform the following steps:

1. Remove R15 and R17 56k Rp pull-up resistors
2. Populate R18 and R23 with 22k, 0402 footprint resistors
3. Set SW1 to the "1.5A" position
4. Remove R3 to isolate the 5V domain on the EVB-UTC200-DFP from the 5V domain on your host PC.
5. Connect an external power supply as shown in section 3.1.1

When connecting the EVB-UTC2000-DFP board to the EVB-UTC2000-UFP while in 1.5A charging mode, the “1.5A” charging capability LED (D3) indicator on the EVB-UTC2000-UFP will be illuminated.

2.2.4 3.0 A Charging Operation

The EVB-UTC2000-DFP is designed to plug in and operate from any legacy USB Type-A port. In order to protect your computer from possible overcurrent issues, 1.5A and 3.0A modes have been disabled by default.

In order to test 1.5A charging mode, please perform the following steps:

1. Remove R15 and R17 56k Rp pull-up resistors
2. Populate R18 and R23 with 22k, 0402 footprint resistors
3. Set SW1 to the "1.5A" position
4. Remove R3 to isolate the 5V domain on the EVB-UTC200-DFP from the 5V domain on your host PC.
5. Connect an external power supply as shown in section 3.1.1

When connecting the EVB-UTC2000-DFP board to the EVB-UTC2000-UFP while in 3.0A charging mode, the “3.0A” charging capability LED indicator (D2) on the EVB-UTC2000-UFP will be illuminated.

Chapter 3. Hardware Configuration

3.1 HARDWARE DESCRIPTION

FIGURE 3-1: EVB-UTC2000-UFP (TOP-SIDE)

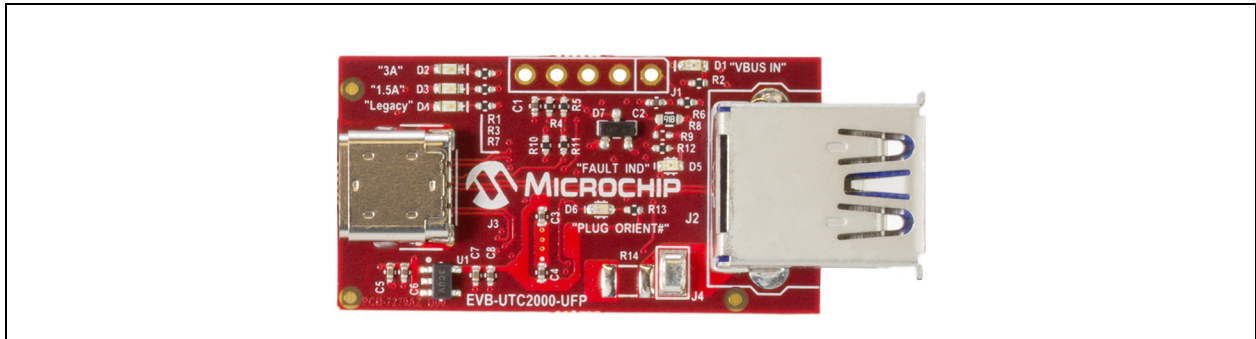
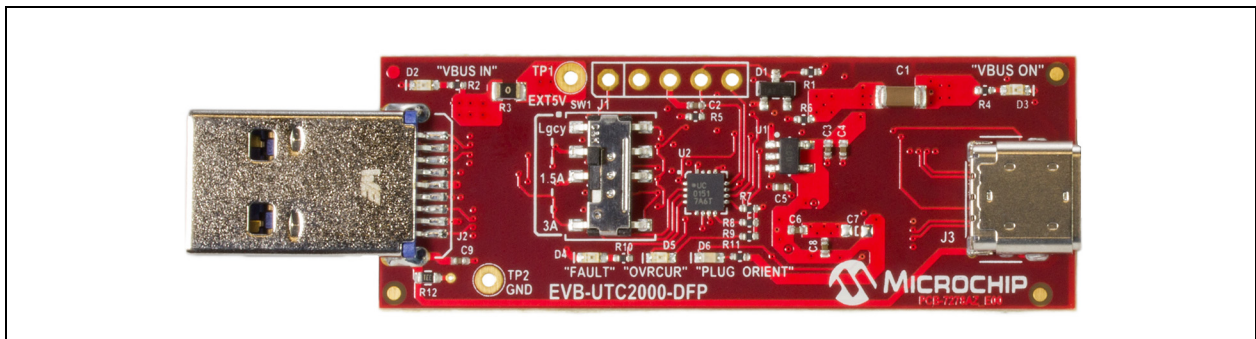


FIGURE 3-2: EVB-UTC2000-DFP (TOP-SIDE)

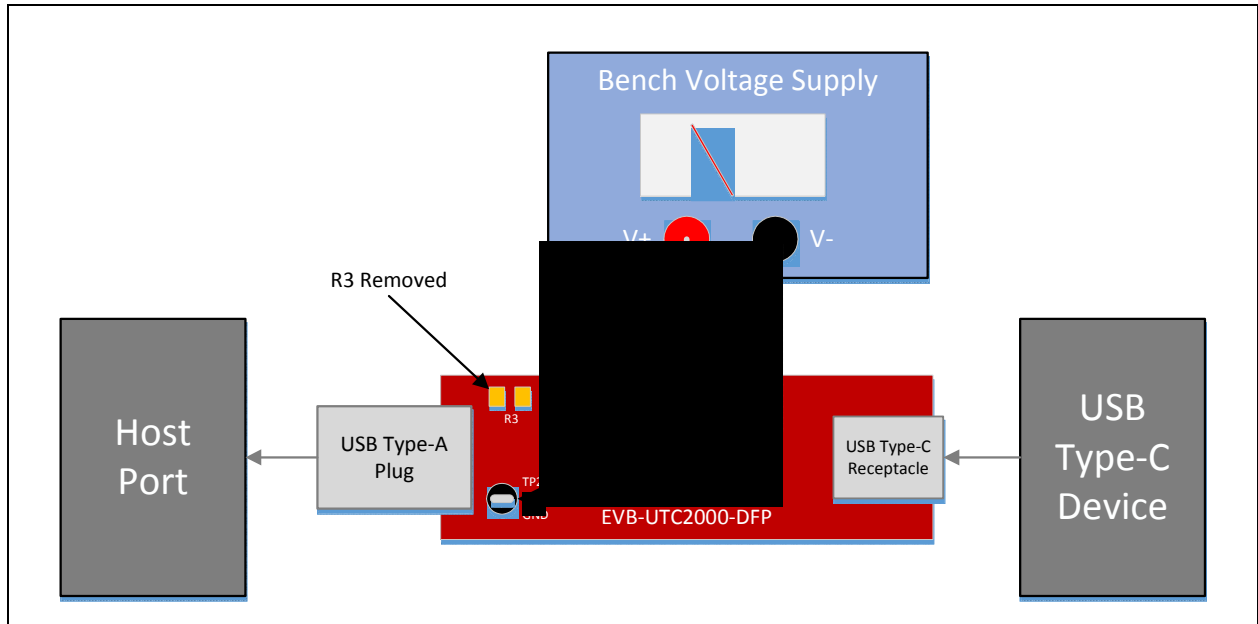


3.1.1 Power Source

The EVB-UTC2000-DFP can be powered in one of two ways:

1. **Host/Hub Port VBUS:** The board can be powered by 5V VBUS sourced from the connected host port. Do not operate with SW1 in the 1.5A or 3.0A modes and attempt to draw 1.5A or 3.0A when connected in this way, as Legacy USB Type-A host ports typically cannot support this amount of current draw.
2. **External 5V Supply:** An external 5V supply may be connected to TP1 to test 1.5A and 3.0A charging. Be sure to remove the R3 zero-ohm resistor to prevent voltage back drive to the host/hub port, as shown in [Figure 3-3](#).

FIGURE 3-3: EVB-UTC2000-DFP EXTERNAL 5V SUPPLY



The EVB-UTC2000-DFP is always powered from VBUS supplied by the downstream facing port it is attached to.

3.1.2 LED Indicators for EVB-UTC2000-DFP

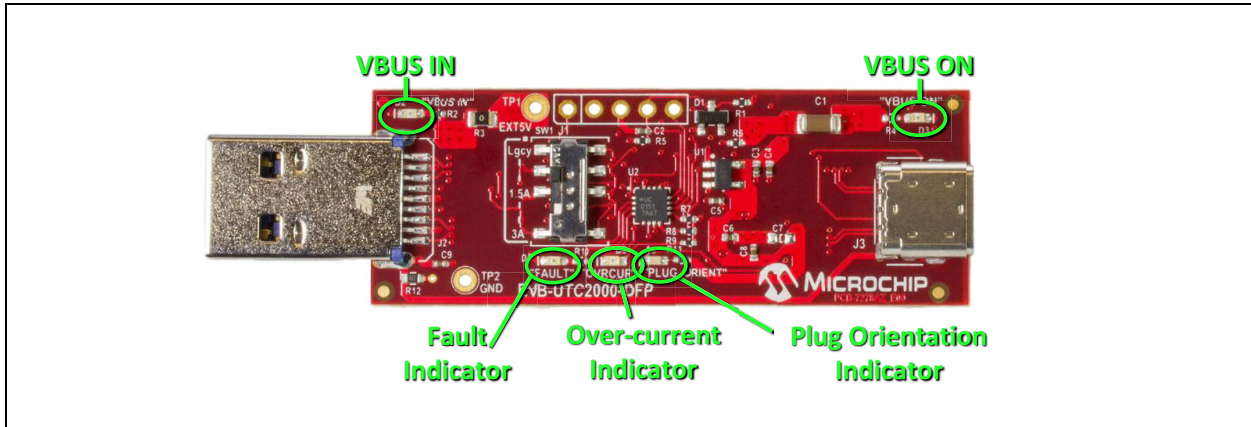
Table 3-1 describes the LED indicators included on the EVB-UTC2000-DFP.

TABLE 3-1: LED INDICATOR DESCRIPTIONS

REF. DES.	LABEL	DESCRIPTION
D2	“VBUS IN”	Indicates that 5V board power is present
D3	“VBUS ON”	Indicates 5V is being supplied to VBUS on the Type-C port
D4	“FAULT”	Indicates an overvoltage or overcurrent event has occurred. This indicator will reset with a power cycle of the board.
D5	“OVRCUR”	Indicates an overcurrent event is occurring. This signal is driven by the 5V port power controller.
D6	“PLUG ORIENT”	Indicates the state of the PLUG_ORIENTATION# signal. When illuminated, PLUG_ORIENTATION is being driven low by the UTC2000.

Figure 3-4 shows their location on the PCB.

FIGURE 3-4: EVB-UTC2000-DFP LED INDICATOR LOCATIONS



3.1.3 Switches on EVB-UTC2000-DFP

Table 3-2 describes the switches included on the EVB-UTC2000-DFP.

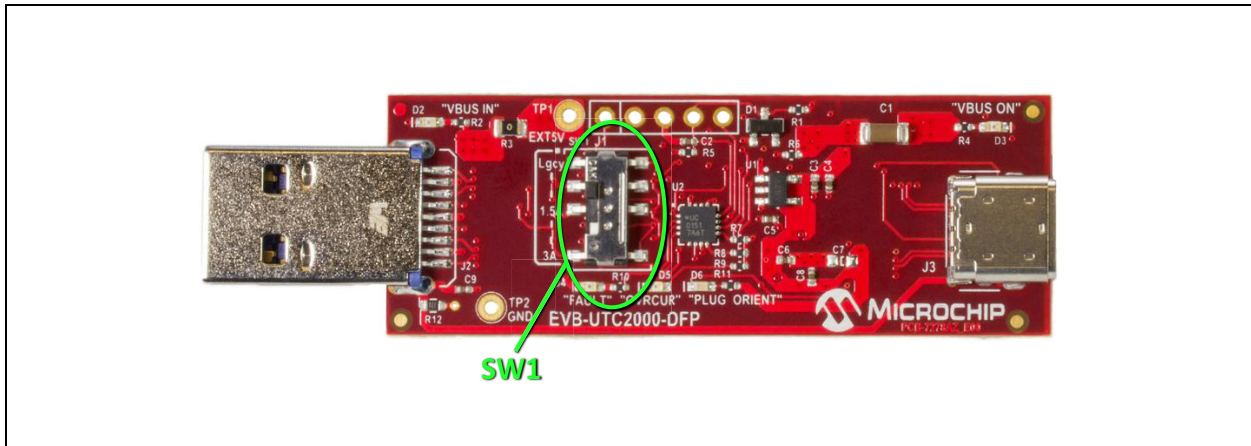
TABLE 3-2: SWITCH DESCRIPTIONS

REF. DES.	LABEL	DESCRIPTION
SW1	"Lgcy -- 1.5A -- 3A"	Selects between the DFP modes of operation: "Lgcy", "1.5A", "3.0A"

Note: The EVB-UTC2000-DFP is configured for Legacy mode of operation by default. See sections 2.2.2/2.2.3 for information on testing 1.5A/3.0A modes.

Figure 3-5 shows their location on the PCB.

FIGURE 3-5: EVB-UTC2000-DFP SWITCH LOCATIONS



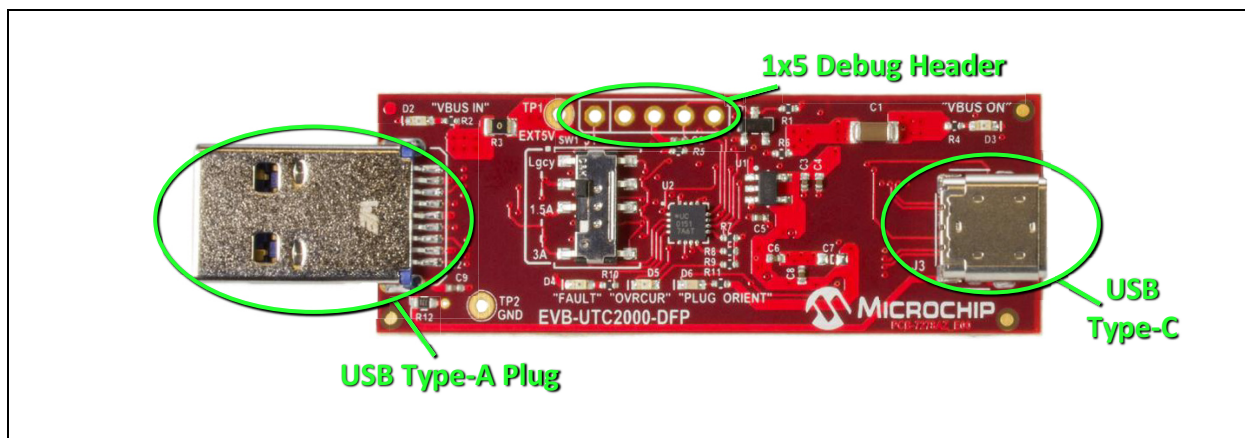
3.1.4 Connector Descriptions for EVB-UTC2000-DFP

Table 3-3 describes the connectors included on the EVB-UTC2000-DFP.

TABLE 3-3: CONNECTOR DESCRIPTIONS

REF. DES.	TYPE	LABEL	DESCRIPTION
J1	1x5 Header	-	5-pin debug header (internal MCHP use only)
J2	USB 3.1 Gen 1 Type-A Plug	-	Type-A male plug
J3	USB 3.1 Gen 1 Type-C Receptacle	-	Type-C receptacle

FIGURE 3-6: EVB-UTC2000-DFP CONNECTOR LOCATIONS



3.1.5 Test Points on EVB-UTC2000-DFP

Table 3-4 describes the test points included on the EVB-UTC2000-DFP. A header may be permanently installed on the through-hole test points if needed.

TABLE 3-4: EVB-UTC2000-DFP TEST POINT DESCRIPTIONS

REF. DES.	TYPE	DESCRIPTION
TP1	Thru-Hole	5V probe point or external 5V supply point
TP2	Thru-Hole	GND

3.1.6 LED Indicators for EVB-UTC2000-UFP

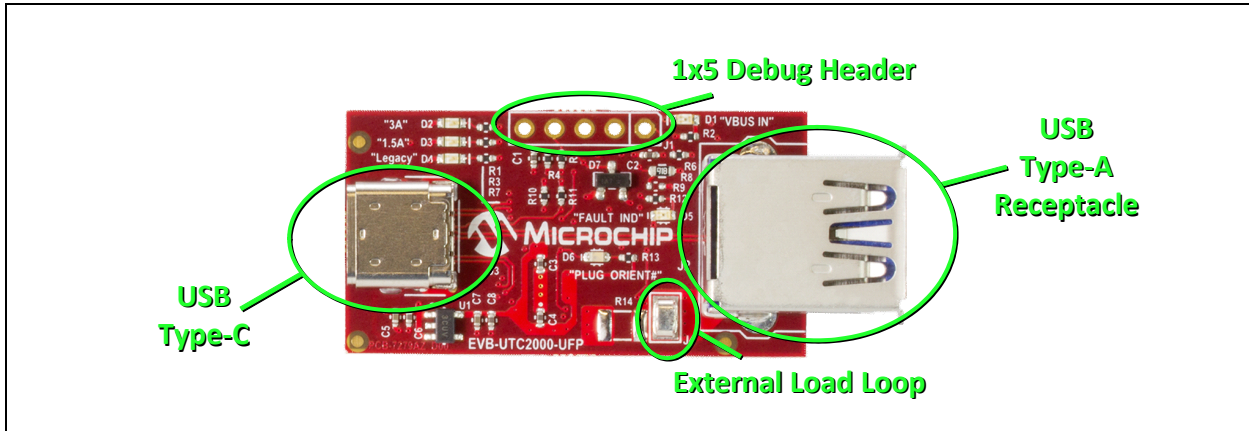
Table 3-5 describes the LED indicators included on the EVB-UTC2000-UFP.

TABLE 3-5: EVB-UTC2000-UFP LED INDICATOR DESCRIPTIONS

REF. DES.	LABEL	DESCRIPTION
D1	"VBUS IN"	Indicates that a valid VBUS (5.5V-4.0V) is being supplied to the EVB-UTC2000-UFP from the USB Type-C™ connection and that 5V is being passed to the USB Type-A receptacle.
D2	"3A"	Indicates when a 3.0 A capable DFP connection is detected.
D3	"1.5A"	Indicates when a 1.5 A capable DFP connection is detected.
D4	"Legacy"	Indicates when legacy 500 mA (USB 2.0) / 900 mA (USB 3.1 Gen 1) capable DFP connection is detected.

Figure 3-7 shows their location on the PCB.

FIGURE 3-7: EVB-UTC2000-UFP LED INDICATOR LOCATIONS



3.1.7 Switches on EVB-UTC2000-UFP

There are no switches present on the EVB-UTC2000-UFP.

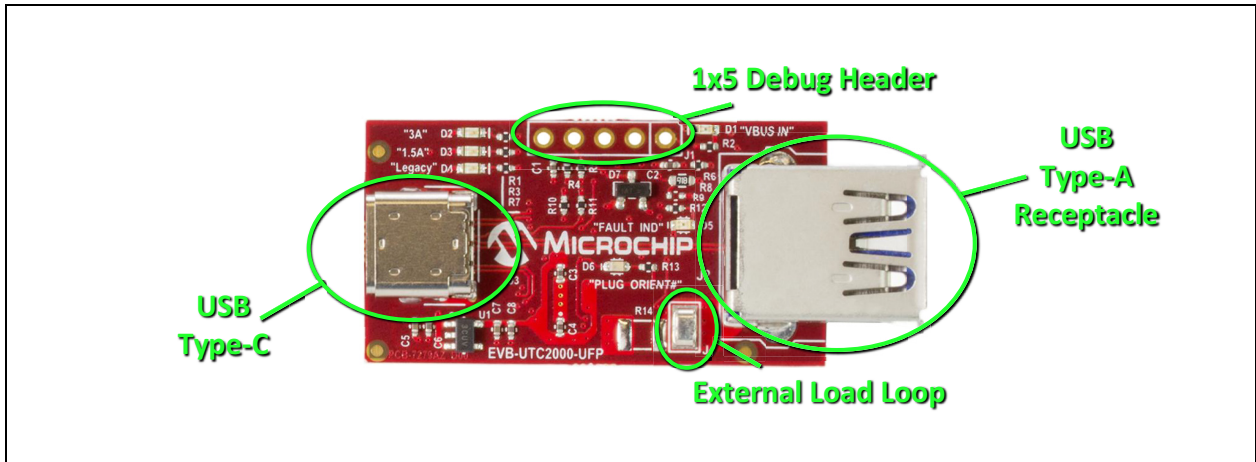
3.1.8 Connector Descriptions for EVB-UTC2000-UFP

Table 3-6 describes the connectors included on the EVB-UTC2000-UFP.

TABLE 3-6: EVB-UTC2000-UFP CONNECTOR DESCRIPTIONS

REF. DES.	TYPE	LABEL	DESCRIPTION
J1	1x5 Header	-	5-pin debug header (internal Microchip use only)
J2	USB 3.1 Gen 1 Type-A Plug	-	USB Type-A receptacle
J3	USB 3.1 Gen 1 Type-C Receptacle	-	USB Type-C™ receptacle
J4	Load Loop	-	An external load may be connected between this load loop and GND (pin 3 of J1)

FIGURE 3-8: EVB-UTC2000-UFP CONNECTOR LOCATIONS



3.1.9 Test Points on EVB-UTC2000-UFP

There are no test points available on the EVB-UTC2000-UFP.

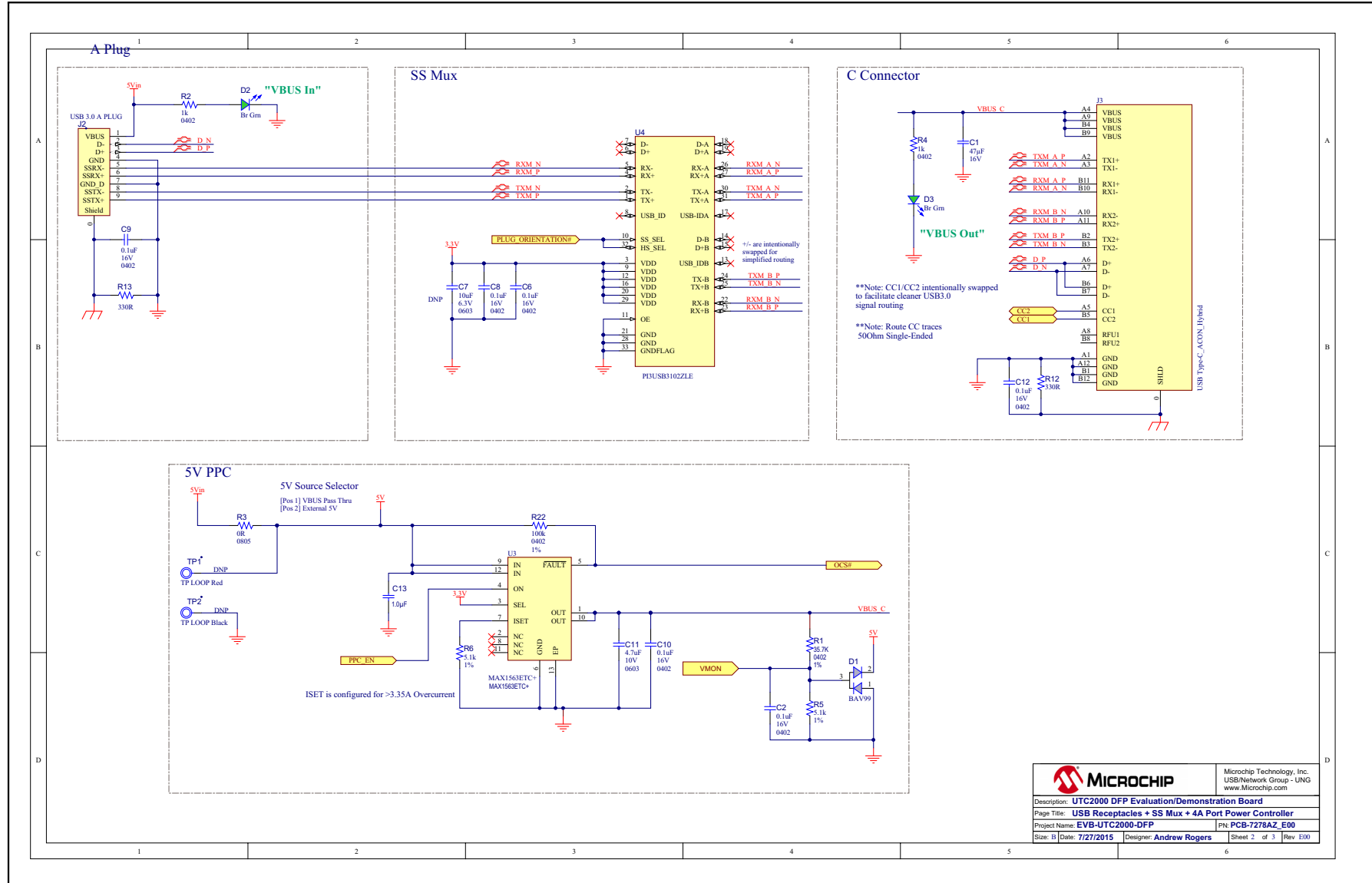


Appendix A. UTC2000 Schematics

A.1 INTRODUCTION

This appendix shows the UTC2000 Evaluation Kit Schematic.

FIGURE A-1: UTC2000 EVALUATION KIT SCHEMATICS



MICROCHIP		Microchip Technology, Inc. USB/Network Group - LUNG www.microchip.com
Description: UTC2000 DFP Evaluation/Demonstration Board		
Page Title: USB Receptacles + SS Mux + 4A Port Power Controller		
Project Name: EVB-UTC2000-DFP		
Size: B Date: 7/27/2015 Designer: Andrew Rogers Sheet 2 of 3 Rev E00		

FIGURE A-1: UTC2000 EVALUATION KIT SCHEMATICS (CONTINUED)

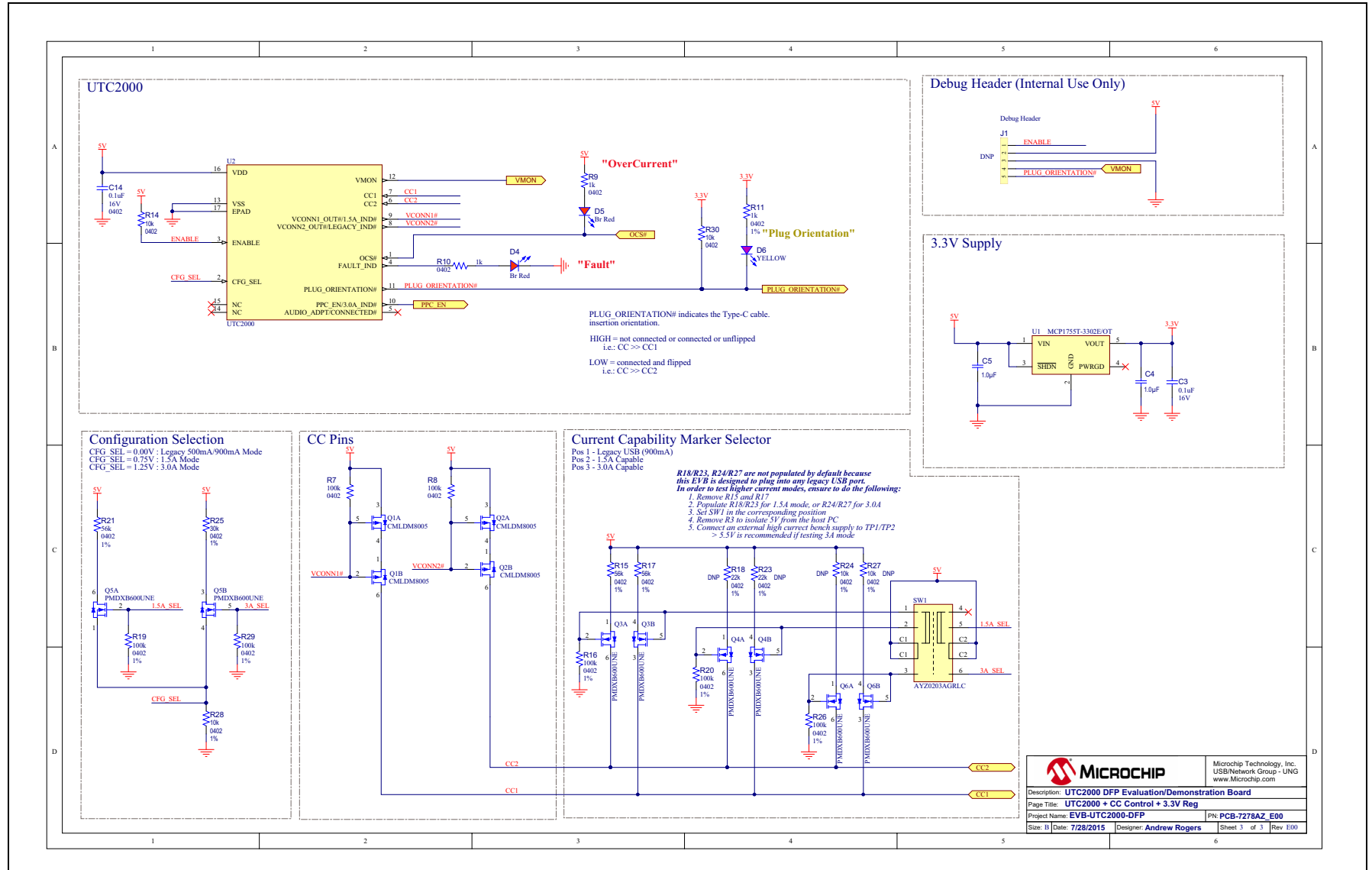
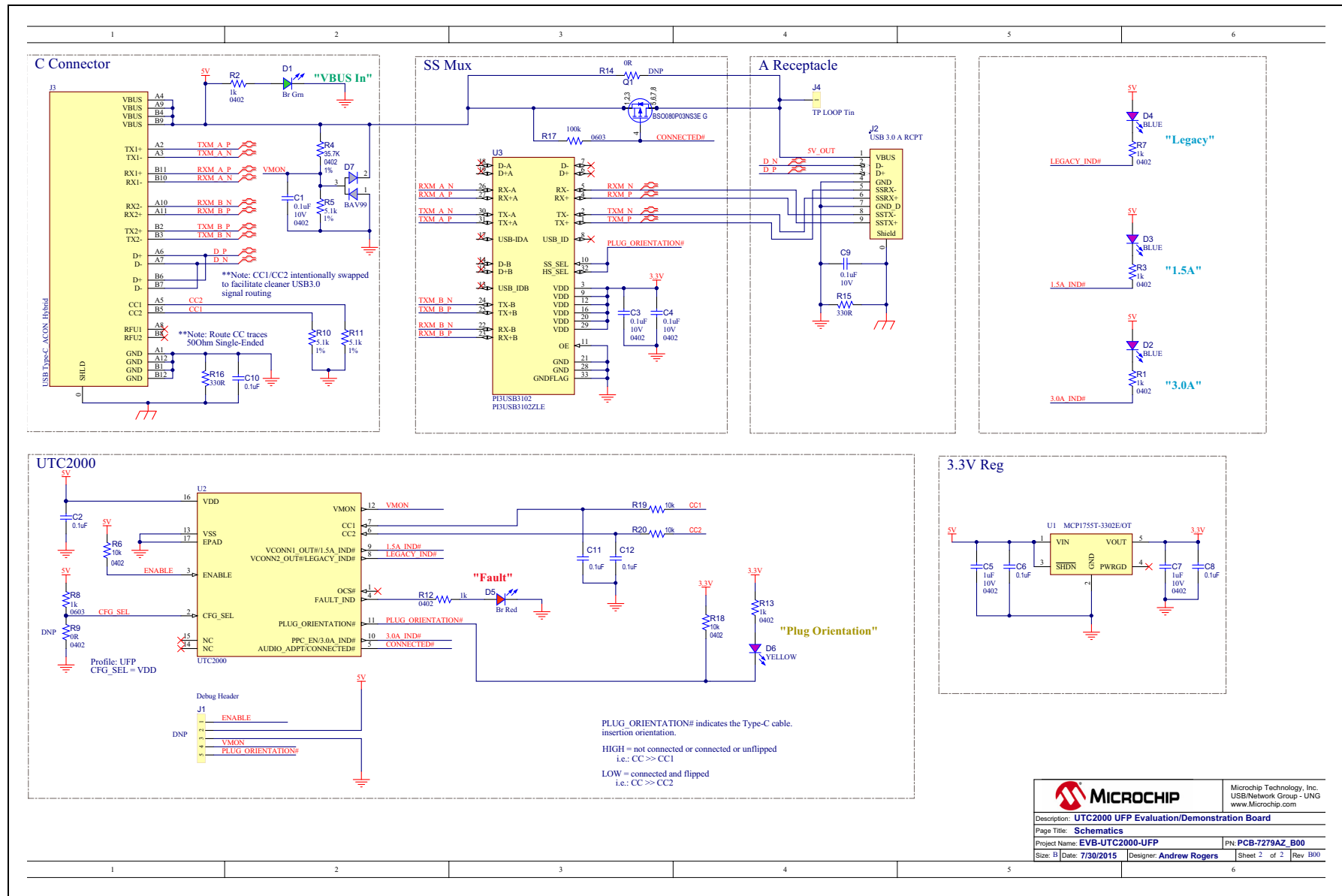


FIGURE A-1: UTC2000 EVALUATION KIT SCHEMATICS (CONTINUED)



		Microchip Technology, Inc. USB/Network Group - UNG www.Microchip.com
Description: UTC2000 UFP Evaluation/Demonstration Board		
Page Title: Schematics		
Project Name: EVB-UTC2000-UFP	PN: PCB-7279AZ_B00	
Size: B	Date: 7/30/2015	Designer: Andrew Rogers
		Sheet 2 of 2
		Rev 1000



Appendix B. EVK-UTC2000 BOM

B.1 INTRODUCTION

This appendix shows the EVK-UTC2000 Evaluation Bill of Materials.

TABLE B-1: EVK-UTC2000-DFP BILL OF MATERIALS

Item	Qty	Qty Pop'd	Reference Designator(s)	Description	Manufacturer	Manufacturer Part Number
1	1	1	C1	CAP CER, 47uF, 16V, 20%, X5R, 1206	TDK Corporation	C3216X5R1C476M160AB
2	8	8	C2, C3, C6, C8, C9, C10, C12, C14	CAP CER, 0.1uF, 16V, 80%, SMD, 0402	Yageo	CC0402ZRY5V7BB104
3	3	3	C4, C5, C13	CAP CER, 1uF, 16V, 10%, X5R, 0402	TDK Corporation	C1005X5R1C105K050BC
4	1	1	C7	CAP CER, 10uF, 6.3V, 20%, X5R SMD, 0603	AVX	06036D106MAT2A
5	1	1	C11	CAP CER, 4.7uF, 10V, 10%, X5R SMD, 0603	Taiyo Yuden	LMK107BJ475KA-T
6	1	1	D1	DIO RECTARR, BAV99, 1.25V, 200mA, 70V, SOT-23-3	Fairchild	BAV99
7	2	2	D2, D3	LED, Bright Green, 0603	Lite-On	LTST-C191KGKT
8	2	2	D4, D5	LED, Bright Red, 0603	Lite-On	LTST-C191KRKT
9	1	1	D6	DIO LED YELLOW 2V 25mA 162.5mcd Diffuse SMD 0603	OSRAM	LY Q976-P1S2-36
10	1	1	J1	CON HDR-2.54 Male 1x5 Gold 5.84MH TH VERT	Samtec	TSW-105-07-S-S
11	1	1	J2	CON USB 3.1 Gen 1 STD-A PLUG SMD R/A	Würth Electronics Inc	692112030100
12	1	1	J3	CON USB 3.1 Gen 1 Hybrid Type-C	ACON	
13	2	2	Q1, Q2	MOSFET SMD- Small Signal P-Channel Mosfet	Central Semiconductor	CMLDM8005 TR
14	4	4	Q3, Q4, Q5, Q6	MOSFET TRENCH 2N-CH 20V 600MA SOT-1216	NXP Semiconductors	PMDXB600UNE
15	1	1	R1	RES SMD 35.7K OHM 1% 1/10W 0402	Panasonic	ERJ-2RKF3572X
16	5	5	R2, R4, R9, R10, R11	RES TKF 1k 1% 1/10W SMD 0402	Panasonic	ERJ-2RKF1001X
17	1	1	R3	RES TKF 0R 1/8W SMD 0805	Panasonic	ERJ-6GEY0R00V
18	2	2	R5, R6	RES SMD 5.1K OHM 1% 1/10W 0402	Panasonic	ERJ-2RKF5101X
19	8	8	R7, R8, R16, R19, R20, R22, R26, R29	RES TKF 100k 1% 1/10W SMD 0402	Panasonic	ERJ-2RKF1003X
20	2	2	R12, R13	RES TKF 330R 1% 1/10W SMD 0603	ROHM	MCR03EZPFX3300
21	3	3	R14, R28, R30	RES TKF 10k 1% 1/10W SMD 0402	Panasonic	ERJ-2RKF1002X
22	3	3	R15, R17, R21	RES TKF 56k 1% 1/16W SMD 0402	ROHM	MCR01MZPF5602
23	1	1	R25	RES SMD 30K OHM 1% 1/10W 0402	Panasonic	ERJ-2RKF3002X
24	1	1	SW1	SW SLIDE DP3T 12VDC 100MA SMT	C&K Components	AYZ0203AGRCLC

TABLE B-1: EVK-UTC2000-DFP BILL OF MATERIALS (CONTINUED)

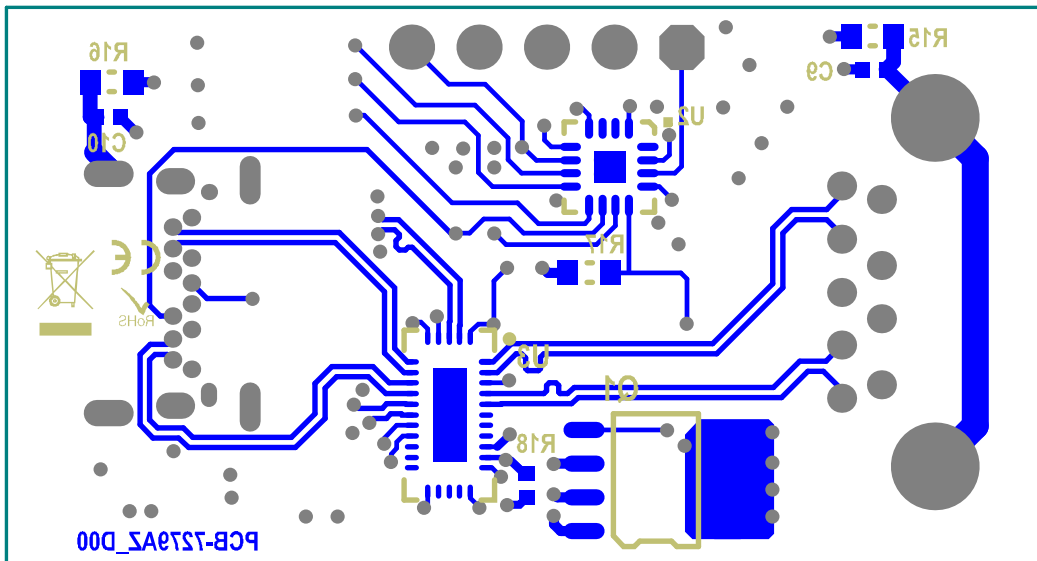
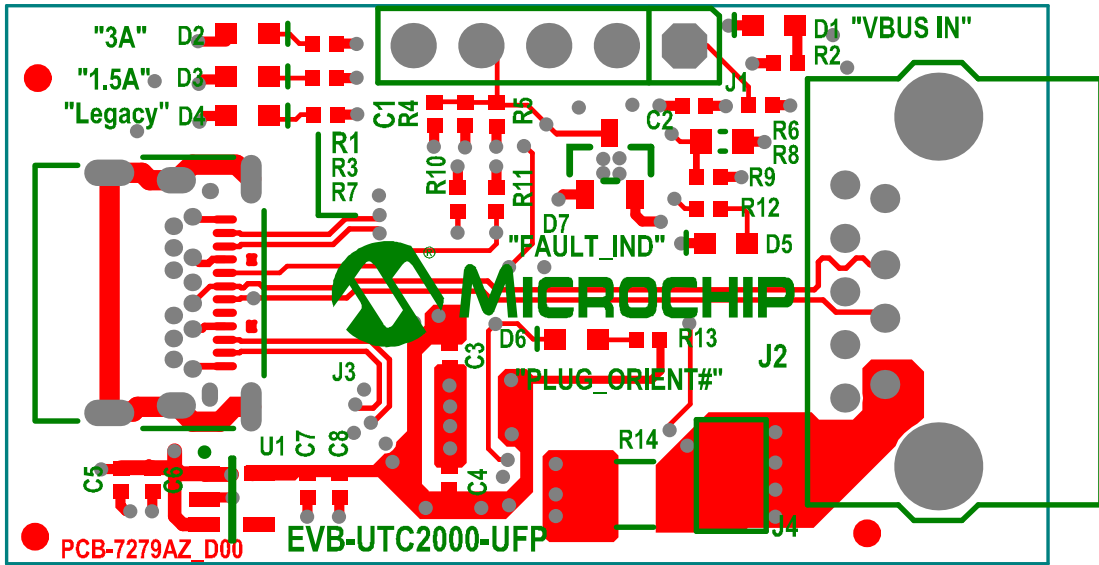
Item	Qty	Qty Pop'd	Reference Designator(s)	Description	Manufacturer	Manufacturer Part Number
25	1	1	TP1	MISC, TEST POINT MULTI PURPOSE MINI RED	Keystone	5000
26	1	1	TP2	MISC, TEST POINT MULTI PURPOSE MINI BLACK	Keystone	5001
27	1	1	U1	IC REG LDO 3.3V 0.3A SOT23-5	Microchip Technology	MCP1755T-3302E/OT
28	1	1	U2	UTC2000 TYPEC CONTROLLER 16QFN	Microchip Technology	UTC2000/MG
29	1	1	U3	IC CURR-LIM SW SNGL PROG 12-TQFN	Maxim Integrated	MAX1563ETC+
30	1	1	U4	IC USB 3.1 Gen 1 & USB 2.0 SWITCH 32TQFN	Pericom	PI3USB3102ZLE

TABLE B-2: EVK-UTC2000-UFP BILL OF MATERIALS

Item	Qty	Qty Pop'd	Reference Designator(s)	Description	Manufacturer	Manufacturer Part Number
1	8	8	C1, C2, C3, C4, C6, C8, C9, C10	CAP CER 0.1uF 10V 10% X5R SMD 0402	KEMET	C0402C104K8PACTU
2	2	2	C5, C7	CAP CER 1uF 10V 10% X5R 0402	Murata Electronics North America	GRM155R61A105KE15D
3	1	1	D1	LED, Bright Green, 0603	Lite-On	LTST-C191KGKT
4	3	3	D2, D3, D4	DIO LED BLUE 2.8V 20mA 15mcd Clear SMD 0603	Lite-On	LTST-C193TBKT-5A
5	1	1	D5	LED, Bright Red, 0603	Lite-On	LTST-C191KRKT
6	1	1	D6	DIO LED YELLOW 2V 25mA 162.5mcd Diffuse SMD 0603	OSRAM	LY Q976-P1S2-36
7	1	1	D7	DIO RECTARR BAV99 1.25V 200mA 70V SOT-23-3	Fairchild	BAV99
8	1	1	J1	CON HDR-2.54 Male 1x5 Gold 5.84MH TH VERT	Samtec	TSW-105-07-S-S
9	1	1	J2	CON USB 3.1 Gen 1 STD-A RCPT TH R/A	Würth Electronics Inc	692121030100
10	1	1	J3	CON USB 3.1 Gen 1 Hybrid Type-C	ACON	
11	1	1	J4	CON TP LOOP Tin SMD	Harwin Inc	S1751-46R
12	1	1	Q1	MOSFET P-CH 30V 12A 8DSO	Infineon Technologies	BSO080P03NS3E G
13	6	6	R1, R2, R3, R7, R12, R13	RES TKF 1k 1% 1/10W SMD 0402	Panasonic	ERJ-2RKF1001X
14	1	1	R4	RES SMD 35.7K OHM 1% 1/10W 0402	Panasonic	ERJ-2RKF3572X
15	3	3	R5, R10, R11	RES SMD 5.1K OHM 1% 1/10W 0402	Panasonic	ERJ-2RKF5101X
16	2	2	R6, R18	RES TKF 10k 1% 1/10W SMD 0402	Panasonic	ERJ-2RKF1002X
17	1	1	R8	RES TKF 1k 1% 1/10W SMD 0603	Yageo	RC0603FR-071KL
18	1	1	R14	RES TKF 0R 1/3W SMD 1210	Vishay	CRCW12100000Z0EA
19	2	2	R15, R16	RES TKF 330R 1% 1/10W SMD 0603	ROHM	MCR03EZPFX3300
20	1	1	R17	RES TKF 100k 1% 1/10W SMD 0603	Panasonic	ERJ-3EKF1003V
21	1	1	U1	IC REG LDO 3.3V 0.3A SOT23-5	Microchip Technology	MCP1755T-3302E/OT
22	1	1	U2	UTC2000 TYPEC CONTROLLER 16QFN	Microchip Technology	EVK-UTC2000-UFP
23	1	1	U3	IC USB 3.1 Gen 1 & USB 2.0 SWITCH 32QFN	Pericom	PI3USB3102ZLE

EVK-UTC2000 PCB Silk Screens

FIGURE C-2: EVB-UTC2000-UFP TOP AND BOTTOM SILK SCREEN IMAGES





MICROCHIP

Worldwide Sales and Service

AMERICAS

Corporate Office

2355 West Chandler Blvd.
Chandler, AZ 85224-6199

Tel: 480-792-7200

Fax: 480-792-7277

Technical Support:

[http://www.microchip.com/
support](http://www.microchip.com/support)

Web Address:

www.microchip.com

Atlanta

Duluth, GA

Tel: 678-957-9614

Fax: 678-957-1455

Austin, TX

Tel: 512-257-3370

Boston

Westborough, MA

Tel: 774-760-0087

Fax: 774-760-0088

Chicago

Itasca, IL

Tel: 630-285-0071

Fax: 630-285-0075

Cleveland

Independence, OH

Tel: 216-447-0464

Fax: 216-447-0643

Dallas

Addison, TX

Tel: 972-818-7423

Fax: 972-818-2924

Detroit

Novi, MI

Tel: 248-848-4000

Houston, TX

Tel: 281-894-5983

Indianapolis

Noblesville, IN

Tel: 317-773-8323

Fax: 317-773-5453

Los Angeles

Mission Viejo, CA

Tel: 949-462-9523

Fax: 949-462-9608

New York, NY

Tel: 631-435-6000

San Jose, CA

Tel: 408-735-9110

Canada - Toronto

Tel: 905-673-0699

Fax: 905-673-6509

ASIA/PACIFIC

Asia Pacific Office

Suites 3707-14, 37th Floor
Tower 6, The Gateway
Harbour City, Kowloon

Hong Kong

Tel: 852-2943-5100

Fax: 852-2401-3431

Australia - Sydney

Tel: 61-2-9868-6733

Fax: 61-2-9868-6755

China - Beijing

Tel: 86-10-8569-7000

Fax: 86-10-8528-2104

China - Chengdu

Tel: 86-28-8665-5511

Fax: 86-28-8665-7889

China - Chongqing

Tel: 86-23-8980-9588

Fax: 86-23-8980-9500

China - Dongguan

Tel: 86-769-8702-9880

China - Hangzhou

Tel: 86-571-8792-8115

Fax: 86-571-8792-8116

China - Hong Kong SAR

Tel: 852-2943-5100

Fax: 852-2401-3431

China - Nanjing

Tel: 86-25-8473-2460

Fax: 86-25-8473-2470

China - Qingdao

Tel: 86-532-8502-7355

Fax: 86-532-8502-7205

China - Shanghai

Tel: 86-21-5407-5533

Fax: 86-21-5407-5066

China - Shenyang

Tel: 86-24-2334-2829

Fax: 86-24-2334-2393

China - Shenzhen

Tel: 86-755-8864-2200

Fax: 86-755-8203-1760

China - Wuhan

Tel: 86-27-5980-5300

Fax: 86-27-5980-5118

China - Xian

Tel: 86-29-8833-7252

Fax: 86-29-8833-7256

ASIA/PACIFIC

China - Xiamen

Tel: 86-592-2388138

Fax: 86-592-2388130

China - Zhuhai

Tel: 86-756-3210040

Fax: 86-756-3210049

India - Bangalore

Tel: 91-80-3090-4444

Fax: 91-80-3090-4123

India - New Delhi

Tel: 91-11-4160-8631

Fax: 91-11-4160-8632

India - Pune

Tel: 91-20-3019-1500

Japan - Osaka

Tel: 81-6-6152-7160

Fax: 81-6-6152-9310

Japan - Tokyo

Tel: 81-3-6880-3770

Fax: 81-3-6880-3771

Korea - Daegu

Tel: 82-53-744-4301

Fax: 82-53-744-4302

Korea - Seoul

Tel: 82-2-554-7200

Fax: 82-2-558-5932 or

82-2-558-5934

Malaysia - Kuala Lumpur

Tel: 60-3-6201-9857

Fax: 60-3-6201-9859

Malaysia - Penang

Tel: 60-4-227-8870

Fax: 60-4-227-4068

Philippines - Manila

Tel: 63-2-634-9065

Fax: 63-2-634-9069

Singapore

Tel: 65-6334-8870

Fax: 65-6334-8850

Taiwan - Hsin Chu

Tel: 886-3-5778-366

Fax: 886-3-5770-955

Taiwan - Kaohsiung

Tel: 886-7-213-7828

Taiwan - Taipei

Tel: 886-2-2508-8600

Fax: 886-2-2508-0102

Thailand - Bangkok

Tel: 66-2-694-1351

Fax: 66-2-694-1350

EUROPE

Austria - Wels

Tel: 43-7242-2244-39

Fax: 43-7242-2244-393

Denmark - Copenhagen

Tel: 45-4450-2828

Fax: 45-4485-2829

France - Paris

Tel: 33-1-69-53-63-20

Fax: 33-1-69-30-90-79

Germany - Dusseldorf

Tel: 49-2129-3766400

Germany - Karlsruhe

Tel: 49-721-625370

Germany - Munich

Tel: 49-89-627-144-0

Fax: 49-89-627-144-44

Italy - Milan

Tel: 39-0331-742611

Fax: 39-0331-466781

Italy - Venice

Tel: 39-049-7625286

Netherlands - Drunen

Tel: 31-416-690399

Fax: 31-416-690340

Poland - Warsaw

Tel: 48-22-3325737

Spain - Madrid

Tel: 34-91-708-08-90

Fax: 34-91-708-08-91

Sweden - Stockholm

Tel: 46-8-5090-4654

UK - Wokingham

Tel: 44-118-921-5800

Fax: 44-118-921-5820

07/14/15