

# LP-MSPM0L1117 Evaluation Module

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## Description

The MSPM0L1117 LaunchPad™ development kit is an easy-to-use evaluation module for the MSPM0L1117 microcontroller (MCU). The LaunchPad kit contains everything needed to start developing on the MSPM0Lx11x microcontroller platform, including an onboard debug probe for programming, debugging, and EnergyTrace™ technology. The board also features on board buttons, LEDs, and a RGB LED.

The MSPM0L1117 is an Arm® Cortex® 32-bit M0+ CPU with a frequency up to 32MHz. The device features 128KB of dual-bank flash with 16KB of SRAM and also has high-performance analog peripherals such as a 12-bit 1.68Mpsps analog-to-digital converter (ADC) with up to 13 total external channels, configurable 1.4V or 2.5V internal ADC voltage reference (VREF), and an integrated temperature sensor

## Get Started

1. Order the [LP-MSPM0L1117](#) from [ti.com](#).
2. Navigate to [dev.ti.com](#) to browse for code examples.
3. Plug LP-MSPM0L1117 into a PC with the provided USB cable.
4. Download code directly from the browser to the MSPM0L1117 with CCS Cloud.

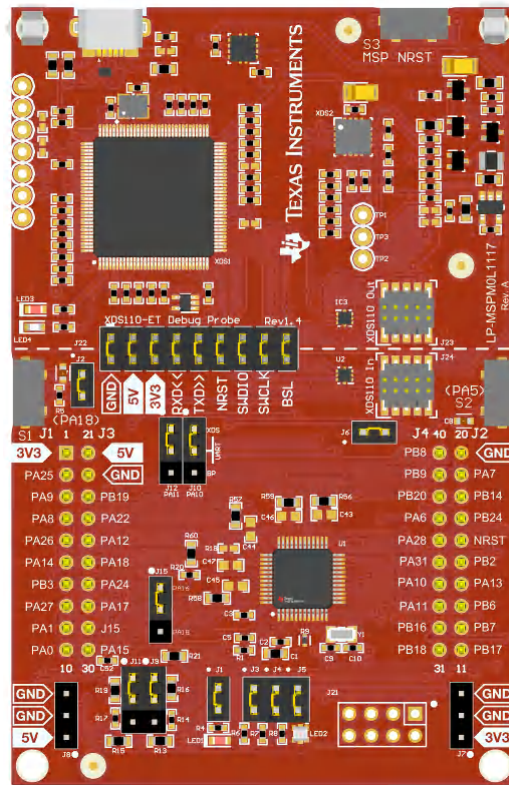
5. Download [CCS Theia](#) for a desktop integrated development environment.
6. Download the [MSPM0 SDK](#) for desktop stored examples, demos, and software libraries.

## Features

- Onboard XDS110 debug probe
- Backchannel UART through USB to PC
- USB powered
- 40-pin BoosterPack headers
- Hardware user interfaces
  - Two buttons
  - 1 RGB Led
  - 1 Red LED
- External clock crystals

## Applications

- [Battery charging and management](#)
- [Power supplies and power delivery](#)
- [Personal electronics](#)
- [Building security and fire safety](#)
- [Connected peripherals and printers](#)
- [Grid infrastructure](#)
- [Smart metering](#)
- [Communication modules](#)
- [Medical and healthcare](#)
- [Lighting](#)



**LP-MSPM0L1117**

# 1 Evaluation Module Overview

## 1.1 Introduction

The MSPM0L1117 is an Arm 32-bit Cortex-M0+ cost-optimized MCU offering high-performance analog peripheral integration, support for extended temperature ranges from -40°C to 125°C, and operation with supply voltages ranging from 1.62V to 3.6V. The device can be used in a variety of tasks from simple housekeeping MCU to full-application level. The easiest way to get started with MSPM0L1117 is with the LP-MSPM0L1117 LaunchPad. The LaunchPad has all the features to load code, debug, and prototype right out of the box.

Rapid prototyping is simplified by the 40-pin BoosterPack™ plug-in module headers, which support a wide range of available BoosterPack plug-in modules. Users can quickly add features like wireless connectivity, graphical displays, environmental sensing and much more. Design your own BoosterPack plug-in module or choose among many already available from TI and third-party developers.

To make prototyping easier, TI provides the MSPM0 software development kit (SDK) which has a variety of code examples to demonstrate how to use the internal peripherals.

Free software development tools are also available, such as TI's [Code Composer Studio™ IDE](#). We also support 3rd party IDEs such as [IAR Embedded Workbench® IDE](#) and [Arm®Keil®µVision® IDE](#). Code Composer Studio IDE supports [EnergyTrace technology](#) with the MSPM0L1117 LaunchPad development kit. More information about the LaunchPad development kit, the supported BoosterPack plug-in modules, and the available resources can be found at TI's [LaunchPad development kit portal](#). To get started quickly and find available resources in the MSPM0 software development kit (SDK), visit the [TI Developer Zone](#). The MSPM0 MCUs are also supported by extensive online collateral, training with [MSPM0 Academy](#) and online support through the [TI E2E support forums](#).

## 1.2 Kit Contents

- LP-MSPM0L1117 LaunchPad development kit
- USB cable
- Quickstart guide

## 1.3 Specification

LP-MSPM0L1117 is designed to be used in conjunction with a PC, Mac®, or Linux® workstation running Code Composer Studio (CCS). CCS can run as a stand-alone on a workstation or be accessed through the web (CCS Cloud) without the need for a software installation. Alternatively, LP-MSPM0L1117 ships with an example loaded, which can be controlled by a GUI. See the out of box description below.

The device can be powered from a power supply other than the built in USB power supply. This allows the user to forgo the PC connection. Power can be applied directly either to the 3.3V rail. When using an external power supply, make sure to not exceed 3.3V. Programming can be done externally with a separate XDS110 external debugger utilizing the on board Arm 10-pin connector.

## 1.4 Device Information

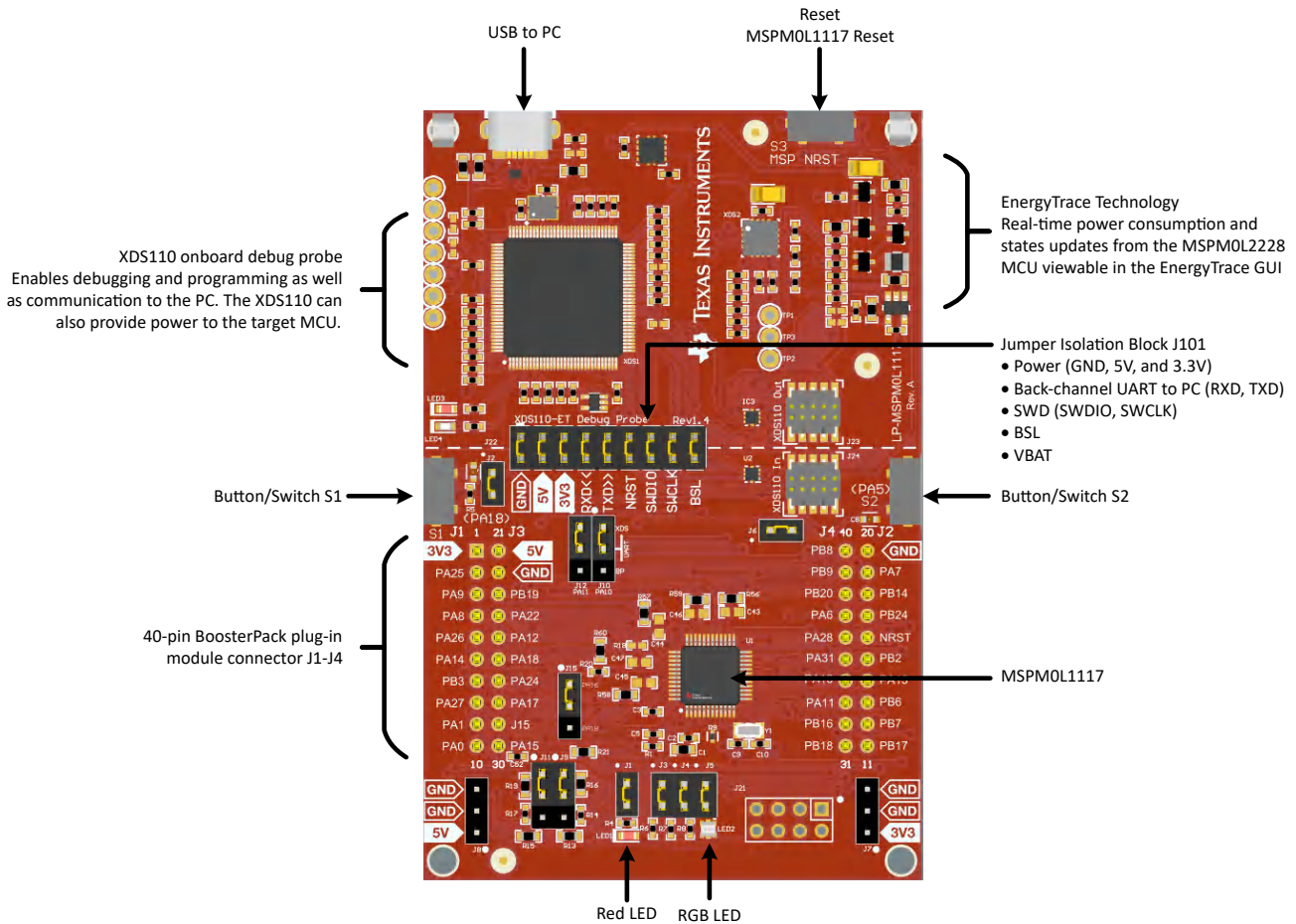
LP-MSPM0L1117 uses the following devices from Texas Instruments.

**Table 1-1. Device Information**

Device Name	Description	Purpose
MSP432E401YTPDT	SimpleLink™ 32-bit ARM Cortex-M4F MCU with Ethernet™, CAN, 1MB Flash and 256kB RAM	XDS110 Host Device
MSPM0L1117	Mixed-Signal Microcontroller with 32MHz Arm Cortex 32-bit-M0+ CPU, 256kB flash, and 32kB SRAM	Evaluation device
MSP430G2452IRSA16R	Mixed-Signal Microcontroller with 16-bit RISC CPU, 8kB Flash, and 256B SRAM	DC/DC controller for EnergyTrace Technology
TPD4E004RSER	ESD-protection array for high-speed data interfaces, 4 channels	Protect LP-MSPM0L1117 from ESD damage through USB connector
TPS73533DRBT	500mA, adjustable, low quiescent current, low-noise, high-PSRR, single-output LDO regulator	3.3V power XDS110 and MSPM0L1117
TPS2102DBVR	2.7V to 4V power mux, dual-input, single-output power switch	Switches XDS110 power

## 2 Hardware

### 2.1 Hardware Overview



**Figure 2-1. Diagram of LP-MSPM0L1117 Jumpers and Connectors**

LP-MSPM0L1117 has many hardware features, which allow the user full access to the MSPM0L1117 pins, while still providing onboard connectivity for easy use. Shunt connections provide a way for the user to easily change LaunchPad configuration. The location of these shunts is shown in [Figure 2-1](#). The connection of each shunt is described in [Table 2-1](#). The default configuration is to have all shunts populated.

**Table 2-1. Jumper Information**

Jumper	Description	Default Setting	Connected Signal
J1	Red LED connection	Populated	3.3V through LED and 470Ω resistor to PA0
J2	BSL Invoke	Populated	PA18: 47kΩ pull down resistor, switch pulls up to 3.3V
J3	RGB Blue Connection	Populated	PA23 through 220Ω resistor and LED to ground.
J4	RGB Red Connection	Populated	PB10 through 330Ω resistor and LED to ground
J5	RGB Green Connection	Populated	PB9 through 330Ω resistor and LED to ground
J9	Open Drain IO Pull-ups	Right and center connection	PA0: 4.7k pull-up resistor to 5v or 2.2k pull-up resistor to 3.3v depending on setting
J11	Open Drain IO Pull-ups	Right and center connection	PA1: 4.7kΩ pull-up resistor to 5v or 2.2kΩ pull-up resistor to 3.3v depending on setting

## 2.2 Power Requirements

The LP-MSPM0L1117 only needs the USB plugged in and the debugger jumper block populated to power the device. With the on-board LDO, the 5V USB supply is converted to 3.3v with a supply of 500mA. The LaunchPad can also be powered via the 3.3v or 5v headers via an external supply. Do not exceed 3.3V on the 3.3v rail or 5V on the 5V rail.

[Figure 2-2](#) shows the power connections on the LP-MSPM0L1117.

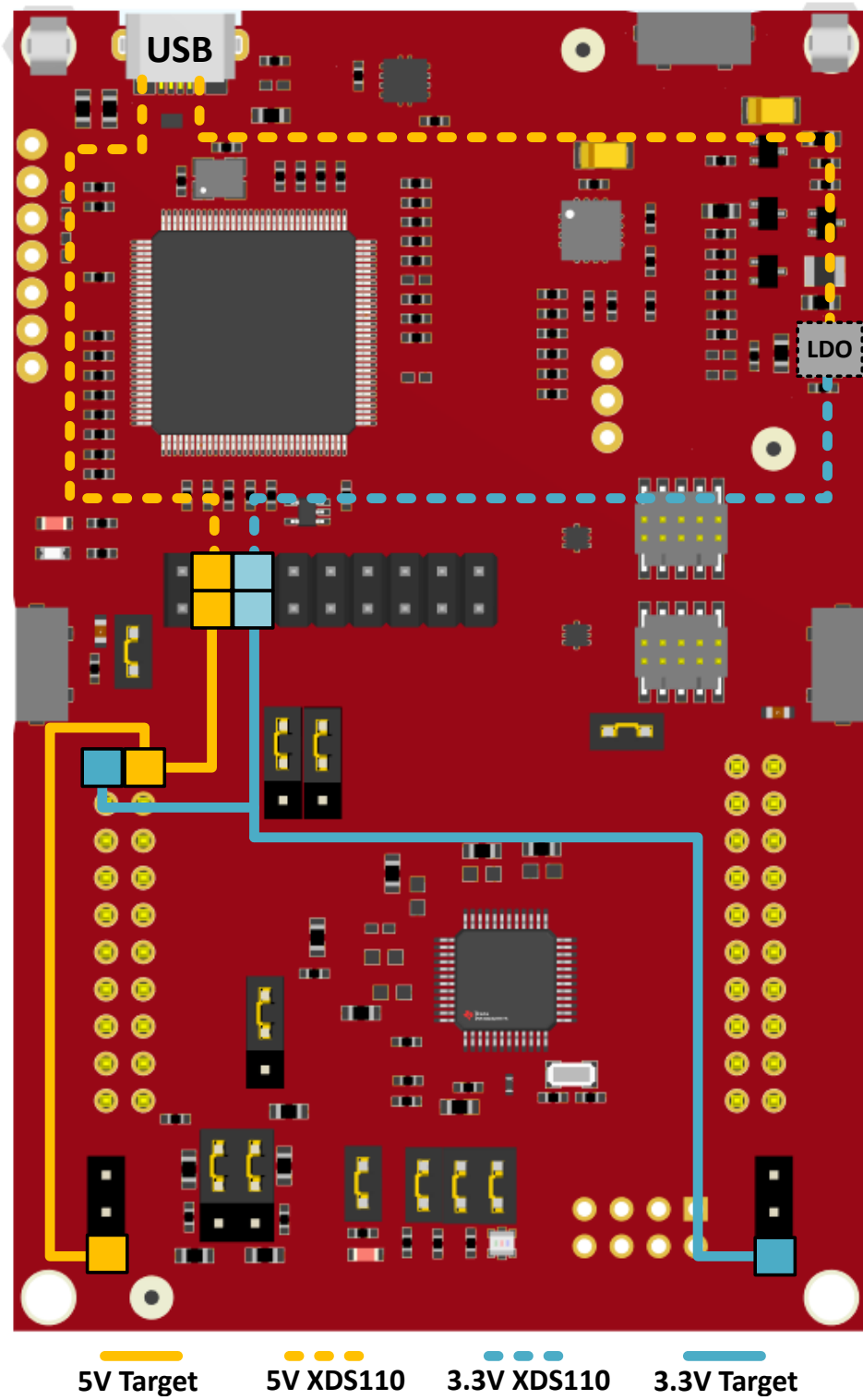


Figure 2-2. LP-MSPM0L1117 Power Connections

## 2.3 XDS110 Debug Probe

LP-MSPM0L1117 features an onboard debug probe to streamline prototyping. The debugger used on this LaunchPad is the XDS110 variant, which supports all MSPM0 device derivatives. The integrated XDS110 debug probe is separated from the rest of the MSPM0L1117 circuitry, which is shown by the dashed silkscreen on the LaunchPad. The XDS110 is only connected through signals that pass through J14, in addition to a common ground.

### Isolation Jumper Block

The isolation jumper block J22 allows the user to connect or disconnect signals that cross from the XDS110 domain into the MSPM0L1117 target domain. This includes XDS110 SWD signals, application UART signals, 3.3V and 5.5V power, BSL, and reset.

Jumper	Description
5V	5V rail from the USB
3V3	3.3V rail from the LDO
RXD<<	Backchannel UART: The target MSPM0L1117 receives data through this signal. The arrows indicate the direction of the signal.
TXD>>	Backchannel UART: The target MSPM0L1117 sends data through this signal. The arrows indicate the direction of the signal.
NRST	Reset signal
SWDIO	Serial Wire Debug: SWDIO data signal.
SWCLK	Serial wire debug: SWCLK clock signal.
BSL	Invoke pin for bootstrap loader. Allows the XDS110 to invoke BSL.

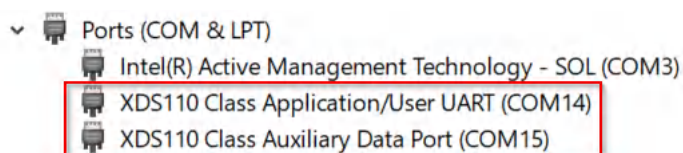
During normal prototyping all shunts are populated. However, there are some scenarios where a user needs to open these connections:

- To remove any and all influence from the XDS110 debug probe for high accuracy target power measurements
- To control 3.3V and 5V power flow between the XDS110 and target domains
- To expose the target MCU pins for other use than onboard debugging and application UART communication.
- To expose the programming and UART interface for the XDS110 so that the XDS110 can be used for devices other than the onboard MCU.

### Application (*Backchannel*) UART

The backchannel UART allows communication with the USB host that is not part of the target application's main functionality. This is very useful during development, and also provides a communication channel to the PC host side. This can be used to create graphical user interfaces (GUIs) and other programs on the PC that communicate with the LaunchPad development kit.

On the host side, a virtual COM port for the application backchannel UART is generated when the LaunchPad development kit enumerates on the host. You can use any PC application that interfaces with COM ports, including terminal applications like HyperTerminal or Docklight, to open this port and communicate with the target application. You need to identify the COM port for the backchannel. On Windows PCs, Device Manager can assist.



**Figure 2-3. Application Backchannel UART in Device Manager**



The backchannel UART is the *XDS110 Class Application/User UART* port. In this case, [Figure 2-3](#) shows COM14, but this port can vary from one host PC to the next. After identifying the correct COM port, configure the port in the host application according to documentation. The user can then open the port and begin communication from the host.

On the target MSPM0L1117 side, the backchannel UART is connected to UART0 (PA10, PA11). The XDS110 has a configurable baud rate; therefore, the PC application configuring the baud rate needs to be the same baud rate.

## 2.4 Measure Current Draw of the MSPM0L1117

To measure the current draw of the MSPM0L1117 MCU using a multimeter, use the 3V3 jumper on the J22 jumper isolation block. The current measured includes the target device, LaunchPad circuits, and any current drawn through the BoosterPack plug-in module headers. To measure ultra-low power, follow these steps:

- Remove the 3V3 jumper in the J22 isolation block, and attach an ammeter across this jumper.
- Consider the effect that the backchannel UART and any circuitry attached to the MSPM0L1117 can have on the current draw. Consider disconnecting these at the isolation jumper block, or at least consider the current sinking and sourcing capability in the final measurement.
- Make sure there are no floating inputs/outputs (I/Os) on the MSPM0L1117. This causes unnecessary extra current draw. Every I/O is either driven or, if the I/O is an input, is pulled or driven to a high or low level.
- Begin target execution.
- For the most accurate current measurements, place the device in Free Run mode and disconnect programming signals between the MSPM0L1117 and the debug portion of the board (header J22).
- Measure the current. Keep in mind that if the current levels are fluctuating, then getting a stable measurement can be difficult. Measuring the quiescent states is easier.

## 2.5 Clocking

The internal SYSOSC is 32MHz as default at the accuracy of 2.5%. The MCLK is sourced by 32MHz SYSOSC at default. CPUCLK is sourced directly from MCLK in RUN mode and disabled in other modes. The low-power clock (ULPCLK) can be sourced by MCLK and active in RUN and SLEEP mode by configuration. The part also includes an internal 32kHz oscillator, LFOSC, which is the default low frequency source. Included on the LaunchPad are two clock crystal options, 1 high-frequency 32MHz crystal (HFXT) and 1 low-frequency 32.728kHz crystal (LFXT). The crystals can be selected during application programming as the clock source for the high frequency and low frequency clocks.

For more clock tree details see Section 2.3 *Clock Module (CKM)* of the [MSPM0 L-Series Microcontrollers Technical Reference Manual](#).

## 2.6 BoosterPack Plug-in Module Pinout

The LaunchPad development kit adheres to the 40-pin LaunchPad development kit pinout standard, where pins are available. A standard was created to aid compatibility between LaunchPad development kits and BoosterPack plug-in modules across the TI ecosystem.

While most BoosterPack plug-in modules are compliant with the standard, some are not. If the reseller or owner of the BoosterPack plug-in module does not explicitly indicate compatibility with the MSPM0L1117 LaunchPad development kit, then compare the schematic of the candidate BoosterPack plug-in module with the LaunchPad development kit to verify compatibility. Conflicts can be resolved by changing the MSPM0L1117 device pin function configuration in software.

## 3 Software

### 3.1 Software Development Options

There are multiple ways to prototype with LP-MSPM0L1117:

- **Out-of-box GUI** - Choose this option for an easy demo of LP-MSPM0L1117
- **CCS Cloud** - Choose this option to get started quickly with minimal installation.
- **CCS Theia** - Choose this option to work offline and have full access to debug features. See CCS Theia documentation to get started.
- **CCS Eclipse** - This option is supported but is a legacy tool and is not covered in this guide.

### 3.2

### 3.3 CCS Cloud

1. Navigate to dev.ti.com. The user can be required to install CCS Cloud Agent. If so, then follow the steps to complete this installation.
2. Plug LP-MSPM0L1117 using a micro-USB cable. TI Developer Zone automatically detects that LP-MSPM0L1117 has been plugged in.
3. Click *Browse software and examples*, which opens the MSPM0 SDK in a new window.
4. In the left bar, navigate to Arm-based microcontrollers > Embedded Software > MSPM0 SDK > Examples > Development Tools > DriverLib > gpio\_toggle\_output > No RTOS > TI Clang Compiler > gpio\_toggle\_output.
5. Click the *Import* button in the top right corner of the screen. This action imports the project into CCS Cloud and open in a new window.
6. In CCS Cloud, click the debug icon in the left bar to open the debug view.
7. Click the *play* button to deploy the code to the device and open a debug session. By default, the debugger pauses the first line of code.
8. Click the blue *play* button to start the application.
9. The RGB LED on LP-MSPM0L1117 needs to be blinking.

Now, the user is ready to begin prototyping by modifying the code or by importing a different example code.

## 4 Hardware Design Files

### 4.1 Schematics

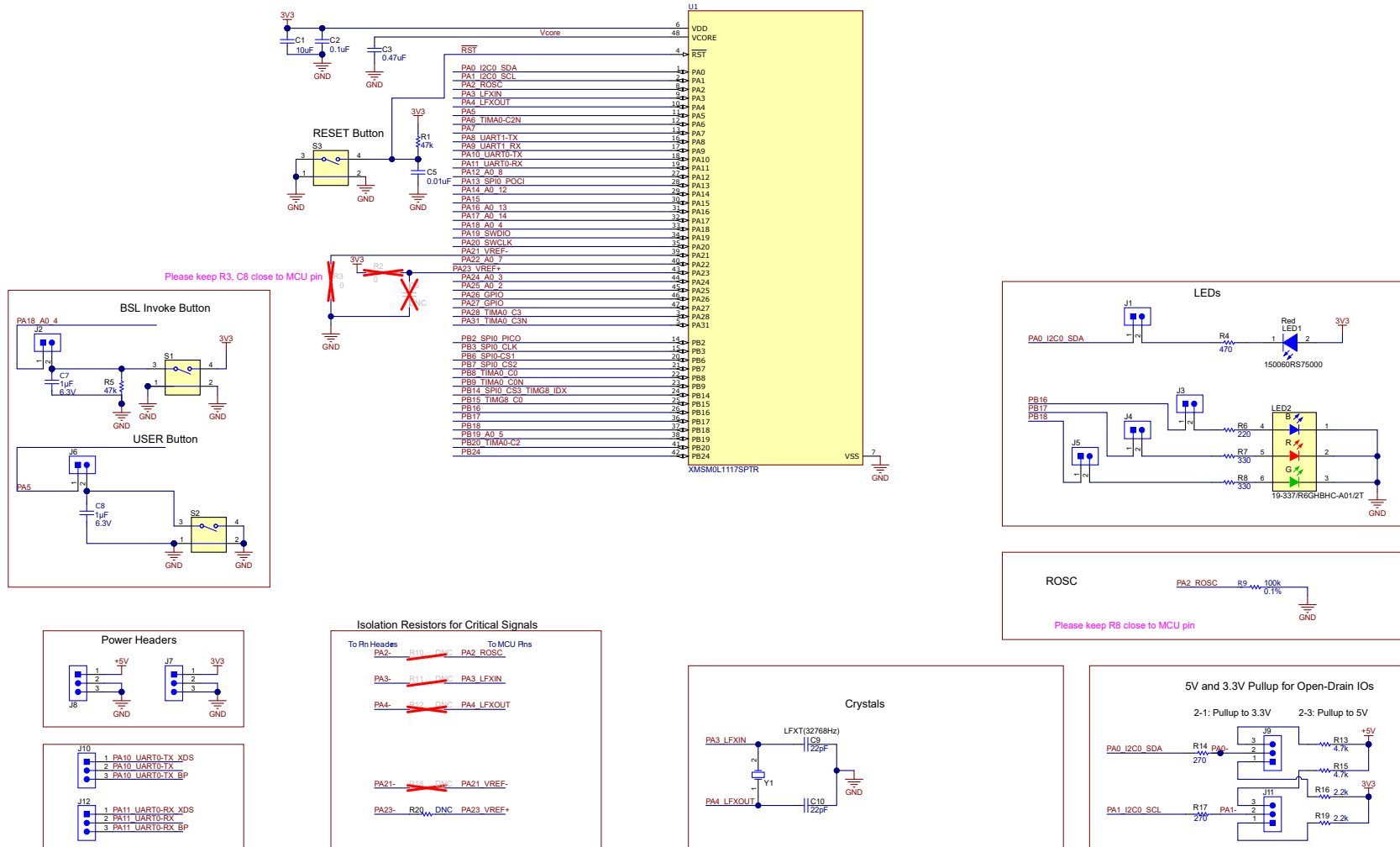
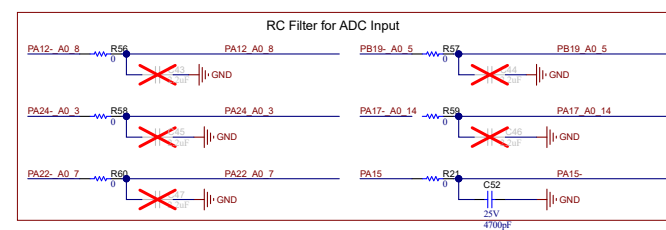
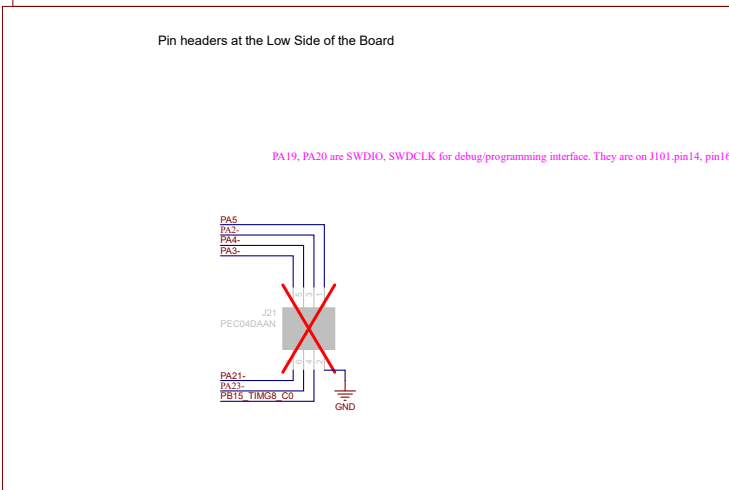
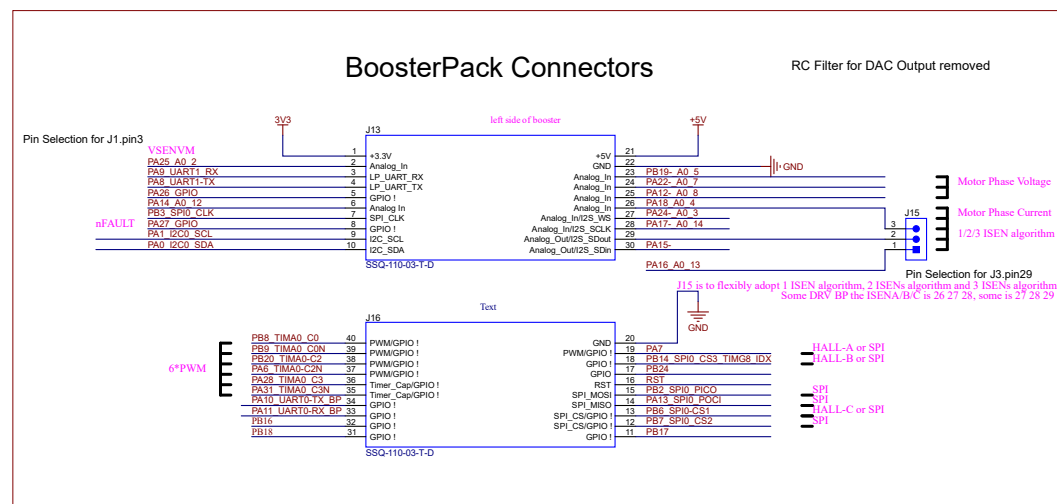


Figure 4-1. MSPM0L1117 Target Device Schematic



**Figure 4-2. BoosterPack Connectors**

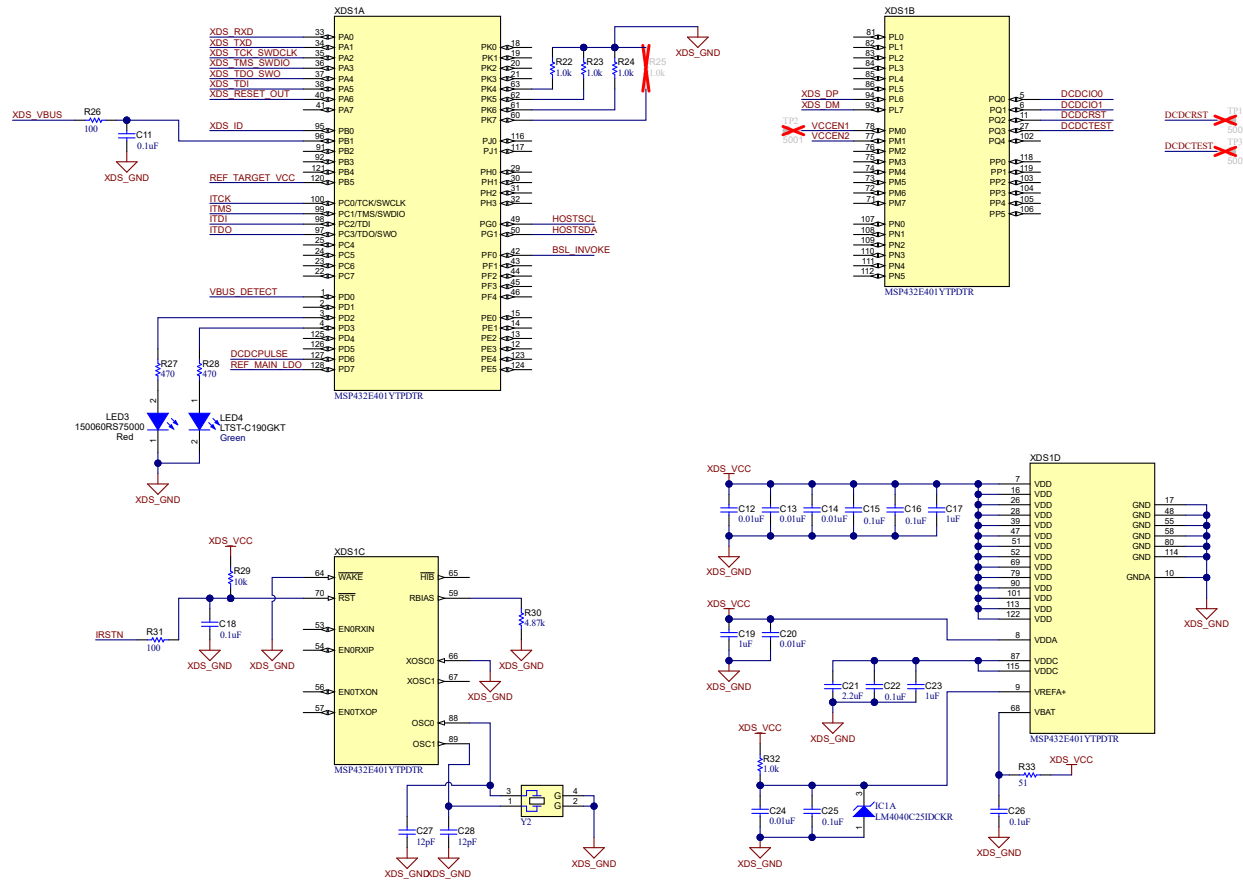


Figure 4-3. XDS110 Debug Probe Schematic



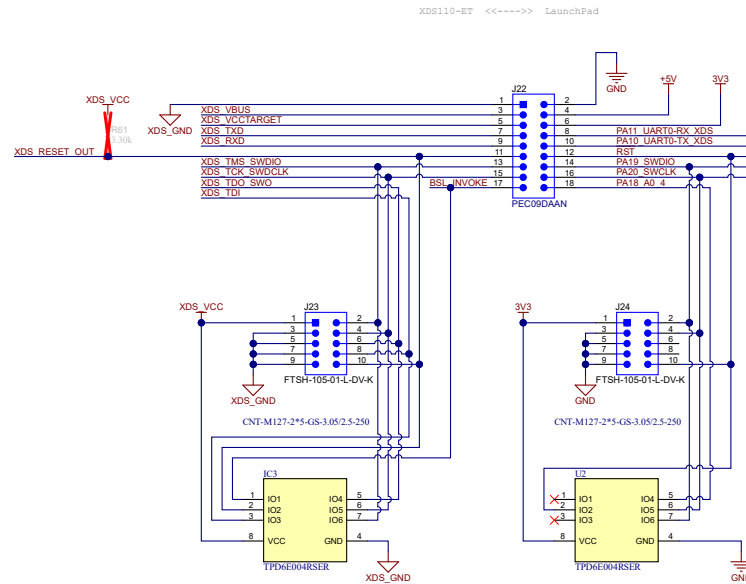


Figure 4-5. XDS110 Target Interface Schematic

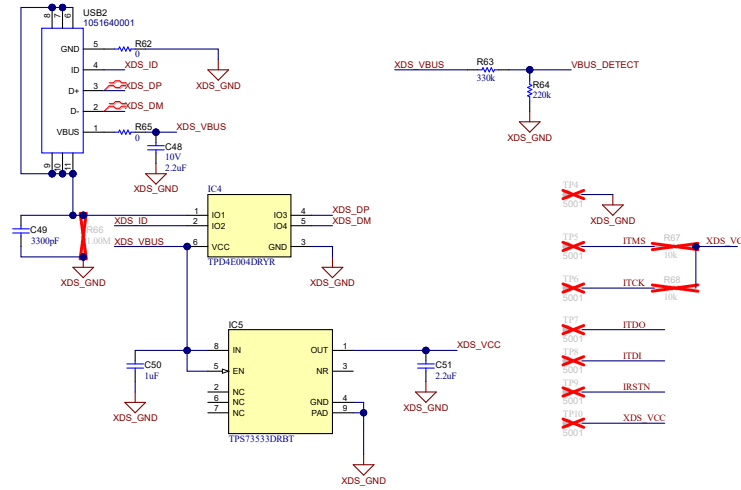
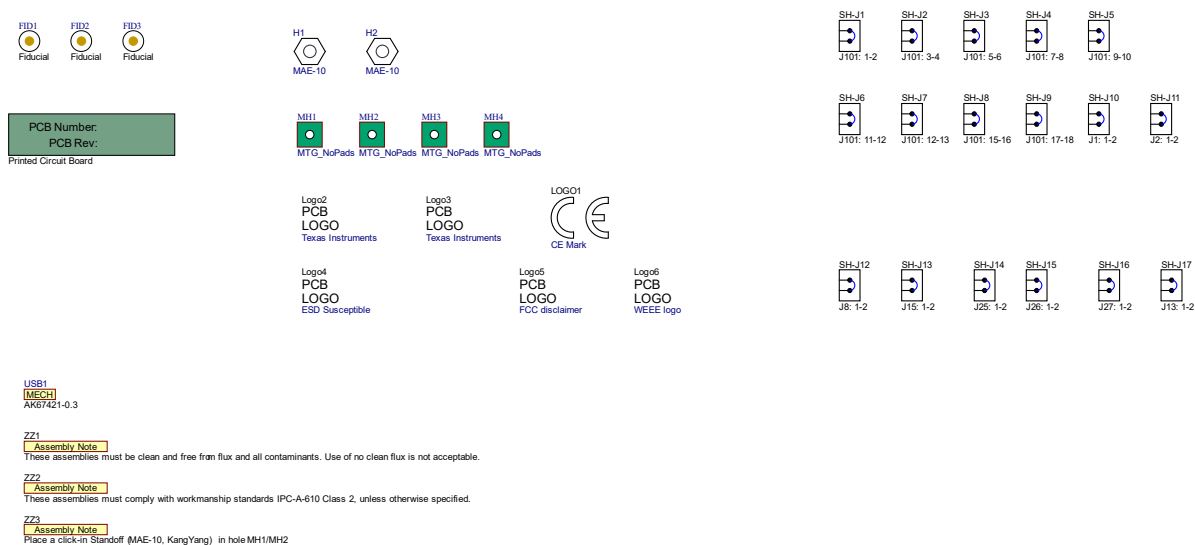


Figure 4-6. XDS110 USB Power Schematic



**Figure 4-7. Hardware Schematic**



## 4.2 Bill of Materials (BOM)

Designator	Quantity	Value	Description	Part Number	Manufacturer
!PCB1	1		Printed Circuit Board	MCU150	Any
C1	1	10uF	CAP, CERM, 10 uF, 6.3 V, +/- 20%, X5R, 0603	GRM188R60J106ME84	MuRata
C2	1	0.1uF	CAP, CERM, 0.1 uF, 50 V, +/- 20%, X5R, 0402	GRM155R61H104ME14D	MuRata
C3	1	0.47uF	CAP, CERM, 0.47 uF, 6.3 V, +/- 10%, X5R, 0402	GRM155R60J474KE19D	MuRata
C5	1	0.01uF	CAP, CERM, 0.01 uF, 16 V, +/- 10%, X5R, 0402	GRM155R61C103KA01D	MuRata
C7, C8	2	1µF	1 µF ±10% 6.3V Ceramic Capacitor X7R 0603 (1608 Metric)	8.85E+11	Würth Electronics
C9, C10	2	22pF	CAP, CERM, 22 pF, 50 V, +/- 5%, C0G/NP0, 0402	GRM1555C1H220JA01D	MuRata
C11, C15, C16, C18, C22, C25, C26, C31, C36, C37, C42	11	0.1uF	CAP, CERM, 0.1 uF, 6.3 V, +/- 10%, X7R, 0402	GRM155R70J104KA01D	MuRata
C12, C13, C14, C20, C24	5	0.01uF	CAP, CERM, 0.01 uF, 25 V, +/- 10%, X7R, 0402	GRM155R71E103KA01D	MuRata
C17, C19, C23, C50	4	1uF	CAP, CERM, 1 uF, 25 V, +/- 10%, X5R, 0402	C1005X5R1E105K050BC	TDK
C21, C51	2	2.2uF	CAP, CERM, 2.2 uF, 6.3 V, +/- 10%, X5R, 0402	GRM155R60J225KE95D	MuRata
C27, C28	2	12pF	CAP, CERM, 12 pF, 50 V, +/- 5%, C0G/NP0, 0402	GRM1555C1H120JA01D	MuRata
C29, C32	2	33pF	CAP, CERM, 33 pF, 50 V, +/- 5%, C0G/NP0, 0402	GRM1555C1H330JA01D	MuRata
C30, C34	2	4.7uF	CAP, TA, 4.7 uF, 16 V, +/- 10%, 4 ohm, SMD	TAJA475K016RNJ	AVX
C33	1	1000pF	CAP, CERM, 1000 pF, 50 V, +/- 10%, X7R, AEC-Q200 Grade 1, 0402	GCM155R71H102KA37D	MuRata

Designator	Quantity	Value	Description	Part Number	Manufacturer
C35, C41	2	4.7uF	CAP, CERM, 4.7 uF, 16 V, +/- 10%, X5R, 0603	GRM188R61C475KAAJ	MuRata
C38	1	47uF	CAP, CERM, 47 uF, 6.3 V, +/- 20%, X5R, 0603	GRM188R60J476ME15D	MuRata
C39, C40	2	0.22uF	CAP, CERM, 0.22 uF, 16 V, +/- 10%, X7R, 0402	GRM155R71C224KA12D	MuRata
C48	1	2.2uF	CAP, CERM, 2.2 uF, 10 V, +/- 10%, X5R, 0603	C0603C225K8PACTU	Kemet
C49	1	3300pF	CAP, CERM, 3300 pF, 50 V, +/- 10%, X7R, 0402	GRM155R71H332KA01D	MuRata
C52	1	4700pF	CAP, CERM, 4700 pF, 25 V, +/- 10%, X5R, 0402	GRM155R61E472KA01D	MuRata
D1, D2	2	40V	Diode, Schottky, 40 V, 0.12 A, AEC-Q101, SOT-323	BAS40-05W,115	Nexperia
FID1, FID2, FID3	3		Fiducial mark. There is nothing to buy or mount.	N/A	N/A
H1, H2	2		Spacer Support, Nylon 66	MAE-10	Kang Yang
IC1	1		Precision Micropower Shunt Voltage Reference, 0.5% accuracy, 2.5 V, 15 ppm / degC, 15 mA, -40 to 85 degC, 5-pin SC70 (DCK), Green (RoHS & no Sb/Br)	LM4040C25IDCKR	Texas Instruments
IC2	1		2.7-4V Dual In/Single Out MOSFET, 0.5A Main/0.1A Aux Input, Act-Low Enable, Comm. Temp., DBV0005A (SOT-23-5)	TPS2102DBVR	Texas Instruments
IC3, U2	2		Low-Capacitance 6-Channel +/-15 kV ESD Protection Array for High-Speed Data Interfaces, RSE0008A (UQFN-8)	TPD6E004RSER	Texas Instruments

Designator	Quantity	Value	Description	Part Number	Manufacturer
IC4	1		4-Channel ESD Protection Array for High-Speed Data Interfaces, DRY0006A (USON-6)	TPD4E004DRYR	Texas Instruments
IC5	1		500mA, Adjustable, Low Quiescent Current, Low-Noise, High-PSRR, Single-Output LDO Regulator, DRB0008A (VSON-8)	TPS73533DRBT	Texas Instruments
J1, J2, J3, J4, J5, J6	6		Header, 100mil, 2x1, Tin, TH	90120-0122	Molex
J7, J8, J9, J10, J11, J12, J15	7		Header, 100mil, 3x1, Tin, TH	PEC03SAAN	Sullins Connector Solutions
J13	1		Receptacle, 2.54mm, 10x2, Tin, TH	SSQ-110-03-T-D	Samtec
J16	1		Receptacle, 2.54mm, 10x2, Tin, TH	SSQ-110-03-T-D	Samtec
J22	1		Header, 2.54mm, 9x2, Tin, TH	PEC09DAAN	Sullins Connector Solutions
J23, J24	2		Header(Shrouded), 1.27mm, 5x2, Gold, SMT	FTSH-105-01-L-DV-K	Samtec
L1	1	2.2uH	Inductor, Wirewound, Ceramic, 2.2 uH, 0.89 A, 0.13 ohm, SMD	LSQNA251818T2R2M	Taiyo Yuden
LED1, LED3	2	Red	LED, Red, SMD	150060RS75000	Würth Elektronik
LED2	1	RGB	LED, RGB, TH	19-337/R6GHBHC-A01/2T	Everlight
LED4	1	Green	LED, Green, SMD	LTST-C190GKT	Lite-On
R1, R5	2	47k	RES, 47 k, 5%, 0.063 W, AEC-Q200 Grade 0, 0402	CRCW040247K0JNED	Vishay-Dale
R4, R27, R28, R46	4	470	RES, 470, 5%, 0.063 W, AEC-Q200 Grade 0, 0402	CRCW0402470RJNED	Vishay-Dale
R6	1	220	RES, 220, 5%, 0.063 W, AEC-Q200 Grade 0, 0402	CRCW0402220RJNED	Vishay-Dale
R7, R8	2	330	RES, 330, 5%, 0.063 W, AEC-Q200 Grade 0, 0402	CRCW0402330RJNED	Vishay-Dale

Designator	Quantity	Value	Description	Part Number	Manufacturer
R9	1		Res Thin Film 0402 100K Ohm 0.1% 1/16W ±25ppm/°C Molded SMD SMD Punched Carrier T/R	ERA-2AEB104X	Panasonic
R13, R15	2	4.7k	RES, 4.7 k, 5%, 0.1 W, 0603	RC0603JR-074K7L	Yageo
R14, R17	2		270 RES, 270, 5%, 0.063 W, AEC- Q200 Grade 0, 0402	CRCW0402270RJNED	Vishay-Dale
R16, R19	2	2.2k	RES, 2.2 k, 5%, 0.1 W, 0603	RC0603JR-072K2L	Yageo
R21, R50, R56, R57, R58, R59, R60, R62, R65	9		0 RES, 0, 5%, 0.1 W, 0603	RC0603JR-070RL	Yageo
R22, R23, R24, R32	4	1.0k	RES, 1.0 k, 5%, 0.063 W, AEC-Q200 Grade 0, 0402	CRCW04021K00JNED	Vishay-Dale
R26, R31	2		100 RES, 100, 5%, 0.063 W, AEC- Q200 Grade 0, 0402	CRCW0402100RJNED	Vishay-Dale
R29	1	10k	RES, 10 k, 5%, 0.063 W, AEC-Q200 Grade 0, 0402	CRCW040210K0JNED	Vishay-Dale
R30	1	4.87k	RES, 4.87 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	CRCW04024K87FKED	Vishay-Dale
R33	1		51 RES, 51, 5%, 0.063 W, AEC- Q200 Grade 0, 0402	CRCW040251R0JNED	Vishay-Dale
R34, R35, R41, R42, R49, R52, R64	7	220k	RES, 220 k, 1%, 0.0625 W, 0402	RC0402FR-07220KL	Yageo America
R36	1	3.30k	RES, 3.30 k, 1%, 0.1 W, AEC- Q200 Grade 0, 0402	ERJ-2RKF3301X	Panasonic
R37	1	2.20k	RES, 2.20 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	CRCW04022K20FKED	Vishay-Dale
R38	1	6.81k	RES, 6.81 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	CRCW04026K81FKED	Vishay-Dale
R39, R40	2	4.7k	RES, 4.7 k, 5%, 0.063 W, AEC-Q200 Grade 0, 0402	CRCW04024K70JNED	Vishay-Dale
R43, R44, R47	3	47.0k	RES, 47.0 k, 1%, 0.0625 W, 0402	RC0402FR-0747KL	Yageo America
R45	1		820 RES, 820, 1%, 0.063 W, 0402	RC0402FR-07820RL	Yageo America

Designator	Quantity	Value	Description	Part Number	Manufacturer
R63	1	330k	RES, 330 k, 1%, 0.0625 W, 0402	RC0402FR-07330KL	Yageo America
S1, S2, S3	3		Switch, SPST, 0.05 A, 12 VDC, SMD	1188E-1K2-V-TR	Diptronics
SH-J1, SH-J2, SH-J3, SH-J4, SH-J5, SH-J6, SH-J7, SH-J8, SH-J9, SH-J14, SH-J16, SH-J17, SH-J18, SH-J19, SH-J20, SH-J21, SH-J22, SH-J23, SH-J24, SH-J25	20	J101: 1-2, J101: 3-4, J101: 5-6, J101: 7-8, J101: 9-10, J101: 11-12, J101: 12-13, J101: 15-16, J101: 17-18, J18: 1-2, J6: 1-2, J7: 1-2, J8: 1-2, J9: 1-2, J13: 1-2, J15: 1-2, J19: 1-2, J20: 1-2, J21: 1-2, J22: 1-2	Shunt, 100mil, Gold plated, Black	SNT-100-BK-G	Samtec
T1	1	-20V	MOSFET, P-CH, -20 V, -0.82 A, SOT-323	DMG1013UW-7	Diodes Inc.
T2	1	45 V	Transistor, NPN, 45 V, 0.1 A, SOT-323	BC850CW,115	NXP Semiconductor
U1	1		Mixed-Signal Microcontrollers	XMSM0L1117SPTR	Texas Instruments
USB1	1		Cable, USB-A to micro USB-B, 0.3 m	AK67421-0.3	Assmann WSW
USB2	1		Receptacle, USB 2.0, Micro B, 5 Position, R/A, SMT	1.05E+09	Molex
XDS1	1		MSP432E401YTPDT, PDT0128A (TQFP-128)	MSP432E401YTPDTR	Texas Instruments
XDS2	1		MSP430G2x52, MSP430G2x12 Mixed Signal Microcontroller, RSA0016B (VQFN-16)	MSP430G2452IRSA16R	Texas Instruments
Y1	1		Crystal, 32.768 kHz, 12.5 pF, SMD	FC-135 32.7680KA-A3	Epson
Y2	1		Crystal, 16 MHz, 8pF, SMD	NX3225GA-16.000M-STD-CRG-1	NDK

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## 6 Related Documentation

### 6.1 Supplemental Content

The following items are important learning materials to get started with MSPM0.

- [MSPM0 Academies](#)
- [MSPM0-SDK Code examples](#)
- [TI Precision Labs](#)

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