*EVM User's Guide: LP-MSPM0C1106*

# *LP-MSPM0C1106 Evaluation Module*

## Description

The MSPM0C1106 LaunchPad™ development kit is an easy-to-use evaluation module for the MSPM0C1106 microcontroller (MCU). The LaunchPad kit contains everything needed to start development on the MSPM0C1106 microcontroller platform, including an onboard debug probe for programming, debugging, and EnergyTrace™ technology. The board also features two onboard buttons and two LEDs for quick integration of a simple user interface.

## Get Started

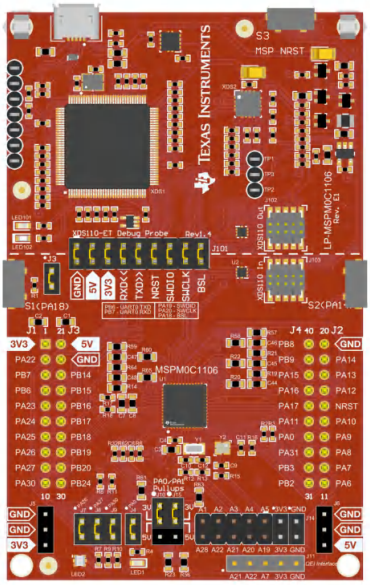
1. Order the LP-MSPM0C1106 from ti.com.
2. Navigate to dev.ti.com to browse for code examples.
3. Plug LP-MSPM0C1106 into a PC with USB cable.
4. Download code directly from the browser to the LP-MSPM0C1106 with CCS Cloud.
5. Download CCS Theia for a desktop integrated development environment.
6. Download 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, one RGB LED, and one red LED
- External clock crystals
- EnergyTrace technology available for ultra-low-power debugging

## 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-MSPM0C1106**

# 1 Evaluation Module Overview

## 1.1 Introduction

The MSPM0C1106 is an Arm® Cortex® M0+ 32-bit CPU with memory protection unit and a frequency up to 32MHz. The device can be used in a variety of tasks from personal electronics to smart metering. The easiest way to get started with the MSPM0C1106 is with the LP-MSPM0C1106 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 environmental sensing and much more. Design you 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 after the MSPM0C1106 SDK released completely.

Free software development tools are also available, such as TI's Code Composer Studio™ IDE. TI also supports 3rd party IDEs, such as IAR Embedded Workbench® IDE and Arm®Keil®µVision® IDE. Code Composer Studio IDE supports EnergyTrace technology with the MSPM0C1106 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-MSPM0C1106 LaunchPad Development Kit
- USB cable
- Quick-start guide

## 1.3 Specification

LP-MSPM0C1106 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-MSPM0C1106 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 build 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-MSPM0C1106 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 |
| MSP430G2452IRSA16R | Mixed-Signal Microcontroller with 16-bit RISC CPU, 8kB Flash, and 256B SRAM | DC/DC controller for EnergyTrace Technology |
| MSPM0C1106SRGZR | Mixed-Signal Microcontroller with 32MHz Arm Cortex 32-bit-M0+ CPU, 64kB flash, and 8kB SRAM | Evaluation device |
| TPS73533DRBT | 500mA, adjustable, low quiescent current, low-noise, high-PSRR, single-output LDO regulator | 3.3V power XDS110 and MSPM0C1106 |
| TPD4E004DRYR | ESD-protection array for high-speed data interfaces, 4 channels | Protect LP-MSPM0C1106 from ESD damage through USB connector |
| TPD6E004RSER | ESD-protection array for high-speed data interfaces, 6 channels | Protect LP-MSPM0C1106 from ESD damage through debug connector |
| TPS2102DBVR | 2.7V to 4V power mux, dual-input, single-output power switch | Switches XDS110 power |
| LM4040B25IDCKR | Precision micropower shunt voltage reference | Voltage reference for XDS110 debugger |

# 2 Hardware

## 2.1 Hardware Overview

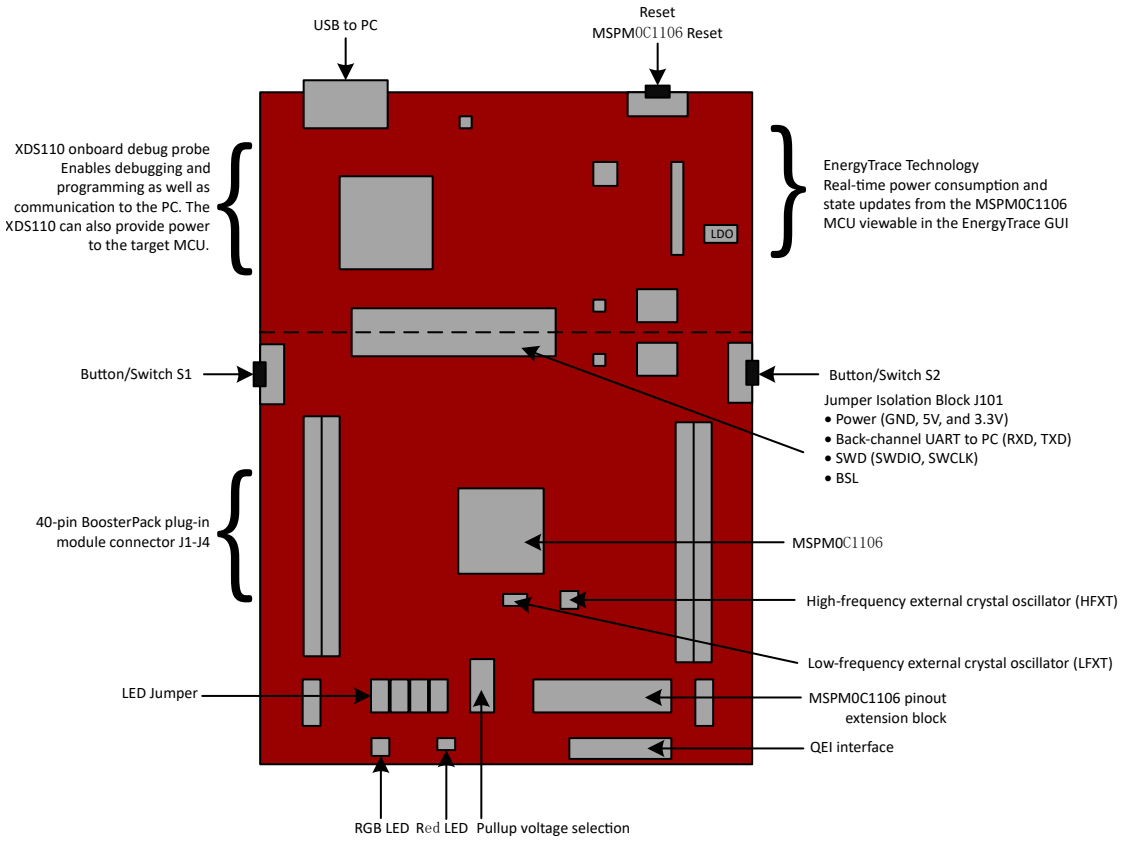



**Figure 2-1. Diagram of LP-MSPM0C1106 Jumpers and Connection**

LP-MSPM0C1106 has many hardware features, which allows the user full access to the MSPM0C1106 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 and J3 | BoosterPack header block 1 | Unpopulated | BoosterPack standard connection for pins 1-20 |
| J2 and J4 | BoosterPack header block 2 | Unpopulated | BoosterPack standard connection for pins 21-40 |
| J3 | BSL invoke | Populated | Connect PA18 to the S1 button |
| J4 | Red LED | Populated | Connect PA0 to the Red LED |
| J7 | RGB (Blue) LED | Populated | Connect PB20 to the RGB (Blue) LED |
| J8 | RGB (Red) LED | Populated | Connect PB24 to the RGB (Red) LED |
| J9 | RGB (Green) LED | Populated | Connect PA30 to the RGB (Green) LED |
| J10 | Open drain pull-up selector | Populated: top and center (1-2) | Pull-up selector for 3.3 or 5V connection for PA0 |
| J15 | Open drain pull-up selector | Populated: top and center (1-2) | Pull-up selector for 3.3 or 5V connection for PA1 |

## 2.2 Power Requirements

The LP-MSPM0C1106 only needs the USB plugged in and debugger jumper block populated to power the device. With the onboard LDO, the 5V USB supply is converted to 3.3V with a supply of 500mA. The LaunchPad can also be powered by 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.

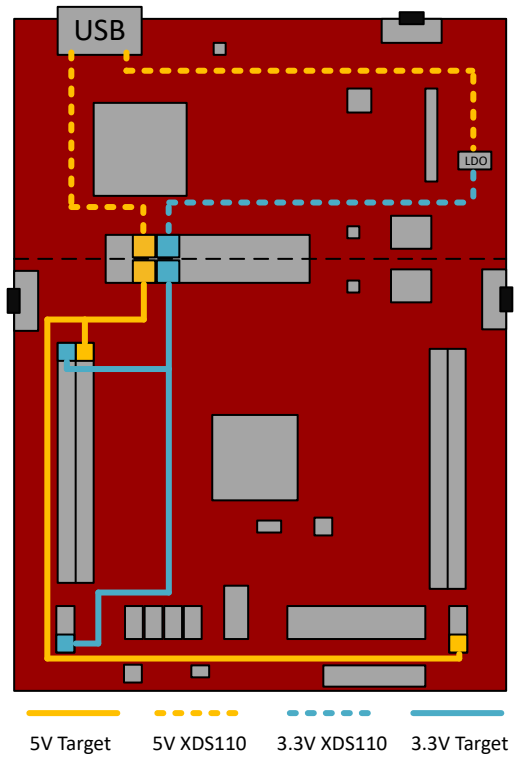



**Figure 2-2. LP-MSPM0C1106 Power Connections**

## 2.3 XDS110 Debug Probe

LP-MSPM0C1106 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 MSPM0C1106 circuitry, which is shown by the dashed silkscreen on the LaunchPad. The XDS110 is only connected through signals that pass through J101, in addition to a common ground.

### Isolation Jumper Block

The isolation jumper block J101 allows the user to connect or disconnect signals that cross from the XDS110 domain into the MSPM0C1106 target domain. This includes XDS110 SWD signals, application UART signals, 3.3V and 5V power, and reset.

**Table 2-2. Isolation Jumper Block**

| Jumper | Description |
|---|---|
| 5V | 5V rail from the USB |
| 3V3 | 3.3V rail from the LDO |
| RXD<< | Backchannel UART: The target MSPM0C1106 receives data through this signal. The arrows indicate the direction of the signal. |
| TXD>> | Backchannel UART: The target MSPM0C1106 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. |

## 2.4 Measure Current Draw of the MSPM0C1106

To measure the current draw of the MSPM0C1106 MCU using a multimeter, use the 3V3 jumper on the J101 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:

1. Remove the 3V3 jumper in the J101 isolation block, and attach an ammeter across the 3V3 jumper.
2. Consider the effect that the backchannel UART and any circuitry attached to the MSPM0C1106 can have on the current draw. Consider disconnecting the backchannel uart at the isolation jumper block, or at least consider the current sinking and sourcing capability in the final measurement.
3. Make sure there are no floating inputs or outputs (I/Os) on the MSPM0C1106. 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.
4. Begin target execution.
5. For the most accurate current measurements, place the device in Free Run mode and disconnect programming signals between the MSPM0C1106 and the debug portion of the board (header J101).
6. Measure the current. Remember 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 by default with an accuracy of 2.5%. The MCLK is sourced by the SYSOSC by 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, one high-frequency 32MHz crystal (HFXT), and one low-frequency 32.768kHz crystal (LFXT). The crystals can be selected during application programming as the clock source for the high frequency and low frequency clocks. For mre clock tree details, see the Clock Module (CKM) section of the MSPM0 C-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 MSPM0C1106 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 MSPM0C1106 device pin function configuration in software.

## 3 Software

### 3.1 Software Development Options

There are multiple ways to prototype with LP-MSPM0C1106:

- Out-of-box GUI - Choose this option for an easy demo of the LP-MSPM0C1106.
- 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
- CCS Eclipse - This option is supported but is a legacy tool and is not covered in this guide.

### 3.2 Out-of-Box GUI

Get started with the out-of-box example on LP-MSPM0C1106. Simply navigate to the Out-of-Box GUI and plug in LP-MSPM0C1106 to a PC, Mac, or Linux workstation. This GUI provides control of the build in LED and a dashboard of the current state of LP-MSPM0C1106. TI Cloud Agent browser extension can be necessary for the GUI functionality.

More GUI information are available after full releasing and can be found on TI Developer Zone

### 3.3 CCS Cloud

1. Navigate to dev.ti.com. User are required to install CCS Cloud Agent. If CCS Cloud Agent is not installed yet, then follow the steps to complete this installation.
2. Plug LP-MSPM0C1106 using a micro-USB cable. TI Developer Zone automatically detects that LPMSPM0C1106 has been plugged in.
3. Click Browse Software And Examples, which opens the MSPM0 SDK in a new window. 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.
4. Click the Import button at the top right corner of the screen. This action imports the project into CCS Cloud and open in a new window.
5. In CCS Cloud, click the debug icon in the left bar to open the debug view.
6. 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.
7. Click the blue *play* button to start the application.
8. The LED on LP-MSPM0C1106 needs to be blinking.

Now, users are ready to begin prototyping by modifying the code or by importing a different example code

# 4 Hardware Design Files

## 4.1 Schematics

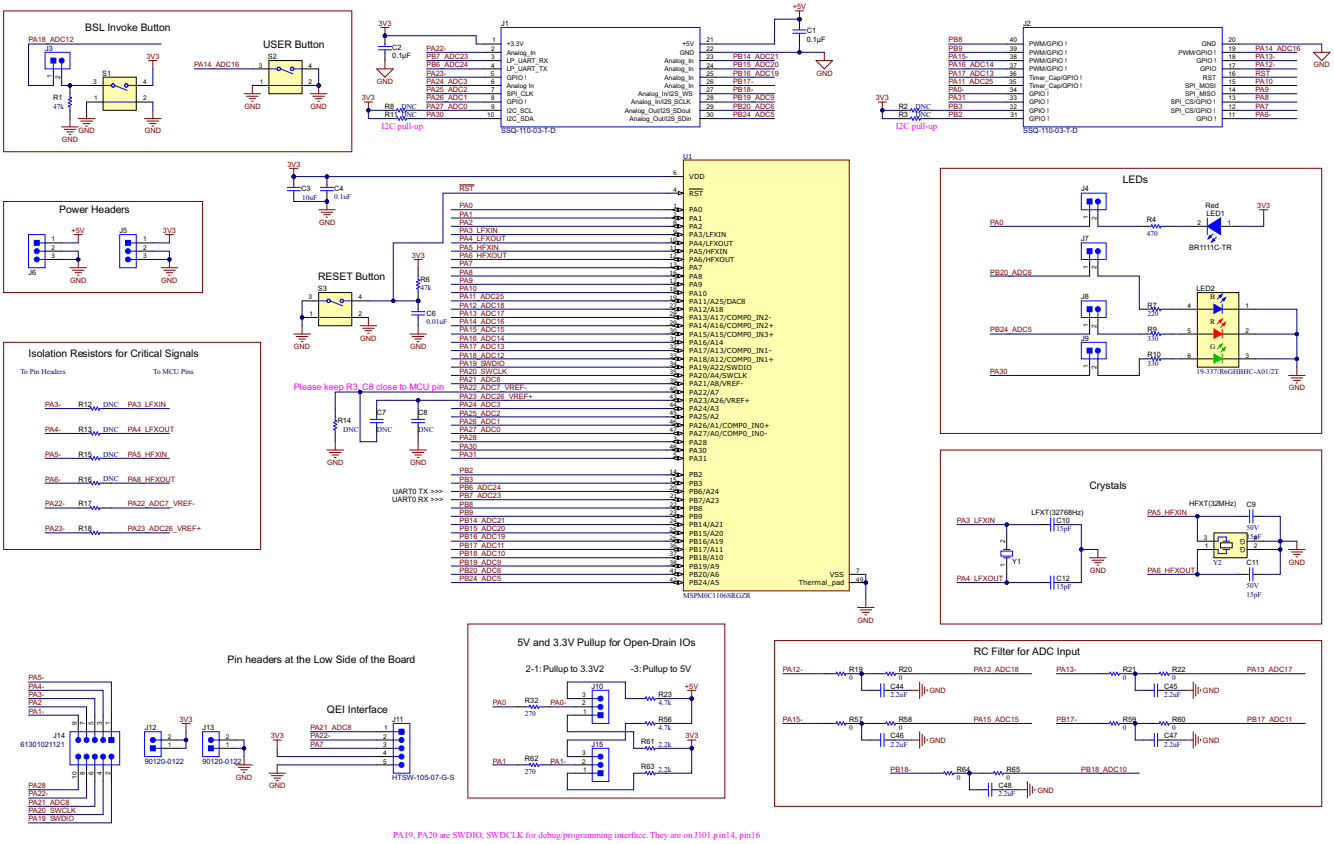



**Figure 4-1. LP-MSPM0C1106 Target Device Schematic**

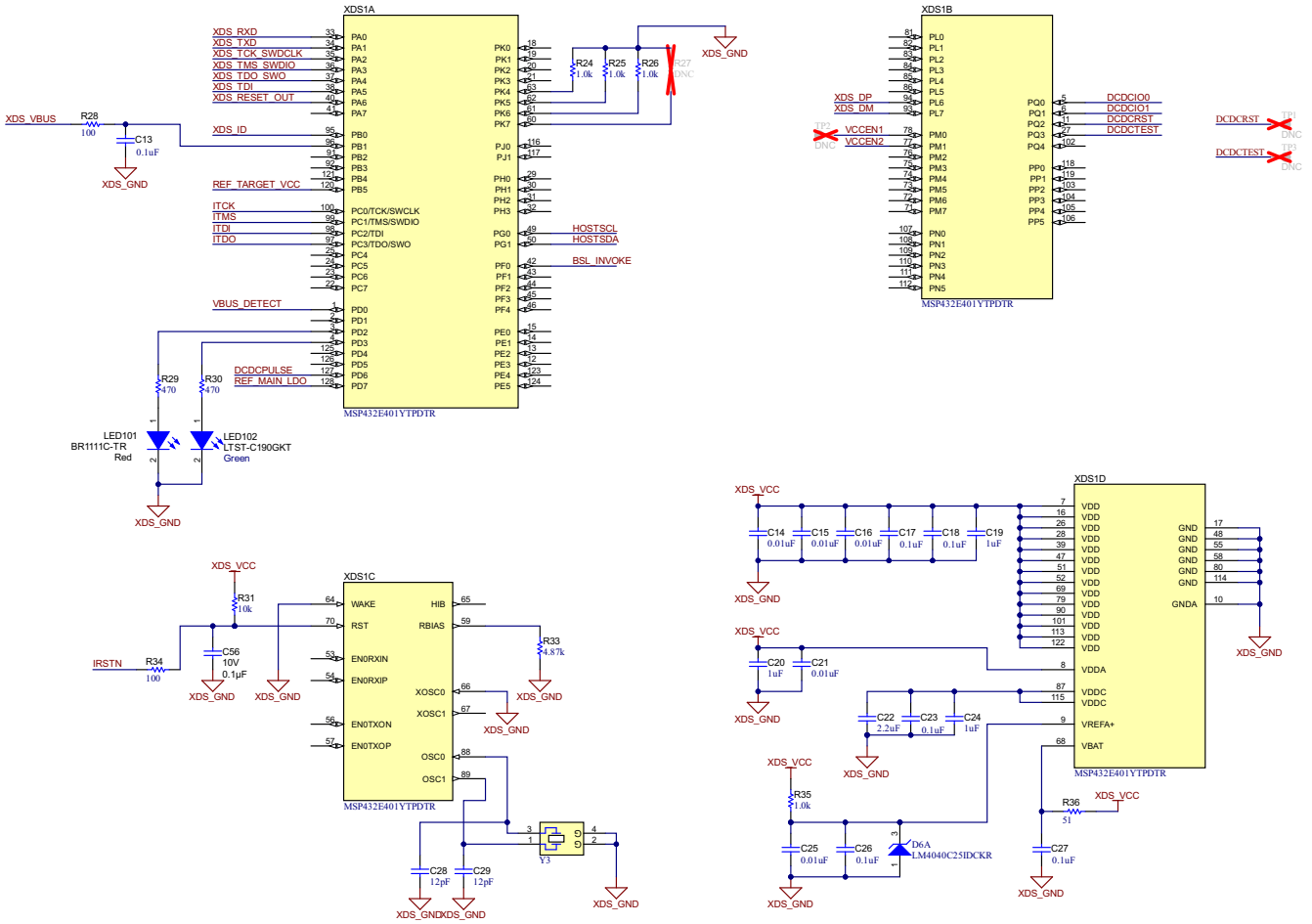



**Figure 4-2. LP-MSPM0C1106 Target Device Schematic**

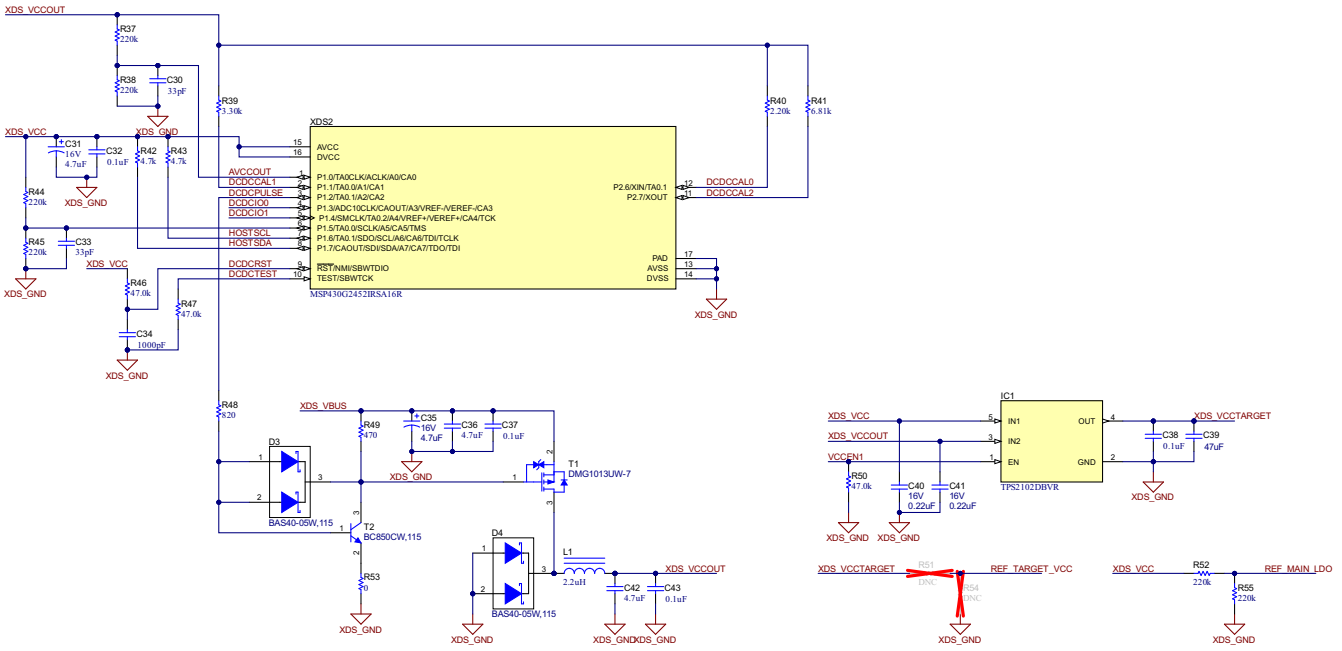



**Figure 4-3. LP-MSPM0C1106 Target Device Schematic**

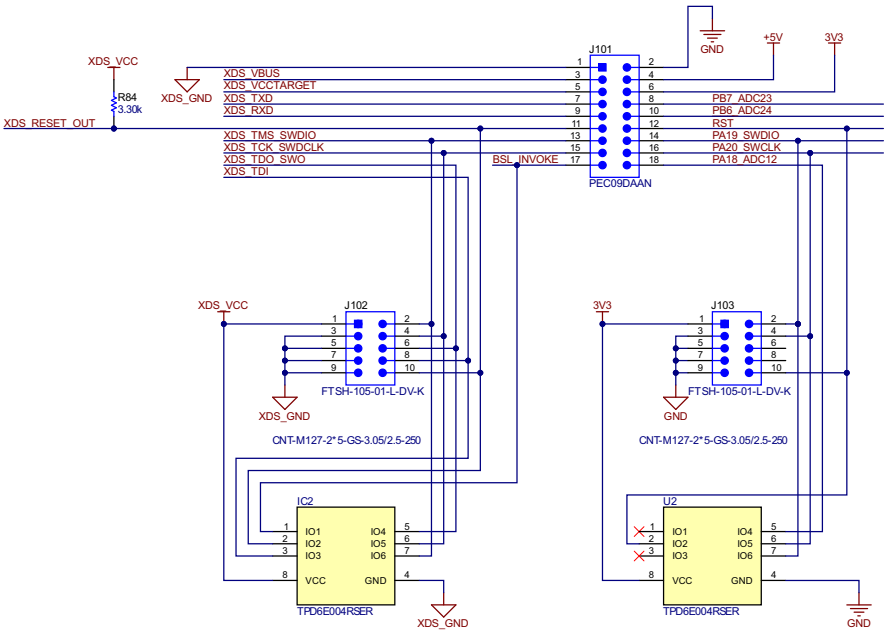



**Figure 4-4. LP-MSPM0C1106 Target Device Schematic**

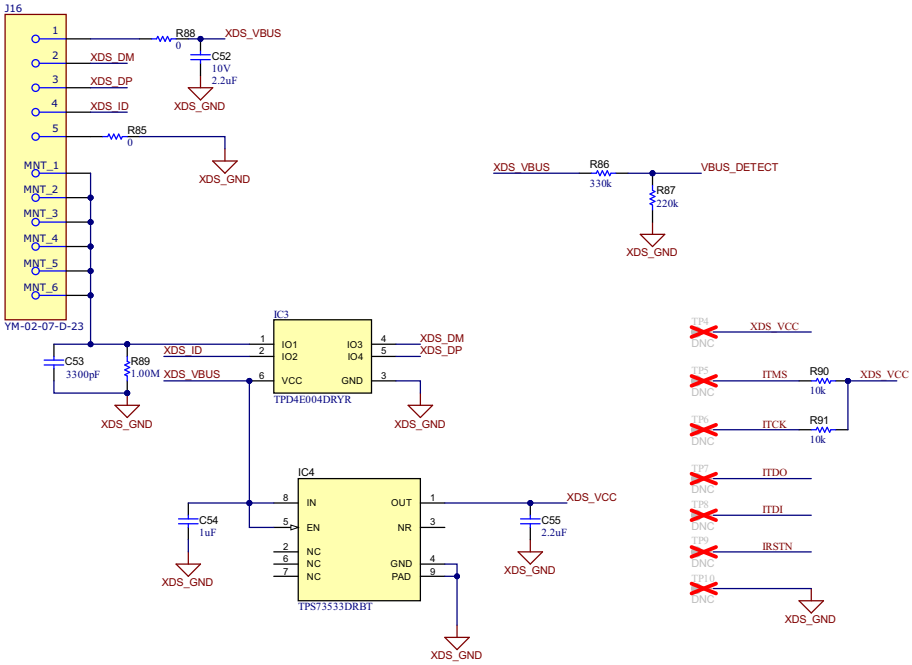



**Figure 4-5. LP-MSPM0C1106 Target Device Schematic**

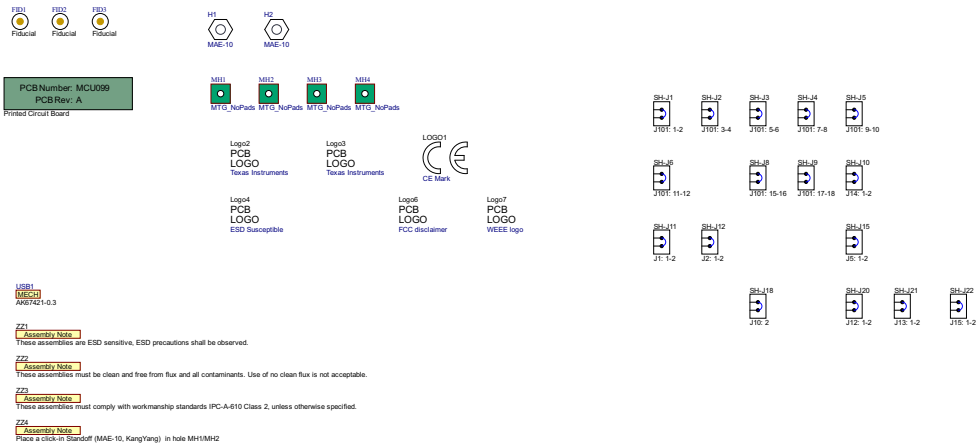



**Figure 4-6. LP-MSPM0C1106 Target Device Schematic**

## 4.2 PCB Layouts

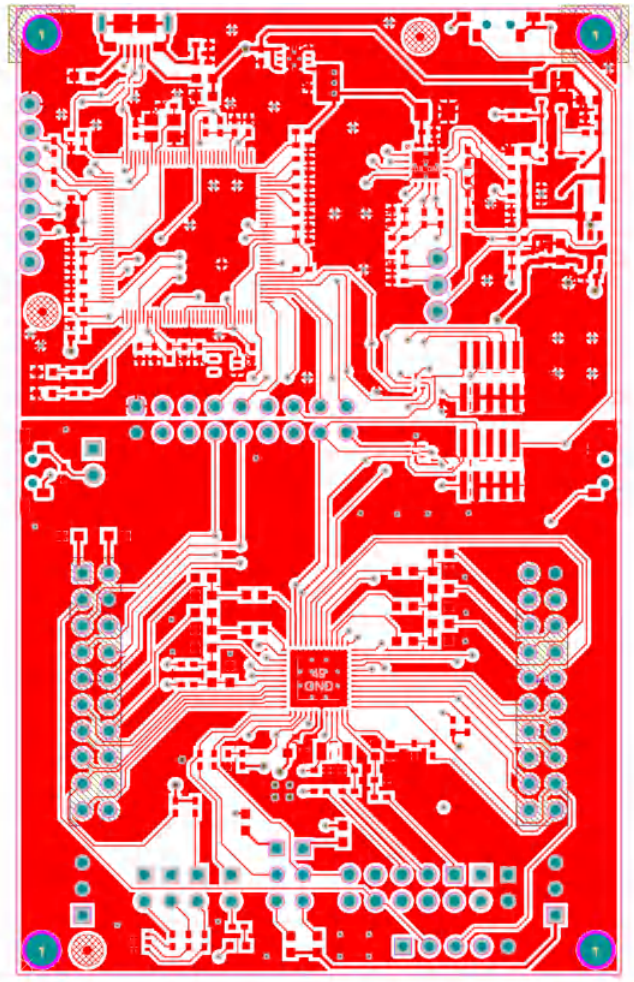



**Figure 4-7. Layer 1: Signal and Power (Top View)**

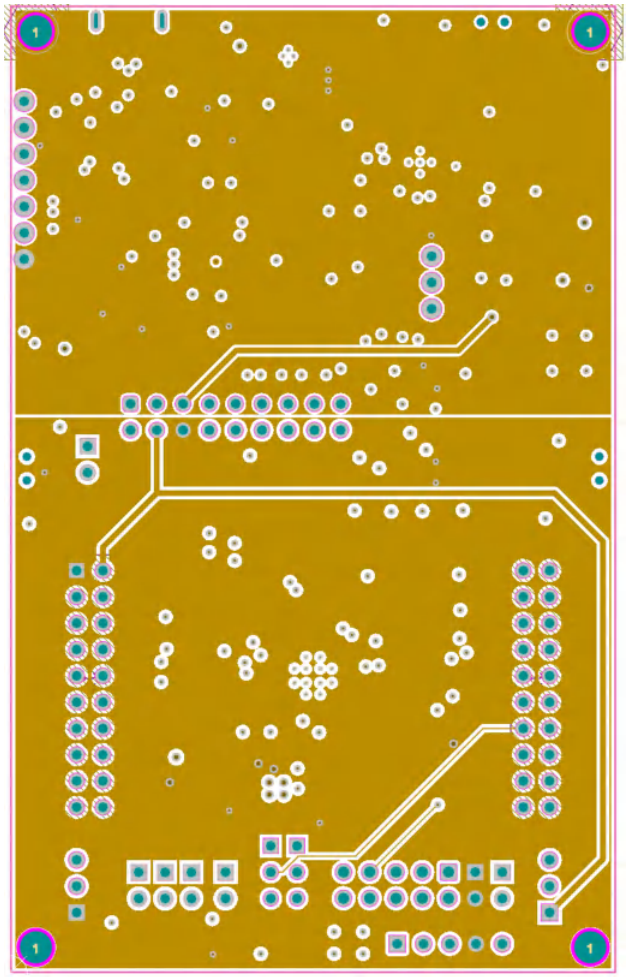


**Figure 4-8. Layer 2: VDD**

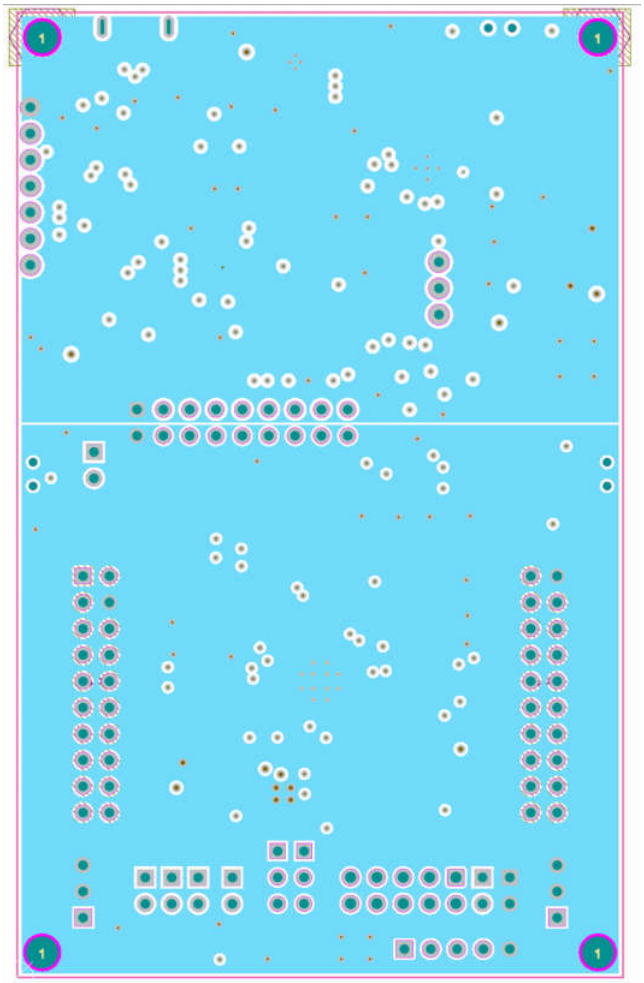


**Figure 4-9. Layer 3: GND**

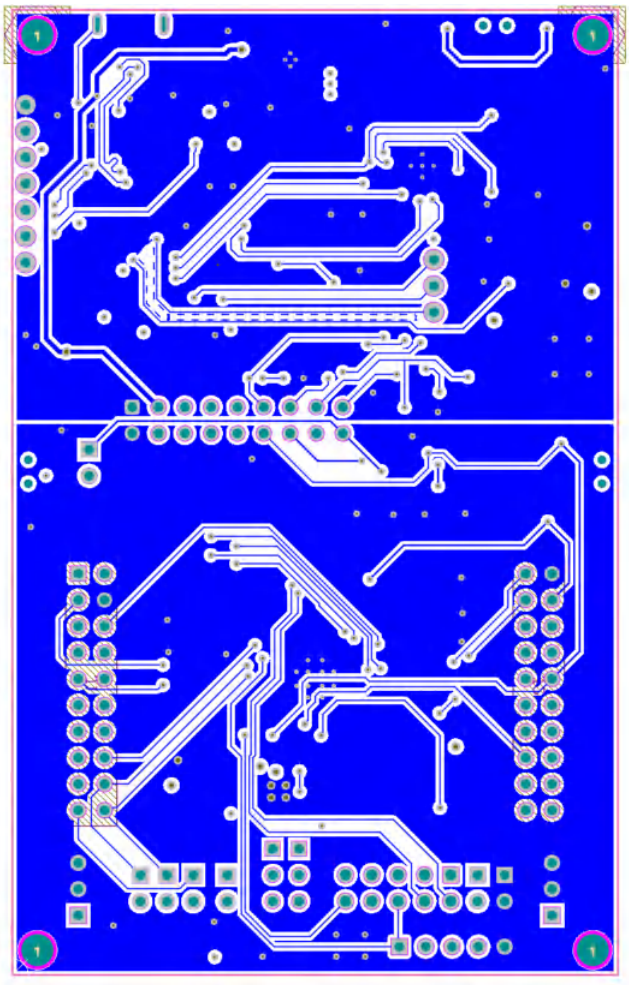


**Figure 4-10. Layer 4: Signal (Bottom View)**

## 4.3 Bill of Materials (BOM)

**Table 4-1. Bill of Materials**

| Designator | Quantity | Value | Description | Part Number | Package Reference | Manufacturer |
|---|---|---|---|---|---|---|
| SH-J1, SH-J2, SH-J3, SH-J4, SH-J5, SH-J6, SH-J8, SH-J9, SH-J10, SH-J11, SH-J12, SH-J15, SH-J18, SH-J20, SH-J21, SH-J22 | 16 | J101: 1-2, J101: 3-4, J101: 5-6, J101: 7-8, J101: 9-10, J101: 11-12, J101: 15-16, J101: 17-18, J14: 1-2, J1: 1-2, J2: 1-2, J5: 1-2, J10: 2, J12: 1-2, J13: 1-2, J15: 1-2 | Shunt, 100mil, Gold plated, Black | 2228CG | SNT-100-BK-G | Nextron |
| R19, R20, R21, R22, R53, R57, R58, R59, R60, R64, R65, R85, R88 | 13 | 0 | RES, 0, 5%, 0.1 W, 0603 | RC0603JR-070RL | 0603 | Yageo |
| C13, C17, C18, C23, C26, C27, C32, C37, C38, C43 | 10 | 0.1uF | CAP, CERM, 0.1uF, 10V, +/- 10%, X5R, 0402 | CC0402KRX5R6BB104 | 0402 | Yageo |
| J3, J4, J7, J8, J9 | 5 | | Header, 100mil, 2x1, Tin, TH | NS-201-SH0386-201S-1*2P(F) | CONN_90120-0122 | NS-TECH |
| C14, C15, C16, C21, C25 | 5 | 0.01uF | CAP, CERM, 0.01 uF, 25V, +/- 10%, X7R, 0402 | CC0402KRX7R8BB103 | 0402 | Yageo |
| R37, R38, R44, R45, R87 | 5 | 220k | RES, 220 k, 1%, 0.0625 W, 0402 | RC0402FR-07220KL | 0402 | Yageo America |
| C19, C20, C24, C54 | 4 | 1uF | CAP, CERM, 1uF, 25V, +/- 10%, X5R, 0402 | CC0402KRX5R8BB105 | 0402 | Yageo |
| R24, R25, R26, R35 | 4 | 1.0k | RES, 1.0 k, 5%, 0.063 W, 0402 | AC0402JR-071KL | 0402 | Yageo |
| R4, R29, R30, R49 | 4 | 470 | RES, 470, 5%, 0.063 W, 0402 | AC0402JR-07470RL | 0402 | Yageo |
| S1, S2, S3 | 3 | | Switch, SPST, 0.05A, 12 VDC, SMD | THBM02-LAB | SW_1188E | HONGJU |
| R31, R90, R91 | 3 | 10k | RES, 10 k, 5%, 0.063 W, 0402 | AC0402JR-0710KL | 0402 | Yageo |
| FID1, FID2, FID3 | 3 | | Fiducial mark. There is nothing to buy or mount. | Fiducial | Fiducial10-30 | N/A |
| R46, R47, R50 | 3 | 47.0k | RES, 47.0 k, 1%, 0.0625 W, 0402 | RC0402FR-0747KL | 0402 | Yageo America |
| D3, D4 | 2 | 40V | Diode, Schottky, 40V, 0.12A, AEC-Q101, SOT-323 | BAS40-05W,115 | SOT-323 | Nexperia |
| LED1, LED101 | 2 | Red | LED, Red, SMD | LTST-C190KRKT | 1111C_Red | LITE-ON |
| C9, C11 | 2 | 15pF | CAP, CERM, 15pF, 50V, +/- 5%, C0G/NP0, 0402 | CC0402JRNPO9BN150 | 0402 | Yageo America |

**Table 4-1. Bill of Materials (continued)**

| Designator | Quantity | Value | Description | Part Number | Package Reference | Manufacturer |
|---|---|---|---|---|---|---|
| C1, C2 | 2 | 0.1uF | CAP, CERM, 0.1µF, 25V,+/- 10%, X5R, 0603 | CC0603KRX5R8BB104 | 0603 | Yageo |
| R42, R43 | 2 | 4.7k | RES, 4.7 k, 5%, 0.063 W, 0402 | AC0402JR-074K7L | 0402 | Yageo |
| R1, R6 | 2 | 47k | RES, 47 k, 5%, 0.063 W, 0402 | AC0402JR-0747KL | 0402 | Yageo |
| R28, R34 | 2 | 100 | RES, 100, 5%, 0.063 W, AEC-Q200 Grade 0, 0402, RES, 100, 5%, 0.063 W, 0402 | AC0402JR-07100RL | 0402 | Yageo |
| R52, R55 | 2 | 220k | RES, 220 k, 5%, 0.063 W, AEC-Q200 Grade 0, 0402 | AC0402JR-07220KL | 0402 | Yageo |
| R32, R62 | 2 | 270 | RES, 270, 5%, 0.063 W, 0402 | AC0402JR-07270RL | 0402 | Yageo |
| R9, R10 | 2 | 330 | RES, 330, 5%, 0.063 W, 0402 | AC0402JR-07330RL | 0402 | Yageo |
| R39, R84 | 2 | 3.30k | RES, 3.30 k, 1%, 0.1 W, AEC-Q200 Grade 0, 0402 | AC0402FR-073K3L | 0402 | Yageo |
| J102, J103 | 2 | | Header(Shrouded), 1.27mm, 5x2, Gold, SMT | GTEC201-0502A001R1BF | Samtec_FTSH-105-01-x-DV-K | Greenconn |
| C22, C55 | 2 | 2.2uF | CAP, CERM, 2.2uF, 6.3V, +/- 10%, X5R, 0402 | CC0402KRX5R5BB225 | 0402 | Yageo |
| C40, C41 | 2 | 0.22uF | CAP, CERM, 0.22uF, 16V, +/- 10%, X7R, 0402 | CC0402KRX7R7BB224 | 0402 | Yageo |
| C36, C42 | 2 | 4.7uF | CAP, CERM, 4.7uF, 16V, +/- 10%, X5R, 0603 | CC0603KRX5R7BB475 | 0603 | Yageo |
| C28, C29 | 2 | 12pF | CAP, CERM, 12pF, 50V, +/- 5%, C0G/NP0, 0402 | CC0402JRNPO9BN120 | 0402 | Yageo |
| C10, C12 | 2 | 15pF | CAP, CERM, 15pF, 50V, +/- 5%, C0G/NP0, 0402 | CC0402JRNPO9BN150 | 0402 | Yageo |
| C30, C33 | 2 | 33pF | CAP, CERM, 33pF, 50V, +/- 5%, C0G/NP0, 0402 | CC0402JRNPO9BN330 | 0402 | Yageo |
| H1, H2 | 2 | | Spacer Support, Nylon 66 | MAE-10 | KY_MAE-10 | Kang Yang |
| J10, J15 | 2 | | Header, 100mil, 3x1, Tin, TH | NS-201-SH0385-201S-1*3P(F) | CONN_PEC03SAAN | NS-TECH |
| R17, R18 | 2 | 0 | RES, 0, 5%, 0.063 W, 0402 | RC0402JR-070RL | 0402 | Yageo America |
| R61, R63 | 2 | 2.2k | RES, 2.2 k, 5%, 0.1 W, 0603 | RC0603JR-072K2L | 0603 | Yageo |

**Table 4-1. Bill of Materials (continued)**

| Designator | Quantity | Value | Description | Part Number | Package Reference | Manufacturer |
|---|---|---|---|---|---|---|
| R23, R56 | 2 | 4.7k | RES, 4.7 k, 5%, 0.1 W, 0603 | RC0603JR-074K7L | 0603 | Yageo |
| C31, C35 | 2 | 4.7uF | CAP, TA, 4.7uF, 16V, +/- 10%, 4 ohm, SMD | TAJA475K016RNJ | 3216-18 | AVX |
| IC2, U2 | 2 | | Low-Capacitance + / - 15 kV ESD Protection Array for High-Speed Data Interfaces, 6 Channels, -40 to +85 degC, 8-pin UQFN (RSE), Green (RoHS & no Sb/Br) | TPD6E004RSER | RSE0008A | Texas Instruments |
| LED2 | 1 | Rgb | LED, RGB, SMD | 19-337/R6GHBHC-A01/2T | 19-337_RGB | Everlight |
| USB1 | 1 | | Cable, USB-A to micro USB-B, 0.3m | A006ZX051 | | ZanXin |
| T2 | 1 | 45V | Transistor, NPN, 45V, 0.1A, SOT-323 | BC850CW,115 | SOT-323 | NXP Semiconductor |
| C56 | 1 | 0.1uF | CAP, CERM, 0.1µF, 10V,+/- 10%, X7R, 0402 | CC0402KRX7R6BB104 | 0402 | Yageo |
| C52 | 1 | 2.2uF | CAP, CERM, 2.2uF, 10V, +/- 10%, X5R, 0603 | CC0603KRX5R6BB225 | 0603 | Yageo |
| L1 | 1 | 2.2uH | Inductor, Wirewound, Ceramic, 2.2uH, 0.89A, 0.13 ohm, SMD | CBC2518T2R2M | CBC2518 | Taiyo Yuden |
| R89 | 1 | 1.00Meg | RES, 1.00M, 1%, 0.063W, 0402 | AC0402FR-071ML | 0402 | Yageo |
| R40 | 1 | 2.20k | RES, 2.20 k, 1%, 0.063 W, 0402 | RMCF0402FT2K20 | 0402 | Stackpole |
| R33 | 1 | 4.87k | RES, 4.87 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402 | AC0402FR-074K87L | 0402 | Yageo |
| R41 | 1 | 6.81k | RES, 6.81 k, 1%, 0.063 W, 0402 | AC0402FR-076K81L | 0402 | Yageo |
| R36 | 1 | 51 | RES, 51, 5%, 0.063 W, AEC-Q200 Grade 0, 0402 | AC0402JR-0751RL | 0402 | Yageo |
| R7 | 1 | 220 | RES, 220, 5%, 0.063 W, 0402 | AC0402JR-07220RL | 0402 | Yageo |
| T1 | 1 | -20V | MOSFET, P-CH, -20 V, -0.82 A, SOT-323 | DMG1013UW-7 | SOT-323 | Diodes Inc. |
| C34 | 1 | 1000pF | CAP, CERM, 1000pF, 6.3V, +/- 10%, X5R, 0402 | CC0402KRX7R7BB102 | 0402 | Yageo |

**Table 4-1. Bill of Materials (continued)**

| Designator | Quantity | Value | Description | Part Number | Package Reference | Manufacturer |
|---|---|---|---|---|---|---|
| C6 | 1 | 0.01uF | CAP, CERM, 0.01uF, 16V, +/- 10%, X5R, 0402 | CC0402KRX7R7BB103 | 0402 | Yageo |
| C4 | 1 | 0.1uF | CAP, CERM, 0.1uF, 50V, +/- 20%, X5R, 0402 | CC0402KRX5R9BB104 | 0402 | Yageo |
| C53 | 1 | 3300pF | CAP, CERM, 3300pF, 50V, +/- 10%, X7R, 0402 | CC0402KRX7R9BB332 | 0402 | Yageo |
| C3 | 1 | 10uF | CAP, CERM, 10uF, 6.3V, +/- 20%, X5R, 0603 | CC0603MRX5R5BB106 | 0603 | Yageo |
| C39 | 1 | 47uF | CAP, CERM, 47uF, 6.3V, +/- 20%, X5R, 0603 | CL10A476MQ8QRNC | 0603 | Samsung |
| D6 | 1 | | Precision Micropower Shunt Voltage Reference, 0.2% accuracy, 2.5V, 15ppm / degC, 15mA, -40 to 85 degC, 5-pin SC70 (DCK), Green (RoHS & no Sb/Br) | LM4040B25IDCKR | DCK0005A_N | Texas Instruments |
| LED102 | 1 | Green | LED, Green, SMD | LTST-C190GKT | LED_LTST-C190 | Lite-On |
| XDS2 | 1 | | MSP430G2x52, MSP430G2x12 Mixed Signal Microcontroller, RSA0016B (VQFN-16) | MSP430G2452IRSA16R | RSA0016B | Texas Instruments |
| XDS1 | 1 | | MSP432E401YTPDT, PDT0128A (TQFP-128) | MSP432E401YTPDTR | PDT0128A | Texas Instruments |
| U1 | 1 | | Mixed-Signal Microcontrollers | MSPM0C1106SRGZ | RGZ0048B-MFG | Texas Instruments |
| Y3 | 1 | | Crystal, 16MHz, 8pF, SMD | 5YAA16000082TF80Q3 | NDK_NX3225GA | INTERQUIP |
| J5 | 1 | | Header, 100mil, 3x1, Tin, TH | NS-201-SH0385-201S-1*3P(F) | PEC03SAAN_Launchpad_3V3 | NS-TECH |
| J6 | 1 | | Header, 100mil, 3x1, Tin, TH | NS-201-SH0385-201S-1*3P(F) | PEC03SAAN_Launchpad_5V0 | NS-TECH |
| J101 | 1 | | Header, 2.54mm, 9x2, Tin, TH | NS-201-SH0384-201S-2*9P(F) | Sullins_PxC09DAAN | NS-TECH |
| !PCB1 | 1 | | Printed Circuit Board | Printed Circuit Board | | Any |
| Y2 | 1 | | Crystal, 32MHz, 10pF, SMD | Q22FA1280009200 | XTAL_FA-128 | Epson |
| R86 | 1 | 330k | RES, 330 k, 1%, 0.0625 W, 0402 | RC0402FR-07330KL | 0402 | Yageo America |
| R48 | 1 | 820 | RES, 820, 1%, 0.063 W, 0402 | RC0402FR-07820RL | 0402 | Yageo America |

**Table 4-1. Bill of Materials (continued)**

| Designator | Quantity | Value | Description | Part Number | Package Reference | Manufacturer |
|---|---|---|---|---|---|---|
| J1 | 1 | | Receptacle, 2.54mm, 10x2, Tin, TH | NS-203-SH0135-203S-Y-2*10P(F) | BoosterPack_40pin_J1J3 | NS-TECH |
| J2 | 1 | | Receptacle, 2.54mm, 10x2, Tin, TH | NS-203-SH0135-203S-Y-2*10P(F) | BoosterPack_40pin_J2J4 | NS-TECH |
| IC3 | 1 | | ESD-Protection Array for High-Speed Data Interfaces, 4 Channels, -40 to +85 degC, 6-pin SON (DRY), Green (RoHS & no Sb/Br) | TPD4E004DRYR | DRY0006A | Texas Instruments |
| IC1 | 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 | DBV0005A_N | Texas Instruments |
| IC4 | 1 | | 500mA, Adjustable, Low Quiescent Current, Low-Noise, High-PSRR, Single-Output LDO Regulator, DRB0008A (VSON-8) | TPS73533DRBT | DRB0008A | Texas Instruments |
| Y1 | 1 | | Crystal, 32.768KHz, 12.5pF, SMD | X1A0001410014 | Epson_FC-135 | Epson |
| J16 | 1 | | Micro USB 5F B Type Smt | YM-02-07-D-23 | FP-YM-02-07-D-23_CONN_USB_8MM10_5MM88-MFG | Yang Ming |

# 5 Additional Information

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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

# 7 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

| Changes from Revision * (April 2025) to Revision A (July 2025) | Page |
|---|---|
| • Updated *Features* section | 1 |
| • Updated the *LP-MSPM0C1106 Target Device Schematic* | 8 |
| • Added the *PCB Layouts* section | 11 |
| • Updated the BOM | 15 |

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