

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

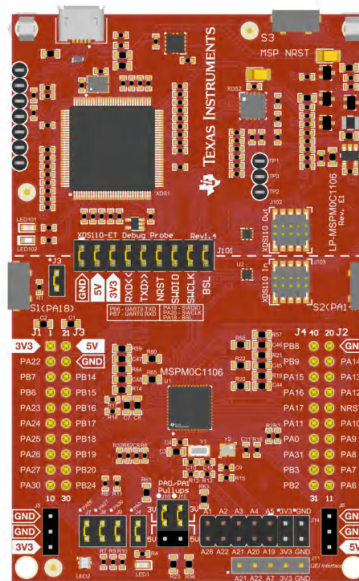
1. Order the LP-MSPM0C1106 from ti.com.
2. Navigate to dev.ti.com to browse for code examples.
3. Plug LP-MSPM0C1106 into a PC with USB cable.
4. Download code directly from the browser to the LP-MSPM0C1106 with CCS Cloud.
5. Download [CCS Theia](#) for a desktop integrated development environment.
6. 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 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 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

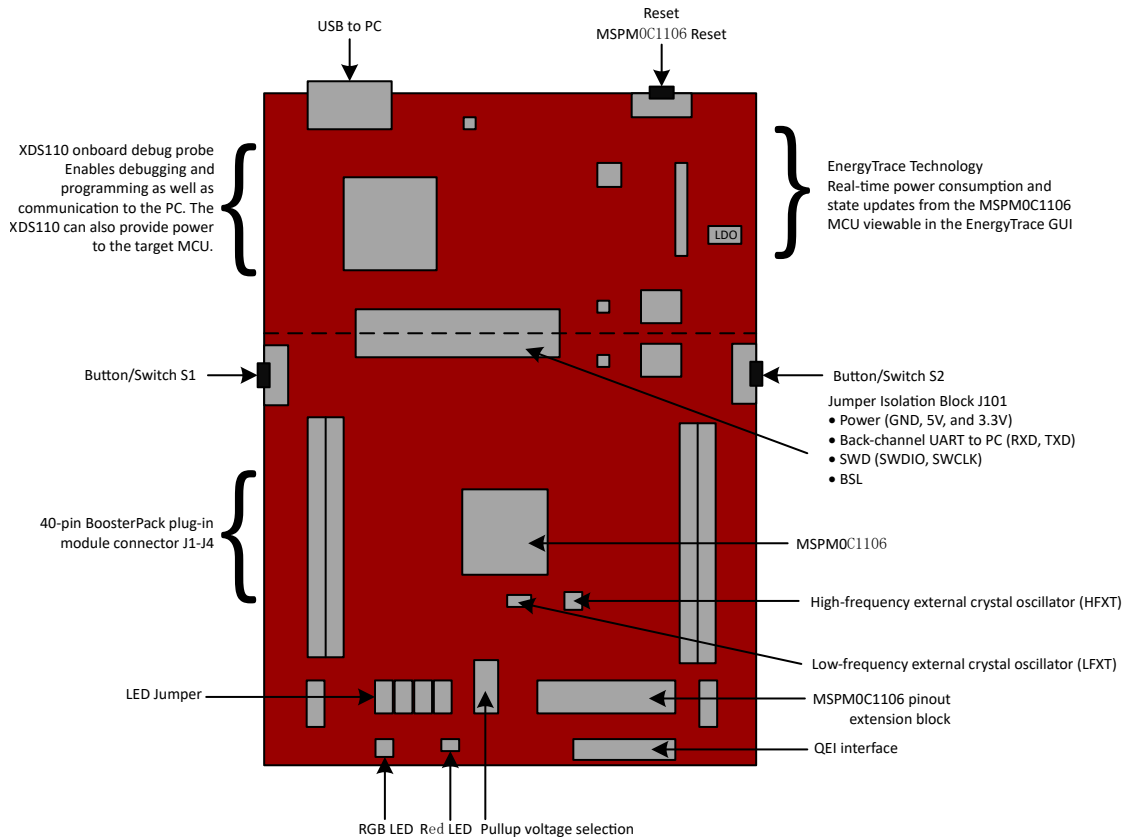


Figure 2-1. Diagram of LP-MSPM0C1106 Jumpers and Connection

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.

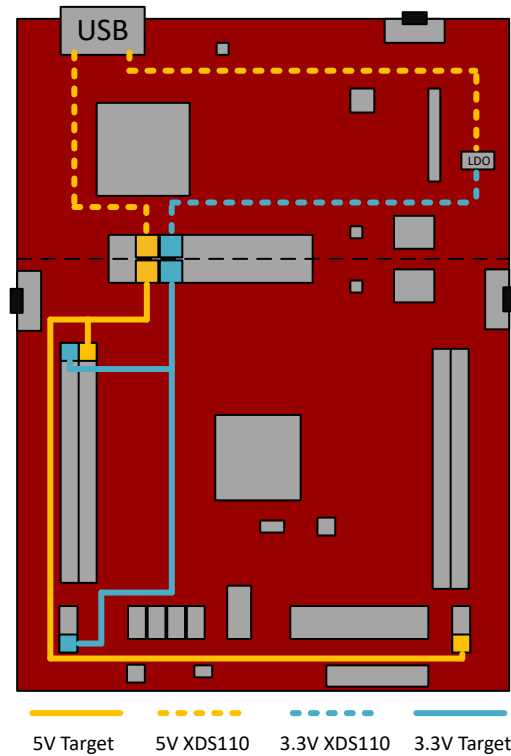


Figure 2-2. LP-MSPM0C1106 Power Connections

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 more 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](#)

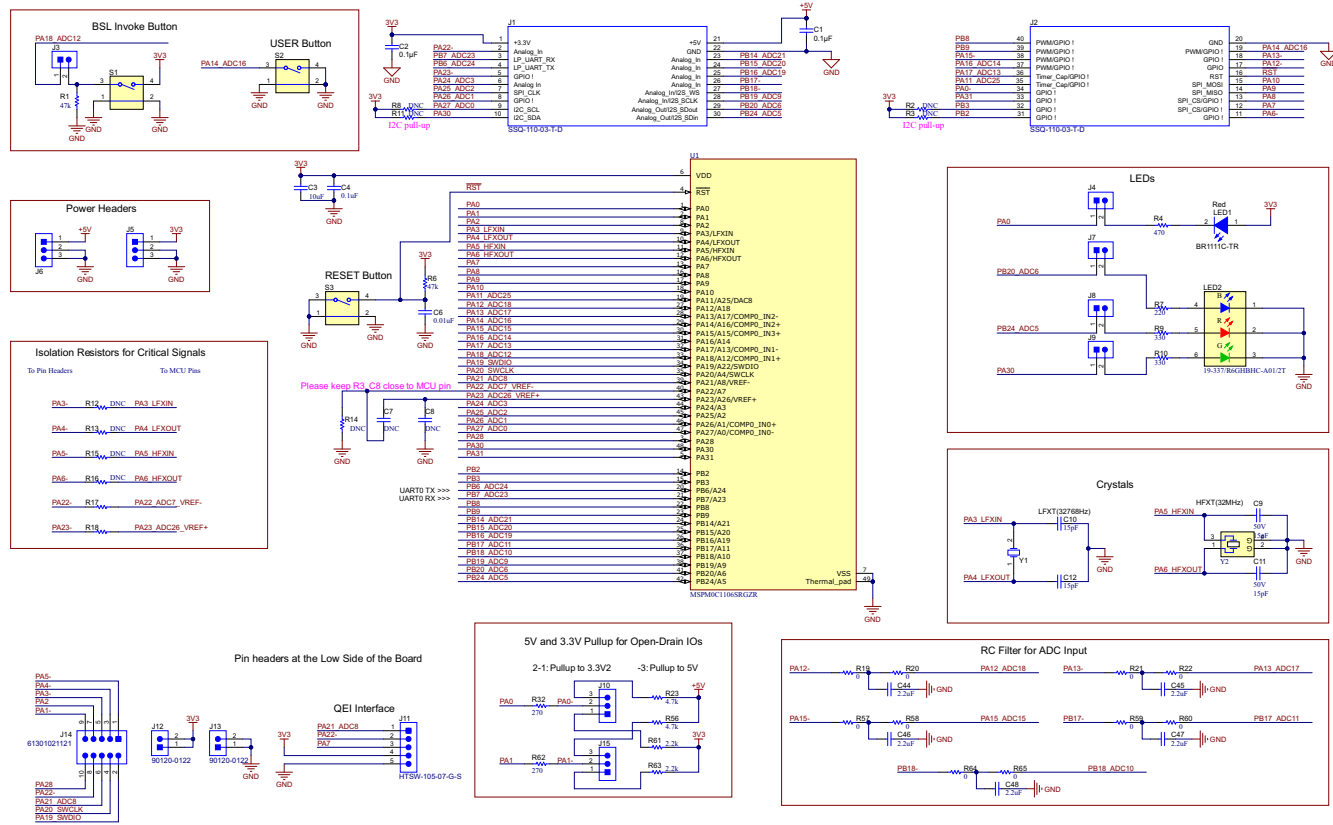
3.3 CCS Cloud

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 LP-MSPM0C1106 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



PA19, PA20 are SWDIO, SWDCLK for debug/programming interface. They are on J101 pin4, pin6

Figure 4-1. LP-MSPM0C1106 Target Device Schematic

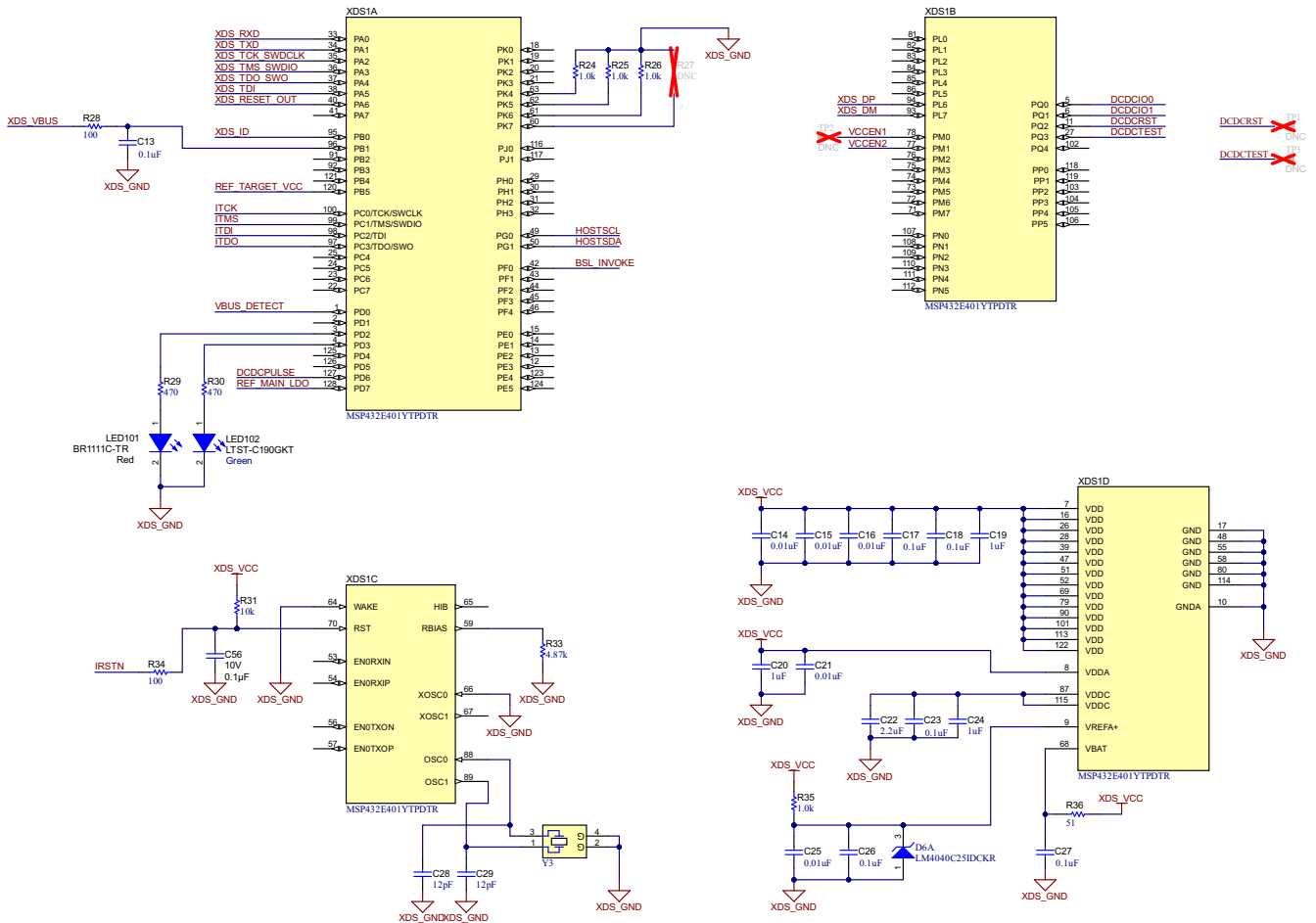


Figure 4-2. LP-MSPM0C1106 Target Device Schematic

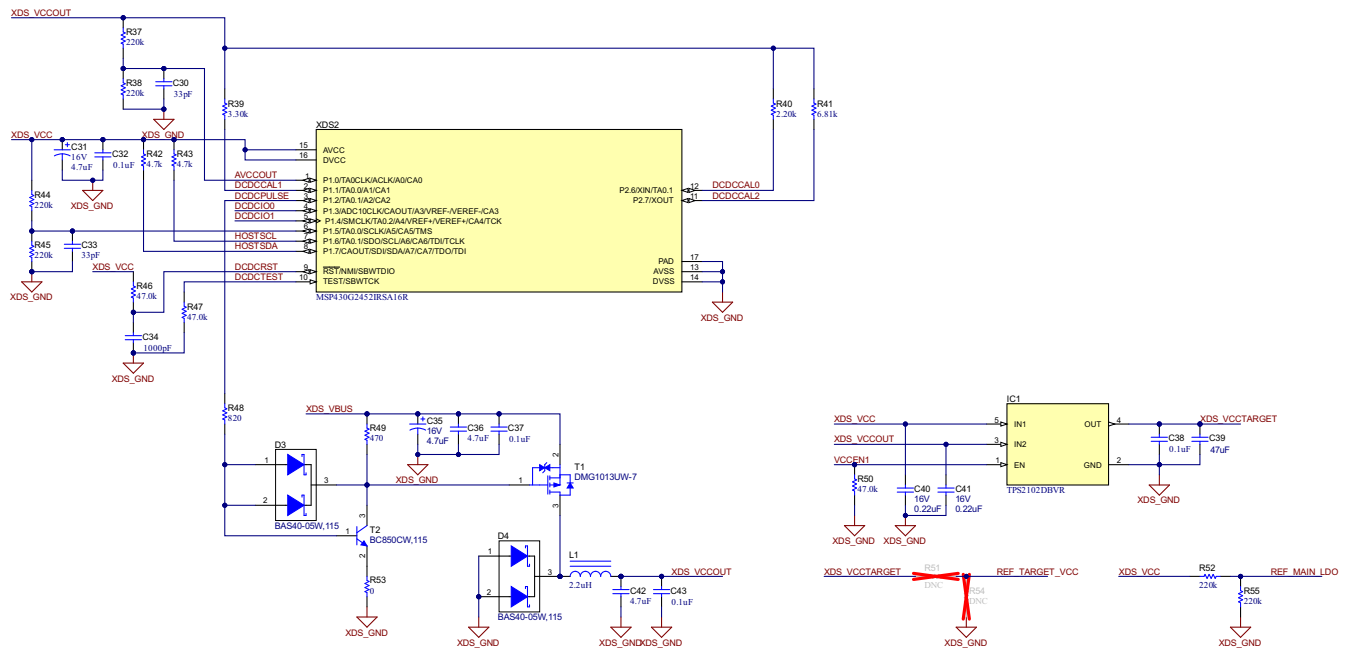


Figure 4-3. LP-MSPM0C1106 Target Device Schematic

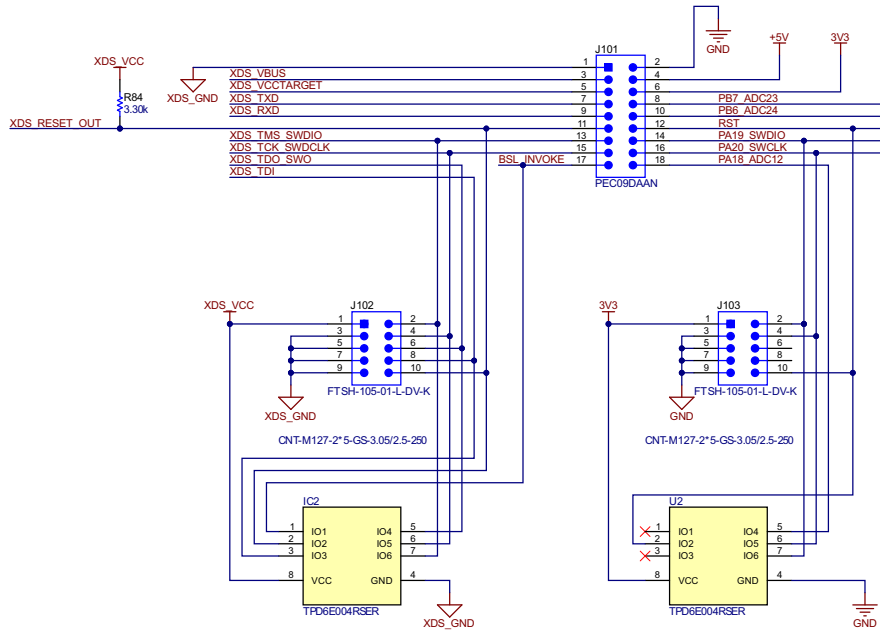


Figure 4-4. LP-MSPM0C1106 Target Device Schematic

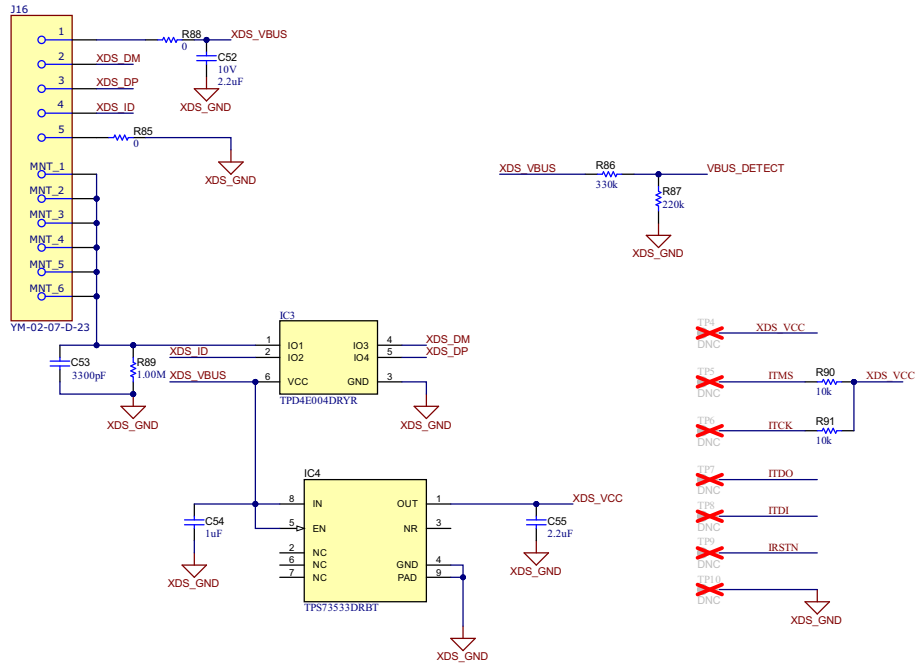


Figure 4-5. LP-MSPM0C1106 Target Device Schematic

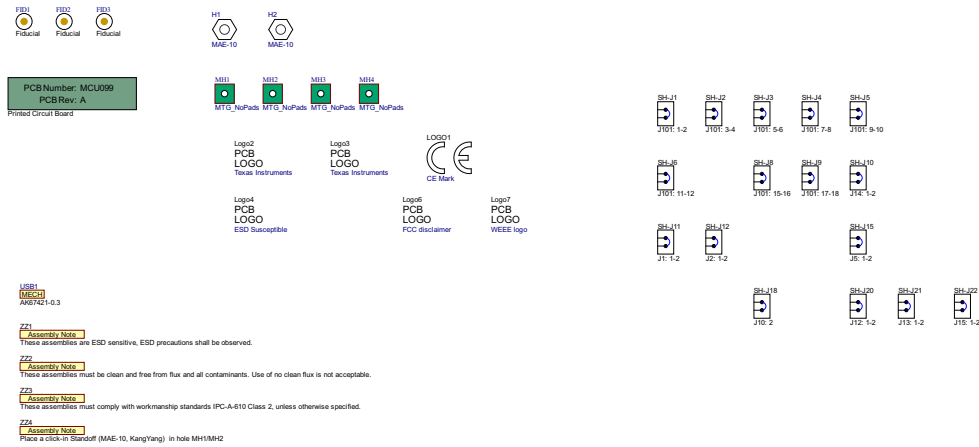


Figure 4-6. LP-MSPM0C1106 Target Device Schematic

4.2 PCB Layouts

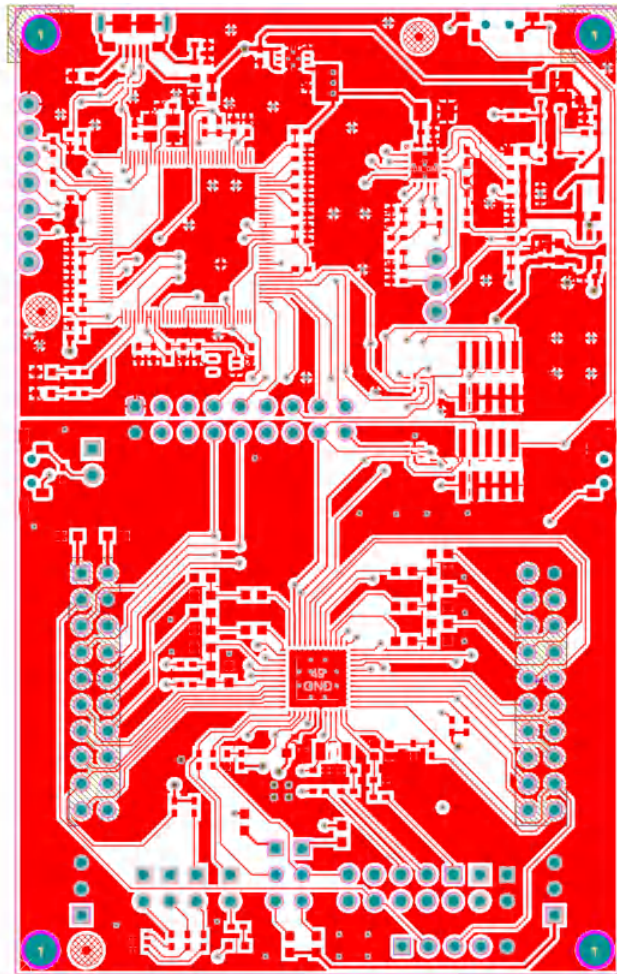


Figure 4-7. Layer 1: Signal and Power (Top View)

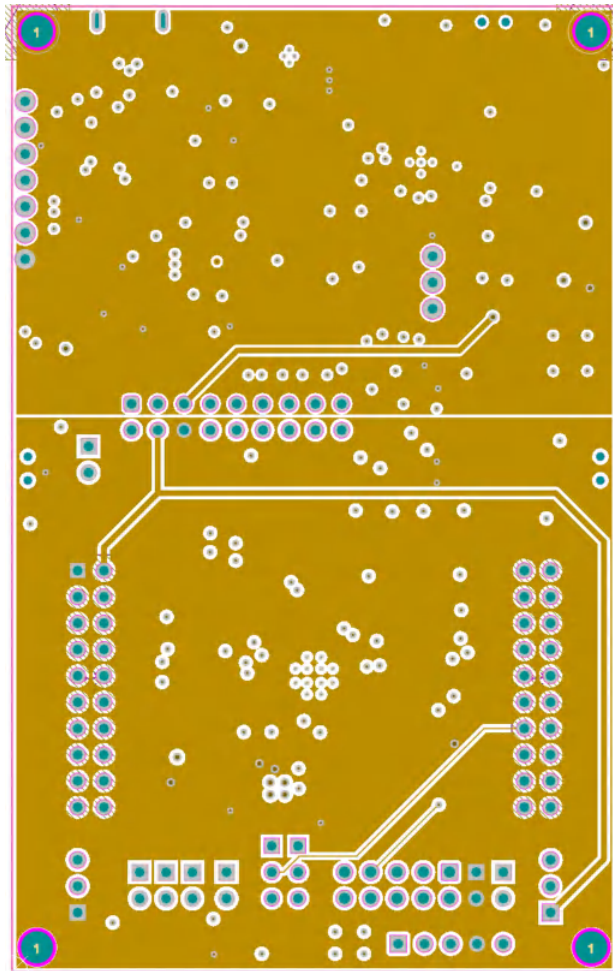


Figure 4-8. Layer 2: VDD

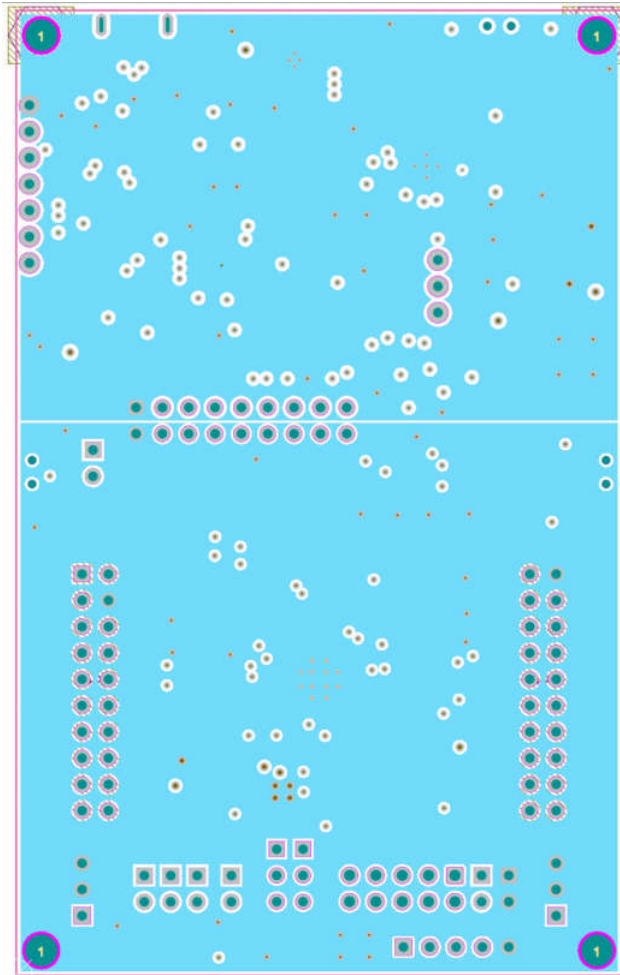


Figure 4-9. Layer 3: GND

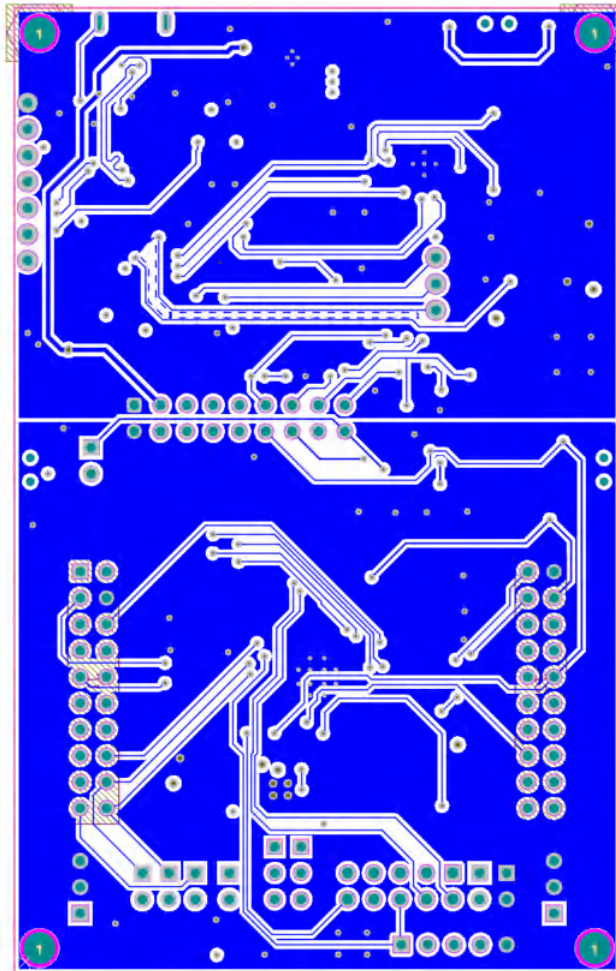


Figure 4-10. Layer 4: Signal (Bottom View)

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	GTEC201-0502A001R1B F	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

5.1 Trademarks

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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 <i>Features</i> section.....	1
• Updated the <i>LP-MSPM0C1106 Target Device Schematic</i>	8
• Added the <i>PCB Layouts</i> section.....	11
• Updated the BOM.....	15

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 - 1.2 EVMs are not intended for consumer or household use. EVMs may not be sold, sublicensed, leased, rented, loaned, assigned, or otherwise distributed for commercial purposes by Users, in whole or in part, or used in any finished product or production system.
2. *Limited Warranty and Related Remedies/Disclaimers:*
 - 2.1 These terms do not apply to Software. The warranty, if any, for Software is covered in the applicable Software License Agreement.
 - 2.2 TI warrants that the TI EVM will conform to TI's published specifications for ninety (90) days after the date TI delivers such EVM to User. Notwithstanding the foregoing, TI shall not be liable for a nonconforming EVM if (a) the nonconformity was caused by neglect, misuse or mistreatment by an entity other than TI, including improper installation or testing, or for any EVMs that have been altered or modified in any way by an entity other than TI, (b) the nonconformity resulted from User's design, specifications or instructions for such EVMs or improper system design, or (c) User has not paid on time. Testing and other quality control techniques are used to the extent TI deems necessary. TI does not test all parameters of each EVM. User's claims against TI under this Section 2 are void if User fails to notify TI of any apparent defects in the EVMs within ten (10) business days after delivery, or of any hidden defects with ten (10) business days after the defect has been detected.
 - 2.3 TI's sole liability shall be at its option to repair or replace EVMs that fail to conform to the warranty set forth above, or credit User's account for such EVM. TI's liability under this warranty shall be limited to EVMs that are returned during the warranty period to the address designated by TI and that are determined by TI not to conform to such warranty. If TI elects to repair or replace such EVM, TI shall have a reasonable time to repair such EVM or provide replacements. Repaired EVMs shall be warranted for the remainder of the original warranty period. Replaced EVMs shall be warranted for a new full ninety (90) day warranty period.

WARNING

Evaluation Kits are intended solely for use by technically qualified, professional electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems, and subsystems.

User shall operate the Evaluation Kit within TI's recommended guidelines and any applicable legal or environmental requirements as well as reasonable and customary safeguards. Failure to set up and/or operate the Evaluation Kit within TI's recommended guidelines may result in personal injury or death or property damage. Proper set up entails following TI's instructions for electrical ratings of interface circuits such as input, output and electrical loads.

NOTE:

EXPOSURE TO ELECTROSTATIC DISCHARGE (ESD) MAY CAUSE DEGRADATION OR FAILURE OF THE EVALUATION KIT; TI RECOMMENDS STORAGE OF THE EVALUATION KIT IN A PROTECTIVE ESD BAG.

3 Regulatory Notices:

3.1 United States

3.1.1 Notice applicable to EVMs not FCC-Approved:

FCC NOTICE: This kit is designed to allow product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of this chapter, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter.

3.1.2 For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant:

CAUTION

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Interference Statement for Class A EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Interference Statement for Class B EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

3.2 Canada

3.2.1 For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210 or RSS-247

Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSSs. Operation is subject to the following two conditions:

(1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concernant les EVMs avec appareils radio:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Concerning EVMs Including Detachable Antennas:

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

3.3 Japan

3.3.1 *Notice for EVMs delivered in Japan:* Please see http://www.tij.co.jp/lstds/ti_ja/general/eStore/notice_01.page 日本国内に輸入される評価用キット、ボードについては、次のところをご覧ください。

<https://www.ti.com/ja-jp/legal/notice-for-evaluation-kits-delivered-in-japan.html>

3.3.2 *Notice for Users of EVMs Considered "Radio Frequency Products" in Japan:* EVMs entering Japan may not be certified by TI as conforming to Technical Regulations of Radio Law of Japan.

If User uses EVMs in Japan, not certified to Technical Regulations of Radio Law of Japan, User is required to follow the instructions set forth by Radio Law of Japan, which includes, but is not limited to, the instructions below with respect to EVMs (which for the avoidance of doubt are stated strictly for convenience and should be verified by User):

1. Use EVMs in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,
2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

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3.3.3 *Notice for EVMs for Power Line Communication:* Please see http://www.tij.co.jp/lstds/ti_ja/general/eStore/notice_02.page

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3.4 European Union

3.4.1 *For EVMs subject to EU Directive 2014/30/EU (Electromagnetic Compatibility Directive):*

This is a class A product intended for use in environments other than domestic environments that are connected to a low-voltage power-supply network that supplies buildings used for domestic purposes. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

-
4. *EVM Use Restrictions and Warnings:*
 - 4.1 EVMS ARE NOT FOR USE IN FUNCTIONAL SAFETY AND/OR SAFETY CRITICAL EVALUATIONS, INCLUDING BUT NOT LIMITED TO EVALUATIONS OF LIFE SUPPORT APPLICATIONS.
 - 4.2 User must read and apply the user guide and other available documentation provided by TI regarding the EVM prior to handling or using the EVM, including without limitation any warning or restriction notices. The notices contain important safety information related to, for example, temperatures and voltages.
 - 4.3 *Safety-Related Warnings and Restrictions:*
 - 4.3.1 User shall operate the EVM within TI's recommended specifications and environmental considerations stated in the user guide, other available documentation provided by TI, and any other applicable requirements and employ reasonable and customary safeguards. Exceeding the specified performance ratings and specifications (including but not limited to input and output voltage, current, power, and environmental ranges) for the EVM may cause personal injury or death, or property damage. If there are questions concerning performance ratings and specifications, User should contact a TI field representative prior to connecting interface electronics including input power and intended loads. Any loads applied outside of the specified output range may also result in unintended and/or inaccurate operation and/or possible permanent damage to the EVM and/or interface electronics. Please consult the EVM user guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative. During normal operation, even with the inputs and outputs kept within the specified allowable ranges, some circuit components may have elevated case temperatures. These components include but are not limited to linear regulators, switching transistors, pass transistors, current sense resistors, and heat sinks, which can be identified using the information in the associated documentation. When working with the EVM, please be aware that the EVM may become very warm.
 - 4.3.2 EVMs are intended solely for use by technically qualified, professional electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems, and subsystems. User assumes all responsibility and liability for proper and safe handling and use of the EVM by User or its employees, affiliates, contractors or designees. User assumes all responsibility and liability to ensure that any interfaces (electronic and/or mechanical) between the EVM and any human body are designed with suitable isolation and means to safely limit accessible leakage currents to minimize the risk of electrical shock hazard. User assumes all responsibility and liability for any improper or unsafe handling or use of the EVM by User or its employees, affiliates, contractors or designees.
 - 4.4 User assumes all responsibility and liability to determine whether the EVM is subject to any applicable international, federal, state, or local laws and regulations related to User's handling and use of the EVM and, if applicable, User assumes all responsibility and liability for compliance in all respects with such laws and regulations. User assumes all responsibility and liability for proper disposal and recycling of the EVM consistent with all applicable international, federal, state, and local requirements.
 5. *Accuracy of Information:* To the extent TI provides information on the availability and function of EVMs, TI attempts to be as accurate as possible. However, TI does not warrant the accuracy of EVM descriptions, EVM availability or other information on its websites as accurate, complete, reliable, current, or error-free.
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