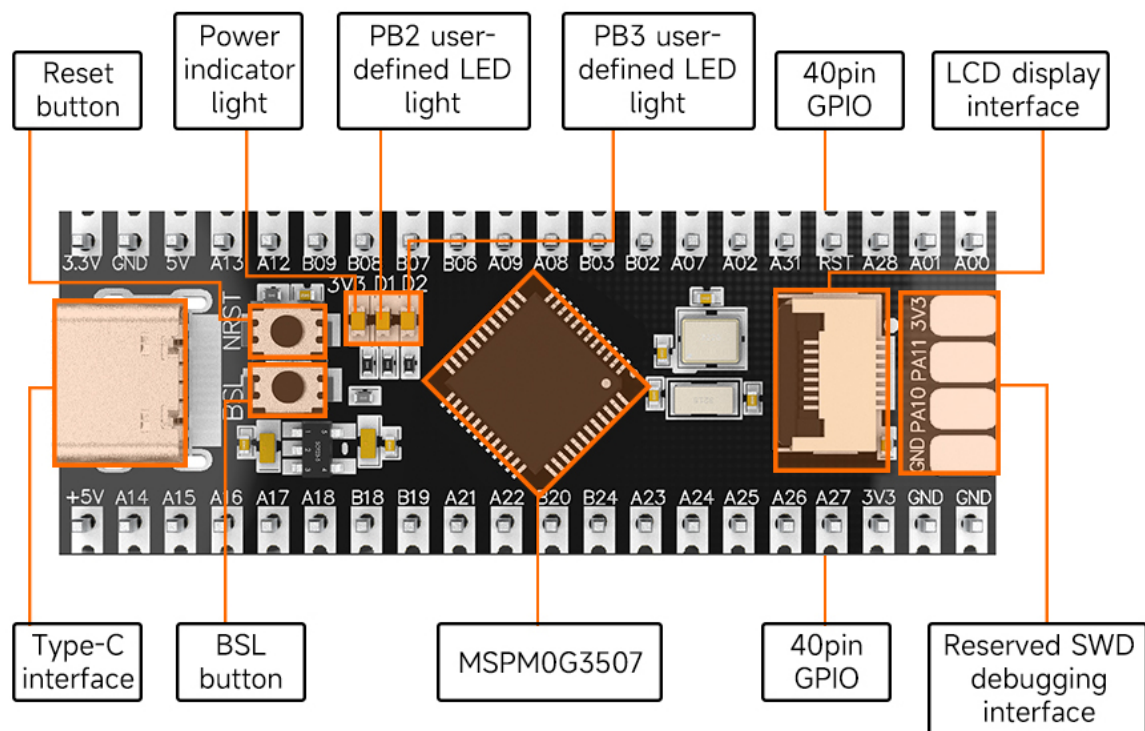# MSPM0 Introduction

1. What is MSPM0?

The MSPM0G3507 belongs to the TI Texas Instruments MSPM0G350x microcontroller (MCU) highly integrated ultra-low power 32-bit MCU series, which is based on the enhanced Arm Cortex-M0+ 32-bit core platform and operates at up to 80MHz. These low-cost MCUs provide high-performance analog peripheral integration, support an operating temperature range of -40°C to 125°C, and operate at a supply voltage of 1.62 V to 3.6 V.

The MSPM0G3507 is an 80MHz Arm® Cortex®-M0+ MC with 128KB flash, 32KB SRAM, 2 4Msps ADCs, DACs, 3 COMPs, 2 op amps, CAN-FD, MATHACL.
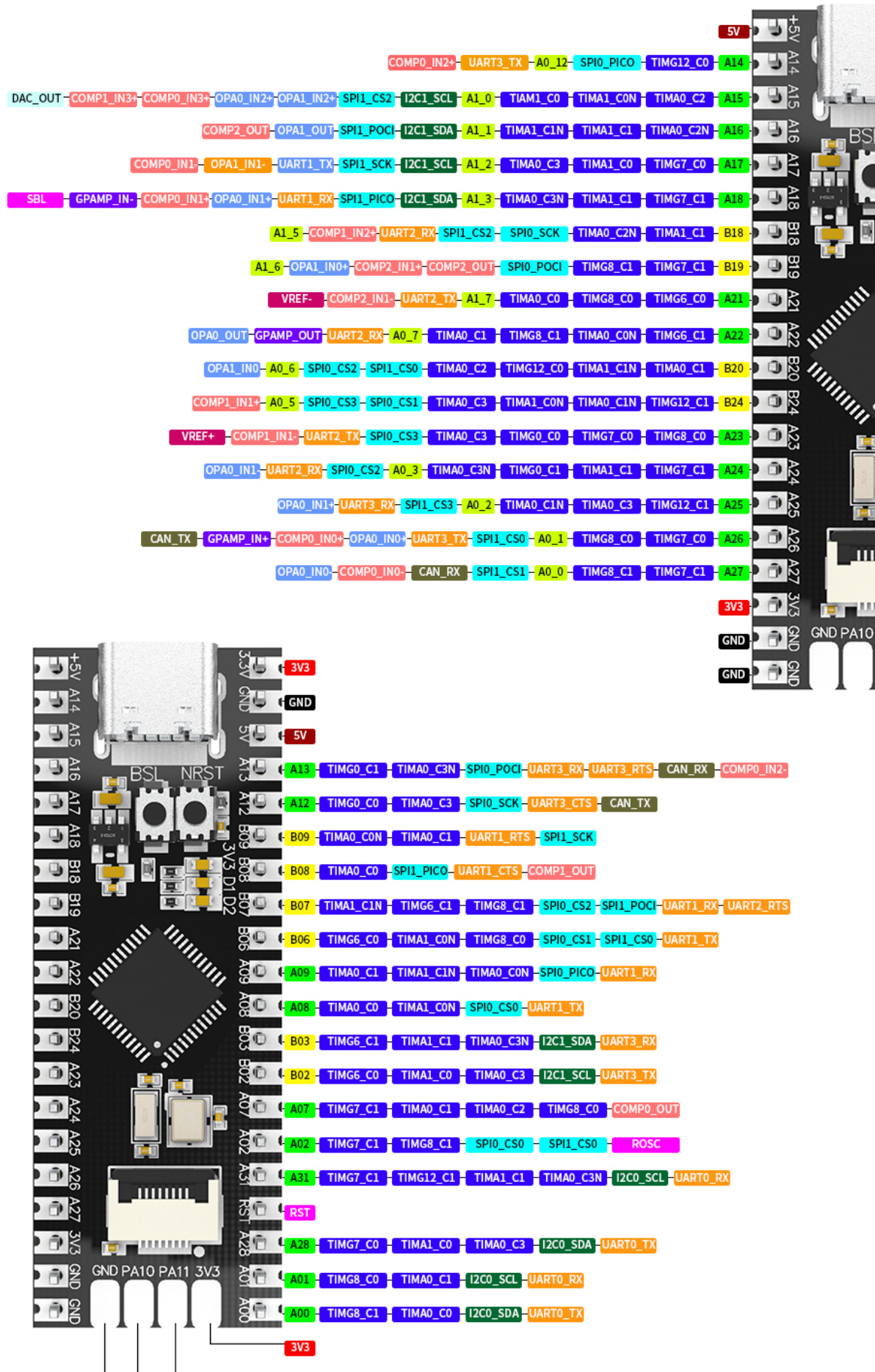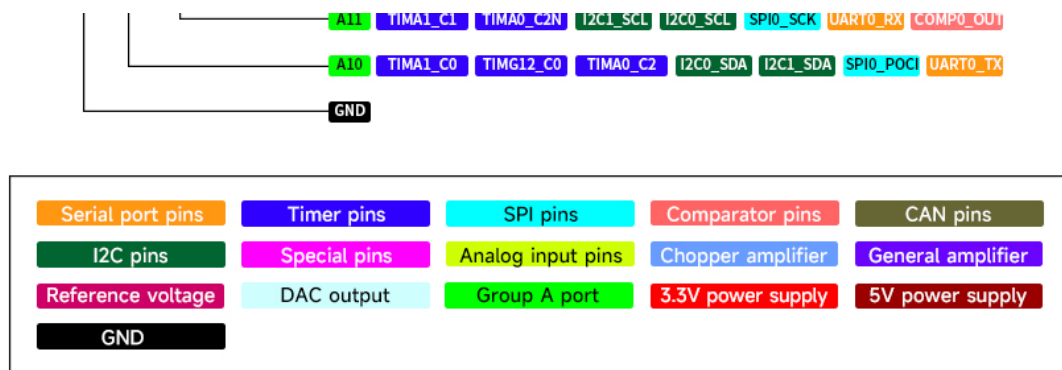
Functional Interface

Mainboard Function Distribution

IO port introduction

IO Resources Display

		COMP0_IN2+	UART3_TX	A0_12	SPI0_PICO	TIMG12_C0		A14	
DAC_OUT	COMP1_IN3+	COMP0_IN3+	OPA0_IN2+	OPA1_IN2+	SPI1_CS2	I2C1_SCL	A1_0	TIAM1_C0	TIMA1_C0N	TIMA0_C2	A15
		COMP2_OUT	OPA1_OUT	SPI1_POCI	I2C1_SDA	A1_1	TIMA1_C1N	TIMA1_C1	TIMA0_C2N	A16
		COMP0_IN1	OPA1_IN1-	UART1_TX	SPI1_SCK	I2C1_SCL	A1_2	TIMA0_C3	TIMA1_C0	TIMG7_C0	A17
SBL	GPAMP_IN-	COMP0_IN1+	OPA0_IN1+	UART1_RX	SPI1_PICO	I2C1_SDA	A1_3	TIMA0_C3N	TIMA1_C1	TIMG7_C1	A18
		A1_5	COMP1_IN2+	UART2_RX	SPI1_CS2	SPI0_SCK	TIMA0_C2N	TIMA1_C1	B18
		A1_6	OPA1_IN0+	COMP2_IN1+	COMP2_OUT	SPI0_POCI	TIMG8_C1	TIMG7_C1	B19
		VREF-	COMP2_IN1-	UART2_TX	A1_7	TIMA0_C0	TIMG8_C0	TIMG6_C0	A21
	OPA0_OUT	GPAMP_OUT	UART2_RX	A0_7	TIMA0_C1	TIMG8_C1	TIMA0_C0N	TIMG6_C1	A22
		OPA0_IN0	A0_6	SPI0_CS2	SPI1_CS0	TIMA0_C2	TIMG12_C0	TIMA1_C1N	TIMA0_C1	B20
	COMP1_IN1+	A0_5	SPI0_CS3	SPI0_CS1	TIMA0_C3	TIMA1_C0N	TIMA0_C1N	TIMG12_C1	B24
	VREF+	COMP1_IN1-	UART2_TX	SPI0_CS3	TIMA0_C3	TIMG0_C0	TIMG7_C0	TIMG8_C0	A23
	OPA0_IN1-	UART2_RX	SPI0_CS2	A0_3	TIMA0_C3N	TIMG0_C1	TIMA1_C1	TIMG7_C1	A24
		OPA0_IN1+	UART3_RX	SPI1_CS3	A0_2	TIMA0_C1N	TIMA0_C3	TIMG12_C1	A25
CAN_TX	GPAMP_IN+	COMP0_IN0+	OPA0_IN0+	UART3_TX	SPI1_CS0	A0_1	TIMG8_C0	TIMG7_C0	A26
		OPA0_IN0-	COMP0_IN0-	CAN_RX	SPI1_CS1	A0_0	TIMG8_C1	TIMG7_C1	A27

| 5V |
| +5V |
| A14 |
| A15 |
| A16 |
| A17 |
| A18 |
| B18 |
| B19 |
| A21 |
| A22 |
| B20 |
| B24 |
| A23 |
| A24 |
| A25 |
| A26 |
| A27 |
| 3V3 |
| GND | GND |
| GND | GND |

BSL

GND PA10

| 3V3 |
| GND |
| 5V |

BSL   NRST

A13	TIMG0_C1	TIMA0_C3N	SPI0_POCI	UART3_RX	UART3_RTS	CAN_RX	COMP0_IN2-
A12	TIMG0_C0	TIMA0_C3	SPI0_SCK	UART3_CTS	CAN_TX
B09	TIMA0_C0N	TIMA0_C1	UART1_RTS	SPI1_SCK
B08	TIMA0_C0	SPI1_PICO	UART1_CTS	COMP1_OUT
B07	TIMA1_C1N	TIMG6_C1	TIMG8_C1	SPI0_CS2	SPI1_POCI	UART1_RX	UART2_RTS
B06	TIMG6_C0	TIMA1_C0N	TIMG8_C0	SPI0_CS1	SPI1_CS0	UART1_TX
A09	TIMA0_C1	TIMA1_C1N	TIMA0_C0N	SPI0_PICO	UART1_RX
A08	TIMA0_C0	TIMA1_C0N	SPI0_CS0	UART1_TX
B03	TIMG6_C1	TIMA1_C1	TIMA0_C3N	I2C1_SDA	UART3_RX
B02	TIMG6_C0	TIMA1_C0	TIMA0_C3	I2C1_SCL	UART3_TX
A07	TIMG7_C1	TIMA0_C1	TIMA0_C2	TIMG8_C0	COMP0_OUT
A02	TIMG7_C1	TIMG8_C1	SPI0_CS0	SPI1_CS0	ROSC
A31	TIMG7_C1	TIMG12_C1	TIMA1_C1	TIMA0_C3N	I2C0_SCL	UART0_RX
RST
A28	TIMG7_C0	TIMA1_C0	TIMA0_C3	I2C0_SDA	UART0_TX
A01	TIMG8_C0	TIMA0_C1	I2C0_SCL	UART0_RX
A00	TIMG8_C1	TIMA0_C0	I2C0_SDA	UART0_TX

| +5V |
| A14 |
| A15 |
| A16 |
| A17 |
| A18 |
| B18 |
| B19 |
| A21 |
| A22 |
| B20 |
| B24 |
| A23 |
| A24 |
| A25 |
| A26 |
| A27 |
| 3V3 |
| GND |
| GND |

GND PA10 PA11 3V3

| 3V3 |

| A11 | TIMA1_C1 | TIMA0_C2N | I2C1_SCL | I2C0_SCL | SPI0_SCK | UART0_RX | COMP0_OUT |
| A10 | TIMA1_C0 | TIMG12_C0 | TIMA0_C2 | I2C0_SDA | I2C1_SDA | SPI0_POCI | UART0_TX |

GND

Serial port pins	Timer pins	SPI pins	Comparator pins	CAN pins
I2C pins	Special pins	Analog input pins	Chopper amplifier	General amplifier
Reference voltage	DAC output	Group A port	3.3V power supply	5V power supply
GND				

2. Features of MSPM0

1. **Based on ARM Cortex-M0 core:**

- **Cortex-M0** is a low-power, high-performance 32-bit microcontroller core launched by ARM. It is the lowest performance in the ARM Cortex-M series, but still provides enough computing power for applications with strict requirements on cost and power consumption.

2. **Low-power design:**

- The MSPM0 series has extremely low power consumption and is suitable for battery-powered devices. Its low power consumption makes it very suitable for IoT devices, sensors and embedded applications that require long-term operation.
- It has multiple low-power modes to optimize battery life under different working conditions.

3. **Rich peripherals and interfaces:**

- **GPIO**: Supports multiple general-purpose input and output pins, which can be used to control external devices such as LEDs, buttons, sensors, etc.
- **Timer**: Includes basic timer, PWM output and other functions for precise time control and signal generation.
- **Serial communication**: Supports **USART** for serial communication with external devices.
- **I2C/SPI**: Supports common communication protocols (I2C and SPI), which facilitates data exchange with sensors and peripherals.
- **ADC (Analog-to-Digital Converter)**: Used to convert analog signals into digital signals, widely used in sensor signal processing.

4. **Small package and high integration:**

- The MSPM0 series supports a variety of package types (such as QFN, TSSOP) to adapt to different sizes and application requirements.
- It integrates a wealth of peripherals, reduces the need for external components, and helps to simplify circuit design.

5. **Wide application scenarios:**

- **IoT devices**: Due to its low power consumption and small size, it is suitable for a variety of smart devices and sensors, such as environmental monitoring, smart home, health monitoring, etc.
- **Consumer electronics**: In battery-powered products (such as smart watches, remote controls, toys, etc.), the MSPM0 series is a common choice.

- **Industrial control**: It can be used in various low-power automation control systems, such as motor control, sensor interface, data acquisition, etc.

6. **Development tools and support:**

- **IDE support**: TI provides a complete development tool chain, including **Code Composer Studio** and **IAR Embedded Workbench**. In addition, third-party tools such as **Keil** can also be used for development.
- **Hardware debugging**: Supports **SWD** debugging interface, which is convenient for developers to perform hardware debugging and program burning.

3. Comparison of MSPM0 with other ARM Cortex-M series MCUs

- **Cortex-M0** core is the lowest performance in the ARM Cortex-M series, but it still provides performance suitable for basic control tasks, while having very low power consumption characteristics.
- Compared with **Cortex-M3** and **Cortex-M4** (with stronger computing power and more hardware acceleration functions), the Cortex-M0 core has weaker performance, but its low power consumption and low cost make it suitable for applications that do not require high performance but require strict power consumption and cost control.

4. Advantages of the MSPM0 series

1. **Low power consumption**: Very suitable for long-term operation in battery-powered devices.
2. **High integration**: Integrates multiple peripherals and interfaces, reduces external hardware requirements and simplifies design.
3. **Rich development support**: Can use a variety of development tools for programming, debugging and burning.
4. **High cost-effectiveness**: Suitable for cost-sensitive applications, especially in mass production, the cost advantage is more obvious.