MSPM0 SPI module introduction
—— MSPM0 peripheral training series

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# MCU level overview

## MSPM0Lxx series

### MSPM0L13x3/4/5/6

- **CPU**
  - ARM Cortex-M0+
  - 32 MHz
- **Power & Clocking**
  - POR / BOR / SVS
  - Internal LF 32kHz (5%)
  - Internal HF 4-32MHz (1%)
- **Communication**
  - UART (1)
  - SPI (1)
- **On-chip Memory**
  - 8, 16, 32 or 64 kB flash
  - 2 or 4 kB SRAM
- **Data Integrity & Security**
  - CRC accelerator (16 and 32 bit)
- **Programming & Debug**
  - ARM SWD interface
  - ROM UART & I2C BSL
- **IO**
  - Up to 28 GPIO
  - Up to 2 low I/O inputs

**Notes:**
- 32 MHz MCU with up to 64kB flash, 32 pins, 12-bit ADC, dual zero-drift OPA/PGA, COMP
- NVIC / 3-ch DMA
- 1.62 - 3.6V
- -40 to 125°C

## MSPM0Gxx series

### MSPM0G350x/310x/150x/110x

- **CPU**
  - Arm Cortex-M0+
  - 80 MHz
- **Power & Clocking**
  - POR / BOR / SVS
  - External LF 32kHz XTAL
  - External HF 4-48MHz XTAL
- **Communication**
  - UART w/ LIN (1)
  - UART (3)
  - I2C (2) w/ FastMode+
- **On-chip Memory**
  - 32, 64, or 128 kB flash [ECC]
  - 16 or 32 kB SRAM [ECC]
- **Data Integrity & Security**
  - CRC accelerator (16 and 32 bit)
  - AES256 accelerator + TRNG
- **Programming & Debug**
  - ARM SWD interface
  - UART & I2C bootloader
- **IO**
  - Up to 66 GPIO

**Notes:**
- 80 MHz MCU with up to 128kB flash, 64 pins, advanced analog, AES/TRNG, CAN-FD
- NVIC / MPU / 7-ch DMA
- 1.62 - 3.6V
- -40 to 125°C
- 12-bit ADC 4Mps (9-bit)
- 12-bit ADC 4Mps (8-bit)
- Comparators w/ 8-bit DACs (3)
- 12-bit 1Msps buffered DAC (1)
- PLL (up to 80 MHz)
- Temperature sensor
- General purpose amp (1)
- Advanced control: 16-bit 4 CC (1)
- Advanced control: 16-bit 2 CC (1)
- General purpose 32-bit 2 CC (1)
- General purpose 16-bit 2 CC (1)
- Low power 16-bit 2 CC (2)
- Real-time clock (1)
- Lead packages: SO8-20, SO8-16
- No-lead packages: MSOP-16, MSOP-8
- Lead packages: QFN-16, QFN-8
- No-lead packages: MSOP-16, MSOP-8
**MSPM0 SPI module introduction**

### Key Features
- Configurable as a controller or a peripheral
- Direct memory access controller interface (DMA)
- Independent FIFOs allowing up to 4 entries with 16-bit width
- Support 3/4 wire connection and multiply peripherals
- Programmable data frame size from 4-bits to 16-bits (Controller Mode)
- Programmable data frame size from 7-bits to 16-bits (Peripheral Mode)
- Programmable SPI mode support Motorola SPI, MICROWIRE, or Texas Instruments format

### Key Differences between G and L MCUs
- MSPM0L130x SPI speed up to 16MHz
- MSPM0G350x SPI speed up to 32MHz
MSPM0 SPI module introduction

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Control / Status
- SPI control register 0 – CTL0
  CTL0.DSS – Data size select, 4~16 bit data frame size
- SPI control register 1 – CTL1
  CTL1.MSB – Controls the direction of the receive and transmit shift register

![Fig1: Motorola SPI Format](image1)
![Fig2: TI SPI Format](image2)
SPI module quick start

Academy
- SPI introduction lab

DriverLib Examples
- MSPM0G350x / MSPM0L13xx:
  - spi_controller_command_data_control
  - spi_controller_echo_interruption
  - spi_controller_internal_loopback_poll
  - spi_controller_multibyte_fifo_dma_interrupts
  - spi_controller_multibyte_fifo_poll
  - spi_controller_register_format
  - spi_controller_repeated_multibyte_fifo_dma_interrupt
  - spi_controller_repeated_multibyte_fifo_poll
  - spi_controller_repeated_multibyte_fifo_register_format

Related Links
- MSPM0 online resource
- MSPM0 Quick start guide
- MSPM0 Sysconfig user's guide
- MSPM0G350x datasheet
- MSPM0L13xx datasheet
- MSPM0Gxx technical reference manual
- MSPM0Lxx technical reference manual

Launchpad
- LP-MSPM0G3507
- LP-MSPM0L1306

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Sysconfig Entrance for SPI setting
- Step 1:
  - Name: Selected Peripheral
  - SPI Demo
  - Quick Profiles
  - SPI

- Step 2:
  - Basic Configuration
  - Advanced Configuration
  - Interrupt Configuration
  - DMA Configuration
  - PinMux Peripheral and Pin Configuration
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- Ti.com.cn
- WeChat (德州仪器公众号)
- Bilibili
- 21IC