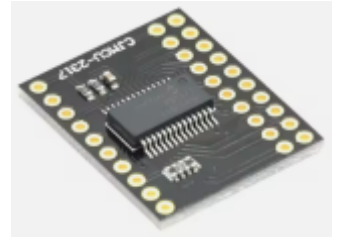


lamaPLC: MCP23017 / MCP23S17 16-Bit I/O Expander with Serial Interface I²C / SPI

The MCP23017/MCP23S17 (**MCP23X17**) (**CJMCU-2317**) device family provides 16-bit, general-purpose parallel I/O expansion for I²C bus or SPI applications. The two devices differ only in the serial interface:



- MCP23017 – I²C interface
- MCP23S17 – SPI interface

The MCP23X17 contains multiple 8-bit configuration registers for input, output, and polarity selection. The system master can set I/Os as inputs or outputs by writing to the I/O configuration bits (IODIRA/B).

The data for each input or output is stored in the corresponding register. The polarity of the Input Port register can be reversed using the Polarity Inversion register. The system master can read all registers.

The 16-bit I/O port is implemented as two 8-bit ports (PORTA and PORTB). The MCP23X17 can be configured to operate in the 8-bit or 16-bit modes via IOCON.BANK.

MCP23017 / MCP23S17 Features

Operating voltage: 1.8V to 5.5V

Voltage on Vdd with respect to Vss: **-0.3V to +5.5V**

Communication interface: I²C (up to 1.7 MHz), SPI (up to 10 MHz)

Number I/O Pins: 16

Interrupt pins: 2

Operating temperature: -40 °C to 125 °C

Total power dissipation: 700 mW


Maximum current out of Vss pin: 150 mA

Maximum current into Vdd pin: 125 mA

MCP23017 / MCP23S17 IC Features:

- 16-Bit Remote Bidirectional I/O Port
 - I/O pins default to input
- High-Speed I²C Interface (**MCP23017**)
 - 100 kHz
 - 400 kHz
 - 1.7 MHz
- High-Speed SPI Interface (**MCP23S17**)
 - 10 MHz (maximum)
- Three Hardware Address Pins to Allow Up to Eight Devices On the Bus

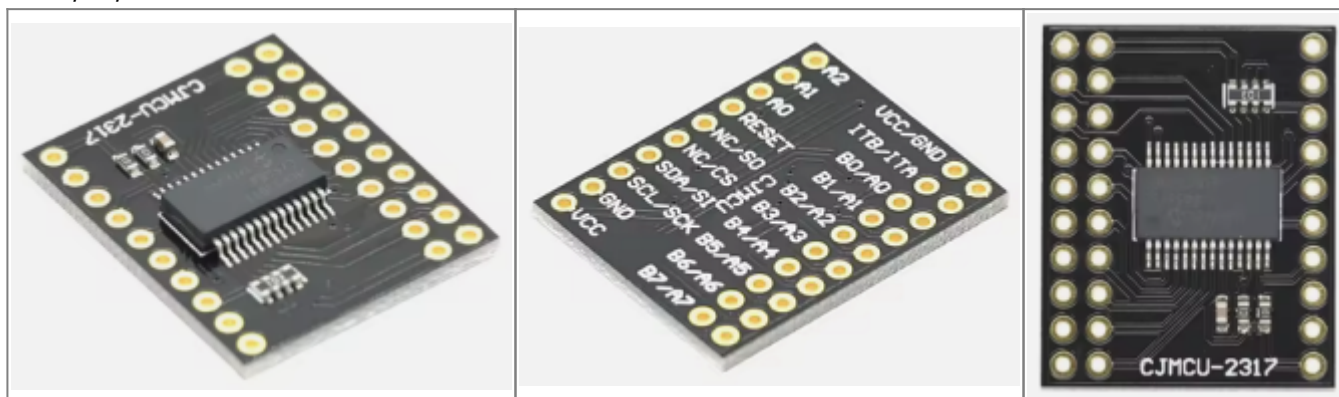
- Configurable Interrupt Output Pins
 - Configurable as active-high, active-low, or open-drain
- INTA and INTB Can Be Configured to Operate Independently or Together
- Configurable Interrupt Source:
 - Interrupt-on-change from configured register defaults or pin changes
- Polarity Inversion Register to Configure the Polarity of the Input Port Data
- External Reset Input
- Low Standby Current: 1 μ A (max.)
- Operating Voltage:
 - 1.8V to 5.5V @ -40°C to +85°C
 - 2.7V to 5.5V @ -40°C to +85°C
 - 4.5V to 5.5V @ -40°C to +125°C



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2026/02/14 23:38

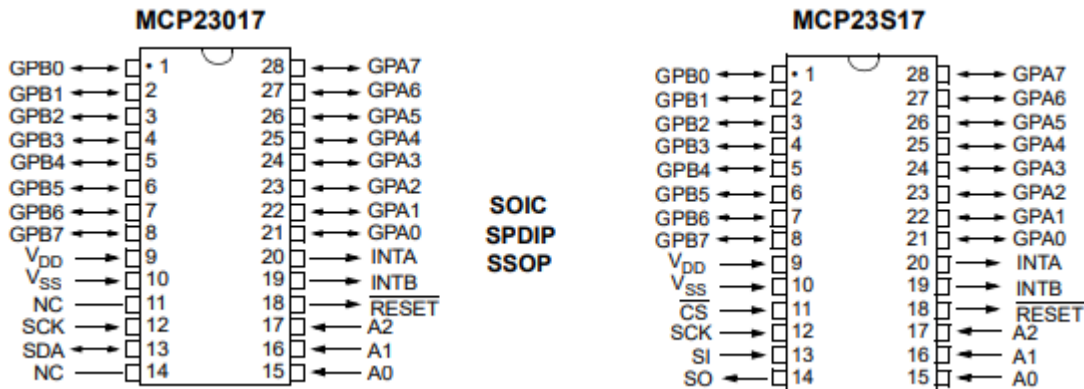


MCP23017 / MCP23S17 Modul Pinout

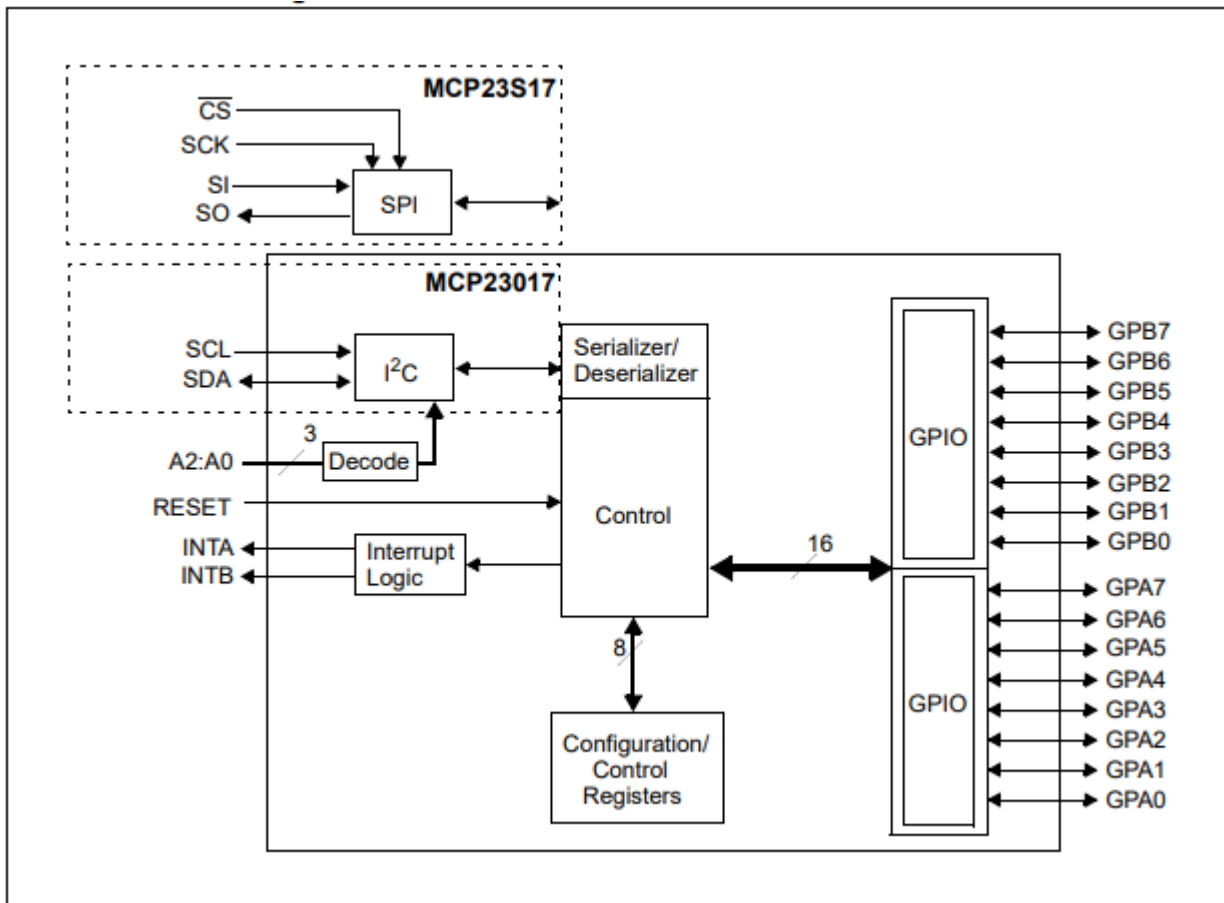
Pin name	Description	Pin name	Description	Pin name	Description
A2	Hardware address pin; look below	Vcc	Power supply (1.8V to 5.5V)	GND	Ground
A1	Hardware address pin; look below	ITB	Interrupt output for PORTB. Can be configured as active-high, active-low, or open-drain	ITA	Interrupt output for PORTA. Can be configured as active-high, active-low, or open-drain
A0	Hardware address pin; look below	B0	digital output pin	A0	digital input pin
RESET	Hardware reset. Must be externally biased	B1	digital output pin	A1	digital input pin
NC/SO	I ² C nop / SPI slave out	B2	digital output pin	A2	digital input pin
NC/CS	I ² C nop / SPI chip select	B3	digital output pin	A3	digital input pin

Pin name	Description	Pin name	Description	Pin name	Description
SDA/SI	I ² C data / SPI slave in	B4	digital output pin	A4	digital input pin
SCL/SCK	I ² C clock / SPI clock	B5	digital output pin	A5	digital input pin
GND	Ground	B6	digital output pin	A6	digital input pin
Vcc	Power supply (1.8V to 5.5V)	B7	digital output pin	A7	digital input pin

MCP23017 / MCP23S17 IC pins



MCP23017 / MCP23S17 Functional Block Diagram



MCP23017 / MCP23S17 I²C / SPI address coding

The hardware address pins are used to determine the device address. To address a device, the corresponding address bits in the control byte must match the pin state. The pins must be biased externally.

I ² C CONTROL BYTE FORMAT	SPI CONTROL BYTE FORMAT
<p>The MCP23017 is a slave I²C interface device that supports 7-bit addressing, with the read/write bit filling out the control byte. The slave address includes four fixed bits and three user-defined hardware address bits (pins A2, A1, and A0).</p>	<p>The MCP23S17 is a slave SPI device. The slave address contains four fixed bits and three user-defined hardware address bits (if enabled via IOCON.HAEN) (pins A2, A1, and A0), with the read/write bit filling out the control byte</p>

MCP23017 / MCP23S17 Source

<https://ww1.microchip.com/downloads/en/devicedoc/20001952c.pdf>

I²C topics on lamaPLC

Page	Date	Tags
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