

# lamaPLC: PCF857x I/O Expander chip/modul with I<sup>2</sup>C communication

The PCF857x series consists of I<sup>2</sup>C-based general-purpose I/O (GPIO) expanders manufactured by NXP and Texas Instruments. They allow microcontrollers (such as Arduino, ESP32, or Raspberry Pi) to control multiple digital pins with only two wires: Serial Data (SDA) and Serial Clock (SCL).



| Feature                            | PCF8574 / PCF8574A                             | PCF8575              |
|------------------------------------|--|----------------------|
| <b>GPIO Count</b>                  | 8-bit (8 pins)                                 | 16-bit (16 pins)     |
| <b>I<sup>2</sup>C Base Address</b> | <b>0x20</b> (PCF8574) / <b>0x38</b> (PCF8574A) | <b>0x20</b>          |
| <b>Max Devices on 1 Bus</b>        | 8 units  | 16 units             |
| <b>Operating Voltage</b>           | 2.5V to 6V                                     | 2.5V to 5.5V         |
| <b>Interrupt Output</b>            | Yes (Open-drain INT)                           | Yes (Open-drain INT) |

The current limits of the PCF857x are heavily lopsided because of its quasi-bidirectional architecture. It handles current entirely differently depending on whether you are sinking current (outputting 0/LOW) or sourcing it (outputting 1/HIGH).

## Main Control & Power Header

- **VCC:** Power input. Connects to **3.3V or 5V** to match your microcontroller's logic levels.
- **GND:** Common ground reference.
- **SDA:** Serial Data line for I<sup>2</sup>C communication.
- **SCL:** Serial Clock line for I<sup>2</sup>C communication.
- **INT:** Interrupt output (Active Low). Pulls low to alert the microcontroller when an input pin changes state, eliminating the need for software polling.

## 8/16-Bit I/O Extension Pins

- **Port 0** (P00 to P07): The first group of 8 quasi-bidirectional GPIO pins.
- **Port 1** (PCF8575 only, P10 to P17): The second group of 8 quasi-bidirectional GPIO pins.

## Sinking Current (Output LOW / Connecting to Ground)

- **Maximum per individual pin:** 25 mA (typical) / 20 mA for extended use.
- **Maximum combined total (all 16 pins combined):** 100 mA.
- **The Math:** If you activate all 16 pins simultaneously at LOW logic, you can only allocate a maximum of 6.25 mA per pin ( $100 \text{ mA} \div 16$ ) to avoid overloading the chip.

## Sourcing Current (Output HIGH / Connecting to VCC)

This is the weak mode meant mostly for sensing state changes.

- **Maximum per individual pin:** Only 100  $\mu$ A (0.1 mA).
- **The Limit:** This current is too weak to directly light up an LED or actuate a standard relay trigger.

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