

# 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).

The [I<sup>2</sup>C LCD adapter](#) utilizes the PCF8574.

## 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 mA ÷ 16) to avoid overloading the chip.

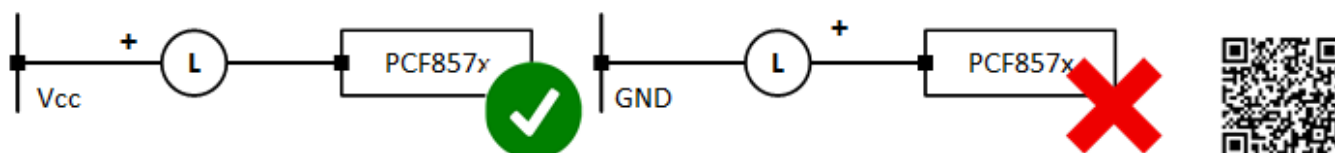
## Sourcing Current (Output HIGH / Connecting to VCC)

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.

### How to Correctly Wire Components

- **Correct (Sinking):** Connect your load's positive wire to VCC, and the negative side (through a current-limiting resistor) directly to the PCF8575 I/O pin. Setting the pin LOW completes the path to ground and activates the load.
- **Incorrect (Sourcing):** Connecting your load's positive wire to the PCF8575 I/O pin and the negative side to Ground will fail, as the pin cannot supply sufficient current.



<https://lomaplc.com/doku.php?id=sensor:pcf857x>



### Wiring with relay modules

Connecting optocoupled relay modules to the PCF8575 is a common practice, but it requires strict electrical care. Because of the chip's asymmetrical quasi-bidirectional ports, a mistake in how you trigger the relay will prevent it from working entirely.

#### The Triggering Rule: Active LOW Only

- **Why Active HIGH fails:** Standard optocoupled multi-channel relay modules require 2-5 mA of logic current on their IN pins to light the internal infrared LED and engage the circuit. Because the PCF8575 can source only 0.1 mA when outputting HIGH, it cannot trigger an Active HIGH configuration.
- **Why Active LOW works:** When configured as Active LOW, the PCF8575 acts as a ground connection (0V), cleanly sinking the current from the relay module. The PCF8575 can safely sink up to 20 mA per pin, easily meeting the relay's current requirements.

For example, the HL-54 (4-channel 3.3V optocoupled relay module) can be directly connected to the PCF8575. Because the HL-54 is hardwired as an Active LOW module, it is perfectly suited to the PCF8575's current limits.

### I<sup>2</sup>C topics on lamaPLC

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• <a href="#">lamaPLC Communication: 1-Wire</a>	2026/04/23 21:51	<a href="#">1-wire</a> , <a href="#">communication</a> , <a href="#">bus</a> , <a href="#">microlan</a> , <a href="#">i2c</a> , <a href="#">uart</a> , <a href="#">usart</a> , <a href="#">ds18b20</a>
• <a href="#">lamaPLC Communication: I<sup>2</sup>C</a>	2025/09/23 21:25	<a href="#">i2c</a> , <a href="#">i c</a> , <a href="#">smbus</a> , <a href="#">philips</a> , <a href="#">bus</a> , <a href="#">communication</a> , <a href="#">arduino</a>

• lamaPLC project: Sension SCD CO <sup>2</sup> measurement module	2026/04/15 19:34	scd30, scd40, scd41, iaq, ndir, sensor, i2c, arduino code
• LamaPLC: AHT10 Modul	2026/03/22 03:14	communication, i2c, temperature, humidity, sensor, aht, aht 10, modul
• LamaPLC: AHT20 / BMP280 Modul	2026/04/23 21:52	bmp280, aht20, adafruit, temperature, humidity, pressure, sensor, arduino, code, i2c
• LamaPLC: APDS - Avago ALS and proximity detection sensors with I <sup>2</sup> C communication	2026/04/23 21:52	avago, apds-9900, apds-9930, apds-9960, als, proximity, detection, gesture recognition, gesture, i2c, communication, sensor, arduino, code
• lamaPLC: Arduino Modul: BME680	2026/05/12 18:40	code, c, 2026, arduino, bme680, sensor, i2c, comunication
• lamaPLC: AS5600 Magnetic Induction Angle Measurement Sensor Module	2026/05/13 00:06	communication, i2c, as5600, as-5600, magnetic, induction, angle, sensor
• lamaPLC: Bi-Directional Logic Level Converter 3.3V ↔ 5V	2026/04/12 00:34	bi-directional, logic level converter, i2c, uart, spi
• LamaPLC: BMP/BME Bosch Temperature/Humidity/Pressure sensors with I <sup>2</sup> C communication	2026/04/23 21:52	bme280, bme680, bme688, bmp180, bmp280, hw-611, hw611, bosch, temperature, humidity, pressure, sensor, arduino, i2c, communication, ai, cjmcu, volatile organic compounds, vocs, volatile sulfur compounds, vscs, iaq
• LamaPLC: CJMCU-219/INA-219 breakout board/IC with I <sup>2</sup> C communication	2026/04/23 21:52	cjmcu-219, ina-219, ina219, breakout board, i2c, communication, sensor, voltage, current, arduino, code, cjmcu
• LamaPLC: CJMCU-3216 / AP-3216 integrated digital ambient light and proximity sensor module/IC with I <sup>2</sup> C communication	2026/04/23 21:52	cjmcu-3216, cjmcu, ap-3216, ap3216, ambient light, proximity, sensor, arduino, code, i2c, communication
• lamaPLC: CJMCU-811 CCS811 Gas Sensor (VOCs TVOC CO <sub>2</sub> )	2026/04/23 21:52	cjmcu-811, ccs811, gas, sensor, vocs, tvoc, eco2, co2, arduino, air quality metal oxide, mox, i2c, micropython, rp2040-eth
• LamaPLC: D6T Omron Non-Contact Thermal Sensors with I <sup>2</sup> C communication	2026/04/23 21:52	d6t, d6t-32l, d6t-44l, d6t-8l, d6t-1a, omron, non-contact, thermal, sensor, i2c, arduino, code
• LamaPLC: DPS Infineon Temperature/Pressure sensors with I <sup>2</sup> C communication	2026/04/23 21:52	dps310, infineon, temperature, pressure, sensor, arduino, i2c, communication, code
• lamaPLC: Energy, power, current, and voltage	2025/05/31 23:32	i2c, i c, communication, arduino, energy, power, current, sensor, ina226
• LamaPLC: ENS ScioSense Multi-gas sensors with I <sup>2</sup> C communication	2026/04/23 21:52	ens160, sciosense, gas-quality, i2c, communication, sensor, arduino, code, eco <sub>2</sub> , tvoc, aqi, indoor air quality, iaq, co <sub>2</sub> , voc

- [lamaPLC: ESP32 / ESP8266](#)      2025/11/22 00:07

esp8266, esp32, esp32-c2, esp32-c3, esp32-c5, esp32-c6, esp32-c61, esp32-h2, esp32-s2, esp32-s3, esp32-p4, espressif systems, communication, ethernet, ip, wi-fi, thread, zigbee, matter, homekit, bluetooth, mqtt, adc, spi, uart, i2c, i2s, rmt, pwm, usb, usb otg, twai
- [LamaPLC: Gas sensors](#)      2023/07/01 17:29

gas, sensor, i2c, onewire, communication, mq-3, mq-4, mq-5, mq-6, mq-7, mq-8, mq-9, mq-135, gm-102b, gm-302b, gm-502b, gm-702b, alcohol, ch4, natural gas, smoke, lng, co, co2, lpg, h2, iso-butane, nox, nh3, benzene, town gas, formaldehyde, propane, humidity, temperature, voc, grv gas sens v2
- [lamaPLC: GY-511 6DOF sensor module](#)      2026/04/23 21:52

stmicroelectronics, lsm303dlhc, i2c, lsm303, sensor, gy-511, 6dof, pololu, module, arduino
- [LamaPLC: GY-9250 MPU-9250/6500 9-axis Attitude Sensor Board](#)      2026/04/23 21:52

ak8963, gy-9250, mpu-9250, 9-axis, motion detection, magnetometer, communication, i c, i2c, spi
- [LamaPLC: HDC Texas Instruments Temperature/humidity sensors with I<sup>2</sup>C communication](#)      2026/04/23 21:52

sht21, htu21, si7021, gy-21, gy-213v, hdc1080, gy-213v-hdc1080, cjmcu, cjmcu-1080, texas instruments, temperature, humidity, sensor, i2c, communication, arduino, code
- [lamaPLC: HT16K33 display controller](#)      2026/04/23 21:51

i2c, 7-segment display, display, ht16k33, arduino
- [LamaPLC: HTU TE Connectivity temperature/humidity sensors with I<sup>2</sup>C communication](#)      2026/04/23 21:52

htu, htu31d, htu21d, htu20d, sht20, htu20, sht21, htu21, si7021, gy-21, gy-213v, hdc1080, si702, gy-20, sht31, htu31, si7031, gy-31, te connectivity, temperature, humidity, i2c, communication, sensor, arduino, code
- [lamaPLC: INA modules with Arduino libraries](#)      2026/04/23 21:52

i2c, i c, communication, arduino, energy, power, current, monitor, sensor, ina219, gy-219, ina226, gy-216, ina228, gy-228, ina237, ina238, ina260, ina3221, ina
- [lamaPLC: INA226 - current/voltage/power monitor with I<sup>2</sup>C communication](#)      2026/04/23 21:52

i2c, i c, communication, arduino, energy, power, current, monitor, sensor, ina226, ina219, ina
- [lamaPLC: LCD 1602/2004 with I<sup>2</sup>C communication](#)      2026/02/14 18:27

communication, i2c, display, lcd, 1602, 2004, hd44780, pcf8574, pcf8574t, pcf8574at, arduino
- [LamaPLC: MAX30100/MAX30102 Heart Rate Click Sensor Module](#)      2026/04/23 21:52

max30102, max30100, heart rate click, sensor, communication, i2c, arduino, code
- [lamaPLC: MCP23017 / MCP23S17 16-Bit I/O Expander with Serial Interface I<sup>2</sup>C / SPI](#)      2026/04/23 21:52

communication, i2c, mcp23017, mcp23s17, spi, i o expander, serial, cjmcu-2317, cjmcu

• lamaPLC: MLX90614 (GY-906) infrared non-contact thermometer	2026/05/08 00:03	communication, i2c, temperature, mlx90614, gy-906, modul, infrared, non-contact thermometer, dsp, pwm, smbus, hailege
• lamaPLC: PCF857x I/O Expander chip/modul with I <sup>2</sup> C communication	2026/05/15 01:03	communication, i2c, pcf857x, pcf8574, pcf8574a, pcf8575, i o expander, i o extension, nxp, texas instruments
• LamaPLC: Pixart PAJ7620U2 Gesture recognition sensors/module with I <sup>2</sup> C communication	2026/04/23 21:52	paj7620u2, gy-paj7620, pixart, gesture recognition, i2c, communication, sensor, arduino, code
• lamaPLC: RP2040_ETH_Modul: I <sup>2</sup> C scanner	2026/05/12 16:20	code, micropython, 2026, rp2040 eth, i2c, comunication
• lamaPLC: RP2040_ETH_Modul: MLX90614 simple	2026/05/12 17:06	code, micropython, 2026, rp2040 eth, i2c, communication, mlx90614
• lamaPLC: RP2040_ETH_Modul: Read BME 680/688 sensor data	2026/05/12 21:06	code, micropython, 2026, rp2040 eth, bme680, i2c, sensor, communication
• lamaPLC: RP2040_ETH_Modul: Read BME 680/688 sensor data and store in Modbus input registers	2026/05/12 18:58	code, micropython, 2026, rp2040 eth, bme680, i2c, sensor, communication
• LamaPLC: SC16IS750 / SC16IS752: One or two serial (UART) ports from microcontroller via I <sup>2</sup> C or SPI communication	2026/04/23 21:52	cjmcu-750, cjmcu-752, cjmcu, nxp, sc16is750, sc16is752, uart, serial, i2c, spi, modul, converter, arduino, code
• LamaPLC: SGP Sensirion TVOC/VOC sensors with I <sup>2</sup> C communication	2026/04/15 19:41	sgp30, sgp40, sgp41, sensirion, gas-sensor, i2c, communication, sensor, arduino, code, eco2, voc, tvoc, indoor air quality, iaq, nox, hydrogen
• LamaPLC: SHT Sensirion Temperature/humidity sensor with I <sup>2</sup> C communication	2026/04/23 21:52	sht20, sht21, sht25, sht30, sht31, sht35, sht40, gy21, temperature, humidity, i2c, communication, sensor, arduino, code
• lamaPLC: Signal level converters	2026/02/14 23:47	pca9306, i2c, voltage, level, converter
• lamaPLC: st756x display drivers	2026/05/20 16:17	display, driver, i2c, spi, lcd, cog, oled, st7565, st7567, gm12864, gm12864-59n, gm12864-03a, gm12864-01a, gme12864-41
• lamaPLC: TCA9548A (HW617); Low-Voltage 8-Channel I <sup>2</sup> C Switch Module	2026/02/14 23:51	tca9548a, hw617, i2c, switch, communication, expansion board, arduino
• lamaPLC: TM1637 7-segment display	2026/02/14 18:26	i2c, 7-segment display, display, tm1637, arduino
• LamaPLC: TOFnnnC STMicroelectronics Time-of-Flight (ToF) sensors with I <sup>2</sup> C communication	2026/04/23 21:52	tof050c, vl6180, tof200c, vl53l0x, tof400c, vl53l1x, stmicroelectronics, time-of-flight, tof, i2c, communication, sensor, arduino, code
• LamaPLC: VL53Lnn STMicroelectronics time-of-flight (ToF) laser-ranging sensors with I <sup>2</sup> C communication	2026/04/23 21:52	vl53l0x, vl53l1x, vl53l0 1xv2, gy-530, time-of-flight, tof, laser-ranging, i2c, communication, sensor, arduino, code
• LamaPLC: VL6180X STMicroelectronics Time-of-Flight (ToF) sensor with I <sup>2</sup> C communication	2026/04/23 21:52	vl6180x, stmicroelectronics, time-of-flight, tof, i2c, communication, sensor, arduino, code

- [lamaPLC: XGZP68xx: Silicon Pressure Sensors/Module](#)
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communication, i2c, sensor, modul, pressure, cfsensor, xgzp68xx, xgzp6810d, xgzp6857d, xgzp6859d, xgzp6887d, xgzp6897d, xgzp6899a, piezoresistive, capacitive
- [Magnetic angle sensors](#)
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magnetic angle sensor, magnetic flux, sensor, spi, i2c, pwm, communication, modul, as5047p, as5600, mt6701, mt6816, mt6835, tle5012b, amr, gmr, tmr, anisotropic magnetoresistive
- [SSH1106/SSD1306 OLED Display with I<sup>2</sup>C communication](#)
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i2c, oled, display, ssd1306, sh1106, ssh1106, arduino, cmos

[communication, i2c, PCF857x, PCF8574, PCF8574A, PCF8575, I/O Expander, I/O Extension, I2C, NXP, Texas Instruments](#)

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