lamaPLC: ESP32 / ESP8266

The ESP32 can operate as a standalone system or as a slave device to a host MCU, reducing communication stack overhead on the central application processor. It can interface with other systems to provide Wi-Fi and Bluetooth functionality via its SPI/SDIO or I²C/UART interfaces. The **ESP32 / ESP8266** was designed by **Espressif Systems** and is manufactured by TSMC using their 40 nm process

Different between ESP32 and ESP8266

The main differences are that the ESP32 has significantly more processing power (a dual-core CPU), more memory, and Bluetooth, while the ESP8266 is older, single-core, and Wi-Fi-only. The ESP32 is better suited to complex projects due to its improved performance and peripheral features, while the ESP8266 is a more affordable choice for simple IoT applications.

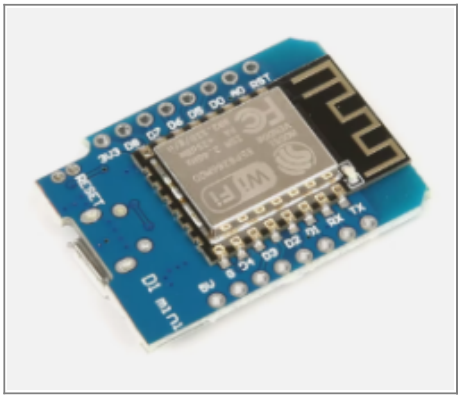
Types of ESP32 / ESP8266

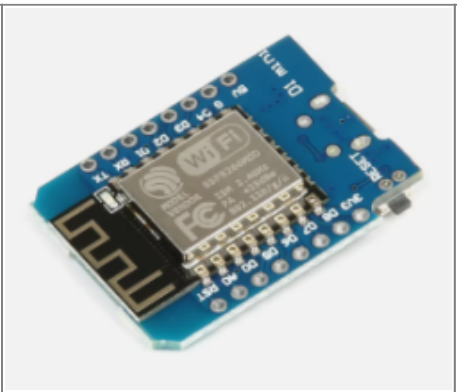
Type of ESP32	CPU	Max clock speed	Connectivity	RAM	GPIO	ADC	Security	Peripherials/Note
ESP8266 Cost-effective and highly integrated Wi-Fi MCU for IoT applications **ESP8266MOD** Lolin D1 Mini	Single-core L106 32-bit RISC	160 MHz	Wi-Fi only	160KB SRAM	17	10-bit ADC	TLS encryption, validate certificates	SPI, I2C, and UART, no TWAI
ESP32 Integrated Wi-Fi and Bluetooth connectivity for a wide-range of applications	Dual-core LX6/LX7	240 MHz	Wi-Fi and Bluetooth (BLE)	520KB	34	12-bit ADC	Secure Boot, Flash Encryption, HMAC	Ethernet, USB, touch sensors, CAN, and hall sensor, 1 TWAI
ESP32-DOWD Wide variety of applications, ranging from low-power sensors networks ESP32-WROOM-32D	Dual-core LX6	240 MHz	Wi-Fi and Bluetooth (BLE)	520KB	32	two 12-bit SAR ADC	Secure Boot, Flash Encryption	SD card, UART, SPI, SDIO, I2C, LED PWM, Motor PWM, I2S, IR, pulse counter, GPIO, capacitive touch sensor, ADC, DAC, TWAI® (compatible with ISO 11898-1, i.e., CAN Specification 2.0)
ESP32-C2 Small-sized, cost-effective SoC	Single-core RISC-V	120 MHz	Wi-Fi 2.4 GHz, Bluetooth 5 (LE)	272 KB SRAM 576 KB ROM	20	12-bit ADC	Secure Boot, Flash Encryption	SPI, UART, I2C, LED PWM controller, General DMA controller (GDMA), SAR ADC, no TWAI

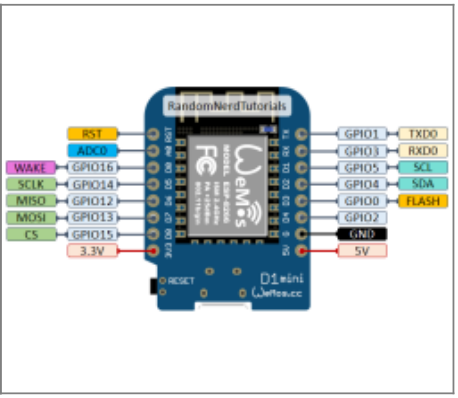
Type of ESP32	CPU	Max clock speed	Connectivity	RAM	GPIO	ADC	Security	Peripherials/Note
ESP32-C3 A cost-effective RISC-V MCU with Wi-Fi and Bluetooth 5 (LE) connectivity for secure IoT applications	Single-core RISC-V	160 MHz	Wi-Fi 2.4 GHz, Bluetooth 5 (LE)	400 KB SRAM 384 KB ROM	22	12-bit ADC	Secure Boot, Flash Encryption	Cost-sensitive applications, Pin compatible with ESP8266, 1 TWAI
ESP32-C5 2.4 and 5 GHz dual-band Wi-Fi 6 MCU, along with Bluetooth 5 (LE) and 802.15.4 for secure and reliable connectivity	Single-core 32-bit RISC-V	240 MHz	Wi-Fi 6 2.4/5 GHz, Bluetooth 5 (LE), Thread, Zigbee, Matter, HomeKit, MQTT	384KB SRAM 320KB ROM	29	12-bit ADC	Secure boot, flash, and PSRAM encryption, and cryptographic accelerators	ADC, SPI, UART, I2C, I2S, RMT, PWM, 2 TWAI
ESP32-C6 A low-power and cost-effective 2.4 GHz Wi-Fi 6 + Bluetooth 5 (LE) + Thread/Zigbee SoC	Single-core RISC-V	160 MHz	Wi-Fi 6 2.4 GHz, Bluetooth 5.3 (LE), Thread, Zigbee, Matter	512 KB SRAM 320 KB ROM	30 (QFN40) or 22 (QFN32)	12-bit ADC	RSA-3072 support	Matter Gateways, Thread Border Routers or Zigbee Matter Bridges, SPI, UART, I2C, I2S, RMT, TWAI, PWM, SDIO, Motor Control PWM, 2 TWAI
ESP32-C61 Delivering affordable Wi-Fi 6 connectivity	Single-core RISC-V	160 MHz	Wi-Fi 6 2.4 GHz, Bluetooth 5.3 (LE) + Mesh 1.1, Matter	320 KB SRAM 256 KB ROM	30 (QFN40) or 22 (QFN32)	12-bit ADC	secure boot, flash and PSRAM encryption	I2C, I2S, SPI, UART, LED PWM, 2 TWAI, ADC, GPIO, LP IO, Timers, and GDMA. Specialized peripherals include the Event Task Matrix (ETM) for automation-triggered tasks and the Analog Voltage Comparator for easy zero-crossing detection
ESP32-H2 Low power and secure connectivity	Single-core 32-bit RISC-V	96 MHz	Wi-Fi 2.4 GHz, Bluetooth 5 (LE), Thread, Zigbee, Matter	320KB SRAM 128KB ROM	19	12-bit ADC	Secure Boot, Flash Encryption	ADC, SPI, UART, I2C, I2S, RMT, 1 TWAI, GDMA and LED PWM
ESP32-S2 Secure and Powerful Wi-Fi MCU with Numerous I/O Capabilities Wemos S2 mini	Single-core Xtensa LX7	240 MHz	Wi-Fi 2.4 GHz, USB OTG	320KB SRAM 128KB ROM	43	2 × 13-bit SAR ADC	RSA-3072 support	Camera Interface, fit for lower-power applications like secure IoT
ESP32-S3 Powerful AI acceleration Reliable security features ESP32-S3 Super Mini	Dual-core Xtensa LX7	240 MHz	Wi-Fi 2.4 GHz, Bluetooth 5 (LE), USB OTG	512KB SRAM 384KB ROM	45	2 × 12-bit SAR ADC	RSA-4096 support	Camera Interface, Accelerate machine learning applications

Type of ESP32	CPU	Max clock speed	Connectivity	RAM	GPIO	ADC	Security	Peripherials/Note
ESP32-P4 High-performing SoC offering extensive IO connectivity, HMI, and security	Dual-core RISC-V	400 MHz	Wi-Fi 6, Bluetooth 5 (LE), USB OTG, ACK, AWS IoT ExpressLink, etc	768KB SRAM	55	-	Secure Boot, Flash Encryption, cryptographic accelerators, and TRNG ensure	SPI, I2S, I2C, LED PWM, MCPWM, RMT, ADC, UART, 3 TWAI. Additionally, it supports USB OTG 2.0 HS, Ethernet, and SDIO Host 3.0. Parallel display and camera interfaces.

Wemos / Lolin D1 Mini





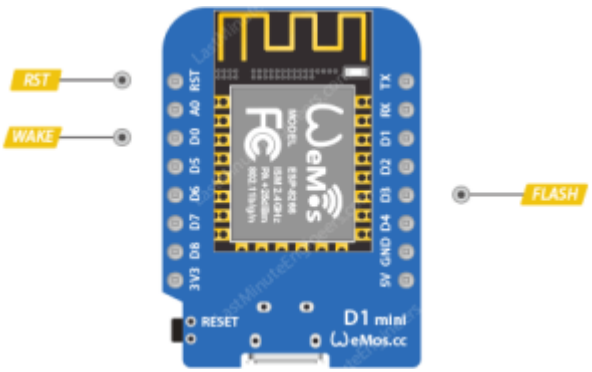


Wemos / Lolin D1 Mini Features

A mini wifi board with 4MB flash based on ESP-8266EX / MOD

- 11 digital IO, interrupt/pwm/I2C/one-wire supported(except D0)
- 1 analog input(3.2V max input)
- Type-C USB Port
- LOLIN I²C Port
- Compatible with MicroPython, Arduino, NodeMCU
- **Peripherals**
  - **GPIO:** The D1 Mini has 11 GPIO pins that can be programmed to perform a variety of functions. Each GPIO can be configured with an internal pull-up or pull-down resistor, or set to high impedance.
  - **PWM:** Almost all digital pins (except D0) can produce a Pulse Width Modulation (PWM) signal
  - **UART:** D1 Mini has a single usable UART (Universal Asynchronous Receiver/Transmitter) interface
  - **I²C:** D1 Mini has a single I2C interface
  - **SPI:** The D1 Mini has one hardware SPI interface (HSPI). It supports the general-purpose SPI features listed below: Full-duplex SPI communication, four timing modes of the SPI format transfer, Clock frequency is 20 MHz at maximum, Up to 64-Byte FIFO
  - **ADC:** The D1 Mini has a single analog input, A0. This analog input pin can measure voltages from 0 to 3.3V.

Wemos / Lolin D1 Mini Control Pins

- The **RST** pin is the reset pin. Pulling this pin low resets the microcontroller, which is equivalent to pressing the board's reset button. - The D1 Mini uses the **FLASH** pin to decide when to boot into the bootloader. By pulling this pin low during power-up, you can put the D1 Mini into flashing mode, which is required for programming the board with new firmware. - The **WAKE** pin wakes the D1 Mini from deep sleep.	

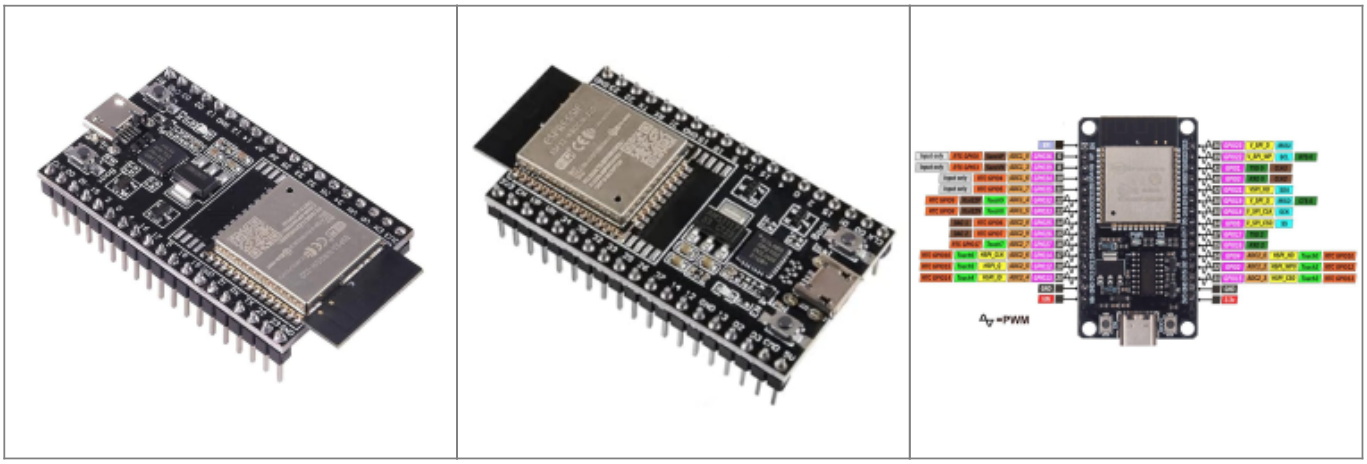
Wemos / Lolin D1 Mini UART

For most ESP32 boards, the UART pin assignment is as follows:

UART Port	TX	RX	Remarks
UART0	GPIO 1	GPIO 3	Used for Serial Monitor and uploading code; Can be assigned to other GPIOs
UART1	GPIO 10	GPIO 9	Must be assigned to other GPIOs
UART2	GPIO 17	GPIO 16	Can be assigned to other GPIOs

About UART1 (GPIO 9 and GPIO 10) – these GPIOs are connected to the ESP32 SPI flash memory, so you can’t use them like that. To use UART1 to communicate with other devices, you must define different pins using the HardwareSerial library.

ESP32-WROOM-32D



ESP32-WROOM-32D Features

- **CPU and On-Chip Memory**
  - ESP32-D0WD embedded, Xtensa dual-core 32-bit LX6 microprocessor, up to 240 MHz
  - 448 KB ROM
  - 520 KB SRAM

    - 8 KB SRAM in RTC
- **Wi-Fi**
    - 802.11b/g/n
    - Bit rate: 802.11n up to 150 Mbps
    - A-MPDU and A-MSDU aggregation
    - 0.4 µs guard interval support
    - Center frequency range of operating channel: 2412 ~ 2484 MHz
- **Bluetooth**
    - Bluetooth V4.2 BR/EDR and Bluetooth LE specification
    - Class-1, class-2 and class-3 transmitter
    - AFH
    - CVSD and SBC
- **Peripherals**
    - Up to 32 GPIOs (5 strapping GPIOs)
    - SD card, UART, SPI, SDIO, I2C, LED PWM, Motor PWM, I2S, IR, pulse counter, GPIO, capacitive touch sensor, ADC, DAC, TWAI (compatible with ISO 11898-1, i.e., CAN Specification 2.0)

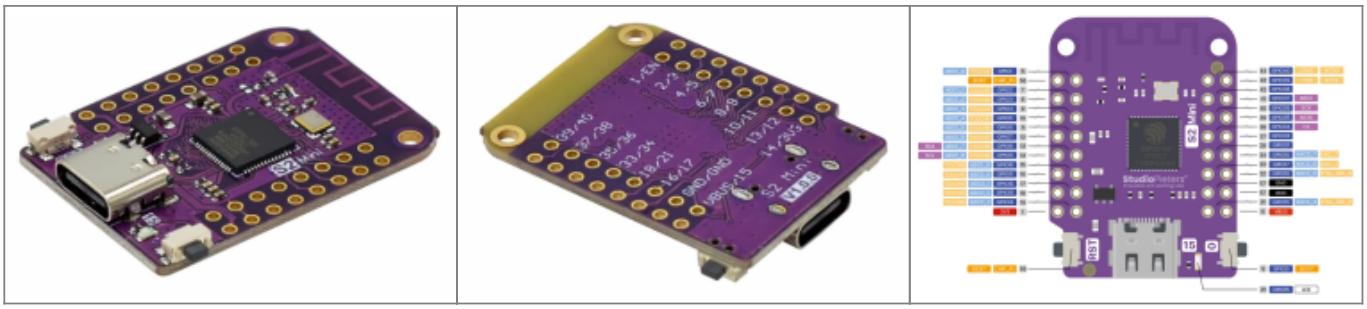
ESP32-WROOM-32D UART

For most ESP32 boards, the UART pin assignment is as follows:

UART Port	TX	RX	Remarks
UART0	GPIO 1	GPIO 3	Used for Serial Monitor and uploading code; Can be assigned to other GPIOs
UART1	GPIO 10	GPIO 9	Must be assigned to other GPIOs
UART2	GPIO 17	GPIO 16	Can be assigned to other GPIOs

About UART1 (GPIO 9 and GPIO 10) – these GPIOs are connected to the ESP32 SPI flash memory, so you can't use them like that. To use UART1 to communicate with other devices, you must define different pins using the HardwareSerial library.

Wemos S2 mini



Wemos S2 mini features

- A mini wifi board based on ESP32-S2FN4R2
- Type-C USB

- ADC, DAC, I2C, SPI, UART, USB OTG
- Compatible with LOLIN D1 mini shields
- Compatible with MicroPython, Arduino, CircuitPython, and ESP-IDF
- Default firmware: MicroPython
- Operating Voltage: **3.3V**
- Digital I/O Pins: 27
- Clock Speed: 240MHz
- Flash: 4M Bytes
- PSRAM: 2M Bytes
- **Wi-Fi**: IEEE 802.11 b/g/n-compliant **Supports 20 MHz, 40 MHz bandwidth in the 2.4 GHz band** Single-band 1T1R mode with data rate up to 150 Mbps **WMM** TX/RX A-MPDU, RX A-MSDU **Immediate Block ACK** Fragmentation and defragmentation **Automatic Beacon monitoring (hardware TSF)** 4 × virtual Wi-Fi interfaces **Simultaneous support for Infrastructure Station, SoftAP, and Promiscuous modes** Note that when ESP32-S2 is in Station mode and performs a scan, the SoftAP channel will change along with the Station channel. **Antenna diversity** 802.11mc FTM
- **Security**: Secure boot **Flash encryption** 4096-bit OTP, up to 1792 bits for users **Cryptographic hardware acceleration: AES-128/192/256 (FIPS PUB 197), Hash (FIPS PUB 180-4), RSA, Random Number Generator (RNG), HMAC** Digital signature
- **Advanced Peripheral Interfaces:**
  - 43 × programmable GPIs
  - Digital interfaces:
    - 4 × SPI
    - 1 × I2S
    - 2 × I²C
    - 2 × UART
    - 1 × RMT (TX/RX)
    - LED PWM controller, up to 8 channels
    - 4 × pulse counters
    - 1 × full-speed USB OTG
    - 1 × DVP 8/16 camera interface, implemented using the hardware resources of I2S
    - 1 × LCD interface (8-bit serial RGB/8080/6800), implemented using the hardware resources of SPI2
    - 1 × LCD interface (8/16/24-bit parallel)
    - DMA controller
    - 1 × TWAI® controller compatible with ISO 11898-1 (CAN Specification 2.0)
  - Analog interfaces:
    - 2 × 12-bit SAR ADCs, up to 20 channels
    - 2 × 8-bit DACs
    - 14 × touch sensing GPIOs
    - 1 × temperature sensor

Wemos S2 mini UART

For most ESP32 boards, the UART pin configuration is as follows:

UART Port	TX	RX	Remarks
UART0	GPIO 1	GPIO 3	Used for Serial Monitor and uploading code; Can be assigned to other GPIOs
UART1	GPIO 10	GPIO 9	Must be assigned to other GPIOs

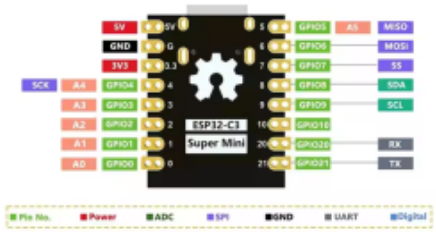
UART Port	TX	RX	Remarks
UART2	GPIO 17	GPIO 16	Can be assigned to other GPIOs

About UART1 (GPIO 9 and GPIO 10) – these GPIOs are connected to the ESP32 SPI flash memory, so you can't use them for other purposes. To use UART1 to communicate with other devices, you need to assign different pins using the HardwareSerial library.

Wemos S2 mini Arduino

Choose the board **LOLIN S2 MINI** or **LOLIN S2 PICO**.

ESP32-S3 Super Mini

Problem: When connecting the unit to Windows 10, the USB connection cycles on and off.

Solution: To fix a disconnected ESP32-C3 Super Mini on Windows 10, first try a manual boot mode: press and hold the boot button, then press and release the reset button, and finally release the boot button.

It includes both **RST** (reset) and **BOOT** buttons. The **BOOT** button puts the board into bootloader mode for uploading code, while the **RST** button resets the board—useful for restarting and running newly uploaded code.

ESP32-S3 Features

- A mini wifi board based on ESP32-S3
- **Wi-Fi**: IEEE 802.11b/g/n-compliant **Supports 20 MHz and 40 MHz bandwidth in 2.4 GHz band** 1T1R mode with data rate up to 150 Mbps **Wi-Fi Multimedia (WMM)** TX/RX A-MPDU,

TX/RX A-MSDU **Immediate Block ACK** Fragmentation and defragmentation **Automatic Beacon monitoring (hardware TSF)** Four virtual Wi-Fi interfaces **Simultaneous support for Infrastructure BSS in Station, SoftAP, or Station + SoftAP modes Note that when ESP32-S3 scans in Station mode, the SoftAP channel will change along with the Station channel** Antenna diversity **802.11mc FTM**

- **Bluetooth**: Bluetooth LE: Bluetooth 5, Bluetooth mesh **High power mode (20 dBm)** Speed: 125 Kbps, 500 Kbps, 1 Mbps, 2 Mbps **Advertising extensions** Multiple advertisement sets **Channel selection algorithm #2** Internal co-existence mechanism between Wi-Fi and Bluetooth to share the same antenna
- **CPU and Memory**: Xtensa® dual-core 32-bit LX7 microprocessor, Clock speed: up to 240 MHz
- **Advanced Peripheral Interfaces**
  - 45 programmable GPIOs
  - 4 strapping GPIOs
  - 6 or 7 GPIOs needed for in-package flash or PSRAM
  - ESP32-S3FN8、ESP32-S3R2、ESP32-S3R8、ESP32-S3R8V、ESP32-S3R16V: 6 GPIOs needed
  - ESP32-S3FH4R2: 7 GPIOs needed
  - **Digital interfaces:**
    - Two SPI ports for communication with flash and RAM
    - Two general-purpose SPI ports
    - LCD interface (8-bit ~ 16-bit parallel RGB, I8080 and MOTO6800), supporting conversion between RGB565, YUV422, YUV420 and YUV411
    - DVP 8-bit ~ 16-bit camera interface
    - Three UARTs
    - Two I2Cs
    - Two I2Ss
    - RMT (TX/RX)
    - Pulse counter
    - LED PWM controller, up to 8 channels
    - Full-speed USB OTG
    - USB Serial/JTAG controller
    - Two Motor Control PWMs (MCPWM)
    - SD/MMC host controller with two slots
    - General DMA controller (GDMA), with 5 transmit channels and five receive channels
    - TWAI® controller, compatible with ISO 11898-1 (CAN Specification 2.0)
    - On-chip debug functionality via JTAG
  - **Analog interfaces:**
    - Two 12-bit SAR ADCs, up to 20 channels
    - Temperature sensor
    - 14 touch sensing IOs

ESP32-S3 UART

Using an ESP32-S3, the UART assignment is completely different from other ESP modules. The following table shows the default RX and TX pins for UART0, UART1, and UART2 on the ESP32-S3:

UART Port	TX	RX	Remarks
UART0	GPIO 43	GPIO 44	Cannot be changed
UART1	GPIO 17	GPIO 18	Can be assigned to other GPIOs
UART2	-	-	Assign any pins of your choice

Sources

https://www.espressif.com/en/products/
https://www.wemos.cc/en/latest/tutorials/s2/get_started_with_arduino_s2.html
https://documentation.espressif.com/esp32-s2_datasheet_en.pdf
https://documentation.espressif.com/esp32-wroom-32d_esp32-wroom-32u_datasheet_en.pdf

Communication topics on lamaPLC

Page	Date	Tags
• ISM Band	2026/04/23 21:51	ism, ism band, rfid, nfc, dash7, hc-12, arduino, zigbee, z-wave, bluetooth, wi-fi, thread, miwi, nrf24, starlink, wiegand, rf, communication, bus, radio, ku band, ka band, k band, x band
• lamaPLC Communication: 1-Wire	2026/04/23 21:51	1-wire, communication, bus, microlan, i2c, uart, usart, ds18b20
• lamaPLC Communication: AS-i	2026/04/23 21:51	bus, communication, as-i, basic, industrial ethernet, devicenet, interbus, manchester-ii, apm
• lamaPLC Communication: Bluetooth basic	2026/04/23 21:51	communication, bus, bluetooth, ism, ieee, 802.15.1, ble, lmp, l2cap, rfcomm, iot, arduino, hc-05, hc-06
• lamaPLC Communication: CAN	2026/04/23 21:51	communication, bus, can, canopen, most, automotive ethernet, sent sae-j2716, flexray, lin bus
• lamaPLC Communication: ControlNet	2026/04/23 21:51	bus, communication, devicenet, cip, can, ethernet ip, ethernet, controlnet, mac, peer-to-peer, allen-bradley, rockwell automation, fieldbus, rg-6, coaxial cable
• lamaPLC Communication: DALI	2024/11/16 21:08	communication, rs-232, dali, light technic, diia, selv, manchester, asynchronous, half-duplex, serial, iec 62386, d4i, dali-2, dt6, dt8
• lamaPLC Communication: DASH7	2026/04/23 21:51	bus, communication, dash7, ism, srd, aes 128, d7a, blast, iot, rfid
• lamaPLC Communication: DeviceNet	2024/11/16 20:43	bus, communication, devicenet, 62026-3, cip, can, ethernet ip, ethernet, controlnet, mac, peer-to-peer, canopen, allen-bradley, rockwell automation, bosch
• lamaPLC Communication: DMX512	2024/11/16 01:16	bus, communication, dmx512, dmx512-a, rs-485, xlr3, xlr5
• lamaPLC Communication: EtherNet/IP	2026/04/23 21:51	communication, ethernet, bus, ip, cip, ethernet ip, udp, industrial ethernet, ie, tcp, unicast, devicenet, controlnet, ieee 802.3

• lamaPLC Communication: GPS	2024/11/15 21:15	communication, satellite, navigation, gps, ocx, cdma, glonass, beidou, galileo, qzss, uart, arduino
• lamaPLC Communication: IEC 61850 basic	2026/04/23 21:51	1-wire, communication, bus, xml, iec 61850, iec, ethernet, scl, goose, ied
• lamaPLC Communication: InterBus	2024/11/16 01:46	bus, communication, interbus, phoenix contact, en 50254, iec 61158
• lamaPLC Communication: IoT	2026/04/23 21:51	communication, iot, internet, iomt, 6lowpan, ipv4, ipv6, bluetooth, ble, li-fi, nfc, rfid, wi-fi, zigbee, z-wave, lte-advanced, 5g, lora, dash7, lpwan, lorawan, sigfox, nb-iot, weightless, rpma, mioty, vsat, ethernet, thread, matter
• lamaPLC Communication: I²C	2025/09/23 21:25	i2c, i c, smbus, philips, bus, communication, arduino
• lamaPLC Communication: KNX / EIB	2026/04/23 21:51	communication, bus, knx, knx tp, knx pl, knx rf, knx ip, eib, ehs, batibus, ethernet, ets
• lamaPLC communication: Matter	2026/04/23 21:51	communication, iot, matter, ethernet, tcp, udp, ipv6, thread, ble, cellular, wifi, pki, ip
• lamaPLC Communication: Modbus	2026/04/23 21:51	modbus, communication, bus, modicon, standard, rtu, tcp, multimaster, coil, register
• lamaPLC Communication: MQTT	2024/11/15 21:28	communication, mqtt, iot, tcp, udp, bluetooth, tcp ip, quic, mqtt-sn, oasis, message broker, mosquitto, qos, arduino, iso iec 20922
• lamaPLC Communication: NFC	2026/04/23 21:51	communication, nfc, rfid, bluetooth, ble, manchester, ask, iso iec 18092
• lamaPLC Communication: NRF24	2024/11/16 02:26	bus, communication, nrf24, ism, ism band, gfsk, rpd, arduino
• lamaPLC Communication: OPC	2024/11/15 21:33	communication, opc, scada, ole, net, xml, tcp, hmi, server, opc ua, opc ua client, mqtt, json, dcom, simatic, erp
• lamaPLC Communication: PowerLink	2026/04/23 21:51	communication, bus, ethernet, tcp, udp, http, powerlink, fast ethernet, opensafety
• lamaPLC Communication: Profibus	2026/04/23 21:51	profibus, profibus pa, profibus dp, communication, fieldbus, bus, iec 61158, iec 61784-1, profinet, rs-485
• lamaPLC Communication: RFID	2026/04/23 21:51	communication, rfid, radio, rf, aidc, prat, arpt, arat, bap, uhf, nfc, em4100, t5557, tag, manchester, fsk, psk, biphase, nrz
• lamaPLC Communication: RS-232	2026/04/23 21:51	bus, communication, rs-232, rs, basic
• lamaPLC Communication: RS-422	2026/04/23 21:51	bus, communication, rs-422, rs, basic
• lamaPLC Communication: RS-485	2026/04/23 21:51	bus, communication, rs-485, rs, basic, profibus
• lamaPLC Communication: SCADA	2026/04/23 21:51	communication, scada, industry, industrial, hmi

• lamaPLC Communication: Sinec H1	2026/04/23 21:51	communication, bus, fieldbus, sinec-h1, s5, s7, simatic, siemens, industrial ethernet, ie, iec 8073
• lamaPLC Communication: SPI	2026/04/23 21:51	bus, communication, spi, basic, arduino, ssi, sdi, miso, sdo
• lamaPLC Communication: TCP / UDP Basic	2025/11/20 22:49	communication, bus, tcp, udp, tcp ip, darpa, ietf, smtp, http, https, ftp, ftps ssh, pop3, imap, mysql, cpanel, whm, ssl, webmail, mqtt, ethernet, ip
• lamaPLC communication: Thread	2024/11/15 23:07	bus, communication, matter, thread, matter over thread, zigbee, aes, ipv6, iot, 6lowpan, ethernet, wifi
• lamaPLC Communication: UART / USART basic	2026/04/23 21:51	bus, communication, uart, rs-232, rs-422, rs-485
• lamaPLC Communication: USB	2026/04/23 21:51	usb, usb otg, otg, msc, ums, mtp, dfu, uac, adc, communication, bus, basic
• lamaPLC Communication: Wi-Fi	2026/04/23 21:51	communication, iot, internet, wi-fi, wifi, ieee 802.11
• lamaPLC Communication: Wiegand	2026/04/23 21:51	wiegand, communication, interface, cr80, iec 7810, h10301, hid, wiegand 26, wiegand 32, wiegand 34, wiegand 35, wiegand 37, wiegand 38, wiegand 42
• lamaPLC Communication: WS2812	2024/11/16 00:36	bus, communication, ws2812, ws2812b, ws 2812, ws 2812 b, 5050smd, 4020, 2020, 3535, 5050, nzr, rgb chip, led, arduino, rgb
• lamaPLC Communication: Z-Wave	2026/04/23 21:51	communication, ethernet, bus, ip, z-wave, ism
• lamaPLC Communication: Zigbee	2026/04/23 21:51	communication, ethernet, bus, ip, zigbee, wpan, bluetooth, wi-fi, ism, ieee 802.15.4, zdo, zigbee pro, zc, zr, zed, smart energy, homegrid, homeplug, powerline, ipso, sunspec, 6lowpan, ipv6, rf4ce
• LamaPLC: AHT10 Modul	2026/03/22 03:14	communication, i2c, temperature, humidity, sensor, aht, aht 10, modul
• lamaPLC: AI-Thinker LoRA products	2026/04/23 21:51	ai-thinker, lora manufacturer, communication, lora, modul, ra-01, ra-02, spi, arduino
• LamaPLC: APDS - Avago ALS and proximity detection sensors with I²C 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: AS5600 Magnetic Induction Angle Measurement Sensor Module	2026/03/28 23:50	communication, i2c, as5600, as-5600, magnetic, induction, angle, sensor
• LamaPLC: BMP/BME Bosch Temperature/Humidity/Pressure sensors with I²C communication	2026/04/23 21:52	bme280, bme680, bmp180, bmp280, hw-611, hw611, bosch, temperature, humidity, pressure, sensor, arduino, i2c, communication, cjmcu
• lamaPLC: CJMCU-164; SN74HC164D 8-bit Shift Register Module	2026/03/06 01:19	cjmcu-164, sn74hc164d, 8-bit shift register, communication, 7-segment, cjmcu, arduino

• LamaPLC: CJMCU-219/INA-219 breakout board/IC with I²C 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 I²C communication	2026/04/23 21:52	cjmcu-3216, cjmcu, ap-3216, ap3216, ambient light, proximity, sensor, arduino, code, i2c, communication
• LamaPLC: CJMCU-3901/PMW-3901 compact optical flow sensor module/IC by PixArt with SPI communication	2026/04/23 21:52	cjmcu-3901, cjmcu, pmw3901, pmw-3901, optical flow, sensor, pixart, spi, communication, arduino, code, pmw3901mb-txqt
• LamaPLC: CJMCU-6701: Biosensor for measuring Galvanic Skin Response (GSR) with SPI communication	2026/04/23 21:52	cjmcu, cjmcu-6701, acs758, acs-758, galvanic skin response, gsr, electrodermal activity, eda, spi, communication, arduino, code, sensor, healthcare
• LamaPLC: DPS Infineon Temperature/Pressure sensors with I2C communication	2026/04/23 21:52	dps310, infineon, temperature, pressure, sensor, arduino, i2c, communication, code
• lamaPLC: DS18B20 1-Wire Digital Thermometer	2026/04/23 21:52	ds18b20, sensor, 1-wire, communication, arduino, thermometer, parasitic mode
• lamaPLC: Ebyte LoRA products	2026/04/23 21:51	ebyte, lora manufacturer, communication, lora, modul
• 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 I²C communication	2026/04/23 21:52	ens160, sciosense, gas-quality, i2c, communication, sensor, arduino, code, eco₂, tvoc, aqi, indoor air quality, iaq, co₂, 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-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 I²C 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: HTU TE Connectivity temperature/humidity sensors with I²C 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: HX711 24-bit analog-to-digital converter (ADC)	2026/04/11 18:28	hx711, hx-711, analog-to-digital, adc, converter, load cell, wheatstone bridge, weight, sensor, communication, arduino, code
• lamaPLC: INA modules with Arduino libraries	2026/04/11 19:54	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 I²C communication	2026/04/23 21:52	i2c, i c, communication, arduino, energy, power, current, monitor, sensor, ina226, ina219, ina
• lamaPlc: Industrial Ethernet (IE) Basic	2026/04/23 21:51	communication, bus, ethernet, industrial ethernet, ie, ethercat, ethernet ip, profinet, powerlink, sercos, iii, cc-link, modbus tcp, ieee, rstp, stp
• lamaPLC: LCD 1602/2004 with I²C communication	2026/02/14 18:27	communication, i2c, display, lcd, 1602, 2004, hd44780, pcf8574, pcf8574t, pcf8574at, arduino
• lamaPLC: LTC3588 - Nanopower energy harvesting power supply IC	2026/04/23 21:52	communication, arduino, sensor, energy harvesting, energy, ambient power
• 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 I²C / SPI	2026/04/23 21:52	communication, i2c, mcp23017, mcp23s17, spi, i o expander, serial, cjmcu-2317, cjmcu
• LamaPLC: MH-Z19 series of NDIR CO_2 sensors	2026/04/23 21:52	mh-z19, mh-z19d, mh-z19c, mh-z19b, mh-z19e, ndir, co_2, sensor, winsen, uart, pwm, communication, non-dispersive infrared, infrared, ir, temperature, arduino, code, tasmota
• LamaPLC: Pixart PAJ7620U2 Gesture recognition sensors/module with I²C communication	2026/04/23 21:52	paj7620u2, gy-paj7620, pixart, gesture recognition, i2c, communication, sensor, arduino, code
• lamaPlc: Profinet	2026/04/23 21:51	communication, bus, profinet, mrp, rstp, gsdml, xml, profibus, ethernet, tcp
• lamaPLC: PTA8C04 4-channel PT100 Modbus Modul	2026/02/14 18:42	pta8c04, sensor, modbus, rtu, rs-485, communication, platine, um72
• LamaPLC: S7-1500 and Metrawatt EM2389 Modbus TCP communication	2026/04/23 21:52	simatic, s7, modbus, communication, metrawatt, em2389, source code, scl, mid
• LamaPLC: S7-1500 and Sicam Q200 Modbus TCP communication	2026/04/23 21:52	simatic, s7, modbus, tia portal, communication, sicam, q200, sicam q200, source code, scl, class a

• lamaPLC: S7-1500 and UICPAL Temp.humi.sensor Modbus TCP communication	2023/06/19 23:24	bus, communication, s7, simatic, s7 1500, s7 1200, scl, uicpal, temperature, humidity, modbus, example, download, tia portal
• LamaPLC: SGP Sensirion TVOC/VOC sensors with I²C 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 I²C communication	2026/04/23 21:52	sht20, sht21, sht25, sht30, sht31, sht35, sht40, gy21, temperature, humidity, i2c, communication, sensor, arduino, code
• lamaPLC: TCA9548A (HW617); Low-Voltage 8-Channel I²C Switch Module	2026/02/14 23:51	tca9548a, hw617, i2c, switch, communication, expansion board, arduino
• LamaPLC: Texas Instruments ADCs: Delta-sigma multi-channel Analog Converters with SPI communication	2026/04/23 21:52	ads111x, ads12xx, delta-sigma, converter, texas instruments, adc, spi, communication, sensor, arduino, code, ads1110, ads1112, ads1113, ads1114, ads1115, ads1118, ads1119, ads1220, ads1232, ads1234, ads1256, ads1261, ads1263, multi channel
• LamaPLC: TOFnnnC STMicroelectronics Time-of-Flight (ToF) sensors with I²C communication	2026/04/23 21:52	tof050c, vl6180, tof200c, vl53l0x, tof400c, vl53l1x, stmicroelectronics, time-of-flight, tof, i2c, communication, sensor, arduino, code
• lamaPLC: TWAI basics	2026/04/23 21:51	bus, communication, as-i, basic, can, twai, espressif, esp32
• LamaPLC: UICPAL Temp.humi.sensor	2023/06/25 00:43	simatic, s7, modbus, communication, temperature, humidity, sensor
• LamaPLC: VL53Lnn STMicroelectronics time-of-flight (ToF) laser-ranging sensors with I²C 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 I²C communication	2026/04/23 21:52	vl6180x, stmicroelectronics, time-of-flight, tof, i2c, communication, sensor, arduino, code
• lamaPLC: Waveshare LoRA products	2026/03/07 01:46	waveshare, lora manufacturer, communication, lora, modul, usb-to-lora-xf02, core 1262, 1262, spi, arduino, rp2040-lora, rp2040
• LamaPLC: XTM35SC Modbus communication	2024/08/18 16:52	xtm35sc, modbus, modbus rtu, measuring, power, communication, current meter, voltmeter
• lamaPLC: YR-3180 - Weight sensor module with UART or Modbus communication	2026/02/15 00:00	communication, modbus, rtu, sensor, weight, yr-3180, hx710b, arduino, ttl, rs-485
• Magnetic angle sensors	2026/03/05 21:19	magnetic angle sensor, magnetic flux, sensor, spi, i2c, pwm, communication, modul, as5047p, as5600, mt6701, mt6816, mt6835, tle5012b, amr, gmr, tmr, anisotropic magnetoresistive
• NT18B07: 7 Kanal RS485 Temperatur Sensor with Modbus RTU	2026/02/14 18:49	nt18b07, sensor, modbus, rtu, rs-485, communication, platine

• Simatic Modbus S7 error- and statuscodes	2026/04/23 21:52	communication, bus, modbus, error, modbus error code, 7000, 7001, 7002, 7003, 7004, 7005, 7006, 80a1, simatic, s7, siemens, tia
• Waveshare	2026/04/23 21:52	waveshare, converter, modbus, modbus rtu, modbus tcp, communication
• XTM35SC current / voltage meter	2026/04/23 21:52	xtm35sc, modbus, modbus rtu, measuring, power, communication, current meter, voltmeter

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, esp32, esp8266, Wi-Fi, Thread, Zigbee, Matter, HomeKit, Bluetooth, MQTT, ADC, SPI, UART, I2C, I2S, RMT, PWM, USB, USB OTG, TWAI