

T-Display P4



Overview

T-Display P4 is a multi-functional development board based on **ESP32-P4** (16 MB Flash) for complex graphics, multimedia, and IoT applications. Features a **4.05-inch MIPI TFT** (540 × 1168) or **4.1-inch AMOLED** (568 × 1232) with capacitive touch, **ESP32-C6** auxiliary processor (Wi-Fi 6 + Bluetooth 5.3, SDIO), **SX1262 LoRa** (HPD16A module), **L76K GPS**, **ES8311 + NS4150B** audio, **AW86224** linear vibration motor, **ICM20948** IMU, **BQ27220** battery monitor, **OV2710** MIPI camera. Supports keyboard expansion board (T-Display-P4-KeyBoard) with CC1101, NRF24L01, and NFC (ST25R3916).

Quick Start

Example Support

Example	ESP-IDF	Description
lvgl_9_ui	✓	Factory example
screen_camera	✓	Camera preview
sx1262_lora_send_receive	✓	SX1262 LoRa send/receive
l76k	✓	L76K GPS
es8311	✓	Audio codec
deep_sleep	✓	Deep sleep (avg 1.2 mA)
icm20948	✓	ICM20948 IMU
aw86224	✓	Vibration motor
xiaozhi	✓	XiaoZhi AI chatbot

ESP-IDF (Primary)

1. Install [Visual Studio Code](#) and the **ESP-IDF** extension
2. Clone the repository:

```
git clone --recursive https://github.com/Xinyuan-LilyGO/T-Display-P4.git
git submodule update --init --recursive
```

shell

3. Install [ESP-IDF v5.4.1](#) and configure the extension
4. Open "SDK Configuration Editor", select the example to build and the screen type, click Save
5. Set target to **ESP32P4**, click "Build Project", then "Flash Project"

PlatformIO

1. Install [Visual Studio Code](#) and the **PlatformIO IDE** extension
2. Open the `T-Display-P4` project folder
3. Open `platformio.ini` and select your example
4. Click ✓ to compile, click → to upload

Arduino

Configure board as **ESP32P4 Dev Module** with appropriate settings when Arduino ESP32 adds ESP32-P4 support.

Development Platforms

- 1. [ESP-IDF](#) — Primary platform
- 2. [Arduino IDE](#)
- 3. [PlatformIO](#)
- 4. [MicroPython](#)

Video

Key Features

- ESP32-P4 (16 MB Flash), ESP32-C6 co-processor (Wi-Fi 6 + BT 5.3, SDIO)
- 4.05" MIPI TFT (540 × 1168) or 4.1" AMOLED (568 × 1232), 10-point capacitive touch
- SX1262 LoRa (HPD16A module), L76K GPS, PCF8563 RTC
- ES8311 + NS4150B audio, AW86224 linear vibration motor
- ICM20948 9-axis IMU, BQ27220 battery monitor, LGS4056H charger
- OV2710 MIPI camera, XL9535 I/O expander
- Keyboard expansion: CC1101, NRF24L01, NFC (ST25R3916), TCA8418 keyboard driver

Product Parameters

Feature	Specification
MCU	ESP32-P4
Flash	16 MB

Feature	Specification
Co-processor	ESP32-C6-FH4, 4 MB PSRAM, SDIO
Wi-Fi	Wi-Fi 6 (ESP32-C6)
Bluetooth	Bluetooth 5.3 LE (ESP32-C6)
Display	4.05" MIPI TFT (540×1168) / 4.1" AMOLED (568×1232)
Touch	10-point capacitive
LoRa	SX1262 (HPD16A module)
GPS	L76K
RTC	PCF8563
Audio	ES8311 codec + NS4150B amplifier
Vibration	AW86224 linear motor
IMU	ICM20948 nine-axis
Battery Monitor	BQ27220
Camera	OV2710 (MIPI)
I/O Expander	XL9535
USB	1 × Type-C

Pin Diagram

AMOLED Version

IO Expansion

Chip: XL9535

RTC Chip: PCF8563

Clock Frequency: 400 MHz

ESP32-P4

FLASH: 16M

PSRAM: 32M

MCU

ESP32-C6

PSRAM: 4M

4.1" AMOLED

Capacitive touch

568(H) × 1232(V) px

Speaker & Microphone

DAC Chip: ES8311_SDA IO20

ES8311 ES8311_SCL IO21

Amplifier: ES8311_ADC IO11

NS4150B ES8311_DAC IO10

ES8311_BCLK IO12

SDIO_D0 IO39 **9-axis IMU**

SDIO_D1 IO40 Chip: **ICM20948**

SDIO_D2 IO41 SDA IO20

SDIO_D3 IO42 SCL IO21

SDIO_CLK IO43

SDIO_CMD IO44

TF Card

LilyGo T-Display-P4 AMOLED PINMAP

ESP32-P4 + C6 + Camera + LoRa + GPS + IMU + Microphone + RTC + TF Card

MMCX1
400-520Mhz, 830-945Mhz
RF Switch
SKY13453: XL9545-IO01
MMCX2
LoRa 2.4Ghz
(Only LR1121)

Camera

Module: **OV2710**

CAMERA_SDA IO20

CAMERA_SCL IO21

LORA

Module: SX1262

SX1262_CS IO24

SX1262_BUSY IO06

SX1262_SCLK IO02

SX1262_MOSI IO03

SX1262_MISO IO04

GPS

Module: **L76K**

GPS_TX IO22

GPS_RX IO23

Ethernet Module

ETH_RST: XL9535-IO05

X-axis Linear Motor

Chip: AW86224AFRCR

TFT Version



For pin definitions see config files:

- [t_display_p4_config.h](#)
- [t_display_p4_keyboard_config.h](#)

Dimension Diagram

Schematic

Datasheet

- [SX1261/2](#)
 - [L76K GPS](#)
 - [ES8311](#)
 - [ICM20948](#)
 - [BQ27220](#)
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Software Development

- [T-Display-P4 GitHub Repository](#)

Dependent Libraries

- (ESP-IDF based — all dependencies managed via IDF component manager)
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FAQ

- **Q. Why does my board keep failing to upload programs?** A. Hold down the **BOOT** button and try uploading again.
- **Q. Why can't I get a GPS fix in the factory firmware?** A. Test outdoors or in an area with good GPS signal. Check the [latest factory firmware](#).
- **Q. Battery not charging when powered off or battery life very short?** A. T-Display-P4 supports charging when off. Factory firmware runs ~3–5 hours (no sleep). For sleep, use the `deep_sleep` example.
- **Q. ESP-IDF menuconfig reports `asyncio.exceptions.LimitOverrunError` ?** A. This is a bug in esp-idf v5.4–v5.5. In `esp-idf-v5.x/tools/idf_py_actions/tools.py` line 351, change `limit=1024 * 256` to `limit=1024 * 512`.

Version History

Version	Release Date	Update Description
T-Display-P4 V1.0	2025-06-13	Initial version
T-Display-P4-Keyboard V1.0	2025-09-12	Keyboard expansion board initial version

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