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XYGStudy ESP32-S3-LCD-2.8

XYGStudy ESP32-S3-LCD-2.8 Development Board Instruction Manual

1. Overview

The ESP32-S3-LCD-2.8 is a development board featuring an ESP32-S3 microcontroller with a 2.8-inch IPS display. It is designed for various embedded applications requiring a compact display and wireless connectivity. This board integrates a high-performance Xtensa 32-bit LX7 dual-core processor, supporting Wi-Fi and Bluetooth 5 (LE), and includes onboard memory and various peripheral interfaces.

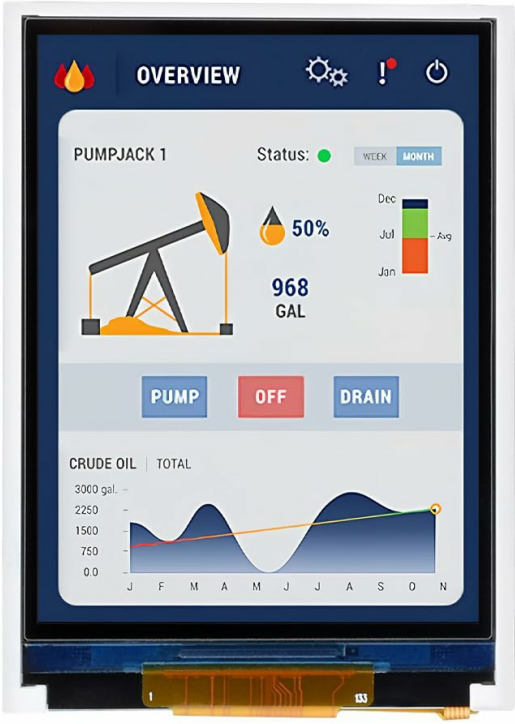


Figure 1: ESP32-S3-LCD-2.8 Development Board

2. Package Contents

Verify that all items listed below are included in your package:

- ESP32-S3-LCD-2.8 board x1
- SH1.0 12PIN cable (~100mm) x1
- SH1.0 4PIN cable (~100mm) x1 (2 pieces)
- 2030 speaker x1

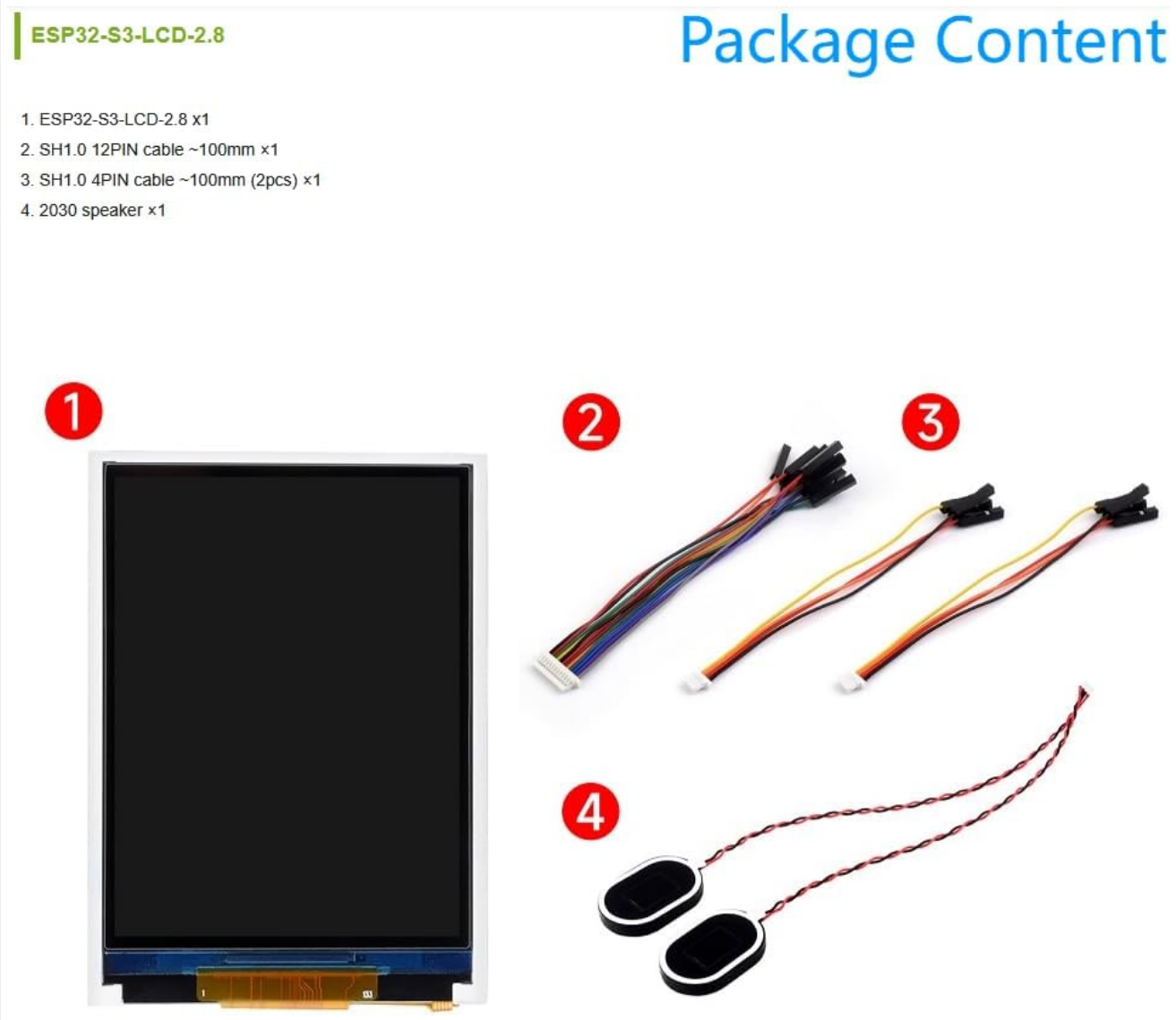


Figure 2: Included components in the package.

3. Features

The ESP32-S3-LCD-2.8 development board offers the following key features:

- **Processor:** High-performance Xtensa 32-bit LX7 dual-core processor, operating up to 240MHz.
- **Wireless Connectivity:** Supports 2.4GHz Wi-Fi (802.11 b/g/n) and Bluetooth 5 (LE) with an onboard antenna.
- **Memory:** Built-in 512KB SRAM and 384KB ROM, with onboard 16MB Flash and 8MB PSRAM.
- **Display:** 2.8-inch IPS LCD display with 240×320 resolution and 262K colors. This model does not include

touch functionality.

- **Interfaces:** Adapts UART, I2C, and other GPIO interfaces, integrating a full-speed USB port.
- **Onboard Peripherals:** Includes an onboard speaker, QMI8658 6-axis sensor (accelerometer and gyroscope), RTC sensor, TF card slot, and a battery recharge management module.
- **Power Management:** Supports accurate control and multiple power modes for low power consumption.

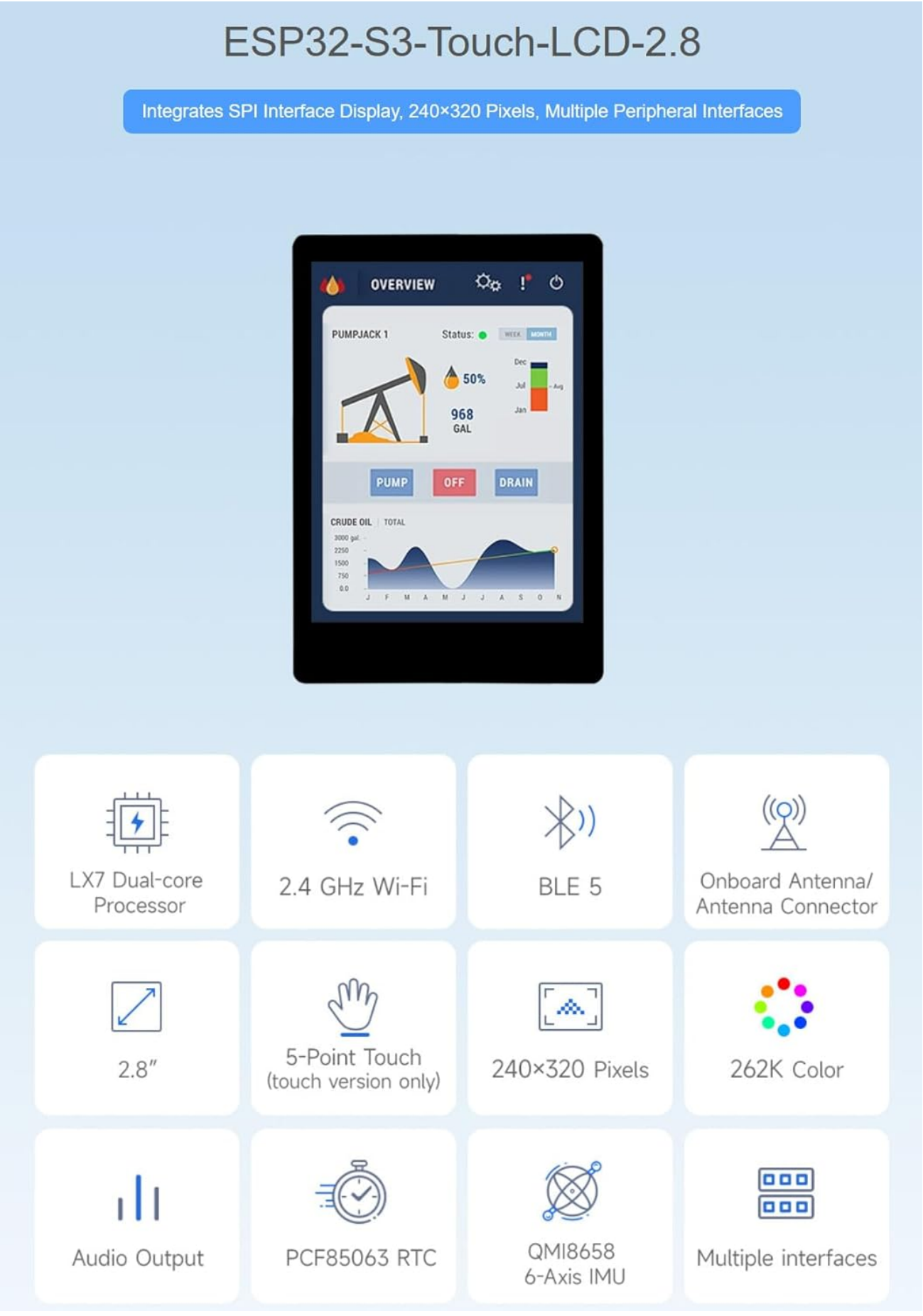


Figure 3: Key features of the ESP32-S3-LCD-2.8 development board.

3.1 Version Options

The ESP32-S3 series offers various versions. This specific model, ESP32-S3-LCD-2.8, is designed**without touch**

functionality. Other versions with touch capabilities are available separately.

Version Options

ESP32-S3-LCD-2.8
without touch control

ESP32-S3-Touch-LCD-2.8
with touch control

Features

This product is a microcontroller development board with 2.4GHz WiFi and Bluetooth BLE 5 support, integrates high-capacity Flash and PSRAM. Onboard 2.8inch LCD screen (optional for touch function) can smoothly run GUI programs such as LVGL. Combined with various peripheral interfaces, suitable for the quick development of the HMI and other ESP32-S3 applications.

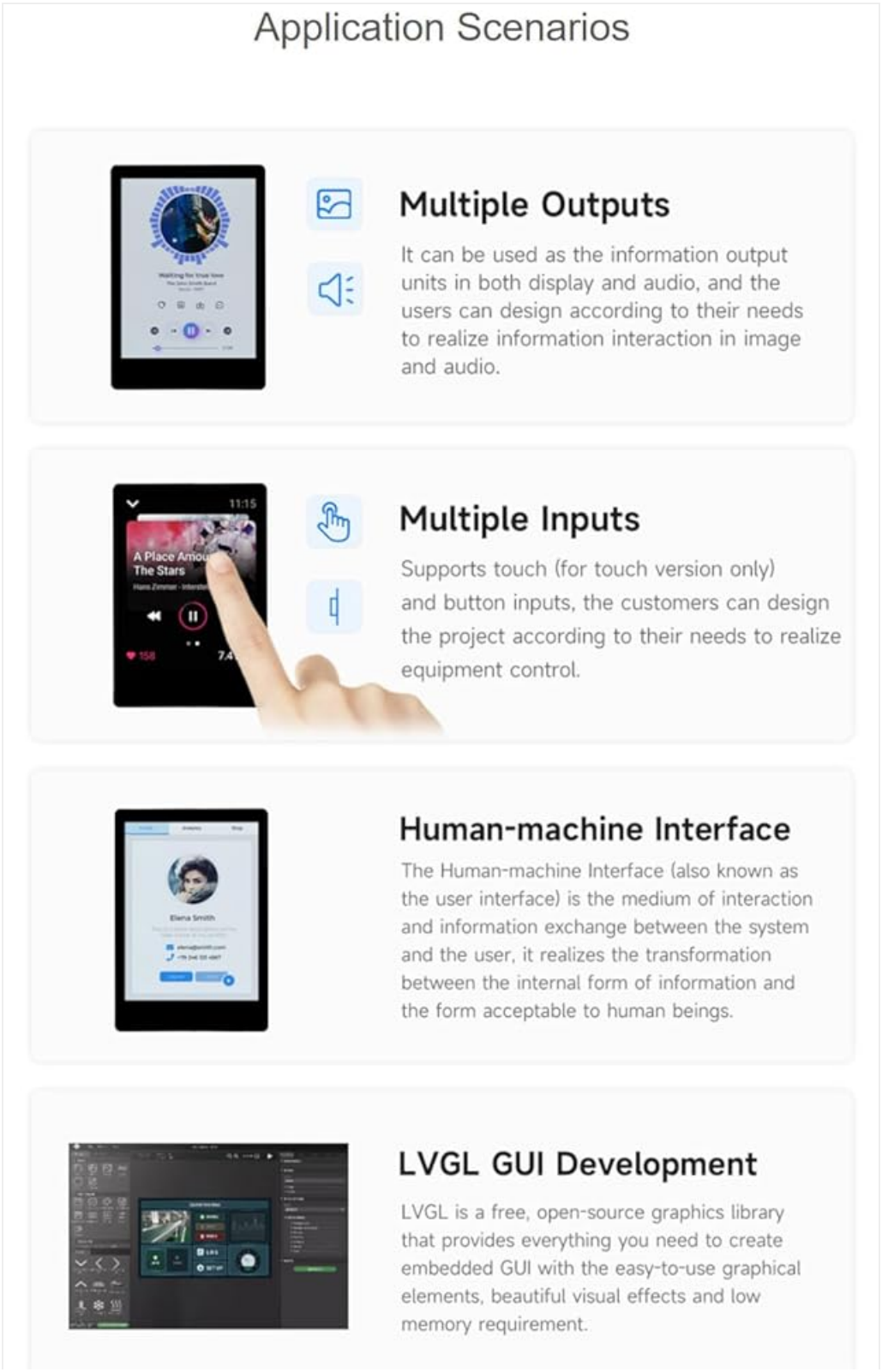
- Equipped with high-performance Xtensa 32-bit LX7 dual-core processor, up to 240MHz main frequency
- Supports 2.4GHz Wi-Fi (802.11 b/g/n) and Bluetooth 5 (LE), with onboard antenna
- Built-in 512KB SRAM and 384KB ROM, with onboard 16MB Flash and 8MB PSRAM
- Onboard 2.8inch LCD display, 240×320 resolution, 262K color
- Optional for capacitive touch function controlled via I2C interface, 5-point touch, with interrupt support
- Adapting UART, I2C and some IO interfaces, integrates full-speed USB port
- Onboard speaker, QMI8658 6-axis sensor, RTC sensor, TF card slot and battery recharge management module, etc.
- Supports accurate control such as flexible clock and multiple power modes to realize low power consumption in different scenarios

Figure 4: Version options for ESP32-S3 LCD boards, showing models with and without touch.

4. Application Scenarios

The ESP32-S3-LCD-2.8 development board is suitable for a wide range of applications, including:

- **Multiple Outputs:** Can be used as an information output unit with both display and audio capabilities. Users can design custom interfaces for image and audio information interaction.
- **Multiple Inputs:** Supports various input methods (excluding touch for this model) for controlling equipment.
- **Human-Machine Interface (HMI):** Serves as a medium for interaction and information exchange between a system and the user, enabling transformation between internal data and user-friendly forms.
- **LVGL GUI Development:** Compatible with LVGL, a free, open-source graphics library, for creating embedded GUIs with visual effects and low memory requirements.



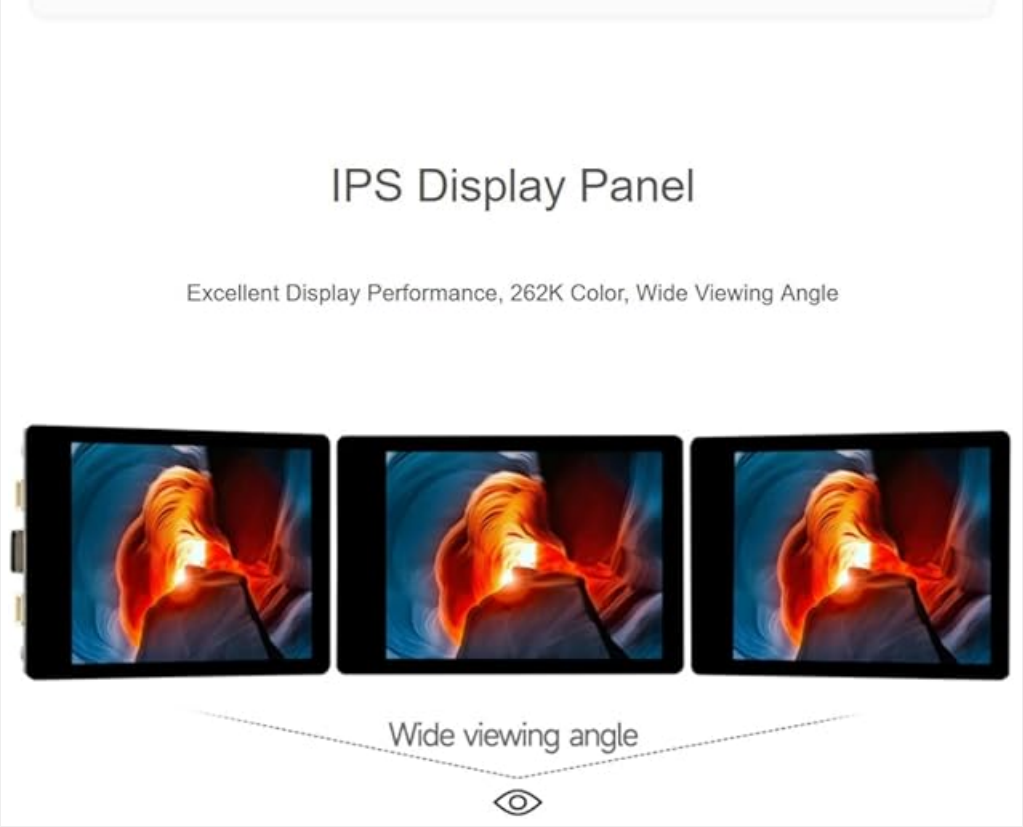
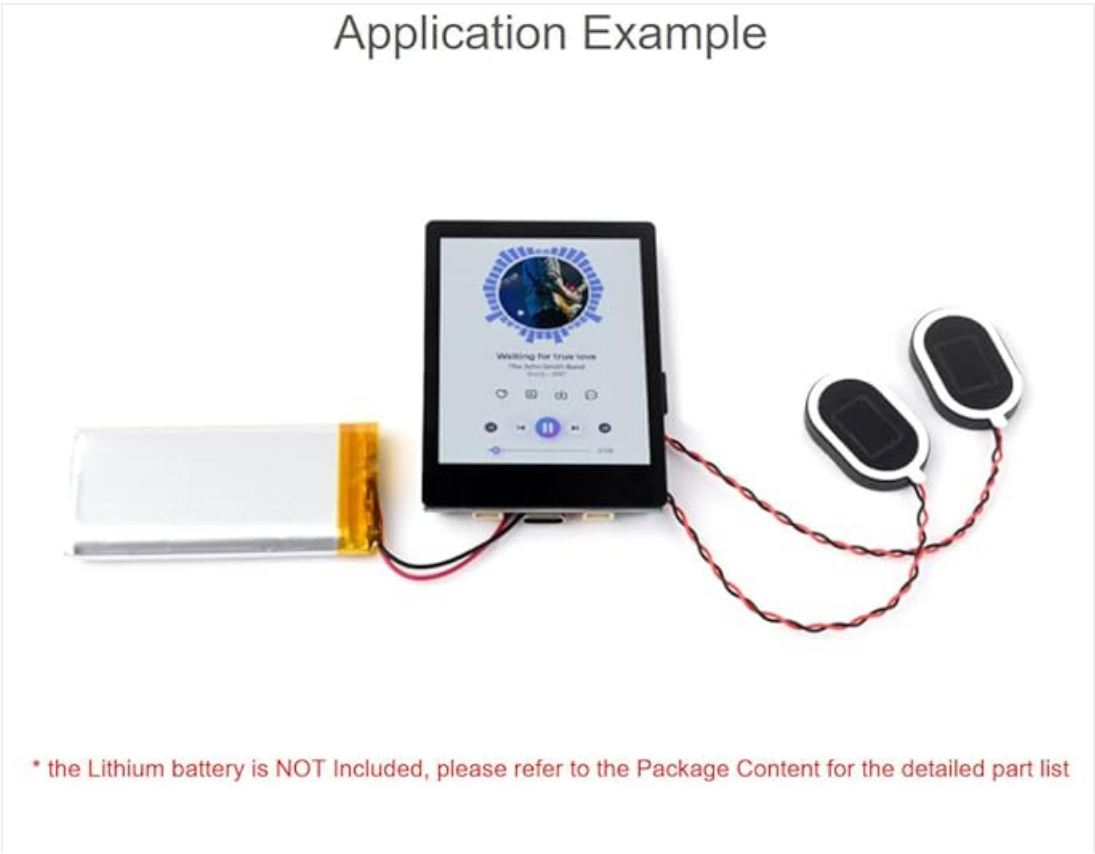


Figure 5: Potential application scenarios for the development board.

5. Hardware Overview

5.1 Pinout Diagram

The board supports the expansion of multiple peripherals via GPIO, UART, and I2C interfaces. Refer to the pinout diagram for detailed connections:



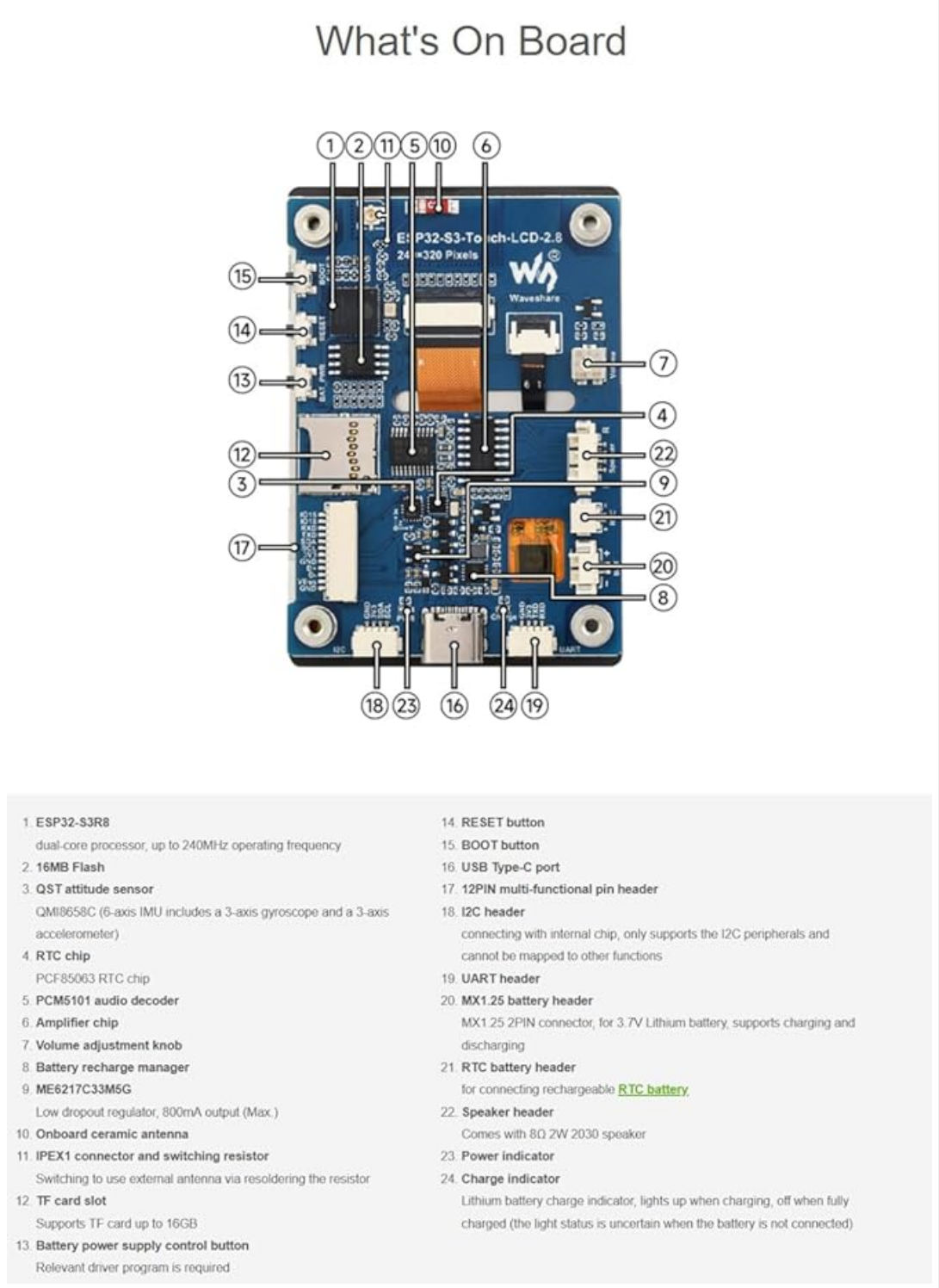
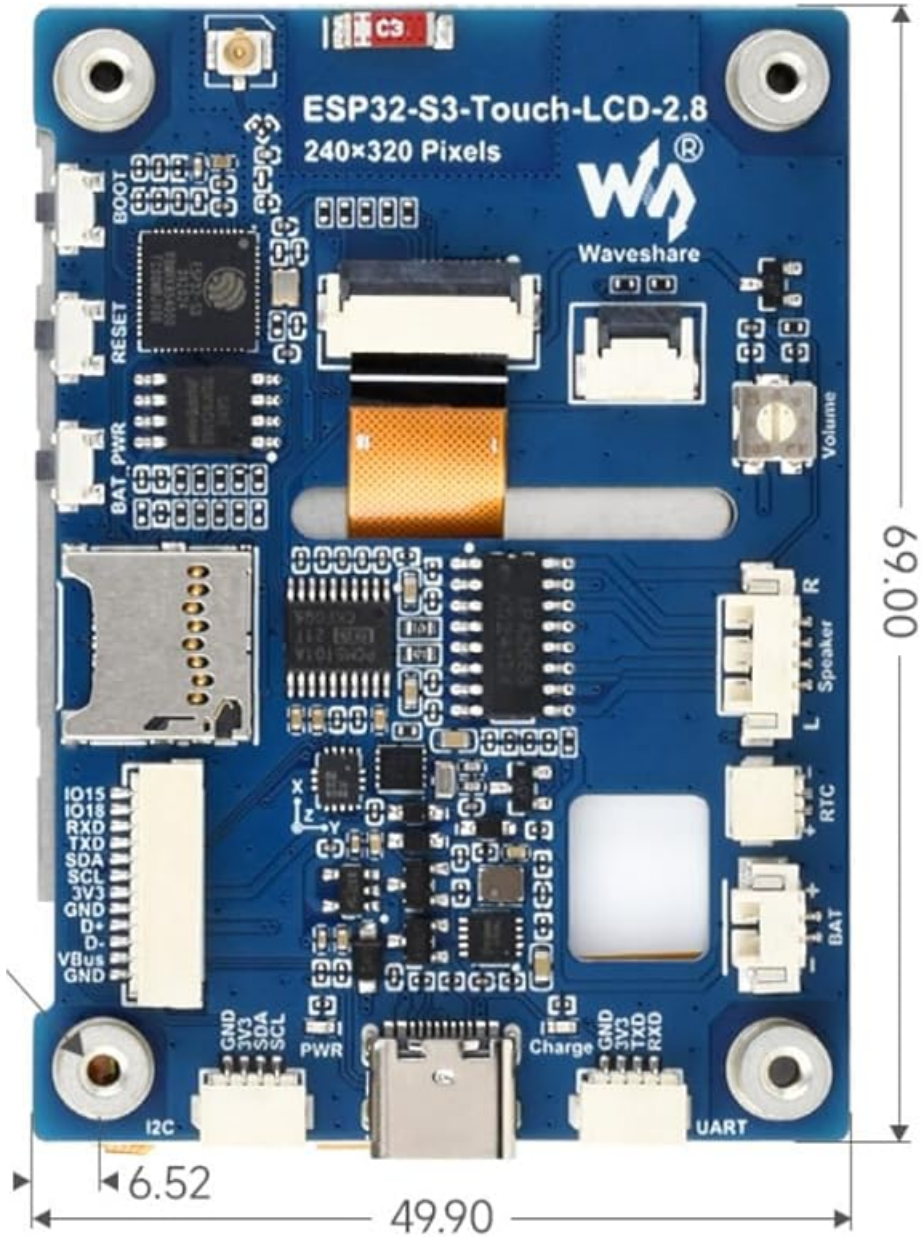


Figure 6: Pinout diagram for connecting peripherals.

5.2 Onboard Components

The board integrates various components for enhanced functionality:


ESP32-S3-Touch-LCD-2.8
240×320 Pixels
Waveshare
BOOT
RESET
BAT_PWR
Volume
Speaker
L
R
RTC
BAT
IO15
IO18
RXD
TXD
SDA
SCL
3V3
GND
D+
D-
VBus
GND
PWR
Charge
I2C
UART
69.00
6.52
49.90

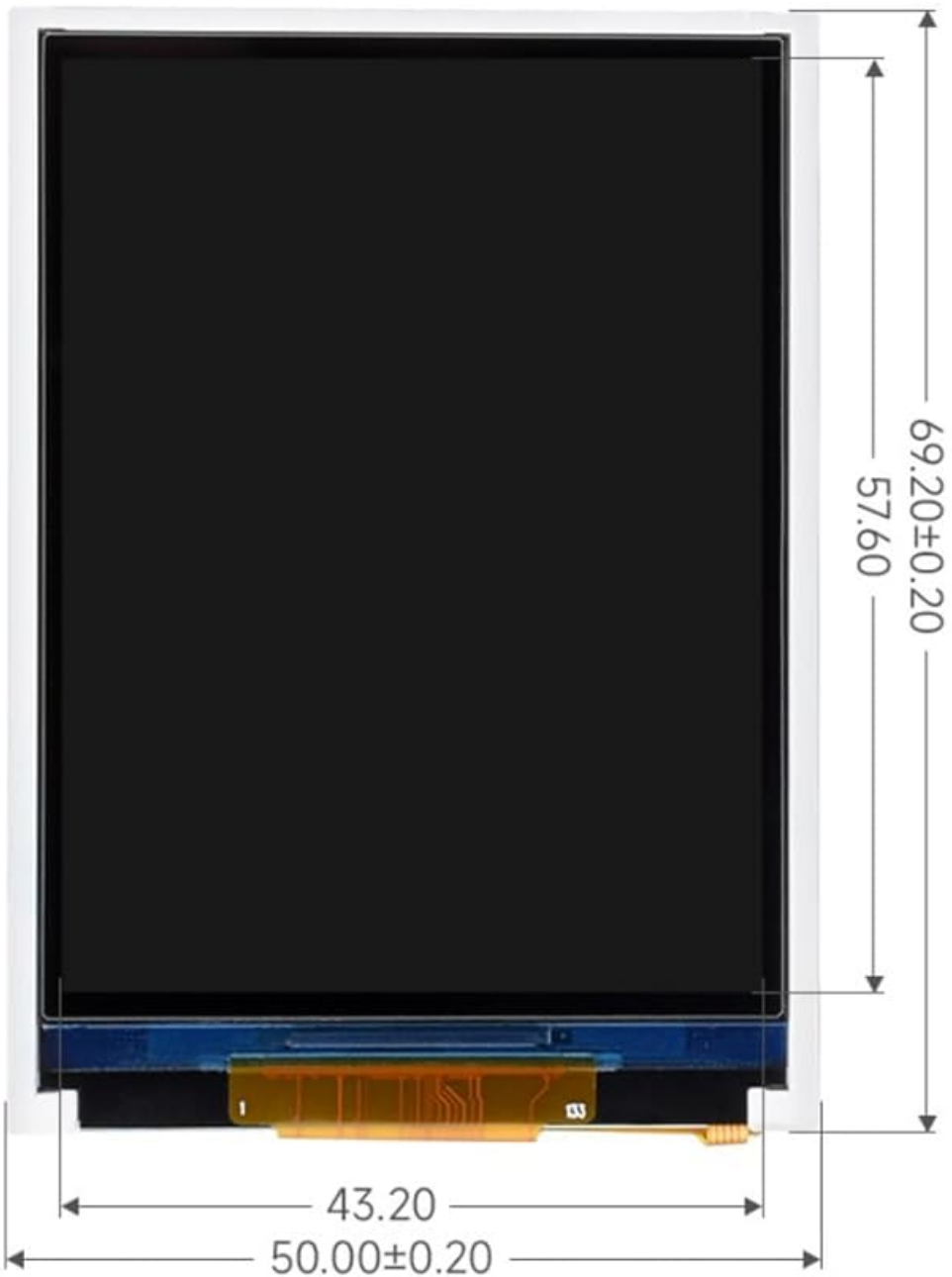

69.20±0.20
57.60
43.20
50.00±0.20

Figure 7: Onboard components and their locations.

1. ESP32-S3-WROOM-1-N16R8 (ESP32-S3 module)
2. 2.8inch LCD (240x320 resolution)
3. QMI8658 6-axis IMU (3-axis accelerometer and 3-axis gyroscope)
4. PCF8563 RTC chip
5. PCM5101 audio decoder
6. Speaker interface
7. Volume adjustment knob
8. ETA6096 battery recharge manager
9. ME6217C33M5G (3.3V LDO)
10. Onboard ceramic antenna
11. IPEX1 connector (for external antenna, requires switching a resistor)
12. TF card slot (supports up to 16GB)
13. Battery power supply control button
14. RESET button
15. USB Type-C port (for power and data)
16. PICO compatible pin header
17. I2C header
18. UART header
19. MX1.25 battery header (for 3.7V Lithium battery, supports charging and discharging)
20. RTC battery header (for connecting a rechargeable RTC battery)
21. Speaker (2030)
22. BOOT button
23. Charge Indicator (LED: lights up when charging, off when fully charged; status uncertain when no battery is connected)

6. Setup and Development Environment

This section outlines the steps to set up your development environment for the ESP32-S3-LCD-2.8 board using Arduino IDE.

6.1 Installing Libraries

To begin development, you need to install the necessary libraries in your Arduino IDE. If you do not have a 'libraries' folder, create one in your Arduino sketchbook directory.

1. Open Arduino IDE preferences and locate the 'Sketchbook location'.
2. Navigate to this location and create a new folder named 'libraries' if it doesn't exist.
3. Copy all required library files into this 'libraries' folder.

6.2 Board Selection and Configuration

Configure the Arduino IDE for the ESP32-S3 board:

1. In the Arduino IDE, go to **Tools > Board > ESP32 Arduino** and select **ESP32S3 Dev Module**.
2. Set the 'Flash Mode' to **QIO 80MHz**.
3. Select 'Flash Size' to **8MB (64Mb)**.
4. Select 'PSRAM' as **OPI PSRAM**.
5. Before uploading, ensure you select the correct COM port for your connected board under **Tools > Port**.

6.3 Uploading Code

After configuring the board and selecting the COM port:

1. Click the 'Upload' button (right arrow icon) in the Arduino IDE to compile and upload your sketch to the board.
2. Monitor the output window for compilation and upload progress.

Video 1: Demonstrates the setup process for the ESP32-S3 development board, including library installation, board configuration, and code uploading using Arduino IDE. This video also shows display effects, which are relevant to the non-touch version.

7. Operating the Display

The 2.8-inch IPS display provides clear and vivid visuals. The board supports 90-degree hardware rotation, allowing for flexible screen orientation in your applications.

Video 2: Provides an overview of the ESP32-S3/C6 LCD development boards, showcasing features like compact design, display quality, 90-degree hardware rotation, power options (USB and battery), and peripheral resources. This video is relevant for understanding the general capabilities of the ESP32-S3-LCD-2.8.

8. Specifications

Feature	Description
Model Number	ESP32-S3-LCD-2.8
Processor	Xtensa 32-bit LX7 Dual-core, up to 240MHz
Display	2.8-inch IPS LCD, 240×320 pixels, 262K color
Touch Function	No
Wi-Fi	2.4GHz (802.11 b/g/n)
Bluetooth	Bluetooth 5 (LE)
SRAM	512KB
ROM	384KB
Flash	16MB Onboard
PSRAM	8MB Onboard

Feature	Description
Interfaces	UART, I2C, GPIO, USB Type-C
Sensors	QMI8658 6-axis IMU, RTC sensor
Storage Expansion	TF card slot (up to 16GB)
Power Supply	USB Type-C, 3.7V Lithium battery (via MX1.25 header)
Dimensions	Approximately 69.20mm x 49.90mm (board), 57.60mm x 43.20mm (display area)

9. Support and Resources

For additional resources, including detailed documentation, example code, and technical support, please contact XYGStudy via Amazon message. Comprehensive SDK open-source materials and tutorials are available to help developers integrate these boards into various project applications.