UeeKKoo ESP32-S3-Touch-AMOLED-2.06

UeeKKoo ESP32-S3-Touch-AMOLED-2.06 Development Board User Manual

Wearable Watch-Style Development Board for Makers & Developers

1. Introduction

The UeeKKoo ESP32-S3-Touch-AMOLED-2.06 is a high-performance, wearable watch-style development board. It is designed for tech enthusiasts, developers, and programming enthusiasts who wish to create their own applications. This is a DIY module and not a standard pre-configured smartwatch. Users are expected to develop their own software to fully utilize its functions.

Figure 1: UeeKKoo ESP32-S3-Touch-AMOLED-2.06 Development Board

2. Key Features

- **Powerful Microcontroller:** Utilizes the ESP32-S3R8 Xtensa 32-bit LX7 dual-core processor, operating at up to 240MHz. It supports 2.4GHz Wi-Fi (802.11 b/g/n) and Bluetooth 5 (LE) with an onboard antenna. It includes 512KB SRAM, 384KB ROM, 8MB PSRAM, and an external 32MB Flash memory.
- **Integrated Multi-Functions:**
  - **AMOLED Display:** A 2.06-inch capacitive touch display with CO5300 driver chip and FT3168 touch controller.
  - **Motion Sensing:** QMI8658 6-axis IMU (3-axis accelerometer and 3-axis gyroscope) for gesture detection and step counting.
  - **Power Management:** AXP2101 chip supports lithium battery charging/discharging and multi-level power consumption control.
  - **Audio System:** ES8311 codec and ES7210 microphone circuit for audio input and output.
- **Developer-Friendly Design:** Features lead-out I2C/UART/USB pads (requires soldering), a Micro SD card slot for storage expansion, and detachable watch straps for customization.
- **AI Support:** Supports offline voice recognition and AI Speech Interaction, with access to online large model platforms like DeepSeek, Doubao, and ChatGPT.

Figure 2: Overview of the Development Board's Features

3. Setup

3.1. Package Contents

Ensure all items are present in your package:

- ESP32-S3-Touch-AMOLED-2.06 Development Board (x1)
- Watch straps (x1 pair)
- MX1.25 Lithium battery (x1)

Figure 3: Package Contents

3.2. Battery Installation

The MX1.25 Lithium battery is included and can be installed inside the case. Connect the battery to the designated port on the development board. Ensure correct polarity. The AXP2101 power management chip handles battery charging and discharge.

3.3. External Connections

The board features lead-out I2C/UART/USB pads for connecting peripherals and debugging. These pads require soldering for use. A Micro SD card slot is available for storage expansion, simplifying data logging and media playback development.

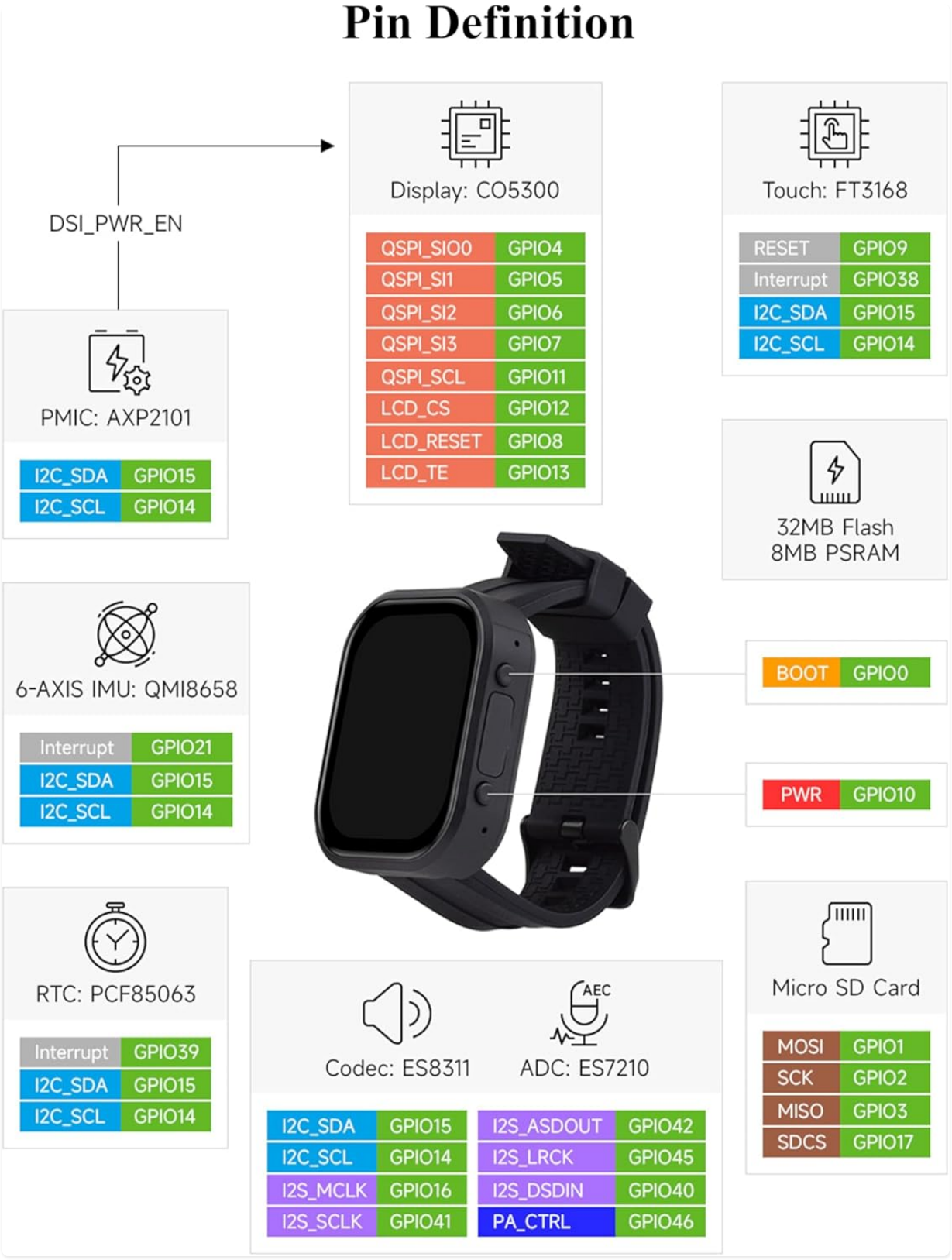

Figure 4: Pin Definition

4. Operating the Device

4.1. Power On/Off and Basic Interaction

The device features PWR and BOOT programmable buttons for custom function development. Refer to your developed application for specific power-on procedures. The 2.06-inch AMOLED capacitive touch display allows for direct interaction with your applications.

Figure 5: Touch Display Interaction

4.2. Wireless Connectivity

The ESP32-S3 supports 2.4GHz Wi-Fi (802.11 b/g/n) and Bluetooth 5 (LE), enabling wireless communication for your applications.

4.3. Motion Sensing and Audio

The integrated QMI8658 6-axis IMU allows for motion detection, gesture recognition, and step counting. The ES8311 audio codec and ES7210 microphone circuit provide capabilities for audio playback and recording, essential for voice interaction applications.

Figure 6: Audio and AI Speech Interaction

4.4. AI Speech Interaction

Leverage the offline voice recognition and AI Speech Interaction capabilities. The device can access online large model platforms for advanced AI functionalities, depending on your developed application.

4.5. Development Environment Support

The ESP32-S3-Touch-AMOLED-2.06 supports both ESP-IDF and Arduino IDE development environments. Comprehensive SDKs, development resources, and tutorials are available to help you get started quickly and integrate your creativity into applications.

Figure 7: Development Environment Support

4.6. Official Product Videos

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Video 1: Overview of the ESP32-S3 2.06inch AMOLED Touch Watch Development Board, highlighting its features and capabilities.

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Video 2: Detailed look at the ESP32-S3 Touch-AMOLED 2.06, showcasing its core components and functionalities.

5. Maintenance

To ensure the longevity and optimal performance of your UeeKKoo ESP32-S3-Touch-AMOLED-2.06 development board, follow these general maintenance guidelines:

- **Handle with Care:** Avoid dropping the device or subjecting it to strong impacts.
- **Keep Dry:** Protect the board from moisture and liquids. Water damage can severely impair functionality.
- **Clean Gently:** Use a soft, dry cloth to clean the display and casing. Avoid abrasive cleaners or solvents.
- **Battery Care:** If using the included lithium battery, ensure proper charging practices. Avoid overcharging or completely draining the battery to prolong its lifespan. Store the device in a cool, dry place when not in use for extended periods.

- **Software Updates:** Regularly check for firmware and software updates from the manufacturer or community to ensure optimal performance and security.

6. Troubleshooting

If you encounter issues with your development board, consider the following basic troubleshooting steps:

- **Power Issues:** If the device does not power on, ensure the battery is correctly installed and charged, or that the USB power source is functioning.
- **Display Not Working:** Check connections to the display. If you are developing, verify your code for display initialization and rendering.
- **Connectivity Problems:** For Wi-Fi or Bluetooth issues, ensure the modules are enabled in your software and that you are within range of a compatible network/device.
- **Software Malfunctions:** If your custom application is not working as expected, review your code for errors. Try flashing a known working example to rule out hardware issues.
- **Development Environment:** Ensure your ESP-IDF or Arduino IDE setup is correct and all necessary drivers and libraries are installed.

For more detailed support, refer to the official UeeKKoo documentation or community forums for ESP32-S3 development.

7. Specifications

Feature	Detail
Processor	ESP32-S3R8 Xtensa 32-bit LX7 dual-core (240 MHz)
RAM	512KB SRAM, 8MB PSRAM
ROM	384KB ROM
Flash Memory	32MB External Flash
Display	2.06-inch AMOLED Capacitive Touch (410 x 502 pixels, 16.7M colors, 178° viewing angle)
Display Driver	CO5300 (QSPI)
Touch Controller	FT3168 (I2C)
Wireless Connectivity	2.4GHz Wi-Fi (802.11 b/g/n), Bluetooth 5 (LE)
IMU Sensor	QMI8658 6-axis (Accelerometer + Gyroscope)
RTC Chip	PCF85063
Power Management	AXP2101 (Lithium battery charge/discharge)
Audio Codec	ES8311
Microphone	ES7210

Feature	Detail
Storage Expansion	Micro SD Card Slot
Interface	Type-C connector, I2C/UART/USB pads (solderable)
Buttons	PWR, BOOT (programmable)
Battery	MX1.25 Lithium battery (included)

Features

The ESP32-S3-Touch-AMOLED-2.06 is a high-performance, wearable **watch-style development board**. Based on the ESP32-S3R8 microcontroller, it integrates a 2.06inch AMOLED capacitive touch display, 6-axis IMU, RTC chip, audio codec chip, power management IC, and so on. Comes with a custom-designed case with a smartwatch-like appearance, making it ideal for prototyping and functional verification of wearable applications.

- •Equipped with ESP32-S3R8 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 of SRAM and 384KB ROM, with onboard 8MB PSRAM and an external 32MB Flash memory
- •Type-C connector, improving device compatibility, easier to use
- •Onboard 2.06inch AMOLED capacitive touch display for clear color picture display, 410 × 502 resolution, 16.7M color
- •Built-in CO5300 display driver and FT3168 capacitive touch chip, using QSPI and I2C communication respectively, effectively saving the IO resources
- •Onboard QMI8658 6-axis IMU (3-axis accelerometer and 3-axis gyroscope) for detecting motion gesture, counting steps, etc.
- •Onboard PCF85063 RTC chip, powered by Lithium battery through AXP2101 chip for uninterrupted power supply
- •Onboard PWR and BOOT programmable buttons for easy custom function development
- •Onboard 3.7V MX1.25 Lithium battery recharge/discharge header
- •Onboard reserved pads of 1 × I2C, 1 × UART and 1 × USB interfaces, for connecting peripherals and debugging
- •Onboard TF card slot for extended storage and fast data transfer, suitable for applications such as data recording and media playback, simplifying circuit design
- •Adopts AXP2101 IC for efficient power management, supports multiple voltage outputs, battery charging, battery management, and battery life optimization, etc.
- •Adopts AMOLED screen, featuring advantages of high contrast, wide viewing angle, rich colors, fast response, thinner design, and low power consumption, etc.

Screen Description--Touch and its Controller

This touch screen is composed of surface toughened glass + thin film material, which has high strength, high hardness, and good light transmittance. It is equipped with FT3168 self-capacitance touch chip as the driver chip, which supports the I2C communication protocol standard and can realize a 10Khz~400Khz configurable communication rate.

AMOLED Parameters			
Display Panel	AMOLED	**Display Size**	2.06 inch
Resolution	410 × 502 pixels	**Display Colors**	16.7M
Brightness	600 cd/㎡	**Contrast Ratio**	100000:1
Communication Interface	QSPI	**Driver IC**	CO5300
Touch	Supported	**Touch IC**	FT3168

Figure 8: Detailed Features and AMOLED Parameters

7.1. Physical Dimensions

Figure 9: Outline Dimensions and Onboard Components

8. Warranty Information

This product is covered by a standard manufacturer's warranty against defects in materials and workmanship. Please retain your proof of purchase for any warranty claims. For specific warranty terms and conditions, refer to the UeeKKoo official website or contact customer support.

9. Technical Support

For technical assistance, development resources, and community support, please visit the UeeKKoo official website or relevant developer forums. You can find detailed documentation, example code, and tutorials to aid in your development process.

Online Resources:

- UeeKKoo Store: Visit Store
- ESP-IDF Documentation: Refer to Espressif Systems official documentation.
- Arduino IDE: Refer to Arduino official documentation and community.