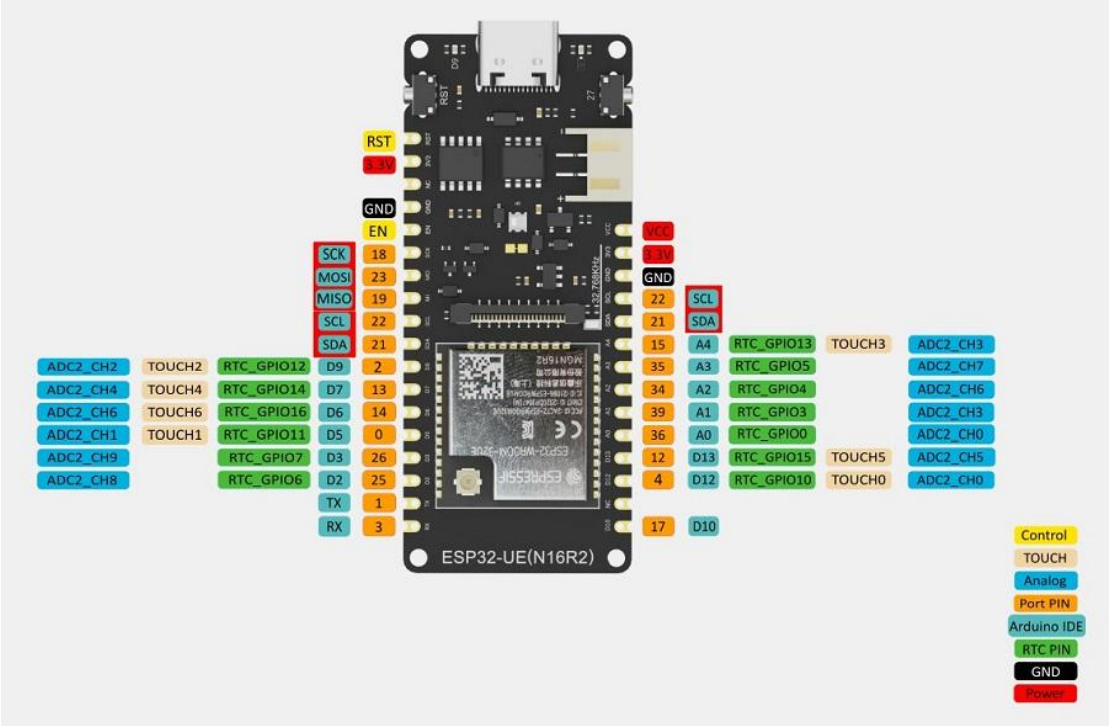
Introduction

FireBeetle 2 ESP32-UE (N16R2) is a powerful IoT microcontroller that supports external Bluetooth & WiFi antennas and features 16M Flash and 2M PSRAM. This product enhances memory capacity and operating space, enabling superior performance for applications such as the LVGL graphics library for interface design and interaction. The support for **external antennas** with higher gain enhances the communication range of Bluetooth or WiFi, setting it apart from the onboard antenna version of the ESP32 development board.

Based on Espressif's ESP32-WROOM-32UE-N16R2 module, this product features a 32-bit dual-core processor with a clock frequency of up to 240MHz and supports MCU, WiFi, and Bluetooth dual-mode communication. It is highly suitable for a wide range of IoT scenarios.

Rich peripheral interfaces

Including 17 digital pins, 11 analog pins, 3 UART interfaces, 1 SPI interface, 1 I2C interface, 1 I2S interface, and 2 DAC interfaces, it can meet various hardware connection requirements.



Dual power supply modes

Supporting USB and external 3.7V lithium battery power supply, it can automatically switch between power sources in dual power supply mode. It also supports USB and external DC charging modes.

Support for multiple programming methods

Including Arduino IDE, ESP-IDF, MicroPython, etc., catering to the programming preferences of different developers.

ESP-IDF

ARDUINO

MicroPython

Compact design, easy to embed

With dimensions of only 25.4mm × 60mm and a stamp hole design, it is easy to embed or integrate into PCB prototypes.

The difference between ESP32-WROOM-32E and ESP32-WROOM-32UE

The ESP32-WROOM-32E uses an onboard PCB antenna. This type of antenna is realized through PCB technology, does not require separate antenna assembly, is not easily damaged by touch, and is convenient for whole machine assembly. Onboard antennas can save space, reduce costs, and because they can be carefully positioned on the board, they can provide signal integrity. However, their gain may be lower than that of external antennas.

The ESP32-WROOM-32UE (this product), on the other hand, connects to an external antenna via a connector. External antennas can be installed on the outside of the device and include both omnidirectional and directional antenna types. The main advantage of external antennas is that they can provide higher gain, thereby enhancing the communication range of Bluetooth or WiFi.

Furthermore, this product is one of the low-power IoT development boards in the FireBeetle series. If it does not meet your requirements, you can refer to the FireBeetle Series Selection Guide to choose a more suitable model.

Features

- Equipped with ESP32-WROOM-32UE-N16R2 dual-core module
- Clock frequency up to 240MHz, with 16M Flash and 2M PSRAM for large memory capacity- Supports external Bluetooth & WiFi antennas
- Low-power development board, supporting dual-mode communication of WiFi and Bluetooth
- Onboard GDI display interface for quick connection to display screens
- Onboard charging circuit and PH2.0 lithium battery interface, supporting dual-power supply and automatic switching
- Supports various programming methods such as Arduino IDE, ESP-IDF, MicroPython, etc.
- Compact design with small size, suitable for IoT projects with limited space and embedded systems

Applications

- IoT project prototyping
- IoT remote control
- Remote robot control

Specification

Power Parameters - Input Voltage

- USB-C interface: 5V DC
- PH2.0 interface: 3.7V Li-ion
- VCC pin: 5V DC

MCU Parameters

- Processor: Tensilica LX6 dual-core processor (one core for high-speed connectivity, one core for independent application development)
- Clock Frequency: 240MHz
- SRAM: 520KB
- ROM: 448KB
- Flash: 16MB
- PSRAM: 2MB
- On-chip Clock: 40MHz crystal oscillator, 32.768KHz crystal oscillator

Wireless Parameters

- Wi-Fi Standard: FCC/CE/TELEC/KCC
- Wi-Fi Protocol: 802.11 b/g/n/d/e/i/k/r (802.11n, up to 150 Mbps), A-MPDU and A-MSDU aggregation, supports 0.4us protection interval
- Wi-Fi Frequency Range: 2.4~2.5 GHz
- Bluetooth Protocol: Compliant with Bluetooth V4.2 BR/EDR and BLE standards

- Bluetooth Audio: CVSD and SBC audio
- Bluetooth Frequency Range: 2.4~2.5GHz

Peripheral Parameters

- Digital Pins × 17: IO0, IO1, IO2, IO3, IO4, IO12, IO13, IO14, IO15, IO17, IO18, IO19, IO21, IO22, IO23, IO25, IO26
- Analog Pins × 11: IO0, IO2, IO4, IO12, IO13, IO14, IO15, IO25, IO26, I34, I35
- UART Interfaces: ×3
- SPI Interface: ×1
- I2C Interface: ×1
- I2S Interface: ×1
- DAC Interface: ×2
- Touch Interfaces: ×7
- LED PWM Channels: ×16
- RGB_LED: WS2812
- Display Interface: GDI

Other Parameters

- Interface Compatibility: FireBeetle V2 series compatible
- Module Size: 25.4mm × 60mm
- Weight: 23.4g

Documents

- Product wiki
- Pinout
- Dimension
- Getting Started (Use for the first time)

- Arduino Tutorials Esp32-wroom-32e/32ue datasheet
- Schematic
- 2D File
- STP File
- Shell stl file

Shipping List

- FireBeetle 2 ESP32-UE (N16R2) IoT Microcontroller x1
- 2.4GHz WiFi and Bluetooth antenna x1
- 18pin-2.54mm Pitch Pin x1
- 18pin-2.54mm Pitch Pin Female x1
- 14pin-2.54mm Pitch Pin x1
- 14pin-2.54mm Pitch Pin Female x1