# DATA COMMUNICATION AND PROCESSING UNIT (DCPU) DATASHEET

## General Description

The DCP unit is powered with Espressif's ESP32-DevKitC V4. It utilizes ESP32-WROOM-32D, which is a compact but powerful dual-core microcontroller integrated with WiFi and Bluetooth making it ideal for IoT and related projects. The board is packed with 10 GPIO, 6 Analog inputs, 2 Analog output and supports various communication protocols including SPI, I2C and UART, to address all your project's needs. The board also includes USB to Serial converter which allows it to be easily programmed and communicate with a computer. In addition to USB, it can be powered through a lithium-polymer (LiPo) battery, making it portable. Moreover, it also features a few buttons and LEDs to aid your projects.

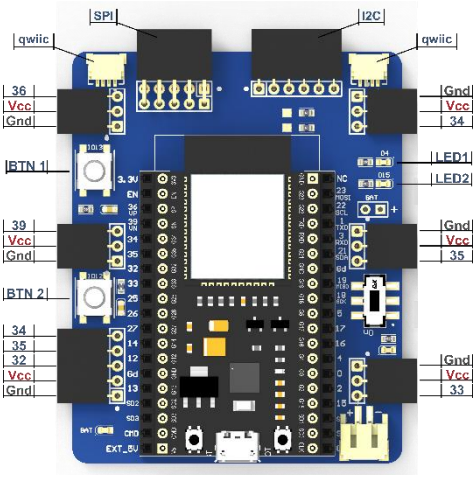


**Figure 1: Wireless E3K board**

## Specifications

- Core: ESP32 WROOM 32D
- Sampling rate: 1-2000 Hz
- Analog ports: 6 (12 bits)
- GPIO: 10
- DAC: 2 (8 bit)
- Communications:
  - Wi-Fi: 802.11 b/g/n
  - Bluetooth: v4.2 BR/EDR and BLE
  - USB 2.0
- Actuators: 2 LED, 2 Buttons
- Power: 3.3 V– 6V

## Features

- Wireless transmission of data
- Open source firmware
- Expandable framework
- Battery-powered with charging
- Modular Design
- Affordable

## Applications

- Biomedical and IoT projects
- Real-time Data Acquisition
- Human-Computer Interaction
- Robotics & Cybernetics
- Physiology studies
- Biofeedback

# PINOUT OF ESP32-DEVKITC V4

Here are specifications from Espressif about the ESP32

- 240 MHz dual-core Tensilica LX6 microcontroller with 600 DMIPS
- Integrated 520 KB SRAM
- Integrated 802.11b/g/n HT40 Wi-Fi transceiver, baseband, stack and LWIP
- Integrated dual-mode Bluetooth (classic and BLE)
- 4 MByte flash
- On-board PCB antenna
- Ultra-low noise analog amplifier
- Hall sensor
- 10x capacitive touch interface
- 32 kHz crystal oscillator
- 3 x UARTs (only two are configured by default in the Feather Arduino IDE support, one UART is used for bootloading/debug)
- 3 x SPI (only one is configured by default in the Feather Arduino IDE support)
- 2 x I2C (only one is configured by default in the Feather Arduino IDE support)
- 12 x ADC input channels
- 2 x I2S Audio
- 2 x DAC
- PWM/timer input/output available on every GPIO pin
- OpenOCD debug interface with 32 kB TRAX buffer
- SDIO master/slave 50 MHz
- SD-card interface support

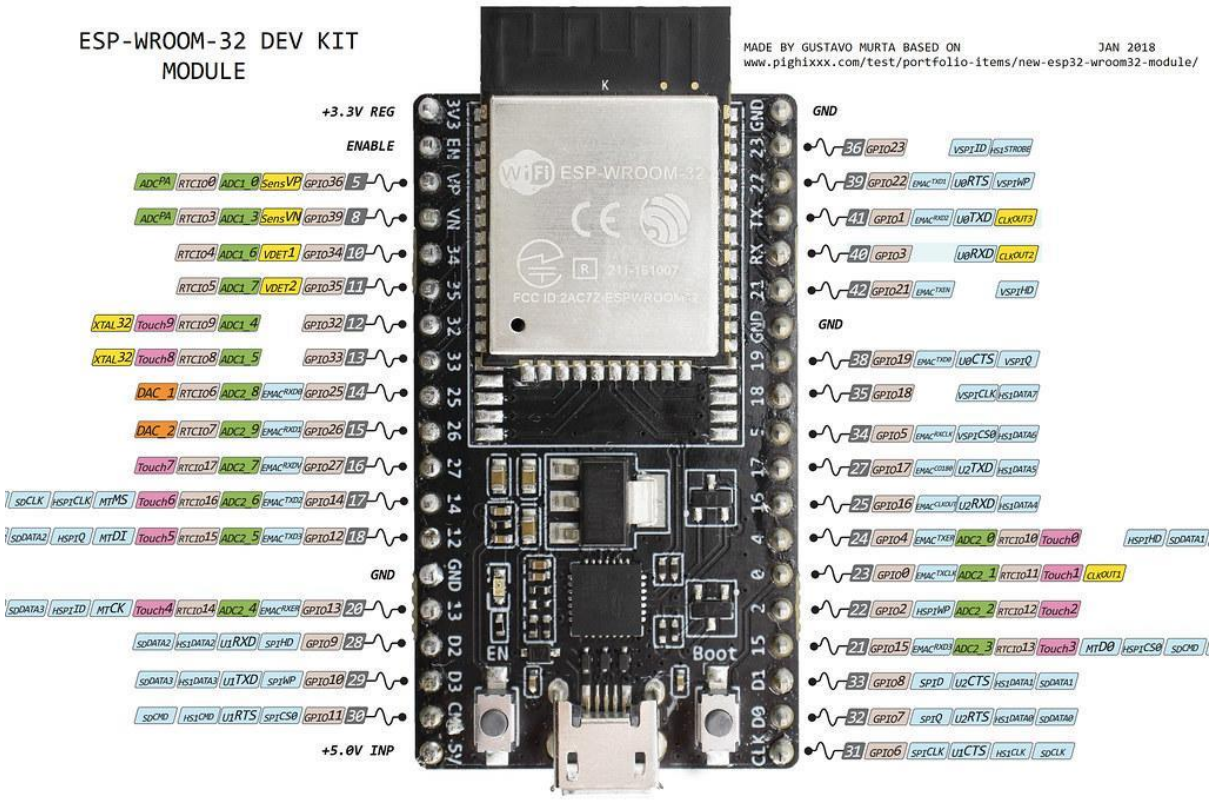


**Figure 2: Pinout diagram of ESP32-DevKitC V4**

## PROGRAMMING

The DCP Unit can be programmed in the Arduino IDE, which is a cross-platform application (for Windows, macOS, Linux). Using the IDE, the user can write the program in C and C++ language and upload it to the DCP block. You can download the software from the official Arduino website (https://www.arduino.cc/en/Main/Software).

### *INSTALLING ESP32 CORE USING ARDUINO IDE BOARDS MANAGER*

For detailed instruction, please follow: https://github.com/espressif/arduino-esp32#using-through-arduino-ide

Note: use the stable release link