

Product Overview

The **ESP32-S3-YD-N8R8** is an advanced, high-performance IoT development board powered by the original Espressif **ESP32-S3-WROOM-1** module. It incorporates a 32-bit LX7 dual-core Xtensa MCU running at up to 240 MHz, accompanied by **8MB Octal Flash** and **8MB Octal PSRAM**.

Designed for modern smart-home and AIoT projects, it integrates 2.4 GHz Wi-Fi (802.11 b/g/n) and Bluetooth® 5 (LE) wireless connectivity. The board features vector instructions for neural network computing, dual USB Type-C ports, an addressable WS2812 RGB LED, and 45 broken-out GPIO pins.



Hardware Schematic Diagram

Technical Specifications

Parameter	Specification Details
Microcontroller (MCU)	Xtensa® dual-core 32-bit LX7 CPU, frequency up to 240 MHz
Flash Memory	8 MByte (64 Mbit) Quad/Octal SPI Flash
External RAM (PSRAM)	8 MByte (64 Mbit) Octal SPI PSRAM
Internal SRAM / ROM	384 KB ROM 512 KB SRAM 16 KB RTC SRAM
Wireless Connectivity	Wi-Fi 802.11 b/g/n (2.4 GHz) + Bluetooth® 5.0 (LE) & Bluetooth Mesh
Operating Voltage	5V via USB Circuit Operating Voltage: 3.0V to 3.6V (LDO Regulator)
USB Connectors	Dual USB Type-C Ports (1x Native USB OTG 1.1 + 1x CP2102 USB-UART Bridge)
On-Board Peripherals	Addressable RGB WS2812 LED (GPIO38), Power LED (3.3V), Boot & Reset Buttons
Dimensions	50.1mm x 13mm (Breadboard Compatible)

Key Peripherals & Features

Communication Interfaces

- 2x I2C | 2x I2S | 4x SPI
- 3x UART (Hardware serial & CP2102)
- 1x USB OTG 1.1 Full-Speed interface
- 45 programmable GPIO pins broken out

Hardware Security Engine

- Hardware Acceleration: AES, SHA, RSA, ECC, RNG
- 4096-bit OTP Memory built-in
- Secure Boot & Flash Encryption support
- Dedicated HMAC engine & Digital Signature

Pinout & Connector Specifications

Component / Interface	Functional Description
ESP32-S3-WROOM-1	Main system-in-package module containing MCU, 8MB Flash, 8MB PSRAM, and PCB antenna.

Component / Interface	Functional Description
USB-to-UART Port	USB Type-C connector using CP2102 bridge for serial programming, debugging, and power.
ESP32-S3 USB Port	Direct USB Type-C interface connected directly to the ESP32-S3 chip for USB OTG and JTAG debugging.
WS2812 RGB LED	Individually addressable RGB LED driven directly via GPIO38.
Boot & Reset Buttons	Hold BOOT + press RESET to force the board into serial firmware download mode.