ESP Series of Products

SRRC Certification Guide

Related products

ESP32 series
ESP32-S2 series
ESP32-S3 series
ESP32-C3 series
ESP32-C6 series
ESP32-H2 series
ESP8266 series
ESP8285 series

Version 1.0
Espressif Systems

About This Document

This guide focuses on SRRC certification tests for ESP series of products.

Release Notes

Date	Version	Release Notes
2021.08	v1.0	Initial release.

Documentation Change Notification

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Certification

Download certificates for Espressif products from *https://www.espressif.com/en/certificates*.

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1. Test Preparation

1.1. Hardware Preparation

Three hardware devices are needed for SRRC certification tests: the DUT (device under test), serial port board, and USB cable as shown in Table 1-1.

Table 1-1. Hardware Description

Item	Picture	Quantity	Description
DUT	N/A	6	Products designed based on ESP chips or modules
Serial port board		1	Connect the PC with the Dupont cables from the DUT. It serves as the USB-UART converter that allows the PC to communicate with the DUT.
USB cable		1	Connect PC with the serial port board.

> *Note:*
>
> *It is recommended to buy Espressif 's serial port board via this link to reduce testing interference and to your convenience.*

1.2. Software Preparation

Download the software required for SRRC certification. Table 1-2 is the software description.

Table 1-2. Software Description

Item	Description
ft232r-usb-uart.zip	The driver application for Espressif's serial port board.
ESP_RF_test_tool.zip	It contains the test bin files and tools for downloading and running the bin.

1.3. Download the Test Bin

Before you conduct any test, please set up the download environment and then download the test bin according to this section.

1.3.1. Setup Download Environment

Table 1-3. Setup Download Environment

Chip	Description
ESP8266 ESP8285	• Connect 3V3/CH_EN pins to the 3.3 V power supply • Connect RXD/TXD/GND pins to corresponding pins of a serial converter so that PC can communicate with DUT • Pull MTDO (GPIO15) low • Pull GPIO0 (Boot) low to make DUT enter the downloading mode
ESP32 ESP32-S2 ESP32-S3	• Connect 3V3/CH_EN pins to the 3.3 V power supply • Connect RXD/TXD/GND pins to corresponding pins of a serial converter so that PC can communicate with DUT • Pull GPIO0 (Boot) low to make DUT enter the downloading mode
ESP32-C3 ESP32-C6 ESP32-H2	• Connect 3V3/CH_EN pins to the 3.3 V power supply • Connect RXD/TXD/GND pins to corresponding pins of a serial converter so that PC can communicate with DUT • Pull GPIO9 (Boot) low and GPIO8 high to make DUT enter the downloading mode

1.3.2. Download Test Bin

After building the hardware environment, please download the test bin as follows:

1. Switch on the serial port board, and the indicator LED will light up as shown in Figure 1-1.

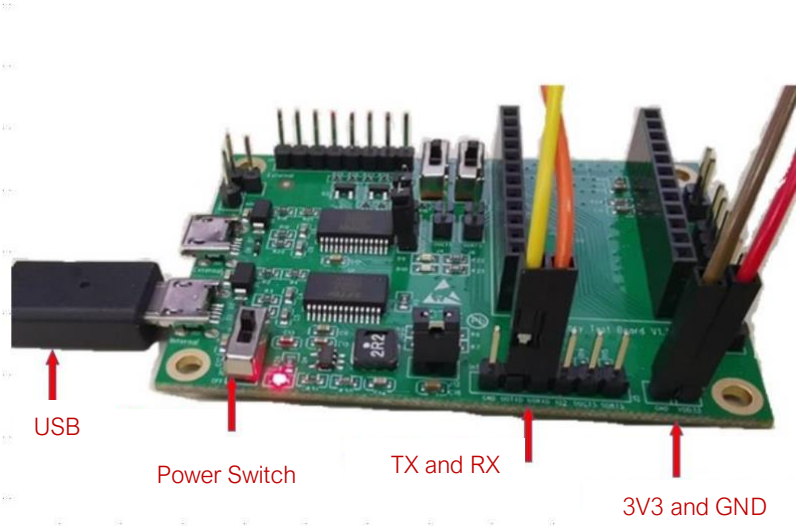

Figure 1-1. Connection with Serial Port Board

2. Unzip and open EspRFTestTool.

- Select the ChipType, COM, BaudRate, and click on **Open** to open the serial port.
- Select Flash as the download address.
- Select the test bin for your chip (see Table 1-4)

Table 1-4. Non-signaling RF Test Bin and the Download Address

Chip	Non-signaling RF Test Bin		Chip Feature	
	Bin	Download Address	Wi-Fi	Bluetooth
ESP32	ESP32_RFTest_Bin	0x1000	11b, 11g, 11n-HT20, 11n-HT40	Bluetooth & Bluetooth LE 4.2
ESP32-S2	ESP32-S2_RFTest_Bin	0x1000	11b, 11g, 11n-HT20, 11n-HT40	—
ESP32-S3	ESP32-S3_RFTest_Bin	0x0	11b, 11g, 11n-HT20, 11n-HT40	BLE 5.0
ESP32-C3	ESP32-C3_RFTest_Bin	0x0	11b, 11g, 11n-HT20, 11n-HT40	BLE 5.0
ESP32-C6	ESP32-C6_RFTest_Bin	0x0	11b, 11g, 11n-HT20, 11n-HT40	BLE 5.0
ESP32-H2	ESP32-H2_RFTest_Bin	0x0	—	BLE 5.2 & Zigbee & Thread
ESP8266 ESP8285	ESP8266_RFTest_Bin	0x0	11b, 11g, 11n-HT20	—

- Click on the **Load bin** button and **SUCC** will show once the download succeeds. Figure 1-2 shows the interface of downloading test bin for ESP32

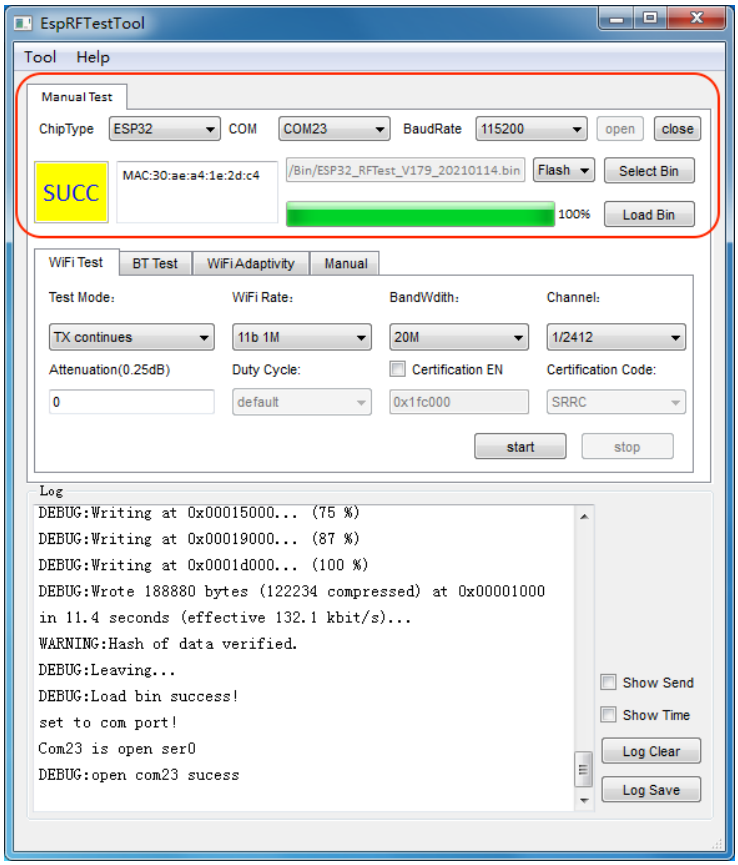

Figure 1-2. Download Test Bin for ESP32

EspRFTestTool's default download address is 0x1000, so it is only applicable to ESP32 and ESP32-S2. For chips with a download address of 0x0, please use DownloadTool. Figure 1-3 shows the interface of downloading ESP32-C3 test bin with this tool. For more details on how to use DownloadTool, please refer to *DownloadTool Instructions* under the help folder.

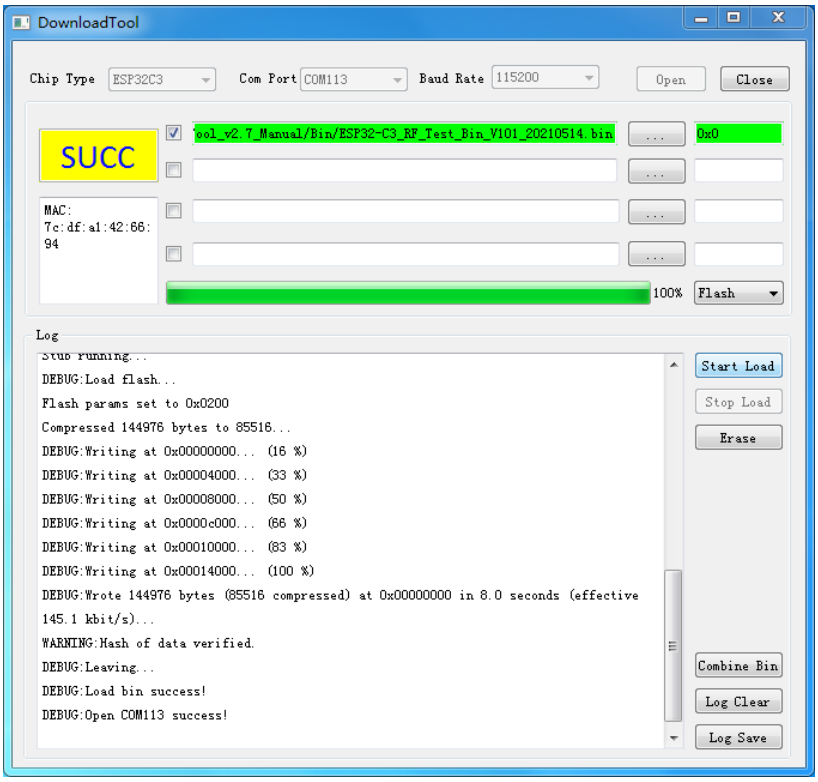

Figure 1-3. Download Test Bin for ESP32-C3

2. Fixed Frequency Test

This chapter describes how to run the fixed frequency test bin on the products that are based on ESP chips or modules.

2.1. Environment Setup

In hardware, the EN pin of ESP chips is usually designed to be connected to the 3V3 power line via an RC delay circuit. Solder Dupont wires to the TXD0, RXD0, Boot, 3V3, and GND of the chip and connect them to the corresponding pins of the serial port board. Connect the serial port board to the PC with a USB cable so that the PC can communicate with the DUT and power up the serial port board. Figure 2-1 shows a block diagram that illustrates the test environment setup for the DUT.

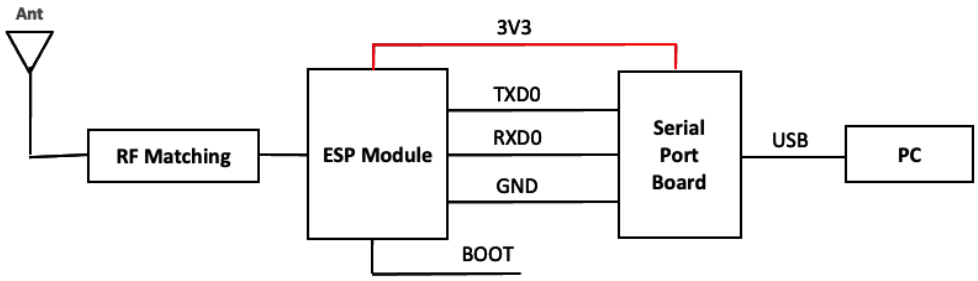

Figure 2-1. Environment Setup Block Diagram

When testing conduction, RF cable is attached to the back of the ESP RF matching, and if an antenna is also attached to the back of the Π match, it should be disconnected. When RF matching is included within a module shield, the RF cable should be soldered to the outside the shield, as shown in Figure 2-2.

When testing radiation, connect the antenna directly to the back of the RF matching and ensure that it has no obstruction around.

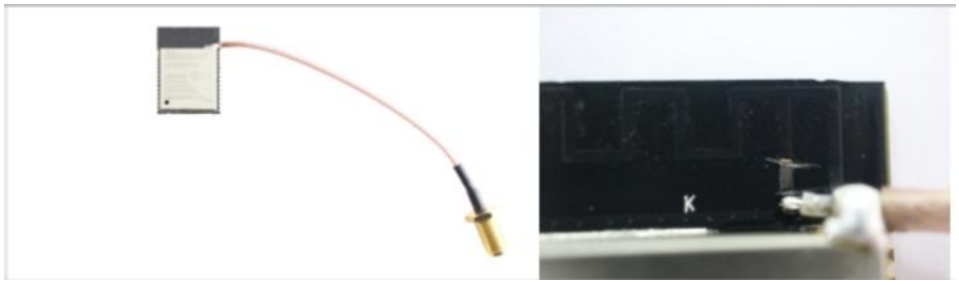

Figure 2-2. RF Cable Connection for Module Conduction Test

Table 2-1 lists the hardware environment for each chip to run the test bin, which is slightly different from the environment to download the bin (differences marked in boldface).

Table 2-1. Hardware Setup for Running the Test Bin

Chip	Description
ESP8266 ESP8285	• Connect 3V3/CH_EN pins to the 3.3 V power supply • Connect RXD/TXD/GND pins to corresponding pins of a serial converter so that PC can communicate with DUT • Pull MTDO (GPIO15) low • **Pull GPIO0 high**
ESP32 ESP32-S2 ESP32-S3	• Connect 3V3/CH_EN pins to the 3.3 V power supply • Connect RXD/TXD/GND pins to corresponding pins of a serial converter so that PC can communicate with DUT • **Pull GPIO0 high**
ESP32-C3 ESP32-C6 ESP32-H2	• Connect 3V3/CH_EN pins to the 3.3 V power supply • Connect RXD/TXD/GND pins to corresponding pins of a serial converter so that PC can communicate with DUT • **Pull both GPIO9 and GPIO8 high**

2.2. Run the Test Bin

2.2.1. Wi-Fi Fixed Frequency Test

- Disconnect IO0 of the DUT, and then toggle the power switch of the serial port board to power it up.
- In EspRFTestTool, click on **WiFi Test**, and select **TX continues** as the **Test Mode**.
- You can decrease power by setting values in the field of **Attenuation(0.25dB)**. The unit is 0.25 dB, which means the value 20 represents a decrease of the maximum power by 20x0.25=5dB. The field defaults to 0, meaning no attenuation.
- Select other options according to the laboratory test needs. Then click on **start** to start the fixed frequency test. The log is displayed in the tool. Figure 2-3 shows the test interface of ESP32.

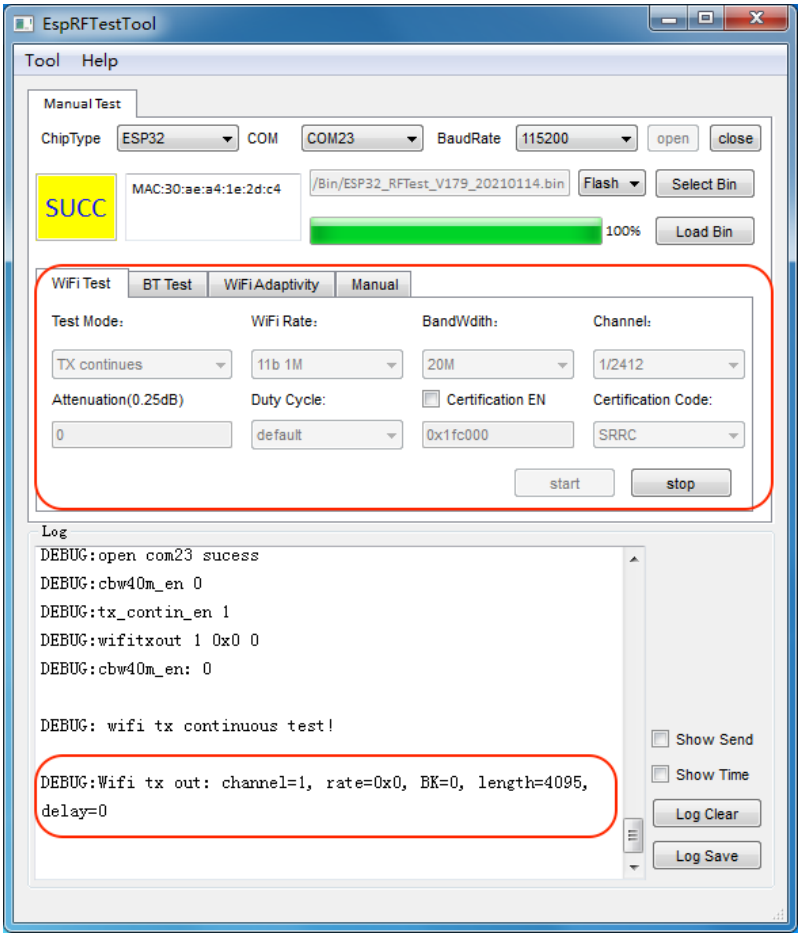

Figure 2-3. ESP32 Wi-Fi Fixed Frequency Test

- For single carrier tests, select **TX Tone** in **Test Mode**. See **Error! Reference source not found.** for the test interface.

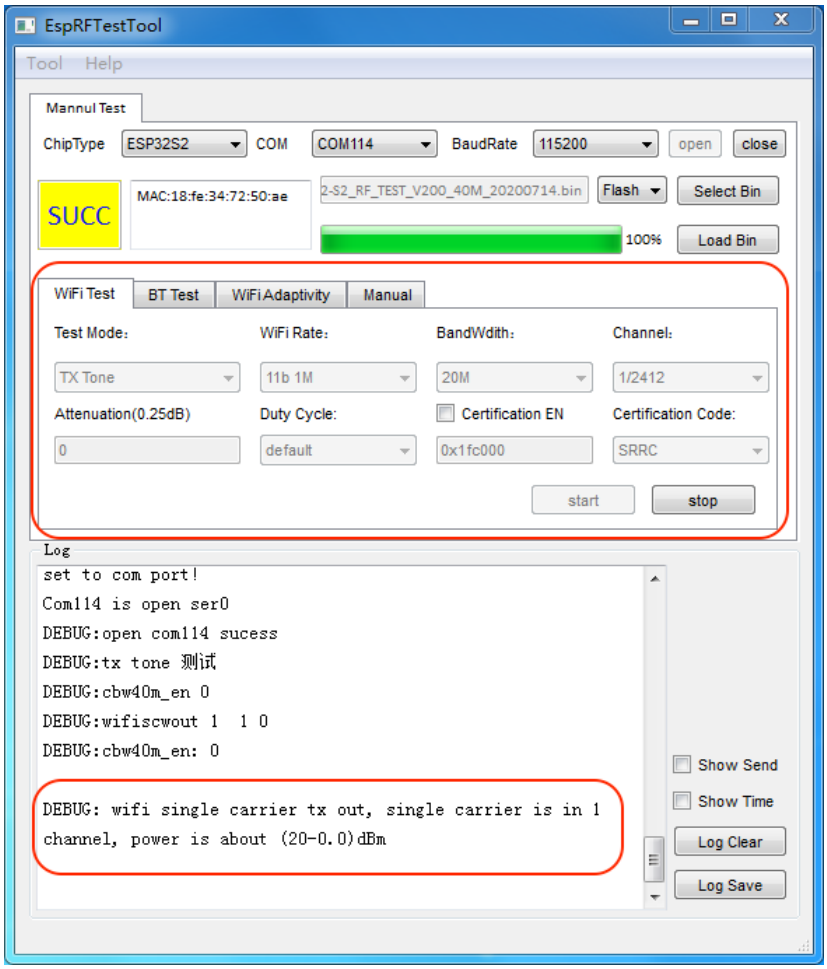

Figure 2-4. Single Carrier Test Interface

2.2.2. Bluetooth Fixed Frequency Test

The bin for Bluetooth Fixed Frequency tests is the same as that for Wi-Fi.

- Open EspRFTestTool, and select the ChipType of the DUT. The ESP8266, ESP32-S2 series of chips do not have Bluetooth functionality, so there is no Bluetooth test for them. ESP32-C3 series of chips only support Bluetooth LE.
- Switch to the **BT Test** tab and configure the parameters: In general, set **Power Level** to 4 and other parameters according to the actual needs. Figure 2-5 shows the ESP32 Bluetooth Fixed Frequency Test interface.

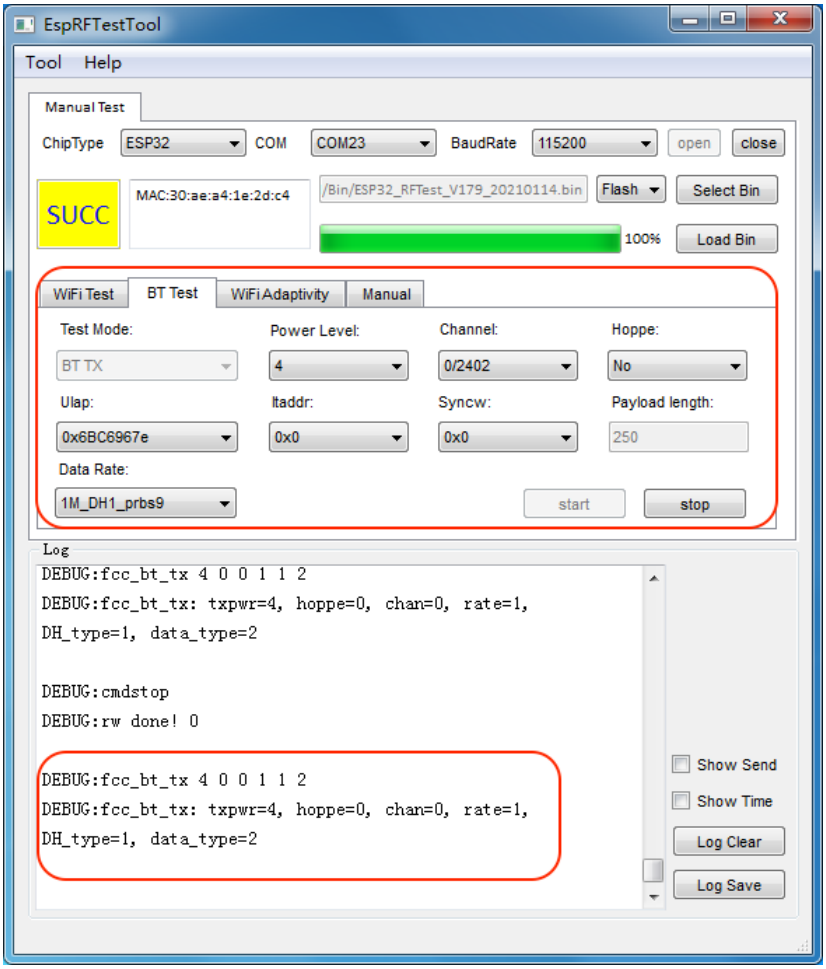

Figure 2-5. Bluetooth Test Interface

3. FAQ

Q: How do I update the power parameters of a certification test to the application firmware?

A: Please refer to the ESP32-Series_PowerLimitTool_Instructions_EN documentation.

Q: Power and PSD exceed the standard.

A: 1. Make sure the RF matching is tuned correctly.

2. Enter a value in the attenuation field of the fixed frequency test tool to reduce the power.

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