

ESP32-WROOM-32E

ESP32-WROOM-32UE

Datasheet

2.4 GHz Wi-Fi + Bluetooth® + Bluetooth LE module

Built around ESP32 series of SoCs, Xtensa® dual-core 32-bit LX6 microprocessor

4/8/16 MB flash available

26 GPIOs, rich set of peripherals

On-board PCB antenna or external antenna connector



ESP32-WROOM-32E



ESP32-WROOM-32UE



Version 1.3
Espressif Systems
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1 Module Overview

Note:

Check the link or the QR code to make sure that you use the latest version of this document:
https://espressif.com/sites/default/files/documentation/esp32-wroom-32e_esp32-wroom-32ue_datasheet_en.pdf



1.1 Features

CPU and On-Chip Memory

- ESP32-D0WD-V3 embedded, Xtensa dual-core 32-bit LX6 microprocessor, up to 240 MHz
- 448 KB ROM
- 520 KB SRAM
- 16 KB SRAM in RTC

Wi-Fi

- 802.11b/g/n
- Bit rate: 802.11n up to 150 Mbps
- A-MPDU and A-MSDU aggregation
- 0.4 μ s guard interval support
- Center frequency range of operating channel: 2412 ~ 2484 MHz

Bluetooth

- Bluetooth V4.2 BR/EDR and Bluetooth LE specification
- Class-1, class-2 and class-3 transmitter
- AFH
- CVSD and SBC

Peripherals

- SD card, UART, SPI, SDIO, I2C, LED PWM, Motor PWM, I2S, IR, pulse counter, GPIO, capacitive touch sensor, ADC, DAC, TWAI®

(compatible with ISO 11898-1, i.e. CAN Specification 2.0)

Integrated Components on Module

- 40 MHz crystal oscillator
- 4/8/16 MB SPI flash

Antenna Options

- ESP32-WROOM-32E: On-board PCB antenna
- ESP32-WROOM-32UE: external antenna via a connector

Operating Conditions

- Operating voltage/Power supply: 3.0 ~ 3.6 V
- Operating ambient temperature:
 - 85 °C version: -40 ~ 85 °C
 - 105 °C version: -40 ~ 105 °C. Note that only the modules embedded with a 4/8 MB flash support this version.

Certification

- Bluetooth certification: BQB
- RF certification: FCC/CE-RED/SRRC
- Green certification: REACH/RoHS

Reliability Test

- HTOL/HTSL/uHAST/TCT/ESD

1.2 Description

ESP32-WROOM-32E and ESP32-WROOM-32UE are two powerful, generic Wi-Fi + Bluetooth + Bluetooth LE MCU modules that target a wide variety of applications, ranging from low-power sensor networks to the most demanding tasks, such as voice encoding, music streaming and MP3 decoding.

ESP32-WROOM-32E comes with a PCB antenna, and ESP32-WROOM-32UE with a connector for an external antenna. **The information in this datasheet is applicable to both modules.**

The ordering information of the two modules is listed as follows:

Table 1: Ordering Information

Module	Chip embedded	Flash	Module dimensions (mm)
ESP32-WROOM-32E (85 °C version)	ESP32-D0WD-V3	4/8/16 MB	18.0 × 25.5 × 3.1
ESP32-WROOM-32E (105 °C version)	ESP32-D0WD-V3	4/8 MB	18.0 × 25.5 × 3.1
ESP32-WROOM-32UE (85 °C version)	ESP32-D0WD-V3	4/8/16 MB	18.0 × 19.2 × 3.2
ESP32-WROOM-32UE (105 °C version)	ESP32-D0WD-V3	4/8 MB	18.0 × 19.2 × 3.2
Notes: 1. For detailed ordering information, please see ESP Product Selector . 2. For dimensions of the external antenna connector, please see Chapter 7.3.			

At the core of the module is the ESP32-D0WD-V3 chip*. The chip embedded is designed to be scalable and adaptive. There are two CPU cores that can be individually controlled, and the CPU clock frequency is adjustable from 80 MHz to 240 MHz. The chip also has a low-power coprocessor that can be used instead of the CPU to save power while performing tasks that do not require much computing power, such as monitoring of peripherals. ESP32 integrates a rich set of peripherals, ranging from capacitive touch sensors, Hall sensors, SD card interface, Ethernet, high-speed SPI, UART, I2S and I2C.

Note:

* For details on the part numbers of the ESP32 family of chips, please refer to the document [ESP32 Series Datasheet](#).

The integration of Bluetooth, Bluetooth LE and Wi-Fi ensures that a wide range of applications can be targeted, and that the module is all-around: using Wi-Fi allows a large physical range and direct connection to the Internet through a Wi-Fi router, while using Bluetooth allows the user to conveniently connect to the phone or broadcast low energy beacons for its detection. The sleep current of the ESP32 chip is less than 5 μ A, making it suitable for battery powered and wearable electronics applications. The module supports a data rate of up to 150 Mbps, and 20 dBm output power at the antenna to ensure the widest physical range. As such the module does offer industry-leading specifications and the best performance for electronic integration, range, power consumption, and connectivity.

The operating system chosen for ESP32 is freeRTOS with LwIP; TLS 1.2 with hardware acceleration is built in as well. Secure (encrypted) over the air (OTA) upgrade is also supported, so that users can upgrade their products even after their release, at minimum cost and effort.

1.3 Applications

- Generic Low-power IoT Sensor Hub
- Generic Low-power IoT Data Loggers
- Cameras for Video Streaming
- Over-the-top (OTT) Devices
- Speech Recognition
- Image Recognition
- Mesh Network
- Home Automation
- Smart Building
- Industrial Automation

- Smart Agriculture
- Audio Applications
- Health Care Applications
- Wi-Fi-enabled Toys
- Wearable Electronics
- Retail & Catering Applications

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2 Block Diagram

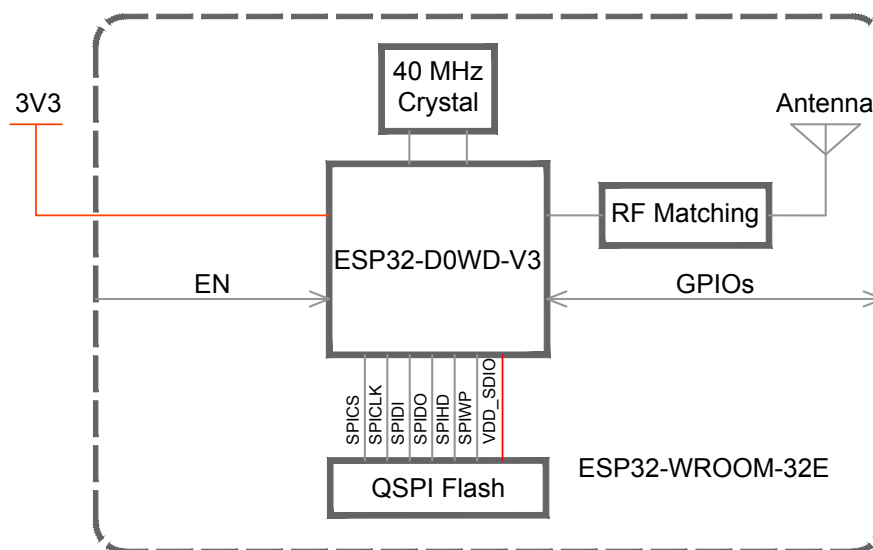


Figure 1: ESP32-WROOM-32E Block Diagram

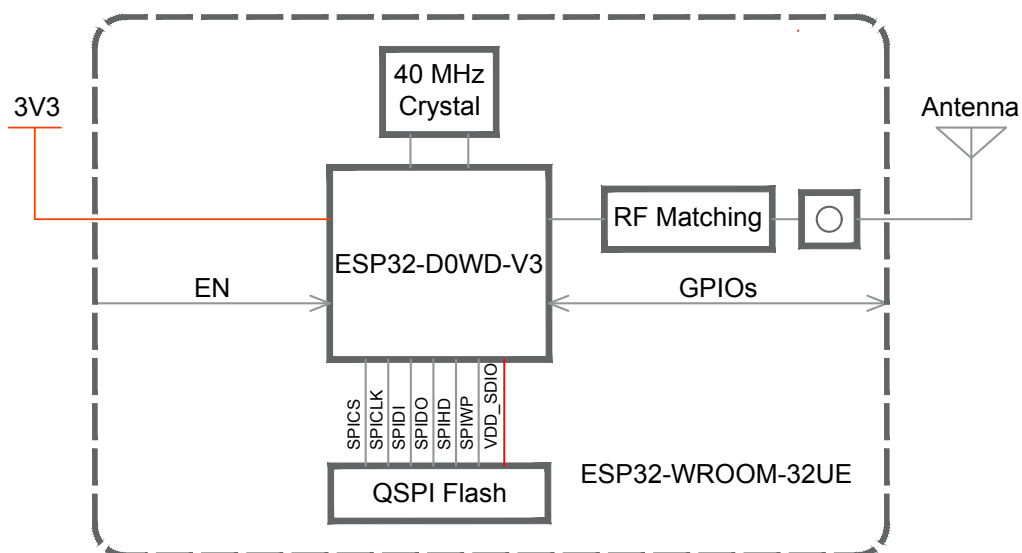


Figure 2: ESP32-WROOM-32UE Block Diagram

3 Pin Definitions

3.1 Pin Layout

The pin layout of ESP32-WROOM-32UE is the same as that of ESP32-WROOM-32E, except that ESP32-WROOM-32UE has no keepout zone.

The pin diagram below shows the approximate location of pins on the module. For the actual diagram drawn to scale, please refer to Figure 7.1 *Physical Dimensions*.

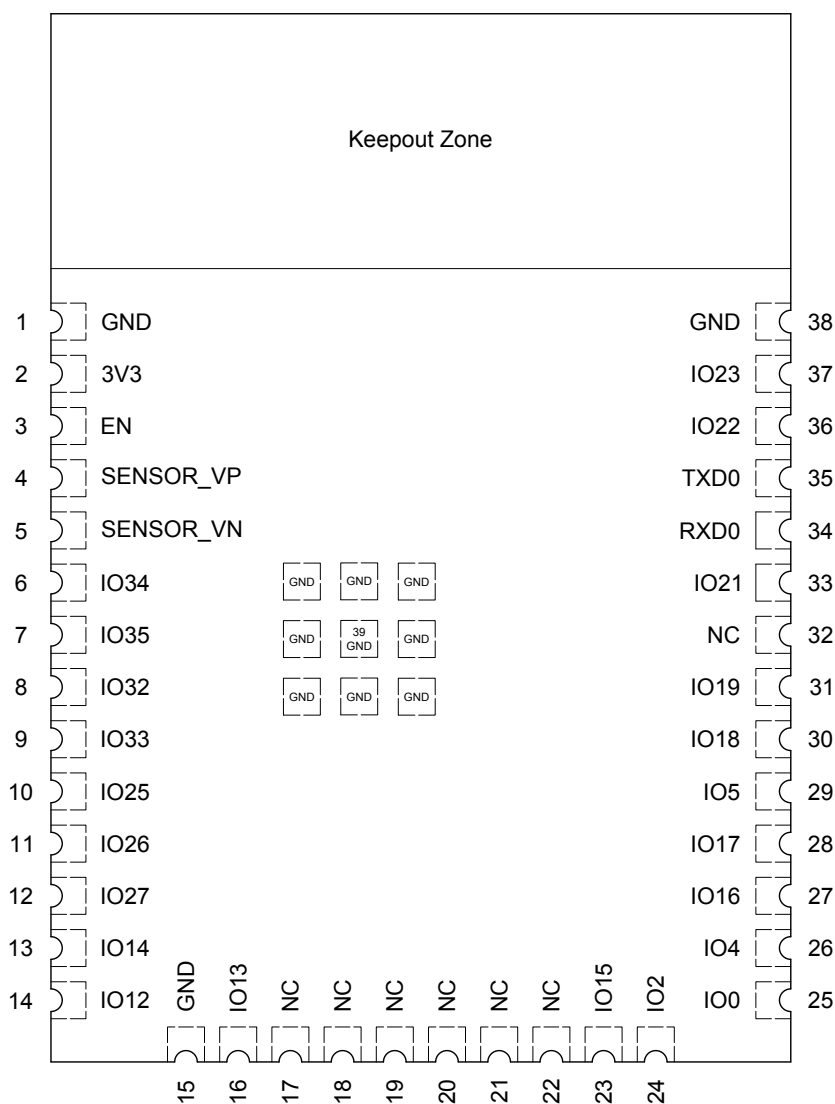


Figure 3: Pin Layout (Top View)

3.2 Pin Description

The module has 38 pins. See pin definitions in Table 2.

For peripheral pin configurations, please refer to [ESP32 Series Datasheet](#).

Table 2: Pin Definitions

Name	No.	Type ¹	Function
GND	1	P	Ground
3V3	2	P	Power supply
EN	3	I	High: On; enables the chip Low: Off; the chip powers off Note: Do not leave the pin floating.
SENSOR_VP	4	I	GPIO36, ADC1_CH0, RTC_GPIO0
SENSOR_VN	5	I	GPIO39, ADC1_CH3, RTC_GPIO3
IO34	6	I	GPIO34, ADC1_CH6, RTC_GPIO4
IO35	7	I	GPIO35, ADC1_CH7, RTC_GPIO5
IO32	8	I/O	GPIO32, XTAL_32K_P (32.768 kHz crystal oscillator input), ADC1_CH4, TOUCH9, RTC_GPIO9
IO33	9	I/O	GPIO33, XTAL_32K_N (32.768 kHz crystal oscillator output), ADC1_CH5, TOUCH8, RTC_GPIO8
IO25	10	I/O	GPIO25, DAC_1, ADC2_CH8, RTC_GPIO6, EMAC_RXD0
IO26	11	I/O	GPIO26, DAC_2, ADC2_CH9, RTC_GPIO7, EMAC_RXD1
IO27	12	I/O	GPIO27, ADC2_CH7, TOUCH7, RTC_GPIO17, EMAC_RX_DV
IO14	13	I/O	GPIO14, ADC2_CH6, TOUCH6, RTC_GPIO16, MTMS, HSPICLK, HS2_CLK, SD_CLK, EMAC_TXD2
IO12	14	I/O	GPIO12, ADC2_CH5, TOUCH5, RTC_GPIO15, MTDI, HSPIQ, HS2_DATA2, SD_DATA2, EMAC_TXD3
GND	15	P	Ground
IO13	16	I/O	GPIO13, ADC2_CH4, TOUCH4, RTC_GPIO14, MTCK, HSPID, HS2_DATA3, SD_DATA3, EMAC_RX_ER
NC	17	-	See note ²
NC	18	-	See note ²
NC	19	-	See note ²
NC	20	-	See note ²
NC	21	-	See note ²
NC	22	-	See note ²
IO15	23	I/O	GPIO15, ADC2_CH3, TOUCH3, MTDO, HSPICS0, RTC_GPIO13, HS2_CMD, SD_CMD, EMAC_RXD3
IO2	24	I/O	GPIO2, ADC2_CH2, TOUCH2, RTC_GPIO12, HSPWP, HS2_DATA0, SD_DATA0
IO0	25	I/O	GPIO0, ADC2_CH1, TOUCH1, RTC_GPIO11, CLK_OUT1, EMAC_TX_CLK
IO4	26	I/O	GPIO4, ADC2_CH0, TOUCH0, RTC_GPIO10, HSPHD, HS2_DATA1, SD_DATA1, EMAC_TX_ER
IO16	27	I/O	GPIO16, HS1_DATA4, U2RXD, EMAC_CLK_OUT
IO17	28	I/O	GPIO17, HS1_DATA5, U2TXD, EMAC_CLK_OUT_180
IO5	29	I/O	GPIO5, VSPICS0, HS1_DATA6, EMAC_RX_CLK
IO18	30	I/O	GPIO18, VSPICLK, HS1_DATA7

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Table 2 – cont'd from previous page

Name	No.	Type ¹	Function
IO19	31	I/O	GPIO19, VSPIQ, U0CTS, EMAC_TXD0
NC	32	-	-
IO21	33	I/O	GPIO21, VSPIHD, EMAC_TX_EN
RXD0	34	I/O	GPIO3, U0RXD, CLK_OUT2
TXD0	35	I/O	GPIO1, U0TXD, CLK_OUT3, EMAC_RXD2
IO22	36	I/O	GPIO22, VSPIWP, U0RTS, EMAC_TXD1
IO23	37	I/O	GPIO23, VSPID, HS1_STROBE
GND	38	P	Ground

¹ P: power supply; I: input; O: output.

² Pins GPIO6 to GPIO11 on the ESP32-D0WD-V3 chip are connected to the SPI flash integrated on the module and are not led out.

3.3 Strapping Pins

Note:

The content below is excerpted from Section Strapping Pins in [ESP32 Series Datasheet](#). For the strapping pin mapping between the chip and modules, please refer to Chapter 5 [Module Schematics](#).

ESP32-D0WD-V3 has five strapping pins:

- MTDI
- GPIO0
- GPIO2
- MTDO
- GPIO5

Software can read the values of these five bits from register "GPIO_STRAPPING".

During the chip's system reset release (power-on-reset, RTC watchdog reset and brownout reset), the latches of the strapping pins sample the voltage level as strapping bits of "0" or "1", and hold these bits until the chip is powered down or shut down. The strapping bits configure the device's boot mode, the operating voltage of VDD_SDIO and other initial system settings.

Each strapping pin is connected to its internal pull-up/pull-down during the chip reset. Consequently, if a strapping pin is unconnected or the connected external circuit is high-impedance, the internal weak pull-up/pull-down will determine the default input level of the strapping pins.

To change the strapping bit values, users can apply the external pull-down/pull-up resistances, or use the host MCU's GPIOs to control the voltage level of these pins when powering on ESP32-D0WD-V3.

After reset release, the strapping pins work as normal-function pins.

Refer to Table 3 for a detailed boot-mode configuration by strapping pins.

Table 3: Strapping Pins

Voltage of Internal LDO (VDD_SDIO)					
Pin	Default	3.3 V		1.8 V	
MTDI	Pull-down	0		1	
Bootling Mode					
Pin	Default	SPI Boot		Download Boot	
GPIO0	Pull-up	1		0	
GPIO2	Pull-down	Don't-care		0	
Enabling/Disabling Debugging Log Print over U0TXD During Bootling					
Pin	Default	U0TXD Active		U0TXD Silent	
MTDO	Pull-up	1		0	
Timing of SDIO Slave					
Pin	Default	FE Sampling FE Output	FE Sampling RE Output	RE Sampling FE Output	RE Sampling RE Output
MTDO	Pull-up	0	0	1	1
GPIO5	Pull-up	0	1	0	1

* FE: falling-edge, RE: rising-edge

* Firmware can configure register bits to change the settings of "Voltage of Internal LDO (VDD_SDIO)" and "Timing of SDIO Slave", after bootling.

* The module integrates a 3.3 V SPI flash, so the pin MTDI cannot be set to 1 when the module is powered up.

4 Electrical Characteristics

4.1 Absolute Maximum Ratings

Stresses above those listed in *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions* is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

Table 4: Absolute Maximum Ratings

Symbol	Parameter	Min	Max	Unit
VDD33	Power supply voltage	−0.3	3.6	V
T _{STORE}	Storage temperature	−40	105	°C

* Please see Appendix IO MUX of [ESP32 Series Datasheet](#) for IO's power domain.

Table 5: Recommended Operating Conditions

Symbol	Parameter	Min	Typ	Max	Unit
VDD33	Power supply voltage	3.0	3.3	3.6	V
I _{VDD}	Current delivered by external power supply	0.5	—	—	A
T	Operating ambient temperature	85 °C version 105 °C version	−40	— 85 105	°C

4.2 DC Characteristics (3.3 V, 25 °C)

Table 6: DC Characteristics (3.3 V, 25 °C)

Symbol	Parameter	Min	Typ	Max	Unit
C _{IN}	Pin capacitance	—	2	—	pF
V _{IH}	High-level input voltage	0.75 × VDD ¹	—	VDD ¹ + 0.3	V
V _{IL}	Low-level input voltage	−0.3	—	0.25 × VDD ¹	V
I _{IH}	High-level input current	—	—	50	nA
I _{IL}	Low-level input current	—	—	50	nA
V _{OH}	High-level output voltage	0.8 × VDD ¹	—	—	V
V _{OL}	Low-level output voltage	—	—	0.1 × VDD ¹	V

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Table 6 – cont'd from previous page

Symbol	Parameter		Min	Typ	Max	Unit
I_{OH}	High-level source current ($V_{DD}^1= 3.3\text{ V}$, $V_{OH} \geq 2.64\text{ V}$, output drive strength set to the maximum)	VDD3P3_CPU power domain ^{1, 2}	—	40	—	mA
		VDD3P3_RTC power domain ^{1, 2}	—	40	—	mA
		VDD_SDIO power domain ^{1, 3}	—	20	—	mA
I_{OL}	Low-level sink current ($V_{DD}^1= 3.3\text{ V}$, $V_{OL} = 0.495\text{ V}$, output drive strength set to the maximum)		—	28	—	mA
R_{PU}	Resistance of internal pull-up resistor		—	45	—	k Ω
R_{PD}	Resistance of internal pull-down resistor		—	45	—	k Ω
V_{IL_nRST}	Low-level input voltage of CHIP_PU to power off the chip		—	—	0.6	V

¹ Please see Appendix IO MUX of [ESP32 Series Datasheet](#) for IO's power domain. VDD is the I/O voltage for a particular power domain of pins.

² For VDD3P3_CPU and VDD3P3_RTC power domain, per-pin current sourced in the same domain is gradually reduced from around 40 mA to around 29 mA, $V_{OH} \geq 2.64\text{ V}$, as the number of current-source pins increases.

³ Pins occupied by flash and/or PSRAM in the VDD_SDIO power domain were excluded from the test.

4.3 Current Consumption Characteristics

Owing to the use of advanced power-management technologies, the module can switch between different power modes. For details on different power modes, please refer to Section *RTC and Low-Power Management* in [ESP32 Series Datasheet](#).

Table 7: Current Consumption Depending on RF Modes

Work mode	Description		Average (mA)	Peak (mA)
Active (RF working)	TX	802.11b, 20 MHz, 1 Mbps, @19.5 dBm	239	379
		802.11g, 20 MHz, 54 Mbps, @15 dBm	190	276
		802.11n, 20 MHz, MCS7, @13 dBm	183	258
		802.11n, 40 MHz, MCS7, @13 dBm	165	211
	RX	802.11b/g/n, 20 MHz	112	112
		802.11n, 40 MHz	118	118

¹ The current consumption measurements are taken with a 3.3 V supply at 25 °C of ambient temperature at the RF port. All transmitters' measurements are based on a 50% duty cycle.

² The current consumption figures for in RX mode are for cases when the peripherals are disabled and the CPU idle.

4.4 Wi-Fi RF Characteristics

4.4.1 Wi-Fi RF Standards

Table 8: Wi-Fi RF Standards

Name		Description
Center frequency range of operating channel		2412 ~ 2484 MHz
Wi-Fi wireless standard		IEEE 802.11b/g/n
Data rate	20 MHz	11b: 1, 2, 5.5, 11 Mbps 11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 11n: MCS0-7, 72.2 Mbps (Max)
	40 MHz	11n: MCS0-7, 150 Mbps (Max)
Antenna type		PCB antenna, external antenna ²

¹ Device should operate in the center frequency range allocated by regional regulatory authorities. Target center frequency range is configurable by software.

² For the modules that use external antennas, the output impedance is 50 Ω . For other modules without external antennas, the output impedance is irrelevant.

4.4.2 Transmitter Characteristics

Target TX power is configurable based on device or certification requirements. The default characteristics are provided in Table 9.

Table 9: TX Power Characteristics

Rate	Typ (dBm)
11b, 1 Mbps	19.5
11b, 11 Mbps	19.5
11g, 6 Mbps	18
11g, 54 Mbps	14
11n, HT20, MCS0	18
11n, HT20, MCS7	13
11n, HT40, MCS0	18
11n, HT40, MCS7	13

4.4.3 Receiver Characteristics

Table 10: RX Sensitivity Characteristics

Rate	Typ (dBm)
1 Mbps	-97
2 Mbps	-94
5.5 Mbps	-92
11 Mbps	-88

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Table 10 – cont'd from previous page

Rate	Typ (dBm)
6 Mbps	-93
9 Mbps	-91
12 Mbps	-89
18 Mbps	-87
24 Mbps	-84
36 Mbps	-80
48 Mbps	-77
54 Mbps	-75
11n, HT20, MCS0	-92
11n, HT20, MCS1	-88
11n, HT20, MCS2	-86
11n, HT20, MCS3	-83
11n, HT20, MCS4	-80
11n, HT20, MCS5	-76
11n, HT20, MCS6	-74
11n, HT20, MCS7	-72
11n, HT40, MCS0	-89
11n, HT40, MCS1	-85
11n, HT40, MCS2	-83
11n, HT40, MCS3	-80
11n, HT40, MCS4	-76
11n, HT40, MCS5	-72
11n, HT40, MCS6	-71
11n, HT40, MCS7	-69

Table 11: RX Maximum Input Level

Rate	Typ (dBm)
11b, 1 Mbps	5
11b, 11 Mbps	5
11g, 6 Mbps	0
11g, 54 Mbps	-8
11n, HT20, MCS0	0
11n, HT20, MCS7	-8
11n, HT40, MCS0	0
11n, HT40, MCS7	-8

Table 12: Adjacent Channel Rejection

Rate	Typ (dB)
11b, 11 Mbps	35
11g, 6 Mbps	27

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Table 12 – cont'd from previous page

Rate	Typ (dB)
11g, 54 Mbps	13
11n, HT20, MCS0	27
11n, HT20, MCS7	12
11n, HT40, MCS0	16
11n, HT40, MCS7	7

4.5 Bluetooth Radio

4.5.1 Receiver – Basic Data Rate

Table 13: Receiver Characteristics – Basic Data Rate

Parameter	Conditions	Min	Typ	Max	Unit
Sensitivity @0.1% BER	—	−90	−89	−88	dBm
Maximum received signal @0.1% BER	—	0	—	—	dBm
Co-channel C/I	—	—	+7	—	dB
Adjacent channel selectivity C/I	F = F0 + 1 MHz	—	—	−6	dB
	F = F0 − 1 MHz	—	—	−6	dB
	F = F0 + 2 MHz	—	—	−25	dB
	F = F0 − 2 MHz	—	—	−33	dB
	F = F0 + 3 MHz	—	—	−25	dB
	F = F0 − 3 MHz	—	—	−45	dB
Out-of-band blocking performance	30 MHz ~ 2000 MHz	−10	—	—	dBm
	2000 MHz ~ 2400 MHz	−27	—	—	dBm
	2500 MHz ~ 3000 MHz	−27	—	—	dBm
	3000 MHz ~ 12.5 GHz	−10	—	—	dBm
Intermodulation	—	−36	—	—	dBm

4.5.2 Transmitter – Basic Data Rate

Table 14: Transmitter Characteristics – Basic Data Rate

Parameter	Conditions	Min	Typ	Max	Unit
RF transmit power*	—	—	0	—	dBm
Gain control step	—	—	3	—	dB
RF power control range	—	−12	—	+9	dBm
+20 dB bandwidth	—	—	0.9	—	MHz
Adjacent channel transmit power	F = F0 ± 2 MHz	—	−55	—	dBm
	F = F0 ± 3 MHz	—	−55	—	dBm
	F = F0 ± > 3 MHz	—	−59	—	dBm
$\Delta f_{1\text{avg}}$	—	—	—	155	kHz
$\Delta f_{2\text{max}}$	—	127	—	—	kHz

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Table 14 – cont'd from previous page

Parameter	Conditions	Min	Typ	Max	Unit
$\Delta f_{2\text{avg}}/\Delta f_{1\text{avg}}$	—	—	0.92	—	—
ICFT	—	—	-7	—	kHz
Drift rate	—	—	0.7	—	kHz/50 μ s
Drift (DH1)	—	—	6	—	kHz
Drift (DH5)	—	—	6	—	kHz

* There are a total of eight power levels from 0 to 7, and the transmit power ranges from -12 dBm to 9 dBm. When the power level rises by 1, the transmit power increases by 3 dB. Power level 4 is used by default and the corresponding transmit power is 0 dBm.

4.5.3 Receiver – Enhanced Data Rate

Table 15: Receiver Characteristics – Enhanced Data Rate

Parameter	Conditions	Min	Typ	Max	Unit
$\pi/4$ DQPSK					
Sensitivity @0.01% BER	—	-90	-89	-88	dBm
Maximum received signal @0.01% BER	—	—	0	—	dBm
Co-channel C/I	—	—	11	—	dB
Adjacent channel selectivity C/I	F = F0 + 1 MHz	—	-7	—	dB
	F = F0 - 1 MHz	—	-7	—	dB
	F = F0 + 2 MHz	—	-25	—	dB
	F = F0 - 2 MHz	—	-35	—	dB
	F = F0 + 3 MHz	—	-25	—	dB
	F = F0 - 3 MHz	—	-45	—	dB
8DPSK					
Sensitivity @0.01% BER	—	-84	-83	-82	dBm
Maximum received signal @0.01% BER	—	—	-5	—	dBm
C/I c-channel	—	—	18	—	dB
Adjacent channel selectivity C/I	F = F0 + 1 MHz	—	2	—	dB
	F = F0 - 1 MHz	—	2	—	dB
	F = F0 + 2 MHz	—	-25	—	dB
	F = F0 - 2 MHz	—	-25	—	dB
	F = F0 + 3 MHz	—	-25	—	dB
	F = F0 - 3 MHz	—	-38	—	dB

4.5.4 Transmitter – Enhanced Data Rate

Table 16: Transmitter Characteristics – Enhanced Data Rate

Parameter	Conditions	Min	Typ	Max	Unit
RF transmit power (see note under Table 14)	—	—	0	—	dBm
Gain control step	—	—	3	—	dB
RF power control range	—	-12	—	+9	dBm

Parameter	Conditions	Min	Typ	Max	Unit
$\pi/4$ DQPSK max w_0	—	—	-0.72	—	kHz
$\pi/4$ DQPSK max w_i	—	—	-6	—	kHz
$\pi/4$ DQPSK max $ w_i + w_0 $	—	—	-7.42	—	kHz
8DPSK max w_0	—	—	0.7	—	kHz
8DPSK max w_i	—	—	-9.6	—	kHz
8DPSK max $ w_i + w_0 $	—	—	-10	—	kHz
$\pi/4$ DQPSK modulation accuracy	RMS DEVM	—	4.28	—	%
	99% DEVM	—	100	—	%
	Peak DEVM	—	13.3	—	%
8 DPSK modulation accuracy	RMS DEVM	—	5.8	—	%
	99% DEVM	—	100	—	%
	Peak DEVM	—	14	—	%
In-band spurious emissions	$F = F_0 \pm 1$ MHz	—	-46	—	dBm
	$F = F_0 \pm 2$ MHz	—	-44	—	dBm
	$F = F_0 \pm 3$ MHz	—	-49	—	dBm
	$F = F_0 \pm > 3$ MHz	—	—	-53	dBm
EDR differential phase coding	—	—	100	—	%

4.6 Bluetooth LE Radio

4.6.1 Receiver

Table 17: Receiver Characteristics – BLE

Parameter	Conditions	Min	Typ	Max	Unit
Sensitivity @30.8% PER	—	-94	-93	-92	dBm
Maximum received signal @30.8% PER	—	0	—	—	dBm
Co-channel C/I	—	—	+10	—	dB
Adjacent channel selectivity C/I	$F = F_0 + 1$ MHz	—	-5	—	dB
	$F = F_0 - 1$ MHz	—	-5	—	dB
	$F = F_0 + 2$ MHz	—	-25	—	dB
	$F = F_0 - 2$ MHz	—	-35	—	dB
	$F = F_0 + 3$ MHz	—	-25	—	dB
	$F = F_0 - 3$ MHz	—	-45	—	dB
Out-of-band blocking performance	30 MHz ~ 2000 MHz	-10	—	—	dBm
	2000 MHz ~ 2400 MHz	-27	—	—	dBm
	2500 MHz ~ 3000 MHz	-27	—	—	dBm
	3000 MHz ~ 12.5 GHz	-10	—	—	dBm
Intermodulation	—	-36	—	—	dBm

4.6.2 Transmitter

Table 18: Transmitter Characteristics – BLE

Parameter	Conditions	Min	Typ	Max	Unit
RF transmit power (see note under Table 14)	—	—	0	—	dBm
Gain control step	—	—	3	—	dB
RF power control range	—	-12	—	+9	dBm
Adjacent channel transmit power	$F = F_0 \pm 2 \text{ MHz}$	—	-55	—	dBm
	$F = F_0 \pm 3 \text{ MHz}$	—	-57	—	dBm
	$F = F_0 \pm > 3 \text{ MHz}$	—	-59	—	dBm
$\Delta f_{1\text{avg}}$	—	—	—	265	kHz
$\Delta f_{2\text{max}}$	—	210	—	—	kHz
$\Delta f_{2\text{avg}}/\Delta f_{1\text{avg}}$	—	—	+0.92	—	—
ICFT	—	—	-10	—	kHz
Drift rate	—	—	0.7	—	kHz/50 μs
Drift	—	—	2	—	kHz

5 Module Schematics

This is the reference design of the module.

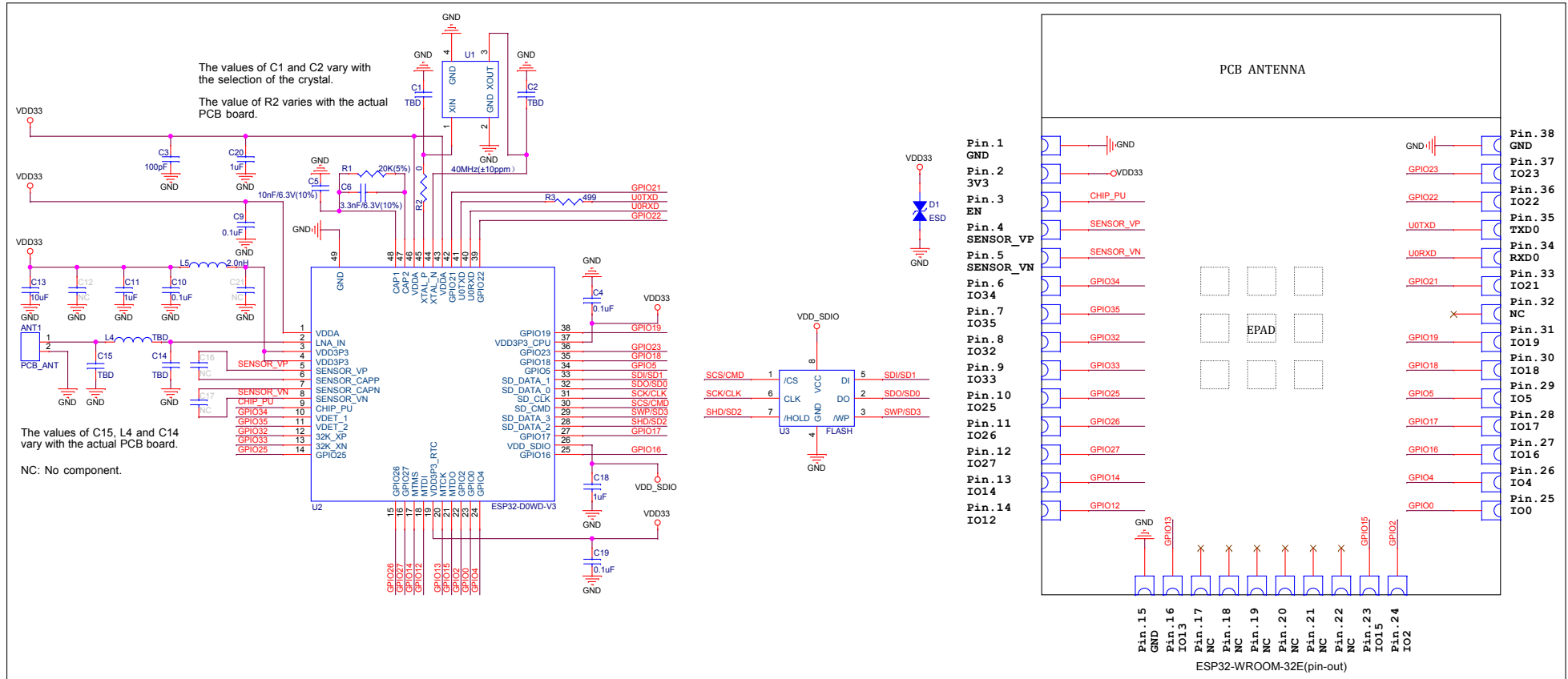


Figure 4: ESP32-WROOM-32E Schematics

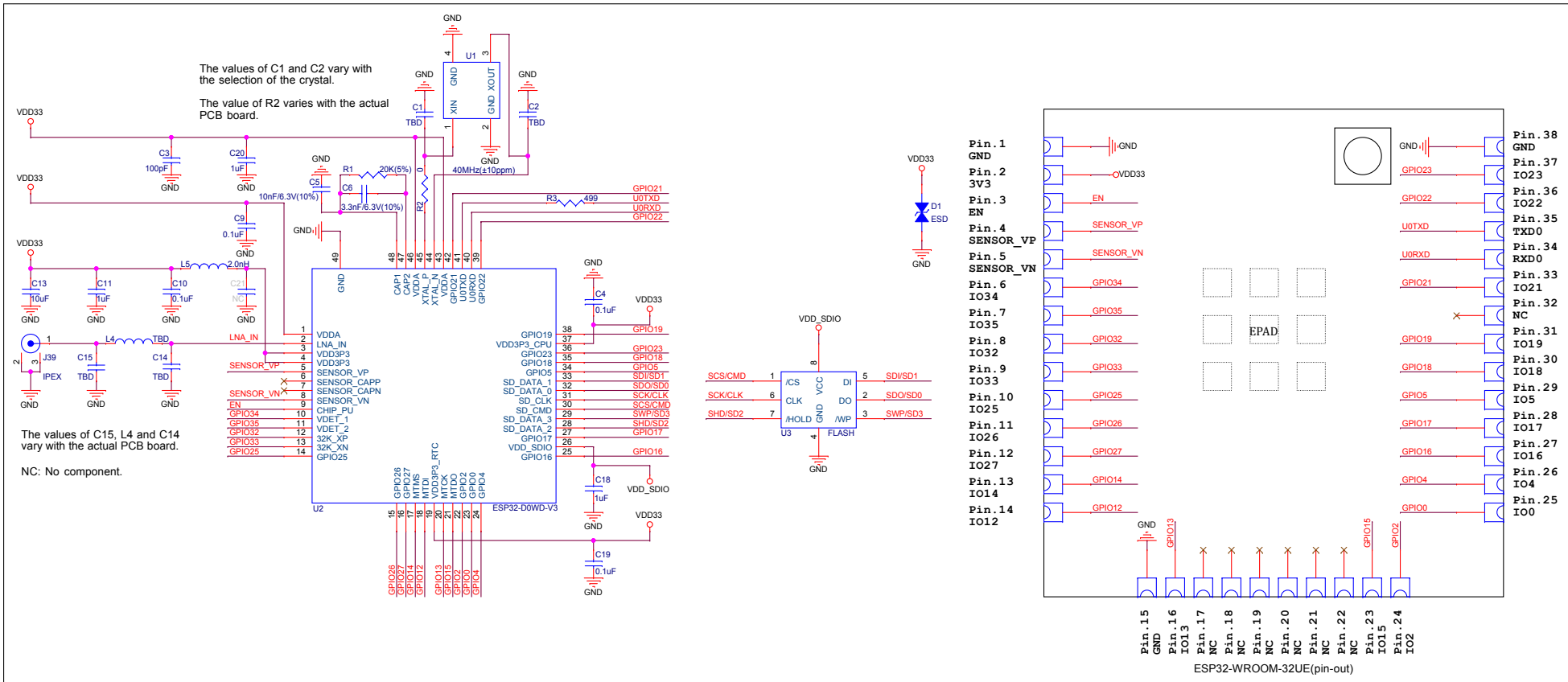


Figure 5: ESP32-WROOM-32UE Schematics

6 Peripheral Schematics

This is the typical application circuit of the module connected with peripheral components (for example, power supply, antenna, reset button, JTAG interface, and UART interface).

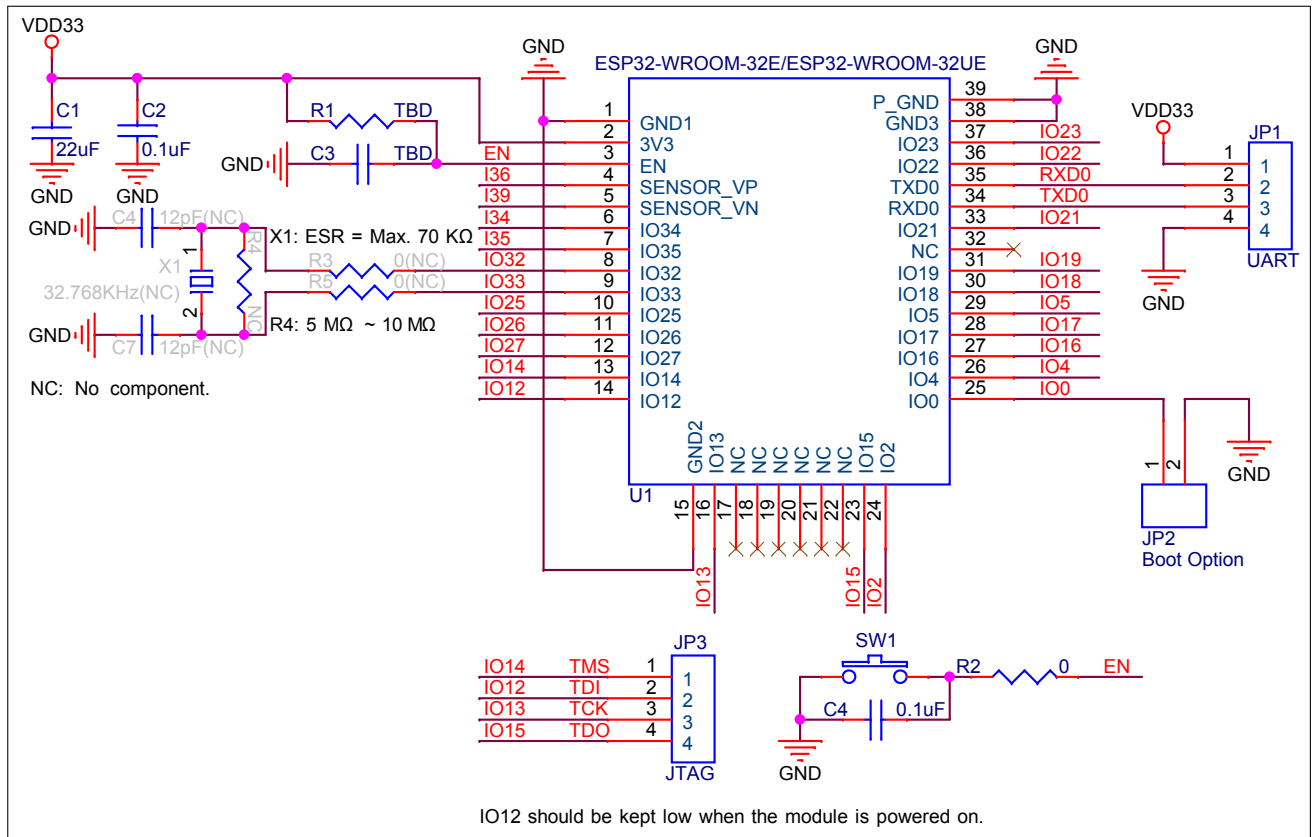


Figure 6: Peripheral Schematics

- Soldering EPAD Pin 39 to the ground of the base board is not a must, however, it can optimize thermal performance. If you choose to solder it, please apply the correct amount of soldering paste.
- To ensure that the power supply to the ESP32 chip is stable during power-up, it is advised to add an RC delay circuit at the EN pin. The recommended setting for the RC delay circuit is usually $R = 10\text{ k}\Omega$ and $C = 1\text{ }\mu\text{F}$. However, specific parameters should be adjusted based on the power-up timing of the module and the power-up and reset sequence timing of the chip. For ESP32's power-up and reset sequence timing diagram, please refer to Section *Power Scheme* in [ESP32 Series Datasheet](#).

7 Physical Dimensions and PCB Land Pattern

7.1 Physical Dimensions

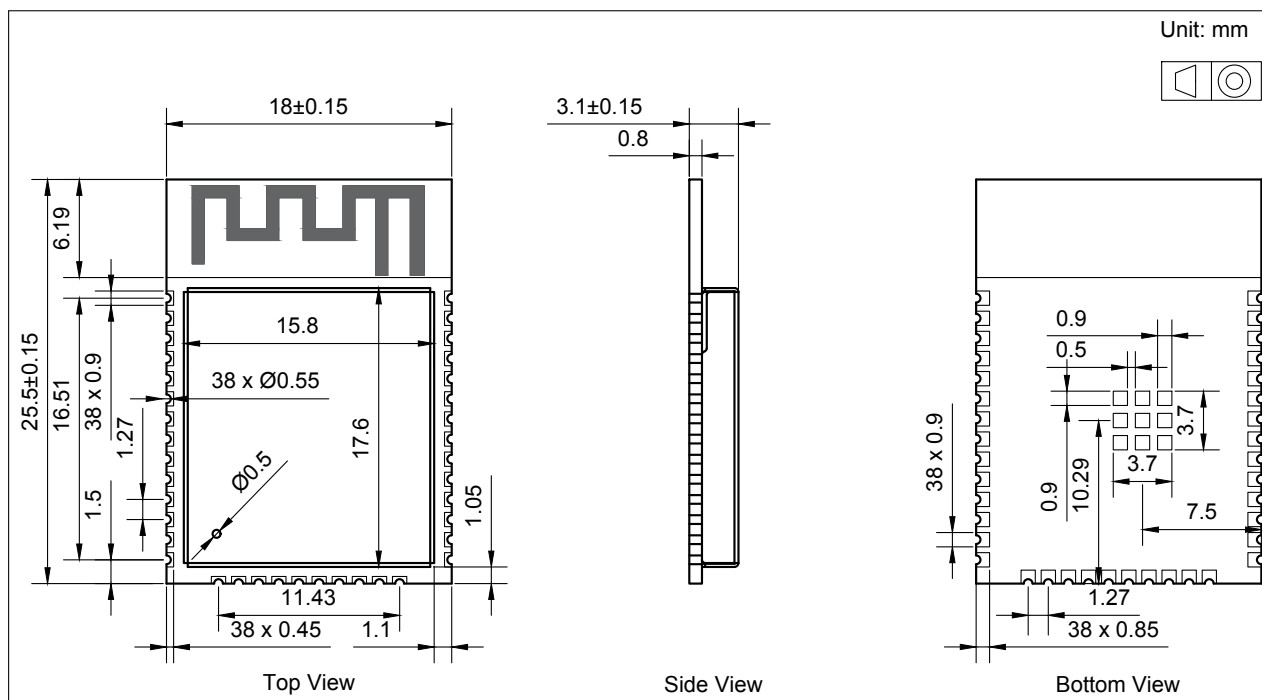


Figure 7: ESP32-WROOM-32E Physical Dimensions

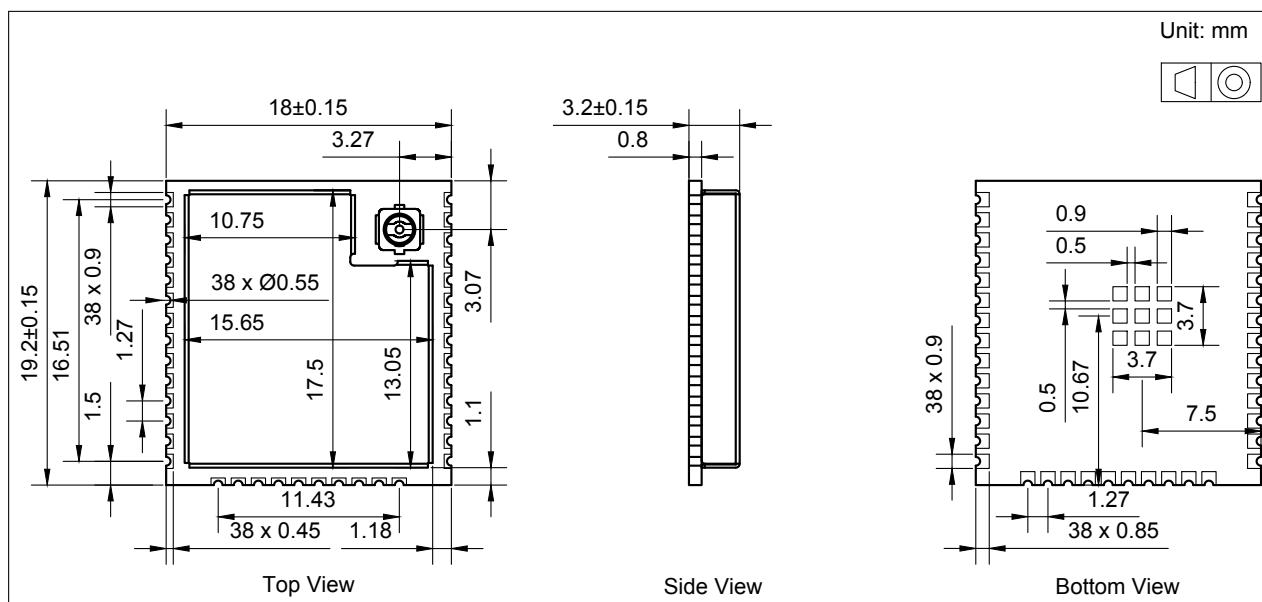


Figure 8: ESP32-WROOM-32UE Physical Dimensions

Note:

For information about tape, reel, and product marking, please refer to [Espressif Module Package Information](#).

7.2 Recommended PCB Land Pattern

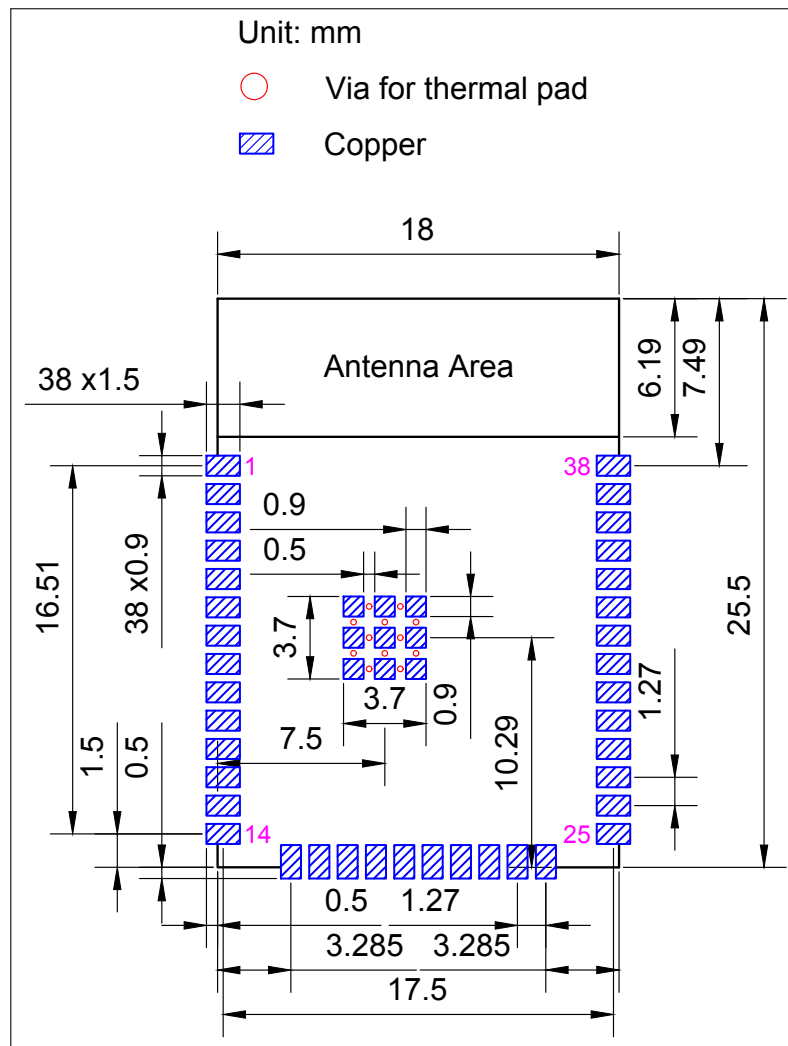
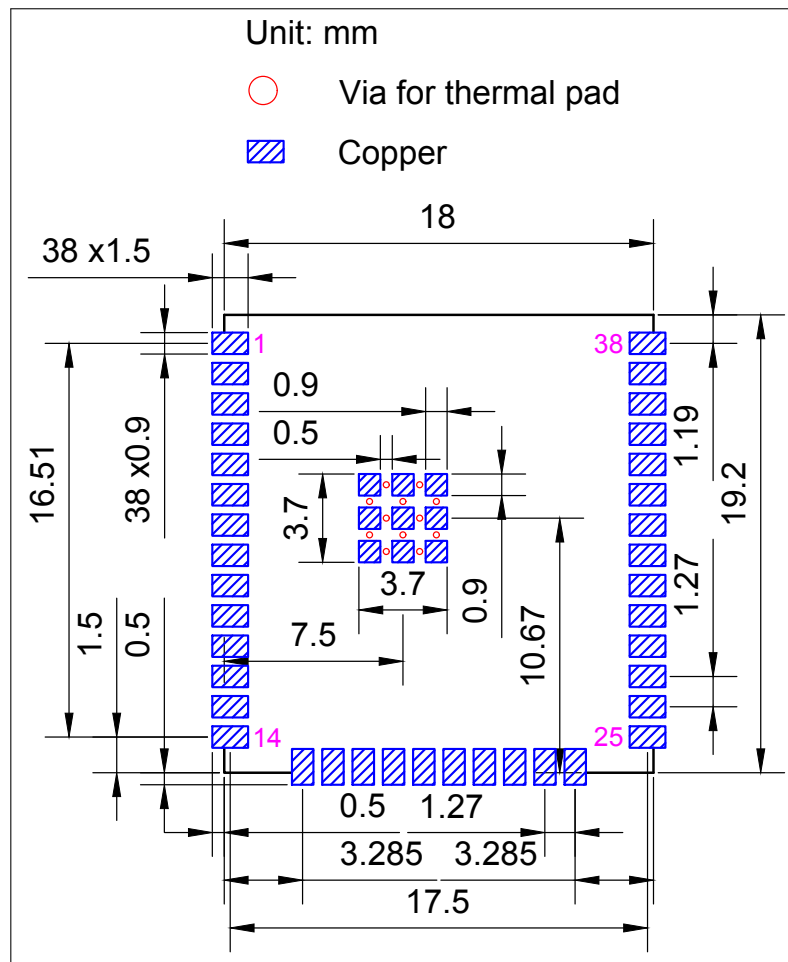


Figure 9: ESP32-WROOM-32E Recommended PCB Land Pattern



7.3 Dimensions of External Antenna Connector

ESP32-WROOM-32UE uses the first generation external antenna connector as shown in Figure 11. This connector is compatible with the following connectors:

- U.FL Series connector from Hirose
- MHF I connector from I-PEX
- AMC connector from Amphenol

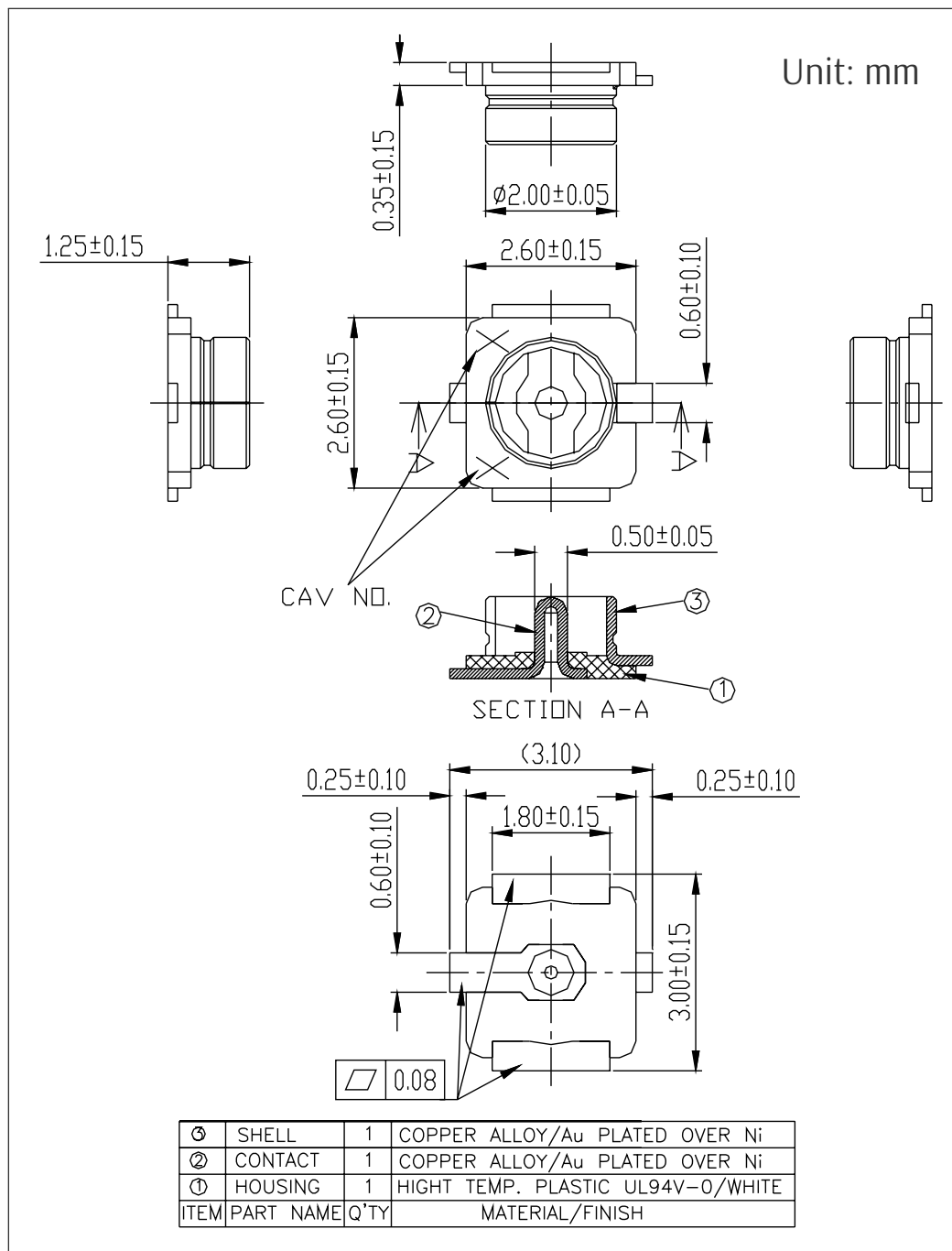


Figure 11: Dimensions of External Antenna Connector

8 Product Handling

8.1 Storage Conditions

The products sealed in moisture barrier bags (MBB) should be stored in a non-condensing atmospheric environment of $< 40\text{ }^{\circ}\text{C}$ and 90%RH. The module is rated at the moisture sensitivity level (MSL) of 3.

After unpacking, the module must be soldered within 168 hours with the factory conditions $25 \pm 5\text{ }^{\circ}\text{C}$ and 60 %RH. If the above conditions are not met, the module needs to be baked.

8.2 Electrostatic Discharge (ESD)

- Human body model (HBM): $\pm 2000\text{ V}$
- Charged-device model (CDM): $\pm 500\text{ V}$
- Air discharge: $\pm 6000\text{ V}$
- Contact discharge: $\pm 4000\text{ V}$

8.3 Reflow Profile

Solder the module in a single reflow.

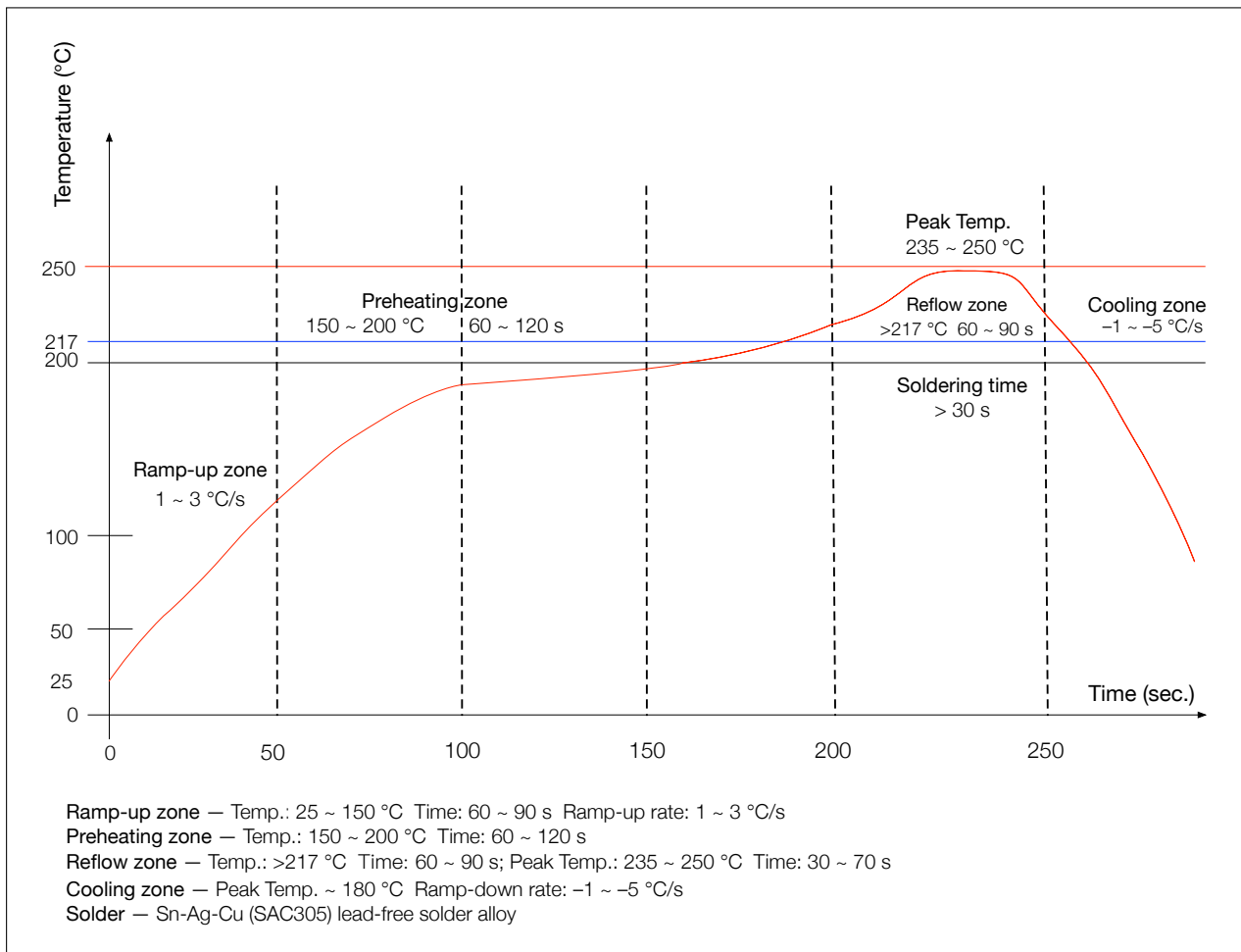


Figure 12: Reflow Profile

9 Related Documentation and Resources

Related Documentation

- [ESP32 Technical Reference Manual](#) – Detailed information on how to use the ESP32 memory and peripherals.
- [ESP32 Series Datasheet](#) – Specifications of the ESP32 hardware.
- [ESP32 Hardware Design Guidelines](#) – Guidelines on how to integrate the ESP32 into your hardware product.
- [ESP32 ECO and Workarounds for Bugs](#) – Correction of ESP32 design errors.
- *Certificates*
<http://espressif.com/en/support/documents/certificates>
- *ESP32 Product/Process Change Notifications (PCN)*
<http://espressif.com/en/support/documents/pcns>
- *ESP32 Advisories* – Information on security, bugs, compatibility, component reliability.
<http://espressif.com/en/support/documents/advisories>
- *Documentation Updates and Update Notification Subscription*
<http://espressif.com/en/support/download/documents>

Developer Zone

- [ESP-IDF Programming Guide for ESP32](#) – Extensive documentation for the ESP-IDF development framework.
- *ESP-IDF* and other development frameworks on GitHub.
<http://github.com/espressif>
- *ESP32 BBS Forum* – Engineer-to-Engineer (E2E) Community for Espressif products where you can post questions, share knowledge, explore ideas, and help solve problems with fellow engineers.
<http://esp32.com/>
- *The ESP Journal* – Best Practices, Articles, and Notes from Espressif folks.
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<http://espressif.com/en/products/socs?id=ESP32>
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Revision History

Date	Version	Release notes
2021-11-08	v1.3	Added a 105 °C module variant Updated Table 4: Absolute Maximum Ratings Updated Table 5: Recommended Operating Conditions Replaced Espressif Product Ordering Information with ESP Product Selector Updated the description of TWAI in Section 1.1: Features Added a note below Figure 8: ESP32-WROOM-32UE Physical Dimensions Upgraded figure formatting Upgraded document formatting
2021-02-09	v1.2	Updated Figure 9: ESP32-WROOM-32E Recommended PCB Land Pattern, Figure 10: ESP32-WROOM-32UE Recommended PCB Land Pattern, Figure 7: ESP32-WROOM-32E Physical Dimensions, and Figure 8: ESP32-WROOM-32UE Physical Dimensions. Modified the note below Figure 12: Reflow Profile. Updated the trade mark from TWAI™ to TWAI®.
2020-11-02	v1.1	Updated the table 7. Added a note to EPAD in Section 7.2 Recommended PCB Land Pattern. Updated the note to RC circuit in Section 6 Peripheral Schematics.
2020-05-29	v1.0	Official release.
2020-05-18	v0.5	Preliminary release.



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Espressif

Product Ordering Information



Version 4.4
Espressif Systems
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About This Guide

This guide provides the ordering information of Espressif products.

Release Notes

For any changes to this document over time, please refer to the last page.

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Notes to This Guide

- MP denotes mass production.
- SPQ: Standard Pack Quantity; MOQ: Minimum Order Quantity.
- For high temperature range option, please contact our [salesperson](#).
- Unless otherwise specified, all the modules have the same dimensional tolerance: ± 0.10 mm for length, width and thickness.
- Release notes for this document are listed on the last page.
- Label ***New** indicates that this is an new product, label ***Recommend** indicates that this product is recommended by Espressif, label ***Default** indicates the default specification of a product, and label ***NRND** indicates that this product is not recommended for new designs.



1. ESP32-S2 Series

1.1. ESP32-S2 Series of SoCs

Product Name	Variants	MPN	Product Description	Flash Size	PSRAM Size	Antenna Type	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP32-S2 Datasheet (*New)	ESP32-S2	-	SMD Wi-Fi IC, ESP32-S2, single-core MCU, QFN 56-pin, 7*7 mm	-	-	-	-40 °C ~ +125 °C	7×7	2,000 & 1,000	1,000	MP	-
ESP32-S2F (*New)	ESP32-S2FH2	-	SMD Wi-Fi IC, ESP32-S2F, single-core MCU, QFN 56-pin, 7*7 mm, 2 MB flash inside, -40°C ~ +105°C	2 MB	-	-	-40 °C ~ +105 °C	7×7	2,000 & 1,000	1,000	Sample	-
	ESP32-S2FH4	-	SMD Wi-Fi IC, ESP32-S2F, single-core MCU, QFN 56-pin, 7*7 mm, 4 MB flash inside, -40°C ~ +105°C	4 MB	-	-	-40 °C ~ +105 °C	7×7	2,000 & 1,000	1,000	Sample	-



1.2. ESP32-S2 Series of Modules

Product Name	Variants	MPN	Product Description	Flash Size	PSRAM Size	Antenna Type	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP32-S2-MINI-1 (*New) (*Recommend)	-	ESP32-S2-MINI-1(M50F2H000PH3Q0)	SMD module, ESP32-S2FH4, PCB antenna	4 MB embedded in chip	-	Internal PCB on-board antenna	-40 °C ~ +85 °C	15.40×20.00×2.40(±0.15)	TBD	TBD	Sample	ESP32-S2FH4
ESP32-S2-MINI-1U (*New) (*Recommend)	-	ESP32-S2-MINI-1U(M50F2H000UH3Q0)	SMD module, ESP32-S2FH4, IPEX antenna connector	4 MB embedded in chip	-	External IPEX antenna	-40 °C ~ +85 °C	15.40×15.40×2.40(±0.15)	TBD	TBD	Sample	ESP32-S2FH4
ESP32-S2-WROOM Datasheet (*New)	ESP32-S2-WROOM (*Default)	ESP32-S2-WROOM(M22S2H3200PH3Q0)	SMD module, ESP32-S2, 4MB SPI flash, PCB antenna	4 MB	-	Internal PCB on-board antenna	-40 °C ~ +85 °C	18.00×31.00×3.30 (±0.15)	650	650	MP	ESP32-S2 Datasheet ESP32-S2-Saola-1 User Guide
	ESP32-S2-WROOM (High Temp. 105°C)	ESP32-S2-WROOM(M22S2H3200PS3Q0)	SMD module, ESP32-S2, 4MB SPI flash, PCB antenna, -40 °C ~ +105 °C	4 MB	-	Internal PCB on-board antenna	-40 °C ~ +105 °C	18.00×31.00×3.30 (±0.15)	650	650	MP	ESP32-S2 Datasheet
ESP32-S2-WROOM-I Datasheet (*New)	ESP32-S2-WROOM-I	ESP32-S2-WROOM-I(M22S2H3200UH3Q0)	SMD module , ESP32-S2, 4MB SPI flash, IPEX antenna connector	4 MB	-	External IPEX antenna	-40 °C ~ +85 °C	18.00×31.00×3.30 (±0.15)	650	650	MP	ESP32-S2 Datasheet ESP32-S2-Saola-1 User Guide
	ESP32-S2-WROOM-I (High Temp. 105°C)	ESP32-S2-WROOM-I(M22S2H3200US3Q0)	SMD module , ESP32-S2, 4MB SPI flash, IPEX antenna connector, -40 °C ~ +105 °C	4 MB	-	External IPEX antenna	-40 °C ~ +105 °C	18.00×31.00×3.30 (±0.15)	650	650	MP	ESP32-S2 Datasheet



1.2 ESP32-S2 Series of Modules

Product Name	Variants	MPN	Product Description	Flash Size	PSRAM Size	Antenna Type	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP32-S2-WROVER Datasheet (*New)	ESP32-S2-WROVER (*Default)	ESP32-S2-WROVER(M22S2H3216PH3Q0)	SMD module, ESP32-S2, 3.3V, 2MB PSRAM, 4MB SPI flash, PCB Antenna	4 MB	2 MB	Internal PCB on-board antenna	-40 °C ~ +85 °C	18.00×31.00×3.30 (±0.15)	650	650	MP	ESP32-S2 Datasheet ESP32-S2-Saola-1 User Guide
ESP32-S2-WROVER-I Datasheet (*New)	ESP32-S2-WROVER-I	ESP32-S2-WROVER-I(M22S2H3216UH3Q0)	SMD module, ESP32-S2, 3.3V, 2MB PSRAM, 4MB SPI flash, IPEX antenna connector	4 MB	2 MB	External IPEX antenna	-40 °C ~ +85 °C	18.00×31.00×3.30 (±0.15)	650	650	MP	ESP32-S2 Datasheet ESP32-S2-Saola-1 User Guide



1.3. ESP32-S2 Series of Development Boards

Product Name	Variants	MPN	Product Description	Flash Size	PSRAM Size	Antenna Type	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP32-S2-Saola-1 User Guide (*New)	ESP32-S2-Saola-1R	ESP32-S2-Saola-1R	ESP32-S2 general-purpose development board, embeds ESP32-S2-WROVER, 4 MB flash, with pin header	4 MB	2 MB	Internal PCB on-board antenna	-40 °C ~ +85 °C	53.9x27.9	1	-	MP	ESP32-S2-WROVER Datasheet
	ESP32-S2-Saola-1RI	ESP32-S2-Saola-1RI	ESP32-S2 general-purpose development board, embeds ESP32-S2-WROVER-I, 4 MB flash, with pin header	4 MB	2 MB	External IPEX antenna	-40 °C ~ +85 °C	53.9x27.9	1	-	MP	ESP32-S2-WROVER-I Datasheet
	ESP32-S2-Saola-1M	ESP32-S2-Saola-1M	ESP32-S2 general-purpose development board, embeds ESP32-S2-WROOM, 4 MB flash, with pin header	4 MB	-	Internal PCB on-board antenna	-40 °C ~ +85 °C	53.9x27.9	1	-	MP	ESP32-S2-WROOM Datasheet
	ESP32-S2-Saola-1MI	ESP32-S2-Saola-1MI	ESP32-S2 general-purpose development board, embeds ESP32-S2-WROOM-I, 4 MB flash, with pin header	4 MB	-	External IPEX antenna	-40 °C ~ +85 °C	53.9x27.9	1	-	MP	ESP32-S2-WROOM-I Datasheet
ESP32-S2-Kaluga-1 User Guide (*New)	-	ESP32-S2-Kaluga-1	The new multimedia development board ESP32-S2-Kaluga-1 based on ESP32-S2 has various functions, such as an LCD screen display, touch panel control, camera image acquisition, audio playback, etc. It can be flexibly assembled and disassembled, thus fulfilling a variety of customized requirements.	4 MB	2 MB	Internal PCB on-board antenna	-40 °C ~ +65 °C	128x166x60 (kit size)	1	-	Sample	ESP32-S2-WROVER Datasheet



2. ESP32 Series

2.1. ESP32 Series of SoCs

Product Name	Variants	MPN	Product Description	Flash Size	PSRAM Size	Antenna Type	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP32 Datasheet	ESP32-D0WD-V3 (*New) (*Recommend)	-	SMD IC ESP32- D0WD-V3, ESP32 ECO V3, dual-core MCU, Wi-Fi & Bluetooth combo, QFN 48-pin, 5*5 mm.	-	-	-	-40 °C ~ +125 °C	5×5	5,000 & 1,000	1,000	MP	-
	ESP32-D0WDQ6-V3 (*New) (*Recommend)	-	SMD IC ESP32- D0WDQ6-V3, ESP32 ECO V3, dual-core MCU, Wi-Fi & Bluetooth combo, QFN 48-pin, 6*6 mm	-	-	-	-40 °C ~ +125 °C	6×6	3,000 & 1,000	1,000	MP	-
	ESP32-D0WD	-	SMD IC ESP32-D0WD, dual-core MCU, Wi-Fi & Bluetooth combo, QFN 48-pin, 5*5 mm	-	-	-	-40 °C ~ +125 °C	5×5	5,000 & 1,000	1,000	MP	-
	ESP32-D0WDQ6	-	SMD IC ESP32-D0WDQ6, dual-core MCU, Wi-Fi & Bluetooth combo, QFN 48-pin, 6*6 mm	-	-	-	-40 °C ~ +125 °C	6×6	3,000 & 1,000	1,000	MP	-
	ESP32-D2WD	-	SMD IC ESP32-D2WD, dual-core MCU, Wi-Fi & Bluetooth combo, 2 MB flash inside, QFN 48-pin, 5*5 mm	2 MB	-	-	-40 °C ~ +105 °C	5×5	5,000 & 1,000	1,000	MP	-
	ESP32-S0WD	-	SMD IC ESP32-S0WD, single-core MCU, Wi-Fi & Bluetooth combo, QFN 48-pin, 5*5 mm	-	-	-	-40 °C ~ +125 °C	5×5	5,000 & 1,000	1,000	MP	-
	ESP32-U4WDH (*New)	-	SMD IC ESP32-U4WDH, ESP32 ECO V3, single-core MCU, Wi-Fi & Bluetooth combo, 4 MB flash inside, QFN 48-pin, 5*5 mm	4 MB	-	-	-40 °C ~ +105 °C	5×5	5,000 & 1,000	1,000	MP	-



2.2. ESP32 Series of Modules

Product Name	Variants	MPN	Product Description	Flash Size	PSRAM Size	Antenna Type	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP32-WROOM-32E Datasheet (*New) (*Recommend)	ESP32-WROOM-32E (*Default)	ESP32-WROOM-32E(M113EH3200PH3Q0)	SMD module, ESP32-D0WD-V3, ESP32 ECO V3, 4 MB SPI flash, PCB antenna	4 MB	-	Internal PCB on-board antenna	-40 °C ~ +85 °C	18.00×25.50×3.10	650	650	MP	ESP32-D0WD-V3 Datasheet
	ESP32-WROOM-32E (8 MB) (*New)	ESP32-WROOM-32E(M113EH6400PH3Q0)	SMD module, ESP32-D0WD-V3, ESP32 ECO V3, 8 MB SPI flash, PCB antenna	8 MB	-	Internal PCB on-board antenna	-40 °C ~ +85 °C	18.00×25.50×3.10	650	650	MP	
	ESP32-WROOM-32E (16 MB) (*New)	ESP32-WROOM-32E(M113EH2800PH3Q0)	SMD module, ESP32-D0WD-V3, ESP32 ECO V3, 16 MB SPI flash, PCB antenna	16 MB	-	Internal PCB on-board antenna	-40 °C ~ +85 °C	18.00×25.50×3.10	650	650	MP	
	ESP32-WROOM-32E (High Temp. 105°C) (*New)	ESP32-WROOM-32E(M113EH3200PS3Q0)	SMD module, ESP32-D0WD-V3, ESP32 ECO V3, 4 MB SPI flash, PCB antenna, -40 °C ~ +105°C	4 MB	-	Internal PCB on-board antenna	-40 °C ~ +85 °C	18.00×31.00×3.30 (±0.15)	650	650	MP	



2.2 ESP32 Series of Modules

Product Name	Variants	MPN	Product Description	Flash Size	PSRAM Size	Antenna Type	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP32-WROOM-32D Datasheet	ESP32-WROOM-32D (*Default)	ESP32-WROOM-32D(M11 3DH3200PH3Q0)	SMD module, ESP32-D0WD, 4 MB SPI flash, PCB antenna	4 MB	-	Internal PCB on-board antenna	-40 °C ~ +85 °C	18.00×25.50×3.10	650	650	MP	ESP32-D0WD Datasheet ESP32-DevKitC-32D Getting Started Guide
	ESP32-WROOM-32D (8 MB)	ESP32-WROOM-32D(M11 3DH6400PH3Q0)	SMD module, ESP32-D0WD, 8 MB SPI flash, PCB antenna	8 MB	-	Internal PCB on-board antenna	-40 °C ~ +85 °C	18.00×25.50×3.10	650	650	MP	
	ESP32-WROOM-32D (16 MB)	ESP32-WROOM-32D(M11 3DH2800PH3Q0)	SMD module, ESP32-D0WD, 16 MB SPI flash, PCB antenna	16 MB	-	Internal PCB on-board antenna	-40 °C ~ +85 °C	18.00×25.50×3.10	650	650	MP	
	ESP32-WROOM-32D (High Temp. 105°C)	ESP32-WROOM-32D(M11 3DH3200PS3Q0)	SMD module, ESP32-D0WD, 4 MB SPI flash, PCB antenna, -40 °C ~ +105 °C	4 MB	-	Internal PCB on-board antenna	-40 °C ~ +105 °C	18.00×25.50×3.10	650	650	MP	ESP32-D0WD Datasheet



2.2 ESP32 Series of Modules

Product Name	Variants	MPN	Product Description	Flash Size	PSRAM Size	Antenna Type	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP32-WROOM-32UE Datasheet	ESP32-WROOM-32UE (*Default)	ESP32-WROOM-32UE(M113EH3200UH3Q0)	SMD module, ESP32-D0WD-V3, ESP32 ECO V3, 4 MB SPI flash, IPEX antenna connector	4 MB	-	External IPEX antenna	-40 °C ~ +85 °C	18.00×19.20×3.20	650	650	MP	ESP32-D0WD-V3 Datasheet
	ESP32-WROOM-32UE (8 MB)	ESP32-WROOM-32UE(M113EH6400UH3Q0)	SMD module, ESP32-D0WD-V3, ESP32 ECO V3, 8 MB SPI flash, IPEX antenna connector	8 MB	-	External IPEX antenna	-40 °C ~ +85 °C	18.00×19.20×3.20	650	650	MP	
	ESP32-WROOM-32UE (16 MB)	ESP32-WROOM-32UE(M113EH2800UH3Q0)	SMD module, ESP32-D0WD-V3, ESP32 ECO V3, 16 MB SPI flash, IPEX antenna connector	16 MB	-	External IPEX antenna	-40 °C ~ +85 °C	18.00×19.20×3.20	650	650	MP	
	ESP32-WROOM-32UE (High Temp. 105°C) (*New)	ESP32-WROOM-32UE(M113EH3200US3Q0)	SMD module, ESP32-D0WD-V3, ESP32 ECO V3, 4 MB SPI flash, IPEX antenna connector, -40 °C ~ +105 °C	4 MB	-	External IPEX antenna	-40 °C ~ +105 °C	18.00×19.20 ×3.20	650	650	MP	



2.2 ESP32 Series of Modules

Product Name	Variants	MPN	Product Description	Flash Size	PSRAM Size	Antenna Type	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP32-WROOM-32U Datasheet	ESP32-WROOM-32U (*Default)	ESP32-WROOM-32U(M11 3DH3200UH3Q0)	SMD module, ESP32-D0WD, 4 MB SPI flash, IPEX antenna connector	4 MB	-	External IPEX antenna	-40 °C ~ +85 °C	18.00×19.20×3.20	650	650	MP	ESP32-D0WD Datasheet ESP32-DevKitC-32U Getting Started Guide
	ESP32-WROOM-32U (8 MB)	ESP32-WROOM-32U(M11 3DH6400UH3Q0)	SMD module, ESP32-D0WD, 8 MB SPI flash, IPEX antenna connector	8 MB	-	External IPEX antenna	-40 °C ~ +85 °C	18.00×19.20×3.20	650	650	MP	
	ESP32-WROOM-32U (16 MB)	ESP32-WROOM-32U(M11 3DH2800UH3Q0)	SMD module, ESP32-D0WD, 16 MB SPI flash, IPEX antenna connector	16 MB	-	External IPEX antenna	-40 °C ~ +85 °C	18.00×19.20×3.20	650	650	MP	
	ESP32-WROOM-32U (High Temp. 105°C)	ESP32-WROOM-32U(M11 3DH3200US3Q0)	SMD module, ESP32-D0WD, 4 MB SPI flash, IPEX antenna connector, -40 °C ~ +105 °C	4 MB	-	External IPEX antenna	-40 °C ~ +105 °C	18.00×19.20×3.20	650	650	MP	ESP32-D0WD Datasheet



2.2 ESP32 Series of Modules

Product Name	Variants	MPN	Product Description	Flash Size	PSRAM Size	Antenna Type	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP32-WROOM-32 Datasheet (*NRND)	-	ESP32-WROOM-32(M103 QH3200PH3Q0)	SMD module, ESP32-D0WDQ6, 4 MB SPI flash, PCB antenna. Note, this module is not recommended for new designs. The recommended replacement for it is ESP32-WROOM-32E .	4 MB	-	Internal PCB on-board antenna	-40 °C ~ +85 °C	18.00×25.50×3.10	550	550	MP	ESP32-D0WDQ6 Datasheet
ESP32-WROOM-32SE Datasheet	ESP32-WROOM-32SE	ESP32-WROOM-32SE(M123DH3200PH3Q0)	SMD module , ESP32-D0WD, 4 MB SPI Flash, ATECC608A chip, PCB antenna	4 MB	-	Internal PCB on-board antenna	-40 °C ~ +85 °C	18.00×25.50×3.10	650	650	MP	ESP32-D0WD Datasheet
ESP32-SOLO-1 Datasheet	ESP32-SOLO-1 (*Default)	ESP32-SOLO-1(M113SH3200PH3Q0)	SMD module, ESP32-S0WD, single core, 4 MB SPI flash, PCB antenna	4 MB	-	Internal PCB on-board antenna	-40 °C ~ +85 °C	18.00×25.50×3.10	650	650	MP	ESP32-S0WD Datasheet ESP32-DevKitC-S1 Getting Started Guide
	ESP32-SOLO-1 (High Temp. 105°C) (*New)	ESP32-SOLO-1(M113SH3200PS3Q0)	SMD module, ESP32-S0WD, single core, 4 MB SPI flash, PCB antenna , -40 °C ~ +105 °C	4 MB	-	Internal PCB on-board antenna	-40 °C ~ +105 °C	18.00×25.50×3.10	650	650	MP	



Product Name	Variants	MPN	Product Description	Flash Size	PSRAM Size	Antenna Type	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP32-WROVER-E Datasheet (*New) (*Recommend)	ESP32-WROVER-E (*Default)	ESP32-WROVER-E(M213EH3264PH3Q0)	SMD module, ESP32-D0WD-V3, ESP32 ECO V3, 3.3 V, 8 MB PSRAM, 4 MB SPI flash, PCB antenna	4 MB	8 MB	Internal PCB on-board antenna	-40 °C ~ +85 °C	18.00×31.40×3.30	650	650	MP	ESP32-D0WD-V3 Datasheet
	ESP32-WROVER-E (8 MB flash)	ESP32-WROVER-E(M213EH6464PH3Q0)	SMD module, ESP32-D0WD-V3, ESP32 ECO V3, 3.3 V, 8 MB PSRAM, 8 MB SPI flash, PCB antenna	8 MB	8 MB	Internal PCB on-board antenna	-40 °C ~ +85 °C	18.00×31.40×3.30	650	650	MP	
	ESP32-WROVER-E (16 MB flash)	ESP32-WROVER-E(M213EH2864PH3Q0)	SMD module, ESP32-D0WD-V3, ESP32 ECO V3, 3.3 V, 8 MB PSRAM, 16 MB SPI flash, PCB antenna	16 MB	8 MB	Internal PCB on-board antenna	-40 °C ~ +85 °C	18.00×31.40×3.30	650	650	MP	



Product Name	Variants	MPN	Product Description	Flash Size	PSRAM Size	Antenna Type	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP32-WROVER-IE Datasheet (*New) (*Recommend)	ESP32-WROVER-IE (*Default)	ESP32-WROVER-IE(M213EH3264UH3Q0)	SMD module, ESP32-D0WD-V3, ESP32 ECO V3, 3.3 V, 8 MB PSRAM, 4 MB SPI flash, IPEX antenna connector	4 MB	8 MB	External IPEX antenna	-40 °C ~ +85 °C	18.00×31.40×3.30	650	650	MP	ESP32-D0WD-V3 Datasheet
	ESP32-WROVER-IE (8 MB flash)	ESP32-WROVER-IE(M213EH6464UH3Q0)	SMD module, ESP32-D0WD-V3, ESP32 ECO V3, 3.3 V, 8 MB PSRAM, 8 MB SPI flash, IPEX antenna connector	8 MB	8 MB	External IPEX antenna	-40 °C ~ +85 °C	18.00×31.40×3.30	650	650	MP	
	ESP32-WROVER-IE (16 MB flash)	ESP32-WROVER-IE(M213EH2864UH3Q0)	SMD module, ESP32-D0WD-V3, ESP32 ECO V3, 3.3 V, 8 MB PSRAM, 16 MB SPI flash, IPEX antenna connector	16 MB	8 MB	External IPEX antenna	-40 °C ~ +85 °C	18.00×31.40×3.30	650	650	MP	



Product Name	Variants	MPN	Product Description	Flash Size	PSRAM Size	Antenna Type	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP32-WROVER-B Datasheet (*NRND)	ESP32-WROVER-B (*Default)	ESP32-WROVER-B(M213DH3264PH3Q0)	SMD module, ESP32-D0WD, 3.3 V, 8 MB PSRAM, 4 MB SPI flash, PCB antenna. Note, this module is not recommended for new designs. The recommended replacement for it is ESP32-WROVER-E / ESP32-WROVER-IE .	4 MB	8 MB	Internal PCB on-board antenna	-40 °C ~ +85 °C	18.00×31.40×3.30	650	650	MP	ESP32-D0WD Datasheet ESP32-DevKitC-VB Getting Started Guide ESP-WROVER-KIT-VB Getting Started Guide
	ESP32-WROVER-B (8 MB flash)	ESP32-WROVER-B(M213DH6464PH3Q0)	SMD module, ESP32-D0WD, 3.3 V, 8 MB PSRAM, 8 MB SPI flash, PCB antenna. Note, this module is not recommended for new designs. The recommended replacement for it is ESP32-WROVER-E / ESP32-WROVER-IE .	8 MB	8 MB	Internal PCB on-board antenna	-40 °C ~ +85 °C	18.00×31.40×3.30	650	650	MP	
	ESP32-WROVER-B (16 MB flash)	ESP32-WROVER-B(M213DH2864PH3Q0)	SMD module, ESP32-D0WD, 3.3 V, 8 MB PSRAM, 16 MB SPI flash, PCB antenna. Note, this module is not recommended for new designs. The recommended replacement for it is ESP32-WROVER-E / ESP32-WROVER-IE .	16 MB	8 MB	Internal PCB on-board antenna	-40 °C ~ +85 °C	18.00×31.40×3.30	650	650	MP	



2.2 ESP32 Series of Modules

Product Name	Variants	MPN	Product Description	Flash Size	PSRAM Size	Antenna Type	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP32-WROVER-B Datasheet (*NRND)	ESP32-WROVER-IB (4 MB flash)	ESP32-WROVER-IB(M213DH3264U H3Q0)	SMD module, ESP32-D0WD, 3.3 V, 8 MB PSRAM, 4 MB SPI flash, IPEX antenna connector. Note, this module is not recommended for new designs. The recommended replacement for it is ESP32-WROVER-E / ESP32-WROVER-IE .	4 MB	8 MB	External IPEX antenna	-40 °C ~ +85 °C	18.00×31.40×3.30	650	650	MP	ESP32-D0WD Datasheet ESP32-DevKitC-VIB Getting Started Guide
	ESP32-WROVER-IB (8 MB flash)	ESP32-WROVER-IB(M213DH6464U H3Q0)	SMD module, ESP32-D0WD, 3.3 V, 8 MB PSRAM, 8 MB SPI flash, IPEX antenna connector. Note, this module is not recommended for new designs. The recommended replacement for it is ESP32-WROVER-E / ESP32-WROVER-IE .	8 MB	8 MB	External IPEX antenna	-40 °C ~ +85 °C	18.00×31.40×3.30	650	650	MP	



Product Name	Variants	MPN	Product Description	Flash Size	PSRAM Size	Antenna Type	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
	ESP32-WROVER-IB (16 MB flash)	ESP32-WROVER-IB(M213DH2864U H3Q0)	SMD module, ESP32-D0WD, 3.3 V, 8 MB PSRAM, 16 MB SPI flash, IPEX antenna connector. Note, this module is not recommended for new designs. The recommended replacement for it is ESP32-WROVER-E / ESP32-WROVER-IE .	16 MB	8 MB	External IPEX antenna	-40 °C ~ +85 °C	18.00×31.40×3.30	650	650	MP	
ESP32-WROVER Datasheet (*NRND)	ESP32-WROVER (PCB)	-	SMD module, ESP32-D0WDQ6, 1.8 V, 8 MB PSRAM, 4 MB SPI flash, PCB antenna. Note, this module is not recommended for new designs. The recommended replacement for it is ESP32-WROVER-E .	4 MB	8 MB	Internal PCB on-board antenna	-40 °C ~ +85 °C	18.00×31.40×3.30	650	650	MP	ESP32-D0WDQ6 Datasheet
	ESP32-WROVER (IPEX)	-	SMD module, ESP32-D0WDQ6, 1.8 V, 8 MB PSRAM, 4 MB SPI flash, IPEX antenna connector. Note, this module is not recommended for new designs. The recommended replacement for it is ESP32-WROVER-E .	4 MB	8 MB	External IPEX antenna	-40 °C ~ +85 °C	18.00×31.40×3.30	650	650	MP	



2.2 ESP32 Series of Modules

Product Name	Variants	MPN	Product Description	Flash Size	PSRAM Size	Antenna Type	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP32-PICO-V3 Datasheet (*New) (*Recommend)	ESP32-PICO-V3	-	Module in SiP form, ESP32 ECO V3 with 4 MB flash, dual-core MCU, Wi-Fi & Bluetooth combo, LGA 48-pin, 7*7 mm	4 MB	-	-	-40 °C ~ +85 °C	7×7	2,000 & 1,000	1,000	MP	-
ESP32-PICO-V3-02 (*New)	-	-	Module in SiP form, ESP32 ECO V3 with 8 MB flash and 2 MB PSRAM inside, dual-core MCU, Wi-Fi & Bluetooth combo, LGA 48-pin, 7*7 mm	8 MB	2 MB	-	-40 °C ~ +85 °C	7×7	2,000 & 1,000	1,000	Sample	-
ESP32-PICO-D4 Datasheet	-	-	Module in SiP form, ESP32 with 4 MB flash, dual-core MCU, Wi-Fi & Bluetooth combo, LGA 48-pin, 7*7 mm	4 MB	-	-	-40 °C ~ +85 °C	7×7	2,000 & 1,000	1,000	MP	ESP32-PICO-KIT Getting Started Guide



2.3. ESP32 Series of Development Boards

Product Name	Variants	MPN	Product Description	Flash Size	PSRAM Size	Antenna Type	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP32-DevKitC Getting Started Guide	ESP32-DevKitC-32D	ESP32-DevKitC-32D	ESP32 general-purpose development board, embeds ESP32-WROOM-32D, 4 MB flash, with pin header	4 MB	-	Internal PCB on-board antenna	-40 °C ~ +85 °C	54.4×27.9	1	-	MP	ESP32-WROOM-32D Datasheet
	ESP32-DevKitC-32U	ESP32-DevKitC-32U	ESP32 general-purpose development board, embeds ESP32-WROOM-32U, 4 MB flash, with pin header	4 MB	-	External IPEX antenna	-40 °C ~ +85 °C	54.4×27.9	1	-	MP	ESP32-WROOM-32U Datasheet
	ESP32-DevKitC-S1	ESP32-DevKitC-S1	ESP32 general-purpose development board, embeds ESP32-SOLO-1, 4 MB flash, with pin header	4 MB	-	Internal PCB on-board antenna	-40 °C ~ +85 °C	54.4×27.9	1	-	MP	ESP32-SOLO-1 Datasheet
	ESP32-DevKitC-VB	ESP32-DevKitC-VB	ESP32 general-purpose development board, embeds ESP32-WROVER-B, 4 MB flash, 8 MB PSRAM, with pin header	4 MB	8 MB	Internal PCB on-board antenna	-40 °C ~ +65 °C	54.4×27.9	1	-	MP	ESP32-WROVER-B Datasheet
	ESP32-DevKitC-VIB	ESP32-DevKitC-VIB	ESP32 general-purpose development board, embeds ESP32-WROVER-B (IPEX), 4 MB flash, 8 MB PSRAM, with pin header	4 MB	8 MB	External IPEX antenna	-40 °C ~ +65 °C	54.4×27.9	1	-	MP	ESP32-WROVER-B (IPEX) Datasheet



2.3 ESP32 Series of Development Boards

Product Name	Variants	MPN	Product Description	Flash Size	PSRAM Size	Antenna Type	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP32-DevKitC Getting Started Guide	ESP32-DevKitC-32E (*New)	ESP32-DevKitC-32E	ESP32 general-purpose development board, embeds ESP32-WROOM-32E, 4 MB flash, with pin header	4 MB	-	Internal PCB on-board antenna	-40 °C ~ +85 °C	54.4×27.9	1	-	MP	ESP32-WROOM-32E Datasheet
	ESP32-DevKitC-32UE (*New)	ESP32-DevKitC-32UE	ESP32 general-purpose development board, embeds ESP32-WROOM-32UE, 4 MB flash, with pin header	4 MB	-	External IPEX antenna	-40 °C ~ +85 °C	54.4×27.9	1	-	MP	ESP32-WROOM-32UE Datasheet
	ESP32-DevKitC-VE (*New)	ESP32-DevKitC-VE	ESP32 general-purpose development board, embeds ESP32-WROVER-E, 8 MB flash, with pin header	8 MB	8 MB	Internal PCB on-board antenna	-40 °C ~ +85 °C	54.4×27.9	1	-	MP	ESP32-WROVER-E Datasheet
	ESP32-DevKitC-VIE (*New)	ESP32-DevKitC-VIE	ESP32 general-purpose development board, embeds ESP32-WROVER-IE, 8 MB flash, with pin header	8 MB	8 MB	External IPEX antenna	-40 °C ~ +85 °C	54.4×27.9	1	-	MP	ESP32-WROVER-IE Datasheet



2.3 ESP32 Series of Development Boards

Product Name	Variants	MPN	Product Description	Flash Size	PSRAM Size	Antenna Type	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP-WROVER-KIT Getting Started Guide	ESP-WROVER-KIT-VB	ESP-WROVER-KIT-VB	ESP32 development board, JTAG function, TFT display and camera supported, ESP32-WROVER-B on the board	4 MB	8 MB	Internal PCB on-board antenna	-40 °C ~ +65 °C	85.1×84.3	1	-	MP	ESP32-WROVER-B Datasheet
ESP32-PICO-KIT Getting Started Guide	-	ESP32-PICO-KIT	ESP32-PICO-D4 development board	4 MB	-	Internal 3D antenna	-40 °C ~ +85 °C	52.0×20.3	1	-	MP	ESP32-PICO-D4 Datasheet
ESP32-LyraT User Guide	-	ESP32-LyraT	ESP32 audio development board, integrates ESP32-WROVER/ESP32-WROVER-B, peripherals like touch buttons, mic, speaker supported	4 MB	8 MB	Internal PCB on-board antenna	-40 °C ~ +65 °C	95.5×80.6	1	-	MP	ESP32-WROVER Datasheet ESP32-WROVER-B Datasheet
ESP32-Vaquita-DSPG User Guide (*New)	-	ESP32-Vaquita-DSPG	Alexa built-in solution powered by ESP32 and DSP Group's DBMD5P audio SoC, 2-Mic array, voice enablement, AWS-IoT cloud connectivity.	16 MB	8 MB	Internal PCB on-board antenna	-40 °C ~ +65 °C	Main board: 85 mm X 65 mm Sun board: 65 mm X 24 mm	1	-	MP	ESP32-WROVER-E Datasheet



Product Name	Variants	MPN	Product Description	Flash Size	PSRAM Size	Antenna Type	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP32-LyraTD-DSPG User Guide (*New) (*Recommend)	-	ESP32-LyraTD-DSPG	An Espressif Audio Development Board, based on ESP32-WROVER-B, a BT/WIFI combo module, and DBMP5P DSP that features a three-microphone array for noise reduction, echo cancellation, beamforming and wake-word detection.	16 MB	8 MB	Internal PCB on-board antenna	-20 °C ~ +65 °C	Main board: 85 mm X 65 mm Sun board: diameter 90 mm	1	-	MP	ESP32-WROVER-B Datasheet
ESP32-LyraTD-SYNA User Guide (*New) (*Recommend)	-	ESP32-LyraTD-SYNA	ESP32-LyraTD-SYNA is one of Espressif's Audio Development Board based on ESP32 MCU and Synaptics DSP. It is an Acoustic Echo Cancelation (AEC) solution, supporting voice recognition and voice wake-up. It also supports connection to Amazon's AVS (Alexa Voice Service), Google's Dialogflow and Google's GVA (Google Voice Assistant).	16 MB	8 MB	Internal PCB on-board antenna	-20 °C ~ +65 °C	91×69	1	-	MP	ESP32-WROVER-E Datasheet



2.3 ESP32 Series of Development Boards

Product Name	Variants	MPN	Product Description	Flash Size	PSRAM Size	Antenna Type	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP32-LyraTD- MSC User Guide	-	ESP32- LyraTD-MSC	ESP32 audio development board, integrates ESP32-WROVER-B and DSP, noise reduction, echo cancellation, voice recognition, near-field and far-field voice wake-up supported	4 MB	8 MB	Internal PCB on-board antenna	-40 °C ~ +65 °C	90×90	1	-	MP	ESP32-WROVER-B Datasheet
ESP32-LyraT-Mini Getting Started	-	ESP32-LyraT-Mini	ESP32-LyraT-Mini is a lightweight audio development board based on ESP32-WROVER-B, which implements AEC, AGC, NS WWE (wake word engine) and other audio signal processing technologies.	8 MB	8 MB	Internal PCB on-board antenna	-20 °C ~ +65 °C	77×72	1	-	MP	ESP32-WROVER-B Datasheet
ESP32-Korvo Datasheet (*New) (*Recommend)	-	ESP32-Korvo	ESP32-based audio development board with microphone arrays, together with Espressif's speech recognition SDK ESP-Skainet, ESP32-Korvo is suitable for far-field speech recognition applications with low power consumption, such as smart displays, smart plugs, smart switches, etc.	16 MB	8 MB	Internal PCB on-board antenna	-20 °C ~ +70 °C	Main board: diameter 88.00 mm Sub board: diameter 88.00 mm	1	-	MP	ESP32-WROVER-E Datasheet



2.3 ESP32 Series of Development Boards

Product Name	Variants	MPN	Product Description	Flash Size	PSRAM Size	Antenna Type	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP-Prog Getting Started	-	ESP-Prog	Development and debugging tool with functions including automatic firmware downloading, serial communication, and JTAG online debugging	-	-	-	-20 °C ~ +65 °C	73.4×25.1	1	-	MP	ESP32-Sense Kit User Guide ESP32-MeshKit-Sense Hardware Design Guidelines
ESP32-MeshKit-Sense Hardware Design Guidelines	-	ESP32-MeshKit-Sense	A development board that embeds ESP32-WROOM-32D, peripherals such as temperature and humidity sensor, ambient light sensor, LCD screen connector, Micro USB port and ESP-Prog connector	4 MB	-	Internal PCB on-board antenna	-40 °C ~ +65 °C	75.0×41.0	1	-	MP	ESP32-WROOM-32D Datasheet ESP-Prog Getting Started ESP32-MeshKit-Light User Guide
ESP32-MeshKit-Light User Guide	-	ESP32-MeshKit-Light	Smart lights based on ESP-Mesh networking technology	4 MB	-	-	-20 °C ~ +40 °C	60×60×118	1	-	MP	ESP32-MeshKit-Sense Hardware Design Guidelines
ESP-EYE Getting Started (*Recommend)	-	ESP-EYE	A development board for image recognition and audio processing in AIoT applications	4 MB	8 MB	3D Antenna	0°C - 50°C	41.00 x 21.00 x 6.50	1	10	MP	ESP32-D0WD Datasheet



2.3 ESP32 Series of Development Boards

Product Name	Variants	MPN	Product Description	Flash Size	PSRAM Size	Antenna Type	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP32-LCDKit Hardware Design Guidelines (*New)	-	ESP32-LCDKit	An HMI development board based on ESP32-DevKitC (need to purchase if you didn't have one), integrated with such peripherals as SD-Card, DAC-Audio, can be connected to an external display.	-	-	-	-40 °C ~ +85 °C	73.4x25.1	1	-	MP	ESP32-DevKitC Getting Started Guide
ESP32-Korvo-DU1906 (*New)	-	ESP32-Korvo-DU1906	ESP32-Korvo-DU1906 is an Espressif audio development board with an ESP32-DU1906 module as its core. This board is designed not only to provide advanced end-to-end audio solutions with highly efficient integrated AI capabilities as well as a Cloud + End integrated device-level AIoT platform, significantly lowering the barrier to entry for IoT devices to AI capability.	8 MB	8 MB	Internal PCB on-board antenna	-40 °C ~ +85 °C	110 x 120	1	-	MP	ESP32-DU1906



2.3 ESP32 Series of Development Boards

Product Name	Variants	MPN	Product Description	Flash Size	PSRAM Size	Antenna Type	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP32-Ethernet-Kit User Guide	ESP32-Ethernet-Kit-VE	ESP32-Ethernet-Kit-VE	ESP32-Ethernet-Kit, ESP32-based development board produced by Espressif, consists of two development boards, the Ethernet board A and the PoE board B. The Ethernet board contains Bluetooth / Wi-Fi dual-mode ESP32-WROVER-E module and IP101GRI, a Single Port 10/100 Fast Ethernet Transceiver (PHY). The PoE board (B) provides power over Ethernet functionality. The A board can work independently, without the board B installed.	4 MB	8 MB	Internal PCB on-board antenna	0 °C ~ +70 °C	Board A: 72 × 98 Board B: 25 × 69	1	-	MP	ESP32-WROVER-E Datasheet



2.4. ESP32 Series of Development Kits

Product Name	Variants	MPN	Product Description	Flash Size	PSRAM Size	Antenna Type	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP32-Sense Kit User Guide (*New)	-	ESP32-Sense Kit	Touch sensor development kit, with ESP-Prog by default	4 MB	-	Internal PCB on-board antenna	-40 °C ~ +85 °C	-	1	-	MP	ESP32-WROOM-32 Datasheet ESP32-WROOM-32D Datasheet ESP-Prog Getting Started
ESP32-MeshKit	-	-	Smart-light development kit, containing 1×ESP32-MeshKit-Sense, 5×ESP32-MeshKit-Light, 1×ESP-Prog	-	-	-	-	-	1	-	MP	ESP32-MeshKit-Sense Hardware Design Guidelines ESP32-MeshKit-Light User Guide ESP-Prog Getting Started



3. ESP8266 Series

3.1. ESP8266 Series of SoCs

Product Name	Variants	MPN	Product Description	Flash Size	PSRAM Size	Antenna Type	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP8266EX Datasheet	-	-	SMD IC ESP8266EX, QFN32-pin, 5*5 mm	NA	-	NA	-40 °C ~ +125 °C	5×5	5,000 & 1,000	1,000	MP	-
ESP8285 Datasheet	ESP8285N08	ESP8285N08	SMD IC ESP8285N08, QFN32-pin, 5*5 mm, 1 MB flash inside, -40 °C ~ +85 °C	1 MB	-	NA	-40 °C ~ +85 °C	5×5	5,000 & 1,000	1,000	MP	-
	ESP8285H08	ESP8285H08	SMD IC ESP8285H08, QFN32-pin, 5*5 mm, 1 MB flash inside, -40 °C ~ +105 °C	1 MB	-	NA	-40 °C ~ +105 °C	5×5	5,000 & 1,000	5,000	MP	-
	ESP8285H16	ESP8285H16	SMD IC ESP8285H16, QFN32-pin, 5*5 mm, 2 MB flash inside, -40 °C ~ +105 °C	2 MB	-	NA	-40 °C ~ +105 °C	5×5	5,000 & 1,000	5,000	Sample	-



3.2. ESP8266 Series of Modules

Product Name	Variants	MPN	Product Description	Flash Size	PSRAM Size	Antenna Type	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP-WROOM-02D Datasheet (*Recommend)	ESP-WROOM-02D (*Default)	ESP-WROOM-02D(M1102H1600PH3Q0)	SMD Module ESP-WROOM-02D, ESP8266EX, 2 MB SPI flash, UART Mode	2 MB	-	Internal PCB on-board antenna	-40 °C ~ +85 °C	18.00×20.00×3.20	650	650	MP	ESP8266EX Datasheet
	ESP-WROOM-02D (4 MB)	ESP-WROOM-02D(M1102H3200PH3Q0)	SMD Module ESP-WROOM-02D, ESP8266EX, 4 MB SPI flash, UART Mode	4 MB	-	Internal PCB on-board antenna	-40 °C ~ +85 °C	18.00×20.00×3.20	650	650	MP	ESP8266-DevKitC Getting Started
	ESP-WROOM-02D (High Temperature) (*New)	ESP-WROOM-02D(M1102H1600PS3Q0)	SMD Module ESP-WROOM-02D, ESP8266EX, 2 MB SPI flash, UART Mode, -40 °C ~ +105 °C	2 MB	-	Internal PCB on-board antenna	-40 °C ~ +105 °C	18.00×20.00×3.20	650	650	MP	ESP8266EX Datasheet
ESP-WROOM-02U Datasheet (*Recommend)	ESP-WROOM-02U (*Default)	ESP-WROOM-02U(M1102H1600UH3Q0)	SMD Module ESP-WROOM-02U, ESP8266EX, 2 MB SPI flash, UART Mode, external IPEX antenna connector	2 MB	-	External IPEX antenna	-40 °C ~ +85 °C	18.00×14.30×3.20	650	650	MP	ESP8266EX Datasheet
	ESP-WROOM-02U (4 MB)	ESP-WROOM-02U(M1102H3200UH3Q0)	SMD Module ESP-WROOM-02U, ESP8266EX, 4 MB SPI flash, UART Mode, external IPEX antenna connector	4 MB	-	External IPEX antenna	-40 °C ~ +85 °C	18.00×14.30×3.20	650	650	MP	ESP8266-DevKitC Getting Started
	ESP-WROOM-02U (High Temperature) (*New)	ESP-WROOM-02U(M1102H1600US3Q0)	SMD Module ESP-WROOM-02U, ESP8266EX, 2 MB SPI flash, UART Mode, external IPEX antenna connector, -40 °C ~ +105 °C	2 MB	-	External IPEX antenna	-40 °C ~ +105 °C	18.00×14.30×3.20	650	650	MP	ESP8266EX Datasheet



3.2 ESP8266 Series of Modules

Product Name	Variants	MPN	Product Description	Flash Size	PSRAM Size	Antenna Type	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP-WROOM-02 Datasheet (*NRND)	-	-	SMD Module, ESP8266EX, 2 MB SPI flash, UART Mode. Note, this module is not recommended for new designs. The recommended replacement for it is ESP-WROOM-02D .	2 MB	-	Internal PCB on-board antenna	- 40 °C ~ +85 °C	18.00×20.00 ×2.80	650	650	MP	ESP8266EX Datasheet
ESP-WROOM-S2 Datasheet (*NRND)	-	-	SMD Module, ESP8266EX, 2 MB SPI flash, SPI Mode. Note, this module is not recommended for new designs. For recommended replacement, please contact our sales person directly.	2 MB	-	Internal PCB on-board antenna	-40 °C ~ +85 °C	16.00×23.00 ×2.80	650	650	MP	ESP8266EX Datasheet



3.3. ESP8266 Series of Development Boards

Product Name	Variants	MPN	Product Description	Flash Size	PSRAM Size	Antenna Type	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP8266-DevKitC Getting Started (*Recommend)	ESP8266-DevKitC-02D-F	ESP8266-DevKitC-02D-F	ESP8266 General Development Kit with ESP-WROOM-02D embedded and female header connector on board	2 MB	-	Internal PCB on-board antenna	-40 °C ~ +85 °C	44.9×25.4	1	-	MP	ESP-WROOM-02D Datasheet
	ESP8266-DevKitC-02U-F	ESP8266-DevKitC-02U-F	ESP8266 General Development Kit, embeds ESP-WROOM-02U and female header connector on the board	2 MB	-	External IPEX antenna	-40 °C ~ +85 °C	44.9×25.4	1	-	MP	ESP-WROOM-02U Datasheet
ESP-Launcher Hardware Design Guidelines	-	ESP-LAUNCHER	Development board for ESP8266EX, with external SMA antenna	4 MB	-	External SMA antenna	-25 °C ~ +85 °C	46×78.5	1	-	MP	ESP8266EX Datasheet



4. Production Testing Equipment

4.1. Production Testing Boards

Product Name	Variants	MPN	Product Description	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP-FactoryTB1	-	ESP-FactoryTB1	Production testing board with two high-speed serial ports	-40 °C ~ +65 °C	66.5×46.0	1	-	MP	All Espressif products



4.2. Signal Boards

Product Name	Variants	MPN	Product Description	Flash Size	Antenna Type	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP-BAT32	-	ESP-BAT32	RF testing board for ESP32 products	4 MB	External SMA antenna	-25 °C ~ +75 °C	100×60×25	1	-	MP	ESP32 products
ESP-BAT8	-	ESP-BAT8	RF testing board for ESP8266 products	4 MB	External SMA antenna	-25 °C ~ +75 °C	100×60×25	1	-	MP	ESP8266 products



4.3. Flashing Boards

Product Name	Variants	MPN	Product Description	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP32-DevKitS (*New)	ESP32-DevKitS	ESP32-DevKitS	ESP32-DevKitS is a flashing board used to flash official ESP32 WROOM and SOLO modules.	-20 °C ~ +65 °C	48.3x28.9	1	-	MP	ESP32 WROOM and SOLO modules
	ESP32-DevKitS-R	ESP32-DevKitS-R	ESP32-DevKitS-R is a flashing board used to flash official ESP32 WROVER modules.	-20 °C ~ +65 °C	48.3x28.9	1	-	MP	ESP32 WROVER modules
ESP8266-DevKitS (*New)	ESP8266-DevKitS	ESP8266-DevKitS	ESP8266-DevKitS is a flashing board used to flash official ESP8266 WROOM modules.	-20 °C ~ +65 °C	38.9x28.9	1	-	MP	ESP8266 WROOM modules



4.4. Test Fixtures

Product Name	Variants	MPN	Product Description	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP32-WROOM-V1	ESP32-WROOM-V1T1 (1 v 1)	ESP32-WROOM-V1T1	This test fixture is a set of production equipment used during the production stage. ESP32-WROOM-V1 can be used to download firmware to modules including ESP32-WROOM-32E / ESP32-WROOM-32D / ESP32-WROOM-32/ ESP32-SOLO-1 / ESP32-WROOM-32DC / ESP32-SOLO-1C and can be used with the ESP-BAT32 signal board for production testing. One piece of a module can be tested with this fixture at a time.	-20 °C ~ +65 °C	150×150×295	1	1	MP	-
	ESP32-WROOM-V1T4 (1 v 4)	ESP32-WROOM-V1T4	This test fixture is a set of production equipment used during the production stage. ESP32-WROOM-V1 can be used to download firmware to modules including ESP32-WROOM-32E/ESP32-WROOM-32D/ESP32-WROOM-32/ ESP32-SOLO-1/ESP32-WROOM-32DC/ ESP32-SOLO-1C and can be used with the ESP-BAT32 signal board for production testing. Four pieces of modules can be tested with this fixture at a time.	-20 °C ~ +65 °C	150×150×295	1	1	MP	-



Product Name	Variants	MPN	Product Description	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP32-WROOM-V3	ESP32-WROOM-V3T4 (1 v 4)	ESP32-WROOM-V3T4	This test fixture is a set of production equipment used during the production stage. ESP32-WROOM-V3 can be used to download firmware to modules including ESP32-WROOM-32UE/ESP32-WROOM-32U and can be used with the ESP-BAT32 signal board for production testing. Four pieces of modules can be tested with this fixture at a time.	-20 °C ~ +65 °C	150×150×295	1	1	MP	-
ESP32-WROVER-V1	ESP32-WROVER-V1T1 (1 v 1)	ESP32-WROVER-V1T1	This test fixture is a set of production equipment used during the production stage. ESP32-WROVER-V1 can be used to download firmware to modules including ESP32-WROVER-E (PCB) / ESP32-WROVER-B (PCB)/ ESP32-WROVER (PCB), and can be used with the ESP-BAT32 signal board for production testing. Four pieces of modules can be tested with this fixture at a time.	-20 °C ~ +65 °C	150×150×295	1	1	MP	-
	ESP32-WROVER-V1T4 (1 v 4)	ESP32-WROVER-V1T4	This test fixture is a set of production equipment used during the production stage. ESP32-WROVER-V2 can be used to download firmware to modules including ESP32-WROVER-IE / ESP32-WROVER-B (IPEX) , and can be used with the ESP-BAT32 signal board for production testing. Four pieces of modules can be tested with this fixture at a time.	-20 °C ~ +65 °C	150×150×295	1	1	MP	-



Product Name	Variants	MPN	Product Description	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP32-WROVER-V2	ESP32-WROVER-V2T4 (1 v 4)	ESP32-WROVER-V2T4	This test fixture is a set of production equipment used during the production stage. ESP32-WROVER-V2 can be used to download firmware to modules including ESP32-WROVER-IE / ESP32-WROVER-B (IPEX) , and can be used with the ESP-BAT32 signal board for production testing. Four pieces of modules can be tested with this fixture at a time.	-20 °C ~ +65 °C	150×150×295	1	1	MP	-
ESP-WROOM-V1	ESP-WROOM-V1T1 (1 v 1)	ESP-WROOM-V1T1	This test fixture is a set of production equipment used during the production stage. ESP-WROOM-V1 can be used to download firmware to modules including ESP-WROOM-02 / ESP-WROOM-02D / ESP-WROOM-02DC, and can be used with the ESP-BAT8 signal board for production testing. One piece of a module can be tested with this fixture at a time.	-20 °C ~ +65 °C	150×150×295	1	1	MP	-
	ESP-WROOM-V1T4 (1 v 4)	ESP-WROOM-V1T4	This test fixture is a set of production equipment used during the production stage. ESP-WROOM-V1 can be used to download firmware to modules including ESP-WROOM-02 / ESP-WROOM-02D / ESP-WROOM-02DC, and can be used with the ESP-BAT8 signal board for production testing. Four pieces of modules can be tested with this fixture at a time.	-20 °C ~ +65 °C	150×150×295	1	1	MP	-



Product Name	Variants	MPN	Product Description	Operating Temperature	Dimensions (mm)	SPQ	MOQ	Production Status	Related Product
ESP-WROOM-V3	ESP-WROOM-V3T4 (1 v 4)	ESP-WROOM-V3T4	This test fixture is a set of production equipment used during the production stage. ESP-WROOM-V3 can be used to download firmware to ESP-WROOM-02U module, and can be used with the ESP-BAT8 signal board for production testing. Four pieces of modules can be tested with this fixture at a time.	-20 °C ~ +65 °C	150×150×295	1	1	MP	-



Release Notes

Date	Version	Release notes
2017.06	V1.0	First release.
2017.08	V1.1	Updated version.
2017.08	V1.2	• Added ESP32-PICO-D4; • Deleted ESP8689; • Corrected typos.
2017.09	V1.3	• Updated SPQ and MOQ for ESP32-PICO-D4; • Updated the marketing status of ESP32-D0WD and ESP32-D2WD to MP; • Added ESP-WROOM-02D module.
2017.11	V1.4	• Added ESP-WROOM-32D and ESP32-WROOM-32U modules; • Added ESP32-PICO-KIT; • Added ESP-WROOM-02D and ESP-WROOM-02U modules; • Updated SPQ and MOQ for several modules.
2017.12	V1.5	Corrected some typos.
2018.03	V1.6	Updated the product names of ESP-WROOM-32 and ESP-WROOM-32D.
2018.06	V1.7	• Updated the marketing status of ESP32-S0WD, ESP32-WROOM-32D, ESP32-WROOM-32U, ESP-WROOM-02D, and ESP-WROOM-02U to MP; • Updated the module information of ESP32-DevKitC; • Updated the information of PSRAM integrated on ESP32-WROVER and ESP32-WROVER-I; • Added ESP32-SOLO-1, ESP32-LyraT, ESP32-LyraTD-MSC, ESP32-Sense Kit, and ESP-Prog.
2018.06	V1.8	• Added the link to ESP32-SOLO-1 Datasheet; • Added ESP32-WROVER-B and ESP32-WROVER-IB.



Date	Version	Release notes
2018.07	V1.9	- Updated the marketing status of ESP32-PICO-D4, ESP32-LyraT, ESP32-LyraTD-MSC, ESP32-Sense Kit, ESP-Prog, ESP32-WROVER-B, and ESP32-WROVER-IB to MP; - Added ESP32-MeshKit-Sense and ESP32-MeshKit-Light. - Added the column “Custom flash size” for modules available for customized order.
2018.09	V2.0	- Added labels *New, *Recommend and *Default; - Updated document cover; - Updated information of modules' dimensions; - Updated the description of a number of products.
2018.11	V2.1	- Added variants of ESP32-WROOM-32D and ESP32-WROOM-32U with high temperature range (–40 °C ~ +105 °C); - Updated the operating temperature range of ESP32-WROVER from –40 °C ~ 65 °C to –40 °C ~ 85 °C; - Removed all ESP32-DevKitC variants with female headers; - Updated the description of ESP32-MeshKit.
2018.12	V2.2	- Removed information about ESP8089; - Added new products and variants: - ESP-WROOM-02DC - ESP-WROOM-02UC - ESP-WROOM-02D (High Temperature) - ESP-WROOM-02U (High Temperature)
2019.01	V2.3	Added the development board for image recognition and audio processing ESP-EYE.
2019.02	V2.4	Removed information about ESP-WROOM-02DC and ESP-WROOM-02UC.
2019.05	V2.5	Added a new product ESP32-LCDKit
2019.07	V2.6	- Corrected a typo in the product description of ESP32-WROOM-32; - Added a new variant for ESP32-SOLO-1; - Updated the description of ESP32-SOLO-1.



Date	Version	Release notes
2019.08	V2.7	• Added a new product ESP32-LyraTD-DSPG; • Updated SPQ and MOQ information of the following products: - ESP32-D0WD - ESP32-D0WDQ6 - ESP32-D2WD - ESP32-S0WD - ESP32-PICO-D4 - ESP8266EX • Updated information of ESP8285.
2019.08	V2.8	• Updated information of ESP32 series of chips; • Added MPNs for ESP32-WROOM-32D and ESP32-WROOM-32U; • Move the location of ESP32-LyraTD-DSPG in the table, so it is closer to other ESP32-LyraT boards.
2019.09	V2.9	Added a new product ESP32-LyraT-Mini.
2019.11	V3.0	Added a new product ESP32-LyraTD-SYNA.
2020.01	V3.1	• Added new product variants ESP32-D0WD-V3 and ESP32-D0WDQ6-V3. • Added Submit Documentation Feedback link in the footer.



Date	Version	Release notes
2020.01	V3.2	- Added the following products: - ESP32-U4WDH - ESP32-WROOM-32E (*Default) - ESP32-WROVER-E series - ESP32-WROVER-IE series - ESP32-PICO-V3 - ESP32-S2 - ESP32-S2-WROOM - ESP32-S2-WROOM-I - ESP32-S2-WROVER - ESP32-S2-WROVER-I - ESP32-S2-Saola series - ESP32-DevKitS series - ESP8266-DevKitS - ESP32-WROOM-32SE - Modified the information for the following products: “Related Product” and tags for ESP32-LyraTD-SYNA - Tags for ESP32-WROOM-32D, ESP32-WROOM-32U and ESP32-WROVER-B



Date	Version	Release notes
2020.03	V3.3	- Added the following products: - ESP32-WROOM-32E (8 MB) - ESP32-WROOM-32E (16 MB) - ESP32-WROOM-32UE - Modified the information for the following products: - Added MPN information for ESP32-WROOM-32, ESP-WROOM-02D (*Default), ESP-WROOM-02D (4 MB), ESP-WROOM-02U (*Default) and ESP-WROOM-02U (4 MB); - ESP32-S2-Saola renamed to ESP32-S2-Saola-1.
2020.03	V3.4	- Modified the MPN and operating temperatures for the following products: - ESP32-WROVER-E - ESP32-WROVER-IE - ESP32-WROVER-B - Added a Table of Contents - Updated “Submit Documentation Feedback” link
2020.03	V3.5	- Added the following product: - ESP32-Vaquita-DSPG - Modified the information for the following products: - The production status of ESP32-U4WDH; - The dimensional tolerance of ESP32-S2-WROOM, ESP32-S2-WROOM-I, ESP32-S2-WROVER and ESP32-S2-WROVER-I.



Date	Version	Release notes
2020.04	V3.6	• Added the following product: - ESP32-Korvo - ESP32-PICO-V3-ZERO • Added the following variants in ESP32-DevKitC: - ESP32-DevKitC-32E - ESP32-DevKitC-32UE - ESP32-DevKitC-VE - ESP32-DevKitC-VIE • Modified the information for the following products: - Provided more detailed information in the product description of ESP32-PICO-V3 and ESP32-PICO-D4.



Date	Version	Release notes
2020.05	V3.7	• Moved ESP32-S2 Series to the beginning of the document; • Added a new label NRND; • Added the following products or variants: - ESP32-Korvo-DU1906 - ESP32-WROOM-V1 and its variants - ESP32-WROOM-V3 and its variants - ESP32-WROVER-V1 and its variants - ESP32-WROVER-V2 - ESP-WROOM-V1 and its variants - ESP-WROOM-V3 • Modified the product information of the following products: - Modified the production status ▸ ESP32-PICO-V3-ZERO ▸ ESP32-WROVER-E ▸ ESP32-WROVER-IE ▸ ESP32-WROOM-32E ▸ ESP32-WROOM-32UE - Added a NRND label ▸ ESP32-WROOM-32 ▸ ESP-WROOM-S2 ▸ ESP-WROOM-02 ▸ ESP32-WROVER - Modified the Related Product information ▸ ESP32-Korvo



Date	Version	Release notes
2020.05	V3.8	• Added the following products: - ESP32-S2-Kaluga-1 - ESP32-S2F • Removed the following products: - ESP32-PICO-V3-ZERO • Modified the production status of the following products: - ESP32-DevKitC • Added reference documents for the following products: - ESP32-LyraTD-SYNA - ESP32-S2-WROOM - ESP32-S2-WROOM-I - ESP32-S2-WROVER - ESP32-S2-WROVER-I - ESP32-S2-Saola-1 - ESP32-WROOM-32E - ESP32-WROOM-32UE - ESP32-WROVER-E - ESP32-WROVER-IE - ESP32-Vaquita-DSPG - ESP32-Korvo
2020.06	V3.9	• Added the following product: - ESP32-Ethernet-Kit • Modified the production status of the following products: - ESP32-S2-WROOM - ESP32-S2-WROOM-I



Date	Version	Release notes
2020.07	V4.0	• Added the following variant: - ESP32-S2FH32 • Modified the production status of the following products or variants: - ESP32-S2-WROVER - ESP32-S2-WROVER-I - ESP32-S2-Saola-1R - ESP32-S2-Saola-1RI - ESP32-S2-Saola-1M - ESP32-S2-Saola-1MI • Modified the product description of the following products or variants: - ESP32-WROVER - ESP32-WROOM-32 - ESP-WROOM-02 - ESP-WROOM-S2
2020.08	V4.1	• Modified the production status of the following product - ESP32-Korvo-DU1906 • Modified the product description of the following products or variants: - ESP32-WROVER-B
2020.08	V4.2	• Added the following products or variants: - ESP32-PICO-V3-02 - ESP32-S2-WROOM (High Temp) - ESP32-S2-WROOM-I (High Temp)
2020.08	V4.3	Updated the variant names of the following product: • ESP32-S2F



Date	Version	Release notes
2020.09	V4.4	• Updated the variant names of the following product: - ESP32-S2F • Added the following products or variants: - ESP32- WROOM-32E - ESP32- WROOM-32UE - ESP32-S2-MINI-1 - ESP32-S2-MINI-1U



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