CDI-W69ESP32-00
DATASHEET
WiFi 4 + BT4.2 Module

Software：

Customer	Approve	Date

Design	Check	Approve	Version	Date
			V1.0	2024.09.05

Reversion History：

Version	Date	Modification
1.0	2024.09.05	First release

1. Overview

CDI-W69ESP32-00 is a single chip solution integrating 2.4 GHz Wi-Fi and Bluetooth dual mode, using TSMC (TSMC) 40 nm process, with ultra high RF performance, stability, versatility and reliability, and ultra low power consumption, meet different power consumption requirements, suitable for various application scenarios, for advanced Internet Internet of things (IoT) applications.

Using advanced design technology and ultra-low power process technology, CDI-W69ESP32-00 provides high integration, efficient security, and minimal power consumption for a wide range of advanced IoT applications.

CDI-W69ESP32-00 has a scalable, adaptive feature. Two CPU nuclei can be controlled individually. The CPU clock frequency is adjusted from 80 MHz to 240 MHz. Users can turn off the power of the CPU and use a low-power coprocessor to monitor the state change of the erals or whether some analog volume exceeds the threshold. ESP32 Also integrates rich peripherals, including capacitive touch sensor, SD card interface, Ethernet interface, high-speed SPI, UART, I2S and I2C, etc.

The CDI-W69ESP32-00 module integrates traditional Bluetooth, low-power Bluetooth and Wi-Fi, with a wide range of uses: Wi-Fi, supports a wide range of communication connections and direct

connection to the Internet through a router; Bluetooth allows users to connect to their phones or broadcast BLE Beacon for signal detection. ESP32 The chip has a sleep current of less than 5 μA, making it suitable for battery-powered wearable electronic devices. The module supports a data transmission rate of up to 150 Mbps, and an antenna output power of 20 dBm, enabling the maximum range of wireless communication. As a result, this module has industry-leading technical specifications and excellent performance in high integration, wireless transmission distance, power consumption and network connectivity.

2. Features

• IEEE 802.11b/g/n 1x1 compliant

• 802.11n (2.4 GHz), with speeds of up to 150 Mbps

• Wireless multimedia (WMM)

• Frame Aggregation (TX / RXA-MPDU, RXA-MSDU)

• Immediately block confirmation (Immediate Block ACK)

• Recombination (Defragmentation)

• Beacon Automatic monitoring (hardware TSF)

• And 4 virtual Wi-Fi interfaces

• Support supports structured network (Infrastructure BSS) Station / SoftAP / confounding mode Note that the SoftAP channel changes simultaneously when ESP32 scans in Station mode

• Bluetooth v4.2 full standard, including traditional Bluetooth (BR / EDR) and Low-power Bluetooth (Bluetooth LE)

• Standard Class-1, Class-2, and Class-3 are supported without an external power amplifier

• Standard HCI based on the SDIO / SPI / UART interface

• High-speed UART HCI, up to 4 Mbps

• Synchronization / extended connection oriented (SCO / eSCO)

• The CVSD and SBC audio codec algorithms

• Bluetooth Microto (Piconet) and Scatter (Scatternet)

• Multi-device connection with traditional Bluetooth and low-power Bluetooth support

• Supports simultaneous broadcasting and scanning

• The Xtensa® 32-bit LX6 single / dual-core processor，Single core, main frequency 240 MHz: 504.85 CoreMark; 2.10 CoreMark / MHz，Dual-core, main frequency 240 MHz: 994.26 CoreMark; 4.14 CoreMark / MHz

• Support for SD card, UART, SPI, SDIO, I2C, LED PWM, motor pwm, i2s, ir, pulse counter, gbio, capacitive touch sensor, adc, dac, twai ® (compatible with ISO 11898-1, i. e., specification 2.0).

3. Block Diagram
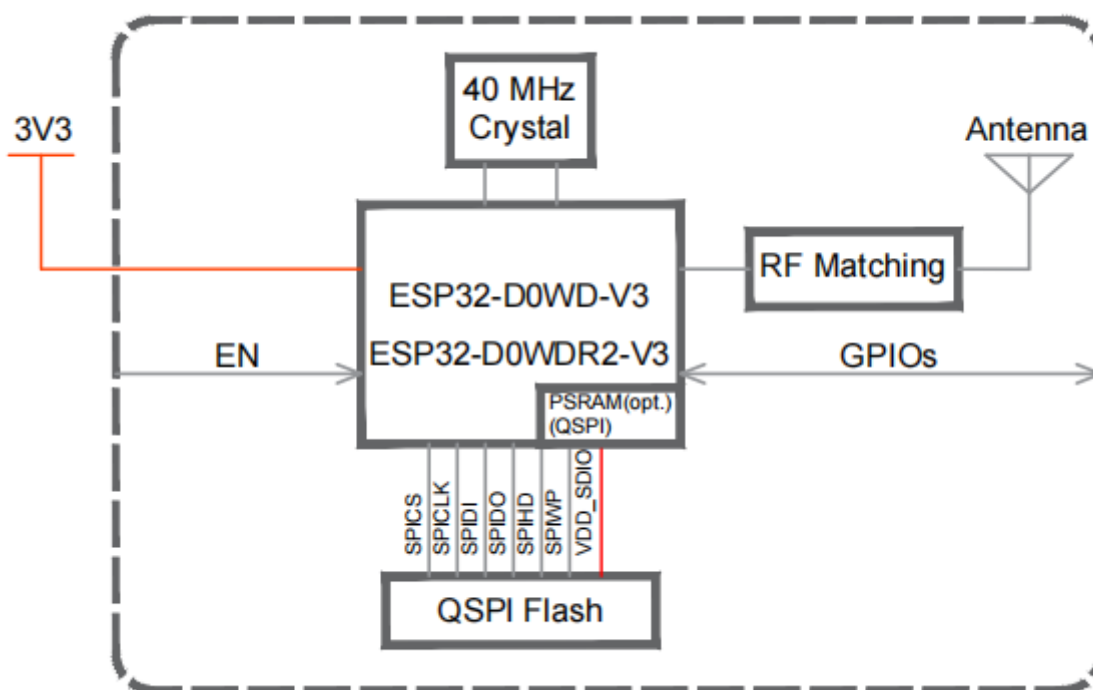
4. General Specification

Model	CDI-W69ESP32-00
Product Name	WLAN 802.11b/g/n UART 1T1R + BT 4.2 module
Major Chipset	ESP32-D0WD-V3
Standard	802.11 b/g/n
WiFi Interface	UART、SPI、SDIO、I2C 、I2S 、PWM
Power Supply Voltage	DC 3.0~3.6V
Operating Temperature	-20° C ~ 70° C
Storage Temperature	-30° C ~ 85°C
Humidity	5% to 90% maximum
ESD Protection	±2KV
Dimension	20.3x15.8x3.5mm　(LxWxH) ±0.2mm

5. RF Specification

A. 2.4GHz RF Specification

Feature	Description	
WLAN Standard	IEEE 802.11b/g/n WiFi compliant	
Frequency Range	2.412 GHz ~ 2.462 GHz (2.4 GHz ISM Band)	
Number of Channels	2.4GHz：Ch1~ Ch11	
Modulation	802.11b : DQPSK, DBPSK, CCK 802.11 g/n : OFDM /64-QAM,16-QAM, QPSK, BPSK	
Output Power	802.11b / 1Mbps : 17dBm ± 2 dB @ EVM ≤ -10dB 802.11b /11Mbps : 17dBm ± 2 dB @ EVM ≤ -15dB	
	802.11g / 6Mbps : 15dBm ± 2 dB @ EVM ≤ -5dB 802.11g /54Mbps : 15 dBm ± 2 dB @ EVM ≤ -28dB	
	802.11n /MCS0 : 15 dBm ± 2 dB @ EVM ≤ -5dB 802.11n /MCS7 : 14 dBm ± 2 dB @ EVM ≤ -30dB	
Receive Sensitivity (11b,20MHz)	- 1Mbps	PER @ -98 dBm, typical
	- 11Mbps	PER @ -88 dBm, typical
Receive Sensitivity (11g,20MHz)	- 6Mbps	PER @ -93 dBm, typical
	- 54Mbps	PER @ -75 dBm, typical
Receive Sensitivity (11n,20MHz)	- MCS=0	PER @ -93 dBm, typical
	- MCS=7	PER @ -73 dBm, typical
Receive Sensitivity (11n,40MHz)	- MCS=0	PER @ -90 dBm, typical
	- MCS=7	PER @ -70 dBm, typical

B. Bluetooth Specification

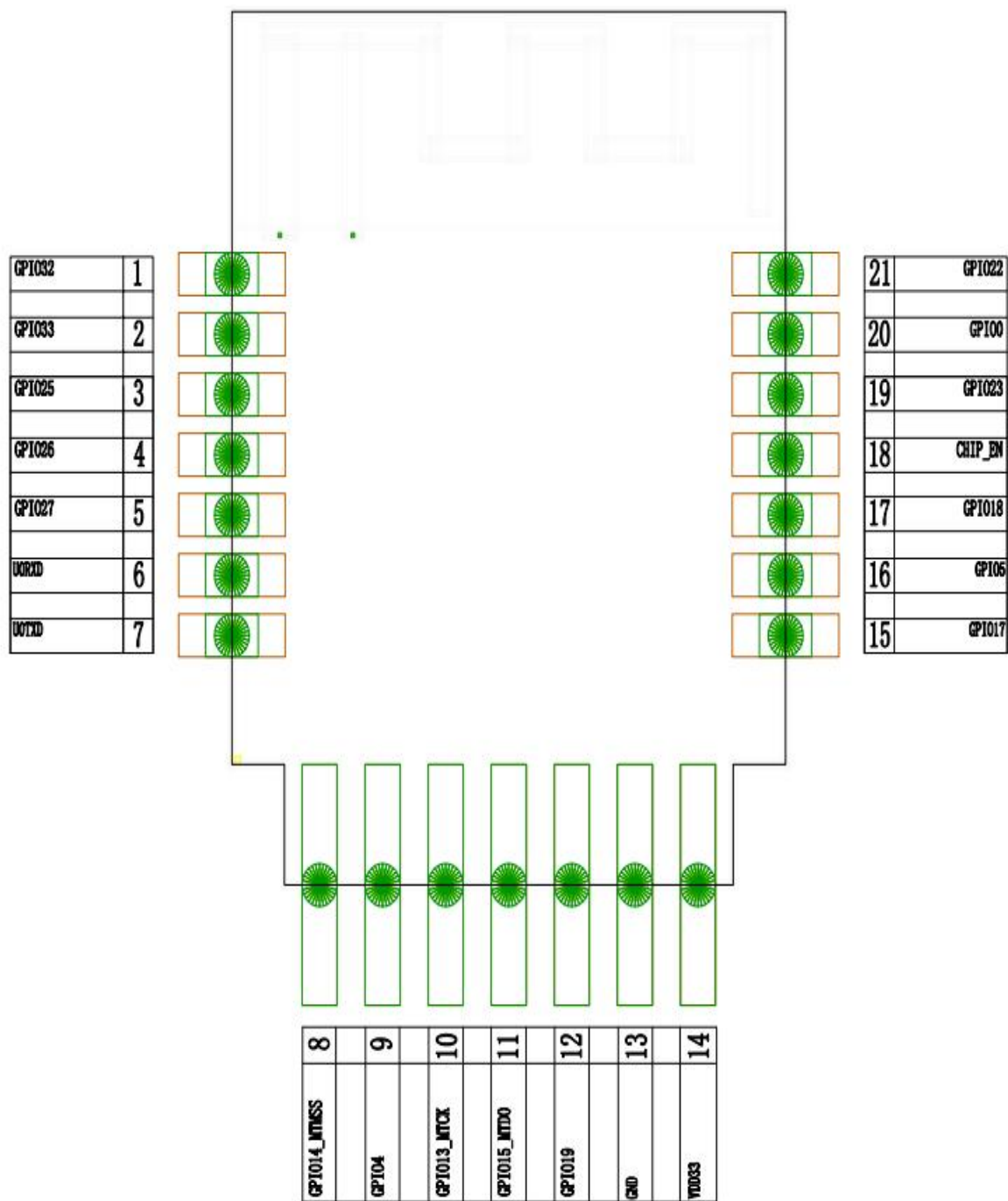|	
Wireless Standard	Bluetooth® V4.2 specification
Frequency Band	2.402~2.480 GHz
RF TX Output Power	-6~6dBm
RX Sensitivity	-90dBm (typical)

6. PIN Description

(TOP VIEW)   **(BOTTOM VIEW)**

Pin	Left		Pin	Right
1	GPIO32		21	GPIO22
2	GPIO33		20	GPIO0
3	GPIO25		19	GPIO23
4	GPIO26		18	CHIP_EN
5	GPIO27		17	GPIO18
6	U0RXD		16	GPIO5
7	U0TXD		15	GPIO17

8	GPIO14_JTMS
9	GPIO4
10	GPIO13_JTCK
11	GPIO15_JTDO
12	GPIO19
13	GND
14	VDD33
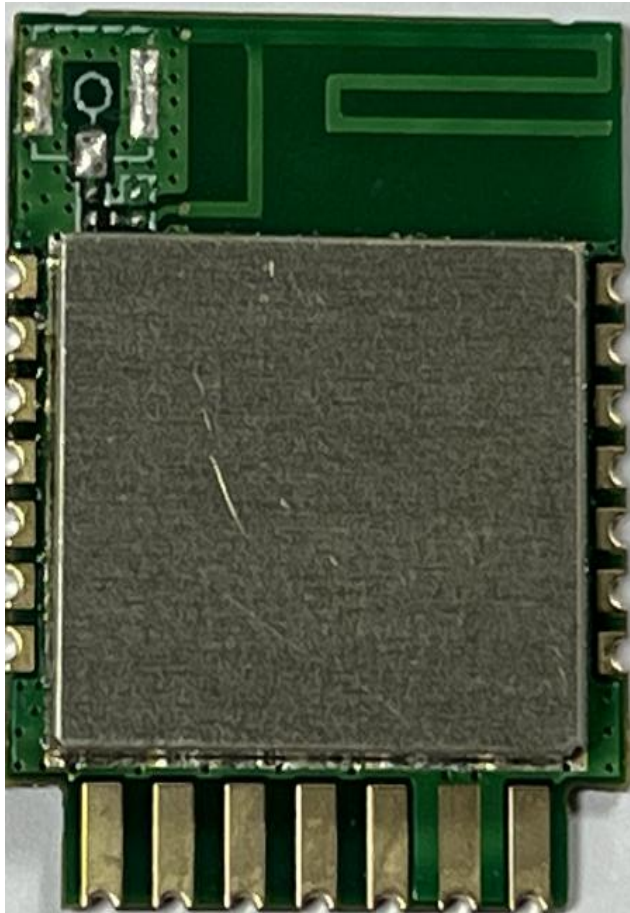
PIN NO.	NAME	TYPE	FUNCTION
1	GPIO32	I/O	GPIO32, XTAL_32K_P, ADC1_CH4, TOUCH9, RTC_GPIO9
2	GPIO33	I/O	GPIO33, XTAL_32K_N, ADC1_CH5, TOUCH8, RTC_GPIO8
3	GPIO25	I/O	GPIO25, DAC_1, ADC2_CH8, RTC_GPIO6, EMAC_RXD0
4	GPIO26	I/O	GPIO26, DAC_2, ADC2_CH9, RTC_GPIO7, EMAC_RXD1
5	GPIO27	I/O	GPIO27, ADC2_CH7, TOUCH7, RTC_GPIO17, EMAC_RX_DV
6	U0RXD	I/O	GPIO3, U0RXD, CLK_OUT2
7	U0TXD	I/O	GPIO1, U0TXD, CLK_OUT3, EMAC_RXD2
8	GPIO14_MTMS	I/O	GPIO14, ADC2_CH6, TOUCH6, RTC_GPIO16, MTMS, HSPICLK, HS2_CLK, SD_CLK, EMAC_TXD2
9	GPIO4	I/O	GPIO4, ADC2_CH0, TOUCH0, RTC_GPIO10, HSPIHD, HS2_DATA1, SD_DATA1, EMAC_TX_ER
10	GPIO13_MTCK	I/O	GPIO13, ADC2_CH4, TOUCH4, RTC_GPIO14, MTCK, HSPID, HS2_DATA3, SD_DATA3, EMAC_RX_ER
11	GPIO15_MTDO	I/O	GPIO15, ADC2_CH3, TOUCH3, MTDO, HSPICS0, RTC_GPIO13, HS2_CMD, SD_CMD, EMAC_RXD3
12	GPIO19	I/O	GPIO19, VSPIQ, U0CTS, EMAC_TXD0
13	GND	Power ground	Ground
14	VDD33	Power VBAT	power supply
15	GPIO17	I/O	GPIO17, HS1_DATA5, U2TXD, EMAC_CLK_OUT_180
16	GPIO5	I/O	GPIO5, VSPICS0, HS1_DATA6, EMAC_RX_CLK
17	GPIO18	I/O	GPIO18, VSPICLK, HS1_DATA7
18	CHIP_EN	I	High level: chip enabled; low level: chip off; note: not to let EN pin empty.

19	GPIO23		GPIO23, VSPID, HS1_STROBE
20	GPIO0		GPIO0, ADC2_CH1, TOUCH1, RTC_GPIO11, CLK_OUT1, EMAC_TX_CLK
21	GPIO22		GPIO22, VSPIWP, UORTS, EMAC_TXD1

7. Physical Dimensions
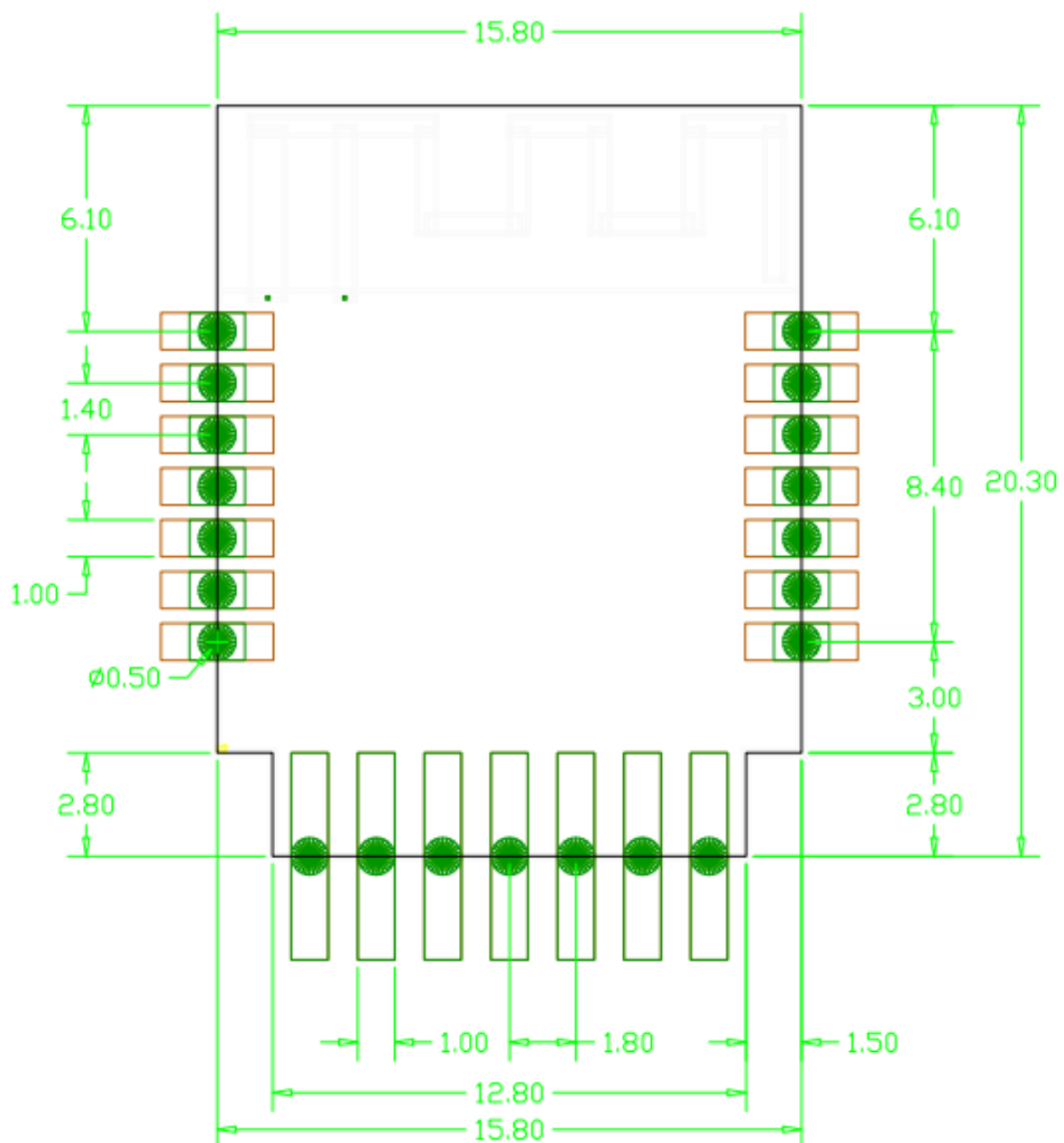
8. Electrical specification

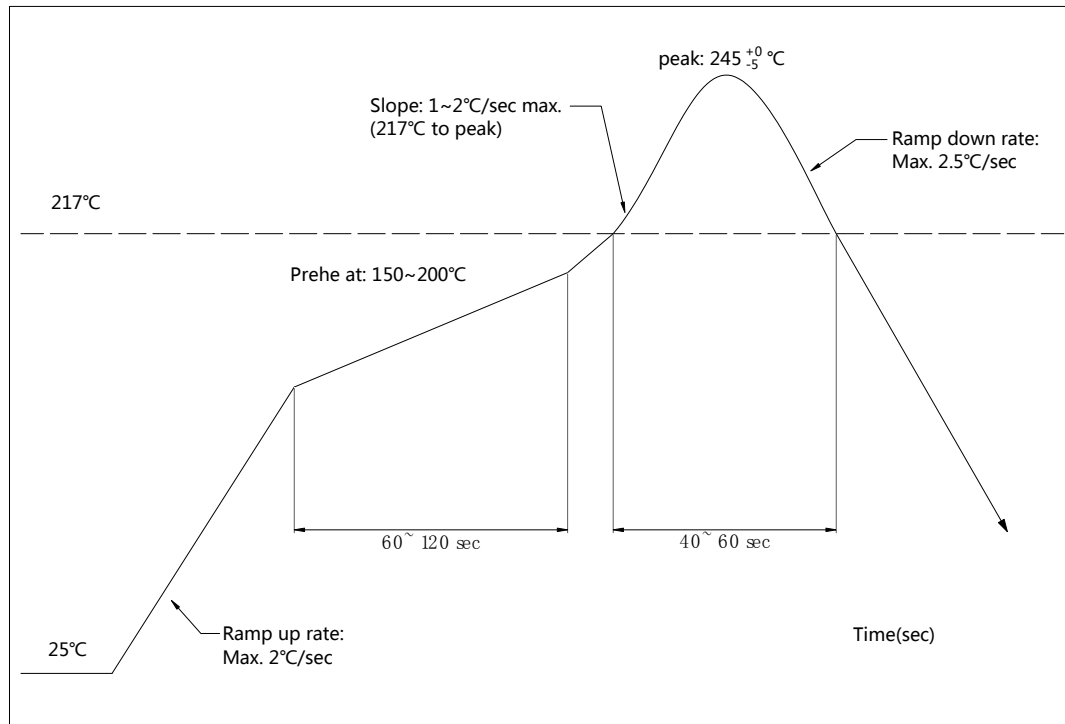## 8.1 Power consumption characteristics:

work pattern		describe	average value (mA)	peak value (mA)
Active (RF work)	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

9. Recommended Reflow Profile

Referred IPC/JEDEC standard.
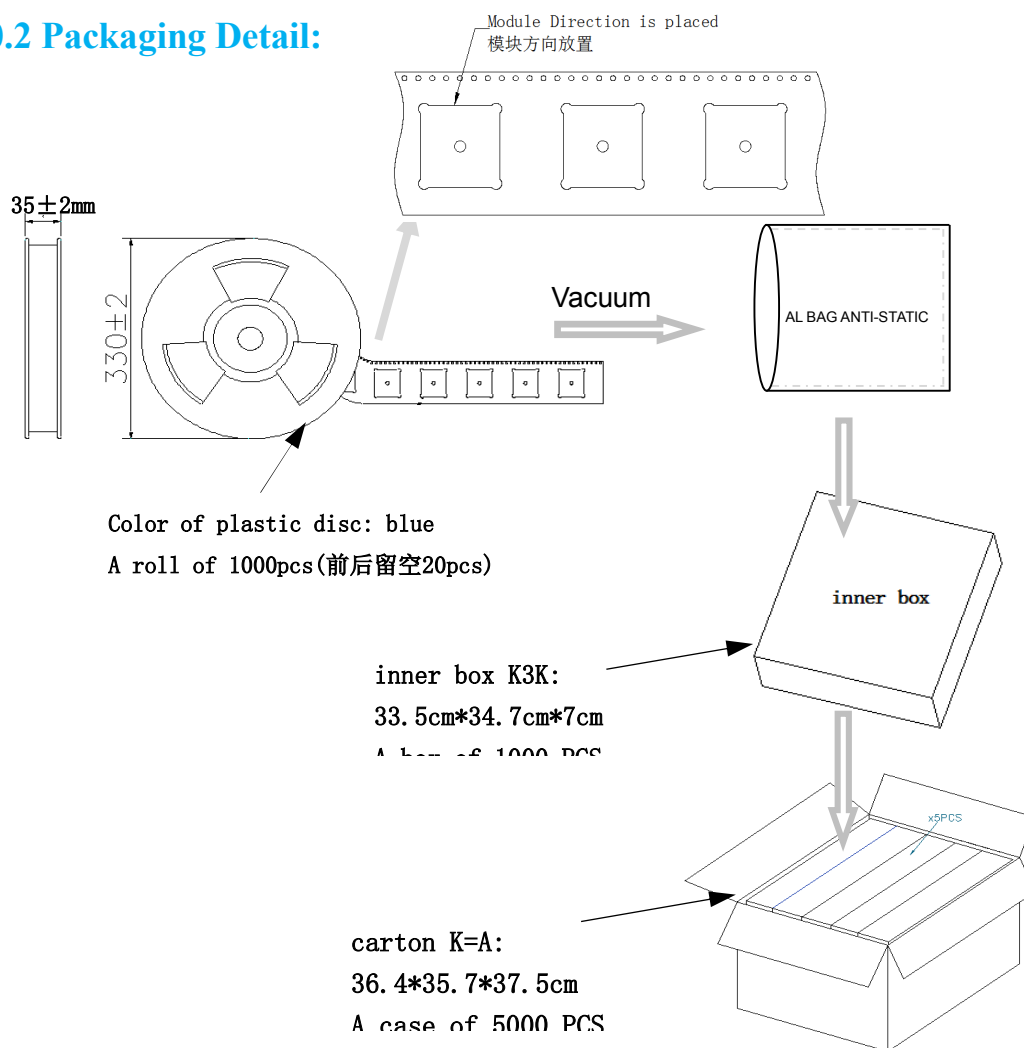
Peak Temperature : <250°C

Number of Times : ≤2 times

10. Packing information

10.1 Carrier size Detail:

10.2 Packaging Detail:

Module Direction is placed
模块方向放置

Vacuum

AL BAG ANTI-STATIC

35±2㎜

330±2

Color of plastic disc: blue
A roll of 1000pcs(前后留空20pcs)

inner box

inner box K3K:
33.5cm*34.7cm*7cm
A box of 1000 PCS

carton K=A:
36.4*35.7*37.5cm
A case of 5000 PCS

x5PCS
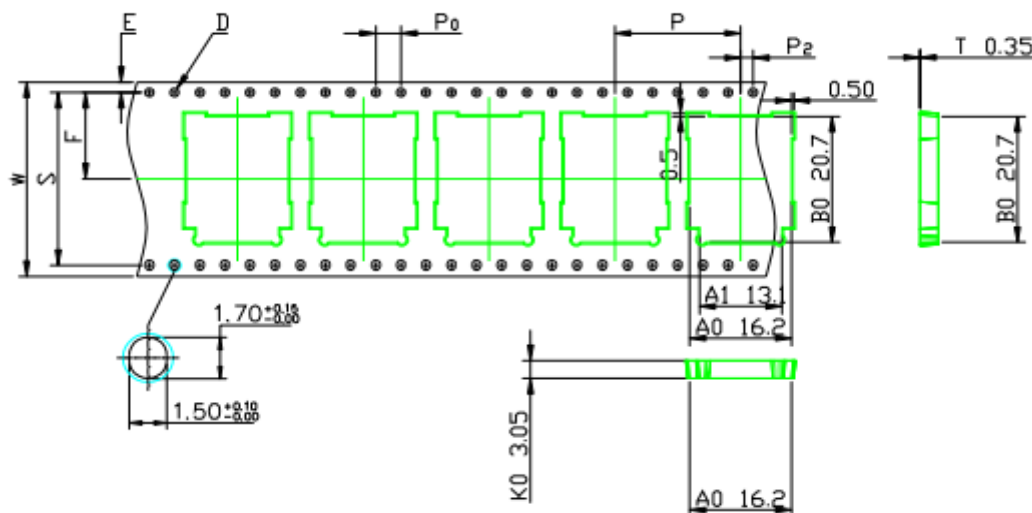
ESD CAUTION

The CDI-W69ESP32-00 module is ESD (electrostatic discharge) sensitive device and may be damaged with ESD or spike voltage. Although CDI-W69ESP32-00 module is with built-in ESD protection circuitry, please handle with care to avoid the permanent malfunction or the performance degradation.

1.1 FCC Certification

Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01r01

2.2   List of applicable FCC rules

The IOT WIFI+BT module. It is within U.S. FCC part 15.247standard

2.3   Specific operational use conditions The EUT is a 802.11a/b/g/n 150Mbps WLAN + BT v5.2 Combo SDIO Module

Operation Frequency: 2402-2480MHz for BLE;   2412-2462MHz for WIFI 2.4G,

Modulation Type: GFSK for BLE,WLAN(DSSS/OFDM)

Antenna Designation: PCB

Antenna Gain: -1.05dBi

2.4   Limited module procedures

Not applicable; Single Modular Approval Request

2.5   Trace antenna designs

Not applicable;

2.6   RF exposure considerations

To maintain compliance with FCC's RF Exposure guidelines, This equipment should be installed and operated with minimum distance between 20cm the radiator your body: Use only the supplied antenna.

2.7   Antennas

The IOT WIFI+BT module beams signals and communicates with its antenna, which is External Antenna . Antenna Designation: PCB Antenna, Antenna Gain: -1.05dBi,   Antenna could not be in no- load state when module is working. During debugging, it is suggested to add 50 ohms   load to the antenna port to avoid damage or performance degradation   of the module under long-time no-load condition.

2.8   Label and compliance information

The final end product must be label in a visible area , the Host must Contains FCC ID: ROW-CDIW69ESP32.

2.9   Information on test modes and additional testing requirements

Data transfer module demo board can control the EUT work in RF test mode at specified test channel.

2.10   Additional testing, Part 15 Subpart B disclaimer

The module without unintentional-radiator digital circuit, so the module does not required an evaluation by FCC Part 15 Subpart B. The host should be evaluated by the FCC Subpart B

2.11   OEM integration instructions:

This device is intended only for OEM integrators under the following conditions: The transmitter module may not be co-located with any other transmitter or antenna. The module shall be only used with the external antenna(s) that has been originally tested and certified with this module. As long as the conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

2.12   Validity of using the module certification:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization for this module in combination with the host equipment is no longer considered valid and the FCC ID of the module cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

ATTENTION

This device is intended only for OEM integrators under the following conditions:

1)   The antenna must be installed such that 5 mm is maintained between the antenna
and users, and

2)   This device and its antenna(s) must not be co-located with any other transmitters except in accordance with FCC multi-transmitter product procedures. Referring to the multi-transmitter policy, multiple transmitter(s) and module(s) can be operated simultaneously without C2PC.

3)   For all products market in US, OEM has to limit the Operating Frequency: 2402-2480MHz by supplied firmware programming tool. OEM shall not supply any tool or info to the end‑user regarding to Regulatory Domain change.

USERS MANUAL OF THE END PRODUCT:

In the user manual of the end product, the end user has to be informed to keep at least 20cm separation with the antenna while this end product is installed and operated. The end user has to be informed that the FCC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied. The end user has to also be informed that any
changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

FCC Caution:
Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.
This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.
If this equipment does cause harmful interference to radio or television reception,
which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
-- Reorient or relocate the receiving antenna.
-- Increase the separation between the equipment and receiver.
-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-- Consult the dealer or an experienced radio/TV technician for help.