

CDW-C4ESP32-00

DATASHEET

Software:

客 户 Customer	客户承认 Approve（请盖印章）	日 期 Date

拟制 Design	审核 Check	批准 Approve	版本 Version	日期 Date
			V1.0	2022.02.19

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更改记录:

Reversion History:

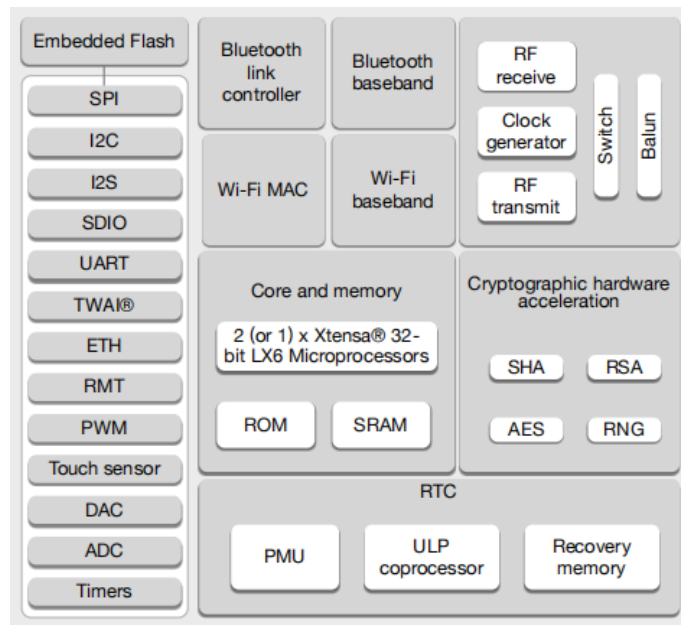
版本 Version	日期 Date	更改内容 Modification
1.0	2022.02.193	First release(Draft)

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1. Overview

CDW.C4ESP32-00 is a Cdtech self-developed low-power WIFI + BLE module. It integrates ESP32-U4WDH solution from Espressif Semiconductor Inc., The ESP32-U4WDH supports full features of 802.11b/g/n Wi-Fi system, with both HT20 and HT40 capability. The integrated Bluetooth low energy 4.2 shares the single antenna port with Wi-Fi transceiver, and both Wi-Fi and Bluetooth could work simultaneously with precise time multiplexing



2. Features

- Support IEEE 802.11b/g/n and BLE4.2
- Embedded Xtensa® dual-core 32-bit LX6 microprocessor, with clock up to 240 MHz
- Program memory: internal 4MB Flash
- Bit rate: 802.11n(2.4GHz) up to 150 Mbps
- Data memory: 520KB internal SRAM, 448KB internal ROM, and 16KB SRAM in RTC
- Frequency of crystal oscillator: 40MHz

3. General Specification

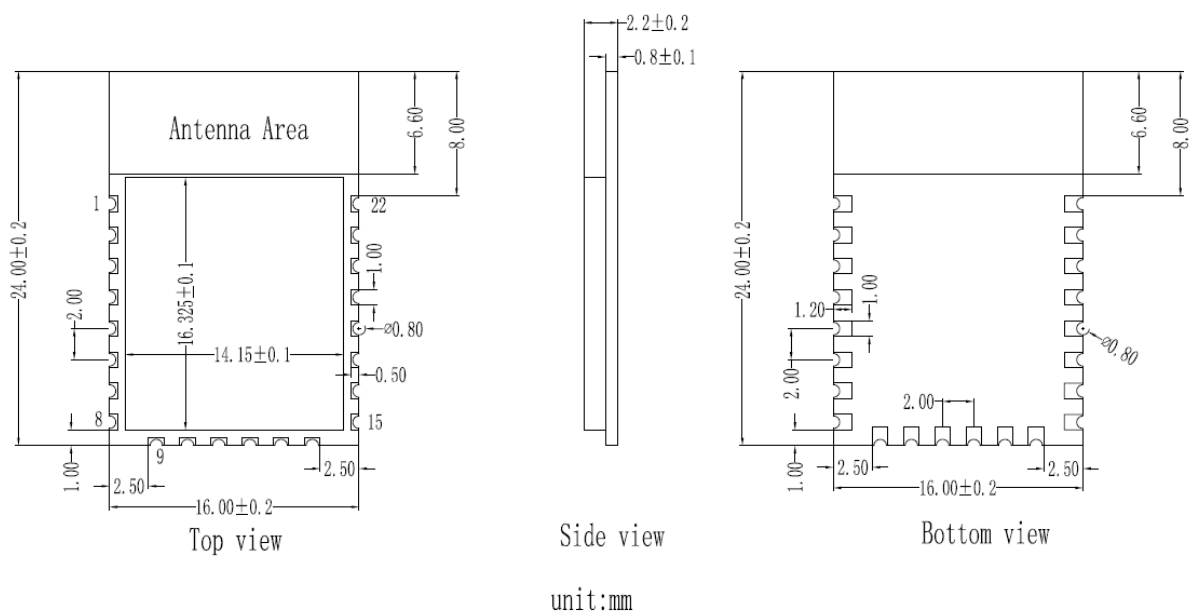
Model	CDW-C4ESP32-00
wlan standard	IEEE 802.11b/g/n WIFI and BLE 4.2
Major Chipset	ESP32-U4WDH
Modulation	802.11b(DSSS):CCK(11,5.5Mbps),DQPSK(2Mbps),DBPSK(1Mbps))802.11g(OFDM):BPSK(9,6Mbps),QPSK(18,12Mbps),16QAM(36,24Mbps),64QAM(54,48Mbps) 802.11n(OFDM):BPSK,QPSK,16QAM,64QAM(65Mbps;BLE(GFSK Π/4-DQPSK 8-DPSK)
Channel Bandwidth	WIFI:20MHz/40MHz BLE:1MHz
Frequency Band	WiFi:2400~2483.5MHZ BT: 2402~2480MHZ
Interface	UART
Encryption	WEP/WPA-PSK/WPA2-PSK
SPI flash	4M Byte default Embedded
Power Consumption	DC3.3V 240mA
Operating Temperature	-20~ +70°C ambient temperature
Storage Temperature	-40 ~ 125°C ambient temperature
Humidity	5 to 90 % maximum (non-condensing)
Dimension	24 x 16 x 2.2 mm (LxWxH) ±0.2mm

4. DC Characteristics

Description	TYPE	Unit
RX 802.11b/g/n, HT20/ HT40;RX BLE	95~100	mA
TX 802.11b, 1 Mbps	240	mA
TX 802.11g, 54 Mbps	190	mA
TX 802.11n, HT20, MCS 7	180	mA
TX BLE	130	mA

Note: The above power consumption data is based on a 3.3V power supply at a 25 °C ambient temperature at an RF interface. All transmission data are based on 50% Duty cycle of.

5. Pin Description and PCB size



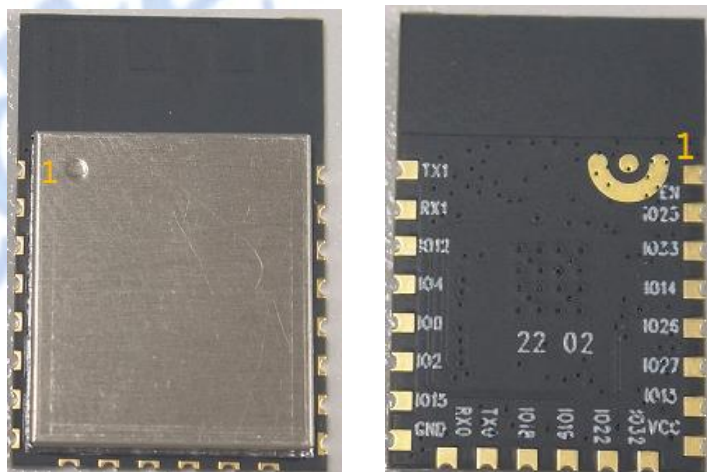
NO	NAME	DESCRIPTION	NO	NAME	DESCRIPTION
1	EN	CHIP_EN(download pull-up)	12	GPI018	GPIO
2	GPI025	GPIO	13	GPI01	UART0_TX(download port)
3	GPI033	GPIO	14	GPI03	UART0_RX(download port)
4	GPI014	GPIO	15	GND	Grounding
5	GPI026	GPIO	16	GPI015	GPIO
6	GPI027	GPIO	17	GPI02	GPIO
7	GPI013	GPIO	18	GPI00	GPIO(download pull-down)
8	VCC	DC power input(3.3V)	19	GPI04	GPIO
9	GPI032	GPIO	20	GPI012	GPIO
10	GPI022	GPIO	21	GPI09	UART1_RX(Application port)
11	GPI019	GPIO	22	GPI10	UART1_TX(Application port)

Note: To ensure burn software when the chip is powered on, Please follow the step 1 and 2.

1. the RC delay circuit needs to be added to the CHIP_EN pin. RC is generally recommended to be $R = 10\text{ K}\Omega$ and $C = 1\text{ }\mu\text{F}$, but the specific values need to be adjusted based on the power-on sequence of the power supply and the power-on reset sequence of the chip.
2. Pin18 GPIO0 need to be pulled down.
3. Pin13/14 download UARTport , Console Rate: 115200bps.
4. VCC supply ripple < 30mV.

6. Module photo

PCBA physical photo



7. Electrical characteristics

7.1 Recommended working conditions

Symbol	Parameter	Min	Type	Max	Units
VDDA,VDD3P3,VDD3P3_RTC	Power pin voltage	3.0	3.3	3.6	v
VDD3P3_CPU	Power pin voltage	1.8	3.3	3.6	v
IVDD	Power supply current of the external power supply	0.5	—	—	A
T _A	Environment temperature	-40	—	105	℃

7.2 Absolute maximum rating

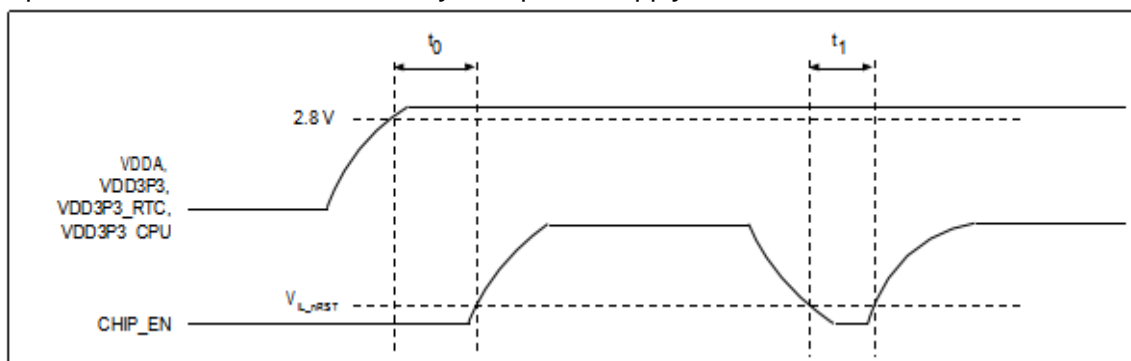
Symbol	Parameter	Min	Max	Units
VDDA, VDD3P3, VDD3P3_RTC, VDD3P3_CPU	Power pin voltage	0.3	3.6	v
I _{output}	IO output total current		1200	mA
T _{STORE}	Storage temperature	-40	150	℃

The measurement condition of the total IO output current of the chip is the ambient temperature of 25 ° C, and the pins of VDD3P3_RTC, VDD3P3_CPU and VDD_SDIO output high level and are directly grounded. At this time, the chip can still work normally after 24 hours.

8. Power-on sequence and reset

8.1 Power-on sequence

The ESP32-C3FN4 series chips use 3.3V as the unified system power supply, so the power-on sequence only needs to follow pin 7 of the ESP32-C3FN4 series chips ,CHIP_EN The enabling pin is powered on later than the 3.3 V system power supply.



Parameter	Explain	Min(μ s)
t_0	CHIP_EN pins are powered on later than VDDA, VDD3P3, VDD3P3_RTC and VDD3P3_RTC VDD3P3_CPU power-on delay time	50
t_1	CHIP_EN electrical level falls below VIL_nRST time	50

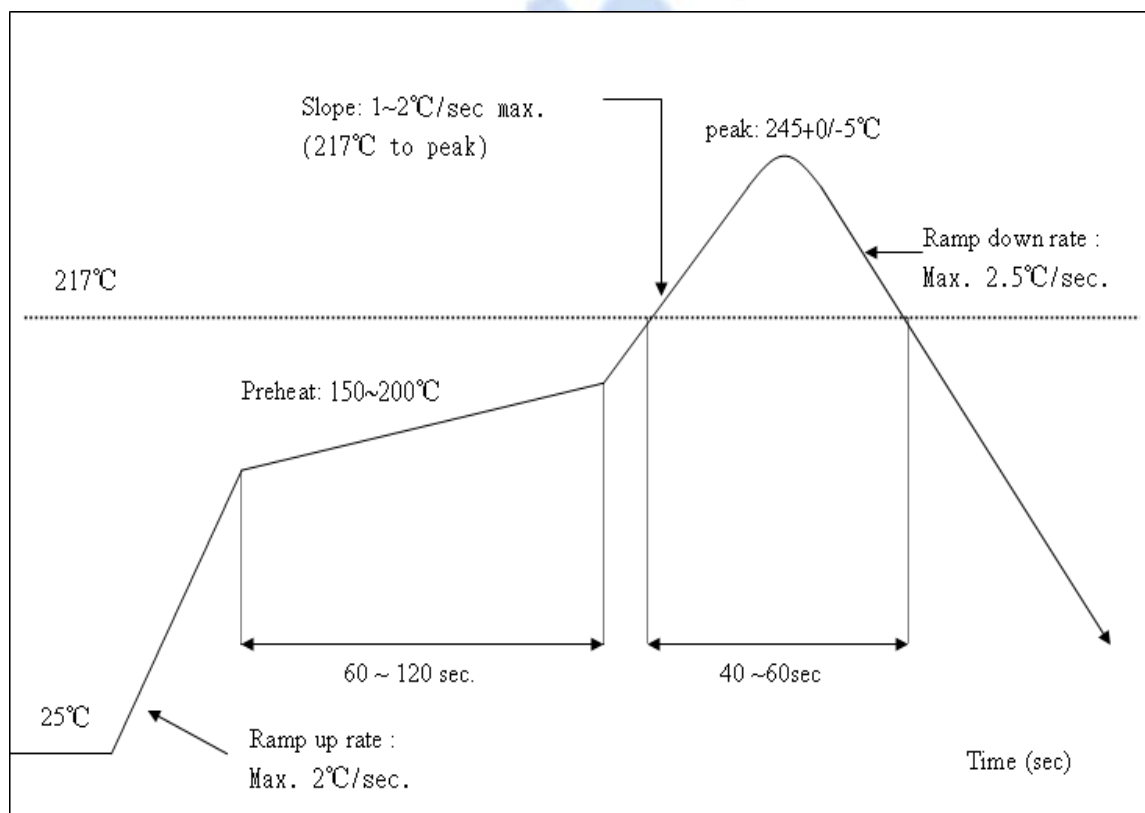
Note: To ensure the normal power supply when the chip is powered on, the RC delay circuit needs to be added to the CHIP_EN pin. RC is generally recommended to be $R = 10\text{ K}\Omega$ and $C = 1\text{ }\mu\text{F}$, but the specific values need to be adjusted based on the power-on sequence of the power supply and the power-on reset sequence of the chip.

9. Recommended Reflow Profile

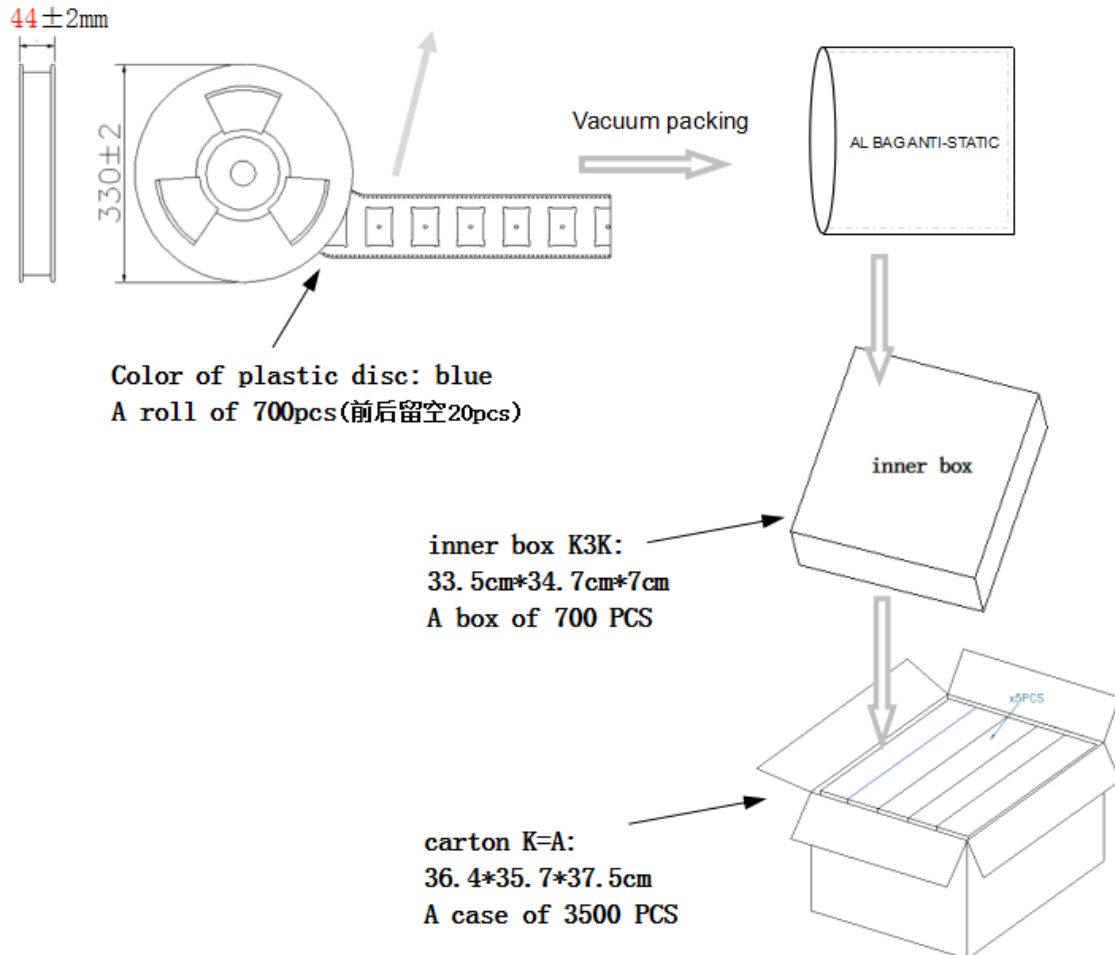
Referred IPC/JEDEC standard.

Peak Temperature : $<250^\circ\text{C}$

Number of Times : 2 times



10. Package



ESD CAUTION

The CDW-C4ESP32-00 is ESD (electrostatic discharge) sensitive device and may be damaged with ESD or spike voltage. Although CDW-CESP32-00 is with built-in ESD protection circuitry, please handle with care to avoid the permanent malfunction or the performance degradation.

FCC WARNING

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.

15.105 Information to the user.

(b) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

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.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body.

Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

The availability of some specific channels and/or operational frequency bands are country dependent and are firmware programmed at the factory to match the intended destination.

The firmware setting is not accessible by the end user.

The final end product must be labelled in a visible area with the following:

“Contains Transmitter Module ROW-C4ESP3200”

Requirement per KDB996369 D03

2.2 List of applicable FCC rules

List the FCC rules that are applicable to the modular transmitter. These are the rules that specifically establish the bands of operation, the power, spurious emissions, and operating fundamental frequencies. DO NOT list compliance to unintentional-radiator rules (Part 15 Subpart B) since that is not a condition of a module grant that is extended to a host manufacturer. See also Section 2.10 below concerning the need to notify host manufacturers that further testing is required.³

Explanation: This module meets the requirements of FCC part 15C(15.247).it specifically establish the 6dB Bandwidth,, Peak Output Power, Radiated Spurious Emission, Power Spectral Density, Restricted Band of Operation and Band Edge (Out of Band Emissions) Measurement

2.3 Summarize the specific operational use conditions

Describe use conditions that are applicable to the modular transmitter, including for example any limits on antennas, etc. For example, if point-to-point antennas are used that require reduction in power or compensation for cable loss, then this information must be in the instructions. If the use condition limitations extend to professional users, then instructions must state that this information also extends to the host manufacturer's instruction manual. In addition, certain information may also be needed, such as peak gain per frequency band and minimum gain, specifically for master devices in 5 GHz DFS bands.

Explanation: The EUT has PCB antenna, Yes, the module contains a permanently attached antenna, The antenna gain is 1.5dBi.

2.4 Limited module procedures

If a modular transmitter is approved as a "limited module," then the module manufacturer is responsible for approving the host environment that the limited module is used with. The manufacturer of a limited module must describe, both in the filing and in the installation instructions, the alternative means that the limited module manufacturer uses to verify that the host meets the necessary requirements to satisfy the module limiting conditions.

A limited module manufacturer has the flexibility to define its alternative method to address the conditions that limit the initial approval, such as: shielding, minimum signaling amplitude, buffered modulation/data inputs, or power supply regulation. The alternative method could include that the limited module manufacturer reviews detailed test data or host designs prior to giving the host manufacturer approval.

This limited module procedure is also applicable for RF exposure evaluation when it is necessary to demonstrate compliance in a specific host. The module manufacturer must state how control of the product into which the modular transmitter will be installed will be maintained such that full compliance of the product is always ensured. For additional hosts other than the specific host originally granted with a limited

module, a Class II permissive change is required on the module grant to register the additional host as a specific host also approved with the module.

Explanation: The module is a single module.

2.5 Trace antenna designs

For a modular transmitter with trace antenna designs, see the guidance in Question 11 of KDB Publication 996369 D02 FAQ – Modules for Micro-Strip Antennas and traces. The integration information shall include for the TCB review the integration instructions for the following aspects: layout of trace design, parts list (BOM), antenna, connectors, and isolation requirements.

- a) Information that includes permitted variances (e.g., trace boundary limits, thickness, length, width, shape(s), dielectric constant, and impedance as applicable for each type of antenna);
- b) Each design shall be considered a different type (e.g., antenna length in multiple(s) of frequency, the wavelength, and antenna shape (traces in phase) can affect antenna gain and must be considered);
- c) The parameters shall be provided in a manner permitting host manufacturers to design the printed circuit (PC) board layout;
- d) Appropriate parts by manufacturer and specifications;
- e) Test procedures for design verification; and
- f) Production test procedures for ensuring compliance.

The module grantee shall provide a notice that any deviation(s) from the defined parameters of the antenna trace, as described by the instructions, require that the host product manufacturer must notify the module grantee that they wish to change the antenna trace design. In this case, a Class II permissive change application is required to be filed by the grantee, or the host manufacturer can take responsibility through the change in FCC ID (new application) procedure followed by a Class II permissive change application.

Explanation: Yes, The module with trace antenna designs, and This manual has been shown the layout of trace design,, antenna, connectors, and isolation requirements.

2.6 RF exposure considerations

It is essential for module grantees to clearly and explicitly state the RF exposure conditions that permit a host product manufacturer to use the module. Two types of instructions are required for RF exposure information: (1) to the host product manufacturer, to define the application conditions (mobile, portable – xx cm from a person's body); and (2) additional text needed for the host product manufacturer to provide to end users in their end-product manuals. If RF exposure statements and use conditions are not provided, then the host product manufacturer is required to take responsibility of the module through a change in FCC ID (new application).

Explanation: This module complies with FCC RF radiation exposure limits set forth for an uncontrolled environment, This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body." This module is designed to comply with the FCC statement, FCC ID is: ROW-C4ESP3200.

2.7 Antennas

A list of antennas included in the application for certification must be provided in the instructions. For modular transmitters approved as limited modules, all applicable professional installer instructions must be included as part of the information to the host product manufacturer. The antenna list shall also identify the antenna types (monopole, PIFA, dipole, etc. (note that for example an “omni-directional antenna” is not considered to be a specific “antenna type”)).

For situations where the host product manufacturer is responsible for an external connector, for example with an RF pin and antenna trace design, the integration instructions shall inform the installer that unique antenna connector must be used on the Part 15 authorized transmitters used in the host product. The module manufacturers shall provide a list of acceptable unique connectors.

Explanation: The EUT has PCB antenna, Yes, the module contains a permanently attached antenna, The antenna gain is 1.5dBi.

2.8 Label and compliance information

Grantees are responsible for the continued compliance of their modules to the FCC rules. This includes advising host product manufacturers that they need to provide a physical or e-label stating “Contains FCC ID” with their finished product. See Guidelines for Labeling and User Information for RF Devices – KDB Publication 784748.

Explanation: The host system using this module, should have label in a visible area indicated the following texts: "Contains FCC ID: ROW-C4ESP3200

2.9 Information on test modes and additional testing requirements

Additional guidance for testing host products is given in KDB Publication 996369 D04 Module Integration Guide. Test modes should take into consideration different operational conditions for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product.

The grantee should provide information on how to configure test modes for host product evaluation for different operational conditions for a stand-alone modular transmitter in a host, versus with multiple, simultaneously transmitting modules or other transmitters in a host.

Grantees can increase the utility of their modular transmitters by providing special means, modes, or instructions that simulates or characterizes a connection by enabling a transmitter. This can greatly simplify a host manufacturer’s determination that a module as installed in a host complies with FCC requirements.

Explanation: WiFiRanger, A LinOra Company can increase the utility of our modular transmitters by providing instructions that simulates or characterizes a connection by enabling a transmitter.

2.10 Additional testing, Part 15 Subpart B disclaimer

The grantee should include a statement that the modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the grantee markets their product as being Part 15

Subpart B compliant (when it also contains unintentional-radiator digital circuitry), then the grantee

shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

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

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