CDW-6986850-00

Single band WiFi + BLE5.0 Module Spec

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
			V1.1	2024.01.11

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更改记录：

Reversion History：

版本 Version	日期 Date	更改内容 Modification
1.0	2023.07.09	First release
1.1	2024.01.11	Remodule information

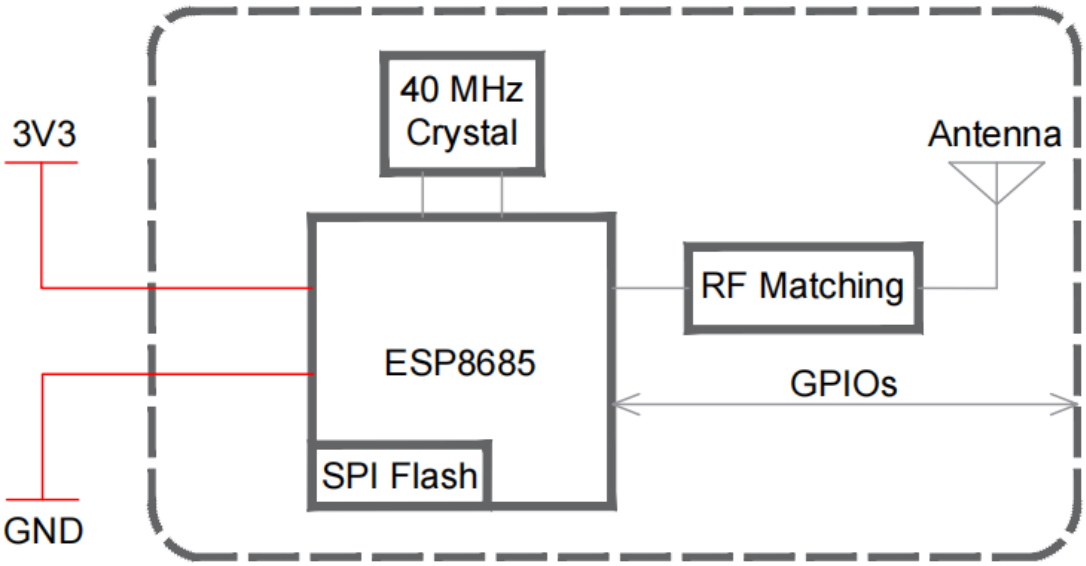
1. Overview

ESP8685 is an ultra-low-power and highly-integrated MCU-based SoC solution that supports 2.4 GHz Wi-Fi and Bluetooth® Low Energy (Bluetooth LE). ESP8685 series of chips have a 32-bit RISC-V singlecore processor. They integrate a rich set of peripherals, ranging from UART, I2C, I2S, remote control peripheral, LED PWM controller, general DMA controller, TWAI ® controller, USB Serial/JTAG controller, temperature sensor, and ADC.

2. Features

- The IEEE 802.11 b / g / n protocol is supported
- Support the 1T1R mode, with data rates up to 150 Mbps
- Support for 20mhz and 40mhz bandwidth in the 2.4 GHz band
- Support BLE5.0
- 32-bit RISC-V single-core processor with main frequency up to 160 MHz

3. Block Diagram



4. General Specification

Model	CDW-6986850-00
Product Name	WLAN 802.11b/g/n UART 1T1R + BlE 5.0 module
Major Chipset	ESP8685
Standard	802.11 b/g/n
Modulation Method	BPSK/ QPSK/ 16-QAM/ 64-QAM
WiFi Interface	UART
Operating Temperature	-40° C ~ 85° C
Storage Temperature	-40° C ~ 105°C
Humidity	5% to 90% maximum
Dimension	20.3x15.8x2.3 (LxWxH) ±0.2mm

5. RF Specification

A. 2.4GHz RF Specification

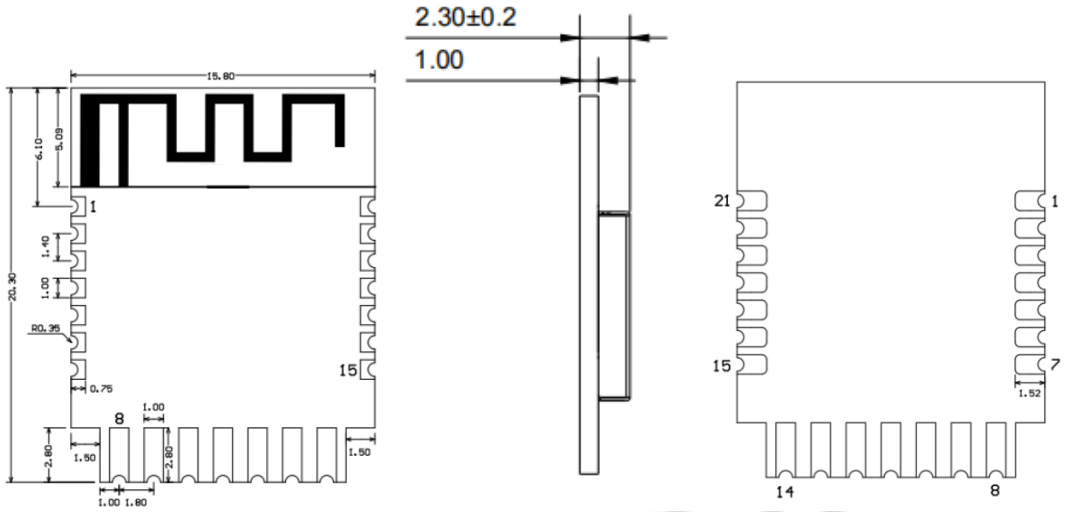
Feature	Description	
WLAN Standard	IEEE 802.11b/g/n WiFi compliant	
Modulation	802.11b : DQPSK, DBPSK, CCK 802.11 g/n : OFDM /64-QAM,16-QAM, QPSK, BPSK	
Receive Sensitivity (11b,20MHz) @8% PER	- 1Mbps	PER @ -93 dBm, typical
	- 2Mbps	PER @ -90 dBm, typical
	- 5.5Mbps	PER @ -88 dBm, typical
	- 11Mbps	PER @ -85 dBm, typical
Receive Sensitivity (11g,20MHz) @10% PER	- 6Mbps	PER @ -91 dBm, typical
	- 9Mbps	PER @ -89 dBm, typical
	- 12Mbps	PER @ -86 dBm, typical
	- 18Mbps	PER @ -83 dBm, typical
	- 24Mbps	PER @ -80 dBm, typical
	- 36Mbps	PER @ -77 dBm, typical
	- 48Mbps	PER @ -74 dBm, typical
	- 54Mbps	PER @ -72 dBm, typical
Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0	PER @ -90 dBm, typical
	- MCS=1	PER @ -87 dBm, typical
	- MCS=2	PER @ -84 dBm, typical
	- MCS=3	PER @ -81 dBm, typical
	- MCS=4	PER @ -78 dBm, typical
	- MCS=5	PER @ -75 dBm, typical
	- MCS=6	PER @ -72 dBm, typical
	- MCS=7	PER @ -70 dBm, typical
Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0	PER @ -87 dBm, typical
	- MCS=1	PER @ -84 dBm, typical
	- MCS=2	PER @ -81 dBm, typical
	- MCS=3	PER @ -78 dBm, typical
	- MCS=4	PER @ -75 dBm, typical
	- MCS=5	PER @ -72 dBm, typical
	- MCS=6	PER @ -69 dBm, typical
	- MCS=7	PER @ -67 dBm, typical

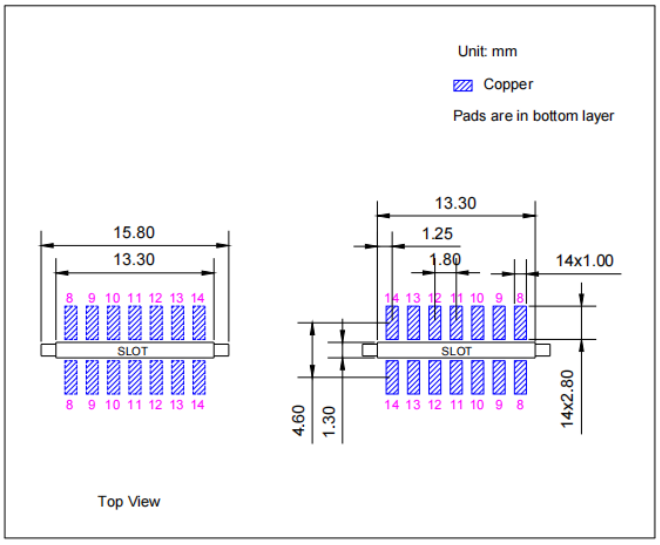
B. Bluetooth Specification

Argument	Min	Typ	Max	unit
Radio-frequency transmitting power	—	0	—	dBm
Gain control step size	—	3	—	dB

6. Physical Dimensions

(Unit: mm)





模组竖插装推荐

7. Electrical specification

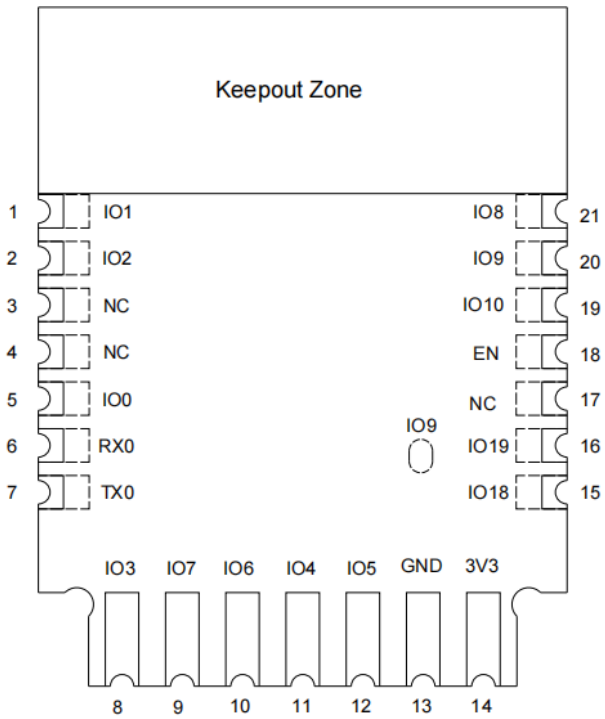
7.1 Suggest working conditions:

Symbol	Argument	Min	Typ	Max	unit
VDD33	Power pipe foot voltage	3.0	3.3	3.6	v
IVDD	Power supply current of the external power supply	0.5	—	—	A
TA	Ambient temperature	-40	—	85	℃

7.2 Absolute maximum rating value:

Symbol	Argument	Min	Max	unit
VDD33	Power pin voltage	-0.3	3.6	v
TSTORE	Storage temperature	-40	105	℃

8. Pin Description



管脚布局（顶视图）

Name	No.	Type	Function
IO1	1	I/O/T	GPIO1,ADC1_CH1,XTAL_32K_N
IO2	2	I/O/T	GPIO2,ADC1_CH2,FSPIQ
NC	3	—	NC
NC	4	—	NC
IO0	5	I/O/T	GPIO0,ADC1_CH0,XTAL_32K_F
RX0	6	I/O/T	GPIO20,U0RXD
TX0	7	I/O/T	GPIO21,U0TXD
IO3	8	I/O/T	GPIO3,ADC1_CH3,LED PWM
IO7	9	I/O/T	GPIO7,FSPID,MTDO,LED PWM
IO6	10	I/O/T	GPIO6,FSPICLK,MTCK,LED PWM
IO4	11	I/O/T	GPIO4,ADC1_CH4,FSPIHD,MTMS,LED PWM
IO5	12	I/0/T	GPIO5,ADC2_CH0,FSPIWP,MTDI,LED PWM
GND	13	P	Ground
3V3	14	P	Power supply
IO18	15	I/O/T	GPIO18,USB_D-
IO19	16	I/O/T	GPIO19,USB_D+
NC	17	—	NC
EN	18	I	High: on,enables the chip. Low:off,the chip powers off. By default,this pin is internally pulled high
IO10	19	I/O/T	GPIO10,FSPICS0
IO9	20	I/O/T	GPIO9
IO8	21	I/O/T	GPIO8

9.Baking & storage temperature & Recommended Reflow Profile

（烘烤，储存温度和推荐炉温）

9.1 Baking & storage temperature

A. Storage life：12 months. Storage conditions:<40℃. Relative humidity:<90%R.H.
(保存期限：12个月，储存环境条件：温度在：<40℃，相对湿度：<90%R.H.)

B. After this bag is opened , devices that will be subjected to infrared reflow, vapor-phase reflow, or equivalent processing must be .(模块包装被拆后，SMT 组装之时限)

a. Check the humidity card :stored at ≦20%RH.If :30%~40%(pink)or greater than 40%(red).Labeling module has moisture absorption.(检查湿度卡：显示值应小于30%（蓝色），如：30%~40%(粉红色）或 者大于40%（红色）表示模块已吸湿气.)

b. Mounted within 168 hours at factory conditions of: t≦30%℃， ≦60%R.H.
(工厂环境温度湿度管制：≦30%℃，≦60%R.H, 168小时内。)

c. Once opened, the workshop the preservation of life for168 hours.
(拆封后，车间的保存寿命为168小时.)

C. Module apart packing after 168 hours，If baking is required, devices may be baked for.
(如在拆封后的168个小时内未使用完，需要烘烤，烘烤条件如下：)

a. Modules must be to remove module moisture problem. (模块须重新烘烤，以除去模块吸湿问题.)

b. Baking temperature: 40℃±5℃, 120 hours. (烘烤温度条件：40℃±5℃，120小时).

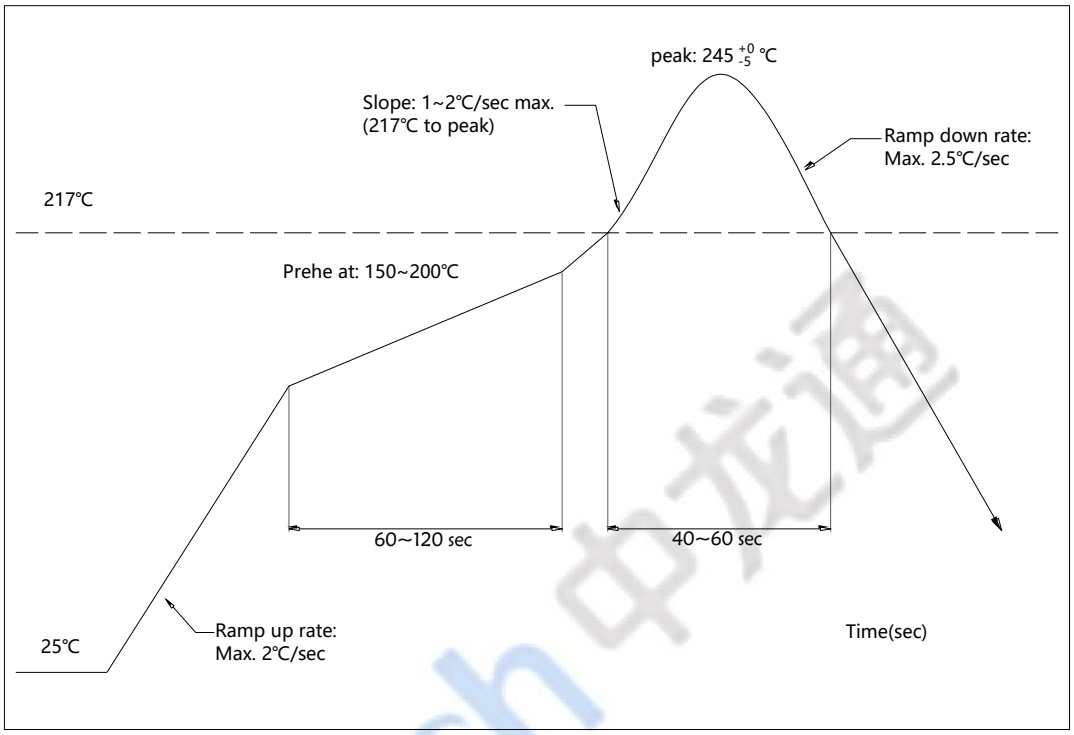
c. After baking, put proper amount of desiccant to seal packages.
(烘烤后，放入适量的干燥剂再密封包装)

9.2 Recommended Reflow Profile

Referred IPC/JEDEC standard.

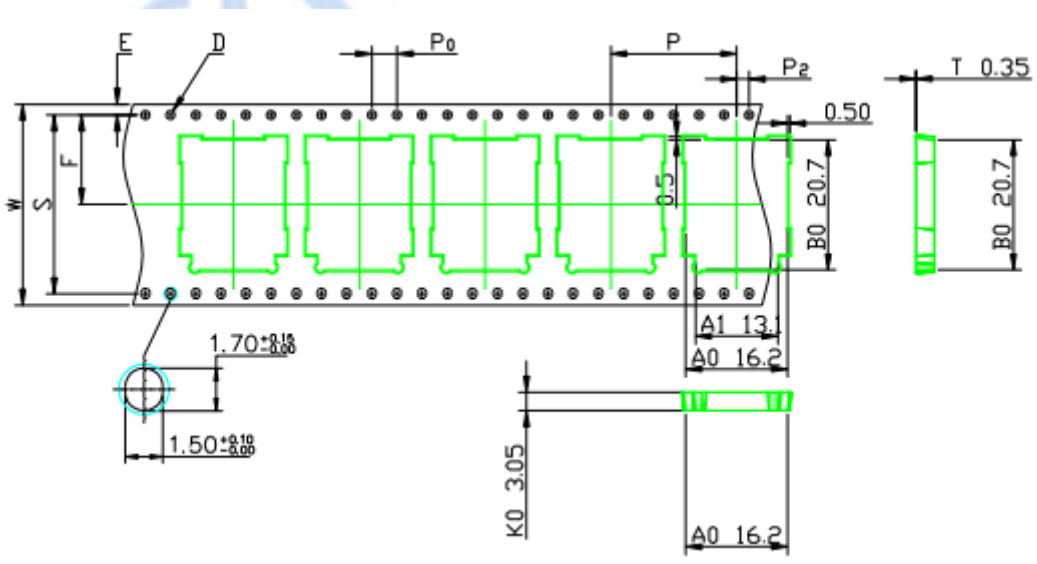
Peak Temperature : <250°C

Number of Times : ≤2 times

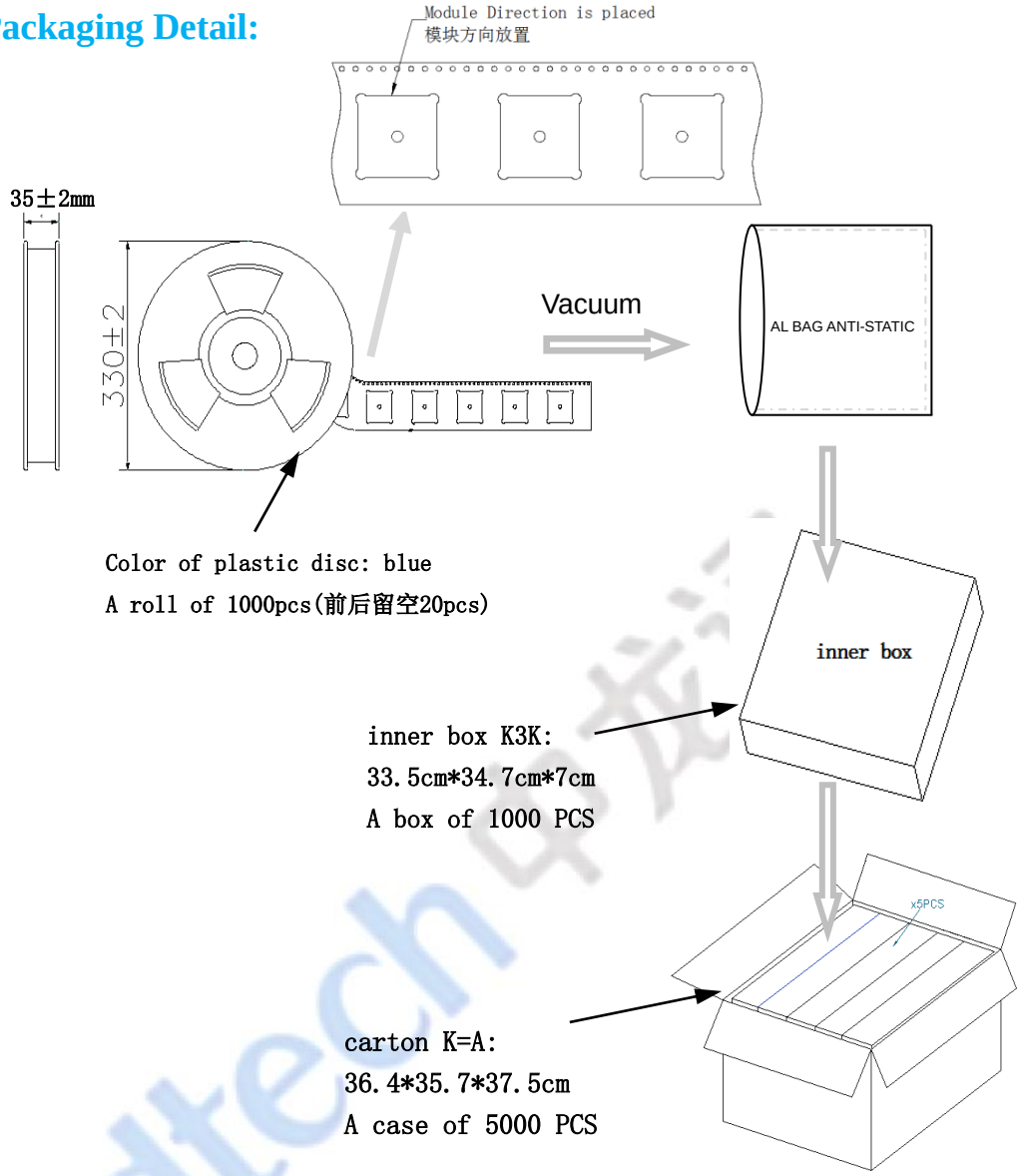


10. Packing information

10.1 Carrier size Detail:



10.2 Packaging Detail:



ESD CAUTION

The 6986850-00 module is ESD (electrostatic discharge) sensitive device and may be damaged with ESD or spike voltage. Although 6986850-00 module 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-CDW69868500”

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).

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 -0.74dBi.

2.4 Limited module procedures

If a modular transmitter is approved as a “limited module,” then the module manufacturer isresponsible 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-CDW69868500.

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 -0.74dBi.

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-CDW69868500”

2.9 Information on test modes and additional testing requirements5

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: 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 circuity), 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 circuity, so the module does not require an evaluation by FCC Part 15 Subpart B. The host shoule be evaluated by the FCC Subpart B.