

CDW-60832BU-00(RL)

Dual band WiFi6 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
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更改记录:

Reversion History:

版本 Version	日期 Date	更改内容 Modification
1.0	2023.08.21	First release
1.1	2023.09.13	更新模组图片、频偏
1.2	2023.10.23	更新 5Gn 模功率

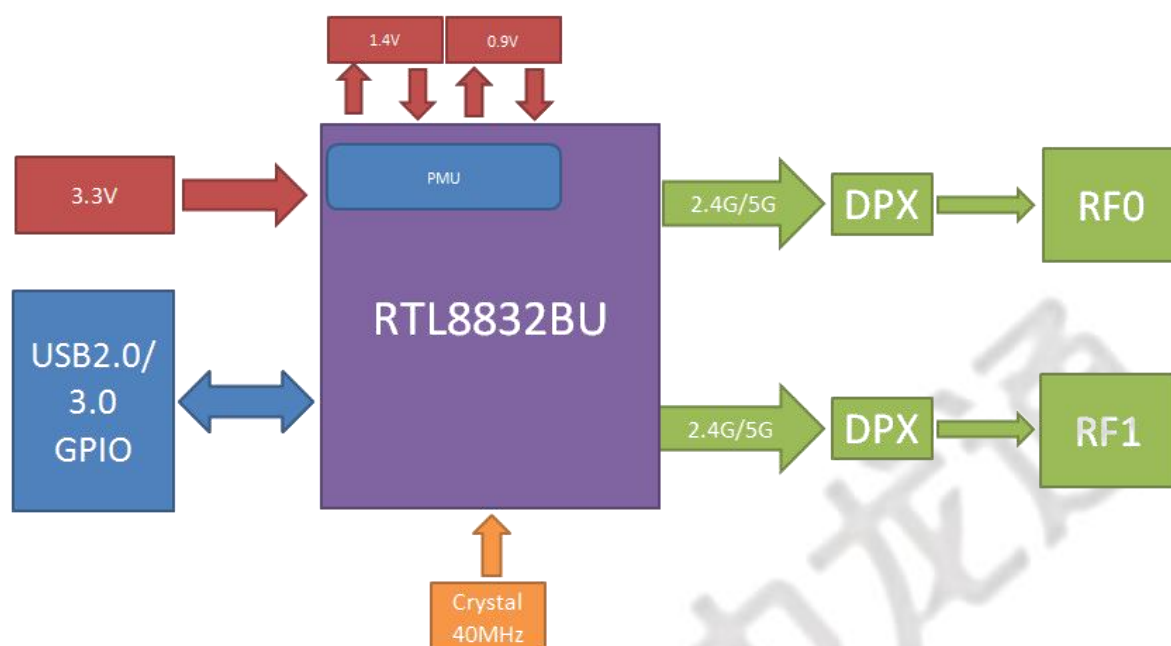
1. Overview

CDW-60832BU-00(RL) be based on RTL8832BU-CG designed module , Realtek RTL8832BU-CG is a highly integrated single-chip that support 2-stream 802.11ax solutions with Multi-user MIMO (Multiple-Input, Multiple-Output) with Wireless LAN (WLAN) USB network interface controller. It combines a WLAN MAC, a 2T2R capable WLAN baseband.

2. Features

- Supports 20MHz/40MHz /80MHz bandwidth transmission
- IEEE 802.11 a/b/g/n/ac/ax compatible WLAN
- Security support for WPA, WPA2, WPA3.0, WAPI
- Complete 802.11n MIMO solution for 2.4G and 5G band
- Compatible with USB2.0 and 3.0 interfaces
- Supports LDPC
- WLAN maximum PHY data rate up to 286.8 to 1201Mbps

3. Block Diagram



4. General Specification

Model	CDW-60832BU-00(RL)
Product Name	Dual band 2T2R WiFi6 Module Spec
Major Chipset	RTL8832BU-CG
Standard	802.11 a/b/g/n/ac/ax
Modulation Method	BPSK/ QPSK/ 16-QAM/ 64-QAM/256-QAM/1024-QAM
Frequency Band	2.4GHz&5GHz ISM band
Interface	USB2.0/3.0
Operating Temperature	-20~ 70°C ambient temperature
Storage Temperature	-40 ~ 80°C ambient temperature
Humidity	5% to 90 % maximum (non-condensing)
Dimension	27.0x17.8x2.6(L*W*H) ±0.2mm

5.RF Specification

2.4GHz RF Specification

Feature	Description
WLAN Standard	IEEE 802.11b/g/n/ax 2X2 WiFi compliant
Frequency Range	2.400 GHz ~ 2.484 GHz (2.4 GHz ISM Band)
Number of Channels	2.4GHz : Ch1 ~ Ch14
Modulation	802.11b: DQPSK, DBPSK, CCK 802.11g/n: BPSK,QPSK,16QAM,64QAM/OFDM 802.11ax: OFDMA/1024QOAM
Frequency Error	-10ppm~~~+10ppm
Output Power	802.11b / 11Mbps : 17dBm $\pm$ 2 dB @ EVM $\leq$ -15dB 802.11g / 54Mbps : 16Bm $\pm$ 2 dB @ EVM $\leq$ -28dB 802.11n 20/40M: 15m $\pm$ 2 dB @ EVM $\leq$ -30dB 802.11ax/HE11:13dbm $\pm$ 2dB@EVM $\leq$ -35dB
Receive Sensitivity 11b@8%PER	11Mbps PER @ -83dBm
Receive Sensitivity 11g@10%PER	54Mbps PER @ -71dBm
Receive Sensitivity 11n@10%PER	MCS7 PER @ -68dBm
Receive Sensitivity 11ax@10%PER	HE=11 PER @ -58dBm

5GHz RF Specification

Feature	Description
WLAN Standard	IEEE 802.11a/n/ac/ax 2X2 WiFi compliant
Frequency Range	4.900 GHz ~ 5.845 GHz (5.0 GHz ISM Band)
Number of Channels	CH36-CH165
Modulation	802.11a: BPSK,QPSK,16QAM,64QAM/OFDM 802.11n: BPSK,QPSK,16QAM,64QAM/OFDM 802.11ac: 256QAM/OFDM 802.11ax: 1024QAM/OFDMA

Frequency Error	-10ppm~~~+10ppm
Output Power	802.11a / 54Mbps : 15dBm $\pm$ 2 dB @ EVM $\leq$ -25dB 802.11n / MCS7 : 15dBm $\pm$ 2 dB @ EVM $\leq$ -30dB 802.11ac/MCS9: 12dBm $\pm$ 2 dB @ EVM $\leq$ -32dB 802.11ax/MCS11: 12dBm $\pm$ 2 dB @ EVM $\leq$ -35dB
Receive Sensitivity 11a@10%PER	54Mbps PER @ -71dBm
Receive Sensitivity 11n@10%PER	MCS7 PER @ -68dBm
Receive Sensitivity 11ac@10%PER	MCS9,NSS1 PER @ -63dBm
Receive Sensitivity 11ax@10%PER	MCS11 PER @ -61dBm

6. Electrical Characteristics

symbol	Parameter	Minimum	Typical	Maximum	Units
VBAT/VDD	3.3V supply voltage	2.97	3.3	3.63	V
VBAT/VDD	current	--	--	1500	mA

6.1 Power-on or Resuming from Deepsleep Sequence

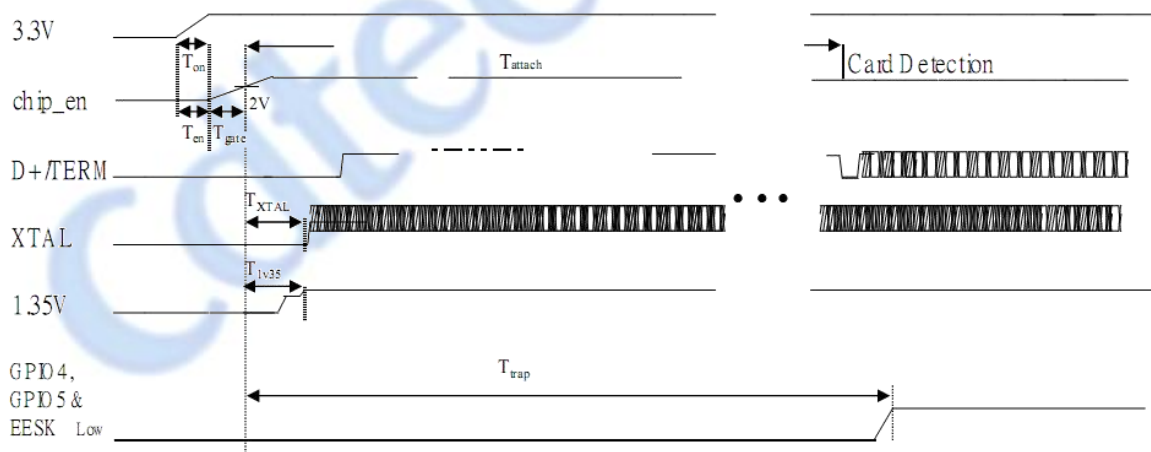


Figure 3 RTL8832BU-CG USB Bus Power On Sequence

Shutdown Sequence

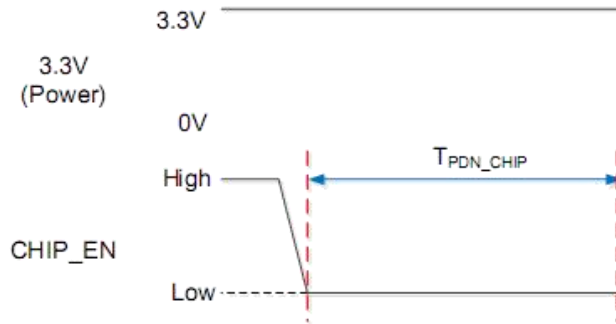
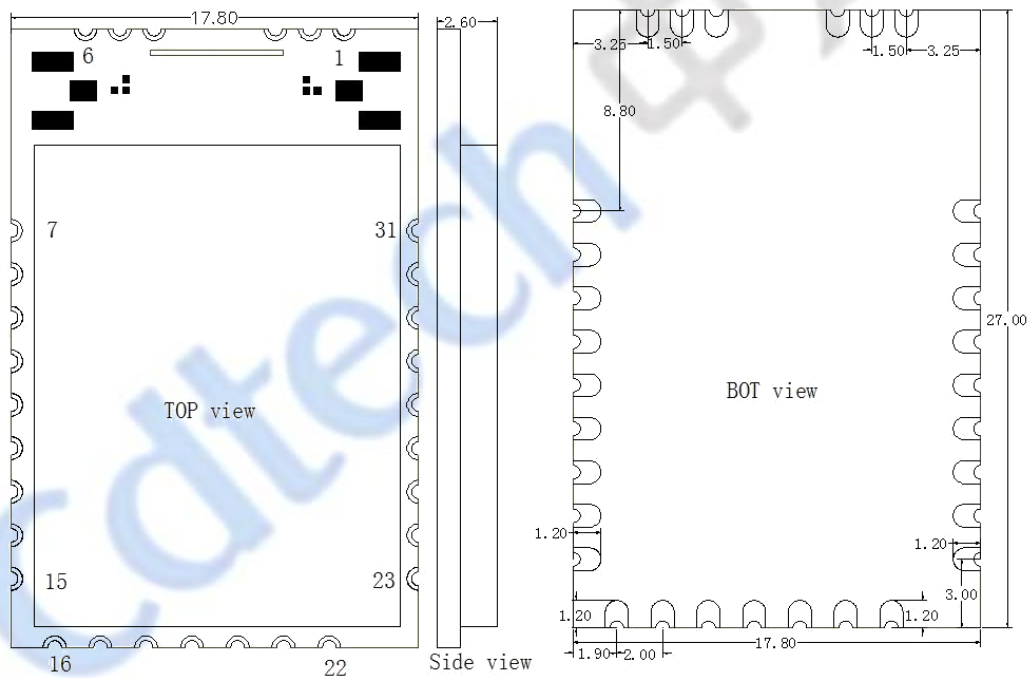


Figure 4 RTL8832BU-CG Power Off Sequence

7.Pin Description& Dimensions (unit: mm)



(Top view)

NO.	Name	Description
1	GND	RF Ground for WLAN_ANT1
2	NC	NC (Reserved 2.4G / 5G RF PAD for WLAN_ANT1)
3	GND	RF Ground for WLAN_ANT1
4	GND	RF Ground for WLAN_ANT0
5	NC	NC (Reserved 2.4G / 5G RF PAD for WLAN_ANT0)
6	GND	RF Ground for WLAN_ANT0

7	GND	Ground connections
8	GPIO5	General purpose input/output
9	GPIO6	General purpose input/output
10	GND	Ground connections
11	GPIO7	General purpose input/output
12	WLAN_Wake_Host	WLAN Wake up Host, output
13	GND	Ground connections
14	HSOP	USB3.0 TX data-
15	HSOP	USB3.0 TX data+
16	HSIN	USB3.0 RX data-
17	HSIP	USB3.0 RX data+
18	GND	Ground connections
19	HSD+	USB2.0 data+
20	HSD-	USB2.0 data+
21	VDD33	3.3V Voltage input
22	RESET	Shutdown Chip when pulled low (CHIP_EN), When this function is not required, external pull high is required (模组内部上拉 47K)
23	NC	No connect (floating)
24	HOST_Wake_WLAN	HOST_Wake_WLAN
25	NC	No connect (floating)
26	EECS	Reserved "EECS" for debug purpose (floating)
27	WL_DIS	Shared with GPIO9. Can defined as WLAN radio off function active low (If not used, this Pin can be left floating)
28	NC	No connect (floating)
29	GND	Ground connections
30	NC	No connect (floating)
31	GND	Ground connections

8. Supplier

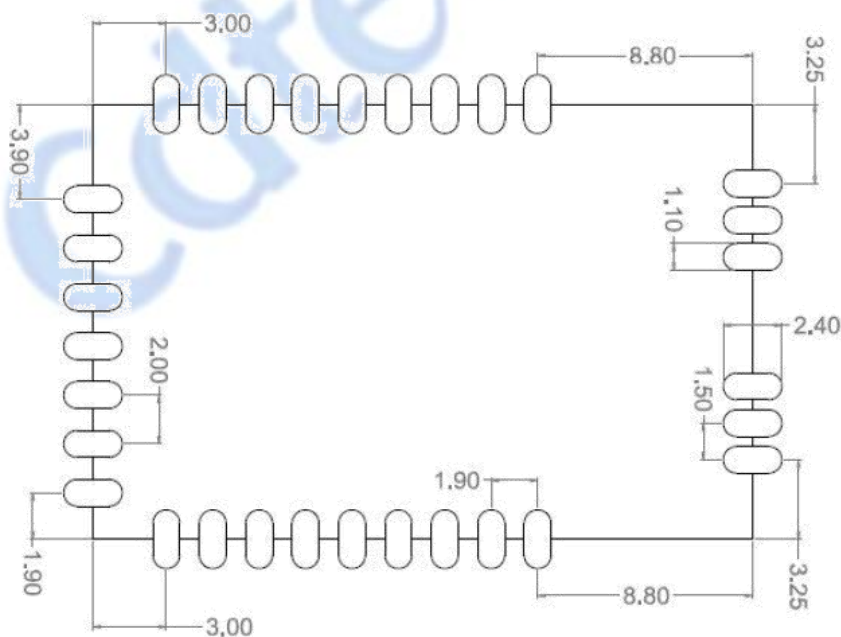
Supplier list	
Name of material	Material brand
Crystal	JWT/FK
Duplexer	GLEAD/Sunlord/TDK/PSA
Inductor	Sunlord
WiFi chip	Realtek

Capacitance	EYANG/VIIYONG/FENGHUA
Resistance	FENGHUA /FOSAN
PCB	A,O,I,F

9. Physical photo



10. Layout Recommendation



11.Baking & storage temperature & Recommended Reflow Profile

(烘烤, 储存温度和推荐炉温)

11.1 Baking & storage temperature

A. Storage life : 12 months. Storage conditions:<40°C. Relative humidity:<90%R.H.

(保存期限 : 12 个月, 储存环境条件 : 温度在 : <40°C , 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 $\leq 20\%RH$.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: $t \leq 30^{\circ}C$, $\leq 60\%R.H$.

(工厂环境温度湿度管制 : $\leq 30^{\circ}C$, $\leq 60\%R.H$, 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: $40^{\circ}C \pm 5^{\circ}C$, 120 hours. (烘烤温度条件 : $40^{\circ}C \pm 5^{\circ}C$, 120 小时).

c. After baking, put proper amount of desiccant to seal packages.

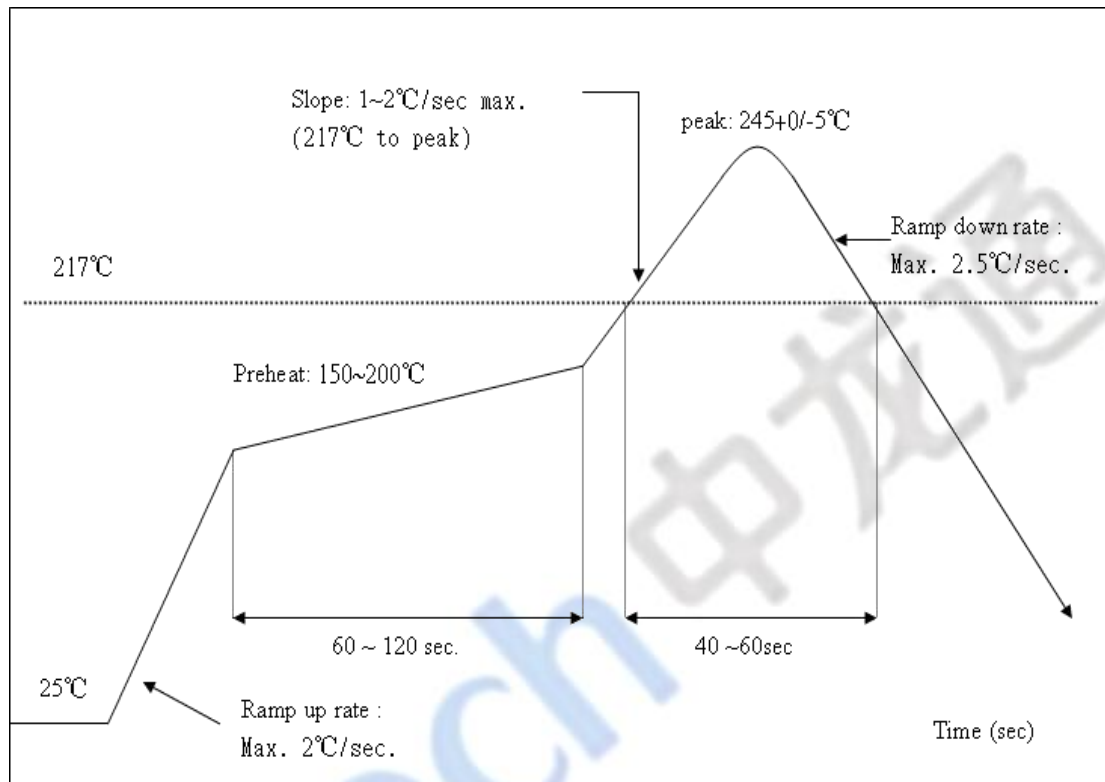
(烘烤后 , 放入适量的干燥剂再密封包装)

11.2 Recommended Reflow Profile

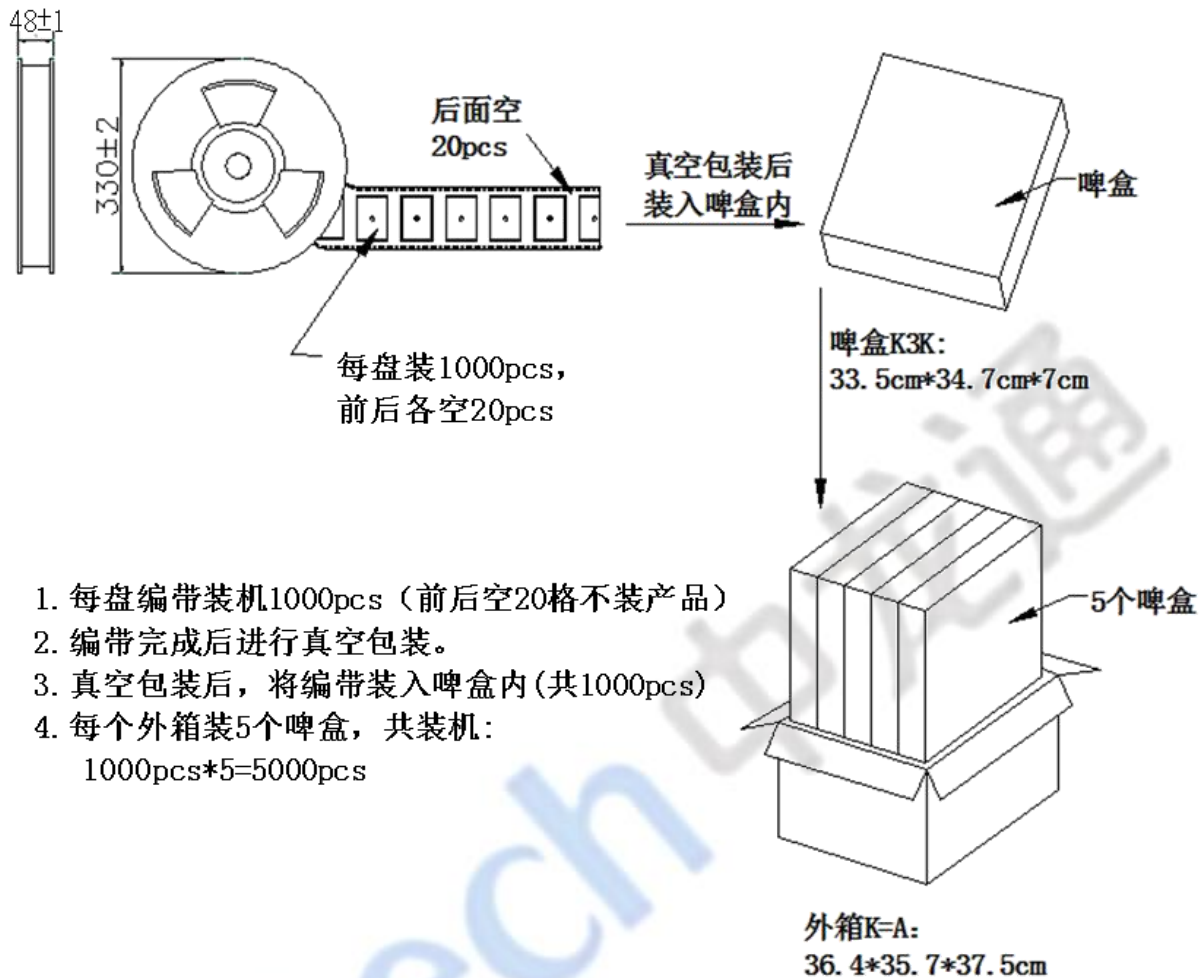
Referred IPC/JEDEC standard.

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

Number of Times : ≤ 2 times



12. Packing information



ESD CAUTION

The CDW-60832BU-00 is ESD (electrostatic discharge) sensitive device and may be damaged with ESD or spike voltage. Although CDW-60832BU-00 is with built-in ESD protection circuitry, please handle with care to avoid the permanent malfunction or the performance degradation.

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 a FPC Antenna, The antenna is the unique connector with a wire antenna.

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 not a limited 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: The antenna of this product is not a printed antenna, It's an FPC antenna

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:

2BN5S-2503P

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 an FPC antenna and uses a unique antenna connector

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: 2BN5S-2503P”

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: Top band 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.

FCC STATEMENT :

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.

Warning: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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.

FCC Radiation Exposure Statement:

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

The OEM must certify the final end product to comply with unintentional radiators (FCC Sections 15.107 and 15.109) before declaring compliance of the final product to Part 15 of the FCC rules and regulations. Integration into devices that are directly or indirectly connected to AC lines must add with Class II Permissive Change.

The OEM must comply with the FCC labeling requirements. If the module's label is not visible when installed, then an additional permanent label must be applied on the outside of the finished product which states: "Contains transmitter module FCC ID: 2BN5S-2503M". Additionally, the following statement should be included on the label and in the final product's user manual:

"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 interferences, and
- (2) this device must accept any interference received, including interference that may cause undesired operation."

The module is limited to installation in mobile or fixed applications. Separate approval is required for all other operating configurations, including portable configuration with respect to Part 2.1093 and different antenna configurations.

A module or modules can only be used without additional authorizations if they have been tested and granted under the same intended end - use operational conditions, including simultaneous transmission operations.

When they have not been tested and granted in this manner, additional testing and/or FCC application filing may be required. The most straightforward approach to address additional testing conditions is to have the grantee responsible for the certification of at least one of the modules submit a permissive change application.

When having a module grantee file a permissive change is not practical or feasible, the following guidance provides some additional options for host manufacturers. Integrations using modules where additional testing and/or FCC application filing(s) may be required are: (A) a module used in devices requiring additional RF exposure compliance information (e.g., MPE evaluation or SAR testing); (B) limited and/or split modules not meeting all of the module requirements; and (C) simultaneous transmissions for independent collocated transmitters not previously granted together.

This Module is full modular approval, it is limited to OEM installation ONLY.

Integration into devices that are directly or indirectly connected to AC lines must add with Class II Permissive Change. (OEM) Integrator has to assure compliance of the entire end product include the integrated Module. Additional measurements (15B) and/or equipment authorizations (e.g. Verification) may need to be addressed depending on co-location or simultaneous transmission issues if applicable. (OEM) Integrator is reminded to assure that these installation instructions will not be made available to the end user

IC labeling requirement for the final end product:

The final end product must be labeled in a visible area with the following "Contains IC: 33667-2503P"

The Host Marketing Name (HMN) must be indicated at any location on the exterior of the host product or product packaging or product literature, which shall be available with the host product or online.

This radio transmitter [IC:33667-2503P] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Frequency range	Manufacturer	Peak gain	Impedance	Antenna type
2402~2480MHz	Shenzhen Be-Comfortable Technology Co. Ltd	3.05dbi	50 Ω	FPC Antenna
2412~2462MHz	Shenzhen Be-Comfortable Technology Co. Ltd	3.05dbi	50 Ω	FPC Antenna
5150-5250MHz	Shenzhen Be-Comfortable Technology Co. Ltd	3.75dbi	50 Ω	FPC Antenna
5250-5350MHz	Shenzhen Be-Comfortable Technology Co. Ltd	4.5dbi	50 Ω	FPC Antenna
5470-5725MHz	Shenzhen Be-Comfortable Technology Co. Ltd	3.78dbi	50 Ω	FPC Antenna
5725-5850 MHz	Shenzhen Be-Comfortable Technology Co. Ltd	4.29dbi	50 Ω	FPC Antenna

This device complies with CAN ICES-3 (B)/NMB-3(B)

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference, and
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil est conforme à la norme CAN ICES-3 (B)/NMB-3 (B)

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

- (1) l'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement