RB1762-25
Bluetooth Module

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1 Device Overview

1.1 Features

- Ultra-low consumption with intelligent PMU

- Supports Bluetooth 5 core specification

- Supports 2Mbps LE

- LE advertising Extensions

- LE Long Range

- Additional Adv channel

- High Duty Cycle Non-Connectable Adv

- Supports multiple level Low Energy states

- Supports LE L2CAP Connection Oriented Channel Support

- Supports GAP,ATT/GATT,SMP,L2CAP

- Supports LE low duty directed advertising

- Supports LE data length extension feature

- Support OTA programming mechanism for firmware upgrade

1.2 Applications

- Mesh LED
- Mice and wireless keyboard
- Game controllers & joysticks
- Voice remote controls

- Home automation
- Sensor network devices
- Amazon gadgets
- Smart lighting/appliances

1.3 Description

The Module is designed base on the Realtek RTL8762CMF that is an ultra-low power system on-chip solution for Bluetooth 5.0 low energy applications.

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2.2 Pin Functions

Table 1. Pin Attributes of RB1762-25

Pin	Name	Type	Description
1,2,8,9,25	GND	Ground	Ground
3	P3_1	I/O	General purpose IO;refer to the Pin Multiplexer Table 8mA driving capability With wakeup function With inter strong/weak pull-up and pull-down HCI_UART_RX(default)
4	P3_0	I/O	General purpose IO;refer to the Pin Multiplexer Table 8mA driving capability With wakeup function With inter strong/weak pull-up and pull-down HCI_UART_TX(default)
5	P0_3	I/O	LOG_UART_TX Power on trap:Pull-up for normal operation Pull-down to bypass executing program code in flash
6	P1_1	I/O	General purpose IO;refer to the Pin Multiplexer Table 8mA driving capability With wakeup function With inter strong/weak pull-up and pull-down SWDCLK(default)
7	P1_0	I/O	General purpose IO;refer to the Pin Multiplexer Table 8mA driving capability With wakeup function With inter strong/weak pull-up and pull-down SWDIO(default)
10	RESET	I	Hardware reset pin,low active
11	P0_6	I/O	General purpose IO 8mA driving capability With wakeup function With inter strong/weak pull-up and pull-down
12	P0_5	I/O	General purpose IO 8mA driving capability With wakeup function With inter strong/weak pull-up and pull-down
13	P0_4	I/O	General purpose IO 8mA driving capability With wakeup function With inter strong/weak pull-up and pull-down
14	P0_2	I/O	General purpose IO 8mA driving capability With wakeup function With inter strong/weak pull-up and pull-down
15	P0_1	I/O	General purpose IO 8mA driving capability With wakeup function With inter strong/weak pull-up and pull-down
16	P0_0	I/O	General purpose IO 8mA driving capability With wakeup function With inter strong/weak pull-up and pull-down
17	P2_2	I/O	General purpose IO 8mA driving capability With wakeup function With inter strong/weak pull-up and pull-down AUXADC input 2

18	P2_3	I/O	General purpose IO 8mA driving capability With wakeup function With inter strong/weak pull-up and pull-down AUXADC input 3
19	P2_4	I/O	General purpose IO 8mA driving capability With wakeup function With inter strong/weak pull-up and pull-down AUXADC input 4
20	P2_5	I/O	General purpose IO 8mA driving capability With wakeup function With inter strong/weak pull-up and pull-down AUXADC input 5
21	P2_6	I/O	General purpose IO 8mA driving capability With wakeup function With inter strong/weak pull-up and pull-down AUXADC input 6
22	P2_7	I/O	General purpose IO 8mA driving capability With wakeup function With inter strong/weak pull-up and pull-down AUXADC input 7
23	P5_0	Ground	Ground
24	VDD	Power Supply	Supply 1.8V~3.3V

Note:Pin Multiplexer

All GPINote:Pin Multiplexer

All GPIO pins are configurable via the built-in pin multiplexer(PINMUX), The table shows all GPIO pin configurations.All pins have an internal pull-up pull-down resistor for controlling GPIO_PU and GPIO_PD.O pins are configurable via the built-in pin multiplexer(PINMUX), The table shows all GPIO pin configurations.All pins have an internal pull-up pull-down resistor for controlling GPIO_PU and GPIO_PD.

Pin Multiplexer Table

0	IDEL	25	qdec_phase_a_z	50	SPI0_CLK (master only)	75	KEY_COL_17	100	Reserved	125	Reserved
1	HCI_UART_TX	26	qdec_phase_b_z	51	SPI0_MO (master only)	76	KEY_COL_18	101	Reserved	126	Reserved
2	HCI_UART_RX	27	UART2_TX	52	SPI0_MI (master only)	77	KEY_COL_19	102	PDM (clk)	127	MCLK
3	HCI_UART_CTS	28	UART2_RX	53	SPI2W_DATA (master only)	78	KEY_ROW_0	103	PDM (data)		
4	HCI_UART_RTS	29	UART1_TX	54	SPI2W_CLK (master only)	79	KEY_ROW_1	104	UART2_CTS		
5	I2C0_CLK	30	UART1_RX	55	SPI2W_CS (master only)	80	KEY_ROW_2	105	UART2_RTS		
6	I2C0_DAT	31	UART1_CTS	56	SWD_CLK	81	KEY_ROW_3	106	Reserved		
7	I2C1_CLK	32	UART1_RTS	57	SWD_DIO	82	KEY_ROW_4	107	Reserved		
8	I2C1_DAT	33	IRDA_TX	58	KEY_COL_0	83	KEY_ROW_5	108	Reserved		
9	PWM2_P	34	IRDA_RX	59	KEY_COL_1	84	KEY_ROW_6	109	Reserved		
10	PWM2_N	35	UART0_TX	60	KEY_COL_2	85	KEY_ROW_7	110	Reserved		
11	PWM3_P	36	UART0_RX	61	KEY_COL_3	86	KEY_ROW_8	111	Reserved		
12	PWM3_N	37	UART0_CTS	62	KEY_COL_4	87	KEY_ROW_9	112	Reserved		
13	PWM0	38	UART0_RTS	63	KEY_COL_5	88	KEY_ROW_10	113	Reserved		
14	PWM1	39	SPI1_SS_N_0 (master only)	64	KEY_COL_6	89	KEY_ROW_11	114	Reserved		
15	PWM2	40	SPI1_SS_N_1 (master only)	65	KEY_COL_7	90	DWGPIO	115	Reserved		
16	PWM3	41	SPI1_SS_N_2 (master only)	66	KEY_COL_8	91	I2S_LRCLK	116	Reserved		
17	PWM4	42	SPI1_CLK (master only)	67	KEY_COL_9	92	I2S_BCLK	117	EN_EXPA		
18	PWM5	43	SPI1_MO (master only)	68	KEY_COL_10	93	I2S_ADCDAT	118	EN_EXLNA		
19	PWM6	44	SPI1_MI (master only)	69	KEY_COL_11	94	I2S_DACDAT	119	ANT_SW0		
20	PWM7	45	SPI0_SS_N_0 (slave)	70	KEY_COL_12	95	Reserved	120	ANT_SW1		
21	qdec_phase_a_x	46	SPI0_CLK (slave)	71	KEY_COL_13	96	DMIC1_CLK	121	ANT_SW2		
22	qdec_phase_b_x	47	SPI0_SO (slave)	72	KEY_COL_14	97	DMIC1_DAT	122	ANT_SW3		
23	qdec_phase_a_y	48	SPI0_SI (slave)	73	KEY_COL_15	98	Reserved	123	Reserved		
24	qdec_phase_b_y	49	SPI0_SS_N_0 (master only)	74	KEY_COL_16	99	Reserved	124	Reserved		

3 Specifications

3.1 Absolute Maximum Rating

1) Power supply voltage :

    VDD:1.8V~3.3V

2) Operation temperature range： -30℃~+85℃

3) Storage temperature range： -40℃~+115℃

3.2 Power Consumption:

Condition: VDD=3V, ambient temperature: 25°C

1) Low Power Mode

Power Mode	Always on Registers	32k RCOSC/XTAL	Retention SRAM	CPU	Wakeup Method	Current Consumption(Typical)
Power down	ON	OFF	OFF	OFF	Wakeup by GPIO	450nA

2)Active Mode

Condition:VDD=3V,ambient temperature:25℃

Power Mode	Current Consumption(Typical)
Active RX mode	7.3mA
Active TX mode(TX power:0dBm)	7.9mA
Active TX mode(TX power:4dBm)	9.6mA
Active TX mode(TX power:7.5dBm)	11.3mA

3.3 RF Characteristics

1) Receiver RF Specifications

Parameter	Condition	Min.	Typ.	Max.
Frequency Range(MHz)		2402		2480
Sensitivity(dBm)	PER≤30.8%		−90	
Maximum Input Level(dBm)	PER≤30.8%		−1	
C/I	C/Ico-channel(dB)	21		
	C/I$_{+1MHz}$(dB)	15		
	C/I$_{-1MHz}$(dB)	15		
	C/I$_{+2MHz}$(dB)	−17		
	C/I$_{-2MHz}$(dB)	−15		
	C/I$_{+3MHz}$(dB)	−27		
	C/I$_{Image}$(dB)	−9		
	C/I$_{Image+1MHz}$(dB)	−15		
	C/I$_{Image-1MHz}$(dB)	−15		

Blocker Power(dBm)	30～2000MHz, Wanted signal level=-67dBm	-30		
	2003～2399MHz, Wanted signal level=-67dBm	-35		
	2484～2997MHz, Wanted signal level=-67dBm	-35		
	3000MHz～12.75GHz, Wanted signal level=-67dBm	-30		
Max PER Report Integrity	Wanted signal:-30dBm		50%	
Max Intermodulation level (dBm)	Wanted signal(f0):-64dBm Worst intermodulation level@2f1-f2=f0, |f1-f2|=nMHz,n=3,4,5…	-50		

Note1：Does not include spur channel

Note2：Depends on PCB design and registers setting

2) Transmitter RF Specifications

Parameter	Condition	Min.	Typ.	Max.
Maximum Output Power(dBm)	-	-	-	8
Adjacent Channel Power Ratio (dBm)	+2MHz	-	-	-20
	-2MHz	-	-	-20
	≥+3MHz	-	-	-30
	≤-3MHz	-	-	-30
Modulation Characteristics	$\Delta f1_{avg}$(kHz)	-	250	-
	$\Delta f2_{max}$(kHz)	185	-	-
	$\Delta f2_{max}$	-	100	-
	$\Delta f2_{max}$PassRate(%)	-	0.88	-
Carrier Frequency Offset and Drift	Average Fn(kHz)	-	12.5	-
	Drift Rate(kHz/50us)	-	10	-
	Avg Rate(kHz/50us)	-	10	-
	Max Rate(kHz/50us)	-	10	-

5 Mechanical and Package

5.1 Mechanical Dimension
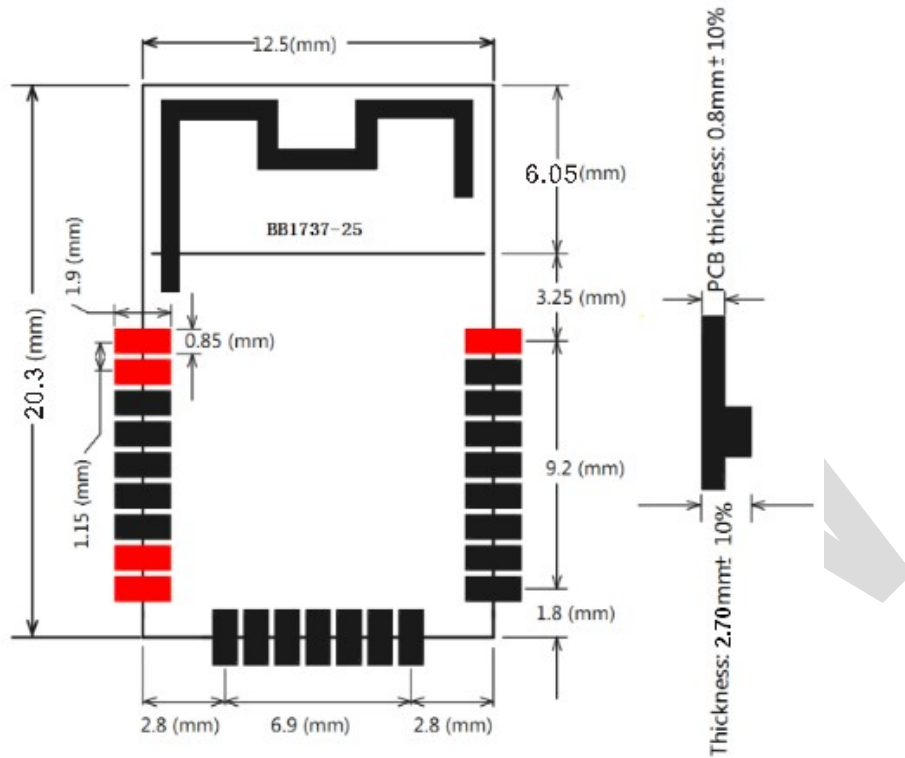
PCB thickness:0.8mm . Product thickness 2.70mm±0.3mm

Figure 6. Mechanical Dimension

Note:Unit is mm. Size tolerance：±0.13mm.

5.2 Package Information
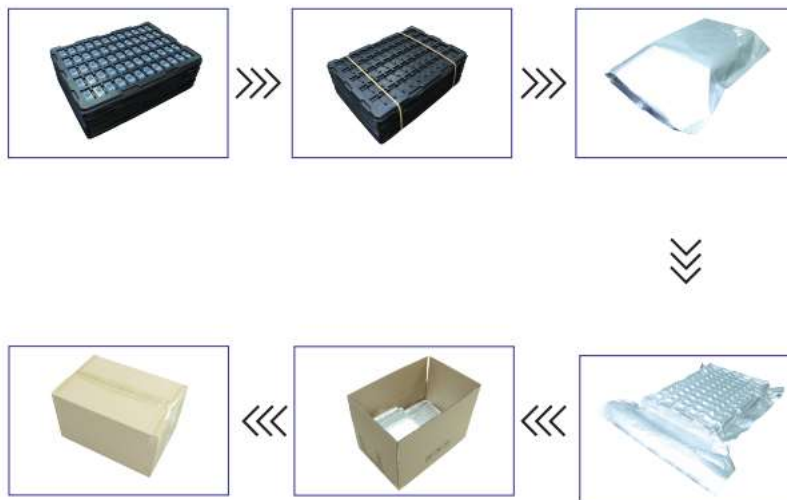
Figure 8. Packaging Information

6 Thermal Reflow

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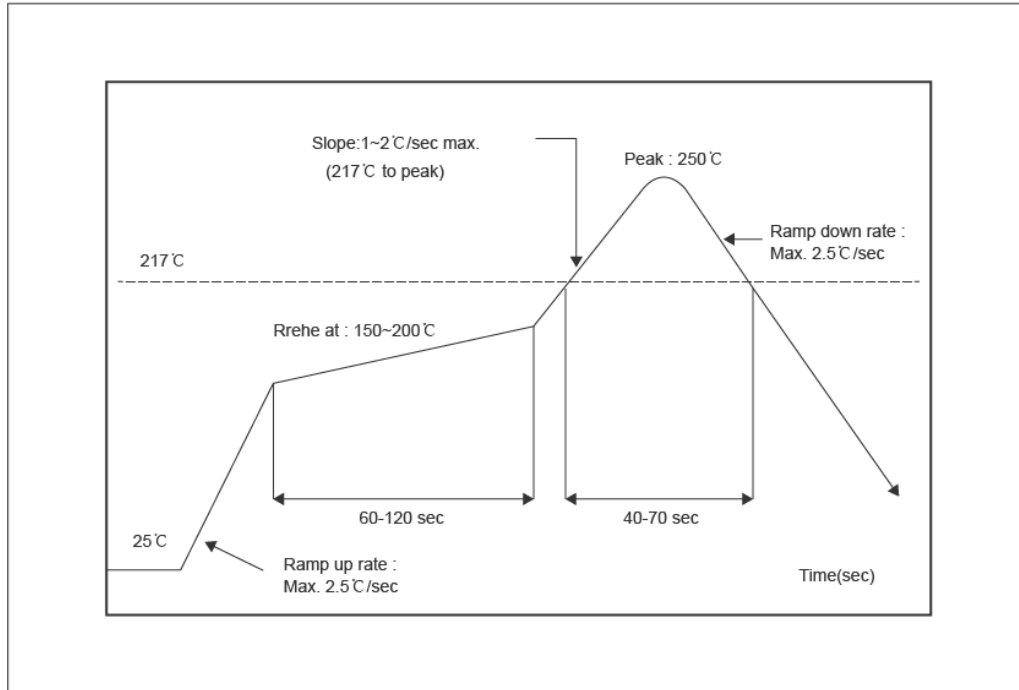
Peak temperature: <250°C

Number of times: 6≤2

Figure 9. Recommended Reflow for Lead Free Solder

Note：Suggest the module can't be go through the reflow furnace again.

7 Ordering Information

Part NO.	Working Voltage	ANT	Shielding cover	Remark
RB1762-25	VDD:1.8V~3.3V	PCB ANT	included	

8 Revision History

Date	Version No.	Description	Author
2020.07.19	V0.1	Initial version	Vin

FCC Regulatory notices

Modification statement

Haier US Appliance Solutions, Inc. has not approved any changes or modifications to this device by the user. Any changes or modifications could void the user's authority to operate the equipment.

Interference statement

This device complies with Part 15 of the FCC Rules and 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.

RF exposure

This equipment complies with FCC and ISED radiation exposure limits set forth for an uncontrolled environment. The antenna should be installed and operated with minimum distance of 5mm between the radiator and your body. Antenna gain must be below 0dBi.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. The host end product must include a user manual that clearly defines operating requirements and conditions that must be observed to ensure compliance with current FCC RF exposure guidelines.

For portable devices, in addition to above, a separate approval is required to satisfy the SAR requirements of FCC Part 2.1093.

If the device is used for other equipment that separate approval is required for all other operating configurations, including portable configurations with respect to 2.1093 and different antenna configurations.

FCC Class B digital device notice

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

Labelling Requirements for the Host device

The host device shall be properly labelled to identify the modules within the host device. The certification label of the module shall be clearly visible at all times when installed in the host device, otherwise the host device must be labelled to display the FCC ID and ISED of the module, preceded by the words "Contains transmitter module", or the word "Contains", or similar wording expressing the same meaning, as follows:

ISED Canada Statement:

This device contains licence-exempt tasmittre(s)/receiver(s)/ that comply with Innovation Science and Economic Development Canada 's licence-exempt RSS(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.

Radiation Exposure: This equipment complies with Canada radiation exposure limits set forth for an uncontrolled environment

RF Exposure Statement

To maintain compliance with IC's RF Exposure guidelincs, This cquipment should be.installed and operated with minimum distance of 5mm the radiator your body. This device and its antenna(s) must not be co-located or operation in conjunction with any other antenna or transmitter

D é claration de l'ISED Canada :

Cet appareil contient des tasmittre (s) / r é cepteur (s) sans licence / conformes à l'innovationRSS exemptes de licence de Sciences et D é veloppement é conomique Canada. L'op é ration est sous r é serve des deux conditions

suivantes :

1) cet appareil ne peut pas causer d'interf é rences et

2) ce dispositif doit accepter toute interf é rence, y compris peut provoquer le fonctionnement ind é sirable de l'appareil.

Exposition aux rayonnements : Cet é quipement est conforme aux radiations du Canada limites d'exposition pour un environnement incontrôl é

nonc é d'exposition RF

Pour maintenir le respect des guides d'exposition RF d'IC, cquipment doit ê tre.install é et actionn é avec une distance minimale de 5mm le radiateur de votre corps. Cet appareil et ses antennes ne doivent pas ê tre co-localis é ou en op é ration en conjonction avec toute autre antenne ou é metteur

OEM Statement

a. The module manufacturer must show how compliance can be demonstrated only for specific host or hosts

b. The module manufacturer must limit the applicable operating conditions in which t transmitter will be used, and

c. The module manufacturer must disclose that only the module grantee can make the te evaluation that the module is compliant in the host. When the module grantee either refuses to make this evaluation, or does not think it is necessary, the module certification is rendered invalid for use in the host, and the host manufacturer has no choice other than to use a different module, or take responsibility (§ 2.929) and obtain a new FCC ID for the product.

d. The module manufacturer must provide the host manufacturer with the followi requirements:

i.   The host manufacturer is responsible for additional testing to verify compliance as composite system. When testing the host device for compliance with Part 15 Subpart B, the host manufacturer is required to show compliance with Part 15 Subpart B while the transmitter module(s) are installed and operating. The modules should be transmitting and the evaluation should confirm that the module's intentional emissions are compliant (i.e. fundamental and out of band emissions).

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 Part 15 Subpart C Section 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 uses PCB Antenna, antenna gain: 0dBi. There is no restriction on the installation method.

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 mnodule

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.4

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: This module does not use Trace antenna designs.

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.

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 uses PCB Antenna, antenna gain: 0dBi.

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 he following texts: "Contains FCC ID: ZKJ-BLEA004

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 standalone
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: Data transfer module demo board can control the EUT work in RF test mode at spcified test channel

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