

Product Specification

| | |
|---------------------|----------------------------------|
| Product Description | BLE Module |
| Module NO | K 6 !-6 * & 7 8 -V1.0 |
| Customer Name | |
| Customer PN | |

| | | |
|--------------------------------|-----------------------------|------------------------------------|
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|--------------------------------|-----------------------------|------------------------------------|

| Customer acknowledgement column | | |
|---------------------------------|------------------------|--------------------|
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| | | |

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Catalog

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1 Basic Information

1.1 Module type

| Module | Size | Process types | Mark |
|----------------|-----------------------|---------------|------|
| LH-BM62CA-V1.0 | 12mm*12mm*2.0mm±0.2mm | SMD | |
| | | | |

1.2 Revision History

| Date | Version | Authorized | Remarks |
|------------|---------|------------|----------------------------------|
| 2022-03-21 | 1.0 | MaxZhang | First release |
| 2022-05-09 | 1.01 | MaxZhang | Uptate PIN2 definition of Module |
| | | | |
| | | | |
| | | | |

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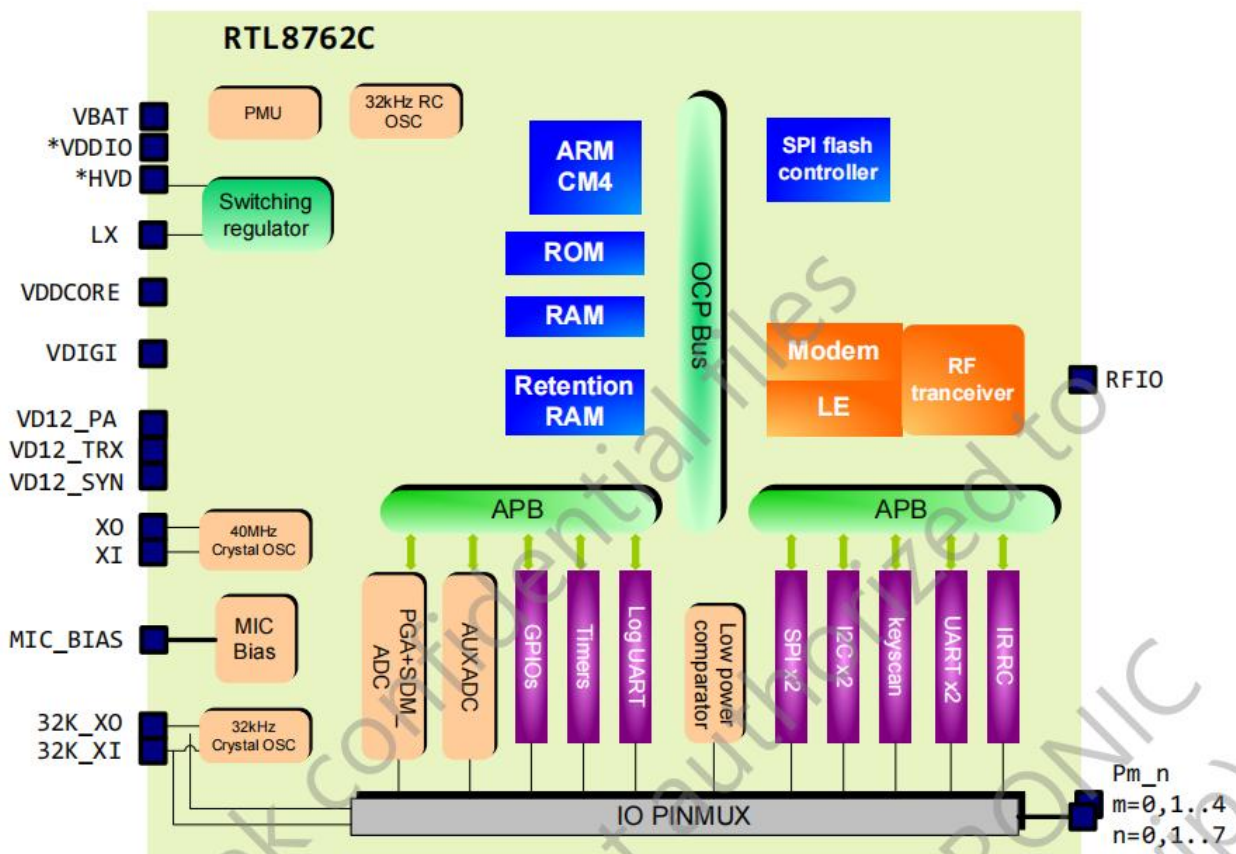
2、General Description

The LH-BM62CA-V1.0 is a 12mmX12mm module. It is based on Realtek RTL8762CMF chip.

The LH-BM62CA-V1.0 is an ultra-low-power system on-module solutions for Bluetooth 5 low energy applications that combine the excellent performance of a leading RF transceiver with a low-power ARM Cortex-M4F and rich powerful supporting features and peripherals.

The embedded ARM Cortex-M4F 32-bit CPU features a 16-bit instruction set with 32-bit extensions that delivers high-density code with a small memory footprint. By using a single-cycle 32-bit multiplier, a 3-stage pipeline, and a Nested Vector Interrupt Controller, the ARM Cortex-M4F makes program execution simple and highly efficient. The RTL8762c memory architecture includes ROM, 160kByte RAM and 8MByte Flash Address Space.

2.1 Block Diagram



2.2 Features

General

- Ultra-low power consumption with intelligent PMU
- Supports Bluetooth 5 core specification
- Supports 2Mbps LE
- LE advertising Extensions
- LE Long Range
- Channel Selection #2
- High Duty Cycle Non-Connectable Adv
- Integrated MCU to execute Bluetooth protocol stack
- Supports multiple level Low Energy states
- Supports LE L2CAP Connection Oriented Channel Support
- Supports LE low duty directed advertising
- Supports LE data length extension feature
- Supports OTA (Over-the-Air) programming mechanism for firmware upgrade
- Generic Applications for GAP Central, Peripheral, Observer and Broadcaster Roles
- The module has a 1db Bluetooth 2.4G Antenna built-in.

Interface

- Timers x 8
- I2C x 2
- PWM x 8
- UART x 2
- GPIO x 24
- I2S/PCM interface for external audio codec

Features

- ARM Cortex-M4F with floating-point unit (Maximum 40MHz)
- Serial flash controller with 16kB 4-way cache
- Total 160kB SRAM
- 160kB SRAM
- 4Kbits eFUSE for manufacturer use
- Embedded 4Mbits flash
- Max TX power:8dBm
- RX sensitivity:-97dBm BLE(min)

Operating Condition

- Operating voltage: 3.3V
- IO voltage:3.3V /1.8V
- Temperature range: -40°C to +85°C

Applications:

- MESH LED

3、Characteristic Description

3.1 Hardware features

| | |
|-------------------|--|
| Module | LH-BM62CA |
| PCB version | V1.0 |
| Major Chipset | RTL8762CMF |
| Standards | Bluetooth 5 |
| Operating Voltage | Operating voltage: 3.3V IO voltage: 3.3V / 1.8V |

3.2 Electrical features

3.2.1 power on timing is shown in the figures below

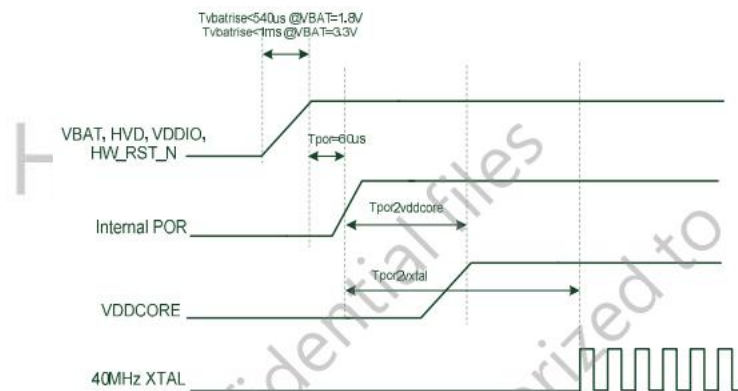


Figure 13. Boot Up By Internal Power On Reset Circuit

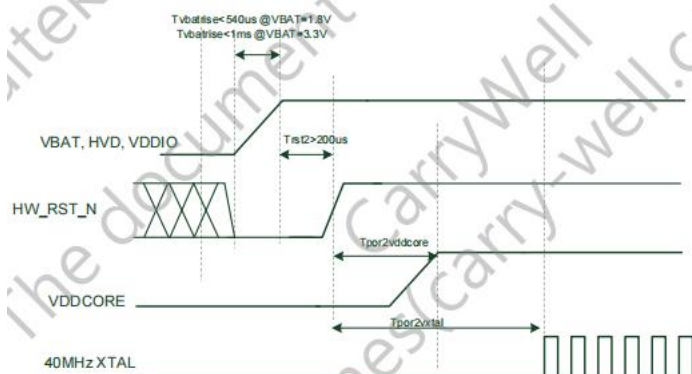


Figure 14. Boot Up By HW_RST_N Pin

3.2.2 Low Power Mode

Condition: VBAT=3V, VDDIO=3V, ambient temperature: 25 C

Table 26. 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 |
| Deep LPS | ON | ON | Retention | OFF | Wakeup by GPIO, timer | 2.5μA (with 160K SRAM in retention state) |

3.2.3 Active Mode Power Consumption

Condition: VBAT=3V, VDDIO=3V, ambient temperature: 25 C

Table 27. Active Mode (RTL8762CMF with Switching Regulator)

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

3.2.4 I2C Timing Characteristics

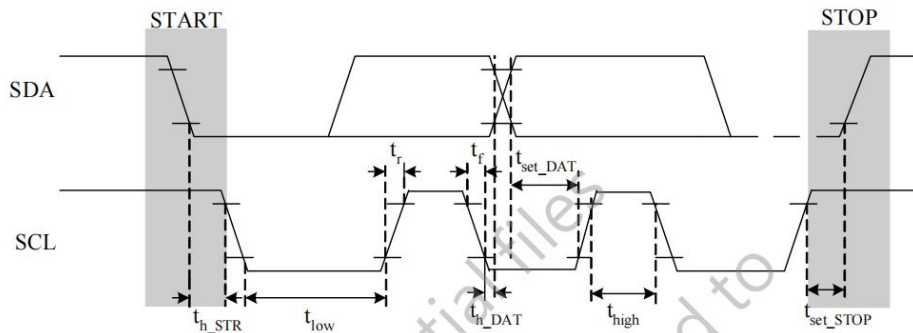


Figure 16. I2C Interface Timing Diagram

Table 25. I2C Timing Characteristics

| Parameter | Symbol | Min | Typical | Max |
|---|-----------------|----------|---------|-----|
| SCL clock frequency (kHz) | - | - | - | 400 |
| High period of SCL (ns) | t_{high} | 600 | - | - |
| Low period of SCL (ns) | t_{low} | 1300 | - | - |
| Hold time of START (ns) | t_{h_STR} | 600 | - | - |
| Hold time of DATA (ns) | t_{h_DAT} | 0 | - | - |
| Setup time of STOP (ns) | t_{set_STOP} | 600 | - | - |
| Setup time of DATA (ns) | t_{set_DAT} | 100 | - | - |
| Rise time of SCL and SDA (ns) (with 4.7k ohm resistor pulled high) | t_r | See note | - | - |
| Fall time of SCA and SDA (ns) | t_f | See note | - | - |

Note: Depends on the external bus pull up resistor.

3.2.5 UART Characteristics

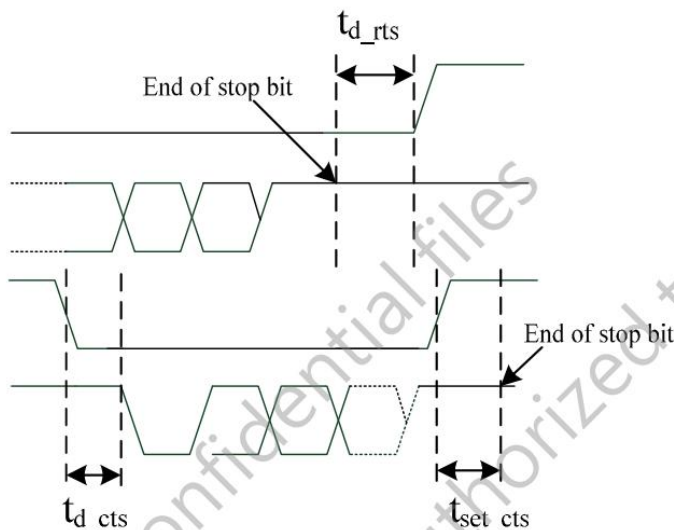


Figure 15. UART Characteristics

Table 24. UART Timing Characteristics

| Parameter | Symbol | Min | Typical | Max |
|---|----------------|-----|---------|-----|
| Timing between RX Stop bit and RTS go high when RX FIFO is full (symbol time) | t_{d_rts} | - | - | 0.5 |
| Timing between CTS go low and device send first bit (ns) | t_{d_cts} | - | - | 25 |
| Timing between CTS go high and TX send stop bit (ns) | t_{set_cts} | 75 | - | - |

3.2.6 AUX ADC

The RTL8762CMF/RTL8752CMF provides a built in (maximum 8 channels; the maximum number of ADC channels depends on the package type) 12bits, 400kpbs AUXADC for external analog signal sensing and internal VBAT voltage monitoring. The functional block is shown in Figure 12.

- A 12bits, max 400kpbs AUXADC with 8 channel sharing
- Flexible sampling schedule table for multi-channel sampling
- Divided mode: Supports 0~VBAT input range with internal resistor divider
- Internal VBAT voltage sensing
- Supports single-ended mode and differential mode

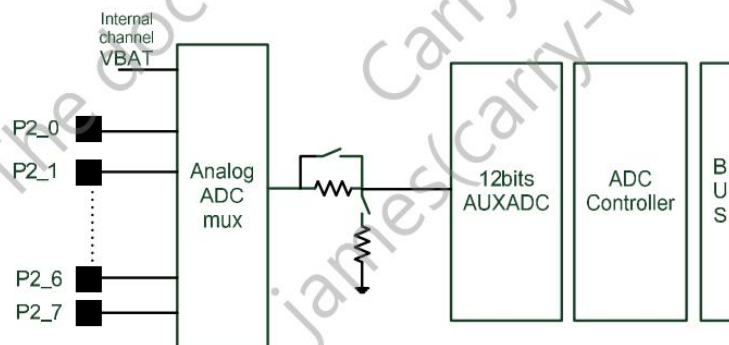


Figure 12. AUXADC Functional Block

3.3 Environmental Requirement

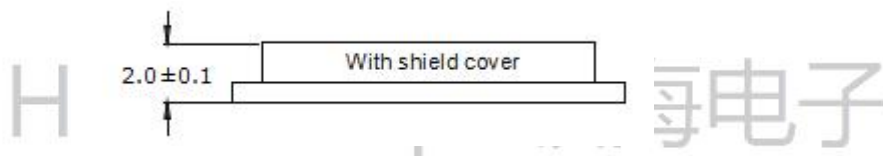
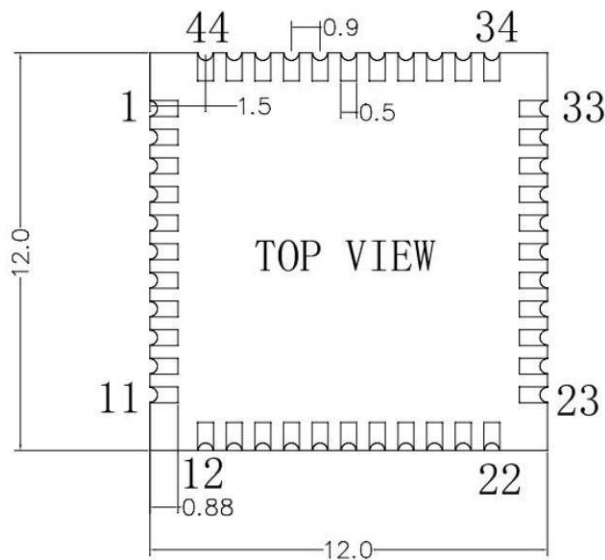
| | |
|------------------------------|-------------|
| Input power ripple | ≤50mV |
| VDD Power input requirements | 3.3V/0.3A |
| Operating Temperature | -40℃ ~ +85℃ |

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4、Mechanical Specifications

4.1 Size (unit:mm)

12*12*2.0mm ± 0.2



4.2 Pin definition and description

| Pin Number | Name | Description |
|------------|---------------|---|
| 1 | GND | GND |
| 2 | BTRF_OUT | BT_ANT |
| 3 | GND | GND |
| 4 | NC | Reserved.Floating |
| 5 | NC | Reserved.Floating |
| 6 | P4_1 | GPIO;With wakeup function |
| 7 | P4_2 | GPIO;With wakeup function |
| 8 | NC | Reserved.Floating |
| 9 | VCC | 3.3V/0.3A Main Power input |
| 10 | 32.768KHz_in | 32.768KHz crystal input or external clock input(Optional); |
| 11 | 32.768KHz_out | 32.768KHz crystal input or external clock output(Optional); |
| 12 | P2_3 | GPIO;With wakeup function;AUXADC input 3. |
| 13 | P2_4 | GPIO;With wakeup function;AUXADC input 4. |
| 14 | P2_5 | GPIO;With wakeup function;AUXADC input 5. |

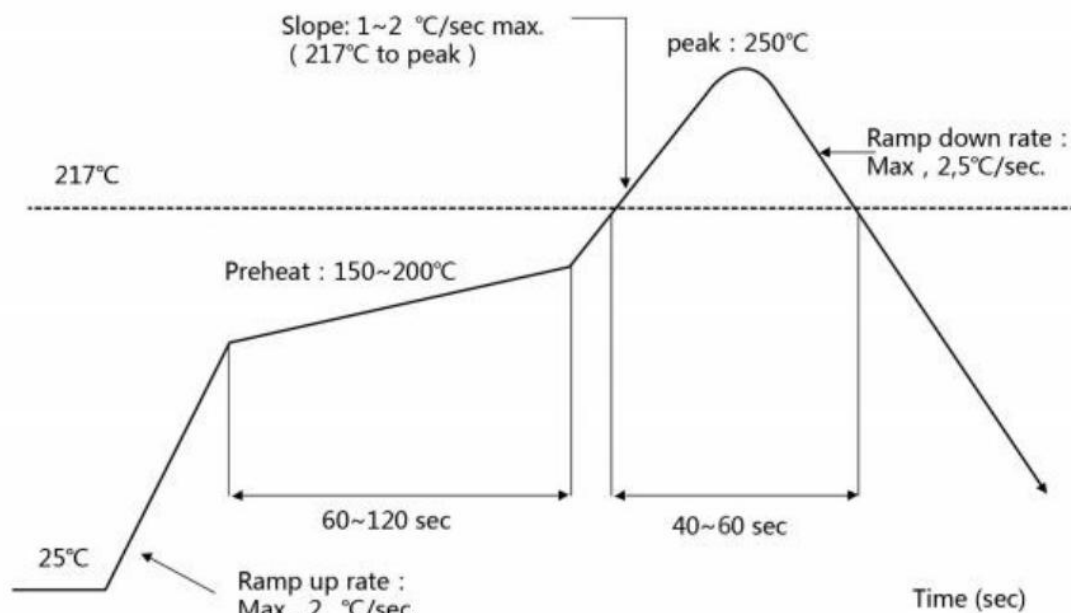
| | | |
|----|-------|---|
| 15 | P2_6 | GPIO;With wakeup function;AUXADC input 6. |
| 16 | P2_7 | GPIO;With wakeup function;AUXADC input 7. |
| 17 | P0_5 | GPIO;With wakeup function |
| 18 | P0_6 | GPIO;With wakeup function |
| 19 | P4_0 | GPIO;With wakeup function |
| 20 | GND | GND |
| 21 | NC | NC |
| 22 | VDDIO | 1.8V or 3.3V |
| 23 | NC | NC |
| 24 | NC | NC |
| 25 | P4_3 | GPIO;With wakeup function |
| 26 | P0_4 | GPIO;With wakeup function |
| 27 | P0_3 | GPIO;With wakeup function; Log_UART_TX; Pull-down to bypass executing program code in flash |
| 28 | P0_2 | GPIO;With wakeup function |
| 29 | NC | NC |
| 30 | NC | NC |
| 31 | GND | GND |
| 32 | NC | NC |
| 33 | GND | GND |
| 34 | P5_0 | GPIO;With wakeup function |
| 35 | P1_0 | GPIO;With wakeup function;SWDIO (default). |
| 36 | GND | GND |
| 37 | P2_2 | GPIO;With wakeup function;AUXADC input2. |
| 38 | P0_1 | GPIO;With wakeup function |
| 39 | P1_1 | GPIO;With wakeup function;SWDCLK (default). |
| 40 | P0_0 | GPIO;With wakeup function |
| 41 | P3_3 | GPIO;With wakeup function |
| 42 | P3_0 | GPIO;With wakeup function;HCI_UART_TX (default). |
| 43 | P3_1 | GPIO;With wakeup function;HCI_UART_RX (default). |
| 44 | P3_2 | GPIO;With wakeup function |

5、Reflow - furnace temperature curve

Referred to IPC/JEDEC standard.

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

Number of Times : ≤ 2 times



6、Patch BT modules installed before the notice

BT module installed note:

1. Please press 1 : 1 and then expand outward proportion to 0.7 mm, 0.12 mm thickness When open a stencil.
2. Take and use the WIFI module, please insure the electrostatic protective measures.
3. Reflow soldering temperature should be according to the customer the main size of the products, such as the temperature set at $250 \pm 5^{\circ}\text{C}$ for the MID motherboard.

About the module packaging, storage and use of matters needing attention are as follows:

1. The module of the reel and storage life of vacuum packing: 1). Shelf life: 8 months, storage environment conditions: temperature in: $< 40^{\circ}\text{C}$, relative humidity: $< 90\%$ r.h.
2. The module vacuum packing once opened, time limit of the assembly:

Card:

- 1) check the humidity display value should be less than 30% (in blue), such as: 30% ~ 40% (pink), or greater than 40% (red) the module have been moisture absorption.
 - 2) factory environmental temperature humidity control: $\leq -30^{\circ}\text{C}$, $\leq 60\%$ r.h..
 - 3) Once opened, the workshop the preservation of life for 168 hours.
3. Once opened, such as when not used up within 168 hours:
 - 1) The module must be again to remove the module moisture absorption.
 - 2) The baking temperature: 125°C , 8 hours. 3). After baking, put the right amount of desiccant to seal packages

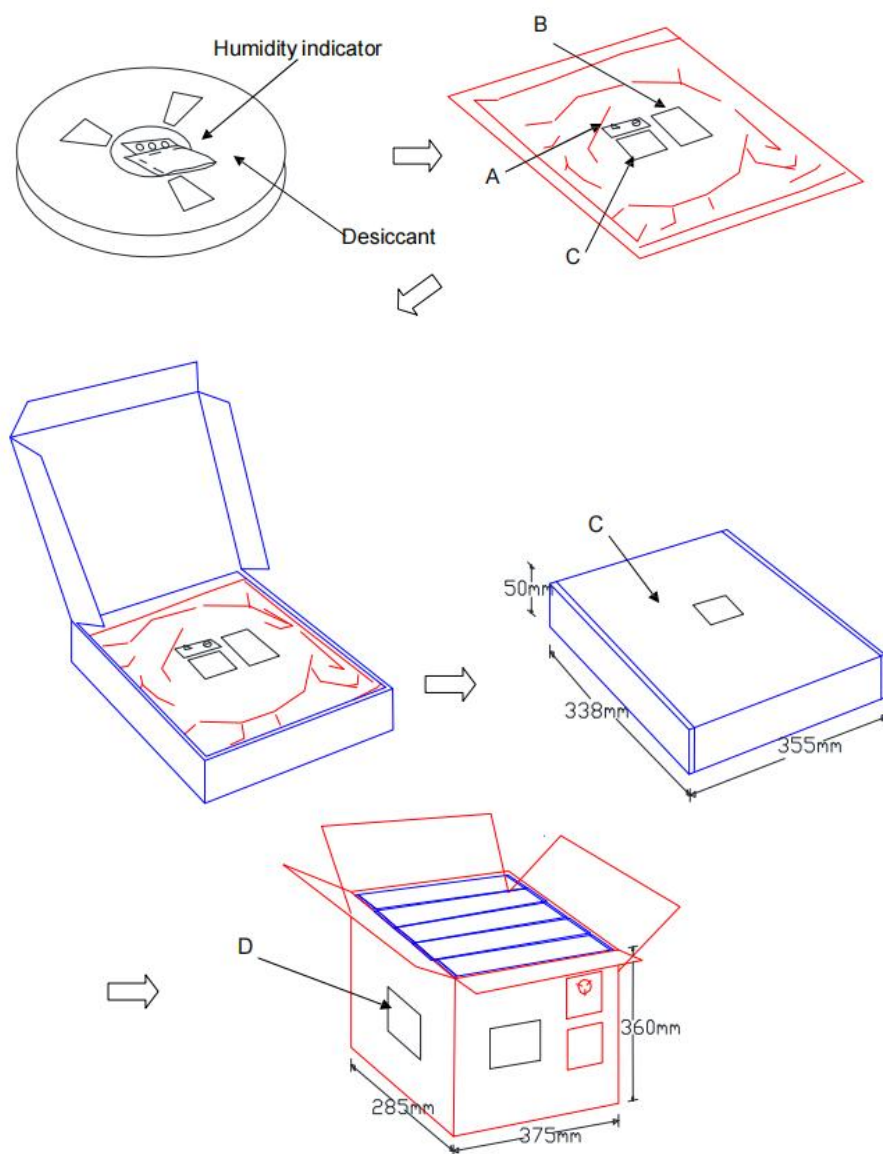
7、Package

7.1 Reel


A roll of 1500pcs

1> 1500pcs of per disc

2> 1500pcs * 5 = 7500pcs (one Cartoon)



7.2 MSL Level / Storage Condition



Caution
This bag contains
MOISTURE-SENSITIVE DEVICES

LEVEL

4

If blank, see adjacent bar code label

1. Calculated shelf life in sealed bag: 12 months at <40°C and <90% relative humidity(RH)
2. Peak package body temperature: 250 °C
If blank, see adjacent bar code label
3. After bag is opened, devices that will be subjected to reflow Solder or other high temperature process must be
 - a) Mounted within: 72 hours of factory conditions
If blank, see adjacent bar code label
≤30°C/60% RH, or
 - b) Stored per J-STD-033
4. Devices require bake, before mounting, if:
 - a) Humidity Indicator Card reads>10% for level 2a- 5a devices or>60% for level 2 devices when read at 23±5°C
 - b) 3a or 3b are not met.
5. If baking is required, refer to IPC/JEDEC J-STD-033 for bake procedure.

Bag Seal Date: _____
If blank, see adjacent bar code label

Note: Level and body temperature defined by IPC/JEDEC J-STD-020

※NOTE : Accumulated baking time should not exceed 96hrs



FCC Warning

Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01

2.2 List of applicable FCC rules

FCC Part 15.247

2.3 Specific operational use conditions

This transmitter/module and its antenna(s) must not be co-located or operating in conjunction with any transmitter. This information also extends to the host manufacturer's instruction manual.

2.4 Limited module procedures

Not applicable

2.5 Trace antenna designs

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

This equipment complies with FCC, RF 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.

2.7 Antennas

PCB Antenna; 1.4dBi; 2.402 GHz~2.480GHZ

2.8 Label and compliance information

The end product must carry a physical label or shall use e-labeling followed KDB784748D01 and KDB 784748 stating "Contains Transmitter Module FCC ID: 2APNFWAC000006.

2.9 Information on test modes and additional testing requirements

For more information on testing, please contact the manufacturer.

2.10 Additional testing, Part 15 Subpart B disclaimer

The modular transmitter is FCC authorized for the specific rule parts (FCC Part 15.247) 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. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed when contains digital circuitry.

FCC Statements

(OEM) Integrator has to assure compliance of the entire end-product incl. the integrated RF Module. For 15 B (\$15.107 and if applicable \$15.109) compliance, the host manufacturer is required to show compliance with 15 while the module is installed and operating.

Furthermore the module should be transmitting and the evaluation should confirm that the module's intentional emissions (15C) are compliant (fundamental / out-of-band). Finally the integrator has to apply the appropriate equipment authorization (e.g. Verification) for the new host device per definition in \$15.101.

Integrator is reminded to assure that these installation instructions will not be made available to the end-user of the final host device.

The final host device, into which this RF Module is integrated" has to be labeled with an auxiliary label stating the FCC ID of the RF Module, such as "Contains FCC ID: 2APNFWAC000006

Module statement

The single-modular transmitter is a self-contained, physically delineated, component for which compliance can be demonstrated independent of the host operating conditions, and which complies with all eight requirements of S 15.212(a)(1) as summarized below.

- 1) The radio elements have the radio frequency circuitry shielded.
- 2) The module has buffered modulation/data inputs to ensure that the device will comply with Part 15 requirements with any type of input signal.
- 3) The module contains power supply regulation on the module.
- 4) The module contains a permanently attached antenna.
- 5) The module demonstrates compliance in a stand-alone configuration.
- 6) The module is labeled with its permanently affixed FCC ID label.
- 7) The module complies with all specific rules applicable to the transmitter, including all the conditions provided in the integration instructions by the grantee.
- 8) The module complies with RF exposure requirements.

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.

FCC warning:

Any 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.

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.