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# BKSG2-MINI Datasheet

DS-BKSG2-MINI-E03 V1.2

2026/5/19

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# 1. Module Overview

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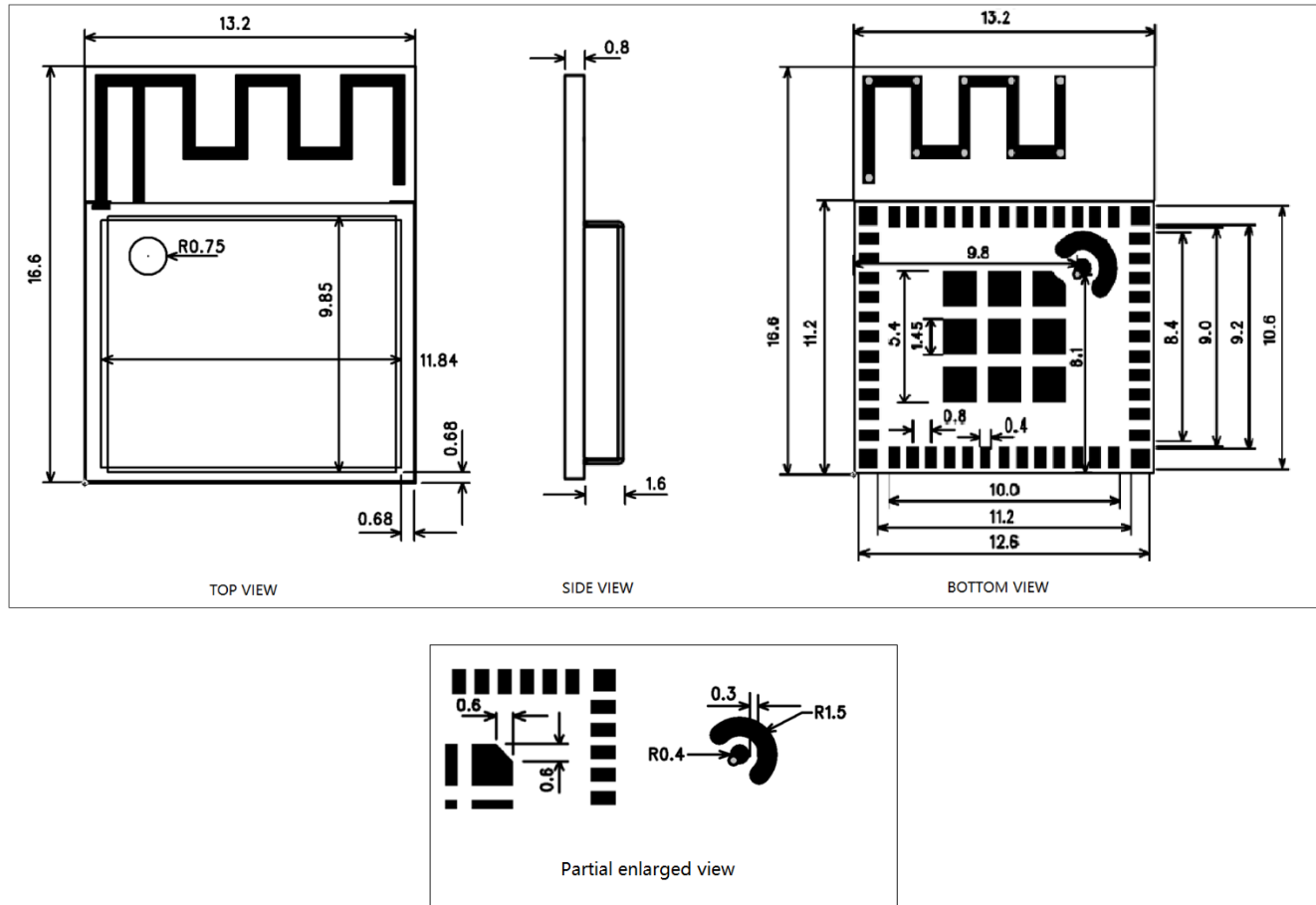
The BKSG2-MINI is a low-power, high-performance Wi-Fi + Bluetooth LE module. It consists of the BK7236N SoC and peripheral resistors and capacitors, crystal oscillators, buck inductors, and onboard PCB antenna. It is a 1x1 single-band 2.4 GHz Wi-Fi 6 and Bluetooth 5.2 combo solution. The module also has a simple and easy-to-use interface targeted for lighting applications. A variety of products can be developed based on this module.

The BK7236N integrates a 32-bit Armv8-M STAR-MC1 MCU that operates at 160 MHz by default. It also incorporates 4 MB flash and 512 KB RAM.

## 2. Module Outline

### 2.1 Module Dimensions

Figure 2-1 Module Dimensions (Unit: mm)



The module dimensions are as below:

- Length: 16.6 mm
- Width: 13.2 mm
- Board thickness: 0.8 mm
- Maximum overall thickness: 3.2 mm



## 2.5 Module PCB Antenna

Gain: -0.7 dBi

Efficiency: 43%

## 2.6 Schematic

Figure 2-3 shows the schematic of the module.

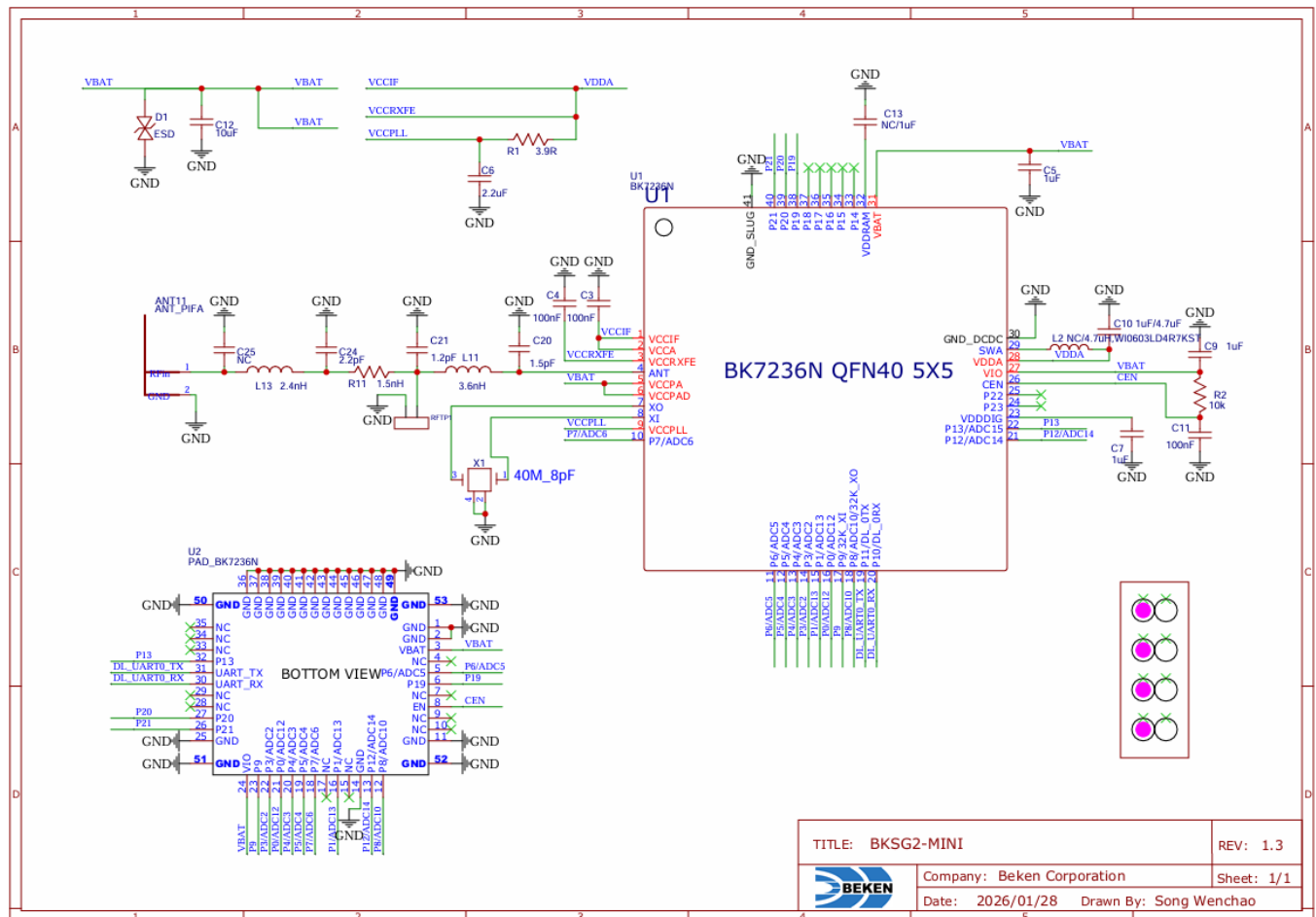


Figure 2-3 BSG2-MINI Schematic

## 3. Pin Descriptions

Figure 3-1 shows the pin assignments of the module.

**Figure 3-1 Pin Assignments (Bottom Layer, Top View)**

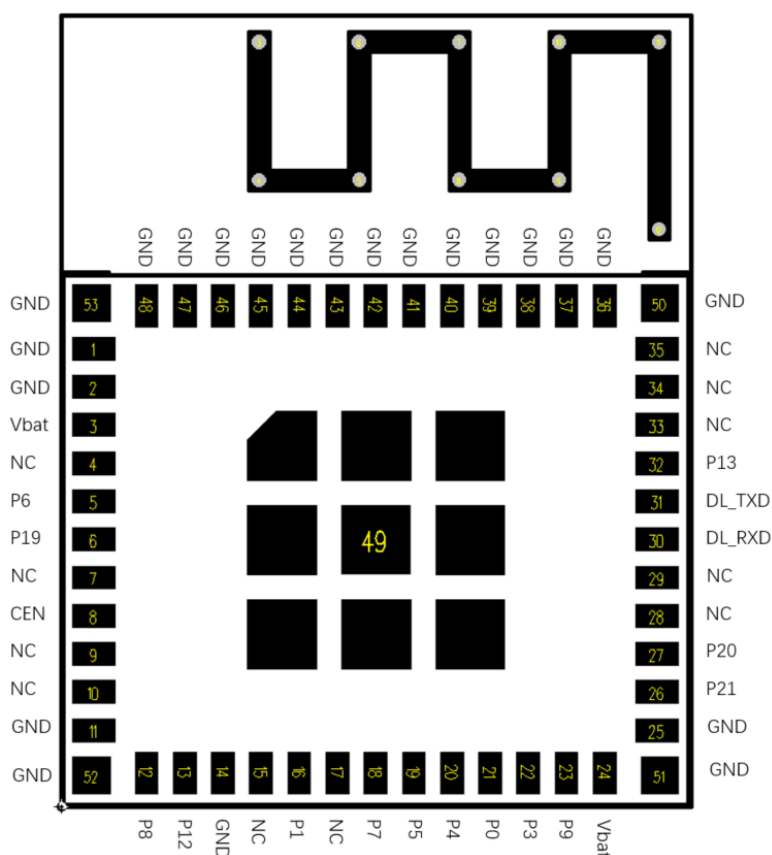


Table 3-1 shows the pin descriptions of the module.

**Table 3-1 Pin Descriptions**

| Pin # | Name | Type | Default State After Power-on | Description                      |
|-------|------|------|------------------------------|----------------------------------|
| 1     | GND  | P    | -                            | Ground                           |
| 2     | GND  | P    | -                            | Ground                           |
| 3     | VBAT | P    | -                            | Chip external power supply input |
| 4     | NC   | -    | -                            | No connect                       |
| 5     | P6   | IO   | Digital/Analog               | GPIO6, <b>ADC5</b>               |
| 6     | P19  | IO   | Digital                      | GPIO19, <b>PWM1</b>              |

| Pin # | Name   | Type | Default State After Power-on | Description                                 |
|-------|--------|------|------------------------------|---------------------------------------------|
| 7     | NC     | -    | -                            | No connect                                  |
| 8     | CEN    | I    | 10 kΩ pulled up to VIO       | Chip enable, active high                    |
| 9     | NC     | -    | -                            | No connect                                  |
| 10    | NC     | -    | -                            | No connect                                  |
| 11    | GND    | P    | -                            | Ground                                      |
| 12    | P8     | IO   | Digital/Analog               | GPIO8, <b>ADC10</b>                         |
| 13    | P12    | IO   | Digital/Analog               | GPIO12, <b>ADC14</b>                        |
| 14    | GND    | P    | -                            | Ground                                      |
| 15    | NC     | -    | -                            | No connect                                  |
| 16    | P1     | IO   | Digital/Analog               | GPIO1, UART1_RX, <b>I2C1_SDA</b>            |
| 17    | NC     | -    | -                            | No connect                                  |
| 18    | P7     | IO   | Digital/Analog               | GPIO7, <b>PWM4/ADC6</b>                     |
| 19    | P5     | IO   | Digital/Analog               | GPIO5, <b>PWM0/ADC4</b>                     |
| 20    | P4     | IO   | Digital/Analog               | GPIO4, <b>PWM2/ADC3</b>                     |
| 21    | P0     | IO   | Digital/Analog               | GPIO0, <b>I2C1_SCL/ADC12</b>                |
| 22    | P3     | IO   | Digital/Analog               | GPIO3, <b>ADC2</b>                          |
| 23    | P9     | IO   | Digital/Analog               | GPIO9                                       |
| 24    | VBAT   | P    | -                            | Power supply output for I2C led driver chip |
| 25    | NC     | -    | -                            | No connect                                  |
| 26    | P21    | IO   | Digital                      | GPIO21, <b>UART2_RX</b>                     |
| 27    | P20    | IO   | Digital                      | GPIO20, <b>UART2_TX</b>                     |
| 28    | NC     | -    | -                            | No connect                                  |
| 29    | NC     | -    | -                            | No connect                                  |
| 30    | DL_RXD | IO   | Digital                      | GPIO10, DL_UART_RX, <b>UART0_RX</b>         |
| 31    | DL_TXD | IO   | Digital                      | GPIO11, DL_UART_TX, <b>UART0_TX</b>         |
| 32    | P13    | IO   | Digital/Analog               | GPIO13, <b>PWM3,ADC15</b>                   |
| 33    | NC     | -    | -                            | No connect                                  |



| Pin # | Name | Type | Default State After Power-on | Description                  |
|-------|------|------|------------------------------|------------------------------|
| 34    | NC   | -    | -                            | No connect                   |
| 35    | NC   | -    | -                            | No connect                   |
| 36–48 | GND  | P    | -                            | Ground                       |
| 49    | PAD  | P    | -                            | Ground pad, connected to GND |
| 50–53 | GND  | -    | -                            | Ground                       |

## 4. Electrical Characteristics

### 4.1 Absolute Maximum Ratings

| Parameter          | Description                      | Min. | Max.                 | Unit |
|--------------------|----------------------------------|------|----------------------|------|
| V <sub>BAT</sub>   | Power supply input               | -0.3 | 4.5                  | V    |
| I <sub>max</sub>   | V <sub>BAT</sub> maximum current | -    | 400                  | mA   |
| V <sub>DIG_A</sub> | Voltage on any digital pin       | -0.3 | V <sub>IO</sub> +0.3 | V    |
| T <sub>STR</sub>   | Storage temperature range        | -55  | 150                  | ℃    |

### 4.2 Recommended Operating Conditions

| Parameter        | Description                                               | Min. | Typ. | Max. | Unit |
|------------------|-----------------------------------------------------------|------|------|------|------|
| T <sub>OPR</sub> | Operating temperature range (shielding cover temperature) | -40  | -    | 105  | ℃    |
| V <sub>BAT</sub> | Power supply input                                        | 2.4  | 3.3  | 3.6  | V    |
| V <sub>IO</sub>  | I/O voltage                                               | 2.4  | 3.3  | 3.6  | V    |
| V <sub>pp</sub>  | Ripple on the V <sub>BAT</sub>                            | -    | -    | 200  | mV   |

### 4.3 Digital I/O Characteristics

| Symbol          | Parameter                      | Conditions                                      | Min.                | Typ. | Max.                  | Unit |
|-----------------|--------------------------------|-------------------------------------------------|---------------------|------|-----------------------|------|
| V <sub>IH</sub> | High-level input voltage       | -                                               | 0.7 V <sub>IO</sub> | -    | V <sub>IO</sub> + 0.3 | V    |
| V <sub>IL</sub> | Low-level input voltage        | -                                               | -0.3                | -    | 0.3 V <sub>IO</sub>   | V    |
| V <sub>OH</sub> | High-level output voltage      | -                                               | 0.9 V <sub>IO</sub> | -    | -                     | V    |
| V <sub>OL</sub> | Low-level output voltage       | -                                               | -                   | -    | 0.1 V <sub>IO</sub>   | V    |
| I <sub>OH</sub> | I/O output high drive strength | VOH: 0.8 V <sub>IO</sub> ,<br>GPIO_CAPACITY = 3 |                     | 40   |                       | mA   |
|                 |                                | VOH: 0.8 V <sub>IO</sub> ,<br>GPIO_CAPACITY =   |                     | 30   |                       |      |

| Symbol          | Parameter                     | Conditions                           | Min. | Typ. | Max. | Unit |
|-----------------|-------------------------------|--------------------------------------|------|------|------|------|
|                 |                               | 2                                    |      |      |      |      |
|                 |                               | VOH = 0.8 VIO,<br>GPIO_CAPACITY = 1  |      | 18   |      |      |
|                 |                               | VOH = 0.8 VIO,<br>GPIO_CAPACITY = 0  |      | 10   |      |      |
| I <sub>OL</sub> | I/O output low drive strength | VOH: 0.15 VIO,<br>GPIO_CAPACITY = 3  |      | 36   |      | mA   |
|                 |                               | VOH: 0.15 VIO,<br>GPIO_CAPACITY = 2  |      | 29   |      |      |
|                 |                               | VOH = 0.15 VIO,<br>GPIO_CAPACITY = 1 |      | 16   |      |      |
|                 |                               | VOH = 0.15 VIO,<br>GPIO_CAPACITY = 0 |      | 8    |      |      |
|                 |                               |                                      |      |      |      |      |
| R <sub>PU</sub> | Weak pull-up resistor         | -                                    | -    | 40   | -    | kΩ   |
| R <sub>PD</sub> | Weak pull-down resistor       | -                                    | -    | 44   | -    | kΩ   |

## 4.4 Current Consumption

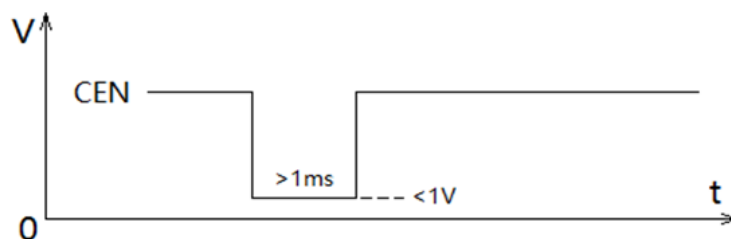
| Parameter          | Condition                                             | Min. | Typ. | Max. | Unit |
|--------------------|-------------------------------------------------------|------|------|------|------|
| <b>Active Mode</b> |                                                       |      |      |      |      |
| RX current         | 11b, continuous receive, buck                         | -    | -    | -    | mA   |
|                    | 11b, continuous receive, LDO                          | -    | 37   | -    | mA   |
|                    | 11b/g/n, 20 MHz, mixed mode, continuous receive, buck | -    | -    | -    | mA   |
|                    | 11n40 MHz, mixed mode, continuous receive, buck       | -    | -    | -    | mA   |
|                    | 11b/g/n, 20 MHz, mixed mode, continuous receive, LDO  | -    | 42   | -    | mA   |

| Parameter            | Condition                                                                                                      | Min. | Typ. | Max. | Unit    |
|----------------------|----------------------------------------------------------------------------------------------------------------|------|------|------|---------|
|                      | 11n, 40 MHz, mixed mode, continuous receive, LDO                                                               | -    | 46   | -    | mA      |
| TX current           | 11b: 1 Mbps DSSS @ 20 dBm (LDO)                                                                                | -    | 340  | -    | mA      |
|                      | 11b: 1 Mbps DSSS @ 20 dBm (BUCK)                                                                               | -    | -    | -    | mA      |
|                      | 11g: 54 Mbps OFDM @ 18 dBm (LDO)                                                                               | -    | 310  | -    | mA      |
|                      | 11g: 54 Mbps OFDM @ 18 dBm (BUCK)                                                                              |      | -    |      | mA      |
|                      | 11n: MCS7, HT20 @ 17 dBm (LDO)                                                                                 | -    | 290  | -    | mA      |
|                      | 11n: MCS7, HT20 @ 17 dBm (BUCK)                                                                                |      | -    |      | mA      |
| <b>Sleep Mode</b>    |                                                                                                                |      |      |      |         |
| Normal sleep         | CPU active(60Mhz), Wi-Fi MAC on, Wi-Fi PHY off, Bluetooth off, multimedia (audio, video) off, encryption off   | -    | 6    | -    | mA      |
| Low-voltage sleep    | CPU halted, Wi-Fi MAC halted, Wi-Fi PHY off, Bluetooth off, encryption off, SMEM3 off, XTALH off, VDDDIG=0.6 V |      | 91   |      | $\mu$ A |
| Deep sleep           | Only the AON domain is active.                                                                                 | -    | 13.7 | -    | $\mu$ A |
| <b>Shutdown Mode</b> |                                                                                                                |      |      |      |         |
| Shutdown             | CEN low                                                                                                        | -    | 3.2  | -    | $\mu$ A |

## 4.5 CEN Timing

| Parameter      | Description                         | Min. | Max. | Unit |
|----------------|-------------------------------------|------|------|------|
| $T_{CEN\_Min}$ | minimum pull-low time for CEN reset | 1    | -    | ms   |
| $V_{CEN\_IL}$  | CEN input low level                 | -    | 1    | V    |

Figure 4-1 CEN Signal Waveform Requirements



## 4.6 Moisture Sensitivity Level

The Module is qualified to moisture sensitivity level MSL3 in accordance with IPC/JEDEC J-STD-020.

## 4.7 ESD Ratings

| Parameter | Description                                                                       | Test Condition | Value | Unit |
|-----------|-----------------------------------------------------------------------------------|----------------|-------|------|
| ESD HBM   | Electrostatic discharge voltage (human body model), per ANSI/ESDA/JEDEC JS-001    | ANT pin        | ±2000 | V    |
|           |                                                                                   | Other pins     | ±3000 | V    |
| ESD CDM   | Electrostatic discharge voltage (charge device model), per ANSI/ESDA/JEDEC JS-002 | All pins       | ±500  | V    |

## 4.8 WLAN RF Receiver Characteristics

Measured with T = 25 °C, VBAT = 3.3 V unless otherwise stated.

| Parameter                                                     | Condition    | Min. | Typ.  | Max. | Unit |
|---------------------------------------------------------------|--------------|------|-------|------|------|
| <b>General</b>                                                |              |      |       |      |      |
| Frequency range                                               | -            | 2412 | -     | 2484 | MHz  |
| <b>Sensitivity</b>                                            |              |      |       |      |      |
| Sensitivity - IEEE 802.11b<br>(8% PER for PSDU)               | 1 Mbps DSSS  | -    | -98   | -    | dBm  |
|                                                               | 11 Mbps DSSS | -    | -89   | -    | dBm  |
| Sensitivity - IEEE 802.11g<br>(10% PER for PSDU)              | 6 Mbps OFDM  | -    | -92   | -    | dBm  |
|                                                               | 54 Mbps OFDM | -    | -76.5 | -    | dBm  |
| Sensitivity - IEEE 802.11n, 20 MHz<br>(10% PER for PSDU, BCC) | HT20, MCS0   | -    | -92   | -    | dBm  |
|                                                               | HT20, MCS7   | -    | -73   | -    | dBm  |
| Sensitivity - IEEE 802.11n, 40 MHz<br>(10% PER for PSDU, BCC) | HT40, MCS0   | -    | -87.5 | -    | dBm  |
|                                                               | HT40, MCS7   | -    | -71.5 | -    | dBm  |

| Parameter                                                                               | Condition                               |         | Min. | Typ. | Max. | Unit |
|-----------------------------------------------------------------------------------------|-----------------------------------------|---------|------|------|------|------|
| Maximum Receive Level                                                                   |                                         |         |      |      |      |      |
| Maximum receive level @ 2.4 GHz                                                         | 11b: 1, 2 Mbps (8% PER, 1024 octets)    |         | -    | 10   | -    | dBm  |
|                                                                                         | 11b: 5.5, 11 Mbps (8% PER, 1024 octets) |         | -    | 10   | -    | dBm  |
|                                                                                         | 11g: 6–54 Mbps (10% PER, 1000 octets)   |         | -    | 0    | -    | dBm  |
|                                                                                         | 11n: MCS0–7 (10% PER, 4096 octets)      |         | -    | 0    | -    | dBm  |
|                                                                                         |                                         |         |      |      |      |      |
| Adjacent Channel Rejection                                                              |                                         |         |      |      |      |      |
| Adjacent channel ( $\pm 30$ MHz) rejection<br>- IEEE 802.11b                            | 1 Mbps DSSS                             | -74 dBm | -    | 50   | -    | dB   |
| (8% PER for 1024 octet PSDU with<br>desired signal level as specified in<br>Condition)  | 2 Mbps DSSS                             | -74 dBm | -    | 45   | -    | dB   |
| Adjacent channel ( $\pm 25$ MHz) rejection<br>- IEEE 802.11b                            | 5.5 Mbps DSSS                           | -70 dBm | -    | 43   | -    | dB   |
| (8% PER for 1024 octet PSDU with<br>desired signal level as specified in<br>Condition)  | 11 Mbps DSSS                            | -70 dBm | -    | 40   | -    | dB   |
| Adjacent channel ( $\pm 25$ MHz) rejection<br>- IEEE 802.11g                            | 6 Mbps OFDM                             | -79 dBm | -    | 43   | -    | dB   |
| (10% PER for 1000 octet PSDU with<br>desired signal level as specified in<br>Condition) | 54 Mbps OFDM                            | -62 dBm | -    | 27   | -    | dB   |
| Adjacent channel ( $\pm 25$ MHz) rejection<br>- IEEE 802.11n                            | HT20, MCS0                              | -79 dBm | -    | 43   | -    | dB   |
| (10% PER for 4096 octet PSDU with<br>desired signal level as specified in<br>Condition) | HT20, MCS7                              | -61 dBm | -    | 21   | -    | dB   |
| Spurious Emissions                                                                      |                                         |         |      |      |      |      |
| Spurious emissions                                                                      | < 1 GHz                                 |         | -    | -60  | -    | dBm  |
|                                                                                         | > 1 GHz                                 |         | -    | -50  | -    | dBm  |

## 4.9 WLAN RF Transmitter Characteristics

Measured with T = 25 °C, VBAT = 3.3 V unless otherwise stated.

| Parameter                                  | Condition            | Min. | Typ. | Max. | Unit |
|--------------------------------------------|----------------------|------|------|------|------|
| <b>General</b>                             |                      |      |      |      |      |
| Frequency range                            | -                    | 2412 | -    | 2484 | MHz  |
| <b>TX Power</b>                            |                      |      |      |      |      |
| TX power - IEEE 802.11b<br>(SEM compliant) | 1 Mbps DSSS          | -    | 20   | -    | dBm  |
|                                            | 11 Mbps DSSS         | -    | 20   | -    | dBm  |
| TX power - IEEE 802.11g<br>(EVM compliant) | 6 Mbps OFDM          | -    | 18   | -    | dBm  |
|                                            | 54 Mbps OFDM         | -    | 18   | -    | dBm  |
| TX power - IEEE 802.11n<br>(EVM compliant) | HT20, MCS0           | -    | 17   | -    | dBm  |
|                                            | HT20, MCS7           | -    | 17   | -    | dBm  |
|                                            | HT40, MCS0           | -    | 16   | -    | dBm  |
|                                            | HT40, MCS7           | -    | 16   | -    | dBm  |
| <b>TX EVM</b>                              |                      |      |      |      |      |
| TX EVM - IEEE 802.11b<br>(SEM compliant)   | 1 Mbps DSSS, @20dBm  | -    | -15  | -    | dB   |
|                                            | 11 Mbps DSSS, @20dBm | -    | -15  | -    | dB   |
| TX EVM - IEEE 802.11g                      | 6 Mbps OFDM, @18dBm  | -    | -27  | -    | dB   |
|                                            | 54 Mbps OFDM, @18dBm | -    | -27  | -    | dB   |
| TX EVM - IEEE 802.11n                      | HT20, MCS0, @17dBm   | -    | -29  | -    | dB   |
|                                            | HT20, MCS7, @17dBm   | -    | -29  | -    | dB   |
|                                            | HT40, MCS0, @16dBm   | -    | -29  | -    | dB   |
|                                            | HT40, MCS7, @16dBm   | -    | -29  | -    | dB   |

| Parameter                                    | Condition          | Min. | Typ. | Max. | Unit |
|----------------------------------------------|--------------------|------|------|------|------|
|                                              | HE20, MCS7, @17dBm | -    | -30  | -    | dB   |
|                                              | HE40, MCS0, @16dBm | -    | -30  | -    | dB   |
|                                              | HE40, MCS7, @16dBm | -    | -30  | -    | dB   |
| <b>Spurious Emissions</b>                    |                    |      |      |      |      |
| Spurious emissions (at maximum output power) | < 1 GHz            | -    | -50  | -    | dBm  |
|                                              | > 1 GHz            | -    | -45  | -    | dBm  |

## 4.10 Bluetooth LE RF Receiver Characteristics

Measured with T = 25 °C, VBAT = 3.3 V unless otherwise stated.

| Parameter                     | Condition     | Min. | Typ. | Max. | Unit |
|-------------------------------|---------------|------|------|------|------|
| <b>General</b>                |               |      |      |      |      |
| Frequency range               | -             | 2402 | -    | 2480 | MHz  |
| <b>Bluetooth LE 1 Mbps</b>    |               |      |      |      |      |
| Sensitivity                   | 30.8% PER     | -    | -97  | -    | dBm  |
| Maximum input level           | 30.8% PER     | -    | 0    | -    | dBm  |
| C/I co-channel                | -             | -    | 8    | -    | dB   |
| C/I 1 MHz adjacent channel    | -             | -    | 0    | -    | dB   |
| C/I -1 MHz adjacent channel   | -             | -    | 0    | -    | dB   |
| C/I 2 MHz adjacent channel    | -             | -    | -26  | -    | dB   |
| C/I -2 MHz adjacent channel   | -             | -    | -27  | -    | dB   |
| C/I 3 MHz adjacent channel    | -             | -    | -28  | -    | dB   |
| C/I -3 MHz adjacent channel   | -             | -    | -29  | -    | dB   |
| C/I > 3 MHz adjacent channel  | -             | -    | -50  | -    | dB   |
| C/I < -3 MHz adjacent channel | -             | -    | -50  | -    | dB   |
| Out-of-band blocking          | 30–2000 MHz   | -10  | -    | -    | dBm  |
|                               | 2003–2399 MHz | -12  | -    | -    | dBm  |
|                               | 2484–2997 MHz | -12  | -    | -    | dBm  |

| Parameter                    | Condition          | Min. | Typ. | Max. | Unit |
|------------------------------|--------------------|------|------|------|------|
|                              | 3000 MHz–12.75 GHz | -2   | -    | -    | dBm  |
| <b>Bluetooth LE 125 kbps</b> |                    |      |      |      |      |
| Sensitivity                  | 30.8% PER          | -    | -102 | -    | dBm  |
| Maximum input level          | 30.8% PER          | -    | 0    | -    | dBm  |
| C/I co-channel               | -                  | -    | 3    | -    | dB   |
| C/I 1 MHz adjacent channel   | -                  | -    | -15  | -    | dB   |
| C/I -1 MHz adjacent channel  | -                  | -    | -16  | -    | dB   |
| C/I 2 MHz adjacent channel   | -                  | -    | -34  | -    | dB   |
| C/I -2 MHz adjacent channel  | -                  | -    | -40  | -    | dB   |
| C/I 3 MHz adjacent channel   | -                  | -    | -42  | -    | dB   |
| C/I -3 MHz adjacent channel  | -                  | -    | -43  | -    | dB   |
| C/I > 3 MHz adjacent channel | -                  | -    | -41  | -    | dB   |

| Parameter                     | Condition | Min. | Typ. | Max. | Unit |
|-------------------------------|-----------|------|------|------|------|
| C/I < -3 MHz adjacent channel | -         | -    | -42  | -    | dB   |
| <b>Bluetooth LE 500 kbps</b>  |           |      |      |      |      |
| Sensitivity                   | 30.8% PER | -    | -99  | -    | dBm  |
| Maximum input level           | 30.8% PER | -    | 0    | -    | dBm  |
| C/I co-channel                | -         | -    | 5    | -    | dB   |
| C/I 1 MHz adjacent channel    | -         | -    | -2   | -    | dB   |
| C/I -1 MHz adjacent channel   | -         | -    | -3   | -    | dB   |
| C/I 2 MHz adjacent channel    | -         | -    | -30  | -    | dB   |
| C/I -2 MHz adjacent channel   | -         | -    | -31  | -    | dB   |
| C/I 3 MHz adjacent channel    | -         | -    | -31  | -    | dB   |
| C/I -3 MHz adjacent channel   | -         | -    | -40  | -    | dB   |
| C/I > 3 MHz adjacent channel  | -         | -    | -36  | -    | dB   |
| C/I < -3 MHz adjacent channel | -         | -    | -36  | -    | dB   |

## 4.11 Bluetooth LE RF Transmitter Characteristics

Measured with T = 25 °C, VBAT = 3.3 V unless otherwise stated.

| Parameter                  | Condition                         | Min. | Typ. | Max. | Unit |
|----------------------------|-----------------------------------|------|------|------|------|
| <b>General</b>             |                                   |      |      |      |      |
| Frequency range            | -                                 | 2402 | -    | 2480 | MHz  |
| TX power                   | -                                 | -20  | 6    | 15   | dBm  |
| <b>Bluetooth LE 1 Mbps</b> |                                   |      |      |      |      |
| In-band emissions          | ±2 MHz offset                     | -    | -    | -47  | dBm  |
|                            | ±3 MHz offset                     | -    | -    | -49  | dBm  |
|                            | > ±3 MHz offset                   | -    | -    | -50  | dBm  |
| Modulation characteristics | $\Delta f_{1avg}$                 | -    | -    | 245  | kHz  |
|                            | $\Delta f_{2max}$                 | -    | -    | 235  | kHz  |
|                            | $\Delta f_{2avg}/\Delta f_{1avg}$ | -    | -    | 0.93 | -    |

| Parameter                          | Condition                                 | Min. | Typ. | Max. | Unit           |
|------------------------------------|-------------------------------------------|------|------|------|----------------|
| Carrier frequency offset and drift | Max $ f_n _{n=0, 1, 2, 3 \dots k}$        | -    | 3    | -    | kHz            |
|                                    | Max $ f_0 - f_n _{n=2, 3, 4 \dots k}$     | -    | 2.5  | -    | kHz            |
|                                    | $ f_1 - f_0 $                             | -    | 2    | -    | kHz            |
|                                    | Max $ f_n - f_{n-5} _{n=6, 7, 8 \dots k}$ | -    | 2.5  | -    | kHz/50 $\mu$ s |

| Bluetooth LE 125 kbps              |                                       |   |   |     |   |                |
|------------------------------------|---------------------------------------|---|---|-----|---|----------------|
| In-band emissions                  | $\pm 2$ MHz offset                    | - | - | -47 | - | dBm            |
|                                    | $\pm 3$ MHz offset                    | - | - | -49 | - | dBm            |
|                                    | $> \pm 3$ MHz offset                  | - | - | -50 | - | dBm            |
| Modulation characteristics         | $\Delta f_{avg}$                      | - | - | 245 | - | kHz            |
|                                    | $\Delta f_{max}$                      | - | - | 246 | - | kHz            |
| Carrier frequency offset and drift | Max $ f_n _{n=0, 1, 2, 3 \dots k}$    | - | - | 1.5 | - | kHz            |
|                                    | Max $ f_0 - f_n _{n=1, 2, 3 \dots k}$ | - | - | 1.5 | - | kHz            |
|                                    | $ f_0 - f_3 $                         | - | - | 1.5 | - | kHz            |
|                                    | $ f_n - f_{n-3} _{n=7, 8, 9 \dots k}$ | - | - | 1.5 | - | kHz/48 $\mu$ s |

| Parameter                    |                      | Condition | Min. | Typ. | Max. | Unit |
|------------------------------|----------------------|-----------|------|------|------|------|
| <b>Bluetooth LE 500 kbps</b> |                      |           |      |      |      |      |
| In-band emissions            | $\pm 2$ MHz offset   | -         | -    | -47  | -    | dBm  |
|                              | $\pm 3$ MHz offset   | -         | -    | -49  | -    | dBm  |
|                              | $> \pm 3$ MHz offset | -         | -    | -50  | -    | dBm  |

## 4.12 AUX ADC Characteristics

| Parameter              | Condition             | Min. | Typ. | Max.             | Unit       |
|------------------------|-----------------------|------|------|------------------|------------|
| Conversion clock       | -                     | -    | -    | 13               | MHz        |
| Conversion time        | -1*11(                | -    | 16   | -                | Cycle      |
| V <sub>REF</sub>       | Internal              | -    | 1.2  | -                | V          |
| Input voltage range    | -                     | 0    | -    | V <sub>BAT</sub> | V          |
| Input impedance        | -                     | 10   | -    | -                | M $\Omega$ |
| Input capacitance (Cs) | -                     | -    | 1    | -                | pF         |
| DNL                    | -                     | -1   | -    | 3                | LSB        |
| INL                    | -                     | -5   | -    | 5                | LSB        |
| Precision              | Internal (> 500 mV)   | -    | -    | 1                | %          |
|                        | Internal (400–500 mV) | -    | 2    | 4                | %          |
|                        | Internal (300–400 mV) | -    | 3    | 6                | %          |
|                        | Internal (200–300 mV) | -    | -    | 8                | %          |
|                        | Internal (100–200 mV) | -    | -    | 20               | %          |
|                        | Internal (50–100 mV)  | -    | -    | 40               | %          |
|                        | Internal (<50 mV)     | -    | -    | 100              | %          |

## 4.13 I2C Characteristics

| Parameter        | Condition | Min. | Typ. | Max. | Unit       |
|------------------|-----------|------|------|------|------------|
| Clock            | -         | -    | -    | 400  | kHz        |
| Pull-up resistor | -         | 1.5  | 4.7  | 10   | k $\Omega$ |

| Parameter                                            | Condition                         | Min. | Typ. | Max. | Unit |
|------------------------------------------------------|-----------------------------------|------|------|------|------|
| Capacitive load drive strength (enhanced drive mode) | Ceramic capacitor added to ground | 20   | -    | -    | nF   |

## 4.14 PWM Characteristics

| Parameter                      | Condition | Min. | Typ. | Max. | Unit       |
|--------------------------------|-----------|------|------|------|------------|
| Frequency                      | -         | -    | -    | 8    | MHz        |
| Recommended pull-down resistor | -         | -    | 51   | -    | K $\Omega$ |

## 4.15 NTC Characteristics

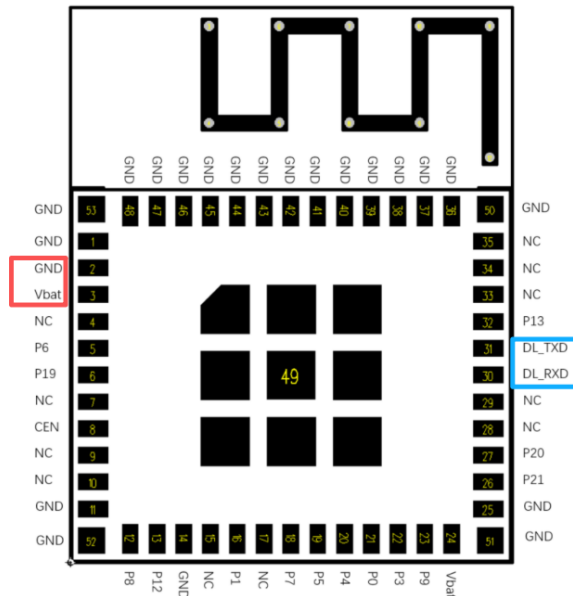
The SOC of BKSG2-MINI includes a temperature sensor (NTC) which, after calibration, can provide chip temperature detection with an accuracy better than  $\pm 5^{\circ}\text{C}$ .

## 5. Module Burning and Test Mode

### 5.1 Firmware Download

The BK7236-MINI module supports firmware download via UART. Within 5 ms after the chip is powered on, the downloader sends a handshake command to complete the interaction and then the firmware can be downloaded. The specific operation method is as follows:

1. Connect the GND, DL\_RXD, DL\_TXD signal lines of the module to the download tool, and do not supply power to VBAT for the time being.



2. Open the PC download tool, select the serial port and firmware path, and start burning (the tool also supports script calls).



3. Supply power to VBAT to start firmware burning.

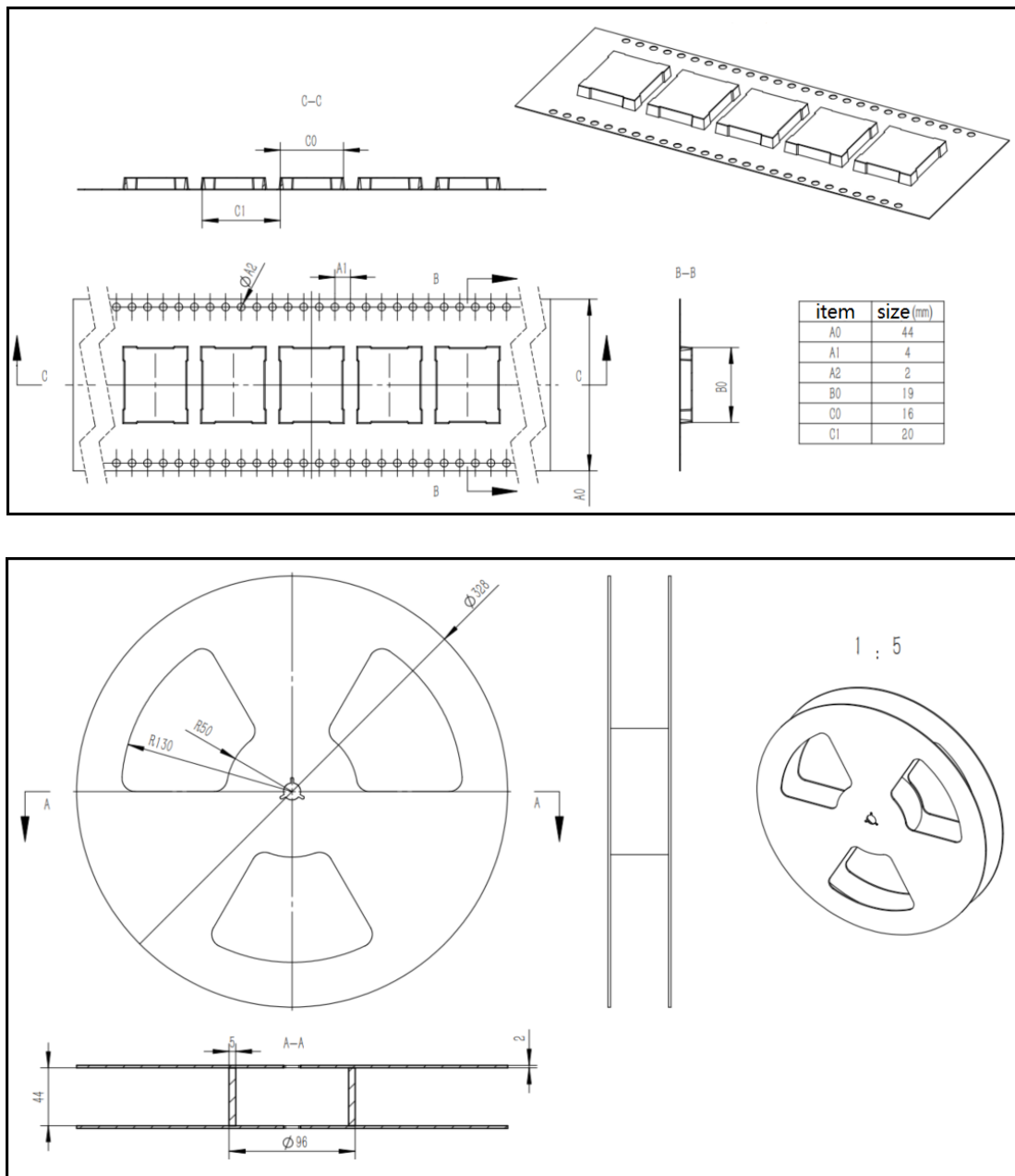
## 5.2 Enter Test Mode

During the power-on initialization phase, the module will determine whether the DL\_TXD pin is pulled low externally (usually connected to GND through a 1 K $\Omega$  resistor). If it is not pulled low, the firmware will start running normally. If it is pulled low, the program enters the test mode (ATE mode), and non-signaling tests and other operations can be performed.

## 6. Package information and ordering number

### 6.1 Package information

The packaging type of the module is tape reel, the reel width is 48mm, and the diameter is 13 inches with 650 modules per reel. One packaging box contains 5 reels.





## 6.2 Ordering number

The order number of the module is: BKBG2 -MINI-V1.1

## 7. Certification

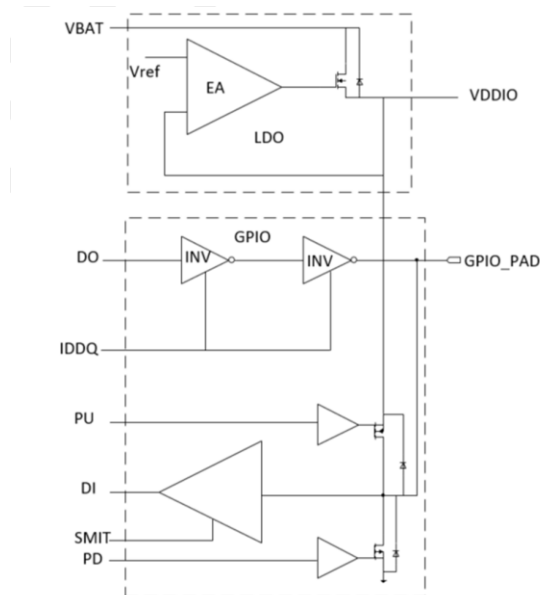
The module has passed the following certifications:

- FCC
- WFA
- BQB

### Notes:

- Due to the optimization of chip and module design, module parameters may change. Please pay attention to the update of the module datasheet.
- During certification, the transmit power is appropriately adjusted due to the specific application and certification requirements.
- Test conditions for RF transceiver performance: supply voltage = 3.3 V, ambient temperature = 25 °C.
- All GPIOs of the BK7236S have protection diodes for VDDIO and GND, and the structure is shown in the figure below. When the module does not supply power to Vbat, if the GPIO has a high level with strong drive strength, the chip will be in a powered operation state. The specific operation is related to the drive strength of the high level on the GPIO. In order to prevent abnormal operation of the chip, when Vbat is not powered, the voltage applied to the GPIO is limited to 1.8 V and the drive strength is limited to 2 mA (Equivalent to connecting a 1K resistor in series).

**Figure 7-1 Structure of GPIO Protection Diode**



## 7.1 Revision History

| Version | Date      | Description                                                                   |
|---------|-----------|-------------------------------------------------------------------------------|
| 1.0     | 2026/1/5  | Initial release                                                               |
| 1.1     | 2026/5/11 | Added the connection from module PIN21 to chip PIN16.                         |
| 1.2     | 2026/5/19 | Add a description of the pin's alternate function. NTC function and accuracy. |
|         |           |                                                                               |
|         |           |                                                                               |
|         |           |                                                                               |

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This module is intended for OEM integrators only. Per FCC KDB 996369 D03 OEM Manual v01 guidance, the following conditions must be strictly followed when using this certified module:

KDB 996369 D03 OEM Manual v01 rule sections:

2.2 List of applicable FCC rules This module has been tested for compliance to FCC part15.247

2.3 Summarize the specific operational use conditions

The module is tested for standalone mobile RF exposure use condition. Any other usage conditions such as co-location with other transmitter(s) or being used in a portable condition will need a separate reassessment through a class II permissive change application or new certification.

2.4 Single module procedures The EUT was tested inside a specific platform (model: SmartCore 100)and Single modular approval for this specific platform.

2.5 Antenna : PCB Antenna;  
Antenna designs Not applicable

2.6 RF exposure considerations This equipment complies with FCC mobile radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator & your body. If the module is installed in a portable host, a separate SAR evaluation is required to confirm compliance with relevant FCC portable RF exposure rules.

2.7 Antennas

The following antennas have been certified for use with this module; antennas of the same type with equal or lower gain may also be used with this module. The antenna must be installed such that 20 cm can be maintained between the antenna and users. Antenna Type Antenna : PCB Antenna;

2.8 Label and compliance information

The final end product must be labeled in a visible area with the following: "Contains FCC ID: 2BWNW-BKSG2-MINI". The grantee'sFCC ID can be used only when all FCC compliance requirements are met.

## 2.9 Information on test modes and additional testing requirements

This transmitter is tested in a standalone mobile RF exposure condition and any co-located or simultaneous transmission with other transmitter(s) or portable use will require a separate class II permissive change re-evaluation or new certification.

## 2.10 Additional testing, Part 15 Subpart B disclaimer

This transmitter module is tested as a subsystem and its certification does not cover the FCC Part 15 Subpart B (unintentional radiator) rule requirement applicable to the final host. The final host will still need to be reassessed for compliance to this portion of rule requirements if applicable.

### **FCC Warning**

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.

NOTE 1: Any changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

### **FCC Radiation Exposure Statement:**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance.

This module certified that complies with RF exposure requirement under mobile or fixed condition, this module is to be installed only in mobile or fixed applications.

A mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. Transmitting devices designed to be used by consumers or workers that can be easily re-located, such as wireless devices associated with a personal computer, are considered to be mobile devices if they meet the 20 centimeter separation requirement.

A fixed device is defined as a device is physically secured at one location and is not able to be easily moved to another location.

**Note 2:** Any modifications made to the module will void the Grant of Certification, this module is limited to OEM installation only and must not be sold to end-users, end-user has no manual instructions to remove or install the device, only software or operating procedure shall be placed in the end-user operating manual of final products.

**Note 3:** Additional testing and certification may be necessary when multiple modules are used.

**Note 4:** The module may be operated only with the antenna with which it is authorized. Any antenna that is of the same type and of equal or less directional gain as an antenna that is authorized with the intentional radiator may be marketed with, and used with, that intentional radiator.