

# TEST REPORT

**Product Name** : TWS Bluetooth earphones  
**Brand Mark** : N/A  
**Model No.** : In2029A  
**FCC ID** : RDR-IN2029A  
**Report Number** : BLA-EMC-202011-A10202  
**Date of Sample Receipt** : 2020/11/30  
**Date of Test** : 2020/11/30 to 2020/12/14  
**Date of Issue** : 2020/12/14  
**Test Standard** : 47 CFR Part 15, Subpart C 15.247  
**Test Result** : Pass

Prepared for:

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Prepared by:

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Date:

2020/12/14



## REPORT REVISE RECORD

| Version No. | Date       | Description |
|-------------|------------|-------------|
| 00          | 2020/12/14 | Original    |

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## 1 TEST SUMMARY

| Test item                                             | Test Requirement                 | Test Method                                          | Class/Severity                               | Result |
|-------------------------------------------------------|----------------------------------|------------------------------------------------------|----------------------------------------------|--------|
| Antenna Requirement                                   | 47 CFR Part 15, Subpart C 15.247 | N/A                                                  | 47 CFR Part 15, Subpart C 15.203 & 15.247(c) | Pass   |
| Conducted Spurious Emissions                          | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 7.8.6 & Section 11.11     | 47 CFR Part 15, Subpart C 15.247(d)          | Pass   |
| Radiated Emissions which fall in the restricted bands | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 6.10.5                    | 47 CFR Part 15, Subpart C 15.209 & 15.247(d) | Pass   |
| Conducted Band Edges Measurement                      | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 7.8.8 & Section 11.13.3.2 | 47 CFR Part 15, Subpart C 15.247(d)          | Pass   |
| Dwell Time                                            | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 7.8.4                     | 47 CFR Part 15, Subpart C 15.247a(1)(iii)    | Pass   |
| Hopping Channel Number                                | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 7.8.3                     | 47 CFR Part 15, Subpart C 15.247a(1)(iii)    | Pass   |
| Carrier Frequencies Separation                        | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 7.8.2                     | 47 CFR Part 15, Subpart C 15.247a(1)         | Pass   |
| 20dB Bandwidth                                        | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 7.8.7                     | 47 CFR Part 15, Subpart C 15.247(a)(1)       | Pass   |
| Conducted Peak Output Power                           | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 7.8.5                     | 47 CFR Part 15, Subpart C 15.247(b)(3)       | Pass   |
| Conducted Emissions at AC Power Line (150kHz-30MHz)   | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 6.2                       | 47 CFR Part 15, Subpart C 15.207             | Pass   |
| Radiated Spurious Emissions                           | 47 CFR Part 15, Subpart C 15.247 | ANSI C63.10 (2013) Section 6.4,6.5,6.6               | 47 CFR Part 15, Subpart C 15.209 & 15.247(d) | Pass   |

## 2 GENERAL INFORMATION

|                       |                                                                   |
|-----------------------|-------------------------------------------------------------------|
| <b>Applicant</b>      | Dongguan Hele Electronics Co.,Ltd                                 |
| <b>Address</b>        | Dalingya Industrial Zone,DaojiaoTown,DongguanCity,Guangdong,China |
| <b>Manufacturer</b>   | Dongguan Hele Electronics Co.,Ltd                                 |
| <b>Address</b>        | Dalingya Industrial Zone,DaojiaoTown,DongguanCity,Guangdong,China |
| <b>Factory</b>        | N/A                                                               |
| <b>Address</b>        | N/A                                                               |
| <b>Product Name</b>   | TWS Bluetooth earphones                                           |
| <b>Test Model No.</b> | In2029A                                                           |

## 3 GENERAL DESCRIPTION OF E.U.T.

|                             |                                   |
|-----------------------------|-----------------------------------|
| <b>Hardware Version</b>     | N/A                               |
| <b>Software Version</b>     | N/A                               |
| <b>Operation Frequency:</b> | 2402MHz-2480MHz                   |
| <b>Modulation Type:</b>     | GFSK, $\pi/4$ DQPSK               |
| <b>Channel Spacing:</b>     | 1MHz                              |
| <b>Number of Channels:</b>  | 79                                |
| <b>Antenna Type:</b>        | Chip Antenna                      |
| <b>Antenna Gain:</b>        | 0.4 dBi(Provided by the customer) |

#### 4 TEST ENVIRONMENT

| Environment | Temperature | Voltage |
|-------------|-------------|---------|
| Normal      | +25°C       | 3.7Vdc  |

#### 5 TEST MODE

| TEST MODE                                                                                                                                                                                                                                           | TEST MODE DESCRIPTION                                                                                                                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Transmitting mode                                                                                                                                                                                                                                   | Keep the EUT in continuously transmitting mode with modulation. (hopping and non hopping mode all have been tested, non hopping mode is worse case for RE ) |
| TX Low channel                                                                                                                                                                                                                                      | Keep the EUT in continuously transmitting mode in low channel                                                                                               |
| TX middle channel                                                                                                                                                                                                                                   | Keep the EUT in continuously transmitting mode in middle channel                                                                                            |
| TX high channel                                                                                                                                                                                                                                     | Keep the EUT in continuously transmitting mode in high channel                                                                                              |
| Remark: Full battery is used during all test except ac conducted emission, DH1,DH3, DH5 all have been tested, during the test, GFSK, Pi/4QPSK modulation were all pre-scanned Only Pi/4QPSK is the worst mode and would be recorded in this report. |                                                                                                                                                             |

#### 6 MEASUREMENT UNCERTAINTY

| Parameter                                      | Expanded Uncertainty (Confidence of 95%) |
|------------------------------------------------|------------------------------------------|
| Radiated Emission(9kHz-30MHz)                  | ±4.34dB                                  |
| Radiated Emission(30Mz-1000MHz)                | ±4.24dB                                  |
| Radiated Emission(1GHz-18GHz)                  | ±4.68dB                                  |
| AC Power Line Conducted Emission(150kHz-30MHz) | ±3.45dB                                  |

## 7 DESCRIPTION OF SUPPORT UNIT

| Device Type | Manufacturer | Model Name | Serial No. | Remark |
|-------------|--------------|------------|------------|--------|
| AC Adapter  | UGREEN       | CD112      | N/A        | N/A    |

## 8 LABORATORY LOCATION

All tests were performed at:  
BlueAsia of Technical Services(Shenzhen) Co., Ltd.  
IOT Test Centre of BlueAsia  
No. 448 Bulong Road, Bantian Street, Longgang District, Shenzhen, China  
Telephone: TEL: +86-755-28682673 FAX: +86-755-28682673  
No tests were sub-contracted.

## 9 TEST INSTRUMENTS LIST

| Test Equipment Of Conducted Spurious Emissions |              |        |            |            |            |
|------------------------------------------------|--------------|--------|------------|------------|------------|
| Equipment                                      | Manufacturer | Model  | S/N        | Cal.Date   | Cal.Due    |
| Spectrum                                       | R&S          | FSP40  | 100817     | 7/1/2020   | 6/30/2021  |
| Spectrum                                       | Agilent      | N9020A | MY49100060 | 12/17/2019 | 12/16/2020 |
| Signal Generator                               | Agilent      | N5182A | MY49060650 | 12/17/2019 | 12/16/2020 |
| Signal Generator                               | Agilent      | E8257D | MY44320250 | 4/20/2020  | 4/19/2021  |

| Test Equipment Of Radiated Emissions which fall in the restricted bands |              |               |                  |           |           |
|-------------------------------------------------------------------------|--------------|---------------|------------------|-----------|-----------|
| Equipment                                                               | Manufacturer | Model         | S/N              | Cal.Date  | Cal.Due   |
| Chamber                                                                 | SKET         | 966           | N/A              | 5/8/2018  | 5/7/2021  |
| Spectrum                                                                | R&S          | FSP40         | 100817           | 7/1/2020  | 6/30/2021 |
| Receiver                                                                | R&S          | ESR7          | 101199           | 4/20/2020 | 4/19/2021 |
| broadband Antenna                                                       | Schwarzbeck  | VULB9168      | 00836<br>P:00227 | 7/14/2018 | 7/13/2021 |
| Horn Antenna                                                            | Schwarzbeck  | 9120D         | 01892<br>P:00331 | 7/14/2018 | 7/13/2021 |
| Amplifier                                                               | SKET         | PA-000318G-45 | N/A              | 7/1/2020  | 6/30/2021 |
| EMI software                                                            | EZ           | EZ-EMC        | N/A              | N/A       | N/A       |
| Loop antenna                                                            | SCHNARZBECK  | FMZB1519B     | 00102            | 2/14/2019 | 2/13/2022 |
| Controller                                                              | SKET         | N/A           | N/A              | N/A       | N/A       |
| Coaxial Cable                                                           | BlueAsia     | BLA-XC-02     | N/A              | N/A       | N/A       |
| Coaxial Cable                                                           | BlueAsia     | BLA-XC-03     | N/A              | N/A       | N/A       |
| Coaxial Cable                                                           | BlueAsia     | BLA-XC-01     | N/A              | N/A       | N/A       |

| Test Equipment Of Conducted Band Edges Measurement |              |       |     |          |         |
|----------------------------------------------------|--------------|-------|-----|----------|---------|
| Equipment                                          | Manufacturer | Model | S/N | Cal.Date | Cal.Due |

|                  |         |        |            |            |            |
|------------------|---------|--------|------------|------------|------------|
| Spectrum         | R&S     | FSP40  | 100817     | 7/1/2020   | 6/30/2021  |
| Spectrum         | Agilent | N9020A | MY49100060 | 12/17/2019 | 12/16/2020 |
| Signal Generator | Agilent | N5182A | MY49060650 | 12/17/2019 | 12/16/2020 |
| Signal Generator | Agilent | E8257D | MY44320250 | 4/20/2020  | 4/19/2021  |

**Test Equipment Of Dwell Time**

| Equipment        | Manufacturer | Model  | S/N        | Cal.Date   | Cal.Due    |
|------------------|--------------|--------|------------|------------|------------|
| Spectrum         | R&S          | FSP40  | 100817     | 7/1/2020   | 6/30/2021  |
| Spectrum         | Agilent      | N9020A | MY49100060 | 12/17/2019 | 12/16/2020 |
| Signal Generator | Agilent      | N5182A | MY49060650 | 12/17/2019 | 12/16/2020 |
| Signal Generator | Agilent      | E8257D | MY44320250 | 4/20/2020  | 4/19/2021  |

**Test Equipment Of Hopping Channel Number**

| Equipment        | Manufacturer | Model  | S/N        | Cal.Date   | Cal.Due    |
|------------------|--------------|--------|------------|------------|------------|
| Spectrum         | R&S          | FSP40  | 100817     | 7/1/2020   | 6/30/2021  |
| Spectrum         | Agilent      | N9020A | MY49100060 | 12/17/2019 | 12/16/2020 |
| Signal Generator | Agilent      | N5182A | MY49060650 | 12/17/2019 | 12/16/2020 |
| Signal Generator | Agilent      | E8257D | MY44320250 | 4/20/2020  | 4/19/2021  |

**Test Equipment Of Carrier Frequencies Separation**

| Equipment        | Manufacturer | Model  | S/N        | Cal.Date   | Cal.Due    |
|------------------|--------------|--------|------------|------------|------------|
| Spectrum         | R&S          | FSP40  | 100817     | 7/1/2020   | 6/30/2021  |
| Spectrum         | Agilent      | N9020A | MY49100060 | 12/17/2019 | 12/16/2020 |
| Signal Generator | Agilent      | N5182A | MY49060650 | 12/17/2019 | 12/16/2020 |

|                  |         |        |            |           |           |
|------------------|---------|--------|------------|-----------|-----------|
| Signal Generator | Agilent | E8257D | MY44320250 | 4/20/2020 | 4/19/2021 |
|------------------|---------|--------|------------|-----------|-----------|

**Test Equipment Of 20dB Bandwidth**

| Equipment        | Manufacturer | Model  | S/N        | Cal.Date   | Cal.Due    |
|------------------|--------------|--------|------------|------------|------------|
| Spectrum         | R&S          | FSP40  | 100817     | 7/1/2020   | 6/30/2021  |
| Spectrum         | Agilent      | N9020A | MY49100060 | 12/17/2019 | 12/16/2020 |
| Signal Generator | Agilent      | N5182A | MY49060650 | 12/17/2019 | 12/16/2020 |
| Signal Generator | Agilent      | E8257D | MY44320250 | 4/20/2020  | 4/19/2021  |

**Test Equipment Of Conducted Peak Output Power**

| Equipment        | Manufacturer | Model  | S/N        | Cal.Date   | Cal.Due    |
|------------------|--------------|--------|------------|------------|------------|
| Spectrum         | R&S          | FSP40  | 100817     | 7/1/2020   | 6/30/2021  |
| Spectrum         | Agilent      | N9020A | MY49100060 | 12/17/2019 | 12/16/2020 |
| Signal Generator | Agilent      | N5182A | MY49060650 | 12/17/2019 | 12/16/2020 |
| Signal Generator | Agilent      | E8257D | MY44320250 | 4/20/2020  | 4/19/2021  |

**Test Equipment Of Conducted Emissions at AC Power Line (150kHz-30MHz)**

| Equipment    | Manufacturer | Model   | S/N           | Cal.Date   | Cal.Due    |
|--------------|--------------|---------|---------------|------------|------------|
| Shield room  | SKET         | 833     | N/A           | 6/10/2018  | 6/9/2021   |
| Receiver     | R&S          | ESPI3   | 101082        | 4/20/2020  | 4/19/2021  |
| LISN         | R&S          | ENV216  | 3560.6550.15  | 7/1/2020   | 6/30/2021  |
| LISN         | AT           | AT166-2 | AKK1806000003 | 12/17/2019 | 12/16/2020 |
| EMI software | EZ           | EZ-EMC  | N/A           | N/A        | N/A        |

**Test Equipment Of Radiated Spurious Emissions**

| Equipment         | Manufacturer | Model         | S/N              | Cal.Date  | Cal.Due   |
|-------------------|--------------|---------------|------------------|-----------|-----------|
| Chamber           | SKET         | 966           | N/A              | 5/8/2018  | 5/7/2021  |
| Spectrum          | R&S          | FSP40         | 100817           | 7/1/2020  | 6/30/2021 |
| Receiver          | R&S          | ESR7          | 101199           | 4/20/2020 | 4/19/2021 |
| broadband Antenna | Schwarzbeck  | VULB9168      | 00836<br>P:00227 | 7/14/2018 | 7/13/2021 |
| Horn Antenna      | Schwarzbeck  | 9120D         | 01892<br>P:00331 | 7/14/2018 | 7/13/2021 |
| Amplifier         | SKET         | PA-000318G-45 | N/A              | 7/1/2020  | 6/30/2021 |
| EMI software      | EZ           | EZ-EMC        | N/A              | N/A       | N/A       |
| Loop antenna      | SCHNARZBECK  | FMZB1519B     | 00102            | 2/14/2019 | 2/13/2022 |
| Controller        | SKET         | N/A           | N/A              | N/A       | N/A       |
| Coaxial Cable     | BlueAsia     | BLA-XC-02     | N/A              | N/A       | N/A       |
| Coaxial Cable     | BlueAsia     | BLA-XC-03     | N/A              | N/A       | N/A       |
| Coaxial Cable     | BlueAsia     | BLA-XC-01     | N/A              | N/A       | N/A       |

## 1 ANTENNA REQUIREMENT

|               |                                  |
|---------------|----------------------------------|
| Test Standard | 47 CFR Part 15, Subpart C 15.247 |
| Test Method   | N/A                              |

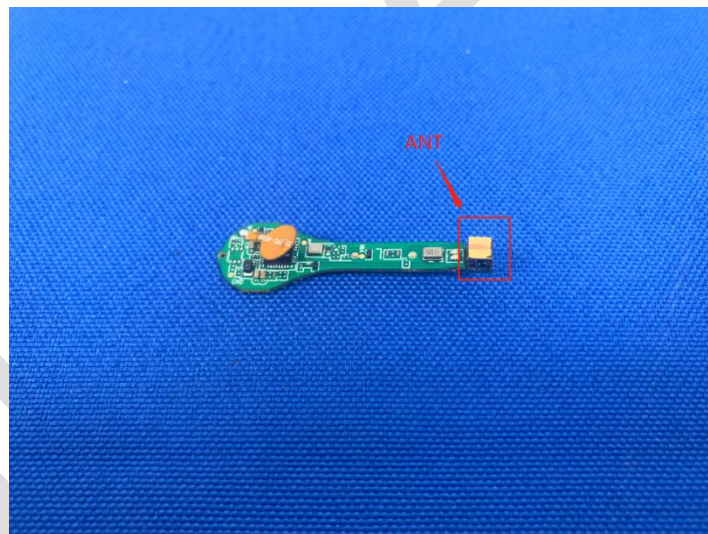
### 1.1 CONCLUSION

Standard Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit permanently attached antenna or of an so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 0.4dBi.



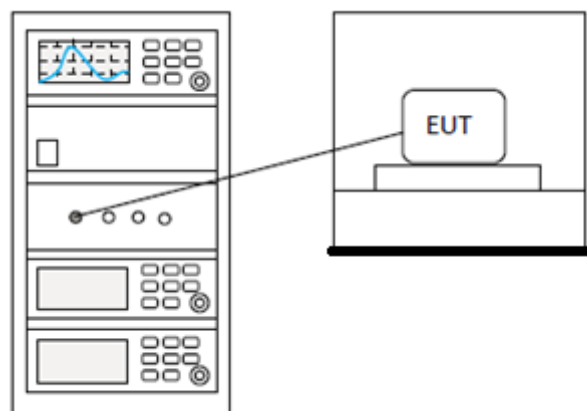
## 2 CONDUCTED SPURIOUS EMISSIONS

|                               |                                                  |
|-------------------------------|--------------------------------------------------|
| <b>Test Standard</b>          | 47 CFR Part 15, Subpart C 15.247                 |
| <b>Test Method</b>            | ANSI C63.10 (2013) Section 7.8.6 & Section 11.11 |
| <b>Test Mode (Pre-Scan)</b>   | TX                                               |
| <b>Test Mode (Final Test)</b> | TX                                               |
| <b>Tester</b>                 | Eason                                            |
| <b>Temperature</b>            | 25°C                                             |
| <b>Humidity</b>               | 60%                                              |

### 2.1 LIMITS

|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Limit:</b> | In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)). |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### 2.2 BLOCK DIAGRAM OF TEST SETUP



### 2.3 TEST DATA

**Pass: Please Refer To Appendix: For Details**

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### 3 RADIATED EMISSIONS WHICH FALL IN THE RESTRICTED BANDS

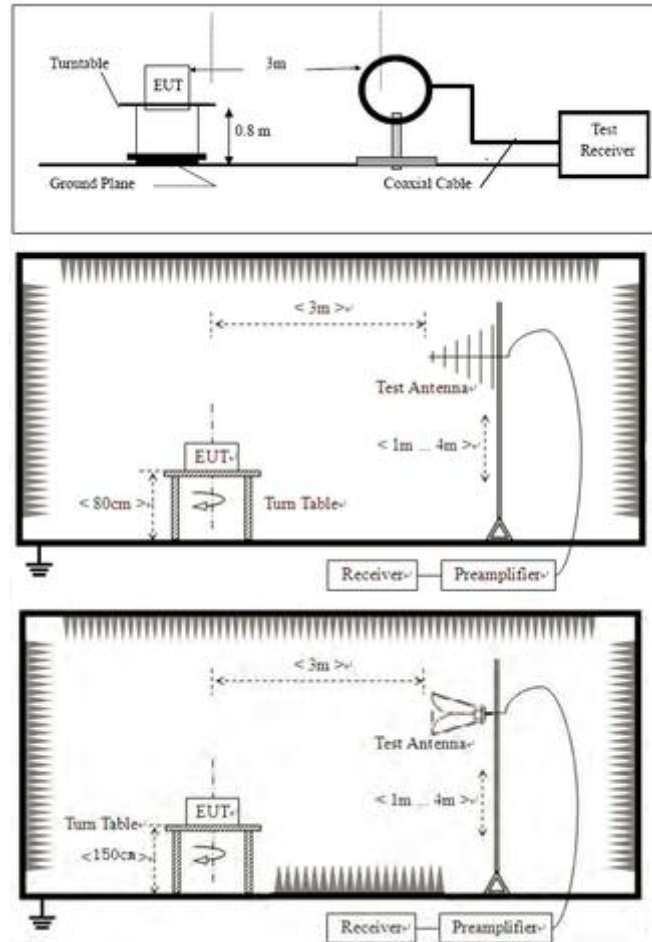
|                               |                                                  |
|-------------------------------|--------------------------------------------------|
| <b>Test Standard</b>          | 47 CFR Part 15, Subpart C 15.247                 |
| <b>Test Method</b>            | ANSI C63.10 (2013) Section 6.10.5                |
| <b>Test Mode (Pre-Scan)</b>   | TX Low channel;TX middle channel;TX high channel |
| <b>Test Mode (Final Test)</b> | TX Low channel;TX high channel                   |
| <b>Tester</b>                 | Eason                                            |
| <b>Temperature</b>            | 25℃                                              |
| <b>Humidity</b>               | 60%                                              |

#### 3.1 LIMITS

| <b>Frequency(MHz)</b> | <b>Field strength(microvolts/meter)</b> | <b>Measurement distance(meters)</b> |
|-----------------------|-----------------------------------------|-------------------------------------|
| 0.009-0.490           | 2400/F(kHz)                             | 300                                 |
| 0.490-1.705           | 24000/F(kHz)                            | 30                                  |
| 1.705-30.0            | 30                                      | 30                                  |
| 30-88                 | 100                                     | 3                                   |
| 88-216                | 150                                     | 3                                   |
| 216-960               | 200                                     | 3                                   |
| Above 960             | 500                                     | 3                                   |

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

### 3.2 BLOCK DIAGRAM OF TEST SETUP



### 3.3 PROCEDURE

- For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark 1:  $\text{Level} = \text{Read Level} + \text{Cable Loss} + \text{Antenna Factor} - \text{Preamp Factor}$

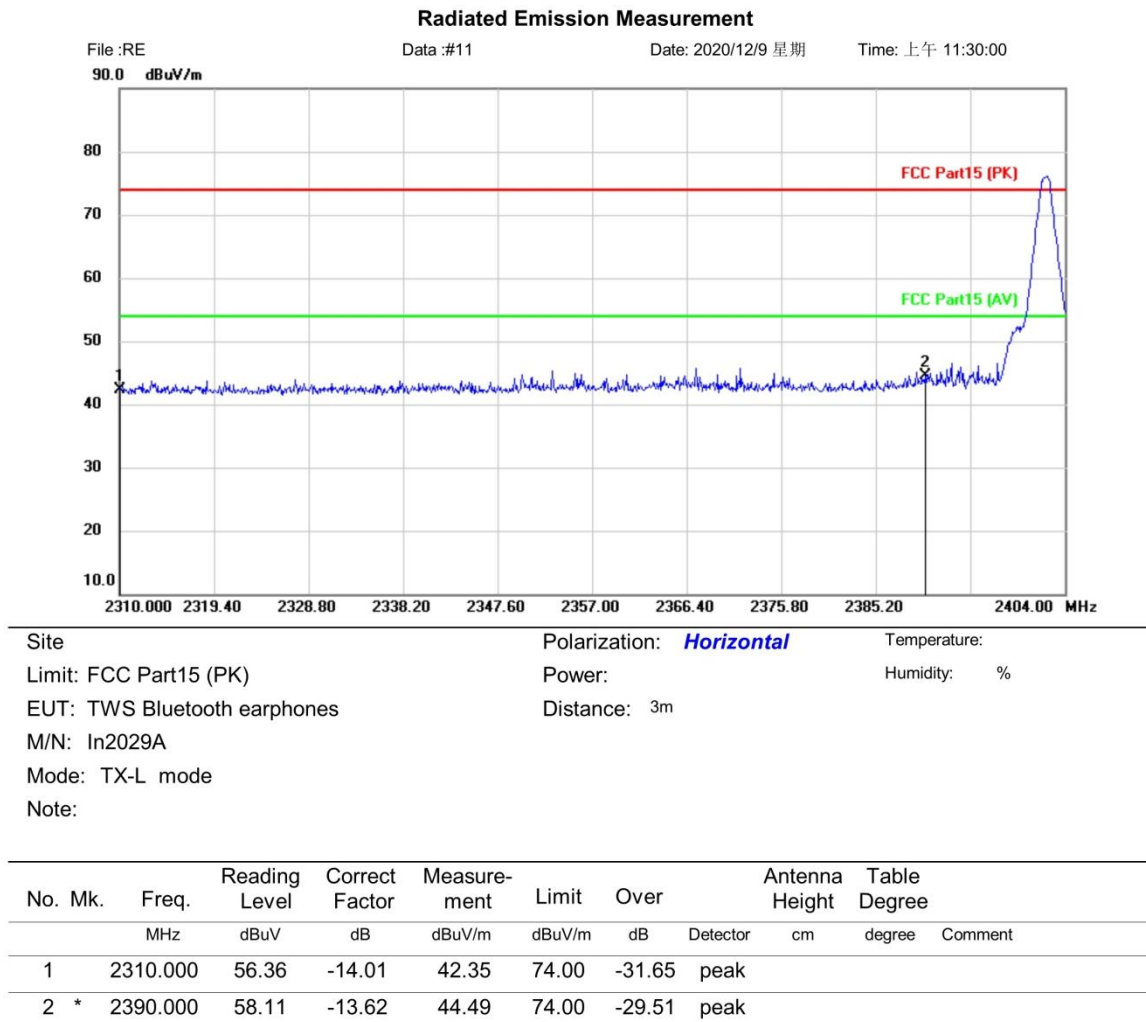
Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

BlueAsia

### 3.4 TEST DATA

Remark: During the test, pre-scan the GFSK, Pi/4QPSK modulation, and found the Pi/4QPSK modulation which it is worse case.

[Test Mode: TX Low channel]; [Polarity: Horizontal]

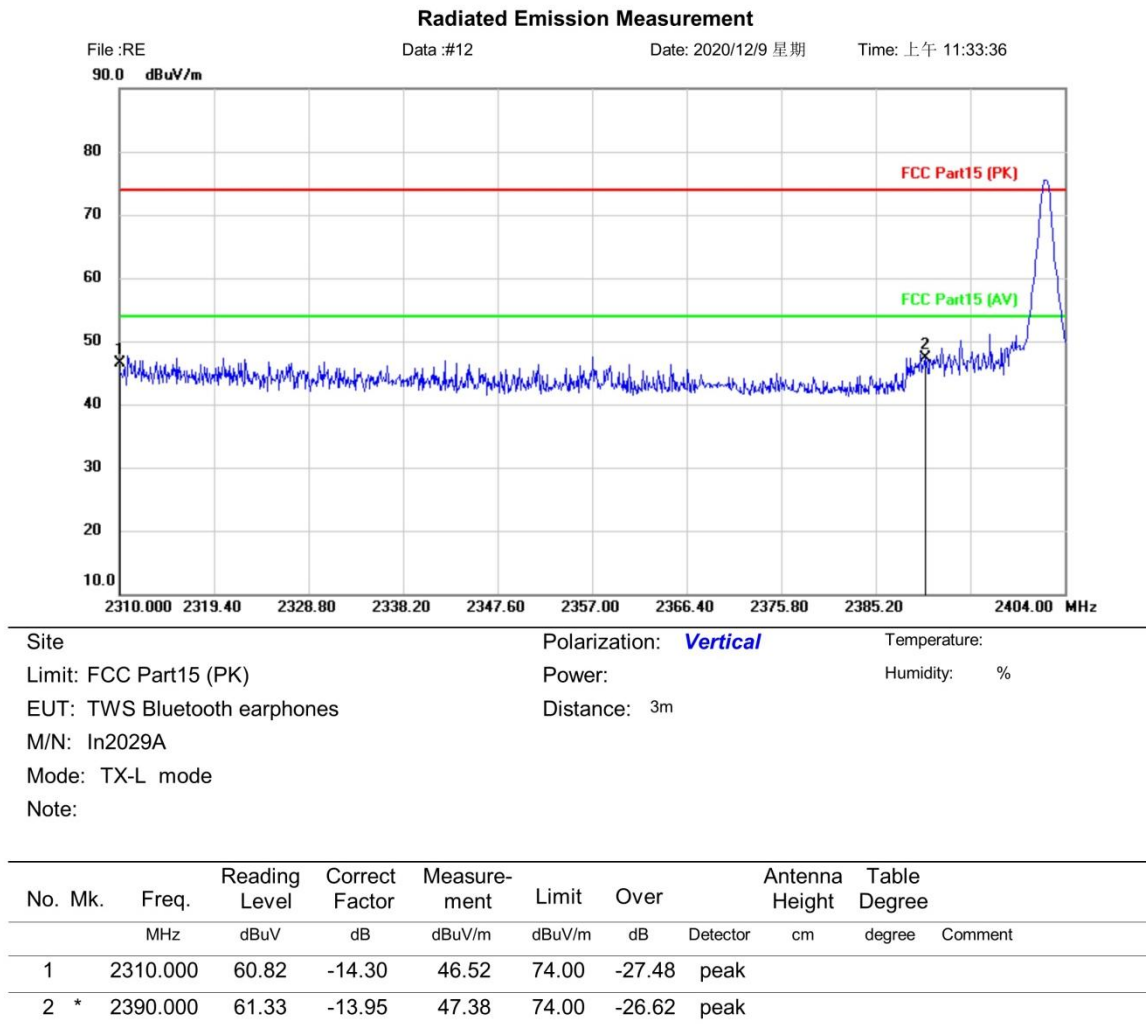


\*:Maximum data    x:Over limit    !:over margin

〈Reference Only

**Test Result: Pass**

[TestMode: TX Low channel]; [Polarity: Vertical]

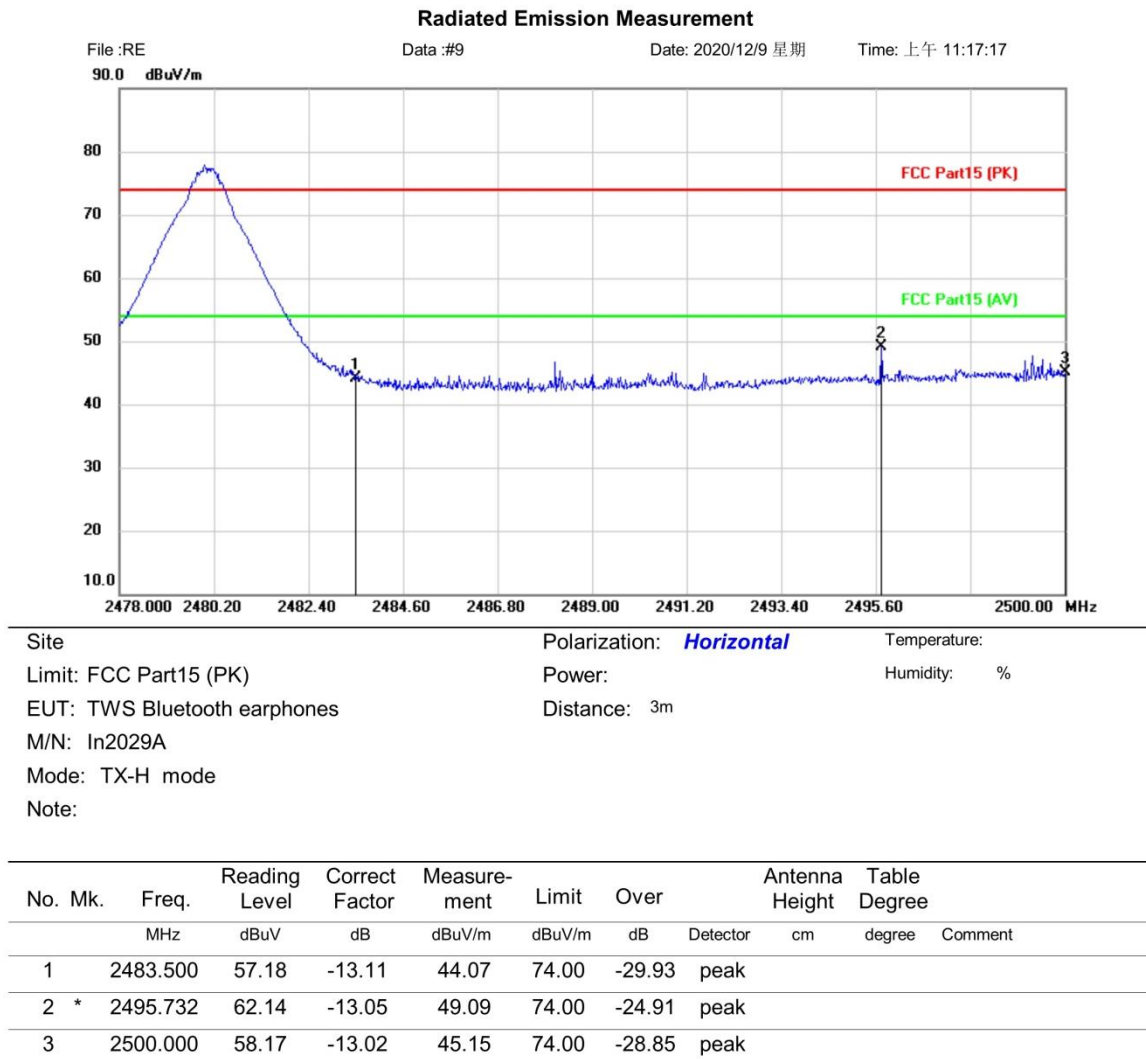


\*:Maximum data    x:Over limit    !:over margin

⟨Reference Only

**Test Result: Pass**

[TestMode: TX high channel]; [Polarity: Horizontal]

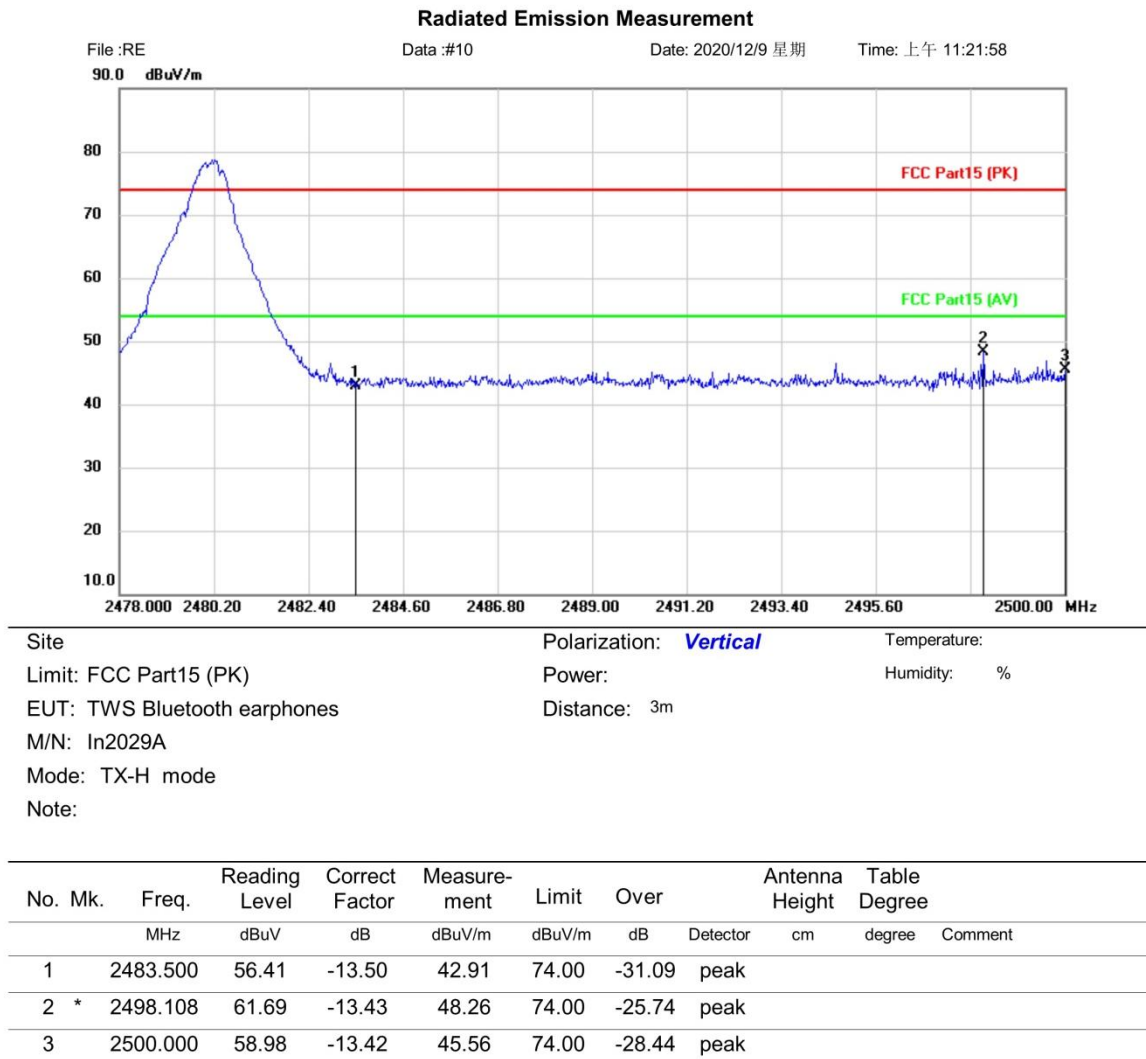


\*:Maximum data    x:Over limit    !:over margin

⟨Reference Only

**Test Result: Pass**

[TestMode: TX high channel]; [Polarity: Vertical]



\*:Maximum data    x:Over limit    !:over margin

⟨Reference Only

**Test Result: Pass**

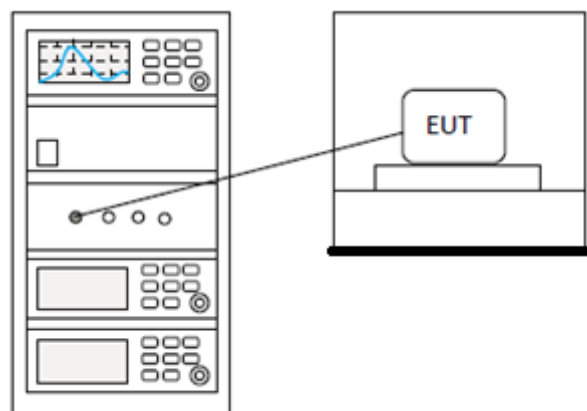
#### 4 CONDUCTED BAND EDGES MEASUREMENT

|                               |                                                      |
|-------------------------------|------------------------------------------------------|
| <b>Test Standard</b>          | 47 CFR Part 15, Subpart C 15.247                     |
| <b>Test Method</b>            | ANSI C63.10 (2013) Section 7.8.8 & Section 11.13.3.2 |
| <b>Test Mode (Pre-Scan)</b>   | TX                                                   |
| <b>Test Mode (Final Test)</b> | TX                                                   |
| <b>Tester</b>                 | Eason                                                |
| <b>Temperature</b>            | 25°C                                                 |
| <b>Humidity</b>               | 60%                                                  |

##### 4.1 LIMITS

|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Limit:</b> | In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)). |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

##### 4.2 BLOCK DIAGRAM OF TEST SETUP



#### 4.3 TEST DATA

**Pass: Please Refer To Appendix: For Details**

BlueAsia

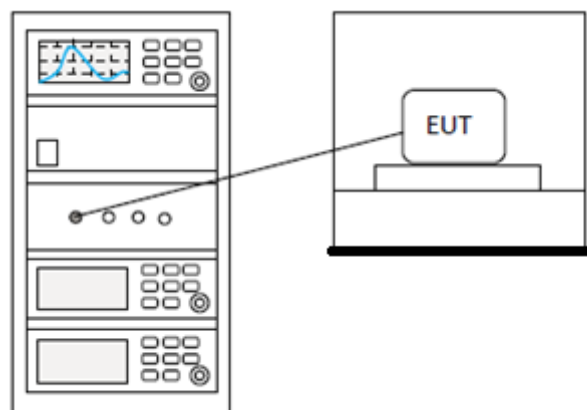
## 5 DWELL TIME

|                        |                                  |
|------------------------|----------------------------------|
| Test Standard          | 47 CFR Part 15, Subpart C 15.247 |
| Test Method            | ANSI C63.10 (2013) Section 7.8.4 |
| Test Mode (Pre-Scan)   | TX                               |
| Test Mode (Final Test) | TX                               |
| Tester                 | Eason                            |
| Temperature            | 25℃                              |
| Humidity               | 60%                              |

### 5.1 LIMITS

| Frequency(MHz) | Limit                                                                    |
|----------------|--------------------------------------------------------------------------|
| 902-928        | 0.4S within a 20S period(20dB bandwidth<250kHz)                          |
|                | 0.4S within a 10S period(20dB bandwidth≥250kHz)                          |
| 2400-2483.5    | 0.4S within a period of 0.4Smultiplied by the number of hopping channels |
| 5725-5850      | 0.4S within a 30S period                                                 |

### 5.2 BLOCK DIAGRAM OF TEST SETUP



### 5.3 EST DATA

**Pass: Please Refer To Appendix: For Details**

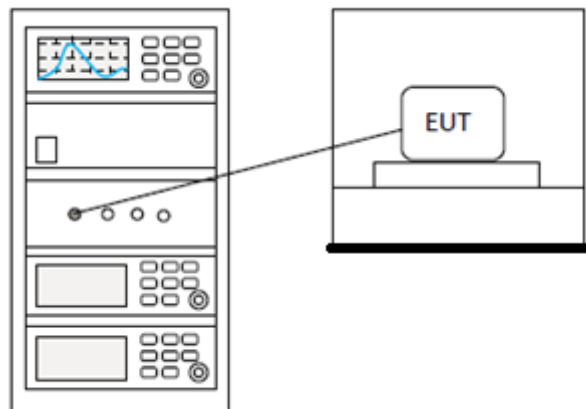
## 6 HOPPING CHANNEL NUMBER

|                        |                                  |
|------------------------|----------------------------------|
| Test Standard          | 47 CFR Part 15, Subpart C 15.247 |
| Test Method            | ANSI C63.10 (2013) Section 7.8.3 |
| Test Mode (Pre-Scan)   | TX                               |
| Test Mode (Final Test) | TX                               |
| Tester                 | Eason                            |
| Temperature            | 25℃                              |
| Humidity               | 60%                              |

### 6.1 LIMITS

| Frequency range(MHz) | Number of hopping channels (minimum) |
|----------------------|--------------------------------------|
| 902-928              | 50 for 20dB bandwidth <250kHz        |
|                      | 25 for 20dB bandwidth ≥250kHz        |
| 2400-2483.5          | 15                                   |
| 5725-5850            | 75                                   |

### 6.2 BLOCK DIAGRAM OF TEST SETUP



### 6.3 TEST DATA

**Pass: Please Refer To Appendix: For Details**

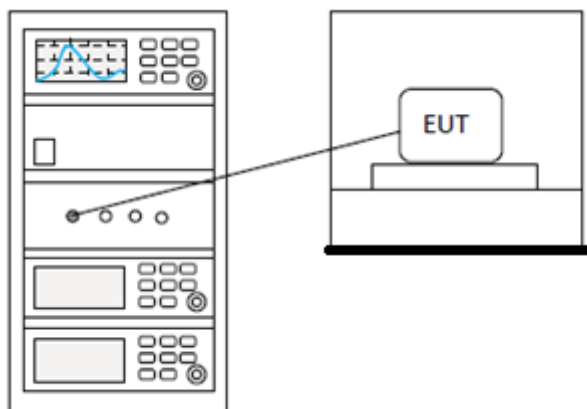
## 7 CARRIER FREQUENCIES SEPARATION

|                        |                                  |
|------------------------|----------------------------------|
| Test Standard          | 47 CFR Part 15, Subpart C 15.247 |
| Test Method            | ANSI C63.10 (2013) Section 7.8.2 |
| Test Mode (Pre-Scan)   | TX                               |
| Test Mode (Final Test) | TX                               |
| Tester                 | Eason                            |
| Temperature            | 25°C                             |
| Humidity               | 60%                              |

### 7.1 LIMITS

|               |                                                                              |
|---------------|------------------------------------------------------------------------------|
| <b>Limit:</b> | 2/3 of the 20dB bandwidth base on the transmission power is less than 0.125W |
|---------------|------------------------------------------------------------------------------|

### 7.2 BLOCK DIAGRAM OF TEST SETUP



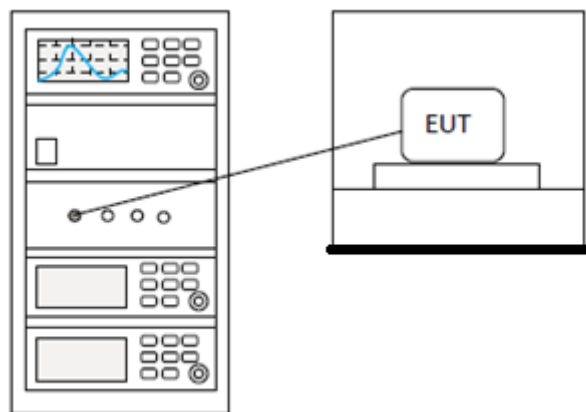
### 7.3 TEST DATA

**Pass: Please Refer To Appendix: For Details**

## 8 20DB BANDWIDTH

|                        |                                  |
|------------------------|----------------------------------|
| Test Standard          | 47 CFR Part 15, Subpart C 15.247 |
| Test Method            | ANSI C63.10 (2013) Section 7.8.7 |
| Test Mode (Pre-Scan)   | TX                               |
| Test Mode (Final Test) | TX                               |
| Tester                 | Eason                            |
| Temperature            | 25℃                              |
| Humidity               | 60%                              |

### 8.1 BLOCK DIAGRAM OF TEST SETUP



### 8.2 TEST DATA

**Pass: Please Refer To Appendix: For Details**

## 9 CONDUCTED PEAK OUTPUT POWER

|                        |                                  |
|------------------------|----------------------------------|
| Test Standard          | 47 CFR Part 15, Subpart C 15.247 |
| Test Method            | ANSI C63.10 (2013) Section 7.8.5 |
| Test Mode (Pre-Scan)   | TX                               |
| Test Mode (Final Test) | TX                               |
| Tester                 | Eason                            |
| Temperature            | 25°C                             |
| Humidity               | 60%                              |

### 9.1 LIMITS

| Frequency range(MHz) | Output power of the intentional radiator(watt)         |
|----------------------|--------------------------------------------------------|
| 902-928              | 1 for $\geq 50$ hopping channels                       |
|                      | 0.25 for $25 \leq \text{hopping channels} < 50$        |
|                      | 1 for digital modulation                               |
| 2400-2483.5          | 1 for $\geq 75$ non-overlapping hopping channels       |
|                      | 0.125 for all other frequency hopping systems          |
|                      | 1 for digital modulation                               |
| 5725-5850            | 1 for frequency hopping systems and digital modulation |

### 9.2 BLOCK DIAGRAM OF TEST SETUP

