

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                            |                                                            |                                           |                                         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|-------------------------------------------|-----------------------------------------|
| <b>Prüfbericht-Nr.:</b><br><i>Test report no.:</i>                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>CN21A0NB 001</b>                                                                                                        | <b>Auftrags-Nr.:</b><br><i>Order no.:</i>                  | <b>168311733</b>                          | Seite 1 von 27<br>Page 1 of 27          |
| <b>Kunden-Referenz-Nr.:</b><br><i>Client reference no.:</i>                                                                                                                                                                                                                                                                                                                                                                                                         | <b>N/A</b>                                                                                                                 | <b>Auftragsdatum:</b><br><i>Order date:</i>                | <b>2021-03-29</b>                         |                                         |
| <b>Auftraggeber:</b><br><i>Client:</i>                                                                                                                                                                                                                                                                                                                                                                                                                              | Lenovo (Beijing) Limited<br>201-H2-6, Floor 2, Building 2, No.6 Shangdi West Road, Haidian District, Beijing, China 100085 |                                                            |                                           |                                         |
| <b>Prüfgegenstand:</b><br><i>Test item:</i>                                                                                                                                                                                                                                                                                                                                                                                                                         | thinkplus Walkie Talkie Earphone HW10                                                                                      |                                                            |                                           |                                         |
| <b>Bezeichnung / Typ-Nr.:</b><br><i>Identification / Type no.:</i>                                                                                                                                                                                                                                                                                                                                                                                                  | HW10TP<br>(Trademark: Lenovo)                                                                                              |                                                            |                                           |                                         |
| <b>Auftrags-Inhalt:</b><br><i>Order content:</i>                                                                                                                                                                                                                                                                                                                                                                                                                    | Test Report                                                                                                                |                                                            |                                           |                                         |
| <b>Prüfgrundlage:</b><br><i>Test specification:</i>                                                                                                                                                                                                                                                                                                                                                                                                                 | FCC CFR Title 47, Part 15, Subpart C, Section 15.247                                                                       |                                                            |                                           |                                         |
| <b>Wareneingangsdatum:</b><br><i>Date of sample receipt:</i>                                                                                                                                                                                                                                                                                                                                                                                                        | 2021-04-16                                                                                                                 | Please refer to Photo Document                             |                                           |                                         |
| <b>Prüfmuster-Nr.:</b><br><i>Test sample no.:</i>                                                                                                                                                                                                                                                                                                                                                                                                                   | A003030849-013,019<br>A003030849-025                                                                                       |                                                            |                                           |                                         |
| <b>Prüfzeitraum:</b><br><i>Testing period:</i>                                                                                                                                                                                                                                                                                                                                                                                                                      | 2021-04-16 – 2021-05-08                                                                                                    |                                                            |                                           |                                         |
| <b>Ort der Prüfung:</b><br><i>Place of testing:</i>                                                                                                                                                                                                                                                                                                                                                                                                                 | TÜV Rheinland (Shenzhen) Co., Ltd.                                                                                         |                                                            |                                           |                                         |
| <b>Prüflaboratorium:</b><br><i>Testing laboratory:</i>                                                                                                                                                                                                                                                                                                                                                                                                              | TÜV Rheinland (Shenzhen) Co., Ltd.                                                                                         |                                                            |                                           |                                         |
| <b>Prüfergebnis*:</b><br><i>Test result*:</i>                                                                                                                                                                                                                                                                                                                                                                                                                       | Pass                                                                                                                       |                                                            |                                           |                                         |
| <b>geprüft von:</b><br><i>tested by:</i>                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>genehmigt von:</b><br><i>authorized by:</i>                                                                             |                                                            |                                           |                                         |
| <b>Datum:</b><br><i>Date:</i> 2021-05-11                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Ausstellungsdatum:</b><br><i>Issue date:</i> 2021-05-11                                                                 |                                                            |                                           |                                         |
| <b>Stellung / Position:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                         | Senior Project Manager                                                                                                     | <b>Stellung / Position:</b>                                | Technical Certifier                       |                                         |
| <b>Sonstiges / Other:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                           | FCC ID: A5MHW10TP                                                                                                          |                                                            |                                           |                                         |
| <b>Zustand des Prüfgegenstandes bei Anlieferung:</b><br><i>Condition of the test item at delivery:</i>                                                                                                                                                                                                                                                                                                                                                              | Prüfmuster vollständig und unbeschädigt<br><i>Test item complete and undamaged</i>                                         |                                                            |                                           |                                         |
| * Legende:                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1 = sehr gut<br>P(ass) = entspricht o.g. Prüfgrundlage(n)                                                                  | 2 = gut<br>F(ail) = entspricht nicht o.g. Prüfgrundlage(n) | 3 = befriedigend<br>N/A = nicht anwendbar | 4 = ausreichend<br>N/T = nicht getestet |
| * Legend:                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1 = very good<br>P(ass) = passed a.m. test specification(s)                                                                | 2 = good<br>F(ail) = failed a.m. test specification(s)     | 3 = satisfactory<br>N/A = not applicable  | 4 = sufficient<br>N/T = not tested      |
| <p><b>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</b><br/> <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i></p> |                                                                                                                            |                                                            |                                           |                                         |

V05

## ***Test Summary***

**5.1.1 ANTENNA REQUIREMENT**

RESULT: Pass

**5.1.2 MAXIMUM PEAK CONDUCTED OUTPUT POWER**

RESULT: Pass

**5.1.3 CONDUCTED POWER SPECTRAL DENSITY**

RESULT: Pass

**5.1.4 6dB BANDWIDTH**

RESULT: Pass

**5.1.5 99% BANDWIDTH**

RESULT: Pass

**5.1.6 20dB BANDWIDTH**

RESULT: Pass

**5.1.7 CARRIER FREQUENCY SEPARATION**

RESULT: Pass

**5.1.8 NUMBER OF HOPPING FREQUENCY**

RESULT: Pass

**5.1.9 TIME OF OCCUPANCY**

RESULT: Pass

**5.1.10 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 kHz BANDWIDTH**

RESULT: Pass

**5.1.11 RADIATED SPURIOUS EMISSION**

RESULT: Pass

**5.1.12 CONDUCTED EMISSION ON AC MAINS**

RESULT: Pass

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# 1 General Remarks

## 1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A: Photographs of Test Set-up

Appendix B: Test Results of BDR/EDR mode

Appendix C: Test Results of Bluetooth LE

## 2 Test Sites

### 2.1 Test Facilities

**TÜV Rheinland (Shenzhen) Co., Ltd.**

362 Huanguan Road Middle Longhua District, Shenzhen 518110 People's Republic of China

FCC Registration No.: 694916

ISED wireless device testing laboratory: 25069

### 2.2 List of Test and Measurement Instruments

**Table 1: List of Test and Measurement Equipment**

| <b>Radio Spectrum Testing (TS8997)</b>       |                     |                      |                   |                   |
|----------------------------------------------|---------------------|----------------------|-------------------|-------------------|
| <b>Equipment</b>                             | <b>Manufacturer</b> | <b>Model</b>         | <b>Serial No.</b> | <b>Cal. until</b> |
| Signal Analyzer                              | R&S                 | FSV 40               | 101441            | 2021-08-10        |
| OSP                                          | R&S                 | OSP 150              | 101017            | 2021-12-10        |
| Control PC                                   | DELL                | OptiPlex 7050        | FTJZ9P2           | N/A               |
| Test Software                                | R&S                 | WMS32<br>(V11.00.00) | N/A               | N/A               |
| Power Meter                                  | R&S                 | NRP2                 | 107105            | 2021-12-10        |
| Wideband Power Sensor                        | R&S                 | NRP-Z81              | 105677            | 2021-09-10        |
| Shielding Room 8#                            | Albatross           | SR8                  | APC17151-SR8      | 2021-07-23        |
| <b>Unwanted Emission Testing (TS9975)</b>    |                     |                      |                   |                   |
| <b>Equipment</b>                             | <b>Manufacturer</b> | <b>Model</b>         | <b>Serial No.</b> | <b>Cal. until</b> |
| EMI Test Receiver                            | R&S                 | ESR 7                | 102021            | 2021-08-11        |
| Signal Analyzer                              | R&S                 | FSV 40               | 101439            | 2021-08-10        |
| System Controller Interface                  | R&S                 | SCI-100              | S10010038         | N/A               |
| Filterbank                                   | R&S                 | Wlan                 | 100759            | 2021-08-10        |
| OSP                                          | R&S                 | OSP 120              | 102040            | N/A               |
| Pre-amplifier                                | R&S                 | SCU08F1              | 08320031          | 2021-08-10        |
| Amplifier                                    | R&S                 | SCU-18F              | 180070            | 2021-08-10        |
| Amplifier                                    | R&S                 | SCU40A               | 100475            | 2021-09-10        |
| Trilog Broadband Antenna<br>(30 MHz - 7 GHz) | Schwarzbeck         | VULB 9162            | 193               | 2022-08-08        |
| Double-Ridged Antenna (1 -18 GHz)            | ETS-LINDGREN        | 3117                 | 00218717          | 2022-08-08        |
| Wideband Ridged Horn Antenna (18-40 GHz)     | Steatite            | QMS-00880            | 19067             | 2022-08-08        |
| Active Loop Antenna                          | Schwarzbeck         | FMZB 1513            | 302               | 2022-09-13        |

|                                          |           |                   |              |            |
|------------------------------------------|-----------|-------------------|--------------|------------|
| Wideband Ridged Horn Antenna (12-18 GHz) | Steatite  | QMS-00208         | 18313        | 2021-09-02 |
| Test software                            | R&S       | EMC32 (V10.60.10) | N/A          | N/A        |
| Control PC                               | Dell      | OptiPlex 7050     | 36NV9P2      | N/A        |
| 3m Semi-Anechoic Chamber                 | Albatross | SAC-3m            | APC17151-SAC | 2021-07-06 |

| Conducted Emission       |              |                     |            |            |
|--------------------------|--------------|---------------------|------------|------------|
| Equipment                | Manufacturer | Model No.           | Serial No. | Cal. Until |
| EMI Test Receiver        | R&S          | ESR3                | 102428     | 2021-08-16 |
| Artificial Mains Network | R&S          | ENV216              | 102333     | 2021-08-16 |
| EMC32 test software      | R&S          | EMC32(Ver.10.50.00) | N/A        | N/A        |

## 2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

## 2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

## 2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table.

| Parameter                                              | Uncertainty                   |
|--------------------------------------------------------|-------------------------------|
| Radio Frequency                                        | $\pm 1 \times 10^{-7}$        |
| RF Power (conducted)                                   | $\pm 2.5$ dB                  |
| Radiated Emission of Transmitter, valid up to 26.5 GHz | $\pm 6$ dB                    |
| Radiated Emission of Receiver, valid up to 26.5 GHz    | $\pm 6$ dB                    |
| Conducted Emission, (9kHz to 150kHz)/(150kHz to 30MHz) | $\pm 3.70$ dB / $\pm 3.30$ dB |
| Temperature                                            | $\pm 1$ °C                    |
| Humidity                                               | $\pm 5$ %                     |
| Voltage (DC)                                           | $\pm 1$ %                     |
| Voltage (AC, <10kHz)                                   | $\pm 2$ %                     |

## 2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A & B & C of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) Co., Ltd. file for certification follow-up purposes.

## 2.7 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. Test facility located at 362 Huanguan Road Middle Longhua District, Shenzhen 518110 People's Republic of China is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

### 3 General Product Information

#### 3.1 Product Function and Intended Use

The EUT is a thinkplus Walkie Talkie Earphone HW10, which supports Bluetooth BDR&EDR and Bluetooth LE wireless technology.

For details refer to the User Manual, Technical Description and Circuit Diagram.

#### 3.2 Ratings and System Details

Table 2: Technical Specification of EUT

| General Information of EUT              | Value                                                   |
|-----------------------------------------|---------------------------------------------------------|
| Kind of Equipment:                      | thinkplus Walkie Talkie Earphone HW10                   |
| Type Designation:                       | HW10TP                                                  |
| Trademark:                              | Lenovo                                                  |
| FCC ID:                                 | A5MHW10TP                                               |
| Testing Voltage:                        | Internal battery operated (3.7Vdc)<br>or USB-C operated |
| Antenna Type:                           | Integral Antenna                                        |
| Antenna Gain:                           | 1.6 dBi                                                 |
| Technical Specification of BDR/EDR      |                                                         |
| Operating Frequency:                    | 2402 MHz to 2480 MHz                                    |
| Type of Modulation:                     | GFSK(BDR), $\pi/4$ -DQPSK(EDR), 8DPSK(EDR)              |
| Channel Number:                         | 79 channels                                             |
| Channel Separation:                     | 1MHz                                                    |
| Technical Specification of Bluetooth LE |                                                         |
| Frequency Range:                        | 2402 MHz to 2480 MHz                                    |
| Type of Modulation:                     | GFSK(BT_LE)                                             |
| Channel Number:                         | 40 channels                                             |
| Data Rate:                              | 1 Mbps, 2Mbps                                           |
| Channel Separation:                     | 2 MHz                                                   |

**Table 3: RF Channel and Frequency of BDR/EDR**

| RF Channel | Frequency (MHz) | RF Channel | Frequency (MHz) | RF Channel | Frequency (MHz) | RF Channel | Frequency (MHz) |
|------------|-----------------|------------|-----------------|------------|-----------------|------------|-----------------|
| 0          | 2402.00         | 20         | 2422.00         | 40         | 2442.00         | 60         | 2462.00         |
| 1          | 2403.00         | 21         | 2423.00         | 41         | 2443.00         | 61         | 2463.00         |
| 2          | 2404.00         | 22         | 2424.00         | 42         | 2444.00         | 62         | 2464.00         |
| 3          | 2405.00         | 23         | 2425.00         | 43         | 2445.00         | 63         | 2465.00         |
| 4          | 2406.00         | 24         | 2426.00         | 44         | 2446.00         | 64         | 2466.00         |
| 5          | 2407.00         | 25         | 2427.00         | 45         | 2447.00         | 65         | 2467.00         |
| 6          | 2408.00         | 26         | 2428.00         | 46         | 2448.00         | 66         | 2468.00         |
| 7          | 2409.00         | 27         | 2429.00         | 47         | 2449.00         | 67         | 2469.00         |
| 8          | 2410.00         | 28         | 2430.00         | 48         | 2450.00         | 68         | 2470.00         |
| 9          | 2411.00         | 29         | 2431.00         | 49         | 2451.00         | 69         | 2471.00         |
| 10         | 2412.00         | 30         | 2432.00         | 50         | 2452.00         | 70         | 2472.00         |
| 11         | 2413.00         | 31         | 2433.00         | 51         | 2453.00         | 71         | 2473.00         |
| 12         | 2414.00         | 32         | 2434.00         | 52         | 2454.00         | 72         | 2474.00         |
| 13         | 2415.00         | 33         | 2435.00         | 53         | 2455.00         | 73         | 2475.00         |
| 14         | 2416.00         | 34         | 2436.00         | 54         | 2456.00         | 74         | 2476.00         |
| 15         | 2417.00         | 35         | 2437.00         | 55         | 2457.00         | 75         | 2477.00         |
| 16         | 2418.00         | 36         | 2438.00         | 56         | 2458.00         | 76         | 2478.00         |
| 17         | 2419.00         | 37         | 2439.00         | 57         | 2459.00         | 77         | 2479.00         |
| 18         | 2420.00         | 38         | 2440.00         | 58         | 2460.00         | 78         | 2480.00         |
| 19         | 2421.00         | 39         | 2441.00         | 59         | 2461.00         |            |                 |

Test frequencies are lowest channel: 2402 MHz, middle channel: 2441 MHz and highest channel: 2480 MHz for General 2.4GHz

**Table 4: RF Channel and Frequency of BLE**

| RF Channel | Frequency (MHz) | RF Channel | Frequency (MHz) | RF Channel | Frequency (MHz) | RF Channel | Frequency (MHz) |
|------------|-----------------|------------|-----------------|------------|-----------------|------------|-----------------|
| 0          | 2402            | 10         | 2422            | 20         | 2442            | 30         | 2462            |
| 1          | 2404            | 11         | 2424            | 21         | 2444            | 31         | 2464            |
| 2          | 2406            | 12         | 2426            | 22         | 2446            | 32         | 2466            |
| 3          | 2408            | 13         | 2428            | 23         | 2448            | 33         | 2468            |
| 4          | 2410            | 14         | 2430            | 24         | 2450            | 34         | 2470            |
| 5          | 2412            | 15         | 2432            | 25         | 2452            | 35         | 2472            |
| 6          | 2414            | 16         | 2434            | 26         | 2454            | 36         | 2474            |
| 7          | 2416            | 17         | 2436            | 27         | 2456            | 37         | 2476            |
| 8          | 2418            | 18         | 2438            | 28         | 2458            | 38         | 2478            |
| 9          | 2420            | 19         | 2440            | 29         | 2460            | 39         | 2480            |

Test frequencies are lowest channel: 2402 MHz, middle channel: 2440 MHz and highest channel: 2480 MHz for BLE

### 3.3 Independent Operation Modes

The basic operation modes are:

- A. On, Bluetooth transmitting mode (BDR & EDR mode)
  - 1) Low Channel
  - 2) Middle Channel
  - 3) High Channel
- B. On, Bluetooth transmitting mode (BLE)
  - 1) Low Channel
  - 2) Middle Channel
  - 3) High Channel
- C. On, Transmitting on Hopping channel
- D. On, Charging

### 3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

### 3.5 Submitted Documents

- Application Form

- User Manual

## 4 Test Set-up and Operation Modes

### 4.1 Principle of Configuration Selection

**Radio Spectrum:** The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

**Emission:** The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

### 4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All tests were performed according to the procedures in ANSI C63.10: 2013.

According to clause 3.1, all tests were performed on model HW10TP in this report.

### 4.3 Special Accessories and Auxiliary Equipment

Table 5: Auxiliary Equipment Used during Test

| Description | Manufacturer | Model                  | S/N             |
|-------------|--------------|------------------------|-----------------|
| Laptop      | Lenovo       | T480                   | PF-16A6N8       |
| Laptop      | Lenovo       | T480                   | PF-180KTA 18/07 |
| USB-C cable | Lenovo       | Shielded, Length: 65cm | N/A             |

### 4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.

## 4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test (Below 1GHz)

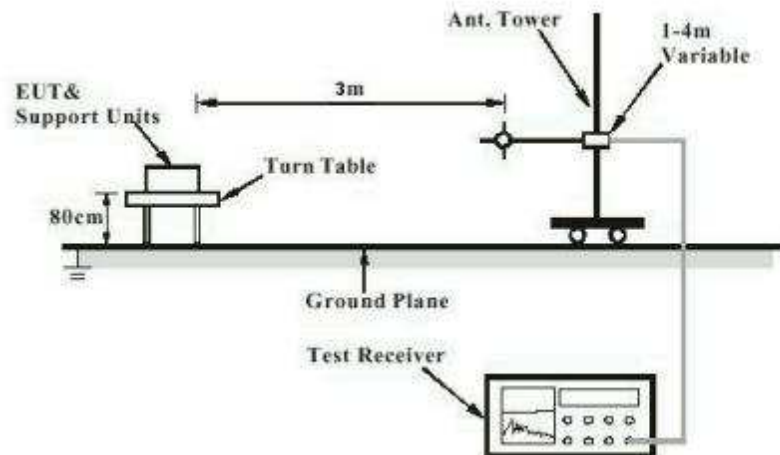
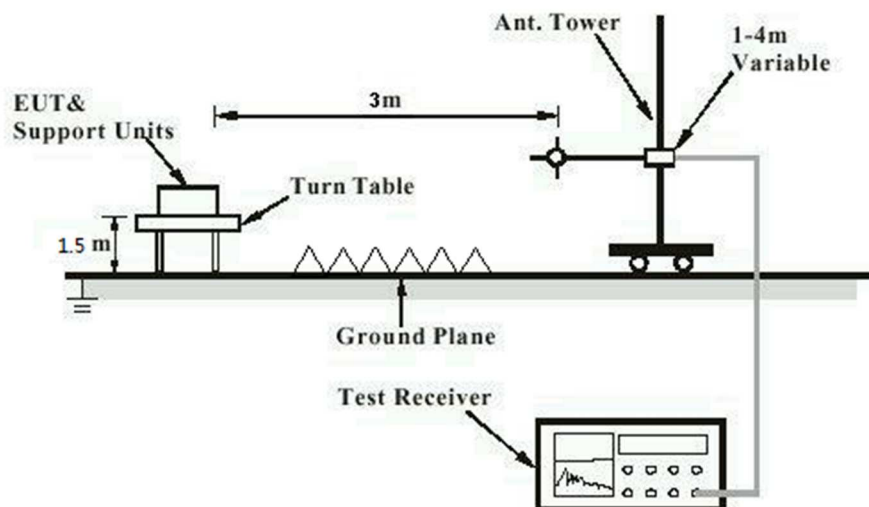
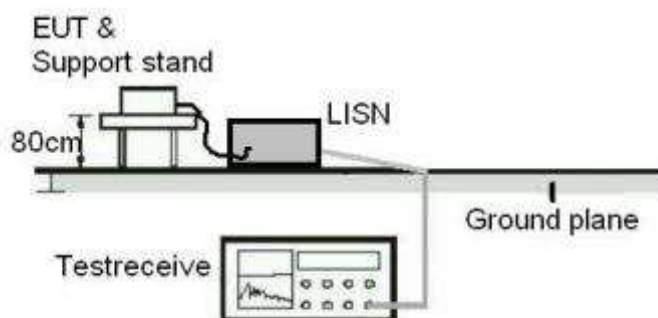


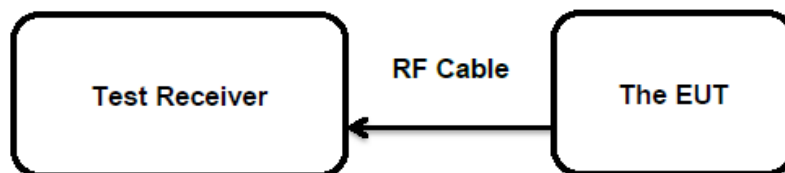
Diagram of Measurement Configuration for Radiation Test (Above 1GHz)



**Diagram of Measurement Configuration for Mains Conduction Measurement**



**Diagram of Measurement Configuration for Conducted Transmitter Measurement**



## 5 Test Results

### 5.1 Transmitter Requirement & Test Suites

#### 5.1.1 Antenna Requirement

RESULT:

Pass

**Test Specification**

Test standard : FCC Part 15.247(b)(4) and Part 15.203

According to the manufacturer declared, the EUT has a PCB antenna, the directional gain of antenna is 1.6 dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement.

Therefore the EUT is considered sufficient to comply with the provision.

Refer to EUT Photo for further details.

## 5.1.2 Maximum Peak Conducted Output Power

**RESULT:**
**Pass**
**Test Specification**

|                   |                                        |
|-------------------|----------------------------------------|
| Test standard     | : FCC Part 15.247(b)(1)&(3)            |
| Basic standard    | : ANSI C63.10: 2013                    |
| Limits            | : FHSS < 0.125 Watts, DSSS < 1.0 Watts |
| Kind of test site | : Shielded Room                        |

**Test Setup**

|                      |                           |
|----------------------|---------------------------|
| Date of testing      | : 2021-04-25 ~ 2021-04-26 |
| Input voltage        | : AC 120V, 60Hz           |
| Operation mode       | : A, B                    |
| Test channel         | : Low / Middle / High     |
| Ambient temperature  | : 25.2 °C                 |
| Relative humidity    | : 52 %                    |
| Atmospheric pressure | : 101 kPa                 |

**Table 6: Test Result of Maximum Peak Conducted Output Power, BDR & EDR**

| Test Mode              | Test Channel (MHz) | Measured Peak Power |        | Limit (W) |
|------------------------|--------------------|---------------------|--------|-----------|
|                        |                    | (dBm)               | (W)    |           |
| GFSK (BDR)             | 2402.0             | -1.20               | 0.0008 | < 0.125   |
|                        | 2441.0             | -1.30               | 0.0007 |           |
|                        | 2480.0             | 0.30                | 0.0011 |           |
| Maximum Measured Value |                    | 0.30                | 0.0011 |           |

| Test Mode              | Test Channel (MHz) | Measured Peak Power |        | Limit (W) |
|------------------------|--------------------|---------------------|--------|-----------|
|                        |                    | (dBm)               | (W)    |           |
| 8DPSK (EDR)            | 2402.0             | 1.00                | 0.0013 | < 0.125   |
|                        | 2441.0             | 1.00                | 0.0013 |           |
|                        | 2480.0             | 3.00                | 0.0020 |           |
| Maximum Measured Value |                    | 3.00                | 0.0020 |           |

**Table 7: Test Result of Maximum Peak Conducted Output Power, Bluetooth LE**

| Test Mode                  | Test Channel (MHz) | Measured Peak Power |        | Limit (W) |
|----------------------------|--------------------|---------------------|--------|-----------|
|                            |                    | (dBm)               | (W)    |           |
| BLE (1 Mbps)               | 2402               | -1.00               | 0.0008 | < 1.0     |
|                            | 2440               | -1.10               | 0.0008 |           |
|                            | 2480               | 0.00                | 0.0010 |           |
| <b>Max. Measured Value</b> |                    | 0.00                | 0.0010 |           |

| Test Mode                  | Test Channel (MHz) | Measured Peak Power |        | Limit (W) |
|----------------------------|--------------------|---------------------|--------|-----------|
|                            |                    | (dBm)               | (W)    |           |
| BLE (2 Mbps)               | 2402               | -1.20               | 0.0008 | < 1.0     |
|                            | 2440               | -1.30               | 0.0007 |           |
|                            | 2480               | 0.50                | 0.0011 |           |
| <b>Max. Measured Value</b> |                    | 0.50                | 0.0011 |           |

Note:

- 1) The cable loss is taken into account in results.
- 2) Antenna gain(G): 1.6 dBi

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### 5.1.3 Conducted Power Spectral Density

**RESULT:****Pass****Test Specification**

|                   |                      |
|-------------------|----------------------|
| Test standard     | : FCC Part 15.247(e) |
| Basic standard    | : ANSI C63.10: 2013  |
| Limits            | : < 8 dBm / 3kHz     |
| Kind of test site | : Shielded Room      |

**Test Setup**

|                      |                        |
|----------------------|------------------------|
| Date of testing      | : Refer to test result |
| Input voltage        | : AC 120V, 60Hz        |
| Operation mode       | : B                    |
| Test channel         | : Low / Middle / High  |
| Ambient temperature  | : 25.2 °C              |
| Relative humidity    | : 52 %                 |
| Atmospheric pressure | : 101 kPa              |

For the measurement records, refer to the appendix C.

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### 5.1.4 6dB Bandwidth

**RESULT:****Pass****Test Specification**

|                   |                         |
|-------------------|-------------------------|
| Test standard     | : FCC Part 15.247(a)(2) |
| Basic standard    | : ANSI C63.10: 2013     |
| Limits            | : > 500 KHz             |
| Kind of test site | : Shielded Room         |

**Test Setup**

|                      |                        |
|----------------------|------------------------|
| Date of testing      | : Refer to test result |
| Input voltage        | : AC 120V, 60Hz        |
| Operation mode       | : B                    |
| Test channel         | : Low / Middle / High  |
| Ambient temperature  | : 25.2 °C              |
| Relative humidity    | : 52 %                 |
| Atmospheric pressure | : 101 kPa              |

For the measurement records, refer to the appendix C.

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## 5.1.5 99% Bandwidth

**RESULT:**

**Pass**

### Test Specification

|                   |                      |
|-------------------|----------------------|
| Test standard     | : FCC Part 15.247(a) |
| Basic standard    | : ANSI C63.10: 2013  |
| Kind of test site | : Shielded Room      |

### Test Setup

|                      |                        |
|----------------------|------------------------|
| Date of testing      | : Refer to test result |
| Input voltage        | : AC 120V, 60Hz        |
| Operation mode       | : A, B                 |
| Test channel         | : Low / Middle / High  |
| Ambient temperature  | : 25.2 °C              |
| Relative humidity    | : 52 %                 |
| Atmospheric pressure | : 101 kPa              |

For the measurement records, refer to the appendix B & C.

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## 5.1.6 20dB Bandwidth

**RESULT:**

**Pass**

### Test Specification

|                   |                         |
|-------------------|-------------------------|
| Test standard     | : FCC Part 15.247(a)(1) |
| Basic standard    | : ANSI C63.10: 2013     |
| Kind of test site | : Shielded Room         |

### Test Setup

|                      |                        |
|----------------------|------------------------|
| Date of testing      | : Refer to test result |
| Input voltage        | : AC 120V, 60Hz        |
| Operation mode       | : A                    |
| Test channel         | : Low / Middle / High  |
| Ambient temperature  | : 25.2 °C              |
| Relative humidity    | : 52 %                 |
| Atmospheric pressure | : 101 kPa              |

For the measurement records, refer to the appendix B.

### 5.1.7 Carrier Frequency Separation

**RESULT:****Pass****Test Specification**

|                   |                                                                      |
|-------------------|----------------------------------------------------------------------|
| Test standard     | : FCC Part 15.247(a)(1)                                              |
| Basic standard    | : ANSI C63.10: 2013                                                  |
| Limits            | : $\geq 25\text{kHz}$ or 2/3 of 20dB bandwidth, whichever is greater |
| Kind of test site | : Shielded Room                                                      |

**Test Setup**

|                      |                        |
|----------------------|------------------------|
| Date of testing      | : Refer to test result |
| Input voltage        | : AC 120V, 60Hz        |
| Operation mode       | : C                    |
| Test channel         | : Low / Middle / High  |
| Ambient temperature  | : 25.2 °C              |
| Relative humidity    | : 52 %                 |
| Atmospheric pressure | : 101 kPa              |

For the measurement records, refer to the appendix B.

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### 5.1.8 Number of Hopping Frequency

**RESULT:**

**Pass**

#### Test Specification

|                   |                                      |
|-------------------|--------------------------------------|
| Test standard     | : FCC part 15.247(a)(1)(iii)         |
| Basic standard    | : ANSI C63.10: 2013                  |
| Limits            | : $\geq 15$ non-overlapping channels |
| Kind of test site | : Shielded Room                      |

#### Test Setup

|                      |                        |
|----------------------|------------------------|
| Date of testing      | : Refer to test result |
| Input voltage        | : AC 120V, 60Hz        |
| Operation mode       | : C                    |
| Ambient temperature  | : 25.2 °C              |
| Relative humidity    | : 52 %                 |
| Atmospheric pressure | : 101 kPa              |

For the measurement records, refer to the appendix B.

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## 5.1.9 Time of Occupancy

**RESULT:****Pass****Test Specification**

|                   |                              |
|-------------------|------------------------------|
| Test standard     | : FCC part 15.247(a)(1)(iii) |
| Basic standard    | : ANSI C63.10: 2013          |
| Limits            | : < 0.4s in 31.6 sec period  |
| Kind of test site | : Shielded Room              |

**Test Setup**

|                      |                        |
|----------------------|------------------------|
| Date of testing      | : Refer to test result |
| Input voltage        | : AC 120V, 60Hz        |
| Operation mode       | : C                    |
| Test channel         | : Low / Middle / High  |
| Ambient temperature  | : 25.2 °C              |
| Relative humidity    | : 52 %                 |
| Atmospheric pressure | : 101 kPa              |

For the measurement records, refer to the appendix B.

### 5.1.10 Conducted Spurious Emissions Measured in 100 kHz Bandwidth

**RESULT:****Pass****Test Specification**

|                   |                                                                                                                                                                                                                                                                    |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test standard     | : FCC Part 15.247(d)                                                                                                                                                                                                                                               |
| Basic standard    | : ANSI C63.10: 2013                                                                                                                                                                                                                                                |
| Limits            | : 20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power);<br>In addition, radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified in 15.209(a) |
| Kind of test site | : Shielded Room                                                                                                                                                                                                                                                    |

**Test Setup**

|                      |                        |
|----------------------|------------------------|
| Date of testing      | : Refer to test result |
| Input voltage        | : AC 120V, 60Hz        |
| Operation mode       | : A, B                 |
| Test channel         | : Low / Middle / High  |
| Ambient temperature  | : 25.2 °C              |
| Relative humidity    | : 52 %                 |
| Atmospheric pressure | : 101 kPa              |

For the measurement records, refer to the appendix B & C.

### 5.1.11 Radiated Spurious Emission

**RESULT:****Pass****Test Specification**

|                   |                                            |
|-------------------|--------------------------------------------|
| Test standard     | : FCC Part 15.247(d) & FCC Part 15.205     |
| Basic standard    | : ANSI C63.10: 2013                        |
| Limits            | : Refer to 15.209(a) of FCC part 15.247(d) |
| Kind of test site | : 3m Semi-anechoic Chamber                 |

**Test Setup**

|                      |                           |
|----------------------|---------------------------|
| Date of testing      | : 2021-04-25 ~ 2021-04-26 |
| Input voltage        | : AC 120V, 60Hz           |
| Operation mode       | : A, B                    |
| Test channel         | : Low / Middle / High     |
| Ambient temperature  | : Refer to test result    |
| Relative humidity    | : Refer to test result    |
| Atmospheric pressure | : 101 kPa                 |

**Remark:**

Testing was carried out within frequency range 9kHz to the tenth harmonics. Only the worst case spurious emissions configuration of the each mode were reported.

For the measurement records, refer to the appendix B & C.

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## 5.1.12 Conducted Emission on AC Mains

**RESULT:**

**Pass**

### Test Specification

|                   |                      |
|-------------------|----------------------|
| Test standard     | : FCC Part 15.207(a) |
| Basic standard    | : ANSI C63.10: 2013  |
| Frequency range   | : 0.15 – 30MHz       |
| Limits            | : FCC Part 15.207(a) |
| Kind of test site | : Shielded Room      |

### Test Setup

|                      |                 |
|----------------------|-----------------|
| Date of testing      | : 2021-04-22    |
| Input voltage        | : AC 120V, 60Hz |
| Operation mode       | : D             |
| Earthing             | : Not connected |
| Ambient temperature  | : 22 °C         |
| Relative humidity    | : 64 %          |
| Atmospheric pressure | : 101 kPa       |

For the measurement records, refer to the appendix C.

## 6 Photographs of the Test Set-Up

For photographs of the test set-up, refer to the appendix A.

## 7 List of Tables

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