

# TEST REPORT

## CERTIFICATE OF CONFORMITY

**Standard:** 47 CFR FCC Part 15, Subpart C (Section 15.247)  
**Report No.:** RFBUIY-WTW-P25080468  
**FCC ID:** XGB-HWBB0013  
**Product:** Wireless Headset  
**Brand:** TURTLE BEACH  
**Model No.:** HWBB0013  
**Received Date:** 2025/8/22  
**Test Date:** 2025/9/9 ~ 2025/9/12  
**Issued Date:** 2025/9/30  
**Applicant:** Voyetra Turtle Beach, Inc.  
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**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
Lin Kou Laboratories  
**Lab Address:** No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan  
**Test Location:** No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan  
**FCC Registration /** 198487 / TW2021  
**Designation Number:**

Approved by: \_\_\_\_\_

Jeremy Lin

Jeremy Lin / Project Engineer

, Date: \_\_\_\_\_

2025/9/30

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Prepared by : Jessica Cheng / Senior Specialist

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**Release Control Record**

| Issue No.            | Description       | Date Issued |
|----------------------|-------------------|-------------|
| RFBUUY-WTW-P25080468 | Original release. | 2025/9/30   |

## 1 Certificate

**Product:** Wireless Headset

**Brand:** TURTLE BEACH

**Test Model:** HWBB0013

**Sample Status:** Engineering sample

**Applicant:** Voyetra Turtle Beach, Inc.

**Test Date:** 2025/9/9 ~ 2025/9/12

**Standard:** 47 CFR FCC Part 15, Subpart C (Section 15.247)

**Measurement** ANSI C63.10-2020

**procedure:** KDB 558074 D01 15.247 Meas Guidance v05r02

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

## 2 Summary of Test Results

| 47 CFR FCC Part 15, Subpart C (Section 15.247) |                                  |        |                                                    |
|------------------------------------------------|----------------------------------|--------|----------------------------------------------------|
| Standard / Clause                              | Test Item                        | Result | Remark                                             |
| 15.247 (a)(1)                                  | RF Output Power                  | Pass   | Meet the requirement of limit.                     |
| 15.247(a)(1) (iii)                             | Number of Hopping Frequency Used | Pass   | Meet the requirement of limit.                     |
| 15.247(a)(1) (iii)                             | Dwell Time on Each Channel       | Pass   | Meet the requirement of limit.                     |
| 15.247(a)(1)                                   | Hopping Channel Separation       | Pass   | Meet the requirement of limit.                     |
| 15.247(a)(1)                                   | 20 dB Bandwidth                  | -      | Refer to Note 1                                    |
| 15.247(d)                                      | Conducted Out of Band Emissions  | Pass   | Meet the requirement of limit.                     |
| 15.207                                         | AC Power Conducted Emissions     | Pass   | Minimum passing margin is -11.96 dB at 0.15000 MHz |
| 15.205 /<br>15.209 /<br>15.247(d)              | Unwanted Emissions below 1 GHz   | Pass   | Minimum passing margin is -6.8 dB at 39.26 MHz     |
| 15.205 /<br>15.209 /<br>15.247(d)              | Unwanted Emissions above 1 GHz   | Pass   | Minimum passing margin is -12.9 dB at 2390.00 MHz  |
| 15.203                                         | Antenna Requirement              | Pass   | No antenna connector is used.                      |

### Notes:

1. If the Frequency Hopping System operating in 2400-2483.5 MHz band and the output power less than 125 mW. The hopping channel carrier frequencies separated by a minimum of 25 kHz or two-thirds of the 20 dB bandwidth of hopping channel whichever is greater.
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

### 2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

| Parameter                       | Specification   | Uncertainty (±) |
|---------------------------------|-----------------|-----------------|
| RF Output Power                 | -               | 1.1 dB          |
| Dwell Time on Each Channel      | -               | 2.18 %          |
| Hopping Channel Separation      | -               | 390 Hz          |
| 20 dB Bandwidth                 | -               | 960 Hz          |
| Conducted Out of Band Emissions | 9 kHz ~ 40 GHz  | 2.7 dB          |
| AC Power Conducted Emissions    | 9 kHz ~ 30 MHz  | 2.9 dB          |
| Unwanted Emissions below 1 GHz  | 9 kHz ~ 30 MHz  | 2.55 dB         |
|                                 | 30 MHz ~ 1 GHz  | 5.77 dB         |
| Unwanted Emissions above 1 GHz  | 1 GHz ~ 6 GHz   | 4.71 dB         |
|                                 | 6 GHz ~ 18 GHz  | 5.3 dB          |
|                                 | 18 GHz ~ 40 GHz | 4.98 dB         |

The other instruments specified are routine verified to remain within the calibrated levels, no measurement uncertainty is required to be calculated.

### 2.2 Supplementary Information

There is not any deviation from the test standards for the test method, and no modifications required for compliance.

### 3 General Information

#### 3.1 General Description

|                       |                                                |
|-----------------------|------------------------------------------------|
| Product               | Wireless Headset                               |
| Brand                 | TURTLE BEACH                                   |
| Test Model            | HWBB0013                                       |
| Status of EUT         | Engineering sample                             |
| Power Supply Rating   | 5Vdc form host equipment & 3.7Vdc from battery |
| Modulation Type       | GFSK, $\pi/4$ -DQPSK, 8DPSK                    |
| Modulation Technology | FHSS                                           |
| Transfer Rate         | Up to 3 Mbps                                   |
| Operating Frequency   | 2.402 GHz ~ 2.48 GHz                           |
| Number of Channel     | 79                                             |
| Output Power          | 1.928 mW (2.85 dBm)                            |

Note:

1. There are Bluetooth and SRD technology used for the EUT.

2. The EUT uses following accessories.

| Item                 | Spec.                     |
|----------------------|---------------------------|
| USB-A to USB-C cable | Shielded without core, 2m |

3. Simultaneously transmission combination.

| Combination | Technology |           |
|-------------|------------|-----------|
| 1           | SRD        | Bluetooth |

Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.

4. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

### 3.2 Antenna Description of EUT

1. The antenna information is listed as below.

| Technology | Gain(dBi) | Antenna Type | Connector Type |
|------------|-----------|--------------|----------------|
| Bluetooth  | 3.14      | PIFA         | none           |
| SRD        | 2.59      | PIFA         | none           |

\* Detail antenna specification please refer to antenna datasheet and/or antenna measurement report.

### 3.3 Channel List

79 channels are provided for BT-EDR:

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|---------|-----------------|---------|-----------------|
| 0       | 2402            | 20      | 2422            | 40      | 2442            | 60      | 2462            |
| 1       | 2403            | 21      | 2423            | 41      | 2443            | 61      | 2463            |
| 2       | 2404            | 22      | 2424            | 42      | 2444            | 62      | 2464            |
| 3       | 2405            | 23      | 2425            | 43      | 2445            | 63      | 2465            |
| 4       | 2406            | 24      | 2426            | 44      | 2446            | 64      | 2466            |
| 5       | 2407            | 25      | 2427            | 45      | 2447            | 65      | 2467            |
| 6       | 2408            | 26      | 2428            | 46      | 2448            | 66      | 2468            |
| 7       | 2409            | 27      | 2429            | 47      | 2449            | 67      | 2469            |
| 8       | 2410            | 28      | 2430            | 48      | 2450            | 68      | 2470            |
| 9       | 2411            | 29      | 2431            | 49      | 2451            | 69      | 2471            |
| 10      | 2412            | 30      | 2432            | 50      | 2452            | 70      | 2472            |
| 11      | 2413            | 31      | 2433            | 51      | 2453            | 71      | 2473            |
| 12      | 2414            | 32      | 2434            | 52      | 2454            | 72      | 2474            |
| 13      | 2415            | 33      | 2435            | 53      | 2455            | 73      | 2475            |
| 14      | 2416            | 34      | 2436            | 54      | 2456            | 74      | 2476            |
| 15      | 2417            | 35      | 2437            | 55      | 2457            | 75      | 2477            |
| 16      | 2418            | 36      | 2438            | 56      | 2458            | 76      | 2478            |
| 17      | 2419            | 37      | 2439            | 57      | 2459            | 77      | 2479            |
| 18      | 2420            | 38      | 2440            | 58      | 2460            | 78      | 2480            |
| 19      | 2421            | 39      | 2441            | 59      | 2461            |         |                 |

### 3.4 Test Mode Applicability and Tested Channel Detail

|             |                                                                                                                                                                                                                                                                                                                                                                     |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pre-Scan:   | 1. EUT can be used in the following ways: XYZ 3-axis. Pre-scan in these ways and find the worst case as a representative test condition.<br>2. For Unwanted Emission below/ above 1 GHz has Battery/ EUT with USB cable(Adapter)/ EUT with USB cable(Laptop) mode of power supply. Pre-scan these modes and find the worst case as a representative test condition. |
| Worst Case: | 1. X/ Y/ Z Worst Condition: Z Axis for Unwanted Emission above 1GHz and Unwanted Emission below 1GHz.<br>2. For Unwanted Emission below/above 1 GHz EUT with USB cable(Laptop) mode is the worst case of power supply.                                                                                                                                              |

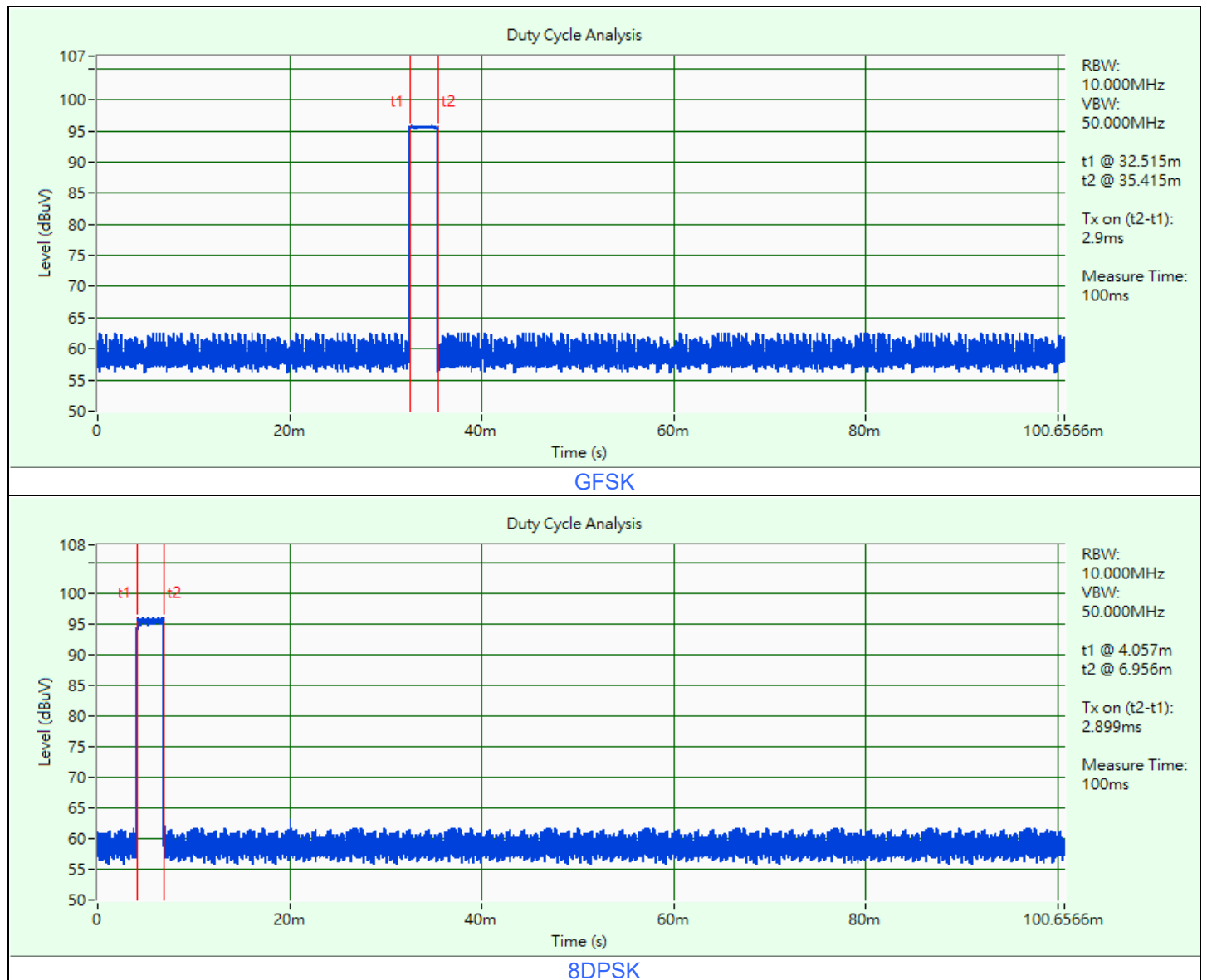
Following channel(s) was (were) selected for the final test as listed below:

| Test Item                                    | EUT Configure Mode | Tested Channel              | Modulation | Data Rate Parameter |
|----------------------------------------------|--------------------|-----------------------------|------------|---------------------|
| RF Output Power                              | A                  | 0, 39, 78                   | GFSK       | DH5                 |
|                                              |                    |                             | 8DPSK      | 3DH5                |
| Number of Hopping Frequency Used             | A                  | Hopping                     | GFSK       | DH5                 |
|                                              |                    |                             | 8DPSK      | 3DH5                |
| Dwell Time on Each Channel                   | A                  | Hopping                     | GFSK       | DH1/DH3/DH5         |
|                                              |                    |                             | 8DPSK      | 3DH1/3DH3/3DH5      |
| Hopping Channel Separation / 20 dB Bandwidth | A                  | 0, 39, 78                   | GFSK       | DH5                 |
|                                              |                    |                             | 8DPSK      | 3DH5                |
| Conducted Out of Band Emissions              | A                  | Hopping<br>0, 78            | GFSK       | DH5                 |
|                                              |                    |                             | 8DPSK      | 3DH5                |
| AC Power Conducted Emissions                 | A                  | 39                          | GFSK       | DH5                 |
|                                              | B                  | 39                          | GFSK       | DH5                 |
| Unwanted Emissions below 1 GHz               | A                  | 39                          | GFSK       | DH5                 |
| Unwanted Emissions above 1 GHz               | A                  | 0, 39, 78                   | GFSK       | DH5                 |
|                                              |                    |                             | 8DPSK      | 3DH5                |
| EUT Configure Mode:                          | A                  | EUT with USB cable(Laptop)  |            |                     |
|                                              | B                  | EUT with USB cable(Adapter) |            |                     |

### 3.5 Duty Cycle of Test Signal

**GFSK:** Duty cycle = 2.9 ms / 100 ms x 100% = 2.9%

**8DPSK:** Duty cycle = 2.899 ms / 100 ms x 100% = 2.9%

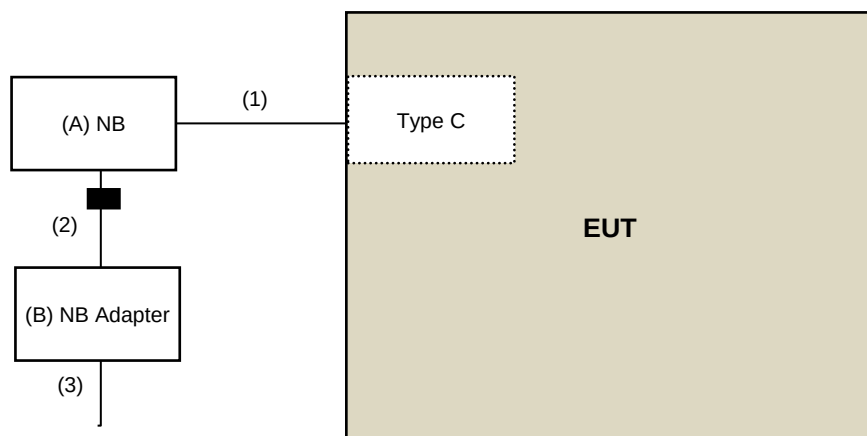


### 3.6 Test Program Used and Operation Descriptions

Controlling software (AB157x\_Airoha\_Tool\_Kit(ATK)\_v5.5.0.2) has been activated to set the EUT under transmission condition continuously at specific channel frequency.

### 3.7 Connection Diagram of EUT and Peripheral Devices

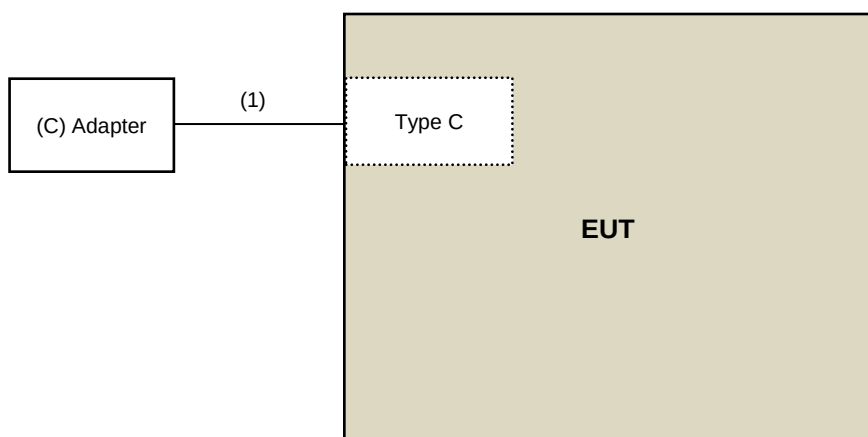
Mode A



----- Remote Site



Mode B



----- Remote Site

### 3.8 Configuration of Peripheral Devices and Cable Connections

| ID | Product    | Brand  | Model No.  | Serial No. | FCC ID | Remarks         |
|----|------------|--------|------------|------------|--------|-----------------|
| A  | NB         | Dell   | P90F       | N/A        | N/A    | Provided by Lab |
| B  | NB Adapter | Dell   | LA65NS2-01 | N/A        | N/A    | Provided by Lab |
| C  | Adapter    | Belkin | WCB007dq   | N/A        | N/A    | Provided by Lab |

| ID | Cable Descriptions   | Qty. | Length (m) | Shielding (Yes/No) | Cores (Qty.) | Remarks               |
|----|----------------------|------|------------|--------------------|--------------|-----------------------|
| 1  | USB-A to USB-C cable | 1    | 2          | Y                  | 0            | Supplied by applicant |
| 2  | NB Adapter DC cable  | 1    | 1.9        | N                  | 1            | Provided by Lab       |
| 3  | NB Adapter AC cable  | 1    | 0.8        | N                  | 0            | Provided by Lab       |

## 4 Test Instruments

The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 4.1 RF Output Power

| Description<br>Manufacturer       | Model No.      | Serial No.        | Calibrated<br>Date | Calibrated<br>Until |
|-----------------------------------|----------------|-------------------|--------------------|---------------------|
| Fixed Attenuator<br>Woken         | 00800A1K01A-20 | 00800A1K01A-20-02 | 2025/5/23          | 2026/5/22           |
| Pulse Power Sensor<br>Anritsu     | MA2411B        | 0738404           | 2025/5/20          | 2026/5/19           |
| RF Power Meter<br>Anritsu         | ML2495A        | 0842014           | 2025/5/20          | 2026/5/19           |
| Wideband Power Sensor<br>Keysight | N1923A         | MY58020002        | 2025/1/21          | 2026/1/20           |

Notes:

1. The test was performed in LK - Oven
2. Tested Date: 2025/9/12

### 4.2 Number of Hopping Frequency Used

| Description<br>Manufacturer     | Model No.                        | Serial No.        | Calibrated<br>Date | Calibrated<br>Until |
|---------------------------------|----------------------------------|-------------------|--------------------|---------------------|
| Fixed Attenuator<br>Woken       | 00800A1K01A-20                   | 00800A1K01A-20-02 | 2025/5/23          | 2026/5/22           |
| PXA Signal Analyzer<br>Keysight | N9030A                           | MY54490260        | 2025/7/24          | 2026/7/23           |
| Signal Analyzer<br>R&S          | FSV40                            | 101544            | 2025/7/1           | 2026/6/30           |
| Software                        | ADT_RF Test Software<br>V6.6.5.4 | N/A               | N/A                | N/A                 |

Notes:

1. The test was performed in LK - Oven
2. Tested Date: 2025/9/12

### 4.3 Dwell Time on Each Channel

Refer to section 4.2 to get the tested date and information of the instruments.

### 4.4 Hopping Channel Separation

Refer to section 4.2 to get the tested date and information of the instruments.

### 4.5 20 dB Bandwidth

Refer to section 4.2 to get the tested date and information of the instruments.

### 4.6 Conducted Out of Band Emissions

Refer to section 4.2 to get the tested date and information of the instruments.

#### 4.7 AC Power Conducted Emissions

| Description<br>Manufacturer          | Model No.            | Serial No.   | Calibrated Date | Calibrated Until |
|--------------------------------------|----------------------|--------------|-----------------|------------------|
| 50 ohm terminal resistance<br>LYNICS | 0900510              | E1-011284    | 2024/9/16       | 2025/9/15        |
|                                      |                      | E1-011285    | 2024/9/25       | 2025/9/24        |
| DC LISN<br>R&S                       | ESH3-Z6              | 100219       | 2025/7/10       | 2026/7/9         |
|                                      |                      | 844950/018   | 2025/7/10       | 2026/7/9         |
| Diode Pulse Limiter<br>Schwarzbeck   | VTSD 9561 F-N        | 01422        | 2025/5/2        | 2026/5/1         |
| EMI Test Receiver<br>R&S             | ESR3                 | 102413       | 2025/1/22       | 2026/1/21        |
|                                      |                      | 102414       | 2024/12/11      | 2025/12/10       |
| Fixed Attenuator<br>EMEC             | EM-<br>ATT30002602NN | N/A          | 2025/3/21       | 2026/3/20        |
| High Pass Filter<br>EMCI             | 150HPF-ME            | 114005       | 2025/5/2        | 2026/5/1         |
|                                      |                      | 114006       | 2025/5/2        | 2026/5/1         |
|                                      | 150HPF-MF            | 113009       | 2025/5/2        | 2026/5/1         |
| High Voltage Probe<br>Schwarzbeck    | TK9420               | 00982        | 2024/12/6       | 2025/12/5        |
| LISN<br>R&S                          | ENV216               | 101195       | 2025/7/18       | 2026/7/17        |
|                                      |                      | 101196       | 2025/5/19       | 2026/5/18        |
|                                      |                      | 101197       | 2025/7/4        | 2026/7/3         |
|                                      | ESH3-Z5              | 100220       | 2024/11/21      | 2025/11/20       |
| LISN<br>Schwarzbeck                  | NNLK 8121            | 8121-731     | 2025/6/10       | 2026/6/9         |
|                                      |                      | 8121-00759   | 2025/8/12       | 2026/8/11        |
|                                      |                      | 8121-808     | 2025/4/23       | 2026/4/22        |
|                                      | NNLK 8129            | 00624        | 2024/10/9       | 2025/10/8        |
|                                      |                      | 8129229      | 2024/10/14      | 2025/10/13       |
| RF Coaxial Cable<br>PEWC             | 5D-FB                | Cable-CO3-01 | 2024/9/12       | 2025/9/11        |
| Software<br>BVADT                    | Cond_V7.4.1.0        | N/A          | N/A             | N/A              |

Notes:

1. The test was performed in Linkou Conduction 3.
2. Tested Date: 2025/9/9

#### 4.8 Unwanted Emissions below 1 GHz

| Description<br>Manufacturer                  | Model No.        | Serial No.   | Calibrated Date | Calibrated Until |
|----------------------------------------------|------------------|--------------|-----------------|------------------|
| Bi_Log Antenna<br>Schwarzbeck                | VULB 9168        | 137          | 2024/10/9       | 2025/10/8        |
| Coupling / Decoupling Network<br>Schwarzbeck | CDNE-M2          | 00097        | 2025/5/28       | 2026/5/27        |
|                                              | CDNE-M3          | 00091        | 2025/3/20       | 2026/3/19        |
| Loop Antenna<br>TESEQ                        | HLA 6121         | 64095        | 2024/10/17      | 2025/10/16       |
| MXE EMI Receiver<br>Agilent                  | N9038A           | MY50010158   | 2024/10/11      | 2025/10/10       |
| Preamplifier<br>Agilent                      | 8447D            | 2944A11064   | 2025/2/14       | 2026/2/13        |
| RF Coaxial Cable<br>Pacific                  | 8D-FB            | Cable-CH6-02 | 2025/6/24       | 2026/6/23        |
| Signal Analyzer<br>R&S                       | FSV40            | 101544       | 2025/7/1        | 2026/6/30        |
| Software<br>BVADT                            | Radiated_V8.7.08 | N/A          | N/A             | N/A              |
| Tower<br>ADT                                 | AT100            | 0306         | N/A             | N/A              |
| Turn Table<br>ADT                            | TT100            | 0306         | N/A             | N/A              |

Notes:

1. The test was performed in Linkou 966 Chamber 6 (CH 6).
2. Tested Date: 2025/9/9

#### 4.9 Unwanted Emissions above 1 GHz

| Description<br>Manufacturer           | Model No.           | Serial No.   | Calibrated Date | Calibrated Until |
|---------------------------------------|---------------------|--------------|-----------------|------------------|
| Boresight antenna tower fixture<br>BV | BAF-02              | 6            | N/A             | N/A              |
| High Pass Filter<br>Wainwright        | WHK 3.1/18G-10SS    | SN 8         | 2025/5/22       | 2026/5/21        |
| Horn Antenna<br>EMCO                  | 3115                | 00028257     | 2024/11/10      | 2025/11/9        |
| Horn Antenna<br>ETS-Lindgren          | 3117-PA             | 00215857     | 2024/11/10      | 2025/11/9        |
| Horn Antenna<br>Schwarzbeck           | BBHA 9170           | 212          | 2024/10/18      | 2025/10/17       |
|                                       |                     | BBHA9170190  | 2024/11/10      | 2025/11/9        |
| MXE EMI Receiver<br>Agilent           | N9038A              | MY50010158   | 2024/10/11      | 2025/10/10       |
| Notch Filter<br>Micro-Tronics         | BRC50703-01         | 010          | 2025/5/22       | 2026/5/21        |
|                                       | BRM17690            | 005          | 2025/5/22       | 2026/5/21        |
| Preamplifier<br>EMCI                  | EMC0126545          | 980076       | 2025/2/14       | 2026/2/13        |
|                                       |                     | 980175       | 2025/8/23       | 2026/8/22        |
|                                       |                     | 980235       | 2025/2/14       | 2026/2/13        |
| Preamplifier<br>HP                    | 8449B               | 3008A01201   | 2025/2/14       | 2026/2/13        |
| RF Coaxial Cable<br>EMCI              | EMC104              | 190801       | 2025/7/4        | 2026/7/3         |
|                                       |                     | 190804       | 2025/7/4        | 2026/7/3         |
| RF Coaxial Cable<br>EMEC              | EM102-KMKM-100      | 02           | 2025/7/4        | 2026/7/3         |
| RF Coaxial Cable<br>HUBER+SUHNER      | SF-104              | Cable-CH6-01 | 2025/7/4        | 2026/7/3         |
| Signal Analyzer<br>R&S                | FSV40               | 101042       | 2024/9/12       | 2025/9/11        |
|                                       |                     | 101544       | 2025/7/1        | 2026/6/30        |
| Software<br>BVADT                     | Radiated_V7.7.1.1.1 | N/A          | N/A             | N/A              |
| Tower<br>ADT                          | AT100               | 0306         | N/A             | N/A              |
| Turn Table<br>ADT                     | TT100               | 0306         | N/A             | N/A              |

#### Notes:

1. The test was performed in Linkou 966 Chamber 6 (CH 6).
2. Tested Date: 2025/9/10

## 5 Limits of Test Items

### 5.1 RF Output Power

The Maximum Output Power Measurement is 125 mW (21 dBm).

### 5.2 Number of Hopping Frequency Used

At least 15 channels frequencies, and should be equally spaced.

### 5.3 Dwell Time on Each Channel

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

### 5.4 Hopping Channel Separation

At least 25 kHz or two-third of 20 dB hopping channel bandwidth (whichever is greater).

### 5.5 20 dB Bandwidth

Maximum bandwidth is not specified.

### 5.6 Conducted Out of Band Emissions

Below 20 dB of the highest emission level of operating band (in 100 kHz Resolution Bandwidth).

### 5.7 AC Power Conducted Emissions

| Frequency (MHz) | Conducted Limit (dBuV) |         |
|-----------------|------------------------|---------|
|                 | Quasi-peak             | Average |
| 0.15 - 0.5      | 66 - 56                | 56 - 46 |
| 0.50 - 5.0      | 56                     | 46      |
| 5.0 - 30.0      | 60                     | 50      |

Notes:

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

## 5.8 Unwanted Emissions below 1 GHz

Radiated emissions up to 1 GHz which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20 dB below the highest level of the desired power:

| Frequencies<br>(MHz) | Field Strength<br>(microvolts/meter) | Measurement Distance<br>(meters) |
|----------------------|--------------------------------------|----------------------------------|
| 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                                |

Notes:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).

## 5.9 Unwanted Emissions above 1 GHz

Radiated emissions above 1 GHz which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20 dB below the highest level of the desired power:

| Frequencies<br>(MHz) | Field Strength<br>(microvolts/meter) | Measurement Distance<br>(meters) |
|----------------------|--------------------------------------|----------------------------------|
| Above 960            | 500                                  | 3                                |

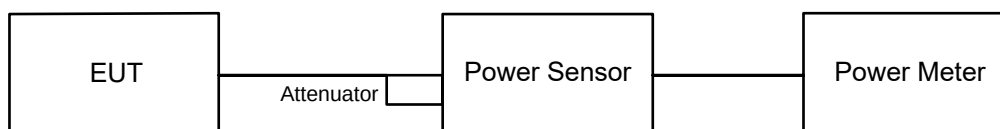
Notes:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, 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.

## 6 Test Arrangements

### 6.1 RF Output Power

#### 6.1.1 Test Setup



#### 6.1.2 Test Procedure

##### Peak Power:

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

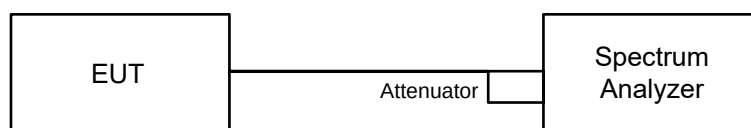
The power meter video bandwidth is greater than or equal to the DTS bandwidth and use a fast responding diode detector.

##### Average Power:

Average power sensor was used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

### 6.2 Number of Hopping Frequency Used

#### 6.2.1 Test Setup



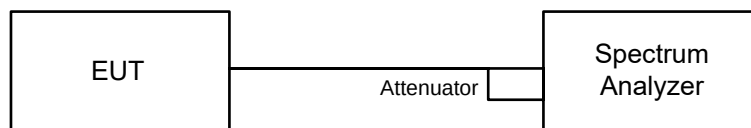
#### 6.2.2 Test Procedure

- Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- Span: The frequency band of operation. Depending on the number of channels the device supports, it could be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
- RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
- Video (or average) bandwidth (VBW)  $\geq$  RBW.
- Sweep: No faster than coupled (auto) time.
- Detector function: Peak.
- Trace: Max-hold.
- Allow the trace to stabilize

Note: Where the device shares the same channel plan (carrier frequencies and number of channels) across multiple data rates or modulation schemes then the number of channels need only be measured for one of those modulation schemes or data rates.

### 6.3 Dwell Time on Each Channel

#### 6.3.1 Test Setup



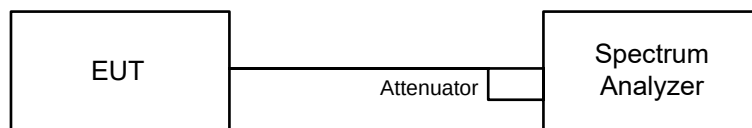
#### 6.3.2 Test Procedure

- a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- c. Span: Zero span, centered on a hopping channel.
- d. RBW shall be  $\leq$  channel spacing and where possible RBW should be set  $\gg 1/T$ , where T is the expected transmission time per hop.
- e. Sweep time: Set so that the start of the first transmission and end of the last transmission for the hop are clearly captured. Setting the sweep time to be slightly longer than the hopping period per channel (hopping period =  $1/\text{hopping rate}$ ) should achieve this.
- f. Use a video trigger, where possible with a trigger delay, so that the start of the transmission is clearly observed. The trigger level might need adjustment to reduce the chance of triggering when the system hops on an adjacent channel.
- g. Detector function: Peak.
- h. Trace: Clear-write, single sweep.
- i. Place markers at the start of the first transmission on the channel and at the end of the last transmission. The dwell time per hop is the time between these two markers.

Note: Where the device shares the same hopping algorithms (dwell time, channel selection) across multiple data rates or modulation schemes then the time of occupancy need only be measured for one of those modulation schemes or data rates. If the dwell time value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in dwell time.

## 6.4 Hopping Channel Separation

### 6.4.1 Test Setup



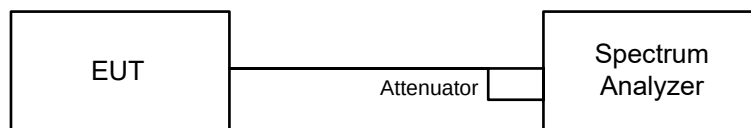
### 6.4.2 Test Procedure

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
- Span: Wide enough to capture the peaks of two adjacent channels.
- RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
- Video (or average) bandwidth (VBW)  $\geq$  RBW.
- Sweep: No faster than coupled (auto) time.
- Detector function: Peak.
- Trace: Max-hold.
- Allow the trace to stabilize.

Note: Where the device shares the same channel plan (carrier frequencies and number of channels) across multiple data rates or modulation schemes then the carrier separation need only be measured for one of those modulation schemes or data rates.

## 6.5 20 dB Bandwidth

### 6.5.1 Test Setup

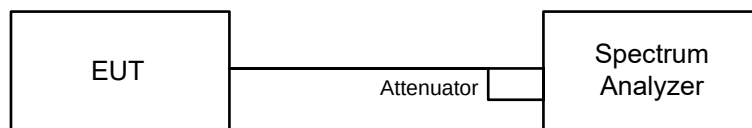


### 6.5.2 Test Procedure

- a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.
- c. The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be at least three times RBW, unless otherwise specified by the applicable requirement.
- d. Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than  $[10 \log (OBW/RBW)]$  below the reference level.
- e. Steps a) through c) might require iteration to adjust within the specified tolerances.
- f. The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target “-xx dB down” requirement; that is, if the requirement calls for measuring the -20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value.
- g. Set detection mode to peak and trace mode to max-hold.
- h. Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
- i. Determine the “-xx dB down amplitude” using  $[(\text{reference value}) - xx]$ . Alternatively, this calculation may be made by using the marker-delta function of the instrument.

## 6.6 Conducted Out of Band Emissions

### 6.6.1 Test Setup



### 6.6.2 Test Procedure

#### MEASUREMENT PROCEDURE REF

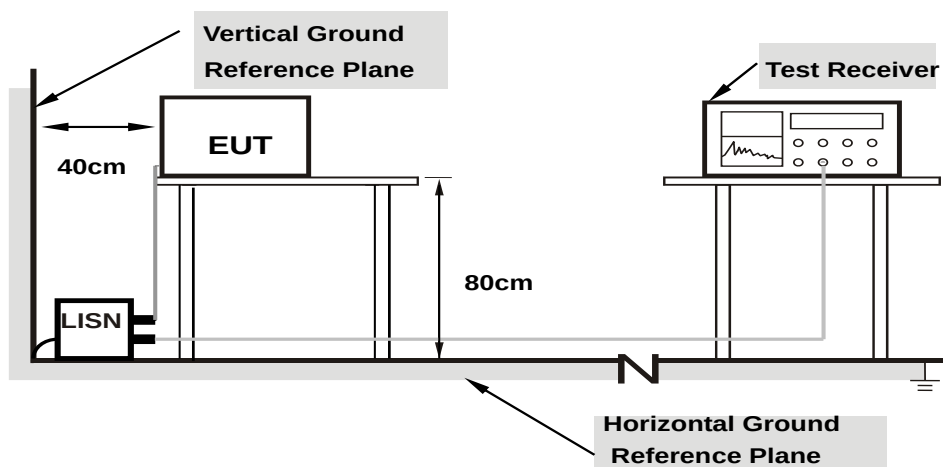
- Set instrument center frequency to DTS channel center frequency.
- Set the span to  $\geq 1.5$  times the DTS bandwidth.
- Set the RBW = 100 kHz.
- Set the VBW  $\geq 300$  kHz.
- Detector = peak.
- Sweep time = No faster than coupled (auto) time.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum PSD level.

#### MEASUREMENT PROCEDURE OOB

- Set the center frequency and span to encompass frequency range to be measured. Note that the frequency range might need to be divided into multiple frequency ranges to retain frequency resolution.
- Set RBW = 100 kHz.
- Set VBW  $\geq 300$  kHz.
- Detector = peak.
- Sweep = No faster than coupled (auto) time.
- Trace Mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level.

## 6.7 AC Power Conducted Emissions

### 6.7.1 Test Setup



**Note: 1. Support units were connected to second LISN.**

For the actual test configuration, please refer to the attached file (Test Setup Photo).

### 6.7.2 Test Procedure

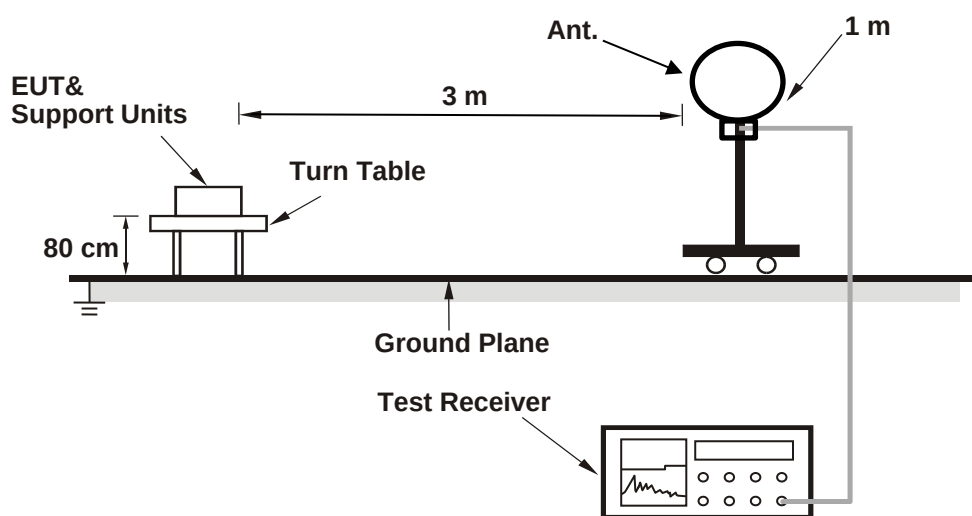
- Exploratory ac power-line conducted emission measurements: The EUT shall be operated on the mid channel and in the mode with highest output power unless the fundamental operates in the AC power-line emission test range then the EUT shall be operated in the range of typical modes of operation.
- The EUT was placed on a 0.8 meter to the top of table and placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50 uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20 dB) was not recorded.

**Note:** The resolution bandwidth and video bandwidth of test receiver is 9 kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15 MHz-30 MHz.

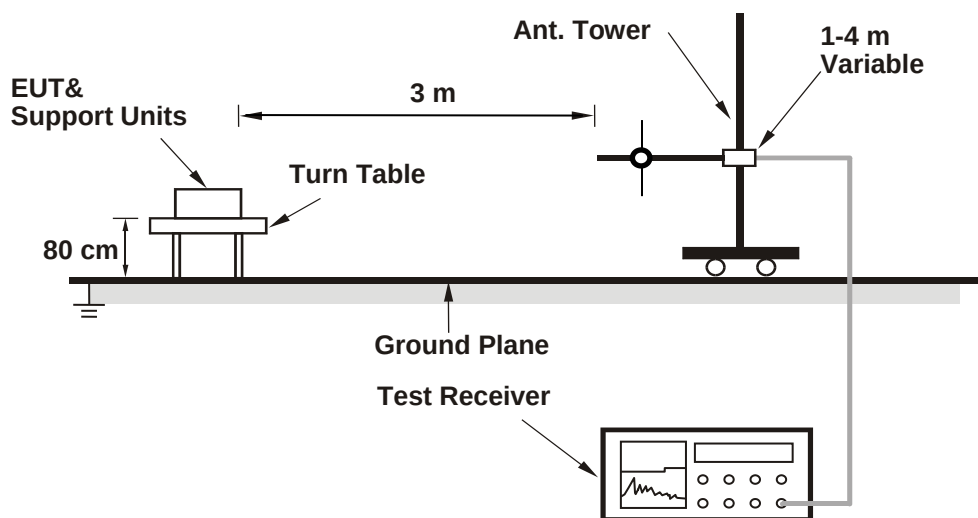
## 6.8 Unwanted Emissions below 1 GHz

### 6.8.1 Test Setup

#### For Radiated emission below 30 MHz



#### For Radiated emission above 30 MHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

## 6.8.2 Test Procedure

### For Radiated emission below 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode, except for the frequency band (9 kHz to 90 kHz and 110 kHz to 490 kHz) set to average detect function and peak detect function.

#### Notes:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 200 Hz at frequency below 150 kHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz or 10 kHz at frequency (150 kHz to 30 MHz).
3. All modes of operation were investigated and the worst-case emissions are reported.

### For Radiated emission above 30 MHz

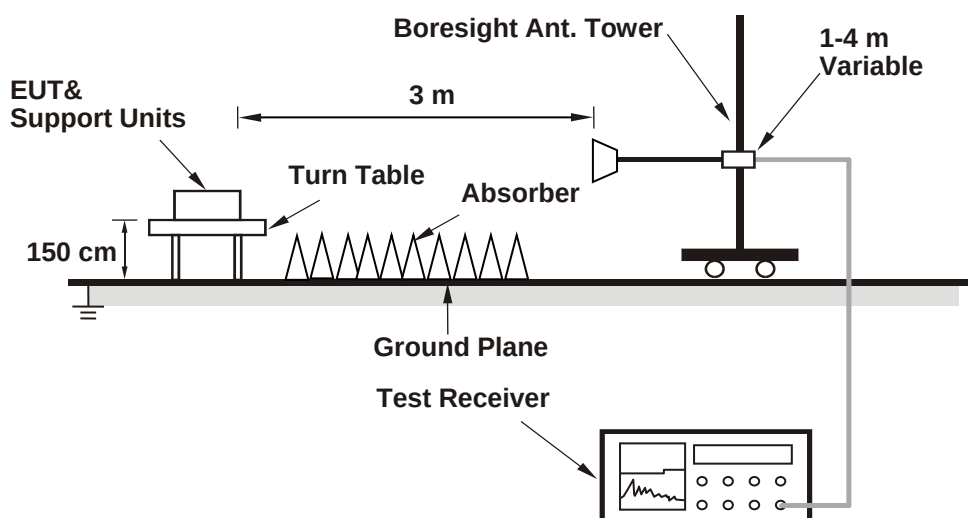
- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna 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.
- d. 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 and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-peak(QP) detect function, Average(AV) detect function, Peak(PK) detect function and specified bandwidth with maximum hold mode when the test frequencies less than or equal to 1 GHz.

#### Notes:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. All modes of operation were investigated and the worst-case emissions are reported.

## 6.9 Unwanted Emissions above 1 GHz

### 6.9.1 Test Setup



For the actual test configuration, please refer to the attached file (Test Setup Photo).

### 6.9.2 Test Procedure

- The EUT was placed on the top of a rotating table 1.5 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The height of antenna 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 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 and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

#### Notes:

- The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) and Average detection (AV) at frequency above 1 GHz.
- The maximum dwell time per 1 MHz is determined as follows:  
Maximum dwell time per 1 MHz = dwell time per 100 ms per channel × (channel separation correction + overlapping channel correction) where:
  - Channel separation correction =  $[1 / \text{channel separation (MHz)}]$  for channel separation < 1 MHz, and = 1 for channel separation ≥ 1 MHz, as determined using the procedures of 7.8.2. If the average measurements are performed on the Nth harmonic, the channel separation value is N times the separation at the fundamental frequency.
  - Overlapping channel correction = 0 when the 20 dB channel bandwidth < channel separation and = 1 for when the 20 dB channel bandwidth > channel separation.
- The average value may be determined as follows:  
From the peak value of the emission: The measured peak value in dBuV/m is corrected by  $20\log(\text{maximum dwell time in 100 ms} / 100)$ .
- All modes of operation were investigated and the worst-case emissions are reported.

## 7 Test Results of Test Item

### 7.1 RF Output Power

|              |                |                           |              |            |            |
|--------------|----------------|---------------------------|--------------|------------|------------|
| Input Power: | 120 Vac, 60 Hz | Environmental Conditions: | 25°C, 76% RH | Tested By: | Waydi Tuan |
|--------------|----------------|---------------------------|--------------|------------|------------|

#### For Peak Power

##### GFSK

| Chan. | Chan. Freq. (MHz) | Peak Power (mW) | Peak Power (dBm) | Power Limit (dBm) | Test Result |
|-------|-------------------|-----------------|------------------|-------------------|-------------|
| 0     | 2402              | 1.892           | 2.77             | 21                | Pass        |
| 39    | 2441              | 1.928           | 2.85             | 21                | Pass        |
| 78    | 2480              | 1.91            | 2.81             | 21                | Pass        |

Note: The antenna gain is 3.14 dBi  $\leq$  6 dBi, so the output power limit shall not be reduced.

##### 8DPSK

| Chan. | Chan. Freq. (MHz) | Peak Power (mW) | Peak Power (dBm) | Power Limit (dBm) | Test Result |
|-------|-------------------|-----------------|------------------|-------------------|-------------|
| 0     | 2402              | 1.875           | 2.73             | 21                | Pass        |
| 39    | 2441              | 1.919           | 2.83             | 21                | Pass        |
| 78    | 2480              | 1.897           | 2.78             | 21                | Pass        |

Note: The antenna gain is 3.14 dBi  $\leq$  6 dBi, so the output power limit shall not be reduced.

#### For Average Power

##### GFSK

| Chan. | Chan. Freq. (MHz) | Average Power (mW) | Average Power (dBm) |
|-------|-------------------|--------------------|---------------------|
| 0     | 2402              | 1.854              | 2.68                |
| 39    | 2441              | 1.892              | 2.77                |
| 78    | 2480              | 1.866              | 2.71                |

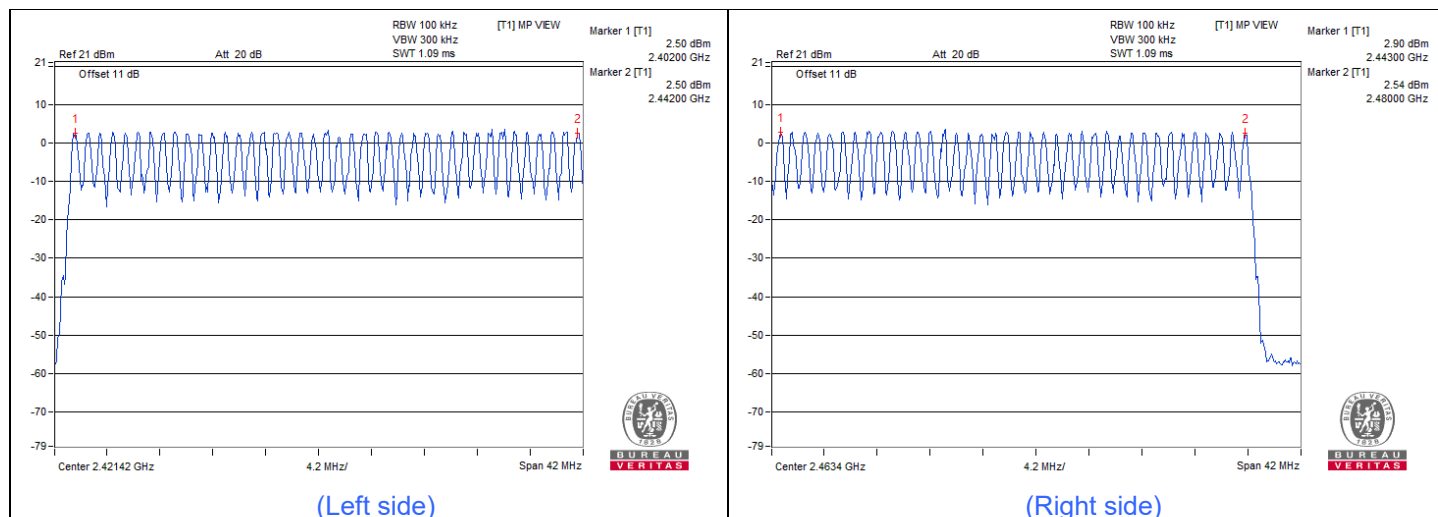
##### 8DPSK

| Chan. | Chan. Freq. (MHz) | Average Power (mW) | Average Power (dBm) |
|-------|-------------------|--------------------|---------------------|
| 0     | 2402              | 1.841              | 2.65                |
| 39    | 2441              | 1.884              | 2.75                |
| 78    | 2480              | 1.858              | 2.69                |

## 7.2 Number of Hopping Frequency Used

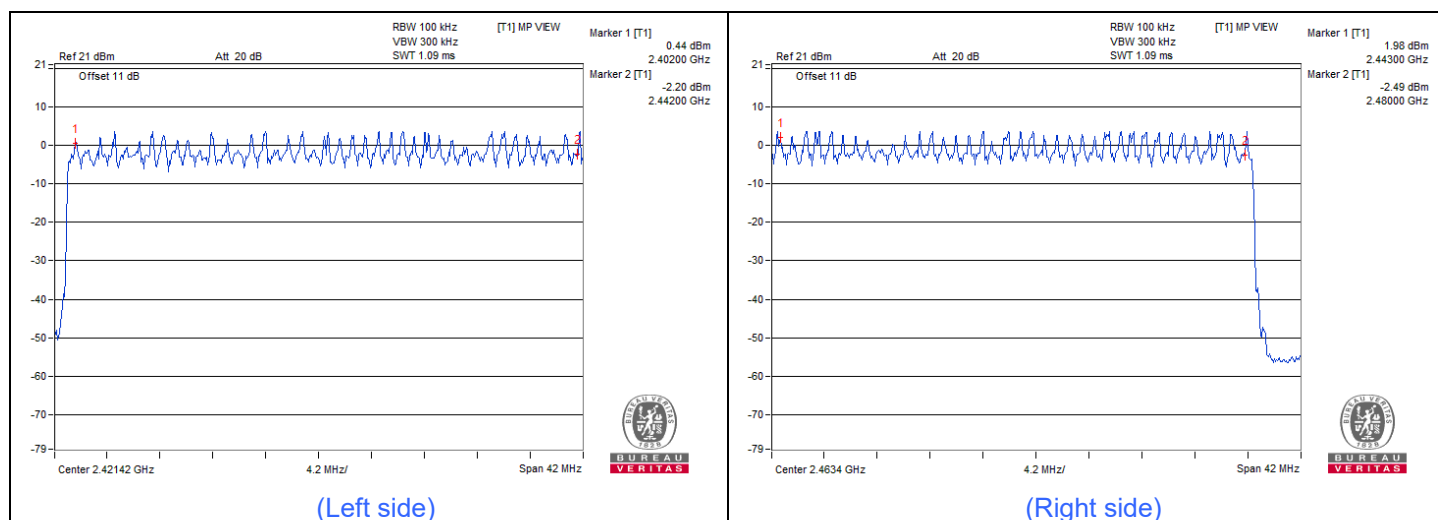
|              |                |                           |              |            |            |
|--------------|----------------|---------------------------|--------------|------------|------------|
| Input Power: | 120 Vac, 60 Hz | Environmental Conditions: | 25°C, 76% RH | Tested By: | Waydi Tuan |
|--------------|----------------|---------------------------|--------------|------------|------------|

### GFSK



Note: There are 79 hopping frequencies in the hopping mode. On the plots, it shows that the hopping frequencies are equally spaced.

### 8DPSK



Note: There are 79 hopping frequencies in the hopping mode. On the plots, it shows that the hopping frequencies are equally spaced.

### 7.3 Dwell Time on Each Channel

|              |                |                           |              |            |            |
|--------------|----------------|---------------------------|--------------|------------|------------|
| Input Power: | 120 Vac, 60 Hz | Environmental Conditions: | 25°C, 76% RH | Tested By: | Waydi Tuan |
|--------------|----------------|---------------------------|--------------|------------|------------|

#### GFSK

| Mode | Number of transmission in 31.6 sec    | Length of transmission time (msec) | Dwell Time (msec) | Limit (msec) | Test Result |
|------|---------------------------------------|------------------------------------|-------------------|--------------|-------------|
| DH1  | 50 (times / 5 sec) * 6.32 = 316 times | 0.474                              | 149.78            | 400          | Pass        |
| DH3  | 25 (times / 5 sec) * 6.32 = 158 times | 1.76                               | 278.08            | 400          | Pass        |
| DH5  | 17 (times / 5 sec) * 6.32 = 108 times | 3.008                              | 324.86            | 400          | Pass        |

#### Spectrum plots of Dwell Time



# 8DPSK

| Mode | Number of transmission in 31.6 sec    | Length of transmission time (msec) | Dwell Time (msec) | Limit (msec) | Test Result |
|------|---------------------------------------|------------------------------------|-------------------|--------------|-------------|
| 3DH1 | 50 (times / 5 sec) * 6.32 = 316 times | 0.474                              | 149.78            | 400          | Pass        |
| 3DH3 | 25 (times / 5 sec) * 6.32 = 158 times | 1.7                                | 268.6             | 400          | Pass        |
| 3DH5 | 17 (times / 5 sec) * 6.32 = 108 times | 2.944                              | 317.95            | 400          | Pass        |

## Spectrum plots of Dwell Time



## 7.4 Hopping Channel Separation

|              |                |                           |              |            |            |
|--------------|----------------|---------------------------|--------------|------------|------------|
| Input Power: | 120 Vac, 60 Hz | Environmental Conditions: | 25°C, 76% RH | Tested By: | Waydi Tuan |
|--------------|----------------|---------------------------|--------------|------------|------------|

### GFSK

| Channel | Frequency (MHz) | Hopping Channel Separation (MHz) | Minimum Limit (MHz) | Test Result |
|---------|-----------------|----------------------------------|---------------------|-------------|
| 0       | 2402            | 1.00                             | 0.64                | Pass        |
| 39      | 2441            | 1.00                             | 0.65                | Pass        |
| 78      | 2480            | 1.00                             | 0.65                | Pass        |

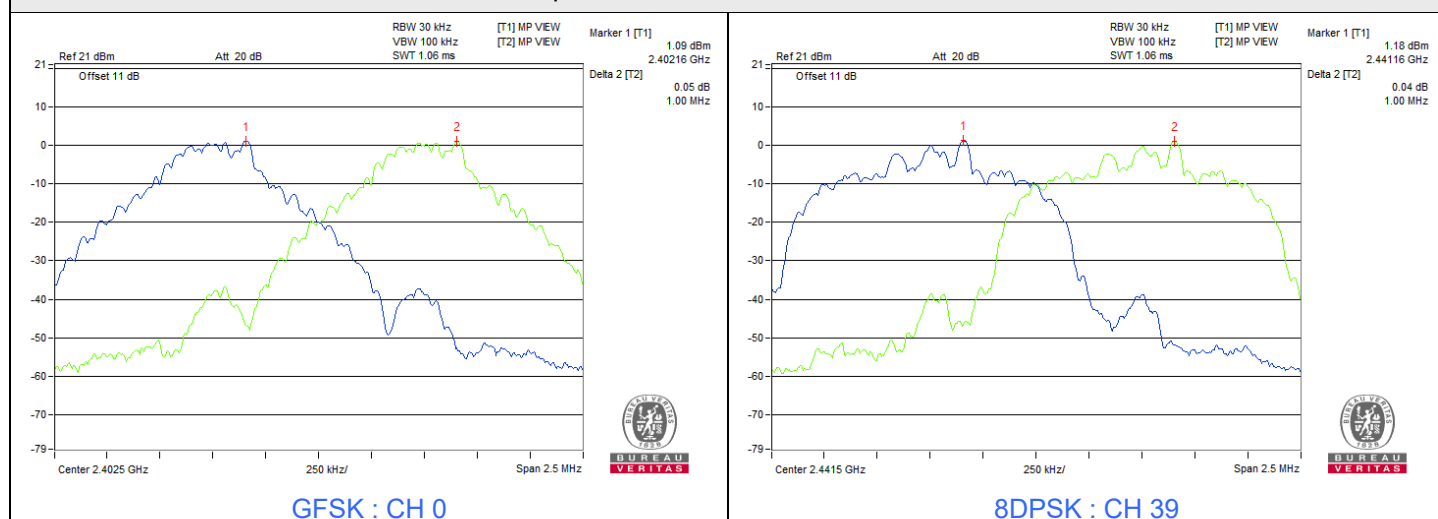
Note: The minimum limit is two-third 20dB bandwidth.

### 8DPSK

| Channel | Frequency (MHz) | Hopping Channel Separation (MHz) | Minimum Limit (MHz) | Test Result |
|---------|-----------------|----------------------------------|---------------------|-------------|
| 0       | 2402            | 1.01                             | 0.84                | Pass        |
| 39      | 2441            | 1.00                             | 0.84                | Pass        |
| 78      | 2480            | 1.01                             | 0.84                | Pass        |

Note: The minimum limit is two-third 20dB bandwidth.

Spectrum Plot of Minimum Value



## 7.5 20 dB Bandwidth

|              |                |                           |              |            |            |
|--------------|----------------|---------------------------|--------------|------------|------------|
| Input Power: | 120 Vac, 60 Hz | Environmental Conditions: | 25°C, 76% RH | Tested By: | Waydi Tuan |
|--------------|----------------|---------------------------|--------------|------------|------------|

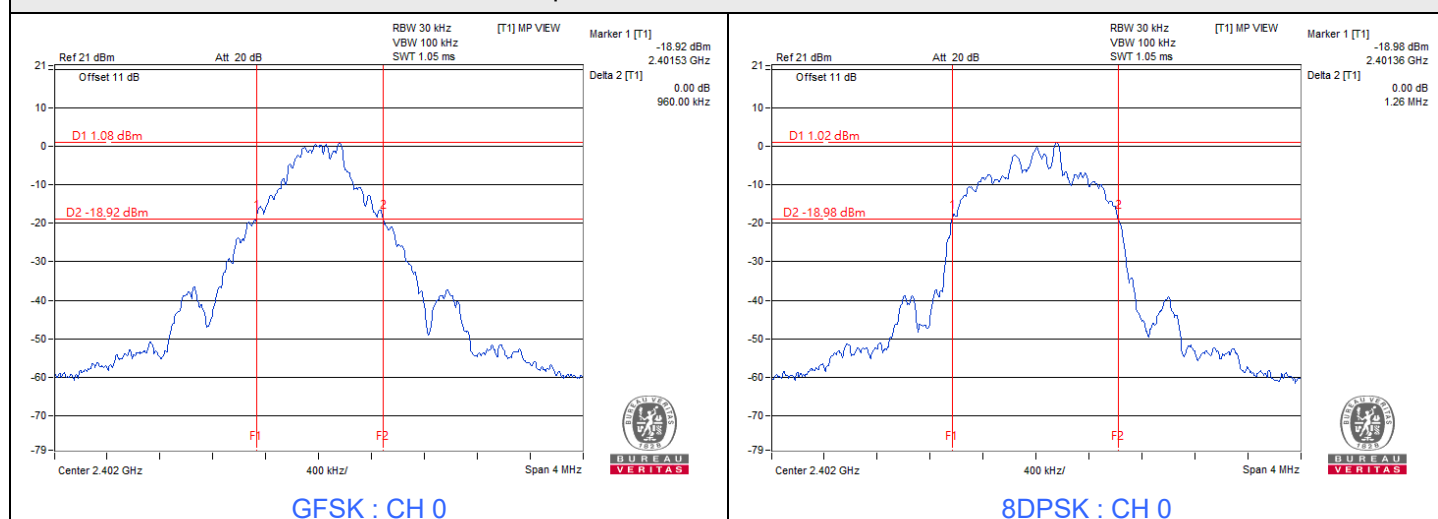
### GFSK

| Channel | Frequency (MHz) | 20dB Bandwidth (MHz) |
|---------|-----------------|----------------------|
| 0       | 2402            | 0.96                 |
| 39      | 2441            | 0.97                 |
| 78      | 2480            | 0.97                 |

### 8DPSK

| Channel | Frequency (MHz) | 20dB Bandwidth (MHz) |
|---------|-----------------|----------------------|
| 0       | 2402            | 1.26                 |
| 39      | 2441            | 1.26                 |
| 78      | 2480            | 1.26                 |

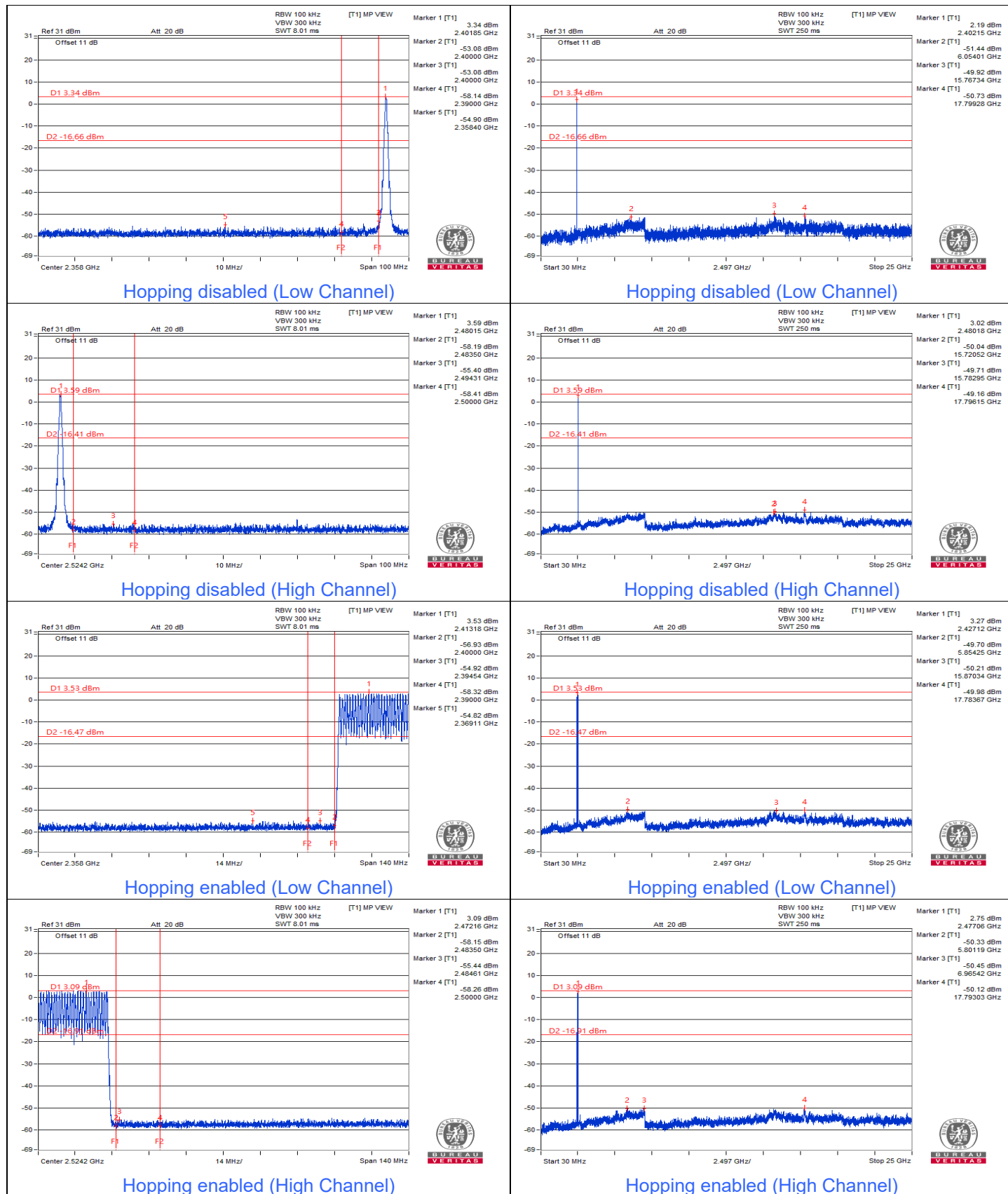
### Spectrum Plot of Minimum Value



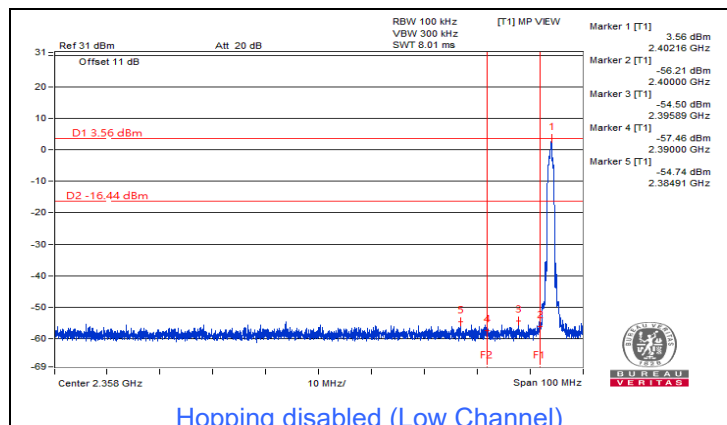
## 7.6 Conducted Out of Band Emissions

|              |                |                           |              |            |            |
|--------------|----------------|---------------------------|--------------|------------|------------|
| Input Power: | 120 Vac, 60 Hz | Environmental Conditions: | 25°C, 76% RH | Tested By: | Waydi Tuan |
|--------------|----------------|---------------------------|--------------|------------|------------|

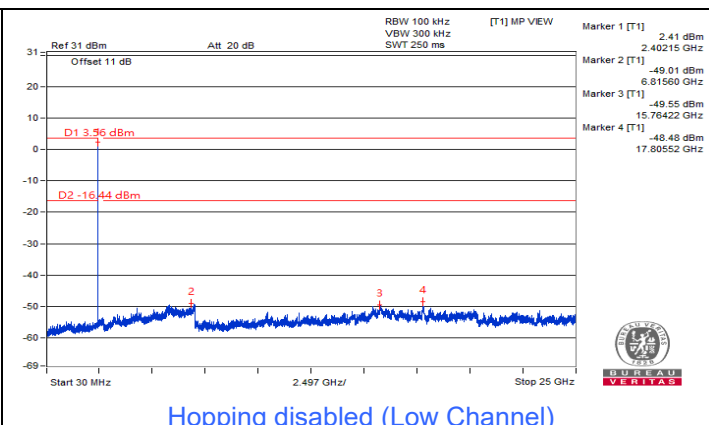
### GFSK



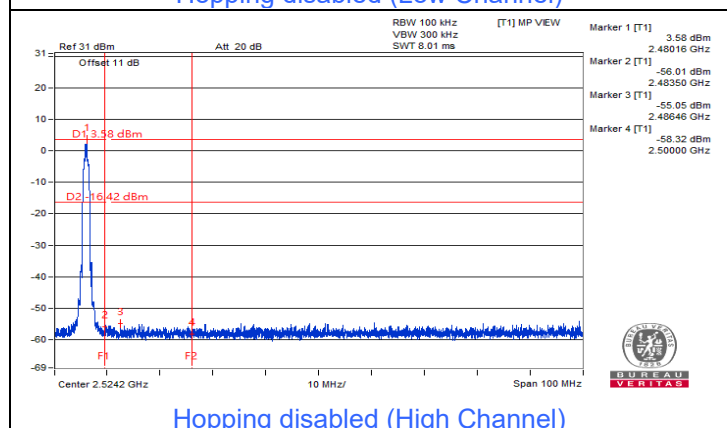
# 8DPSK



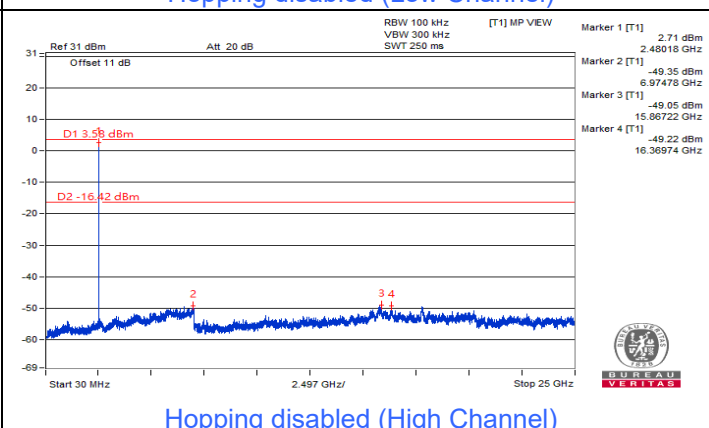
Hopping disabled (Low Channel)



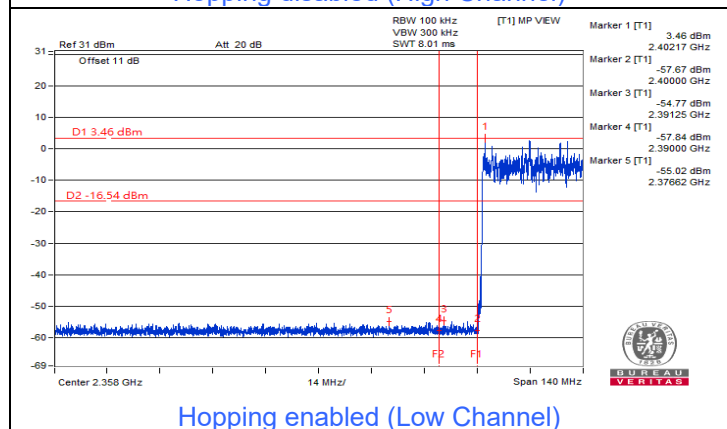
Hopping disabled (Low Channel)



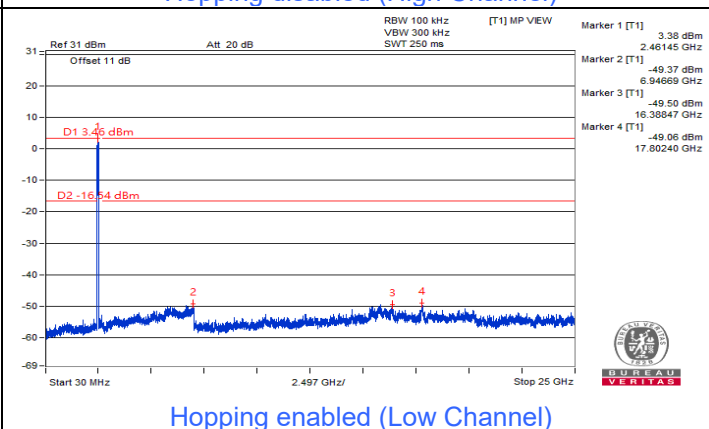
Hopping disabled (High Channel)



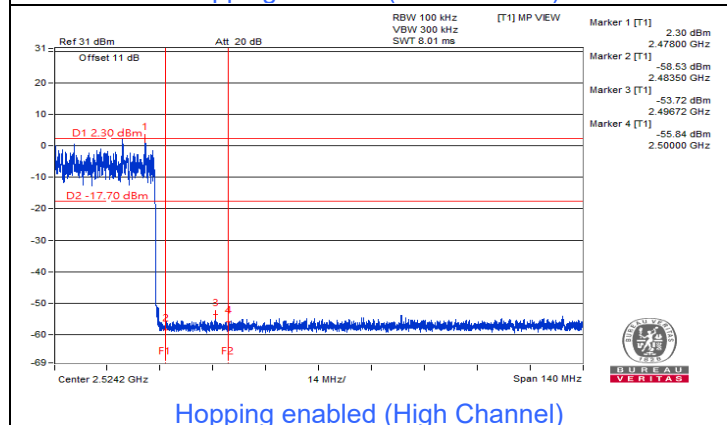
Hopping disabled (High Channel)



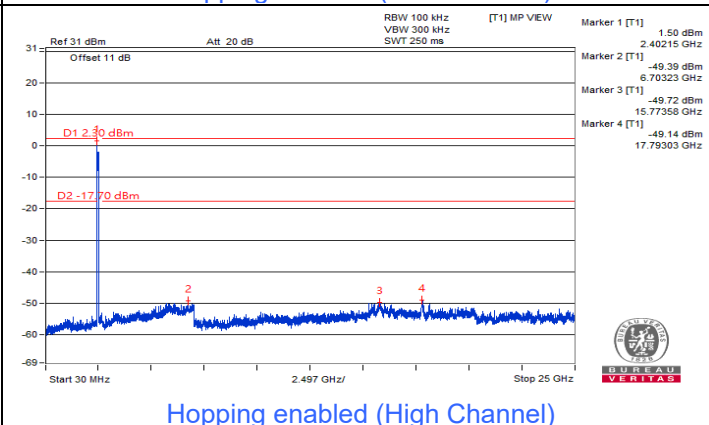
Hopping enabled (Low Channel)



Hopping enabled (Low Channel)



Hopping enabled (High Channel)



Hopping enabled (High Channel)

## 7.7 AC Power Conducted Emissions

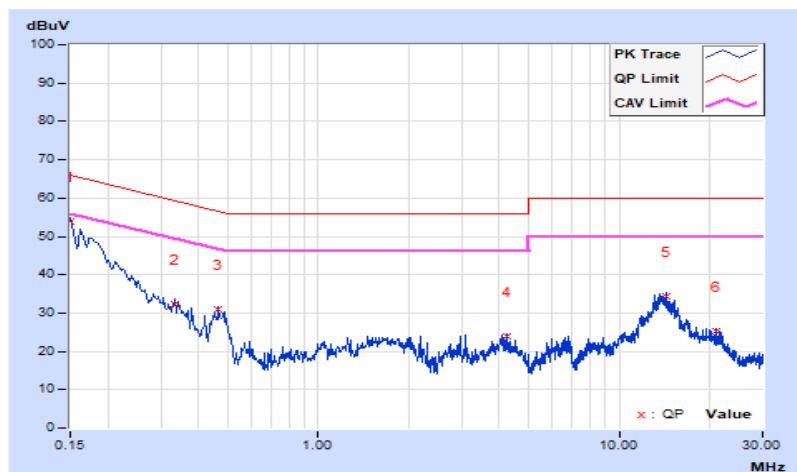
### Mode A

|                 |                  |                                          |                                       |
|-----------------|------------------|------------------------------------------|---------------------------------------|
| RF Mode         | BT GFSK          | Channel                                  | CH 39 : 2441 MHz                      |
| Frequency Range | 150 kHz ~ 30 MHz | Detector Function & Resolution Bandwidth | Quasi-Peak (QP) / Average (AV), 9 kHz |
| Input Power     | 120 Vac, 60 Hz   | Environmental Conditions                 | 25 °C, 75% RH                         |
| Tested By       | Jed Wu           |                                          |                                       |

| Phase Of Power : Line (L) |                 |                        |                      |       |                       |       |              |       |             |        |
|---------------------------|-----------------|------------------------|----------------------|-------|-----------------------|-------|--------------|-------|-------------|--------|
| No                        | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) |       | Emission Level (dBuV) |       | Limit (dBuV) |       | Margin (dB) |        |
|                           |                 |                        | Q.P.                 | AV.   | Q.P.                  | AV.   | Q.P.         | AV.   | Q.P.        | AV.    |
| 1                         | 0.15000         | 9.77                   | 44.24                | 23.09 | 54.01                 | 32.86 | 66.00        | 56.00 | -11.99      | -23.14 |
| 2                         | 0.33382         | 9.77                   | 22.51                | 7.89  | 32.28                 | 17.66 | 59.36        | 49.36 | -27.08      | -31.70 |
| 3                         | 0.46679         | 9.77                   | 21.31                | 13.47 | 31.08                 | 23.24 | 56.57        | 46.57 | -25.49      | -23.33 |
| 4                         | 4.22327         | 9.85                   | 14.02                | 9.84  | 23.87                 | 19.69 | 56.00        | 46.00 | -32.13      | -26.31 |
| 5                         | 14.27689        | 9.98                   | 24.50                | 18.76 | 34.48                 | 28.74 | 60.00        | 50.00 | -25.52      | -21.26 |
| 6                         | 21.14070        | 10.05                  | 15.17                | 10.60 | 25.22                 | 20.65 | 60.00        | 50.00 | -34.78      | -29.35 |

#### Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

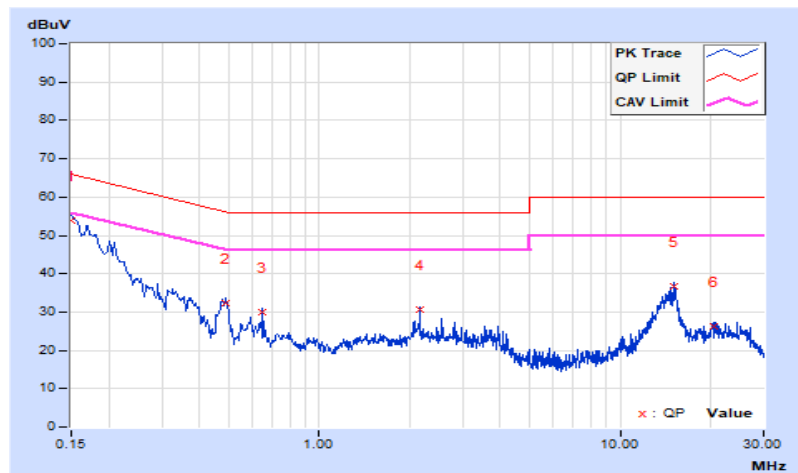


|                        |                  |                                                     |                                       |
|------------------------|------------------|-----------------------------------------------------|---------------------------------------|
| <b>RF Mode</b>         | BT GFSK          | <b>Channel</b>                                      | CH 39 : 2441 MHz                      |
| <b>Frequency Range</b> | 150 kHz ~ 30 MHz | <b>Detector Function &amp; Resolution Bandwidth</b> | Quasi-Peak (QP) / Average (AV), 9 kHz |
| <b>Input Power</b>     | 120 Vac, 60 Hz   | <b>Environmental Conditions</b>                     | 25 °C, 75% RH                         |
| <b>Tested By</b>       | Jed Wu           |                                                     |                                       |

| Phase Of Power : Neutral (N) |                 |                        |                      |       |                       |       |              |       |             |        |
|------------------------------|-----------------|------------------------|----------------------|-------|-----------------------|-------|--------------|-------|-------------|--------|
| No                           | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) |       | Emission Level (dBuV) |       | Limit (dBuV) |       | Margin (dB) |        |
|                              |                 |                        | Q.P.                 | AV.   | Q.P.                  | AV.   | Q.P.         | AV.   | Q.P.        | AV.    |
| 1                            | 0.15000         | 10.02                  | 44.02                | 26.27 | 54.04                 | 36.29 | 66.00        | 56.00 | -11.96      | -19.71 |
| 2                            | 0.49026         | 10.04                  | 22.41                | 15.32 | 32.45                 | 25.36 | 56.16        | 46.16 | -23.71      | -20.80 |
| 3                            | 0.64471         | 10.05                  | 19.82                | 13.19 | 29.87                 | 23.24 | 56.00        | 46.00 | -26.13      | -22.76 |
| 4                            | 2.15435         | 10.08                  | 20.42                | 15.99 | 30.50                 | 26.07 | 56.00        | 46.00 | -25.50      | -19.93 |
| 5                            | 15.03563        | 10.30                  | 26.51                | 20.50 | 36.81                 | 30.80 | 60.00        | 50.00 | -23.19      | -19.20 |
| 6                            | 20.39370        | 10.40                  | 15.76                | 10.96 | 26.16                 | 21.36 | 60.00        | 50.00 | -33.84      | -28.64 |

**Remarks:**

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



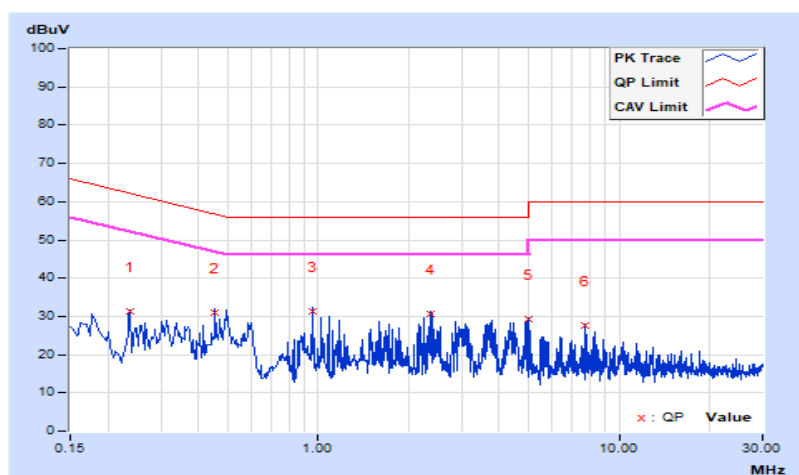
## Mode B

|                 |                  |                                          |                                       |
|-----------------|------------------|------------------------------------------|---------------------------------------|
| RF Mode         | BT GFSK          | Channel                                  | CH 39 : 2441 MHz                      |
| Frequency Range | 150 kHz ~ 30 MHz | Detector Function & Resolution Bandwidth | Quasi-Peak (QP) / Average (AV), 9 kHz |
| Input Power     | 120 Vac, 60 Hz   | Environmental Conditions                 | 25 °C, 75% RH                         |
| Tested By       | Jed Wu           |                                          |                                       |

| Phase Of Power : Line (L) |                 |                        |                      |       |                       |       |              |       |             |        |
|---------------------------|-----------------|------------------------|----------------------|-------|-----------------------|-------|--------------|-------|-------------|--------|
| No                        | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) |       | Emission Level (dBuV) |       | Limit (dBuV) |       | Margin (dB) |        |
|                           |                 |                        | Q.P.                 | AV.   | Q.P.                  | AV.   | Q.P.         | AV.   | Q.P.        | AV.    |
| 1                         | 0.23604         | 9.78                   | 21.63                | 14.30 | 31.41                 | 24.08 | 62.23        | 52.23 | -30.82      | -28.15 |
| 2                         | 0.45506         | 9.77                   | 21.18                | 15.39 | 30.95                 | 25.16 | 56.78        | 46.78 | -25.83      | -21.62 |
| 3                         | 0.96150         | 9.78                   | 21.39                | 11.98 | 31.17                 | 21.76 | 56.00        | 46.00 | -24.83      | -24.24 |
| 4                         | 2.36555         | 9.82                   | 20.69                | 9.33  | 30.51                 | 19.15 | 56.00        | 46.00 | -25.49      | -26.85 |
| 5                         | 4.97027         | 9.86                   | 19.40                | 8.46  | 29.26                 | 18.32 | 56.00        | 46.00 | -26.74      | -27.68 |
| 6                         | 7.74552         | 9.90                   | 17.76                | 9.58  | 27.66                 | 19.48 | 60.00        | 50.00 | -32.34      | -30.52 |

### Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

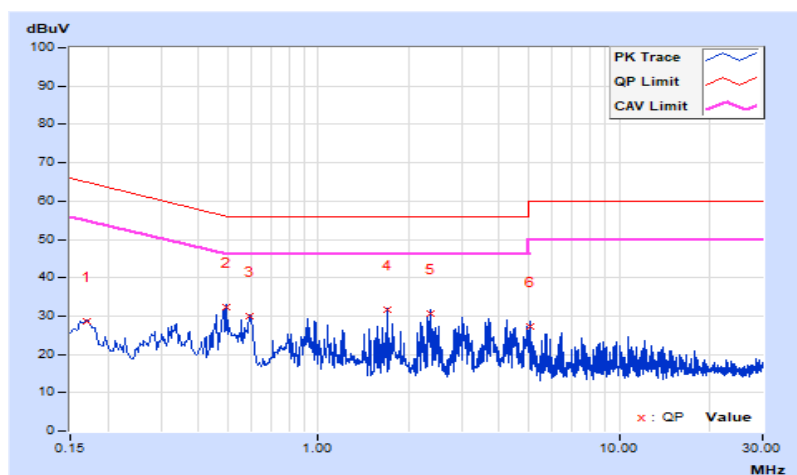


|                 |                  |                                          |                                       |
|-----------------|------------------|------------------------------------------|---------------------------------------|
| RF Mode         | BT GFSK          | Channel                                  | CH 39 : 2441 MHz                      |
| Frequency Range | 150 kHz ~ 30 MHz | Detector Function & Resolution Bandwidth | Quasi-Peak (QP) / Average (AV), 9 kHz |
| Input Power     | 120 Vac, 60 Hz   | Environmental Conditions                 | 25 °C, 75% RH                         |
| Tested By       | Jed Wu           |                                          |                                       |

| Phase Of Power : Neutral (N) |                 |                        |                      |       |                       |       |              |       |             |        |
|------------------------------|-----------------|------------------------|----------------------|-------|-----------------------|-------|--------------|-------|-------------|--------|
| No                           | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) |       | Emission Level (dBuV) |       | Limit (dBuV) |       | Margin (dB) |        |
|                              |                 |                        | Q.P.                 | AV.   | Q.P.                  | AV.   | Q.P.         | AV.   | Q.P.        | AV.    |
| 1                            | 0.16956         | 10.02                  | 18.72                | 12.85 | 28.74                 | 22.87 | 64.98        | 54.98 | -36.24      | -32.11 |
| 2                            | 0.49808         | 10.04                  | 22.43                | 15.51 | 32.47                 | 25.55 | 56.03        | 46.03 | -23.56      | -20.48 |
| 3                            | 0.59386         | 10.05                  | 19.94                | 16.61 | 29.99                 | 26.66 | 56.00        | 46.00 | -26.01      | -19.34 |
| 4                            | 1.69285         | 10.07                  | 21.63                | 11.62 | 31.70                 | 21.69 | 56.00        | 46.00 | -24.30      | -24.31 |
| 5                            | 2.36555         | 10.09                  | 20.48                | 12.45 | 30.57                 | 22.54 | 56.00        | 46.00 | -25.43      | -23.46 |
| 6                            | 5.05084         | 10.14                  | 17.11                | 8.99  | 27.25                 | 19.13 | 60.00        | 50.00 | -32.75      | -30.87 |

#### Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



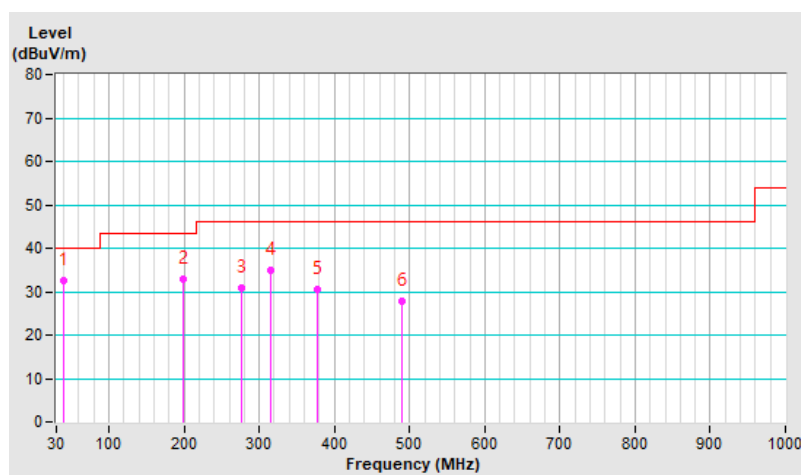
## 7.8 Unwanted Emissions below 1 GHz

|                        |                |                                          |                                |
|------------------------|----------------|------------------------------------------|--------------------------------|
| <b>RF Mode</b>         | BT GFSK        | <b>Channel</b>                           | CH 39 : 2441 MHz               |
| <b>Frequency Range</b> | 30 MHz ~ 1 GHz | <b>Detector Function &amp; Bandwidth</b> | QP: RB=120 kHz, DET=Quasi-Peak |
| <b>Input Power</b>     | 120 Vac, 60 Hz | <b>Environmental Conditions</b>          | 25 °C, 75% RH                  |
| <b>Tested By</b>       | Jed Wu         |                                          |                                |

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |                         |                |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 39.26           | 32.5 QP                 | 40.0           | -7.5        | 1.38 H             | 360                  | 42.2             | -9.7                     |
| 2                                                    | 198.25          | 32.8 QP                 | 43.5           | -10.7       | 1.46 H             | 256                  | 43.1             | -10.3                    |
| 3                                                    | 276.23          | 31.0 QP                 | 46.0           | -15.0       | 1.57 H             | 180                  | 37.3             | -6.3                     |
| 4                                                    | 315.28          | 34.9 QP                 | 46.0           | -11.1       | 1.28 H             | 178                  | 40.0             | -5.1                     |
| 5                                                    | 376.53          | 30.5 QP                 | 46.0           | -15.5       | 1.98 H             | 338                  | 34.4             | -3.9                     |
| 6                                                    | 488.96          | 27.9 QP                 | 46.0           | -18.1       | 1.72 H             | 246                  | 29.4             | -1.5                     |

### Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.

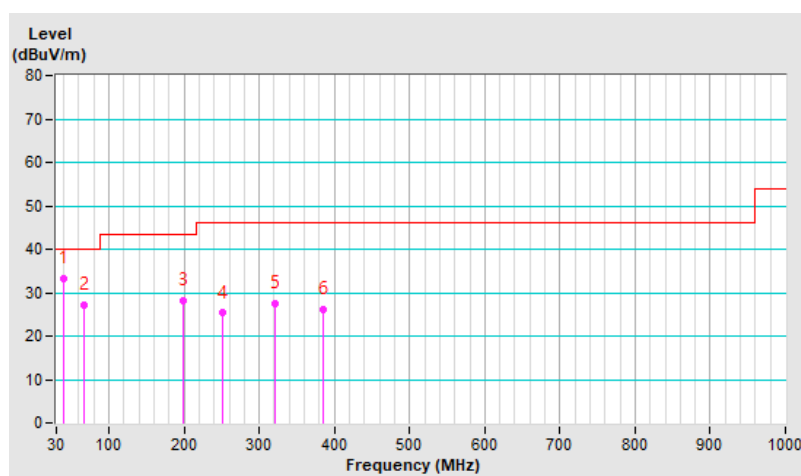


|                 |                |                               |                                |
|-----------------|----------------|-------------------------------|--------------------------------|
| RF Mode         | BT GFSK        | Channel                       | CH 39 : 2441 MHz               |
| Frequency Range | 30 MHz ~ 1 GHz | Detector Function & Bandwidth | QP: RB=120 kHz, DET=Quasi-Peak |
| Input Power     | 120 Vac, 60 Hz | Environmental Conditions      | 25 °C, 75% RH                  |
| Tested By       | Jed Wu         |                               |                                |

| Antenna Polarity & Test Distance : Vertical at 3 m |                 |                         |                |             |                    |                      |                  |                          |
|----------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                 | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                  | 39.26           | 33.2 QP                 | 40.0           | -6.8        | 1.18 V             | 217                  | 42.9             | -9.7                     |
| 2                                                  | 66.52           | 27.1 QP                 | 40.0           | -12.9       | 1.24 V             | 53                   | 36.9             | -9.8                     |
| 3                                                  | 198.25          | 28.2 QP                 | 43.5           | -15.3       | 1.67 V             | 317                  | 38.5             | -10.3                    |
| 4                                                  | 250.24          | 25.3 QP                 | 46.0           | -20.7       | 1.32 V             | 53                   | 33.0             | -7.7                     |
| 5                                                  | 321.73          | 27.4 QP                 | 46.0           | -18.6       | 1.89 V             | 115                  | 32.4             | -5.0                     |
| 6                                                  | 384.73          | 26.2 QP                 | 46.0           | -19.8       | 1.57 V             | 195                  | 30.0             | -3.8                     |

#### Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.



## 7.9 Unwanted Emissions above 1 GHz

|                        |                |                                          |                                                                     |
|------------------------|----------------|------------------------------------------|---------------------------------------------------------------------|
| <b>RF Mode</b>         | BT GFSK        | <b>Channel</b>                           | CH 0 : 2402 MHz                                                     |
| <b>Frequency Range</b> | 1 GHz ~ 25 GHz | <b>Detector Function &amp; Bandwidth</b> | PK: RB=1 MHz, VB=3 MHz, DET=Peak<br>AV: RB=1 MHz, VB=3 MHz, DET=RMS |
| <b>Input Power</b>     | 120 Vac, 60 Hz | <b>Environmental Conditions</b>          | 25.2 °C, 74.3% RH                                                   |
| <b>Tested By</b>       | Jed Wu         |                                          |                                                                     |

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |                         |                |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 2390.00         | 52.6 PK                 | 74.0           | -21.4       | 2.40 H             | 135                  | 53.3             | -0.7                     |
| 2                                                    | 2390.00         | 41.0 AV                 | 54.0           | -13.0       | 2.40 H             | 135                  | 41.7             | -0.7                     |
| 3                                                    | *2402.00        | 99.0 PK                 |                |             | 2.40 H             | 135                  | 99.6             | -0.6                     |
| 4                                                    | *2402.00        | 68.2 AV                 |                |             | 2.40 H             | 135                  | 68.8             | -0.6                     |
| 5                                                    | 4804.00         | 46.2 PK                 | 74.0           | -27.8       | 2.31 H             | 128                  | 39.1             | 7.1                      |
| 6                                                    | 4804.00         | 15.4 AV                 | 54.0           | -38.6       | 2.31 H             | 128                  | 8.3              | 7.1                      |
| Antenna Polarity & Test Distance : Vertical at 3 m   |                 |                         |                |             |                    |                      |                  |                          |
| No                                                   | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 2390.00         | 52.3 PK                 | 74.0           | -21.7       | 1.79 V             | 332                  | 53.0             | -0.7                     |
| 2                                                    | 2390.00         | 40.7 AV                 | 54.0           | -13.3       | 1.79 V             | 332                  | 41.4             | -0.7                     |
| 3                                                    | *2402.00        | 95.5 PK                 |                |             | 1.79 V             | 332                  | 96.1             | -0.6                     |
| 4                                                    | *2402.00        | 64.7 AV                 |                |             | 1.79 V             | 332                  | 65.3             | -0.6                     |
| 5                                                    | 4804.00         | 45.8 PK                 | 74.0           | -28.2       | 2.81 V             | 41                   | 38.7             | 7.1                      |
| 6                                                    | 4804.00         | 15.0 AV                 | 54.0           | -39.0       | 2.81 V             | 41                   | 7.9              | 7.1                      |

### Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " \* ": Fundamental frequency, the limit was restricted at the RF Output Power.
6. The average value of harmonic frequency is: Average = Peak value + 20 log(dwelling time per 100 ms per channel \* (channel separation correction + overlapping channel correction)) Where the duty cycle correction factor is calculated from following formula:  

$$20 \log(\text{dwelling time per 100 ms per channel} \times (\text{channel separation correction} + \text{overlapping channel correction}))$$

$$= 20 \log(2.9\text{ms} \times (1+0) / 100 \text{ ms}) = -30.8 \text{ dB}$$

|                        |                |                                          |                                                                     |
|------------------------|----------------|------------------------------------------|---------------------------------------------------------------------|
| <b>RF Mode</b>         | BT GFSK        | <b>Channel</b>                           | CH 39 : 2441 MHz                                                    |
| <b>Frequency Range</b> | 1 GHz ~ 25 GHz | <b>Detector Function &amp; Bandwidth</b> | PK: RB=1 MHz, VB=3 MHz, DET=Peak<br>AV: RB=1 MHz, VB=3 MHz, DET=RMS |
| <b>Input Power</b>     | 120 Vac, 60 Hz | <b>Environmental Conditions</b>          | 25.2 °C, 74.3% RH                                                   |
| <b>Tested By</b>       | Jed Wu         |                                          |                                                                     |

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |                         |                |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | *2441.00        | 98.7 PK                 |                |             | 2.38 H             | 133                  | 99.1             | -0.4                     |
| 2                                                    | *2441.00        | 67.9 AV                 |                |             | 2.38 H             | 133                  | 68.3             | -0.4                     |
| 3                                                    | 4882.00         | 45.9 PK                 | 74.0           | -28.1       | 2.26 H             | 125                  | 38.4             | 7.5                      |
| 4                                                    | 4882.00         | 15.1 AV                 | 54.0           | -38.9       | 2.26 H             | 125                  | 7.6              | 7.5                      |
| Antenna Polarity & Test Distance : Vertical at 3 m   |                 |                         |                |             |                    |                      |                  |                          |
| No                                                   | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | *2441.00        | 95.2 PK                 |                |             | 1.82 V             | 329                  | 95.6             | -0.4                     |
| 2                                                    | *2441.00        | 64.4 AV                 |                |             | 1.82 V             | 329                  | 64.8             | -0.4                     |
| 3                                                    | 4882.00         | 45.5 PK                 | 74.0           | -28.5       | 2.78 V             | 37                   | 38.0             | 7.5                      |
| 4                                                    | 4882.00         | 14.7 AV                 | 54.0           | -39.3       | 2.78 V             | 37                   | 7.2              | 7.5                      |

**Remarks:**

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- Margin value = Emission Level – Limit value
- The other emission levels were very low against the limit.
- " \* ": Fundamental frequency, the limit was restricted at the RF Output Power.
- The average value of harmonic frequency is: Average = Peak value + 20 log(dwelling time per 100 ms per channel \* (channel separation correction + overlapping channel correction)) Where the duty cycle correction factor is calculated from following formula:  

$$20 \log(\text{dwelling time per 100 ms per channel} \times (\text{channel separation correction} + \text{overlapping channel correction}))$$

$$= 20 \log(2.9\text{ms} \times (1+0) / 100 \text{ ms}) = -30.8 \text{ dB}$$

|                        |                |                                          |                                                                     |
|------------------------|----------------|------------------------------------------|---------------------------------------------------------------------|
| <b>RF Mode</b>         | BT GFSK        | <b>Channel</b>                           | CH 78 : 2480 MHz                                                    |
| <b>Frequency Range</b> | 1 GHz ~ 25 GHz | <b>Detector Function &amp; Bandwidth</b> | PK: RB=1 MHz, VB=3 MHz, DET=Peak<br>AV: RB=1 MHz, VB=3 MHz, DET=RMS |
| <b>Input Power</b>     | 120 Vac, 60 Hz | <b>Environmental Conditions</b>          | 25.2 °C, 74.3% RH                                                   |
| <b>Tested By</b>       | Jed Wu         |                                          |                                                                     |

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |                         |                |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | *2480.00        | 99.7 PK                 |                |             | 2.28 H             | 146                  | 99.8             | -0.1                     |
| 2                                                    | *2480.00        | 68.9 AV                 |                |             | 2.28 H             | 146                  | 69.0             | -0.1                     |
| 3                                                    | 2483.50         | 53.6 PK                 | 74.0           | -20.4       | 2.28 H             | 146                  | 53.7             | -0.1                     |
| 4                                                    | 2483.50         | 22.8 AV                 | 54.0           | -31.2       | 2.28 H             | 146                  | 22.9             | -0.1                     |
| 5                                                    | 4960.00         | 46.9 PK                 | 74.0           | -27.1       | 2.19 H             | 139                  | 39.4             | 7.5                      |
| 6                                                    | 4960.00         | 16.1 AV                 | 54.0           | -37.9       | 2.19 H             | 139                  | 8.6              | 7.5                      |
| Antenna Polarity & Test Distance : Vertical at 3 m   |                 |                         |                |             |                    |                      |                  |                          |
| No                                                   | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | *2480.00        | 96.2 PK                 |                |             | 1.67 V             | 321                  | 96.3             | -0.1                     |
| 2                                                    | *2480.00        | 65.4 AV                 |                |             | 1.67 V             | 321                  | 65.5             | -0.1                     |
| 3                                                    | 2483.50         | 54.0 PK                 | 74.0           | -20.0       | 1.67 V             | 321                  | 54.1             | -0.1                     |
| 4                                                    | 2483.50         | 23.2 AV                 | 54.0           | -30.8       | 1.67 V             | 321                  | 23.3             | -0.1                     |
| 5                                                    | 4960.00         | 46.5 PK                 | 74.0           | -27.5       | 2.69 V             | 30                   | 39.0             | 7.5                      |
| 6                                                    | 4960.00         | 15.7 AV                 | 54.0           | -38.3       | 2.69 V             | 30                   | 8.2              | 7.5                      |

**Remarks:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " \* ": Fundamental frequency, the limit was restricted at the RF Output Power.
6. The average value of harmonic frequency is: Average = Peak value + 20 log(dwelling time per 100 ms per channel \* (channel separation correction + overlapping channel correction)) Where the duty cycle correction factor is calculated from following formula:  

$$20 \log(\text{dwelling time per 100 ms per channel} \times (\text{channel separation correction} + \text{overlapping channel correction}))$$

$$= 20 \log(2.9\text{ms} \times (1+0) / 100 \text{ ms}) = -30.8 \text{ dB}$$

|                        |                |                                          |                                                                     |
|------------------------|----------------|------------------------------------------|---------------------------------------------------------------------|
| <b>RF Mode</b>         | BT 8DPSK       | <b>Channel</b>                           | CH 0 : 2402 MHz                                                     |
| <b>Frequency Range</b> | 1 GHz ~ 25 GHz | <b>Detector Function &amp; Bandwidth</b> | PK: RB=1 MHz, VB=3 MHz, DET=Peak<br>AV: RB=1 MHz, VB=3 MHz, DET=RMS |
| <b>Input Power</b>     | 120 Vac, 60 Hz | <b>Environmental Conditions</b>          | 25.2 °C, 74.3% RH                                                   |
| <b>Tested By</b>       | Jed Wu         |                                          |                                                                     |

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |                         |                |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 2390.00         | 52.7 PK                 | 74.0           | -21.3       | 2.42 H             | 134                  | 53.4             | -0.7                     |
| 2                                                    | 2390.00         | 41.1 AV                 | 54.0           | -12.9       | 2.42 H             | 134                  | 41.8             | -0.7                     |
| 3                                                    | *2402.00        | 99.1 PK                 |                |             | 2.42 H             | 134                  | 99.7             | -0.6                     |
| 4                                                    | *2402.00        | 74.4 AV                 |                |             | 2.42 H             | 134                  | 75.0             | -0.6                     |
| 5                                                    | 4804.00         | 46.3 PK                 | 74.0           | -27.7       | 2.29 H             | 127                  | 39.2             | 7.1                      |
| 6                                                    | 4804.00         | 21.6 AV                 | 54.0           | -32.4       | 2.29 H             | 127                  | 14.5             | 7.1                      |
| Antenna Polarity & Test Distance : Vertical at 3 m   |                 |                         |                |             |                    |                      |                  |                          |
| No                                                   | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 2390.00         | 52.4 PK                 | 74.0           | -21.6       | 1.81 V             | 331                  | 53.1             | -0.7                     |
| 2                                                    | 2390.00         | 40.8 AV                 | 54.0           | -13.2       | 1.81 V             | 331                  | 41.5             | -0.7                     |
| 3                                                    | *2402.00        | 95.7 PK                 |                |             | 1.81 V             | 331                  | 96.3             | -0.6                     |
| 4                                                    | *2402.00        | 71.0 AV                 |                |             | 1.81 V             | 331                  | 71.6             | -0.6                     |
| 5                                                    | 4804.00         | 45.9 PK                 | 74.0           | -28.1       | 2.80 V             | 42                   | 38.8             | 7.1                      |
| 6                                                    | 4804.00         | 21.2 AV                 | 54.0           | -32.8       | 2.80 V             | 42                   | 14.1             | 7.1                      |

**Remarks:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " \* ": Fundamental frequency, the limit was restricted at the RF Output Power.
6. The average value of harmonic frequency is: Average = Peak value + 20 log(dwelling time per 100 ms per channel \* (channel separation correction + overlapping channel correction)) Where the duty cycle correction factor is calculated from following formula:  

$$20 \log(\text{dwelling time per 100 ms per channel} \times (\text{channel separation correction} + \text{overlapping channel correction}))$$

$$= 20 \log(2.899\text{ms} \times (1+1) / 100 \text{ ms}) = -24.7 \text{ dB}$$

|                 |                |                               |                                                                     |
|-----------------|----------------|-------------------------------|---------------------------------------------------------------------|
| RF Mode         | BT 8DPSK       | Channel                       | CH 39 : 2441 MHz                                                    |
| Frequency Range | 1 GHz ~ 25 GHz | Detector Function & Bandwidth | PK: RB=1 MHz, VB=3 MHz, DET=Peak<br>AV: RB=1 MHz, VB=3 MHz, DET=RMS |
| Input Power     | 120 Vac, 60 Hz | Environmental Conditions      | 25.2 °C, 74.3% RH                                                   |
| Tested By       | Jed Wu         |                               |                                                                     |

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |                         |                |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | *2441.00        | 98.8 PK                 |                |             | 2.40 H             | 132                  | 99.2             | -0.4                     |
| 2                                                    | *2441.00        | 74.1 AV                 |                |             | 2.40 H             | 132                  | 74.5             | -0.4                     |
| 3                                                    | 4882.00         | 46.0 PK                 | 74.0           | -28.0       | 2.28 H             | 123                  | 38.5             | 7.5                      |
| 4                                                    | 4882.00         | 21.3 AV                 | 54.0           | -32.7       | 2.28 H             | 123                  | 13.8             | 7.5                      |
| Antenna Polarity & Test Distance : Vertical at 3 m   |                 |                         |                |             |                    |                      |                  |                          |
| No                                                   | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | *2441.00        | 95.3 PK                 |                |             | 1.80 V             | 327                  | 95.7             | -0.4                     |
| 2                                                    | *2441.00        | 70.6 AV                 |                |             | 1.80 V             | 327                  | 71.0             | -0.4                     |
| 3                                                    | 4882.00         | 45.6 PK                 | 74.0           | -28.4       | 2.79 V             | 39                   | 38.1             | 7.5                      |
| 4                                                    | 4882.00         | 20.9 AV                 | 54.0           | -33.1       | 2.79 V             | 39                   | 13.4             | 7.5                      |

**Remarks:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " \* ": Fundamental frequency, the limit was restricted at the RF Output Power.
6. The average value of harmonic frequency is: Average = Peak value + 20 log(dwelling time per 100 ms per channel \* (channel separation correction + overlapping channel correction)) Where the duty cycle correction factor is calculated from following formula:  

$$20 \log(\text{dwelling time per 100 ms per channel} \times (\text{channel separation correction} + \text{overlapping channel correction}))$$

$$= 20 \log(2.899\text{ms} \times (1+1) / 100 \text{ ms}) = -24.7 \text{ dB}$$

|                        |                |                                          |                                                                     |
|------------------------|----------------|------------------------------------------|---------------------------------------------------------------------|
| <b>RF Mode</b>         | BT 8DPSK       | <b>Channel</b>                           | CH 78 : 2480 MHz                                                    |
| <b>Frequency Range</b> | 1 GHz ~ 25 GHz | <b>Detector Function &amp; Bandwidth</b> | PK: RB=1 MHz, VB=3 MHz, DET=Peak<br>AV: RB=1 MHz, VB=3 MHz, DET=RMS |
| <b>Input Power</b>     | 120 Vac, 60 Hz | <b>Environmental Conditions</b>          | 25.2 °C, 74.3% RH                                                   |
| <b>Tested By</b>       | Jed Wu         |                                          |                                                                     |

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |                         |                |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | *2480.00        | 99.8 PK                 |                |             | 2.27 H             | 146                  | 99.9             | -0.1                     |
| 2                                                    | *2480.00        | 75.1 AV                 |                |             | 2.27 H             | 146                  | 75.2             | -0.1                     |
| 3                                                    | 2483.50         | 53.7 PK                 | 74.0           | -20.3       | 2.27 H             | 146                  | 53.8             | -0.1                     |
| 4                                                    | 2483.50         | 29.0 AV                 | 54.0           | -25.0       | 2.27 H             | 146                  | 29.1             | -0.1                     |
| 5                                                    | 4960.00         | 47.0 PK                 | 74.0           | -27.0       | 2.18 H             | 138                  | 39.5             | 7.5                      |
| 6                                                    | 4960.00         | 22.3 AV                 | 54.0           | -31.7       | 2.18 H             | 138                  | 14.8             | 7.5                      |
| Antenna Polarity & Test Distance : Vertical at 3 m   |                 |                         |                |             |                    |                      |                  |                          |
| No                                                   | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | *2480.00        | 96.3 PK                 |                |             | 1.68 V             | 321                  | 96.4             | -0.1                     |
| 2                                                    | *2480.00        | 71.6 AV                 |                |             | 1.68 V             | 321                  | 71.7             | -0.1                     |
| 3                                                    | 2483.50         | 54.1 PK                 | 74.0           | -19.9       | 1.68 V             | 321                  | 54.2             | -0.1                     |
| 4                                                    | 2483.50         | 29.4 AV                 | 54.0           | -24.6       | 1.68 V             | 321                  | 29.5             | -0.1                     |
| 5                                                    | 4960.00         | 46.6 PK                 | 74.0           | -27.4       | 2.70 V             | 31                   | 39.1             | 7.5                      |
| 6                                                    | 4960.00         | 21.9 AV                 | 54.0           | -32.1       | 2.70 V             | 31                   | 14.4             | 7.5                      |

**Remarks:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " \* " : Fundamental frequency, the limit was restricted at the RF Output Power.
6. The average value of harmonic frequency is: Average = Peak value + 20 log(dwelling time per 100 ms per channel \* (channel separation correction + overlapping channel correction)) Where the duty cycle correction factor is calculated from following formula:  

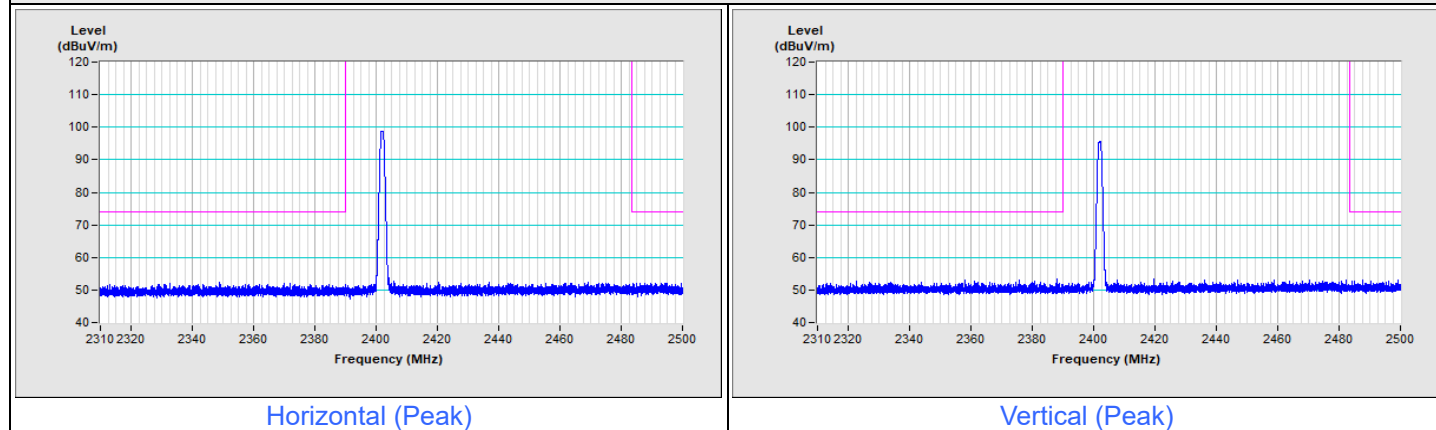
$$20 \log(\text{dwelling time per 100 ms per channel} \times (\text{channel separation correction} + \text{overlapping channel correction}))$$

$$= 20 \log(2.899\text{ms} \times (1+1) / 100 \text{ ms}) = -24.7 \text{ dB}$$

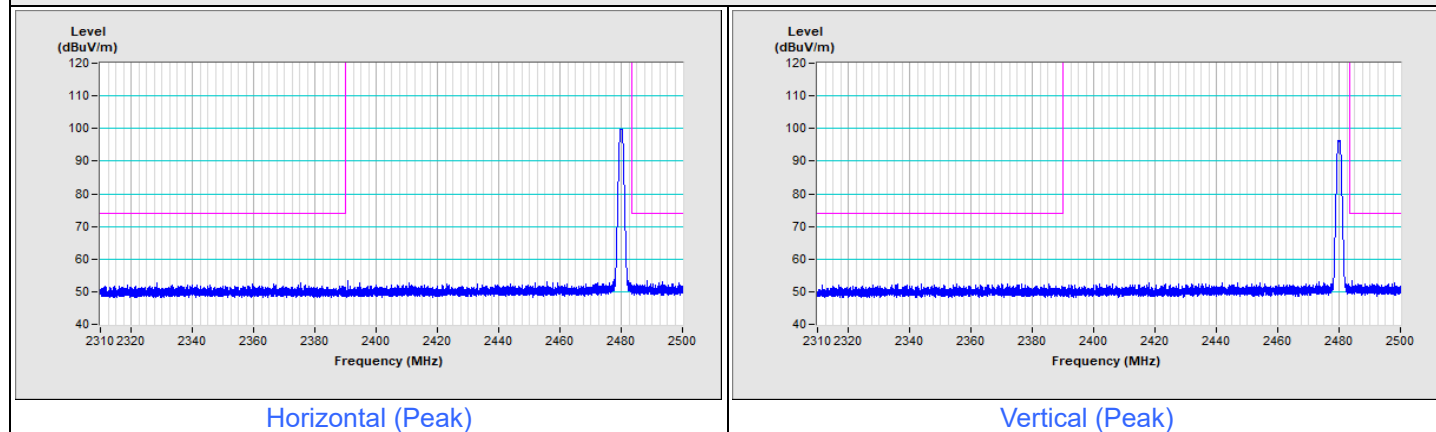
## Plot of Band Edge

|                 |                    |                               |                                  |
|-----------------|--------------------|-------------------------------|----------------------------------|
| Frequency Range | 2.31 GHz ~ 2.5 GHz | Detector Function & Bandwidth | PK: RB=1 MHz, VB=3 MHz, DET=Peak |
|-----------------|--------------------|-------------------------------|----------------------------------|

### BT GFSK Channel 0

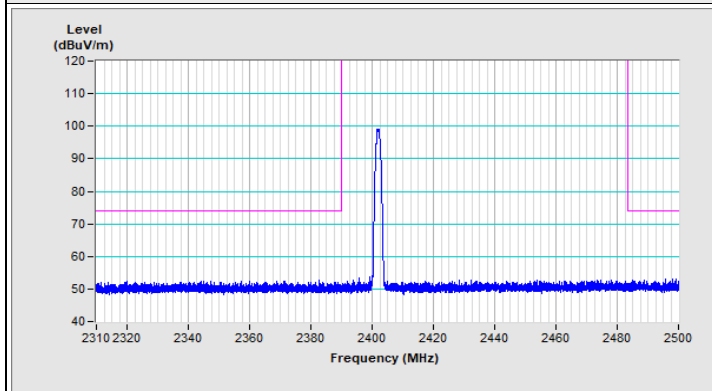


### BT GFSK Channel 78

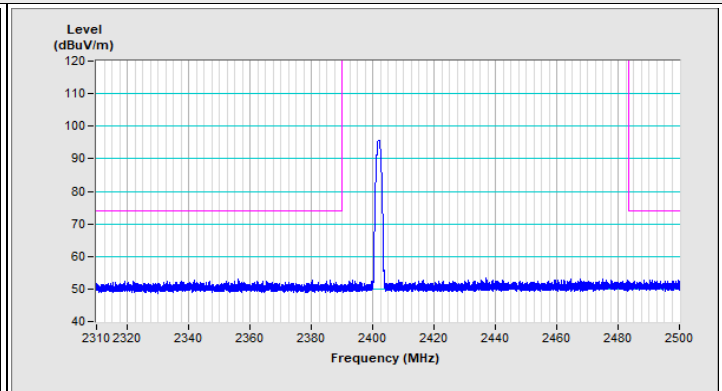


|                 |                    |                               |                                  |
|-----------------|--------------------|-------------------------------|----------------------------------|
| Frequency Range | 2.31 GHz ~ 2.5 GHz | Detector Function & Bandwidth | PK: RB=1 MHz, VB=3 MHz, DET=Peak |
|-----------------|--------------------|-------------------------------|----------------------------------|

### BT 8DPSK Channel 0

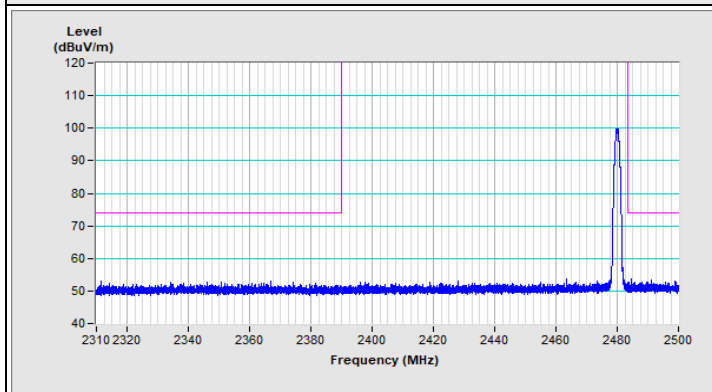


Horizontal (Peak)

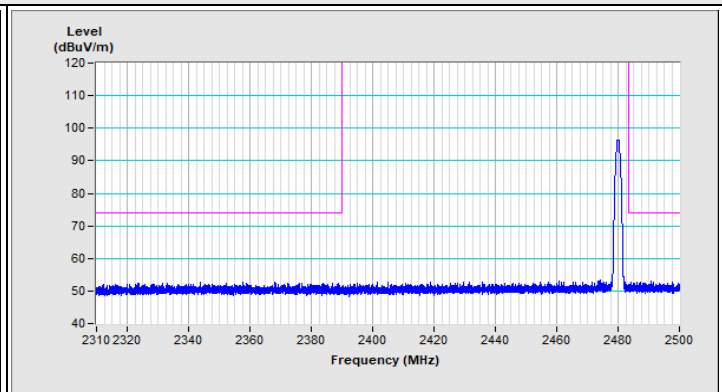


Vertical (Peak)

### BT 8DPSK Channel 78



Horizontal (Peak)



Vertical (Peak)

## 8 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo)

## 9 Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

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The address and road map of all our labs can be found in our web site also.

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