

## TEST REPORT

|           |                                   |
|-----------|-----------------------------------|
| Applicant | GOLABS INC.                       |
| Address   | 2201 LUNA RD CARROLLTON, TX 75006 |

|                                     |                                                                                      |
|-------------------------------------|--------------------------------------------------------------------------------------|
| Manufacturer or Supplier            | ZHEJIANG TAOTAO VEHICLES CO.,LTD                                                     |
| Address                             | No.10 XINYUAN ROAD, XINBI STREET, JINYUN COUNTY LISHUI City<br>ZHEJIANG 321400 CHINA |
| Product                             | ELECTRIC SCOOTER                                                                     |
| Brand Name                          | GOTRAX                                                                               |
| Model                               | T7                                                                                   |
| Additional Model & Model Difference | NEBULA, CX1, XR GLOW, XOOMPLUS see item 3.1                                          |
| Date of tests                       | Apr. 26, 2024 ~ Jul. 11, 2024                                                        |

the tests have been carried out according to the requirements of the following standard:

☒ **FCC Part 15, Subpart C, Section 15.247**

**CONCLUSION: The submitted sample was found to COMPLY with the test requirement**

|                                                                                     |                                                                                      |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Tested by Loren Luo<br>Project Engineer / EMC Department                            | Approved by Glyn He<br>Assistant Manager / EMC Department                            |
|  |  |
|                                                                                     | Date: Jul. 31, 2024                                                                  |

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Test Report No.: RF2404WDG0306-2

## RELEASE CONTROL RECORD

| ISSUE NO.       | REASON FOR CHANGE | DATE ISSUED   |
|-----------------|-------------------|---------------|
| RF2404WDG0306-2 | Original release  | Jul. 31, 2024 |

## 1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

| APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247) |                                  |        |                                |
|-----------------------------------------------------------|----------------------------------|--------|--------------------------------|
| STANDARD SECTION                                          | TEST TYPE AND LIMIT              | RESULT | REMARK                         |
| 15.207                                                    | AC Power Conducted Emission      | N/A    | Powered from battery           |
| 15.205<br>15.209                                          | Radiated Emission                | PASS   | Meet the requirement of limit. |
| 15.247(d)                                                 | Out of band Emission Measurement | PASS   | Meet the requirement of limit. |
| 15.247(a)(2)                                              | 6dB bandwidth                    | PASS   | Meet the requirement of limit. |
| 15.247(b)                                                 | Conducted Output power           | PASS   | Meet the requirement of limit. |
| 15.247(e)                                                 | Power Spectral Density           | PASS   | Meet the requirement of limit. |
| 15.203                                                    | Antenna Requirement              | PASS   | No antenna connector is used   |

## 2 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:

| MEASUREMENT        | FREQUENCY     | UNCERTAINTY |
|--------------------|---------------|-------------|
| Radiated emissions | 9KHz ~ 30MHz  | 2.72dB      |
|                    | 30MHz ~ 1GMHz | 4.24dB      |
|                    | 1GHz ~ 18GHz  | 4.10dB      |
|                    | 18GHz ~ 40GHz | 4.10dB      |

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k = 2$ .



### 3 GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

|                              |                                                                    |
|------------------------------|--------------------------------------------------------------------|
| <b>PRODUCT</b>               | ELECTRIC SCOOTER                                                   |
| <b>MODEL NO.</b>             | T7                                                                 |
| <b>ADDITIONAL MODELS</b>     | NEBULA, CX1, XR GLOW, XOOMPLUS                                     |
| <b>FCC ID</b>                | 2AWFV-T7                                                           |
| <b>NOMINAL VOLTAGE</b>       | DC 21.6V from Li-ion battery;<br>Charging by DC 25.2V from adapter |
| <b>MODULATION TECHNOLOGY</b> | GFSK                                                               |
| <b>MODULATION TYPE</b>       | BT-LE(GFSK)                                                        |
| <b>OPERATING FREQUENCY</b>   | 2402-2480MHz                                                       |
| <b>PEAK OUTPUT POWER</b>     | 0.1265mW (Max. Measured)                                           |
| <b>ANTENNA TYPE</b>          | PCB Antenna, -0.58dBi Gain                                         |
| <b>I/O PORTS</b>             | Refer to user's manual                                             |
| <b>CABLE SUPPLIED</b>        | N/A                                                                |

**NOTE:**

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.
3. Please refer to the EUT photo document (Reference No.: 2404WDG0306) for detailed product photo.
4. Additional models NEBULA, CX1, XR GLOW, XOOMPLUS are identical with the test model T7 except the appearance and model number for trading purpose.
5. The charging mode was tested in sDoC report(FS2404WDG0306), and EUT in the charging mode that bluetooth function can't working.

### 3.2 DESCRIPTION OF TEST MODES

40 channels are provided for BT-LE(GFSK):

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

#### 3.2.1. CONFIGURATION OF SYSTEM UNDER TEST

Please see section 5 photographs of the test configuration for reference.

#### 3.2.2. TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis, power supply voltage range and antenna ports. The worst case was found when positioned on X axis for radiated emission. Following test modes were selected for the final test, and the final worst case is marked in boldface and recorded in the report:

| EUT CONFIGURE<br>MODE | APPLICABLE TO |       |     |      | DESCRIPTION                                       |
|-----------------------|---------------|-------|-----|------|---------------------------------------------------|
|                       | RE<1G         | RE≥1G | PLC | APCM |                                                   |
| A                     | √             | √     | -   | √    | Powered by Li-ion Battery with BT <b>Function</b> |

Where **RE<1G**: Radiated Emission below 1GHz      **RE≥1G**: Radiated Emission above 1GHz  
**PLC**: Power Line Conducted Emission      **APCM**: Antenna Port Conducted Measurement

**NOTE:** No need to concern of Conducted Emission due to the EUT is powered by battery.

**RADIATED EMISSION TEST (BELOW 1GHz):**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| EUT CONFIGURE<br>MODE | AVAILABLE<br>CHANNEL | TESTED<br>CHANNEL | MODULATION<br>TECHNOLOGY | MODULATION<br>TYPE | DATA RATE<br>(Mbps) |
|-----------------------|----------------------|-------------------|--------------------------|--------------------|---------------------|
| A                     | 0 to 39              | 39                | DTS                      | GFSK               | 1                   |

For the test results, only the worst case was shown in test report.

**RADIATED EMISSION TEST (ABOVE 1GHz):**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| EUT CONFIGURE<br>MODE | AVAILABLE<br>CHANNEL | TESTED<br>CHANNEL | MODULATION<br>TECHNOLOGY | MODULATION<br>TYPE | DATA RATE<br>(Mbps) |
|-----------------------|----------------------|-------------------|--------------------------|--------------------|---------------------|
| A                     | 0 to 39              | 0,19, 39          | DTS                      | GFSK               | 1                   |

**ANTENNA PORT CONDUCTED MEASUREMENT:**

- ☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture), and packet types.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| EUT CONFIGURE<br>MODE | AVAILABLE<br>CHANNEL | TESTED<br>CHANNEL | MODULATION<br>TECHNOLOGY | MODULATION<br>TYPE | DATA RATE<br>(Mbps) |
|-----------------------|----------------------|-------------------|--------------------------|--------------------|---------------------|
| A                     | 0 to 39              | 0,19, 39          | DTS                      | GFSK               | 1                   |

**TEST CONDITION:**

| APPLICABLE TO | ENVIRONMENTAL<br>CONDITIONS | INPUT POWER(POE)      | TESTED BY |
|---------------|-----------------------------|-----------------------|-----------|
| RE<1G         | 25deg. C, 53%RH             | DC 21.6V from battery | Durant    |
| RE≥1G         | 25deg. C, 53%RH             | DC 21.6V from battery | Durant    |
| PLC           | -                           | -                     | -         |
| APCM          | 25deg. C, 60%RH             | DC 21.6V from battery | Ryker     |





**Test Report No.: RF2404WDG0306-2**

**Bureau Veritas Shenzhen Co., Ltd.  
Dongguan Branch**

No. 96, Guantai Road (Houjie Section), Houjie  
Town, Dongguan City, Guangdong Province.  
523942. People's Republic of China.

Tel: +86 769 8998 2098  
Fax: +86 769 8593 1080  
Email: [customerservice.dg@bureauveritas.com](mailto:customerservice.dg@bureauveritas.com)

### 3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart C, Section 15.247**

**KDB558074 D01 15.247 Meas Guidance v05r02**

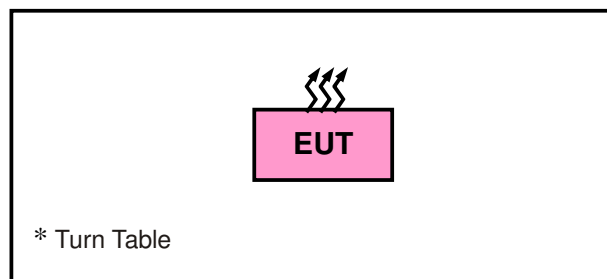
**ANSI C63.10-2013**

Note: All test items have been performed and recorded as per the above standards.

### 3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together without any other necessary accessories or support units.

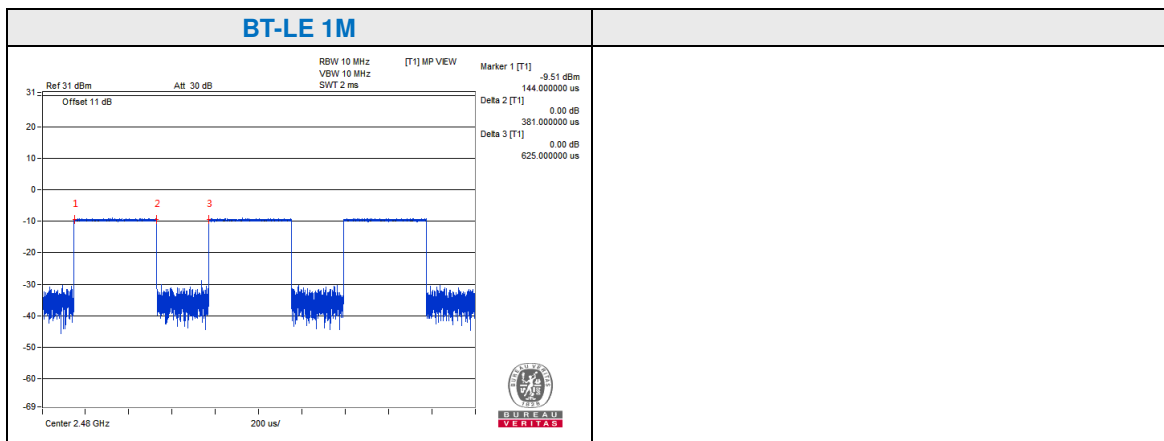
### 3.5 CONFIGURATION OF SYSTEM UNDER TEST



### 3.6 DUTY CYCLE OF TESET SIGNAL

| Test Mode | On Time (ms) | Period (ms) | Duty Cycle (%) | 1/T Min. VBW (KHz) | VBW Setting |
|-----------|--------------|-------------|----------------|--------------------|-------------|
| BT-LE 1M  | 0.381        | 0.625       | 61             | 2.62               | 500Hz       |

Duty Cycle=On Time/Period=0.381/0.625=0.6096



## 4 TEST TYPES AND RESULTS

### 4.1 RADIATED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

| 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                                |

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, 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 20dB under any condition of modulation.



#### 4.1.2 TEST INSTRUMENTS

| Equipment                   | Manufacturer  | Model No.                | Serial No.   | Next Cal.    |
|-----------------------------|---------------|--------------------------|--------------|--------------|
| Spectrum Analyzer           | Rohde&Schwarz | FSV3044                  | 101326       | July 09, 25  |
| EMI Test Receiver           | Rohde&Schwarz | ESU8                     | 100372       | Apr. 16, 25  |
| Bilog Antenna               | SCHWARZBECK   | VULB 9168                | 9168-555     | Nov. 07, 25  |
| Pre-Amplifier               | Agilent       | 8447D                    | 2944A10488   | July. 26, 24 |
| 3m Semi-anechoic Chamber    | ETS-Lindgren  | 9m*6m*6m                 | D3040003DG-1 | July 30, 24  |
| Coaxial RF Cable            | Joinfront     | JFAA6-NMNM-8000          | 2100033742   | July 02, 25  |
| Coaxial RF Cable            | Joinfront     | JFAR-NMBNCM-2000         | 2100033742   | July 02, 25  |
| Coaxial RF Cable            | Joinfront     | JFAR-BNCMSMM-500         | 2100033742   | July 02, 25  |
| Test software               | ADT           | ADT_Radiated_V7.6.15.9.2 | N/A          | N/A          |
| Horn Antenna                | ETS-Lindgren  | 3117                     | 00240036     | Apr. 20, 25  |
| Horn Antenna                | SCHWARZBECK   | BBHA 9170                | 01024        | Oct. 16, 25  |
| Pre-Amplifier (1GHz-18GHz)  | Rohde&Schwarz | SCU18                    | 102265       | Aug. 01, 24  |
| Pre-Amplifier (18GHz-40GHz) | Rohde&Schwarz | SCU40                    | 100437       | Oct. 10, 24  |
| Coaxial RF Cable            | Joinfront     | JFAA6-NMNM-8000          | 2100033742   | July 02, 25  |
| Coaxial RF Cable            | Joinfront     | JFAA6-NMSMM-2000         | 2100033742   | July 02, 25  |
| Coaxial RF Cable            | Joinfront     | JFAA6-NMSMM-800          | 2100033742   | July 02, 25  |

**NOTE:**

1. The test was performed in 966 Chamber.
2. Equipment are calibrated by calibration laboratory accredited to ISO/IEC 17025 by a mutually recognized Accreditation.
3. The horn antenna is used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site registration No. is 749762, and the designation number is CN1174.
5. Test site: No. 122, Houjie Avenue West Houjie Town, Dongguan City Guangdong Province, 523960, People's Republic of China.

#### 4.1.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 1.5 meters (above 1GHz) and 0.8 meters (below 1GHz) above the ground at a 3 meters semi-anechoic chamber. 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. For below 1GHz was used bilog antenna, and above 1GHz was used horn antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 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 Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. a loop antenna with its vertical plane is place 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1.3m above the ground.
- g. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, For battery operated equipment, the equipment tests shall be perform using fresh batteries. The turntable was rotated to maximize the emission level.

#### NOTE:

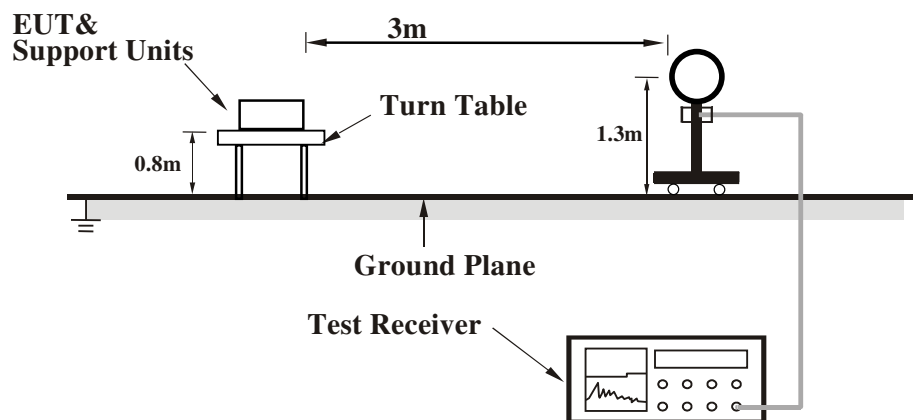
1. The resolution bandwidth and video bandwidth of test receiver is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of spectrum analyzer is 1MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.
5. The testing of the EUT was performed on all 3 orthogonal axes; the worst-case test configuration was reported on the file test setup photo.

#### 4.1.4 DEVIATION FROM TEST STANDARD

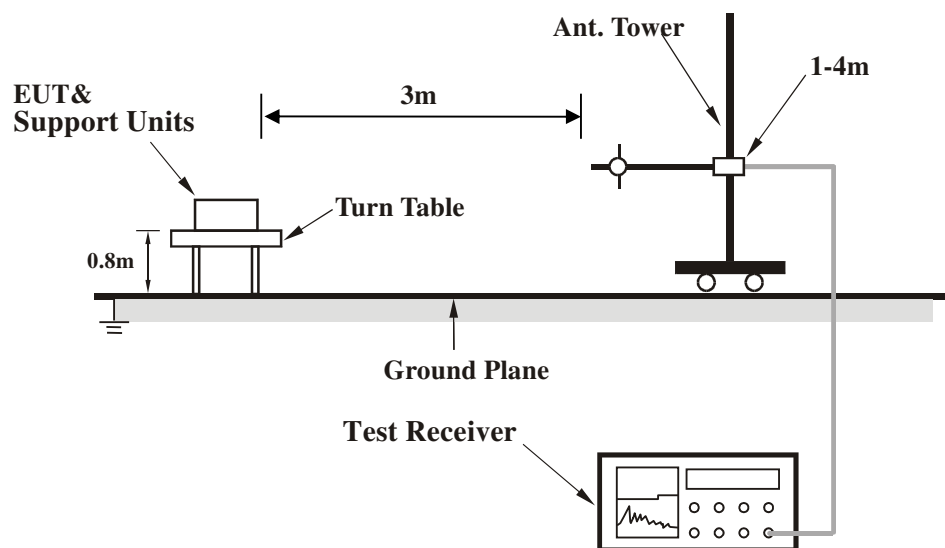
No deviation.

#### 4.1.5 TEST SETUP

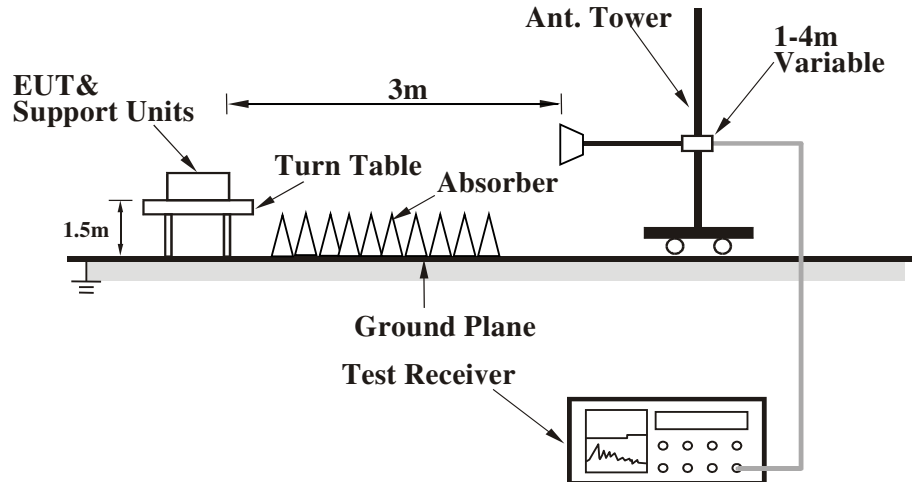
##### Below 30MHz test setup



##### Below 1GHz test setup



### Above 1GHz test setup



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

#### 4.1.6 EUT OPERATING CONDITIONS

- Set the EUT under full load condition and placed them on a testing table.
- Set the transmitter part of EUT under transmission condition continuously at specific channel frequency.
- The necessary accessories enable the EUT in full functions.





## 4.1.7 TEST RESULTS

## BELOW 1GHz WORST-CASE DATA:

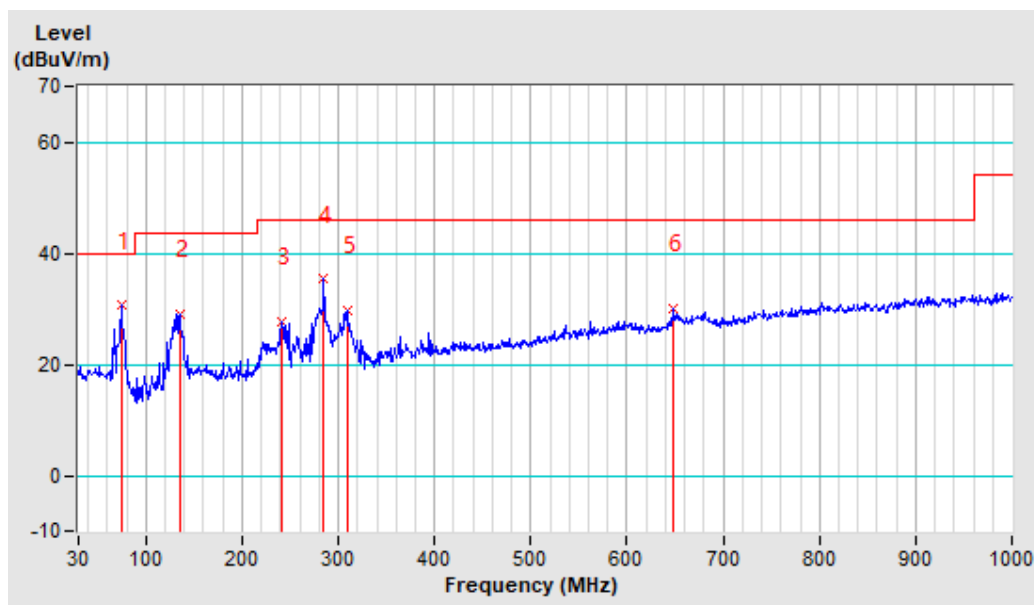
## BT-LE (GFSK)

|                 |               |                   |                 |
|-----------------|---------------|-------------------|-----------------|
| CHANNEL         | TX Channel 39 | DETECTOR FUNCTION | Quasi-Peak (QP) |
| FREQUENCY RANGE | 9KHz ~ 1GHz   |                   |                 |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |             |                         |                |             |                    |                      |                  |                          |
|-----------------------------------------------------|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO.                                                 | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1                                                   | 74.66       | 30.55 QP                | 40.00          | -9.45       | 2.16 H             | 158                  | 42.80            | -12.25                   |
| 2                                                   | 134.86      | 29.13 QP                | 43.50          | -14.37      | 1.51 H             | 225                  | 38.68            | -9.55                    |
| 3                                                   | 241.67      | 27.78 QP                | 46.00          | -18.22      | 1.31 H             | 230                  | 37.11            | -9.33                    |
| 4                                                   | 284.39      | 35.31 QP                | 46.00          | -10.69      | 1.39 H             | 125                  | 43.08            | -7.77                    |
| 5                                                   | 309.64      | 29.60 QP                | 46.00          | -16.40      | 2.57 H             | 280                  | 36.84            | -7.24                    |
| 6                                                   | 647.54      | 30.11 QP                | 46.00          | -15.89      | 2.37 H             | 182                  | 31.11            | -1.00                    |

## 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).
3. The emission levels of other frequencies were greater than 20dB margin.
4. 9KHz~30MHz have been test and test data more than 20dB margin.
5. Margin value = Emission level – Limit value

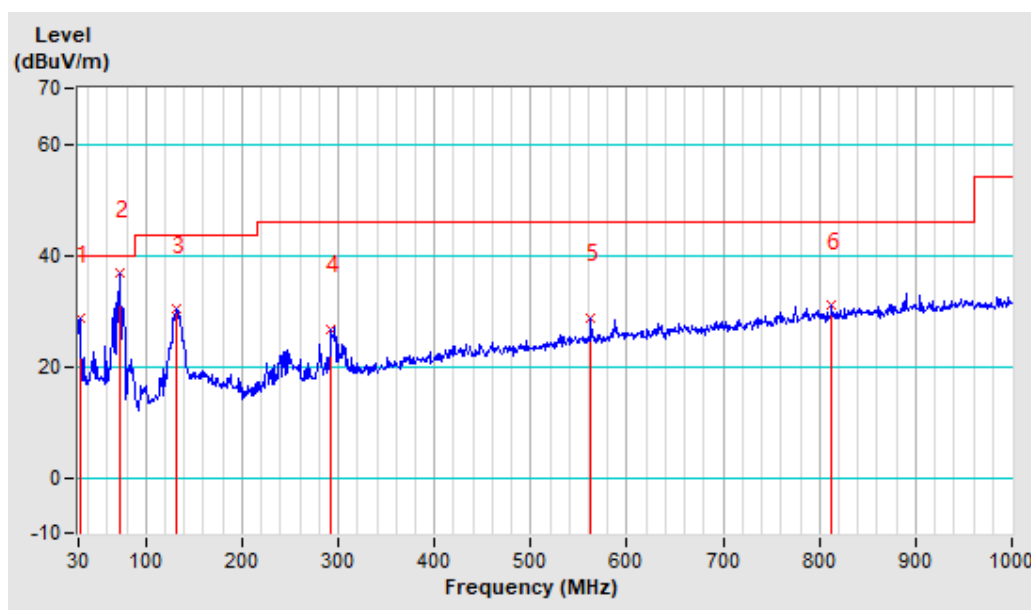


|                        |               |                              |                 |
|------------------------|---------------|------------------------------|-----------------|
| <b>CHANNEL</b>         | TX Channel 39 | <b>DETECTOR<br/>FUNCTION</b> | Quasi-Peak (QP) |
| <b>FREQUENCY RANGE</b> | 9KHz ~ 1GHz   |                              |                 |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|---------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                               | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                 | 31.94          | 28.54 QP                      | 40.00             | -11.46         | 3.08 V                   | 137                        | 38.64                  | -10.10                         |
| 2                                                 | 73.69          | 36.67 QP                      | 40.00             | -3.33          | 1.24 V                   | 221                        | 48.67                  | -12.00                         |
| 3                                                 | 130.98         | 30.23 QP                      | 43.50             | -13.27         | 1.66 V                   | 231                        | 40.28                  | -10.05                         |
| 4                                                 | 292.16         | 26.74 QP                      | 46.00             | -19.26         | 3.47 V                   | 171                        | 34.41                  | -7.67                          |
| 5                                                 | 562.09         | 28.80 QP                      | 46.00             | -17.20         | 1.57 V                   | 205                        | 31.28                  | -2.48                          |
| 6                                                 | 812.60         | 30.88 QP                      | 46.00             | -15.12         | 2.06 V                   | 282                        | 28.58                  | 2.30                           |

**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).
3. The emission levels of other frequencies were greater than 20dB margin.
4. 9KHz~30MHz have been test and test data more than 20dB margin.
5. Margin value = Emission level – Limit value



**ABOVE 1GHz TEST DATA:**

**BT-LE (GFSK)**

|                        |              |                              |              |
|------------------------|--------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 0 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 25GHz |                              | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE : HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|------------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                                  | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                    | 2390.00        | 43.96 PK                      | 74.00             | -30.04         | 1.20 H                   | 90                         | 47.70                  | -3.74                          |
| 2                                                    | 2390.00        | 33.81 AV                      | 54.00             | -20.19         | 1.20 H                   | 90                         | 37.55                  | -3.74                          |
| 3                                                    | *2402.00       | 85.35 PK                      |                   |                | 1.20 H                   | 90                         | 89.09                  | -3.74                          |
| 4                                                    | *2402.00       | 81.74 AV                      |                   |                | 1.20 H                   | 90                         | 85.48                  | -3.74                          |
| 5                                                    | 4801.00        | 50.36 PK                      | 74.00             | -23.64         | 1.00 H                   | 145                        | 52.54                  | -2.18                          |
| 6                                                    | 4801.00        | 44.23 AV                      | 54.00             | -9.77          | 1.00 H                   | 145                        | 46.41                  | -2.18                          |
| 7                                                    | 4804.00        | 48.11 PK                      | 74.00             | -25.89         | 1.00 H                   | 145                        | 50.29                  | -2.18                          |
| 8                                                    | 4804.00        | 35.80 AV                      | 54.00             | -18.20         | 1.00 H                   | 145                        | 37.98                  | -2.18                          |
| 9                                                    | 7206.00        | 48.36 PK                      | 74.00             | -25.64         | 1.00 H                   | 145                        | 47.40                  | 0.96                           |
| 10                                                   | 7206.00        | 35.74 AV                      | 54.00             | -18.26         | 1.00 H                   | 145                        | 34.78                  | 0.96                           |
| ANTENNA POLARITY & TEST DISTANCE : VERTICAL AT 3 M   |                |                               |                   |                |                          |                            |                        |                                |
| NO.                                                  | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                    | 2390.00        | 42.83 PK                      | 74.00             | -31.17         | 1.00 V                   | 150                        | 46.57                  | -3.74                          |
| 2                                                    | 2390.00        | 33.24 AV                      | 54.00             | -20.76         | 1.00 V                   | 150                        | 36.98                  | -3.74                          |
| 3                                                    | *2402.00       | 86.69 PK                      |                   |                | 1.00 V                   | 150                        | 90.43                  | -3.74                          |
| 4                                                    | *2402.00       | 82.12 AV                      |                   |                | 1.00 V                   | 150                        | 85.86                  | -3.74                          |
| 5                                                    | 4801.00        | 49.83 PK                      | 74.00             | -24.17         | 1.23 V                   | 200                        | 52.01                  | -2.18                          |
| 6                                                    | 4801.00        | 42.30 AV                      | 54.00             | -11.70         | 1.23 V                   | 200                        | 44.48                  | -2.18                          |
| 7                                                    | 4804.00        | 45.11 PK                      | 74.00             | -28.89         | 1.23 V                   | 200                        | 47.29                  | -2.18                          |
| 8                                                    | 4804.00        | 41.61 AV                      | 54.00             | -12.39         | 1.23 V                   | 200                        | 43.79                  | -2.18                          |
| 9                                                    | 7206.00        | 47.51 PK                      | 74.00             | -26.49         | 1.45 V                   | 120                        | 46.55                  | 0.96                           |
| 10                                                   | 7206.00        | 35.18 AV                      | 54.00             | -18.82         | 1.45 V                   | 120                        | 34.22                  | 0.96                           |

**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).
3. The emission levels of other frequencies were greater than 20dB margin.
4. Margin value = Emission level – Limit value.
5. " \* " : Fundamental frequency.

|                        |               |                              |              |
|------------------------|---------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 19 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 25GHz  |                              | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE : HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|------------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                                  | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                    | *2440.00       | 86.16 PK                      |                   |                | 1.42 H                   | 120                        | 89.91                  | -3.75                          |
| 2                                                    | *2440.00       | 82.35 AV                      |                   |                | 1.42 H                   | 120                        | 86.10                  | -3.75                          |
| 3                                                    | 4878.00        | 50.28 PK                      | 74.00             | -23.72         | 1.20 H                   | 144                        | 52.44                  | -2.16                          |
| 4                                                    | 4878.00        | 43.16 AV                      | 54.00             | -10.84         | 1.20 H                   | 144                        | 45.32                  | -2.16                          |
| 5                                                    | 4880.00        | 47.62 PK                      | 74.00             | -26.38         | 1.20 H                   | 144                        | 49.79                  | -2.17                          |
| 6                                                    | 4880.00        | 37.11 AV                      | 54.00             | -16.89         | 1.20 H                   | 144                        | 39.28                  | -2.17                          |
| 7                                                    | 7320.00        | 47.11 PK                      | 74.00             | -26.89         | 1.20 H                   | 148                        | 46.62                  | 0.49                           |
| 8                                                    | 7320.00        | 36.85 AV                      | 54.00             | -17.15         | 1.20 H                   | 148                        | 36.36                  | 0.49                           |
| ANTENNA POLARITY & TEST DISTANCE : VERTICAL AT 3 M   |                |                               |                   |                |                          |                            |                        |                                |
| NO.                                                  | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                    | *2440.00       | 88.19 PK                      |                   |                | 1.20 V                   | 150                        | 91.94                  | -3.75                          |
| 2                                                    | *2440.00       | 83.62 AV                      |                   |                | 1.20 V                   | 150                        | 87.37                  | -3.75                          |
| 3                                                    | 4878.00        | 51.67 PK                      | 74.00             | -22.33         | 1.50 V                   | 160                        | 53.83                  | -2.16                          |
| 4                                                    | 4878.00        | 43.36 AV                      | 54.00             | -10.64         | 1.50 V                   | 160                        | 45.52                  | -2.16                          |
| 5                                                    | 4880.00        | 48.34 PK                      | 74.00             | -25.66         | 1.50 V                   | 150                        | 50.51                  | -2.17                          |
| 6                                                    | 4880.00        | 41.33 AV                      | 54.00             | -12.67         | 1.50 V                   | 150                        | 43.50                  | -2.17                          |
| 7                                                    | 7320.00        | 48.36 PK                      | 74.00             | -25.64         | 1.36 V                   | 254                        | 47.87                  | 0.49                           |
| 8                                                    | 7320.00        | 36.14 AV                      | 54.00             | -17.86         | 1.36 V                   | 254                        | 35.65                  | 0.49                           |

**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).
3. The emission levels of other frequencies were greater than 20dB margin.
4. Margin value = Emission level – Limit value.
5. " \* " : Fundamental frequency.

|                        |               |                              |              |
|------------------------|---------------|------------------------------|--------------|
| <b>CHANNEL</b>         | TX Channel 39 | <b>DETECTOR<br/>FUNCTION</b> | Peak (PK)    |
| <b>FREQUENCY RANGE</b> | 1GHz ~ 25GHz  |                              | Average (AV) |

| ANTENNA POLARITY & TEST DISTANCE : HORIZONTAL AT 3 M |                |                               |                   |                |                          |                            |                        |                                |
|------------------------------------------------------|----------------|-------------------------------|-------------------|----------------|--------------------------|----------------------------|------------------------|--------------------------------|
| NO.                                                  | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                    | *2480.00       | 86.13 PK                      |                   |                | 1.00 H                   | 125                        | 89.89                  | -3.76                          |
| 2                                                    | *2480.00       | 82.37 AV                      |                   |                | 1.00 H                   | 125                        | 86.13                  | -3.76                          |
| 3                                                    | 2483.50        | 43.64 PK                      | 74.00             | -30.36         | 1.00 H                   | 125                        | 47.39                  | -3.75                          |
| 4                                                    | 2483.50        | 33.11 AV                      | 54.00             | -20.89         | 1.00 H                   | 125                        | 36.86                  | -3.75                          |
| 5                                                    | 4957.00        | 50.18 PK                      | 74.00             | -23.82         | 1.00 H                   | 185                        | 52.33                  | -2.15                          |
| 6                                                    | 4957.00        | 44.11 AV                      | 54.00             | -9.89          | 1.00 H                   | 185                        | 46.26                  | -2.15                          |
| 7                                                    | 4960.00        | 46.31 PK                      | 74.00             | -27.69         | 1.00 H                   | 185                        | 48.46                  | -2.15                          |
| 8                                                    | 4960.00        | 39.62 AV                      | 54.00             | -14.38         | 1.00 H                   | 185                        | 41.77                  | -2.15                          |
| 9                                                    | 7440.00        | 48.34 PK                      | 74.00             | -25.66         | 1.42 H                   | 230                        | 48.34                  | 0.00                           |
| 10                                                   | 7440.00        | 36.17 AV                      | 54.00             | -17.83         | 1.42 H                   | 230                        | 36.17                  | 0.00                           |
| ANTENNA POLARITY & TEST DISTANCE : VERTICAL AT 3 M   |                |                               |                   |                |                          |                            |                        |                                |
| NO.                                                  | FREQ.<br>(MHz) | EMISSION<br>LEVEL<br>(dBuV/m) | LIMIT<br>(dBuV/m) | MARGIN<br>(dB) | ANTENNA<br>HEIGHT<br>(m) | TABLE<br>ANGLE<br>(Degree) | RAW<br>VALUE<br>(dBuV) | CORRECTION<br>FACTOR<br>(dB/m) |
| 1                                                    | *2480.00       | 88.04 PK                      |                   |                | 1.20 V                   | 130                        | 91.80                  | -3.76                          |
| 2                                                    | *2480.00       | 83.81 AV                      |                   |                | 1.20 V                   | 130                        | 87.57                  | -3.76                          |
| 3                                                    | 2483.50        | 45.32 PK                      | 74.00             | -28.68         | 1.20 V                   | 130                        | 49.07                  | -3.75                          |
| 4                                                    | 2483.50        | 34.91 AV                      | 54.00             | -19.09         | 1.20 V                   | 130                        | 38.66                  | -3.75                          |
| 5                                                    | 4957.00        | 52.33 PK                      | 74.00             | -21.67         | 1.00 V                   | 155                        | 54.48                  | -2.15                          |
| 6                                                    | 4957.00        | 45.17 AV                      | 54.00             | -8.83          | 1.00 V                   | 155                        | 47.32                  | -2.15                          |
| 7                                                    | 4960.00        | 48.96 PK                      | 74.00             | -25.04         | 1.00 V                   | 155                        | 51.11                  | -2.15                          |
| 8                                                    | 4960.00        | 40.83 AV                      | 54.00             | -13.17         | 1.00 V                   | 155                        | 42.98                  | -2.15                          |
| 9                                                    | 7440.00        | 47.51 PK                      | 74.00             | -26.49         | 1.52 V                   | 289                        | 47.51                  | 0.00                           |
| 10                                                   | 7440.00        | 35.32 AV                      | 54.00             | -18.68         | 1.52 V                   | 289                        | 35.32                  | 0.00                           |

**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).
3. The emission levels of other frequencies were greater than 20dB margin.
4. Margin value = Emission level – Limit value.
5. " \* ": Fundamental frequency.

## 4.2 6dB BANDWIDTH MEASUREMENT

### 4.2.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

### 4.2.2 TEST INSTRUMENTS

| Equipment                                 | Manufacturer  | Model No.                     | Serial No.  | Next Cal.   |
|-------------------------------------------|---------------|-------------------------------|-------------|-------------|
| Wireless Connectivity Tester              | Rohde&Schwarz | CMW270                        | 101601      | Oct. 15, 24 |
| Spectrum Analyzer                         | Rohde&Schwarz | FSV40                         | 101003      | Jan. 01, 25 |
| Spectrum Analyzer                         | Rohde&Schwarz | FSV40                         | 101094      | Jan. 01, 25 |
| Frequency Analyzer                        | Keysight      | N9010B                        | MY60240432  | Oct. 10, 24 |
| Power Meter                               | Rohde&Schwarz | NRX                           | 103107      | Apr. 09, 25 |
| Power Sensor                              | Rohde&Schwarz | NRP6A                         | 103356      | Apr. 09, 25 |
| Programmable Temperature&Humidity Chamber | Hongjin       | HYC-TH-225DH                  | DG-180746   | Jan. 02, 25 |
| Attenuator                                | MINI          | BW-S10W2+                     | S130129FGE2 | N/A         |
| DC Source                                 | Agilent       | E3640A                        | MY40004013  | Jan. 01, 25 |
| Test software                             | ADT           | ADT_RF Test Software V6.6.5.3 | N/A         | N/A         |
| Test software                             | ADT           | ADT_RF Test Software V6.6.5.4 | N/A         | N/A         |

#### NOTE:

1. The test was performed in RF Oven room.
2. Equipment are calibrated by calibration laboratory accredited to ISO/IEC 17025 by a mutually recognized Accreditation.
3. Test site: No. 122, Houjie Avenue West Houjie Town, Dongguan City Guangdong Province, 523960, People's Republic of China.



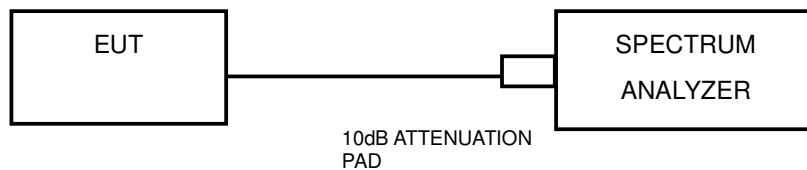
#### 4.2.3 TEST PROCEDURE

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW)  $\geq 3$  RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

#### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.2.5 TEST SETUP



#### 4.2.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

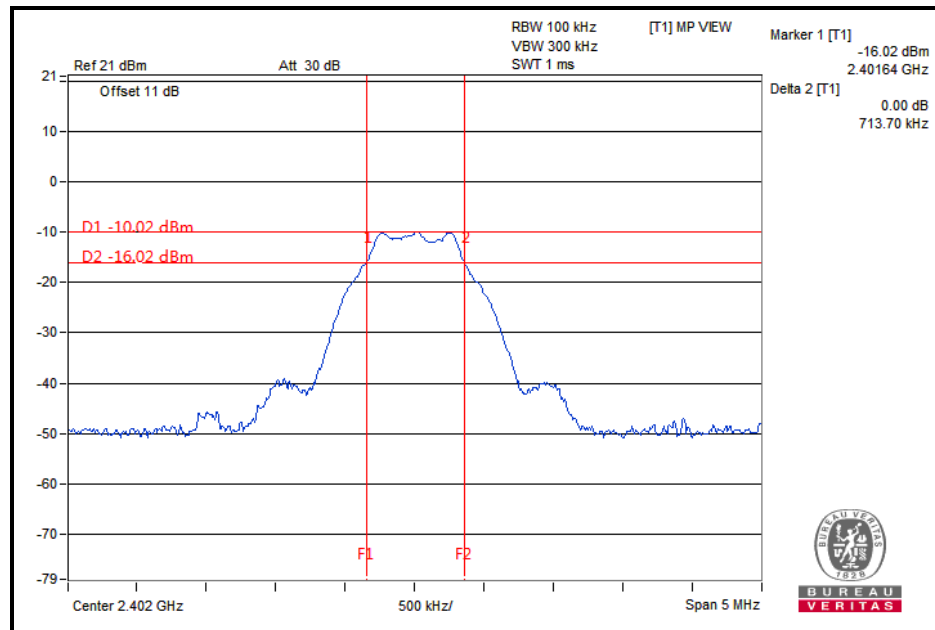


## 4.2.7 TEST RESULTS

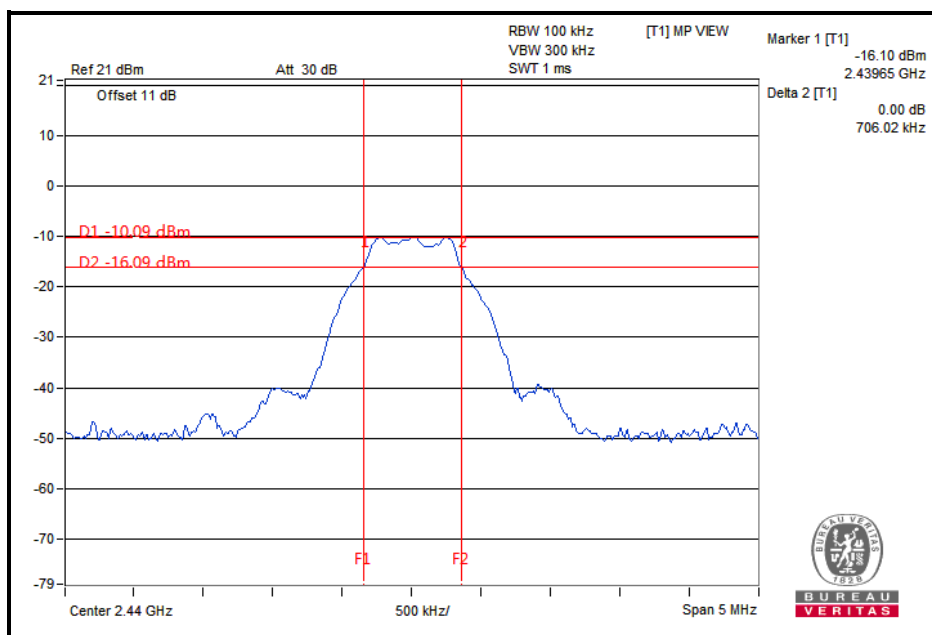
### BT-LE (GFSK)

| CHANNEL | CHANNEL<br>FREQUENCY<br>(MHz) | 6dB<br>BANDWIDTH<br>(MHz) | MINIMUM LIMIT<br>(MHz) | PASS / FAIL |
|---------|-------------------------------|---------------------------|------------------------|-------------|
| 0       | 2402                          | 0.71                      | 0.5                    | PASS        |
| 19      | 2440                          | 0.71                      | 0.5                    | PASS        |
| 39      | 2480                          | 0.71                      | 0.5                    | PASS        |

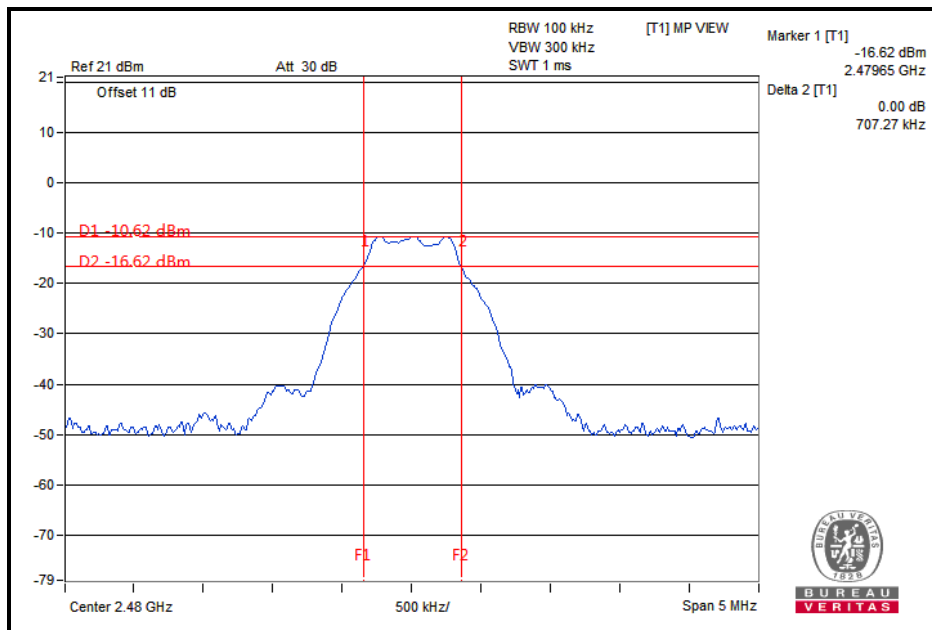
### CH 0



CH 19



CH 39

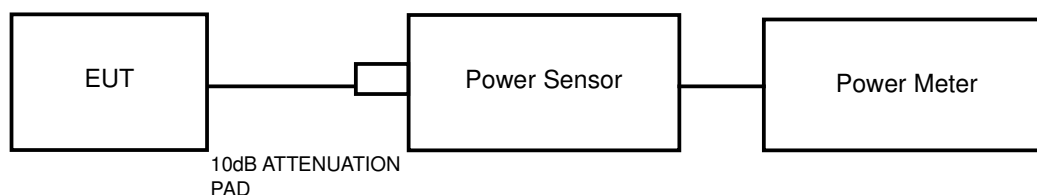


### 4.3 CONDUCTED OUTPUT POWER

#### 4.3.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

For systems using digital modulation in the 2400–2483.5 MHz band: 1 Watt (30dBm)

#### 4.3.2 TEST SETUP



#### 4.3.3 TEST INSTRUMENTS

| Equipment                                | Manufacturer  | Model No.                     | Serial No.  | Next Cal.   |
|------------------------------------------|---------------|-------------------------------|-------------|-------------|
| Wireless Connectivity Tester             | Rohde&Schwarz | CMW270                        | 101601      | Oct. 15, 24 |
| Spectrum Analyzer                        | Rohde&Schwarz | FSV40                         | 101003      | Jan. 01, 25 |
| Spectrum Analyzer                        | Rohde&Schwarz | FSV40                         | 101094      | Jan. 01, 25 |
| Frequency Analyzer                       | Keysight      | N9010B                        | MY60240432  | Oct. 10, 24 |
| Power Meter                              | Rohde&Schwarz | NRX                           | 103107      | Apr. 09, 25 |
| Power Sensor                             | Rohde&Schwarz | NRP6A                         | 103356      | Apr. 09, 25 |
| Programable Temperature&Humidity Chamber | Hongjin       | HYC-TH-225DH                  | DG-180746   | Jan. 02, 25 |
| Attenuator                               | MINI          | BW-S10W2+                     | S130129FGE2 | N/A         |
| DC Source                                | Agilent       | E3640A                        | MY40004013  | Jan. 01, 25 |
| Test software                            | ADT           | ADT_RF Test Software V6.6.5.3 | N/A         | N/A         |
| Test software                            | ADT           | ADT_RF Test Software V6.6.5.4 | N/A         | N/A         |

**NOTE:**1. The test was performed in RF Oven room.

2. Equipment are calibrated by calibration laboratory accredited to ISO/IEC 17025 by a mutually recognized Accreditation.

3. Test site: No. 122, Houjie Avenue West Houjie Town, Dongguan City Guangdong Province, 523960, People's Republic of China.

#### 4.3.4 TEST PROCEDURES

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 and set the detector to PEAK. Record the power level.

An average power sensor was used on the output port of the EUT. A power meter was used to read the response of the average power sensor and set the detector to AVERAGE. Record the power level.

#### 4.3.5 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

#### 4.3.7 TEST RESULTS

##### 4.3.7.1 MAXIMUM PEAK OUTPUT POWER

###### BT-LE (GFSK)

| CHANNEL | CHANNEL<br>FREQUENCY<br>(MHz) | PEAK<br>POWER<br>(dBm) | PEAK<br>POWER<br>(mW) | PEAK<br>POWER LIMIT<br>(W) | PASS/FAIL |
|---------|-------------------------------|------------------------|-----------------------|----------------------------|-----------|
| 0       | 2402                          | -8.98                  | 0.1265                | 1                          | PASS      |
| 19      | 2440                          | -8.98                  | 0.1265                | 1                          | PASS      |
| 39      | 2480                          | -9.42                  | 0.1143                | 1                          | PASS      |

#### 4.3.7.2 AVERAGE OUTPUT POWER (FOR REFERENCE)

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

##### BT-LE (GFSK)

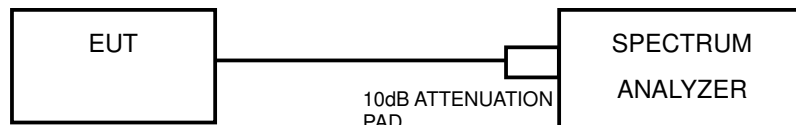
| CHANNEL   | CHANNEL<br>FREQUENCY (MHz) | AVERAGE<br>POWER (dBm) |
|-----------|----------------------------|------------------------|
| 0         | 2402                       | -10.13                 |
| <b>19</b> | <b>2440</b>                | <b>-10.11</b>          |
| 39        | 2480                       | -10.57                 |

#### 4.4 POWER SPECTRAL DENSITY MEASUREMENT

##### 4.4.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm/3KHz.

##### 4.4.2 TEST SETUP



##### 4.4.3 TEST INSTRUMENTS

Refer to section 4.3.3 to get information of above instrument.

##### 4.4.4 TEST PROCEDURE

1. Set the span to 1.5 times the DTS bandwidth
2. Set the RBW = 3 kHz, VBW  $\geq 3 \times$  RBW, Detector = peak.
3. Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
4. Use the peak marker function to determine the maximum amplitude level.

##### 4.4.5 DEVIATION FROM TEST STANDARD

No deviation.

##### 4.4.6 EUT OPERATING CONDITION

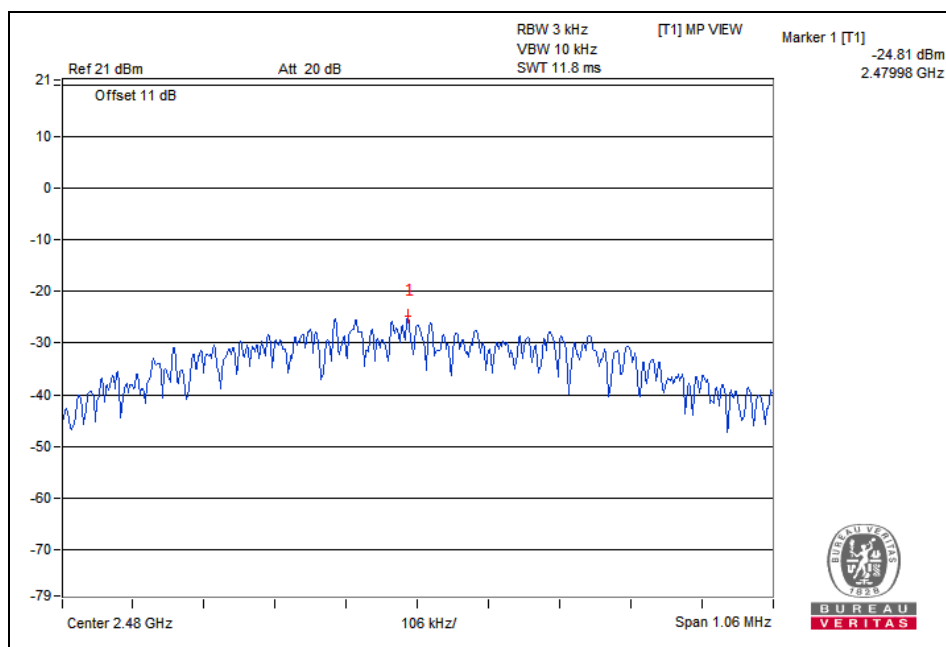
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

#### 4.4.7 TEST RESULTS

##### BT-LE (GFSK)

| Channel | FREQ.<br>(MHz) | PSD<br>(dBm/3kHz) | Limit<br>(dBm/3kHz) | PASS<br>/FAIL |
|---------|----------------|-------------------|---------------------|---------------|
| 0       | 2402           | -24.22            | 8                   | PASS          |
| 19      | 2440           | -24.10            | 8                   | PASS          |
| 39      | 2480           | -24.81            | 8                   | PASS          |

##### WORSE PLOT

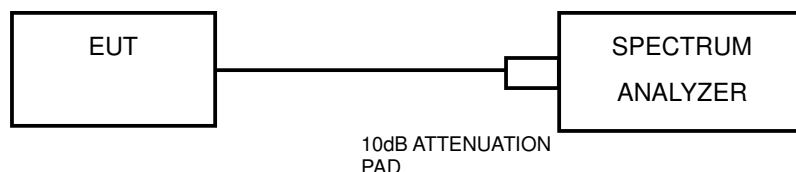


## 4.5 OUT OF BAND EMISSION MEASUREMENT

### 4.5.1 LIMITS OF OUT OF BAND EMISSION MEASUREMENT

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

### 4.5.2 TEST SETUP



### 4.5.3 TEST INSTRUMENTS

Refer to section 4.3.3 to get information of above instrument.

### 4.5.4 TEST PROCEDURE

#### MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW  $\geq$  300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.





## **MEASUREMENT PROCEDURE OOB**

1. Set RBW = 100 kHz.
2. Set VBW  $\geq$  300 kHz.
3. Set span to encompass the spectrum to be examined
4. Detector = peak.
5. Trace Mode = max hold.
6. Sweep = auto couple.

### **4.5.5 DEVIATION FROM TEST STANDARD**

No deviation.

### **4.5.6 EUT OPERATING CONDITION**

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.



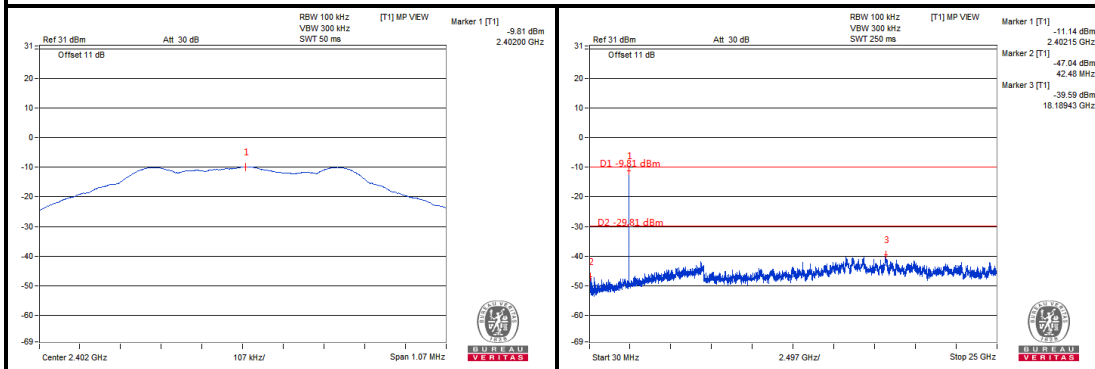
BUREAU  
VERITAS

Test Report No.: RF2404WDG0306-2

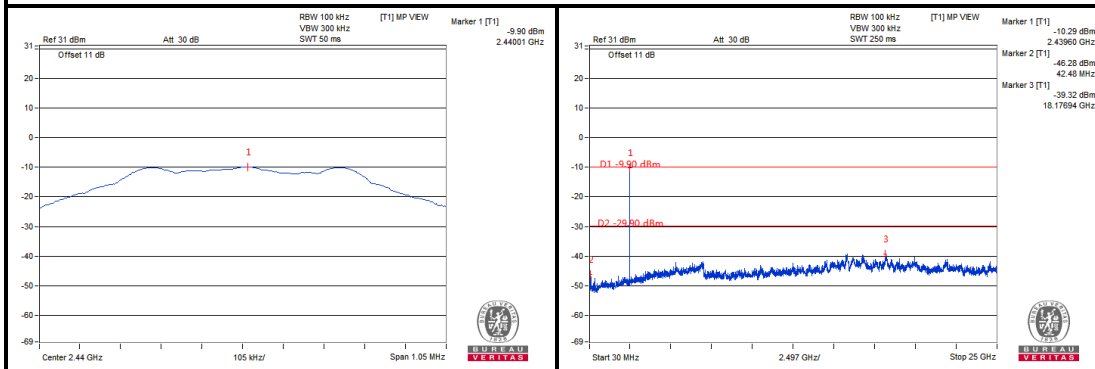
## 4.5.7 TEST RESULTS

### BT-LE (GFSK)

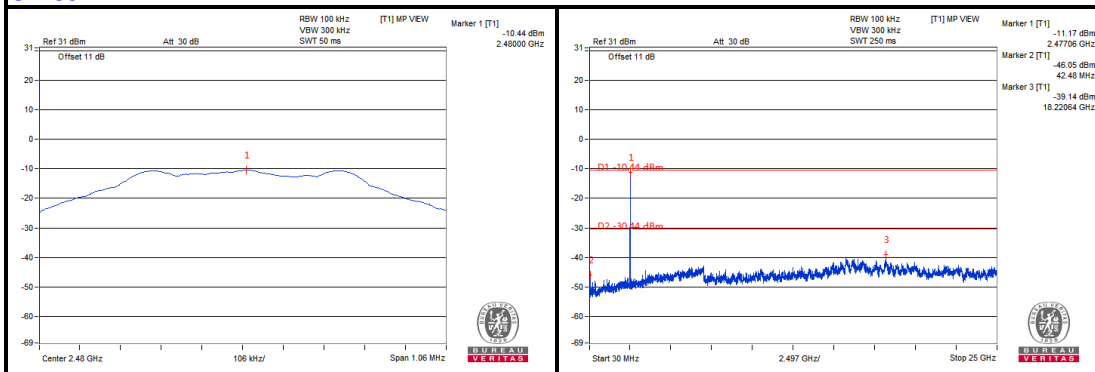
#### CH 0



#### CH 19



#### CH 39



Bureau Veritas Shenzhen Co., Ltd.  
Dongguan Branch

No. 96, Guantai Road (Houjie Section), Houjie  
Town, Dongguan City, Guangdong Province.  
523942. People's Republic of China.

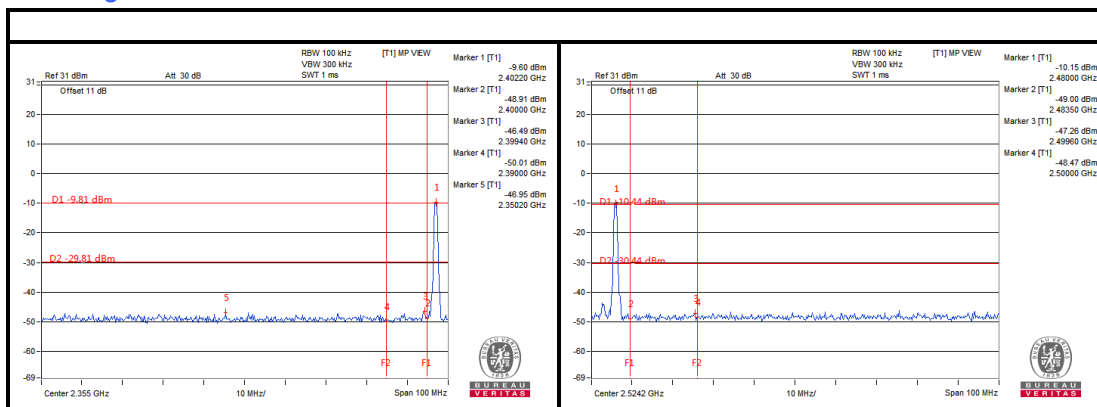
Tel: +86 769 8998 2098  
Fax: +86 769 8593 1080  
Email: [customerservice.dg@bureauveritas.com](mailto:customerservice.dg@bureauveritas.com)



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### Band Edge:



Bureau Veritas Shenzhen Co., Ltd.  
Dongguan Branch

No. 96, Guantai Road (Houjie Section), Houjie  
Town, Dongguan City, Guangdong Province.  
523942. People's Republic of China.

Tel: +86 769 8998 2098  
Fax: +86 769 8593 1080  
Email: [customerservice.dg@bureauveritas.com](mailto:customerservice.dg@bureauveritas.com)



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## 5 PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).



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## 6 APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

---END---