

# TEST REPORT

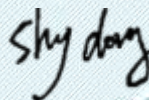
Report No..... : KS2307S3564E01  
FCC ID..... : 2ATT4-MS30  
Applicant..... : Shenzhen Waydoo Intelligence Technology Co., Ltd.  
Address..... : Office Building A101, No. 3. Keji Road,Zhukeng Community, Longtian Street,PingshanDistrict Shenzhen  
Manufacturer..... : Shenzhen Waydoo Intelligence Technology Co., Ltd.  
Address..... : Office Building A101, No. 3. Keji Road,Zhukeng Community, Longtian Street,PingshanDistrict Shenzhen  
Product Name..... : EVO Mast  
Trademark..... : WAYDOO  
Model/Type reference..... : MS30A10890, MS30A10690, MS30A10490, MS30A10790  
Standard..... : 47 CFR Part 15.247  
Date of Receipt..... : July 7, 2023  
Date of Test Date..... : July 8, 2023 to December 18, 2024  
Date of issue..... : December 24, 2024  
**Test result..... : Pass**

Conclusion..... : The submitted sample was found to COMPLY with the standards above.

Prepared by:  
( Printed name + Signature) Chad Lin



Approved by:  
( Printed name + Signature) Sky Dong



**Testing Laboratory Name...: KSIGN(Guangdong) Testing Co., Ltd.**

Address..... : West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China



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## 1. TEST SUMMARY

### 1.1. Test Standards

The tests were performed according to following standards:

**47 CFR Part 15.247:** Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

**ANSI C63.10-2013:** American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

**KDB 558074 D01 15.247 Meas Guidance v05r02:** Guidance for compliance measurements on digital transmission system, frequency hopping spread spectrum system, and hybrid system devices operating under section 15.247 of the FCC rules.

### 1.2. Report Version

| Revised No. | Date of issue     | Description |
|-------------|-------------------|-------------|
| 01          | December 24, 2024 | Original    |
|             |                   |             |
|             |                   |             |
|             |                   |             |



### 1.3. Test Description

| Test Item                                   | Standard           | Requirement                      | Result |
|---------------------------------------------|--------------------|----------------------------------|--------|
| Antenna requirement                         | 47 CFR Part 15.247 | 47 CFR 15.203                    | Pass   |
| Conducted Emission at AC power line         | 47 CFR Part 15.247 | 47 CFR 15.207(a)                 | Pass   |
| Occupied Bandwidth                          | 47 CFR Part 15.247 | 47 CFR 15.247(a)(2)              | Pass   |
| Maximum Conducted Output Power              | 47 CFR Part 15.247 | 47 CFR 15.247(b)(3)              | Pass   |
| Power Spectral Density                      | 47 CFR Part 15.247 | 47 CFR 15.247(e)                 | Pass   |
| Emissions in non-restricted frequency bands | 47 CFR Part 15.247 | 47 CFR 15.247(d), 15.209, 15.205 | Pass   |
| Band edge emissions (Radiated)              | 47 CFR Part 15.247 | 47 CFR 15.247(d), 15.209, 15.205 | Pass   |
| Emissions in frequency bands (below 1GHz)   | 47 CFR Part 15.247 | 47 CFR 15.247(d), 15.209, 15.205 | Pass   |
| Emissions in frequency bands (above 1GHz)   | 47 CFR Part 15.247 | 47 CFR 15.247(d), 15.209, 15.205 | Pass   |



## 1.4. Test Facility

### KSIGN(Guangdong) Testing Co., Ltd .

West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

The test facility is recognized, certified, or accredited by the following organizations:

#### **CNAS-Lab Code: L 13261**

KSIGN(Guangdong) Testing Co., Ltd. has been assessed and proved to be in Compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements) for the Competence of Testing and Calibration Laboratories.

#### **A2LA-Lab Cert. No.: 5457.01**

KSIGN(Guangdong) Testing Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing

#### **ISED# : 25693 CAB identifier.: CN0096**

KSIGN(Guangdong) Testing Co., Ltd. has been listed by Innovation, Science and Economic Development Canada to perform electromagnetic emission measurement.

#### **FCC-Registration No.: 294912 Designation Number: CN1328**

KSIGN(Guangdong) Testing Co., Ltd. EMC Laboratory has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

## 1.5. Measurement Uncertainty

| Test Items                      | Measurement Uncertainty |
|---------------------------------|-------------------------|
| Conducted Emission (150k-30MHz) | ± 3.34dB                |
| Output Power, Conducted         | ± 1.4dB                 |
| PSD, Conducted                  | ± 1.0dB                 |
| Spurious Emissions, Conducted   | ± 3.3dB                 |
| RSE (1-18GHz)                   | ± 4.68dB                |
| RSE (30-1000MHz)                | ± 5.7dB                 |
| RSE (18-40GHz)                  | ± 5.18dB                |

The reported uncertainty of measurement  $y \pm U$ , where expended uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95 %. Otherwise required by the applicant or Product Regulations. Decision Rule in this report did not consider the uncertainty.



## 2. GENERAL INFORMATION

### 2.1. General Description Of EUT

|                         |                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Sample Number:     | 1-1(Normal Sample), 1-2(Engineering Sample)                                                                                                                                                                                                                                                                                                                                              |
| Product Name:           | EVO Mast                                                                                                                                                                                                                                                                                                                                                                                 |
| Trademark:              | WAYDOO                                                                                                                                                                                                                                                                                                                                                                                   |
| Model / Type reference: | MS30A10890, MS30A10690, MS30A10490, MS30A10790                                                                                                                                                                                                                                                                                                                                           |
| Model Difference:       | The difference between product models is only the appearance of different sizes, and different model names are for market demand. Other power supply methods, internal structure, circuit and key components are the same, and do not affect the safety and electromagnetic compatibility performance, According to the above information, all tests were performed on model MS30A10890. |
| Power Supply:           | Battery: DC 50.8V                                                                                                                                                                                                                                                                                                                                                                        |
| Power Adaptor:          | Input: 100-240V~8.0A, Max 50-60Hz Output: 58V= 10A                                                                                                                                                                                                                                                                                                                                       |
| Operation Frequency:    | 2402MHz to 2480MHz                                                                                                                                                                                                                                                                                                                                                                       |
| Number of Channels:     | 40                                                                                                                                                                                                                                                                                                                                                                                       |
| Bandwidth:              | 1MHz, 2MHz                                                                                                                                                                                                                                                                                                                                                                               |
| Modulation Type:        | GFSK                                                                                                                                                                                                                                                                                                                                                                                     |
| Antenna Type:           | PCB                                                                                                                                                                                                                                                                                                                                                                                      |
| Antenna Gain:           | 1.61dBi                                                                                                                                                                                                                                                                                                                                                                                  |
| Max TX Power:           | 0.40dBm                                                                                                                                                                                                                                                                                                                                                                                  |
| Hardware Version:       | V5                                                                                                                                                                                                                                                                                                                                                                                       |
| Software Version:       | V2.1.11                                                                                                                                                                                                                                                                                                                                                                                  |

**Note:**Antenna gain provided by the applicant Can affect the validity of results

### 2.2. Accessory Equipment Information

| Title             | Manufacturer | Model No. | Technical Parameters | Provided by |
|-------------------|--------------|-----------|----------------------|-------------|
| Notebook Computer | Lenovo       | E5-IAP082 | /                    | Laboratory  |

### 2.3. Description of Test Modes

| No.        | Title      | Description of Mode                                                                                                                           |
|------------|------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Test Mode1 | TX mode 1M | Keep the EUT connect to AC power line and works in continuously transmitting mode with GFSK modulation at lowest, middle and highest channel. |
| Test Mode2 | TX mode 2M | Keep the EUT connect to AC power line and works in continuously transmitting mode with GFSK modulation at lowest, middle and highest channel. |



## 2.4. Operation channel list

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



## 2.5. Measurement Instruments List

| Conducted Emission at AC power line |              |           |                      |            |
|-------------------------------------|--------------|-----------|----------------------|------------|
| Test Equipment                      | Manufacturer | Model No. | Serial No.           | Cal. Until |
| LISN                                | R&S          | ENV432    | 1326.6105.02         | 2025-01-21 |
| EMI Test Receiver                   | R&S          | ESR       | 102524               | 2025-01-21 |
| Manual RF Switch                    | JS TOYO      | /         | MSW-01/002           | 2025-01-21 |
| ISN CAT6                            | Schwarzbeck  | CAT5 8158 | 227                  | 2025-01-21 |
| Color Signal Generator              | Philips      | PM5418    | 672926               | 2025-01-21 |
| Power Absorbing Clamp               | R&S          | MDS-21    | 100925               | 2025-01-22 |
| TV Tuner                            | SUNLIGHT     | ST5075    | /                    | 2024-12-12 |
| Artificial power network            | EVERFINE     | LS-5      | G657431CD14311<br>12 | 2025-01-21 |

| Occupied Bandwidth<br>Maximum Conducted Output Power<br>Power Spectral Density<br>Emissions in non-restricted frequency bands |                            |                         |            |            |
|-------------------------------------------------------------------------------------------------------------------------------|----------------------------|-------------------------|------------|------------|
| Test Equipment                                                                                                                | Manufacturer               | Model No.               | Serial No. | Cal. Until |
| Wideband Radio Communication Tester                                                                                           | R&S                        | CMU200                  | 115297     | 2025-01-19 |
| Audio Analyzer                                                                                                                | R&S                        | UPL16                   | 100001     | 2025-01-19 |
| Shielding box                                                                                                                 | Gxiong                     | GX-5915A                | 2201113    | 2025-01-19 |
| High Pass Filter                                                                                                              | COM-MW Technology Co., Ltd | ZHPF-M1.2-9G-1<br>87    | 09203403   | 2025-01-19 |
| Band Stop Filter                                                                                                              | COM-MW Technology Co., Ltd | ZBSF6-C820-920<br>-188  | 09203401   | 2025-01-19 |
| Splitter                                                                                                                      | COM-MW Technology Co., Ltd | ZPD-M1-8-2103           | 09203407   | 2025-01-19 |
| Coaxial Cable                                                                                                                 | BEBES                      | A40-2.92M2.92F-<br>4.5M | 1907021    | 2025-01-19 |
| Hygrothermograph                                                                                                              | Anymetre                   | JB913                   | /          | 2025-01-19 |
| Climate Chamber                                                                                                               | Angul                      | AGNH80L                 | 1903042120 | 2025-01-19 |
| Spectrum Analyzer                                                                                                             | HP                         | 8593E                   | 3831U02087 | 2025-01-19 |
| Dual Output DC Power Supply                                                                                                   | Agilent                    | E3646A                  | MY40009992 | 2025-01-19 |
| RF Control Unit                                                                                                               | Tonscend                   | JS0806-2                | /          | 2025-01-19 |
| Analog Signal Generator                                                                                                       | HP                         | 83752A                  | 3344A00337 | 2025-01-19 |
| Vector Signal Generator                                                                                                       | Agilent                    | N5182A                  | MY50142520 | 2025-01-19 |
| Wideband Radio Communication Tester                                                                                           | R&S                        | CMW500                  | 157282     | 2025-01-19 |
| Spectrum Analyzer                                                                                                             | R&S                        | FSV40-N                 | 101798     | 2025-01-19 |

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| <b>Band edge emissions (Radiated)</b><br><b>Emissions in frequency bands (below 1GHz)</b><br><b>Emissions in frequency bands (above 1GHz)</b> |                     |                  |                   |                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------------|-------------------|-------------------|
| <b>Test Equipment</b>                                                                                                                         | <b>Manufacturer</b> | <b>Model No.</b> | <b>Serial No.</b> | <b>Cal. Until</b> |
| Color Signal Generator                                                                                                                        | Philips             | PM5418           | 672926            | 2025-01-21        |
| Log Periodic Antenna                                                                                                                          | Schwarzbeck         | VULB 9163        | 1230              | 2025-01-29        |
| Pre-Amplifier                                                                                                                                 | Schwarzbeck         | BBV 9745         | 9745#129          | 2025-01-21        |
| Broadcast Television<br>Signal Generator                                                                                                      | R&S                 | SFE100           | 141038            | 2025-01-21        |
| Analog Signal Generator                                                                                                                       | Agilent             | 8648A            | 3847M00445        | 2025-01-21        |
| EMI Test Receiver                                                                                                                             | R&S                 | ESR              | 102525            | 2025-01-21        |
| Loop Antenna                                                                                                                                  | Beijin ZHINAN       | ZN30900C         | 18050             | 2025-01-29        |
| Horn Antenna                                                                                                                                  | Schwarzbeck         | BBHA 9120 D      | 2023              | 2025-01-22        |
| Pre-Amplifier                                                                                                                                 | EMCI                | EMC051835SE      | 980662            | 2025-01-21        |
| Spectrum Analyzer                                                                                                                             | Keysight            | N9020A           | MY46471971        | 2025-01-21        |

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### 3. Evaluation Results (Evaluation)

#### 3.1. Antenna requirement

|                   |                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement: | Refer to 47 CFR Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

##### 3.1.1. Conclusion:

|                                                                                                                                                                                                                                                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The directional gain of the antenna less than 6dBi. It comply with the standard requirement. In case of replacement of broken antenna the same antenna type must be used.<br>Antenna structure please refer to the EUT internal photographs antenna photo. |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



## 4. Radio Spectrum Matter Test Results (RF)

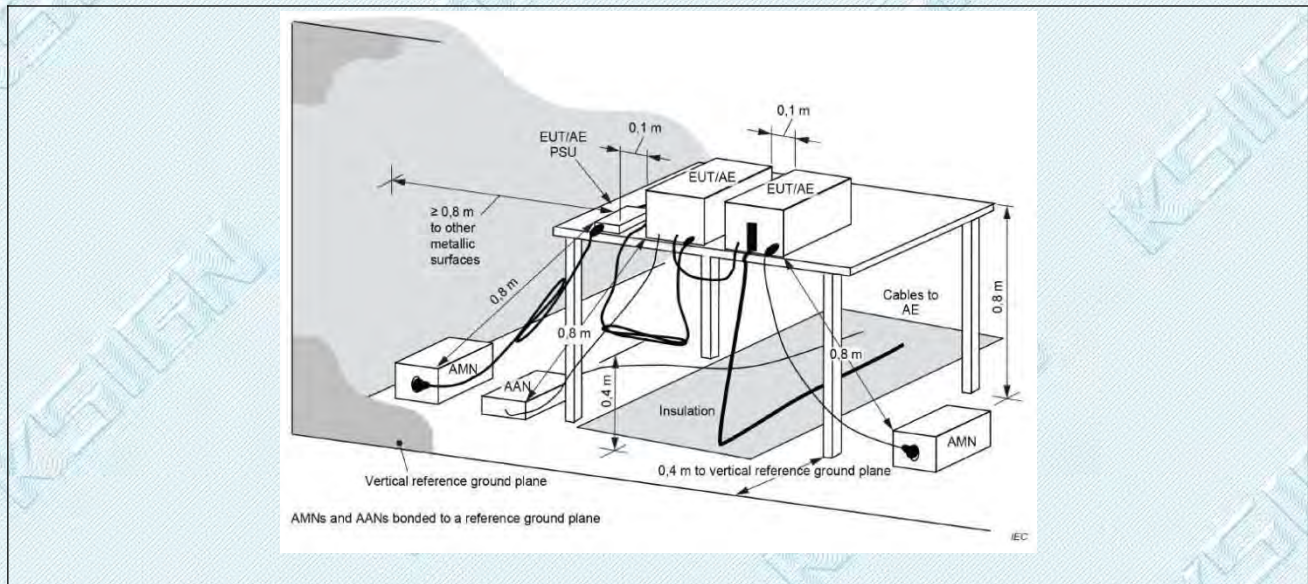
### 4.1. Conducted Emission at AC power line

|                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                              |           |
|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-----------|
| Test Requirement:                               | Refer to 47 CFR 15.207(a), Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 $\mu$ H/50 ohms line impedance stabilization network (LISN). |                              |           |
| Test Limit:                                     | Frequency of emission (MHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Conducted limit (dB $\mu$ V) |           |
|                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Quasi-peak                   | Average   |
|                                                 | 0.15-0.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 66 to 56*                    | 56 to 46* |
|                                                 | 0.5-5                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 56                           | 46        |
|                                                 | 5-30                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 60                           | 50        |
| *Decreases with the logarithm of the frequency. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                              |           |
| Test Method:                                    | ANSI C63.10-2013 section 6.2                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                              |           |
| Procedure:                                      | Refer to ANSI C63.10-2013 section 6.2, standard test method for ac power-line conducted emissions from unlicensed wireless devices                                                                                                                                                                                                                                                                                                                                              |                              |           |

#### 4.1.1. E.U.T. Operation:

|                        |                        |
|------------------------|------------------------|
| Operating Environment: |                        |
| Temperature:           | 25.7 °C                |
| Humidity:              | 53.9 %                 |
| Atmospheric Pressure:  | 102 kPa                |
| Final test mode:       | Test Mode1, Test Mode2 |

#### 4.1.2. Test Setup Diagram:



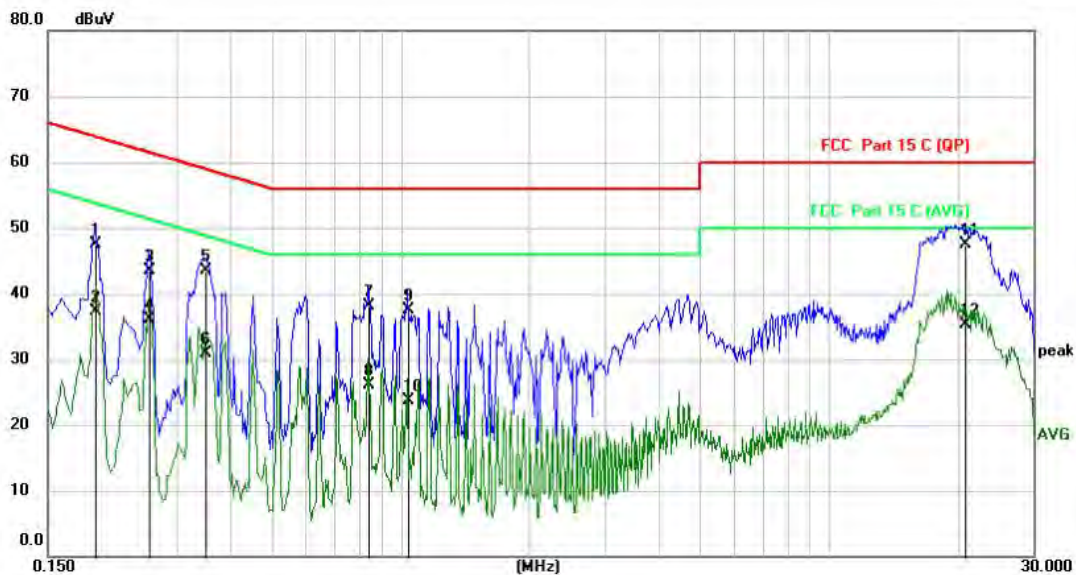


### 4.1.3. Test Data:

Note:

- 1.Measurement = Reading level + Correct Factor
- 2.Correct Factor=Antenna Factor + Cable Loss -Preamplifier Factor
- 3.Both modes of BLE 1Mbps and 2Mbps were tested at Low, Middle, and High channel; only the worst result of BLE 1Mbps was reported as below:
- 4.Both 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz power supply have been tested, only the worst result of 120 VAC, 60 Hz was reported as below:

Test Mode1 / Line: Line / Band: 2400-2483.5 MHz / BW: 1 / CH: L



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dBuV | Over<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|------------|----------|---------|
| 1   |     | 0.1940       | 36.47                    | 11.05                   | 47.52                    | 63.86         | -16.34     | QP       |         |
| 2   |     | 0.1940       | 26.16                    | 11.05                   | 37.21                    | 53.86         | -16.65     | AVG      |         |
| 3   |     | 0.2580       | 32.55                    | 11.03                   | 43.58                    | 61.50         | -17.92     | QP       |         |
| 4   |     | 0.2580       | 24.98                    | 11.03                   | 36.01                    | 51.50         | -15.49     | AVG      |         |
| 5   |     | 0.3500       | 32.53                    | 10.99                   | 43.52                    | 58.96         | -15.44     | QP       |         |
| 6   |     | 0.3500       | 19.88                    | 10.99                   | 30.87                    | 48.96         | -18.09     | AVG      |         |
| 7   |     | 0.8417       | 27.03                    | 11.06                   | 38.09                    | 56.00         | -17.91     | QP       |         |
| 8   |     | 0.8417       | 15.09                    | 11.06                   | 26.15                    | 46.00         | -19.85     | AVG      |         |
| 9   |     | 1.0380       | 26.44                    | 11.06                   | 37.50                    | 56.00         | -18.50     | QP       |         |
| 10  |     | 1.0380       | 12.57                    | 11.06                   | 23.63                    | 46.00         | -22.37     | AVG      |         |
| 11  | *   | 20.7655      | 32.04                    | 15.42                   | 47.46                    | 60.00         | -12.54     | QP       |         |
| 12  |     | 20.7655      | 19.84                    | 15.42                   | 35.26                    | 50.00         | -14.74     | AVG      |         |

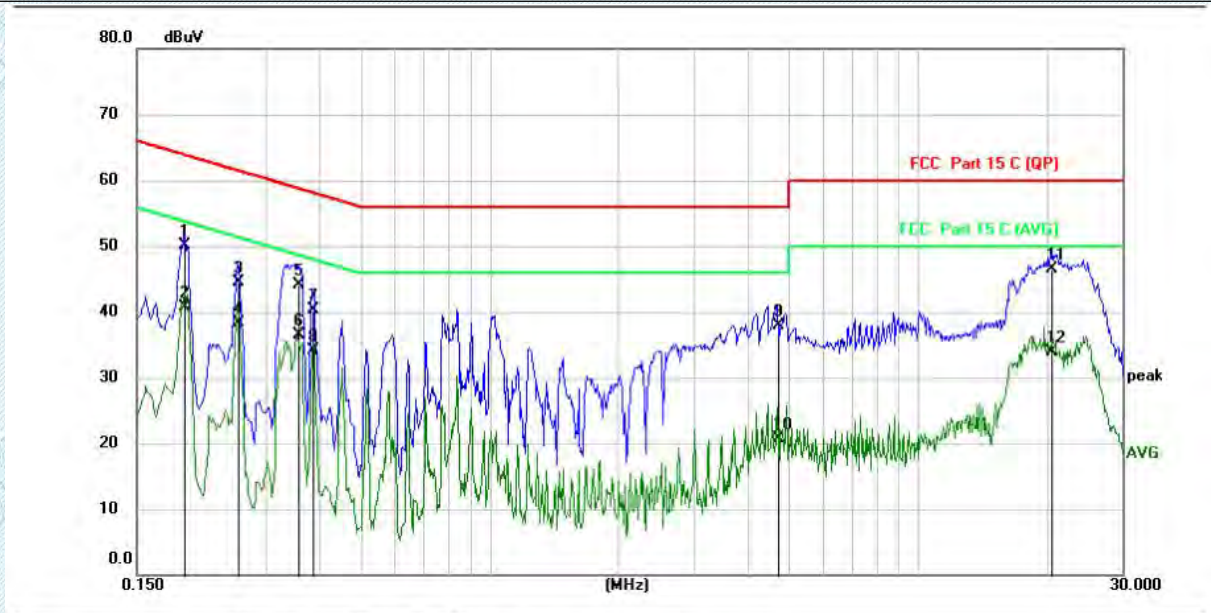
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Test Mode1 / Line: Neutral / Band: 2400-2483.5 MHz / BW: 1 / CH: L



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dBuV | Over<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|------------|----------|---------|
| 1   |     | 0.1940       | 39.01                    | 11.04                   | 50.05                    | 63.86         | -13.81     | QP       |         |
| 2   |     | 0.1940       | 29.65                    | 11.04                   | 40.69                    | 53.86         | -13.17     | AVG      |         |
| 3   |     | 0.2580       | 33.37                    | 11.04                   | 44.41                    | 61.50         | -17.09     | QP       |         |
| 4   |     | 0.2580       | 27.32                    | 11.04                   | 38.36                    | 51.50         | -13.14     | AVG      |         |
| 5   |     | 0.3593       | 33.07                    | 11.01                   | 44.08                    | 58.74         | -14.66     | QP       |         |
| 6   | *   | 0.3593       | 25.44                    | 11.01                   | 36.45                    | 48.74         | -12.29     | AVG      |         |
| 7   |     | 0.3860       | 29.21                    | 11.00                   | 40.21                    | 58.15         | -17.94     | QP       |         |
| 8   |     | 0.3860       | 23.14                    | 11.00                   | 34.14                    | 48.15         | -14.01     | AVG      |         |
| 9   |     | 4.6977       | 26.49                    | 11.50                   | 37.99                    | 56.00         | -18.01     | QP       |         |
| 10  |     | 4.6977       | 9.30                     | 11.50                   | 20.80                    | 46.00         | -25.20     | AVG      |         |
| 11  |     | 20.5457      | 30.98                    | 15.61                   | 46.59                    | 60.00         | -13.41     | QP       |         |
| 12  |     | 20.5457      | 18.25                    | 15.61                   | 33.86                    | 50.00         | -16.14     | AVG      |         |

TRF No. RF\_R1

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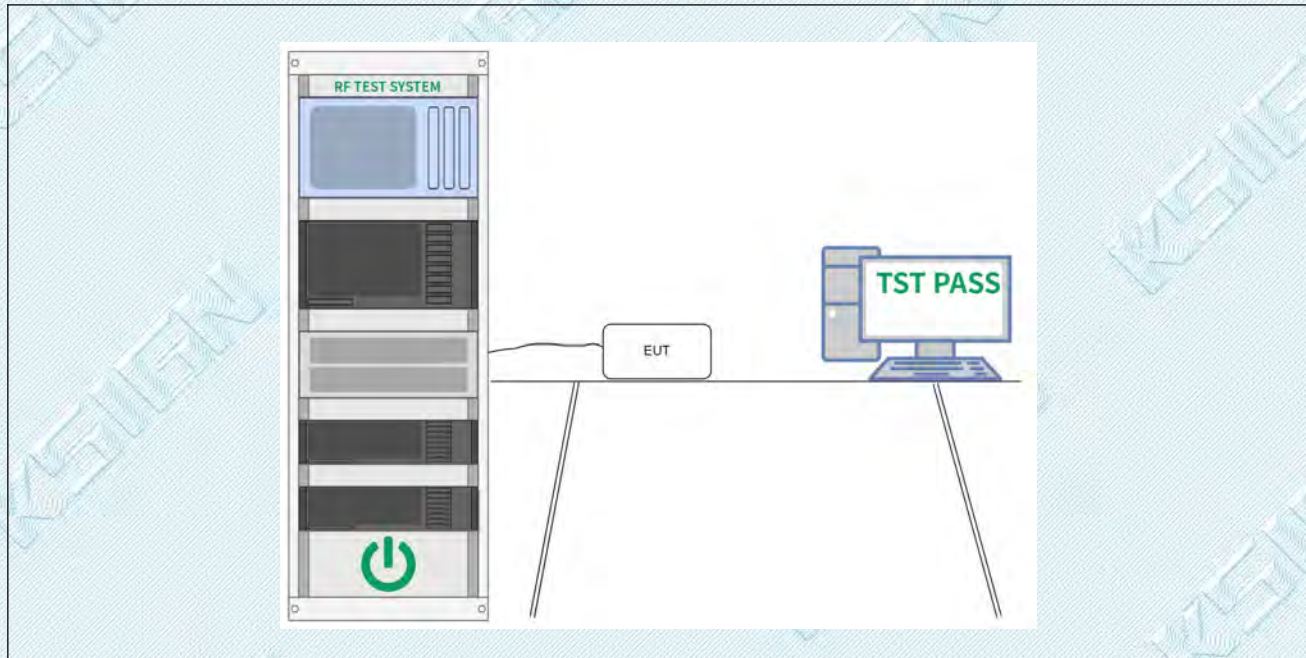
## 4.2. Occupied Bandwidth

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement: | 47 CFR 15.247(a)(2)                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Test Limit:       | Refer to 47 CFR 15.247(a)(2), Systems using digital modulation techniques may operate in the 902-928 MHz, and 2400-2483.5 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.                                                                                                                                                                                                                                                                        |
| Test Method:      | ANSI C63.10-2013, section 11.8<br>KDB 558074 D01 15.247 Meas Guidance v05r02                                                                                                                                                                                                                                                                                                                                                                                      |
| Procedure:        | a) Set RBW = 100 kHz.<br>b) Set the VBW $\geq [3 \times \text{RBW}]$ .<br>c) Detector = peak.<br>d) Trace mode = max hold.<br>e) Sweep = auto couple.<br>f) Allow the trace to stabilize.<br>g) 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. |

### 4.2.1. E.U.T. Operation:

|                        |                        |
|------------------------|------------------------|
| Operating Environment: |                        |
| Temperature:           | 25.5 °C                |
| Humidity:              | 51.8 %                 |
| Atmospheric Pressure:  | 102 kPa                |
| Final test mode:       | Test Mode1, Test Mode2 |

### 4.2.2. Test Setup Diagram:



### 4.2.3. Test Data:

Please Refer to Appendix for Details.



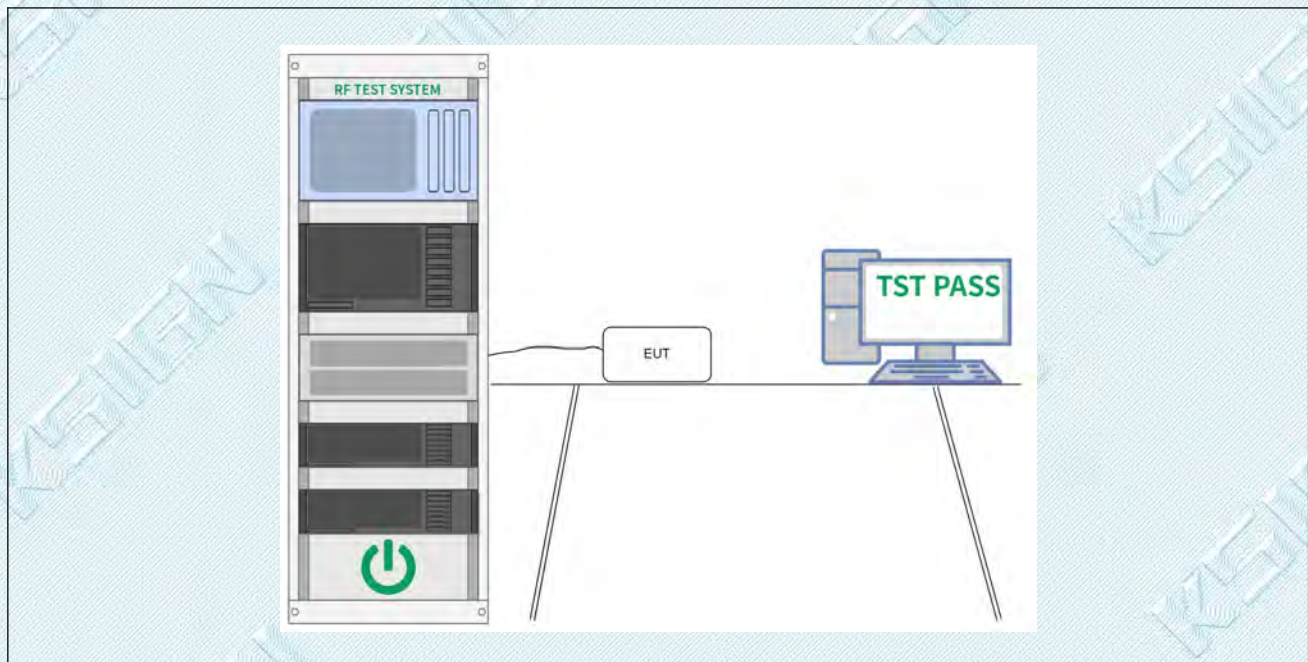
### 4.3. Maximum Conducted Output Power

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement: | 47 CFR 15.247(b)(3)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Test Limit:       | Refer to 47 CFR 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode. |
| Test Method:      | ANSI C63.10-2013, section 11.9.1<br>KDB 558074 D01 15.247 Meas Guidance v05r02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Procedure:        | ANSI C63.10-2013, section 11.9.1 Maximum peak conducted output power                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

#### 4.3.1. E.U.T. Operation:

|                        |                        |
|------------------------|------------------------|
| Operating Environment: |                        |
| Temperature:           | 25.5 °C                |
| Humidity:              | 51.8 %                 |
| Atmospheric Pressure:  | 102 kPa                |
| Final test mode:       | Test Mode1, Test Mode2 |

#### 4.3.2. Test Setup Diagram:



#### 4.3.3. Test Data:

Please Refer to Appendix for Details.



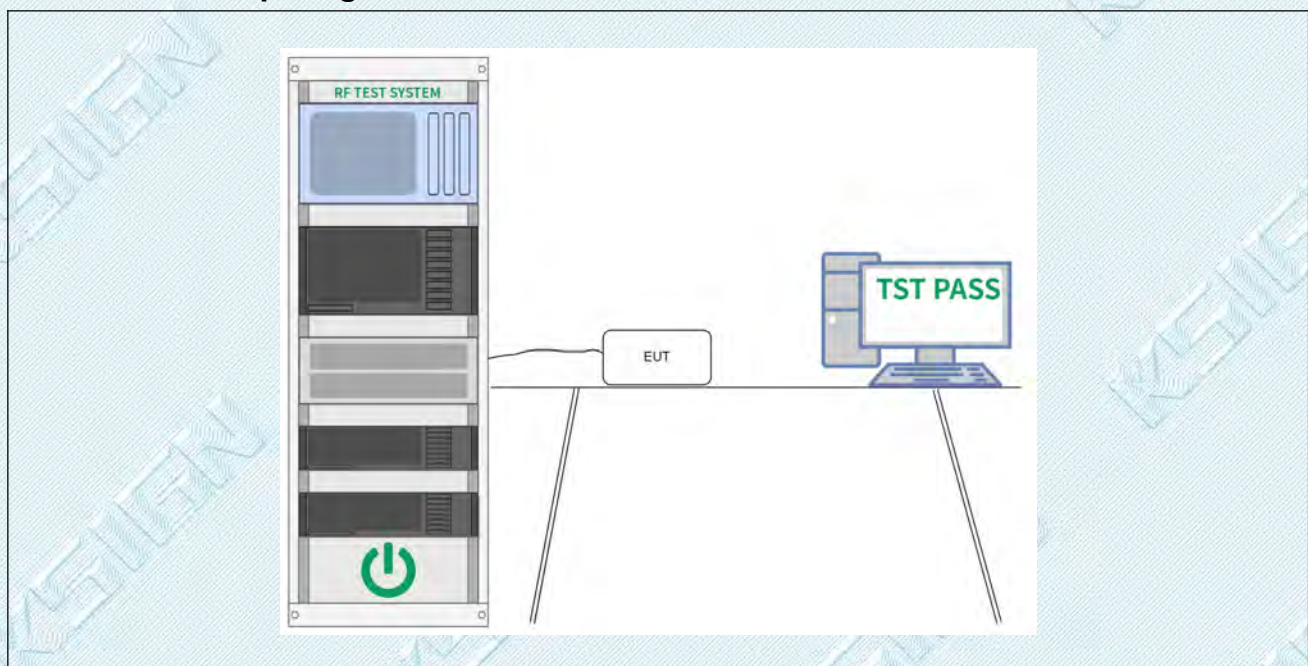
#### 4.4. Power Spectral Density

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement: | 47 CFR 15.247(e)                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Test Limit:       | Refer to 47 CFR 15.247(e), For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density. |
| Test Method:      | ANSI C63.10-2013, section 11.10<br>KDB 558074 D01 15.247 Meas Guidance v05r02                                                                                                                                                                                                                                                                                                                                                                                                             |
| Procedure:        | ANSI C63.10-2013, section 11.10, Maximum power spectral density level in the fundamental emission                                                                                                                                                                                                                                                                                                                                                                                         |

##### 4.4.1. E.U.T. Operation:

|                        |                        |
|------------------------|------------------------|
| Operating Environment: |                        |
| Temperature:           | 25.5 °C                |
| Humidity:              | 51.8 %                 |
| Atmospheric Pressure:  | 102 kPa                |
| Final test mode:       | Test Mode1, Test Mode2 |

##### 4.4.2. Test Setup Diagram:



##### 4.4.3. Test Data:

Please Refer to Appendix for Details.



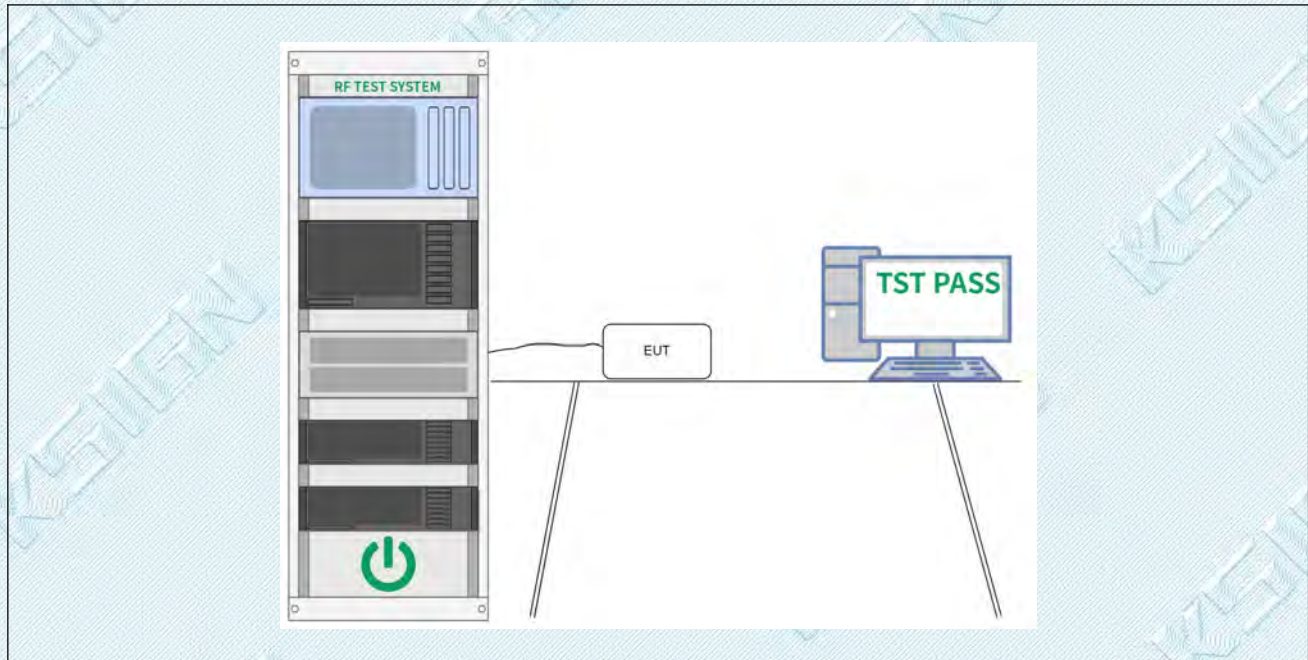
## 4.5. Emissions in non-restricted frequency bands

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement: | 47 CFR 15.247(d), 15.209, 15.205                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Test Limit:       | Refer to 47 CFR 15.247(d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required. |
| Test Method:      | ANSI C63.10-2013 section 11.11<br>KDB 558074 D01 15.247 Meas Guidance v05r02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Procedure:        | ANSI C63.10-2013<br>Section 11.11.1, Section 11.11.2, Section 11.11.3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

### 4.5.1. E.U.T. Operation:

|                        |                        |
|------------------------|------------------------|
| Operating Environment: |                        |
| Temperature:           | 25.5 °C                |
| Humidity:              | 51.8 %                 |
| Atmospheric Pressure:  | 102 kPa                |
| Final test mode:       | Test Mode1, Test Mode2 |

### 4.5.2. Test Setup Diagram:



### 4.5.3. Test Data:

Please Refer to Appendix for Details.



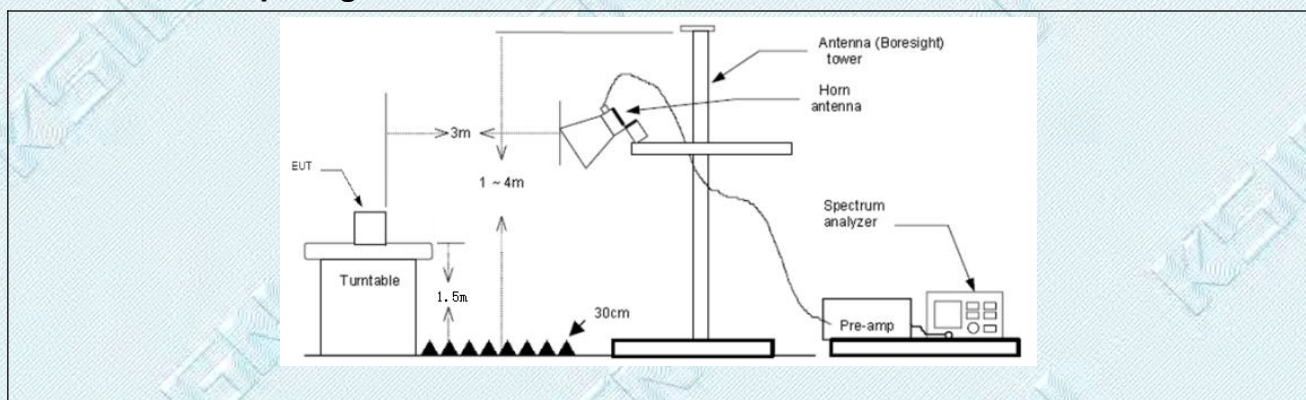
#### 4.6. Band edge emissions (Radiated)

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                         |                                   |                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-------------------------------|
| Test Requirement:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Refer to 47 CFR 15.247(d), In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)). |                                   |                               |
| Test Limit:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Frequency (MHz)                                                                                                                                                                                                         | Field strength (microvolts/meter) | Measurement distance (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                             |
| <p>** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.</p> <p>In the emission table above, the tighter limit applies at the band edges.</p> <p>The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.</p> |                                                                                                                                                                                                                         |                                   |                               |
| Test Method:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ANSI C63.10-2013 section 6.10<br>KDB 558074 D01 15.247 Meas Guidance v05r02                                                                                                                                             |                                   |                               |
| Procedure:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ANSI C63.10-2013 section 6.10.5.2                                                                                                                                                                                       |                                   |                               |

##### 4.6.1. E.U.T. Operation:

|                        |                        |
|------------------------|------------------------|
| Operating Environment: |                        |
| Temperature:           | 25.9 °C                |
| Humidity:              | 54.1 %                 |
| Atmospheric Pressure:  | 102 kPa                |
| Final test mode:       | Test Mode1, Test Mode2 |

##### 4.6.2. Test Setup Diagram:



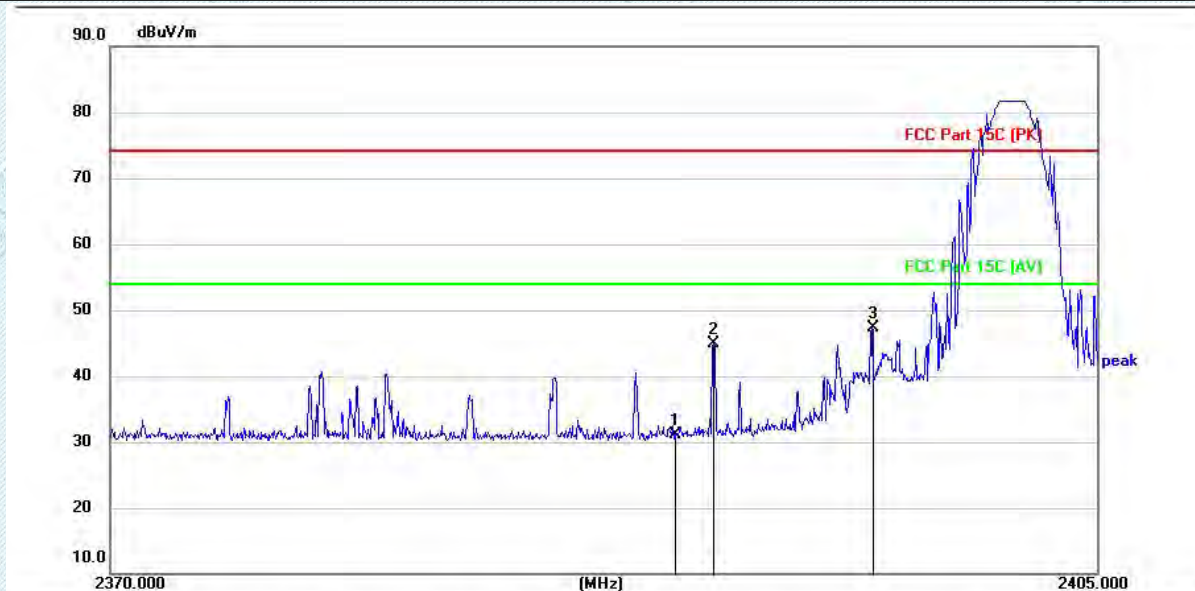


### 4.6.3. Test Data:

Note:

- 1.Measurement = Reading level + Correct Factor
- 2.Correct Factor=Antenna Factor + Cable Loss -Preamplifier Factor
- 3.Both modes of BLE 1Mbps and 2Mbps were tested at Low and High channel and recorded worst mode at BLE 1Mbps.
4. Since the peak value is less than the limit of the AVG value, there is no AVG data.

**Test Mode1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: L**



| No. | Mk. | Freq.<br>MHz | Reading Level<br>(dBuV) | Correct Factor<br>(dB/m) | Measurement<br>(dBuV/m) | Limit<br>(dBuV/m) | Over<br>(dB) | Detector |
|-----|-----|--------------|-------------------------|--------------------------|-------------------------|-------------------|--------------|----------|
| 1   |     | 2390.000     | 42.43                   | -11.34                   | 31.09                   | 74.00             | 42.91        | peak     |
| 2   |     | 2391.325     | 56.17                   | -11.34                   | 44.83                   | 74.00             | 29.17        | peak     |
| 3   | *   | 2396.954     | 58.56                   | -11.34                   | 47.22                   | 74.00             | 26.78        | peak     |

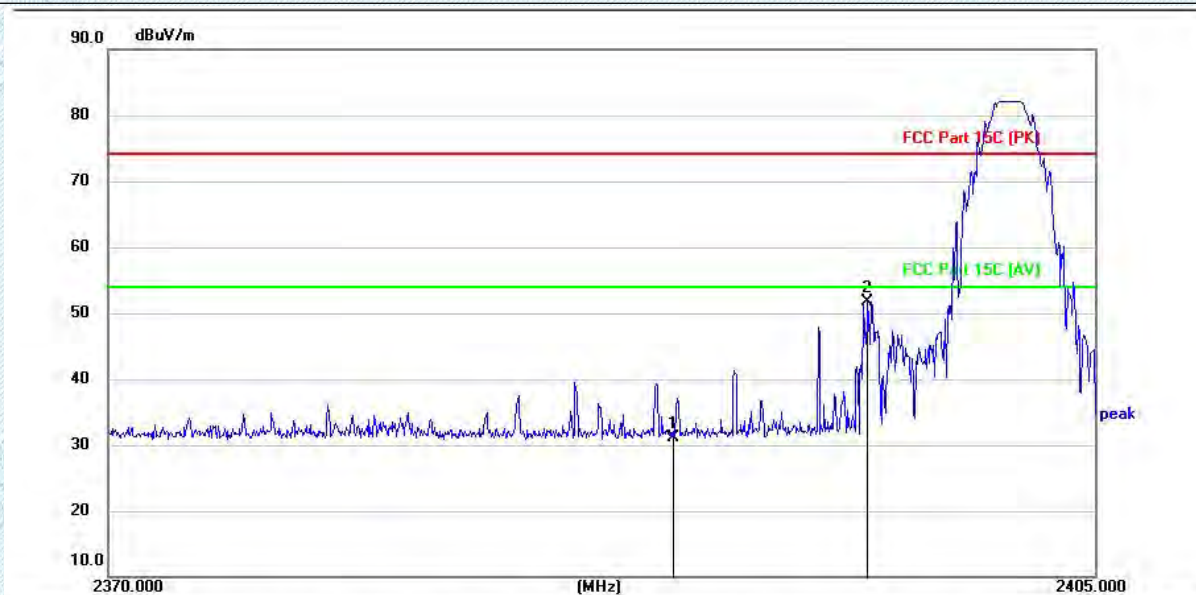
TRF No. RF\_R1

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Test Mode1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: L



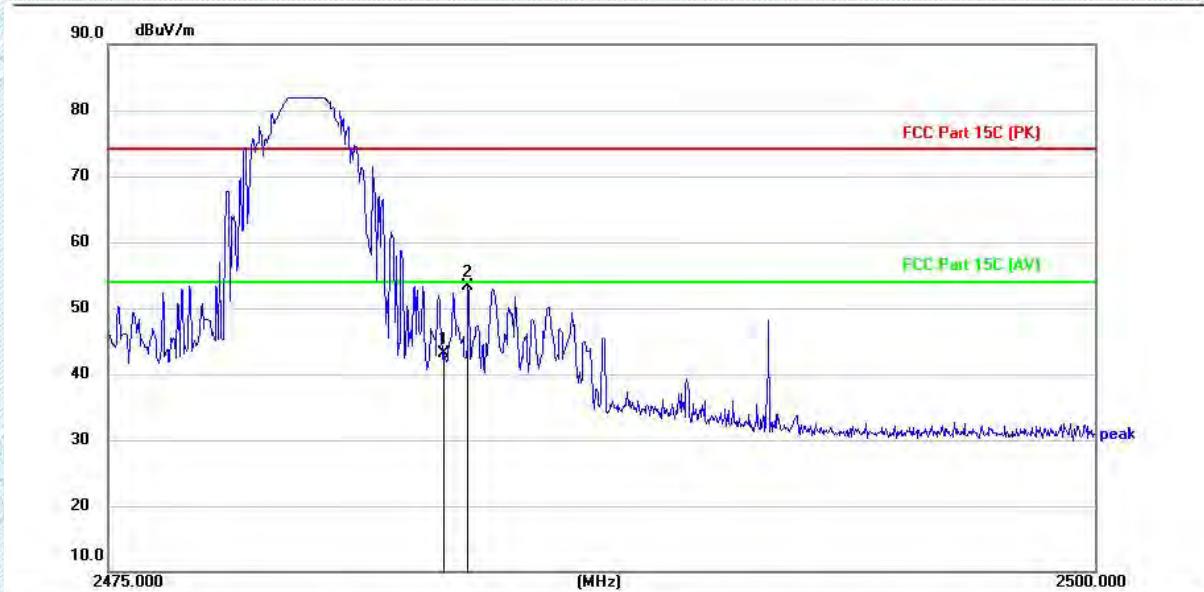
| No. | Mk. | Freq.<br>MHz | Reading Level<br>(dBuV) | Correct Factor<br>(dB/m) | Measurement<br>(dBuV/m) | Limit<br>(dBuV/m) | Over<br>(dB) | Detector |
|-----|-----|--------------|-------------------------|--------------------------|-------------------------|-------------------|--------------|----------|
| 1   |     | 2390.000     | 42.07                   | -10.92                   | 31.15                   | 74.00             | 42.85        | peak     |
| 2   | *   | 2396.873     | 62.68                   | -10.92                   | 51.76                   | 74.00             | 22.24        | peak     |

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**Test Mode1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: H**


| No. | Mk. | Freq.<br>MHz | Reading Level<br>(dBuV) | Correct Factor<br>(dB/m) | Measurement<br>(dBuV/m) | Limit<br>(dBuV/m) | Over<br>(dB) | Detector |
|-----|-----|--------------|-------------------------|--------------------------|-------------------------|-------------------|--------------|----------|
| 1   |     | 2483.500     | 54.47                   | -11.29                   | 43.18                   | 74.00             | 30.82        | peak     |
| 2   | *   | 2484.120     | 64.58                   | -11.29                   | 53.29                   | 74.00             | 20.71        | peak     |

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**Test Mode1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: H**


| No. | Mk. | Freq.<br>MHz | Reading Level<br>(dBuV) | Correct Factor<br>(dB/m) | Measurement<br>(dBuV/m) | Limit<br>(dBuV/m) | Over<br>(dB) | Detector |
|-----|-----|--------------|-------------------------|--------------------------|-------------------------|-------------------|--------------|----------|
| 1   |     | 2483.500     | 50.98                   | -10.88                   | 40.10                   | 74.00             | 33.90        | peak     |
| 2   | *   | 2484.780     | 62.21                   | -10.88                   | 51.33                   | 74.00             | 22.67        | peak     |

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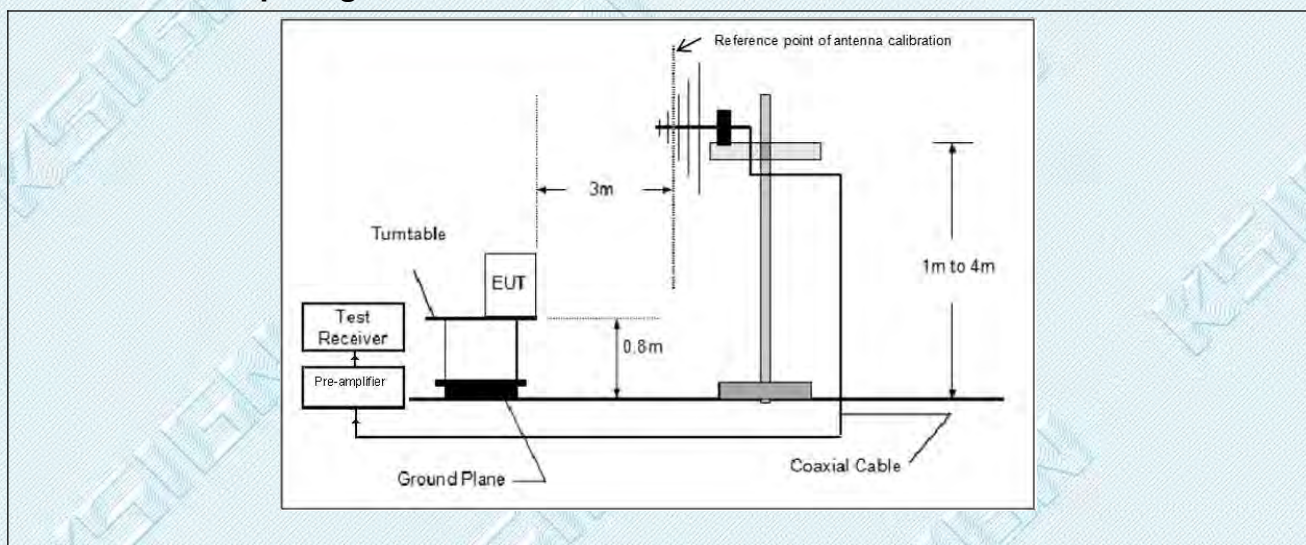
## 4.7. Emissions in frequency bands (below 1GHz)

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                          |                                   |                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-------------------------------|
| Test Requirement:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Refer to 47 CFR 15.247(d), In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).` |                                   |                               |
| Test Limit:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Frequency (MHz)                                                                                                                                                                                                          | Field strength (microvolts/meter) | Measurement distance (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                             |
| <p>** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.</p> <p>In the emission table above, the tighter limit applies at the band edges.</p> <p>The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.</p> |                                                                                                                                                                                                                          |                                   |                               |
| Test Method:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ANSI C63.10-2013 section 6.6.4<br>KDB 558074 D01 15.247 Meas Guidance v05r02                                                                                                                                             |                                   |                               |
| Procedure:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ANSI C63.10-2013 section 6.6.4                                                                                                                                                                                           |                                   |                               |

### 4.7.1. E.U.T. Operation:

|                        |                        |
|------------------------|------------------------|
| Operating Environment: |                        |
| Temperature:           | 25.9 °C                |
| Humidity:              | 54.1 %                 |
| Atmospheric Pressure:  | 102 kPa                |
| Final test mode:       | Test Mode1, Test Mode2 |

### 4.7.2. Test Setup Diagram:





### 4.7.3. Test Data:

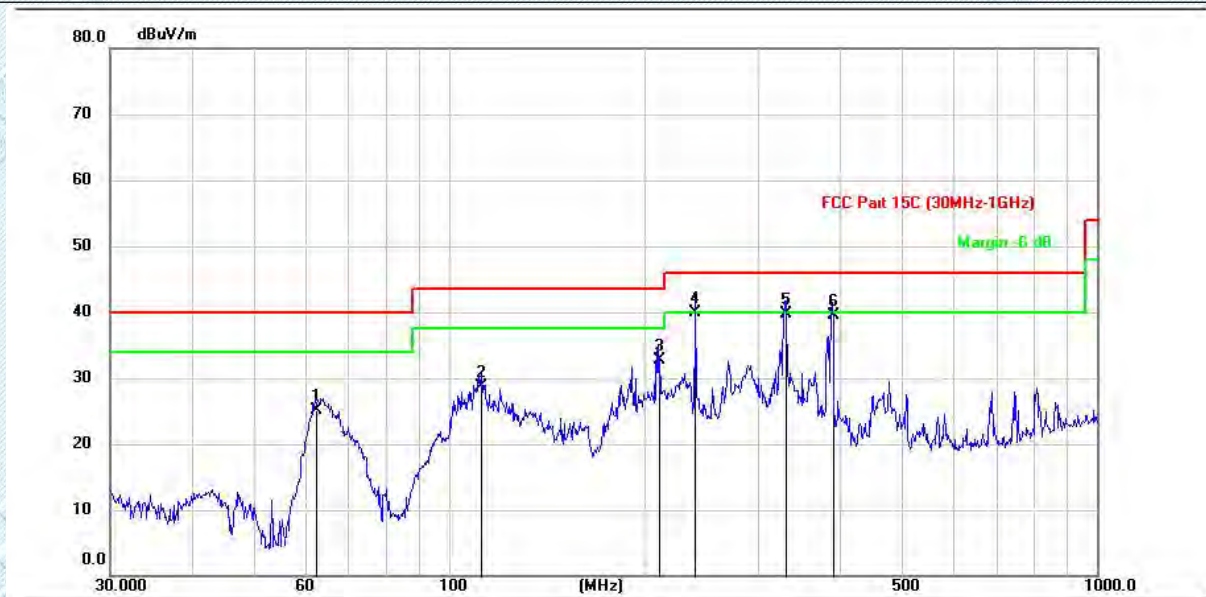
Note:

- 1.Measurement = Reading level + Correct Factor
- 2.Correct Factor=Antenna Factor + Cable Loss -Preamplifier Factor
- 3.Both modes of BLE 1Mbps and 2Mbps were tested at Low, Middle, and High channel and recorded worst mode at BLE 1Mbps.

9 KHz - 30 MHz:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

**Test Mode1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: L**



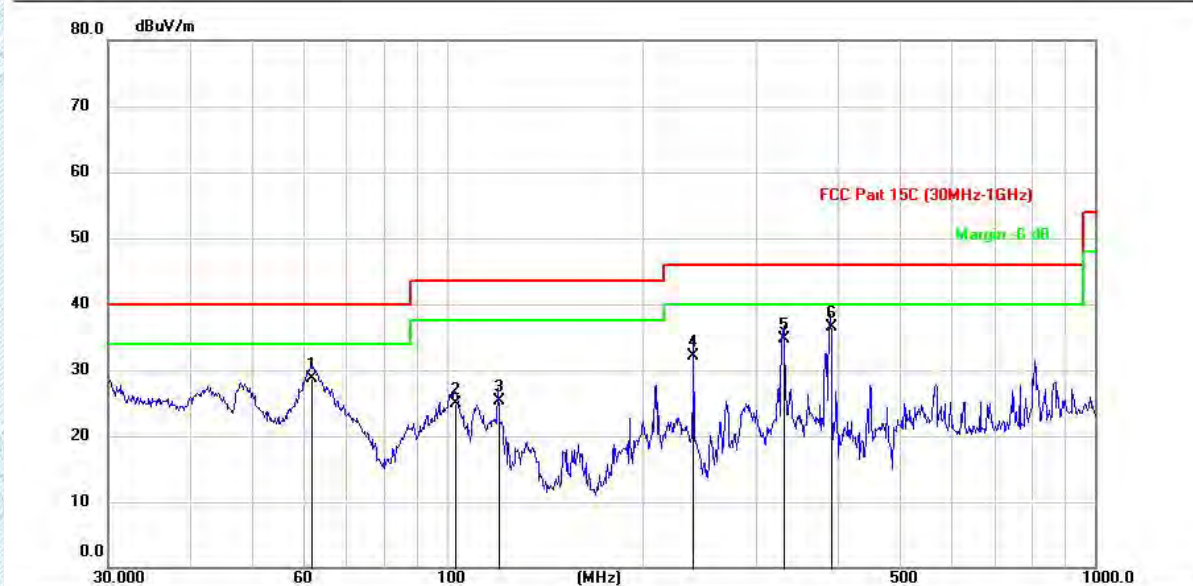
| No. | Mk. | Freq.<br>MHz | Reading Level<br>(dBuV) | Correct Factor<br>(dB/m) | Measurement<br>(dBuV/m) | Limit<br>(dBuV/m) | Over<br>(dB) | Detector |
|-----|-----|--------------|-------------------------|--------------------------|-------------------------|-------------------|--------------|----------|
| 1   |     | 62.1691      | 43.11                   | -18.03                   | 25.08                   | 40.00             | -14.92       | QP       |
| 2   |     | 112.1303     | 47.43                   | -18.63                   | 28.80                   | 43.50             | -14.70       | QP       |
| 3   |     | 210.5644     | 50.33                   | -17.53                   | 32.80                   | 43.50             | -10.70       | QP       |
| 4   | *   | 239.9873     | 56.06                   | -16.13                   | 39.93                   | 46.00             | -6.07        | QP       |
| 5   |     | 330.6582     | 53.13                   | -13.36                   | 39.77                   | 46.00             | -6.23        | QP       |
| 6   |     | 389.4912     | 50.74                   | -11.26                   | 39.48                   | 46.00             | -6.52        | QP       |

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**Test Mode1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: L**


| No. | Mk. | Freq.<br>MHz | Reading Level<br>(dBuV) | Correct Factor<br>(dB/m) | Measurement<br>(dBuV/m) | Limit<br>(dBuV/m) | Over<br>(dB) | Detector |
|-----|-----|--------------|-------------------------|--------------------------|-------------------------|-------------------|--------------|----------|
| 1   |     | 61.6698      | 46.64                   | -17.92                   | 28.72                   | 40.00             | -11.28       | QP       |
| 2   |     | 102.8632     | 42.67                   | -17.86                   | 24.81                   | 43.50             | -18.69       | QP       |
| 3   |     | 119.9817     | 44.62                   | -19.33                   | 25.29                   | 43.50             | -18.21       | QP       |
| 4   |     | 239.9873     | 48.33                   | -16.13                   | 32.20                   | 46.00             | -13.80       | QP       |
| 5   |     | 330.5423     | 47.97                   | -13.36                   | 34.61                   | 46.00             | -11.39       | QP       |
| 6   | *   | 389.4912     | 47.70                   | -11.26                   | 36.44                   | 46.00             | -9.56        | QP       |

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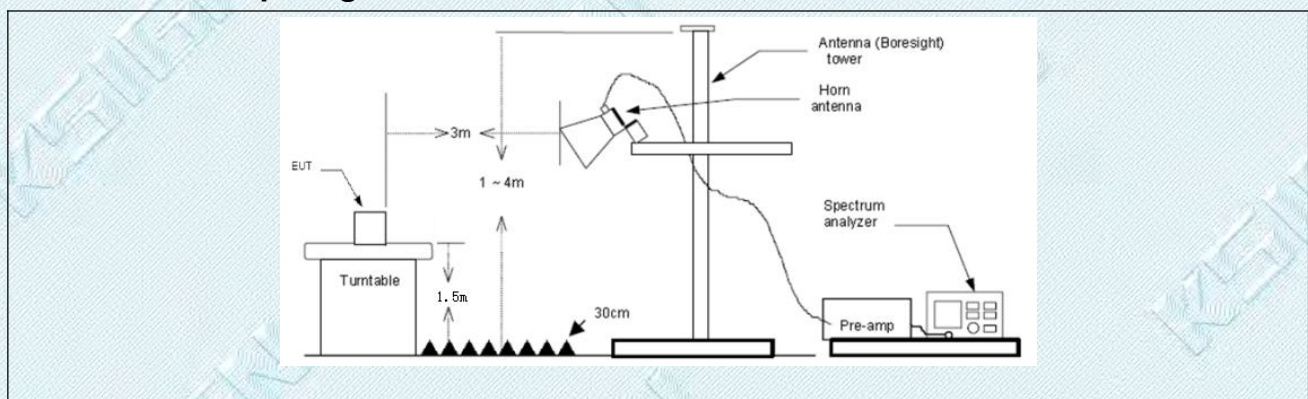
#### 4.8. Emissions in frequency bands (above 1GHz)

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                               |                                   |                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-------------------------------|
| Test Requirement:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).` |                                   |                               |
| Test Limit:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Frequency (MHz)                                                                                                                                                                               | Field strength (microvolts/meter) | Measurement distance (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                             |
| <p>** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.</p> <p>In the emission table above, the tighter limit applies at the band edges.</p> <p>The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.</p> |                                                                                                                                                                                               |                                   |                               |
| Test Method:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ANSI C63.10-2013 section 6.6.4<br>KDB 558074 D01 15.247 Meas Guidance v05r02                                                                                                                  |                                   |                               |
| Procedure:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ANSI C63.10-2013 section 6.6.4                                                                                                                                                                |                                   |                               |

##### 4.8.1. E.U.T. Operation:

|                        |                        |
|------------------------|------------------------|
| Operating Environment: |                        |
| Temperature:           | 25.9 °C                |
| Humidity:              | 54.1 %                 |
| Atmospheric Pressure:  | 102 kPa                |
| Final test mode:       | Test Mode1, Test Mode2 |

##### 4.8.2. Test Setup Diagram:



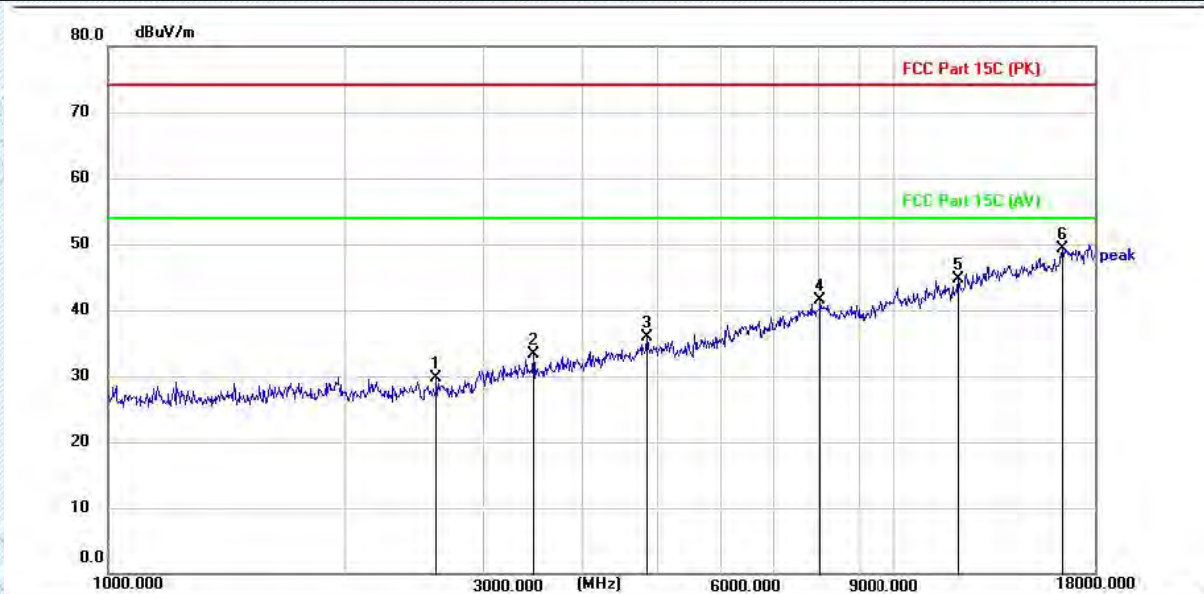


### 4.8.3. Test Data:

Note:

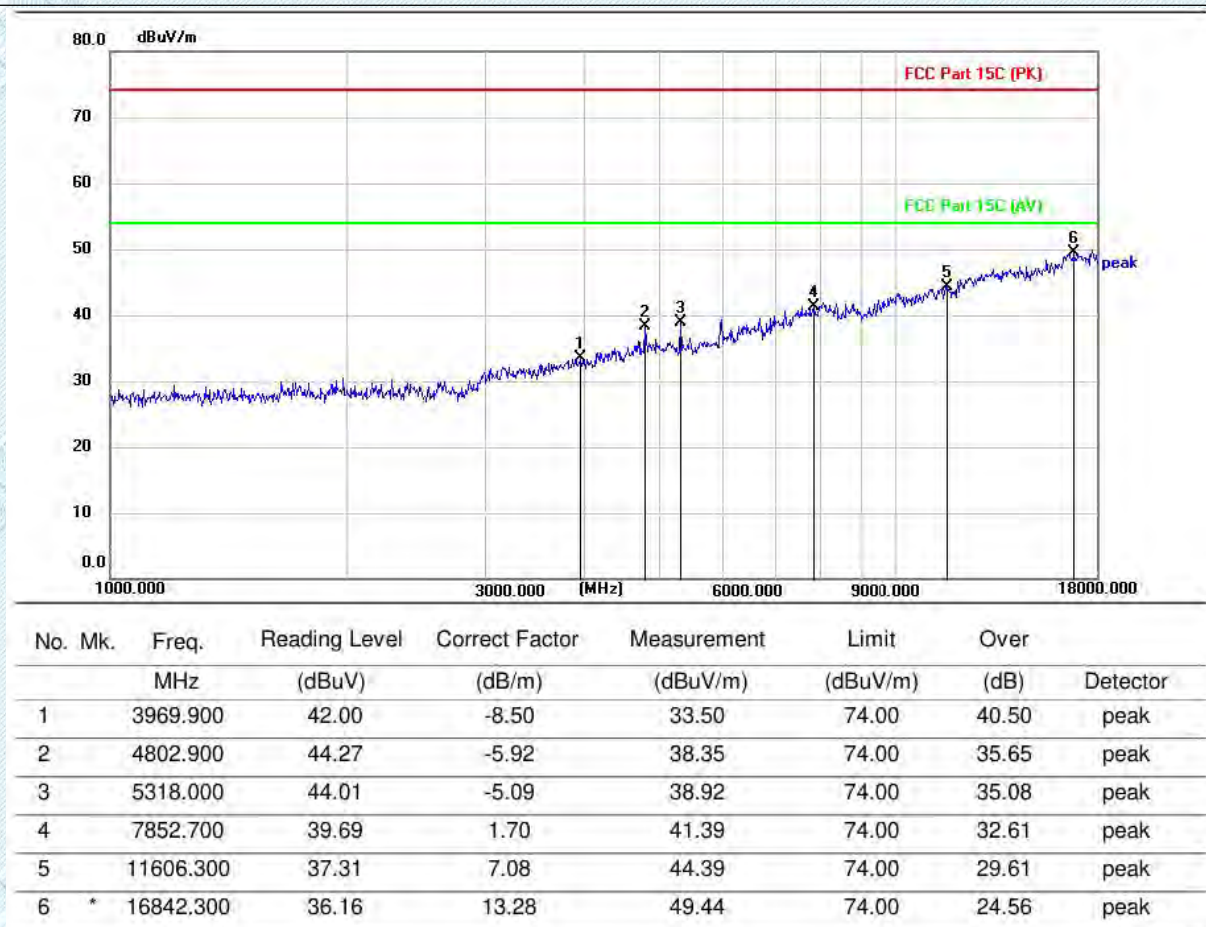
- 1.Measurement = Reading level + Correct Factor
- 2.Correct Factor=Antenna Factor + Cable Loss -Preamplifier Factor
- 3.Both modes of BLE 1Mbps and 2Mbps were tested at Low, Middle, and High channel and recorded worst mode at BLE 1Mbps.
- 4.18GHz~25GHz,the amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
- 5.Since the peak value is less than the limit of the AVG value, there is no AVG data.

**Test Mode1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: L**



| No. | Mk. | Freq.<br>MHz | Reading Level<br>(dBuV) | Correct Factor<br>(dB/m) | Measurement<br>(dBuV/m) | Limit<br>(dBuV/m) | Over<br>(dB) | Detector |
|-----|-----|--------------|-------------------------|--------------------------|-------------------------|-------------------|--------------|----------|
| 1   |     | 2620.100     | 40.92                   | -11.23                   | 29.69                   | 74.00             | 44.31        | peak     |
| 2   |     | 3476.900     | 43.39                   | -10.13                   | 33.26                   | 74.00             | 40.74        | peak     |
| 3   |     | 4847.100     | 42.47                   | -6.60                    | 35.87                   | 74.00             | 38.13        | peak     |
| 4   |     | 8044.800     | 40.15                   | 1.26                     | 41.41                   | 74.00             | 32.59        | peak     |
| 5   |     | 12085.700    | 37.53                   | 7.27                     | 44.80                   | 74.00             | 29.20        | peak     |
| 6   | *   | 16390.100    | 35.87                   | 13.39                    | 49.26                   | 74.00             | 24.74        | peak     |



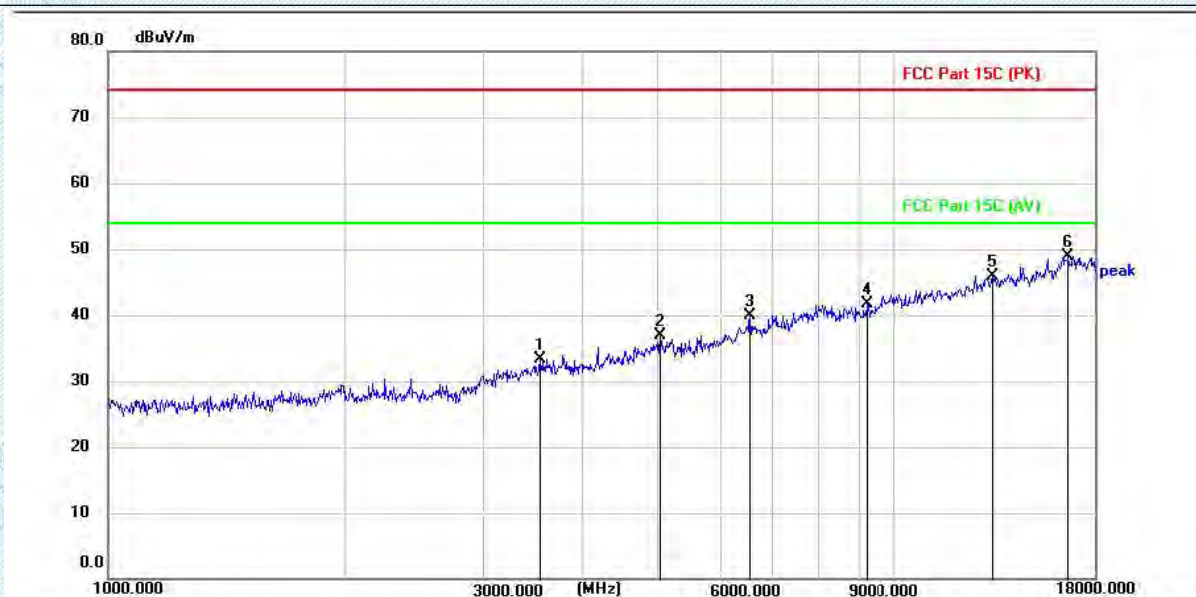
**Test Mode1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: L**


TRF No. RF\_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

Tel: +(86) 0755-2985 2678 Fax: +(86) 0755-2985 2397 E-mail: info@gdksign.cn Web: www.gdksign.com



**Test Mode1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: M**


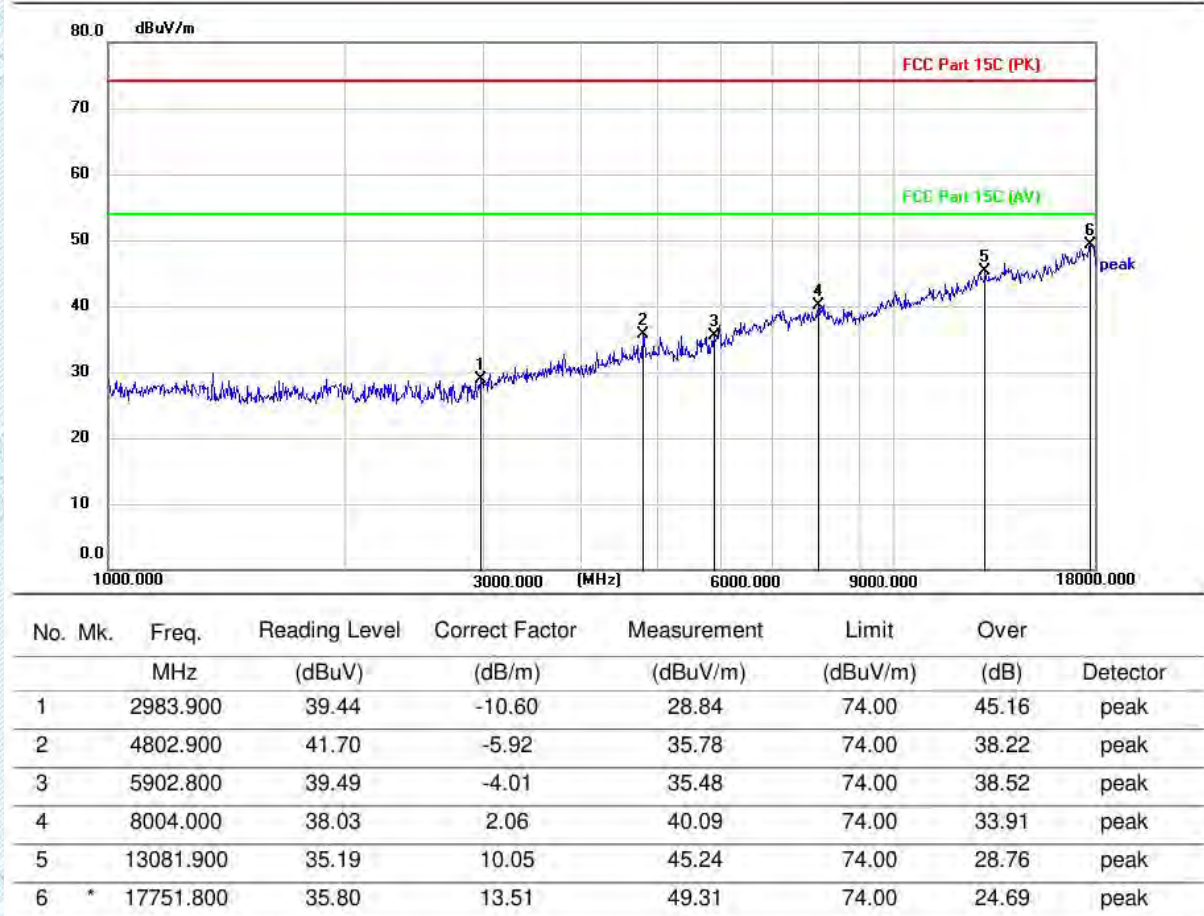
| No. | Mk. | Freq.<br>MHz | Reading Level<br>(dBuV) | Correct Factor<br>(dB/m) | Measurement<br>(dBuV/m) | Limit<br>(dBuV/m) | Over<br>(dB) | Detector |
|-----|-----|--------------|-------------------------|--------------------------|-------------------------|-------------------|--------------|----------|
| 1   |     | 3555.100     | 43.33                   | -9.93                    | 33.40                   | 74.00             | 40.60        | peak     |
| 2   |     | 5040.900     | 43.03                   | -6.17                    | 36.86                   | 74.00             | 37.14        | peak     |
| 3   |     | 6553.900     | 42.50                   | -2.56                    | 39.94                   | 74.00             | 34.06        | peak     |
| 4   |     | 9226.300     | 40.16                   | 1.57                     | 41.73                   | 74.00             | 32.27        | peak     |
| 5   |     | 13328.400    | 36.29                   | 9.67                     | 45.96                   | 74.00             | 28.04        | peak     |
| 6   | *   | 16655.300    | 35.52                   | 13.43                    | 48.95                   | 74.00             | 25.05        | peak     |

TRF No. RF\_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

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**Test Mode1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: M**


TRF No. RF\_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

Tel: +(86) 0755-2985 2678 Fax: +(86) 0755-2985 2397 E-mail: info@gdksign.cn Web: www.gdksign.com



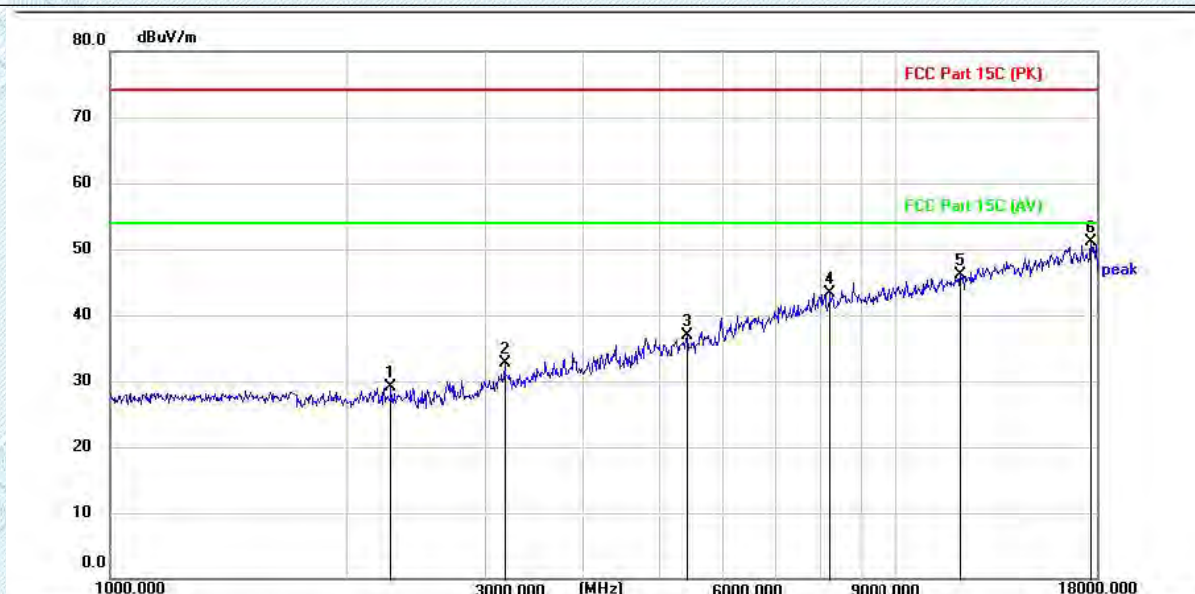
**Test Mode1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: H**


TRF No. RF\_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

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**Test Mode1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: H**


| No. | Mk. | Freq.<br>MHz | Reading Level<br>(dBuV) | Correct Factor<br>(dB/m) | Measurement<br>(dBuV/m) | Limit<br>(dBuV/m) | Over<br>(dB) | Detector |
|-----|-----|--------------|-------------------------|--------------------------|-------------------------|-------------------|--------------|----------|
| 1   |     | 2280.100     | 40.01                   | -10.96                   | 29.05                   | 74.00             | 44.95        | peak     |
| 2   |     | 3186.200     | 42.97                   | -10.26                   | 32.71                   | 74.00             | 41.29        | peak     |
| 3   |     | 5426.800     | 41.92                   | -5.00                    | 36.92                   | 74.00             | 37.08        | peak     |
| 4   |     | 8230.100     | 41.34                   | 2.01                     | 43.35                   | 74.00             | 30.65        | peak     |
| 5   |     | 12109.500    | 37.91                   | 8.13                     | 46.04                   | 74.00             | 27.96        | peak     |
| 6   | *   | 17722.900    | 37.60                   | 13.49                    | 51.09                   | 74.00             | 22.91        | peak     |

TRF No. RF\_R1

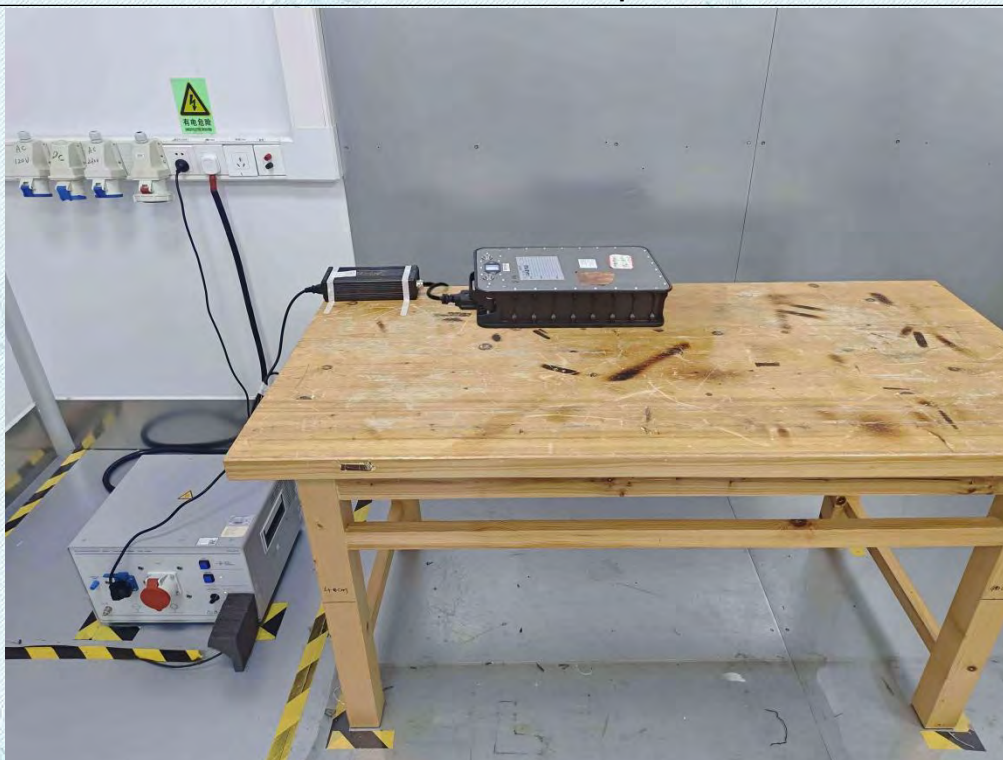
Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

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## 5. EUT TEST PHOTOS

Conducted Emission at AC power line



RF Conducted



TRF No. RF\_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

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**Emissions in frequency bands (below 1GHz)****Emissions in frequency bands (above 1GHz)**



## 6. PHOTOGRAPHS OF EUT CONSTRUCTIONAL

Refer to Appendix - EUT Photos for KS2307S3564E.docx



## 7. Appendix

### 7.1. Appendix A: DTS Bandwidth

#### 7.1.1. Test Result

| TestMode | Antenna | Freq[MHz] | DTS BW [MHz] | FL[MHz] | FH[MHz] | Limit[MHz] | Verdict |
|----------|---------|-----------|--------------|---------|---------|------------|---------|
| BLE_1M   | Ant1    | 2402      | 0.73         | 2401.63 | 2402.36 | 0.5        | PASS    |
|          |         | 2440      | 0.75         | 2439.62 | 2440.37 | 0.5        | PASS    |
|          |         | 2480      | 0.73         | 2479.63 | 2480.36 | 0.5        | PASS    |
| BLE_2M   | Ant1    | 2402      | 1.22         | 2401.38 | 2402.60 | 0.5        | PASS    |
|          |         | 2440      | 1.17         | 2439.42 | 2440.59 | 0.5        | PASS    |
|          |         | 2480      | 1.18         | 2479.41 | 2480.59 | 0.5        | PASS    |



## 7.1.2. Test Graphs

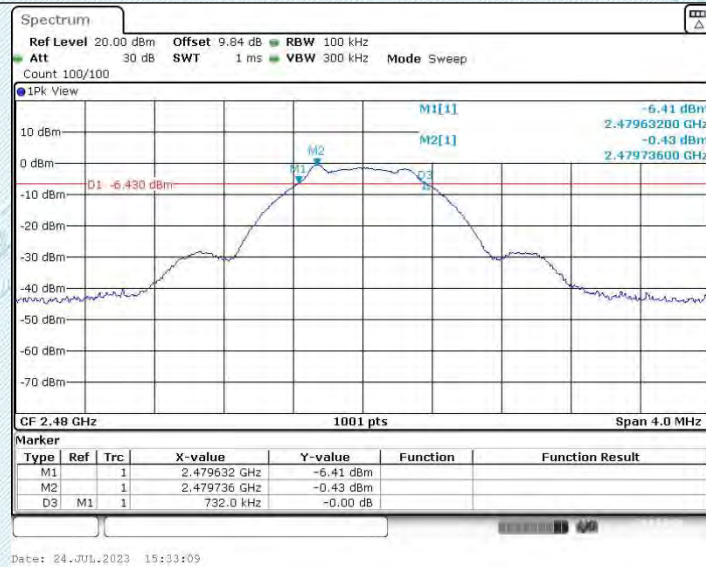


TRF No. RF\_R1

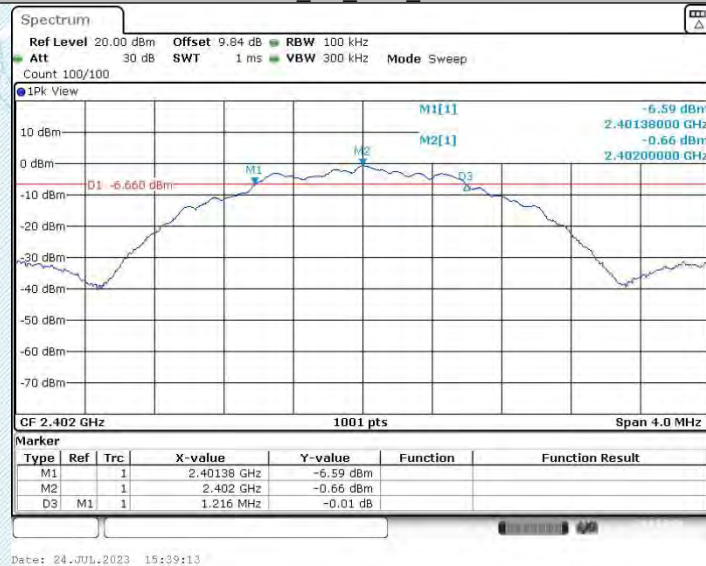
Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

Tel: +(86) 0755-2985 2678 Fax: +(86) 0755-2985 2397 E-mail: info@gdksign.cn Web: www.gdksign.com

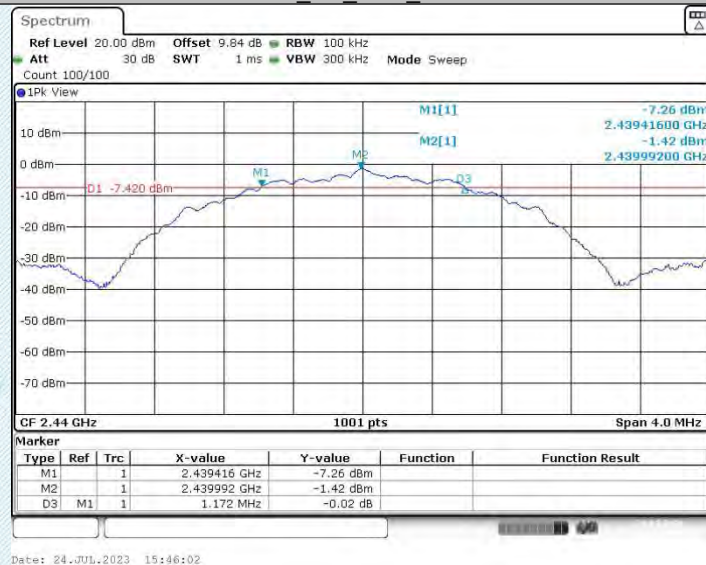




BLE\_2M\_Ant1\_2402



BLE\_2M\_Ant1\_2440



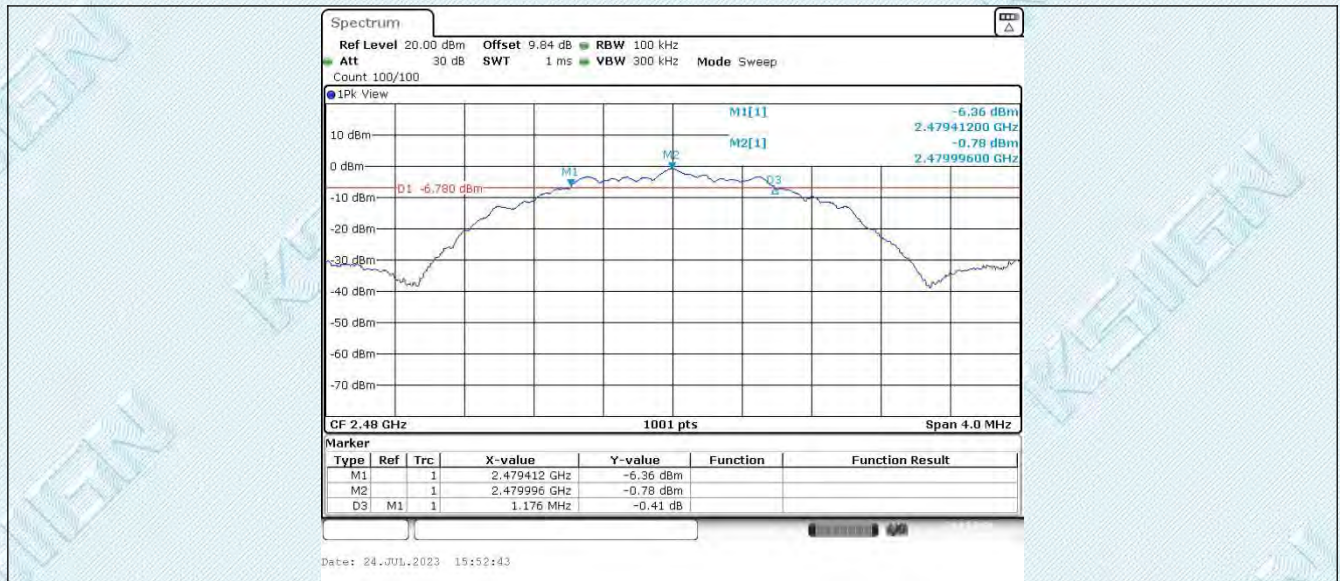
BLE\_2M\_Ant1\_2480

TRF No. RF\_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

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## 7.2. Appendix B: Occupied Channel Bandwidth

### 7.2.1. Test Result

| TestMode | Antenna | Freq[MHz] | OCB [MHz] | FL[MHz]  | FH[MHz]  | Limit[MHz] | Verdict |
|----------|---------|-----------|-----------|----------|----------|------------|---------|
| BLE_1M   | Ant1    | 2402      | 1.051     | 2401.465 | 2402.515 | ---        | PASS    |
|          |         | 2440      | 1.079     | 2439.449 | 2440.527 | ---        | PASS    |
|          |         | 2480      | 1.087     | 2479.445 | 2480.531 | ---        | PASS    |
| BLE_2M   | Ant1    | 2402      | 2.062     | 2400.957 | 2403.019 | ---        | PASS    |
|          |         | 2440      | 2.11      | 2438.921 | 2441.031 | ---        | PASS    |
|          |         | 2480      | 2.11      | 2478.917 | 2481.027 | ---        | PASS    |



## 7.2.2. Test Graphs

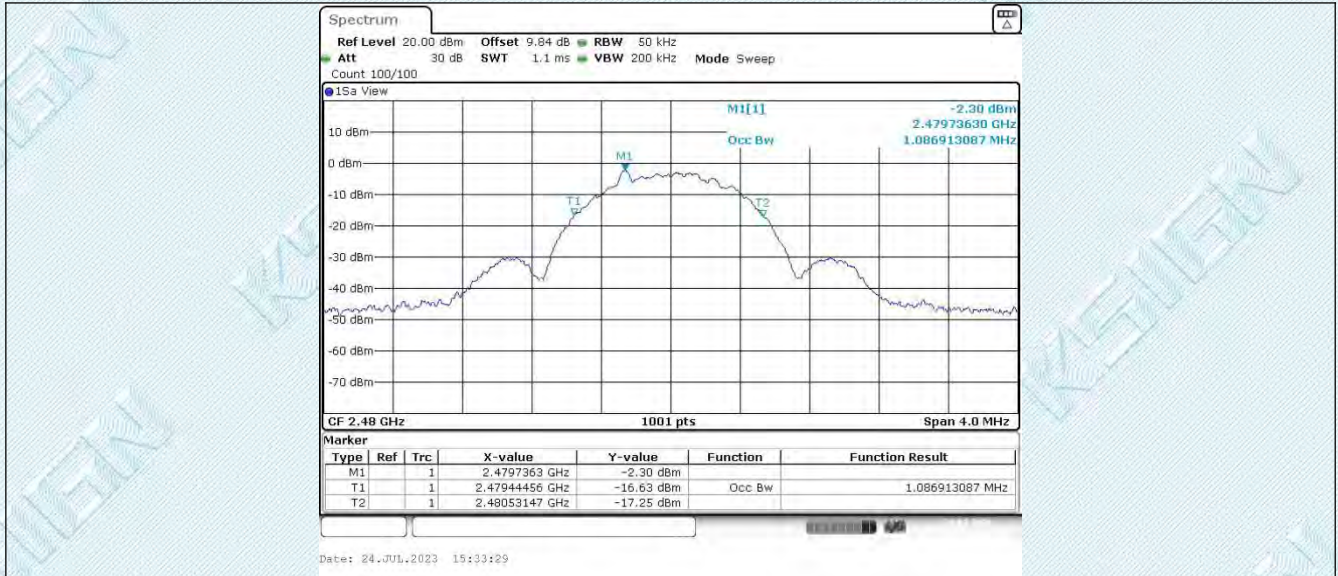


TRF No. RF\_R1

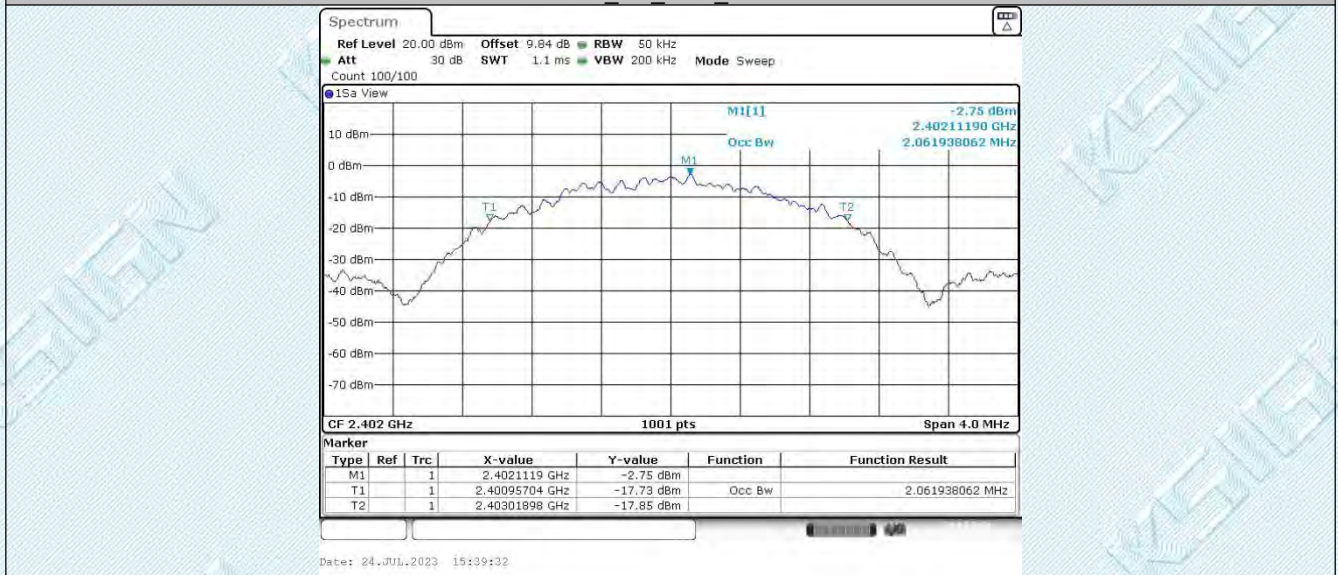
Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

Tel: +(86) 0755-2985 2678 Fax: +(86) 0755-2985 2397 E-mail: info@gdksign.cn Web: www.gdksign.com

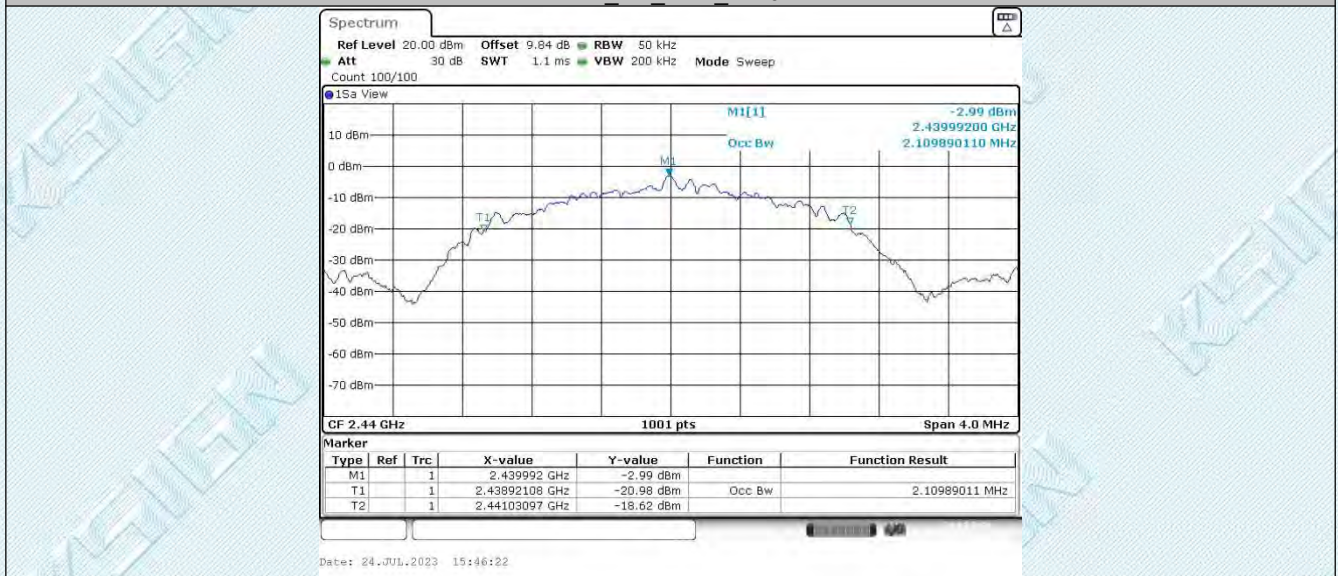




BLE\_2M\_Ant1\_2402



BLE\_2M\_Ant1\_2440



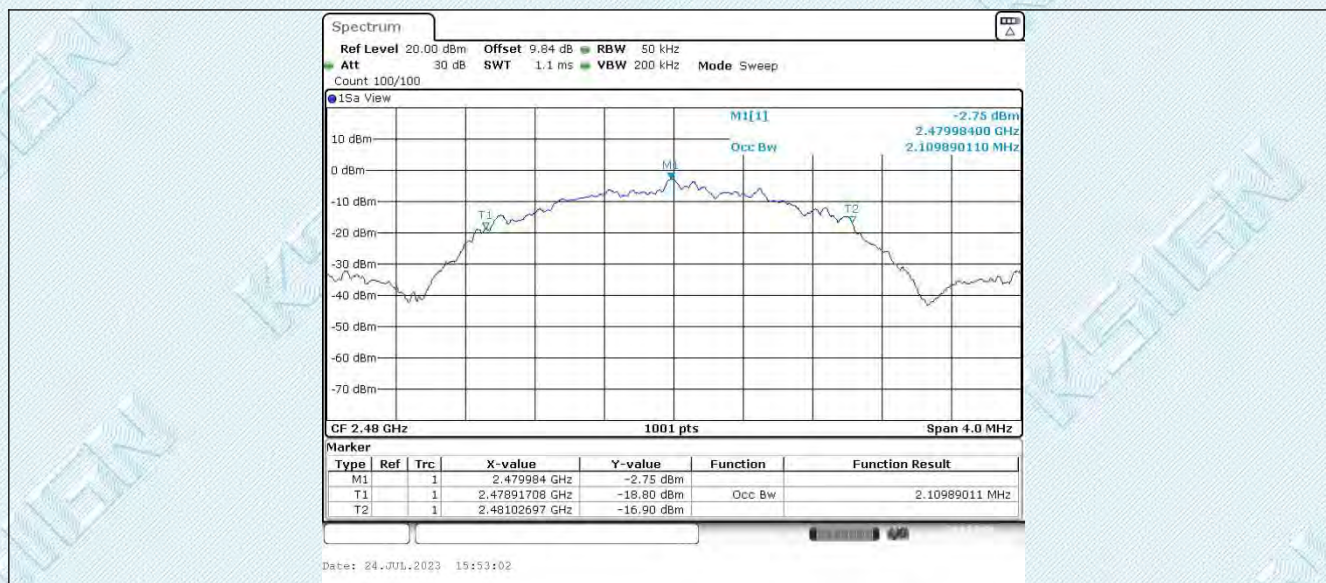
BLE\_2M\_Ant1\_2480

TRF No. RF\_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

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TRF No. RF\_R1

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### 7.3. Appendix C: Maximum conducted output power

#### 7.3.1. Test Result Peak

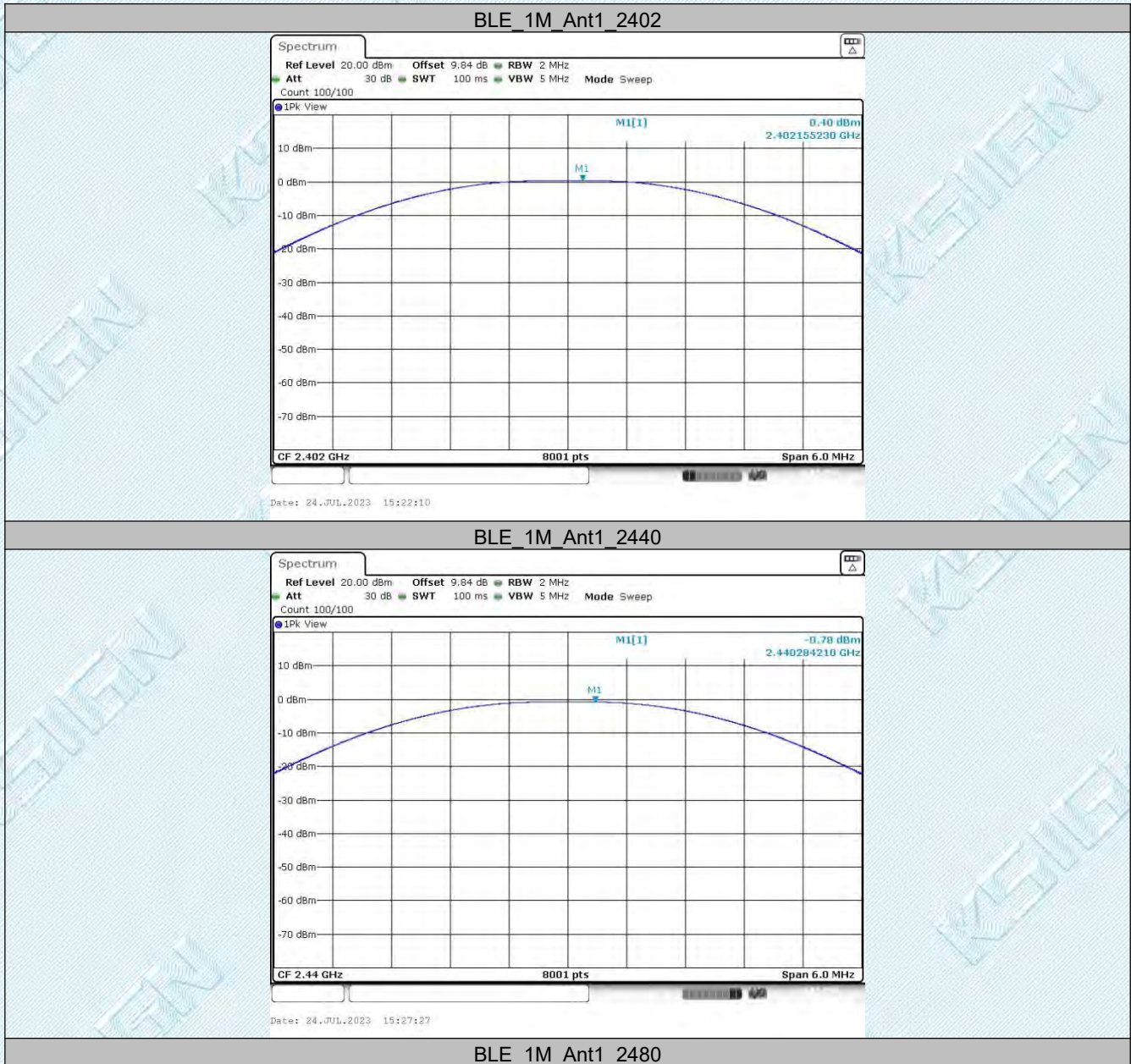
| TestMode | Antenna | Freq[MHz] | Conducted Peak Power[dBm] | Conducted Limit[dBm] | Verdict |
|----------|---------|-----------|---------------------------|----------------------|---------|
| BLE_1M   | Ant1    | 2402      | 0.4                       | ≤30                  | PASS    |
|          |         | 2440      | -0.78                     | ≤30                  | PASS    |
|          |         | 2480      | -0.07                     | ≤30                  | PASS    |
| BLE_2M   | Ant1    | 2402      | 0.38                      | ≤30                  | PASS    |
|          |         | 2440      | -0.79                     | ≤30                  | PASS    |
|          |         | 2480      | -0.08                     | ≤30                  | PASS    |

Note:

Antenna Gain:1.61dBi



### 7.3.2. Test Graphs Peak

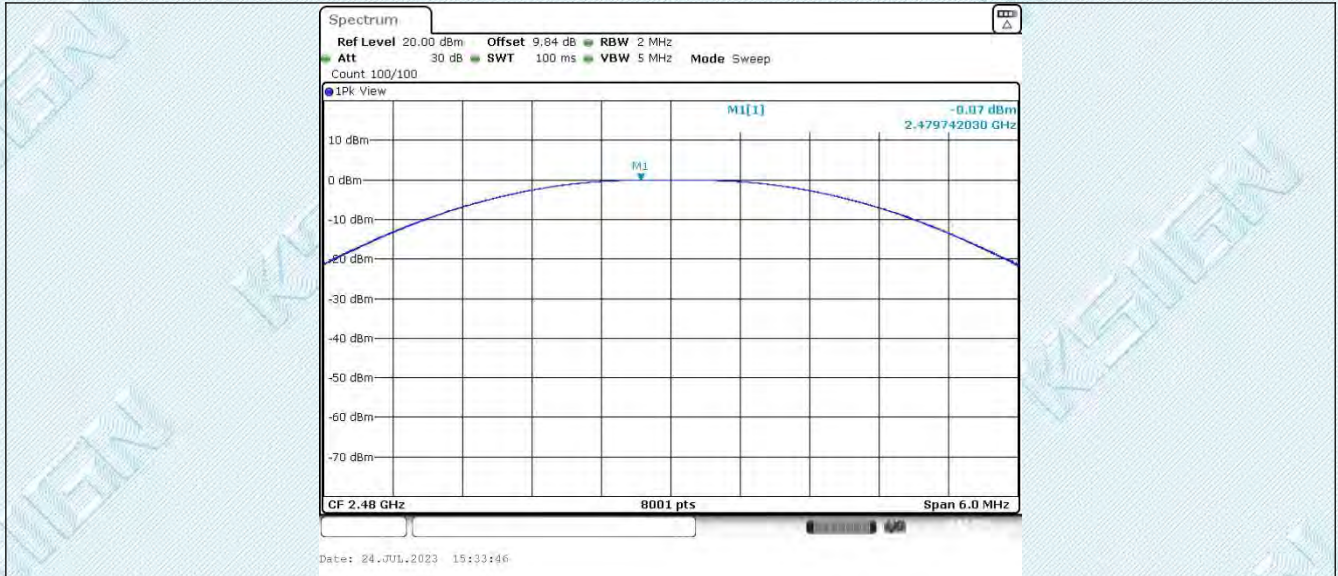


TRF No. RF\_R1

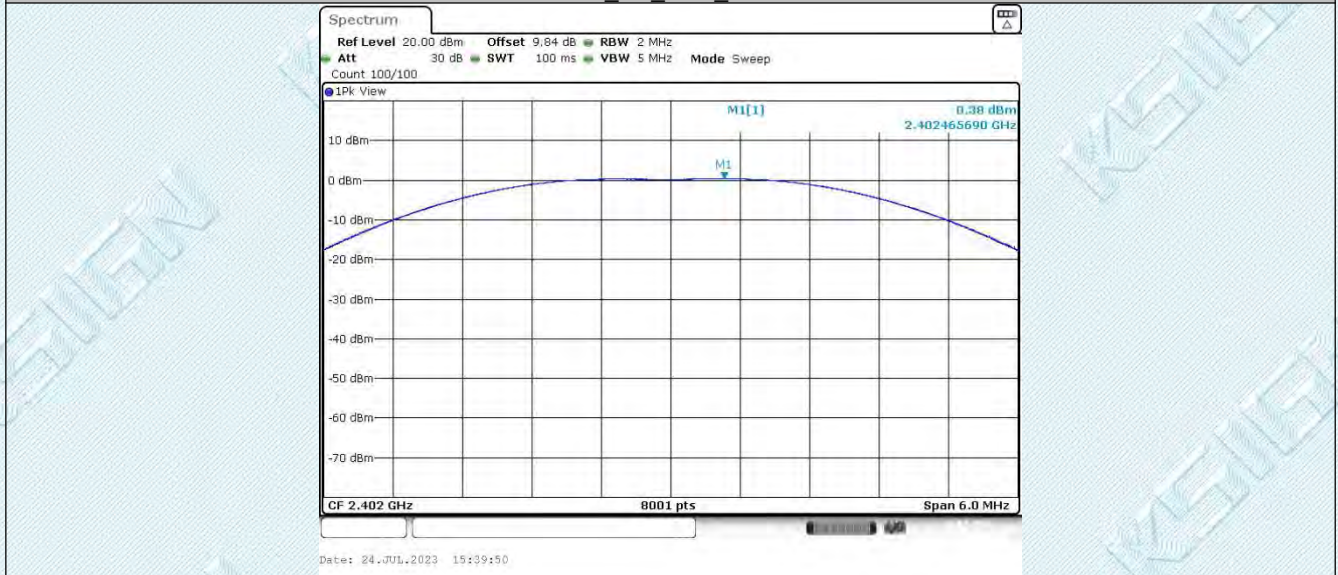
Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

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BLE\_2M\_Ant1\_2402



BLE\_2M\_Ant1\_2440



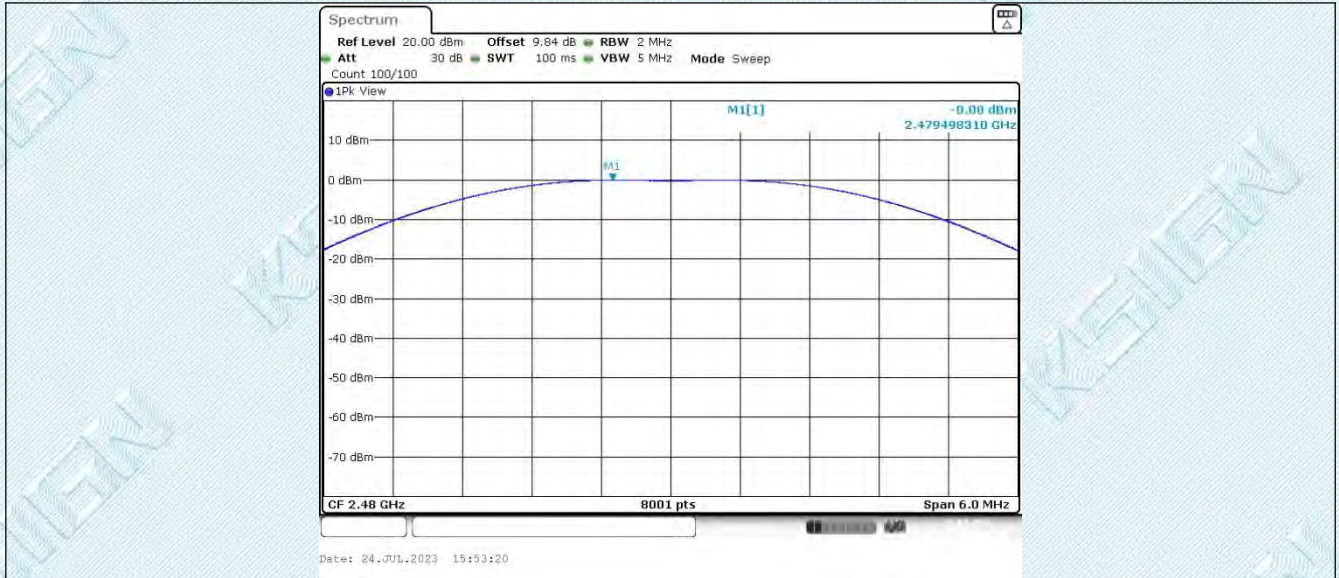
BLE\_2M\_Ant1\_2480

TRF No. RF\_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

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TRF No. RF\_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

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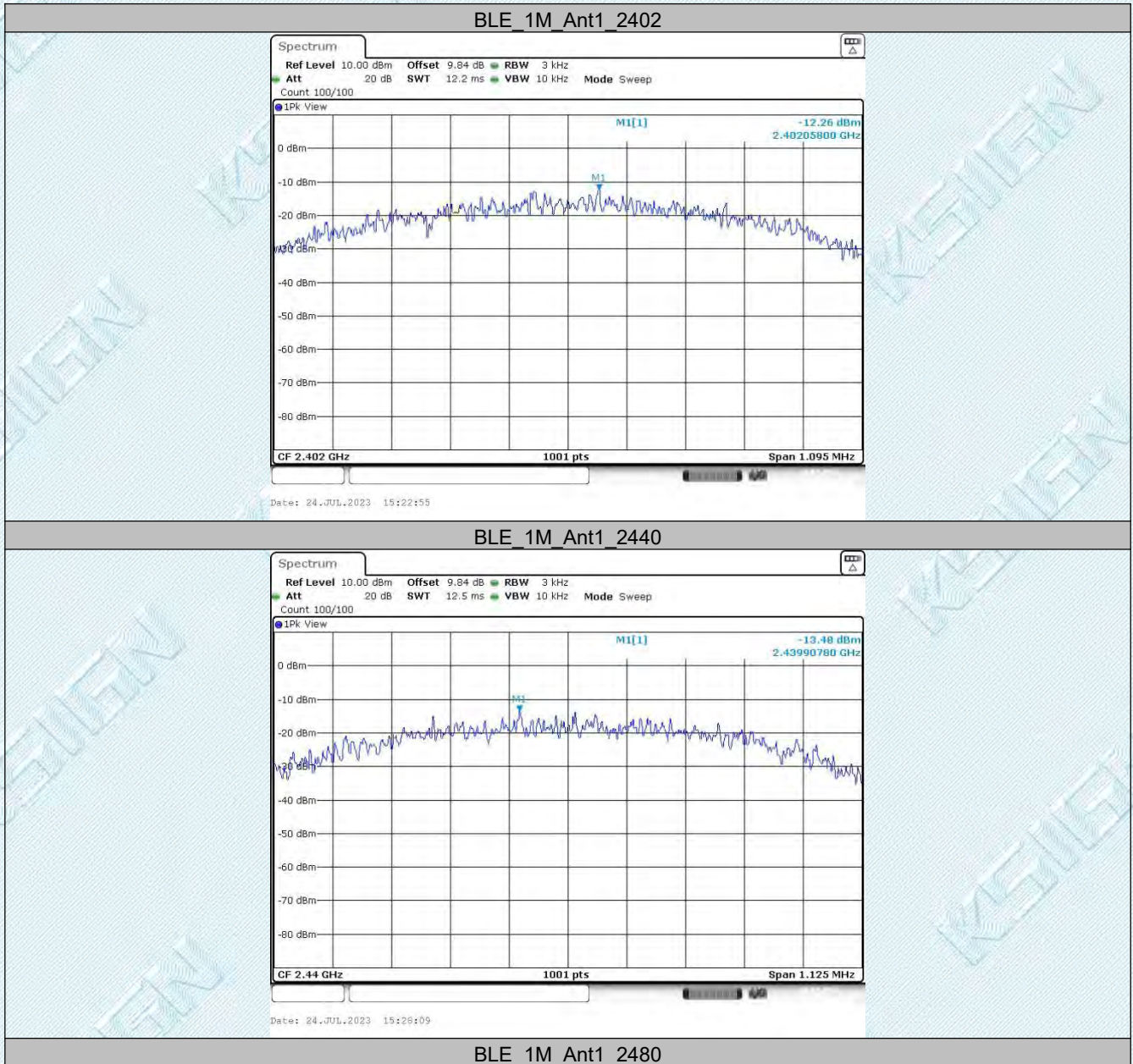
## 7.4. Appendix D: Maximum power spectral density

### 7.4.1. Test Result

| TestMode | Antenna | Freq[MHz] | Result[dBm/3kHz] | Limit[dBm/3kHz] | Verdict |
|----------|---------|-----------|------------------|-----------------|---------|
| BLE_1M   | Ant1    | 2402      | -12.26           | ≤8.00           | PASS    |
|          |         | 2440      | -13.48           | ≤8.00           | PASS    |
|          |         | 2480      | -13.84           | ≤8.00           | PASS    |
| BLE_2M   | Ant1    | 2402      | -15.7            | ≤8.00           | PASS    |
|          |         | 2440      | -17.43           | ≤8.00           | PASS    |
|          |         | 2480      | -16.12           | ≤8.00           | PASS    |



## 7.4.2. Test Graphs

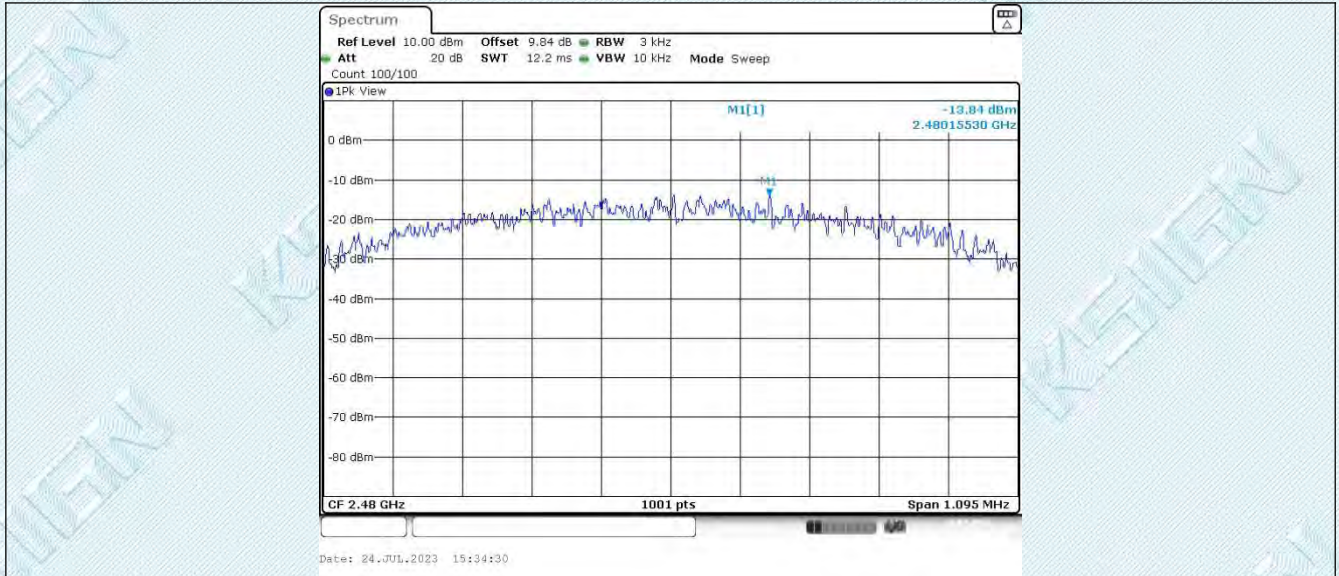


TRF No. RF\_R1

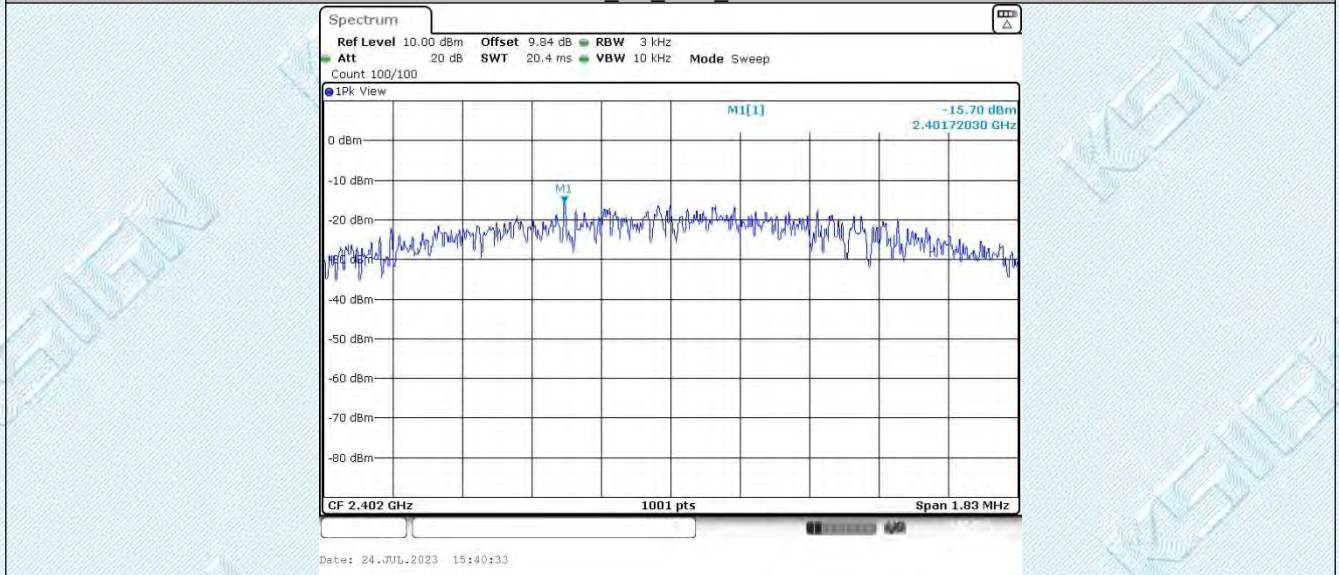
Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

Tel: +(86) 0755-2985 2678 Fax: +(86) 0755-2985 2397 E-mail: info@gdksign.cn Web: www.gdksign.com

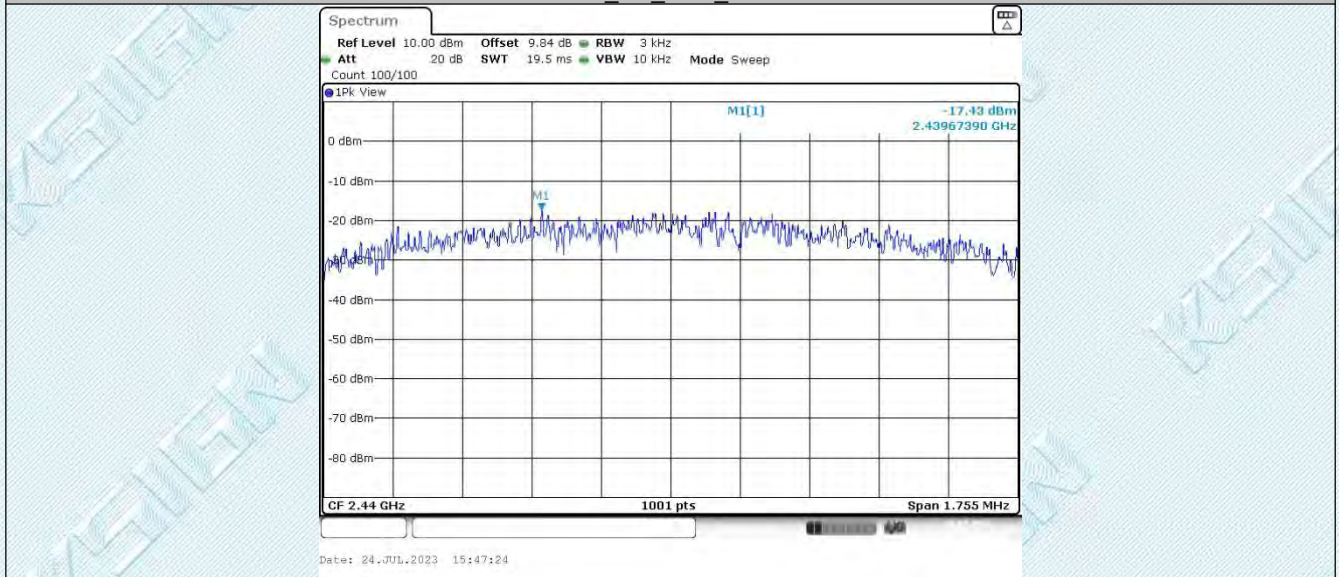




BLE\_2M\_Ant1\_2402



BLE\_2M\_Ant1\_2440



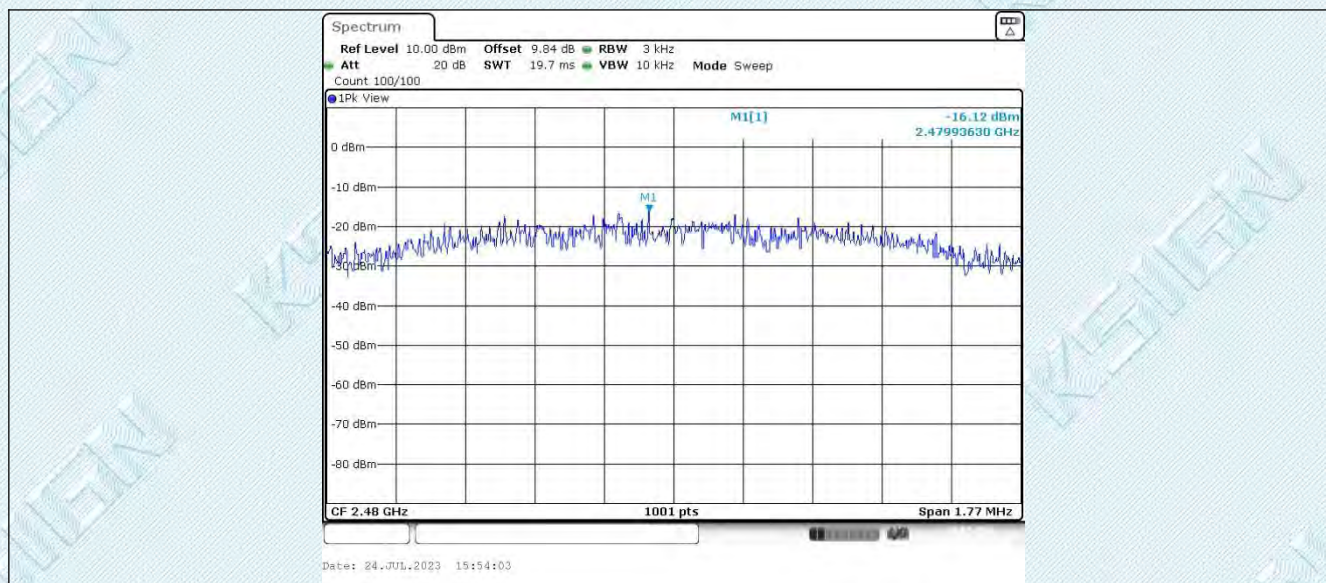
BLE\_2M\_Ant1\_2480

TRF No. RF\_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

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TRF No. RF\_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

Tel: +(86) 0755-2985 2678 Fax: +(86) 0755-2985 2397 E-mail: info@gdksign.cn Web: www.gdksign.com



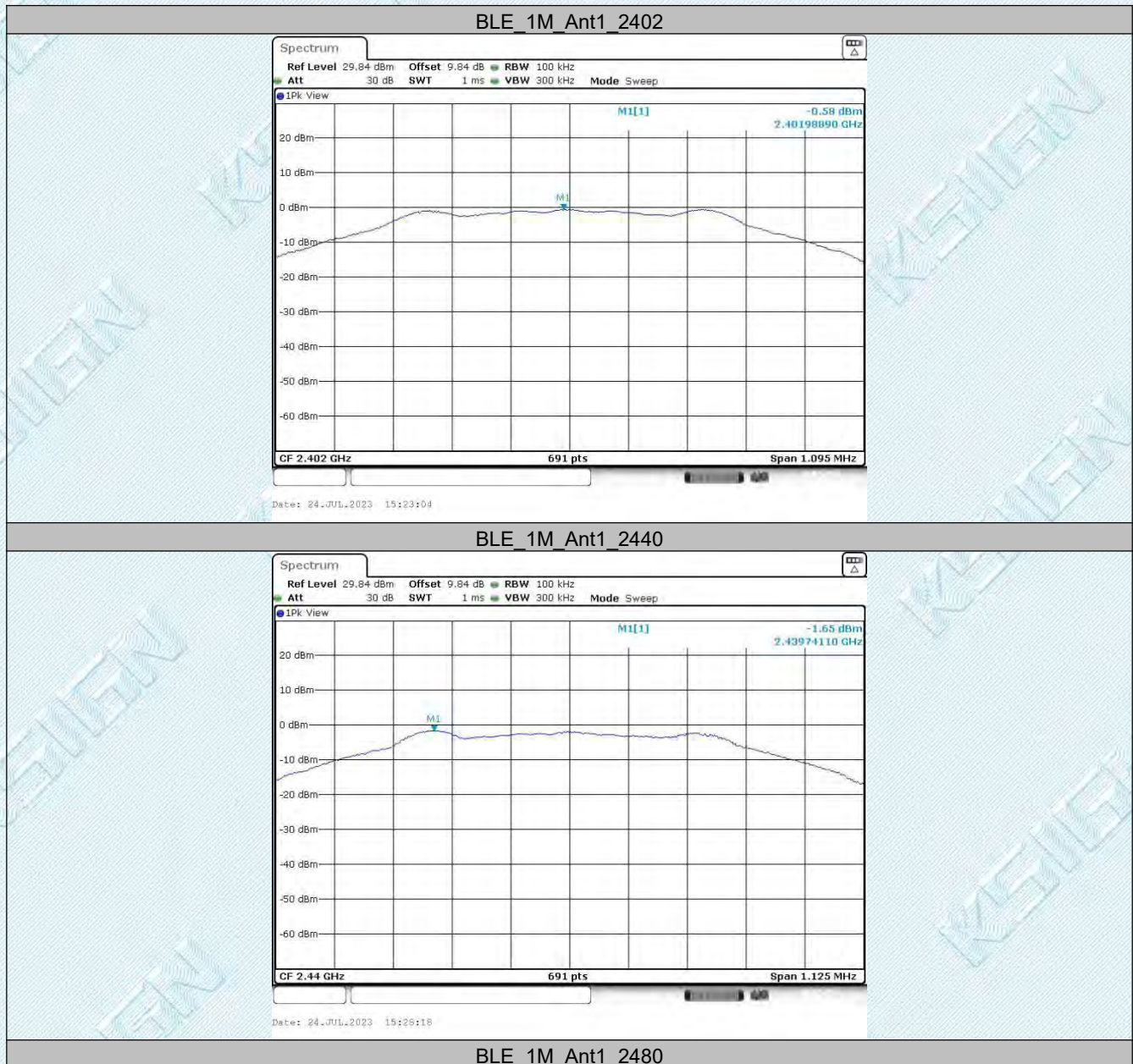
## 7.5. Appendix E: Reference level measurement

### 7.5.1. Test Result

| TestMode | Antenna | Freq[MHz] | Max.Point[MHz] | Result[dBm] |
|----------|---------|-----------|----------------|-------------|
| BLE_1M   | Ant1    | 2402      | 2401.99        | -0.58       |
|          |         | 2440      | 2439.74        | -1.65       |
|          |         | 2480      | 2479.74        | -0.44       |
| BLE_2M   | Ant1    | 2402      | 2402.01        | -0.72       |
|          |         | 2440      | 2439.99        | -1.49       |
|          |         | 2480      | 2479.99        | -0.83       |



## 7.5.2. Test Graphs

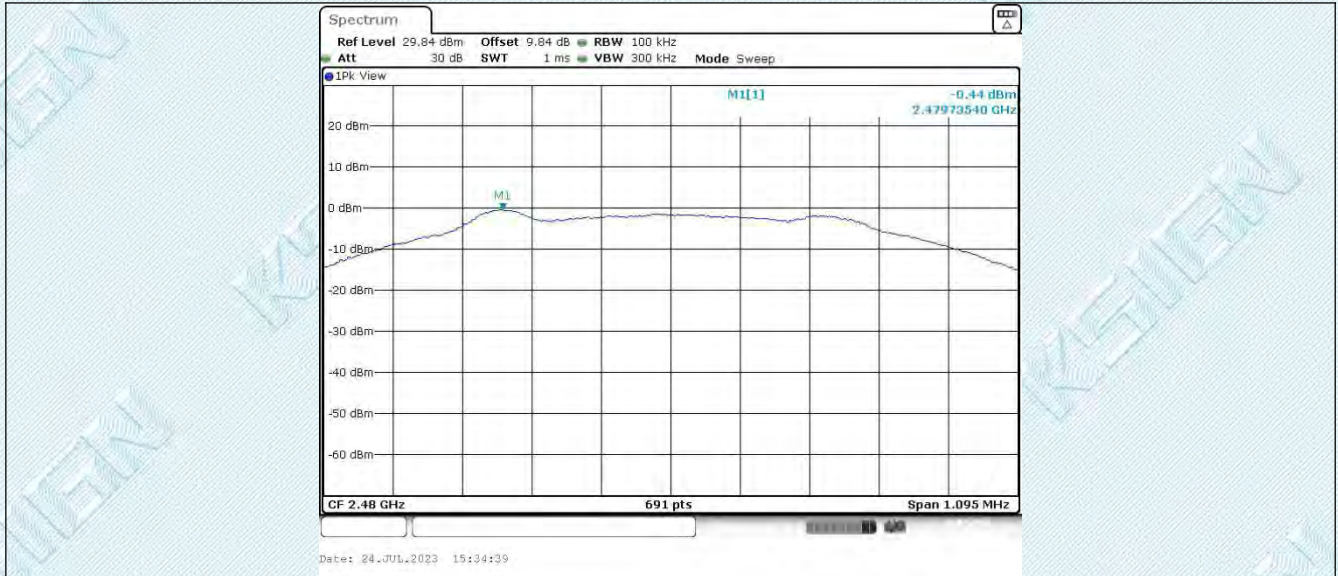


TRF No. RF\_R1

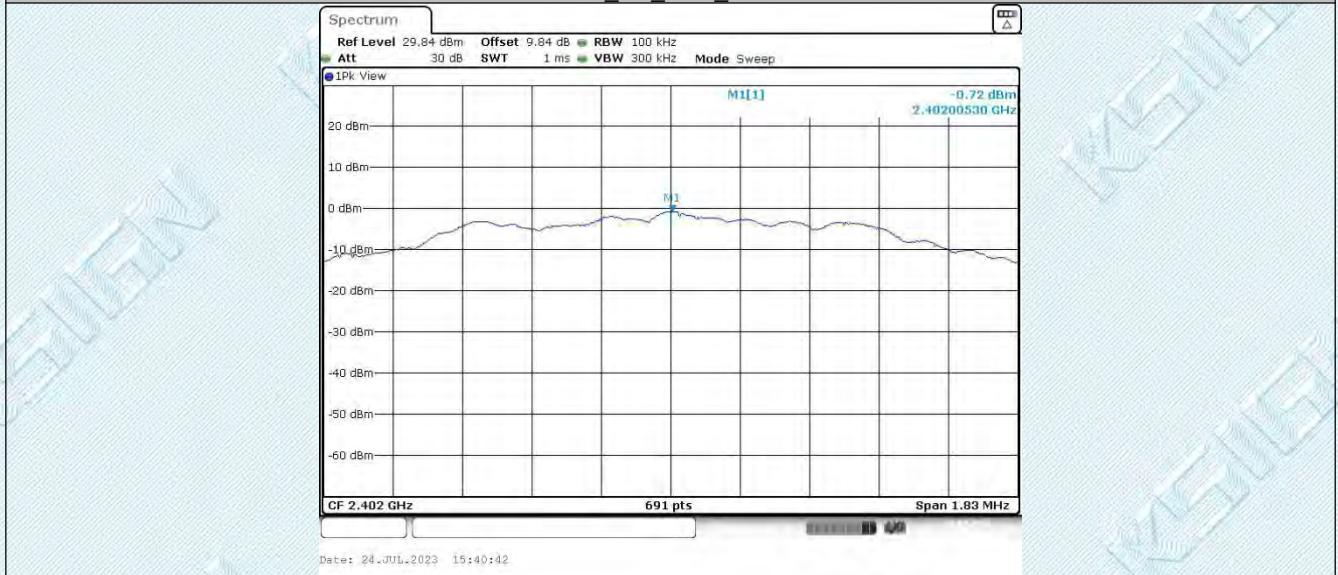
Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

Tel: +(86) 0755-2985 2678 Fax: +(86) 0755-2985 2397 E-mail: info@gdksign.cn Web: www.gdksign.com

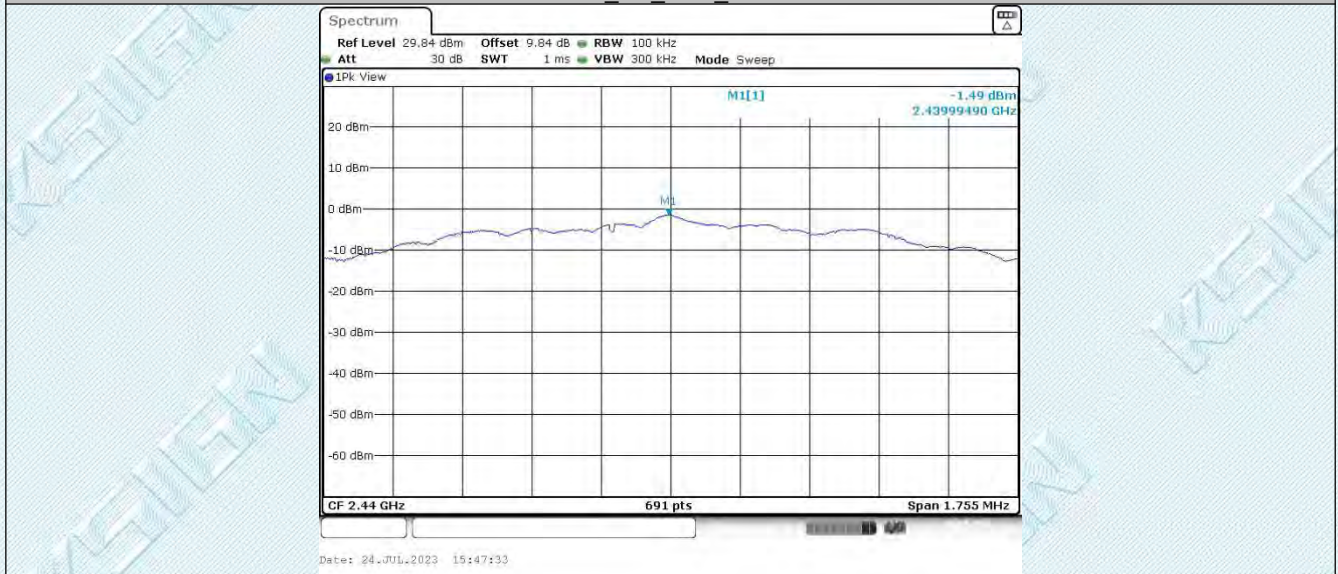




BLE\_2M\_Ant1\_2402



BLE\_2M\_Ant1\_2440



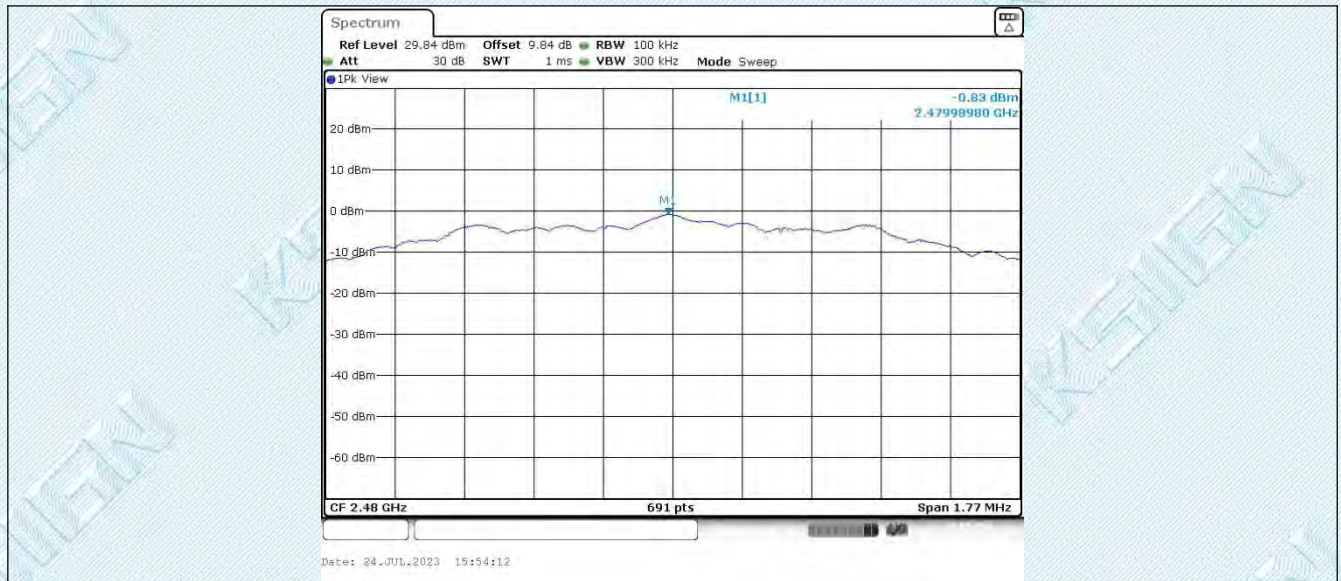
BLE\_2M\_Ant1\_2480

TRF No. RF\_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

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## 7.6. Appendix F: Band edge measurements

### 7.6.1. Test Result

| TestMode | Antenna | ChName | Freq[MHz] | RefLevel[dBm] | Result[dBm] | Limit[dBm]    | Verdict |
|----------|---------|--------|-----------|---------------|-------------|---------------|---------|
| BLE_1M   | Ant1    | Low    | 2402      | -0.58         | -40.98      | $\leq -20.58$ | PASS    |
|          |         | High   | 2480      | -0.44         | -40.31      | $\leq -20.44$ | PASS    |
| BLE_2M   | Ant1    | Low    | 2402      | -0.72         | -32.58      | $\leq -20.72$ | PASS    |
|          |         | High   | 2480      | -0.83         | -39.99      | $\leq -20.83$ | PASS    |



## 7.6.2. Test Graphs



TRF No. RF\_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

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## 7.7. Appendix G: Conducted Spurious Emission

### 7.7.1. Test Result

| TestMode | Antenna | Freq[MHz] | FreqRange [MHz] | RefLevel [dBm] | Result[dBm] | Limit[dBm] | Verdict |
|----------|---------|-----------|-----------------|----------------|-------------|------------|---------|
| BLE_1M   | Ant1    | 2402      | 30~1000         | -0.58          | -51.22      | ≤-30.58    | PASS    |
|          |         |           | 1000~26500      | -0.58          | -52.19      | ≤-30.58    | PASS    |
|          |         | 2440      | 30~1000         | -1.65          | -52.42      | ≤-31.65    | PASS    |
|          |         |           | 1000~26500      | -1.65          | -52.29      | ≤-31.65    | PASS    |
|          |         | 2480      | 30~1000         | -0.44          | -52.28      | ≤-30.44    | PASS    |
|          |         |           | 1000~26500      | -0.44          | -51.94      | ≤-30.44    | PASS    |
| BLE_2M   | Ant1    | 2402      | 30~1000         | -0.72          | -52.04      | ≤-30.72    | PASS    |
|          |         |           | 1000~26500      | -0.72          | -52.28      | ≤-30.72    | PASS    |
|          |         | 2440      | 30~1000         | -1.49          | -52.21      | ≤-31.49    | PASS    |
|          |         |           | 1000~26500      | -1.49          | -52.19      | ≤-31.49    | PASS    |
|          |         | 2480      | 30~1000         | -0.83          | -52.31      | ≤-30.83    | PASS    |
|          |         |           | 1000~26500      | -0.83          | -52.63      | ≤-30.83    | PASS    |

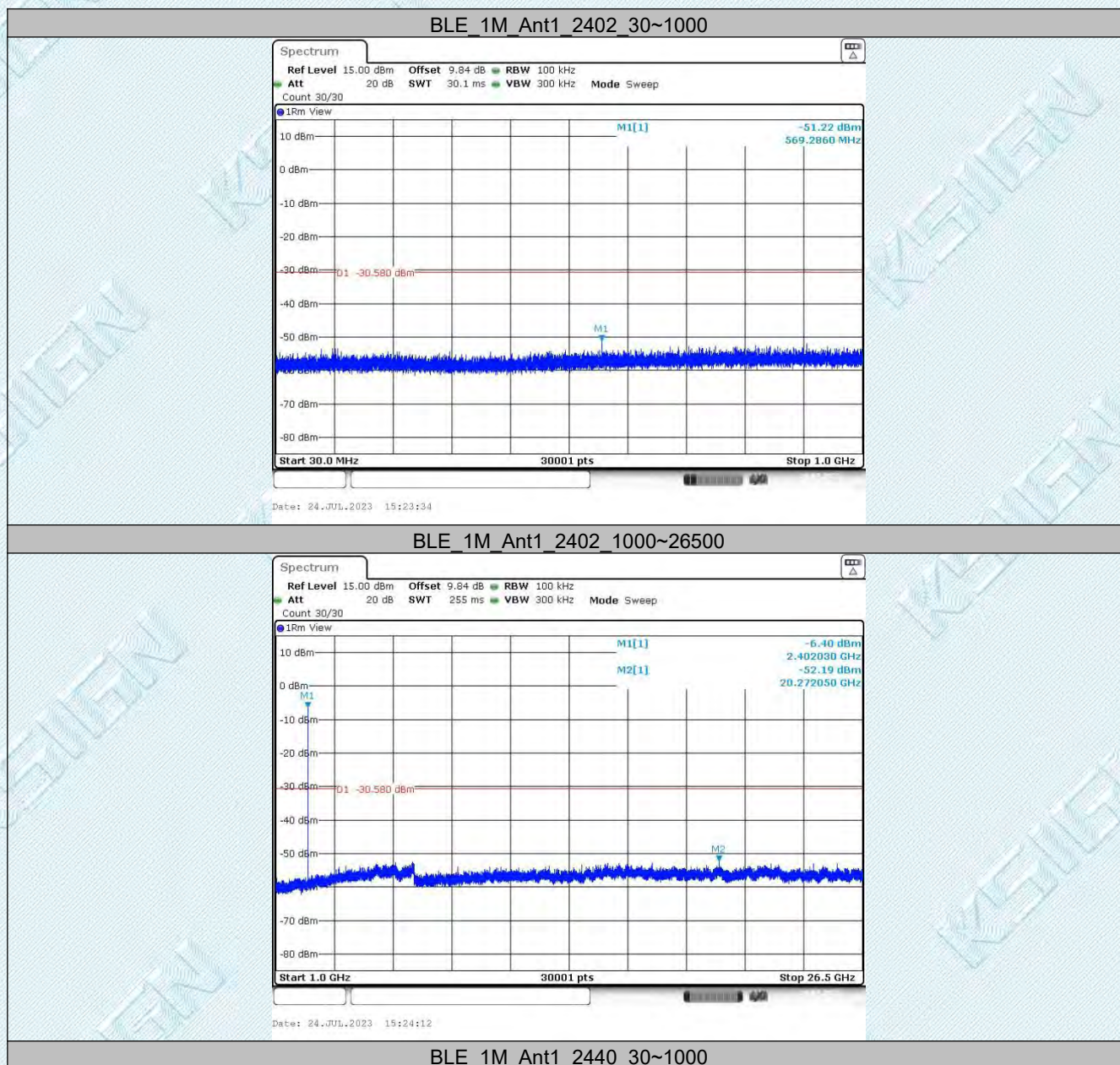
TRF No. RF\_R1

Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

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## 7.7.2. Test Graphs

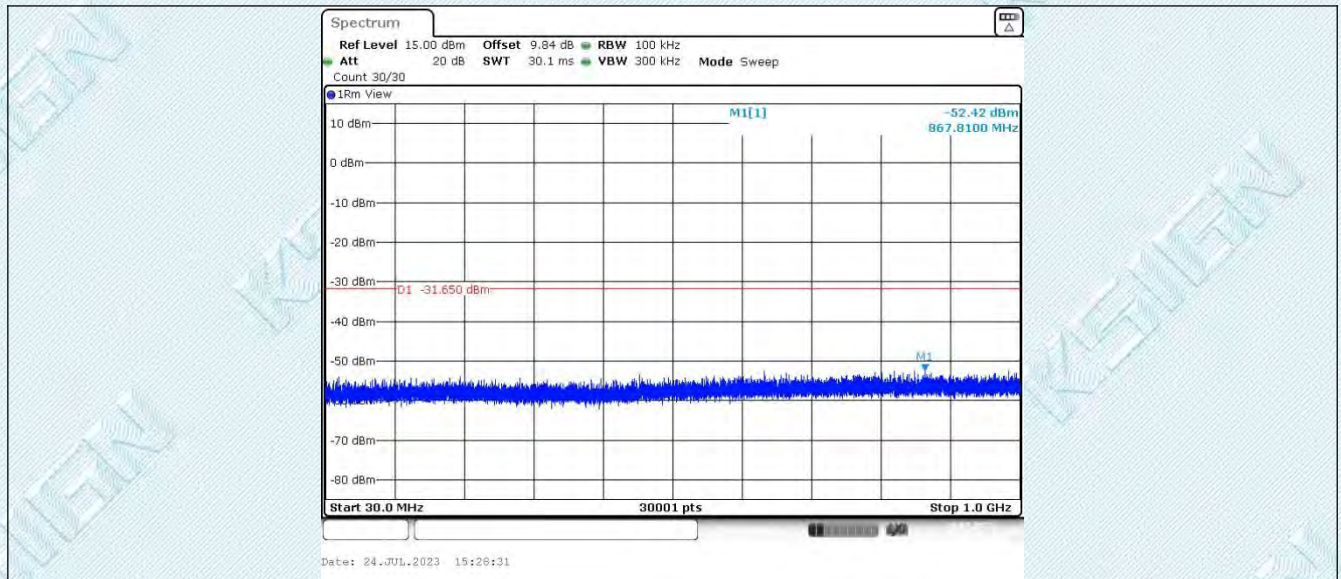


TRF No. RF\_R1

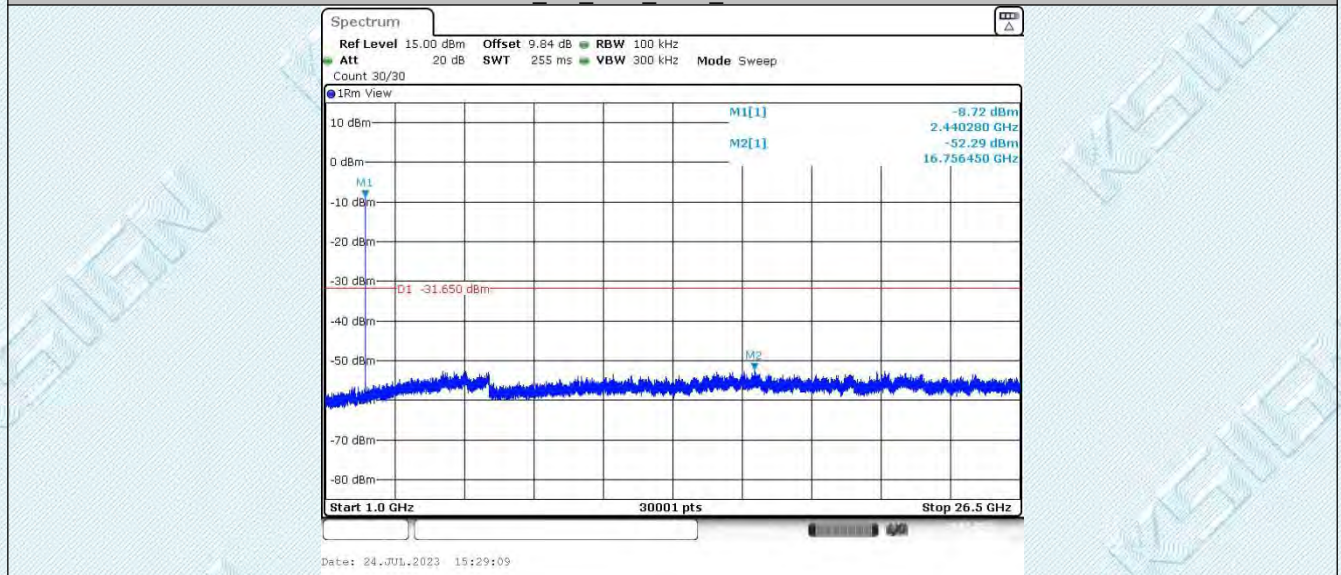
Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

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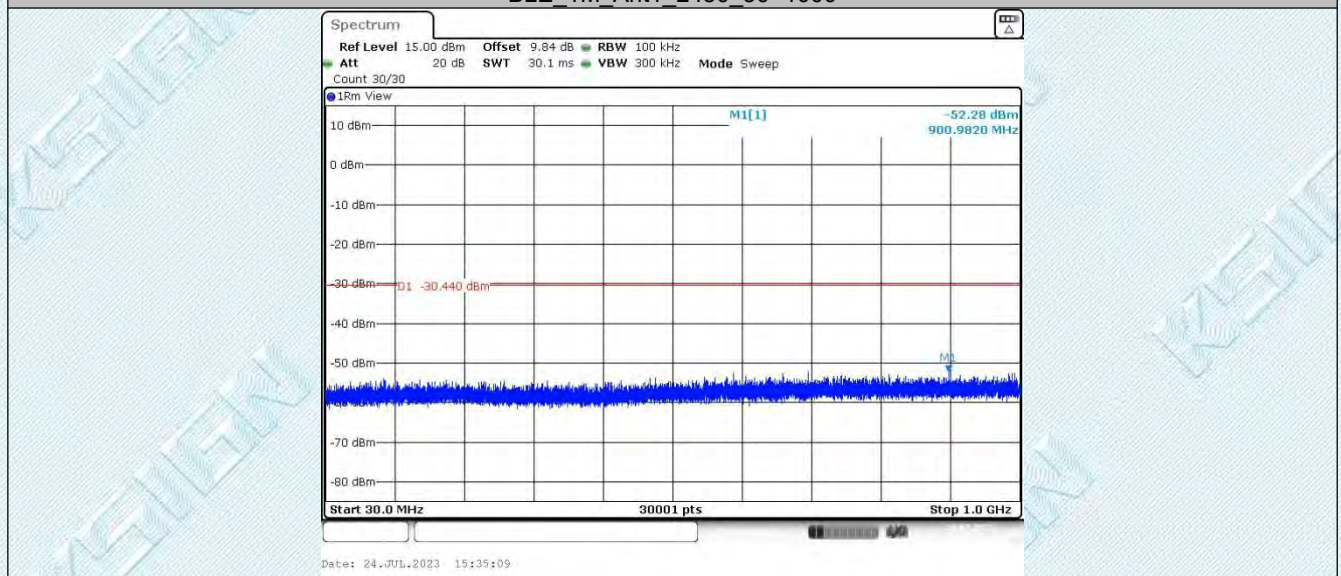




BLE\_1M\_Ant1\_2440\_1000~26500



BLE\_1M\_Ant1\_2480\_30~1000



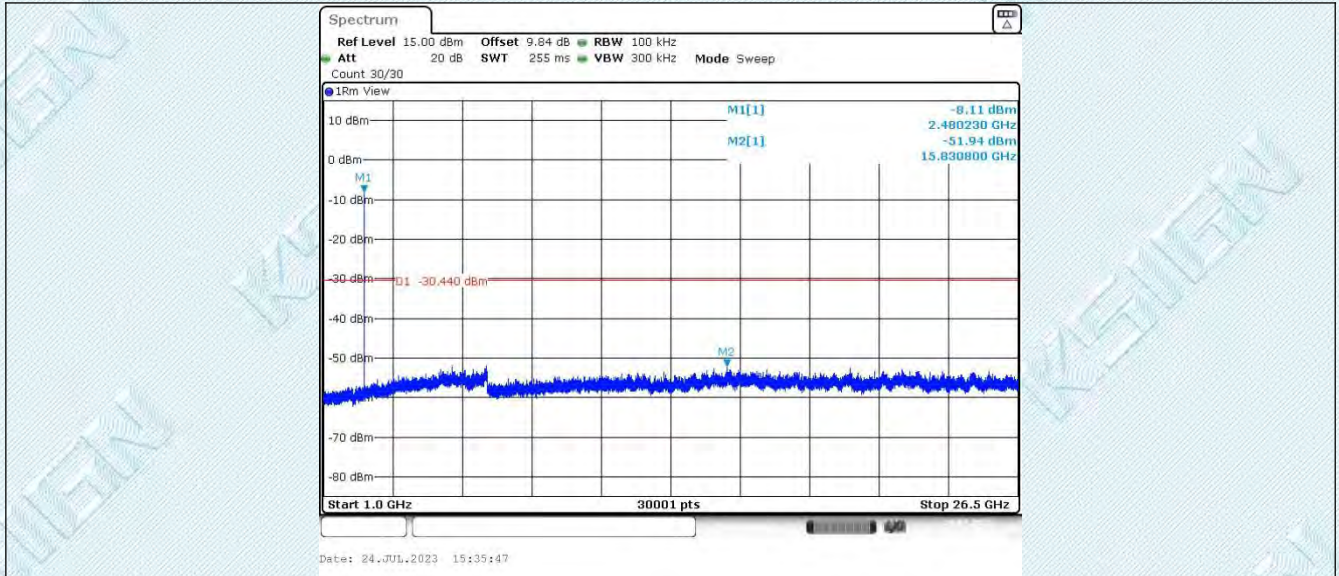
BLE\_1M\_Ant1\_2480\_1000~26500

TRF No. RF\_R1

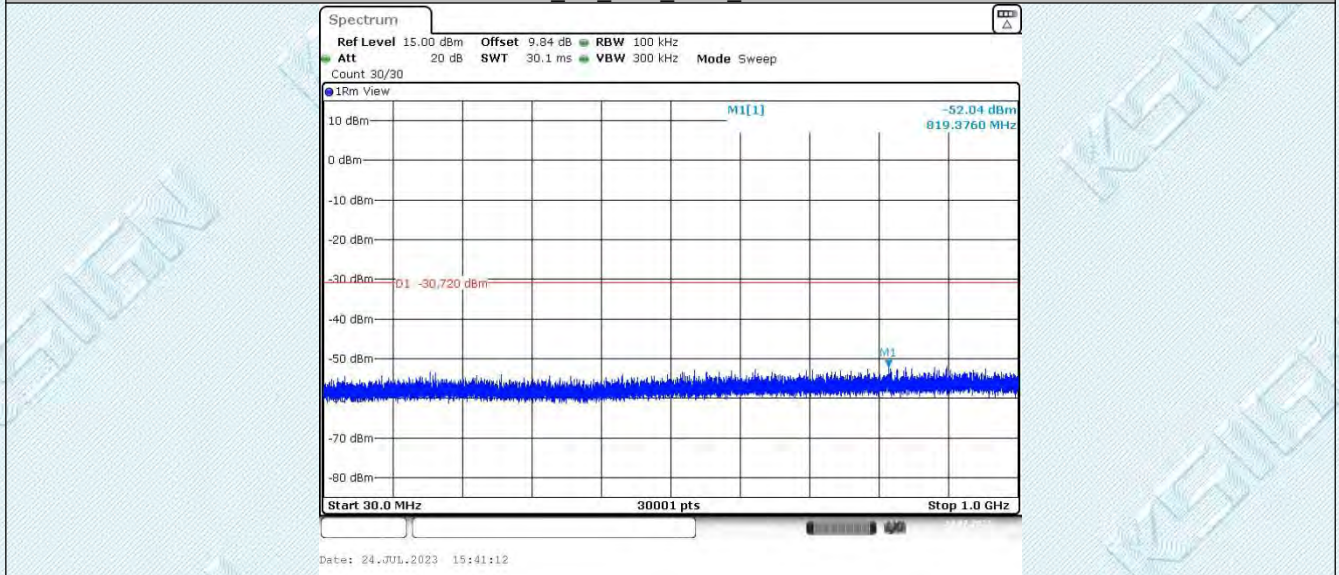
Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

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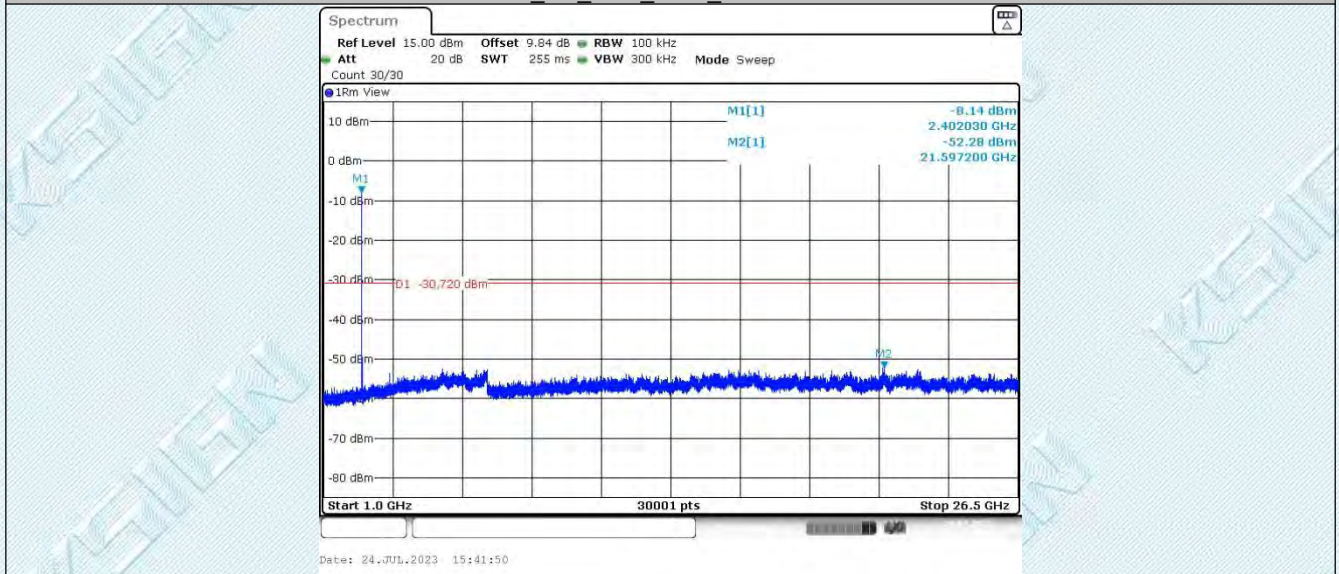




BLE 2M Ant1\_2402\_30~1000



BLE 2M Ant1\_2402\_1000~26500



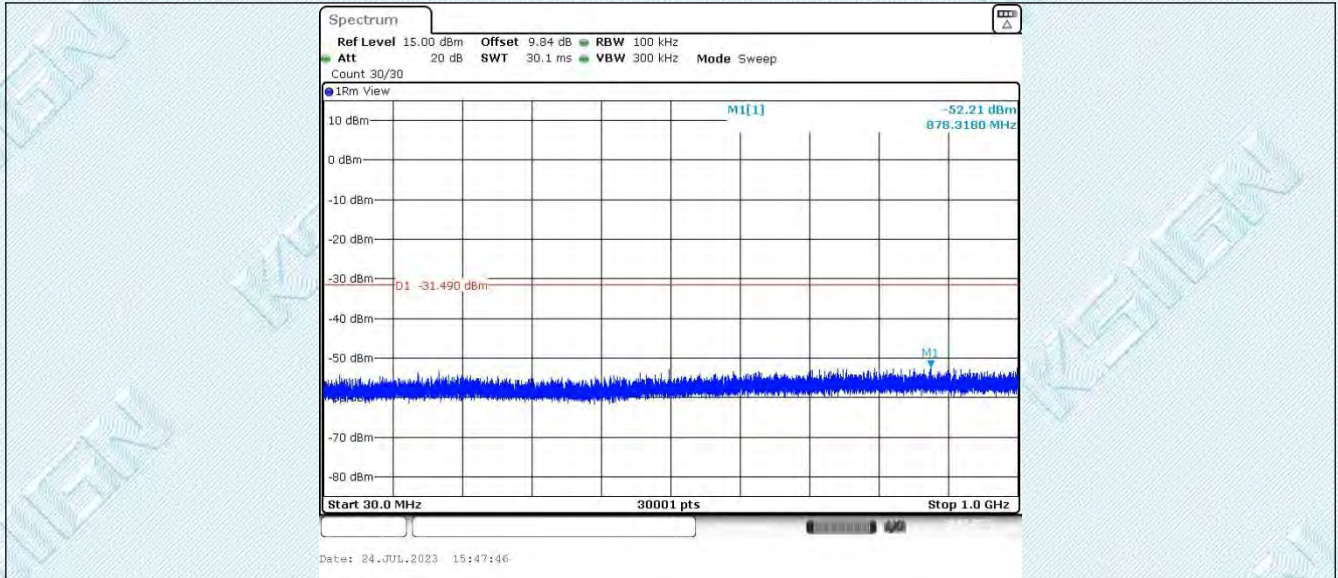
BLE 2M Ant1\_2440\_30~1000

TRF No. RF\_R1

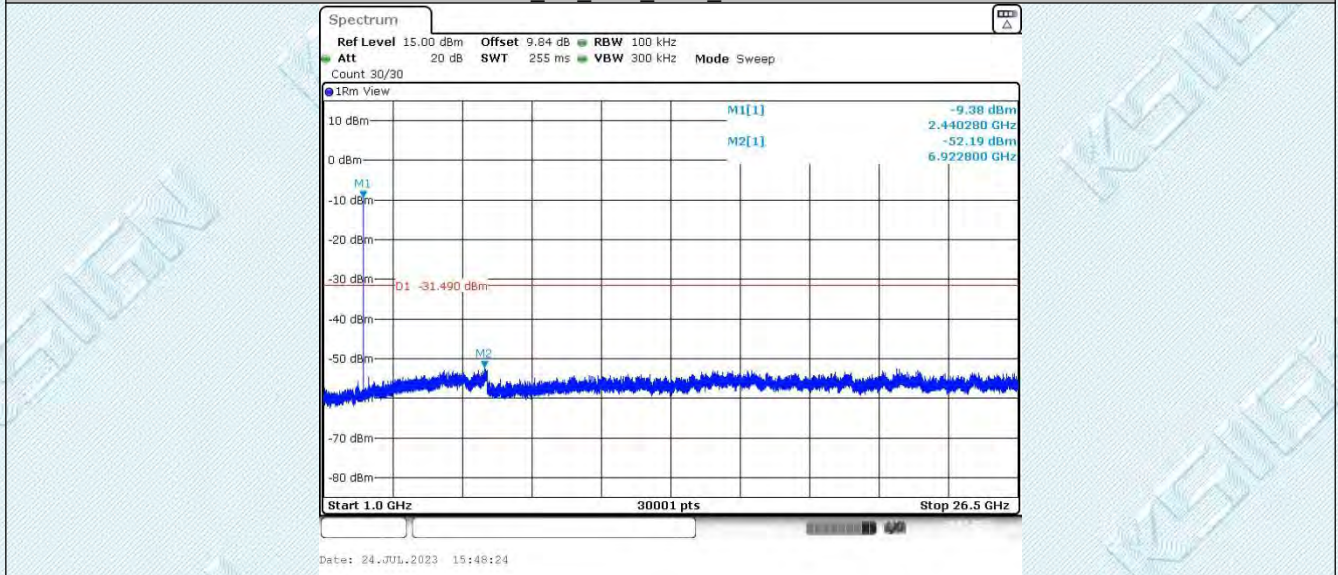
Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

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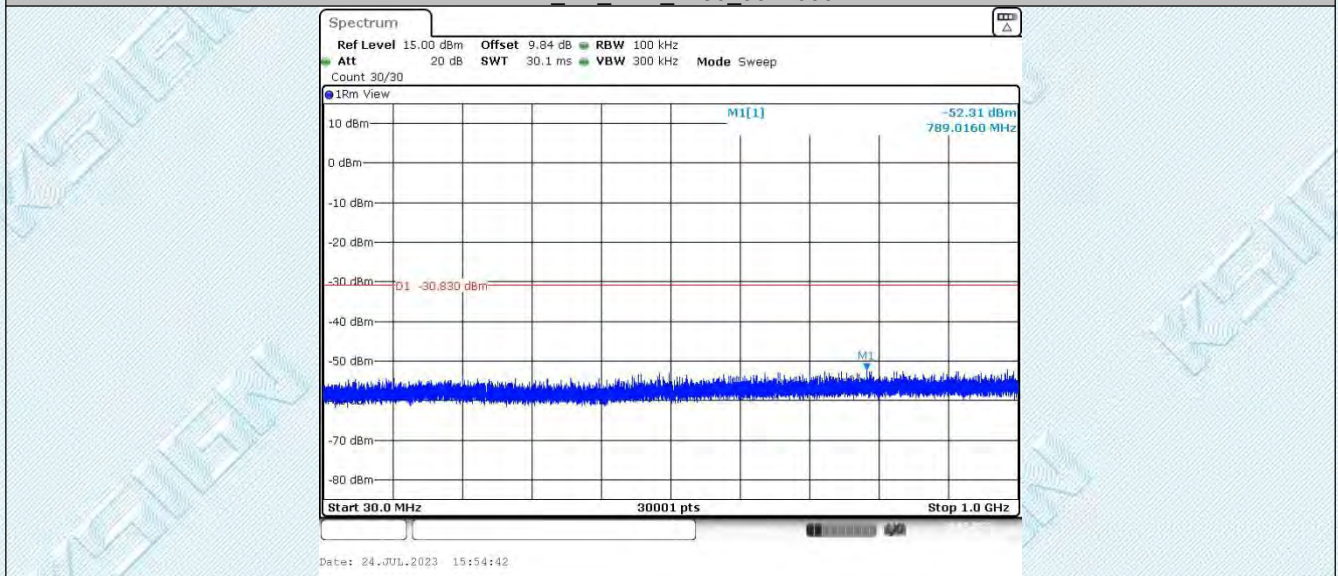




BLE 2M Ant1\_2440\_1000~26500



BLE 2M Ant1\_2480\_30~1000



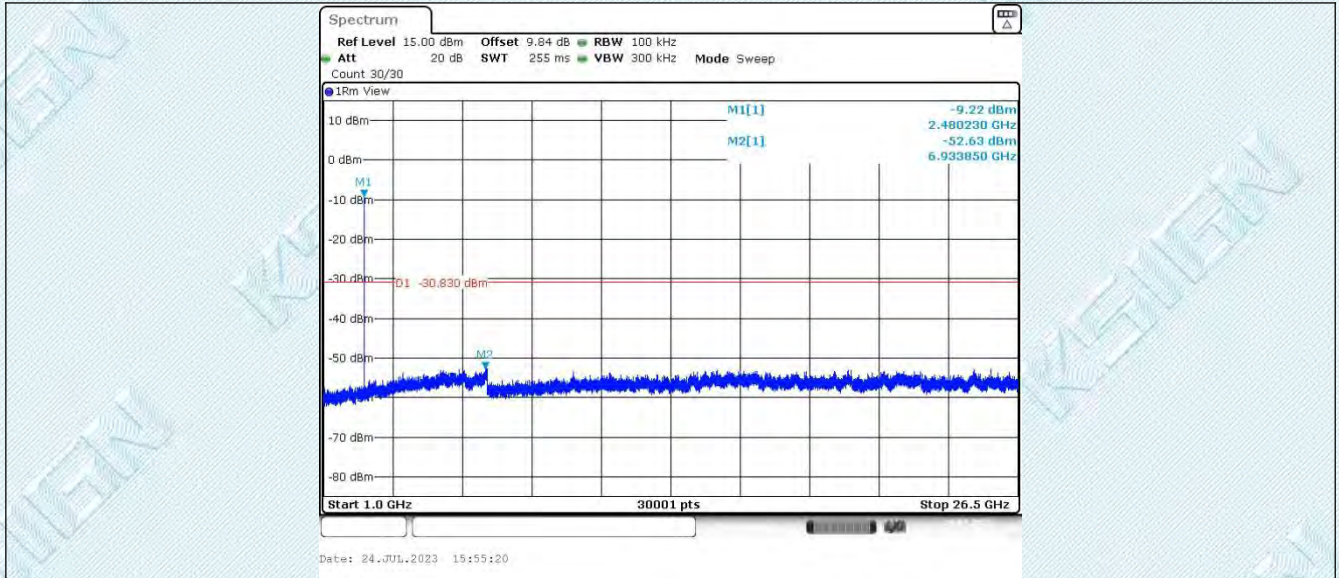
BLE 2M Ant1\_2480\_1000~26500

TRF No. RF\_R1

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## 7.8. Appendix H: Duty Cycle

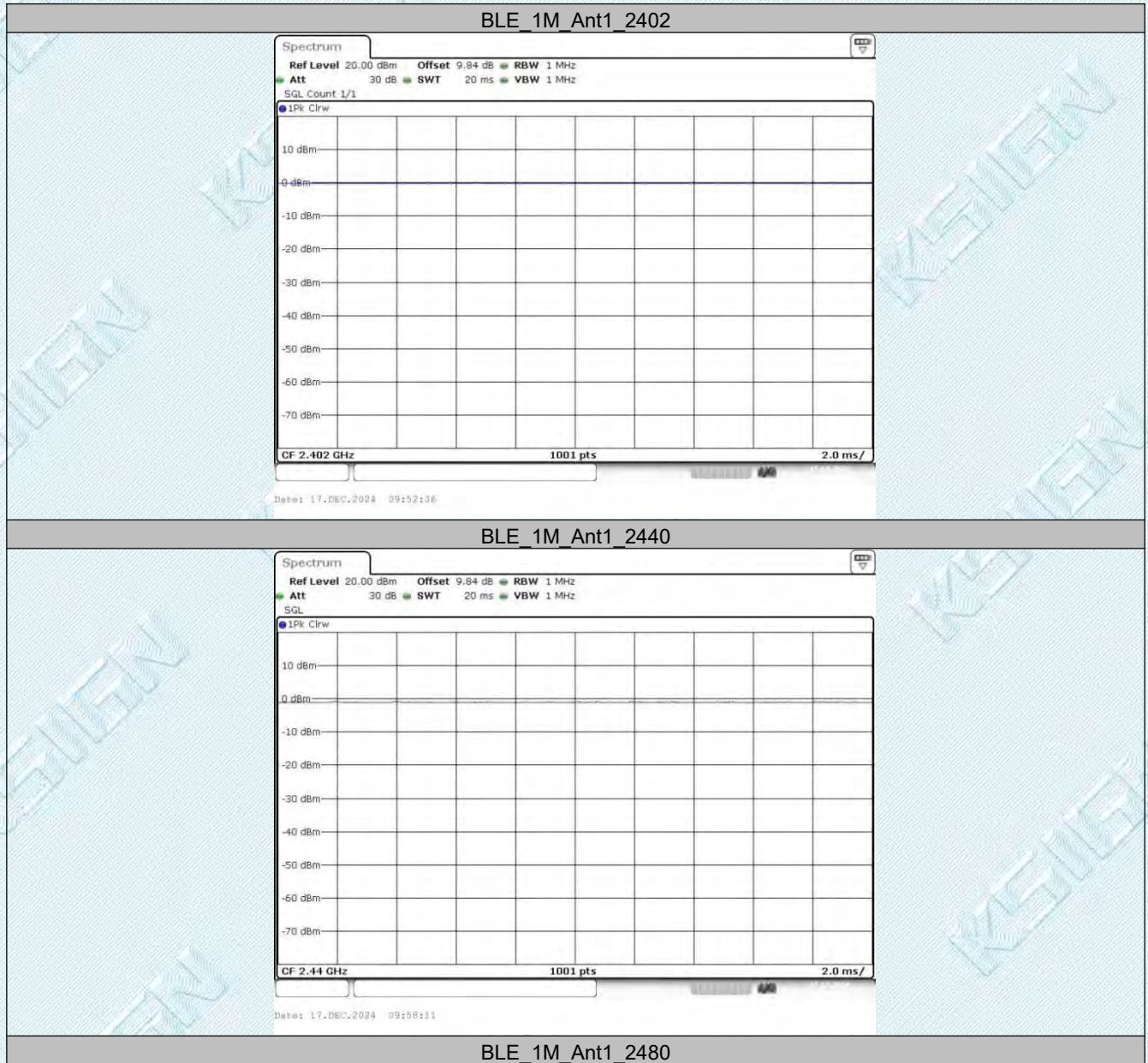
### 7.8.1. Test Result

| TestMode | Antenna | Freq[MHz] | ON Time<br>[ms] | Period<br>[ms] | DC [%] | Limit | Verdict |
|----------|---------|-----------|-----------------|----------------|--------|-------|---------|
| BLE_1M   | Ant1    | 2402      | 20.00           | 20.00          | 100.00 | ---   | PASS    |
|          |         | 2440      | 20.00           | 20.00          | 100.00 | ---   | PASS    |
|          |         | 2480      | 20.00           | 20.00          | 100.00 | ---   | PASS    |
| BLE_2M   | Ant1    | 2402      | 20.00           | 20.00          | 100.00 | ---   | PASS    |
|          |         | 2440      | 20.00           | 20.00          | 100.00 | ---   | PASS    |
|          |         | 2480      | 20.00           | 20.00          | 100.00 | ---   | PASS    |

DC=ON Time/Period\*100%



## 7.8.2. Test Graphs

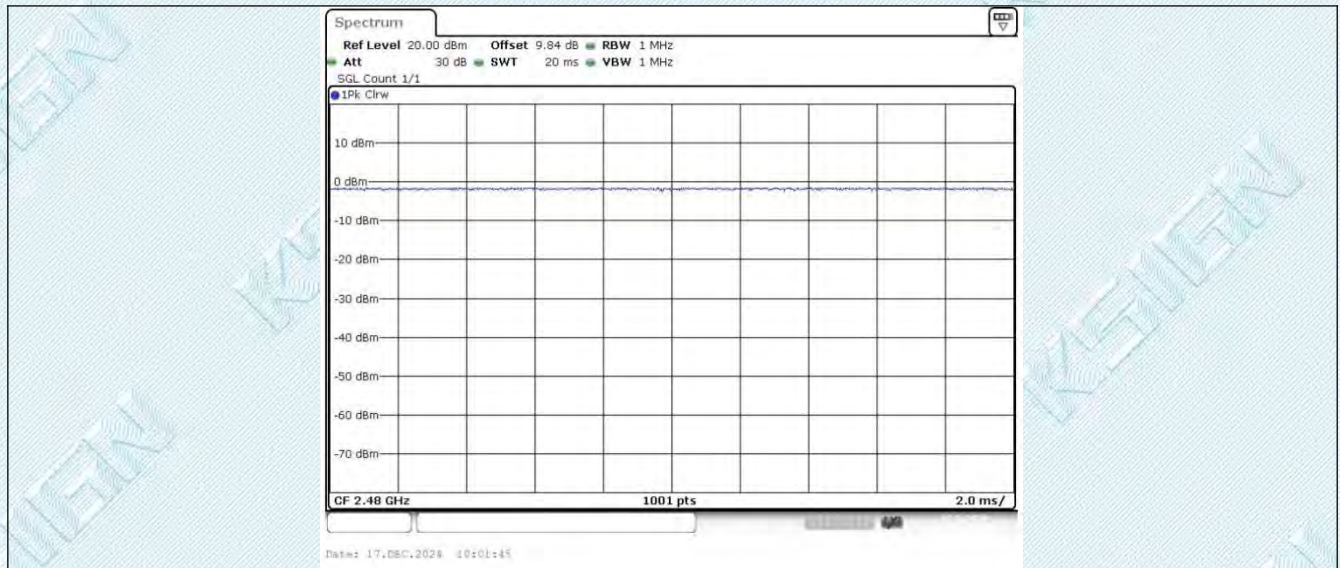


TRF No. RF\_R1

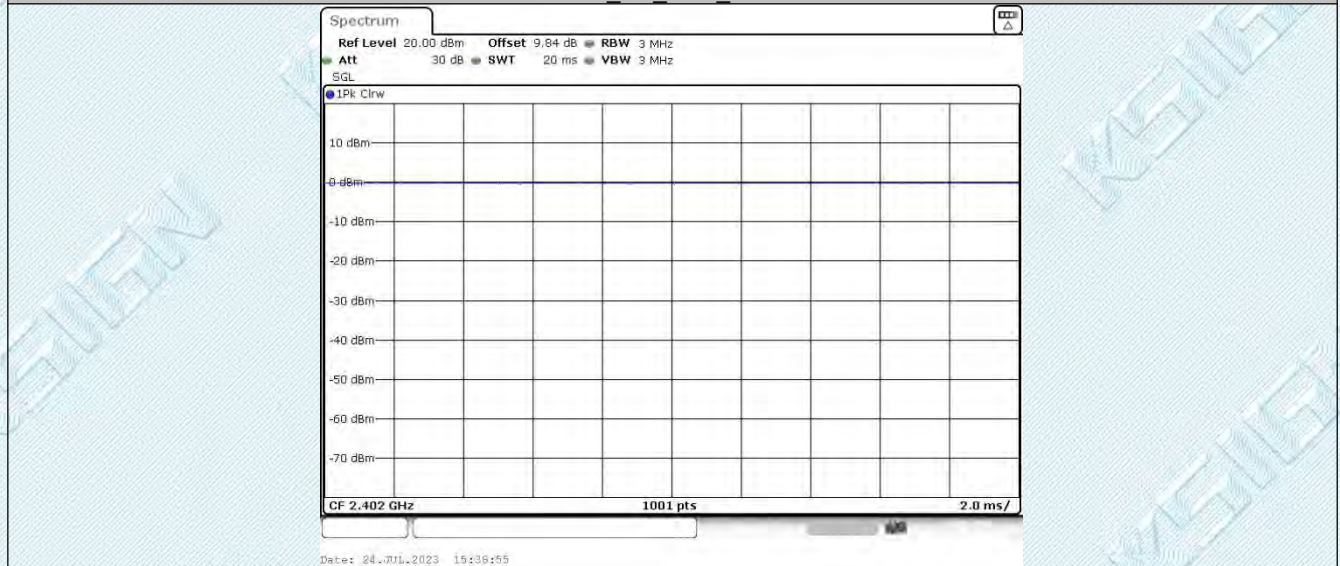
Add: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

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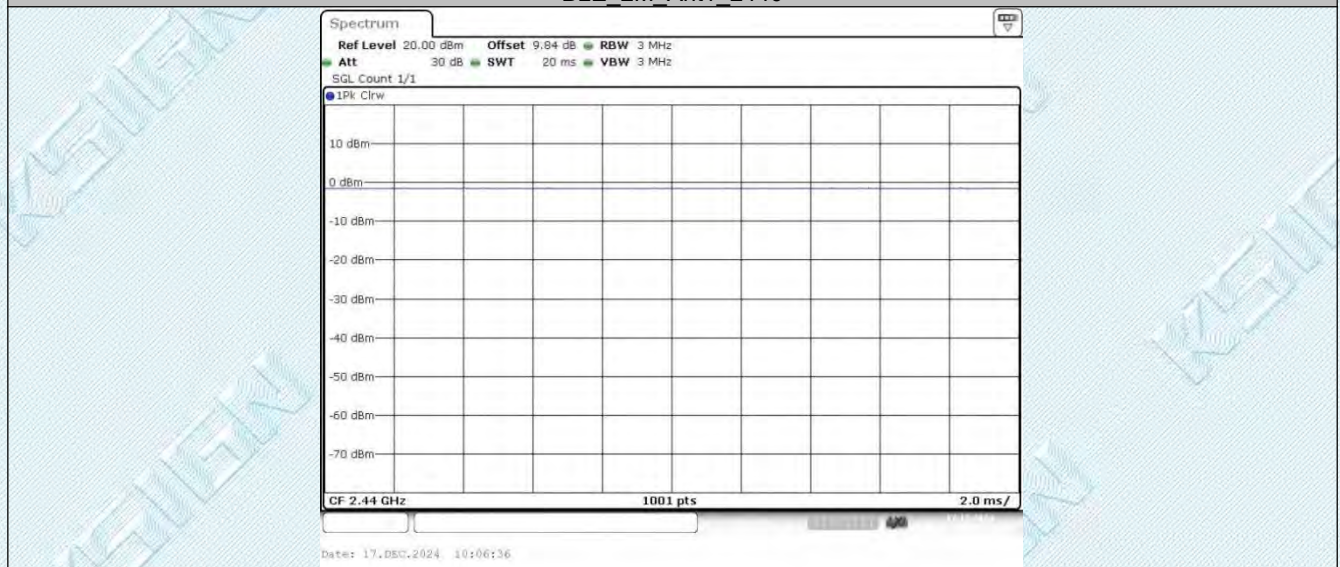




BLE\_2M\_Ant1\_2402



BLE\_2M\_Ant1\_2440



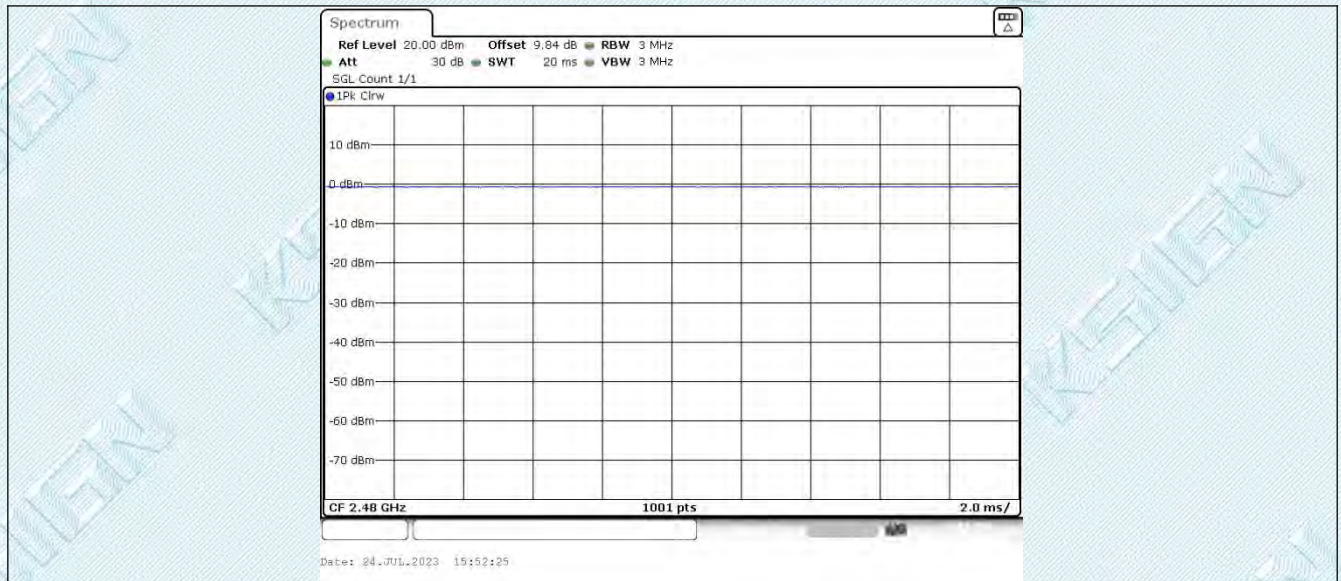
BLE\_2M\_Ant1\_2480

TRF No. RF\_R1

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--THE END--

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