

# **TEST REPORT**

| Applicant:                | Zhuhai Hoksi Technology CO.,LTD  |
|---------------------------|--|
| Address of Applicant:     | Room803, No.3 BLDG, No.6, Pingbei 1 Rd., Nanping<br>Technology&Industry Park, Xiangzhou St., ZhuHai, China |
| Manufacturer:             | Zhuhai Hoksi Technology CO.,LTD  |
| Address of Manufacturer:  | Room803, No.3 BLDG, No.6, Pingbei 1 Rd., Nanping<br>Technology&Industry Park, Xiangzhou St., ZhuHai, China |
| Equipment Under Test (EUT |  |
| Product Name:             | DGK710 Wireless Mechanical Keyboard  |
| Model No.:                | DGK710   |
| Trade Mark:               | N/A  |
| FCC ID:                   | 2AXCA-DGK710   |
| Applicable standards:     | FCC CFR Title 47 Part 15 Subpart C Section 15.247  |
| Date of sample receipt:   | 2023.07.12   |
| Date of Test:             | 2023.07.13-2023.07.21  |
| Date of report issued:    | 2023.07.24   |
| Test Result :             | PASS *   |

\* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Laboratory Manager

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.



## 2 Version

| Version No. | Date          | Description |
|-------------|---------------|-------------|
| 00          | July 24, 2023 | Original    |
|             |               |             |
|             |               |             |
|             |               |             |
|             |               |             |

**Prepared By:** 

Date: Sout

Date:

Project Engineer

Check By:

opinson lunt Reviewer

July 24, 2023

July 24, 2023

## Report No.: GTSL2023070184F01

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## 4 Test Summary

| Test Item                        | Section in CFR 47 | Result |
|----------------------------------|-------------------|--------|
| Antenna requirement              | 15.203/15.247 (c) | Pass   |
| AC Power Line Conducted Emission | 15.207            | Pass   |
| Conducted Output Power           | 15.247 (b)(3)     | Pass   |
| Channel Bandwidth                | 15.247 (a)(2)     | Pass   |
| Power Spectral Density           | 15.247 (e)        | Pass   |
| Band Edge                        | 15.247(d)         | Pass   |
| Spurious Emission                | 15.205/15.209     | Pass   |

Remarks:

- 1. Pass: The EUT complies with the essential requirements in the standard.
- 2. Test according to ANSI C63.10:2013.

## **Measurement Uncertainty**

| Test Item                        | Measurement Uncertainty |     |  |
|----------------------------------|-------------------------|-----|--|
| Radiated Emission                | 3.1dB(9kHz~30MHz)       | (1) |  |
| Radiated Emission                | 3.8039dB(30MHz~200MHz)  | (1) |  |
| Radiated Emission                | 3.9679dB(200MHz~1GHz)   | (1) |  |
| Radiated Emission                | 4.29dB(1GHz~18GHz)      | (1) |  |
| Radiated Emission                | 3.30dB(18GHz~40GHz)     | (1) |  |
| AC Power Line Conducted Emission | 3.44dB(0.15MHz~30MHz)   | (1) |  |
| Occupied Bandwidth               | ±3%                     | (1) |  |
| RF conducted power               | ±0.75dB                 | (1) |  |
| RF power density                 | ±3dB                    | (1) |  |
| Conducted Spurious emissions     | ±2.58dB                 | (1) |  |

## **5** General Information

## 5.1 General Description of EUT

| Product Name:                       | DGK710 Wireless Mechanical Keyboard              |
|-------------------------------------|--|
| Model No.:                          | DGK710   |
| Test Model No.:                     | DGK710   |
| Remark: Only the model name is diff | erent  |
| Test sample(s) ID:                  | GTSL2023070184-01                                |
| Sample(s) Status:                   | Engineer sample                                  |
| S/N:                                | N/A  |
| Operation Frequency:                | 2402MHz~2480MHz                                  |
| Channel Numbers:                    | 40   |
| Channel Separation:                 | 2MHz   |
| Modulation Type:                    | GFSK   |
| Antenna Type:                       | PCB antenna                                      |
| Antenna Gain:                       | 3.12dBi  |
| Power Supply:                       | DC 5V from USB-C or DC 3.8V from lithium battery |
| Remark:                             |  |

#### Remark:

1. Antenna gain information provided by the customer.

2. The relevant information of the sample is provided by the entrusting company, and the laboratory is not responsible for its authenticity.



| Operation Frequency each of channel |           |         |           |         |           |         |           |
|-------------------------------------|-----------|---------|-----------|---------|-----------|---------|-----------|
| Channel                             | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
| 1                                   | 2402 MHz  | 11      | 2422 MHz  | 21      | 2442 MHz  | 31      | 2462 MHz  |
| 2                                   | 2404 MHz  | 12      | 2424 MHz  | 22      | 2444 MHz  | 32      | 2464 MHz  |
| 3                                   | 2406 MHz  | 13      | 2426 MHz  | 23      | 2446 MHz  | 33      | 2466 MHz  |
| 4                                   | 2408 MHz  | 14      | 2428 MHz  | 24      | 2448 MHz  | 34      | 2468 MHz  |
| 5                                   | 2410 MHz  | 15      | 2430 MHz  | 25      | 2450 MHz  | 35      | 2470 MHz  |
| 6                                   | 2412 MHz  | 16      | 2432 MHz  | 26      | 2452 MHz  | 36      | 2472 MHz  |
| 7                                   | 2414 MHz  | 17      | 2434 MHz  | 27      | 2454 MHz  | 37      | 2474 MHz  |
| 8                                   | 2416 MHz  | 18      | 2436 MHz  | 28      | 2456 MHz  | 38      | 2476 MHz  |
| 9                                   | 2418 MHz  | 19      | 2438 MHz  | 29      | 2458 MHz  | 39      | 2478 MHz  |
| 10                                  | 2420 MHz  | 20      | 2440 MHz  | 30      | 2460 MHz  | 40      | 2480 MHz  |

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

| Channel             | Frequency |
|---------------------|-----------|
| The lowest channel  | 2402MHz   |
| The middle channel  | 2440MHz   |
| The Highest channel | 2480MHz   |



## 5.2 Test mode

| Transmitting mode | Keep the EUT in continuously transmitting mode.   |
|-------------------|---|
|                   | the test voltage was tuned from 85% to 115% of the nominal rated supply<br>ne worst case was under the nominal rated supply condition. So the report just<br>ata. |

## 5.3 Description of Support Units

|     | Support Equipment                         |        |            |   |  |  |  |
|-----|---|--------|------------|---|--|--|--|
| No. | Equipment Manufacturer Model Name Remarks |        |            |   |  |  |  |
| 1   | Notebook                                  | Lenovo | E4-II L287 | / |  |  |  |
| 2   | Printer                                   | Canone | IP1600     | / |  |  |  |
| 3   | Mouse                                     | YISHE  | YS-MA75USB | 1 |  |  |  |

## 5.4 Deviation from Standards

None.

## 5.5 Abnormalities from Standard Conditions

None.

## 5.6 Test Facility

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

## • FCC—Registration No.: 381383

Designation Number: CN5029

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files.

## ISED—Registration No.: 9079A

CAB identifier: CN0091

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of ISED for radio equipment testing

## • NVLAP (LAB CODE:600179-0)

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP).

## 5.7 Test Location

|     | All tests were performed at:   |
|-----|--|
| 196 | Global United Technology Services Co., Ltd.  |
|     | Address: No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang |
|     | Road, Baoan District, Shenzhen, Guangdong, China 518102  |
|     | Tel: 0755-27798480   |
|     | Fax: 0755-27798960   |

## 6 Test Instruments list

| Radiated Emission: |  |                                |                       |                  |                        |                            |  |
|--------------------|--|--------------------------------|-----------------------|------------------|------------------------|----------------------------|--|
| Item               | Test Equipment                         | Manufacturer                   | Model No.             | Inventory<br>No. | Cal.Date<br>(mm-dd-yy) | Cal.Due date<br>(mm-dd-yy) |  |
| 1                  | 3m Semi- Anechoic<br>Chamber           | ZhongYu Electron               | 9.2(L)*6.2(W)* 6.4(H) | GTS250           | June 23, 2021          | June 22, 2024              |  |
| 2                  | Control Room                           | ZhongYu Electron               | 6.2(L)*2.5(W)* 2.4(H) | GTS251           | N/A                    | N/A                        |  |
| 3                  | EMI Test Receiver                      | Rohde & Schwarz                | ESU26                 | GTS203           | April 14, 2023         | April 13, 2024             |  |
| 4                  | BiConiLog Antenna                      | SCHWARZBECK<br>MESS-ELEKTRONIK | VULB9168              | GTS640           | March 19, 2023         | March 18, 2025             |  |
| 5                  | Double -ridged<br>waveguide horn       | SCHWARZBECK<br>MESS-ELEKTRONIK | BBHA 9120 D           | GTS208           | April 17, 2023         | April 16, 2025             |  |
| 6                  | EMI Test Software                      | AUDIX                          | E3                    | N/A              | N/A                    | N/A                        |  |
| 7                  | Coaxial Cable                          | GTS                            | N/A                   | GTS213           | April 21, 2023         | April 20, 2024             |  |
| 8                  | Coaxial Cable                          | GTS                            | N/A                   | GTS211           | April 21, 2023         | April 20, 2024             |  |
| 9                  | Coaxial cable                          | GTS                            | N/A                   | GTS210           | April 21, 2023         | April 20, 2024             |  |
| 10                 | Coaxial Cable                          | GTS                            | N/A                   | GTS212           | April 21, 2023         | April 20, 2024             |  |
| 11                 | Wideband Radio<br>Communication Tester | Rohde & Schwarz                | CMW500                | GTS575           | April 14, 2023         | April 13, 2024             |  |
| 12                 | Loop Antenna                           | ZHINAN                         | ZN30900A              | GTS534           | Nov. 29, 2022          | Nov. 28, 2023              |  |
| 13                 | Broadband Preamplifier                 | SCHWARZBECK                    | BBV9718               | GTS535           | April 14, 2023         | April 13, 2024             |  |
| 14                 | Amplifier(1GHz-26.5GHz)                | HP                             | 8449B                 | GTS601           | April 14, 2023         | April 13, 2024             |  |
| 15                 | Horn Antenna (18-<br>26.5GHz)          | /                              | UG-598A/U             | GTS664           | Oct. 30, 2022          | Oct. 29, 2023              |  |
| 16                 | Horn Antenna<br>(26.5-40GHz)           | A.H Systems                    | SAS-573               | GTS665           | Oct. 30, 2022          | Oct. 29, 2023              |  |
| 17                 | FSV-Signal Analyzer<br>(10Hz-40GHz)    | Keysight                       | FSV-40-N              | GTS666           | March 13, 2023         | March 12, 2024             |  |
| 18                 | Amplifier                              | /                              | LNA-1000-30S          | GTS650           | April 14, 2023         | April 13, 2024             |  |
| 19                 | CDNE M2+M3-16A                         | НСТ                            | 30MHz-300MHz          | GTS668           | Dec. 20, 2022          | Dec.19, 2023               |  |
| 20                 | Thermo meter                           | JINCHUANG                      | GSP-8A                | GTS643           | April 19, 2023         | April 18, 2024             |  |



| Cond | Conducted Emission   |                             |                      |                  |                        |                            |  |  |  |  |  |  |  |
|------|----------------------|-----------------------------|----------------------|------------------|------------------------|----------------------------|--|--|--|--|--|--|--|
| Item | Test Equipment       | Manufacturer                | Model No.            | Inventory<br>No. | Cal.Date<br>(mm-dd-yy) | Cal.Due date<br>(mm-dd-yy) |  |  |  |  |  |  |  |
| 1    | Shielding Room       | ZhongYu Electron            | 7.3(L)x3.1(W)x2.9(H) | GTS252           | July 12, 2022          | July 11, 2027              |  |  |  |  |  |  |  |
| 2    | EMI Test Receiver    | R&S                         | ESCI 7               | GTS552           | April 14, 2023         | April 13, 2024             |  |  |  |  |  |  |  |
| 3    | LISN                 | <b>ROHDE &amp; SCHWARZ</b>  | ENV216               | GTS226           | April 14, 2023         | April 13, 2024             |  |  |  |  |  |  |  |
| 4    | Coaxial Cable        | GTS                         | N/A                  | GTS227           | N/A                    | N/A                        |  |  |  |  |  |  |  |
| 5    | EMI Test Software    | AUDIX                       | E3                   | N/A              | N/A                    | N/A                        |  |  |  |  |  |  |  |
| 6    | Thermo meter         | JINCHUANG                   | GSP-8A               | GTS642           | April 19, 2023         | April 18, 2024             |  |  |  |  |  |  |  |
| 7    | Absorbing clamp      | Elektronik-<br>Feinmechanik | MDS21                | GTS229           | April 14, 2023         | April 13, 2024             |  |  |  |  |  |  |  |
| 8    | ISN                  | SCHWARZBECK                 | NTFM 8158            | GTS565           | April 14, 2023         | April 13, 2024             |  |  |  |  |  |  |  |
| 9    | High voltage probe   | SCHWARZBECK                 | TK9420               | GTS537           | April 14, 2023         | April 13, 2024             |  |  |  |  |  |  |  |
| 10   | Antenna end assembly | Weinschel                   | 1870A                | GTS560           | April 14, 2023         | April 13, 2024             |  |  |  |  |  |  |  |

| RF Co | RF Conducted Test:                                   |              |                  |            |                        |                            |  |  |  |  |  |  |  |
|-------|--|--------------|------------------|------------|------------------------|----------------------------|--|--|--|--|--|--|--|
| Item  | Test Equipment                                       | Manufacturer | Model No.        | Serial No. | Cal.Date<br>(mm-dd-yy) | Cal.Due date<br>(mm-dd-yy) |  |  |  |  |  |  |  |
| 1     | MXA Signal Analyzer                                  | Agilent      | N9020A           | GTS566     | April 14, 2023         | April 13, 2024             |  |  |  |  |  |  |  |
| 2     | EMI Test Receiver                                    | R&S          | ESCI 7           | GTS552     | April 14, 2023         | April 13, 2024             |  |  |  |  |  |  |  |
| 3     | PSA Series Spectrum<br>Analyzer                      | Agilent      | E4440A           | GTS536     | April 14, 2023         | April 13, 2024             |  |  |  |  |  |  |  |
| 4     | MXG vector Signal<br>Generator                       | Agilent      | N5182A           | GTS567     | April 14, 2023         | April 13, 2024             |  |  |  |  |  |  |  |
| 5     | ESG Analog Signal<br>Generator                       | Agilent      | E4428C           | GTS568     | April 14, 2023         | April 13, 2024             |  |  |  |  |  |  |  |
| 6     | USB RF Power Sensor                                  | DARE         | RPR3006W         | GTS569     | April 14, 2023         | April 13, 2024             |  |  |  |  |  |  |  |
| 7     | RF Switch Box  | Shongyi      | RFSW3003328      | GTS571     | April 14, 2023         | April 13, 2024             |  |  |  |  |  |  |  |
| 8     | Programmable Constant<br>Temp & Humi Test<br>Chamber | WEWON        | WHTH-150L-40-880 | GTS572     | April 14, 2023         | April 13, 2024             |  |  |  |  |  |  |  |
| 9     | Thermo meter   | JINCHUANG    | GSP-8A           | GTS641     | April 19, 2023         | April 18, 2024             |  |  |  |  |  |  |  |

| Gen  | General used equipment: |              |           |                  |                        |                            |  |  |  |  |  |  |
|------|-------------------------|--------------|-----------|------------------|------------------------|----------------------------|--|--|--|--|--|--|
| Item | Test Equipment          | Manufacturer | Model No. | Inventory<br>No. | Cal.Date<br>(mm-dd-yy) | Cal.Due date<br>(mm-dd-yy) |  |  |  |  |  |  |
| 1    | Barometer               | KUMAO        | SF132     | GTS647           | April 19, 2023         | April 18, 2024             |  |  |  |  |  |  |



## 7 Test results and Measurement Data

## 7.1 Antenna requirement

| Standard requirement:                                    | FCC Part15 C Section 15.203 /247(c)   |
|--|---|
| 15.203 requirement:                                      |   |
| responsible party shall be us antenna that uses a unique | be designed to ensure that no antenna other than that furnished by the<br>sed with the device. The use of a permanently attached antenna or of an<br>coupling to the intentional radiator, the manufacturer may design the unit<br>n be replaced by the user, but the use of a standard antenna jack or<br>bited. |
| 15.247(c) (1)(i) requiremen                              | t:  |
| operations may employ tran                               | 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point smitting antennas with directional gain greater than 6dBi provided the power of the intentional radiator is reduced by 1 dB for every 3 dB that the na exceeds 6dBi.  |
| E.U.T Antenna:   |   |
| The antenna is PCB antenn<br>details                     | a, the best case gain of the is 3.12dBi, reference to the appendix II for   |



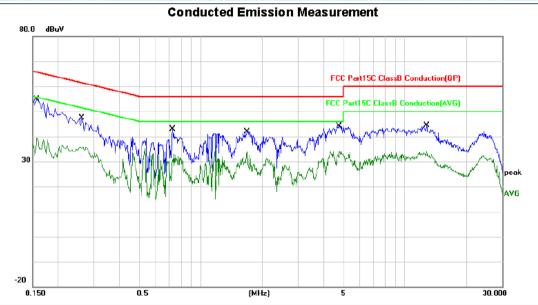
## 7.2 Conducted Emissions

| Test Requirement:     | FCC Part15 C Section 15.207   |   |   |  |  |  |  |  |
|-----------------------|---|---|---|--|--|--|--|--|
| Test Method:          | ANSI C63.10:2013  |   |   |  |  |  |  |  |
| Test Frequency Range: | 150KHz to 30MHz   |   |   |  |  |  |  |  |
| Class / Severity:     | Class B   |   |   |  |  |  |  |  |
| Receiver setup:       | RBW=9KHz, VBW=30KHz, S  | weep time=auto  |   |  |  |  |  |  |
| Limit:                | Frequency range (MHz)   | Limit   | (dBuV)  |  |  |  |  |  |
|                       |   | Quasi-peak  | Ave   | -  |  |  |  |  |
|                       | 0.15-0.5  | 66 to 56*   |   | 0 46*  |  |  |  |  |
|                       | 0.5-5<br>5-30   | 56<br>60  |   | 6<br>0   |  |  |  |  |
|                       | * Decreases with the logarithm  |   | J   | 0  |  |  |  |  |
| Test setup:           | Reference Plane   |   | a states  |  |  |  |  |  |
|                       | LISN       40cm       80cm         AUX       Equipment       E.U.T         Test table/Insulation plane       E.U.T         Remark       E.U.T         E.U.T       E.U.T         Test table/Insulation plane       E.U.T         Remark       E.U.T         E.U.T       E.U.T         Test table height=0.8m       E.U.T         1. The E.U.T and simulators a | LISN<br>Filter AC p<br>EMI<br>Receiver  |   | through a  |  |  |  |  |
| Test procedure:       | <ol> <li>The E.O.T and simulators a<br/>line impedance stabilization<br/>50ohm/50uH coupling impediate<br/>LISN that provides a 50ohr<br/>termination. (Please refer to<br/>photographs).</li> <li>Both sides of A.C. line are<br/>interference. In order to find<br/>positions of equipment and<br/>according to ANSI C63.10:</li> </ol>                     | n network (L.I.S.N.).<br>edance for the measu<br>also connected to the<br>n/50uH coupling imp<br>o the block diagram<br>checked for maximus<br>d the maximum emis<br>all of the interface c | This provides<br>uring equipm<br>he main powe<br>edance with<br>of the test se<br>m conducted<br>sion, the rela<br>ables must b | s a<br>lent.<br>er through a<br>50ohm<br>tup and<br>ative<br>e changed |  |  |  |  |
| Test Instruments:     | Refer to section 6.0 for details  |   |   |  |  |  |  |  |
| Test mode:            | Refer to section 5.2 for details  |   |   |  |  |  |  |  |
| Test environment:     | Temp.: 25.2 C Hun   | nid.: 49%   | Press.:   | 1010mbar   |  |  |  |  |
| Test voltage:         | AC 120V, 60Hz   |   |   |  |  |  |  |  |
| Test results:         | Pass  |   |   |  |  |  |  |  |
| 10001000000           | 1 400   |   |   |  |  |  |  |  |

## Report No.: GTSL2023070184F01

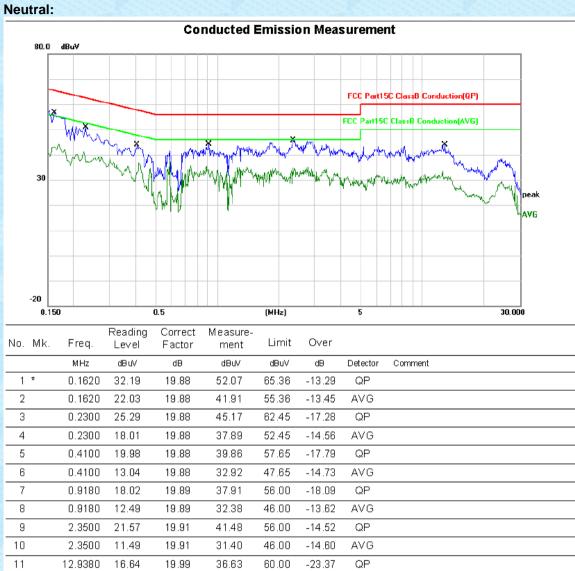
#### **Measurement data**

We only recorded the data of the worst mode. Please see the following: Line:



| No. | Mk. | Freq.   | Reading<br>Level | Correct<br>Factor | Measure-<br>ment | Limit | Over   |          |         |
|-----|-----|---------|------------------|-------------------|------------------|-------|--------|----------|---------|
|     |     | MHz     | dBuV             | dB                | dBuV             | dBuV  | dB     | Detector | Comment |
| 1   |     | 0.1580  | 31.53            | 19.88             | 51.41            | 65.57 | -14.16 | QP       |         |
| 2   |     | 0.1580  | 17.07            | 19.88             | 36.95            | 55.57 | -18.62 | AVG      |         |
| 3   |     | 0.2620  | 22.71            | 19.88             | 42.59            | 61.37 | -18.78 | QP       |         |
| 4   |     | 0.2620  | 14.75            | 19.88             | 34.63            | 51.37 | -16.74 | AVG      |         |
| 5   |     | 0.7300  | 17.76            | 19.88             | 37.64            | 56.00 | -18.36 | QP       |         |
| 6   |     | 0.7300  | 9.34             | 19.88             | 29.22            | 46.00 | -16.78 | AVG      |         |
| 7   |     | 1.6900  | 18.83            | 19.90             | 38.73            | 56.00 | -17.27 | QP       |         |
| 8   |     | 1.6900  | 9.05             | 19.90             | 28.95            | 46.00 | -17.05 | AVG      |         |
| 9   |     | 4.7940  | 21.23            | 19.92             | 41.15            | 56.00 | -14.85 | QP       |         |
| 10  | *   | 4.7940  | 12.12            | 19.92             | 32.04            | 46.00 | -13.96 | AVG      |         |
| 11  |     | 12.8500 | 18.36            | 19.99             | 38.35            | 60.00 | -21.65 | QP       |         |
| 12  |     | 12.8500 | 11.07            | 19.99             | 31.06            | 50.00 | -18.94 | AVG      |         |
|     |     |         |                  |                   |                  |       |        |          |         |

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Notes:

12

12.9380

1. Correct Factor = LISN Factor + Cable Loss + Pulse Limiter Factor, the value was added to Original Receiver Reading by the software automatically.

-21.15

AVG

2. Measurement = Reading + Correct Factor.

19.99

28.85

50.00

3. Over = Measurement - Limit

8.86



## 7.3 Conducted Output Power

| Test Requirement: | FCC Part15 C Section 15.247 (b)(3)  |
|-------------------|---|
| Test Method:      | ANSI C63.10:2013 and KDB558074 D01 15.247 Meas Guidance v05r02              |
| Limit:            | 30.00dBm  |
| Test setup:       | Spectrum Analyzer<br>E.U.T<br>Non-Conducted Table<br>Ground Reference Plane |
| Test Instruments: | Refer to section 6.0 for details  |
| Test mode:        | Refer to section 5.2 for details  |
| Test results:     | Pass  |

## **Measurement Data**

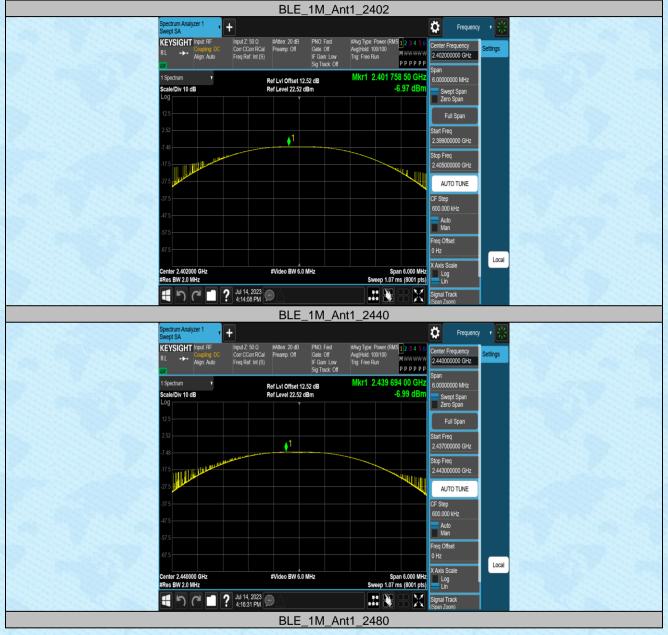
#### Duty Cycle:

| TestMode | Antenna | Freq(MHz) | ON Time<br>[ms] | Period<br>[ms] | Х      | DC [%] | xFactor | Limit | Verdict |
|----------|---------|-----------|-----------------|----------------|--------|--------|---------|-------|---------|
|          |         | 2402      | 0.41            | 0.63           | 0.6508 | 65.08  | 1.87    |       |         |
| BLE_1M   | Ant1    | 2440      | 0.41            | 0.63           | 0.6508 | 65.08  | 1.87    | 1     |         |
|          |         | 2480      | 0.41            | 0.63           | 0.6508 | 65.08  | 1.87    |       |         |

| Test Mode | Test Mode Antenna |      | Peak Output Power (dBm) | Conducted Limit[dBm] | Verdict |
|-----------|-------------------|------|-------------------------|----------------------|---------|
|           |                   | 2402 | -6.97                   | ≤30                  | PASS    |
| BLE_1M    | Ant1              | 2440 | -7.00                   | ≤30                  | PASS    |
|           | Section Section   | 2480 | -7.20                   | ≤30                  | PASS    |



### Test plot as follows:







## 7.4 Channel Bandwidth

| Test Requirement: | FCC Part15 C Section 15.247 (a)(2)  |  |  |  |  |  |  |
|-------------------|---|--|--|--|--|--|--|
| Test Method:      | ANSI C63.10:2013 and KDB558074 D01 15.247 Meas Guidance v05r02              |  |  |  |  |  |  |
| Limit:            | >500KHz   |  |  |  |  |  |  |
| Test setup:       | Spectrum Analyzer<br>E.U.T<br>Non-Conducted Table<br>Ground Reference Plane |  |  |  |  |  |  |
| Test Instruments: | Refer to section 6.0 for details  |  |  |  |  |  |  |
| Test mode:        | Refer to section 5.2 for details  |  |  |  |  |  |  |
| Test results:     | Pass  |  |  |  |  |  |  |

## **Measurement Data**

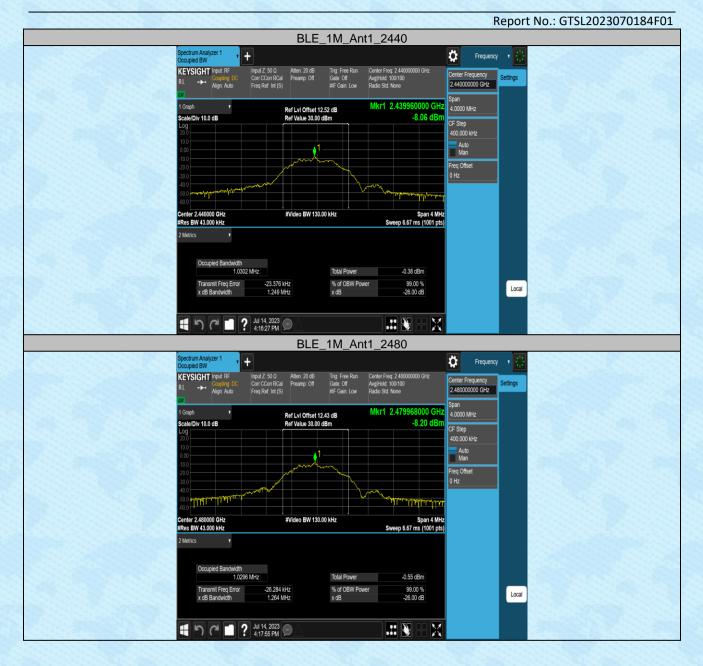
## **Occupied Channel Bandwidth**

| TestMode | Antenna | Freq(MHz) | OCB [MHz] | FL[MHz]   | FH[MHz]   | Limit[MHz] | Verdict |
|----------|---------|-----------|-----------|-----------|-----------|------------|---------|
|          |         | 2402      | 1.0266    | 2401.4642 | 2402.4908 |            |         |
| BLE_1M   | Ant1    | 2440      | 1.0302    | 2439.4615 | 2440.4917 |            |         |
|          |         | 2480      | 1.0296    | 2479.4589 | 2480.4885 |            |         |

## Test plot as follows:









#### **DTS Bandwidth**

| TestMode | Antenna | Freq(MHz) | DTS BW [MHz] | FL[MHz]  | FH[MHz]  | Limit[MHz] | Verdict |
|----------|---------|-----------|--------------|----------|----------|------------|---------|
|          |         | 2402      | 0.660        | 2401.640 | 2402.300 | 0.5        | PASS    |
| BLE_1M   | Ant1    | 2440      | 0.668        | 2439.636 | 2440.304 | 0.5        | PASS    |
|          |         | 2480      | 0.660        | 2479.640 | 2480.300 | 0.5        | PASS    |

## Test plot as follows:









## 7.5 Power Spectral Density

| Test Requirement: | FCC Part15 C Section 15.247 (e)   |  |  |  |
|-------------------|---|--|--|--|
| Test Method:      | ANSI C63.10:2013 and KDB558074 D01 15.247 Meas Guidance v05r02              |  |  |  |
| Limit:            | 8dBm/3kHz   |  |  |  |
| Test setup:       | Spectrum Analyzer<br>E.U.T<br>Non-Conducted Table<br>Ground Reference Plane |  |  |  |
| Test Instruments: | Refer to section 6.0 for details  |  |  |  |
| Test mode:        | Refer to section 5.2 for details  |  |  |  |
| Test results:     | Pass  |  |  |  |

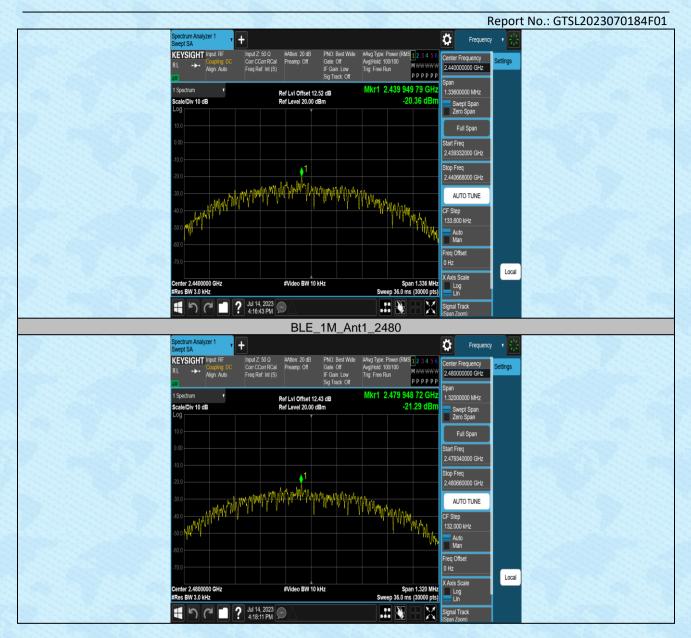
## **Measurement Data**

| TestMode | Antenna | Freq(MHz) | Result[dBm/3kHz] | Limit[dBm/3kHz] | Verdict |
|----------|---------|-----------|------------------|-----------------|---------|
|          |         | 2402      | -20.51           | ≤8.00           | PASS    |
| BLE_1M   | Ant1    | 2440      | -20.36           | ≤8.00           | PASS    |
|          |         | 2480      | -21.29           | ≤8.00           | PASS    |

## Test plot as follows:









## 7.6 Spurious Emission in Non-restricted & restricted Bands

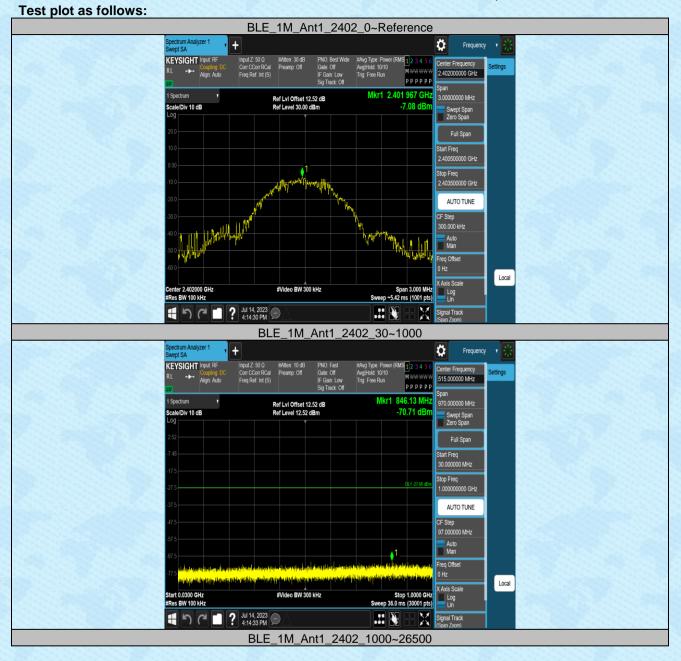
## 7.6.1 Conducted Emission Method

| Test Requirement: | FCC Part15 C Section 15.247 (d)   |  |  |  |  |
|-------------------|---|--|--|--|--|
| Test Method:      | ANSI C63.10:2013 and KDB558074 D01 15.247 Meas Guidance v05r02  |  |  |  |  |
| Limit:            | In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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. |  |  |  |  |
| Test setup:       | Spectrum Analyzer<br>E.U.T<br>Non-Conducted Table<br>Ground Reference Plane   |  |  |  |  |
| Test Instruments: | Refer to section 6.0 for details  |  |  |  |  |
| Test mode:        | Refer to section 5.2 for details  |  |  |  |  |
| Test results:     | Pass  |  |  |  |  |

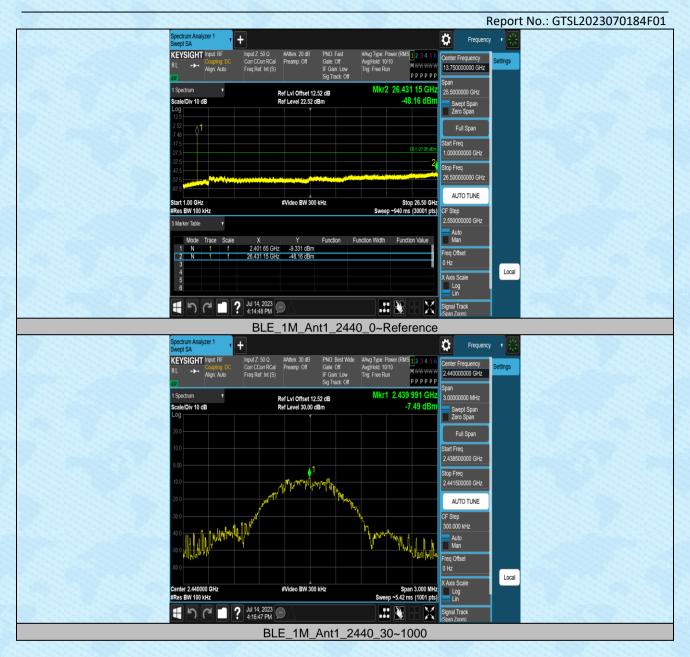
## Measurement data:

| TestMode | Antenna | Freq(MHz) | FreqRange<br>[MHz] | RefLevel<br>[dBm] | Result[dBm] | Limit[dBm] | Verdict |
|----------|---------|-----------|--------------------|-------------------|-------------|------------|---------|
|          |         |           | Reference          | -7.08             | -7.08       |            | PASS    |
|          |         | 2402      | 30~1000            | -7.08             | -70.71      | ≤-27.08    | PASS    |
|          |         |           | 1000~26500         | -7.08             | -48.16      | ≤-27.08    | PASS    |
|          |         |           | Reference          | -7.49             | -7.49       | 1          | PASS    |
| BLE_1M   | Ant1    | 2440      | 30~1000            | -7.49             | -70.06      | ≤-27.49    | PASS    |
|          |         |           | 1000~26500         | -7.49             | -49.10      | ≤-27.49    | PASS    |
|          |         |           | Reference          | -7.29             | -7.29       |            | PASS    |
|          |         | 2480      | 30~1000            | -7.29             | -69.97      | ≤-27.29    | PASS    |
|          |         |           | 1000~26500         | -7.29             | -48.52      | ≤-27.29    | PASS    |

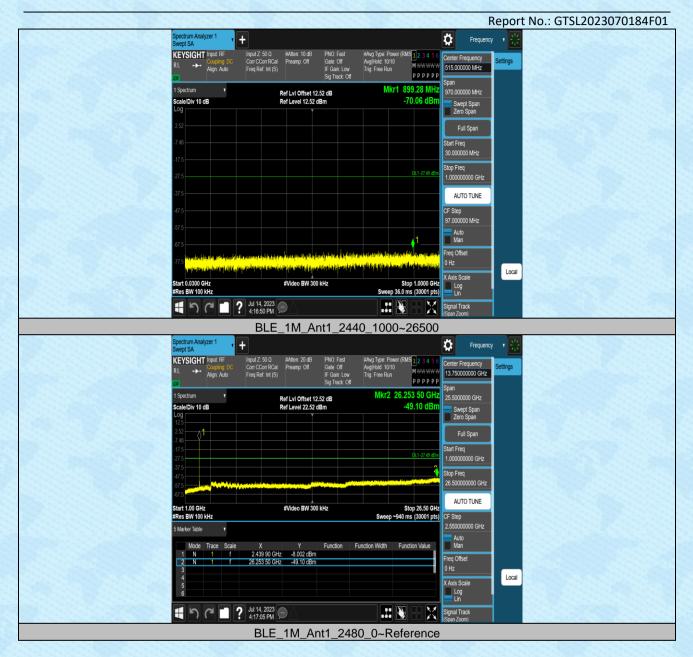




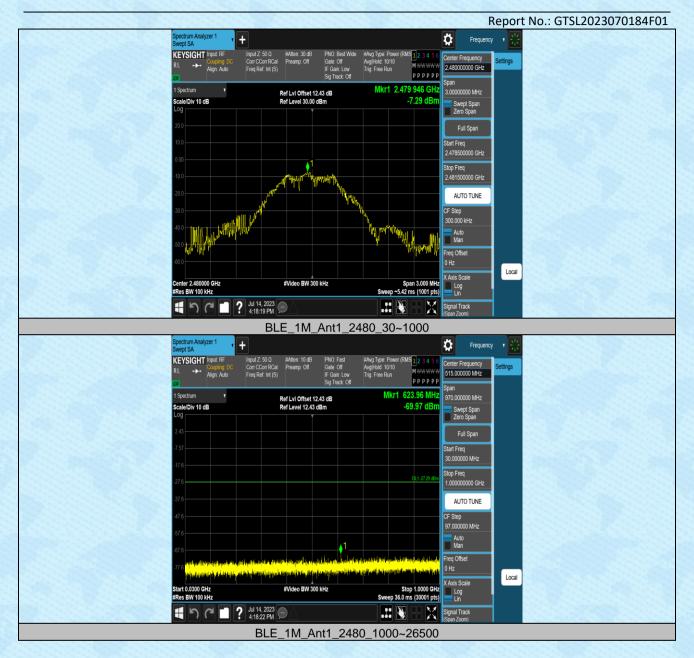


















#### **Band edge measurements**

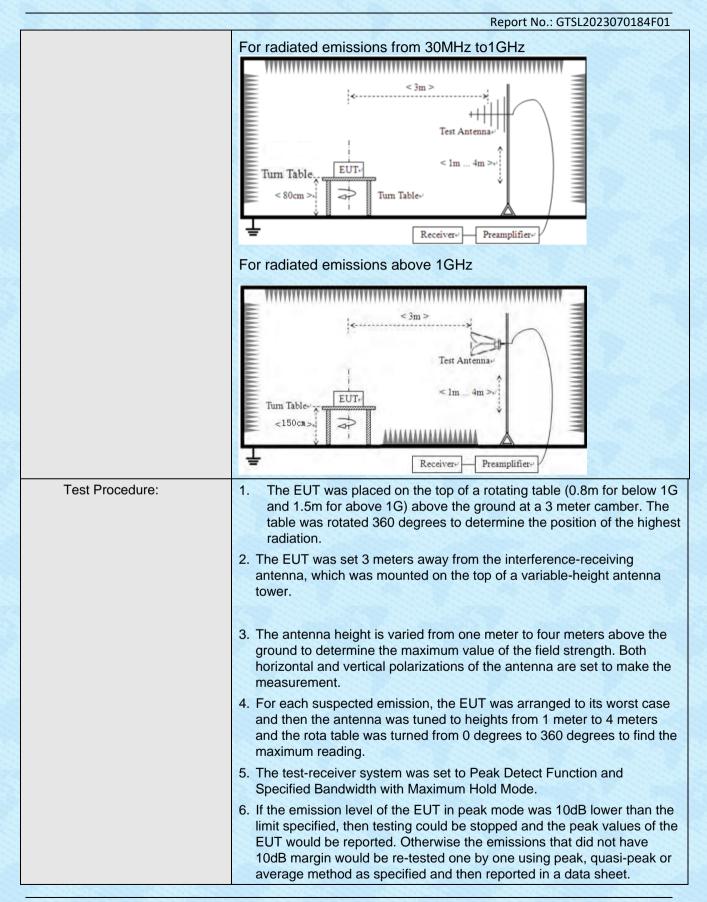
| TestMode Antenna |        | ChName | Freq(MHz) RefLevel[dBm] |       | Result[dBm] | Limit[dBm] | Verdict |
|------------------|--------|--------|-------------------------|-------|-------------|------------|---------|
|                  | A = 14 | Low    | 2402                    | -7.12 | -44.16      | ≤-27.12    | PASS    |
| BLE_1M           | Ant1   | High   | 2480                    | -7.92 | -51.79      | ≤-27.92    | PASS    |

## Test plot as follows:



| hod  |  |   |   |   |  |  |
|--|--|---|---|---|--|--|
| FCC Part15 C Section   | on 15.209 a  | nd 15.205   |   |   |  |  |
| ANSI C63.10:2013   |  |   |   |   |  |  |
| All of the restrict bands were tested, only the worst band's (2310MHz to 2500MHz) data was showed. |  |   |   |   |  |  |
| Measurement Distar   | nce: 3m  |   |   |   |  |  |
| Frequency  | Detecto  | Detector RBV  |   | VBW   | Value  |  |
| 9KHz-150KHz  | Quasi-pea  | ak 200  | Hz  | 600Hz   | Quasi-peak   |  |
| 150KHz-30MHz   | Quasi-pea  | ak 9K   | Hz  | 30KHz   | Quasi-peak   |  |
| 30MHz-1GHz   | Quasi-pea  | ak 120  | KHz   | 300KHz  | Quasi-peak   |  |
| Above 1GHz   | Peak   | 1M  | Hz  | 3MHz  | Peak   |  |
|  | Peak   |   |   | 10Hz  | Average  |  |
|  |  |   |   |   | ve For Duty cycle  |  |
| Frequency  | Limit  | (uV/m)  | V   | /alue   | Measurement<br>Distance  |  |
| 0.009MHz-0.490M  | Hz 2400  | 2400/F(KHz)   |   | /PK/AV  | 300m   |  |
| 0.490MHz-1.705M  | Hz 2400  | 0/F(KHz)  |   | QP  | 30m  |  |
| 1.705MH -30MH  | lz   | 30  |   | QP  | 30m  |  |
| 30MHz-88MHz  |  | 100   |   | QP  |  |  |
|  |  |   |   | QP  |  |  |
|  |  |   |   |   | 3m   |  |
| 960MHz-1GHz  |  |   |   |   |  |  |
| Above 1GHz   | 1  |   |   |   |  |  |
|  |  | 6000  |   | Peak  |  |  |
| For radiated emiss   | ions from s  | kHz to 3  | OMHz  | 2   |  |  |
| Tum Table  | ~  | Test Antenna<br>Im  | -X-   |   |  |  |
|  | FCC Part15 C Section         ANSI C63.10:2013         All of the restrict base         2500MHz) data wass         Measurement Distant         Frequency         9KHz-150KHz         150KHz-30MHz         30MHz-1GHz         Above 1GHz         Note: For Duty cycle         < 98%, average dete         Frequency         0.009MHz-0.490M         0.490MHz-1.705M         1.705MH -30MHz         30MHz-88MHz         88MHz-216MHz         216MHz-960MH         960MHz-1GHz         Above 1GHz         For radiated emiss | FCC Part15 C Section 15.209 atANSI C63.10:2013All of the restrict bands were to<br>2500MHz) data was showed.Measurement Distance: 3mFrequency Detector9KHz-150KHzQuasi-peat150KHz-30MHzQuasi-peat30MHz-1GHzQuasi-peatAbove 1GHzPeakPeakPeakNote: For Duty cycle $\geq$ 98%, average detector set asFrequencyLimit0.009MHz-0.490MHz240001.705MH-30MHz30MHz-88MHz3030MHz-88MHz30960MHz-1GHz30960MHz-1GHz5For radiated emissions from SFor radiated emissions from S | FCC Part15 C Section 15.209 and 15.205ANSI C63.10:2013All of the restrict bands were tested, only<br>2500MHz) data was showed.Measurement Distance: 3mFrequencyDetectorPKHz-150KHzQuasi-peak9KHz-150KHzQuasi-peak30MHz-1GHzQuasi-peakAbove 1GHzPeakPeak1MNote: For Duty cycle $\geq$ 98%, average detector set as below: VBFrequencyLimit (uV/m)0.009MHz-0.490MHz2400/F(KHz)0.490MHz-1.705MHz24000/F(KHz)1.705MH -30MHz3030MHz-88MHz10088MHz-216MHz150216MHz-960MHz200960MHz-1GHz500Above 1GHz500For radiated emissions from 9kHz to 3For radiated emissions from 9kHz to 3 | FCC Part15 C Section 15.209 and 15.205         ANSI C63.10:2013         All of the restrict bands were tested, only the 2500MHz) data was showed.         Measurement Distance: 3m         Frequency       Detector         RBW         9KHz-150KHz       Quasi-peak         200Hz       150KHz-30MHz         Quasi-peak       9KHz         30MHz-1GHz       Quasi-peak         Above 1GHz       Peak         Peak       1MHz         Note: For Duty cycle ≥ 98%, average detector set as below: VBW ≥ 1         Frequency       Limit (uV/m)         0.009MHz-0.490MHz       2400/F(KHz)         Q       0.490MHz-1.705MHz       24000/F(KHz)         1.705MH       -30MHz       30         30MHz-88MHz       100       88MHz-216MHz         1.705MH       -30MHz       200         960MHz-1GHz       500       Avertage         4bove 1GHz       500       Avertage         5000       Avertage       500         Above 1GHz       500       Avertage         5000       Avertage       500         Above 1GHz       500       Avertage         For radiated emissions from 9kHz to 30MHz       100 <t< th=""><th>FCC Part15 C Section 15.209 and 15.205ANSI C63.10:2013All of the restrict bands were tested, only the worst bar<br/>2500MHz) data was showed.Measurement Distance: 3mFrequencyDetectorRBWVBW9KHz-150KHzQuasi-peak200Hz600Hz150KHz-30MHzQuasi-peak30MHz-1GHzQuasi-peakAbove 1GHzPeakPeak1MHz30MHz-1GHzQuasi-peakQuasi-peak120KHz30MHz-1GHzQuasi-peak120KHz300KHzAbove 1GHzPeakPeak1MHz10HzNote: For Duty cycle ≥ 98%, average detector set as abolow: VBW ≥ 1 / TFrequencyLimit (uV/m)Value0.009MHz-0.490MHz2400/F(KHz)QP/PK/AV0.490MHz-1.705MHz24000/F(KHz)QP1.705MH -30MHz30QP30MHz-88MHz100QP88MHz-216MHz150QPAbove 1GHz500Above 1GHz500QPAbove 1GHz500QPAbove 1GHz500Above 1GHz500<!--</th--></th></t<> | FCC Part15 C Section 15.209 and 15.205ANSI C63.10:2013All of the restrict bands were tested, only the worst bar<br>2500MHz) data was showed.Measurement Distance: 3mFrequencyDetectorRBWVBW9KHz-150KHzQuasi-peak200Hz600Hz150KHz-30MHzQuasi-peak30MHz-1GHzQuasi-peakAbove 1GHzPeakPeak1MHz30MHz-1GHzQuasi-peakQuasi-peak120KHz30MHz-1GHzQuasi-peak120KHz300KHzAbove 1GHzPeakPeak1MHz10HzNote: For Duty cycle ≥ 98%, average detector set as abolow: VBW ≥ 1 / TFrequencyLimit (uV/m)Value0.009MHz-0.490MHz2400/F(KHz)QP/PK/AV0.490MHz-1.705MHz24000/F(KHz)QP1.705MH -30MHz30QP30MHz-88MHz100QP88MHz-216MHz150QPAbove 1GHz500Above 1GHz500QPAbove 1GHz500QPAbove 1GHz500Above 1GHz500 </th |  |

## 7.6.2 Radiated Emission Method





| Test Instruments: | Refer to see | ction 6.0 for c | letails |     |         |          |
|-------------------|--------------|-----------------|---------|-----|---------|----------|
| Test mode:        | Refer to see | ction 5.2 for c | letails |     |         |          |
| Test environment: | Temp.:       | 23.3 □C         | Humid.: | 52% | Press.: | 1010mbar |
| Test voltage:     | AC 120V, 6   | 0Hz             |         |     |         |          |
| Test results:     | Pass         |                 |         |     |         |          |

#### Measurement data:

### Remark:

Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.

#### 9kHz~30MHz

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

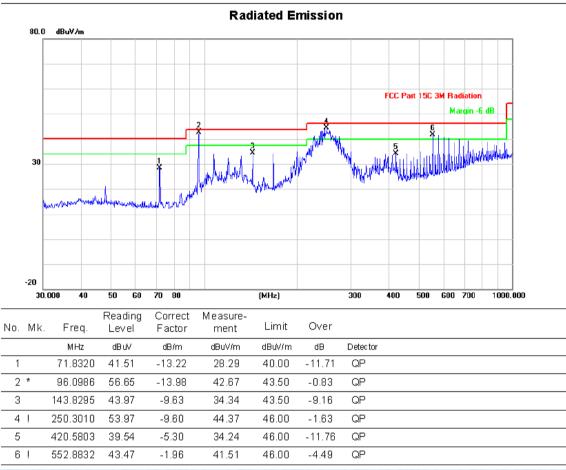
There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.



## Below 1GHz

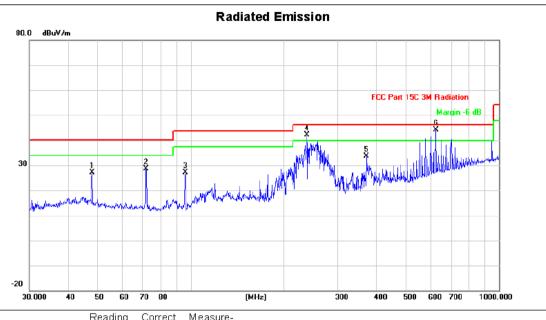
We only recorded the data of the worst mode. Please see the following:

## Horizontal:



## Report No.: GTSL2023070184F01

#### Vertical:



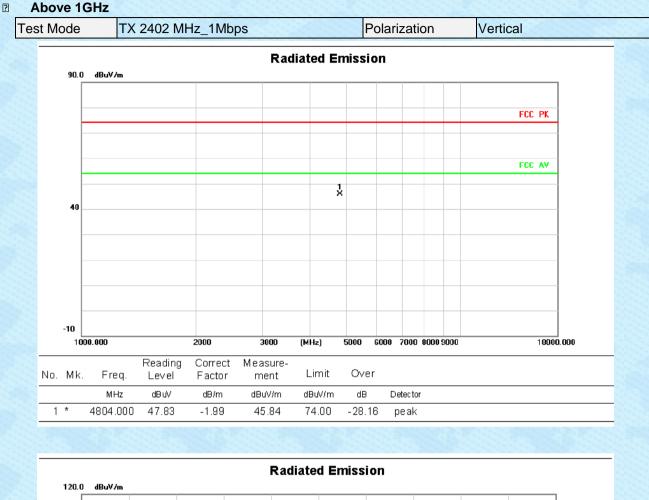
| No. | Mk. | Freq.    | Reading<br>Level | Correct<br>Factor | Measure-<br>ment | Limit  | Over   |          |  |  |
|-----|-----|----------|------------------|-------------------|------------------|--------|--------|----------|--|--|
|     |     | MHz      | dBuV             | dB/m              | dBuV/m           | dBuV/m | dB     | Detector |  |  |
| 1   |     | 47.9940  | 38.11            | -10.92            | 27.19            | 40.00  | -12.81 | QP       |  |  |
| 2   |     | 71.8320  | 41.84            | -13.22            | 28.62            | 40.00  | -11.38 | QP       |  |  |
| 3   |     | 96.0985  | 41.14            | -13.98            | 27.16            | 43.50  | -16.34 | QP       |  |  |
| 4   | ļ   | 238.3101 | 52.07            | -9.92             | 42.15            | 46.00  | -3.85  | QP       |  |  |
| 5   |     | 372.0045 | 40.10            | -6.43             | 33.67            | 46.00  | -12.33 | QP       |  |  |
| 6   | *   | 625.0780 | 44.38            | -0.21             | 44.17            | 46.00  | -1.83  | QP       |  |  |
| 5   |     | 372.0045 | 40.10            | -6.43             | 33.67            | 46.00  | -12.33 | QP       |  |  |

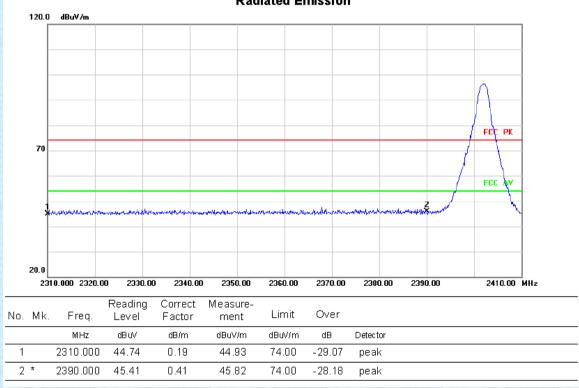
## **REMARKS**:

(1) Measurement Value = Reading Level + Correct Factor.

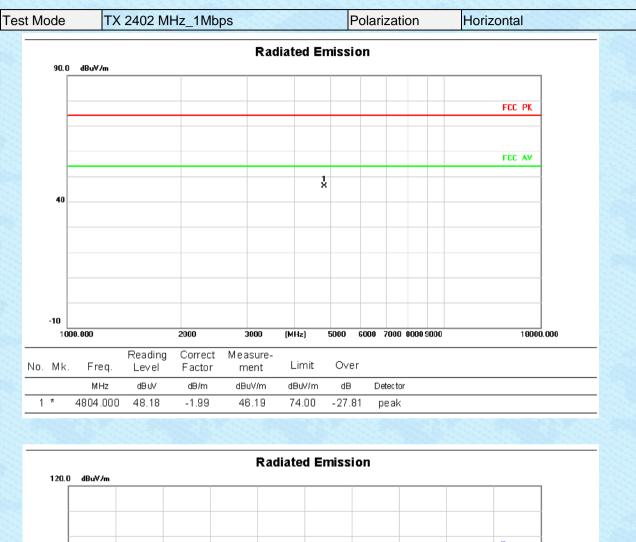
(2) Margin Level = Measurement Value - Limit Value.

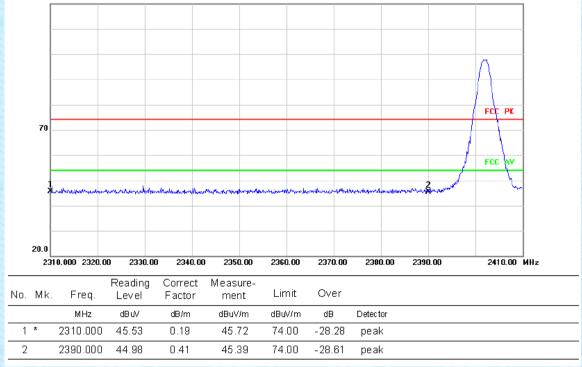
Report No.: GTSL2023070184F01



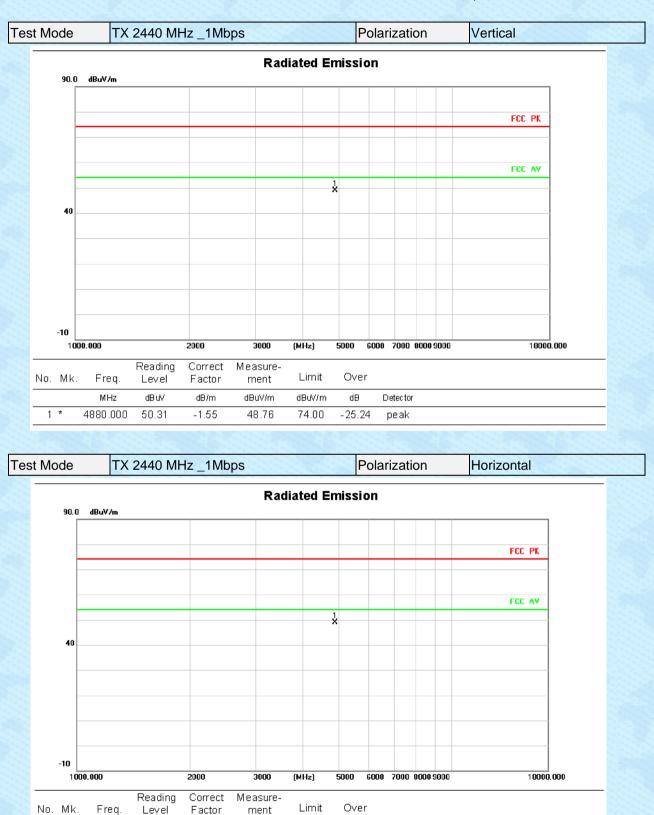












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dB/m

-1.55

dBuV/m

48.94

dBuV/m

74.00

dВ

-25.06

Detector

peak

dBuV

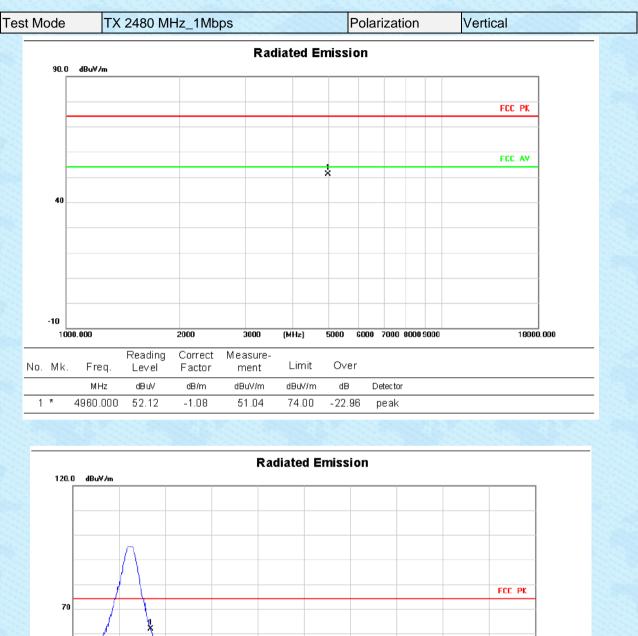
50.49

MHz

4880.000

1 \*

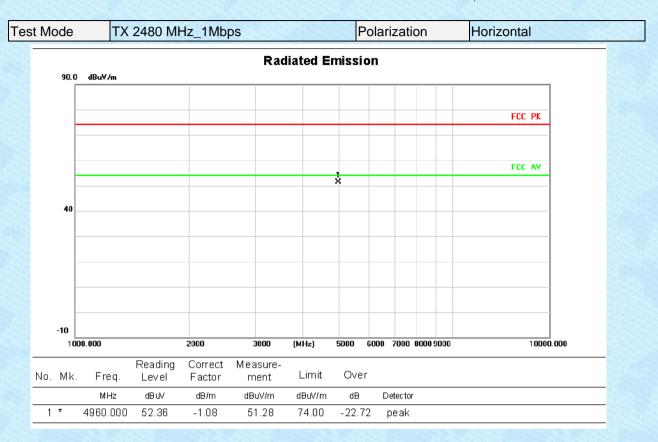




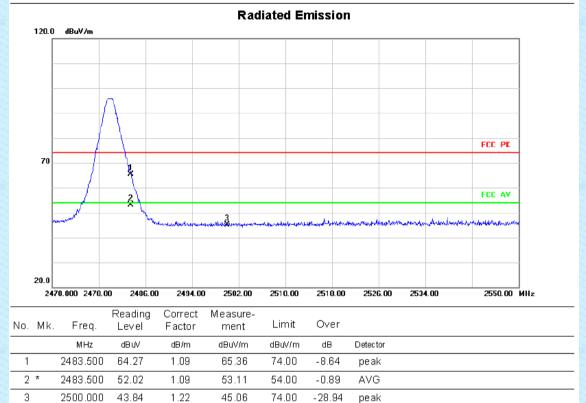


| No. | Mk. | Freq.    | Reading<br>Level |      | Measure-<br>ment | Limit  | Over   |          |  |
|-----|-----|----------|------------------|------|------------------|--------|--------|----------|--|
|     |     | MHz      | dBuV             | dB/m | dBuV/m           | dBuV/m | dB     | Detector |  |
| 1   |     | 2483.500 | 60.84            | 1.09 | 61.93            | 74.00  | -12.07 | peak     |  |
| 2   | *   | 2483.500 | 49.34            | 1.09 | 50.43            | 54.00  | -3.57  | AVG      |  |
| 3   |     | 2500.000 | 44.30            | 1.22 | 45.52            | 74.00  | -28.48 | peak     |  |











- 1. REMARKS:
- 2. (1) Measurement Value = Reading Level + Correct Factor.
- 3. (2) Margin Level = Measurement Value Limit Value.

Report No.: GTSL2023070184F01

# 8 Test Setup Photo

Reference to the appendix I for details.

## 9 EUT Constructional Details

Reference to the appendix II for details.

-----End-----