

TEST REPORT

Reference No...... : WTD24D04085741W003
FCC ID : 2BG82-WONDER-PHONE
Applicant..... : Lighko Corp
Address..... : 131 Rt 306, Monsey, NY, 10952, USA
Manufacturer : Ying Tai Electronics Co., Ltd
Address..... : lingang Industrial Park, Enyang Dist., Bazhong, Sichuan, China
Product..... : Wonder Phone
Model(s) : WP01
Brand Name : Wonder
Standards..... : FCC 47CFR Part 15.247
Date of Receipt sample : 2024-04-19
Date of Test : 2024-04-28 to 2024-07-17
Date of Issue..... : 2024-07-24
Test Result..... : **Pass**

Remarks:

The 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.

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3 Revision History

| Test Report No. | Date of Receipt Sample | Date of Test | Date of Issue | Purpose | Comment | Approved |
|--------------------|------------------------|--------------------------------|---------------|----------|---------|----------|
| WTD24D04085741W003 | 2024-04-19 | 2024-04-28 to 2024-07-17 | 2024-07-24 | Original | - | Valid |

4 General Information

4.1 General Description of E.U.T.

| | |
|--------------------|--------------------------|
| Product: | Wonder Phone |
| Model(s): | WP01 |
| Model Description | N/A |
| Test Sample No.: | 1-1/1 |
| Bluetooth Version: | 5.0 |
| Hardware Version: | P61-MB-V1.1-A |
| Software Version: | mt6761_P61-v228_20240625 |

4.2 Details of E.U.T.

| | |
|-----------------------|--------------|
| Operation Frequency: | 2402~2480MHz |
| Max. RF output power: | -0.72dBm |
| Type of Modulation: | GFSK |
| Antenna installation: | PIFA Antenna |
| Antenna Gain: | 0.29dBi |

Note:

#: The antenna gain is provided by the applicant, and the applicant should be responsible for its authenticity, WALTEK lab has not verified the authenticity of its information.

Ratings: Battery: DC 3.8V, 2850mAh, 10.83Wh

4.3 Channel List

| Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) |
|-------------|-----------------|-------------|-----------------|-------------|-----------------|-------------|-----------------|
| 0 | 2402 | 1 | 2404 | 2 | 2406 | 3 | 2408 |
| 4 | 2410 | 5 | 2412 | 6 | 2414 | 7 | 2416 |
| 8 | 2418 | 9 | 2420 | 10 | 2422 | 11 | 2424 |
| 12 | 2426 | 13 | 2428 | 14 | 2430 | 15 | 2432 |
| 16 | 2434 | 17 | 2436 | 18 | 2438 | 19 | 2440 |
| 20 | 2442 | 21 | 2444 | 22 | 2446 | 23 | 2448 |
| 24 | 2450 | 25 | 2452 | 26 | 2454 | 27 | 2456 |
| 28 | 2458 | 29 | 2460 | 30 | 2462 | 31 | 2464 |
| 32 | 2466 | 33 | 2468 | 34 | 2470 | 35 | 2472 |
| 36 | 2474 | 37 | 2476 | 38 | 2478 | 39 | 2480 |

4.4 Test Facility

The test facility has a test site registered with the following organizations:

ISED CAB identifier: CN0013. Test Firm Registration No.: 7760A.

Waltek Testing Group Co., Ltd. Has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files.

Registration number 7760A, October 15, 2016.

FCC Designation No.: CN1201. Test Firm Registration No.: 523476.

Waltek Testing Group Co., Ltd. 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 our files. Registration number 523476, September 10, 2019.

4.5 Subcontracted

Whether parts of tests for the product have been subcontracted to other labs:

Yes No

If Yes, list the related test items and lab information:

Test Lab: N/A

Lab address: N/A

Test items: N/A

4.6 Abnormalities from Standard Conditions

None.

4.7 Test Mode

Tests Carried Out Under FCC part 15.247

| Test Items | Mode | Data Rate | Channel | TX/RX |
|--------------------------------|--------|-----------|---------|-------|
| Maximum Peak Output Power | BT BLE | 1 Mbps | 0/19/39 | TX |
| Power Spectral Density | BT BLE | 1 Mbps | 0/19/39 | TX |
| 6dB Bandwidth | BT BLE | 1 Mbps | 0/19/39 | TX |
| Band Edge | BT BLE | 1 Mbps | 0/19/39 | TX |
| Transmitter Spurious Emissions | BT BLE | 1 Mbps | 0/19/39 | TX |

Note: Parameters set by test software during channel & power tests, the software provided by the customer was used to set the operating channels as well as the output power level. The RF output power set is the power expected by the manufacturer and is going to be fixed on the firmware of the final product.

5 Test Summary

| Test Items | Test Requirement | Result |
|---|-------------------------------------|--------|
| Radiated Spurious Emissions | 15.247(d) 15.205(a) 15.209(a) | PASS |
| Conducted Spurious Emissions | 15.247(d) | PASS |
| Conducted Emissions | 15.207(a) | PASS |
| 6dB Bandwidth | 15.247(a)(2) | PASS |
| Maximum Peak Output Power | 15.247(b)(3),(4) | PASS |
| Power Spectral Density | 15.247(e) | PASS |
| Band Edge | 15.247(d) | PASS |
| Antenna Requirement | 15.203 | PASS |
| Maximum Permissible Exposure (Exposure of Humans to RF Fields) | 1.1307(b)(1) | PASS |

6 Equipment Used during Test

6.1 Equipments List

| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. Date | Calibration Due Date |
|--|---------------------------|--------------|-----------------------|-----------------|----------------|----------------------|
| Conducted Emissions 2# | | | | | | |
| 1 | EMI Test Receiver | R&S | ESCI | 101155 | 2023-07-27 | 2024-07-26 |
| 2 | LISN | SCHWARZBECK | NSLK 8128 | 8128-259 | 2023-10-31 | 2024-10-30 |
| 3 | Pulse Limiter | CYBERTEK | EM5010 | 261115-001-0024 | 2023-07-27 | 2024-07-26 |
| 4 | Cable | Laplace | RF300 | - | 2023-07-27 | 2024-07-26 |
| 3m Semi-anechoic Chamber for Radiation Emissions 1# | | | | | | |
| 1 | Spectrum Analyzer | R&S | FSP30 | 100091 | 2024-04-22 | 2025-04-21 |
| 2 | Amplifier | Agilent | 8447D | 2944A10178 | 2023-07-27 | 2024-07-26 |
| 3 | Tri-log Broadband Antenna | SCHWARZBECK | VULB9163 | 336 | 2023-08-07 | 2024-08-06 |
| 4 | Coaxial Cable | Top | TYPE16(13M) | - | 2024-04-22 | 2025-04-21 |
| 5 | Broad-band Horn Antenna | SCHWARZBECK | BBHA 9120D | 667 | 2024-01-23 | 2025-01-22 |
| 6 | Broad-band Horn Antenna | SCHWARZBECK | BBHA 9170 | 335 | 2023-07-27 | 2024-07-26 |
| 7 | Broadband Preamplifier | COMPLIANCE | PAP-1G18 | 2004 | 2023-08-08 | 2024-08-07 |
| 8 | Coaxial Cable | Top | ZT26-NJ-NJ-8M/FA | - | 2024-04-22 | 2025-04-21 |
| 9 | Microwave Amplifier | SCHWARZBECK | BBV 9721 | 100472 | 2023-07-27 | 2024-07-26 |
| 10 | Coaxial Cable | Top | ZT40-2.92J-2.92J-2.0M | 17100919 | 2024-04-22 | 2025-04-21 |
| 3m Semi-anechoic Chamber for Radiation Emissions 2# | | | | | | |
| 1 | Test Receiver | R&S | ESCI | 101296 | 2024-04-22 | 2025-04-21 |
| 2 | Trilog Broadband Antenna | SCHWARZBECK | VULB9160 | 9160-3325 | 2023-11-04 | 2024-11-03 |
| 3 | Active Loop Antenna | Com-Power | AL-130R | 10160007 | 2024-04-27 | 2025-04-26 |
| 4 | Amplifier | ANRITSU | MH648A | M43381 | 2024-04-22 | 2025-04-21 |
| 5 | Cable | HUBER+SUHNER | CBL2 | 525178 | 2024-04-22 | 2025-04-21 |
| RF Conducting | | | | | | |
| 1 | Spectrum Analyzer | R&S | FSP40 | 100501 | 2023-07-27 | 2024-07-26 |
| 2 | Spectrum Analyzer | Agilent | N9020A | MY49100060 | 2023-07-27 | 2024-07-26 |

Test Software:

| Test Item | Software name | Software version |
|---|---------------|-------------------|
| Conduction disturbance Radiated Emission(3m) | EZ-EMC | EZ-EMC(RA-03A1-1) |

6.2 Measurement Uncertainty

| Parameter | Uncertainty |
|---|---|
| Conducted Emission | ± 3.64 dB(AC mains 150KHz~30MHz) |
| Radiated Spurious Emissions | ± 5.08 dB (Bilog antenna 30M~1000MHz) |
| | ± 5.47 dB (Horn antenna 1000M~25000MHz) |
| Radio Frequency | ± 1 x 10 ⁻⁷ Hz |
| RF Power | ± 0.42 dB |
| RF Power Density | ± 0.7dB |
| Conducted Spurious Emissions | ± 2.76 dB (9kHz~26500MHz) |
| Confidence interval: 95%. Confidence factor:k=2 | |

7 Duty Cycle

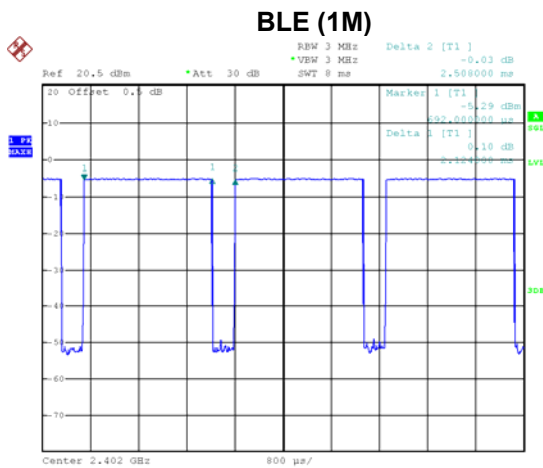
| Operation mode | On time ms | Period ms | Duty Cycle linear | Duty Cycle % | Duty Cycle Factor(dB) | Average Factor(dB) |
|----------------|------------|-----------|-------------------|--------------|-----------------------|--------------------|
| BLE (1M) | 2.124 | 2.508 | 0.85 | 84.69 | 0.72 | -1.44 |
| BLE (1M) | 1.068 | 1.884 | 0.57 | 56.69 | 2.47 | -4.93 |

Remark:

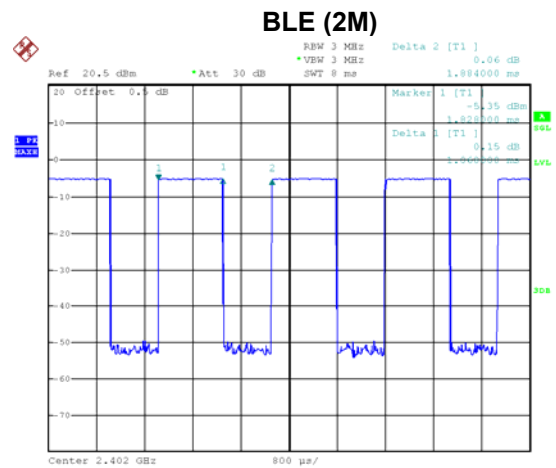
Duty cycle=On Time/period;

Duty cycle factor= $10 \cdot \log(1/\text{Duty cycle})$;

Average factor= $20 \log_{10} \text{Duty cycle}$



Date: 29.APR.2024 14:53:04



Date: 29.APR.2024 14:52:16

8 Conducted Emission

Test Requirement: 47CFR FCC Part15 Subpart C §15.207

Test Method: ANSI C63.10:2013

Test Result: PASS

Frequency Range: 150kHz to 30MHz

Limit:

| Frequency (MHz) | Conducted Limit (dB μ V) | |
|-----------------|------------------------------|-----------|
| | Quasi-peak | Average |
| 0.15 to 0.5 | 66 to 56* | 56 to 46* |
| 0.5 to 5.0 | 56 | 46 |
| 5.0 to 30 | 60 | 50 |

8.1 E.U.T. Operation

Operating Environment:

Temperature: 26.9°C

Humidity: 53.7%RH

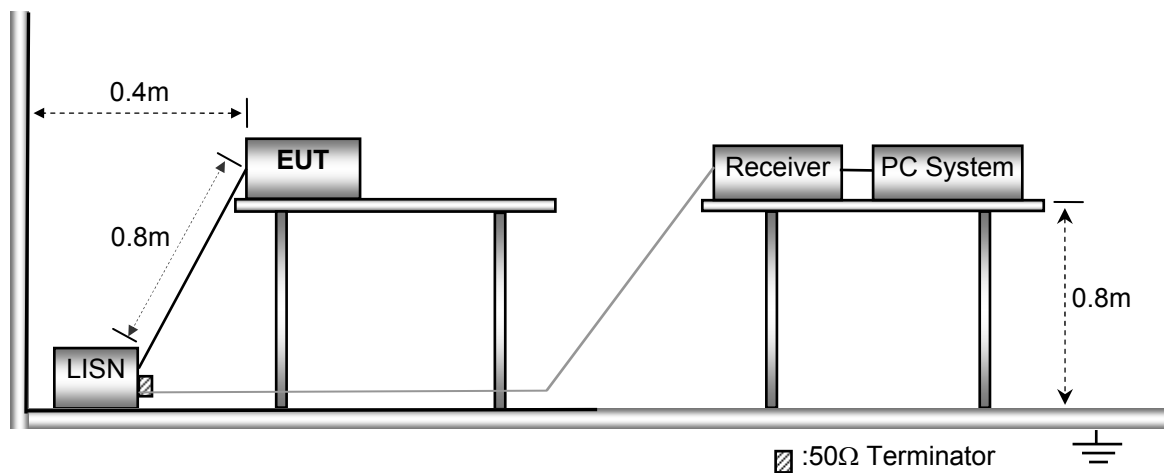
Atmospheric Pressure: 101.2kPa

EUT Operation:

The test was performed in Transmitting mode, the worst test data were shown in the report.

8.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10:2013.



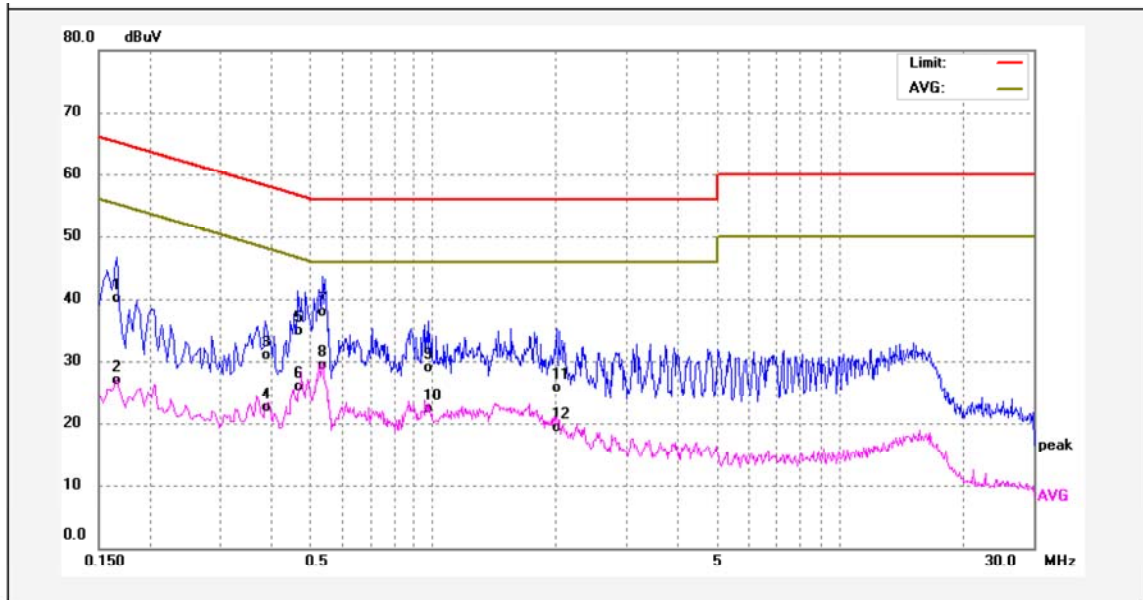
8.3 Measurement Description

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

8.4 Conducted Emission Test Result

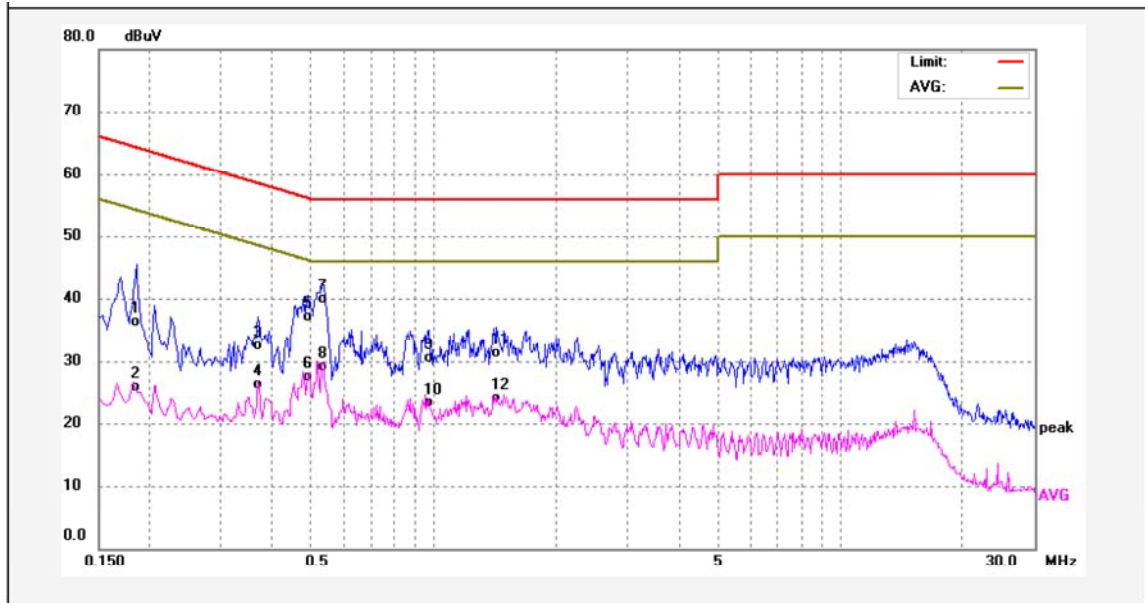
Remark: only the worst data (High channel mode) were reported

Live line:



| No. | Freq. (MHz) | Reading (dBuV) | Factor (dB) | Result (dBuV) | Limit dBuV | Margin (dB) | Detector | Remark |
|-----|-------------|----------------|-------------|---------------|------------|-------------|----------|--------|
| 1 | 0.1660 | 29.93 | 10.25 | 40.18 | 65.15 | -24.97 | QP | |
| 2 | 0.1660 | 16.56 | 10.25 | 26.81 | 55.15 | -28.34 | AVG | |
| 3 | 0.3860 | 20.32 | 10.59 | 30.91 | 58.15 | -27.24 | QP | |
| 4 | 0.3860 | 11.94 | 10.59 | 22.53 | 48.15 | -25.62 | AVG | |
| 5 | 0.4660 | 24.14 | 10.71 | 34.85 | 56.58 | -21.73 | QP | |
| 6 | 0.4660 | 15.14 | 10.71 | 25.85 | 46.58 | -20.73 | AVG | |
| 7 | 0.5340 | 27.06 | 10.75 | 37.81 | 56.00 | -18.19 | QP | |
| 8 | 0.5340 | 18.65 | 10.75 | 29.40 | 46.00 | -16.60 | AVG | |
| 9 | 0.9700 | 17.75 | 11.10 | 28.85 | 56.00 | -27.15 | QP | |
| 10 | 0.9700 | 11.30 | 11.10 | 22.40 | 46.00 | -23.60 | AVG | |
| 11 | 2.0220 | 14.34 | 11.31 | 25.65 | 56.00 | -30.35 | QP | |
| 12 | 2.0220 | 8.00 | 11.31 | 19.31 | 46.00 | -26.69 | AVG | |

Neutral line:



| No. | Freq. (MHz) | Reading (dBuV) | Factor (dB) | Result (dBuV) | Limit dBuV | Margin (dB) | Detector | Remark |
|-----|-------------|----------------|-------------|---------------|------------|-------------|----------|--------|
| 1 | 0.1860 | 26.02 | 10.37 | 36.39 | 64.21 | -27.82 | QP | |
| 2 | 0.1860 | 15.54 | 10.37 | 25.91 | 54.21 | -28.30 | AVG | |
| 3 | 0.3700 | 22.15 | 10.42 | 32.57 | 58.50 | -25.93 | QP | |
| 4 | 0.3700 | 15.95 | 10.42 | 26.37 | 48.50 | -22.13 | AVG | |
| 5 | 0.4900 | 26.48 | 10.66 | 37.14 | 56.17 | -19.03 | QP | |
| 6 | 0.4900 | 16.87 | 10.66 | 27.53 | 46.17 | -18.64 | AVG | |
| 7 | 0.5340 | 29.26 | 10.66 | 39.92 | 56.00 | -16.08 | QP | |
| 8 | 0.5340 | 18.54 | 10.66 | 29.20 | 46.00 | -16.80 | AVG | |
| 9 | 0.9700 | 19.79 | 10.76 | 30.55 | 56.00 | -25.45 | QP | |
| 10 | 0.9700 | 12.46 | 10.76 | 23.22 | 46.00 | -22.78 | AVG | |
| 11 | 1.4260 | 20.53 | 10.87 | 31.40 | 56.00 | -24.60 | QP | |
| 12 | 1.4260 | 13.27 | 10.87 | 24.14 | 46.00 | -21.86 | AVG | |

9 Radiated Emissions

Test Requirement: FCC 47CFR Part 15 Section 15.209 & 15.247

Test Method: ANSI C63.10:2013

Test Result: PASS

Measurement Distance: 3m

Limit:

| Frequency (MHz) | Field Strength | | Field Strength Limit at 3m Measurement Dist | |
|--------------------|----------------|-----------------|---|--------------------------------------|
| | uV/m | Distance (m) | uV/m | dBuV/m |
| 0.009 ~ 0.490 | 2400/F(kHz) | 300 | 10000 * 2400/F(kHz) | 20log ^{(2400/F(kHz))} + 80 |
| 0.490 ~ 1.705 | 24000/F(kHz) | 30 | 100 * 24000/F(kHz) | 20log ^{(24000/F(kHz))} + 40 |
| 1.705 ~ 30 | 30 | 30 | 100 * 30 | 20log ⁽³⁰⁾ + 40 |
| 30 ~ 88 | 100 | 3 | 100 | 20log ⁽¹⁰⁰⁾ |
| 88 ~ 216 | 150 | 3 | 150 | 20log ⁽¹⁵⁰⁾ |
| 216 ~ 960 | 200 | 3 | 200 | 20log ⁽²⁰⁰⁾ |
| Above 960 | 500 | 3 | 500 | 20log ⁽⁵⁰⁰⁾ |

9.1 EUT Operation

Operating Environment:

Temperature: 25.6 °C

Humidity: 66.8 % RH

Atmospheric Pressure: 101.3kPa

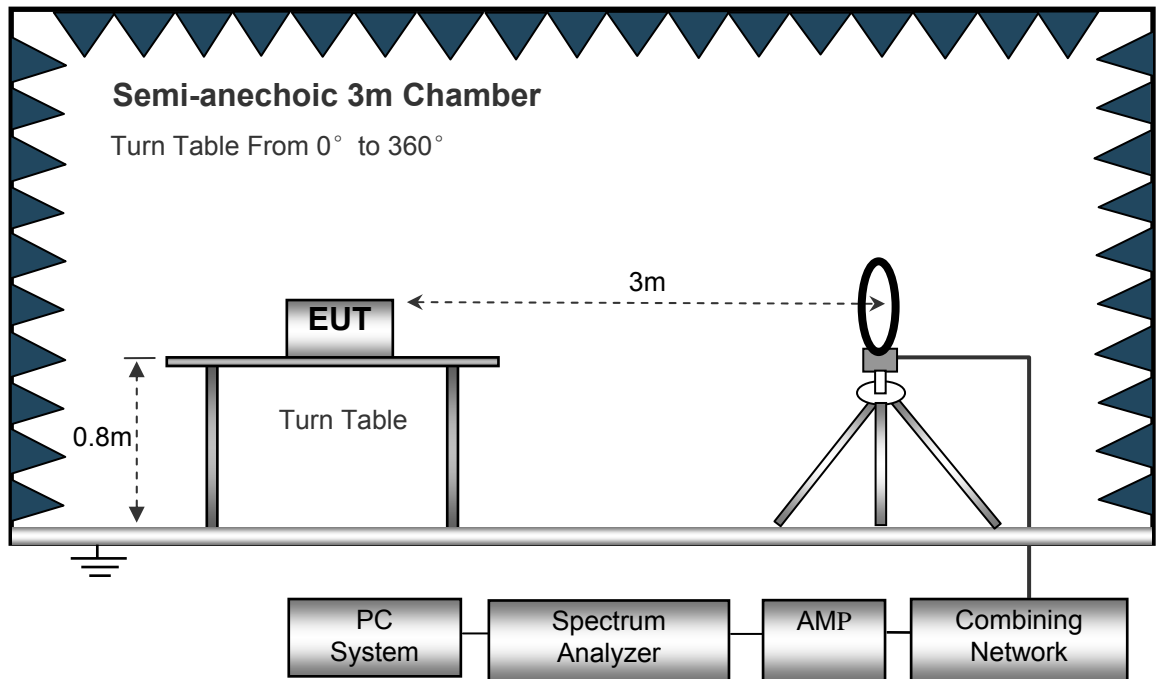
EUT Operation:

The test was performed in transmitting mode, the test data were shown in the report.

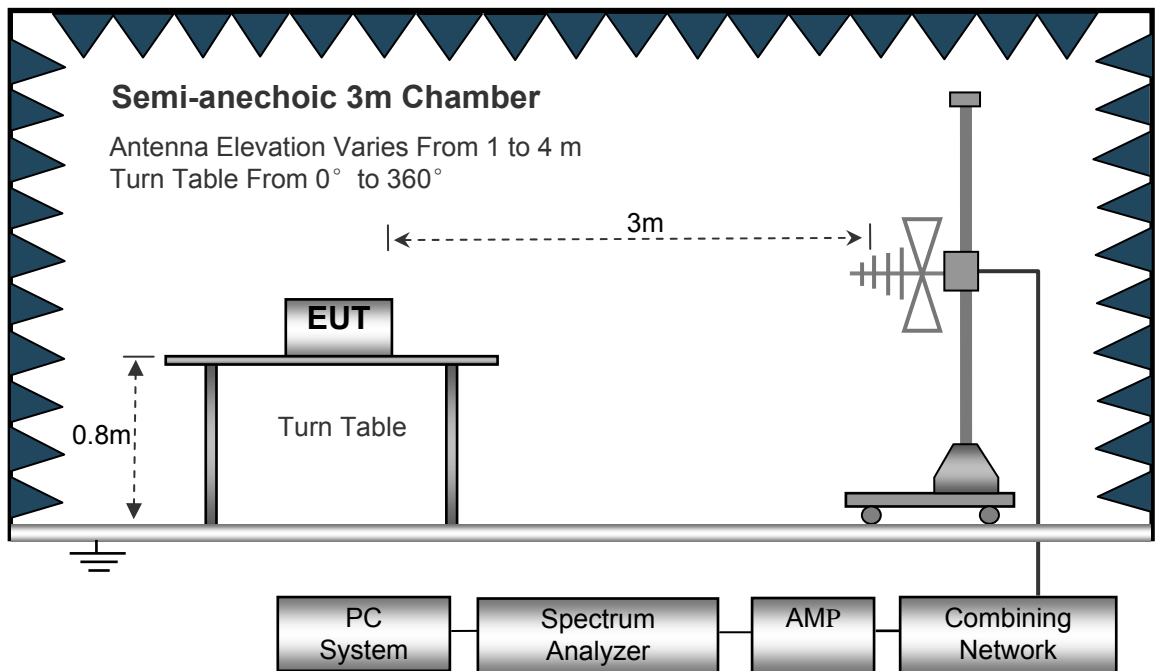
9.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10.

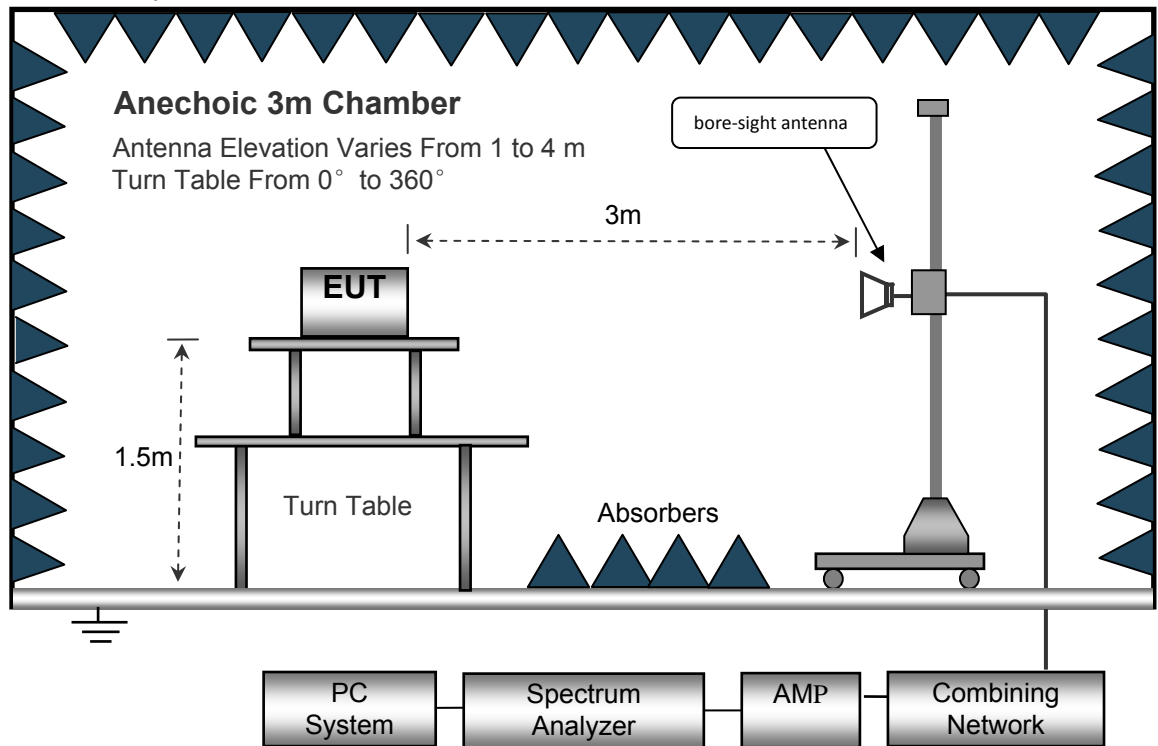
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



9.3 Spectrum Analyzer Setup

Below 30MHz

Sweep Speed Auto
 IF Bandwidth..... 10kHz
 Video Bandwidth..... 10kHz
 Resolution Bandwidth..... 10kHz

30MHz ~ 1GHz

Sweep Speed Auto
 Detector PK
 Resolution Bandwidth..... 100kHz
 Video Bandwidth..... 300kHz

Above 1GHz

Sweep Speed Auto
 Detector PK
 Resolution Bandwidth..... 1MHz
 Video Bandwidth..... 3MHz
 Detector Ave.
 Resolution Bandwidth..... 1MHz
 Video Bandwidth..... 10Hz

9.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane for below 1GHz and 1.5m for above 1GHz.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are performed in X,Y and Z axis positioning(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand),the worst condition was tested putting the eut in Z axis,so the worst data were shown as follow.
8. A 2.4GHz high –pass filter is used during radiated emissions above 1GHz measurement.

9.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit}$$

9.6 Summary of Test Results

Test Frequency: 9kHz~30MHz

The measurements were more than 20 dB below the limit and not reported.

Test Frequency: 30MHz ~ 8GHz

Remark: only the worst data (BLE (1M) mode) were reported.

| Frequency (MHz) | Receiver Reading (dB μ V) | Detector (PK/QP/Ave) | Turn table Angle Degree | RX Antenna | | Corrected Factor (dB) | Corrected Amplitude (dB μ V/m) | Limit (dB μ V/m) | Margin (dB) |
|------------------------------|-------------------------------------|-------------------------|----------------------------------|---------------|----------------|-----------------------------|--|-------------------------|----------------|
| | | | | Height (m) | Polar (H/V) | | | | |
| BLE (1M) Low Channel 2402MHz | | | | | | | | | |
| 152.85 | 43.87 | QP | 98 | 1.3 | H | -11.88 | 31.99 | 43.50 | -11.51 |
| 152.85 | 48.33 | QP | 305 | 1.3 | V | -11.88 | 36.45 | 43.50 | -7.05 |
| 4804.00 | 56.79 | PK | 7 | 1.1 | V | -1.06 | 55.73 | 74.00 | -18.27 |
| 4804.00 | 41.87 | Ave | 7 | 1.1 | V | -1.06 | 40.81 | 54.00 | -13.19 |
| 7206.00 | 57.96 | PK | 32 | 1.8 | H | 1.33 | 59.29 | 74.00 | -14.71 |
| 7206.00 | 39.04 | Ave | 32 | 1.8 | H | 1.33 | 40.37 | 54.00 | -13.63 |
| 2345.93 | 45.47 | PK | 59 | 1.1 | V | -13.19 | 32.28 | 74.00 | -41.72 |
| 2345.93 | 39.46 | Ave | 59 | 1.1 | V | -13.19 | 26.27 | 54.00 | -27.73 |
| 2375.03 | 43.85 | PK | 229 | 1.5 | H | -13.14 | 30.71 | 74.00 | -43.29 |
| 2375.03 | 38.54 | Ave | 229 | 1.5 | H | -13.14 | 25.40 | 54.00 | -28.60 |
| 2495.61 | 42.84 | PK | 120 | 1.6 | V | -13.08 | 29.76 | 74.00 | -44.24 |
| 2495.61 | 38.17 | Ave | 120 | 1.6 | V | -13.08 | 25.09 | 54.00 | -28.91 |

| Frequency | Receiver Reading | Detector | Turn table Angle | RX Antenna | | Corrected Factor | Corrected Amplitude | Limit | Margin |
|---------------------------------|------------------|-------------|------------------|------------|-------|------------------|---------------------|----------------|--------|
| | | | | Height | Polar | | | | |
| (MHz) | (dB μ V) | (PK/QP/Ave) | Degree | (m) | (H/V) | (dB) | (dB μ V/m) | (dB μ V/m) | (dB) |
| BLE (1M) Middle Channel 2440MHz | | | | | | | | | |
| 152.85 | 44.63 | QP | 291 | 1.3 | H | -13.35 | 31.28 | 43.50 | -12.22 |
| 152.85 | 47.69 | QP | 296 | 1.2 | V | -13.35 | 34.34 | 43.50 | -9.16 |
| 4880.00 | 57.62 | PK | 130 | 1.2 | V | -0.62 | 57.00 | 74.00 | -17.00 |
| 4880.00 | 41.04 | Ave | 130 | 1.2 | V | -0.62 | 40.42 | 54.00 | -13.58 |
| 7320.00 | 59.07 | PK | 237 | 1.9 | H | 2.21 | 61.28 | 74.00 | -12.72 |
| 7320.00 | 39.29 | Ave | 237 | 1.9 | H | 2.21 | 41.50 | 54.00 | -12.50 |
| 2334.88 | 46.98 | PK | 309 | 1.4 | V | -13.19 | 33.79 | 74.00 | -40.21 |
| 2334.88 | 39.27 | Ave | 309 | 1.4 | V | -13.19 | 26.08 | 54.00 | -27.92 |
| 2379.37 | 43.09 | PK | 119 | 1.9 | H | -13.14 | 29.95 | 74.00 | -44.05 |
| 2379.37 | 38.53 | Ave | 119 | 1.9 | H | -13.14 | 25.39 | 54.00 | -28.61 |
| 2485.43 | 43.24 | PK | 42 | 1.8 | V | -13.08 | 30.16 | 74.00 | -43.84 |
| 2485.43 | 38.59 | Ave | 42 | 1.8 | V | -13.08 | 25.51 | 54.00 | -28.49 |

| Frequency | Receiver Reading | Detector | Turn table Angle | RX Antenna | | Corrected Factor | Corrected Amplitude | Limit | Margin |
|-------------------------------|------------------|-------------|------------------|------------|-------|------------------|---------------------|----------------|--------|
| | | | | Height | Polar | | | | |
| (MHz) | (dB μ V) | (PK/QP/Ave) | Degree | (m) | (H/V) | (dB) | (dB μ V/m) | (dB μ V/m) | (dB) |
| BLE (1M) High Channel 2480MHz | | | | | | | | | |
| 152.85 | 44.04 | QP | 325 | 1.1 | H | -13.35 | 30.69 | 43.50 | -12.81 |
| 152.85 | 47.81 | QP | 236 | 1.3 | V | -13.35 | 34.46 | 43.50 | -9.04 |
| 4960.00 | 58.62 | PK | 270 | 1.2 | V | -0.24 | 58.38 | 74.00 | -15.62 |
| 4960.00 | 39.98 | Ave | 270 | 1.2 | V | -0.24 | 39.74 | 54.00 | -14.26 |
| 7440.00 | 59.22 | PK | 324 | 1.8 | H | 2.84 | 62.06 | 74.00 | -11.94 |
| 7440.00 | 40.70 | Ave | 324 | 1.8 | H | 2.84 | 43.54 | 54.00 | -10.46 |
| 2312.85 | 46.69 | PK | 254 | 2.0 | V | -13.19 | 33.50 | 74.00 | -40.50 |
| 2312.85 | 39.38 | Ave | 254 | 2.0 | V | -13.19 | 26.19 | 54.00 | -27.81 |
| 2360.28 | 43.03 | PK | 248 | 1.7 | H | -13.14 | 29.89 | 74.00 | -44.11 |
| 2360.28 | 36.23 | Ave | 248 | 1.7 | H | -13.14 | 23.09 | 54.00 | -30.91 |
| 2483.70 | 44.71 | PK | 297 | 1.5 | V | -13.08 | 31.63 | 74.00 | -42.37 |
| 2483.70 | 37.60 | Ave | 297 | 1.5 | V | -13.08 | 24.52 | 54.00 | -29.48 |

Test Frequency: 8GHz~25GHz

The measurements were more than 20 dB below the limit and not reported.

10 Conducted Spurious Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019;
ANSI C63.10:2013

Test Result: PASS

Limit:

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 Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

10.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer:
 - a) Set instrument center frequency to DTS channel center frequency.
 - b) Set the span to _ 1.5 times the DTS bandwidth.
 - c) Set the RBW = 100 kHz.
 - d) Set the VBW _ [3 × RBW].
 - e) Detector = peak.
 - f) Sweep time = auto couple.
 - g) Trace mode = max hold.
 - h) Allow trace to fully stabilize.
 - i) Use the peak marker function to determine the maximum PSD level.

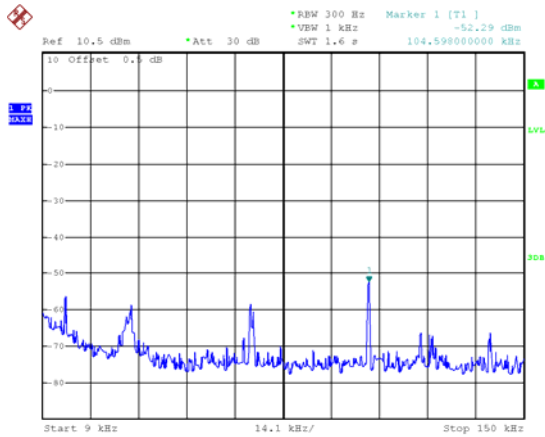
Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

10.2 Test Result

BLE (1M)

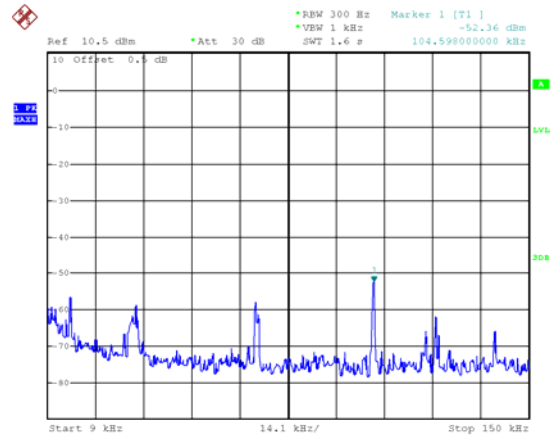
9kHz – 150kHz

Mode: channel 0



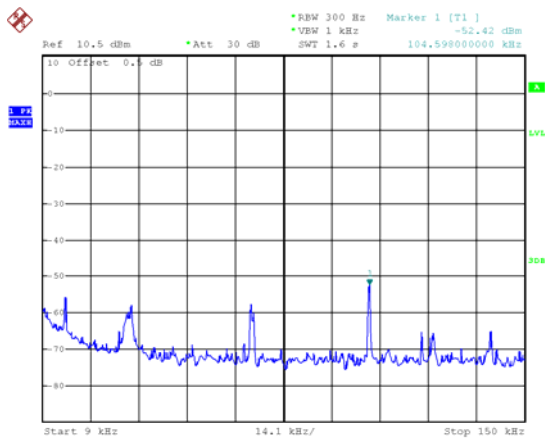
Date: 29.APR.2024 15:37:20

Mode: channel 19



Date: 29.APR.2024 15:36:54

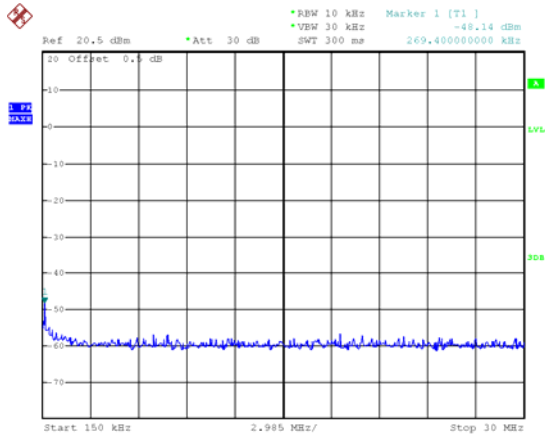
Mode: channel 39



Date: 29.APR.2024 15:36:32

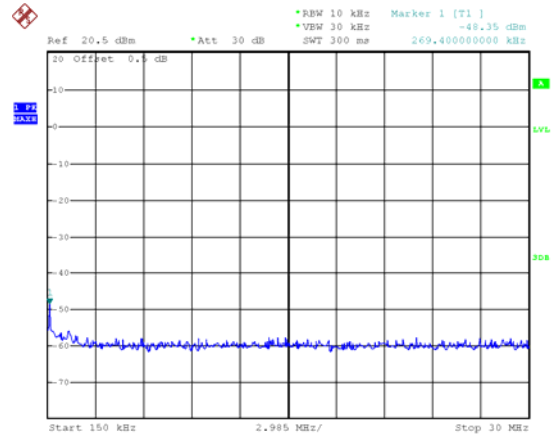
150kHz – 30MHz

Mode: channel 0



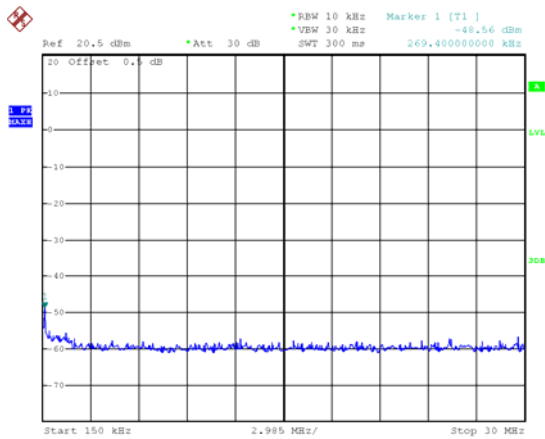
Date: 29.APR.2024 15:19:26

Mode: channel 19



Date: 29.APR.2024 15:19:54

Mode: channel 39

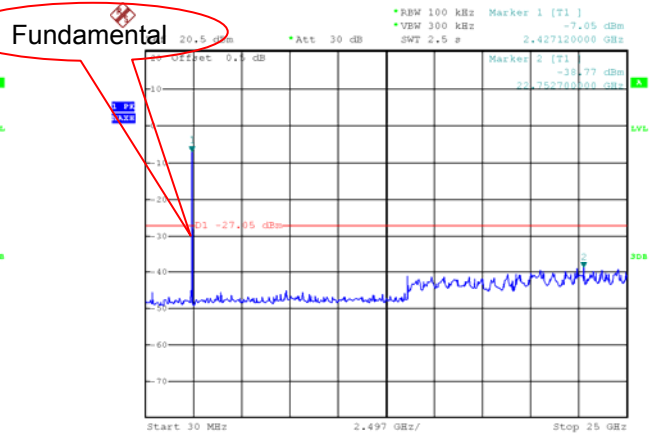
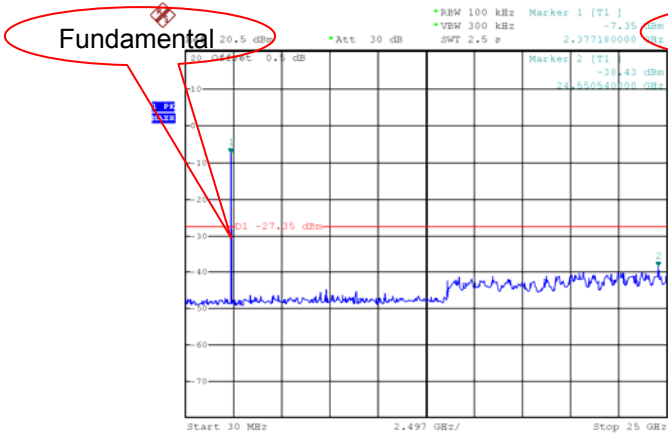


Date: 29.APR.2024 15:25:52

Above 30MHz

Mode: channel 0

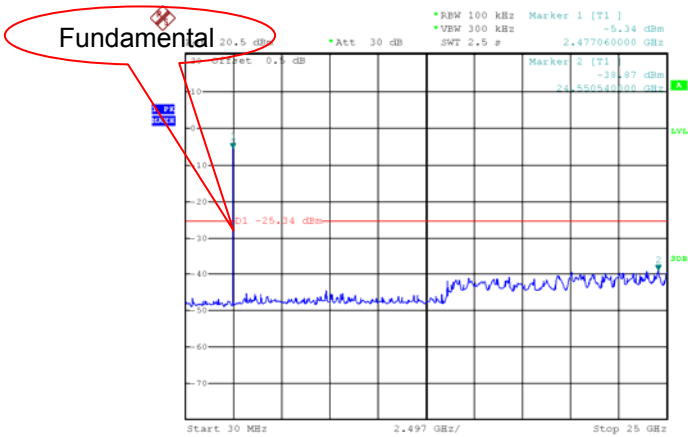
Mode: channel 19



Date: 29.APR.2024 15:05:58

Date: 29.APR.2024 15:05:07

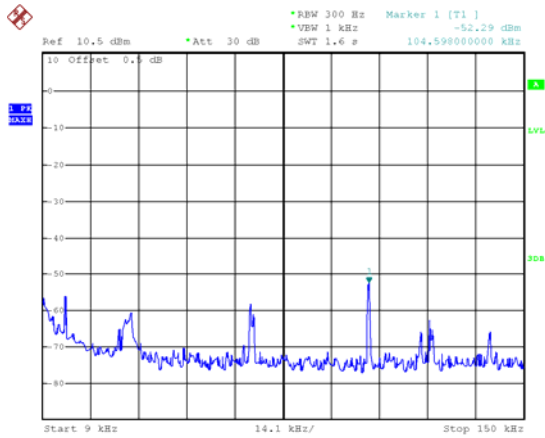
Mode: channel 39



Date: 6.MAY.2024 14:21:26

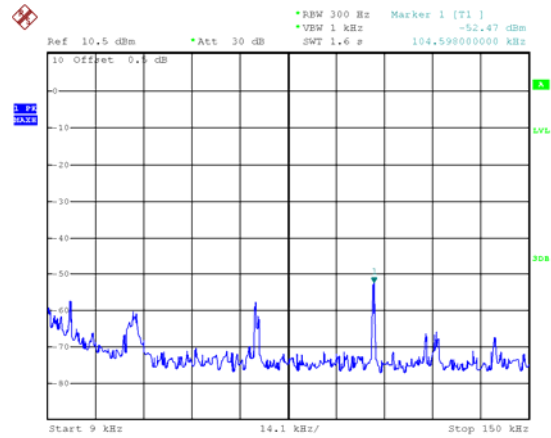
BLE (2M) 9kHz – 150kHz

Mode: channel 0



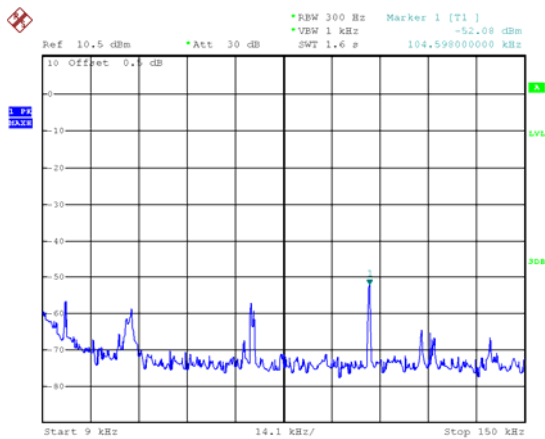
Date: 29.APR.2024 15:37:58

Mode: channel 19



Date: 29.APR.2024 15:38:31

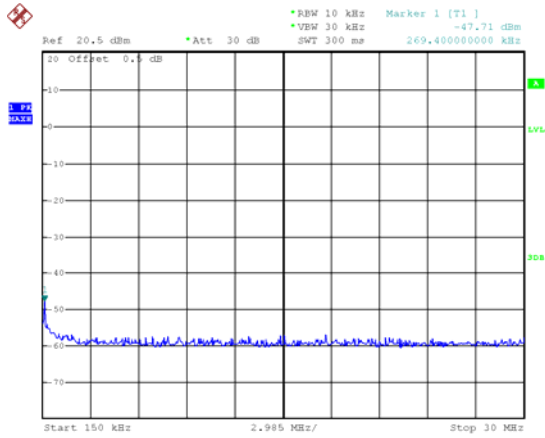
Mode: channel 39



Date: 29.APR.2024 15:39:30

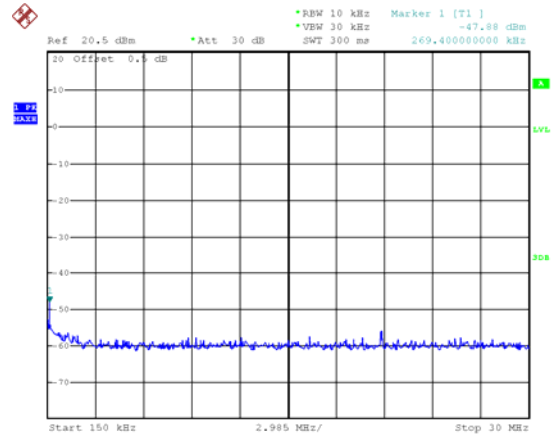
150kHz – 30MHz

Mode: channel 0



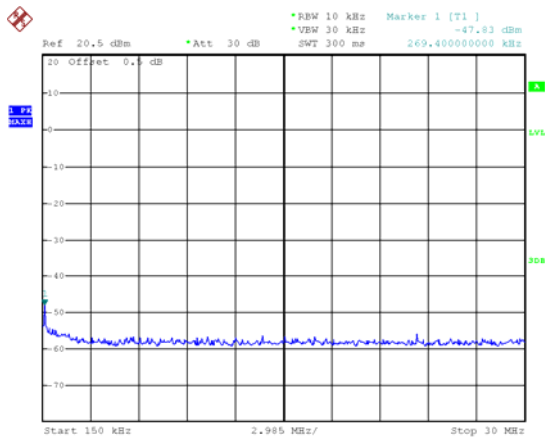
Date: 29.APR.2024 15:18:48

Mode: channel 19



Date: 29.APR.2024 15:17:56

Mode: channel 39

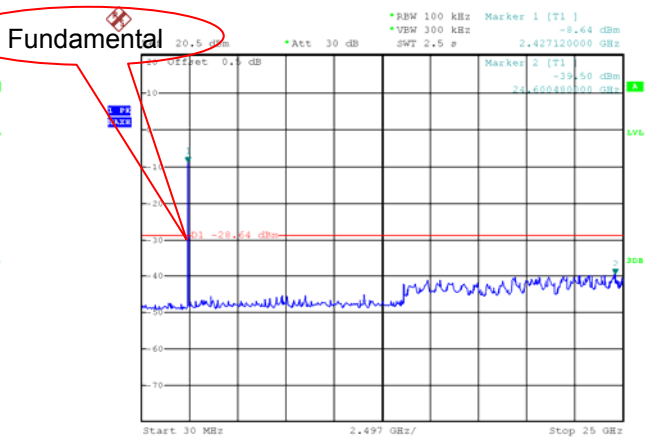
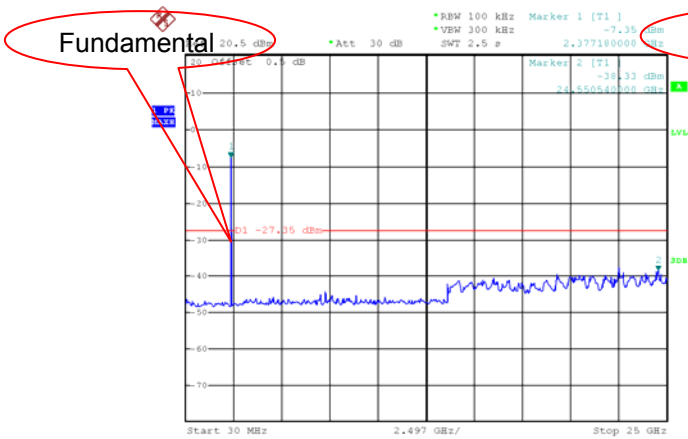


Date: 29.APR.2024 15:17:35

Above 30MHz

Mode: channel 0

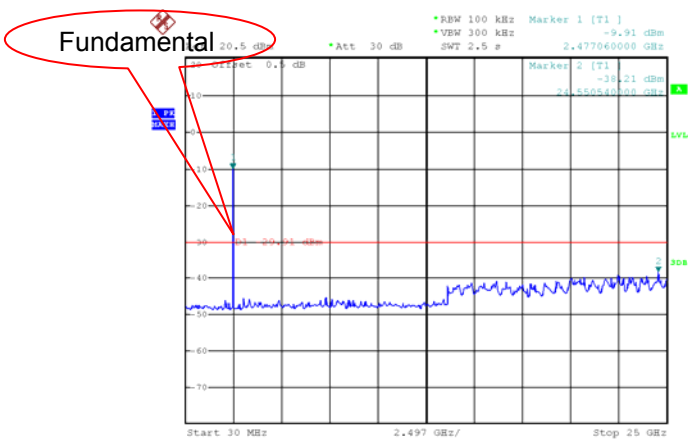
Mode: channel 19



Date: 29.APR.2024 15:08:31

Date: 29.APR.2024 15:09:35

Mode: channel 39



Date: 29.APR.2024 15:11:25

11 Band Edge Measurement

Test Requirement: FCC 47CFR Part 15 Section 15.247

Test Method: KDB 558074 D01 15.247 Meas Guidance v05r02, April 2, 2019

Regulation 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. 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:

Test Mode: Transmitting

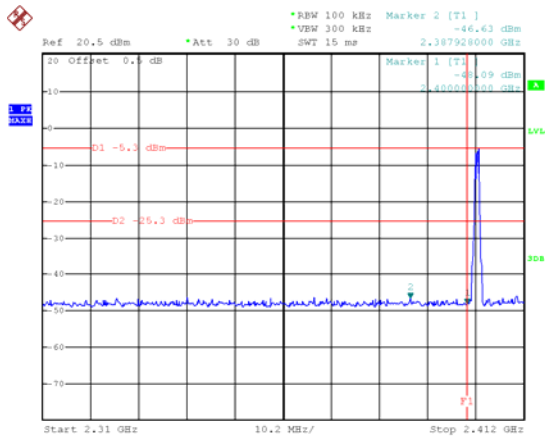
11.1 Test Produce

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

11.2 Test Result

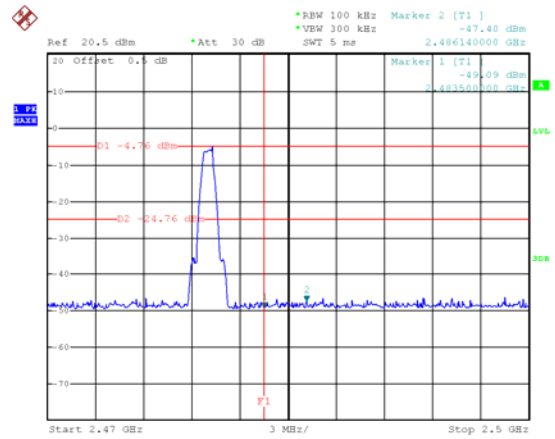
Test result plots shown as follows:

BLE (1M): Band edge-left side



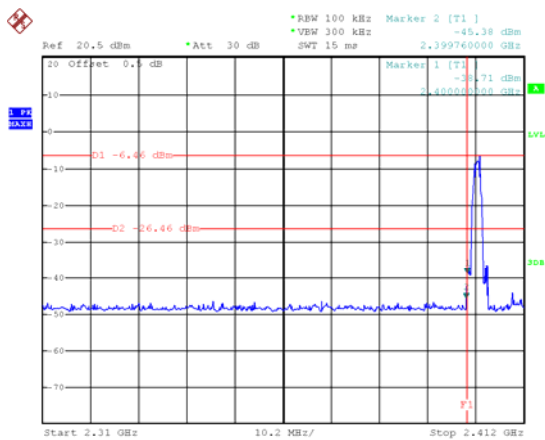
Date: 29.APR.2024 14:57:24

BLE (1M): Band edge-right side



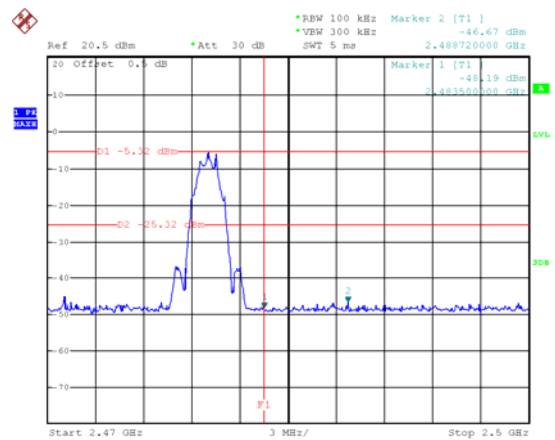
Date: 29.APR.2024 15:02:24

BLE (2M): Band edge-left side



Date: 29.APR.2024 14:58:59

BLE (2M): Band edge-right side



Date: 29.APR.2024 15:00:57

12 6 dB Bandwidth Measurement

| | |
|-------------------|--|
| Test Requirement: | FCC 47CFR Part 15 Section 15.247 |
| Test Method: | ANSI C63.10:2013 KDB 558074 D01 15.247 Meas Guidance v05r02, April 2, 2019 |
| Test Limit: | §15.247(a)(2) Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz. |
| Test Mode: | Transmitting |

12.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. 6dB Bandwidth Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

12.2 Test Result

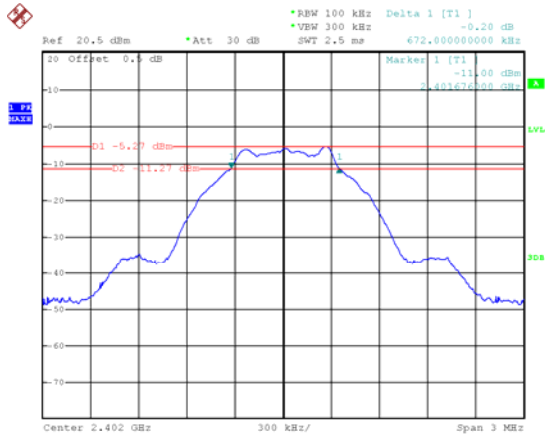
| Operation mode | Test Channel | 6dB Bandwidth (MHz) |
|----------------|--------------|---------------------|
| BLE (1M) | Channel 0 | 0.672 |
| | Channel 19 | 0.654 |
| | Channel 39 | 0.654 |
| BLE (2M) | Channel 0 | 1.176 |
| | Channel 19 | 1.128 |
| | Channel 39 | 1.176 |

Note: please refer to next page for test plot.

Test result plot:

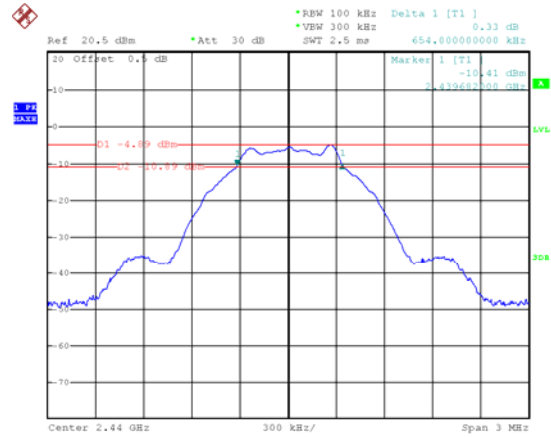
BLE (1M)

Mode: TX GFSK channel 0



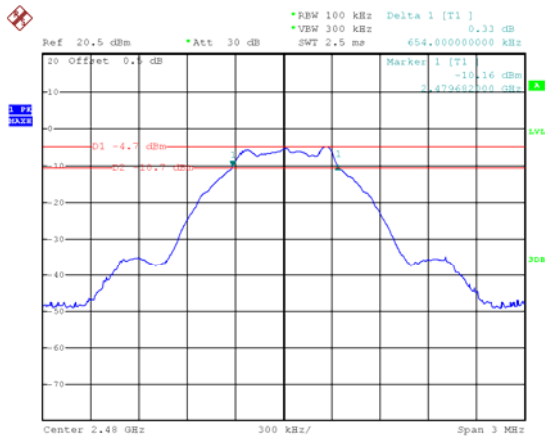
Date: 29.APR.2024 14:32:07

Mode: TX GFSK channel 19



Date: 29.APR.2024 14:34:37

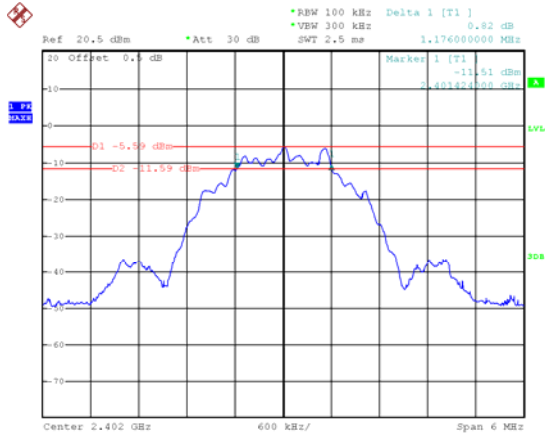
Mode: TX GFSK channel 39



Date: 29.APR.2024 14:36:17

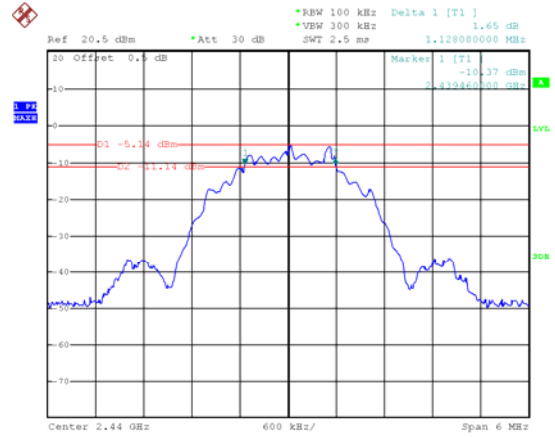
BLE (2M)

Mode: TX GFSK channel 0



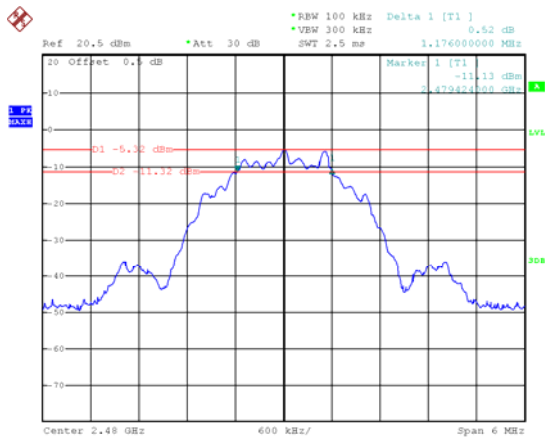
Date: 6.MAY.2024 14:28:59

Mode: TX GFSK channel 19



Date: 6.MAY.2024 14:30:25

Mode: TX GFSK channel 39



Date: 29.APR.2024 14:39:14

13 Maximum Peak Output Power

| | |
|-------------------|---|
| Test Requirement: | FCC 47CFR Part 15 Section 15.247 |
| Test Method: | ANSI C63.10:2013 KDB 558074 D01 15.247 Meas Guidance v05r02, April 2, 2019 §15.247(b) |
| Test Limit: | The maximum peak conducted output power of the intentional radiator shall not exceed 1W. |
| Test Mode: | Transmitting |

13.1 Test Procedure

According to KDB 558074 D01 15.247 Meas Guidance v05r02, April 2, 2019

Section 8.3.1.1 RBW \geq DTS bandwidth

Subclause 11.9.1.1 of ANSI C63.10 is applicable.

Section 8.3.1.2 Integrated band power method

For measuring the output power of a device transmitting a wide-band noise-like signal where the peak power amplitude is a statistical parameter, the preferred methodology is to use an integrated average power measurement, as described in 8.3.2. The peak integrated band power method of 11.9.1 in ANSI C63.10 is not applicable.

Subclause 11.9.2 of ANSI C63.10 is applicable.

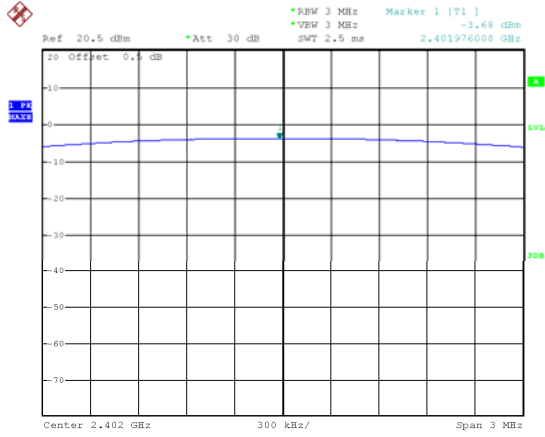
13.2 Test Result

| Operation mode | Channel Frequency (MHz) | Measurements (dBm) | Duty Cycle Factor (dB) | Conducted Output Power (dBm) | Limit |
|----------------|-------------------------|--------------------|------------------------|------------------------------|----------|
| BLE (1M) | Low-2402 | -3.68 | 0.72 | -2.96 | 1W/30dBm |
| | Middle-2440 | -3.27 | | -2.55 | 1W/30dBm |
| | High-2480 | -3.21 | | -2.49 | 1W/30dBm |
| BLE (2M) | Low-2402 | -3.69 | 2.47 | -1.22 | 1W/30dBm |
| | Middle-2440 | -3.20 | | -0.73 | 1W/30dBm |
| | High-2480 | -3.19 | | -0.72 | 1W/30dBm |

Test Plot

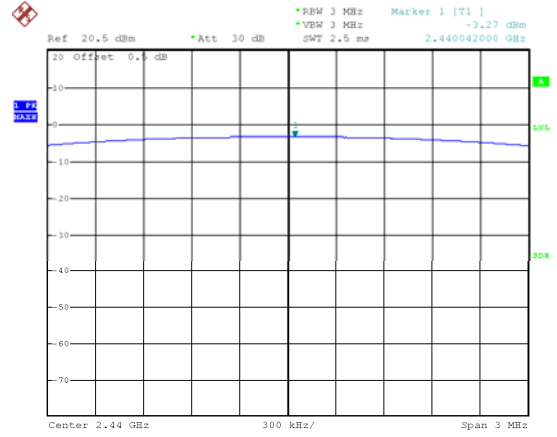
BLE (1M)

Mode: TX GFSK channel 0



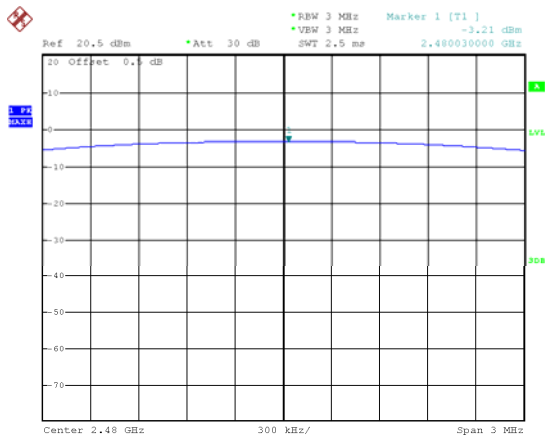
Date: 1.JUL.2024 11:12:03

Mode: TX GFSK channel 19



Date: 1.JUL.2024 11:13:01

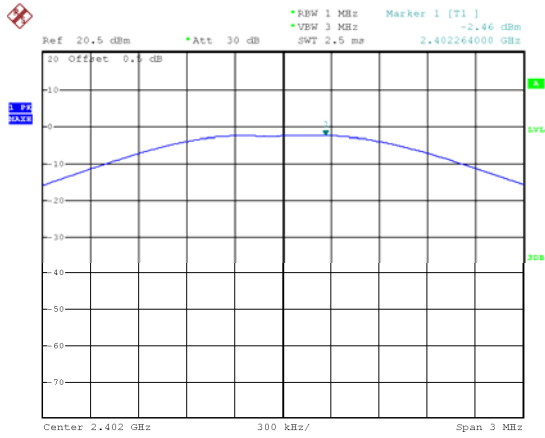
Mode: TX GFSK channel 39



Date: 1.JUL.2024 11:13:30

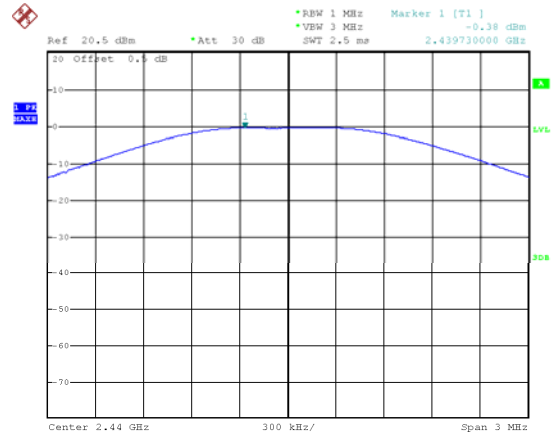
BLE (2M)

Mode: TX GFSK channel 0



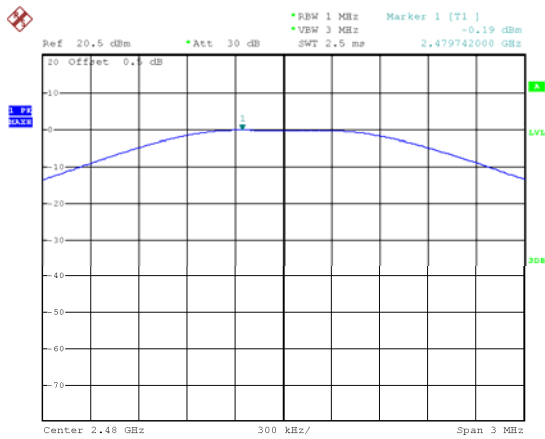
Date: 24.JUN.2024 15:53:36

Mode: TX GFSK channel 19



Date: 24.JUN.2024 15:54:08

Mode: TX GFSK channel 39



Date: 24.JUN.2024 15:55:30

14 Power Spectral density

| | |
|-------------------|---|
| Test Requirement: | FCC 47CFR Part 15 Section 15.247 |
| Test Method: | ANSI C63.10:2013 KDB 558074 D01 15.247 Meas Guidance v05r02, April 2, 2019 |
| Test Limit: | §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. |
| Test Mode: | Transmitting |

14.1 Test Procedure

According to KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019 section 8.4

Subclause 11.10 of ANSI C63.10 is applicable.

Choose the test procedure according to the product type

Peak PSD

Subclause 11.10.2 of ANSI C63.10 is applicable.

AVG PSD

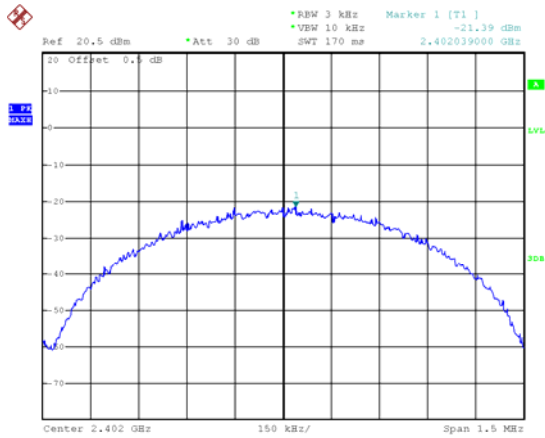
Subclause 11.10.3/4/5/6/7/8 of ANSI C63.10 is applicable.

14.2 Test Result

| Operation mode | Channel Frequency (MHz) | Measurements (dBm per 3kHz) | Duty Cycle Factor (dB) | Power Spectral density (dBm per 3kHz) | Limit |
|----------------|-------------------------|-----------------------------|------------------------|---------------------------------------|---------------|
| BLE (1M) | Low-2402 | -21.39 | 0.72 | -20.67 | 8dBm per 3kHz |
| | Middle-2440 | -21.01 | | -20.29 | 8dBm per 3kHz |
| | High-2480 | -20.77 | | -20.05 | 8dBm per 3kHz |
| BLE (2M) | Low-2402 | -23.89 | 2.47 | -21.42 | 8dBm per 3kHz |
| | Middle-2440 | -23.40 | | -20.93 | 8dBm per 3kHz |
| | High-2480 | -23.24 | | -20.77 | 8dBm per 3kHz |

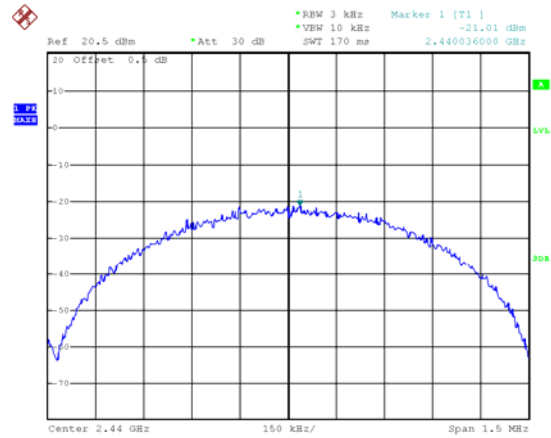
Test Plot BLE (1M)

Mode: TX GFSK channel 0



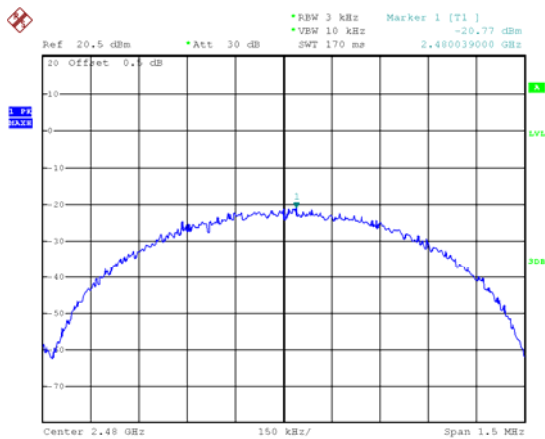
Date: 29.APR.2024 15:47:45

Mode: TX GFSK channel 19



Date: 29.APR.2024 15:48:21

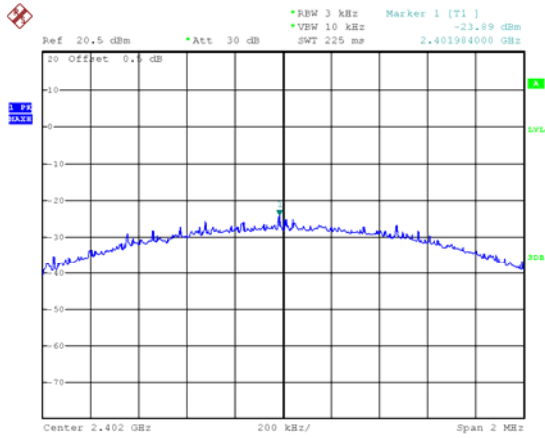
Mode: TX GFSK channel 39



Date: 29.APR.2024 15:48:53

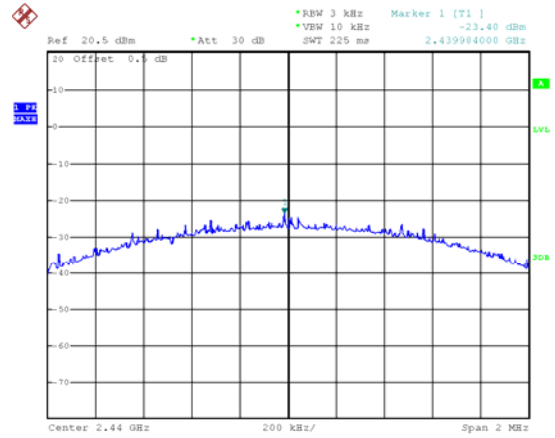
BLE (2M)

Mode: TX GFSK channel 0



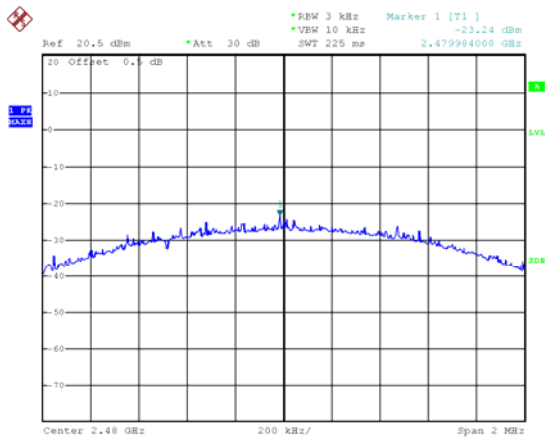
Date: 29.APR.2024 15:55:01

Mode: TX GFSK channel 19



Date: 29.APR.2024 15:54:30

Mode: TX GFSK channel 39



Date: 29.APR.2024 15:52:45

15 Antenna Requirement

According to the FCC Part 15 Paragraph 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. This product has a PIFA Antenna fulfil the requirement of this section.

Note: Please refer to EUT photos for more details.

16 RF Exposure

Remark: Please refer to SAR test report: WTD24D04085741W007.

17 Photographs of test setup and EUT.

Note: Please refer to appendix: Appendix-WP01-Photos.

=====**End of Report**=====