

TEST REPORT

Reference No...... : WTD21D05047152W001 V1
FCC ID : GU6ZYGS003
Applicant..... : Avery Dennison Retail Information Services, LLC
Address..... : 170 Monarch Lane Miamisburg, OH 45342
Manufacturer : CME Electronics Technology Co., LTD
Address..... : Suite B, 18th Floor, Jingwange No. 303, Qinglv Road South,
Gongbei, Zhuhai 519020, Guangdong Province, China
Product..... : ZippyYum Scancase
Model(s) : ZYGS003, ZYGS003-M
Standards..... : FCC CFR47 Part 15.247
Date of Receipt sample : 2021-05-19
Date of Test : 2021-05-19 to 2021-07-08
Date of Issue..... : 2021-09-22
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.

Prepared By:

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3 Revision History

| Test report No. | Date of Receipt sample | Date of Test | Date of Issue | Purpose | Comment | Approved |
|---------------------------|------------------------|--------------------------------|---------------|-----------|---------|----------|
| WTD21D05047152 W001 | 2021-05-19 | 2021-05-19 to 2021-07-08 | 2021-08-25 | Original | - | Replaced |
| WTD21D05047152 W001 V1 | 2021-05-19 | 2021-05-19 to 2021-07-08 | 2021-09-22 | Version 1 | updated | Valid |

4 General Information

4.1 General Description of E.U.T.

| | |
|--------------------|---|
| Product: | ZippyYum Scancase |
| Model(s): | ZYGS003, ZYGS003-M |
| Model Description: | All same except for model ZYGS003-M the IR Temperature sensor is replaced by a medical grade sensor of the same series. The test sample's model is ZYGS003 |
| Bluetooth Version: | V4.0 |
| Hardware Version: | V0.45 |
| Software Version: | V0.70 |

4.2 Details of E.U.T.

| | |
|-----------------------|---------------------|
| Operation Frequency: | 2402~2480MHz |
| Max. RF output power: | -2.71dBm |
| Type of Modulation: | GFSK |
| Antenna installation: | PCB printed antenna |
| Antenna Gain: | 0dBi |
| Ratings: | Input: 5V, 2A Max |
| Battery: | 3.7V 2000mAh |

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 Test Mode

Table 2 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 |

6 Equipment Used during Test

6.1 Equipments List

| Conducted Emissions Test Site 1# | | | | | | |
|---|----------------------------------|-----------------------|--------------|-----------------|--------------------------|--------------------------|
| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Calibration Date | Calibration Due Date |
| 1. | EMI Test Receiver | R&S | ESCI | 100947 | 2020-07-30 | 2021-07-29 |
| 2. | LISN | R&S | ENV216 | 100115 | 2020-07-30 | 2021-07-29 |
| 3. | Cable | Top | TYPE16(3.5M) | - | 2020-07-30 | 2021-07-29 |
| Conducted Emissions Test Site 2# | | | | | | |
| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Calibration Date | Calibration Due Date |
| 1. | EMI Test Receiver | R&S | ESCI | 101155 | 2020-07-30 | 2021-07-29 |
| 2. | LISN | SCHWARZBECK | NSLK 8128 | 8128-259 | 2020-07-30 | 2021-07-29 |
| 3. | Limiter | CYBERTEK | EM5010 | 261115-001-0024 | 2020-07-30 | 2021-07-29 |
| 4. | Cable | Laplace | RF300 | - | 2020-07-30 | 2021-07-29 |
| 3m Semi-anechoic Chamber for Radiation Emissions Test site 1# | | | | | | |
| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Calibration Date | Calibration Due Date |
| 1 | Spectrum Analyzer | R&S | FSP30 | 100091 | 2020-04-20 2021-04-19 | 2021-04-19 2022-04-18 |
| 2 | Amplifier | Agilent | 8447D | 2944A10178 | 2020-04-20 2021-04-19 | 2021-04-19 2022-04-18 |
| 3 | Trilog Broadband Antenna | SCHWARZBECK | VULB9163 | 336 | 2020-08-22 | 2021-08-21 |
| 4 | Coaxial Cable (below 1GHz) | Top | TYPE16(13M) | - | 2020-04-20 2021-04-19 | 2021-04-19 2022-04-18 |
| 5 | Broad-band Horn Antenna | SCHWARZBECK | BBHA 9120 D | 667 | 2020-04-25 2021-04-24 | 2021-04-24 2022-04-23 |
| 6 | Broad-band Horn Antenna | SCHWARZBECK | BBHA 9170 | 335 | 2020-04-20 2021-04-19 | 2021-04-19 2022-04-18 |
| 7 | Broadband Preamplifier | COMPLIANCE DIRECTION | PAP-1G18 | 2004 | 2020-04-20 2021-04-19 | 2021-04-19 2022-04-18 |
| 8 | Coaxial Cable (above 1GHz) | ZT26-NJ-NJ-8M/FA | 1GHz-18GHz | NA | 2020-04-20 2021-04-19 | 2021-04-19 2022-04-18 |
| 9 | Microwave Broadband Preamplifier | SCHWARZBECK | BBV 9721 | 100472 | 2020-07-31 | 2021-07-30 |
| 10 | Coaxial Cable | ZT40-2.92J-2.92J-2.0M | 10MHz-40GHz | 17100919 | 2021-04-26 | 2022-04-25 |
| 3m Semi-anechoic Chamber for Radiation Emissions Test site 2# | | | | | | |
| Item | Equipment | Manufacturer | Model No. | Serial No | Last Calibration Date | Calibration Due Date |

| 1 | Test Receiver | R&S | ESCI | 101296 | 2020-04-20 2021-04-19 | 2021-04-19 2022-04-18 |
|-----------------------------|------------------------------|-------------------|-----------|------------|--------------------------|--------------------------|
| 2 | Trilog Broadband Antenna | SCHWARZBECK | VULB9160 | 9160-3325 | 2020-04-25 2021-04-24 | 2021-04-24 2022-04-23 |
| 3 | Active Loop Antenna | Com-Power Corp. | AL-130R | 10160007 | 2020-05-06 | 2021-05-05 |
| 4 | Amplifier | ANRITSU | MH648A | M43381 | 2020-04-20 2021-04-19 | 2021-04-19 2022-04-18 |
| 5 | Cable | HUBER+SUHNER | CBL2 | 525178 | 2020-04-20 2021-04-19 | 2021-04-19 2022-04-18 |
| RF Conducted Testing | | | | | | |
| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Calibration Date | Calibration Due Date |
| 1. | EMC Analyzer (9k~26.5GHz) | Agilent | E7405A | MY45114943 | 2020-04-20 2021-04-19 | 2021-04-19 2022-04-18 |
| 2. | Spectrum Analyzer | R&S | FSP30 | 100091 | 2020-04-20 2021-04-19 | 2021-04-19 2022-04-18 |
| 3. | EXA Signal Analyzer | Malaysia Keysight | N9010A | MY50520207 | 2020-04-20 2021-04-19 | 2021-04-19 2022-04-18 |

6.2 Description of Support Units

| Equipment | Manufacturer | Model No. | Series No. |
|-----------|---|--------------|------------|
| Adapter | Shenzhen Hangjia Chi yuan Electric Co., Ltd. | HW-050100C01 | / |
| USB Cable | Waltek | / | / |

6.3 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 | $\pm 1 \times 10^{-7}$ Hz |
| RF Power | ± 0.42 dB |
| RF Power Density | ± 0.7 dB |
| Conducted Spurious Emissions | ± 2.76 dB (9kHz~26500MHz) |
| Confidence interval: 95%. Confidence factor:k=2 | |

6.4 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

7 Conducted Emission

Test Requirement: FCC CFR 47 Part 15 Section 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 |

*Decreases with the logarithm of the frequency.

7.1 E.U.T. Operation

Operating Environment:

Temperature: 22.4 °C

Humidity: 53.7 % RH

Atmospheric Pressure: 101.8kPa

Test Voltage: AC 120V, 60Hz

EUT Operation:

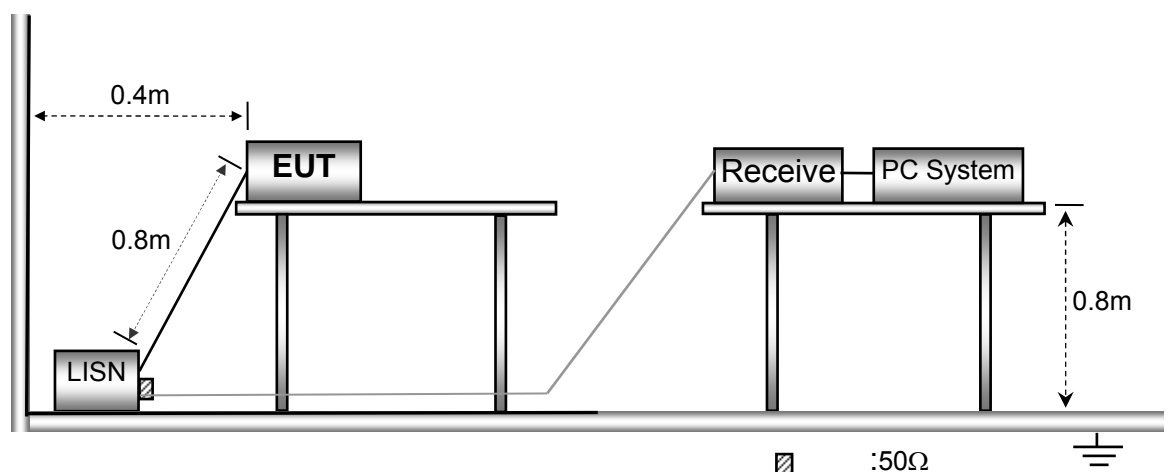
The test was performed in Transmitting mode, the worst test data (Low channel) were shown in the report.

7.2 EUT Setup

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

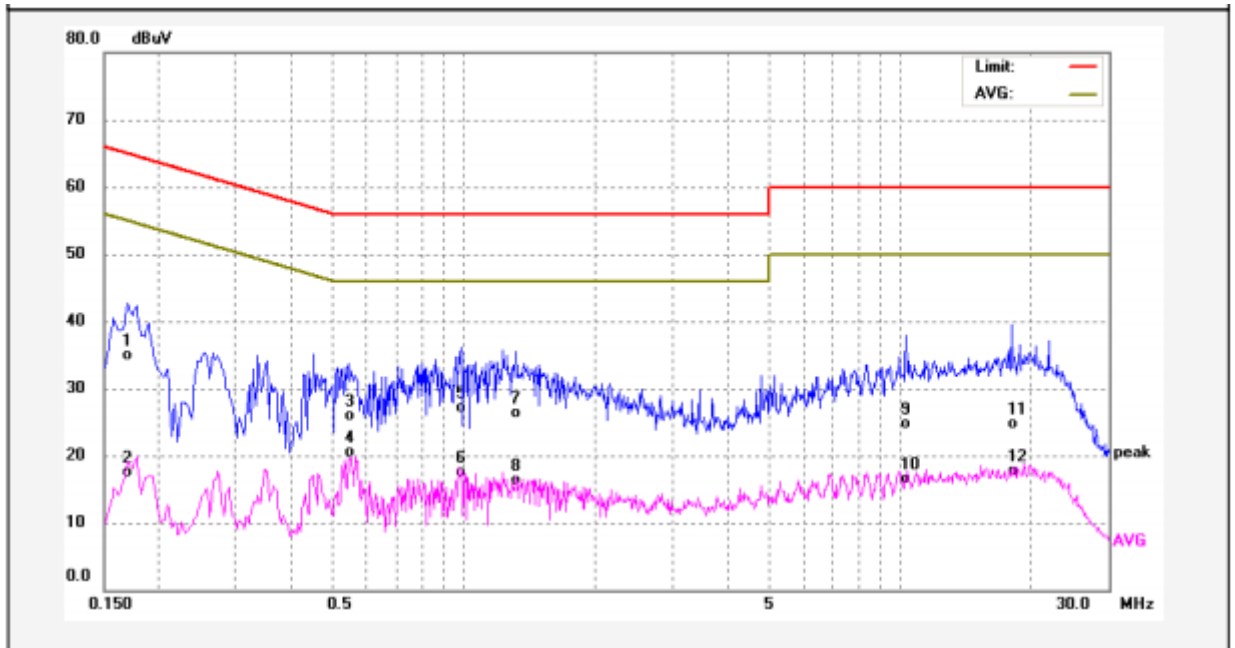
7.3 Measurement Description

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.



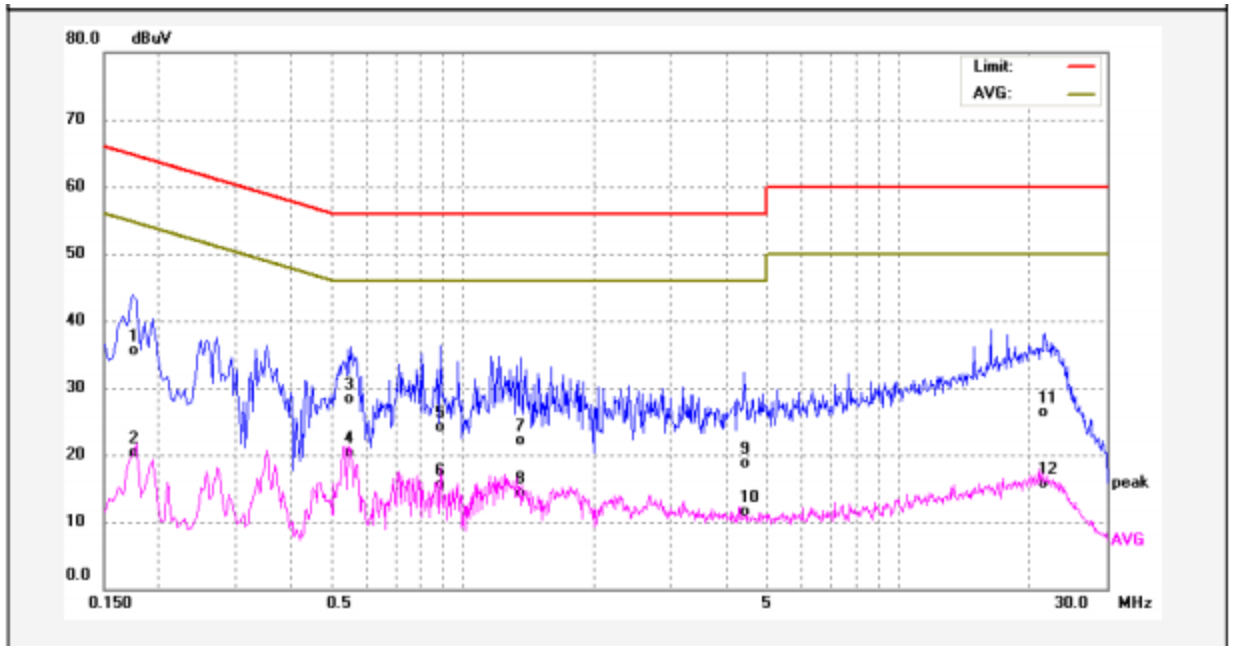
7.4 Conducted Emission Test Result

Live line:



| No. | Freq. (MHz) | Reading (dBuV) | Factor (dB) | Result (dBuV) | Limit dBuV | Margin (dB) | Detector | Remark |
|-----|-------------|----------------|-------------|---------------|------------|-------------|----------|--------|
| 1 | 0.1700 | 24.15 | 10.76 | 34.91 | 64.96 | -30.05 | QP | |
| 2 | 0.1700 | 6.81 | 10.76 | 17.57 | 54.96 | -37.39 | AVG | |
| 3 | 0.5460 | 15.42 | 10.54 | 25.96 | 56.00 | -30.04 | QP | |
| 4 | 0.5460 | 10.05 | 10.54 | 20.59 | 46.00 | -25.41 | AVG | |
| 5 | 0.9860 | 16.49 | 10.60 | 27.09 | 56.00 | -28.91 | QP | |
| 6 | 0.9860 | 6.84 | 10.60 | 17.44 | 46.00 | -28.56 | AVG | |
| 7 | 1.3220 | 15.70 | 10.60 | 26.30 | 56.00 | -29.70 | QP | |
| 8 | 1.3220 | 5.78 | 10.60 | 16.38 | 46.00 | -29.62 | AVG | |
| 9 | 10.3300 | 13.89 | 10.80 | 24.69 | 60.00 | -35.31 | QP | |
| 10 | 10.3300 | 5.71 | 10.80 | 16.51 | 50.00 | -33.49 | AVG | |
| 11 | 17.9580 | 13.86 | 10.75 | 24.61 | 60.00 | -35.39 | QP | |
| 12 | 17.9580 | 6.93 | 10.75 | 17.68 | 50.00 | -32.32 | AVG | |

Neutral line:



| No. | Freq. (MHz) | Reading (dBuV) | Factor (dB) | Result (dBuV) | Limit dBuV | Margin (dB) | Detector | Remark |
|-----|-------------|----------------|-------------|---------------|------------|-------------|----------|--------|
| 1 | 0.1740 | 24.69 | 10.75 | 35.44 | 64.76 | -29.32 | QP | |
| 2 | 0.1740 | 9.62 | 10.75 | 20.37 | 54.76 | -34.39 | AVG | |
| 3 | 0.5540 | 17.70 | 10.54 | 28.24 | 56.00 | -27.76 | QP | |
| 4 | 0.5540 | 9.69 | 10.54 | 20.23 | 46.00 | -25.77 | AVG | |
| 5 | 0.8860 | 13.50 | 10.60 | 24.10 | 56.00 | -31.90 | QP | |
| 6 | 0.8860 | 4.94 | 10.60 | 15.54 | 46.00 | -30.46 | AVG | |
| 7 | 1.3540 | 11.54 | 10.60 | 22.14 | 56.00 | -33.86 | QP | |
| 8 | 1.3540 | 3.78 | 10.60 | 14.38 | 46.00 | -31.62 | AVG | |
| 9 | 4.4140 | 7.97 | 10.77 | 18.74 | 56.00 | -37.26 | QP | |
| 10 | 4.4140 | 0.76 | 10.77 | 11.53 | 46.00 | -34.47 | AVG | |
| 11 | 21.6780 | 15.61 | 10.75 | 26.36 | 60.00 | -33.64 | QP | |
| 12 | 21.6780 | 4.87 | 10.75 | 15.62 | 50.00 | -34.38 | AVG | |

8 Radiated Emissions

Test Requirement: FCC CFR47 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 | $2400/F(\text{kHz})$ | 300 | $10000 * 2400/F(\text{kHz})$ | $20\log^{(2400/F(\text{kHz}))} + 80$ |
| 0.490 ~ 1.705 | $24000/F(\text{kHz})$ | 30 | $100 * 24000/F(\text{kHz})$ | $20\log^{(24000/F(\text{kHz}))} + 40$ |
| 1.705 ~ 30 | 30 | 30 | $100 * 30$ | $20\log^{(30)} + 40$ |
| 30 ~ 88 | 100 | 3 | 100 | $20\log^{(100)}$ |
| 88 ~ 216 | 150 | 3 | 150 | $20\log^{(150)}$ |
| 216 ~ 960 | 200 | 3 | 200 | $20\log^{(200)}$ |
| Above 960 | 500 | 3 | 500 | $20\log^{(500)}$ |

8.1 EUT Operation

Operating Environment :

Temperature: 23.5 °C

Humidity: 52.1 % RH

Atmospheric Pressure: 101.2kPa

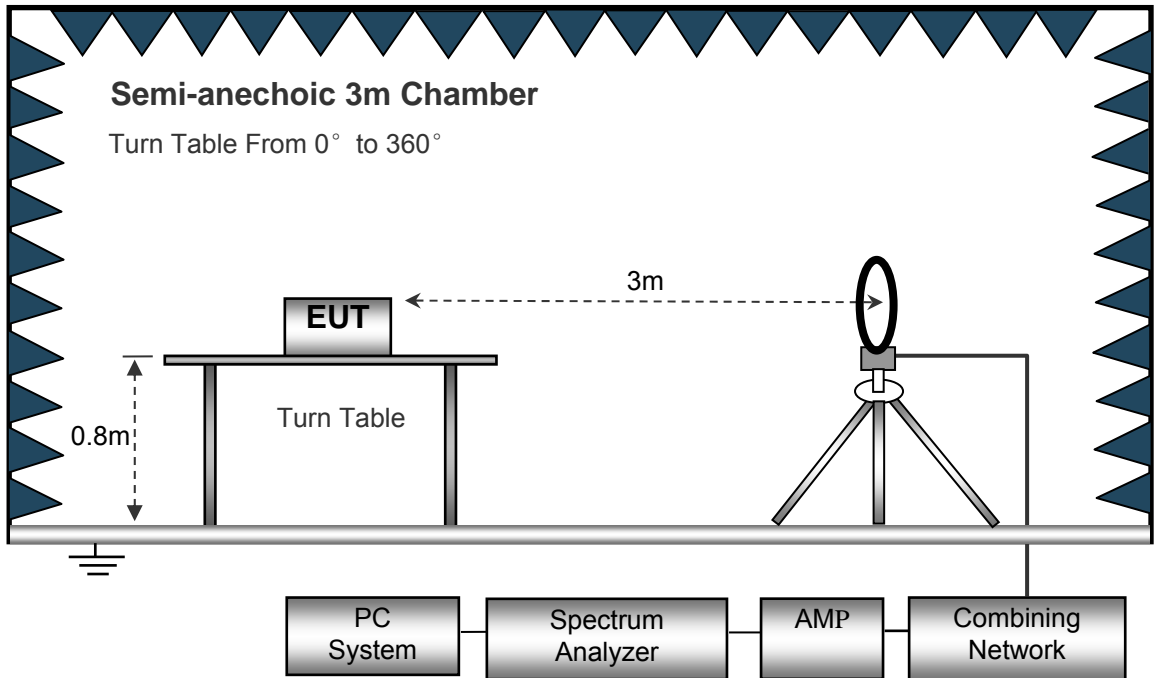
EUT Operation :

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

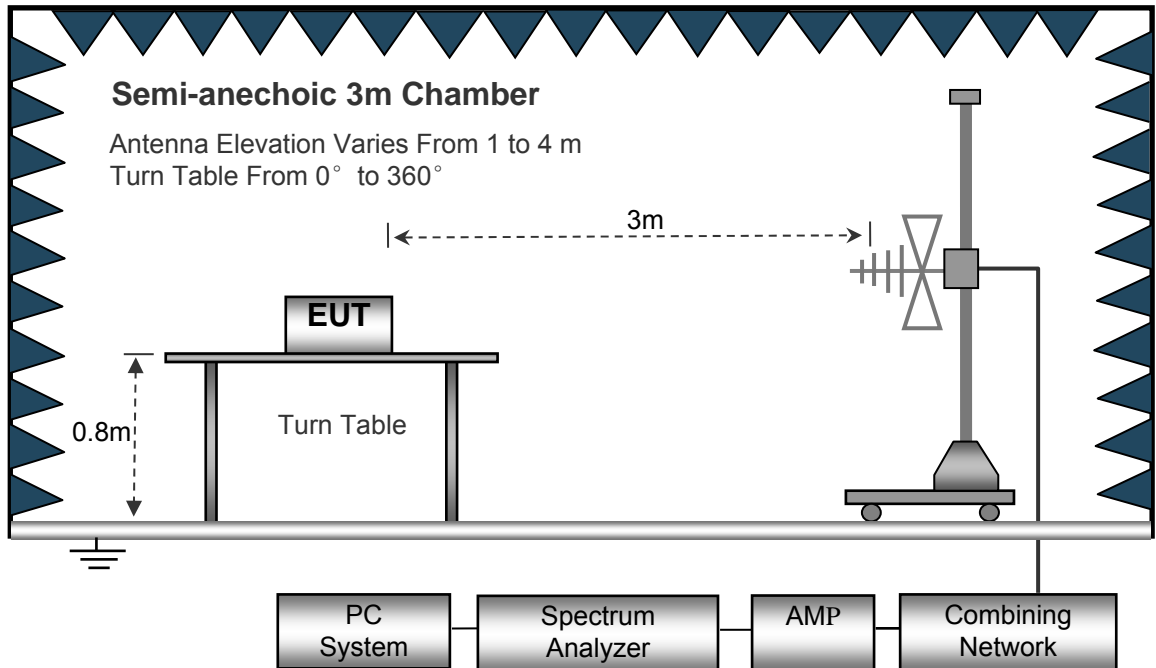
8.2 Test Setup

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

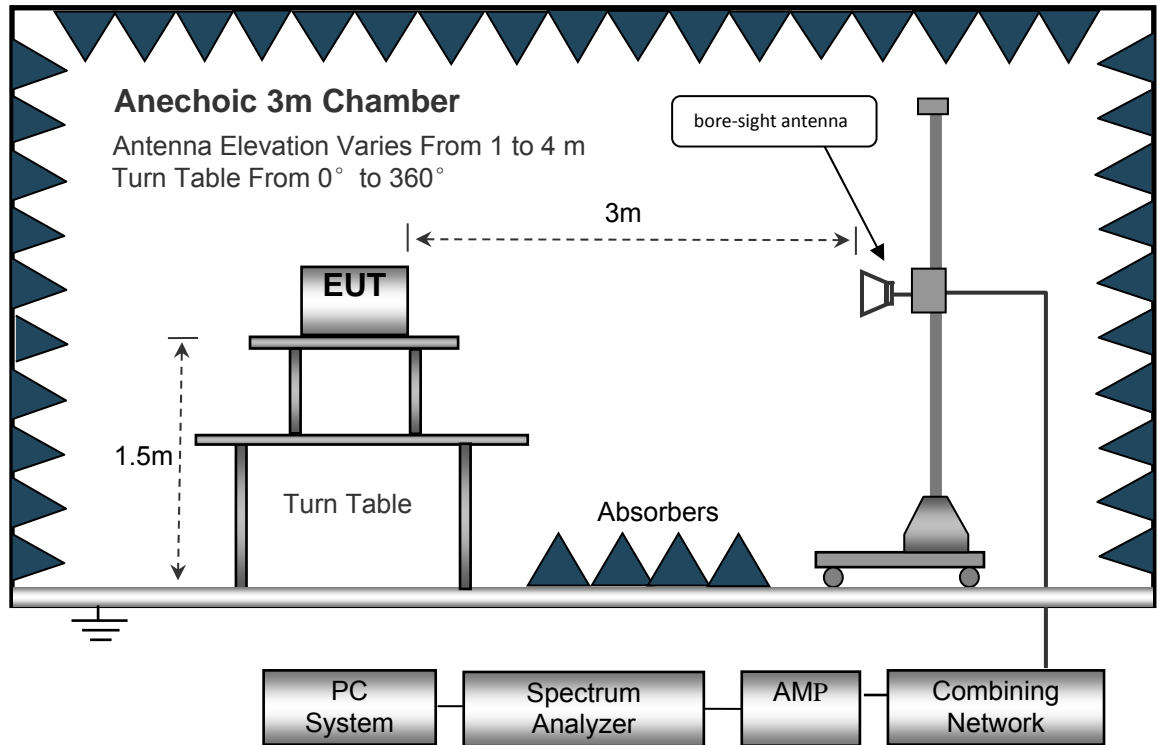
The test setup for emission measurement below 30MHz.



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



The test setup for emission measurement above 1 GHz.



8.3 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

8.4 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 druing radiated emissions above 1GHz measurement.

8.5 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:

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

8.6 Summary of Test Results

Test Frequency: 9KHz~30MHz

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

Test Frequency : 30MHz ~ 18GHz

| 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) |
| GFSK Low Channel 2402MHz | | | | | | | | | |
| 267.45 | 36.63 | QP | 335 | 1.2 | H | -13.35 | 23.28 | 46.00 | -22.72 |
| 267.45 | 40.60 | QP | 199 | 2.0 | V | -13.35 | 27.25 | 46.00 | -18.75 |
| 4804.00 | 49.10 | PK | 51 | 1.3 | V | -1.06 | 48.04 | 74.00 | -25.96 |
| 4804.00 | 46.16 | Ave | 51 | 1.3 | V | -1.06 | 45.10 | 54.00 | -8.90 |
| 7206.00 | 38.79 | PK | 54 | 2.0 | H | 1.33 | 40.12 | 74.00 | -33.88 |
| 7206.00 | 35.80 | Ave | 54 | 2.0 | H | 1.33 | 37.13 | 54.00 | -16.87 |
| 2334.94 | 46.20 | PK | 35 | 1.8 | V | -13.19 | 33.01 | 74.00 | -40.99 |
| 2334.94 | 39.10 | Ave | 35 | 1.8 | V | -13.19 | 25.91 | 54.00 | -28.09 |
| 2388.87 | 43.10 | PK | 281 | 1.3 | H | -13.14 | 29.96 | 74.00 | -44.04 |
| 2388.87 | 37.73 | Ave | 281 | 1.3 | H | -13.14 | 24.59 | 54.00 | -29.41 |
| 2486.38 | 44.03 | PK | 149 | 1.8 | V | -13.08 | 30.95 | 74.00 | -43.05 |
| 2486.38 | 37.72 | Ave | 149 | 1.8 | V | -13.08 | 24.64 | 54.00 | -29.36 |

| 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) |
| GFSK Middle Channel 2440MHz | | | | | | | | | |
| 267.45 | 36.91 | QP | 350 | 2.0 | H | -13.35 | 23.56 | 46.00 | -22.44 |
| 267.45 | 41.53 | QP | 24 | 2.0 | V | -13.35 | 28.18 | 46.00 | -17.82 |
| 4882.00 | 49.34 | PK | 107 | 1.4 | V | -0.62 | 48.72 | 74.00 | -25.28 |
| 4882.00 | 46.74 | Ave | 107 | 1.4 | V | -0.62 | 46.12 | 54.00 | -7.88 |
| 7323.00 | 38.83 | PK | 84 | 1.8 | H | 2.21 | 41.04 | 74.00 | -32.96 |
| 7323.00 | 35.36 | Ave | 84 | 1.8 | H | 2.21 | 37.57 | 54.00 | -16.43 |
| 2310.28 | 46.55 | PK | 38 | 1.1 | V | -13.19 | 33.36 | 74.00 | -40.64 |
| 2310.28 | 39.24 | Ave | 38 | 1.1 | V | -13.19 | 26.05 | 54.00 | -27.95 |
| 2368.28 | 44.64 | PK | 16 | 1.3 | H | -13.14 | 31.50 | 74.00 | -42.50 |
| 2368.28 | 38.79 | Ave | 16 | 1.3 | H | -13.14 | 25.65 | 54.00 | -28.35 |
| 2492.15 | 43.05 | PK | 4 | 1.1 | V | -13.08 | 29.97 | 74.00 | -44.03 |
| 2492.15 | 38.96 | Ave | 4 | 1.1 | V | -13.08 | 25.88 | 54.00 | -28.12 |

| 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) |
| GFSK High Channel 2480MHz | | | | | | | | | |
| 267.45 | 36.23 | QP | 109 | 1.0 | H | -13.35 | 22.88 | 46.00 | -23.12 |
| 267.45 | 42.14 | QP | 148 | 1.4 | V | -13.35 | 28.79 | 46.00 | -17.21 |
| 4960.00 | 50.70 | PK | 336 | 1.4 | V | -0.24 | 50.46 | 74.00 | -23.54 |
| 4960.00 | 45.53 | Ave | 336 | 1.4 | V | -0.24 | 45.29 | 54.00 | -8.71 |
| 7440.00 | 39.87 | PK | 48 | 1.8 | H | 2.84 | 42.71 | 74.00 | -31.29 |
| 7440.00 | 36.01 | Ave | 48 | 1.8 | H | 2.84 | 38.85 | 54.00 | -15.15 |
| 2324.32 | 45.89 | PK | 337 | 2.0 | V | -13.19 | 32.70 | 74.00 | -41.30 |
| 2324.32 | 38.24 | Ave | 337 | 2.0 | V | -13.19 | 25.05 | 54.00 | -28.95 |
| 2354.72 | 43.60 | PK | 283 | 1.9 | H | -13.14 | 30.46 | 74.00 | -43.54 |
| 2354.72 | 36.85 | Ave | 283 | 1.9 | H | -13.14 | 23.71 | 54.00 | -30.29 |
| 2489.88 | 42.79 | PK | 175 | 1.8 | V | -13.08 | 29.71 | 74.00 | -44.29 |
| 2489.88 | 38.50 | Ave | 175 | 1.8 | V | -13.08 | 25.42 | 54.00 | -28.58 |

Test Frequency: 18GHz~25GHz

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

9 Duty Cycle

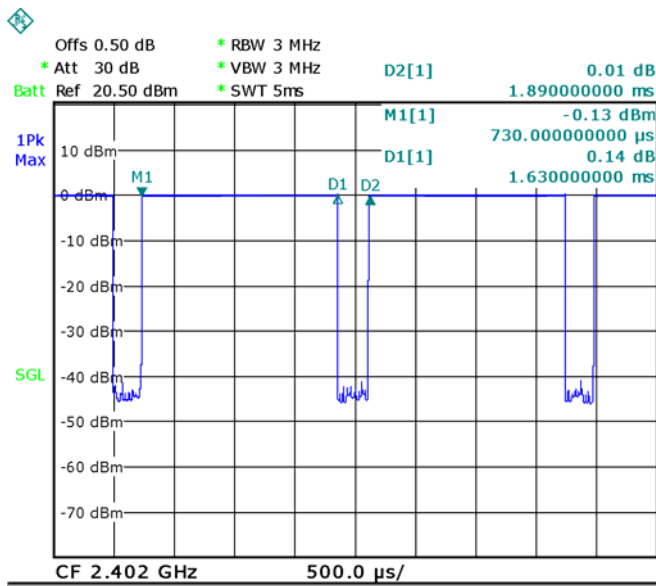
| Type of Modulation | On time ms | Period ms | Duty Cycle linear | Duty Cycle % | Duty Cycle Factor(dB) | Average Factor(dB) |
|--------------------|------------|-----------|-------------------|--------------|-----------------------|--------------------|
| GFSK | 1.6300 | 1.8900 | 0.86 | 86.24 | 0.64 | -1.29 |

Remark:

Duty cycle=On Time/period;

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

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



10 Band Edge Measurement

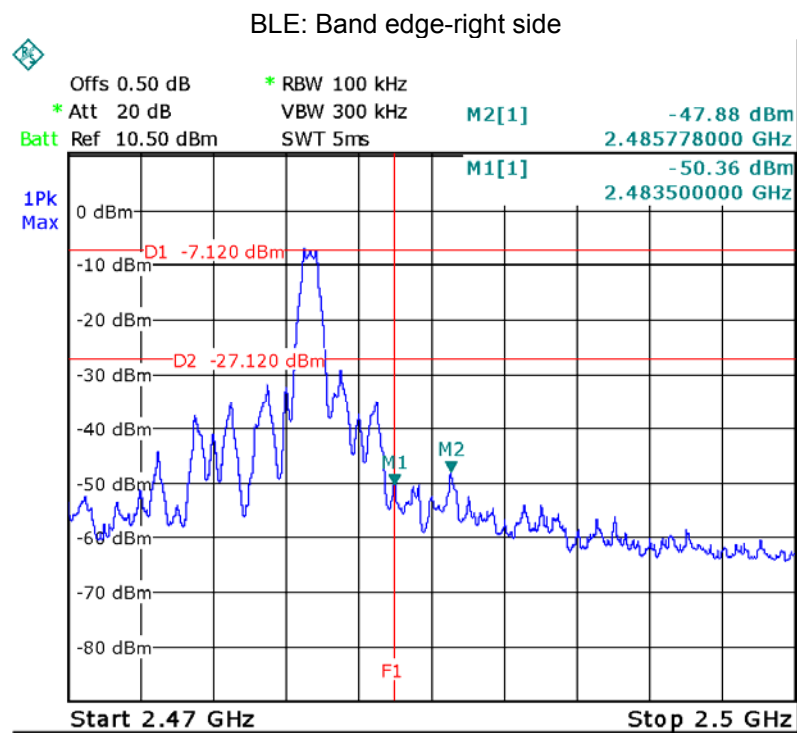
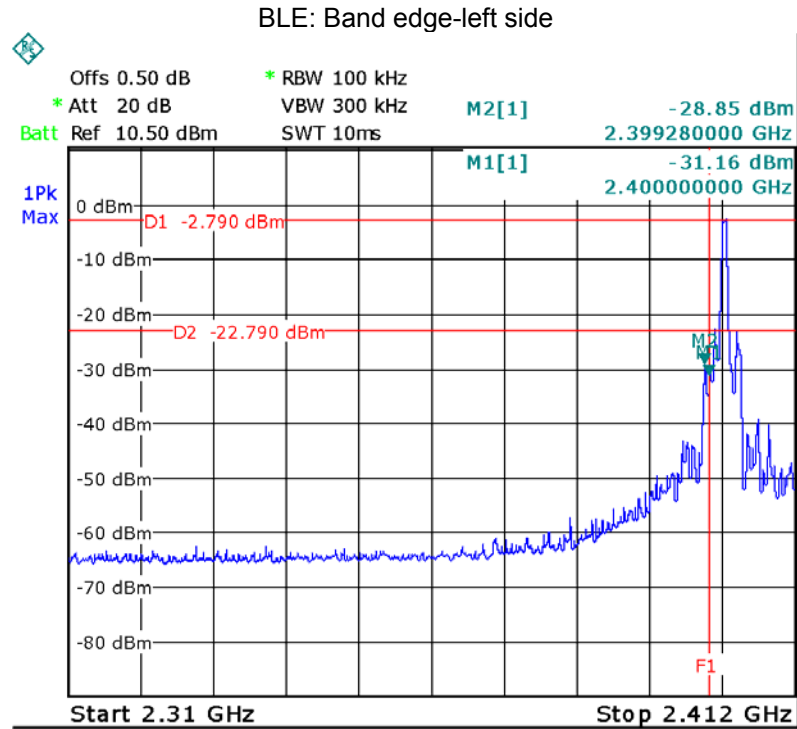
| | |
|-------------------|---|
| Test Requirement: | FCC CFR47 Part 15 Section 15.247 |
| Test Method: | KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019 |
| Test Limit: | Regulation 15.247 (d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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 Mode: | Transmitting |

10.1 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.

10.2 Test Result

Test result plots shown as follows:



11 6 dB Bandwidth Measurement

Test Requirement: FCC CFR47 Part 15 Section 15.247

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

11.1 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: RBW = 100kHz, VBW = 300kHz

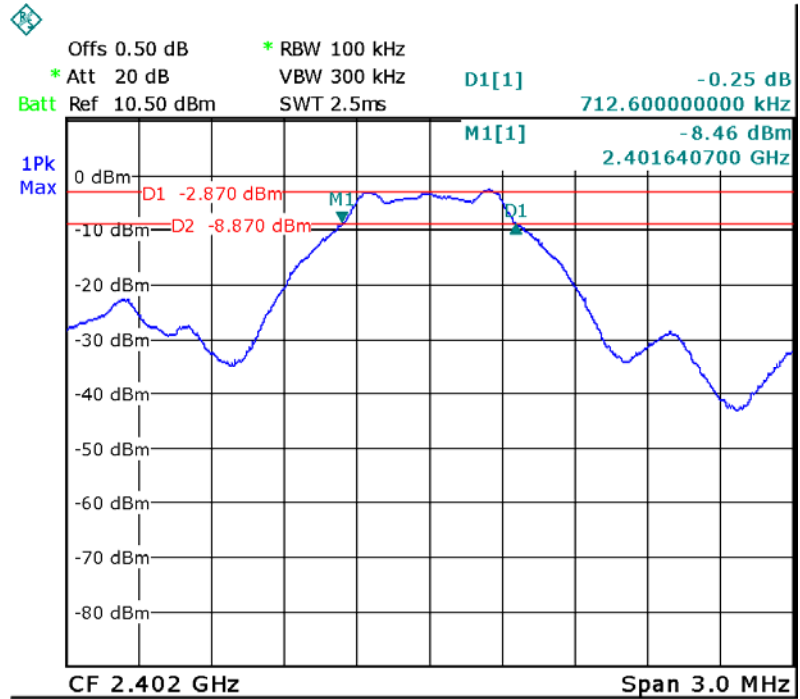
11.2 Test Result:

| Operation mode | Test Channel | Bandwidth (MHz) | 99% Bandwidth (MHz) |
|----------------|--------------|-----------------|---------------------|
| BLE | Channel 0 | 0.713 | 1.144 |
| | Channel 19 | 0.695 | 1.186 |
| | Channel 39 | 0.671 | 1.102 |

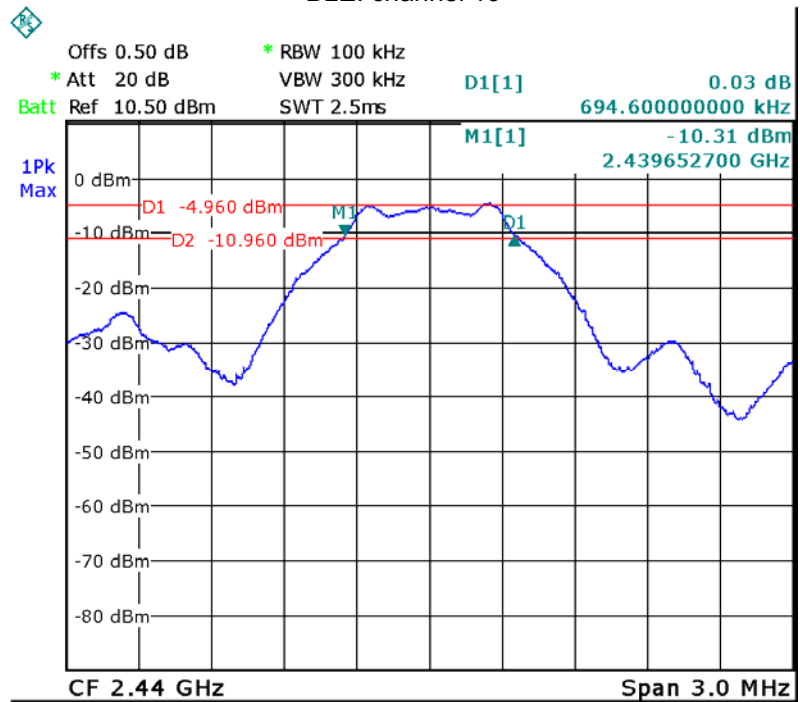
Test result plot:

6dB Bandwidth

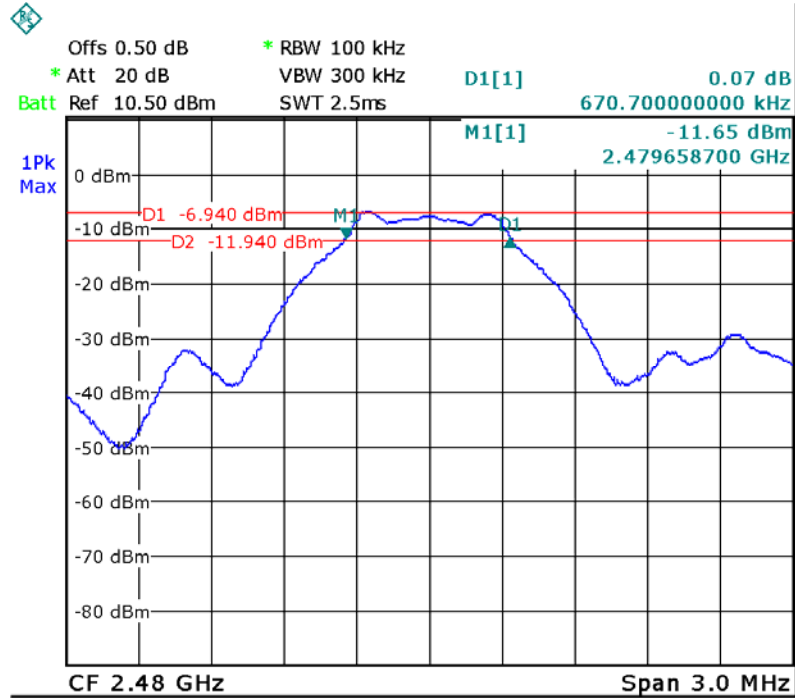
BLE: channel 0



BLE: channel 19

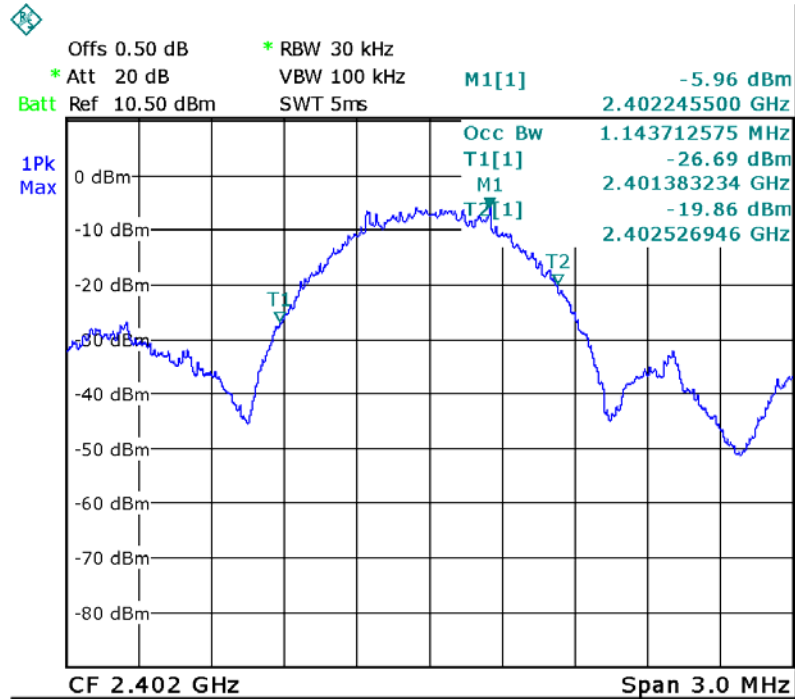


BLE: channel 39

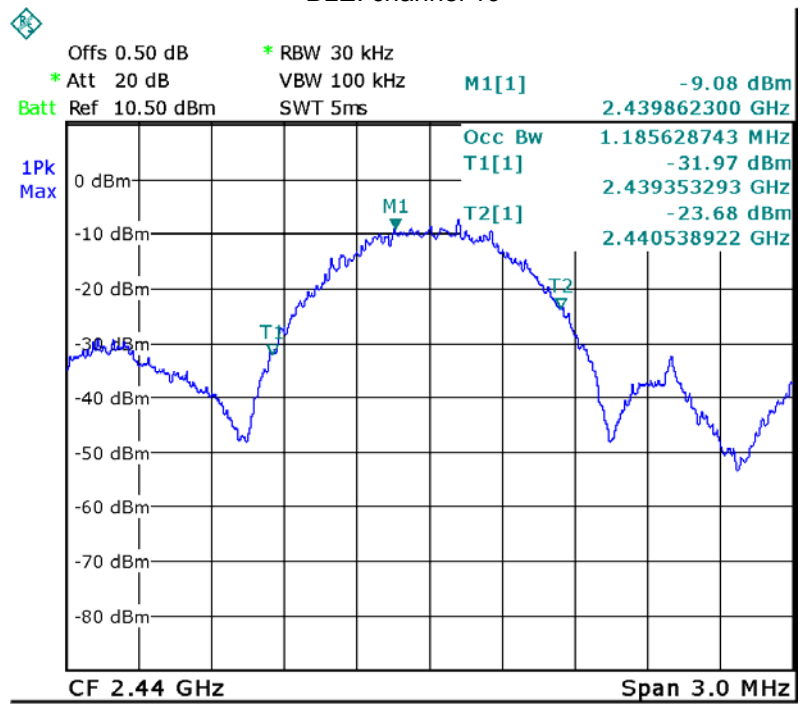


99% Bandwidth

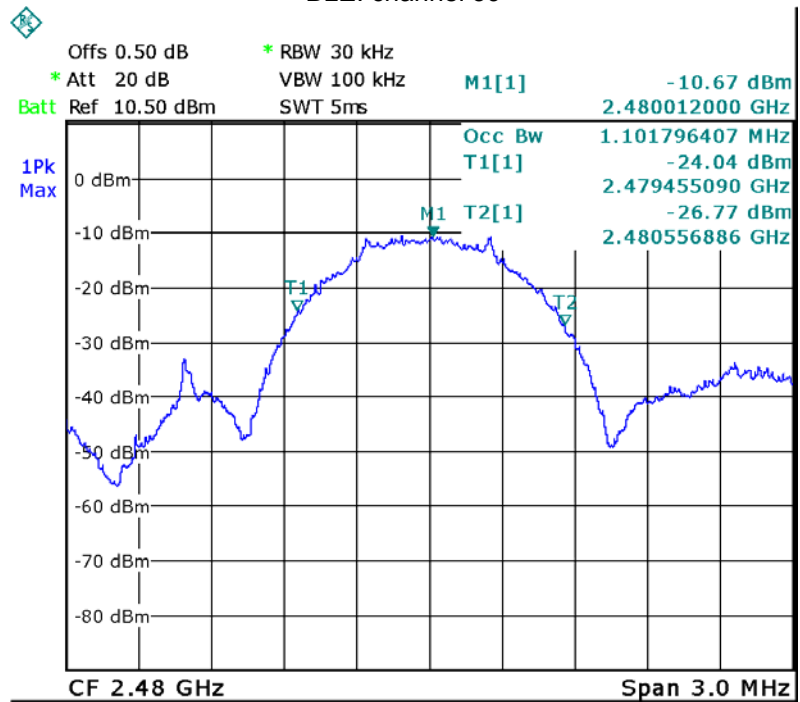
BLE: channel 0



BLE: channel 19



BLE: channel 39



12 Maximum Peak Output Power

Test Requirement:

FCC CFR47 Part 15 Section 15.247

Test Method:

KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019

12.1 Test Procedure:

KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019

section 9.1.1 (For BLE)

This procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the DTS bandwidth.

- a) Set the $RBW \geq$ DTS bandwidth.
- b) Set $VBW \geq 3 \times RBW$.
- c) Set $span \geq 3 \times RBW$
- d) Sweep time = auto couple.
- e) Detector = peak.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use peak marker function to determine the peak amplitude level.

section 9.1.2 (For WIFI)

This procedure may be used when the maximum available RBW of the measurement instrument is less than the DTS bandwidth.

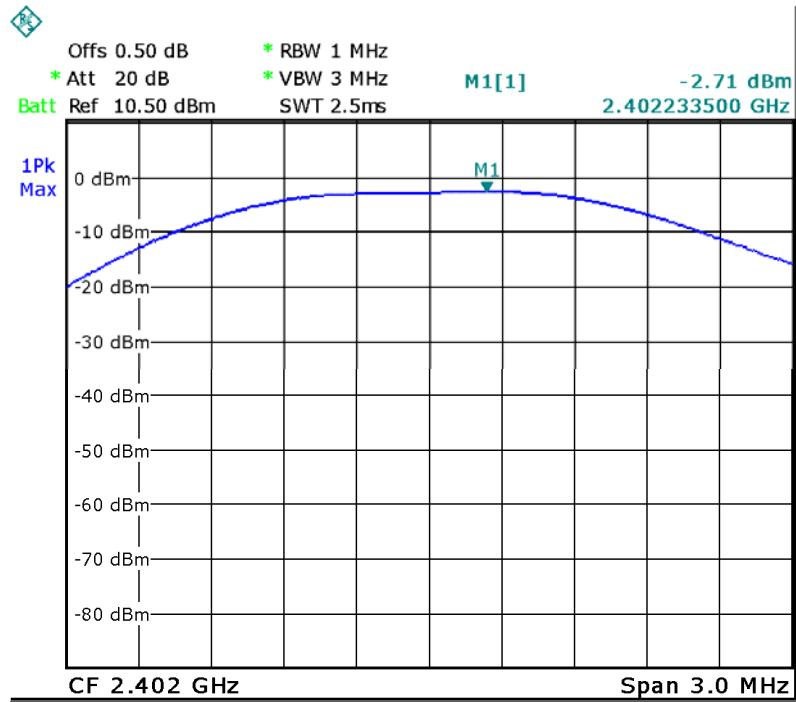
- a) Set the $RBW = 1$ MHz.
- b) Set the $VBW \geq 3 \times RBW$
- c) Set the $span \geq 1.5 \times$ DTS bandwidth.
- d) Detector = peak.
- e) Sweep time = auto couple.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select peak detector). If the instrument does not have a band power function, sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS bandwidth.

12.2 Test Result:

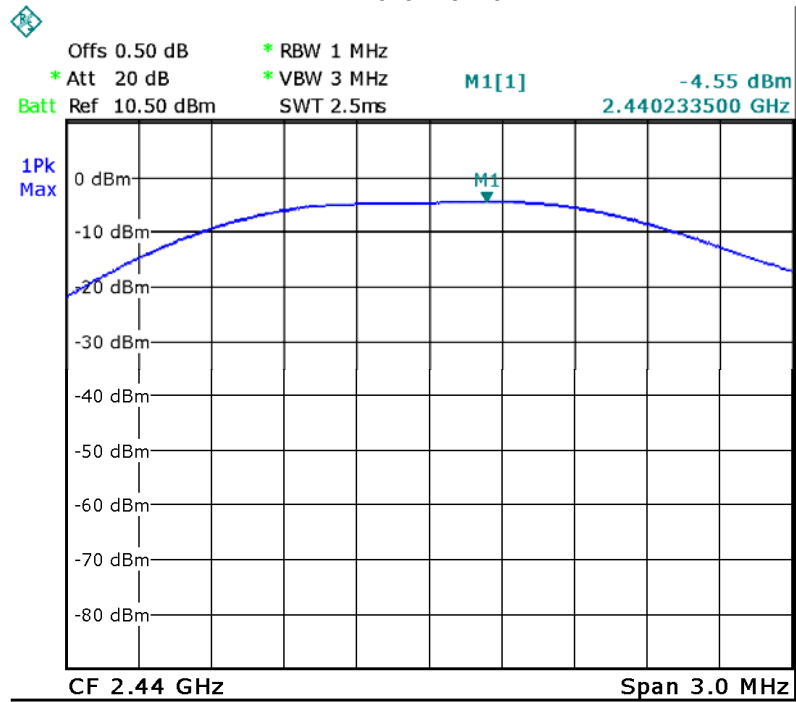
| Operation mode | Channel Frequency (MHz) | Maximum Peak Output Power (dBm) | Limit |
|-----------------------|------------------------------------|--|--------------|
| BLE | Low-2402 | -2.71 | 1W/30dBm |
| | Middle-2440 | -4.55 | 1W/30dBm |
| | High-2480 | -6.71 | 1W/30dBm |

Test Plot

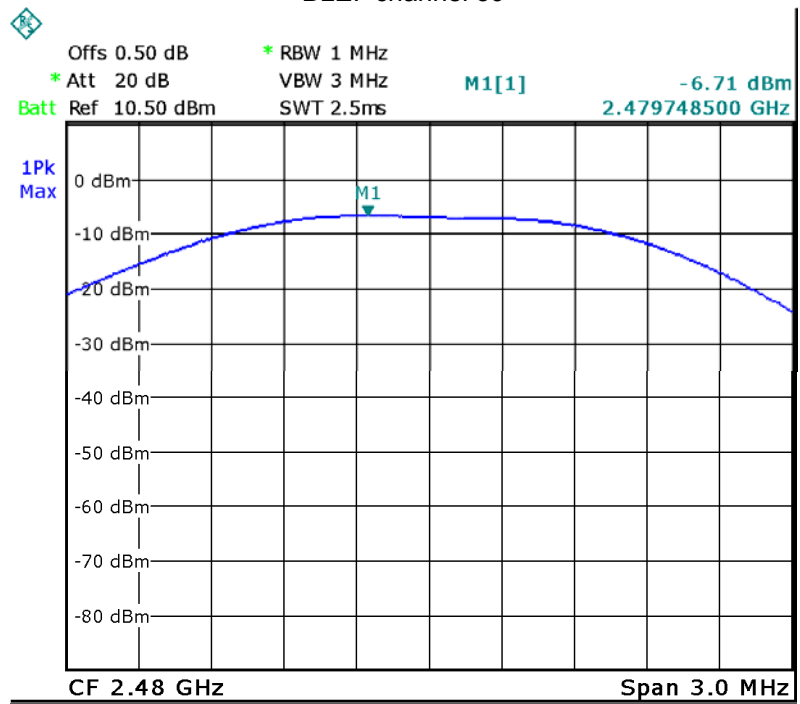
BLE: channel 0



BLE: channel 19



BLE: channel 39



13 Power Spectral density

Test Requirement: FCC CFR47 Part 15 Section 15.247

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

13.1 Test Procedure:

KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019 section 10.2

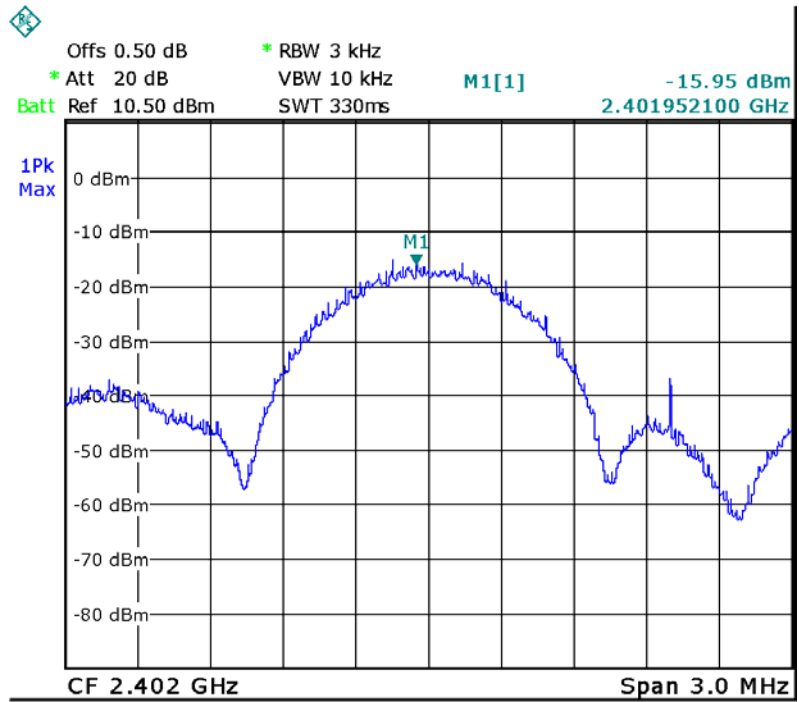
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 3kHz. VBW = 10kHz , Span = 1.5 times the DTS channel bandwidth(6 dB bandwidth). Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

13.2 Test Result:

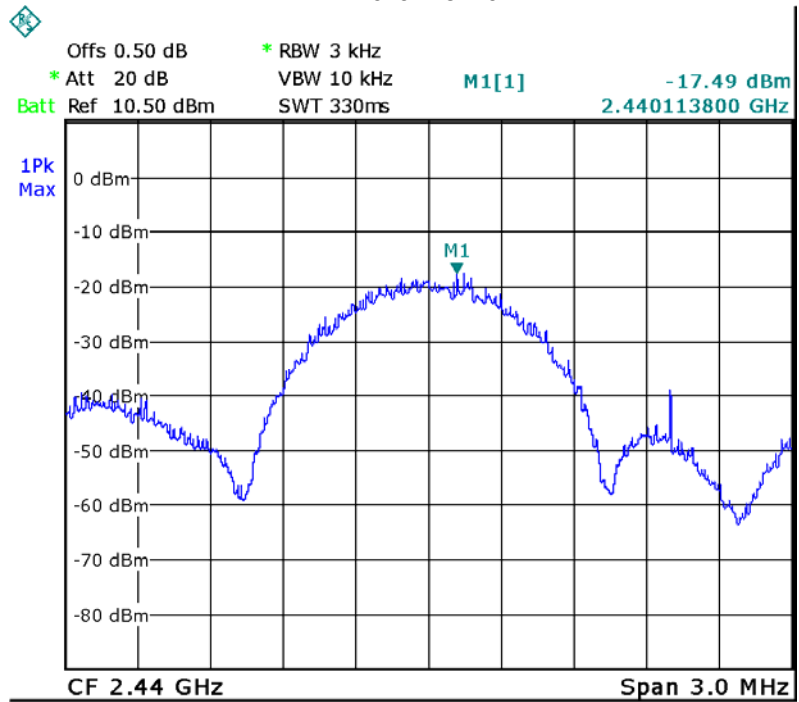
| Operation mode | Channel Frequency (MHz) | Power Spectral (dBm per 3kHz) | Limit |
|----------------|-------------------------|-------------------------------|---------------|
| BLE | Low-2402 | -15.59 | 8dBm per 3kHz |
| | Middle-2440 | -17.49 | 8dBm per 3kHz |
| | High-2480 | -21.05 | 8dBm per 3kHz |

Test Plot

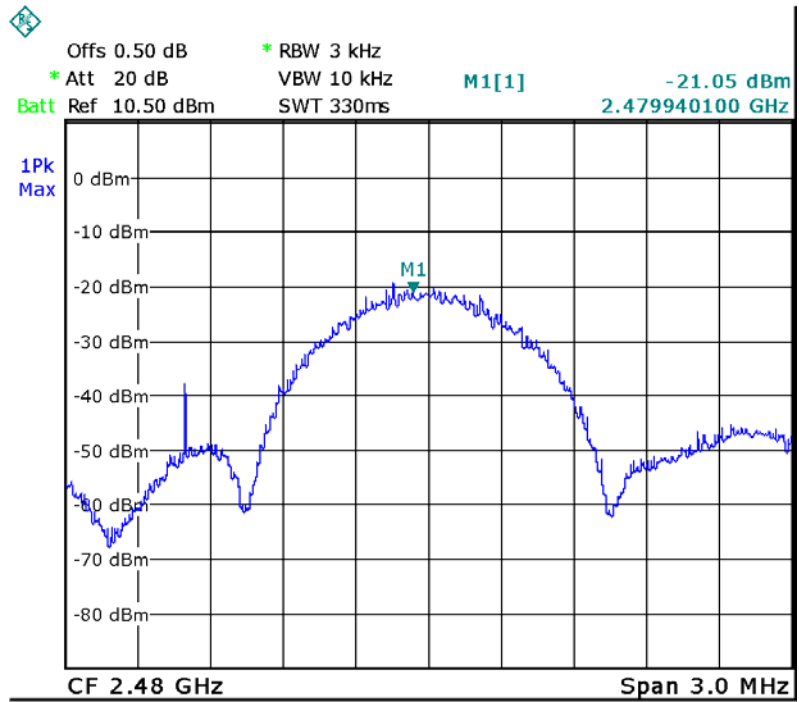
BLE: channel 0



BLE: channel 19



BLE: channel 39



14 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 an integrated antenna fulfil the requirement of this section.

Note: Please refer to EUT photos for more details.

15 RF Exposure

Remark: refer to MPE test report: WTD21D05047152W002.

16 Photographs of test setup and EUT.

Note: Please refer to appendix: Appendix-ZYGS003-Photos.

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