# FCC Part 15C Test Report

# FCC ID: 2AGHAD20

| | |
|---|---|
| **Product Name:** | TWS speakers |
| **Trademark:** | N/A |
| **Model Name :** | D20<br>D21, H2SM-2BK, Dxx(xx represents 01, 02, 03, 04,……..99) |
| **Prepared For :**<br>**Address :** | Shenzhen ABC Industrial Co.,Ltd<br>6/F, building B14, Yintian industrial district, Bao'An Blvd., Bao'an District, Shenzhen, P.R.China |
| **Prepared By :**<br>**Address :** | Shenzhen BCTC Testing Co., Ltd.<br>BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China |
| **Test Date:** | Feb. 20, 2019 – Mar. 27, 2019 |
| **Date of Report :** | Mar. 27, 2019 |
| **Report No.:** | BCTC-LH190200014E |

# TEST RESULT CERTIFICATION

| | |
|---|---|
| **Applicant's name ..... :** | Shenzhen ABC Industrial Co.,Ltd |
| Address ..... : | 6/F, building B14, Yintian industrial district, Bao'An Blvd., Bao'an District, Shenzhen, P.R.China |
| **Manufacture's Name..... :** | Shenzhen ABC Industrial Co.,Ltd |
| Address ..... : | 6/F, building B14, Yintian industrial district, Bao'An Blvd., Bao'an District, Shenzhen, P.R.China |
| **Product description** | |
| Product name ..... : | TWS speakers |
| Trademark ..... : | N/A |
| Model and/or type reference ..... : | D20 |
| **Standards .....** : | FCC Part15.247<br>ANSI C63.10:2013 |

This device described above has been tested by BCTC, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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| | | |
|---|---|---|
| Prepared by(Engineer): | Cai Fang Zhong | Cai Fang Zhong |
| Reviewer(Supervisor): | Eric Yang | Eric Yang |
| Approved(Manager): | Zero Zhou | Zero Zhou |

**Table of Contents**

*(Note: N/A means not applicable)*

# 1. TEST SUMMARY

Test procedures according to the technical standards:

| FCC Part15 (15.247) , Subpart C | | | |
|---|---|---|---|
| Standard Section | Test Item | Judgment | Remark |
| 15.205(a)<br>15.209<br>15.247(d) | Radiated Spurious Emissions | PASS | |
| 15.247(d) | Conducted Spurious emissions | PASS | |
| 15.247(d)<br>15.205(a) | Band edge | PASS | |
| 15.207 | Conducted Emission | PASS | |
| 15.247(a) | 20dB Bandwidth | PASS | |
| 15.247(b) | Maximum Peak Output Power | PASS | |
| 15.247(a) | Frequency Separation | PASS | |
| 15.247(a) | Number of Hopping Frequency | PASS | |
| 15.247(a) | Dwell time | PASS | |
| 15.203 | Antenna Requirement | PASS | |
| Note: (1)" N/A" denotes test is not applicable in this Test Report | | | |

# 2. TEST FACILITY

Shenzhen BCTC Testing Co., Ltd.
Add. : BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China
Test Firm Registration Number: 712850
IC Registered No.: 23583

# 3. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y ± U，where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2，providing a level of confidence of approximately 95 %。

| No. | Item | Uncertainty |
|---|---|---|
| 1 | 3m camber Radiated spurious emission(30MHz-1GHz) | U=4.3dB |
| 2 | 3m chamber Radiated spurious emission(1GHz-18GHz) | U=4.5dB |
| 3 | 3m chamber Radiated spurious emission(18GHz-40GHz) | U=3.34dB |
| 4 | Conducted Adjacent channel power | U=1.38dB |
| 5 | Conducted output power uncertainty Above 1G | U=1.576dB |
| 6 | Conducted output power uncertainty below 1G | U=1.28dB |
| 7 | humidity uncertainty | U=5.3% |
| 8 | Temperature uncertainty | U=0.59℃ |

# 4. GENERAL INFORMATION

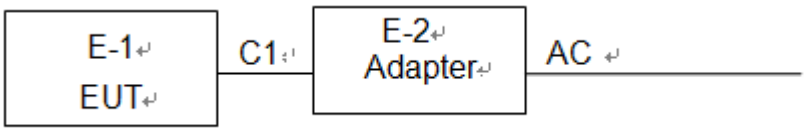
## 4.1 GENERAL DESCRIPTION OF EUT

| | |
|---|---|
| Equipment | TWS speakers |
| Trade Name | N/A |
| Model Name | D20<br>D21, H2SM-2BK, Dxx(xx represents 01, 02, 03, 04,……..99) |
| Model Difference | All the model are the same circuit and RF module, except model names. |
| Product Description | The EUT is a TWS speakers<br>Operation Frequency: 2402-2480 MHz<br>Modulation Type: GFSK, Pi/4DQPSK, 8DPSK<br>Number Of Channel 79CH<br>Antenna Designation: FPCB antenna, 1dBi<br>Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual. |
| Channel List | Please refer to the Note 2. |
| Ratings | DC 7.4V |
| Connecting I/O Port(s) | Please refer to the User's Manual |

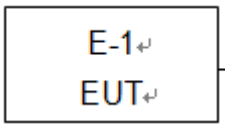
## 4.2 Test Setup Configuration

See test photographs attached in EUT TEST SETUP Photographs for the actual

Conducted Emission



Radiated Spurious Emission




## 4.3 Support Equipment

| Item | Equipment | Mfr/Brand | Model/Type No. | Series No. | Note |
|---|---|---|---|---|---|
| E-1 | TWS speakers | N/A | D20 | N/A | EUT |
| E-2 | Adapter | N/A | BCTC005 | N/A | Auxiliary |
| | | | | | |

| Item | Shielded Type | Ferrite Core | Length | Note |
|---|---|---|---|---|
| C-1 | NO | NO | 0.8M | USB cable unshielded |
| | | | | |

Note:

(1) The support equipment was authorized by Declaration of Confirmation.

(2) For detachable type I/O cable should be specified the length in cm in『Length』column.

## 4.4 Channel List

| CH | Frequency (MHz) | CH | Frequency (MHz) | CH | Frequency (MHz) | CH | Frequency (MHz) |
|---|---|---|---|---|---|---|---|
| 0 | 2402 | 1 | 2403 | 2 | 2404 | 3 | 2405 |
| 4 | 2406 | 5 | 2407 | 6 | 2408 | 7 | 2409 |
| 8 | 2410 | 9 | 2411 | 10 | 2412 | 11 | 2413 |
| 12 | 2414 | 13 | 2415 | 14 | 2416 | 15 | 2417 |
| 16 | 2418 | 17 | 2419 | 18 | 2420 | 19 | 2421 |
| 20 | 2422 | 21 | 2423 | 22 | 2424 | 23 | 2425 |
| 24 | 2426 | 25 | 2427 | 26 | 2428 | 27 | 2429 |
| 28 | 2430 | 29 | 2431 | 30 | 2432 | 31 | 2433 |
| 32 | 2434 | 33 | 2435 | 34 | 2436 | 35 | 2437 |
| 36 | 2438 | 37 | 2439 | 38 | 2440 | 39 | 2441 |
| 40 | 2442 | 41 | 2443 | 42 | 2444 | 43 | 2445 |
| 44 | 2446 | 45 | 2447 | 46 | 2448 | 47 | 2449 |
| 48 | 2450 | 49 | 2451 | 50 | 2452 | 51 | 2453 |
| 52 | 2454 | 53 | 2455 | 54 | 2456 | 55 | 2457 |
| 56 | 2458 | 57 | 2459 | 58 | 2460 | 59 | 2461 |
| 60 | 2462 | 61 | 2463 | 62 | 2464 | 63 | 2465 |
| 64 | 2466 | 65 | 2467 | 66 | 2468 | 67 | 2469 |
| 68 | 2470 | 69 | 2471 | 70 | 2472 | 71 | 2473 |
| 72 | 2474 | 73 | 2475 | 74 | 2476 | 75 | 2477 |
| 76 | 2478 | 77 | 2479 | 78 | 2480 | 79 | / |

## 4.5 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

During testing, Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

The EUT is Continue Transmitting.

The software is installed in operation system, named “RFTestTool.apk” ,Version 1.0.

| Test Mode | Test mode | Low channel | Middle channel | High channel |
|---|---|---|---|---|
| 1 | Transmitting(GFSK) | 2402MHz | 2441MHz | 2480MHz |
| 2 | Transmitting(Pi/4DQPSK) | 2402MHz | 2441MHz | 2480MHz |
| 3 | Transmitting(8DPSK) | 2402MHz | 2441MHz | 2480MHz |
| 4 | Transmitting (conducted emission and Radiated emission) | | | |

# 5. EQUIPMENTS LIST FOR ALL TEST ITEMS

## Radiation Test equipment

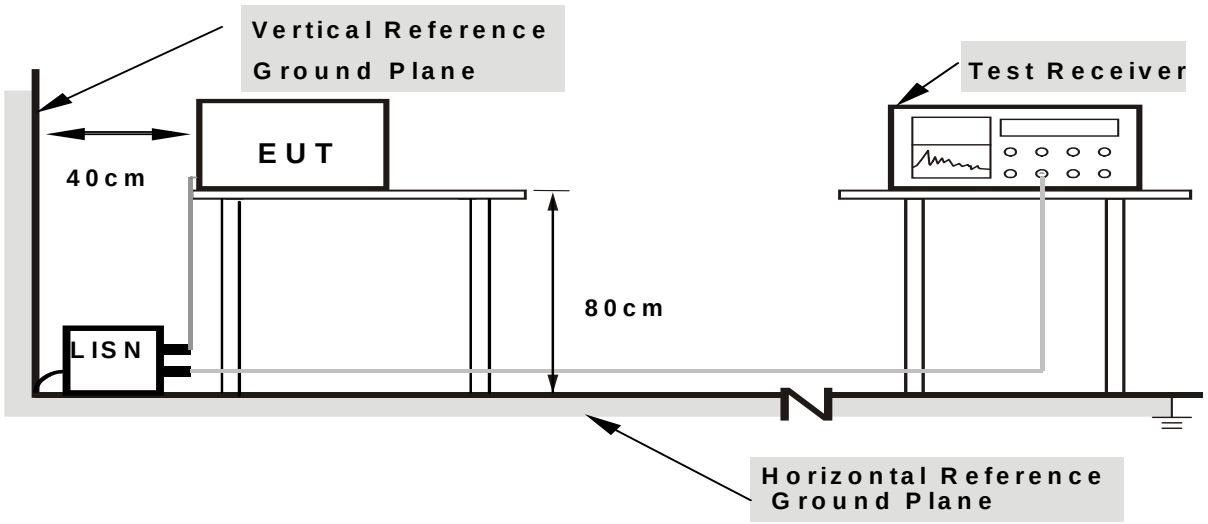
| Item | Equipment | Manufacturer | Type No. | Serial No. | Last calibration | Calibrated until |
|---|---|---|---|---|---|---|
| 1 | Spectrum Analyzer (9kHz-26.5GHz) | Agilent | E4407B | MY45109572 | 2018.06.20 | 2019.06.20 |
| 2 | Test Receiver (9kHz-7GHz) | R&S | ESR7 | 101154 | 2018.06.20 | 2019.06.20 |
| 3 | Bilog Antenna (30MHz-3GHz) | SCHWARZBECK | VULB9163 | VULB9163-942 | 2018.06.23 | 2019.06.23 |
| 4 | Horn Antenna (1GHz-18GHz) | SCHWARZBECK | BBHA9120D | 1541 | 2018.06.23 | 2019.06.22 |
| 5 | Horn Antenna (18GHz-40GHz) | SCHWARZBECK | BBHA9170 | 822 | 2018.08.06 | 2019.08.06 |
| 6 | Amplifier (9KHz-6GHz) | SCHWARZBECK | BBV9744 | 9744-0037 | 2018.06.20 | 2019.06.20 |
| 7 | Amplifier (0.5GHz-18GHz) | SCHWARZBECK | BBV9718 | 9718-309 | 2018.06.20 | 2019.06.20 |
| 8 | Amplifier (18GHz-40GHz) | MITEQ | TTA1840-35-HG | 2034381 | 2018.08.06 | 2019.08.06 |
| 9 | Loop Antenna (9KHz-30MHz) | SCHWARZBECK | FMZB1519B | 014 | 2018.06.23 | 2019.06.23 |
| 10 | RF cables1 (9kHz-30MHz) | Huber+Suhnar | 9kHz-30MHz | B1702988-0008 | 2019.02.12 | 2020.02.12 |
| 11 | RF cables2 (30MHz-1GHz) | Huber+Suhnar | 30MHz-1GHz | 1486150 | 2018.03.27 | 2019.03.27 |
| 12 | RF cables3 (1GHz-40GHz) | Huber+Suhnar | 1GHz-40GHz | 1607106 | 2018.06.19 | 2019.06.19 |
| 13 | Power Metter | Keysight | E4419 | \ | 2018.04.15 | 2019.04.15 |
| 14 | Power Sensor (AV) | Keysight | E9 300A | \ | 2018.04.15 | 2019.04.15 |
| 15 | Signal Analyzer 20kHz-26.5GHz | KEYSIGHT | N9020A | MY49100060 | 2018.08.14 | 2019.08.13 |
| 16 | Test Receiver 9kHz-40GHz | R&S | FSP40 | 100550 | 2018.06.13 | 2019.06.12 |
| 17 | D.C. Power Supply | LongWei | TPR-6405D | \ | \ | \ |
| 18 | Software | Frad | EZ-EMC | FA-03A2 RE | \ | \ |

## Conduction Test equipment

| Item | Equipment | Manufacturer | Type No. | Serial No. | Last calibration | Calibrated until |
|---|---|---|---|---|---|---|
| 1 | Test Receiver | R&S | ESR3 | 102075 | 2018.06.20 | 2019.06.20 |
| 2 | LISN | SCHWARZBECK | NSLK8127 | 8127739 | 2018.06.19 | 2019.06.19 |
| 3 | LISN | R&S | ENV216 | 101375 | 2018.06.20 | 2019.06.20 |
| 4 | RF cables | Huber+Suhnar | 9kHz-30MHz | B1702988-0008 | 2019.02.12 | 2020.02.12 |
| 5 | Software | Frad | EZ-EMC | EMC-CON 3A1 | \ | \ |

# 6. CONDUCTED EMISSIONS

## 6.1 Block Diagram Of Test Setup




Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

## 6.2 Limit

| FREQUENCY (MHz) | Limit (dBuV) | | Standard |
|---|---|---|---|
| | Quasi-peak | Average | |
| 0.15 -0.5 | 66 - 56 * | 56 - 46 * | FCC |
| 0.50 -5.0 | 56.00 | 46.00 | FCC |
| 5.0 -30.0 | 60.00 | 50.00 | FCC |

## 6.3 Test procedure

| Receiver Parameters | Setting |
|---|---|
| Attenuation | 10 dB |
| Start Frequency | 0.15 MHz |
| Stop Frequency | 30 MHz |
| IF Bandwidth | 9 kHz |

a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

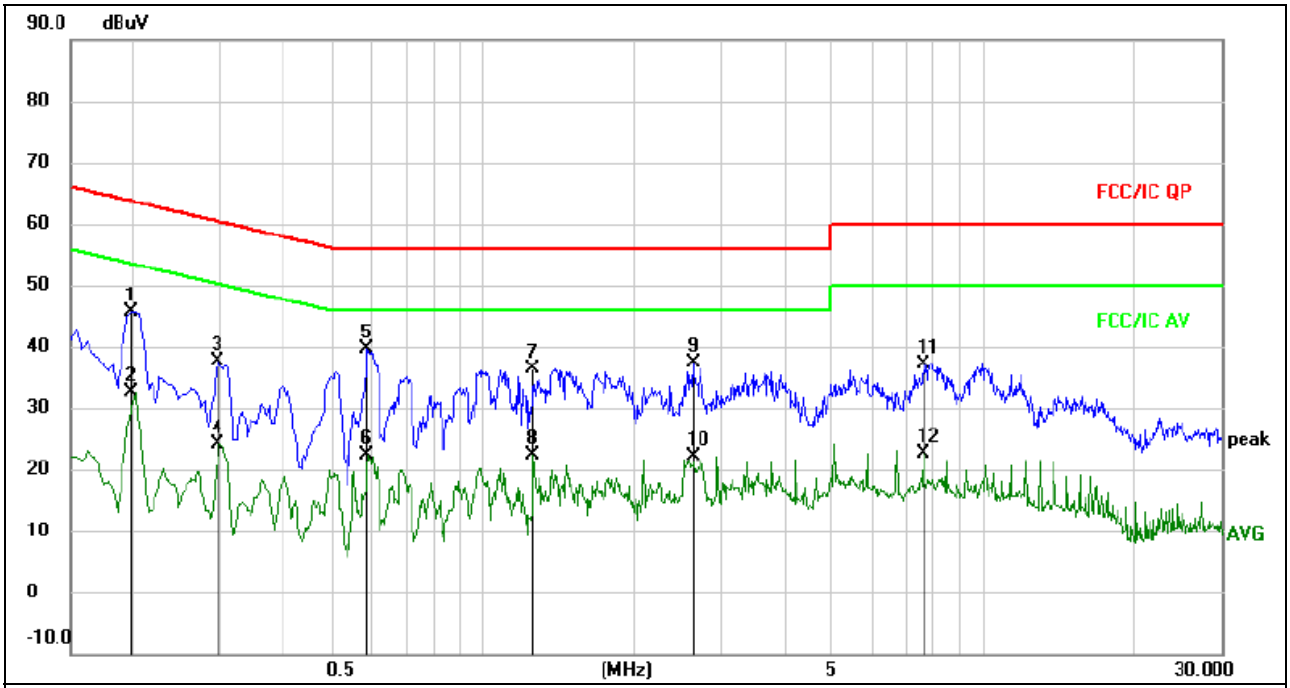
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

d. LISN at least 80 cm from nearest part of EUT chassis.

e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

## 6.4 Test Result

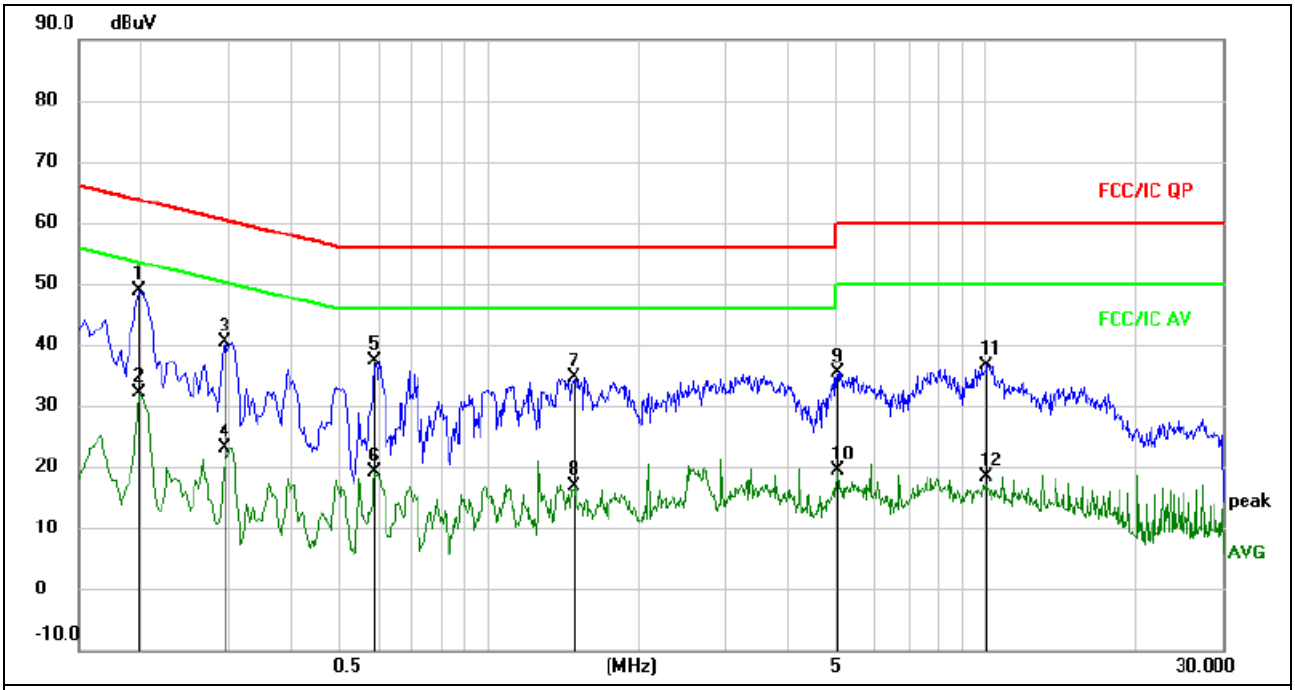
| | | | |
|---|---|---|---|
| Temperature： | 26 ℃ | Relative Humidity： | 54% |
| Pressure： | 101kPa | Phase： | L |
| Test Voltage ： | DC 5V from adapter | Test Mode： | Mode 4 |




Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | | dBuV | dBuV | dB | Detector | Comment |
| 1 | | 0.1980 | 36.28 | 9.46 | 45.74 | 63.69 | -17.95 | QP | |
| 2 | | 0.1980 | 23.17 | 9.46 | 32.63 | 53.69 | -21.06 | AVG | |
| 3 | | 0.2940 | 27.99 | 9.57 | 37.56 | 60.41 | -22.85 | QP | |
| 4 | | 0.2940 | 14.63 | 9.57 | 24.20 | 50.41 | -26.21 | AVG | |
| 5 | * | 0.5860 | 29.60 | 9.94 | 39.54 | 56.00 | -16.46 | QP | |
| 6 | | 0.5860 | 12.33 | 9.94 | 22.27 | 46.00 | -23.73 | AVG | |
| 7 | | 1.2620 | 26.71 | 9.58 | 36.29 | 56.00 | -19.71 | QP | |
| 8 | | 1.2620 | 12.74 | 9.58 | 22.32 | 46.00 | -23.68 | AVG | |
| 9 | | 2.6340 | 27.78 | 9.63 | 37.41 | 56.00 | -18.59 | QP | |
| 10 | | 2.6340 | 12.46 | 9.63 | 22.09 | 46.00 | -23.91 | AVG | |
| 11 | | 7.5780 | 27.44 | 9.71 | 37.15 | 60.00 | -22.85 | QP | |
| 12 | | 7.5780 | 12.84 | 9.71 | 22.55 | 50.00 | -27.45 | AVG | |

| | | | |
|---|---|---|---|
| Temperature： | 26 ℃ | Relative Humidity： | 54% |
| Pressure： | 101kPa | Phase： | N |
| Test Voltage ： | DC 5V from adapter | Test Mode： | Mode 4 |



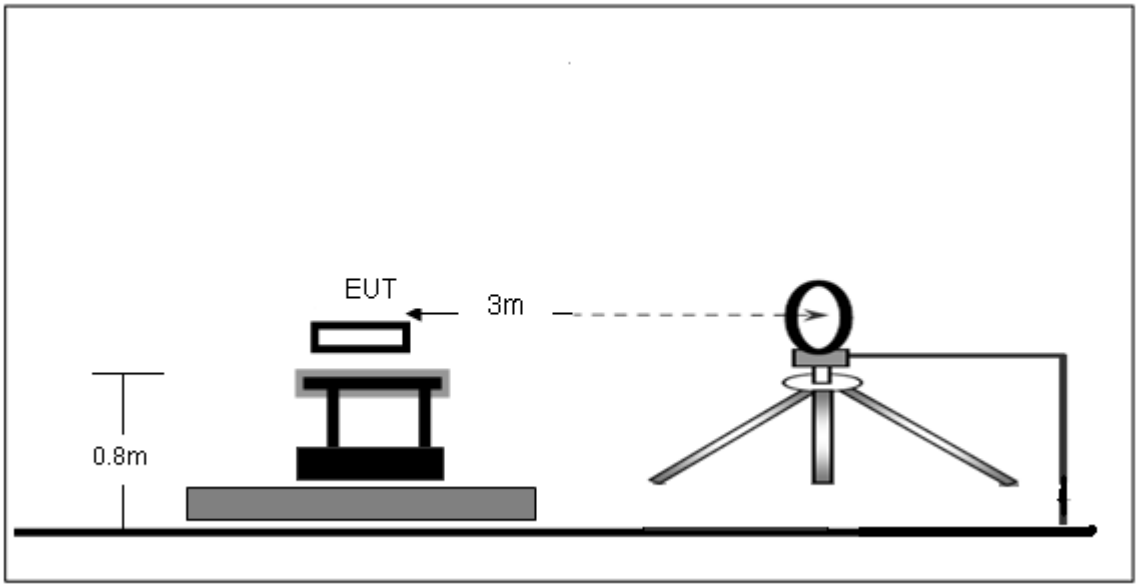

Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | | dBuV | dBuV | dB | Detector | Comment |
| 1 | * | 0.1980 | 39.32 | 9.46 | 48.78 | 63.69 | -14.91 | QP | |
| 2 | | 0.1980 | 22.69 | 9.46 | 32.15 | 53.69 | -21.54 | AVG | |
| 3 | | 0.2940 | 30.91 | 9.57 | 40.48 | 60.41 | -19.93 | QP | |
| 4 | | 0.2940 | 13.67 | 9.57 | 23.24 | 50.41 | -27.17 | AVG | |
| 5 | | 0.5899 | 27.53 | 9.96 | 37.49 | 56.00 | -18.51 | QP | |
| 6 | | 0.5899 | 9.11 | 9.96 | 19.07 | 46.00 | -26.93 | AVG | |
| 7 | | 1.4819 | 25.04 | 9.58 | 34.62 | 56.00 | -21.38 | QP | |
| 8 | | 1.4819 | 7.20 | 9.58 | 16.78 | 46.00 | -29.22 | AVG | |
| 9 | | 5.0459 | 25.61 | 9.80 | 35.41 | 60.00 | -24.59 | QP | |
| 10 | | 5.0459 | 9.58 | 9.80 | 19.38 | 50.00 | -30.62 | AVG | |
| 11 | | 10.0459 | 27.01 | 9.69 | 36.70 | 60.00 | -23.30 | QP | |
| 12 | | 10.0459 | 8.61 | 9.69 | 18.30 | 50.00 | -31.70 | AVG | |

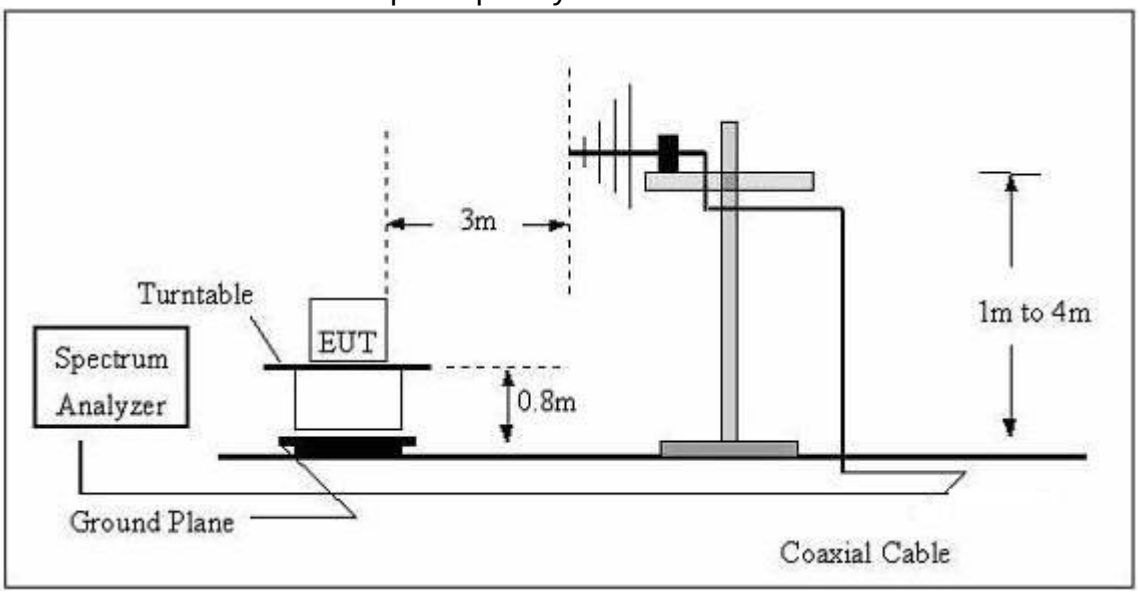
# 7. RADIATED EMISSIONS

## 7.1 Block Diagram Of Test Setup

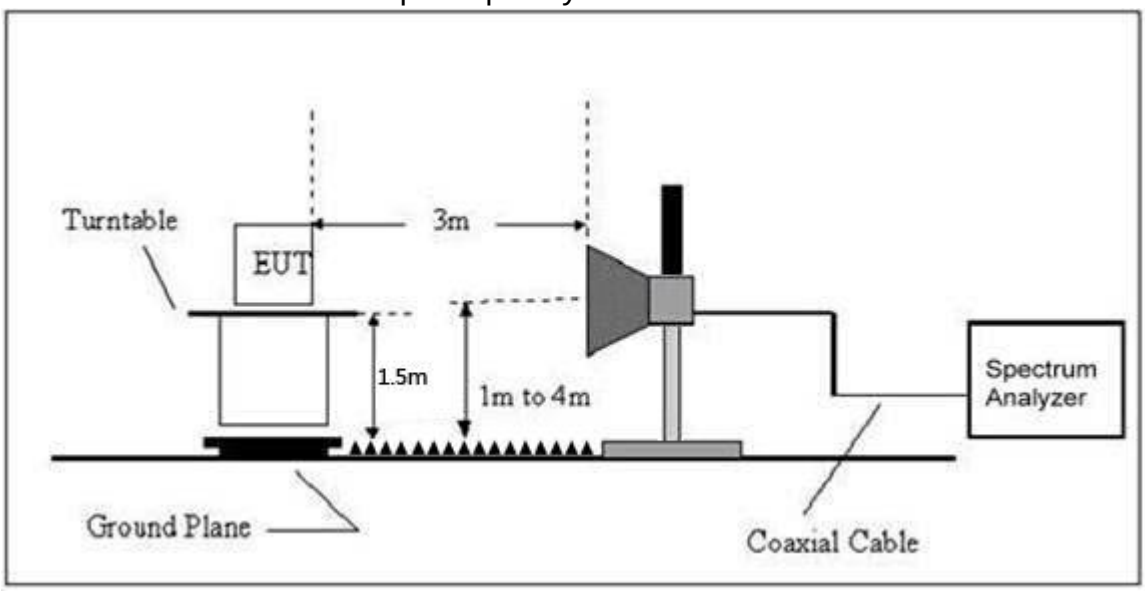
（A）Radiated Emission Test-Up Frequency Below 30MHz




（B）Radiated Emission Test-Up Frequency 30MHz~1GHz



（C）Radiated Emission Test-Up Frequency Above 1GHz




## 7.2 Limit

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

| Frequency | Field Strength | Distance | Field Strength Limit at 3m Distance | |
|---|---|---|---|---|
| (MHz) | uV/m | (m) | uV/m | dBuV/m |
| 0.009 ~ 0.490 | 2400/F(kHz) | 300 | 10000 * 2400/F(kHz) | $20\log^{(2400/F(kHz))}$ + 80 |
| 0.490 ~ 1.705 | 24000/F(kHz) | 30 | 100 * 24000/F(kHz) | $20\log^{(24000/F(kHz))}$ + 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 | $20\log^{(500)}$ |

## 7.3 Test procedure

| Receiver Parameter | Setting |
|---|---|
| Attenuation | Auto |
| 9kHz~150kHz | RBW 200Hz for QP |
| 150kHz~30MHz | RBW 9kHz for QP |
| 30MHz~1000MHz | RBW 120kHz for QP |

| Spectrum Parameter | Setting |
|---|---|
| 1-25GHz | RBW 1 MHz /VBW 1 MHz for Peak,<br>RBW 1 MHz / VBW 10Hz for Average |

Below 1GHz test procedure as below:

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre( Above 18GHz the distance is 1 meter and table is 1.5 metre).

h. Test the EUT in the lowest channel ,the middle channel ,the Highest channel.

Note:

Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

## 7.4 Test Result

Below 30MHz

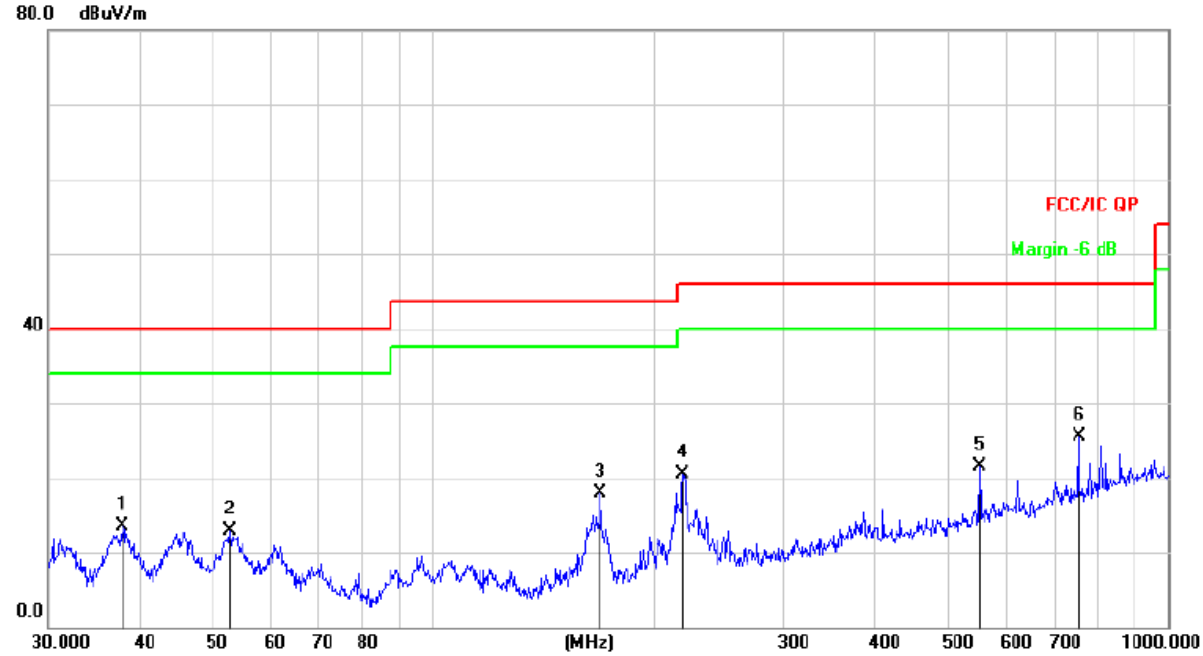
| | | | |
|---|---|---|---|
| Temperature： | 26℃ | Relative Humidtity： | 54% |
| Pressure： | 101 kPa | Test Voltage ： | DC 7.4V |
| Test Mode ： | Mode 4 | Polarization : | -- |

| Freq. | Reading | Limit | Margin | State |
|---|---|---|---|---|
| (MHz) | (dBuV/m) | (dBuV/m) | (dB) | P/F |
| -- | -- | -- | -- | PASS |
| -- | -- | -- | -- | PASS |

Note:
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
Distance extrapolation factor =40 log (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor.

Between 30MHz – 1GHz

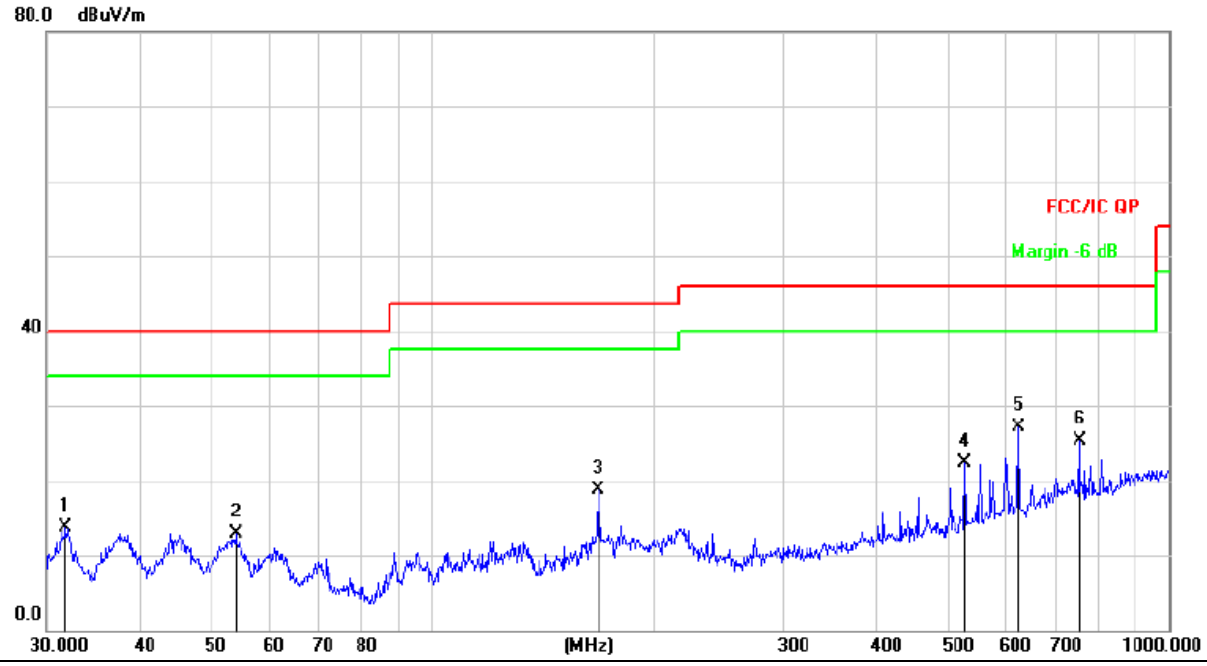
| | | | |
|---|---|---|---|
| Temperature： | 26℃ | Relative Humidtity： | 54% |
| Pressure： | 101kPa | Test Voltage ： | DC7.4V |
| Test Mode ： | Mode 4 | Polarization : | Horizontal |




Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dB/m | dB | Detector |
| 1 | | 37.8121 | 29.33 | -15.82 | 13.51 | 40.00 | -26.49 | QP |
| 2 | | 52.9453 | 28.00 | -15.16 | 12.84 | 40.00 | -27.16 | QP |
| 3 | | 169.0054 | 36.18 | -18.28 | 17.90 | 43.50 | -25.60 | QP |
| 4 | | 218.3085 | 36.41 | -15.88 | 20.53 | 46.00 | -25.47 | QP |
| 5 | | 552.8832 | 29.14 | -7.61 | 21.53 | 46.00 | -24.47 | QP |
| 6 | * | 755.3873 | 29.73 | -4.26 | 25.47 | 46.00 | -20.53 | QP |

| | | | |
|---|---|---|---|
| Temperature： | 26℃ | Relative Humidtity： | 54% |
| Pressure： | 101kPa | Test Voltage ： | DC7.4V |
| Test Mode ： | Mode 4 | Polarization : | Vertical |




Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dB/m | dB | Detector |
| 1 | | 31.8427 | 30.61 | -16.94 | 13.67 | 40.00 | -26.33 | QP |
| 2 | | 54.0711 | 28.09 | -15.28 | 12.81 | 40.00 | -27.19 | QP |
| 3 | | 167.8243 | 37.12 | -18.36 | 18.76 | 43.50 | -24.74 | QP |
| 4 | | 528.2458 | 30.46 | -8.23 | 22.23 | 46.00 | -23.77 | QP |
| 5 | * | 625.0780 | 33.76 | -6.67 | 27.09 | 46.00 | -18.91 | QP |
| 6 | | 755.3873 | 29.61 | -4.26 | 25.35 | 46.00 | -20.65 | QP |

Between 1-25GHz

| Polar (H/V) | Frequency (MHz) | Meter Reading (dBuV) | Pre-amplifier (dB) | Cable Loss (dB) | Antenna Factor (dB) | Emission Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|---|---|---|
| GFSK Low Channel:2402MHz | | | | | | | | | |
| V | 4804.00 | 53.55 | 39.55 | 7.77 | 25.66 | 47.43 | 74.00 | -26.57 | PK |
| V | 4804.00 | 43.83 | 39.55 | 7.77 | 25.66 | 37.71 | 54.00 | -16.29 | AV |
| V | 7206.00 | 54.49 | 38.33 | 7.30 | 24.55 | 48.01 | 74.00 | -25.99 | PK |
| V | 7206.00 | 43.26 | 38.33 | 7.30 | 24.55 | 36.78 | 54.00 | -17.22 | AV |
| V | 15450.00 | 50.56 | 35.23 | 6.6 | 26.59 | 48.52 | 74.00 | -25.48 | PK |
| H | 4804.00 | 54.05 | 39.55 | 7.77 | 25.66 | 47.93 | 74.00 | -26.07 | PK |
| H | 4804.00 | 43.18 | 39.55 | 7.77 | 25.66 | 37.06 | 54.00 | -16.94 | AV |
| H | 7206.00 | 52.90 | 38.33 | 7.30 | 23.55 | 45.42 | 74.00 | -28.58 | PK |
| H | 7206.00 | 43.83 | 38.33 | 7.30 | 23.22 | 36.02 | 54.00 | -17.98 | AV |
| H | 15450.00 | 53.60 | 35.45 | 6.6 | 27.88 | 52.63 | 74.00 | -21.37 | PK |

| Polar (H/V) | Frequency (MHz) | Meter Reading (dBuV) | Pre-amplifier (dB) | Cable Loss (dB) | Antenna Factor (dB) | Emission Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|---|---|---|
| GFSK Middle Channel:2441MHz | | | | | | | | | |
| V | 4882.00 | 51.96 | 38.89 | 7.57 | 25.45 | 46.09 | 74.00 | -27.91 | PK |
| V | 4882.00 | 43.55 | 38.89 | 7.57 | 25.45 | 37.68 | 54.00 | -16.32 | AV |
| V | 7323.00 | 51.96 | 38.78 | 7.35 | 24.78 | 45.31 | 74.00 | -28.69 | PK |
| V | 7323.00 | 43.76 | 38.78 | 7.35 | 24.78 | 37.11 | 54.00 | -16.89 | AV |
| V | 15450.00 | 53.08 | 35.89 | 6.42 | 26.47 | 50.08 | 74.00 | -23.92 | PK |
| H | 4882.00 | 51.98 | 38.89 | 7.57 | 25.45 | 46.11 | 74.00 | -27.89 | PK |
| H | 4882.00 | 43.64 | 38.89 | 7.57 | 25.45 | 37.77 | 54.00 | -16.23 | AV |
| H | 7323.00 | 53.93 | 38.78 | 7.35 | 24.78 | 47.28 | 74.00 | -26.72 | PK |
| H | 7323.00 | 43.08 | 38.78 | 7.35 | 24.78 | 36.43 | 54.00 | -17.57 | AV |
| H | 15450.00 | 51.61 | 36.68 | 6.42 | 26.65 | 48.00 | 74.00 | -26.00 | PK |

| Polar (H/V) | Frequency (MHz) | Meter Reading (dBuV) | Pre-amplifier (dB) | Cable Loss (dB) | Antenna Factor (dB) | Emission Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|---|---|---|
| GFSK High Channel:2480MHz | | | | | | | | | |
| V | 4960.00 | 54.18 | 38.75 | 7.38 | 25.45 | 48.26 | 74.00 | -25.74 | PK |
| V | 4960.00 | 43.92 | 38.75 | 7.38 | 25.45 | 38.00 | 54.00 | -16.00 | AV |
| V | 7440.00 | 54.39 | 38.65 | 7.15 | 24.78 | 47.67 | 74.00 | -26.33 | PK |
| V | 7440.00 | 43.40 | 38.65 | 7.15 | 24.78 | 36.68 | 54.00 | -17.32 | AV |
| V | 15450.00 | 52.63 | 35.58 | 6.25 | 26.47 | 49.77 | 74.00 | -24.23 | PK |
| H | 4960.00 | 53.70 | 38.75 | 7.38 | 25.45 | 47.78 | 74.00 | -26.22 | PK |
| H | 4960.00 | 43.64 | 38.75 | 7.38 | 25.45 | 37.72 | 54.00 | -16.28 | AV |
| H | 7440.00 | 53.80 | 38.65 | 7.15 | 24.78 | 47.08 | 74.00 | -26.92 | PK |
| H | 7440.00 | 43.04 | 38.65 | 7.15 | 24.78 | 36.32 | 54.00 | -17.68 | AV |
| H | 15450.00 | 52.57 | 36.42 | 6.25 | 26.65 | 49.05 | 74.00 | -24.95 | PK |

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
   Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
4. All the Modulation are test, the worst mode is GFSK, the data recording in the report.

## 7.5 RADIATED Band EMISSION MEASUREMENT

Test Requirement:

FCC Part15 C Section 15.209 and 15.205

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

| FREQUENCY (MHz) | Limit (dBuV/m) (at 3M) | |
|---|---|---|
| | PEAK | AVERAGE |
| Above 1000 | 74 | 54 |

Notes:

(1) The limit for radiated test was performed according to FCC PART 15C.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

| Spectrum Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Start Frequency | 2300MHz |
| Stop Frequency | 2520 |
| RB / VB (emission in restricted band) | 1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average |

TEST PROCEDURE

Above 1GHz test procedure as below:

a. 1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

g. Test the EUT in the lowest channel,the Highest channel

Note:

Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

## TEST RESULT

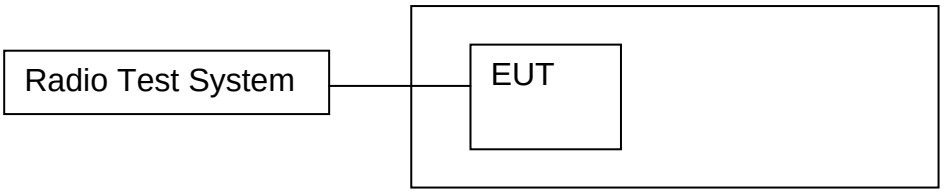
| | Polar (H/V) | Frequency (MHz) | Meter Reading (dBuV) | Pre-amplifier (dB) | Cable Loss (dB) | Antenna Factor (dB/m) | Emission evel (dBuV/m) | Limits (dBuV/m) | | Result |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | PK | PK | AV | |
| GFSK | **Low Channel 2402MHz** | | | | | | | | | |
| | H | 2390.00 | 61.74 | 38.06 | 7.42 | 20.15 | 51.25 | 74.00 | 54.00 | PASS |
| | H | 2400.00 | 54.26 | 38.06 | 7.42 | 20.15 | 43.77 | 74.00 | 54.00 | PASS |
| | V | 2390.00 | 60.59 | 38.06 | 7.42 | 20.15 | 50.10 | 74.00 | 54.00 | PASS |
| | V | 2400.00 | 52.44 | 38.06 | 7.42 | 20.15 | 41.95 | 74.00 | 54.00 | PASS |
| | **High Channel 2480MHz** | | | | | | | | | |
| | H | 2483.50 | 59.90 | 38.17 | 7.45 | 20.54 | 49.72 | 74.00 | 54.00 | PASS |
| | H | 2485.50 | 51.84 | 38.17 | 7.45 | 20.54 | 41.66 | 74.00 | 54.00 | PASS |
| | V | 2483.50 | 59.94 | 38.2 | 7.45 | 20.54 | 49.73 | 74.00 | 54.00 | PASS |
| | V | 2485.50 | 54.22 | 38.2 | 7.45 | 20.54 | 44.01 | 74.00 | 54.00 | PASS |
| Pi/4DQPSK | **Low Channel 2402MHz** | | | | | | | | | |
| | H | 2390.00 | 61.28 | 38.06 | 7.42 | 20.15 | 50.79 | 74.00 | 54.00 | PASS |
| | H | 2400.00 | 53.59 | 38.06 | 7.42 | 20.15 | 43.10 | 74.00 | 54.00 | PASS |
| | V | 2390.00 | 60.58 | 38.06 | 7.42 | 20.15 | 50.09 | 74.00 | 54.00 | PASS |
| | V | 2400.00 | 52.91 | 38.06 | 7.42 | 20.15 | 42.42 | 74.00 | 54.00 | PASS |
| | **High Channel 2480MHz** | | | | | | | | | |
| | H | 2483.50 | 61.68 | 38.17 | 7.45 | 20.54 | 51.50 | 74.00 | 54.00 | PASS |
| | H | 2485.50 | 54.19 | 38.17 | 7.45 | 20.54 | 44.01 | 74.00 | 54.00 | PASS |
| | V | 2483.50 | 59.93 | 38.2 | 7.45 | 20.54 | 49.72 | 74.00 | 54.00 | PASS |
| | V | 2485.50 | 53.12 | 38.2 | 7.45 | 20.54 | 42.91 | 74.00 | 54.00 | PASS |
| 8DPSK | **Low Channel 2402MHz** | | | | | | | | | |
| | H | 2390.00 | 60.92 | 38.06 | 7.42 | 20.15 | 50.43 | 74.00 | 54.00 | PASS |
| | H | 2400.00 | 54.11 | 38.06 | 7.42 | 20.15 | 43.62 | 74.00 | 54.00 | PASS |
| | V | 2390.00 | 61.73 | 38.06 | 7.42 | 20.15 | 51.24 | 74.00 | 54.00 | PASS |
| | V | 2400.00 | 53.87 | 38.06 | 7.42 | 20.15 | 43.38 | 74.00 | 54.00 | PASS |
| | **High Channel 2480MHz** | | | | | | | | | |
| | H | 2483.50 | 61.79 | 38.17 | 7.45 | 20.54 | 51.61 | 74.00 | 54.00 | PASS |
| | H | 2485.50 | 55.38 | 38.17 | 7.45 | 20.54 | 45.20 | 74.00 | 54.00 | PASS |
| | V | 2483.50 | 60.40 | 38.2 | 7.45 | 20.54 | 50.19 | 74.00 | 54.00 | PASS |
| | V | 2485.50 | 53.90 | 38.2 | 7.45 | 20.54 | 43.69 | 74.00 | 54.00 | PASS |

**Remark:**

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit
2. If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.

# 8. CONDUCTED EMISSION

## 8.1 Block Diagram Of Test Setup




## 8.2 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)).

## 8.3 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:

Blow 30MHz:

RBW = 100kHz, VBW = 300kHz, Sweep = auto

Detector function = peak, Trace = max hold

Above 30MHz:

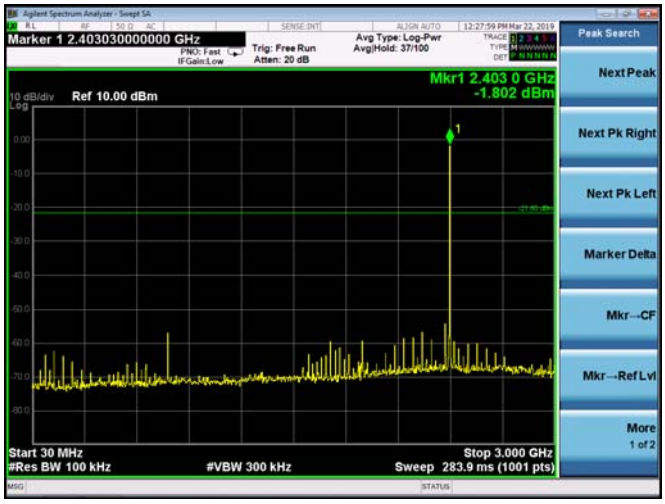
RBW = 100KHz, VBW = 300KHz, Sweep = auto

Detector function = peak, Trace = max hold

## 8.4 Test Result

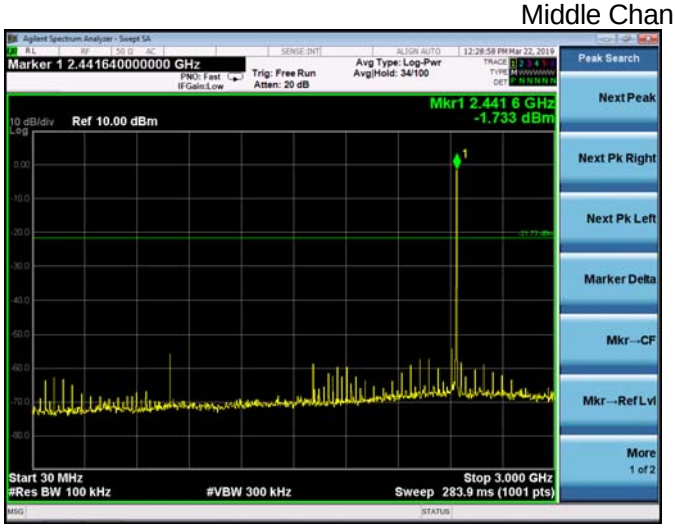
GFSK

Low Channel 2402MHz



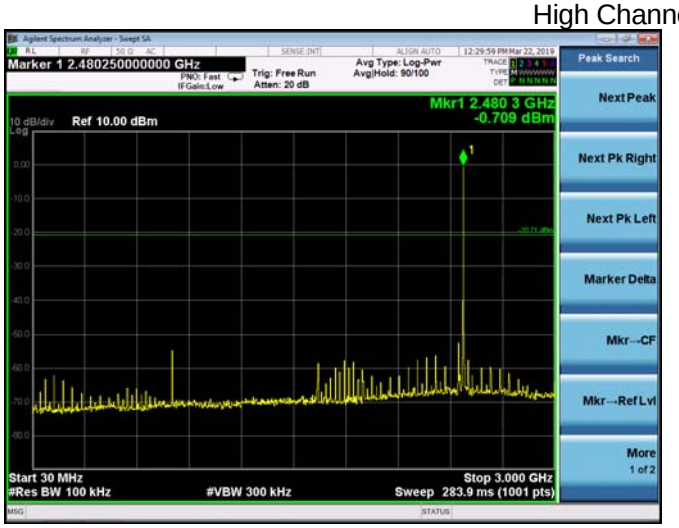


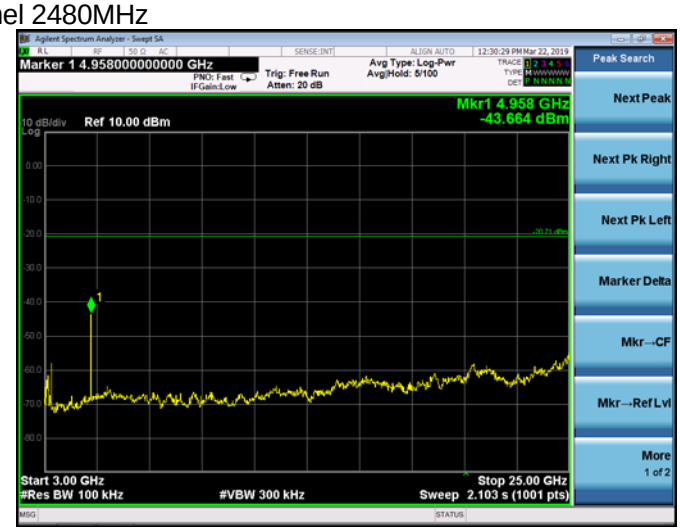
Middle Channel 2440MHz





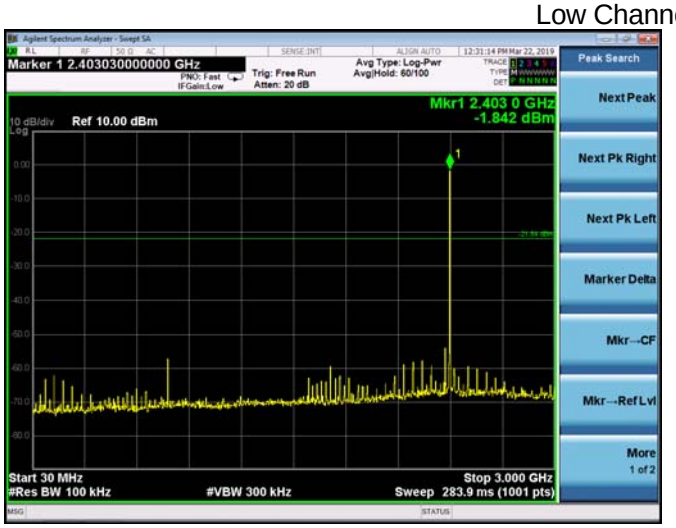
High Channel 2480MHz



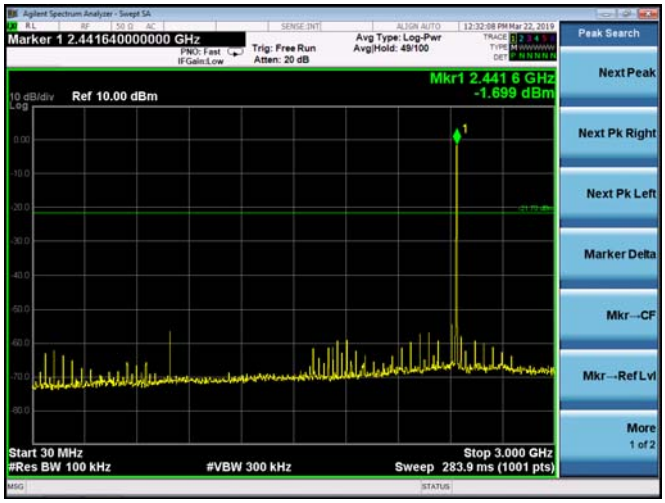
Pi/4 DQPSK

Low Channel 2402MHz



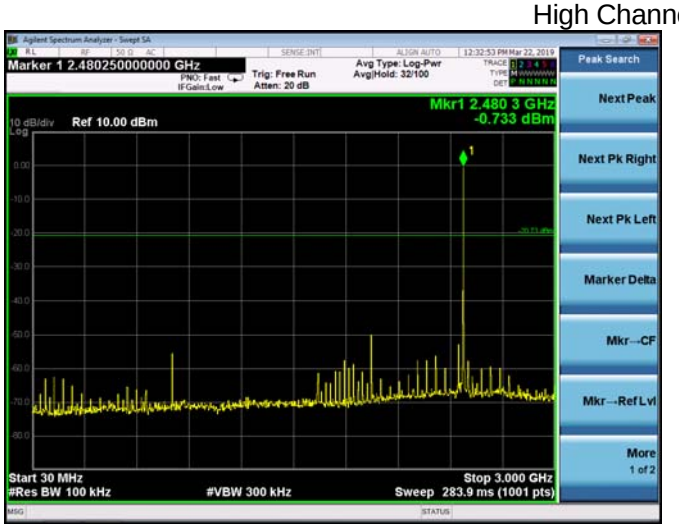


Middle Channel 2440MHz



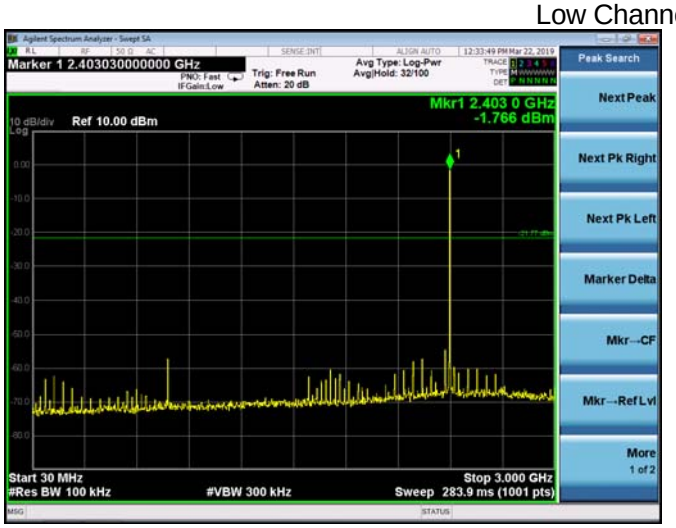


High Channel 2480MHz



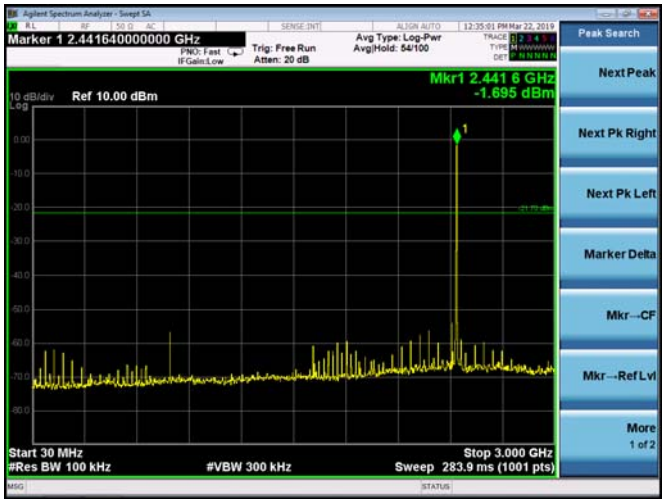

8DPSK

Low Channel 2402MHz



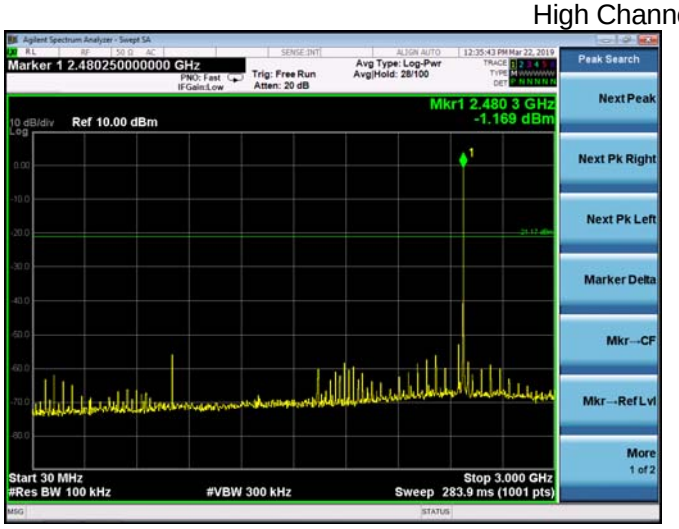


Middle Channel 2440MHz

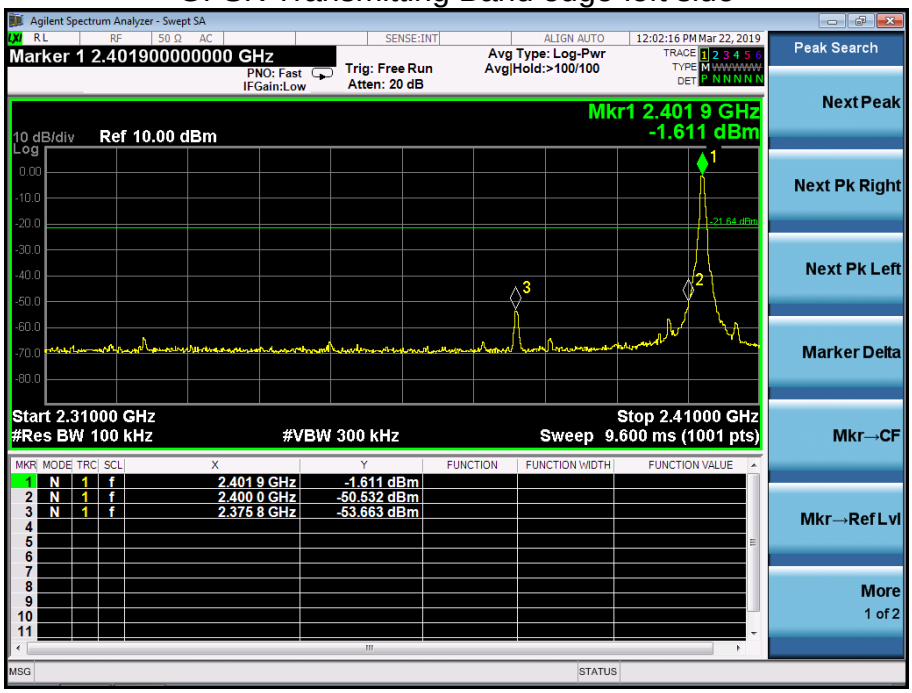




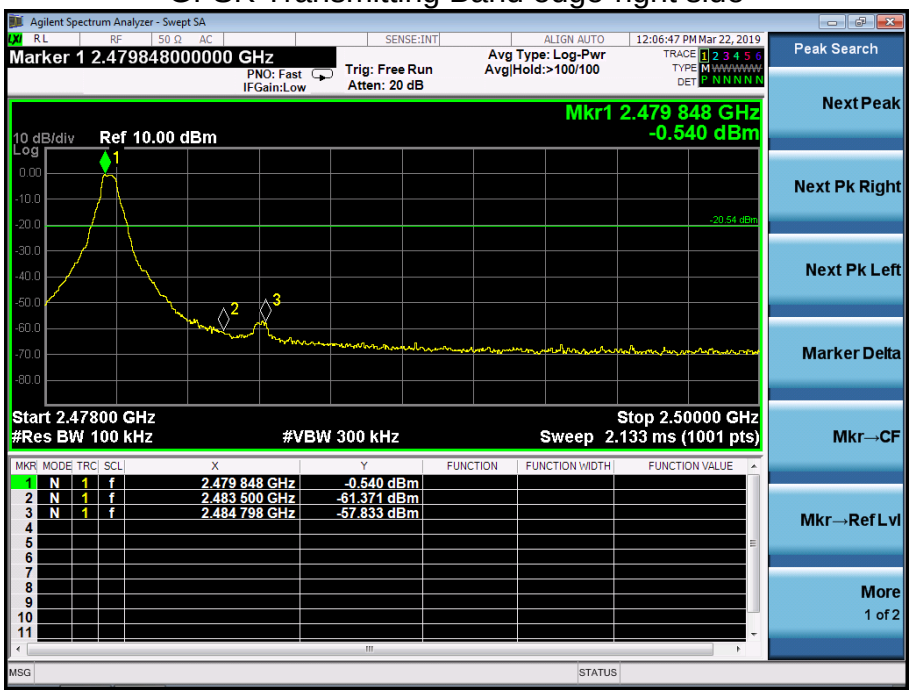
High Channel 2480MHz



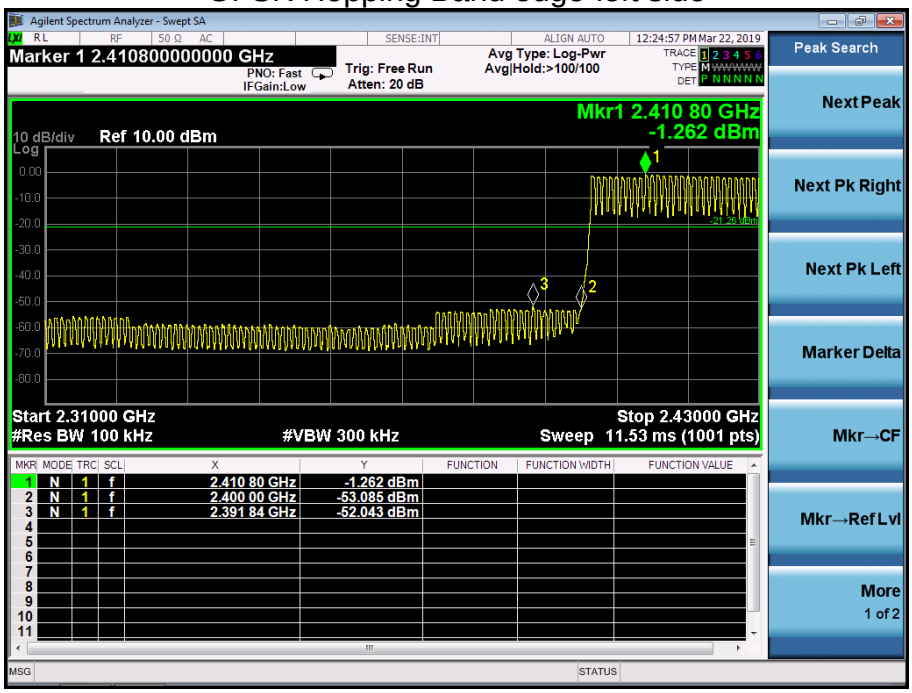

GFSK Transmitting Band edge-left side



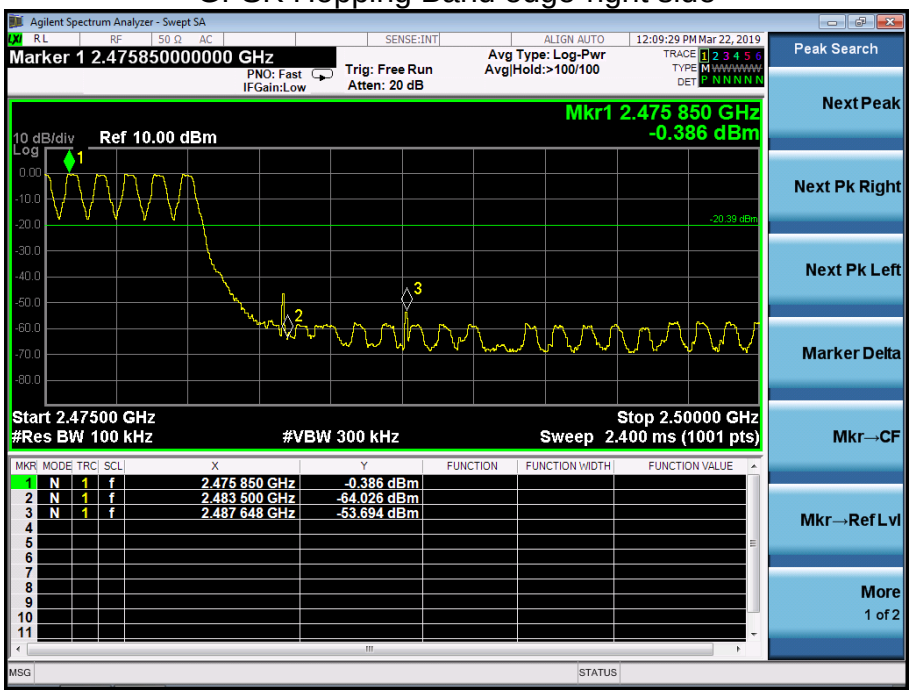

GFSK Transmitting Band edge-right side



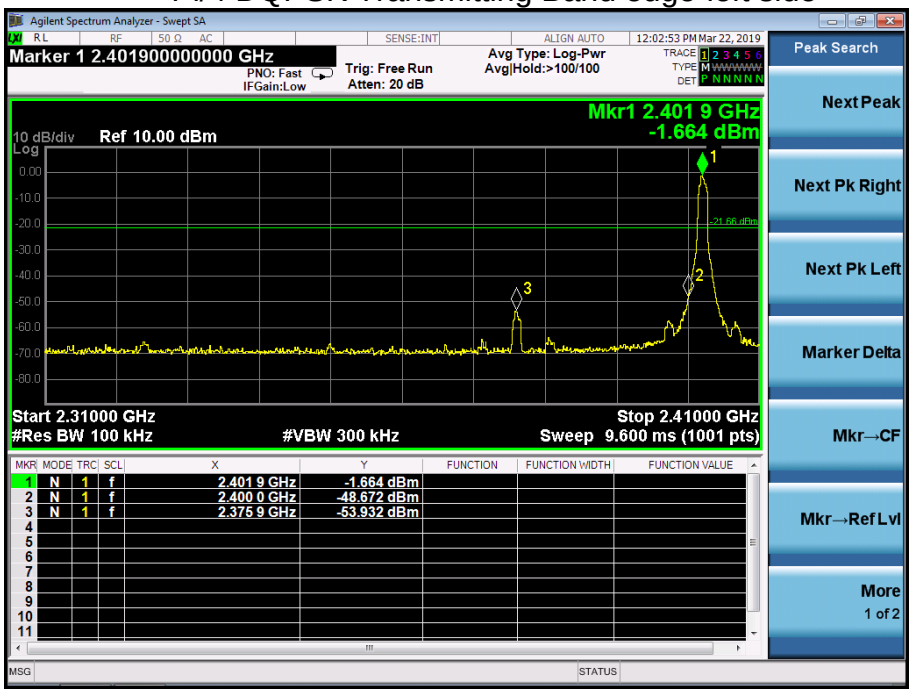
GFSK Hopping Band edge-left side



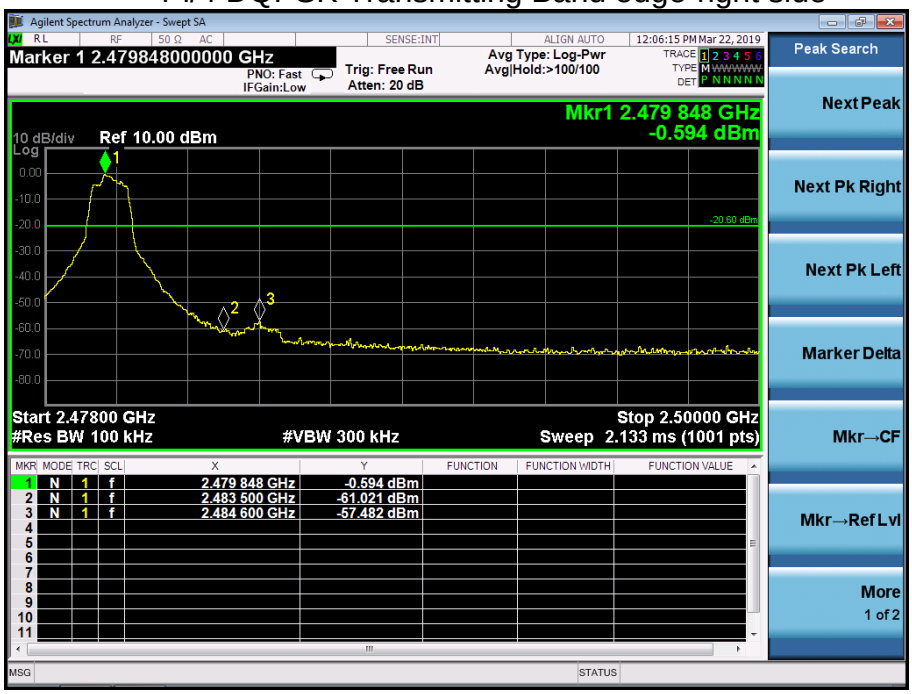

GFSK Hopping Band edge-right side



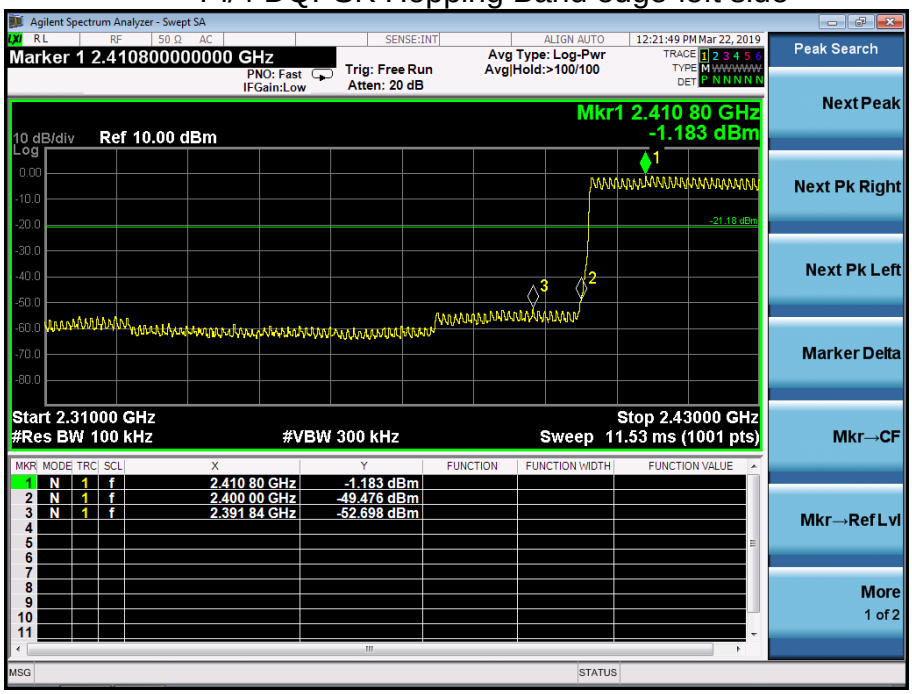
Pi/4 DQPSK Transmitting Band edge-left side



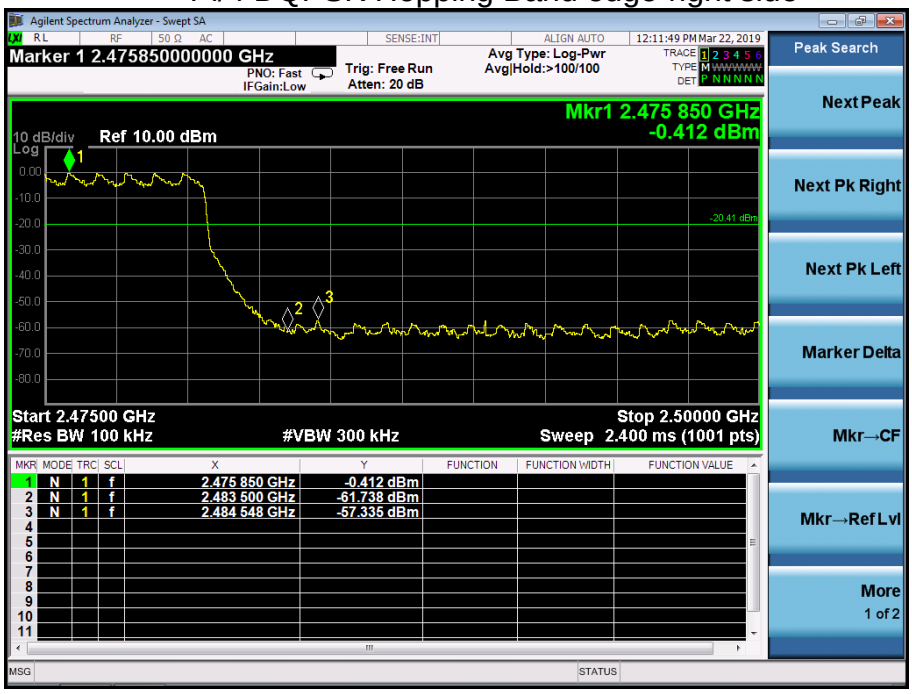

Pi/4 DQPSK Transmitting Band edge-right side



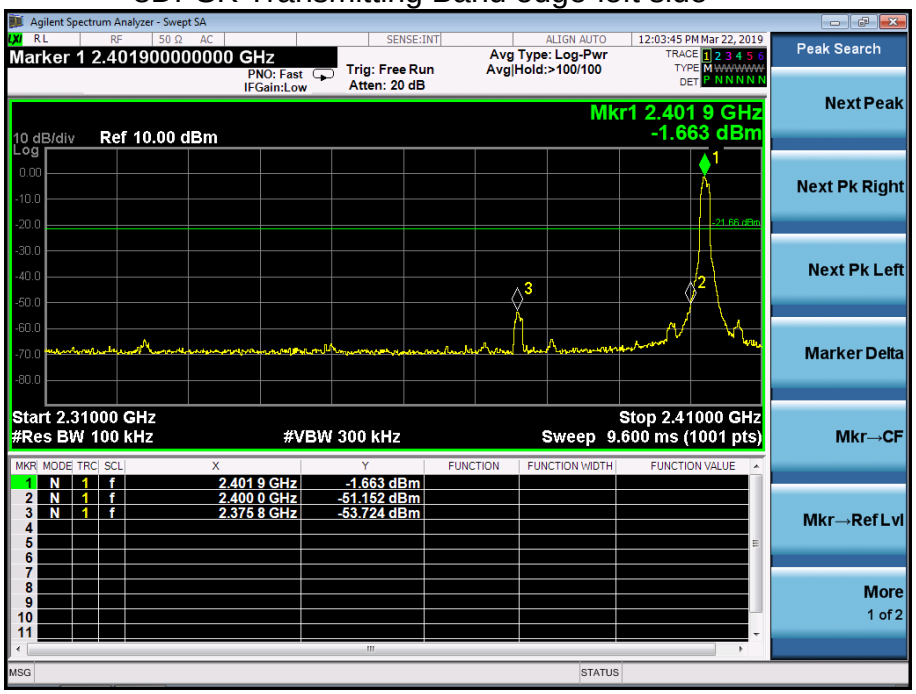
Pi/4 DQPSK Hopping Band edge-left side



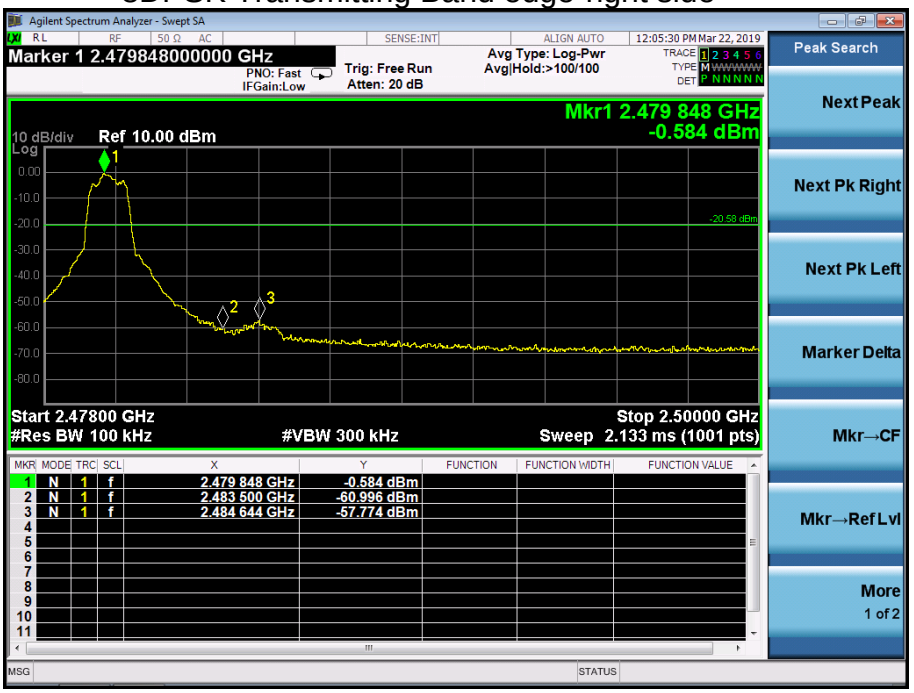

Pi/4 DQPSK Hopping Band edge-right side



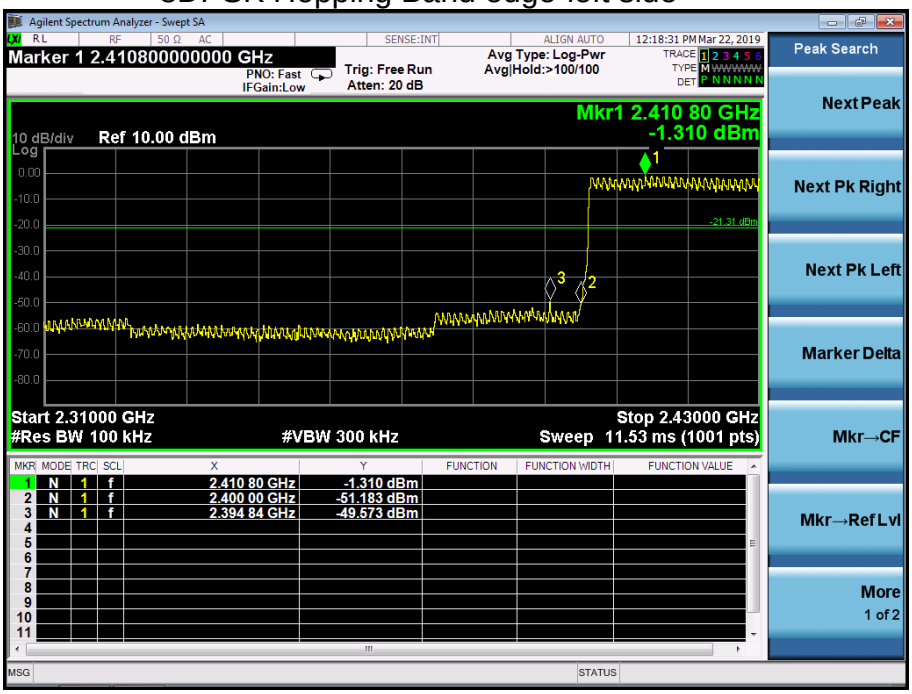
8DPSK Transmitting Band edge-left side



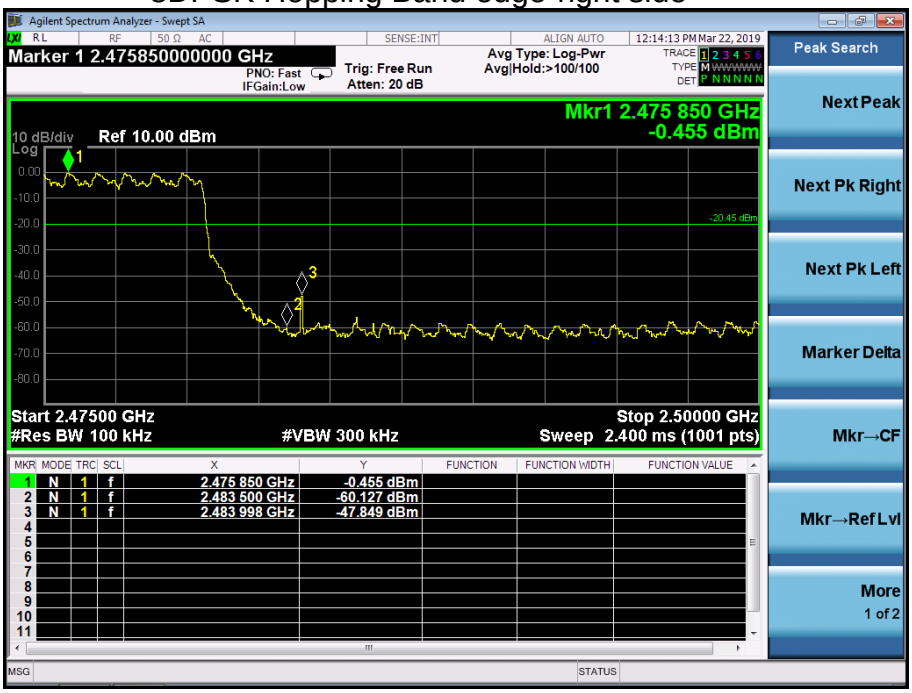

8DPSK Transmitting Band edge-right side



8DPSK Hopping Band edge-left side

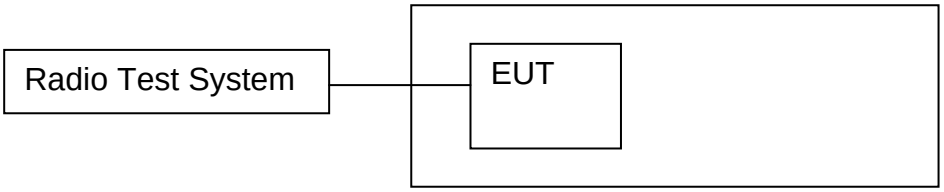



8DPSK Hopping Band edge-right side



# 9. 20 DB BANDWIDTH

## 9.1 Block Diagram Of Test Setup




## 9.2 Limit

N/A

## 9.3 Test procedure

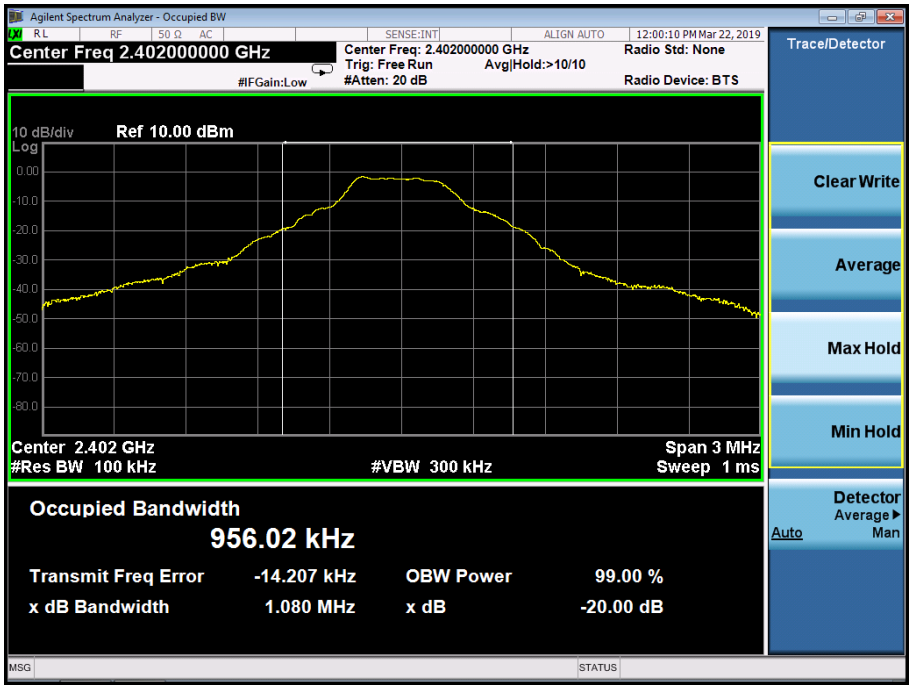
1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points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

## 9.4 Test Result

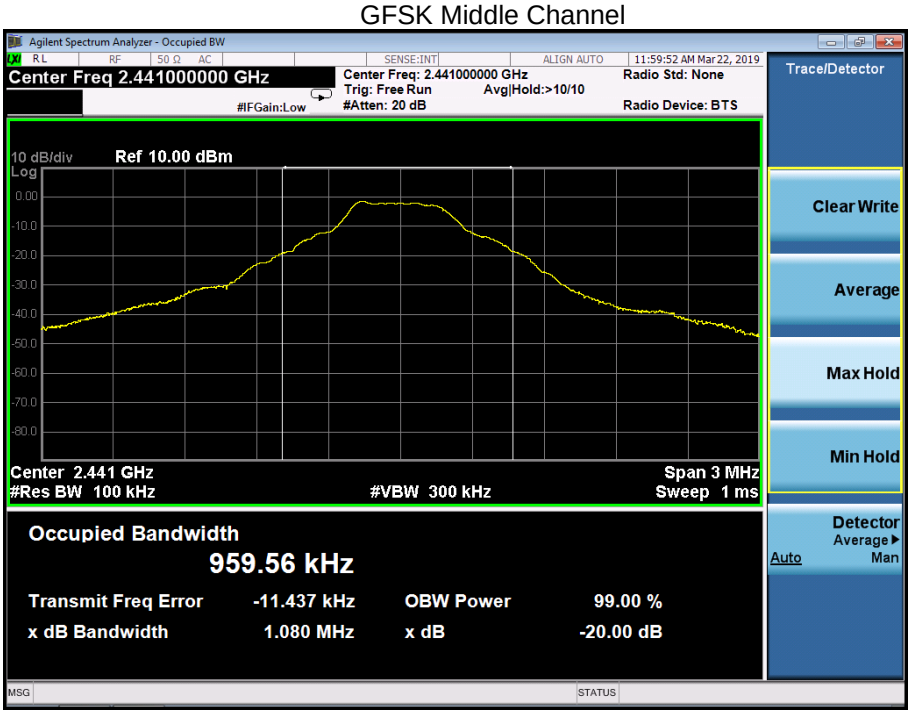
| Modulation | Test Channel | Bandwidth(MHz) |
|---|---|---|
| GFSK | Low | 1.080 |
| GFSK | Middle | 1.080 |
| GFSK | High | 1.087 |
| Pi/4 DQPSK | Low | 1.379 |
| Pi/4 DQPSK | Middle | 1.378 |
| Pi/4 DQPSK | High | 1.379 |
| 8DPSK | Low | 1.352 |
| 8DPSK | Middle | 1.351 |
| 8DPSK | High | 1.355 |

**Test plots**

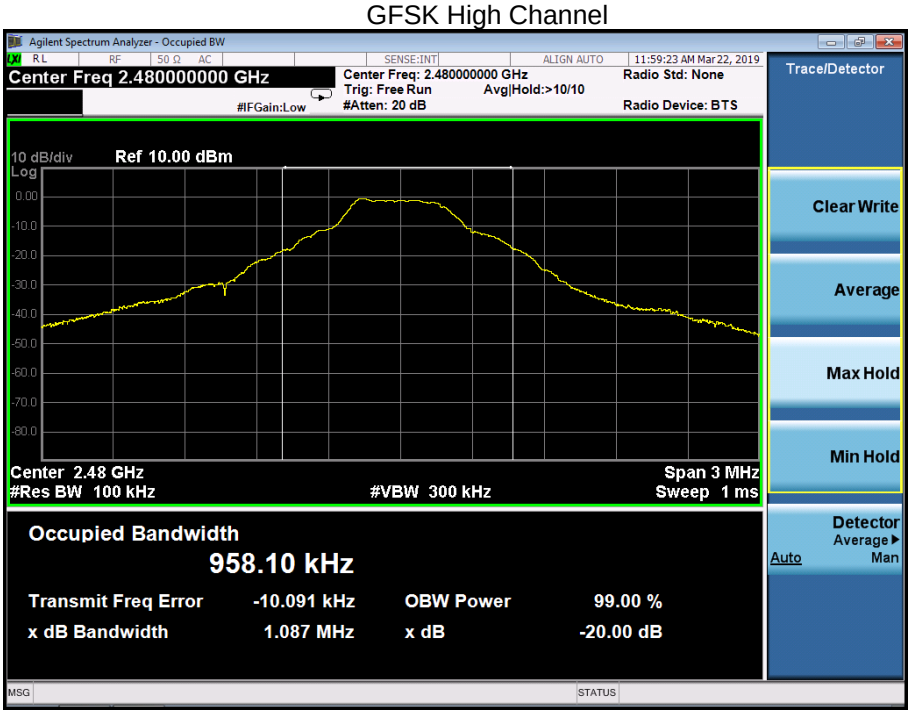
GFSK Low Channel



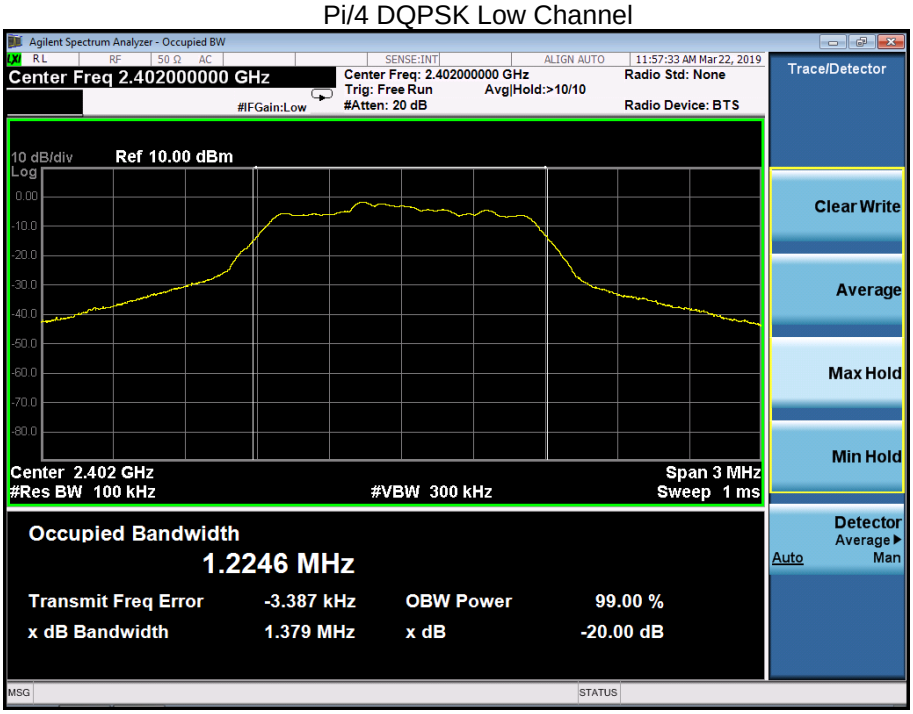
GFSK Middle Channel



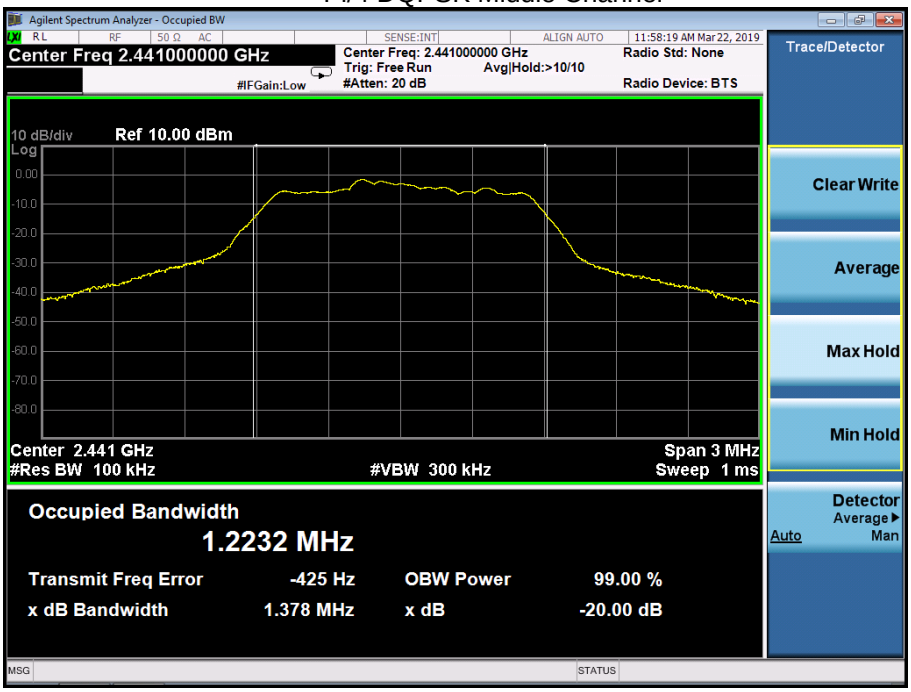

GFSK High Channel



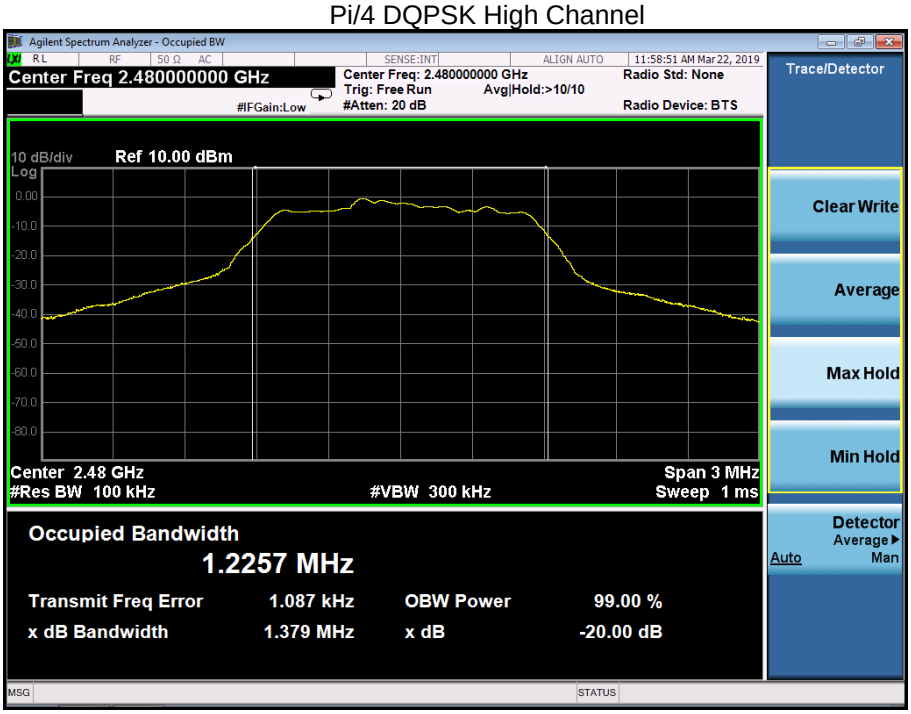
Pi/4 DQPSK Low Channel



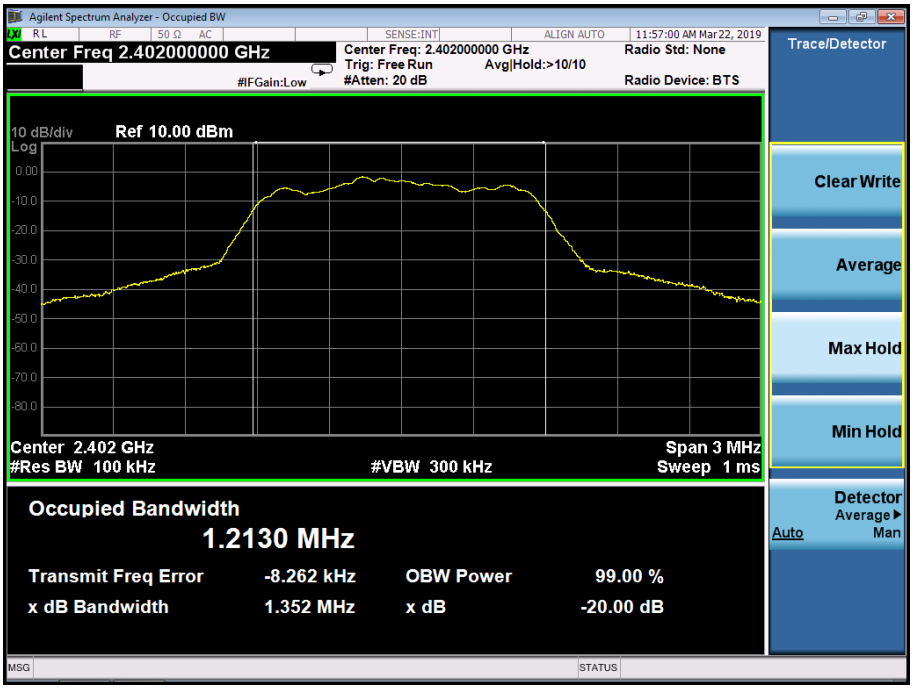

Pi/4 DQPSK Middle Channel



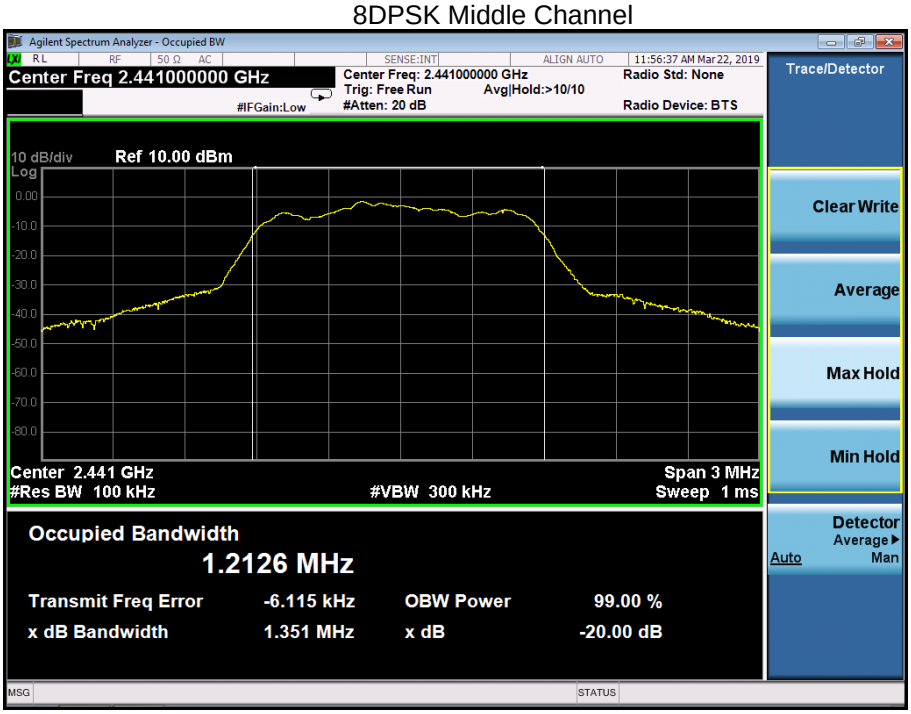
Pi/4 DQPSK High Channel



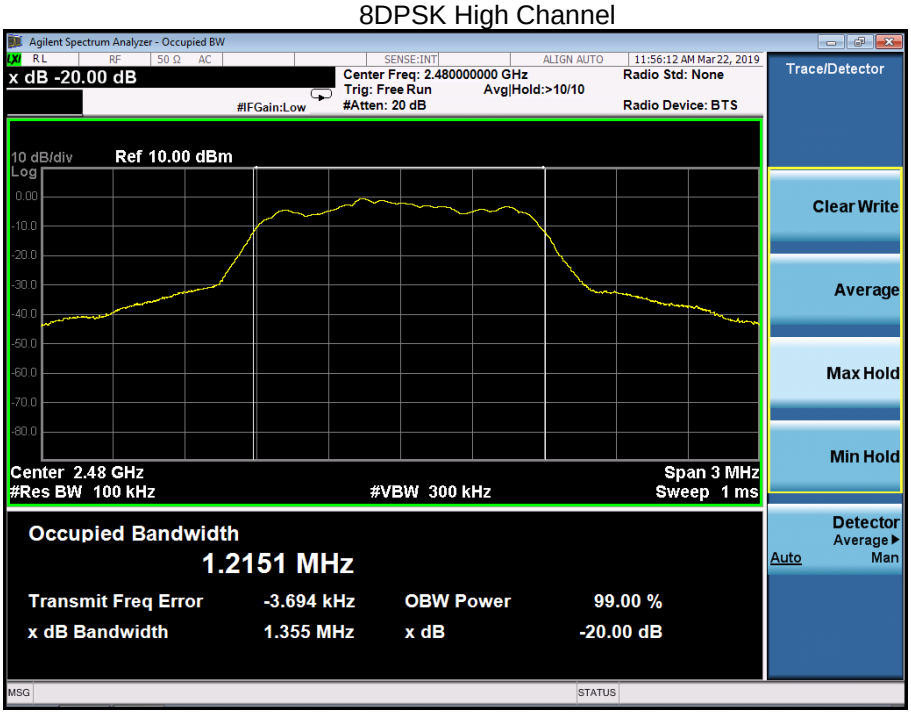

8DPSK Low Channel



8DPSK Middle Channel




8DPSK High Channel



# 10. MAXIMUM PEAK OUTPUT POWER

## 10.1 Applied procedures / limit

| FCC Part15 (15.247) , Subpart C | | | | |
|---|---|---|---|---|
| Section | Test Item | Limit | Frequency Range (MHz) | Result |
| 15.247(b)(3) | Peak Output Power | 1 watt or 30dBm | 2400-2483.5 | PASS |

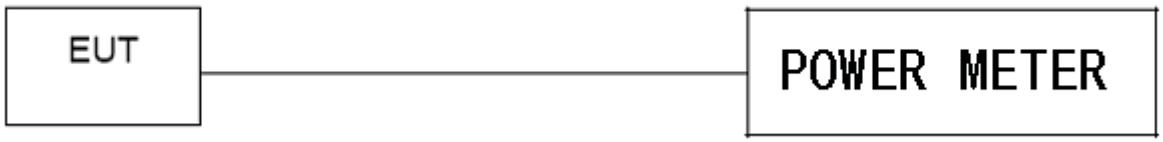
## 10.2 TEST PROCEDURE

a. The EUT was directly connected to the Power meter

## 10.3 DEVIATION FROM STANDARD

No deviation.

## 10.4 TEST SETUP




## 10.5 EUT OPERATION CONDITIONS

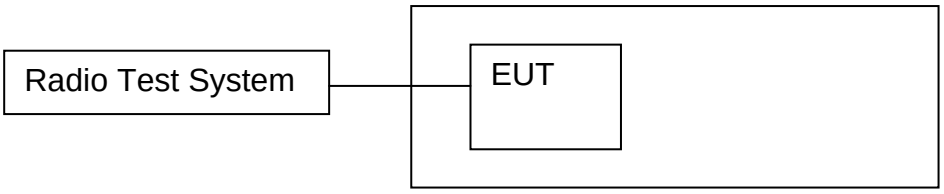
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

## 10.6 Test Result

| Modulation | Test Channel | Output Power PK(dBm) | Limit (dBm) |
|---|---|---|---|
| GFSK | Low | 1.16 | 21 |
| GFSK | Middle | 1.14 | 21 |
| GFSK | High | 0.17 | 21 |
| Pi/4 DQPSK | Low | 1.45 | 21 |
| Pi/4 DQPSK | Middle | 1.50 | 21 |
| Pi/4 DQPSK | High | 0.46 | 21 |
| 8DPSK | Low | 1.72 | 21 |
| 8DPSK | Middle | 1.59 | 21 |
| 8DPSK | High | 1.13 | 21 |

# 11. HOPPING CHANNEL SEPARATION

## 11.1 Block Diagram Of Test Setup




## 11.2 Limit

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 0.125W.

## 11.3 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 = 30kHz. VBW = 100kHz , Span = 2.0MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.

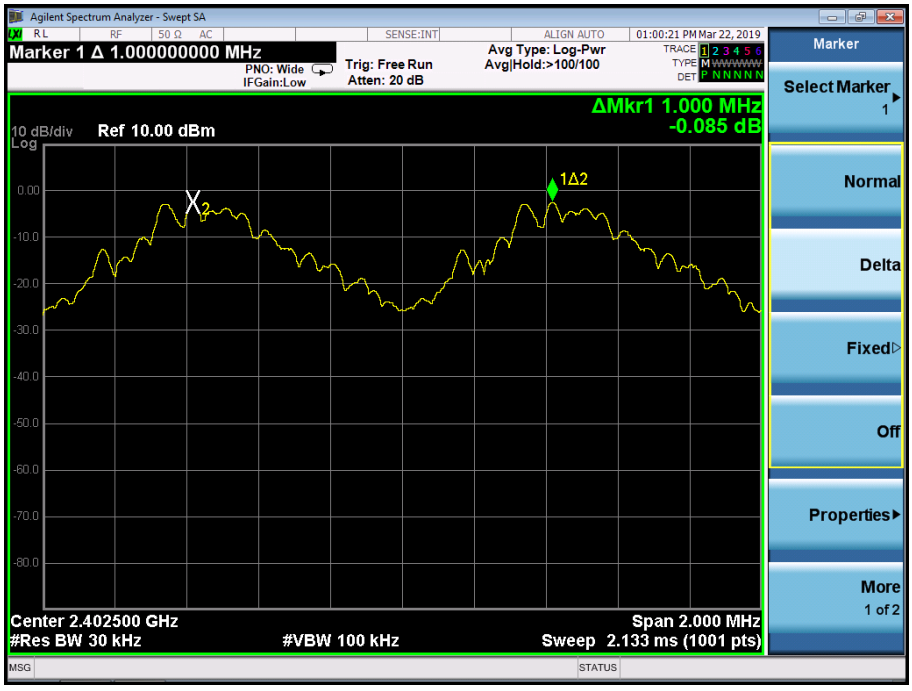
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

## 11.4 Test Result

| Modulation | Test Channel | Separation (MHz) | Limit(MHz) | Result |
|---|---|---|---|---|
| GFSK | Low | 1.000 | 0.720 | PASS |
| | Middle | 0.996 | 0.720 | PASS |
| | High | 1.000 | 0.725 | PASS |
| Pi/4DQPSK | Low | 1.000 | 0.919 | PASS |
| | Middle | 0.996 | 0.919 | PASS |
| | High | 0.998 | 0.919 | PASS |
| 8DPSK | Low | 1.004 | 0.901 | PASS |
| | Middle | 1.002 | 0.901 | PASS |
| | High | 1.000 | 0.903 | PASS |

**Test plots**

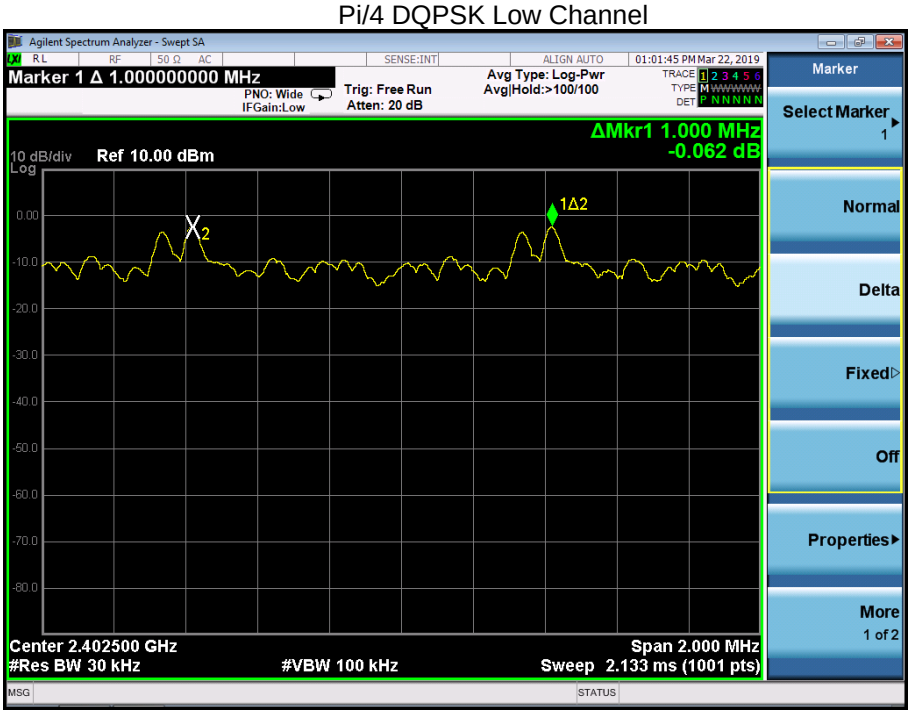
GFSK Low Channel



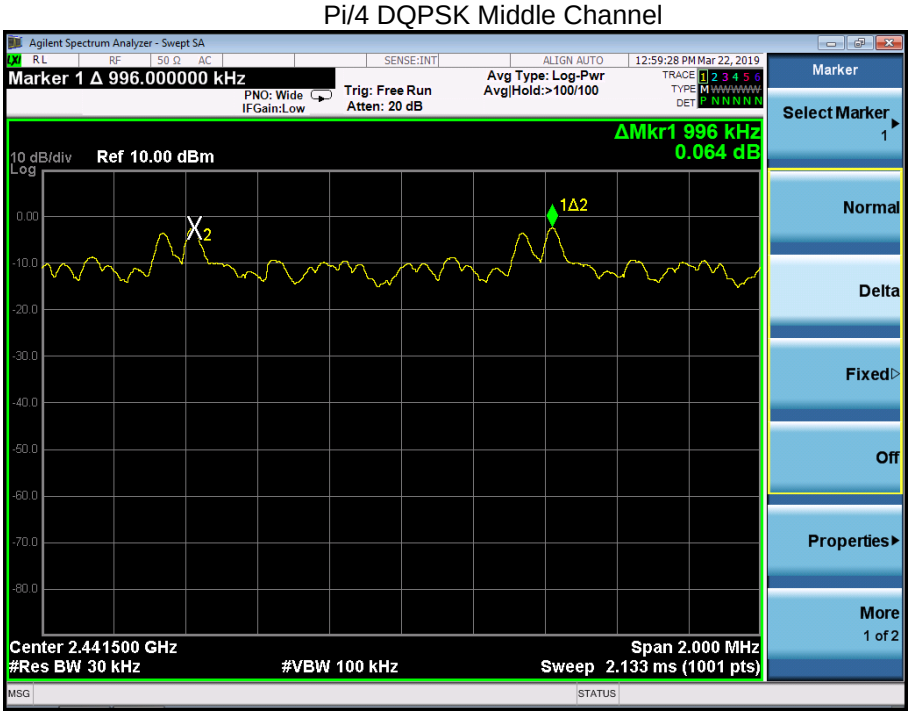
GFSK Middle Channel


GFSK High Channel

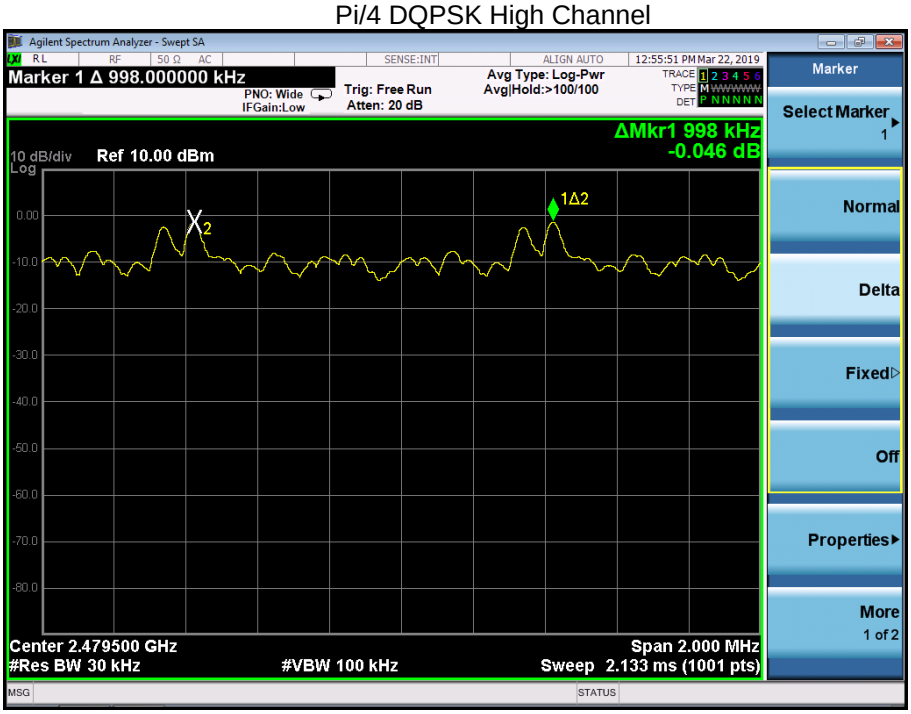
Pi/4 DQPSK Low Channel



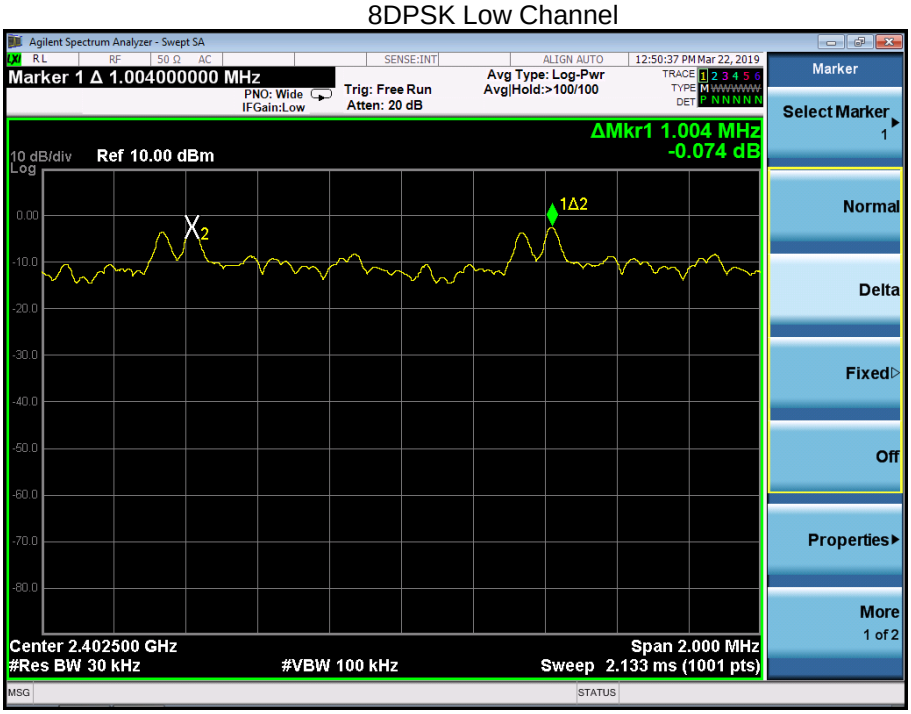

Pi/4 DQPSK Middle Channel



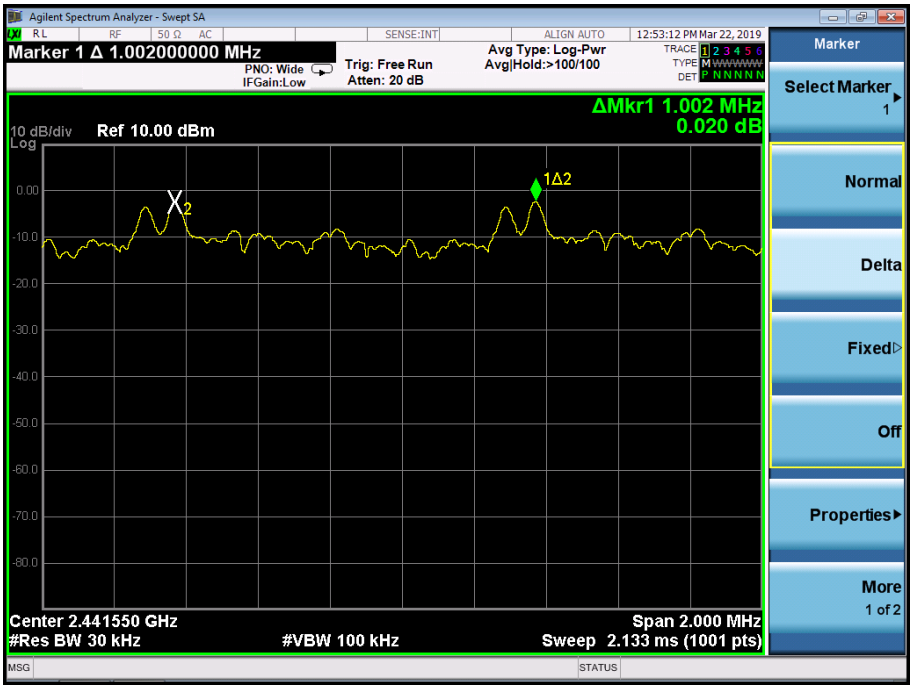
Pi/4 DQPSK High Channel



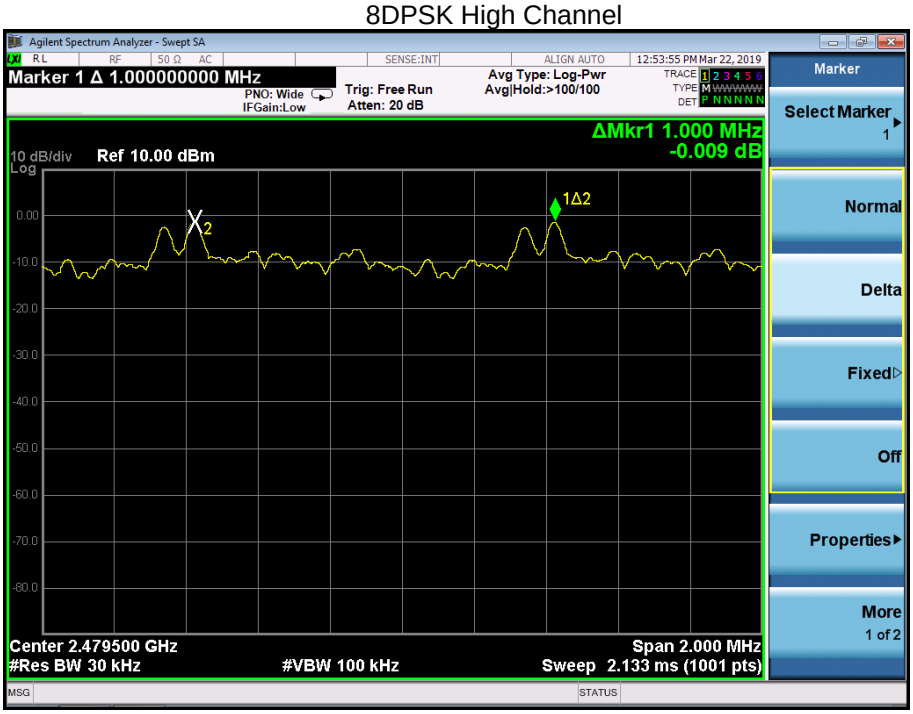

8DPSK Low Channel



8DPSK Middle Channel

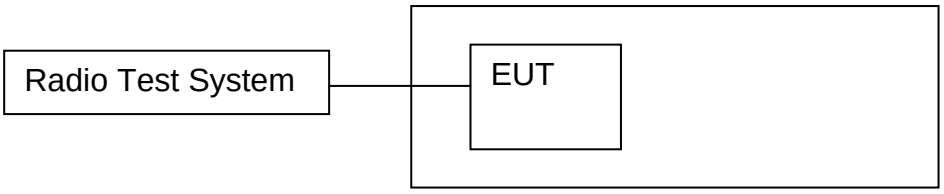



8DPSK High Channel



# 12. NUMBER OF HOPPING FREQUENCY

## 12.1 Block Diagram Of Test Setup




## 12.2 Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

## 12.3 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 = 1MHz. VBW = 1MkHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.

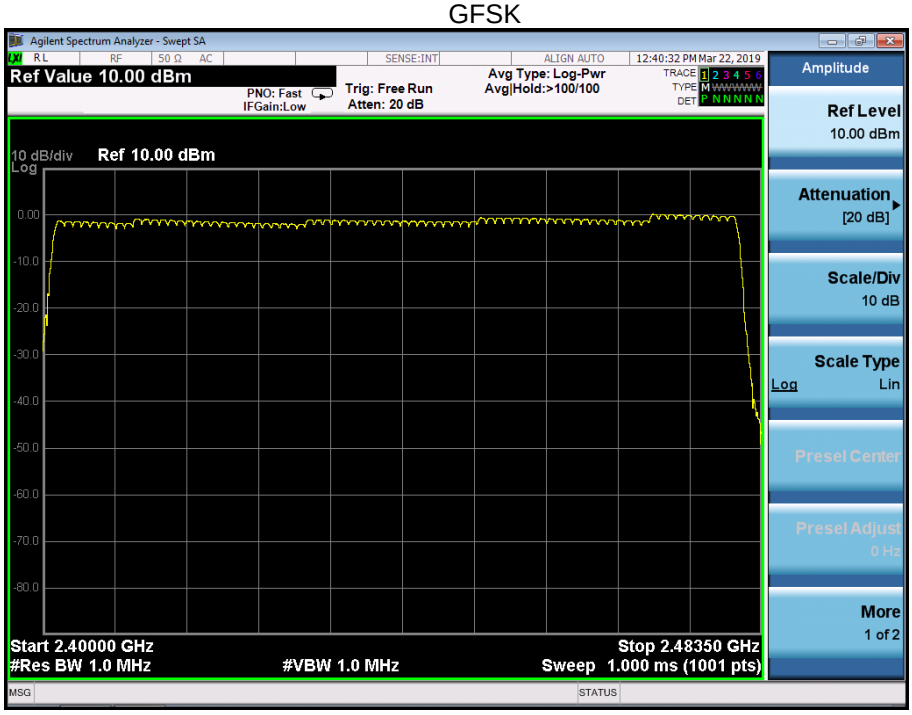
3. Allow the trace to stabilize. It may prove necessary to break the span up to sections. in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section.

4. Set the spectrum analyzer: Start Frequency = 2.4GHz, Stop Frequency = 2.4835GHz. Sweep=auto;

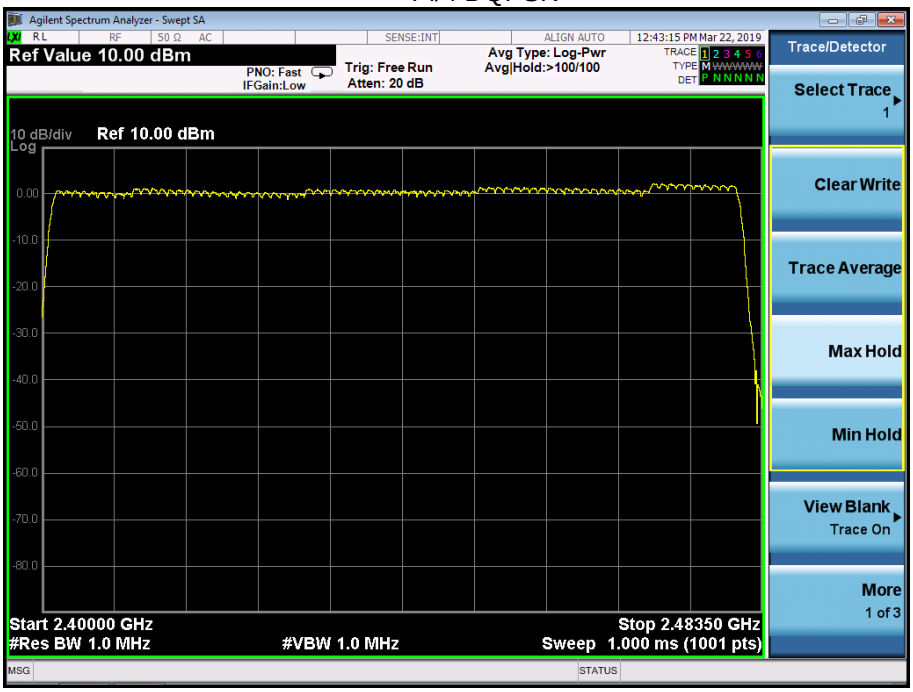
## 12.4 Test Result

| Modulation | Hopping No | Limit | Result |
|---|---|---|---|
| GFSK | 79 | 15 | PASS |
| Pi/4 DQPSK | 79 | 15 | PASS |
| 8DPSK | 79 | 15 | PASS |

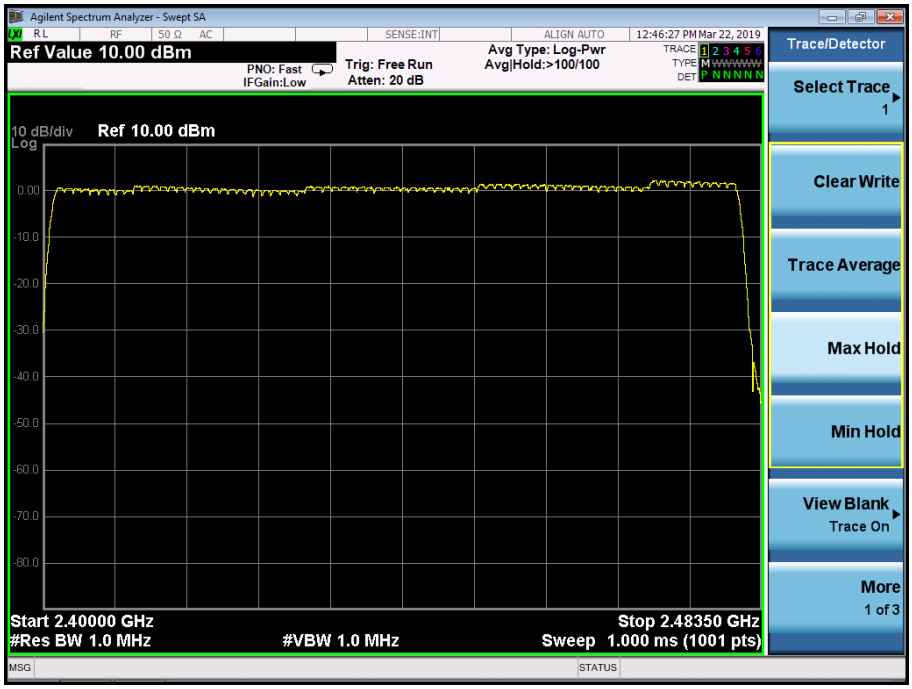
**Test Plots:**
79 Channels in total
GFSK



Pi/4 DQPSK

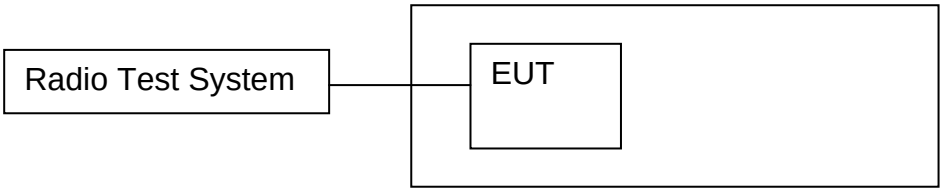



8DPSK



# 13. DWELL TIME

## 13.1 Block Diagram Of Test Setup




## 13.2 Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

## 13.3 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 spectrum analyzer span = 0. Centred on a hopping channel;

3. Set RBW = 1MHz and VBW = 3MHz.Sweep = as necessary to capture the entire dwell time per hopping channel. Set the EUT for DH5, DH3 and DH1 packet transmitting.

4. Use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g.. data rate. modulation format. etc.). repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).

## 13.4 Test Result

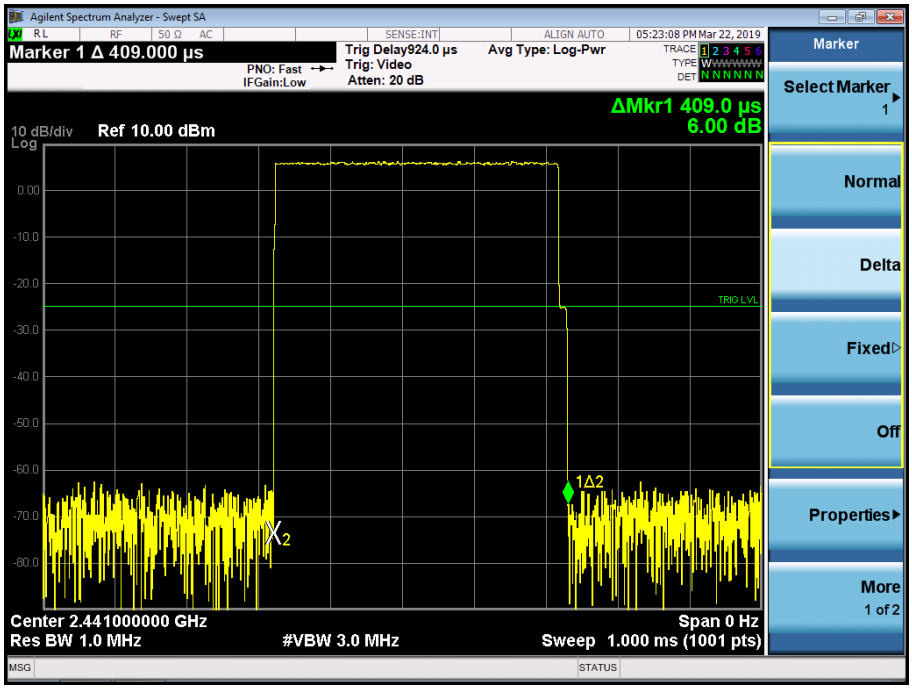
DH5 Packet permit maximum 1600 / 79 / 6 hops per second in each channel (5 time slots RX, 1 time slot TX).
DH3 Packet permit maximum 1600 / 79 / 4 hops per second in each channel (3 time slots RX, 1 time slot TX).
DH1 Packet permit maximum 1600 / 79 /2 hops per second in each channel (1 time slot RX, 1 time slot TX). So, the Dwell Time can be calculated as follows:

DH5:1600/79/6*0.4*79*(MkrDelta)/1000
DH3:1600/79/4*0.4*79*(MkrDelta)/1000
DH1:1600/79/2*0.4*79*(MkrDelta)/1000
Remark: Mkr Delta is once pulse time.

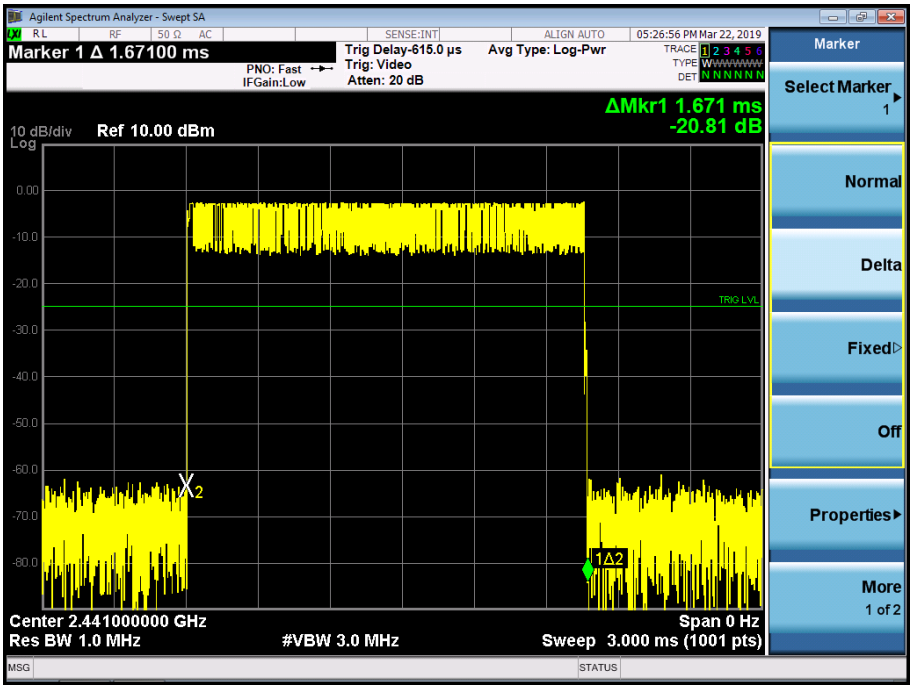
| Modulation | Channel Data | Packet | pulse time(ms) | Dwell Time(s) | Limits(s) |
|---|---|---|---|---|---|
| GFSK | Middle | DH1 | 0.409 | 0.131 | 0.4 |
| | | DH3 | 1.671 | 0.267 | 0.4 |
| | | DH5 | 2.934 | 0.313 | 0.4 |
| Pi/4DQPSK | Middle | 2DH1 | 0.422 | 0.135 | 0.4 |
| | | 2DH3 | 1.680 | 0.269 | 0.4 |
| | | 2DH5 | 2.934 | 0.313 | 0.4 |
| 8DPSK | Middle | 3DH1 | 0.421 | 0.135 | 0.4 |
| | | 3DH3 | 1.677 | 0.268 | 0.4 |
| | | 3DH5 | 2.940 | 0.314 | 0.4 |

Test Plots

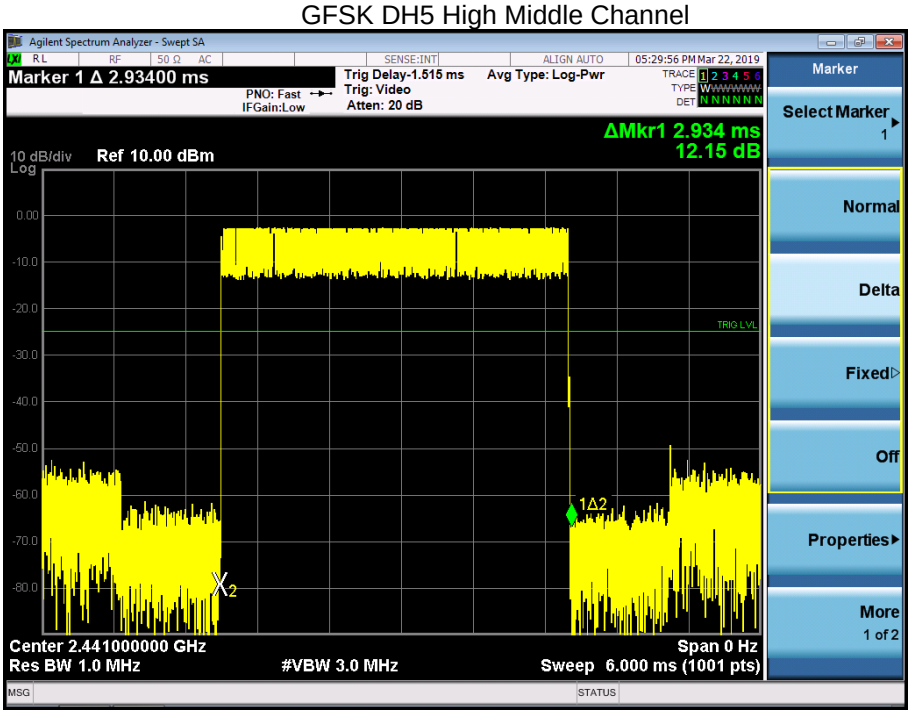
GFSK DH1 Middle Channel



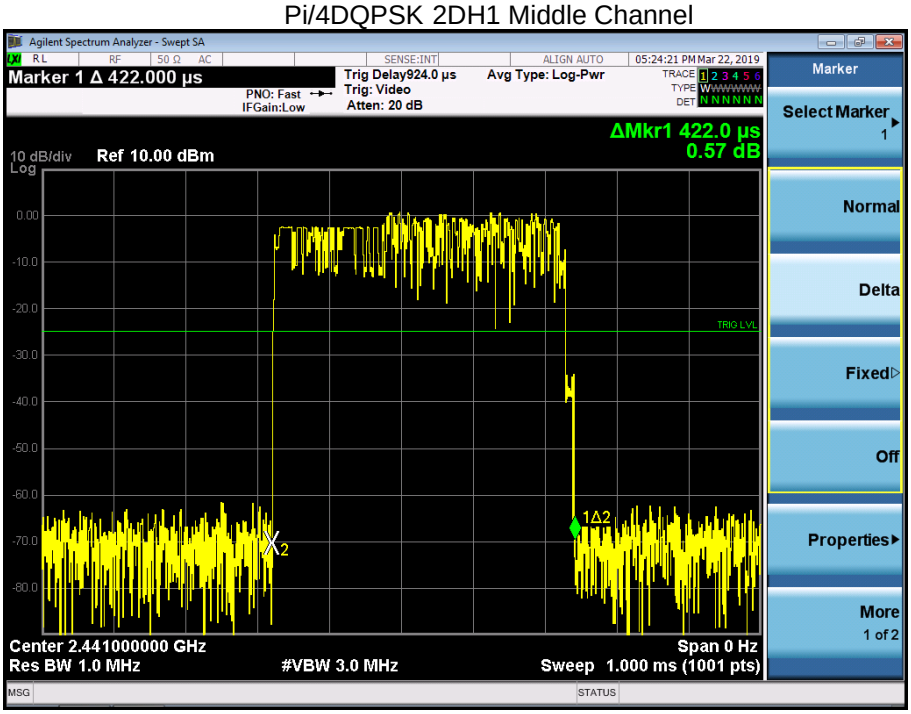

GFSK DH3 Middle Channel



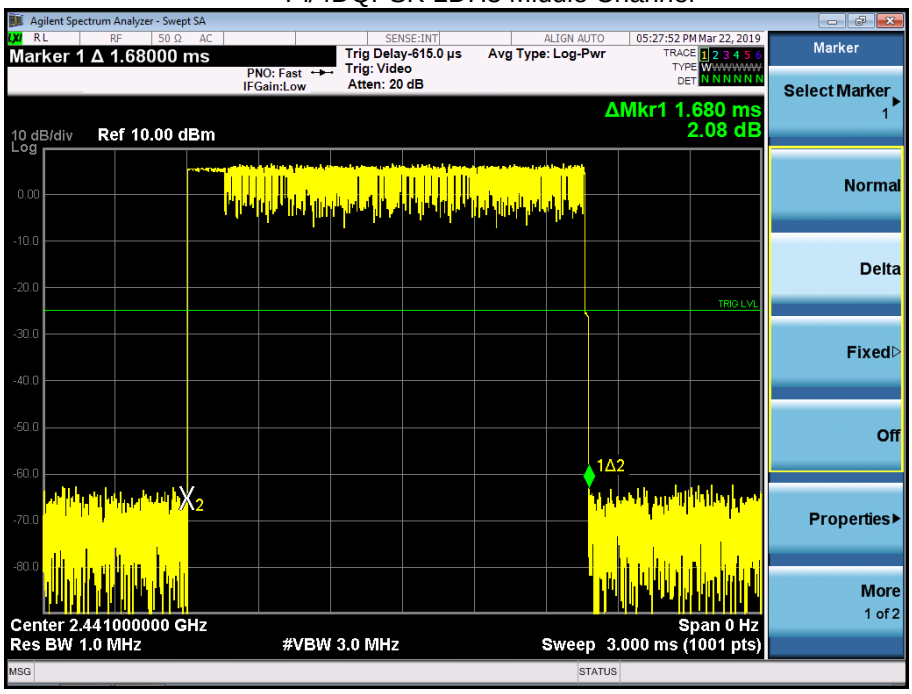
GFSK DH5 High Middle Channel



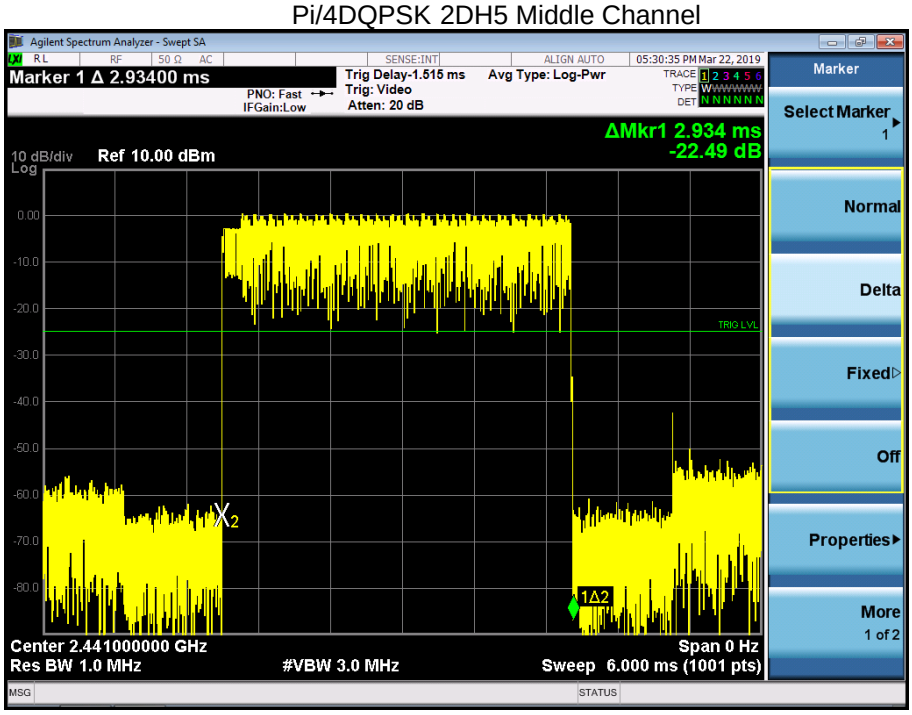

Pi/4DQPSK 2DH1 Middle Channel



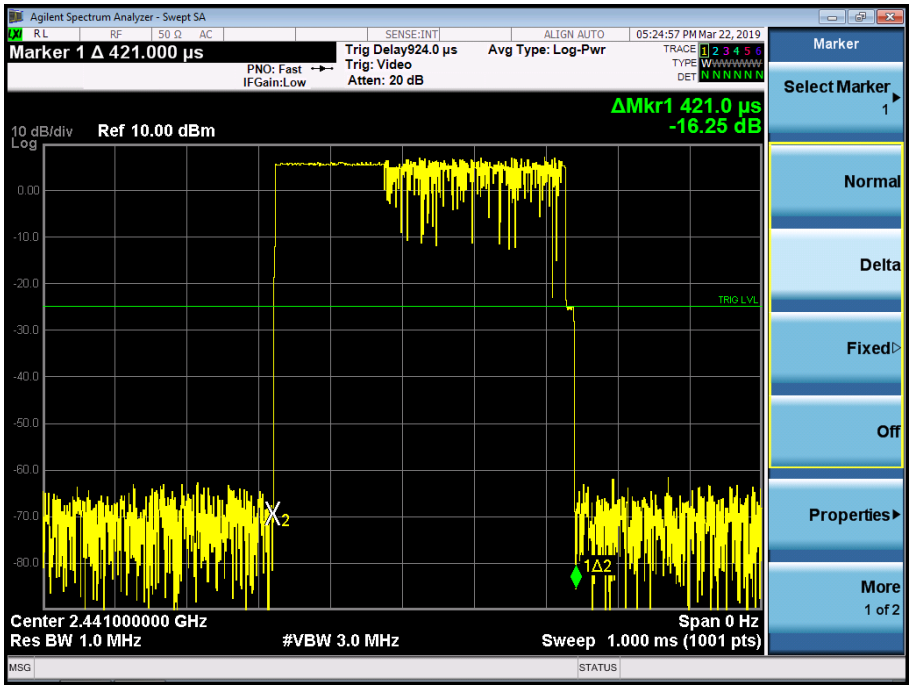
Pi/4DQPSK 2DH3 Middle Channel



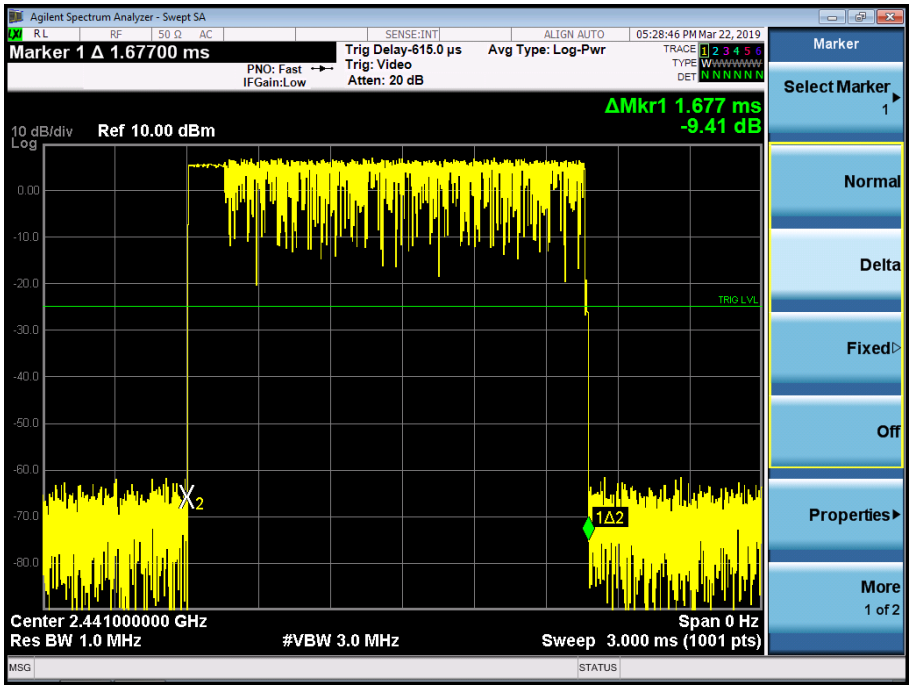

Pi/4DQPSK 2DH5 Middle Channel



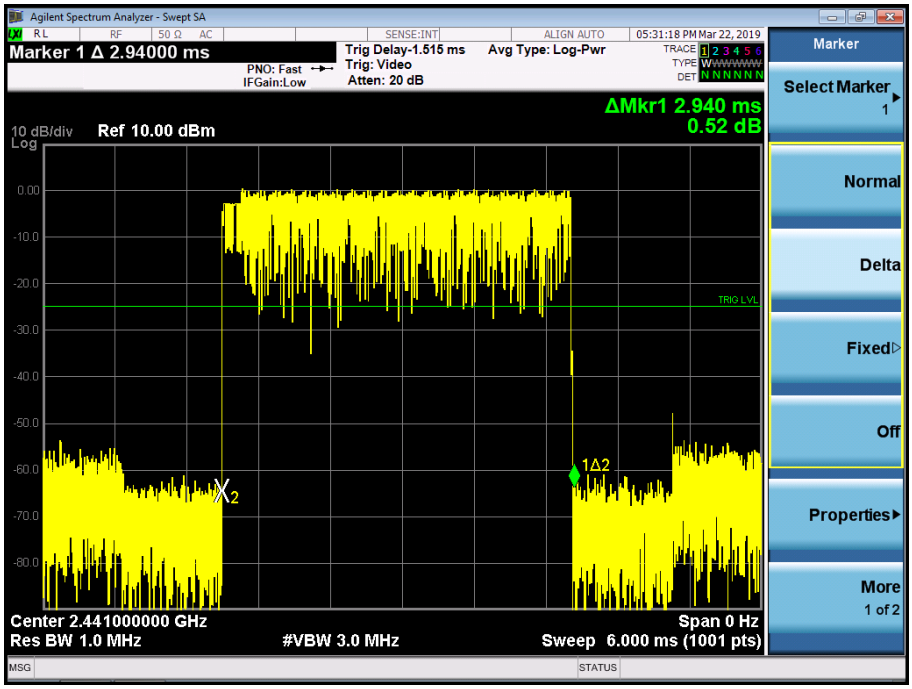
8DPSK 3DH1 Middle Channel




8DPSK 3DH3 Middle Channel



8DPSK 3DH5 Middle Channel



# 14. ANTENNA REQUIREMENT

## 14.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 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.

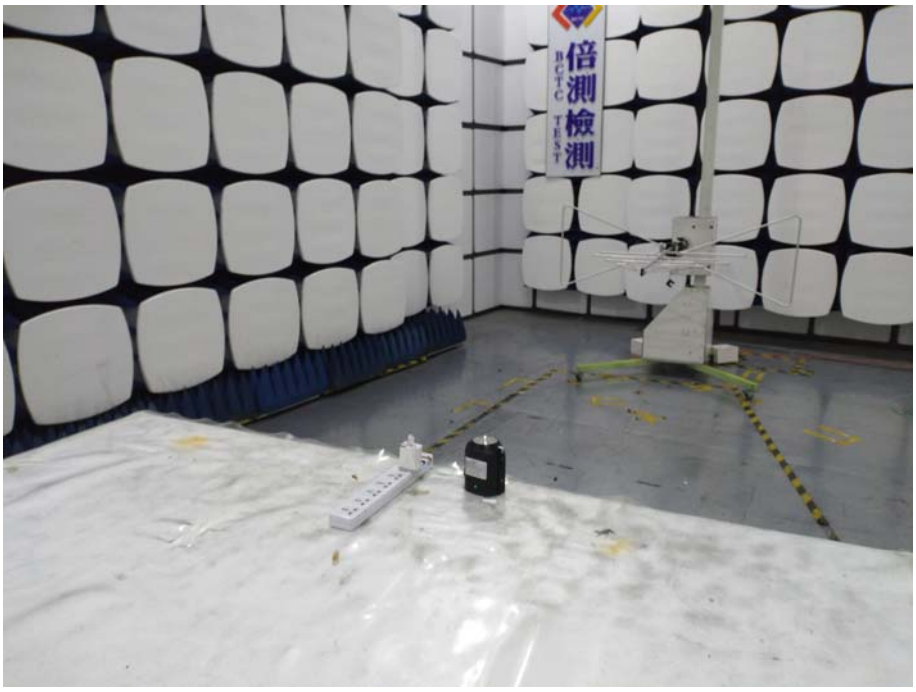
## 14.2 EUT ANTENNA

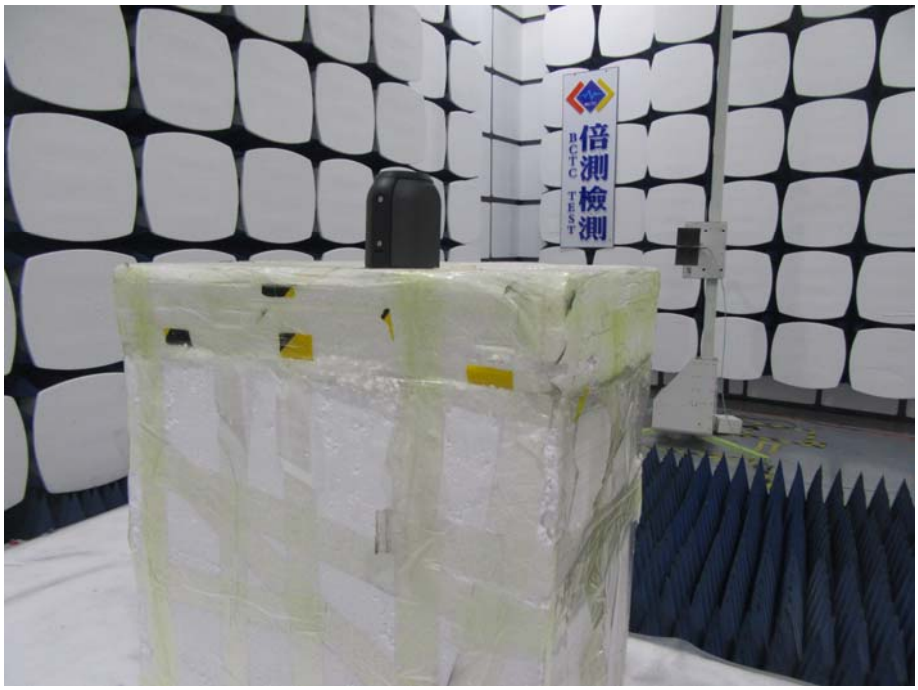
The EUT antenna is FPCB antenna, fulfill the requirement of this section.

# 15. EUT TEST SETUP PHOTOGRAPHS

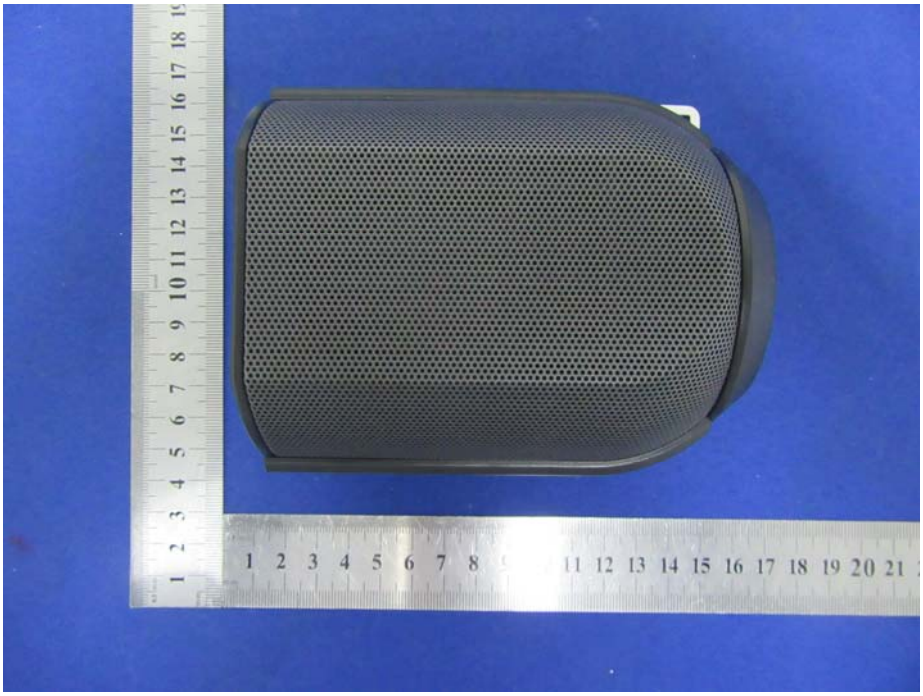
**Conducted Emission**

## Radiated Measurement Photos



# 16. EUT PHOTOGRAPHS



**※※※※※ END OF REPORT ※※※※※**