



TEST REPORT

APPLICANT : BLU Products, Inc.
PRODUCT NAME : Smart Phone
MODEL NAME : G71L
BRAND NAME : BLU
FCC ID : YHLBLUG71L
STANDARD(S) : 47 CFR Part 15 Subpart C
RECEIPT DATE : 2021-12-27
TEST DATE : 2021-12-31 to 2022-01-23
ISSUE DATE : 2022-01-24

Edited by: Zeng Xiaoying
Zeng Xiaoying (Rapporteur)
Approved by: Shen Junsheng
Shen Junsheng (Supervisor)

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| Change History | | |
|----------------|------------|-------------------|
| Version | Date | Reason for change |
| 1.0 | 2022-01-24 | First edition |
| | | |



1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

| | |
|------------------------------|--|
| Applicant: | BLU Products, Inc. |
| Applicant Address: | 10814 NW 33rd St # 100 Doral, FL 33172,USA |
| Manufacturer: | BLU Products, Inc. |
| Manufacturer Address: | 10814 NW 33rd St # 100 Doral, FL 33172,USA |

1.2. Equipment Under Test (EUT) Description

| | | |
|-----------------------------------|--|----------------------------|
| Product Name: | Smart Phone | |
| Sample No.: | 6# | |
| Hardware Version: | V4.0 | |
| Software Version: | BLU_G0710WW_V11.0.01.01_GENERIC 16-12-2021 01:35 | |
| Equipment Type: | Bluetooth classic | |
| Bluetooth Version: | 4.2 | |
| Modulation Type: | FHSS (GFSK(1Mbps), $\pi/4$ -DQPSK(EDR 2Mbps), 8-DPSK(EDR 3Mbps)) | |
| Operating Frequency Range: | 2402MHz–2480MHz | |
| Antenna Type: | PIFA Antenna | |
| Antenna Gain: | 0.5dBi | |
| Accessory Information: | Battery | |
| | Brand Name: | BLU |
| | Model No.: | C886450500P |
| | Serial No.: | N/A |
| | Capacity: | 5000mAh |
| | Rated Voltage: | 3.85V |
| | Charge Limit: | 4.4V |
| | Manufacturer: | Hunan Gaoyuan Battery, Ltd |



| | | |
|-------------------------------|---------------|---|
| Accessory Information: | AC Adapter | |
| | Brand Name: | BLU |
| | Model No.: | UC-CR-2000 |
| | Serial No.: | N/A |
| | Rated Output: | 5.0V \pm 2A |
| | Rated Input: | 100-240V \sim 50/60Hz, 0.3A |
| | Manufacturer: | Shenzhen BaiJunda Electronics Co., Ltd. |

Note 1: We use the dedicated software to control the EUT continuous transmission.

Note 2: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

1.3. The Channel Number and Frequency

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

Note 1: The black bold channels were selected for test.



1.4. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C for the EUT FCC ID Certification:

| No. | Identity | Document Title |
|-----|----------------|-------------------------|
| 1 | 47 CFR Part 15 | Radio Frequency Devices |

Test detailed items/section required by FCC rules and results are as below:

| No. | Section | Description | Test Date | Test Engineer | Result | Method Determination /Remark |
|-----|------------------------|--|-----------------|---------------|--------|------------------------------|
| 1 | 15.203 | Antenna Requirement | N/A | N/A | PASS | No deviation |
| 2 | 15.247(a) 15.247(h) | Hopping Mechanism | N/A | N/A | PASS | No deviation |
| 3 | 15.247(a) | Number of Hopping Frequency | Jan 06, 2022 | Meng Shurui | PASS | No deviation |
| 4 | ANSI C63.10 | Duty Cycle | Jan 04, 2022 | Meng Shurui | PASS | No deviation |
| 5 | 15.247(b) | Maximum Peak Conducted Output Power | Jan 04, 2022 | Meng Shurui | PASS | No deviation |
| 6 | 15.247(b) | Maximum Average Conducted Output Power | Jan 04, 2022 | Meng Shurui | PASS | No deviation |
| 7 | 15.247(a) | 20dB Bandwidth | Jan 06, 2022 | Meng Shurui | PASS | No deviation |
| 8 | 15.247(a) | Carrier Frequency Separation | Jan 06, 2022 | Meng Shurui | PASS | No deviation |
| 9 | 15.247(a) | Time of Occupancy (Dwell time) | Jan 06, 2022 | Meng Shurui | PASS | No deviation |
| 10 | 15.247(d) | Conducted Spurious Emission | Jan 06, 2022 | Meng Shurui | PASS | No deviation |
| 11 | 15.207 | Conducted Emission | Dec 31, 2021 | Yang Lian | PASS | No deviation |
| 12 | 15.247(d) | Restricted Frequency Bands | Jan 12&19, 2022 | Yin Xiaogang | PASS | No deviation |
| 13 | 15.209, 15.247(d) | Radiated Emission | Jan 18&23, 2022 | Lin Jiayong | PASS | No deviation |



Note 1: The tests were performed according to the method of measurements prescribed in ANSI C63.10-2013, KDB558074 D01 v05r02 and DA 00-075.

Note 2: The path loss during the RF test is calibrated to correct the results by the offset setting in the test equipments. The Ref offset 1.0dB means the cable loss is 1.0dB.

Note 3: Additions to, deviation, or exclusions from the method shall be judged in the "method determination" column of add, deviate or exclude from the specific method shall be explained in the "Remark" of the above table.

Note 4: When the test result is a critical value, we will use the measurement uncertainty give the judgment result based on the 95% confidence intervals.

1.5. Environmental Conditions

During the measurement, the environmental conditions were within the listed ranges:

| | |
|-----------------------------|--------|
| Temperature (°C): | 15-35 |
| Relative Humidity (%): | 30-60 |
| Atmospheric Pressure (kPa): | 86-106 |



2.47 CFR Part 15C Requirements

2.1. Antenna Requirement

2.1.1. Applicable Standard

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

2.1.2. Test Result: Compliant

Inside of the EUT has a PIFA antenna coupled with the metal shrapnel. Please refer to the EUT internal photos.

2.2. Hopping Mechanism

2.2.1. Requirement

According to FCC §15.247(a)(1), a frequency hopping spread spectrum system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

According to FCC §15.247(h), the incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hop sets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

2.2.2. Result: Compliant

The hopping mechanism of the EUT is in compliance with the document "**Bluetooth core specification v5.1**".

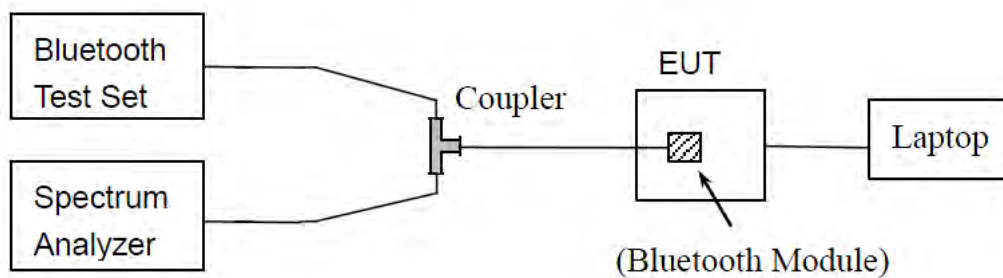
2.3. Number of Hopping Frequency

2.3.1. Requirement

According to FCC §15.247(a)(1)(iii), frequency hopping systems operating in the 2400MHz to 2483.5MHz bands shall use at least 15 hopping frequencies.

2.3.2. Test Description

Test Setup:



The Bluetooth Module of the EUT is coupled to the Spectrum Analyzer (SA) and the Bluetooth Test Set through the coupler; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

2.3.3. Test Procedure

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = the frequency band of operation

RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.

VBW \geq RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize



2.3.4. Test Result

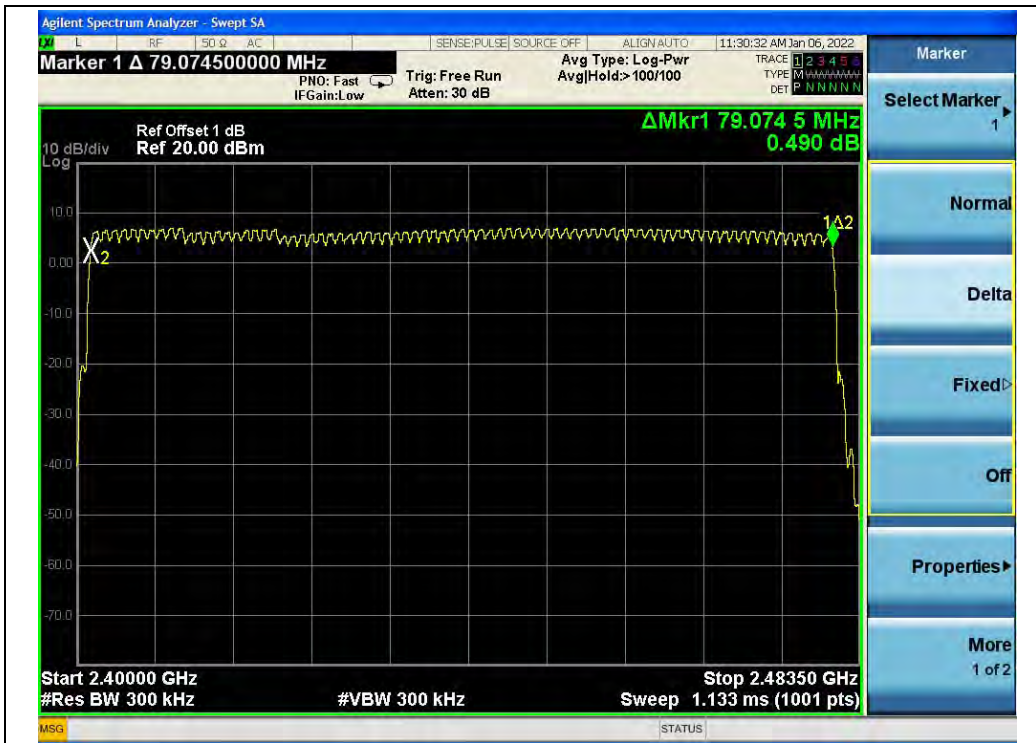
A. Test Verdict:

| Test Mode | Frequency Block (MHz) | Measured Channel Numbers | Min. Limit | Verdict |
|----------------|-----------------------|--------------------------|------------|---------|
| GFSK | 2400 - 2483.5 | 79 | 15 | PASS |
| $\pi/4$ -DQPSK | 2400 - 2483.5 | 79 | 15 | PASS |
| 8-DPSK | 2400 - 2483.5 | 79 | 15 | PASS |

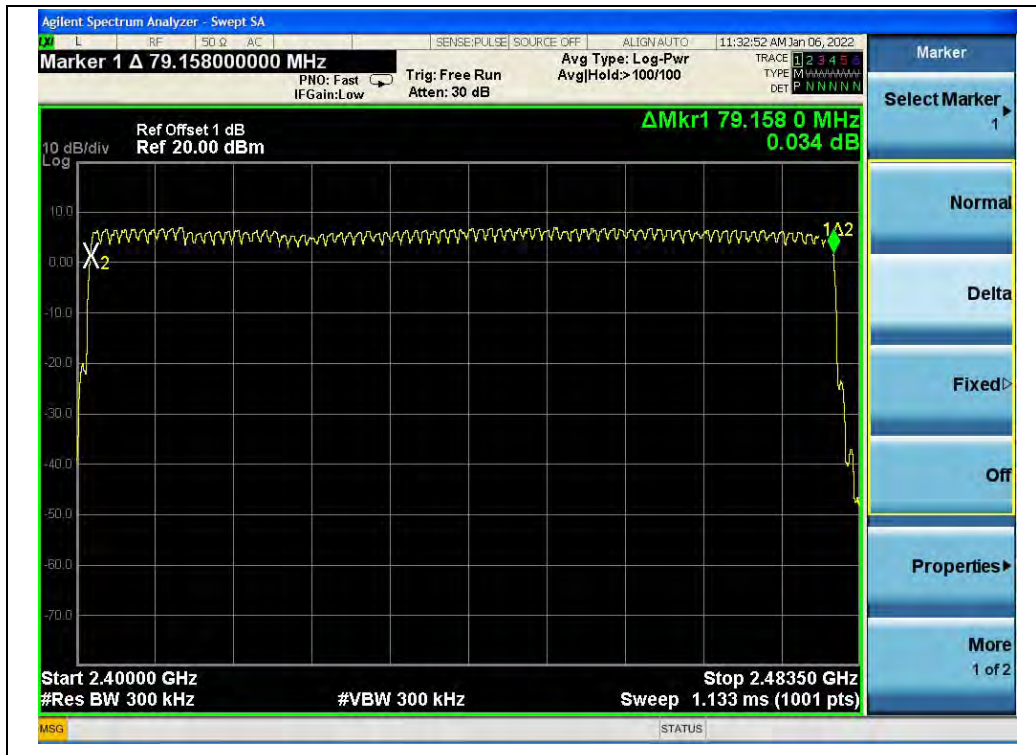
B. Test Plot:



(GFSK)



($\pi/4$ -DQPSK)



(8-DPSK)

2.4. Duty Cycle of Test Signal

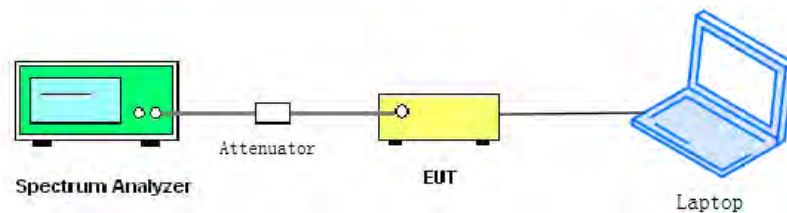
2.4.1. Requirement

Preferably, all measurements of maximum conducted (average) output power will be performed with the EUT transmitting continuously (i.e., with a duty cycle of greater than or equal to 98%). When continuous operation cannot be realized, then the use of sweep triggering/signal gating techniques can be used to ensure that measurements are made only during transmissions at the maximum power control level. Such sweep triggering/signal gating techniques will require knowledge of the minimum transmission duration (T) over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation. Sweep triggering/signal gating techniques can then be used if the measurement/sweep time of the analyzer can be set such that it does not exceed T at any time that data are being acquired (i.e., no transmitter OFF-time is to be considered).

When continuous transmission cannot be achieved and sweep triggering/signal gating cannot be implemented, alternative procedures are provided that can be used to measure the average power; however, they will require an additional measurement of the transmitter duty cycle (D). Within this sub clause, the duty cycle refers to the fraction of time over which the transmitter is ON and is transmitting at its maximum power control level. The duty cycle is considered to be constant if variations are less than $\pm 2\%$; otherwise, the duty cycle is considered to be nonconstant.

2.4.2. Test Description

Test Setup:



ANSI C63.10 2013 Clause 11.6 was used in order to prove compliance.

2.4.3. Test Result

| Test Mode | Duty Cycle (%) (D) | Duty Factor ($10 \cdot \lg[1/D]$) |
|----------------|--------------------|-------------------------------------|
| GFSK | 77.33 | 1.12 |
| $\pi/4$ -DQPSK | 76.80 | 1.15 |
| 8-DPSK | 77.33 | 1.12 |

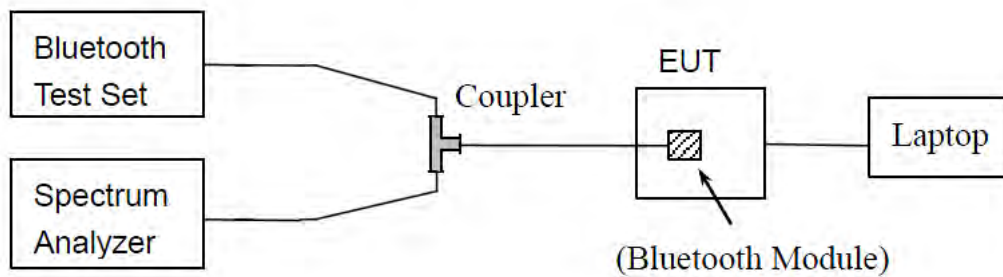
2.5. Maximum Peak Conducted Output Power

2.5.1. Requirement

According to FCC §15.247(b)(1), for frequency hopping systems that operates in the 2400MHz to 2483.5MHz band employing at least 75 hopping channels, the maximum peak output power of the intentional radiator shall not exceed 1Watt. For all other frequency hopping systems in the 2400MHz to 2483.5MHz band, it is 0.125Watts.

2.5.2. Test Description

Test Setup:



The Bluetooth Module of the EUT is coupled to the Spectrum Analyzer (SA) and the Bluetooth Test Set through the coupler; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.



2.5.3. Test Result

GFSK Mode

A. Test Verdict:

| Channel | Frequency (MHz) | Measured Output Peak Power | | Limit | | Verdict |
|---------|-----------------|----------------------------|-------|-------|-------|---------|
| | | dBm | W | dBm | W | |
| 0 | 2402 | 8.10 | 0.006 | 20.96 | 0.125 | PASS |
| 39 | 2441 | 7.76 | 0.006 | | | |
| 78 | 2480 | 6.13 | 0.004 | | | |

B. Test Plot:



(Channel 0, GFSK)



(Channel 39, GFSK)



(Channel 78, GFSK)



$\pi/4$ -DQPSK Mode

A. Test Verdict:

| Channel | Frequency (MHz) | Measured Output Peak Power | | Limit | | Verdict |
|---------|-----------------|----------------------------|-------|-------|-------|---------|
| | | dBm | W | dBm | W | |
| 0 | 2402 | 7.51 | 0.006 | 20.96 | 0.125 | PASS |
| 39 | 2441 | 7.88 | 0.006 | | | PASS |
| 78 | 2480 | 6.59 | 0.005 | | | PASS |

B. Test Plot:



(Channel 0, $\pi/4$ -DQPSK)



(Channel 39, $\pi/4$ -DQPSK)



(Channel 78, $\pi/4$ -DQPSK)

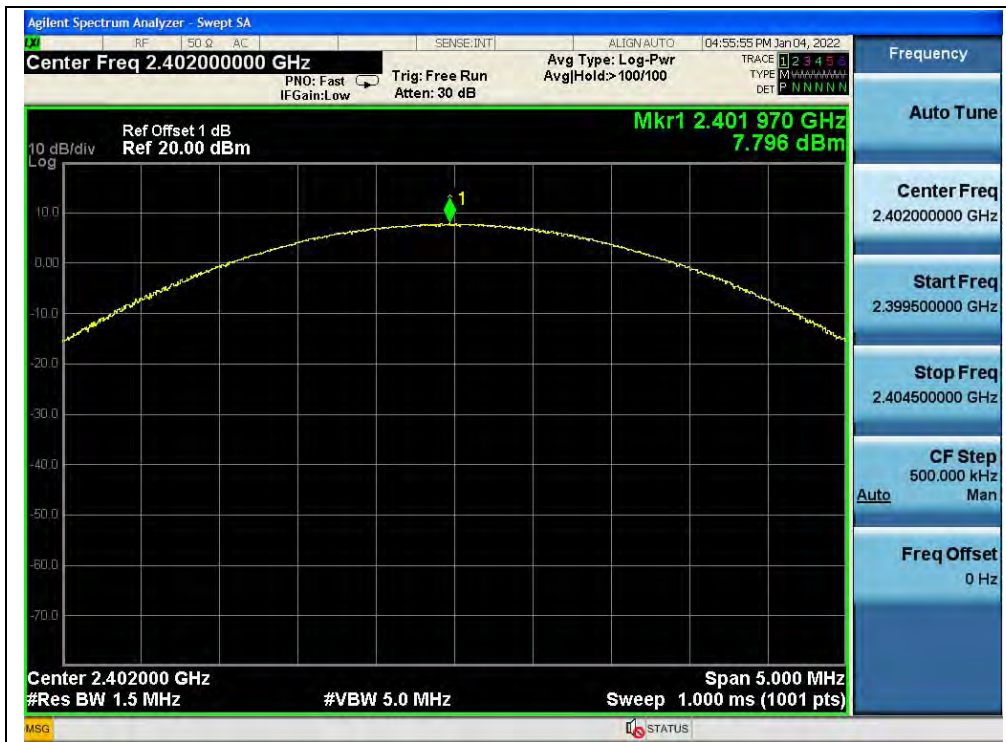


8-DPSK Mode

A. Test Verdict:

| Channel | Frequency (MHz) | Measured Output Peak Power | | Limit | | Verdict |
|---------|-----------------|----------------------------|--------------|-------|-------|---------|
| | | dBm | W | dBm | W | |
| 0 | 2402 | 7.80 | 0.006 | 20.96 | 0.125 | PASS |
| 39 | 2441 | 8.20 | 0.007 | | | PASS |
| 78 | 2480 | 6.90 | 0.005 | | | PASS |

B. Test Plot:



(Channel 0, 8-DPSK)



(Channel 39, 8-DPSK)



(Channel 78, 8-DPSK)

2.6. Maximum Average Conducted Output Power

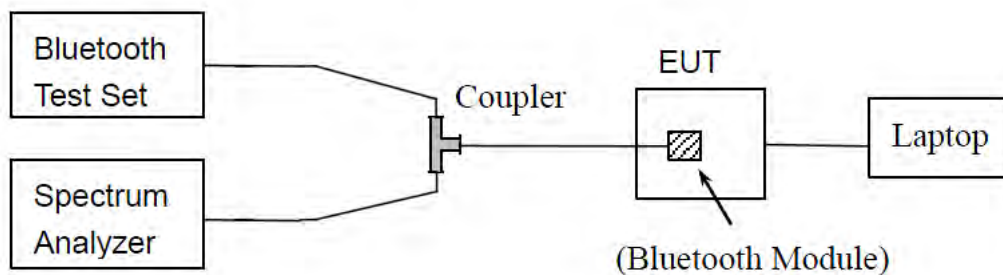
2.6.1. Requirement

According to FCC §15.247(b), for frequency hopping systems that operates in the 2400MHz to 2483.5MHz band employing at least 75 hopping channels, the maximum average output power of the intentional radiator shall not exceed 1Watt. For all other frequency hopping systems in the 2400MHz to 2483.5MHz band, it is 0.125Watts.

2.6.2. Test Description

The measured output power was calculated by the reading of the USB Wideband Power Sensor and calibration.

Test Setup:



The Bluetooth Module of the EUT is coupled to the Spectrum Analyzer (SA) and the Bluetooth Test Set through the coupler; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.



2.6.3. Test Result

GFSK Mode

| Channel | Frequency (MHz) | Measured | Average Power | | | Limit | | Verdict |
|---------|-----------------|----------|---------------|------------------------|--------------|-------|-------|---------|
| | | | Duty Factor | Duty Factor Calculated | | dBm | W | |
| | | dBm | dBm | W | | | | |
| 0 | 2402 | 6.73 | 1.12 | 7.85 | 0.006 | 20.96 | 0.125 | PASS |
| 39 | 2441 | 6.39 | | 7.51 | 0.006 | | | PASS |
| 78 | 2480 | 4.78 | | 5.90 | 0.004 | | | PASS |

$\pi/4$ -DQPSK Mode

| Channel | Frequency (MHz) | Measured | Average Power | | | Limit | | Verdict |
|---------|-----------------|----------|---------------|------------------------|-------|-------|-------|---------|
| | | | Duty Factor | Duty Factor Calculated | | dBm | W | |
| | | dBm | dBm | W | | | | |
| 0 | 2402 | 3.50 | 1.15 | 4.65 | 0.003 | 20.96 | 0.125 | PASS |
| 39 | 2441 | 3.66 | | 4.81 | 0.003 | | | PASS |
| 78 | 2480 | 2.69 | | 3.84 | 0.002 | | | PASS |

8-DPSK Mode

| Channel | Frequency (MHz) | Measured | Average Power | | | Limit | | Verdict |
|---------|-----------------|----------|---------------|------------------------|-------|-------|-------|---------|
| | | | Duty Factor | Duty Factor Calculated | | dBm | W | |
| | | dBm | dBm | W | | | | |
| 0 | 2402 | 3.40 | 1.12 | 4.52 | 0.003 | 20.96 | 0.125 | PASS |
| 39 | 2441 | 3.73 | | 4.85 | 0.003 | | | PASS |
| 78 | 2480 | 2.71 | | 3.83 | 0.002 | | | PASS |

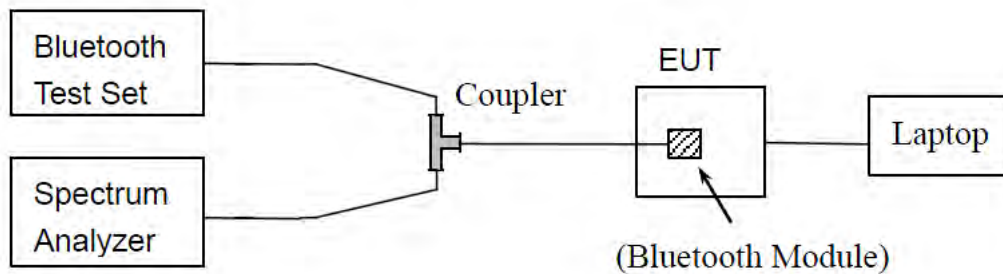
2.7. 20 dB Bandwidth

2.7.1. Definition

According to FCC §15.247(a)(1), the 20 dB bandwidth is known as the 99% emission bandwidth, or 20 dB bandwidth ($10 \cdot \log 1\% = 20$ dB) taking the total RF output power.

2.7.2. Test Description

Test Setup:



The Bluetooth Module of the EUT is coupled to the Spectrum Analyzer (SA) and the Bluetooth Test Set through the coupler; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

2.7.3. Test Procedure

Use the following spectrum analyzer settings:

Span = between 2 to 5 times the OBW, centered on the test channel

RBW= 1% to 5% of the OBW

VBW $\geq 3 \times$ RBW

Sweep = auto

Detector function = peak

Trace = max hold



2.7.4. Test Result

GFSK Mode

A. Test Verdict:

| Channel | Frequency (MHz) | 20 dB Bandwidth (MHz) | Result |
|---------|-----------------|-----------------------|--------|
| 0 | 2402 | 0.943 | PASS |
| 39 | 2441 | 0.942 | PASS |
| 78 | 2480 | 0.943 | PASS |

B. Test Plot:



(Channel 0, GFSK)



(Channel 39, GFSK)



(Channel 78, GFSK)

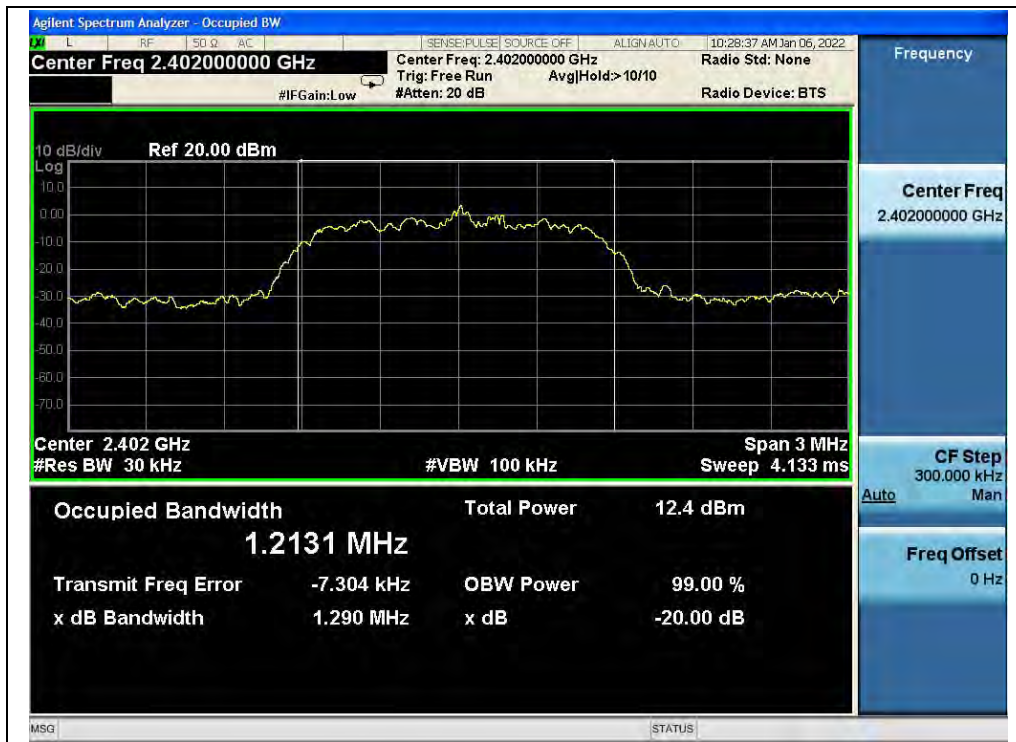


$\pi/4$ -DQPSK Mode

A. Test Verdict:

| Channel | Frequency (MHz) | 20dB Bandwidth (MHz) | Result |
|---------|-----------------|----------------------|--------|
| 0 | 2402 | 1.290 | PASS |
| 39 | 2441 | 1.285 | PASS |
| 78 | 2480 | 1.286 | PASS |

B. Test Plot:



(Channel 0, $\pi/4$ -DQPSK)



(Channel 39, $\pi/4$ -DQPSK)



(Channel 78, $\pi/4$ -DQPSK)



8-DPSK Mode

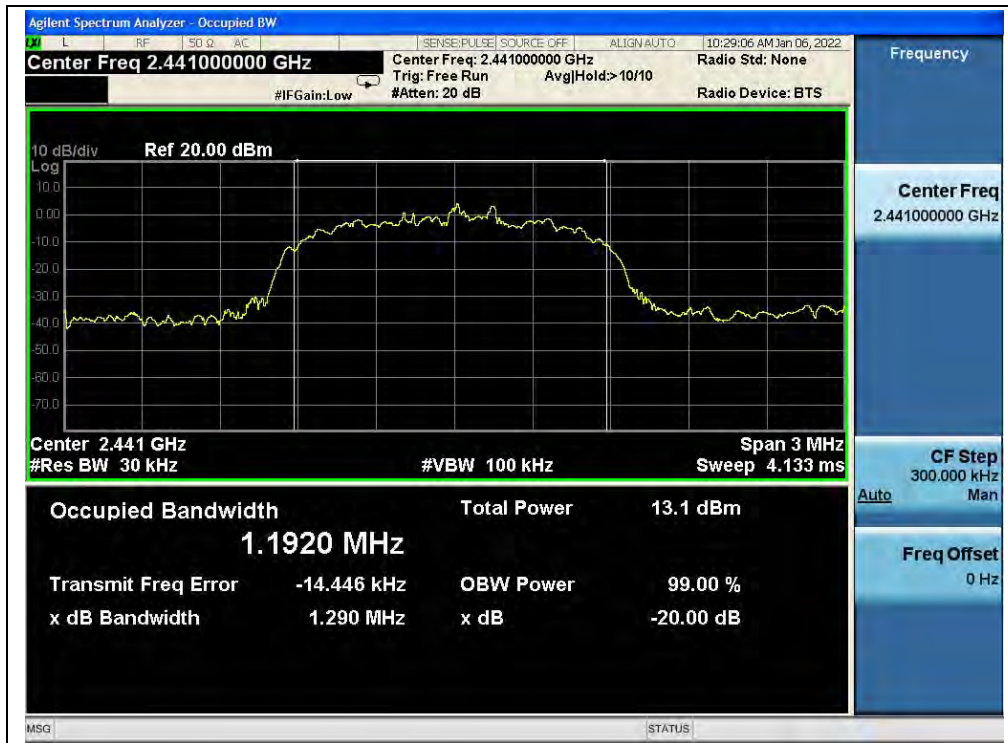
A. Test Verdict:

| Channel | Frequency (MHz) | 20dB Bandwidth (MHz) | Result |
|---------|-----------------|----------------------|--------|
| 0 | 2402 | 1.292 | PASS |
| 39 | 2441 | 1.290 | PASS |
| 78 | 2480 | 1.292 | PASS |

B. Test Plot:



(Channel 0, 8-DPSK)



(Channel 39, 8-DPSK)



(Channel 78, 8-DPSK)

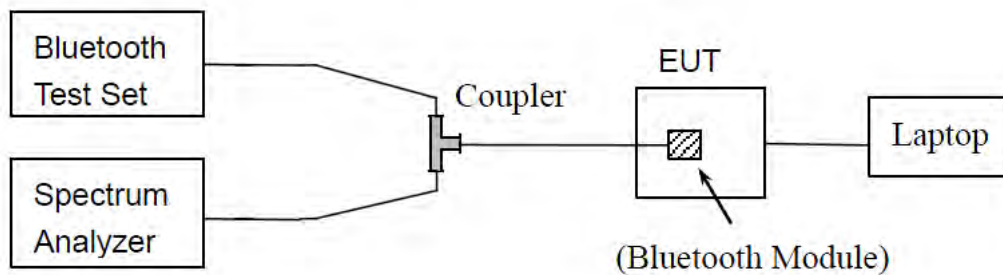
2.8. Carried Frequency Separation

2.8.1. Definition

According to FCC §15.247(a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater.

2.8.2. Test Description

Test Setup:



The Bluetooth Module of the EUT is coupled to the Spectrum Analyzer (SA) and the Bluetooth Test Set through the coupler; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

2.8.3. Test Procedure

The EUT must have its hopping function enabled. According to DA 00-705, use the following spectrum analyzer settings:

Span = wide enough to capture the peaks of two adjacent channels

Resolution (or IF) Bandwidth (RBW) \geq 1% of the span

Video (or Average) Bandwidth (VBW) \geq RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.



2.8.4. Test Result

A. Test Verdict:

| Test Mode | Measured Channel Numbers | Carried Frequency Separation (MHz) | 20 dB Bandwidth (MHz) | Min. Limit | Verdict |
|----------------|--------------------------|------------------------------------|-----------------------|---------------------------------|---------|
| GFSK | 39 and 40 | 0.972 | 0.943 | two-thirds of the 20dBbandwidth | PASS |
| $\pi/4$ -DQPSK | 39 and 40 | 1.005 | 1.290 | | PASS |
| 8-DPSK | 39 and 40 | 1.164 | 1.292 | | PASS |

B. Test Plot:



(GFSK)



($\pi/4$ -DQPSK)



(8-DPSK)

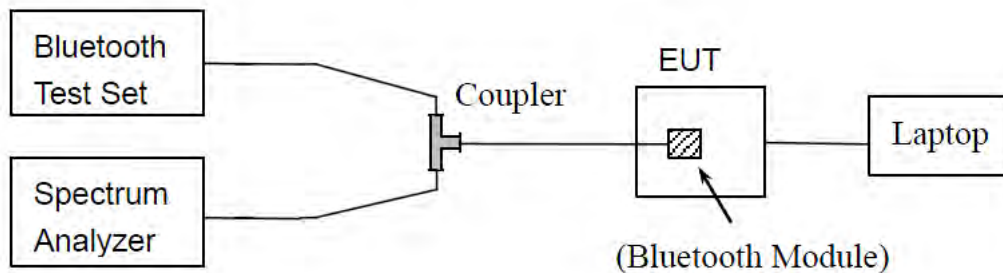
2.9. Time of Occupancy (Dwell time)

2.9.1. Requirement

According to FCC §15.247(a) (1) (iii), frequency hopping systems in the 2400 - 2483.5MHz band shall use at least 15 non-overlapping 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.

2.9.2. Test Description

Test Setup:



The Bluetooth Module of the EUT is coupled to the Spectrum Analyzer (SA) and the Bluetooth Test Set through the coupler; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

2.9.3. Test Procedure

Normal Mode:

DH1: Dwell time equal to Pulse time (ms) * (1600 / 2 / 79) * 31.6 Millisecond
DH3: Dwell time equal to Pulse time (ms) * (1600 / 4 / 79) * 31.6 Millisecond
DH5: Dwell time equal to Pulse Time (ms) * (1600 / 6 / 79) * 31.6 Millisecond

AFH Mode:

DH1: Dwell time equal to Pulse time (ms) * (800 / 2 / 20) * (0.4 * 20) Millisecond
DH3: Dwell time equal to Pulse time (ms) * (800 / 4 / 20) * (0.4 * 20) Millisecond
DH5: Dwell time equal to Pulse Time (ms) * (800 / 6 / 20) * (0.4 * 20) Millisecond.



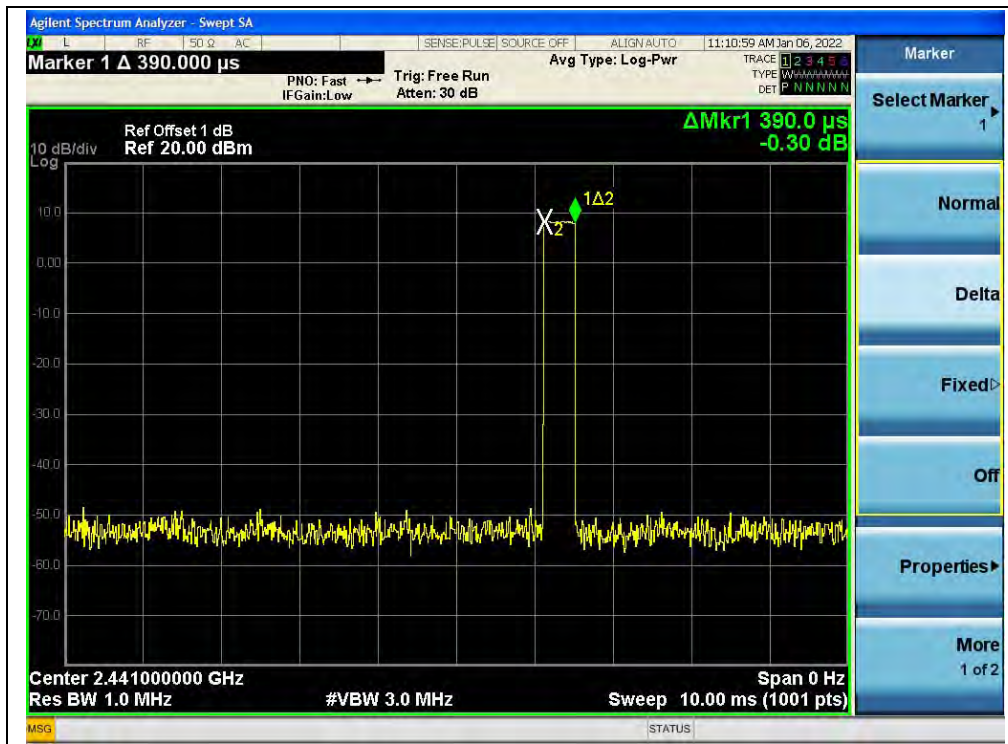
2.9.4. Test Result

GFSK Mode

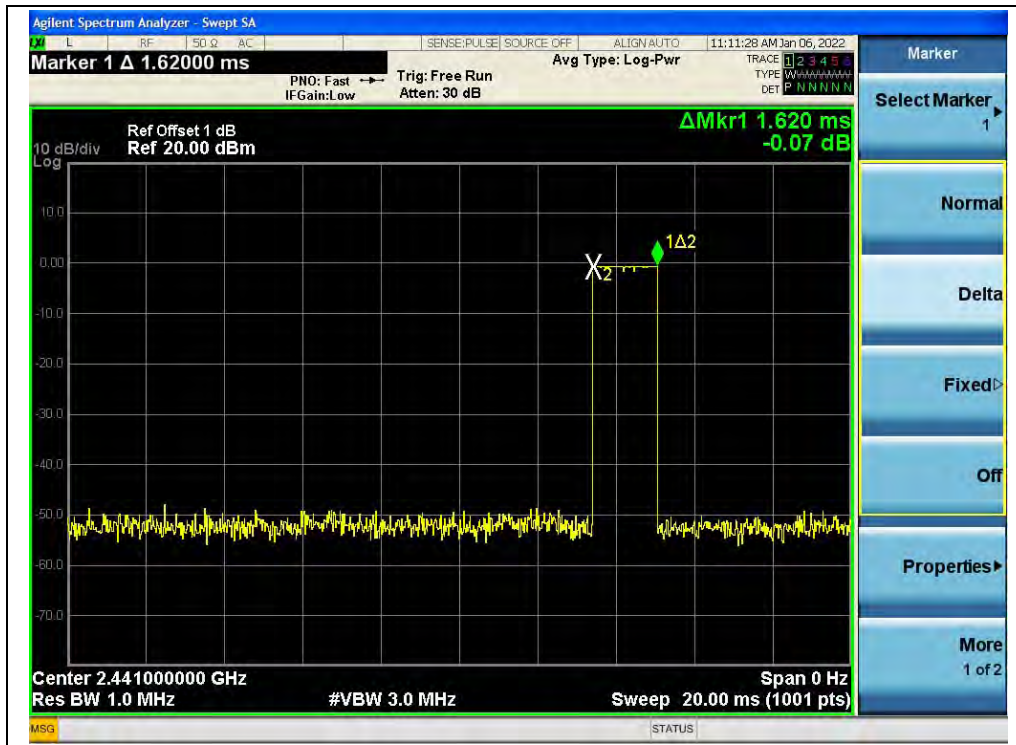
A. Test Verdict:

| DH Packet | Pulse Width (ms) | Dwell Time (ms) | | Limit (sec) | Verdict |
|-----------|------------------|-----------------|----------|-------------|---------|
| | | Normal Mode | AFH Mode | | |
| DH1 | 0.39 | 124.80 | 62.40 | 0.4 | PASS |
| DH3 | 1.62 | 259.20 | 129.60 | | PASS |
| DH5 | 2.85 | 304.00 | 152.00 | | PASS |

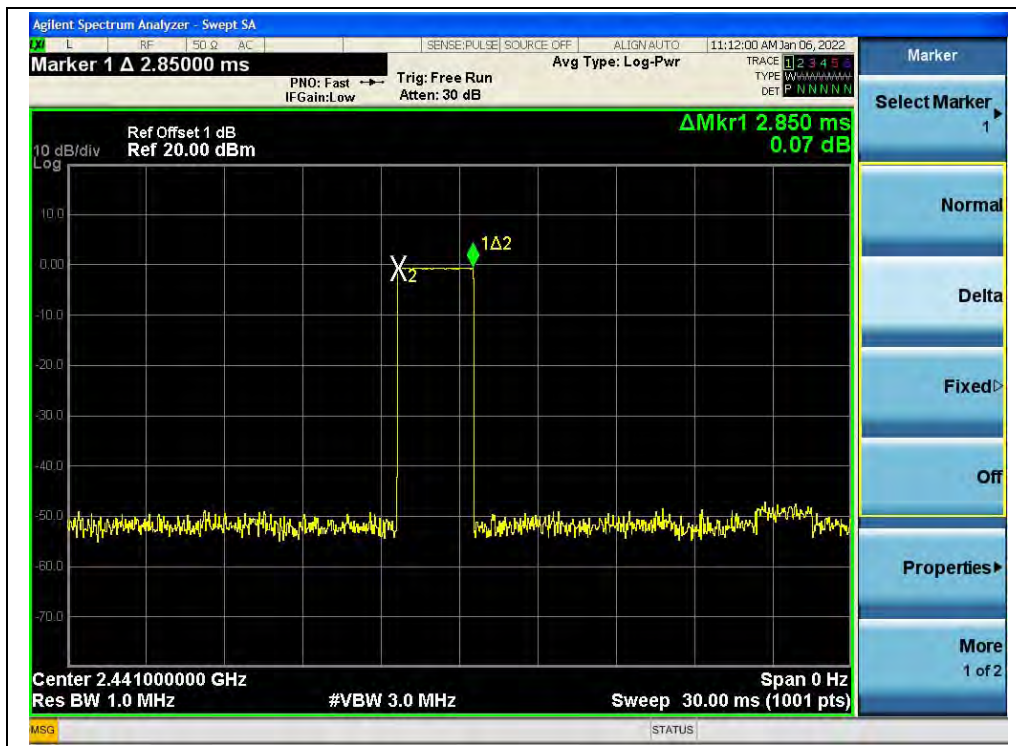
B. Test Plot:



(DH1, GFSK)



(DH3, GFSK)



(DH5, GFSK)

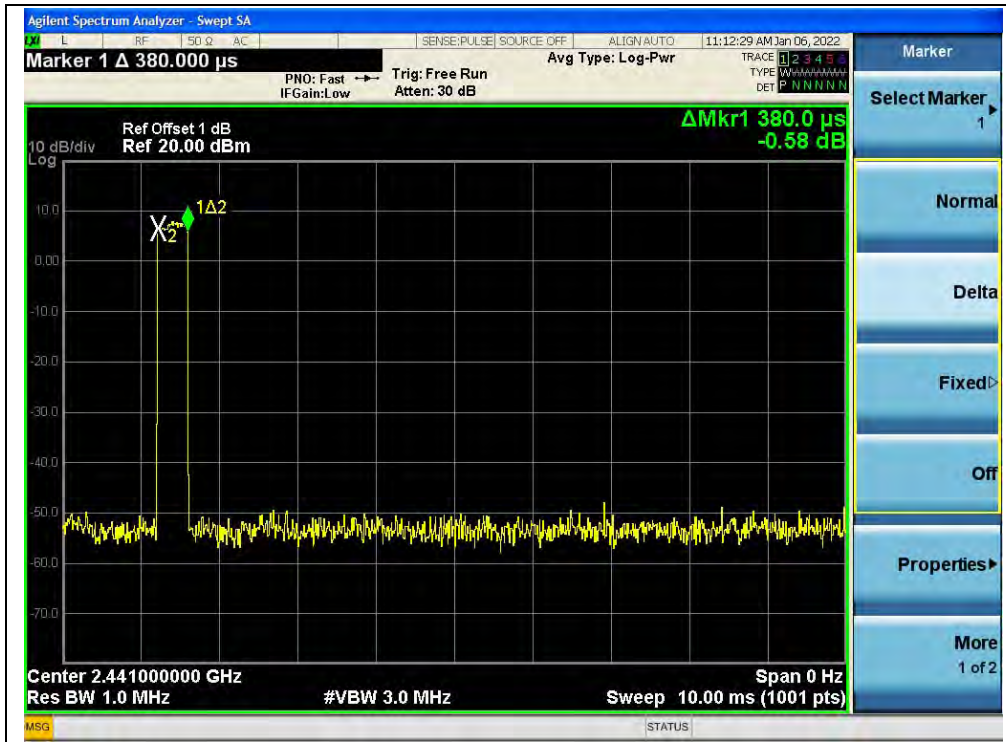


$\pi/4$ -DQPSK Mode

A. Test Verdict:

| DH Packet | Pulse Width (ms) | Dwell Time (ms) | | Limit (sec) | Verdict |
|-----------|------------------|-----------------|----------|-------------|---------|
| | | Normal Mode | AFH Mode | | |
| DH1 | 0.38 | 121.60 | 60.80 | 0.4 | PASS |
| DH3 | 1.62 | 259.20 | 129.60 | | PASS |
| DH5 | 2.88 | 307.20 | 153.60 | | PASS |

B. Test Plot:



(DH1, $\pi/4$ -DQPSK)



(DH3, $\pi/4$ -DQPSK)



(DH5, $\pi/4$ -DQPSK)



8-DPSK mode

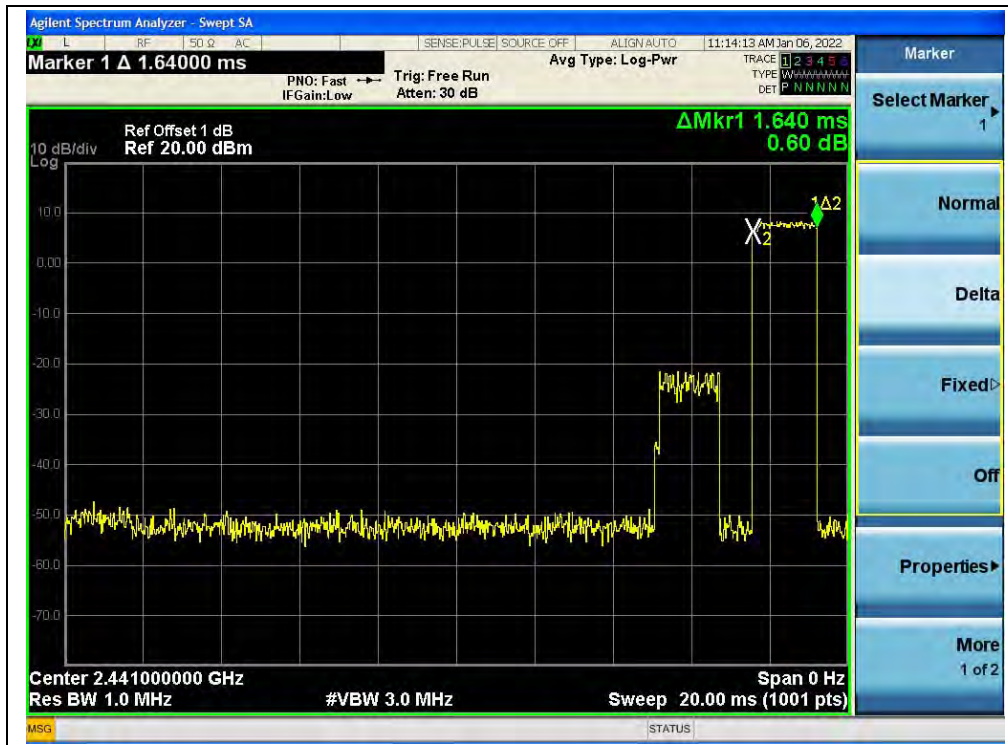
A. Test Verdict:

| DH Packet | Pulse Width (ms) | Dwell Time (ms) | | Limit (sec) | Verdict |
|-----------|------------------|-----------------|----------|-------------|---------|
| | | Normal Mode | AFH Mode | | |
| DH1 | 0.38 | 121.60 | 60.80 | 0.4 | PASS |
| DH3 | 1.64 | 262.40 | 131.20 | | PASS |
| DH5 | 2.88 | 307.20 | 153.60 | | PASS |

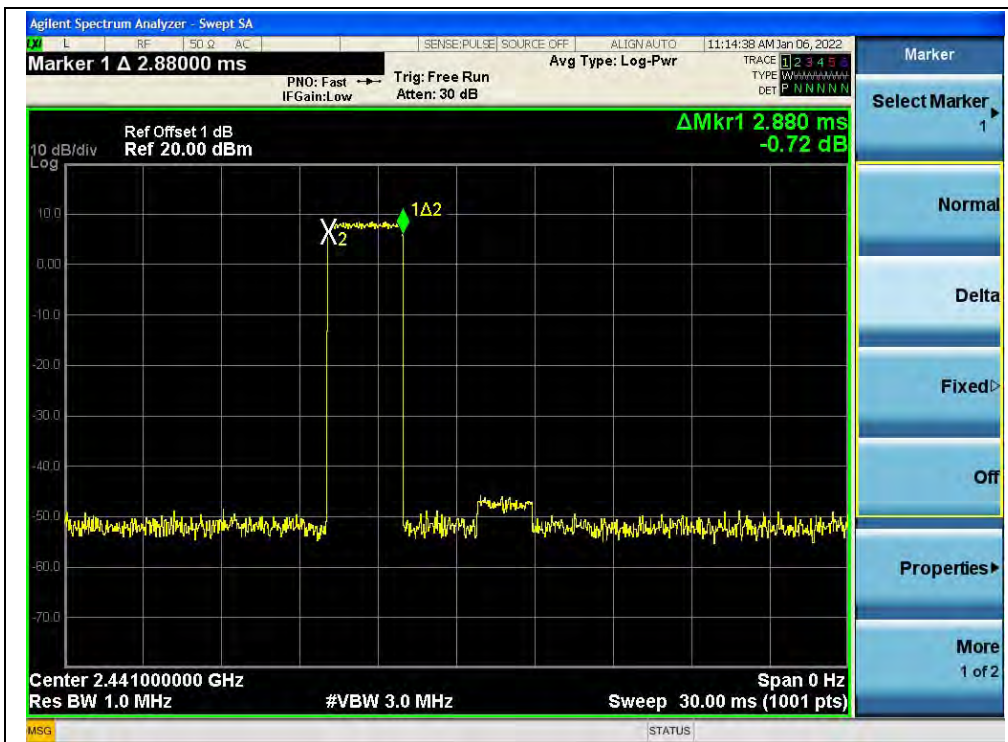
B. Test Plot:



(DH1, 8-DPSK)



(DH3, 8-DPSK)



(DH5, 8-DPSK)

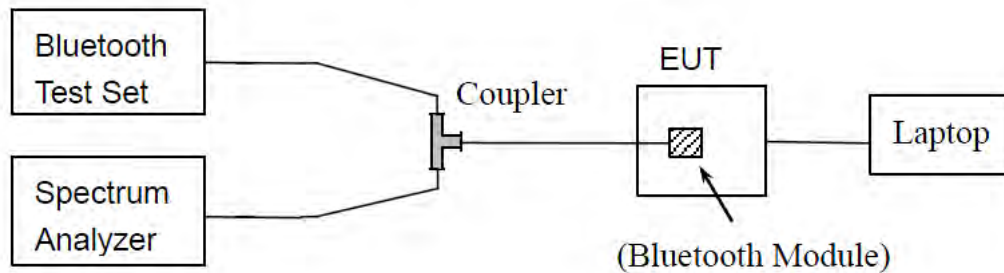
2.10. Conducted Spurious Emissions

2.10.1. Requirement

According to FCC §15.247(d), in any 100kHz 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 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

2.10.2. Test Description

Test Setup:



The Bluetooth Module of the EUT is coupled to the Spectrum Analyzer (SA) and the Bluetooth Test Set through the coupler; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

2.10.3. Test Procedure

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.

RBW = 100 kHz

VBW \geq RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize.



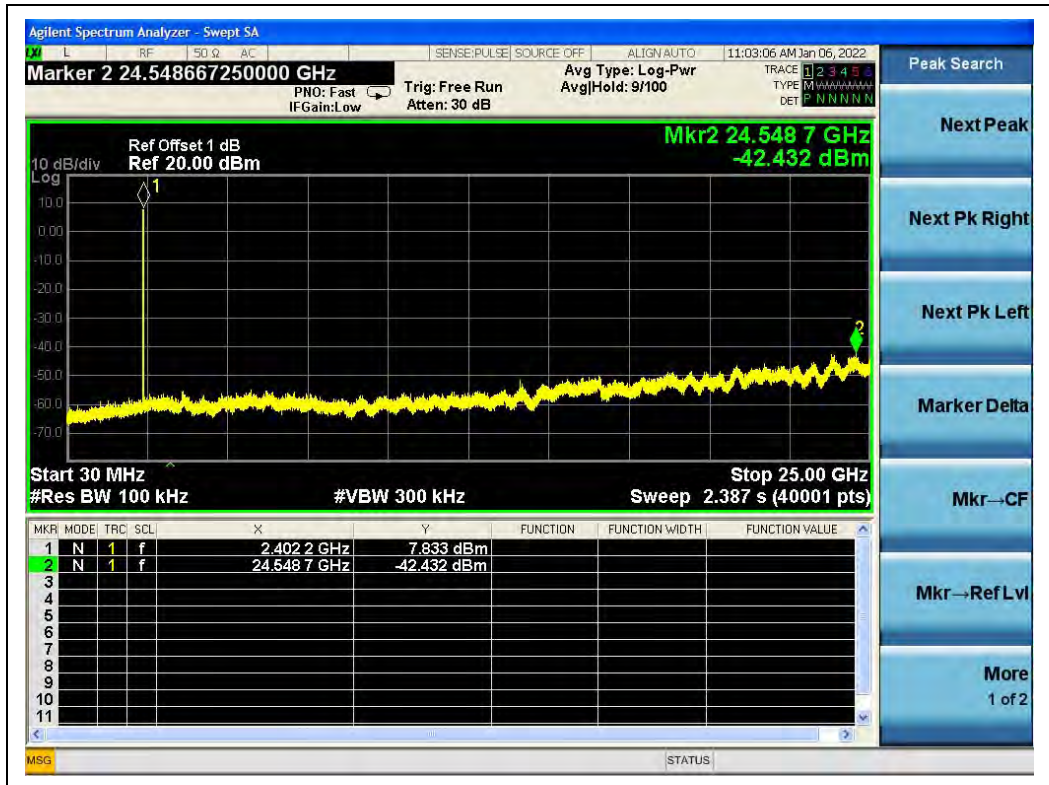
2.10.4. Test Result

GFSK Mode

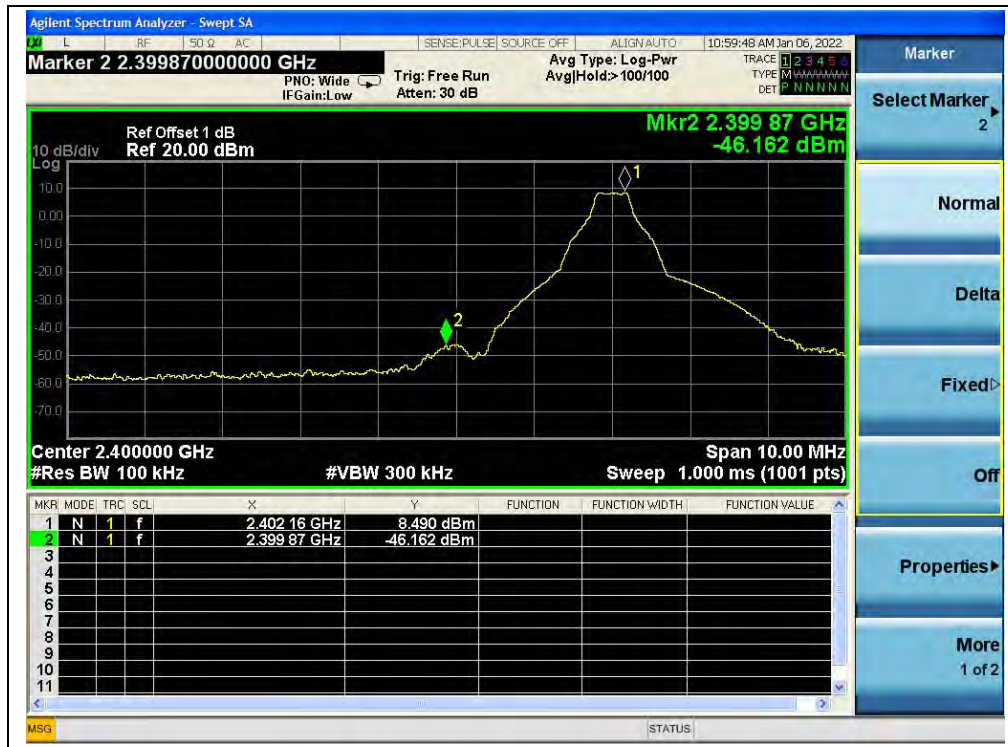
A. Test Verdict:

| Channel | Frequency (MHz) | Measured Max. Out of Band Emission (dBm) | Limit (dBm) | | Verdict |
|---------|-----------------|--|---------------|-------------------------|---------|
| | | | Carrier Level | Calculated -20dBc Limit | |
| 0 | 2402 | -42.43 | 7.83 | -12.17 | PASS |
| 39 | 2441 | -42.95 | 7.86 | -12.14 | PASS |
| 78 | 2480 | -42.57 | 6.13 | -13.87 | PASS |

B. Test Plot:



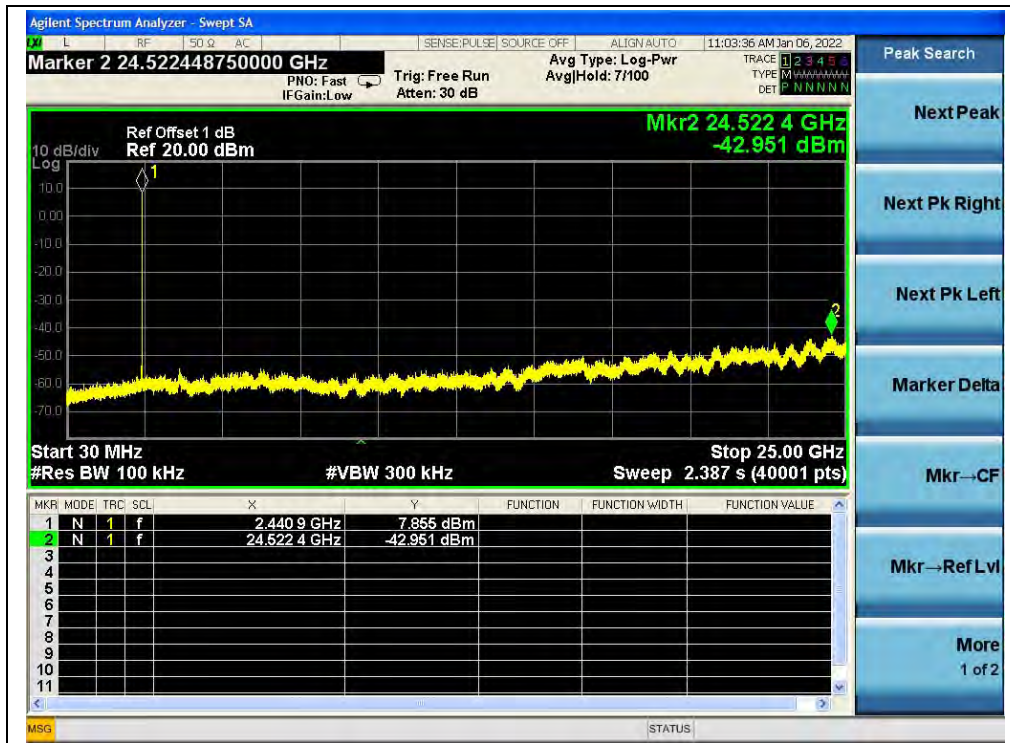
(30MHz to 25GHz, Channel 0, GFSK)



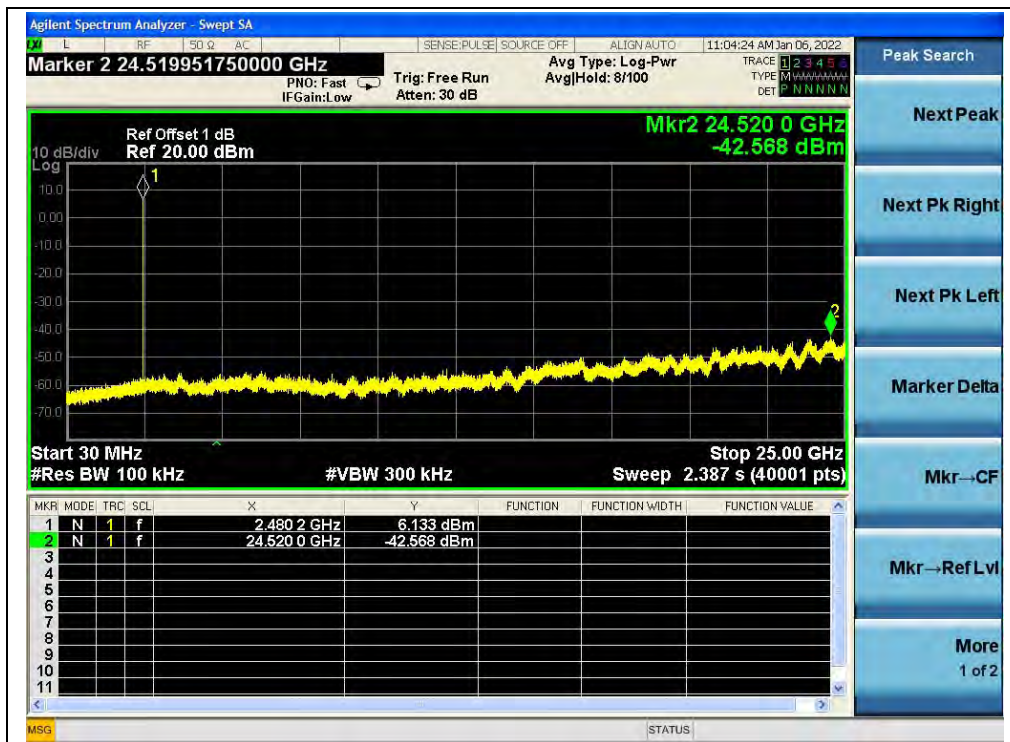
(Band edge, Channel 0, GFSK)



(Band edge with hopping on, Channel 0, GFSK)



(30MHz to 25GHz, Channel 39, GFSK)



(30MHz to 25GHz, Channel 78, GFSK)



(Band edge, Channel 78, GFSK)



(Band edge with hopping on, Channel 78, GFSK)

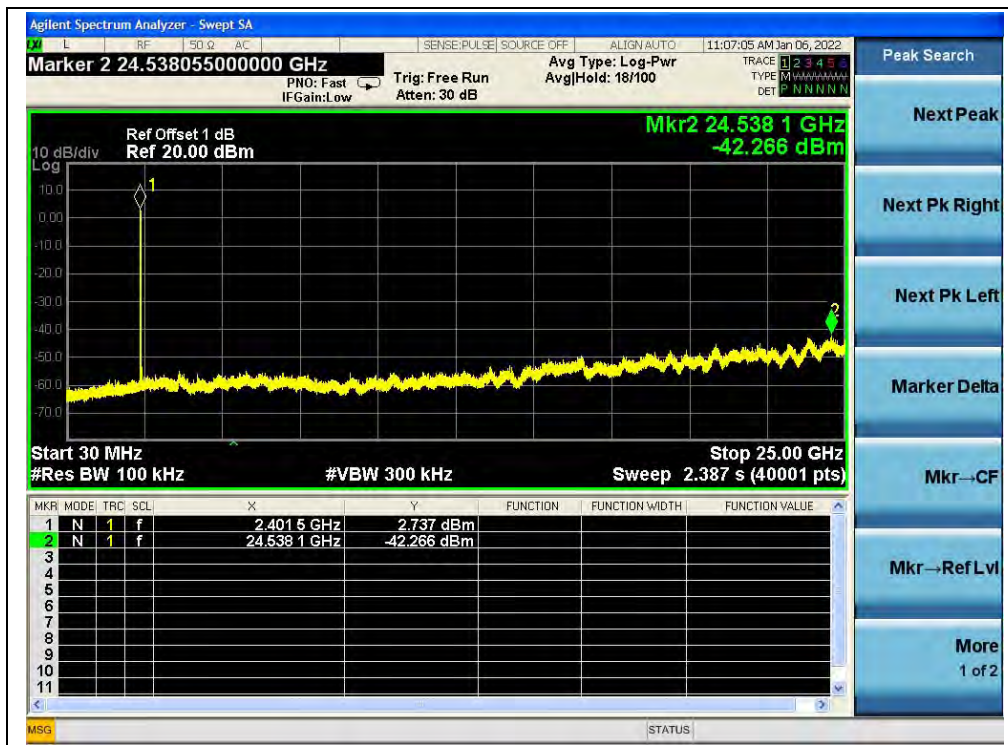


$\pi/4$ -DQPSK Mode

A. Test Verdict:

| Channel | Frequency (MHz) | Measured Max. Out of Band Emission (dBm) | Limit (dBm) | | Verdict |
|---------|-----------------|--|---------------|-------------------------|---------|
| | | | Carrier Level | Calculated -20dBc Limit | |
| 0 | 2402 | -42.27 | 2.74 | -17.26 | PASS |
| 39 | 2441 | -43.02 | 3.42 | -16.58 | PASS |
| 78 | 2480 | -42.34 | 1.59 | -18.41 | PASS |

B. Test Plot:



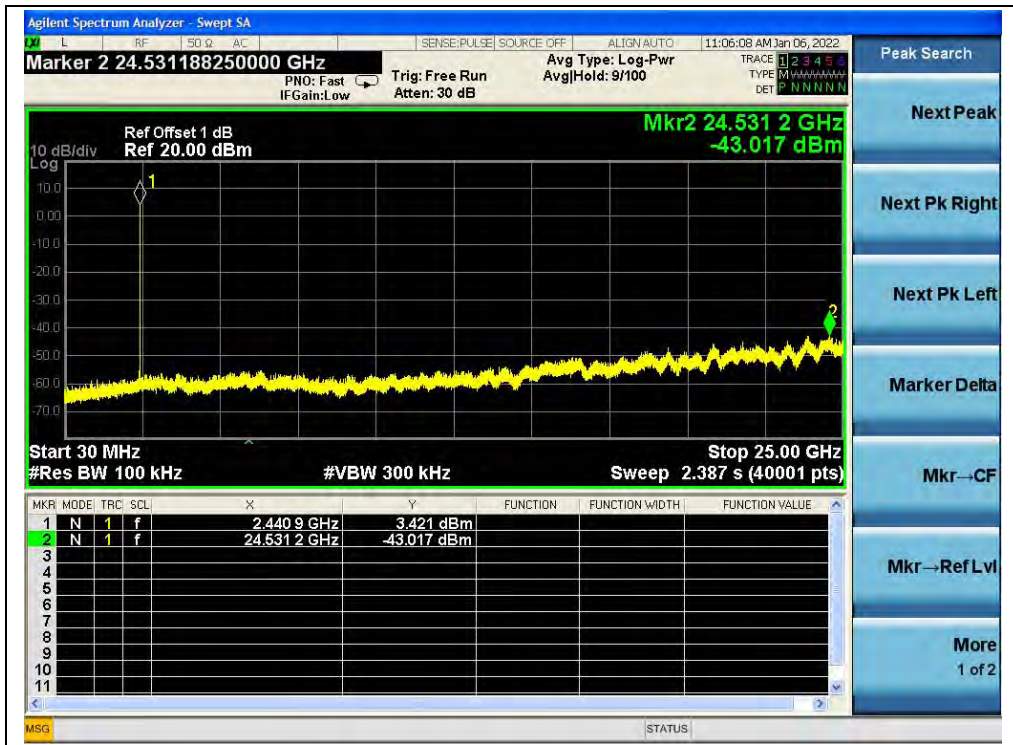
(30MHz to 25GHz, Channel 0, $\pi/4$ -DQPSK)



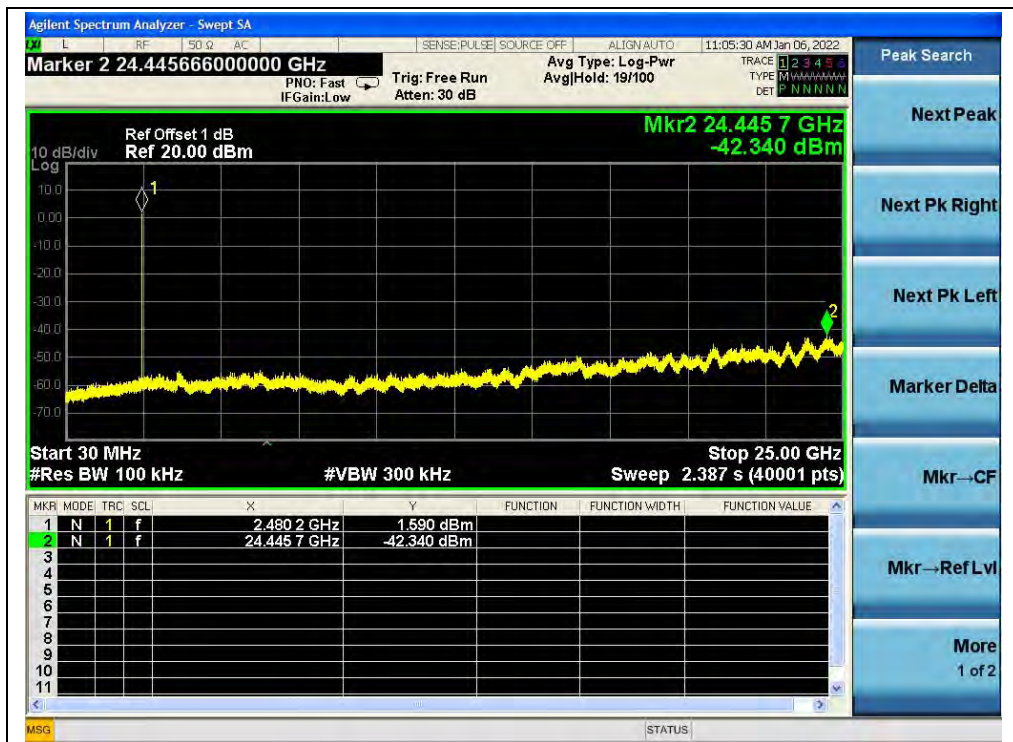
(Band edge, Channel 0, $\pi/4$ -DQPSK)



(Band edge with hopping on, Channel 0, $\pi/4$ -DQPSK)



(30MHz to 25GHz, Channel 39, $\pi/4$ -DQPSK)



(30MHz to 25GHz, Channel 78, $\pi/4$ -DQPSK)



(Band edge, Channel 78, $\pi/4$ -DQPSK)



(Band edge with hopping on, Channel 78, $\pi/4$ -DQPSK)

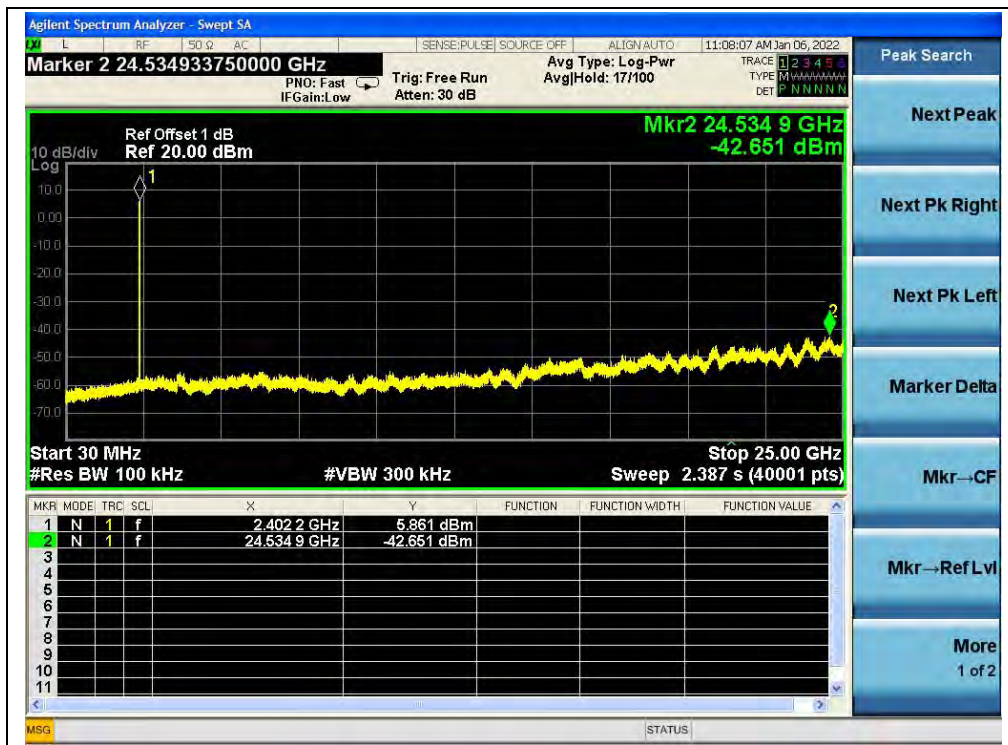


8-DPSK Mode

A. Test Verdict:

| Channel | Frequency (MHz) | Measured Max. Out of Band Emission (dBm) | Limit (dBm) | | Verdict |
|---------|-----------------|--|---------------|-------------------------|---------|
| | | | Carrier Level | Calculated -20dBc Limit | |
| 0 | 2402 | -42.65 | 5.86 | -14.14 | PASS |
| 39 | 2441 | -43.16 | 5.22 | -14.78 | PASS |
| 78 | 2480 | -42.71 | 2.51 | -17.49 | PASS |

B. Test Plot:



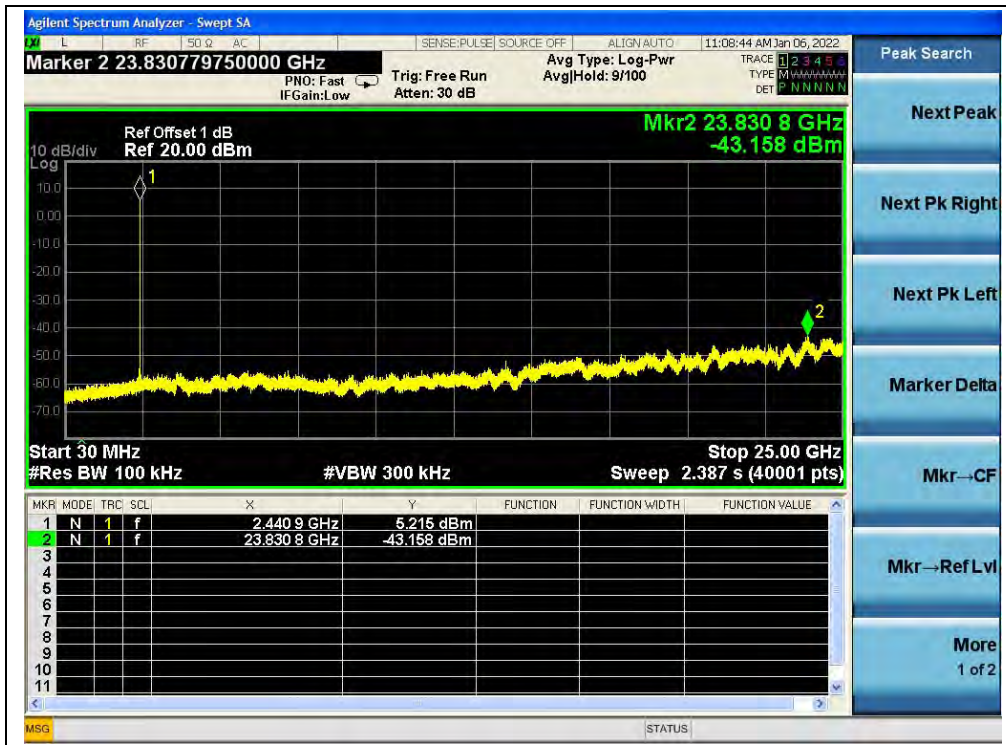
(30MHz to 25GHz, Channel 0, 8-DPSK)



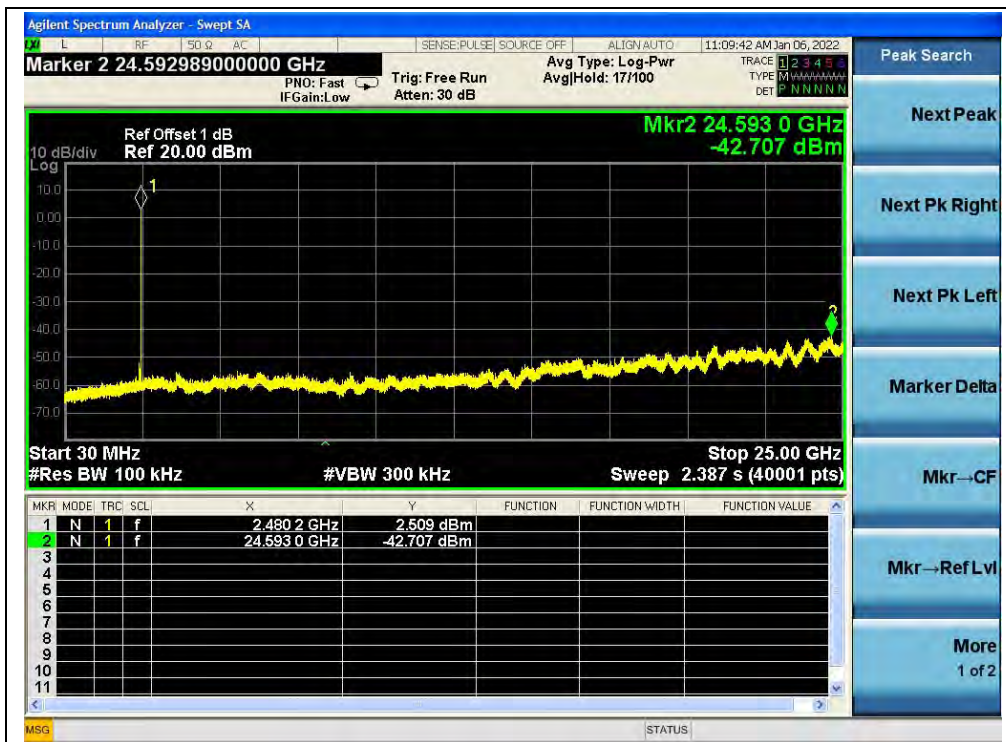
(Band edge, Channel 0, 8-DPSK)



(Band edge with hopping on, Channel 0, 8-DPSK)



(30MHz to 25GHz, Channel 39, 8-DPSK)



(30MHz to 25GHz, Channel 78, 8-DPSK)



(Band edge, Channel 78, 8-DPSK)



(Band edge with hopping on, Channel 78, 8-DPSK)

2.11. Conducted Emission

2.11.1. Requirement

According to FCC section 15.207, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 Ω line impedance stabilization network (LISN).

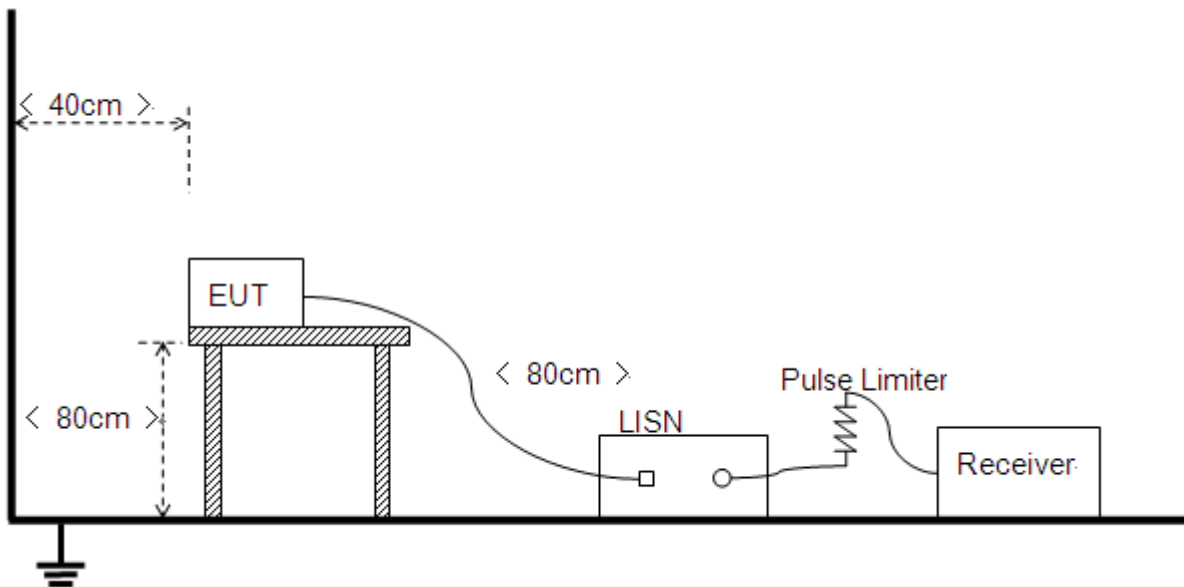
| Frequency Range (MHz) | Conducted Limit (dB μ V) | |
|-----------------------|------------------------------|----------|
| | Quai-peak | Average |
| 0.15 - 0.50 | 66 to 56 | 56 to 46 |
| 0.50 - 5 | 56 | 46 |
| 5- 30 | 60 | 50 |

Note:

- (a) The lower limit shall apply at the band edges.
- (b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

2.11.2. Test Description

Test Setup:



The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.10: 2013.



2.11.3. Test Result

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Set RBW=9kHz, VBW=30kHz. Refer to recorded points and plots below.

Note: Both of the test voltage AC 120V/60Hz and AC 230V/50Hz were considered and tested respectively, only the results of the worst case AC 120V/60Hz were recorded in this report.

A. Test Setup:

Test Mode: EUT+Adapter+Earphone+ BT TX

Test Voltage: AC 120V/60Hz

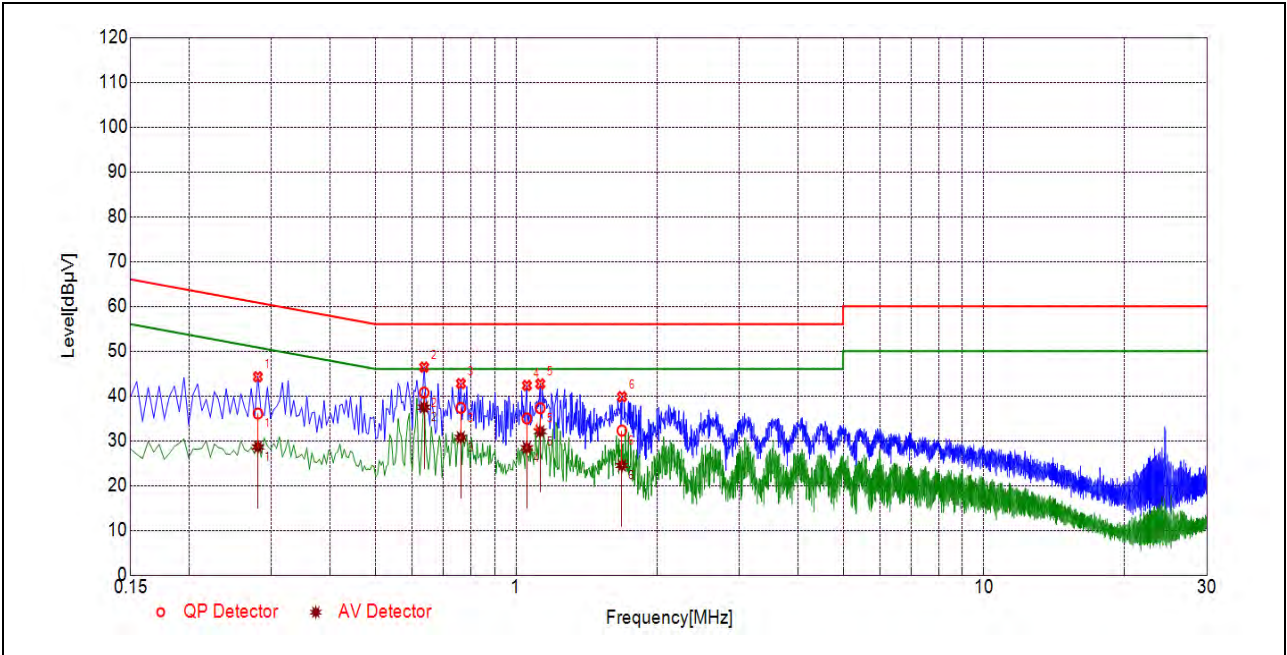
The measurement results are obtained as below:

$$E \text{ [dB}\mu\text{V]} = U_R + L_{\text{Cable loss}} \text{ [dB]} + A_{\text{Factor}}$$

U_R : Receiver Reading

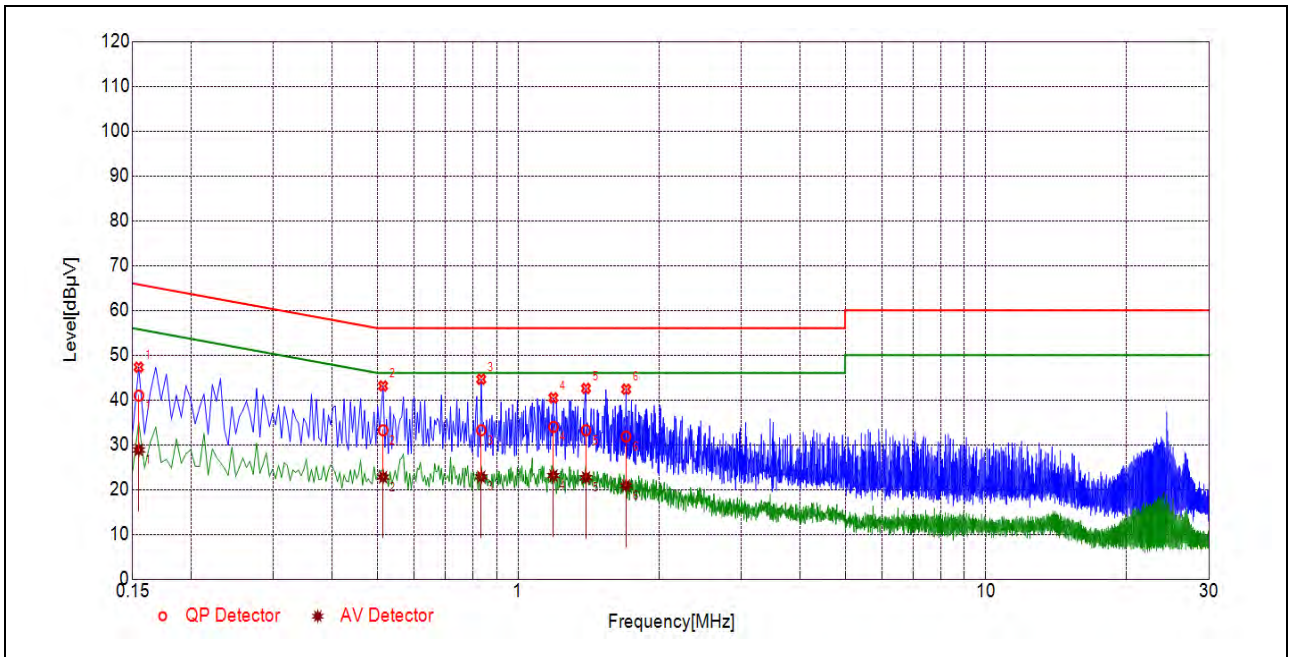
A_{Factor} : Voltage division factor of LISN

B. Test Plot:



(L Phase)

| No. | Fre. (MHz) | Emission Level (dBµV) | | Limit (dBµV) | | Power-line | Verdict |
|-----|------------|-----------------------|---------|--------------|---------|------------|---------|
| | | Quai-peak | Average | Quai-peak | Average | | |
| 1 | 0.2806 | 36.05 | 28.60 | 60.80 | 50.80 | Line | PASS |
| 2 | 0.6358 | 40.73 | 37.47 | 56.00 | 46.00 | | PASS |
| 3 | 0.7616 | 37.33 | 30.73 | 56.00 | 46.00 | | PASS |
| 4 | 1.0539 | 34.96 | 28.40 | 56.00 | 46.00 | | PASS |
| 5 | 1.1261 | 37.25 | 32.05 | 56.00 | 46.00 | | PASS |
| 6 | 1.6828 | 32.25 | 24.47 | 56.00 | 46.00 | | PASS |



(N Phase)

| No. | Fre. (MHz) | Emission Level (dBµV) | | Limit (dBµV) | | Power-line | Verdict |
|-----|------------|-----------------------|---------|--------------|---------|------------|---------|
| | | Quai-peak | Average | Quai-peak | Average | | |
| 1 | 0.1546 | 40.95 | 28.83 | 65.75 | 55.75 | Neutral | PASS |
| 2 | 0.5144 | 33.20 | 22.75 | 56.00 | 46.00 | | PASS |
| 3 | 0.8341 | 33.23 | 22.80 | 56.00 | 46.00 | | PASS |
| 4 | 1.1900 | 33.97 | 23.09 | 56.00 | 46.00 | | PASS |
| 5 | 1.3967 | 33.22 | 22.63 | 56.00 | 46.00 | | PASS |
| 6 | 1.7009 | 31.81 | 20.87 | 56.00 | 46.00 | | PASS |

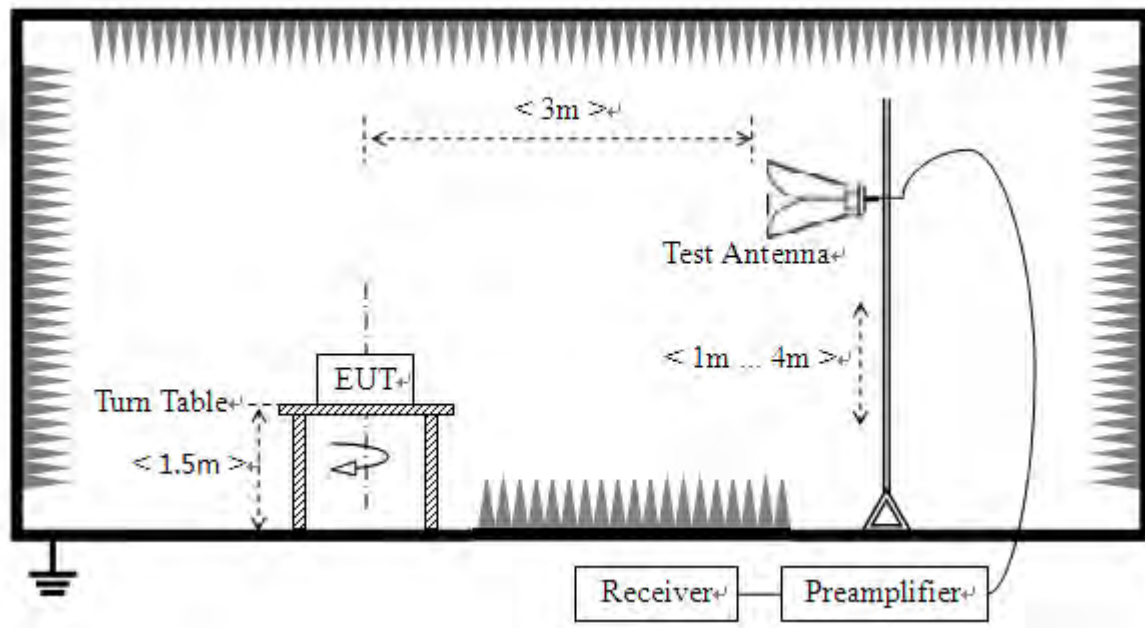
2.12. Restricted Frequency Bands

2.12.1. Requirement

According to FCC section 15.247(d), in any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, 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).

2.12.2. Test Description

Test Setup:



The EUT is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading.

For the Test Antenna:

Horn Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.



2.12.3. Test Procedure

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for $f \geq 1\text{GHz}$, 100 kHz for $f < 1\text{GHz}$

VBW = 3 MHz

Sweep = auto

Detector function = peak/average

Trace = max hold

Allow the trace to stabilize

2.12.4. Test Result

The lowest and highest channels are tested to verify Restricted Frequency Bands.

The measurement results are obtained as below:

$$E [\text{dB}\mu\text{V}/\text{m}] = U_R + A_T + A_{\text{Factor}} [\text{dB}]; AT = L_{\text{Cable loss}} [\text{dB}] - G_{\text{preamp}} [\text{dB}]$$

AT: Total correction Factor except Antenna

UR: Receiver Reading

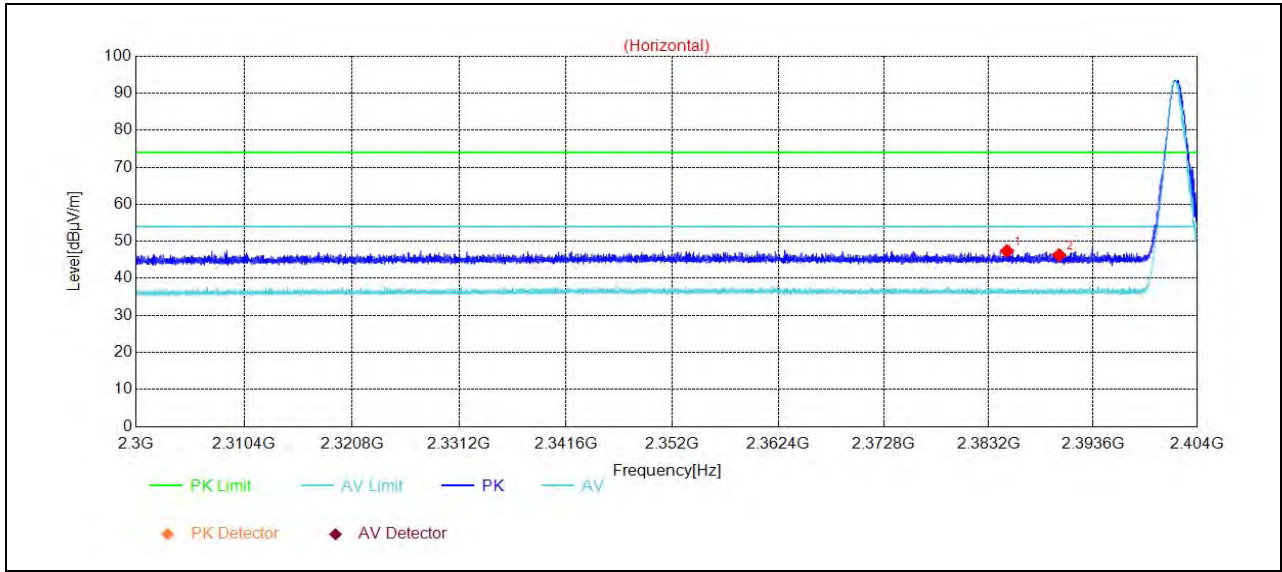
G_{preamp} : Preamplifier Gain

A_{Factor} : Antenna Factor at 3m

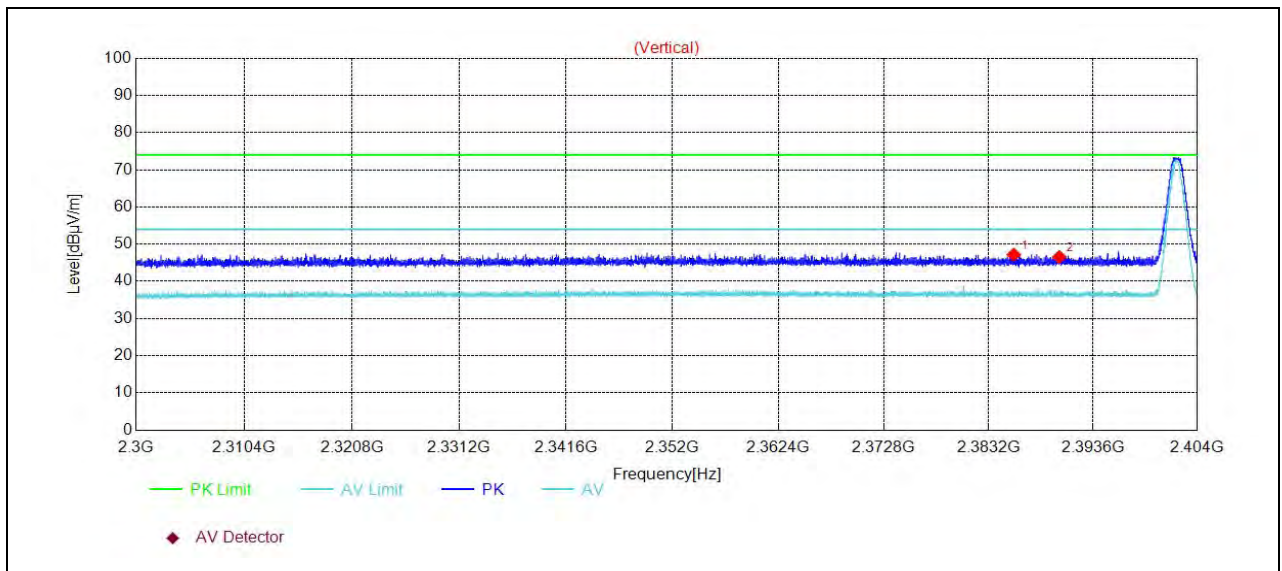
Note: The maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.



GFSK Mode, Plot for Channel 0



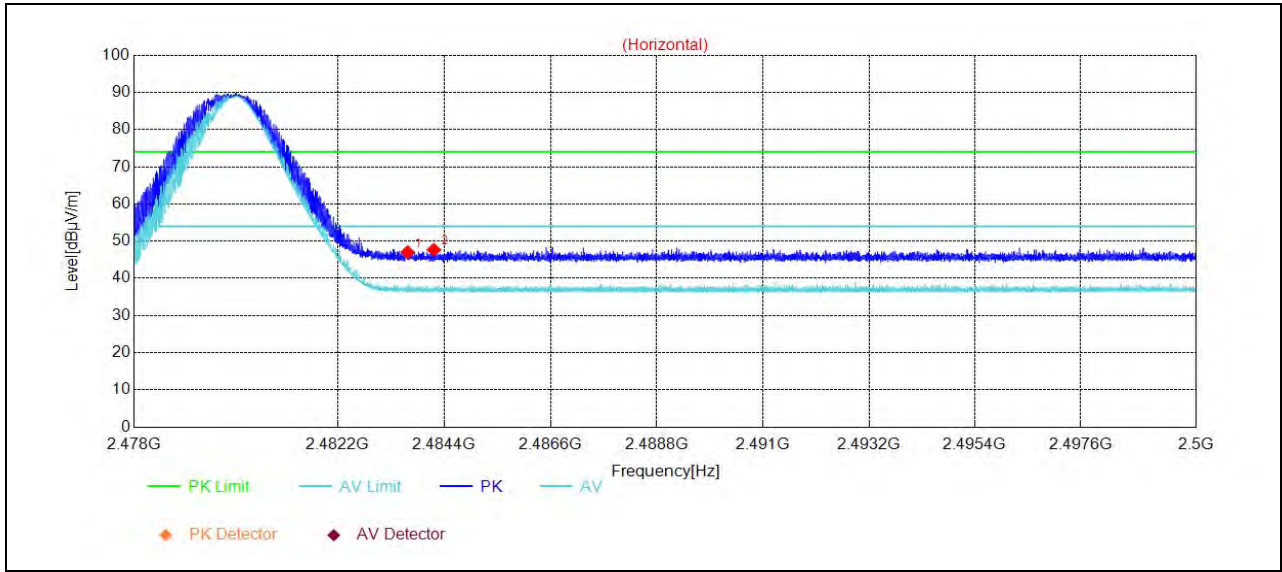
| No. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Polarity | Detector | Verdict |
|-----|-------------|----------------|-------------|----------------|------------|----------|---------|
| 1 | 2385.0200 | 47.39 | -2.85 | 74.00 | Horizontal | PK | PASS |
| 2 | 2390.1992 | 46.29 | -2.87 | 74.00 | Horizontal | PK | PASS |



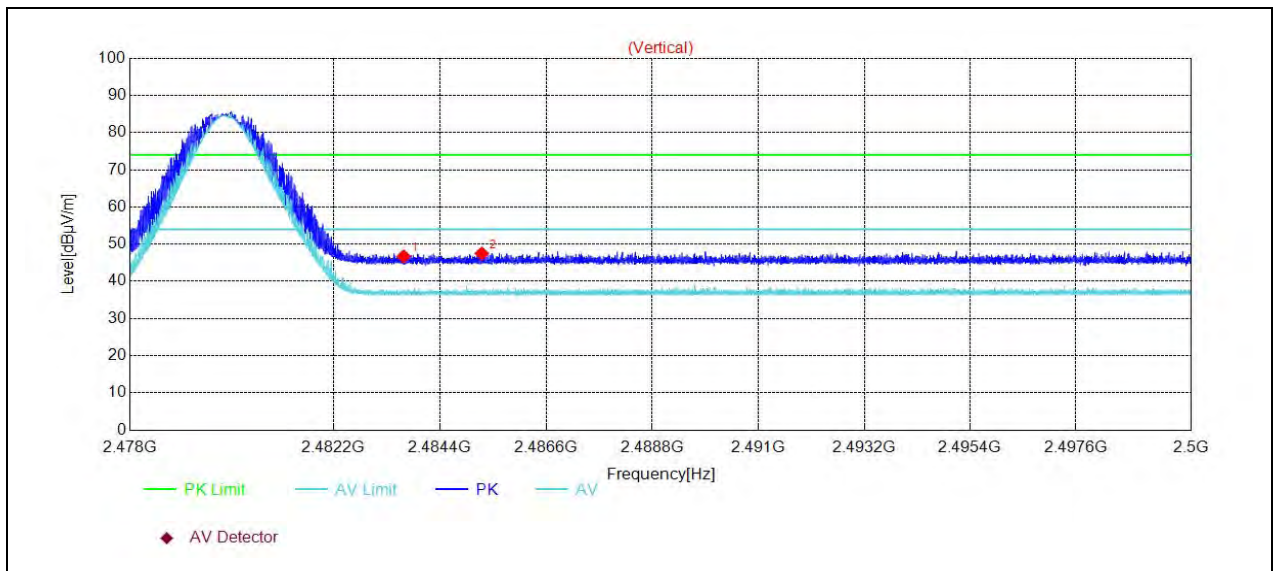
| No. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Polarity | Detector | Verdict |
|-----|-------------|----------------|-------------|----------------|----------|----------|---------|
| 1 | 2385.6856 | 47.17 | -2.86 | 74.00 | Vertical | PK | PASS |
| 2 | 2390.2304 | 46.55 | -2.87 | 74.00 | Vertical | PK | PASS |



GFSK Mode, Plot for Channel 78

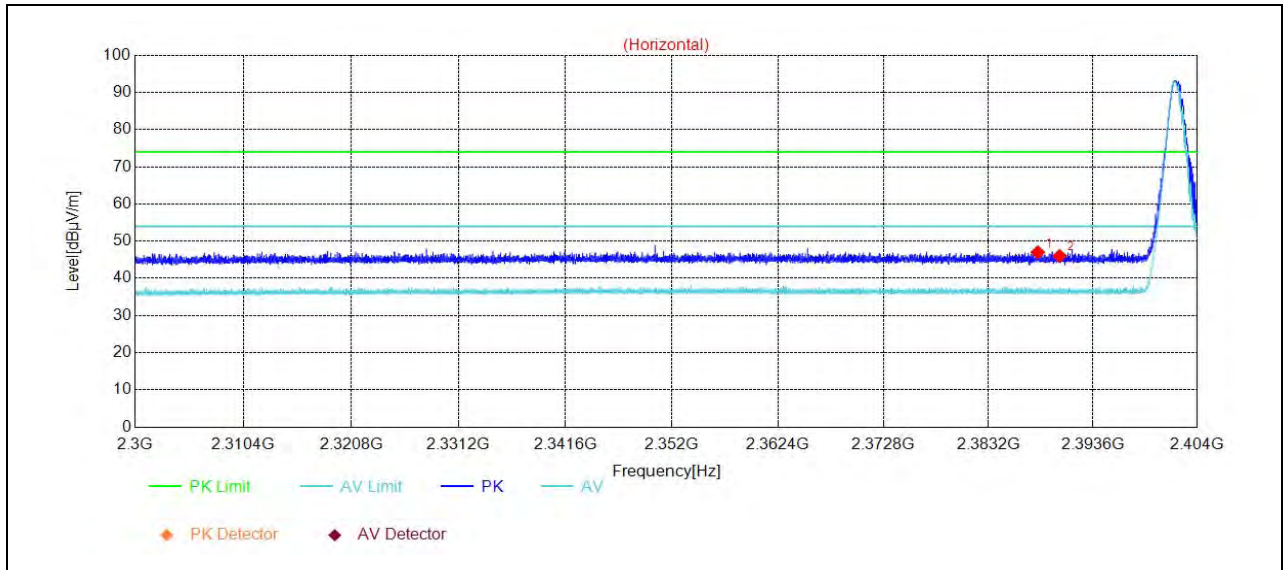


| No. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Polarity | Detector | Verdict |
|-----|-------------|----------------|-------------|----------------|------------|----------|---------|
| 1 | 2483.6474 | 46.99 | -2.66 | 74.00 | Horizontal | PK | PASS |
| 2 | 2484.1908 | 47.65 | -2.65 | 74.00 | Horizontal | PK | PASS |

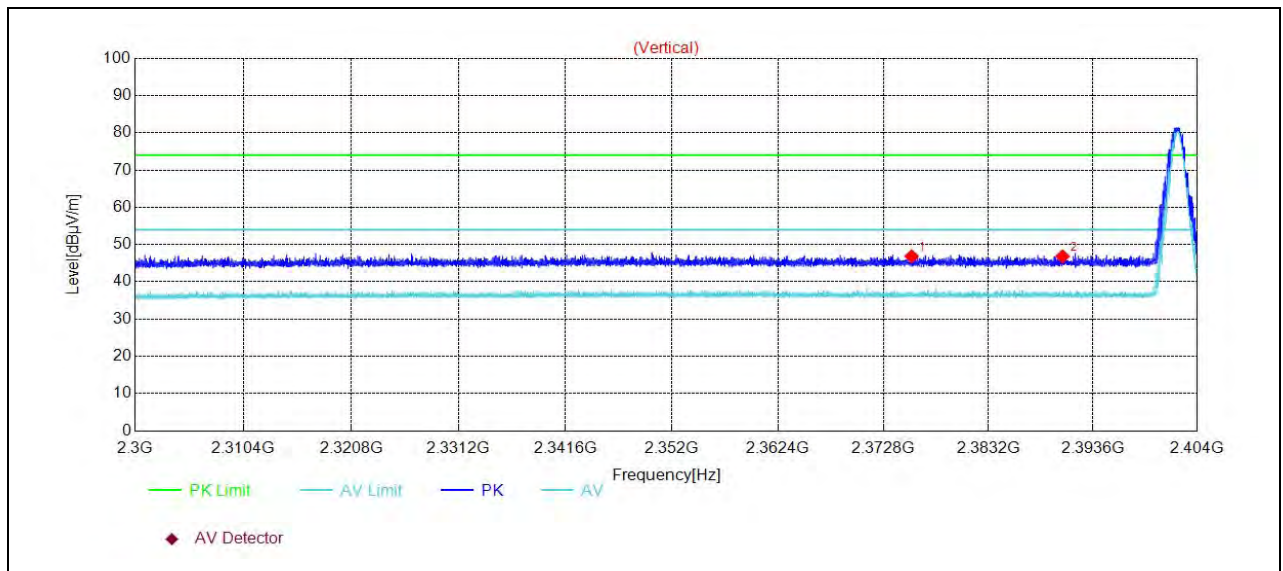


| No. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Polarity | Detector | Verdict |
|-----|-------------|----------------|-------------|----------------|----------|----------|---------|
| 1 | 2483.6540 | 46.72 | -2.66 | 74.00 | Vertical | PK | PASS |
| 2 | 2485.2710 | 47.49 | -2.65 | 74.00 | Vertical | PK | PASS |

π/4-DQPSK Mode, Plot for Channel 0



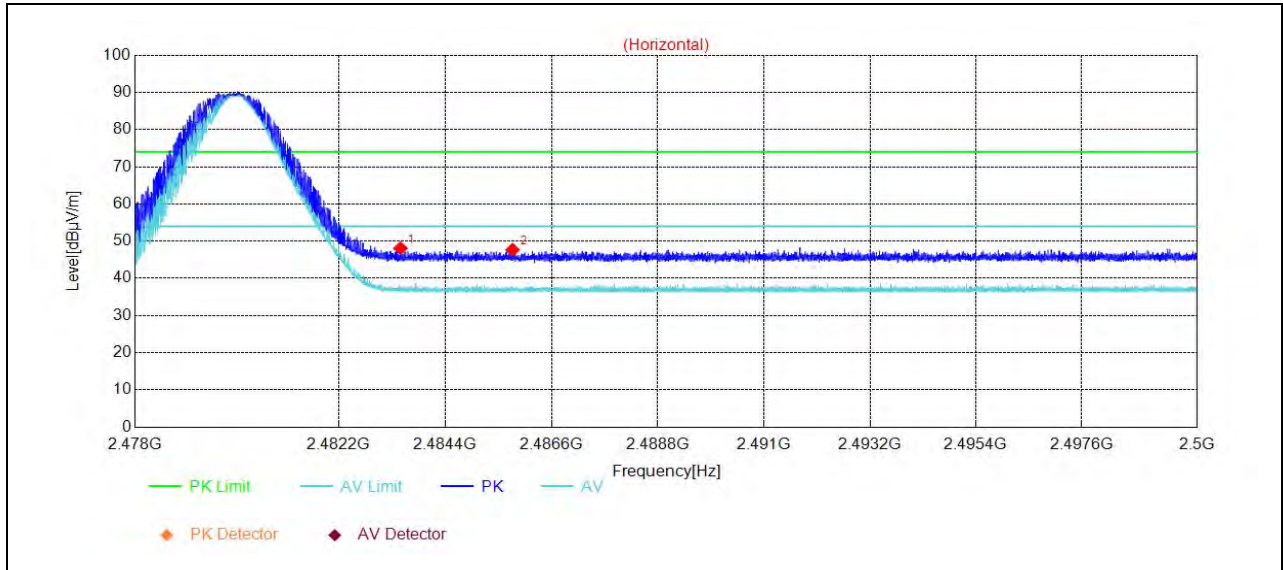
| No. | Freq. [MHz] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Polarity | Detector | Verdict |
|-----|-------------|----------------|-------------|----------------|------------|----------|---------|
| 1 | 2388.0984 | 47.01 | -2.86 | 74.00 | Horizontal | PK | PASS |
| 2 | 2390.2720 | 46.03 | -2.87 | 74.00 | Horizontal | PK | PASS |



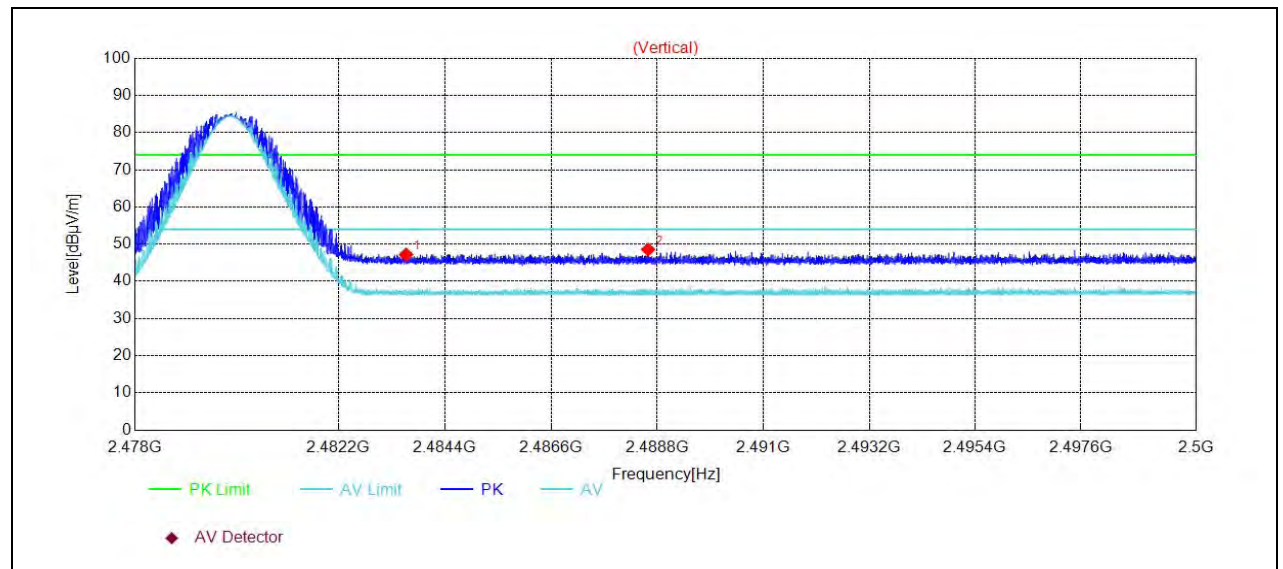
| No. | Freq. [MHz] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Polarity | Detector | Verdict |
|-----|-------------|----------------|-------------|----------------|----------|----------|---------|
| 1 | 2375.5872 | 46.84 | -2.83 | 74.00 | Vertical | PK | PASS |
| 2 | 2390.5632 | 46.82 | -2.87 | 74.00 | Vertical | PK | PASS |



$\pi/4$ -DQPSK Mode, Plot for Channel 78



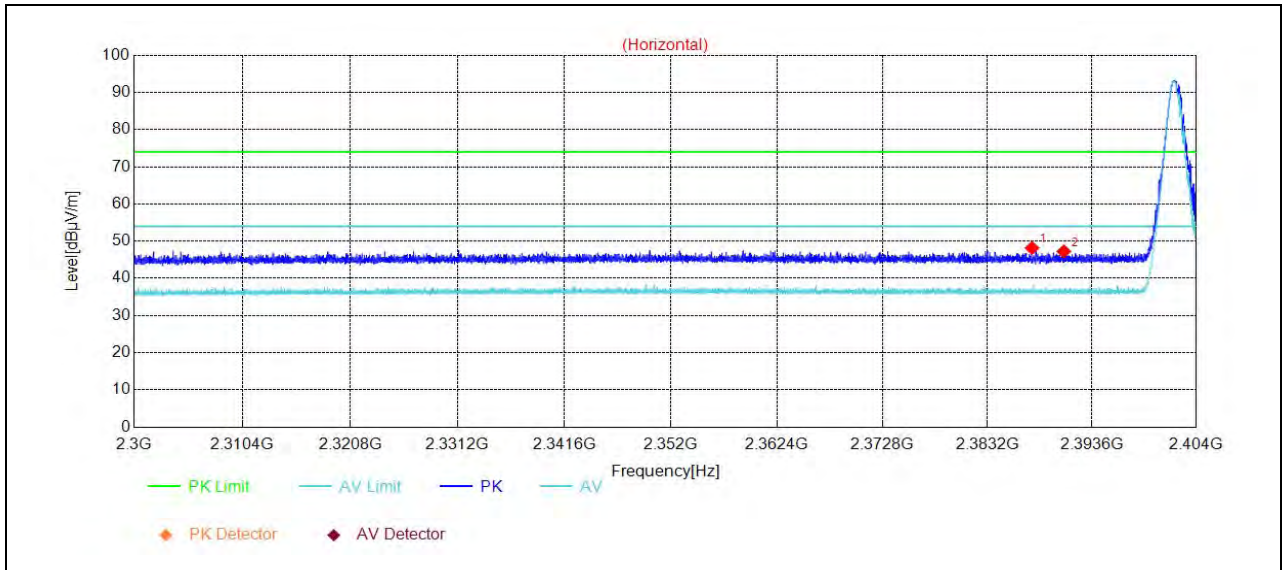
| No. | Freq. [MHz] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Polarity | Detector | Verdict |
|-----|-------------|----------------|-------------|----------------|------------|----------|---------|
| 1 | 2483.4802 | 48.05 | -2.66 | 74.00 | Horizontal | PK | PASS |
| 2 | 2485.7968 | 47.65 | -2.64 | 74.00 | Horizontal | PK | PASS |



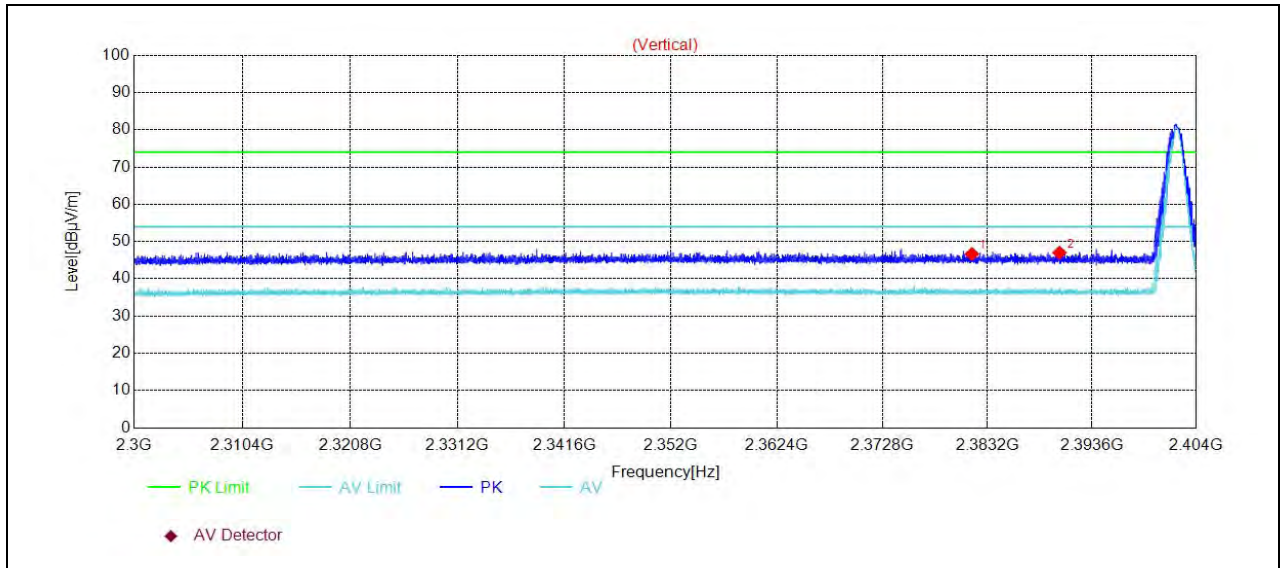
| No. | Freq. [MHz] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Polarity | Detector | Verdict |
|-----|-------------|----------------|-------------|----------------|----------|----------|---------|
| 1 | 2483.6012 | 47.20 | -2.66 | 74.00 | Vertical | PK | PASS |
| 2 | 2488.6128 | 48.56 | -2.63 | 74.00 | Vertical | PK | PASS |



8-DPSK Mode, Plot for Channel 0



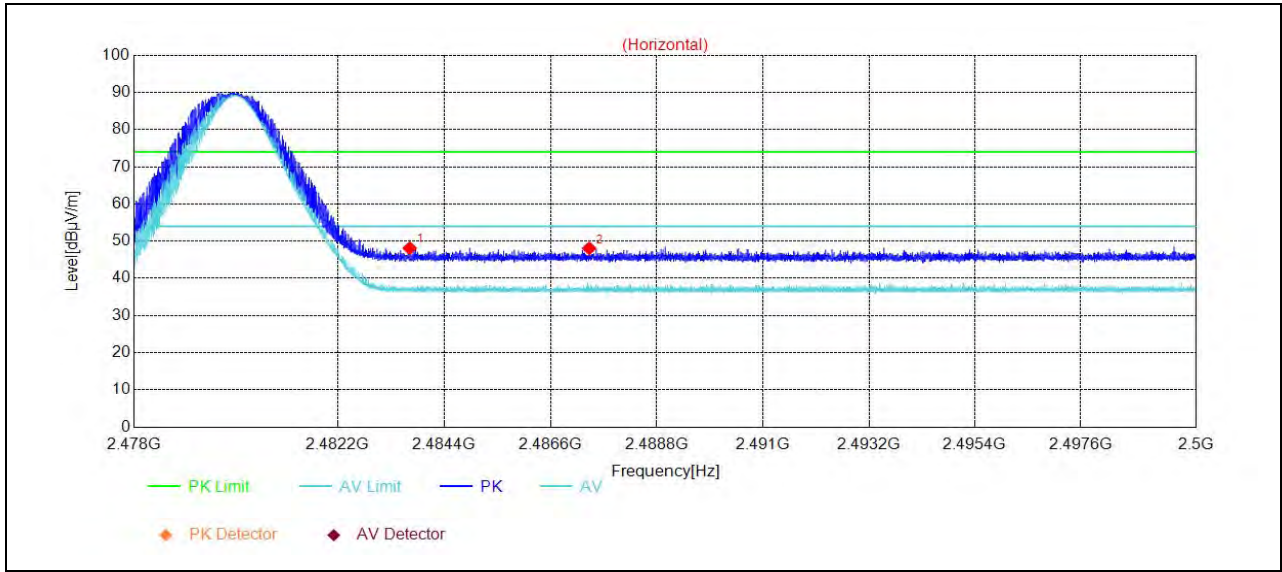
| No. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Polarity | Detector | Verdict |
|-----|-------------|----------------|-------------|----------------|------------|----------|---------|
| 1 | 2387.6200 | 48.16 | -2.86 | 74.00 | Horizontal | PK | PASS |
| 2 | 2390.7920 | 47.23 | -2.87 | 74.00 | Horizontal | PK | PASS |



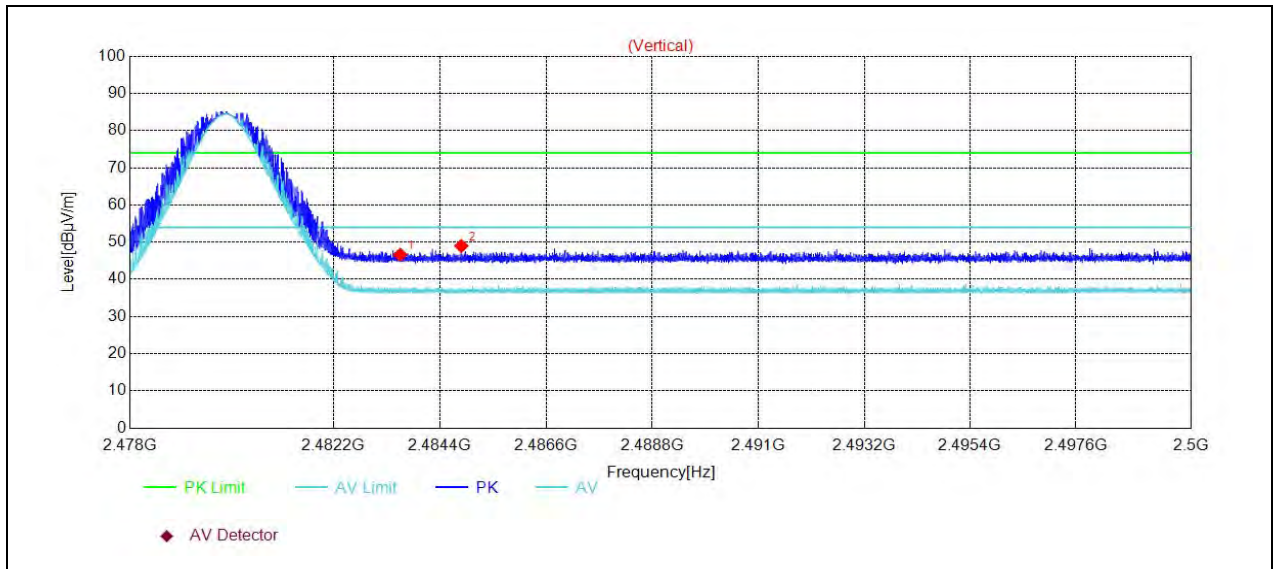
| No. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Polarity | Detector | Verdict |
|-----|-------------|----------------|-------------|----------------|----------|----------|---------|
| 1 | 2381.6504 | 46.65 | -2.85 | 74.00 | Vertical | PK | PASS |
| 2 | 2390.3552 | 47.02 | -2.87 | 74.00 | Vertical | PK | PASS |



8-DPSK Mode, Plot for Channel 78



| No. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Polarity | Detector | Verdict |
|-----|-------------|----------------|-------------|----------------|------------|----------|---------|
| 1 | 2483.6892 | 48.11 | -2.66 | 74.00 | Horizontal | PK | PASS |
| 2 | 2487.4028 | 48.06 | -2.63 | 74.00 | Horizontal | PK | PASS |



| No. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Polarity | Detector | Verdict |
|-----|-------------|----------------|-------------|----------------|----------|----------|---------|
| 1 | 2483.5836 | 46.64 | -2.66 | 74.00 | Vertical | PK | PASS |
| 2 | 2484.8464 | 48.98 | -2.65 | 74.00 | Vertical | PK | PASS |