

TEST REPORT

| | |
|---------------------------------|---|
| Applicant: | First Audio Manufacturing (Guangzhou) Ltd. |
| Address of Applicant: | Tanbu Fidek Industrial Zone, Huadu District, Guangzhou 510820, China |
| Manufacturer: | First Audio Manufacturing (Guangzhou) Ltd. |
| Address of Manufacturer: | Tanbu Fidek Industrial Zone, Huadu District, Guangzhou 510820, China |
| Product name: | Portable Stereo |
| Model: | DJ BOOMBOX |
| Rating(s): | Input: AC 100-240V, 50-60Hz, 2A Max Output: DC 18V, 2.6A (For AC Adaptor) DC 18V, 2.6A (For main) |
| Trademark: | DJ-Tech |
| Standards: | FCC Part 15.247 :2013 |
| FCC ID: | 2AE4I-DJBOOMBOX |
| Date of Receipt: | 2015-06-19 |
| Date of Test: | 2015-06-19~2015-07-20 |
| Date of Issue: | 2015-07-21 |
| Test Result | Pass* |

* In the configuration tested, the test item complied with the standards specified above.

Authorized for issue by:

Test by:

Jumy qiu

Jun.21, 2015 Jumy Qiu

Project Engineer



Reviewed by:

Pauler Li

Jun.21, 2015

Pauler Li

Project Manager

Date

Name/Position

Signature

Date

Name/Position

Signature

Possible test case verdicts:

test case does not apply to the test object ...: N/A

test object does meet the requirement: P (Pass)

test object does not meet the requirement ...: F (Fail)

Testing Laboratory information:

Testing Laboratory Name: I-Test Laboratory

Address.....: 1-2 floor, South Block, Building A2 , No 3 Keyan Lu,
Science City, Guangzhou, Guangdong Province, P.R. China

Testing location : Same as above

Tel : 0086-20-32209330

Fax : 0086-20-62824387

E-mail : itl@i-testlab.com

General remarks:

The test results presented in this report relate only to the object tested.

The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.

This report would be invalid test report without all the signatures of testing technician and approver.

This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

General product information:

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1 Test Summary

| Test | Test Requirement | Test method | Result |
|---|---|---|--------|
| Antenna Requirement | FCC PART 15 C section 15.247 (c) and Section 15.203 | FCC PART 15 C section 15.247 (c) and Section 15.203 | PASS |
| Occupied Bandwidth (-20dB) | FCC PART 15 C section 15.247 (a)(1); | ANSI C63.10:2009 Clause 6.9 & DA 00-705 | PASS |
| Carrier Frequencies Separated | FCC PART 15 C section 15.247(a)(1); | DA 00-705 | PASS |
| Hopping Channel Number | FCC PART 15 C section 15.247(a)(1)(iii) | DA 00-705 | PASS |
| Dwell Time | FCC PART 15 C section 15.247(a)(1)(iii); | DA 00-705 | PASS |
| Maximum Peak Output Power | FCC PART 15 C section 15.247(b)(1); | ANSI C63.10:2009 Clause 6.10 & DA 00-705 | PASS |
| Conducted Spurious Emission (30 MHz to 25 GHz) | FCC PART 15 C section 15.247(d); | ANSI C63.10:2009 Clause 6.7 & DA 00-705 | PASS |
| Radiated Spurious Emission (9 kHz to 25 GHz) | FCC PART 15 C section 15.247(d); | ANSI C63.10:2009 Clause 6.4, 6.5 and 6.6 & DA 00- 705 | PASS |
| Band Edges Measurement | FCC PART 15 C section 15.247 (d) &15.205 | ANSI C63.10:2009 Clause 6.9 & DA 00-705 | PASS |
| Conducted Emissions at Mains Terminals | FCC PART 15 C section 15.207; | ANSI C63.10:2009 Clause 6.2 & DA 00-705 | PASS |
| Remark: | | | |
| N/A: not applicable. Refer to the relative section for the details. EUT: In this whole report EUT means Equipment Under Test. Tx: In this whole report Tx (or tx) means Transmitter. Rx: In this whole report Rx (or rx) means Receiver. RF: In this whole report RF means Radio Frequency. ANSI C63.10: the detail version is ANSI C63.10:2009 in the whole report. DA 00-705: "Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems" | | | |

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3 General Information

3.1 Client Information

Applicant: First Audio Manufacturing (Guangzhou) Ltd.
Address of Applicant: Tanbu Fidek Industrial Zone, Huadu District, Guangzhou 510820, China

3.2 General Description of E.U.T.

Name: Portable Stereo
Model No.: DJ BOOMBOX
Trade Mark: DJ-Tech
Operating Frequency: 2402 MHz to 2480 MHz for Bluetooth.
Channels: 79 channels with 1MHz step for Bluetooth

Bluetooth Version: 3.0

Modulation Technique: Frequency Hopping Spread Spectrum (FHSS)
Type of Modulation: GFSK, ($\pi/4$) DQPSK, 8DPSK for Bluetooth
Dwell time: Per channel is less than 0.4s.
Antenna Type: PCB Antenna
Antenna gain: 0dBi max
Function: Bluetooth speaker

3.3 Details of E.U.T.

EUT Power Supply: AC for power supply
Test mode: The program used to control the EUT for staying in continuous transmitting and receiving mode is programmed. Channel lowest (2402MHz), middle (2441MHz) and highest (2480MHz) are chosen for Bluetooth full testing.
Normal mode: the Bluetooth has been tested on the Modulation of GFSK;
EDR mode: the Bluetooth has been tested on the Modulation of ($\pi/4$)DQPSK and 8DPSK, compliance test and record the worst case on ($\pi/4$)DQPSK and 8DPSK

Power cord: 1.8m AC power cord

3.4 Description of Support Units

The EUT has been tested as an independent unit for fixed frequency by testing lab.

3.5 Test Location

All tests were performed at:

I-Test Laboratory

1-2 floor, South Block, Building A2 , No 3 Keyan Lu, Science City, Guangzhou, Guangdong Province, P.R. China

0086-20-32209330

itl@i-testlab.com

No tests were sub-contracted.

3.6 Deviation from Standards

Biconical and log periodic antennas were used instead of dipole antennas.

3.7 Abnormalities from Standard Conditions

None.

3.8 Other Information Requested by the Customer

None.

3.9 Test Facility

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

- CNAS(Lab code:L4957)
- FCC (Registration No.:935596)
- IC (Registration NO.:8368A)

3.10 Measurement Uncertainty

The below measurement uncertainties given below are based on a 95% confidence level (base on a coverage factor (k=2).)

| Parameter | Uncertainty |
|-------------------------------|---------------------------|
| Radio frequency | $\pm 1.06 \times 10^{-7}$ |
| total RF power, conducted | 1.37 dB |
| RF power density , conducted | 2.89 dB |
| All emissions, radiated | ± 3.35 dB |
| Temperature | ± 0.23 °C |
| Humidity | ± 0.3 % |
| DC and low frequency voltages | ± 0.3 % |

4 Instruments Used during Test

| No. | Test Equipment | Manufacturer | Model | Serial No. | Last Cal. | Cal. Due |
|---------|--------------------------------|---------------|----------------|----------------|------------|------------|
| ITL-114 | Spectrum Analyzer | Agilent | N9010A | MY51250936 | 2015/01/19 | 2016/01/19 |
| ITL-116 | Pre Amplifier | HP | 8447F | 3113A05905 | 2015/01/19 | 2016/01/19 |
| ITL-117 | Wideband Amplifier Super Ultra | Mini-circuits | ZVA-183-S+ | 469101134 | 2015/01/19 | 2016/01/19 |
| ITL-105 | Biconilog Antenna | ETS•Lindgren | 3142D | 00108096 | 2015/01/24 | 2018/01/24 |
| ITL-110 | Horn Antenna | A-INFOMW | JXTXLB-10180-N | J2031090612133 | 2015/01/24 | 2018/01/24 |
| ITL-102 | EMI Test receiver | R&S | ESCI | 100910 | 2015/06/23 | 2016/06/23 |
| ITL-103 | Two-line v-network | R&S | ENV216 | 100120 | 2015/06/23 | 2016/06/23 |
| ITL-115 | 50Ω Coaxial Cable | Mini-circuits | CBL | C001 | 2014/09/07 | 2015/09/07 |
| ITL-100 | Semi-Anechoic chamber | ETS•Lindgren | FACT3 2.0 | CT09015 | 2013/06/17 | 2016/06/17 |
| ITL-145 | Loop Antenna | ZHINAN | ZN30900 A | 002489 | 2015/01/19 | 2016/01/19 |
| ITL-146 | Horn Antenna | Schwarzbeck | BBHA 9170 | B09806543 | 2015/06/23 | 2016/06/23 |
| ITL-101 | Shielded Room | ETS•Lindgren | 8*4*3 | CT09010 | 2015/03/09 | 2018/03/09 |

5 Test Results

5.1 E.U.T. test conditions

Test Voltage: Input: AC 120V, 60 Hz

Temperature: 20.0 -25.0 °C

Humidity: 38-50 % RH

Atmospheric Pressure: 1000 -1010 mbar

Test frequencies and frequency range: According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

According to the 15.33 (a) For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency shown in the following table:

Number of fundamental frequencies to be tested in EUT transmit band

| Frequency range in which | Number of | Location in frequency range |
|--------------------------|-----------|---|
| 1 MHz or less | 1 | Middle |
| 1 MHz to 10 MHz | 2 | 1 near top and 1 near bottom |
| More than 10 MHz | 3 | 1 near top, 1 near middle and 1 near bottom |

Frequency range of radiated emission measurements

| Lowest frequency generated | Upper frequency range of measurement |
|-----------------------------|--|
| 9 kHz to below 10 GHz | 10th harmonic of highest fundamental frequency or to 40 GHz, |
| At or above 10 GHz to below | 5th harmonic of highest fundamental frequency or to 100 GHz, |
| At or above 30 GHz | 5th harmonic of highest fundamental frequency or to 200 GHz, |

EUT channels and frequencies list for bluetooth:

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

Test frequencies are the lowest channel: 0 channel (2402 MHz), middle channel: 39 channel (2441 MHz) and highest channel: 78 channel (2480 MHz)

5.2 Antenna requirement

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.

15.247(c) (1)(i) requirement:

(i) Systems operating in the 2400-2483.5 MHz bands that are used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna

The antenna is a PCB antenna and no consideration of replacement. The best case gain of the antenna is 0dBi.

Test result: The unit does meet the FCC requirements.

5.3 Occupied Bandwidth

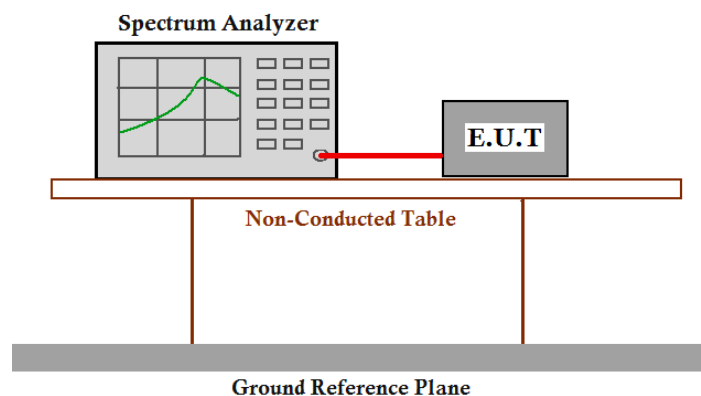
Test Requirement: FCC Part 15 C section 15.247

(a)(1) 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 125 mW.

Test Method: ANSI C63.10:2009 Clause 6.9 & DA 00-705

Test Status: Pre-test the EUT in continuous transmitting mode at the lowest, middle and highest channel with different data package. Compliance test in normal mode (DH5), EDR mode (2DH5) and EDR mode (3DH5) as the worst case was found.

Test Configuration:



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: Span = approximately 2 to 3 times the 20dB bandwidth, centring on a hopping channel;
3. Set the spectrum analyzer: RBW \geq 1% of the 20dB bandwidth VBW \geq RBW. Sweep = auto; Detector Function = Peak. Trace = Max Hold.
4. Mark the peak frequency and -20dB points bandwidth.

Test result (-20dB bandwidth), For bluetooth**Normal mode:**

| Test Channel | Bandwidth(MHz) | 2/3 bandwidth(MHz) |
|--------------|----------------|--------------------|
| Lowest | 1.061 | 0.707 |
| Middle | 1.064 | 0.709 |
| Highest | 1.066 | 0.711 |

EDR mode (2DH5):

| Test Channel | Bandwidth(MHz) | 2/3 bandwidth(MHz) |
|--------------|----------------|--------------------|
| Lowest | 1.309 | 0.873 |
| Middle | 1.311 | 0.874 |
| Highest | 1.311 | 0.874 |

EDR mode (3DH5):

| Test Channel | Bandwidth(MHz) | 2/3 bandwidth(MHz) |
|--------------|----------------|--------------------|
| Lowest | 1.297 | 0.865 |
| Middle | 1.296 | 0.864 |
| Highest | 1.299 | 0.866 |

Highest Channel:



2DH5:

Lowest channel:



Middle channel:



Highest channel:



3DH5:

Lowest channel:



Middle channel:



Agilent Spectrum Analyzer - Swept SA

Marker 1 2.479770000000 GHz

PNO: Wide IFGain: Low Trig: Free Run Atten: 30 dB

Avg Type: Log-Pwr

TRACE 1 2 3 4 5 6
TYPE M W W W W W W W W W
DET P N N N N N N

10 dB/div Ref 15.00 dBm

Mkr1 2.479 770 GHz
4.476 dBm

-20.00 dB
1.299 MHz

Center 2.480000 GHz Span 5.000 MHz
#Res BW 100 kHz #VBW 300 kHz #Sweep 2.53 ms (1001 pts)

MSG Alignment Completed STATUS

Trace/Det Select Trace 1
Clear Write
Trace Average
Max Hold
Min Hold
View/Blank View
More 1 of 3

The image shows a screenshot of an Agilent Spectrum Analyzer. The main display is a plot of power spectral density (PSD) in dBm/Hz versus frequency. The y-axis is labeled '10 dB/div Log' and ranges from -75.0 to 10.0 dBm/Hz. The x-axis is labeled 'Ref 15.00 dBm' and ranges from 2.475 to 2.485 GHz. A signal peak is visible at 2.47977 GHz, marked with a green diamond and labeled 'Mkr1 2.479 770 GHz 4.476 dBm'. A green arrow indicates a bandwidth of 1.299 MHz, corresponding to a power level of -20.00 dB. The plot shows a noisy signal with a clear peak. The right side of the screen contains a control panel with buttons for 'Trace/Det', 'Select Trace 1', 'Clear Write', 'Trace Average', 'Max Hold', 'Min Hold', 'View/Blank View', and 'More 1 of 3'. The bottom status bar shows 'MSG Alignment Completed' and 'STATUS'.

5.4 Carrier Frequencies Separated

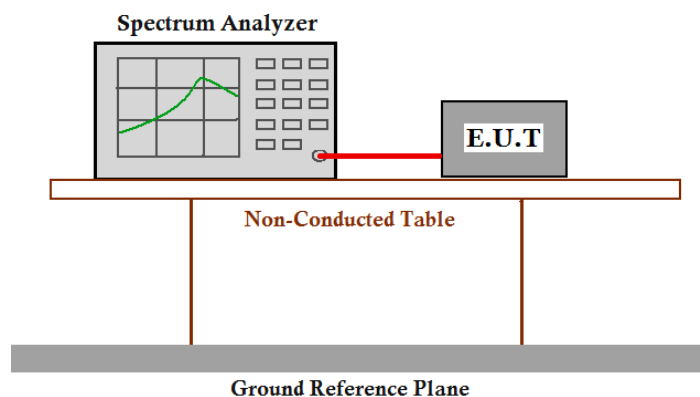
Test Requirement: FCC Part 15 C section 15.247

(a),(1) 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 125 mW.

Test Method: DA 00-705

Test Status: Pre-test the EUT in continuous transmitting mode at the lowest, middle and highest channel with different data package. Compliance test in normal mode (DH5), EDR mode (2DH5) and EDR mode (3DH5) as the worst case was found.

Test Configuration:



Test Procedure:

1. Remove the antenna from the EUT and then connect a low attenuation RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW \geq 1% of the span, VBW \geq RBW. 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.

Test result:**For Bluetooth****DH5**

| Test Channel | Carrier Frequencies Separated | Pass/Fail |
|--|-------------------------------|-----------|
| Lower Channels (channel 0 and channel 1) | 1.00 MHz | Pass |
| Middle Channels (channel 39 and channel 40) | 1.00 MHz | Pass |
| Upper Channels (channel 77 and channel 78) | 1.00 MHz | Pass |
| Remark: The limit is maximum two-thirds of the 20 dB bandwidth: 0.711 MHz | | |

2DH5

| Test Channel | Carrier Frequencies Separated | Pass/Fail |
|---|-------------------------------|-----------|
| Lower Channels (channel 0 and channel 1) | 1.00 MHz | Pass |
| Middle Channels (channel 39 and channel 40) | 1.00 MHz | Pass |
| Upper Channels (channel 77 and channel 78) | 1.00 MHz | Pass |
| Remark: The limit is maximum two-thirds of the 20 dB bandwidth:0.874 MHz | | |

3DH5

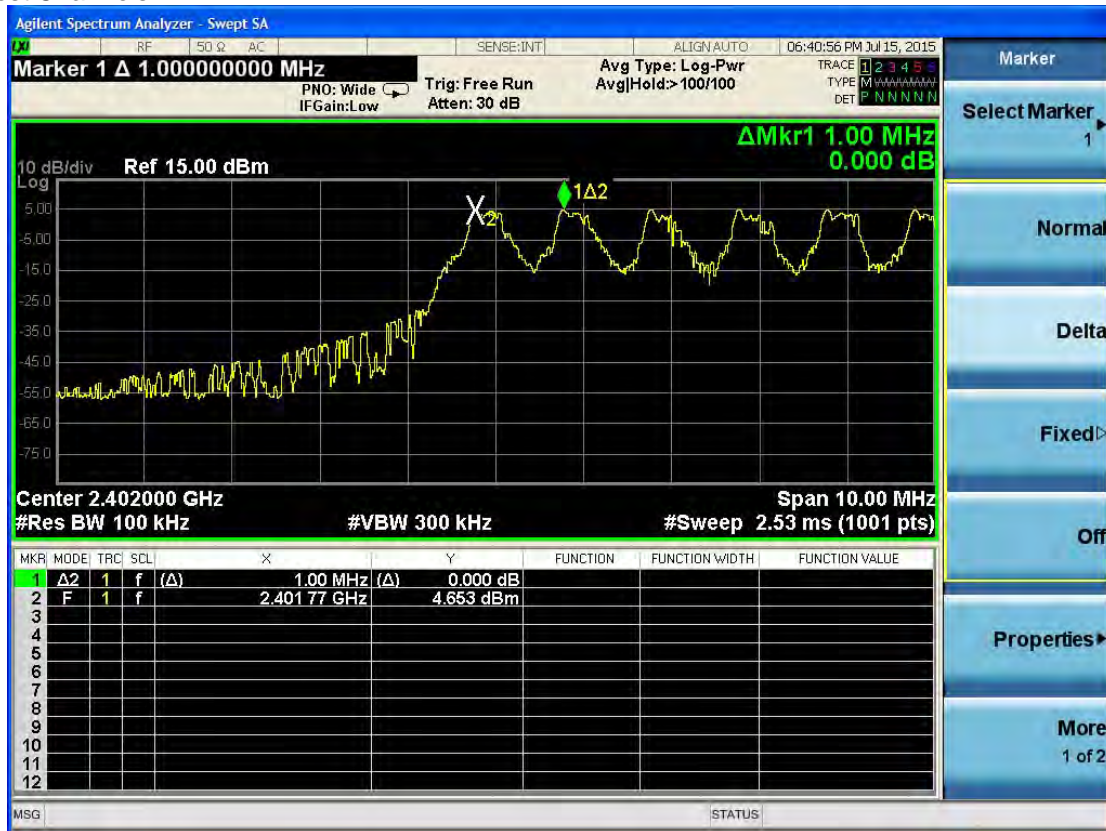
| Test Channel | Carrier Frequencies Separated | Pass/Fail |
|--|-------------------------------|-----------|
| Lower Channels (channel 0 and channel 1) | 1.00 MHz | Pass |
| Middle Channels (channel 39 and channel 40) | 1.00 MHz | Pass |
| Upper Channels (channel 77 and channel 78) | 1.00 MHz | Pass |
| Remark: The limit is maximum two-thirds of the 20 dB bandwidth: 0.866 MHz | | |

For bluetooth

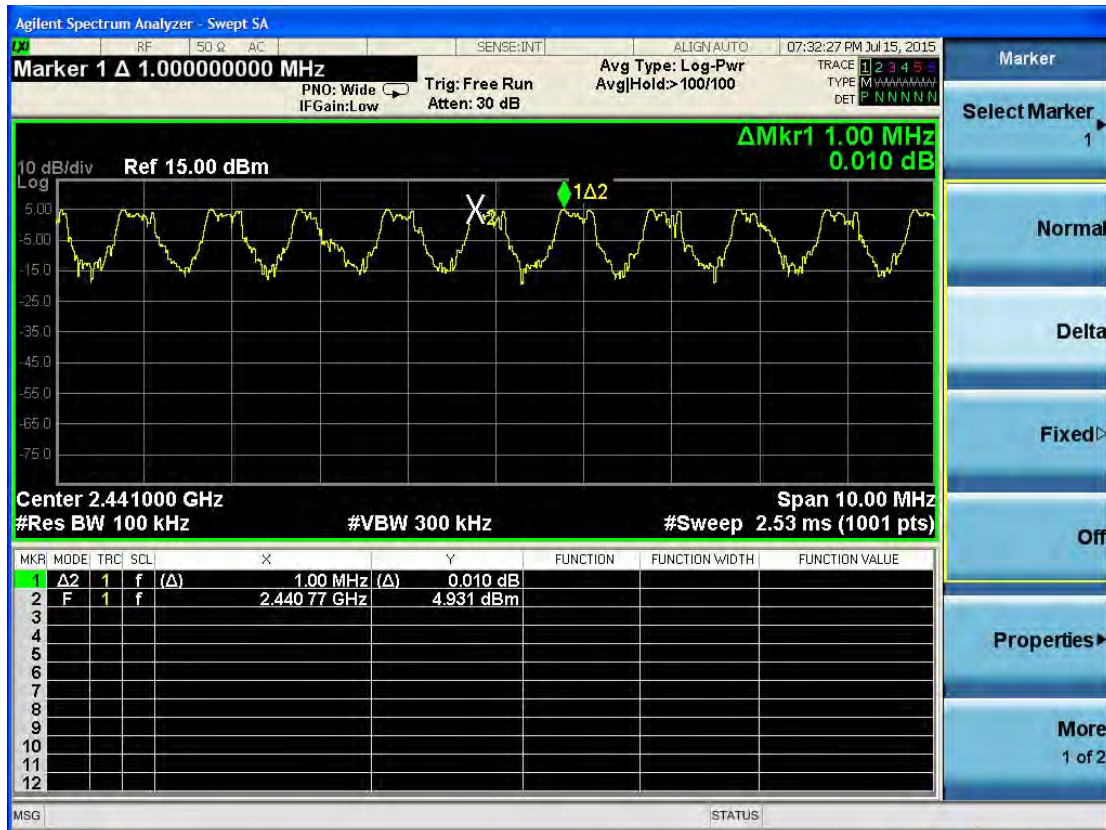
Carrier Frequencies Separated plot:

DH5

1. Lowest Channels:



2. Middle Channels:



3. Highest Channels



2DH5

1. Lowest Channels:



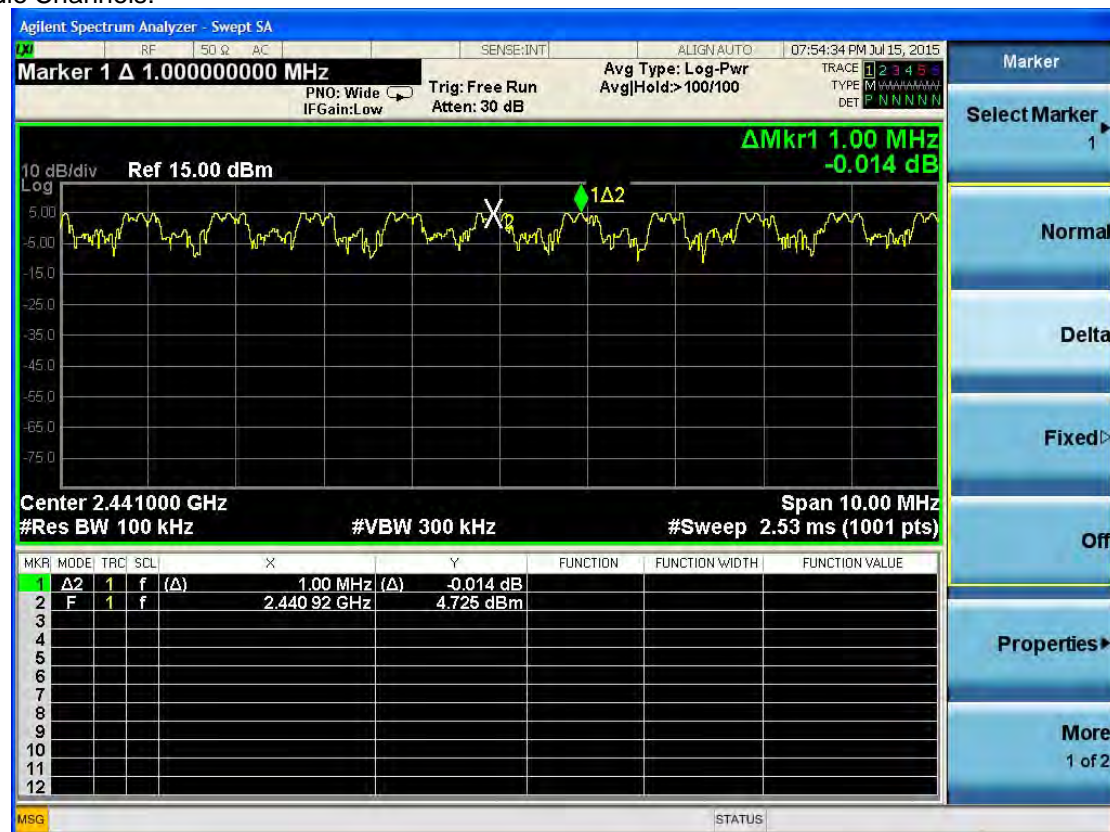
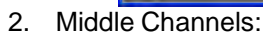
2. Middle Channels:



3. Highest Channels



1. Lowest Channels:





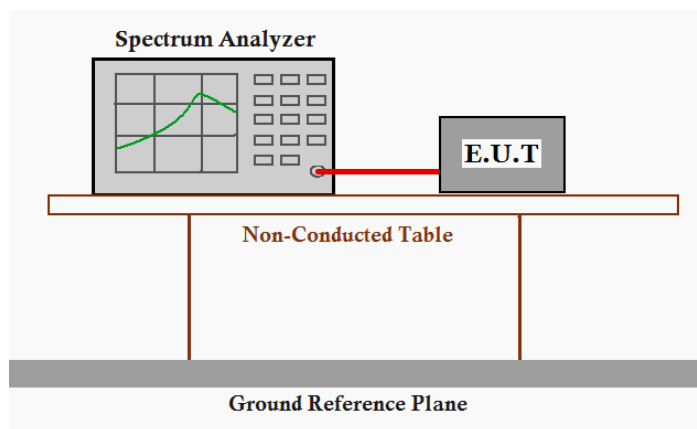
5.5 Hopping Channel Number

Test Requirement: FCC Part15 C section 15.247
(a)(1)(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

Test Method: DA 00-705

Test Status: Pre-test the EUT in hopping mode with different data packet. Compliance test in hopping with normal mode (DH5), EDR mode (2DH5) and EDR mode (3DH5) as the worst case was found.

Test Configuration:

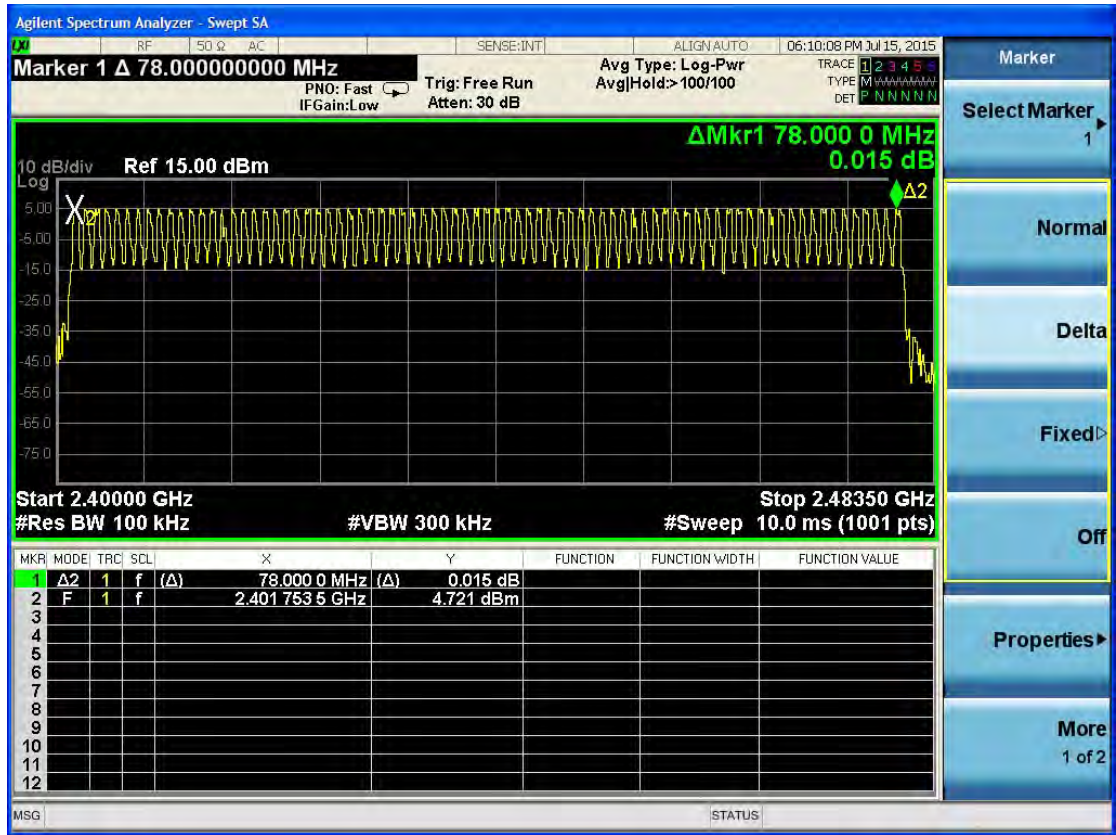


Test Procedure:

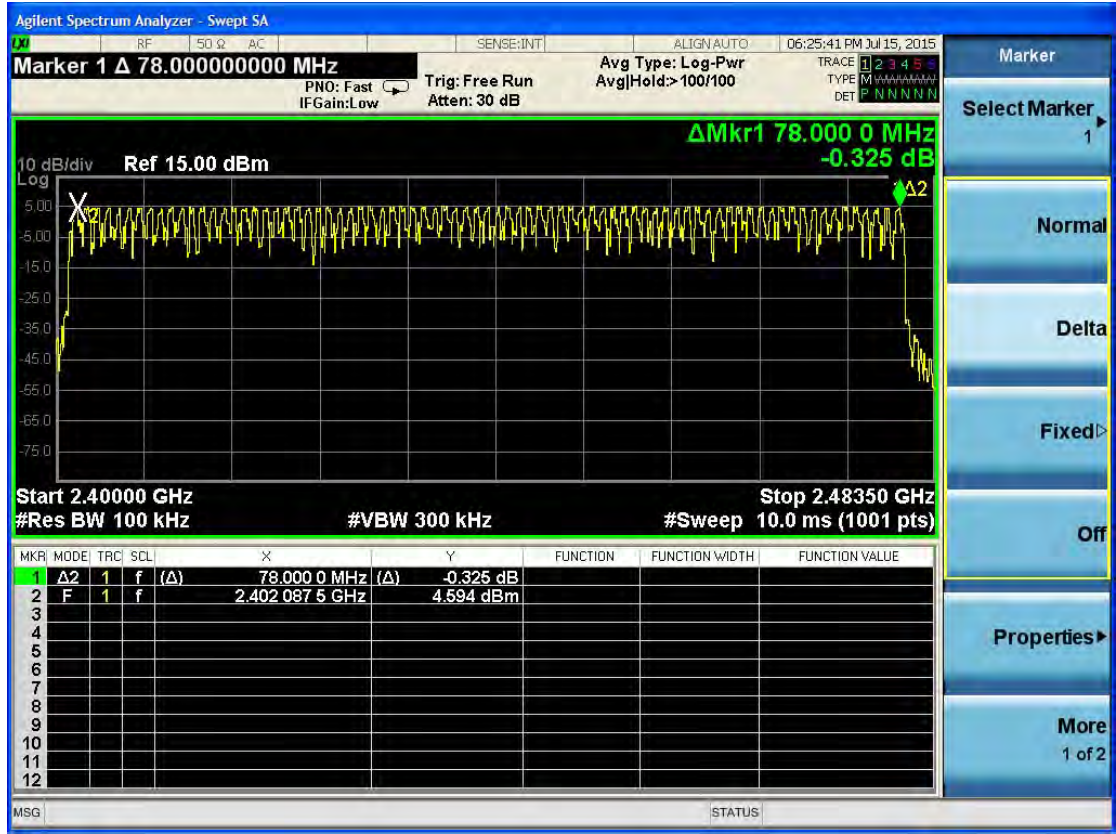
1. Remove the antenna from the EUT and then connect a low attenuation RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 100 kHz. VBW = 300 kHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. It may prove necessary to break 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 = 2400 MHz. stop frequency = 2483.5 MHz. Submit the test result graph.

For bluetooth

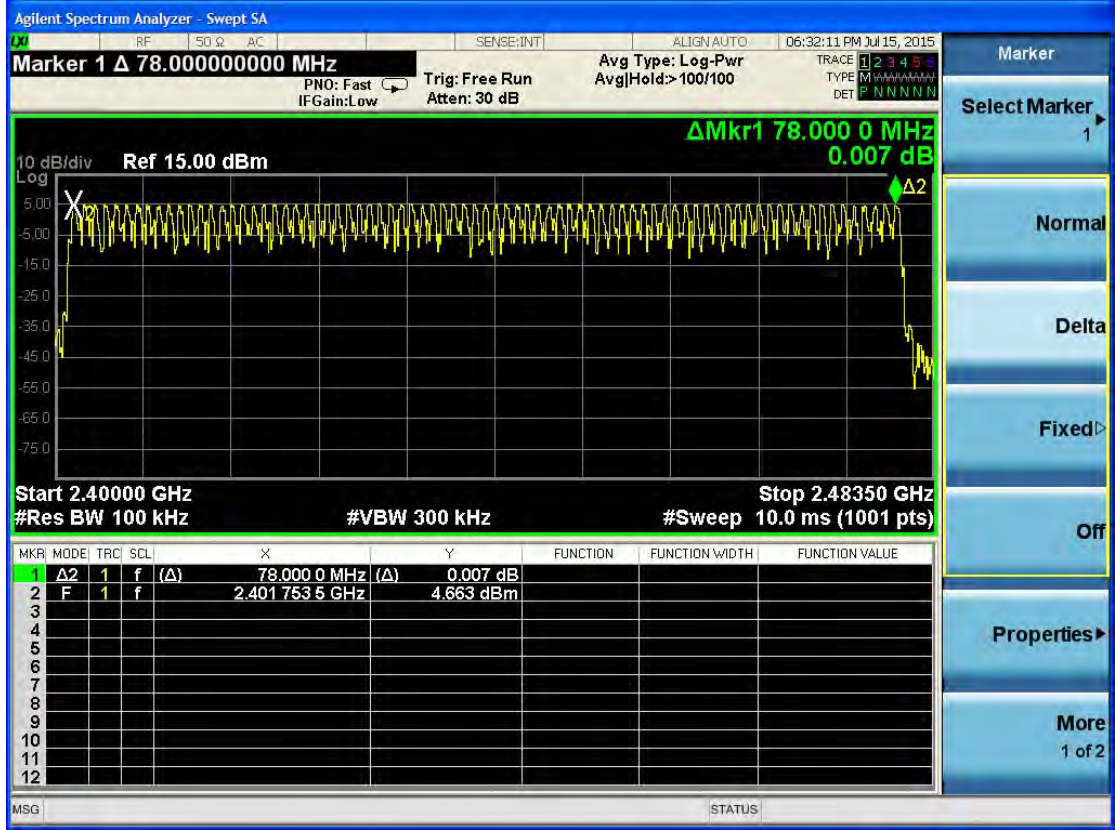
Test result: Total channels are 79 channels.
DH5:



2DH5:



3DH5:



Test result: The unit does meet the FCC requirements.

5.6 Dwell Time

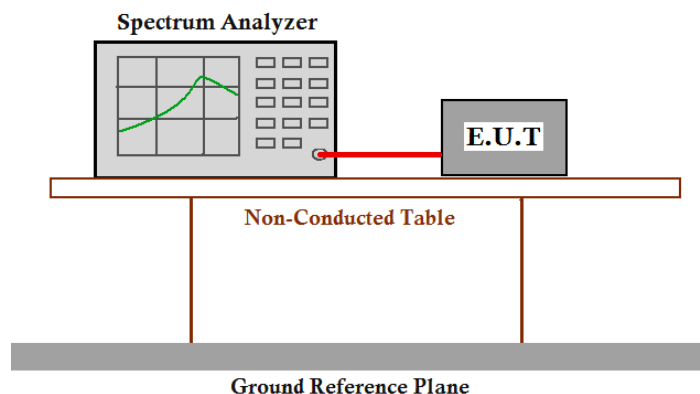
Test Requirement: FCC Part 15 C section 15.247

(a)(1)(iii) 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.

Test Method: DA 00-705

Test Status: Pre-test the EUT in continuous transmitting mode at the lowest, middle and highest channel with different data packet. Compliance test in hopping with Normal mode (DH1, DH3 and DH5) and EDR mode (2DH1, 2DH3 and 2DH5; 3DH1, 3DH3 and 3DH5) as the worst case was found.

Test Configuration:



Test Procedure:

1. Remove the antenna from the EUT and then connect a low attenuation RF cable from the antenna port to the spectrum.
2. Set spectrum analyzer span = 0. centered on a hopping channel;
3. Set RBW = 1 MHz and VBW = 1 MHz. Sweep = as necessary to capture the entire dwell time per hopping channel. Detector Function = Peak. Trace = View;
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). An oscilloscope may be used instead of a spectrum analyzer.

Test Result:**For bluetooth**

The test period: $T = 0.4 \text{ Second/Channel} \times 79 \text{ Channel} = 31.6 \text{ s}$

1. Channel 0: 2.402GHz

DH1 time slot = $0.410 \text{ (ms)} \times (1600/(2 \times 79)) \times 31.6 = 131.11 \text{ ms}$

DH3 time slot = $1.670 \text{ (ms)} \times (1600/(4 \times 79)) \times 31.6 = 267.02 \text{ ms}$

DH5 time slot = $2.930 \text{ (ms)} \times (1600/(6 \times 79)) \times 31.6 = 312.48 \text{ ms}$

2. Channel 39: 2.441GHz

DH1 time slot = $0.410 \text{ (ms)} \times (1600/(2 \times 79)) \times 31.6 = 131.11 \text{ ms}$

DH3 time slot = $1.670 \text{ (ms)} \times (1600/(4 \times 79)) \times 31.6 = 267.02 \text{ ms}$

DH5 time slot = $2.930 \text{ (ms)} \times (1600/(6 \times 79)) \times 31.6 = 312.48 \text{ ms}$

3. Channel 78: 2.480GHz

DH1 time slot = $0.410 \text{ (ms)} \times (1600/(2 \times 79)) \times 31.6 = 131.11 \text{ ms}$

DH3 time slot = $1.670 \text{ (ms)} \times (1600/(4 \times 79)) \times 31.6 = 267.02 \text{ ms}$

DH5 time slot = $2.930 \text{ (ms)} \times (1600/(6 \times 79)) \times 31.6 = 312.48 \text{ ms}$

4. Channel 0: 2.402GHz

2DH1 time slot = $0.410 \text{ (ms)} \times (1600/(2 \times 79)) \times 31.6 = 131.11 \text{ ms}$

2DH3 time slot = $1.670 \text{ (ms)} \times (1600/(4 \times 79)) \times 31.6 = 267.02 \text{ ms}$

2DH5 time slot = $2.930 \text{ (ms)} \times (1600/(6 \times 79)) \times 31.6 = 312.48 \text{ ms}$

5. Channel 39: 2.441GHz

2DH1 time slot = $0.410 \text{ (ms)} \times (1600/(2 \times 79)) \times 31.6 = 131.11 \text{ ms}$

2DH3 time slot = $1.670 \text{ (ms)} \times (1600/(4 \times 79)) \times 31.6 = 267.02 \text{ ms}$

2DH5 time slot = $2.920 \text{ (ms)} \times (1600/(6 \times 79)) \times 31.6 = 311.42 \text{ ms}$

6. Channel 78: 2.480GHz

2DH1 time slot = $0.410 \text{ (ms)} \times (1600/(2 \times 79)) \times 31.6 = 131.11 \text{ ms}$

2DH3 time slot = $1.670 \text{ (ms)} \times (1600/(4 \times 79)) \times 31.6 = 267.02 \text{ ms}$

2DH5 time slot = $2.930 \text{ (ms)} \times (1600/(6 \times 79)) \times 31.6 = 312.48 \text{ ms}$

7 Channel 0: 2.402GHz

3DH1 time slot = $0.410 \text{ (ms)} * (1600/(2*79)) * 31.6 = 131.11 \text{ ms}$

3DH3 time slot = $1.670 \text{ (ms)} * (1600/(4*79)) * 31.6 = 267.02 \text{ ms}$

3DH5 time slot = $2.930 \text{ (ms)} * (1600/(6*79)) * 31.6 = 312.48 \text{ ms}$

8. Channel 39: 2.441GHz

3DH1 time slot = $0.410 \text{ (ms)} * (1600/(2*79)) * 31.6 = 131.11 \text{ ms}$

3DH3 time slot = $1.670 \text{ (ms)} * (1600/(4*79)) * 31.6 = 267.02 \text{ ms}$

3DH5 time slot = $2.930 \text{ (ms)} * (1600/(6*79)) * 31.6 = 312.48 \text{ ms}$

9. Channel 78: 2.480GHz

3DH1 time slot = $0.410 \text{ (ms)} * (1600/(2*79)) * 31.6 = 131.11 \text{ ms}$

3DH3 time slot = $1.670 \text{ (ms)} * (1600/(4*79)) * 31.6 = 267.02 \text{ ms}$

3DH5 time slot = $2.930 \text{ (ms)} * (1600/(6*79)) * 31.6 = 312.48 \text{ ms}$

The results are not greater than 0.4 seconds

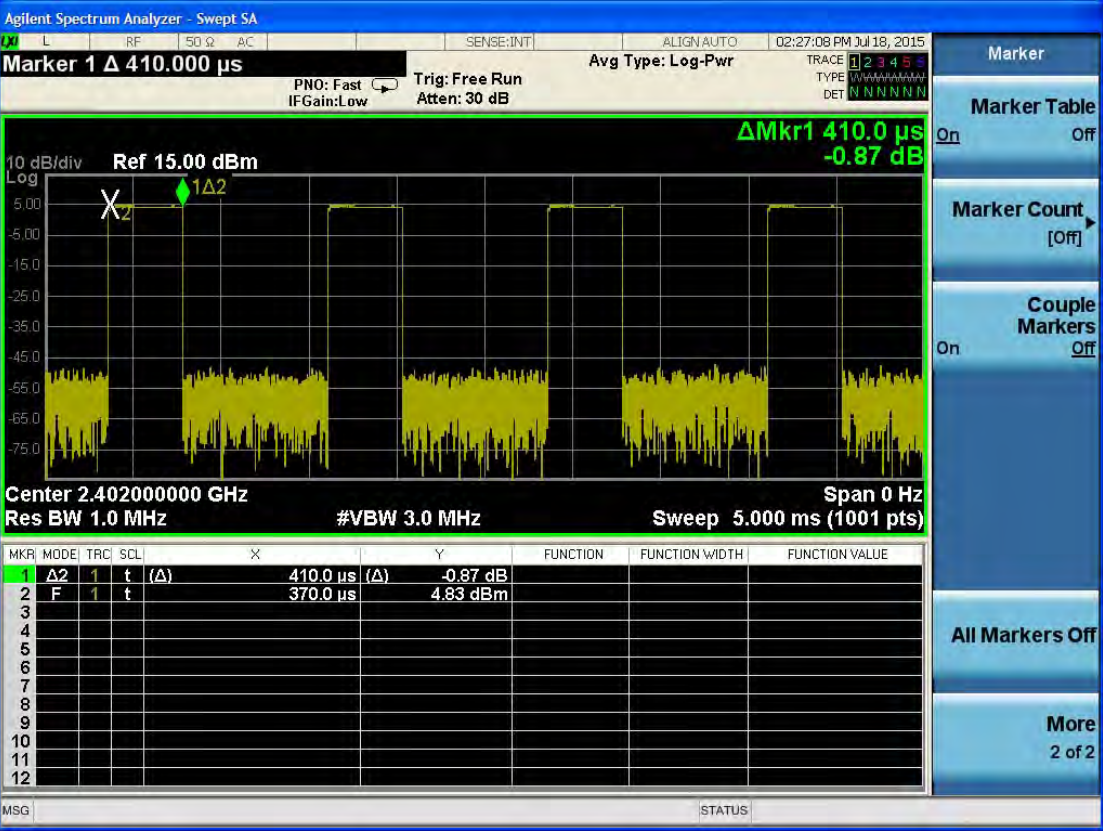
The unit does meet the FCC requirements.

For bluetooth

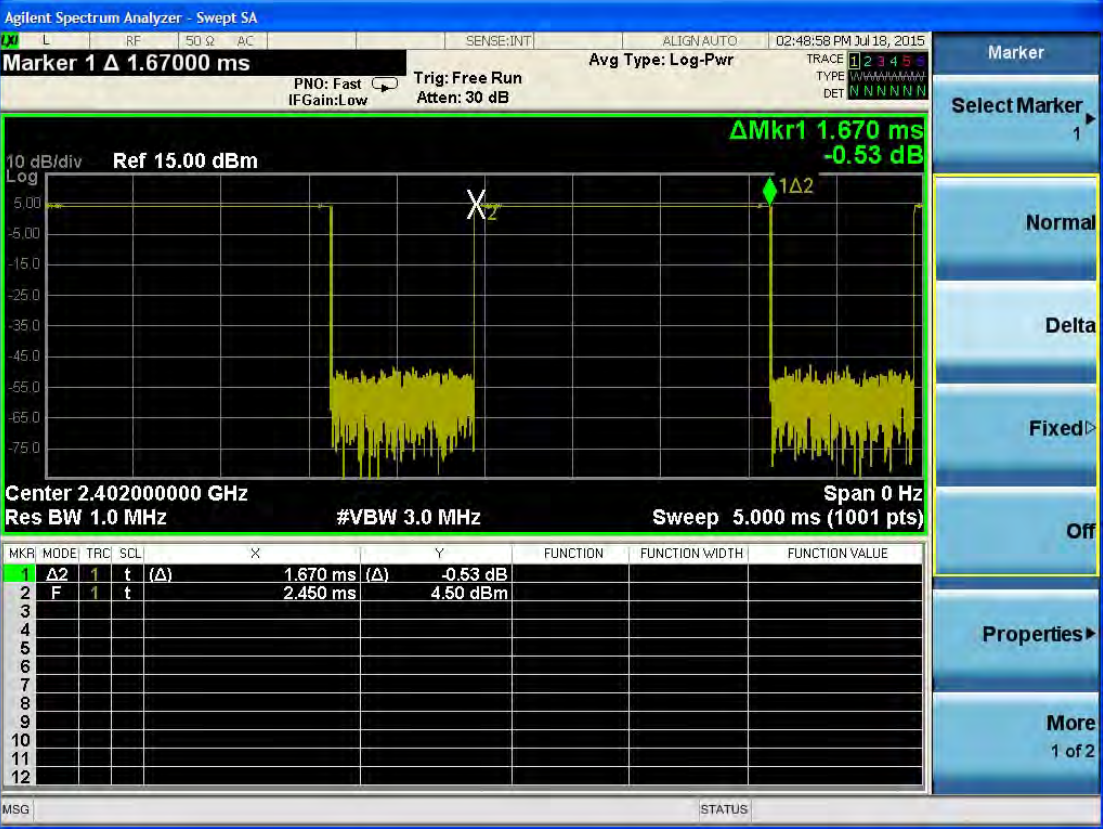
Please refer the graph as below:

1. Lowest channel (2.402 GHz):

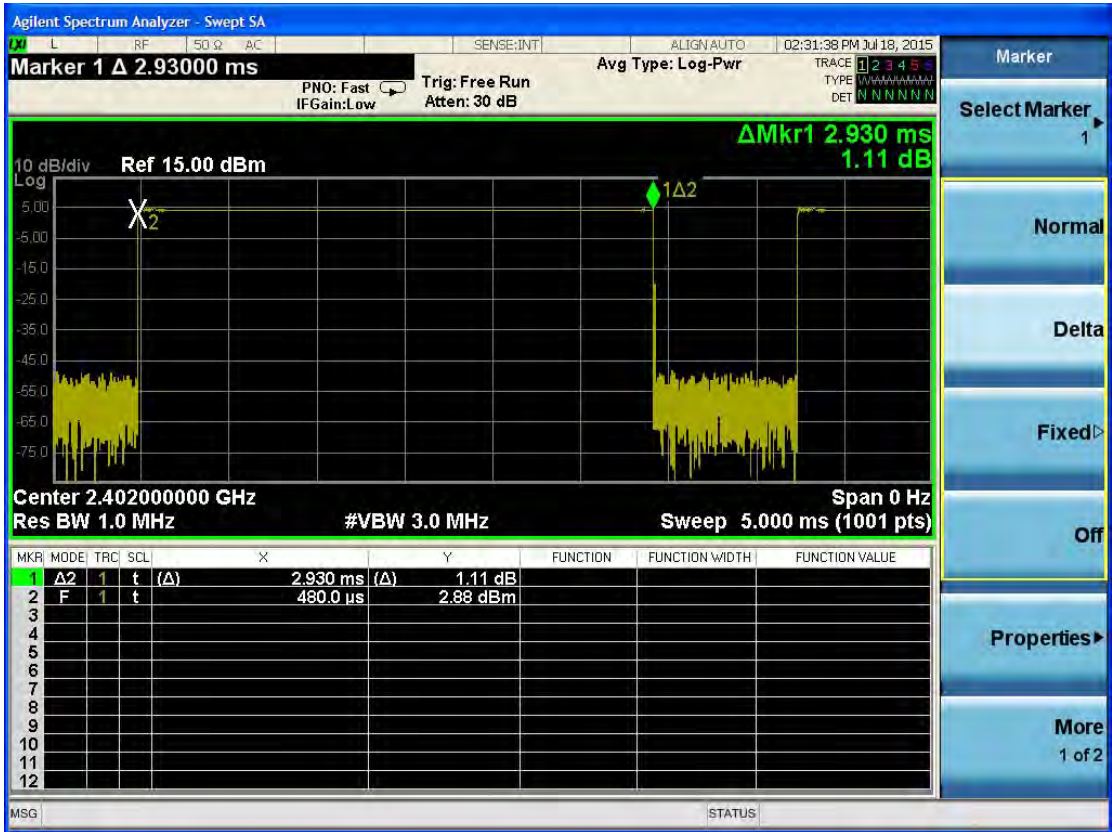
(1) DH1



(2) DH3

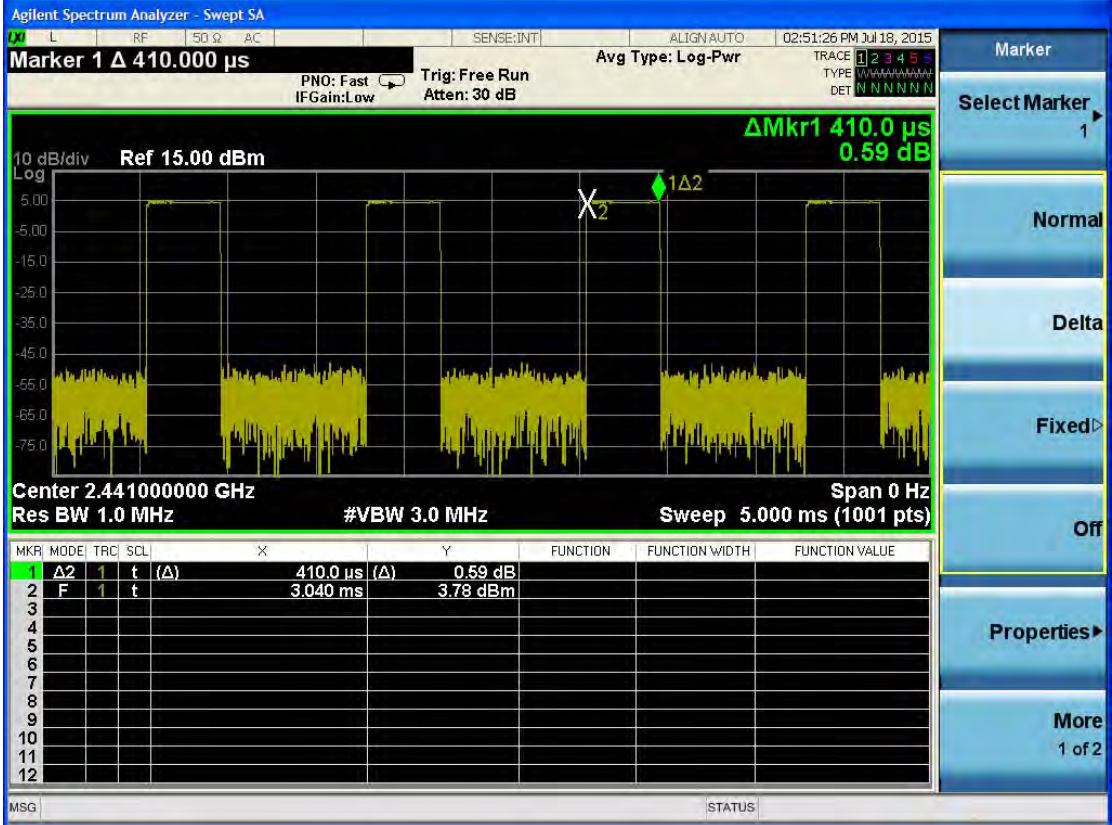


(3) DH5

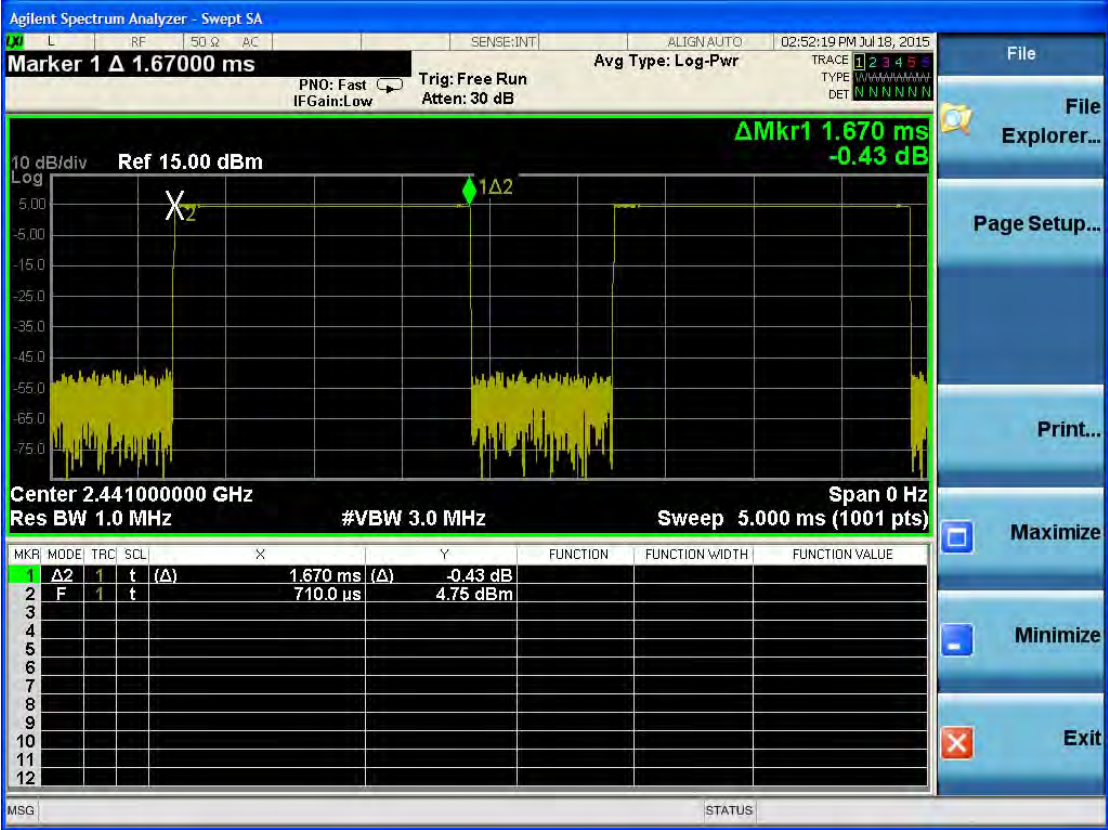


2. Middle channel (2.441 GHz):

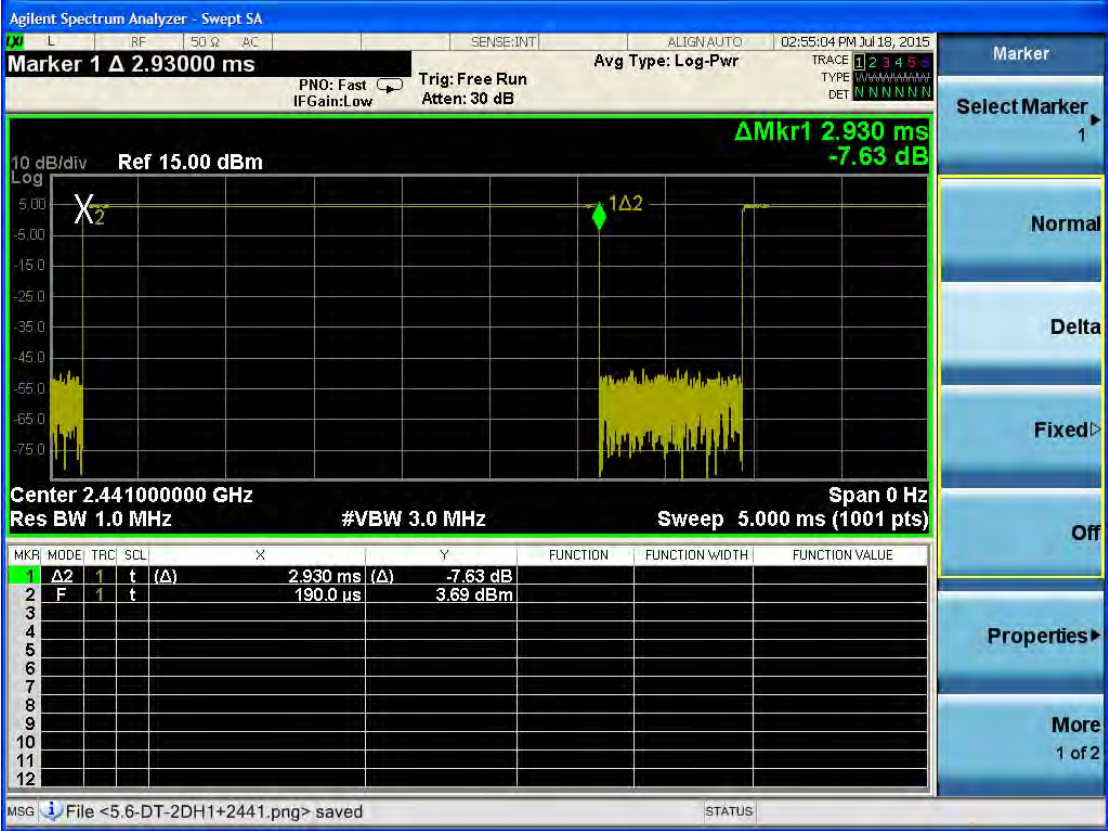
(1) DH1



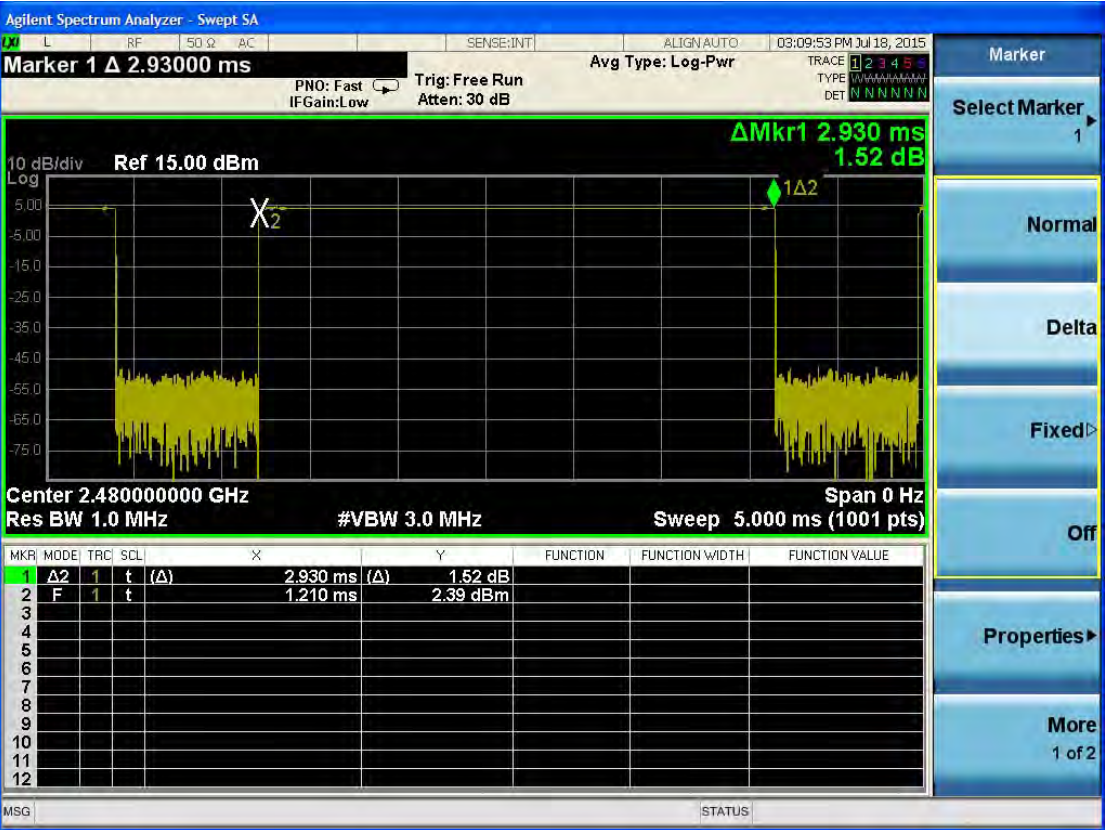
(2) DH3



(3) DH5

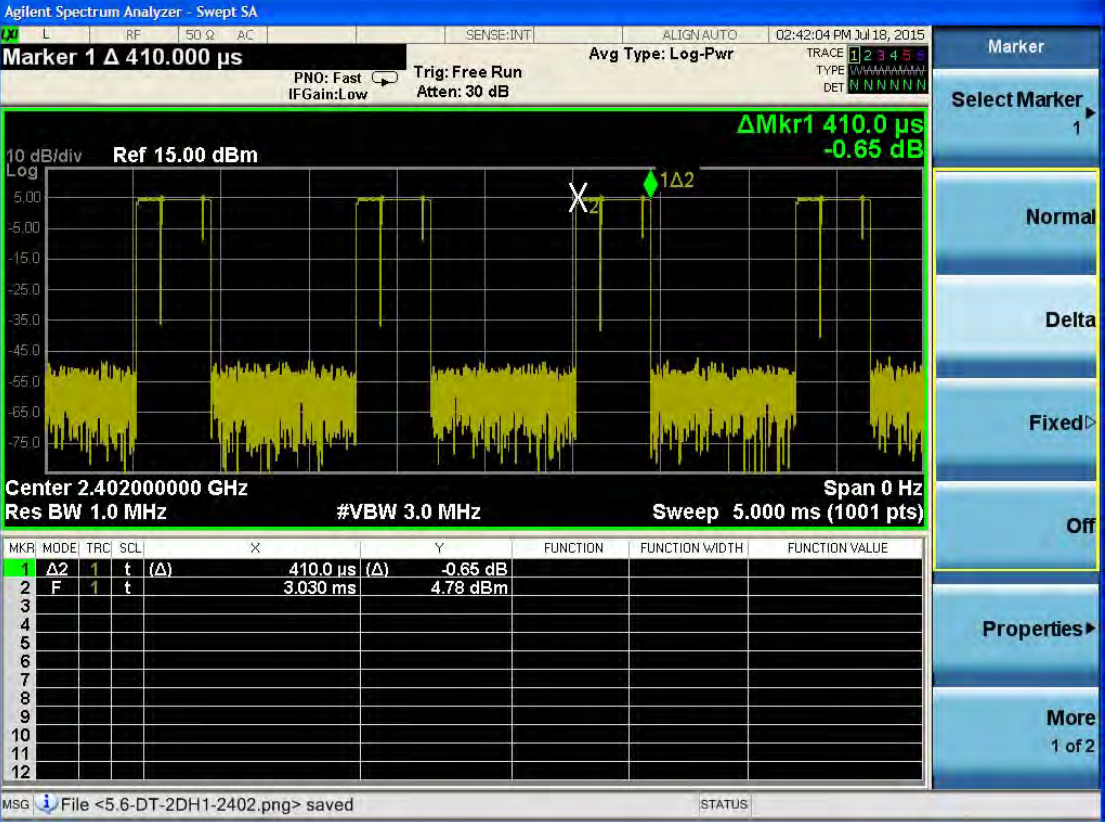


(3) DH5



4. Lowest channel (2.402 GHz):

(1) 2DH1



[illegible][illegible]

[illegible]

Agilent Spectrum Analyzer - Swept SA

RF 50 Ω AC SENSE:INT ALIGN:AUTO 10:52:04 AM Jul 28, 2015

Marker 1 Δ 2.92000 ms Avg Type: Log-Pwr

PNO: Wide IFGain:Low Trig: Free Run Atten: 30 dB

TRACE 1 2 3 4 5
TYPE
DET

ΔMkr1 2.920 ms
6.09 dB

10 dB/div Log Ref 15.00 dBm

Center 2.441000000 GHz Span 0 Hz
Res BW 100 kHz #VBW 300 kHz Sweep 5.000 ms (1001 pts)

MSG STATUS

Marker

Select Marker 1

Normal

Delta

Fixed

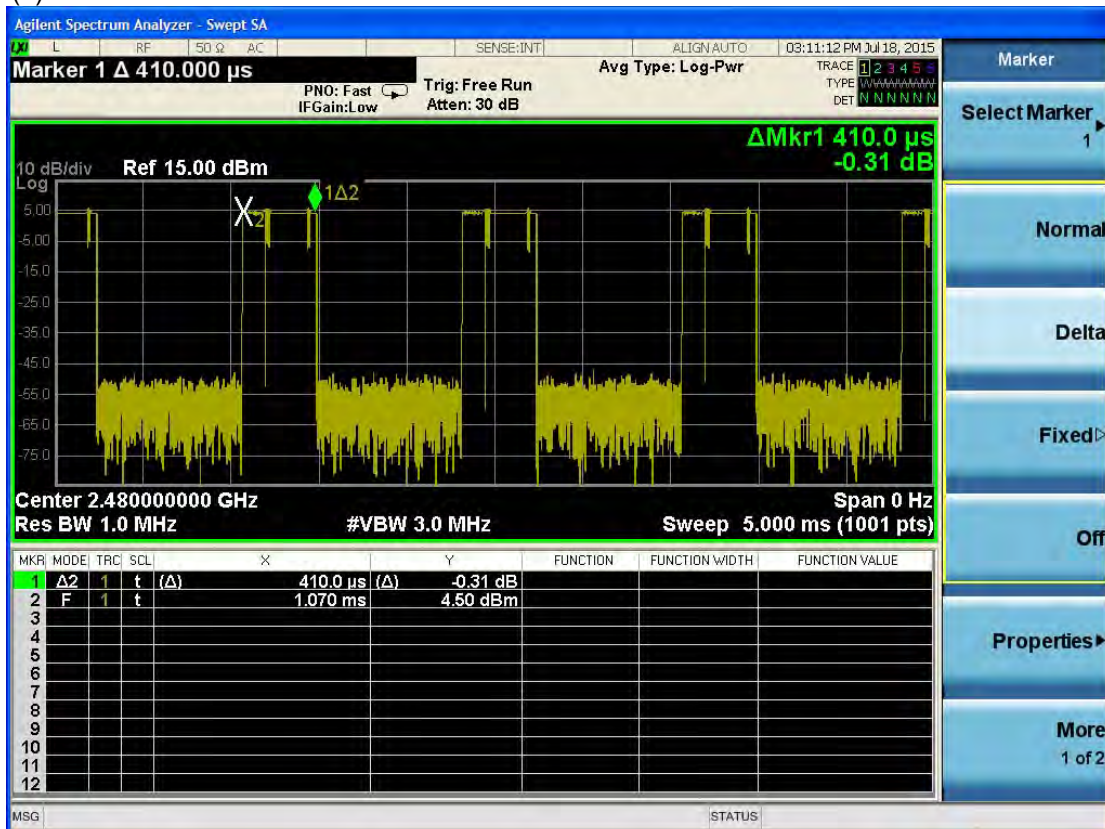
Off

Properties

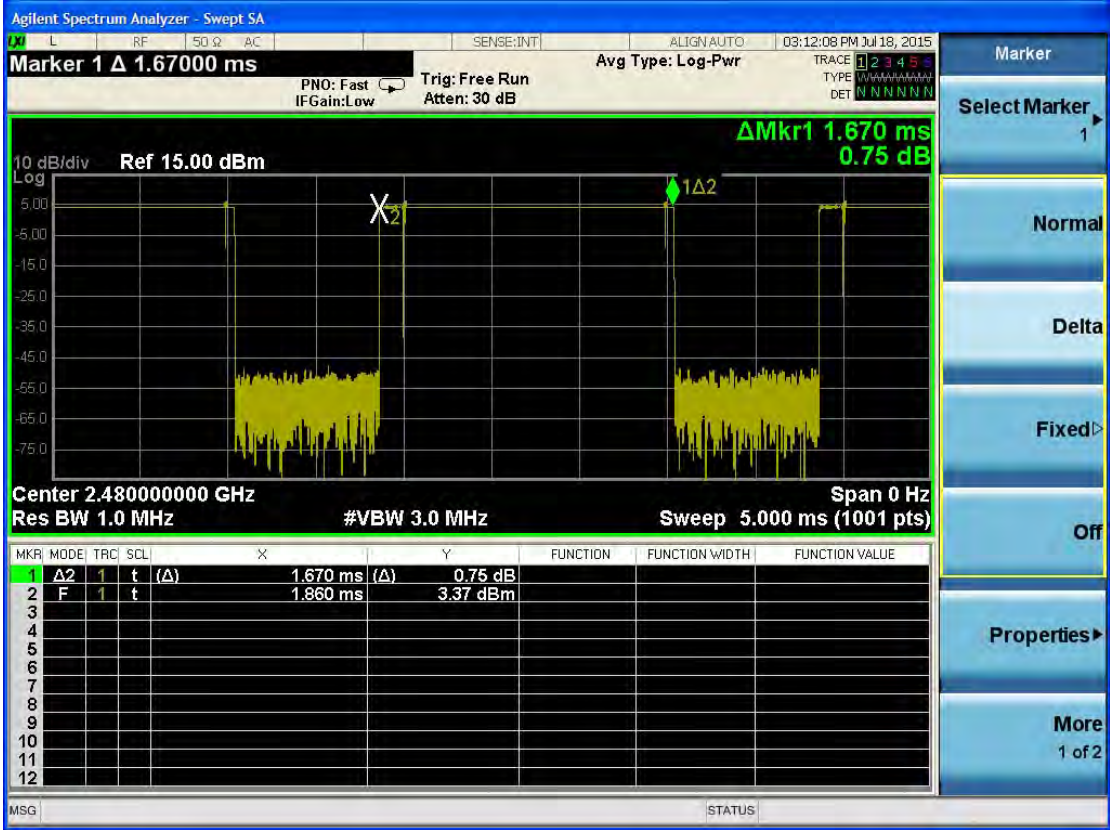
More

1 of 2

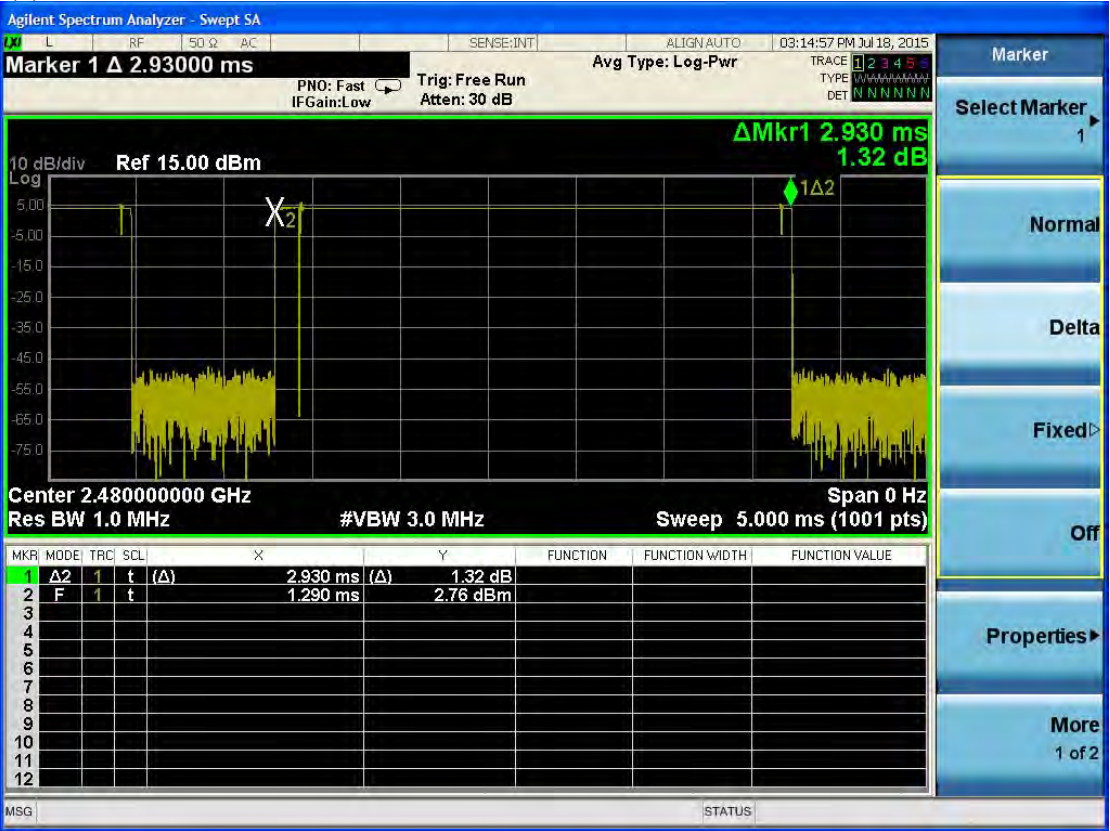
(1) 2DH1



(2) 2DH3

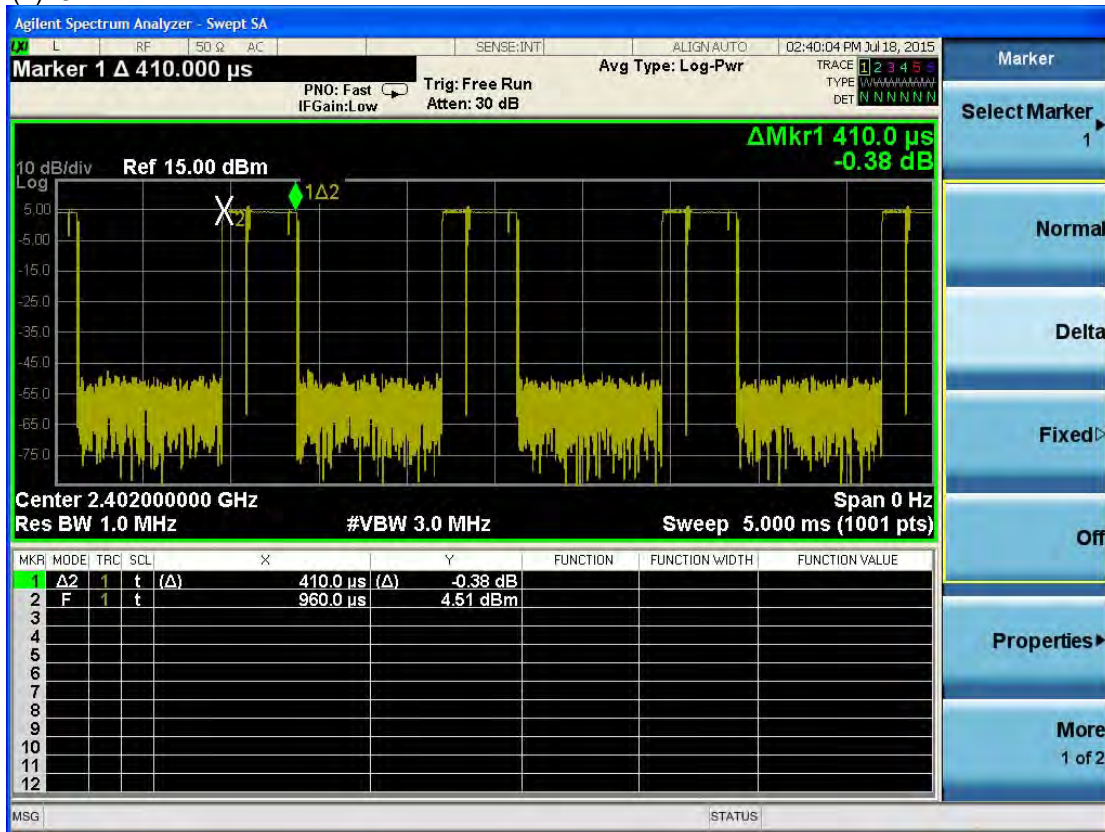


(3) 2DH5

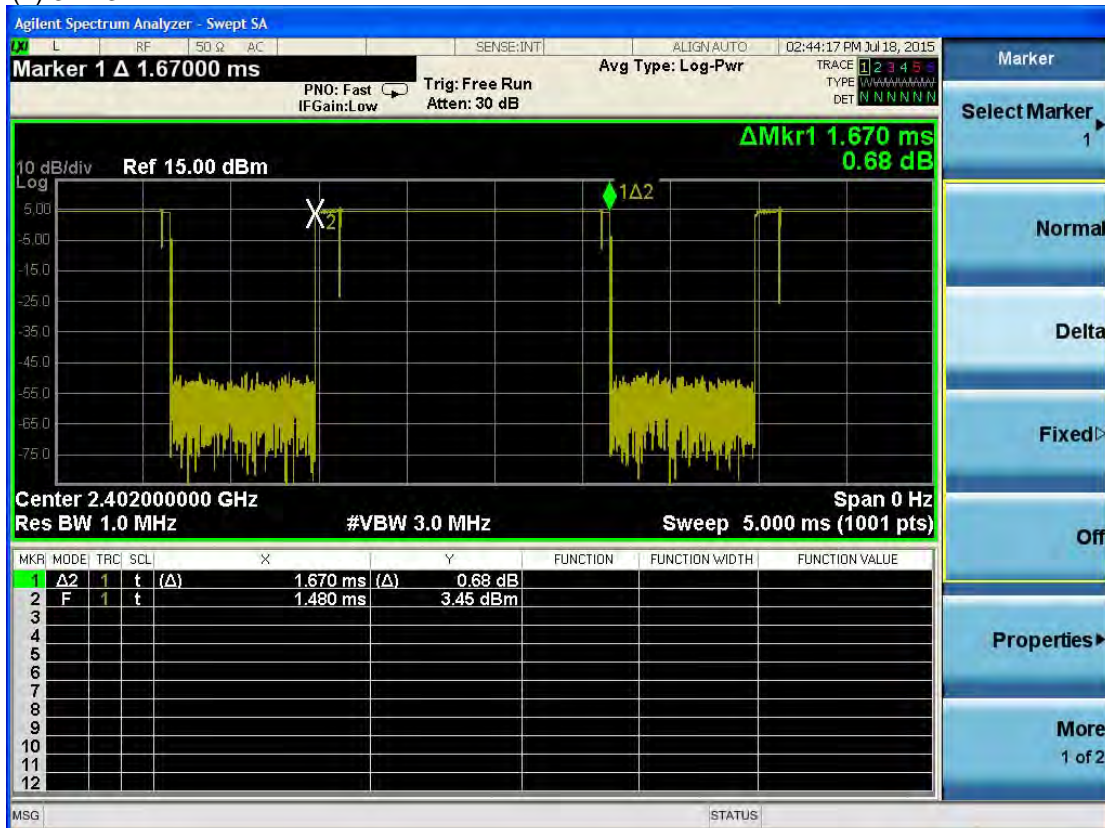


7. Lowest channel (2.402 GHz):

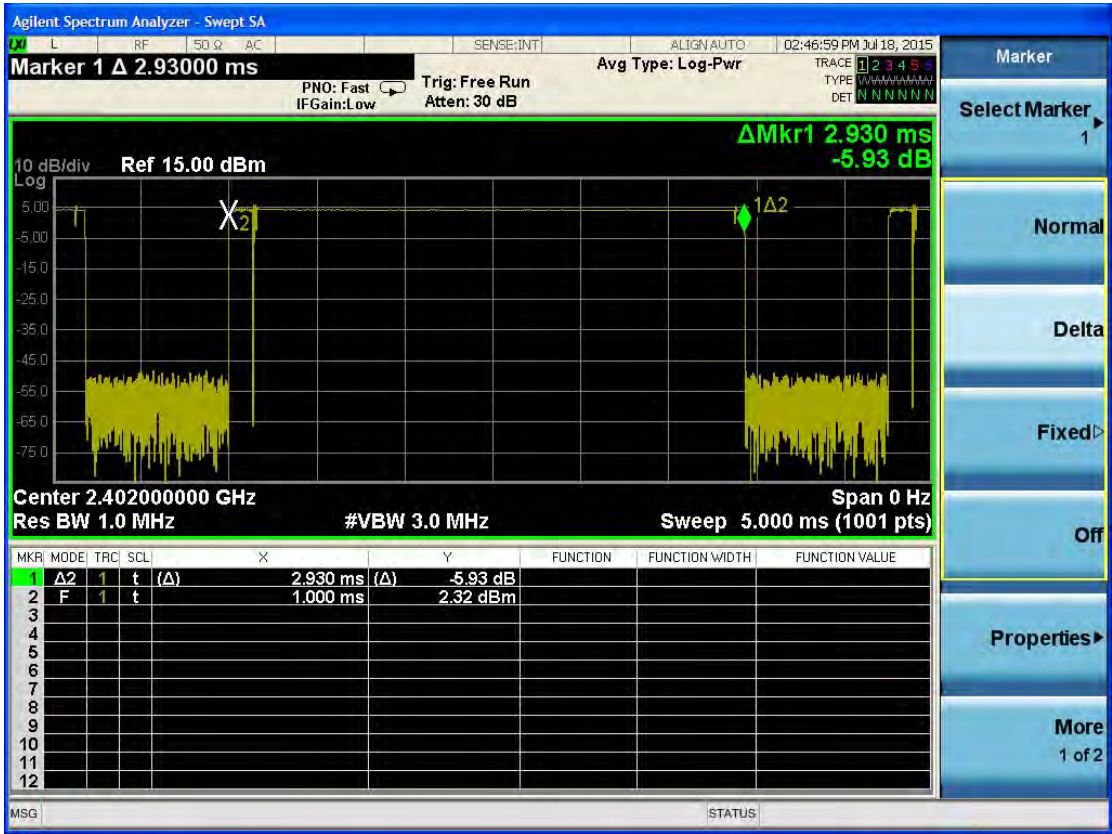
(1). 3DH1



(2) 3DH3

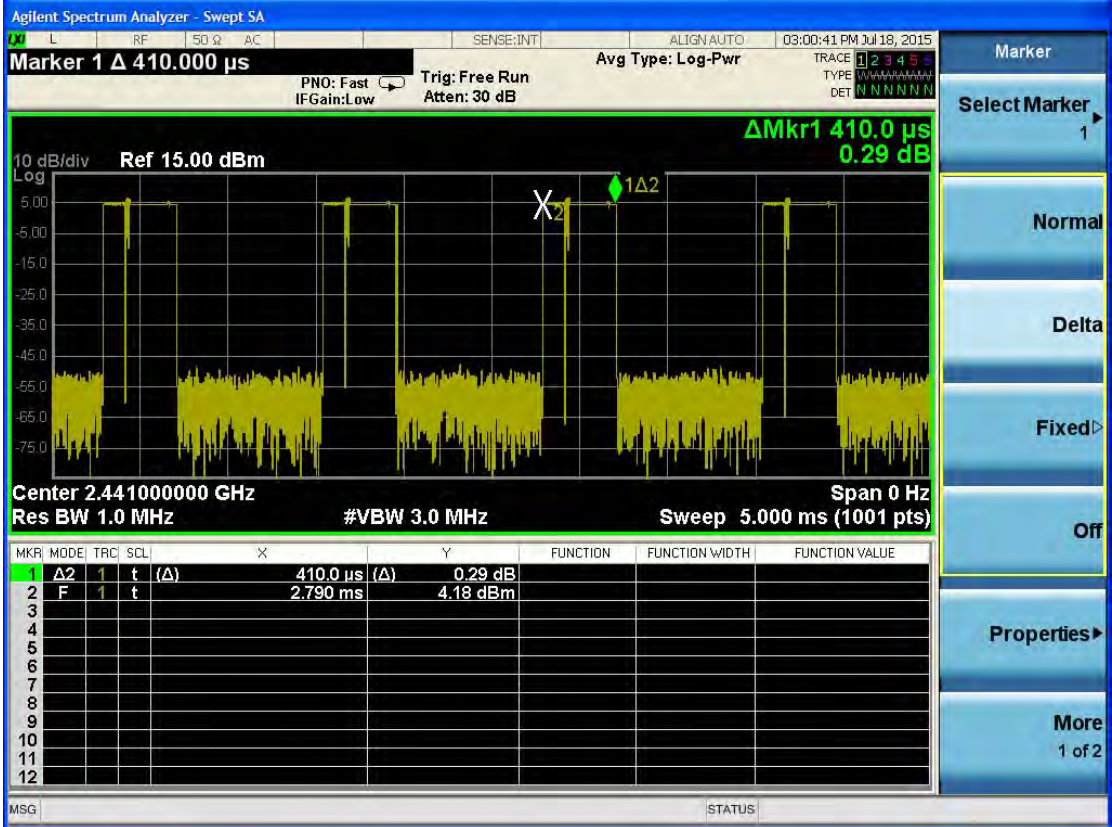


(3) 3DH5

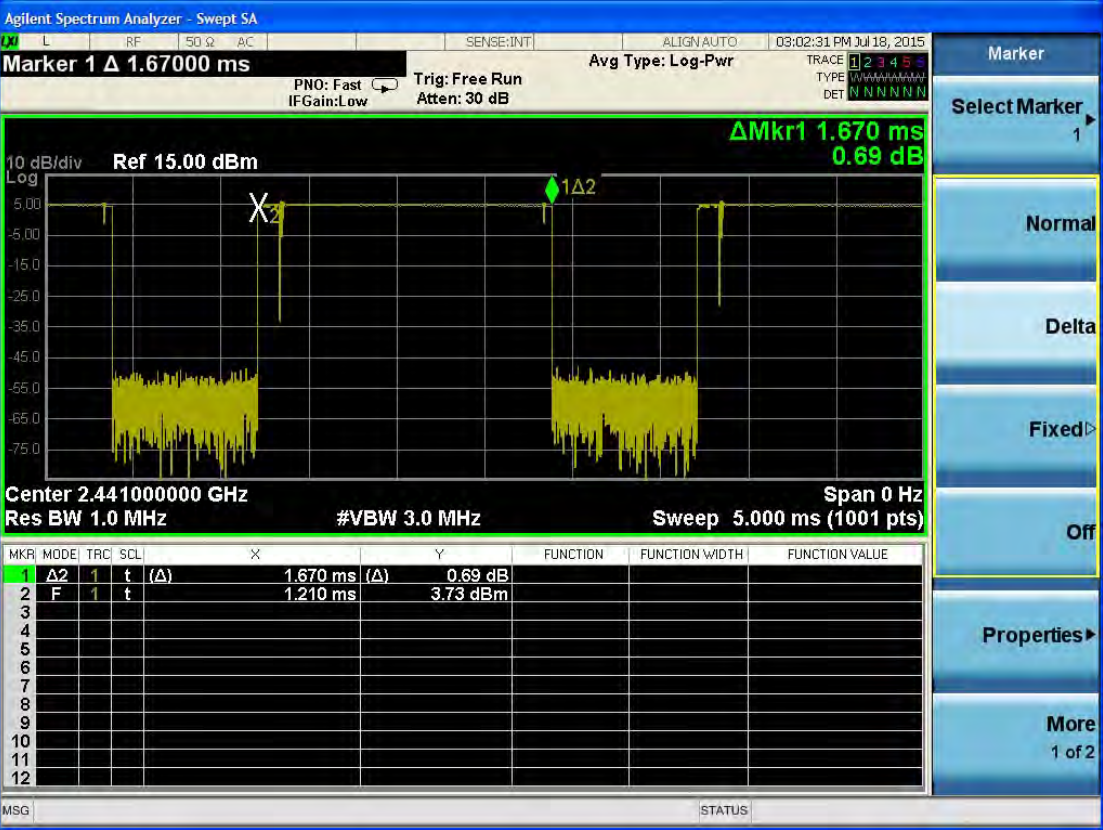


8. Middle channel (2.441 GHz):

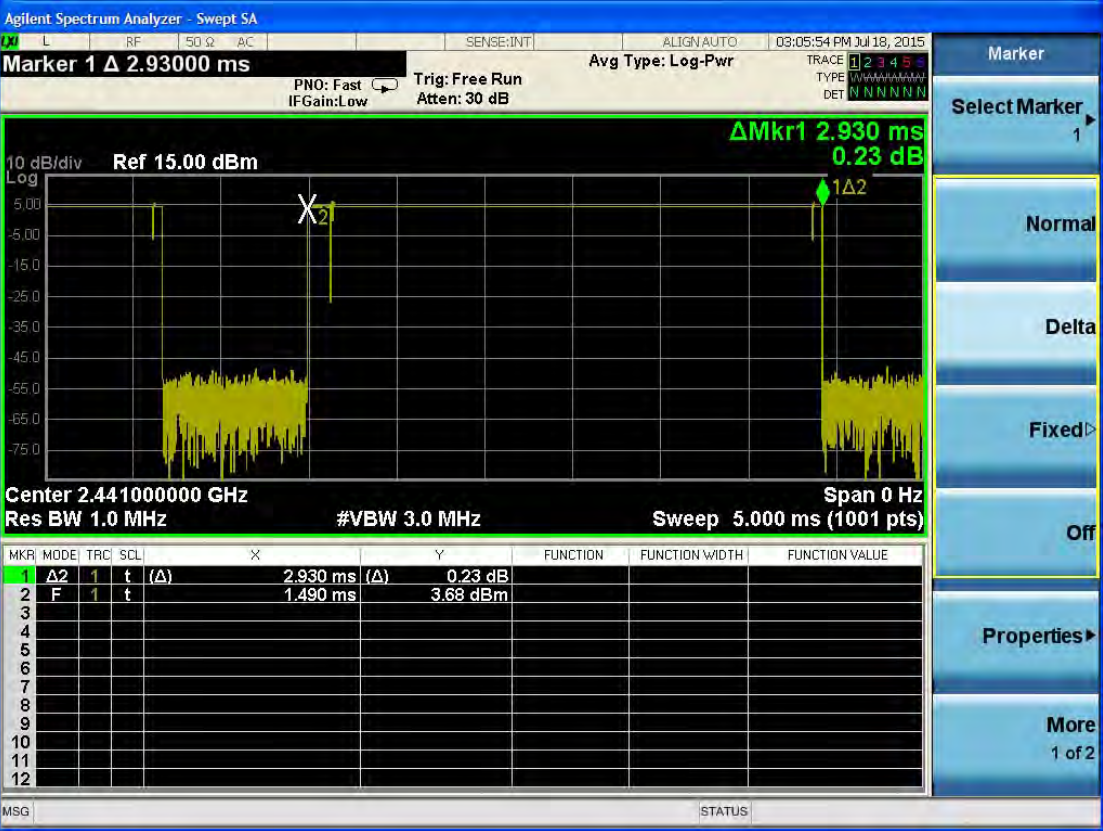
(1). 3DH1



(2) 3DH3

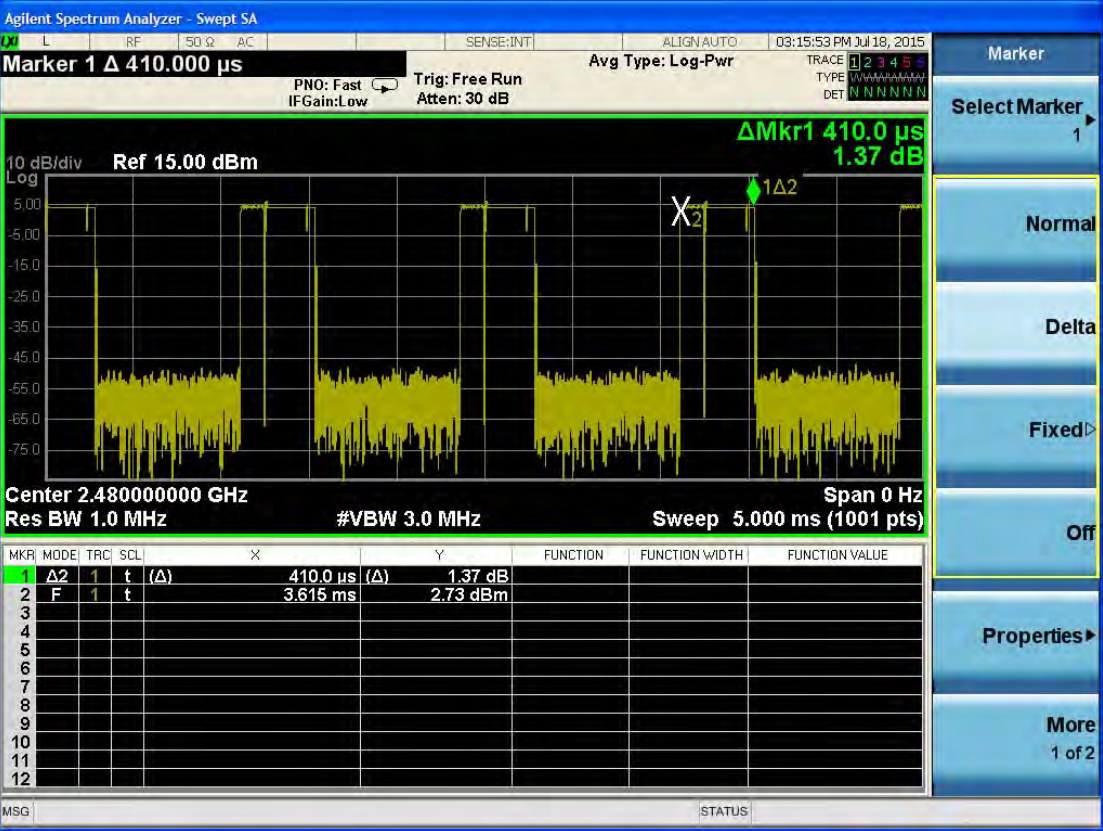


(3) 3DH5

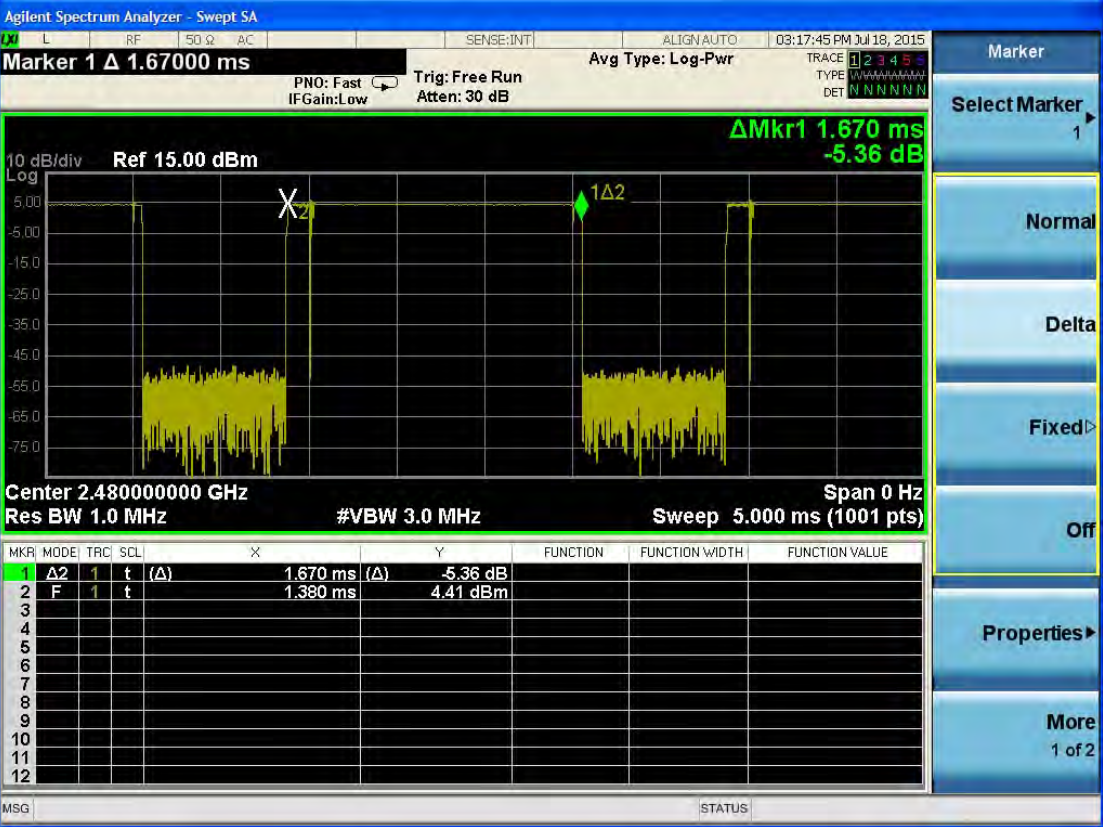


9. Highest channel (2.480 GHz):

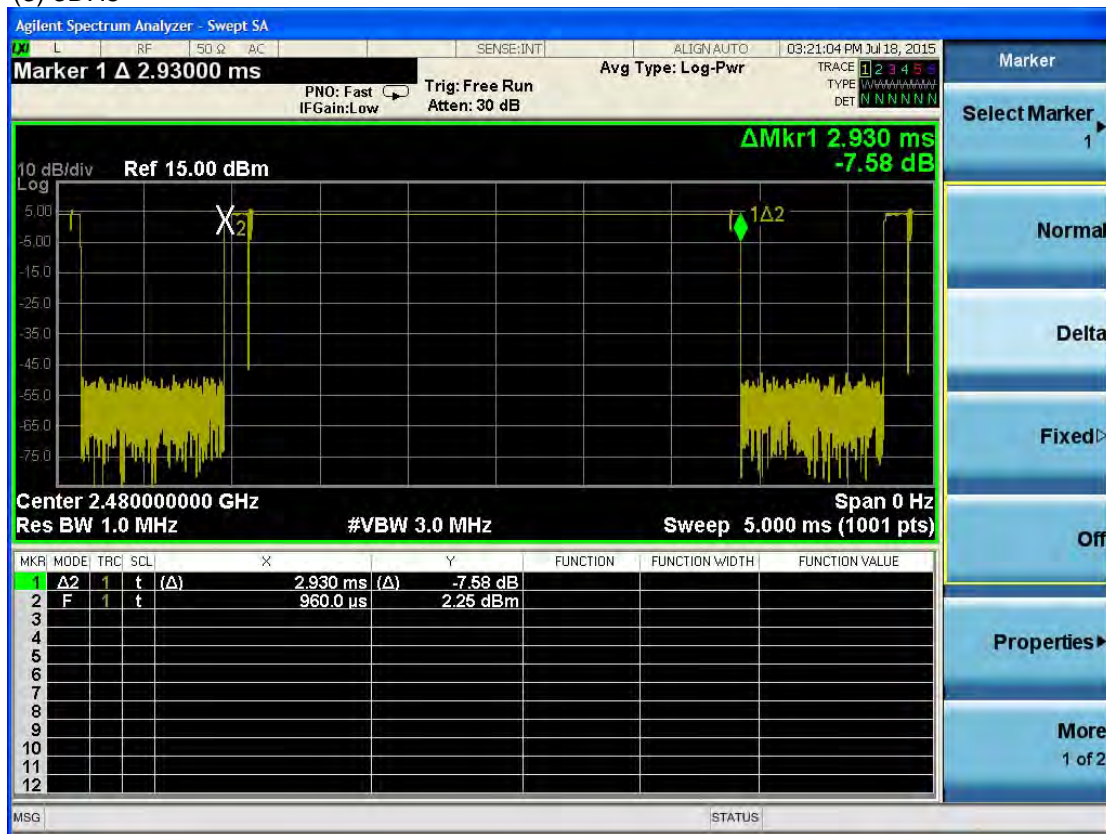
(1). 3DH1



(2) 3DH3



(3) 3DH5



Remark:

In communication data link mode (expect inquiry or page mode) the hopping rate is 1600 per second, the 79 channels will be randomly selected for RF channel, and each channel have equal probability to be selected. The hop selection scheme is defined in Clause 2.6 of Part B of Volume 2 of core specification of Bluetooth.

The Dwell time must be calculated via following formula:

Dwell time = Pulse wide x (Hopping rate / Number of channels) x Period

Period = 0.4 (seconds/ channel) x 79 (channel) = 31.6 seconds

So

Dwell time DH1= slot time * (1600/2/79) * 31.6

Dwell time DH3= slot time * (1600/4/79) * 31.6

Dwell time DH5= slot time * (1600/6/79) * 31.6

The RF channel will remain fixed for duration of a packet, that means for DH3 packet the RF frequency will remain unchanged during 3 slots (1slot=1/1600=625us), and for DH5 packet the RF frequency will remain unchanged during 5 slots, illustrated the principle as below:

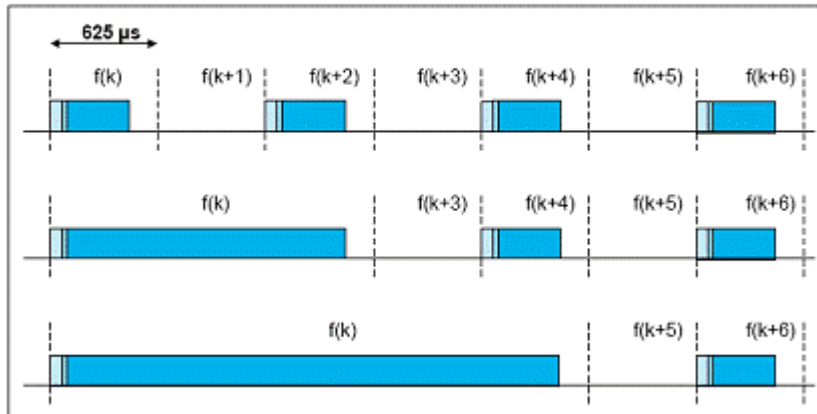


Figure 2.14: Single- and multi-slot packets.

Therefore, in a certain period for different packet types, the quantities of hops (not hopping rate 1600) are different, accurately, the quantity of hops for DH1 is double of DH3's and triple of DH5's. "for DH1 packet, 1 hop in 1 slot; for DH3 packet, $\frac{1}{2}$ hop in 1 slot; for DH5 packet, $\frac{1}{3}$ hop in 1 slot.", explained as below:

From the illustrated hopping scheme:

For DH1, in two slots, there are two hops, i.e. $f(k)$ in Slot(k), $f(k+1)$ in Slot(k+1), means DH1 1 hop in 1 slot;

For DH3, in four slots, there are two hops, i.e. $f(k)$ in Slot(k) & Slot(k+1) & Slot(k+2), $f(k+3)$ in Slot(k+3), means DH3 2 hops in four slots $\rightarrow \frac{1}{2}$ hop in 1 slot;

For DH5, in six slots, there are two hops, i.e. $f(k)$ in Slot(k) & Slot(k+1) & Slot(k+2) & Slot(k+3) & Slot(k+4), $f(k+5)$ in Slot(k+5), means DH3 2 hops in six slots $\rightarrow \frac{1}{3}$ hop in 1 slot.

The Hopping rate in the formula should not be fixed value, for DH1, it is $1600/2$; for DH3, it is $1600/4$; for DH5, it is $1600/6$.

To calculate Dwell time of data transmission of Bluetooth system, the worst case is for Bluetooth PICONET that contains two devices only (although Bluetooth PICONET can support up to eight devices), and for Bluetooth data transmission, after device A sending a packet to device B, device A must get response packet from device B to continue data transmission;

For DH1 packet: assume device A is EUT, the worst case is after device A sending a DH1 packet to device B, device A gets a DH1 response packet from device B, that means device A needs 1 time slot for transmitting and 1 time slot for receiving, therefore, the actual hopping rate of device A is half of 1600, i.e. 800 hops per second for EUT;

For DH3 packet: assume device A is EUT, the worst case is after device A sending a DH3 packet to device B, device A gets a DH1 response packet from device B, that means device A needs 3 time slots for transmitting and 1 time slot for receiving, therefore, the actual hopping rate of device A is quarter of 1600, i.e. 400 hops per second for EUT;

For DH5 packet: assume device A is EUT, the worst case is after device A sending a DH5 packet to device B, device A gets a DH1 response packet from device B, that means device A needs 5 time slots for transmitting and 1 time slot for receiving, therefore, the actual hopping rate of device A is sixth of 1600, i.e. $1600/6=266.7$ hops per second for EUT;

5.7 Maximum Peak Output Power

Test Requirement: FCC Part 15 C section 15.247

(b)(1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band:

0.125 watts.

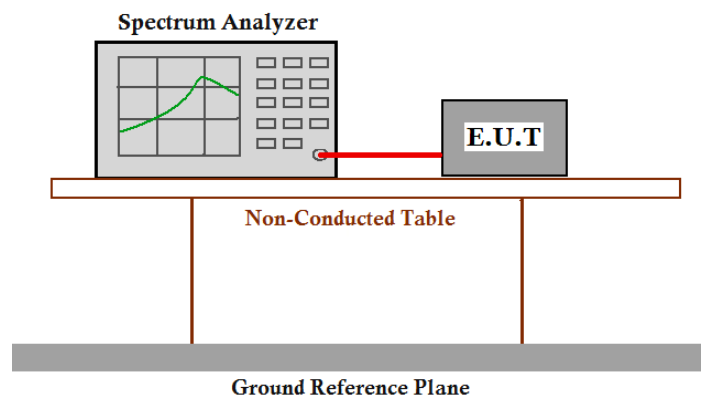
Refer to the result "Hopping channel number" of this document. The 1 watt (30.0 dBm) limit applies.

Test Method: ANSI C63.10:2009 Clause 6.10 & DA 00-705

Test Limit:

Test mode: Pre-test the EUT in continuous transmitting mode at the lowest, middle and highest channel with different data packet. Compliance test in continuous transmitting mode with normal (DH5), EDR mode (2DH5) and EDR mode (3DH5) as the worst case was found.

Test Configuration:



Test Procedure:

- 1 . Remove the antenna from the EUT and then connect a low attenuation RF cable from the antenna port to the spectrum.
- 2 . Set the spectrum analyzer: RBW = 3 MHz. VBW = 3 MHz. Sweep = auto; Detector Function = Peak.
- 3 . Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

| Test Result: (For Bluetooth) | | | | |
|--|------------------------------------|---------------------------|--------------------|---------------|
| Normal mode: | | | | |
| Test Channel | Fundamental Frequency (MHz) | Output Power (dBm) | Limit (dBm) | Result |
| Lowest | 2402 | 5.117 | 30 | Pass |
| Middle | 2441 | 5.436 | 30 | Pass |
| Highest | 2480 | 5.191 | 30 | Pass |
| EDR mode(2DH5): | | | | |
| Test Channel | Fundamental Frequency (MHz) | Output Power (dBm) | Limit (dBm) | Result |
| Lowest | 2402 | 6.937 | 30 | Pass |
| Middle | 2441 | 7.241 | 30 | Pass |
| Highest | 2480 | 7.024 | 30 | Pass |
| EDR mode(3DH5): | | | | |
| Test Channel | Fundamental Frequency | Output Power (dBm) | Limit (dBm) | Result |
| Lowest | 2402 | 6.855 | 30 | Pass |
| Middle | 2441 | 7.178 | 30 | Pass |
| Highest | 2480 | 6.948 | 30 | Pass |
| Remark: cable loss=0.5dB | | | | |
| Test result: The unit does meet the FCC requirements. | | | | |
| Test result plot as follows: | | | | |

For bluetooth

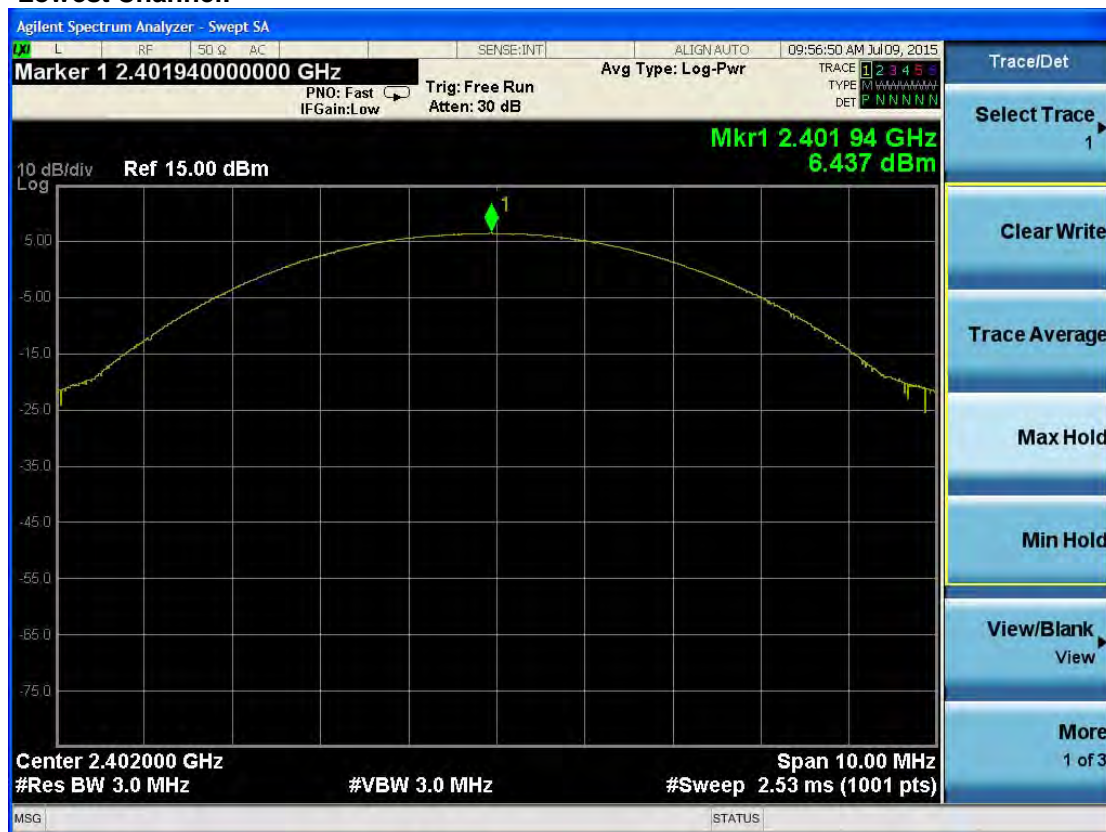
Normal mode:

Lowest Channel:



Middle Channel:



Highest Channel:**EDR mode (2DH5):****Lowest Channel:**

Middle Channel:



Highest Channel:



**EDR mode (3DH5):
Lowest Channel:****Middle Channel:**

Highest Channel:

5.8 Conducted Spurious Emissions

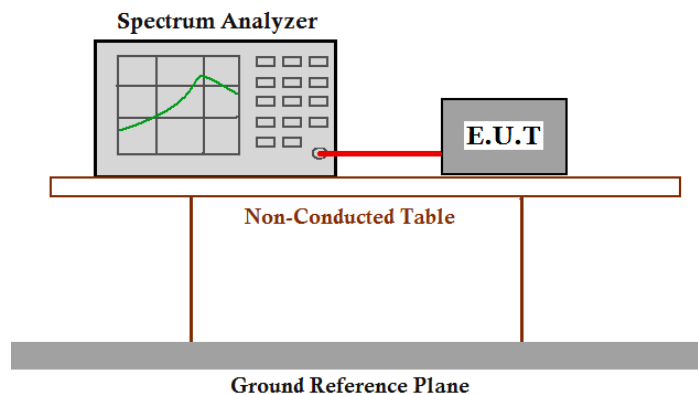
Test Requirement: FCC Part15 C section 15.247

(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.

Test Method: ANSI C63.10:2009 Clause 6.7 & DA 00-705

Test Status: Pre-test the EUT in continuous transmitting mode at the lowest, middle and highest channel with different data packet. Compliance test in continuous transmitting mode with normal (DH5), EDR mode (2DH5) and EDR mode (3DH5) as the worst case was found.

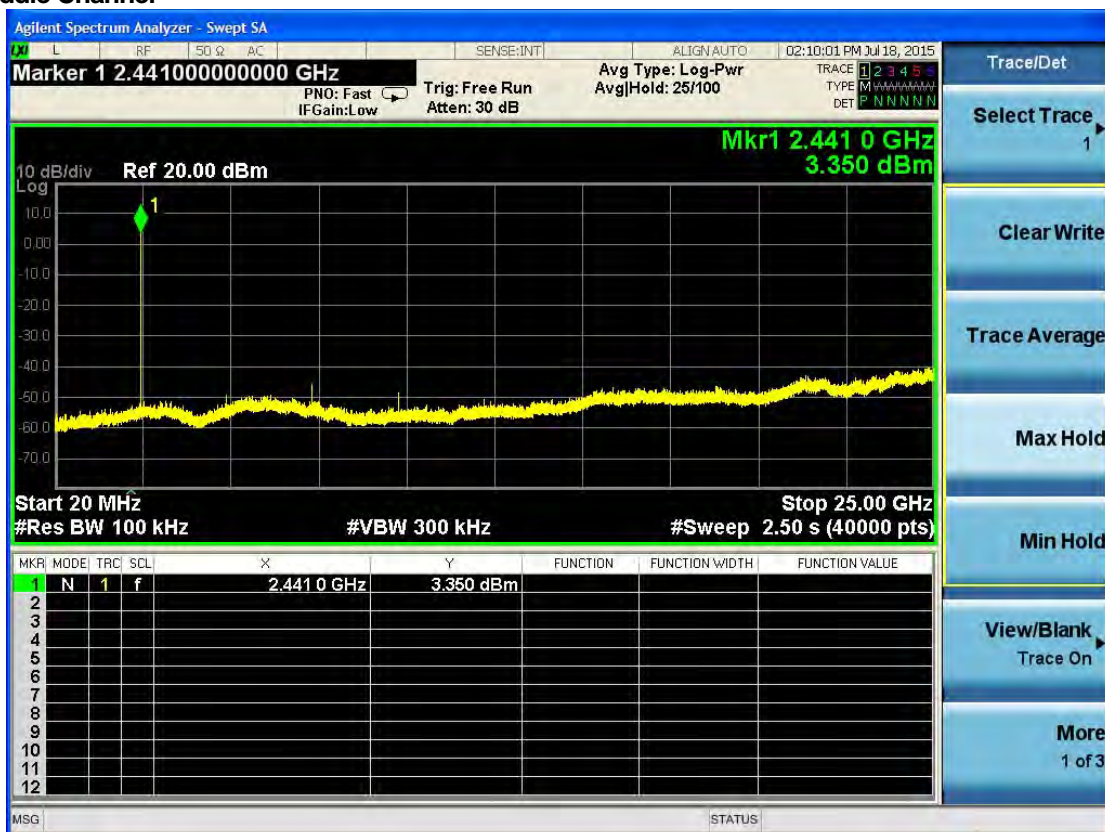
Test Configuration:



Test Procedure:

1. Remove the antenna from the EUT and then connect a low attenuation RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 100 kHz. VBW \geq RBW. Sweep = auto; Detector Function = Peak (Max. hold).

Test result plot as follows (Normal mode):
Lowest Channel:



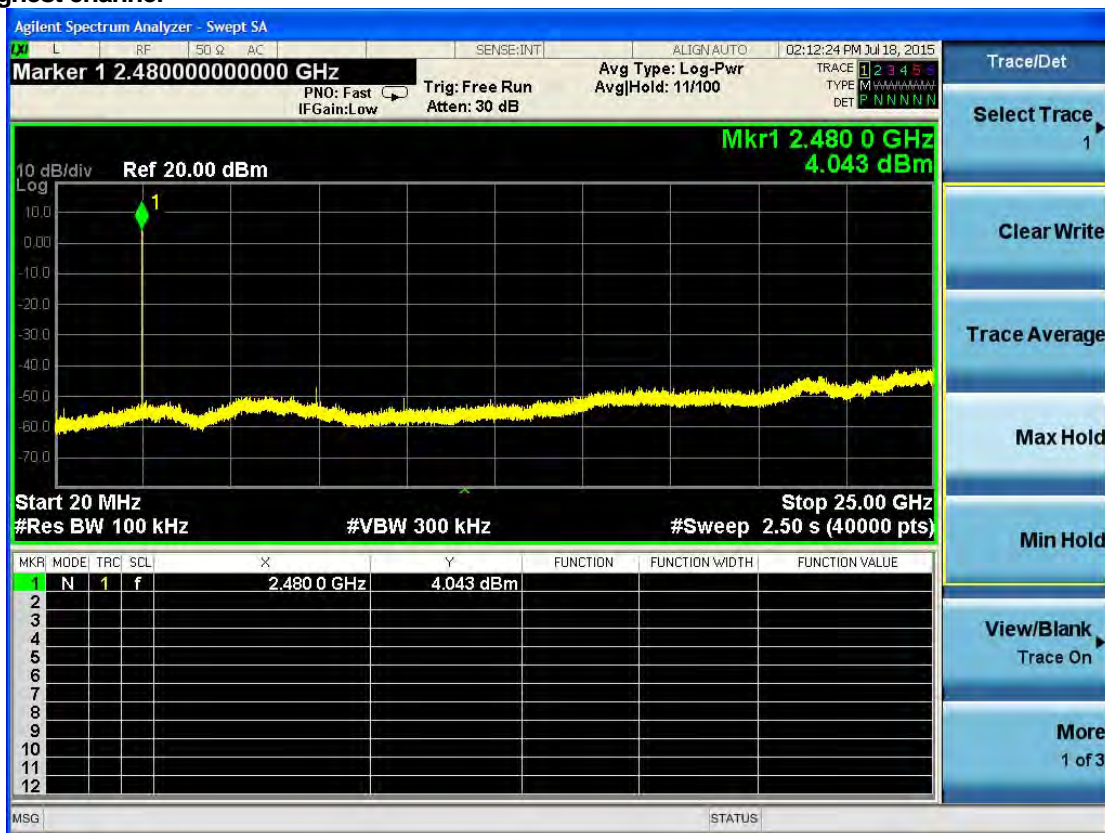
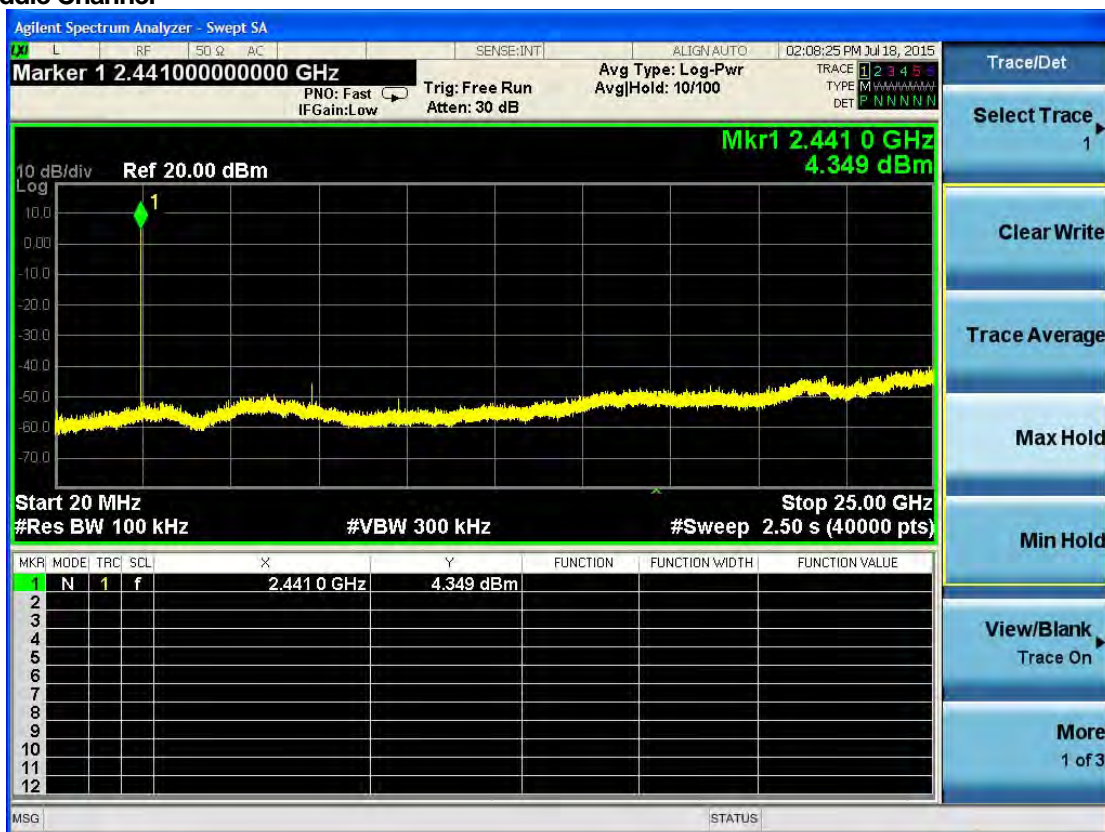
Highest channel



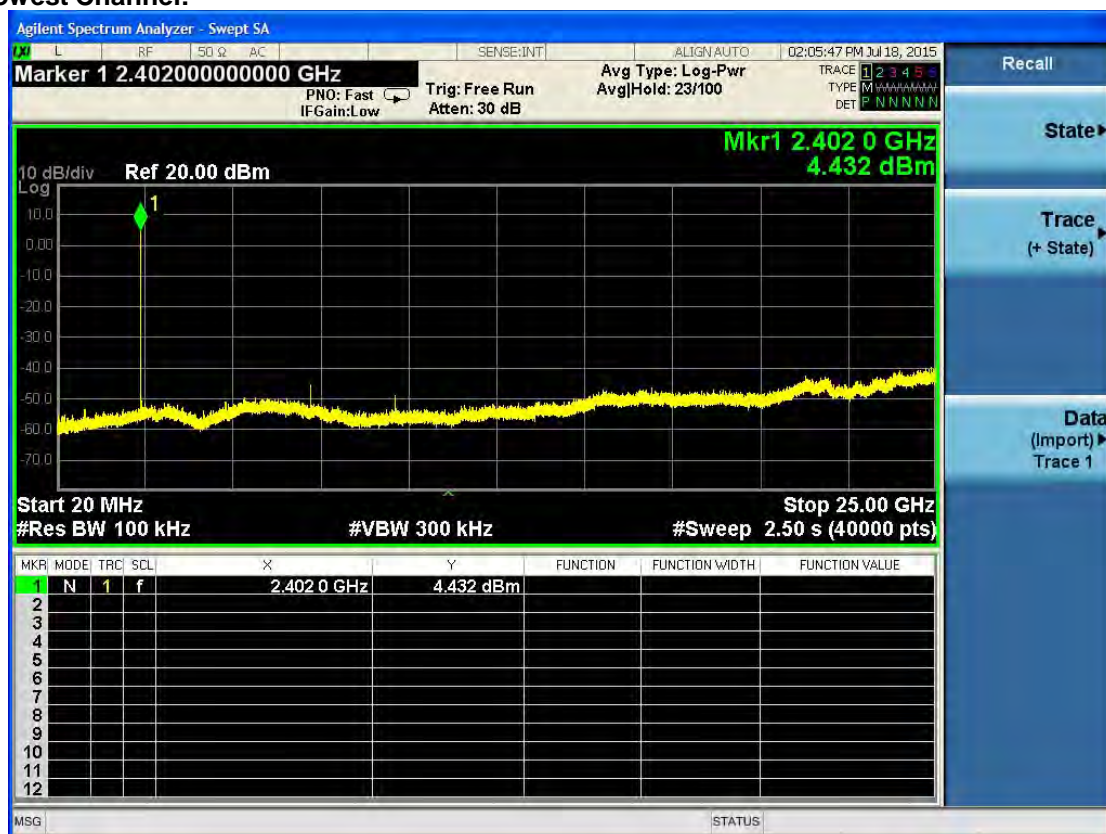
Test result plot as follows (EDR mode-2DH5):

Lowest Channel:

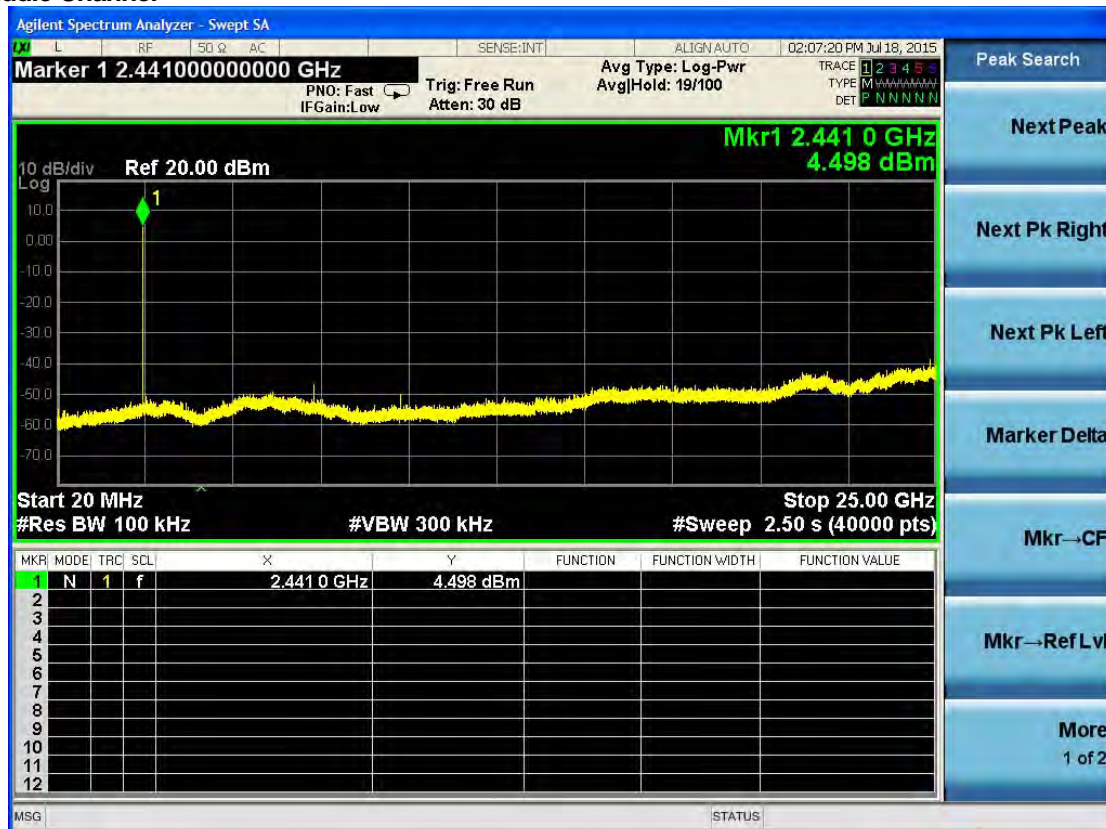


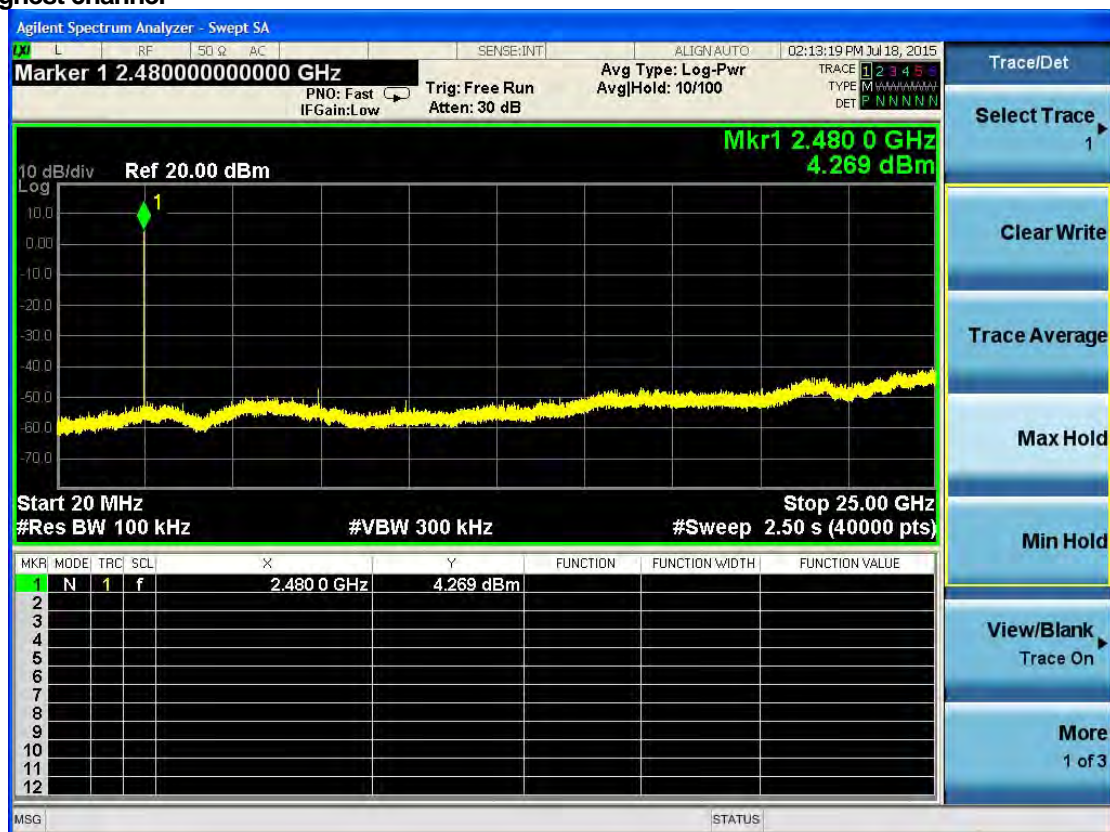


Lowest Channel:



Middle Channel



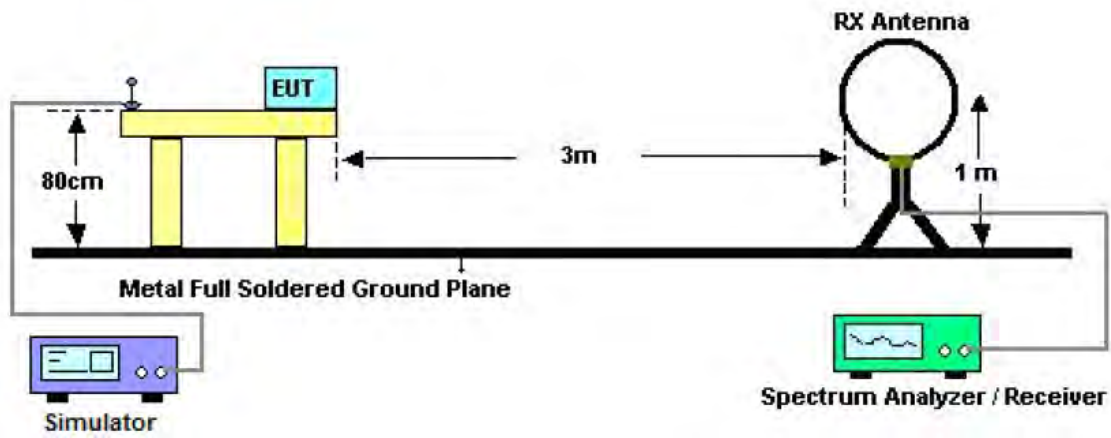


5.9 Radiated Spurious Emissions

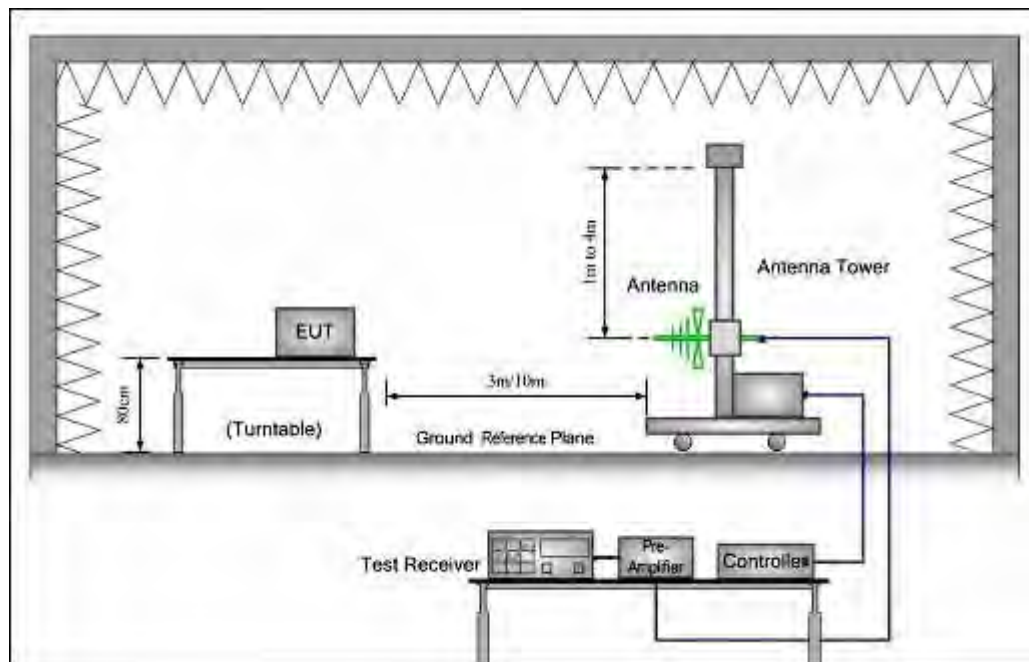
| | |
|--------------------------|--|
| Test Requirement: | FCC Part15 C section 15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating. The radio frequency power that is produced by the intentional radiator 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, and provided the transmitter demonstrates compliance with the peak conducted power limits. |
| Test Method: | ANSI C63.10:2009 Clause 6.4, 6.5 and 6.6 & DA 00-705 |
| Test Status: | Pre-test the EUT in continuous transmitting mode at the lowest, middle and highest channel with different data packet. Compliance test in continuous transmitting mode with normal mode (DH5) as the worst case was found. |
| Detector: | For PK value: RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz, 9kHz for <30 MHz VBW \geq RBW Sweep = auto Detector function = peak Trace = max hold For AV value: RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz, 9kHz for <30 MHz VBW =10 Hz Sweep = auto Detector function = peak Trace = max hold |
| 15.209 Limit: | 40.0 dB μ V/m between 30MHz & 88MHz 43.5 dB μ V/m between 88MHz & 216MHz 46.0 dB μ V/m between 216MHz & 960MHz 54.0 dB μ V/m above 960MHz |

Test Configuration:

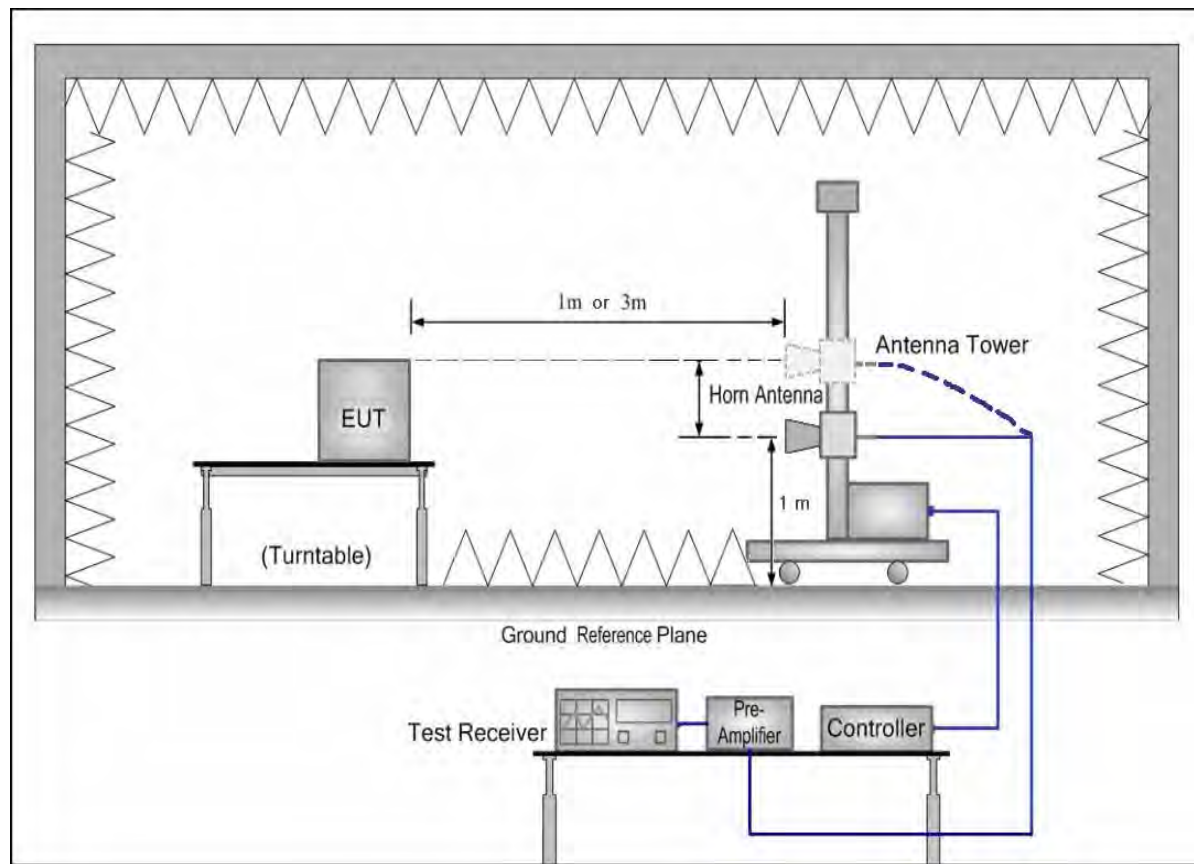
- 1) 9kHz to 30MHz emissions:



- 2) 30 MHz to 1 GHz emissions:



3) 1 GHz to 40 GHz emissions:



Test Procedure: The procedure used was ANSI Standard C63.4:2003. The receiver was scanned from 30MHz to 25GHz. When an emission was found, the table was rotated to produce the maximum signal strength. An initial pre-scan was performed for in peak detection mode using the receiver. The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. After pre-test, it was found that the worse radiation emission was get at the X position. So the data shown was the X position only. The worst case emissions were reported.

Now set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from $20\log(\text{dwell time}/100 \text{ ms})$, in an effort to demonstrate compliance with the 15.209 limit.

Submit this data.

5.9.1 Harmonic and other spurious emissions

Test at low Channel in transmitting status

9kHz~30MHz Test result

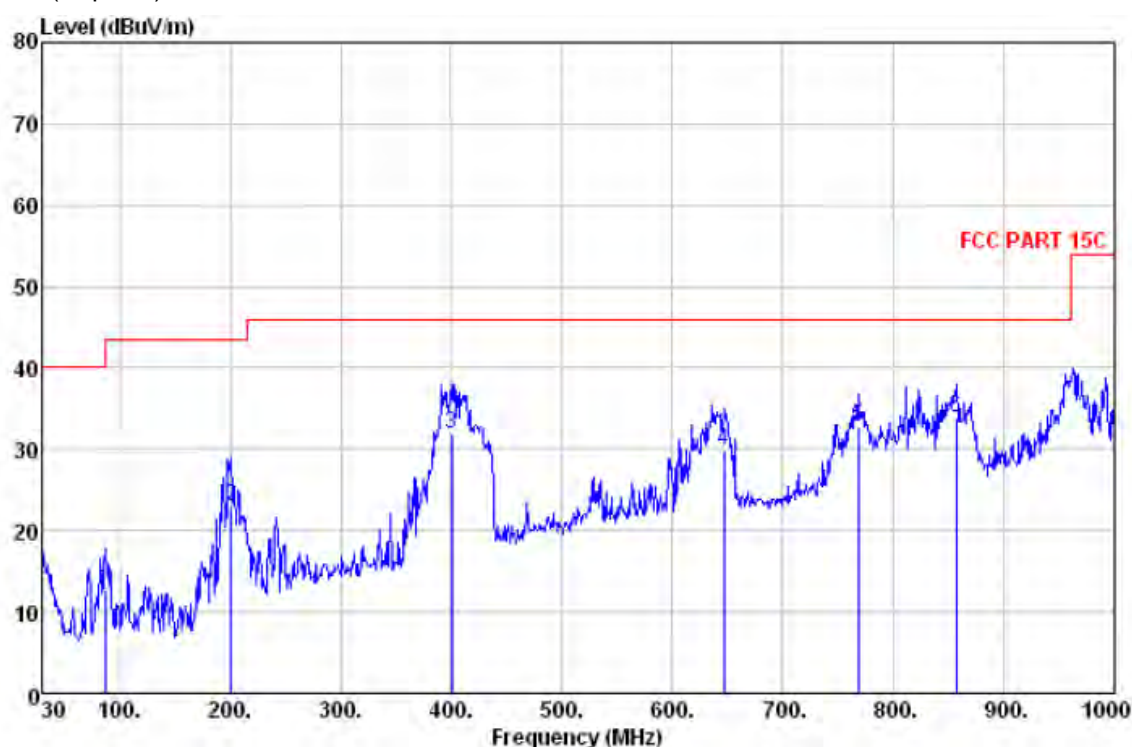
The Low frequency, which started from 9kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not report

30 MHz~1 GHz Spurious Emissions .Quasi-Peak Measurement

Horizontal:

Peak scan

Level (dBμV/m)



Quasi-peak measurement

| No. | Freq MHz | Level dBμV/m | Remark | Antenna Factor dB/m | Cable Loss dB | Limit Line dBμV/m | Margin dB | A/pos cm | I/pos deg |
|-----|-------------|-----------------|--------|---------------------------|---------------------|-------------------------|--------------|-------------|--------------|
| 1 | 87.230 | 12.73 | QP | 7.93 | 1.09 | 40.00 | -27.27 | 100 | 123 |
| 2 | 200.720 | 23.03 | QP | 8.93 | 1.71 | 43.50 | -20.47 | 100 | 188 |
| 3 | 400.540 | 31.91 | QP | 16.01 | 2.45 | 46.00 | -14.09 | 100 | 178 |
| 4 | 646.920 | 29.88 | QP | 20.78 | 3.19 | 46.00 | -16.12 | 200 | 179 |
| 5 | 768.170 | 32.77 | QP | 22.08 | 3.49 | 46.00 | -13.23 | 200 | 131 |
| 6 | 856.440 | 33.98 | QP | 23.18 | 3.70 | 46.00 | -12.02 | 200 | 164 |

Level=Read Level + Antenna Factor + Cable Loss

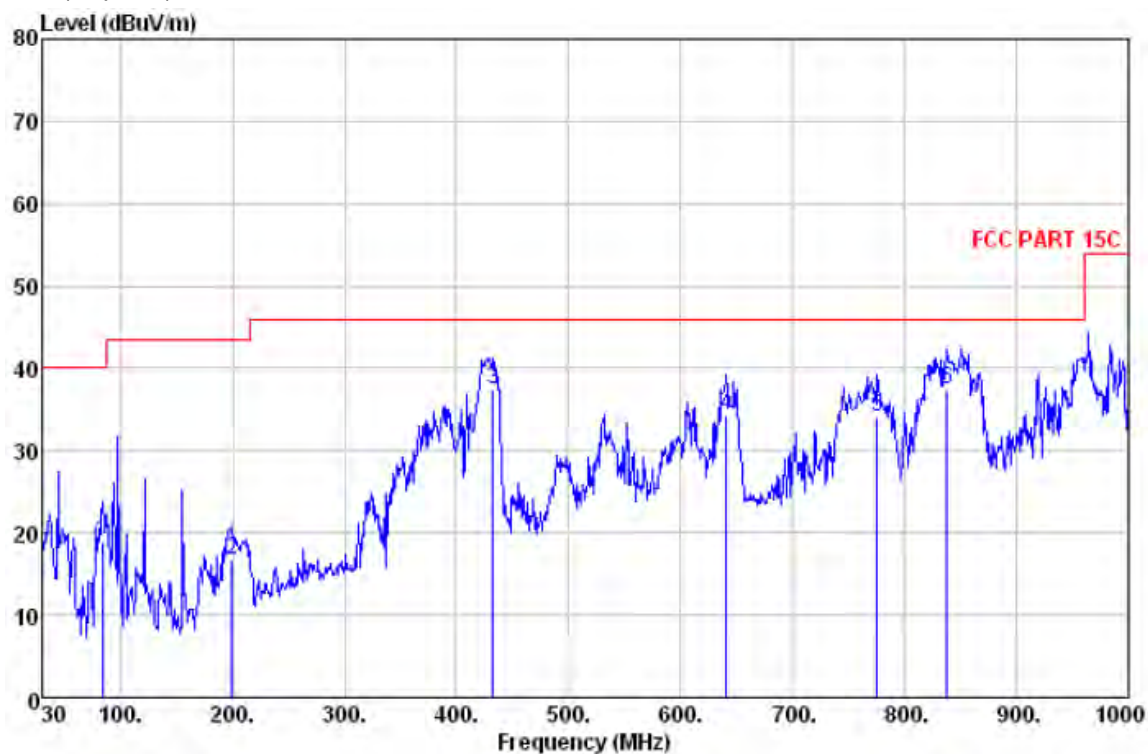
Test at low Channel in transmitting status

30 MHz~1 GHz Spurious Emissions .Quasi-Peak Measurement

Vertical:

Peak scan

Level (dBμV/m)



Quasi-peak measurement

| No. | Freq MHz | Level dBμV/m | Remark | Antenna Factor dB/m | Cable Loss dB | Limit Line dBμV/m | Margin dB | A/pos cm | I/pos deg |
|-----|-------------|-----------------|--------|---------------------------|---------------------|-------------------------|--------------|-------------|--------------|
| 1 | 83.350 | 18.84 | QP | 7.60 | 1.06 | 40.00 | -21.16 | 100 | 123 |
| 2 | 199.750 | 16.64 | QP | 8.87 | 1.70 | 43.50 | -26.86 | 100 | 165 |
| 3 | 432.550 | 37.33 | QP | 16.60 | 2.57 | 46.00 | -8.67 | 100 | 132 |
| 4 | 641.100 | 34.31 | QP | 20.54 | 3.17 | 46.00 | -11.69 | 200 | 345 |
| 5 | 775.930 | 34.14 | QP | 22.16 | 3.50 | 46.00 | -11.86 | 200 | 145 |
| 6 | 838.010 | 37.39 | QP | 22.92 | 3.66 | 46.00 | -8.61 | 200 | 186 |

Level=Read Level + Antenna Factor + Cable Loss

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Peak Measurement:

| Frequency (MHz) | Antenna factors (dB/m) | Cable loss (dB) | Preamp factor (dB) | Reading Level (dBμV) | Emission Level (dBμV/m) | Limit (dBμV/m) | Antenna polarization |
|-----------------|------------------------|-----------------|--------------------|----------------------|-------------------------|----------------|----------------------|
| 4804.000 | 34.32 | 9.59 | 27.62 | 36.34 | 52.63 | 74.00 | V |
| 7206.000 | 34.88 | 12.15 | 27.33 | 36.11 | 55.81 | 74.00 | V |
| 9608.000 | 37.72 | 14.41 | 27.14 | 37.06 | 62.05 | 74.00 | V |
| 4804.000 | 34.32 | 9.59 | 27.62 | 37.45 | 53.74 | 74.00 | H |
| 7206.000 | 34.88 | 12.15 | 27.33 | 36.59 | 56.29 | 74.00 | H |
| 9608.000 | 37.72 | 14.41 | 27.14 | 36.95 | 61.94 | 74.00 | H |

Average Measurement:

| Frequency (MHz) | Antenna factors (dB/m) | Cable loss (dB) | Preamp factor (dB) | Reading Level (dBμV) | Emission Level (dBμV/m) | Limit (dBμV/m) | Antenna polarization |
|-----------------|------------------------|-----------------|--------------------|----------------------|-------------------------|----------------|----------------------|
| 4804.000 | 34.32 | 9.59 | 27.62 | 22.64 | 38.93 | 54.00 | V |
| 7206.000 | 34.88 | 12.15 | 27.33 | 21.32 | 41.02 | 54.00 | V |
| 9608.000 | 37.72 | 14.41 | 27.14 | 22.33 | 47.32 | 54.00 | V |
| 4804.000 | 34.32 | 9.59 | 27.62 | 22.95 | 39.24 | 54.00 | H |
| 7206.000 | 34.88 | 12.15 | 27.33 | 23.61 | 43.31 | 54.00 | H |
| 9608.000 | 37.72 | 14.41 | 27.14 | 21.54 | 46.53 | 54.00 | H |

Test at Middle Channel in transmitting status

9kHz~30MHz Test result

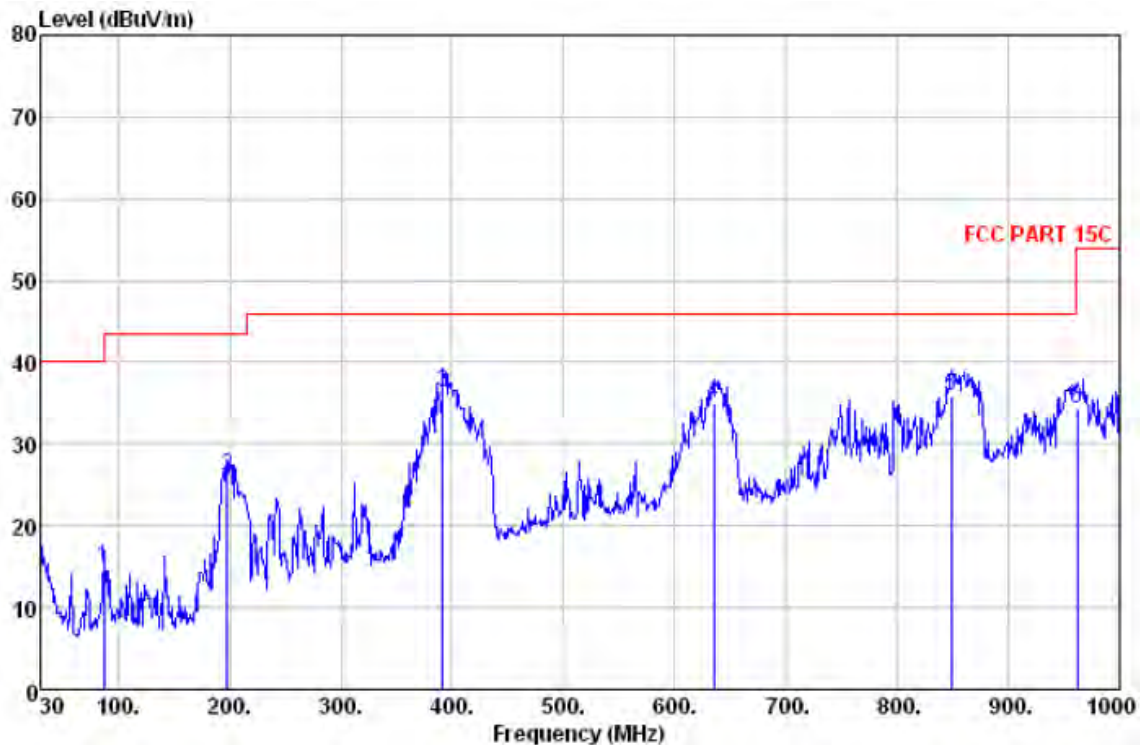
The Low frequency, which started from 9kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not report

30 MHz~1 GHz Spurious Emissions .Quasi-Peak Measurement

Horizontal:

Peak scan

Level (dBμV/m)



Quasi-peak measurement

| No. | Freq MHz | Level dBμV/m | Remark | Antenna Factor dB/m | Cable Loss dB | Limit Line dBμV/m | Margin dB | A/pos cm | T/pos deg |
|-----|-------------|-----------------|--------|---------------------------|---------------------|-------------------------|--------------|-------------|--------------|
| 1 | 87.230 | 14.96 | QP | 7.93 | 1.09 | 40.00 | -25.04 | 100 | 186 |
| 2 | 197.810 | 26.14 | QP | 8.64 | 1.70 | 43.50 | -17.36 | 100 | 123 |
| 3 | 391.810 | 36.32 | QP | 15.67 | 2.42 | 46.00 | -9.68 | 100 | 225 |
| 4 | 635.280 | 34.99 | QP | 20.36 | 3.16 | 46.00 | -11.01 | 200 | 322 |
| 5 | 848.680 | 35.97 | QP | 23.42 | 3.68 | 46.00 | -10.03 | 200 | 122 |
| 6 | 962.170 | 34.37 | QP | 23.98 | 3.93 | 54.00 | -19.63 | 200 | 341 |

Level=Read Level + Antenna Factor + Cable Loss

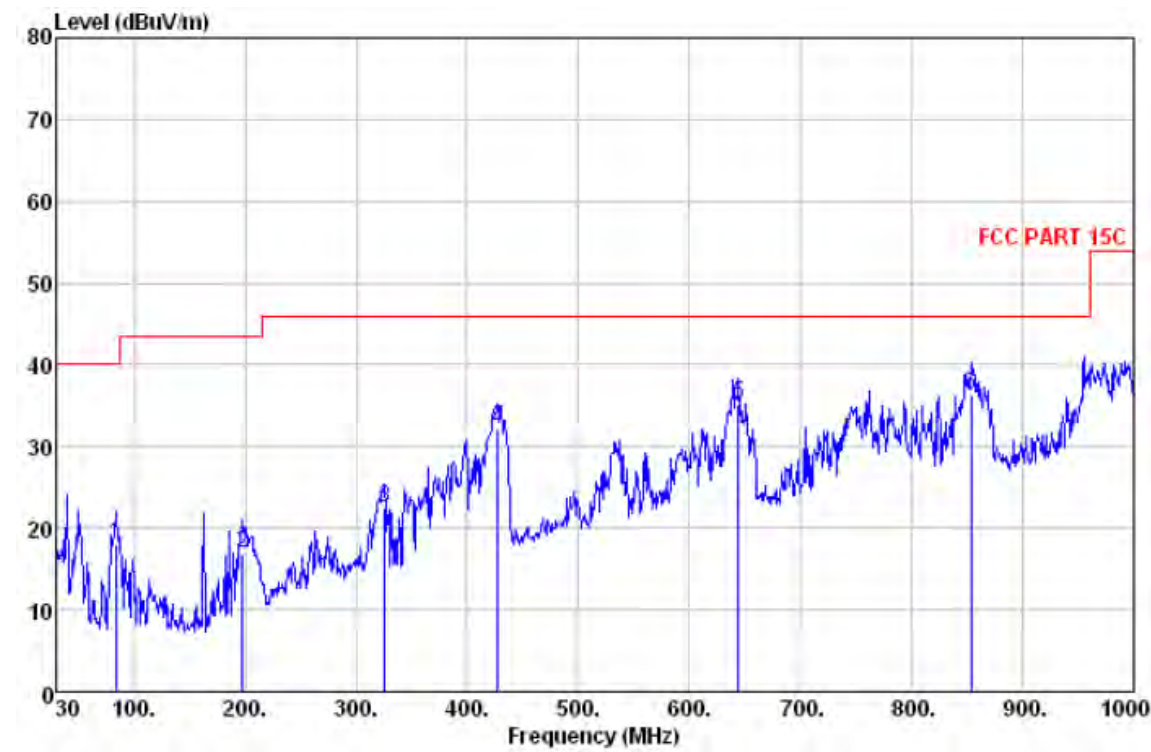
Test at Middle Channel in transmitting status

30 MHz~1 GHz Spurious Emissions .Quasi-Peak Measurement

Vertical:

Peak scan

Level (dBμV/m)



Quasi-peak measurement

| No. | Freq MHz | Level dBμV/m | Remark | Antenna Factor dB/m | Cable Loss dB | Limit Line dBμV/m | Margin dB | A/pos cm | T/pos deg |
|-----|-------------|-----------------|--------|---------------------------|---------------------|-------------------------|--------------|-------------|--------------|
| 1 | 83.350 | 18.06 | QP | 7.60 | 1.06 | 40.00 | -21.94 | 100 | 122 |
| 2 | 197.810 | 16.88 | QP | 8.64 | 1.70 | 43.50 | -26.62 | 100 | 222 |
| 3 | 325.850 | 22.49 | QP | 14.00 | 2.21 | 46.00 | -23.51 | 100 | 274 |
| 4 | 427.700 | 32.19 | QP | 16.60 | 2.55 | 46.00 | -13.81 | 200 | 344 |
| 5 | 644.010 | 35.28 | QP | 20.66 | 3.18 | 46.00 | -10.72 | 200 | 266 |
| 6 | 853.530 | 36.24 | QP | 23.32 | 3.69 | 46.00 | -9.76 | 200 | 177 |

Level=Read Level + Antenna Factor + Cable Loss

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Peak Measurement:

| Frequency (MHz) | Antenna factors (dB/m) | Cable loss (dB) | Preamp factor (dB) | Reading Level (dBμV) | Emission Level (dBμV/m) | Limit (dBμV/m) | Antenna polarization |
|-----------------|------------------------|-----------------|--------------------|----------------------|-------------------------|----------------|----------------------|
| 4882.000 | 34.33 | 9.59 | 27.60 | 37.32 | 53.64 | 74.00 | V |
| 7323.000 | 34.92 | 12.17 | 27.31 | 36.19 | 55.97 | 74.00 | V |
| 9764.000 | 37.91 | 14.49 | 27.13 | 36.52 | 61.79 | 74.00 | V |
| 4882.000 | 34.33 | 9.59 | 27.60 | 37.95 | 54.27 | 74.00 | H |
| 7323.000 | 34.92 | 12.17 | 27.31 | 36.84 | 56.62 | 74.00 | H |
| 9764.000 | 37.91 | 14.49 | 27.13 | 36.52 | 61.79 | 74.00 | H |

Average Measurement:

| Frequency (MHz) | Antenna factors (dB/m) | Cable loss (dB) | Preamp factor (dB) | Reading Level (dBμV) | Emission Level (dBμV/m) | Limit (dBμV/m) | Antenna polarization |
|-----------------|------------------------|-----------------|--------------------|----------------------|-------------------------|----------------|----------------------|
| 4882.000 | 34.33 | 9.59 | 27.60 | 21.74 | 38.06 | 54.00 | V |
| 7323.000 | 34.92 | 12.17 | 27.31 | 23.84 | 43.62 | 54.00 | V |
| 9764.000 | 37.91 | 14.49 | 27.13 | 22.07 | 47.34 | 54.00 | V |
| 4882.000 | 34.33 | 9.59 | 27.60 | 22.43 | 38.75 | 54.00 | H |
| 7323.000 | 34.92 | 12.17 | 27.31 | 22.95 | 42.73 | 54.00 | H |
| 9764.000 | 37.91 | 14.49 | 27.13 | 23.74 | 49.01 | 54.00 | H |

Test at high Channel in transmitting status

9kHz~30MHz Test result

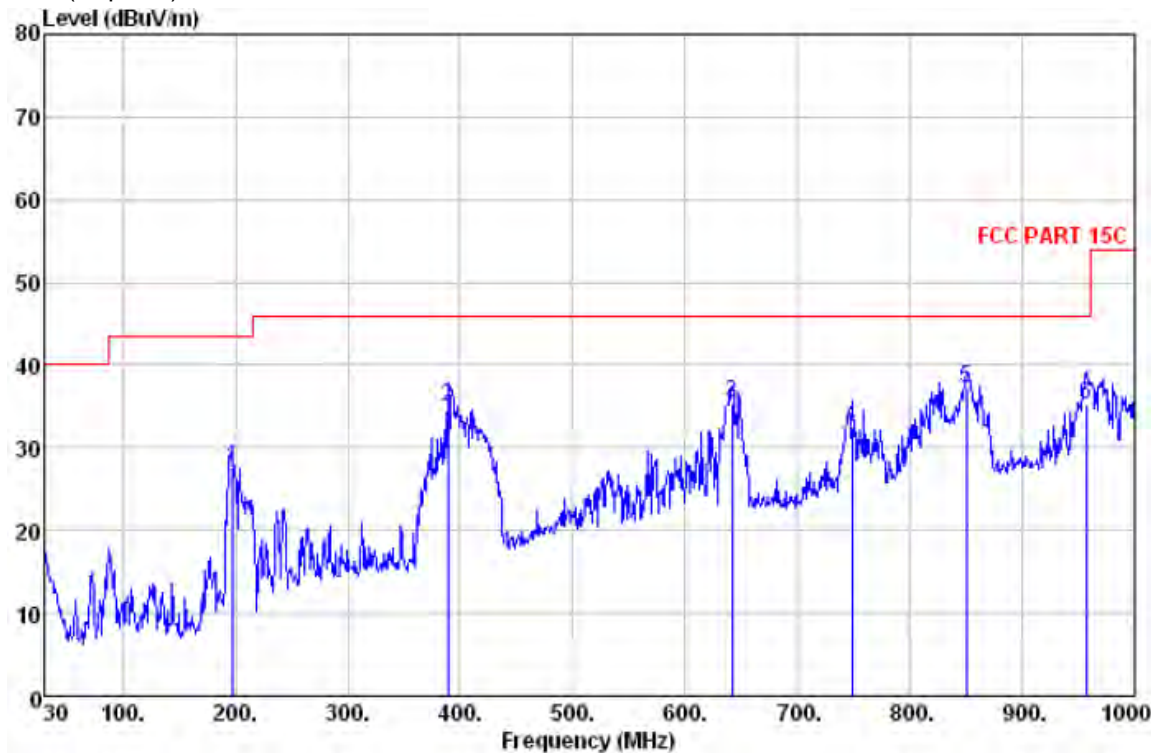
The Low frequency, which started from 9kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not report

30 MHz~1 GHz Spurious Emissions .Quasi-Peak Measurement

Horizontal:

Peak scan

Level (dBμV/m)



Quasi-peak measurement

| No. | Freq MHz | Level dBμV/m | Remark | Antenna Factor dB/m | Cable Loss dB | Limit Line dBμV/m | Margin dB | A/pos cm | T/pos deg |
|-----|-------------|-----------------|--------|---------------------------|---------------------|-------------------------|--------------|-------------|--------------|
| 1 | 197.810 | 27.73 | QP | 8.64 | 1.70 | 43.50 | -15.77 | 100 | 122 |
| 2 | 388.900 | 34.95 | QP | 15.57 | 2.41 | 46.00 | -11.05 | 100 | 225 |
| 3 | 642.070 | 35.52 | QP | 20.58 | 3.18 | 46.00 | -10.48 | 200 | 197 |
| 4 | 748.770 | 32.56 | QP | 21.90 | 3.44 | 46.00 | -13.44 | 200 | 174 |
| 5 | 850.620 | 37.23 | QP | 23.47 | 3.68 | 46.00 | -8.77 | 200 | 175 |
| 6 | 957.320 | 35.29 | QP | 24.08 | 3.92 | 46.00 | -10.71 | 200 | 344 |

Level=Read Level + Antenna Factor + Cable Loss

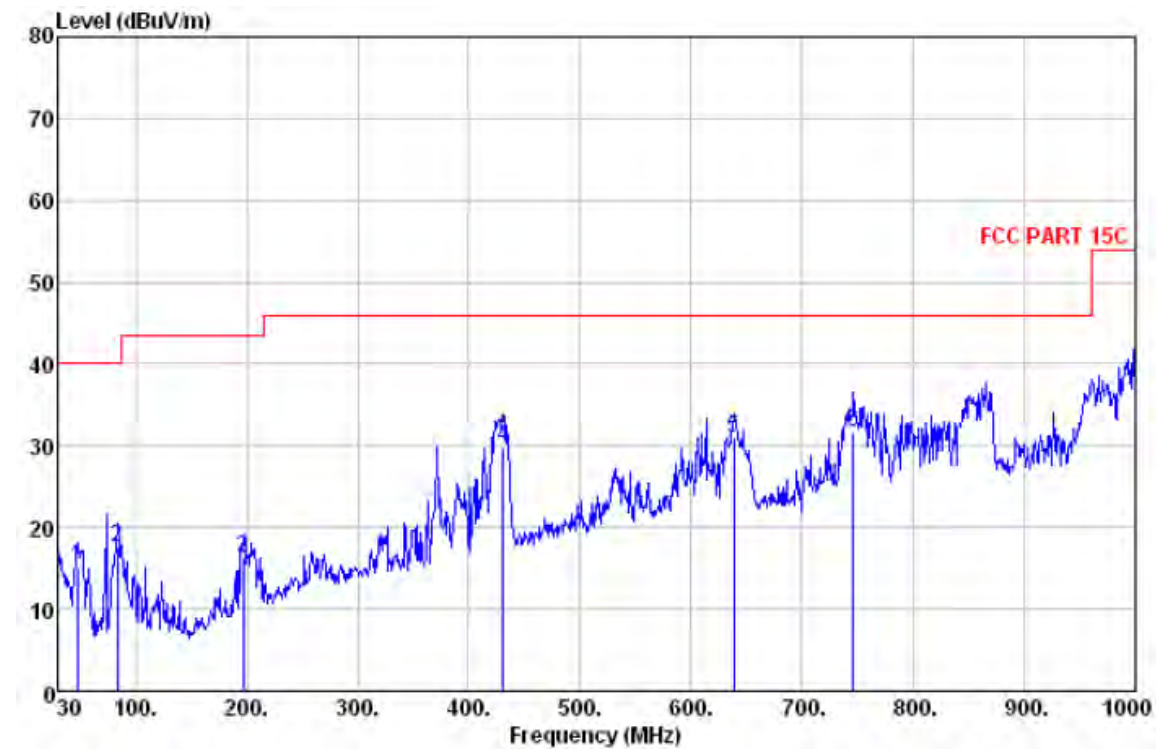
Test at High Channel in transmitting status

30 MHz~1 GHz Spurious Emissions .Quasi-Peak Measurement

Vertical:

Peak scan

Level (dBμV/m)



Quasi-peak measurement

| No. | Freq MHz | Level dBμV/m | Remark | Antenna Factor dB/m | Cable Loss dB | Limit Line dBμV/m | Margin dB | A/pos cm | T/pos deg |
|-----|-------------|-----------------|--------|---------------------------|---------------------|-------------------------|--------------|-------------|--------------|
| 1 | 47.460 | 15.15 | QP | 9.41 | 0.78 | 40.00 | -24.85 | 100 | 122 |
| 2 | 83.350 | 17.51 | QP | 7.60 | 1.06 | 40.00 | -22.49 | 100 | 177 |
| 3 | 196.840 | 16.25 | QP | 8.52 | 1.69 | 43.50 | -27.25 | 100 | 132 |
| 4 | 430.610 | 29.96 | QP | 16.60 | 2.56 | 46.00 | -16.04 | 200 | 224 |
| 5 | 638.190 | 30.96 | QP | 20.45 | 3.17 | 46.00 | -15.04 | 200 | 31 |
| 6 | 745.860 | 31.60 | QP | 21.90 | 3.43 | 46.00 | -14.40 | 200 | 144 |

Level=Read Level + Antenna Factor + Cable Loss

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Peak Measurement:

| Frequency (MHz) | Antenna factors (dB/m) | Cable loss (dB) | Preamp factor (dB) | Reading Level (dBμV) | Emission Level (dBμV/m) | Limit (dBμV/m) | Antenna polarization |
|-----------------|------------------------|-----------------|--------------------|----------------------|-------------------------|----------------|----------------------|
| 4960.000 | 34.36 | 9.60 | 27.61 | 37.23 | 53.58 | 74.00 | V |
| 7440.000 | 34.98 | 12.19 | 27.30 | 36.85 | 56.72 | 74.00 | V |
| 9920.000 | 37.96 | 14.52 | 27.11 | 36.33 | 61.70 | 74.00 | V |
| 4960.000 | 34.36 | 9.60 | 27.61 | 35.81 | 52.16 | 74.00 | H |
| 7440.000 | 34.98 | 12.19 | 27.30 | 35.37 | 55.24 | 74.00 | H |
| 9920.000 | 37.96 | 14.52 | 27.11 | 37.61 | 62.98 | 74.00 | H |

Average Measurement:

| Frequency (MHz) | Antenna factors (dB/m) | Cable loss (dB) | Preamp factor (dB) | Reading Level (dBμV) | Emission Level (dBμV/m) | Limit (dBμV/m) | Antenna polarization |
|-----------------|------------------------|-----------------|--------------------|----------------------|-------------------------|----------------|----------------------|
| 4960.000 | 34.36 | 9.60 | 27.61 | 22.87 | 39.22 | 54.00 | V |
| 7440.000 | 34.98 | 12.19 | 27.30 | 23.11 | 42.98 | 54.00 | V |
| 9920.000 | 37.96 | 14.52 | 27.11 | 22.82 | 48.19 | 54.00 | V |
| 4960.000 | 34.36 | 9.60 | 27.61 | 22.31 | 38.66 | 54.00 | H |
| 7440.000 | 34.98 | 12.19 | 27.30 | 23.98 | 43.85 | 54.00 | H |
| 9920.000 | 37.96 | 14.52 | 27.11 | 22.11 | 47.48 | 54.00 | H |

5.10 Radiated Emissions which fall in the restricted bands

| | |
|------------------------------|--|
| Test Requirement: | FCC Part15 C Section 15.247 (d) In addition, radiated emissions which fall in the restricted bands. as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)). |
| Test Method: | ANSI C63.10:2009 Clause 6.4, 6.5 and 6.6 & DA 00-705 |
| Test Status: | Pre-test the EUT in continuous transmitting mode at the lowest (2402 MHz), middle (2441 MHz) and highest (2480 MHz) channel with different data packet. Compliance test in continuous transmitting mode with normal mode (DH5) as the worst case was found. |
| Measurement Distance: | 3m (Semi-Anechoic Chamber) |
| Limit: | Section 15.209(a) 40.0 dB μ V/m between 30MHz & 88MHz; 43.5 dB μ V/m between 88MHz & 216MHz; 46.0 dB μ V/m between 216MHz & 960MHz; 54.0 dB μ V/m above 960MHz. |
| Detector: | For PK value: RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz VBW \geq RBW Sweep = auto Detector function = peak Trace = max hold For AV value: RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz VBW =10 Hz Sweep = auto Detector function = peak Trace = max hold |

Test Result:**For bluetooth****1. Low Channel (2402MHz)**

Antenna polarization: Vertical

| Frequency (MHz) | Antenna factors (dB/m) | Cable loss(dB) | Preamp factor(dB) | Peak Reading Level (dBμV) | Average Reading Level (dBμV) | Peak Emission Level (dBμV/m) | Average Emission Level (dBμV/m) |
|-----------------|------------------------|----------------|-------------------|---------------------------|------------------------------|------------------------------|---------------------------------|
| 2310.000 | 26.65 | 6.45 | 27.78 | 36.46 | 22.11 | 41.78 | 27.43 |
| 2390.000 | 26.56 | 6.46 | 27.79 | 35.79 | 21.89 | 41.02 | 27.12 |
| 2500.000 | 25.70 | 6.62 | 27.80 | 35.21 | 22.83 | 39.73 | 27.35 |
| 2483.500 | 25.79 | 6.61 | 27.80 | 36.76 | 22.69 | 41.36 | 27.29 |

Antenna polarization: Horizontal

| Frequency (MHz) | Antenna factors (dB/m) | Cable loss(dB) | Preamp factor(dB) | Peak Reading Level (dBμV) | Average Reading Level (dBμV) | Peak Emission Level (dBμV/m) | Average Emission Level (dBμV/m) |
|-----------------|------------------------|----------------|-------------------|---------------------------|------------------------------|------------------------------|---------------------------------|
| 2310.000 | 26.65 | 6.45 | 27.78 | 35.78 | 23.56 | 41.10 | 28.88 |
| 2390.000 | 26.56 | 6.46 | 27.79 | 36.12 | 21.11 | 41.35 | 26.34 |
| 2500.000 | 25.70 | 6.62 | 27.80 | 36.53 | 22.84 | 41.05 | 27.36 |
| 2483.500 | 25.79 | 6.61 | 27.80 | 35.32 | 23.25 | 39.92 | 27.85 |

2. Middle Channel (2441MHz)

Antenna polarization: Vertical

| Frequency (MHz) | Antenna factors (dB/m) | Cable loss(dB) | Preamp factor(dB) | Peak Reading Level (dBμV) | Average Reading Level (dBμV) | Peak Emission Level (dBμV/m) | Average Emission Level (dBμV/m) |
|-----------------|------------------------|----------------|-------------------|---------------------------|------------------------------|------------------------------|---------------------------------|
| 2310.000 | 26.65 | 6.45 | 27.78 | 35.33 | 21.82 | 40.65 | 27.14 |
| 2390.000 | 26.56 | 6.46 | 27.79 | 36.19 | 21.34 | 41.42 | 26.57 |
| 2500.000 | 25.70 | 6.62 | 27.80 | 36.37 | 22.48 | 40.89 | 27.00 |
| 2483.500 | 25.79 | 6.61 | 27.80 | 35.27 | 22.52 | 39.87 | 27.12 |

Antenna polarization: Horizontal

| Frequency (MHz) | Antenna factors (dB/m) | Cable loss(dB) | Preamp factor(dB) | Peak Reading Level (dBμV) | Average Reading Level (dBμV) | Peak Emission Level (dBμV/m) | Average Emission Level (dBμV/m) |
|-----------------|------------------------|----------------|-------------------|---------------------------|------------------------------|------------------------------|---------------------------------|
| 2310.000 | 26.65 | 6.45 | 27.78 | 36.19 | 22.45 | 41.51 | 27.77 |
| 2390.000 | 26.56 | 6.46 | 27.79 | 35.75 | 21.65 | 40.98 | 26.88 |
| 2500.000 | 25.70 | 6.62 | 27.80 | 35.63 | 21.85 | 40.15 | 26.37 |
| 2483.500 | 25.79 | 6.61 | 27.80 | 36.33 | 22.33 | 40.93 | 26.93 |

3. High Channel (2480MHz)

Antenna polarization: Vertical

| Frequency (MHz) | Antenna factors (dB/m) | Cable loss(dB) | Preamplifier factor(dB) | Peak Reading Level (dBμV) | Average Reading Level (dBμV) | Peak Emission Level (dBμV/m) | Average Emission Level (dBμV/m) |
|-----------------|------------------------|----------------|-------------------------|---------------------------|------------------------------|------------------------------|---------------------------------|
| 2310.000 | 26.65 | 6.45 | 27.78 | 35.33 | 22.47 | 40.65 | 27.79 |
| 2390.000 | 26.56 | 6.46 | 27.79 | 35.82 | 22.51 | 41.05 | 27.74 |
| 2500.000 | 25.70 | 6.62 | 27.80 | 36.17 | 21.76 | 40.69 | 26.28 |
| 2483.500 | 25.79 | 6.61 | 27.80 | 36.86 | 21.09 | 41.46 | 25.69 |

Antenna polarization: Horizontal

| Frequency (MHz) | Antenna factors (dB/m) | Cable loss(dB) | Preamplifier factor(dB) | Peak Reading Level (dBμV) | Average Reading Level (dBμV) | Peak Emission Level (dBμV/m) | Average Emission Level (dBμV/m) |
|-----------------|------------------------|----------------|-------------------------|---------------------------|------------------------------|------------------------------|---------------------------------|
| 2310.000 | 26.65 | 6.45 | 27.78 | 35.84 | 22.07 | 41.16 | 27.39 |
| 2390.000 | 26.56 | 6.46 | 27.79 | 36.25 | 22.46 | 41.48 | 27.69 |
| 2500.000 | 25.70 | 6.62 | 27.80 | 36.33 | 22.86 | 40.85 | 27.38 |
| 2483.500 | 25.79 | 6.61 | 27.80 | 36.36 | 21.54 | 40.96 | 26.14 |

Remark: No any other emission which falls in restricted bands can be detected and be reported.

Test result: The unit does meet the FCC requirements.

5.11 Band Edges Requirement

Test Requirement: FCC Part15 C section 15.247

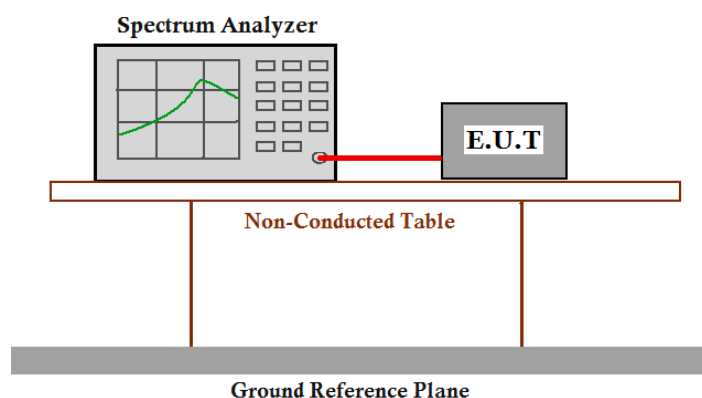
(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains 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 Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Frequency Band: 2400 MHz to 2483.5 MHz

Test Method: ANSI C63.10:2009 Clause 6.9 & DA 00-705

Test Status: Pre-test the EUT in continuous transmitting mode at the lowest (2402 MHz), and highest (2480 MHz) channel and hopping mode with different data packet. Compliance test in continuous transmitting mode with normal (DH5) EDR mode (2DH5) and EDR mode (3DH5) as the worst case was found.

Test Configuration:



Test Procedure:

Set RBW of spectrum analyzer to 100 kHz and VBW of spectrum analyzer to 300 kHz with suitable frequency span including 100 kHz bandwidth from band edge.

The band edges was measured and recorded Result:

The Lower Edges attenuated more than 20dB.

The Upper Edges attenuated more than 20dB.

The graph as below. Represents the emissions take for this device.

For Bluetooth

DH5:

Low channel:



High channel:



2DH5:
Low channel:



High channel:



3DH5:
Low channel:



High channel:



DH5:
Low channel:



High channel:



2DH5:

Low channel:



High channel:



3DH5:

Low channel:



High channel:



Test result: The unit does meet the FCC requirements.

5.12 Conducted Emissions at Mains Terminals 150 kHz to 30 MHz

Test Requirement: FCC Part 15 C section 15.207

Test Method: ANSI C63.10:2009 Clause 6.2 & DA 00-705

Frequency Range: 150 kHz to 30 MHz

Detector: Peak for pre-scan (9 kHz Resolution Bandwidth)

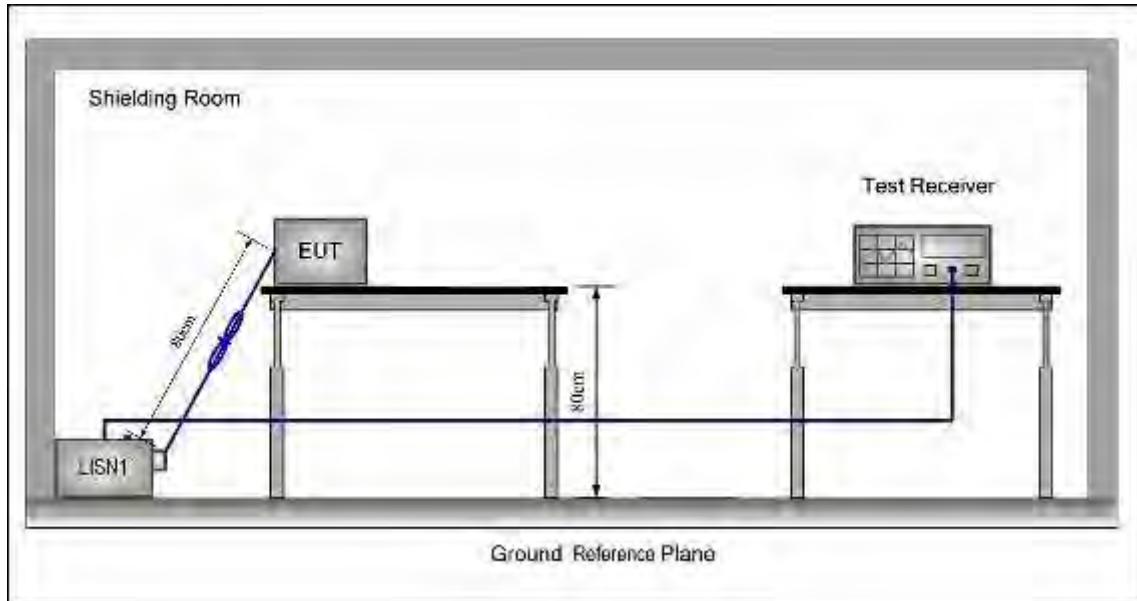
Test Limit

Limits for conducted disturbance at the mains ports of class B

| Frequency Range | Class B Limit dB(μ V) | |
|--|----------------------------|----------|
| | Quasi-peak | Average |
| 0.15 to 0.50 | 66 to 56 | 56 to 46 |
| 0.50 to 5 | 56 | 46 |
| 5 to 30 | 60 | 50 |
| NOTE 1 The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz. | | |

EUT Operation:

Test in normal operating mode. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Test Configuration:**Test procedure:**

1. The mains terminal disturbance voltage test was conducted in a shielded room.
2. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.

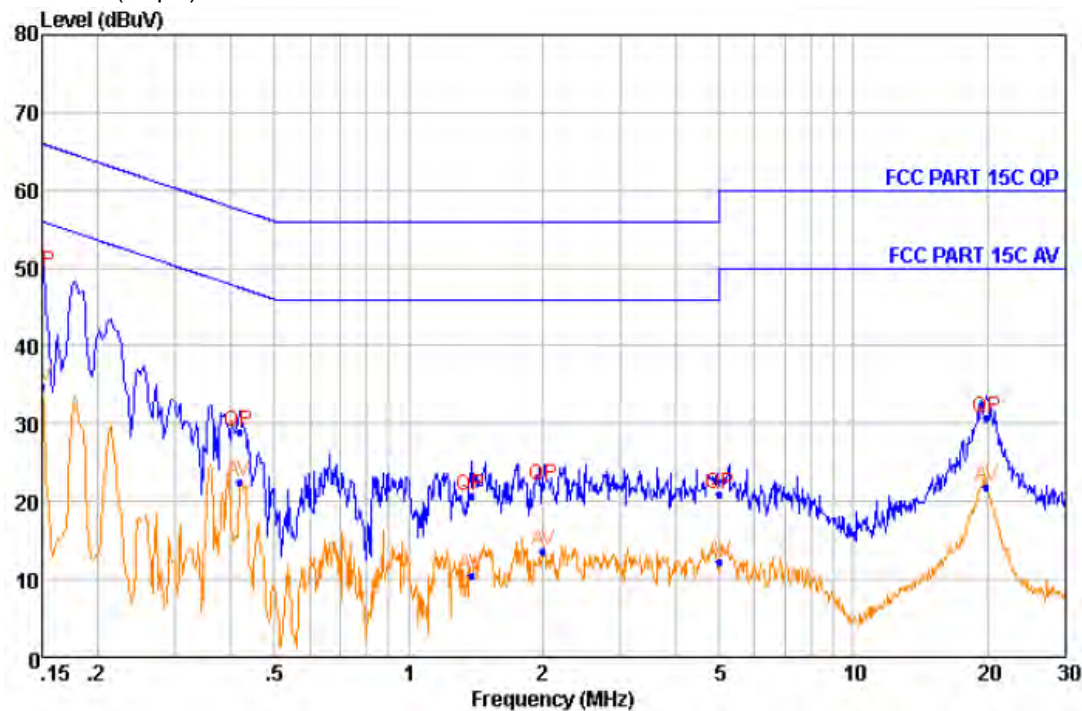
5.12.1 Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected. For EUT the communicating was worst case mode.

The following Quasi-Peak and Average measurements were performed on the EUT Live line

Peak Scan:

Level (dBμV)



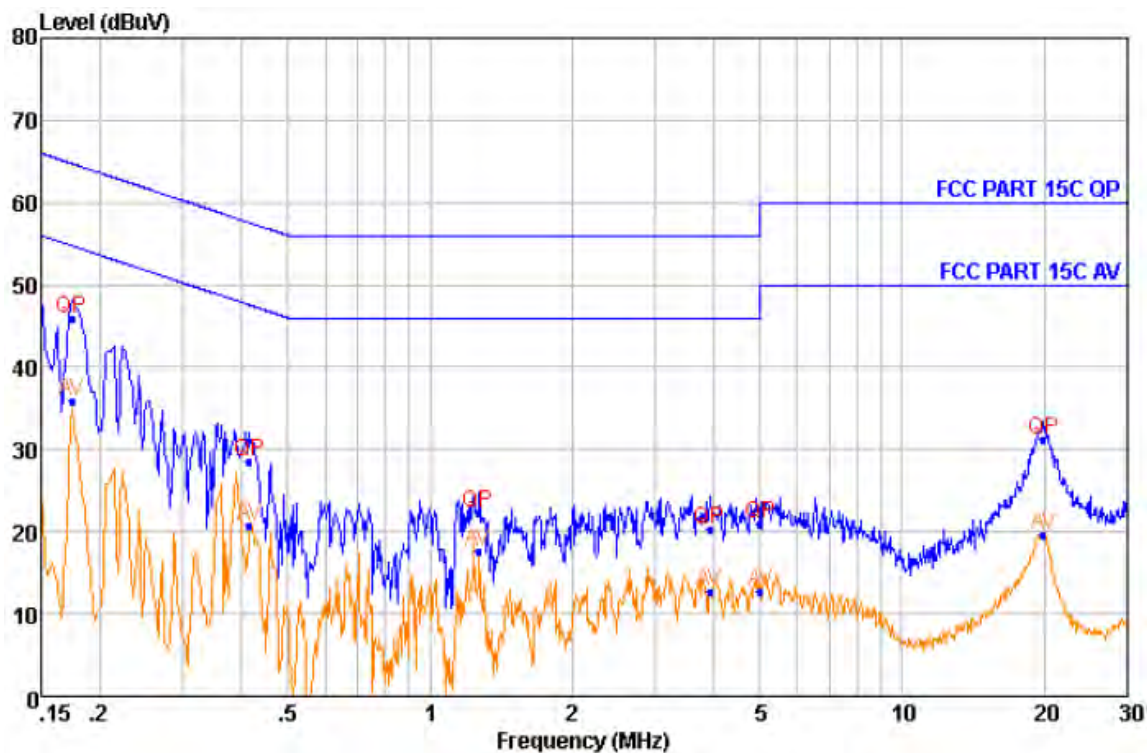
Quasi-peak and Average measurement

| NO. | Freq MHz | Level dBμV | Remark | LISN Factor dB | Cable Loss dB | Limit Line dBμV | Over Limit dB |
|-----|-------------|---------------|---------|-------------------|------------------|--------------------|------------------|
| 1 | 0.150 | 49.42 | QP | 9.36 | 0.39 | 66.00 | -16.58 |
| 2 | 0.150 | 34.76 | Average | 9.36 | 0.39 | 56.00 | -21.24 |
| 3 | 0.416 | 28.87 | QP | 9.37 | 0.43 | 57.52 | -28.65 |
| 4 | 0.416 | 22.46 | Average | 9.37 | 0.43 | 47.52 | -25.06 |
| 5 | 1.385 | 20.82 | QP | 9.29 | 0.48 | 56.00 | -35.18 |
| 6 | 1.385 | 10.49 | Average | 9.29 | 0.48 | 46.00 | -35.51 |
| 7 | 2.007 | 22.05 | QP | 9.32 | 0.49 | 56.00 | -33.95 |
| 8 | 2.007 | 13.63 | Average | 9.32 | 0.49 | 46.00 | -32.37 |
| 9 | 5.000 | 20.94 | QP | 9.29 | 0.53 | 56.00 | -35.06 |
| 10 | 5.000 | 12.22 | Average | 9.29 | 0.53 | 46.00 | -33.78 |
| 11 | 19.903 | 30.82 | QP | 9.75 | 0.58 | 60.00 | -29.18 |
| 12 | 19.903 | 21.88 | Average | 9.75 | 0.58 | 50.00 | -28.12 |

Neutral Line

Peak Scan:

Level (dBμV)



Quasi-peak and Average measurement

| NO. | Freq MHz | Level dBμV | Remark | LISN Factor dB | Cable Loss dB | Limit Line dBμV | Over Limit dB |
|-----|-------------|---------------|---------|-------------------|------------------|--------------------|------------------|
| 1 | 0.174 | 45.92 | QP | 9.37 | 0.40 | 64.77 | -18.85 |
| 2 | 0.174 | 35.77 | Average | 9.37 | 0.40 | 64.77 | -29.00 |
| 3 | 0.414 | 28.54 | QP | 9.36 | 0.43 | 57.57 | -29.03 |
| 4 | 0.414 | 20.71 | Average | 9.36 | 0.43 | 57.57 | -36.86 |
| 5 | 1.266 | 22.38 | QP | 9.38 | 0.48 | 56.00 | -33.62 |
| 6 | 1.266 | 17.71 | Average | 9.38 | 0.48 | 56.00 | -38.29 |
| 7 | 3.915 | 20.17 | QP | 9.42 | 0.52 | 56.00 | -35.83 |
| 8 | 3.915 | 12.65 | Average | 9.42 | 0.52 | 56.00 | -43.35 |
| 9 | 5.000 | 21.02 | QP | 9.43 | 0.53 | 56.00 | -34.98 |
| 10 | 5.000 | 12.60 | Average | 9.43 | 0.53 | 56.00 | -43.40 |
| 11 | 19.903 | 31.25 | QP | 9.91 | 0.58 | 60.00 | -28.75 |
| 12 | 19.903 | 19.60 | Average | 9.91 | 0.58 | 60.00 | -40.40 |

--End of Report--