RF Test Report

Applicant	:	iFIT Health and Fitness, Inc.
Product Name	:	Tablet
Trade Name	:	iFit Inc.
Model Number	:	MP22-NEON416-C
Applicable Standard	:	FCC 47 CFR PART 15 SUBPART C Canada RSS-247 Issue 3 Canada RSS-Gen Issue 5 (Amendment 2) ANSI C63.10:2013
Received Date	:	Oct. 23, 2023
Test Period	:	Nov. 16 ~ Nov. 25, 2023
Issued Date	:	Jan. 24, 2024

Issued by

Eurofins E&E Wireless Taiwan Co., Ltd.
No. 140-1, Changan Street, Bade District,
Taoyuan City 334025, Taiwan (R.O.C.)
Tel：+886-3-2710188 / Fax：+886-3-2710190

Testing Laboratory
1330

Taiwan Accreditation Foundation accreditation number: 1330
Frequency Range: 9 kHz to 325 GHz (Bade test site)
Test Firm Registration Number: 226252 (Bade test site)
Test Firm Registration Number: 191812 (Wugu test site)
Test Firm Registration Number: 7381A (Bade test site)
Test Firm Registration Number: 28922 (Wugu test site)

Note:

1. The test results are valid only for samples provided by customers and under the test conditions described in this report.
2. This report shall not be reproduced except in full, without the written approval of Eurofins E&E Wireless Taiwan Co., Ltd.
3. The relevant information is provided by customers in this test report. According to the correctness, appropriateness or completeness of the information provided by the customer, if there is any doubt or error in the information which affects the validity of the test results, the laboratory does not take the responsibility.

Revision History

Rev.	Issued Date	Description	Revised by
00	Jan. 24, 2024	Initial Issue	Nicole Chu

Verification of Compliance

Applicant	:	iFIT Health and Fitness, Inc.
Product Name	:	Tablet
Trade Name	:	iFit Inc.
Model Number	:	MP22-NEON416-C
FCC ID	:	OMC447847C
IC	:	3673A-447847C
Applicable Standard	:	FCC 47 CFR PART 15 SUBPART C Canada RSS-247 Issue 3 Canada RSS-Gen Issue 5 (Amendment 2) ANSI C63.10:2013
Test Result	:	Complied
Performing Lab.	:	Eurofins E&E Wireless Taiwan Co., Ltd. No. 140-1, Changan Street, Bade District, Taoyuan City 334025, Taiwan (R.O.C.) Tel：+886-3-2710188 / Fax：+886-3-2710190 Taiwan Accreditation Foundation accreditation number: 1330

Testing Laboratory 1330

Eurofins E&E Wireless Taiwan Co., Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by Eurofins E&E Wireless Taiwan Co., Ltd. based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Approved By : Kai Yu Yang

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1 General Information

1.1. Summary of Test Result

FCC Standard	Item	Result	Remark
15.207	AC Power Conducted Emission	PASS	-----
15.203	Antenna Requirement	PASS	-----
15.247(b)(1)	Max. Output Power	PASS	-----
15.247(d)	Transmitter Radiated Emissions	PASS	-----
15.247(a)(1)	20 dB RF Bandwidth	PASS	-----
15.247(a)(1)	Carrier Frequency Separation	PASS	-----
15.247(a)(1)(iii)	Number of Hopping	PASS	-----
15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	PASS	-----
15.247(d)	Out of Band Conducted Spurious Emission	PASS	-----

IC Standard RSS-GEN	Item	Result	Remark
6.7	99 % Occupied Bandwidth	Reference	-----
8.8	AC Power Line Conducted Emissions	PASS	-----
8.9	Transmitter Radiated Emissions	PASS	-----
6.8	Antenna Requirement	PASS	-----
Standard RSS-247	Item	Result	Remark
5.1 (b), 5.4 (b), 5.4 (f) (ii)	Max. Output Power and E.I.R.P.	PASS	-----
5.1 (a)	20 dB Emission Bandwidth	PASS	-----
5.1 (b)	Carrier Frequency Separation	PASS	-----
5.1 (d)	Number of Hopping	PASS	-----
5.1 (d)	Time of Occupancy (Dwell Time)	PASS	-----
5.5	Out of Band Conducted Spurious Emission	PASS	-----

Decision Rule

■ Uncertainty is not included.

□ Uncertainty is included.

Standard	Description
CFR47, Part 15, Subpart C	Intentional Radiators
IC RSS-247 Issue 3	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
IC RSS-Gen Issue 5 Amendment 2	General Requirements for Compliance of Radio Apparatus Amendment
ANSI C63. 10: 2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

1.2. Testing Location

Lab Name: Eurofins E&E Wireless Taiwan Co., Ltd.

Site Address: ■ No. 140-1, Changan Street, Bade District, Taoyuan City 334025, Taiwan (R.O.C.)

Site Address: □ No. 2, Wuquan 5th Rd. Wugu Dist., New Taipei City, Taiwan (R.O.C.)

1.3. Measurement Uncertainty

Test Item	Frequency	Uncertainty	
		BD	WG
Conducted Emission	150 kHz ~ 30 MHz	2.7 dB	2.6 dB
Conducted Output Power		1.1 dB	1.1 dB
RF Bandwidth		4.5 %	4.5 %
Power Spectral Density		1.1 dB	1.1 dB

Test Item	Frequency	Uncertainty			
		96601-BD	96603-BD	96602-WG	96603-WG
Radiated Emission	9 kHz ~ 30 MHz	1.9 dB	1.9 dB	1.6 dB	1.6 dB
	30 MHz ~ 1000 MHz	4.9 dB	4.9 dB	4.8 dB	4.8 dB
	1000 MHz ~ 18000 MHz	4.9 dB	5.0 dB	5.0 dB	5.2 dB
	18000 MHz ~ 26500 MHz	4.3 dB	4.4 dB	4.4 dB	4.5 dB
	26500 MHz ~ 40000 MHz	4.5 dB	4.5 dB	4.6 dB	4.5 dB

1.4. Test Site Environment

Items	Required (IEC 60068-1)	Interval(*)
Temperature (°C)	15-35	20-30
Humidity (%RH)	25-75	45-75

(*)The measurement ambient temperature is within this range.

2 EUT Description

The product specifications of the EUT presented in the report are declared by the manufacturer who shall take full responsibility for the authenticity(except Max. RF Output Power / E.I.R.P. / 99 % Occupied Bandwidth / Emission Designator).

Applicant	iFIT Health and Fitness, Inc. 1500 S 1000 W, Logan, Utah, United States, 84321				
Product Name	Tablet				
Trade Name	iFit Inc.				
Model Number	MP22-NEON416-C				
FCC ID	OMC447847C				
IC	3673A-447847C				
Hardware Version	R03				
Software Version	CKN1_20231011				
Frequency Range	2402 ~ 2480 MHz				
Modulation Type	GFSK for 1 Mbps				
	π/4-DQPSK for 2 Mbps				
	8DPSK for 3 Mbps				
Operate Temp. Range	0 ~ +40 ℃				
EUT Power Rating	DC 12 V, 2 A				
Antenna information	Manufacturer	Model name	Type	Frequency (MHz)	Max. Gain (dBi)
	Smart Approach Co., Ltd.	DC33002Q42H (SE-ER5L1-003)	PIFA Antenna	2400-2500	2.28

Frequency Band	Max. RF Output Power (W)	E.I.R.P. (W)	99 % Occupied Bandwidth	Emission Designator
BT_GFSK	0.00225	0.00380	741 kHz	741KF1D
BT_π/4-DQPSK	0.00221	0.00373	---	---
BT_8DPSK	0.00223	0.00377	1.180 MHz	1M18F1D

CH	Freq. (MHz)	CH	Freq. (MHz)	CH	Freq. (MHz)	CH	Freq. (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
19	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	---	---

3 Test Methodology

3.1. Mode of Operation

Decision of Test Eurofins has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Pre-Test Mode	Final-Test Mode
Transmit Mode	V
BT_GFSK	V
BT_π/4-DQPSK	
BT_8DPSK	V

After verification, all tests were carried out with the worst case test modes.
By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that “Z axis” position was the worst, then the final test was executed the worst condition and test data were recorded in this report.

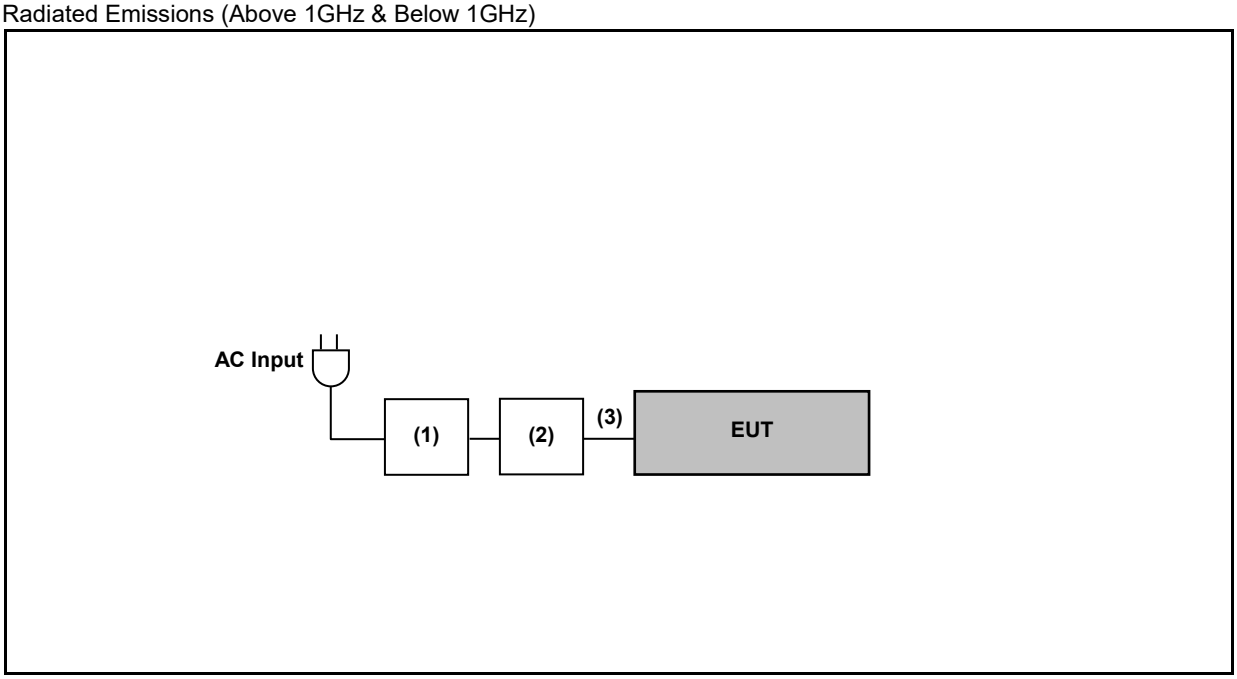
Description of Test Modes
Preliminary tests were performed in different modulation to find the worst case. The modulation has shown the worst-case in section 3.1. Investigation has been done on all the possible configurations for searching the worst cases.

3.2. EUT Test Step

1	Setup the EUT shown on “Configuration of Test System Details.”
2	Turn on the power of all equipment.
3	Turn on TX function
4	EUT run test program.

3.3. Configuration of Test System Details

Radiated Emissions (Above 1GHz & Below 1GHz)



Product		Manufacturer	Model Number
(1)	Adapter	ASUS	EXA1203YH
(2)	NB	ASUS	BU400A
(3)	USB	USBMAX	USB2.0 MINI 5pin

3.4. Test Instruments

For Conducted Emission
Test Period: Nov. 21, 2023
Testing Engineer: Jayson Hsieh

Test Site		Conduction01-BD				
Use	Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Cal. Period
☒	Test Receiver	R&S	ESCI	100367	May 22, 2023	1 year
☒	LISN	R&S	ENV216	101040	Mar. 21, 2023	1 year
☒	LISN	R&S	ENV216	101140	Jan. 12, 2023	1 year
☒	RF Cable	Woken	00100D1380194M	TE-02-03	Jun. 01, 2023	1 year
☒	Software	EZ EMC	1.1.4.3	N/A	N.C.R.	---

For Conducted
Test Period: Nov. 16 ~ Nov. 25, 2023
Testing Engineer: John Chen, Peter Shui

Test Site		RF01-BD				
Use	Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Cal. Period
☒	Power Sensor	Anritsu	MA2411B	1126022	Aug. 31, 2023	1 year
☒	Power Meter	Anritsu	ML2495A	1135009	Aug. 31, 2023	1 year
☒	Spectrum Analyzer (20 Hz~26.5 GHz)	Agilent	N9020A	US47520902	Sep. 04, 2023	1 year

Note: N.C.R. = No Calibration Request.

For Radiated Emissions
Test Period: Nov. 22 ~ Nov. 24, 2023
Testing Engineer: Hung Chou, Kerry Xu, Marc Yeh

Test Site		96603-BD				
Radiation test sites		Semi Anechoic Room				
Use	Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Cal. Period
☒	Spectrum Analyzer (10 Hz~44 GHz)	Keysight	N9020B	MY60112363	Jan. 13, 2023	1 year
☒	Amplifier (100 kHz~1.3 GHz)	Agilent	8447D	2944A11119	Jan. 07, 2023	1 year
☒	Broadband Amplifier (1 GHz~26.5 GHz)	Titan	T0912E01263025 A1F	002	Jul. 24, 2023	1 year
☒	Trilog Broadband Antenna (30 kHz~1 GHz)	Schwarzbeck Mess-Elektronik	VULB9168	01146	Jun. 26, 2023	1 year
☒	Broadband Horn Antenna (1 GHz~18 GHz)	Schwarzbeck Mess-Elektronik	9120D	02207	Jul. 07, 2023	1 year
☒	Broadband Horn Antenna (18 GHz~40 GHz)	Schwarzbeck Mess-Elektronik	9170	9170-320	Jul. 21, 2023	1 year
☒	Coaxial Cable	Titan	T0710AT327A10A 100	J11005	Aug. 10, 2023	1 year
☒	Coaxial Cable	Titan	T0710AT327A10A 900	J11004	Aug. 10, 2023	1 year
☒	Coaxial Cable	Titan	CFD400NL-LW	001	Aug. 10, 2023	1 year
☒	Software	EZ EMC	1.1.4.4	N/A	N.C.R.	---

Note: N.C.R. = No Calibration Request.

4 Measurement Procedure

4.1. Maximum Conducted Output Power and E.I.R.P. Measurement

■ **Limit**

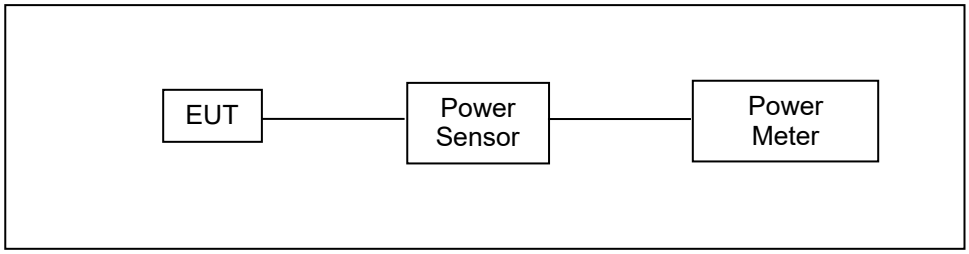
For FCC:

For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels < 0.125 watt.

For IC:

FHSs operating in the band 2400-2483.5 MHz 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 that the systems operate with an output power no greater than 0.125 W and the e.i.r.p. shall not exceed 0.5 W.

■ **Test Setup**



■ **Test Procedure**

The tests below are run with the EUT's transmitter set at high power in TX mode. The EUT is needed to force selection of output power level and channel number. While testing, EUT was set to transmit continuously. Remove the subjective device's antenna and connect the RF output port to power sensor.

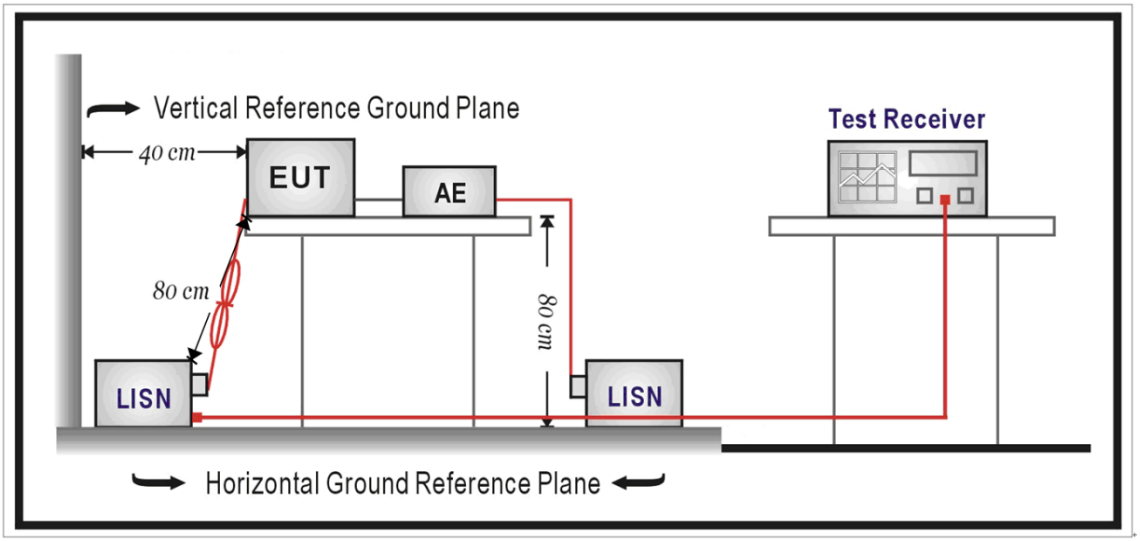
The total conducted output power shall be reduced by 1 dB below the specified limits for each 3 dB that the directional gain of the antenna/antenna array exceeds 6 dBi. The directional antenna gain shall be computed as the sum of 10 log (number of array elements or staves) plus the directional gain of the element or stave having the highest gain.

4.2. AC Power Line Conducted Emission Measurement

■ **Limit**

Frequency (MHz)	Quasi-peak	Average
0.15 - 0.5	66 to 56	56 to 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

■ **Test Setup**



■ **Test Procedure**

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 Ω// 50 uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50 Ω// 50 uH coupling impedance with 50 ohm termination.

Tabletop device shall be placed on a non-conducting platform, of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The wall of screened room shall be located 40 cm to the rear of the EUT. Other surfaces of tabletop or floor standing EUT shall be at least 80 cm from any other ground conducting surface including one or more LISNs. For floor-standing device shall be placed under the EUT with a 12 mm insulating material.

Conducted emissions were investigated over the frequency range from 0.15 MHz to 30 MHz using a resolution bandwidth of 9 kHz. The equipment under test (EUT) shall be meet the limits in section 4.1, as applicable, including the average limit and the quasi-peak limit when using respectively, an average detector and quasi-peak detector measured in accordance with the methods described of related standard. When all of peak value were complied with quasi-peak and average limit from 150 kHz to 30 MHz then quasi-peak and average measurement was unnecessary.

The AMN shall be placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for AMNs mounted on top of the ground reference plane. This distance is between the closest points of the AMN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8 m from the AMN. If the mains power cable is longer than 1 m then the cable shall be folded back and forth at the centre of the lead to form a bundle no longer than 0.4 m. All of interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 cm to 40 cm long. All of EUT and AE shall be separate place more than 0.1 m. All 50 Ω ports of the LISN shall be resistively terminated into 50 Ω loads when not connected to the measuring instrument.

If the reading of the measuring receiver shows fluctuations close to the limit, the reading shall be observed for at least 15 s at each measurement frequency; the higher reading shall be recorded with the exception of any brief isolated high reading which shall be ignored.

4.3. Radiated Emission Measurement

■ **Limit**

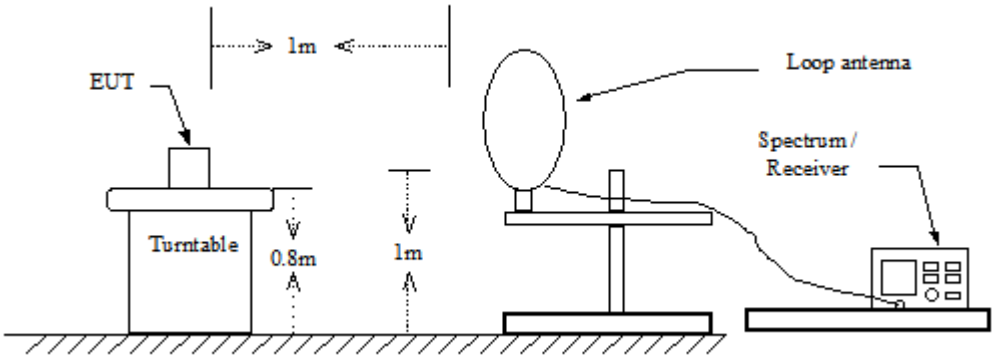
According to §15.209(a) and RSS-Gen, except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (μV/m at meter)	Measurement Distance (meters)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30 - 88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

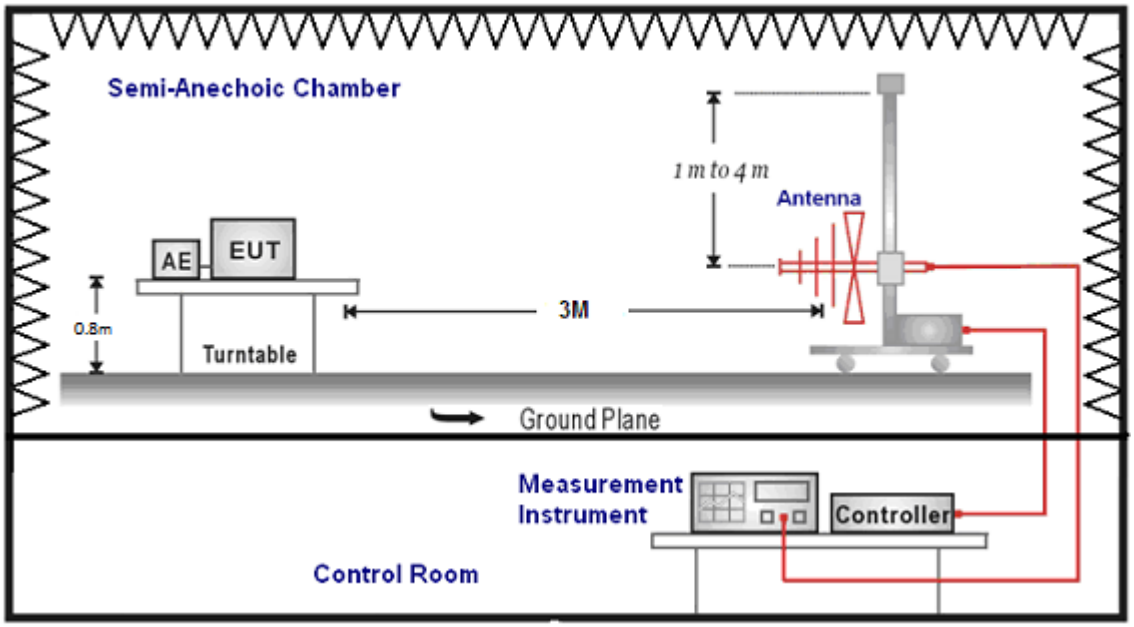
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

■ **Setup**

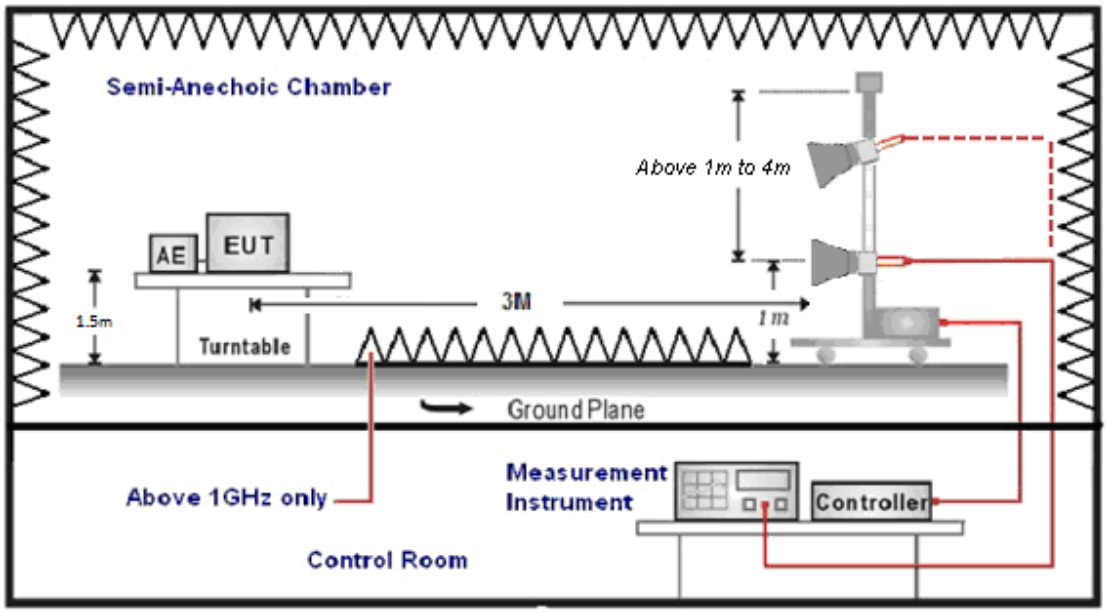
9 kHz ~ 30 MHz



Below 1 GHz



Above 1 GHz



■ **Test Procedure**

Final radiation measurements were made on a three-meter, Semi Anechoic Chamber. The EUT system was placed on a nonconductive turntable which is 0.8 or 1.5 meters height, top surface 1.0 x 1.5 meter. The spectrum was examined from 250 MHz to 2.5 GHz in order to cover the whole spectrum below 10th harmonic which could generate from the EUT. During the test, EUT was set to transmit continuously & Measurements spectrum range from 9 kHz to 26.5 GHz is investigated.

For measurements below 30 MHz the resolution bandwidth is set to 10 kHz for peak detection measurements or 9 kHz for quasi-peak detection measurements. The video bandwidth is 3 times of the resolution bandwidth.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, and then the video bandwidth is set to 3 MHz for peak measurements and 10 Hz for average measurements when Duty cycle >98 % / 1/T for average measurements when Duty cycle <98 %. A nonconductive material surrounded the EUT to supporting the EUT for standing on tree orthogonal planes. At each condition, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters to find the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarization.

Biconilog Antenna at 3 Meter and the Horn Antenna was used in frequencies 1 – 26.5 GHz at a distance of 1 meter. All test results were extrapolated to equivalent signal at 3 meters utilizing an inverse linear distance extrapolation Factor (20 dB/decade).

For testing above 1 GHz, the emission level of the EUT in peak mode was 20 dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

Appropriate preamplifiers were used for improving sensitivity and precautions were taken to avoid overloading or desensitizing the spectrum analyzer. No post – detector video filters were used in the test.

The spectrum analyzer's 6 dB bandwidth was set to 1 MHz, and the analyzer was operated in the peak detection mode, for frequencies both below and up 1 GHz. The average levels were obtained by subtracting the duty cycle correction factor from the peak readings.

The following procedures were used to convert the emission levels measured in decibels referenced to 1 microvolt (dBuV) into field intensity in micro volts pre meter (uV/m).

The actual field intensity in decibels referenced to 1 microvolt in to field intensity in micro colts per meter (dBuV/m).

The actual field is intensity in referenced to 1 microvolt per meter (dBuV/m) is determined by algebraically adding the measured reading in dBuV, the antenna factor (dB), and cable loss (dB) and Subtracting the gain of preamplifier (dB) is auto calculate in spectrum analyzer.

(1) Amplitude (dBuV/m) = FI (dBuV) +AF (dBuV) +CL (dBuV)-Gain (dB)

FI= Reading of the field intensity.

AF= Antenna factor.

CL= Cable loss.

P.S Amplitude is auto calculate in spectrum analyzer.

(2) Actual Amplitude (dBuV/m) = Amplitude (dBuV)-Dis(dB)

The FCC specified emission limits were calculated according the EUT operating frequency and by following linear interpolation equations:

(a) For fundamental frequency : Transmitter Output < +30 dBm

(b) For spurious frequency : Spurious emission limits = fundamental emission limit /10

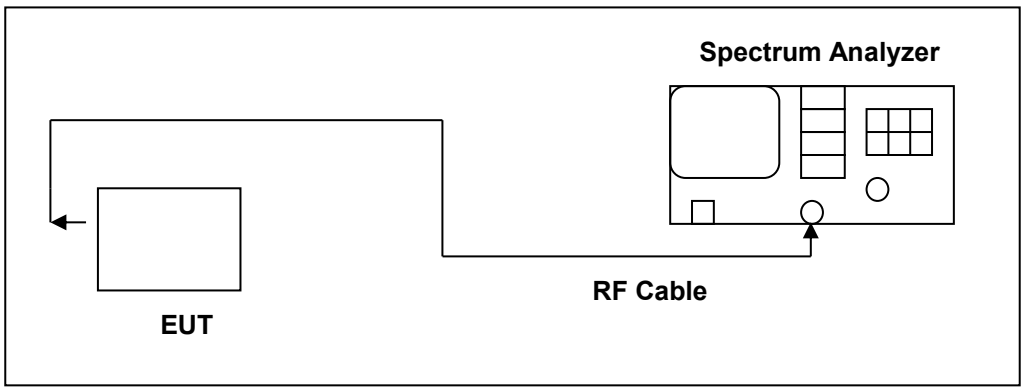
Data of measurement within this frequency range without mark in the table above means the reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.

4.4. 20 dB RF Bandwidth and 99 % Occupied Bandwidth Measurement

■ Limit

N/A

■ Test Setup



■ Test Procedure

20 dB Emission Bandwidth

The RF output port of the Equipment-Under-Test is directly coupled to the input of the spectrum analyzer through a specialized RF connector. A fully charged battery was used for the supply voltage. The Bluetooth frequency hopping function of the EUT was enabled. The spectrum analyzer used the following settings:

1. Span = approx. 2 to 3 times the 20 dB bandwidth, centered on a hopping frequency
2. RBW ≥ 1 % of the 20 dB span
3. VBW ≥ RBW
4. Sweep = auto
5. Detector function = peak
6. Trace = max hold

The trace was allowed to stabilize. The EUT was transmitting at its maximum data rate. The marker-to-peak function was used to set the marker to the peak of the emission. The marker-delta function was used to measure 20 dB down one side of the emission. The marker-delta function and marker was moved to the other side of the emission until it was even with the reference marker. The marker-delta reading at this point was the 20 dB bandwidth of the emission.

99 % Occupied Bandwidth

The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1 % of the selected span as is possible without being below 1 %. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual.

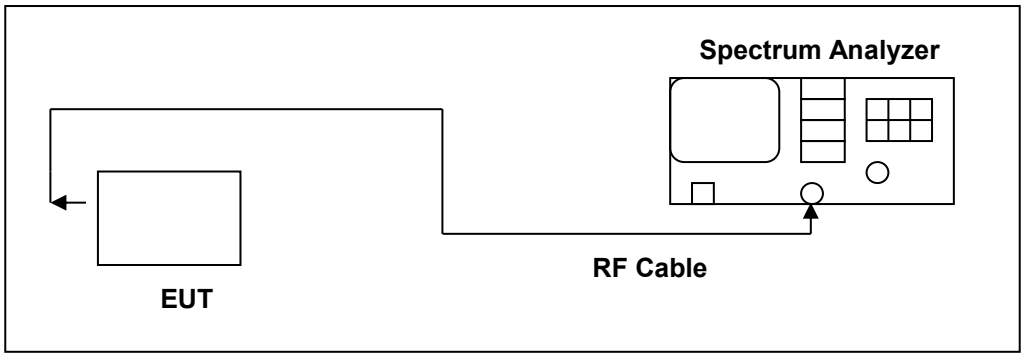
The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded.

4.5. Carrier Frequency Separation Measurement

■ Limit

Title 47 of the CFR, Part 15 Subpart (c) 15.247(a)(1) and RSS-247 requires the measurement of the bandwidth of the transmission between the -20 dB points on the transmitted spectrum. The results of this test determine the limits for channel spacing. The channel spacing shall be a minimum of 25 kHz or the 20 dB bandwidth, 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.

■ Test Setup



■ Test Procedure

The RF output port of the Equipment-Under-Test is directly coupled to the input of the spectrum analyzer through a specialized RF connector. A fully charged battery was used for the supply voltage. The Bluetooth transmitter of the EUT its hopping function enabled. The following spectrum analyzer settings were used:

1. Span = wide enough to capture the peaks of two adjacent channels
2. Resolution (or IF) Bandwidth (RBW) = Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
3. Video (or Average) Bandwidth (VBW) ≥ RBW
4. Sweep = auto
5. Detector function = peak
6. Trace = max hold

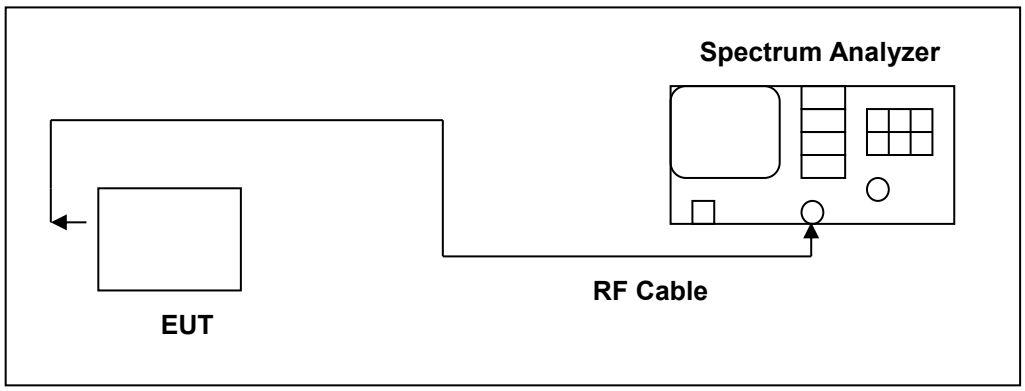
The trace was allowed to stabilize. The marker-delta function was used to determine the separation between the peaks of the adjacent channels.

4.6. Number of Hopping Measurement

■ Limit

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

■ Test Setup



■ Test Procedure

The RF output port of the Equipment-Under-Test is directly coupled to the input of the spectrum analyzer through a specialized RF connector. A fully charged battery was used for the supply voltage. The Bluetooth transmitter of the EUT its hopping function enabled. The following spectrum analyzer settings were used:

1. Span = the frequency band of operation
2. 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.
3. VBW ≥ RBW
4. Sweep = auto
5. Detector function = peak
6. Trace = max hold

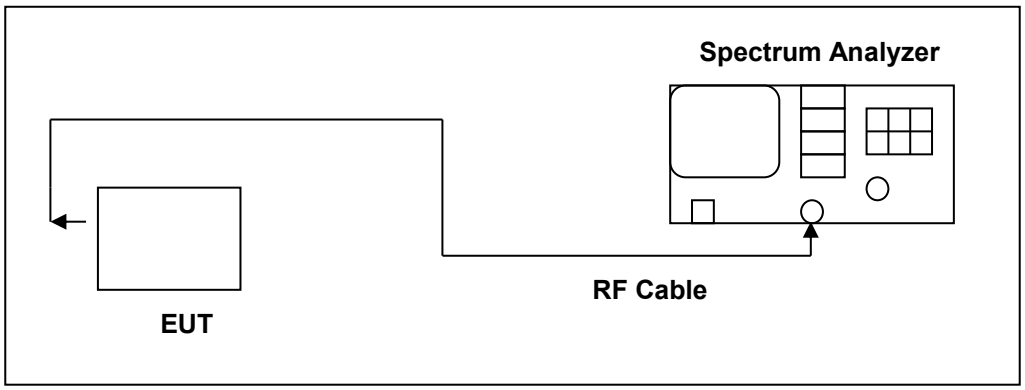
The trace was allowed to stabilize.

4.7. Time of Occupancy (Dwell Time) Measurement

■ Limit

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.

■ Test Setup



■ Test Procedure

The RF output port of the Equipment-Under-Test is directly coupled to the input of the spectrum analyzer through a specialized RF connector. A fully charged battery was used for the supply voltage. The Bluetooth transmitter of the EUT its hopping function enabled. The following spectrum analyzer settings were used:

1. Span = zero span, centered on a hopping channel
2. RBW = 1 MHz
3. VBW $\geq$ RBW
4. Sweep = as necessary to capture the entire dwell time per hopping channel
5. Detector function = peak
6. Trace = max hold

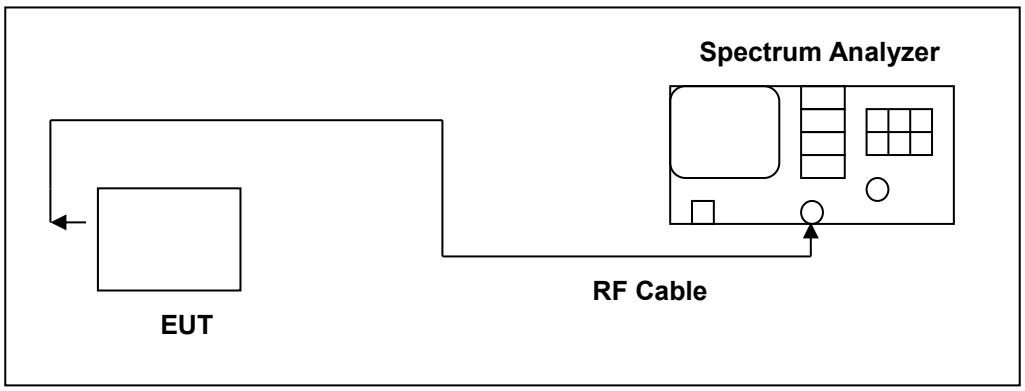
The marker-delta function was used to determine the dwell time.

4.8. Out of Band Conducted Emissions Measurement

■ Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

■ Test Setup



■ Test Procedure

In any 100 kHz bandwidth outside the EUT pass band, the RF power produced by the modulation products of the spreading sequence, the information sequence, and the carrier frequency shall be at least 20 dB below that of the maximum in-band 100 kHz emission, antenna output of the EUT was coupled directly to spectrum analyzer; if an external attenuator and/or cable was used, these losses are compensated for with the analyzer OFFSET function. All other types of emissions from the EUT shall meet the general limits for radiated frequencies outside the pass band. The test was performed at 3 channels (Channel 0, 39, 78).

4.9. Antenna Measurement

■ **Limit**

For FCC:

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.
And According to 15.247 (b)(4), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For IC:

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

For licence-exempt equipment with detachable antennas, the user manual shall also contain the following notice in a conspicuous location:

This radio transmitter [enter the device's ISED certification number] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.
Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

■ **Antenna Connector Construction**

See section 2 – antenna information.

4.10. Other requirements

■ **System Receiver Input Bandwidth**

Each channel bandwidth is 1MHz.

The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

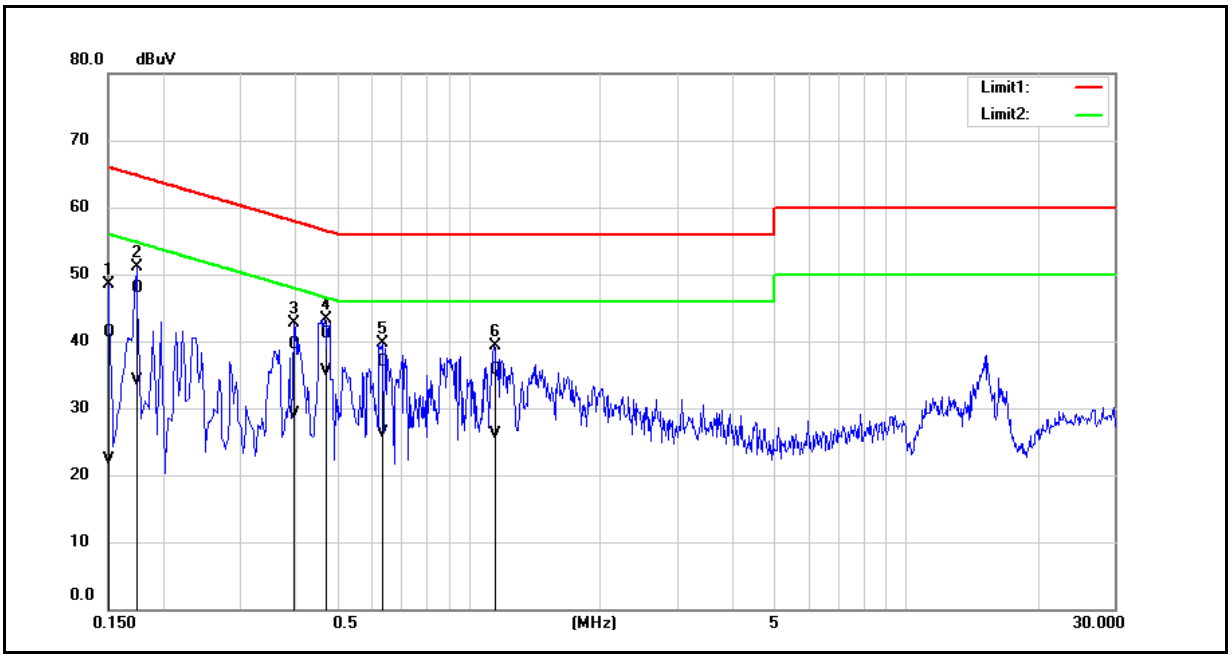
■ **Equipment Description**

The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. 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.

5 Test Results

5.1. Conducted Emission

Standard:	FCC Part 15.247	Line:	L1
Test item:	Conducted Emission	Power:	AC 120 V/60 Hz
Mode:	Transmit Mode		
Description:			

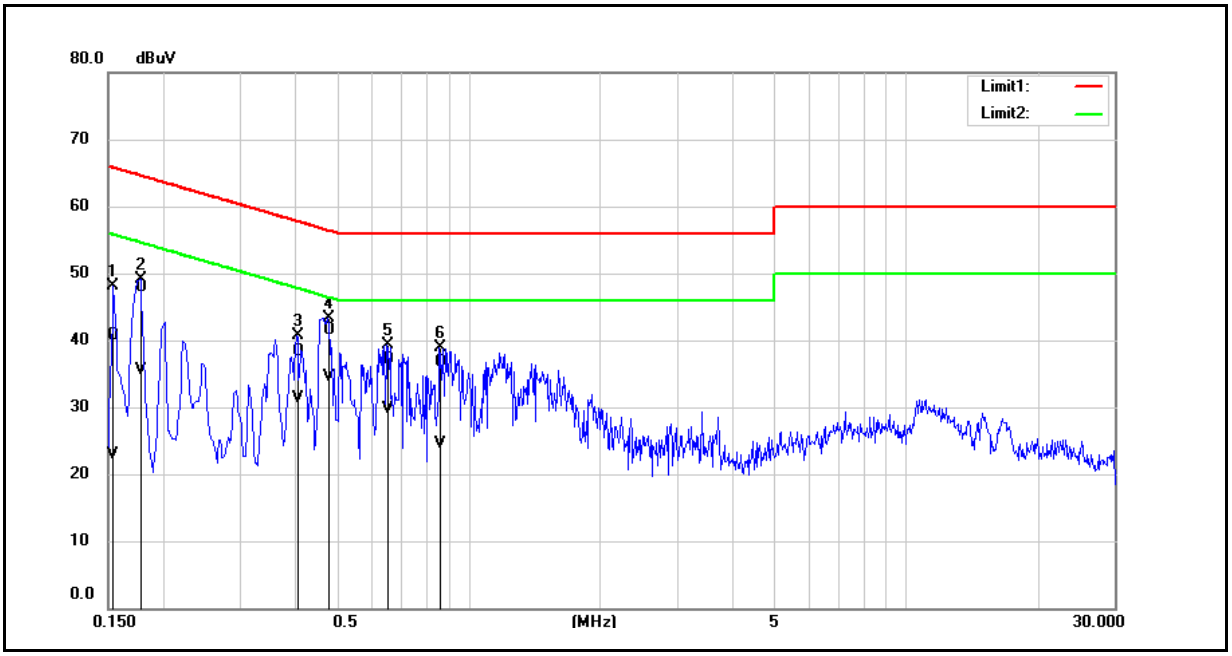


No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1500	31.63	12.73	9.61	41.24	22.34	66.00	56.00	-24.76	-33.66	Pass
2	0.1740	38.38	24.46	9.61	47.99	34.07	64.77	54.77	-16.78	-20.70	Pass
3	0.3980	29.84	19.44	9.63	39.47	29.07	57.90	47.90	-18.43	-18.83	Pass
4	0.4700	31.55	25.80	9.63	41.18	35.43	56.51	46.51	-15.33	-11.08	Pass
5	0.6340	27.29	16.68	9.64	36.93	26.32	56.00	46.00	-19.07	-19.68	Pass
6	1.1420	25.99	16.54	9.66	35.65	26.20	56.00	46.00	-20.35	-19.80	Pass

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB) = Cable loss (dB) + L.I.S.N. factor (dB).

Standard:	FCC Part 15.247	Line:	N
Test item:	Conducted Emission	Power:	AC 120 V/60 Hz
Mode:	Transmit Mode		
Description:			



No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1540	31.12	13.33	9.60	40.72	22.93	65.78	55.78	-25.06	-32.85	Pass
2	0.1780	38.30	25.81	9.61	47.91	35.42	64.58	54.58	-16.67	-19.16	Pass
3	0.4060	28.65	21.72	9.62	38.27	31.34	57.73	47.73	-19.46	-16.39	Pass
4	0.4780	31.80	24.84	9.62	41.42	34.46	56.37	46.37	-14.95	-11.91	Pass
5	0.6540	27.39	20.03	9.63	37.02	29.66	56.00	46.00	-18.98	-16.34	Pass
6	0.8580	26.99	14.85	9.64	36.63	24.49	56.00	46.00	-19.37	-21.51	Pass

Note: 1. Result (dBuV) = Correction factor (dB) + Reading(dBuV).

2. Correction factor (dB) = Cable loss (dB) + L.I.S.N. factor (dB).

5.2. Conducted Test Results

Maximum Conducted Output Power Measurement
Reference Appendix A

20 dB RF Bandwidth Measurement
Reference Appendix A / Appendix B

Carrier Frequency Separation Measurement
Reference Appendix A / Appendix B

Number of Hopping Measurement
Reference Appendix A / Appendix B

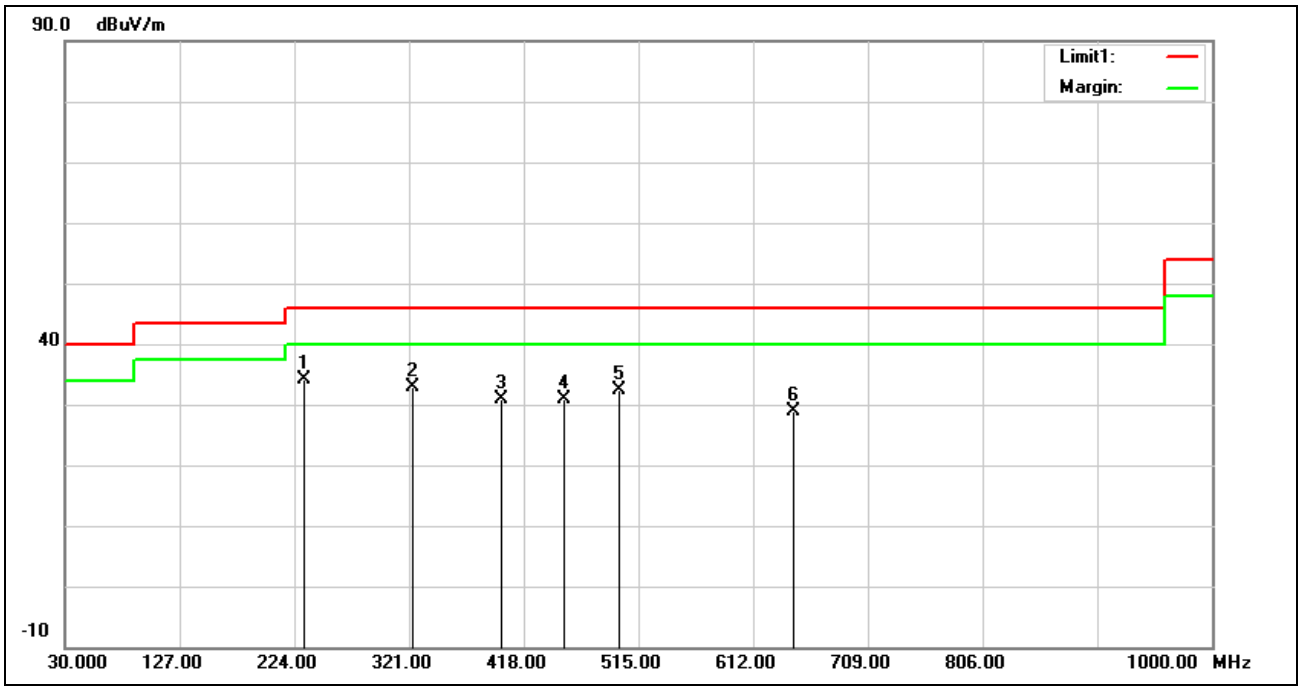
Out of Band Conducted Emissions Measurement
Reference Appendix B

Time of Occupancy (Dwell Time) Measurement
Reference Appendix A / Appendix B

5.3. Radiated Emission Measurement

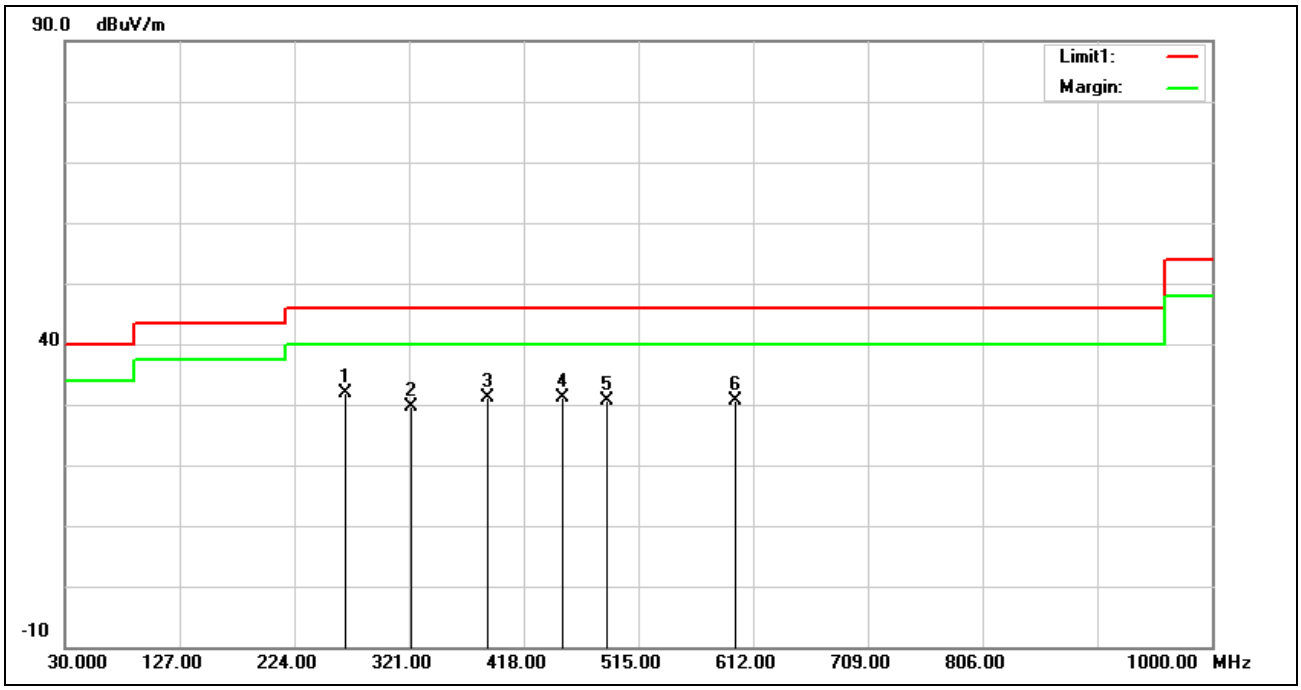
Below 1 GHz

Standard:	Part 15C	Test Site:	966 Chamber
Polarization:	Horizontal		
Test Mode:	Transmit Mode		
Remark:			



No.	Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	232.7300	41.90	-7.85	34.05	46.00	-11.95	QP
2	323.9100	38.10	-5.17	32.93	46.00	-13.07	QP
3	398.6000	34.09	-3.25	30.84	46.00	-15.16	QP
4	451.9500	32.75	-1.99	30.76	46.00	-15.24	QP
5	498.5100	34.23	-1.92	32.31	46.00	-13.69	QP
6	645.9500	27.51	1.30	28.81	46.00	-17.19	QP

Standard:	Part 15C	Test Site:	966 Chamber
Polarization:	Vertical		
Test Mode:	Transmit Mode		
Remark:			

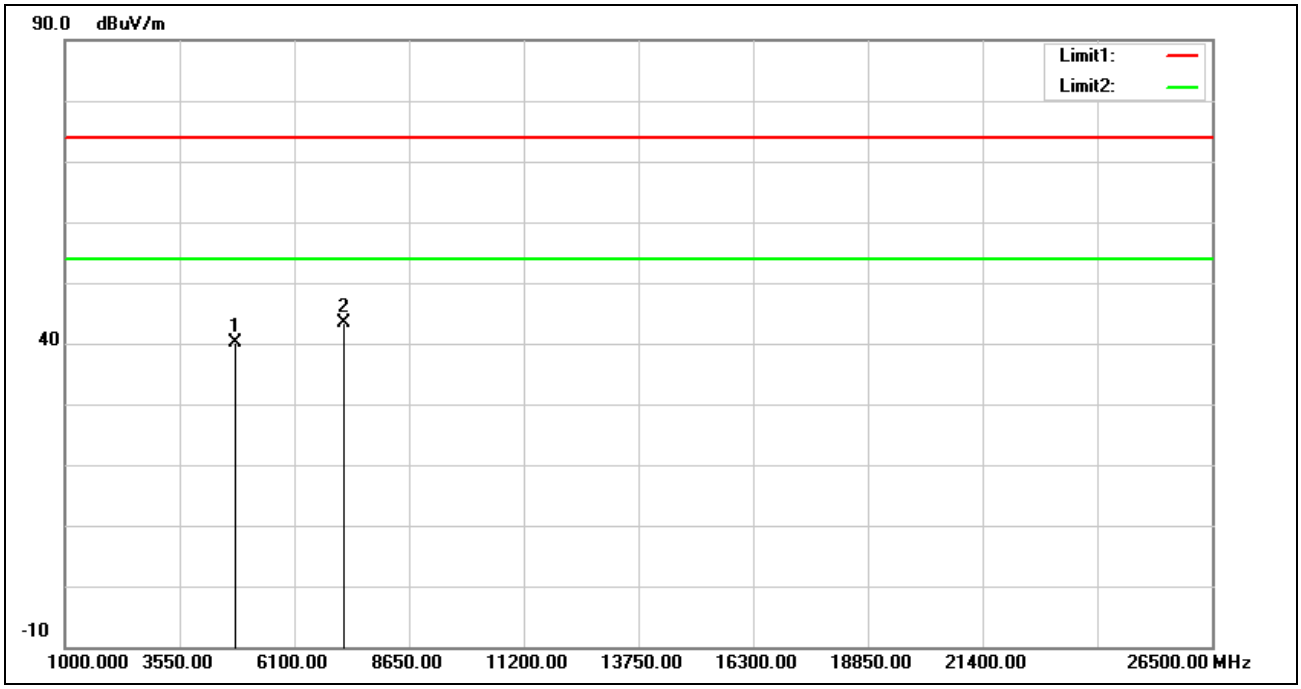


No.	Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	266.6800	38.59	-6.62	31.97	46.00	-14.03	QP
2	322.9400	34.75	-5.20	29.55	46.00	-16.45	QP
3	387.9300	34.55	-3.54	31.01	46.00	-14.99	QP
4	450.9800	33.25	-2.00	31.25	46.00	-14.75	QP
5	488.8100	32.68	-1.94	30.74	46.00	-15.26	QP
6	597.4500	30.00	0.52	30.52	46.00	-15.48	QP

Harmonic

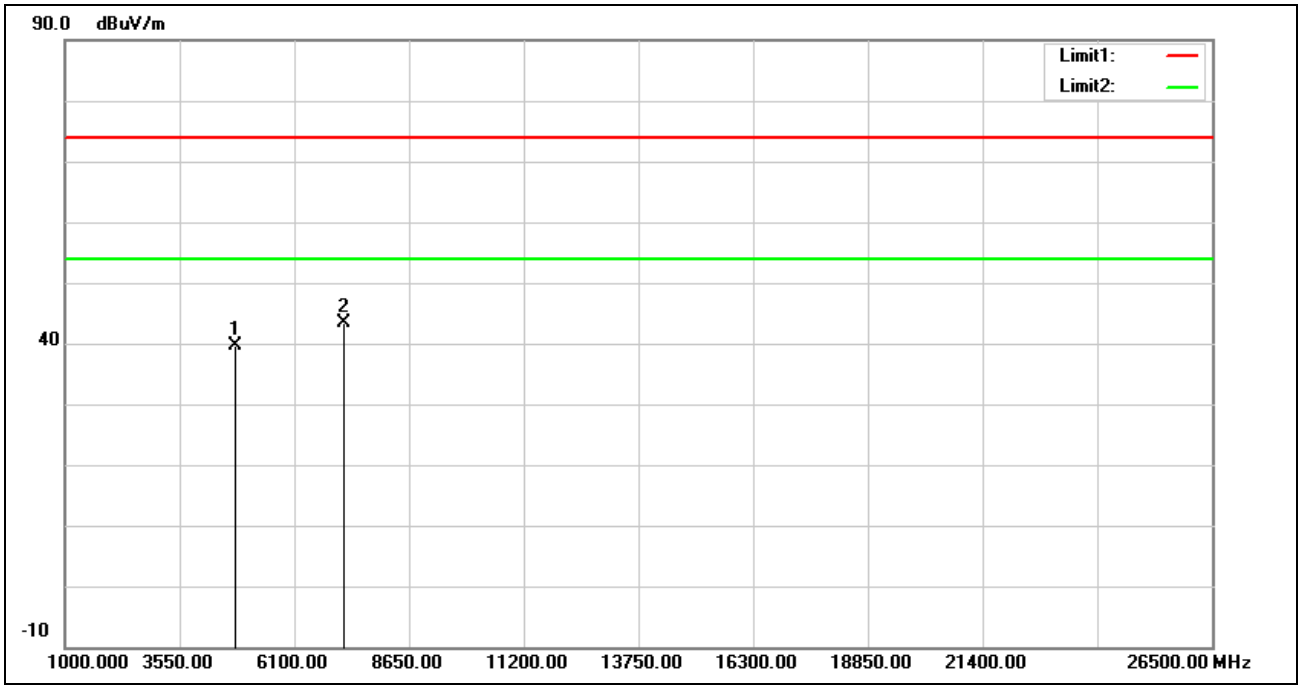
Above 1 GHz

Standard:	Part 15C	Test Site:	966 Chamber
Polarization:	Horizontal		
Test Mode:	BT_GFSK 2402 MHz		
Remark:			



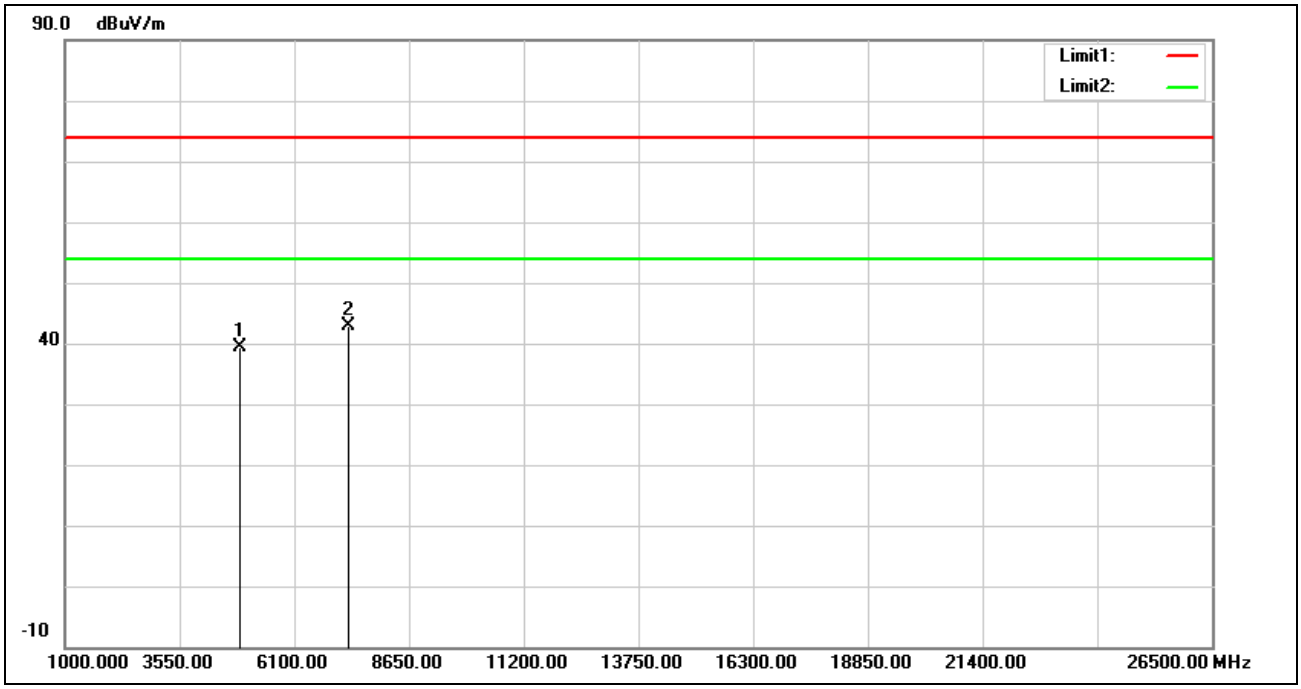
No.	Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4804.000	40.33	-0.31	40.02	74.00	-33.98	peak
2*	7206.000	36.80	6.52	43.32	74.00	-30.68	peak

Standard:	Part 15C	Test Site:	966 Chamber
Polarization:	Vertical		
Test Mode:	BT_GFSK 2402 MHz		
Remark:			



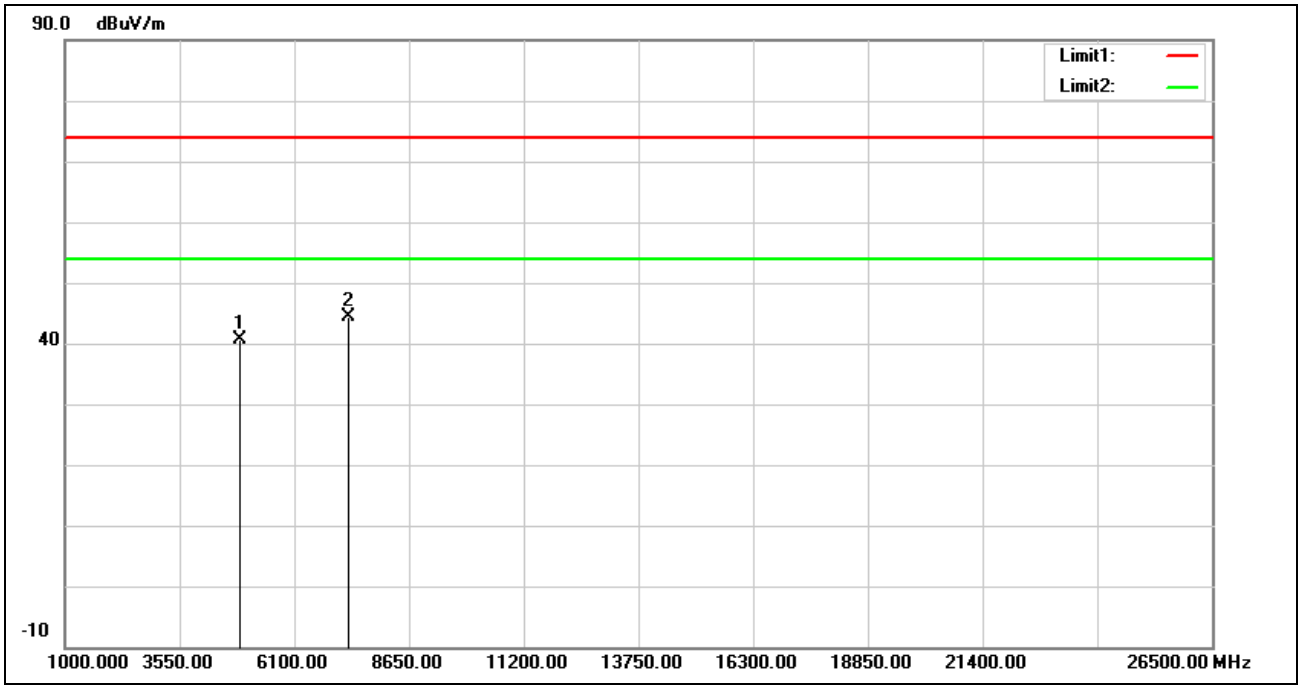
No.	Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4804.000	39.86	-0.31	39.55	74.00	-34.45	peak
2*	7206.000	36.85	6.52	43.37	74.00	-30.63	peak

Standard:	Part 15C	Test Site:	966 Chamber
Polarization:	Horizontal		
Test Mode:	BT_GFSK 2441 MHz		
Remark:			



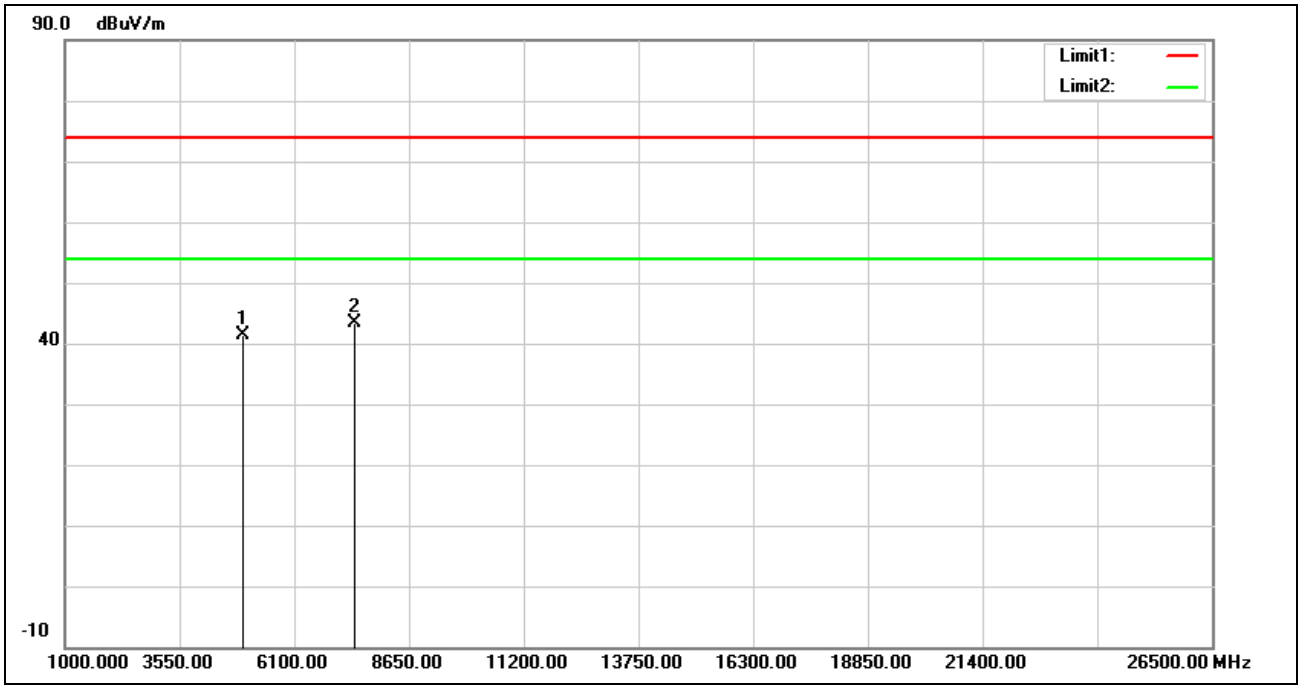
No.	Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4882.000	39.55	-0.13	39.42	74.00	-34.58	peak
2*	7323.000	36.77	6.21	42.98	74.00	-31.02	peak

Standard:	Part 15C	Test Site:	966 Chamber
Polarization:	Vertical		
Test Mode:	BT_GFSK 2441 MHz		
Remark:			



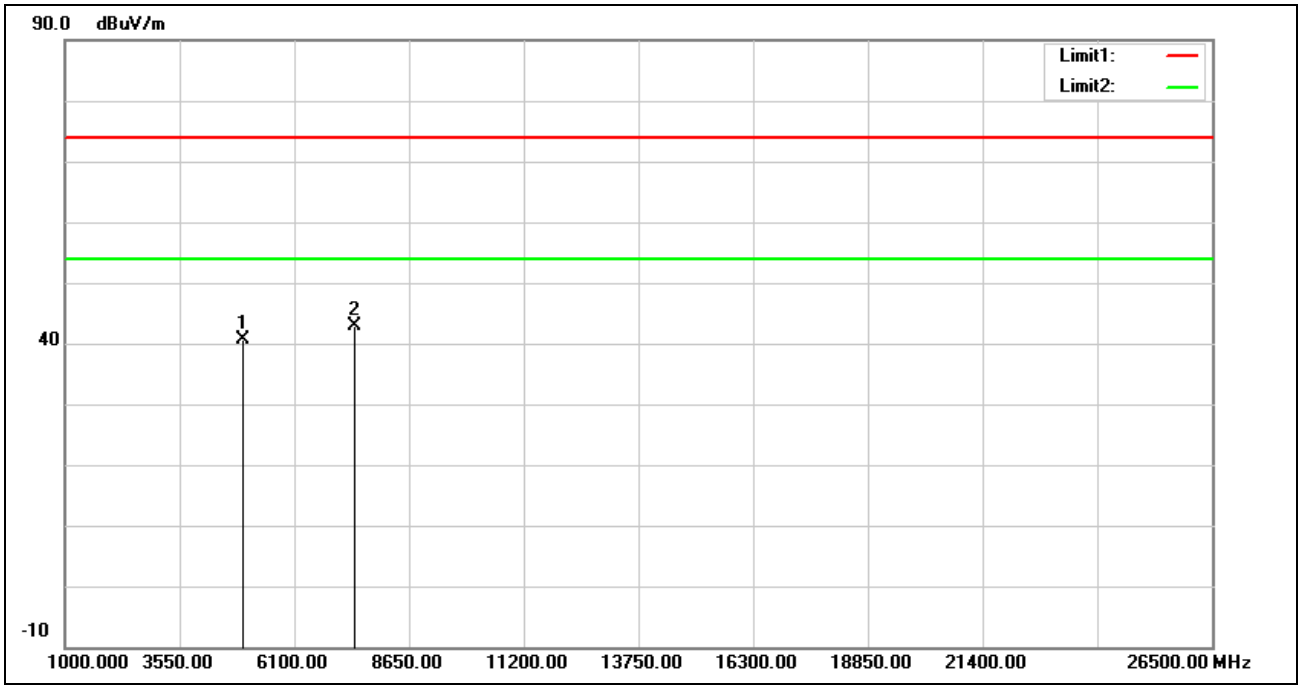
No.	Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4882.000	40.79	-0.13	40.66	74.00	-33.34	peak
2*	7323.000	38.12	6.21	44.33	74.00	-29.67	peak

Standard:	Part 15C	Test Site:	966 Chamber
Polarization:	Horizontal		
Test Mode:	BT_GFSK 2480 MHz		
Remark:			



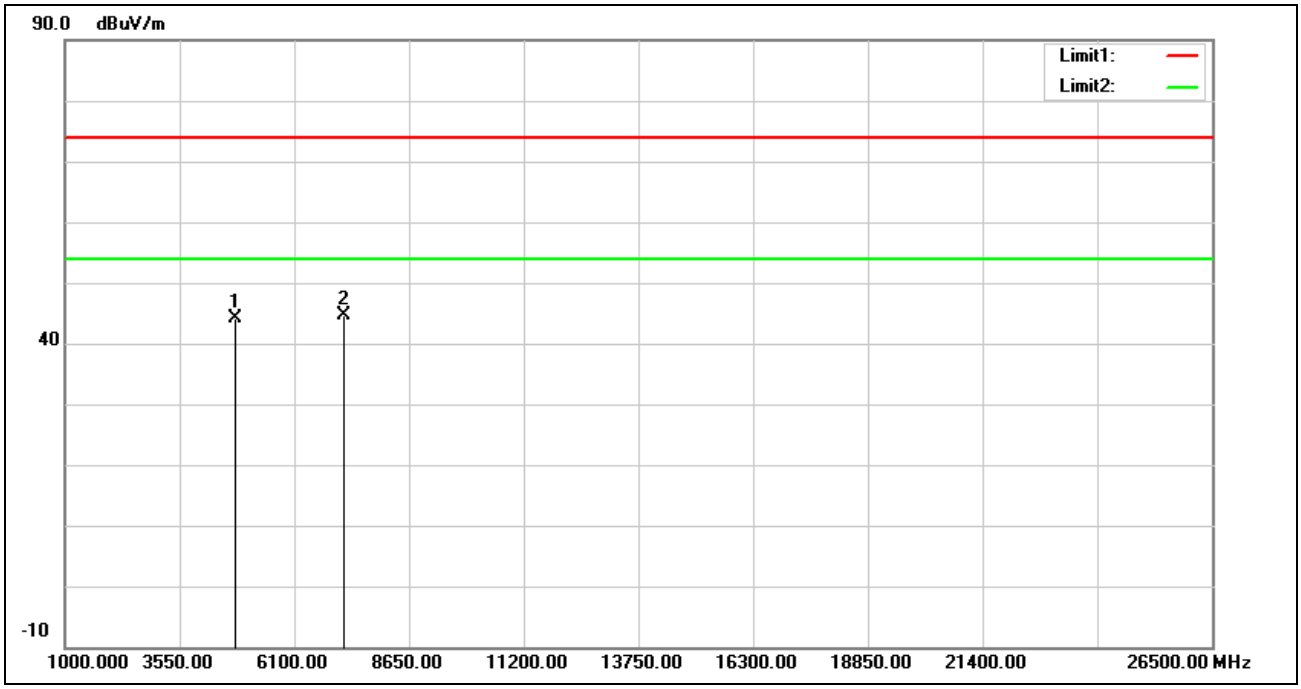
No.	Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4960.000	41.22	0.22	41.44	74.00	-32.56	peak
2*	7440.000	36.95	6.40	43.35	74.00	-30.65	peak

Standard:	Part 15C	Test Site:	966 Chamber
Polarization:	Vertical		
Test Mode:	BT_GFSK 2480 MHz		
Remark:			



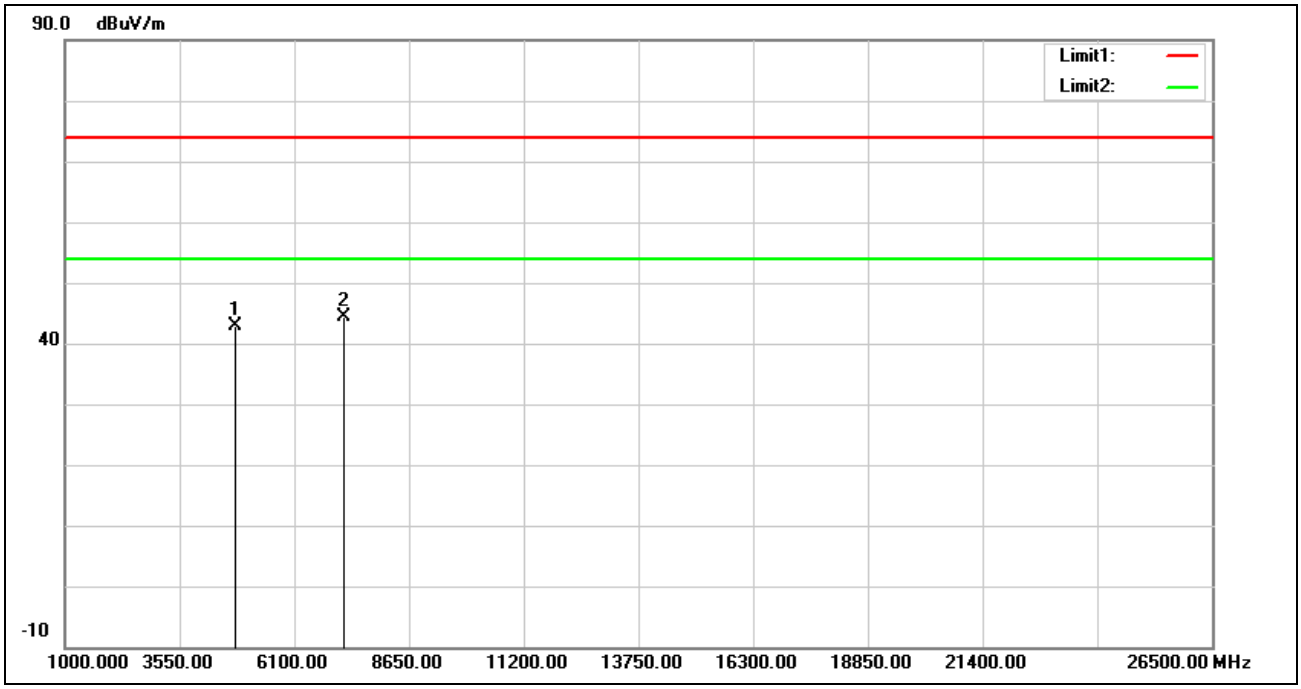
No.	Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4960.000	40.32	0.22	40.54	74.00	-33.46	peak
2*	7440.000	36.59	6.40	42.99	74.00	-31.01	peak

Standard:	Part 15C	Test Site:	966 Chamber
Polarization:	Horizontal		
Test Mode:	BT_8DPSK 2402 MHz		
Remark:			



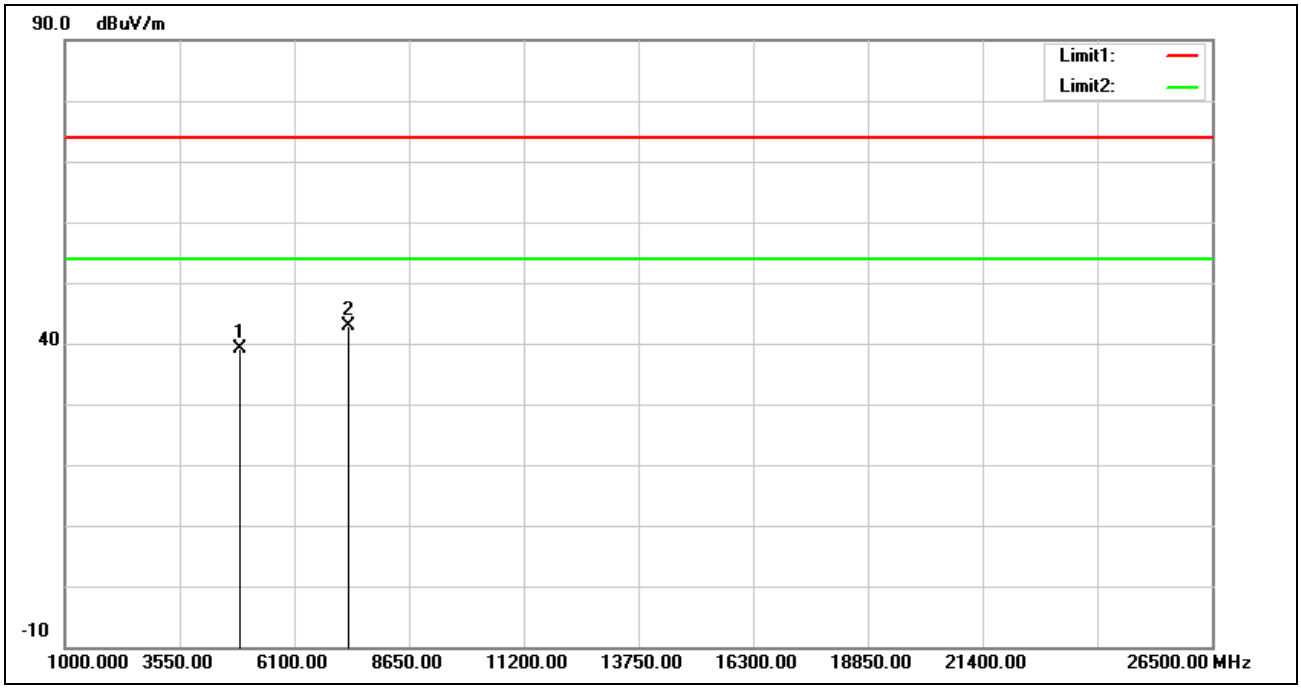
No.	Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4804.000	44.54	-0.31	44.23	74.00	-29.77	peak
2*	7206.000	38.06	6.52	44.58	74.00	-29.42	peak

Standard:	Part 15C	Test Site:	966 Chamber
Polarization:	Vertical		
Test Mode:	BT_8DPSK 2402 MHz		
Remark:			



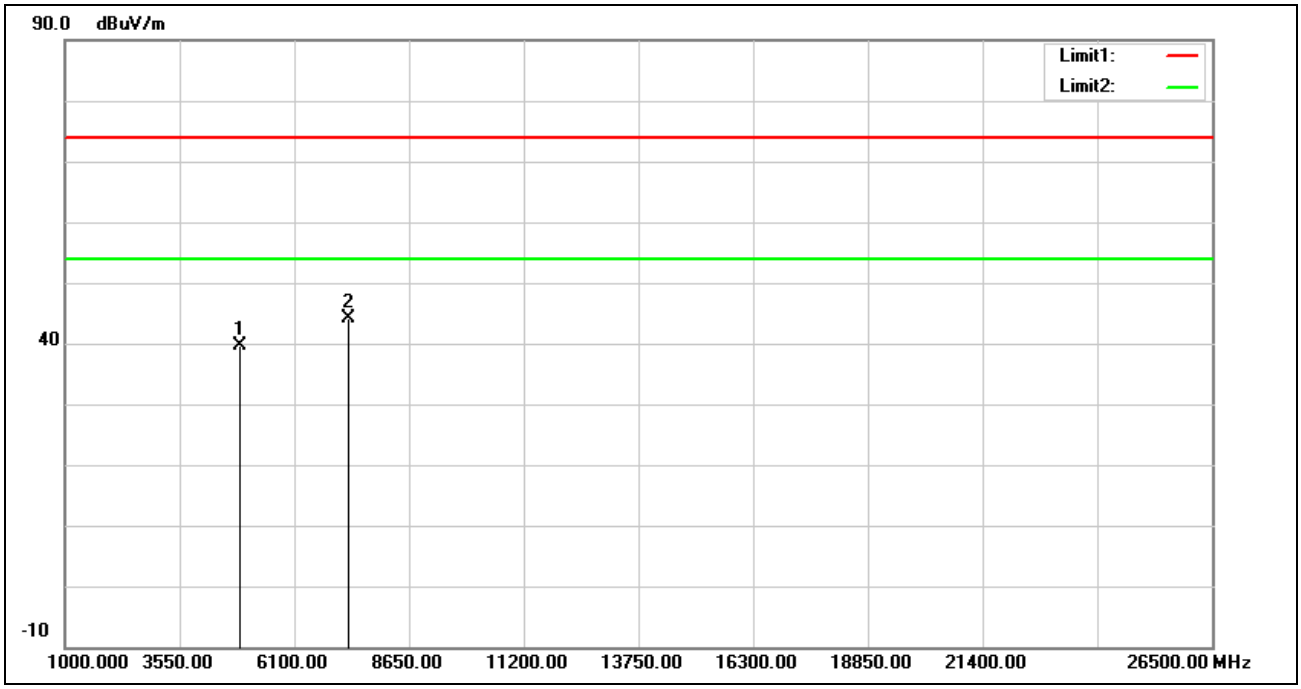
No.	Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4804.000	43.16	-0.31	42.85	74.00	-31.15	peak
2*	7206.000	37.83	6.52	44.35	74.00	-29.65	peak

Standard:	Part 15C	Test Site:	966 Chamber
Polarization:	Horizontal		
Test Mode:	BT_8DPSK 2441 MHz		
Remark:			



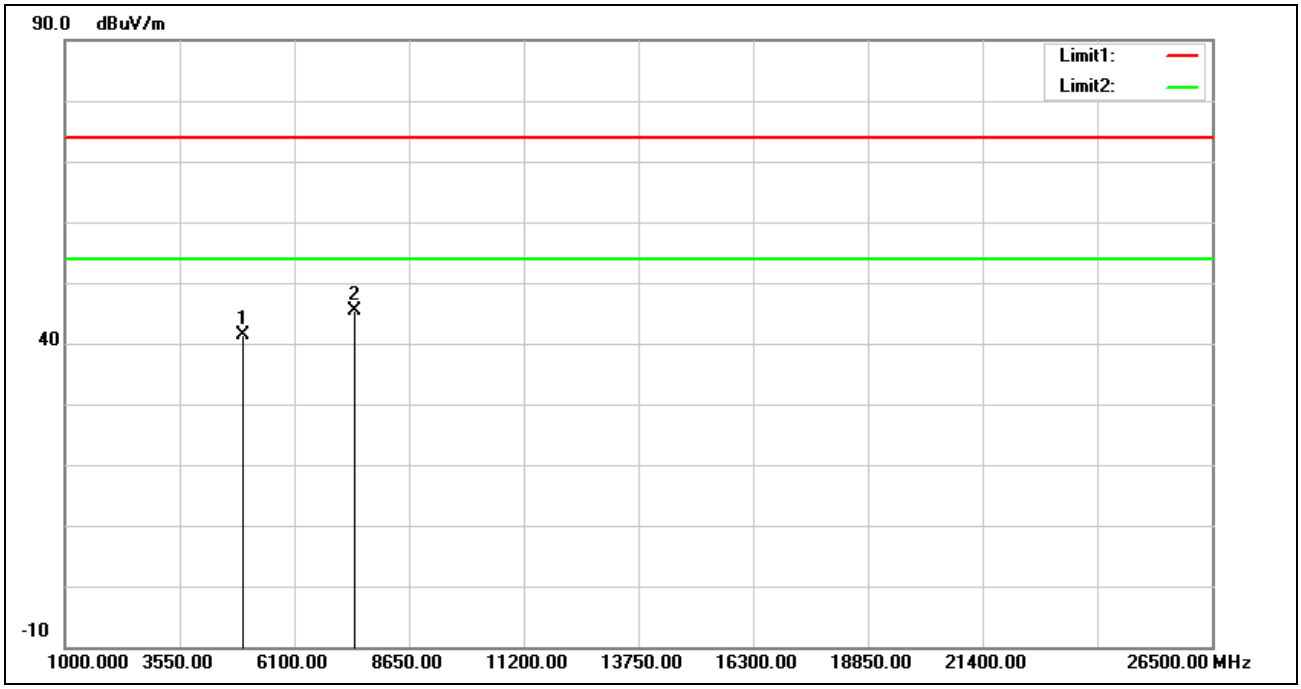
No.	Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4882.000	39.14	-0.13	39.01	74.00	-34.99	peak
2*	7323.000	36.70	6.21	42.91	74.00	-31.09	peak

Standard:	Part 15C	Test Site:	966 Chamber
Polarization:	Vertical		
Test Mode:	BT_8DPSK 2441 MHz		
Remark:			



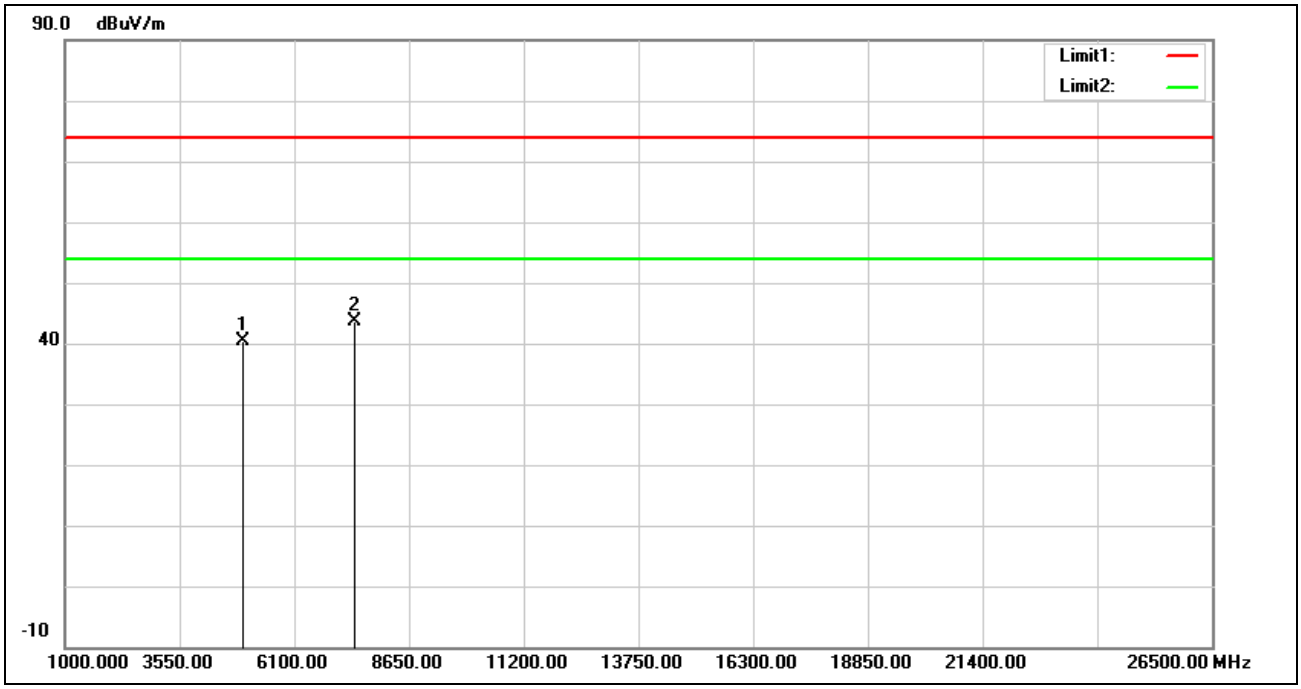
No.	Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4882.000	39.74	-0.13	39.61	74.00	-34.39	peak
2*	7323.000	37.87	6.21	44.08	74.00	-29.92	peak

Standard:	Part 15C	Test Site:	966 Chamber
Polarization:	Horizontal		
Test Mode:	BT_8DPSK 2480 MHz		
Remark:			



No.	Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4960.000	41.12	0.22	41.34	74.00	-32.66	peak
2*	7440.000	39.06	6.40	45.46	74.00	-28.54	peak

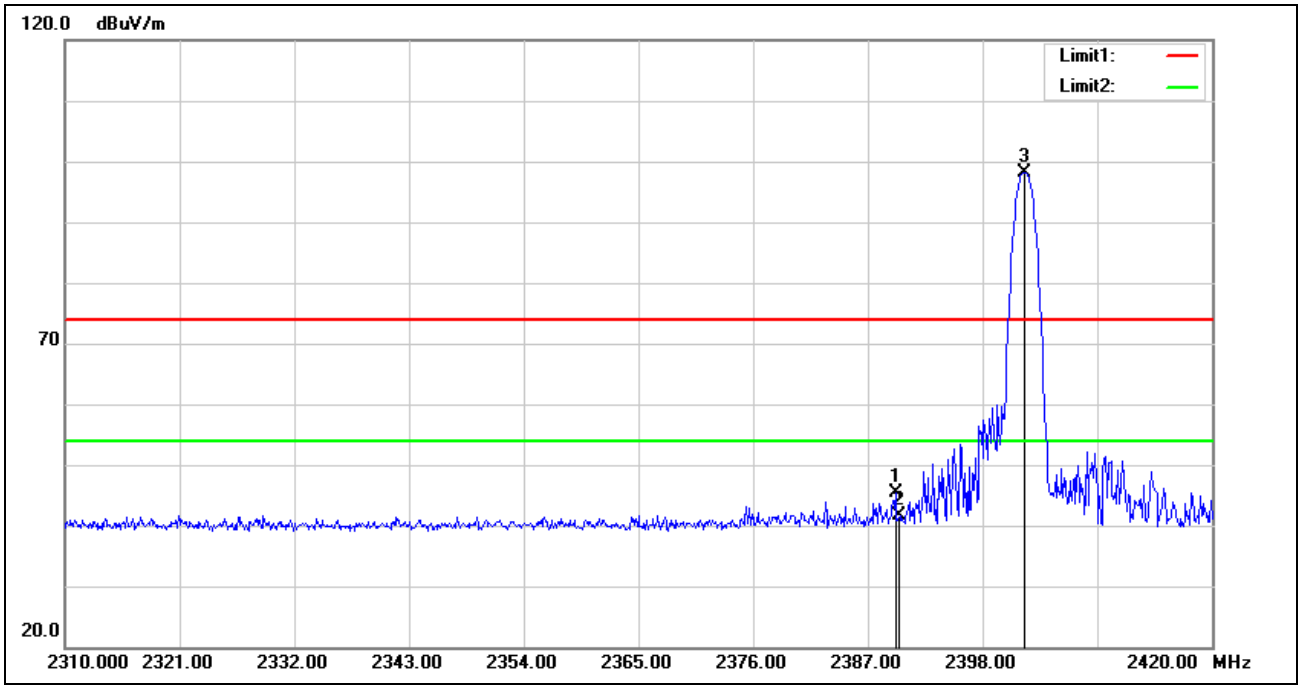
Standard:	Part 15C	Test Site:	966 Chamber
Polarization:	Vertical		
Test Mode:	BT_8DPSK 2480 MHz		
Remark:			



No.	Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4960.000	40.19	0.22	40.41	74.00	-33.59	peak
2*	7440.000	37.30	6.40	43.70	74.00	-30.30	peak

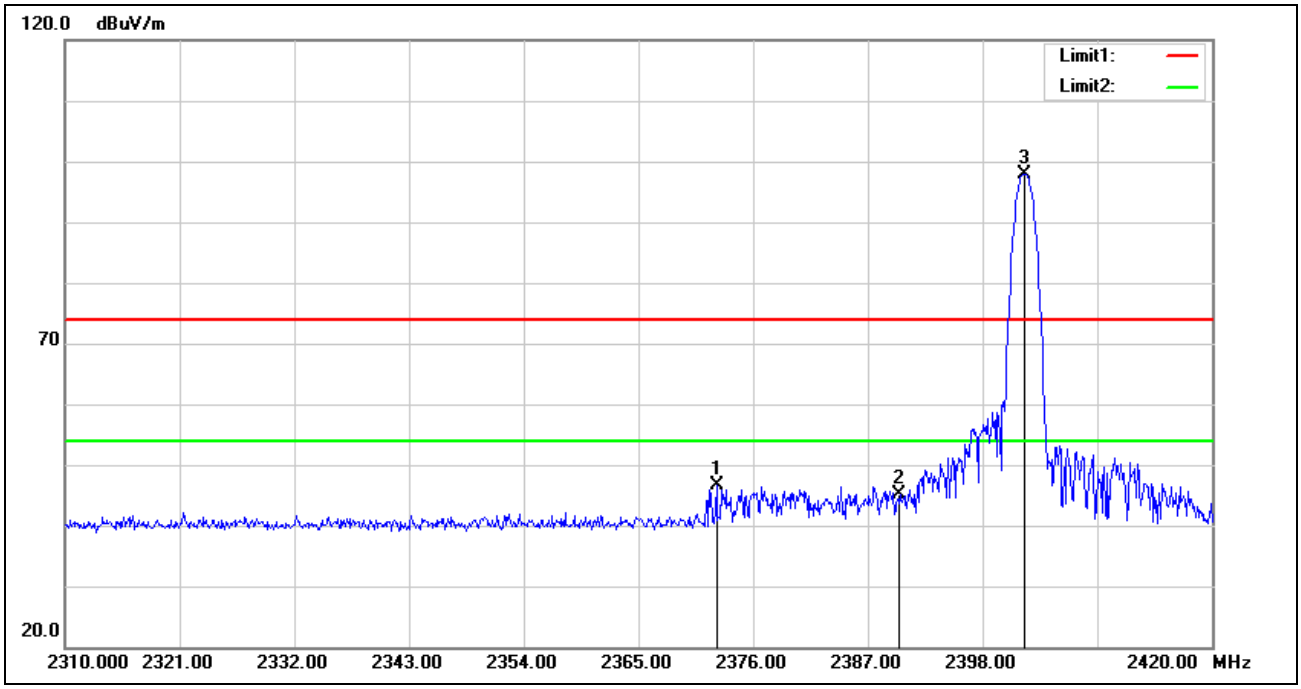
Band Edge

Standard:	Part 15C	Test Site:	966 Chamber
Polarization:	Horizontal		
Test Mode:	BT_GFSK 2402 MHz		
Remark:			



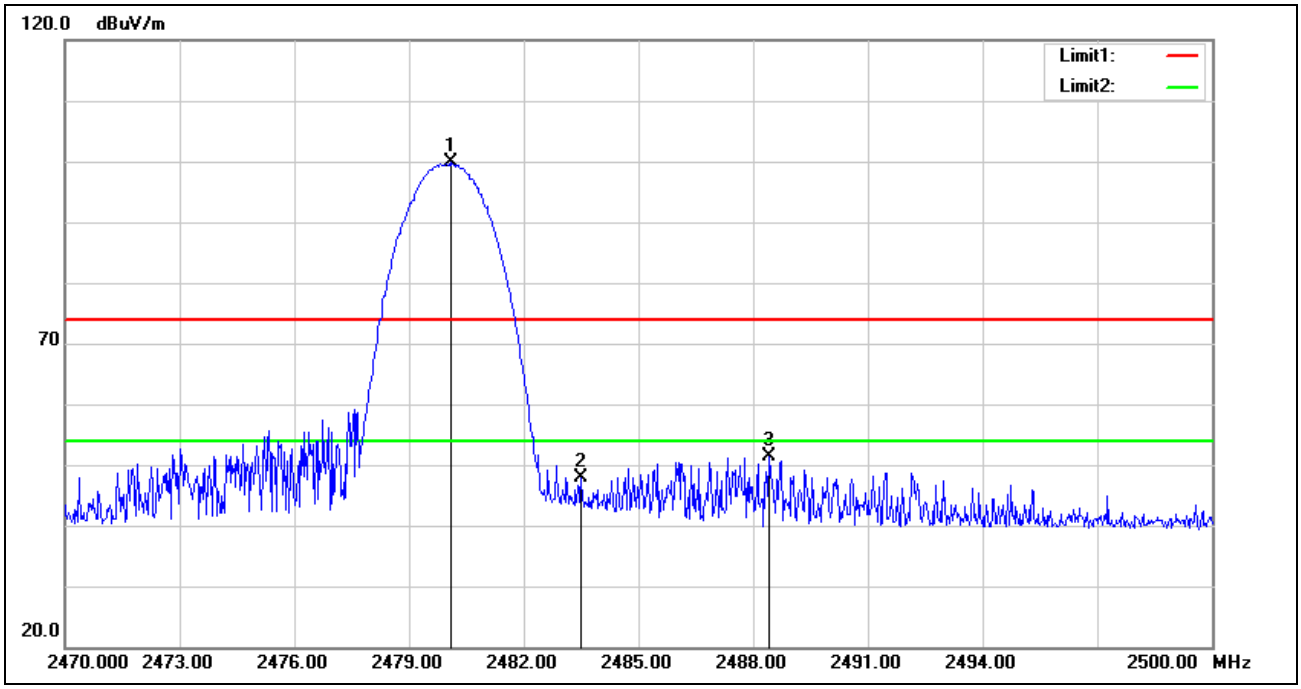
No.	Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2389.640	51.77	-6.50	45.27	74.00	-28.73	peak
2	2390.000	48.24	-6.50	41.74	74.00	-32.26	peak
3*	2401.960	104.64	-6.51	98.13	74.00	24.13	peak

Standard:	Part 15C	Test Site:	966 Chamber
Polarization:	Vertical		
Test Mode:	BT_GFSK 2402 MHz		
Remark:			



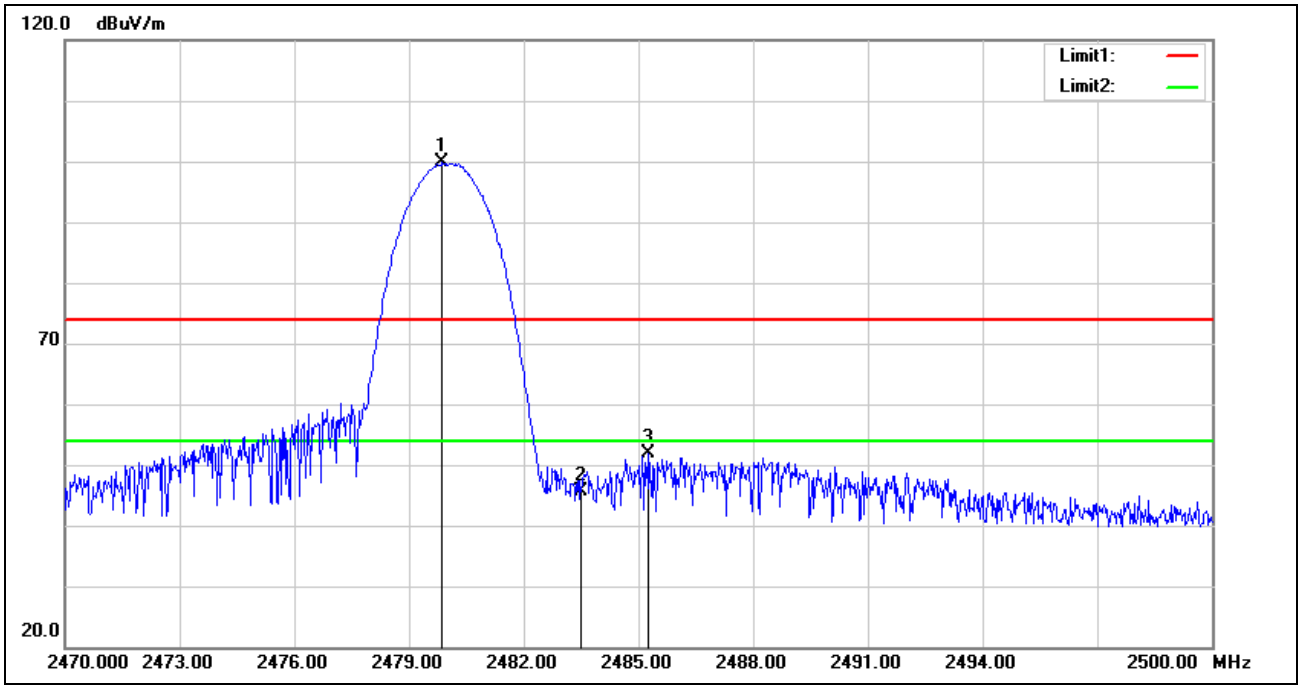
No.	Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2372.480	53.16	-6.47	46.69	74.00	-27.31	peak
2	2390.000	51.60	-6.50	45.10	74.00	-28.90	peak
3*	2401.960	104.49	-6.51	97.98	74.00	23.98	peak

Standard:	Part 15C	Test Site:	966 Chamber
Polarization:	Horizontal		
Test Mode:	BT_GFSK 2480 MHz		
Remark:			



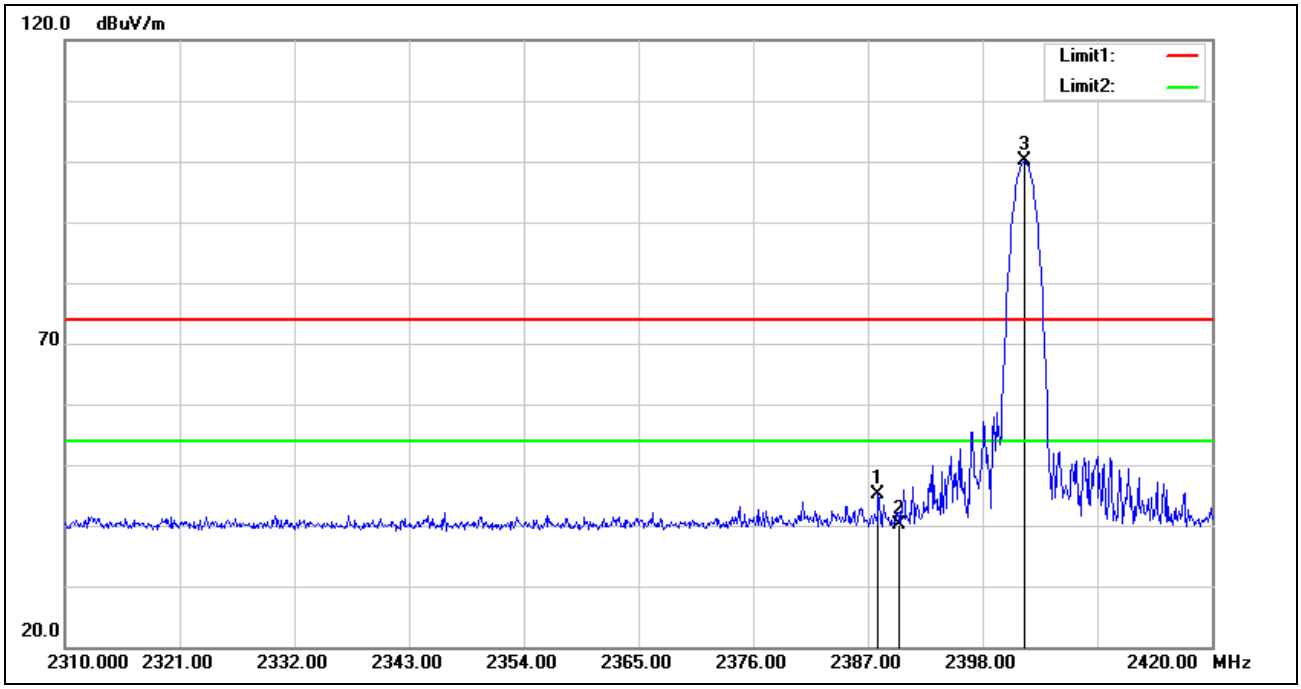
No.	Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	2480.080	106.34	-6.58	99.76	74.00	25.76	peak
2	2483.500	54.34	-6.57	47.77	74.00	-26.23	peak
3	2488.420	57.90	-6.58	51.32	74.00	-22.68	peak

Standard:	Part 15C	Test Site:	966 Chamber
Polarization:	Vertical		
Test Mode:	BT_GFSK 2480 MHz		
Remark:			



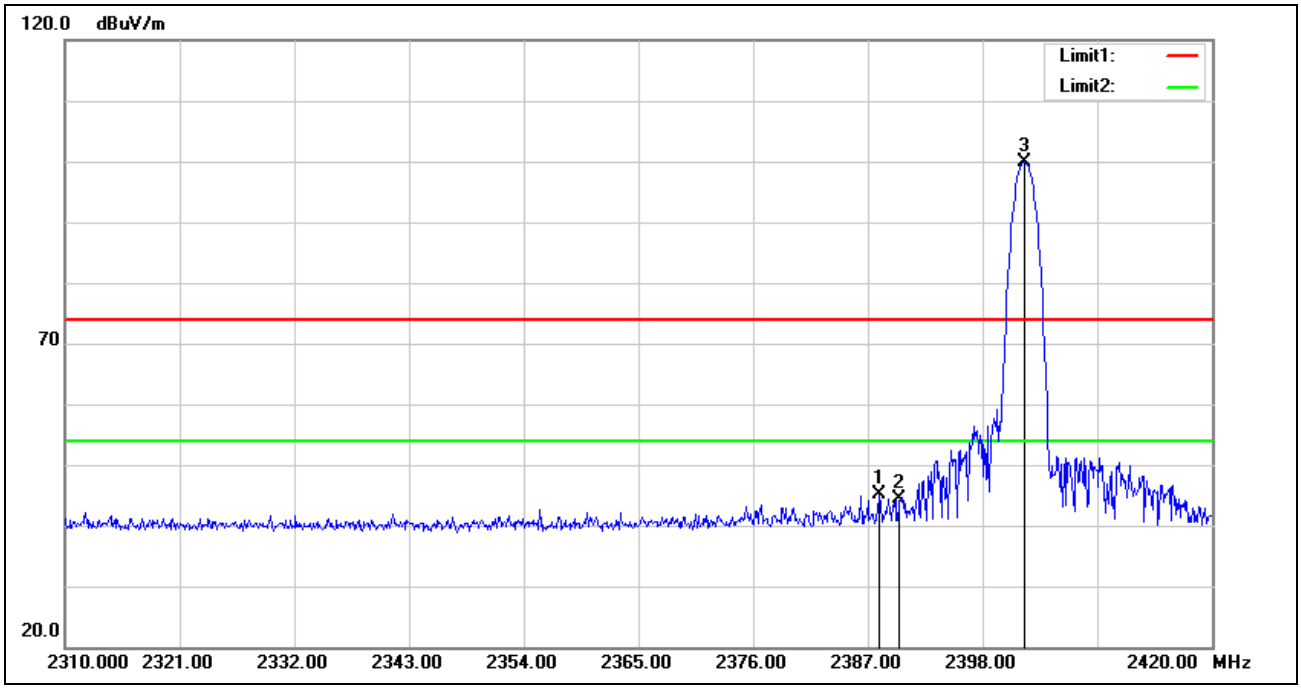
No.	Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	2479.870	106.41	-6.58	99.83	74.00	25.83	peak
2	2483.500	52.10	-6.57	45.53	74.00	-28.47	peak
3	2485.270	58.35	-6.57	51.78	74.00	-22.22	peak

Standard:	Part 15C	Test Site:	966 Chamber
Polarization:	Horizontal		
Test Mode:	BT_8DPSK 2402 MHz		
Remark:			



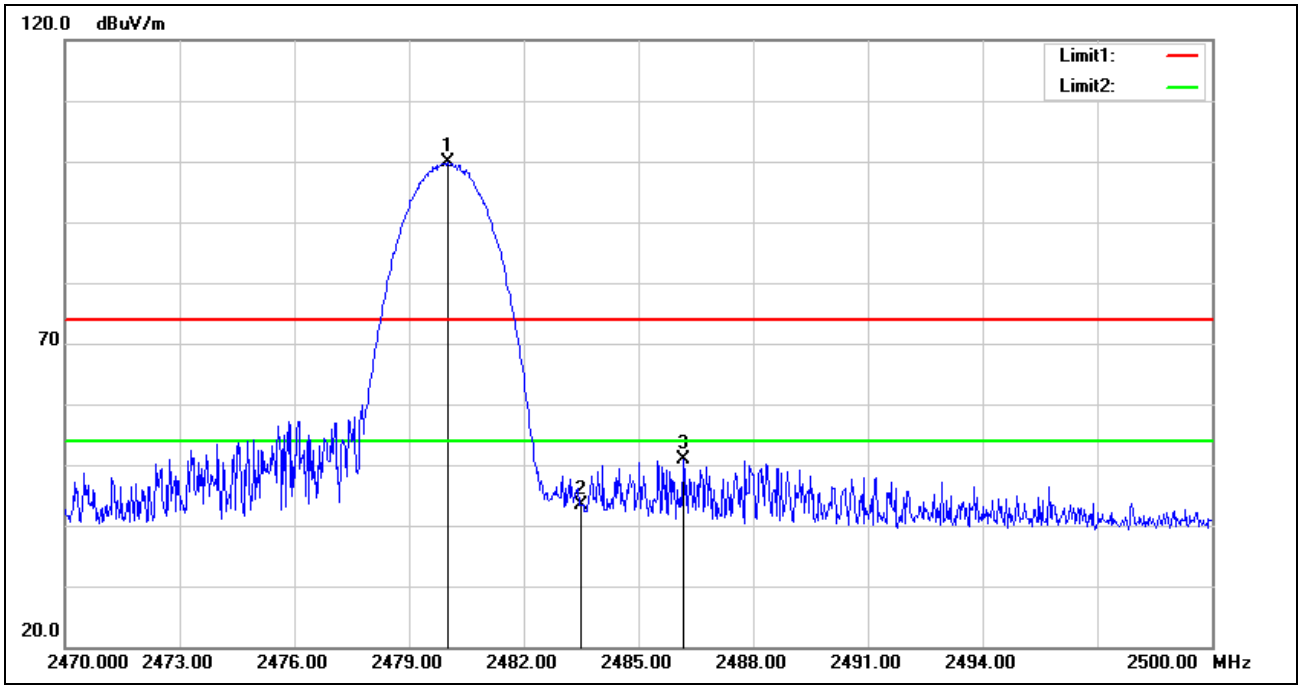
No.	Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2387.990	51.55	-6.50	45.05	74.00	-28.95	peak
2	2390.000	46.71	-6.50	40.21	74.00	-33.79	peak
3*	2402.070	106.61	-6.51	100.10	74.00	26.10	peak

Standard:	Part 15C	Test Site:	966 Chamber
Polarization:	Vertical		
Test Mode:	BT_8DPSK 2402 MHz		
Remark:			



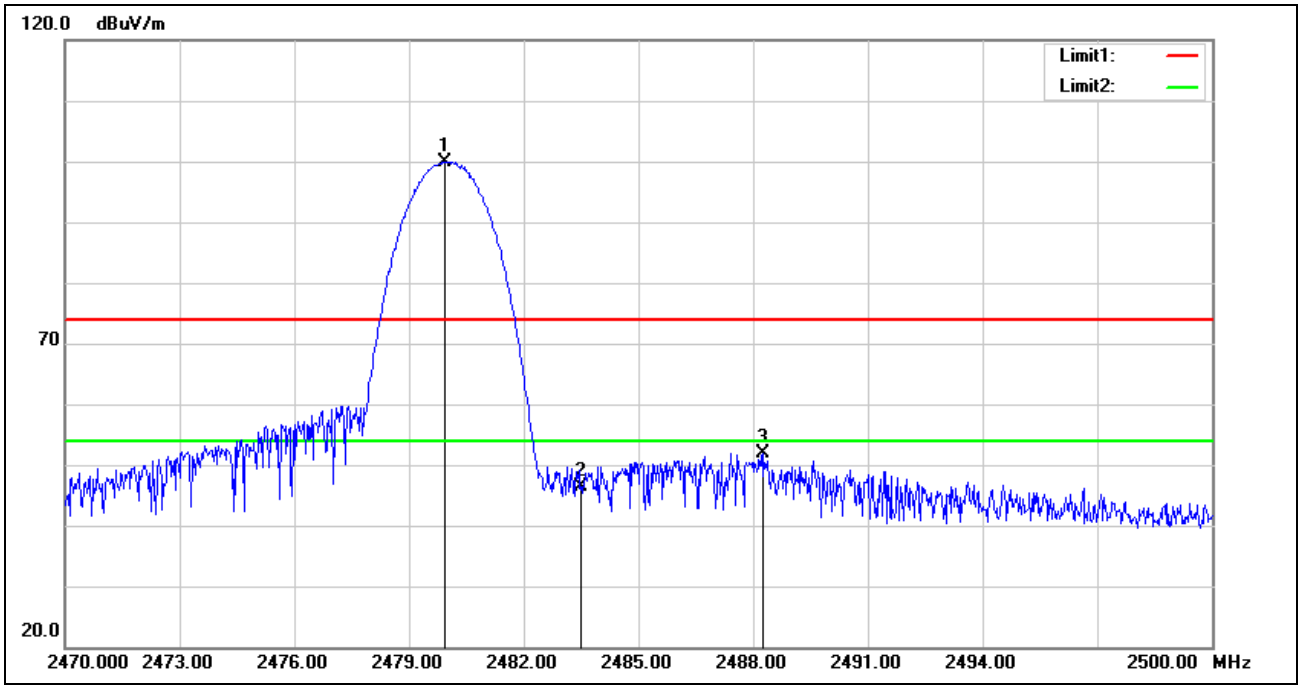
No.	Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2388.100	51.59	-6.50	45.09	74.00	-28.91	peak
2	2390.000	50.80	-6.50	44.30	74.00	-29.70	peak
3*	2401.960	106.49	-6.51	99.98	74.00	25.98	peak

Standard:	Part 15C	Test Site:	966 Chamber
Polarization:	Horizontal		
Test Mode:	BT_8DPSK 2480 MHz		
Remark:			



No.	Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	2480.020	106.44	-6.58	99.86	74.00	25.86	peak
2	2483.500	50.03	-6.57	43.46	74.00	-30.54	peak
3	2486.170	57.34	-6.57	50.77	74.00	-23.23	peak

Standard:	Part 15C	Test Site:	966 Chamber
Polarization:	Vertical		
Test Mode:	BT_8DPSK 2480 MHz		
Remark:			



No.	Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	2479.930	106.58	-6.58	100.00	74.00	26.00	peak
2	2483.500	53.04	-6.57	46.47	74.00	-27.53	peak
3	2488.270	58.54	-6.58	51.96	74.00	-22.04	peak

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