

RF Test Report

Applicant : EmWicon Corporation

Product Type : Wi-Fi 5 802.11ac 2x2 dual-band Mini PCIe Module

Trade Name : 

Model Number : WMX6218

Applicable Standard : FCC 47 CFR PART 15 SUBPART C
ANSI C63.10:2013

Received Date : Dec. 17, 2021

Test Period : Jan. 04 ~ Jan. 09, 2022

Issued Date : Feb. 10, 2022

Issued by

A Test Lab Techno Corp.
No. 140-1, Changan Street, Bade District,
Taoyuan City 334025, Taiwan (R.O.C.)
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Taiwan Accreditation Foundation accreditation number: 1330
Frequency Range : 9 kHz to 40 GHz
Test Firm MRA designation number: TW0010

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 A Test Lab Technology Corporation.
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	Revisions	Revised By
00	Feb. 10, 2022	Initial Issue	Nicole Chu

Verification of Compliance

Applicant : EmWicon Corporation

Product Type : Wi-Fi 5 802.11ac 2x2 dual-band Mini PCIe Module

Trade Name : 

Model Number : WMX6218

FCC ID : 2A3G3-WMX6218

Applicable Standard : FCC 47 CFR PART 15 SUBPART C
ANSI C63.10:2013

Test Result : Complied

Performing Lab. : A Test Lab Techno Corp.
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Taiwan Accreditation Foundation accreditation number: 1330
<http://www.atl-lab.com.tw/e-index.htm>

A Test Lab Techno Corp. 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 A Test Lab Techno Corp. 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

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	-----

Decision Rule

- ☒ Uncertainty is not included.
☐ Uncertainty is included.

Standard	Description
CFR47, Part 15, Subpart C	Intentional Radiators
ANSI C63. 10: 2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
DA 00-705	Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems

1.2. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty
Conducted Emission	150 kHz ~ 30 MHz	2.7 dB
Radiated Emission	9 kHz ~ 30 MHz	2.2 dB
	30 MHz ~ 1000 MHz	5.1 dB
	1000 MHz ~ 18000 MHz	5.2 dB
	18000 MHz ~ 26500 MHz	4.6 dB
	26500 MHz ~ 40000 MHz	4.6 dB
Conducted Output Power	1.1 dB	
RF Bandwidth	4.7 %	
Power Spectral Density	1.1 dB	

2 EUT Description

Applicant	EmWicon Corporation 7F.-5, No. 258, Liancheng Rd., Zhonghe Dist., New Taipei City 235, Taiwan (R.O.C.)			
Product	Wi-Fi 5 802.11ac 2x2 dual-band Mini PCIe Module			
Trade Name				
Model Number	WMX6218			
FCC ID	2A3G3-WMX6218			
Frequency Range	2402 ~ 2480 MHz			
Modulation Type	GFSK for 1 Mbps			
	$\pi/4$ -DQPSK for 2 Mbps			
	8DPSK for 3 Mbps			
Operate Temp. Range	-40 ~ +85 °C			
EUT Power Rating	3.3 Vdc			
Antenna information	Antenna	Model name	Type	Max. Gain (dBi)
	ANT-1	1461530150	Dipole antenna	2.8
		ATD6251	Dipole antenna	2
		ATD6351	Dipole antenna	3
		ATD6551(*)	Dipole antenna	5
Note : (*)This is the antenna worst.				
Max. RF Output Power	GFSK for 1 Mbps	0.00436	W	
	$\pi/4$ -DQPSK for 2 Mbps	0.00710	W	
	8DPSK for 3 Mbps	0.00755	W	

3 Test Methodology

3.1. Mode of Operation

Decision of Test ATL 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
Mode 1: Transmit mode
Mode 2: GFSK Continuous TX mode
Mode 3: $\pi/4$ -DQPSK Continuous TX mode
Mode 4: 8DPSK Continuous TX mode

After verification, all tests were carried out with the worst case test modes.

By preliminary testing and verifying three axis (X and Y) position of EUT transmitted status, it was found that "X axis" position was the worst, then the final test was executed the worst condition and test data were recorded in this report.

Final-Test Mode
Mode 1: Transmit mode
Mode 2: GFSK Continuous TX mode
Mode 4: 8DPSK Continuous TX mode

Description of Test Modes

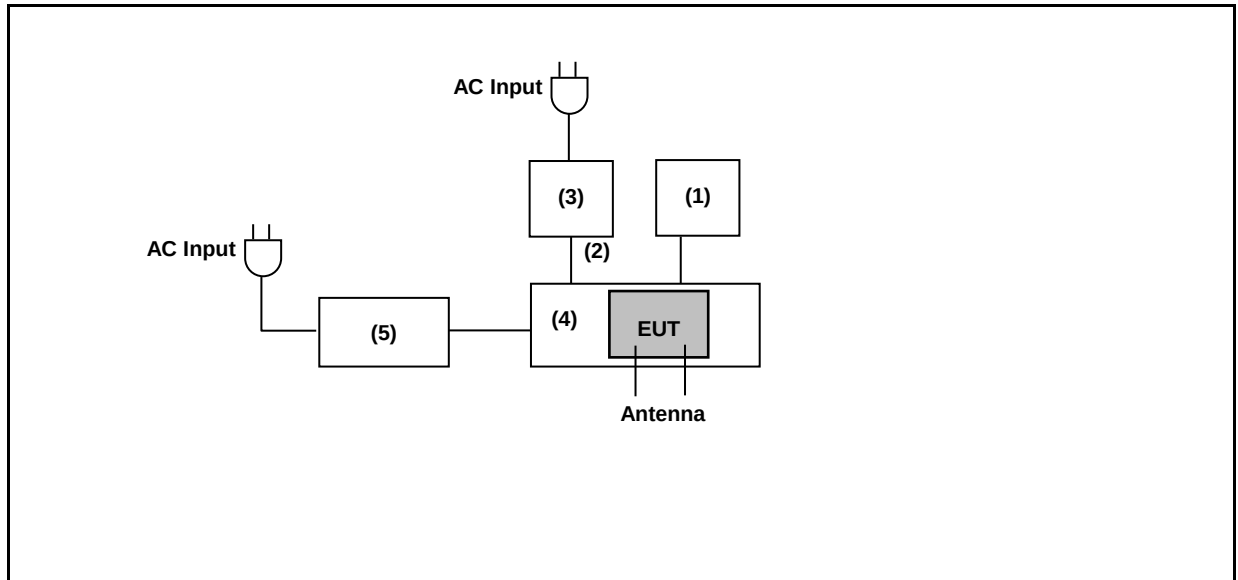
Preliminary tests were performed in different modulation to find the worst case. The modulation has shown the worst-case in section 4.5. Investigation has been done on all the possible configurations for searching the worst cases.

3.2. EUT Test Step

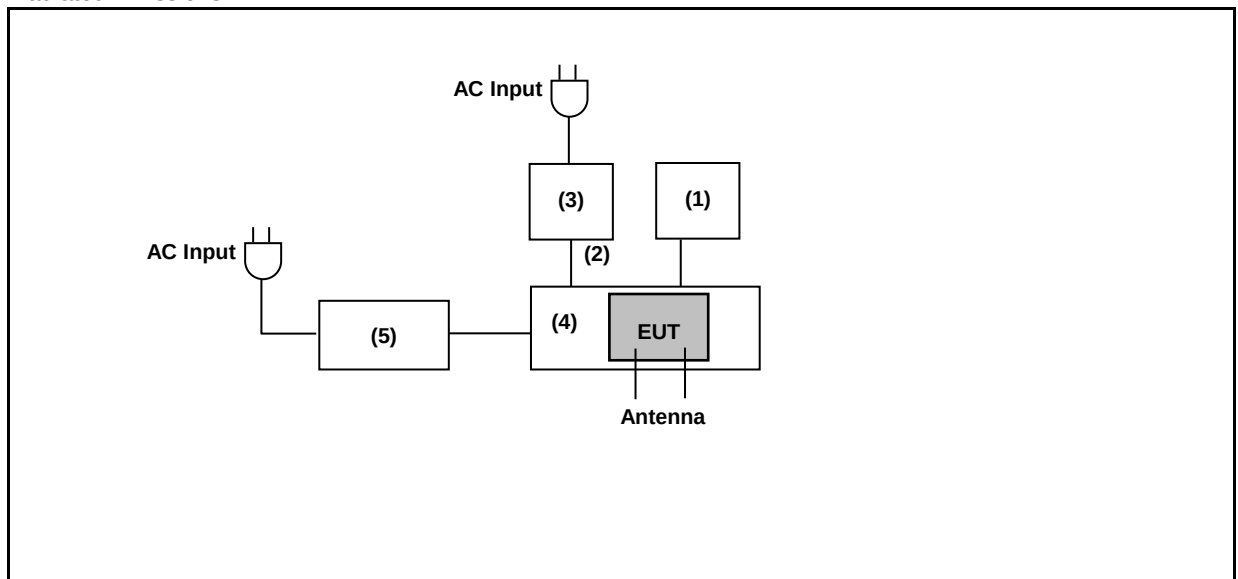
1	Setup the EUT shown on "Configuration of Test System Details."
2	Turn on the power of all equipment.
3	Turn on TX function
4	EUT run test program.

3.3. Configuration of Test System Details

Conducted Emission



Radiated Emissions



	Product	Manufacturer	Model Number	Serial Number	Power Cord
(1)	Mouse	ASUS	MOBTUOA	---	---
(2)	HDMI Cable	Avier	K48GHS	---	---
(3)	Monitor	ViewSonic	VA2719	---	---
(4)	Fixture	AAEON	UP SQUARED	---	---
(5)	Adapter	Jiangsu Sunward Electronics Technology Corp Ltd	AD36AM050600	---	---

3.4. Test Instruments

For Conducted Emission
Test Period: Jan. 08, 2022
Testing Engineer: Brian Lin

Use	Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Cal. Period
☒	Test Receiver	R&S	ESCI	100367	May 21, 2021	1 year
☐	Test Receiver	R&S	ESCI	100722	Nov. 02, 2021	1 year
☐	Test Receiver	R&S	ESCI	101000	Nov. 26, 2021	1 year
☒	LISN	R&S	ENV216	101040	Mar. 29, 2021	1 year
☒	LISN	R&S	ENV216	101041	Apr. 08, 2021	1 year
☒	RF Cable	Woken	00100D1380194M	TE-02-03	May 28, 2021	1 year
☒	Software	EZ EMC	1.1.4.3	N/A	N.C.R.	---

For Conducted
Test Period: Jan. 04 ~ Jan. 05, 2022
Testing Engineer: Brian Lin

Use	Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Cal. Period
☐	Power Sensor	Anritsu	MA2411B	1126022	Sep. 03, 2021	1 year
☐	Power Meter	Anritsu	ML2495A	1135009	Sep. 03, 2021	1 year
☒	Power Sensor	Agilent	N1921A	MY45241957	Dec. 06, 2021	1 year
☒	Power Meter	Agilent	N1911A	MY45101619	Dec. 06, 2021	1 year
☒	Spectrum Analyzer (10 Hz~26.5 GHz)	Keysight	N9010B	MY59071418	Mar. 17, 2021	1 year
☐	Spectrum Analyzer (9 kHz~26.5 GHz)	Agilent	N9010A	MY48030518	Jul. 23, 2021	1 year
☐	Spectrum Analyzer (20 Hz~26.5 GHz)	Agilent	N9020A	US47520902	Sep. 09, 2021	1 year
☐	Temperature & Humidity Chamber	TAICHY	MHU-225LA	980729	Mar. 30, 2021	1 year
☐	Signal Generator	Keysight	N5182B	MY53052569	Apr. 20, 2021	1 year
☐	Signal Generator	Keysight	N5182BX07	MY59360221	Apr. 20, 2021	1 year
☒	Bluetooth Tester	R&S	CBT	100350	Mar. 17, 2021	2 years
☐	Wireless Connectivity Tester	R&S	CMW270	102208	Jun. 02, 2021	1 year
☐	Power Supply	KEITHLEY	2303	4045290	Feb. 01, 2021	1 year
☐	RF Communication Test Set	HP	8920A	3344A03297	Aug. 10, 2021	1 year

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

For Radiated Emissions

Test Period: Jan. 08 ~ Jan. 09, 2022

Testing Engineer: Pink Li

Radiation test sites		Semi Anechoic Room				
Use	Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Cal. Period
☐	Spectrum Analyzer (10 Hz~44 GHz)	Keysight	N9010A	MY52221312	Jan. 18, 2021	1 year
☒	Spectrum Analyzer (2 Hz~50 GHz)	Keysight	N9030B	MY57143537	Apr. 19, 2021	1 year
☒	Amplifier (100 kHz~1.3 GHz)	Agilent	8447D	2944A11119	Jan. 15, 2021	1 year
☐	Amplifier (100 kHz~1.3 GHz)	Agilent	8447D	2944A10961	Jul. 06, 2021	1 year
☐	Broadband Amplifier (100 kHz~1 GHz)	Titan	T0910E00014330A1F	001	Jul. 23, 2021	1 year
☐	Amplifier (1 GHz~26.5 GHz)	Agilent	8449B	3008A02237	Oct. 21, 2021	1 year
☒	Broadband Amplifier (1 GHz~26.5 GHz)	Titan	T0912E01263025A1F	002	Jul. 26, 2021	1 year
☐	Preamplifier (26.5 GHz~40 GHz)	EMCI	EMC2654045	980028	Aug. 19, 2021	1 year
☒	Loop Antenna (9 kHz~30 MHz)	COM-POWER CORPORATION	AL-130	121014	Apr. 07, 2021	1 year
☒	Trilog Broadband Antenna (30 kHz~1 GHz)	Schwarzbeck Mess-Elektronik	VULB9168	01146	Jul. 19, 2021	1 year
☐	Trilog Broadband Antenna (30 kHz~1 GHz)	Schwarzbeck Mess-Elektronik	VULB9168	416	Nov. 17, 2021	1 year
☒	Broadband Horn Antenna (1 GHz~18 GHz)	Schwarzbeck Mess-Elektronik	9120D	02207	Jul. 09, 2021	1 year
☐	Broadband Horn Antenna (1 GHz~18 GHz)	Schwarzbeck Mess-Elektronik	9120D	9120D-550	Aug. 24, 2021	1 year
☒	Broadband Horn Antenna (18 GHz~40 GHz)	Schwarzbeck Mess-Elektronik	9170	9170-320	Aug. 24, 2021	1 year
☐	Horn Antenna (18 GHz~40 GHz)	ETS	3116	00086467	Dec. 03, 2021	1 year
☐	RF Cable	EMCI	EMC104-N-N-6000	TE01-1	Feb. 19, 2021	1 year
☐	Microwave Cable	EMCI	EMC104-SM-SM-13000	170814	Feb. 19, 2021	1 year
☐	Microwave Cable	EMCI	EMC102-KM-KM-14000	151001	Feb. 19, 2021	1 year
☒	Coaxial Cable	Titan	T0710AT327A10A100	J11005	Aug. 06, 2021	1 year
☒	Coaxial Cable	Titan	T0710AT327A10A900	J11004	Aug. 06, 2021	1 year
☒	Coaxial Cable	Titan	CFD400NL-LW	001	Aug. 06, 2021	1 year
☒	Bluetooth Tester	R&S	CBT	100350	Mar. 17, 2021	2 years
☐	Wireless Connectivity Tester	R&S	CMW270	102208	Jun. 02, 2021	1 year
☐	Power Supply	KEITHLEY	2303	4045290	Feb. 01, 2021	1 year
☒	Software	EZ EMC	1.1.4.4	N/A	N.C.R.	---

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

3.5. Test Site Environment

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

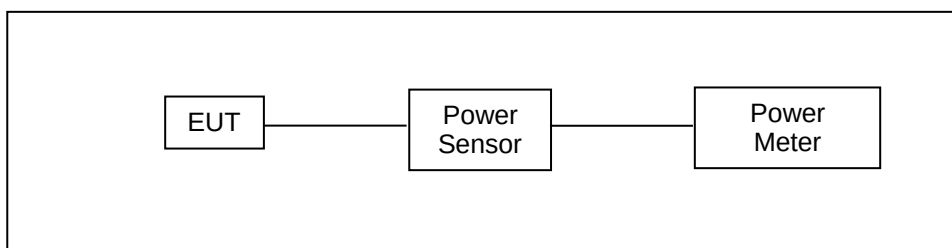
4 Measurement Procedure

4.1. Maximum Conducted Output Power Measurement

■ Limit

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

■ Test Setup



■ Test Procedure

Testing must be done according to this procedure, FCC Public Notice DA 00-705 - Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems. This is the only method recognized by the FCC. 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 maximum peak output power shall not exceed 1 watt.

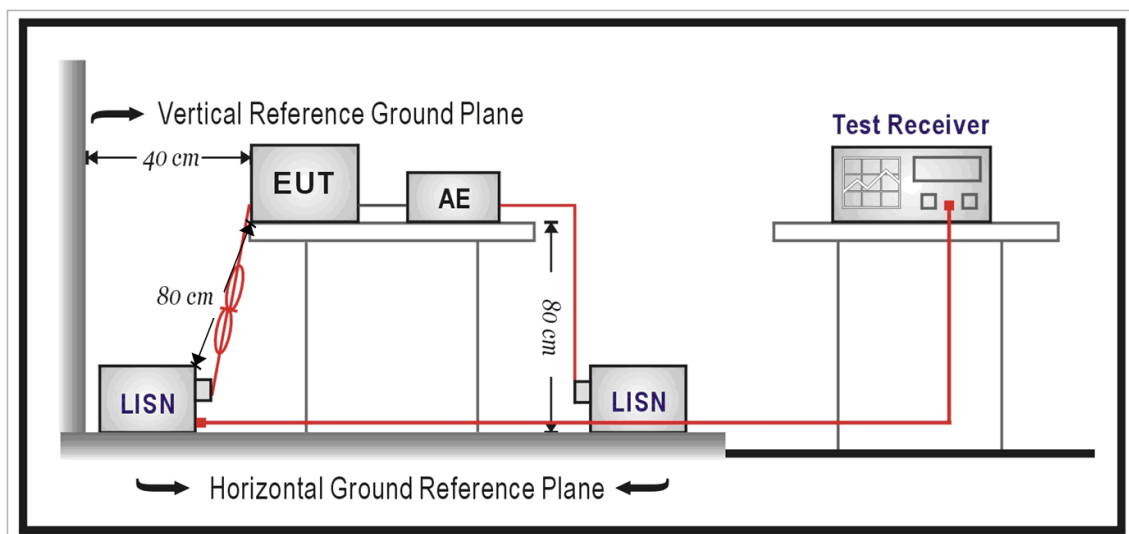
Use a direct connection between the antenna port of transmitter and the power sensor, for prevent the power sensor input attenuation 40-50 dB. Set the RBW Bandwidth of the emission or use a channel power meter mode. For antennas with gains of 6 dBi or less, maximum allowed transmitter output is 1 watt (+30 dBm). For antennas with gains greater than 6 dBi, transmitter output level must be decreased by an amount equal to (GAIN - 6)/3 dBm. The antenna port of the EUT was connected to the input of a power sensor. Power was read directly and cable loss correction was added to the reading to obtain power at the EUT antenna terminals.

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 $50\ \Omega // 50\ \mu\text{H}$ coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a $50\ \Omega // 50\ \mu\text{H}$ 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

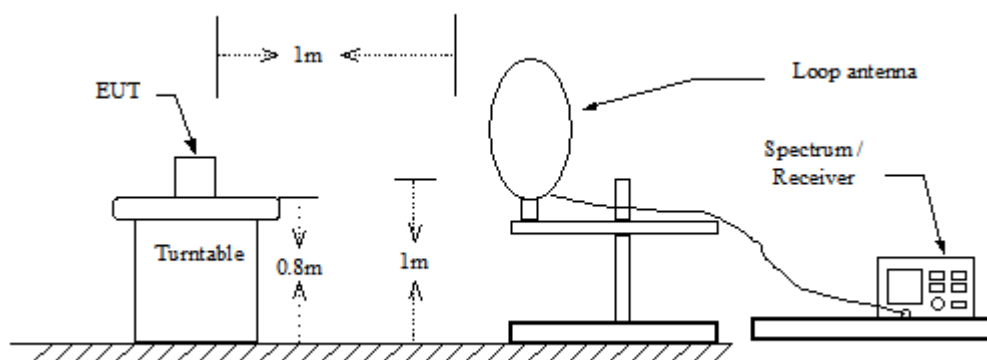
According to §15.209(a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength ($\mu\text{V/m}$ 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

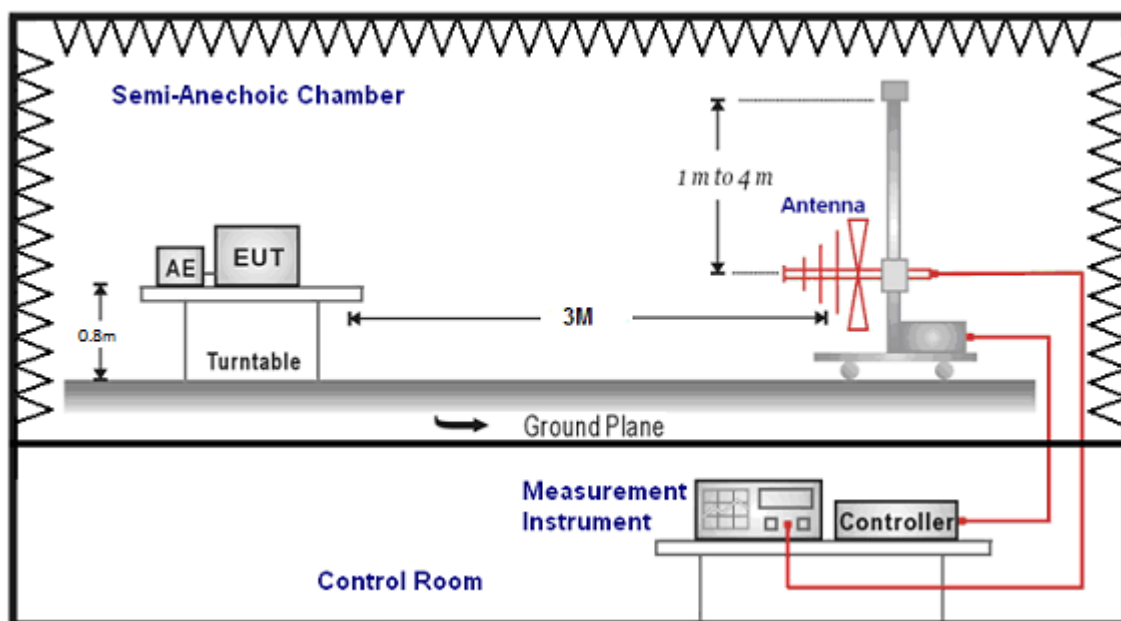
****** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of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

■ Setup

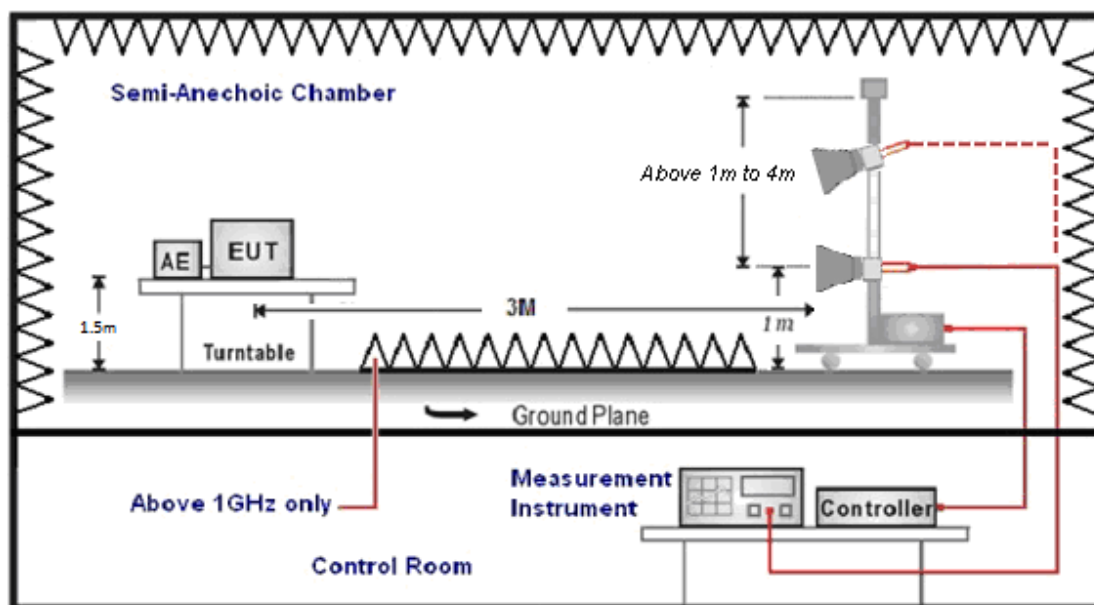
9 kHz ~ 30 MHz



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 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 three 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.

SCHWARZBECK MESS-ELEKTRONIK Biconilog Antenna at 3 Meter and the SCHWARZBECK Double Ridged Guide 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 per meter (uV/m).

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

The actual field 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.

$$(1) \text{ Amplitude (dBuV/m) = FI (dBuV) + AF (dBuV) + CL (dBuV) - Gain (dB)}$$

FI= Reading of the field intensity.

AF= Antenna factor.

CL= Cable loss.

P.S Amplitude is auto calculate in spectrum analyzer.

$$(2) \text{ Actual Amplitude (dBuV/m) = Amplitude (dBuV) - Dis(dB)}$$

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

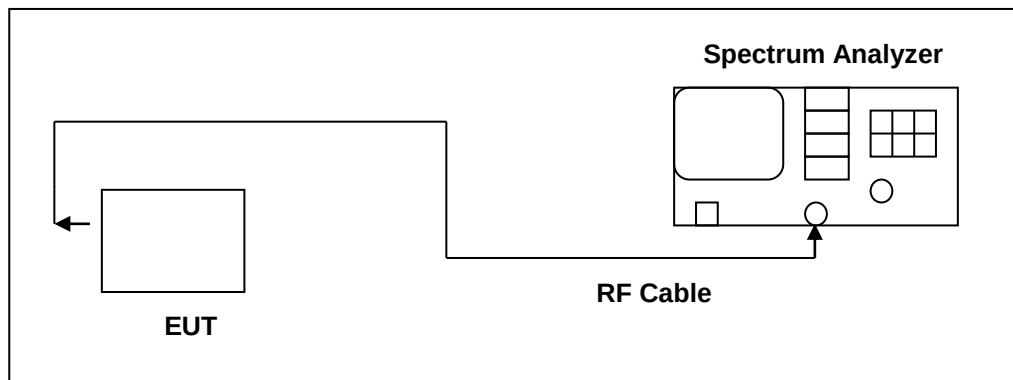
Data of measurement within this frequency range without mark in the table above means the reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.

4.4. 20 dB RF Bandwidth Measurement

■ Limit

N/A

■ Test Setup



■ Test Procedure

Testing must be done according to this procedure, FCC Public Notice DA 00-705 - Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems. This is the only method recognized by the FCC. The RF output port of the Equipment-Under-Test is directly coupled to the input of the EMC analyzer through a specialized RF connector and a 10 dB passive attenuator. 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 $\geq$ 1 % of the 20 dB span
3. VBW $\geq$ RBW
4. Sweep = auto
5. Detector function = peak
6. Trace = max hold

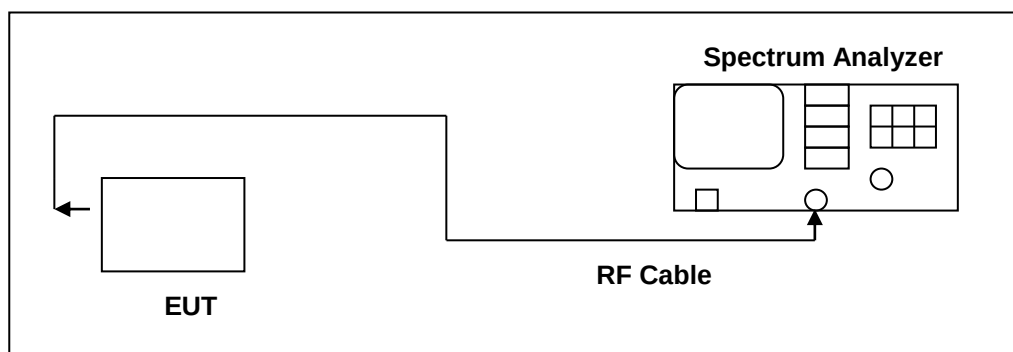
The trace was allowed to stabilize. The EUT was transmitting at its maximum data rate. The marker-to-peak function was used to set the marker to the peak of the emission. The marker-delta function was used to measure 20 dB down one side of the emission. The marker-delta function and marker was moved 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.

4.5. Carrier Frequency Separation Measurement

■ Limit

Title 47 of the CFR, Part 15 Subpart (c) 15.247(a)(1) 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

Testing must be done according to this procedure, FCC Public Notice DA 00-705 - Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems. This is the only method recognized by the FCC. The RF output port of the Equipment-Under-Test is directly coupled to the input of the EMC analyzer through a specialized RF connector and a 10 dB passive attenuator. A fully charged battery was used for the supply voltage. The Bluetooth frequency hopping function of the EUT was 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) $\geq$ 1 % of the span
3. Video (or Average) Bandwidth (VBW) $\geq$ RBW
4. Sweep = auto
5. Detector function = peak
6. Trace = max hold

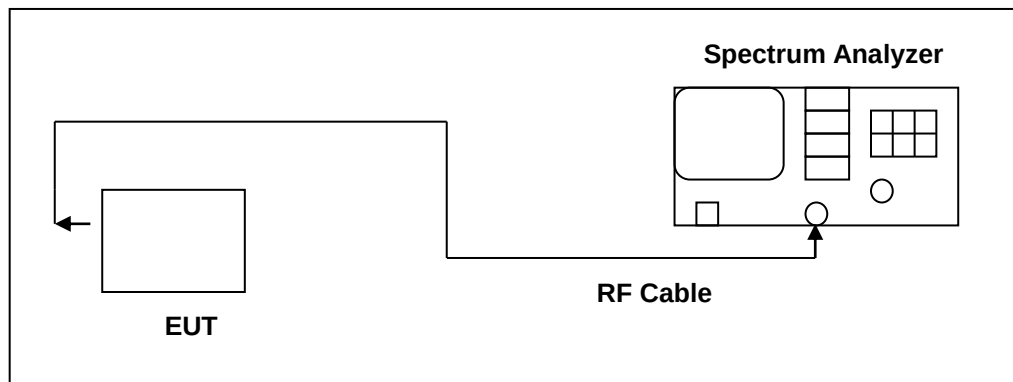
The trace was allowed to stabilize. The marker-delta function was used to determine the separation between the peaks of the adjacent channels.

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

Testing must be done according to this procedure, FCC Public Notice DA 00-705 - Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems. This is the only method recognized by the FCC. The RF output port of the Equipment-Under-Test is directly coupled to the input of the EMC analyzer through a specialized RF connector and a 10 dB passive attenuator. 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 = the frequency band of operation
2. RBW $\geq$ 1 % of the span
3. VBW $\geq$ RBW
4. Sweep = auto
5. Detector function = peak
6. Trace = max hold

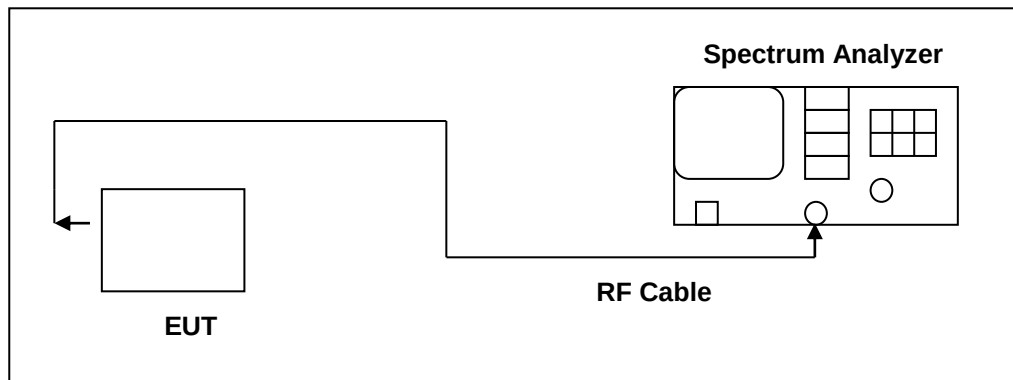
The trace was allowed to stabilize.

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

Testing must be done according to this procedure, FCC Public Notice DA 00-705 - Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems. This is the only method recognized by the FCC. The RF output port of the Equipment-Under-Test is directly coupled to the input of the spectrum through a specialized RF connector and a 10 dB passive attenuator. A fully charged battery was used for the supply voltage. The Bluetooth hopping function of the EUT was 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

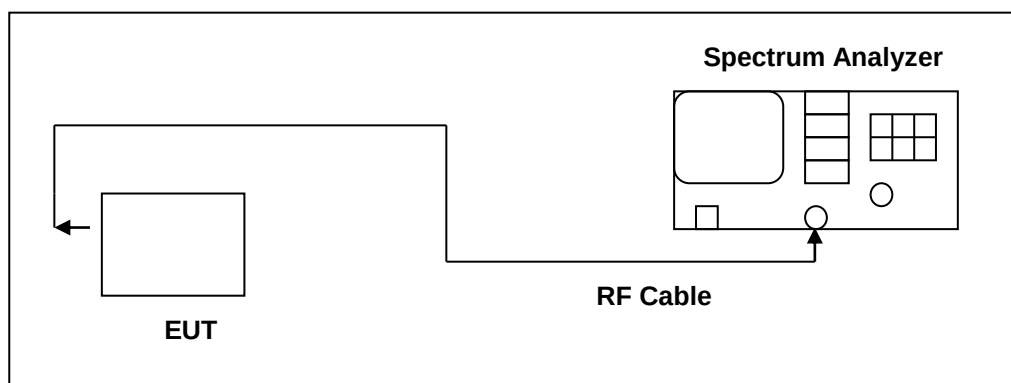
The marker-delta function was used to determine the dwell time.

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

Testing must be done according to this procedure, FCC Public Notice DA 00-705 - Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems. This is the only method recognized by the FCC. 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 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.

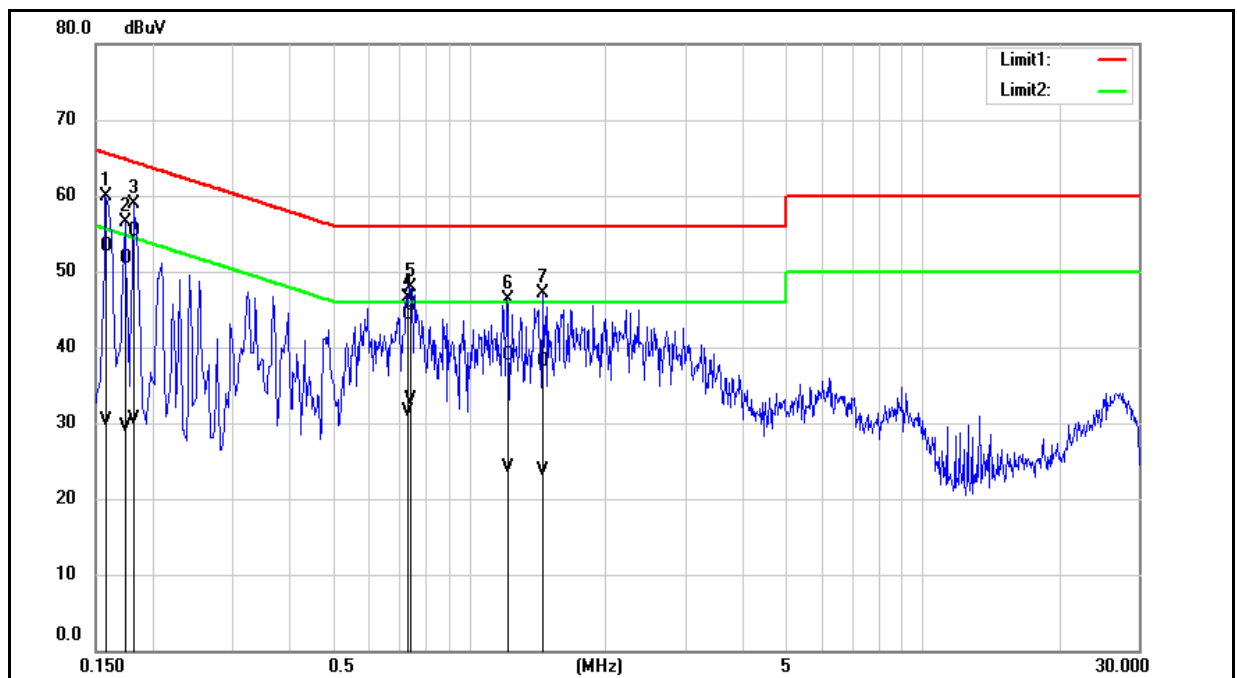
■ Antenna Connector Construction

See section 2 – antenna information.

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:	Mode 1	Temp.(°C)/Hum.(%RH):	26(°C)/60 %RH
Description:			

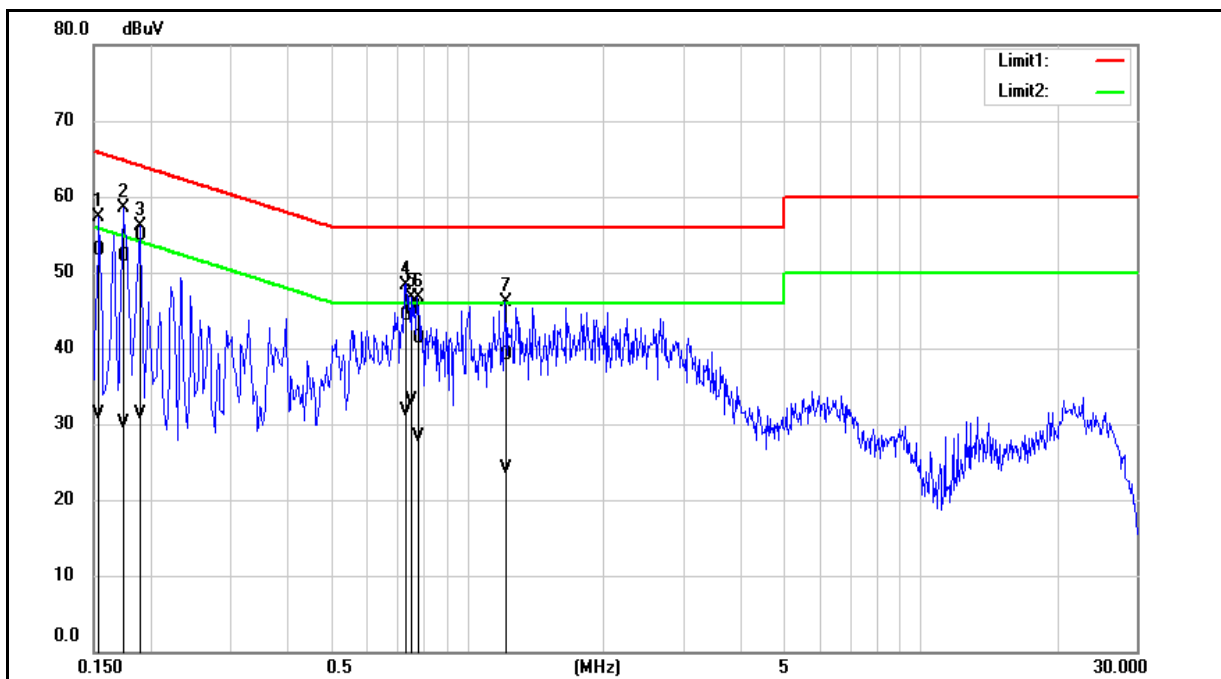


No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1580	43.49	20.51	9.74	53.23	30.25	65.57	55.57	-12.34	-25.32	Pass
2	0.1740	42.02	19.68	9.74	51.76	29.42	64.77	54.77	-13.01	-25.35	Pass
3	0.1820	45.53	20.70	9.74	55.27	30.44	64.39	54.39	-9.12	-23.95	Pass
4	0.7300	34.62	21.76	9.75	44.37	31.51	56.00	46.00	-11.63	-14.49	Pass
5	0.7420	35.76	23.38	9.75	45.51	33.13	56.00	46.00	-10.49	-12.87	Pass
6	1.2100	29.08	14.39	9.77	38.85	24.16	56.00	46.00	-17.15	-21.84	Pass
7	1.4540	28.38	13.94	9.77	38.15	23.71	56.00	46.00	-17.85	-22.29	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:	Mode 1	Temp.(°C)/Hum.(%RH):	26(°C)/60 %RH
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	43.15	21.61	9.74	52.89	31.35	65.78	55.78	-12.89	-24.43	Pass
2	0.1740	42.33	20.41	9.74	52.07	30.15	64.77	54.77	-12.70	-24.62	Pass
3	0.1900	45.27	21.66	9.73	55.00	31.39	64.04	54.04	-9.04	-22.65	Pass
4	0.7300	34.55	22.03	9.75	44.30	31.78	56.00	46.00	-11.70	-14.22	Pass
5	0.7540	35.22	23.37	9.75	44.97	33.12	56.00	46.00	-11.03	-12.88	Pass
6	0.7780	31.60	18.59	9.75	41.35	28.34	56.00	46.00	-14.65	-17.66	Pass
7	1.2140	29.33	14.41	9.77	39.10	24.18	56.00	46.00	-16.90	-21.82	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

Test Mode	Frequency (MHz)	RF Power setting in Test Software	Test Software Version
Mode 2	2402	Default	MP Tool RTL2200CE MP Version 0.0001.1020.2018 / Bluetooth RF Test Tool (RtlBluetoothMP.dll Version :5.3.1.64 RTLBT APP Version :5.2.2.99) / CBT
	2441	Default	
	2480	Default	
Mode 3	2402	Default	
	2441	Default	
	2480	Default	
Mode 4	2402	Default	
	2441	Default	
	2480	Default	

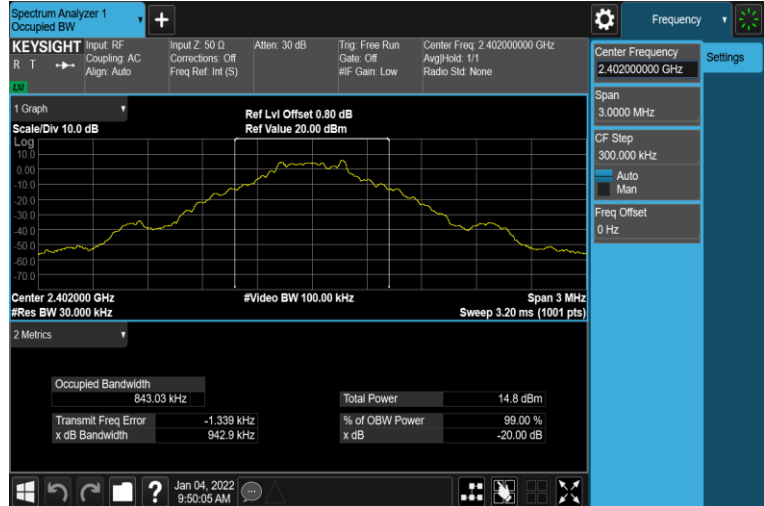
Test Mode	Frequency (MHz)	Packet Type	Average Power		Peak Power		Limit (W)
			(dBm)	(W)	(dBm)	(W)	
Mode 2	2402	DH1	6.06	0.00404	6.36	0.00433	≤ 0.125
		DH3	6.08	0.00406	6.37	0.00434	≤ 0.125
		DH5	6.10	0.00407	6.39	0.00436	≤ 0.125
	2441	DH1	5.38	0.00345	5.68	0.00370	≤ 0.125
		DH3	5.42	0.00348	5.70	0.00372	≤ 0.125
		DH5	5.45	0.00351	5.73	0.00374	≤ 0.125
	2480	DH1	5.57	0.00361	5.85	0.00385	≤ 0.125
		DH3	5.58	0.00361	5.86	0.00385	≤ 0.125
		DH5	5.59	0.00362	5.87	0.00386	≤ 0.125
Mode 3	2402	2DH1	6.67	0.00465	8.41	0.00693	≤ 0.125
		2DH3	6.68	0.00466	8.46	0.00701	≤ 0.125
		2DH5	6.70	0.00468	8.51	0.00710	≤ 0.125
	2441	2DH1	6.06	0.00404	7.80	0.00603	≤ 0.125
		2DH3	6.08	0.00406	7.86	0.00611	≤ 0.125
		2DH5	6.10	0.00407	7.92	0.00619	≤ 0.125
	2480	2DH1	6.28	0.00425	8.04	0.00637	≤ 0.125
		2DH3	6.31	0.00428	8.07	0.00641	≤ 0.125
		2DH5	6.35	0.00432	8.09	0.00644	≤ 0.125
Mode 4	2402	3DH1	6.70	0.00468	8.68	0.00738	≤ 0.125
		3DH3	6.72	0.00470	8.72	0.00745	≤ 0.125
		3DH5	6.73	0.00471	8.78	0.00755	≤ 0.125
	2441	3DH1	6.09	0.00406	8.26	0.00670	≤ 0.125
		3DH3	6.11	0.00408	8.35	0.00684	≤ 0.125
		3DH5	6.13	0.00410	8.41	0.00693	≤ 0.125
	2480	3DH1	6.35	0.00432	8.49	0.00706	≤ 0.125
		3DH3	6.37	0.00434	8.52	0.00711	≤ 0.125
		3DH5	6.39	0.00436	8.53	0.00713	≤ 0.125

Note: The relevant measured result has the offset with cable loss already.

20 dB RF Bandwidth Measurement

Test Mode	Frequency (MHz)	Measurement Results (MHz)
Mode 2	2402	0.943
	2441	0.943
	2480	0.943
Mode 4	2402	1.270
	2441	1.298
	2480	1.270

Test Graphs

Mode 2: GFSK Continuous TX mode													
2402 MHz	 Center Frequency: 2.402000000 GHz Span: 3.0000 MHz CF Step: 300.000 kHz Auto Man Freq Offset: 0 Hz Center: 2.402000 GHz #Res BW 30.000 kHz #Video BW 100.00 kHz Sweep 3.20 ms (1001 pts) 2 Metrics <table><tr><td>Occupied Bandwidth</td><td>843.03 kHz</td><td>Total Power</td><td>14.8 dBm</td></tr><tr><td>Transmit Freq Error</td><td>-1.339 kHz</td><td>% of OBW Power</td><td>99.00 %</td></tr><tr><td>x dB Bandwidth</td><td>942.9 kHz</td><td>x dB</td><td>-20.00 dB</td></tr></table>	Occupied Bandwidth	843.03 kHz	Total Power	14.8 dBm	Transmit Freq Error	-1.339 kHz	% of OBW Power	99.00 %	x dB Bandwidth	942.9 kHz	x dB	-20.00 dB
Occupied Bandwidth	843.03 kHz	Total Power	14.8 dBm										
Transmit Freq Error	-1.339 kHz	% of OBW Power	99.00 %										
x dB Bandwidth	942.9 kHz	x dB	-20.00 dB										
2441 MHz	 Center Frequency: 2.441000000 GHz Span: 3.0000 MHz CF Step: 300.000 kHz Auto Man Freq Offset: 0 Hz Center: 2.441000 GHz #Res BW 30.000 kHz #Video BW 100.00 kHz Sweep 3.20 ms (1001 pts) 2 Metrics <table><tr><td>Occupied Bandwidth</td><td>841.13 kHz</td><td>Total Power</td><td>14.3 dBm</td></tr><tr><td>Transmit Freq Error</td><td>-1.753 kHz</td><td>% of OBW Power</td><td>99.00 %</td></tr><tr><td>x dB Bandwidth</td><td>942.6 kHz</td><td>x dB</td><td>-20.00 dB</td></tr></table>	Occupied Bandwidth	841.13 kHz	Total Power	14.3 dBm	Transmit Freq Error	-1.753 kHz	% of OBW Power	99.00 %	x dB Bandwidth	942.6 kHz	x dB	-20.00 dB
Occupied Bandwidth	841.13 kHz	Total Power	14.3 dBm										
Transmit Freq Error	-1.753 kHz	% of OBW Power	99.00 %										
x dB Bandwidth	942.6 kHz	x dB	-20.00 dB										
2480 MHz	 Center Frequency: 2.480000000 GHz Span: 3.0000 MHz CF Step: 300.000 kHz Auto Man Freq Offset: 0 Hz Center: 2.480000 GHz #Res BW 30.000 kHz #Video BW 100.00 kHz Sweep 3.20 ms (1001 pts) 2 Metrics <table><tr><td>Occupied Bandwidth</td><td>842.92 kHz</td><td>Total Power</td><td>14.6 dBm</td></tr><tr><td>Transmit Freq Error</td><td>-2.345 kHz</td><td>% of OBW Power</td><td>99.00 %</td></tr><tr><td>x dB Bandwidth</td><td>943.3 kHz</td><td>x dB</td><td>-20.00 dB</td></tr></table>	Occupied Bandwidth	842.92 kHz	Total Power	14.6 dBm	Transmit Freq Error	-2.345 kHz	% of OBW Power	99.00 %	x dB Bandwidth	943.3 kHz	x dB	-20.00 dB
Occupied Bandwidth	842.92 kHz	Total Power	14.6 dBm										
Transmit Freq Error	-2.345 kHz	% of OBW Power	99.00 %										
x dB Bandwidth	943.3 kHz	x dB	-20.00 dB										

Mode 4: 8DPSK Continuous TX mode													
2402 MHz	 Spectrum Analyzer 1 Occupied BW KEYSIGHT Input: RF Input Z: 50 Ω Atten: 30 dB Trig: Free Run Center Freq: 2.402000000 GHz R T Coupling: AC Corrections: Off Freq Ref: Int (S) Gate: Off Avg/Hold: 1/1 #F Gain: Low Radio Std: None 1 Graph Scale/Div 10.0 dB Log Ref Lvl Offset 0.80 dB Ref Value 20.00 dBm Center 2.402000 GHz #Res BW 30.000 kHz #Video BW 100.00 kHz Span 3 MHz Sweep 3.20 ms (1001 pts) 2 Metrics <table><tr><td>Occupied Bandwidth</td><td>1.1495 MHz</td><td>Total Power</td><td>15.3 dBm</td></tr><tr><td>Transmit Freq Error</td><td>-11.241 kHz</td><td>% of OBW Power</td><td>99.00 %</td></tr><tr><td>x dB Bandwidth</td><td>1.270 MHz</td><td>x dB</td><td>-20.00 dB</td></tr></table> Jan 04, 2022 10:04:13 AM	Occupied Bandwidth	1.1495 MHz	Total Power	15.3 dBm	Transmit Freq Error	-11.241 kHz	% of OBW Power	99.00 %	x dB Bandwidth	1.270 MHz	x dB	-20.00 dB
Occupied Bandwidth	1.1495 MHz	Total Power	15.3 dBm										
Transmit Freq Error	-11.241 kHz	% of OBW Power	99.00 %										
x dB Bandwidth	1.270 MHz	x dB	-20.00 dB										
2441 MHz	 Spectrum Analyzer 1 Occupied BW KEYSIGHT Input: RF Input Z: 50 Ω Atten: 30 dB Trig: Free Run Center Freq: 2.441000000 GHz R T Coupling: AC Corrections: Off Freq Ref: Int (S) Gate: Off Avg/Hold: 1/1 #F Gain: Low Radio Std: None 1 Graph Scale/Div 10.0 dB Log Ref Lvl Offset 0.80 dB Ref Value 20.00 dBm Center 2.441000 GHz #Res BW 30.000 kHz #Video BW 100.00 kHz Span 3 MHz Sweep 3.20 ms (1001 pts) 2 Metrics <table><tr><td>Occupied Bandwidth</td><td>1.1631 MHz</td><td>Total Power</td><td>14.1 dBm</td></tr><tr><td>Transmit Freq Error</td><td>-11.819 kHz</td><td>% of OBW Power</td><td>99.00 %</td></tr><tr><td>x dB Bandwidth</td><td>1.298 MHz</td><td>x dB</td><td>-20.00 dB</td></tr></table> Jan 04, 2022 10:06:37 AM	Occupied Bandwidth	1.1631 MHz	Total Power	14.1 dBm	Transmit Freq Error	-11.819 kHz	% of OBW Power	99.00 %	x dB Bandwidth	1.298 MHz	x dB	-20.00 dB
Occupied Bandwidth	1.1631 MHz	Total Power	14.1 dBm										
Transmit Freq Error	-11.819 kHz	% of OBW Power	99.00 %										
x dB Bandwidth	1.298 MHz	x dB	-20.00 dB										
2480 MHz	 Spectrum Analyzer 1 Occupied BW KEYSIGHT Input: RF Input Z: 50 Ω Atten: 30 dB Trig: Free Run Center Freq: 2.480000000 GHz R T Coupling: AC Corrections: Off Freq Ref: Int (S) Gate: Off Avg/Hold: 1/1 #F Gain: Low Radio Std: None 1 Graph Scale/Div 10.0 dB Log Ref Lvl Offset 0.80 dB Ref Value 20.00 dBm Center 2.480000 GHz #Res BW 30.000 kHz #Video BW 100.00 kHz Span 3 MHz Sweep 3.20 ms (1001 pts) 2 Metrics <table><tr><td>Occupied Bandwidth</td><td>1.1504 MHz</td><td>Total Power</td><td>15.0 dBm</td></tr><tr><td>Transmit Freq Error</td><td>-11.998 kHz</td><td>% of OBW Power</td><td>99.00 %</td></tr><tr><td>x dB Bandwidth</td><td>1.270 MHz</td><td>x dB</td><td>-20.00 dB</td></tr></table> Jan 04, 2022 10:08:00 AM	Occupied Bandwidth	1.1504 MHz	Total Power	15.0 dBm	Transmit Freq Error	-11.998 kHz	% of OBW Power	99.00 %	x dB Bandwidth	1.270 MHz	x dB	-20.00 dB
Occupied Bandwidth	1.1504 MHz	Total Power	15.0 dBm										
Transmit Freq Error	-11.998 kHz	% of OBW Power	99.00 %										
x dB Bandwidth	1.270 MHz	x dB	-20.00 dB										

Carrier Frequency Separation Measurement

Test Mode	Frequency (MHz)	Measurement Results (MHz)	Limit (MHz)
Mode 2	2402	1.000	≥ 0.629
	2441	0.994	≥ 0.629
	2480	0.998	≥ 0.613
Mode 4	2402	1.002	≥ 0.629
	2441	1.000	≥ 0.629
	2480	0.998	≥ 0.613

Test Graphs

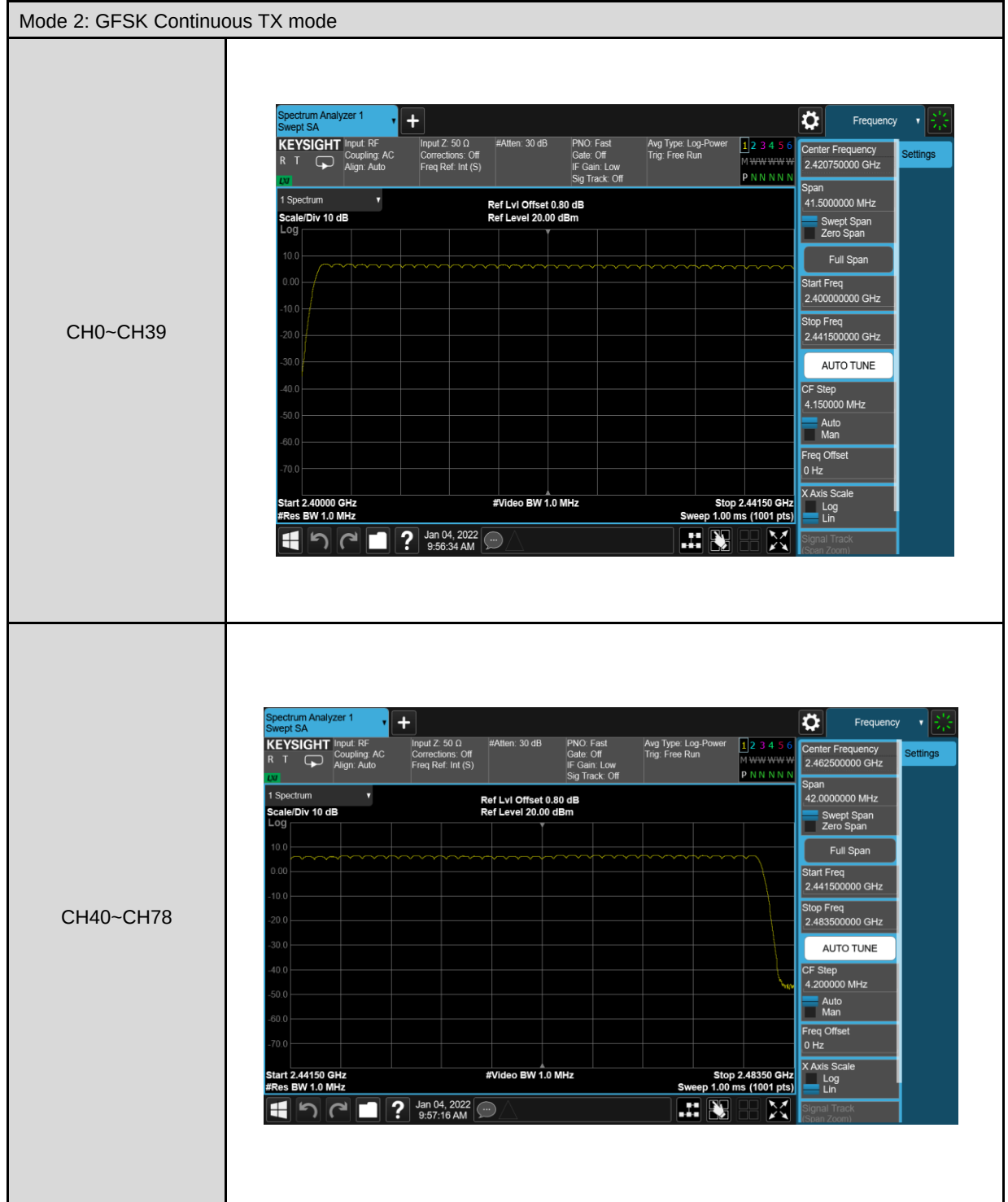


Mode 4: 8DPSK Continuous TX mode																																																									
2402 MHz	Spectrum Analyzer 1 Sweep SA + KEYSIGHT Input: RF Coupling: AC Align: Auto Input Z: 50 Ω Corrections: Off Freq Ref: Int (S) #Atten: 30 dB PNO: Best Wide Gate: Off IF Gain: Low Sig Track: Off Avg Type: Log-Power Trig: Free Run 1 2 3 4 5 6 M W W W W W P N N N N N 1 Spectrum Scale/Div 10 dB Ref Lvl Offset 0.80 dB Ref Level 20.00 dBm Mkr2 2.403 154 GHz 6.65 dBm Center 2.402500 GHz #Video BW 100 kHz Span 2.000 MHz #Res BW 30 kHz Sweep 2.13 ms (1001 pts) 5 Marker Table <table><tr><th>Mode</th><th>Trace</th><th>Scale</th><th>X</th><th>Y</th><th>Function</th><th>Function Width</th><th>Function Value</th></tr><tr><td>1</td><td>N</td><td>1</td><td>f</td><td>2.402 152 GHz</td><td>4.678 dBm</td><td></td><td></td></tr><tr><td>2</td><td>N</td><td>1</td><td>f</td><td>2.403 154 GHz</td><td>6.652 dBm</td><td></td><td></td></tr><tr><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>6</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> Jan 04, 2022 10:14:33 AM Frequency Settings Center Frequency 2.402500000 GHz Span 2.000000000 MHz Sweep Span Zero Span Full Span Start Freq 2.401500000 GHz Stop Freq 2.403500000 GHz AUTO TUNE CF Step 200.000 kHz Auto Man Freq Offset 0 Hz X Axis Scale Log Lin Signal Track (Main Zoom)	Mode	Trace	Scale	X	Y	Function	Function Width	Function Value	1	N	1	f	2.402 152 GHz	4.678 dBm			2	N	1	f	2.403 154 GHz	6.652 dBm			3								4								5								6							
Mode	Trace	Scale	X	Y	Function	Function Width	Function Value																																																		
1	N	1	f	2.402 152 GHz	4.678 dBm																																																				
2	N	1	f	2.403 154 GHz	6.652 dBm																																																				
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4																																																									
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6																																																									
2441 MHz	Spectrum Analyzer 1 Sweep SA + KEYSIGHT Input: RF Coupling: AC Align: Auto Input Z: 50 Ω Corrections: Off Freq Ref: Int (S) #Atten: 30 dB PNO: Best Wide Gate: Off IF Gain: Low Sig Track: Off Avg Type: Log-Power Trig: Free Run 1 2 3 4 5 6 M W W W W W P N N N N N 1 Spectrum Scale/Div 10 dB Ref Lvl Offset 0.80 dB Ref Level 20.00 dBm Mkr2 2.442 152 GHz 4.61 dBm Center 2.441500 GHz #Video BW 100 kHz Span 2.000 MHz #Res BW 30 kHz Sweep 2.13 ms (1001 pts) 5 Marker Table <table><tr><th>Mode</th><th>Trace</th><th>Scale</th><th>X</th><th>Y</th><th>Function</th><th>Function Width</th><th>Function Value</th></tr><tr><td>1</td><td>N</td><td>1</td><td>f</td><td>2.441 152 GHz</td><td>6.046 dBm</td><td></td><td></td></tr><tr><td>2</td><td>N</td><td>1</td><td>f</td><td>2.442 152 GHz</td><td>4.610 dBm</td><td></td><td></td></tr><tr><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>6</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> Jan 04, 2022 10:15:17 AM Frequency Settings Center Frequency 2.441500000 GHz Span 2.000000000 MHz Sweep Span Zero Span Full Span Start Freq 2.440500000 GHz Stop Freq 2.442500000 GHz AUTO TUNE CF Step 200.000 kHz Auto Man Freq Offset 0 Hz X Axis Scale Log Lin Signal Track (Main Zoom)	Mode	Trace	Scale	X	Y	Function	Function Width	Function Value	1	N	1	f	2.441 152 GHz	6.046 dBm			2	N	1	f	2.442 152 GHz	4.610 dBm			3								4								5								6							
Mode	Trace	Scale	X	Y	Function	Function Width	Function Value																																																		
1	N	1	f	2.441 152 GHz	6.046 dBm																																																				
2	N	1	f	2.442 152 GHz	4.610 dBm																																																				
3																																																									
4																																																									
5																																																									
6																																																									
2480 MHz	Spectrum Analyzer 1 Sweep SA + KEYSIGHT Input: RF Coupling: AC Align: Auto Input Z: 50 Ω Corrections: Off Freq Ref: Int (S) #Atten: 30 dB PNO: Best Wide Gate: Off IF Gain: Low Sig Track: Off Avg Type: Log-Power Trig: Free Run 1 2 3 4 5 6 M W W W W W P N N N N N 1 Spectrum Scale/Div 10 dB Ref Lvl Offset 0.80 dB Ref Level 20.00 dBm Mkr2 2.480 150 GHz 6.33 dBm Center 2.479500 GHz #Video BW 100 kHz Span 2.000 MHz #Res BW 30 kHz Sweep 2.13 ms (1001 pts) 5 Marker Table <table><tr><th>Mode</th><th>Trace</th><th>Scale</th><th>X</th><th>Y</th><th>Function</th><th>Function Width</th><th>Function Value</th></tr><tr><td>1</td><td>N</td><td>1</td><td>f</td><td>2.479 152 GHz</td><td>5.001 dBm</td><td></td><td></td></tr><tr><td>2</td><td>N</td><td>1</td><td>f</td><td>2.480 150 GHz</td><td>6.333 dBm</td><td></td><td></td></tr><tr><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>6</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> Jan 04, 2022 10:17:13 AM Frequency Settings Center Frequency 2.479500000 GHz Span 2.000000000 MHz Sweep Span Zero Span Full Span Start Freq 2.478500000 GHz Stop Freq 2.480500000 GHz AUTO TUNE CF Step 200.000 kHz Auto Man Freq Offset 0 Hz X Axis Scale Log Lin Signal Track (Main Zoom)	Mode	Trace	Scale	X	Y	Function	Function Width	Function Value	1	N	1	f	2.479 152 GHz	5.001 dBm			2	N	1	f	2.480 150 GHz	6.333 dBm			3								4								5								6							
Mode	Trace	Scale	X	Y	Function	Function Width	Function Value																																																		
1	N	1	f	2.479 152 GHz	5.001 dBm																																																				
2	N	1	f	2.480 150 GHz	6.333 dBm																																																				
3																																																									
4																																																									
5																																																									
6																																																									

Number of Hopping Measurement

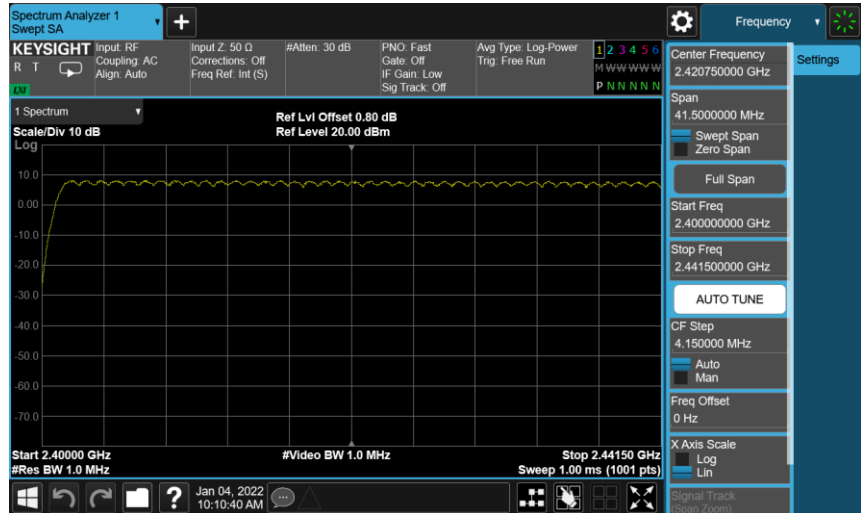
Test Mode	Frequency Range (MHz)	Measurement Results (Ch)	Limit (ch)
Mode 2	2402 - 2480	79	≥ 15
Mode 4	2402 - 2480	79	≥ 15

■ Test Graphs

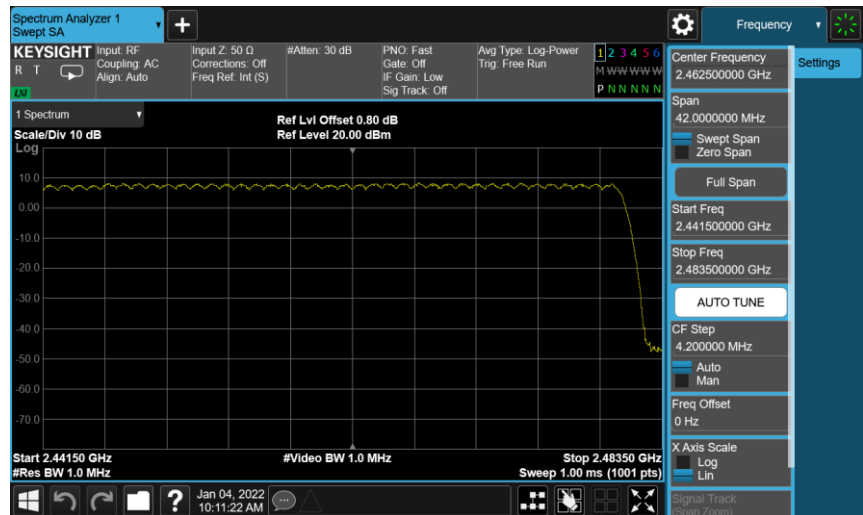


Mode 4: 8DPSK Continuous TX mode

CH0~CH39



CH40~CH78



Time of Occupancy (Dwell Time) Measurement

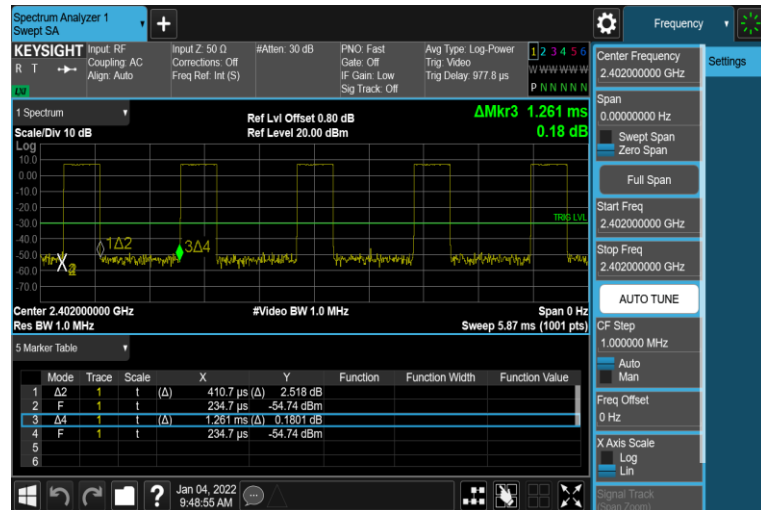
Mode 2: GFSK Continuous TX mode	
DH1	
Cycle Calculate	$79CH * 0.4 = 31.6 \text{ (sec)}$
The EUT Hopping Number per Sec	1600 times/sec
Each Channel Dwell Times per Sec	$800/79CH = 10.13(\text{times/sec})$
Each Channel Dwell Times on Cycle(1)	$31.6 * 10.13 = 320.108(\text{times})$
Each Channel Dwell Times (2)	0.411 ms (sec)
Dwell Times on Cycle (1) * (2)	131.458 ms (sec)
LIMIT(msec)	≤ 400
DH3	
Cycle Calculate	$79CH * 0.4 = 31.6 \text{ (sec)}$
The EUT Hopping Number per Sec	1600 times/sec
Each Channel Dwell Times per Sec	$400/79CH = 5.1(\text{times/sec})$
Each Channel Dwell Times on Cycle(1)	$31.6 * 5.1 = 161.16(\text{times})$
Each Channel Dwell Times (2)	1.700 ms (sec)
Dwell Times on Cycle (1) * (2)	271.823 ms (sec)
LIMIT(msec)	≤ 400
DH5	
Cycle Calculate	$79CH * 0.4 = 31.6 \text{ (sec)}$
The EUT Hopping Number per Sec	1600 times/sec
Each Channel Dwell Times per Sec	$266.7/79CH = 3.37(\text{times/sec})$
Each Channel Dwell Times on Cycle(1)	$31.6 * 3.37 = 106.492(\text{times})$
Each Channel Dwell Times (2)	2.920 ms (sec)
Dwell Times on Cycle (1) * (2)	311.908 ms (sec)
LIMIT(msec)	≤ 400

Mode 4: 8DPSK Continuous TX mode	
3DH1	
Cycle Calculate	$79CH * 0.4 = 31.6 \text{ (sec)}$
The EUT Hopping Number per Sec	1600 times/sec
Each Channel Dwell Times per Sec	$800/79CH = 10.13(\text{times/sec})$
Each Channel Dwell Times on Cycle(1)	$31.6 * 10.13 = 320.108(\text{times})$
Each Channel Dwell Times (2)	0.425 ms (sec)
Dwell Times on Cycle (1) * (2)	136.046 ms (sec)
LIMIT(msec)	$< = 400$
3DH3	
Cycle Calculate	$79CH * 0.4 = 31.6 \text{ (sec)}$
The EUT Hopping Number per Sec	1600 times/sec
Each Channel Dwell Times per Sec	$400/79CH = 5.1(\text{times/sec})$
Each Channel Dwell Times on Cycle(1)	$31.6 * 5.1 = 161.16(\text{times})$
Each Channel Dwell Times (2)	1.675 ms (sec)
Dwell Times on Cycle (1) * (2)	267.826 ms (sec)
LIMIT(msec)	$< = 400$
3DH5	
Cycle Calculate	$79CH * 0.4 = 31.6 \text{ (sec)}$
The EUT Hopping Number per Sec	1600 times/sec
Each Channel Dwell Times per Sec	$266.7/79CH = 3.37(\text{times/sec})$
Each Channel Dwell Times on Cycle(1)	$31.6 * 3.37 = 106.492(\text{times})$
Each Channel Dwell Times (2)	2.933 ms (sec)
Dwell Times on Cycle (1) * (2)	313.247 ms (sec)
LIMIT(msec)	$< = 400$

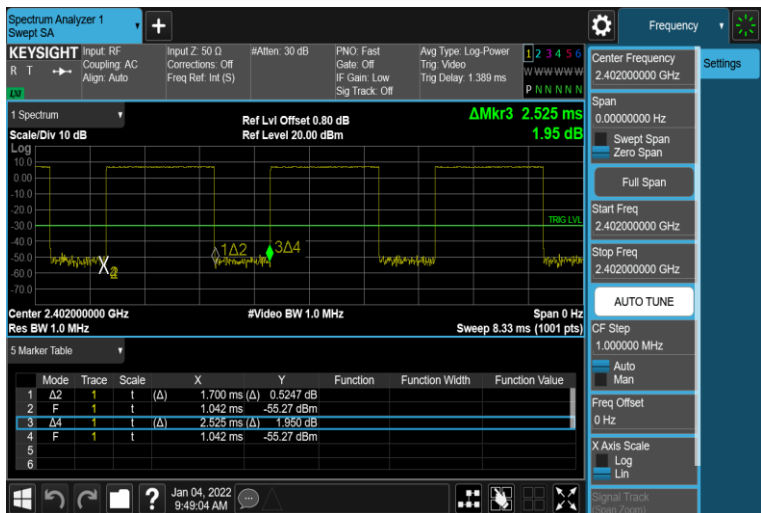
Test Graphs

Mode 2: GFSK Continuous TX mode

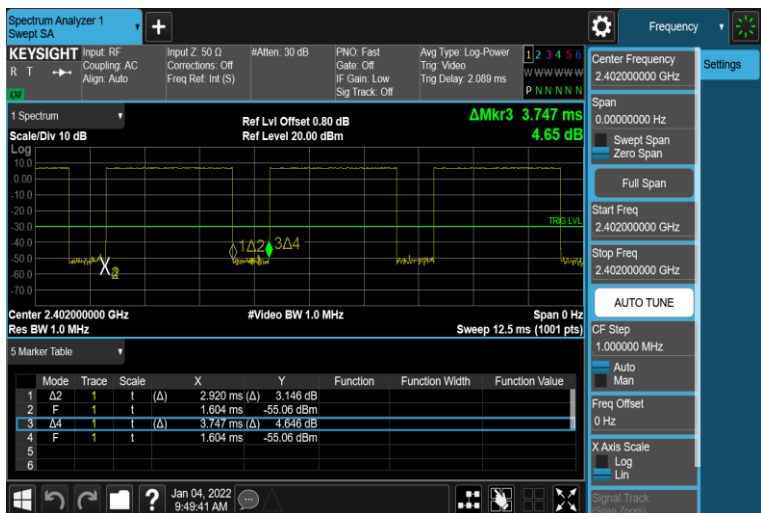
DH1



DH3

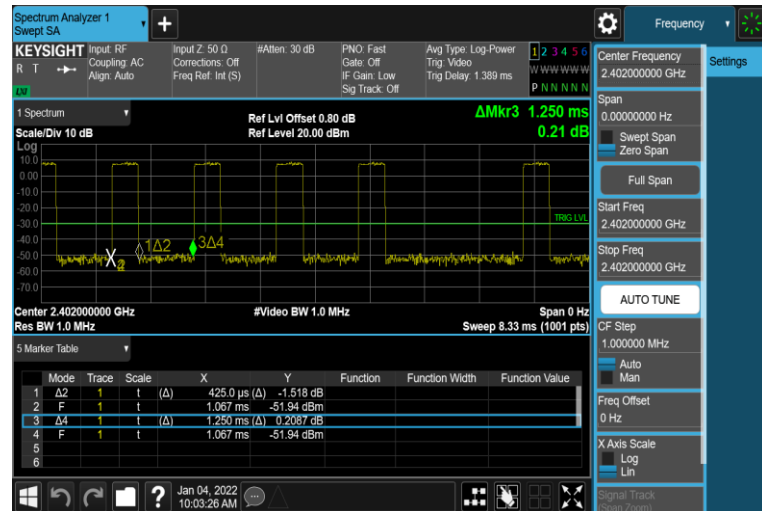


DH5



Mode 4: 8DPSK Continuous TX mode

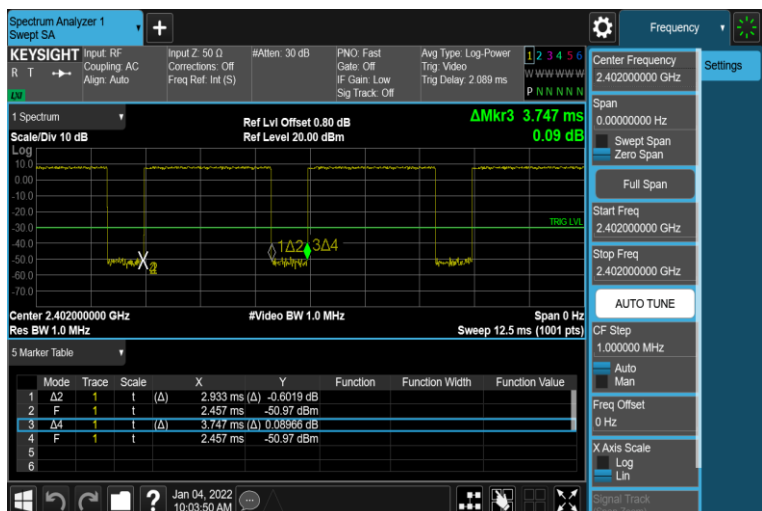
3DH1



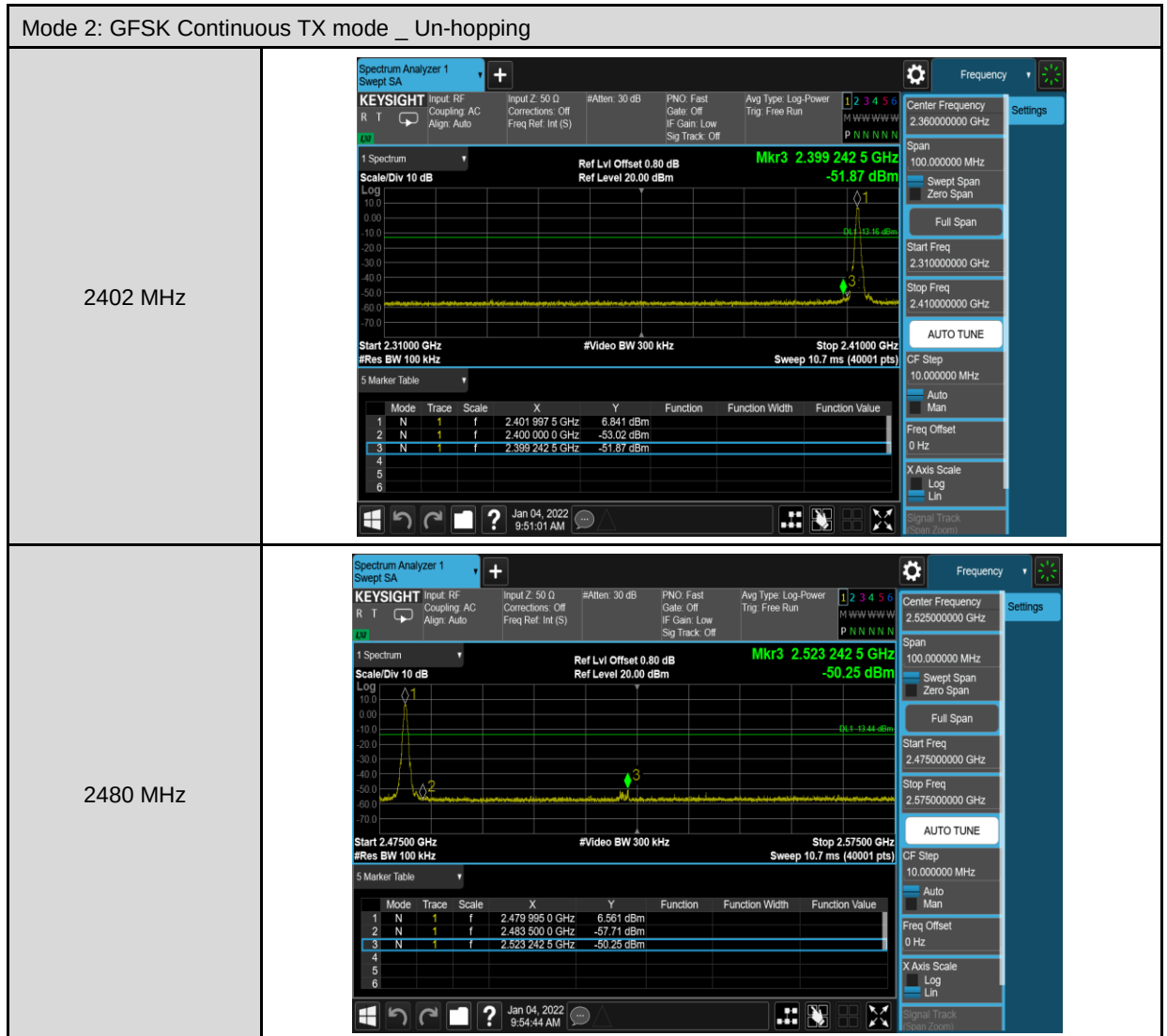
3DH3



3DH5



Conducted Band Edge

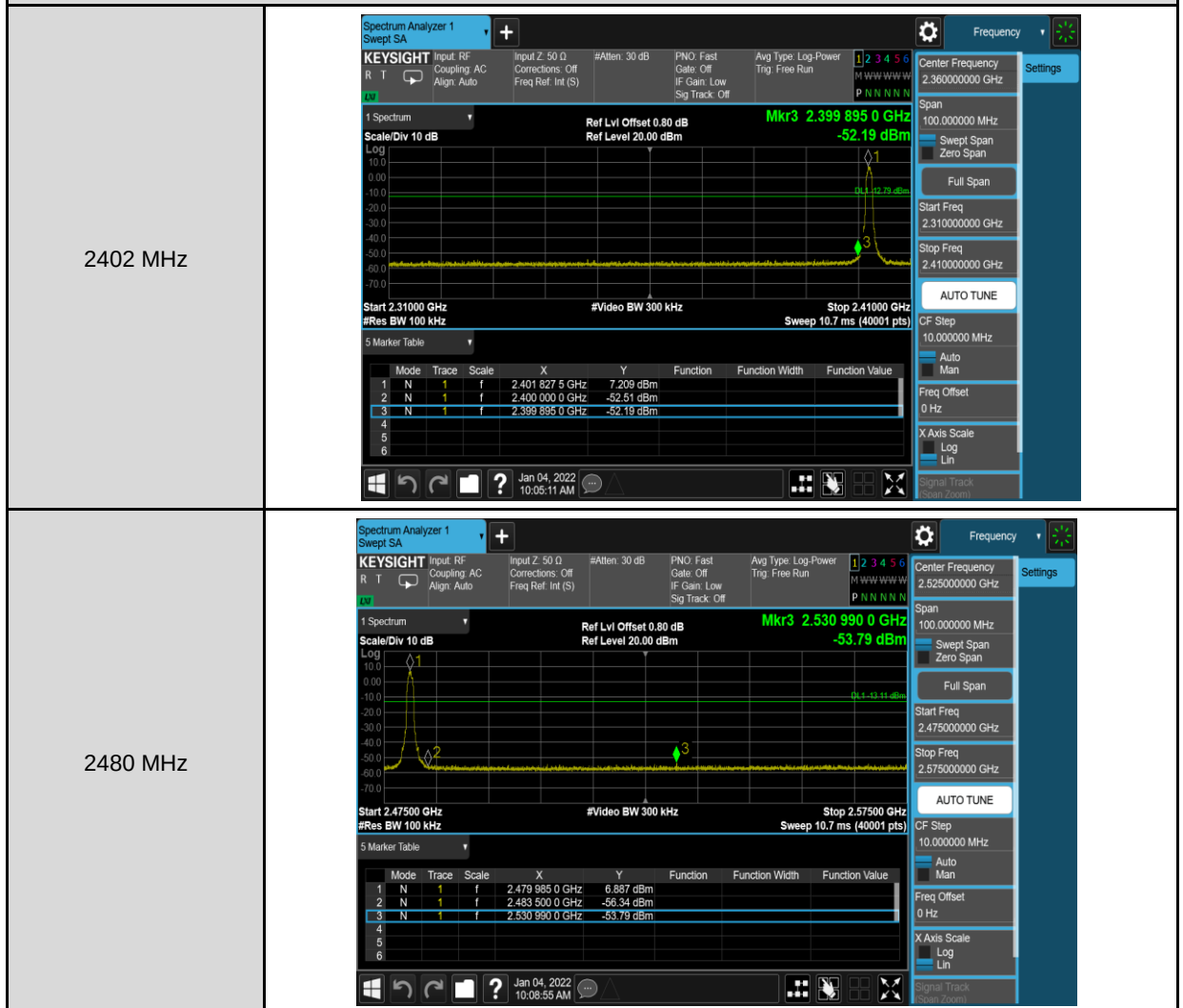


Mode 2: GFSK Continuous TX mode _ Hopping

2402 ~ 2480 MHz

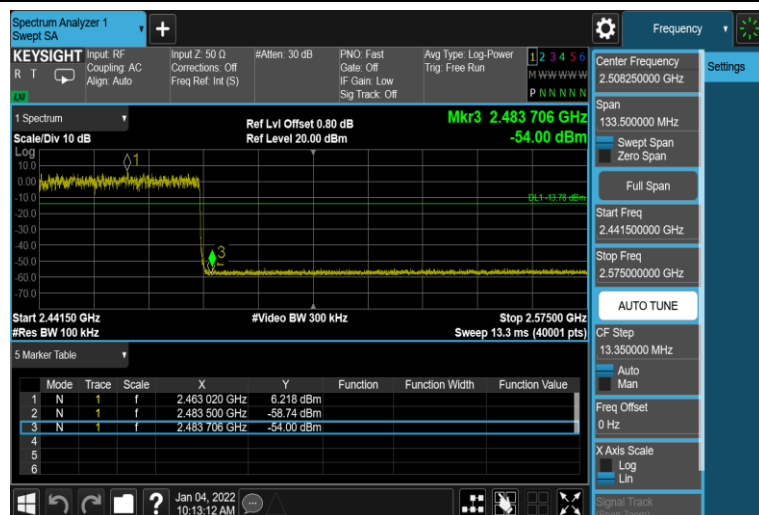
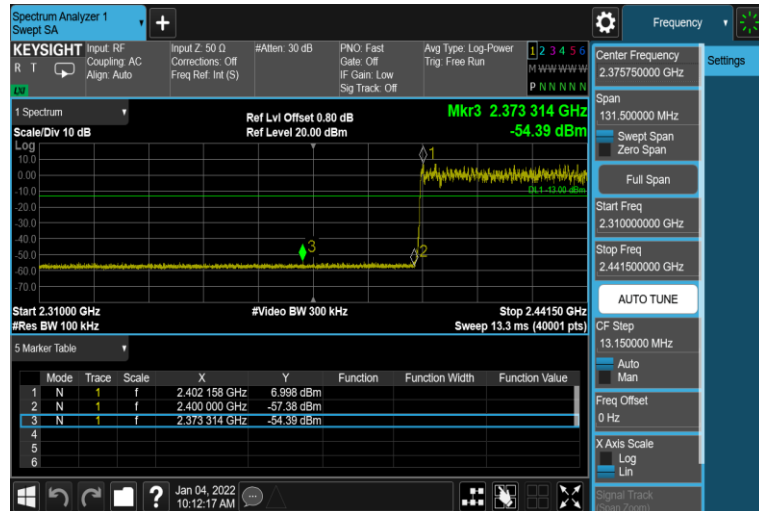


Mode 4: 8DPSK Continuous TX mode _ Un-hopping



Mode 4: 8DPSK Continuous TX mode _ Hopping

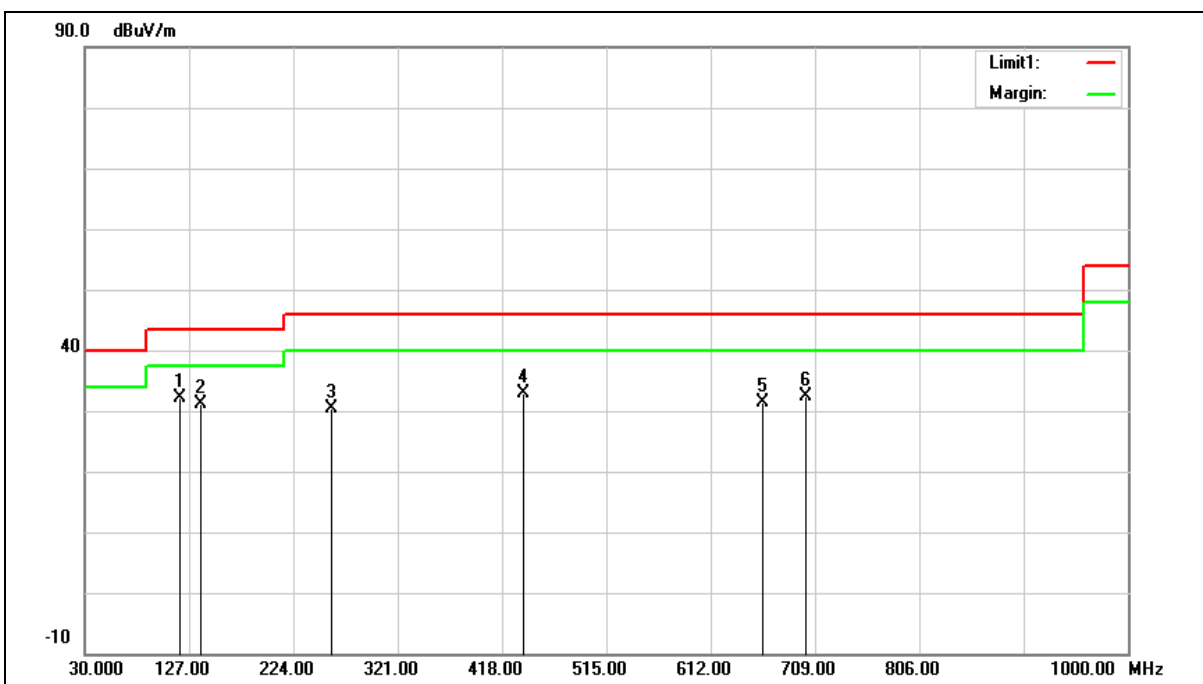
2402 ~ 2480 MHz



5.3 Radiated Emission Measurement

Below 1 GHz

Standard:	FCC Part 15.247	Test Distance:	3m
Frequency:	2402 MHz		
Mode:	Mode 1		
Ant.Polar.:	Horizontal		



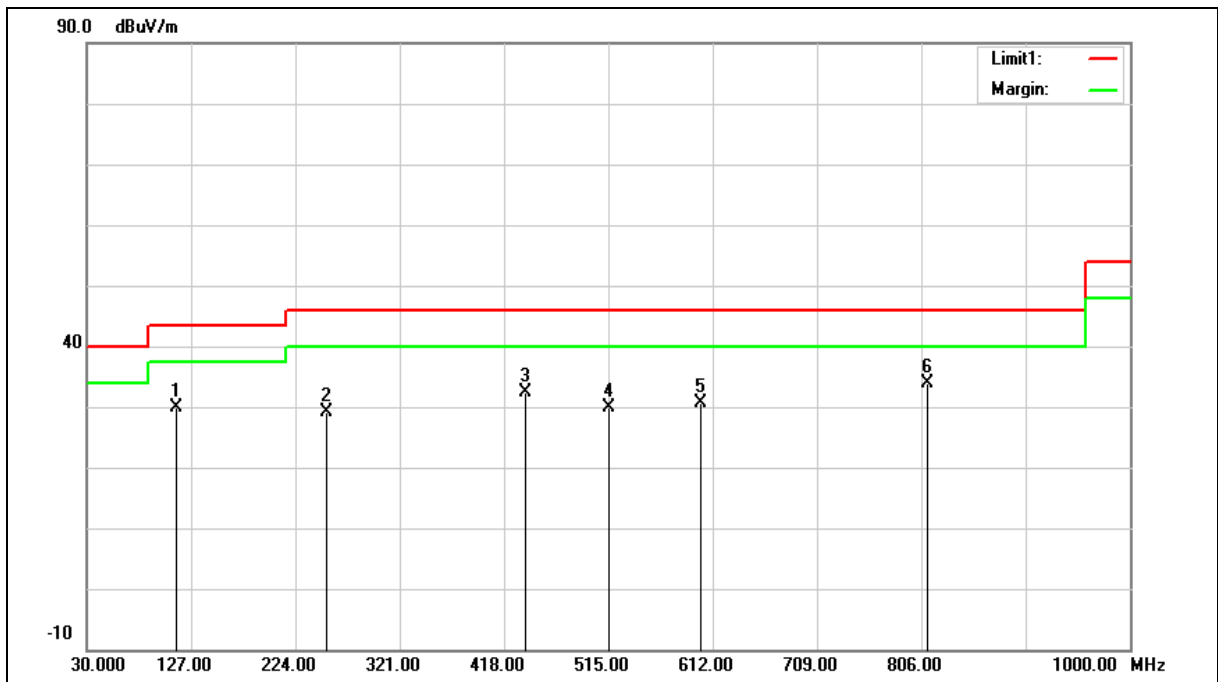
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	118.2700	41.67	-9.59	32.08	43.50	-11.42	QP
2	137.6700	38.67	-7.49	31.18	43.50	-12.32	QP
3	259.8900	37.06	-6.68	30.38	46.00	-15.62	QP
4	437.4000	35.55	-2.74	32.81	46.00	-13.19	QP
5	660.5000	30.07	1.35	31.42	46.00	-14.58	QP
6	700.2700	30.24	2.24	32.48	46.00	-13.52	QP

Note:1.Result (dBuV/m) = Correct Factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

3.When the peak results are less than average limit, so not need to evaluate the average.

Standard:	FCC Part 15.247	Test Distance:	3m
Frequency:	2402 MHz		
Mode:	Mode 1		
Ant.Polar.:	Vertical		



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	113.4200	39.83	-10.07	29.76	43.50	-13.74	QP
2	253.1000	36.15	-6.92	29.23	46.00	-16.77	QP
3	438.3700	35.07	-2.72	32.35	46.00	-13.65	QP
4	515.0000	31.34	-1.58	29.76	46.00	-16.24	QP
5	600.3600	30.16	0.55	30.71	46.00	-15.29	QP
6	811.8200	29.79	4.13	33.92	46.00	-12.08	QP

Note:1.Result (dBuV/m) = Correct Factor (dB/m) + Reading(dBuV).

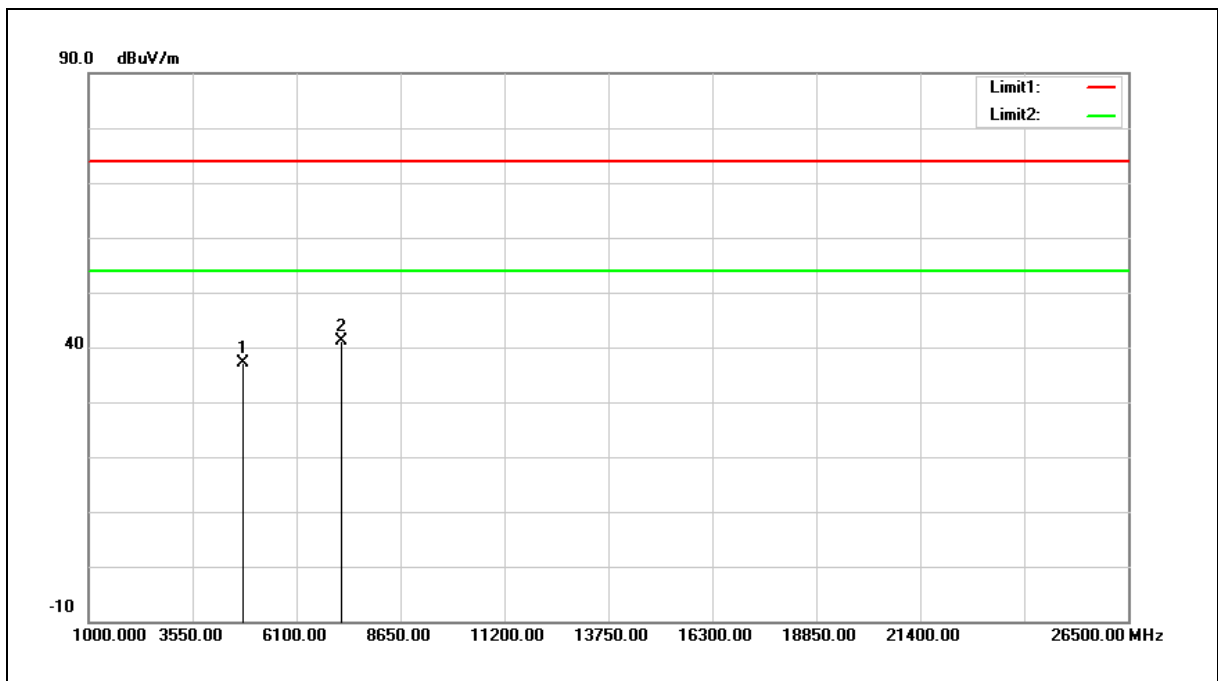
2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

3.When the peak results are less than average limit, so not need to evaluate the average.

Harmonic

Above 1 GHz

Standard:	FCC Part 15.247	Test Distance:	3m
Test item:	Harmonic		
Frequency:	2402 MHz		
Mode:	Mode 2		
Ant.Polar.:	Horizontal		



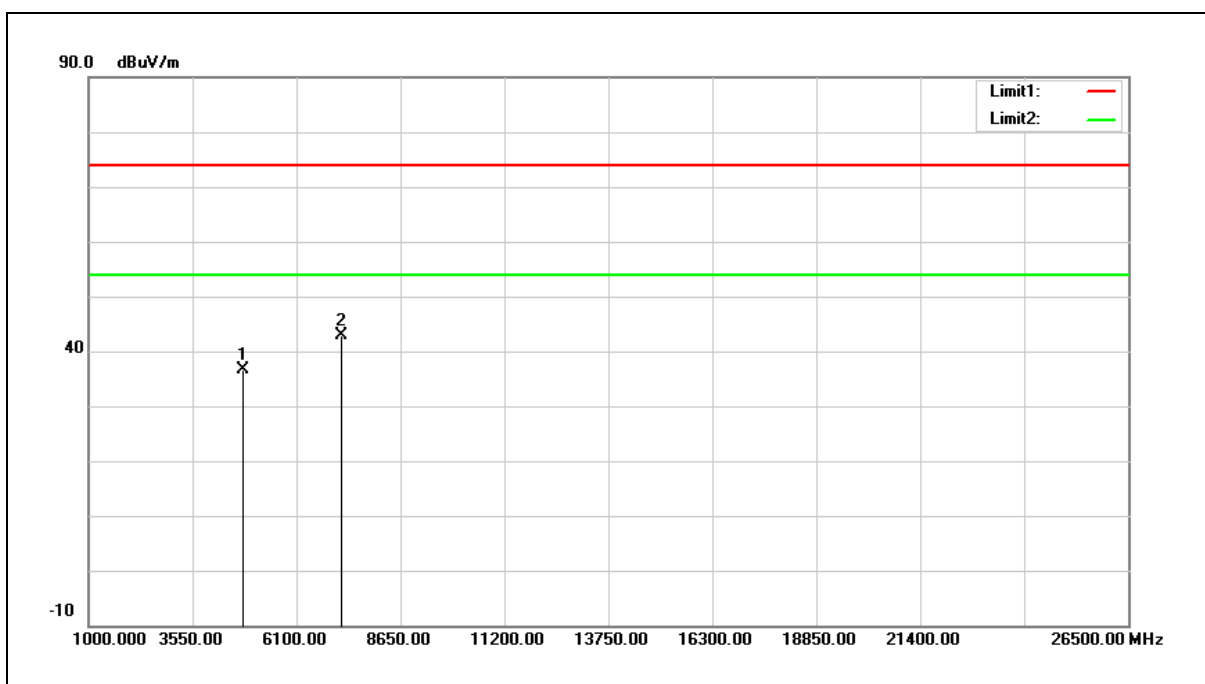
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4804.000	38.23	-1.04	37.19	74.00	-36.81	peak
2	7206.000	35.20	6.04	41.24	74.00	-32.76	peak

Note:1.Result (dBuV/m) = Correct Factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

3.When the peak results are less than average limit, so not need to evaluate the average.

Standard:	FCC Part 15.247	Test Distance:	3m
Test item:	Harmonic		
Frequency:	2402 MHz		
Mode:	Mode 2		
Ant.Polar.:	Vertical		



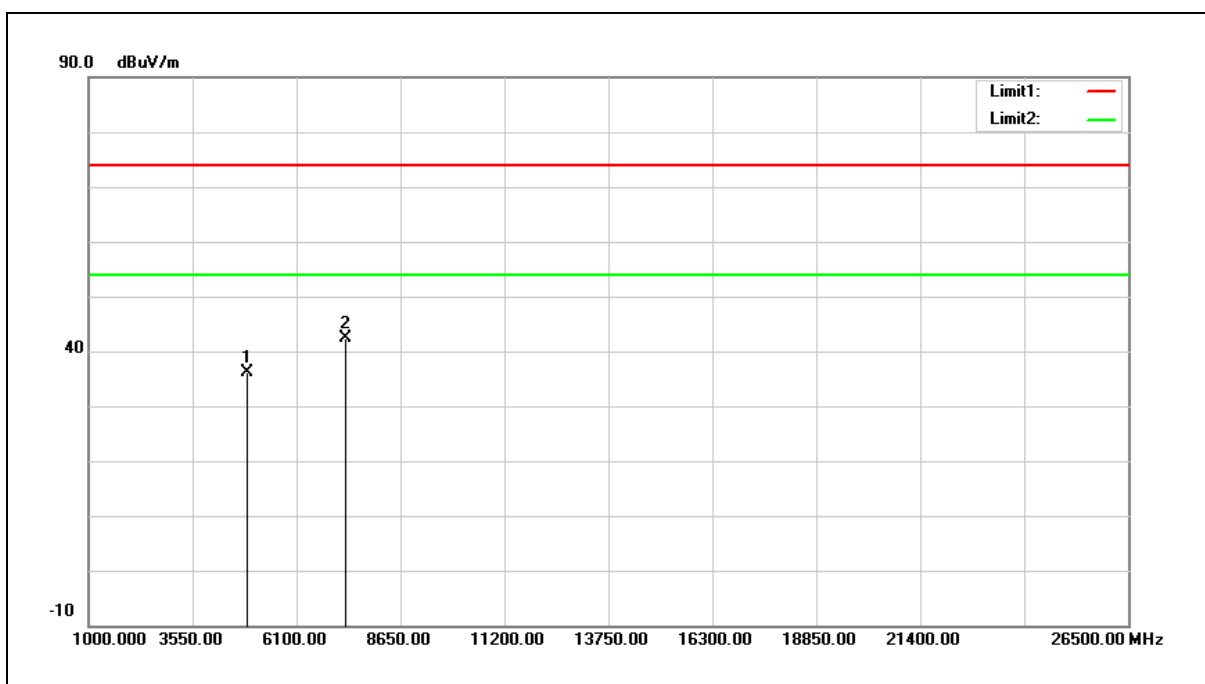
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4804.000	37.55	-1.04	36.51	74.00	-37.49	peak
2	7206.000	36.76	6.04	42.80	74.00	-31.20	peak

Note:1.Result (dBuV/m) = Correct Factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

3.When the peak results are less than average limit, so not need to evaluate the average.

Standard:	FCC Part 15.247	Test Distance:	3m
Test item:	Harmonic		
Frequency:	2441 MHz		
Mode:	Mode 2		
Ant.Polar.:	Horizontal		



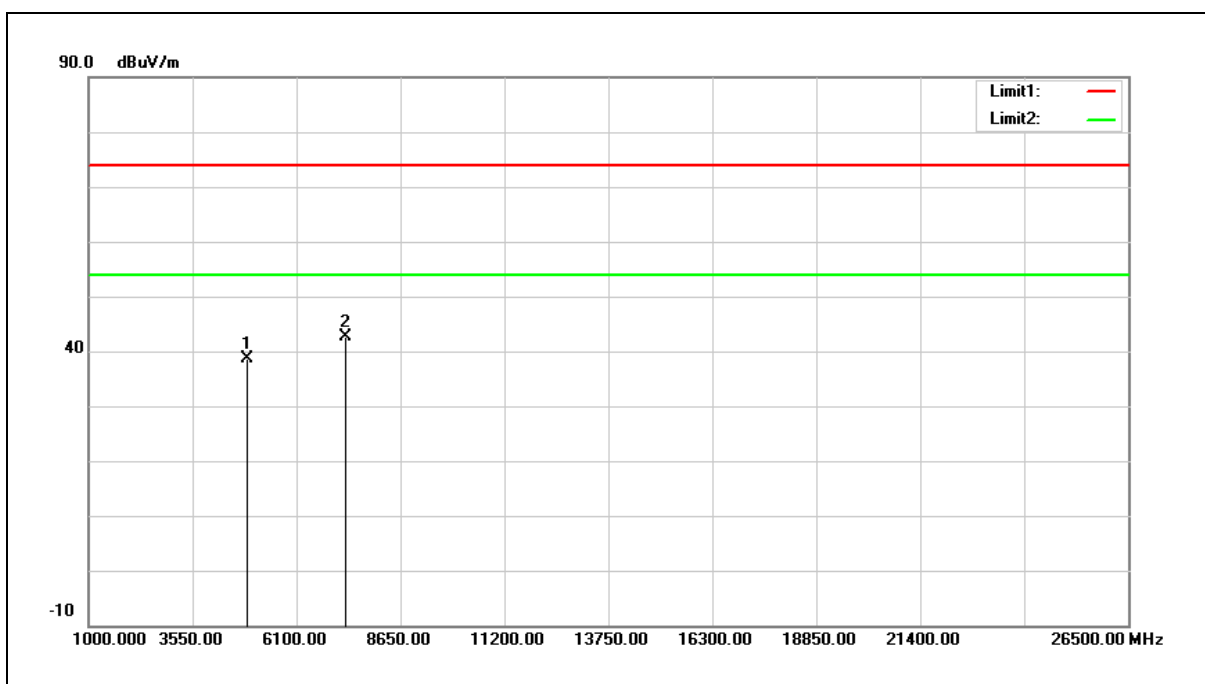
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4882.000	36.85	-0.77	36.08	74.00	-37.92	peak
2	7323.000	35.87	6.50	42.37	74.00	-31.63	peak

Note:1.Result (dBuV/m) = Correct Factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

3.When the peak results are less than average limit, so not need to evaluate the average.

Standard:	FCC Part 15.247	Test Distance:	3m
Test item:	Harmonic		
Frequency:	2441 MHz		
Mode:	Mode 2		
Ant.Polar.:	Vertical		



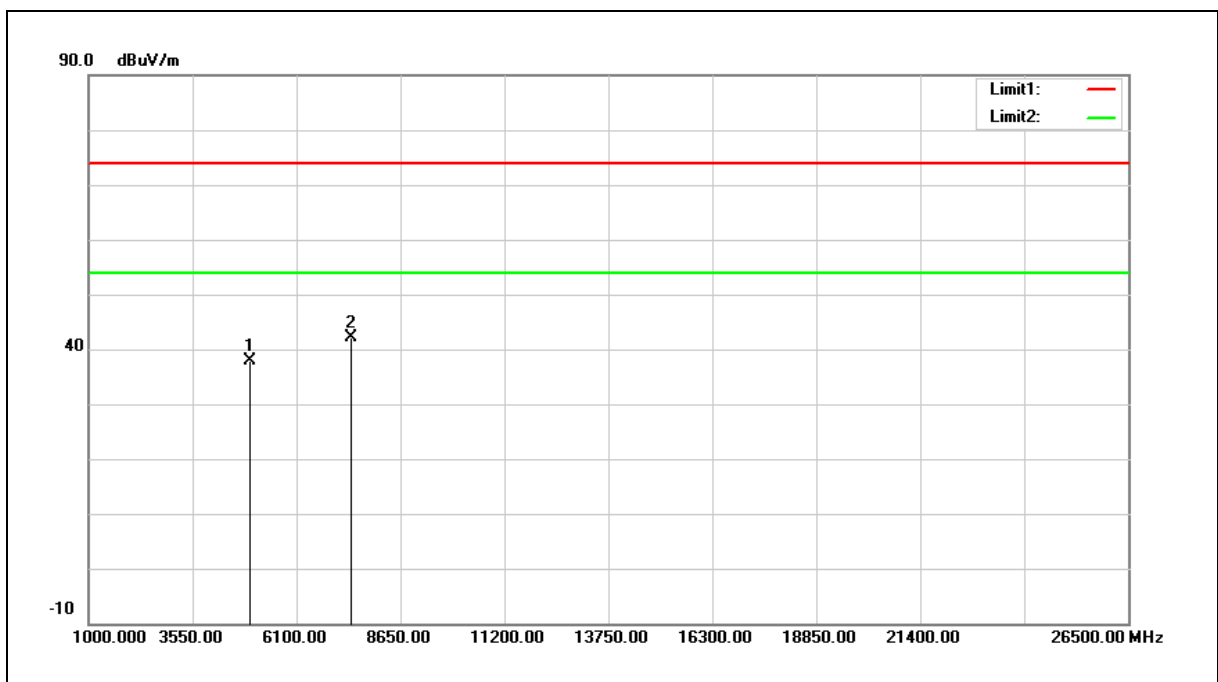
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4882.000	39.41	-0.77	38.64	74.00	-35.36	peak
2	7323.000	36.10	6.50	42.60	74.00	-31.40	peak

Note:1.Result (dBuV/m) = Correct Factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

3.When the peak results are less than average limit, so not need to evaluate the average.

Standard:	FCC Part 15.247	Test Distance:	3m
Test item:	Harmonic		
Frequency:	2480 MHz		
Mode:	Mode 2		
Ant.Polar.:	Horizontal		



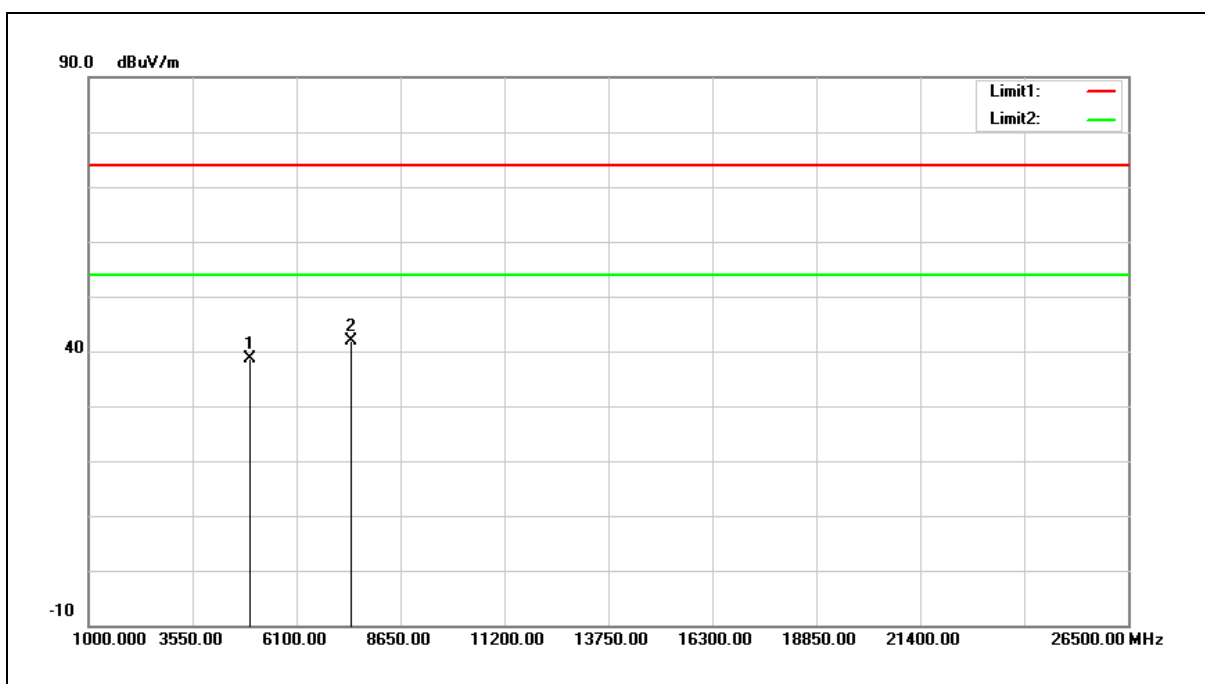
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4960.000	38.27	-0.50	37.77	74.00	-36.23	peak
2	7440.000	35.29	6.95	42.24	74.00	-31.76	peak

Note:1.Result (dBuV/m) = Correct Factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

3.When the peak results are less than average limit, so not need to evaluate the average.

Standard:	FCC Part 15.247	Test Distance:	3m
Test item:	Harmonic		
Frequency:	2480 MHz		
Mode:	Mode 2		
Ant.Polar.:	Vertical		



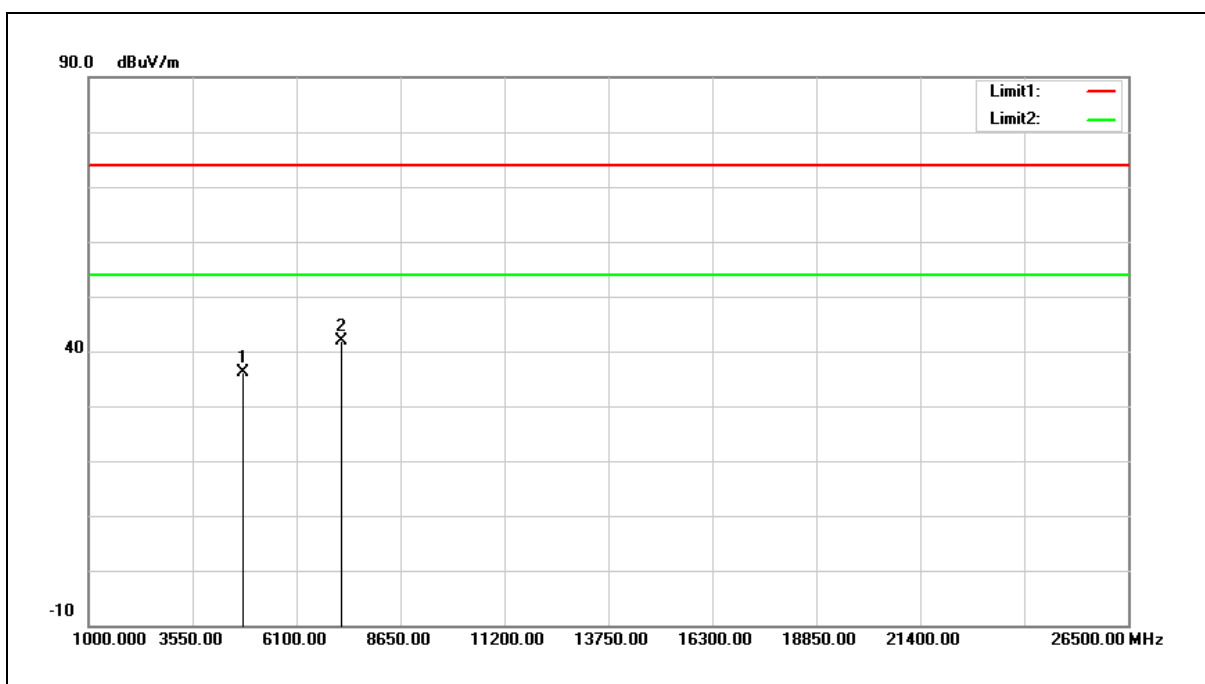
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4960.000	39.01	-0.50	38.51	74.00	-35.49	peak
2	7440.000	35.03	6.95	41.98	74.00	-32.02	peak

Note:1.Result (dBuV/m) = Correct Factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

3.When the peak results are less than average limit, so not need to evaluate the average.

Standard:	FCC Part 15.247	Test Distance:	3m
Test item:	Harmonic		
Frequency:	2402 MHz		
Mode:	Mode 4		
Ant.Polar.:	Horizontal		



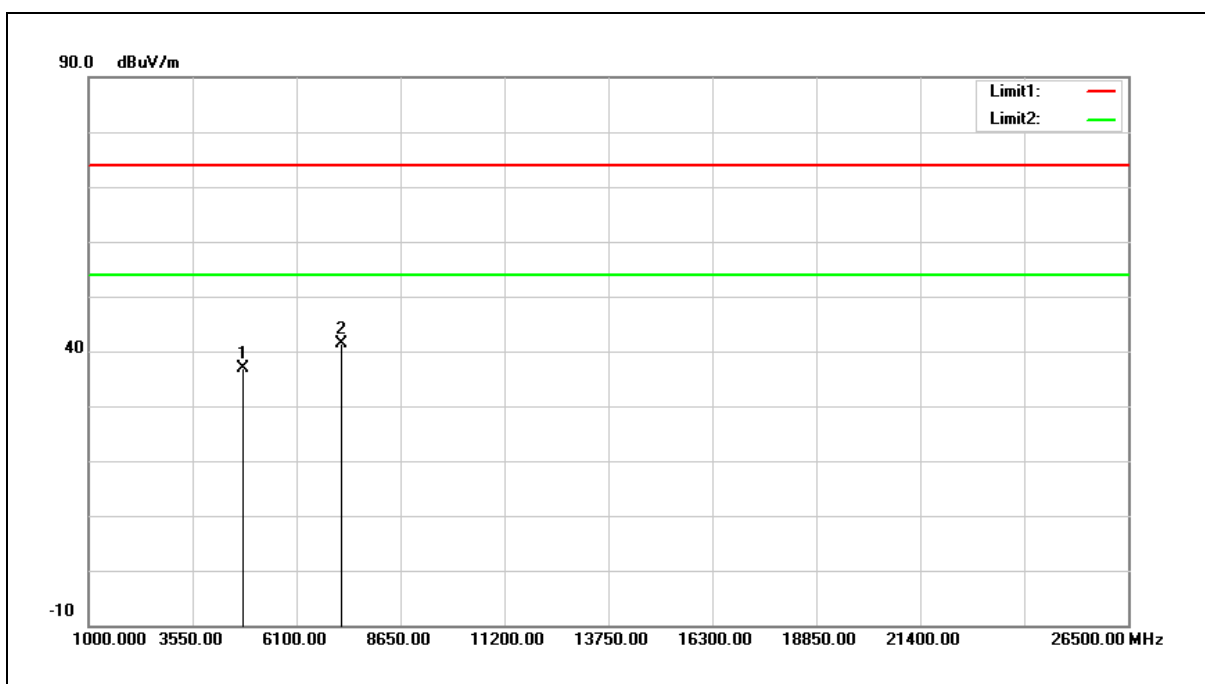
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4804.000	37.21	-1.04	36.17	74.00	-37.83	peak
2	7206.000	35.83	6.04	41.87	74.00	-32.13	peak

Note:1.Result (dBuV/m) = Correct Factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

3.When the peak results are less than average limit, so not need to evaluate the average.

Standard:	FCC Part 15.247	Test Distance:	3m
Test item:	Harmonic		
Frequency:	2402 MHz		
Mode:	Mode 4		
Ant.Polar.:	Vertical		



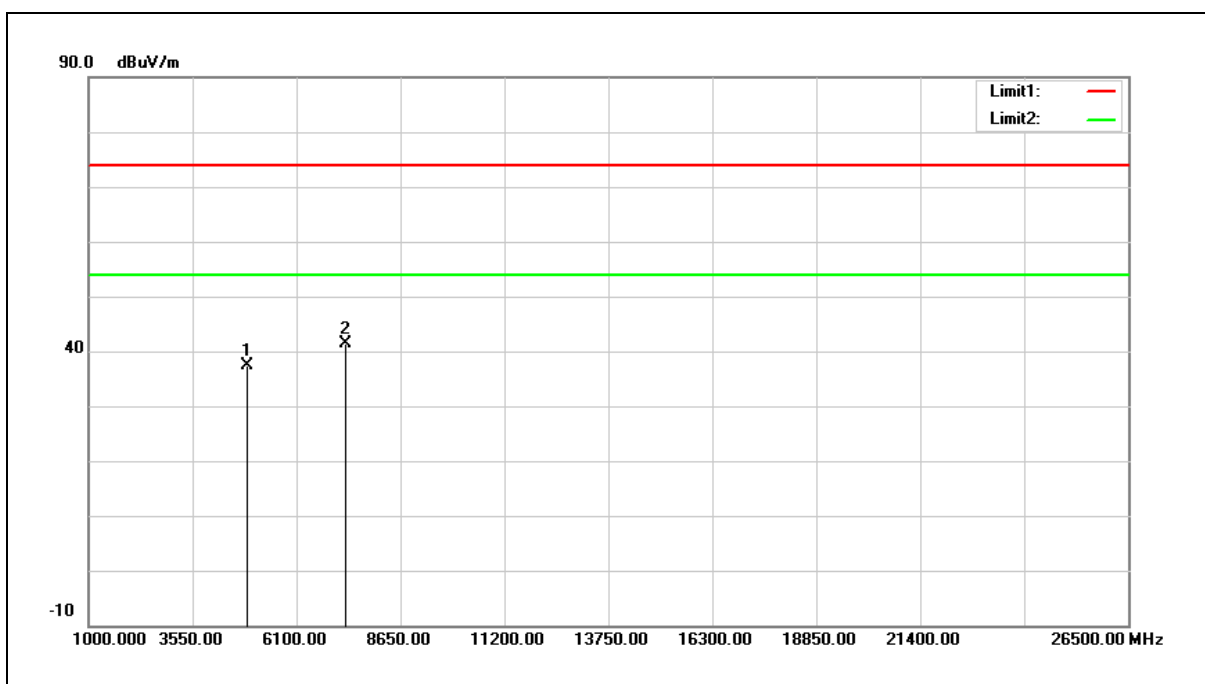
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4804.000	37.96	-1.04	36.92	74.00	-37.08	peak
2	7206.000	35.44	6.04	41.48	74.00	-32.52	peak

Note:1.Result (dBuV/m) = Correct Factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

3.When the peak results are less than average limit, so not need to evaluate the average.

Standard:	FCC Part 15.247	Test Distance:	3m
Test item:	Harmonic		
Frequency:	2441 MHz		
Mode:	Mode 4		
Ant.Polar.:	Horizontal		



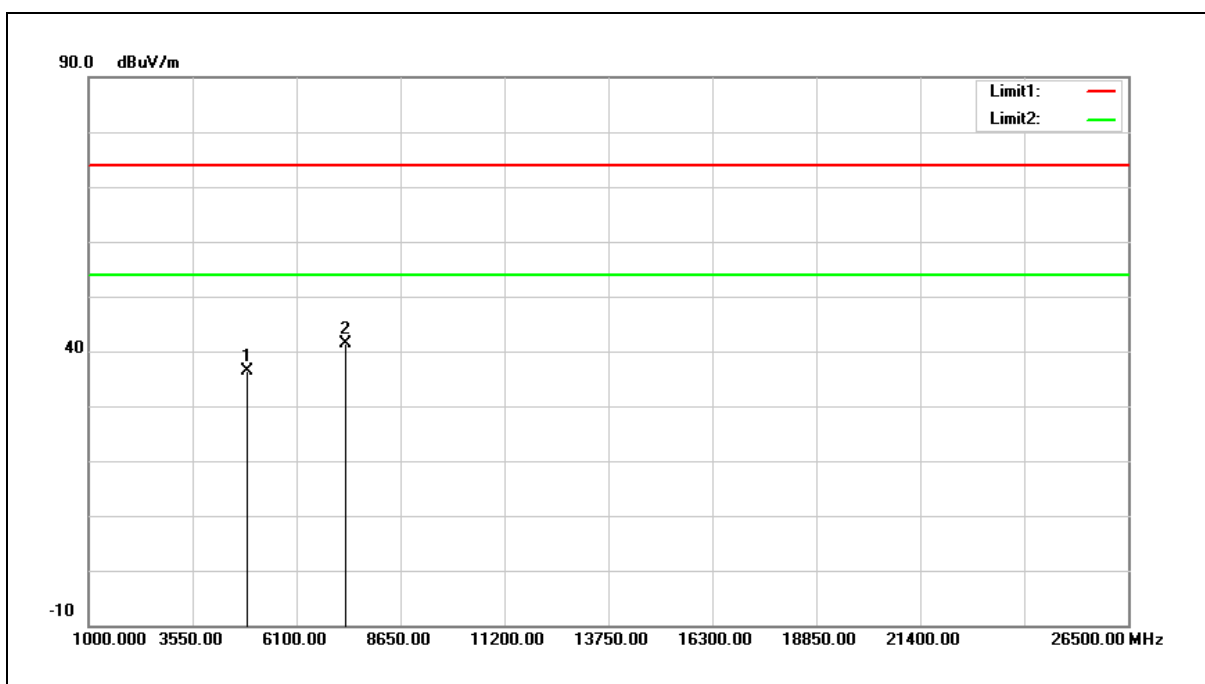
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4882.000	38.16	-0.77	37.39	74.00	-36.61	peak
2	7323.000	34.91	6.50	41.41	74.00	-32.59	peak

Note:1.Result (dBuV/m) = Correct Factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

3.When the peak results are less than average limit, so not need to evaluate the average.

Standard:	FCC Part 15.247	Test Distance:	3m
Test item:	Harmonic		
Frequency:	2441 MHz		
Mode:	Mode 4		
Ant.Polar.:	Vertical		



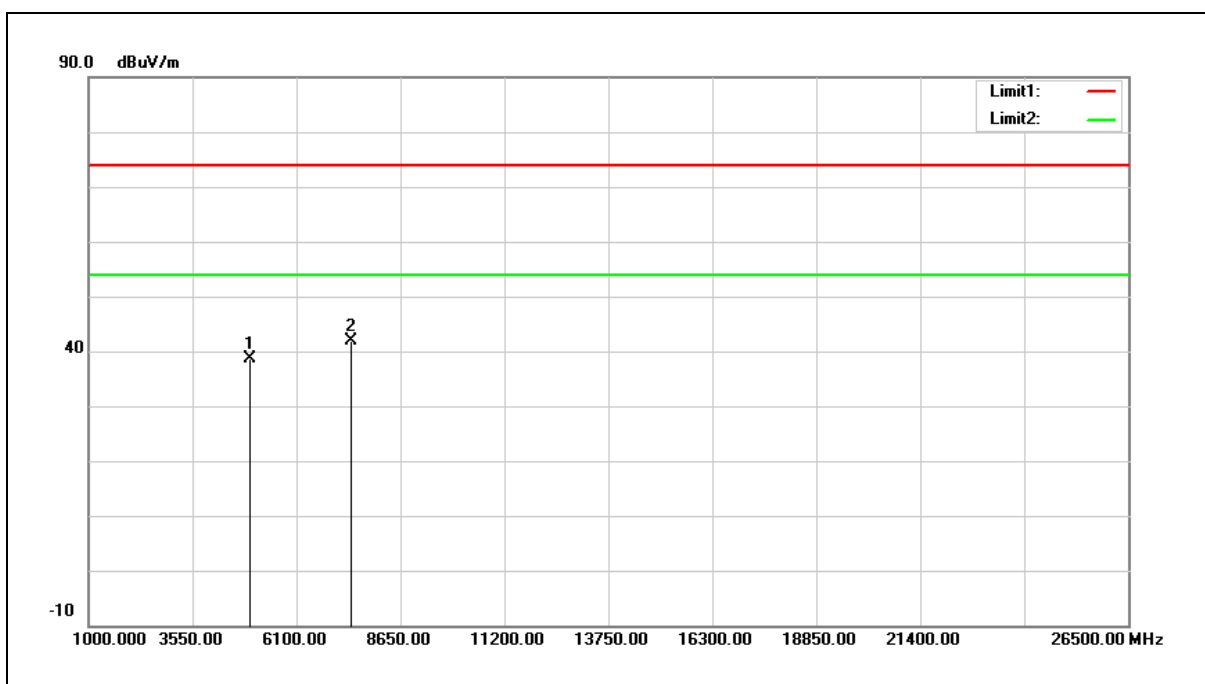
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4882.000	37.13	-0.77	36.36	74.00	-37.64	peak
2	7323.000	34.93	6.50	41.43	74.00	-32.57	peak

Note:1.Result (dBuV/m) = Correct Factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

3.When the peak results are less than average limit, so not need to evaluate the average.

Standard:	FCC Part 15.247	Test Distance:	3m
Test item:	Harmonic		
Frequency:	2480 MHz		
Mode:	Mode 4		
Ant.Polar.:	Horizontal		



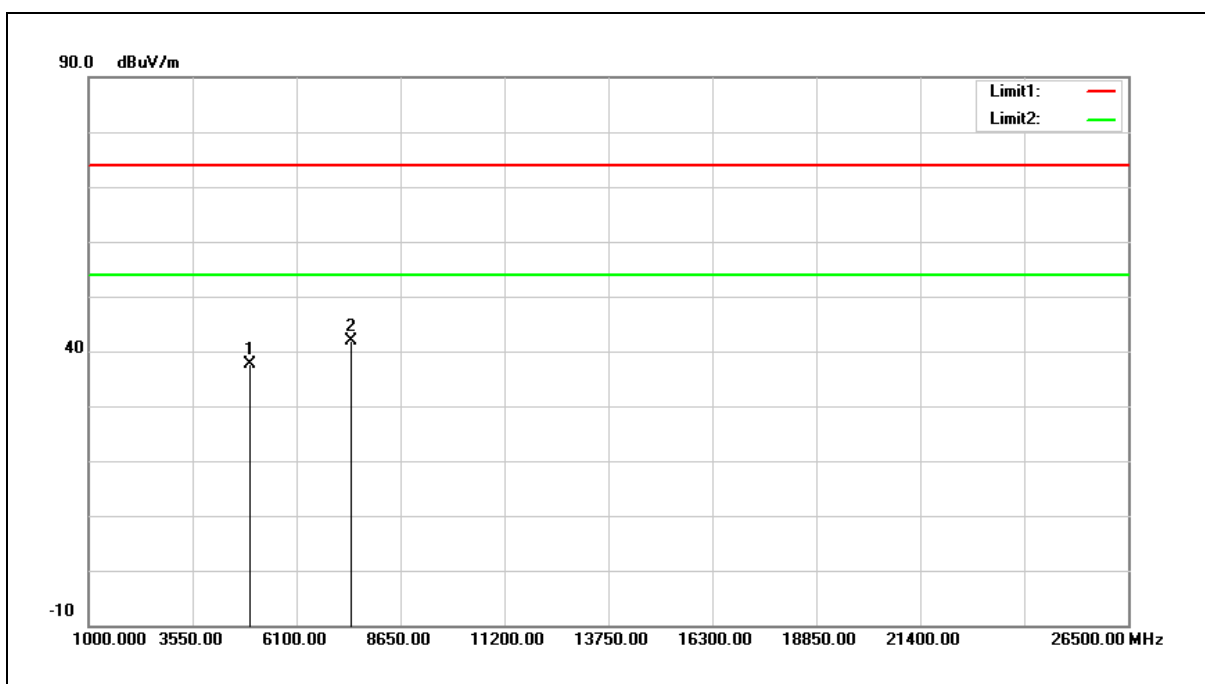
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4960.000	39.04	-0.50	38.54	74.00	-35.46	peak
2	7440.000	34.94	6.95	41.89	74.00	-32.11	peak

Note:1.Result (dBuV/m) = Correct Factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

3.When the peak results are less than average limit, so not need to evaluate the average.

Standard:	FCC Part 15.247	Test Distance:	3m
Test item:	Harmonic		
Frequency:	2480 MHz		
Mode:	Mode 4		
Ant.Polar.:	Vertical		



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4960.000	38.02	-0.50	37.52	74.00	-36.48	peak
2	7440.000	34.85	6.95	41.80	74.00	-32.20	peak

Note:1.Result (dBuV/m) = Correct Factor (dB/m) + Reading(dBuV).

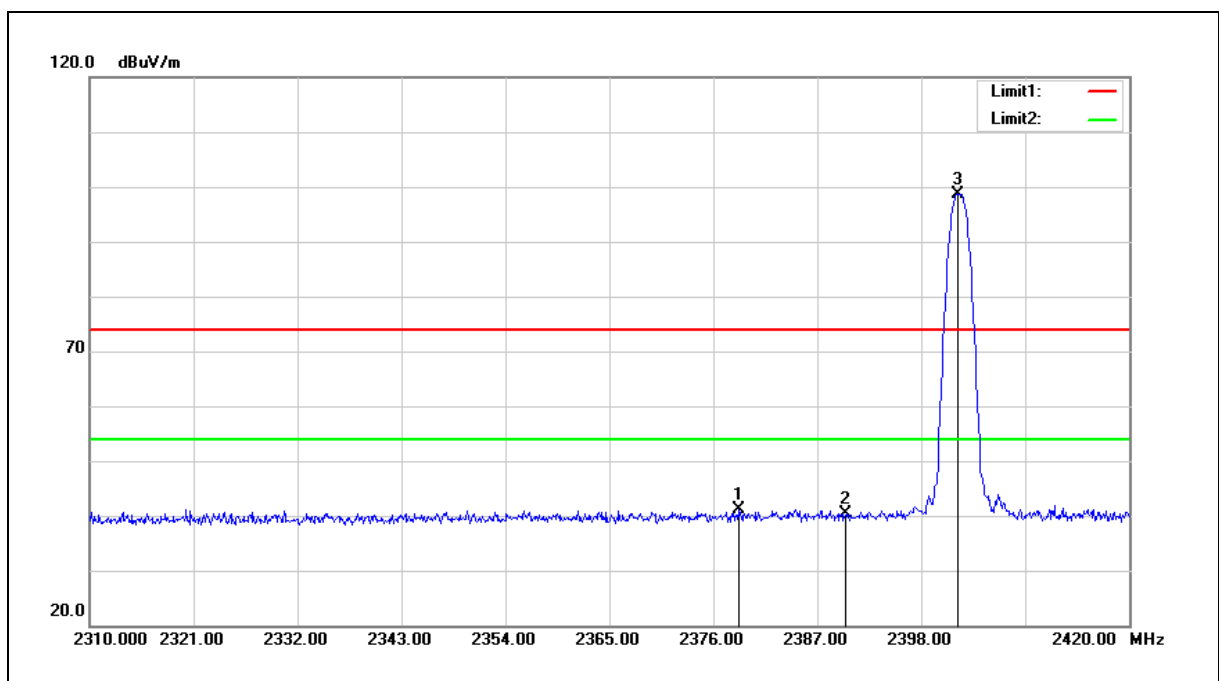
2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

3.When the peak results are less than average limit, so not need to evaluate the average.

Band Edge

Peak

Standard:	FCC Part 15.247	Test Distance:	3m
Test item:	Harmonic		
Frequency:	2402 MHz		
Mode:	Mode 2		
Ant.Polar.:	Horizontal		



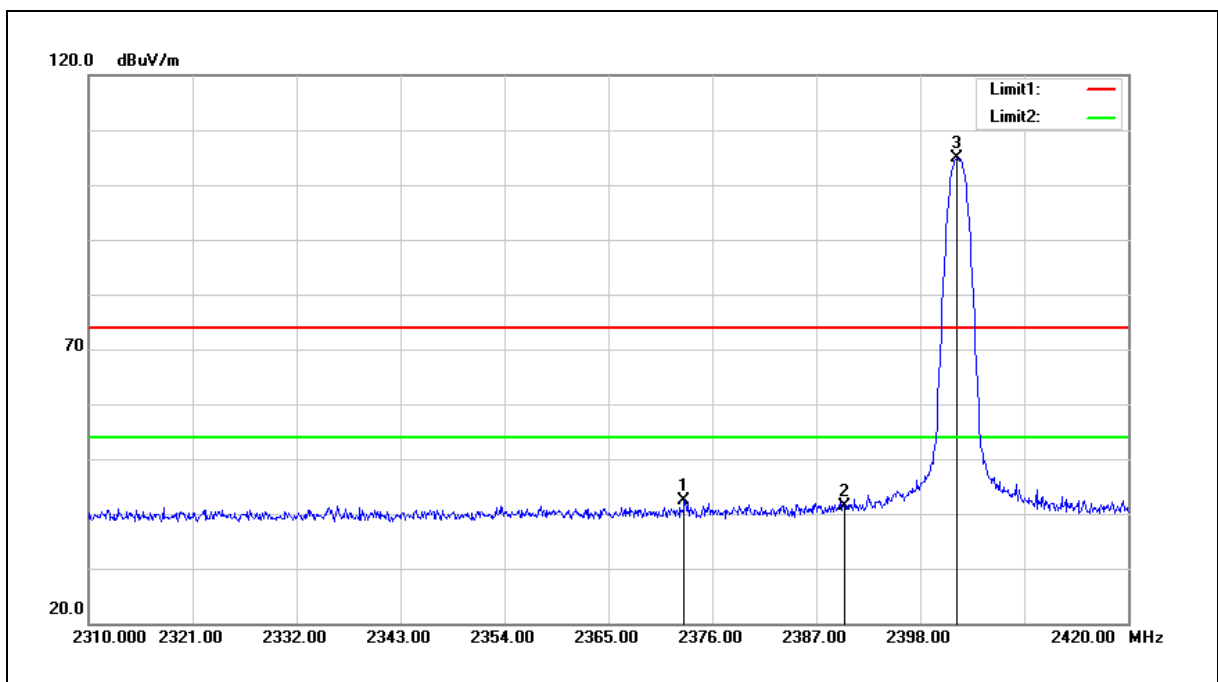
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2378.640	48.52	-7.35	41.17	74.00	-32.83	peak
2	2390.000	47.61	-7.30	40.31	74.00	-33.69	peak
3	2401.850	105.92	-7.25	98.67	74.00	24.67	peak

Note:1.Result (dBuV/m) = Correct Factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

3.When the peak results are less than average limit, so not need to evaluate the average.

Standard:	FCC Part 15.247	Test Distance:	3m
Test item:	Harmonic		
Frequency:	2402 MHz		
Mode:	Mode 2		
Ant.Polar.:	Vertical		



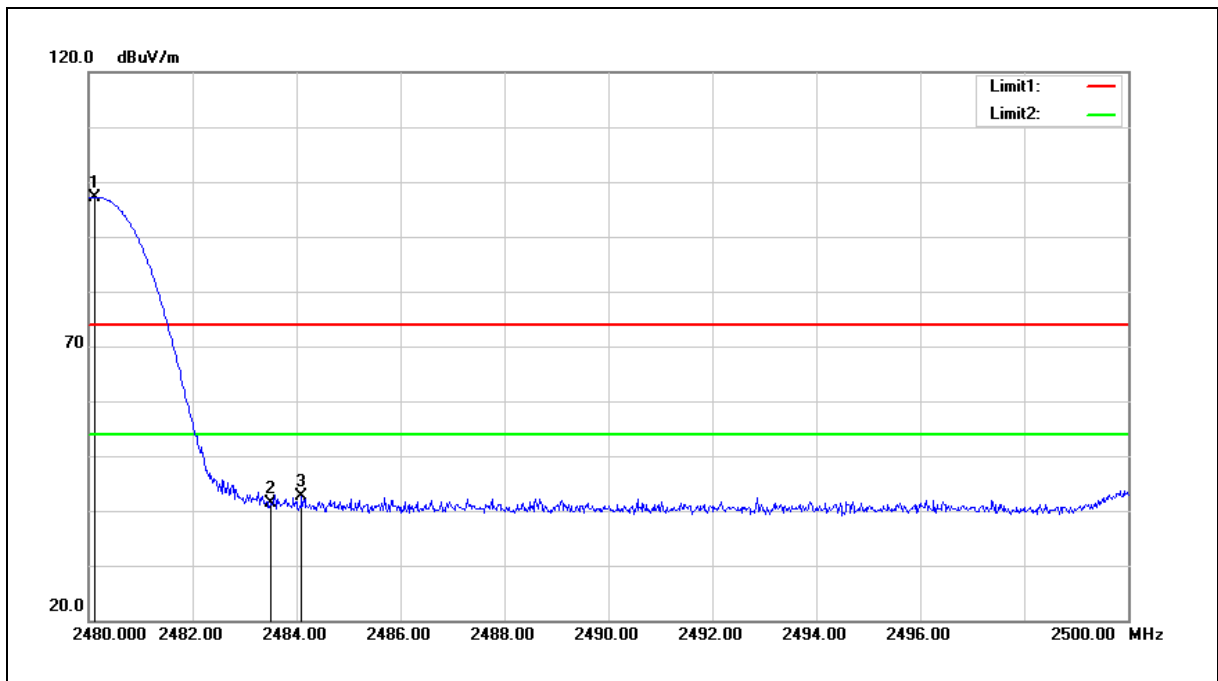
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2373.030	49.83	-7.38	42.45	74.00	-31.55	peak
2	2390.000	48.79	-7.30	41.49	74.00	-32.51	peak
3	2401.850	112.01	-7.25	104.76	74.00	30.76	peak

Note:1.Result (dBuV/m) = Correct Factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

3.When the peak results are less than average limit, so not need to evaluate the average.

Standard:	FCC Part 15.247	Test Distance:	3m
Test item:	Harmonic		
Frequency:	2480 MHz		
Mode:	Mode 2		
Ant.Polar.:	Horizontal		



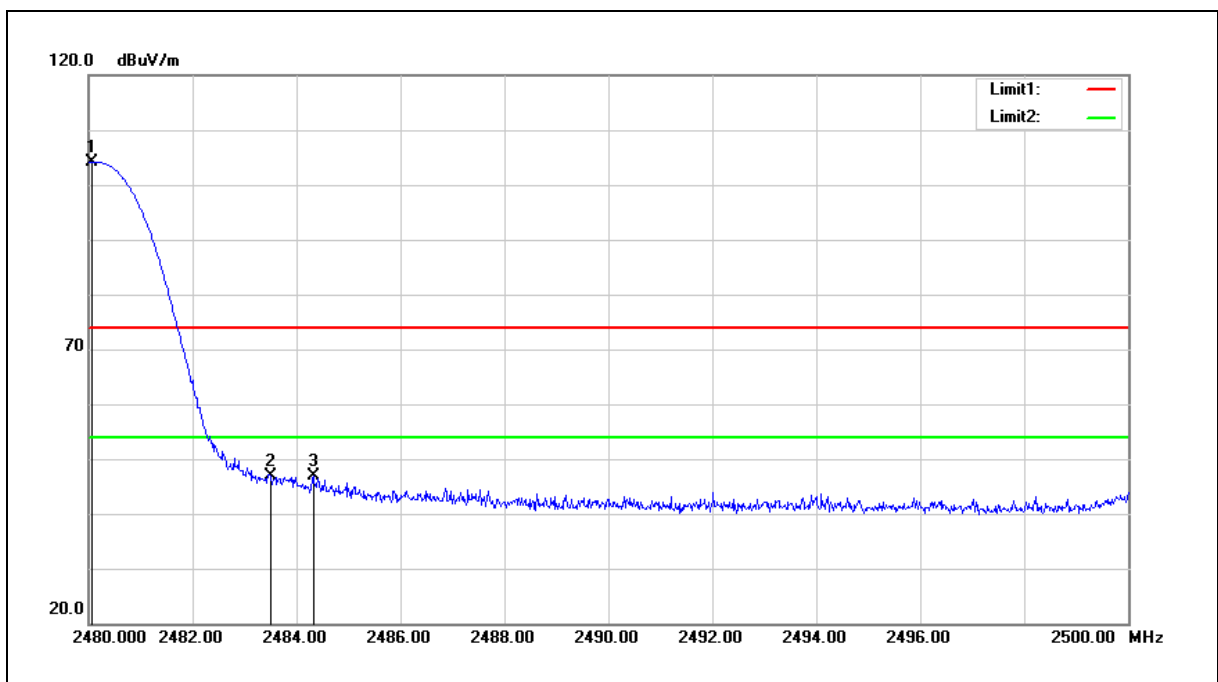
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2480.120	104.17	-6.95	97.22	74.00	23.22	peak
2	2483.500	48.20	-6.94	41.26	74.00	-32.74	peak
3	2484.100	49.61	-6.92	42.69	74.00	-31.31	peak

Note:1.Result (dBuV/m) = Correct Factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

3.When the peak results are less than average limit, so not need to evaluate the average.

Standard:	FCC Part 15.247	Test Distance:	3m
Test item:	Harmonic		
Frequency:	2480 MHz		
Mode:	Mode 2		
Ant.Polar.:	Vertical		



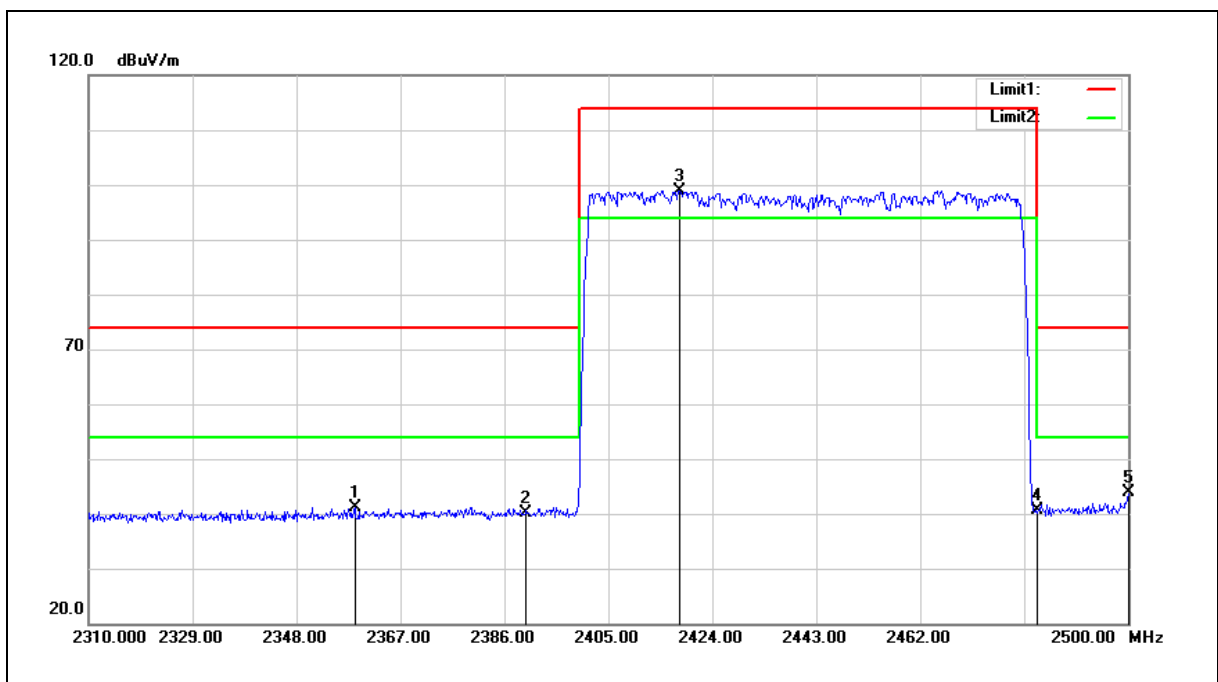
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2480.060	111.14	-6.95	104.19	74.00	30.19	peak
2	2483.500	53.81	-6.94	46.87	74.00	-27.13	peak
3	2484.320	53.73	-6.92	46.81	74.00	-27.19	peak

Note:1.Result (dBuV/m) = Correct Factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

3.When the peak results are less than average limit, so not need to evaluate the average.

Standard:	FCC Part 15.247	Test Distance:	3m
Test item:	Harmonic		
Frequency:	Hopping		
Mode:	Mode 2		
Ant.Polar.:	Horizontal		



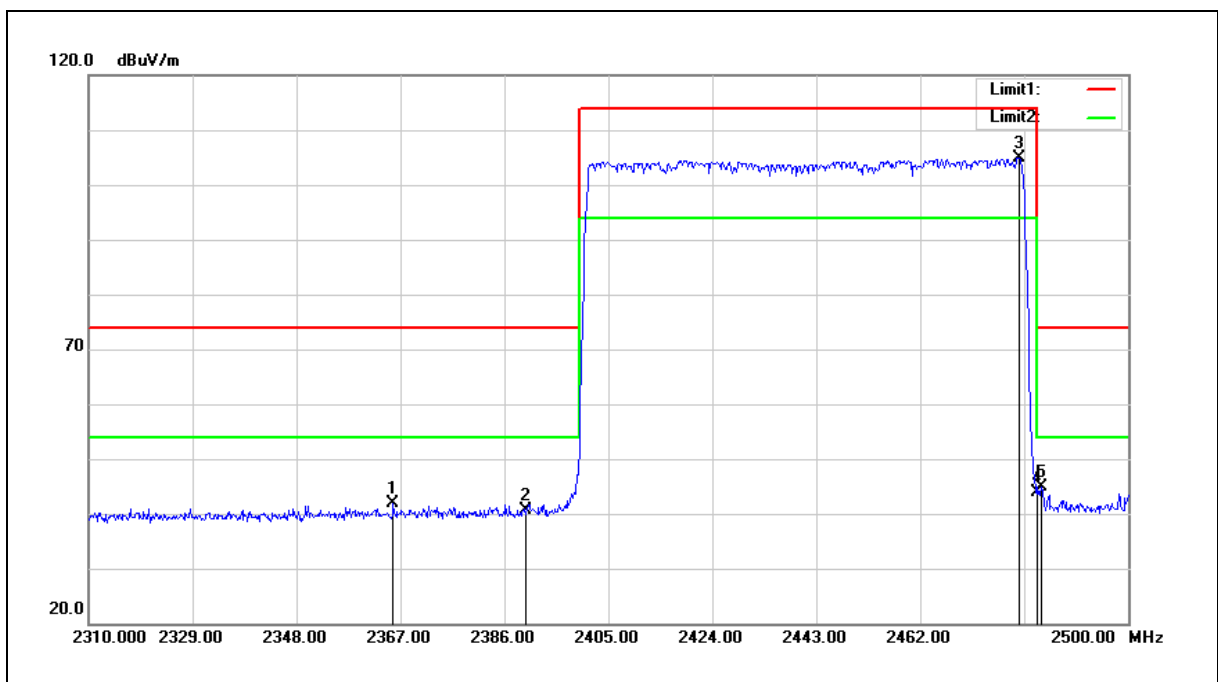
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2358.640	48.56	-7.43	41.13	74.00	-32.87	peak
2	2390.000	47.51	-7.30	40.21	74.00	-33.79	peak
3	2418.110	106.06	-7.20	98.86	114.00	-15.14	peak
4	2483.500	47.57	-6.94	40.63	74.00	-33.37	peak
5	2500.000	50.72	-6.87	43.85	74.00	-30.15	peak

Note:1.Result (dBuV/m) = Correct Factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

3.When the peak results are less than average limit, so not need to evaluate the average.

Standard:	FCC Part 15.247	Test Distance:	3m
Test item:	Harmonic		
Frequency:	Hopping		
Mode:	Mode 2		
Ant.Polar.:	Vertical		



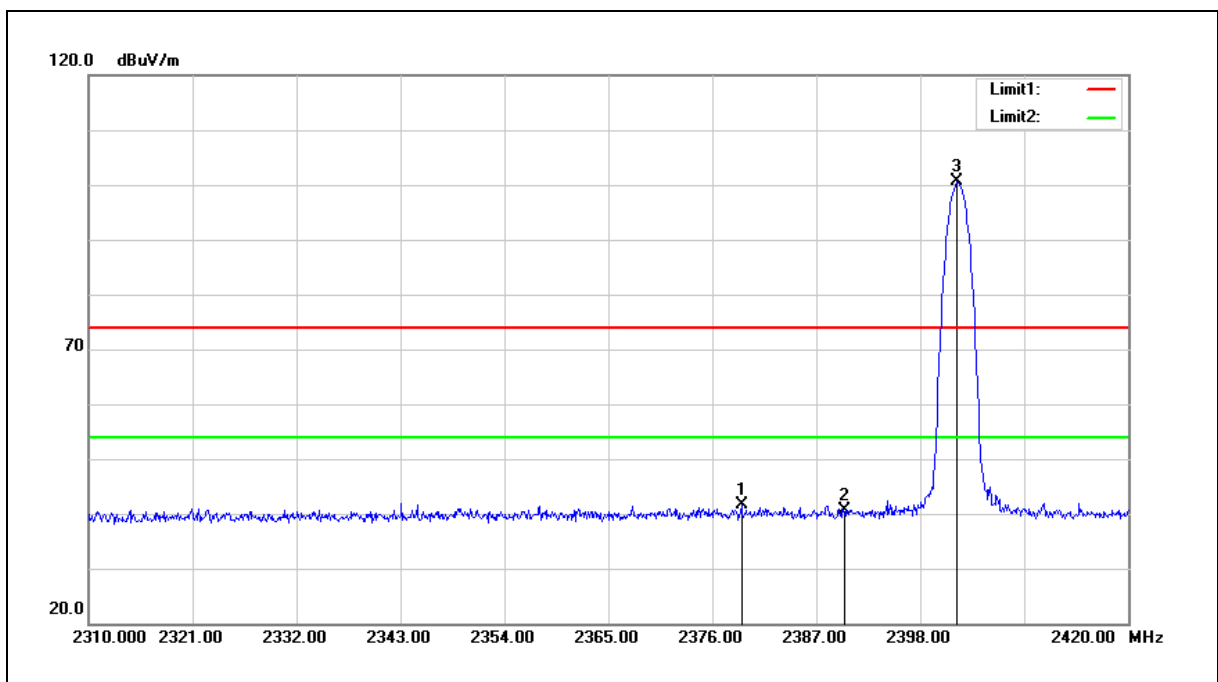
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2365.670	49.36	-7.41	41.95	74.00	-32.05	peak
2	2390.000	47.88	-7.30	40.58	74.00	-33.42	peak
3	2480.050	111.78	-6.95	104.83	114.00	-9.17	peak
4	2483.500	50.84	-6.94	43.90	74.00	-30.10	peak
5	2484.040	51.79	-6.93	44.86	74.00	-29.14	peak

Note:1.Result (dBuV/m) = Correct Factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

3.When the peak results are less than average limit, so not need to evaluate the average.

Standard:	FCC Part 15.247	Test Distance:	3m
Test item:	Harmonic		
Frequency:	2402 MHz		
Mode:	Mode 4		
Ant.Polar.:	Horizontal		



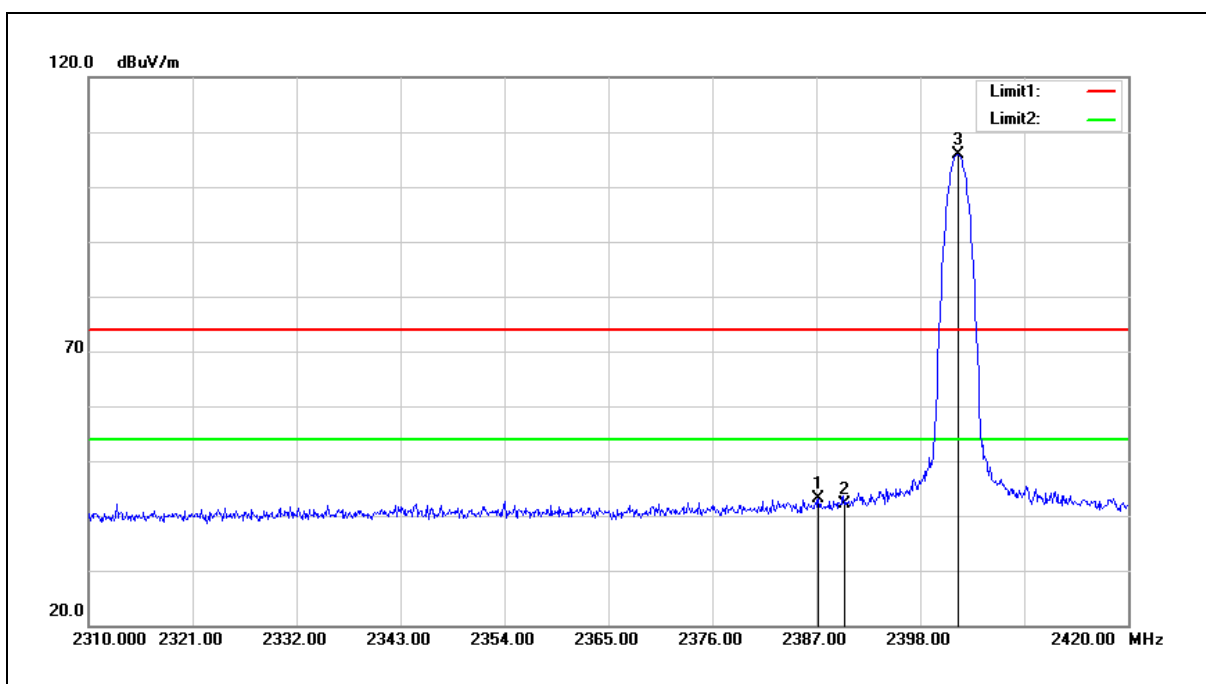
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2379.080	48.86	-7.35	41.51	74.00	-32.49	peak
2	2390.000	47.89	-7.30	40.59	74.00	-33.41	peak
3	2401.850	107.77	-7.25	100.52	74.00	26.52	peak

Note:1.Result (dBuV/m) = Correct Factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

3.When the peak results are less than average limit, so not need to evaluate the average.

Standard:	FCC Part 15.247	Test Distance:	3m
Test item:	Harmonic		
Frequency:	2402 MHz		
Mode:	Mode 4		
Ant.Polar.:	Vertical		



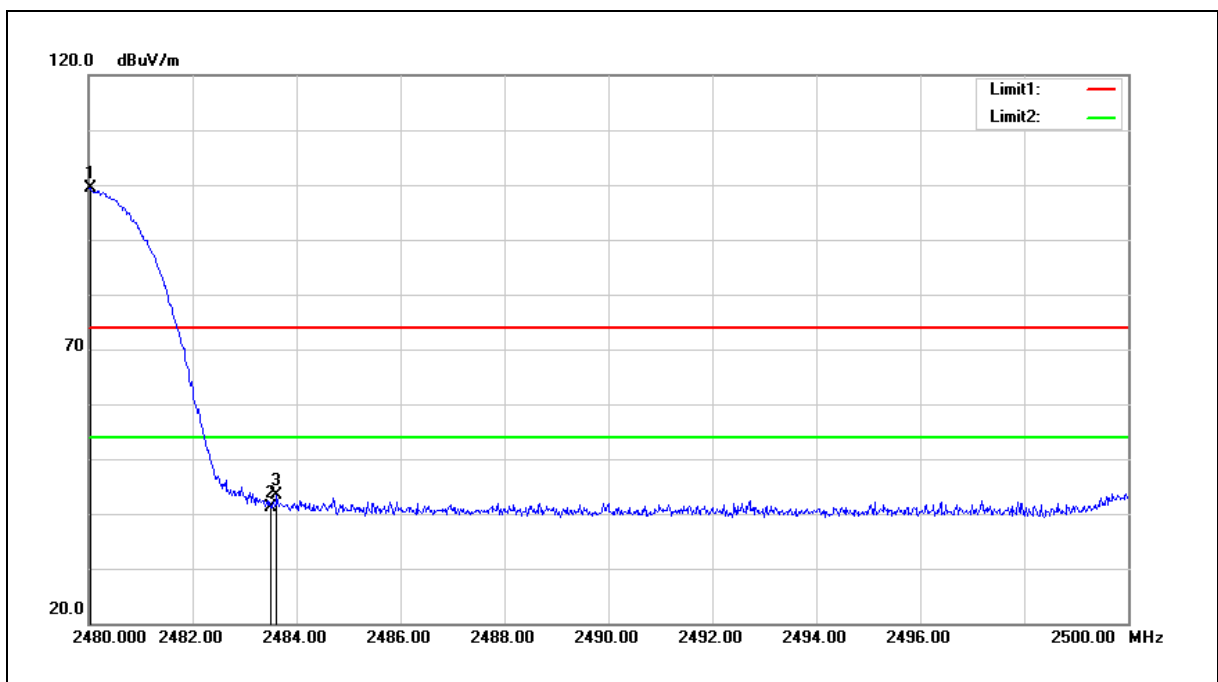
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2387.220	50.43	-7.33	43.10	74.00	-30.90	peak
2	2390.000	49.49	-7.30	42.19	74.00	-31.81	peak
3	2402.070	113.23	-7.25	105.98	74.00	31.98	peak

Note:1.Result (dBuV/m) = Correct Factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

3.When the peak results are less than average limit, so not need to evaluate the average.

Standard:	FCC Part 15.247	Test Distance:	3m
Test item:	Harmonic		
Frequency:	2480 MHz		
Mode:	Mode 4		
Ant.Polar.:	Horizontal		



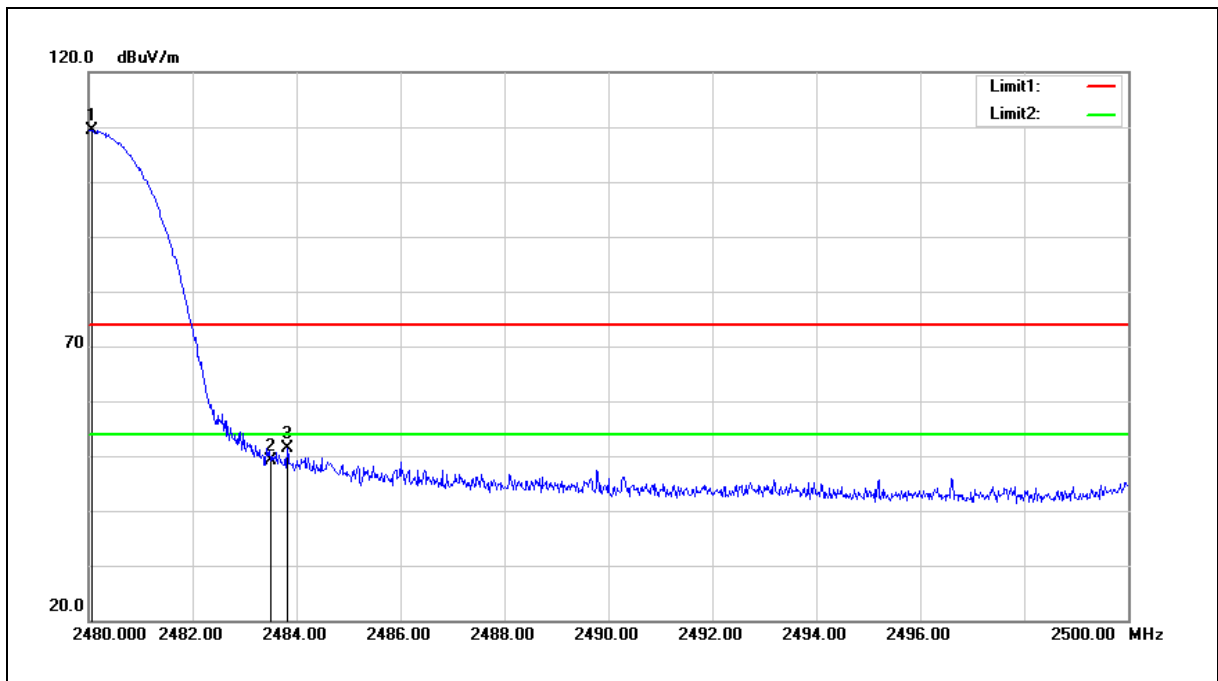
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2480.040	106.30	-6.95	99.35	74.00	25.35	peak
2	2483.500	48.04	-6.94	41.10	74.00	-32.90	peak
3	2483.620	50.28	-6.94	43.34	74.00	-30.66	peak

Note:1.Result (dBuV/m) = Correct Factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

3.When the peak results are less than average limit, so not need to evaluate the average.

Standard:	FCC Part 15.247	Test Distance:	3m
Test item:	Harmonic		
Frequency:	2480 MHz		
Mode:	Mode 4		
Ant.Polar.:	Vertical		



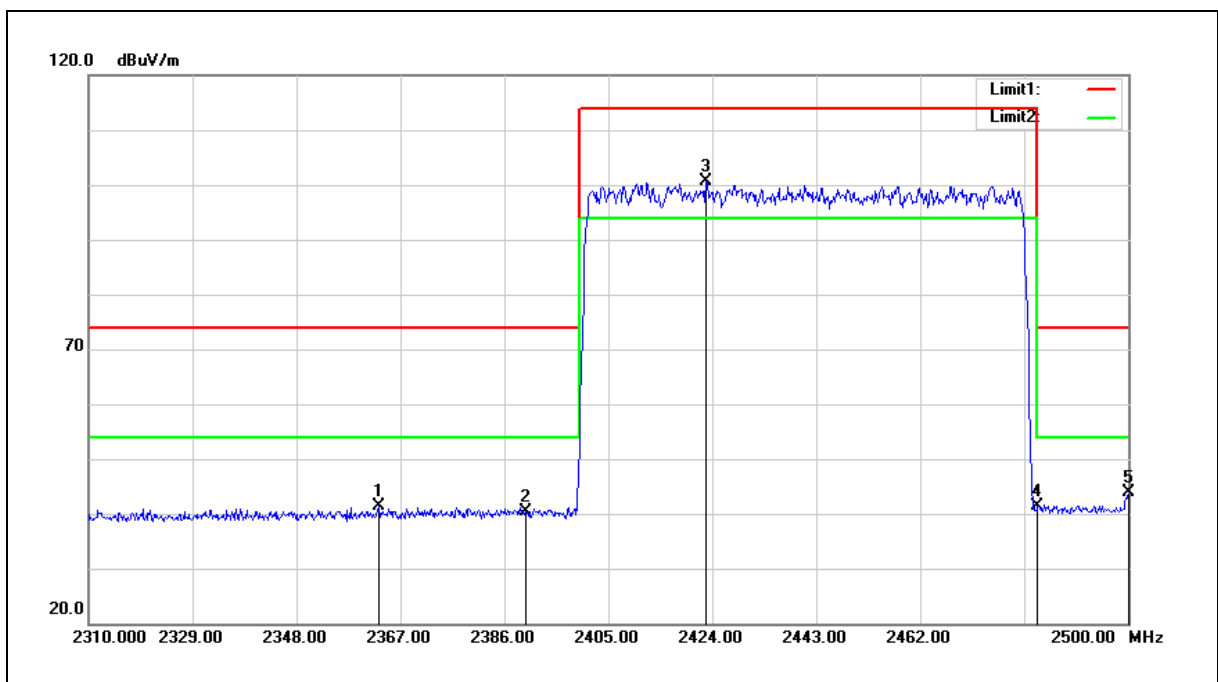
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2480.060	116.39	-6.95	109.44	74.00	35.44	peak
2	2483.500	56.09	-6.94	49.15	74.00	-24.85	peak
3	2483.820	58.23	-6.94	51.29	74.00	-22.71	peak

Note:1.Result (dBuV/m) = Correct Factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

3.When the peak results are less than average limit, so not need to evaluate the average.

Standard:	FCC Part 15.247	Test Distance:	3m
Test item:	Harmonic		
Frequency:	Hopping		
Mode:	Mode 4		
Ant.Polar.:	Horizontal		



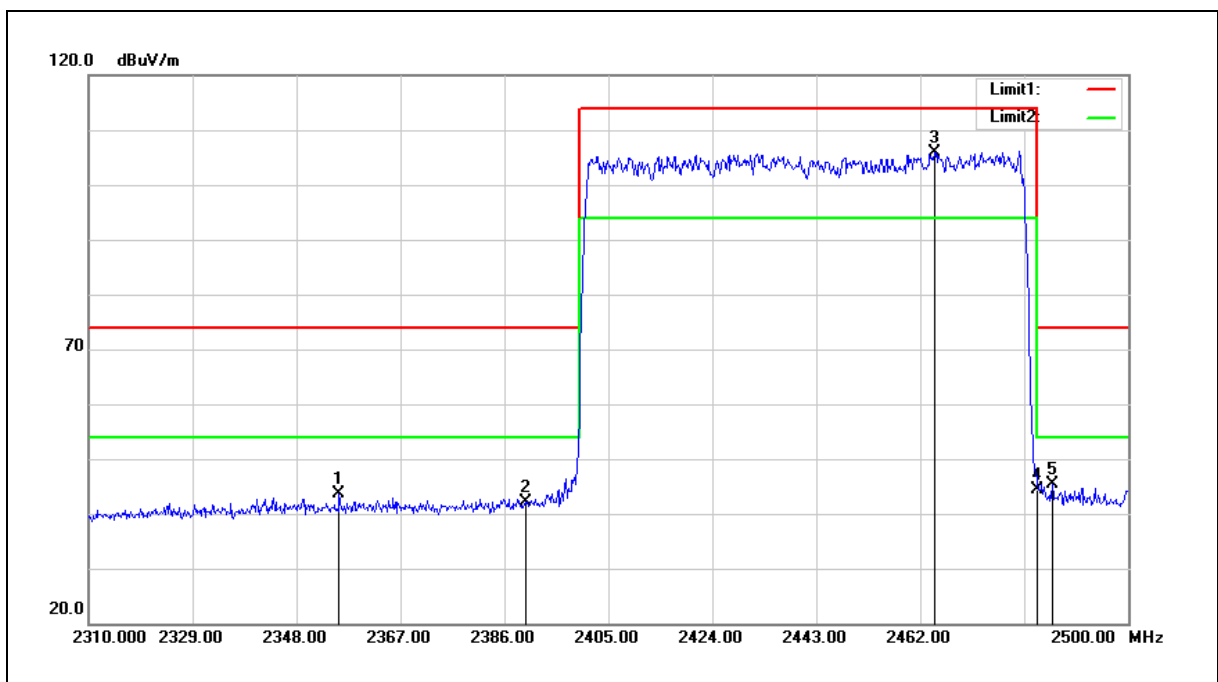
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2363.010	48.72	-7.41	41.31	74.00	-32.69	peak
2	2390.000	47.60	-7.30	40.30	74.00	-33.70	peak
3	2422.860	107.79	-7.18	100.61	114.00	-13.39	peak
4	2483.500	48.34	-6.94	41.40	74.00	-32.60	peak
5	2500.000	50.72	-6.87	43.85	74.00	-30.15	peak

Note:1.Result (dBuV/m) = Correct Factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

3.When the peak results are less than average limit, so not need to evaluate the average.

Standard:	FCC Part 15.247	Test Distance:	3m
Test item:	Harmonic		
Frequency:	Hopping		
Mode:	Mode 4		
Ant.Polar.:	Vertical		



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2355.790	50.96	-7.44	43.52	74.00	-30.48	peak
2	2390.000	49.50	-7.30	42.20	74.00	-31.80	peak
3	2464.660	112.93	-7.00	105.93	114.00	-8.07	peak
4	2483.500	51.39	-6.94	44.45	74.00	-29.55	peak
5	2486.130	52.27	-6.92	45.35	74.00	-28.65	peak

Note:1.Result (dBuV/m) = Correct Factor (dB/m) + Reading(dBuV).

2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

3.When the peak results are less than average limit, so not need to evaluate the average.

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