

RF Test Report

Applicant : Nuheara Limited

Product Type : IQbuds

Trade Name : NUHEARA

Model Number : NU317

Test Specification : FCC 47 CFR PART 15 SUBPART C
ANSI C63.10:2013

Receive Date : Aug. 02, 2017

Test Period : Aug. 11, 2017

Issue Date : Aug. 21, 2017

Issue by

A Test Lab Techno Corp.
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Taiwan Accreditation Foundation accreditation number: 1330

Test Firm MRA designation number: TW0010

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Revision History

Rev.	Issue Date	Revisions	Revised By
00	Aug. 21, 2017	Initial Issue	Nina Lin



Verification of Compliance

Issued Date: Aug. 21, 2017

Applicant : Nuheara Limited
Product Type : IQbuds
Trade Name : NUHEARA
Model Number : NU317
FCC ID : 2AKMG00000NU317
EUT Rated Voltage : DC 4.2V, 100mA
Test Voltage : DC 3.7V
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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<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. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Approved By

: Fly Lu

(Manager)

(Fly Lu)

Reviewed By

: Eric Ou Yang

(Testing Engineer)

(Eric Ou 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	N/A	-----
15.203	Antenna Requirement	PASS	-----
15.247(b)(1)	Max. Output Power	N/A	-----
15.247(d)	Transmitter Radiated Emissions	PASS	-----
15.247(a)(1)	20dB RF Bandwidth	N/A	-----
15.247(a)(1)	Carrier Frequency Separation	N/A	-----
15.247(a)(1)(iii)	Number of Hopping	N/A	-----
15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	N/A	-----
15.247(d)	Out of Band Conducted Spurious Emission	N/A	-----

The test results of this report relate only to the tested sample(s) identified in this report. Manufacturer or whom it may concern should recognize the pass or fail of the test result.

Note: The device adding new type antenna and Max. Gain to do Class II Permissive Change report so it only test transmitter radiated emissions and band edge measurement.

1.2. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty (dB)
Conducted Emission	9kHz ~ 150KHz	2.7
	150kHz ~ 30MHz	2.7
Radiated Emission	9kHz ~ 30MHz	1.7
	30MHz ~ 1000MHz	5.7
	1000MHz ~ 18000MHz	5.5
	18000MHz ~ 26500MHz	4.8
	26500MHz ~ 40000MHz	4.8
Conducted Output Power	+0.27 dB / -0.28 dB	
RF Bandwidth	4.96%	
Power Spectral Density	+0.71 dB / -0.77 dB	

2 EUT Description

Applicant	Nuheara Limited Unit 5, 28 John St Northbridge, 6003, Australia	
Manufacturer	Flextronics, Zhuhai Xin Qing Science & Technology Industrial Park, Jing An, Doumen, Zhuhai, P.R. China	
Product	IQbuds	
Trade Name	NUHEARA	
Model Number	NU317	
FCC ID	2AKMG00000NU317	
Class II Permissive Change	Adding new type antenna and Max. Gain	
Frequency Range	2402 ~ 2480 MHz	
Modulation Type	GFSK for 1Mbps	
	$\pi/4$ -DQPSK for 2Mbps	
	8DPSK for 3Mbps	
Operate Temp. Range	0 ~ +50 °C	
Antenna information	Type	Max. Gain (dBi)
	Fluid conductive silver Antenna	-3.68
RF Output Power (Conducted)	GFSK for 1Mbps	0.00507 W
	$\pi/4$ -DQPSK for 2Mbps	0.00337 W
	8DPSK for 3Mbps	0.00361 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 as shown below except radiated spurious emission below 1GHz and power line conducted emissions below 30MHz, which worst case was in TX mode only. By preliminary testing and verifying three axis (X, Y and Z) 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.

Tested System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

	Product	Manufacturer	Model Number	Serial Number	Power Cord
1.	Bluetooth Tester	R & S	CBT	100350	NA

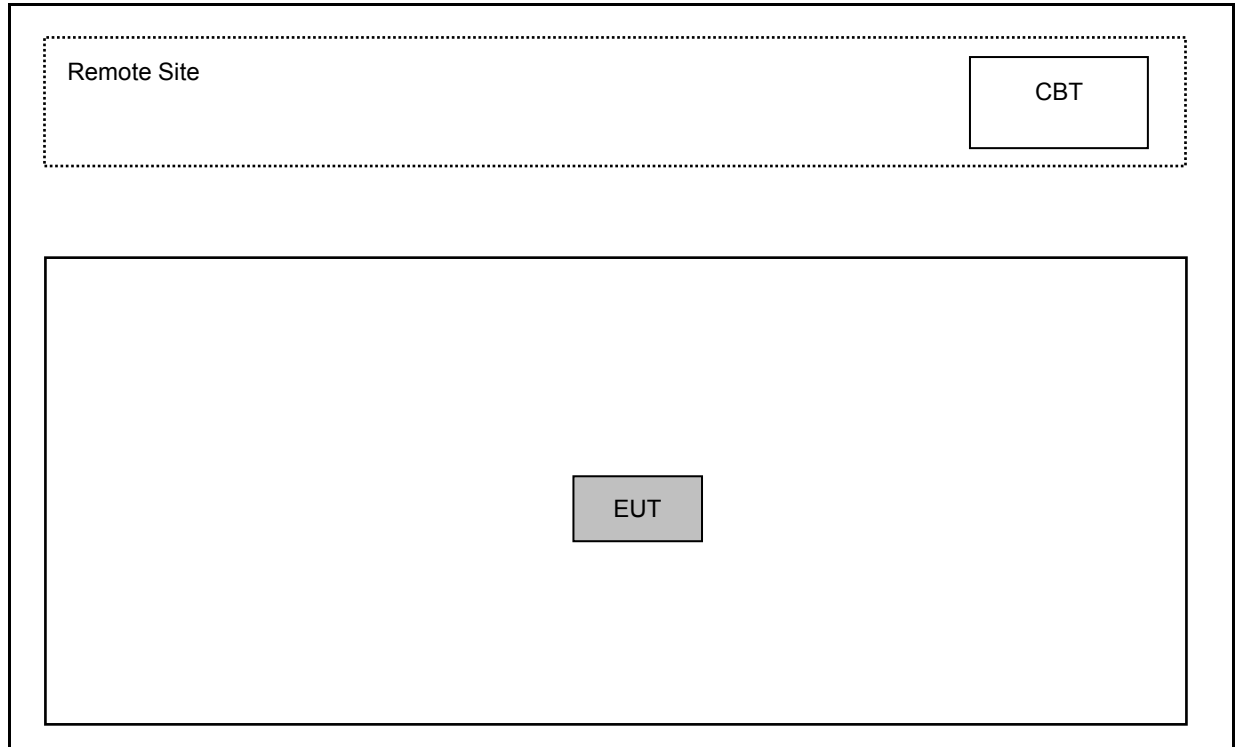
3.2. EUT Exercise Software

1	Setup the EUT and Bluetooth Tester (CBT) as shown on 3.3.
2	Turn on the power of all equipment.
3	Turn on Bluetooth function and link to Bluetooth tester
4	EUT run test program.

Measurement Software
1 EZ-EMC Ver. ATL-03A1-1

3.3. Configuration of Test System Details

Radiated Emissions



3.4. Test Site Environment

Items	Required (IEC 60068-1)	Actual
Temperature (°C)	15-35	26
Humidity (%RH)	25-75	60
Barometric pressure (mbar)	860-1060	950



4 Radiated Interference 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.

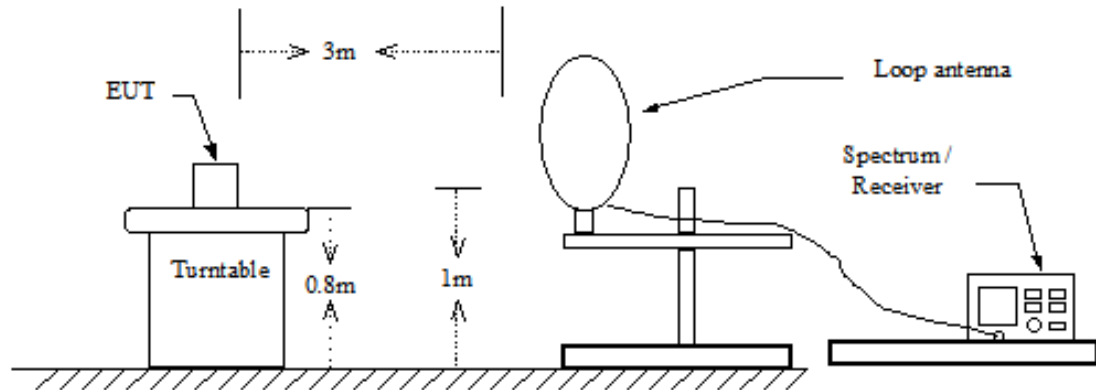
■ Test Instruments

3 Meter Chamber					
Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Cal. Period
RF Pre-selector	Agilent	N9039A	MY46520256	04/24/2017	1 year
Spectrum Analyzer	Agilent	E4446A	MY46180578	04/24/2017	1 year
Pre Amplifier	Agilent	8449B	3008A02237	10/11/2016	1 year
Pre Amplifier	Agilent	8447D	2944A11119	01/12/2017	1 year
Broadband Antenna	Schwarzbeck	VULB9168	416	10/13/2016	1 year
Horn Antenna (1~18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA9120D	9120D-550	06/22/2017	1 year
Horn Antenna (18~40GHz)	ETS	3116	86467	09/05/2016	1 year
Loop Antenna	COM-POWER CORPORATION	AL-130	121014	01/26/2017	1 year
Microwave Cable	EMCI	EMC102-KM-KM-14000	151001	02/20/2017	1 year
Microwave Cable	EMCI	EMC-104-SM-SM-14000	140202	02/20/2017	1 year
Microwave Cable	EMCI	EMC104-SM-SM-600	140301	02/20/2017	1 year
Test Site	ATL	TE01	888001	08/29/2016	1 year

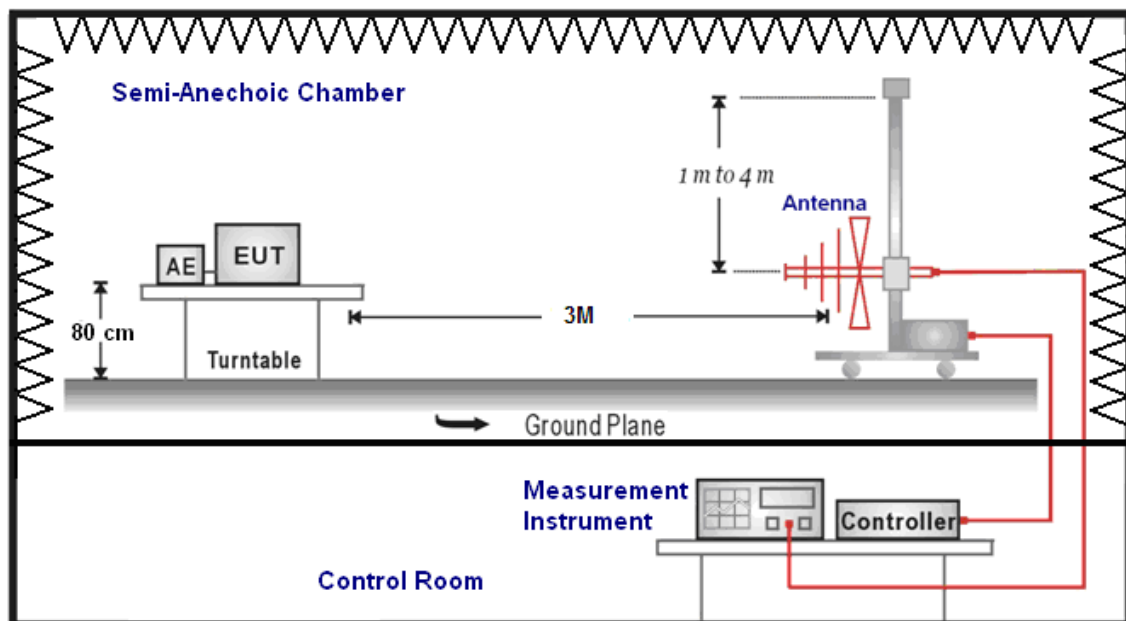
Note: N.C.R. = No Calibration Request.

■ Setup

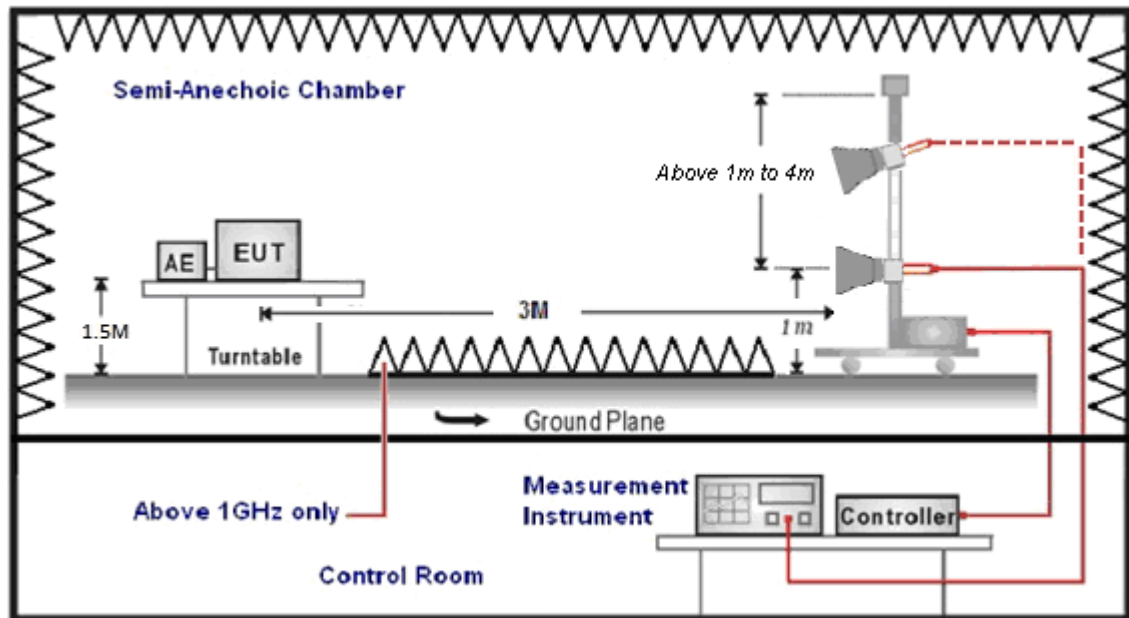
9kHz ~ 30MHz



Below 1GHz



Above 1GHz



■ 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 (below 1GHz use 0.8m turntable / above 1GHz use 1.5m turntable) 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 1 MHz for peak measurements and 10 Hz for average measurements.

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 (20dB/decade).

For testing above 1GHz, the emission level of the EUT in peak mode was 20dB 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 < +30dBm

(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 20dB below the permissible limits or the field strength is too small to be measured.



■ Test Result

Below 1GHz

Standard:		FCC Part 15.247		Test Distance:		3m	
Test item:		Harmonic		Power:		DC 3.7V	
Test Mode:		Mode 1		Temp.(°C)/Hum.(%RH):		26(°C)/60%RH	
				Date:		08/11/2017	
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
232.7300	34.71	-5.47	29.24	46.00	-16.76	QP	H
322.9400	30.47	-2.33	28.14	46.00	-17.86	QP	H
428.6700	26.88	-0.22	26.66	46.00	-19.34	QP	H
516.9400	30.26	1.55	31.81	46.00	-14.19	QP	H
701.2400	26.42	5.05	31.47	46.00	-14.53	QP	H
896.2100	26.51	8.95	35.46	46.00	-10.54	QP	H
232.7300	34.51	-5.47	29.04	46.00	-16.96	QP	V
322.9400	31.11	-2.33	28.78	46.00	-17.22	QP	V
451.9500	30.01	0.23	30.24	46.00	-15.76	QP	V
580.9600	28.24	2.93	31.17	46.00	-14.83	QP	V
698.3300	26.84	5.00	31.84	46.00	-14.16	QP	V
868.0800	27.41	8.34	35.75	46.00	-10.25	QP	V

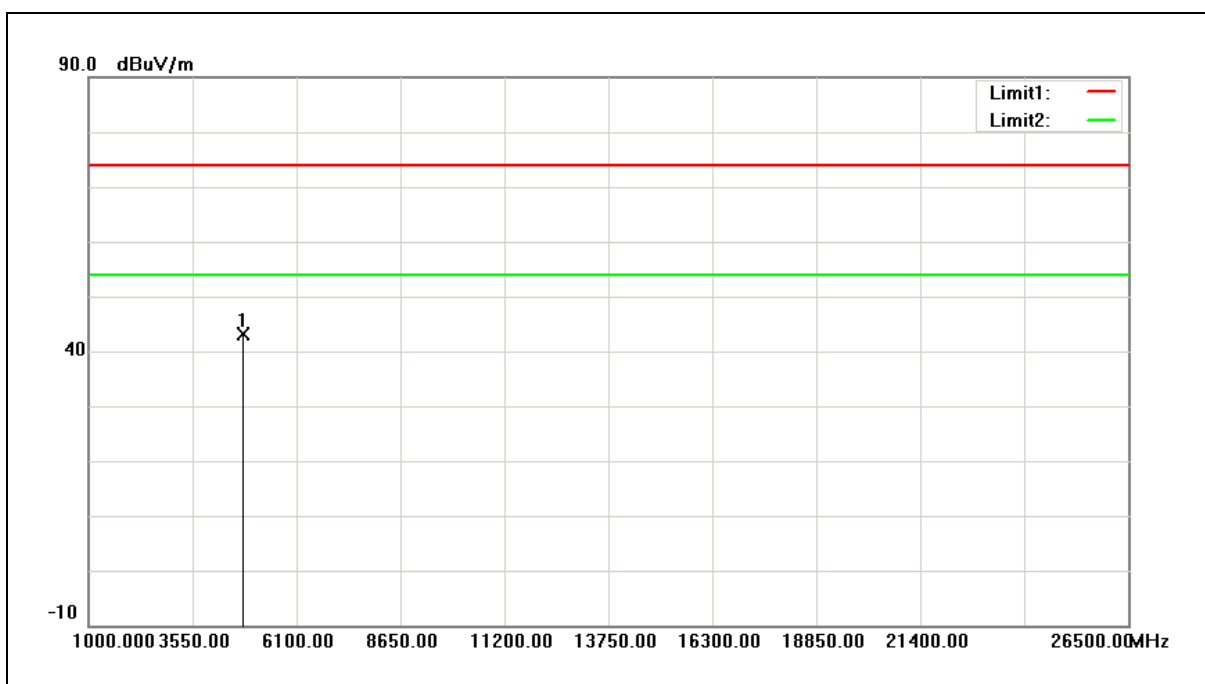
Note: 1. Result (dBuV/m) = Correct Factor (dB/m) + Reading (dBuV).

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

3. No emission found between lowest internal used/generated frequencies to 30MHz (9 kHz~30MHz).

Above 1GHz

Standard:	FCC Part 15.247	Test Distance:	3m
Test item:	Harmonic	Power:	DC 3.7V
Frequency:	2402MHz	Temp.(°C)/Hum. (%RH):	26(°C)/60%RH
Mode:	Mode 2	Date:	08/11/2017
Ant.Polar.:	Horizontal		



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4804.000	49.55	-6.40	43.15	74.00	-30.85	peak

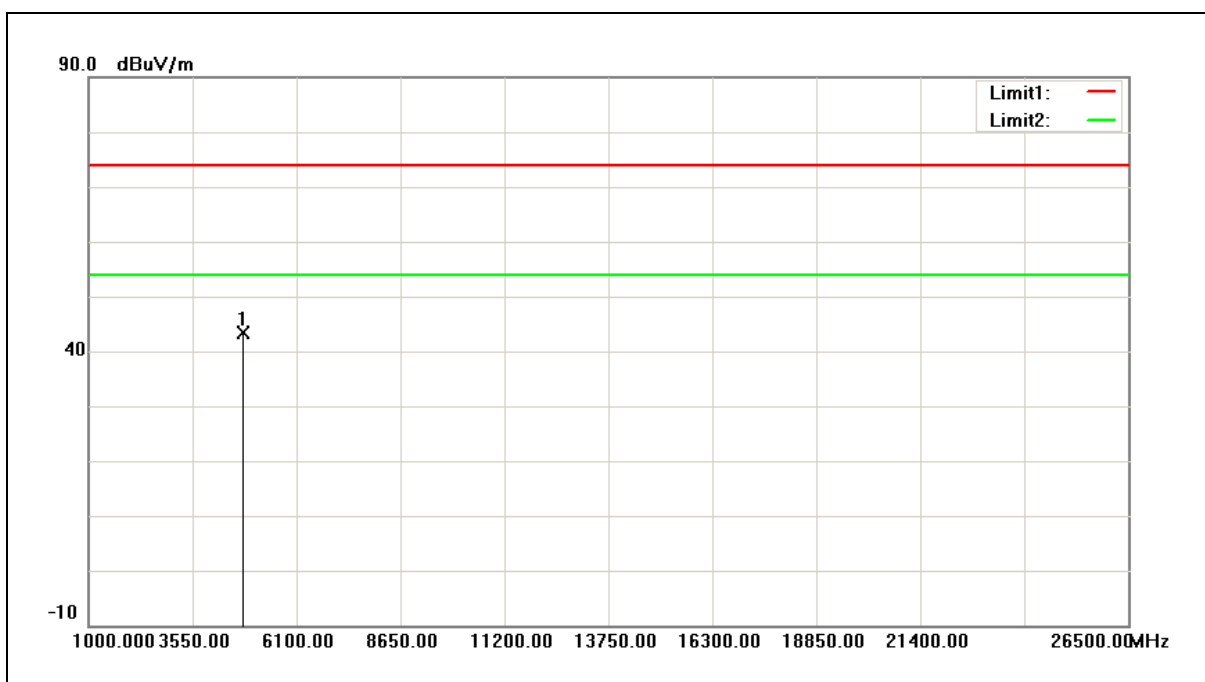
Note: 1. Result (dBuV/m) = Correct Factor (dB/m) + Reading (dBuV).

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	Power:	DC 3.7V
Frequency:	2402MHz	Temp.(°C)/Hum. (%RH):	26(°C)/60%RH
Mode:	Mode 2	Date:	08/11/2017
Ant.Polar.:	Vertical		



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4804.000	49.71	-6.40	43.31	74.00	-30.69	peak

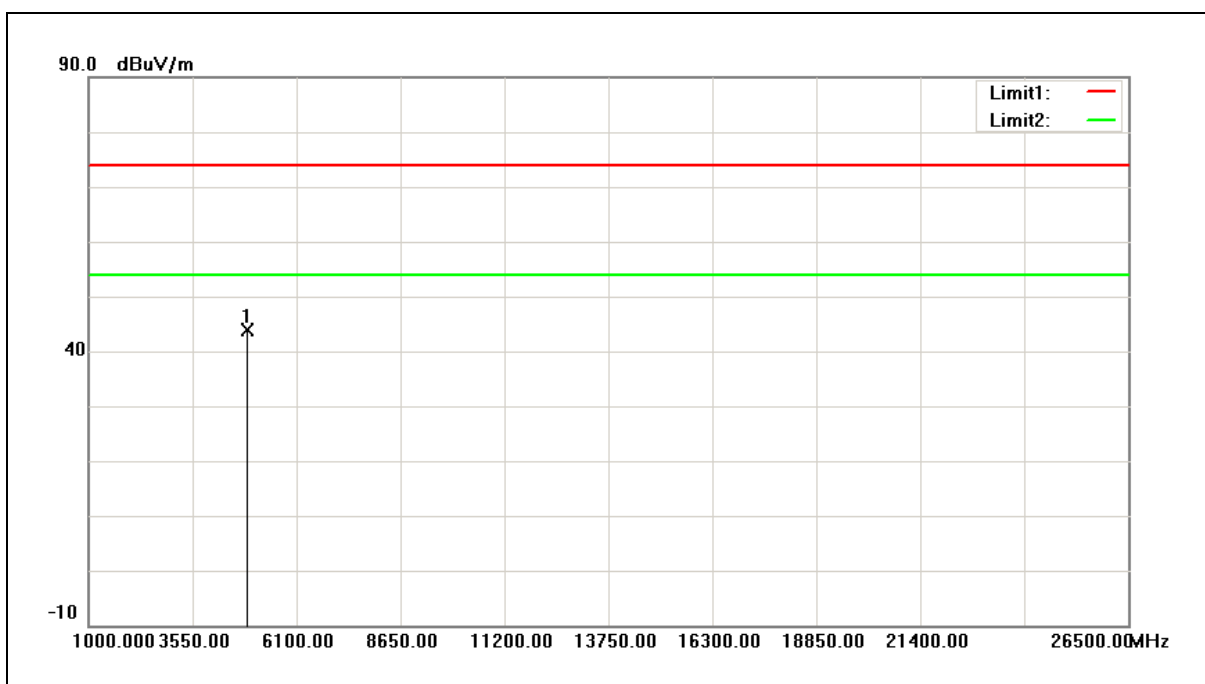
Note:1.Result (dBuV/m) = Correct Factor (dB/m) + Reading(dBuV).

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	Power:	DC 3.7V
Frequency:	2441MHz	Temp.(°C)/Hum. (%RH):	26(°C)/60%RH
Mode:	Mode 2	Date:	08/11/2017
Ant.Polar.:	Horizontal		



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4882.000	50.02	-6.12	43.90	74.00	-30.10	peak

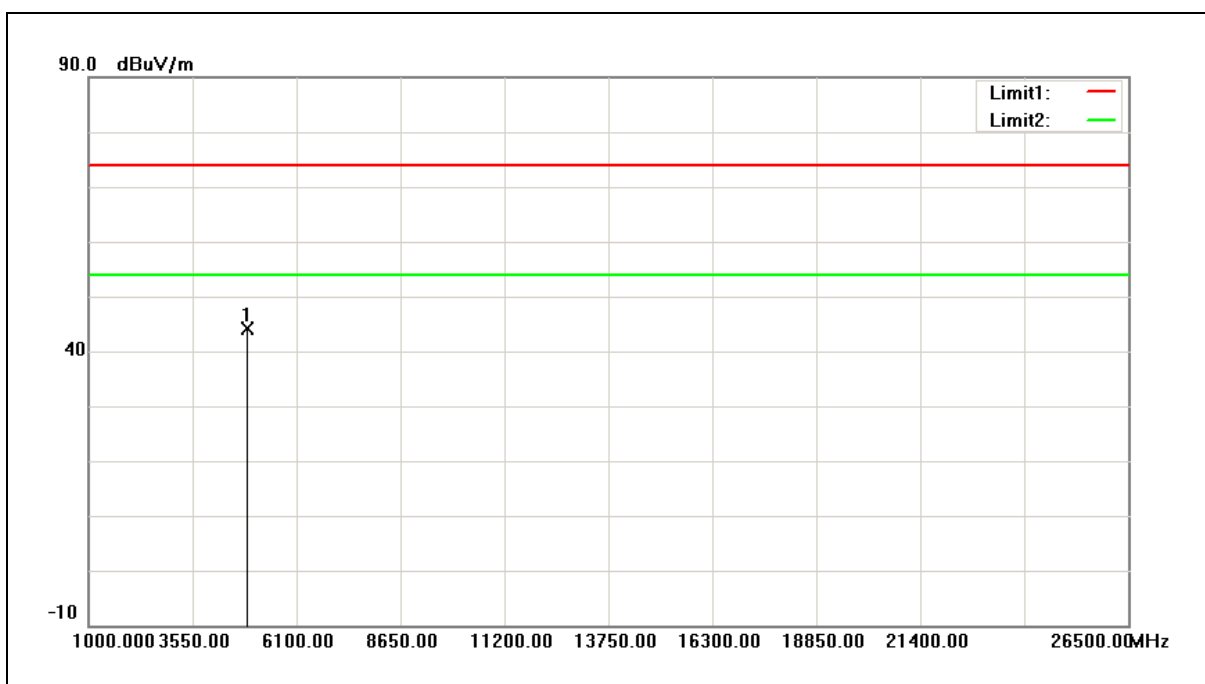
Note: 1. Result (dBuV/m) = Correct Factor (dB/m) + Reading (dBuV).

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	Power:	DC 3.7V
Frequency:	2441MHz	Temp.(°C)/Hum. (%RH):	26(°C)/60%RH
Mode:	Mode 2	Date:	08/11/2017
Ant.Polar.:	Vertical		



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4882.000	50.27	-6.12	44.15	74.00	-29.85	peak

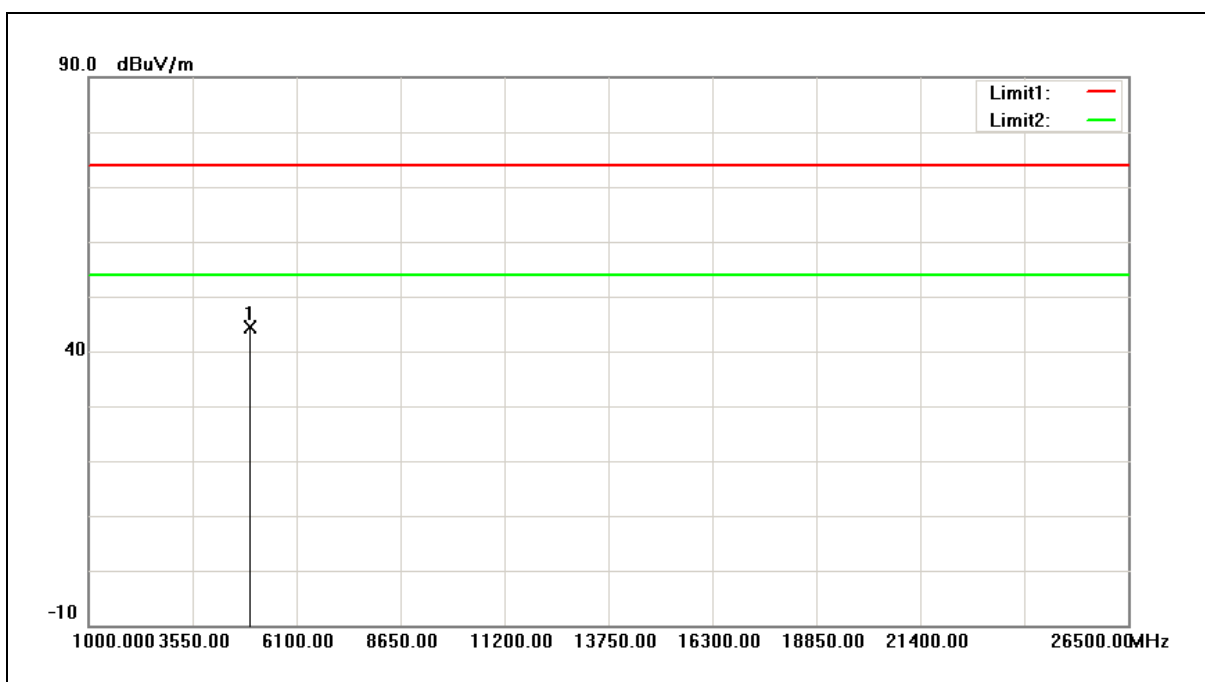
Note: 1. Result (dBuV/m) = Correct Factor (dB/m) + Reading (dBuV).

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	Power:	DC 3.7V
Frequency:	2480MHz	Temp.(°C)/Hum. (%RH):	26(°C)/60%RH
Mode:	Mode 2	Date:	08/11/2017
Ant.Polar.:	Horizontal		



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4960.000	50.32	-5.86	44.46	74.00	-29.54	peak

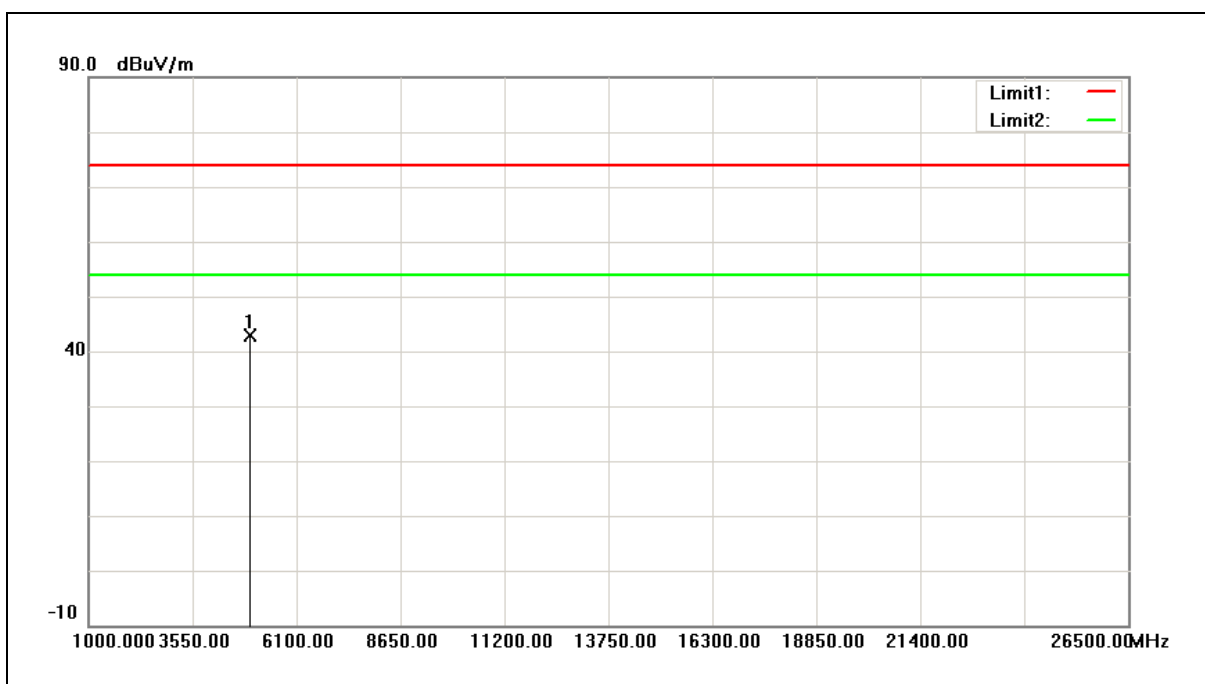
Note: 1. Result (dBuV/m) = Correct Factor (dB/m) + Reading (dBuV).

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	Power:	DC 3.7V
Frequency:	2480MHz	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 2	Date:	08/11/2017
Ant.Polar.:	Vertical		



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4960.000	48.83	-5.86	42.97	74.00	-31.03	peak

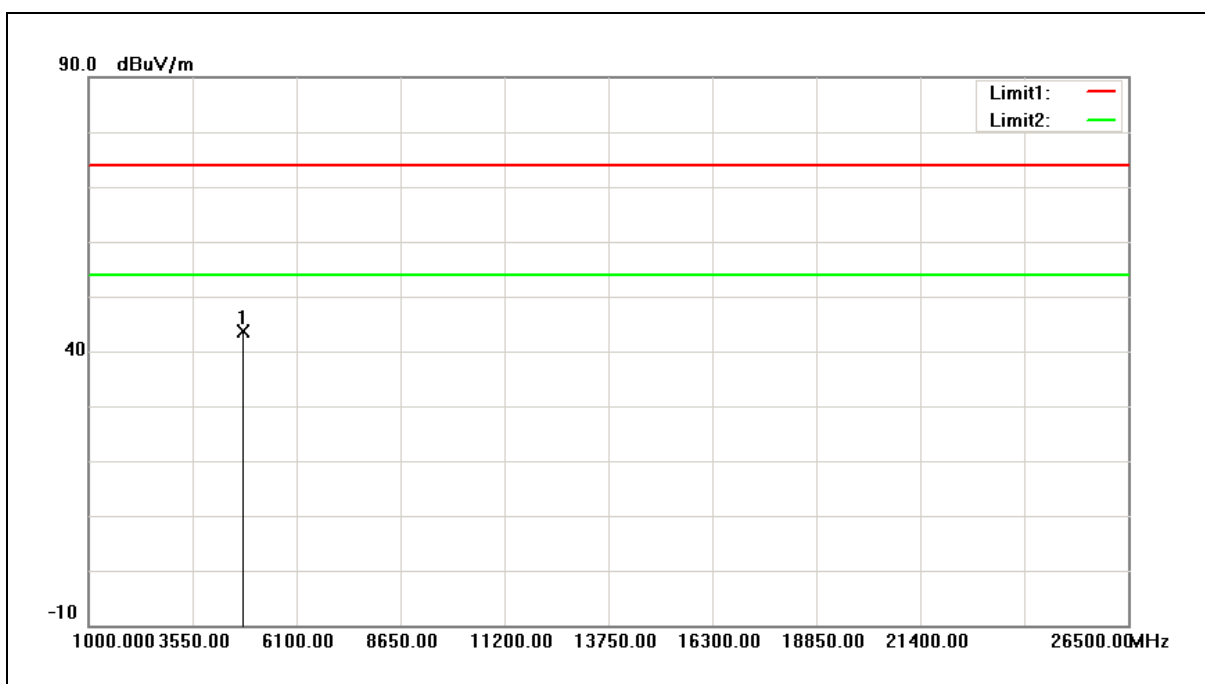
Note:1.Result (dBuV/m) = Correct Factor (dB/m) + Reading(dBuV).

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	Power:	DC 3.7V
Frequency:	2402MHz	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 4	Date:	08/11/2017
Ant.Polar.:	Horizontal		



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4804.000	50.09	-6.40	43.69	74.00	-30.31	peak

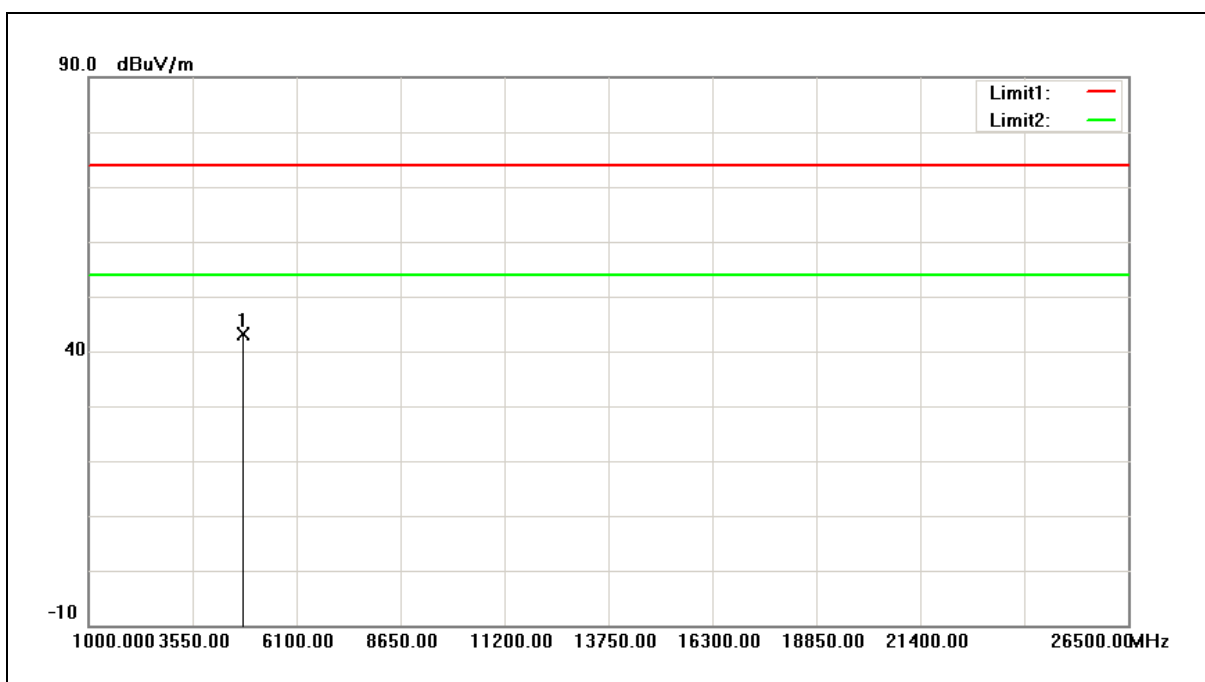
Note: 1. Result (dBuV/m) = Correct Factor (dB/m) + Reading (dBuV).

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	Power:	DC 3.7V
Frequency:	2402MHz	Temp.(°C)/Hum. (%RH):	26(°C)/60%RH
Mode:	Mode 4	Date:	08/11/2017
Ant.Polar.:	Vertical		



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4804.000	49.64	-6.40	43.24	74.00	-30.76	peak

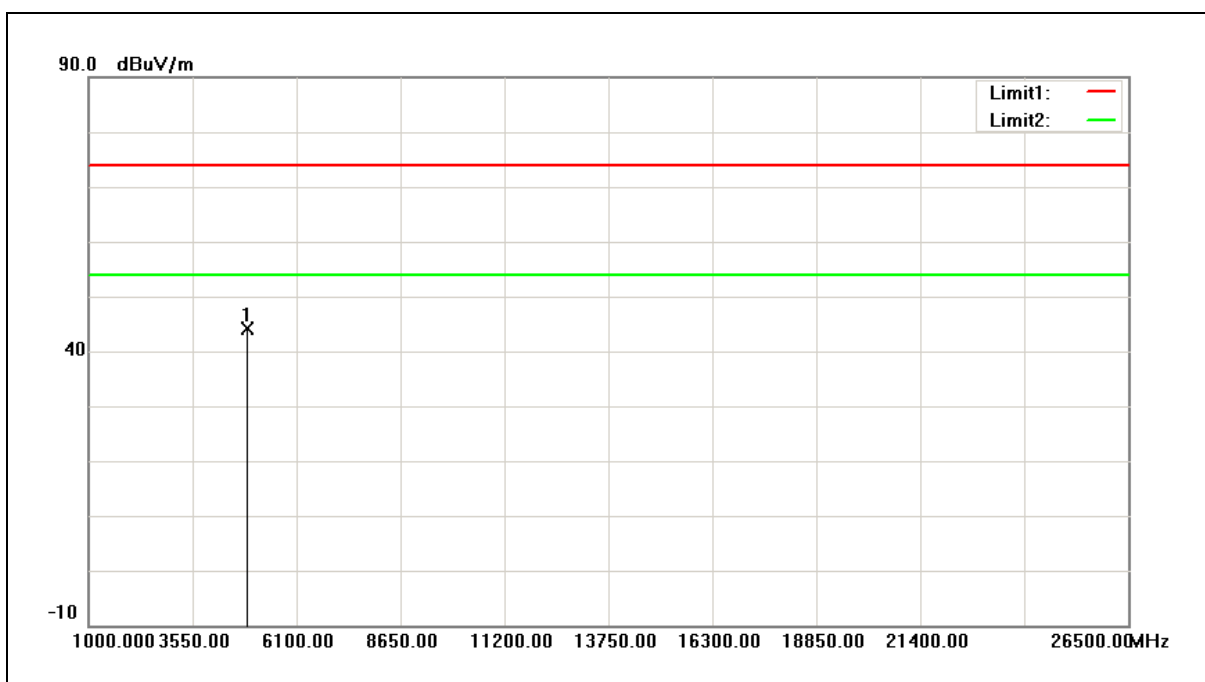
Note: 1. Result (dBuV/m) = Correct Factor (dB/m) + Reading (dBuV).

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	Power:	DC 3.7V
Frequency:	2441MHz	Temp.(°C)/Hum. (%RH):	26(°C)/60%RH
Mode:	Mode 4	Date:	08/11/2017
Ant.Polar.:	Horizontal		



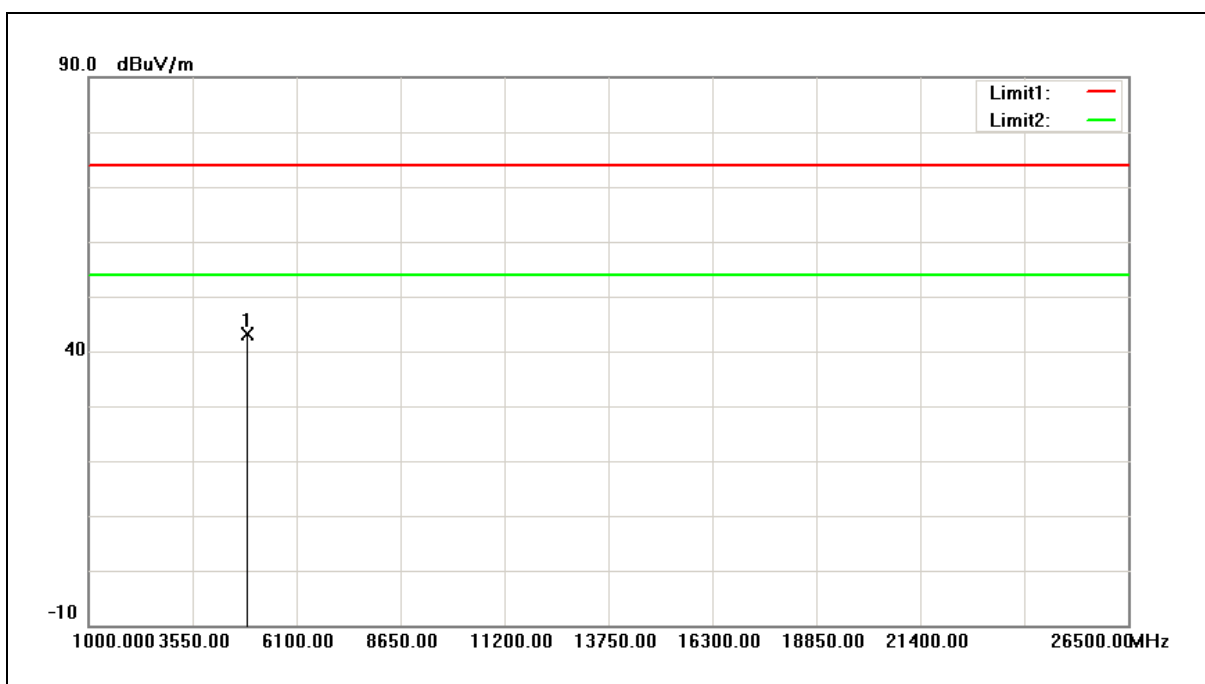
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4882.000	50.32	-6.12	44.20	74.00	-29.80	peak

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	Power:	DC 3.7V
Frequency:	2441MHz	Temp.(°C)/Hum. (%RH):	26(°C)/60%RH
Mode:	Mode 4	Date:	08/11/2017
Ant.Polar.:	Vertical		



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4882.000	49.20	-6.12	43.08	74.00	-30.92	peak

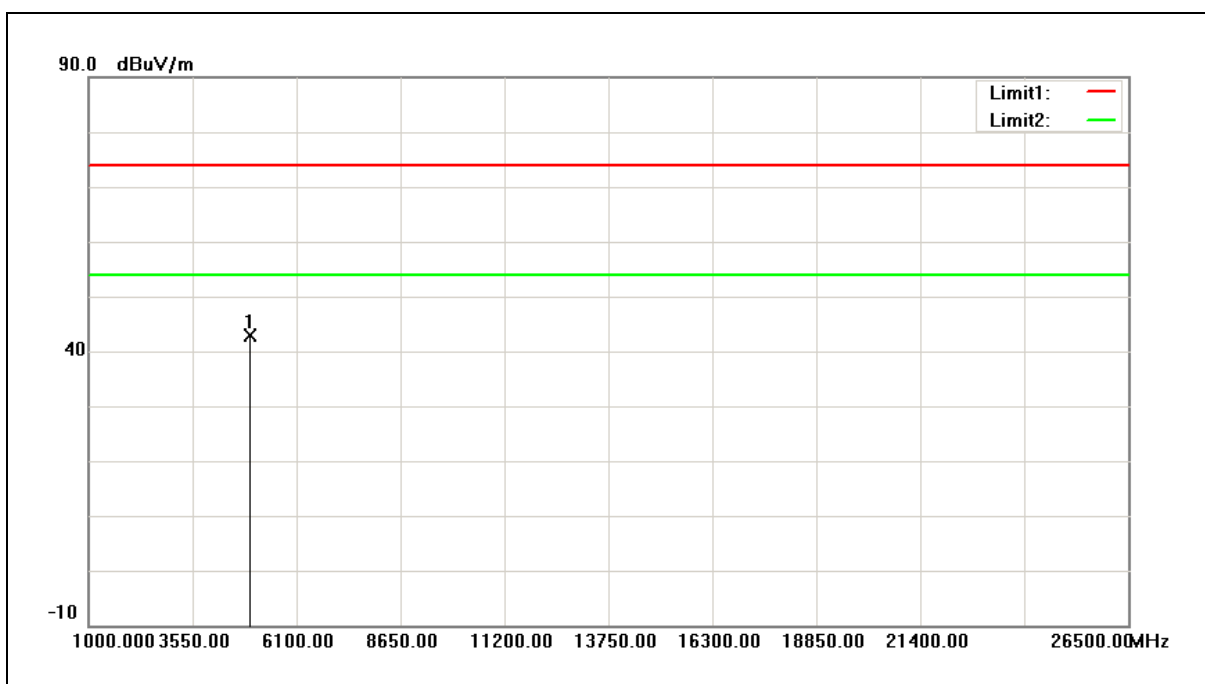
Note: 1. Result (dBuV/m) = Correct Factor (dB/m) + Reading (dBuV).

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	Power:	DC 3.7V
Frequency:	2480MHz	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 4	Date:	08/11/2017
Ant.Polar.:	Horizontal		



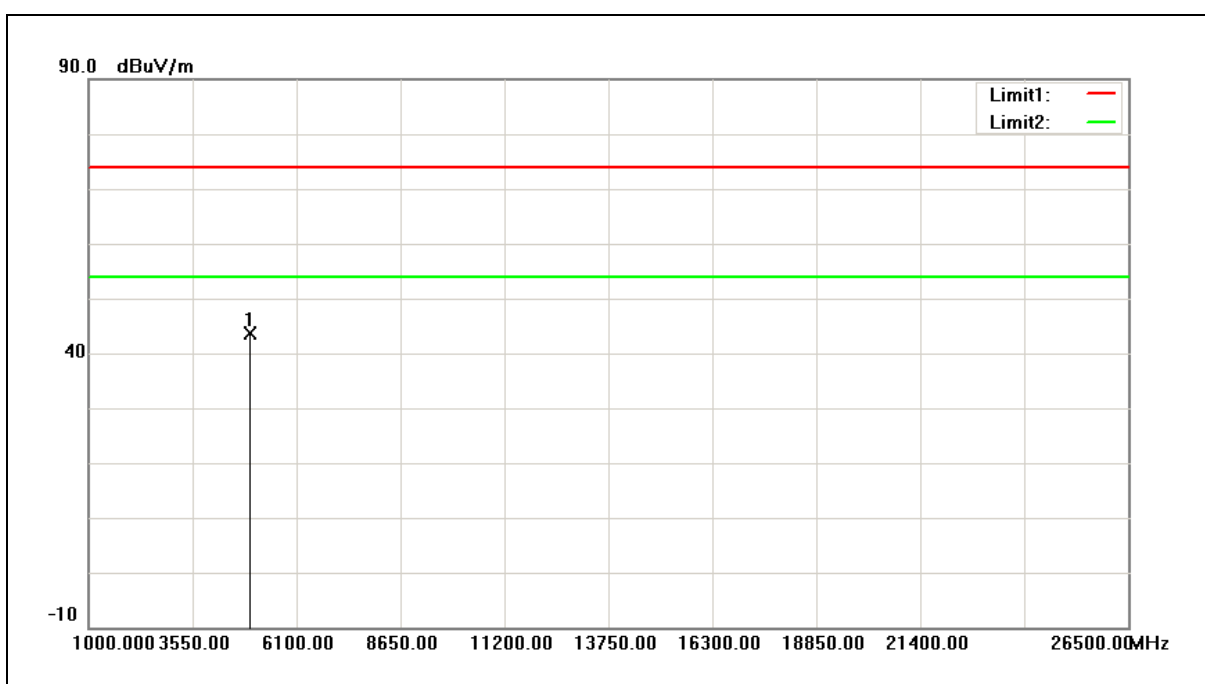
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4960.000	48.70	-5.86	42.84	74.00	-31.16	peak

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	Power:	DC 3.7V
Frequency:	2480MHz	Temp.(°C)/Hum. (%RH):	26(°C)/60%RH
Mode:	Mode 4	Date:	08/11/2017
Ant.Polar.:	Vertical		



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4960.000	49.48	-5.86	43.62	74.00	-30.38	peak

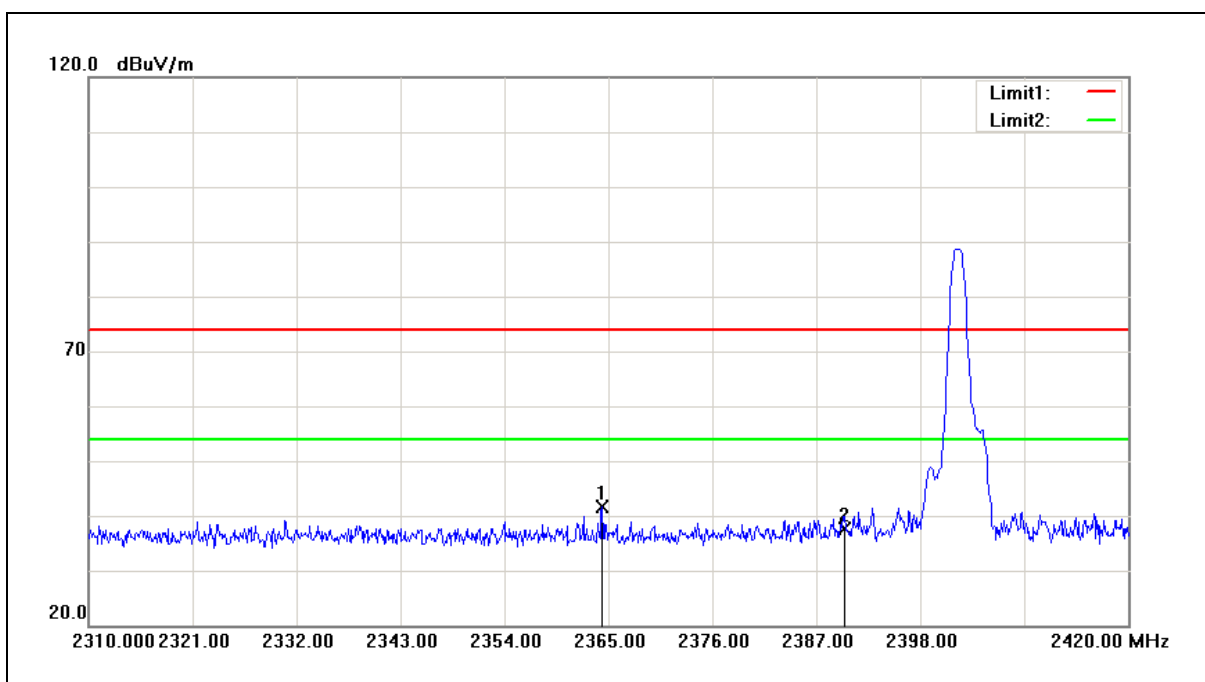
Note: 1. Result (dBuV/m) = Correct Factor (dB/m) + Reading (dBuV).

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

Standard:	FCC Part 15.247	Test Distance:	3m
Test item:	Band edge	Power:	DC 3.7V
Frequency:	2402MHz	Temp.(°C)/Hum. (%RH):	26(°C)/60%RH
Mode:	Mode 2	Date:	08/11/2017
Ant.Polar.:	Horizontal		



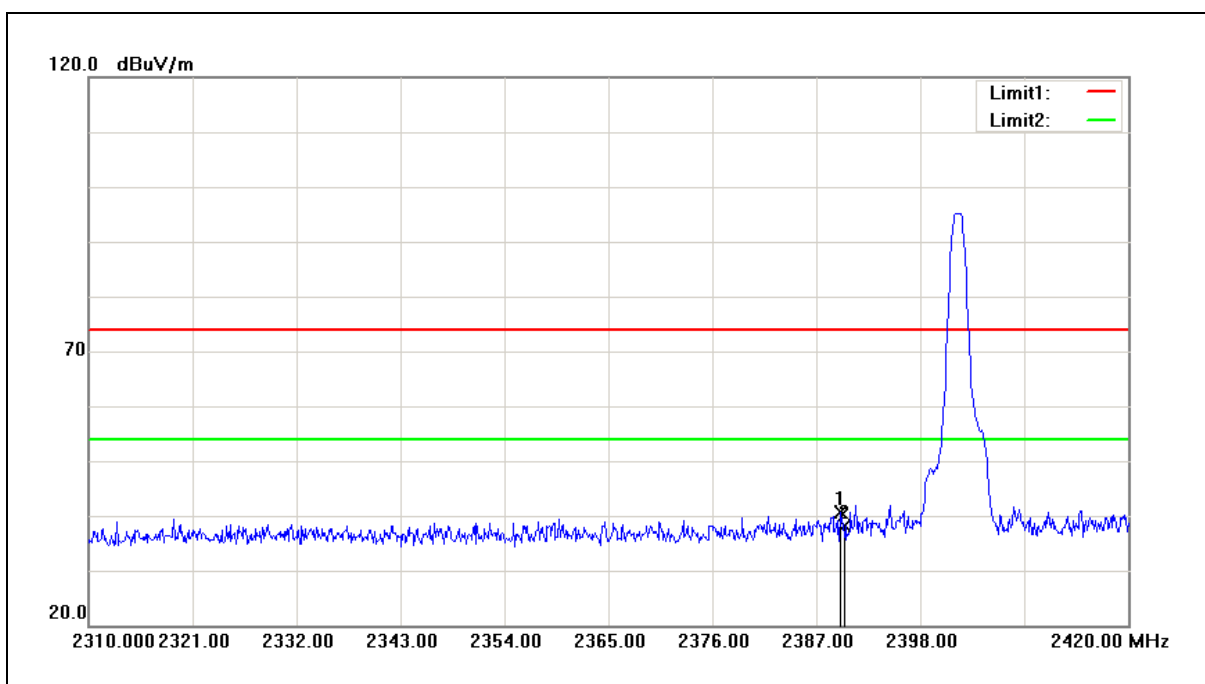
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2364.340	41.56	0.05	41.61	74.00	-32.39	peak
2	2390.000	37.48	0.15	37.63	74.00	-36.37	peak

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:	Band edge	Power:	DC 3.7V
Frequency:	2402MHz	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 2	Date:	08/11/2017
Ant.Polar.:	Vertical		



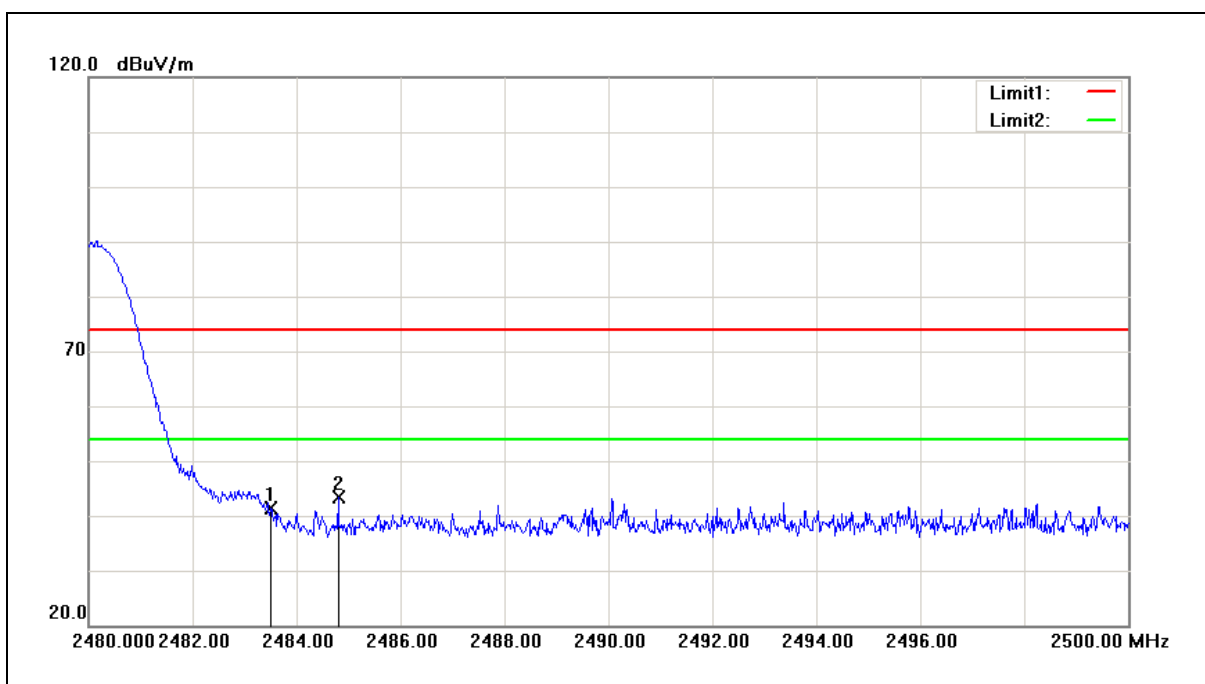
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2389.530	40.42	0.15	40.57	74.00	-33.43	peak
2	2390.000	37.88	0.15	38.03	74.00	-35.97	peak

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:	Band edge	Power:	DC 3.7V
Frequency:	2480MHz	Temp.(°C)/Hum. (%RH):	26(°C)/60%RH
Mode:	Mode 2	Date:	08/11/2017
Ant.Polar.:	Horizontal		



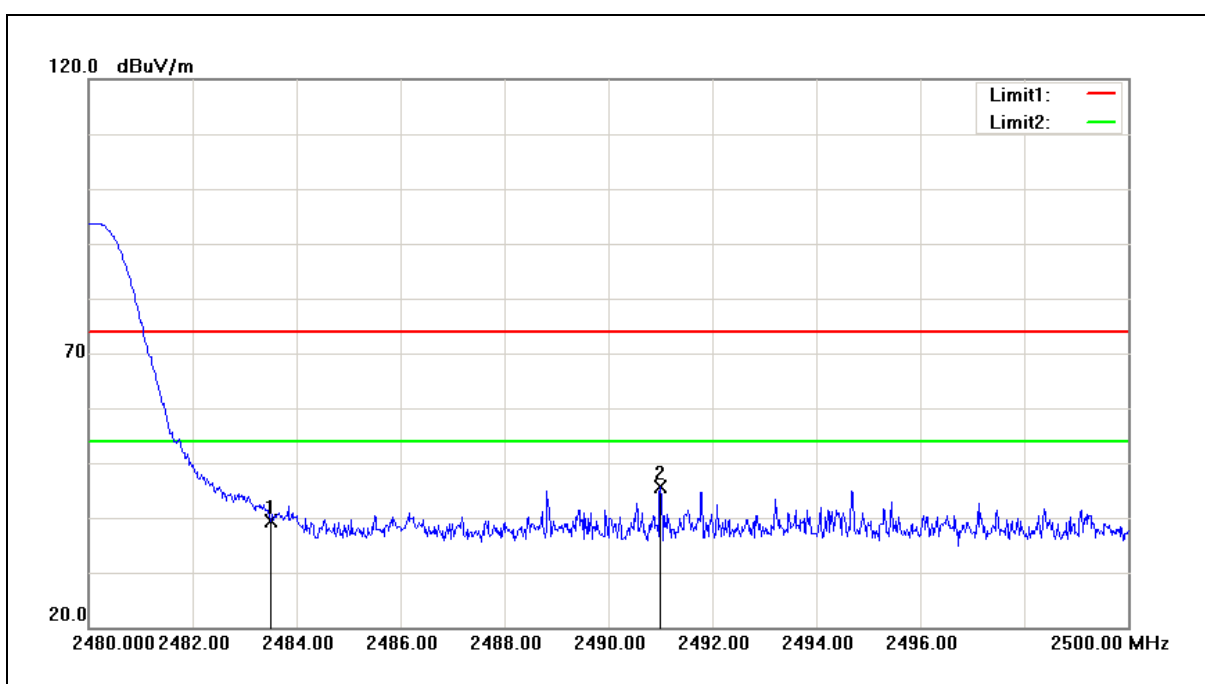
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	40.91	0.55	41.46	74.00	-32.54	peak
2	2484.800	42.89	0.56	43.45	74.00	-30.55	peak

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:	Band edge	Power:	DC 3.7V
Frequency:	2480MHz	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 2	Date:	08/11/2017
Ant.Polar.:	Vertical		



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	38.75	0.55	39.30	74.00	-34.70	peak
2	2491.000	45.09	0.58	45.67	74.00	-28.33	peak

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

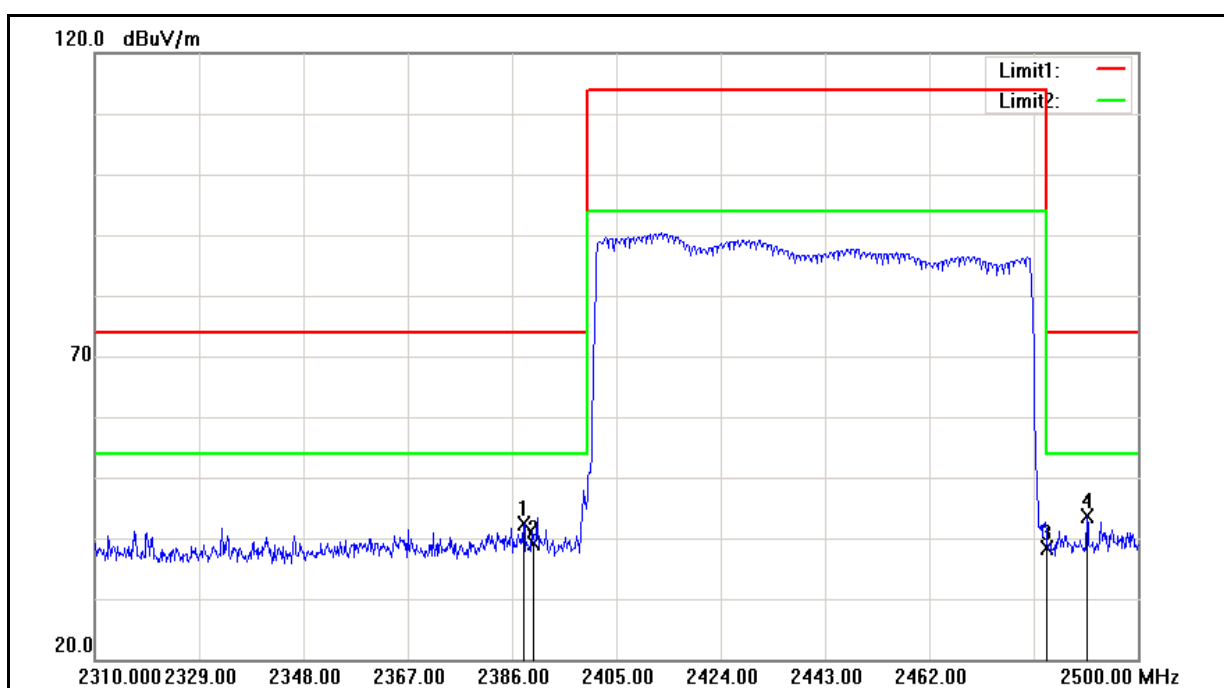
2.Correction factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) – Pre-Amplifier gain (dB).

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



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Standard:	FCC Part 15.247	Test Distance:	3m
Test item:	Band Edge	Power:	DC 3.7V
Test Mode:	Mode 2	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Frequency:	Hopping	Date:	08/11/2017
Ant.Polar.:	Horizontal		

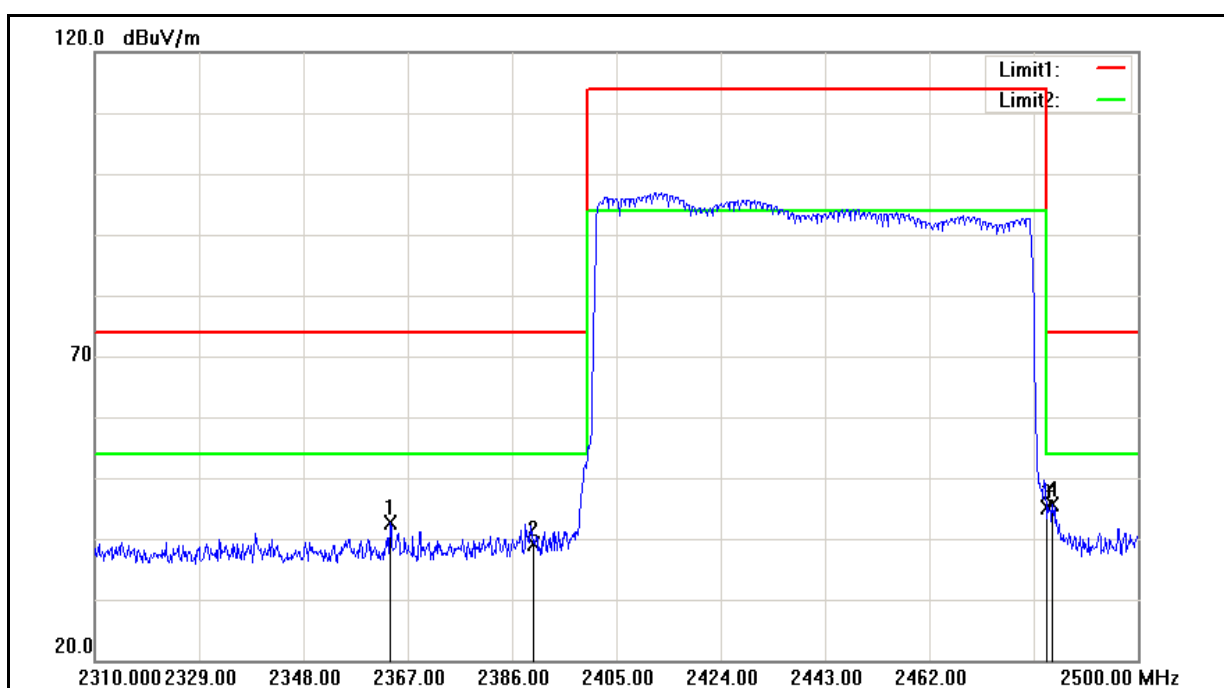


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2388.090	42.14	0.15	42.29	74.00	-31.71	peak
2	2390.000	38.86	0.15	39.01	74.00	-34.99	peak
3	2483.500	37.83	0.55	38.38	74.00	-35.62	peak
4	2490.690	42.95	0.58	43.53	74.00	-30.47	peak

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).

Standard:	FCC Part 15.247	Test Distance:	3m
Test item:	Band Edge	Power:	DC 3.7V
Test Mode:	Mode 2	Temp.(°C)/Hum. (%RH):	26(°C)/60%RH
Frequency:	Hopping	Date:	08/11/2017
Ant.Polar.:	Vertical		



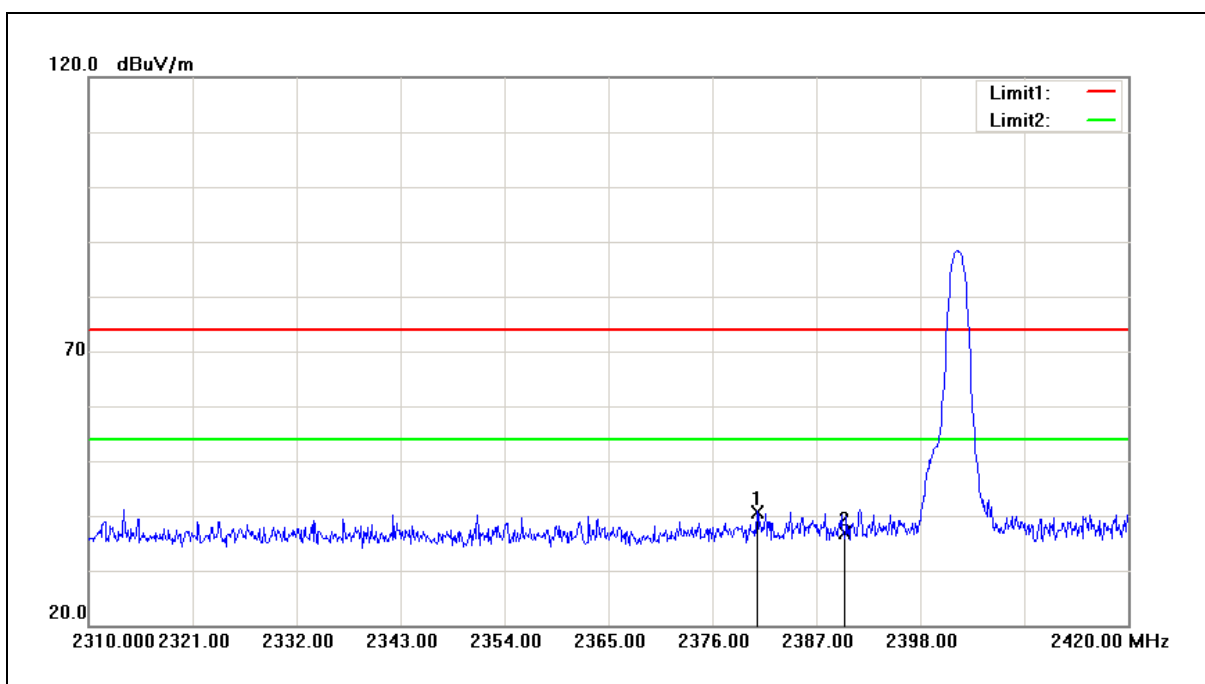
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2363.770	42.52	0.05	42.57	74.00	-31.43	peak
2	2390.000	39.01	0.15	39.16	74.00	-34.84	peak
3	2483.500	44.55	0.55	45.10	74.00	-28.90	peak
4	2484.420	45.12	0.56	45.68	74.00	-28.32	peak

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).



Standard:	FCC Part 15.247	Test Distance:	3m
Test item:	Band edge	Power:	DC 3.7V
Frequency:	2402MHz	Temp.(°C)/Hum. (%RH):	26(°C)/60%RH
Mode:	Mode 4	Date:	08/11/2017
Ant.Polar.:	Horizontal		



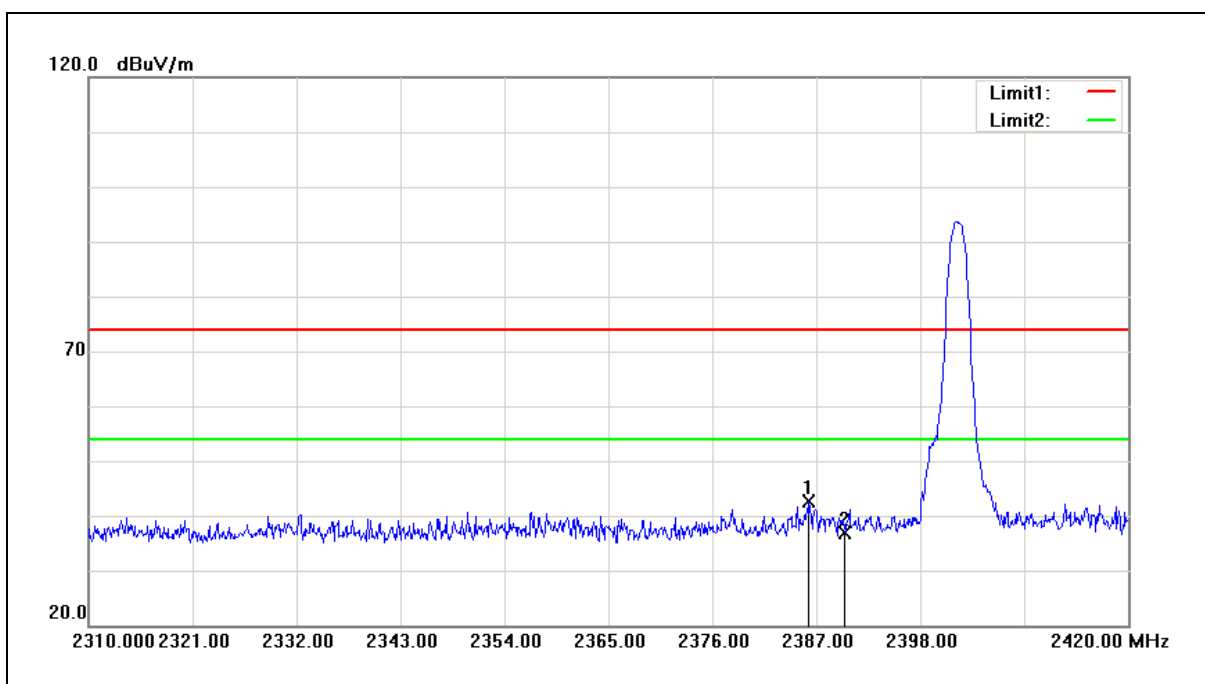
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2380.730	40.63	0.12	40.75	74.00	-33.25	peak
2	2390.000	36.78	0.15	36.93	74.00	-37.07	peak

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:	Band edge	Power:	DC 3.7V
Frequency:	2402MHz	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 4	Date:	08/11/2017
Ant.Polar.:	Vertical		



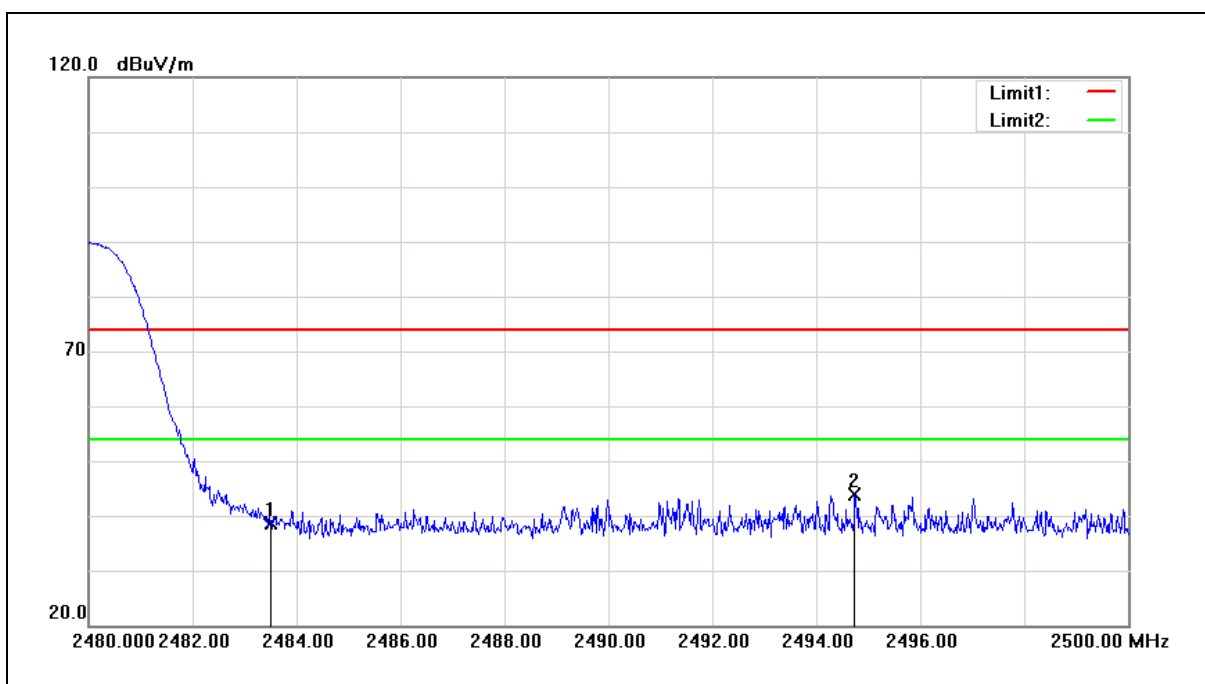
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2386.230	42.54	0.14	42.68	74.00	-31.32	peak
2	2390.000	36.76	0.15	36.91	74.00	-37.09	peak

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:	Band edge	Power:	DC 3.7V
Frequency:	2480MHz	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 4	Date:	08/11/2017
Ant.Polar.:	Horizontal		



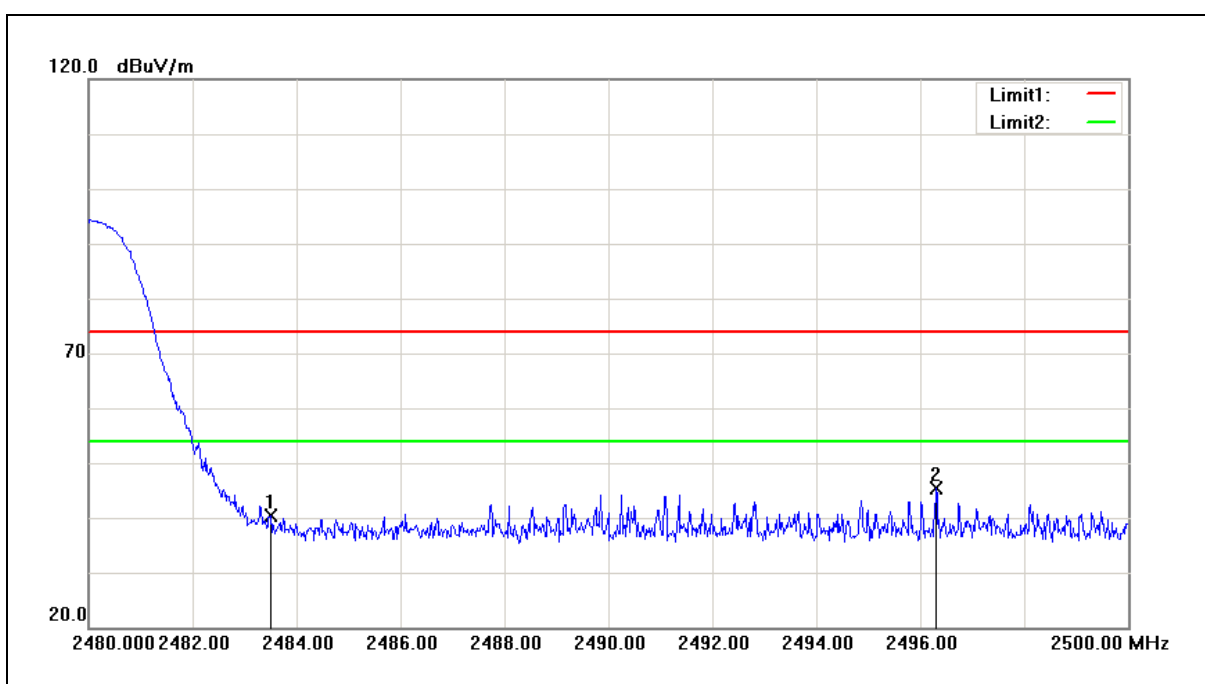
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	38.05	0.55	38.60	74.00	-35.40	peak
2	2494.740	43.18	0.60	43.78	74.00	-30.22	peak

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:	Band edge	Power:	DC 3.7V
Frequency:	2480MHz	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 4	Date:	08/11/2017
Ant.Polar.:	Vertical		



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	39.74	0.55	40.29	74.00	-33.71	peak
2	2496.300	44.82	0.60	45.42	74.00	-28.58	peak

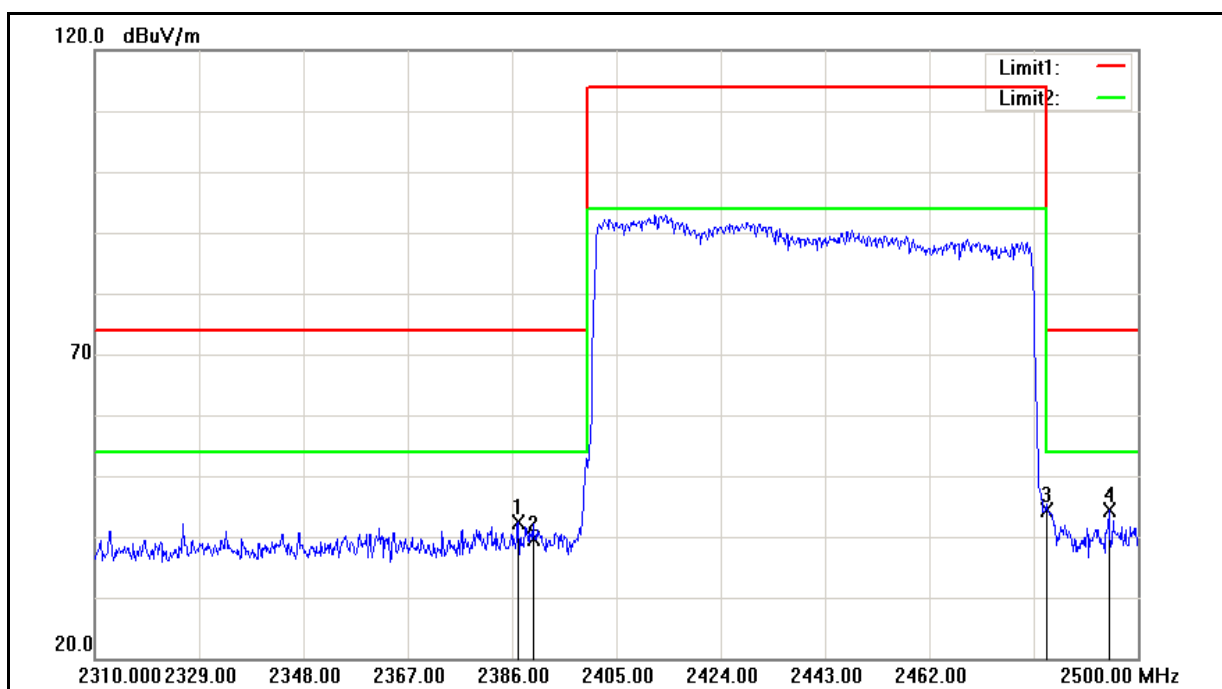
Note:1.Result (dBuV/m) = Correct Factor (dB/m) + Reading(dBuV).

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:	Band Edge	Power:	DC 3.7V
Test Mode:	Mode 4	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Frequency:	Hopping	Date:	08/11/2017
Ant.Polar.:	Horizontal		



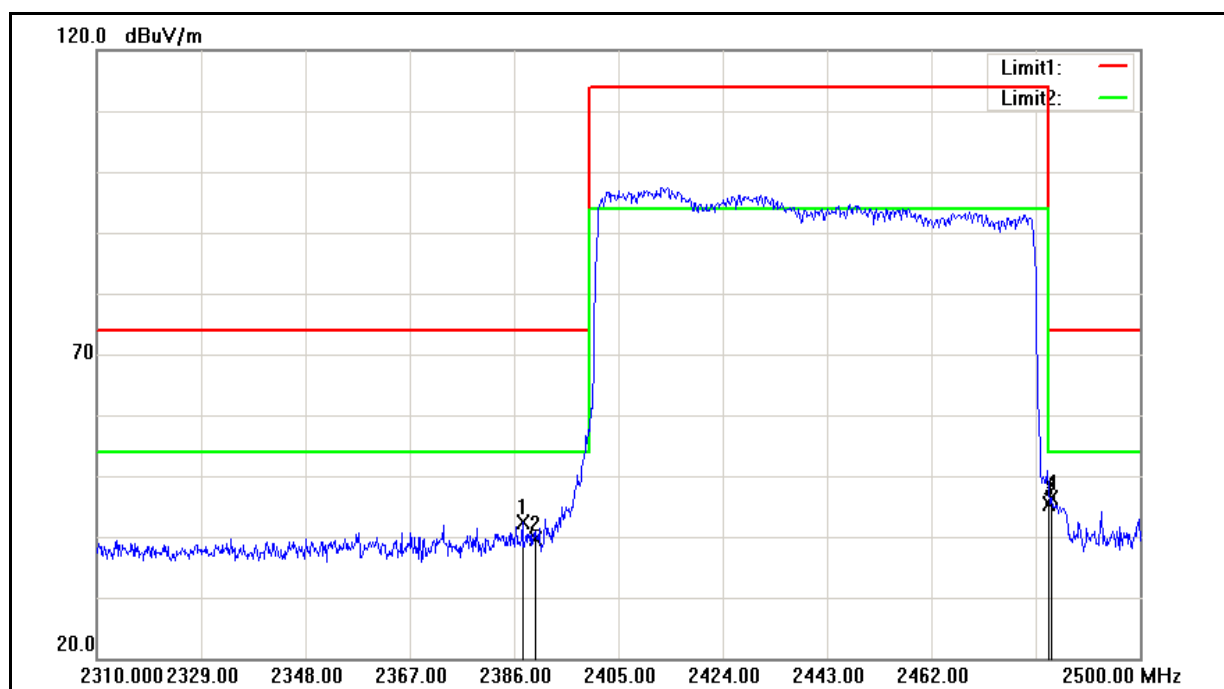
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2387.140	42.12	0.14	42.26	74.00	-31.74	peak
2	2390.000	39.60	0.15	39.75	74.00	-34.25	peak
3	2483.500	43.83	0.55	44.38	74.00	-29.62	peak
4	2494.680	43.88	0.60	44.48	74.00	-29.52	peak

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).



Standard:	FCC Part 15.247	Test Distance:	3m
Test item:	Band Edge	Power:	DC 3.7V
Test Mode:	Mode 4	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Frequency:	Hopping	Date:	08/11/2017
Ant.Polar.:	Vertical		



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2387.520	42.16	0.15	42.31	74.00	-31.69	peak
2	2390.000	39.40	0.15	39.55	74.00	-34.45	peak
3	2483.500	44.75	0.55	45.30	74.00	-28.70	peak
4	2483.850	45.72	0.55	46.27	74.00	-27.73	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).



5 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 6dBi.

■ Antenna Connector Construction

See section 2 – antenna information.