



## CFR 47 FCC PART 15 SUBPART C

### TEST REPORT

*For*

**WIFI+BLE module**

**MODEL NUMBER: RM002**

**REPORT NUMBER: 4790728609-1-RF-2**

**ISSUE DATE: March 14, 2023**

**FCC ID: 2BAII-RM002**

*Prepared for*

**Shenzhen Waterworld Information Co., Ltd.**

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*Prepared by*

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**The results reported herein have been performed in accordance with the laboratory's terms of accreditation. This report shall not be reproduced except in full without the written approval of the Laboratory. The results in this report apply to the test sample(s) mentioned above at the time of the testing period only and are not to be used to indicate applicability to other similar products.**



## Revision History

Rev.	Issue Date	Revisions	Revised By
V0	March 14, 2023	Initial Issue	

## Summary of Test Results

Test Item	Clause	Limit/Requirement	Result
Antenna Requirement	N/A	FCC Part 15.203/15.247 (c)	Pass
AC Power Line Conducted Emission	ANSI C63.10-2013, Clause 6.2	FCC Part 15.207	Pass
Conducted Output Power	ANSI C63.10-2013, Clause 11.9.1.3	FCC Part 15.247 (b)(3)	Pass
6dB Bandwidth and 99% Occupied Bandwidth	ANSI C63.10-2013, Clause 11.8.1	FCC Part 15.247 (a)(2)	Pass
Power Spectral Density	ANSI C63.10-2013, Clause 11.10.2	FCC Part 15.247 (e)	Pass
Conducted Band edge and spurious emission	ANSI C63.10-2013, Clause 11.11	FCC Part 15.247(d)	Pass
Radiated Band edge and Spurious Emission	ANSI C63.10-2013, Clause 11.12 & Clause 11.13	FCC Part 15.247 (d) FCC Part 15.205/15.209	Pass
Duty Cycle	ANSI C63.10-2013, Clause 11.6	None; for reporting purposes only.	Pass

\*This test report is only published to and used by the applicant, and it is not for evidence purpose in China.

\*The measurement result for the sample received is <Pass> according to <CFR 47 FCC PART 15 SUBPART C> when <Accuracy Method> decision rule is applied.

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## 1. ATTESTATION OF TEST RESULTS

### Applicant Information

Company Name: Shenzhen Waterworld Information Co., Ltd.  
Address: 1F, Building 3, Dexinchang Wisdom Park, No. 23 Heping Road, Longhua district, Shenzhen city, China

### Manufacturer Information

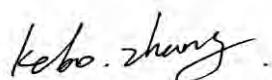
Company Name: Shenzhen Waterworld Information Co., Ltd.  
Address: 1F, Building 3, Dexinchang Wisdom Park, No. 23 Heping Road, Longhua district, Shenzhen city, China

### EUT Information

EUT Name: WIFI+BLE module  
Model: RM002  
Sample Received Date: January 31, 2023  
Sample Status: Normal  
Sample ID: 5748055  
Date of Tested: February 8, 2023 to March 14, 2023

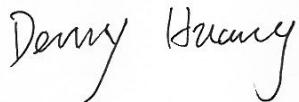
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 FCC PART 15 SUBPART C	Pass

Prepared By:



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Senior Project Engineer

Checked By:



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## 2. TEST METHODOLOGY

All tests were performed in accordance with the standard CFR 47 FCC PART 15 SUBPART C , KDB 558074 D01 15.247 Meas Guidance v05r02, KDB 414788 D01 Radiated Test Site v01r01, CFR 47 FCC Part 2, ANSI C63.10-2013.

## 3. FACILITIES AND ACCREDITATION

Accreditation Certificate	<p><b>A2LA (Certificate No.: 4102.01)</b> UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with A2LA.</p> <p><b>FCC (FCC Designation No.: CN1187)</b> UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. Has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules</p> <p><b>ISED (Company No.: 21320)</b> UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been registered and fully described in a report filed with ISED. The Company Number is 21320 and the test lab Conformity Assessment Body Identifier (CABID) is CN0046.</p> <p><b>VCCI (Registration No.: G-20019, R-20004, C-20012 and T-20011)</b> UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with VCCI, the Membership No. is 3793.</p> <p>Facility Name: Chamber D, the VCCI registration No. is G-20019 and R-20004 Shielding Room B , the VCCI registration No. is C-20012 and T-20011</p>
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### Note1:

All tests measurement facilities use to collect the measurement data are located at Building 10, Innovation Technology Park, No. 1, Li Bin Road, Song Shan Lake Hi-Tech Development Zone Dongguan, 523808, People's Republic of China.

### Note2:

The test anechoic chamber in UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.

### Note3:

For below 30 MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. And these measurements below 30 MHz had been correlated to measurements performed on an OFS.

## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations and is traceable to recognized national standards.

### 4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Item	Uncertainty
Conduction emission	3.62 dB
Radiated Emission (Included Fundamental Emission) (9 kHz ~ 30 MHz)	2.2 dB
Radiated Emission (Included Fundamental Emission) (30 MHz ~ 1 GHz)	4.00 dB
Radiated Emission (Included Fundamental Emission) (1 GHz to 26 GHz)	5.78 dB (1 GHz ~ 18 GHz) 5.23 dB (18 GHz ~ 26 GHz)
Duty Cycle	±0.028%
DTS and 99% Occupied Bandwidth	±0.0196%
Maximum Conducted Output Power	±0.686 dB
Maximum Power Spectral Density Level	±0.743 dB
Conducted Band-edge Compliance	±1.328 dB
Conducted Unwanted Emissions In Non-restricted Frequency Bands	±0.746 dB (9 kHz ~ 1 GHz) ±1.328dB (1 GHz ~ 26 GHz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

EUT Name	WIFI+BLE module
Model	RM002
Frequency Range:	2412 MHz to 2462 MHz
Radio Technology:	IEEE 802.11b/g/n HT20/n HT40
Type of Modulation:	IEEE 802.11b: DSSS(CCK, DQPSK, DBPSK) IEEE 802.11g/n: OFDM(64-QAM, 16-QAM, QPSK, BPSK)
Normal Test Voltage:	DC 3.3 V

### 5.2. CHANNEL LIST

Channel List for 802.11b/g/n (20 MHz)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	4	2427	7	2442	10	2457
2	2417	5	2432	8	2447	11	2462
3	2422	6	2437	9	2452	/	/

Channel List for 802.11n (40 MHz)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
3	2422	5	2432	7	2442	9	2452
4	2427	6	2437	8	2447	/	/

### 5.3. MAXIMUM EIRP

IEEE Std. 802.11	Frequency (MHz)	Channel Number	Maximum Conducted AVG Output Power (dBm)
b	2412 ~ 2462	1-11[11]	18.13
g	2412 ~ 2462	1-11[11]	15.87
n HT20	2412 ~ 2462	1-11[11]	15.83
n HT40	2422 ~ 2452	3-9[7]	15.36

## 5.4. TEST CHANNEL CONFIGURATION

IEEE Std. 802.11	Test Channel Number	Frequency
b	CH 1(Low Channel), CH 6(MID Channel), CH 11(High Channel)	2412 MHz, 2437 MHz, 2462 MHz
g	CH 1(Low Channel), CH 6(MID Channel), CH 11(High Channel)	2412 MHz, 2437 MHz, 2462 MHz
n HT20	CH 1(Low Channel), CH 6(MID Channel), CH 11(High Channel)	2412 MHz, 2437 MHz, 2462 MHz
n HT40	CH 3(Low Channel), CH 6(MID Channel), CH 9(High Channel)	2422 MHz, 2437 MHz, 2452 MHz

## 5.5. THE WORSE CASE POWER SETTING PARAMETER

The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band							
Test Software		ESP32_RFTest					
Modulation Mode	Transmit Antenna Number	Test Channel					
		NCB: 20MHz			NCB: 40MHz		
		CH 1	CH 6	CH 11	CH 3	CH 6	CH 9
802.11b	1	default	default	default	/		
802.11g	1	default	default	default			
802.11n HT20	1	default	default	default			
802.11n HT40	1	/			default	default	default

## WORST-CASE CONFIGURATIONS

The EUT was tested in the following configuration(s):

Controlled in test mode using a software application on the EUT supplied by customer. The application was used to enable a continuous transmission and to select the mode, test channels, bandwidth, data rates as required.

Test channels referring to section 5.4.

Maximum power setting referring to section 5.5.

Worst-case data rates as provided by the client were:

802.11b mode: 1 Mbps  
802.11g mode: 6 Mbps  
802.11n HT20 mode: MCS0  
802.11n HT40 mode: MCS0

The measured additional path loss was included in any path loss calculations for all RF cable used during tested.

## 5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Antenna	Frequency (MHz)	Antenna Type	MAX Antenna Gain (dBi)
1	2412-2462	FPC Antenna	1.65

Test Mode	Transmit and Receive Mode	Description
IEEE 802.11b	<input checked="" type="checkbox"/> 1TX, 1RX	ANT 1 can be used as transmitting/receiving antenna.
IEEE 802.11g	<input checked="" type="checkbox"/> 1TX, 1RX	ANT 1 can be used as transmitting/receiving antenna.
IEEE 802.11n HT20	<input checked="" type="checkbox"/> 1TX, 1RX	ANT 1 can be used as transmitting/receiving antenna.
IEEE 802.11n HT40	<input checked="" type="checkbox"/> 1TX, 1RX	ANT 1 can be used as transmitting/receiving antenna.

Note:

1.BLE&WLAN 2.4G can't transmit simultaneously. (declared by client)

Note: The value of the antenna gain was declared by customer.

## 5.7. SUPPORT UNITS FOR SYSTEM TEST

### SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	Remarks
1	Laptop	Lenovo	E42-80	/
2	Test Fixture	/	/	/
3	AC Adaptor	Lenovo	ADLX65YCC3D	Input: AC 100-240V, 1.8A, 50-60Hz Output: DC 20V, 3.25A, 65.0W Max

### I/O CABLES

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	USB	/	/	1.0	/

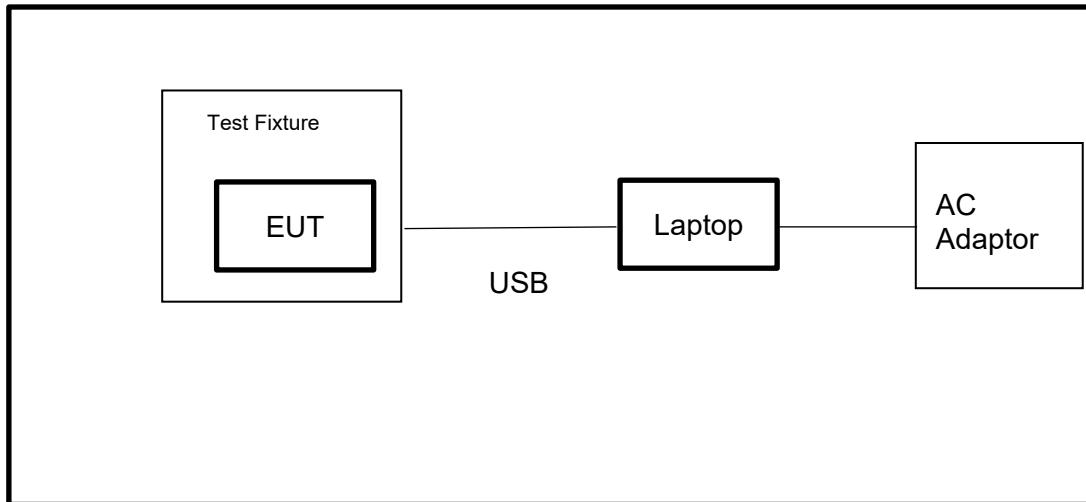
### ACCESSORIES

Item	Accessory	Brand Name	Model Name	Description
1	/	/	/	/

### TEST SETUP

The EUT can work in engineering mode with a software.

### SETUP DIAGRAM FOR TESTS



Note: AC Adaptor only use for AC POWER LINE CONDUCTED EMISSION test.

## 6. MEASURING EQUIPMENT AND SOFTWARE USED

R&S TS 8997 Test System					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
Power sensor, Power Meter	R&S	OSP120	100921	Apr.02,2022	Apr.01,2023
Vector Signal Generator	R&S	SMBV100A	261637	Oct.17, 2022	Oct.16, 2023
Signal Generator	R&S	SMB100A	178553	Oct.17, 2022	Oct.16, 2023
Signal Analyzer	R&S	FSV40	101118	Oct.17, 2022	Oct.16, 2023
Software					
Description		Manufacturer		Name	
For R&S TS 8997 Test System		Rohde & Schwarz		EMC 32	
Tonsend RF Test System					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
Wideband Radio Communication Tester	R&S	CMW500	155523	Oct.17, 2022	Oct.16, 2023
Wireless Connectivity Tester	R&S	CMW270	1201.0002N75-102	Sep.28, 2022	Sep.27, 2023
PXA Signal Analyzer	Keysight	N9030A	MY55410512	Oct.17, 2022	Oct.16, 2023
MXG Vector Signal Generator	Keysight	N5182B	MY56200284	Oct.17, 2022	Oct.16, 2023
MXG Vector Signal Generator	Keysight	N5172B	MY56200301	Oct.17, 2022	Oct.16, 2023
DC power supply	Keysight	E3642A	MY55159130	Oct.17, 2022	Oct.16, 2023
Temperature & Humidity Chamber	SANMOOD	SG-80-CC-2	2088	Oct.17, 2022	Oct.16, 2023
Software					
Description		Manufacturer		Name	
Tonsend SRD Test System		Tonsend		JS1120-3 RF Test System	
				2.6.77.0518	



Conducted Emissions					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date
EMI Test Receiver	R&S	ESR3	101961	Oct.17, 2022	Oct.16, 2023
Two-Line V-Network	R&S	ENV216	101983	Oct.17, 2022	Oct.16, 2023
Artificial Mains Networks	Schwarzbeck	NSLK 8126	8126465	Oct.17, 2022	Oct.16, 2023
Software					
Description		Manufacturer		Name	Version
Test Software for Conducted Emissions		Farad		EZ-EMC	Ver. UL-3A1

Radiated Emissions					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date
MXE EMI Receiver	KESIGHT	N9038A	MY56400036	Oct.17, 2022	Oct.16, 2023
Hybrid Log Periodic Antenna	TDK	HLP-3003C	130959	Aug.02, 2021	Aug.01, 2024
Preamplifier	HP	8447D	2944A09099	Oct.17, 2022	Oct.16, 2023
EMI Measurement Receiver	R&S	ESR26	101377	Oct.17, 2022	Oct.16, 2023
Horn Antenna	TDK	HRN-0118	130940	July 20, 2021	July 19, 2024
Preamplifier	TDK	PA-02-0118	TRS-305-00067	Oct.17, 2022	Oct.16, 2023
Horn Antenna	Schwarzbeck	BBHA9170	697	July 20, 2021	July 19, 2024
Preamplifier	TDK	PA-02-2	TRS-307-00003	Oct.17, 2022	Oct.16, 2023
Preamplifier	TDK	PA-02-3	TRS-308-00002	Oct.17, 2022	Oct.16, 2023
Loop antenna	Schwarzbeck	1519B	00008	Dec.14, 2021	Dec.13, 2024
Preamplifier	TDK	PA-02-001-3000	TRS-302-00050	Oct.17, 2022	Oct.16, 2023
Preamplifier	Mini-Circuits	ZX60-83LN-S+	SUP01202035	Oct.17, 2022	Oct.16, 2023
High Pass Filter	Wi	WHKX10-2700-3000-18000-40SS	23	/	/
Highpass Filter	Wainwright	WHKX10-5850-6500-1800-40SS	4	/	/
Band Reject Filter	Wainwright	WRCJV12-5695-5725-5850-5880-40SS	4	/	/
Band Reject Filter	Wainwright	WRCJV20-5120-5150-	2	/	/



		5350-5380-60SS			
Band Reject Filter	Wainwright	WRCJV20-5440-5470-5725-5755-60SS	1	/	/
Band Reject Filter	Wainwright	WRCJV8-2350-2400-2483.5-2533.5-40SS	4	/	/
Band Reject Filter	Wainwright	WRCD5-1879-1879.85-1880.15-1881-40SS	1	/	/
Notch Filter	Wainwright	WHJ10-882-980-7000-40SS	1	/	/
Software					
Description			Manufacturer	Name	Version
Test Software for Radiated Emissions			Farad	EZ-EMC	Ver. UL-3A1

Other Instrument					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date
Temperature humidity probe	OMEGA	ITHX-SD-5	18470007	Oct.22, 2022	Oct.21, 2023
Barometer	Yiyi	Baro	N/A	Oct.24, 2022	Oct.23, 2023
Attenuator	Agilent	8495B	2814a12853	Oct.18, 2022	Oct.17, 2023

## 7. ANTENNA PORT TEST RESULTS

### 7.1. CONDUCTED OUTPUT POWER

#### LIMITS

CFR 47 FCC Part15 (15.247) Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247(b)(3)	AVG Output Power	1 watt or 30 dBm	2400-2483.5

#### TEST PROCEDURE

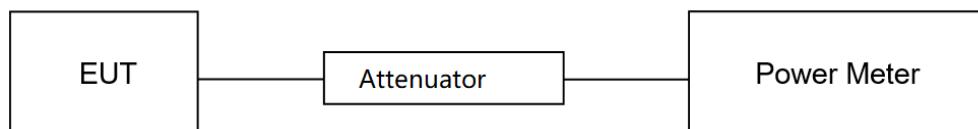
Refer to ANSI C63.10-2013 clause 11.9.2.3.1.

Connect the EUT to a low loss RF cable from the antenna port to the power sensor (video bandwidth is greater than the occupied bandwidth).

Measure peak emission level, the indicated level is the average output power, after any corrections for external attenuators and cables.

The test result in dBm by adding  $[10 \log (1 / D)]$ , where D is the duty cycle.

#### TEST SETUP



#### TEST ENVIRONMENT

Temperature	25.3°C	Relative Humidity	19.1%
Atmosphere Pressure	101.2kPa	Test Voltage	DC 3.3 V

#### TEST DATE / ENGINEER

Test Date	March 1, 2023	Test By	Walker Yuan
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#### TEST RESULTS

Please refer to section "Test Data" - Appendix C

## 7.2. 6DB BANDWIDTH AND 99% OCCUPIED BANDWIDTH

### LIMITS

CFR 47 FCC Part15 (15.247) Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247(a)(2)	6 dB Bandwidth	$\geq 500$ kHz	2400-2483.5
ISED RSS-Gen Clause 6.7	99 % Occupied Bandwidth	For reporting purposes only.	2400-2483.5

### TEST PROCEDURE

Refer to ANSI C63.10-2013 clause 11.8 for DTS bandwidth and clause 6.9 for Occupied Bandwidth.

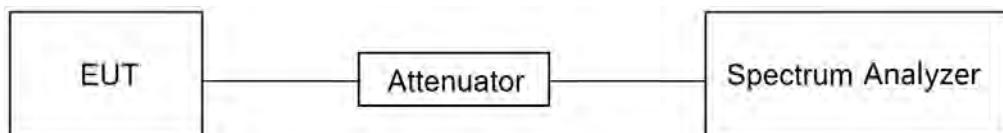
Connect the EUT to the spectrum analyser and use the following settings:

Center Frequency	The center frequency of the channel under test
Frequency Span	For 6 dB Bandwidth: Enough to capture all products of the modulation carrier emission For 99 % Occupied Bandwidth: Between 1.5 times and 5.0 times the OBW
Detector	Peak
RBW	For 6 dB Bandwidth: 100 kHz For 99 % Occupied Bandwidth: 1 % to 5 % of the occupied bandwidth
VBW	For 6 dB Bandwidth: $\geq 3 \times$ RBW For 99 % Occupied Bandwidth: $\geq 3 \times$ RBW
Trace	Max hold
Sweep	Auto couple

a) Use the 99 % power bandwidth function of the instrument, allow the trace to stabilize and report the measured bandwidth.

b) Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

### TEST SETUP



**TEST ENVIRONMENT**

Temperature	25.3°C	Relative Humidity	49.1%
Atmosphere Pressure	101.2kPa	Test Voltage	DC 3.3 V

**TEST DATE / ENGINEER**

Test Date	March 1, 2023	Test By	Walker Yuan
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**TEST RESULTS**

Please refer to section "Test Data" - Appendix A&B

### 7.3. POWER SPECTRAL DENSITY

#### LIMITS

CFR 47 FCC Part15 (15.247) Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC §15.247 (e)	Power Spectral Density	8 dBm in any 3 kHz band	2400-2483.5

#### TEST PROCEDURE

Refer to ANSI C63.10-2013 clause 11.10.5.

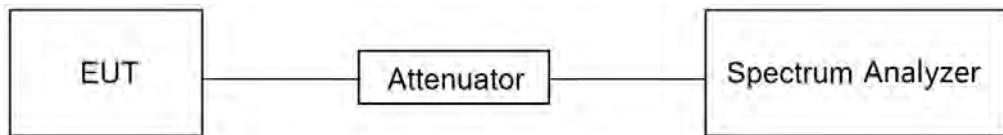
Connect the EUT to the spectrum analyser and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	power averaging (rms)
RBW	$3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$
VBW	$\geq 3 \times \text{RBW}$
Span	$1.5 \times \text{OBW}$ bandwidth
Trace	Average
Sweep time	Auto couple

Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.

If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

#### TEST SETUP



**TEST ENVIRONMENT**

Temperature	25.3°C	Relative Humidity	49.1%
Atmosphere Pressure	101.2kPa	Test Voltage	DC 3.3 V

**TEST DATE / ENGINEER**

Test Date	March 1, 2023	Test By	Walker Yuan
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**TEST RESULTS**

Please refer to section "Test Data" - Appendix D

## 7.4. CONDUCTED BAND EDGE AND SPURIOUS EMISSION

### LIMITS

CFR 47 FCC Part15 (15.247) Subpart C		
Section	Test Item	Limit
CFR 47 FCC §15.247 (d)	Conducted Bandedge and Spurious Emissions	at least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

### TEST PROCEDURE

Refer to ANSI C63.10-2013 clause 11.11 and 11.13.

Connect the EUT to the spectrum analyser and use the following settings for reference level measurement:

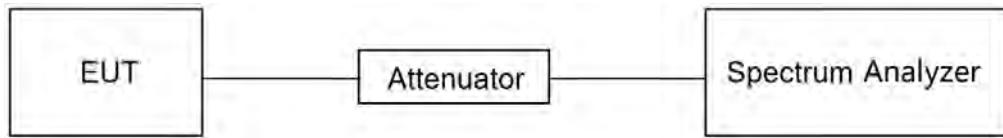
Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	100 kHz
VBW	$\geq 3 \times$ RBW
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

Allow trace to fully stabilize and use the peak marker function to determine the maximum PSD level.

Change the settings for emission level measurement:

Span	Set the center frequency and span to encompass frequency range to be measured
Detector	Peak
RBW	100 kHz
VBW	$\geq 3 \times$ RBW
measurement points	$\geq$ span/RBW
Trace	Max hold
Sweep time	Auto couple.

Allow trace to fully stabilize and use the peak marker function to determine the maximum PSD level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11.

**TEST SETUP****TEST ENVIRONMENT**

Temperature	25.3°C	Relative Humidity	49.1%
Atmosphere Pressure	101.2kPa	Test Voltage	DC 3.3 V

**TEST DATE / ENGINEER**

Test Date	March 1, 2023	Test By	Walker Yuan
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**TEST RESULTS**

Please refer to section "Test Data" - Appendix E&F

## 7.5. DUTY CYCLE

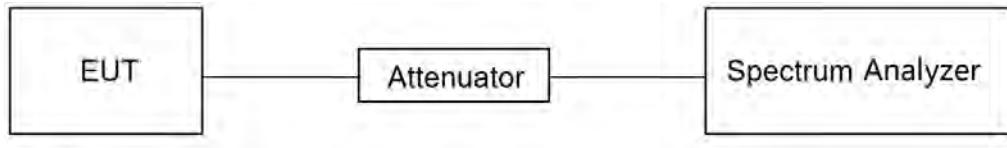
### LIMITS

None; for reporting purposes only.

### TEST PROCEDURE

Refer to ANSI C63.10-2013 clause 11.6 Zero – Span Spectrum Analyzer method.

### TEST SETUP



### TEST ENVIRONMENT

Temperature	25.3°C	Relative Humidity	49.1%
Atmosphere Pressure	101.2kPa	Test Voltage	DC 3.3 V

### TEST DATE / ENGINEER

Test Date	March 1, 2023	Test By	Walker Yuan
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### TEST RESULTS

Please refer to section "Test Data" - Appendix G

## 8. RADIATED TEST RESULTS

### LIMITS

Please refer to CFR 47 FCC §15.205 and §15.209.

Radiation Disturbance Test Limit for FCC (Class B) (9 kHz ~ 1 GHz)

Emissions radiated outside of the specified frequency bands above 30 MHz			
Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m	
		Quasi-Peak	
30 - 88	100	40	
88 - 216	150	43.5	
216 - 960	200	46	
Above 960	500	54	
Above 1000	500	Peak	Average
		74	54

FCC Emissions radiated outside of the specified frequency bands below 30 MHz		
Frequency (MHz)	Field strength (microvolts/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

FCC Restricted bands of operation refer to FCC §15.205 (a):

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
<sup>1</sup> 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	( <sup>2</sup> )
13.36-13.41			

Note: <sup>1</sup>Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup>Above 38.6c

## TEST PROCEDURE

Below 30 MHz

The setting of the spectrum analyser

RBW	200 Hz (From 9 kHz to 0.15 MHz)/ 9 kHz (From 0.15 MHz to 30 MHz)
VBW	200 Hz (From 9 kHz to 0.15 MHz)/ 9 kHz (From 0.15 MHz to 30 MHz)
Sweep	Auto

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.4.
2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both Horizontal, Face-on and Face-off polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 80 cm above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a 1 m height antenna tower.
5. The radiated emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz Radiated emission limits in these three bands are based on measurements employing an average detector.
6. For measurement below 1 GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak and average detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak and average detector and reported.
7. Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30m open field site. Therefore sufficient tests were made

to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field site based on KDB 414788.

8. The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of  $377\Omega$ . For example, the measurement frequency  $X$  KHz resulted in a level of  $Y$  dB $\mu$ V/m, which is equivalent to  $Y-51.5 = Z$  dB $\mu$ A/m, which has the same margin,  $W$  dB, to the corresponding RSS-GEN Table 6 limit as it has to be 15.209(a) limit.

Below 1 GHz and above 30 MHz

The setting of the spectrum analyser

RBW	120 kHz
VBW	300 kHz
Sweep	Auto
Detector	Peak/QP
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.5.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 80 cm above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. For measurement below 1 GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

Above 1G

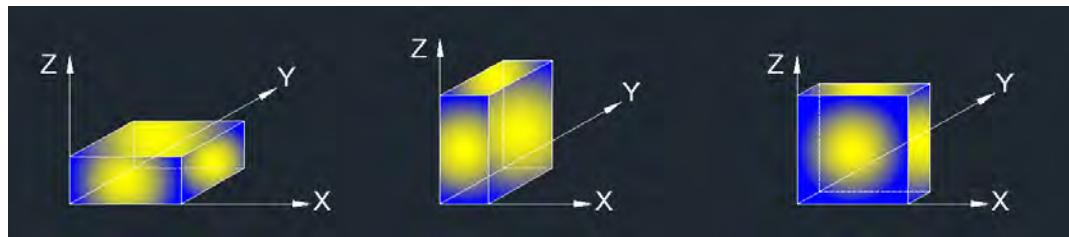
The setting of the spectrum analyser

RBW	1 MHz
VBW	PEAK: 3 MHz AVG: see note 6
Sweep	Auto
Detector	Peak
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.6.

2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 1.5 m above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. For measurement above 1 GHz, the emission measurement will be measured by the peak detector. This peak level, once corrected, must comply with the limit specified in Section 15.209.
6. For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements. For the Duty Cycle please refer to clause 7.5.ON TIME AND DUTY CYCLE.

X axis, Y axis, Z axis positions:



Note 1: For all radiated test, EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

For Band edge note:

1. Measurement = Reading Level + Correct Factor.
2. If the peak values are less than the average limit of 54 dBuV/m, the average result is deemed to comply with average limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton, where: Ton is the transmitting duration.
5. For the transmitting duration, please refer to clause 7.5.
6. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.
7. Horizontal and Vertical have been tested, only the worst data was recorded in the report.
8. All modes and channels have been tested, only the worst data was recorded in the report.

For Radiate Spurious emission 1GHz-3GHz note:

Note:

1. Measurement = Reading Level + Correct Factor.
2. If the Peak values are less than the Average limit of 54 dBuV/m, the Average result is deemed to comply with Average limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton, where: Ton is the transmitting duration.
5. For the transmitting duration, please refer to clause 7.5.
6. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band reject filter losses.
7. Proper operation of the transmitter prior to adding the filter to the measurement chain.
8. All modes and channels have been tested, only the worst data was recorded in the report.

For Radiate Spurious emission 3GHz-18GHz note:

Note: 1. Peak Result = Reading Level + Correct Factor.  
2. If the Peak values are less than the Average limit of 54 dBuV/m, the Average result is deemed to comply with Average limit.  
3. Peak: Peak detector.  
4. AVG: VBW=1/Ton, where: Ton is the transmitting duration.  
5. For the transmitting duration, please refer to clause 7.5.  
6. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.  
7. Proper operation of the transmitter prior to adding the filter to the measurement chain.  
8. All modes and channels have been tested, only the worst data was recorded in the report.

For Radiate Spurious emission 9kHz-30MHz note:

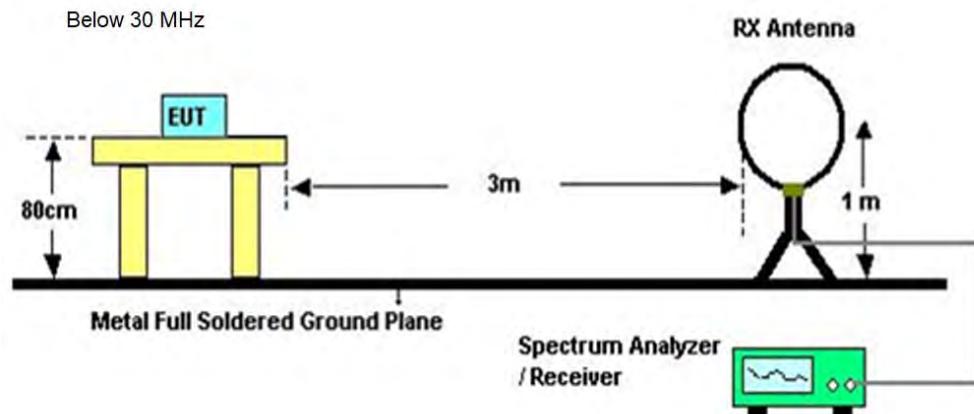
1. Measurement = Reading Level + Correct Factor.  
2. If the Peak values are less than the QP limit, the QP result is deemed to comply with QP limit.  
3. All 3 polarizations (Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.  
4. All modes and channels have been tested, only the worst data was recorded in the report.

For Radiate Spurious emission 18GHz-26GHz note:

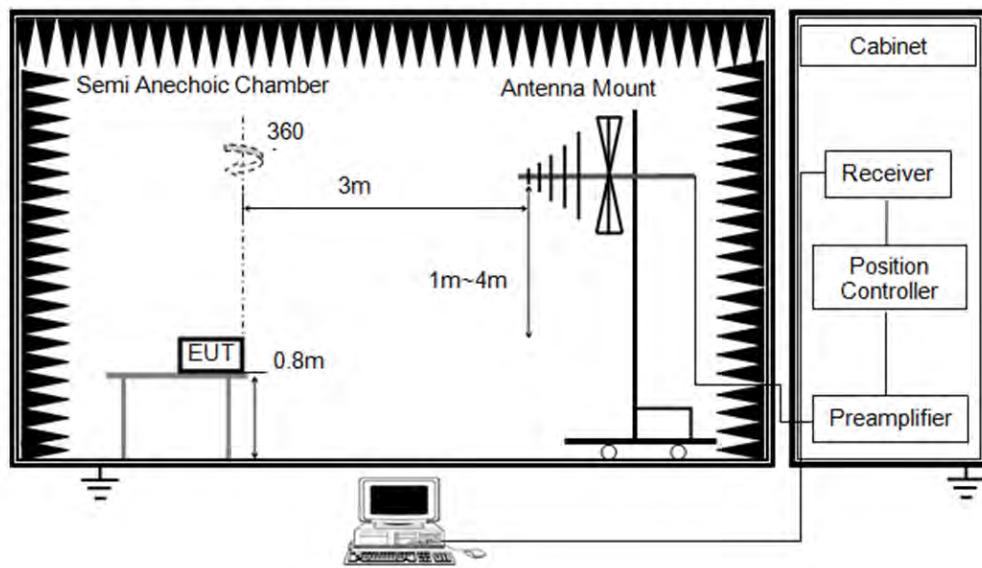
1. Measurement = Reading Level + Correct Factor.  
2. If the Peak values are less than the Average limit of 54 dBuV/m, the Average result is deemed to comply with Average limit.  
3. Peak: Peak detector.  
4. All modes and channels have been tested, only the worst data was recorded in the report.

For Radiate Spurious emission 30MHz-1GHz note:

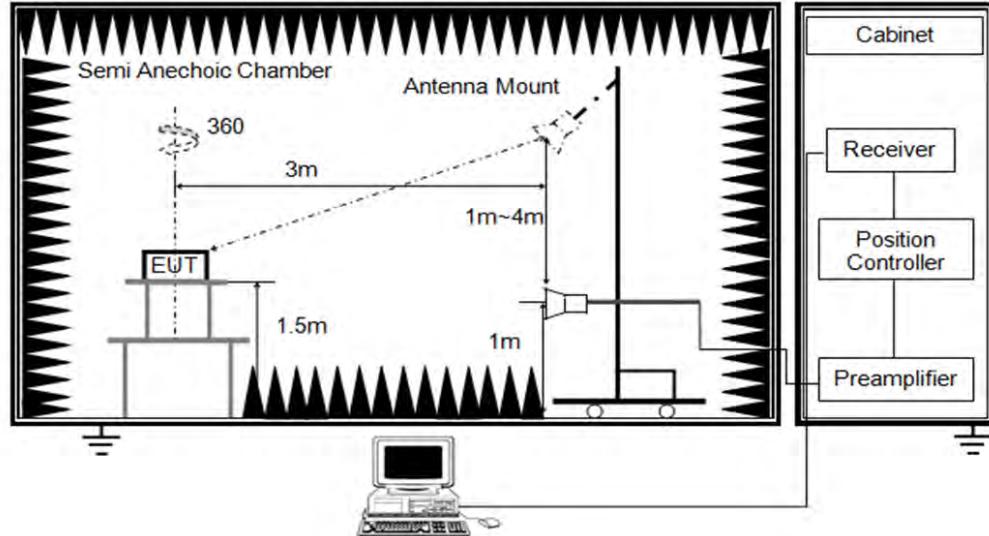
1. Result Level = Read Level + Correct Factor.  
2. If the Peak values are less than the QP limit, the QP result is deemed to comply with QP limit.  
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.  
4. All modes and channels have been tested, only the worst data was recorded in the report.

**TEST SETUP**

Below 1 GHz and above 30 MHz



Above 1 GHz



**TEST ENVIRONMENT**

Temperature	25.2°C	Relative Humidity	63%
Atmosphere Pressure	101kPa	Test Voltage	DC 3.3 V

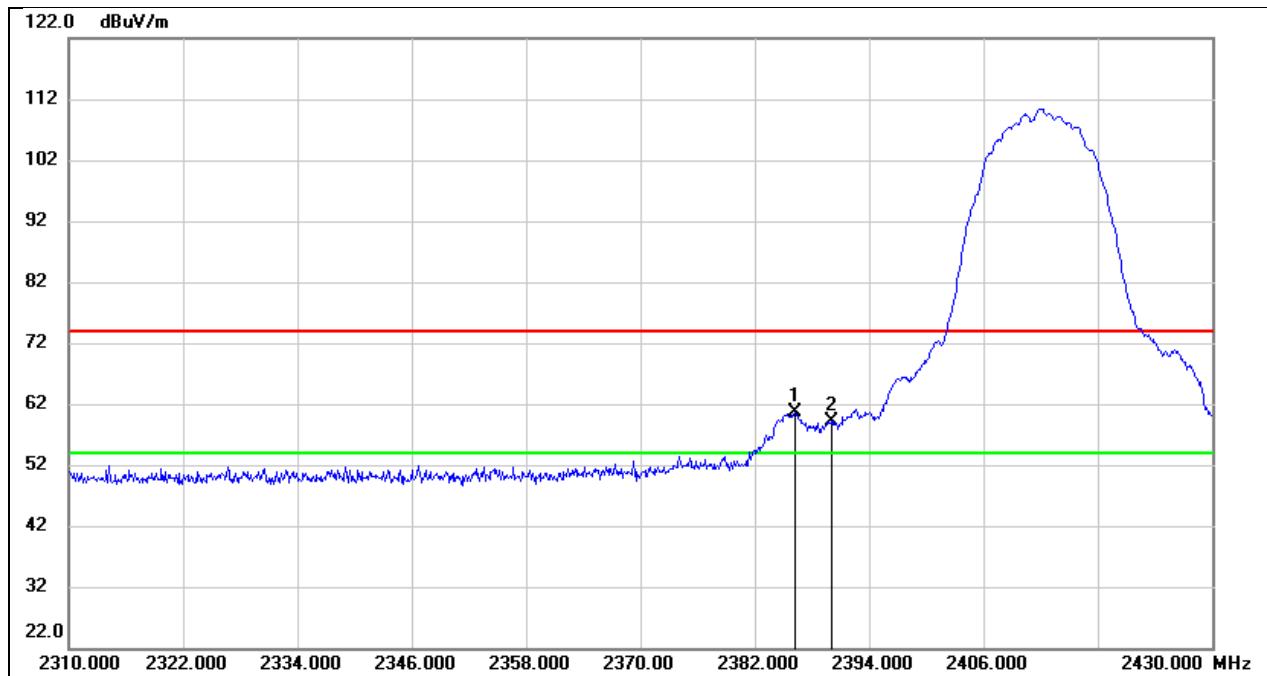
**TEST DATE / ENGINEER**

Test Date	February 28, 2023	Test By	Rex Huang
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**TEST RESULTS**

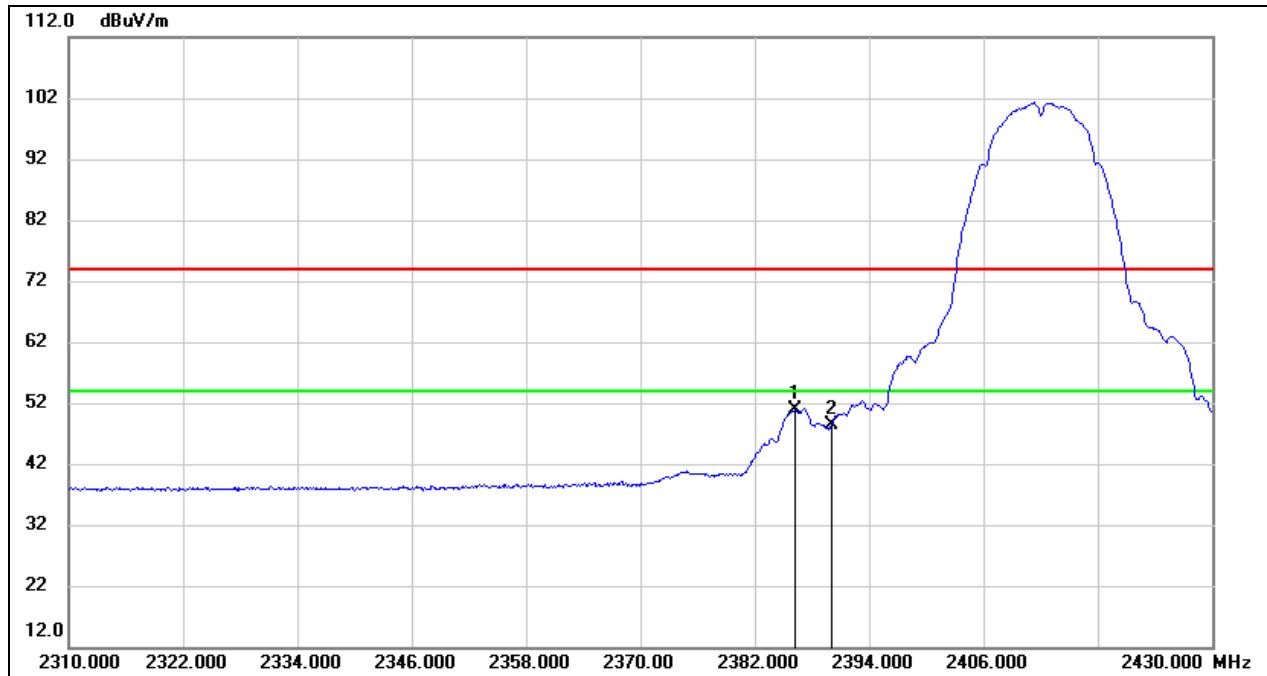
## 8.1. RESTRICTED BANDEDGE

Test Mode:	802.11b PK	Channel:	2412
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



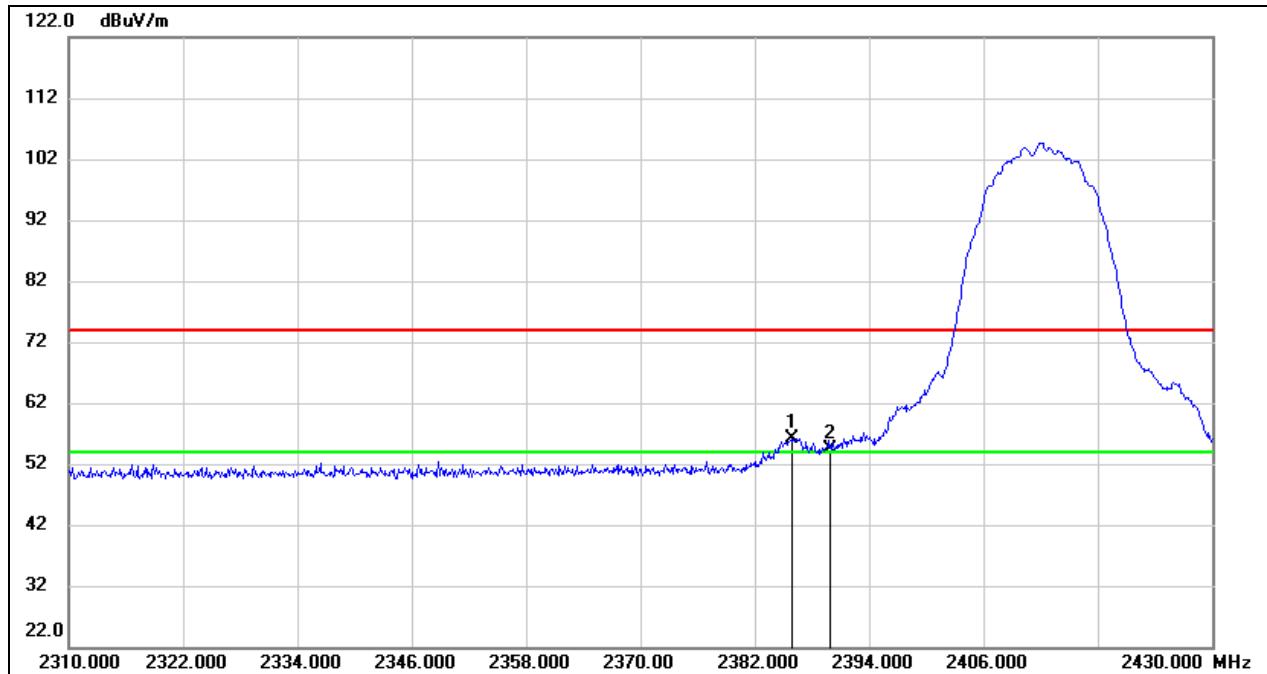
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2386.200	28.50	32.14	60.64	74.00	-13.36	peak
2	2390.000	27.00	32.16	59.16	74.00	-14.84	peak

Test Mode:	802.11b AV	Channel:	2412
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



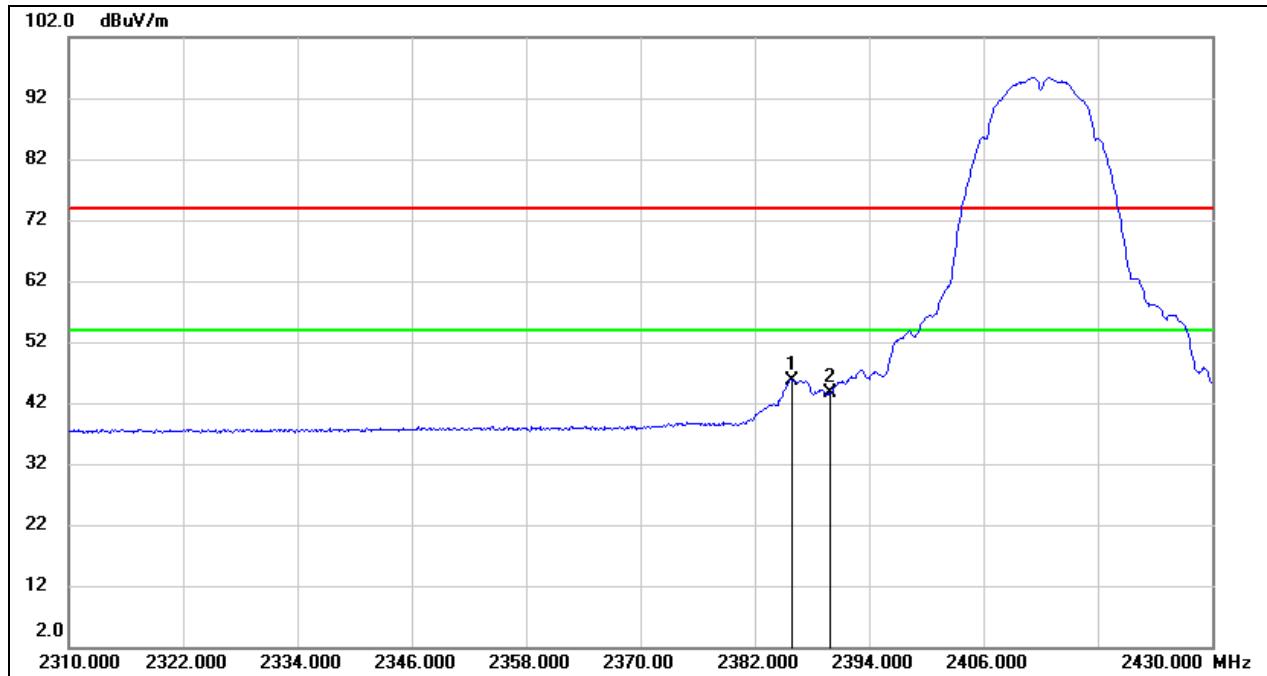
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2386.200	18.77	32.14	50.91	54.00	-3.09	AVG
2	2390.000	16.17	32.16	48.33	54.00	-5.67	AVG

Test Mode:	802.11b PK	Channel:	2412
Polarity:	Vertical	Test Voltage:	DC 3.3 V



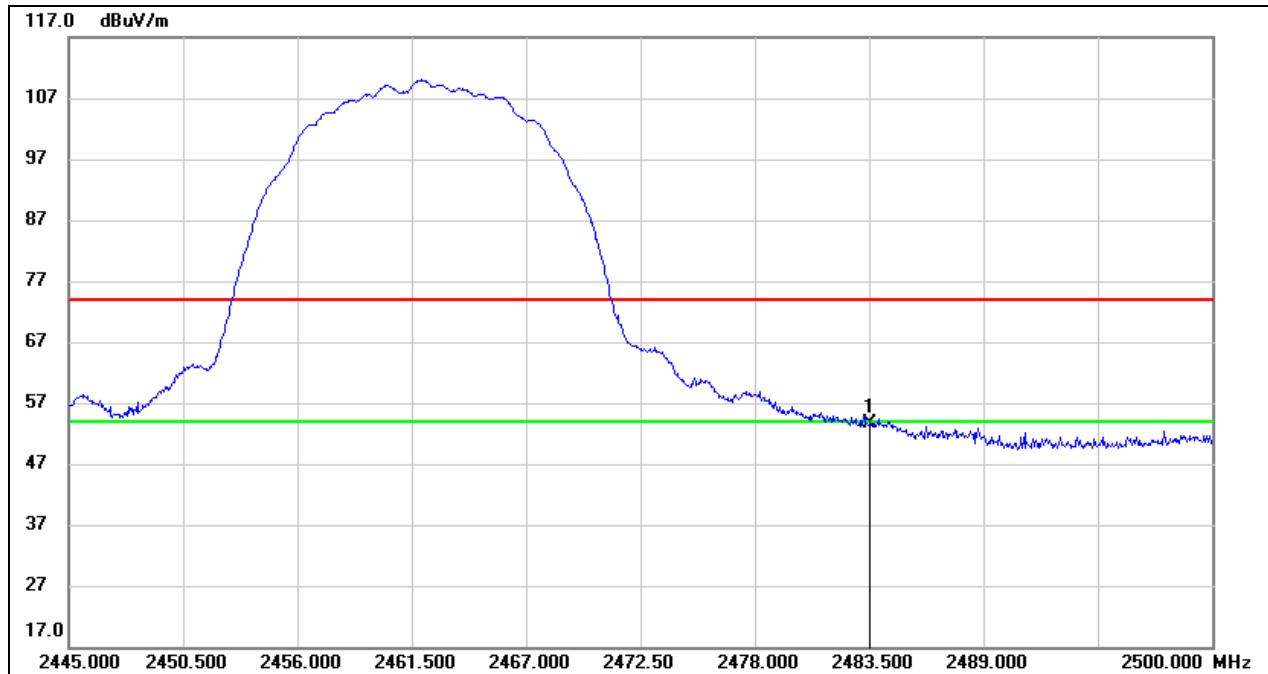
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2385.840	24.02	32.14	56.16	74.00	-17.84	peak
2	2390.000	22.23	32.16	54.39	74.00	-19.61	peak

Test Mode:	802.11b AV	Channel:	2412
Polarity:	Vertical	Test Voltage:	DC 3.3 V



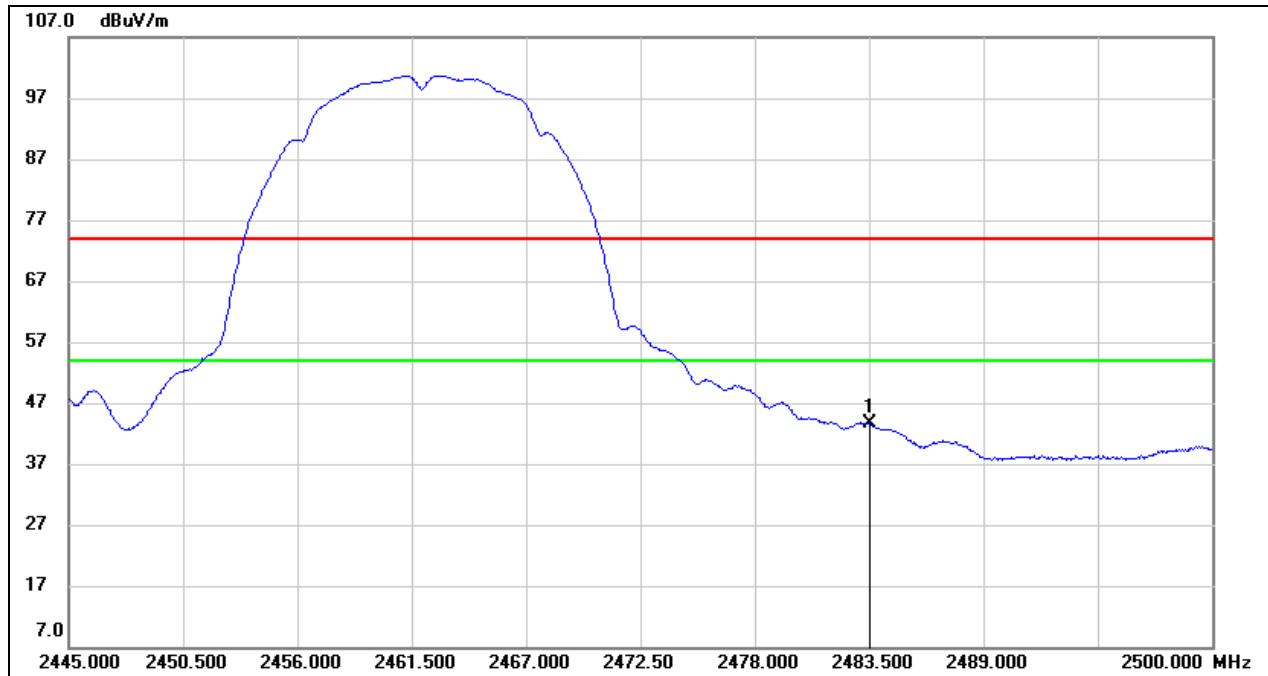
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2385.840	13.38	32.14	45.52	54.00	-8.48	AVG
2	2390.000	11.45	32.16	43.61	54.00	-10.39	AVG

Test Mode:	802.11b PK	Channel:	2462
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



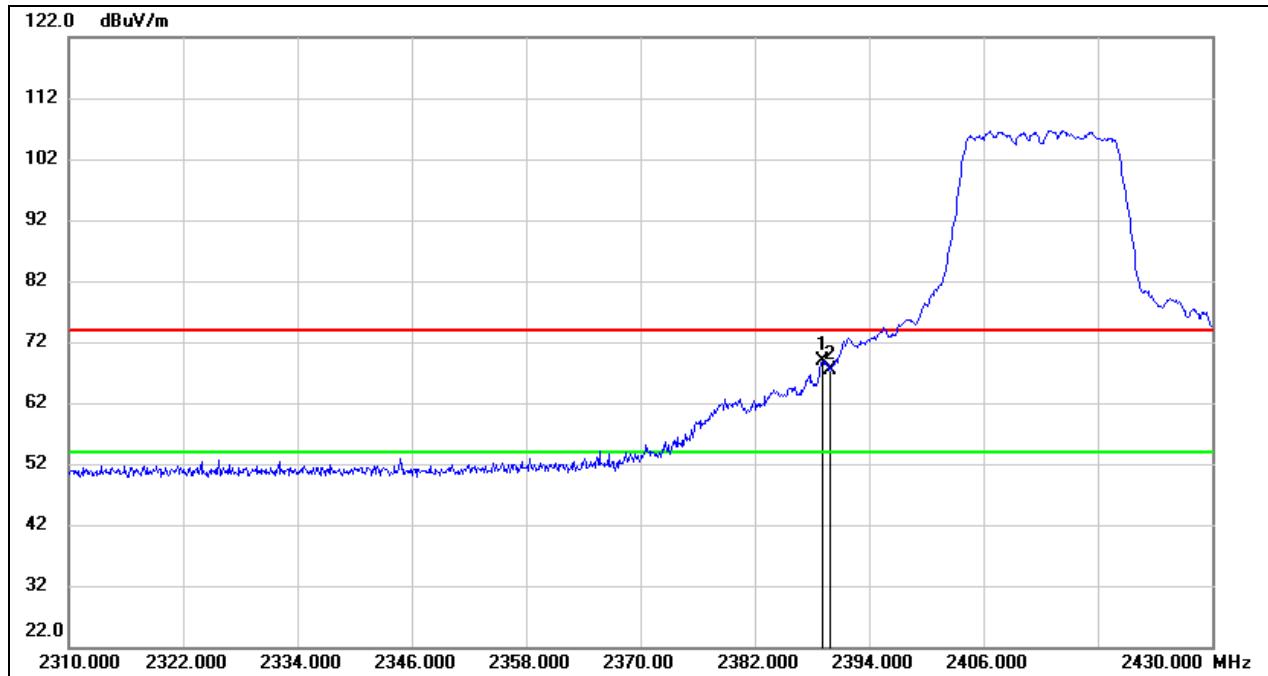
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	21.08	32.44	53.52	74.00	-20.48	peak

Test Mode:	802.11b AV	Channel:	2462
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



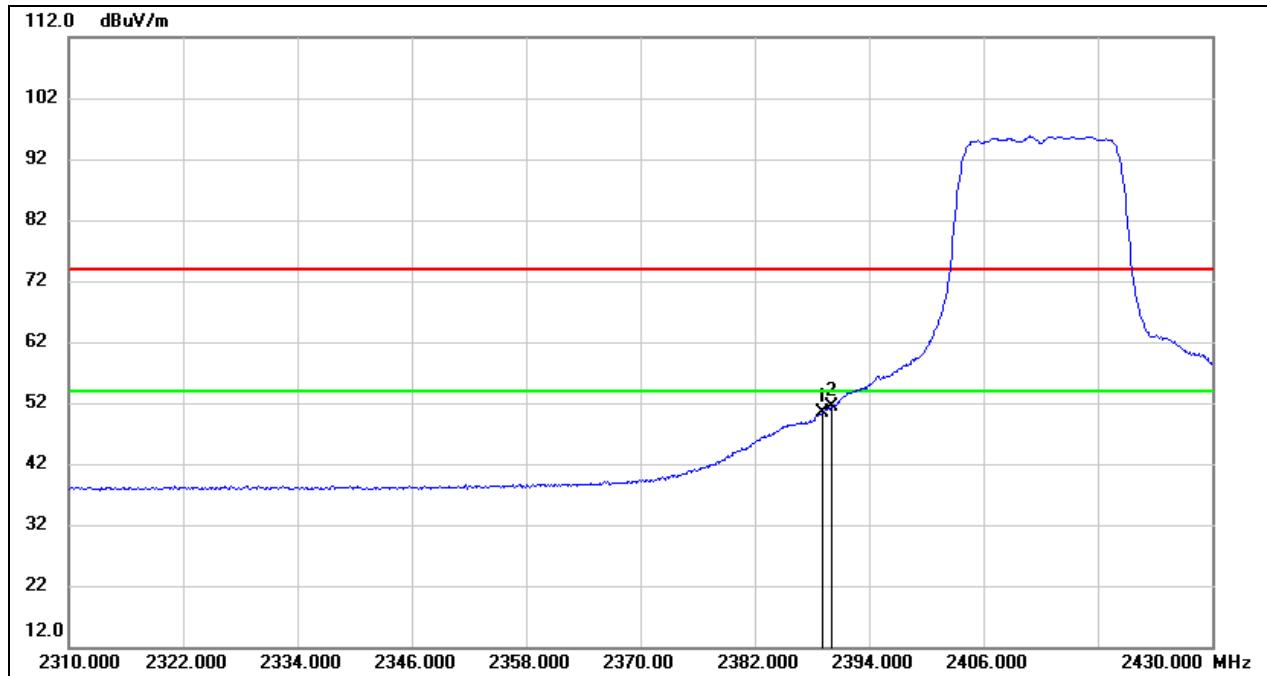
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	11.15	32.44	43.59	54.00	-10.41	AVG

Test Mode:	802.11g PK	Channel:	2412
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



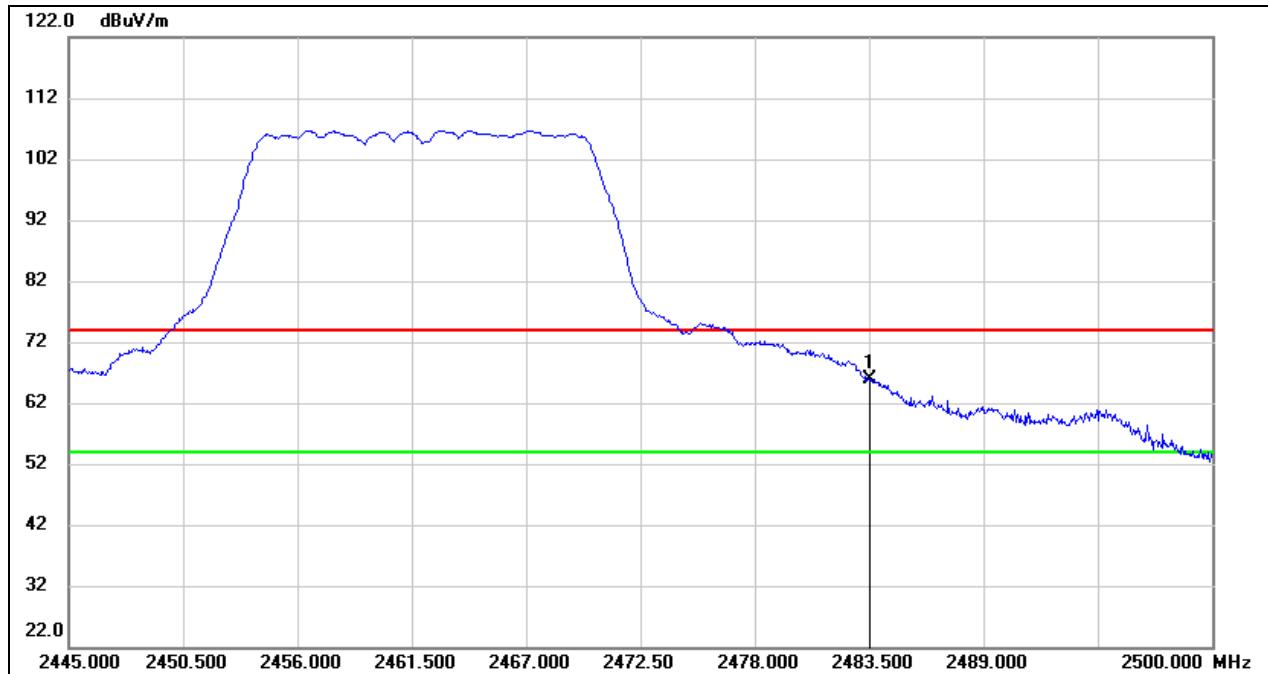
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2389.080	36.78	32.16	68.94	74.00	-5.06	peak
2	2390.000	35.24	32.16	67.40	74.00	-6.60	peak

Test Mode:	802.11g AV	Channel:	2412
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



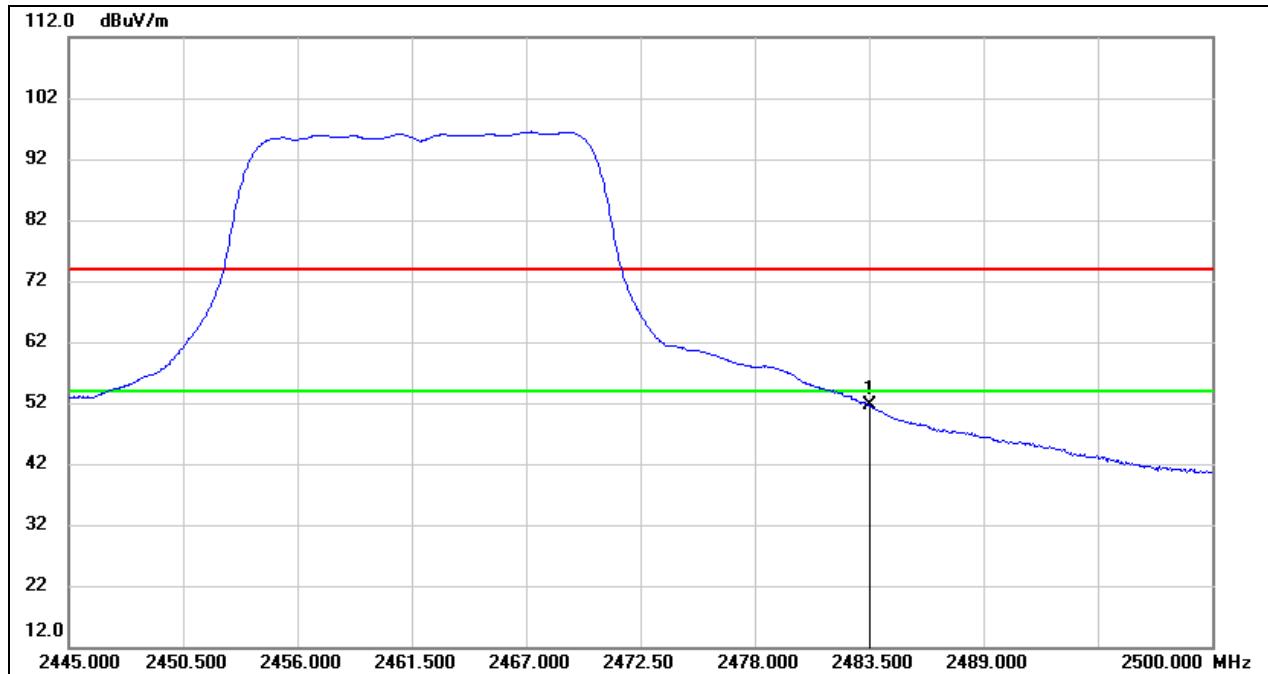
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2389.080	18.33	32.16	50.49	54.00	-3.51	AVG
2	2390.000	19.13	32.16	51.29	54.00	-2.71	AVG

Test Mode:	802.11g PK	Channel:	2462
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



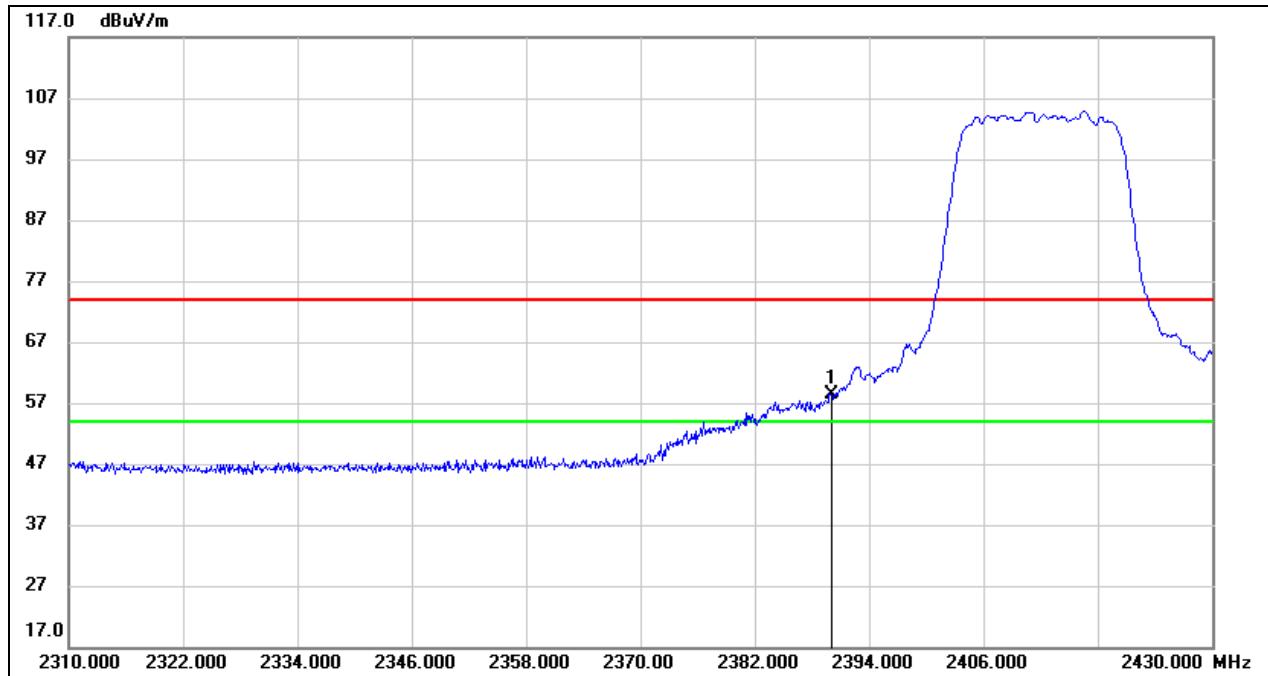
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	33.52	32.44	65.96	74.00	-8.04	peak

Test Mode:	802.11g AV	Channel:	2462
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



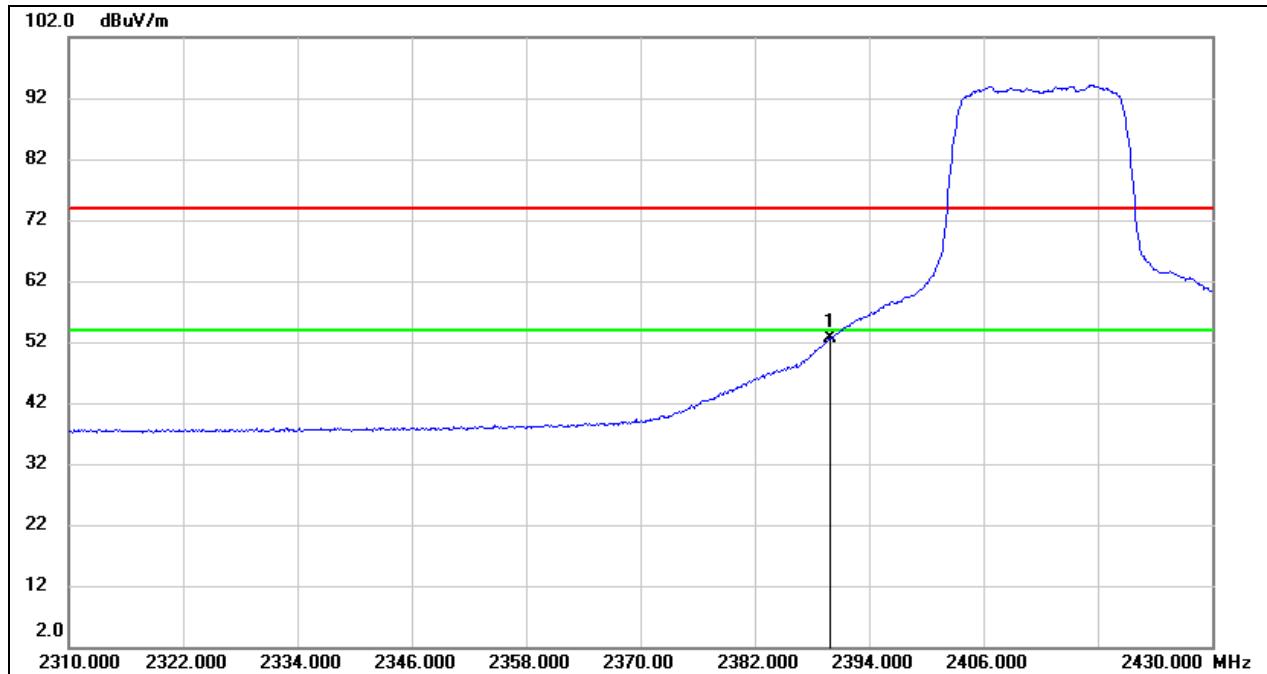
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	19.12	32.44	51.56	54.00	-2.44	AVG

Test Mode:	802.11n HT20 PK	Channel:	2412
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



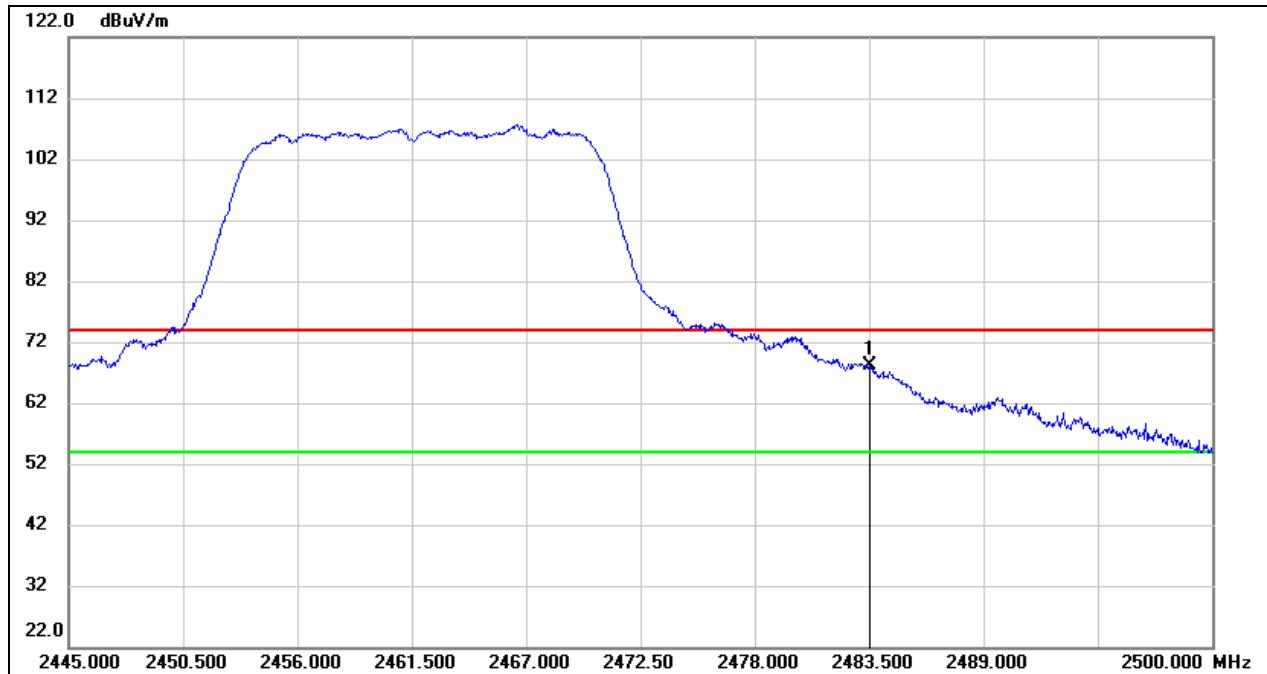
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2390.000	26.22	32.16	58.38	74.00	-15.62	peak

Test Mode:	802.11n HT20 AV	Channel:	2412
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



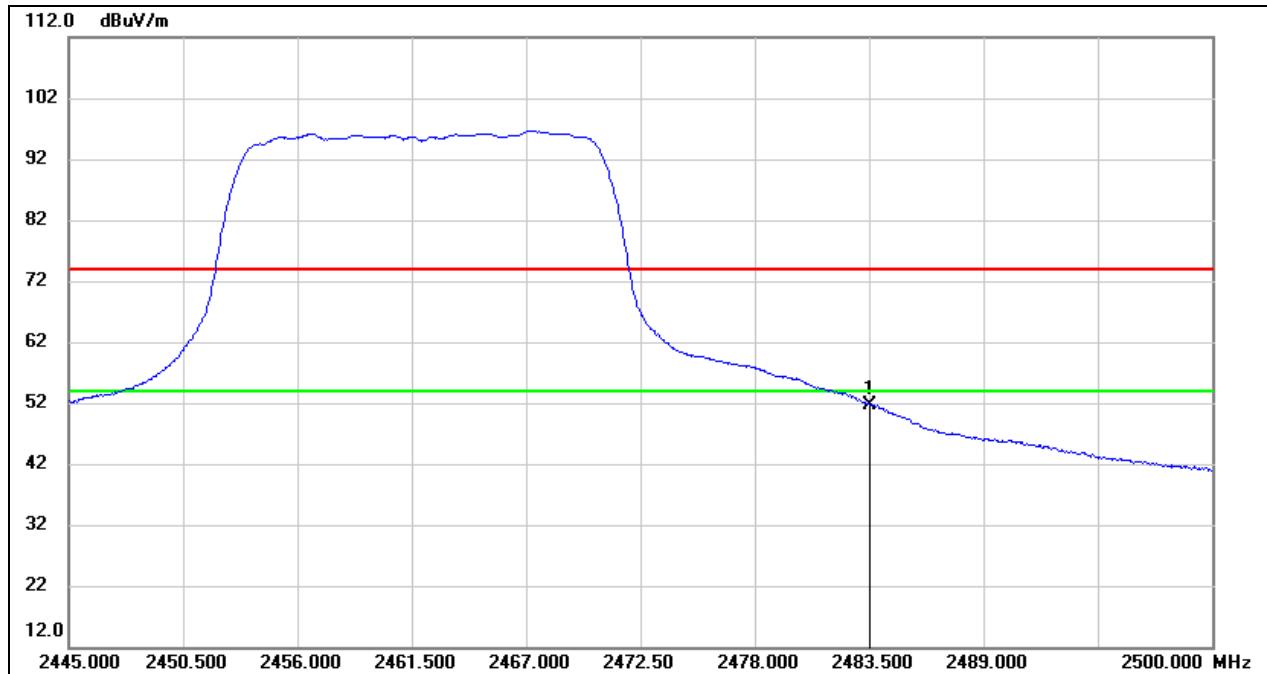
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2390.000	20.43	32.16	52.59	54.00	-1.41	AVG

Test Mode:	802.11n HT20 PK	Channel:	2462
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



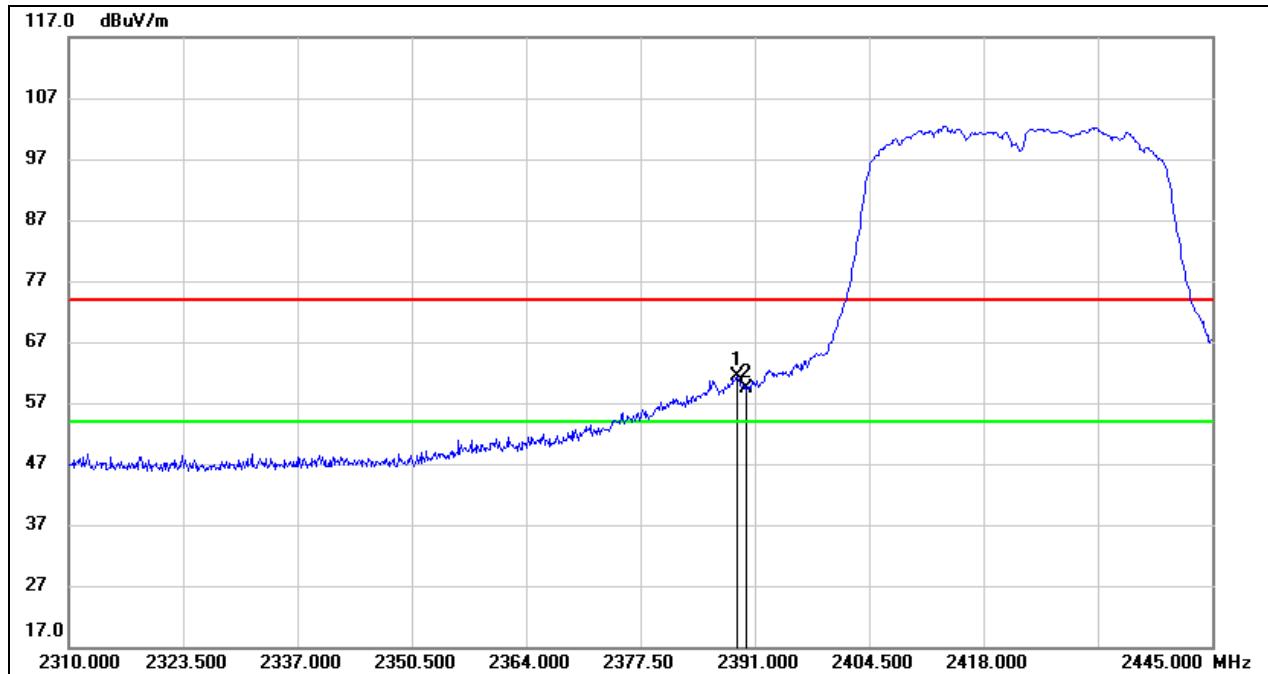
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	35.62	32.44	68.06	74.00	-5.94	peak

Test Mode:	802.11n HT20 AV	Channel:	2462
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



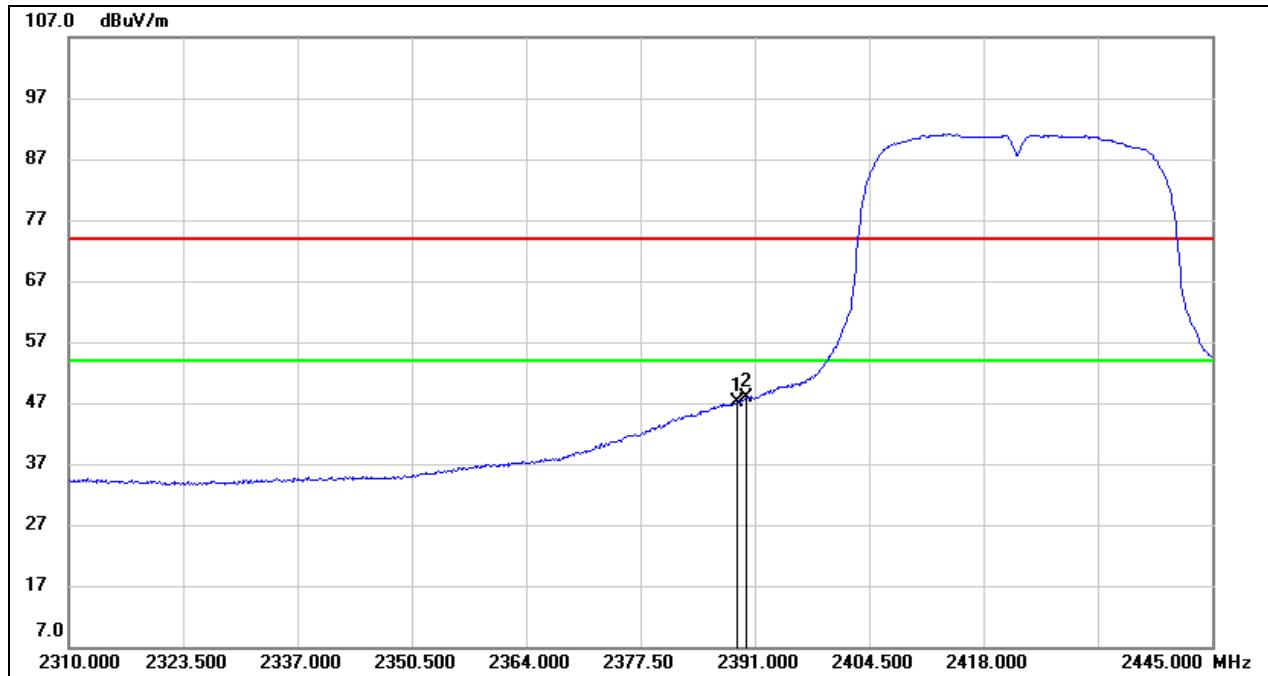
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	19.28	32.44	51.72	54.00	-2.28	AVG

Test Mode:	802.11n HT40 PK	Channel:	2422
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



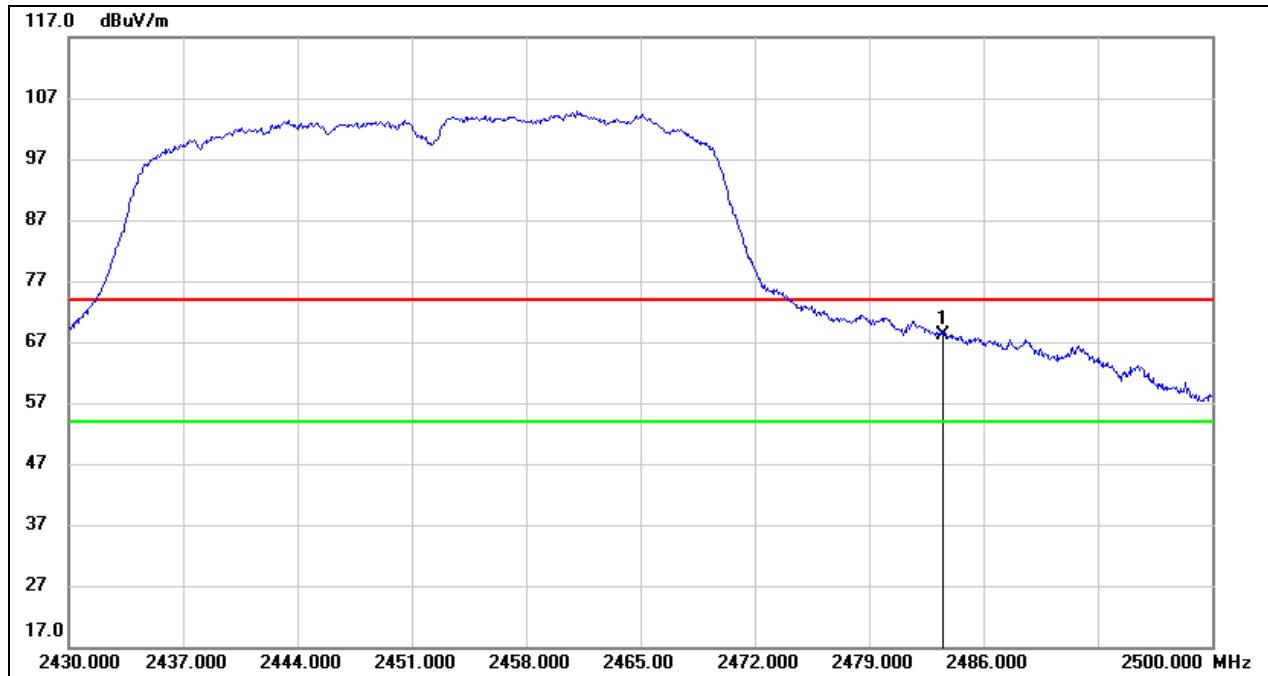
No.	Frequency (MHz)	Reading (dB <sub>UV</sub> )	Correct (dB/m)	Result (dB <sub>UV</sub> /m)	Limit (dB <sub>UV</sub> /m)	Margin (dB)	Remark
1	2388.840	29.13	32.16	61.29	74.00	-12.71	peak
2	2390.000	27.24	32.16	59.40	74.00	-14.60	peak

Test Mode:	802.11n HT40 AV	Channel:	2422
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



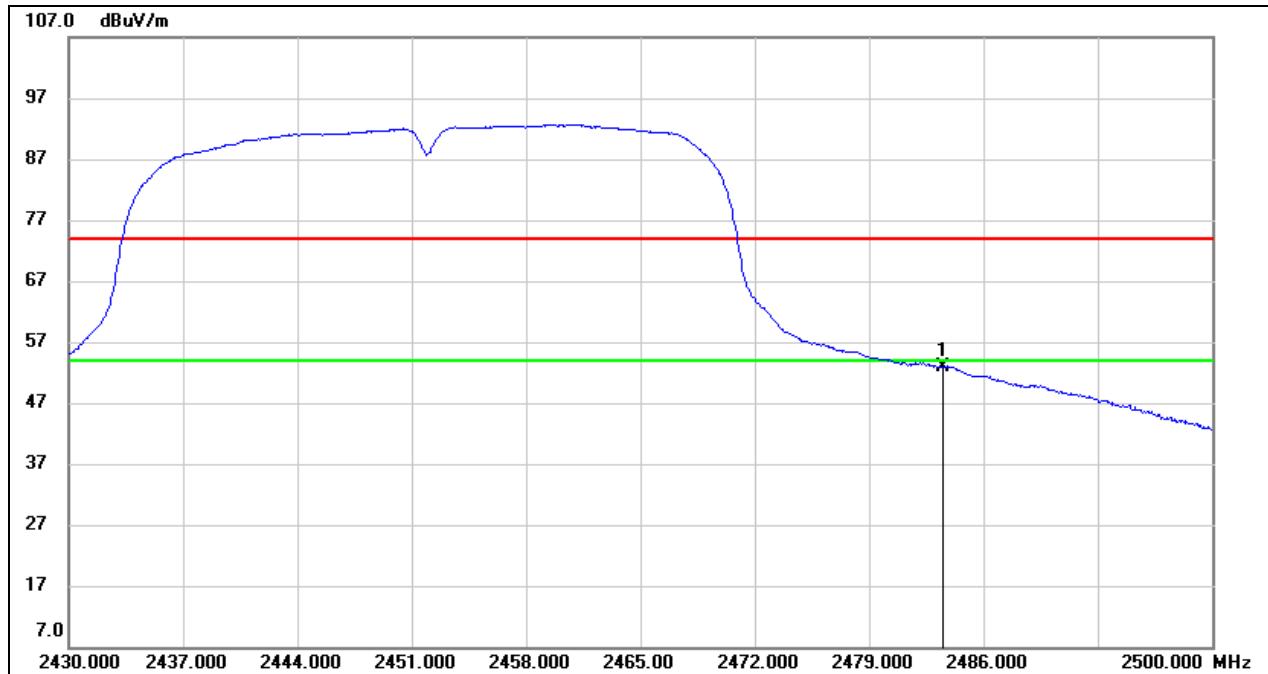
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2388.840	14.86	32.16	47.02	54.00	-6.98	AVG
2	2390.000	15.69	32.16	47.85	54.00	-6.15	AVG

Test Mode:	802.11n HT40 PK	Channel:	2452
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	35.66	32.44	68.10	74.00	-5.90	peak

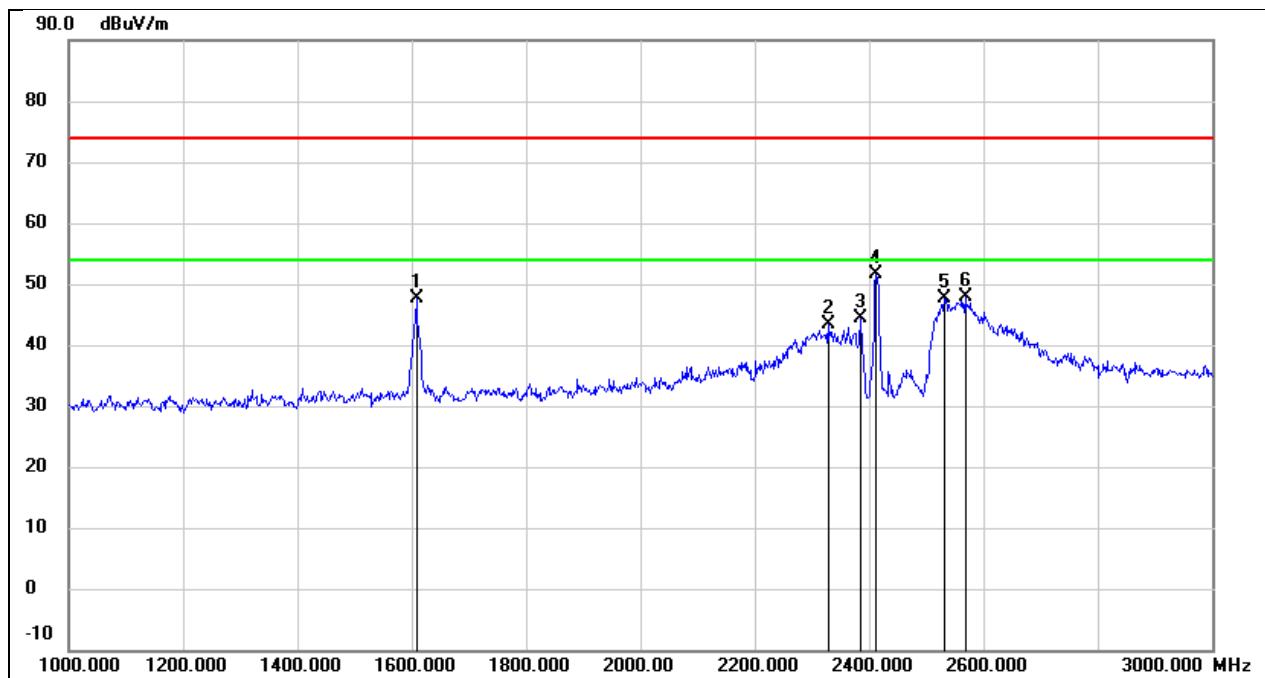
Test Mode:	802.11n HT40 AV	Channel:	2452
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



No.	Frequency (MHz)	Reading (dB <sub>UV</sub> )	Correct (dB/m)	Result (dB <sub>UV</sub> /m)	Limit (dB <sub>UV</sub> /m)	Margin (dB)	Remark
1	2483.500	20.45	32.44	52.89	54.00	-1.11	AVG

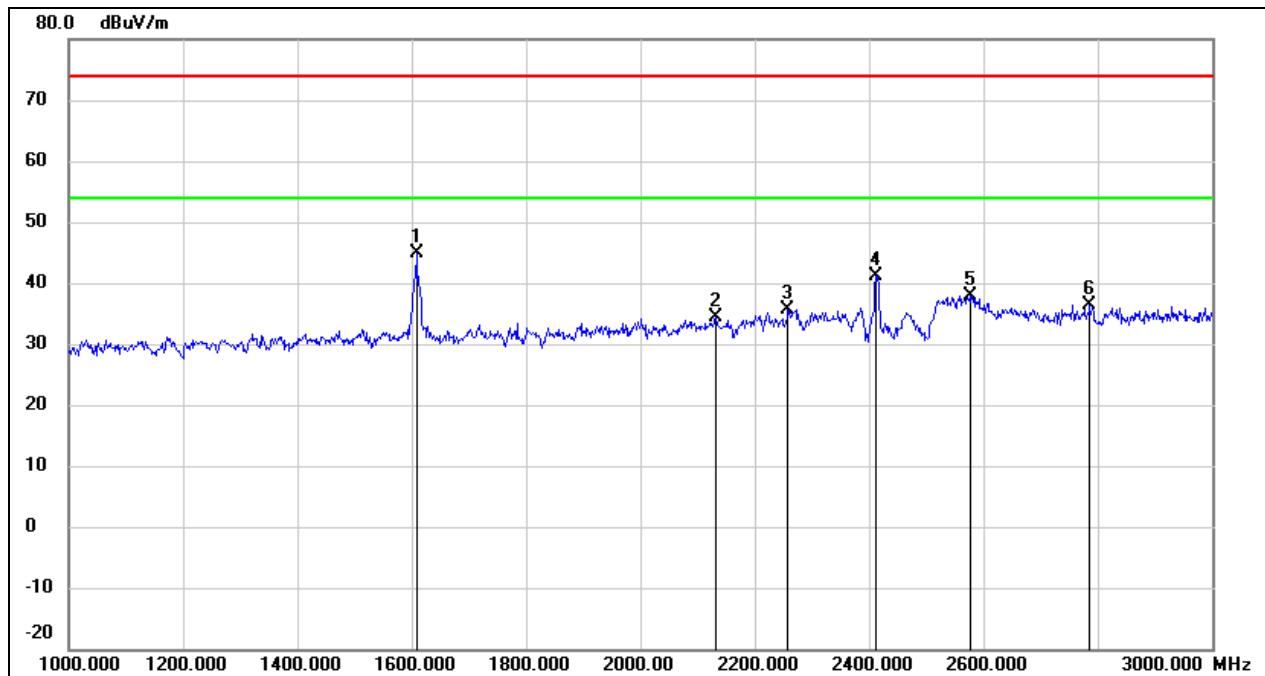
## 8.2. SPURIOUS EMISSIONS(1 GHZ~3 GHZ)

Test Mode:	802.11b	Channel:	2412
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



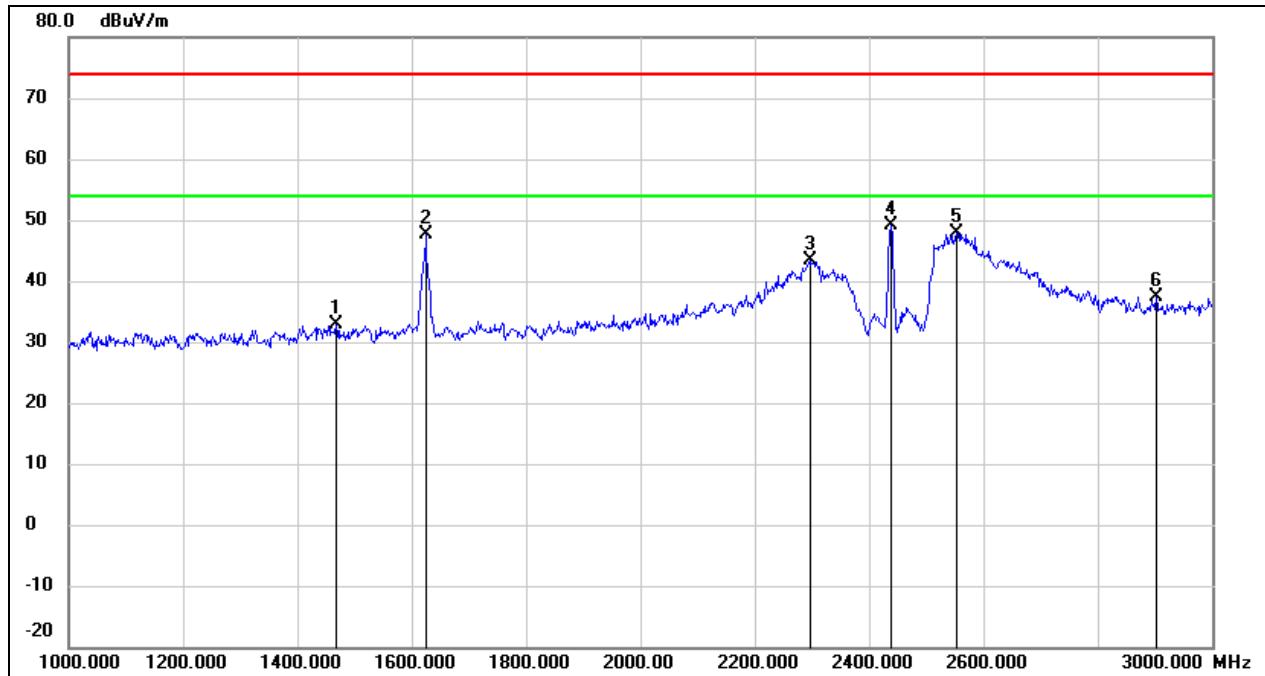
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1608.000	59.89	-12.35	47.54	74.00	-26.46	peak
2	2328.000	52.83	-9.38	43.45	74.00	-30.55	peak
3	2384.000	53.56	-9.08	44.48	74.00	-29.52	peak
4	2412.000	60.67	-8.94	51.73	/	/	fundamental
5	2532.000	55.91	-8.39	47.52	74.00	-26.48	peak
6	2568.000	56.04	-8.28	47.76	74.00	-26.24	peak

Test Mode:	802.11b	Channel:	2412
Polarity:	Vertical	Test Voltage:	DC 3.3 V



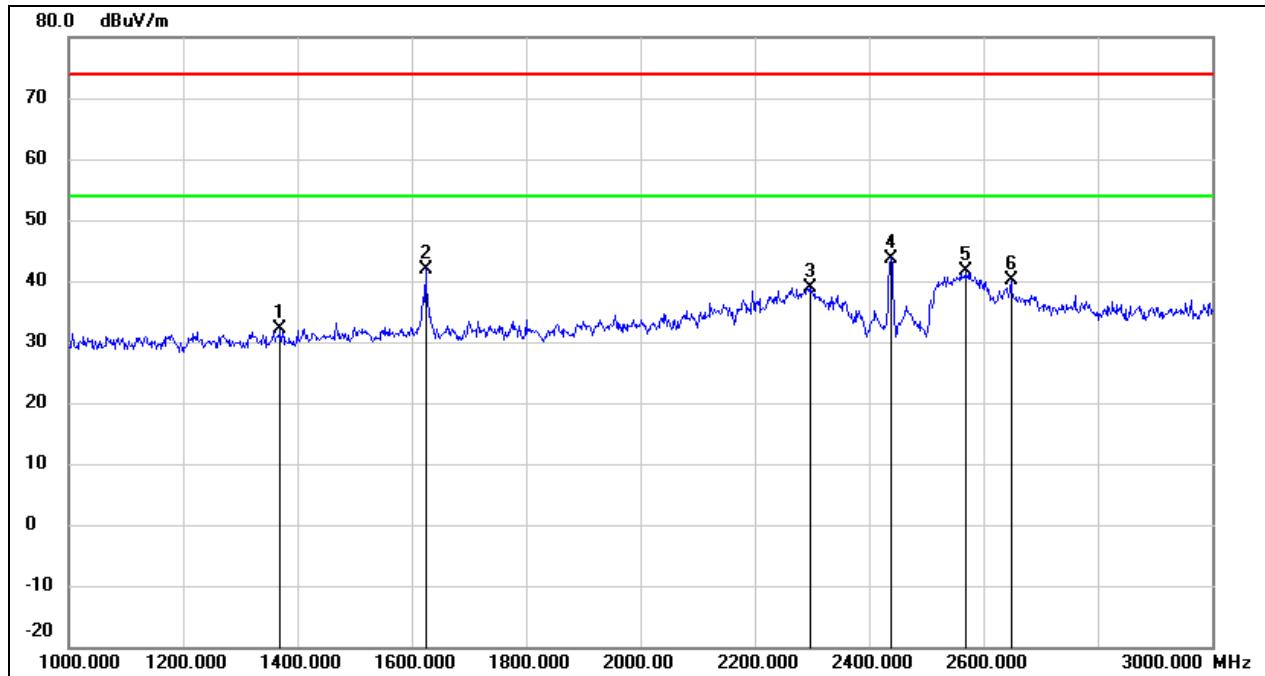
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1608.000	57.15	-12.35	44.80	74.00	-29.20	peak
2	2132.000	44.86	-10.39	34.47	74.00	-39.53	peak
3	2258.000	45.44	-9.74	35.70	74.00	-38.30	peak
4	2412.000	50.03	-8.94	41.09	/	/	fundamental
5	2578.000	46.19	-8.26	37.93	74.00	-36.07	peak
6	2786.000	44.09	-7.63	36.46	74.00	-37.54	peak

Test Mode:	802.11b	Channel:	2437
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



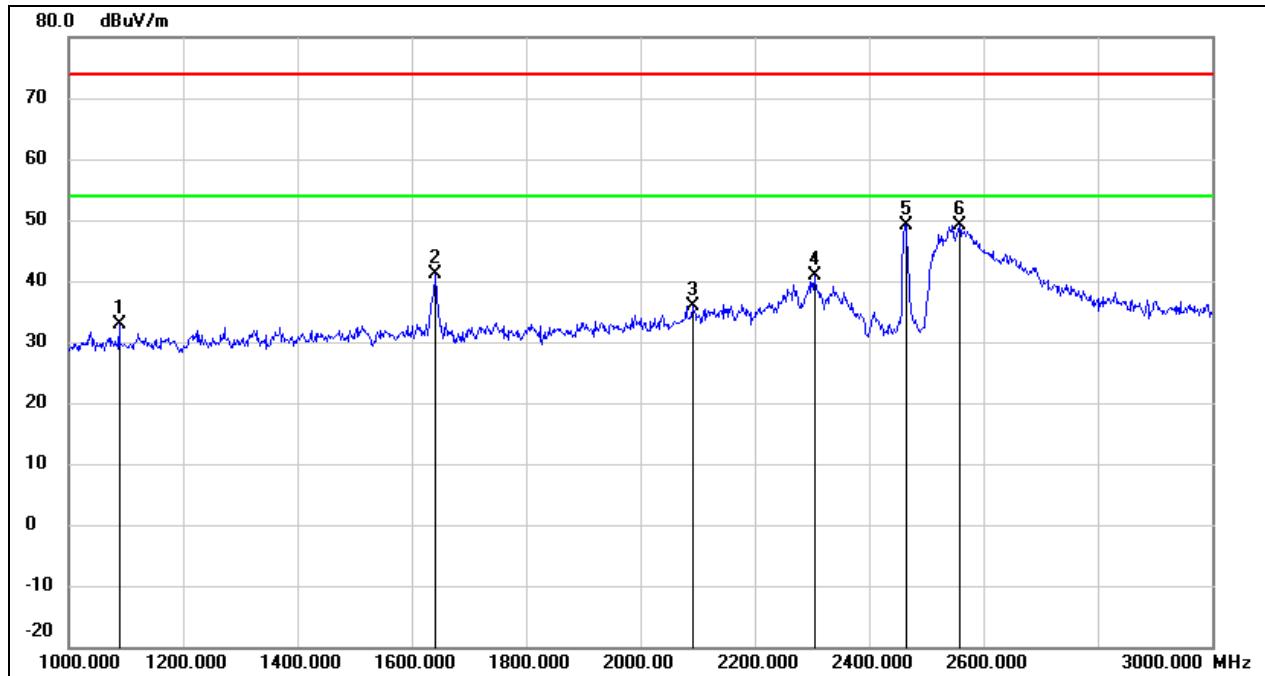
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1468.000	45.62	-12.86	32.76	74.00	-41.24	peak
2	1624.000	60.01	-12.30	47.71	74.00	-26.29	peak
3	2296.000	52.80	-9.54	43.26	74.00	-30.74	peak
4	2437.000	58.03	-8.80	49.23	/	/	fundamental
5	2552.000	56.30	-8.33	47.97	74.00	-26.03	peak
6	2902.000	44.60	-7.28	37.32	74.00	-36.68	peak

Test Mode:	802.11b	Channel:	2437
Polarity:	Vertical	Test Voltage:	DC 3.3 V



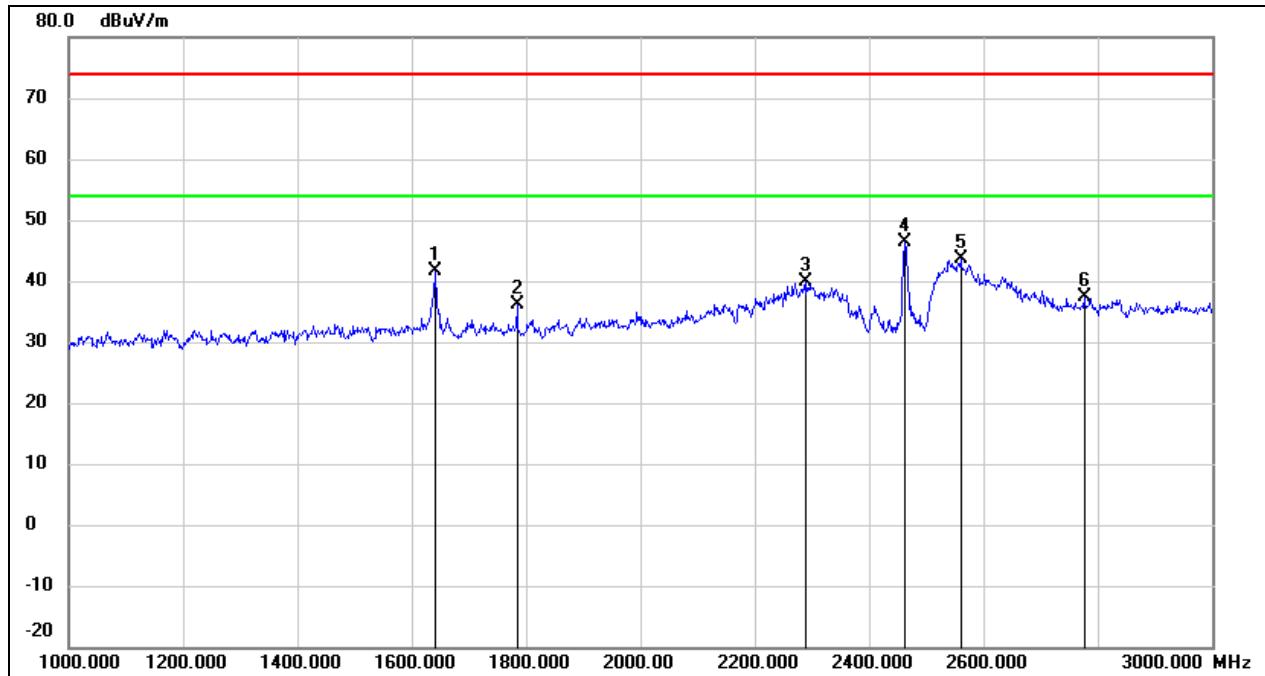
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1370.000	45.47	-13.31	32.16	74.00	-41.84	peak
2	1624.000	54.30	-12.30	42.00	74.00	-32.00	peak
3	2296.000	48.48	-9.54	38.94	74.00	-35.06	peak
4	2437.000	52.55	-8.80	43.75	/	/	fundamental
5	2570.000	49.79	-8.27	41.52	74.00	-32.48	peak
6	2648.000	48.18	-8.04	40.14	74.00	-33.86	peak

Test Mode:	802.11b	Channel:	2462
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1088.000	47.46	-14.62	32.84	74.00	-41.16	peak
2	1640.000	53.28	-12.24	41.04	74.00	-32.96	peak
3	2092.000	46.41	-10.59	35.82	74.00	-38.18	peak
4	2304.000	50.31	-9.50	40.81	74.00	-33.19	peak
5	2462.000	57.87	-8.68	49.19	/	/	fundamental
6	2558.000	57.43	-8.32	49.11	74.00	-24.89	peak

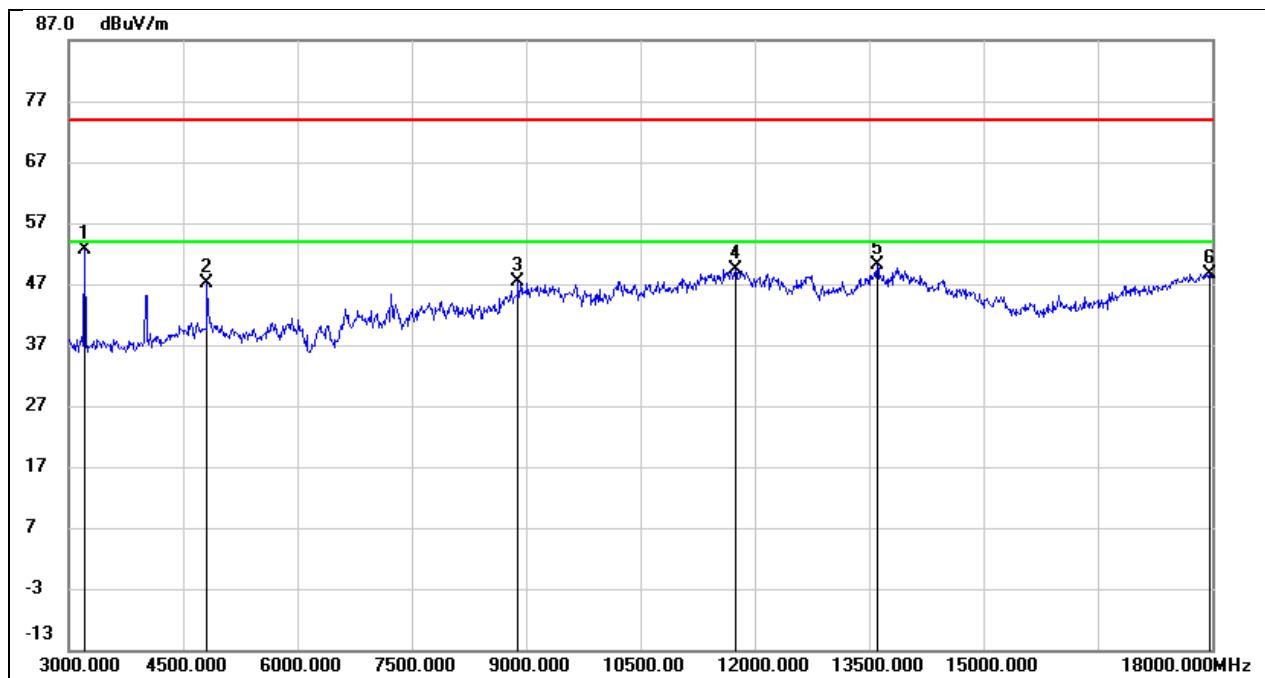
Test Mode:	802.11b	Channel:	2462
Polarity:	Vertical	Test Voltage:	DC 3.3 V



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1642.000	53.90	-12.24	41.66	74.00	-32.34	peak
2	1784.000	48.01	-11.77	36.24	74.00	-37.76	peak
3	2290.000	49.37	-9.58	39.79	74.00	-34.21	peak
4	2462.000	55.16	-8.69	46.47	/	/	fundamental
5	2560.000	52.03	-8.31	43.72	74.00	-30.28	peak
6	2776.000	44.92	-7.66	37.26	74.00	-36.74	peak

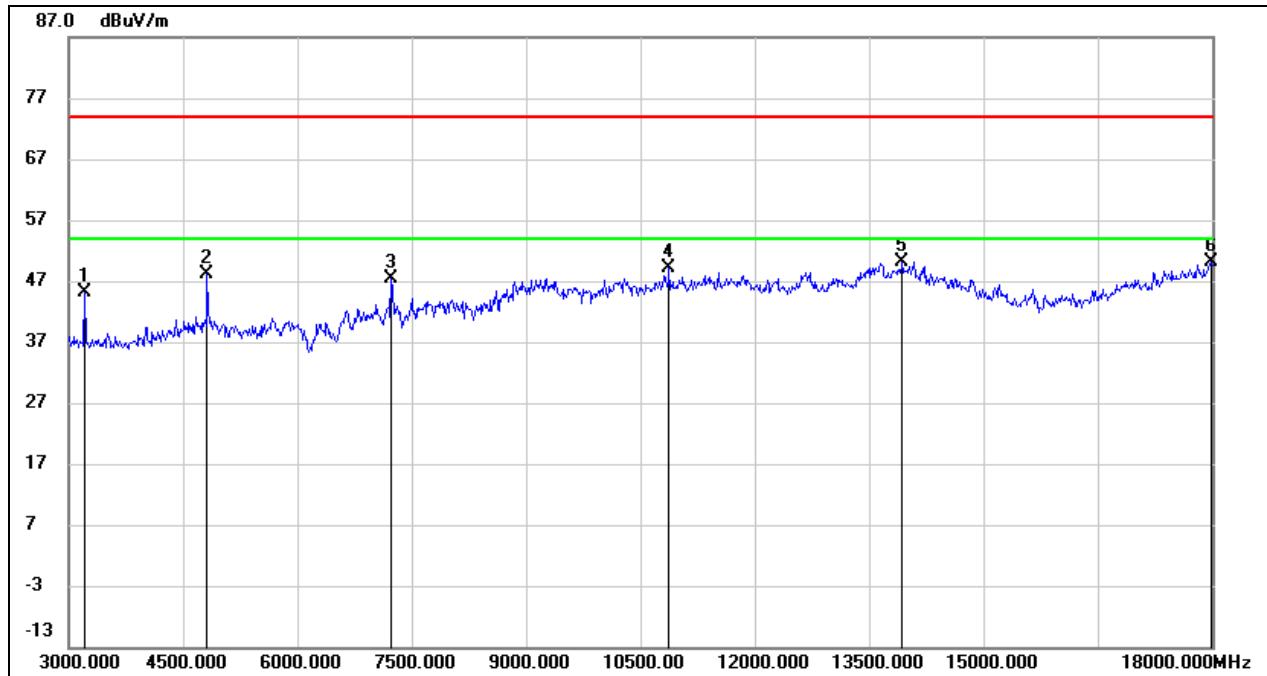
### 8.3. SPURIOUS EMISSIONS(3 GHZ~18 GHZ)

Test Mode:	802.11b	Channel:	2412
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



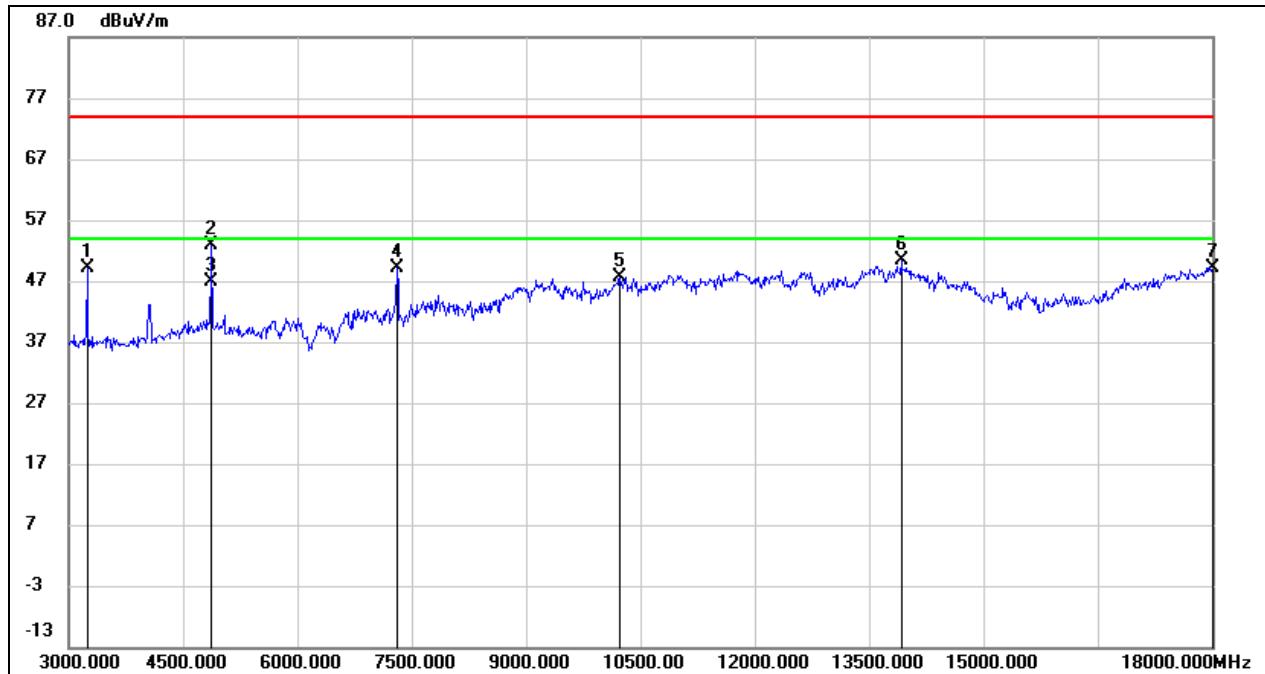
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3210.000	57.69	-5.12	52.57	74.00	-21.43	peak
2	4815.000	47.51	-0.26	47.25	74.00	-26.75	peak
3	8895.000	37.56	9.71	47.27	74.00	-26.73	peak
4	11745.000	32.07	17.27	49.34	74.00	-24.66	peak
5	13605.000	28.98	21.12	50.10	74.00	-23.90	peak
6	17970.000	23.16	25.51	48.67	74.00	-25.33	peak

Test Mode:	802.11b	Channel:	2412
Polarity:	Vertical	Test Voltage:	DC 3.3 V



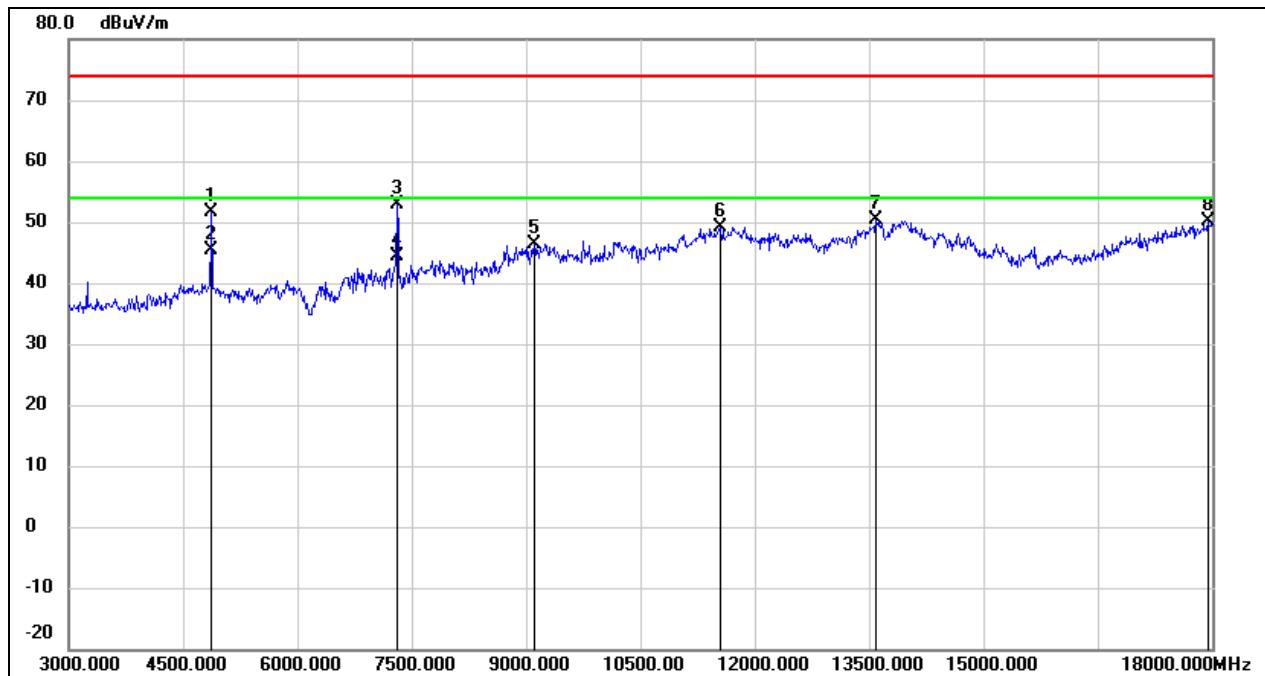
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3210.000	50.22	-5.12	45.10	74.00	-28.90	peak
2	4815.000	48.29	-0.26	48.03	74.00	-25.97	peak
3	7230.000	40.97	6.53	47.50	74.00	-26.50	peak
4	10875.000	34.78	14.32	49.10	74.00	-24.90	peak
5	13935.000	28.32	21.82	50.14	74.00	-23.86	peak
6	17985.000	24.42	25.60	50.02	74.00	-23.98	peak

Test Mode:	802.11b	Channel:	2437
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



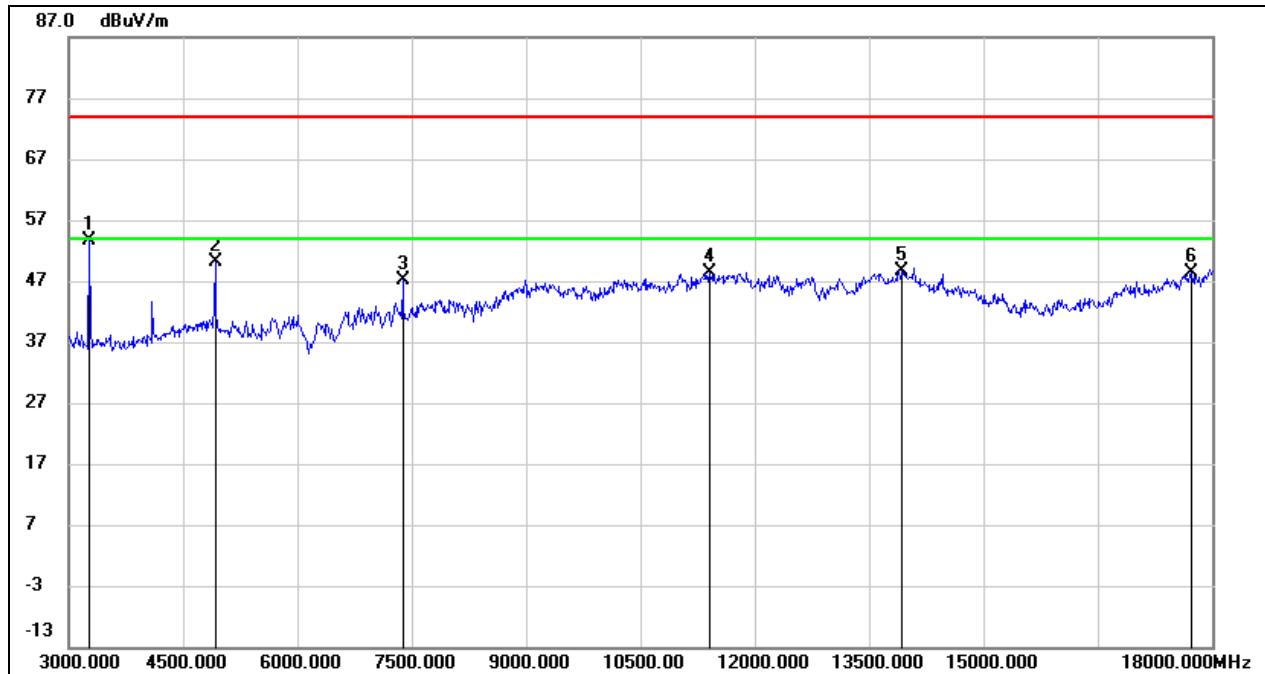
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3240.000	54.18	-5.11	49.07	74.00	-24.93	peak
2	4875.000	52.95	-0.03	52.92	74.00	-21.08	peak
3	4875.000	46.85	-0.03	46.82	54.00	-7.18	AVG
4	7305.000	42.68	6.47	49.15	74.00	-24.85	peak
5	10230.000	35.19	12.46	47.65	74.00	-26.35	peak
6	13920.000	28.48	21.79	50.27	74.00	-23.73	peak
7	18000.000	23.52	25.69	49.21	74.00	-24.79	peak

Test Mode:	802.11b	Channel:	2437
Polarity:	Vertical	Test Voltage:	DC 3.3 V



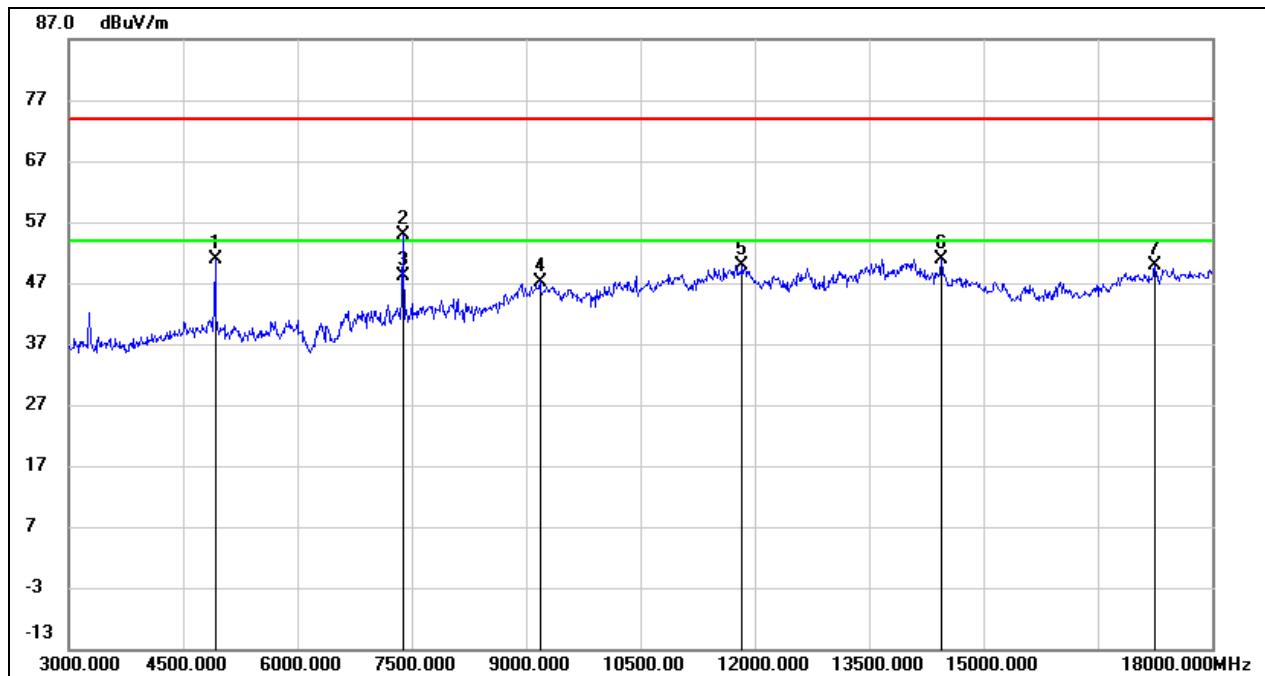
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4875.000	51.63	-0.03	51.60	74.00	-22.40	peak
2	4875.000	45.51	-0.03	45.48	54.00	-8.52	AVG
3	7305.000	46.40	6.47	52.87	74.00	-21.13	peak
4	7305.000	37.99	6.47	44.46	54.00	-9.54	AVG
5	9105.000	35.77	10.53	46.30	74.00	-27.70	peak
6	11550.000	32.45	16.74	49.19	74.00	-24.81	peak
7	13590.000	29.24	21.09	50.33	74.00	-23.67	peak
8	17940.000	24.82	25.34	50.16	74.00	-23.84	peak

Test Mode:	802.11b	Channel:	2462
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



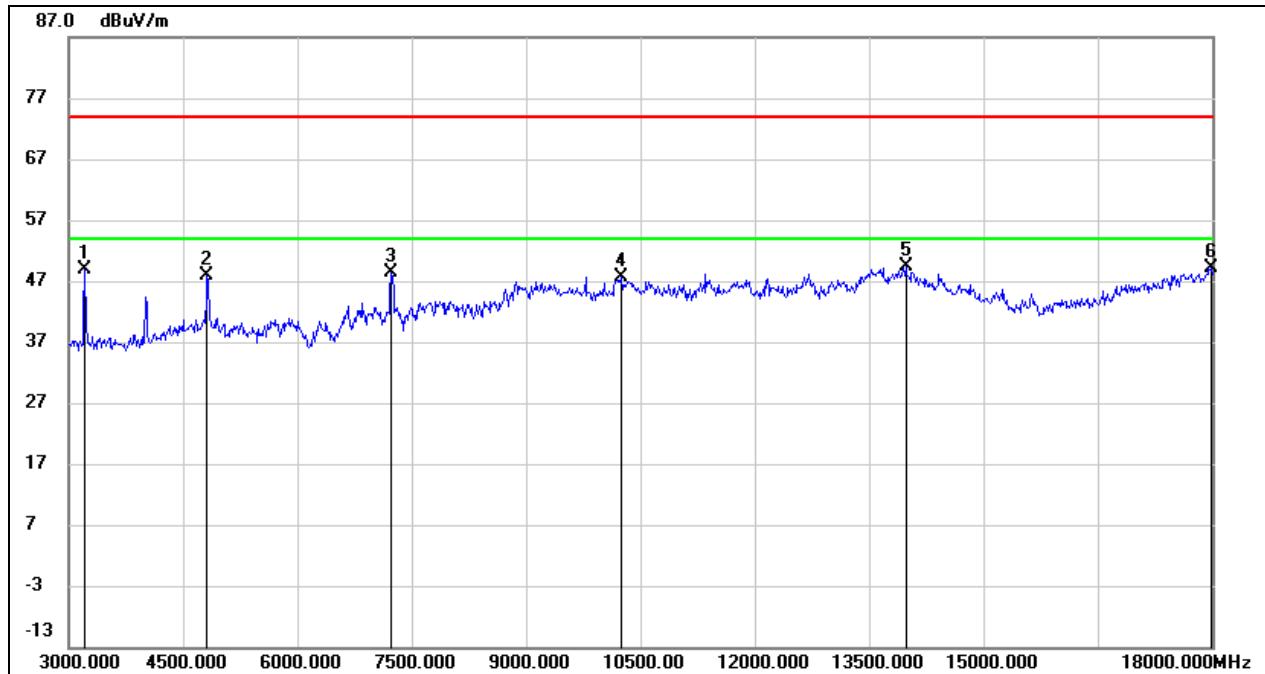
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3270.000	58.74	-5.09	53.65	74.00	-20.35	peak
2	4920.000	50.02	0.14	50.16	74.00	-23.84	peak
3	7380.000	40.78	6.42	47.20	74.00	-26.80	peak
4	11400.000	32.11	16.23	48.34	74.00	-25.66	peak
5	13920.000	26.77	21.79	48.56	74.00	-25.44	peak
6	17730.000	24.40	24.09	48.49	74.00	-25.51	peak

Test Mode:	802.11b	Channel:	2462
Polarity:	Vertical	Test Voltage:	DC 3.3 V



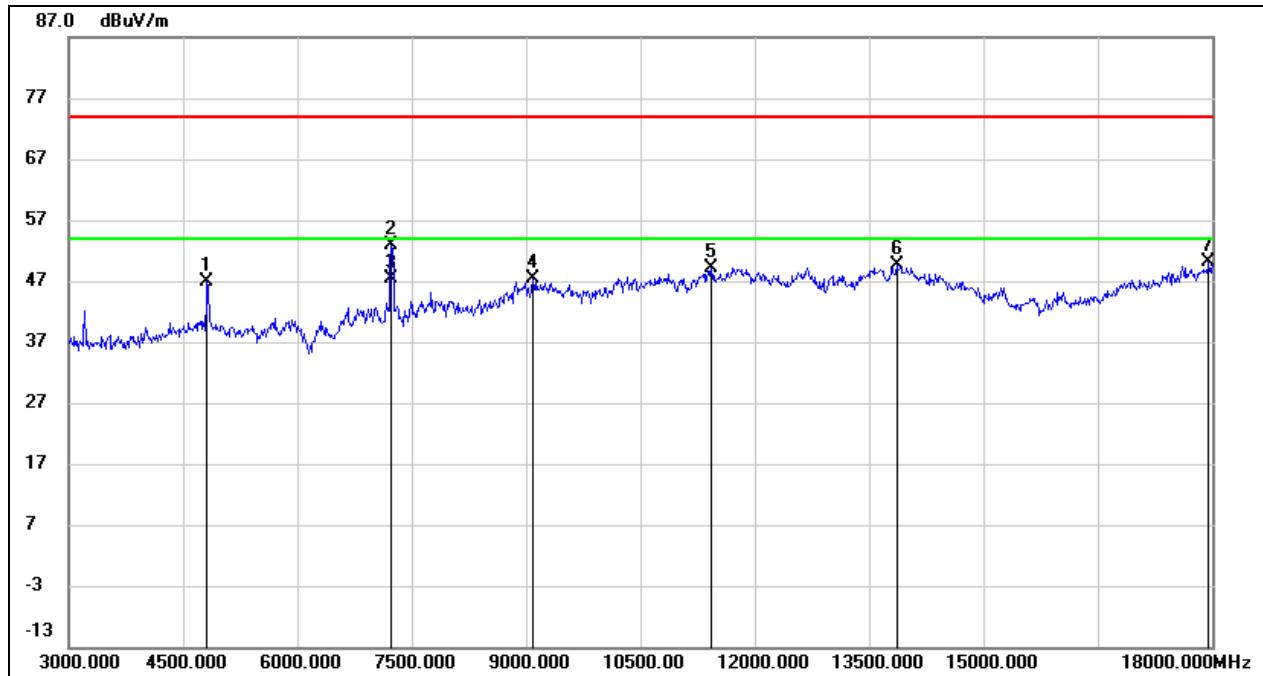
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4920.000	50.68	0.14	50.82	74.00	-23.18	peak
2	7380.000	48.57	6.42	54.99	74.00	-19.01	peak
3	7380.000	41.81	6.42	48.23	54.00	-5.77	AVG
4	9180.000	36.69	10.56	47.25	74.00	-26.75	peak
5	11835.000	32.36	17.51	49.87	74.00	-24.13	peak
6	14445.000	30.80	20.14	50.94	74.00	-23.06	peak
7	17250.000	27.98	21.81	49.79	74.00	-24.21	peak

Test Mode:	802.11g	Channel:	2412
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



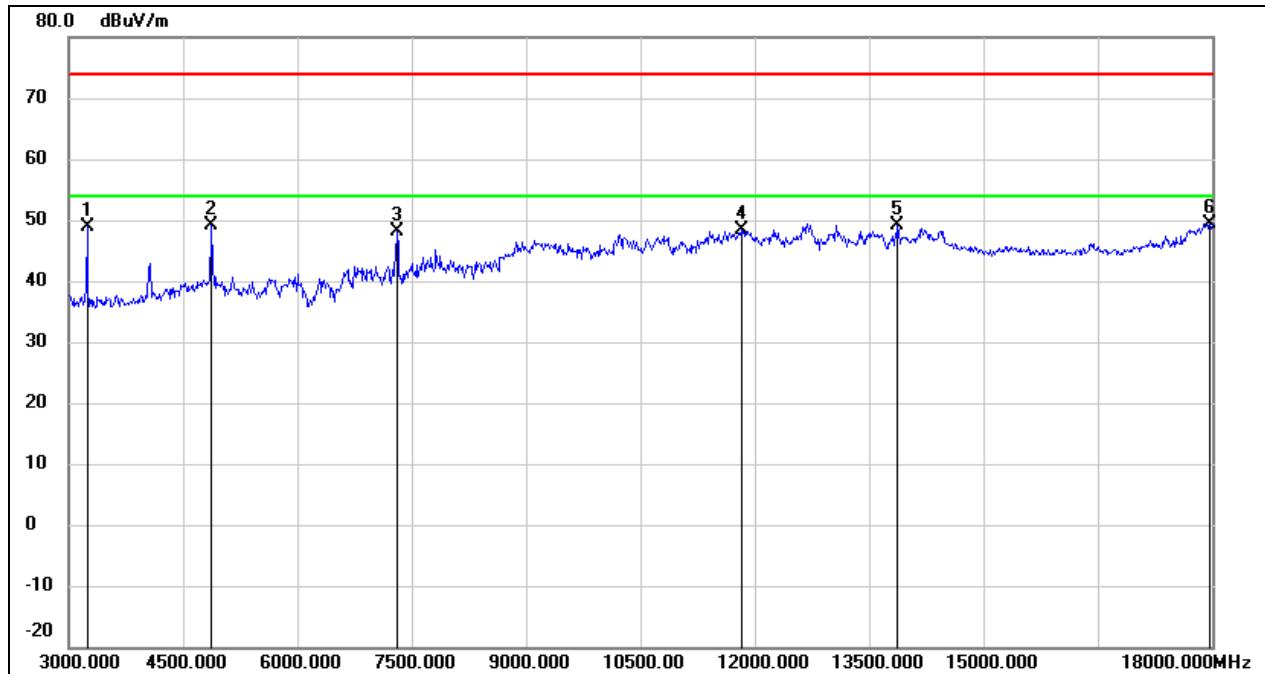
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3210.000	54.04	-5.12	48.92	74.00	-25.08	peak
2	4815.000	48.26	-0.26	48.00	74.00	-26.00	peak
3	7230.000	41.83	6.53	48.36	74.00	-25.64	peak
4	10245.000	35.19	12.48	47.67	74.00	-26.33	peak
5	13980.000	27.57	21.92	49.49	74.00	-24.51	peak
6	17985.000	23.43	25.60	49.03	74.00	-24.97	peak

Test Mode:	802.11g	Channel:	2412
Polarity:	Vertical	Test Voltage:	DC 3.3 V



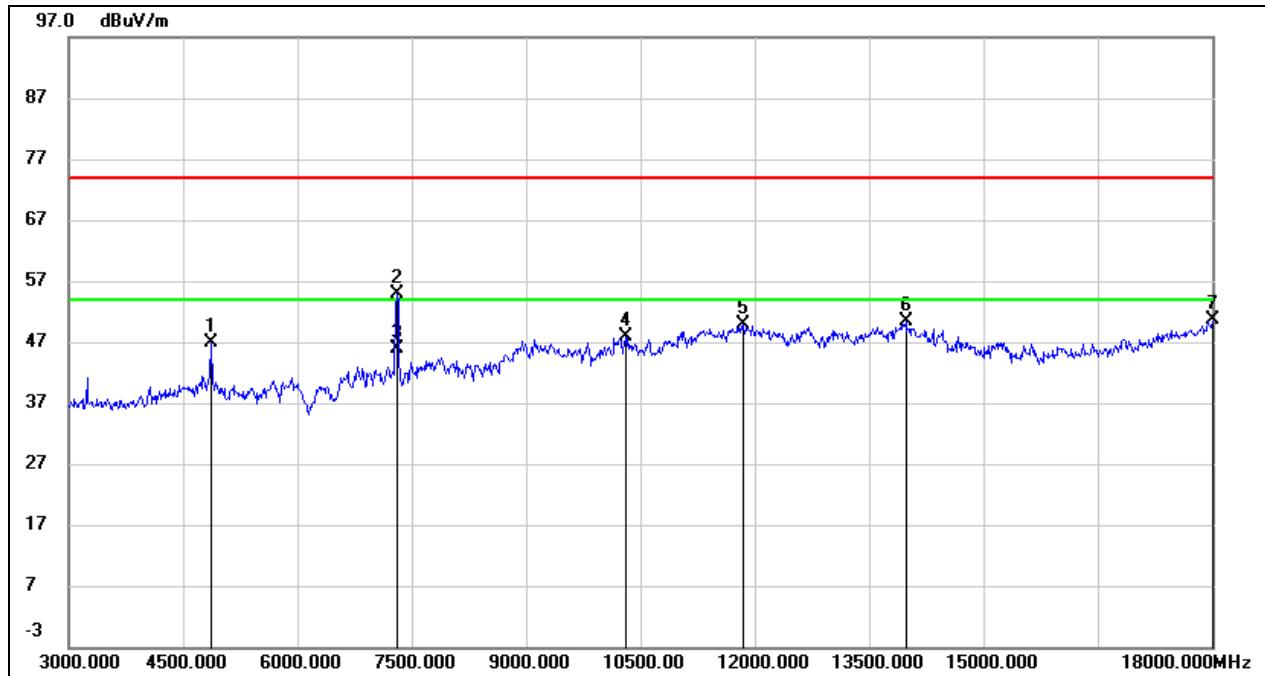
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4815.000	47.07	-0.26	46.81	74.00	-27.19	peak
2	7230.000	46.46	6.53	52.99	74.00	-21.01	peak
3	7230.000	40.73	6.53	47.26	54.00	-6.74	AVG
4	9090.000	36.91	10.51	47.42	74.00	-26.58	peak
5	11430.000	32.91	16.34	49.25	74.00	-24.75	peak
6	13860.000	27.92	21.67	49.59	74.00	-24.41	peak
7	17955.000	24.80	25.42	50.22	74.00	-23.78	peak

Test Mode:	802.11g	Channel:	2437
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



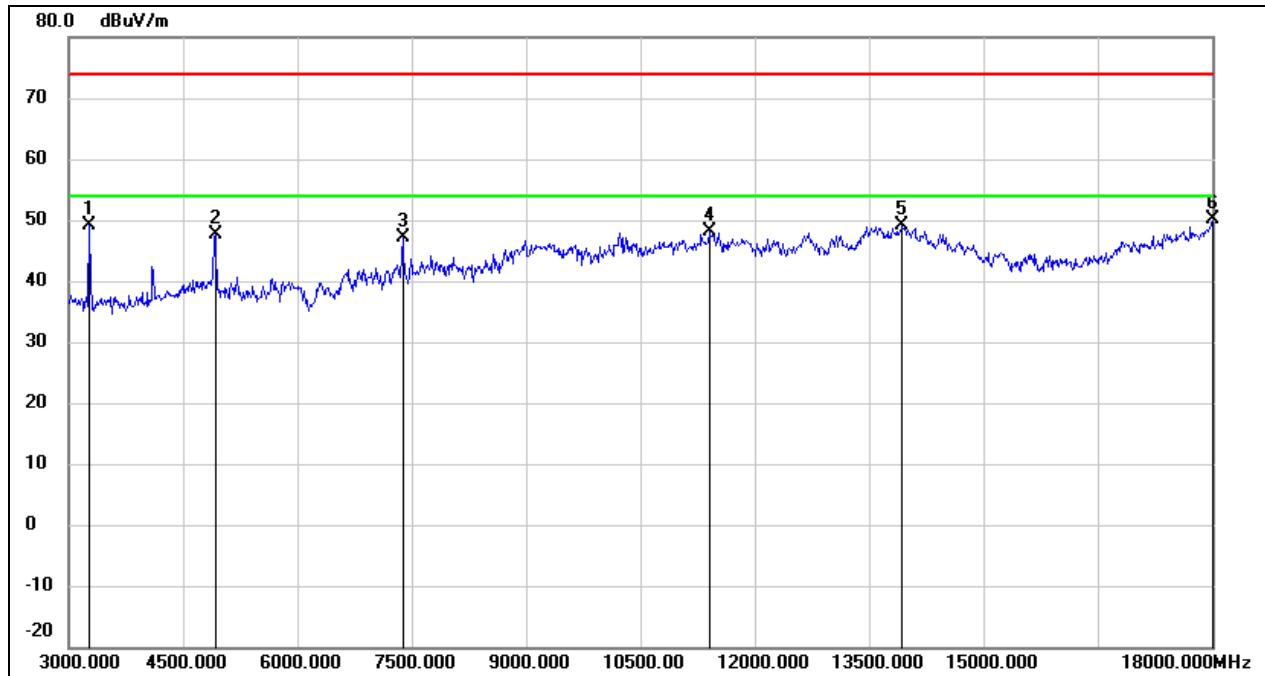
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3240.000	53.94	-5.11	48.83	74.00	-25.17	peak
2	4875.000	49.09	-0.03	49.06	74.00	-24.94	peak
3	7305.000	41.57	6.47	48.04	74.00	-25.96	peak
4	11820.000	30.92	17.47	48.39	74.00	-25.61	peak
5	13875.000	27.38	21.70	49.08	74.00	-24.92	peak
6	17970.000	23.97	25.51	49.48	74.00	-24.52	peak

Test Mode:	802.11g	Channel:	2437
Polarity:	Vertical	Test Voltage:	DC 3.3 V



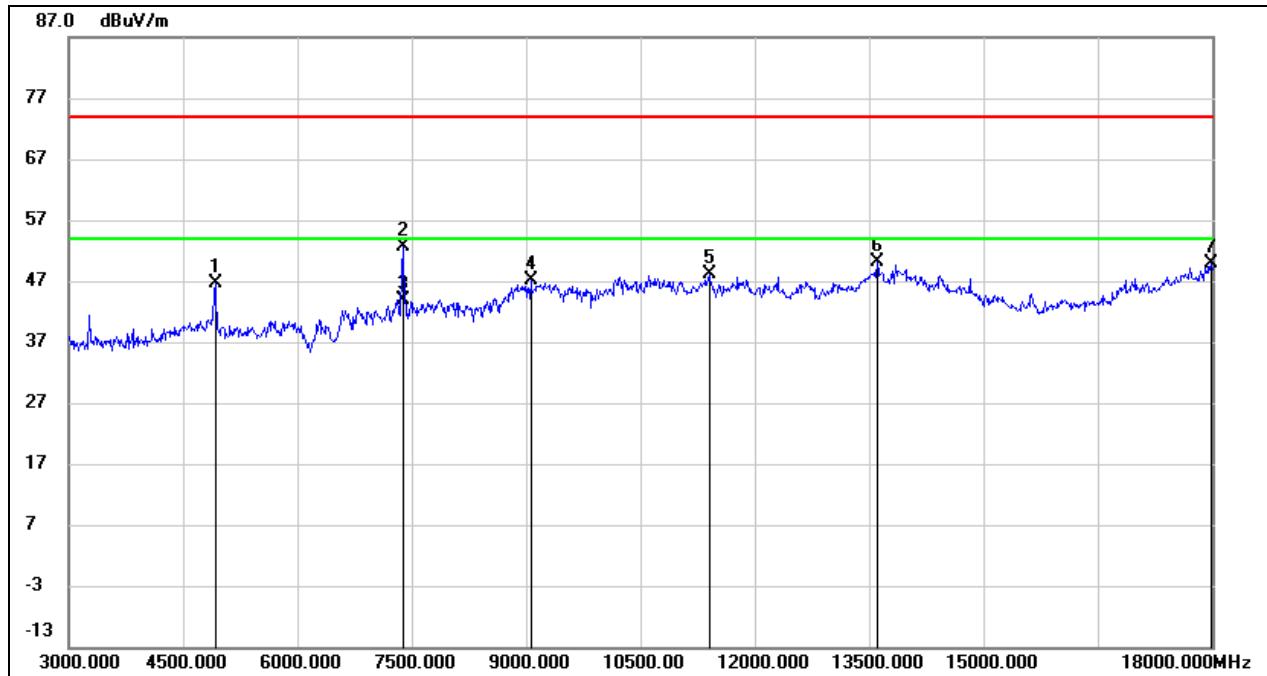
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4860.000	46.90	-0.09	46.81	74.00	-27.19	peak
2	7305.000	48.39	6.47	54.86	74.00	-19.14	peak
3	7305.000	39.45	6.47	45.92	54.00	-8.08	AVG
4	10305.000	35.30	12.61	47.91	74.00	-26.09	peak
5	11850.000	32.25	17.56	49.81	74.00	-24.19	peak
6	13980.000	28.35	21.92	50.27	74.00	-23.73	peak
7	18000.000	24.95	25.69	50.64	74.00	-23.36	peak

Test Mode:	802.11g	Channel:	2462
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



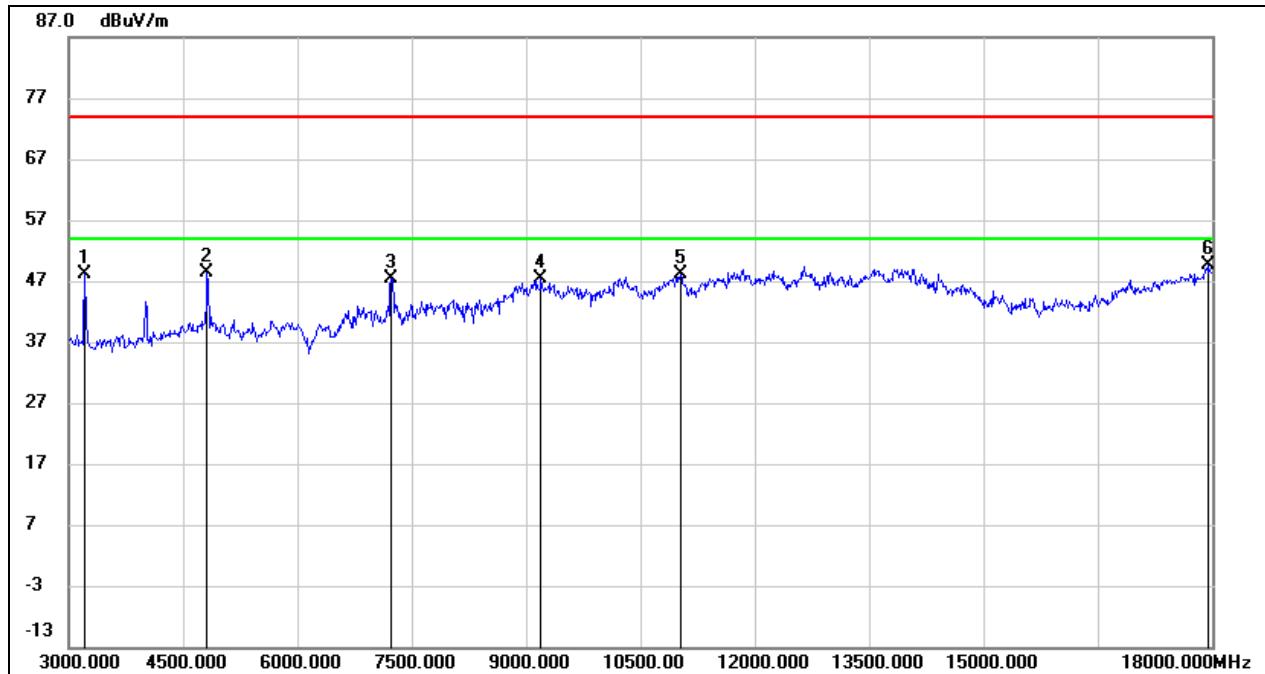
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3270.000	54.14	-5.09	49.05	74.00	-24.95	peak
2	4920.000	47.56	0.14	47.70	74.00	-26.30	peak
3	7380.000	40.76	6.42	47.18	74.00	-26.82	peak
4	11400.000	31.88	16.23	48.11	74.00	-25.89	peak
5	13935.000	27.20	21.82	49.02	74.00	-24.98	peak
6	18000.000	24.53	25.69	50.22	74.00	-23.78	peak

Test Mode:	802.11g	Channel:	2462
Polarity:	Vertical	Test Voltage:	DC 3.3 V



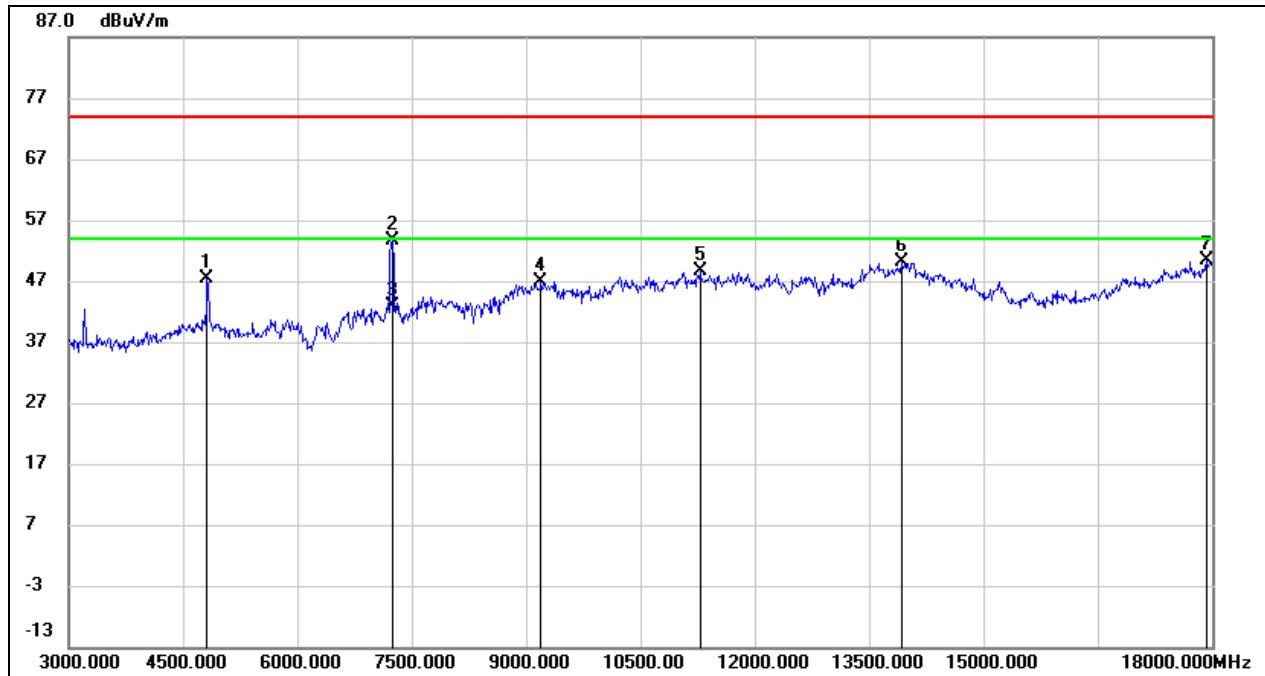
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4920.000	46.47	0.14	46.61	74.00	-27.39	peak
2	7380.000	46.18	6.42	52.60	74.00	-21.40	peak
3	7380.000	37.34	6.42	43.76	54.00	-10.24	AVG
4	9060.000	36.64	10.51	47.15	74.00	-26.85	peak
5	11400.000	31.94	16.23	48.17	74.00	-25.83	peak
6	13605.000	29.08	21.12	50.20	74.00	-23.80	peak
7	17985.000	24.24	25.60	49.84	74.00	-24.16	peak

Test Mode:	802.11n HT20	Channel:	2412
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



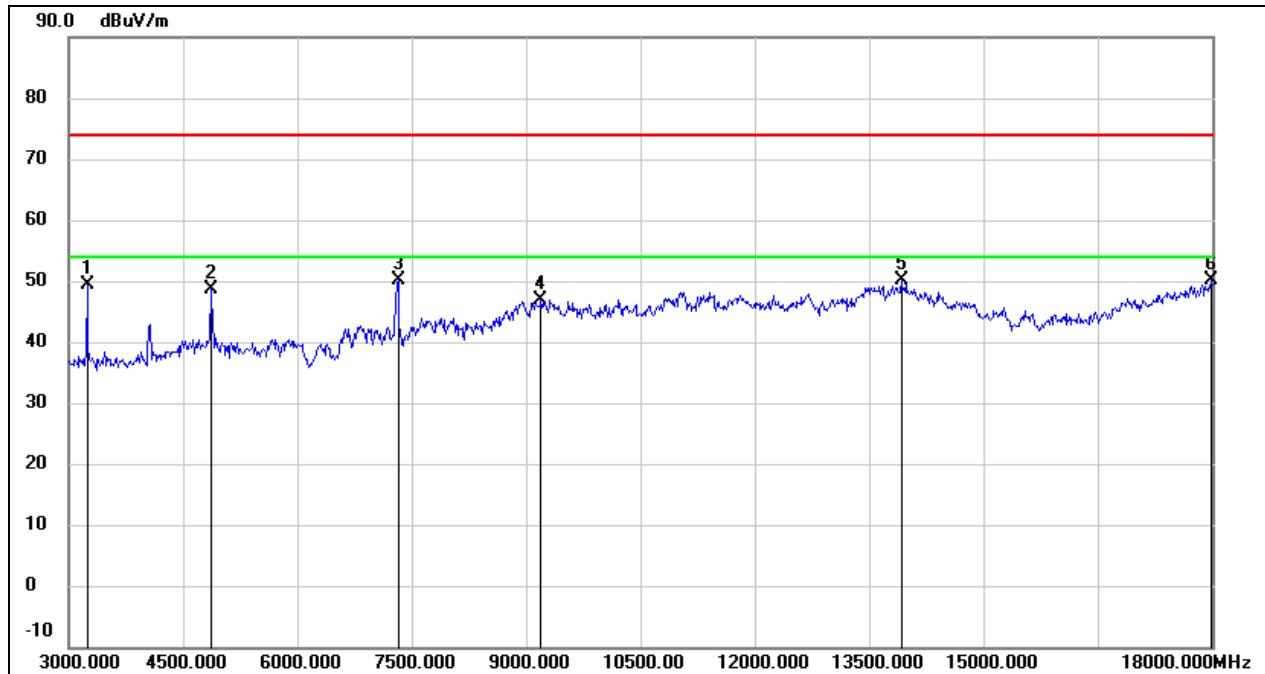
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3210.000	53.29	-5.12	48.17	74.00	-25.83	peak
2	4815.000	48.74	-0.26	48.48	74.00	-25.52	peak
3	7230.000	40.91	6.53	47.44	74.00	-26.56	peak
4	9195.000	36.78	10.56	47.34	74.00	-26.66	peak
5	11025.000	33.24	14.85	48.09	74.00	-25.91	peak
6	17940.000	24.40	25.34	49.74	74.00	-24.26	peak

Test Mode:	802.11n HT20	Channel:	2412
Polarity:	Vertical	Test Voltage:	DC 3.3 V



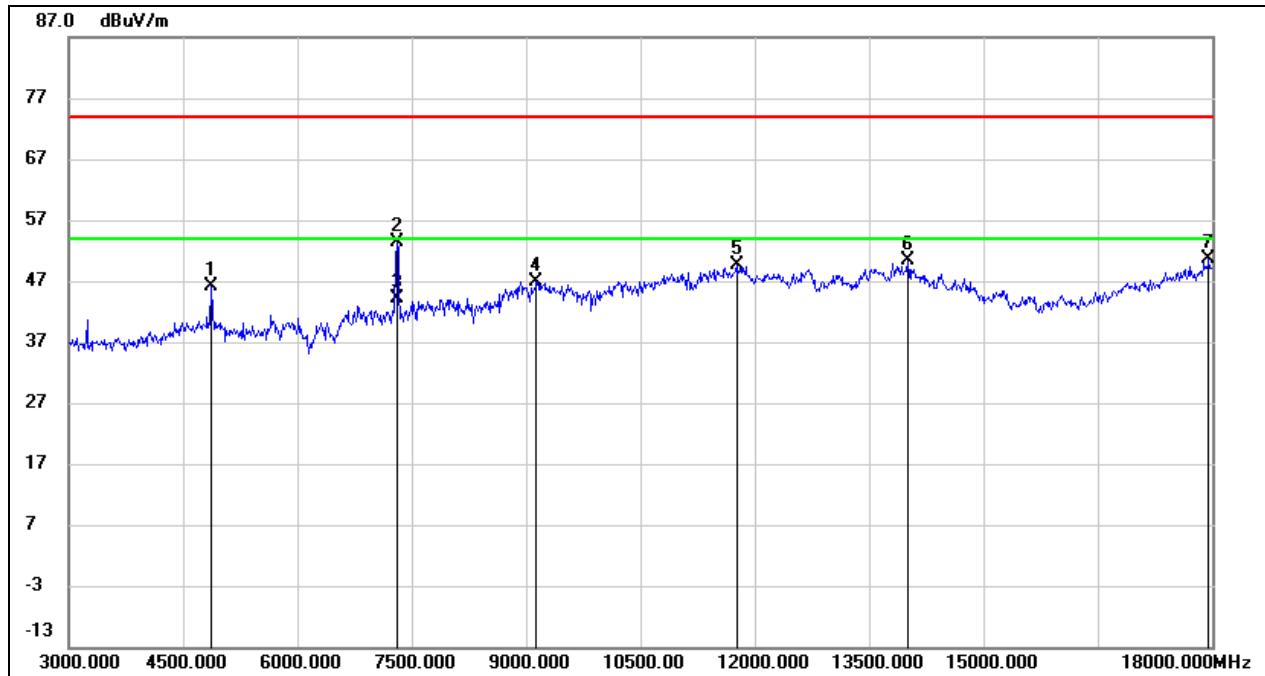
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4815.000	47.66	-0.26	47.40	74.00	-26.60	peak
2	7245.000	47.13	6.51	53.64	74.00	-20.36	peak
3	7245.000	36.32	6.51	42.83	54.00	-11.17	AVG
4	9195.000	36.43	10.56	46.99	74.00	-27.01	peak
5	11280.000	32.90	15.80	48.70	74.00	-25.30	peak
6	13920.000	28.38	21.79	50.17	74.00	-23.83	peak
7	17925.000	25.01	25.25	50.26	74.00	-23.74	peak

Test Mode:	802.11n HT20	Channel:	2437
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



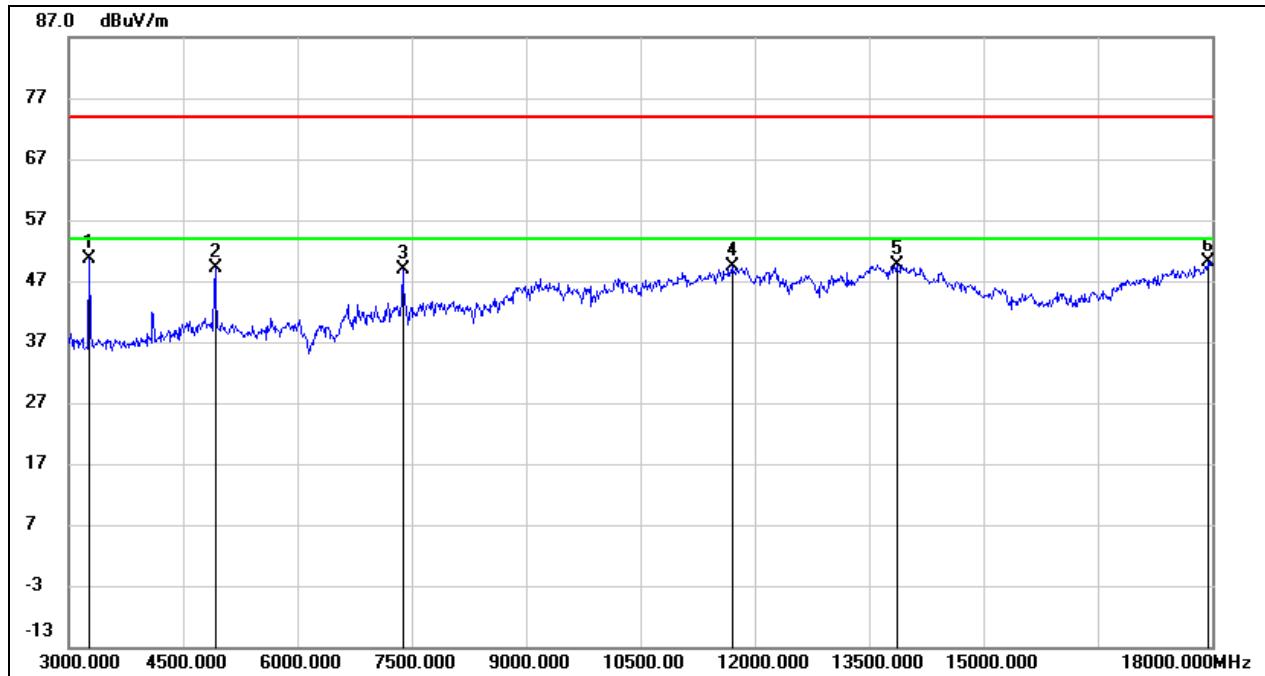
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3240.000	54.44	-5.11	49.33	74.00	-24.67	peak
2	4860.000	48.82	-0.09	48.73	74.00	-25.27	peak
3	7320.000	43.77	6.46	50.23	74.00	-23.77	peak
4	9195.000	36.22	10.56	46.78	74.00	-27.22	peak
5	13920.000	28.29	21.79	50.08	74.00	-23.92	peak
6	17985.000	24.50	25.60	50.10	74.00	-23.90	peak

Test Mode:	802.11n HT20	Channel:	2437
Polarity:	Vertical	Test Voltage:	DC 3.3 V



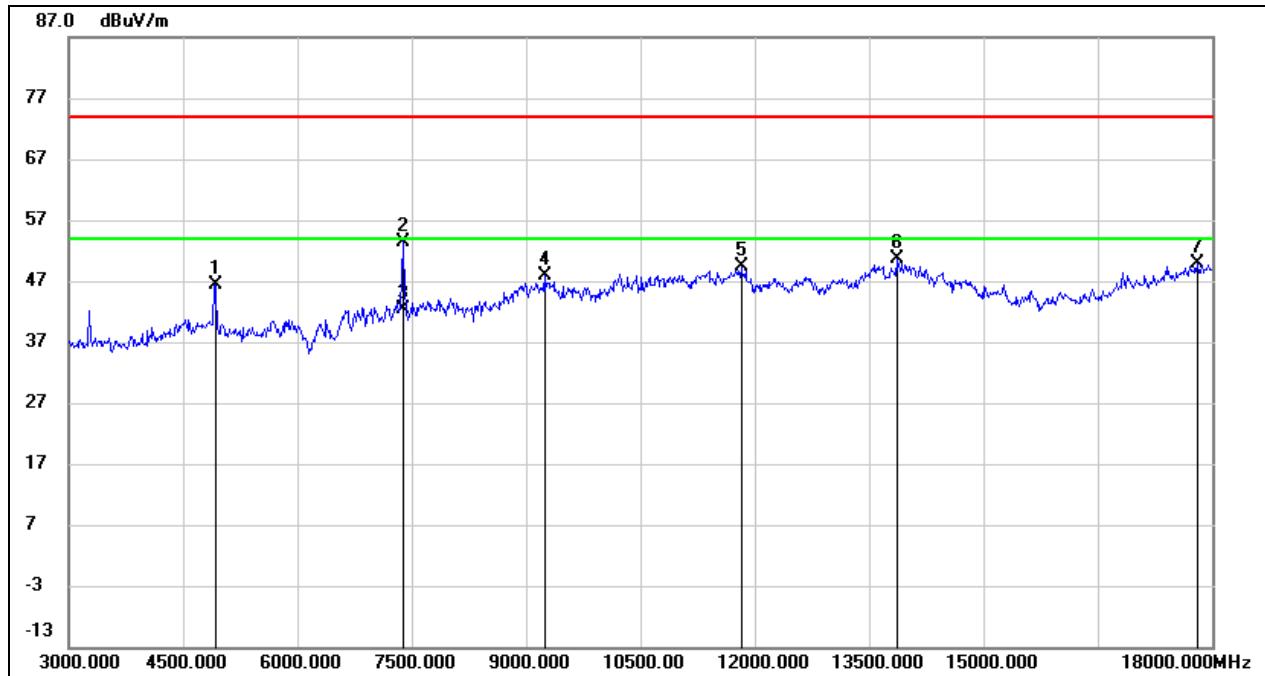
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4875.000	46.16	-0.03	46.13	74.00	-27.87	peak
2	7305.000	47.01	6.47	53.48	74.00	-20.52	peak
3	7305.000	37.74	6.47	44.21	54.00	-9.79	AVG
4	9135.000	36.40	10.55	46.95	74.00	-27.05	peak
5	11760.000	32.25	17.31	49.56	74.00	-24.44	peak
6	14010.000	28.42	21.93	50.35	74.00	-23.65	peak
7	17955.000	25.14	25.42	50.56	74.00	-23.44	peak

Test Mode:	802.11n HT20	Channel:	2462
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



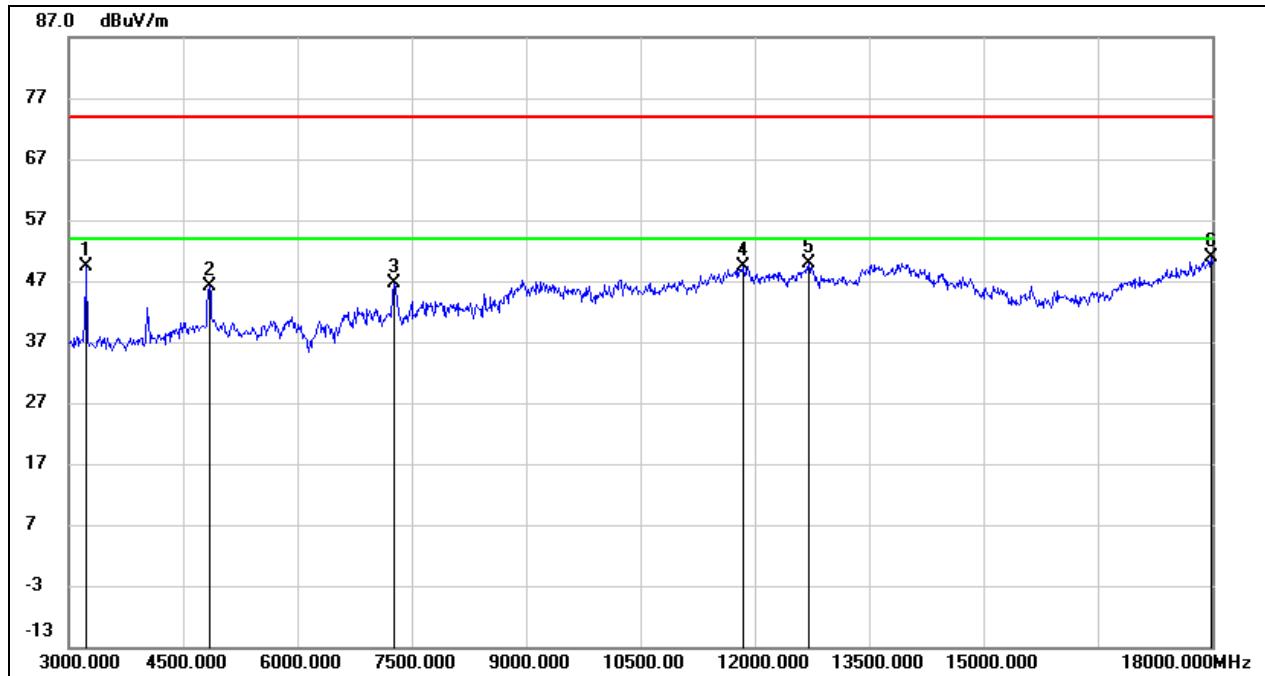
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3270.000	55.77	-5.09	50.68	74.00	-23.32	peak
2	4920.000	49.06	0.14	49.20	74.00	-24.80	peak
3	7380.000	42.35	6.42	48.77	74.00	-25.23	peak
4	11700.000	32.31	17.14	49.45	74.00	-24.55	peak
5	13860.000	27.93	21.67	49.60	74.00	-24.40	peak
6	17940.000	24.90	25.34	50.24	74.00	-23.76	peak

Test Mode:	802.11n HT20	Channel:	2462
Polarity:	Vertical	Test Voltage:	DC 3.3 V



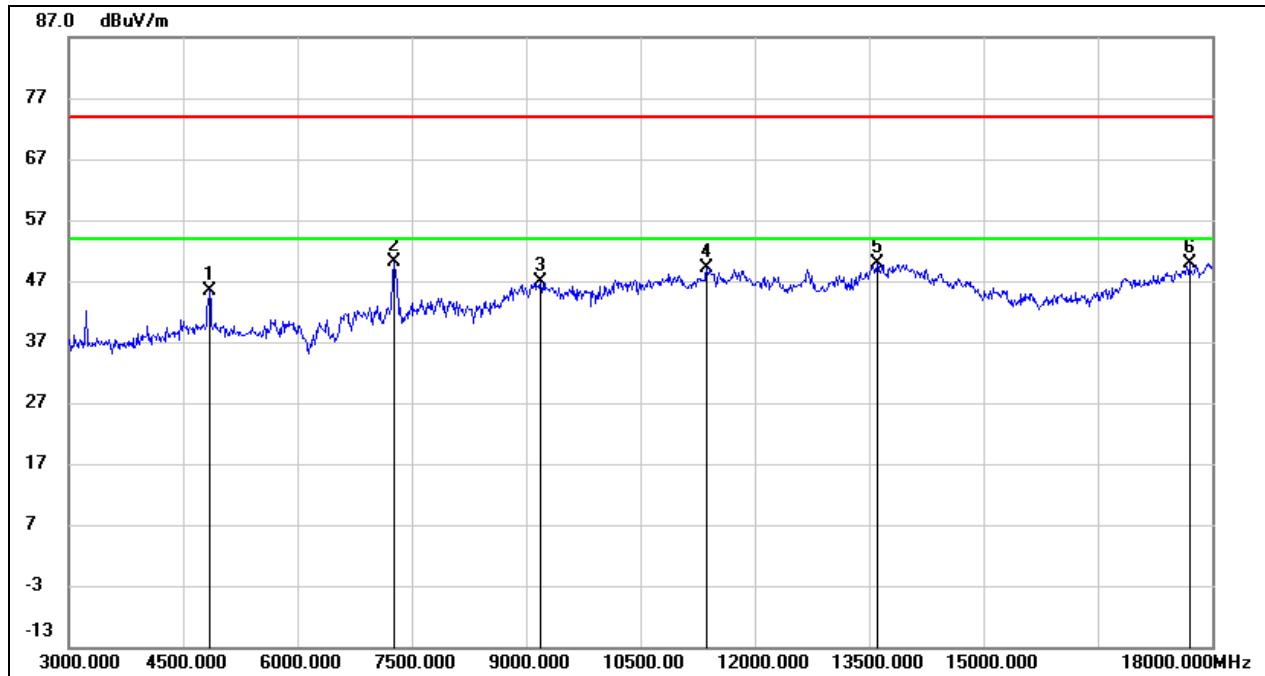
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4920.000	46.26	0.14	46.40	74.00	-27.60	peak
2	7380.000	46.94	6.42	53.36	74.00	-20.64	peak
3	7380.000	35.87	6.42	42.29	54.00	-11.71	AVG
4	9240.000	37.19	10.58	47.77	74.00	-26.23	peak
5	11820.000	31.84	17.47	49.31	74.00	-24.69	peak
6	13860.000	29.03	21.67	50.70	74.00	-23.30	peak
7	17805.000	25.22	24.54	49.76	74.00	-24.24	peak

Test Mode:	802.11n HT40	Channel:	2422
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



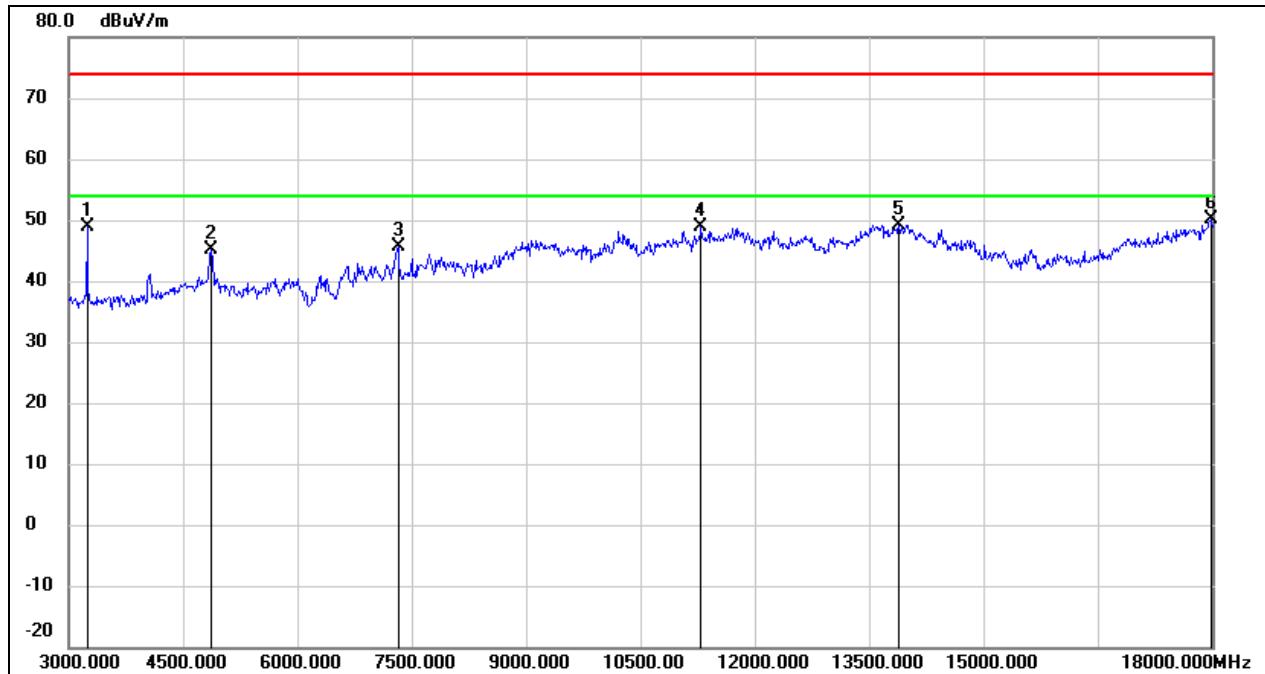
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3225.000	54.38	-5.11	49.27	74.00	-24.73	peak
2	4845.000	46.29	-0.15	46.14	74.00	-27.86	peak
3	7275.000	40.26	6.49	46.75	74.00	-27.25	peak
4	11850.000	31.83	17.56	49.39	74.00	-24.61	peak
5	12705.000	31.76	18.06	49.82	74.00	-24.18	peak
6	17985.000	25.16	25.60	50.76	74.00	-23.24	peak

Test Mode:	802.11n HT40	Channel:	2422
Polarity:	Vertical	Test Voltage:	DC 3.3 V



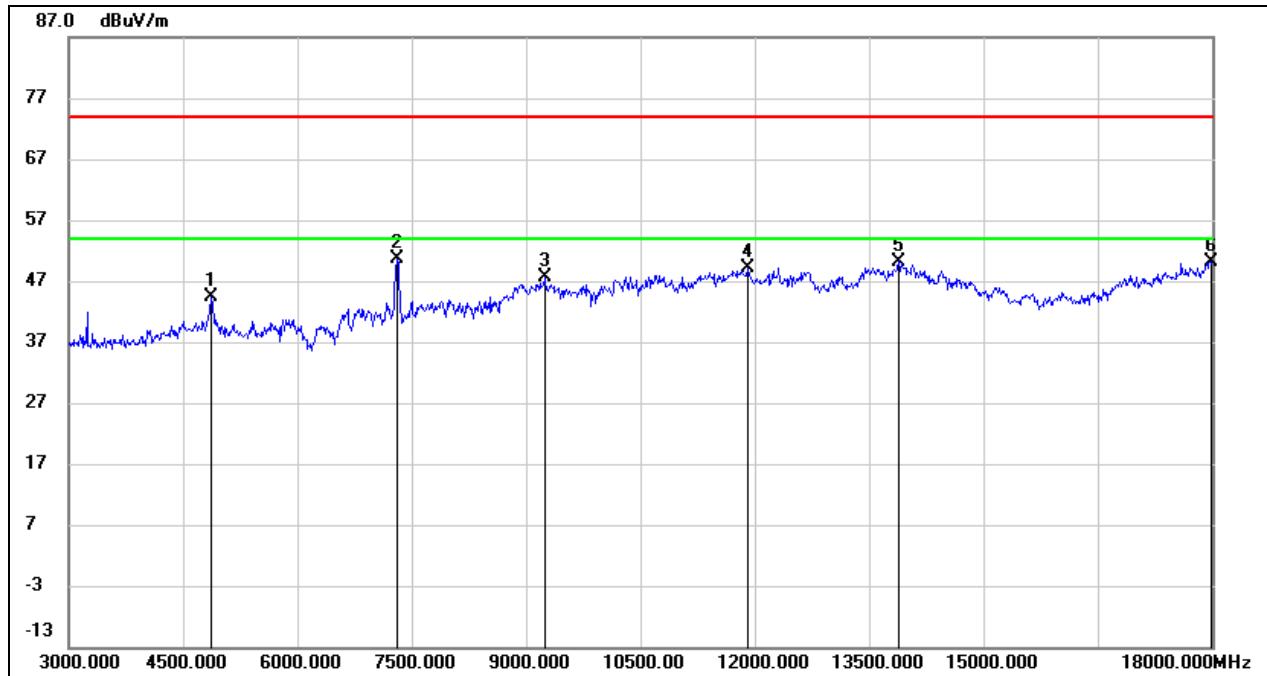
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4845.000	45.60	-0.15	45.45	74.00	-28.55	peak
2	7275.000	43.73	6.49	50.22	74.00	-23.78	peak
3	9180.000	36.30	10.56	46.86	74.00	-27.14	peak
4	11370.000	33.02	16.12	49.14	74.00	-24.86	peak
5	13605.000	28.66	21.12	49.78	74.00	-24.22	peak
6	17700.000	26.01	23.91	49.92	74.00	-24.08	peak

Test Mode:	802.11n HT40	Channel:	2437
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



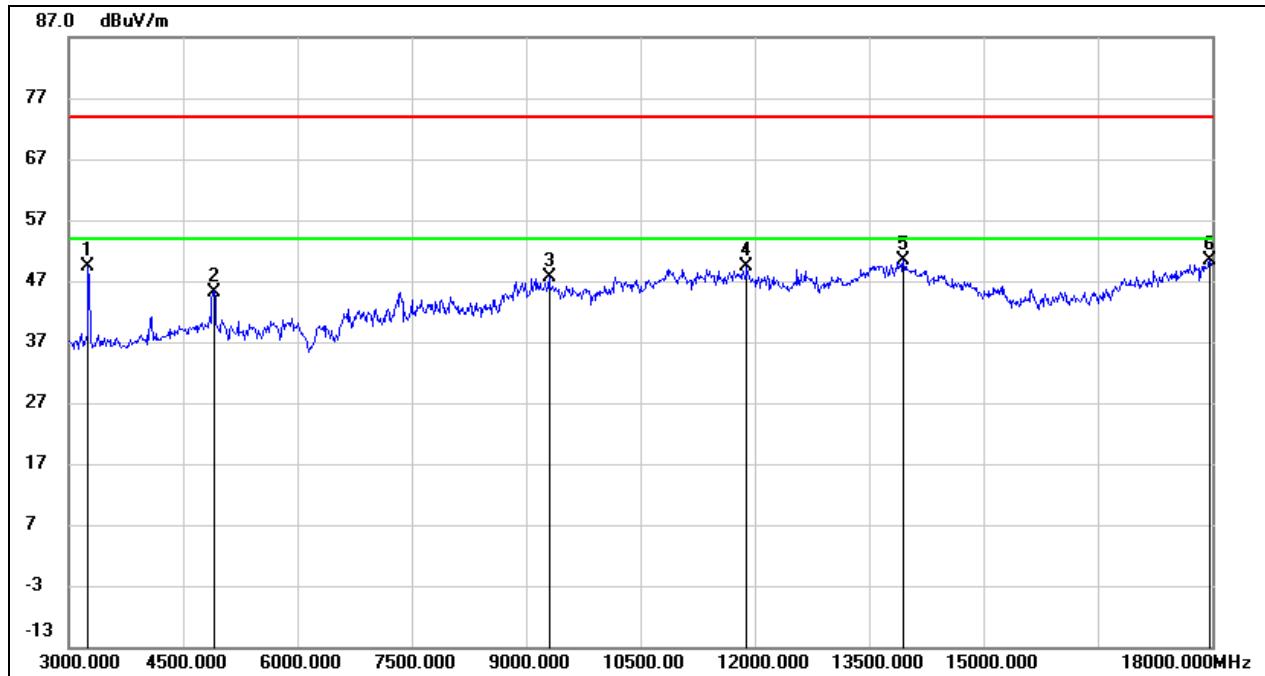
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3240.000	54.01	-5.11	48.90	74.00	-25.10	peak
2	4875.000	45.09	-0.03	45.06	74.00	-28.94	peak
3	7320.000	39.22	6.46	45.68	74.00	-28.32	peak
4	11295.000	33.10	15.85	48.95	74.00	-25.05	peak
5	13890.000	27.42	21.72	49.14	74.00	-24.86	peak
6	17985.000	24.43	25.60	50.03	74.00	-23.97	peak

Test Mode:	802.11n HT40	Channel:	2437
Polarity:	Vertical	Test Voltage:	DC 3.3 V



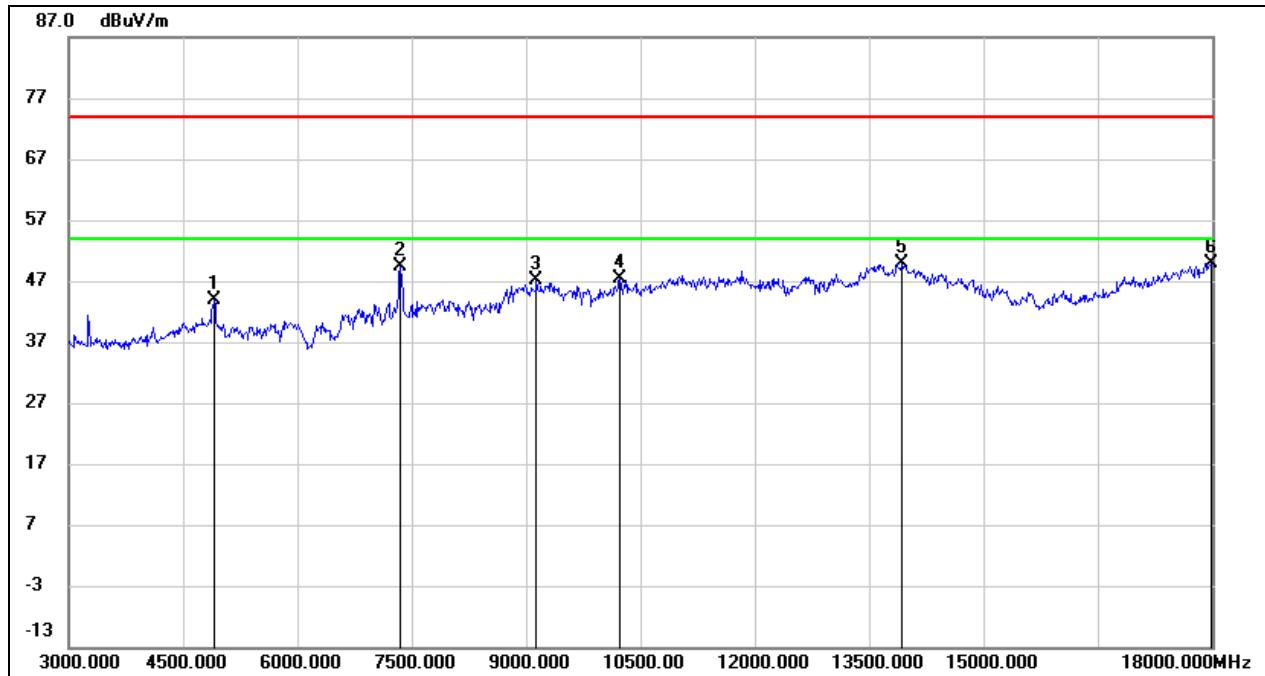
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4860.000	44.58	-0.09	44.49	74.00	-29.51	peak
2	7305.000	44.05	6.47	50.52	74.00	-23.48	peak
3	9240.000	37.07	10.58	47.65	74.00	-26.35	peak
4	11910.000	31.42	17.72	49.14	74.00	-24.86	peak
5	13890.000	28.53	21.72	50.25	74.00	-23.75	peak
6	17985.000	24.55	25.60	50.15	74.00	-23.85	peak

Test Mode:	802.11n HT40	Channel:	2452
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3255.000	54.43	-5.10	49.33	74.00	-24.67	peak
2	4905.000	45.16	0.09	45.25	74.00	-28.75	peak
3	9300.000	36.91	10.61	47.52	74.00	-26.48	peak
4	11895.000	31.66	17.68	49.34	74.00	-24.66	peak
5	13950.000	28.54	21.86	50.40	74.00	-23.60	peak
6	17970.000	24.95	25.51	50.46	74.00	-23.54	peak

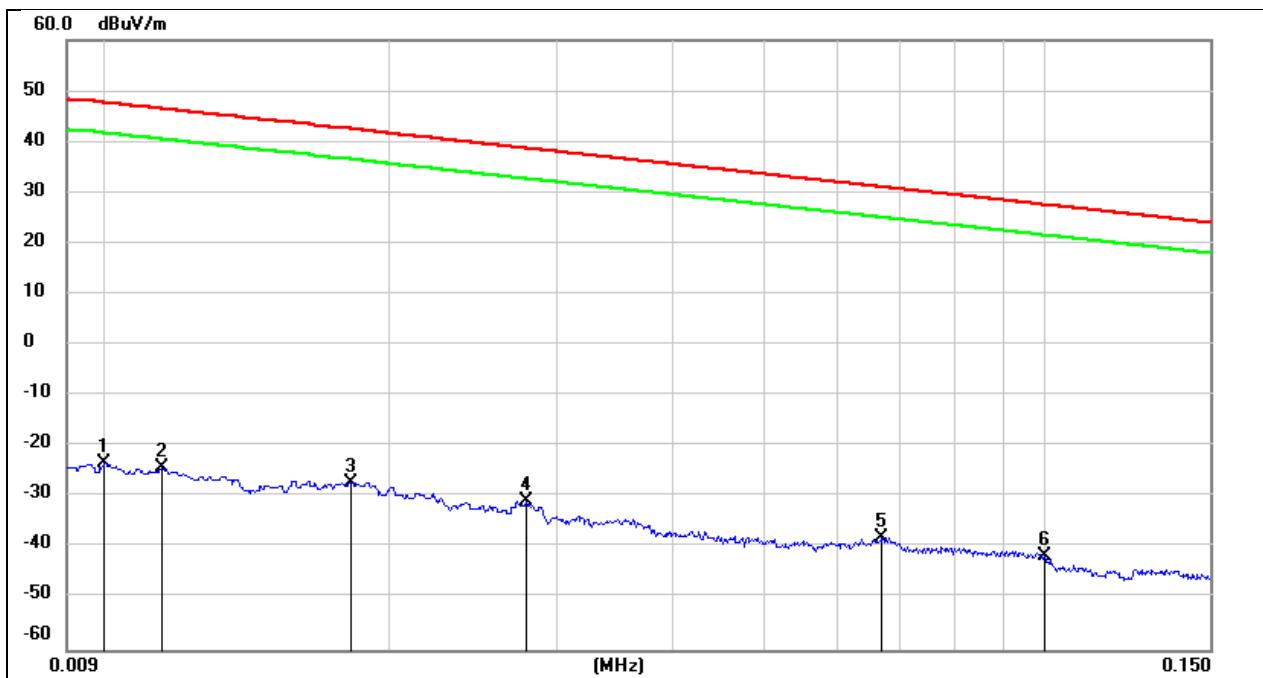
Test Mode:	802.11n HT40	Channel:	2452
Polarity:	Vertical	Test Voltage:	DC 3.3 V



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4905.000	43.70	0.09	43.79	74.00	-30.21	peak
2	7350.000	43.05	6.44	49.49	74.00	-24.51	peak
3	9135.000	36.53	10.55	47.08	74.00	-26.92	peak
4	10230.000	34.94	12.46	47.40	74.00	-26.60	peak
5	13935.000	28.02	21.82	49.84	74.00	-24.16	peak
6	17985.000	24.17	25.60	49.77	74.00	-24.23	peak

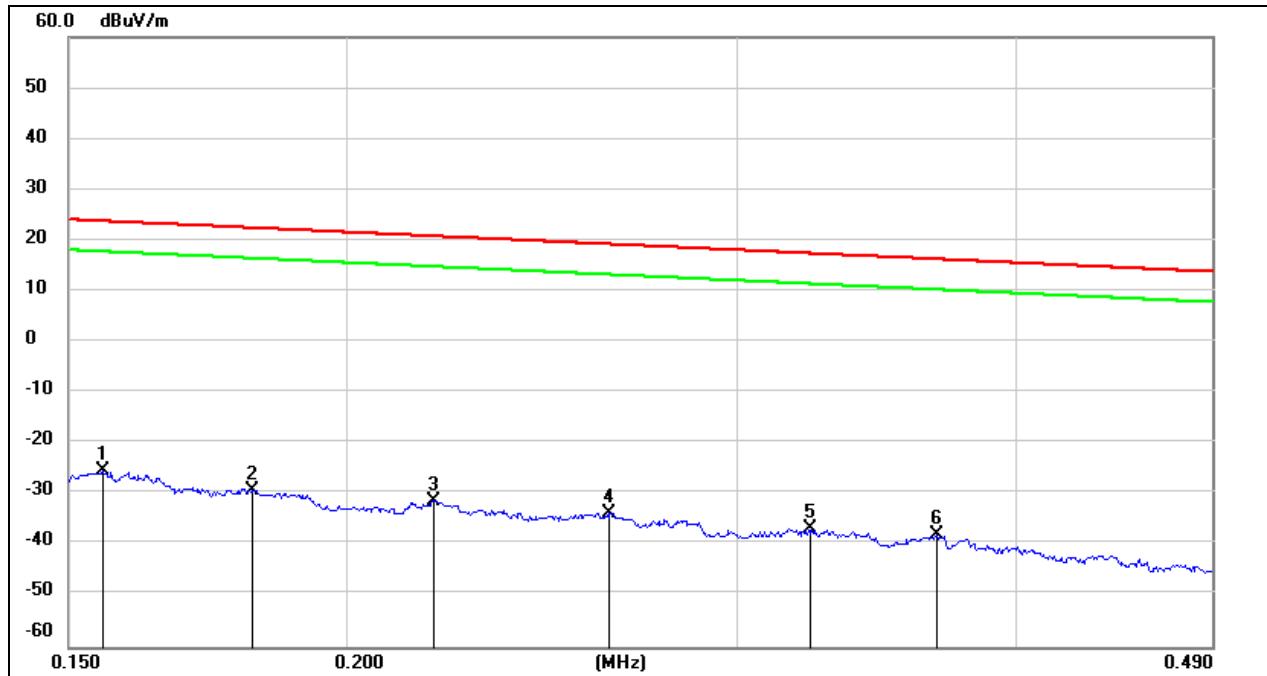
#### 8.4. SPURIOUS EMISSIONS(9 KHZ~30 MHZ)

Test Mode:	802.11b	Channel:	2412
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



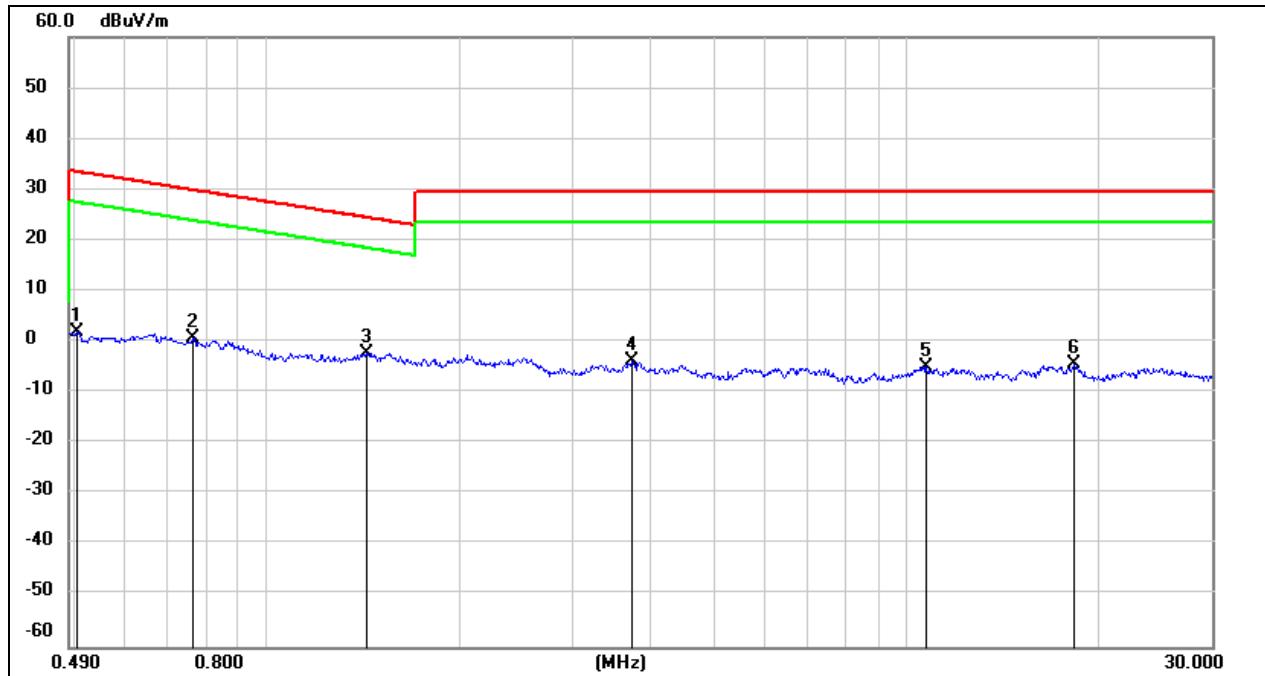
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.0100	78.22	-101.40	-23.18	47.60	-70.78	peak
2	0.0114	77.38	-101.40	-24.02	46.46	-70.48	peak
3	0.0181	74.35	-101.36	-27.01	42.45	-69.46	peak
4	0.0279	70.67	-101.38	-30.71	38.69	-69.40	peak
5	0.0670	63.72	-101.55	-37.83	31.08	-68.91	peak
6	0.1000	60.17	-101.80	-41.63	27.60	-69.23	peak

Test Mode:	802.11b	Channel:	2412
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.1554	76.27	-101.65	-25.38	23.77	-49.15	peak
2	0.1816	72.54	-101.68	-29.14	22.42	-51.56	peak
3	0.2190	70.27	-101.75	-31.48	20.79	-52.27	peak
4	0.2626	67.99	-101.82	-33.83	19.22	-53.05	peak
5	0.3234	64.98	-101.88	-36.90	17.41	-54.31	peak
6	0.3684	63.98	-101.93	-37.95	16.27	-54.22	peak

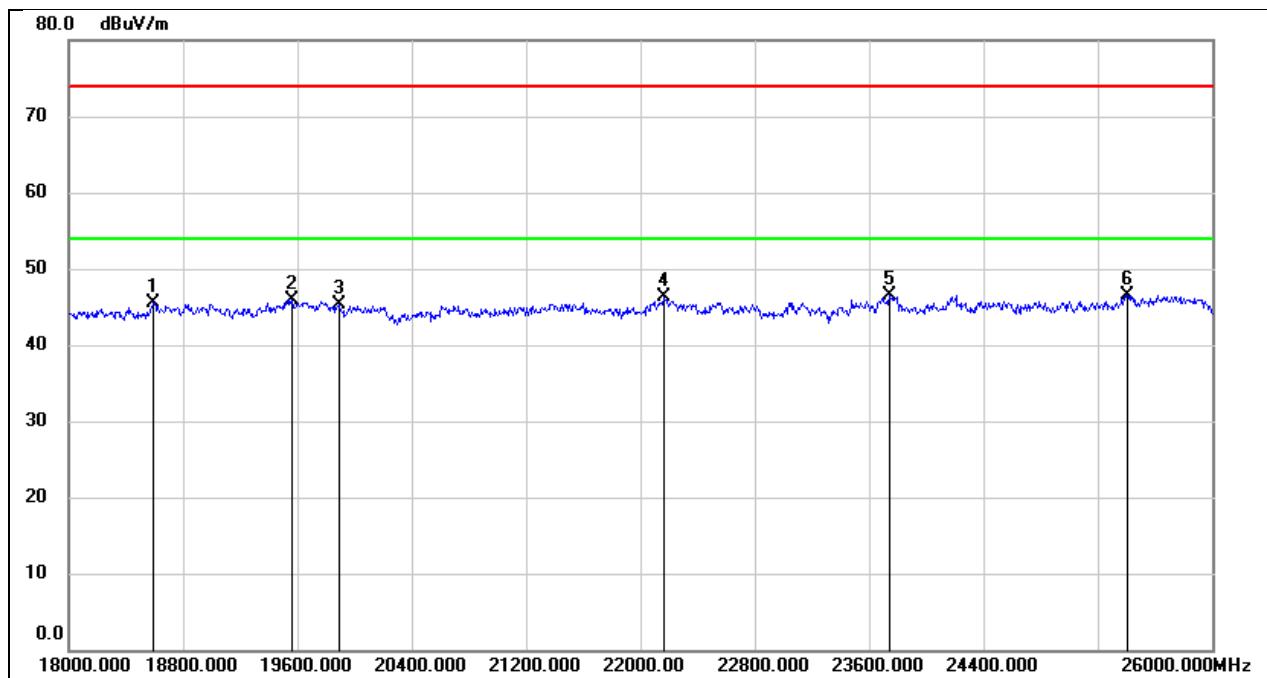
Test Mode:	802.11b	Channel:	2412
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.5039	63.93	-62.07	1.86	33.56	-31.70	peak
2	0.7641	62.92	-62.12	0.80	29.94	-29.14	peak
3	1.4274	59.88	-62.08	-2.20	24.51	-26.71	peak
4	3.7100	57.70	-61.41	-3.71	29.54	-33.25	peak
5	10.7299	55.98	-60.83	-4.85	29.54	-34.39	peak
6	18.2545	56.43	-60.90	-4.47	29.54	-34.01	peak

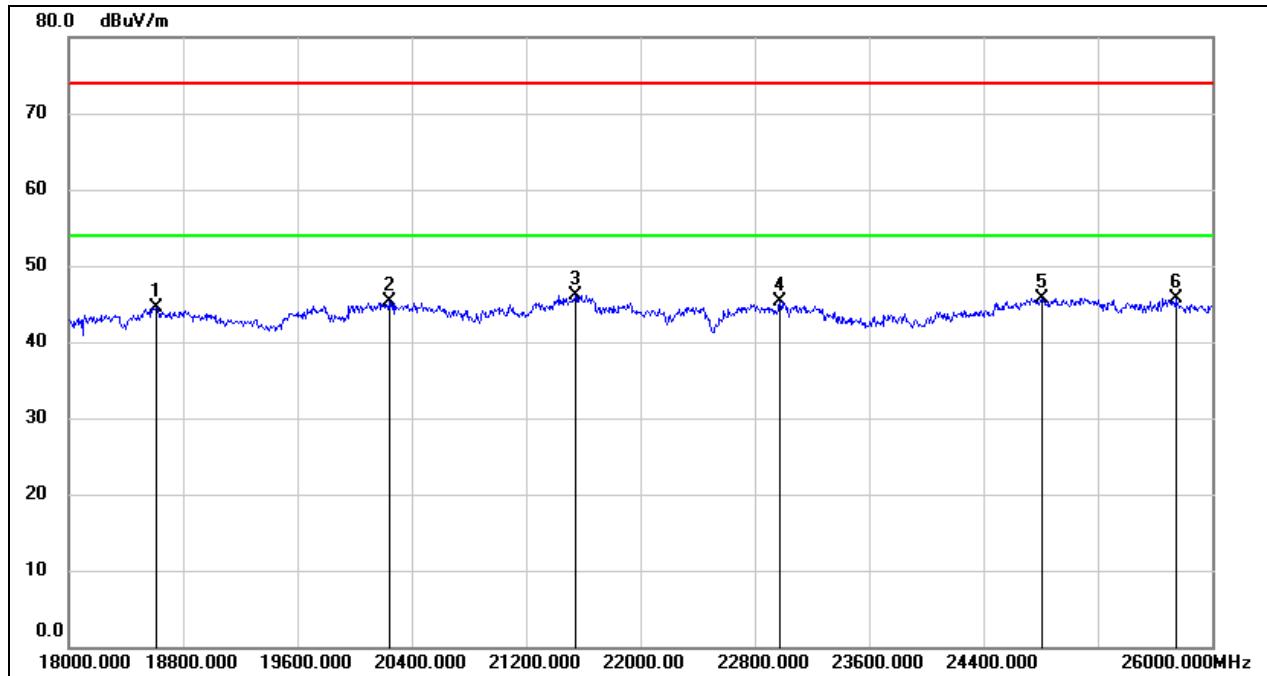
## 8.5. SPURIOUS EMISSIONS(18 GHZ~26 GHZ)

Test Mode:	802.11b	Channel:	2412
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	18592.000	50.75	-5.31	45.44	74.00	-28.56	peak
2	19560.000	51.36	-5.48	45.88	74.00	-28.12	peak
3	19888.000	50.57	-5.36	45.21	74.00	-28.79	peak
4	22160.000	50.58	-4.31	46.27	74.00	-27.73	peak
5	23744.000	49.65	-3.20	46.45	74.00	-27.55	peak
6	25408.000	48.20	-1.73	46.47	74.00	-27.53	peak

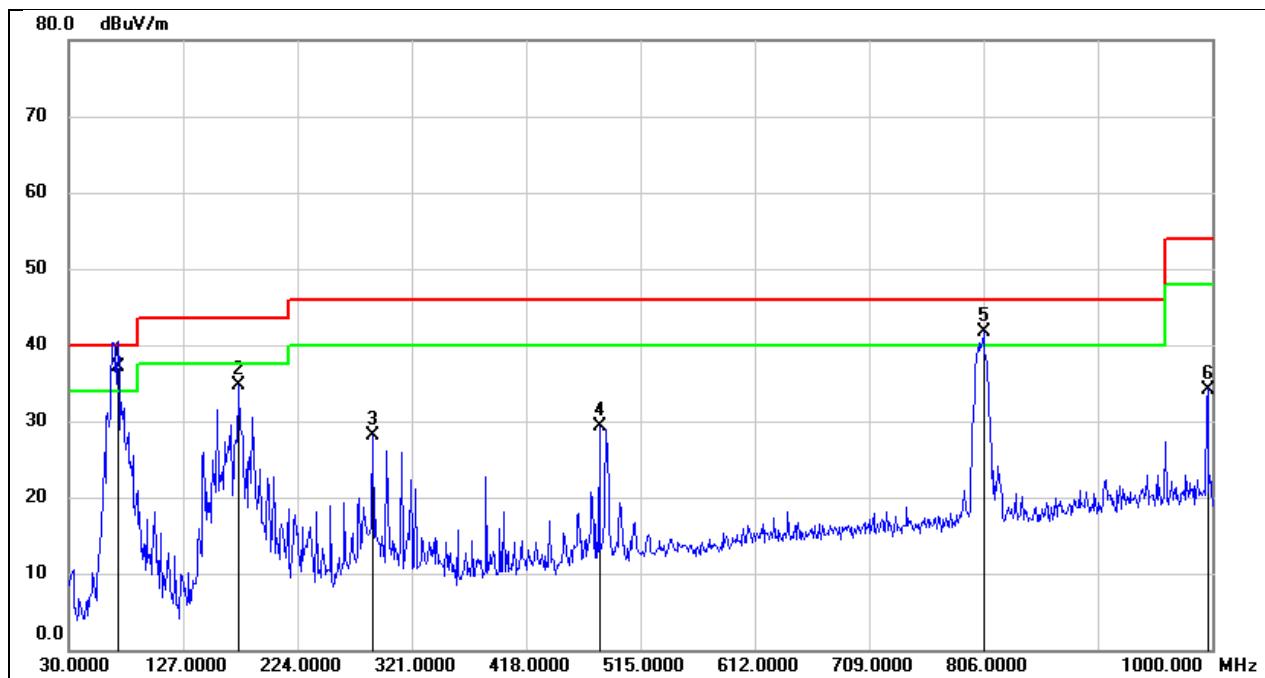
Test Mode:	802.11b	Channel:	2412
Polarity:	Vertical	Test Voltage:	DC 3.3 V



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	18616.000	49.89	-5.34	44.55	74.00	-29.45	peak
2	20240.000	50.82	-5.61	45.21	74.00	-28.79	peak
3	21544.000	50.76	-4.63	46.13	74.00	-27.87	peak
4	22976.000	48.76	-3.46	45.30	74.00	-28.70	peak
5	24808.000	47.93	-2.27	45.66	74.00	-28.34	peak
6	25744.000	46.30	-0.64	45.66	74.00	-28.34	peak

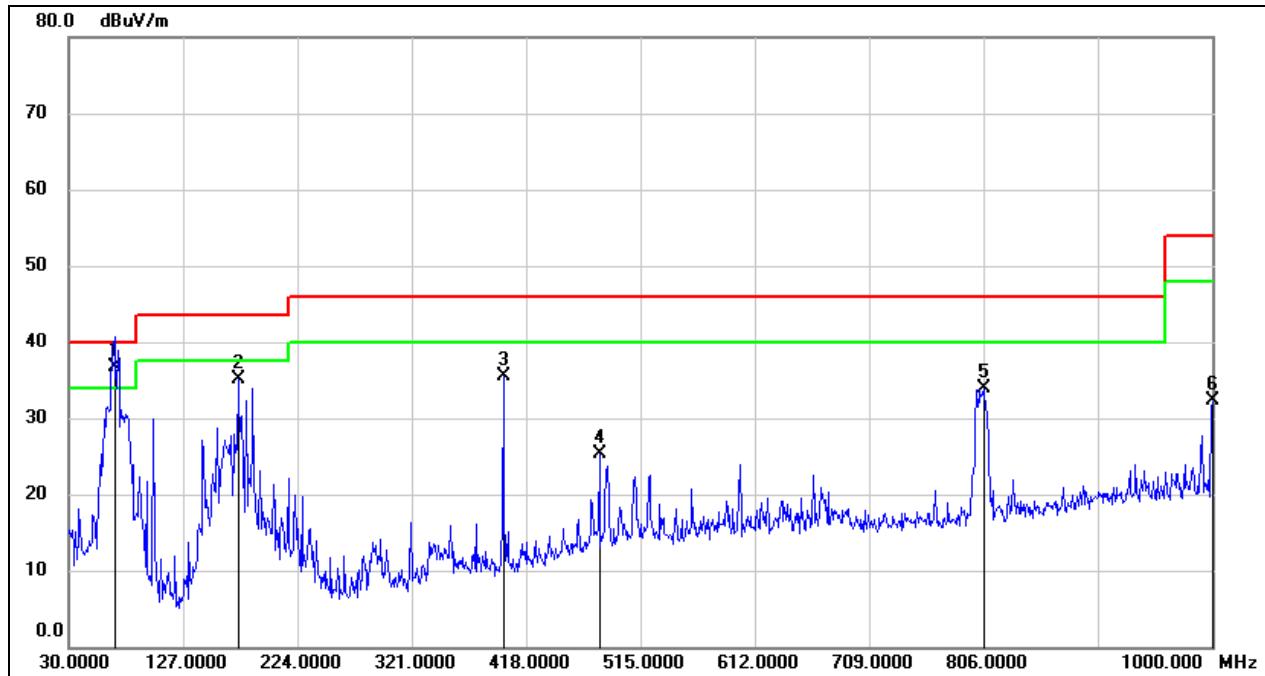
## 8.6. SPURIOUS EMISSIONS(30 MHZ~1 GHZ)

Test Mode:	802.11b	Channel:	2412
Polarity:	Horizontal	Test Voltage:	DC 3.3 V



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	71.7100	57.89	-20.70	37.19	40.00	-2.81	QP
2	174.5300	51.75	-17.12	34.63	43.50	-8.87	QP
3	288.0200	44.16	-16.06	28.10	46.00	-17.90	QP
4	480.0800	41.07	-11.79	29.28	46.00	-16.72	QP
5	806.0000	48.85	-7.22	41.63	46.00	-4.37	QP
6	996.1200	38.40	-4.20	34.20	54.00	-19.80	QP

Test Mode:	802.11b	Channel:	2412
Polarity:	Vertical	Test Voltage:	DC 3.3 V



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	68.8000	57.26	-20.56	36.70	40.00	-3.30	QP
2	173.5600	52.20	-17.16	35.04	43.50	-8.46	QP
3	398.6000	48.85	-13.37	35.48	46.00	-10.52	QP
4	480.0800	37.10	-11.79	25.31	46.00	-20.69	QP
5	806.0000	41.22	-7.22	34.00	46.00	-12.00	QP
6	1000.0000	36.48	-4.15	32.33	54.00	-21.67	QP

## 9. ANTENNA REQUIREMENT

### REQUIREMENT

Please refer to FCC part 15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Please refer to FCC part 15.247(b)(4)

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### DESCRIPTION

Pass

## 10. AC POWER LINE CONDUCTED EMISSION

### LIMITS

Please refer to CFR 47 FCC §15.207 (a) and ISED RSS-Gen Clause 8.8

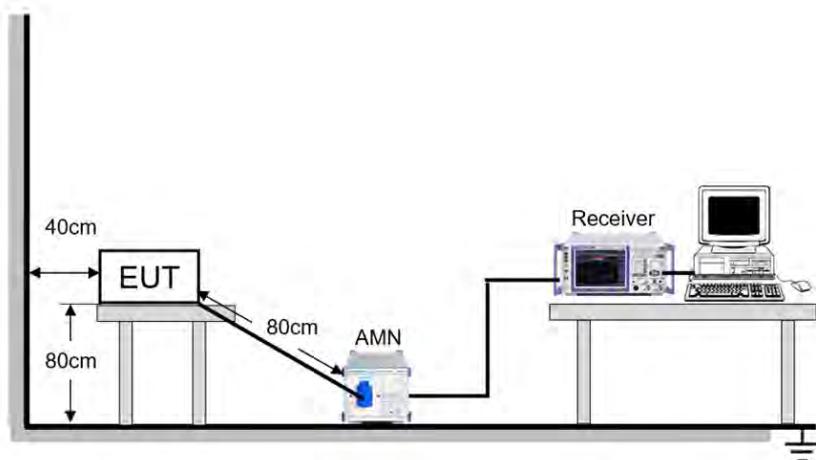
FREQUENCY (MHz)	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

### TEST PROCEDURE

The EUT is put on a table of non-conducting material that is 80 cm high. The vertical conducting wall of shielding is located 40 cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI Measurement Receiver (R&S Test Receiver ESR3) is used to test the emissions from both sides of AC line. According to the requirements in Section 6.2 of ANSI C63.10-2013. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver is set at 9 kHz.

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application.

### TEST SETUP



**TEST ENVIRONMENT**

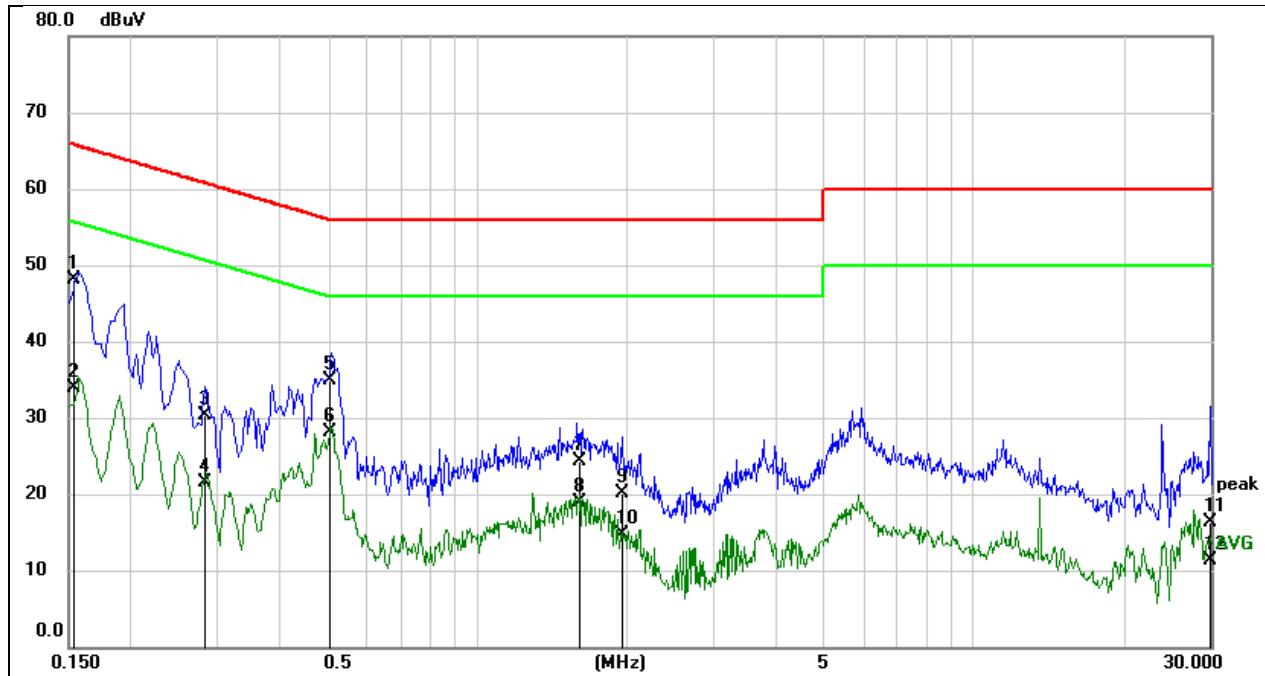
Temperature	22.1°C	Relative Humidity	52.2%
Atmosphere Pressure	101kPa	Test Voltage	AC 120 V, 60 Hz

**TEST DATE / ENGINEER**

Test Date	March 1, 2023	Test By	Karl Wu
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**TEST RESULTS**

Test Mode:	802.11b	Channel:	2412
Line:	Line	Test Voltage	AC 120 V, 60 Hz



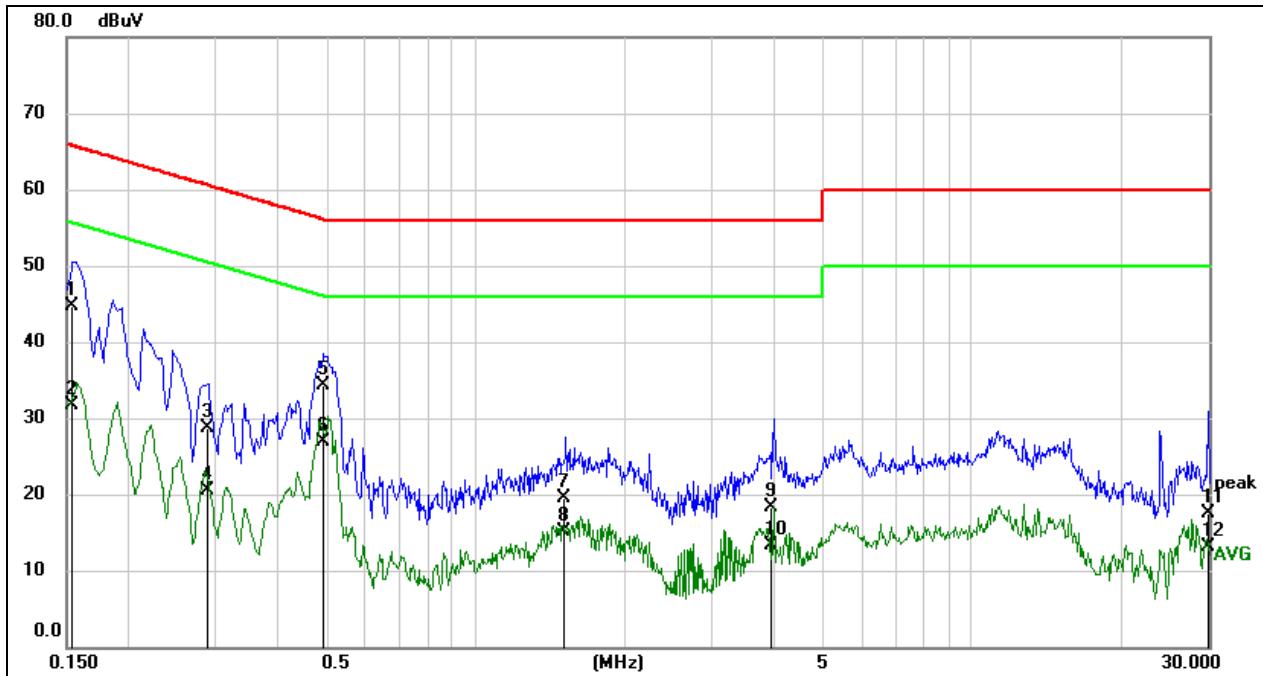
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1539	38.55	9.59	48.14	65.79	-17.65	QP
2	0.1539	24.24	9.59	33.83	55.79	-21.96	AVG
3	0.2818	20.80	9.59	30.39	60.76	-30.37	QP
4	0.2818	11.98	9.59	21.57	50.76	-29.19	AVG
5	0.5021	25.29	9.60	34.89	56.00	-21.11	QP
6	0.5021	18.47	9.60	28.07	46.00	-17.93	AVG
7	1.6007	14.67	9.62	24.29	56.00	-31.71	QP
8	1.6007	9.34	9.62	18.96	46.00	-27.04	AVG
9	1.9532	10.41	9.63	20.04	56.00	-35.96	QP
10	1.9532	5.10	9.63	14.73	46.00	-31.27	AVG
11	29.9993	6.57	9.68	16.25	60.00	-43.75	QP
12	29.9993	1.69	9.68	11.37	50.00	-38.63	AVG

**Note:**

1. Result = Reading + Correct Factor.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 200 Hz (9 kHz ~ 150 kHz), 9 kHz (150 kHz ~ 30 MHz).
4. Step size: 80 Hz (0.009 MHz ~ 0.15 MHz), 4 kHz (0.15 MHz ~ 30 MHz), Scan time: auto.

Note: All the modes have been tested, only the worst data was recorded in the report.

Test Mode:	802.11b	Channel:	2412
Line:	Neutral	Test Voltage	AC 120 V, 60 Hz



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1536	35.04	9.59	44.63	65.80	-21.17	QP
2	0.1536	22.19	9.59	31.78	55.80	-24.02	AVG
3	0.2869	19.16	9.59	28.75	60.61	-31.86	QP
4	0.2869	10.93	9.59	20.52	50.61	-30.09	AVG
5	0.4954	24.75	9.60	34.35	56.08	-21.73	QP
6	0.4954	17.34	9.60	26.94	46.08	-19.14	AVG
7	1.4994	9.95	9.62	19.57	56.00	-36.43	QP
8	1.4994	5.50	9.62	15.12	46.00	-30.88	AVG
9	3.9201	8.58	9.70	18.28	56.00	-37.72	QP
10	3.9201	3.55	9.70	13.25	46.00	-32.75	AVG
11	29.9993	7.88	9.68	17.56	60.00	-42.44	QP
12	29.9993	3.39	9.68	13.07	50.00	-36.93	AVG

**Note:**

1. Result = Reading + Correct Factor.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 200 Hz (9 kHz ~ 150 kHz), 9 kHz (150 kHz ~ 30 MHz).
4. Step size: 80 Hz (0.009 MHz ~ 0.15 MHz), 4 kHz (0.15 MHz ~ 30 MHz), Scan time: auto.

Note: All the modes have been tested, only the worst data was recorded in the report.

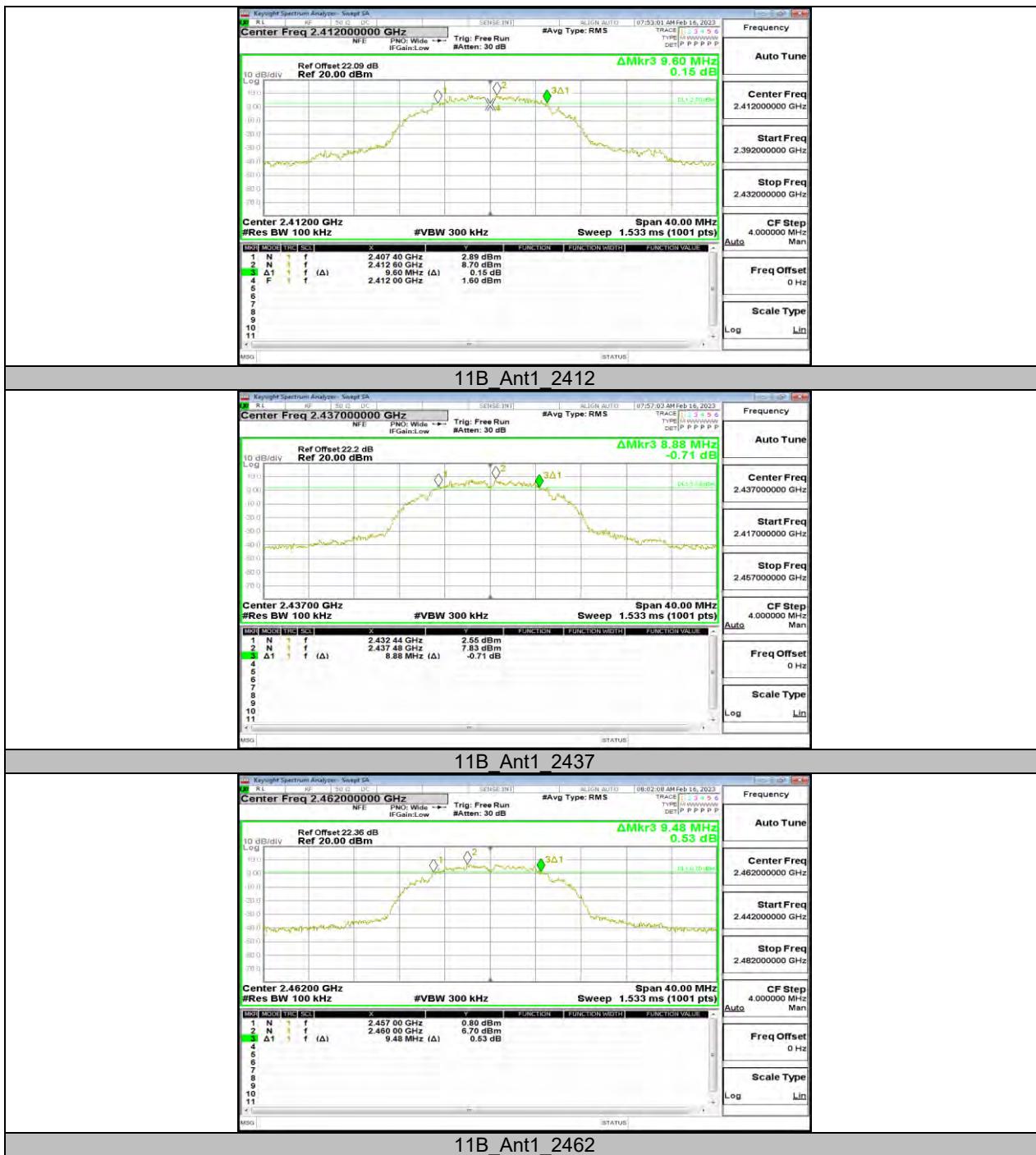
## 11. TEST DATA

### 11.1. APPENDIX A: DTS BANDWIDTH

#### 11.1.1. Test Result

Test Mode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	9.600	2407.400	2417.000	0.5	PASS
		2437	8.880	2432.440	2441.320	0.5	PASS
		2462	9.480	2457.000	2466.480	0.5	PASS
11G	Ant1	2412	16.360	2403.800	2420.160	0.5	PASS
		2437	16.440	2428.760	2445.200	0.5	PASS
		2462	16.360	2453.800	2470.160	0.5	PASS
11N20SISO	Ant1	2412	17.000	2403.480	2420.480	0.5	PASS
		2437	16.920	2428.480	2445.400	0.5	PASS
		2462	16.920	2453.520	2470.440	0.5	PASS
11N40SISO	Ant1	2422	32.560	2405.680	2438.240	0.5	PASS
		2437	32.800	2420.680	2453.480	0.5	PASS
		2452	32.960	2435.520	2468.480	0.5	PASS

## 11.1.2. Test Graphs









## 11.2. APPENDIX B: OCCUPIED CHANNEL BANDWIDTH

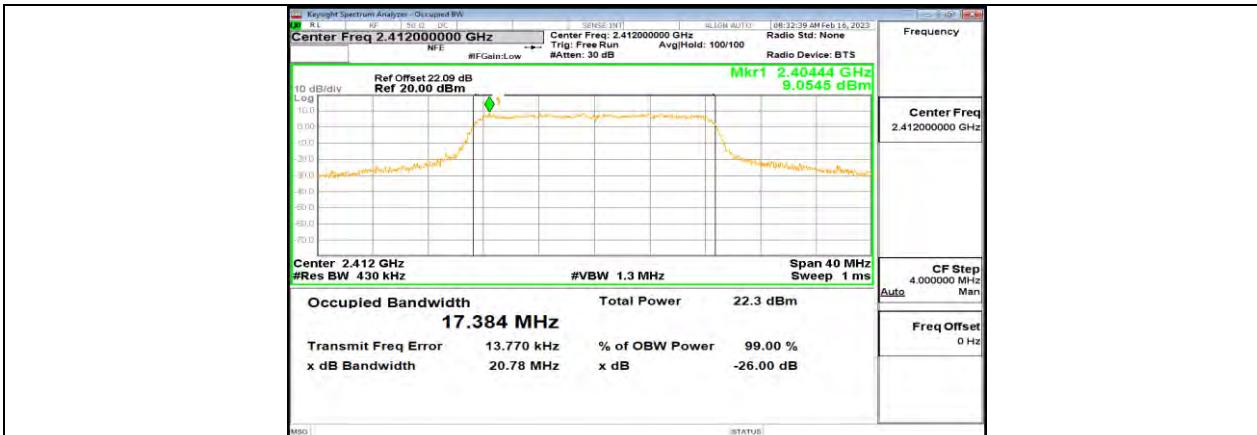
### 11.2.1. Test Result

Test Mode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Verdict
11B	Ant1	2412	13.375	2405.2356	2418.6106	PASS
		2437	13.227	2430.3245	2443.5515	PASS
		2462	13.231	2455.3041	2468.5351	PASS
11G	Ant1	2412	16.630	2403.7239	2420.3539	PASS
		2437	16.600	2428.7205	2445.3205	PASS
		2462	16.582	2453.7443	2470.3263	PASS
11N20SISO	Ant1	2412	17.384	2403.3218	2420.7058	PASS
		2437	17.367	2428.3261	2445.6931	PASS
		2462	17.365	2453.3012	2470.6662	PASS
11N40SISO	Ant1	2422	34.657	2404.7187	2439.3757	PASS
		2437	34.714	2419.6664	2454.3804	PASS
		2452	34.669	2434.6936	2469.3626	PASS

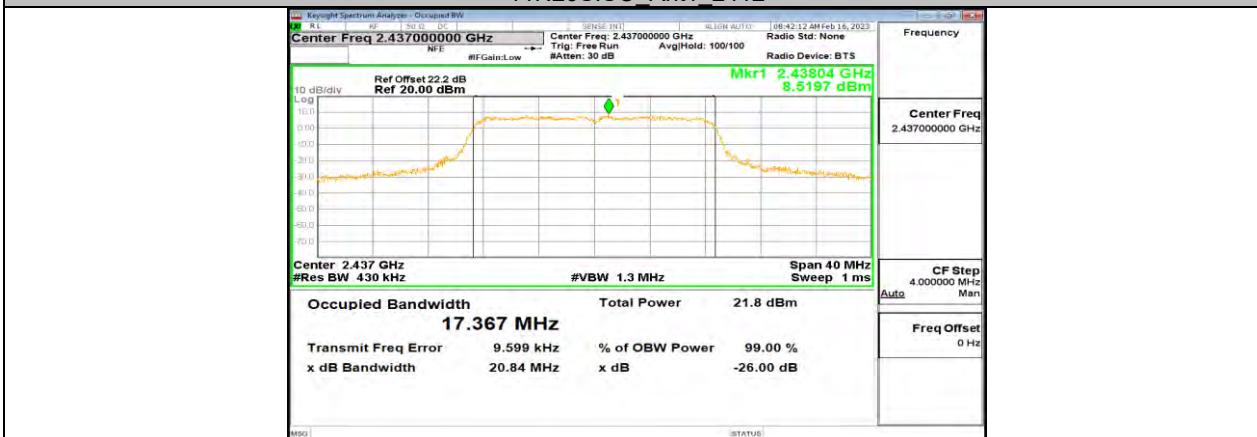
## 11.2.2. Test Graphs



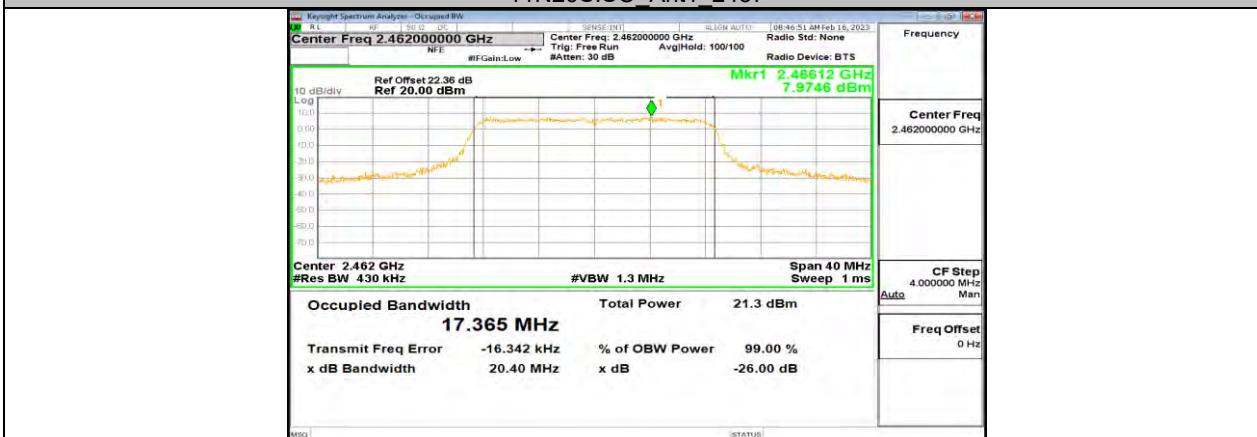




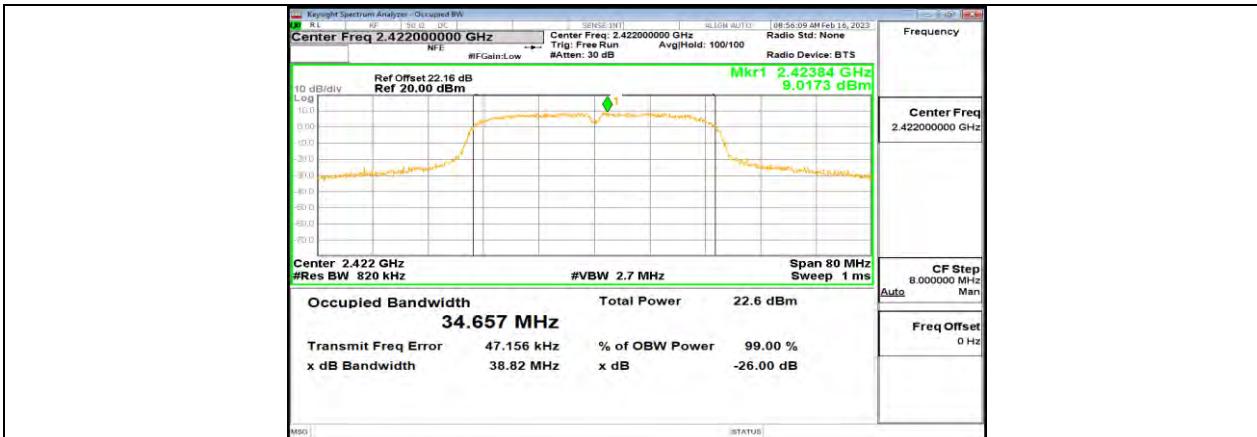
11N20SISO Ant1 2412



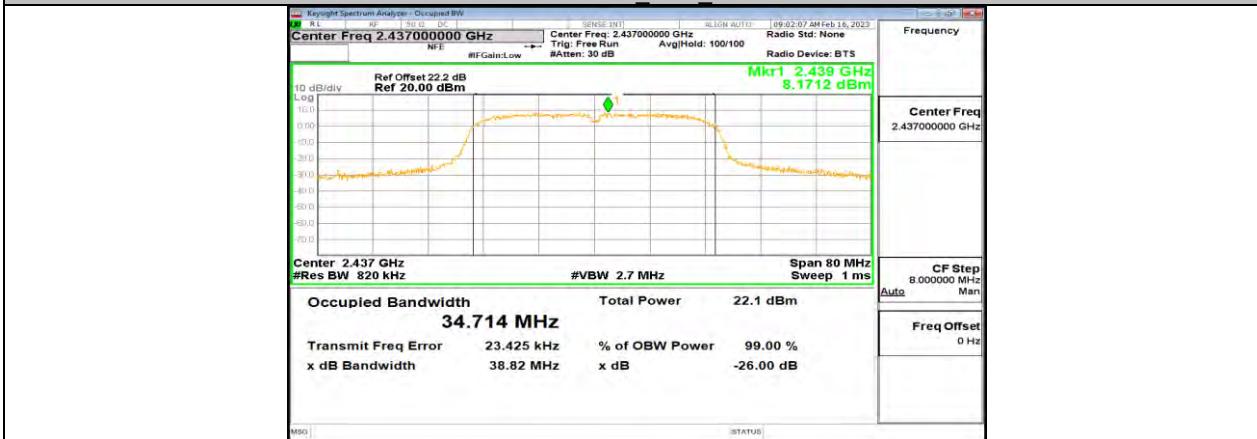
11N20S|SO Ant1 2437



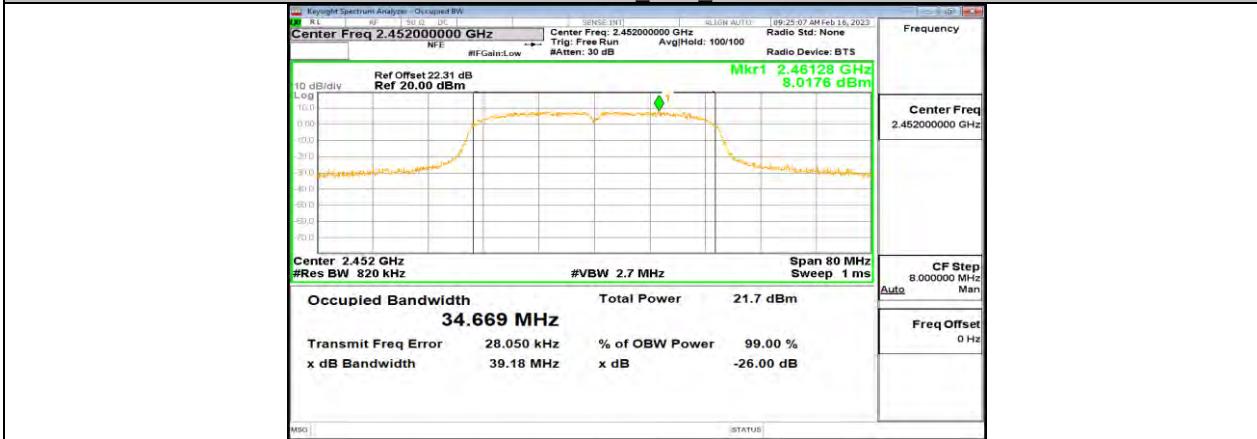
11N20SISO Ant1 2462



11N40SISO Ant1 2422



11N40SISO\_Ant1\_2437



11N40SISO\_Ant1\_2452

## 11.3. APPENDIX C: MAXIMUM CONDUCTED OUTPUT POWER

### 11.3.1. Test Result

Test Mode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	2412	18.13	≤30.00	PASS
		2437	17.03	≤30.00	PASS
		2462	16.61	≤30.00	PASS
11G	Ant1	2412	15.87	≤30.00	PASS
		2437	15.32	≤30.00	PASS
		2462	14.95	≤30.00	PASS
11N20SISO	Ant1	2412	15.83	≤30.00	PASS
		2437	15.18	≤30.00	PASS
		2462	14.83	≤30.00	PASS
11N40SISO	Ant1	2422	15.36	≤30.00	PASS
		2437	14.80	≤30.00	PASS
		2452	14.56	≤30.00	PASS

Note: 1. Conducted Power=Meas. Level+ Correction Factor

2. The Duty Cycle Factor (refer to section 7.5) had already compensated to the test data.

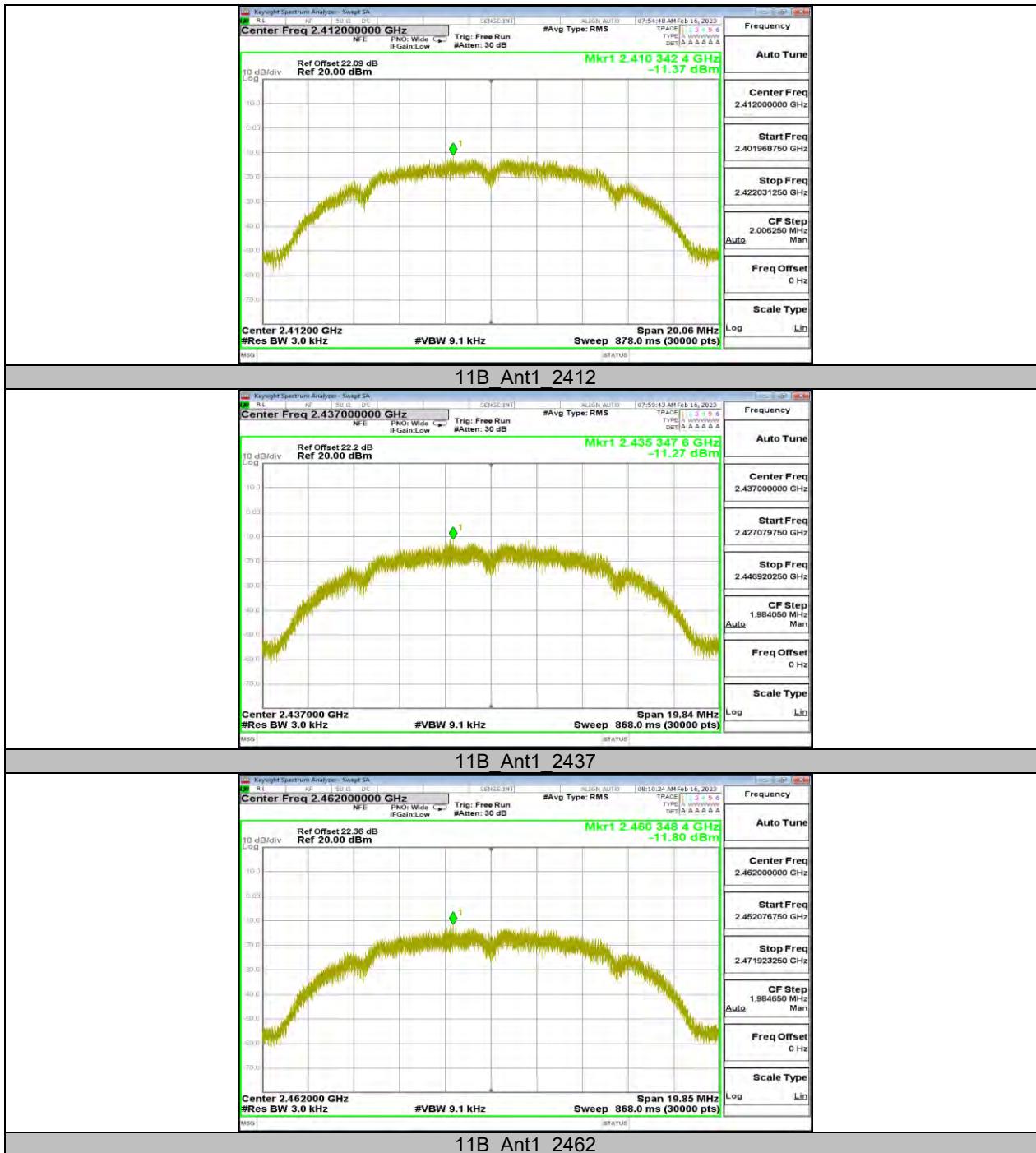
## 11.4. APPENDIX D: MAXIMUM POWER SPECTRAL DENSITY

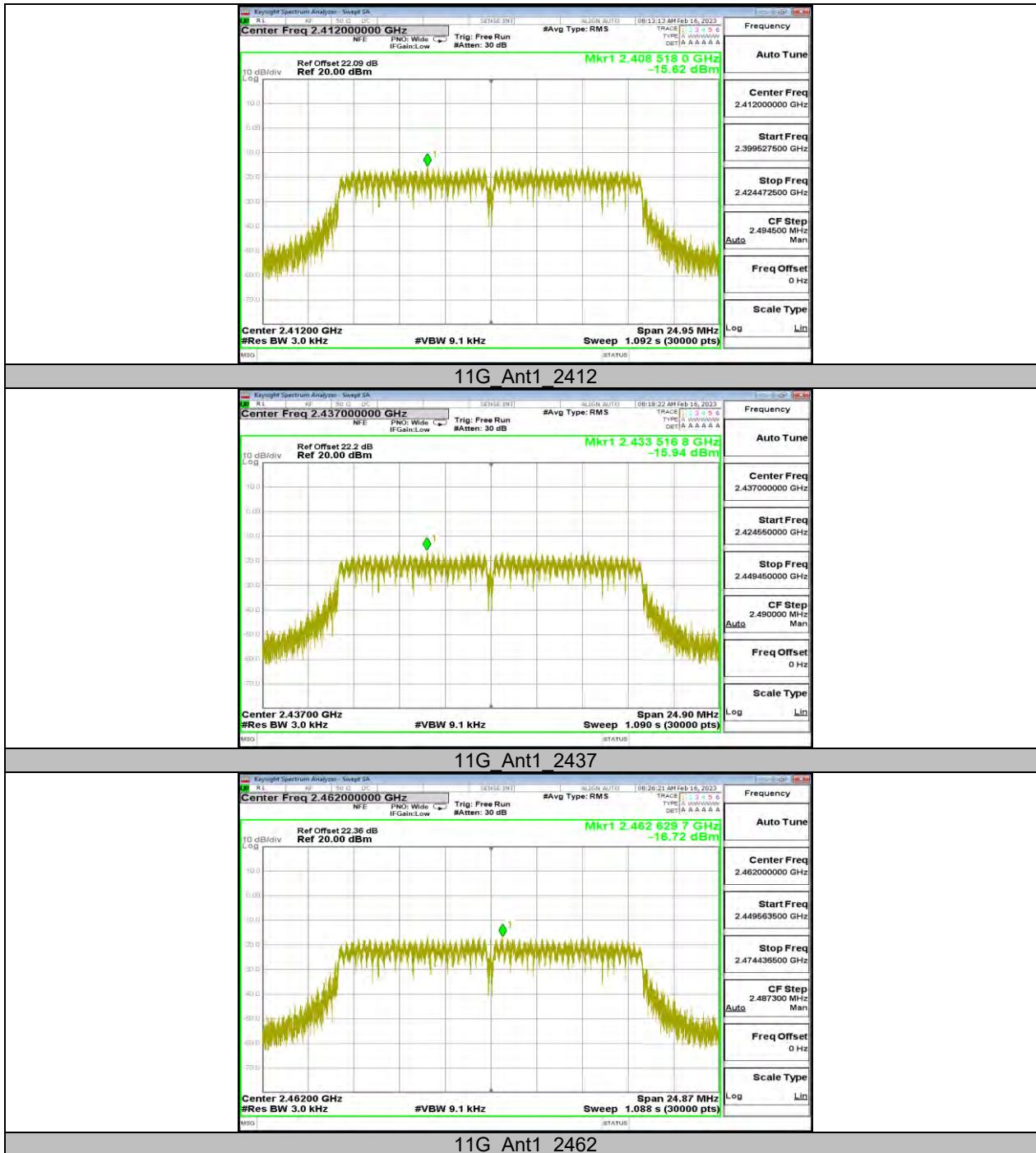
### 11.4.1. Test Result

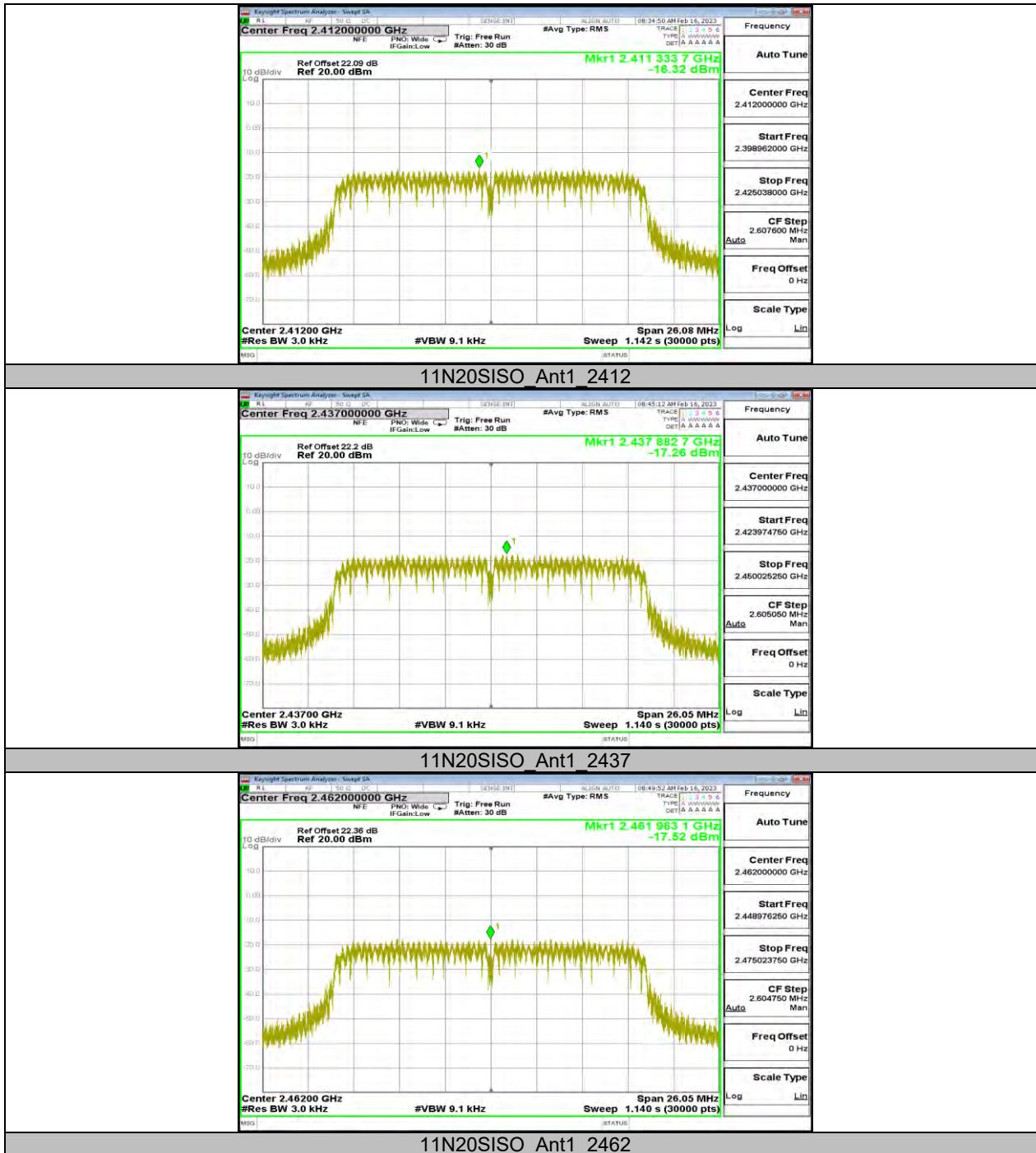
Test Mode	Antenna	Channel	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
11B	Ant1	2412	-11.37	≤8.00	PASS
		2437	-11.27	≤8.00	PASS
		2462	-11.8	≤8.00	PASS
11G	Ant1	2412	-15.62	≤8.00	PASS
		2437	-15.94	≤8.00	PASS
		2462	-16.72	≤8.00	PASS
11N20SISO	Ant1	2412	-16.32	≤8.00	PASS
		2437	-17.26	≤8.00	PASS
		2462	-17.52	≤8.00	PASS
11N40SISO	Ant1	2422	-18.9	≤8.00	PASS
		2437	-18.81	≤8.00	PASS
		2452	-19.62	≤8.00	PASS

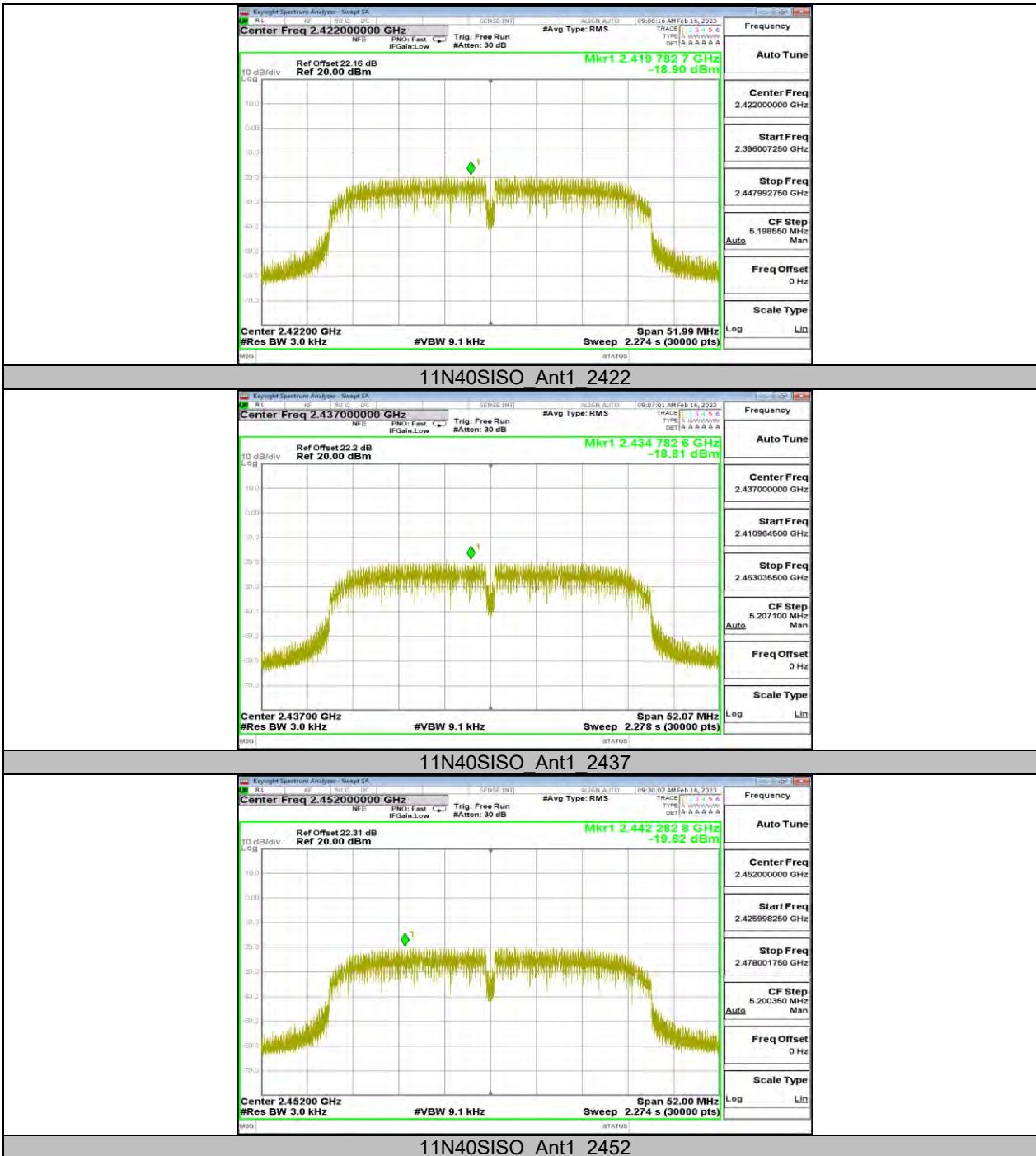
Note: 1. The Duty Cycle Factor (refer to section 7.5) had already compensated to the test graphs.

## 11.4.2. Test Graphs







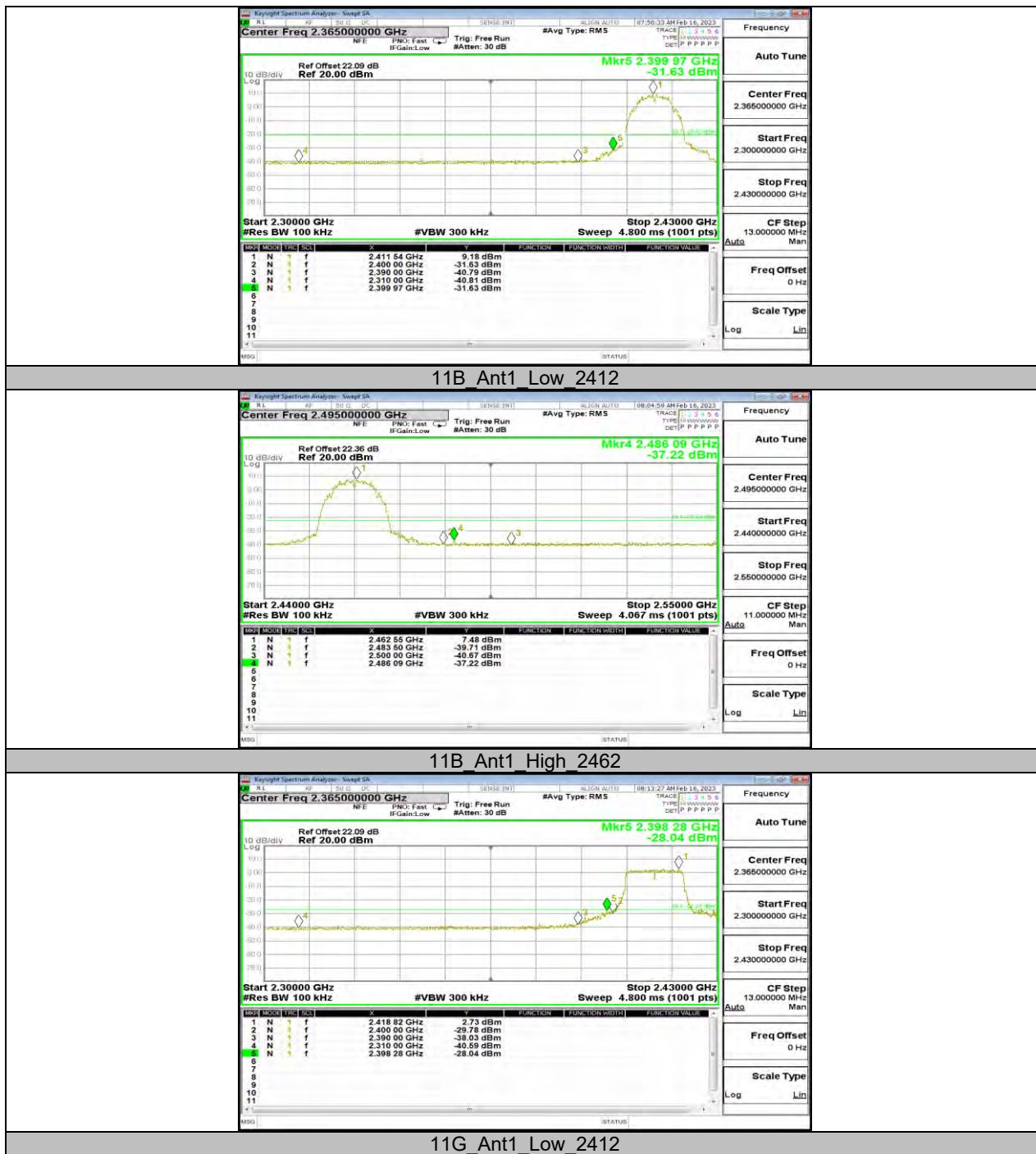


## 11.5. APPENDIX E: BAND EDGE MEASUREMENTS

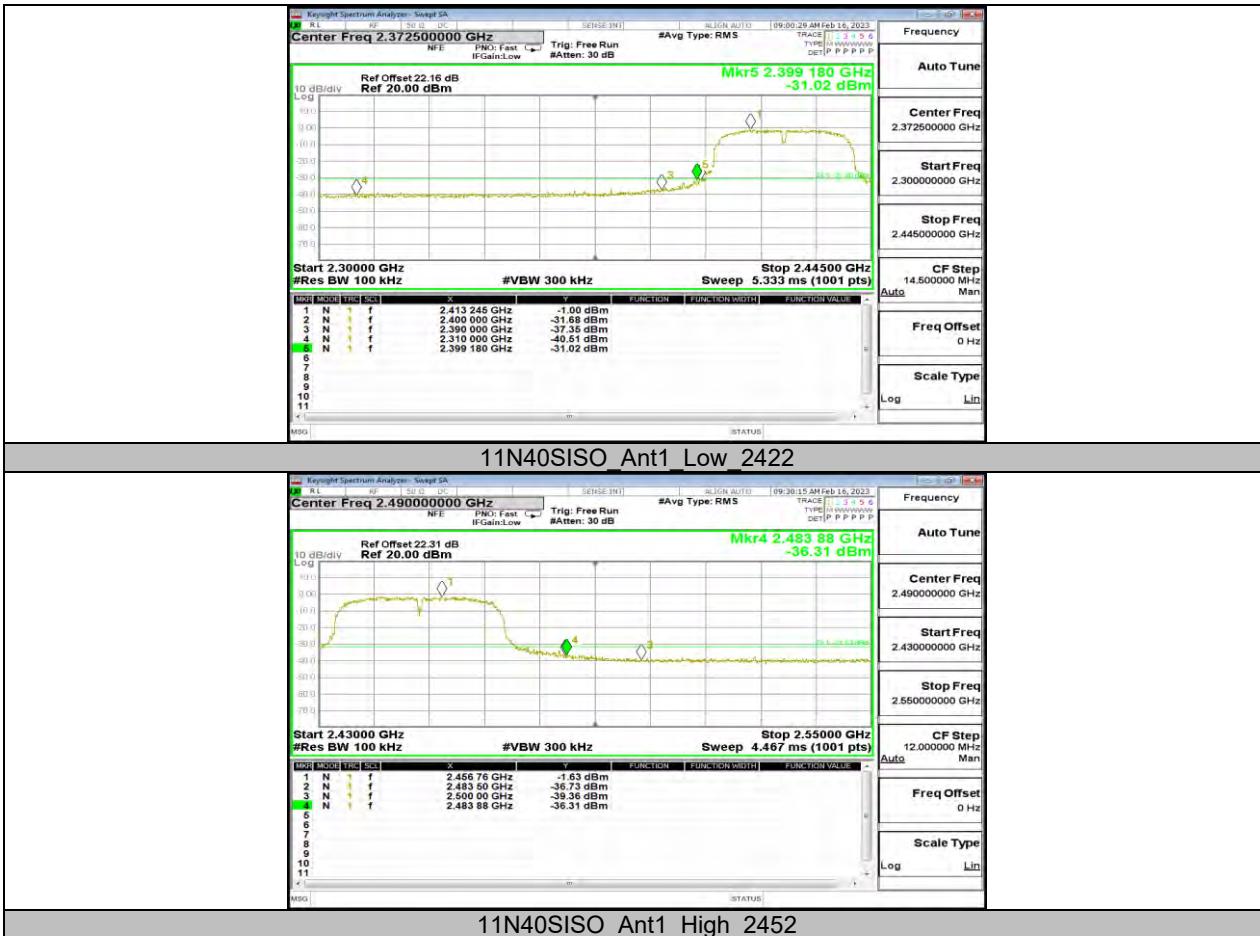
### 11.5.1. Test Result

Test Mode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	Low	2412	9.18	-31.63	≤-20.82	PASS
		High	2462	7.48	-37.22	≤-22.52	PASS
11G	Ant1	Low	2412	2.73	-28.04	≤-27.27	PASS
		High	2462	1.69	-36.24	≤-28.31	PASS
11N20SISO	Ant1	Low	2412	2.59	-29.18	≤-27.41	PASS
		High	2462	1.63	-37.04	≤-28.37	PASS
11N40SISO	Ant1	Low	2422	-1.00	-31.02	≤-31	PASS
		High	2452	-1.63	-36.31	≤-31.63	PASS

## 11.5.2. Test Graphs





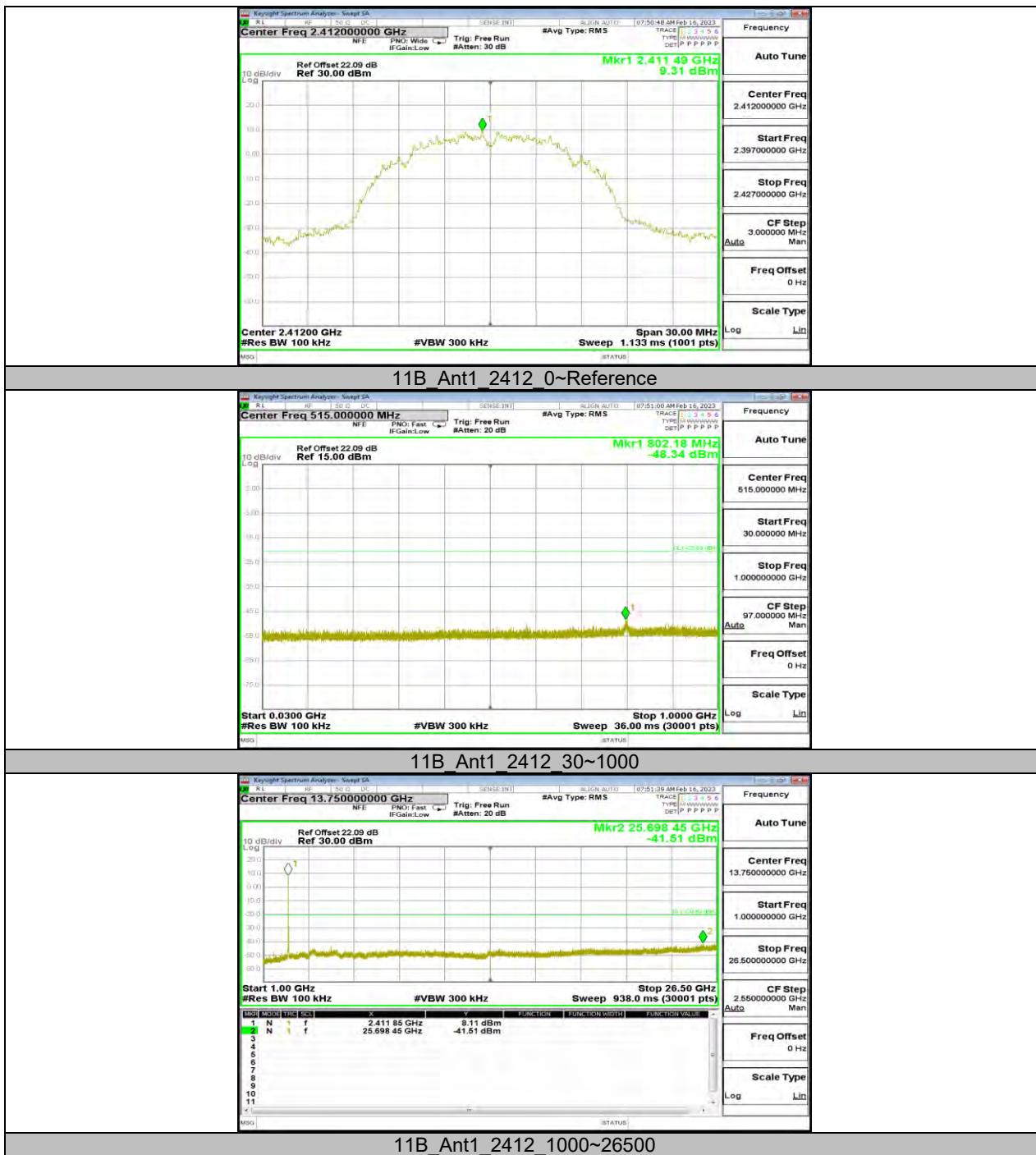


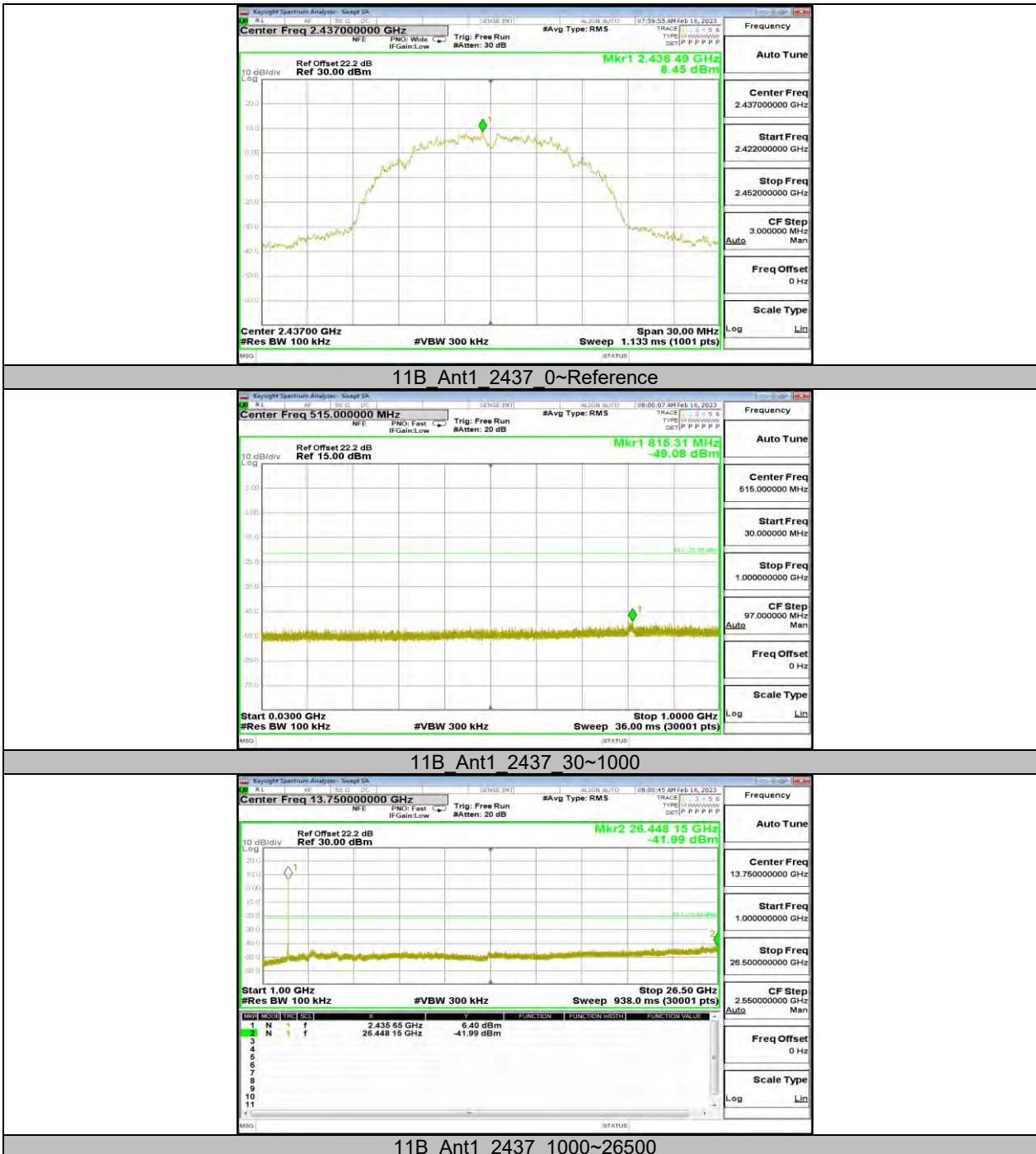
## 11.6. APPENDIX F: CONDUCTED SPURIOUS EMISSION

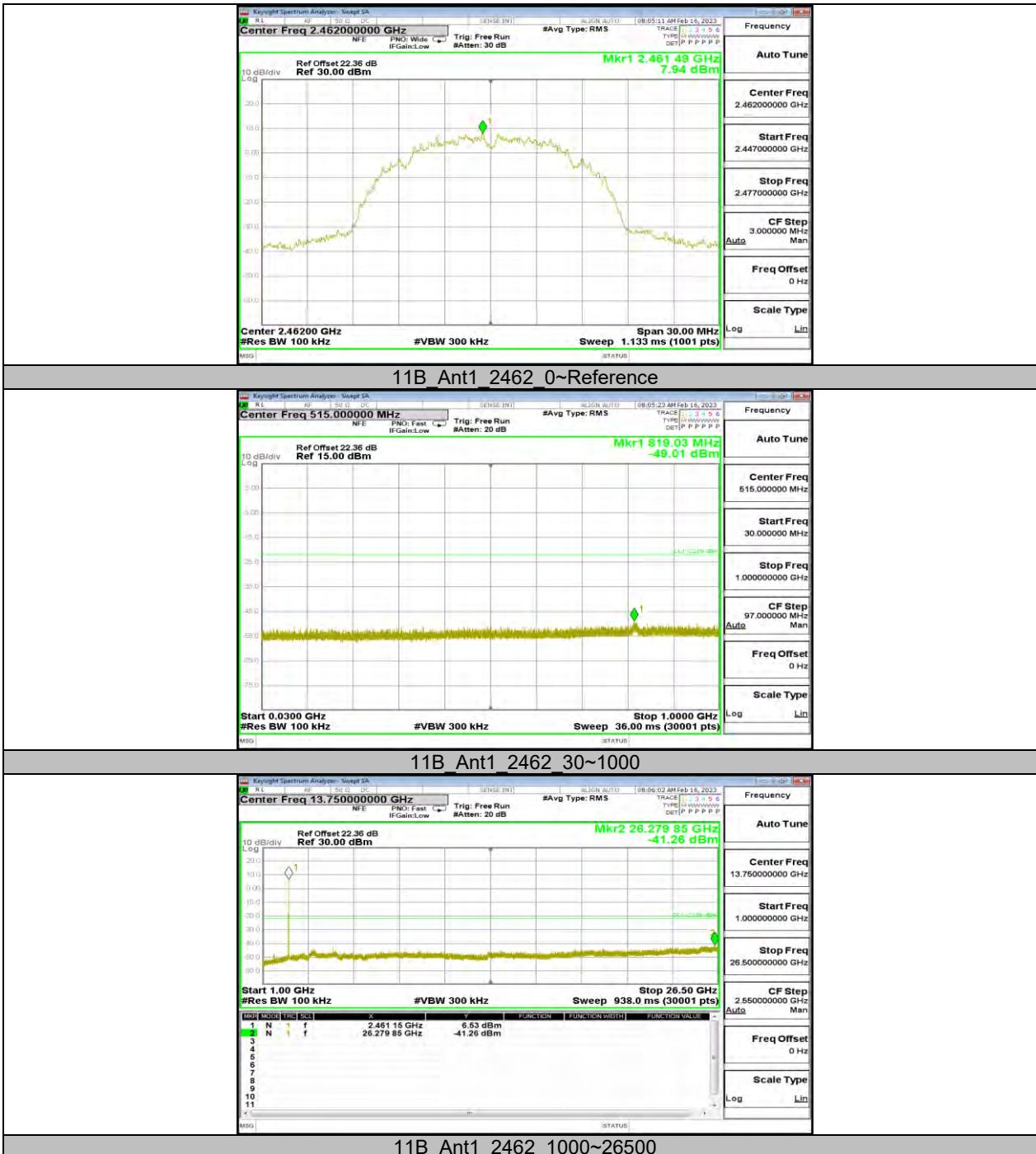
### 11.6.1. Test Result

Test Mode	Antenna	Channel	FreqRange [Mhz]	Result [dBm]	Limit [dBm]	Verdict
11B	Ant1	2412	Reference	9.31	---	PASS
			30~1000	-48.34	≤-20.69	PASS
			1000~26500	-41.51	≤-20.69	PASS
		2437	Reference	8.45	---	PASS
			30~1000	-49.08	≤-21.55	PASS
			1000~26500	-41.99	≤-21.55	PASS
		2462	Reference	7.94	---	PASS
			30~1000	-49.01	≤-22.06	PASS
			1000~26500	-41.26	≤-22.06	PASS
11G	Ant1	2412	Reference	2.67	---	PASS
			30~1000	-49.19	≤-27.33	PASS
			1000~26500	-41.65	≤-27.33	PASS
		2437	Reference	2.27	---	PASS
			30~1000	-48.24	≤-27.73	PASS
			1000~26500	-41.42	≤-27.73	PASS
		2462	Reference	1.73	---	PASS
			30~1000	-48.68	≤-28.27	PASS
			1000~26500	-41.7	≤-28.27	PASS
11N20SISO	Ant1	2412	Reference	2.54	---	PASS
			30~1000	-49.24	≤-27.46	PASS
			1000~26500	-41.79	≤-27.46	PASS
		2437	Reference	2.39	---	PASS
			30~1000	-49.72	≤-27.61	PASS
			1000~26500	-41.67	≤-27.61	PASS
		2462	Reference	1.70	---	PASS
			30~1000	-49.13	≤-28.3	PASS
			1000~26500	-41.36	≤-28.3	PASS
11N40SISO	Ant1	2422	Reference	-0.89	---	PASS
			30~1000	-49.12	≤-30.89	PASS
			1000~26500	-41.53	≤-30.89	PASS
		2437	Reference	-1.57	---	PASS
			30~1000	-49.72	≤-31.57	PASS
			1000~26500	-41.69	≤-31.57	PASS
		2452	Reference	-1.51	---	PASS
			30~1000	-49.01	≤-31.51	PASS
			1000~26500	-41.83	≤-31.51	PASS

## 11.6.2. Test Graphs



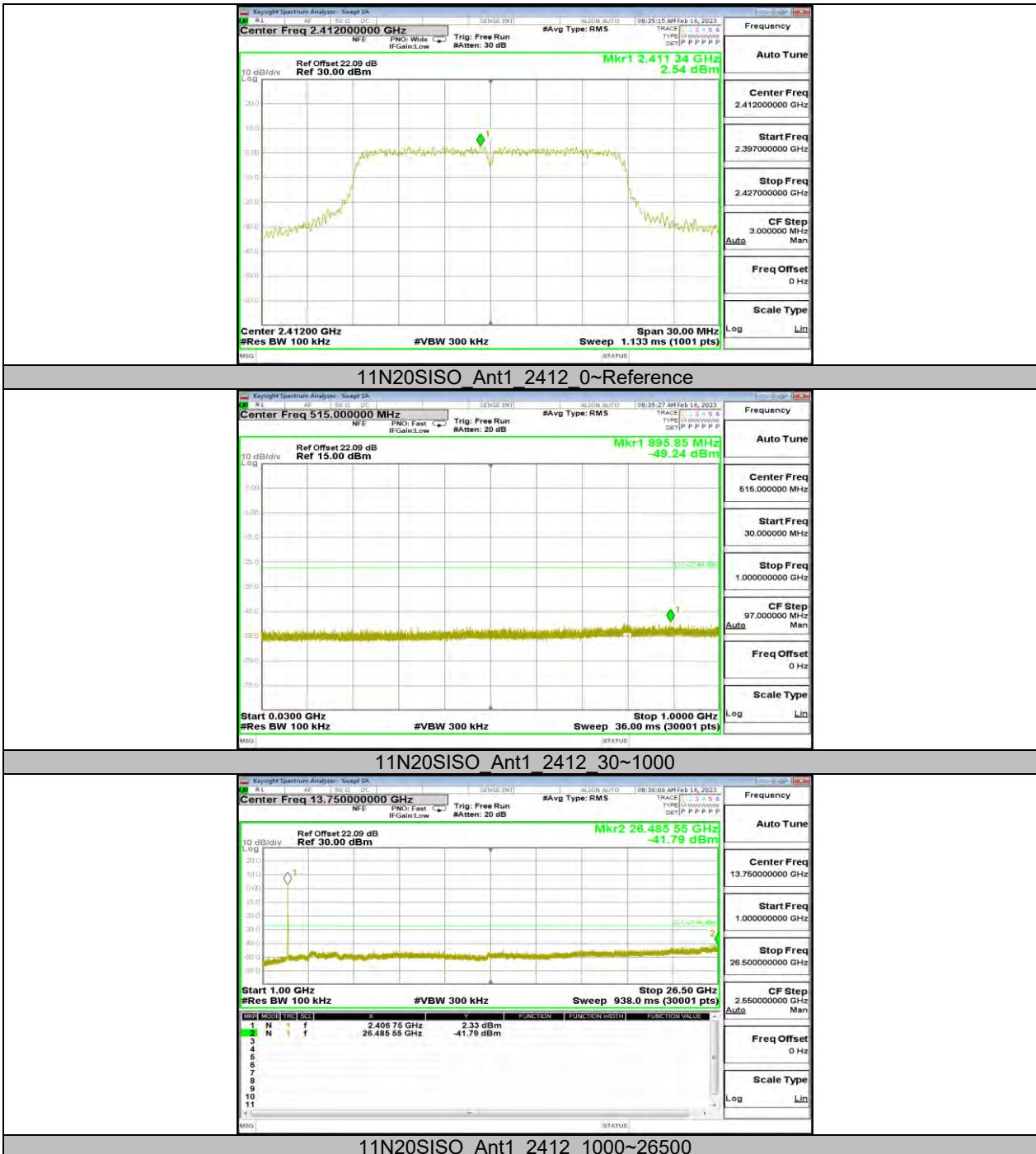






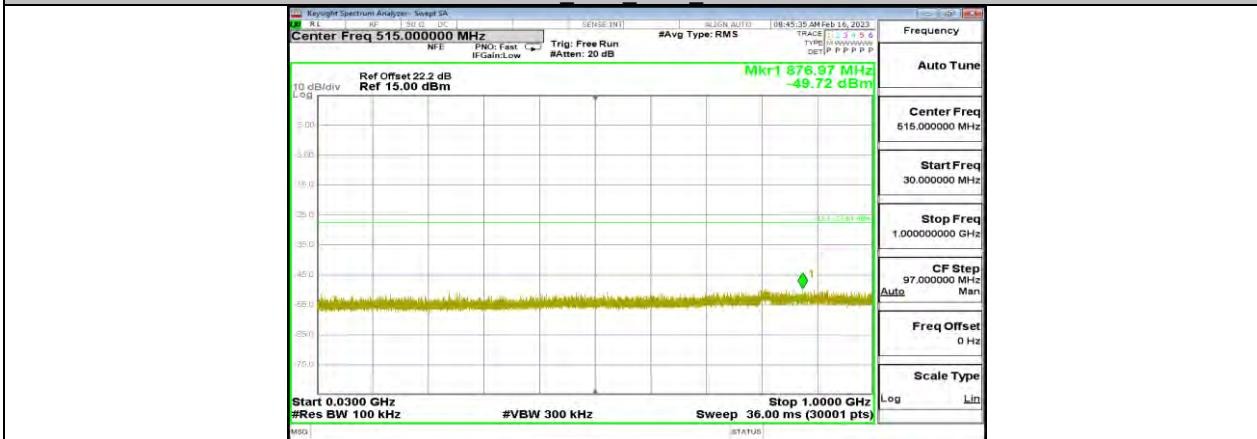




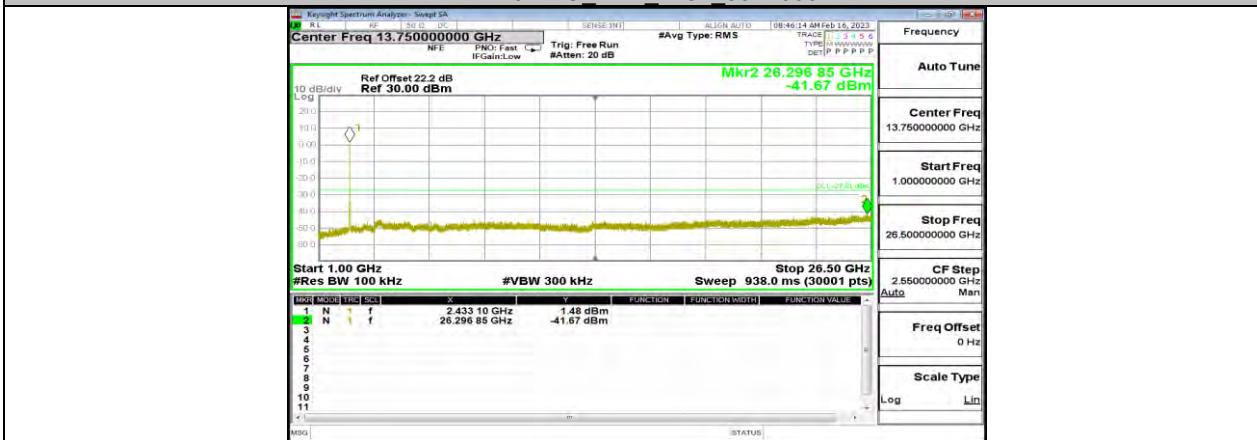




11N20SISO\_Ant1\_2437\_0~Reference



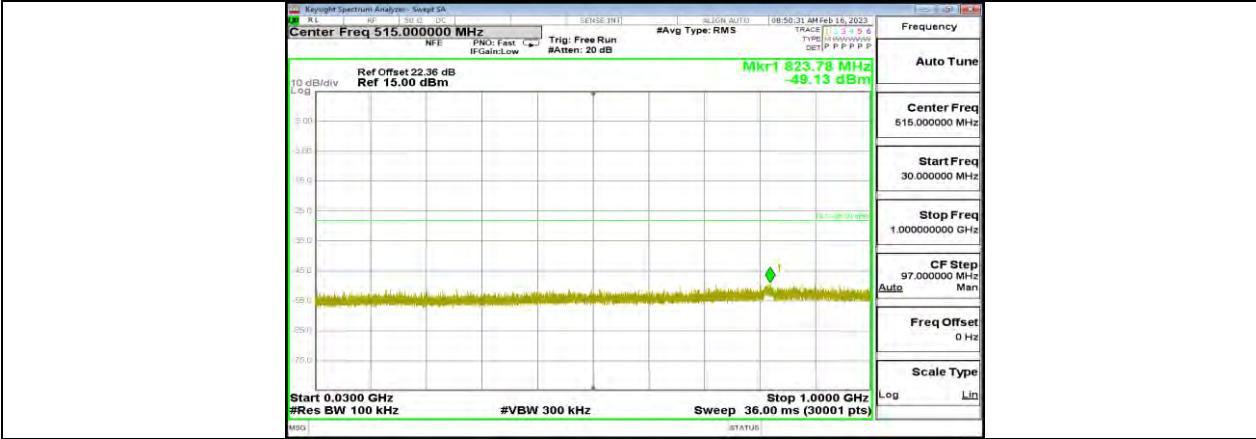
11N20SISO\_Ant1\_2437\_30~1000



11N20SISO\_Ant1\_2437\_1000~26500



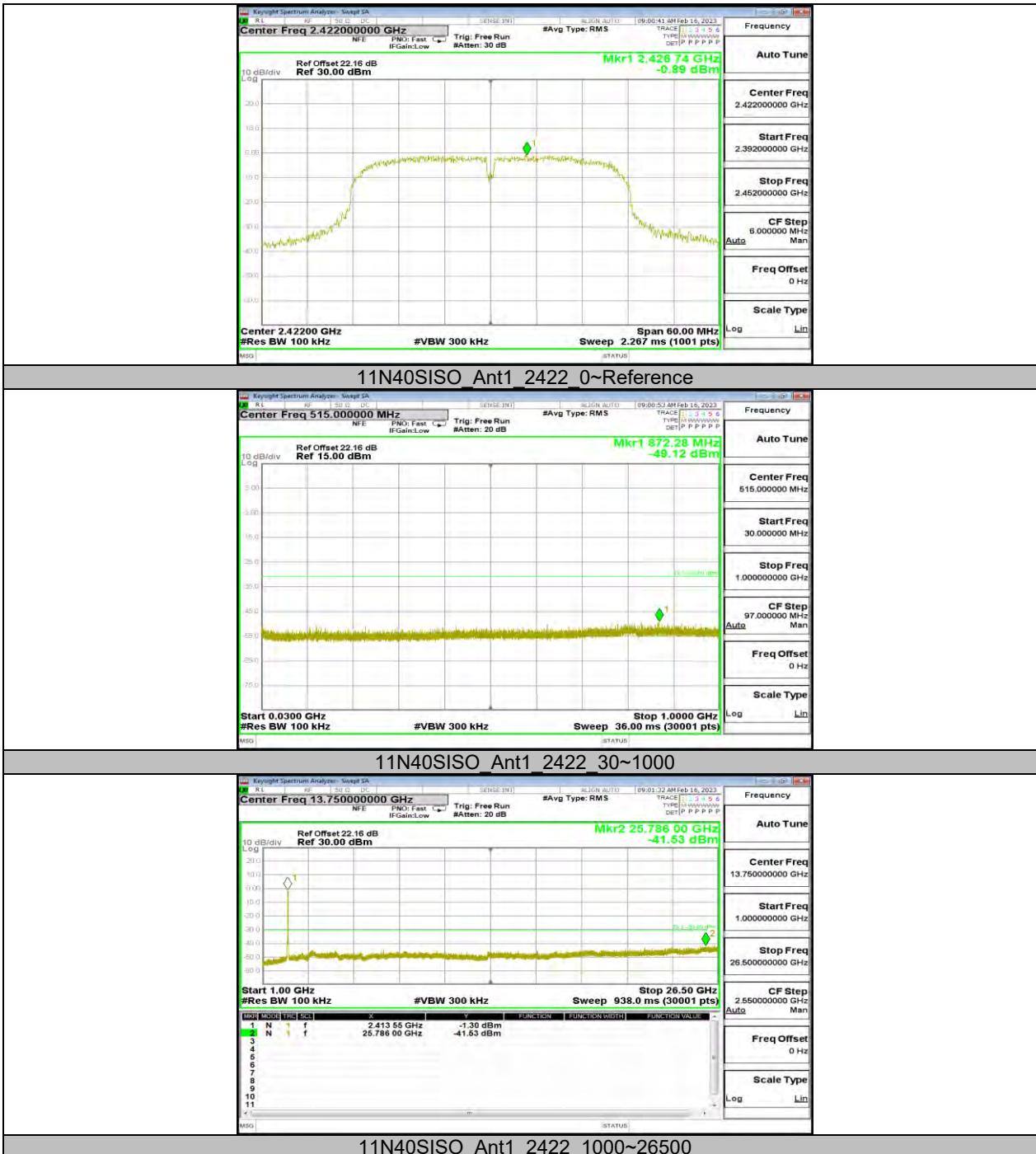
11N20SISO\_Ant1\_2462\_0~Reference

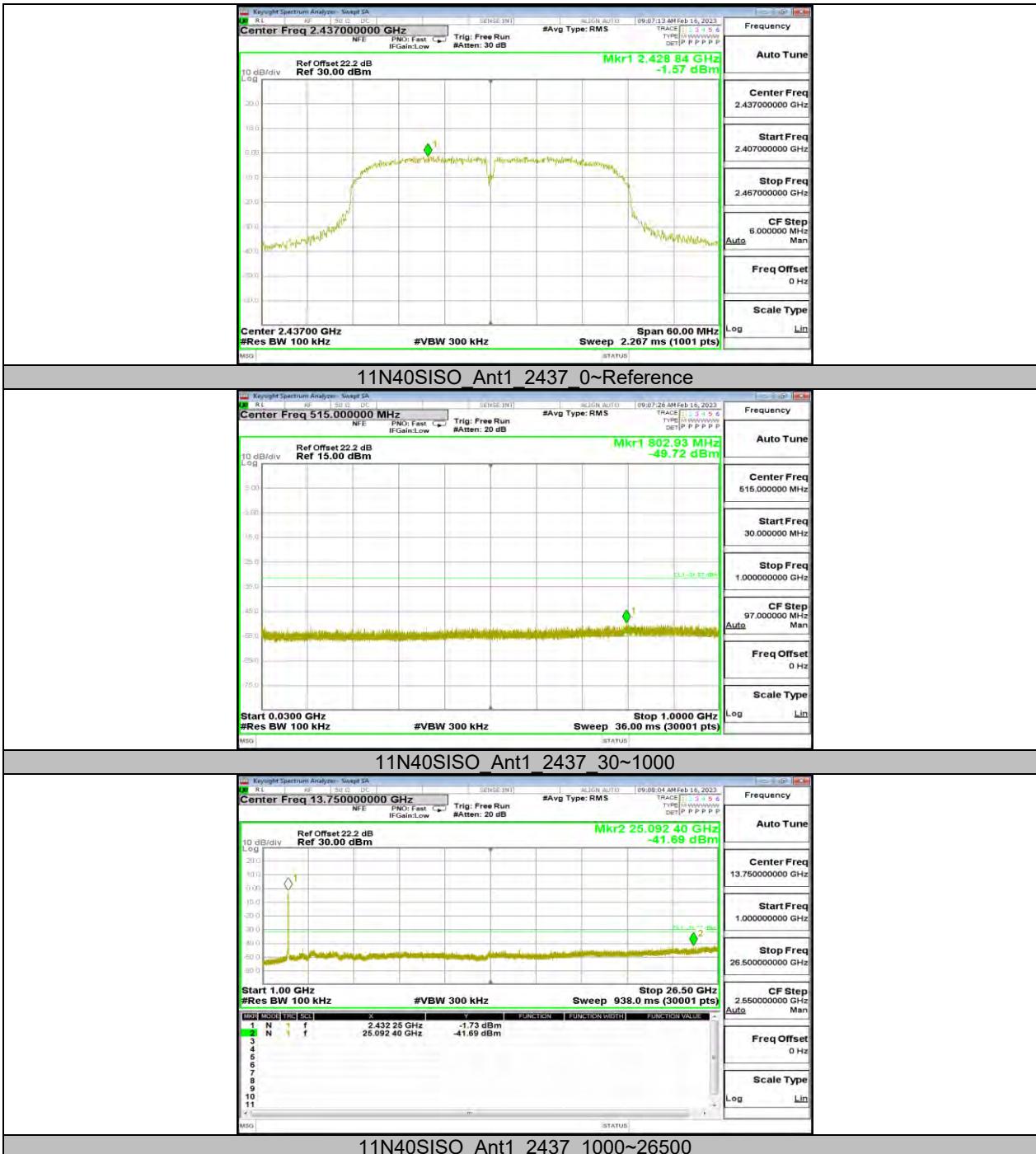


11N20SISO\_Ant1\_2462\_30~1000



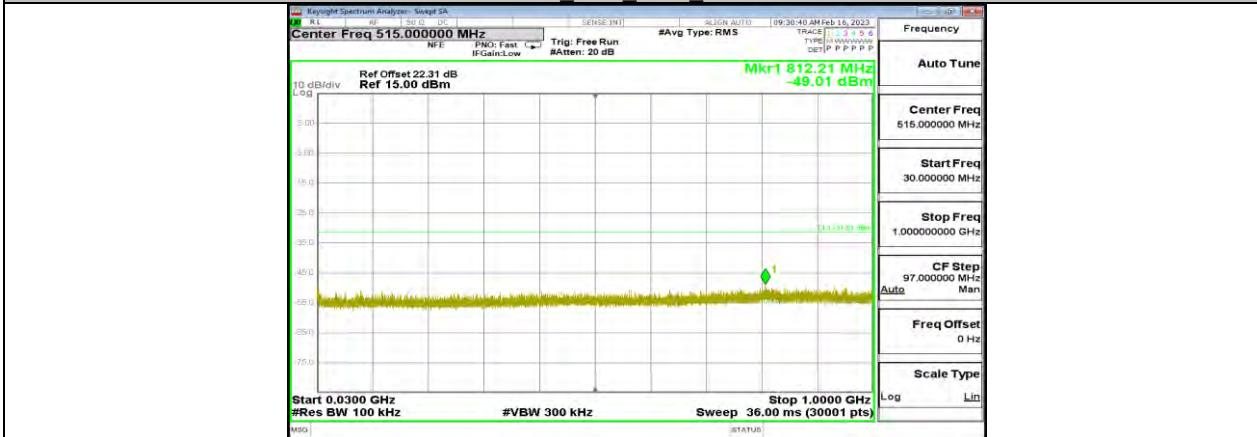
11N20SISO\_Ant1\_2462\_1000~26500



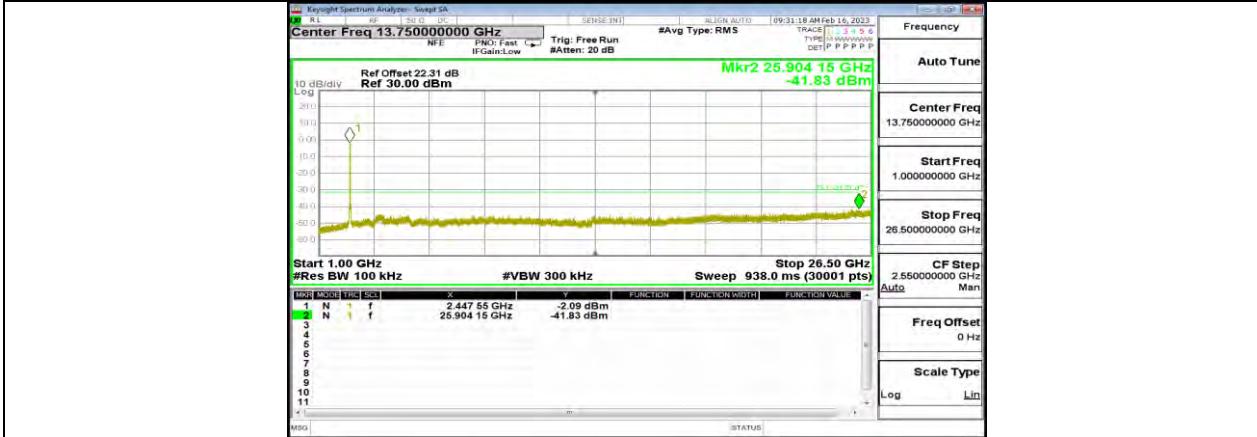




11N40SISO\_Ant1\_2452\_0~Reference



11N40SISO\_Ant1\_2452\_30~1000



11N40SISO\_Ant1\_2452\_1000~26500

## 11.7. APPENDIX G: DUTY CYCLE

### 11.7.1. Test Result

Test Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/T Minimum VBW (kHz)	Final setting For VBW (kHz)
11B	50	50	1.0000	100.00	0.00	N/A	0.01
11G	50	50	1.0000	100.00	0.00	N/A	0.01
11N20SISO	50	50	1.0000	100.00	0.00	N/A	0.01
11N40SISO	50	50	1.0000	100.00	0.00	N/A	0.01

Note:

Duty Cycle Correction Factor=10log (1/x).

Where: x is Duty Cycle (Linear)

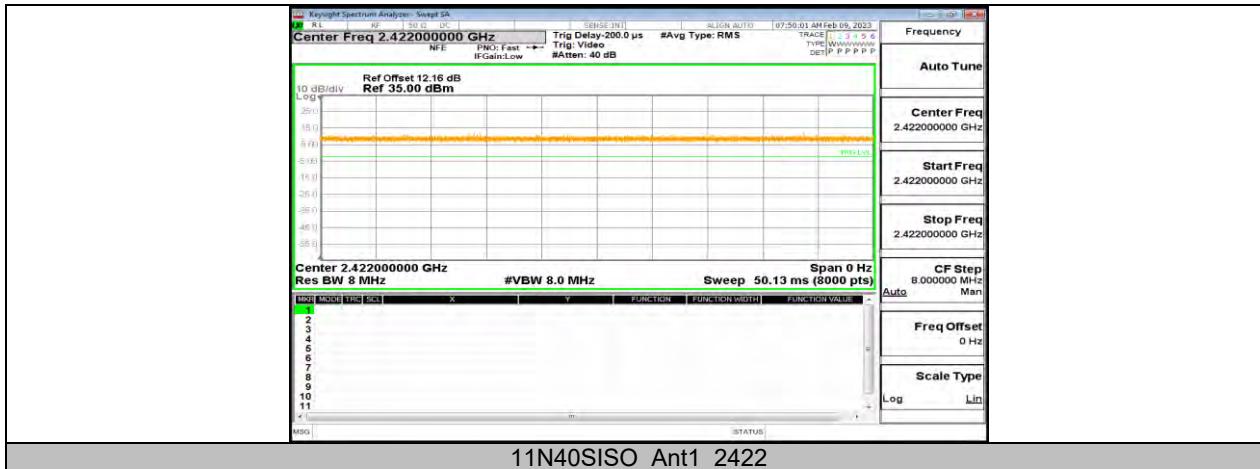
Where: T is On Time

If that calculated VBW is not available on the analyzer then the next higher value should be used.

If the EUT is configured to transmit with duty cycle  $\geq 98\%$ , set  $VBW \leq RBW/100$  (i.e., 10 kHz) but not less than 10 Hz.

## 11.7.2. Test Graphs





## END OF REPORT