



## **CFR 47 FCC PART 15 SUBPART C**

### **CERTIFICATION TEST REPORT**

*For*

**Payment terminal**

**MODEL NUMBER: SOLO**

**FCC ID: 2A39U-SOLO002**

**REPORT NUMBER: 4790095248-2**

**ISSUE DATE: March 28, 2022**

*Prepared for*

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Revision History

Rev.	Issue Date	Revisions	Revised By
V0	3/28/2022	Initial Issue	



Summary of Test Results			
Clause	Test Items	FCC Rules	Test Results
1	6dB Bandwidth	FCC Part 15.247 (a) (2)	Pass
2	Conducted Output Power	FCC Part 15.247 (b) (3)	Pass
3	Power Spectral Density	FCC Part 15.247 (e)	Pass
4	Conducted Bandedge and Spurious Emission	FCC Part 15.247 (d)	Pass
5	Radiated Bandedge and Spurious Emission	FCC Part 15.247 (d) FCC Part 15.209 FCC Part 15.205	Pass
6	Conducted Emission Test for AC Power Port	FCC Part 15.207	Pass
7	Antenna Requirement	FCC Part 15.203	Pass
<p>Note:</p> <p>1. This test report is only published to and used by the applicant, and it is not for evidence purpose in China.</p> <p>2. The measurement result for the sample received is &lt;Pass&gt; according to &lt; CFR 47 FCC PART 15 SUBPART C &gt; when &lt;Accuracy Method&gt; decision rule is applied.</p>			

## TABLE OF CONTENTS

<b>1. ATTESTATION OF TEST RESULTS.....</b>	<b>6</b>
<b>2. TEST METHODOLOGY .....</b>	<b>7</b>
<b>3. FACILITIES AND ACCREDITATION.....</b>	<b>7</b>
<b>4. CALIBRATION AND UNCERTAINTY .....</b>	<b>8</b>
4.1. MEASURING INSTRUMENT CALIBRATION .....	8
4.2. MEASUREMENT UNCERTAINTY .....	8
<b>5. EQUIPMENT UNDER TEST .....</b>	<b>9</b>
5.1. DESCRIPTION OF EUT .....	9
5.2. CHANNEL LIST.....	9
5.3. MAXIMUM OUTPUT POWER.....	10
5.4. TEST CHANNEL CONFIGURATION .....	10
5.5. THE WORSE CASE POWER SETTING PARAMETER.....	10
5.6. THE WORSE CASE CONFIGURATIONS.....	11
5.7. DESCRIPTION OF AVAILABLE ANTENNAS .....	12
5.8. DESCRIPTION OF TEST SETUP .....	13
<b>6. MEASURING INSTRUMENT AND SOFTWARE USED .....</b>	<b>14</b>
<b>7. ANTENNA PORT TEST RESULTS .....</b>	<b>16</b>
7.1. ON TIME AND DUTY CYCLE .....	16
7.2. 6 dB DTS BANDWIDTH AND 99 % OCCUPIED BANDWIDTH.....	17
7.3. CONDUCTED OUTPUT POWER .....	19
7.4. POWER SPECTRAL DENSITY .....	20
7.5. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS .....	22
<b>8. RADIATED TEST RESULTS .....</b>	<b>24</b>
8.1. RESTRICTED BANDEDGE .....	30
8.1.1. 802.11b SISO MODE .....	30
8.1.2. 802.11g SISO MODE .....	34
8.1.3. 802.11n HT20 SISO MODE .....	38
8.2. SPURIOUS EMISSIONS (1 GHz ~ 3 GHz) .....	42
8.2.1. 802.11b SISO MODE .....	42
8.3. SPURIOUS EMISSIONS (3 GHz ~ 18 GHz) .....	48
8.3.1. 802.11b SISO MODE .....	48
8.3.2. 802.11g SISO MODE .....	54
8.3.3. 802.11n HT20 SISO MODE .....	60
8.4. SPURIOUS EMISSIONS (18 GHz ~ 26 GHz) .....	66



8.4.1.	802.11b MODE.....	66
8.5.	SPURIOUS EMISSIONS (30 MHz ~ 1 GHz).....	68
8.5.1.	802.11b MODE.....	68
8.6.	SPURIOUS EMISSIONS BELOW 30 MHz .....	70
8.6.1.	802.11b MODE.....	70
<b>9.</b>	<b>AC POWER LINE CONDUCTED EMISSIONS.....</b>	<b>73</b>
9.1.1.	802.11b MODE.....	74
<b>10.</b>	<b>ANTENNA REQUIREMENTS.....</b>	<b>76</b>
<b>11.</b>	<b>Appendix.....</b>	<b>77</b>
11.1.	Appendix A: DTS Bandwidth.....	77
11.1.1.	Test Result.....	77
11.1.2.	Test Graphs .....	78
11.2.	Appendix B: Occupied Channel Bandwidth .....	81
11.2.1.	Test Result.....	81
11.2.2.	Test Graphs .....	82
11.3.	Appendix C: Maximum conducted output power .....	85
11.3.1.	Test Result.....	85
11.4.	Appendix D: Maximum power spectral density .....	86
11.4.1.	Test Result.....	86
11.4.2.	Test Graphs .....	87
11.5.	Appendix E: Band edge measurements .....	90
11.5.1.	Test Result.....	90
11.5.2.	Test Graphs .....	91
11.6.	Appendix F: Conducted Spurious Emission.....	93
11.6.1.	Test Result.....	93
11.6.2.	Test Graphs .....	94
11.7.	Appendix G: Duty Cycle .....	103
11.7.1.	Test Result.....	103
11.7.2.	Test Graphs .....	104



## 1. ATTESTATION OF TEST RESULTS

### Applicant Information

Company Name: SumUp Inc  
Address: 2000 Central Ave Ste 100 Boulder Colorado 80301 United States

### Manufacturer Information

Company Name: SumUp Inc  
Address: 2000 Central Ave Ste 100 Boulder Colorado 80301 United States

### EUT Information

EUT Name: Payment terminal  
Model: SOLO  
Sample Received Date: January 06, 2022  
Sample Status: Normal  
Sample ID: 4405274  
Date of Tested: January 06~Mar 25, 2022

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

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## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with KDB 558074 D01 15.247 Meas Guidance v05r02, KDB 414788 D01 Radiated Test Site v01r01, CFR 47 FCC Part 2, CFR 47 FCC Part 15 and 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. 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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Note 1: All tests measurement facilities use to collect the measurement data are located at Building 10, Innovation Technology Park, Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China

Note 2: 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.

Note 3: 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 recognize 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	Payment terminal
Model Name	SOLO
Radio Technology	IEEE802.11b/g/n HT20
Operation frequency	IEEE 802.11b: 2412MHz—2462MHz IEEE 802.11g: 2412MHz—2462MHz IEEE 802.11n HT20: 2412MHz—2462MHz
Modulation	IEEE 802.11b: DSSS(CCK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK,BPSK)
Battery	Li-ion 1.6 Ah, 3,8 Vdc
Ratings	5 Vdc via USB Type C

### 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	/	/



### 5.3. MAXIMUM OUTPUT POWER

IEEE Std. 802.11	Frequency (MHz)	Channel Number	Maximum Conducted AVG Output Power (dBm)
b	2412 ~ 2462	1-11[11]	16.75
g	2412 ~ 2462	1-11[11]	12.80
n HT20	2412 ~ 2462	1-11[11]	11.63

### 5.4. TEST CHANNEL CONFIGURATION

Test Mode	Test Channel	Frequency
WiFi TX(802.11b)	CH 1, CH 6, CH 11/ Low, Middle, High	2412MHz, 2437MHz, 2462MHz
WiFi TX(802.11g)	CH 1, CH 6, CH 11/ Low, Middle, High	2412MHz, 2437MHz, 2462MHz
WiFi TX(802.11n HT20)	CH 1, CH 6, CH 11/ Low, Middle, High	2412MHz, 2437MHz, 2462MHz

### 5.5. THE WORSE CASE POWER SETTING PARAMETER

The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band							
Test Software		CMD					
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			



## 5.6. THE WORSE 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

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



## 5.7. DESCRIPTION OF AVAILABLE ANTENNAS

Antenna	Frequency (MHz)	Antenna Type	MAX Antenna Gain (dBi)
1	2412-2462	MID	0.4

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.

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



## 5.8. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	Remarks
1	Laptop	Lenovo	E14	/
2	Adapter	SAMSUNG	ETA-U90CBC	5Vdc,2A

### I/O CABLES

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

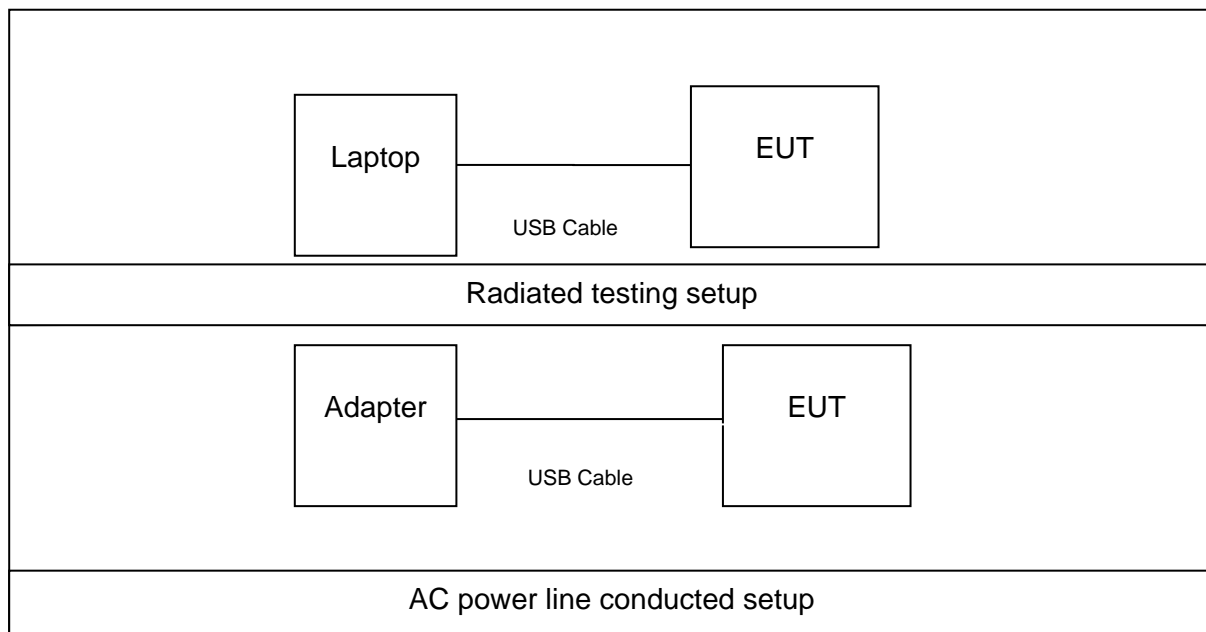
### ACCESSORY

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

### TEST SETUP

The EUT can work in engineering mode with the software in the laptop.

### SETUP DIAGRAM FOR TESTS





## 6. MEASURING INSTRUMENT AND SOFTWARE USED

Conducted Emissions					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date
EMI Test Receiver	R&S	ESR3	101961	Oct.30, 2021	Oct.29, 2022
Artificial Mains Networks	Schwarzbeck	NSLK 8126	8126465	Oct.30, 2021	Oct.29, 2022
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.30, 2021	Oct.29, 2022
Hybrid Log Periodic Antenna	TDK	HLP-3003C	130959	Aug.02, 2021	Aug.01, 2024
Preamplifier	HP	8447D	2944A09099	Oct.30, 2021	Oct.29, 2022
EMI Measurement Receiver	R&S	ESR26	101377	Oct.30, 2021	Oct.29, 2022
Horn Antenna	TDK	HRN-0118	130940	July 20, 2021	July 19, 2024
Preamplifier	TDK	PA-02-0118	TRS-305-00067	Oct.30, 2021	Oct.29, 2022
Horn Antenna	Schwarzbeck	BBHA9170	697	July 20, 2021	July 19, 2024
Preamplifier	TDK	PA-02-2	TRS-307-00003	Oct.31, 2021	Oct.30, 2022
Preamplifier	TDK	PA-02-3	TRS-308-00002	Oct.31, 2021	Oct.30, 2022
Loop antenna	Schwarzbeck	1519B	00008	Dec.14, 2021	Dec.13,2024
Preamplifier	TDK	PA-02-001-3000	TRS-302-00050	Oct.31, 2021	Oct.30, 2022
Preamplifier	Mini-Circuits	ZX60-83LN-S+	SUP01201941	Oct.31, 2021	Oct.30, 2022
High Pass Filter	Wi	WHKX10-2700-3000-18000-40SS	23	Oct.31, 2021	Oct.30, 2022
Highpass Filter	Wainwright	WHKX10-5850-6500-1800-40SS	4	Oct.31, 2021	Oct.30, 2022
Band Reject Filter	Wainwright	WRCJV8-2350-2400-2483.5-2533.5-40SS	4	Oct.31, 2021	Oct.30, 2022



Software			
Description	Manufacturer	Name	Version
Test Software for Radiated Emissions	Farad	EZ-EMC	Ver. UL-3A1

Other instruments					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Spectrum Analyzer	R&S	FSV40	101117	Oct.31, 2021	Oct.30, 2022
Dual Channel Power Meter	Keysight	N1912A	MY55416024	Oct.30, 2021	Oct.29, 2022
Power Sensor	Keysight	USB Wideband Power Sensor	MY5100022	Oct.30, 2021	Oct.29, 2022



## 7. ANTENNA PORT TEST RESULTS

### 7.1. ON TIME AND DUTY CYCLE

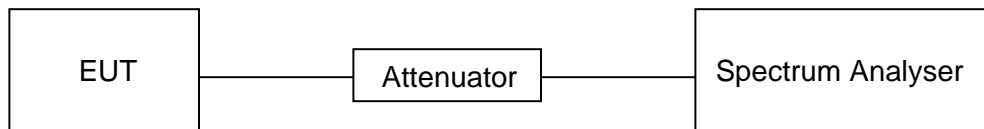
#### LIMITS

None; for reporting purposes only

#### PROCEDURE

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

#### TEST SETUP



#### TEST ENVIRONMENT

Temperature	21.8 °C	Relative Humidity	56.9 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 3.8 V

#### RESULTS

Please refer to appendix G.





## 7.2. 6 dB DTS 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) ISED RSS-247 5.2 (a)	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

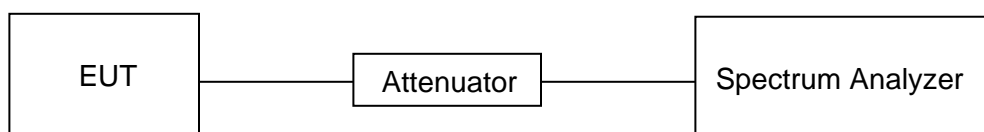
Connect the EUT to the spectrum analyser and use the following settings:

Center Frequency	The center frequency of the channel under test
Frequency Span	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	21.8 °C	Relative Humidity	56.9 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 3.8 V

### **RESULTS**

Please refer to appendix A & B.



### 7.3. CONDUCTED OUTPUT POWER

#### LIMITS

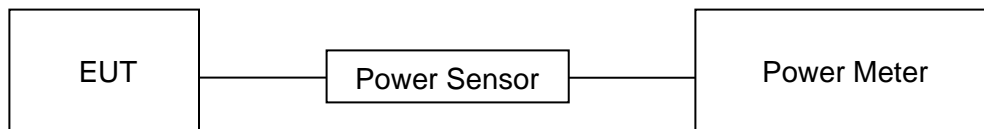
CFR 47 FCC Part15 (15.247) Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247(b)(3)	AVG Output Power	1 watt or 30 dBm	2400-2483.5

#### TEST PROCEDURE

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.

#### TEST SETUP



#### TEST ENVIRONMENT

Temperature	21.8 °C	Relative Humidity	56.9 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 3.8 V

#### RESULTS

Please refer to appendix C.



## 7.4. 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/3 kHz	2400-2483.5

### TEST PROCEDURE

Refer to ANSI C63.10-2013 clause 11.10.

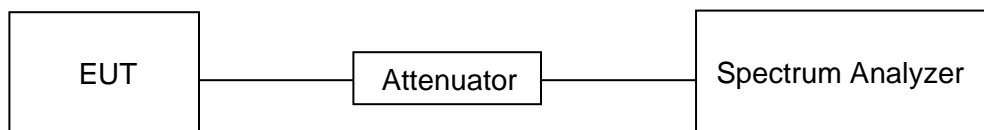
Connect the EUT to the spectrum analyser and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	PEAK
RBW	$3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$
VBW	$\geq 3 \times \text{RBW}$
Span	$1.5 \times \text{DTS bandwidth}$
Trace	Max hold
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	21.8 °C	Relative Humidity	56.9 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 3.8 V



## **RESULTS**

Please refer to appendix D.

## 7.5. CONDUCTED BANDEGE AND SPURIOUS EMISSIONS

### 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	$\geq 3 \times \text{RBW}$
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

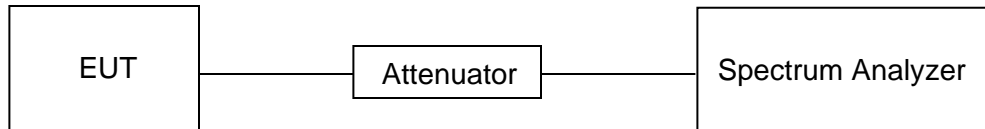
Allow trace to fully stabilize and use the peak marker function to determine the maximum PSD level.

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	$\geq 3 \times \text{RBW}$
measurement points	$\geq \text{span}/\text{RBW}$
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	21.8 °C	Relative Humidity	56.9 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 3.8 V

### **RESULTS**

Please refer to appendix E & F.



## 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):

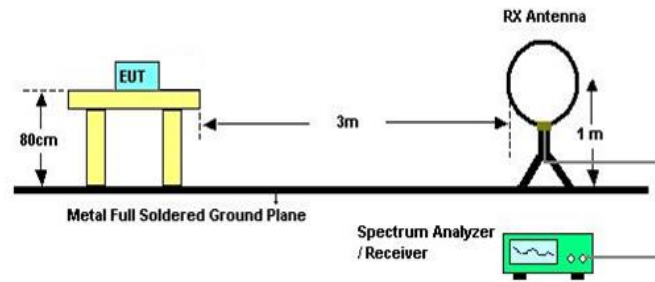
MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
<sup>1</sup> 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
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 SETUP AND PROCEDURE

Below 30 MHz

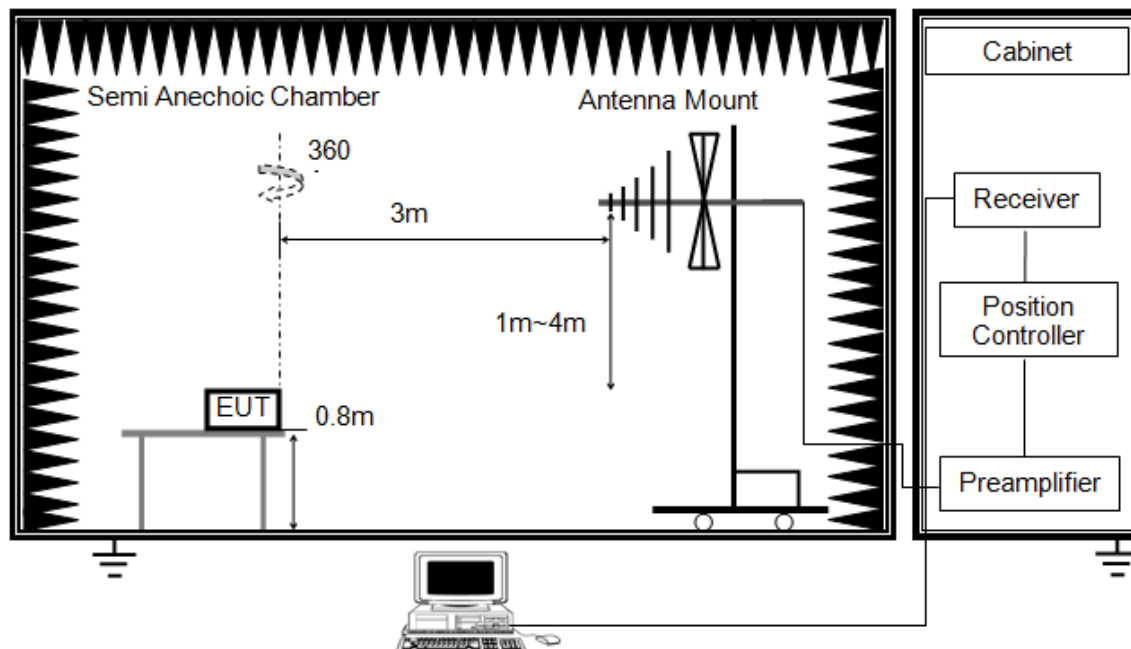


The setting of the spectrum analyser

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 377Ω. For example, the measurement frequency X KHz resulted in a level of Y dBuV/m, which is equivalent to  $Y - 51.5 = Z$  dBuA/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

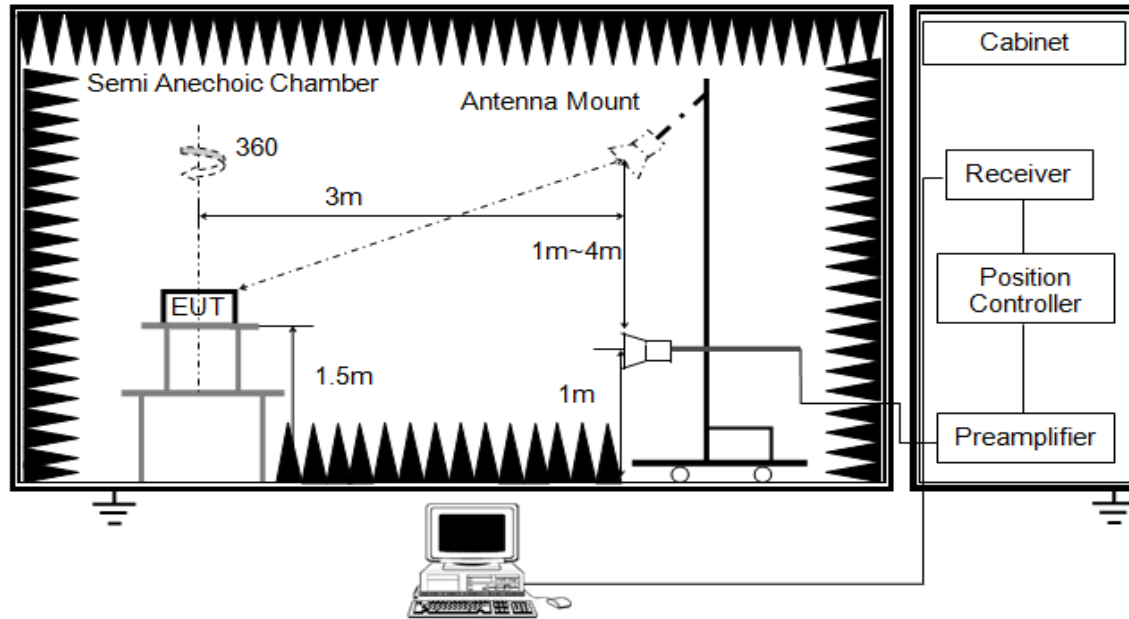


The setting of the spectrum analyser

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 1 GHz

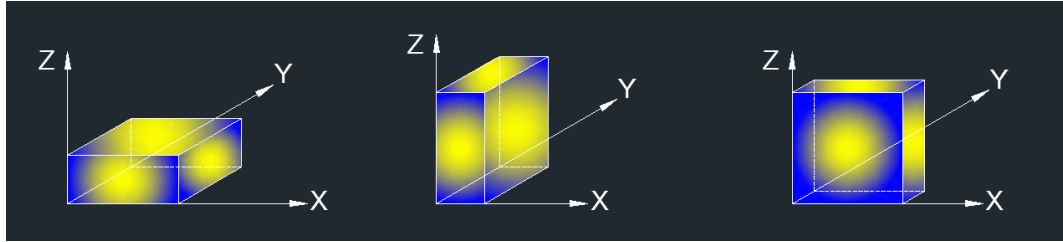


The setting of the spectrum analyser

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 7.1.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.

### TEST ENVIRONMENT

Temperature	21.8 °C	Relative Humidity	56.9 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 3.8 V

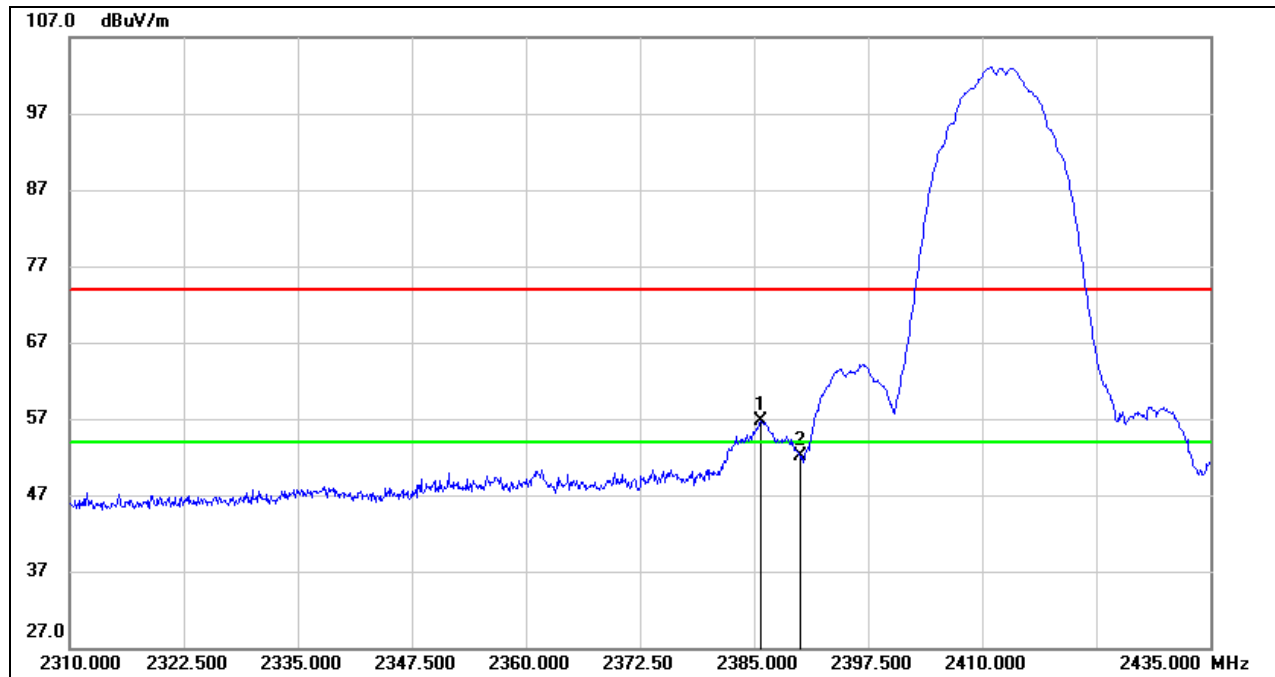
### RESULTS

## 8.1. RESTRICTED BANDEDGE

### 8.1.1. 802.11b SISO MODE

#### RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

#### PEAK



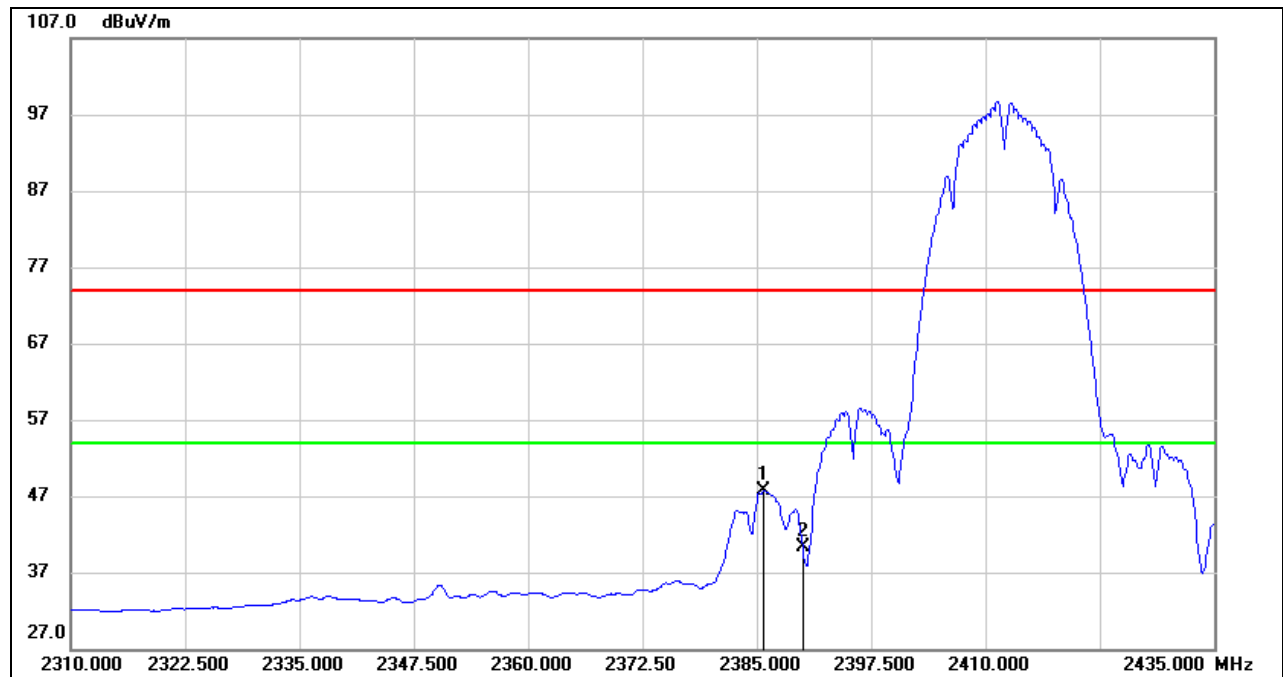
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2385.750	24.05	32.63	56.68	74.00	-17.32	peak
2	2390.000	19.35	32.66	52.01	74.00	-21.99	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. Peak: Peak detector.

3. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

### AVG

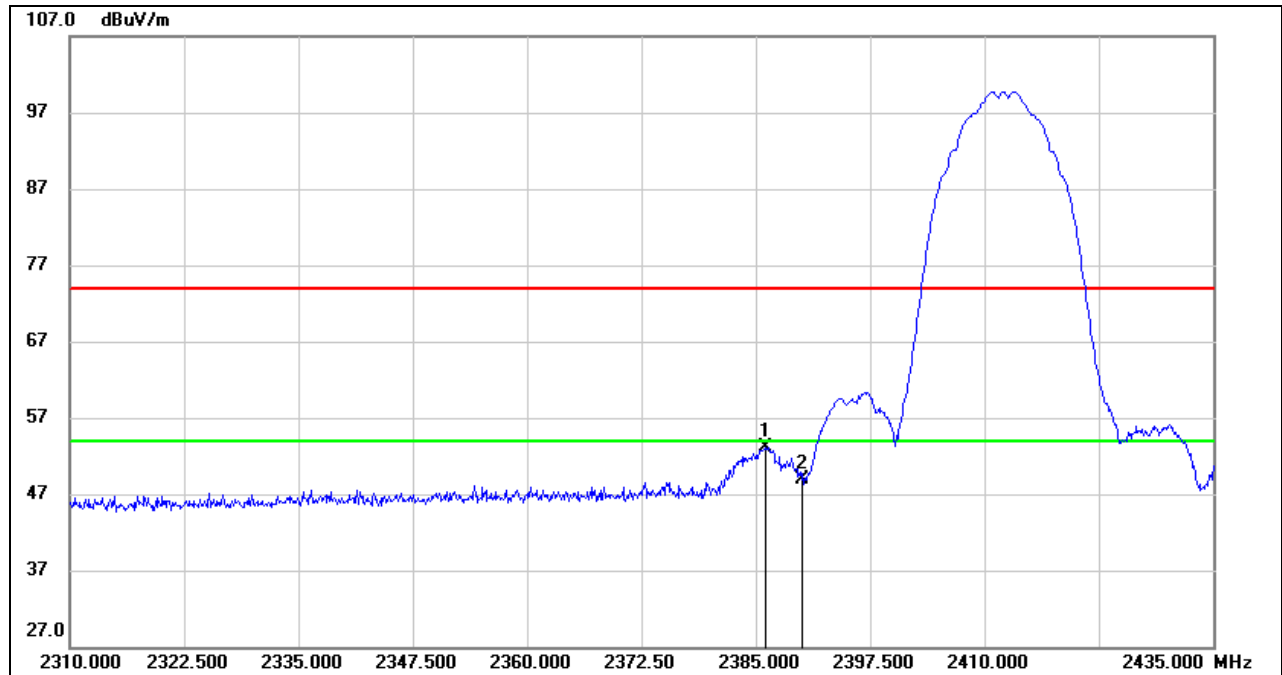


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2385.750	15.09	32.63	47.72	54.00	-6.28	AVG
2	2390.000	7.62	32.66	40.28	54.00	-13.72	AVG

Note: 1. Measurement = Reading Level + Correct Factor.  
 2. Peak: Peak detector.  
 3. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

**RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**

**PEAK**



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2386.125	20.54	32.63	53.17	74.00	-20.83	peak
2	2390.000	16.18	32.66	48.84	74.00	-25.16	peak

Note: 1. Measurement = Reading Level + Correct Factor.

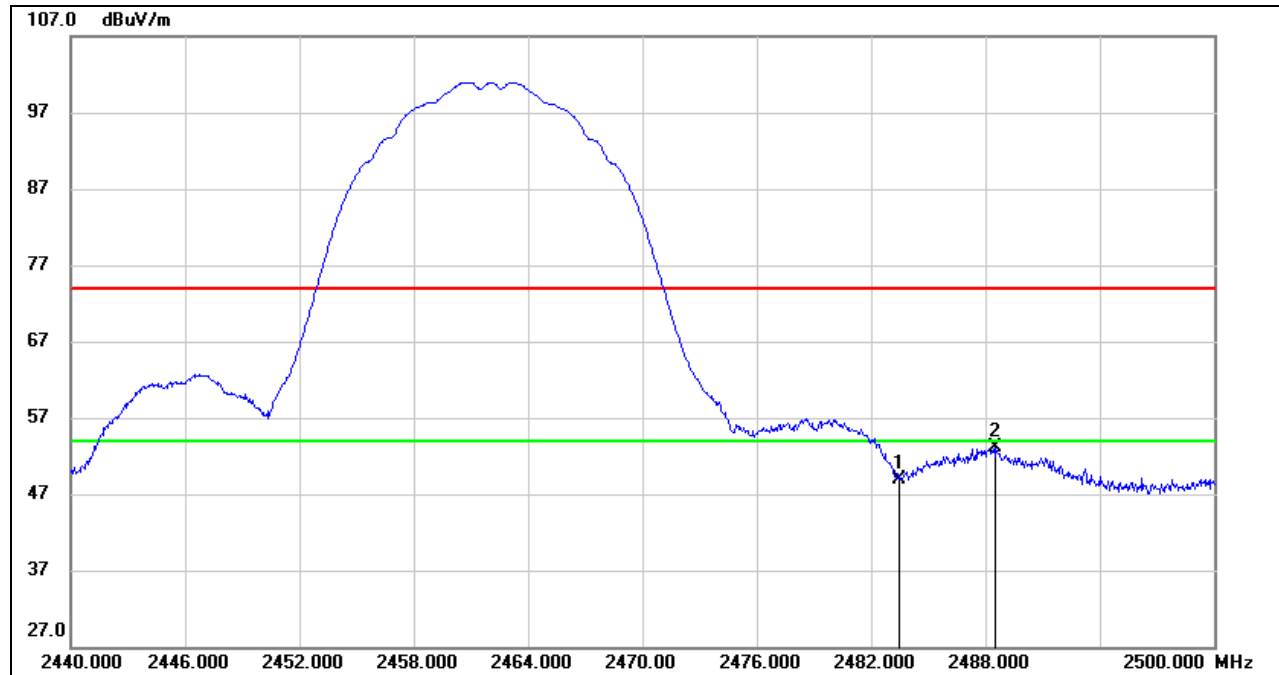
2. Peak: Peak detector.

3. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.



# RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

## PEAK



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	15.86	33.10	48.96	74.00	-25.04	peak
2	2488.540	20.03	33.11	53.14	74.00	-20.86	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. Peak: Peak detector.

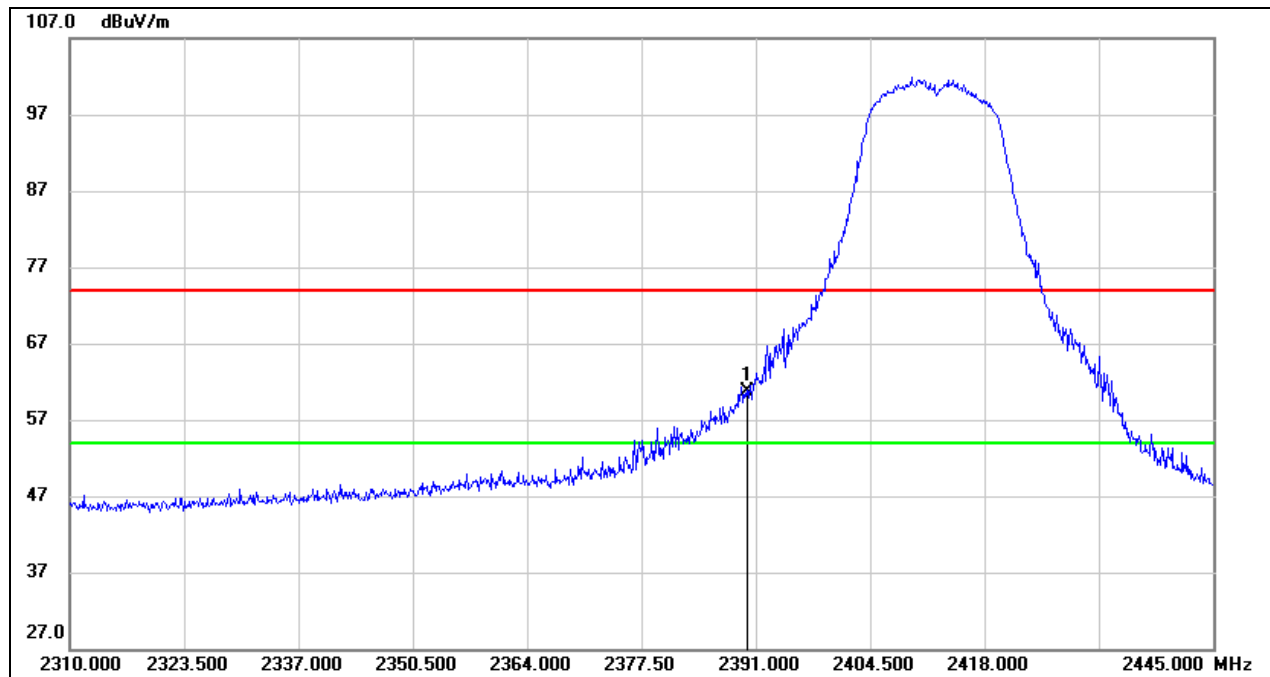
3. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

Note: Horizontal and Vertical have been tested, only the worst data was recorded in the report.

## 8.1.2. 802.11g SISO MODE

### RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

#### PEAK



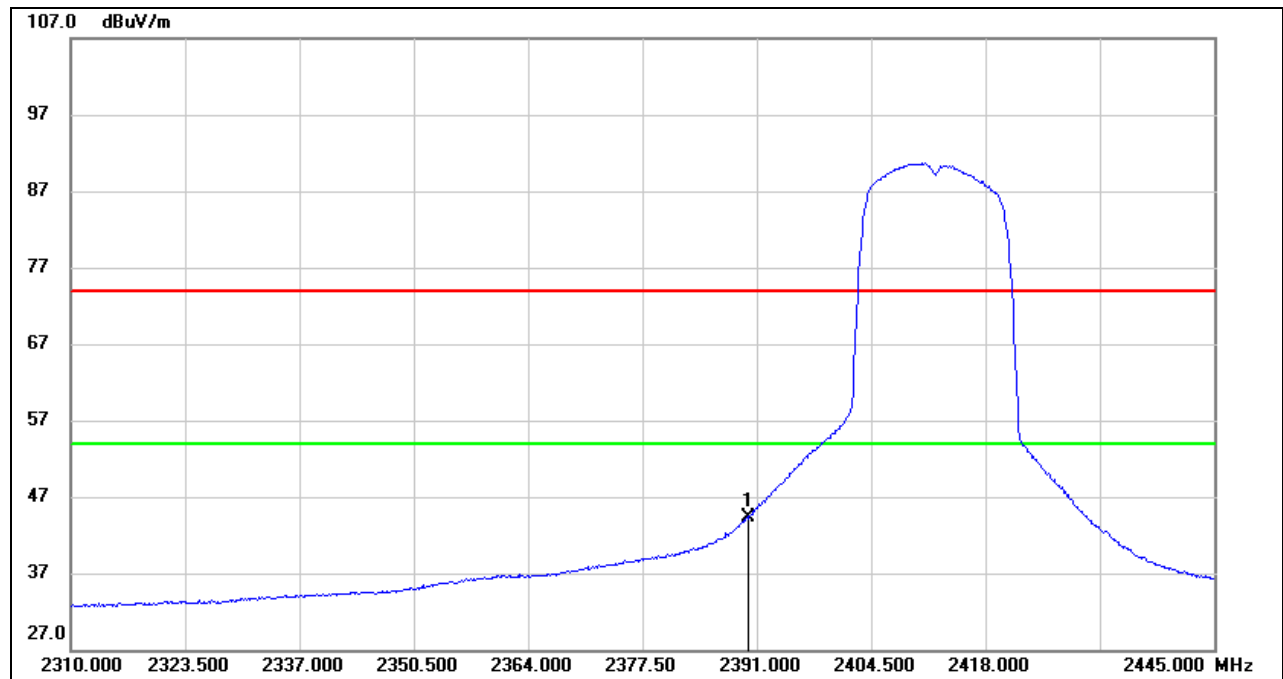
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2390.000	28.01	32.66	60.67	74.00	-13.33	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. Peak: Peak detector.

3. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

### AVG



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2390.000	11.74	32.66	44.40	54.00	-9.60	AVG

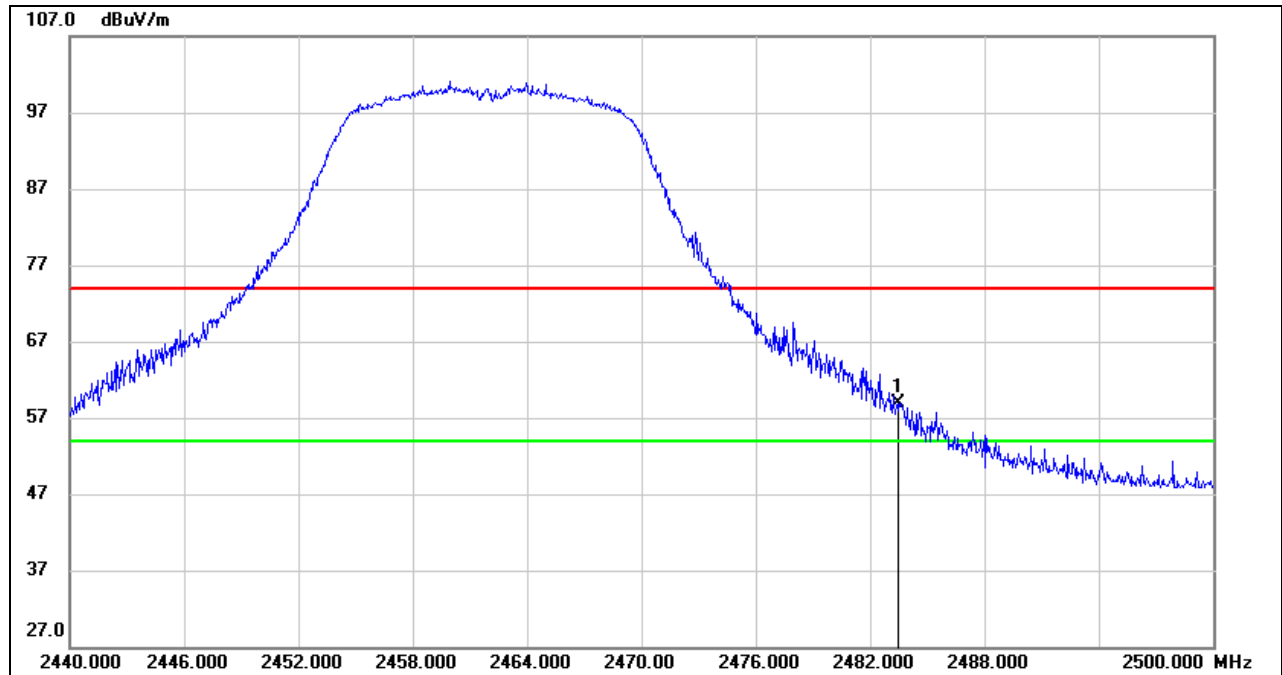
Note: 1. Measurement = Reading Level + Correct Factor.

2. Peak: Peak detector.

3. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

# RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

## PEAK



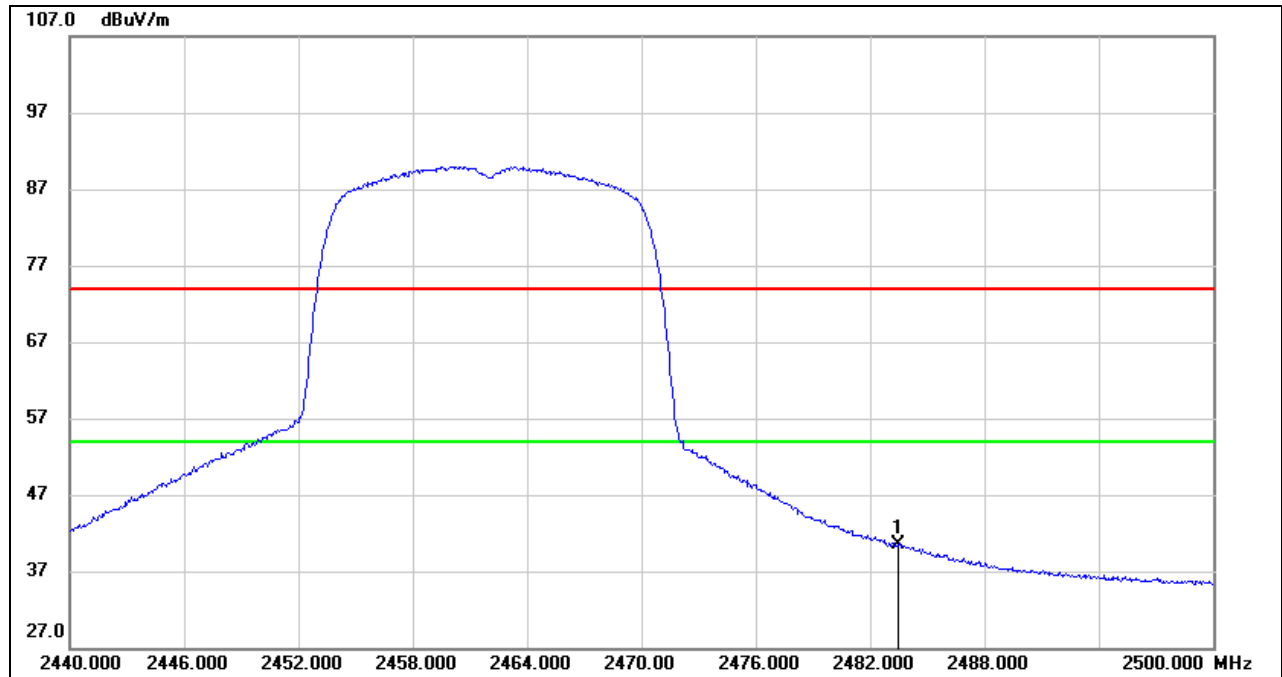
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	25.74	33.10	58.84	74.00	-15.16	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. Peak: Peak detector.

3. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

### AVG



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	7.32	33.10	40.42	54.00	-13.58	AVG

Note: 1. Measurement = Reading Level + Correct Factor.

2. Peak: Peak detector.

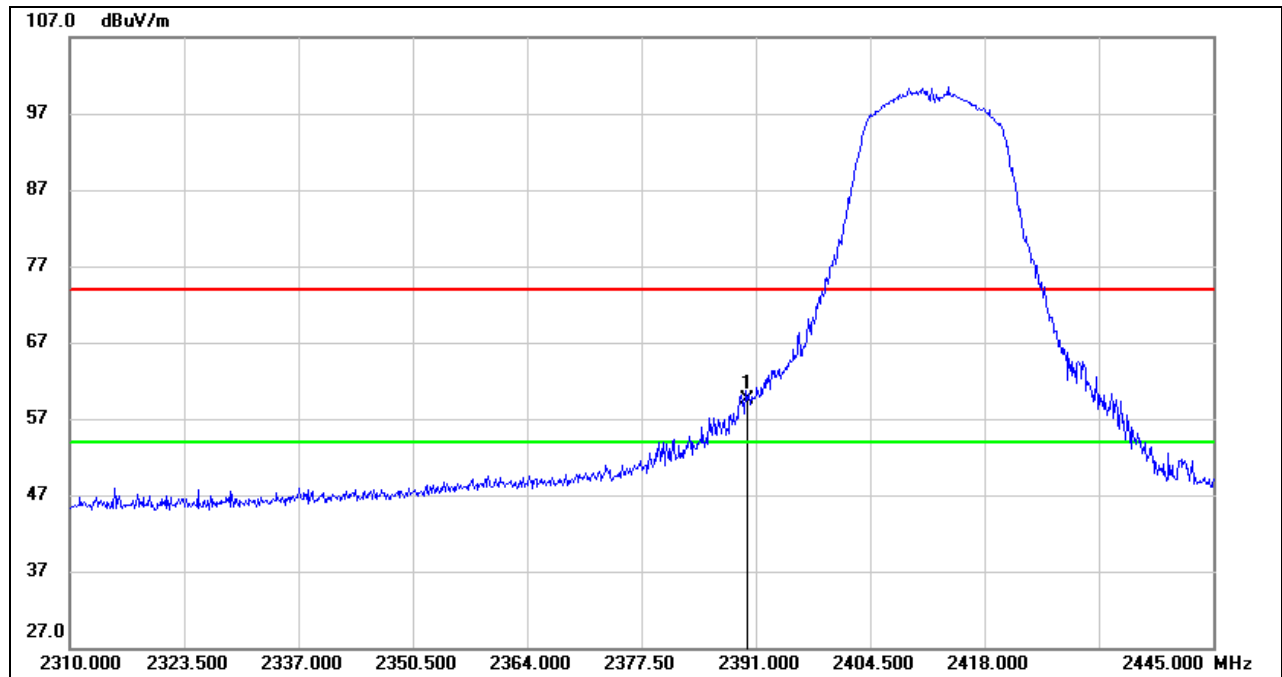
3. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

Note: Horizontal and Vertical have been tested, only the worst data was recorded in the report.

### 8.1.3. 802.11n HT20 SISO MODE

#### RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

#### PEAK



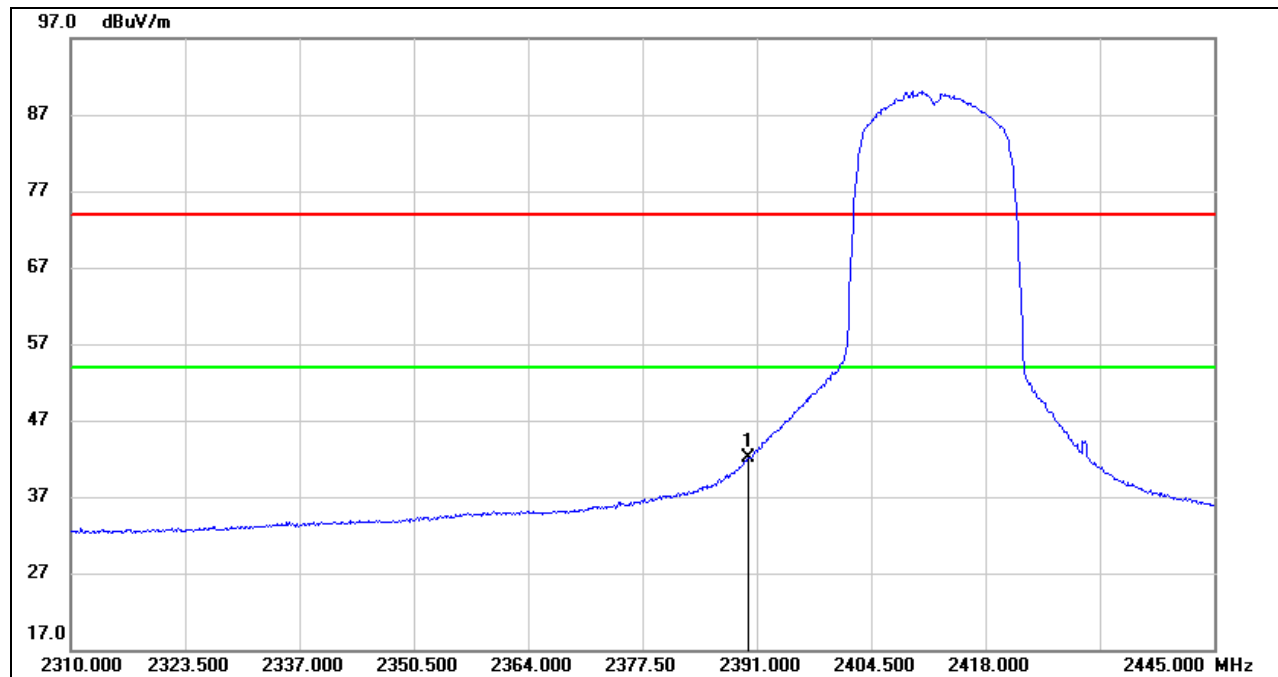
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2390.000	26.80	32.66	59.46	74.00	-14.54	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. Peak: Peak detector.

3. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

### AVG



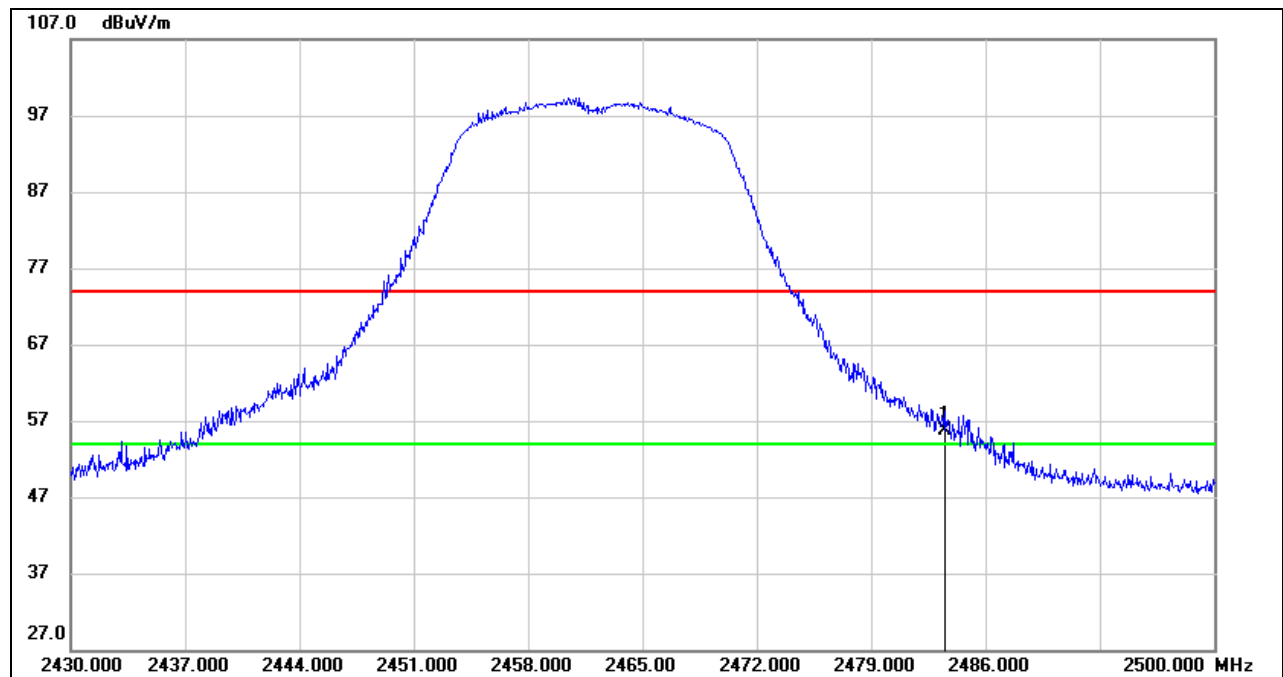
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2390.000	9.50	32.66	42.16	54.00	-11.84	AVG

Note: 1. Measurement = Reading Level + Correct Factor.

2. AVG:  $VBW=1/Ton$ , where: Ton is the transmitting duration.

3. For the transmitting duration, please refer to clause 7.1.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

**RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)****PEAK**

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	22.64	33.10	55.74	74.00	-18.26	peak

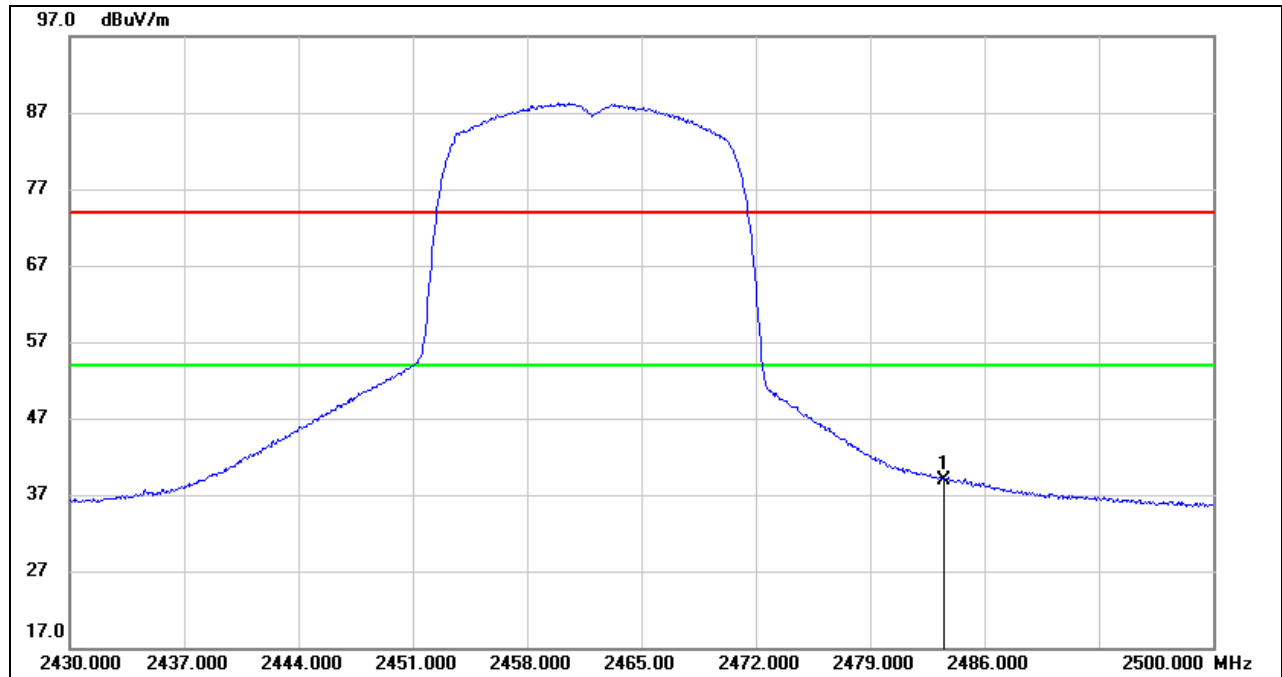
Note: 1. Measurement = Reading Level + Correct Factor.

2. Peak: Peak detector.

3. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.



### AVG



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	5.83	33.10	38.93	54.00	-15.07	AVG

Note: 1. Measurement = Reading Level + Correct Factor.  
 2. AVG:  $VBW=1/Ton$ , where: Ton is the transmitting duration.  
 3. For the transmitting duration, please refer to clause 7.1.  
 4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

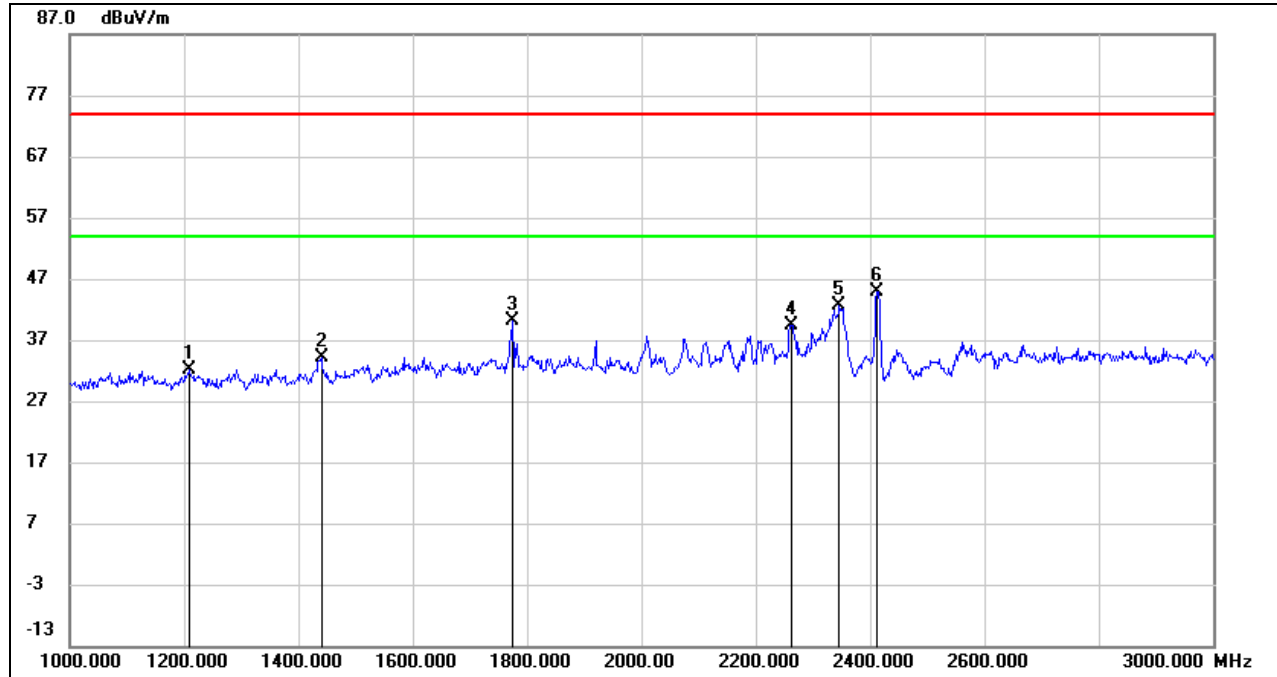
Note: Horizontal and Vertical have been tested, only the worst data was recorded in the report.  
 Note: All modes have been tested, only the worst data was recorded in the report.

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

### 8.2.1. 802.11b SISO MODE

#### ANTENNA 0 TEST RESULTS (WORST CASE)

#### HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1210.000	45.77	-13.68	32.09	74.00	-41.91	peak
2	1440.000	46.88	-12.79	34.09	74.00	-39.91	peak
3	1775.000	50.85	-10.74	40.11	74.00	-33.89	peak
4	2263.000	48.96	-9.48	39.48	74.00	-34.52	peak
5	2346.000	51.75	-9.16	42.59	74.00	-31.41	peak
6	2412.000	53.82	-8.92	44.90	/	/	Fundamental

Note: 1. Measurement = Reading Level + Correct Factor.

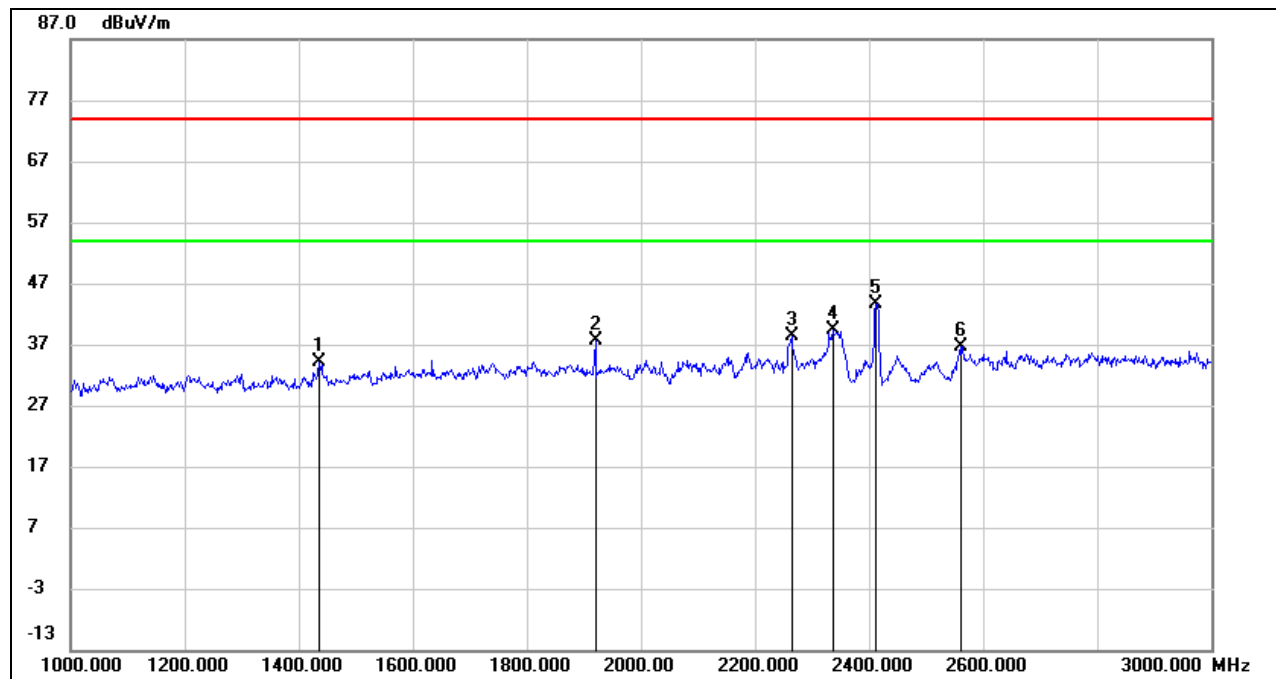
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band reject filter losses.

5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

### HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1437.000	46.90	-12.81	34.09	74.00	-39.91	peak
2	1920.000	48.44	-10.81	37.63	74.00	-36.37	peak
3	2264.000	47.85	-9.47	38.38	74.00	-35.62	peak
4	2337.000	48.54	-9.18	39.36	74.00	-34.64	peak
5	2412.000	52.58	-8.92	43.66	/	/	Fundamental
6	2561.000	45.26	-8.63	36.63	74.00	-37.37	peak

Note: 1. Measurement = Reading Level + Correct Factor.

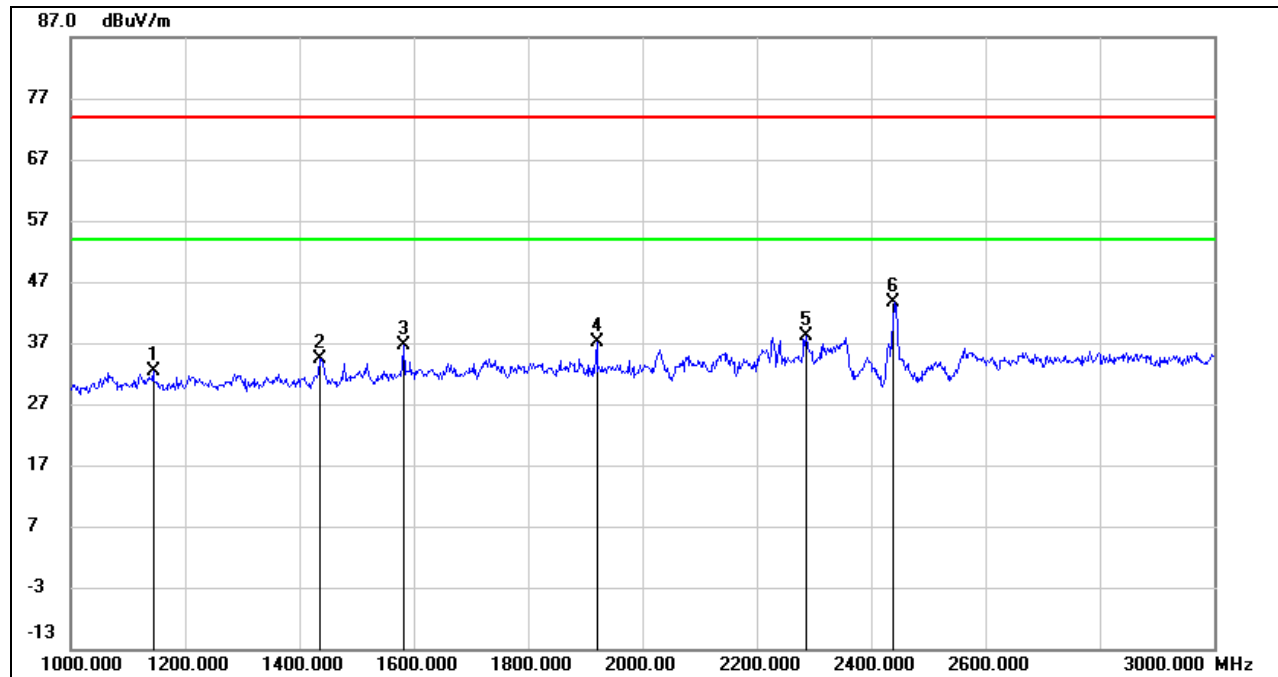
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band reject filter losses.

5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

### HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1145.000	46.40	-14.08	32.32	74.00	-41.68	peak
2	1437.000	47.29	-12.81	34.48	74.00	-39.52	peak
3	1583.000	48.54	-11.94	36.60	74.00	-37.40	peak
4	1920.000	47.85	-10.81	37.04	74.00	-36.96	peak
5	2286.000	47.57	-9.39	38.18	74.00	-35.82	peak
6	2437.000	52.38	-8.86	43.52	/	/	Fundamental

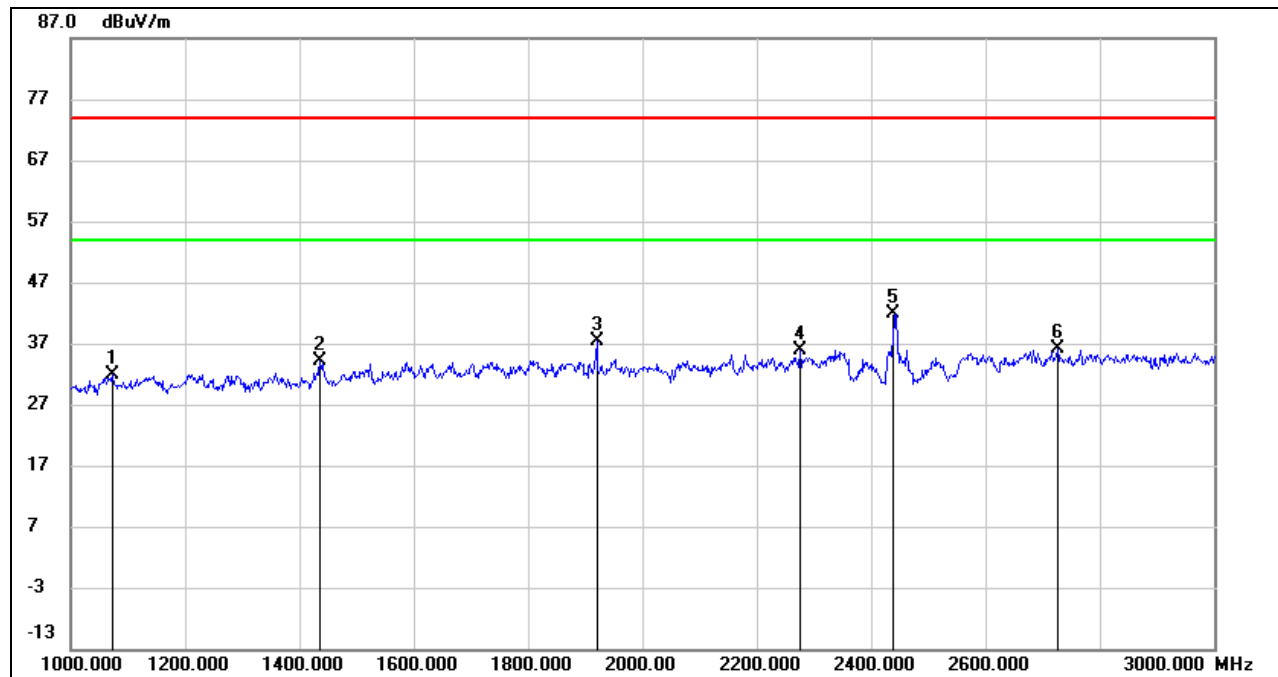
Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band reject filter losses.

5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

**HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)**

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1073.000	46.52	-14.57	31.95	74.00	-42.05	peak
2	1436.000	46.88	-12.83	34.05	74.00	-39.95	peak
3	1920.000	48.29	-10.81	37.48	74.00	-36.52	peak
4	2276.000	45.18	-9.42	35.76	74.00	-38.24	peak
5	2437.000	50.73	-8.86	41.87	/	/	Fundamental
6	2727.000	44.08	-8.00	36.08	74.00	-37.92	peak

Note: 1. Measurement = Reading Level + Correct Factor.

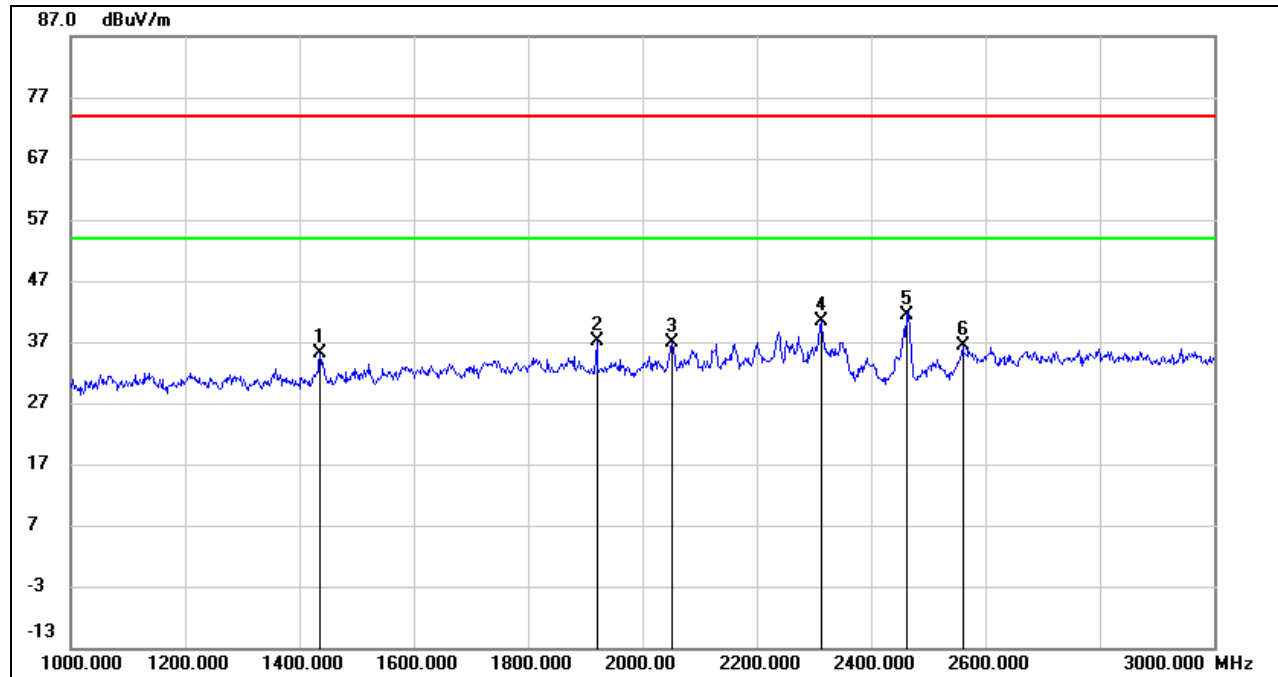
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band reject filter losses.

5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

### HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1437.000	48.06	-12.81	35.25	74.00	-38.75	peak
2	1920.000	47.82	-10.81	37.01	74.00	-36.99	peak
3	2053.000	47.40	-10.62	36.78	74.00	-37.22	peak
4	2313.000	49.58	-9.28	40.30	74.00	-33.70	peak
5	2462.000	50.22	-8.81	41.41	/	/	Fundamental
6	2561.000	45.10	-8.63	36.47	74.00	-37.53	peak

Note: 1. Measurement = Reading Level + Correct Factor.

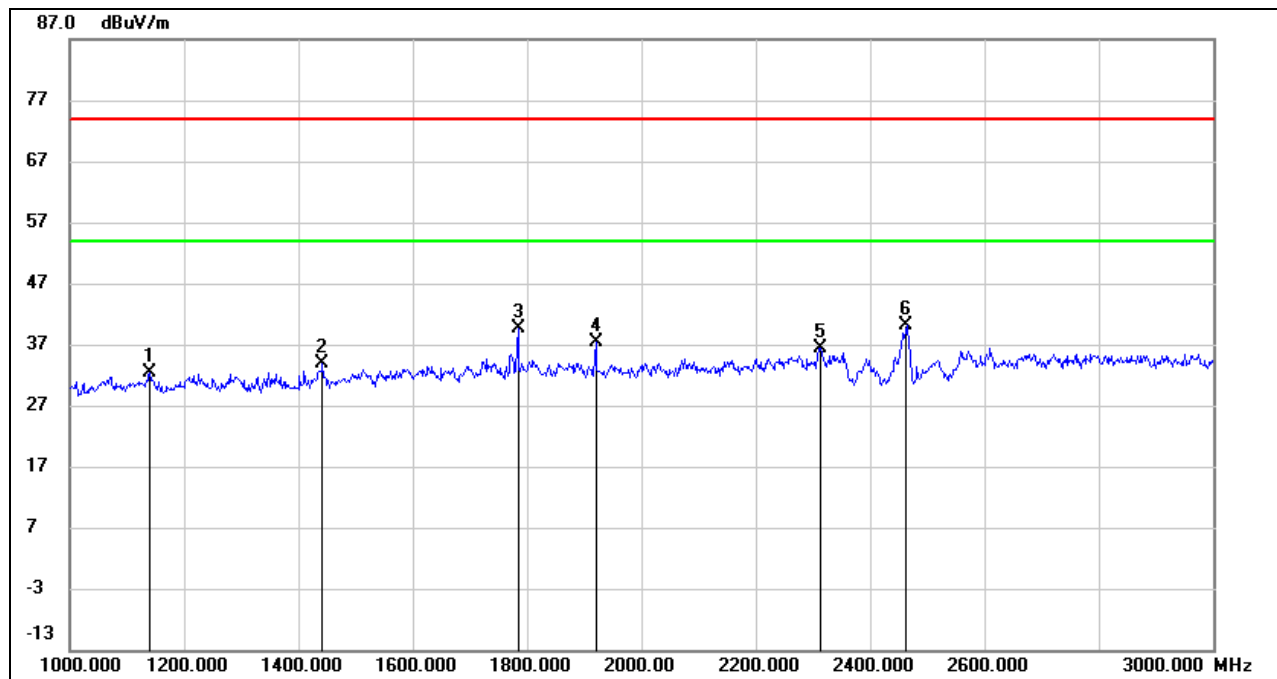
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band reject filter losses.

5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

### HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1140.000	46.49	-14.11	32.38	74.00	-41.62	peak
2	1442.000	46.75	-12.79	33.96	74.00	-40.04	peak
3	1784.000	50.33	-10.68	39.65	74.00	-34.35	peak
4	1920.000	48.24	-10.81	37.43	74.00	-36.57	peak
5	2313.000	45.73	-9.28	36.45	74.00	-37.55	peak
6	2462.000	48.83	-8.81	40.02	/	/	Fundamental

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band reject filter losses.

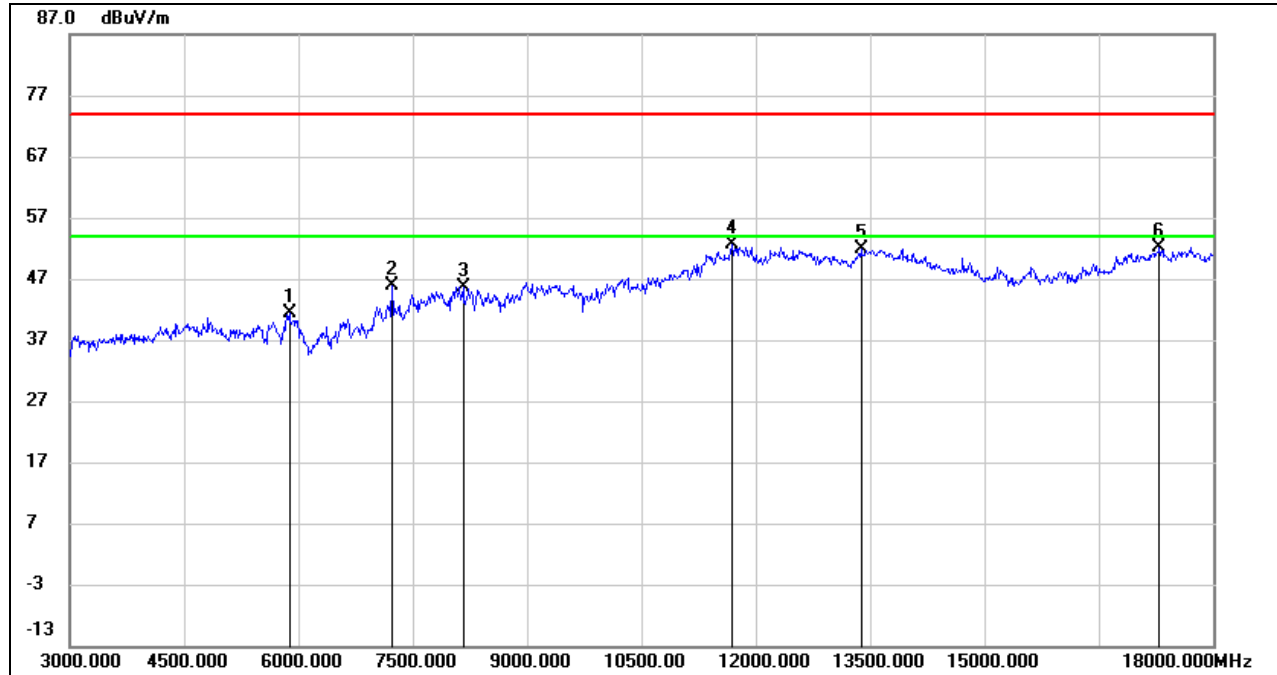
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

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

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

#### 8.3.1. 802.11b SISO MODE

##### HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5887.500	38.91	2.50	41.41	74.00	-32.59	peak
2	7237.500	40.60	5.39	45.99	74.00	-28.01	peak
3	8160.000	37.83	7.80	45.63	74.00	-28.37	peak
4	11692.500	35.75	16.82	52.57	74.00	-21.43	peak
5	13387.500	32.12	19.86	51.98	74.00	-22.02	peak
6	17295.000	30.39	21.86	52.25	74.00	-21.75	peak

Note: 1. Peak Result = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. AVG: VBW=1/Ton, where: Ton is the transmitting duration.

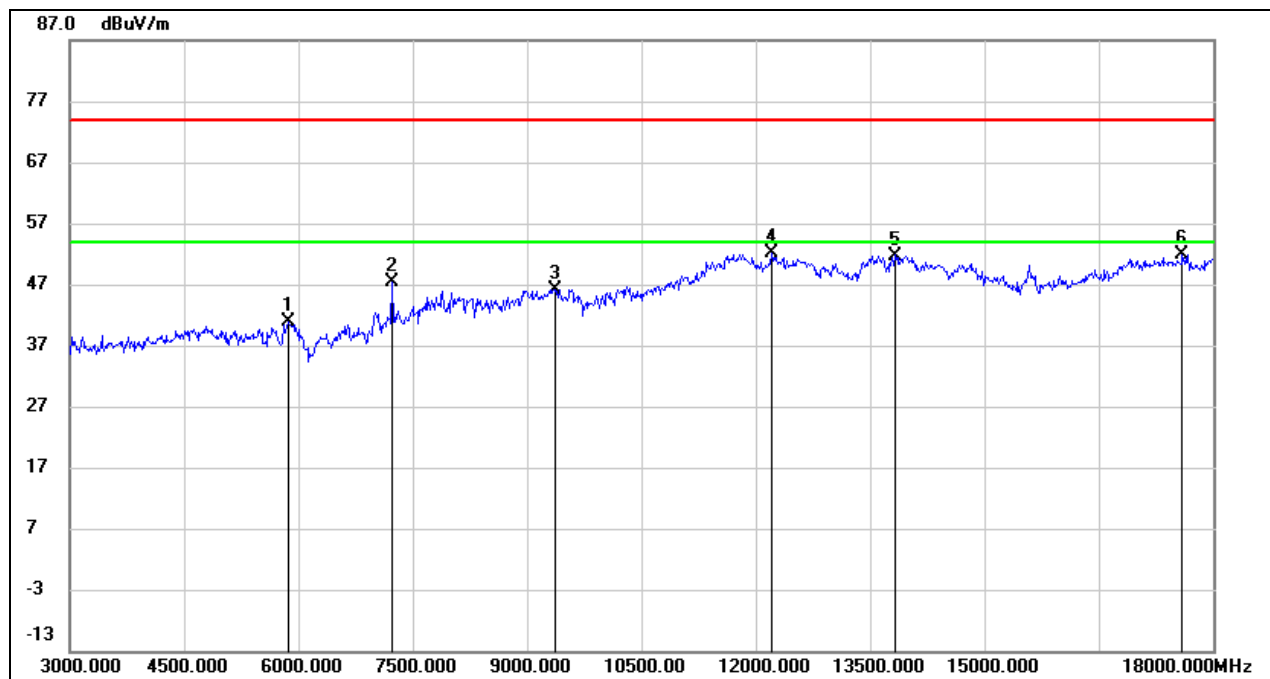
5. For the transmitting duration, please refer to clause 7.1.

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.



### HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5865.000	38.51	2.29	40.80	74.00	-33.20	peak
2	7230.000	41.97	5.41	47.38	74.00	-26.62	peak
3	9360.000	36.13	10.07	46.20	74.00	-27.80	peak
4	12217.500	34.62	17.62	52.24	74.00	-21.76	peak
5	13837.500	30.59	21.16	51.75	74.00	-22.25	peak
6	17602.500	29.10	22.70	51.80	74.00	-22.20	peak

Note: 1. Peak Result = Reading Level + Correct Factor.

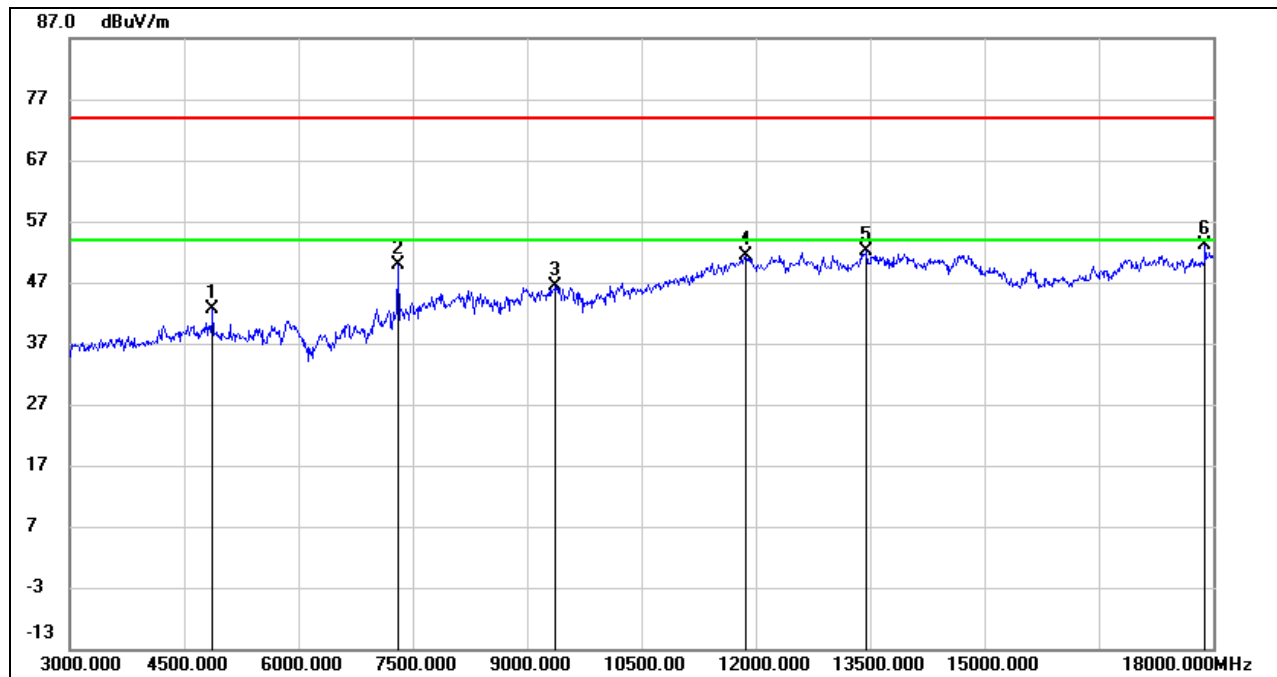
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.

5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

### HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4875.000	43.07	-0.52	42.55	74.00	-31.45	peak
2	7312.500	44.45	5.31	49.76	74.00	-24.24	peak
3	9375.000	36.14	10.17	46.31	74.00	-27.69	peak
4	11865.000	34.37	17.08	51.45	74.00	-22.55	peak
5	13462.500	31.89	20.21	52.10	74.00	-21.90	peak
6	17902.500	28.39	24.64	53.03	74.00	-20.97	peak

Note: 1. Peak Result = Reading Level + Correct Factor.

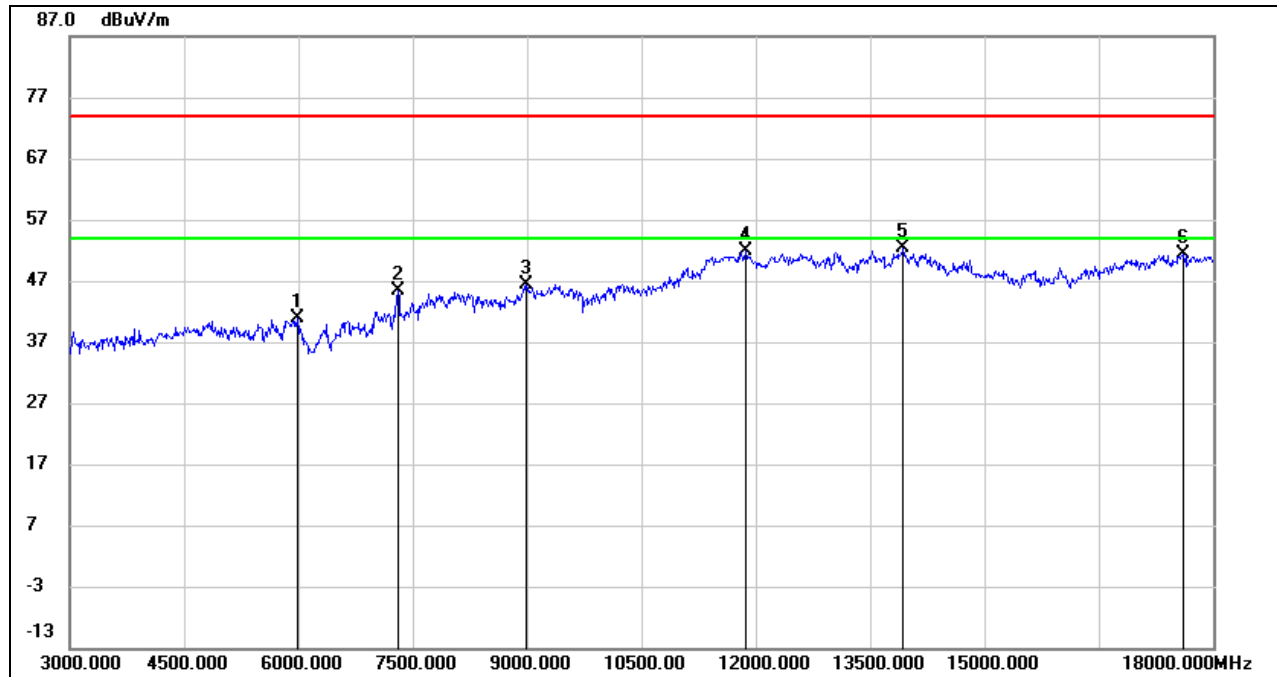
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.

5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

### HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5992.500	38.74	2.11	40.85	74.00	-33.15	peak
2	7312.500	40.07	5.31	45.38	74.00	-28.62	peak
3	8985.000	36.40	9.86	46.26	74.00	-27.74	peak
4	11865.000	34.84	17.08	51.92	74.00	-22.08	peak
5	13935.000	31.05	21.29	52.34	74.00	-21.66	peak
6	17617.500	28.59	22.84	51.43	74.00	-22.57	peak

Note: 1. Peak Result = Reading Level + Correct Factor.

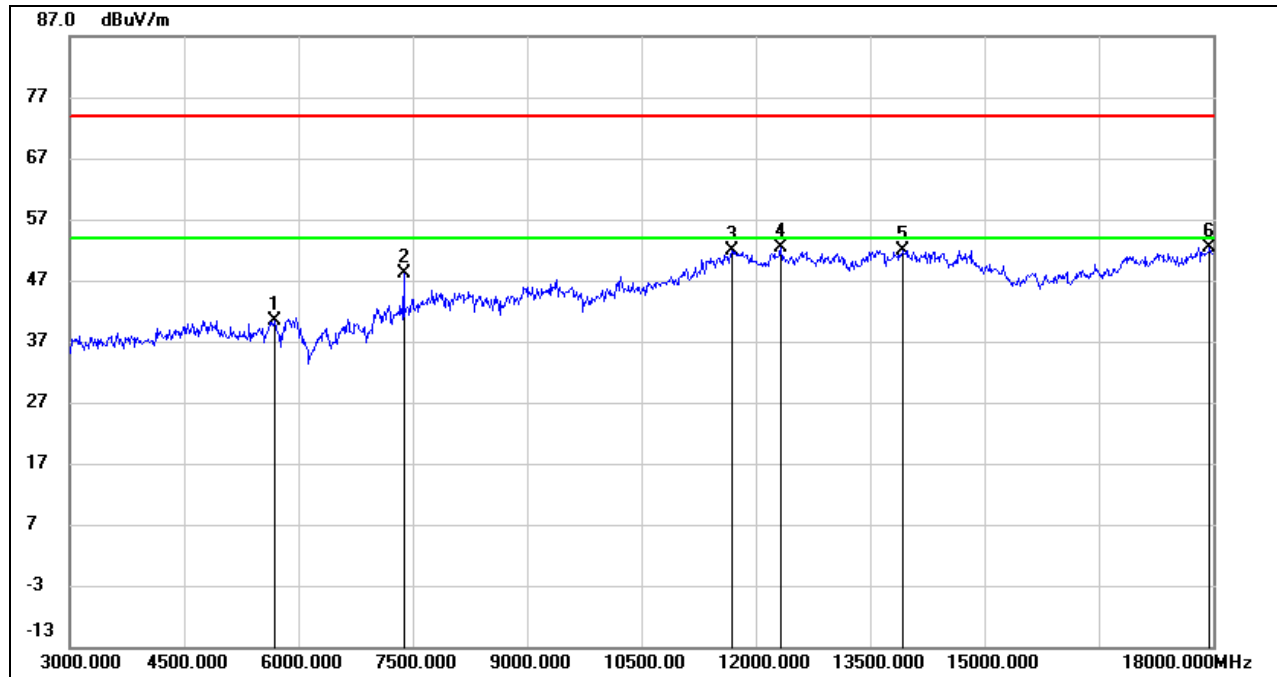
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.

5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

### HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5685.000	39.10	1.28	40.38	74.00	-33.62	peak
2	7380.000	42.21	5.87	48.08	74.00	-25.92	peak
3	11685.000	35.00	16.76	51.76	74.00	-22.24	peak
4	12337.500	34.79	17.61	52.40	74.00	-21.60	peak
5	13942.500	30.61	21.30	51.91	74.00	-22.09	peak
6	17955.000	27.42	24.98	52.40	74.00	-21.60	peak

Note: 1. Peak Result = Reading Level + Correct Factor.

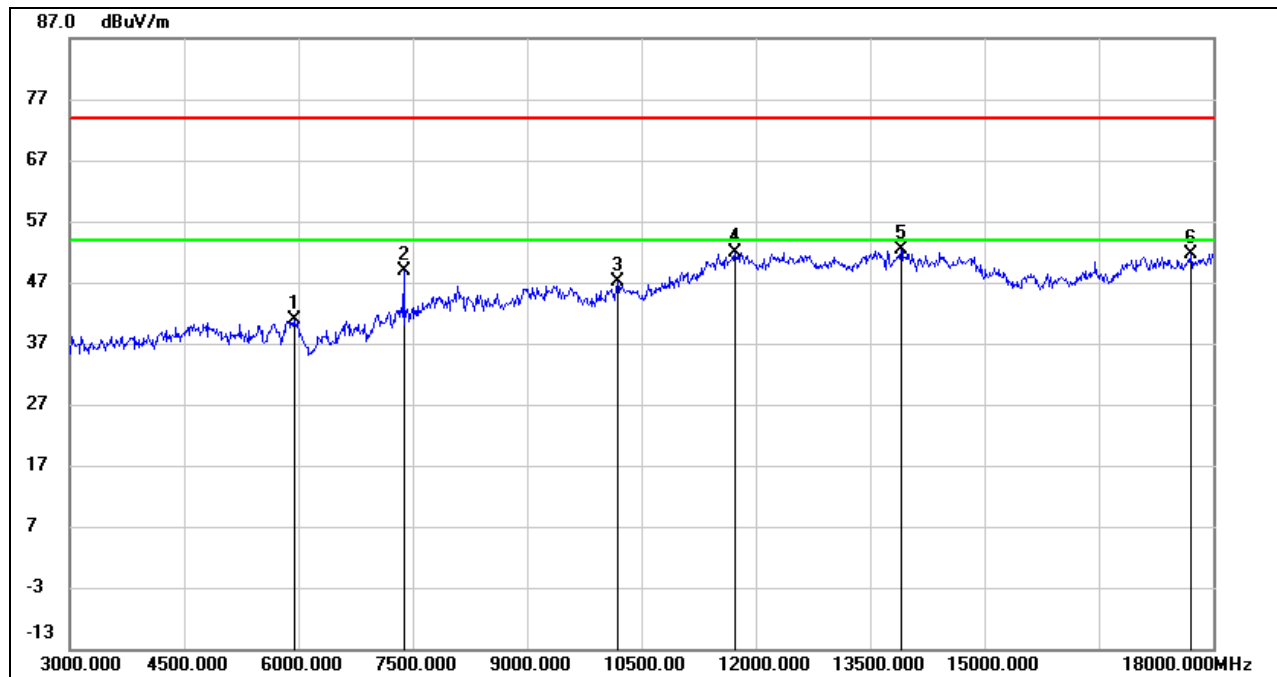
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.

5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

### HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5947.500	38.59	2.36	40.95	74.00	-33.05	peak
2	7387.500	42.93	5.94	48.87	74.00	-25.13	peak
3	10185.000	35.41	11.63	47.04	74.00	-26.96	peak
4	11737.500	35.12	16.86	51.98	74.00	-22.02	peak
5	13912.500	31.06	21.22	52.28	74.00	-21.72	peak
6	17707.500	27.98	23.74	51.72	74.00	-22.28	peak

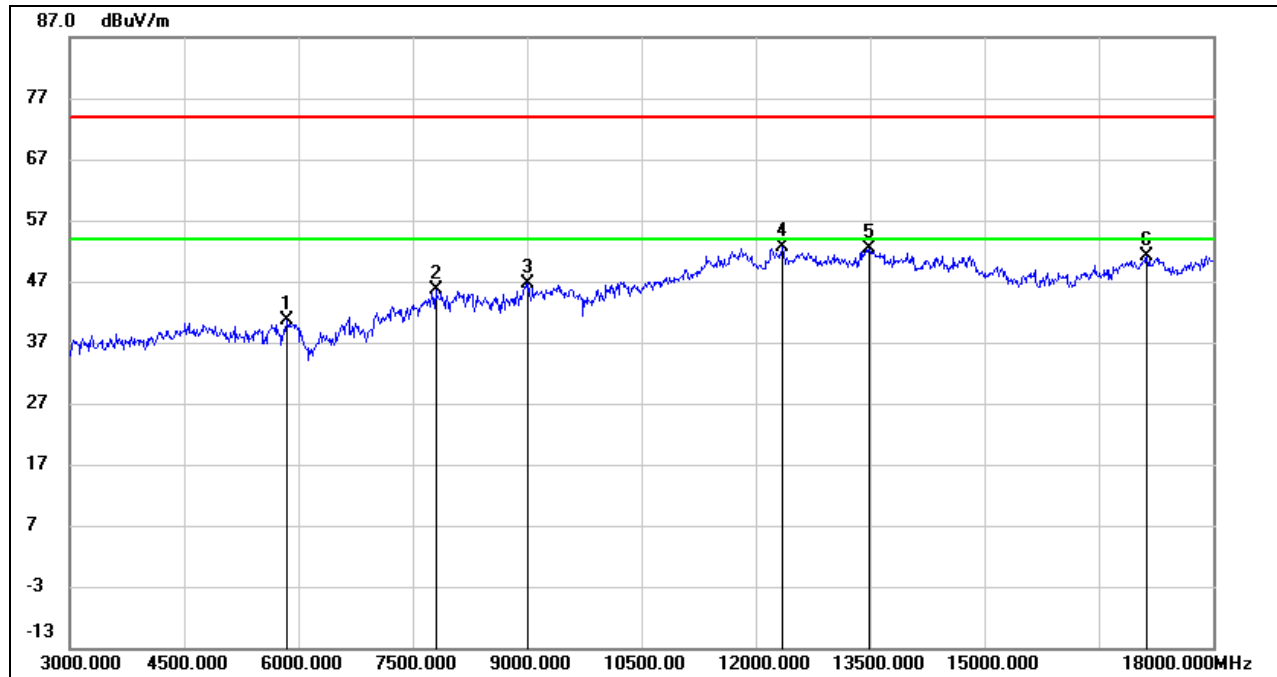
Note: 1. Peak Result = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.

5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

**8.3.2. 802.11g SISO MODE****ANTENNA 0 TEST RESULTS (WORST CASE)****HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)**

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5857.500	38.51	2.22	40.73	74.00	-33.27	peak
2	7800.000	38.41	7.18	45.59	74.00	-28.41	peak
3	9015.000	36.62	10.02	46.64	74.00	-27.36	peak
4	12345.000	35.06	17.59	52.65	74.00	-21.35	peak
5	13492.500	31.95	20.35	52.30	74.00	-21.70	peak
6	17130.000	30.27	20.90	51.17	74.00	-22.83	peak

Note: 1. Peak Result = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

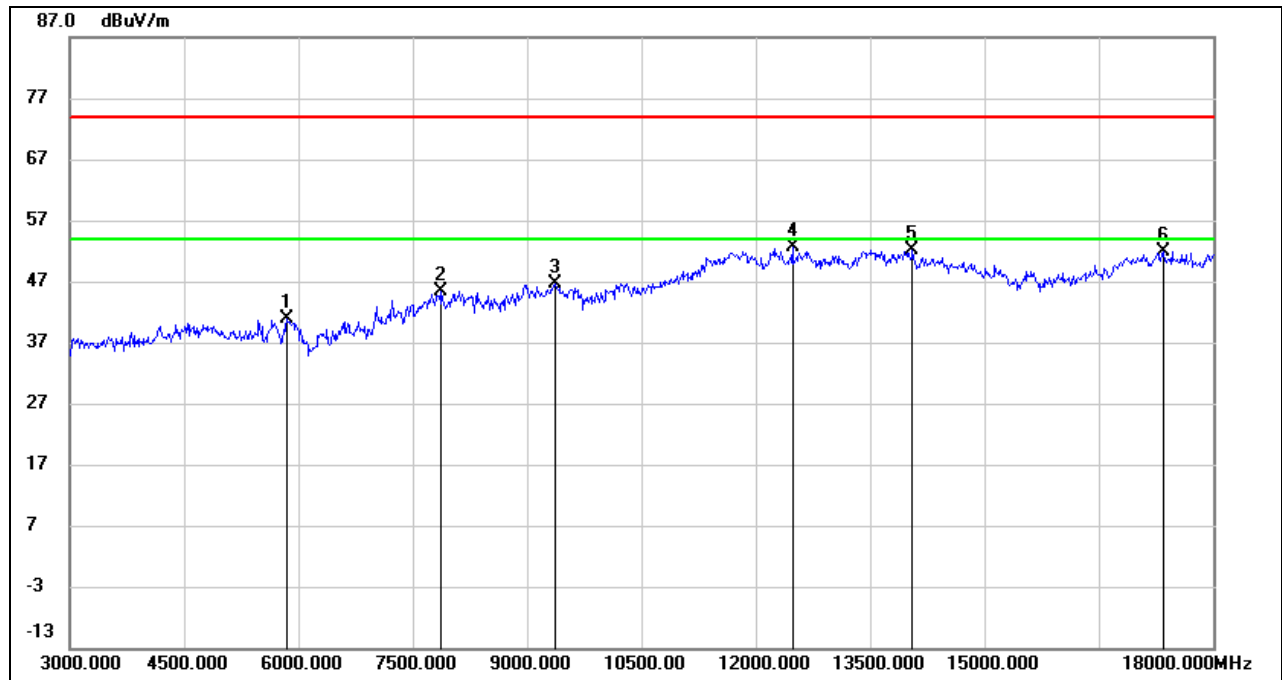
4. AVG:  $VBW=1/Ton$ , where: Ton is the transmitting duration.

5. For the transmitting duration, please refer to clause 7.1.

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.

### HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5850.000	38.73	2.13	40.86	74.00	-33.14	peak
2	7875.000	38.74	6.75	45.49	74.00	-28.51	peak
3	9360.000	36.62	10.07	46.69	74.00	-27.31	peak
4	12480.000	35.52	17.21	52.73	74.00	-21.27	peak
5	14055.000	31.12	21.11	52.23	74.00	-21.77	peak
6	17340.000	30.22	21.68	51.90	74.00	-22.10	peak

Note: 1. Peak Result = Reading Level + Correct Factor.

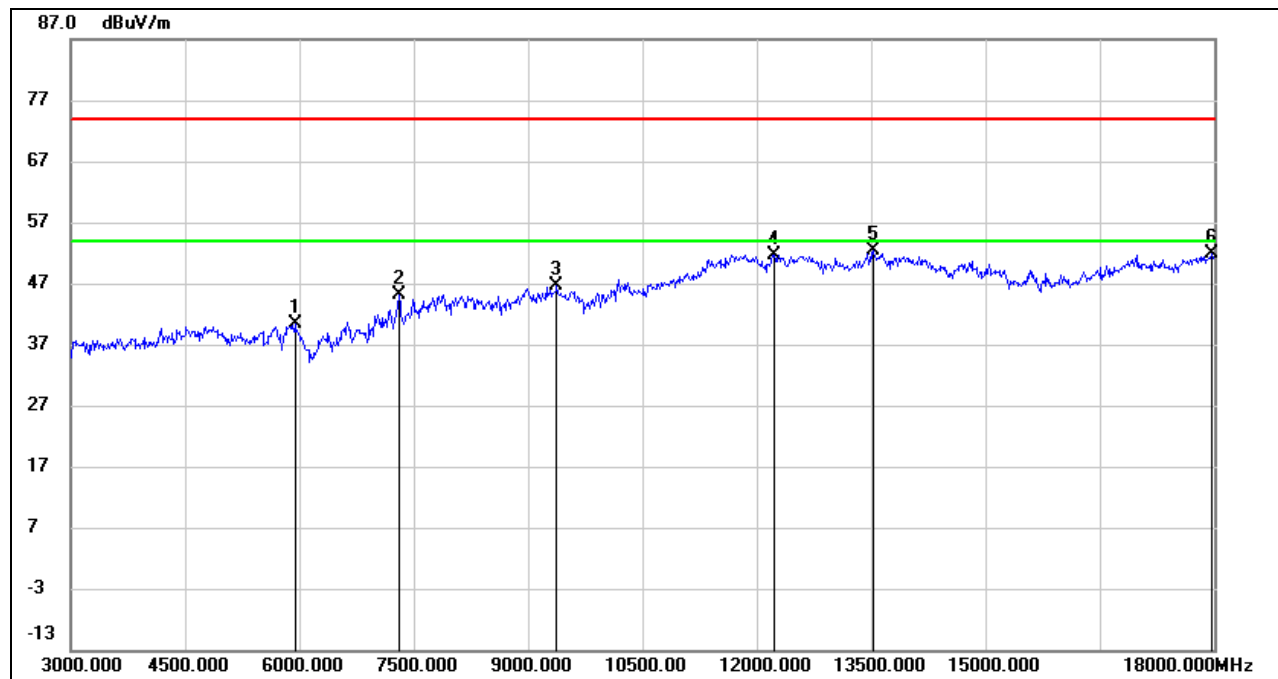
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.

5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

### HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5947.500	37.95	2.36	40.31	74.00	-33.69	peak
2	7305.000	39.83	5.25	45.08	74.00	-28.92	peak
3	9382.500	36.41	10.21	46.62	74.00	-27.38	peak
4	12225.000	34.10	17.62	51.72	74.00	-22.28	peak
5	13530.000	31.87	20.39	52.26	74.00	-21.74	peak
6	17970.000	26.73	25.08	51.81	74.00	-22.19	peak

Note: 1. Peak Result = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

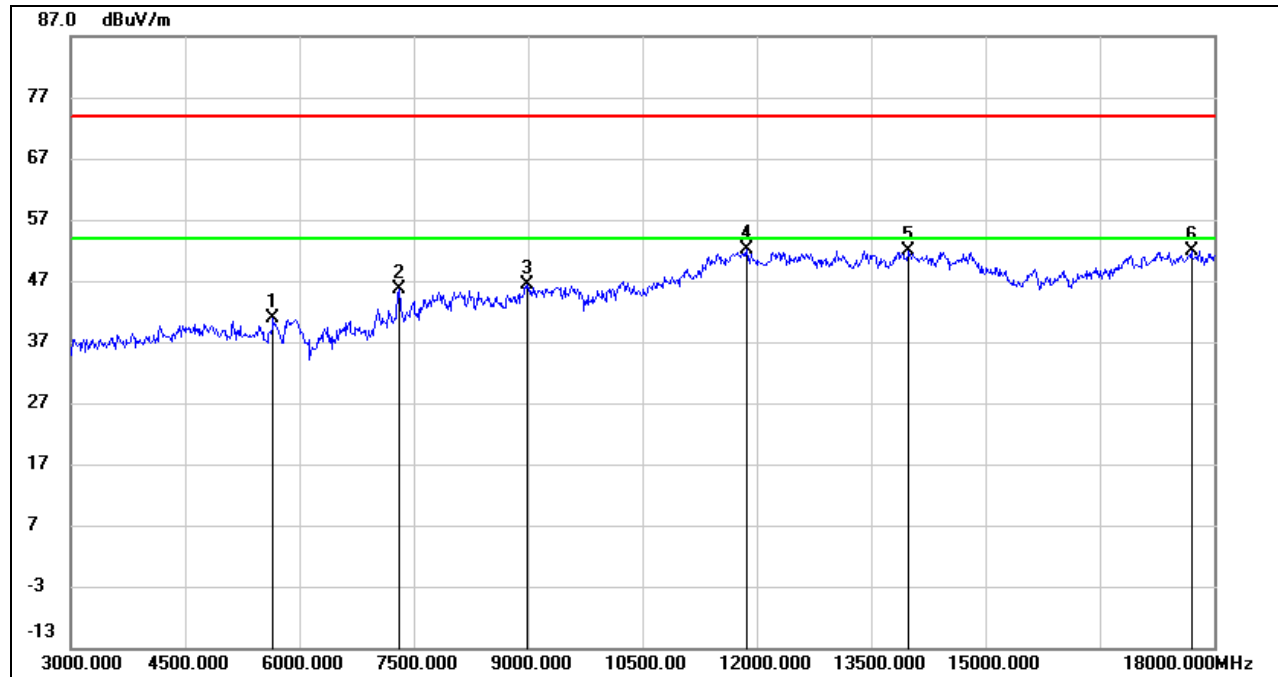
3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.

5. Proper operation of the transmitter prior to adding the filter to the measurement chain.



### HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5662.500	39.63	1.26	40.89	74.00	-33.11	peak
2	7312.500	40.30	5.31	45.61	74.00	-28.39	peak
3	8985.000	36.59	9.86	46.45	74.00	-27.55	peak
4	11865.000	34.94	17.08	52.02	74.00	-21.98	peak
5	14002.500	30.50	21.45	51.95	74.00	-22.05	peak
6	17707.500	28.18	23.74	51.92	74.00	-22.08	peak

Note: 1. Peak Result = Reading Level + Correct Factor.

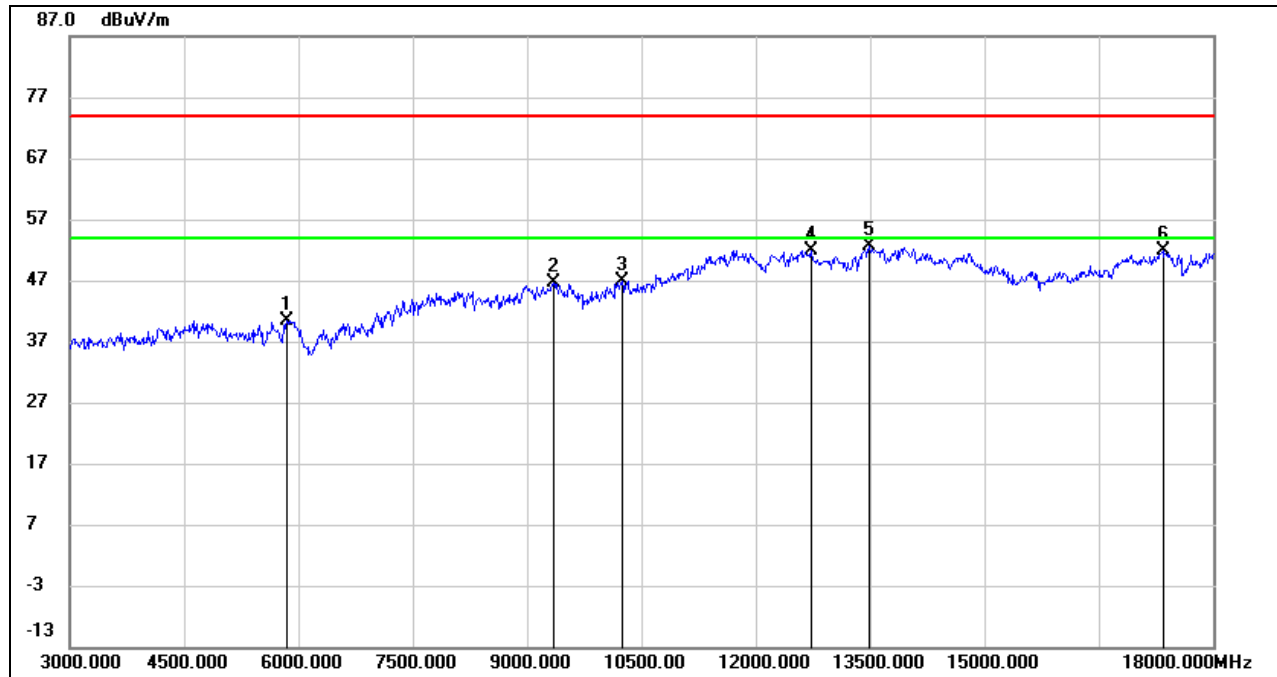
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.

5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

### HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5850.000	38.35	2.13	40.48	74.00	-33.52	peak
2	9345.000	36.67	9.96	46.63	74.00	-27.37	peak
3	10252.500	35.04	11.79	46.83	74.00	-27.17	peak
4	12720.000	34.67	17.28	51.95	74.00	-22.05	peak
5	13492.500	32.21	20.35	52.56	74.00	-21.44	peak
6	17347.500	30.24	21.64	51.88	74.00	-22.12	peak

Note: 1. Peak Result = Reading Level + Correct Factor.

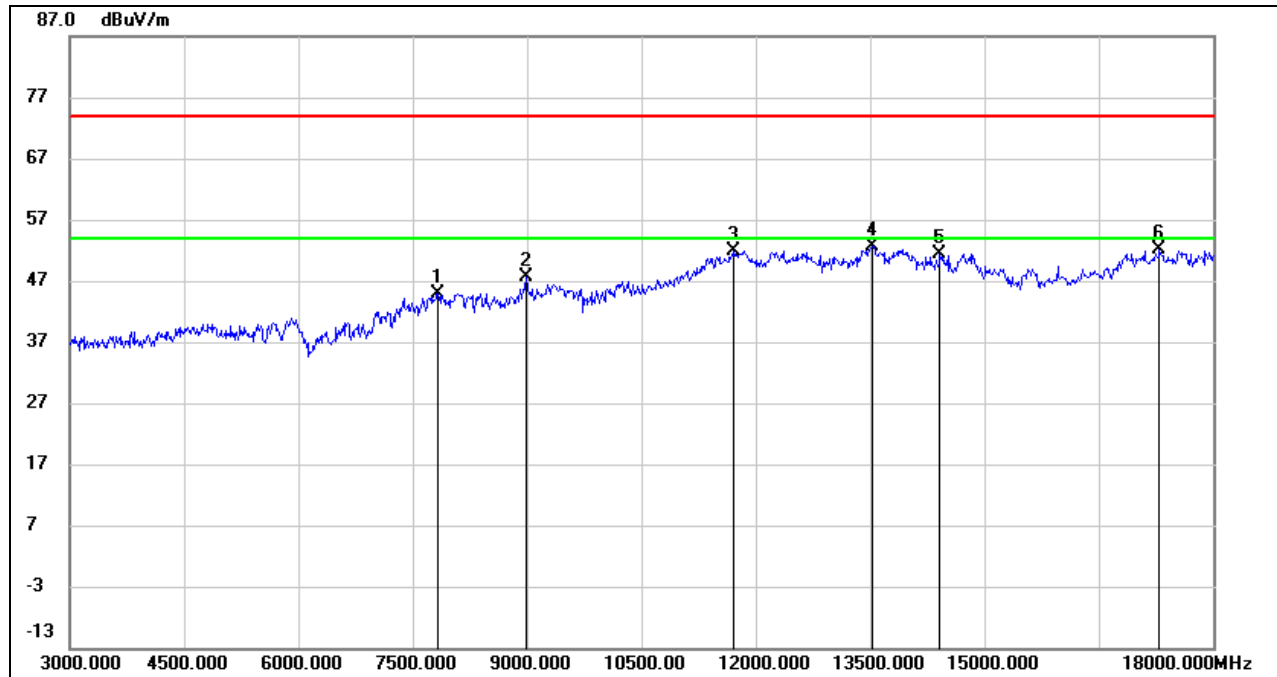
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.

5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

### HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)

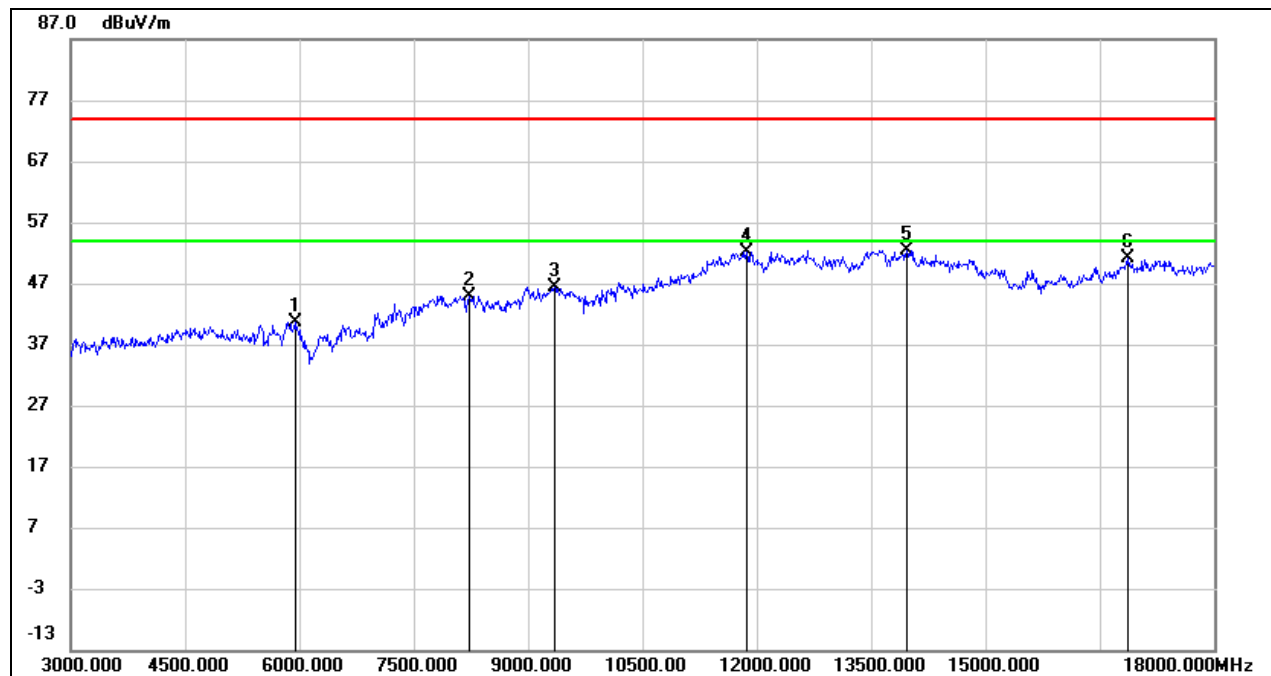


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	7837.500	38.03	6.97	45.00	74.00	-29.00	peak
2	8992.500	37.64	10.01	47.65	74.00	-26.35	peak
3	11715.000	35.06	16.87	51.93	74.00	-22.07	peak
4	13530.000	32.36	20.39	52.75	74.00	-21.25	peak
5	14422.500	32.13	19.36	51.49	74.00	-22.51	peak
6	17295.000	30.16	21.86	52.02	74.00	-21.98	peak

- Note: 1. Peak Result = Reading Level + Correct Factor.  
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV 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 7.1.  
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.

### 8.3.3. 802.11n HT20 SISO MODE

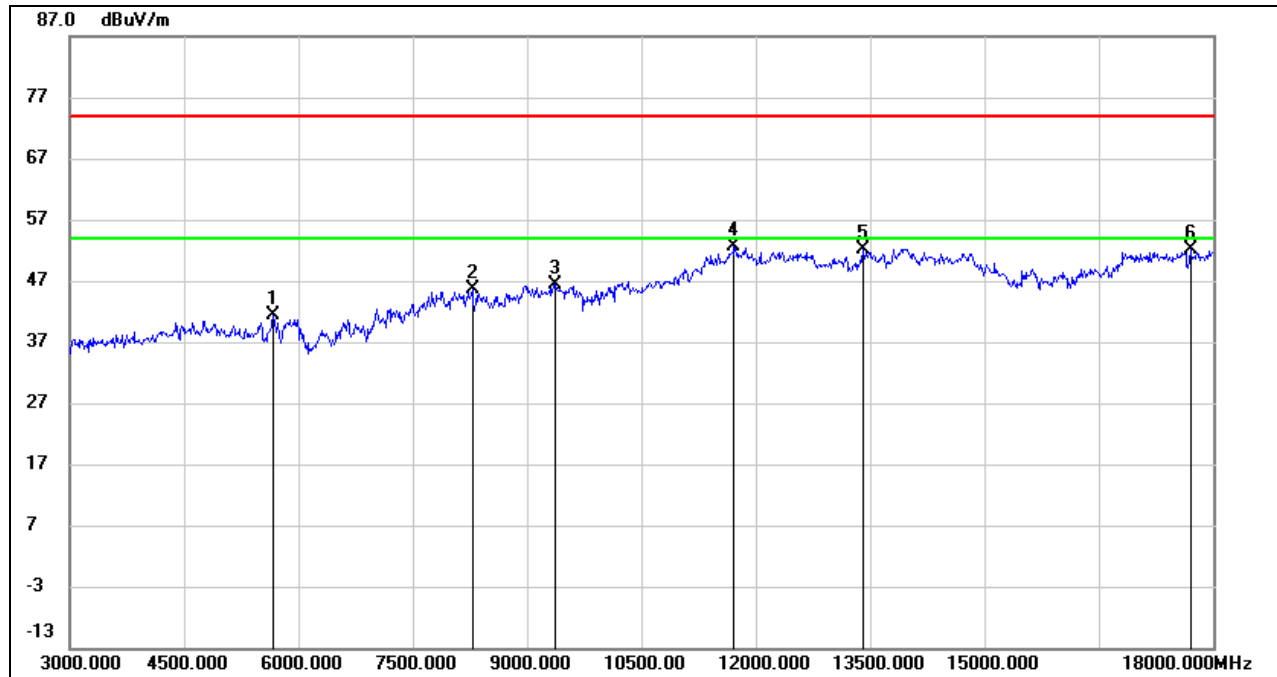
#### HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5947.500	38.26	2.36	40.62	74.00	-33.38	peak
2	8235.000	37.32	7.67	44.99	74.00	-29.01	peak
3	9352.500	36.41	10.01	46.42	74.00	-27.58	peak
4	11872.500	35.09	17.11	52.20	74.00	-21.80	peak
5	13972.500	31.02	21.38	52.40	74.00	-21.60	peak
6	16882.500	31.10	20.03	51.13	74.00	-22.87	peak

Note: 1. Peak Result = Reading Level + Correct Factor.  
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV 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 7.1.  
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.

### HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5670.000	40.16	1.27	41.43	74.00	-32.57	peak
2	8287.500	38.00	7.65	45.65	74.00	-28.35	peak
3	9375.000	36.23	10.17	46.40	74.00	-27.60	peak
4	11715.000	35.67	16.87	52.54	74.00	-21.46	peak
5	13417.500	32.24	20.00	52.24	74.00	-21.76	peak
6	17700.000	28.43	23.68	52.11	74.00	-21.89	peak

Note: 1. Peak Result = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

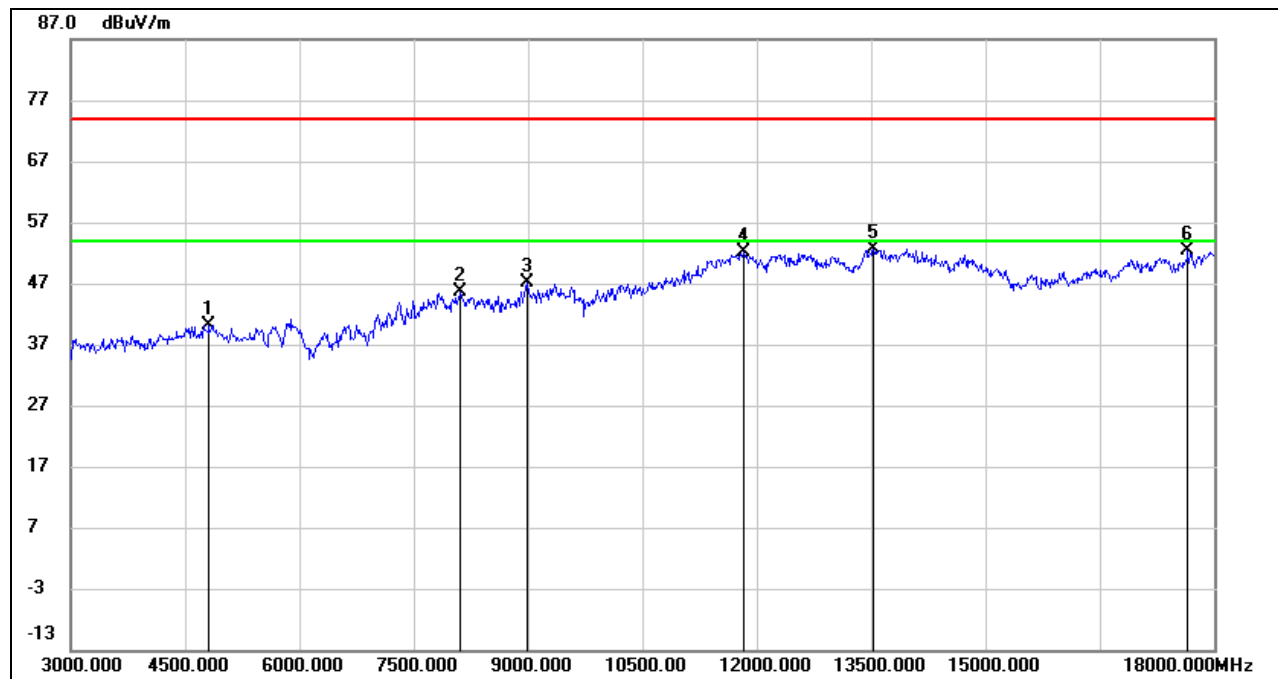
3. Peak: Peak detector.

4. AVG:  $VBW=1/Ton$ , where: Ton is the transmitting duration.

5. For the transmitting duration, please refer to clause 7.1.

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.

**HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)**

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4822.500	40.48	-0.39	40.09	74.00	-33.91	peak
2	8115.000	37.71	7.92	45.63	74.00	-28.37	peak
3	8992.500	37.04	10.01	47.05	74.00	-26.95	peak
4	11827.500	35.09	16.95	52.04	74.00	-21.96	peak
5	13537.500	32.28	20.39	52.67	74.00	-21.33	peak
6	17662.500	29.12	23.30	52.42	74.00	-21.58	peak

Note: 1. Peak Result = Reading Level + Correct Factor.

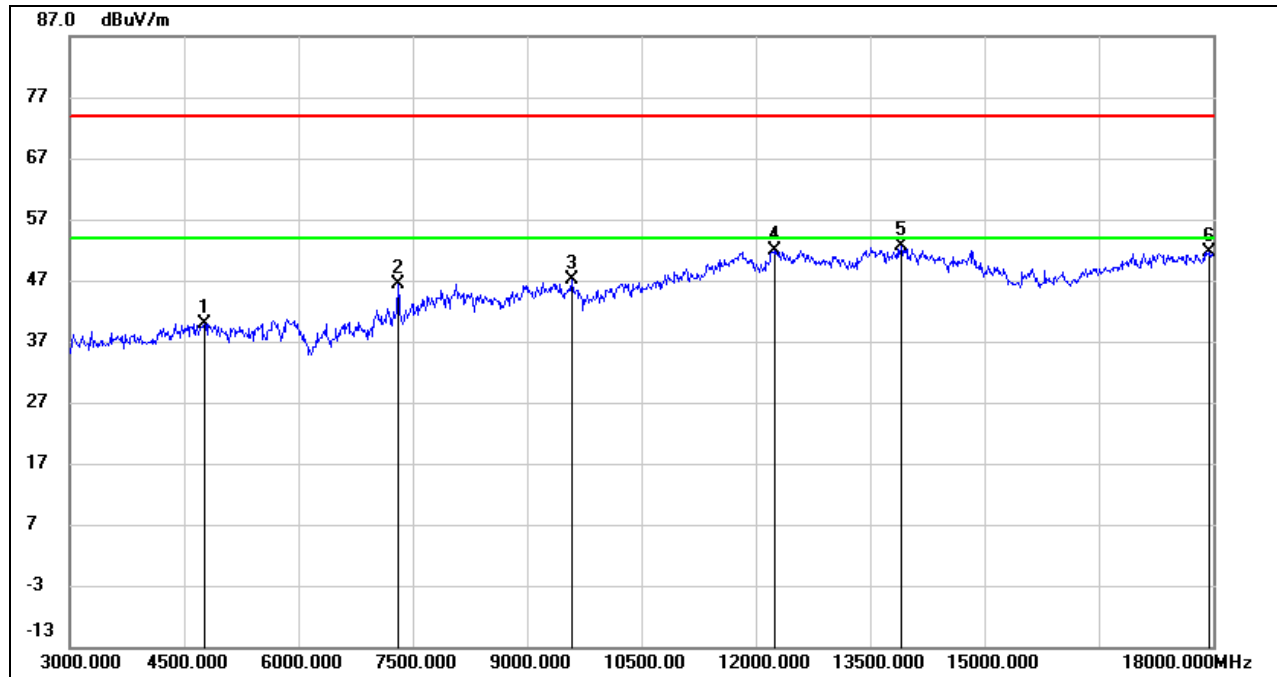
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.

5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

### HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4777.500	40.53	-0.56	39.97	74.00	-34.03	peak
2	7305.000	41.19	5.25	46.44	74.00	-27.56	peak
3	9585.000	36.60	10.60	47.20	74.00	-26.80	peak
4	12240.000	34.17	17.64	51.81	74.00	-22.19	peak
5	13912.500	31.46	21.22	52.68	74.00	-21.32	peak
6	17940.000	26.82	24.89	51.71	74.00	-22.29	peak

Note: 1. Peak Result = Reading Level + Correct Factor.

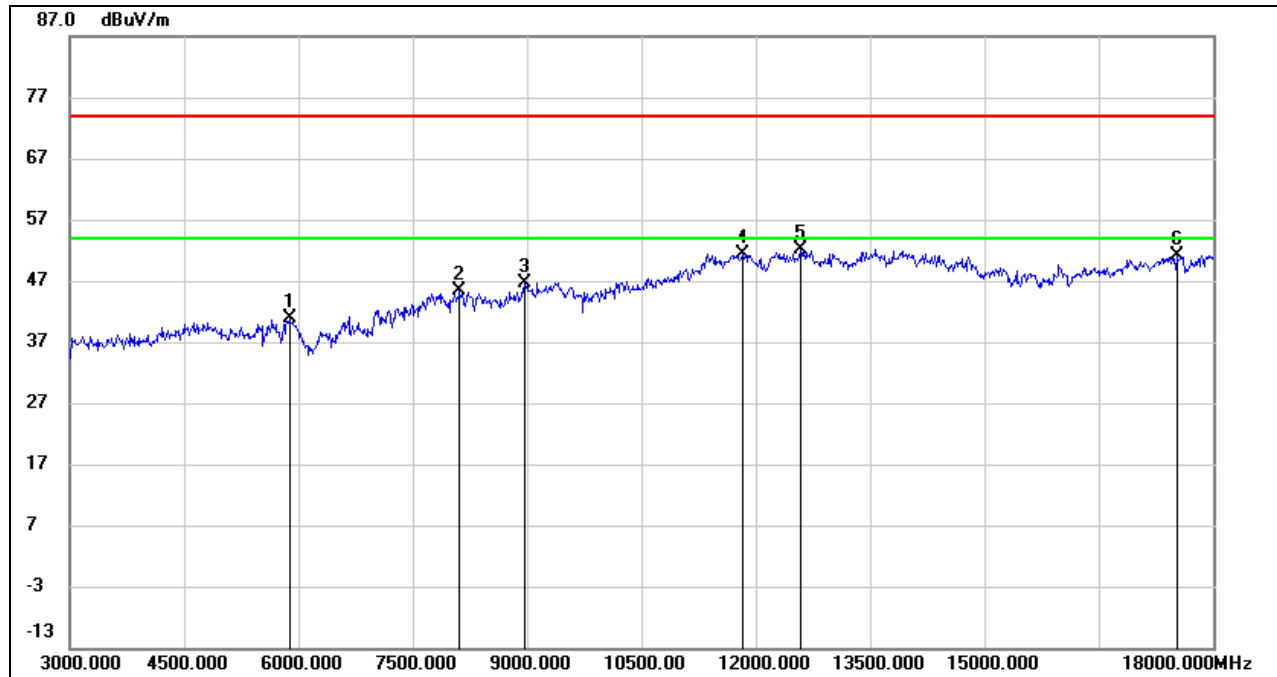
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.

5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

### HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5880.000	38.57	2.43	41.00	74.00	-33.00	peak
2	8122.500	37.45	7.89	45.34	74.00	-28.66	peak
3	8970.000	37.19	9.55	46.74	74.00	-27.26	peak
4	11827.500	34.55	16.95	51.50	74.00	-22.50	peak
5	12585.000	34.82	17.27	52.09	74.00	-21.91	peak
6	17520.000	29.31	21.90	51.21	74.00	-22.79	peak

Note: 1. Peak Result = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

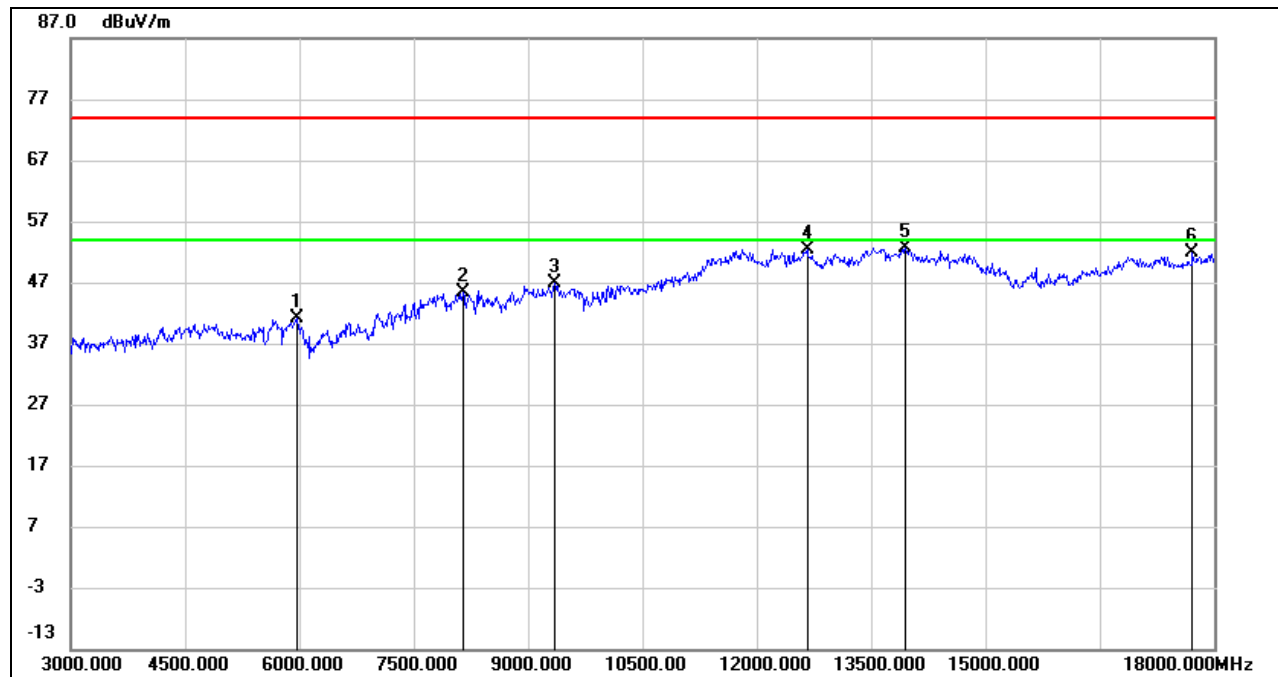
3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.

5. Proper operation of the transmitter prior to adding the filter to the measurement chain.



### HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)



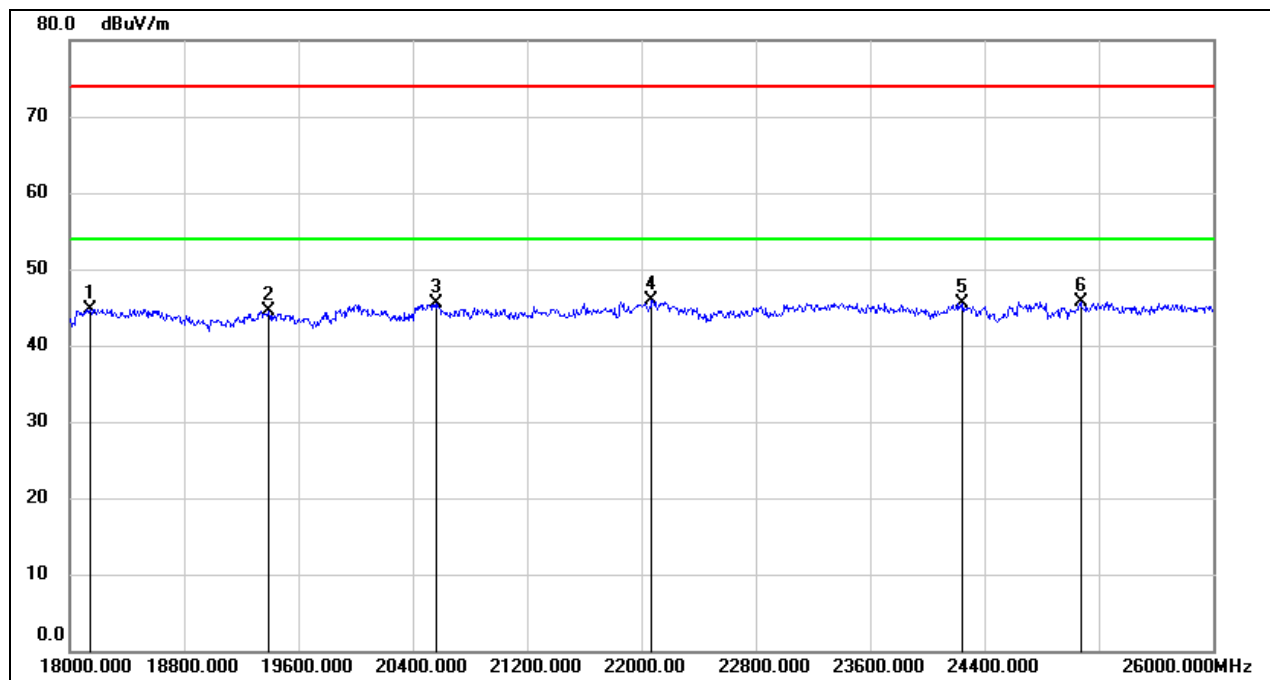
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5970.000	38.89	2.24	41.13	74.00	-32.87	peak
2	8152.500	37.46	7.82	45.28	74.00	-28.72	peak
3	9345.000	36.86	9.96	46.82	74.00	-27.18	peak
4	12667.500	35.26	17.23	52.49	74.00	-21.51	peak
5	13957.500	31.33	21.35	52.68	74.00	-21.32	peak
6	17722.500	27.90	23.88	51.78	74.00	-22.22	peak

- Note: 1. Peak Result = Reading Level + Correct Factor.  
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV 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 7.1.  
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.

## 8.4. SPURIOUS EMISSIONS (18 GHz ~ 26 GHz)

### 8.4.1. 802.11b MODE

#### SPURIOUS EMISSIONS (LOW CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)

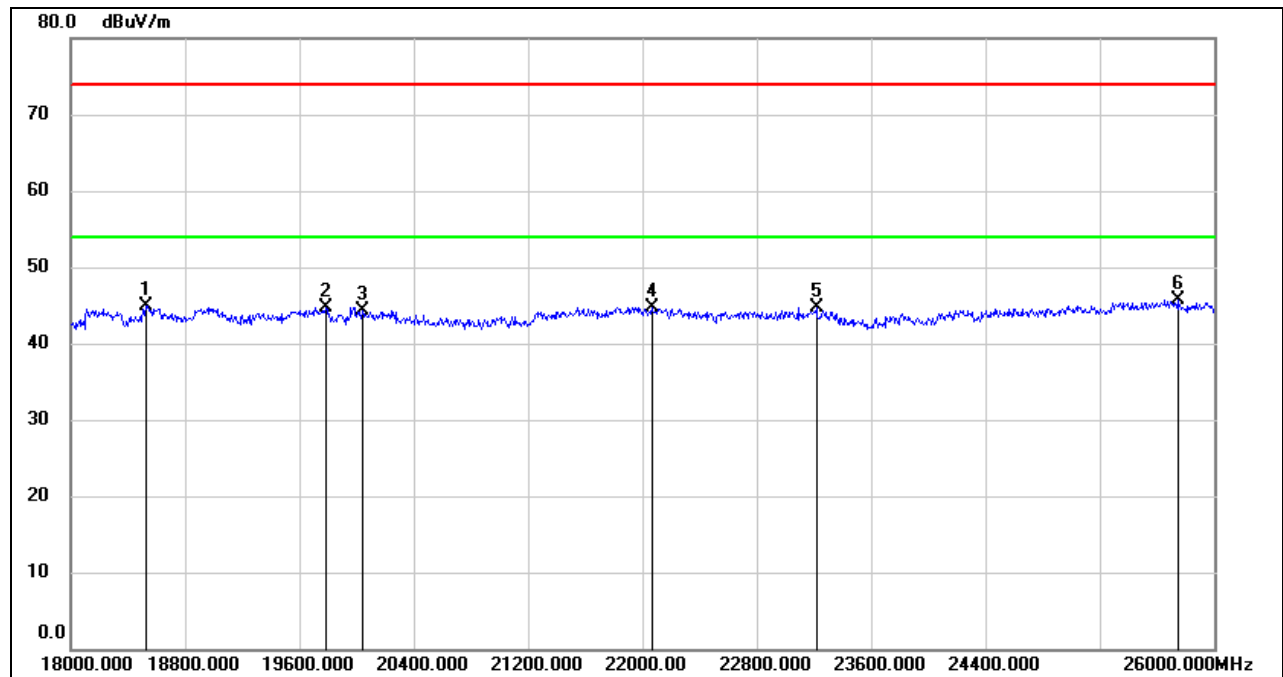


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	18144.000	50.27	-5.48	44.79	74.00	-29.21	peak
2	19392.000	50.12	-5.57	44.55	74.00	-29.45	peak
3	20560.000	50.73	-5.30	45.43	74.00	-28.57	peak
4	22072.000	50.27	-4.41	45.86	74.00	-28.14	peak
5	24248.000	48.32	-2.83	45.49	74.00	-28.51	peak
6	25072.000	47.67	-1.97	45.70	74.00	-28.30	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

**SPURIOUS EMISSIONS (LOW CHANNEL, WORST-CASE CONFIGURATION, VERTICAL)**

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	18528.000	50.11	-5.26	44.85	74.00	-29.15	peak
2	19784.000	50.07	-5.28	44.79	74.00	-29.21	peak
3	20040.000	49.71	-5.48	44.23	74.00	-29.77	peak
4	22064.000	49.07	-4.41	44.66	74.00	-29.34	peak
5	23216.000	48.01	-3.38	44.63	74.00	-29.37	peak
6	25744.000	46.30	-0.64	45.66	74.00	-28.34	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

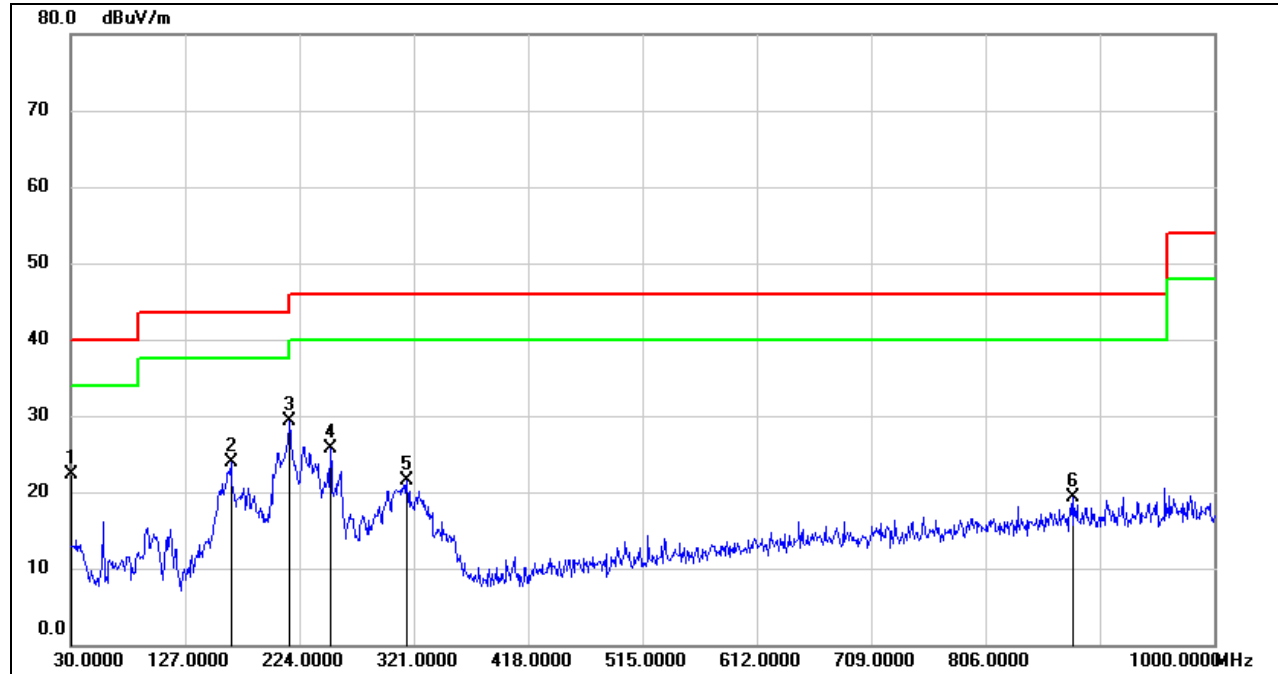
Note: All the modes and channels had been tested, but only the worst data was recorded in the report.



## 8.5. SPURIOUS EMISSIONS (30 MHz ~ 1 GHz)

### 8.5.1. 802.11b MODE

#### SPURIOUS EMISSIONS (LOW CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)

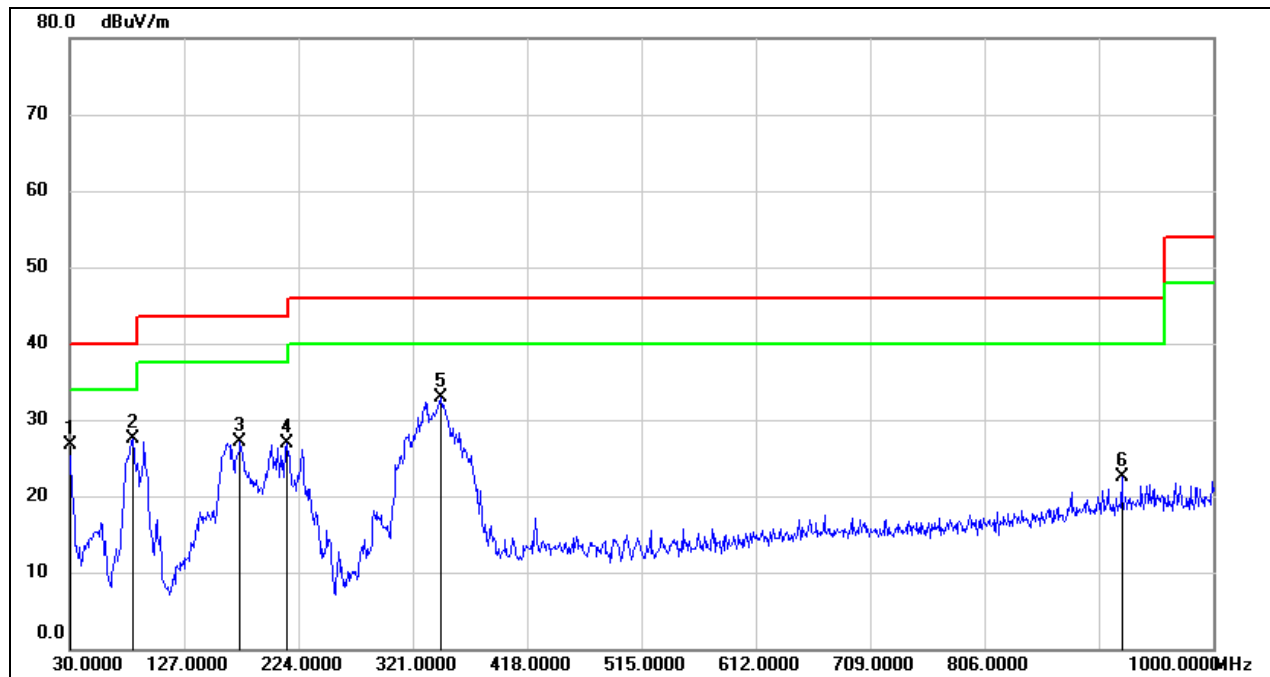


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	30.0000	41.24	-18.94	22.30	40.00	-17.70	peak
2	165.8000	41.45	-17.51	23.94	43.50	-19.56	peak
3	215.2700	47.07	-17.76	29.31	43.50	-14.19	peak
4	250.1900	44.53	-18.91	25.62	46.00	-20.38	peak
5	315.1800	36.38	-14.92	21.46	46.00	-24.54	peak
6	880.6900	24.82	-5.52	19.30	46.00	-26.70	peak

Note: 1. Result Level = Read Level + Correct Factor.

2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

**SPURIOUS EMISSIONS (LOW CHANNEL, WORST-CASE CONFIGURATION, VERTICAL)**

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	30.0000	45.57	-18.94	26.63	40.00	-13.37	peak
2	83.3500	49.15	-21.56	27.59	40.00	-12.41	peak
3	174.5300	44.15	-17.12	27.03	43.50	-16.47	peak
4	214.3000	44.52	-17.66	26.86	43.50	-16.64	peak
5	345.2500	47.35	-14.38	32.97	46.00	-13.03	peak
6	922.4000	27.19	-4.76	22.43	46.00	-23.57	peak

Note: 1. Result Level = Read Level + Correct Factor.

2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto

Note: All the modes and channels had been tested, but only the worst data was recorded in the report.

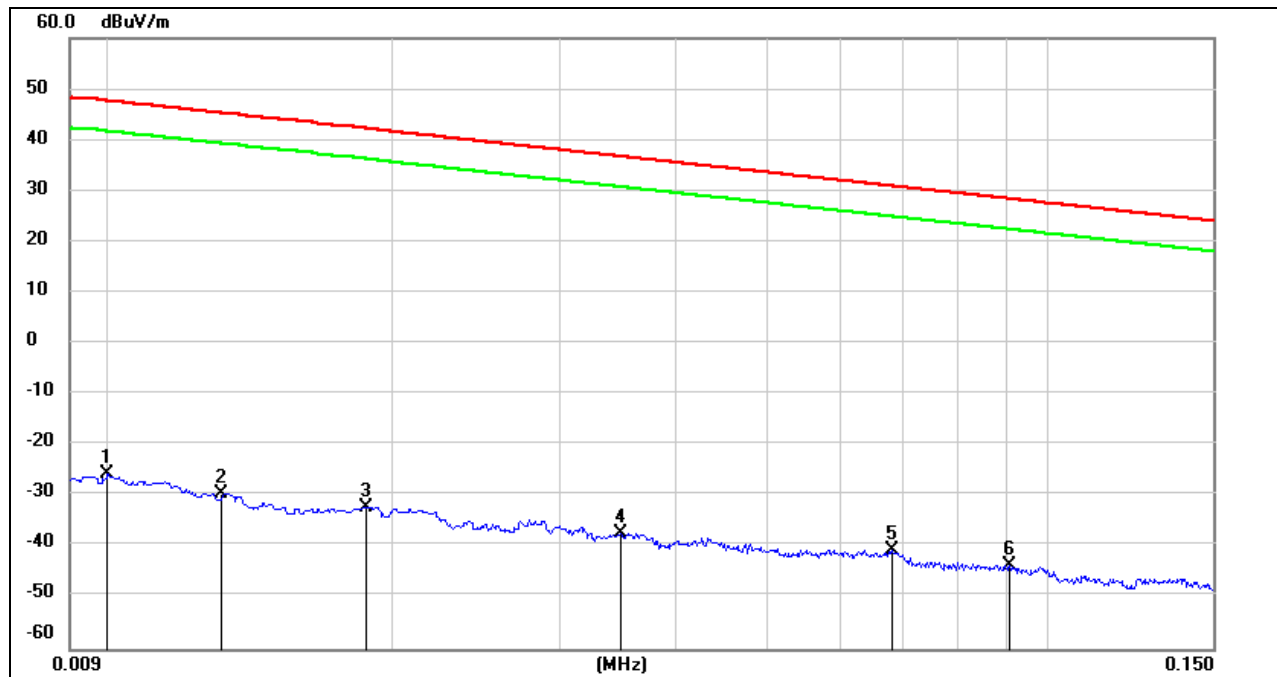


## 8.6. SPURIOUS EMISSIONS BELOW 30 MHz

### 8.6.1. 802.11b MODE

#### SPURIOUS EMISSIONS (LOW CHANNEL, LOOP ANTENNA FACE ON TO THE EUT, WORST-CASE CONFIGURATION)

9 kHz~ 150 kHz



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.0100	75.72	-101.40	-25.68	47.60	-73.28	peak
2	0.0131	71.97	-101.38	-29.41	45.25	-74.66	peak
3	0.0187	69.20	-101.35	-32.15	42.16	-74.31	peak
4	0.0349	64.03	-101.41	-37.38	36.75	-74.13	peak
5	0.0680	61.04	-101.56	-40.52	30.95	-71.47	peak
6	0.0911	58.11	-101.72	-43.61	28.41	-72.02	peak

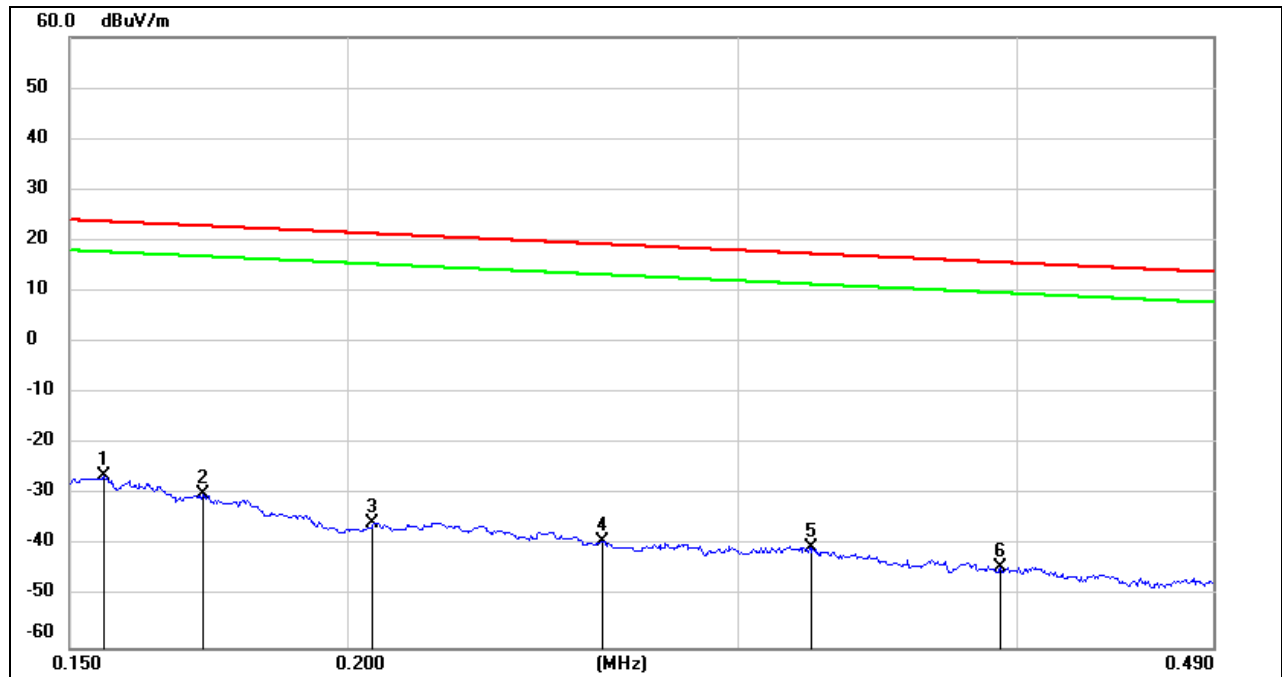
Note: 1. Measurement = Reading Level + Correct Factor (dBuA/m= dBuV/m- 20Log10[120 $\pi$ ] = dBuV/m- 51.5).

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV 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.



150 kHz ~ 490 kHz



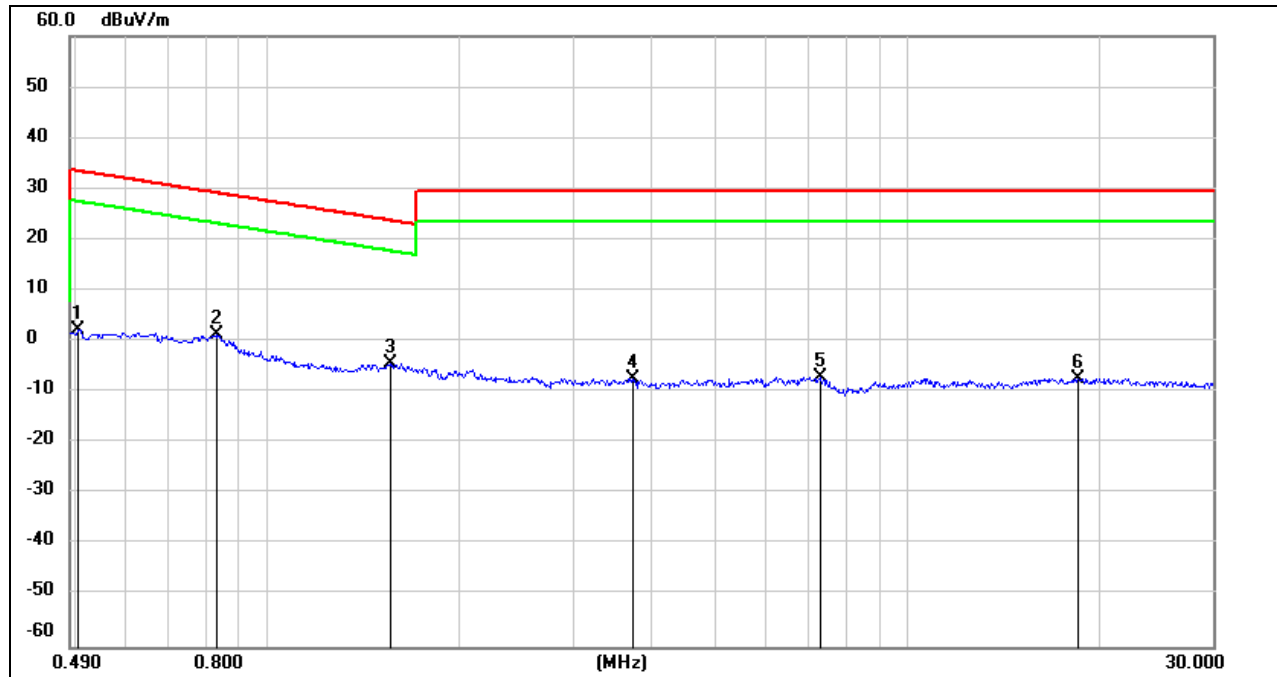
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.1554	75.27	-101.65	-26.38	23.77	-50.15	peak
2	0.1720	71.69	-101.67	-29.98	22.90	-52.88	peak
3	0.2053	66.29	-101.73	-35.44	21.35	-56.79	peak
4	0.2605	62.64	-101.81	-39.17	19.28	-58.45	peak
5	0.3234	61.48	-101.88	-40.40	17.41	-57.81	peak
6	0.3933	57.72	-101.96	-44.24	15.71	-59.95	peak

Note: 1. Measurement = Reading Level + Correct Factor (dBuA/m= dBuV/m- 20Log10[120π] = dBuV/m- 51.5).

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV 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.

### 490 kHz ~ 30 MHz



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.5039	64.44	-62.07	2.37	33.56	-31.19	peak
2	0.8296	63.44	-62.17	1.27	29.23	-27.96	peak
3	1.5564	57.68	-62.02	-4.34	23.76	-28.10	peak
4	3.7100	54.20	-61.41	-7.21	29.54	-36.75	peak
5	7.3361	54.08	-61.17	-7.09	29.54	-36.63	peak
6	18.4908	53.56	-60.89	-7.33	29.54	-36.87	peak

Note: 1. Measurement = Reading Level + Correct Factor (dBuA/m= dBuV/m- 20Log10[120π] = dBuV/m- 51.5).

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV 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.

Note: All the modes and channels had been tested, but only the worst data was recorded in the report.



## 9. AC POWER LINE CONDUCTED EMISSIONS

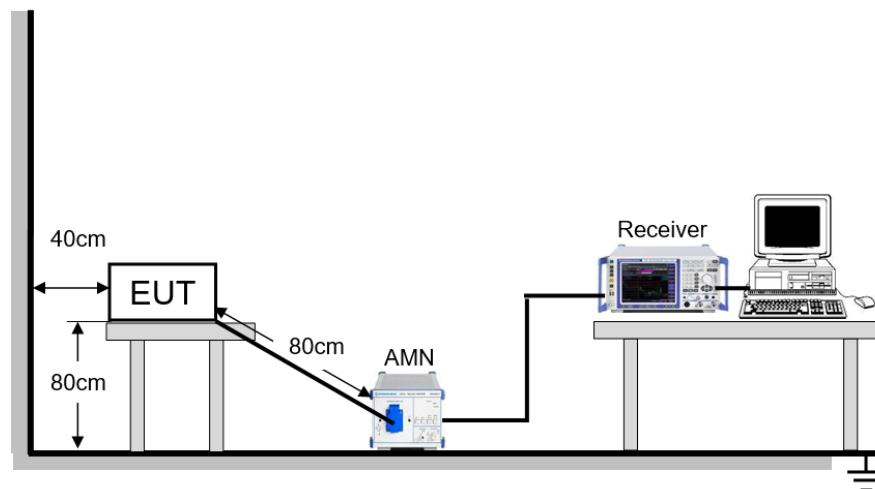
### LIMITS

Please refer to CFR 47 FCC §15.207 (a).

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 SETUP AND PROCEDURE

Refer to ANSI C63.10-2013 clause 6.2.

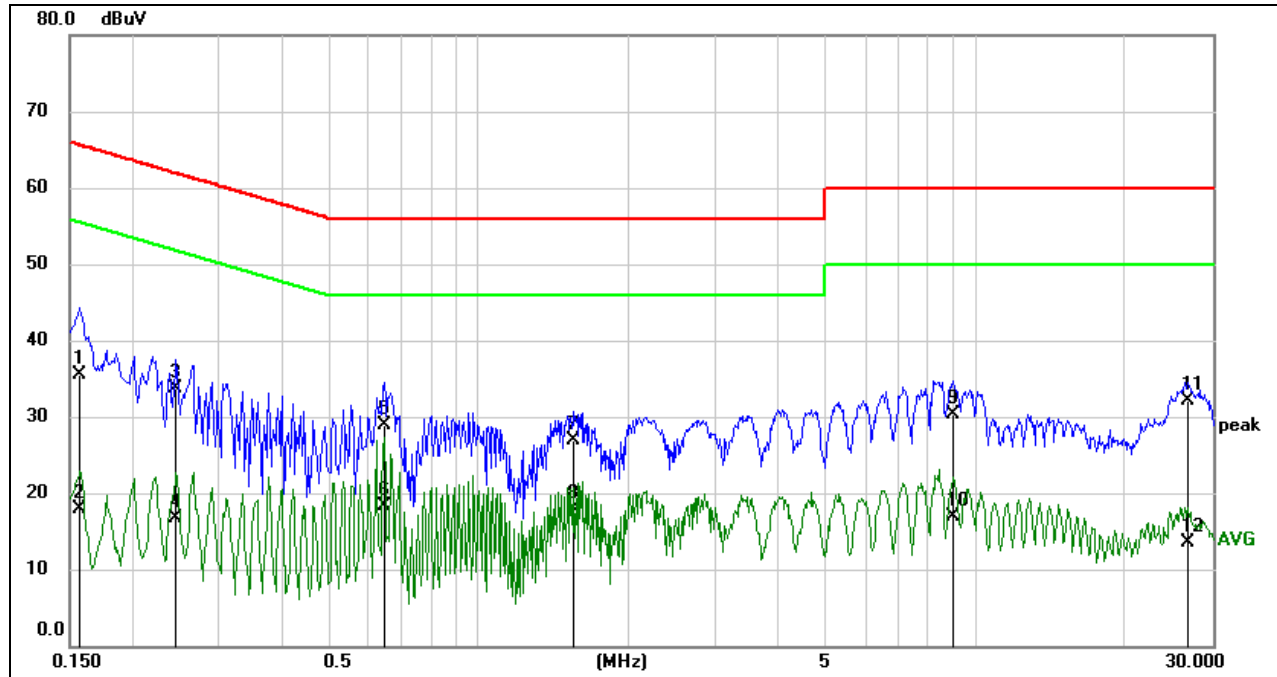


The EUT is put on a table of non-conducting material that is 80 cm high. The vertical conducting wall of shielding is located 40 cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI Measurement Receiver (R&S Test Receiver 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 ENVIRONMENT

Temperature	23.8 °C	Relative Humidity	68.4 %
Atmosphere Pressure	101 kPa	Test Voltage	AC 120 V, 60 Hz

**RESULTS****9.1.1. 802.11b MODE****LINE L RESULTS (LOW CHANNEL, WORST-CASE CONFIGURATION)**

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1580	25.96	9.59	35.55	65.57	-30.02	QP
2	0.1580	8.36	9.59	17.95	55.57	-37.62	AVG
3	0.2460	24.03	9.59	33.62	61.89	-28.27	QP
4	0.2460	7.03	9.59	16.62	51.89	-35.27	AVG
5	0.6460	19.36	9.60	28.96	56.00	-27.04	QP
6	0.6460	8.69	9.60	18.29	46.00	-27.71	AVG
7	1.5540	17.26	9.62	26.88	56.00	-29.12	QP
8	1.5540	8.36	9.62	17.98	46.00	-28.02	AVG
9	8.9700	20.63	9.61	30.24	60.00	-29.76	QP
10	8.9700	7.36	9.61	16.97	50.00	-33.03	AVG
11	26.7140	22.30	9.87	32.17	60.00	-27.83	QP
12	26.7140	3.59	9.87	13.46	50.00	-36.54	AVG

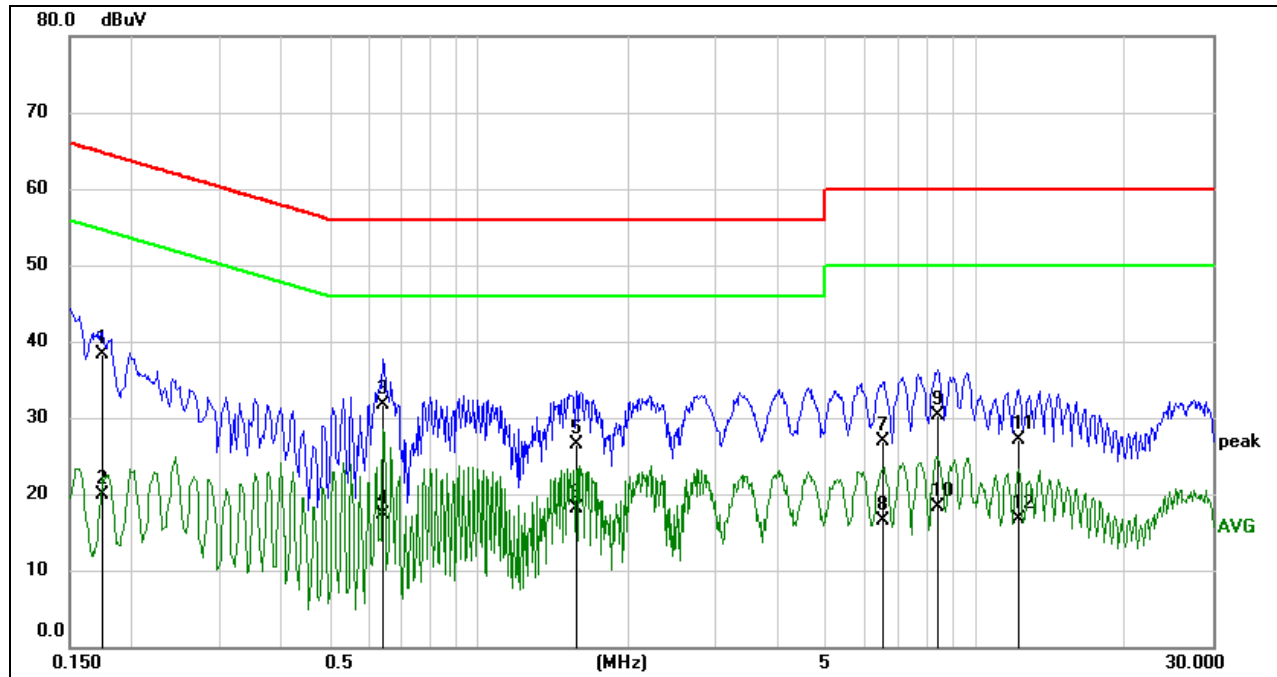
Note: 1. Result = Reading +Correct Factor.

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.

### LINE N RESULTS (LOW CHANNEL, WORST-CASE CONFIGURATION)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1748	28.65	9.59	38.24	64.73	-26.49	QP
2	0.1748	10.26	9.59	19.85	54.73	-34.88	AVG
3	0.6419	22.06	9.60	31.66	56.00	-24.34	QP
4	0.6419	7.65	9.60	17.25	46.00	-28.75	AVG
5	1.5740	16.85	9.62	26.47	56.00	-29.53	QP
6	1.5740	8.48	9.62	18.10	46.00	-27.90	AVG
7	6.5100	17.35	9.63	26.98	60.00	-33.02	QP
8	6.5100	6.85	9.63	16.48	50.00	-33.52	AVG
9	8.3939	20.65	9.61	30.26	60.00	-29.74	QP
10	8.3939	8.65	9.61	18.26	50.00	-31.74	AVG
11	12.2219	17.36	9.66	27.02	60.00	-32.98	QP
12	12.2219	7.03	9.66	16.69	50.00	-33.31	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 and channels had been tested, but only the worst data was recorded in the report.

## 10. ANTENNA REQUIREMENTS

### APPLICABLE REQUIREMENTS

Please refer to FCC §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 §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.

### RESULTS

Complies



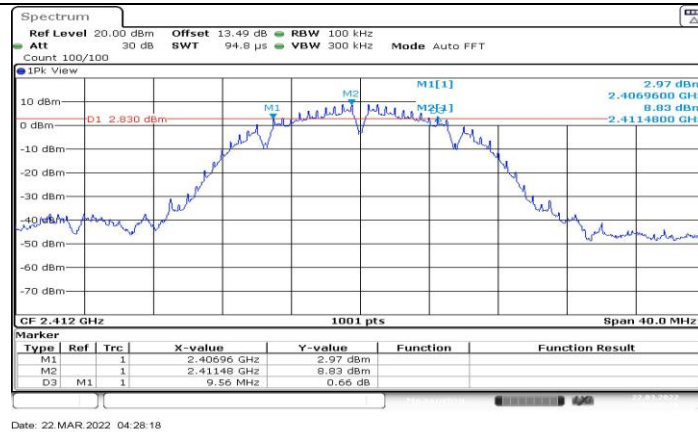
## 11. Appendix

### 11.1. Appendix A: DTS Bandwidth

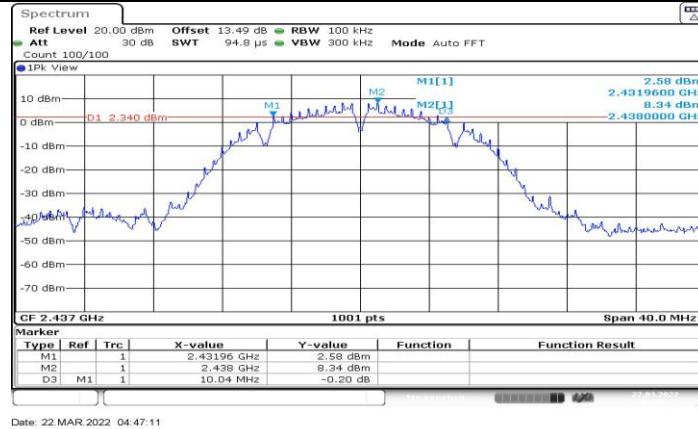
#### 11.1.1. Test Result

Test Mode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	9.56	2406.96	2416.52	0.5	PASS
		2437	10.04	2431.96	2442.00	0.5	PASS
		2462	8.56	2457.44	2466.00	0.5	PASS
11G	Ant1	2412	16.08	2403.84	2419.92	0.5	PASS
		2437	15.56	2429.20	2444.76	0.5	PASS
		2462	15.12	2454.44	2469.56	0.5	PASS
11N20SISO	Ant1	2412	16.92	2403.48	2420.40	0.5	PASS
		2437	17.00	2428.48	2445.48	0.5	PASS
		2462	17.32	2453.44	2470.76	0.5	PASS

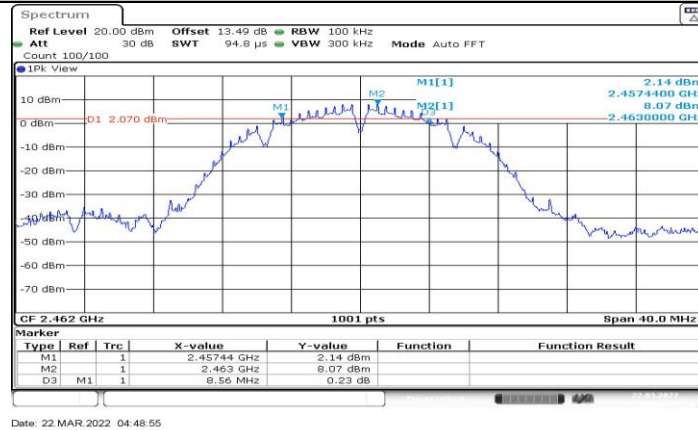
## 11.1.2. Test Graphs



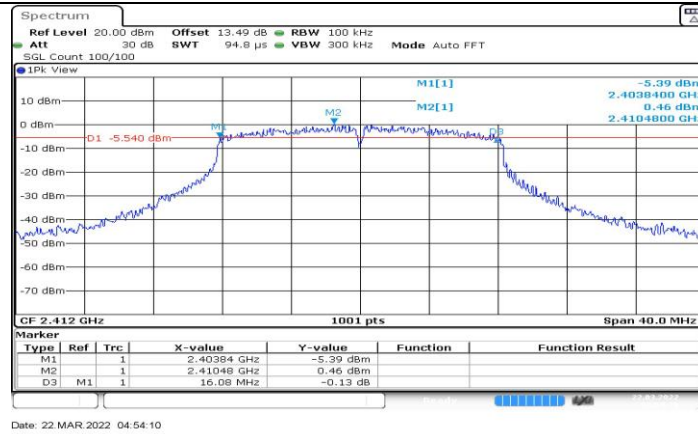
11B\_Ant1\_2412



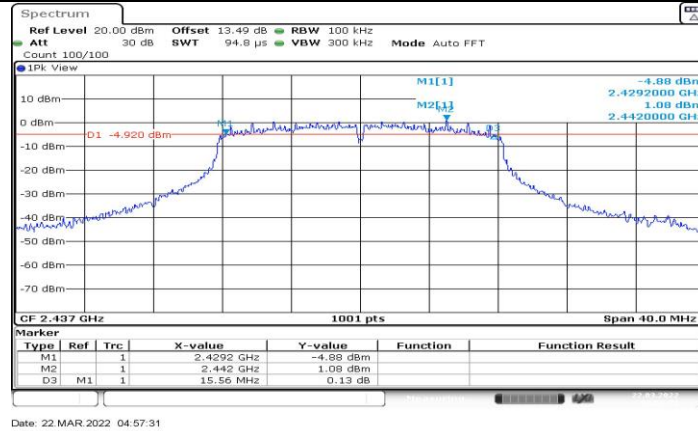
11B\_Ant1\_2437



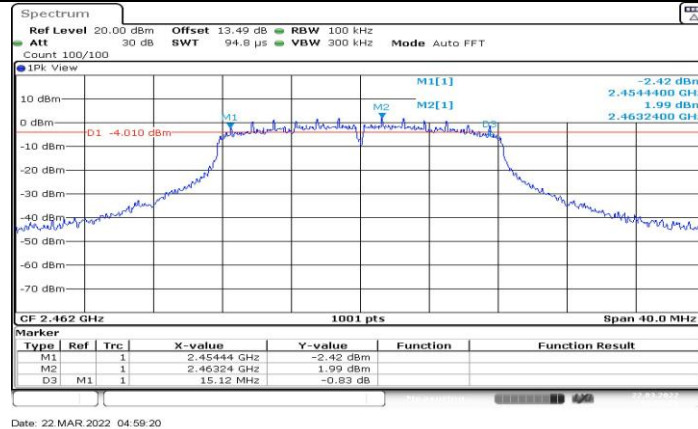
11B\_Ant1\_2462



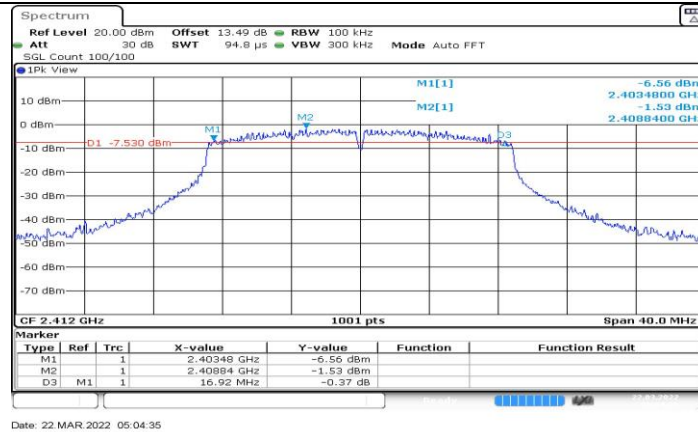
## 11G\_Ant1\_2412



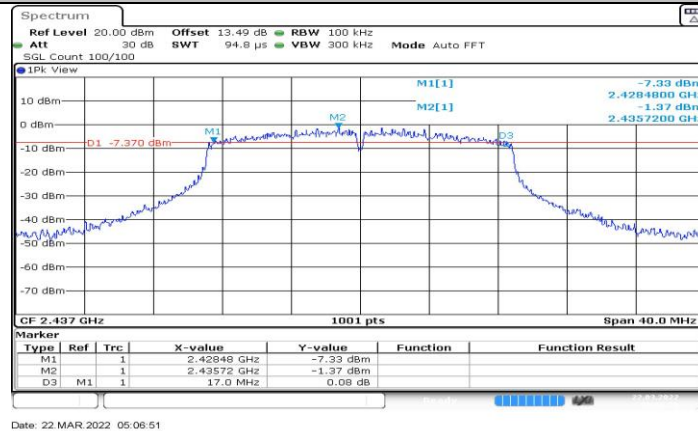
## 11G\_Ant1\_2437



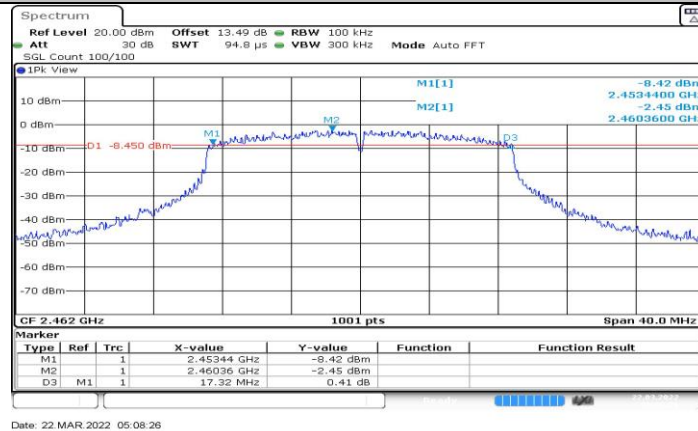
## 11G\_Ant1\_2462



11N20SISO\_Ant1\_2412



11N20SISO\_Ant1\_2437



11N20SISO\_Ant1\_2462



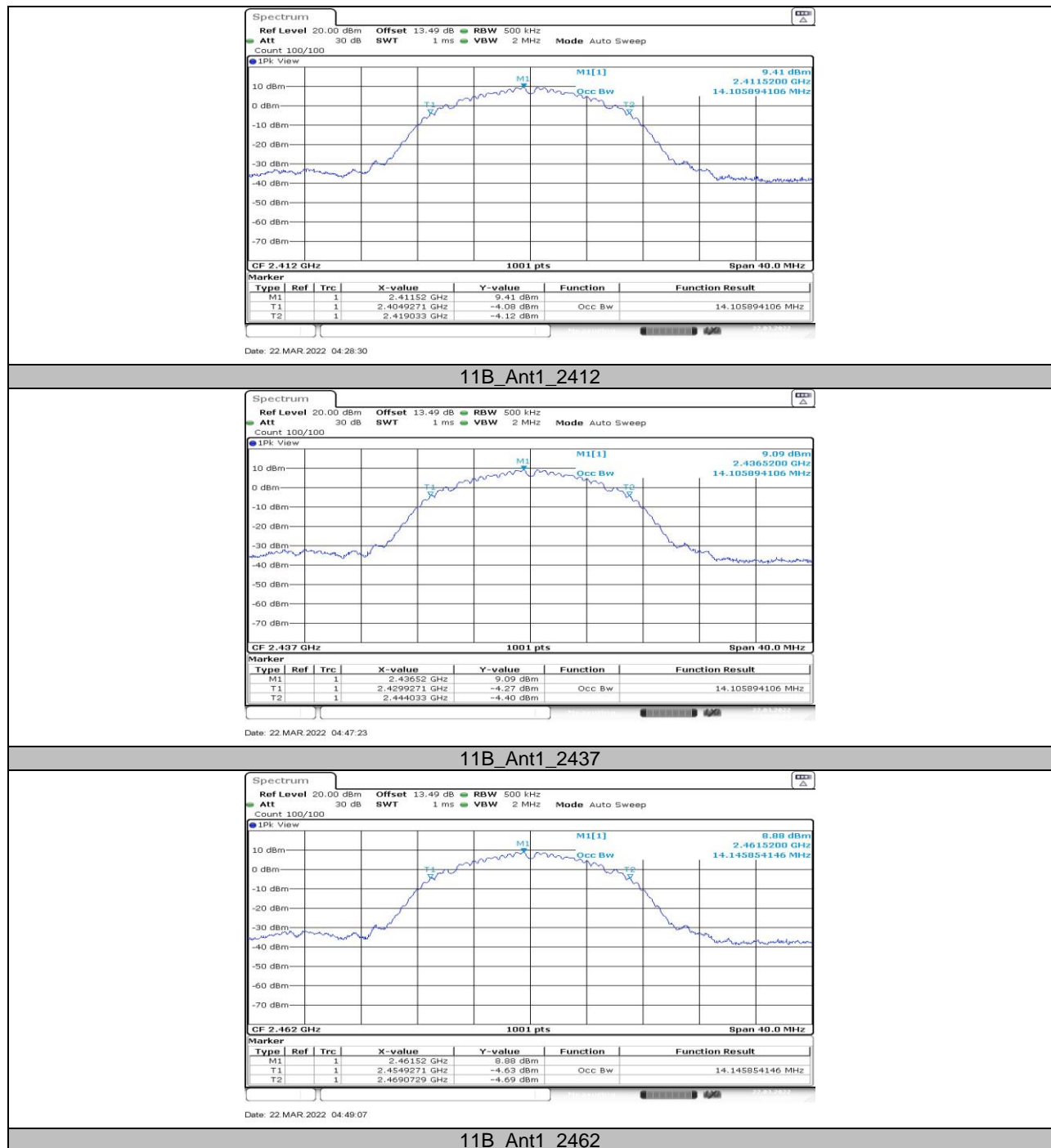


## 11.2. Appendix B: Occupied Channel Bandwidth

### 11.2.1. Test Result

Test Mode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Verdict
11B	Ant1	2412	14.106	2404.927	2419.033	PASS
		2437	14.106	2429.927	2444.033	PASS
		2462	14.146	2454.927	2469.073	PASS
11G	Ant1	2412	16.983	2403.489	2420.472	PASS
		2437	16.983	2428.489	2445.472	PASS
		2462	17.023	2453.489	2470.511	PASS
11N20SISO	Ant1	2412	18.022	2402.969	2420.991	PASS
		2437	18.022	2427.969	2445.991	PASS
		2462	18.022	2452.929	2470.951	PASS

## 11.2.2. Test Graphs

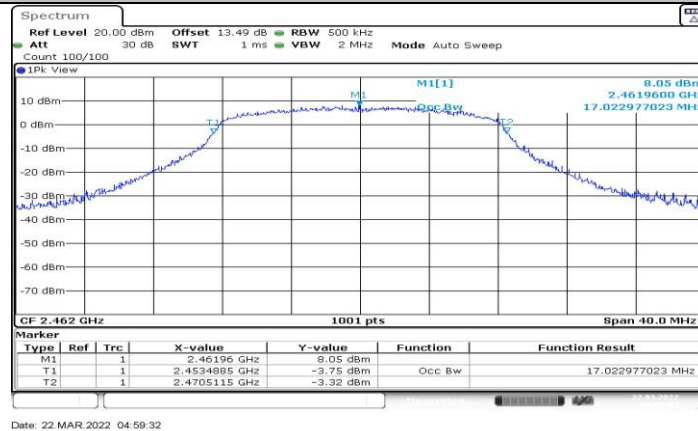




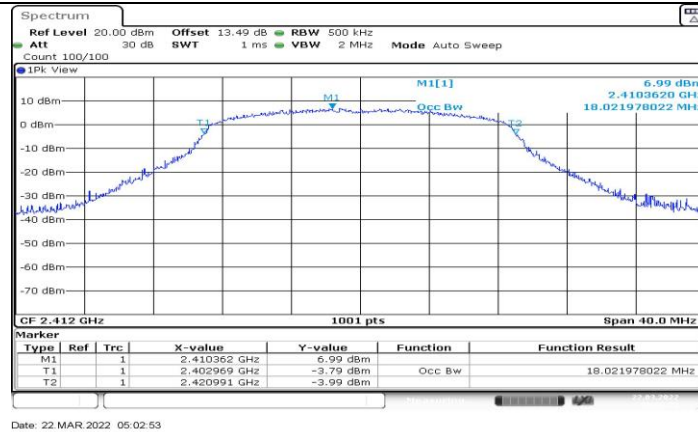
11G\_Ant1\_2412



11G\_Ant1\_2437



11G\_Ant1\_2462



11N20SISO\_Ant1\_2412



11N20SISO\_Ant1\_2437



11N20SISO\_Ant1\_2462



### 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	16.75	≤30.00	PASS
		2437	16.32	≤30.00	PASS
		2462	16.05	≤30.00	PASS
11G	Ant1	2412	12.80	≤30.00	PASS
		2437	12.39	≤30.00	PASS
		2462	12.24	≤30.00	PASS
11N20SISO	Ant1	2412	11.63	≤30.00	PASS
		2437	11.17	≤30.00	PASS
		2462	10.96	≤30.00	PASS

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

2. The Duty Cycle Factor (refer to section 7.1) had already compensated to the test data.

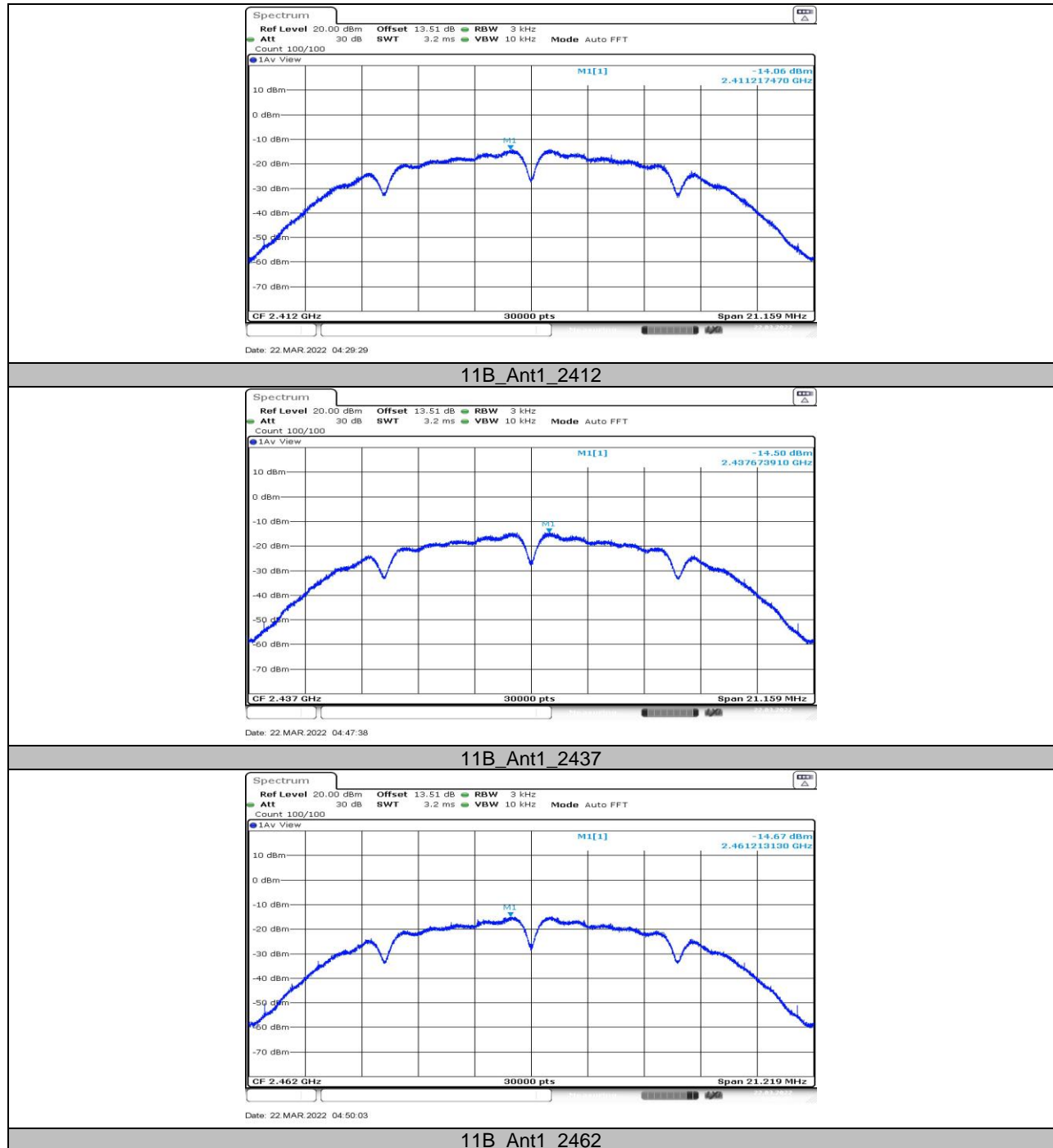


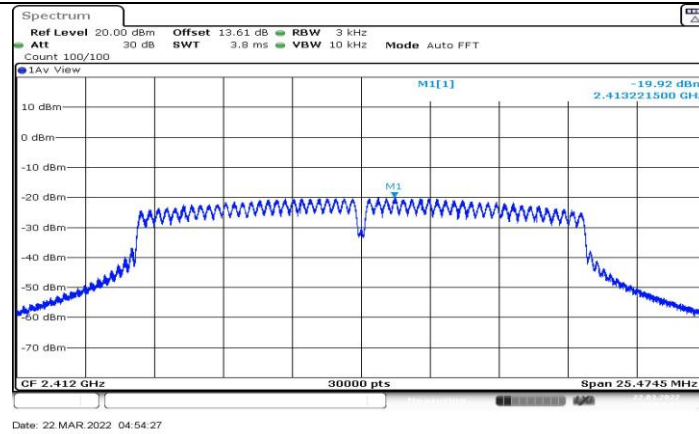
## 11.4. Appendix D: Maximum power spectral density

### 11.4.1. Test Result

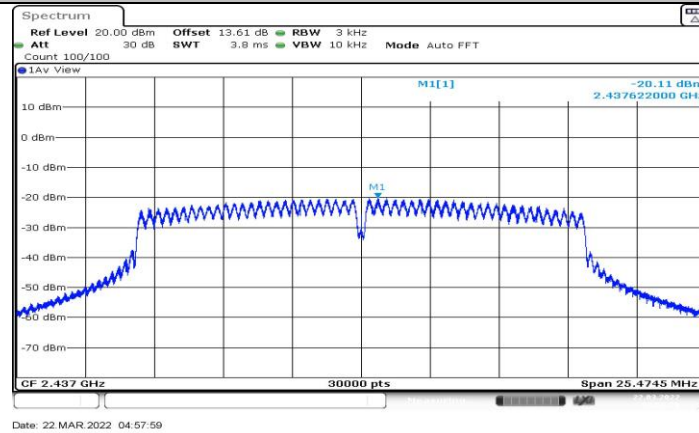
Test Mode	Antenna	Channel	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
11B	Ant1	2412	-14.06	≤8.00	PASS
		2437	-14.5	≤8.00	PASS
		2462	-14.67	≤8.00	PASS
11G	Ant1	2412	-19.92	≤8.00	PASS
		2437	-20.11	≤8.00	PASS
		2462	-20.66	≤8.00	PASS
11N20SISO	Ant1	2412	-20.84	≤8.00	PASS
		2437	-21.36	≤8.00	PASS
		2462	-21.38	≤8.00	PASS

## 11.4.2. Test Graphs

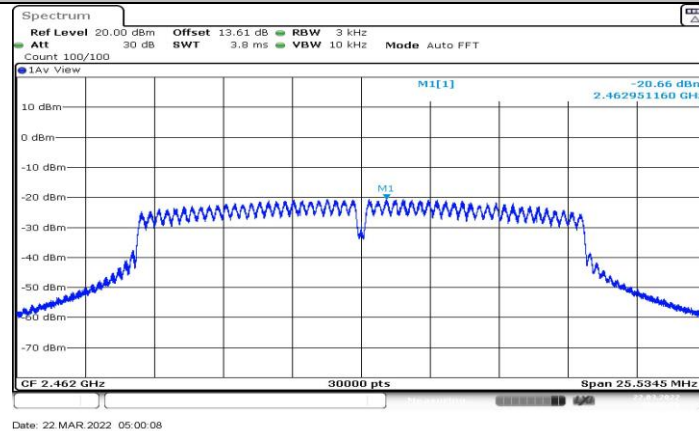




11G\_Ant1\_2412

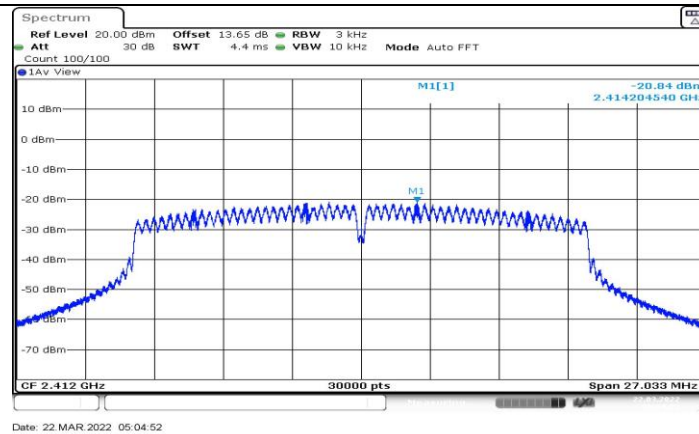


11G\_Ant1\_2437

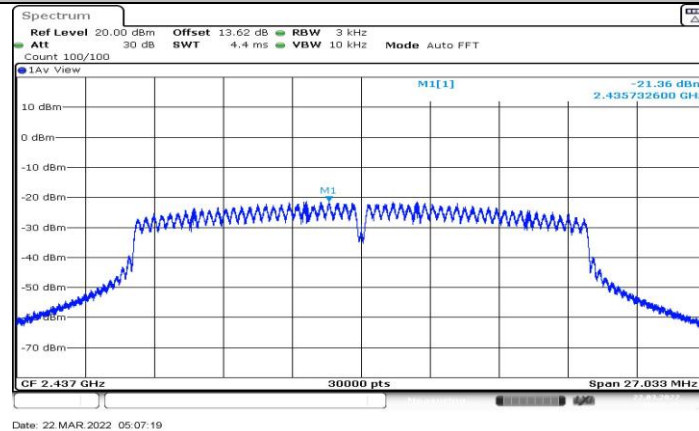


11G\_Ant1\_2462

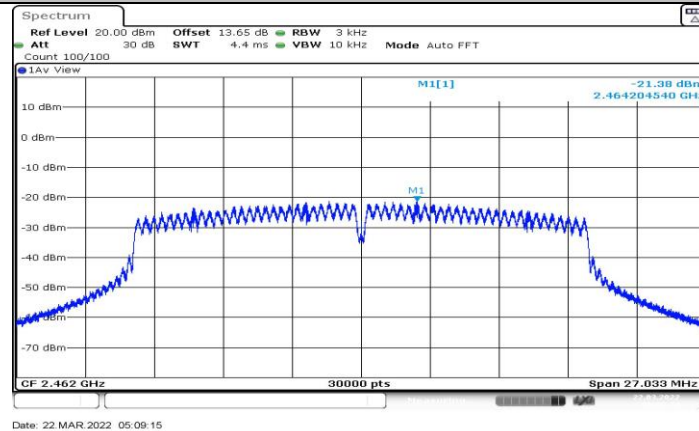




11N20SISO\_Ant1\_2412



11N20SISO\_Ant1\_2437



11N20SISO\_Ant1\_2462

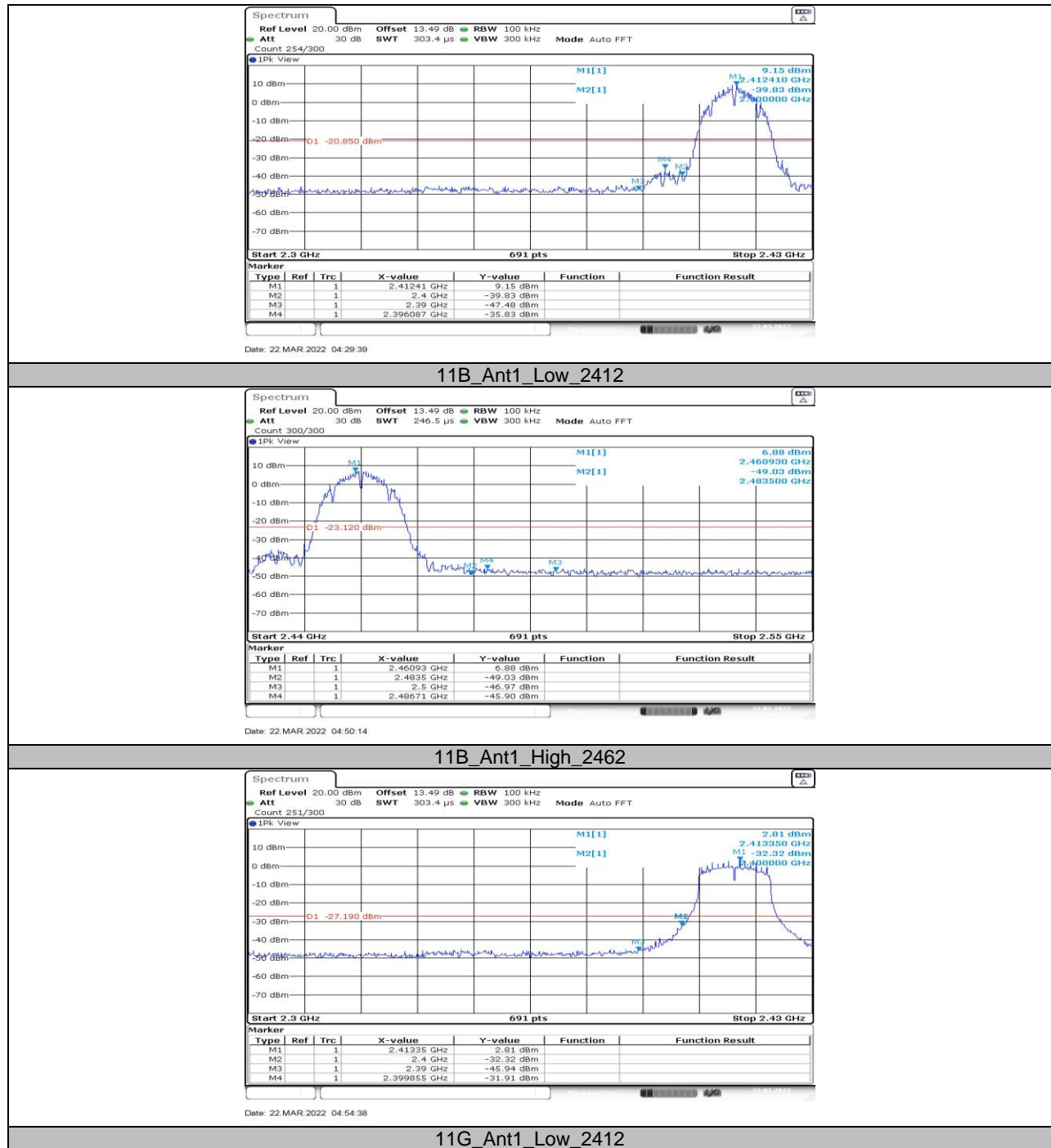


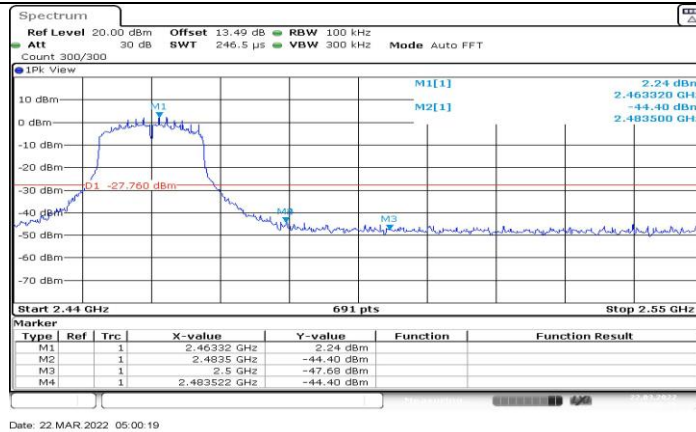
## 11.5. Appendix E: Band edge measurements

### 11.5.1. Test Result

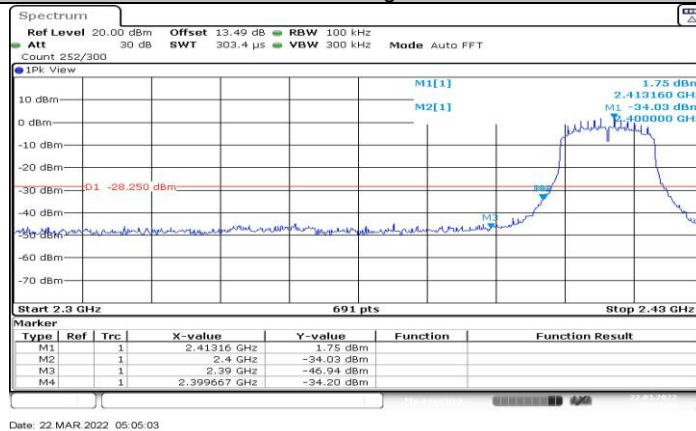
Test Mode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	Low	2412	9.15	-35.83	$\leq -20.85$	PASS
		High	2462	6.88	-45.9	$\leq -23.12$	PASS
11G	Ant1	Low	2412	2.81	-31.91	$\leq -27.19$	PASS
		High	2462	2.24	-44.4	$\leq -27.76$	PASS
11N20SISO	Ant1	Low	2412	1.75	-34.2	$\leq -28.25$	PASS
		High	2462	-1.07	-45.64	$\leq -31.07$	PASS

## 11.5.2. Test Graphs

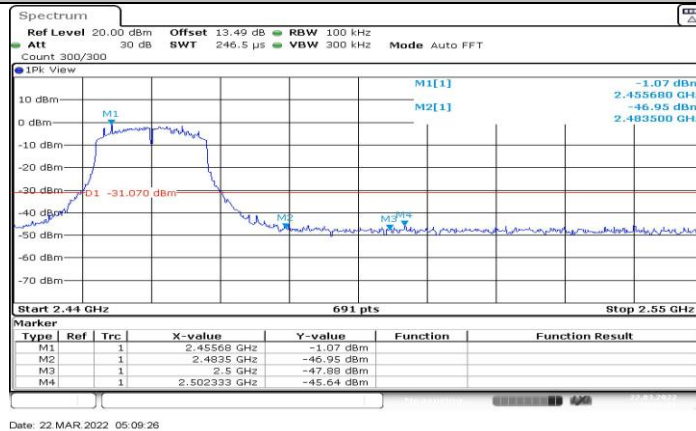




11G\_Ant1\_High\_2462



11N20SISO\_Ant1\_Low\_2412



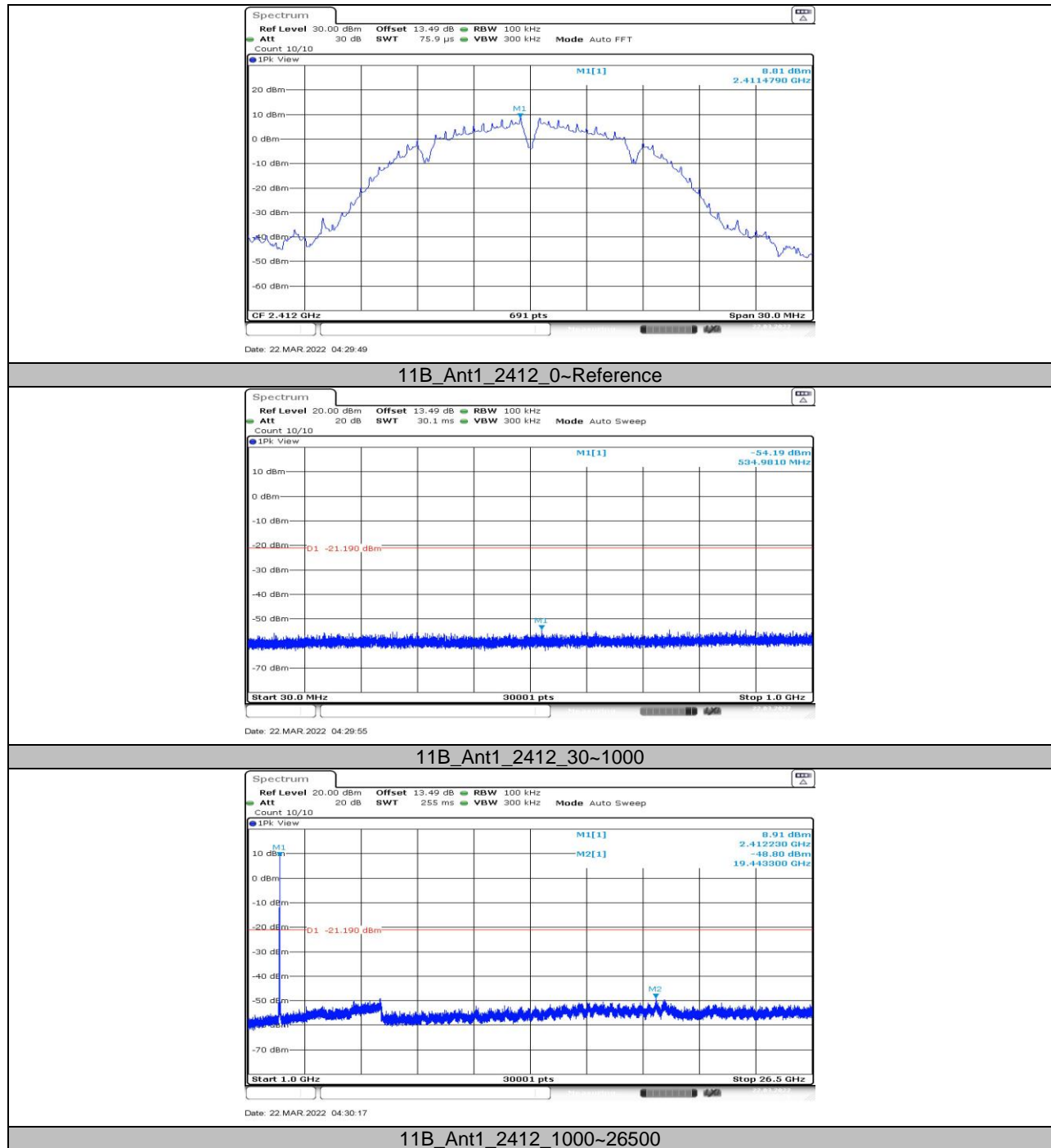
11N20SISO\_Ant1\_High\_2462

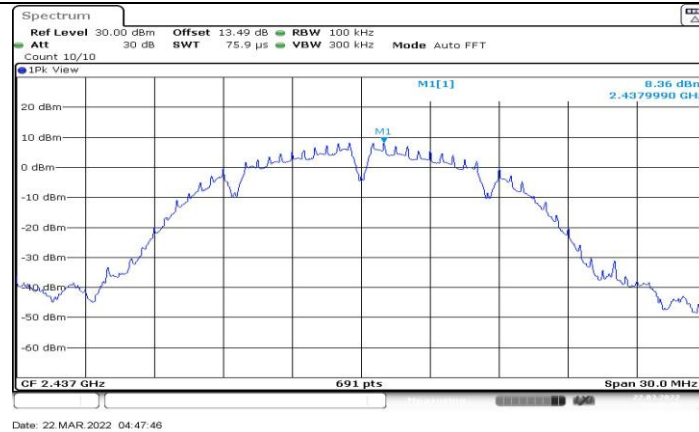
## 11.6. Appendix F: Conducted Spurious Emission

### 11.6.1. Test Result

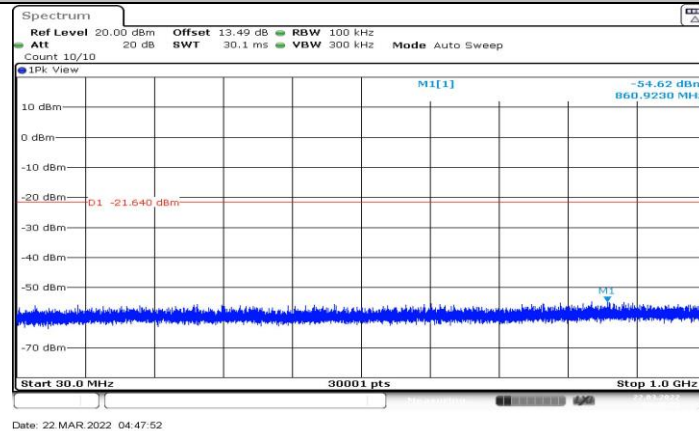
Test Mode	Antenna	Channel	FreqRange [Mhz]	Result [dBm]	Limit [dBm]	Verdict
11B	Ant1	2412	Reference	8.81	---	PASS
			30~1000	-54.19	$\leq -21.19$	PASS
			1000~26500	-48.8	$\leq -21.19$	PASS
		2437	Reference	8.36	---	PASS
			30~1000	-54.62	$\leq -21.64$	PASS
			1000~26500	-49.79	$\leq -21.64$	PASS
		2462	Reference	8.44	---	PASS
			30~1000	-54.5	$\leq -21.56$	PASS
			1000~26500	-49.47	$\leq -21.56$	PASS
11G	Ant1	2412	Reference	2.42	---	PASS
			30~1000	-54.58	$\leq -27.58$	PASS
			1000~26500	-49.51	$\leq -27.58$	PASS
		2437	Reference	2.36	---	PASS
			30~1000	-54.03	$\leq -27.64$	PASS
			1000~26500	-48.41	$\leq -27.64$	PASS
		2462	Reference	2.12	---	PASS
			30~1000	-54.42	$\leq -27.88$	PASS
			1000~26500	-49.01	$\leq -27.88$	PASS
11N20SISO	Ant1	2412	Reference	1.56	---	PASS
			30~1000	-54.58	$\leq -28.44$	PASS
			1000~26500	-48.67	$\leq -28.44$	PASS
		2437	Reference	1.26	---	PASS
			30~1000	-54.05	$\leq -28.74$	PASS
			1000~26500	-49.27	$\leq -28.74$	PASS
		2462	Reference	0.98	---	PASS
			30~1000	-53.98	$\leq -29.02$	PASS
			1000~26500	-48.81	$\leq -29.02$	PASS

## 11.6.2. Test Graphs

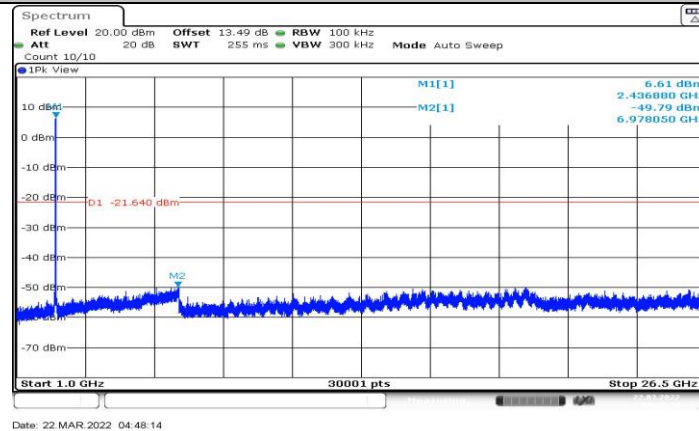




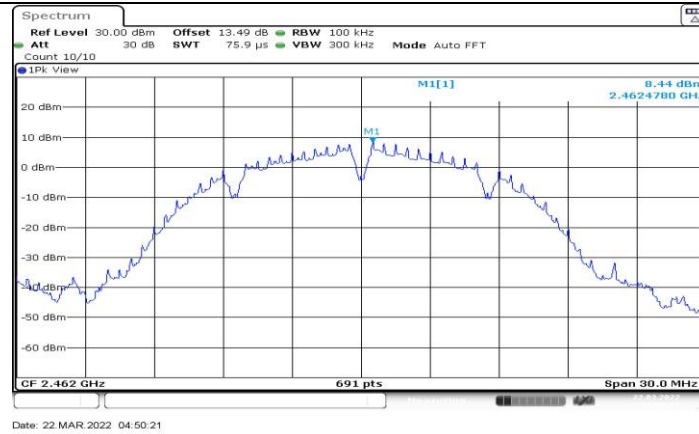
## 11B\_Ant1\_2437\_0~Reference



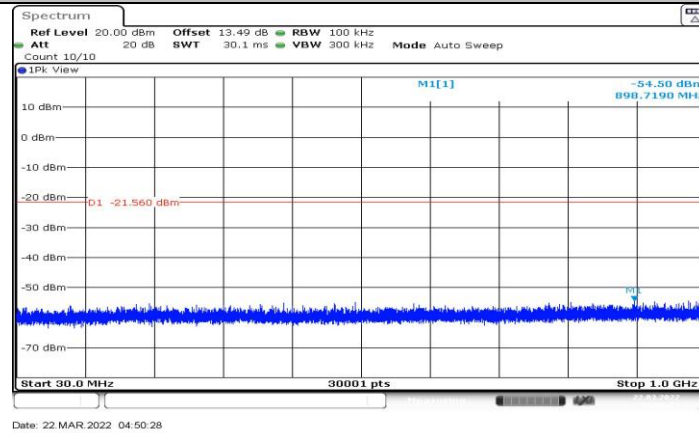
## 11B\_Ant1\_2437\_30~1000



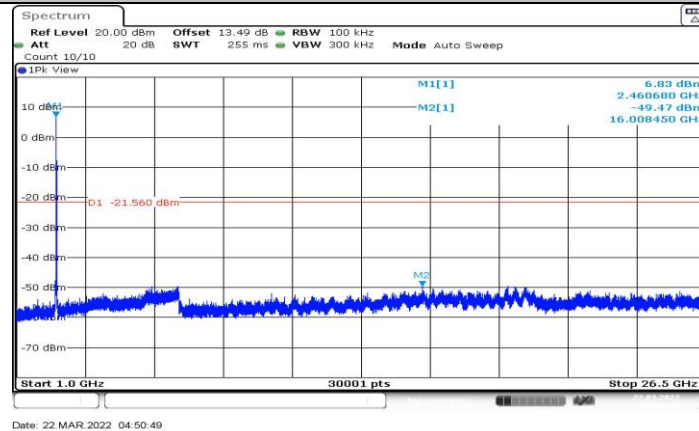
## 11B\_Ant1\_2437\_1000~26500



## 11B\_Ant1\_2462\_0~Reference

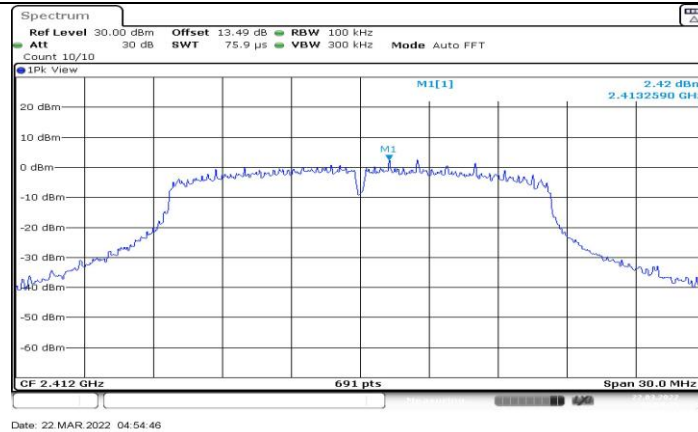


## 11B\_Ant1\_2462\_30~1000

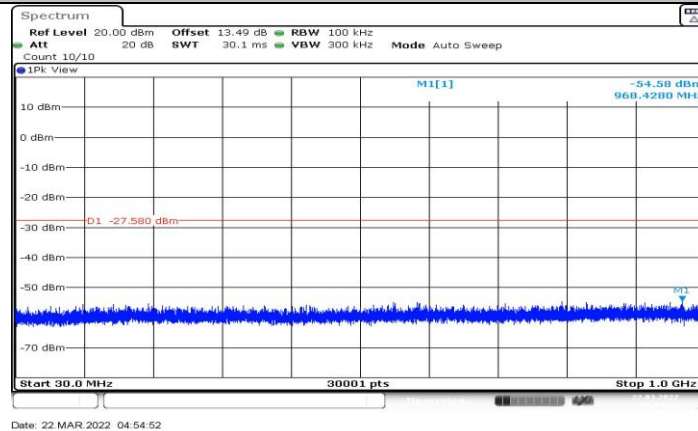


## 11B\_Ant1\_2462\_1000~26500

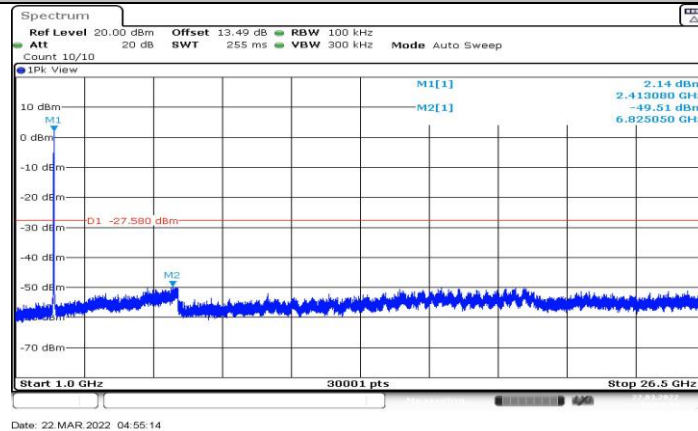




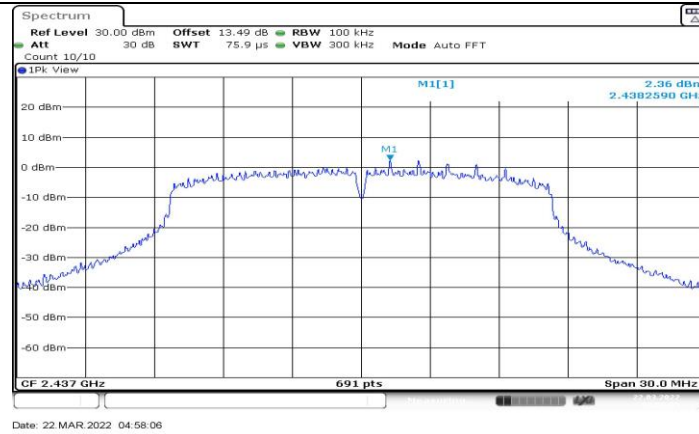
## 11G\_Ant1\_2412\_0~Reference



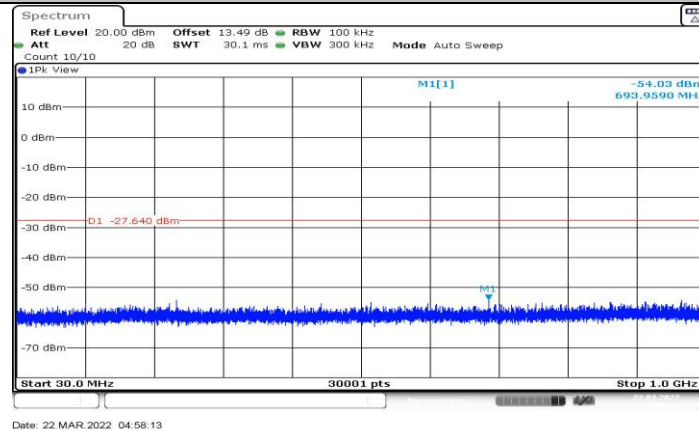
## 11G\_Ant1\_2412\_30~1000



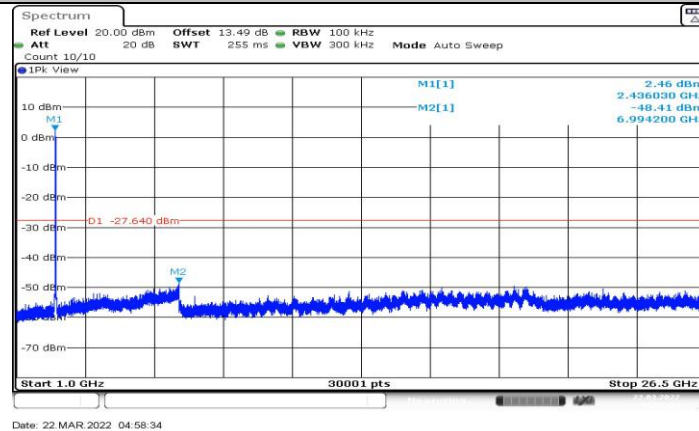
## 11G\_Ant1\_2412\_1000~26500



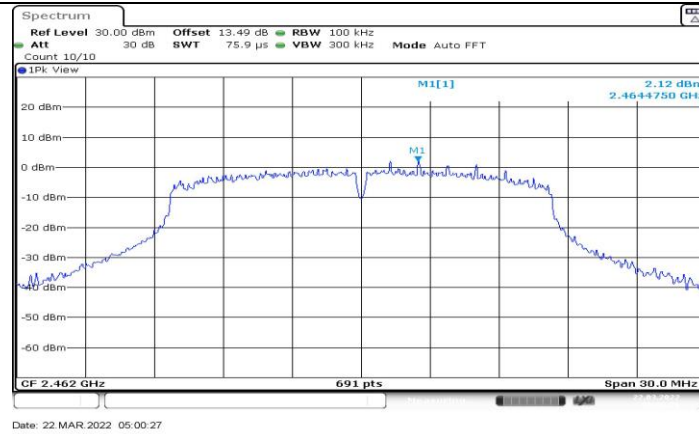
## 11G\_Ant1\_2437\_0~Reference



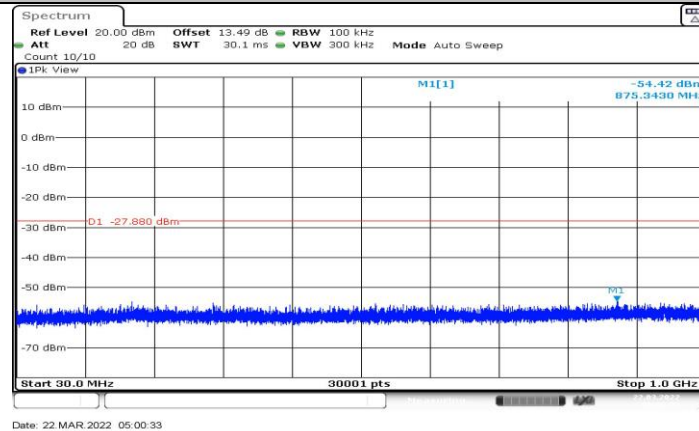
## 11G\_Ant1\_2437\_30~1000



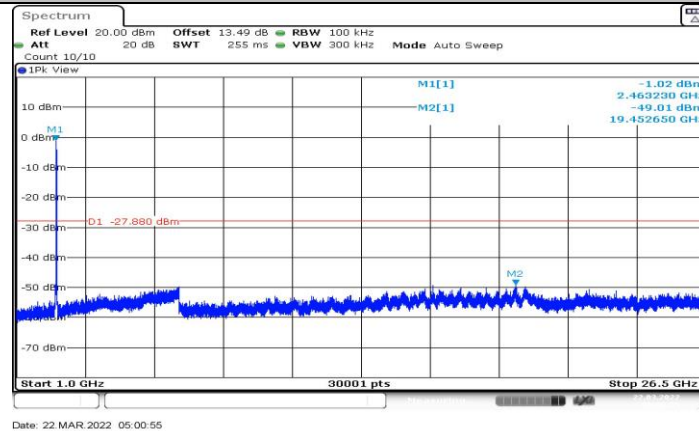
## 11G\_Ant1\_2437\_1000~26500



## 11G\_Ant1\_2462\_0~Reference



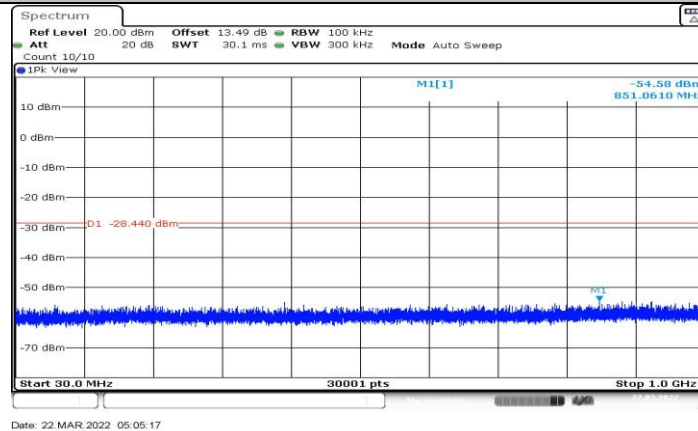
## 11G\_Ant1\_2462\_30~1000



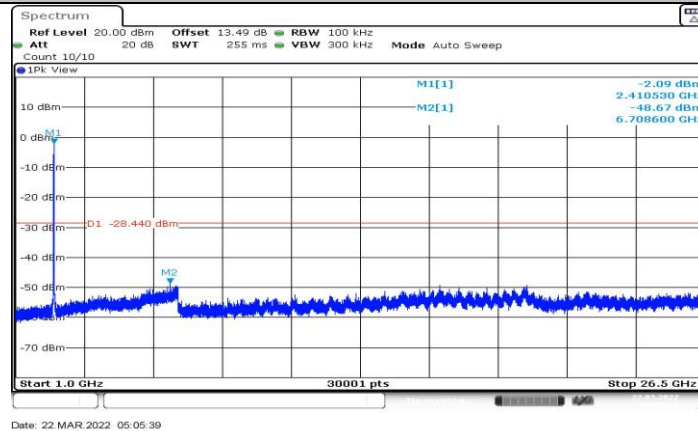
## 11G\_Ant1\_2462\_1000~26500



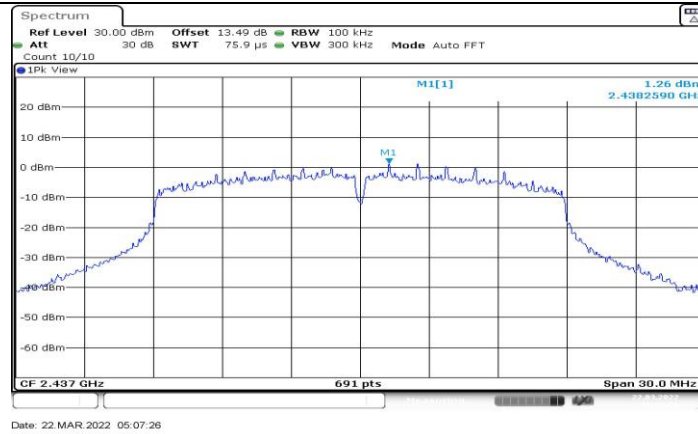
## 11N20SISO\_Ant1\_2412\_0~Reference



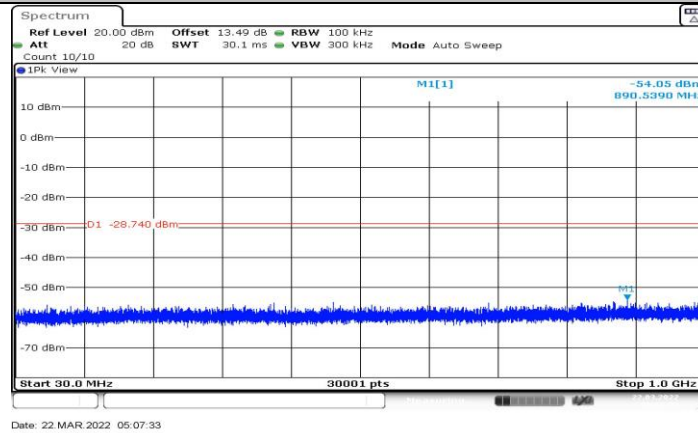
## 11N20SISO\_Ant1\_2412\_30~1000



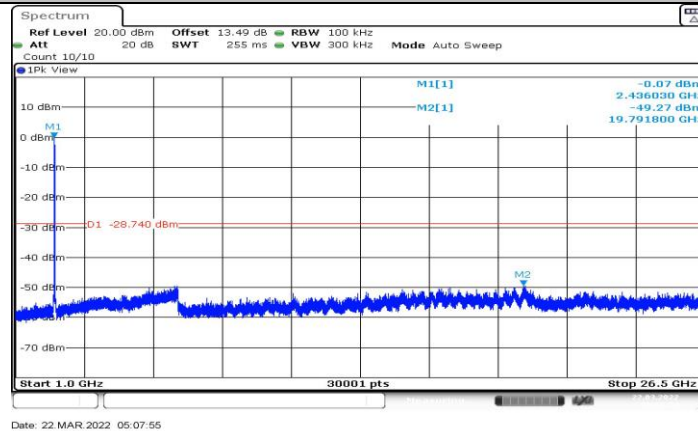
## 11N20SISO\_Ant1\_2412\_1000~26500



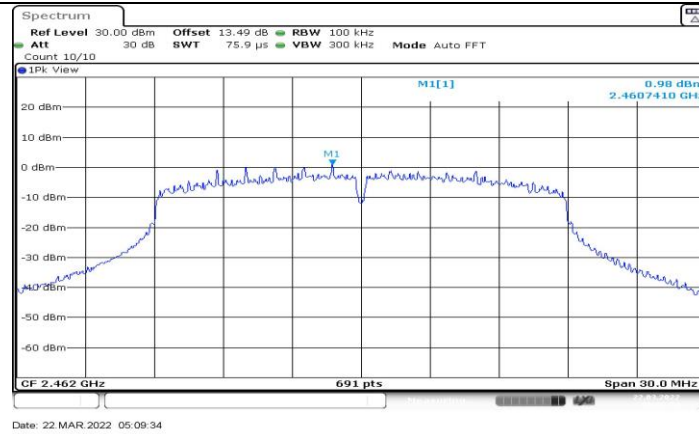
## 11N20SISO\_Ant1\_2437\_0~Reference



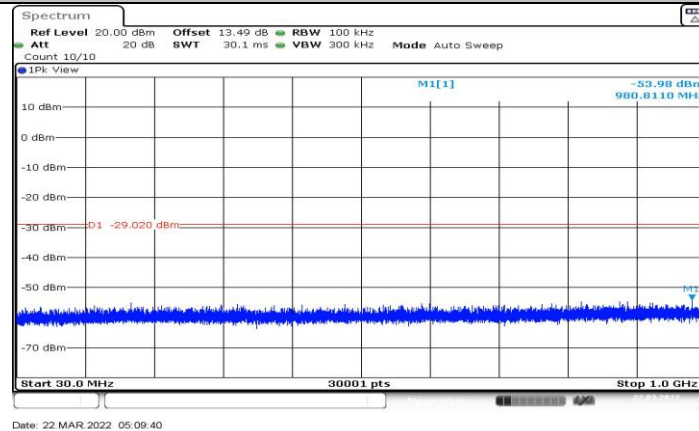
## 11N20SISO\_Ant1\_2437\_30~1000



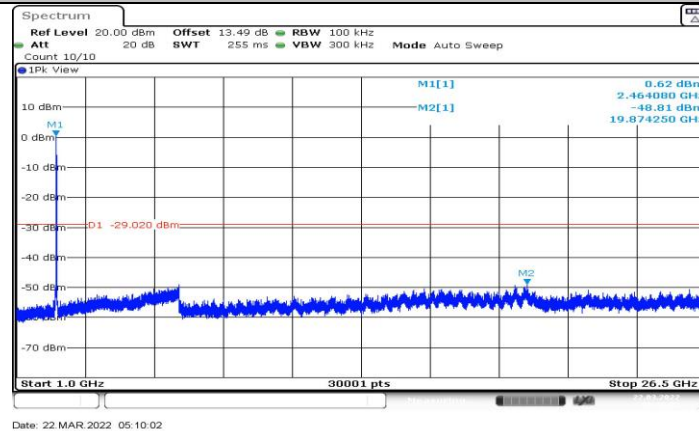
## 11N20SISO\_Ant1\_2437\_1000~26500



## 11N20SISO\_Ant1\_2462\_0~Reference



## 11N20SISO\_Ant1\_2462\_30~1000



## 11N20SISO\_Ant1\_2462\_1000~26500



## 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	8.39	8.43	0.9953	99.53	0.02	0.12	0.01
11G	1.38	1.42	0.9718	97.18	0.12	0.72	1
11N20SISO	1.30	1.34	0.9701	97.01	0.13	0.77	1

Note:

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

Where: x is Duty Cycle (Linear)

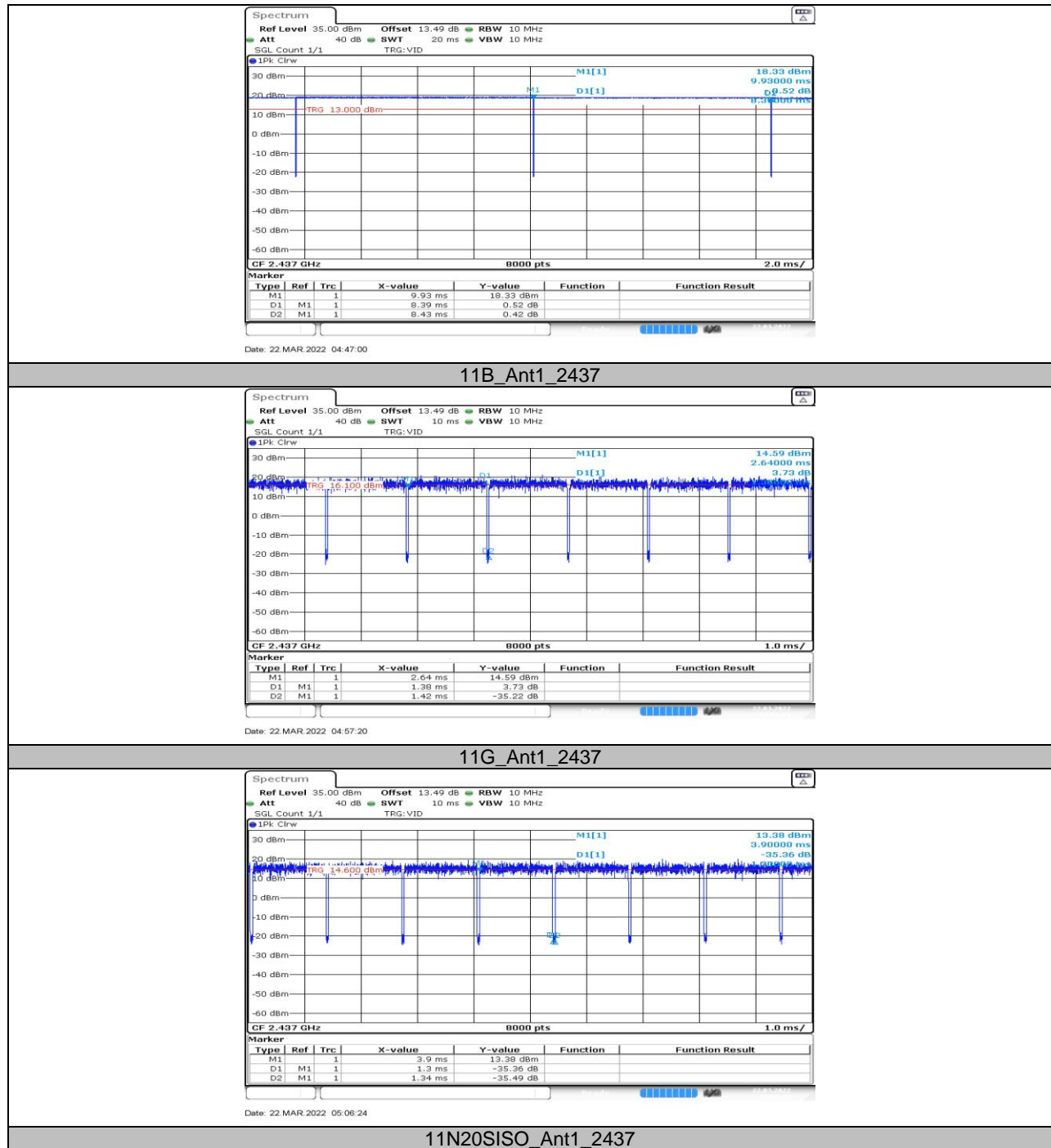
Where: T is On Time

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

For 802.11b mode, the duty cycle > 98%, so, VBW=10Hz has been used to test.



## 11.7.2. Test Graphs



END OF REPORT