Report No. 367960-01

Test Report

Product	Indoor Home Monitoring Camera with WiFi
Name and address of the applicant	Panasonic Corporation of North America Two Riverfront Plaza, 9th Floor Newark, NJ 07102-5490, USA
Name and address of the manufacturer	Same as above
Model	KX-HNC810 KX-HNC815C
Rating	Mains (120 V_{AC} 60 Hz)
Trademark	Panasonic
Serial number	/
Additional information	WiFi, 802.11a/b/g/n
Tested according to	**FCC Part 15.247** Frequency Hopping Transmitters / Digital Transmission Systems **Industry Canada RSS-247, Issue 2** Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
Order number	367960
Tested in period	2018-11-26 to 2019-01-31
Issue date	2019-03-12
Name and address of the testing laboratory	Nemko Instituttveien 6 Kjeller, Norway www.nemko.com CAB Number: FCC: NO0001 ISED: NO0470 TEL: +47 22 96 03 30 FAX: +47 22 96 05 50 ilac-MRA NORWEGIAN ACCREDITATION TEST 033 **An accredited technical test executed under the Norwegian accreditation scheme**

Prepared by [Frode Sveinsen]	Approved by [G. Suhanthakumar]

This report shall not be reproduced except in full without the written approval of Nemko. Opinions and interpretations expressed within this report are not part of the current accreditation. This report was originally distributed electronically with digital signatures. For more information contact Nemko.

Template version: C

CONTENTS

1 INFORMATION 3
1.1 Test Item 3
1.2 Normal test condition 3
1.3 Test Engineer(s) 4
1.4 Description of modification for Modification Filing 4
1.5 Family List Rational 4
1.6 Antenna Requirement 4
1.7 Worst-Case Configuration and Mode 4
1.8 Comments 4

2 TEST REPORT SUMMARY 5
2.1 General 5
2.2 Test Summary 6

3 TEST RESULTS 7
3.1 Power Line Conducted Emissions 7
3.2 Occupied Bandwidth (99% BW) 9
3.3 Minimum 6 dB Bandwidth 12
3.4 Peak Power Output 18
3.5 Conducted Emissions at Antenna Connector 24
3.6 Restricted Bands of operation 45
3.7 Spurious Emissions (Radiated) 46
3.8 Power Spectral Density (PSD) 71

4 Measurement Uncertainty 77

5 LIST OF TEST EQUIPMENT 78

6 BLOCK DIAGRAM 79
6.1 Power Line Conducted Emission 79
6.2 Conducted Tests 79
6.3 Test Site Radiated Emission 80

1 INFORMATION

1.1 Test Item

Name	Panasonic
Model/version	KX-HNC810 (US model) KX-HNC815C (Canada model)
FCC ID	ACJ96NKX-HNC810
ISED ID	216A-KXHNC815
Serial number	/
Hardware identity and/or version	N/A
Software identity and/or version	N/A
Frequency Range	2412 – 2462 MHz
Number of Channels	11
Channel Separation	5 MHz
Operating Modes	802.11b/g/n (HT20)
Type of Modulation	Digital (DSSS, OFDM)
User Frequency Adjustment	None
Conducted Output Power	0.024 W
Power Supply	AC Adaptor Model PNLV251 (Input: 120V 60Hz 350mA, Output: $5V_{DC}$ 1.8A)
Antenna Connector	None (Integral Mono-Pol antenna)
Number of Antennas	1
Antenna Diversity	No
Smart Antennas or MIMO	No

Description of Test Item

The tested device is an Indoor Home Monitoring Camera with WiFi connection.

The KX-HNC810 is identical to the KX-HNC850 (FCC ID: ACJ96NKX-HNC850) except for the voltage regulator circuitry, and the KX-HNC850 is a floor standing model that also includes a LED lamp. The Output Power in the 2.4GHz band is also reduced on the KX-HNC810.

The models KX-HNC810 and KX-HNC815C are identical.

1.2 Normal test condition

Temperature:	20 - 24 °C
Relative humidity:	20 - 50 %
Normal test voltage:	120 V 60 Hz

The values are the limit registered during the test period.

1.3 Test Engineer(s)

Frode Sveinsen

1.4 Description of modification for Modification Filing

Not applicable.

1.5 Family List Rational

Not Applicable.

1.6 Antenna Requirement

Is the antenna detachable?	☐ Yes	☒ No
If detachable, is the antenna connector non-standard?	☐ Yes	☐ No

Type of antenna connector: N/A

Ref. FCC §15.203

1.7 Worst-Case Configuration and Mode

Radiated Emissions and Power Line Conducted Emissions were performed with the EUT set to transmit at the channel with the highest output power as worst-case scenario.

The worst case data rates were:

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

1.8 Comments

The measurements were done with the EUT powered by 120 V AC. It was checked that power variations between 85% and 115% did not have any influence on the measurements.

All ports were populated during spurious emission measurements.

2 TEST REPORT SUMMARY

2.1 General

All measurements are tracable to national standards.

The tests were conducted for demonstrating compliance with FCC CFR 47 Part 15, paragraph 15.247 and ISED RSS-247 Issue 2 and RSS-GEN Issue 5.

Tests were performed in accordance with ANSI C63.4-2014 and ANSI C63.10-2013.

Radiated tests were performed in a semi-anechoic chamber at measuring distances of 1m and 3m.

A description of the test facility is on file with the FCC and ISED.

☒ New Submission
☐ Class II Permissive Change
DTS Equipment Code

☒ Production Unit
☐ Pre-production Unit
☐ Family Listing

THIS TEST REPORT APPLIES ONLY TO THE ITEM(S) AND CONFIGURATIONS TESTED.

Deviations from, additions to, or exclusions from the test specifications are described in “Summary of Test Data”.

Nemko Group authorizes the above named entity to reproduce this report provided it is reproduced in its entirety and for use by the entity’s employees only. Any reproduction of parts of this report requires approval in writing from Nemko Group.

Any use that a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Nemko Group accepts no responsibility for damages suffered by any third party caused by decisions made or actions based on this report.

2.2 Test Summary

Name of test	FCC Part 15 reference	RSS-247 Issue 2, RSS-GEN Issue 5 reference	Result
Supply Voltage Variations	15.31(e)	6.11 (RSS-GEN)	**Complies**
Antenna Requirement	15.203	6.8 (RSS-GEN)	**Complies**
Power Line Conducted Emission	15.107(a) 15.207(a)	7.2 / 8.8 (RSS-GEN)	**Complies**
Occupied Bandwidth	N/A	6.7 (RSS-GEN)	**Complies**
Minimum 6 dB Bandwidth	15.247(a)(2)	5.2 (1) (RSS-247)	**Complies**
Peak Power Output	15.247(b)	5.4 (RSS-247)	**Complies**
Power Spectral Density	15.247(d)	5.2 (2) (RSS-247)	**Complies**
Spurious Emissions (Antenna Conducted)	15.247(c)	5.5 (RSS-247)	**Complies**
Spurious Emissions (Radiated)	15.247(c) 15.109(a) 15.209(a)	5.5 (RSS-247) 7.3 (RSS-GEN) 8.9 (RSS-GEN)	**Complies**

Revision history

Version	Date	Comment	Sign
1.0	2019-02-12	First edition	FS
1.1	2019-02-26	Updated with Antenna Gain	FS
1.2	2019-03-12	Updated after TCB review	FS

3 TEST RESULTS

3.1 Power Line Conducted Emissions

FCC Part 15.207

ISED RSS-GEN Issue 5, Clause 7.2 / 8.8

Measurement procedure: ANSI C63.4-2014 using 50 µH/50 ohms LISN

Test Results: Complies

Measurement Data: See attached plots

Highest measured value (L1 and N):

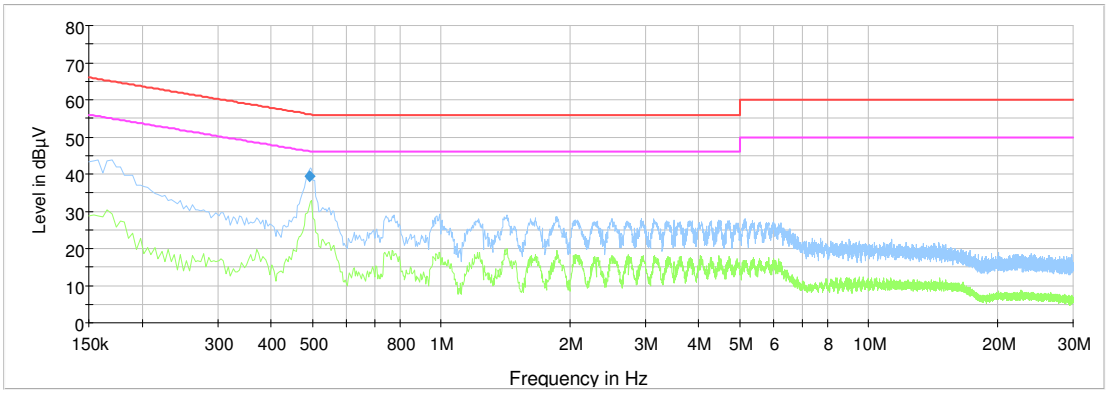
110V 60Hz, Camera in Standby:

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter
0.492	39.45	---	56.13	16.68	1000	9	L1	OFF

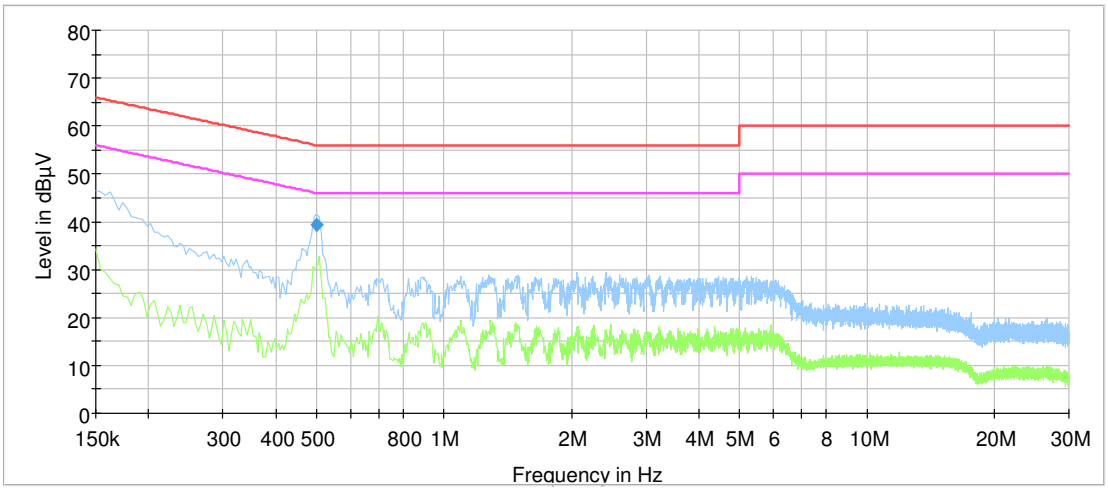
110V 60Hz, Camera Active:

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter
0.500	39.41	---	56.00	16.59	1000	9	L1	OFF

110V 60Hz, Camera in Standby:



110V 60Hz, Camera Active:



3.2 Occupied Bandwidth (99% BW)

FCC Part 15.247 (a)(1)(iii)

Test Results: Complies

Measurement Data:

Number of RF channels in use: 11

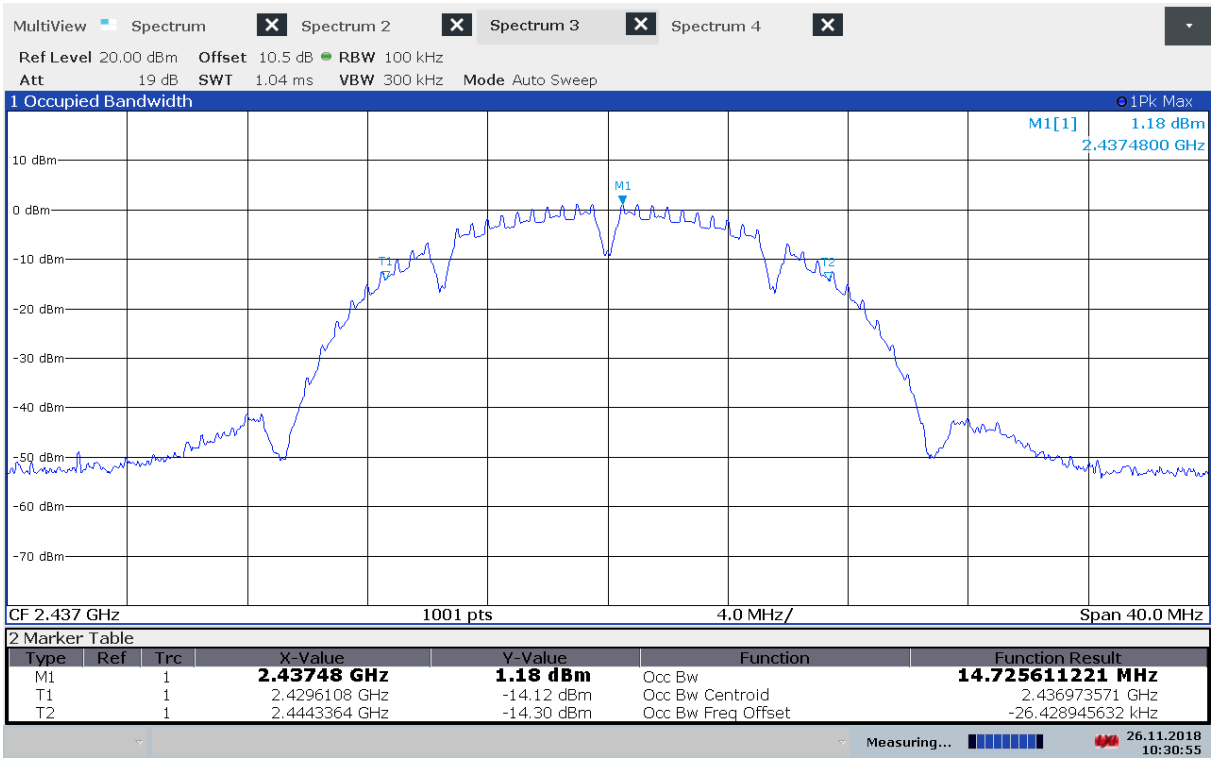
Modulation type and bitrate	Occupied Bandwidth (99% BW) (MHz)
	Ch 06, 2437 MHz
802.11b, 1 Mbps	14.72
802.11g, 6 Mbps	16.91
802.11n, MCS0	17.54

Occupied Bandwith is reported for information only.

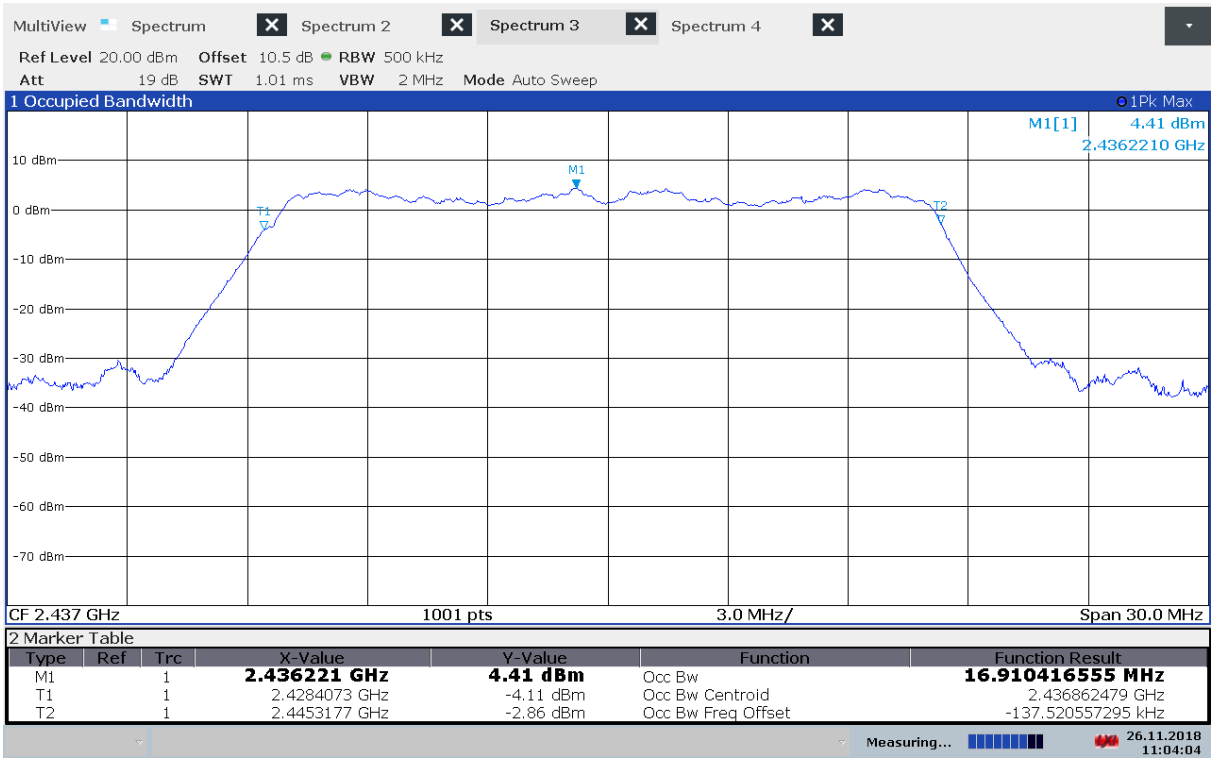
See attached plots

Requirements:

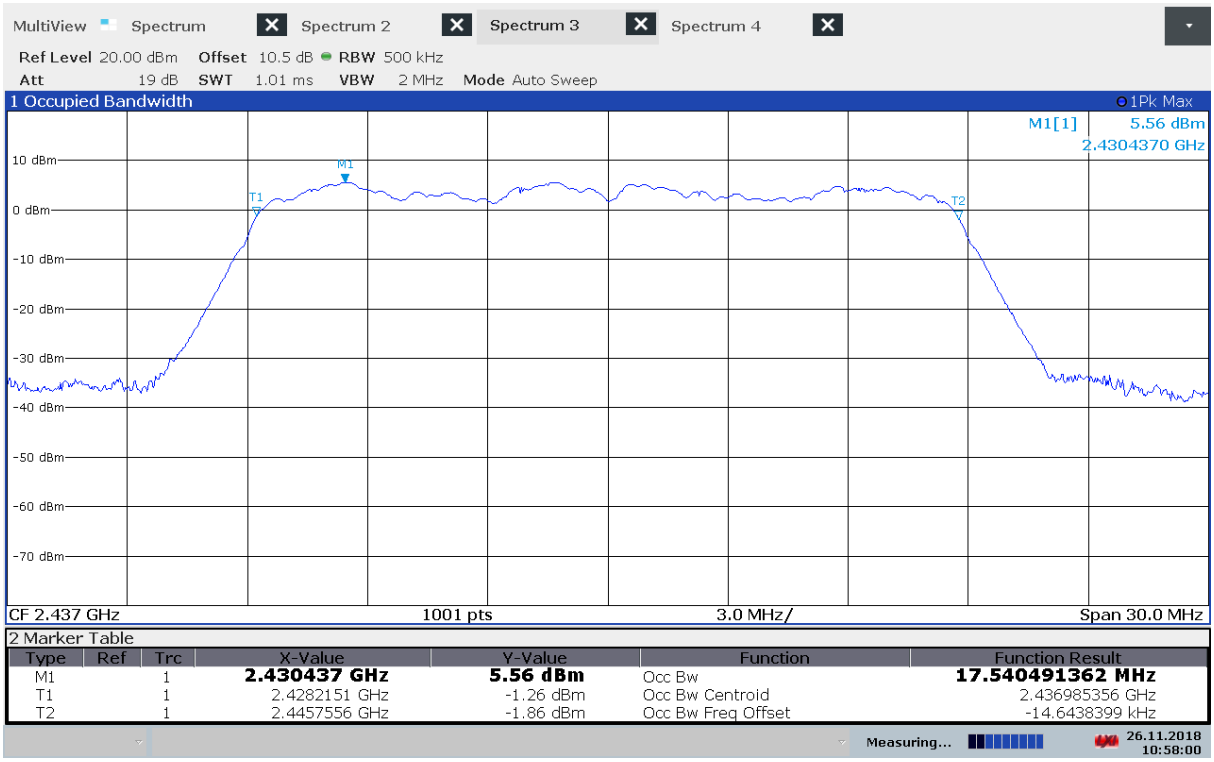
No requirements for Digital Transmission Systems.



Occupied Bandwidth, 2437 MHz, 802.11b, 1Mbps



Occupied Bandwidth, 2437 MHz, 802.11g, 6Mbps



Occupied Bandwidth, 2437 MHz, 802.11n, MCS0

3.3 Minimum 6 dB Bandwidth

FCC Part 15.247 (a)(2)

Test Results: Complies

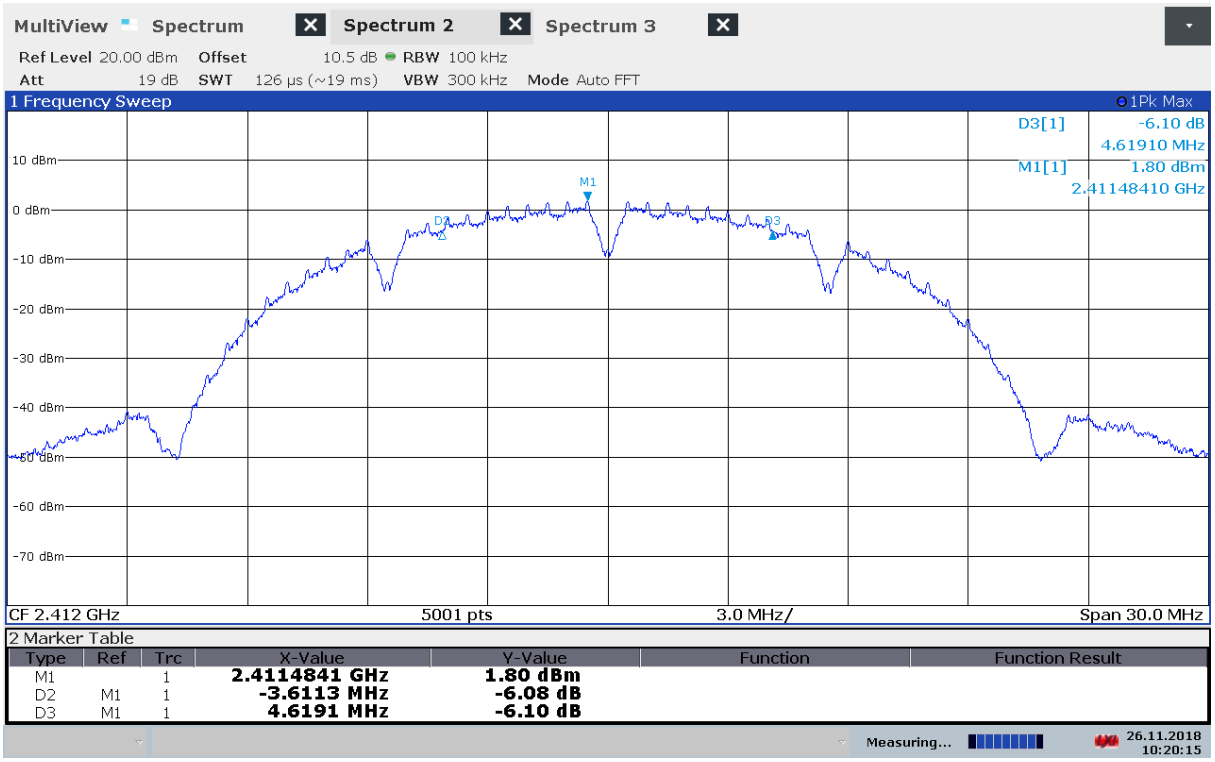
Measurement Data:

Modulation type and bitrate	Measured 6 dB Bandwidth		
	Ch 01, 2412 MHz	Ch 06, 2437 MHz	Ch 11, 2462 MHz
802.11b, 1 Mbps	8.23 MHz	8.38 MHz	8.33 MHz
802.11g, 6 Mbps	16.46 MHz	16.47 MHz	16.47 MHz
802.11n, MCS0	17.38 MHz	17.39 MHz	17.27 MHz

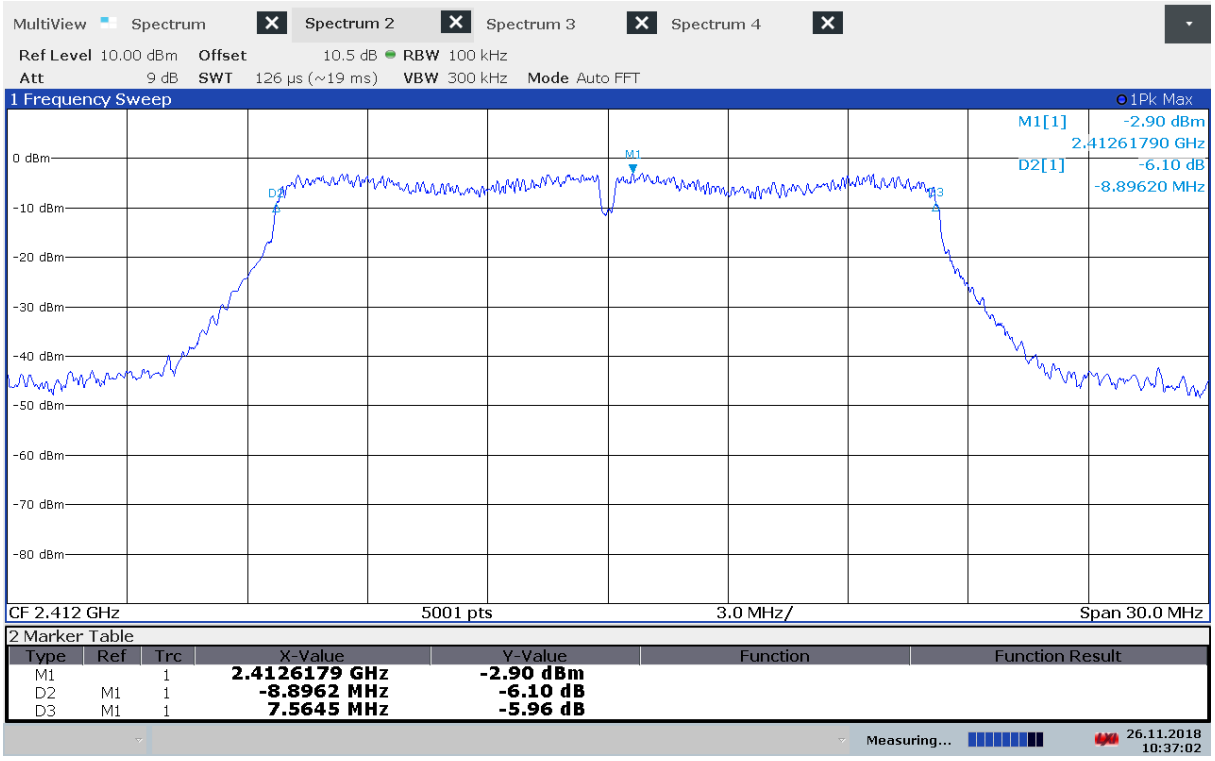
Power supply variation within 85 % to 115% of nominal value has no influence on measured value.

Requirements:

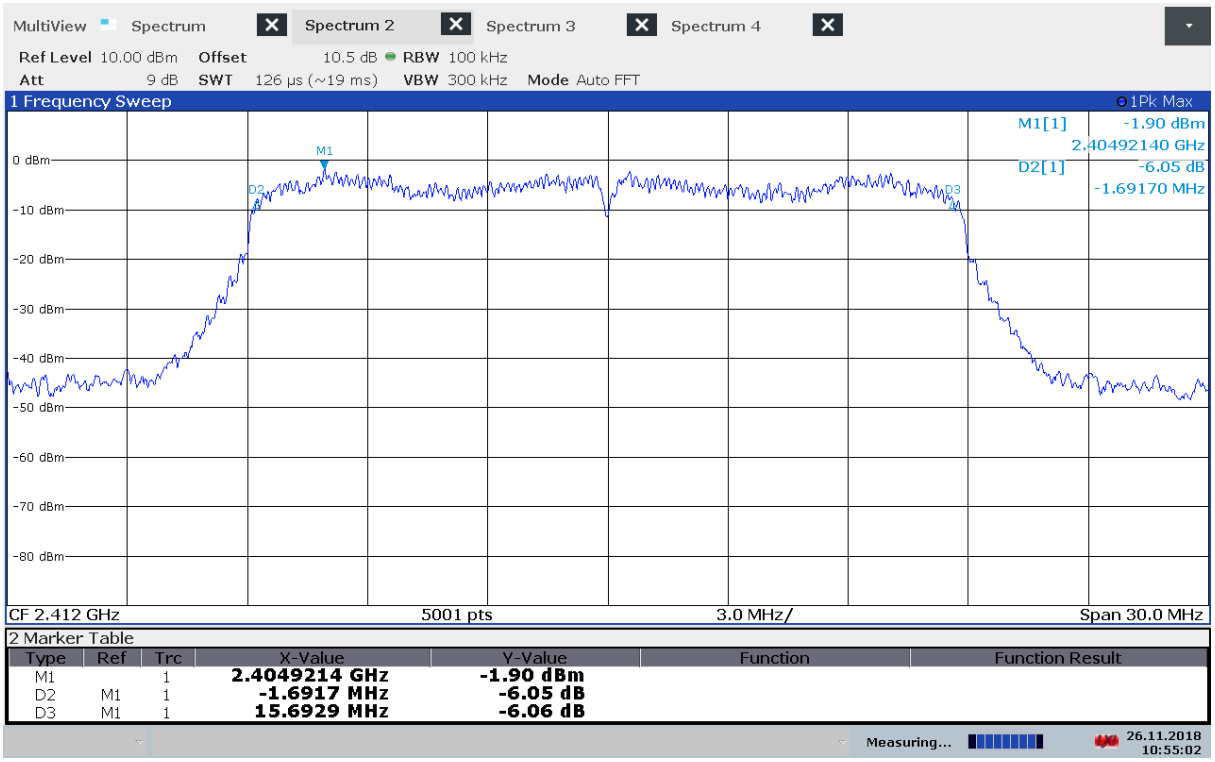
For Digital Transmission Systems in the 2400-2483.5 MHz band the minimum 6 dB bandwidth shall be at least 500 KHz.



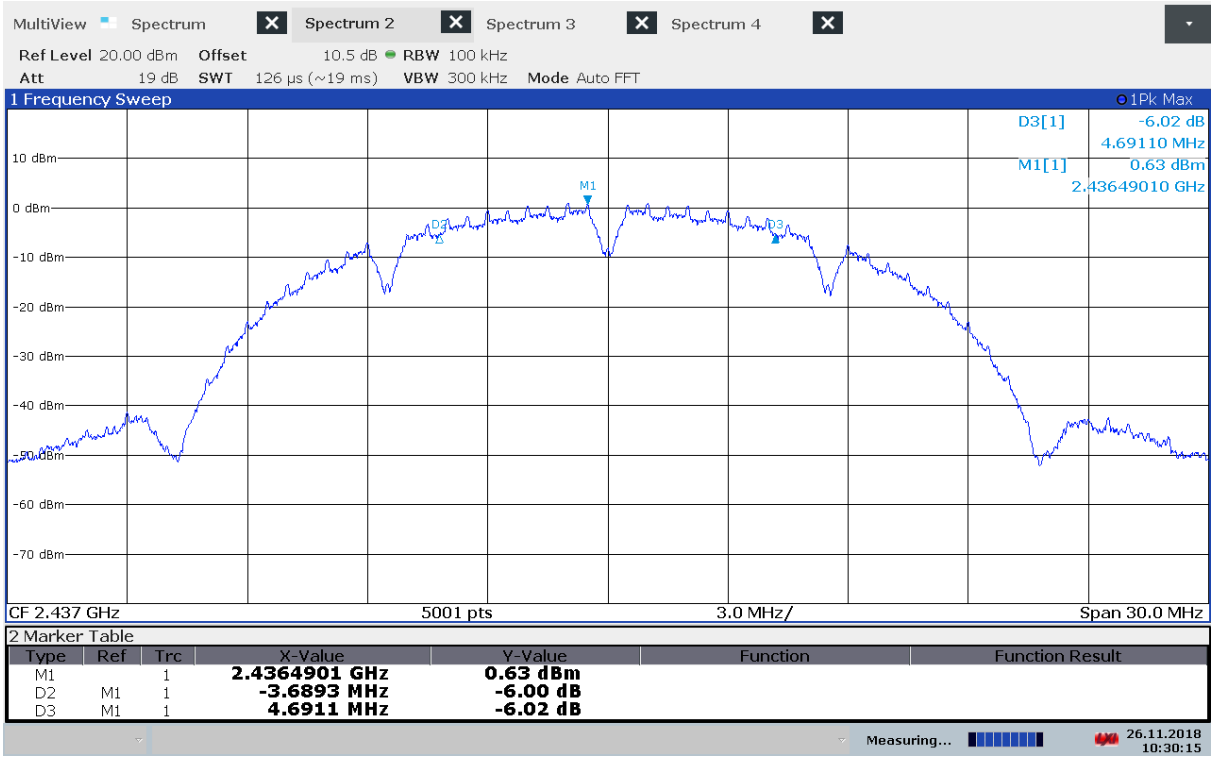
6 dB Bandwidth, 2412 MHz, 802.11b, 1Mbps



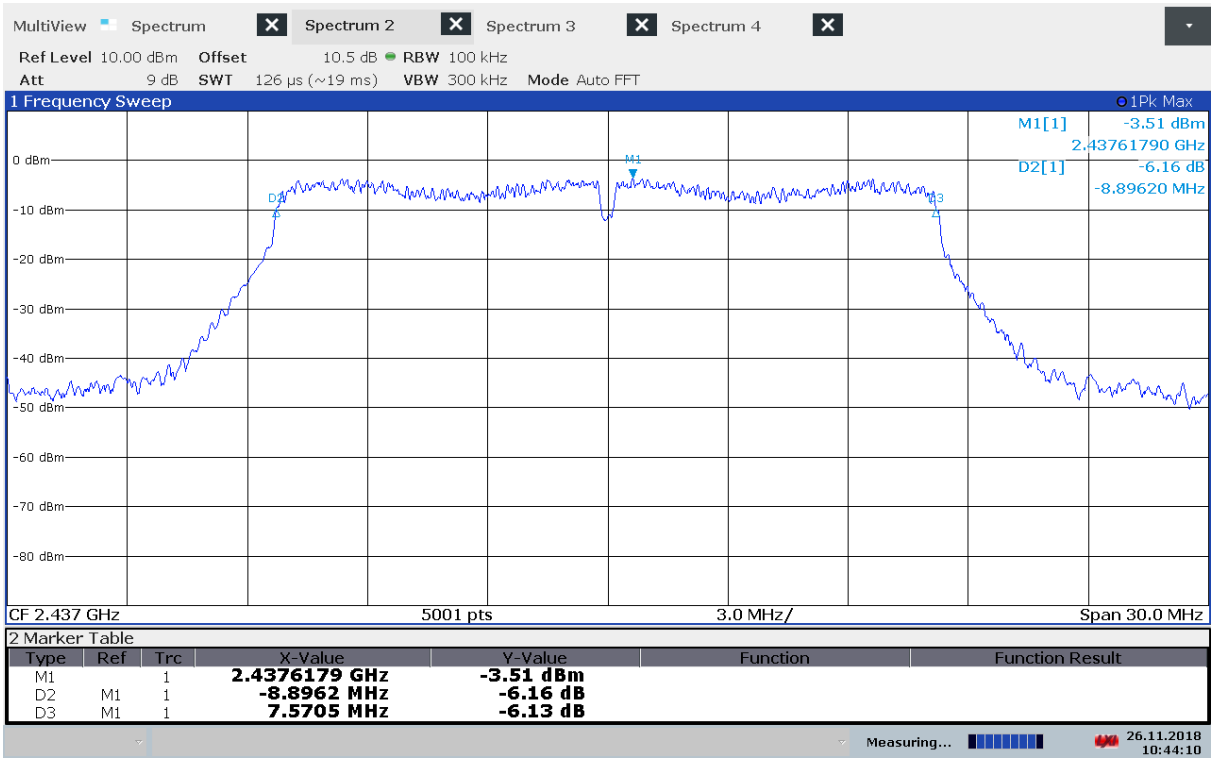
6 dB Bandwidth, 2412 MHz, 802.11g, 6Mbps



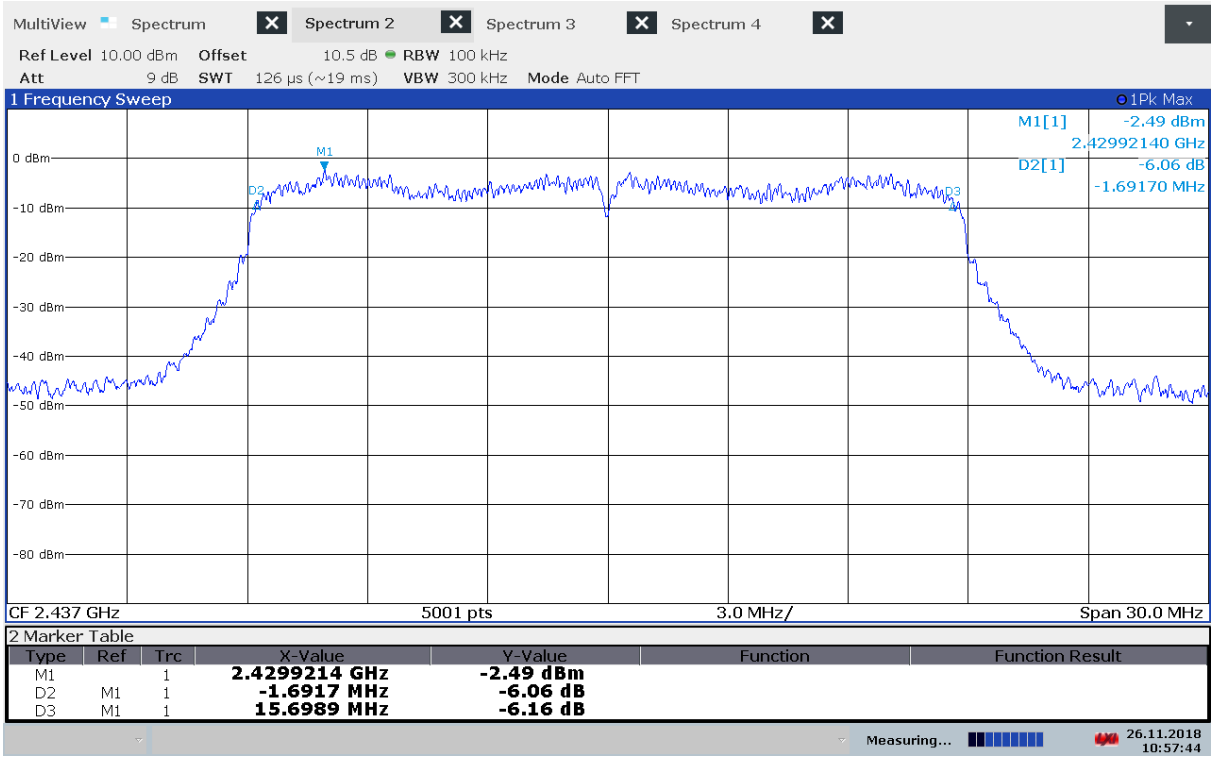
6 dB Bandwidth, 2412 MHz, 802.11n, MCS0



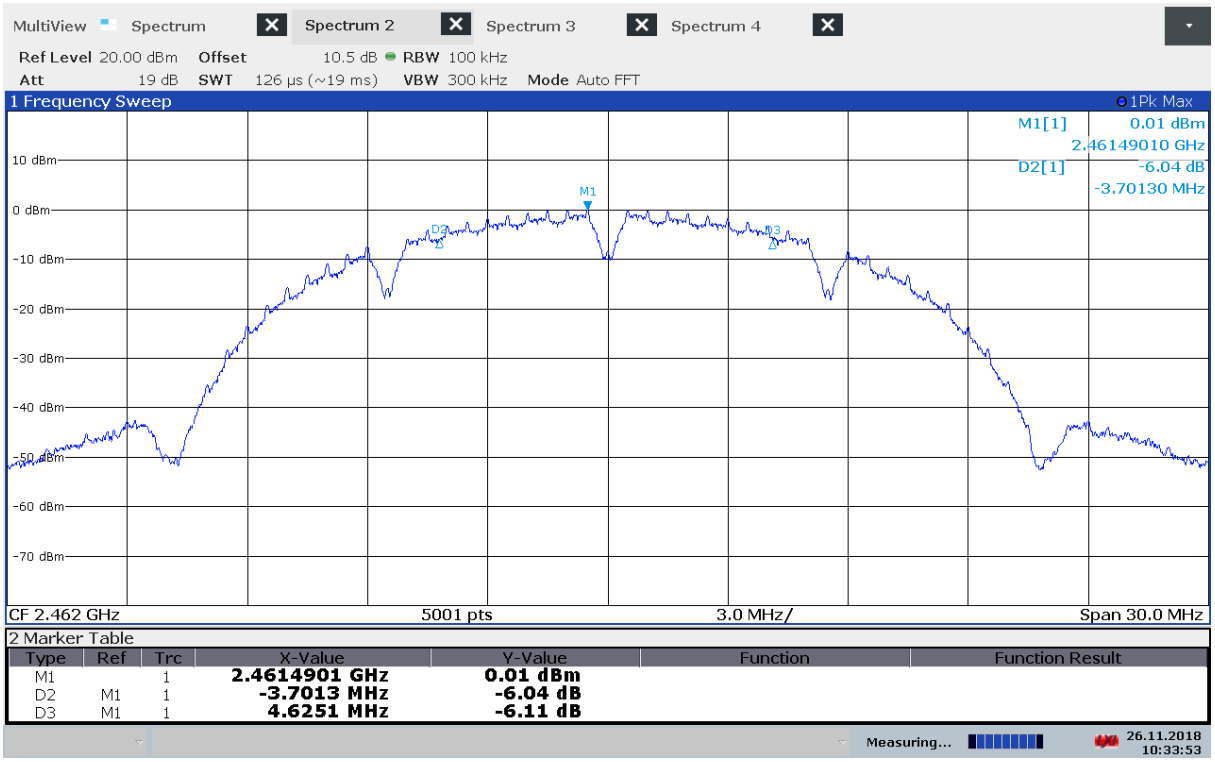
6 dB Bandwidth, 2437 MHz, 802.11b, 1Mbps



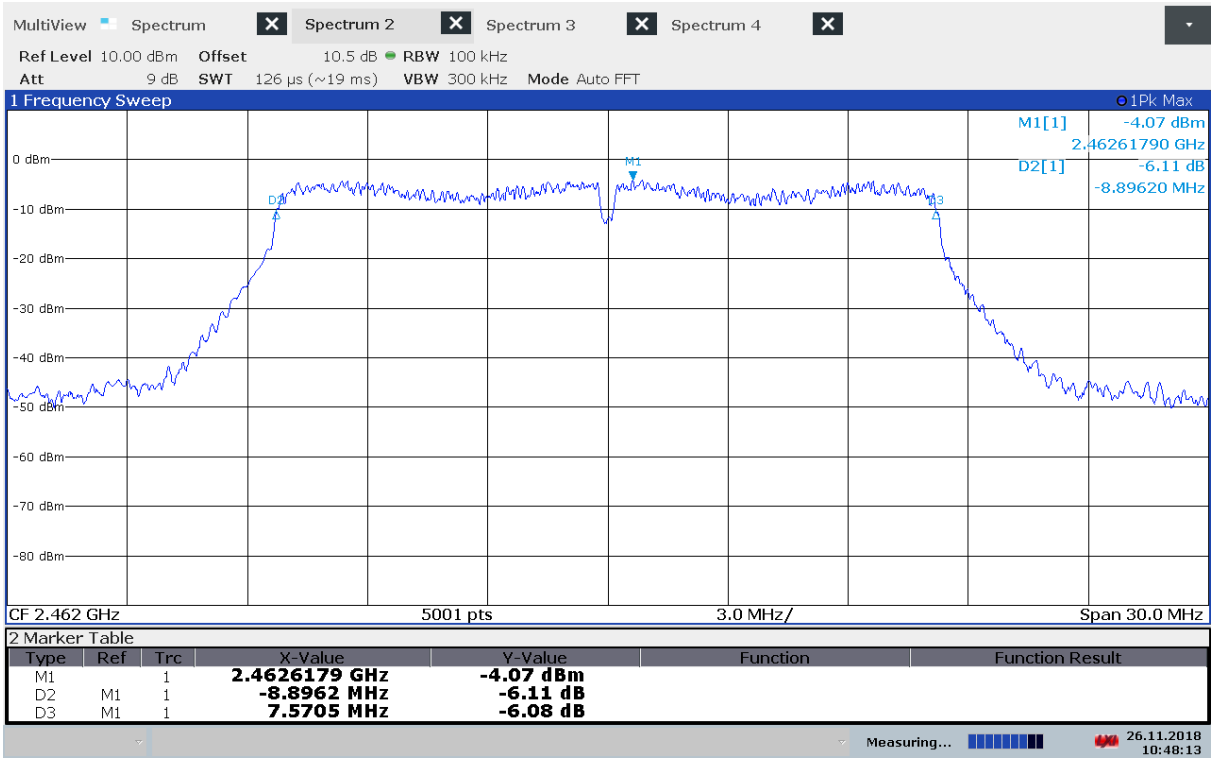
6 dB Bandwidth, 2437 MHz, 802.11g, 6Mbps



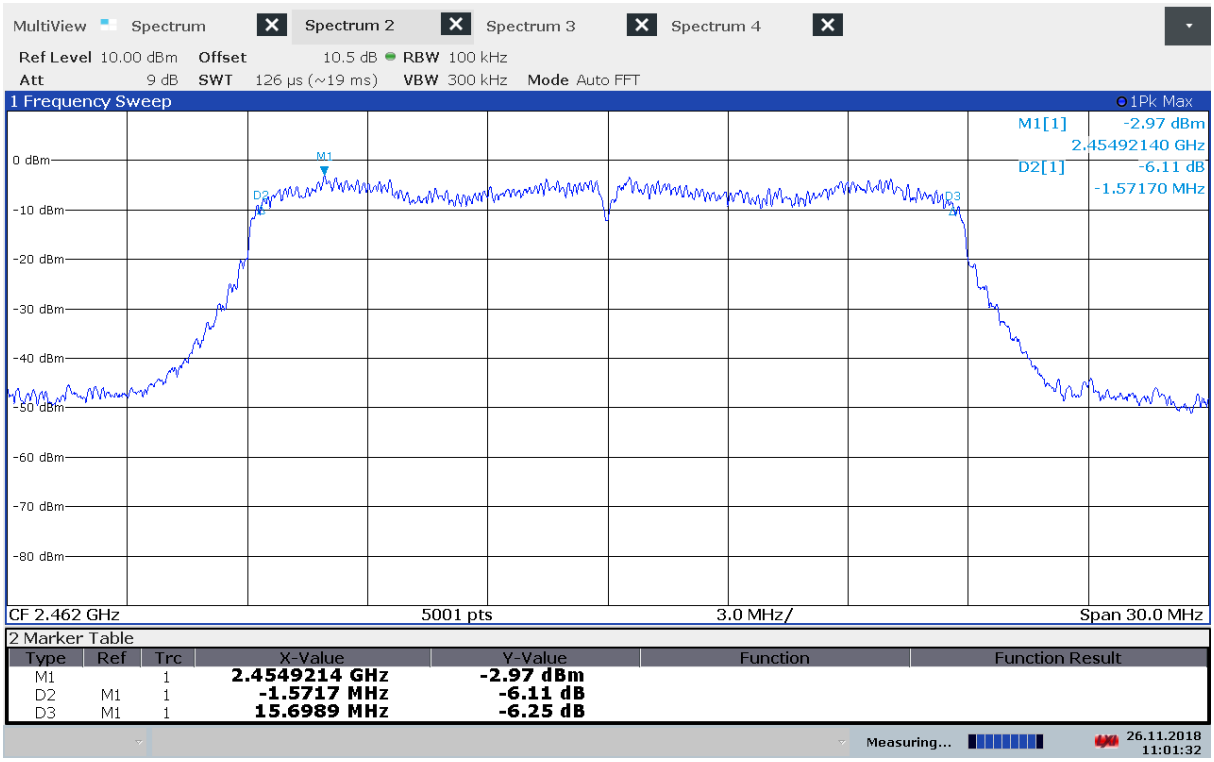
6 dB Bandwidth, 2437 MHz, 802.11n, MCS0



6 dB Bandwidth, 2462 MHz, 802.11b, 1Mbps



6 dB Bandwidth, 2462 MHz, 802.11g, 6Mbps



6 dB Bandwidth, 2462 MHz, 802.11n, MCS0

3.4 Peak Power Output

FCC Part 15.247 (b)

RSS-247 Issue 2, Clause 5.4

Test Results: Complies

Measurement Data:

Carrier Frequency	Maximum Conducted Output Power (mW)			Declared Antenna Gain (dBi)	Verdict
	802.11b 1 Mbps	802.11g 6 Mbps	802.11n MCS0		
2412 MHz	24.0	19.1	22.8	-2.0	Complies
2437 MHz	21.4	16.8	19.9	-2.0	Complies
2462 MHz	18.5	14.3	17.3	-2.0	Complies

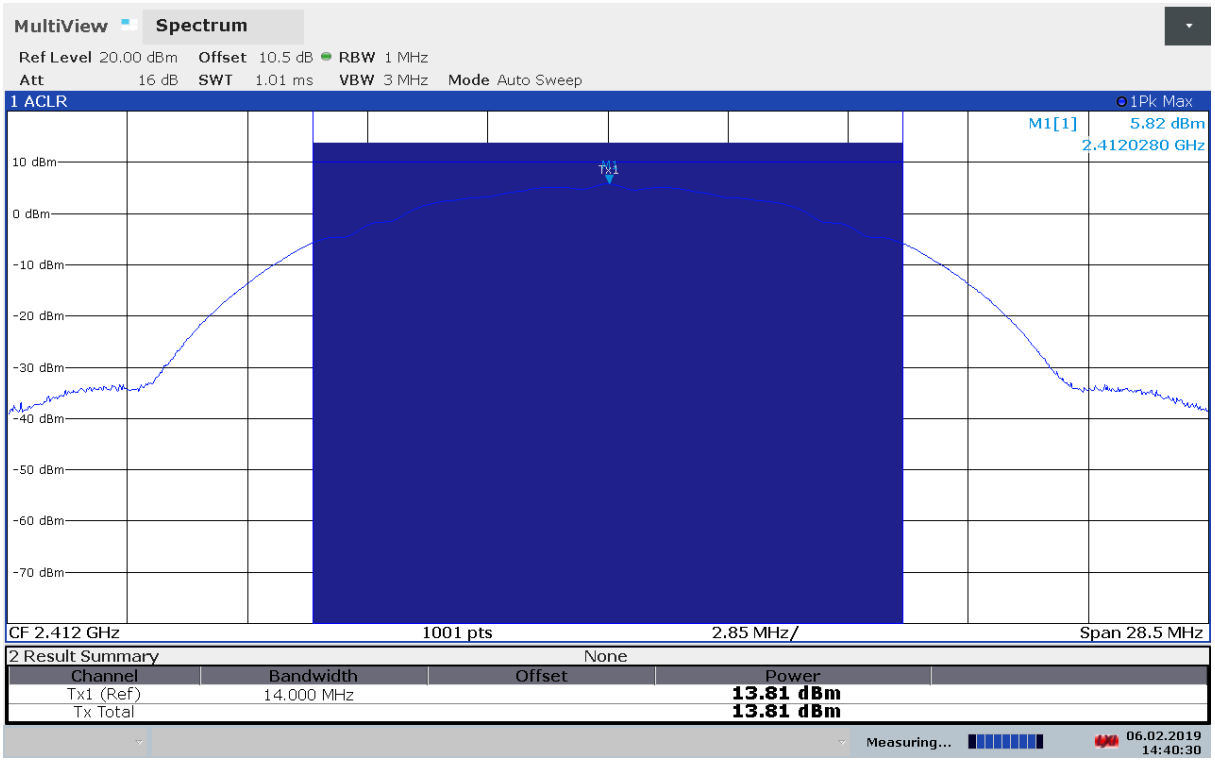
See attached plots

Requirements:

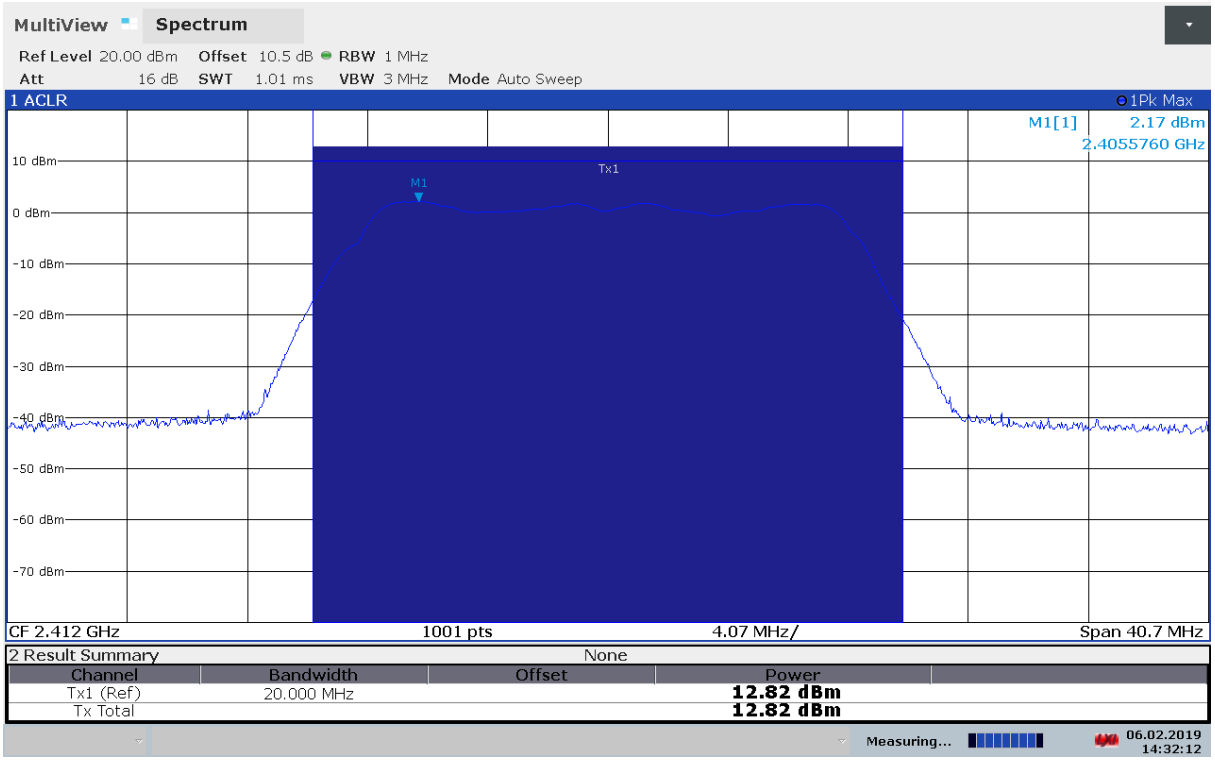
The maximum peak output power shall not exceed the following limits:

For Digital Transmission Systems in the 2400 - 2483.5 MHz band: 1 Watt

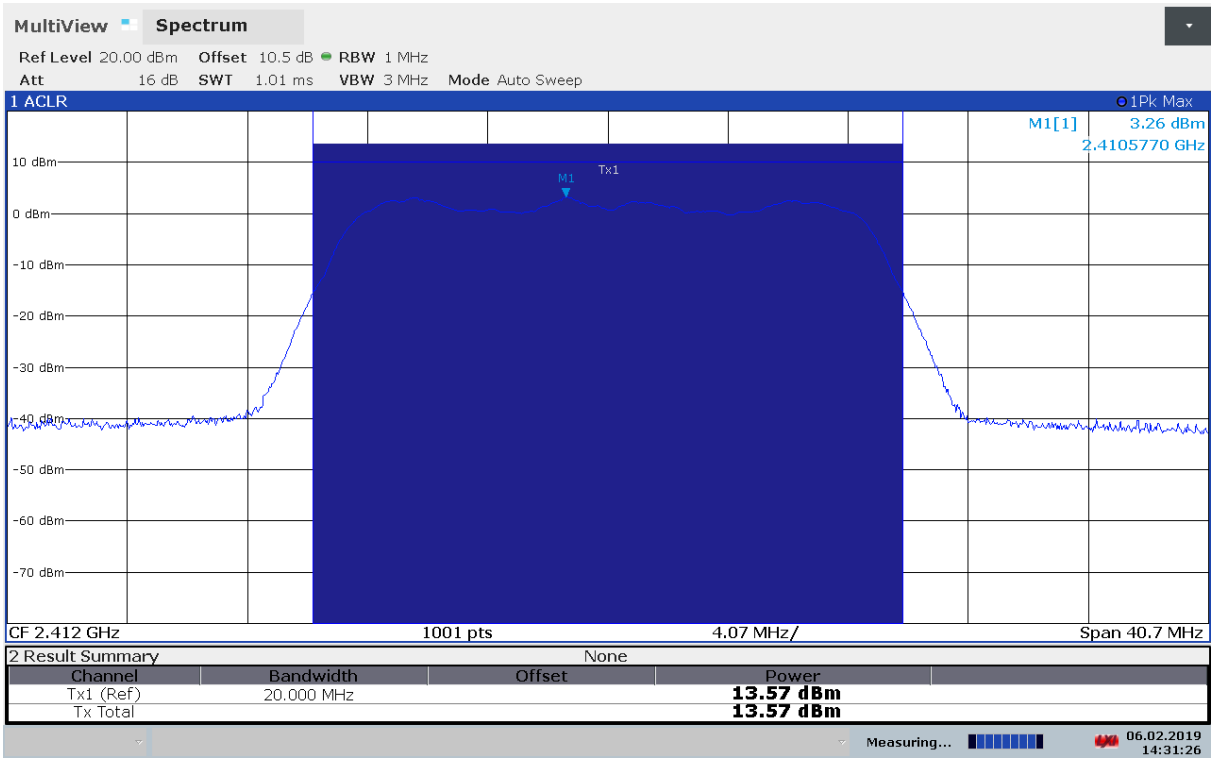
If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power from the intentional radiator shall be reduced below the stated value above by the amount in dB that the directional gain of the antenna exceeds 6 dBi.



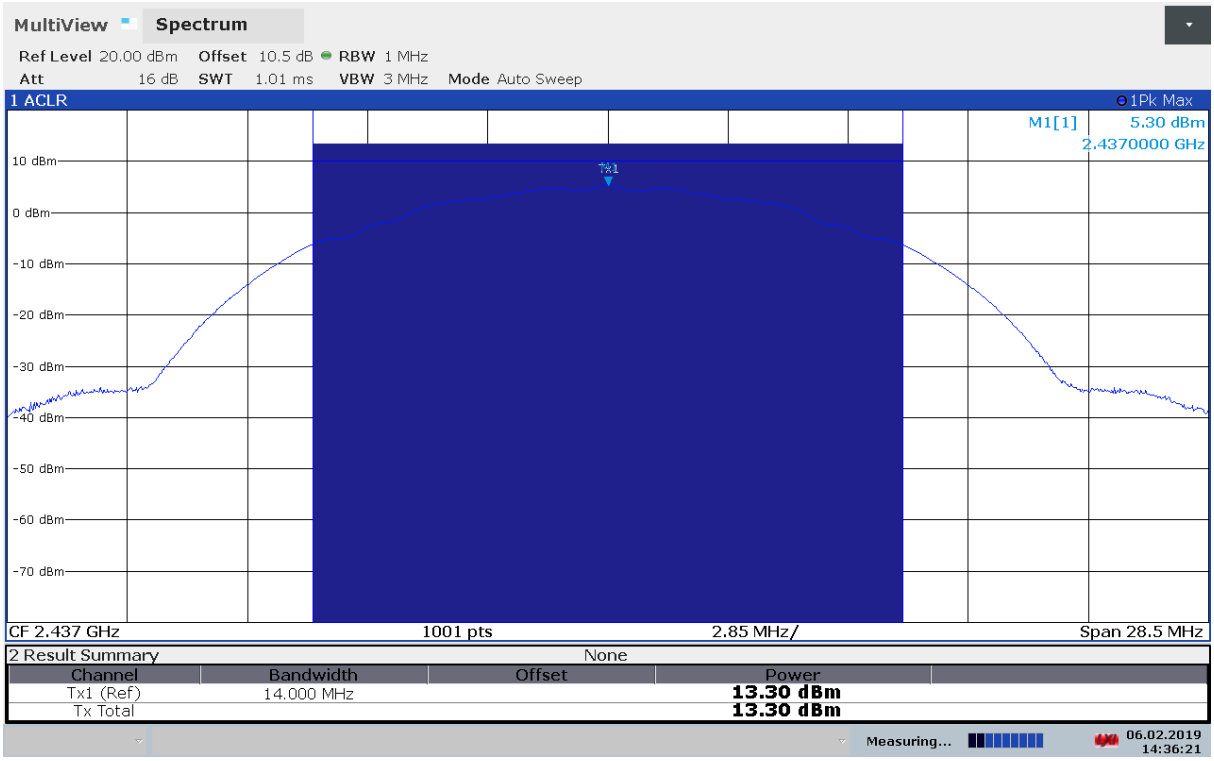
Conducted Output Power, 2412 MHz, 802.11b, 1Mbps



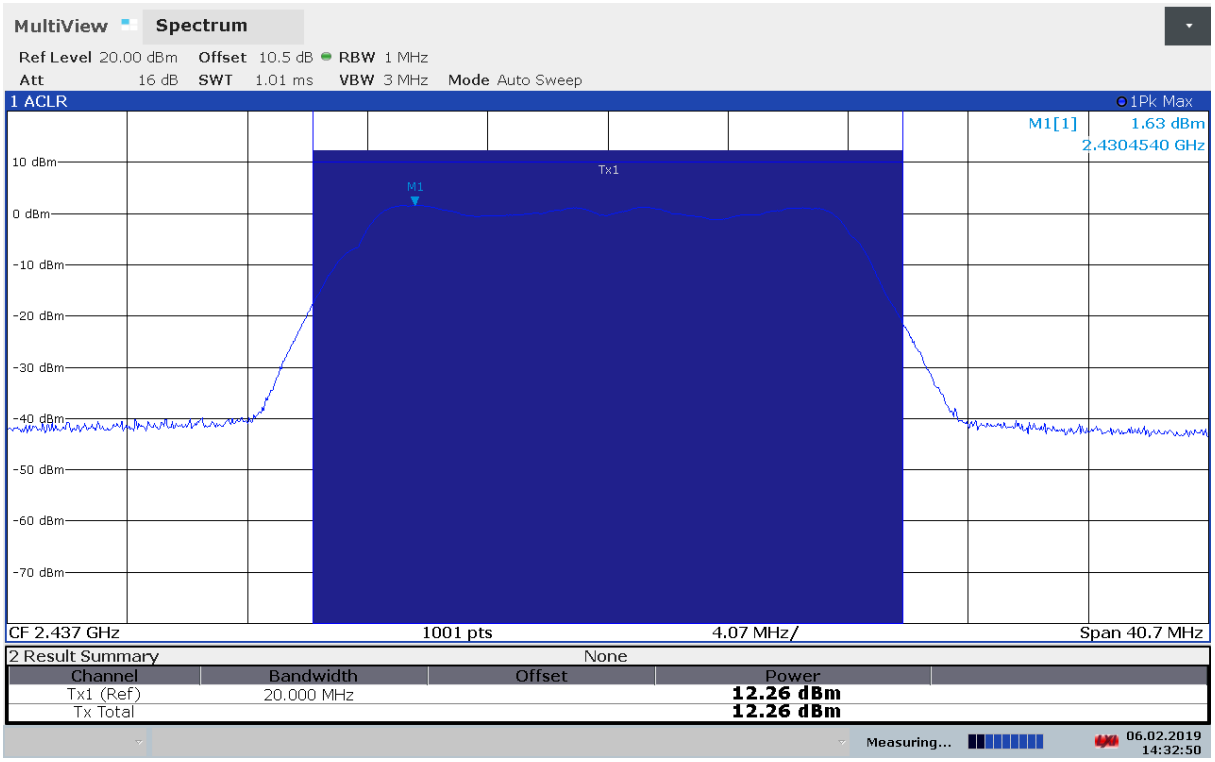
Conducted Output Power, 2412 MHz, 802.11g, 6Mbps



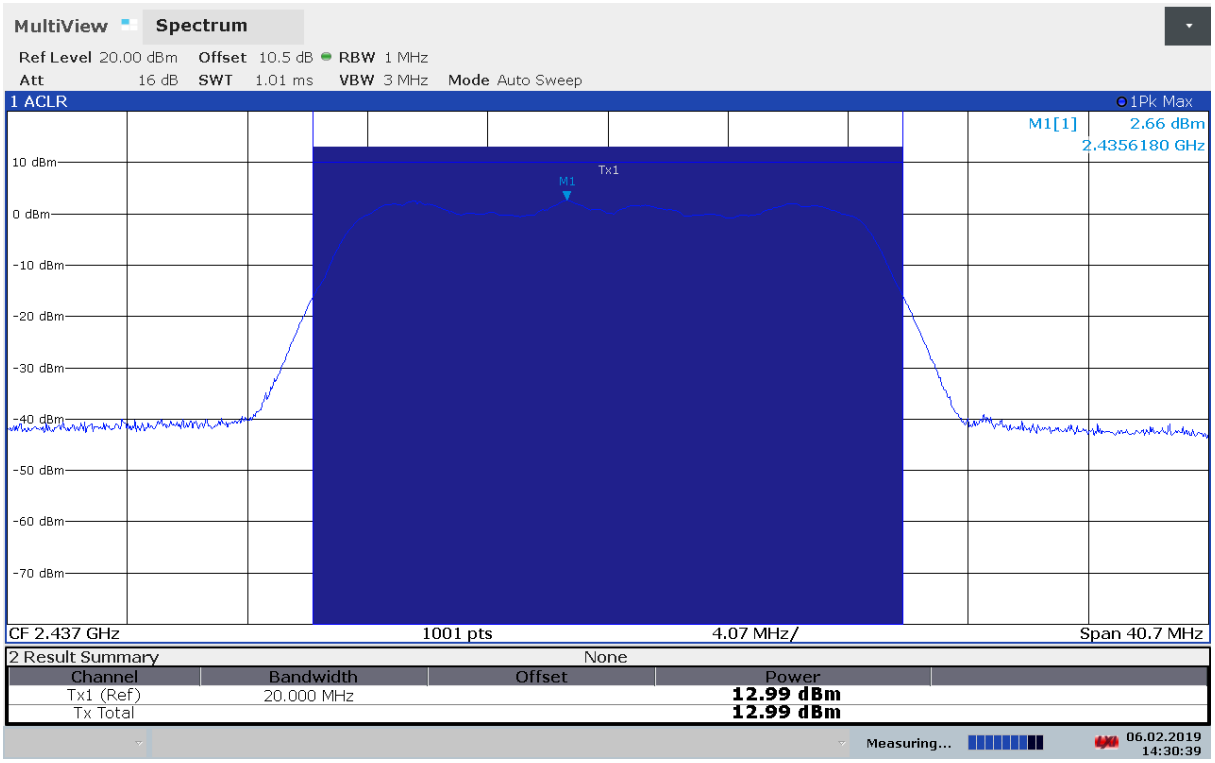
Conducted Output Power, 2412 MHz, 802.11n, MCS0



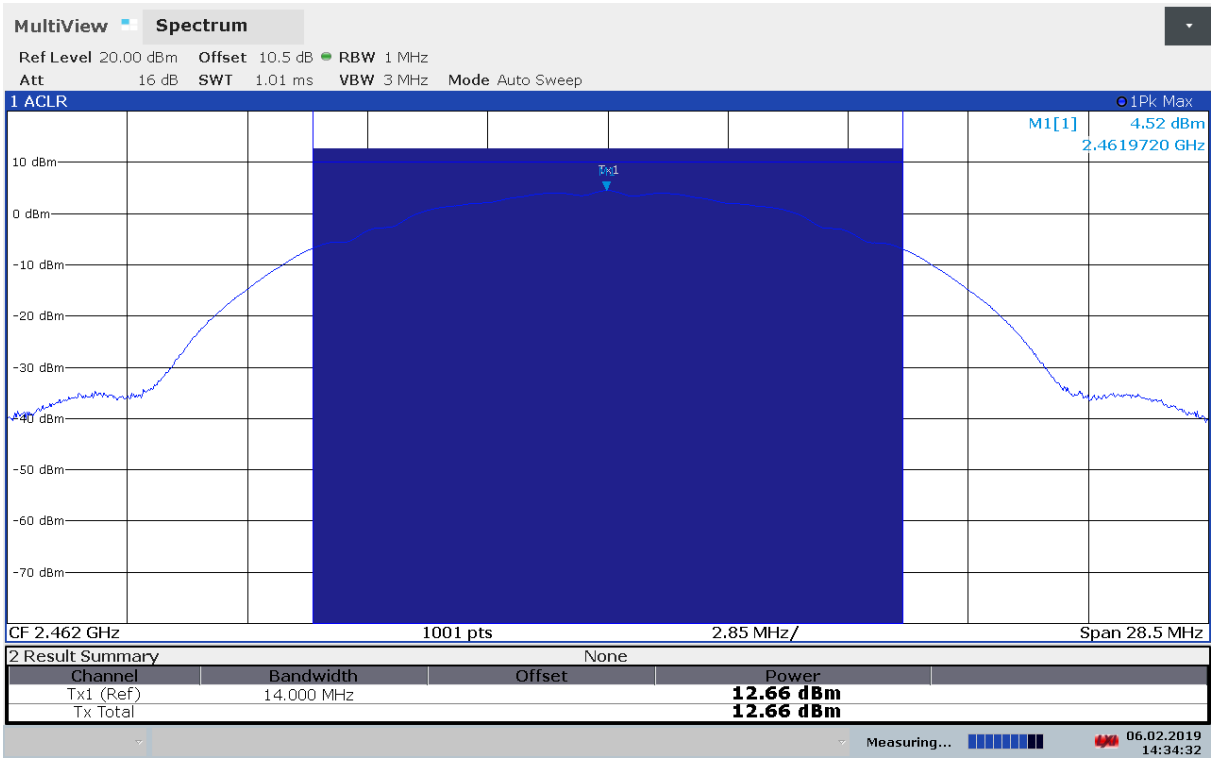
Conducted Output Power, 2437 MHz, 802.11b, 1Mbps



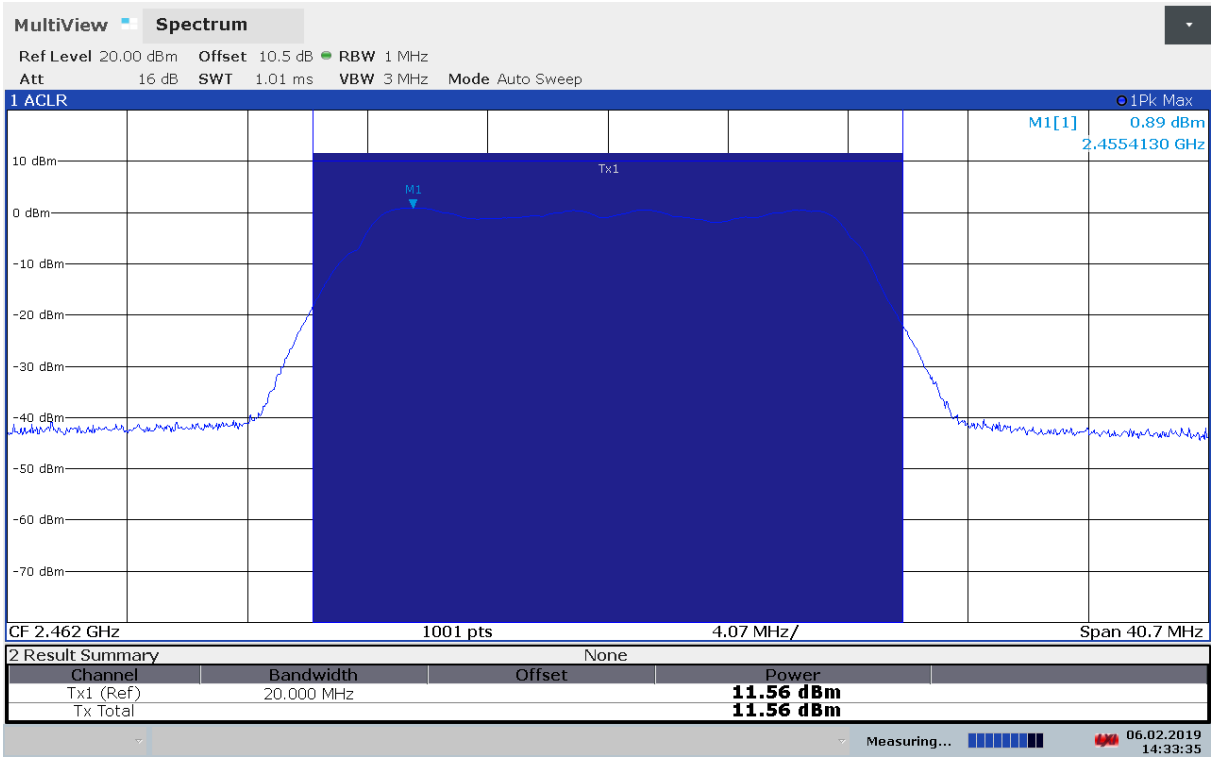
Conducted Output Power, 2437 MHz, 802.11g, 6Mbps



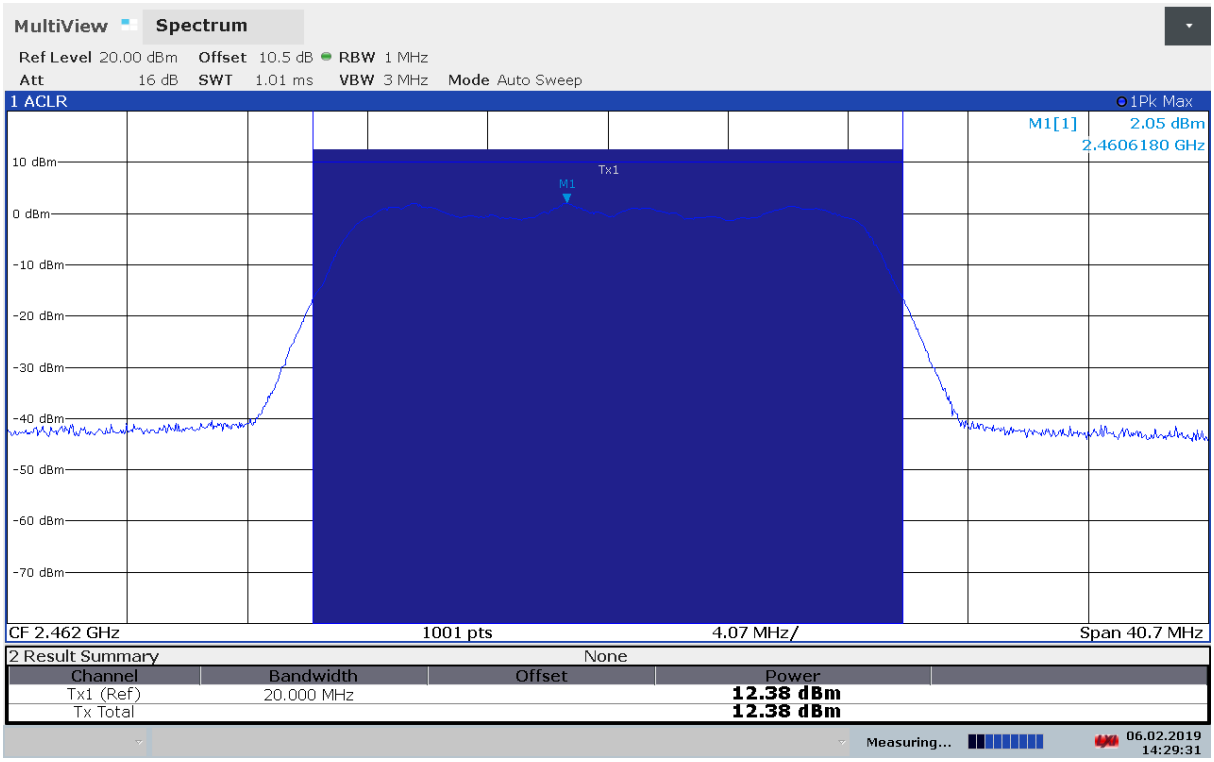
Conducted Output Power, 2437 MHz, 802.11n, MCS0



Conducted Output Power, 2462 MHz, 802.11b, 1Mbps



Conducted Output Power, 2462 MHz, 802.11g, 6Mbps



Conducted Output Power, 2462 MHz, 802.11n, MCS0

3.5 Conducted Emissions at Antenna Connector

FCC Part 15.247 (d)

Carrier Frequency	Highest Value (dBc)	Margin (dB)	Verdict
2412 MHz	> 30	> 10	Pass
2437 MHz	> 30	> 10	Pass
2462 MHz	> 30	> 10	Pass

Measured with Peak Detector

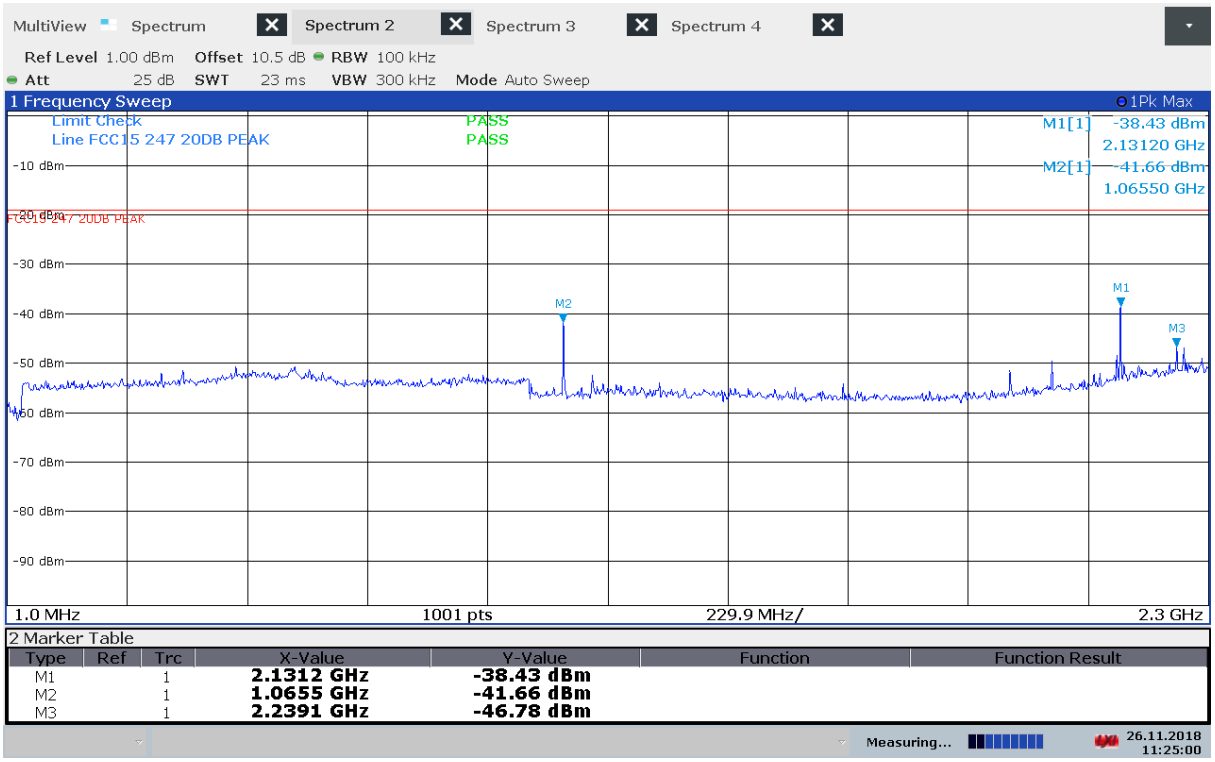
RF conducted power to 25 GHz: see attached plots.

Limit

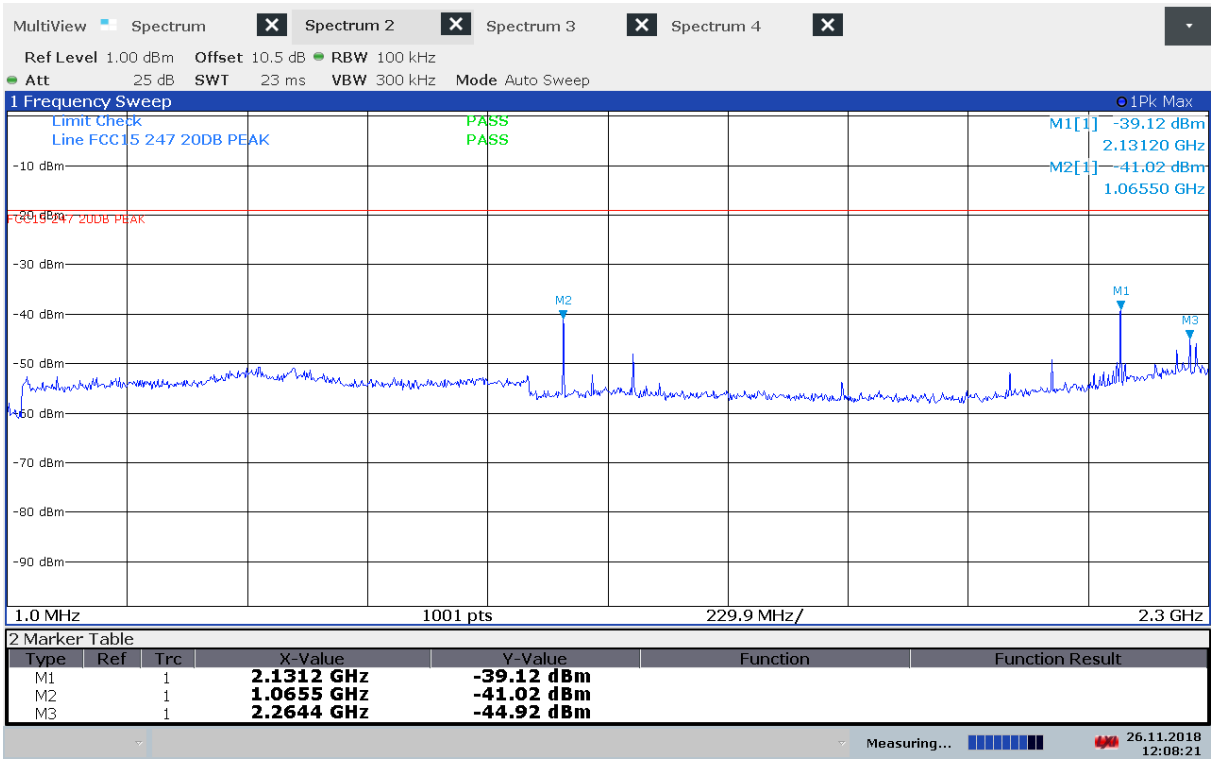
Peak measurement	RMS averaging
20 dBc or more in 100 kHz bandwidth	**30 dBc or more in 100 kHz bandwidth**

Detector type shall be the same as used for measuring Output Power.

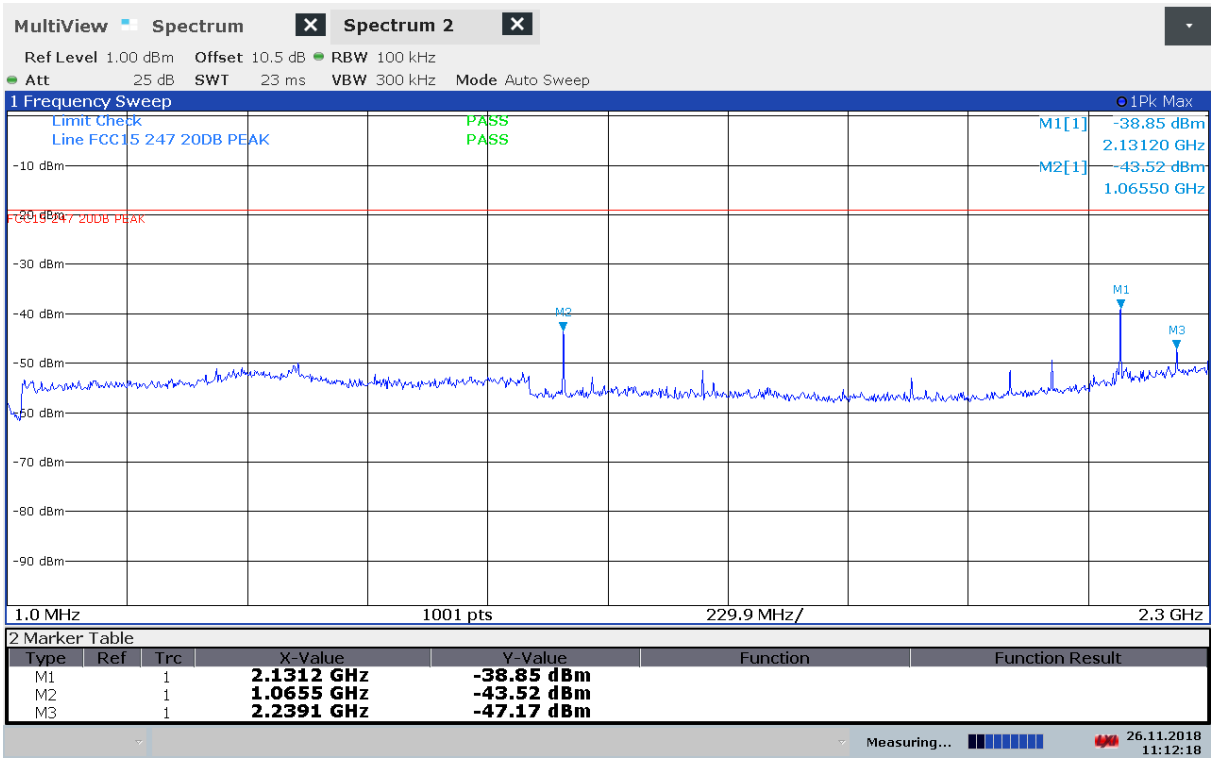
Attenuation below the general limits specified in part 15.209(a) is not required.



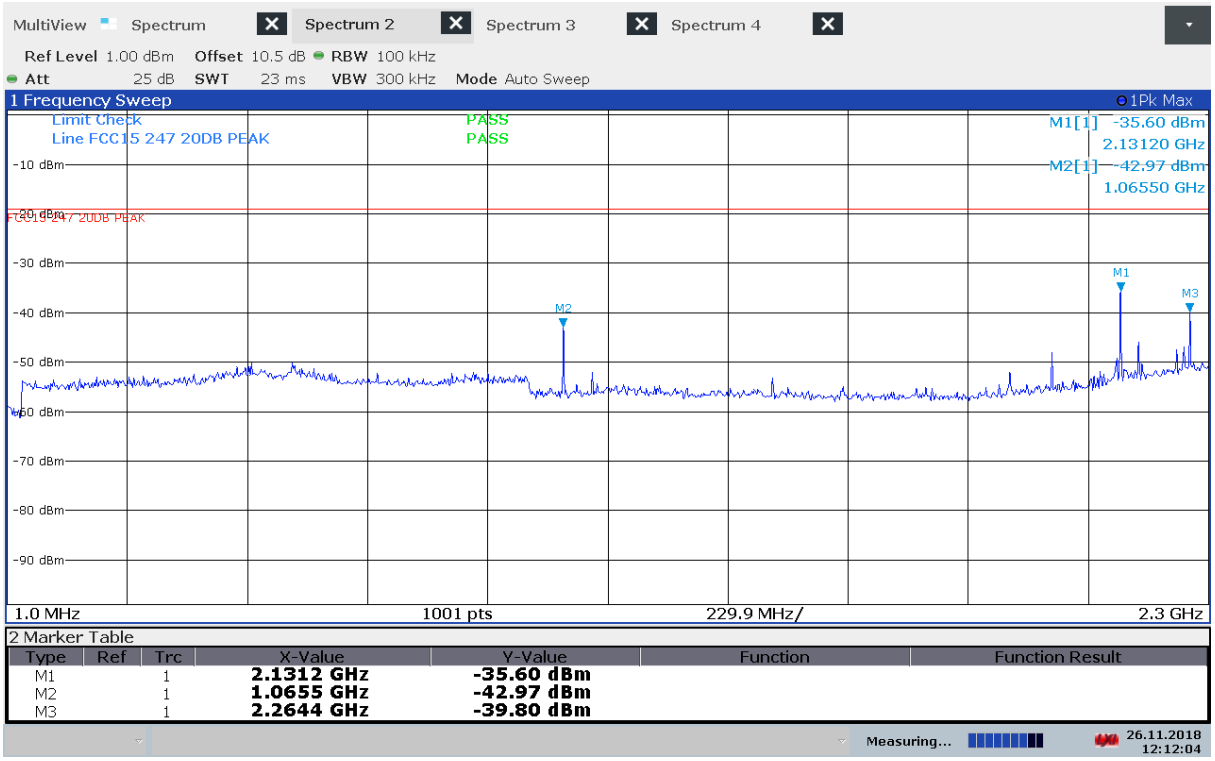
Conducted Emissions, 1 – 2300 MHz, 2412 MHz, 802.11b, 1Mbps



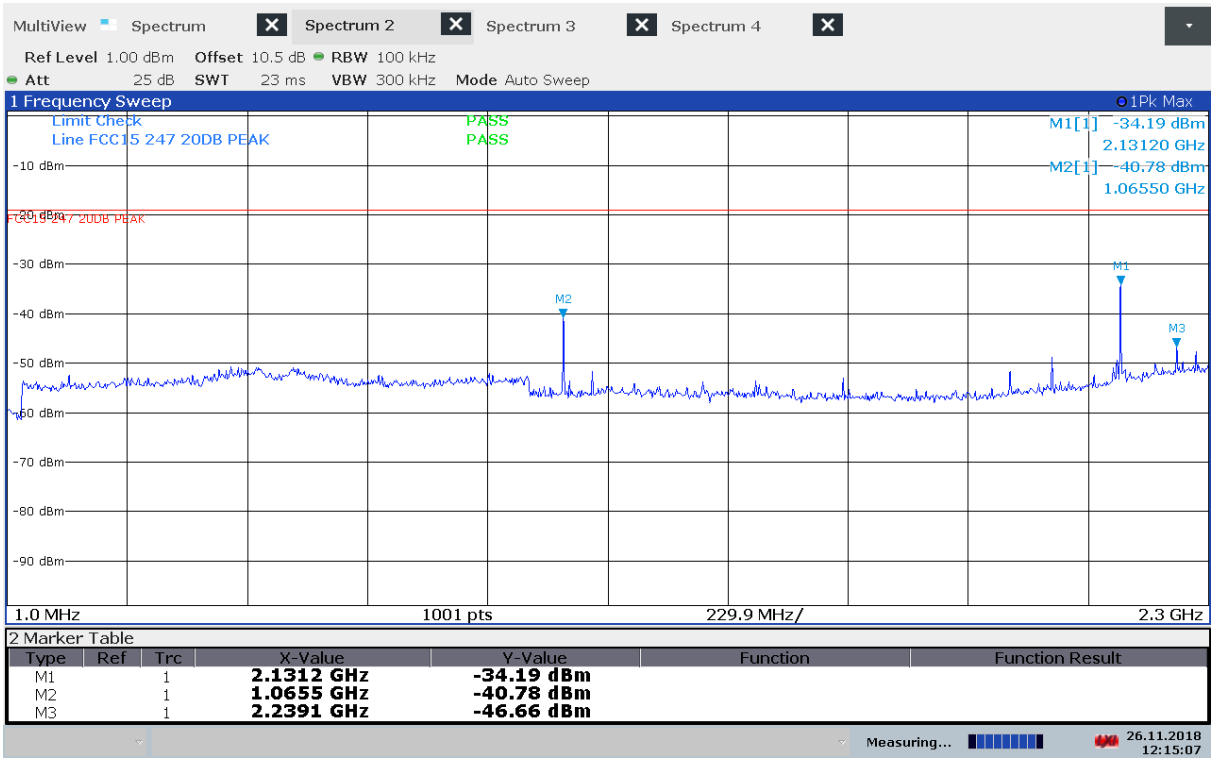
Conducted Emissions, 1 – 2300 MHz, 2437 MHz, 802.11b, 1Mbps



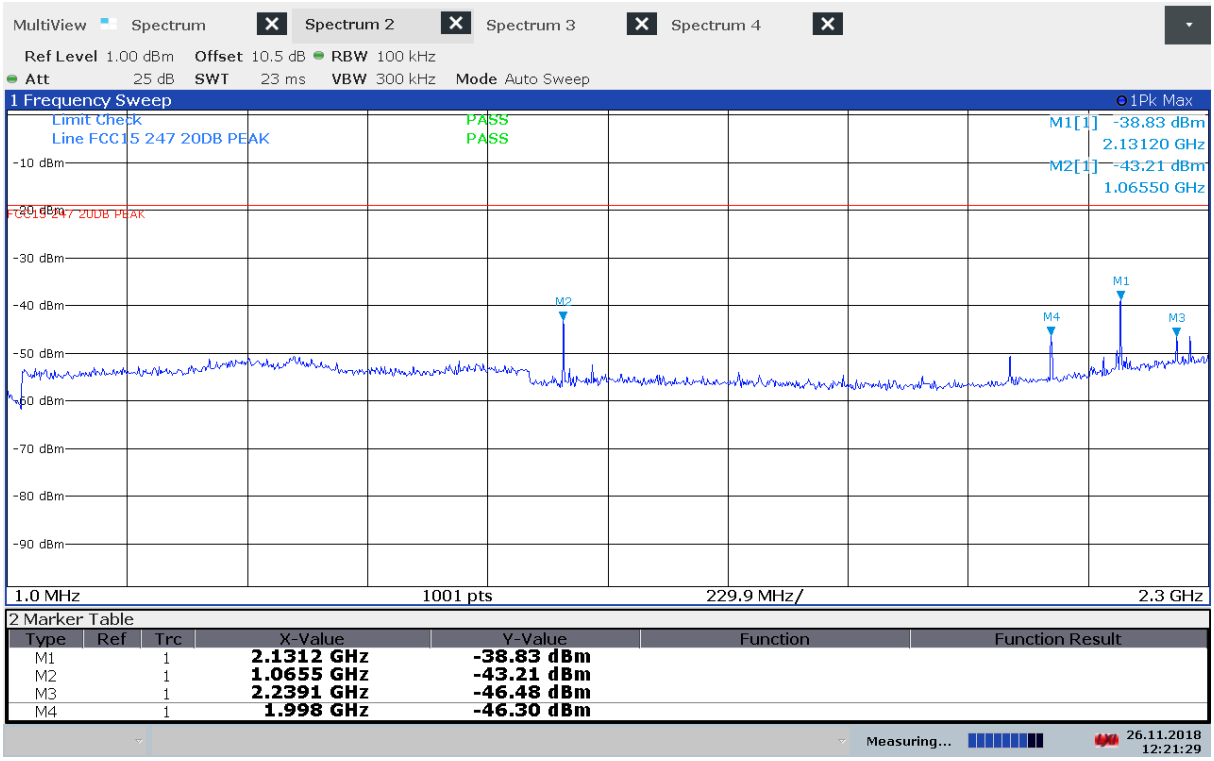
Conducted Emissions, 1 – 2300 MHz, 2462 MHz, 802.11b, 1Mbps



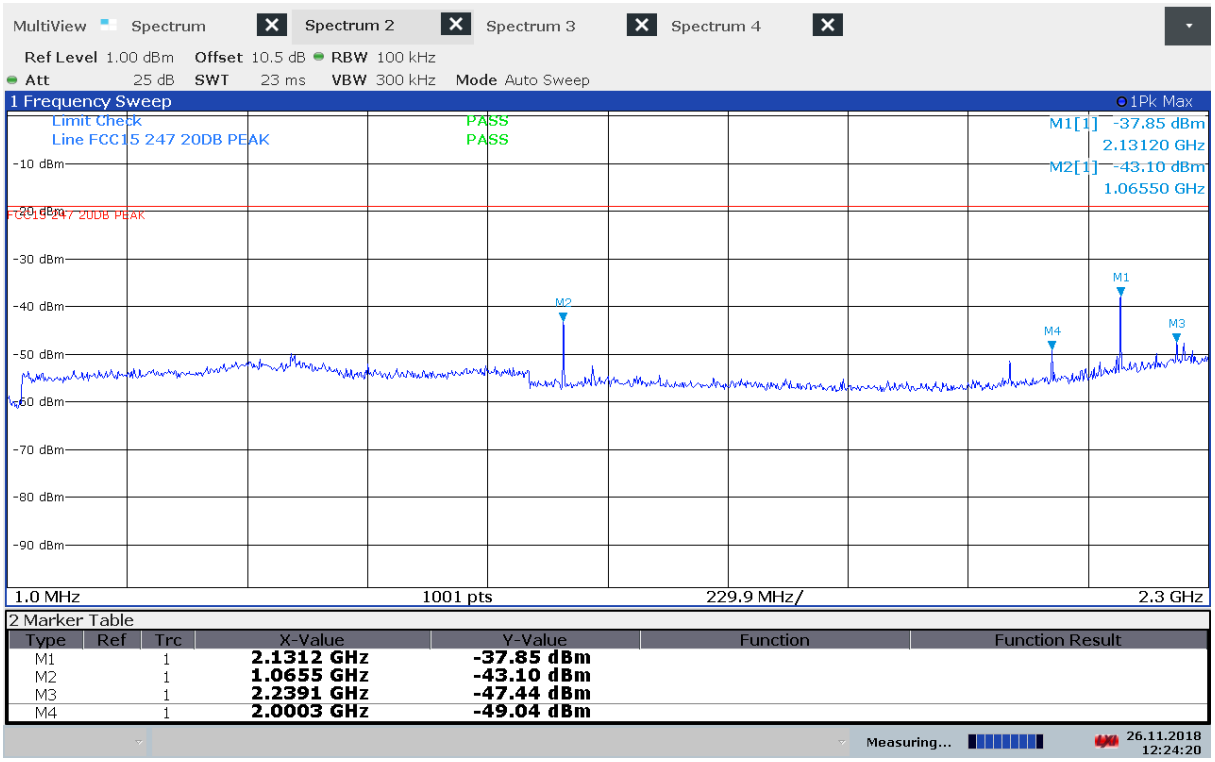
Conducted Emissions, 1 – 2300 MHz, 2412 MHz, 802.11g, 6Mbps



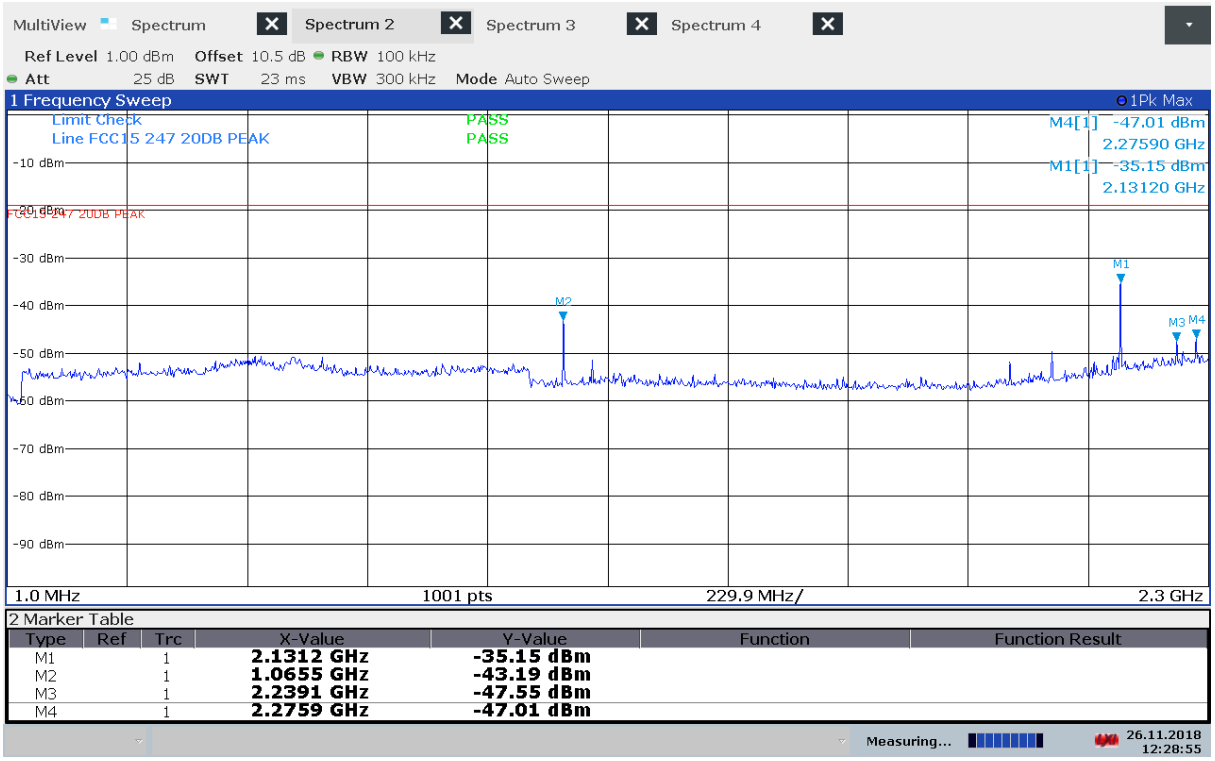
Conducted Emissions, 1 – 2300 MHz, 2437 MHz, 802.11g, 6Mbps



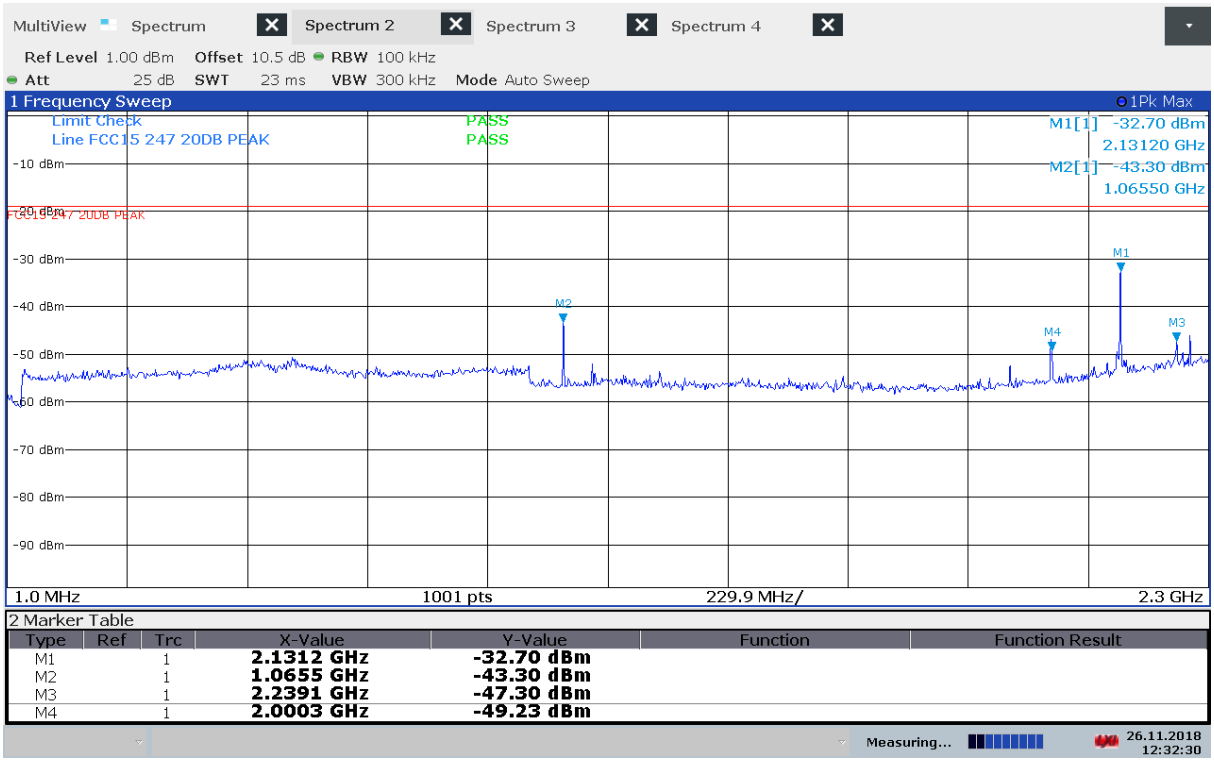
Conducted Emissions, 1 – 2300 MHz, 2462 MHz, 802.11g, 6Mbps



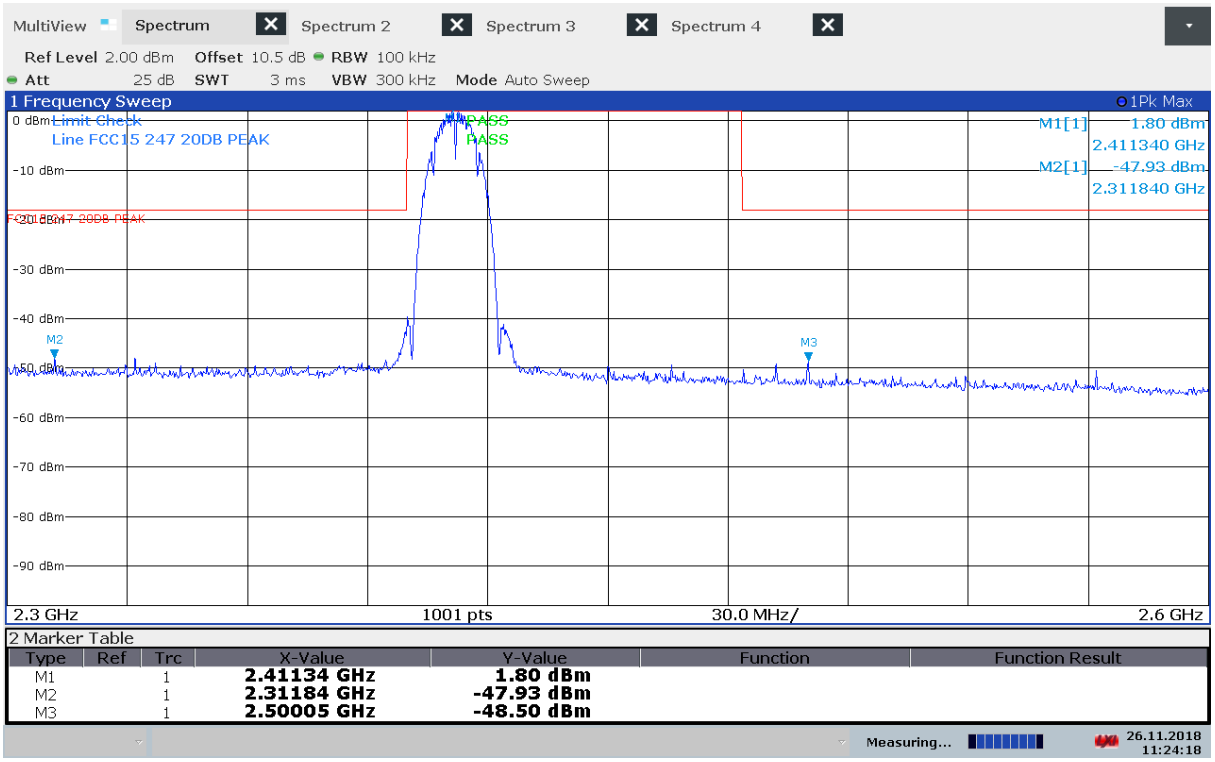
Conducted Emissions, 1 – 2300 MHz, 2412 MHz, 802.11n, MCS0



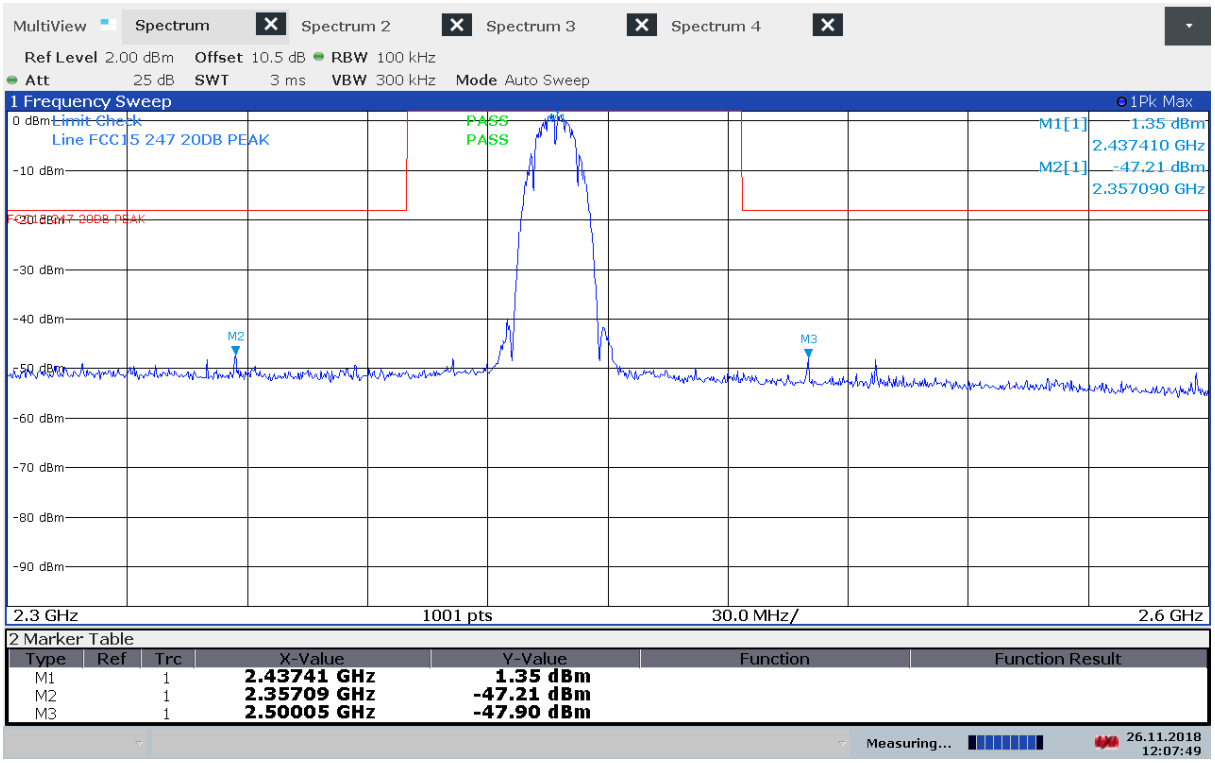
Conducted Emissions, 1 – 2300 MHz, 2437 MHz, 802.11n, MCS0



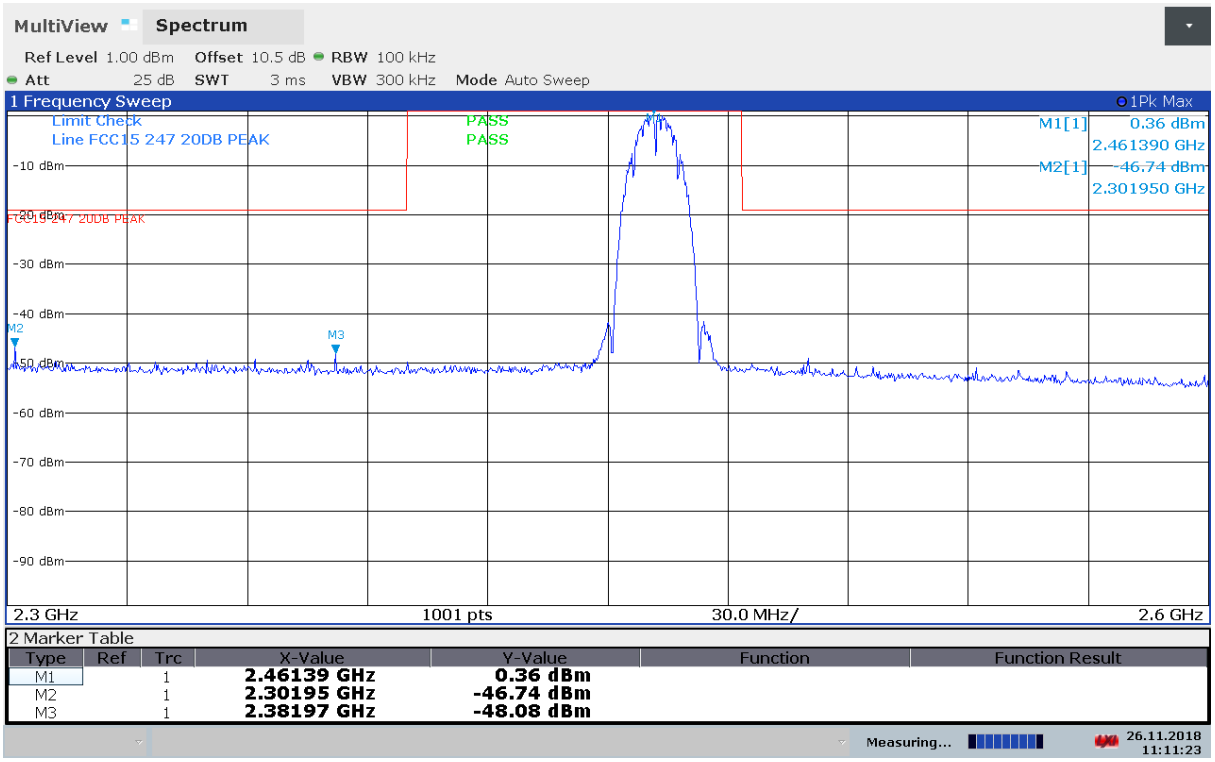
Conducted Emissions, 1 – 2300 MHz, 2462 MHz, 802.11n, MCS0



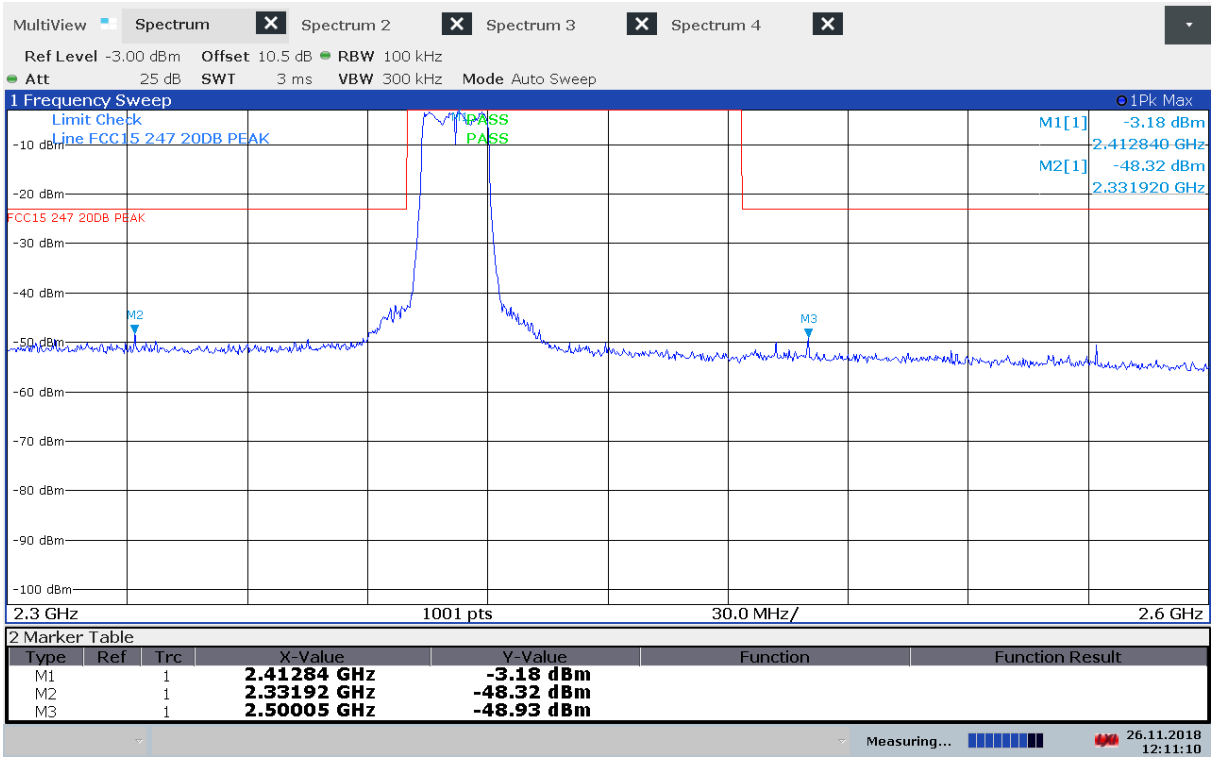
Conducted Emissions, 2300 – 2600 MHz, 2412 MHz, 802.11b, 1Mbps



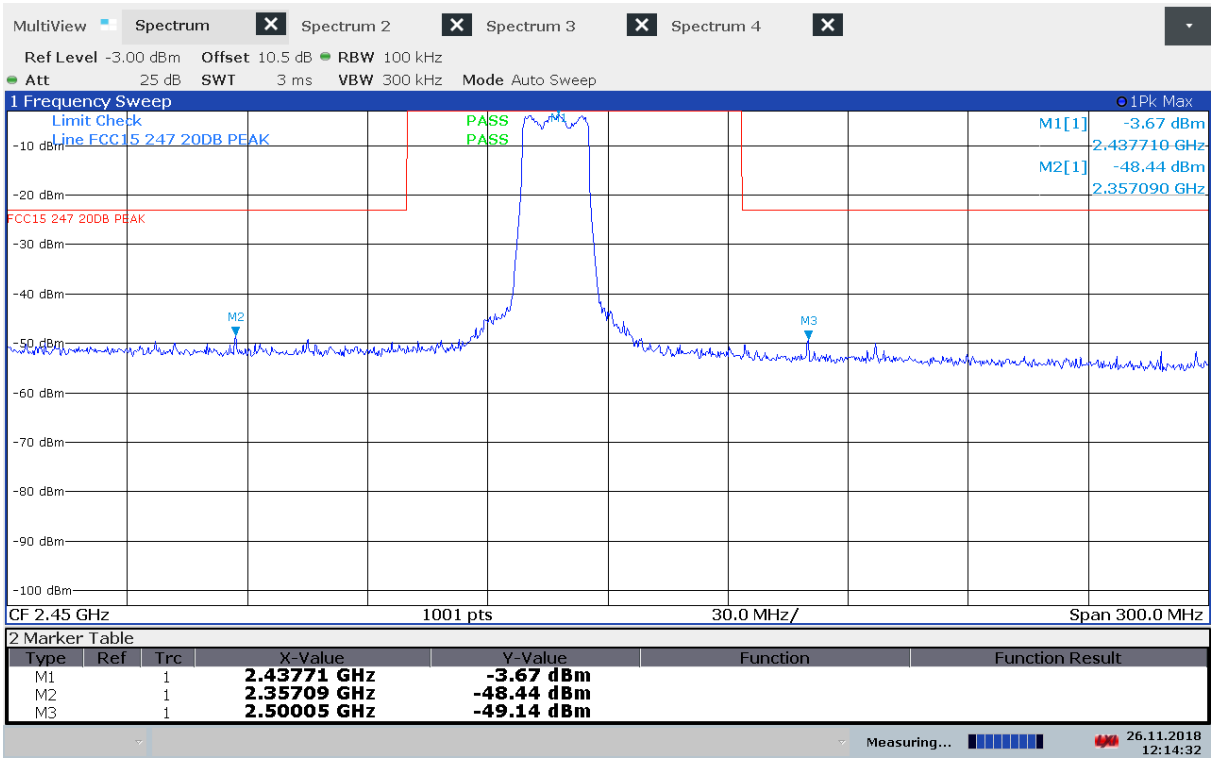
Conducted Emissions, 2300 – 2600 MHz, 2437 MHz, 802.11b, 1Mbps



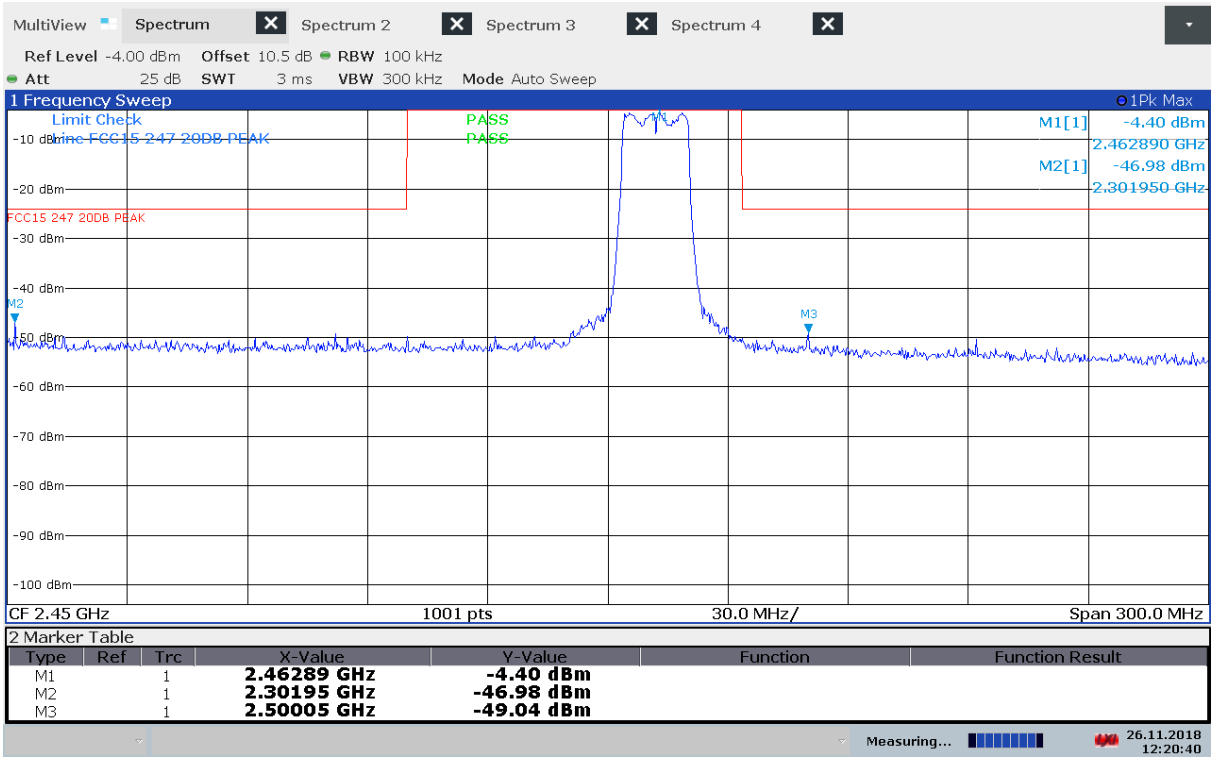
Conducted Emissions, 2300 – 2600 MHz, 2462 MHz, 802.11b, 1Mbps



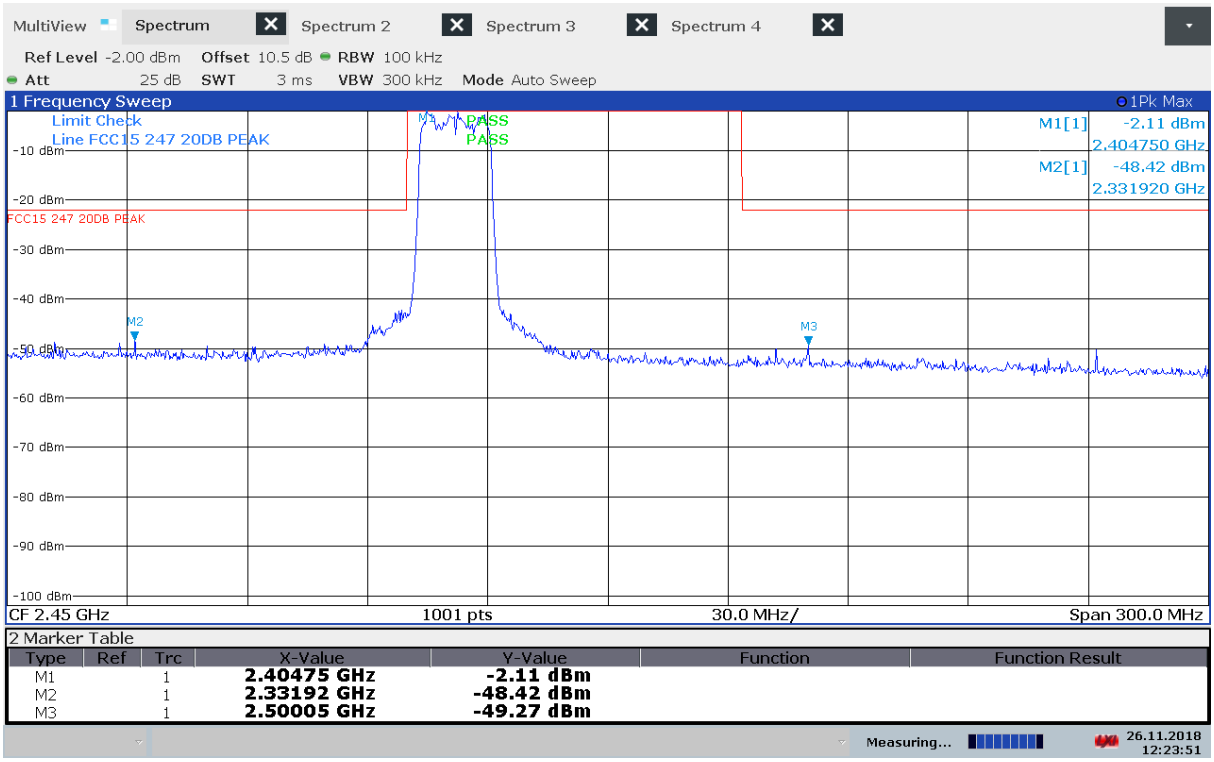
Conducted Emissions, 2300 – 2600 MHz, 2412 MHz, 802.11g, 6Mbps



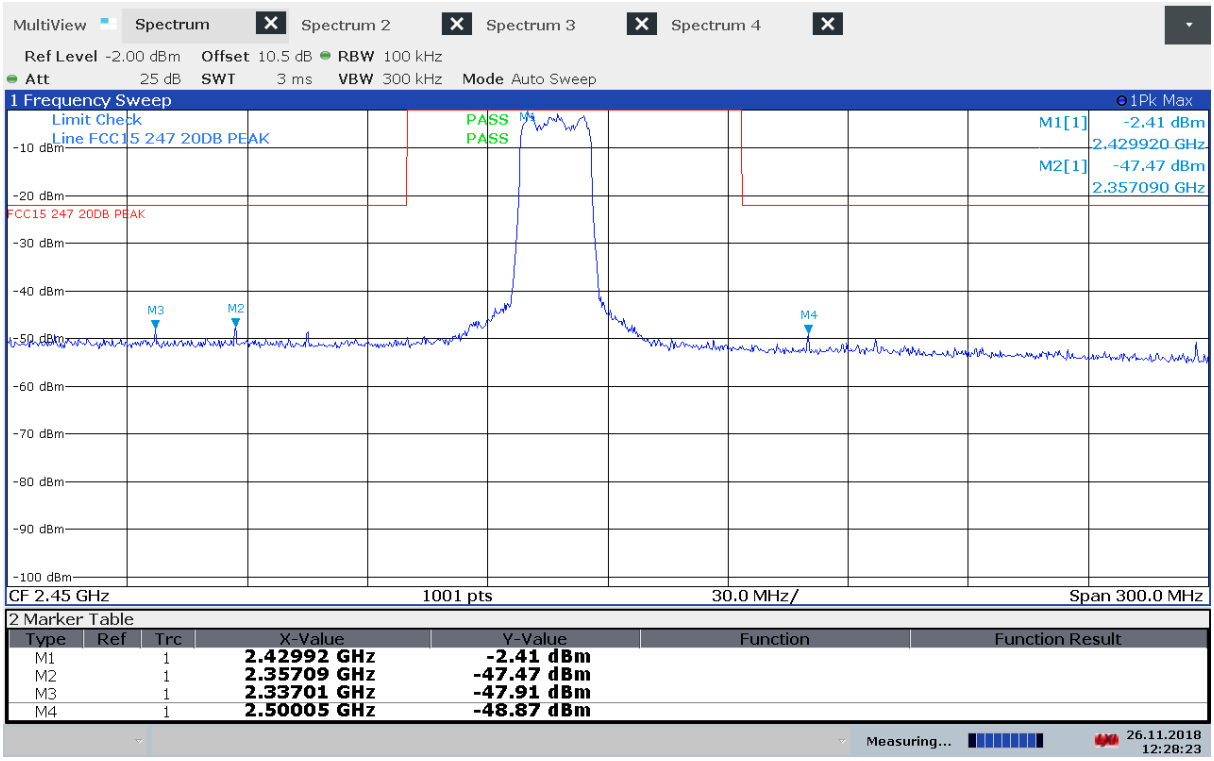
Conducted Emissions, 2300 – 2600 MHz, 2437 MHz, 802.11g, 6Mbps



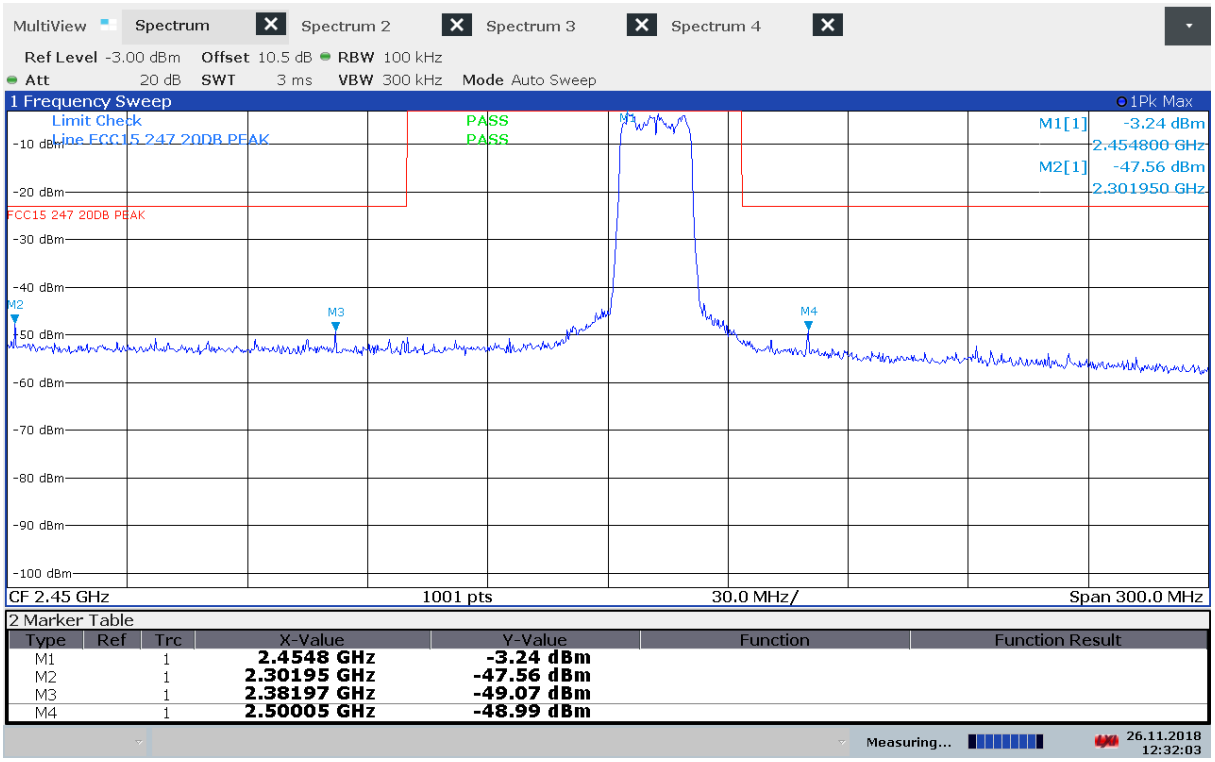
Conducted Emissions, 2300 – 2600 MHz, 2462 MHz, 802.11g, 6Mbps



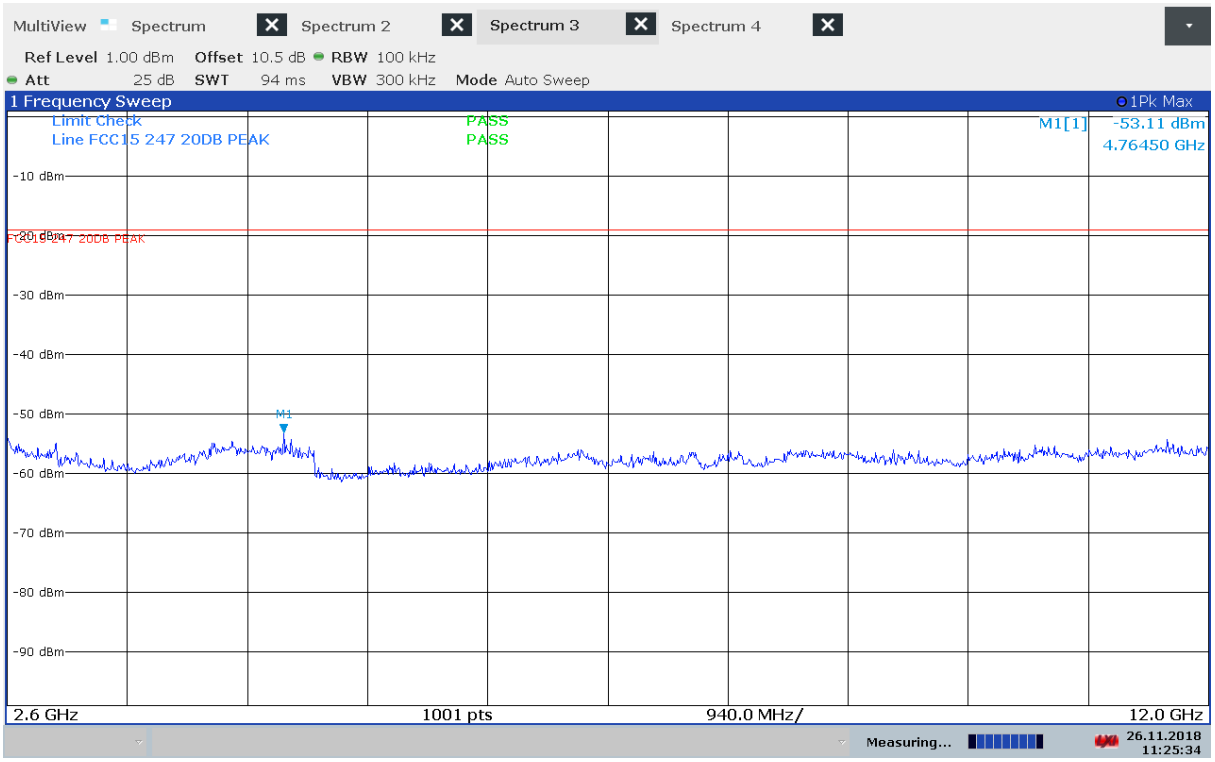
Conducted Emissions, 2300 – 2600 MHz, 2412 MHz, 802.11n, MCS0



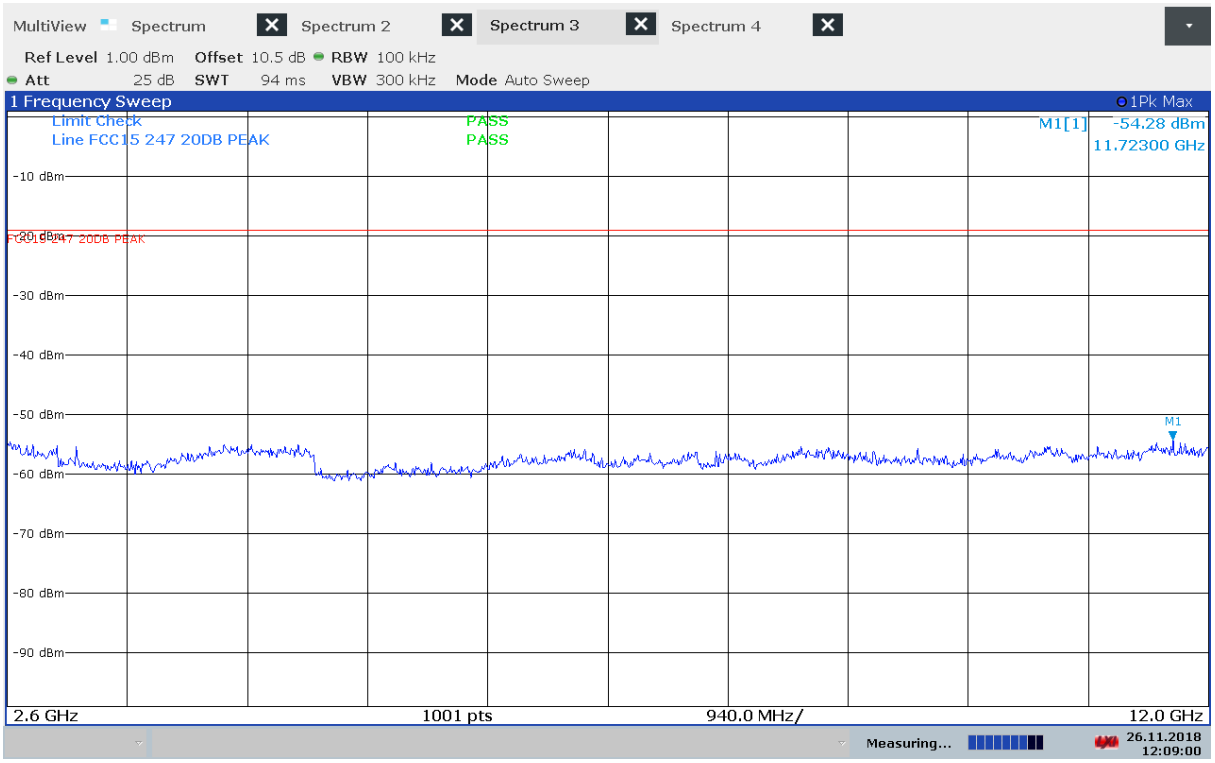
Conducted Emissions, 2300 – 2600 MHz, 2437 MHz, 802.11n, MCS0



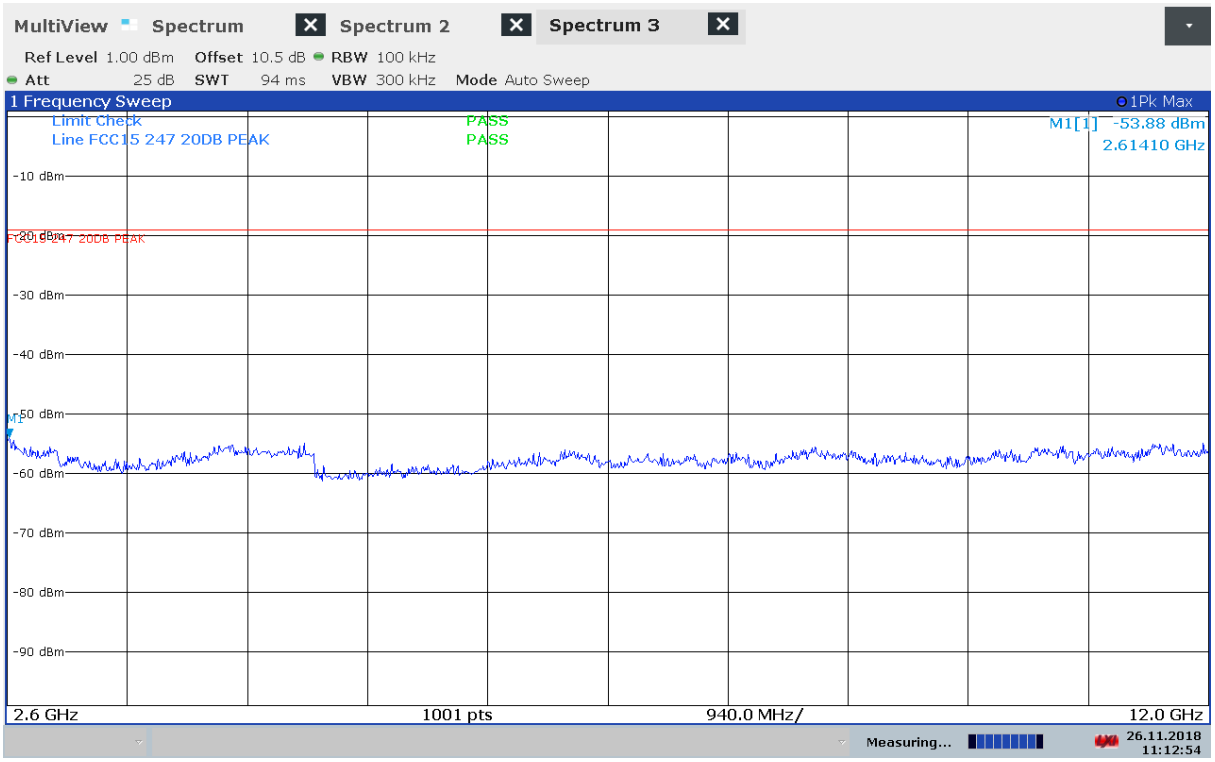
Conducted Emissions, 2300 – 2600 MHz, 2462 MHz, 802.11n, MCS0



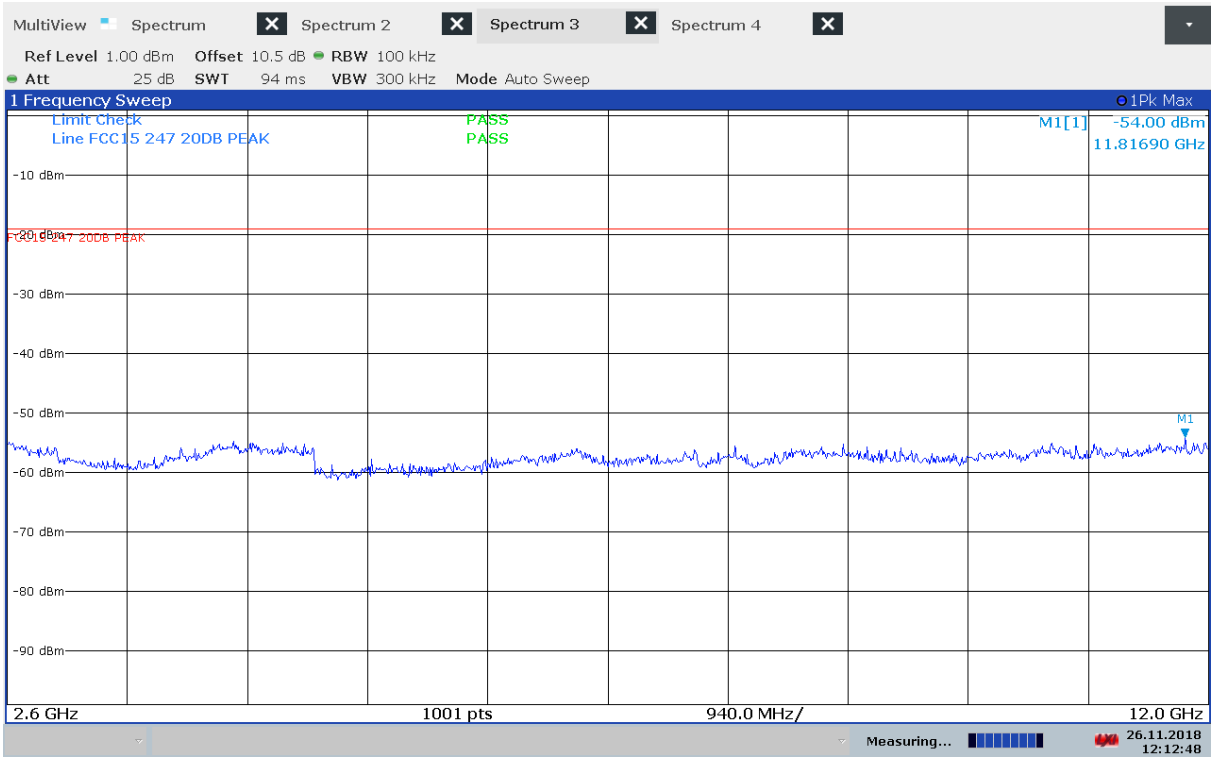
Conducted Emissions, 2600 – 12000 MHz, 2412 MHz, 802.11b, 1Mbps



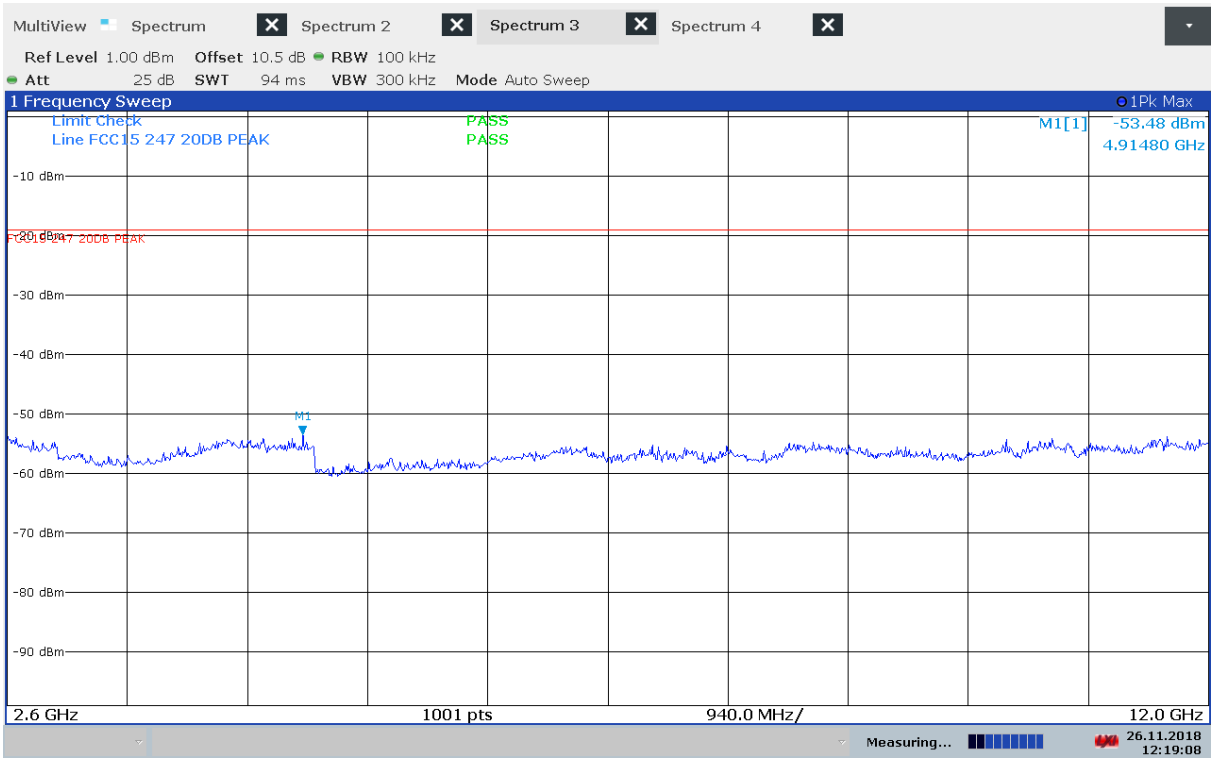
Conducted Emissions, 2600 – 12000 MHz, 2437 MHz, 802.11b, 1Mbps



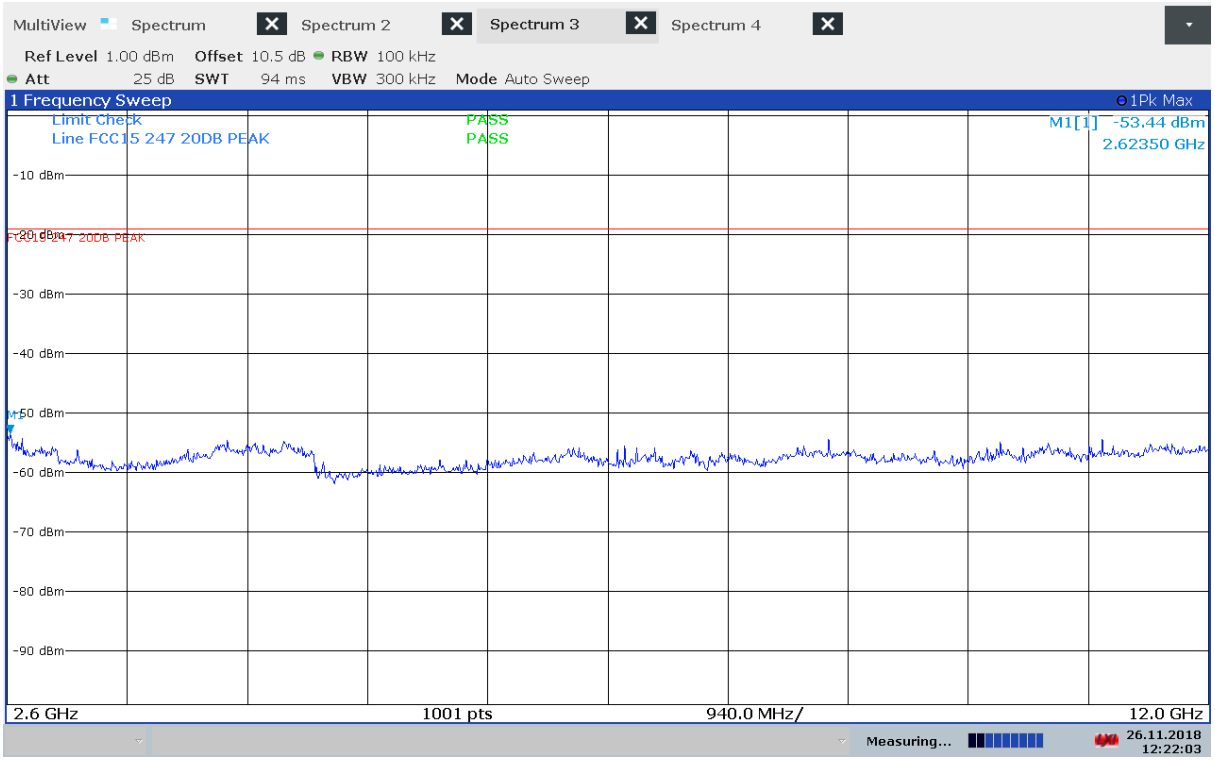
Conducted Emissions, 2600 – 12000 MHz, 2462 MHz, 802.11b, 1Mbps



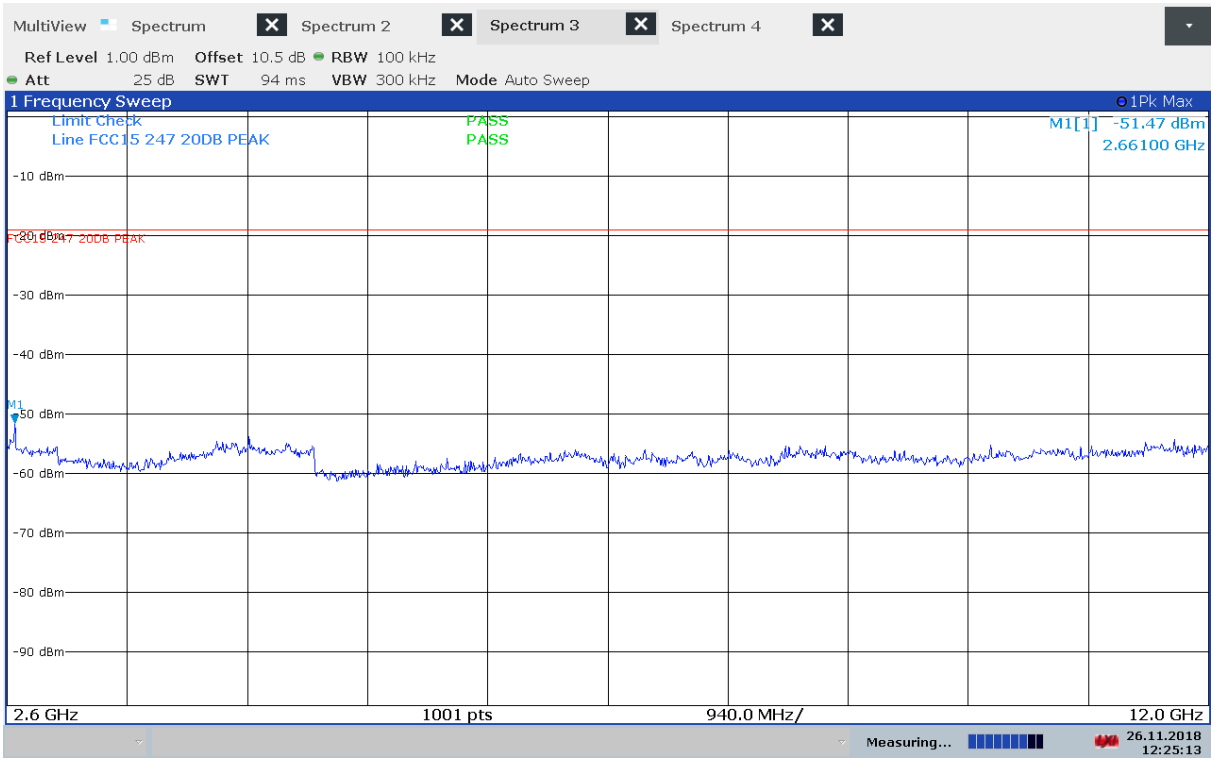
Conducted Emissions, 2600 – 12000 MHz, 2412 MHz, 802.11g, 6Mbps



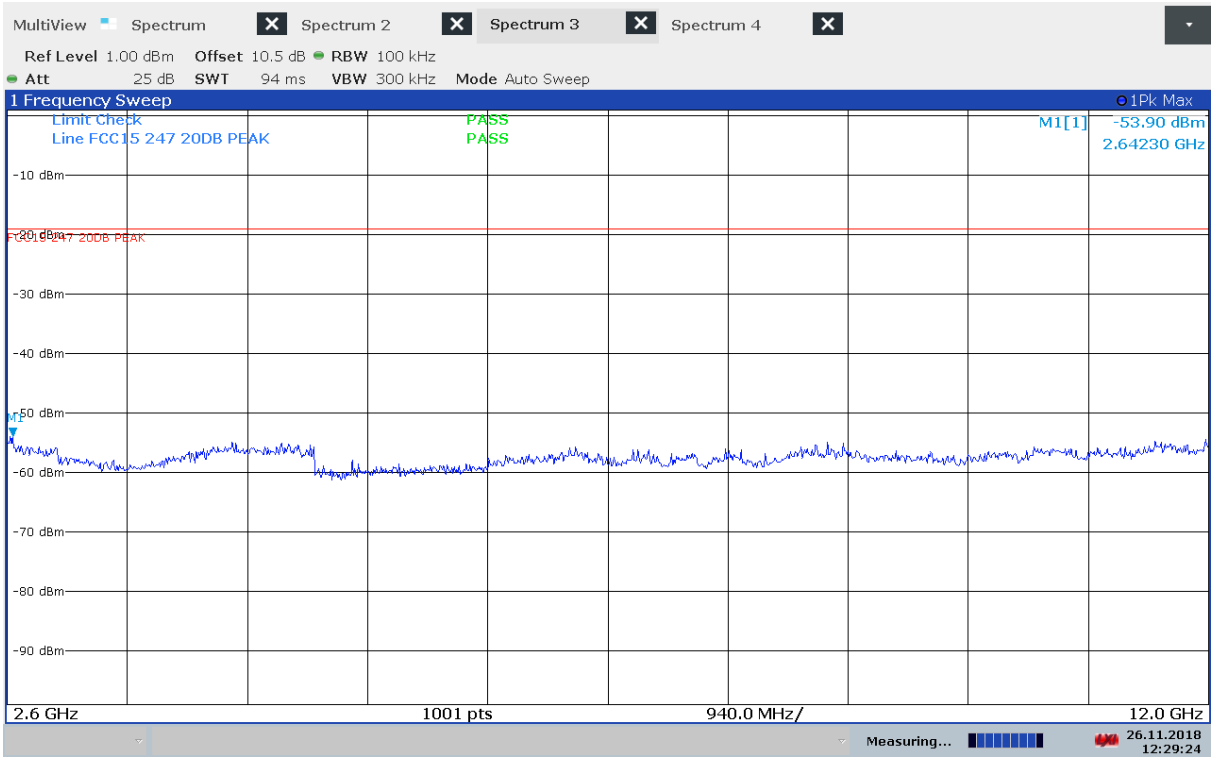
Conducted Emissions, 2600 – 12000 MHz, 2437 MHz, 802.11g, 6Mbps



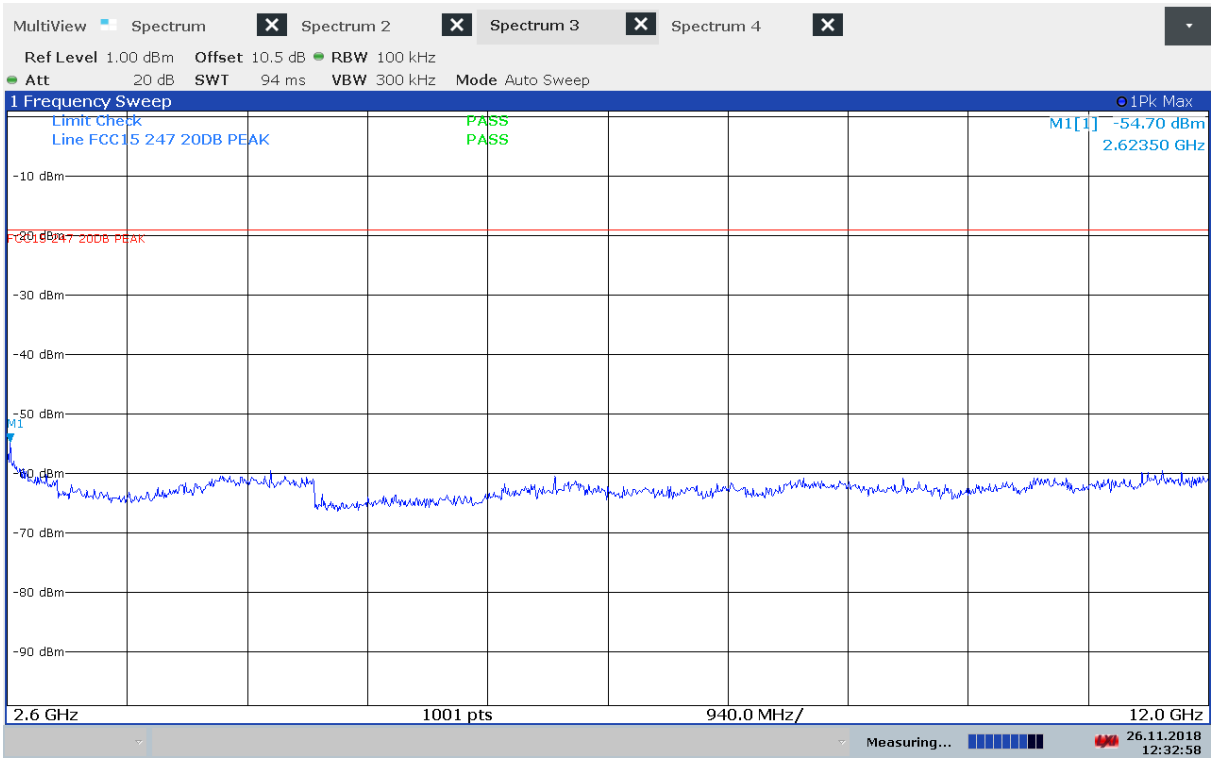
Conducted Emissions, 2600 – 12000 MHz, 2462 MHz, 802.11g, 6Mbps



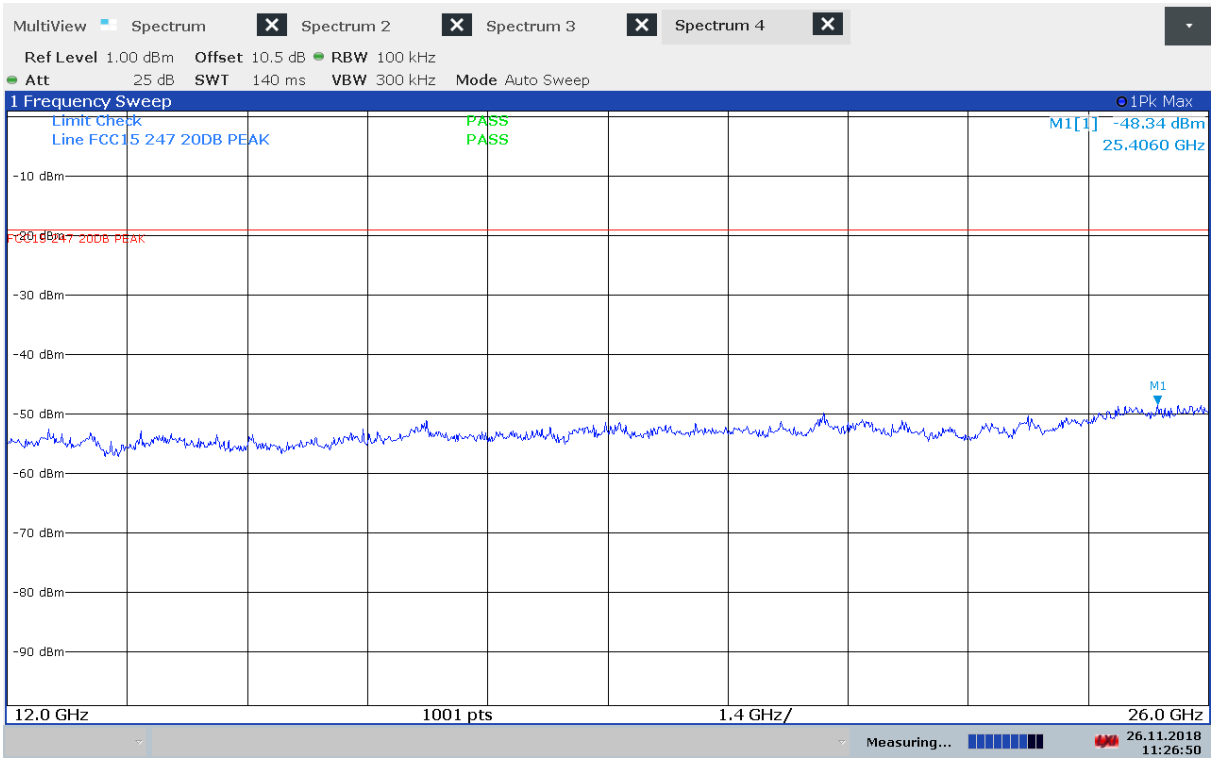
Conducted Emissions, 2600 – 12000 MHz, 2412 MHz, 802.11n, MCS0



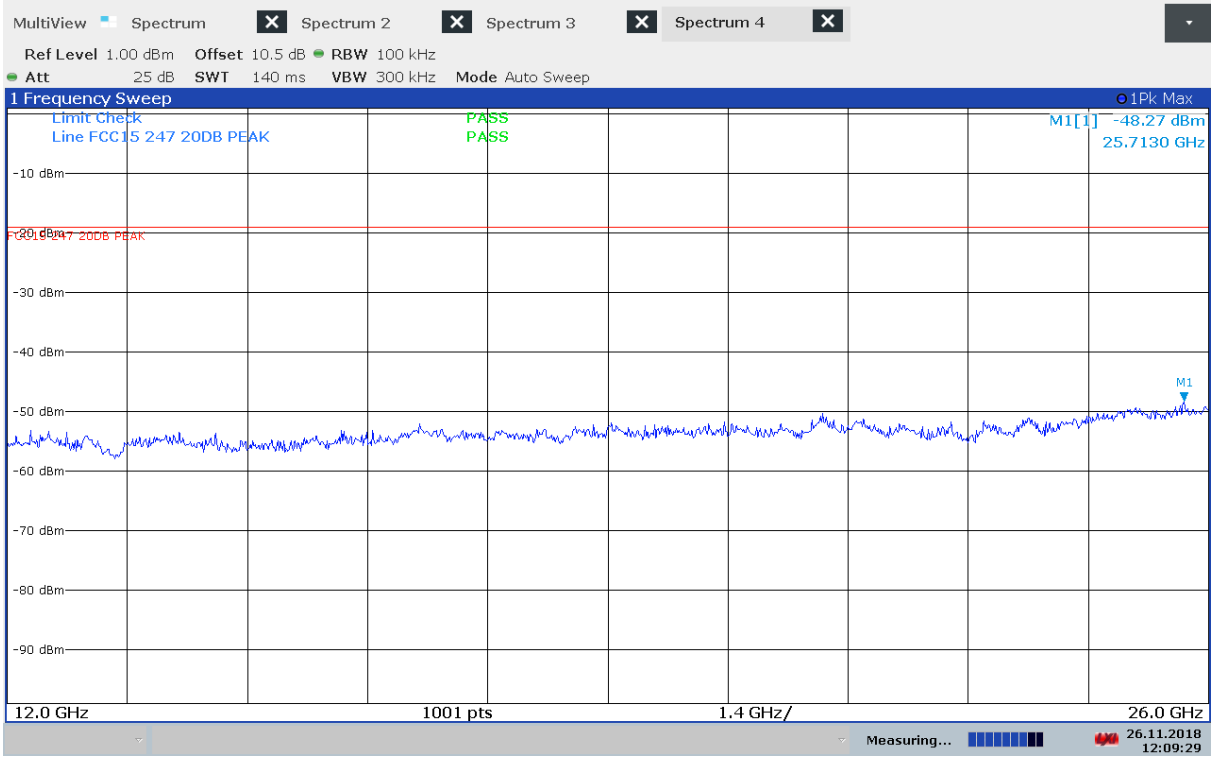
Conducted Emissions, 2600 – 12000 MHz, 2437 MHz, 802.11n, MCS0



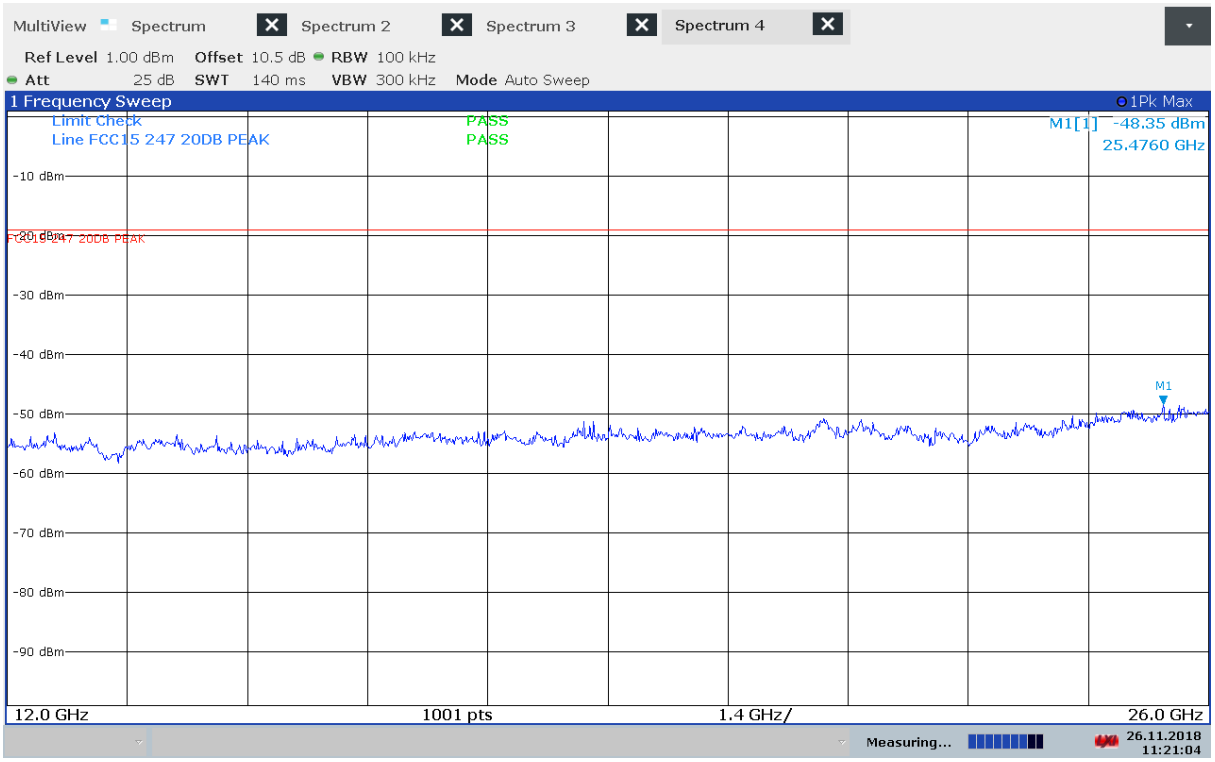
Conducted Emissions, 2600 – 12000 MHz, 2462 MHz, 802.11n, MCS0



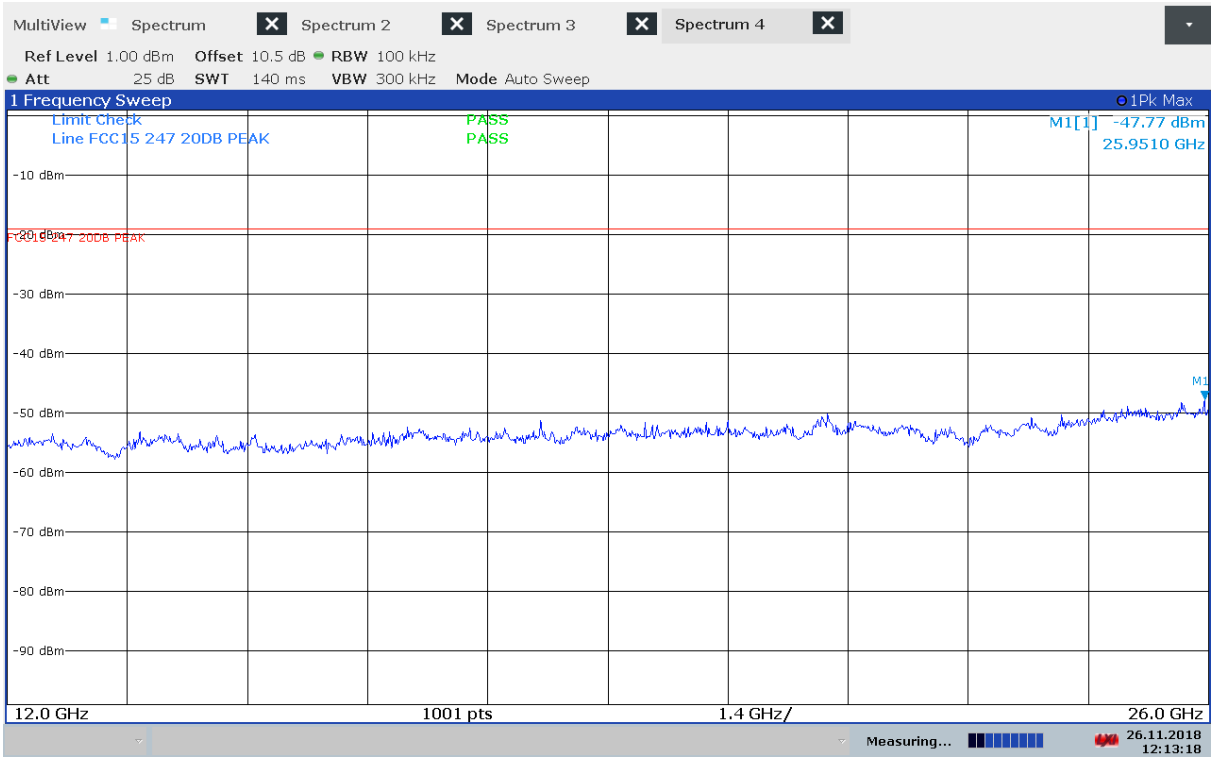
Conducted Emissions, 12000 – 26000 MHz, 2412 MHz, 802.11b, 1Mbps



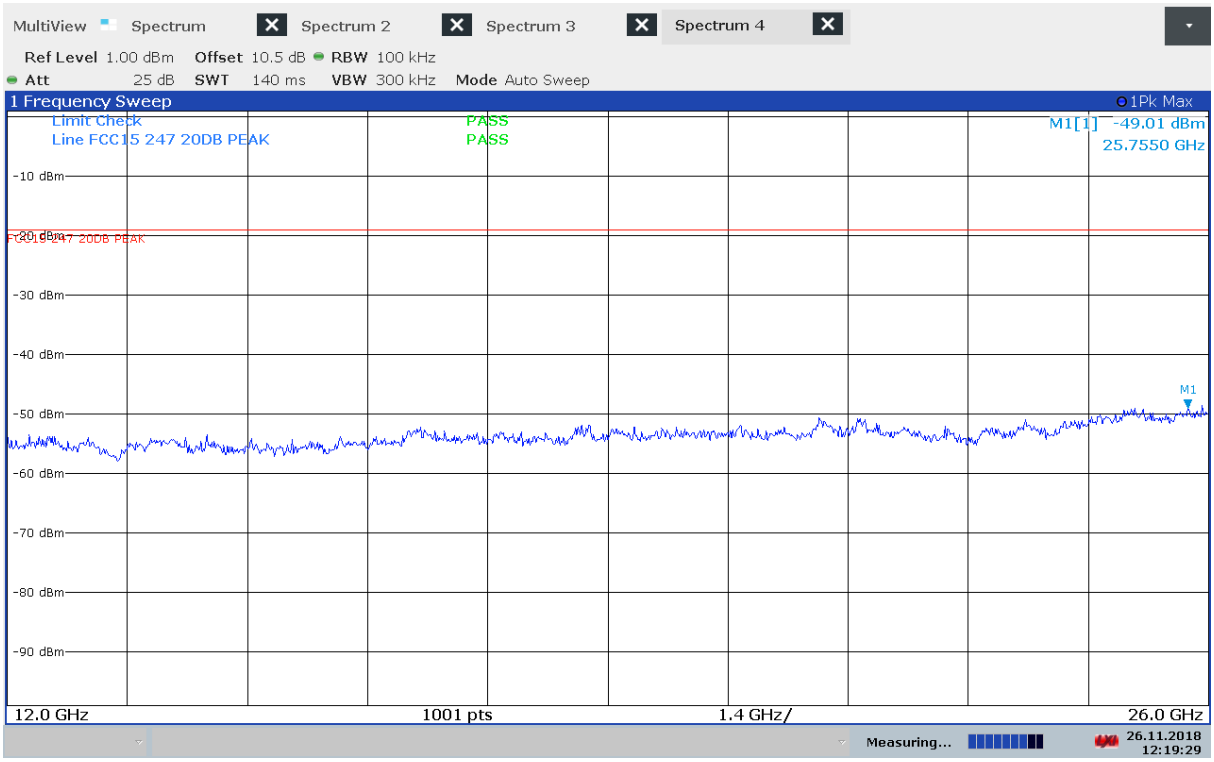
Conducted Emissions, 12000 – 26000 MHz, 2437 MHz, 802.11b, 1Mbps



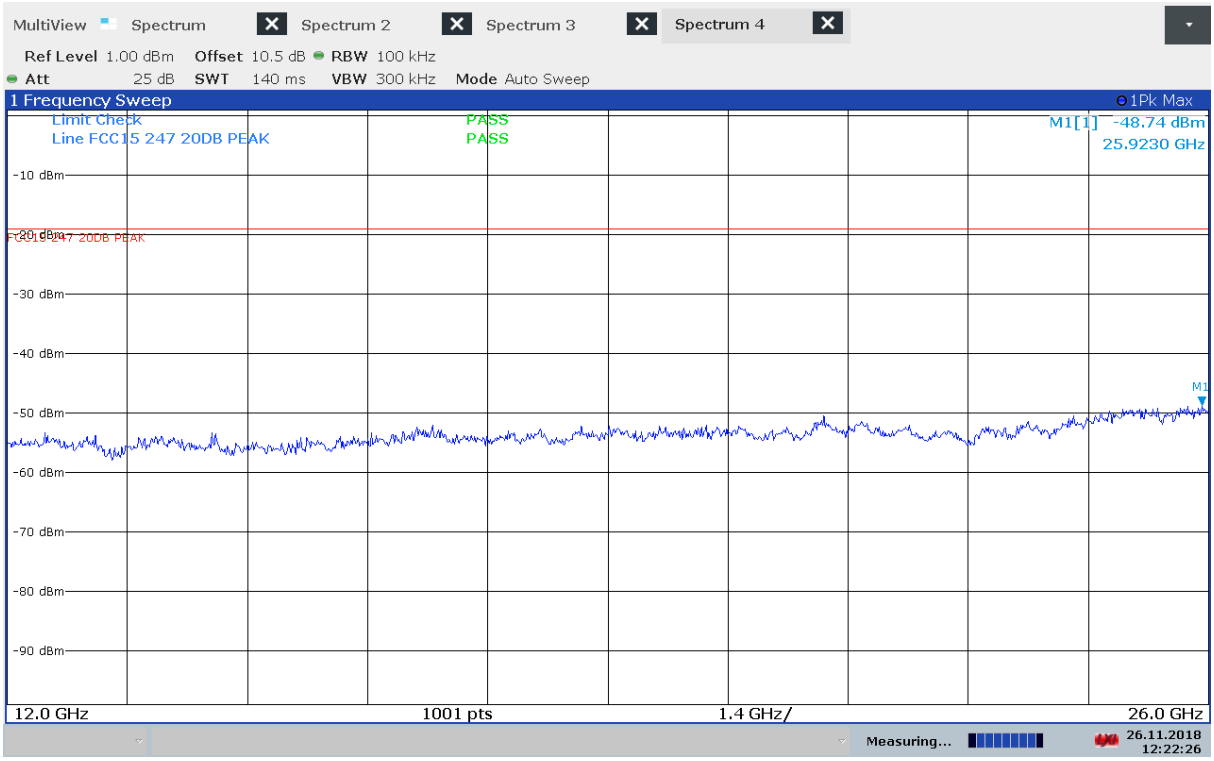
Conducted Emissions, 12000 – 26000 MHz, 2462 MHz, 802.11b, 1Mbps



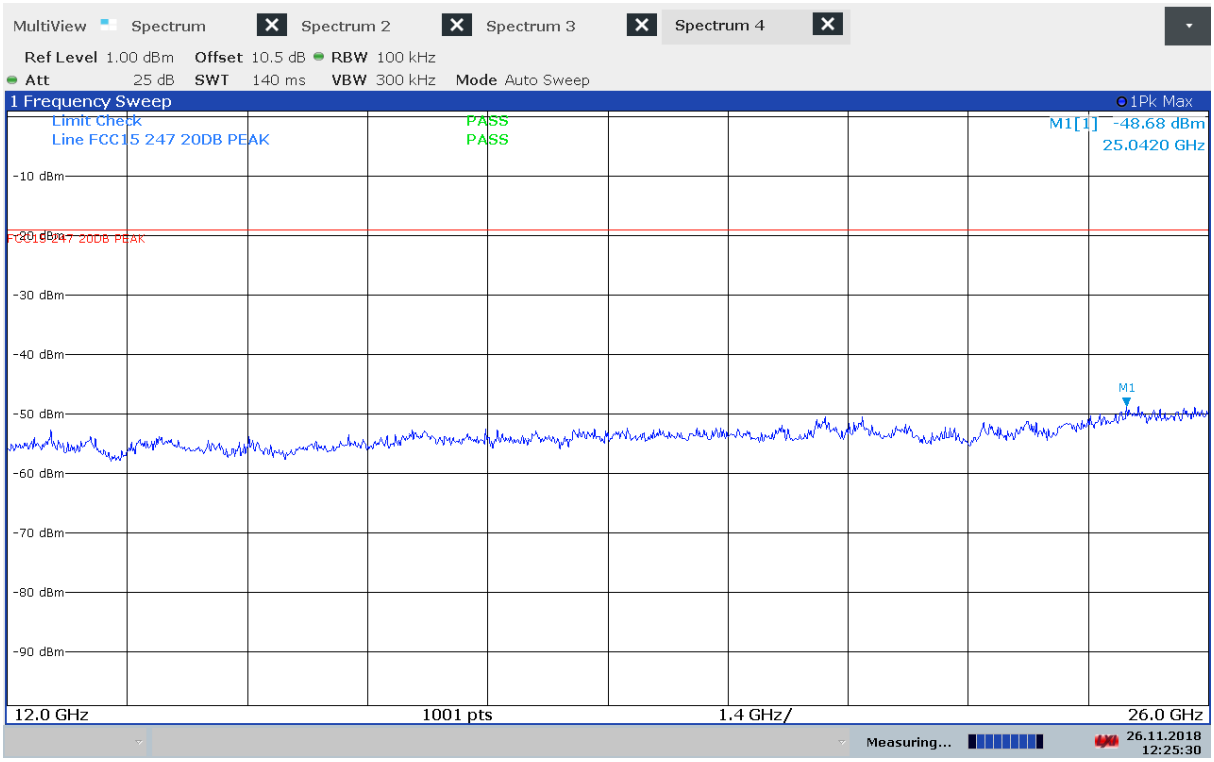
Conducted Emissions, 12000 – 26000 MHz, 2412 MHz, 802.11g, 6Mbps



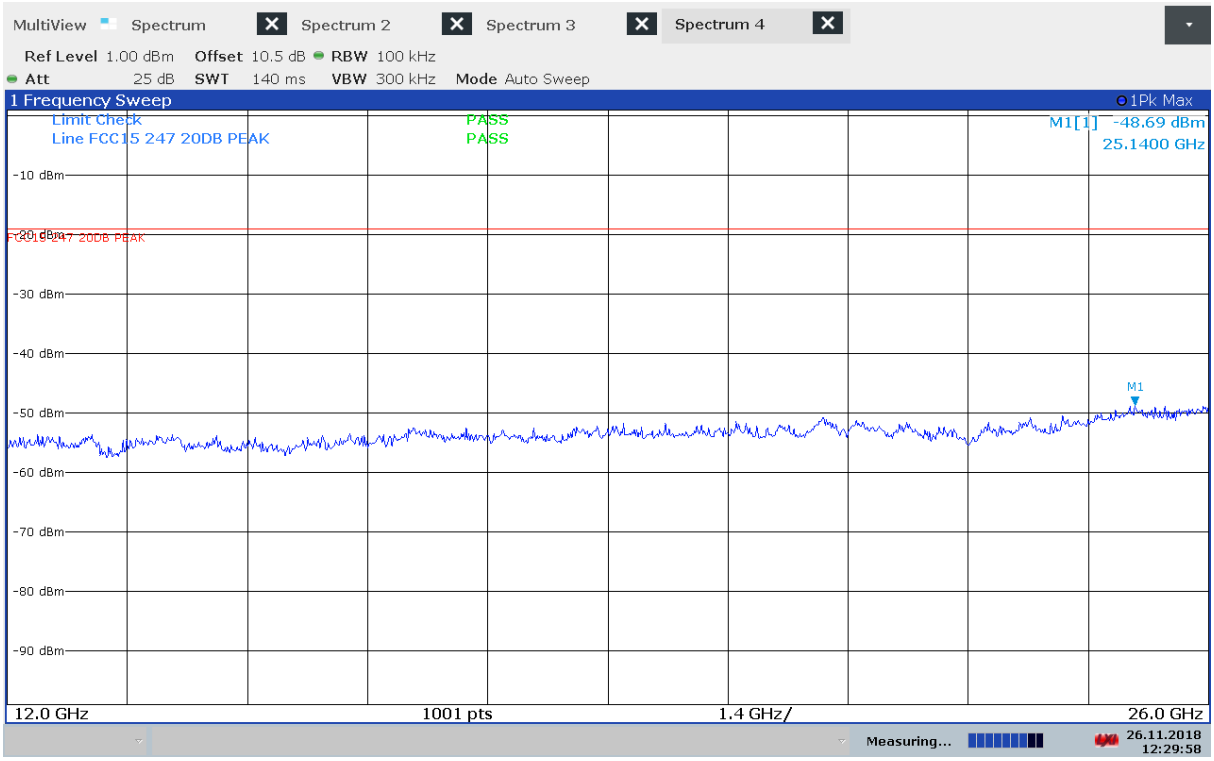
Conducted Emissions, 12000 – 26000 MHz, 2437 MHz, 802.11g, 6Mbps



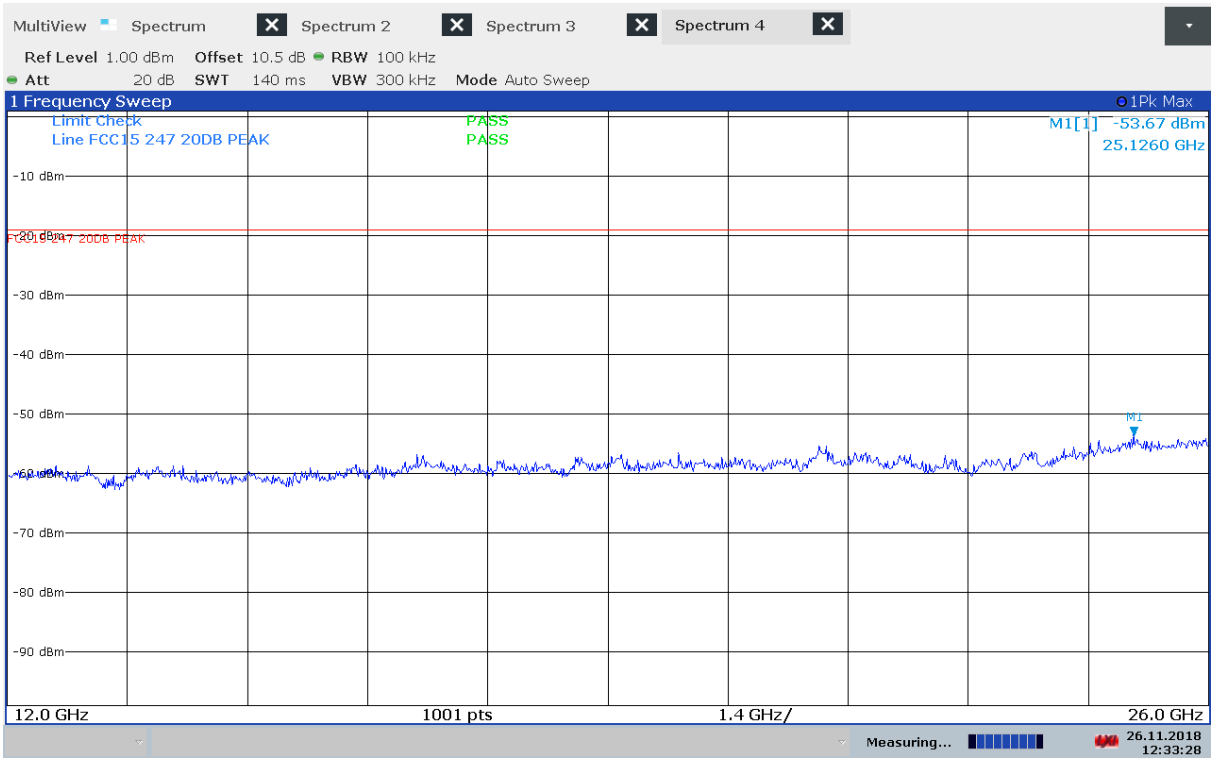
Conducted Emissions, 12000 – 26000 MHz, 2462 MHz, 802.11g, 6Mbps



Conducted Emissions, 12000 – 26000 MHz, 2412 MHz, 802.11n, MCS0



Conducted Emissions, 12000 – 26000 MHz, 2437 MHz, 802.11n, MCS0



Conducted Emissions, 12000 – 26000 MHz, 2462 MHz, 802.11n, MCS0

3.6 Restricted Bands of operation

Restricted Bands of operation for FCC and ISED are defined in FCC Part 15.205 and ISED RSS-GEN, Issue 4 clause 8.10.

Generally, no fundamentals are allowed in the restricted bands and all emissions must comply with the limits in FCC 15.209 or RSS-GEN, Issue 5, clause 8.9.

FCC (MHz)	ISED (MHz)	FCC (GHz)	ISED (GHz)
0.090-0.110		**0.96-1.24** **1.3-1.427**	**0.96-1.427**
0.495-0.505		1.435-1.6265	
2.1735-2.1905		1.6455-1.6465	
	3.020-3.026	1.660-1.710	
4.125-4.128		1.7188-1.7222	
4.17725-4.17775		2.2-2.3	
4.20725-4.20775		2.31-2.39	
	5.677-5.683	2.4835-2.5	
6.215-6.218		**2.69-2.9**	**2.655-2.9**
6.26775-6.26825		3.26-3.267	
6.31175-6.31225		3.332-3.339	
8.291-8.294		3.3458-3.358	
8.362-8.366		**3.6-4.4**	**3.5-4.4**
8.37625-8.38675		4.5-5.15	
8.41425-8.41475		5.35-5.46	
12.29-12.293		7.25-7.75	
12.51975-12.52025		8.025-8.5	
12.57675-12.57725		9.0-9.2	
13.36-13.41		9.3-9.5	
16.42-16.423		10.6-12.7	
16.69475-16.69525		13.25-13.4	
16.80425-16.80475		14.47-14.5	
25.5-25.67		15.35-16.2	
37.5-38.25		17.7-21.4	
73-74.6		22.01-23.12	
74.8-75.2		23.6-24.0	
108-121.94 **123-138**	**108-138**	31.2-31.8	
149.9-150.05		36.43-36.5	
156.52475-156.52525		Above 38.6	
156.7-156.9			
162.0125-167.17			
167.72-173.2			
240-285			
322-335.4			
399.9-410			
608-614			

Frequencies in **Bold** text are specific for FCC or ISED, all other frequencies are common.

3.7 Spurious Emissions (Radiated)

FCC Part 15.209

Test Results: Complies

Measurement Data:

Peak Detector:

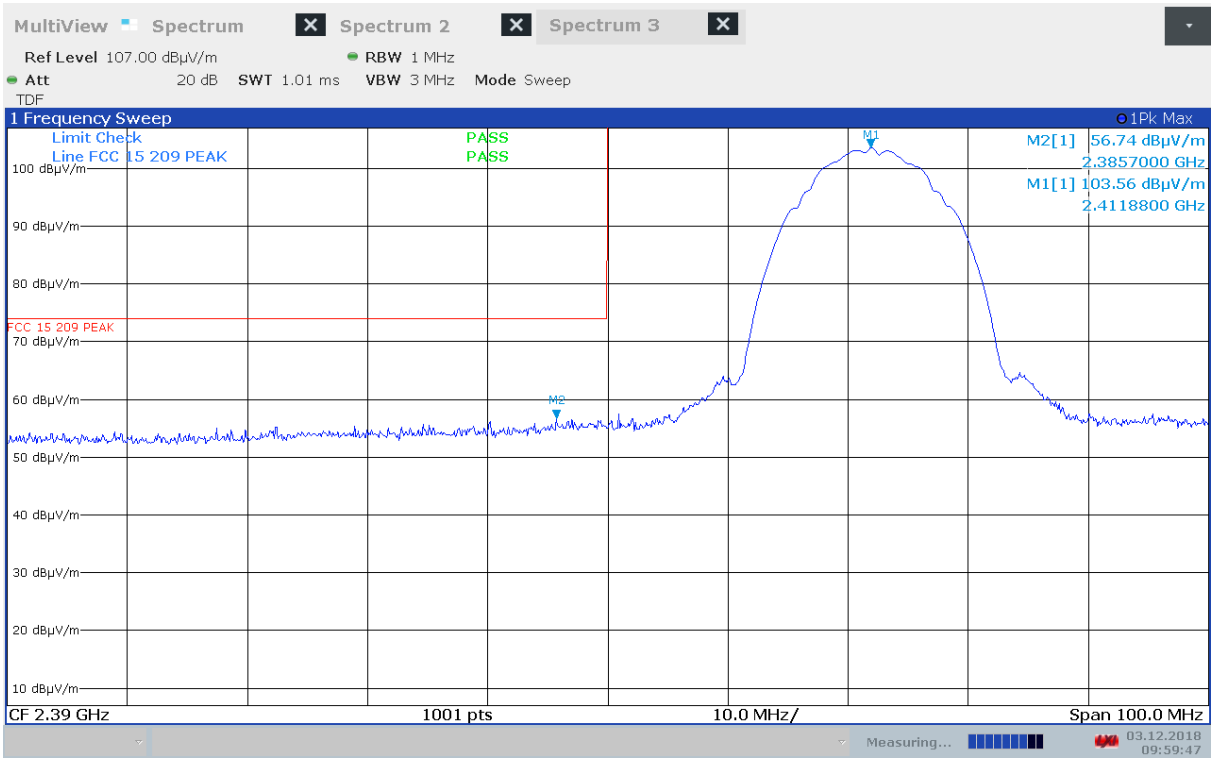
Modulation and Bitrate	Measured field strength (dBµV/m)		Limit	Margin	
	2390 MHz	2483.5 MHz	dB	dB	
802.11b, 11 Mbps	56.7	57.7	74	17.3	16.3
802.11g, 6 Mbps	64.5	63.6	74	9.5	10.4
802.11n, MCS0	56.5	56.9	74	17.5	17.1

Average Detector:

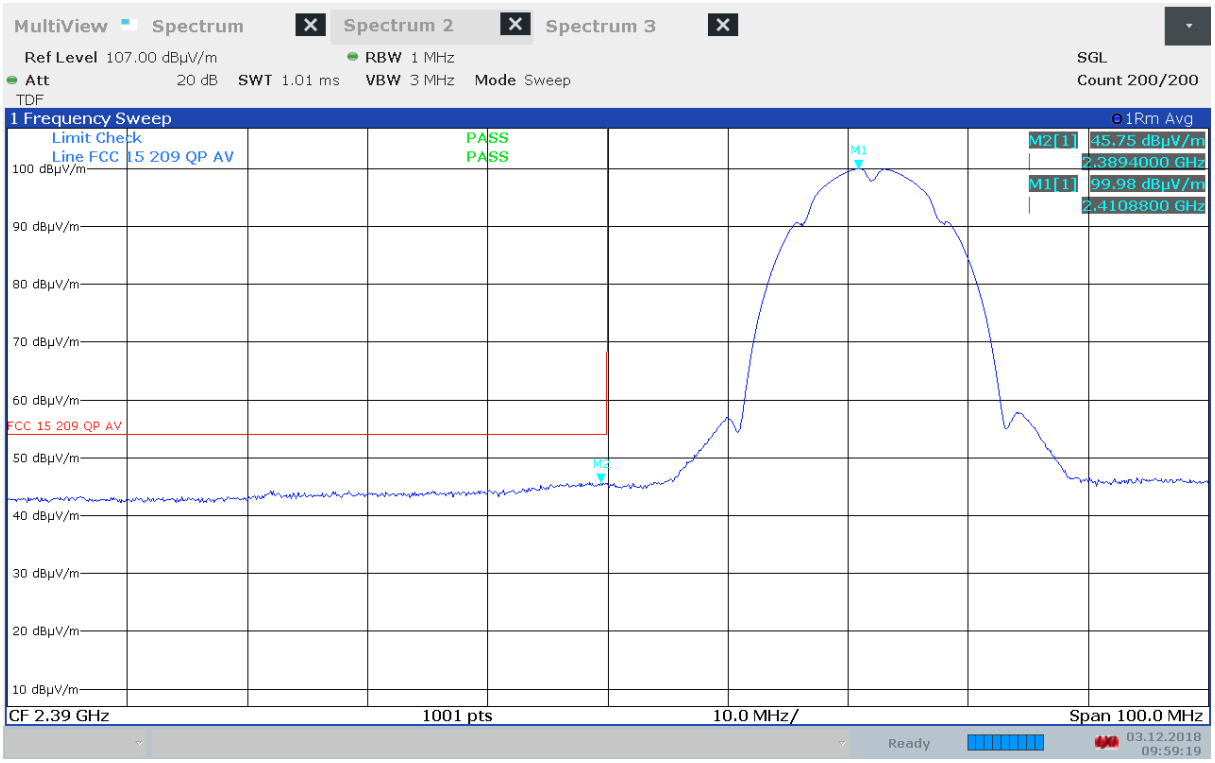
Modulation and Bitrate	Measured field strength (dBµV/m)		Limit	Margin	
	2390 MHz	2483.5 MHz	dB	dB	
802.11b, 11 Mbps	45.8	46.6	54	8.1	7.4
802.11g, 6 Mbps	49.5	49.8	54	4.5	4.2
802.11n, MCS0	45.1	46.7	54	8.9	7.3

Average values are measured with RMS detector and trace averaging (Duty Cycle ≈100%).

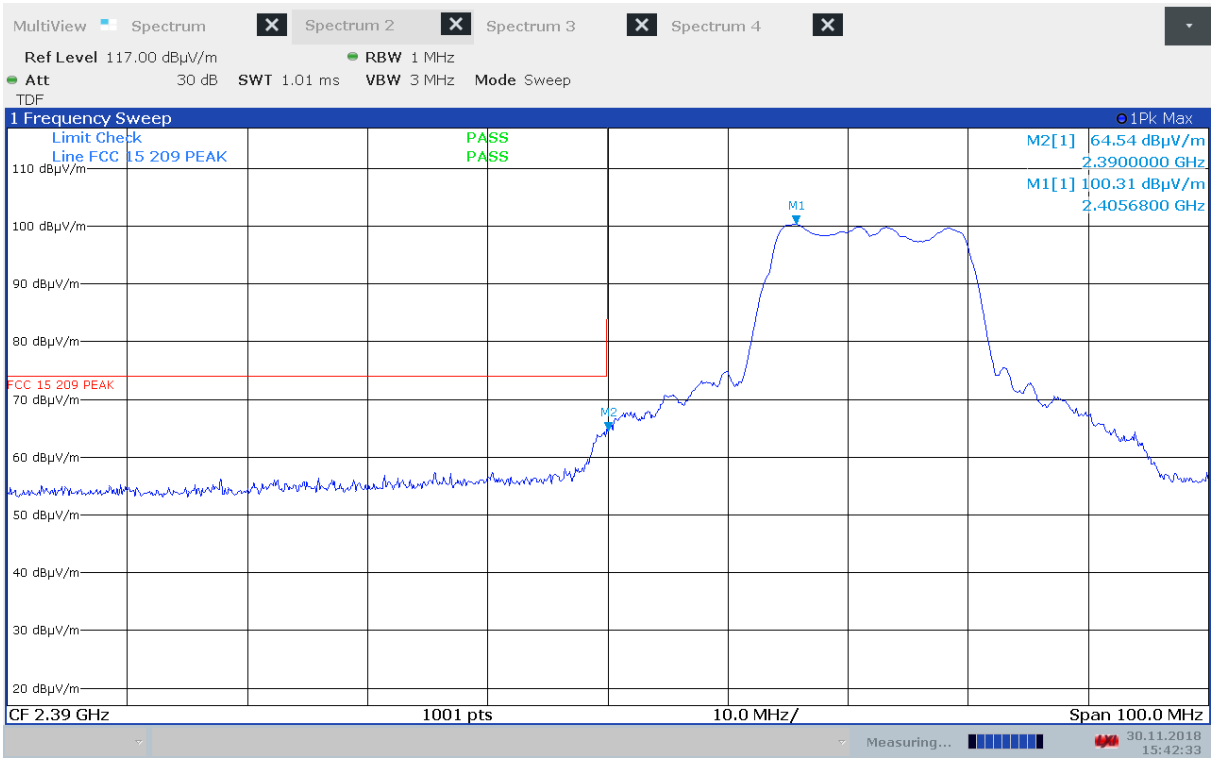
See attached plots.



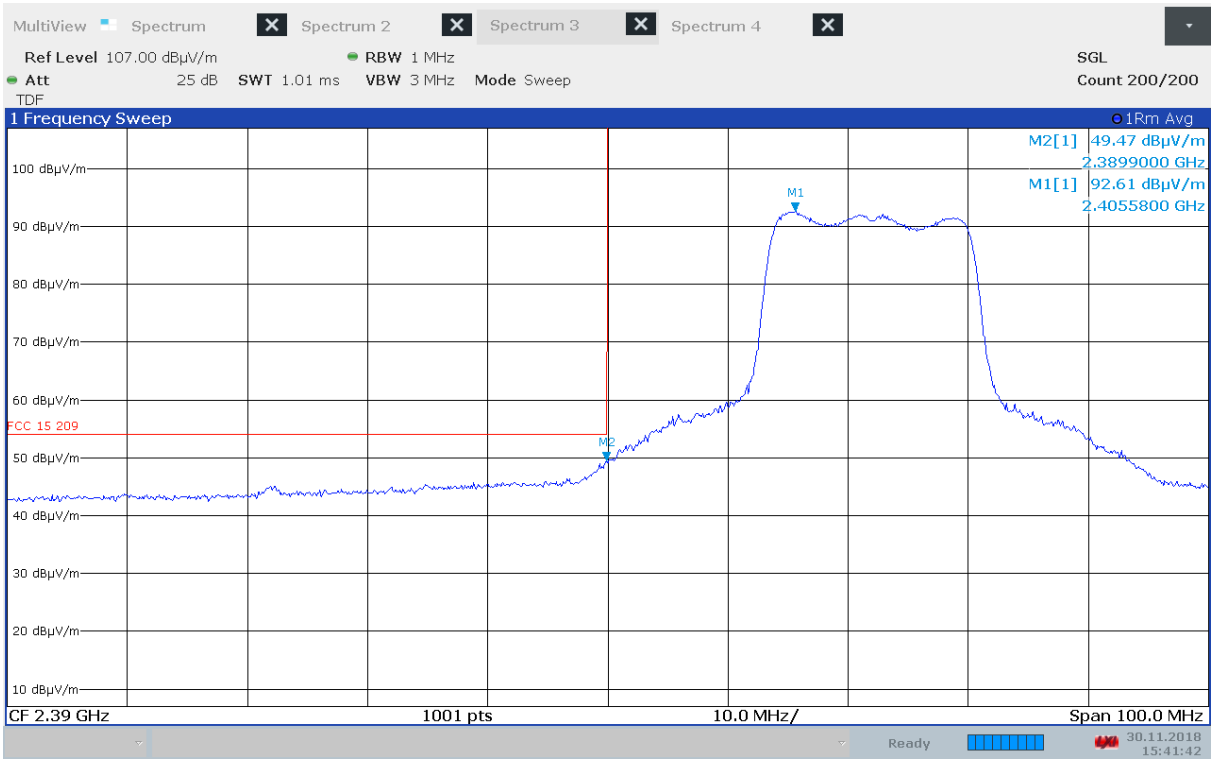
Lower Band Edge, Peak, 2412 MHz, 802.11b, 1Mbps



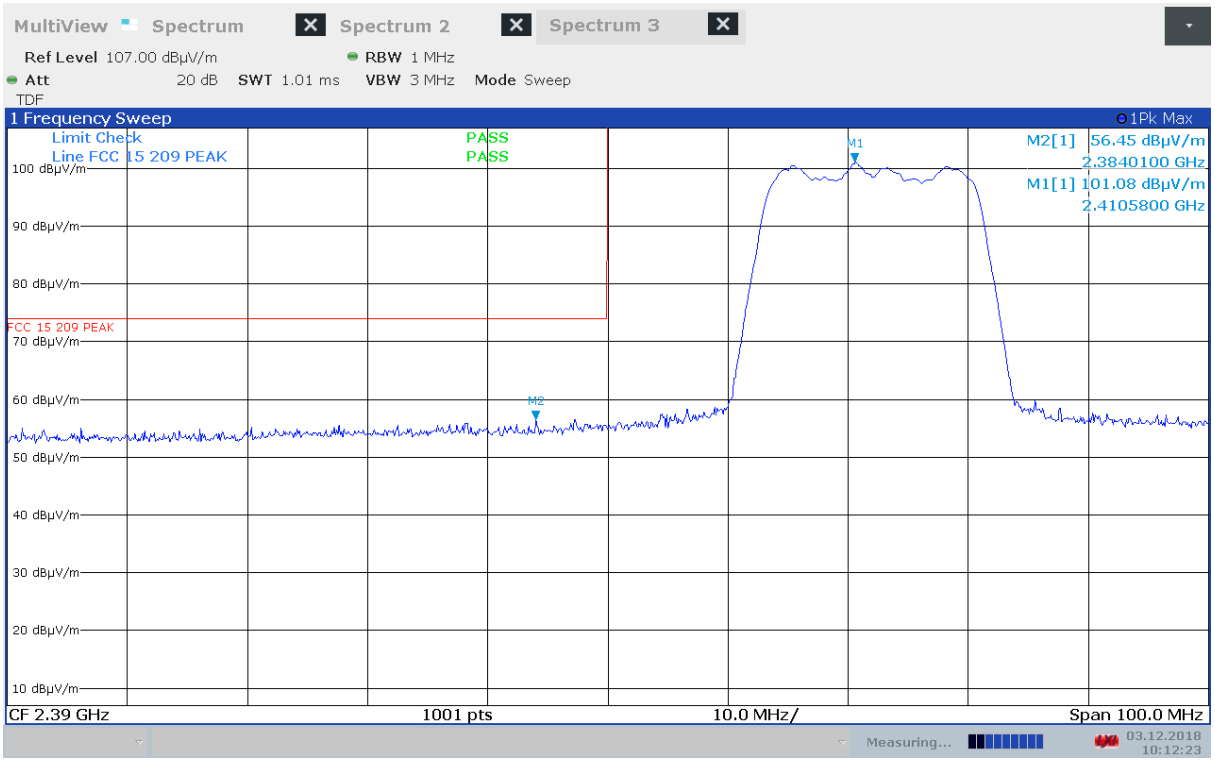
Lower Band Edge, Average, 2412 MHz, 802.11b, 1Mbps



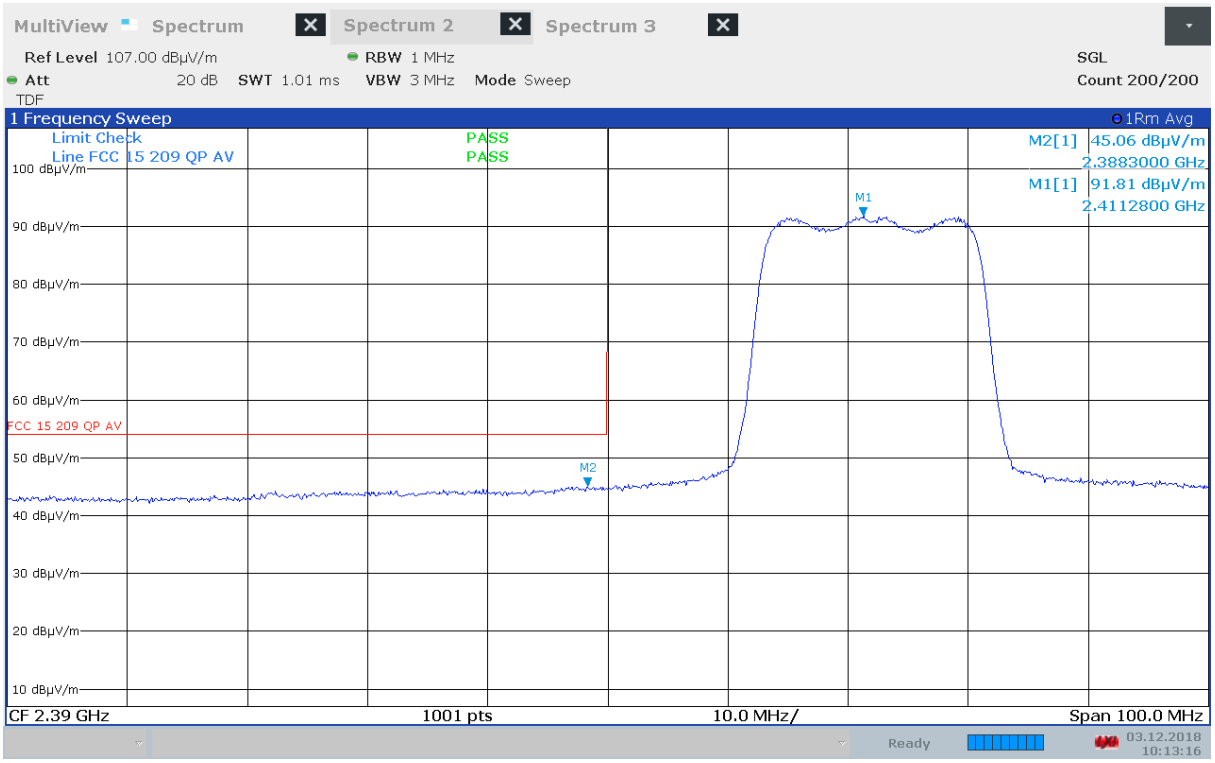
Lower Band Edge, Peak, 2412 MHz, 802.11g, 6Mbps



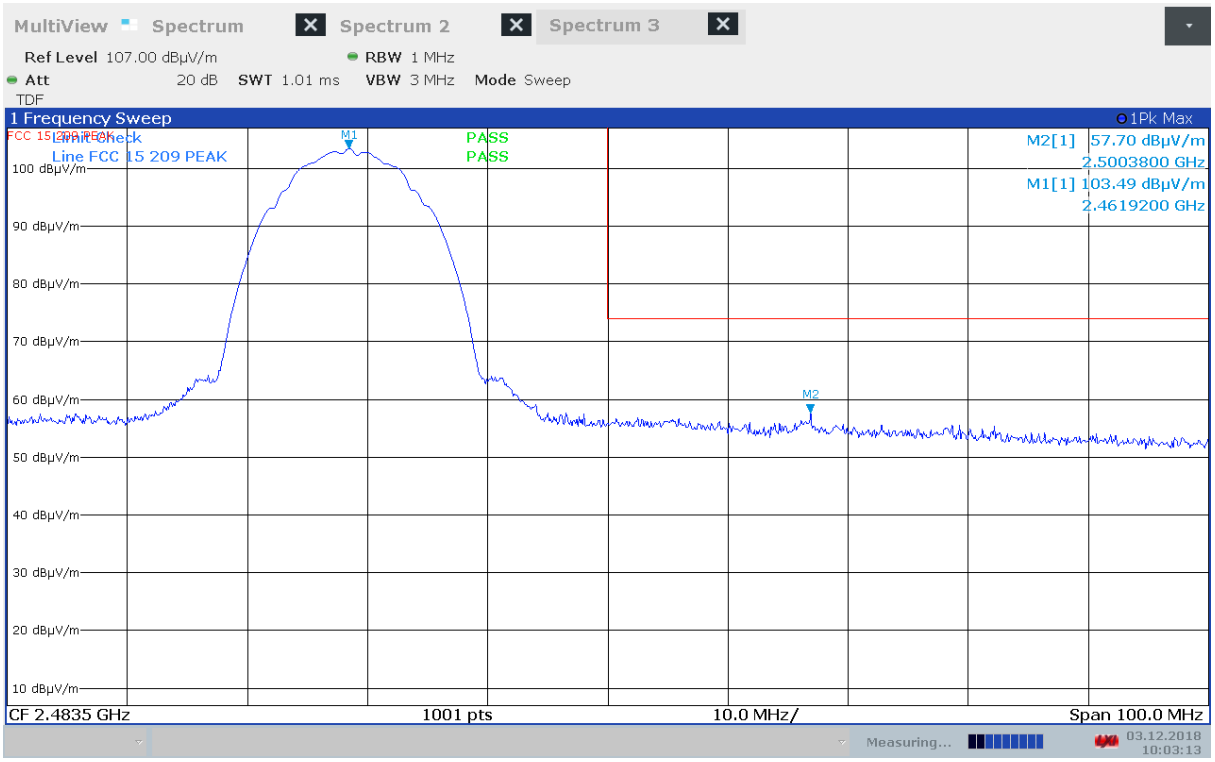
Lower Band Edge, Average, 2412 MHz, 802.11g, 6Mbps



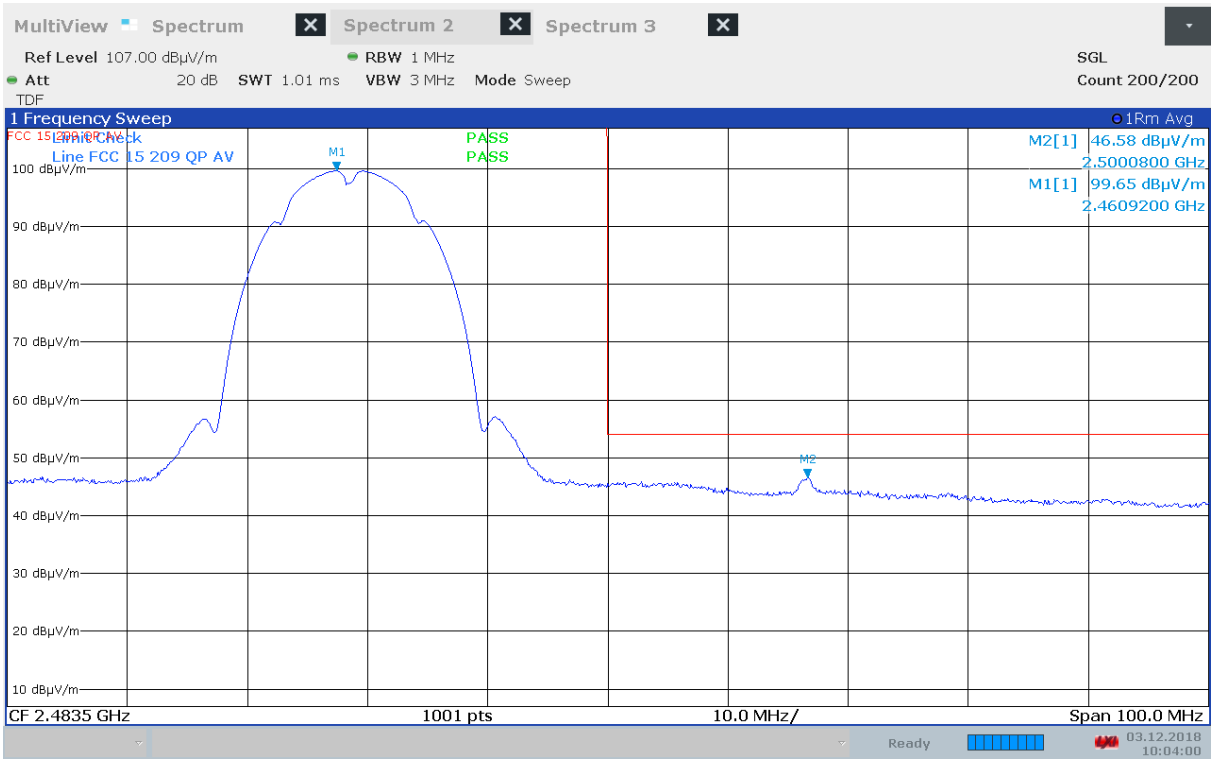
Lower Band Edge, Peak, 2412 MHz, 802.11n, MCS0



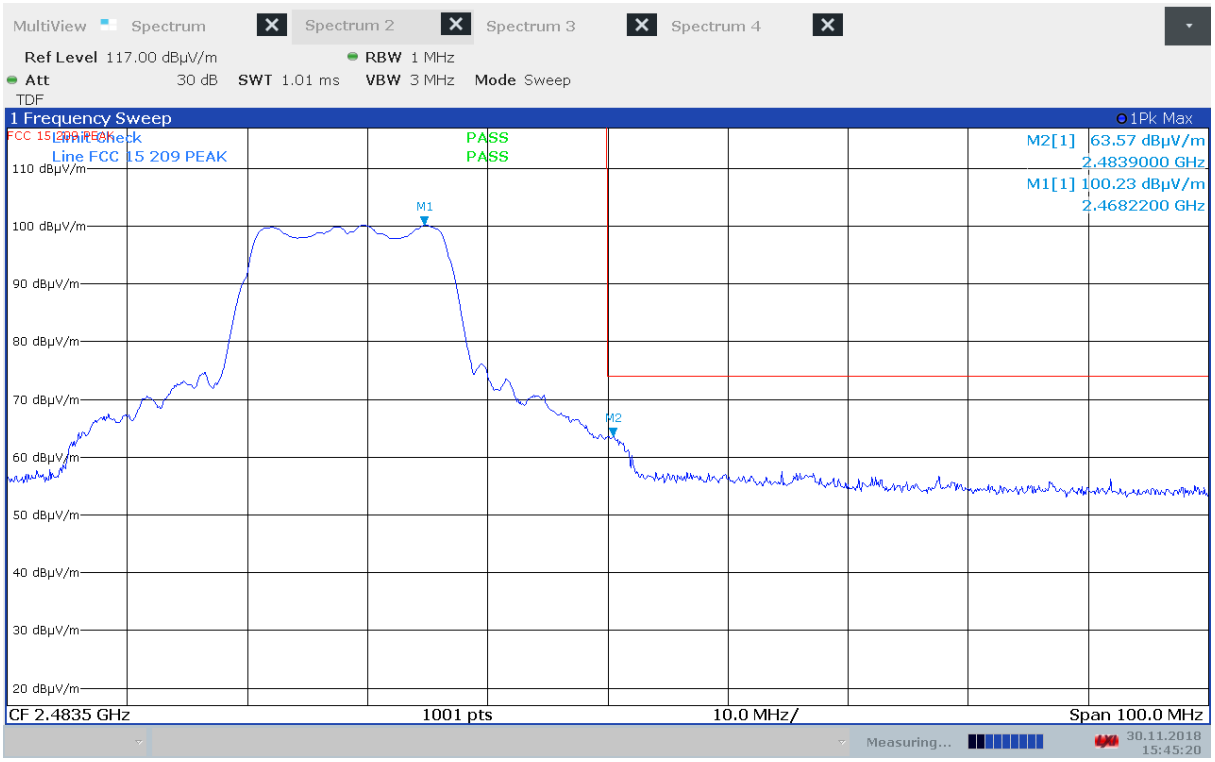
Lower Band Edge, Average, 2412 MHz, 802.11n, MCS0



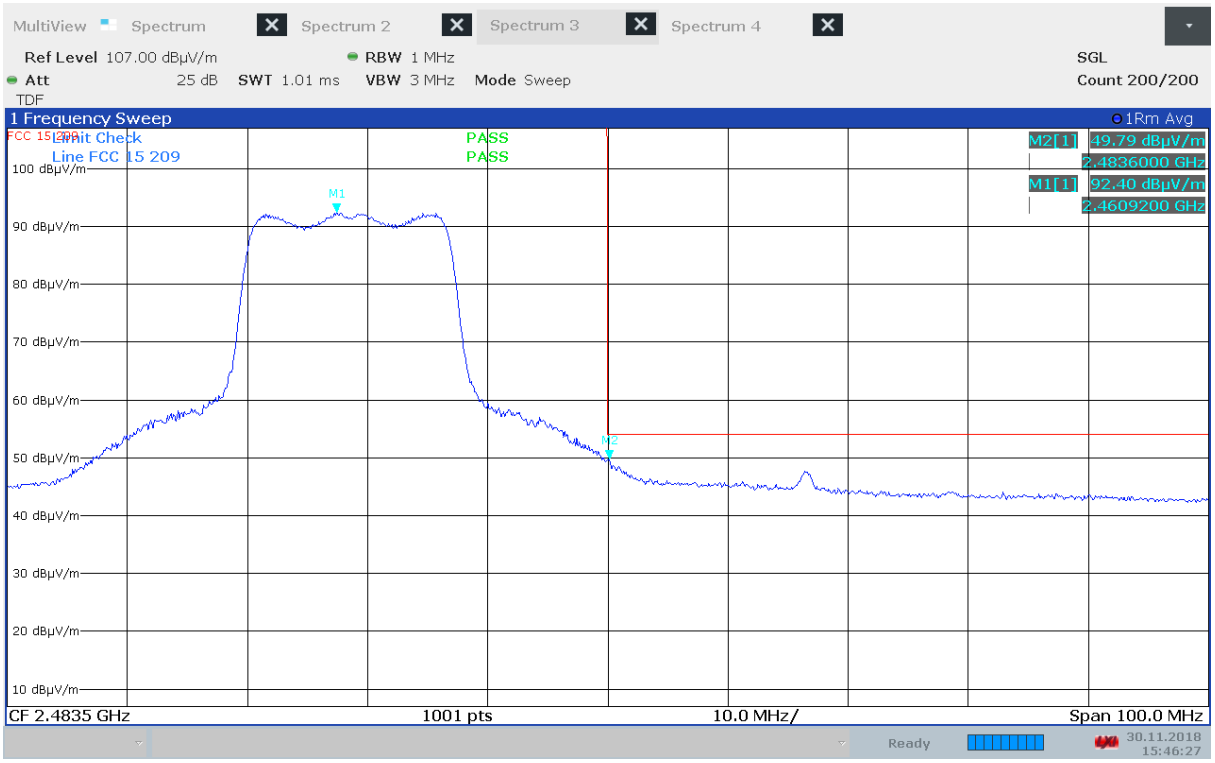
Upper Band Edge, Peak, 2462 MHz, 802.11b, 1Mbps



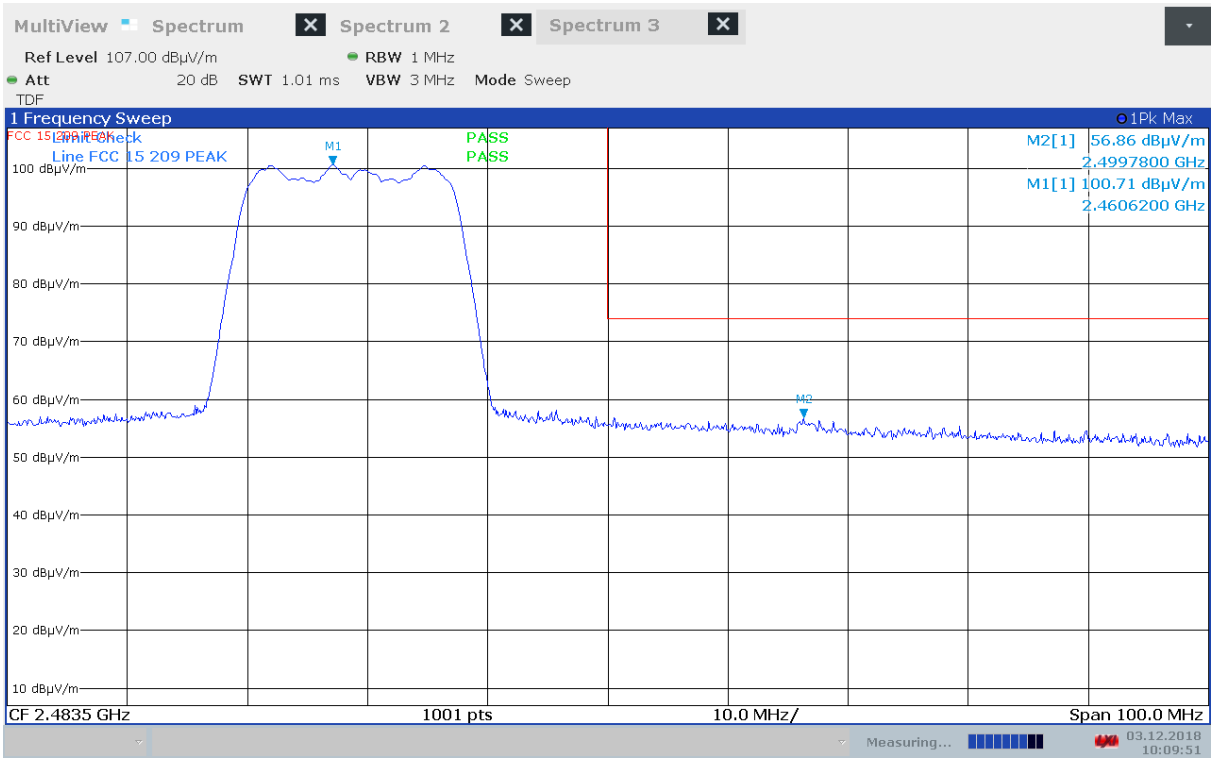
Upper Band Edge, Average, 2462 MHz, 802.11b, 1Mbps



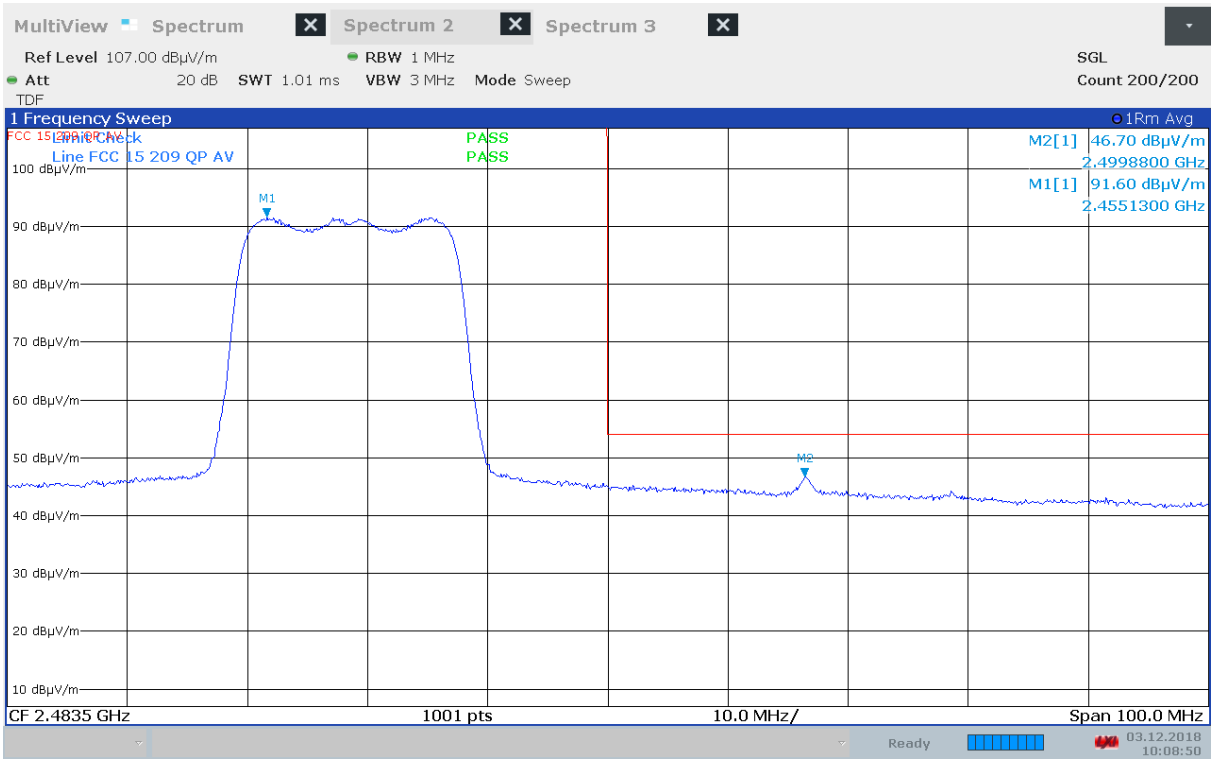
Upper Band Edge, Peak, 2462 MHz, 802.11g, 6Mbps



Upper Band Edge, Average, 2462 MHz, 802.11g, 6Mbps



Upper Band Edge, Peak, 2462 MHz, 802.11n, MCS0



Upper Band Edge, Average, 2462 MHz, 802.11n, MCS0

Radiated emission 30 – 1000 MHz.

Detector: Peak

Measuring distance 3 m

Tested in test mode with EUT transmitting on ch01

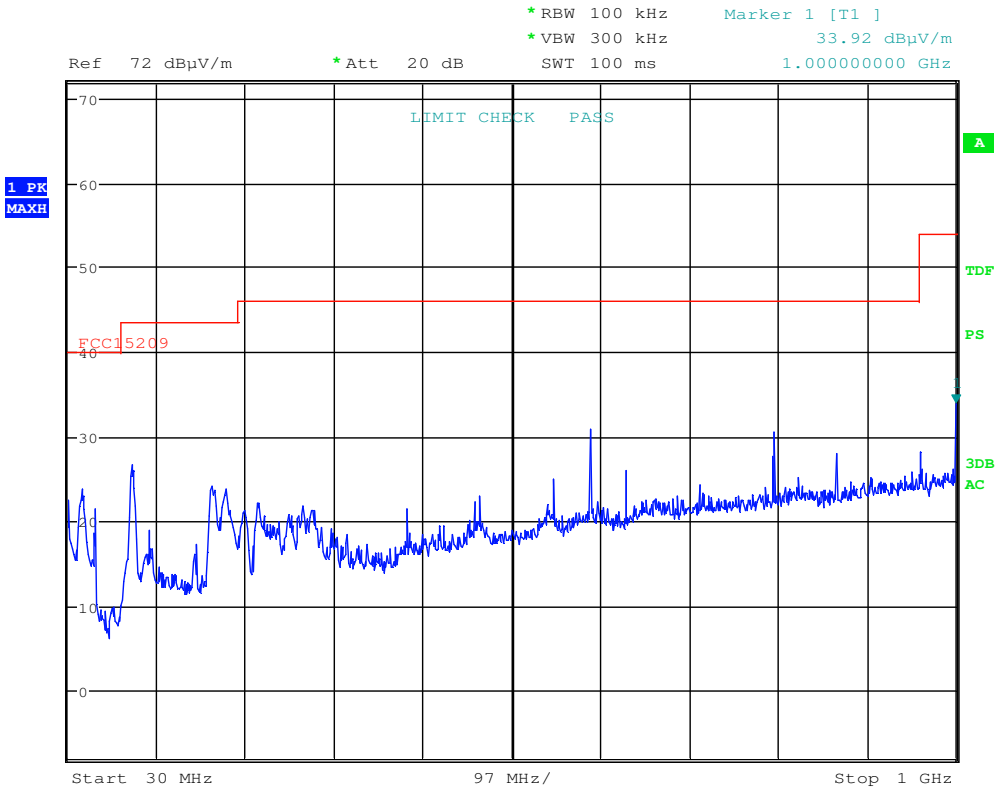
Measured Frequency (MHz)	Carrier Frequency (MHz)	Modulation	Measured Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
30 – 88	**2412**	**802.11a 6Mbps**	**< 25**	**40.0**	**>15**
88 – 216	**2412**	**802.11a 6Mbps**	**< 28**	**43.5**	**>15**
216 – 960	**2412**	**802.11a 6Mbps**	**< 31**	**46.0**	**>15**
960 – 1000	**2412**	**802.11a 6Mbps**	**< 34**	**54.0**	**>20**

See attached plots.

Requirements/Limit

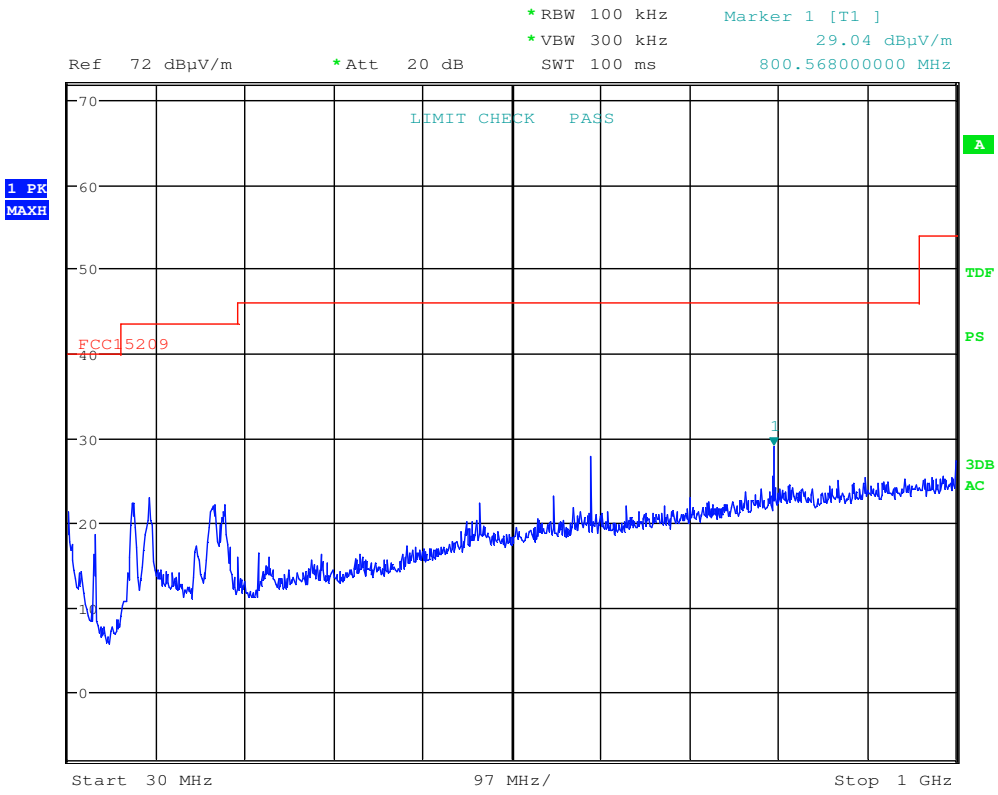
FCC	**Part 15.209 @ frequencies defined in §15.205**	
ISED	**RSS-GEN Issue 5, clause 8.9 @ frequencies defined in clause 8.10**	
	Radiated emission limit @3 meters	
Frequency (MHz)	**Quasi Peak (µV/m)**	**Quasi Peak (dBµV/m)**
30 – 88	100	40.0
88 – 216	150	43.5
216 – 960	200	46.0
Above 960	500	54.0

The limit above 1000 MHz is specified for Average Detector, when the measurement is performed with a Peak Detector a Duty-Cycle Correction Factor has to be calculated to find the corresponding Average Detector value.



Date: 30.NOV.2018 16:32:20

Radiated Emissions, 30 -1000 MHz, 2412 MHz, VP, 802.11b, 1Mbps



Date: 30.NOV.2018 16:34:24

Radiated Emissions, 30 -1000 MHz, 2412 MHz, HP, 802.11b, 1Mbps

Radiated Emissions, 1 - 25 GHz

Measuring distance: 3m (1 – 18 GHz)

A pre-scan was performed above 18 GHz and any found spuriouses were measured @1m

Peak Detector, RBW=1 MHz

Carrier Frequency	Measured Frequency	Modulation	Measured Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Any*	2132 MHz	Any	68.0	74	6.0
Any	Any other	Any	< 54	74	>20

*Worst case

Average Detector, RBW=1 MHz

Carrier Frequency	Measured Frequency	Modulation	Measured Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2412 MHz	19.3 GHz	802.11a 6Mbps	45.6	54	8.4
	Any other	Any other	< 44	54	>10
2437 MHz	19.5 GHz	802.11a 6Mbps	48.7	54	5.3
	Any other	Any other	< 44	54	>10
2462 MHz	19.7 GHz	802.11a 6Mbps	50.6	54	3.4
	Any other	Any other	< 44	54	>10
Any*	1600 MHz	Any	30.2	54	13.8
Any*	2132 MHz	Any	53.6	54	0.4

*Same value for all modulations and carrier frequencies

Measured results are for 802.11a 6 Mbps and 802.11n MCS0, it was checked that other modulations and/or bitrates did not produce higher emissions.

A Band Reject Filter was used for measurements from 1 GHz to 4 GHz and a High Pass Filter was used from 3 GHz to 18 GHz.

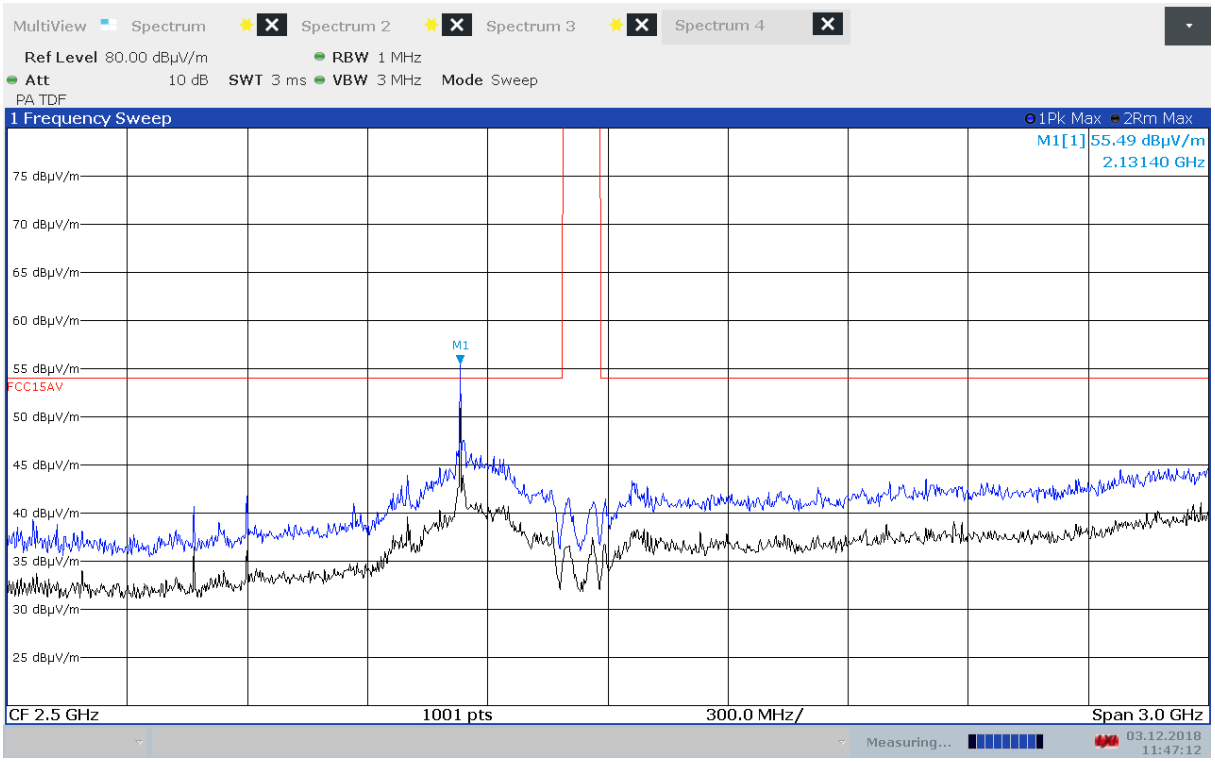
Only harmonics that fall in the restricted bands (ref. §15.205) have been measured.

Antenna factor, amplifier gain and cable loss are included in Spectrum Analyzer “Transducer factor”.

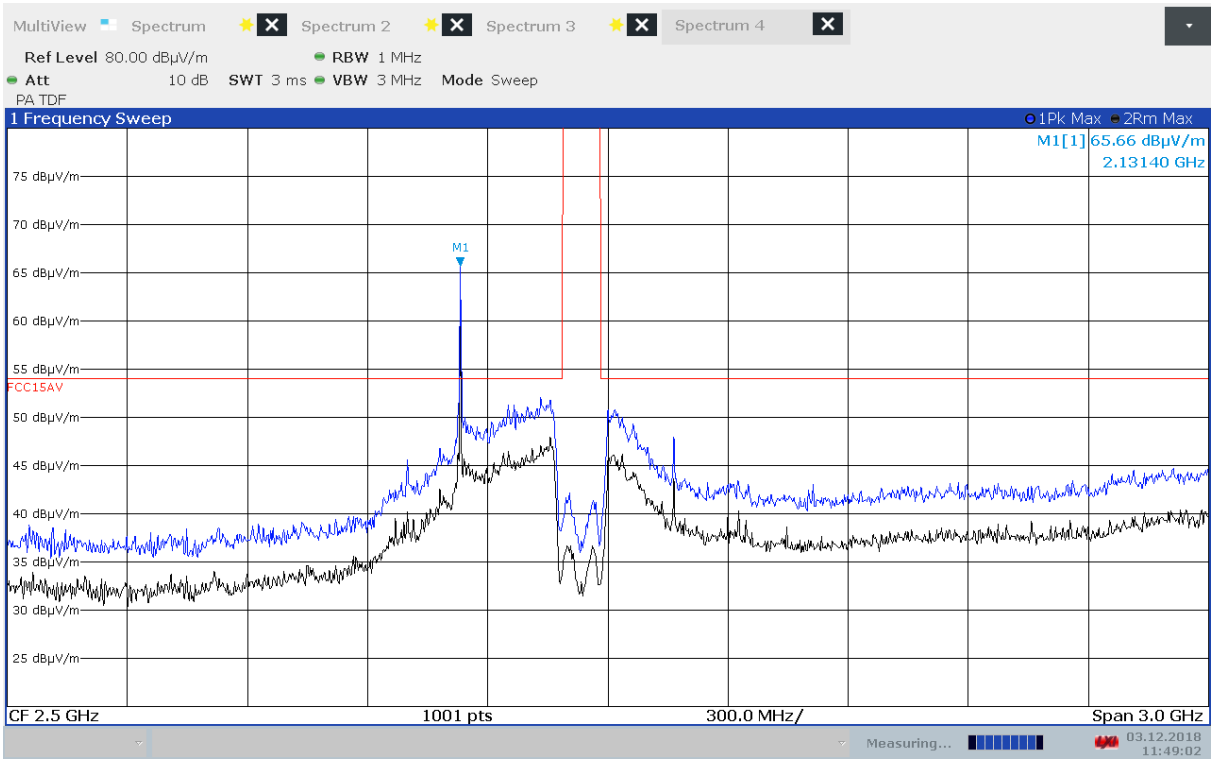
See attached plots.

Requirements/Limit

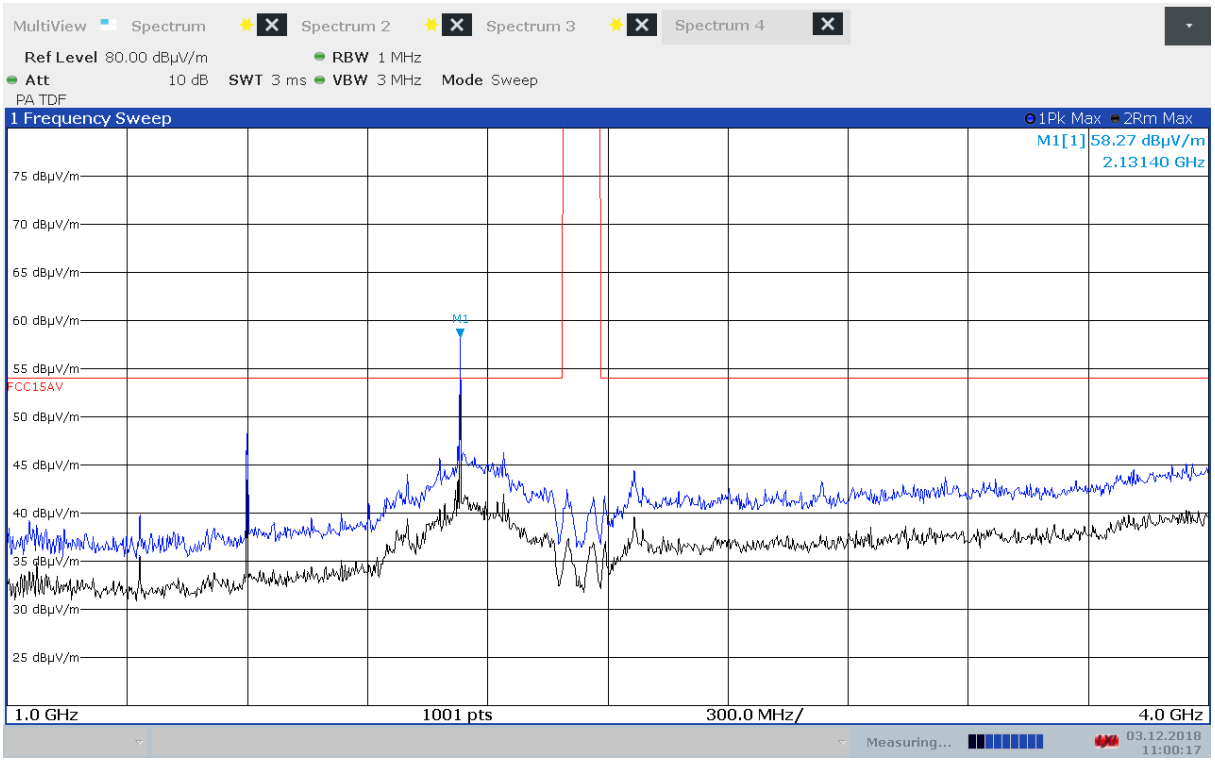
FCC	Part 15.209 @ frequencies defined in §15.205	
ISED	RSS-GEN Issue 5, clause 8.9 @ frequencies defined in clause 8.10	
	Radiated emission limit @3 meters	
Frequency (MHz)	AV (dBµV/m)	Peak (dBµV/m)
Above 1 GHz	54.0	74.0



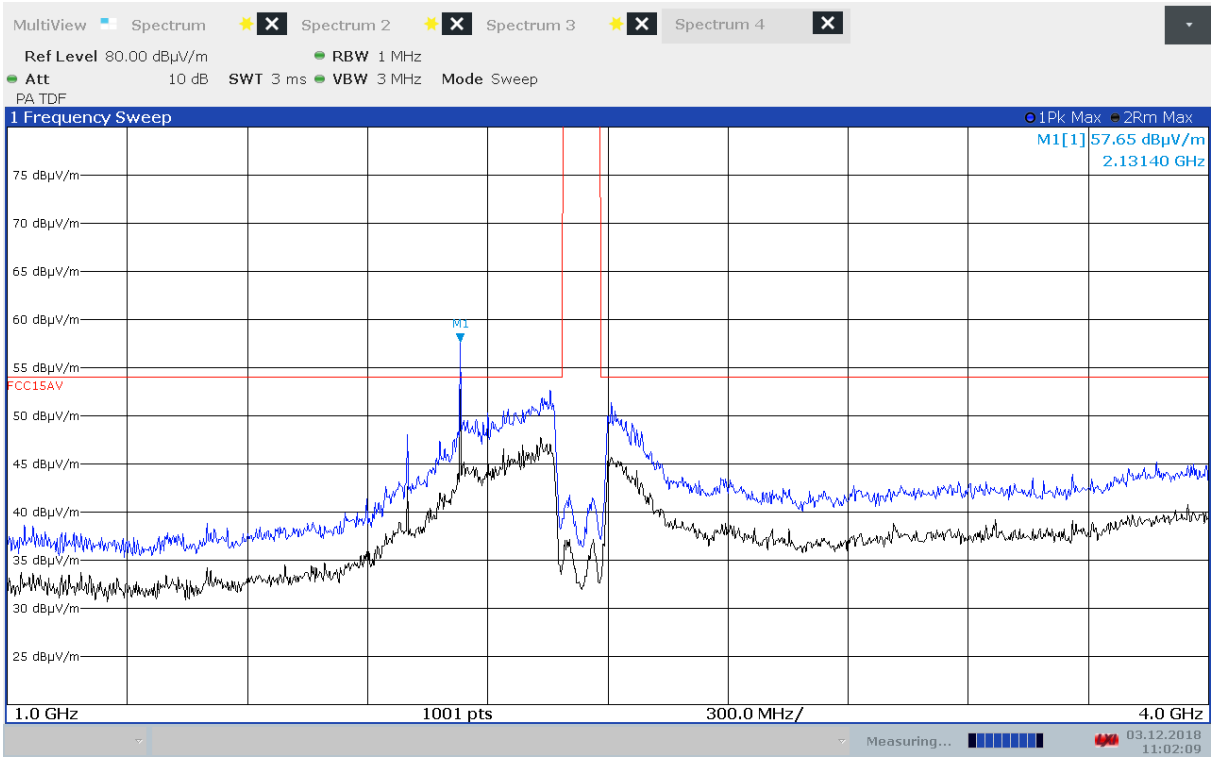
Radiated Emissions, 1000 -4000 MHz, 2412 MHz, VP, 802.11b, 1Mbps



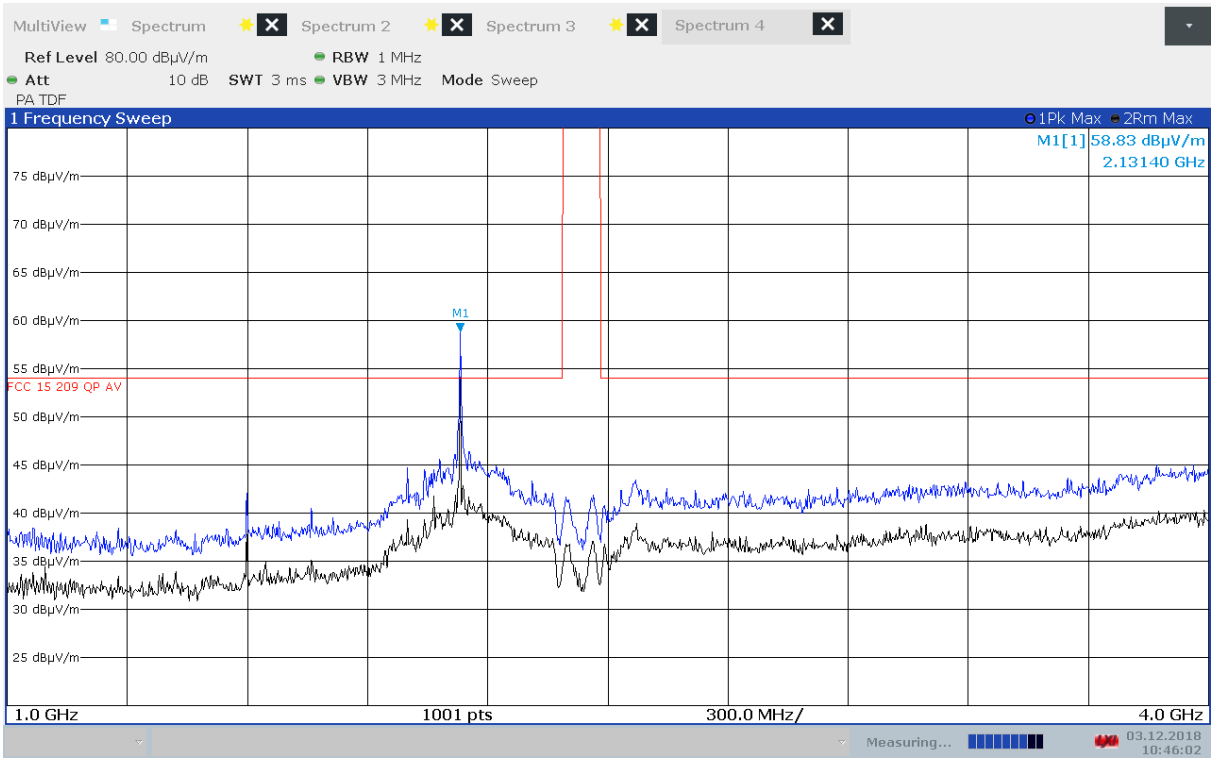
Radiated Emissions, 1000 -4000 MHz, 2412 MHz, HP, 802.11b, 1Mbps



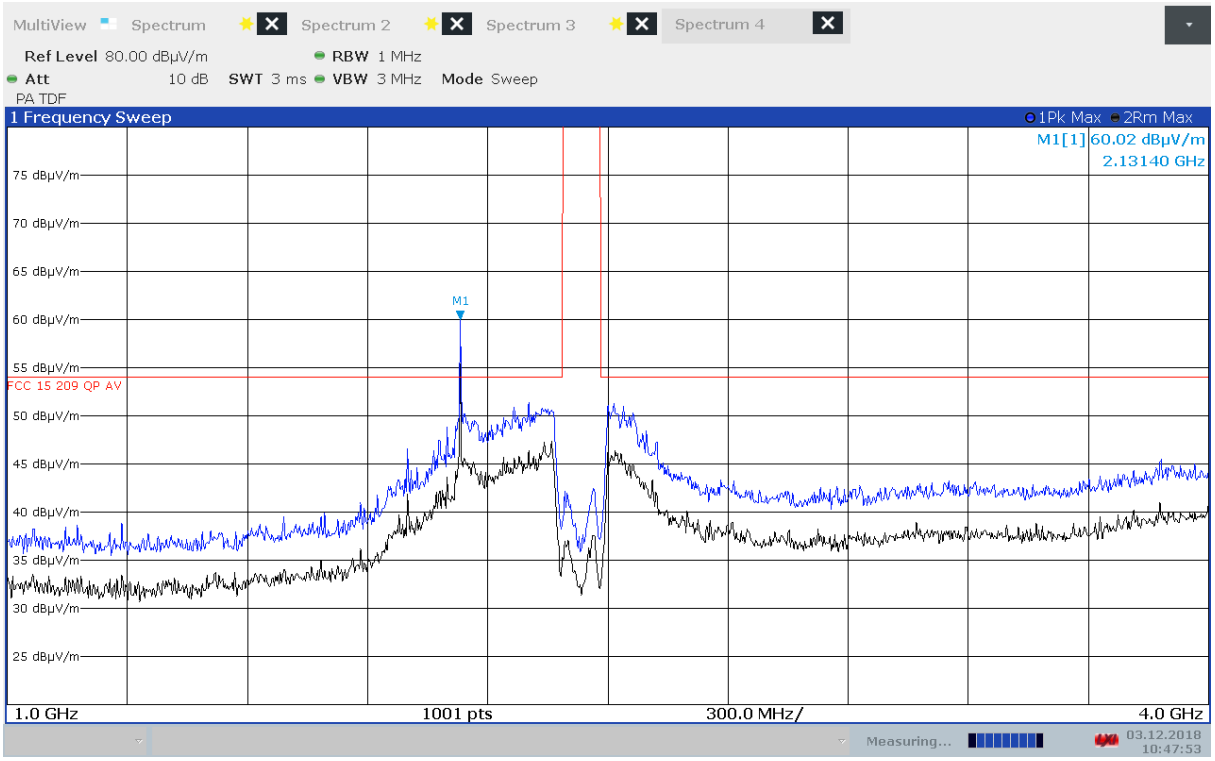
Radiated Emissions, 1000 -4000 MHz, 2412 MHz, VP, 802.11g, 6Mbps



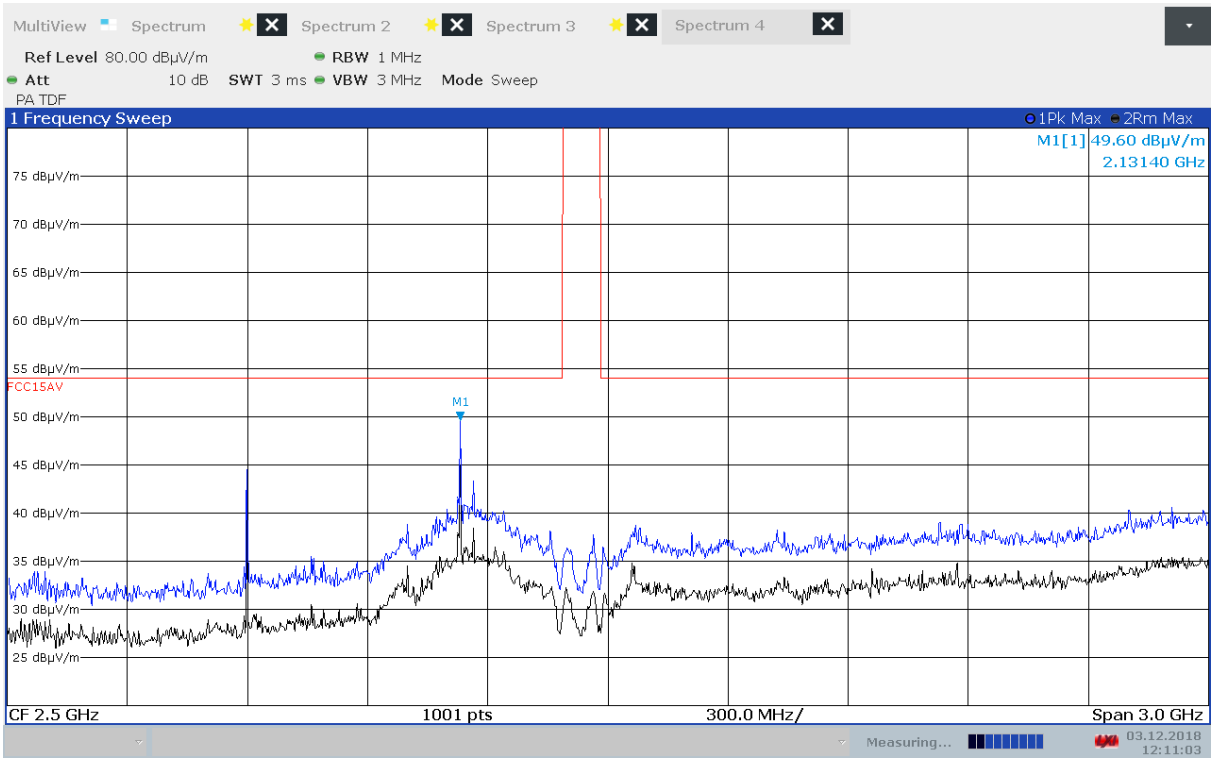
Radiated Emissions, 1000 -4000 MHz, 2412 MHz, HP, 802.11g, 6Mbps



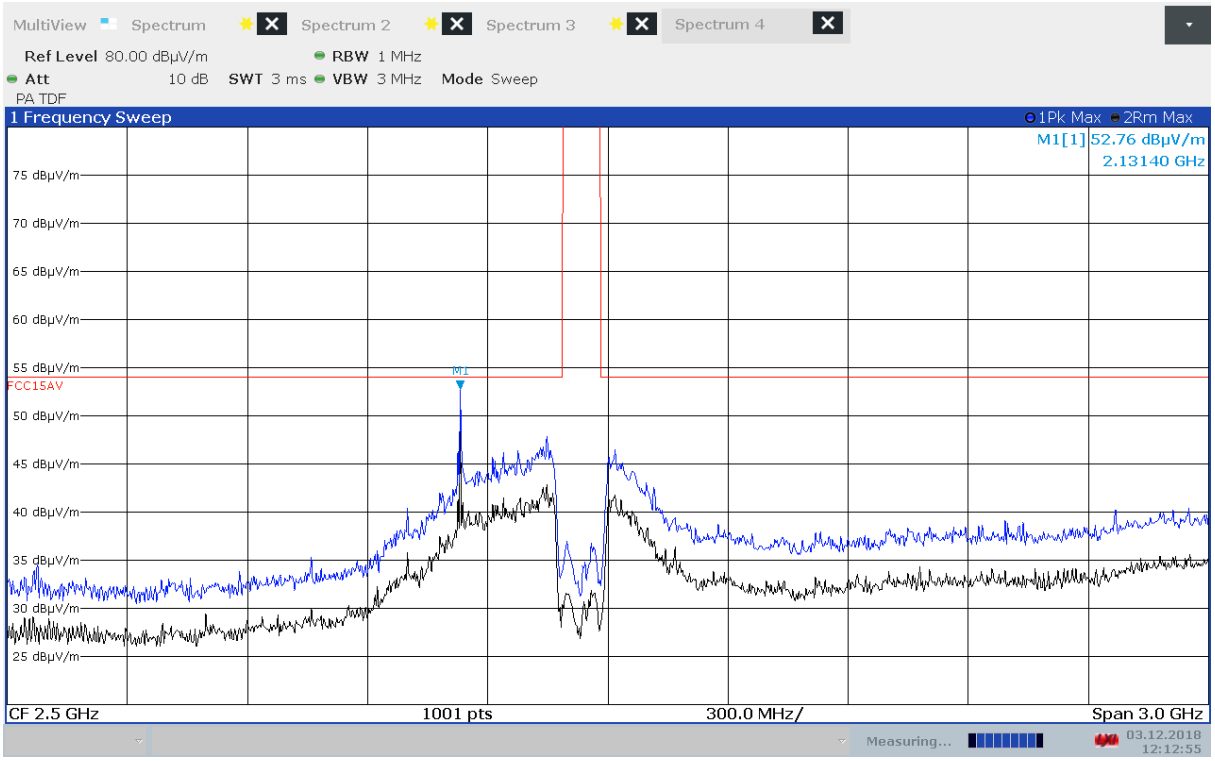
Radiated Emissions, 1000 -4000 MHz, 2412 MHz, VP, 802.11n, MCS0



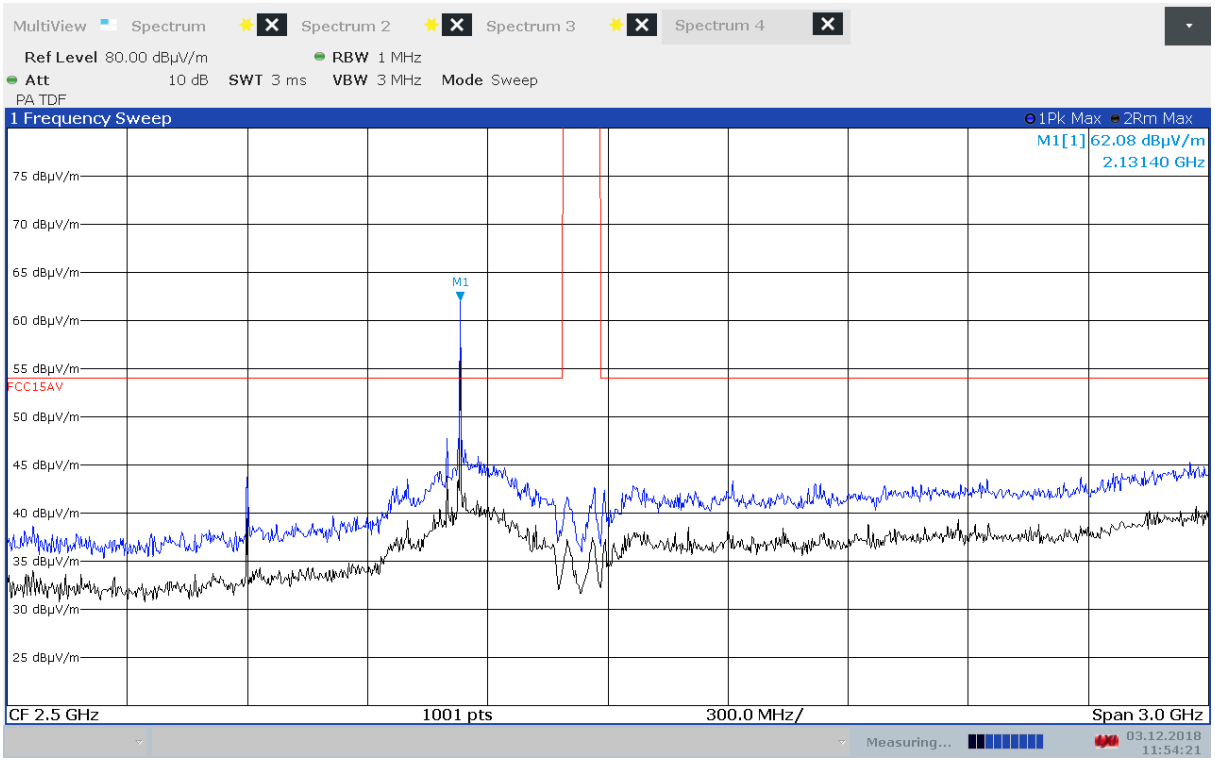
Radiated Emissions, 1000 -4000 MHz, 2412 MHz, HP, 802.11n, MCS0



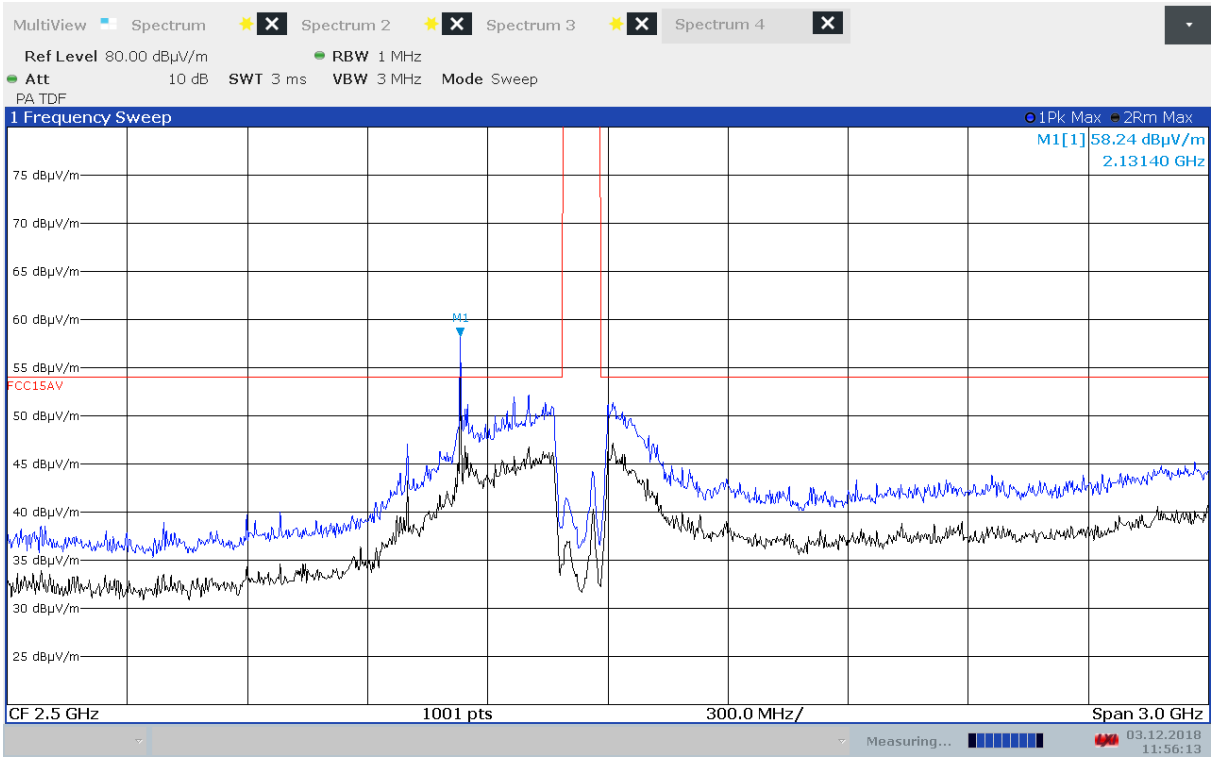
Radiated Emissions, 1000 -4000 MHz, 2437 MHz, VP, 802.11b, 1Mbps



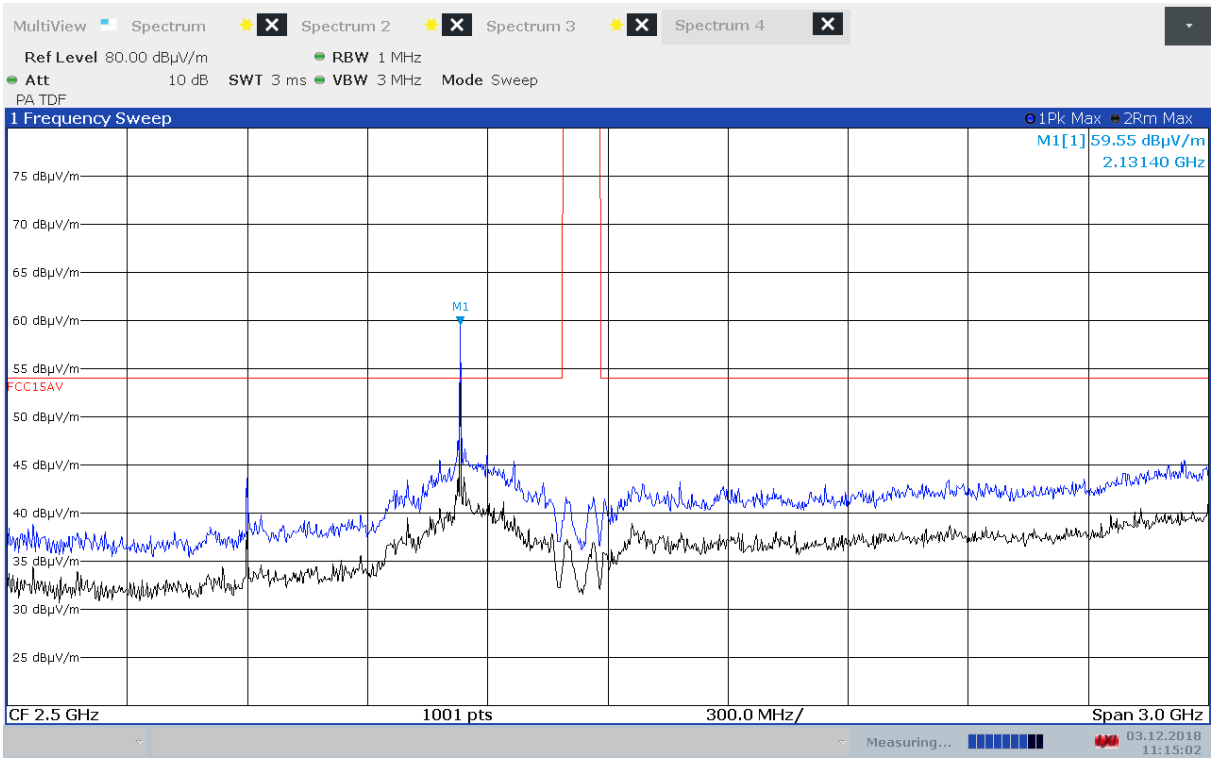
Radiated Emissions, 1000 -4000 MHz, 2437 MHz, HP, 802.11b, 1Mbps



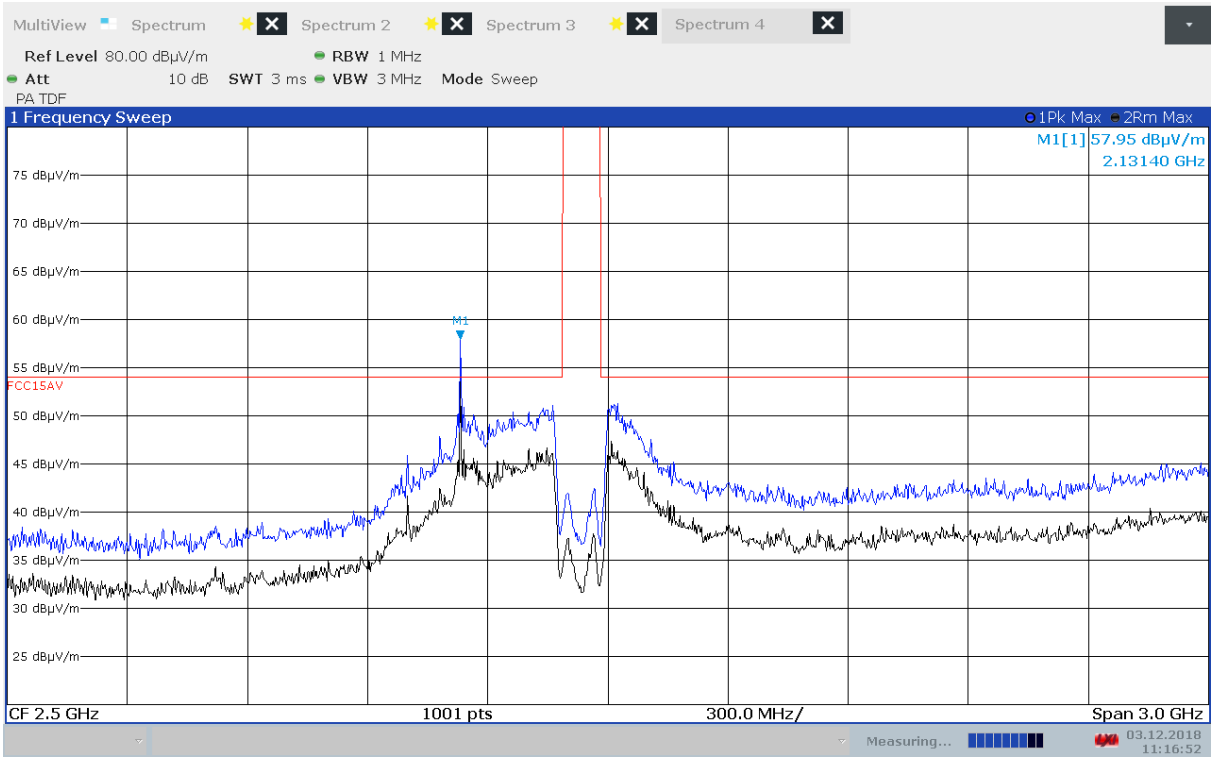
Radiated Emissions, 1000 -4000 MHz, 2462 MHz, VP, 802.11b, 1Mbps



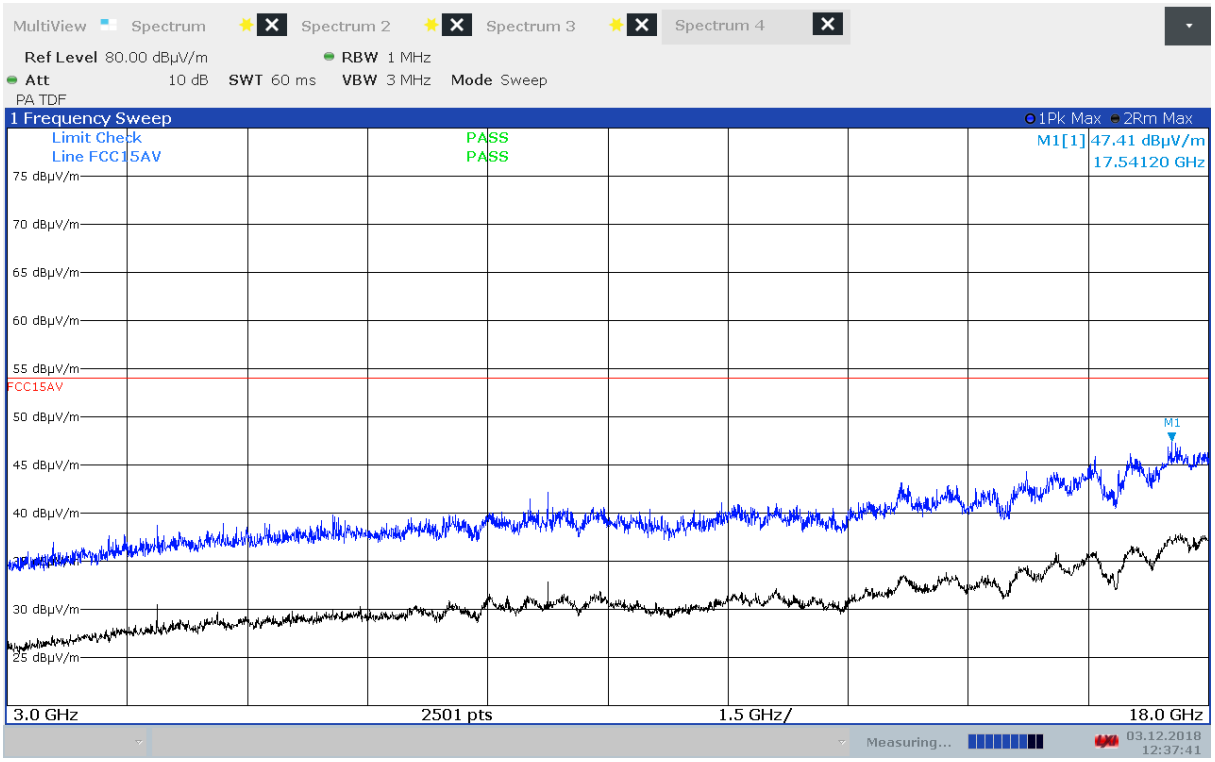
Radiated Emissions, 1000 -4000 MHz, 2462 MHz, HP, 802.11b, 1Mbps



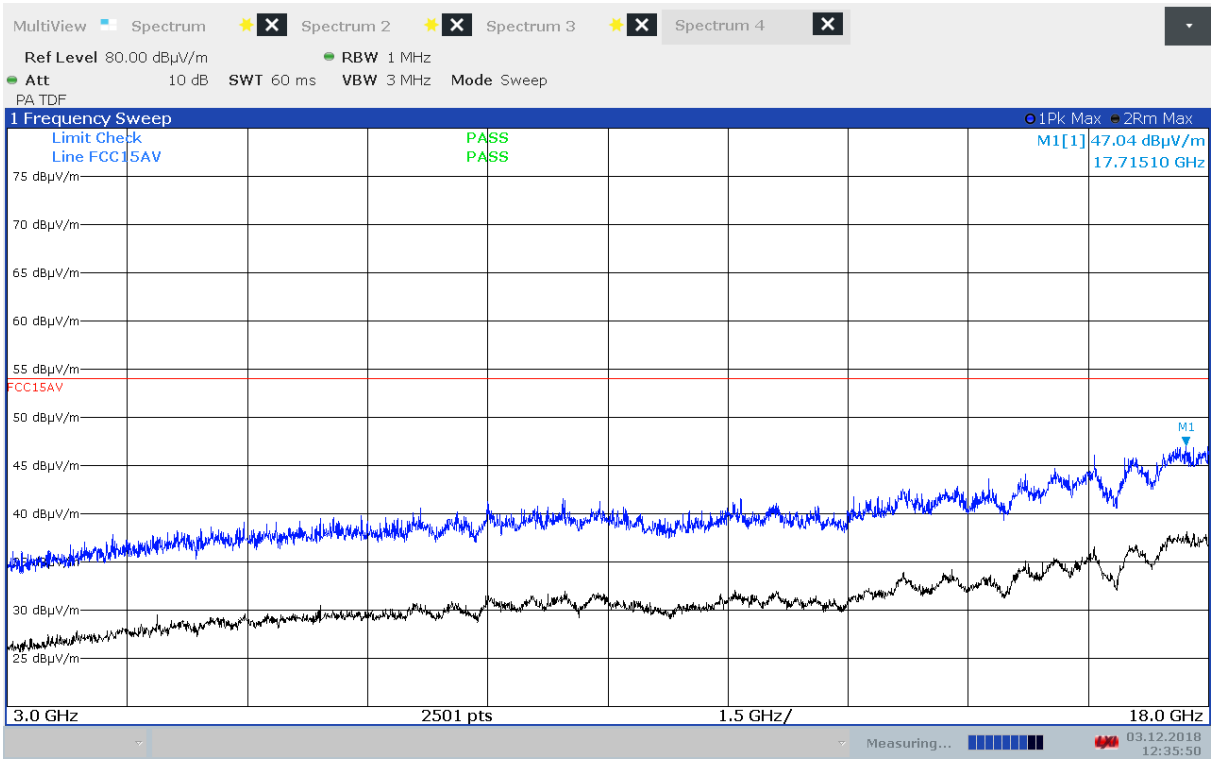
Radiated Emissions, 1000 -4000 MHz, 2462 MHz, VP, 802.11g, 6Mbps



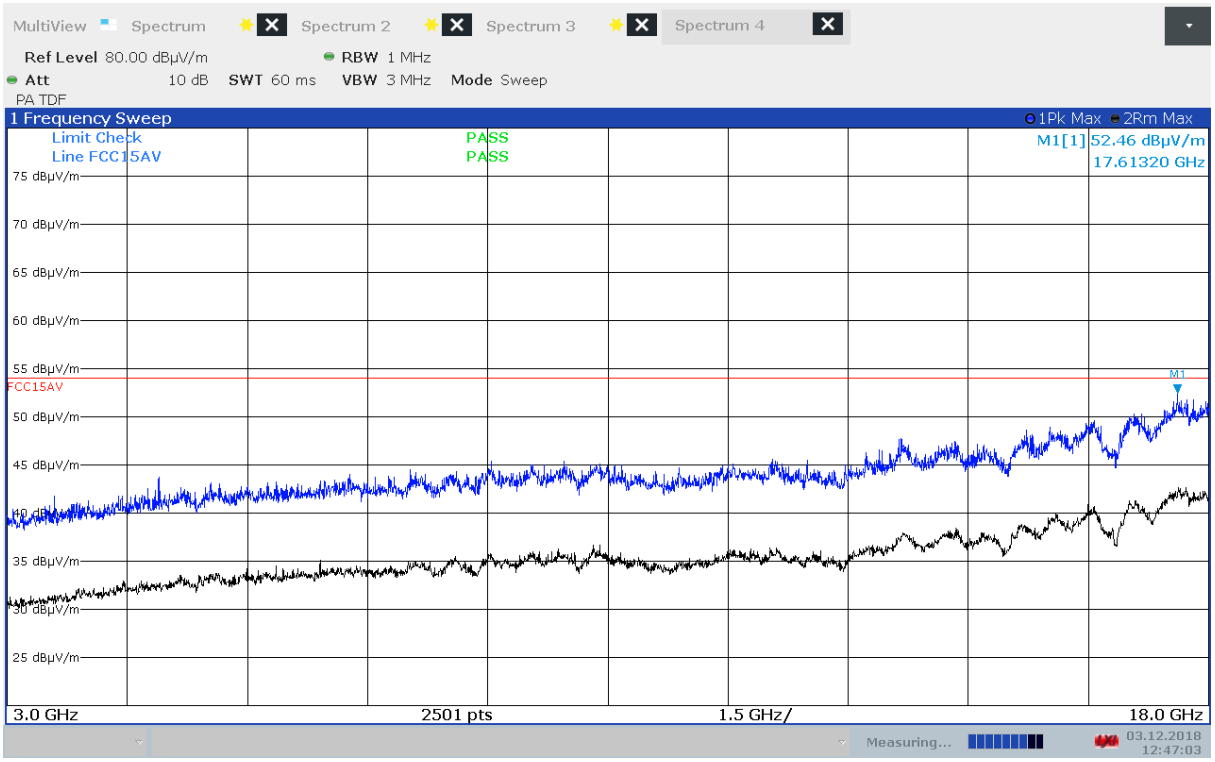
Radiated Emissions, 1000 -4000 MHz, 2462 MHz, HP, 802.11g, 6Mbps



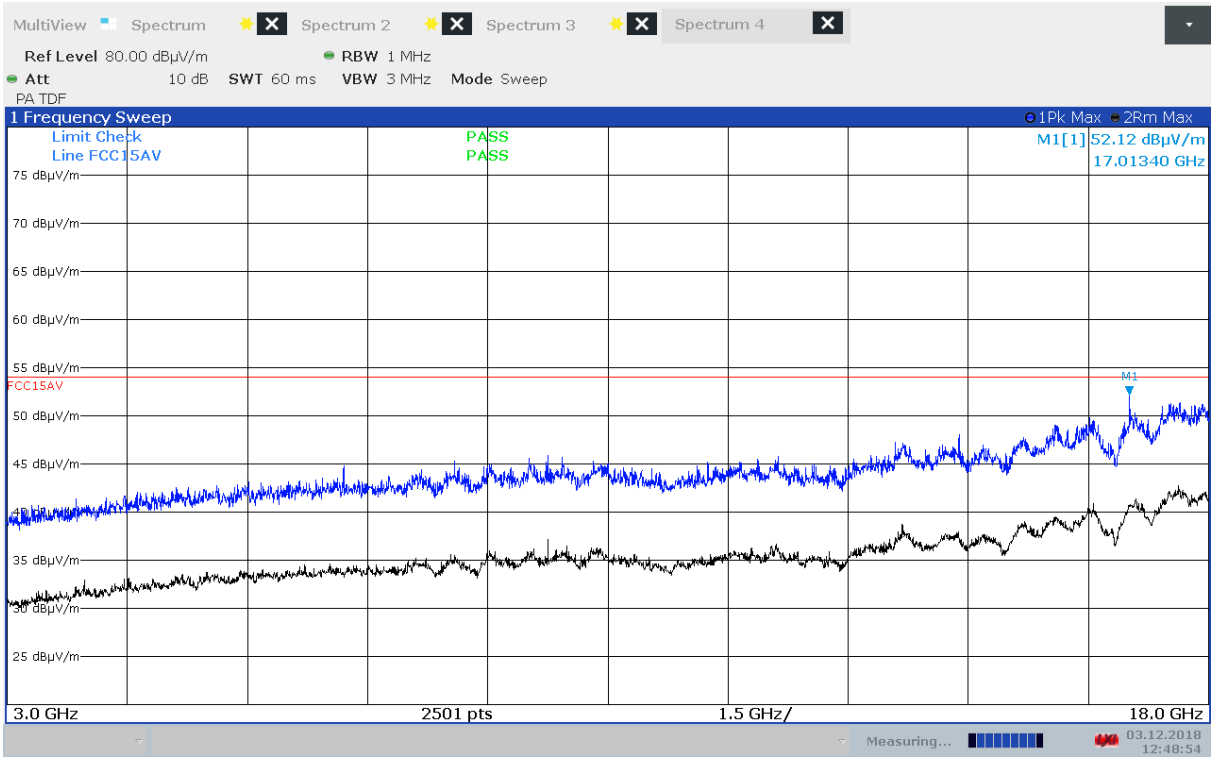
Radiated Emissions, 3000 -18000 MHz, 2437 MHz, VP, 802.11b, 1Mbps



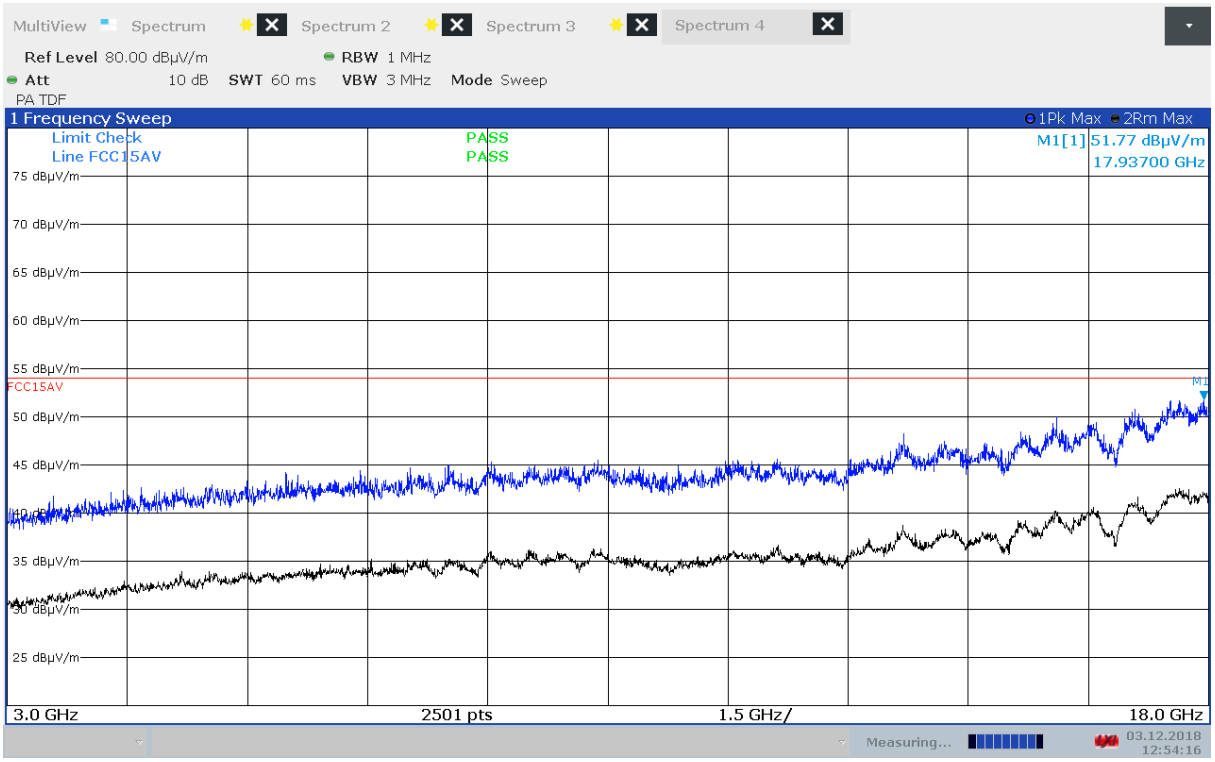
Radiated Emissions, 3000 -18000 MHz, 2437 MHz, HP, 802.11b, 1Mbps



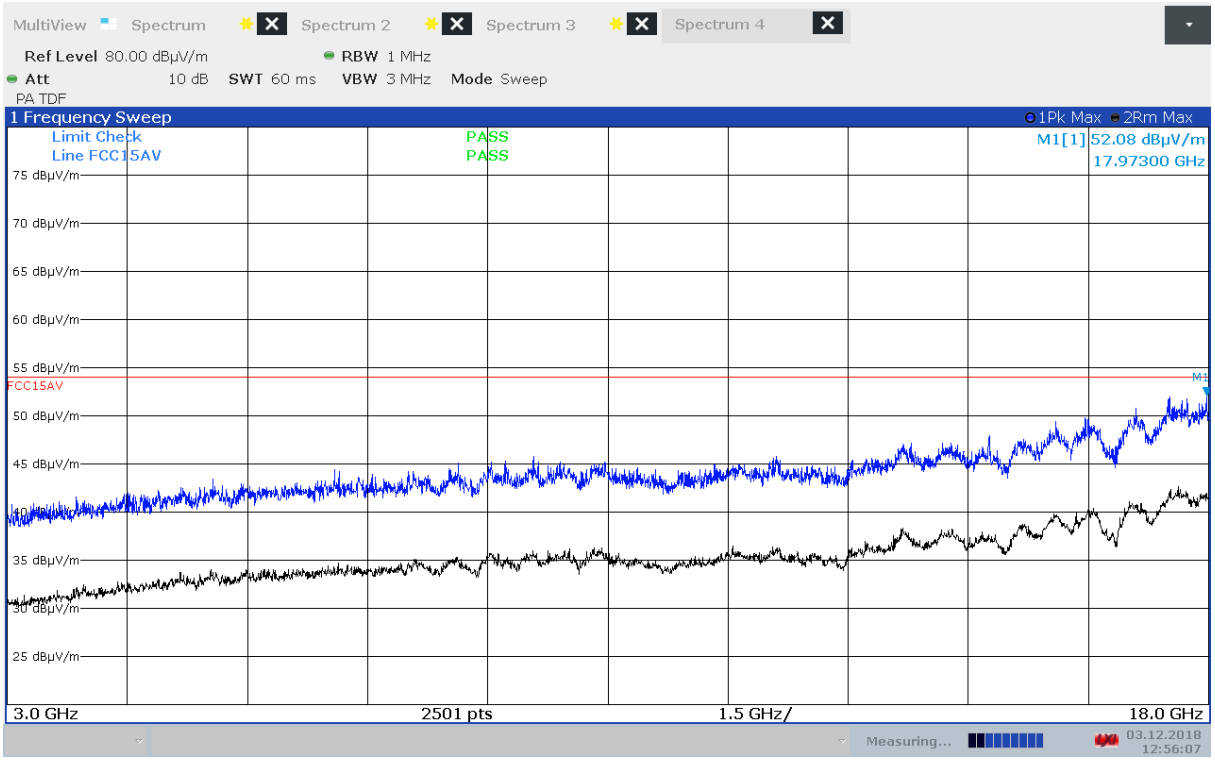
Radiated Emissions, 3000 -18000 MHz, 2437 MHz, VP, 802.11g, 6Mbps



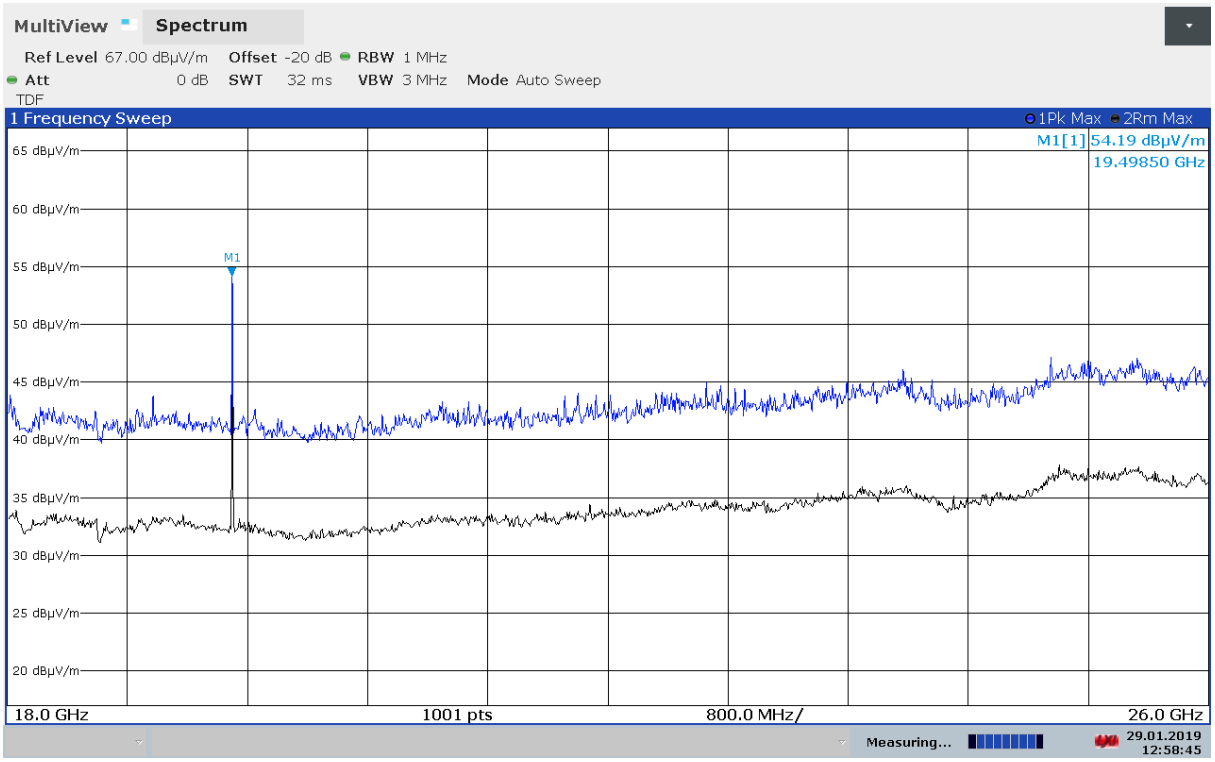
Radiated Emissions, 3000 -18000 MHz, 2437 MHz, HP, 802.11g, 6Mbps



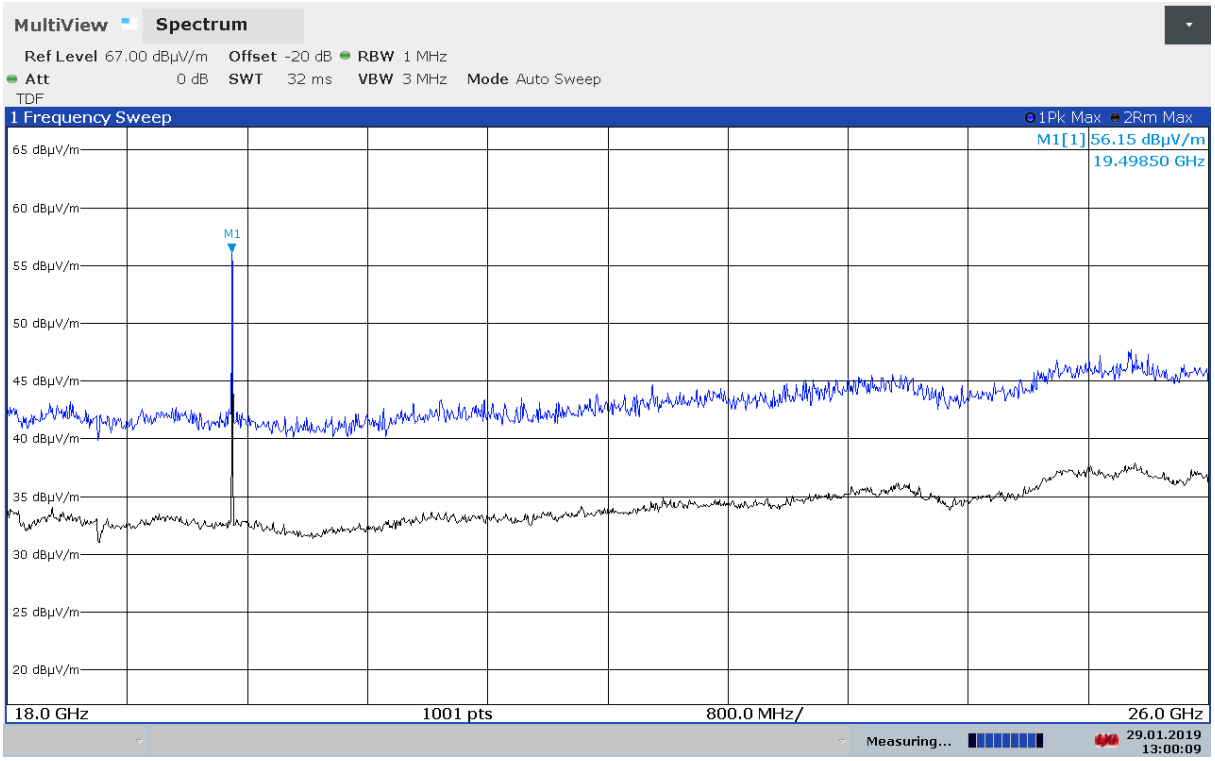
Radiated Emissions, 3000 -18000 MHz, 2437 MHz, VP, 802.11n, MCS0



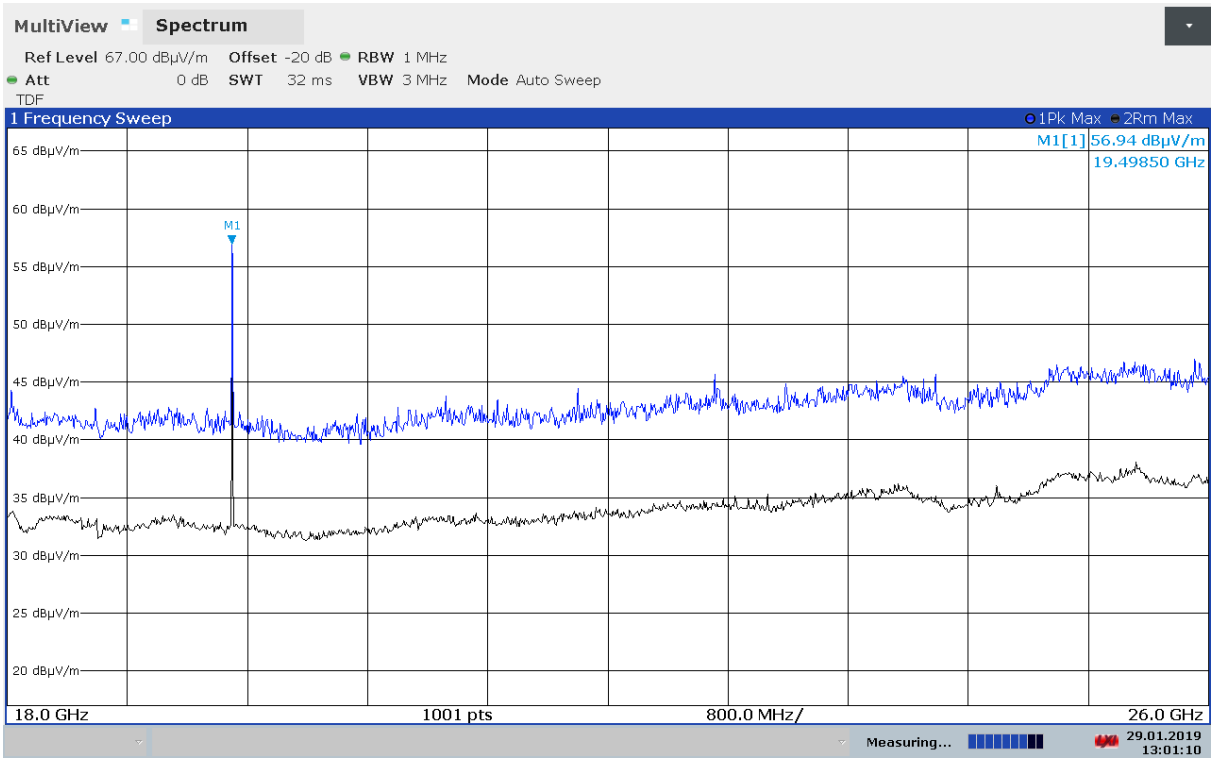
Radiated Emissions, 3000 -18000 MHz, 2437 MHz, HP, 802.11n, MCS0



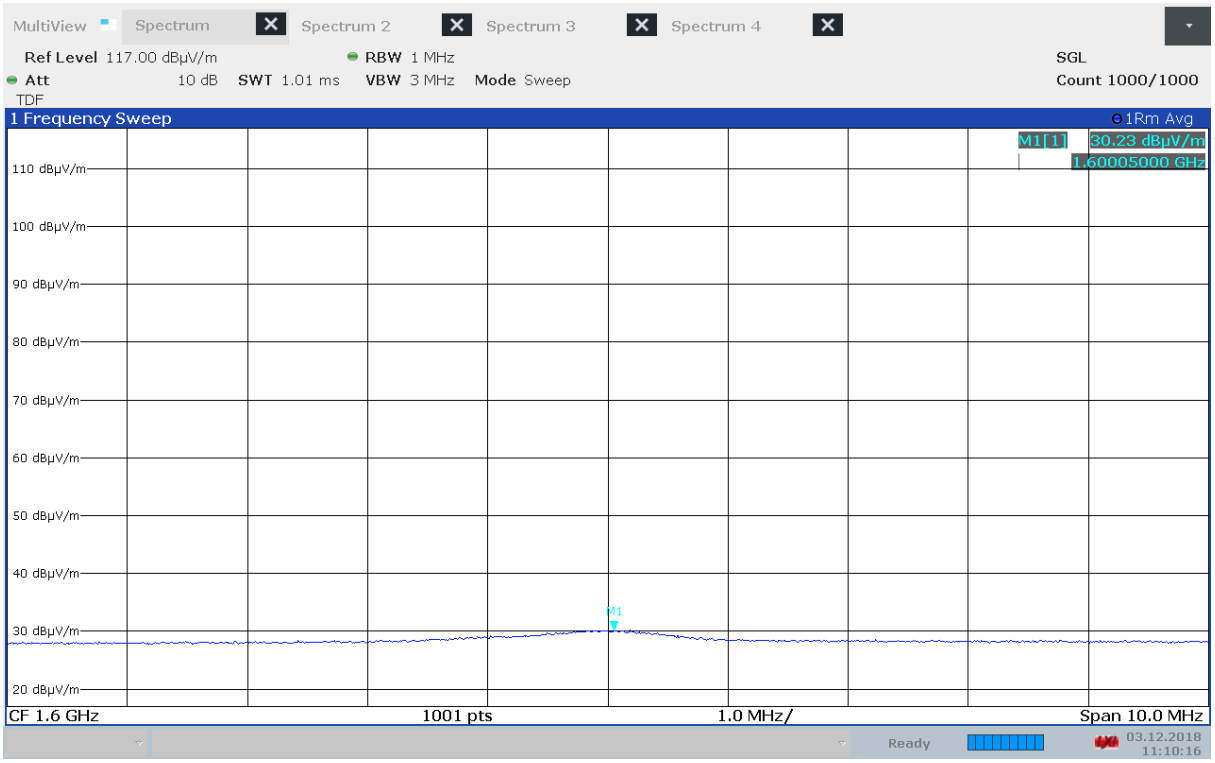
Pre-scan, 18000 -25000 MHz, 802.11b, 1Mbps



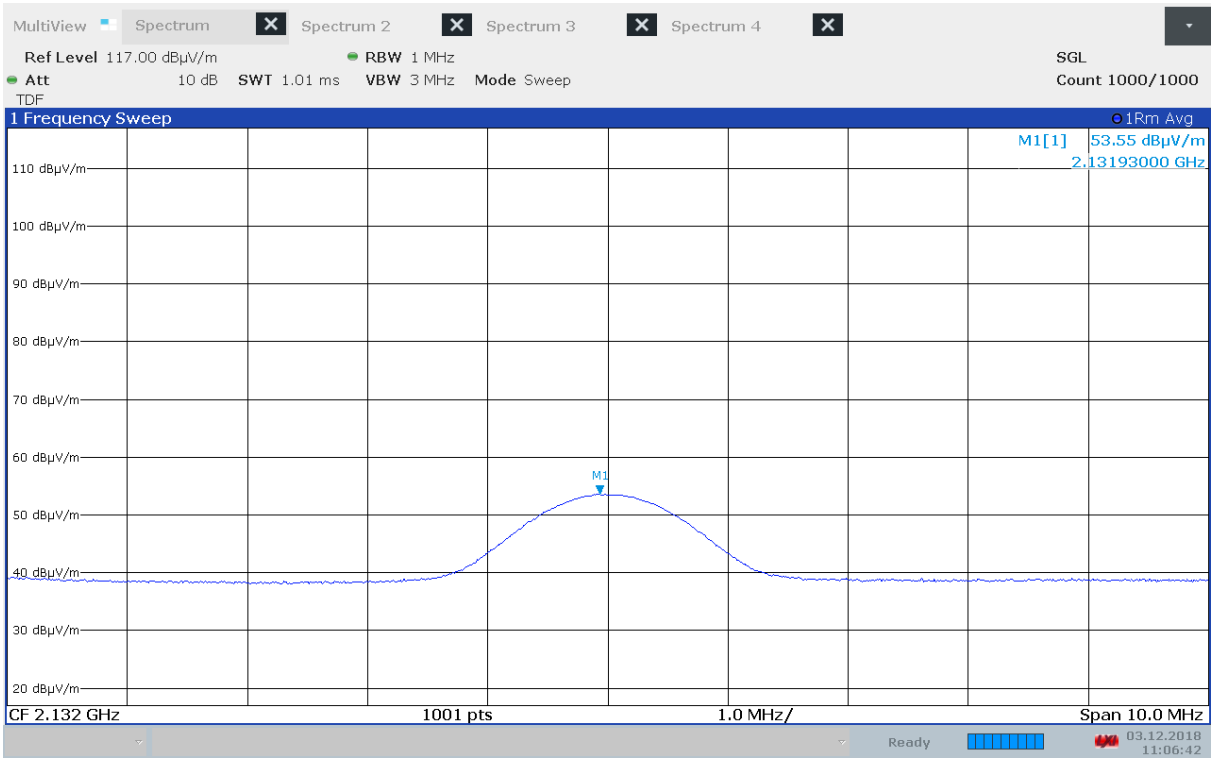
Pre-scan, 18000 -25000 MHz, 802.11g, 6Mbps



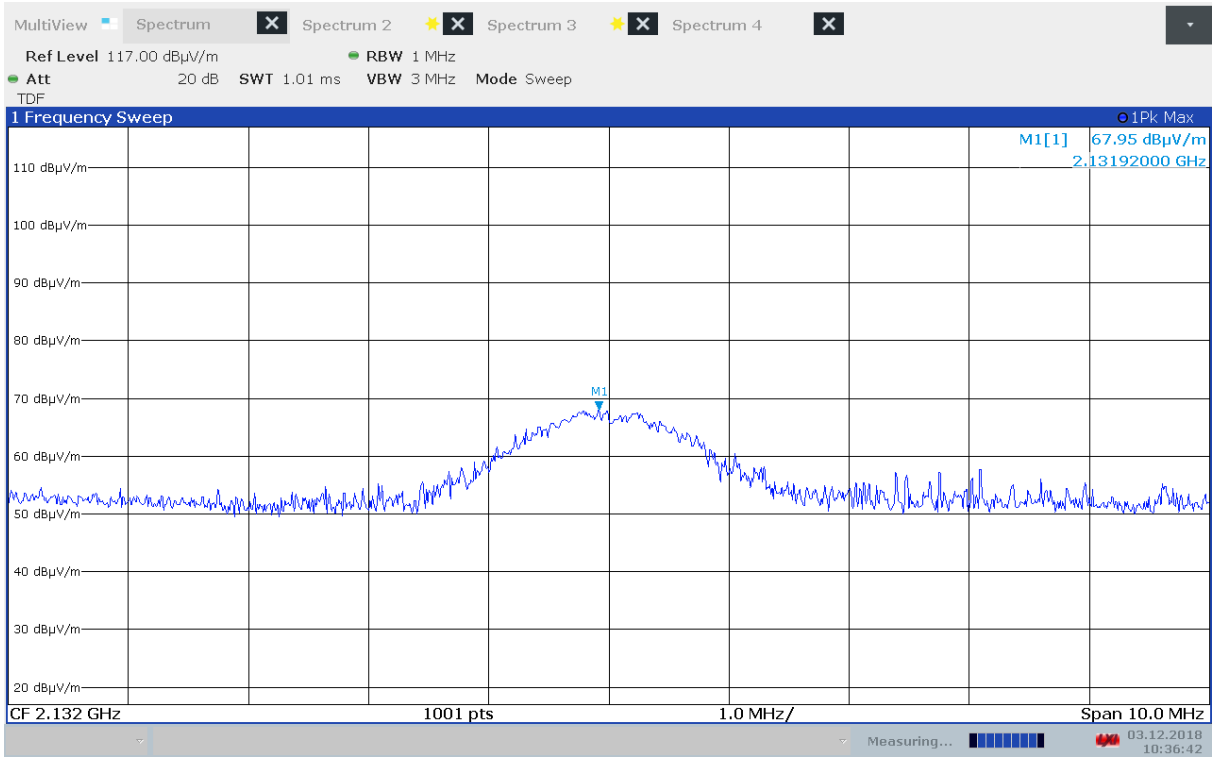
Pre-scan, 18000 -25000 MHz, 802.11n, MCS0



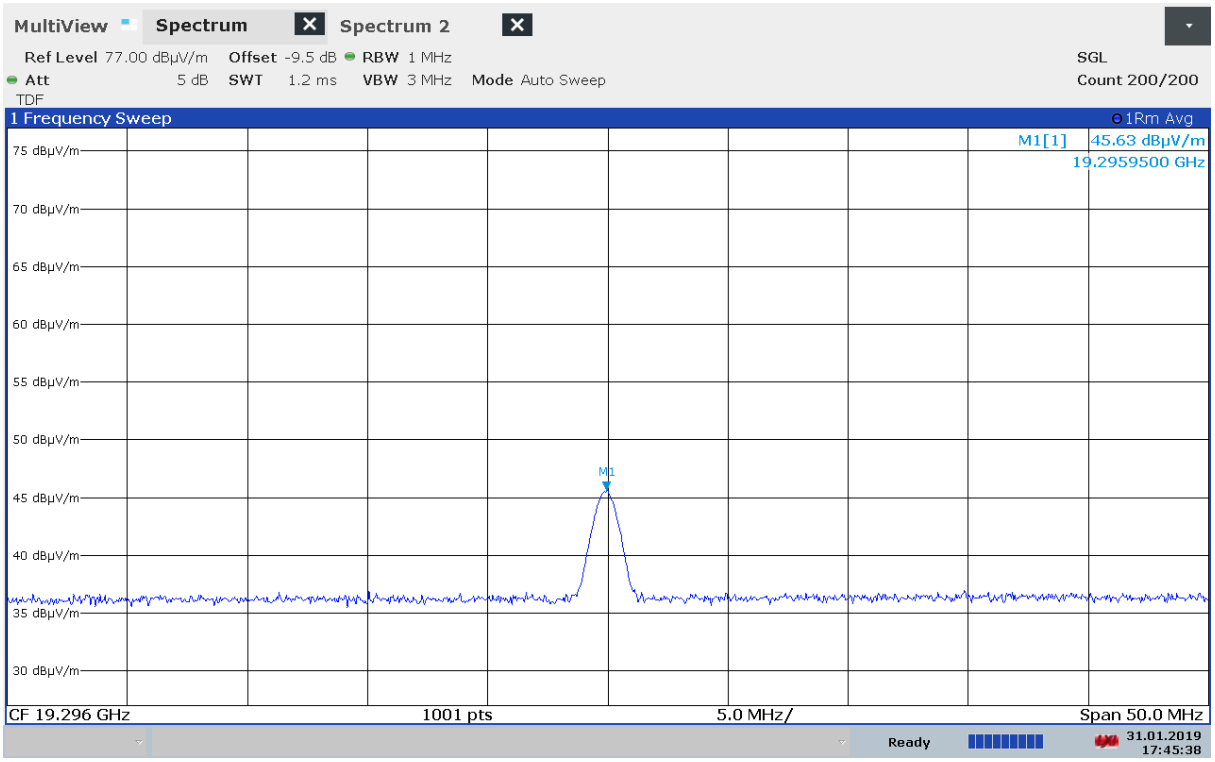
Radiated Emissions, 1600 MHz, 2412 MHz, 802.11g, 6Mbps (Max: VP), Average



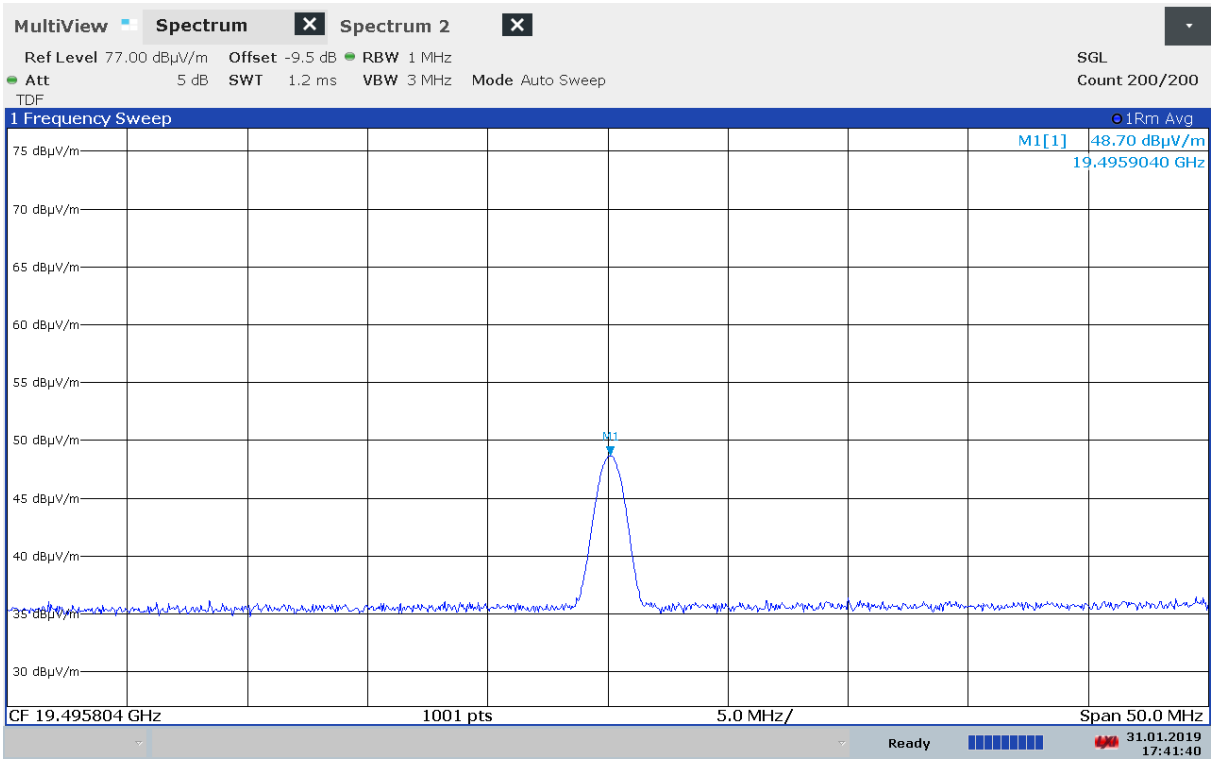
Radiated Emissions, 2132 MHz, 2412 MHz, 802.11g, 6Mbps (Max: HP), Average



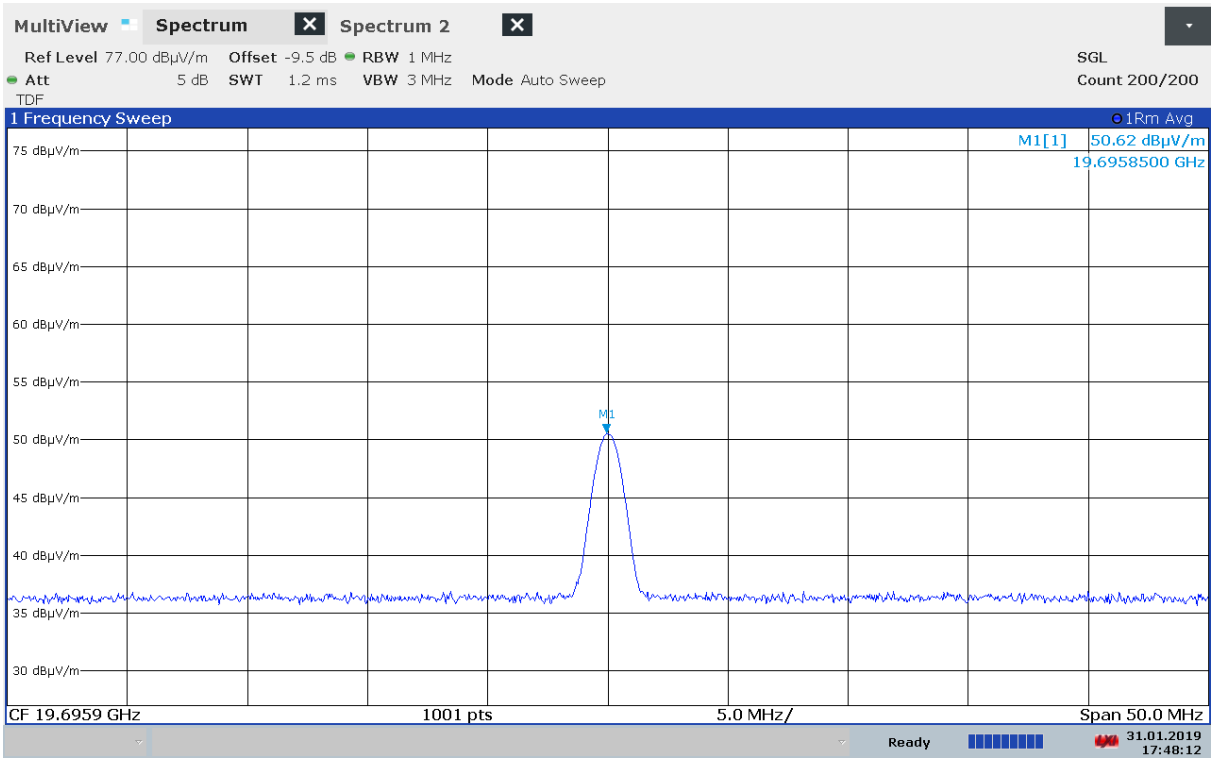
Radiated Emissions, 2132 MHz, 2412 MHz, 802.11g, 6Mbps (Max: HP), Peak



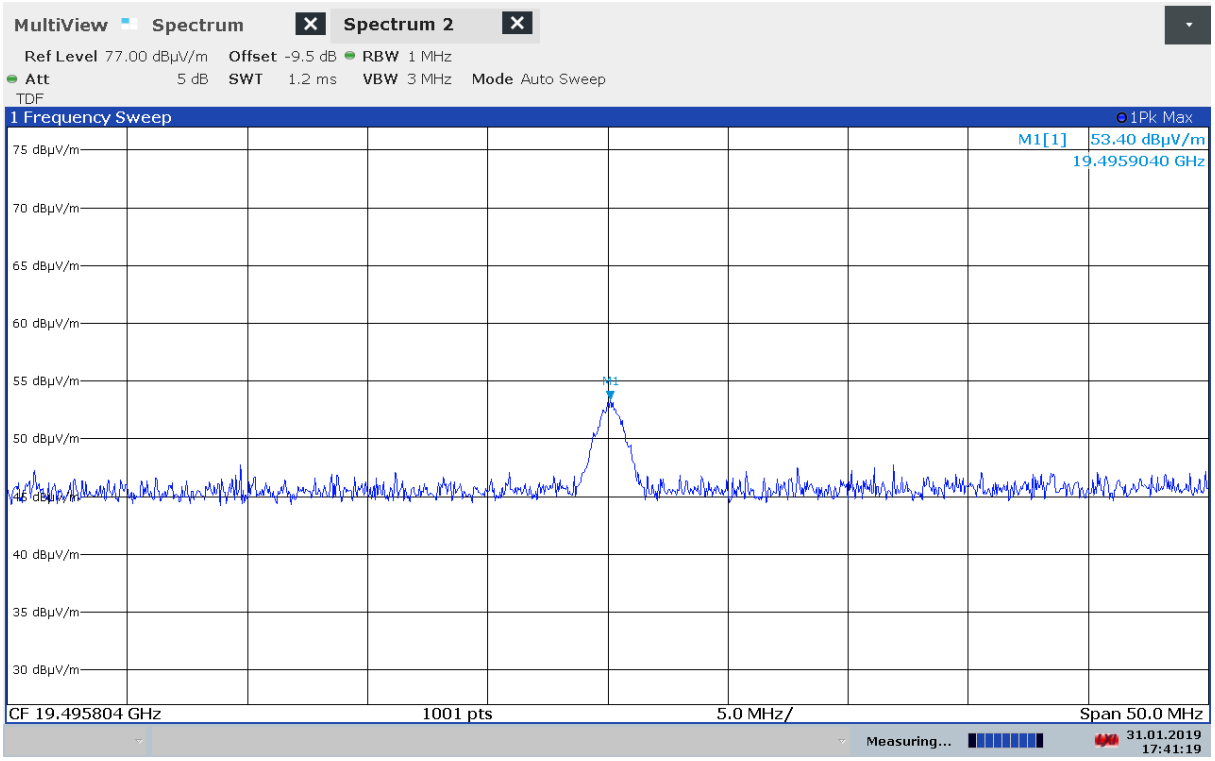
Radiated Emissions, 19.3 GHz, 2412 MHz, 802.11g, 6Mbps (Max: HP), Average, @1m



Radiated Emissions, 19.5 GHz, 2437 MHz, 802.11n, MCS0 (Max: HP), Average, @1m



Radiated Emissions, 19.7 GHz, 2462 MHz, 802.11g, 6Mbps (Max: HP), Average, @1m



Radiated Emissions, 19.5 GHz, 2437 MHz, 802.11g, 6Mbps (Max: HP), Peak, @1m

3.8 Power Spectral Density (PSD)

FCC part 15.247(e)

Test Results: Passed

Measured and Calculated Data:

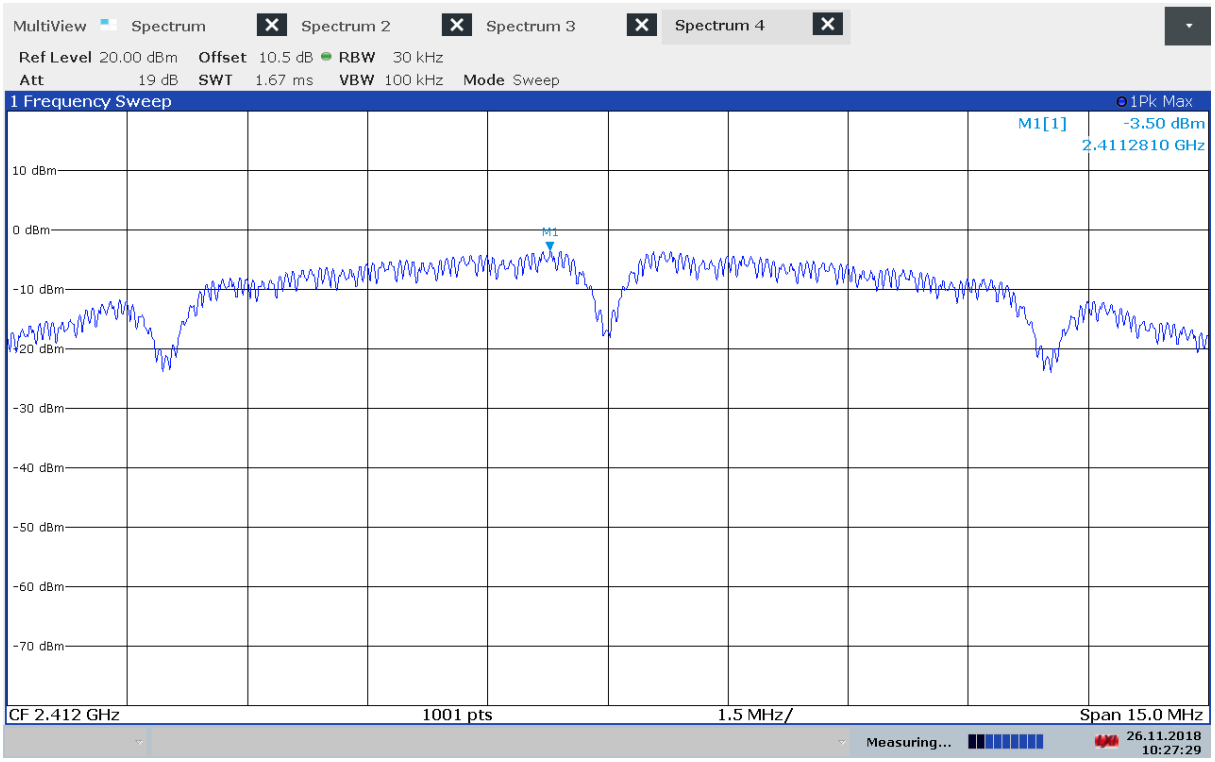
The measurement procedures PKPSD described in ANSI C63.10-2013 was used.

Carrier Frequency (MHz)	Power Spectral Density (dBm)		
	802.11b, 11 Mbps	802.11g, 6 Mbps	802.11n, MCS0
2412	-13.5	-14.2	-14.7
2437	-15.4	-16.0	-16.4
2462	-15.2	-15.7	-16.3

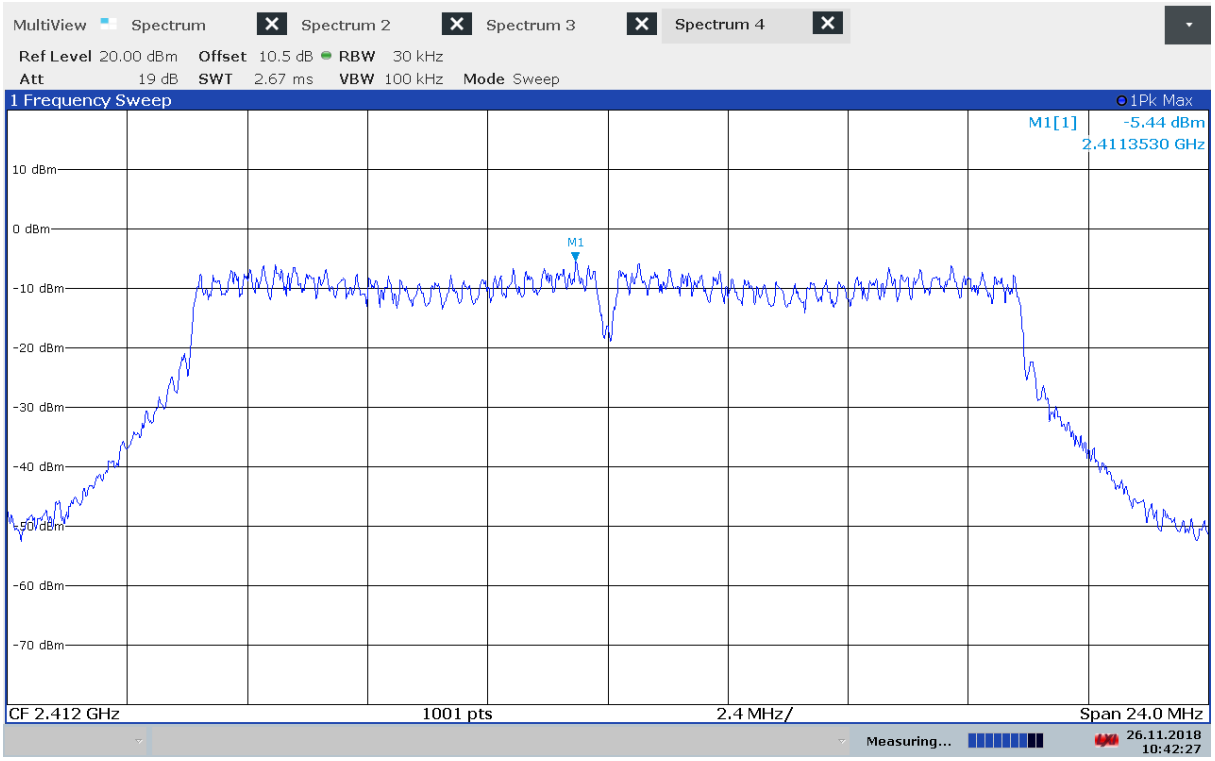
The measured values with 30 kHz RBW are corrected by a Bandwidth Correction Factor of -10 dB.

Requirements:

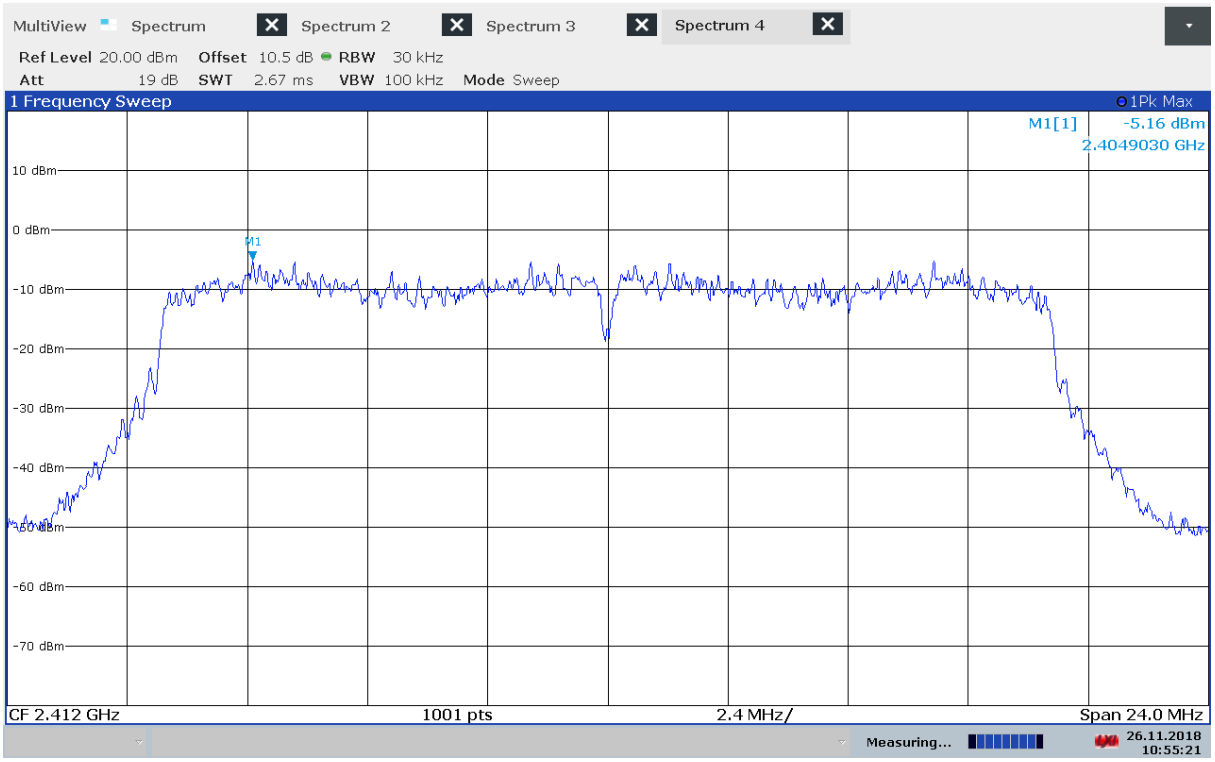
The Power Spectral Density of a Digital Transmission System shall be no greater than +8 dBm in any 3 kHz band



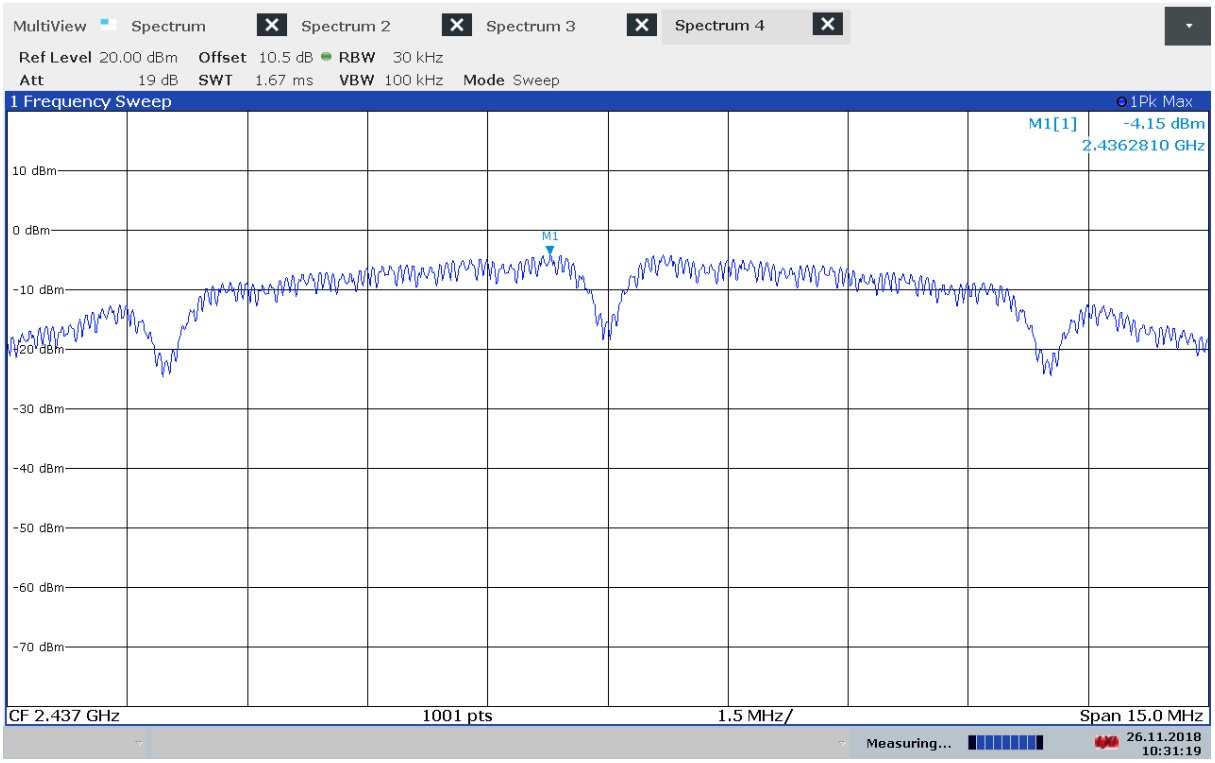
PSD, 2412 MHz, 802.11b, 1Mbps



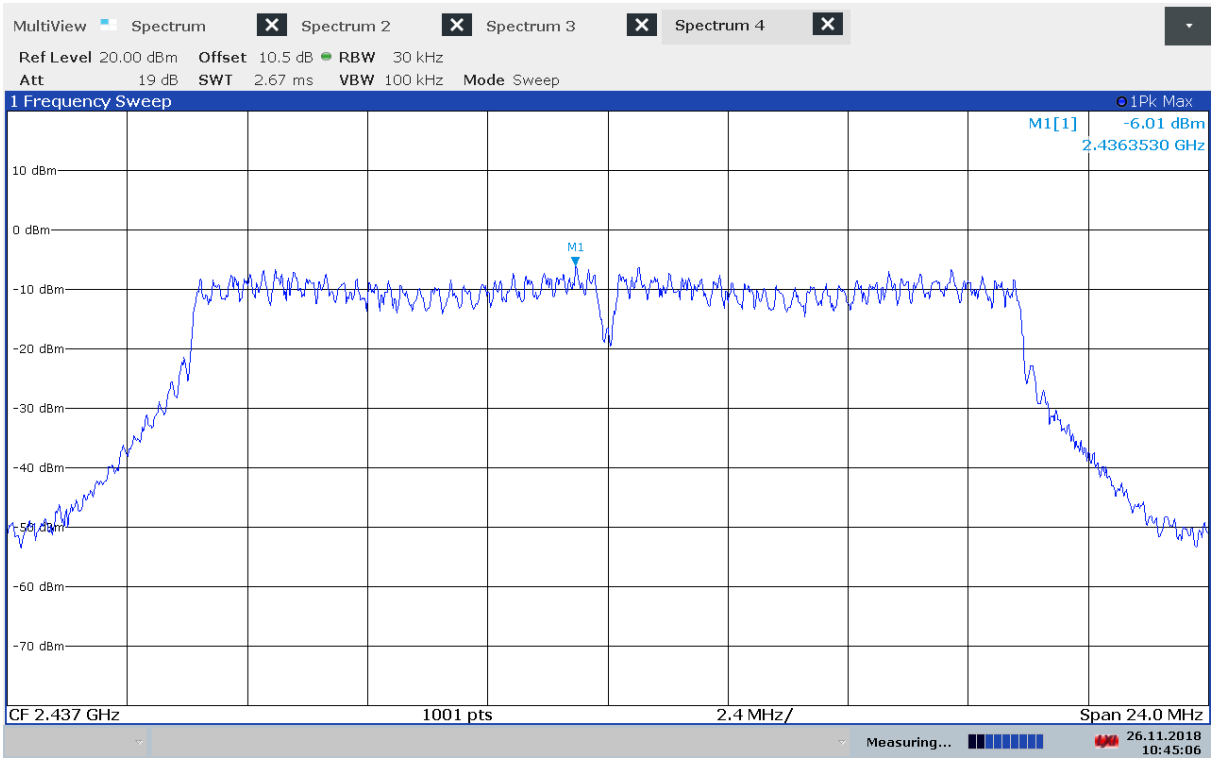
PSD, 2412 MHz, 802.11g, 6Mbps



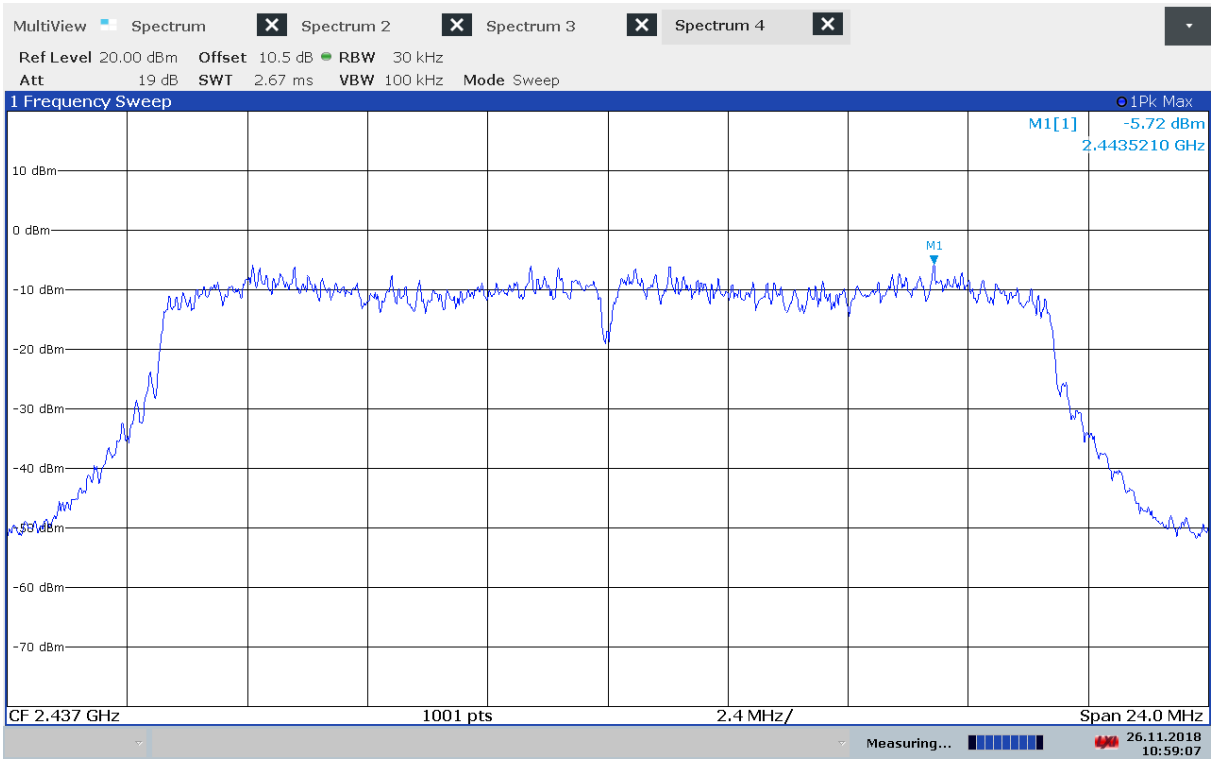
PSD, 2412 MHz, 802.11n, MCS0



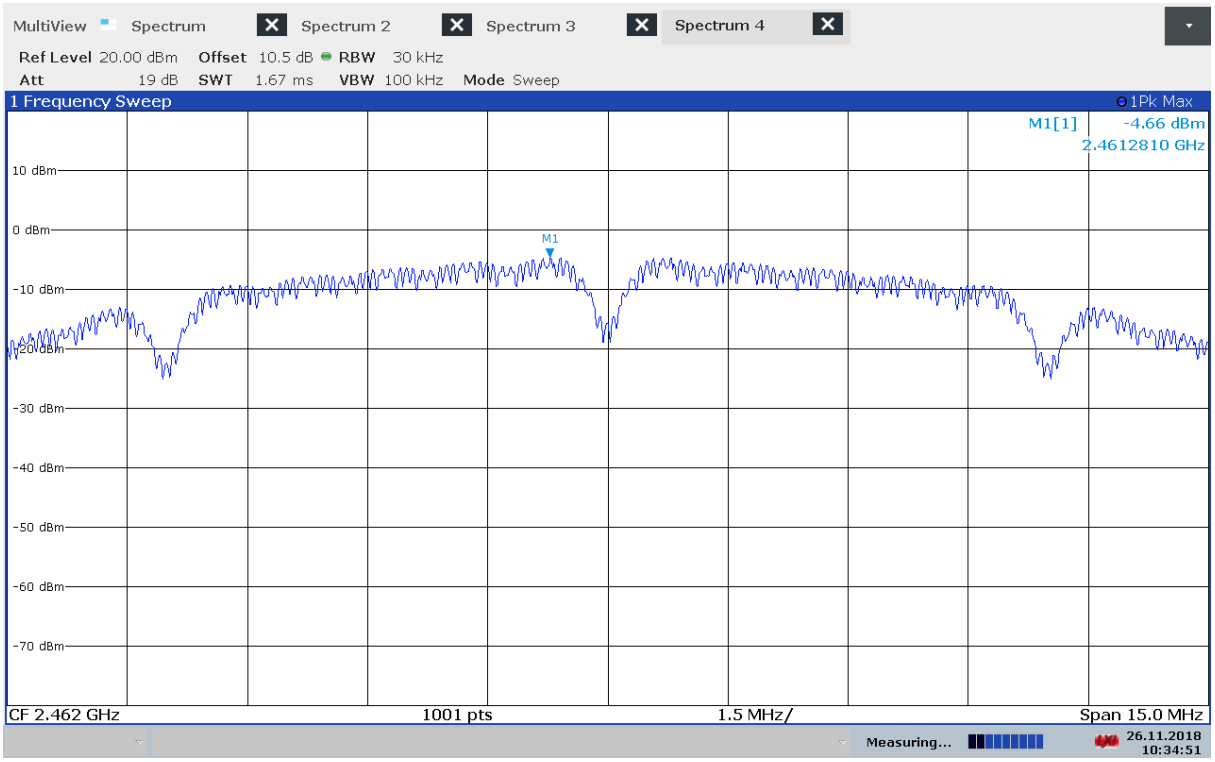
PSD, 2437 MHz, 802.11b, 1Mbps



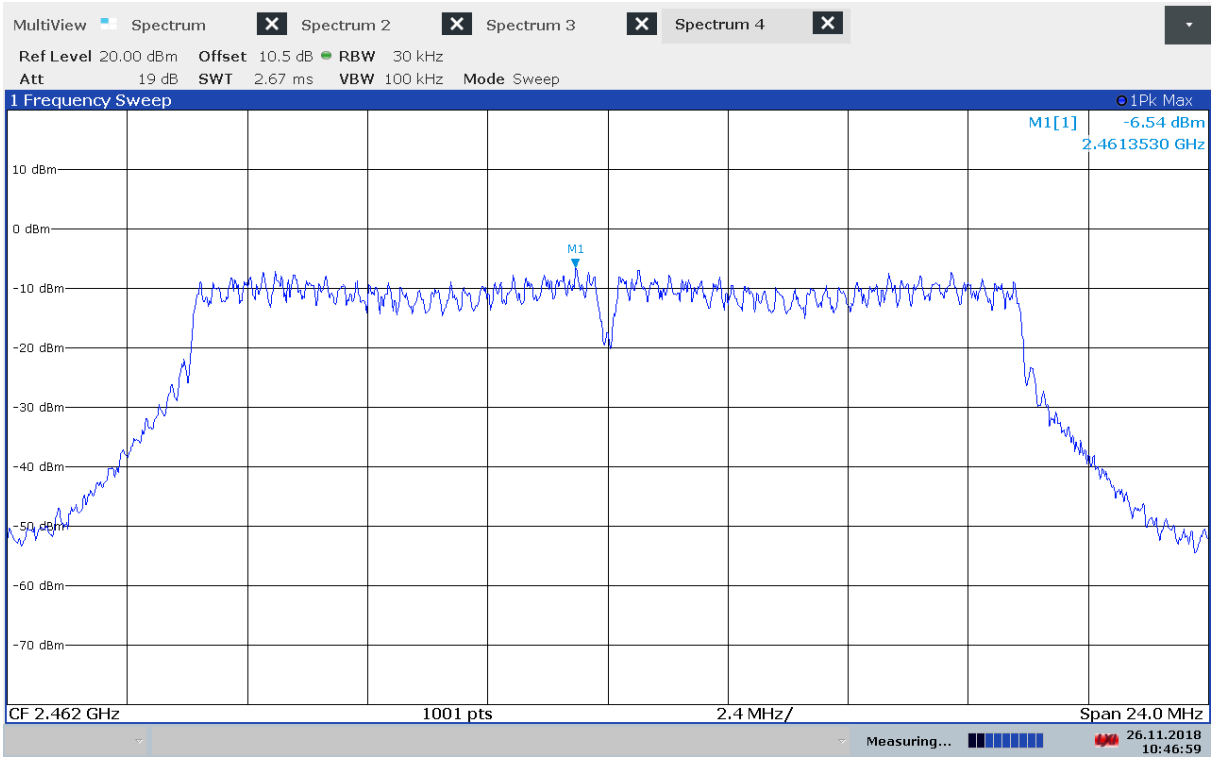
PSD, 2437 MHz, 802.11g, 6Mbps



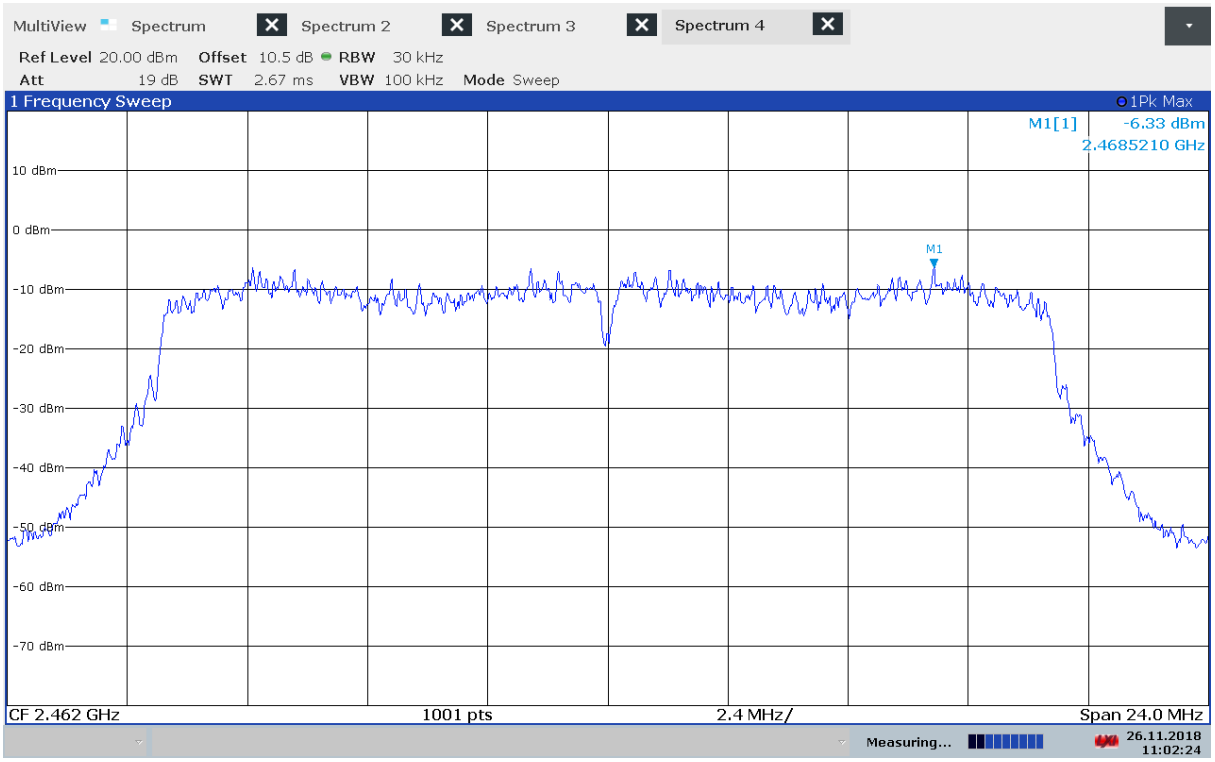
PSD, 2437 MHz, 802.11n, MCS0



PSD, 2462 MHz, 802.11b, 1Mbps



PSD, 2462 MHz, 802.11g, 6Mbps



PSD, 2462 MHz, 802.11n, MCS0

4 Measurement Uncertainty

Measurement Uncertainty Values		
Test Item		**Uncertainty**
Output Power		±0.5 dB
Power Spectral Density		±0.5 dB
Out of Band Emissions, Conducted	**< 3.6 GHz**	±0.6 dB
	> 3.6 GHz	±0.9 dB
Spurious Emissions, Radiated	**< 1 GHz**	±2.5 dB
	> 1 GHz	±2.2 dB
Emission Bandwidth		±4 %
Power Line Conducted Emissions		+2.9 / -4.1 dB
Spectrum Mask Measurements	**Frequency**	±5 %
	Amplitude	±1.0 dB
Frequency Error		±0.6 ppm
Temperature Uncertainty		±1 °C

All uncertainty values are expanded standard uncertainty to give a confidence level of 95%, based on coverage factor k=2

5 LIST OF TEST EQUIPMENT

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment and ancillaries are identified (numbered) by the Test Laboratory.

No.	Model number	Description	Manufacturer	Ref. no.	Cal. date	Cal. Due
1	FSW43	Spectrum Analyzer	Rohde & Schwarz	LR 1690	2018.01 2019.01	2019.01 2020.01
2	ESU40	Measuring Receiver	Rohde & Schwarz	LR 1639	2018.03 2019.01	2019.03 2020.01
3	6810-17B	Attenuator	Suhner	LR 1669	COU	
4	6HC3000/18000	Highpass Filter	Trilithic	LR 1614	COU	
5	JB3	BiLog Antenna	Sunol Sciences	N-4525	2016.05	2019.05
6	317	Preamplifier	Sonoma Inst.	LR 1687	2018.07	2019.07
7	8449A	Pre-amplifier	Hewlett Packard	LR 1322	2018.07	2019.07
8	3115	Horn Antenna	EMCO	LR 1330	2016.10	2019.12
9	3117-PA	Horn Antenna +PreAmp	EMCO	LR 1717	2017-12	2019-12
10	638	Antenna Horn	Narda	LR 1480	2010.06	2020.06
11	WRCG2400/2483.5	Band Reject Filter	Wainwright Inst.	LR 1530	COU	
12	Model 87 V	Multimeter	Fluke	LR 1597	2018.02	2019.02
14	6812B	AC Power Source	Agilent	LR 1515	COU	
15	ENV216	Two Line V-Network	Rohde & Schwarz	LR 1665	2017.11	2019.11
16	ESCI3	Measuring Receiver	Rohde & Schwarz	N-4259	2017.10	2019.10
17	ST18/SMA/N/36	RF Cable	Suhner	LR 1627	COU	
18	SF102/1000MM	RF Cable	Suhner	SN 50113/2	COU	
19	SF102/2000MM	RF Cable	Suhner	SN 500100/2	COU	

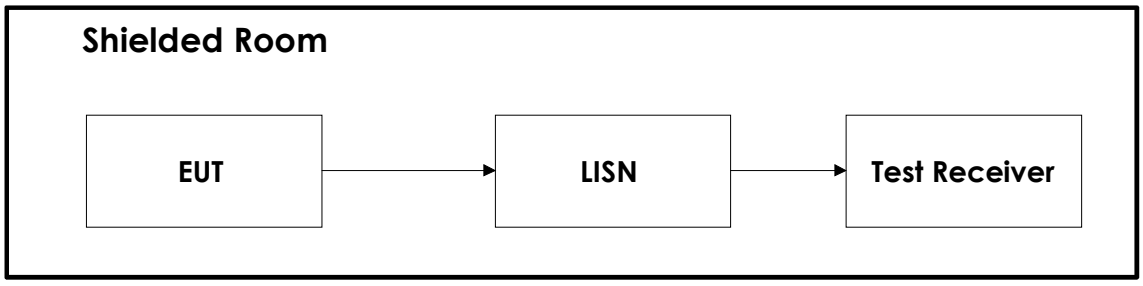
Note: COU – calibrate on use; N/A – Not Applicable

The software listed below has been used for one or more tests.

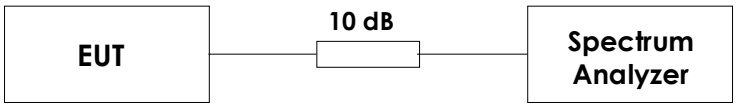
No.	Manufacturer	Name	Version	Comment
1	Rohde & Schwarz	EMC32	10.20.10	Power Line Conducted test software
2	Rohde & Schwarz	EMC32	10.20.10	Radiated Emission test software
3	Rohde & Schwarz	GPIBShot	2.7	Screenshots from R&S Spectrum Analyzers

6 BLOCK DIAGRAM

6.1 Power Line Conducted Emission

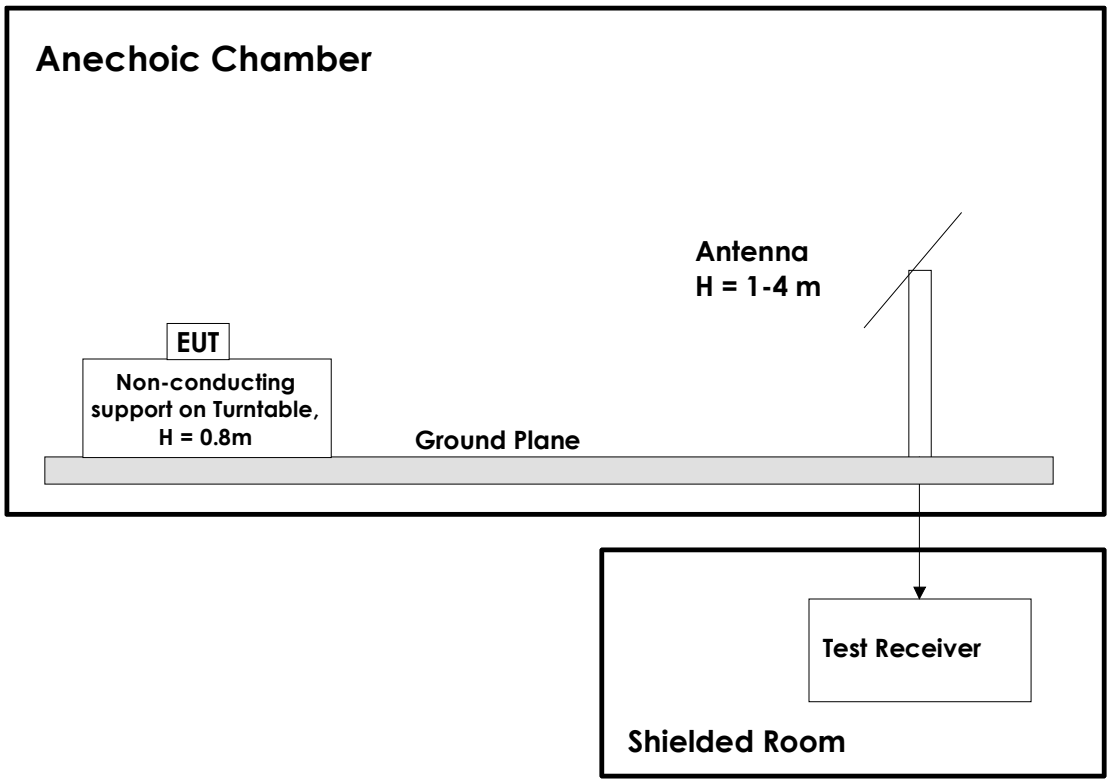


6.2 Conducted Tests



This test set-up is used for all Conducted tests.

6.3 Test Site Radiated Emission



This test setup is used for all radiated emissions tests. Measuring distance is 3m for all frequencies.

Emissions above 1 GHz are measured with a Spectrum Analyzer and Horn Antenna.

All measurements at 1GHz and above were performed with turntable height 1.5m and with the ground plane covered by absorbers.

A pre-amplifier is used for all measurements, and High-Pass filter is used for all harmonics.