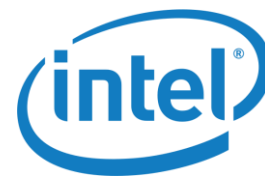




TESTING CERT #3478.01



TEST REPORT

EUT Description	1x1 802.11ac + BT 4.2 combo, PCIe M.2 2230 adapter card
Brand Name	Intel® Dual-Band Wireless-AC 3168
Model Name	3168NGW
Serial Number	TA#: H84692-006 WF MAC: 34:13:E8:4F:20:63 / 34:13:EB:4F:12:3A BT MAC: 34:13:E8:4F:20:67 / 34:13:E8:4F:12:3E (see section 4)
FCC/IC ID	FCC ID: PD93168NG / PD93168NGU IC ID: 1000M-3168NG
Antenna type	SkyCross WIMAX/WLAN Reference Antenna
Hardware/Software Version	HW: TF1 – cfg 51.12 Test SW: DRTU version 1.8.4-02432 Op SW: 99.0.17.7
Date of Sample Receipt	2016-01-07
Date of Test Start/End	2016-01-19 / 2016-01-27
Features	802.11 a/b/g/n/ac Wireless LAN + BDR/EDR 2.1 + BLE 4.2 (see section 5)

Applicant	Intel Mobile Communications
Address	100 Center Point Circle, Suite 200 Columbia, South Carolina 29210 USA
Contact Person	Steven Hackett
Telephone/Fax/ Email	steven.c.hackett@intel.com

Reference Standards	FCC CFR Title 47 Part 15E RSS-247 issue 1, RSS-Gen issue 4 (see section 1)
---------------------	--

Test Report number	160107-01.TR01
Revision Control	Rev.00

The test results relate only to the samples tested.
The test report shall not be reproduced in full, without written approval of the laboratory.

Issued by

Reviewed by

Olivier FARGANT
(RF Test Lead)

Jose M. FORTES
(Technical Manager)

Intel Mobile Communications France S.A.S – WRF Lab
425 rue de Goa – Le Cargo B6 – 06600, Antibes, France
Tel. +33493001400 / Fax +33493001401

Table of Contents

1. Standards, reference documents and applicable test methods	3
2. General conditions, competences and guarantees	3
3. Environmental Conditions.....	3
4. Test samples.....	4
5. EUT features	4
6. Remarks and comments.....	4
7. Test Verdicts summary.....	5
7.1. 802.11 a/n/ac – U-NII-1.....	5
7.2. 802.11 a/n/ac – U-NII-2A.....	5
7.3. 802.11 a/n/ac – U-NII-2C.....	5
8. Document Revision History	5
Annex A. Test & System Description	6
A.1 TEST CONDITIONS	6
A.2 MEASUREMENT SYSTEM	8
A.3 TEST EQUIPMENT LIST.....	10
A.4 MEASUREMENT UNCERTAINTY EVALUATION.....	10
Annex B. Test Results UNII-1	11
B.1 26dB & 99% BANDWIDTH.....	11
B.2 POWER LIMITS. MAXIMUM OUTPUT POWER & PEAK POWER SPECTRAL DENSITY	21
B.3 UNDESIRABLE EMISSIONS LIMITS: BAND EDGE (CONDUCTED)	29
B.4 RADIATED SPURIOUS EMISSION	38
Annex C. Test Results U-NII-2A	51
C.1 26dB & 99% BANDWIDTH.....	51
C.2 POWER LIMITS. MAXIMUM OUTPUT POWER & PEAK POWER SPECTRAL DENSITY	61
C.3 UNDESIRABLE EMISSIONS LIMITS: BAND EDGE (CONDUCTED)	69
C.4 RADIATED SPURIOUS EMISSION	75
Annex D. Test Results U-NII-2C	89
D.1 26dB & 99% BANDWIDTH.....	89
D.2 POWER LIMITS. MAXIMUM OUTPUT POWER & PEAK POWER SPECTRAL DENSITY	104
D.3 UNDESIRABLE EMISSIONS LIMITS: BAND EDGE (CONDUCTED)	114
D.4 RADIATED SPURIOUS EMISSION	124
Annex E. Photographs.....	141

1. Standards, reference documents and applicable test methods

1. FCC 47 CFR part 15 – Subpart E – Unlicensed National Information Infrastructure Devices.
2. FCC 47 CFR part 15 - Subpart C – §15.209 Radiated emission limits; general requirements.
3. FCC OET KDB 789033 D02 General UNII Test Procedures New Rules – Guidelines for compliance testing of Unlicensed National Information Infrastructure (U-NII) Devices.
4. FCC OET KDB 644545 D03 Guidance for IEEE 802.11ac v01 - GUIDANCE FOR IEEE Std 802.11ac™ DEVICES EMISSION TESTING.
5. RSS-247 Issue 1 – Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment.
6. RSS-Gen Issue 4 – General Requirements for Compliance of Radio Apparatus.
7. ANSI C63.10-2009 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

2. General conditions, competences and guarantees

- ✓ Intel Mobile Communications Wireless RF Lab (Intel WRF Lab) is a testing laboratory accredited by the American Association for Laboratory Accreditation (A2LA).
- ✓ Intel Mobile Communications Wireless RF Lab (Intel WRF Lab) is an Accredited Test Firm listed by the FCC, with Designation Number FR0011.
- ✓ Intel Mobile Communications Wireless RF Lab (Intel WRF Lab) is a Registered Test Site listed by IC, with IC Assigned Code 1000Y.
- ✓ Intel WRF Lab only provides testing services and is committed to providing reliable, unbiased test results and interpretations.
- ✓ Intel WRF Lab is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.
- ✓ Intel WRF Lab has developed calibration and proficiency programs for its measurement equipment to ensure correlated and reliable results to its customers.
- ✓ This report is only referred to the item that has undergone the test.
- ✓ This report does not imply an approval of the product by the Certification Bodies or competent Authorities.
- ✓ Complete or partial reproduction of the report cannot be made without written permission of Intel WRF Lab.

3. Environmental Conditions

- ✓ At the site where the measurements were performed the following limits were not exceeded during the tests:

Temperature	22°C ± 2°C
Humidity	35% ± 5%

4. Test samples

Sample	Control #	Description	Model	Serial #	Date of reception	Note
#01	160107-01.S07	WiFi/BT Module	3168NGW	WF MAC: 34:13:E8:4F:20:63	2016-01-07	Used for conducted tests
	160107-01.S14	Extender board	PC00495	ASS0495-001, 4950414-064	2016-01-07	
	160107-01.S19	Switching power supply SINPRO 5V 6A	SPU60-102	08741187 1350	2016-01-07	
	15040201.S14	Laptop	Dell Latitude	27081704053	2015-04-15	
#02	160107-01.S03	WiFi/BT High End Module	3168NGW	WF MAC: 34:13:EB:4F:12:3A	2016-07-01	Used for radiated tests
	160107-01.S11	Extender board	PC00495	4955013-097	2016-07-01	
	160107-01.S27	USB Cable	E154336	NA	2015-05-12	
	15081801.S14	PCI Cable	Blue cable 1 meter	NA	2015-05-12	
	160107-01.S28	Laptop	Dell E5440	BJSYN32	2016-01-15	
	160107-01.S26	AC/DC Adapter	SPU60-102	07990509 1249	2016-01-15	

NA: Not Applicable

5. EUT features

These are the detailed bands and modes supported by the Equipment Under Test:

802.11b/g/n	2.4GHz (2400.0 – 2483.5 MHz)
802.11a/n/ac	5.2GHz (5150.0 – 5250.0 MHz) 5.3GHz (5250.0 – 5350.0 MHz) 5.6GHz (5470.0 – 5725.0 MHz) 5.8GHz (5725.0 – 5850.0 MHz)
BDR/EDR 2.1 BLE 4.2	2.4GHz (2400.0 – 2483.5 MHz)

6. Remarks and comments

N/A

7. Test Verdicts summary

7.1. 802.11 a/n/ac – U-NII-1

FCC part	RSS part	Test name	Verdict
15.407 (a) (1)	RSS-247 Clause 6.2.2 (1)	Power Limits. Maximum output power	P
15.407 (a) (1)	RSS-247 Clause 6.2.2 (1)	Peak power spectral density	P
15.407 (b) (1) 15.209	RSS-247 Clause 6.2.2 (2)	Undesirable emissions limits: Band Edge (conducted)	P
15.407 (b) (1) 15.209	RSS-247 Clause 6.2.2 (2)	Undesirable emissions limits (radiated)	P

7.2. 802.11 a/n/ac – U-NII-2A

FCC part	RSS part	Test name	Verdict
15.407 (a) (2)	RSS-247 Clause 6.2.2 (1)	Power Limits. Maximum output power	P
15.407 (a) (2)	RSS-247 Clause 6.2.2 (1)	Peak power spectral density	P
15.407 (b) (2) 15.209	RSS-247 Clause 6.2.2 (2)	Undesirable emissions limits: Band Edge (conducted)	P
15.407 (b) (2) 15.209	RSS-247 Clause 6.2.2 (2)	Undesirable emissions limits (radiated)	P

7.3. 802.11 a/n/ac – U-NII-2C

FCC part	RSS part	Test name	Verdict
15.407 (a) (2)	RSS-247 Clause 6.2.3 (1)	Power Limits. Maximum output power	P
15.407 (a) (2)	RSS-247 Clause 6.2.3 (1)	Peak power spectral density	P
15.407 (b) (3) 15.209	RSS-247 Clause 6.2.3 (2)	Undesirable emissions limits: Band Edge (conducted)	P
15.407 (b) (3) 15.209	RSS-247 Clause 6.2.3 (2)	Undesirable emissions limits (radiated)	P

P: Pass
 F: Fail
 NM: Not Measured
 NA: Not Applicable

8. Document Revision History

Revision #	Date	Modified by	Details
Rev. 00	2016-02-22	O.Fargant	First Issue

Annex A. Test & System Description

A.1 Test Conditions

For 802.11a, 802.11n20 (20 MHz channel bandwidth), 802.11n40 (40MHz channel bandwidth) and 802.11ac80 (80MHz channel bandwidth) mode the EUT can transmit only at CHAIN A RF.

The conducted RF output power at chain A was adjusted according to the client's supplied Target values (see following table) using the Intel DRTU tool and measuring the power by using a spectrum analyzer with the channel integration method according to point II) E) 2) e) (Method SA-2 Alternative) of Guidance 789033 D02.

Measured values for adjustment were within -0.2 dB/+0.3 dB from the declared Target values.

U-NII-1					Conducted Power Target Value (dBm)
Mode	BW (MHz)	Data Rate	CH #	Freq. (MHz)	SISO Chain A
802.11a	20	6Mbps	36	5180	17.0
			40	5200	17.0
			48	5240	17.0
802.11n	20	HT0	36	5180	17.0
			40	5200	17.0
			48	5240	17.0
	40	HT0	38F	5190	13.5
			46F	5230	16.5
802.11ac	80	VHT0	42ac80	5210	11.5

U-NII-2A					Conducted Power, Target Value (dBm)
Mode	BW (MHz)	Data Rate	CH #	Freq. (MHz)	SISO Chain A
802.11a	20	6Mbps	52	5260	17.0
			56	5280	17.0
			64	5320	16.5
802.11n	20	HT0	52	5260	17.0
			56	5280	17.0
			64	5320	16.5
	40	HT0	54F	5270	17.0
			62F	5310	15.5
802.11ac	80	VHT0	58ac80	5290	13.5

U-NII-2C					Conducted Power, Target Value (dBm)
Mode	BW (MHz)	Data Rate	CH #	Freq. (MHz)	SISO Chain A
802.11a	20	6Mbps	100	5500	17.0
			120	5600	17.0
			140	5700	17.0
802.11n	20	HT0	100	5500	17.0
			120	5600	17.0
			140	5700	17.5
			144*	5720	17.0
	40	HT0	102F	5510	15.0
			118F	5590	17.0
			134F	5670	17.5
		142F*	5670	17.5	
802.11ac	80	VHT0	106ac80	5530	11.5
			122ac80	5610	17.0
			138ac80*	5690	17.5

***Overlapped channels between UNII-2C and 5.8 GHz DTS**

The following data rates were selected based on preliminary testing that identified those rates as the worst cases for output power and spurious levels at the band edges:

802.11a → 6Mbps
 802.11n20 and 802.11n40 (SISO) → HT0
 802.11ac80 (SISO) → VHT0

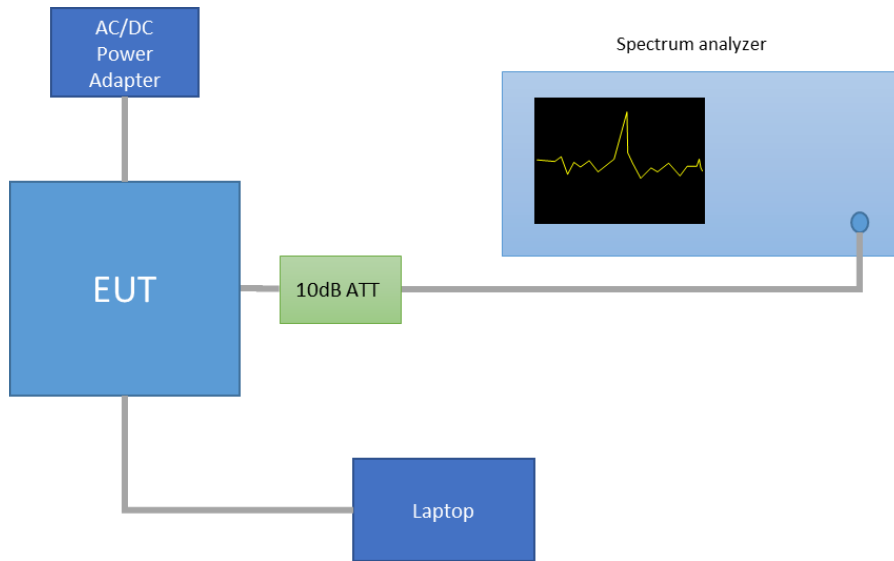
Alternative channels to the lowest and highest channels per band have been also tested for Band Edge compliance.

A.2 Measurement system

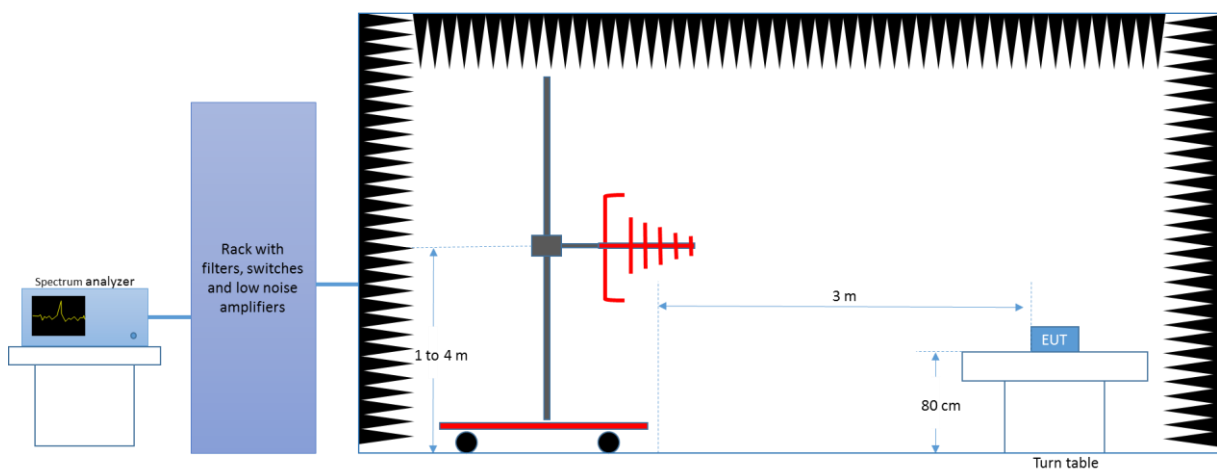
Measurements were performed using the following setups, made in accordance to the general provisions of FCC KDB 789033 D02 General UNII Test Procedures.

The DUT was installed in a test fixture and this test fixture is connected to a laptop computer and AC/DC power adapter. The laptop computer was used to configure the EUT to continuously transmit at a specified output power using all different modes and modulation schemes, using the Intel proprietary tool DRTU.

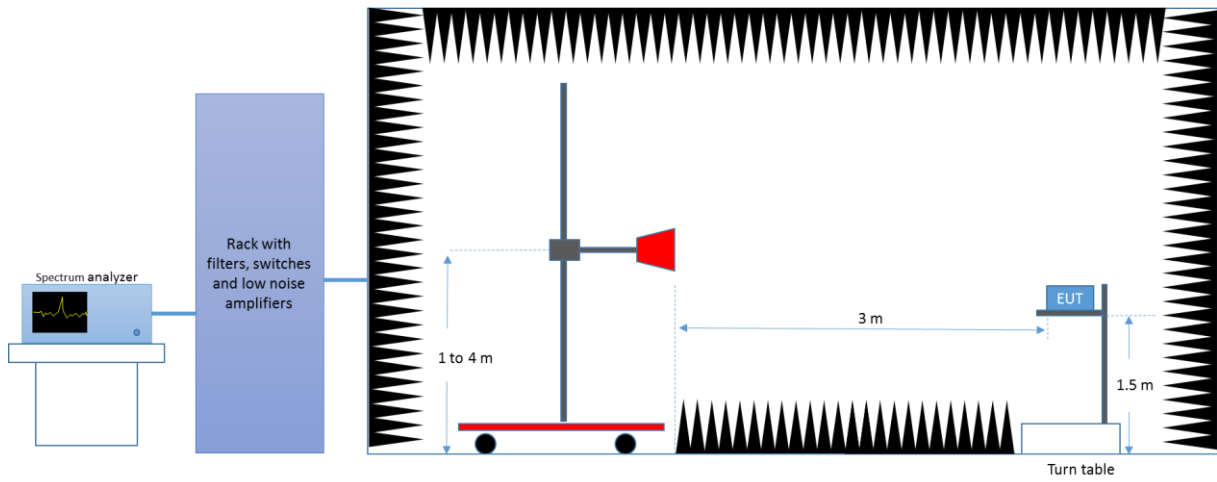
Conducted Setup



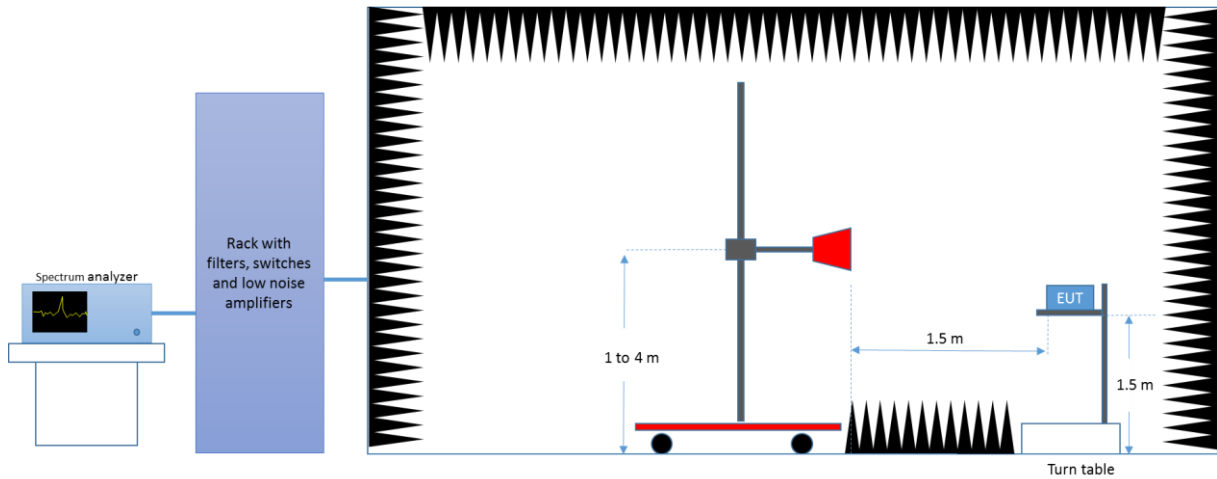
Radiated Setup < 1GHz



Radiated Setup 1 GHz - 18 GHz



Radiated Setup > 18 GHz



A.3 Test Equipment List

Conducted Setup

ID#	Device	Type/Model	Serial Number	Manufacturer	Cal. Date	Cal. Due Date
0316	Spectrum analyzer	FSV	103309	Rohde & Schwarz	2015-03-20	2017-03-20

Radiated Setup

ID#	Device	Type/Model	Serial Number	Manufacturer	Cal. Date	Cal. Due Date
0133	Spectrum analyzer	FSV40	101358	Rohde & Schwarz	2014-05-09	2016-05-09
0137	Log antenna 30 MHz – 1 GHz	3142E	00156946	ETS Lindgren	2014-03-05	2016-03-05
0138	Horn antenna 1 GHz – 6.4 GHz	3117	00152266	ETS Lindgren	2014-03-04	2016-03-04
0141	Horn Antenna 6.4 GHz – 18 GHz	3117-PA	00157736	ETS Lindgren	2014-06-03	2016-06-03
0248	Horn Antenna 1 GHz – 18 GHz	3117-PA	00167062	ETS Lindgren	2014-08-13	2016-08-13
0139	Horn Antenna 18GHz – 26GHz	114514	00167100	ETS Lindgren	2014-04-25	2016-04-25
0140	Horn Antenna 26GHz – 40GHz	120722	00169638	ETS Lindgren	2014-08-14	2016-08-14
0135	Anechoic chamber	FACT 3	RFD_FA_100	ETS Lindgren	2014-05-06	2016-05-06
0329	Measurement Software	EMC32	1300.7027.00 (100401)	Rohde & Schwarz	N/A	N/A
0296	DC Power Supply	6673A	MY41000318	Agilent	N/A	N/A

A.4 Measurement Uncertainty Evaluation

The system uncertainty evaluation is shown in the below table:

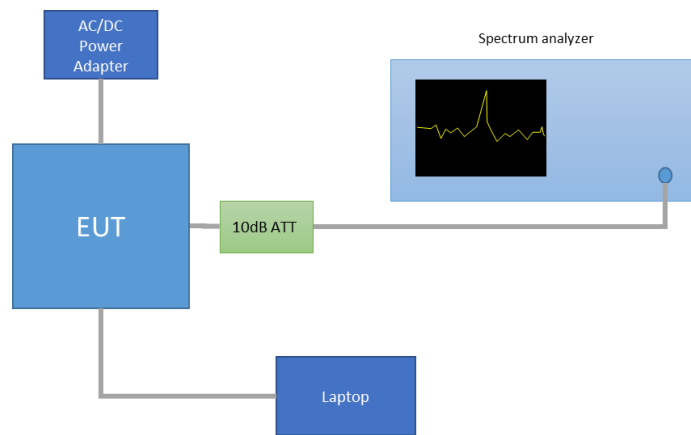
Measurement type	Uncertainty [±dB]
Conducted Power	±1.0
Conducted Spurious Emission	±2.9
Radiated tests <1GHz	±3.8
Radiated tests 1GHz - 40 GHz	±4.7

Annex B. Test Results UNII-1

B.1 26dB & 99% Bandwidth

Test procedure

The setup below was used to measure the 26dB & 99% Bandwidth. The antenna terminal of the EUT is connected to the spectrum analyzer through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.

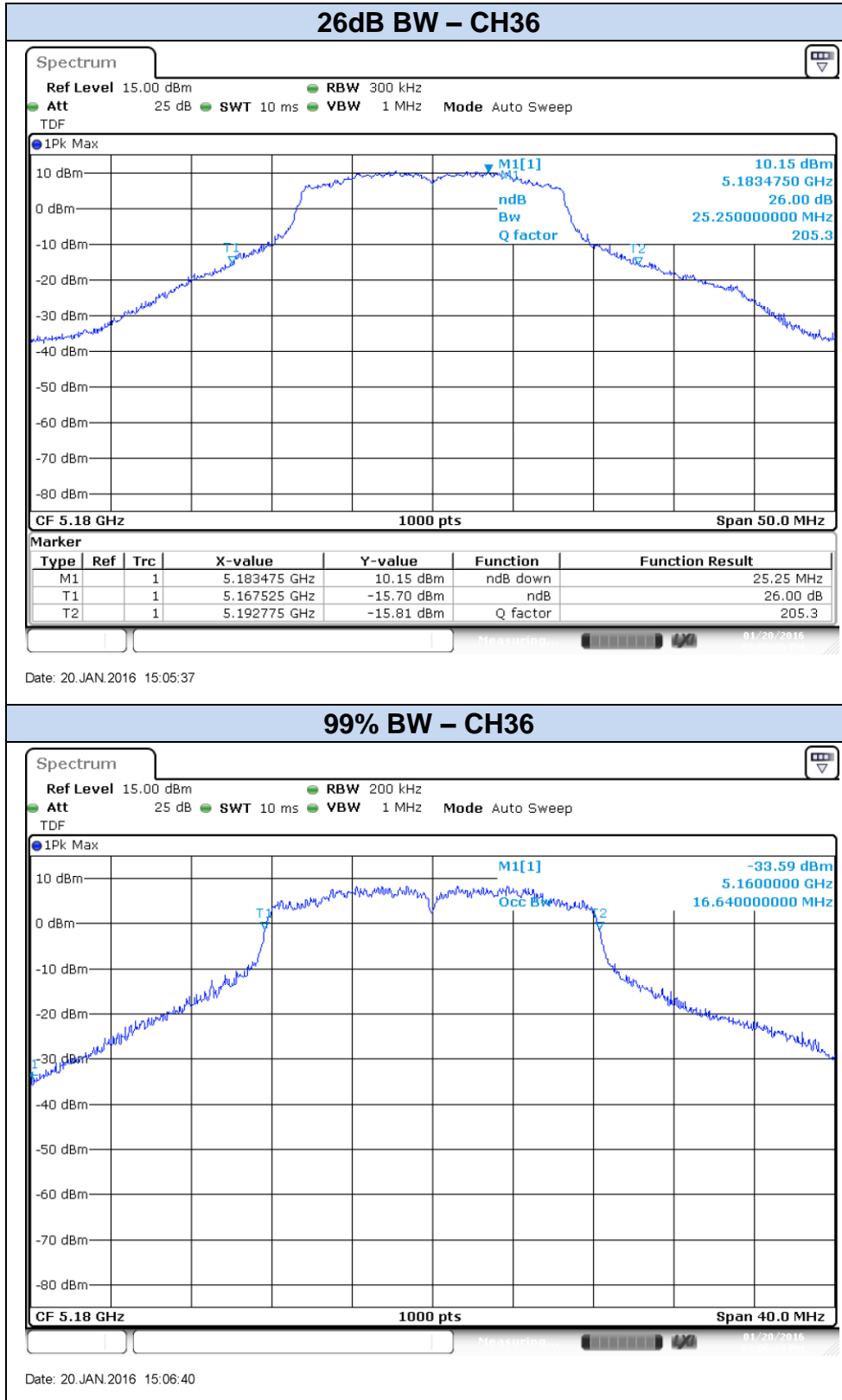


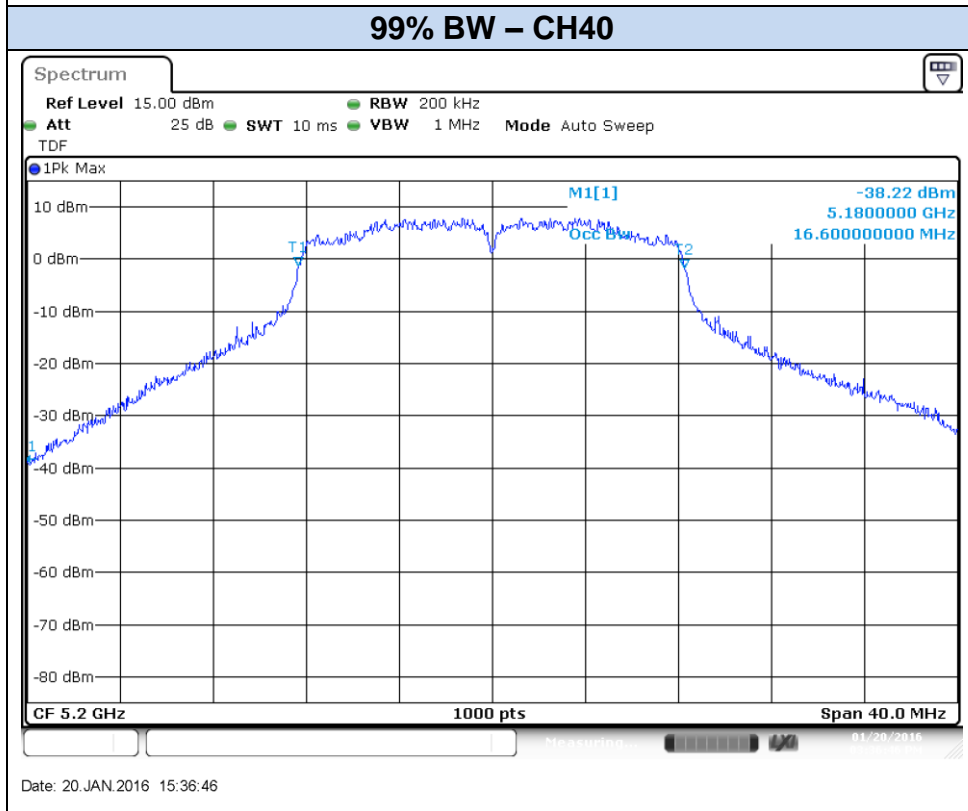
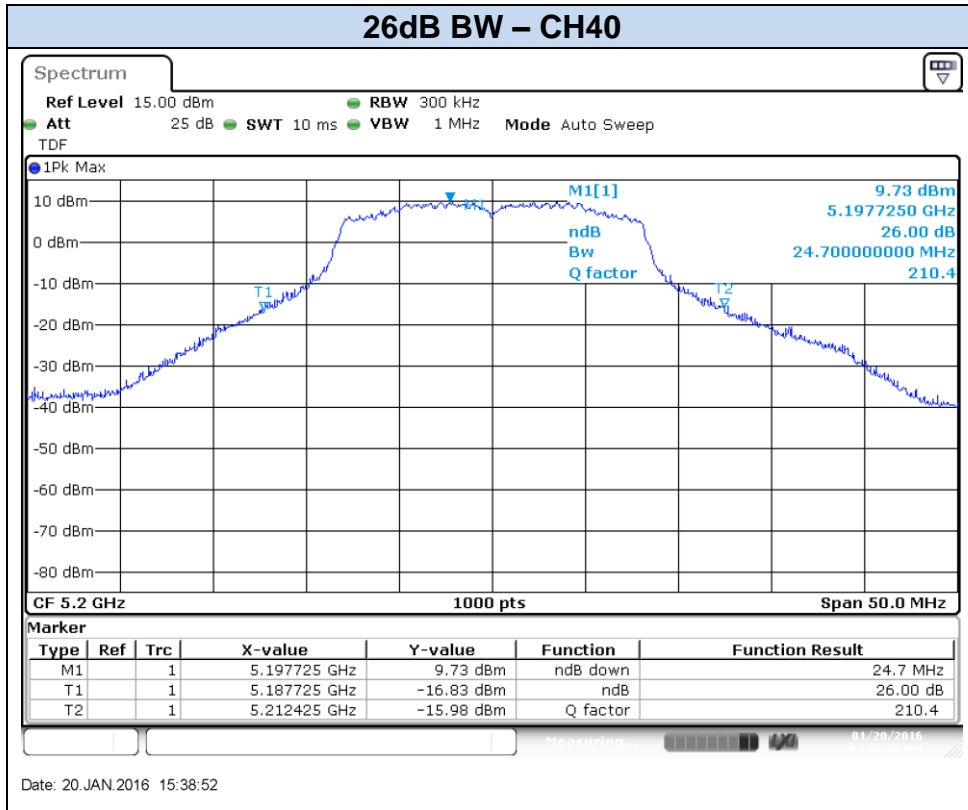
Results tables

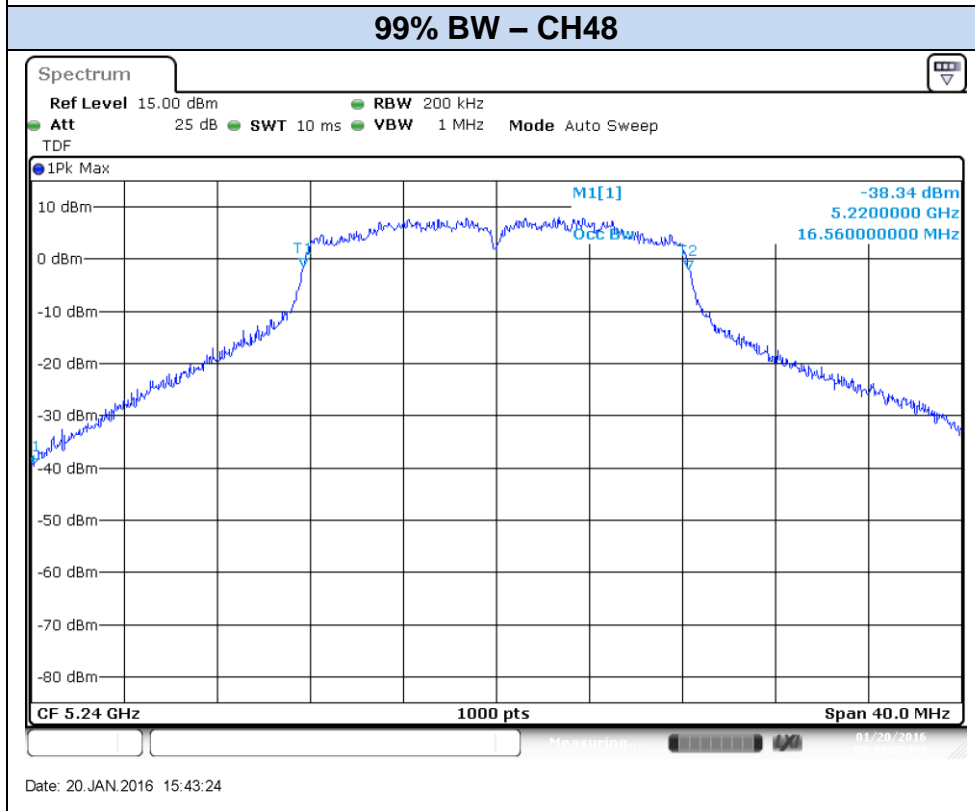
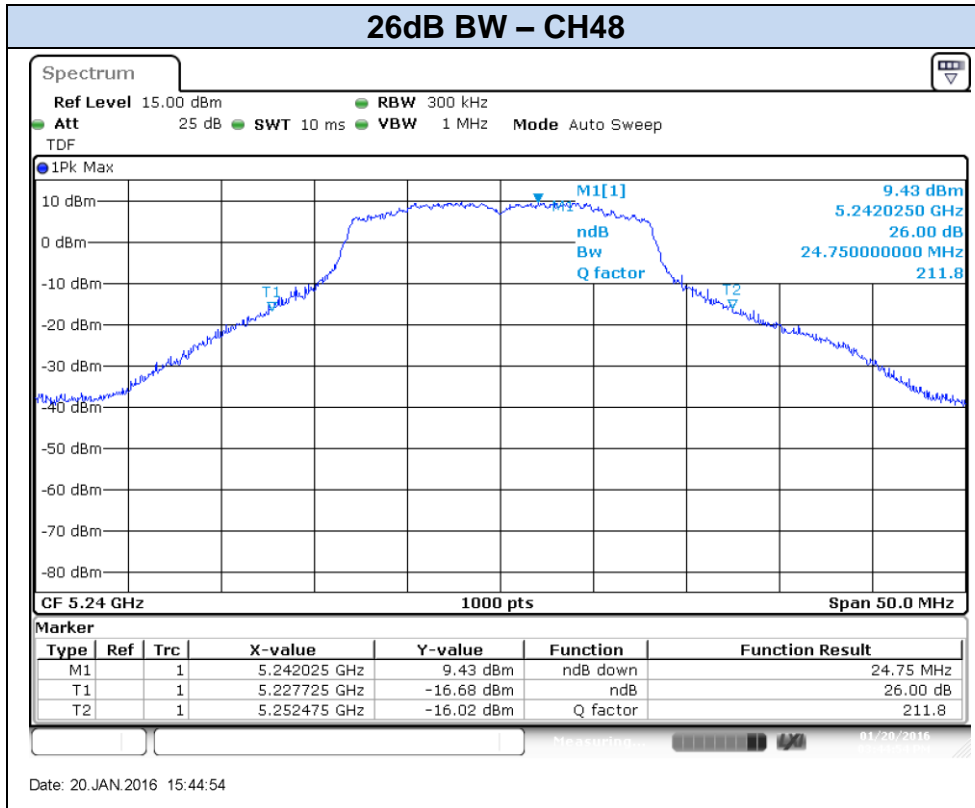
Mode	Rate	Antenna	Channel	Frequency [MHz]	26dB BW [MHz]	99% BW [MHz]
802.11a	6Mbps	SISO CHAIN A	36	5180	25.25	16.64
			40	5200	24.70	16.60
			48	5240	24.75	16.56
802.11n20	HT0		36	5180	24.30	17.68
			40	5200	24.95	17.68
			48	5240	24.80	17.68
802.11n40	HT0		38F	5190	43.29	36.24
			46F	5230	43.83	36.24
802.11ac80	VHT0		42ac80	5210	82.27	75.24

Results screenshot

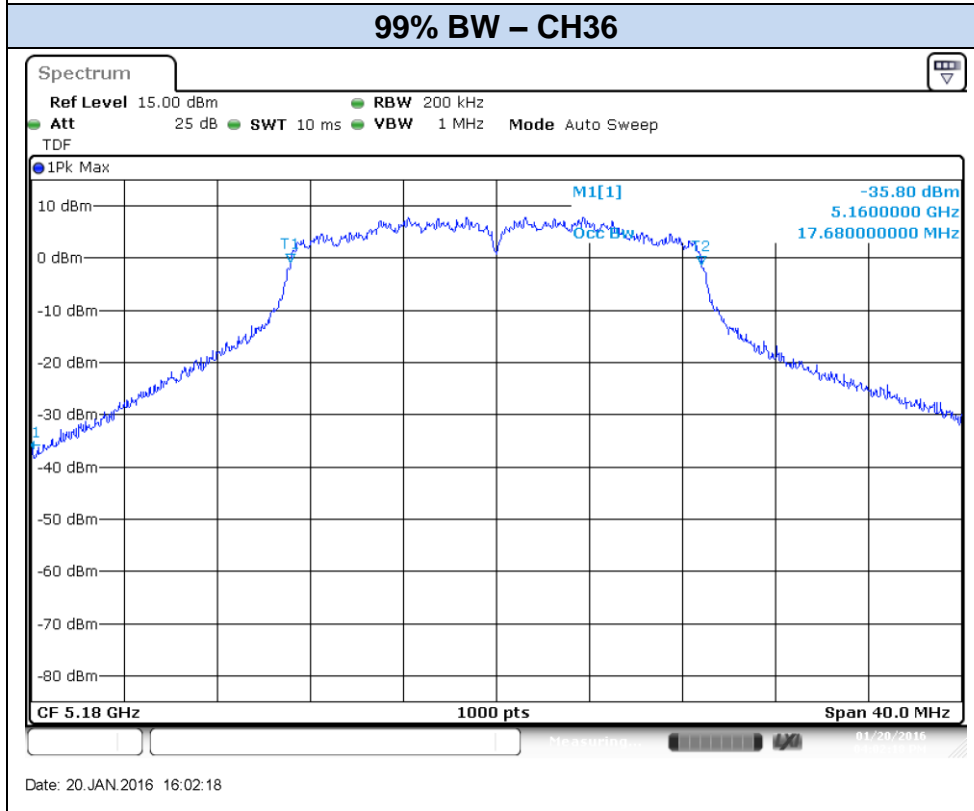
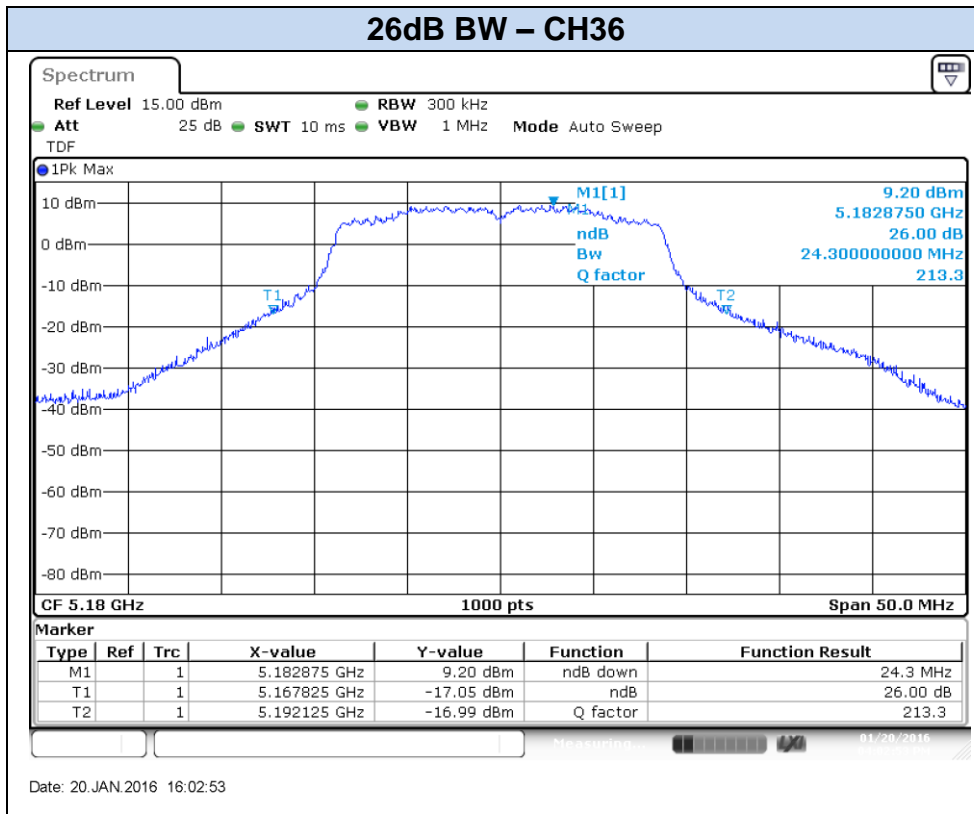
802.11a, 6Mbps – Chain A

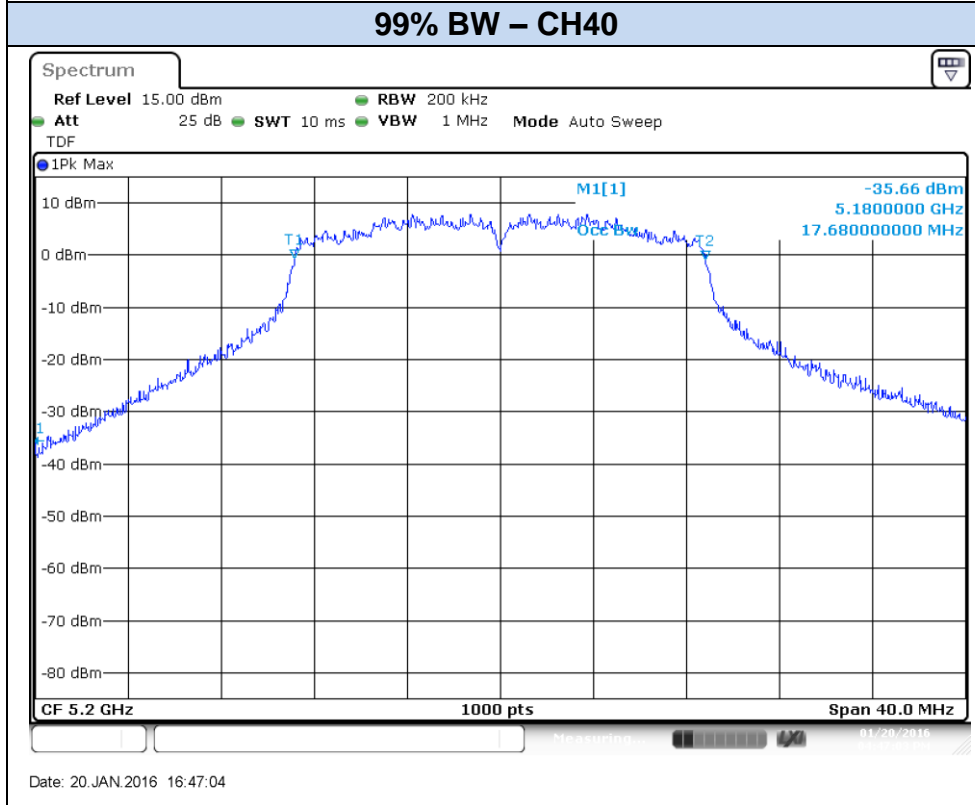
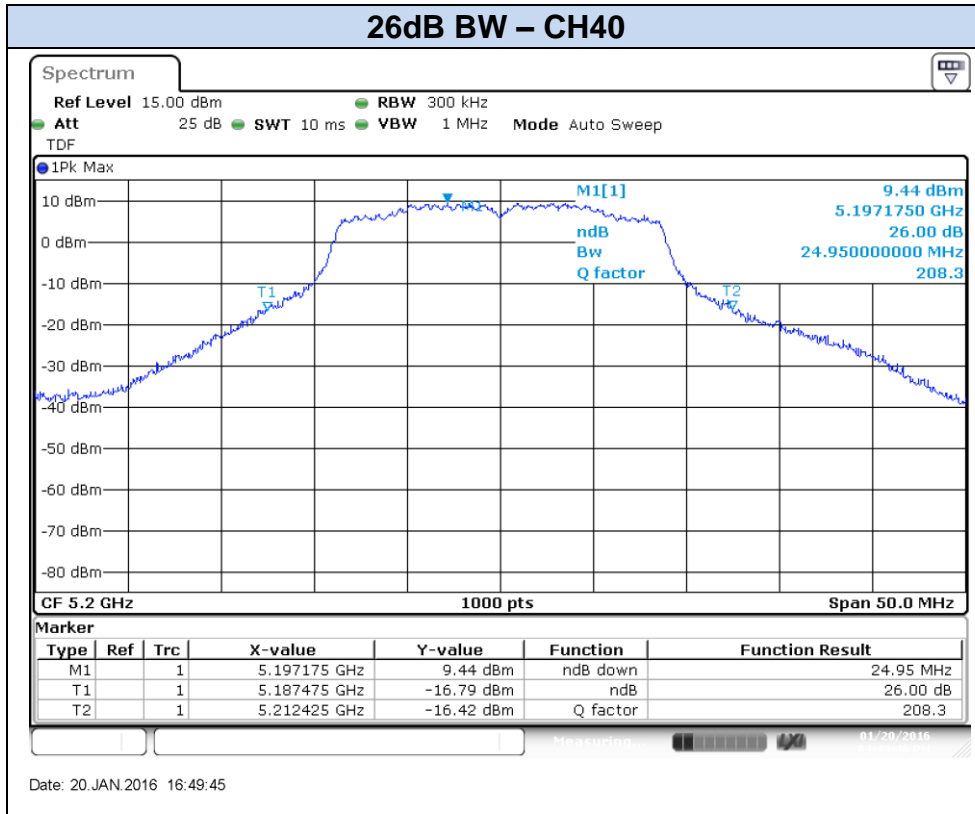


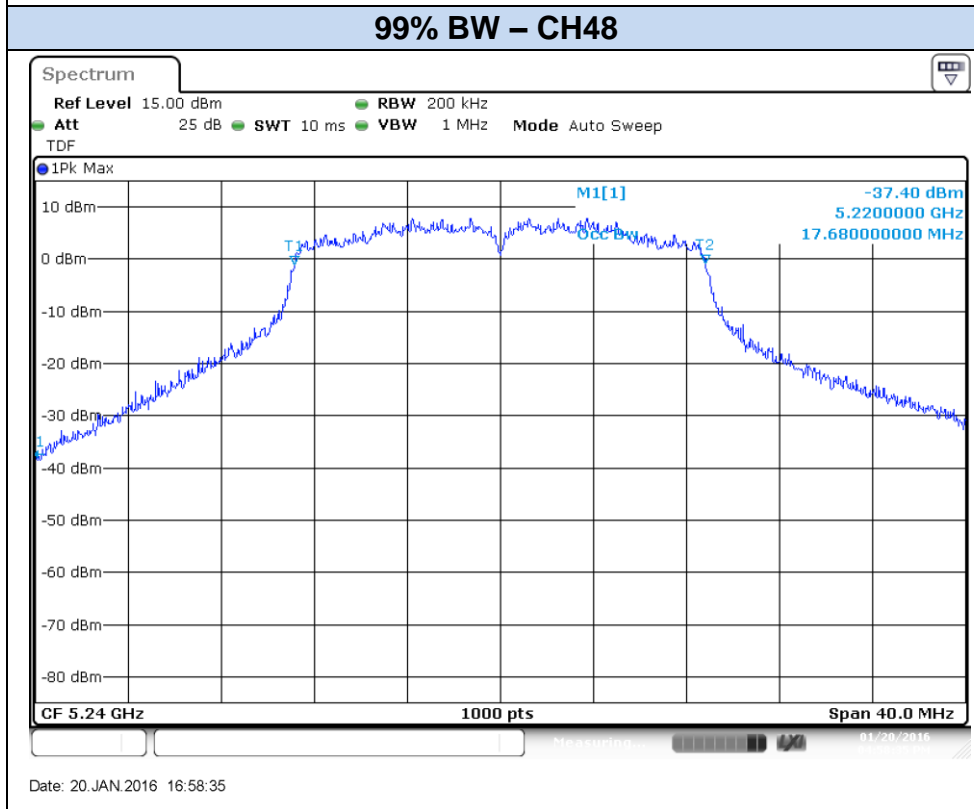
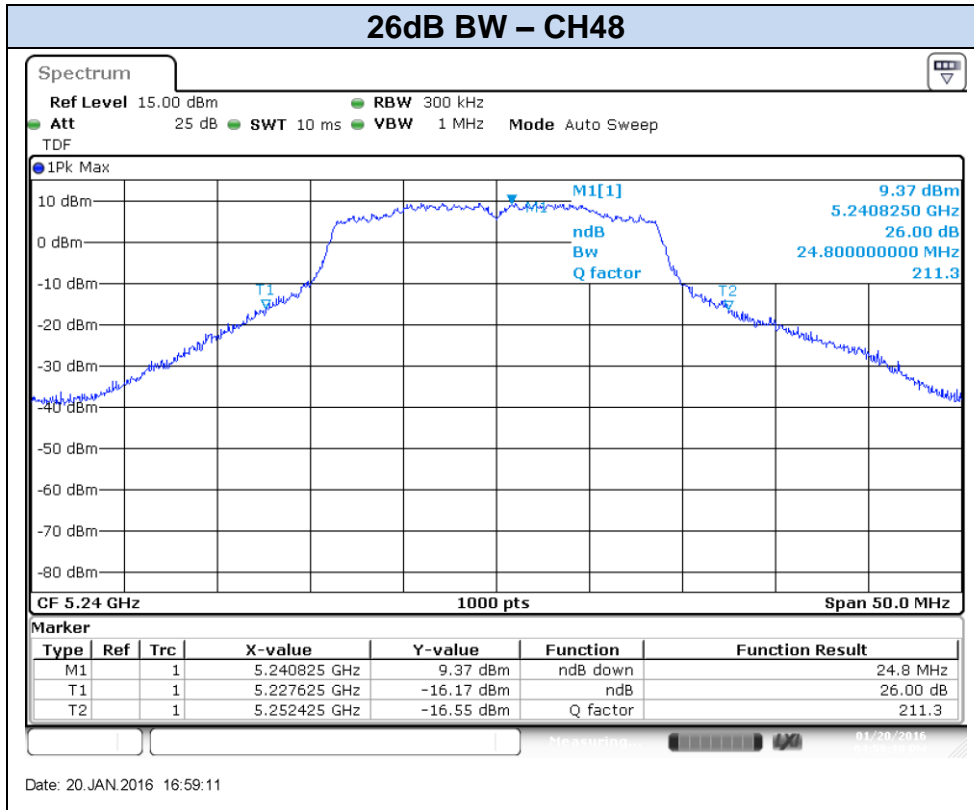




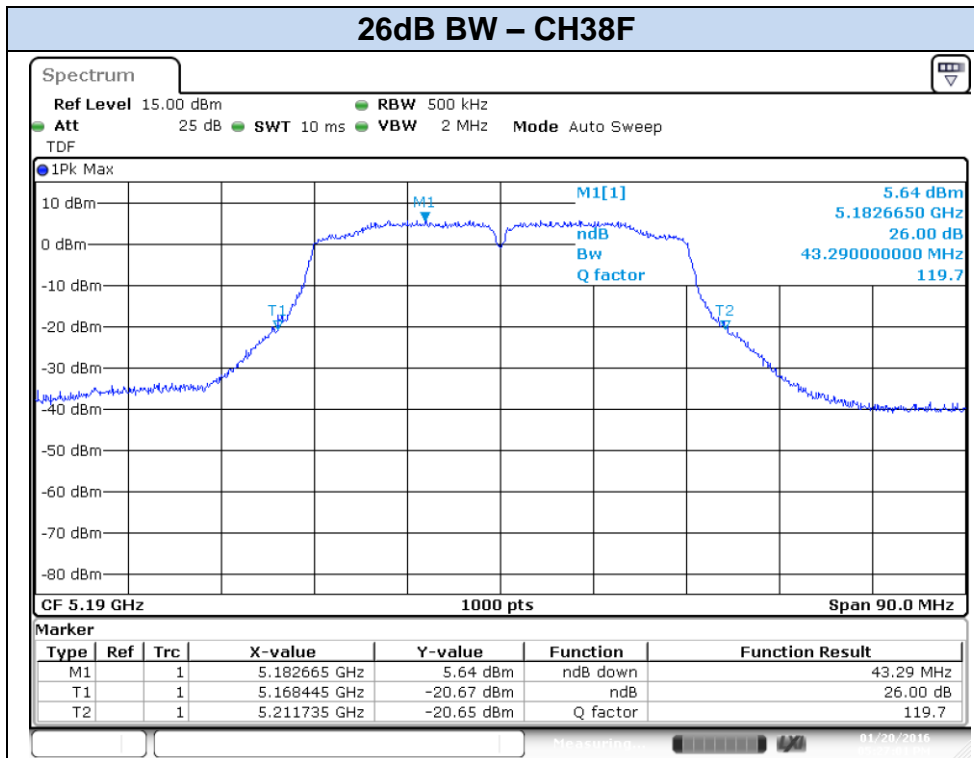
802.11n20, HT0 – Chain A



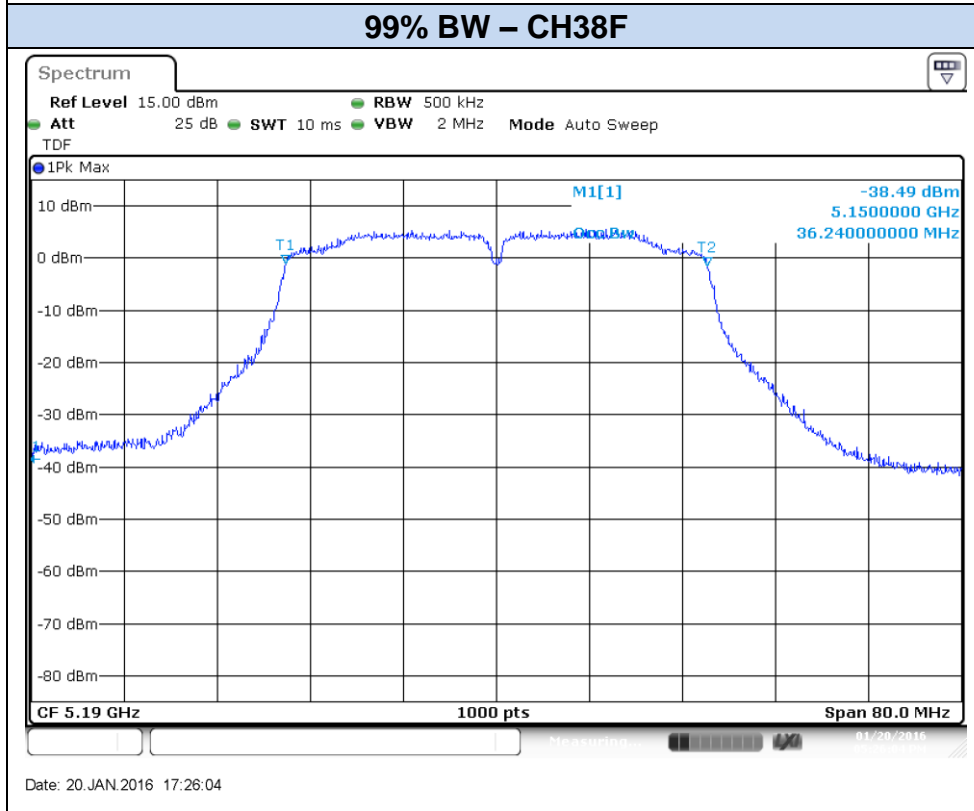




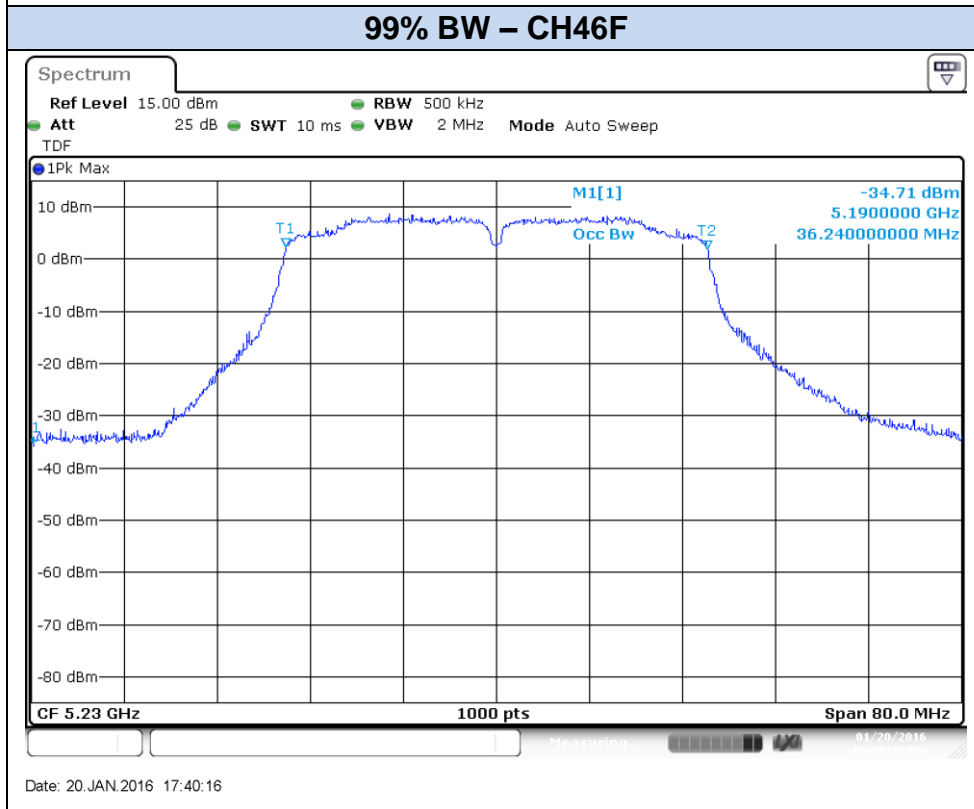
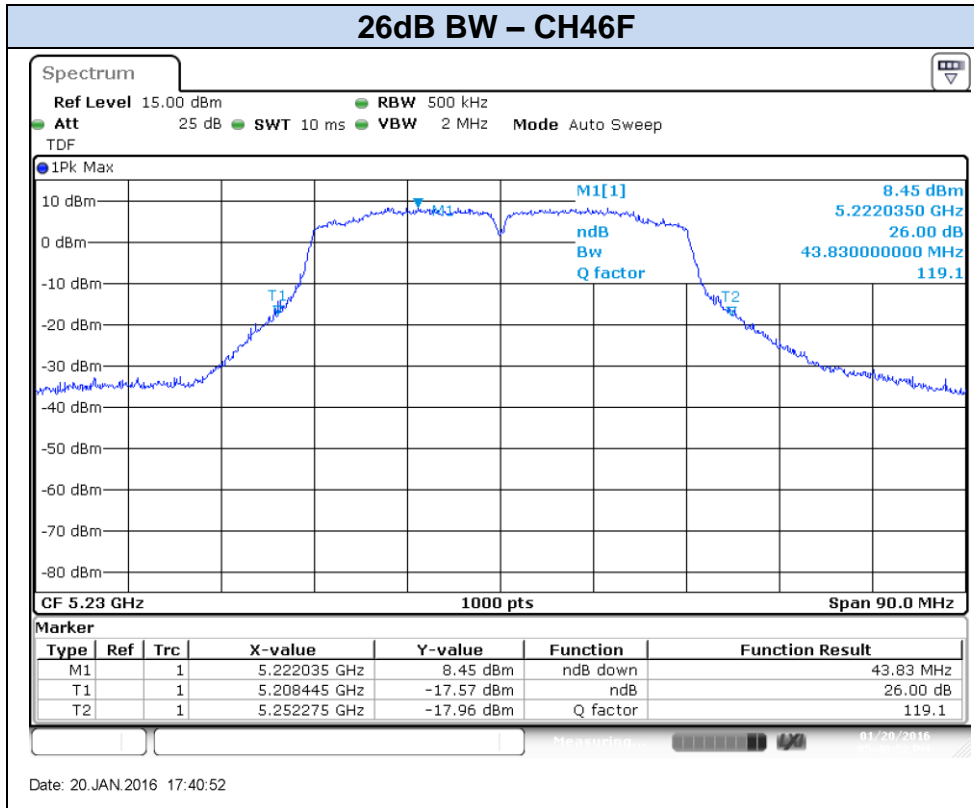
802.11n40, HT0 – Chain A



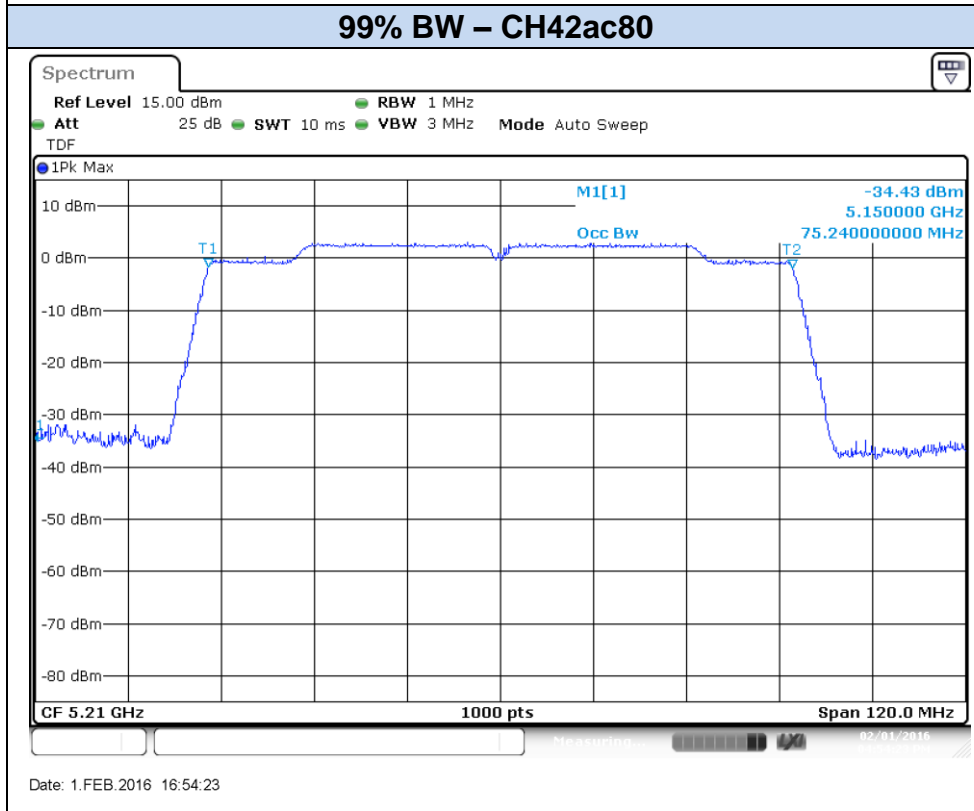
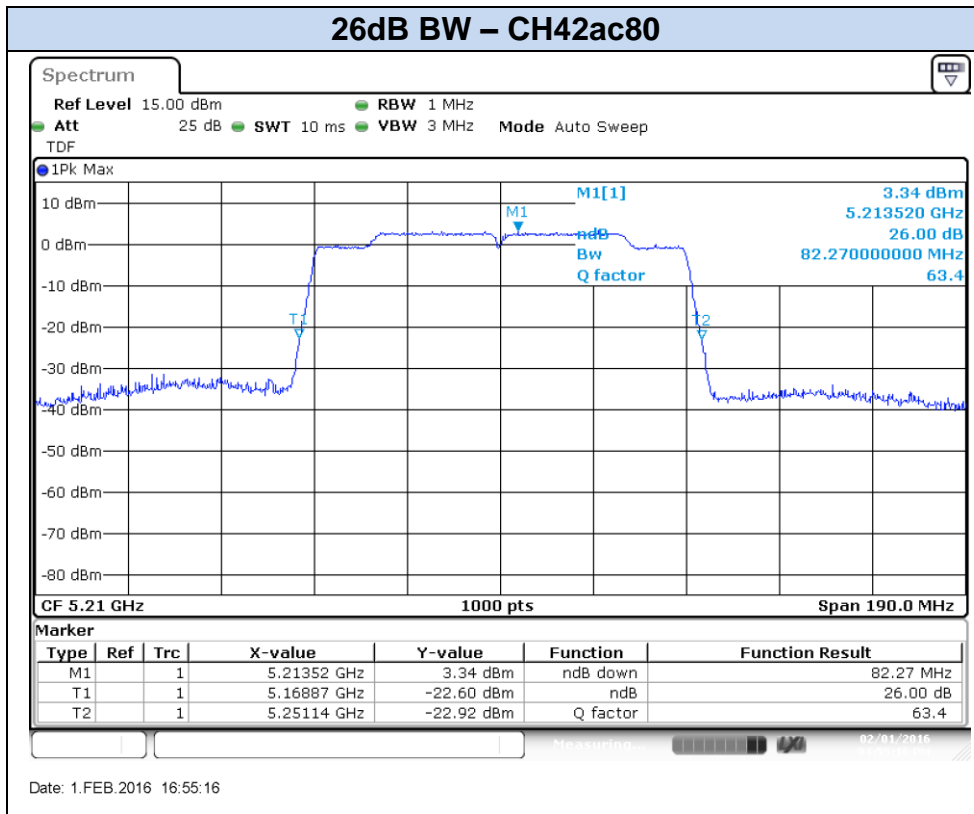
Date: 20.JAN.2016 17:27:01



Date: 20.JAN.2016 17:28:04



802.11ac80, VHT0 – Chain A



B.2 Power Limits. Maximum Output power & Peak power spectral density

Test limits

FCC part	Limits
15.407 (a) (1) (iv)	For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

Test procedure

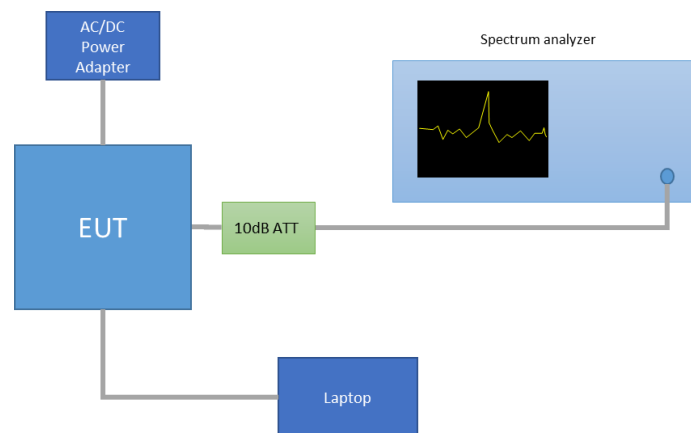
The Maximum Conducted Output Power was measured using the channel integration method according to point E) 2) e) (Method SA-2 Alternative) of KDB 789033 D02.

The maximum power spectral density (PSD) was measured using the method according to point F) (Method SA-2 Alternative) of KDB 789033 D02.

The EIRP power (dBm) is calculated by adding the declared maximum antenna gain to the measured conducted power.

The setup below was used to measure the maximum conducted output power and power spectral density. The antenna terminal of the EUT is connected to the spectrum analyser through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.

The declared maximum antenna gain is 5dBi.

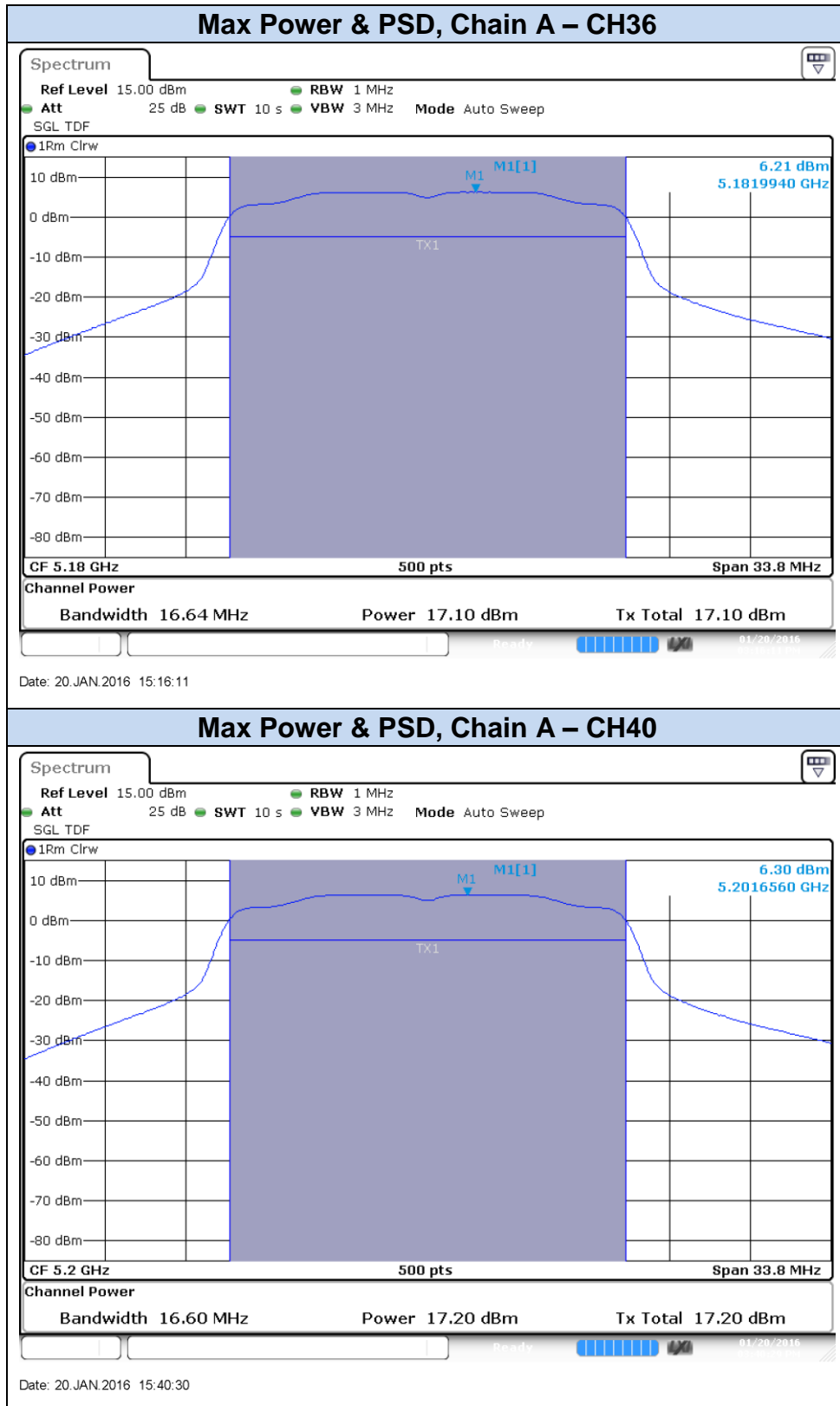


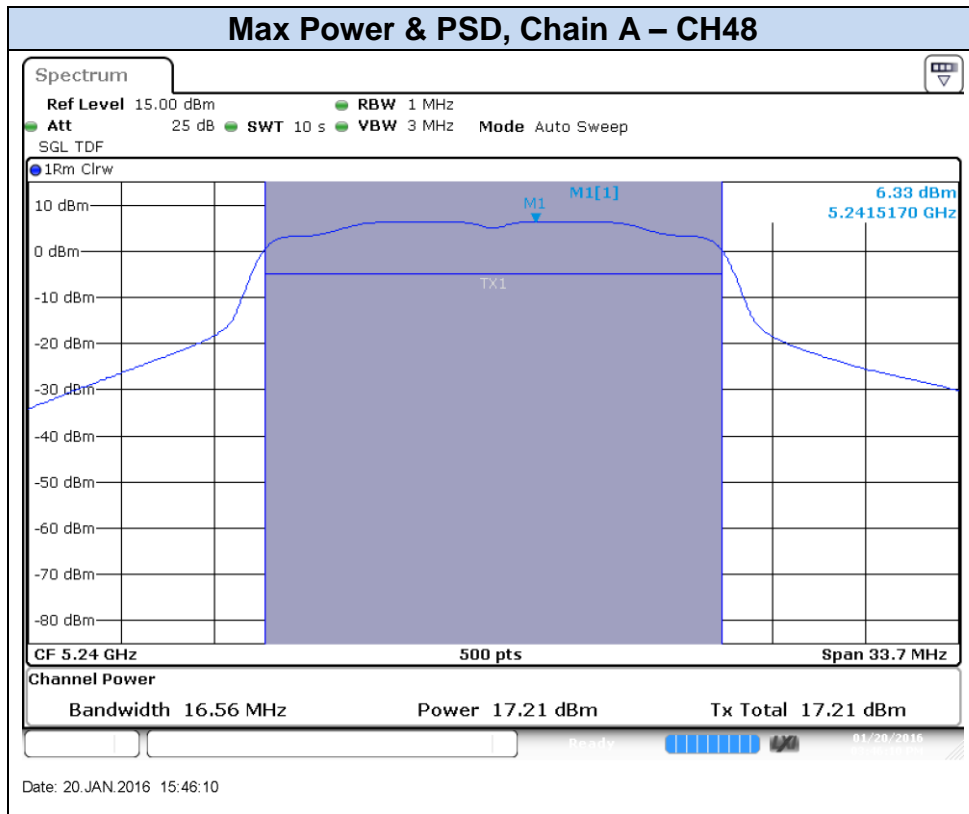
Results tables

Mode	Rate	Meas Duty Cycle [%]	CH	Freq [MHz]	Antenna	Power [dBm]				Power [mW]
						Meas. Cond RMS	Duty cycle Compensated	EIRP	PSD Duty cycle Compensated	
802.11a	6Mbps	98.4	36	5180	SISO CHAIN A	17.10	17.17	22.17	6.28	52.13
			40	5200		17.20	17.27	22.27	6.37	53.34
			48	5240		17.21	17.28	22.28	6.40	53.46
802.11n20	HT0	98.6	36	5180		17.03	17.09	22.09	6.01	51.20
			40	5200		17.08	17.14	22.14	6.06	51.79
			48	5240		17.10	17.16	22.16	6.08	52.03
802.11n40	HT0	97.1	38F	5190		13.62	13.75	18.75	-0.71	23.71
			46F	5230		16.57	16.70	21.70	2.24	46.77
802.11ac80	VHT0	96.0	42ac80	5210		11.54	11.72	16.72	-5.68	14.84

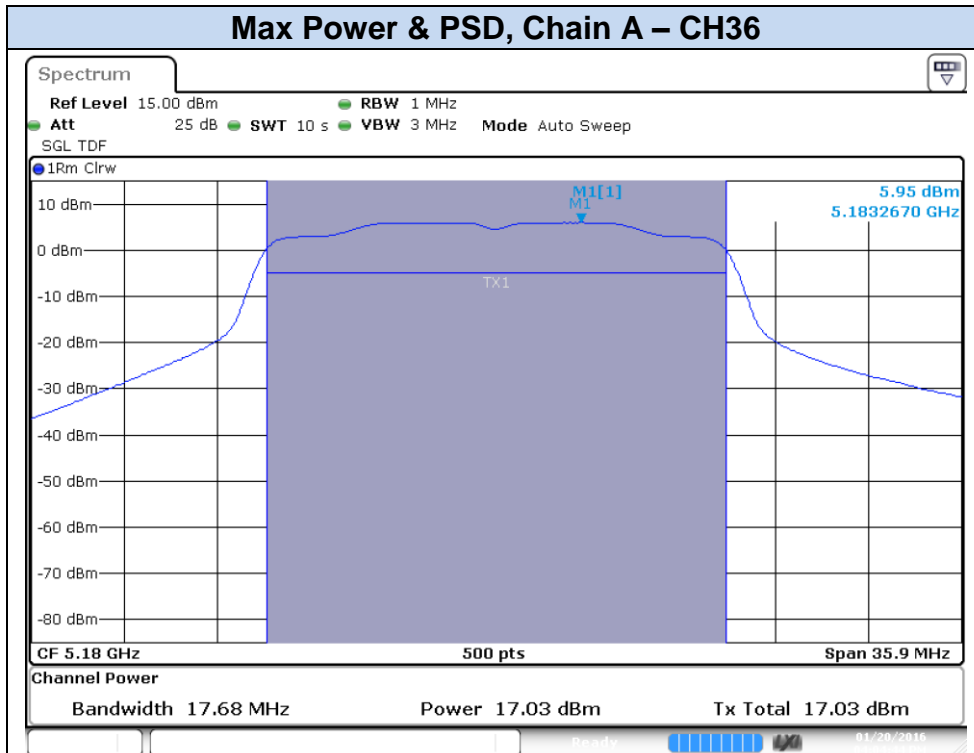
Max Value

Min Value

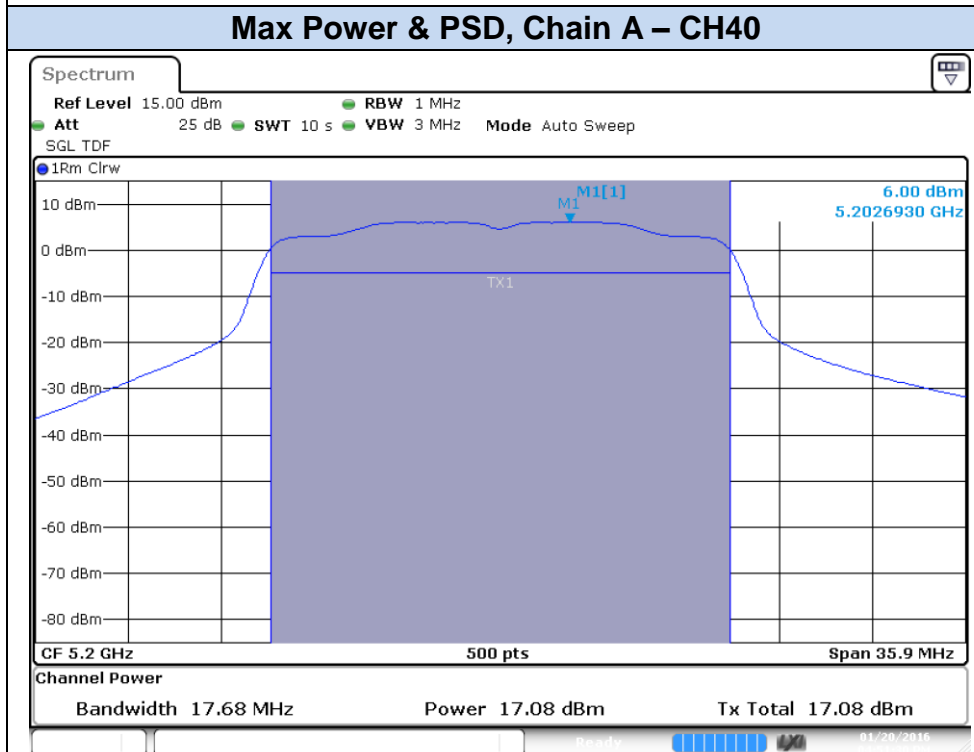
Results screenshot**802.11a, 6Mbps**



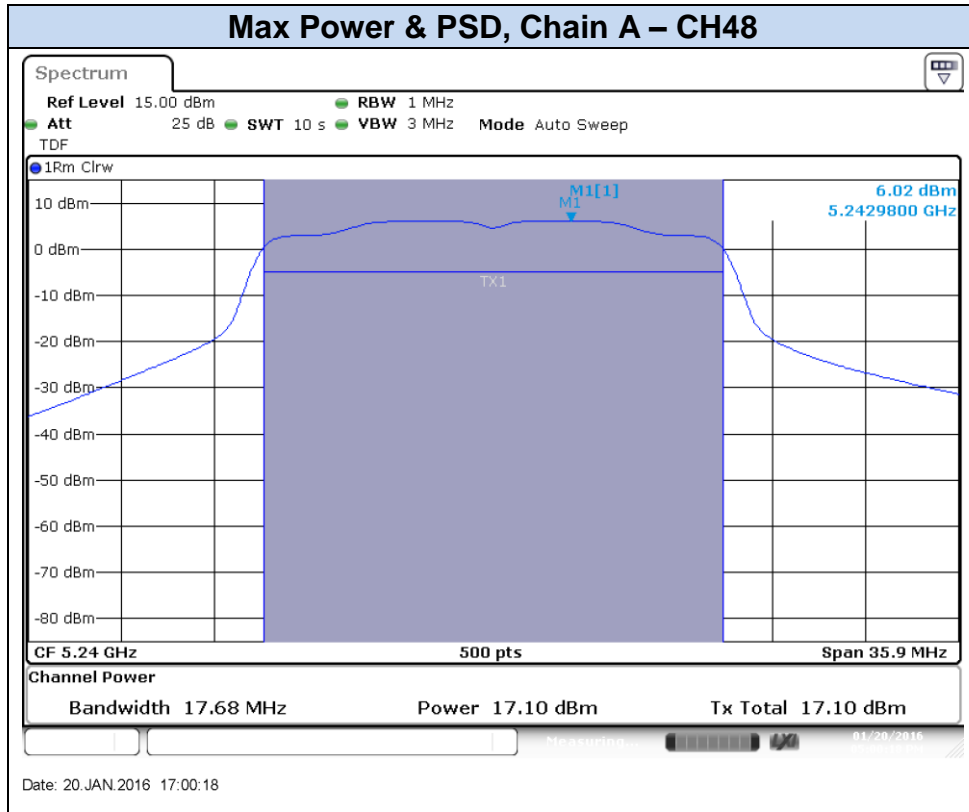
802.11n20, HT0

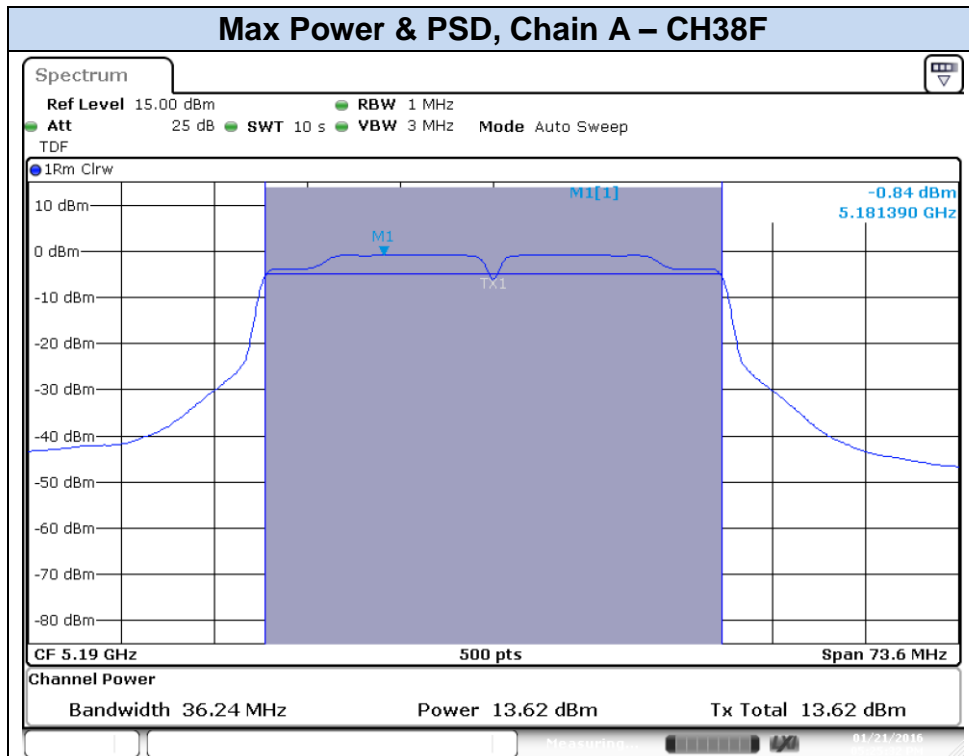


Date: 20.JAN.2016 16:04:44

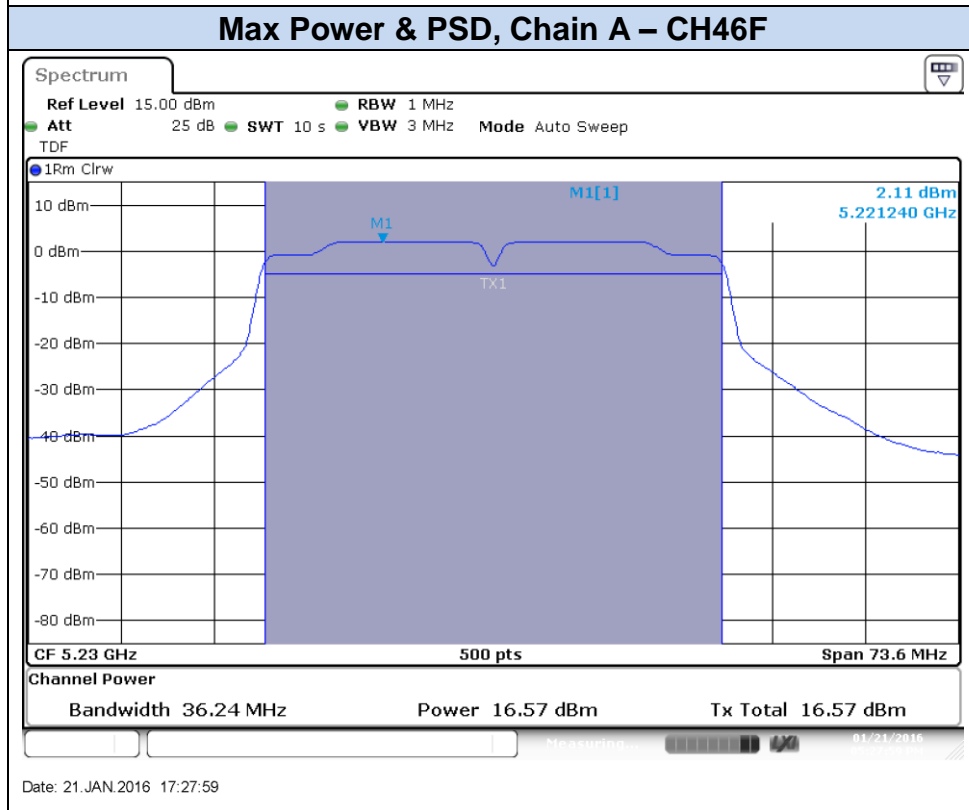


Date: 20.JAN.2016 16:51:30



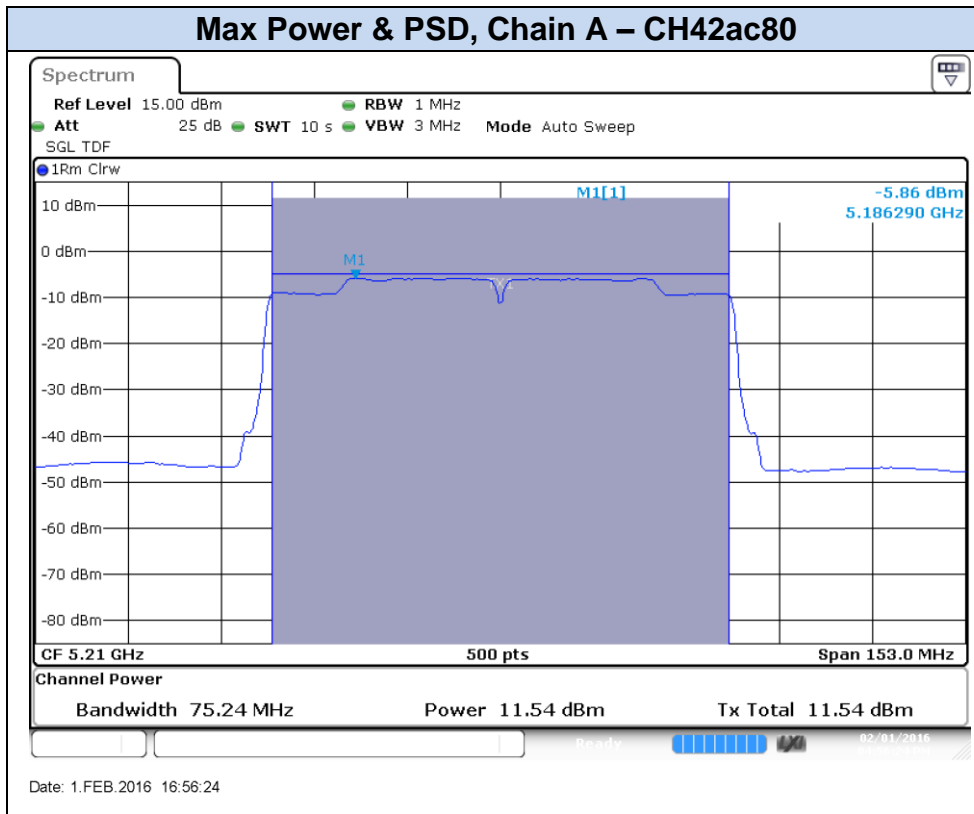
802.11n40, HT0

Date: 21.JAN.2016 17:25:32



Date: 21.JAN.2016 17:27:59

802.11ac80, VHT0



B.3 Undesirable emissions limits: Band Edge (conducted)

Test limits

FCC part	Limits																																
15.407 (b) (1)	For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.																																
15.209	<p>Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a):</p> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th style="background-color: #d9e1f2;">Freq Range (MHz)</th> <th style="background-color: #d9e1f2;">Field Strength (µV/m)</th> <th style="background-color: #d9e1f2;">Field Strength (dBµV/m)</th> <th style="background-color: #d9e1f2;">Meas. Distance (m)</th> </tr> </thead> <tbody> <tr> <td>0.009-0.490</td> <td>2400/f(kHz)</td> <td>-</td> <td>300</td> </tr> <tr> <td>0.490-1.705</td> <td>24000/f(kHz)</td> <td>-</td> <td>300</td> </tr> <tr> <td>1.705-30.0</td> <td>30</td> <td>-</td> <td>30</td> </tr> <tr> <td>30-88</td> <td>100</td> <td>40</td> <td>3</td> </tr> <tr> <td>88-216</td> <td>150</td> <td>43.5</td> <td>3</td> </tr> <tr> <td>216-960</td> <td>200</td> <td>46</td> <td>3</td> </tr> <tr> <td>Above 960</td> <td>500</td> <td>54</td> <td>3</td> </tr> </tbody> </table> <p>The emission limits shown in the above table are based on measurements employing 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.</p> <p>For average radiated emission measurements above 1000 MHz, there is also a limit specified when measuring with peak detector function, corresponding to 20 dB above the indicated values in the table.</p>	Freq Range (MHz)	Field Strength (µV/m)	Field Strength (dBµV/m)	Meas. Distance (m)	0.009-0.490	2400/f(kHz)	-	300	0.490-1.705	24000/f(kHz)	-	300	1.705-30.0	30	-	30	30-88	100	40	3	88-216	150	43.5	3	216-960	200	46	3	Above 960	500	54	3
Freq Range (MHz)	Field Strength (µV/m)	Field Strength (dBµV/m)	Meas. Distance (m)																														
0.009-0.490	2400/f(kHz)	-	300																														
0.490-1.705	24000/f(kHz)	-	300																														
1.705-30.0	30	-	30																														
30-88	100	40	3																														
88-216	150	43.5	3																														
216-960	200	46	3																														
Above 960	500	54	3																														

Test procedure

The setup below was used to measure the maximum peak output power. The antenna terminal of the EUT is connected to the spectrum analyzer through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss and the declared Antenna Gain.

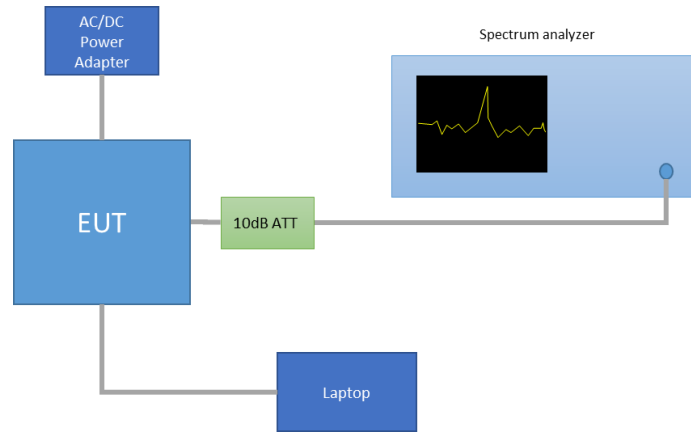
For the BE low RMS, we use the Video Bandwidth Method according to point G) 6) (KDB 789033 D02)

➔ When the duty cycle is > 98 %, we set VBW=10Hz

➔ When the duty cycle is < 98 %, we set VBW > 1/T, where T is defined in section II.B.1.a

In case of Band Edge measurements falling in restricted bands, the declared Antenna Gain is also compensated in the graph.

The declared maximum antenna gain is 5dBi.

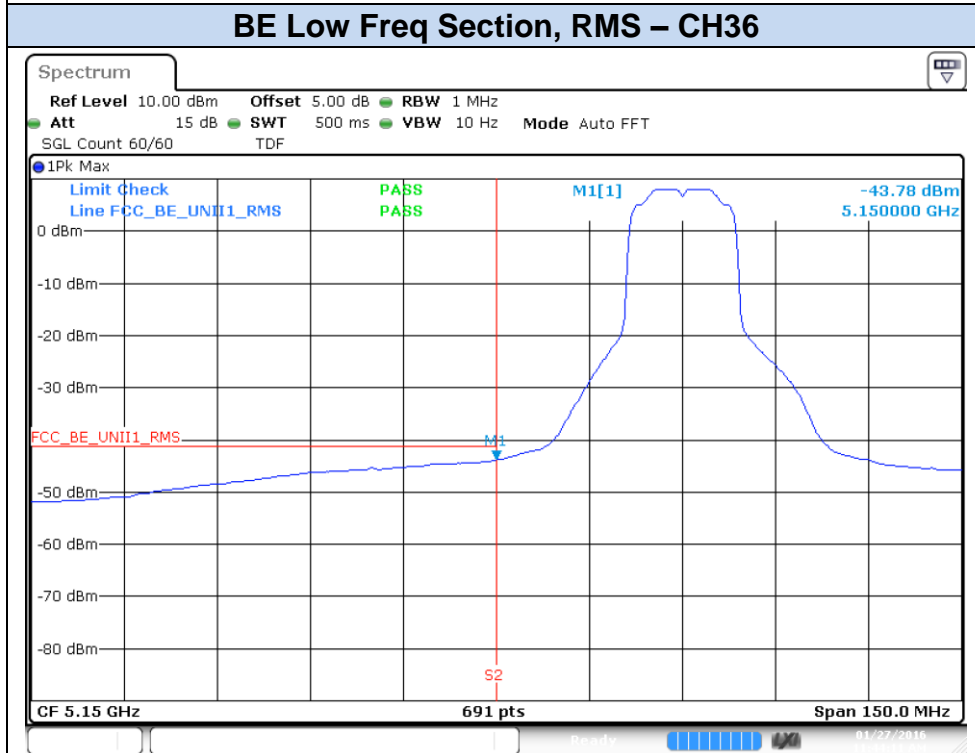
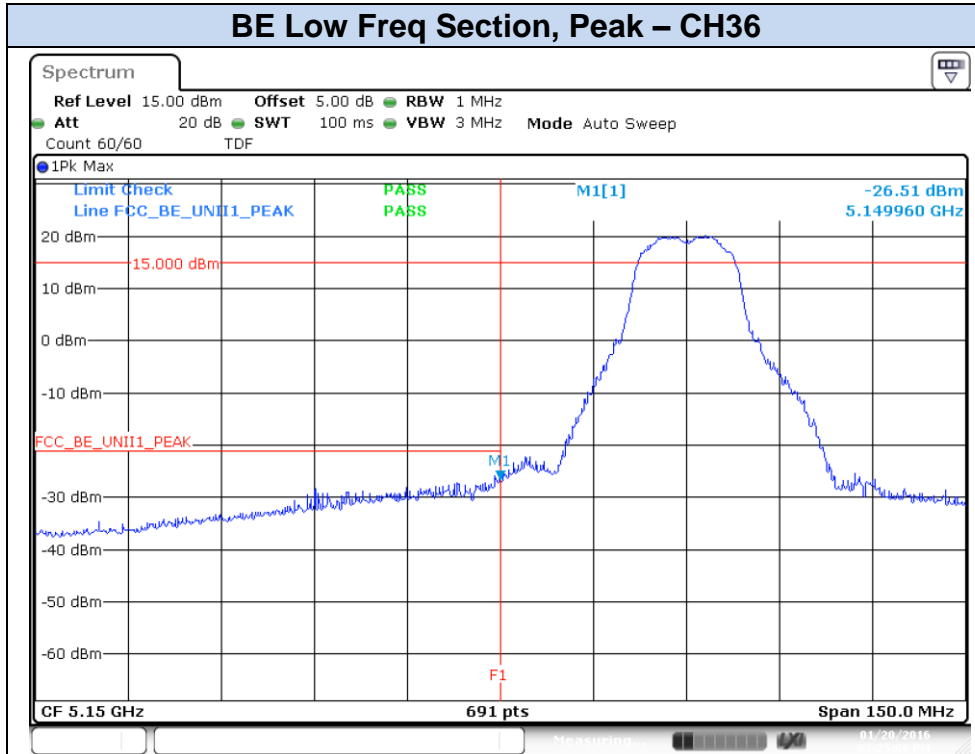


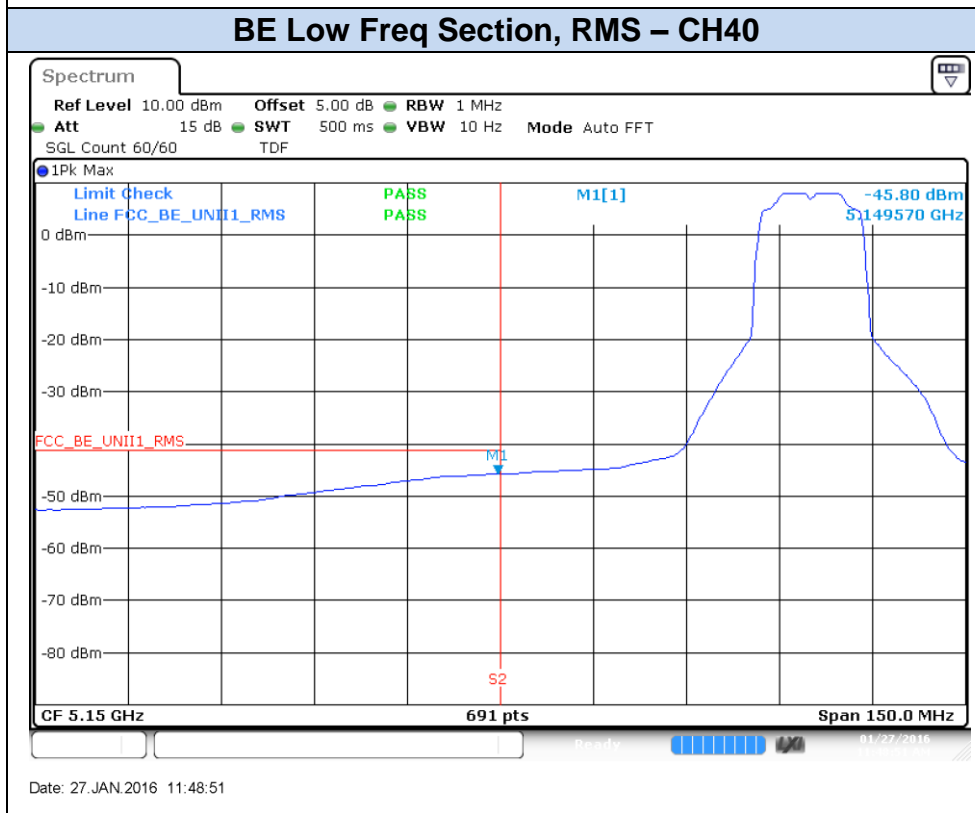
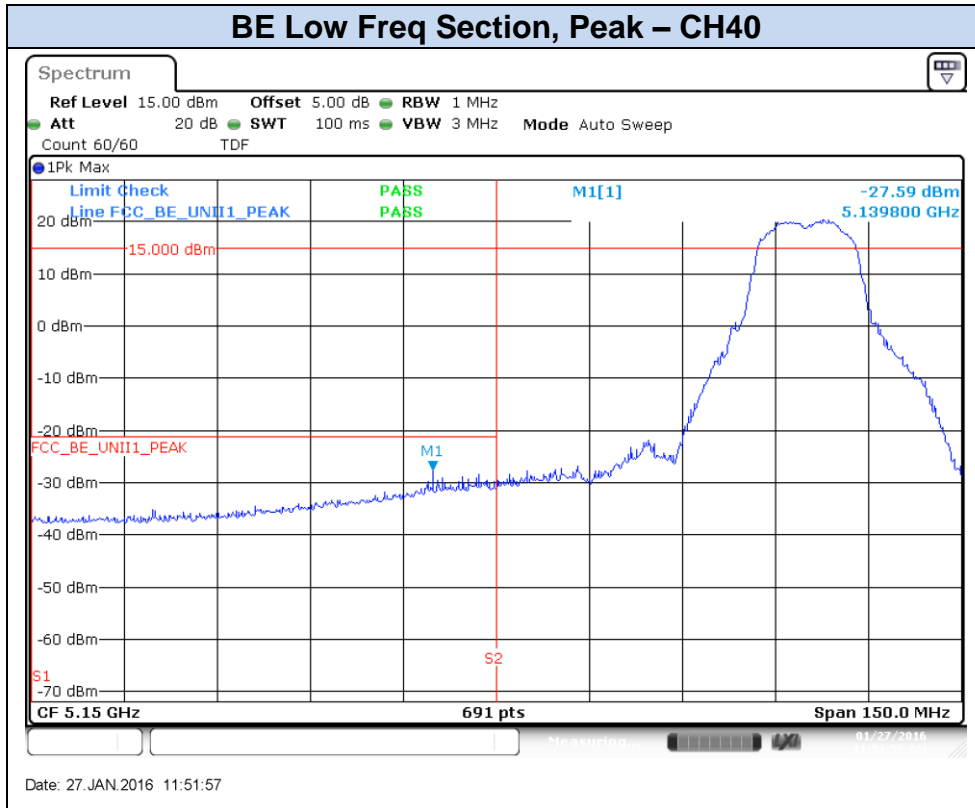
All values reported are converted in dBm, the table below shows the limits of the radiated emission (FCC part 15.209(a)) converted from dB μ V/m to dBm.

§15.209(a)			Converted values	
Freq Range (MHz)	Distance (m)	Field strength (microvolts/meter)	Field strength (dB microvolts/meter)	Power (dBm)
Above 960	3	500	53.98	-41.2

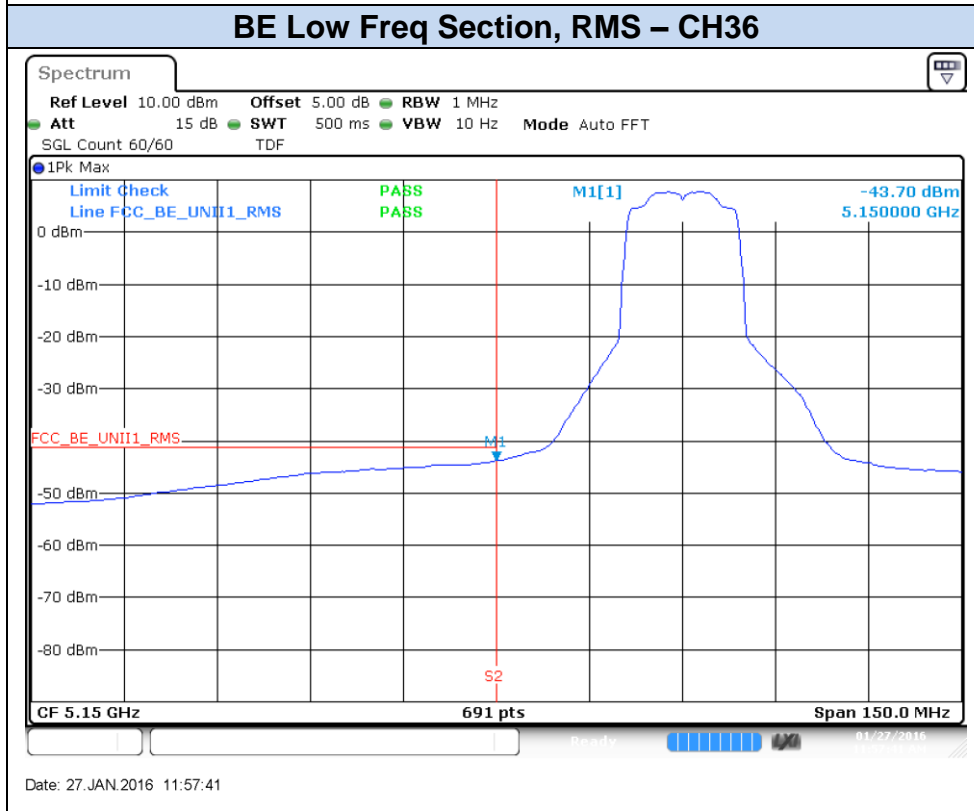
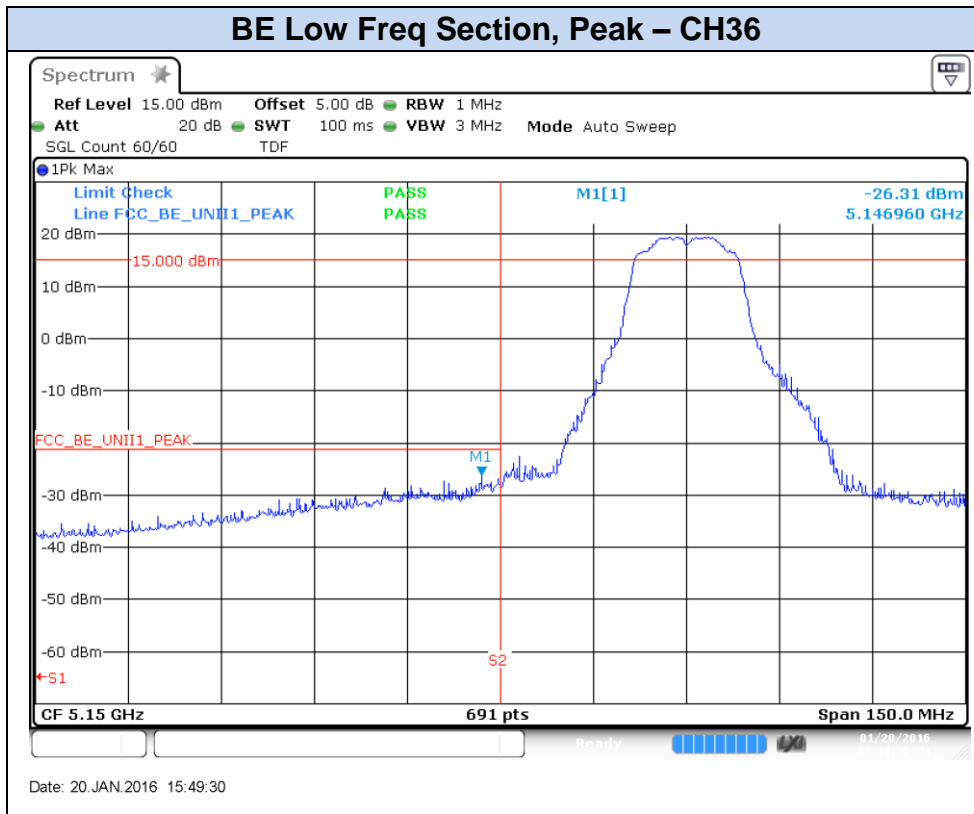
Results Screenshot

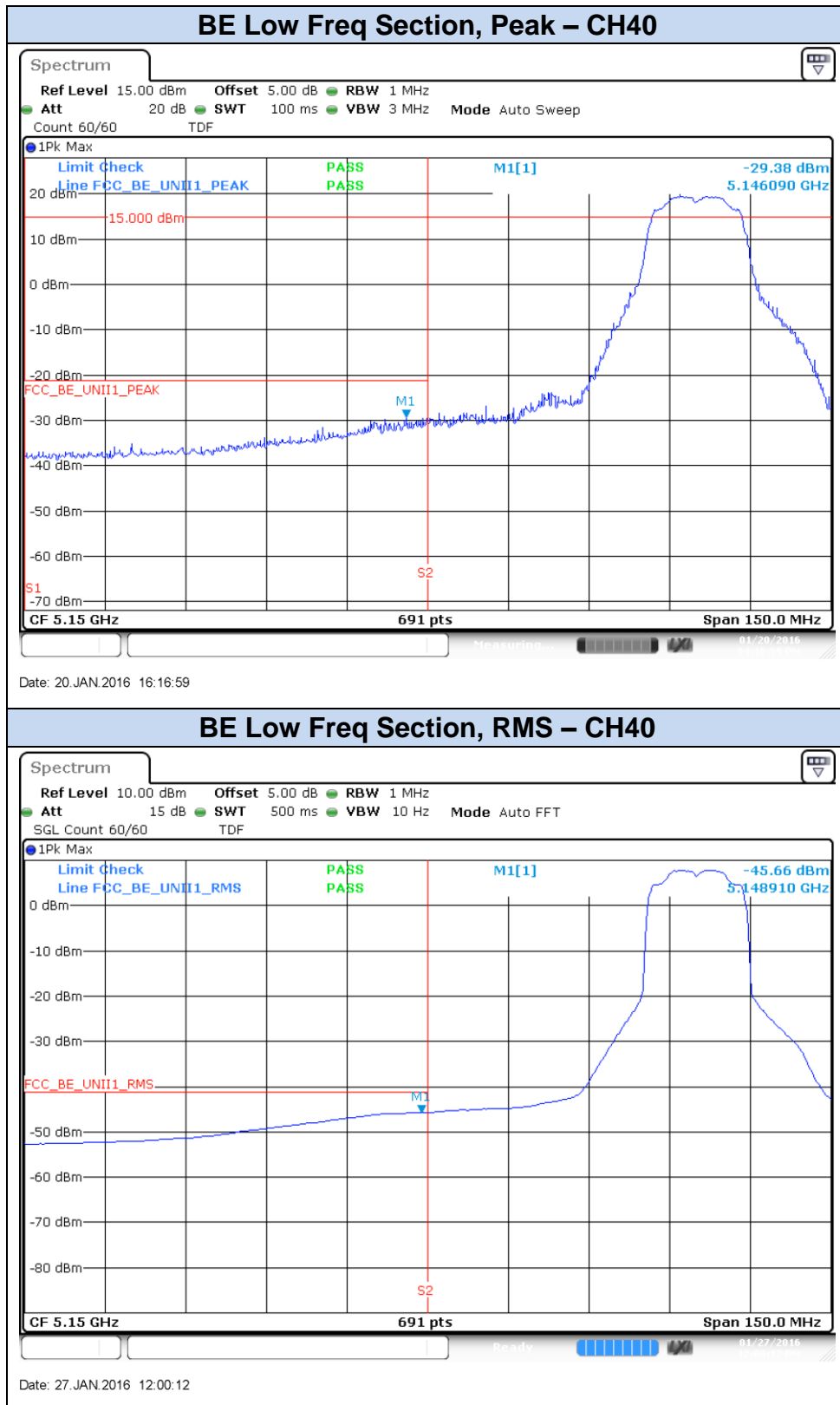
802.11a, 6Mbps – Chain A



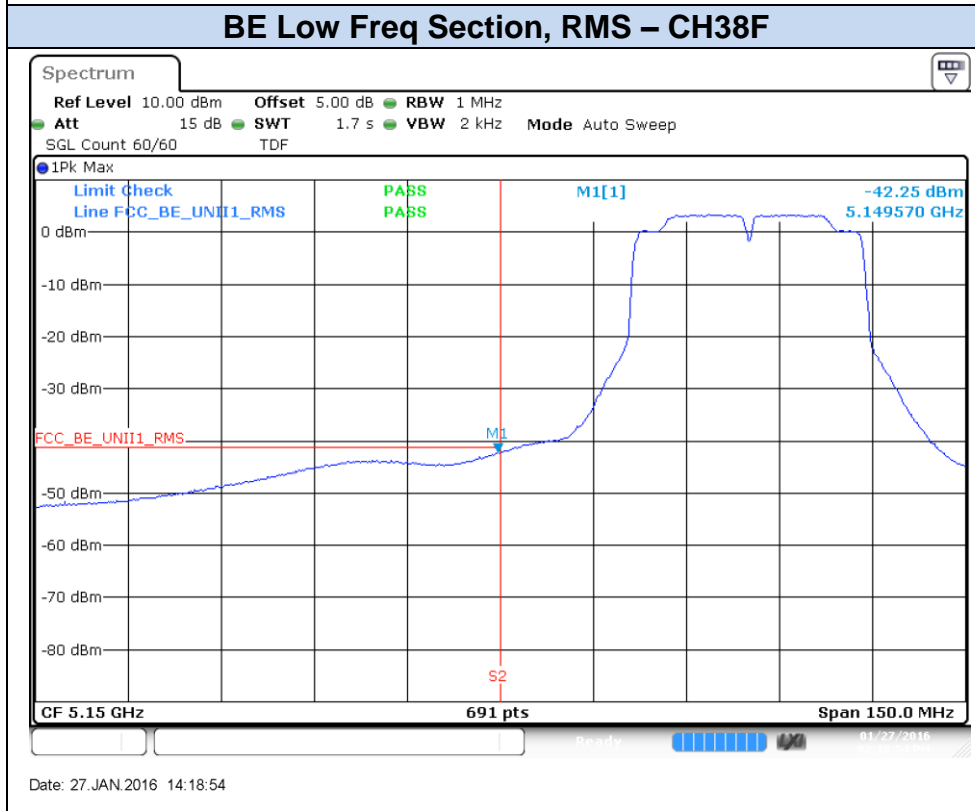
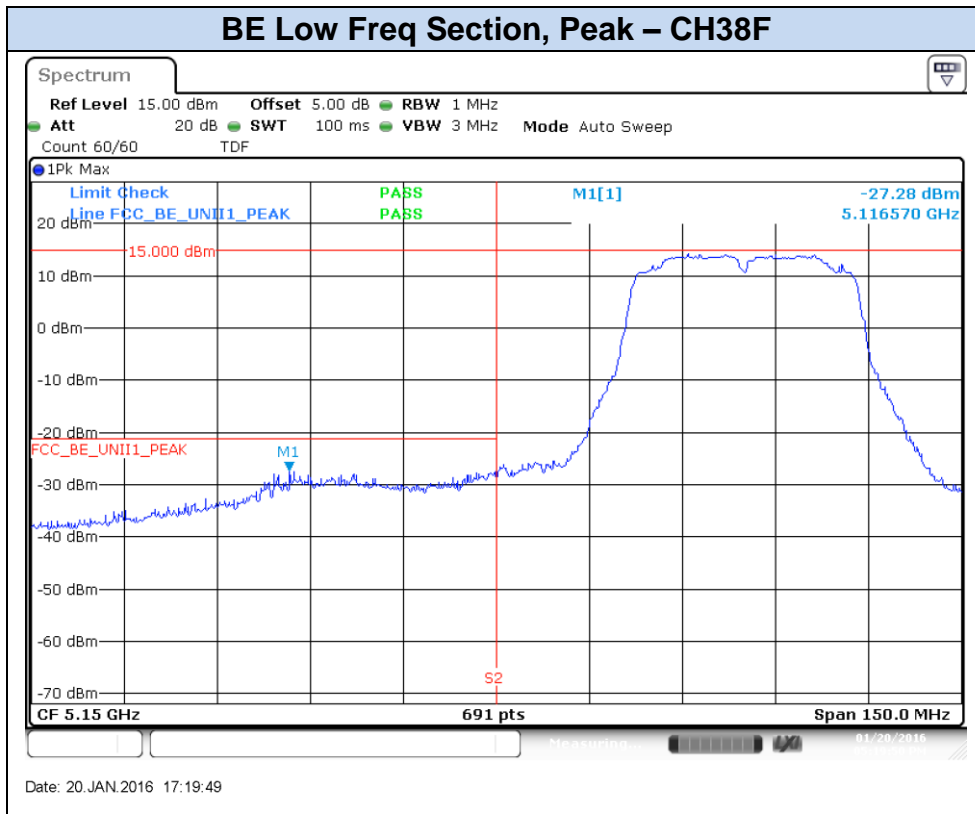


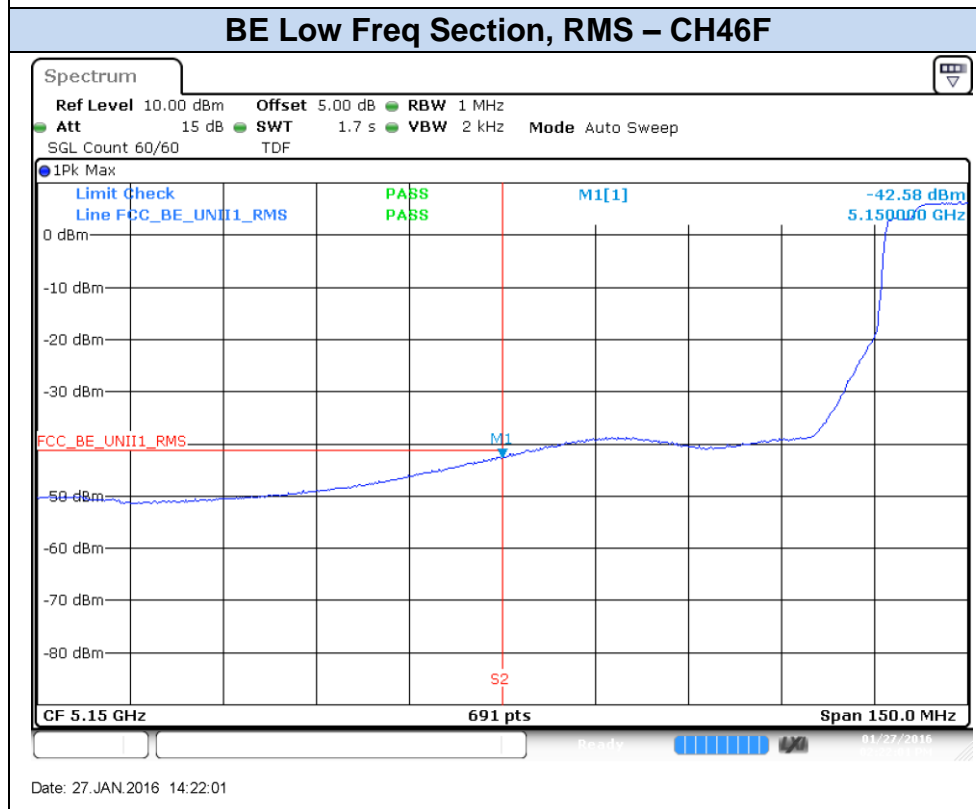
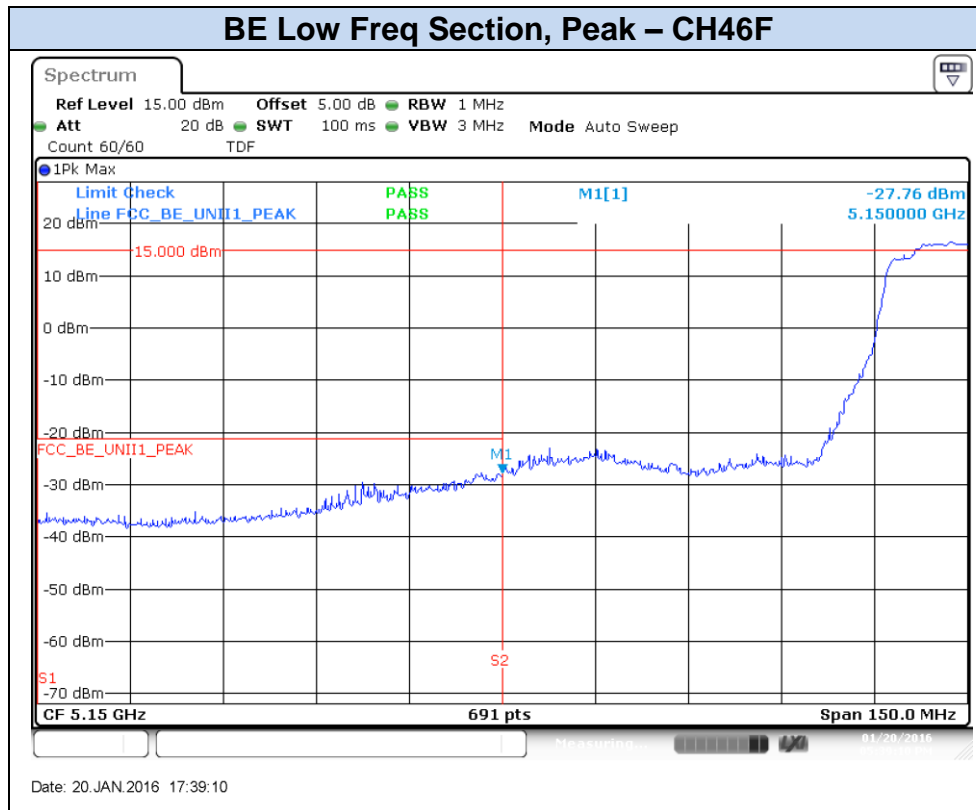
802.11n20, HT0 – Chain A

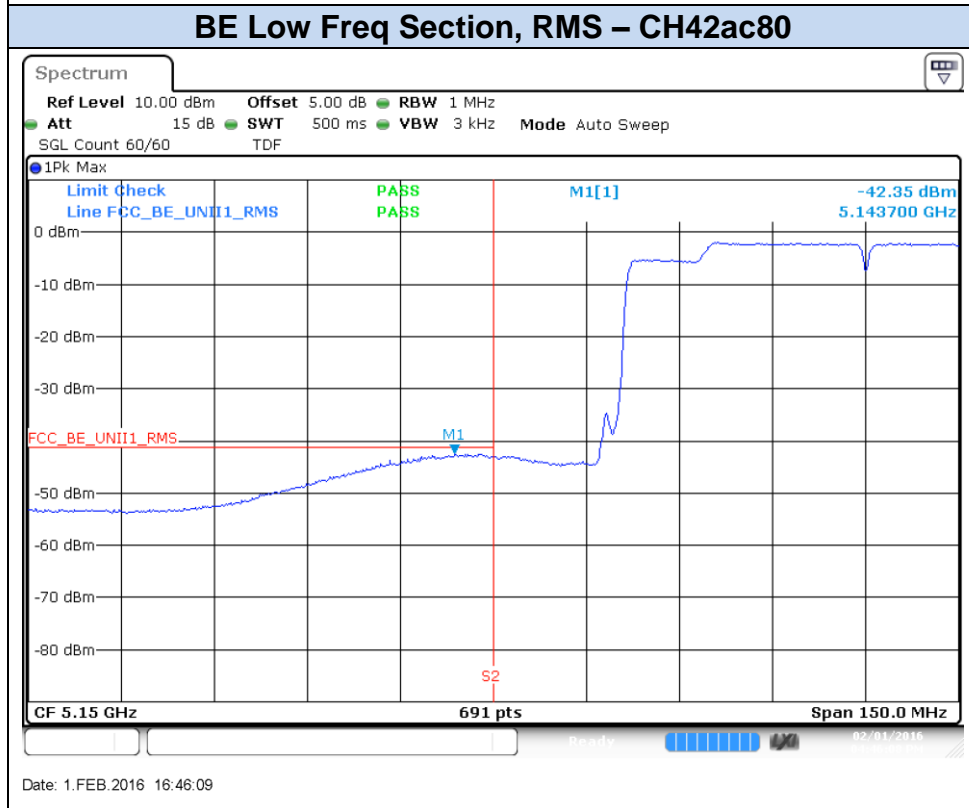
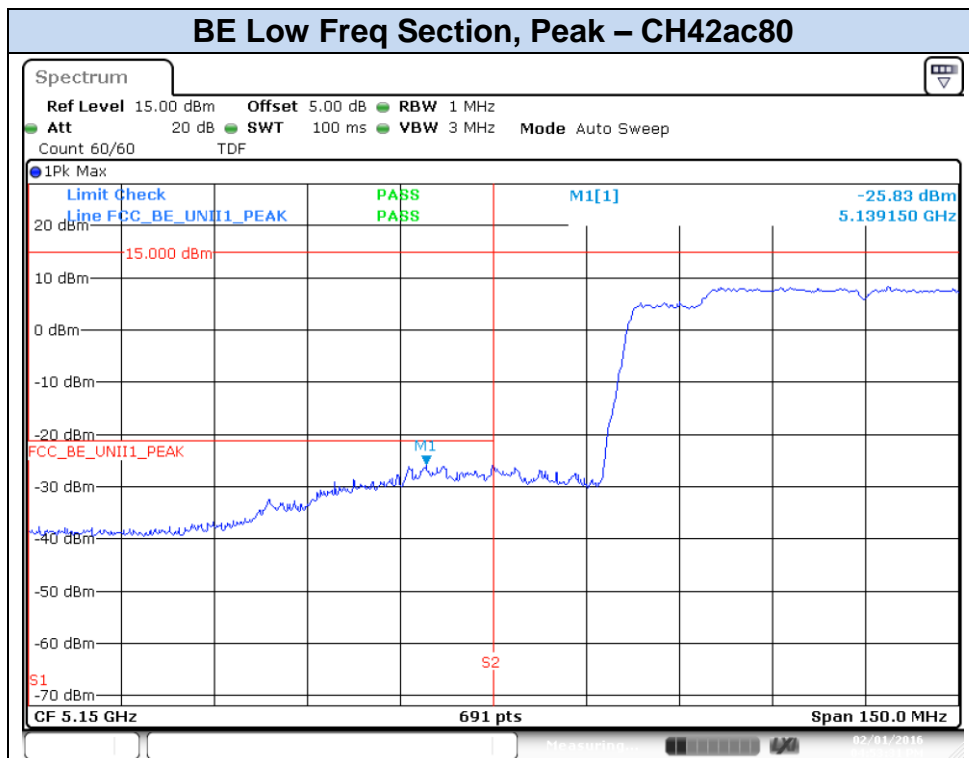




802.11n40, HT0 – Chain A





802.11ac80, VHT0 (SISO)- Chain A

B.4 Radiated spurious emission

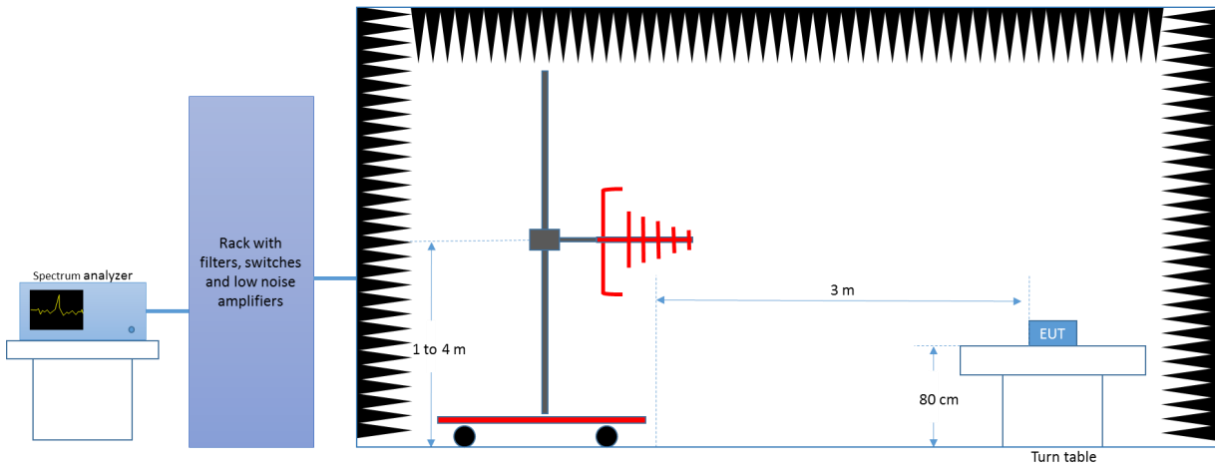
Standard references

FCC part	RSS part	Limits			
15.247 (d)	RSS-210 Clause A8.5	Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a):			
		Freq Range (MHz)	Field Strength ($\mu\text{V}/\text{m}$)	Field Strength ($\text{dB}\mu\text{V}/\text{m}$)	Meas. Distance (m)
		0.009-0.490	2400/f(kHz)	-	300
		0.490-1.705	24000/f(kHz)	-	300
		1.705-30.0	30	-	30
		30-88	100	40	3
		88-216	150	43.5	3
		216-960	200	46	3
		Above 960	500	54	3
<p>The emission limits shown in the above table are based on measurements employing 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.</p> <p>For average radiated emission measurements above 1000 MHz, there is also a limit specified when measuring with peak detector function, corresponding to 20 dB above the indicated values in the table.</p>					

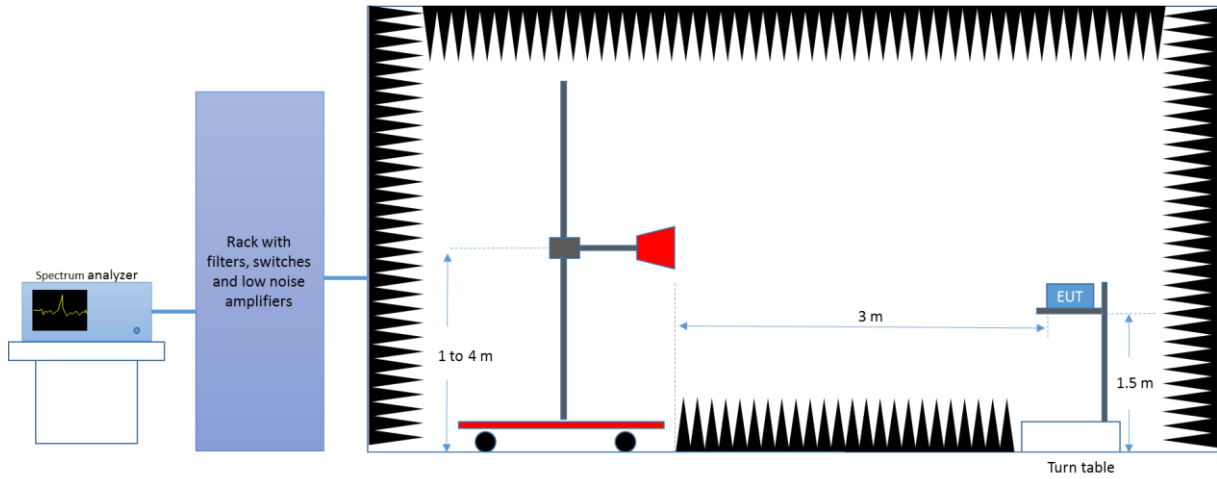
Test procedure

The setup below was used to measure the radiated spurious emissions. Depending of the frequency range and bands being tested, different antennas and filters were used. The final measurement is done by varying the antenna height from 1 to 4 meters, the EUT azimuth over 360° and for both Vertical and Horizontal polarizations. The radiated spurious emission was measured on the worst case configuration selected from the chapter 0 and on the low, middle and high channel.

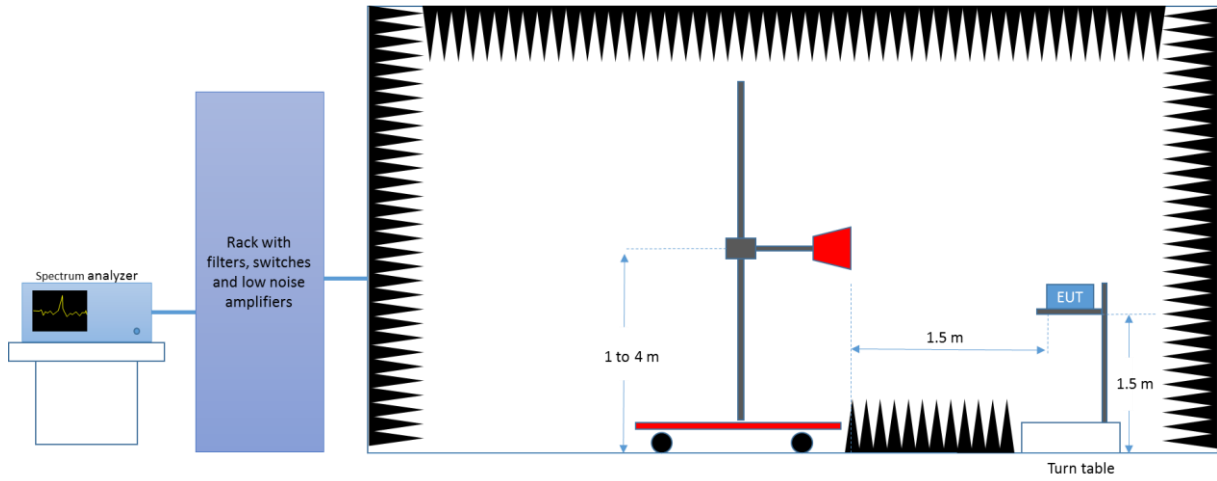
Radiated Setup < 1GHz



Radiated Setup 1 GHz – 18 GHz



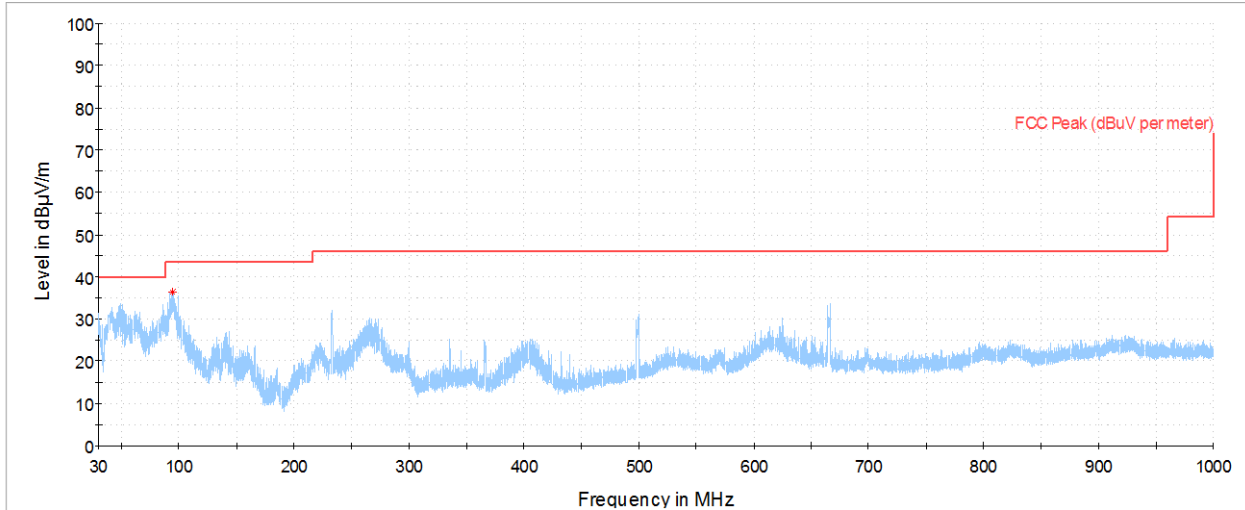
Radiated Setup > 18 GHz



Test Results

30 MHz – 1 GHz

Radiated Spurious – All modes



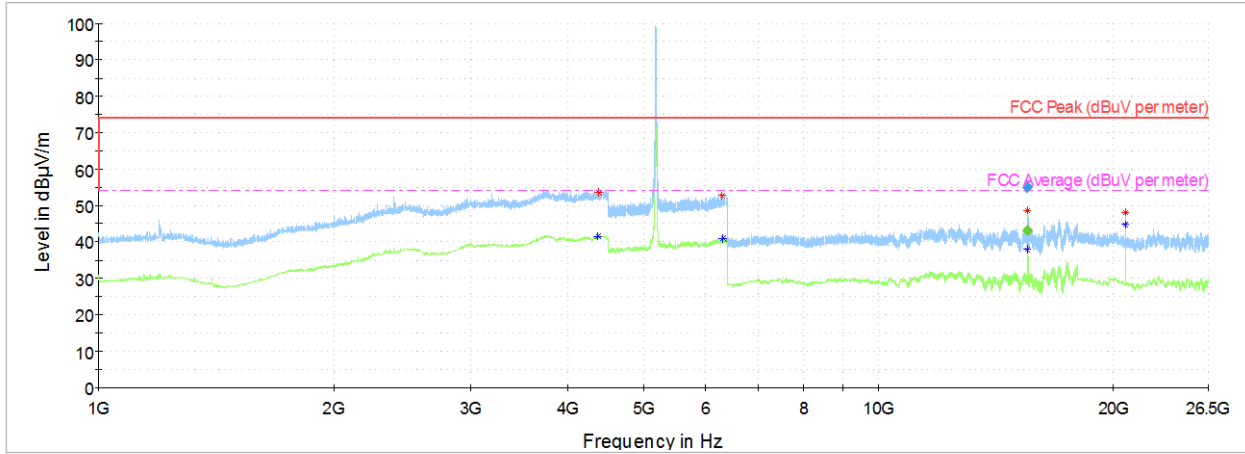
— Peak measurements — Limit FCC Peak

Frequency	MaxPeak	Limit	Margin
MHz	dBm	dBm	dB
94.87	36.40	43.56	7.15

Note 1: The spurious signals detected do not depend on either the operating channel or the modulation mode.

1 GHz – 26.5GHz, 802.11a, Chain A

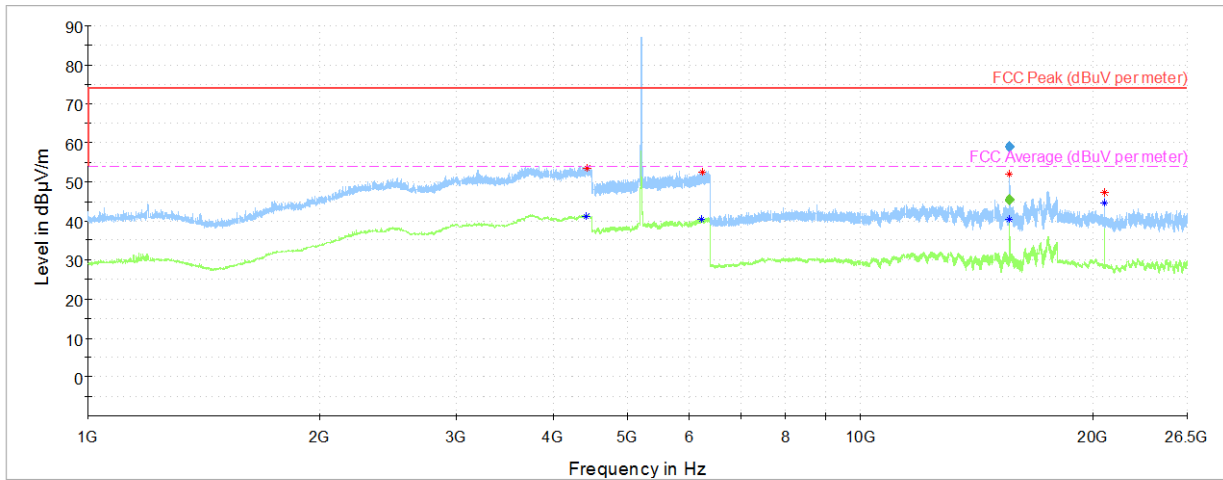
Radiated Spurious – CH36



— Peak measurements
 — AVG measurements
 — Limit FCC Peak
 - - - Limit FCC Avg

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
4419.50	---	41.11	54.06	12.94
4431.75	53.47	---	74.06	20.59
6232.63	---	40.26	54.06	13.80
6239.97	52.47	---	74.06	21.59
15536.16	---	55.04	74.06	19.02
15536.16	43.08	---	54.06	10.98
20720.00	44.86	---	54.06	9.19
20720.00	---	48.19	74.06	25.87

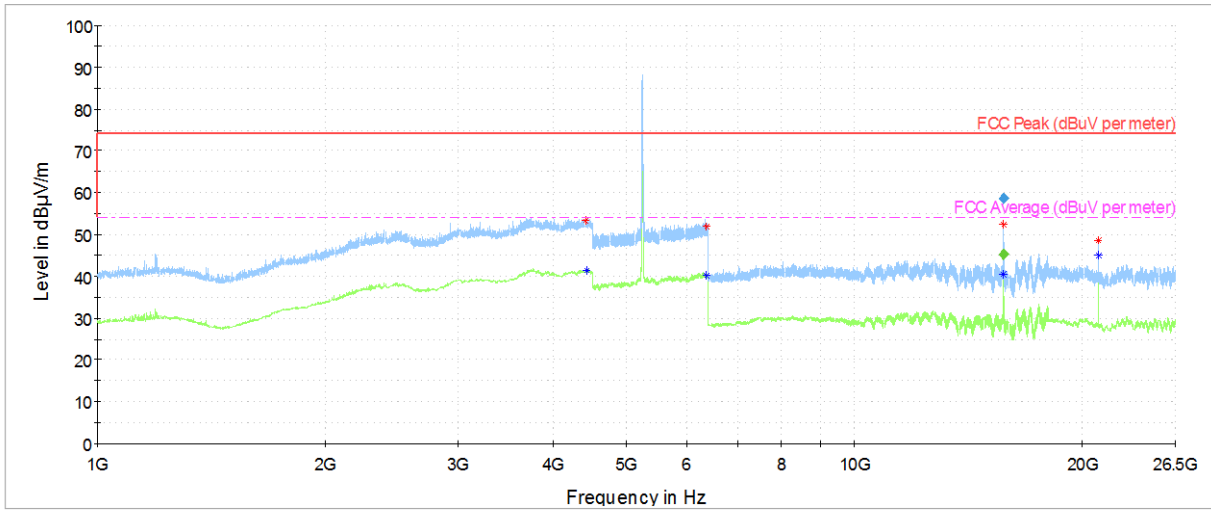
Radiated Spurious – CH40



— Peak measurements
 — AVG measurements
 — Limit FCC Peak
 - - - Limit FCC Avg

Frequency MHz	MaxPeak dBuV/m	Avg dBuV/m	Limit dBuV/m	Margin dB
4419.50	---	41.11	54.06	12.94
4431.75	53.47	---	74.06	20.59
6232.63	---	40.26	54.06	13.80
6239.97	52.47	---	74.06	21.59
15599.96	---	58.94	74.06	15.12
15602.86	45.51	---	54.06	8.55
20719.61	---	47.10	74.06	26.96
20720.00	44.67	---	54.06	9.38

Radiated Spurious – CH48

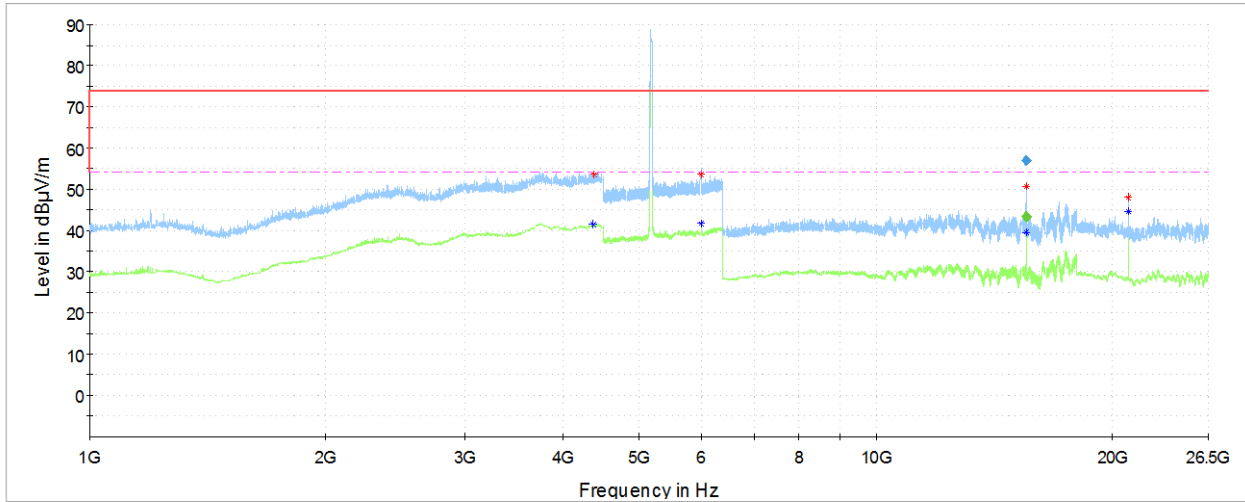


— Peak measurements
 — AVG measurements
 — Limit FCC Peak
 - - - Limit FCC Avg

Frequency MHz	MaxPeak dBuV/m	Avg dBuV/m	Limit dBuV/m	Margin dB
4413.38	53.34	---	74.06	20.72
4424.75	---	41.46	54.06	12.60
6377.29	51.99	---	74.06	22.07
6377.46	---	40.30	54.06	13.75
15718.28	58.69	---	74.06	15.37
15720.02	---	45.17	54.06	8.89
20959.93	48.50	---	74.06	25.56
20959.93	---	45.07	54.06	8.99

1 GHz – 26.5GHz, 802.11n20, Chain A

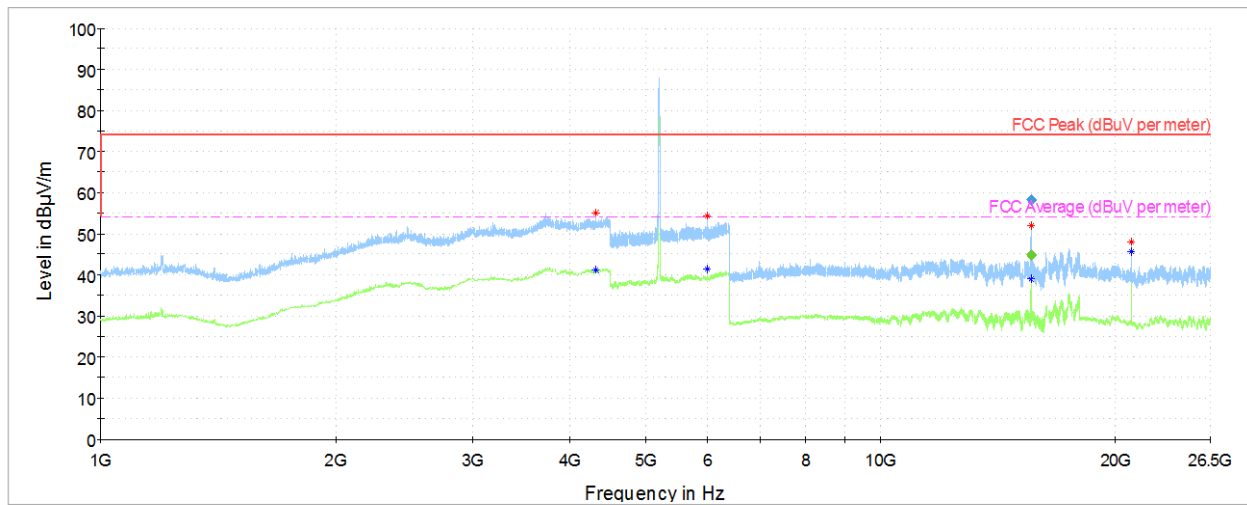
Radiated Spurious – CH36



— Peak measurements
 — AVG measurements
 — Limit FCC Peak
 - - - Limit FCC Avg

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
4371.38	---	41.56	54.06	12.50
4382.31	53.60	---	74.06	20.46
5992.71	53.59	---	74.06	20.47
5993.57	---	41.69	54.06	12.37
15539.64	---	43.42	54.06	10.64
15542.54	56.96	---	74.06	17.10
20959.93	48.08	---	74.06	25.98
20959.93	---	44.64	54.06	9.42

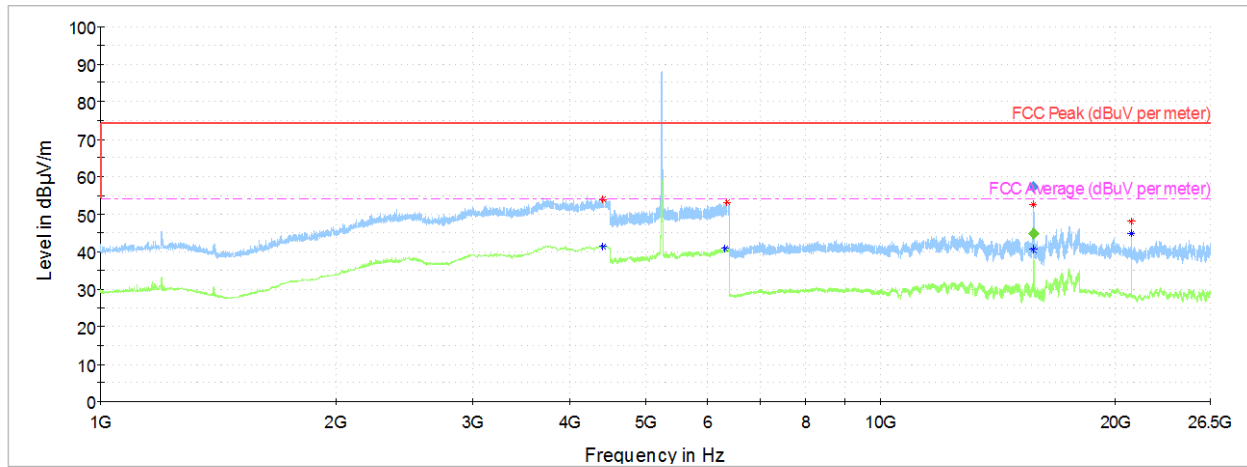
Radiated Spurious – CH40



— Peak measurements
 — AVG measurements
 — Limit FCC Peak
 - - - Limit FCC Avg

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
4320.63	55.01	---	74.06	19.05
4322.81	---	41.33	54.06	12.72
5990.46	54.36	---	74.06	19.70
5991.76	---	41.40	54.06	12.66
15599.96	---	44.94	54.06	9.12
15606.34	58.22	---	74.06	15.84
20959.55	48.00	---	74.06	26.06
20959.93	---	45.69	54.06	8.36

Radiated Spurious – CH48

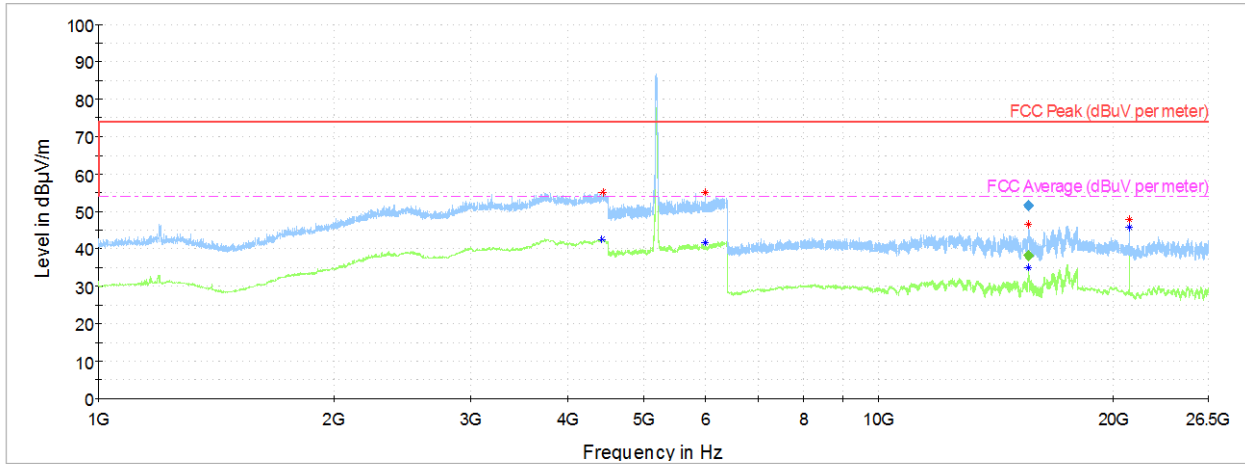


— Peak measurements
 — AVG measurements
 — Limit FCC Peak
 - - - Limit FCC Avg

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
4406.38	---	41.32	54.06	12.74
4406.38	53.75	---	74.06	20.31
6328.49	---	40.78	54.06	13.28
6362.52	53.03	---	74.06	21.03
15713.64	57.39	---	74.06	16.67
15716.54	---	44.73	54.06	9.33
20959.93	---	44.80	54.06	9.26
20959.93	48.11	---	74.06	25.95

1 GHz – 26.5GHz, 802.11n40, Chain A

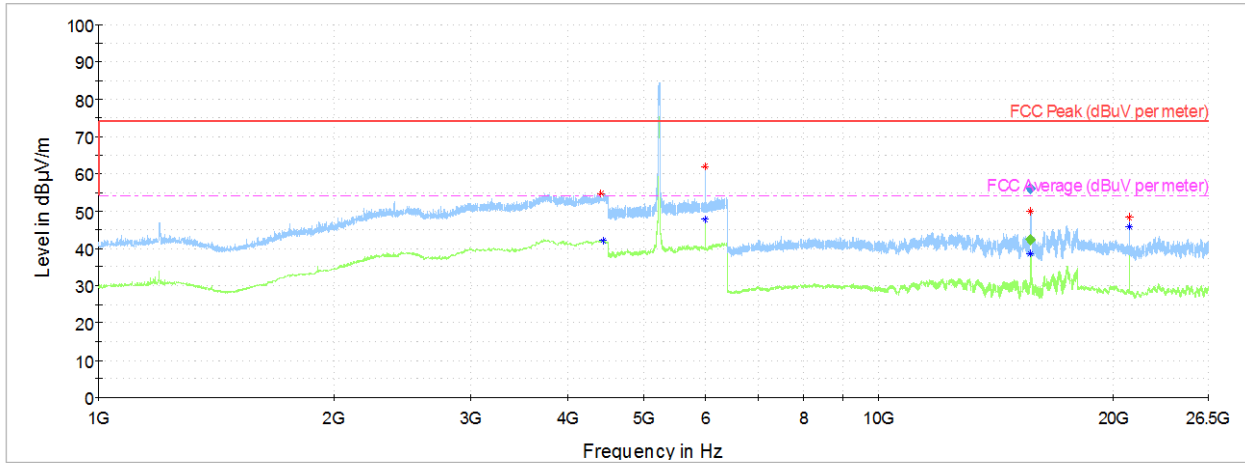
Radiated Spurious – CH38F



— Peak measurements
 — AVG measurements
 — Limit FCC Peak
 - - - Limit FCC Avg

Frequency MHz	MaxPeak dBuV/m	Avg dBuV/m	Limit dBuV/m	Margin dB
4419.50	---	42.54	54.06	11.52
4431.75	55.13	---	74.06	18.92
5988.65	---	41.74	54.06	12.32
5997.63	55.00	---	74.06	19.06
15559.36	---	38.32	54.06	15.74
15573.86	51.69	---	74.06	22.37
20959.93	47.99	---	74.06	26.07
20959.93	---	45.81	54.06	8.25

Radiated Spurious – CH46F

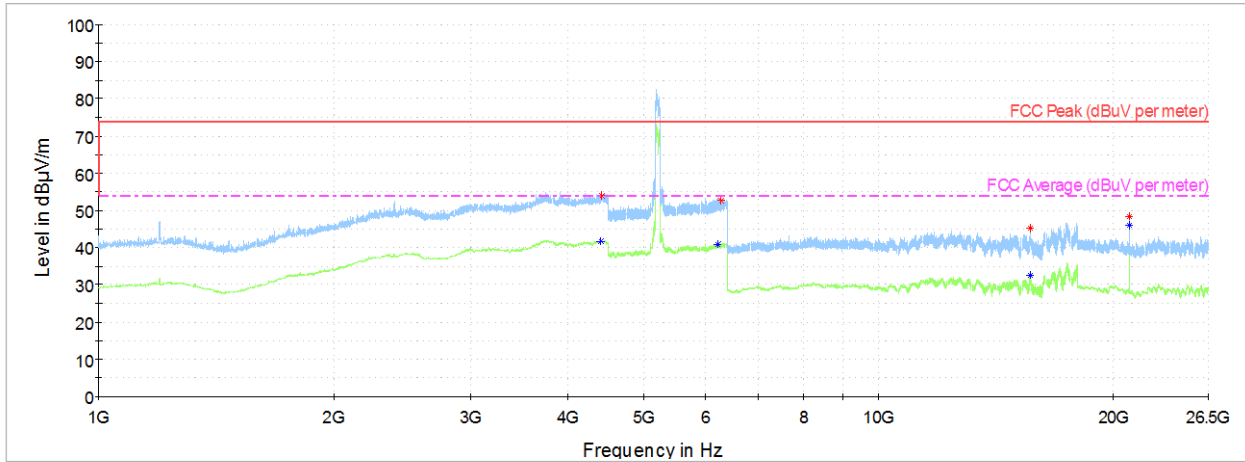


— Peak measurements
 — AVG measurements
 — Limit FCC Peak
 - - - Limit FCC Avg

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
4405.50	54.81	---	74.06	19.25
4440.50	---	42.18	54.06	11.87
5994.26	---	47.76	54.06	6.30
5995.04	61.92	---	74.06	12.14
15680.58	56.02	---	74.06	18.04
15682.90	---	42.32	54.06	11.74
20959.93	---	45.74	54.06	8.32
20959.93	48.18	---	74.06	25.87

1 GHz – 26.5GHz, 802.11ac80, Chain A

Radiated Spurious – CH42ac80

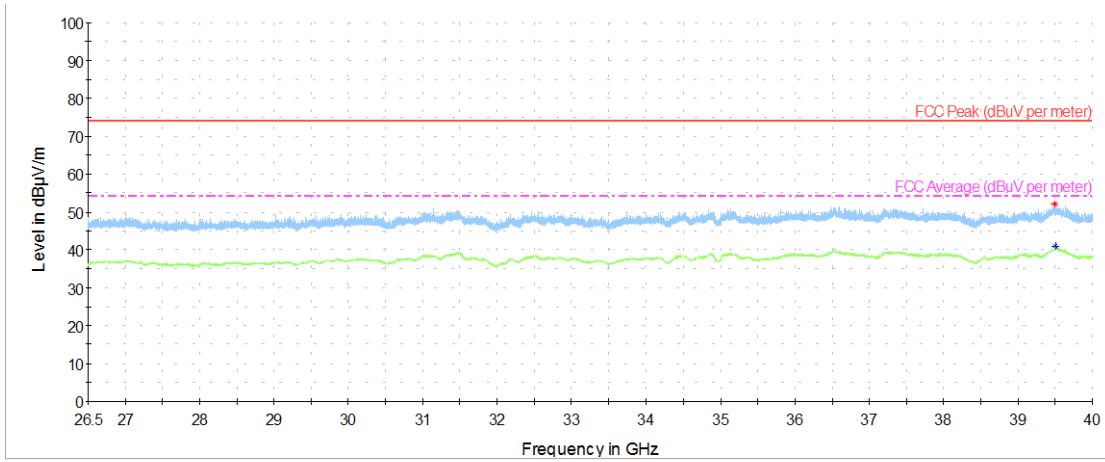


— Peak measurements
 — AVG measurements
 — Limit FCC Peak
 - - - Limit FCC Avg

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
4409.44	---	41.77	54.06	12.29
4423.44	54.05	---	74.06	20.01
6233.75	---	40.97	54.06	13.09
6290.23	52.64	---	74.06	21.42
15650.42	---	32.46	54.06	21.60
15670.14	45.04	---	74.06	29.02
20959.93	48.52	---	74.06	25.54
20959.93	---	45.97	54.06	8.08

26.5 GHz – 40GHz

Radiated Spurious – All modes



— Peak measurements
 — AVG measurements
 — Limit FCC Peak
 - - - Limit FCC Avg

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
39496.87	51.94	---	74.06	22.12
39503.10	---	40.87	54.06	13.19

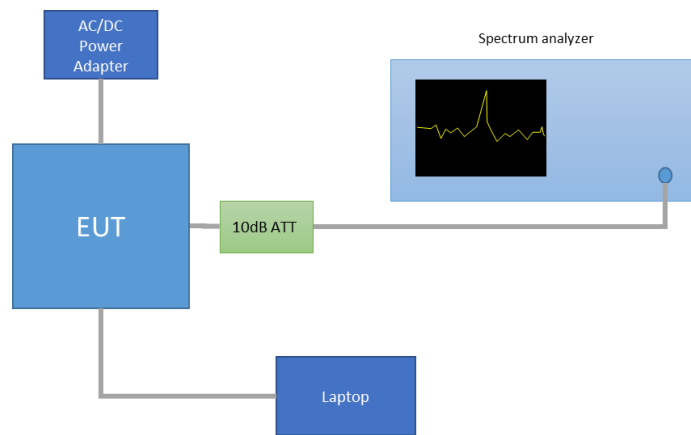
Note 1: The spurious signals detected do not depend on either the operating channel or the modulation mode.

Annex C. Test Results U-NII-2A

C.1 26dB & 99% Bandwidth

Test procedure:

The setup below was used to measure the 26dB & 99% Bandwidth. The antenna terminal of the EUT is connected to the spectrum through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.

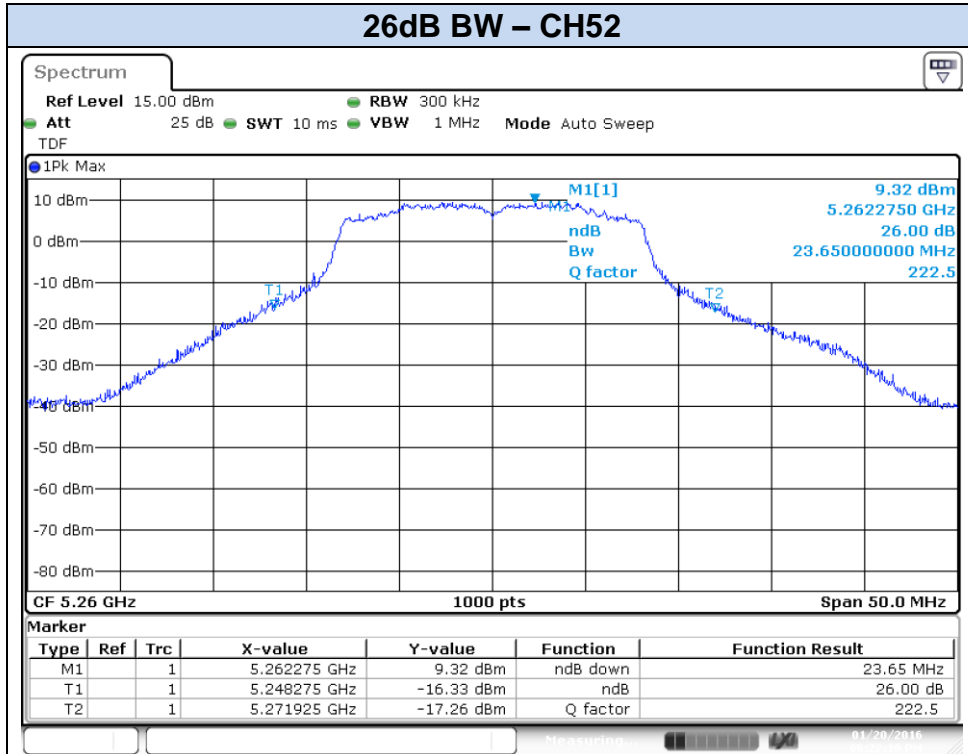


Results tables:

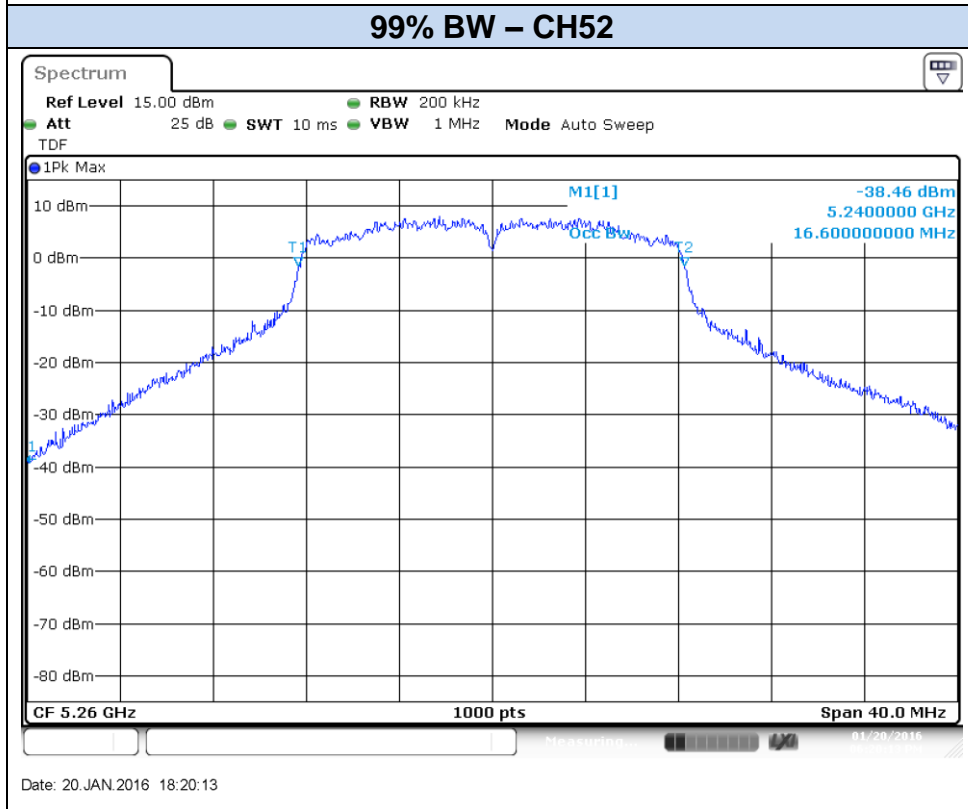
Mode	Rate	Antenna	Channel	Frequency [MHz]	26dB BW [MHz]	99% BW [MHz]
802.11a	6Mbps	SISO CHAIN A	52	5260	23.65	16.60
			56	5280	23.70	16.64
			64	5320	24.45	16.56
802.11n20	HT0	SISO CHAIN A	52	5260	24.05	17.76
			56	5280	25.60	17.80
			64	5320	23.70	17.72
802.11n40	HT0	SISO CHAIN A	54F	5270	43.65	36.32
			62F	5310	43.02	36.24
802.11ac80	VHT0	SISO CHAIN A	58ac80	5290	82.27	75.36

Results screenshot:

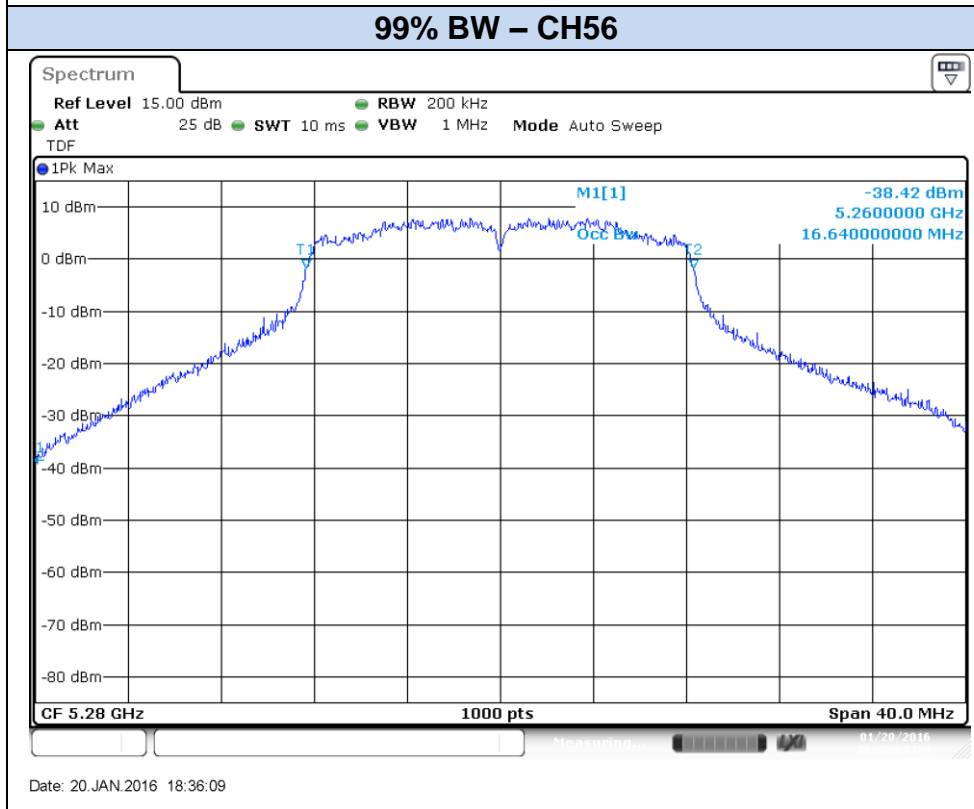
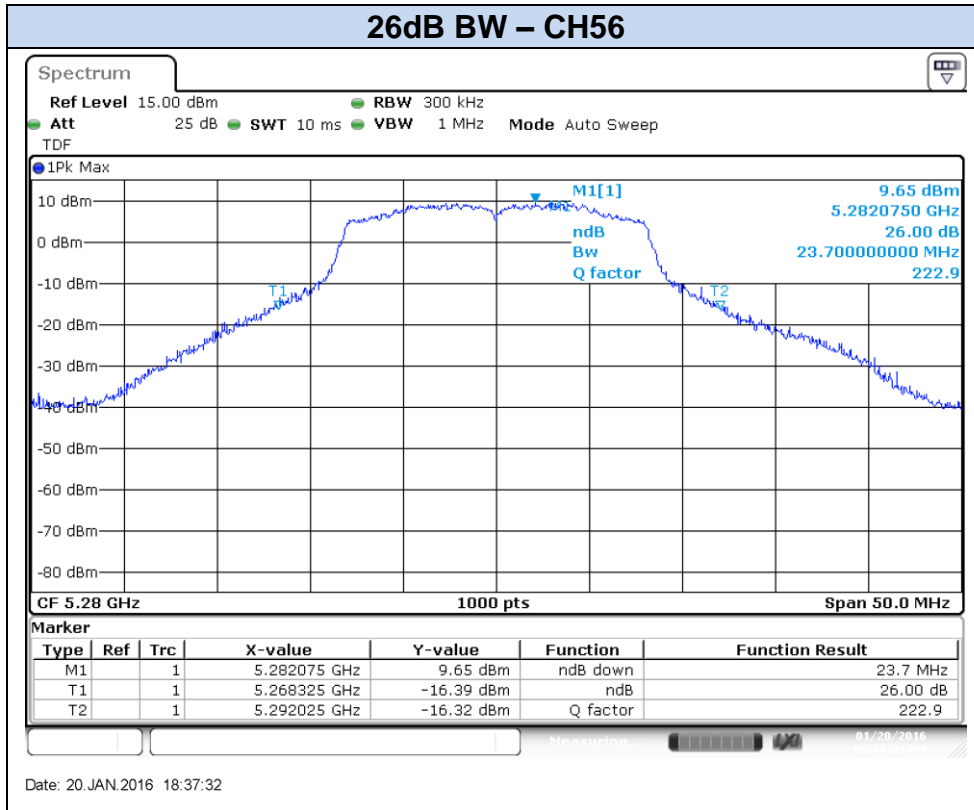
802.11a, 6Mbps – Chain A

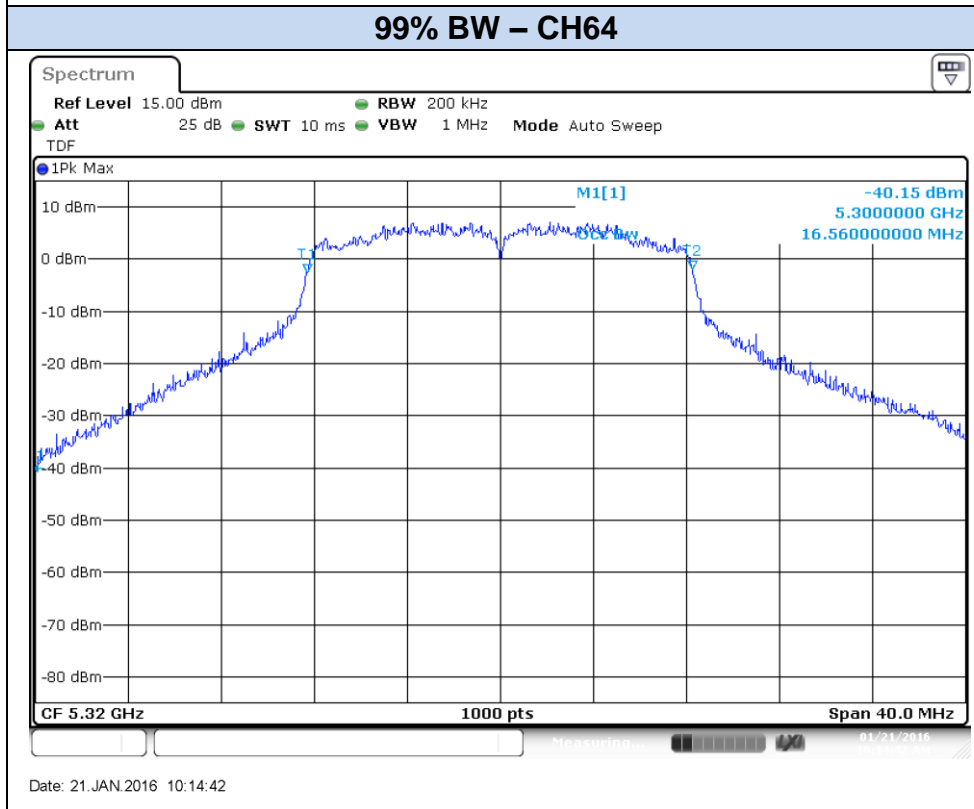
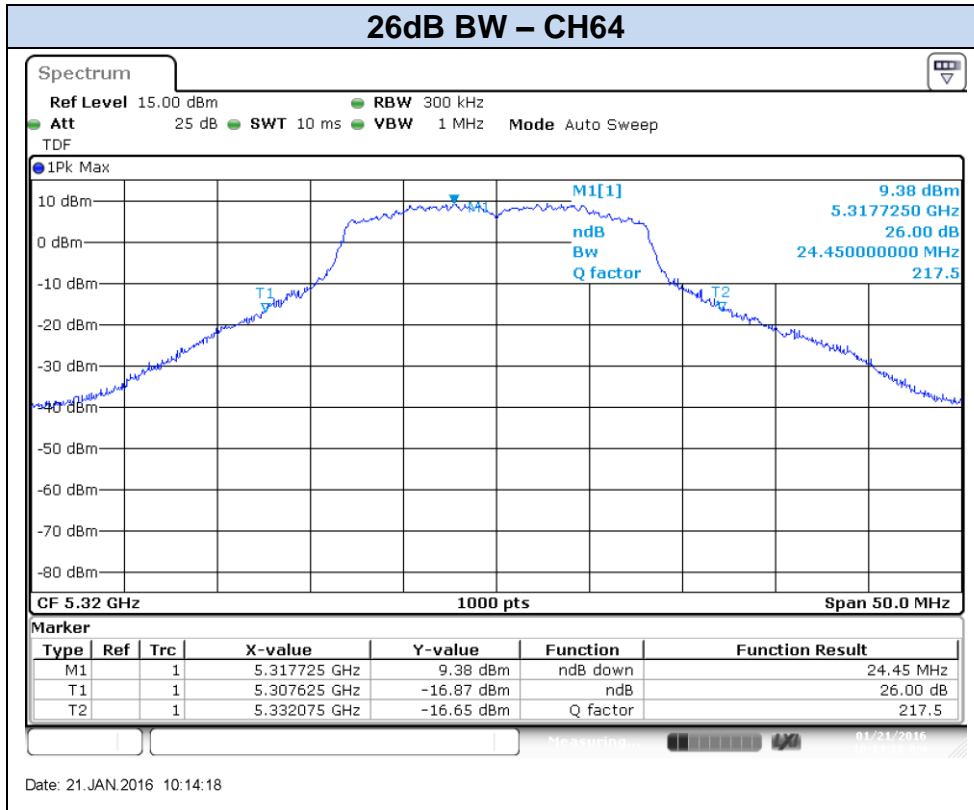


Date: 20.JAN.2016 18:22:10

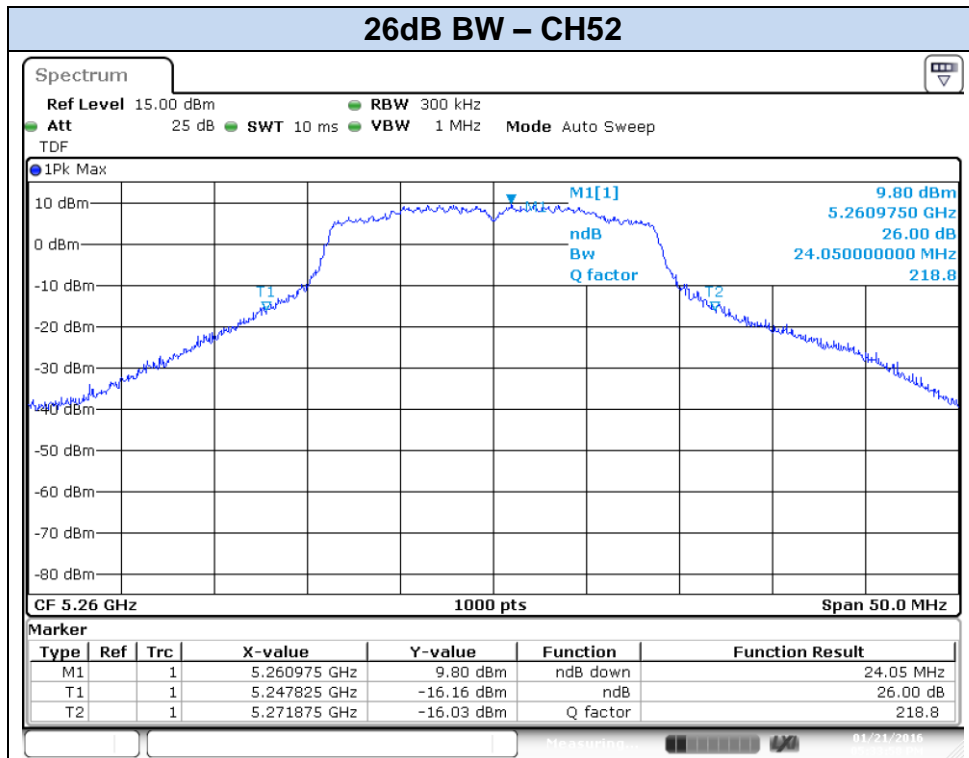


Date: 20.JAN.2016 18:20:13

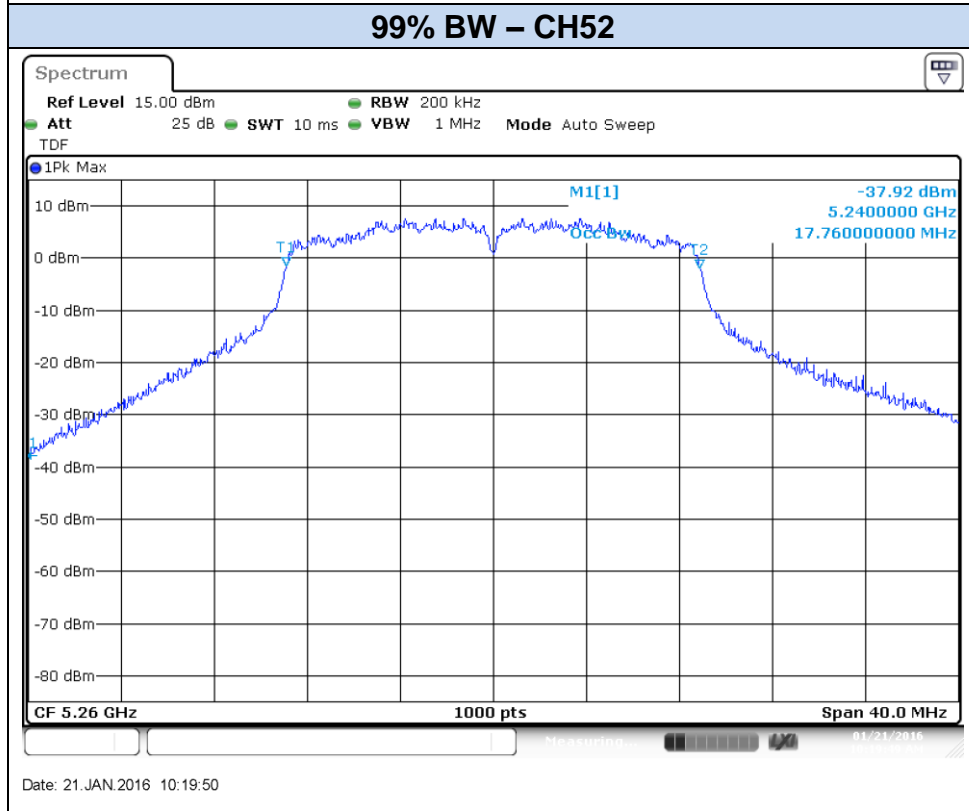




802.11n20, HT0 (SISO) – Chain A



Date: 21.JAN.2016 17:33:58



Date: 21.JAN.2016 10:19:50