CERTIFICATE #3478.01

TEST REPORT

EUT Description	**WLAN and BT. 1x1 PCIe M.2 1216 SD adapter card**
Brand Name	**Intel® Wireless-AC 9462**
Model Name	**9462D2W**
FCC ID	**PD99462D2**
Date of Test Start/End	**2017-10-25 / 2017-11-29**
Features	**802.11ac. Dual Band. 1x1 Wi-Fi + Bluetooth® 5. Diversity Antenna** (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 15 E** (see section 1)

Test Report identification	**170919-01.TR01**
Revision Control	**Rev. 00** **This test report revision replaces any previous test report revision** (see section 8)

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

Digitally signed by Gregory ROUSTAN
Date: 2017.12.08 15:16:10 +01'00'

Gregory ROUSTAN
(Test Engineer Lead)

Reviewed by

Digitally signed by Jose M. FORTES
DN: cn=Jose M. FORTES, o=Intel Mobile Communications, ou=WRF Lab, email=jose.m.fortes.lopez@intel.com, c=FR
Date: 2017.12.08 16:29:49 +01'00'

Jose M. FORTES
(Technical Officer)

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

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 U-NII Test Procedures New Rules v01r04 – Guidelines for compliance testing of Unlicensed National Information Infrastructure (U-NII) Devices (Part 15. Subpart E).
4. FCC OET KDB 644545 D03 Guidance for IEEE 802.11ac v01 - GUIDANCE FOR IEEE Std 802.11ac™ DEVICES EMISSION TESTING.
5. ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

2. General conditions. competences and guarantees

- ✓ Intel Mobile Communications France SAS Wireless RF Lab (Intel WRF Lab) is an ISO/IEC 17025:2005 testing laboratory accredited by the American Association for Laboratory Accreditation (A2LA) with the certificate number 3478.01.
- ✓ Intel Mobile Communications France SAS Wireless RF Lab (Intel WRF Lab) is an Accredited Test Firm recognized by the FCC. with Designation Number FR0011.
- ✓ 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.

3. Environmental Conditions

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

Temperature	21 ºC ±3 ºC
Humidity	35 % ± 10 %

4. Test samples

Sample	Control #	Description	Model	Serial #	Date of receipt	Note
#01	170919-01.S41	Module	9462D2W	WFM: 3413E86E6045	2017-10-05	Used for Conducted Tests
	170524-02.S15	Extender Board	PCB00609_01	6092416-442	2017-05-30	
	170000-01.S01	Laptop	Latitude E5470	DPBLMC2	2017-03-28	
	170220-04.S04	Adapter 1216SD to M.2	JfP Adapter M2	N/A	2017-04-10	
#02	170919-01.S46	Module	9462 D2W	WFM: 3413E86E603B	2017-10-05	Used for Radiated Tests (From 30MHz to 1GHz)
	170220-02.S03	Extender Board	PCB00609_01	6092416-446	2017-02-20	
	170000-01.S13	Laptop	Latitude E5470	FT6LMC2	2017-05-30	
	170727-02.S11	Adapter 1216SD to M.2	JfP Adapter M2	N/A	2017-08-09	
#03	170919-01.S48	Module	9462 D2W	WFM: 3413E86E5FE1	2017-10-05	Used for Radiated Tests (From 1GHz to 40GHz)
	170220-02.S04	Extender Board	PCB00609_01	6092416-493	2017-02-20	
	170801-01.S10	Laptop	Latitude E7470	7KNOXF2	2017-09-13	
	170727-02.S13	Adapter 1216SD to M.2	JfP Adapter M2	N/A	2017-08-09	

5. EUT Features

Brand Name	Intel® Wireless-AC 9462
Model Name	9462D2W
FCC ID	PD99462D2
Software Version	10.1739.0-06012
Driver Version	99.0.28.6
Prototype / Production	Production
Supported Radios	802.11b/g/n 2.4GHz (2400.0 – 2483.5 MHz) 802.11a/n/ac 5.2GHz (5150.0 – 5350.0 MHz) 5.6GHz (5470.0 – 5725.0 MHz) 5.8GHz (5725.0 – 5850.0 MHz) Bluetooth 5 2.4GHz (2400.0 – 2483.5 MHz)
Antenna Information	CHAIN A Div1: PIFA antenna. WiFi 2.4GHz & 5GHz and BT CHAIN A Div2: PIFA antenna. WiFi 2.4GHz & 5GHz and BT
Additional Information	-

6. Remarks and comments

N/A

7. Test Verdicts summary

7.1. 802.11 a/n/ac – U-NII-1

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

7.2. 802.11 a/n/ac – U-NII-2A

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

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

8. Document Revision History

Revision #	Date	Modified by	Revision Details
Rev.00	2017-12-06	A.Sayoud I. Kharrat	First Issue

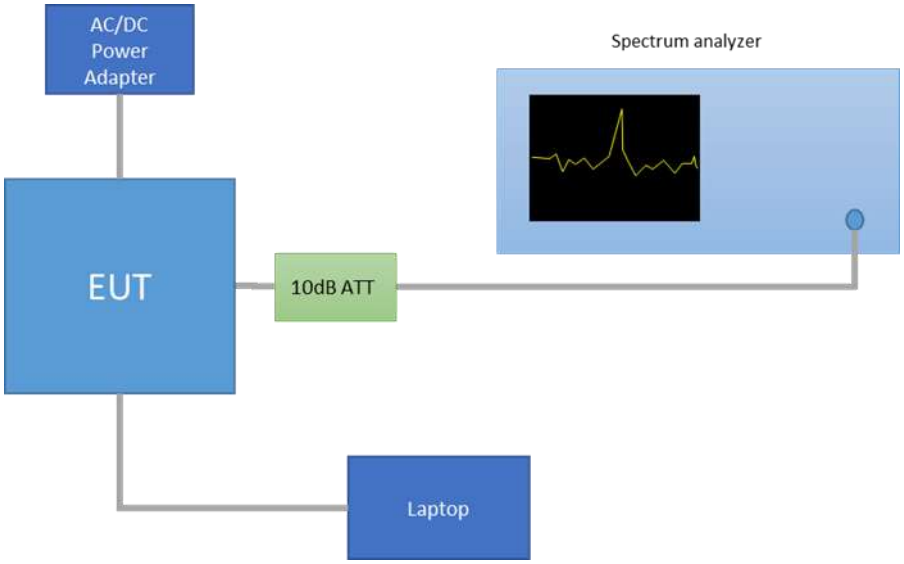
Annex A. Test & System Description

A.1 Measurement System

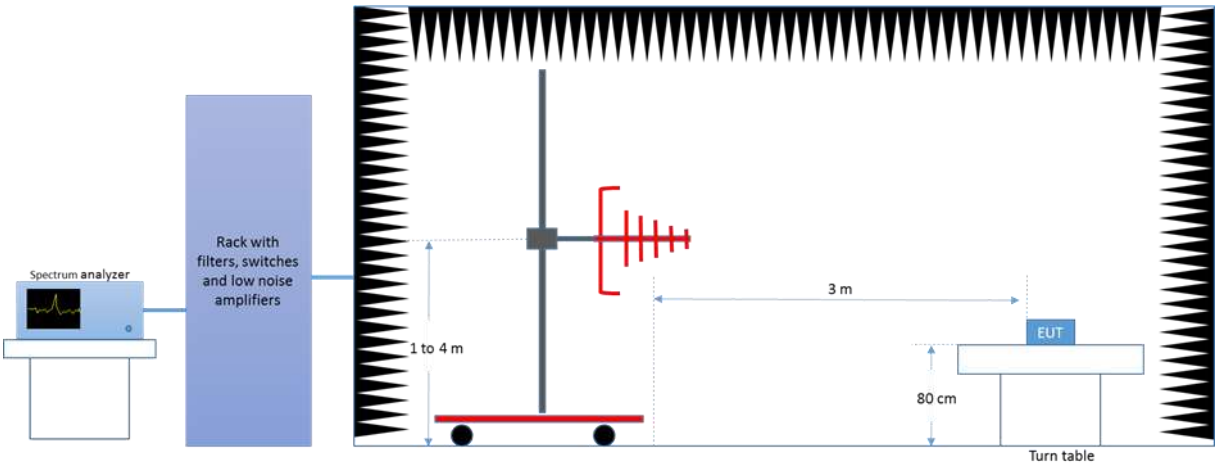
Measurements were performed using the following setups, made in accordance to the general provisions of FCC KDB 789033 D02 General UNII Test Procedures.

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.

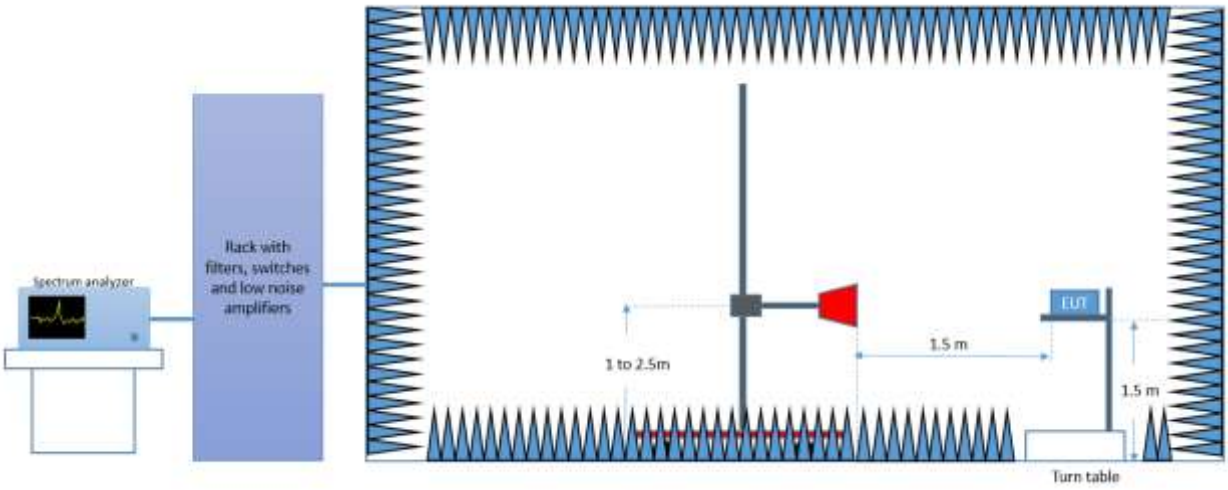
Conducted Setup



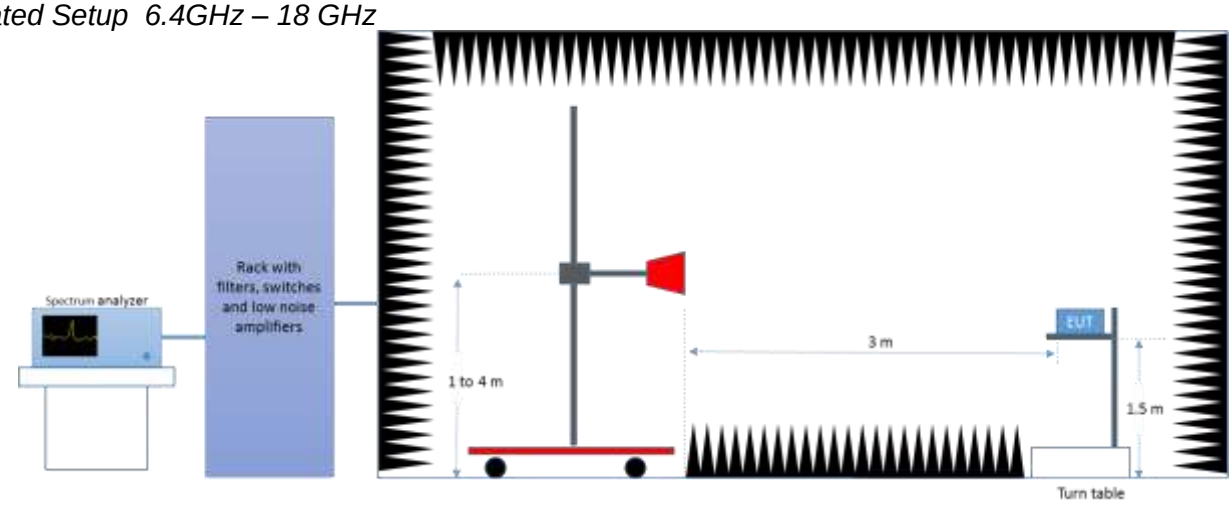
Radiated Setup 30 MHz - 1GHz



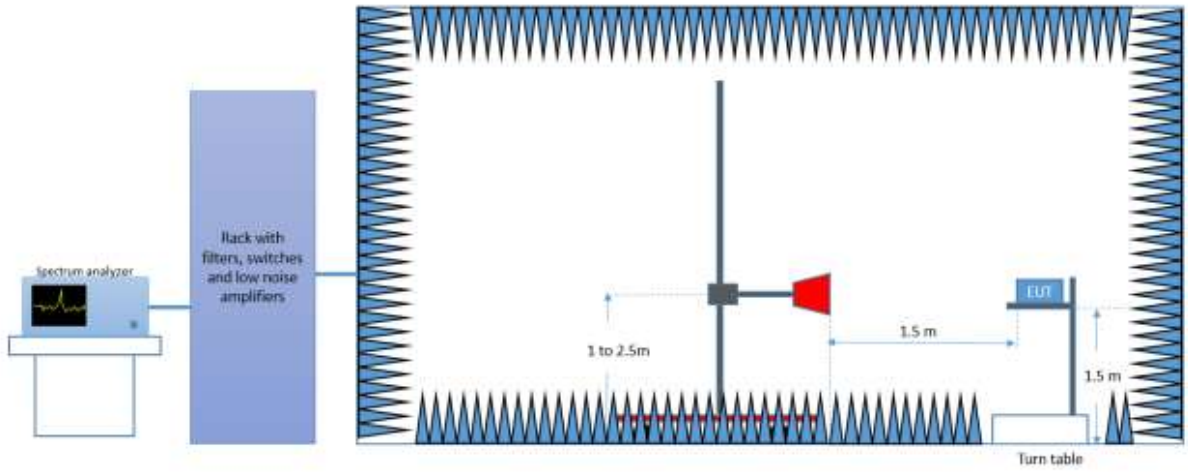
Radiated Setup 1 GHz – 6.4 GHz



Radiated Setup 6.4GHz – 18 GHz



Radiated Setup 18 GHz – 40 GHz



A.2 Test Equipment List

Conducted Setup

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
0316	Spectrum analyzer	FSV30	103309	Rohde & Schwarz	2017-09-22	2019-09-22

Radiated Setup-1

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
0133	Spectrum analyzer	FSV40	101358	Rohde & Schwarz	2016-04-15	2018-04-15
0137	Log antenna 30 MHz – 1 GHz	3142E	00156946	ETS Lindgren	2015-12-11	2017-12-11
0141	Double Ridged Horn Antenna 1 GHz – 18 GHz	3117	00157736	ETS Lindgren	2016-04-13	2018-04-13
0135	Semi Anechoic chamber	FACT 3	5720	ETS Lindgren	2016-04-28	2018-04-28
0530	Measurement Software	EMC32	100623	Rohde & Schwarz	N/A	N/A
0296	Power Supply	6673A	MY41000318	Agilent	N/A	N/A
0346	Multimeter	34401A	US36054685	HP	2016-02-04	2018-02-04

N/A: Not Applicable

Radiated Setup-2

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
0420	Spectrum analyzer	FSV40	101556	Rohde & Schwarz	2016-04-14	2018-04-14
0138	Horn antenna 1 GHz – 6.4 GHz	3117	00152266	ETS Lindgren	2016-03-14	2018-03-14
0334	Double Ridged Horn Antenna 18 GHz – 40 GHz	3116C-PA	00196308	ETS Lindgren	2017-08-22	2019-08-22
0337	Full Anechoic chamber	RFD_FA_100	5996	ETS Lindgren	2016-04-28	2018-04-28
0329	Measurement Software	EMC32	100401	Rohde & Schwarz	N/A	N/A

N/A: Not Applicable

Radiated Setup - shared equipments

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
0617	Power Sensor 50MHz-18GHz (Peak and average)	NRP-Z81	104386	Rohde & Schwarz	2017-05-24	2019-05-24
0618	Power Sensor 50MHz-18GHz (Peak and average)	NRP-Z81	104382	Rohde & Schwarz	2017-05-24	2019-05-24

A.3 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 U-NII-1 & U-NII-2A

B.1 Test Conditions

For 802.11a. 802.11n20 (20 MHz channel bandwidth). 802.11n40 (40MHz channel bandwidth). 802.11ac80 (80MHz channel bandwidth) modes the EUT can transmit at both CHAIN A Div1 and CHAIN A Div2 RF outputs individually. but not simultaneously.

The conducted RF output power at Chain A Div1 and Chain A Div2 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 analyser 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 +/- 0.25 dB from the declared Target values.

U-NII-1					Conducted Power. Target Value (dBm)	
Mode	BW (MHz)	Data Rate	CH #	Freq. (MHz)	Chain A Div1	Chain A Div2
802.11a	20	6Mbps	36	5180	17.0	17.0
			40	5200	20.5	20.0
			48	5240	21.0	21.5
802.11n	20	HT0	36	5180	16.5	17.0
			40	5200	20.0	20.0
			48	5240	21.0	21.5
	40	HT0	38F	5190	15.5	15.5
			46F	5230	19.0	19.5
802.11ac	80	VHT0	42ac80	5210	15.0	15.0

U-NII-2A					Conducted Power. Target Value (dBm)	
Mode	BW (MHz)	Data Rate	CH #	Freq. (MHz)	Chain A Div1	Chain A Div2
802.11a	20	6Mbps	52	5260	21.0	21.5
			56	5280	21.0	21.5
			64	5320	17.0	17.5
802.11n	20	HT0	52	5260	21.0	21.0
			56	5280	21.0	21.5
			64	5320	17.0	17.5
	40	HT0	54F	5270	19.0	18.0
			62F	5310	15.0	15.0
802.11ac	80	VHT0	58ac80	5290	16.0	16.5

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

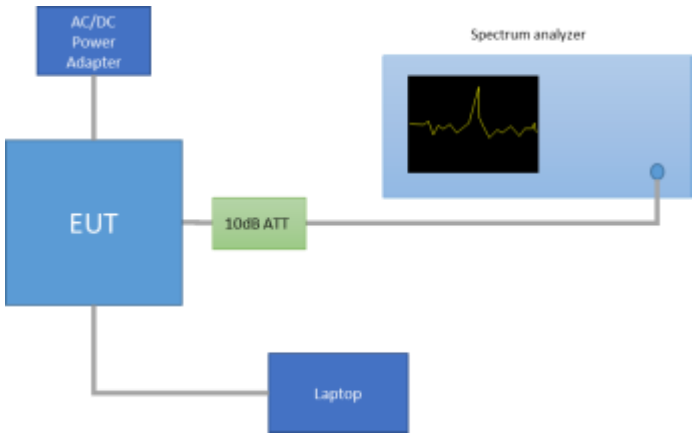
Alternative channels to the lowest and highest channels per band have been also tested for Band Edge compliance.

B.2 Test Results Tables U-NII-1

B.2.1 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	CHAIN A DIV1	36	5180	23.92	16.84
			40	5200	27.88	17.44
			48	5240	**34.33**	**19.52**
		CHAIN A DIV2	36	5180	23.97	16.80
			40	5200	25.28	16.96
			48	5240	31.53	18.44
802.11n20	HT0	CHAIN A DIV1	36	5180	24.58	17.92
			40	5200	27.03	18.12
			48	5240	32.13	18.72
		CHAIN A DIV2	36	5180	24.53	17.88
			40	5200	26.88	18.08
			48	5240	**37.34**	**19.48**

Mode	Rate	Antenna	Channel	Frequency [MHz]	26dB BW [MHz]	99% BW [MHz]
802.11n40	HT0	CHAIN A DIV1	38F	5190	44.87	36.56
			46F	5230	45.41	**36.80**
		CHAIN A DIV2	38F	5190	43.96	36.56
			46F	5230	**46.58**	36.72
802.11ac80	VHT0	CHAIN A DIV1	42ac80	5210	84.64	**75.24**
		CHAIN A DIV2	42ac80	5210	**85.59**	75.24

Max Value

See Section B.3.1 and Section B.3.2 for the screenshot results.

B.2.2 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.

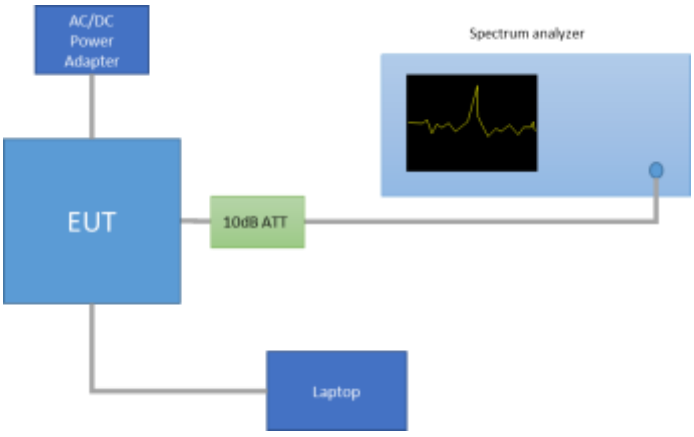
Test procedure

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

Duty cycle

Mode	Rate	Antenna	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]
802.11a	6Mbps	CHAIN A DIV1	2.03	2.07	98.28%
		CHAIN A DIV2	2.03	2.07	98.28%
802.11n20	HT0	CHAIN A DIV1	1.89	1.93	98.11%
		CHAIN A DIV2	1.89	1.93	98.11%
802.11n40	HT0	CHAIN A DIV1	0.93	0.96	96.19%
		CHAIN A DIV2	0.93	0.96	96.19%
802.11ac80	VHT0	CHAIN A DIV1	0.46	0.49	93.31%
		CHAIN A DIV2	0.46	0.49	93.31%

Maximum output power

Mode	Rate	Channel	Freq. [MHz]	Antenna	Average Conducted Output Power [dBm]	Maximum* Conducted Output Power [dBm]	Maximum* Conducted Output Power [mW]	Max of EIRP [dBm]
802.11a	6Mbps	36	5180	CHAIN A DIV1	16.97	16.97	**49.77**	21.97
				CHAIN A DIV2	17.05	17.05	50.70	22.05
		40	5200	CHAIN A DIV1	20.44	20.44	110.66	25.44
				CHAIN A DIV2	19.92	19.92	98.17	24.92
		48	5240	CHAIN A DIV1	21.08	21.08	128.23	26.08
				CHAIN A DIV2	21.27	21.27	**133.97**	26.27
802.11n20	HT0	36	5180	CHAIN A DIV1	16.71	16.71	**46.88**	21.71
				CHAIN A DIV2	16.90	16.90	48.98	21.90
		40	5200	CHAIN A DIV1	20.14	20.14	103.28	25.14
				CHAIN A DIV2	20.21	20.21	104.95	25.21
		48	5240	CHAIN A DIV1	21.00	21.00	125.89	26.00
				CHAIN A DIV2	21.47	21.47	**140.28**	26.47

Mode	Rate	Channel	Freq. [MHz]	Antenna	Average Conducted Output Power [dBm]	Maximum* Conducted Output Power [dBm]	Maximum* Conducted Output Power [mW]	Max of EIRP [dBm]
802.11n40	HT0	38F	5190	CHAIN A DIV1	15.30	15.47	35.23	20.47
				CHAIN A DIV2	15.20	15.37	**34.43**	20.37
		46F	5230	CHAIN A DIV1	18.88	19.05	80.33	24.05
				CHAIN A DIV2	19.50	19.67	**92.66**	24.67
802.11ac80	VHT0	42ac80	5210	CHAIN A DIV1	14.45	14.75	**29.86**	19.75
				CHAIN A DIV2	14.76	15.06	**32.07**	20.06

* Maximum values are the duty cycle compensated values calculated from the average (measured) values

Max Value

Min Value

Maximum power spectral Density (PSD)

Mode	Rate	Channel	Freq. [MHz]	Antenna	Average conducted PSD [dBm/MHz]	Maximum* conducted PSD [dBm/MHz]
802.11a	6Mbps	36	5180	CHAIN A DIV1	5.25	5.25
				CHAIN A DIV2	5.34	5.34
		40	5200	CHAIN A DIV1	8.73	8.73
				CHAIN A DIV2	8.21	8.21
		48	5240	CHAIN A DIV1	9.36	9.36
				CHAIN A DIV2	9.54	9.54
802.11n20	HT0	36	5180	CHAIN A DIV1	4.72	4.72
				CHAIN A DIV2	4.93	4.93
		40	5200	CHAIN A DIV1	8.13	8.13
				CHAIN A DIV2	8.21	8.21
		48	5240	CHAIN A DIV1	8.96	8.96
				CHAIN A DIV2	9.42	9.42
802.11n40	HT0	38F	5190	CHAIN A DIV1	0.23	0.40
				CHAIN A DIV2	0.18	0.35
		46F	5230	CHAIN A DIV1	3.83	4.00
				CHAIN A DIV2	4.42	4.59
802.11ac80	VHT0	42ac80	5210	CHAIN A DIV1	-3.00	-2.70
				CHAIN A DIV2	-2.68	-2.38

* Maximum values are the duty cycle compensated values calculated from the measured average values

See Section B.3.3 for the screenshot results.

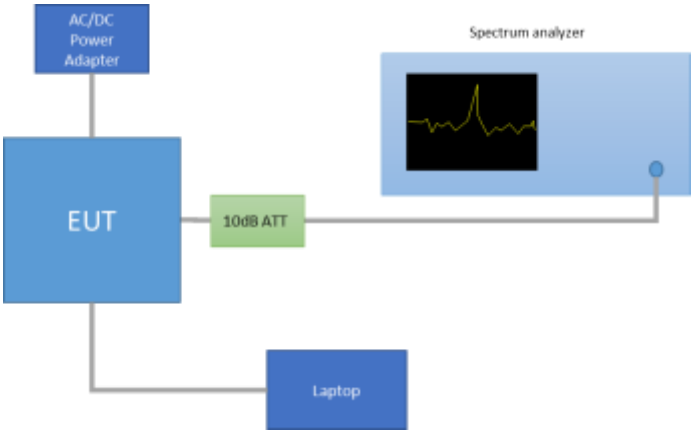
B.2.3 Undesirable emission limits : Band Edge (Conducted)

Test limits

<table>
<tr><th>FCC part</th><th>Limits</th></tr>
<tr><td>15.407 (b) (1)</td><td>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.</td></tr>
<tr><td>15.209</td><td>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):
<table>
<tr><th>Freq Range (MHz)</th><th>Field Strength (µV/m)</th><th>Field Strength (dBµV/m)</th><th>Meas. Distance (m)</th></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>
</table>
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.
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.</td></tr>
</table>

Test procedure

The setup below was used to measure undesirable emissions on the Band Edge domain. 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 Band Edge measurements in average mode on the low frequency section. one of the two methods is used according to section G) 6) (KDB 789033 D02):

1) Method AD (Average Detection) as per paragraph II.G.6.c.
2) Method VB (Averaging using reduced video bandwidth) as per paragraph II.G.6.d.

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.

For Band Edge measurements falling in restricted bands. the following limits in dBm were applied for the average detector after the conversion from the limits detailed above in dBµV/m. according to FCC 47 CFR part 15 - Subpart C – §15.209(a). The limits in dBm for peak detector are 20dB above the indicated values in the table.

§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	54.0	-41.2

See Section B.3.4 for the screenshot results.

B.2.4 Radiated spurious emission

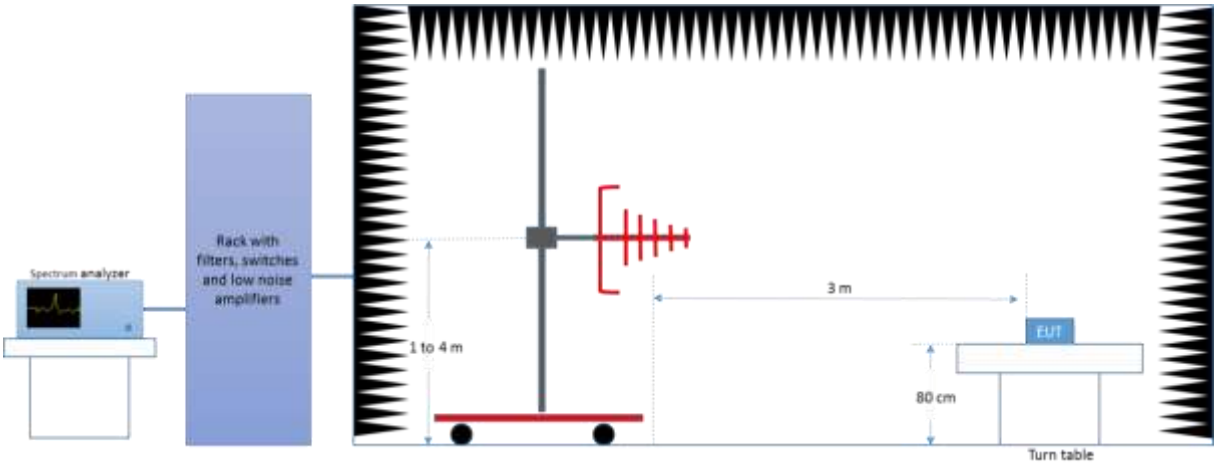
Standard references

<table>
<tr><th>FCC part</th><th>Limits</th></tr>
<tr><td>15.407 (b) (1)</td><td>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.</td></tr>
<tr><td>15.209</td><td>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):
<table>
<tr><th>Freq Range (MHz)</th><th>Field Strength (µV/m)</th><th>Field Strength (dBµV/m)</th><th>Meas. Distance (m)</th></tr>
<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>
</table>
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.
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.</td></tr>
</table>

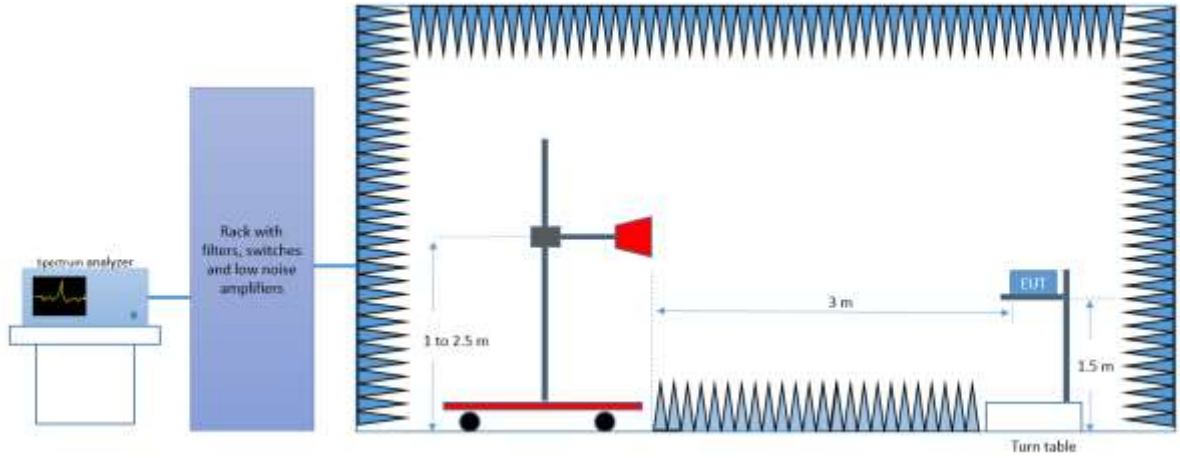
Test procedure

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. the EUT azimuth over 360º and for both Vertical and Horizontal polarizations.
The radiated spurious emission was measured on the worst case configuration selected from the chapter B.2.2 and using the low. middle and high channel.

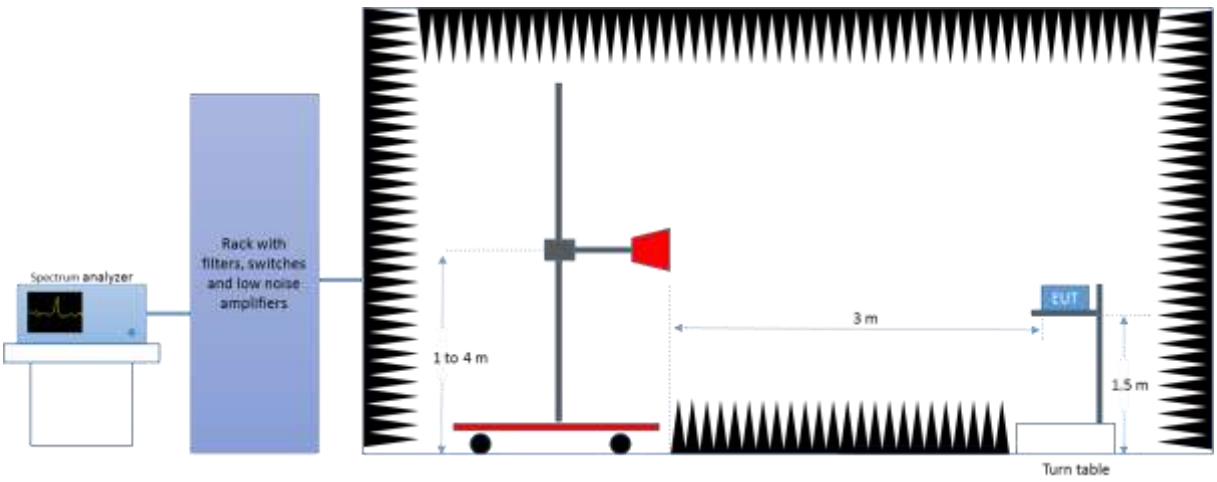
Radiated Setup 30 MHz - 1GHz



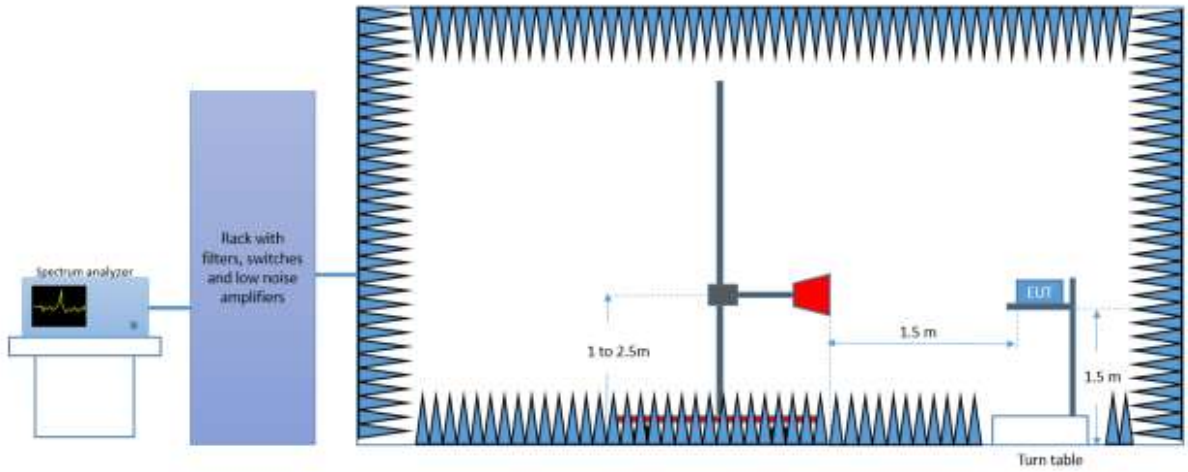
Radiated Setup 1 GHz – 6.4 GHz



Radiated Setup 6.4GHz – 18 GHz



Radiated Setup 18 GHz - 40 GHz



Sample Calculation

The field strength is deduced from the radiated measurement using the following equation:

$$E = 126.8 - 20\log(\lambda) + P - G$$

where

E is the field strength of the emission at the measurement distance in dBµV/m.

P is the power measured at the output of the test antenna in dBm.

λ is the wavelength of the emission under investigation [300/f_{MHz}] in m.

G is the gain of the test antenna in dBi.

NOTE – The measured power P includes all applicable instrument correction factors up to the connection to the test

Antenna e.g. cable losses, amplifier gains.

For field strength measurements made at other than the distance at which the applicable limit is specified, the field strength of the emission at the distance specified by the limit is deduced as follows:

$$E_{SpecLimit} = E_{Meas} + 20\log(D_{Meas}/D_{SpecLimit})$$

where

$E_{SpecLimit}$ *is the field strength of the emission at the distance specified by the limit in dBµV/m.*

E_{Meas} *is the field strength of the emission at the measurement distance in dBµV/m.*

D_{Meas} *is the measurement distance in m.*

$D_{SpecLimit}$ *is the distance specified by the limit in m.*

Test Results

30 MHz – 40 GHz. 802.11a. 6Mbps. Chain A Div1

Radiated Spurious – CH36

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
72.0	28.0	---	40.0	12.0
178.9	27.7	---	43.5	15.8
183.0	28.4	---	43.5	15.1
216.0	31.1	---	43.5	12.4
500.0	35.3	---	46.0	10.7
640.1	38.2	---	46.0	7.8
1190.2	---	44.4	54.0	9.6
1190.2	49.1	---	74.0	24.9
10350.8	59.5	---	74.0	14.5
10358.0	---	47.7	54.0	6.3
25937.8	---	37.0	54.0	17.0

Radiated Spurious – CH40

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
72.0	27.3	---	40.0	12.8
96.0	29.6	---	43.5	13.9
115.2	27.7	---	43.5	15.8
216.0	30.8	---	46.0	15.2
500.1	35.5	---	46.0	10.5
640.0	38.4	---	46.0	7.6
1190.2	---	43.8	54.0	10.2
1190.2	48.0	---	74.0	26.0
10400.1	---	41.1	54.0	12.9
10407.8	53.3	---	74.0	20.7
25938.6	---	36.9	54.0	17.1
25967.9	47.0	---	74.0	27.0

Radiated Spurious – CH48

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
62.5	29.7	---	40.0	10.4
115.1	28.0	---	43.5	15.5
216.0	31.3	---	43.5	12.2
437.6	35.5	---	46.0	10.5
500.0	34.9	---	46.0	11.2
640.0	38.2	---	46.0	7.9
1190.2	---	44.1	54.0	9.9
1190.5	48.5	---	74.0	25.5
10482.2	---	42.1	54.0	11.9
10486.1	56.1	---	74.0	17.9
22848.5	---	36.5	54.0	17.5

30 MHz – 40 GHz. 802.11a. 6Mbps. Chain A Div2

Radiated Spurious – CH36

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
59.5	32.4	---	40.0	7.6
72.0	27.3	---	40.0	12.7
115.2	27.1	---	43.5	16.4
216.0	30.9	---	46.0	15.1
500.0	34.9	---	46.0	11.1
640.0	38.3	---	46.0	7.7
1190.2	48.3	---	74.0	25.7
1190.5	---	43.5	54.0	10.5
20720.0	---	37.1	54.0	16.9

Radiated Spurious – CH40

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
72.0	27.2	---	40.0	12.8
96.0	26.5	---	43.5	17.0
115.2	28.4	---	43.5	15.1
216.0	31.6	---	46.0	14.4
437.6	36.7	---	46.0	9.3
640.0	37.9	---	46.0	8.1
1190.2	---	44.2	54.0	9.8
1190.2	48.2	---	74.0	25.8
20799.9	---	39.2	54.0	14.8

Radiated Spurious – CH48

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
72.0	26.7	---	40.0	13.4
96.0	27.6	---	43.5	15.9
115.2	27.4	---	43.5	16.1
216.0	31.8	---	43.5	11.7
500.1	35.0	---	46.0	11.0
640.0	37.6	---	46.0	8.4
1190.2	48.8	---	74.0	25.2
1190.5	---	43.8	54.0	10.2
25896.7	---	36.8	54.0	17.2

30 MHz – 40 GHz. 802.11n20. HT0. Chain A Div1

Radiated Spurious – CH36

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
72.0	28.6	---	40.0	11.4
115.2	26.9	---	43.5	16.6
216.0	31.2	---	43.5	12.3
437.6	36.3	---	46.0	9.7
500.1	36.4	---	46.0	9.6
640.0	38.5	---	46.0	7.6
1190.2	---	44.0	54.0	10.0
1190.2	48.8	---	74.0	25.2
10358.0	52.1	---	74.0	22.0
10360.4	---	42.3	54.0	11.7
20720.3	---	37.9	54.0	16.1

Radiated Spurious – CH40

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
72.0	27.5	---	40.0	12.5
79.0	27.4	---	40.0	12.6
96.0	27.5	---	43.5	16.0
115.2	27.4	---	43.5	16.1
216.0	31.9	---	46.0	14.1
640.0	37.0	---	46.0	9.0
1190.2	---	44.1	54.0	9.9
1190.2	47.7	---	74.0	26.3
20720.0	---	38.1	54.0	15.9

Radiated Spurious – CH48

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
72.0	26.9	---	40.0	13.1
95.9	26.6	---	43.5	16.9
115.2	26.9	---	43.5	16.6
216.0	30.9	---	46.0	15.1
500.1	35.6	---	46.0	10.4
640.0	38.2	---	46.0	7.8
1190.2	---	43.9	54.0	10.1
1190.2	48.9	---	74.0	25.1
20959.9	---	39.7	54.0	14.3

30 MHz – 40 GHz. 802.11n20. HT0. Chain A Div2

Radiated Spurious – CH36

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
62.4	27.1	---	40.0	12.9
72.0	26.7	---	40.0	13.3
115.2	27.8	---	43.5	15.7
216.0	32.1	---	46.0	13.9
500.0	36.2	---	46.0	9.8
640.0	37.5	---	46.0	8.5
1190.2	---	44.0	54.0	10.0
1190.2	48.5	---	74.0	25.6
20720.0	---	38.1	54.0	15.9

Radiated Spurious – CH40

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
72.0	27.0	---	40.0	13.0
96.0	29.0	---	43.5	14.5
115.2	27.8	---	43.5	15.7
216.0	31.7	---	46.0	14.3
500.0	36.5	---	46.0	9.5
640.0	39.0	---	46.0	7.0
1190.5	---	43.6	54.0	10.4
1190.5	48.8	---	74.0	25.2
10476.9	52.6	---	74.0	21.4
10486.6	---	42.6	54.0	11.4
20799.9	---	39.0	54.0	15.0

Radiated Spurious – CH48

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
96.0	26.6	---	43.5	16.9
115.2	27.1	---	43.5	16.4
201.7	33.7	---	43.5	9.8
216.0	31.8	---	46.0	14.2
500.0	35.9	---	46.0	10.1
640.0	38.8	---	46.0	7.2
1190.2	---	43.9	54.0	10.1
1190.2	48.0	---	74.0	26.0
25918.9	---	36.7	54.0	17.3

30 MHz – 40 GHz. 802.11n40. HT0. Chain A Div1

Radiated Spurious – CH38F

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
72.0	26.3	---	40.0	13.7
115.2	26.9	---	43.5	16.6
216.0	30.8	---	46.0	15.2
437.6	34.5	---	46.0	11.5
500.1	35.1	---	46.0	10.9
640.0	38.6	---	46.0	7.4
1190.2	48.1	---	74.0	26.0
1190.5	---	44.0	54.0	10.0
22225.0	---	36.6	54.0	17.4

Radiated Spurious – CH46F

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
72.0	28.0	---	40.0	12.0
115.2	26.7	---	43.5	16.8
216.0	31.3	---	46.0	14.7
437.6	35.2	---	46.0	10.8
500.0	35.3	---	46.0	10.7
640.0	38.0	---	46.0	8.0
1190.2	---	44.1	54.0	10.0
1190.2	49.2	---	74.0	24.8
20920.0	---	37.4	54.0	16.6

30 MHz – 40 GHz. 802.11n40. HT0. Chain A Div2

Radiated Spurious – CH38F

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
71.9	27.2	---	40.0	12.9
115.2	27.0	---	43.5	16.5
216.0	31.0	---	46.0	15.0
437.5	35.9	---	46.0	10.1
500.0	35.7	---	46.0	10.3
640.0	39.4	---	46.0	6.6
1190.2	---	44.1	54.0	9.9
1190.2	47.8	---	74.0	26.2
20760.3	---	37.0	54.0	17.0

Radiated Spurious – CH46F

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
96.0	28.8	---	43.5	14.7
115.2	26.5	---	43.5	17.0
216.0	30.8	---	43.5	12.7
437.6	35.2	---	46.0	10.9
500.1	36.6	---	46.0	9.4
640.0	38.2	---	46.0	7.8
1190.2	---	44.1	54.0	9.9
1190.2	48.0	---	74.0	26.1
20920.0	---	39.7	54.0	14.3

30 MHz – 40 GHz. 802.11ac80. VHT0. Chain A Div1

Radiated Spurious – CH42ac80

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
96.0	25.8	---	43.5	17.7
115.2	26.4	---	43.5	17.1
312.0	33.3	---	46.0	12.7
320.0	33.3	---	46.0	12.7
500.1	35.5	---	46.0	10.6
640.0	38.5	---	46.0	7.5
1190.2	---	43.9	54.0	10.1
1190.2	47.6	---	74.0	26.4
20839.8	---	37.2	54.0	16.8

30 MHz – 40 GHz. 802.11ac80. VHT0. Chain A Div2

Radiated Spurious – CH42ac80

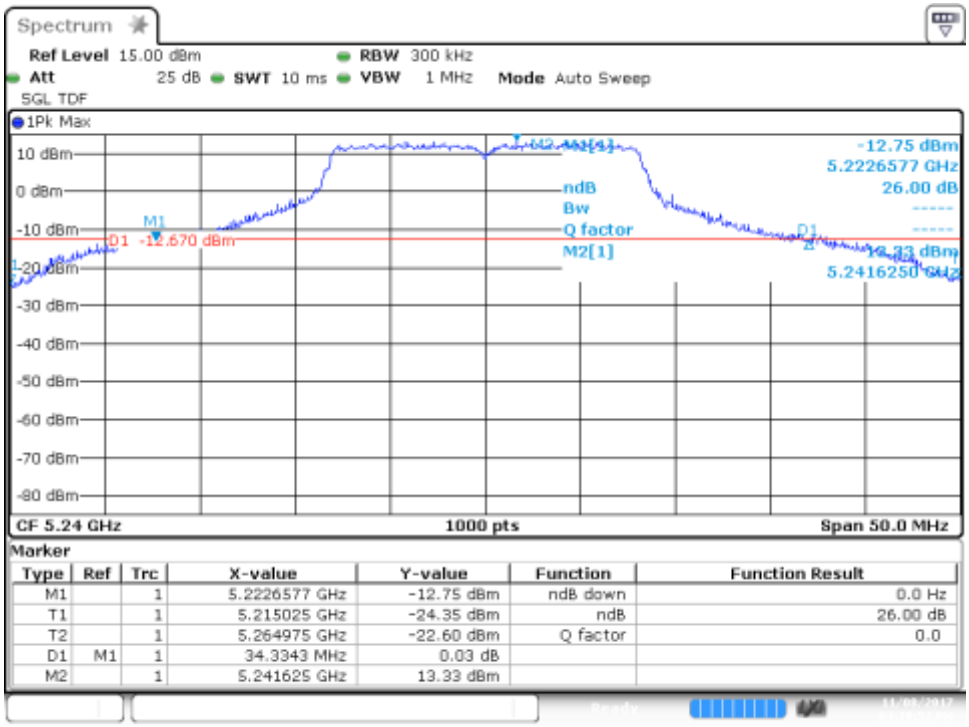
Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
96.0	24.5	---	43.5	19.0
312.0	33.3	---	46.0	12.7
320.0	33.3	---	46.0	12.7
437.6	34.9	---	46.0	11.1
500.0	35.3	---	46.0	10.7
640.0	39.0	---	46.0	7.0
1190.2	47.7	---	74.0	26.3
1190.5	---	43.4	54.0	10.6
20839.8	---	39.0	54.0	15.0

B.3 Test Results Screenshot U-NII-1

B.3.1 26dB Bandwidth

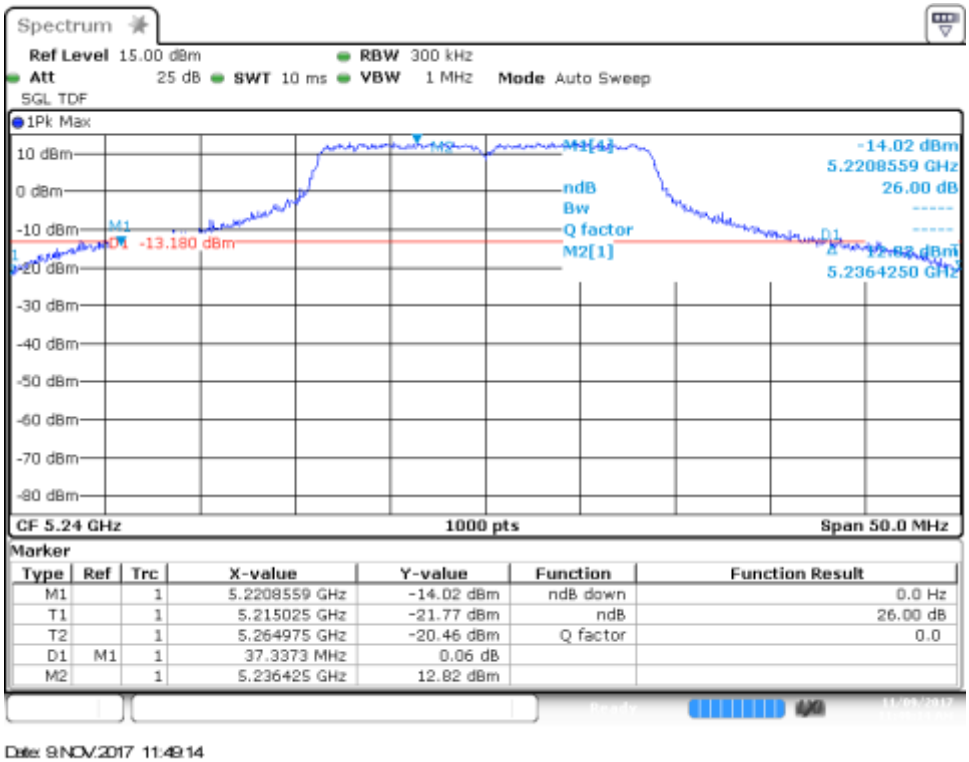
CHAIN A DIV1. 802.11a. 6Mbps

Channel 48



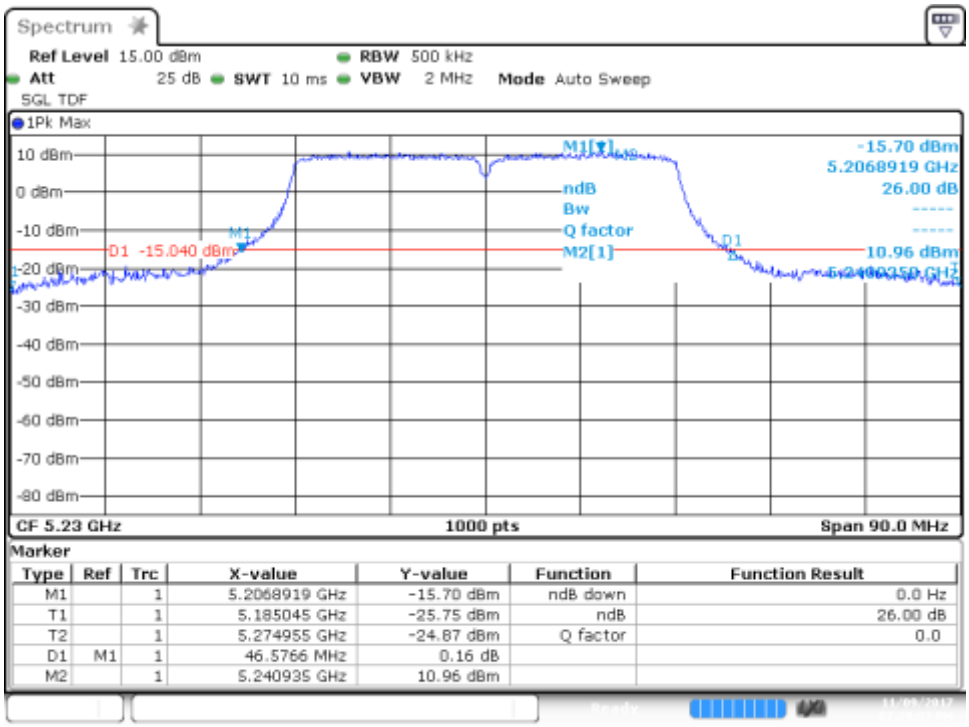
CHAIN A DIV2. 802.11n20. HT0

Channel 48



CHAIN A DIV2. 802.11n40. HT0

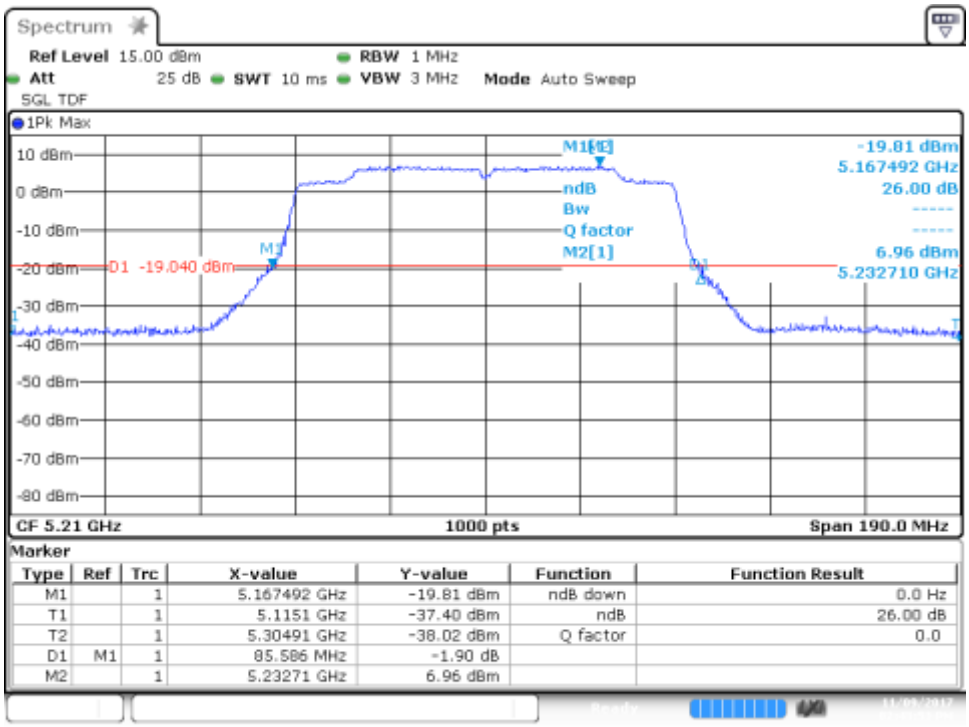
Channel 46F



Date: 9.NOV.2017 14:29:34

CHAIN A DIV2. 802.11ac80. VHT0

Channel 42ac80

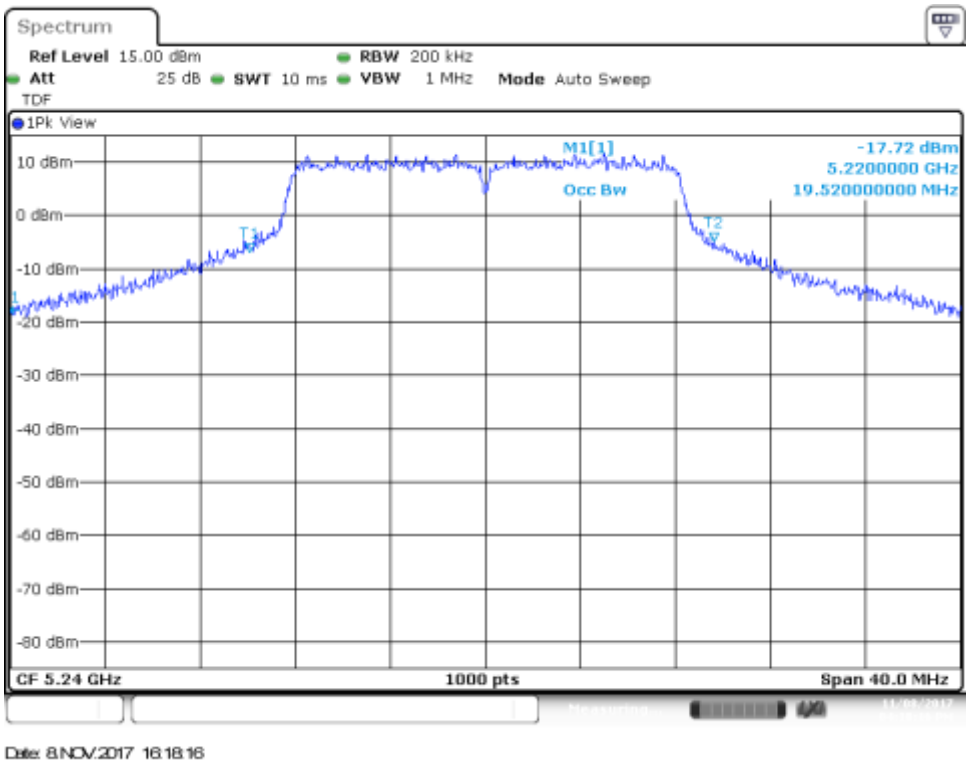


Date: 9.NOV.2017 14:43:53

B.3.2 99% Bandwidth

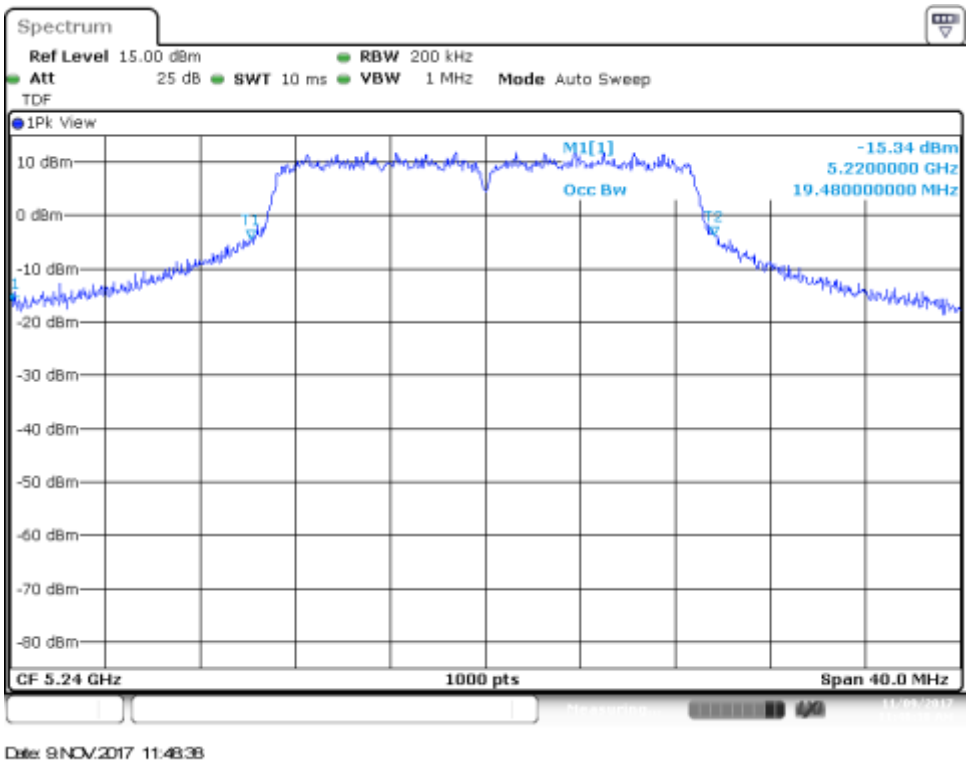
CHAIN A DIV1. 802.11a. 6Mbps

Channel 48



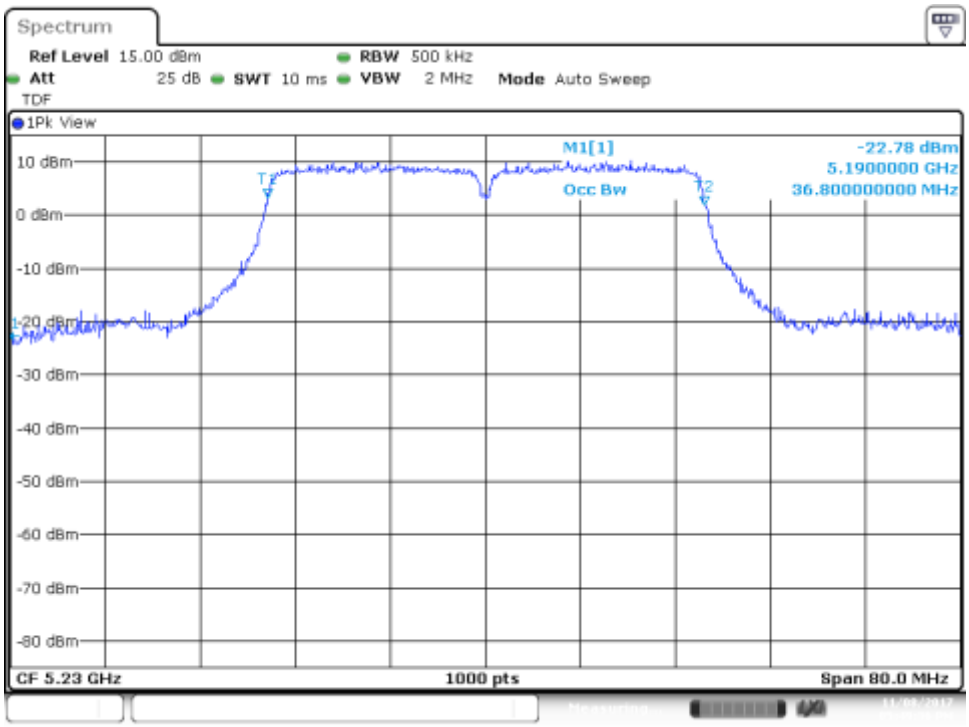
CHAIN A DIV2. 802.11n20. HT0

Channel 48



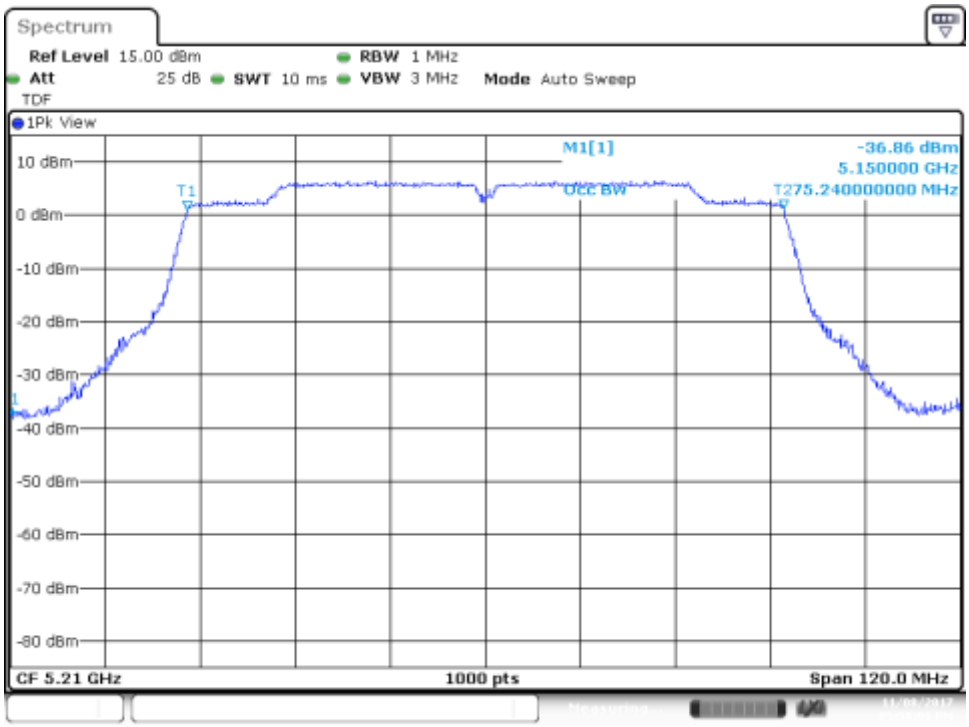
CHAIN A DIV1. 802.11n40. HT0

Channel 46F



CHAIN A DIV1. 802.11n20. VTH0

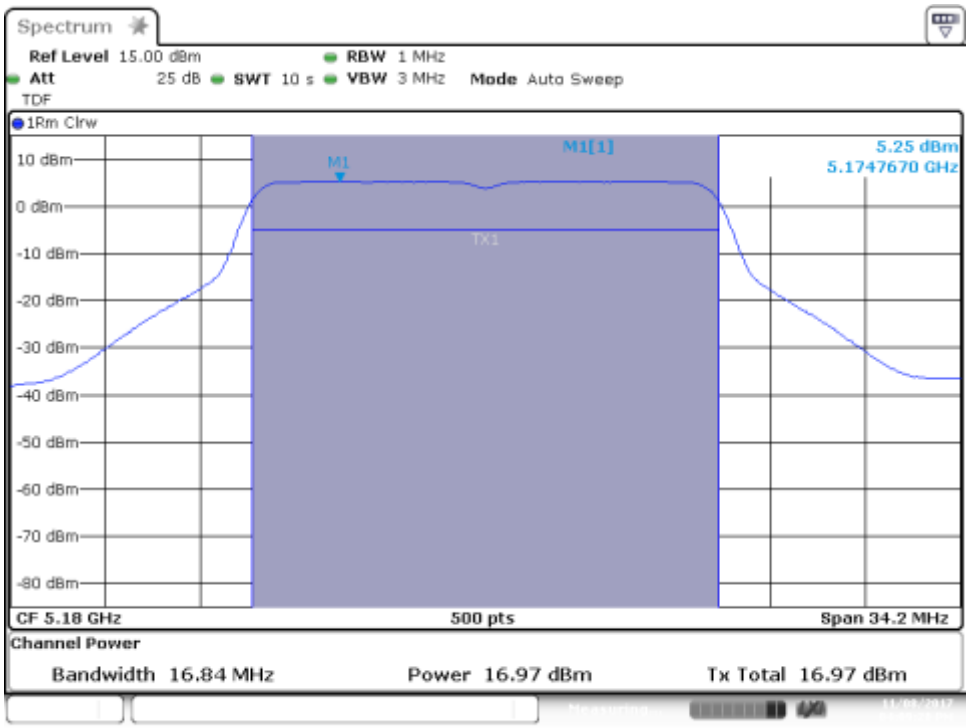
Channel 42ac80



B.3.3 Power Limits. Maximum Output power & Peak power spectral density

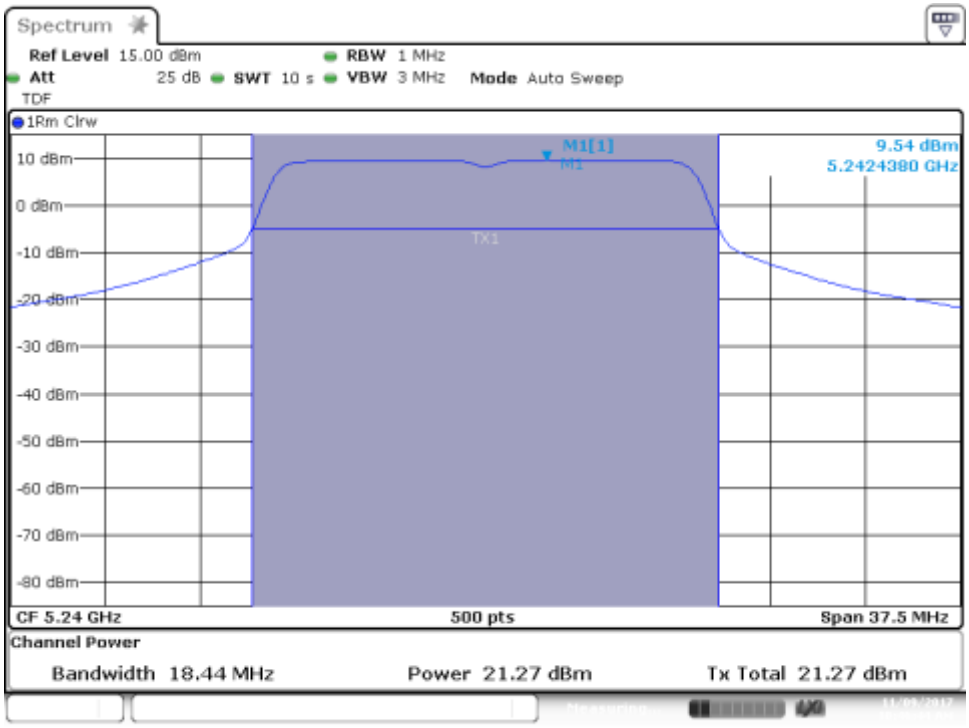
CHAIN A DIV1. 802.11a. 6Mbps

Channel 36



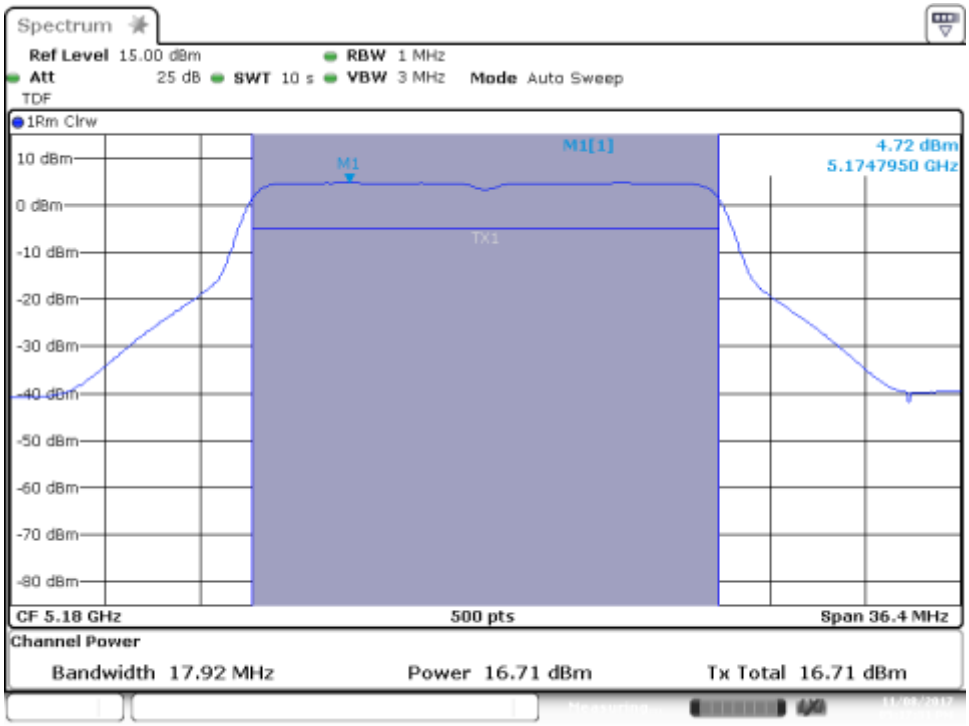
CHAIN A DIV2. 802.11a. 6Mbps

Channel 48



CHAIN A DIV1. 802.11n20. HT0

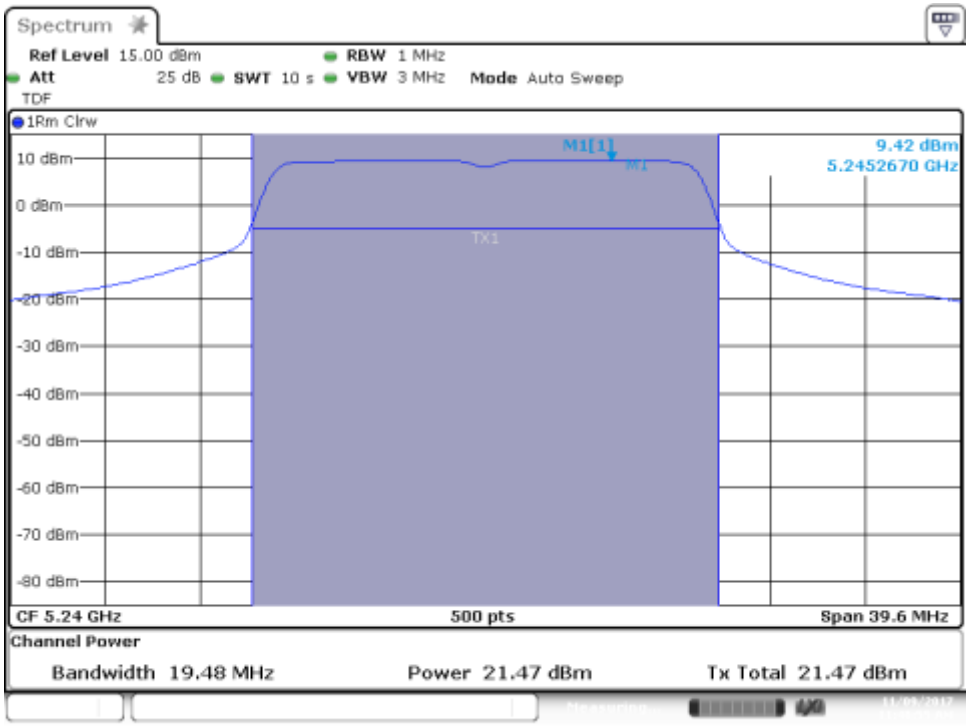
Channel 36



Date: 8.NOV.2017 17:17:32

CHAIN A DIV2. 802.11n20. HT0

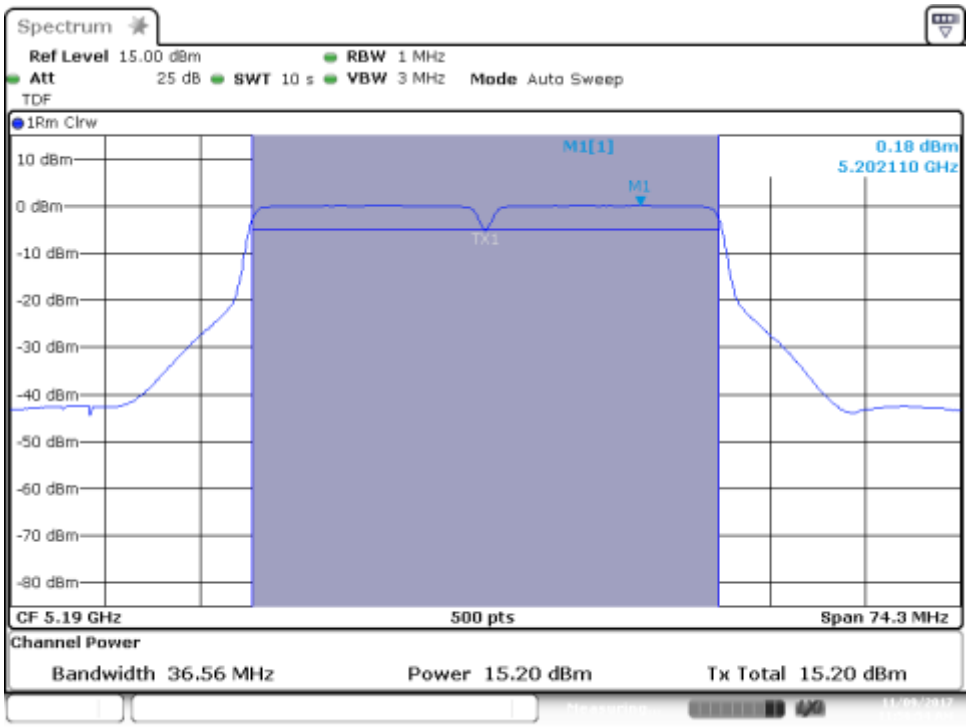
Channel 48



Date: 9.NOV.2017 11:48:56

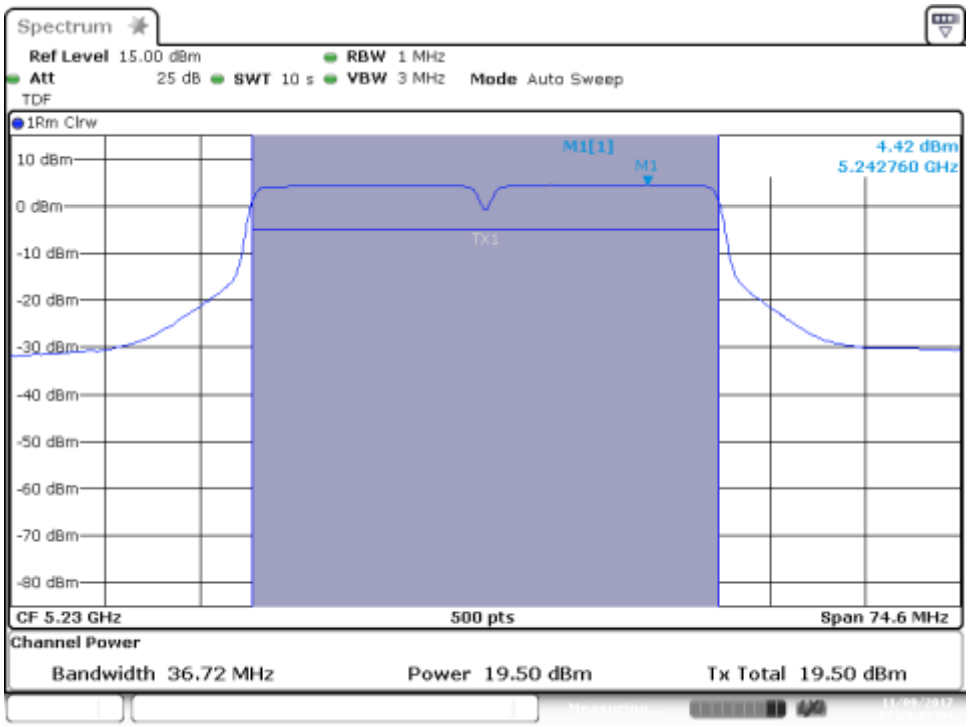
CHAIN A DIV2. 802.11n40. HT0

Channel 38F



Date: 9.NOV.2017 11:58:55

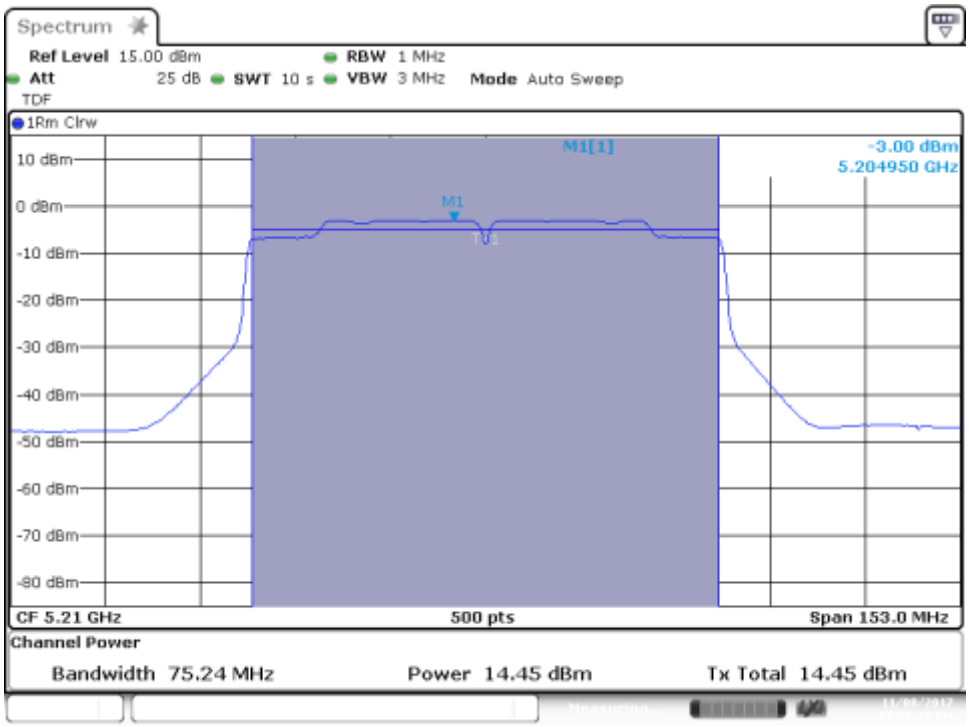
Channel 46F



Date: 9.NOV.2017 14:29:15

CHAIN A DIV1. 802.11ac80. VHT0

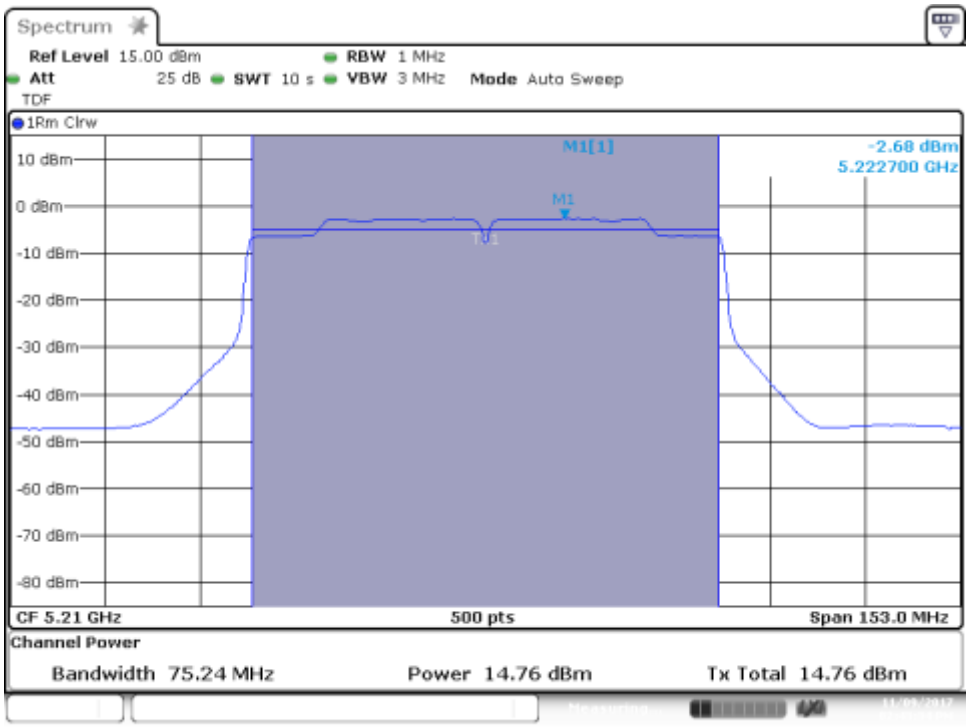
Channel 42ac80



Date: 8.NOV.2017 17:58:23

CHAIN A DIV2. 802.11ac80. VHT0

Channel 42ac80

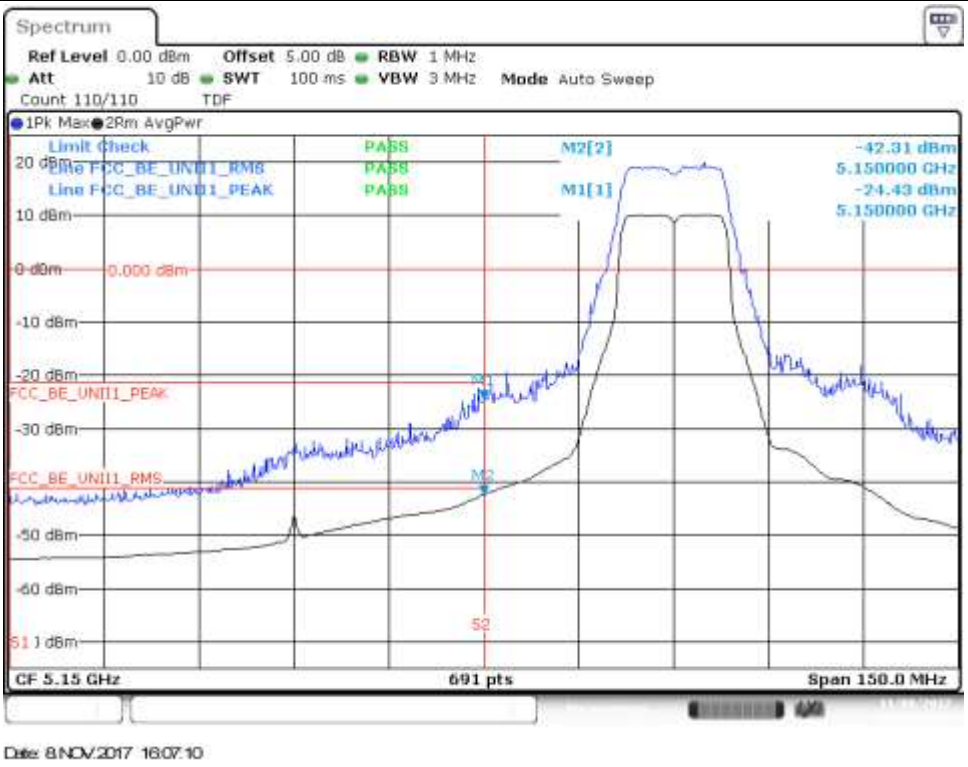


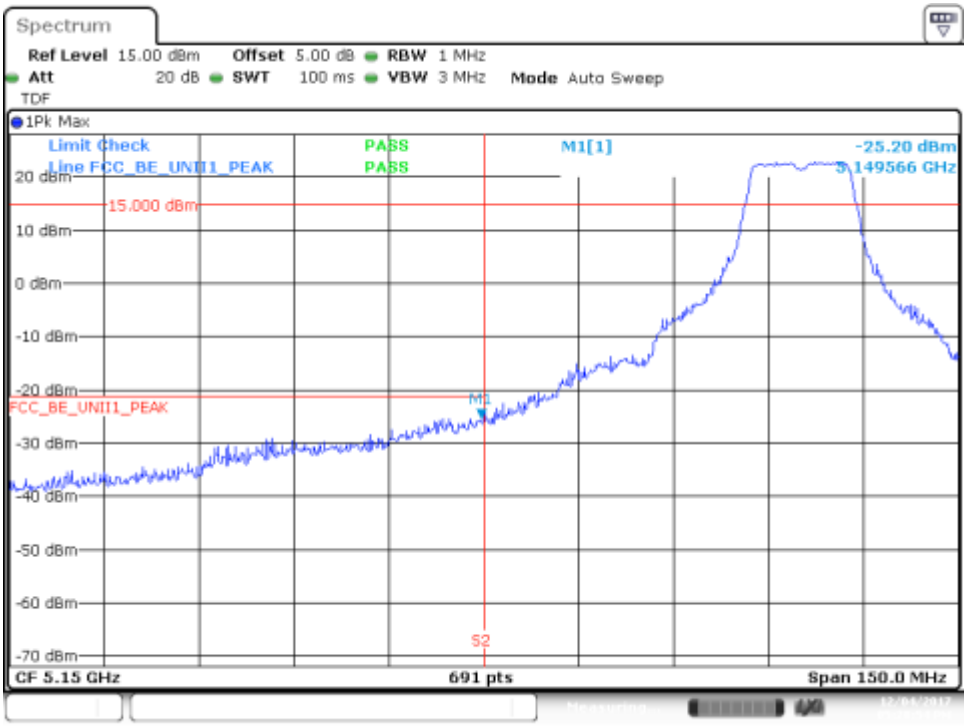
Date: 9.NOV.2017 14:43:34

B.3.4 Undesirable emission limits : Band Edge (Conducted)

802.11a. 6Mbps – Chain A Div1

BE Low Freq Section – CH36

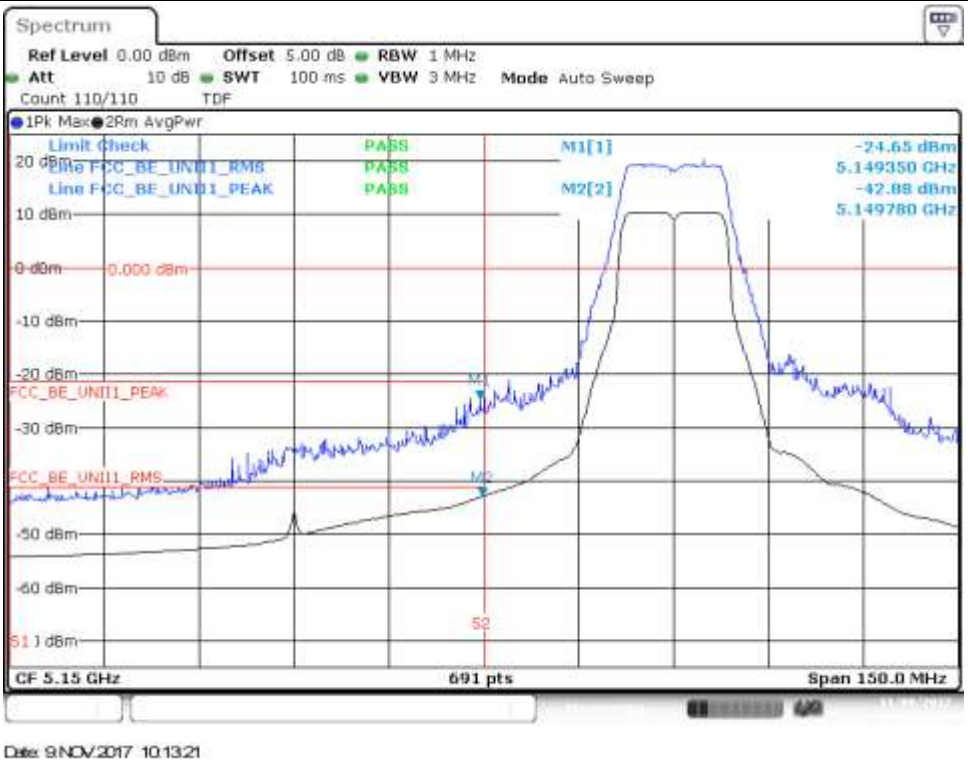


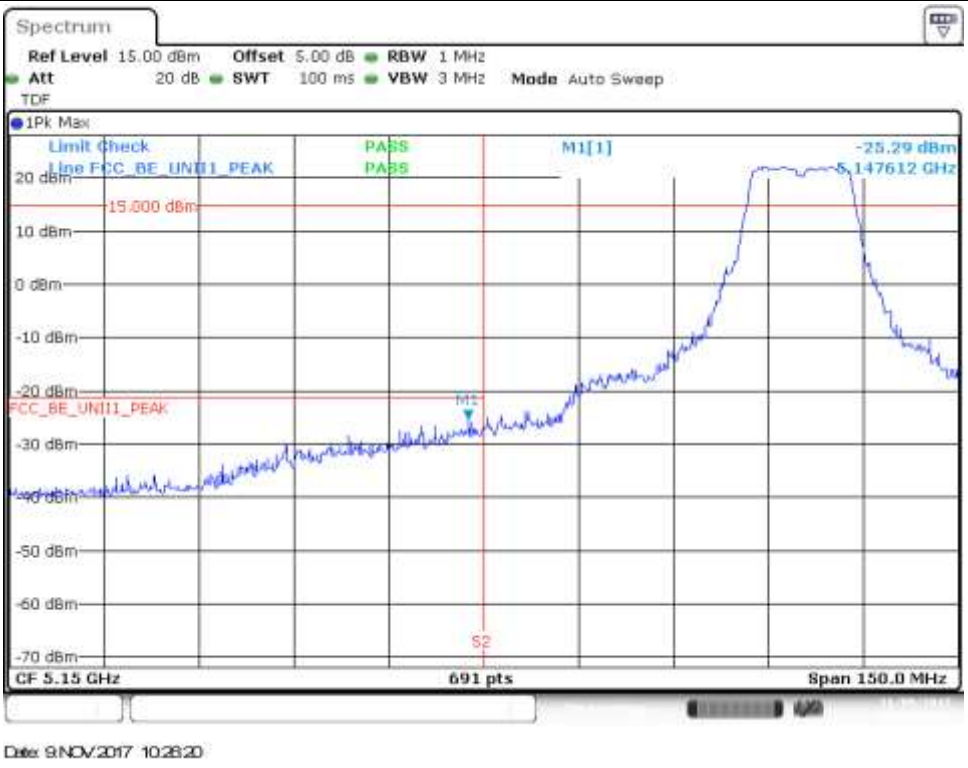
BE Low Freq Section. Peak – CH40


BE Low Freq Section. RMS – CH40


802.11a. 6Mbps – Chain A Div2

BE Low Freq Section . Peak. RMS – CH36

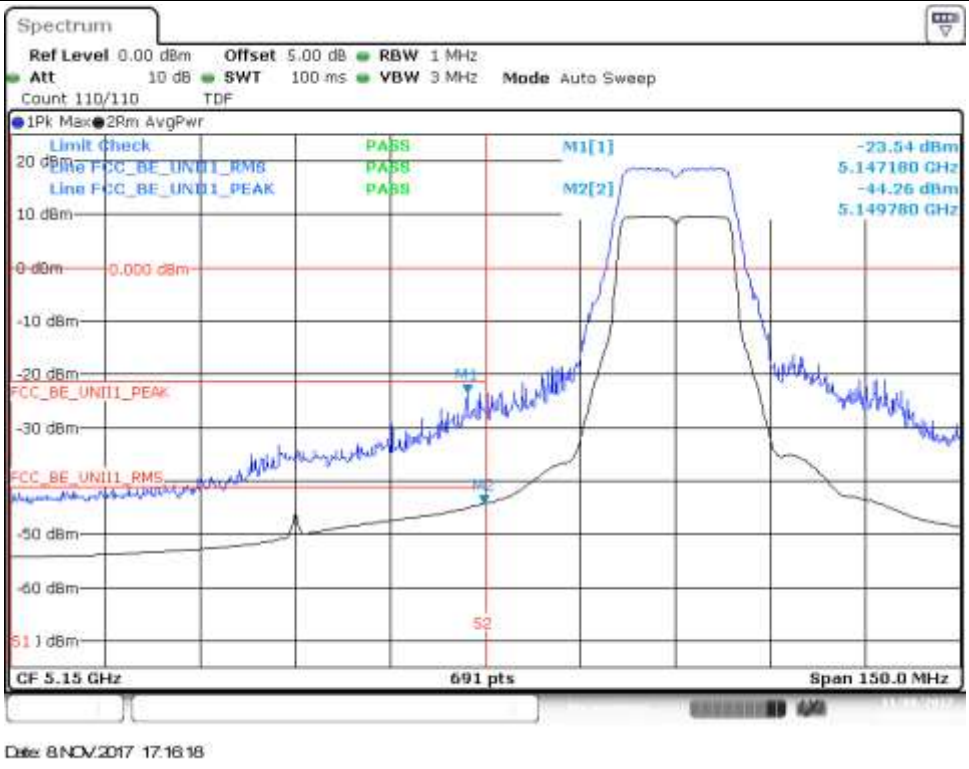


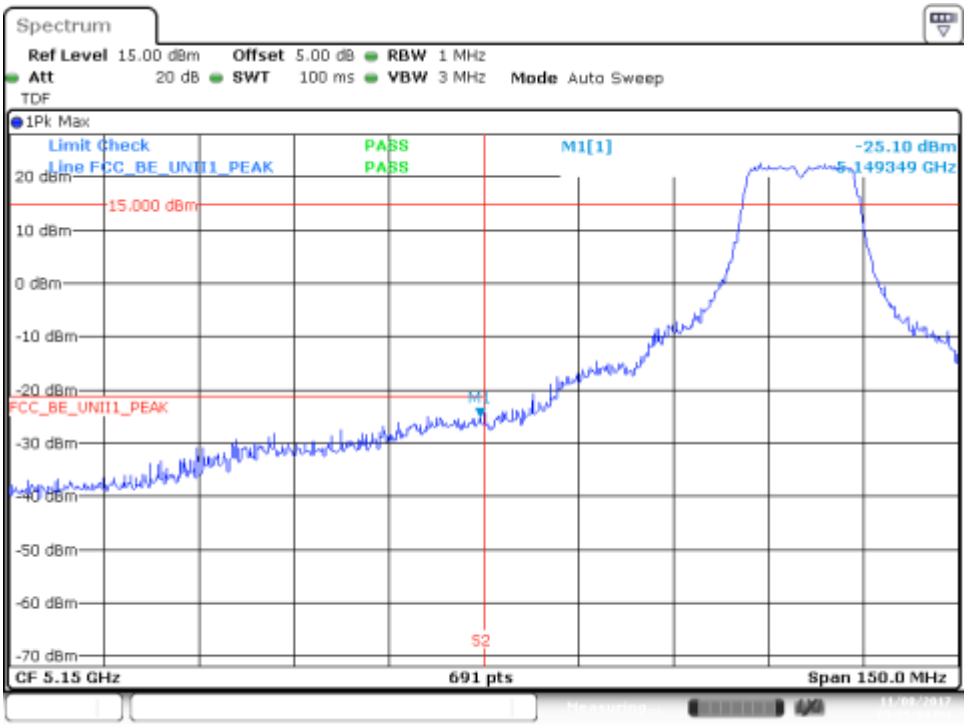
BE Low Freq Section. Peak – CH40


BE Low Freq Section. RMS – CH40


802.11n20. HT0 – Chain A Div1

BE Low Freq Section. Peak. RMS – CH36

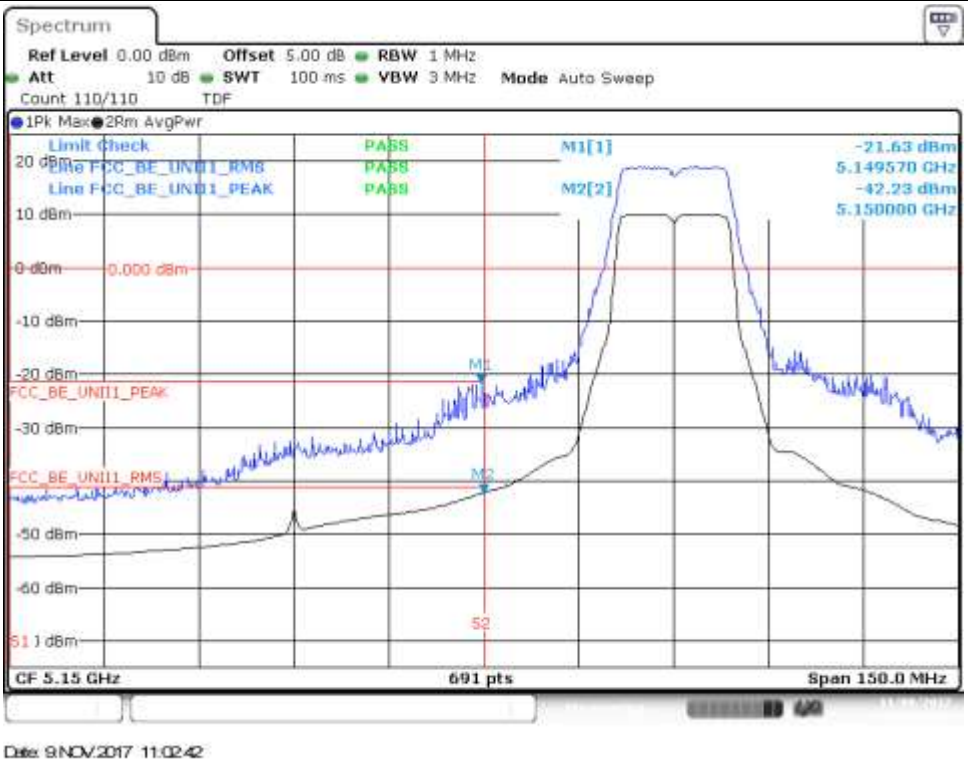


BE Low Freq Section. Peak – CH40


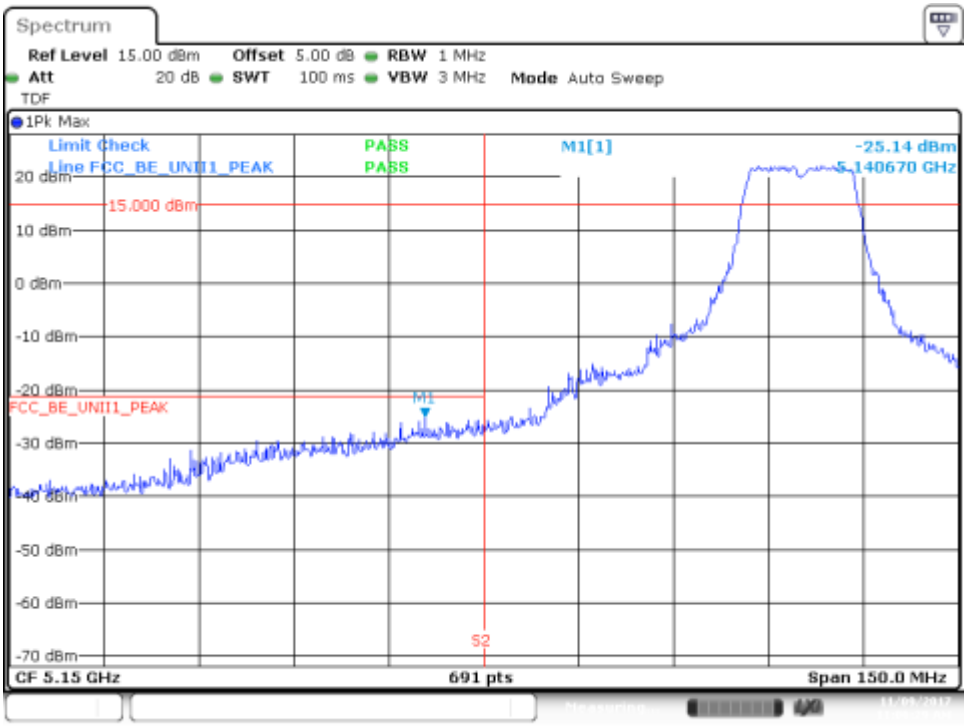
BE Low Freq Section. RMS – CH40


802.11n20. HT0 – Chain A Div2

BE Low Freq Section. Peak. RMS – CH36



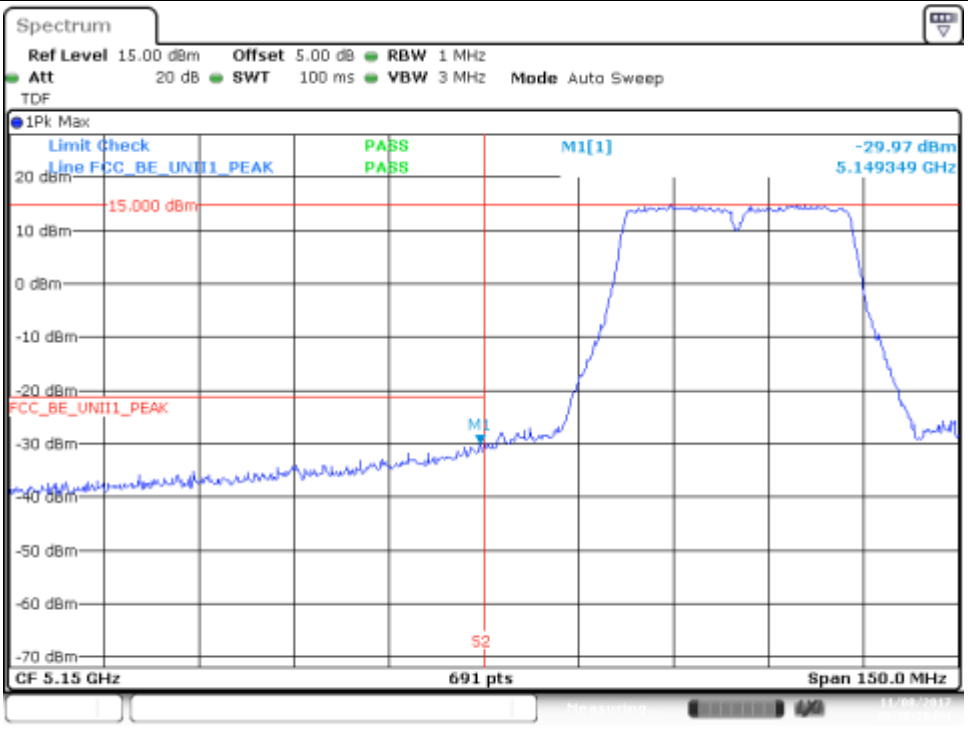
BE Low Freq Section. Peak – CH40



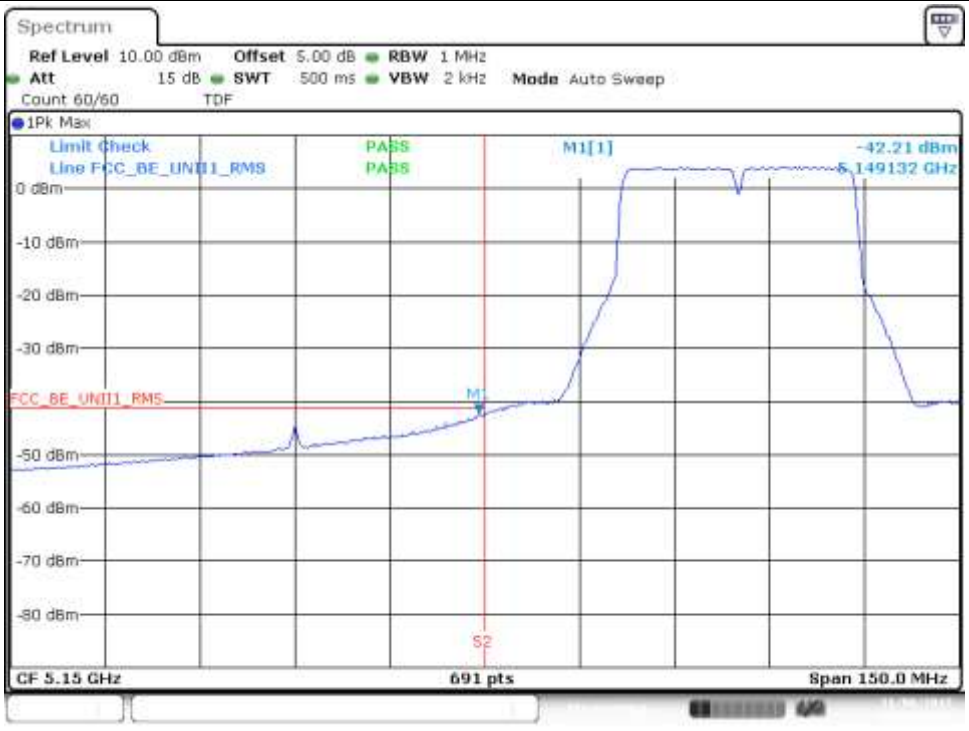
BE Low Freq Section. RMS – CH40

802.11n40. HT0 – Chain A Div1

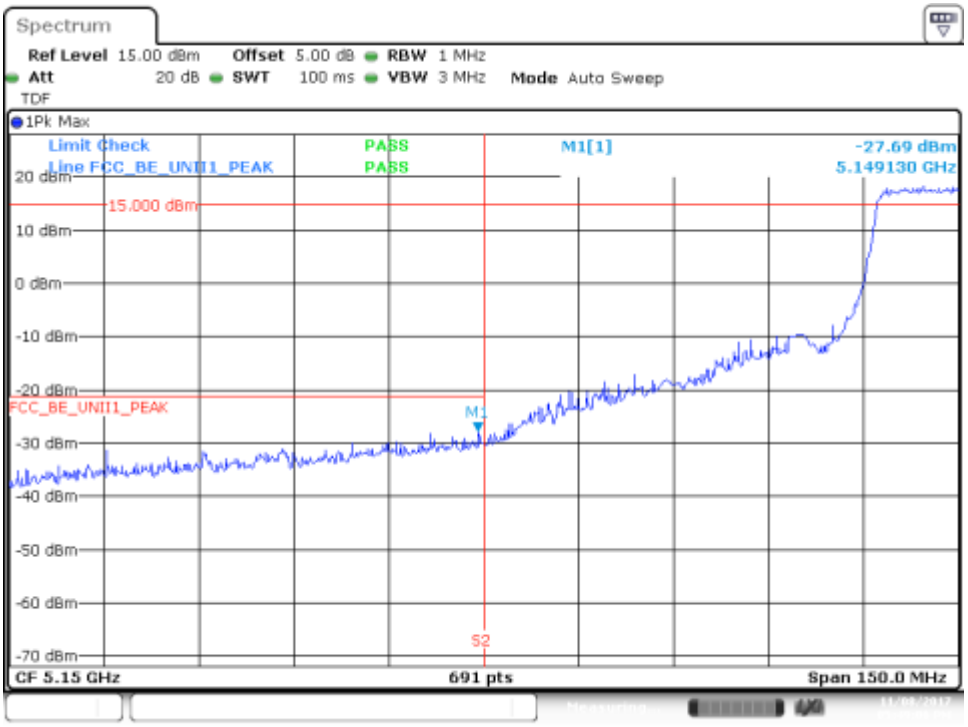
BE Low Freq Section. Peak – CH38F



BE Low Freq Section. RMS – CH38F



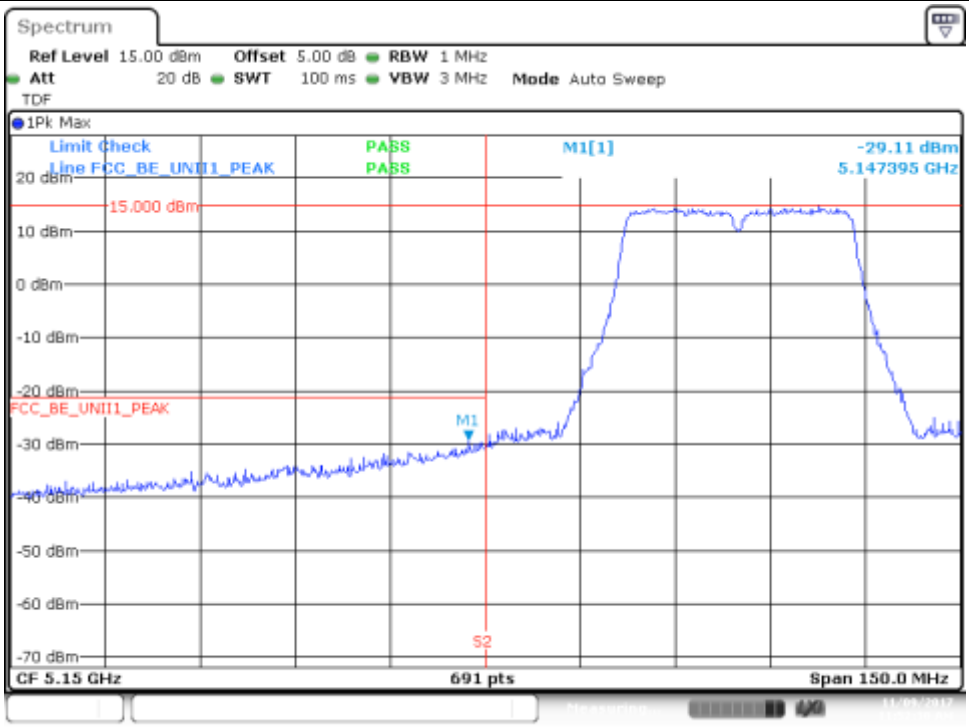
BE Low Freq Section. Peak – CH46F



BE Low Freq Section. RMS – CH46F

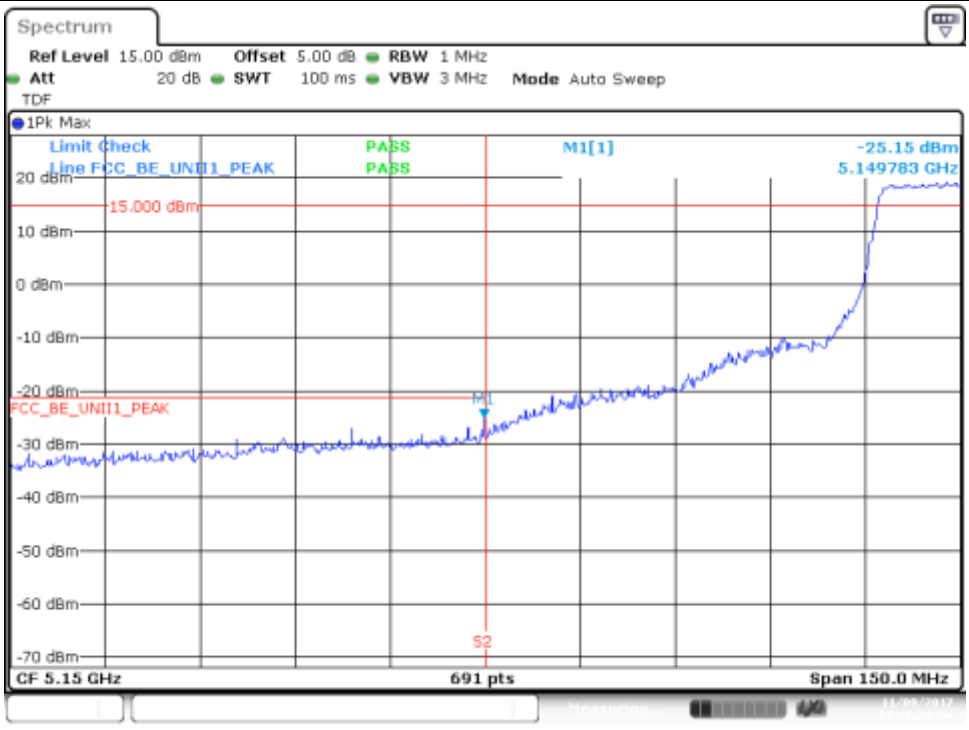
802.11n40. HT0 – Chain A Div2

BE Low Freq Section. Peak – CH38F

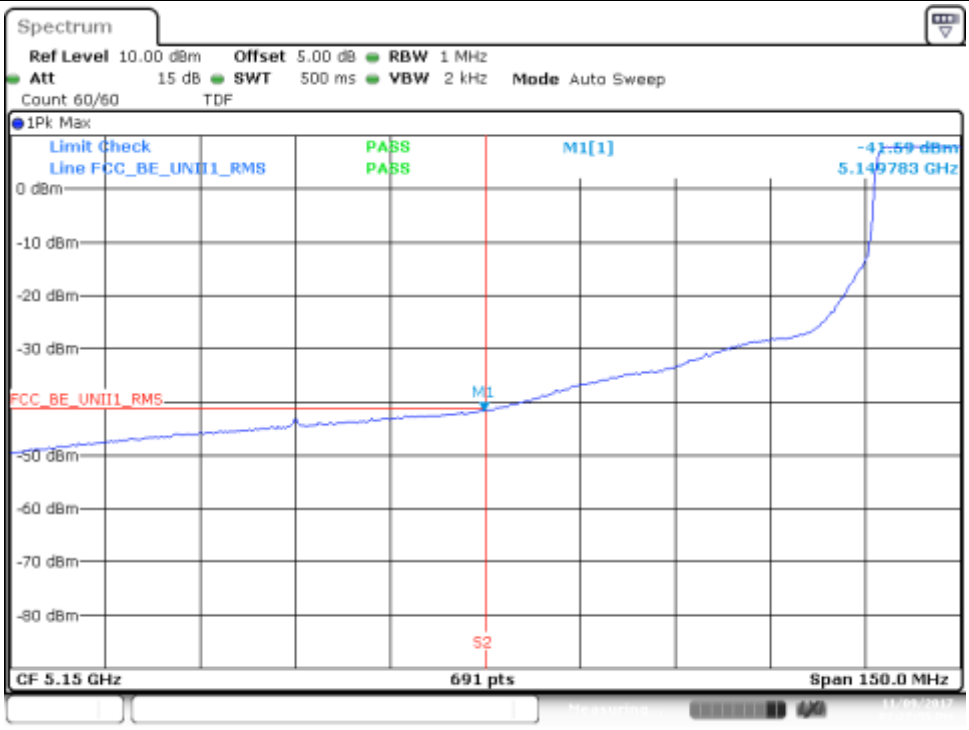


BE Low Freq Section. RMS – CH38F

BE Low Freq Section. Peak – CH46F

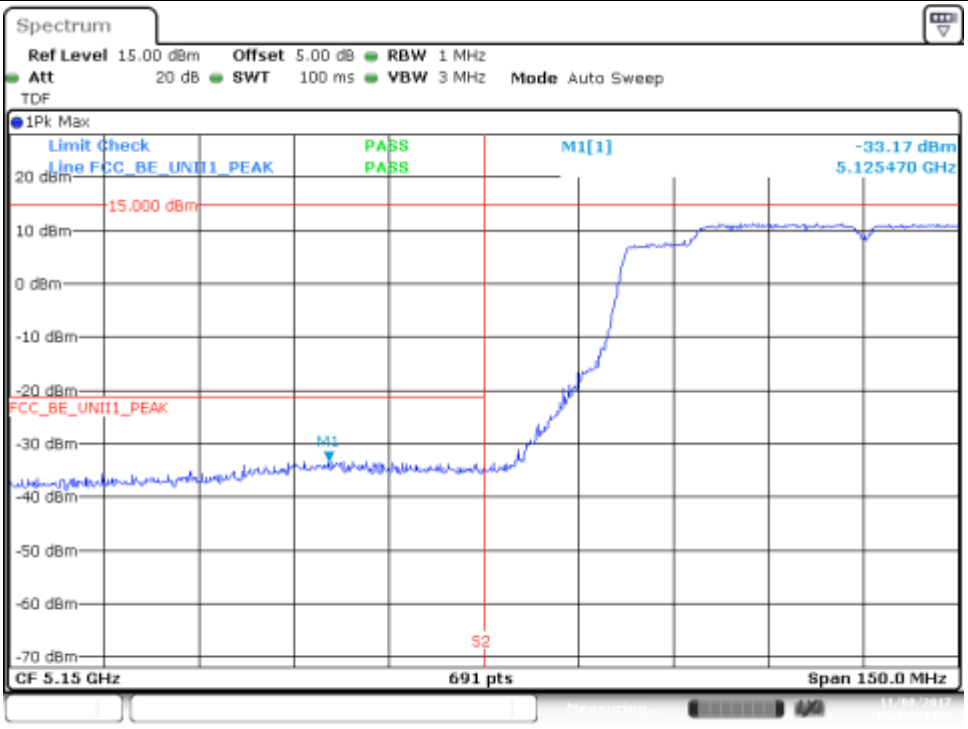


BE Low Freq Section. RMS – CH46F

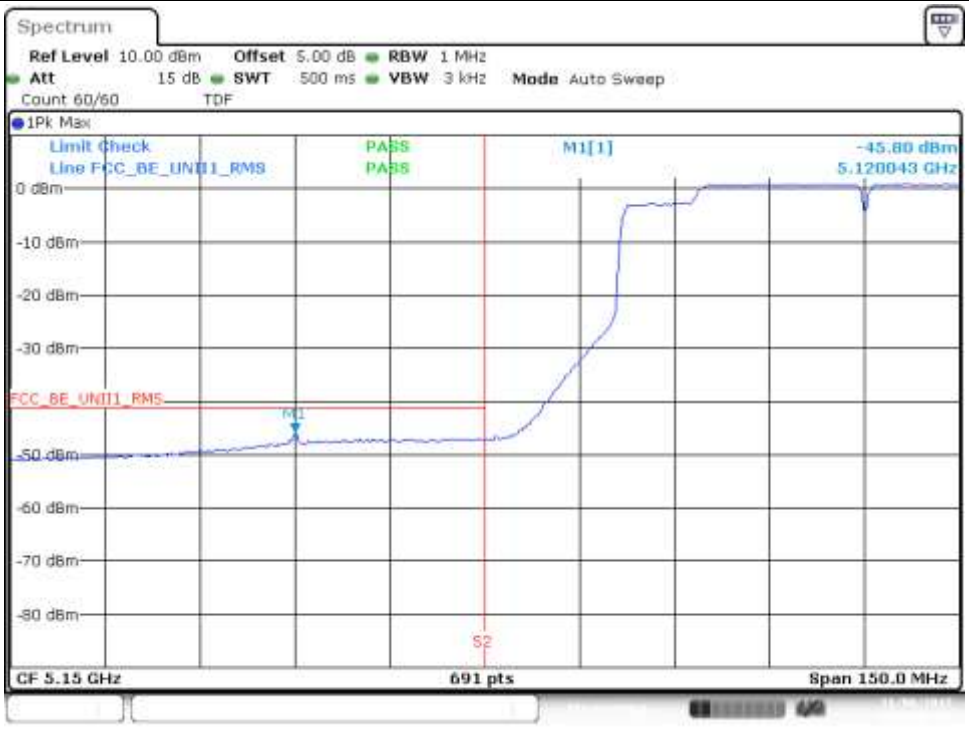


802.11ac80. VHT0 – Chain A Div1

BE Low Freq Section. Peak – CH42ac80

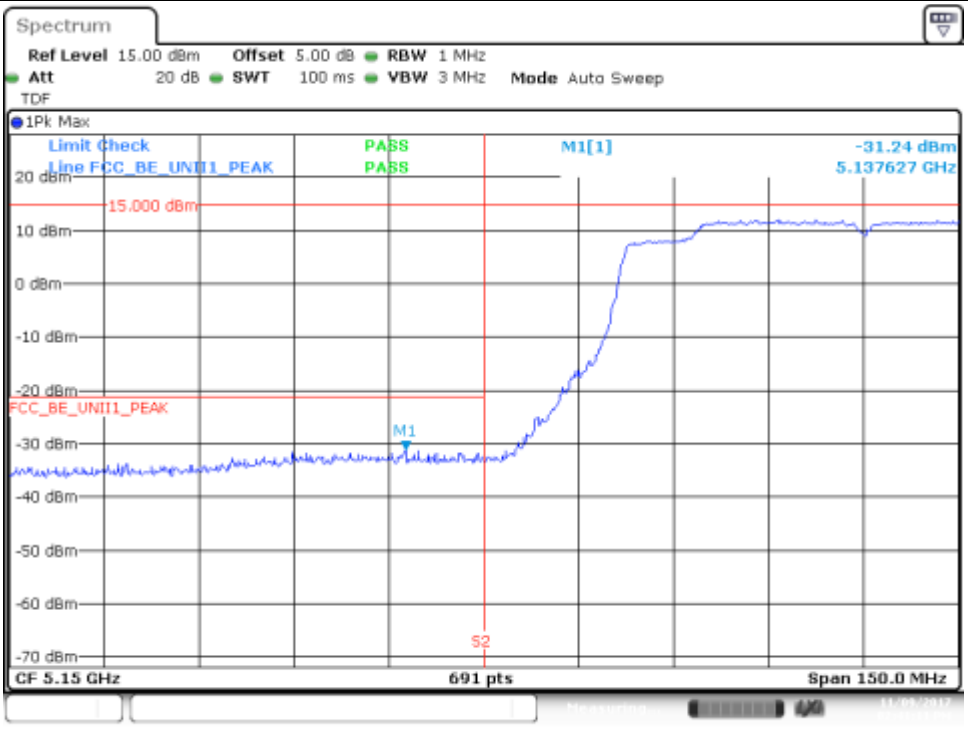


BE Low Freq Section. RMS – CH42ac80



802.11ac80. VHT0 – Chain A Div2

BE Low Freq Section. Peak – CH42ac80



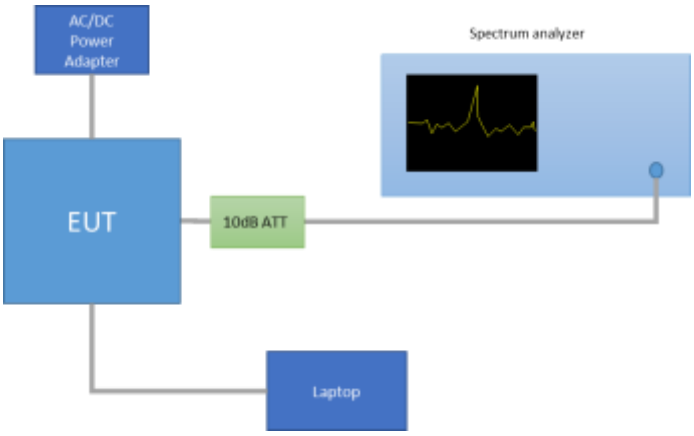
BE Low Freq Section. RMS – CH42ac80

B.4 Test Results Tables U-NII-2A

B.4.1 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	CHAIN A DIV1	52	5260	27.78	17.88
			56	5280	27.98	17.52
			64	5320	24.17	16.76
		CHAIN A DIV2	52	5260	**29.93**	**18.20**
			56	5280	29.48	18.16
			64	5320	23.92	16.80
802.11n20	HT0	CHAIN A DIV1	52	5260	30.58	18.48
			56	5280	28.83	18.44
			64	5320	24.53	17.88
		CHAIN A DIV2	52	5260	30.73	18.72
			56	5280	**30.93**	**18.72**
			64	5320	24.27	17.88
802.11n40	HT0	CHAIN A DIV1	54F	5270	45.14	36.72
			62F	5310	43.69	36.56
		CHAIN A DIV2	54F	5270	**45.50**	**36.80**
			62F	5310	43.24	36.56
802.11ac80	VHT0	CHAIN A DIV1	58ac80	5290	85.97	75.12
		CHAIN A DIV2	58ac80	5290	**86.16**	**75.12**

Max Value

See Section B.5.1 and Section B.5.2 for the screenshot results.

B.4.2 Power Limits. Maximum Output power & Peak power spectral density

Test limits

FCC part	Limits
15.407 (a) (2)	For the 5.25–5.35 GHz and 5.47–5.725 GHz bands. the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B. where B is the 26 dB emission bandwidth in megahertz. In addition. the peak power spectral density shall not exceed 11 dBm in any 1 megahertz band.

Test procedure

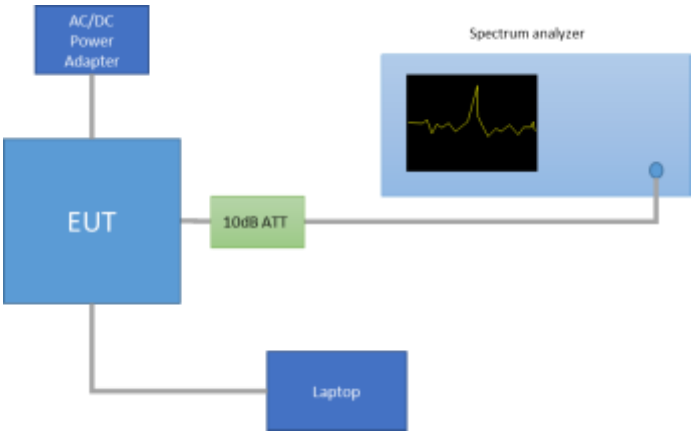
The Maximum Conducted Output Power was measured using the channel integration method according to point E) 2) e) (Method SA-2 Alternative) of KDB 789033 D02.

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 analyzer 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

Duty cycle

Mode	Rate	Antenna	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]
802.11a	6Mbps	CHAIN A DIV1	2.03	2.07	98.28%
		CHAIN A DIV2	2.03	2.07	98.28%
802.11n20	HT0	CHAIN A DIV1	1.89	1.93	98.11%
		CHAIN A DIV2	1.89	1.93	98.11%
802.11n40	HT0	CHAIN A DIV1	0.93	0.96	96.19%
		CHAIN A DIV2	0.93	0.96	96.19%
802.11ac80	VHT0	CHAIN A DIV1	0.46	0.49	93.31%
		CHAIN A DIV2	0.46	0.49	93.31%

Maximum output power

Mode	Rate	Channel	Freq. [MHz]	Antenna	Average Conducted Output Power [dBm]	Maximum* Conducted Output Power [dBm]	Maximum* Conducted Output Power [mW]	Maximum* EIRP [dBm]
802.11a	6Mbps	52	5260	CHAIN A DIV1	21.10	21.10	128.82	26.10
				CHAIN A DIV2	21.27	21.27	133.97	26.27
		56	5280	CHAIN A DIV1	21.00	21.00	125.89	26.00
				CHAIN A DIV2	21.52	21.52	**141.91**	26.52
		64	5320	CHAIN A DIV1	17.04	17.04	**50.58**	22.04
				CHAIN A DIV2	17.33	17.33	54.08	22.33
802.11n20	HT0	52	5260	CHAIN A DIV1	20.93	20.93	123.88	25.93
				CHAIN A DIV2	21.23	21.23	132.74	26.23
		56	5280	CHAIN A DIV1	20.81	20.81	120.50	25.81
				CHAIN A DIV2	21.50	21.50	**141.25**	26.50
		64	5320	CHAIN A DIV1	17.17	17.17	**52.12**	22.17
				CHAIN A DIV2	17.26	17.26	53.21	22.26
802.11n40	HT0	54F	5270	CHAIN A DIV1	18.95	19.12	**81.64**	24.12
				CHAIN A DIV2	17.90	18.07	64.10	23.07
		62F	5310	CHAIN A DIV1	14.62	14.79	**30.12**	19.79
				CHAIN A DIV2	15.08	15.25	33.49	20.25
802.11ac80	VHT0	58ac80	5290	CHAIN A DIV1	15.49	15.79	**37.94**	20.79
				CHAIN A DIV2	15.99	16.29	**42.57**	21.29

* Maximum values are the duty cycle compensated values calculated from the average (measured) values

Max Value

Min Value

Maximum Power Spectral Density (PSD)

Mode	Rate	Channel	Freq. [MHz]	Antenna	Average conducted PSD [dBm/MHz]	Maximum* conducted PSD [dBm/MHz]
802.11a	6Mbps	52	5260	CHAIN A DIV1	9.38	9.38
				CHAIN A DIV2	9.55	9.55
		56	5300	CHAIN A DIV1	9.28	9.28
				CHAIN A DIV2	9.81	9.81
		64	5320	CHAIN A DIV1	5.38	5.38
				CHAIN A DIV2	5.68	5.68
802.11n20	HT0	52	5260	CHAIN A DIV1	8.91	8.91
				CHAIN A DIV2	9.21	9.21
		56	5300	CHAIN A DIV1	8.80	8.80
				CHAIN A DIV2	9.47	9.47
		64	5320	CHAIN A DIV1	5.23	5.23
				CHAIN A DIV2	5.31	5.31
802.11n40	HT0	54F	5270	CHAIN A DIV1	3.91	4.08
				CHAIN A DIV2	2.86	3.03
		62F	5310	CHAIN A DIV1	-0.40	-0.23
				CHAIN A DIV2	0.04	0.21
802.11ac80	VHT0	58ac80	5290	CHAIN A DIV1	-1.94	-1.64
				CHAIN A DIV2	-1.43	-1.13

* Maximum values are the duty cycle compensated values calculated from the measured average values

See Section B.5.3 for the screenshot results.

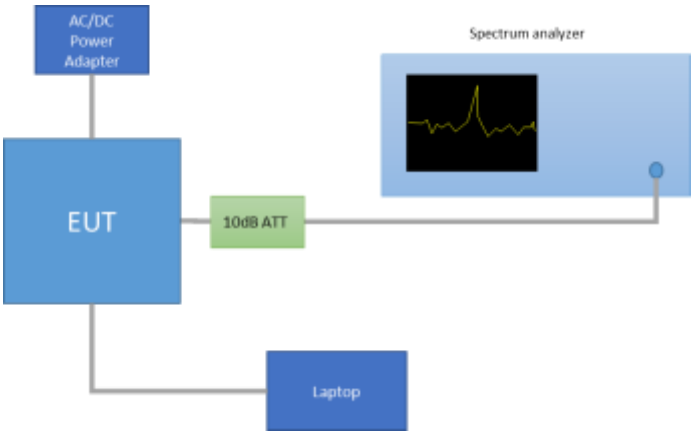
B.4.3 Undesirable emissions limits : Band Edge (Conducted)

Test limits

<table>
<tr><th>FCC part</th><th>Limits</th></tr>
<tr><td>15.407 (b) (2)</td><td>For transmitters operating in the 5.25–5.35 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of –27 dBm/MHz.</td></tr>
<tr><td>15.209</td><td>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):
<table>
<tr><th>Freq Range (MHz)</th><th>Field Strength (µV/m)</th><th>Field Strength (dBµV/m)</th><th>Meas. Distance (m)</th></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>
</table>
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.
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.</td></tr>
</table>

Test procedure

The setup below was used to measure undesirable emissions on the Band Edge domain. 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 Band Edge measurements in average mode on the low frequency section. one of the two methods is used according to section G) 6) (KDB 789033 D02):

1) Method AD (Average Detection) as per paragraph II.G.6.c.
2) Method VB (Averaging using reduced video bandwidth) as per paragraph II.G.6.d.

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.

The following limits in dBm were applied for the average detector after the conversion from the limits detailed above in dBµV/m. according to FCC 47 CFR part 15 - Subpart C – §15.209(a). The limits in dBm for peak detector are 20dB above the indicated values in the table.

§15.209(a)			Converted values	
Freq Range (MHz)	Distance (m)	Field strength (microvolts/meter)	Field strength (dB microvolts/meter)	Power (dBm)
960-25000	3	500	53.98	-41.2

See Section B.5.4 for the screenshot results.

B.4.4 Radiated spurious emission

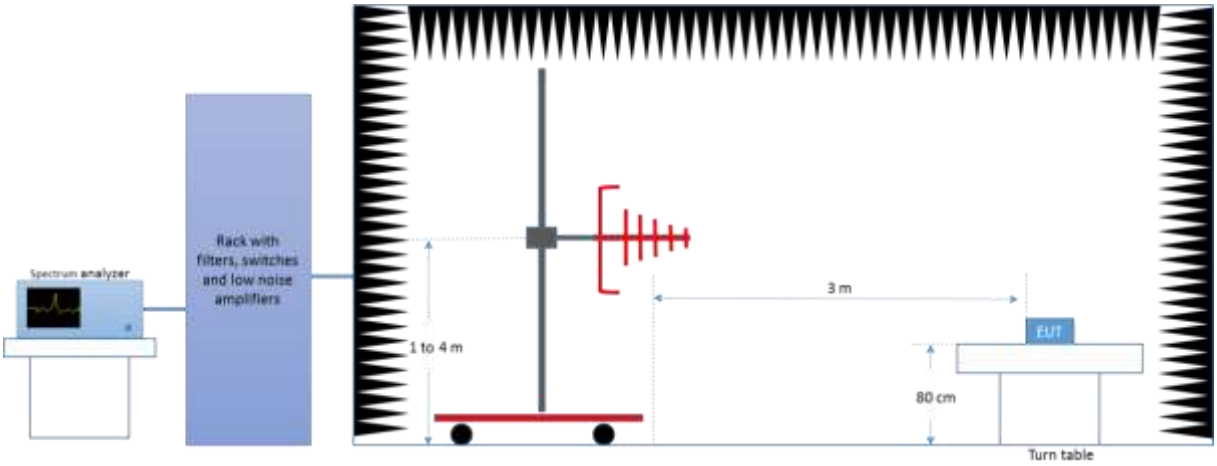
Standard references

<table>
<tr><th>FCC part</th><th>Limits</th></tr>
<tr><td>15.407 (b) (3)</td><td>For the 5.25–5.35 GHz and 5.47–5.725 GHz bands. the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B. where B is the 26 dB emission bandwidth in megahertz. In addition. the peak power spectral density shall not exceed 11 dBm in any 1 megahertz band.</td></tr>
<tr><td>15.209</td><td>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):
<table>
<tr><th>Freq Range (MHz)</th><th>Field Strength (µV/m)</th><th>Field Strength (dBµV/m)</th><th>Meas. Distance (m)</th></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>
</table>
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.
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.</td></tr>
</table>

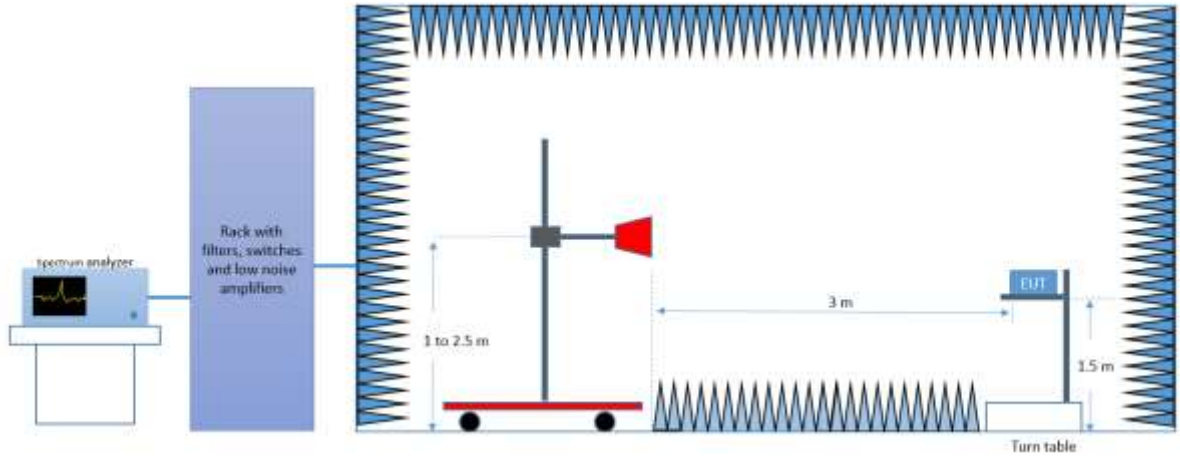
Test procedure

The below setups were 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. the EUT azimuth over 360º and for both Vertical and Horizontal polarizations.
The radiated spurious emissions were measured on the worst case configuration selected from the chapter B.4.2 and using the lowest. middle and highest channels.

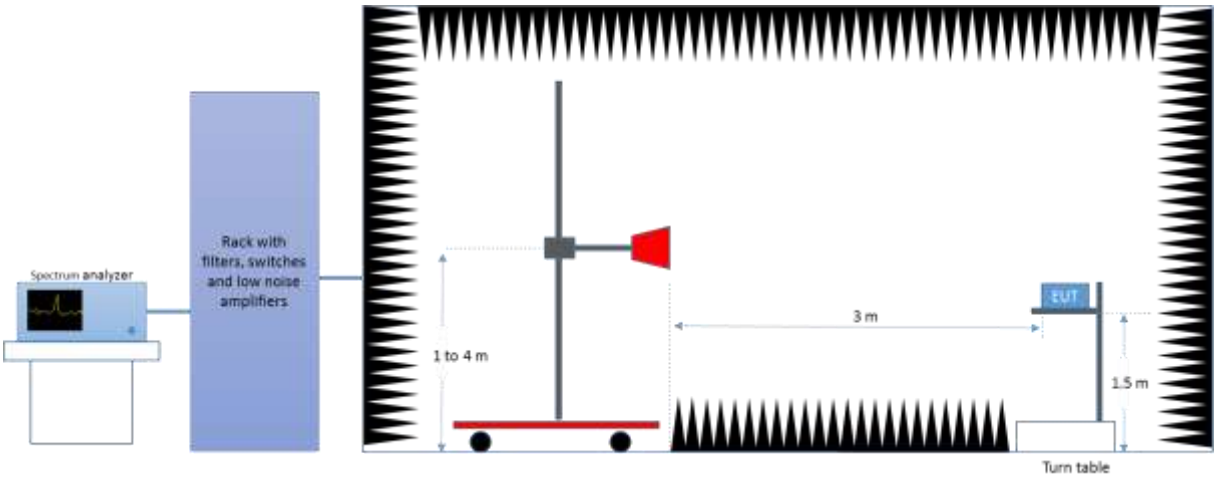
Radiated Setup 30MHz - 1GHz



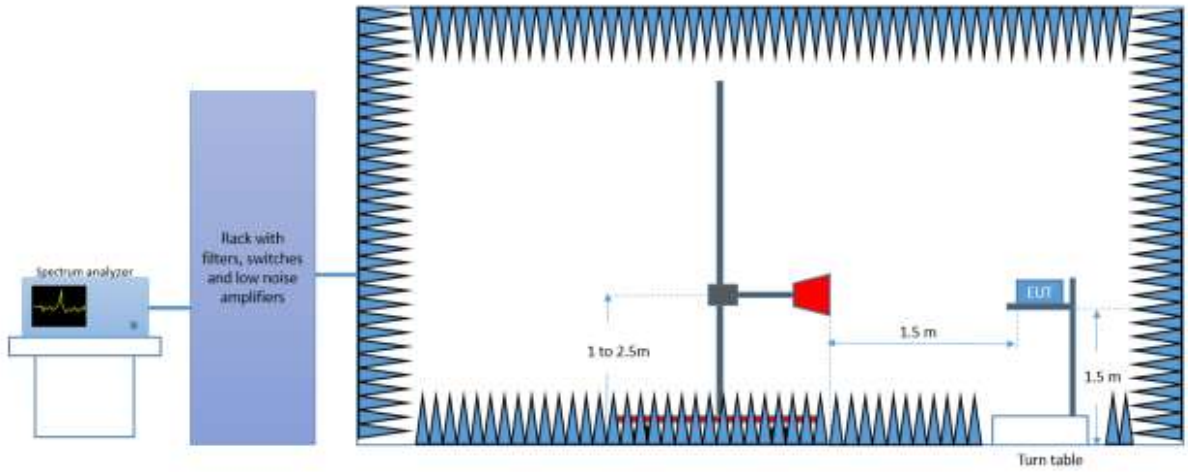
Radiated Setup 1 GHz – 6.4 GHz



Radiated Setup 6.4GHz – 18 GHz



Radiated Setup 18 GHz - 40 GHz



Sample Calculation

The field strength is deduced from the radiated measurement using the following equation:

$$E = 126.8 - 20\log(\lambda) + P - G$$

where

E is the field strength of the emission at the measurement distance. in dBµV/m

P is the power measured at the output of the test antenna. in dBm

λ is the wavelength of the emission under investigation [300/f_{MHz}]. in m

G is the gain of the test antenna. in dBi

NOTE – The measured power P includes all applicable instrument correction factors up to the connection to the test

Antenna e.g. cable losses. amplifier gains.

For field strength measurements made at other than the distance at which the applicable limit is specified. the field strength of the emission at the distance specified by the limit is deduced as follows:

$$E_{SpecLimit} = E_{Meas} + 20\log(D_{Meas}/D_{SpecLimit})$$

where

$E_{SpecLimit}$ *is the field strength of the emission at the distance specified by the limit. in dBµV/m*

E_{Meas} *is the field strength of the emission at the measurement distance. in dBµV/m*

D_{Meas} *is the measurement distance. in m*

$D_{SpecLimit}$ *is the distance specified by the limit. in m*

Test Results

30 MHz – 40 GHz. 802.11a. 6Mbps. Chain A Div1

Radiated Spurious – CH52

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
71.9	24.0	---	40.0	16.0
115.1	25.2	---	43.5	18.3
192.0	28.4	---	43.5	15.1
216.0	31.0	---	43.6	12.6
437.6	36.7	---	46.0	9.3
640.0	39.2	---	46.0	6.8
1190.2	---	44.0	54.0	10.0
1190.5	48.3	---	74.0	25.7
25903.2	---	36.9	54.0	17.1

Radiated Spurious – CH56

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
72.0	24.7	---	40.0	15.3
115.2	25.5	---	43.5	18.0
216.0	31.7	---	46.0	14.3
312.0	34.3	---	46.0	11.7
437.6	35.8	---	46.0	10.2
640.0	39.1	---	46.0	6.9
1190.2	---	44.1	54.0	9.9
1190.2	48.0	---	74.0	26.0
25911.3	---	37.0	54.0	17.0

Radiated Spurious – CH64

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
72.0	28.4	---	40.0	11.6
115.2	25.8	---	43.5	17.7
183.0	28.8	---	43.5	14.7
216.0	30.2	---	46.0	15.8
437.5	35.6	---	46.0	10.4
640.0	41.2	---	46.0	4.8
1190.0	47.1	---	74.0	26.9
1190.2	---	43.7	54.0	10.3
21280.0	---	37.0	54.0	17.0

30 MHz – 40 GHz. 802.11a. 6Mbps. Chain A Div2

Radiated Spurious – CH52

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
72.0	24.5	---	40.0	15.5
96.0	24.1	---	43.5	19.4
216.0	29.6	---	46.0	16.5
360.0	34.6	---	46.0	11.4
437.6	36.6	---	46.0	9.4
640.0	38.3	---	46.0	7.7
1190.2	---	43.9	54.0	10.1
1190.2	48.3	---	74.0	25.7
10520.9	---	45.1	54.0	8.9
10527.2	53.9	---	74.0	20.1
21039.8	---	37.5	54.0	16.5

Radiated Spurious – CH56

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
72.0	24.1	---	40.0	15.9
115.2	25.8	---	43.5	17.7
216.0	30.6	---	46.0	15.4
437.6	36.3	---	46.0	9.7
500.0	35.7	---	46.0	10.3
640.0	40.5	---	46.0	5.5
1190.0	48.0	---	74.0	26.0
1190.5	---	43.7	54.0	10.3
10561.0	---	44.1	54.0	9.9
10563.0	54.3	---	74.0	19.7
21120.0	---	38.5	54.0	15.5

Radiated Spurious – CH64

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
72.0	25.8	---	40.0	14.2
115.2	25.7	---	43.5	17.8
192.0	27.7	---	43.5	15.8
216.0	30.3	---	46.0	15.7
437.6	36.5	---	46.0	9.5
640.0	38.4	---	46.0	7.6
1190.2	---	44.0	54.0	10.0
1190.2	48.3	---	74.0	25.7
10629.7	51.9	---	74.0	22.1
10642.2	---	43.0	54.0	11.0
21279.7	---	37.4	54.0	16.7

30 MHz – 40 GHz. 802.11n20. HT0. Chain A Div1

Radiated Spurious – CH52

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
71.9	26.4	---	40.0	13.6
95.9	23.3	---	43.5	20.2
115.1	25.3	---	43.5	18.2
216.0	30.7	---	46.0	15.3
437.6	35.5	---	46.0	10.5
640.0	38.9	---	46.0	7.1
1190.2	---	43.8	54.0	10.2
1190.5	48.3	---	74.0	25.7
21040.1	---	39.1	54.0	14.9

Radiated Spurious – CH56

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
71.9	24.6	---	40.0	15.4
115.2	25.9	---	43.5	17.6
216.0	30.7	---	43.5	12.8
312.0	33.0	---	46.0	13.0
437.6	36.0	---	46.0	10.0
640.0	38.8	---	46.0	7.2
1190.2	---	43.9	54.0	10.1
1190.5	48.7	---	74.0	25.3
10562.0	---	41.3	54.0	12.7
10573.1	50.6	---	74.0	23.4
21120.3	---	38.5	54.0	15.5

Radiated Spurious – CH64

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
72.0	26.3	---	40.0	13.7
115.2	24.9	---	43.5	18.6
216.0	31.6	---	46.0	14.4
437.6	36.1	---	46.0	9.9
500.1	35.3	---	46.0	10.7
640.0	38.5	---	46.0	7.5
1190.0	47.5	---	74.0	26.5
1190.2	---	43.9	54.0	10.2
10640.3	50.0	---	74.0	24.0
10644.6	---	39.9	54.0	14.1
21280.0	---	37.7	54.0	16.3

30 MHz – 40 GHz. 802.11n20. HT0. Chain A Div2

Radiated Spurious – CH52

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
71.9	27.6	---	40.0	12.4
115.2	25.6	---	43.5	18.0
216.0	31.8	---	43.5	11.8
437.5	35.9	---	46.0	10.1
500.1	37.1	---	46.0	8.9
640.0	38.6	---	46.0	7.4
1190.2	---	43.7	54.0	10.3
1190.5	48.0	---	74.0	26.0
10520.4	---	44.7	54.0	9.3
10520.4	54.7	---	74.0	19.3
21039.8	---	38.8	54.0	15.2

Radiated Spurious – CH56

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
72.0	25.1	---	40.0	15.0
115.2	26.6	---	43.5	16.9
216.0	30.5	---	46.0	15.5
437.6	35.3	---	46.0	10.7
500.0	37.0	---	46.0	9.0
640.0	41.3	---	46.0	4.7
1190.2	---	44.0	54.0	10.0
1190.2	48.0	---	74.0	26.0
10558.6	---	45.2	54.0	8.9
10562.5	54.8	---	74.0	19.2
21120.3	---	37.3	54.0	16.7

Radiated Spurious – CH64

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
72.0	24.8	---	40.0	15.2
115.2	25.5	---	43.5	18.0
216.0	30.4	---	46.0	15.6
437.5	35.5	---	46.0	10.5
576.0	35.3	---	46.0	10.7
640.0	41.0	---	46.0	5.0
1190.2	---	43.8	54.0	10.2
1190.5	48.4	---	74.0	25.6
10637.9	---	43.2	54.0	10.8
10643.7	52.8	---	74.0	21.2
21279.7	---	38.5	54.0	15.5

30 MHz – 40 GHz. 802.11n40. HT0. Chain A Div1

Radiated Spurious – CH54F

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
72.0	26.7	---	40.0	13.3
96.0	25.4	---	43.5	18.1
216.0	30.8	---	46.0	15.2
437.6	35.2	---	46.0	10.9
500.1	35.0	---	46.0	11.0
640.0	36.8	---	46.0	9.2
1190.2	---	44.0	54.0	10.0
1190.2	49.0	---	74.0	25.1
21080.0	---	38.0	54.0	16.0

Radiated Spurious – CH62F

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
72.0	26.1	---	40.0	13.9
96.0	33.6	---	43.5	9.9
115.2	25.6	---	43.5	17.9
216.0	30.8	---	46.0	15.2
437.6	35.8	---	46.0	10.2
640.0	37.8	---	46.0	8.2
1190.0	48.5	---	74.0	25.5
1190.2	---	44.4	54.0	9.6
25937.2	---	36.9	54.0	17.1

30 MHz – 40 GHz. 802.11n40. HT0. Chain A Div2

Radiated Spurious – CH54F

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
72.0	24.2	---	40.0	15.8
115.2	24.7	---	43.5	18.8
216.0	30.8	---	46.0	15.2
312.0	33.4	---	46.0	12.7
437.6	34.8	---	46.0	11.2
640.0	38.9	---	46.0	7.2
1190.2	---	44.0	54.0	10.0
1190.5	48.6	---	74.0	25.4
10539.8	51.2	---	74.0	22.8
10541.7	---	41.4	54.0	12.6
21079.8	---	39.4	54.0	14.6

Radiated Spurious – CH62F

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
71.9	26.3	---	40.0	13.7
115.2	25.3	---	43.5	18.2
216.0	30.5	---	43.5	13.0
272.0	36.0	---	46.0	10.0
437.6	35.3	---	46.0	10.7
640.0	41.2	---	46.0	4.8
2127.9	---	37.1	54.0	16.9
2129.1	56.8	---	74.0	17.2
10606.0	51.8	---	74.0	22.3
10611.8	---	40.9	54.0	13.2
21239.8	---	37.5	54.0	16.5

30 MHz – 40 GHz. 802.11ac80. HT0. Chain A Div1

Radiated Spurious – CH58ac80

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
71.9	27.4	---	40.0	12.6
96.0	25.7	---	43.5	17.8
216.0	30.1	---	46.0	15.9
437.6	36.6	---	46.0	9.4
500.0	36.1	---	46.0	9.9
640.0	38.1	---	46.0	7.9
2127.1	---	36.7	54.0	17.3
2130.3	56.2	---	74.0	17.8
21159.9	---	37.5	54.0	16.5

30 MHz – 40 GHz. 802.11ac80. HT0. Chain A Div2

Radiated Spurious – CH58ac80

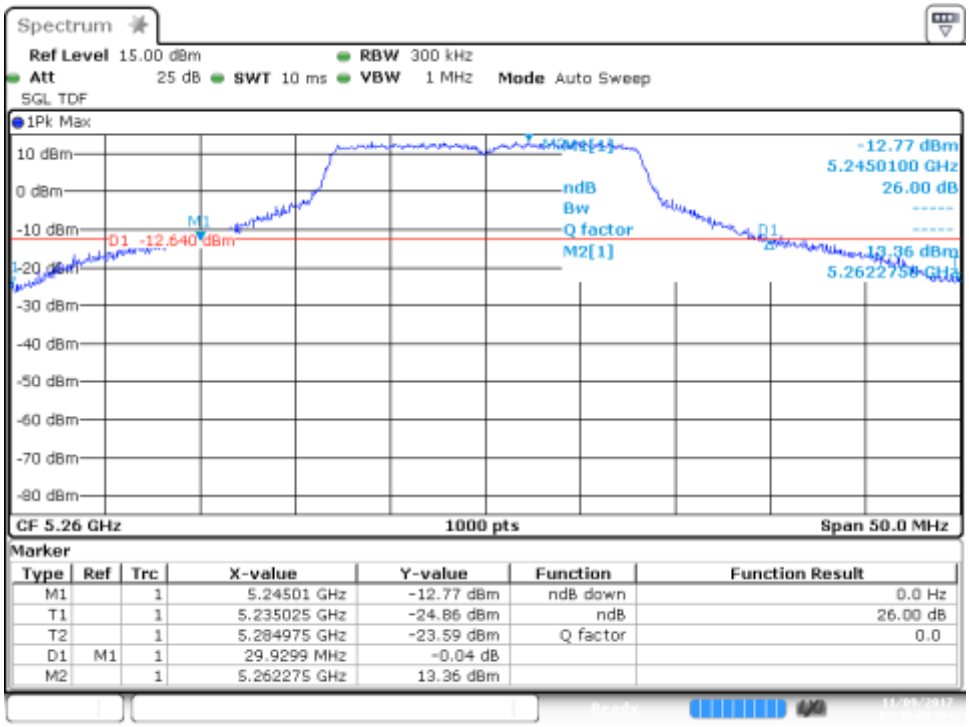
Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBµV/m	dBµV/m	dBµV/m	dB
71.9	26.1	---	40.0	13.9
96.0	34.1	---	43.5	9.4
115.2	25.1	---	43.5	18.4
216.0	30.6	---	46.0	15.4
437.5	34.8	---	46.0	11.2
640.0	37.4	---	46.0	8.6
2126.1	---	36.6	54.0	17.4
2126.1	50.5	---	74.0	23.5
25935.8	---	37.3	54.0	16.7

B.5 Test Results Screenshot U-NII-2A

B.5.1 26dB Bandwidth

CHAIN A DIV2. 802.11a. 6Mbps

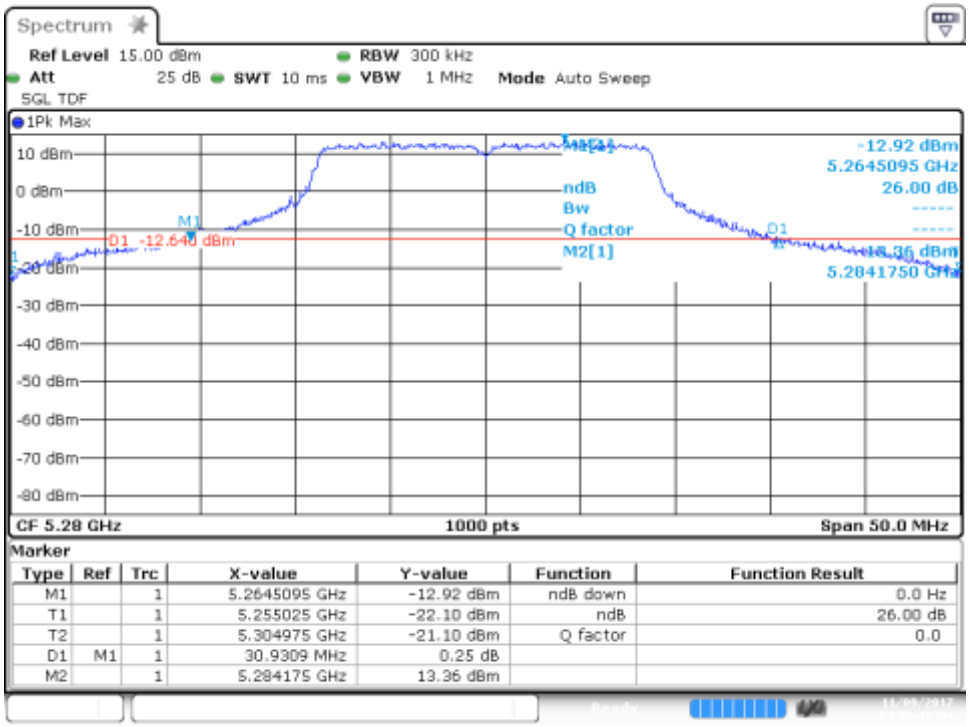
Channel 52



Date: 9.NOV.2017 15:38:59

CHAIN A DIV2. 802.11n20. HT0

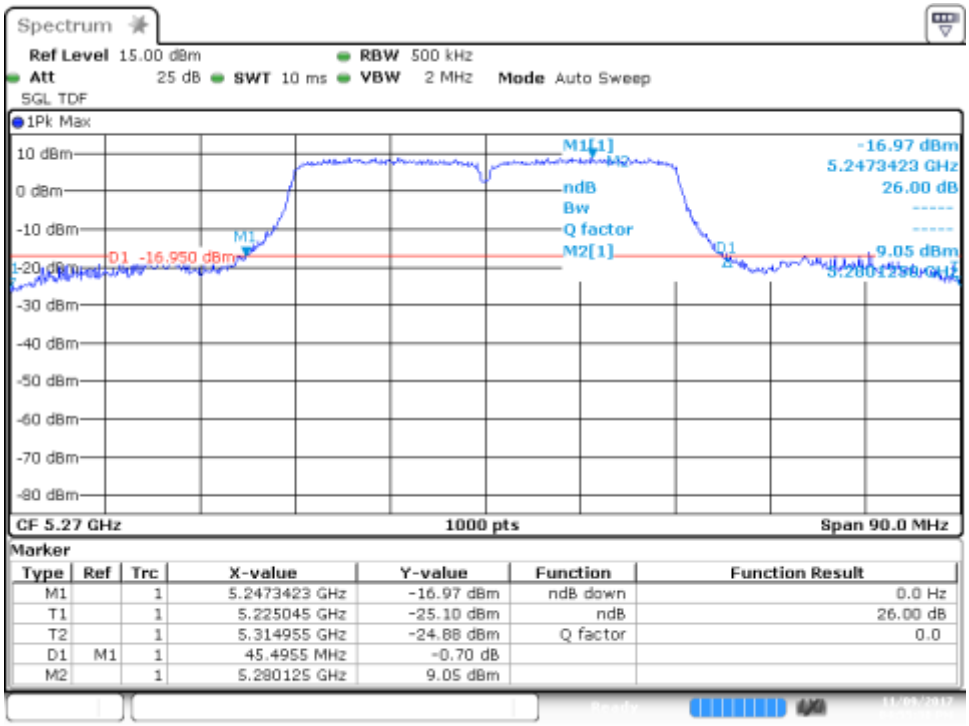
Channel 56



Date: 9.NOV.2017 16:01:44

CHAIN A DIV2. 802.11n40. HT0

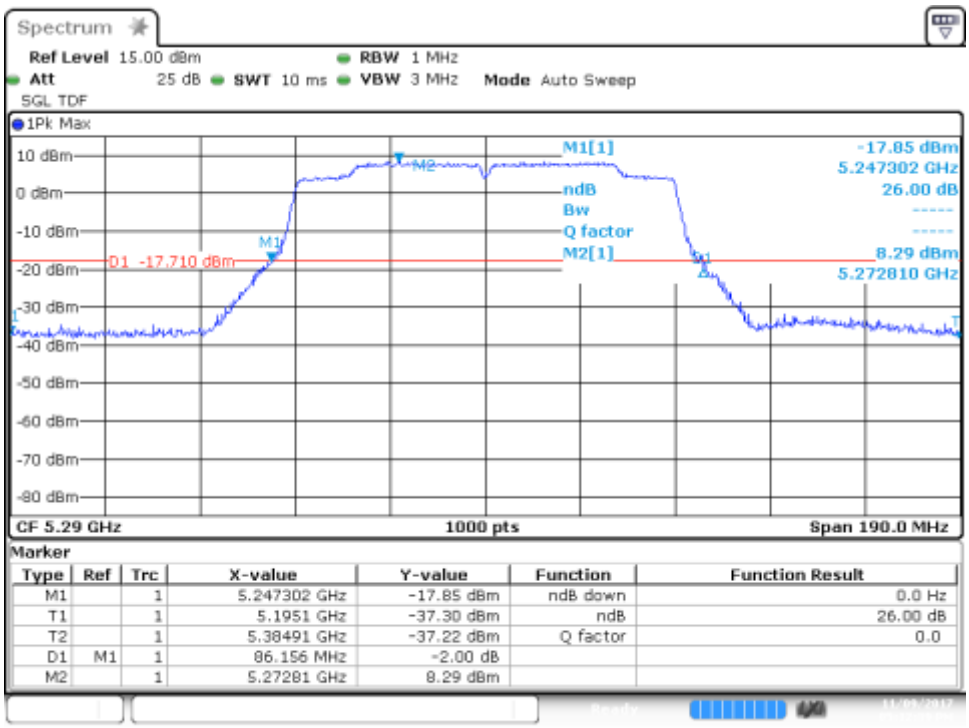
Channel 54F



Date: 9.NOV.2017 16:55:38

CHAIN A DIV2. 802.11ac80. VHT0

Channel 58ac80

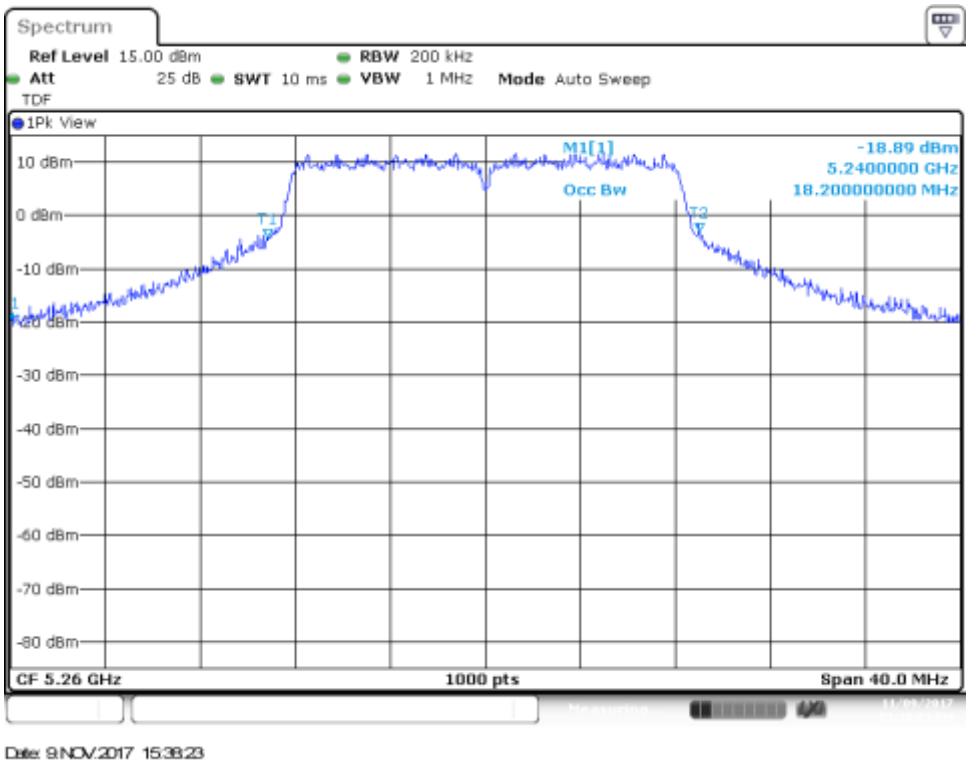


Date: 9.NOV.2017 17:12:40

B.5.2 99% Bandwidth

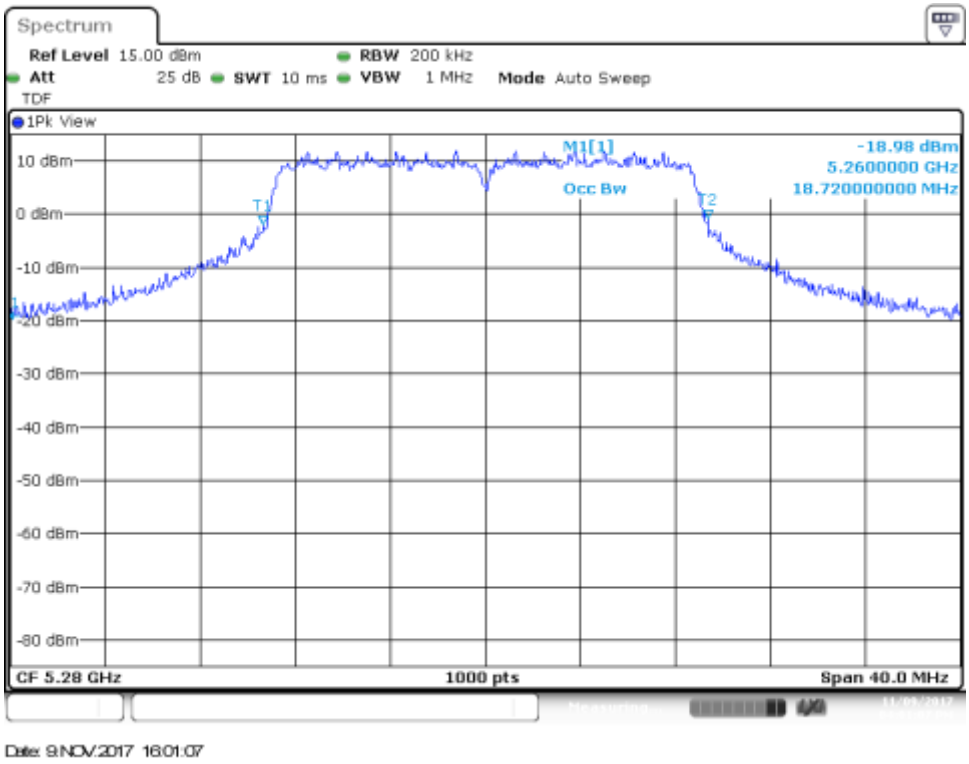
CHAIN A DIV2. 802.11a. 6Mbps

Channel 52



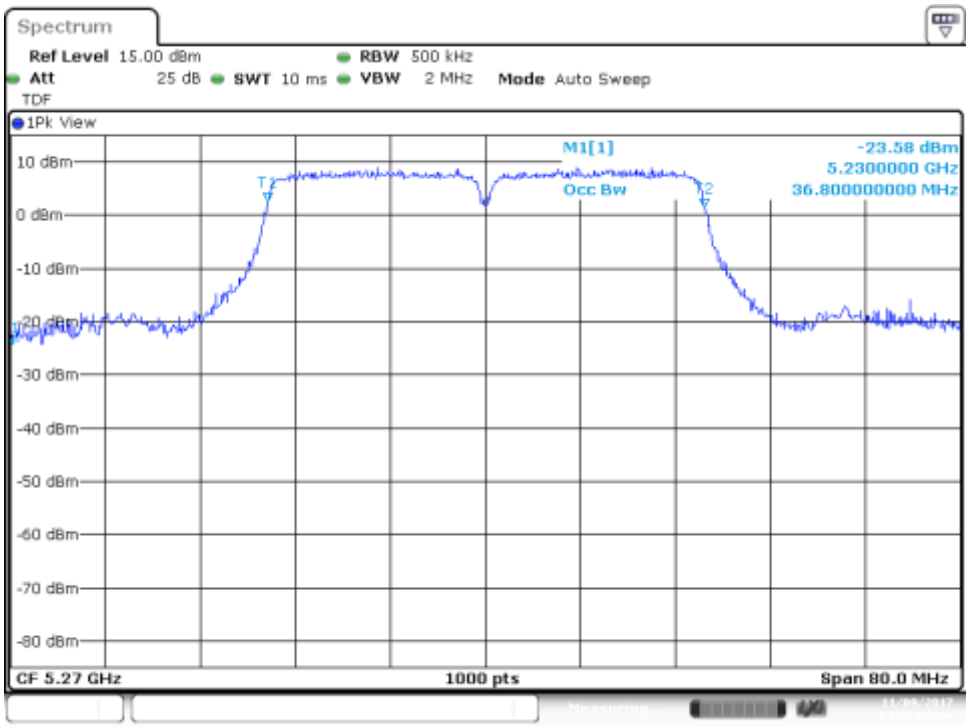
CHAIN A DIV2. 802.11n20. HT0

Channel 56



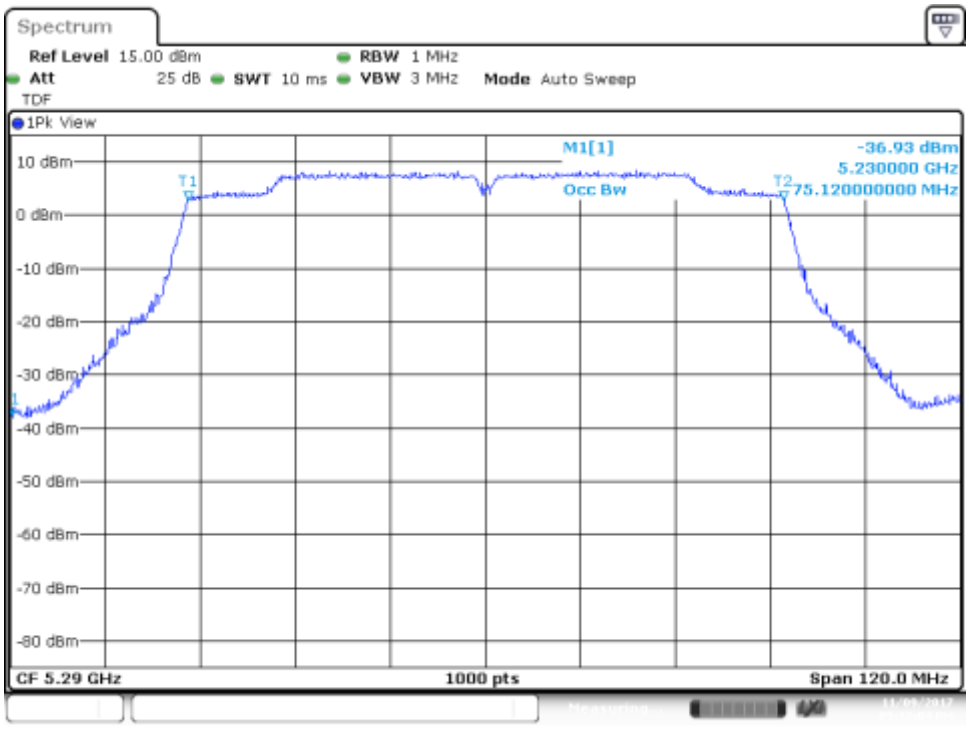
CHAIN A DIV2. 802.11n40. HT0

Channel 54F



CHAIN A DIV2. 802.11ac80. VHT0

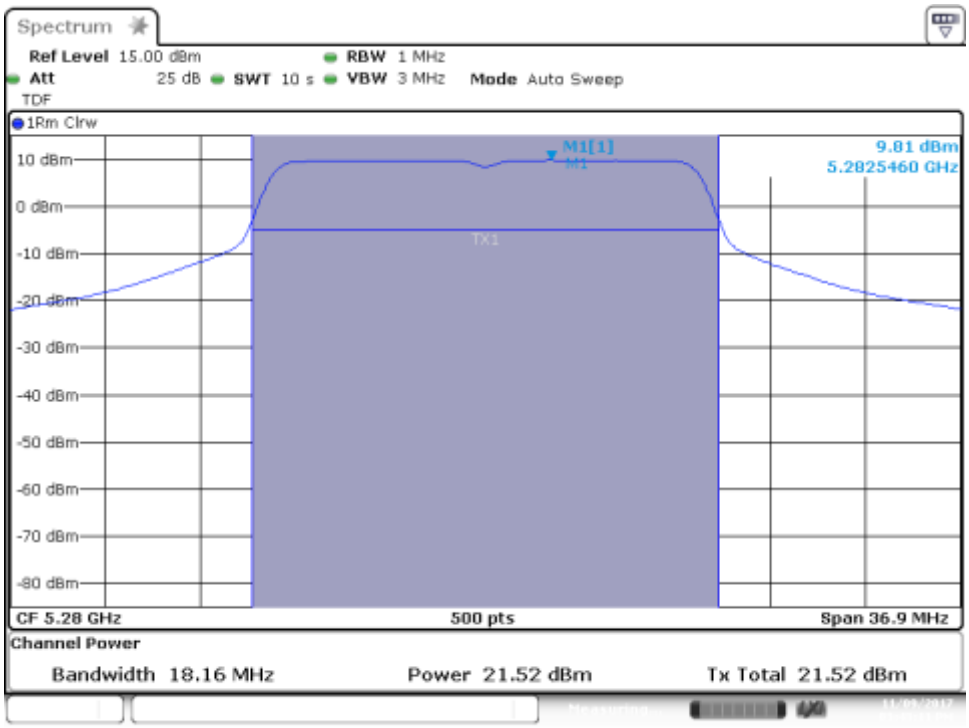
Channel 58ac80



B.5.3 Power Limits. Maximum Output power & Peak power spectral density

CHAIN A DIV2. 802.11a. 6Mbps

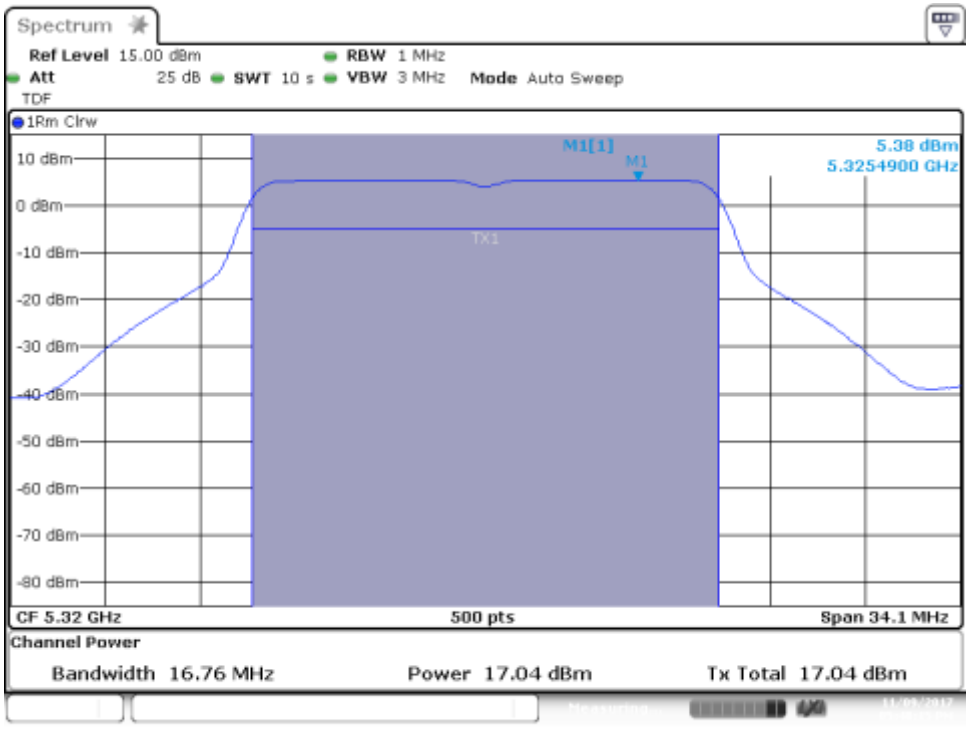
Channel 56



Date: 9.NOV.2017 15:43:11

CHAIN A DIV1. 802.11a. 6Mbps

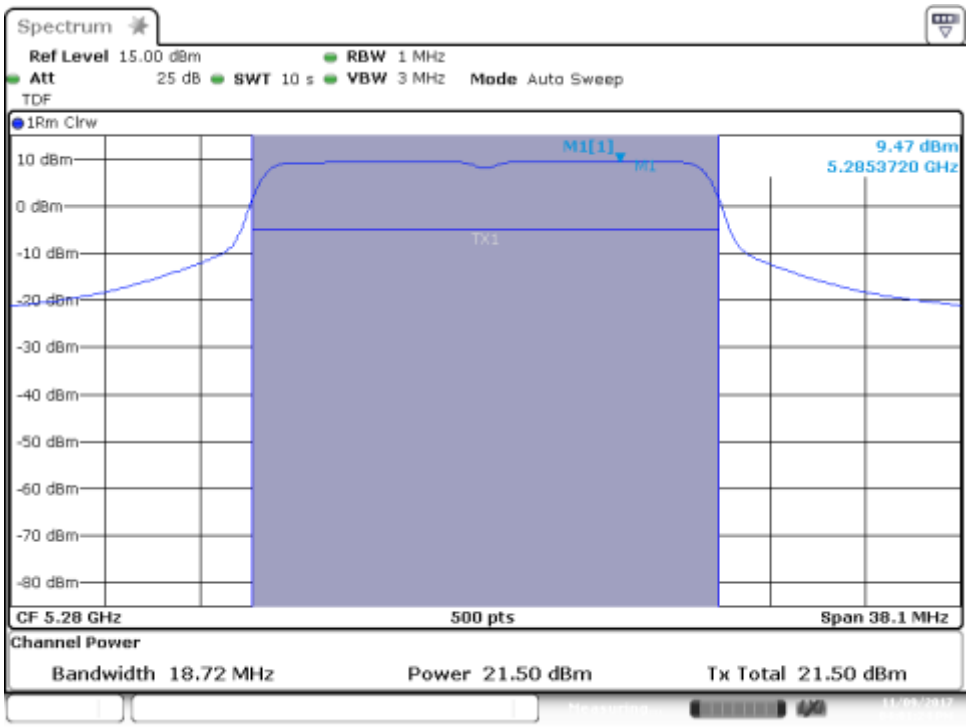
Channel 64



Date: 9.NOV.2017 17:48:15

CHAIN A DIV2. 802.11n20. HT0

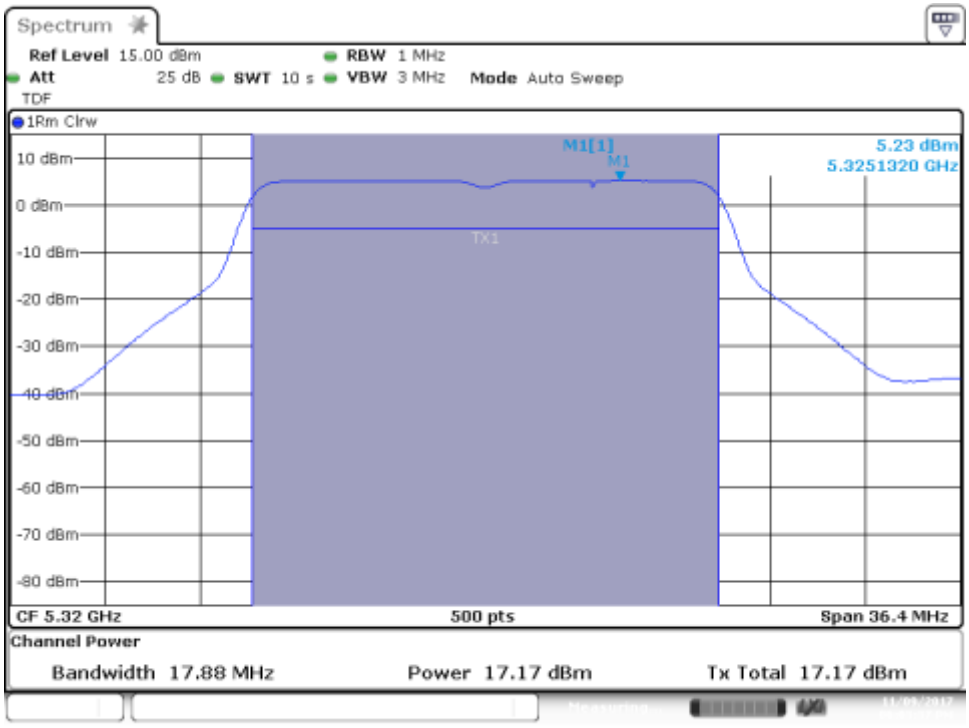
Channel 56



Date: 9.NOV.2017 16:01:25

CHAIN A DIV1. 802.11n20. HT0

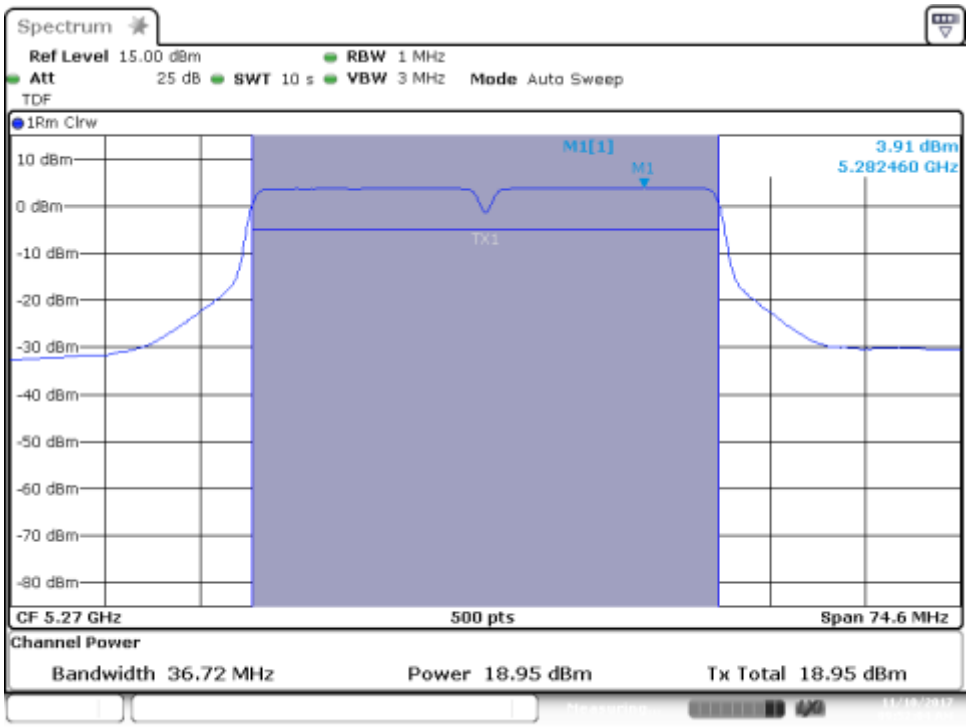
Channel 64



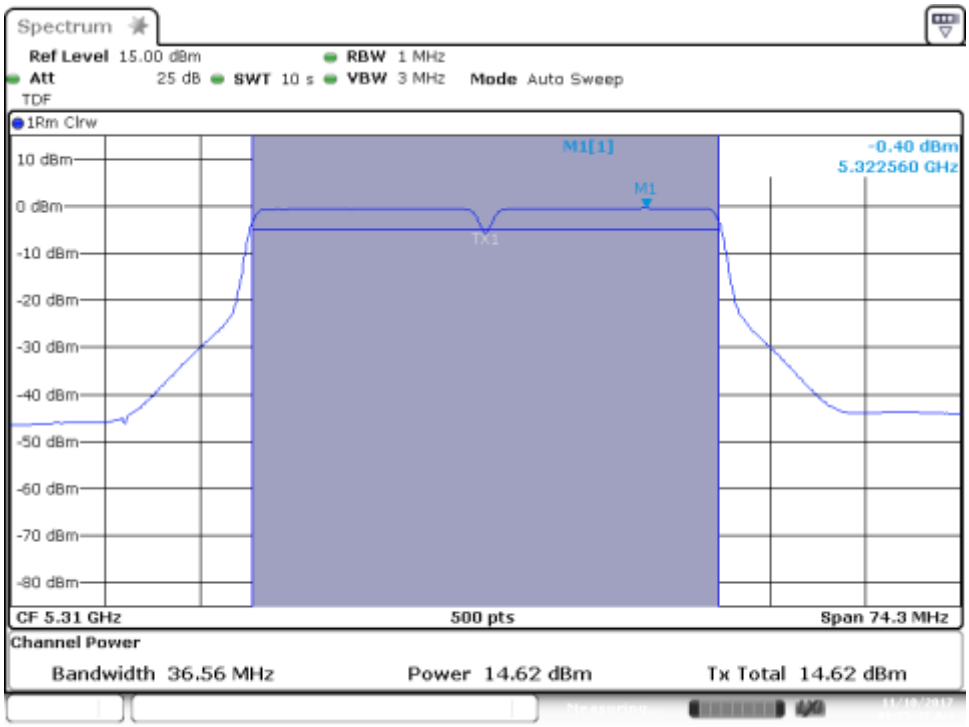
Date: 9.NOV.2017 16:03:38

CHAIN A DIV1. 802.11n40. HT0

Channel 54F

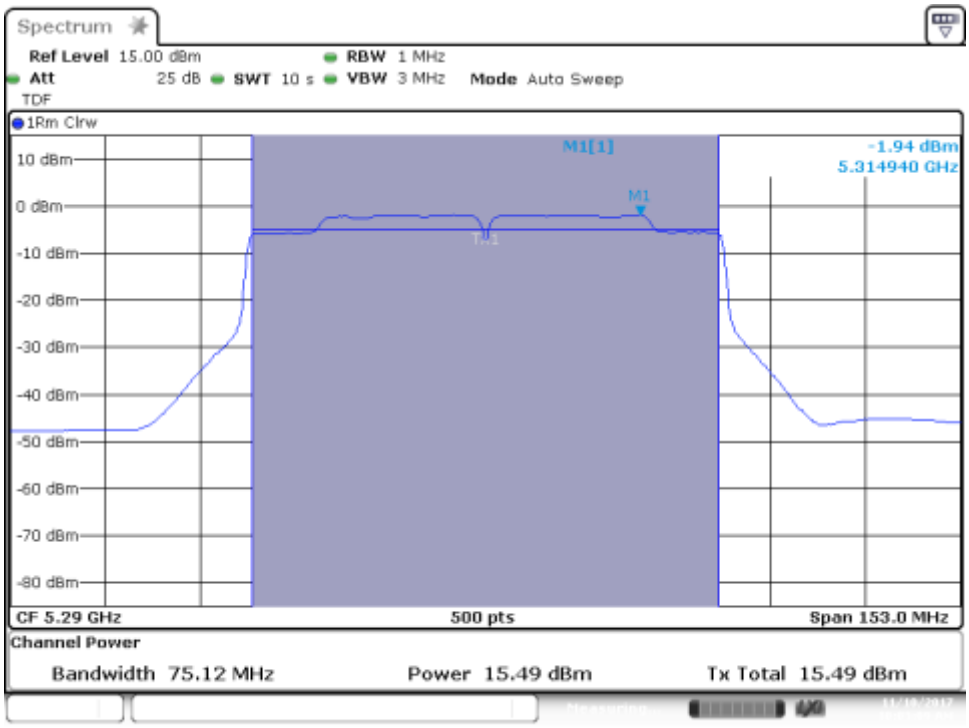


Channel 62F



CHAIN A DIV1. 802.11ac80. VHT0

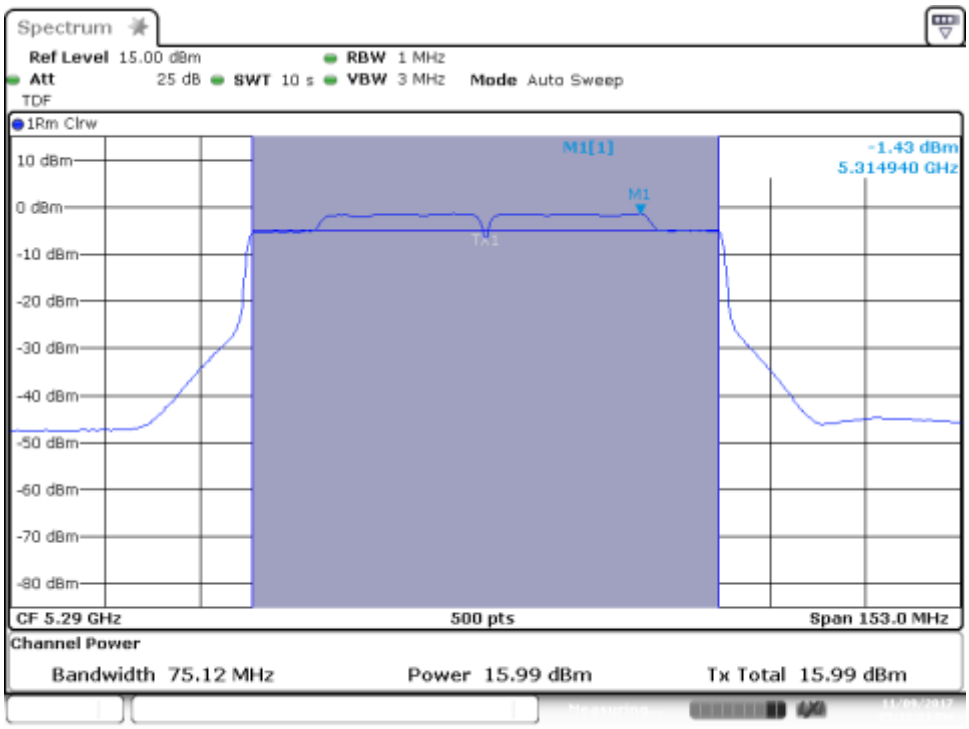
Channel 58ac80



Date: 10.NOV.2017 10:03:10

CHAIN A DIV2. 802.11ac80. VHT0

Channel 58ac80

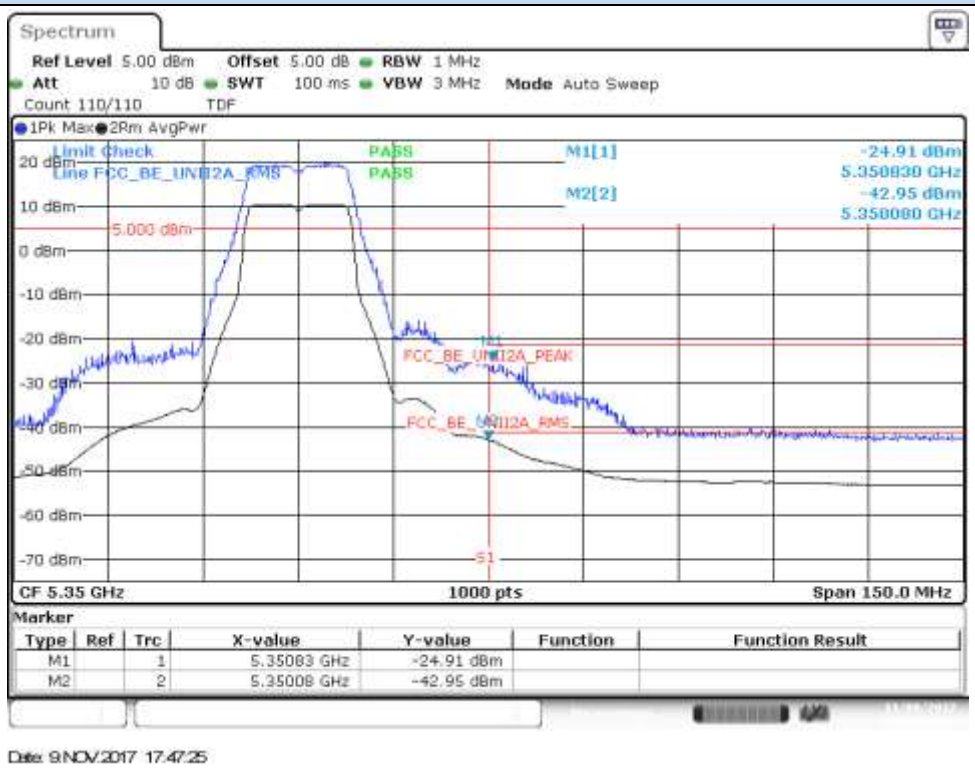


Date: 9.NOV.2017 17:12:21

B.5.4 Undesirable emissions limits : Band Edge (Conducted)

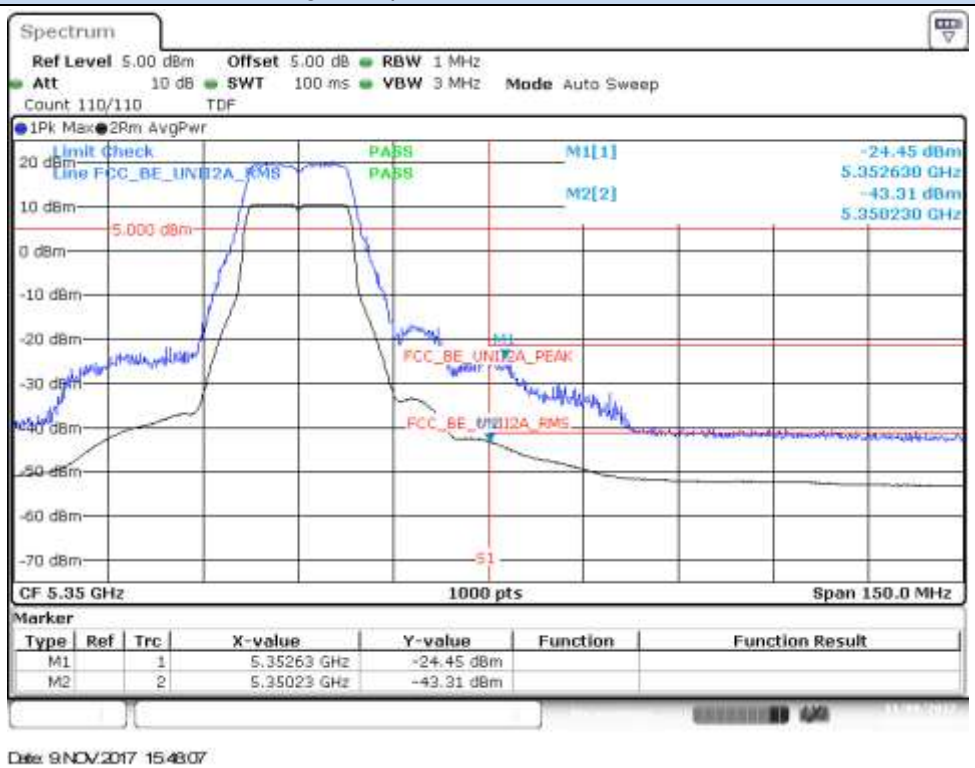
802.11a. 6Mbps – Chain A Div1

BE High Freq Section. Peak. RMS – CH64



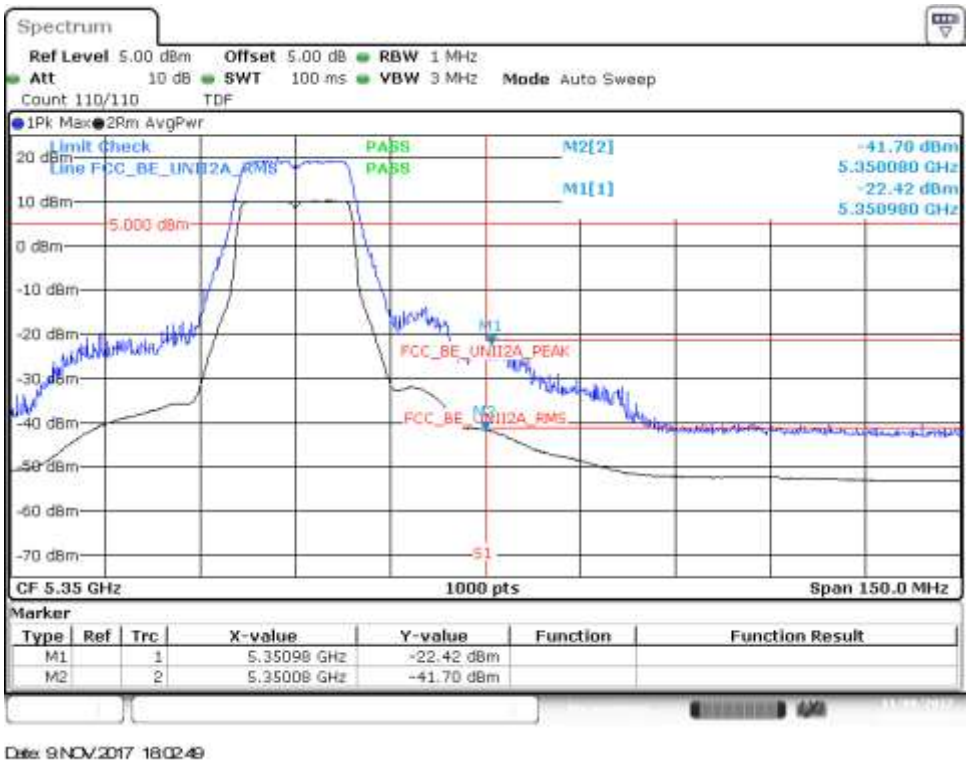
802.11a. 6Mbps – Chain A Div2

BE High Freq Section. Peak. RMS – CH64



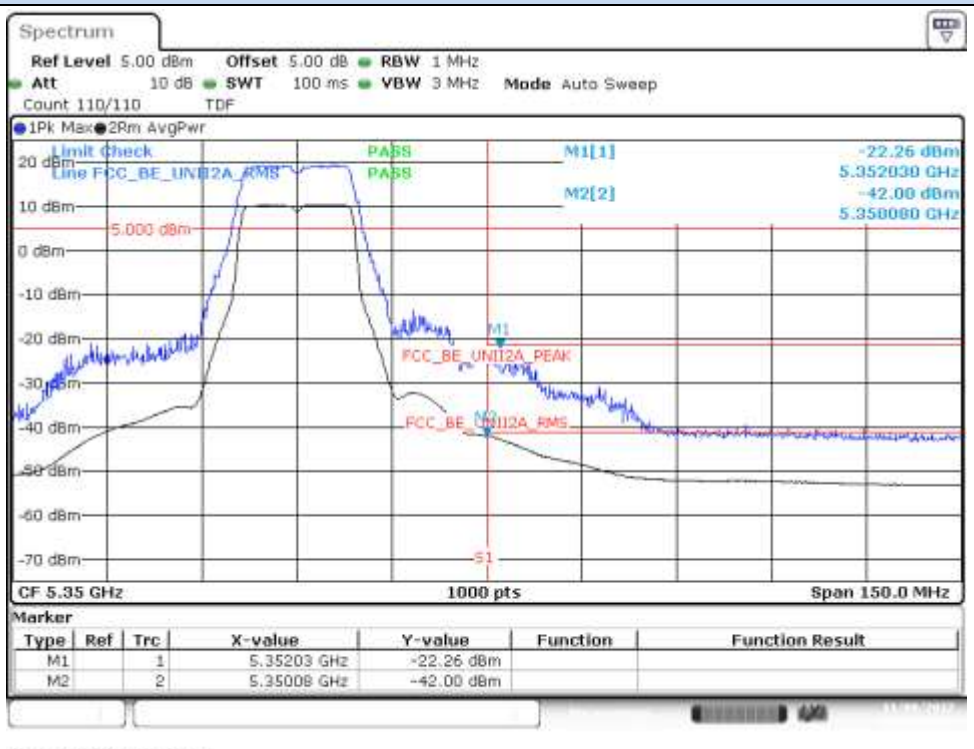
802.11n20. HT0 - Chain A Div1

BE High Freq Section. Peak. RMS – CH64



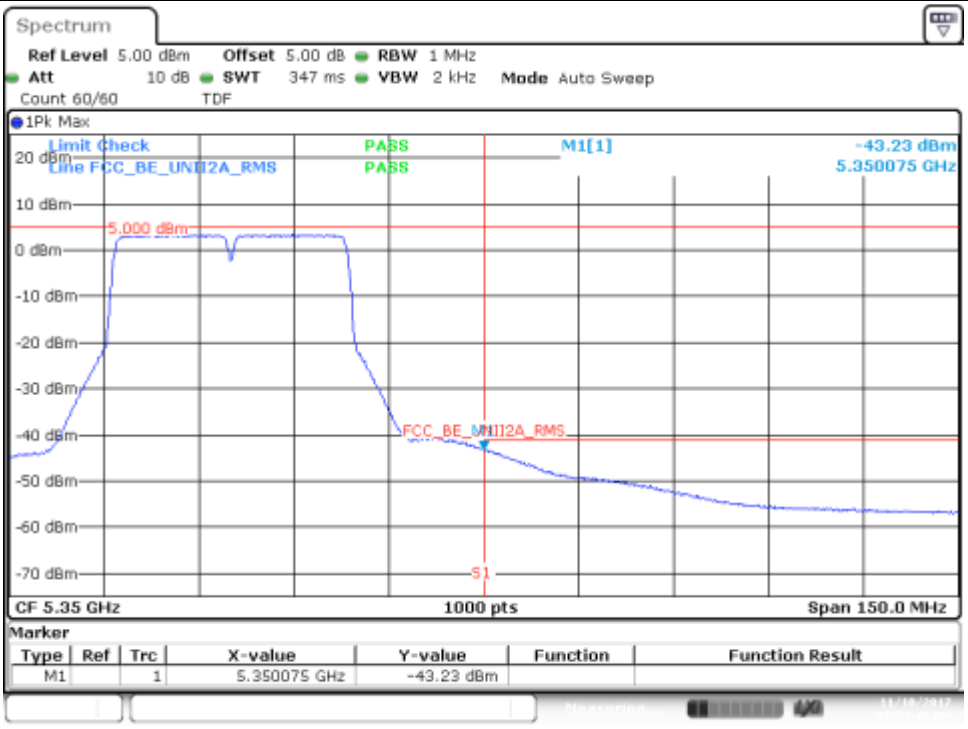
802.11n20. HT0 - Chain A Div2

BE High Freq Section. Peak. RMS – CH64



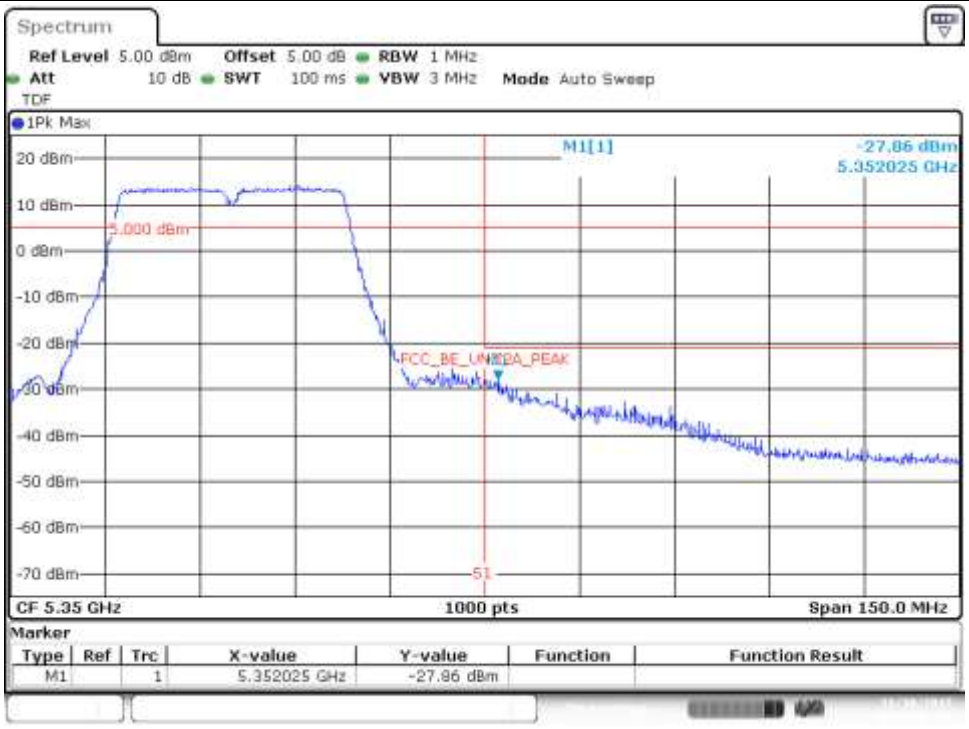
802.11n40. HT0 - Chain A Div1

BE High Freq Section. Peak – CH62F



Date: 10.NOV.2017 09:54:43

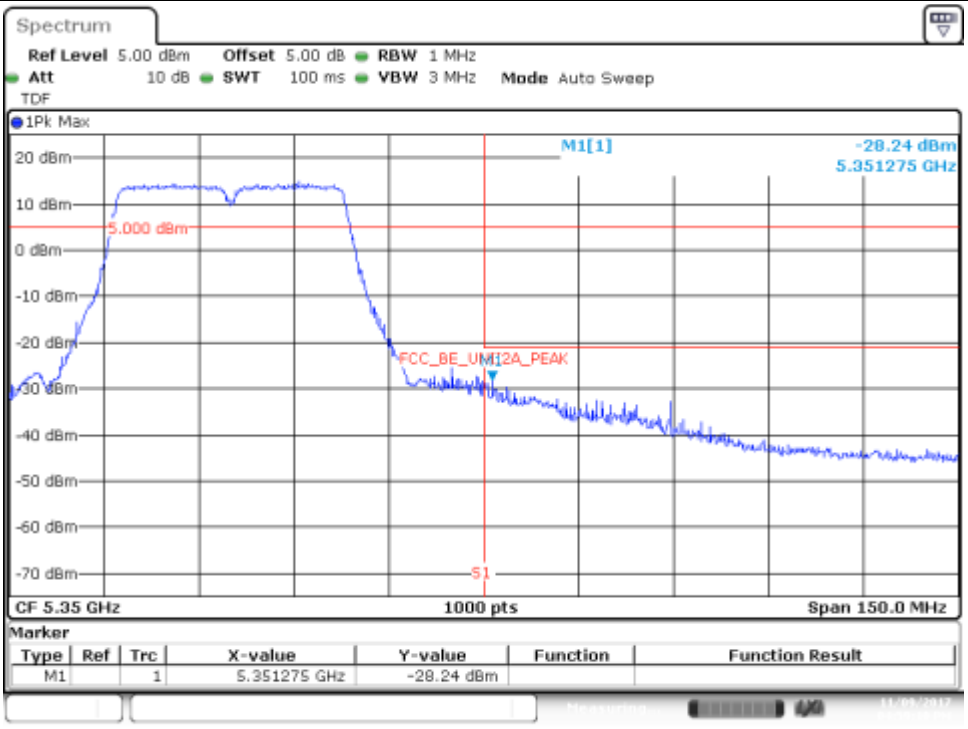
BE High Freq Section. RMS – CH62F



Date: 10.NOV.2017 09:54:59

802.11n40. HT0 - Chain A Div2

BE High Freq Section. Peak – CH62F



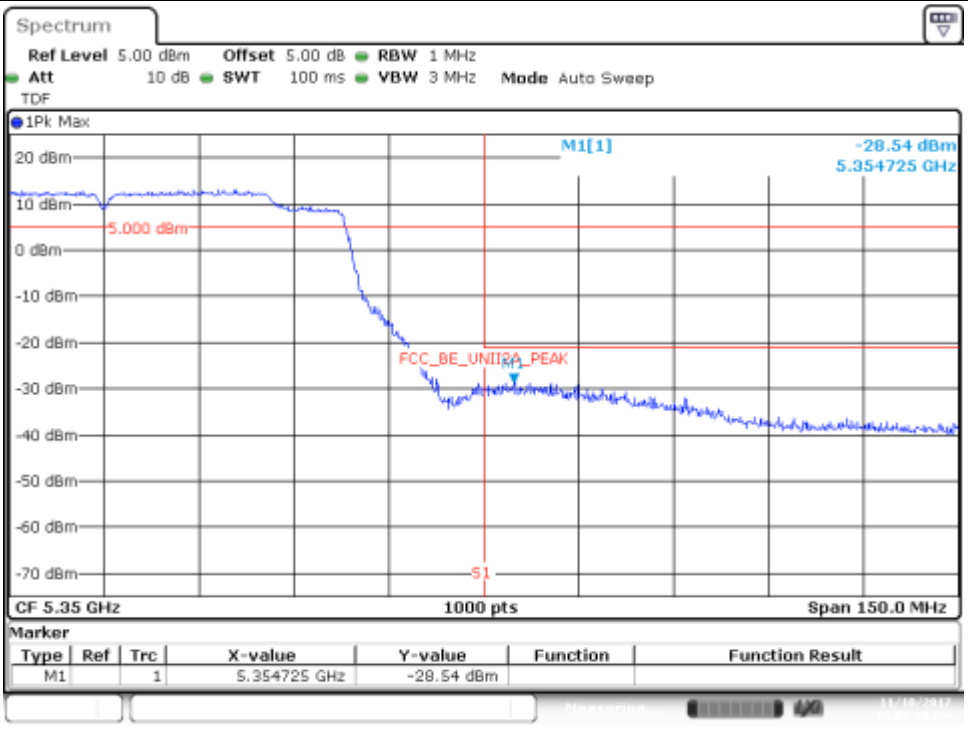
Date: 9.NOV.2017 16:59:11

BE High Freq Section. RMS – CH62F

Date: 9.NOV.2017 16:58:54

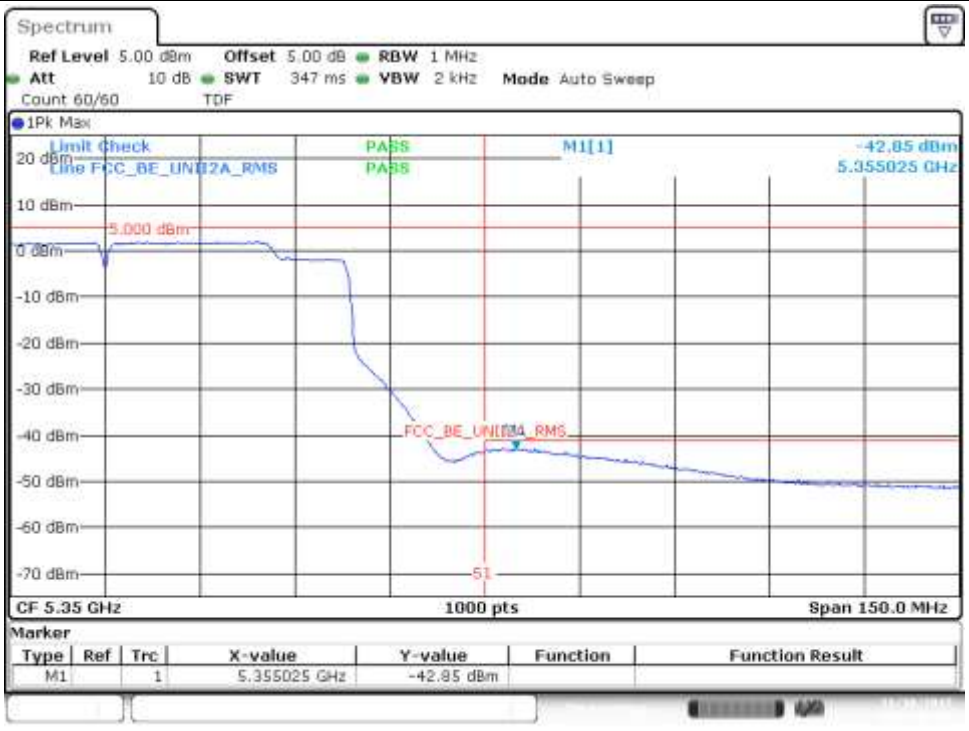
802.11ac80. VHT0 - Chain A Div1

BE High Freq Section. Peak – CH58ac80



Date: 10.NOV.2017 10:02:19

BE High Freq Section. RMS – CH58ac80



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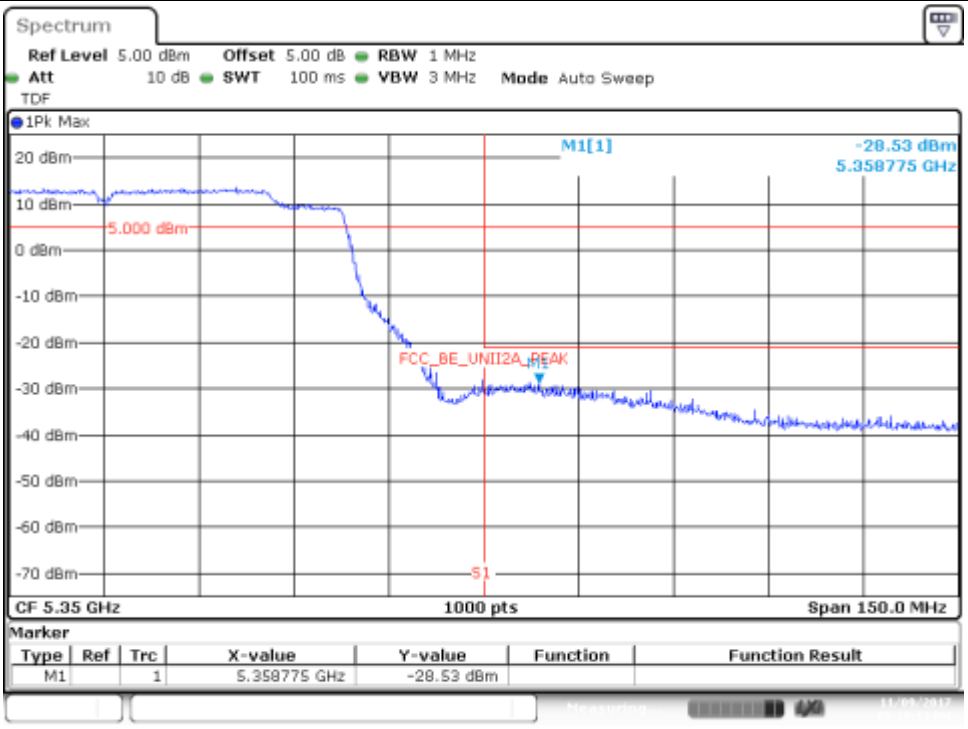
802.11ac80. VHT0 - Chain A Div2

BE High Freq Section. Peak – CH58ac80



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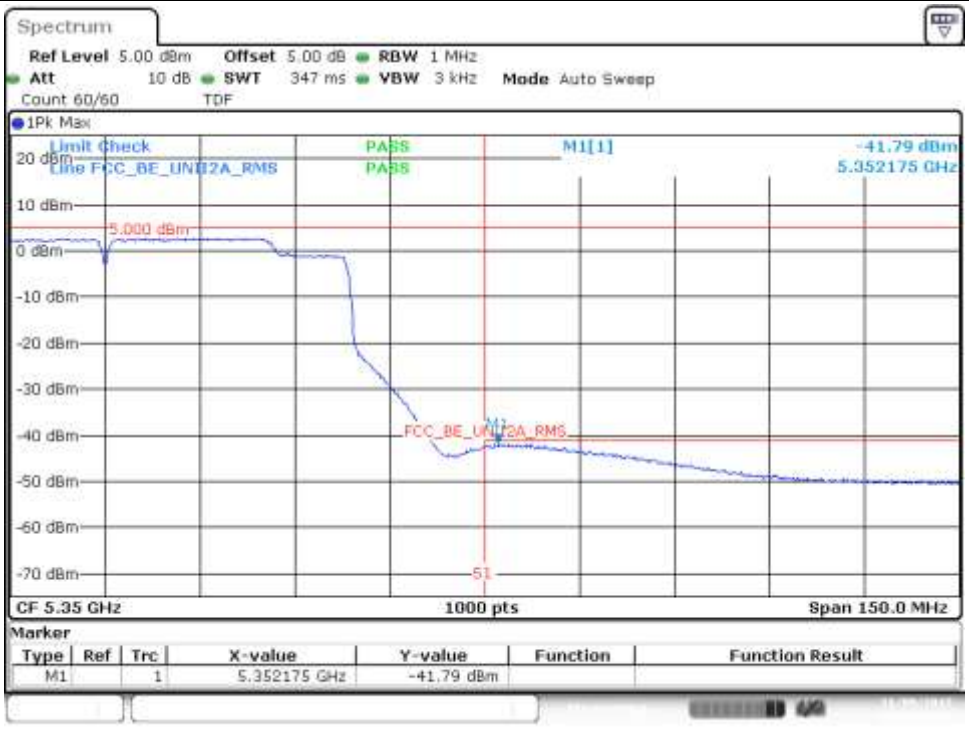
BE High Freq Section. RMS – CH58ac80



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