CERTIFICATE #3478.01

TEST REPORT

EUT Description	**WLAN and BT, 2x2 PCIe M.2 2230 adapter card**
Brand Name	**Intel® Wireless-AC 9560**
Model Name	**9560NGW**
FCC ID	**PD99560NG**
Date of Test Start/End	**2017-05-29 / 2017-06-12**
Features	**802.11 a/b/g/n/ac Wireless LAN + Bluetooth 5** (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	**170524-02.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

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Gregory ROUSTAN
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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 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. 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	23 ºC ±3 ºC
Humidity	50 % ± 20 %

4. Test samples

Sample	Control #	Description	Model	Serial #	Date of receipt	Note
#01	170524-02.S01	Module	9560NGW	WFM 3413E8901EAB	2017-05-30	Used for conducted tests
	170524-02.S11	Extender Board	PCB00609_01	6092416-453	2017-05-30	
	170000-01.S03	Laptop	Latitude E5470	6Q9LMC2	2017-04-25	
#02	170524-02.S02	Module	9560NGW	WFM 3413E88FF066	2017-05-30	Used for radiated tests
	170220-02.S03	Extender Board	PCB00609_01	6092416-446	2017-02-20	
	170000-01.S13	Laptop	Latitude E5470	FT6LMC2	2017-05-30	
#03	170524-02.S06	Module	9560NGW	WFM 3413E890192E	2017-05-30	Used for radiated tests
	170524-02.S16	Extender Board	PCB00609_01	6092416-451	2017-06-15	
	161129-02.S01	Laptop	Latitude 6430U	25PVLX1	2016-06-12	

5. EUT Features

Brand Name	Intel® Wireless-AC 9560
Model Name	9560NGW
FCC ID	PD99560NG
Software Version	10.1720.0-05195
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	**Main WLAN:** Slot antenna. WiFi 2.4GHz & 5GHz (DRTU CHAIN B) **Aux WLAN:** Slot antenna. WiFi 2.4GHz & 5GHz and BT (DRTU CHAIN A)
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	2017-07-07	BLavenant	First Issue

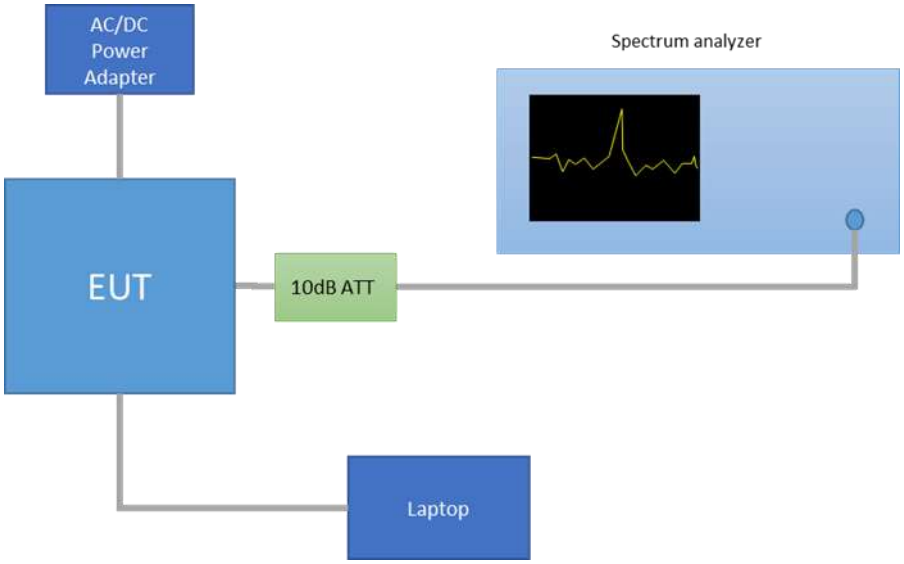
Annex A. Test & System Description

A.1 Measurement System

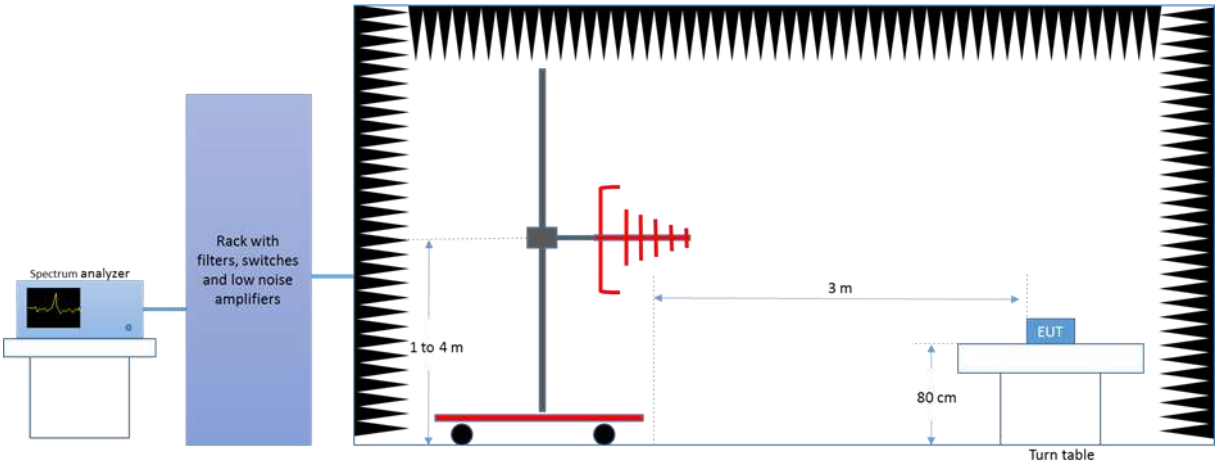
Measurements were performed using the following setups, made in accordance to the general provisions of FCC KDB 789033 D02 General UNII Test Procedures.

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.

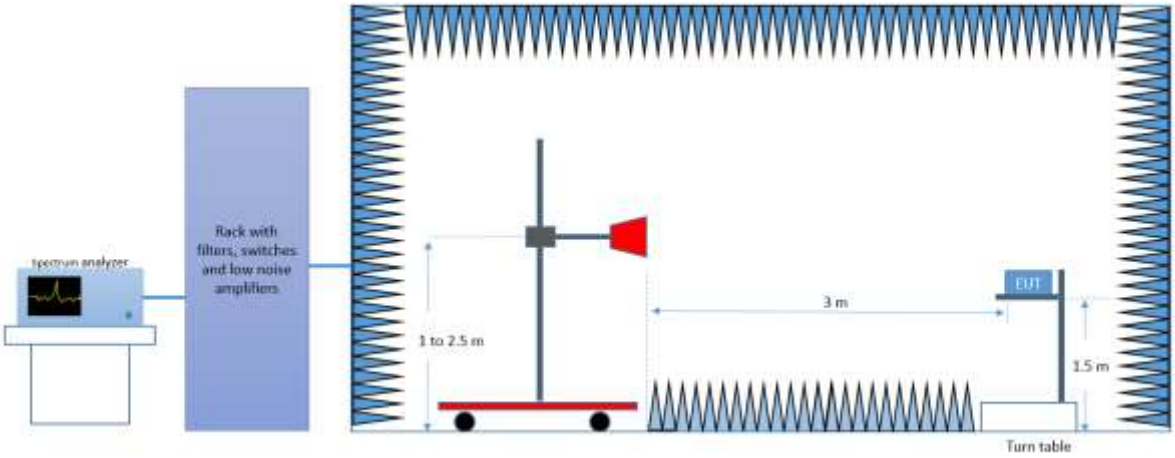
Conducted Setup



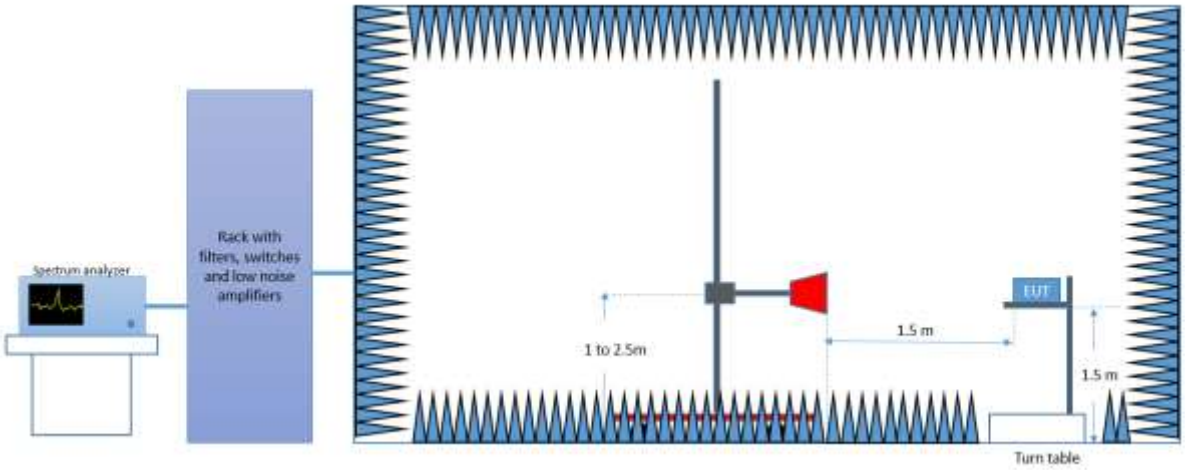
Radiated Setup < 1GHz



Radiated Setup 1 GHz – 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
0315	Spectrum analyzer	FSV30	103307	Rohde & Schwarz	2017-01-30	2019-01-30

Radiated Setup

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
0420	Spectrum analyzer	FSV40	101556	Rohde & Schwarz	2016-04-15	2018-04-15
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
0138	Horn antenna 1 GHz – 6.4 GHz	3117	00152266	ETS Lindgren	2016-03-14	2018-03-14
0141	Double Ridge Horn Antenna 1 GHz – 18 GHz	3117	00157736	ETS Lindgren	2016-04-13	2018-04-13
0409	PreAmplifier	3117-PA	00157993	ETS Lindgren	N/A	N/A
0139	Horn Antenna 18 GHz - 26.5 GHz	114514	00167100	ETS Lindgren	2016-03-16	2018-03-16
0334	Double Ridged Horn Antenna 18 GHz – 40 GHz	3116C-PA	00196308	ETS Lindgren	2015-07-15	2017-07-15
0140	Horn Antenna 26.5 GHz - 40 GHz	120722	00169638	ETS Lindgren	2016-07-26	2018-07-26
0135	Semi Anechoic chamber	FACT 3	5720	ETS Lindgren	2016-04-28	2018-04-28
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
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
0014	Power Sensor	NRP-Z57	101280	Rohde & Schwarz	2017-04-25	2019-04-25

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 mode the EUT can transmit at both CHAIN A and CHAIN B RF outputs individually, but not simultaneously.

For 802.11n20 (20 MHz channel bandwidth), 802.11n40 (40MHz channel bandwidth), 802.11ac80 (80MHz channel bandwidth) and 802.11ac160 (160MHz channel bandwidth) modes the EUT can transmit at both CHAIN A and CHAIN B RF outputs individually, and also simultaneously.

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 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

Mode	BW (MHz)	Data Rate	CH #	Freq. (MHz)	Conducted Power, Target Value (dBm)		
					SISO Chain A	SISO Chain B	MIMO at both ports A and B
802.11a	20	6Mbps	36	5180	19.00	19.00	-
			40	5200	21.50	21.50	-
			48	5240	21.00	21.00	-
802.11n	20	HT0 HT8*	36	5180	18.00	18.50	19.00
			40	5200	21.50	21.50	23.00
			48	5240	21.00	20.50	23.00
	40	HT0 HT8*	38F	5190	18.50	18.50	19.00
			46F	5230	19.50	19.50	22.00
802.11ac	80	VHT0	42ac80	5210	18.50	18.00	18.00
802.11ac	160	VHT0	50ac160	5250	14.00	14.00	14.50

..

U-NII-2A

Mode	BW (MHz)	Data Rate	CH #	Freq. (MHz)	Conducted Power, Target Value (dBm)		
					SISO Chain A	SISO Chain B	MIMO at both ports A and B
802.11a	20	6Mbps	52	5260	21.00	21.50	-
			56	5280	21.50	21.50	-
			64	5320	16.50	17.00	-
802.11n	20	HT0 HT8*	52	5260	21.00	21.50	23.00
			56	5280	21.50	21.50	23.00
			64	5320	16.50	16.50	19.00
	40	HT0 HT8*	54F	5270	19.00	19.00	21.00
			62F	5310	15.00	15.00	17.50
802.11ac	80	VHT0	58ac80	5290	16.00	15.50	16.00

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
802.11n20 and 802.11n40 (MIMO) → HT8
802.11ac80 (SISO) → VHT0
802.11ac80 (MIMO) → VHT0
802.11ac160 (SISO) → VHT0
802.11ac160 (MIMO) → VHT0

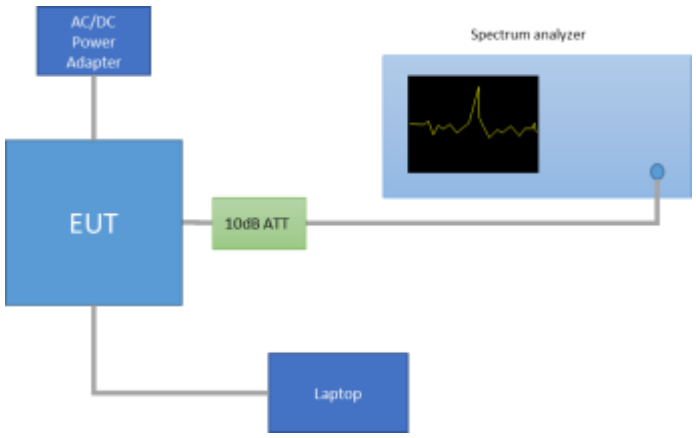
Alternative channels to the lowest and highest channels per band have been also tested for Band Edge compliance.

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	SISO CHAIN A	36	5180	24.98	16.64
			40	5200	27.98	17.16
			48	5240	45.50	28.12
		SISO CHAIN B	36	5180	24.22	16.76
			40	5200	27.17	17.52
			48	5240	**45.60**	**29.08**
802.11n20	HT0	SISO CHAIN A	36	5180	24.37	17.92
			40	5200	29.52	18.40
			48	5240	**48.45**	**28.76**
		SISO CHAIN B	36	5180	24.42	17.88
			40	5200	28.22	18.20
			48	5240	47.70	28.36
802.11n20	HT8	MIMO CHAIN A	36	5180	24.92	17.92
			40	5200	24.78	17.92
			48	5240	25.82	18.00
		MIMO CHAIN B	36	5180	24.17	17.92
			40	5200	25.27	18.00
			48	5240	**25.97**	**18.04**

Mode	Rate	Antenna	Channel	Frequency [MHz]	26dB BW [MHz]	99% BW [MHz]
802.11n40	HT0	SISO CHAIN A	38F	5190	**45.14**	**36.64**
			46F	5230	43.24	36.54
		SISO CHAIN B	38F	5190	45.05	36.64
			46F	5230	43.78	36.56
	HT8	MIMO CHAIN A	38F	5190	46.04	36.64
			46F	5230	**45.41**	**36.72**
		MIMO CHAIN B	38F	5190	44.87	36.40
			46F	5230	42.79	36.32
802.11ac80	VHT0	SISO CHAIN A	42ac80	5210	**84.82**	**75.12**
		SISO CHAIN B	42ac80	5210	84.25	75.12
	VHT0	MIMO CHAIN A	42ac80	5210	**86.53**	**75.12**
		MIMO CHAIN B	42ac80	5210	85.21	75.12
802.11ac160	VHT0	SISO CHAIN A	50ac160	5250	**165.17**	**153.20**
		SISO CHAIN B	50ac160	5250	164.05	153.00
	VHT0	MIMO CHAIN A	50ac160	5250	**164.17**	**153.00**
		MIMO CHAIN B	50ac160	5250	164.17	152.00

Max Value

B.2.2 Power Limits. Maximum Output power & Maximum 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

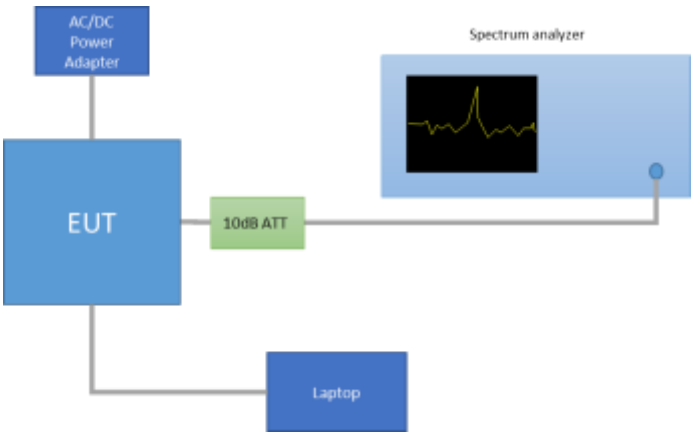
The Maximum Conducted Output Power was measured using the channel integration method according to point E) 2) e) (Method SA-2 Alternative) of KDB 789033 D02.
The maximum power spectral density (PSD) was measured using the method according to point F) (Method SA-2 Alternative) of KDB 789033 D02.

In the measure-and-sum approach for MIMO mode, the conducted emission level (e.g., transmit power or power in specified bandwidth) is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically in linear power units to determine the total emission level from the device.

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	SISO-A	2.04	2.07	98.31%
		SISO-B	2.04	2.07	98.36%
802.11n20	HT0	SISO-A	1.90	1.93	98.24%
		SISO-B	1.90	1.93	98.08%
	HT8	MIMO-A	0.97	1.01	96.06%
		MIMO-B	0.97	1.01	96.15%
802.11n40	HT0	SISO-A	0.93	0.97	96.69%
		SISO-B	0.94	0.98	96.52%
	HT8	MIMO-A	0.49	0.53	92.45%
		MIMO-B	0.49	0.53	92.82%
802.11ac80	VHT0	SISO-A	0.46	0.49	93.10%
		SISO-B	0.46	0.49	93.09%
		MIMO-A	0.26	0.29	87.03%
		MIMO-B	0.26	0.29	87.03%
802.11ac160	VHT0	SISO-A	0.25	0.28	88.65%
		SISO-B	0.25	0.28	88.34%
		MIMO-A	0.15	0.19	79.89%
		MIMO-B	0.15	0.19	79.89%

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	SISO CHAIN A	18.89	18.89	77.45	23.89
				SISO CHAIN B	18.79	18.79	**75.68**	23.79
		40	5200	SISO CHAIN A	21.35	21.35	136.46	26.35
				SISO CHAIN B	21.45	21.45	**139.64**	26.45
		48	5240	SISO CHAIN A	20.87	20.87	122.18	25.87
				SISO CHAIN B	20.99	20.99	125.60	25.99
802.11n20	HT0	36	5180	SISO CHAIN A	17.96	17.96	**62.52**	22.96
				SISO CHAIN B	18.60	18.60	72.44	23.60
		40	5200	SISO CHAIN A	21.65	21.65	**146.22**	26.65
				SISO CHAIN B	21.28	21.28	134.28	26.28
		48	5240	SISO CHAIN A	20.84	20.84	121.34	25.84
				SISO CHAIN B	20.67	20.67	116.68	25.67
	HT8	36	5180	MIMO CHAIN A	15.88	16.05	40.32	21.05
				MIMO CHAIN B	15.59	15.76	**37.67**	20.76
				Combined A+B	18.75	18.92	77.99	23.92
		40	5200	MIMO CHAIN A	19.48	19.65	92.36	24.65
				MIMO CHAIN B	19.80	19.97	99.32	24.97
				Combined A+B	22.65	22.83	**191.68**	**27.83**
		48	5240	MIMO CHAIN A	19.53	19.70	93.43	24.70
				MIMO CHAIN B	19.65	19.82	95.95	24.82
				Combined A+B	22.60	22.77	189.38	27.77

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	SISO CHAIN A	18.30	18.45	69.92	23.45
				SISO CHAIN B	18.26	18.41	**69.41**	23.41
		46F	5230	SISO CHAIN A	19.50	19.65	**92.18**	24.65
				SISO CHAIN B	19.29	19.44	87.98	24.44
	HT8	38F	5190	MIMO CHAIN A	15.57	15.91	39.00	20.91
				MIMO CHAIN B	15.37	15.69	**37.10**	20.69
				Combined A+B	18.48	18.81	76.10	23.81
		46F	5230	MIMO CHAIN A	18.54	18.88	77.28	23.88
				MIMO CHAIN B	18.55	18.87	77.16	23.87
				Combined A+B	21.56	21.89	**154.44**	26.89
802.11ac80	VHT0	42ac80	5210	SISO CHAIN A	18.05	18.36	**68.55**	23.36
				SISO CHAIN B	17.48	17.79	**60.13**	22.79
				MIMO CHAIN A	15.18	15.78	37.87	20.78
				MIMO CHAIN B	13.10	13.70	**23.46**	18.70
				Combined A+B	17.27	17.88	**61.33**	22.88
802.11ac160	VHT0	50ac160	5250	SISO CHAIN A	13.32	13.84	**24.23**	18.84
				SISO CHAIN B	13.35	13.89	**24.48**	18.89
				MIMO CHAIN A	10.47	11.44	**13.95**	16.44
				MIMO CHAIN B	10.59	11.56	14.34	16.56
				Combined A+B	13.54	14.52	**28.29**	19.52

* 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]	Maximum* EIRP PSD [dBm/MHz]
802.11a	6Mbps	36	5180	SISO CHAIN A	7.27	7.27	12.27
				SISO CHAIN B	7.21	7.21	12.21
		40	5200	SISO CHAIN A	9.69	9.69	14.69
				SISO CHAIN B	9.80	9.80	**14.80**
		48	5240	SISO CHAIN A	9.12	9.12	14.12
				SISO CHAIN B	9.25	9.25	14.25
802.11n20	HT0	36	5180	SISO CHAIN A	6.06	6.06	11.06
				SISO CHAIN B	6.72	6.72	11.72
		40	5200	SISO CHAIN A	9.69	9.69	**14.69**
				SISO CHAIN B	9.38	9.38	14.38
		48	5240	SISO CHAIN A	8.81	8.81	13.81
				SISO CHAIN B	8.62	8.62	13.62
	HT8	36	5180	MIMO CHAIN A	4.01	4.18	9.18
				MIMO CHAIN B	3.72	3.89	8.89
				Combined A+B	6.88	7.05	12.05
		40	5200	MIMO CHAIN A	7.55	7.72	12.72
				MIMO CHAIN B	7.89	8.06	13.06
				Combined A+B	10.73	10.91	**15.91**
		48	5240	MIMO CHAIN A	7.60	7.77	12.77
				MIMO CHAIN B	7.74	7.91	12.91
				Combined A+B	10.68	10.85	15.85

Mode	Rate	Channel	Freq. [MHz]	Antenna	Average conducted PSD [dBm/MHz]	Maximum* conducted PSD [dBm/MHz]	Maximum* EIRP PSD [dBm/MHz]
802.11n40	HT0	38F	5190	SISO CHAIN A	3.25	3.40	8.40
				SISO CHAIN B	3.33	3.48	8.48
		46F	5230	SISO CHAIN A	4.46	4.61	**9.61**
				SISO CHAIN B	4.27	4.42	9.42
	HT8	38F	5190	MIMO CHAIN A	0.54	0.88	5.88
				MIMO CHAIN B	0.38	0.70	5.70
				Combined A+B	3.47	3.80	8.80
		46F	5230	MIMO CHAIN A	3.54	3.88	8.88
				MIMO CHAIN B	3.57	3.89	8.89
				Combined A+B	6.57	6.90	**11.90**
802.11ac80	VHT0	42ac80	5210	SISO CHAIN A	0.62	0.93	**5.93**
				SISO CHAIN B	0.05	0.36	5.36
				MIMO CHAIN A	-2.17	-1.57	3.43
				MIMO CHAIN B	-4.09	-3.49	1.51
				Combined A+B	-0.01	0.59	**5.59**
802.11ac160	VHT0	50ac160	5250	SISO CHAIN A	-6.70	-6.18	**-1.18**
				SISO CHAIN B	-6.85	-6.31	-1.31
				MIMO CHAIN A	-9.44	-8.47	-3.47
				MIMO CHAIN B	-9.23	-8.26	-3.26
				Combined A+B	-6.32	-5.35	**-0.35**

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

Max Value

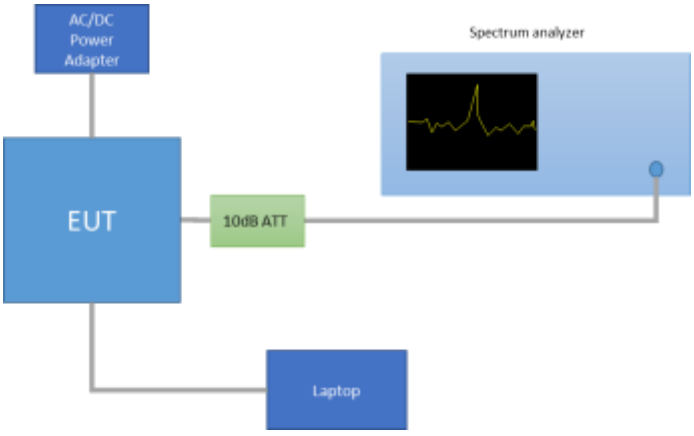
B.2.3 Undesirable emission limits : Band Edge (Conducted)

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.



Band Edge measurements in average mode on the low frequency section was done with the Video Bandwidth Method was used according to section G) 6) (KDB 789033 D02), with the following parameters:

- When the duty cycle is > 98 %, VBW = 10Hz
- When the duty cycle is < 98 %, 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.

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

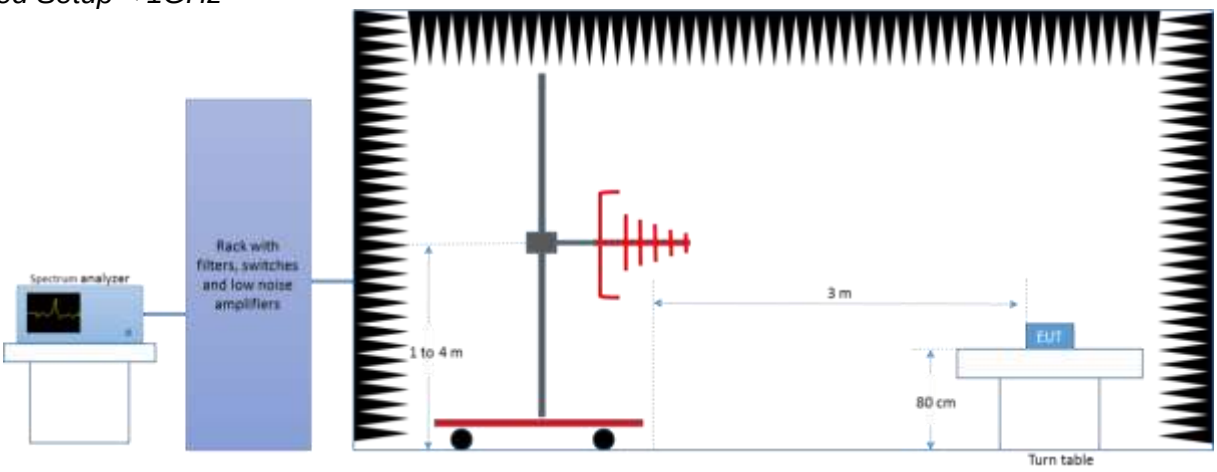
Standard references

<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>

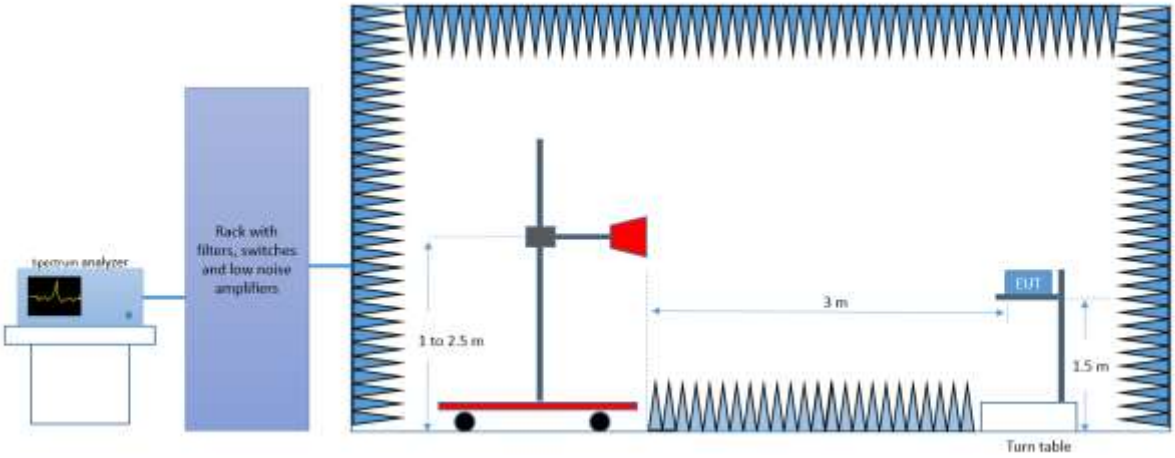
Test procedure

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.
For technologies 802.11n20, 802.11n40, 802.11ac80 and 802.11ac160 the worst case in terms of spurious emissions found among the low, mid and high channels when tested on chain A and B separately is used to perform the test in MIMO mode (Chain A+B).

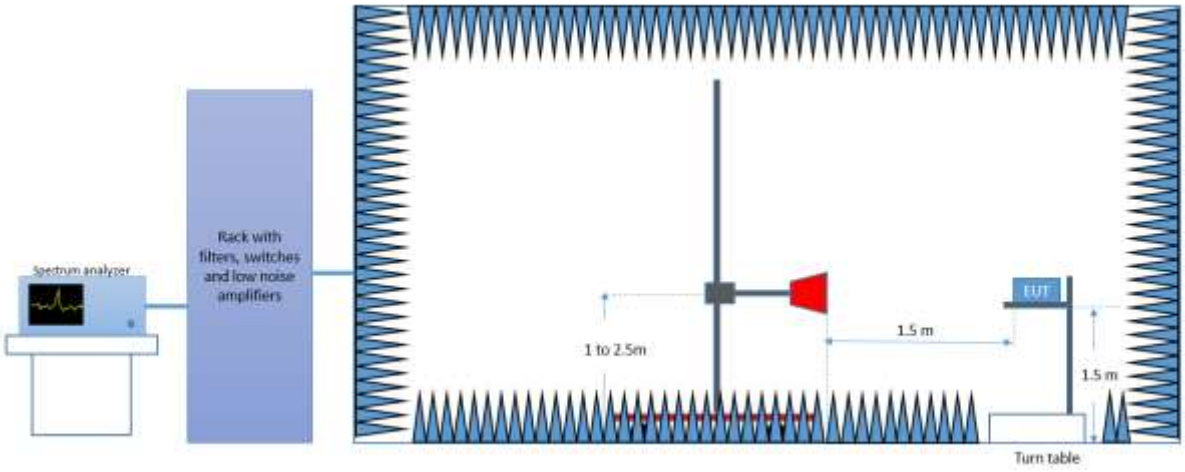
Radiated Setup < 1GHz



Radiated Setup 1 GHz - 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

Radiated Spurious – CH36

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	30.5	---	40	9.5
62.5	---	29.8	40	10.3
1124.9	---	37.6	54	16.5
2291.8	49.3	---	74	24.8
2464.4	49.1	---	74	24.9
2468.8	---	37.6	54	16.4
15539.5	---	47.0	54	7.1
15556.4	57.3	---	74	16.8
17984.4	---	49.9	54	4.1
17997.3	60.7	---	74	13.4
20719.8	---	39.7	54	14.4
39809.9	58.5	---	74	15.6
39830.9	58.3	---	74	15.7
39854.6	---	48.1	54	5.9

Radiated Spurious – CH40

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	29.2	---	40	10.8
62.5	---	27.9	40	12.1
1125.2	---	37.5	54	16.5
1187.5	---	38.2	54	15.8
2343.9	50.3	---	74	23.8
2367.4	49.6	---	74	24.5
15597.9	57.8	---	74	16.3
15601.0	---	46.4	54	7.7
17981.7	60.9	---	74	13.2
17999.1	---	50.1	54	4.0
20799.8	---	39.5	54	14.5
39865.9	58.0	---	74	16.0
39876.9	---	48.1	54	6.0
39968.7	58.0	---	74	16.1

Radiated Spurious – CH48

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	27.6	---	40	12.4
62.5	---	26.7	40	13.4
1124.9	---	37.3	54	16.7
1187.8	---	37.6	54	16.4
1592.3	44.8	---	74	29.2
2290.1	48.2	---	74	25.8
15713.9	55.1	---	74	19.0
15718.4	---	44.5	54	9.6
17995.1	61.1	---	74	13.0
17996.0	---	50.0	54	4.0
20960.0	---	39.0	54	15.1
39826.8	57.5	---	74	16.6
39837.8	---	47.2	54	6.9
39890.7	57.8	---	74	16.3

30 MHz – 40 GHz, 802.11a, 6Mbps, Chain B

Radiated Spurious – CH36

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	---	28.1	40	11.9
62.5	29.7	---	40	10.4
1158.1	45.8	---	74	28.2
1187.5	---	37.3	54	16.7
2140.1	48.2	---	74	25.9
2340.7	---	37.3	54	16.8
15539.9	55.4	---	74	18.6
15540.4	---	45.0	54	9.1
17975.0	---	49.9	54	4.2
17998.7	61.3	---	74	12.7
39832.3	---	47.6	54	6.4
39891.7	58.1	---	74	15.9
39921.3	---	47.6	54	6.4
39969.8	58.1	---	74	16.0

Radiated Spurious – CH40

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	28.9	---	40	11.2
62.5	---	26.9	40	13.2
1125.2	---	37.5	54	16.6
1187.5	---	37.6	54	16.4
2352.9	49.8	---	74	24.2
2430.3	48.5	---	74	25.5
15597.0	55.8	---	74	18.3
15601.5	---	45.5	54	8.6
17995.5	61.1	---	74	12.9
17997.8	---	**50.2**	54	3.9
20800.2	---	36.9	54	17.2
39779.3	57.5	---	74	16.5
39872.8	57.9	---	74	16.1
39895.2	---	47.3	54	6.7

Radiated Spurious – CH48

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	---	33.6	40	6.5
62.5	35.0	---	40	5.1
1125.2	46.6	---	74	27.4
1125.2	---	37.7	54	16.3
1187.5	---	38.0	54	16.0
2252.6	49.3	---	74	24.8
15718.8	---	44.4	54	9.6
15722.8	55.1	---	74	19.0
17978.6	61.5	---	74	12.5
18000.0	---	50.0	54	4.0
20959.7	---	37.5	54	16.6
39812.3	57.5	---	74	16.6
39857.3	---	47.4	54	6.6
39949.5	57.5	---	74	16.5

30 MHz – 40 GHz, 802.11n20, HT0, Chain A

Radiated Spurious – CH36

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	---	23.4	40	16.7
62.5	24.6	---	40	15.5
1124.9	---	37.5	54	16.6
1187.5	---	37.9	54	16.2
2148.0	49.8	---	74	24.2
3008.1	50.4	---	74	23.6
15533.7	---	46.3	54	7.8
15536.8	57.1	---	74	16.9
17966.1	61.9	---	74	12.2
17999.6	---	50.0	54	4.1
20720.1	---	38.5	54	15.6
39865.9	57.6	---	74	16.5
39939.8	58.6	---	74	15.5
39980.4	---	47.2	54	6.9

Radiated Spurious – CH40

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	31.5	---	40	8.6
62.5	---	30.3	40	9.7
1124.9	---	37.7	54	16.3
1124.9	45.7	---	74	28.3
1187.5	---	38.1	54	16.0
2141.9	52.7	---	74	21.3
15595.7	57.2	---	74	16.8
15601.5	---	46.2	54	7.8
17968.8	60.6	---	74	13.4
17987.1	---	50.0	54	4.1
20799.8	---	40.5	54	13.6
20800.2	48.1	---	74	26.0
39853.9	57.8	---	74	16.3
39855.3	---	47.2	54	6.8

Radiated Spurious – CH48

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	28.7	---	40	11.3
62.5	---	27.8	40	12.3
1000.0	---	37.5	54	16.6
1124.9	---	38.0	54	16.1
2255.7	47.7	---	74	26.3
5706.3	56.3	---	74	17.7
15721.5	---	44.3	54	9.8
15722.8	55.9	---	74	18.2
17983.5	60.6	---	74	13.5
17992.9	---	49.8	54	4.2
20960.0	---	40.0	54	14.1
39839.8	57.6	---	74	16.4
39856.0	58.3	---	74	15.8
39880.4	---	47.1	54	7.0

30 MHz – 40 GHz, 802.11n20, HT0, Chain B

Radiated Spurious – CH36

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	29.4	---	40	10.6
62.5	---	28.4	40	11.7
1124.9	45.9	---	74	28.2
1124.9	---	37.1	54	16.9
1187.5	---	38.0	54	16.0
2143.8	48.3	---	74	25.8
15535.9	---	45.6	54	8.5
15551.5	55.6	---	74	18.4
17999.6	---	**50.1**	54	4.0
17999.6	61.3	---	74	12.8
39660.0	57.7	---	74	16.4
39793.8	---	47.0	54	7.0
39852.9	58.0	---	74	16.0
39865.6	---	47.2	54	6.8

Radiated Spurious – CH40

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	---	32.2	40	7.9
62.5	32.9	---	40	7.1
1124.9	---	38.1	54	15.9
1187.5	---	37.3	54	16.8
2144.3	51.3	---	74	22.8
5632.0	55.8	---	74	18.3
15594.8	---	45.1	54	9.0
15606.8	55.6	---	74	18.5
17987.1	---	50.0	54	4.0
17996.0	61.7	---	74	12.4
20800.2	---	36.5	54	17.6
39742.5	57.3	---	74	16.8
39816.1	57.4	---	74	16.6
39867.7	---	47.2	54	6.9

Radiated Spurious – CH48

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	31.9	---	40	8.2
62.5	---	31.3	40	8.8
1124.9	---	38.0	54	16.0
1187.5	---	37.8	54	16.2
2257.0	51.8	---	74	22.2
2294.8	49.5	---	74	24.5
15710.8	54.4	---	74	19.6
15718.8	---	44.2	54	9.9
17994.2	61.5	---	74	12.6
18000.0	---	**50.1**	54	4.0
20960.0	---	37.4	54	16.7
39855.6	57.8	---	74	16.2
39875.9	---	47.5	54	6.6
39883.1	58.0	---	74	16.1

30 MHz – 40 GHz, 802.11n20, HT8, Chain A+B

Radiated Spurious – CH40

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
32.6	---	31.1	40	8.9
32.6	32.5	---	40	7.6
2435.4	49.8	---	74	24.2
2438.4	---	43.6	54	10.4
6370.8	---	46.0	54	8.1
6386.3	58.3	---	74	15.7
15594.3	---	47.6	54	6.5
15596.1	58.7	---	74	15.4
17991.1	61.2	---	74	12.8
17996.0	---	49.9	54	4.2
20799.8	---	38.5	54	15.6
39841.9	---	47.5	54	6.6
39916.5	58.2	---	74	15.9
39923.3	57.9	---	74	16.1

30 MHz – 40 GHz, 802.11n40, HT0, Chain A

Radiated Spurious – CH38F

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
46.2	34.2	---	40	5.9
46.9	---	23.8	40	16.3
1125.2	---	37.3	54	16.7
1187.5	---	38.0	54	16.0
1593.5	47.3	---	74	26.8
2280.5	49.3	---	74	24.8
15553.7	---	44.0	54	10.0
15589.9	54.9	---	74	19.2
17986.6	---	49.9	54	4.2
17992.4	61.0	---	74	13.1
20760.0	---	39.4	54	14.7
39849.1	57.5	---	74	16.6
39870.1	57.9	---	74	16.2
39874.2	---	47.3	54	6.7

Radiated Spurious – CH46F

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	28.9	---	40	11.1
62.5	---	28.2	40	11.8
1000.0	---	38.3	54	15.7
1187.5	---	36.5	54	17.5
2135.5	47.9	---	74	26.2
2345.1	51.8	---	74	22.2
15688.9	---	43.4	54	10.7
15692.9	54.5	---	74	19.5
17996.0	---	49.9	54	4.2
18000.0	61.5	---	74	12.5
20919.5	46.7	---	74	27.3
20919.8	---	39.0	54	15.1
39863.9	---	47.7	54	6.4
39926.8	57.7	---	74	16.3

30 MHz – 40 GHz, 802.11n40, HT0, Chain B

Radiated Spurious – CH38F

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.4	27.2	---	40	12.9
62.5	---	26.1	40	14.0
1000.0	---	38.1	54	16.0
1187.5	---	37.6	54	16.5
2144.1	53.0	---	74	21.1
2254.3	49.8	---	74	24.3
15564.0	---	43.9	54	10.2
15578.3	54.7	---	74	19.3
17992.9	---	49.8	54	4.3
17996.9	60.6	---	74	13.4
20760.0	---	37.6	54	16.5
39830.2	57.2	---	74	16.9
39843.3	57.4	---	74	16.7
39858.4	---	47.2	54	6.8

Radiated Spurious – CH46F

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	25.5	---	40	14.6
62.5	---	23.9	40	16.2
1000.0	---	38.7	54	15.3
1187.5	---	37.3	54	16.8
1596.2	46.4	---	74	27.7
2279.3	50.0	---	74	24.1
15702.8	---	43.2	54	10.9
15703.6	54.0	---	74	20.0
17992.4	61.1	---	74	13.0
18000.0	---	50.0	54	4.0
20919.8	---	37.6	54	16.5
39814.4	57.3	---	74	16.7
39832.9	---	47.6	54	6.5
39970.4	57.2	---	74	16.8

30 MHz – 40 GHz, 802.11n40, HT8, Chain A+B

Radiated Spurious – CH38F

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	---	27.0	40	13.1
62.5	28.0	---	40	12.0
1000.0	46.5	---	74	27.6
1000.0	---	39.6	54	14.5
1124.9	46.2	---	74	27.9
1187.5	---	37.3	54	16.7
15568.5	---	45.7	54	8.3
15583.2	56.4	---	74	17.6
17993.3	---	**50.1**	54	3.9
17999.1	61.3	---	74	12.8
20760.0	47.3	---	74	26.8
20760.0	---	40.3	54	13.8
39828.5	---	47.1	54	6.9
39903.4	58.1	---	74	15.9

30 MHz – 40 GHz, 802.11ac80, VHT0, Chain A

Radiated Spurious – CH42ac80

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	26.2	---	40	13.9
62.5	---	25.1	40	14.9
1000.0	---	38.2	54	15.9
1187.5	---	37.6	54	16.5
2416.5	51.0	---	74	23.0
2626.9	50.7	---	74	23.4
15634.5	---	43.6	54	10.5
15639.0	53.9	---	74	20.2
17988.4	---	50.0	54	4.1
17993.8	61.2	---	74	12.8
20839.7	---	38.8	54	15.3
39817.8	57.6	---	74	16.5
39836.0	57.8	---	74	16.3
39883.8	---	47.5	54	6.5

30 MHz – 40 GHz, 802.11ac80, VHT0, Chain B

Radiated Spurious – CH42ac80

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	28.5	---	40	11.5
62.5	---	27.4	40	12.7
1000.0	---	38.4	54	15.7
2139.4	---	38.3	54	15.8
2143.1	54.7	---	74	19.4
2577.8	51.3	---	74	22.7
15638.5	---	43.8	54	10.3
15641.2	54.1	---	74	20.0
17980.4	61.1	---	74	13.0
17991.1	---	**50.1**	54	4.0
24538.1	---	37.4	54	16.7
39847.4	---	47.3	54	6.8
39854.6	57.5	---	74	16.6
39977.0	57.3	---	74	16.8

30 MHz – 40 GHz, 802.11ac80, VHT0, Chain A+B

Radiated Spurious – CH42ac80

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	28.4	---	40	11.4
62.5	---	27.4	40	12.7
1000.0	---	40.3	54	13.7
1000.2	47.3	---	74	26.8
1187.5	---	37.7	54	16.3
2290.6	48.9	---	74	25.1
15619.3	55.5	---	74	18.5
15632.3	---	44.6	54	9.4
17967.0	61.0	---	74	13.1
18000.0	---	50.0	54	4.0
20839.7	47.4	---	74	26.6
20839.7	---	41.1	54	12.9
39867.7	---	47.4	54	6.7
39986.3	57.4	---	74	16.6

30 MHz – 40 GHz, 802.11ac160, VHT0, Chain A

Radiated Spurious – CH50ac160

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	27.0	---	40	13.1
62.5	---	25.5	40	14.5
5407.6	---	50.5	54	3.6
5418.4	62.5	---	74	11.5
5426.3	62.8	---	74	11.2
5426.8	---	50.2	54	3.8
15976.2	54.8	---	74	19.3
15983.8	---	43.2	54	10.9
17981.3	62.6	---	74	11.5
17983.9	---	50.1	54	3.9
20999.6	46.3	---	74	27.7
20999.9	---	39.4	54	14.7
39807.5	57.5	---	74	16.5
39843.9	---	47.6	54	6.5

30 MHz – 40 GHz, 802.11ac160, VHT0, Chain B

Radiated Spurious – CH50ac160

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	28.5	---	40	11.5
62.5	---	27.5	40	12.5
5403.0	---	**51.8**	54	2.3
5406.2	64.4	---	74	9.7
5426.3	64.1	---	74	10.0
5428.5	---	51.0	54	3.0
15930.7	---	42.7	54	11.4
15930.7	54.5	---	74	19.5
17983.9	61.7	---	74	12.3
17999.6	---	50.1	54	4.0
20999.9	---	38.1	54	16.0
39818.5	57.8	---	74	16.2
39820.9	57.8	---	74	16.2
39857.0	---	47.4	54	6.7

30 MHz – 40 GHz, 802.11ac160, VHT0, Chain A+B

Radiated Spurious – CH50ac160

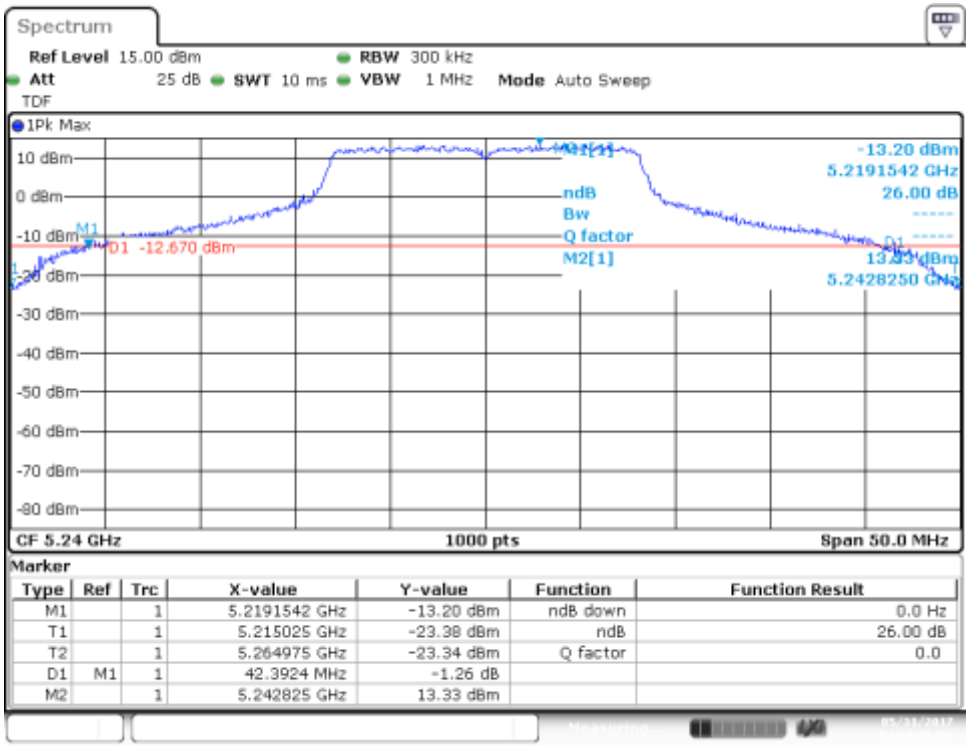
Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	26.8	---	40	13.2
62.5	---	26.3	40	13.8
1000.0	---	39.6	54	14.4
1187.5	---	38.2	54	15.9
2281.8	51.3	---	74	22.8
2367.2	49.1	---	74	25.0
13542.0	---	39.8	54	14.3
13585.3	51.0	---	74	23.1
17994.2	---	50.1	54	4.0
17999.6	61.2	---	74	12.9
20999.9	---	40.7	54	13.4
39534.6	57.5	---	74	16.5
39859.1	57.8	---	74	16.3
39859.4	---	47.1	54	6.9

B.3 Test Results Screenshots U-NII-1

B.3.1 26dB Bandwidth

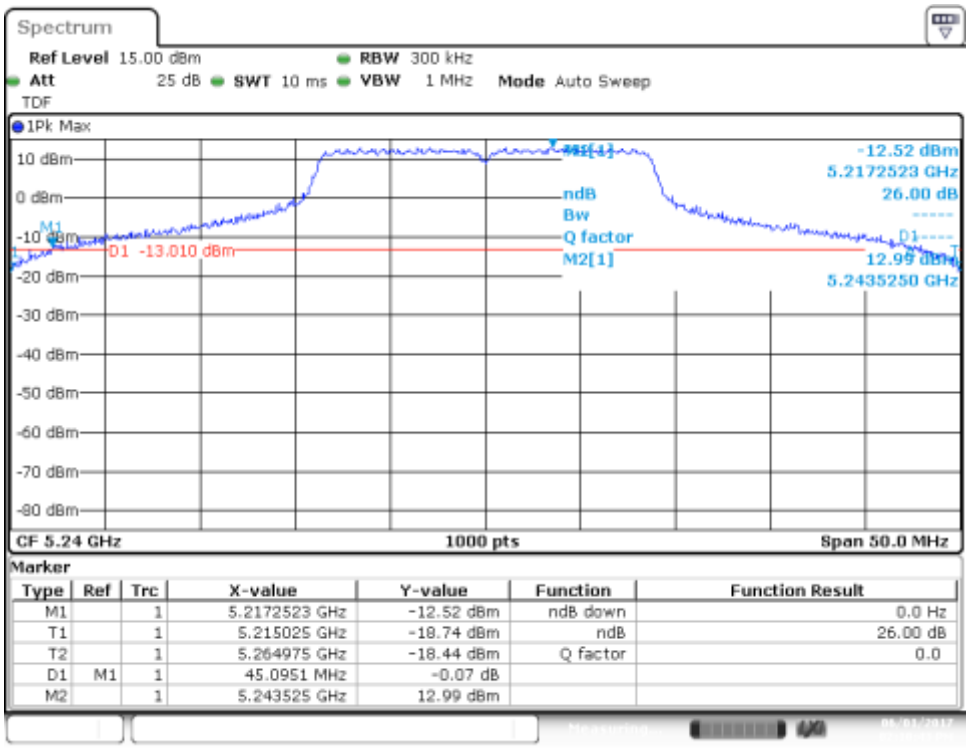
SISO-B, 802.11a, 6Mbps

Channel 48



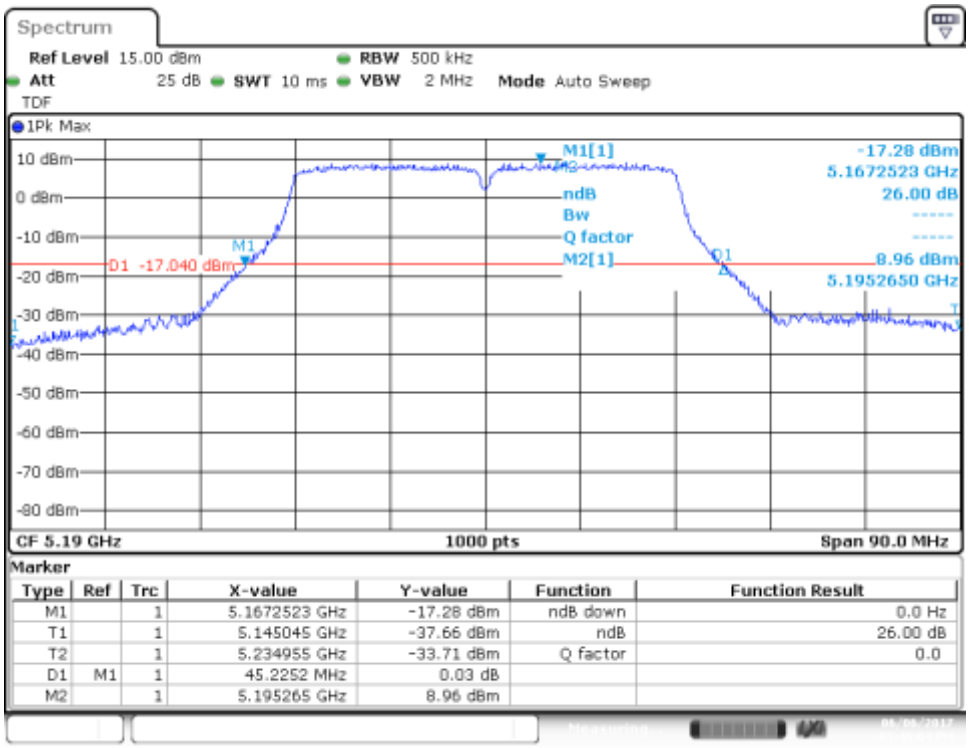
SISO-A, 802.11n20, HT0

Channel 48



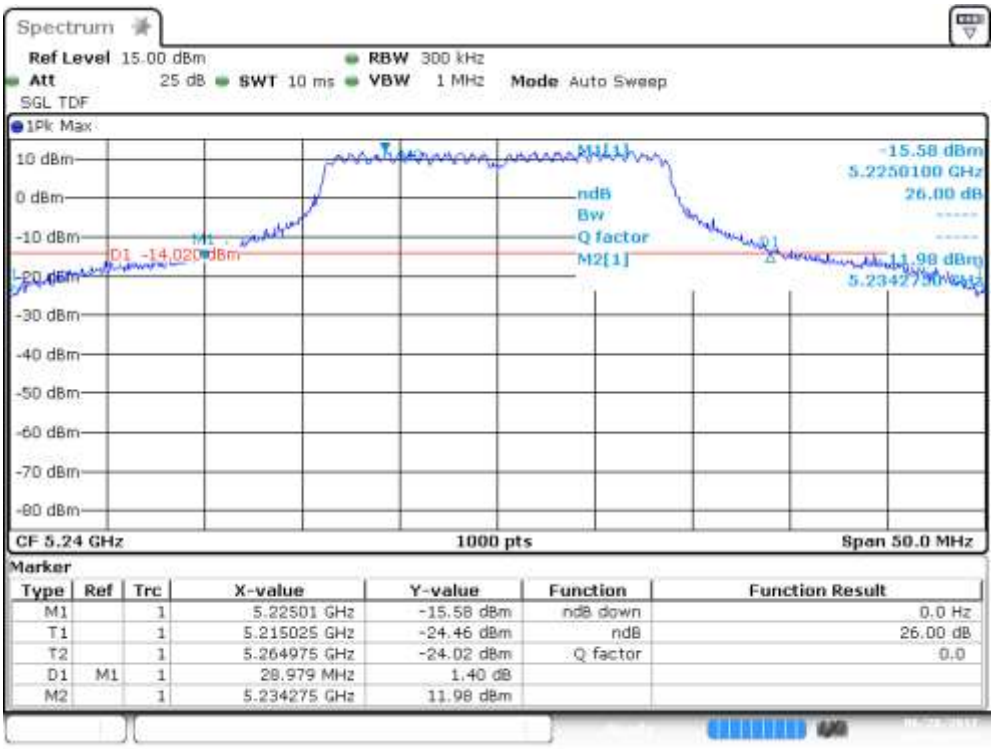
SISO-A, 802.11n40, HT0

Channel 38F



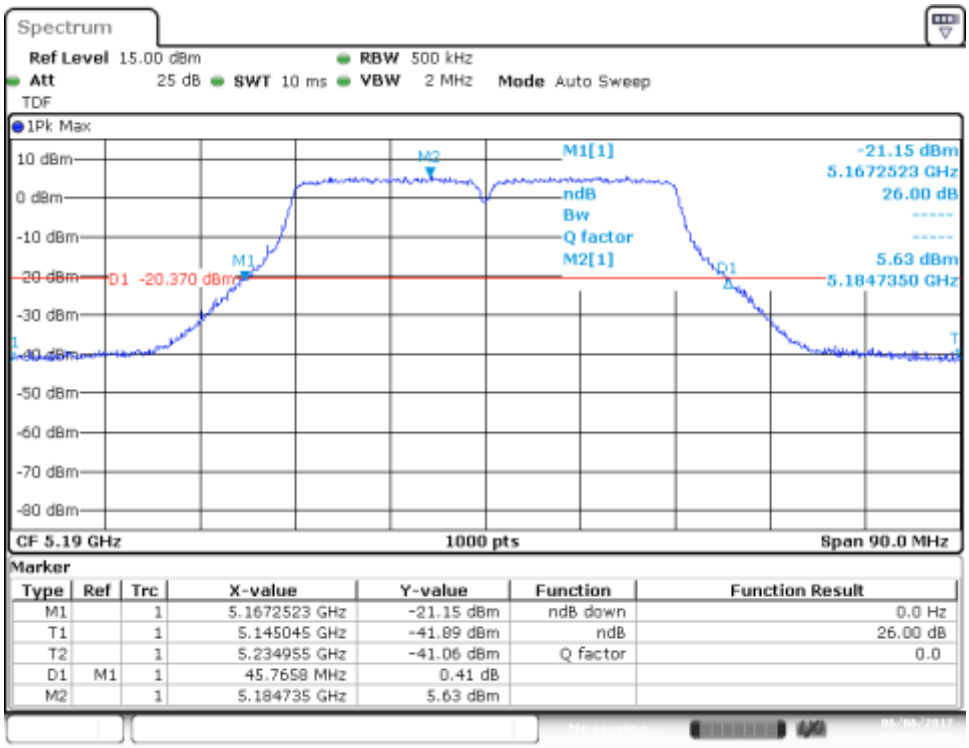
MIMO-B, 802.11n20, HT8

Channel 48



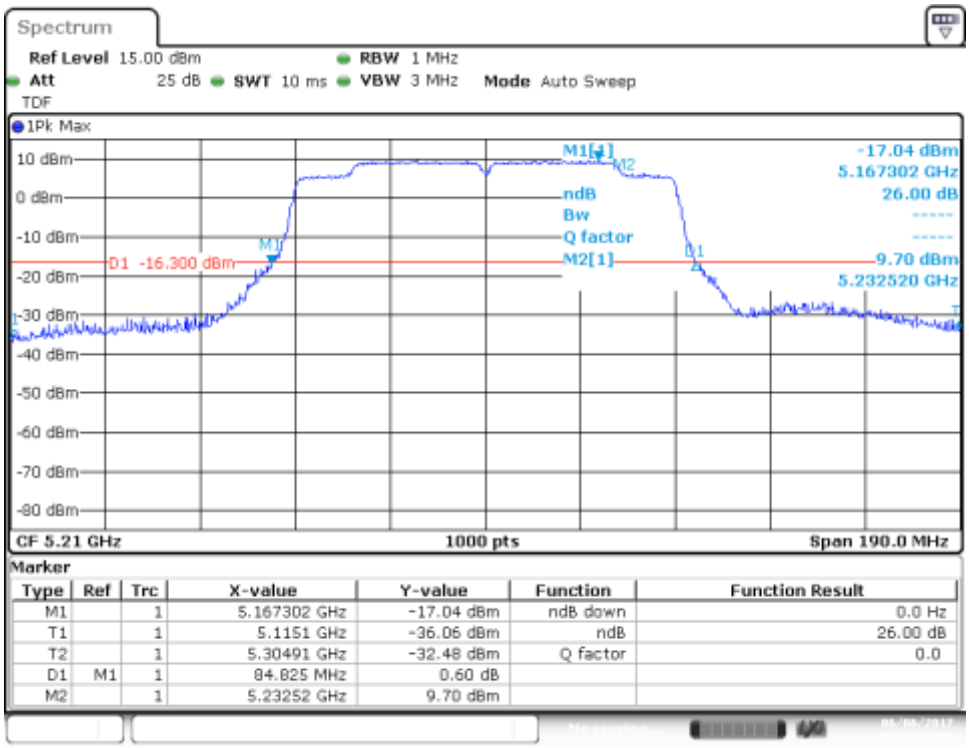
MIMO-A, 802.11n40, HT8

Channel 38F



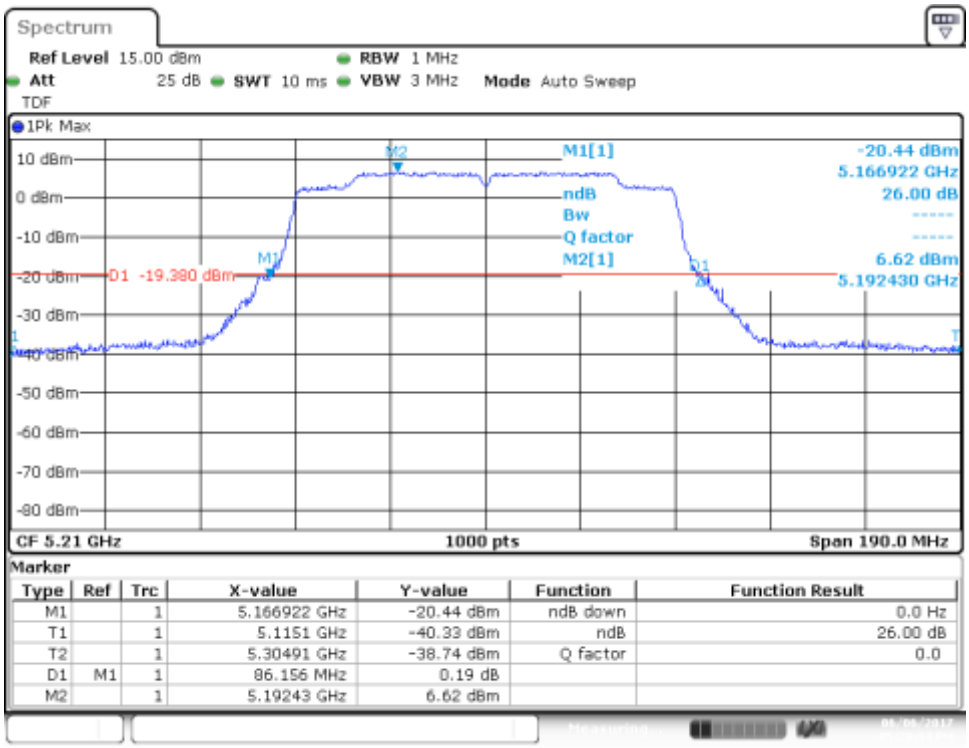
SISO-A, 802.11ac80, VHT0

Channel 42ac80



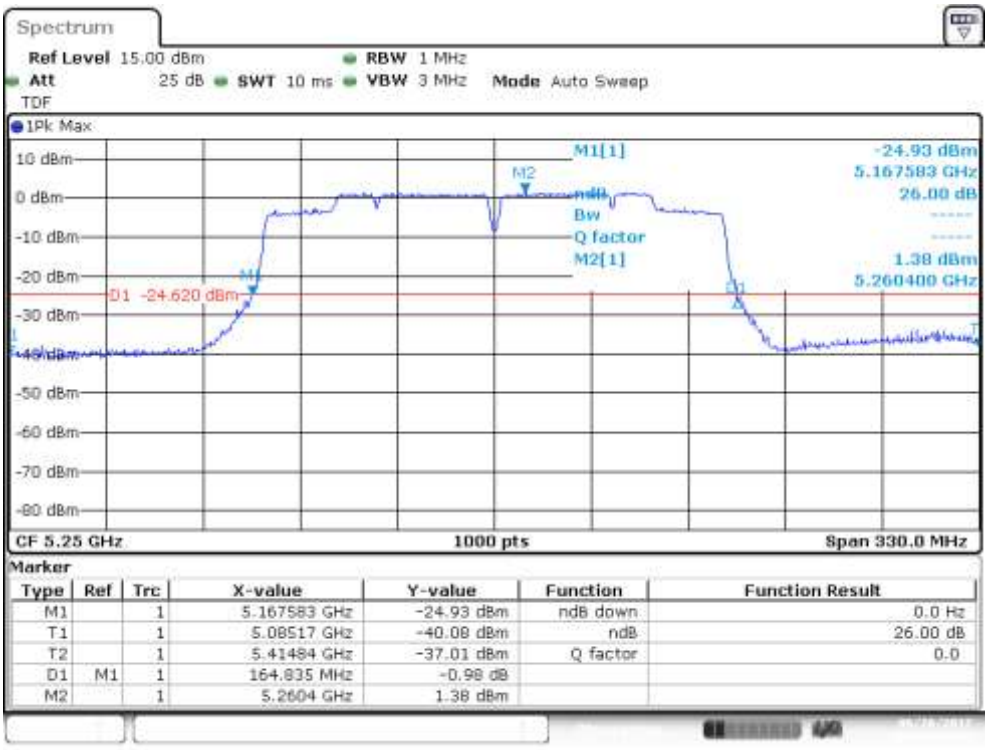
MIMO-A, 802.11ac80, VHT0

Channel 42ac80



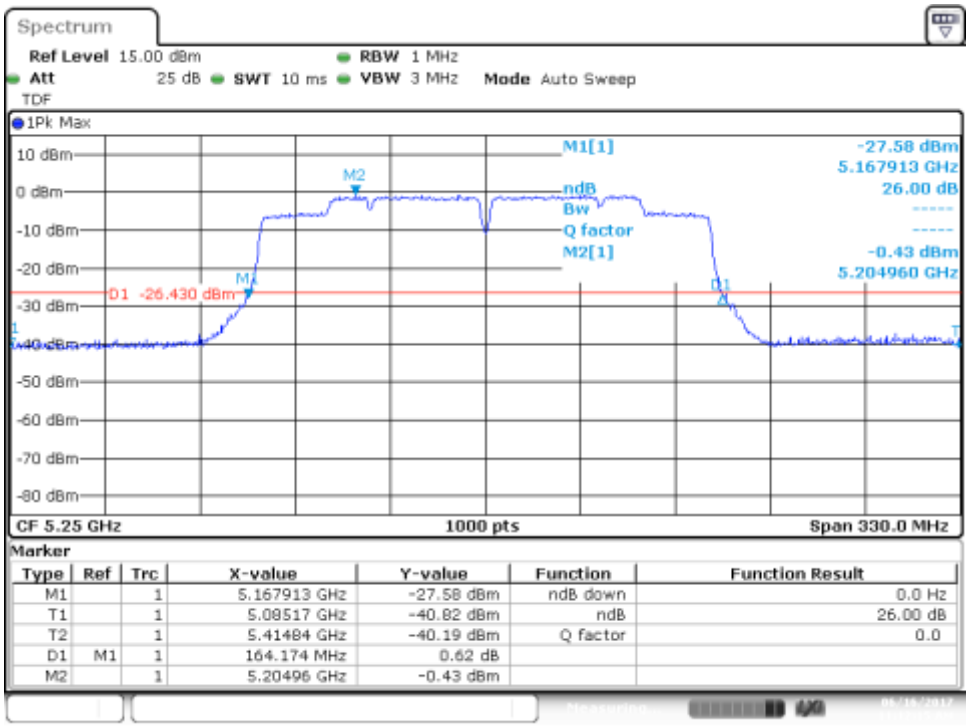
SISO-A, 802.11ac160, VHT0

Channel 50ac160



MIMO-A, 802.11ac160, VHT0

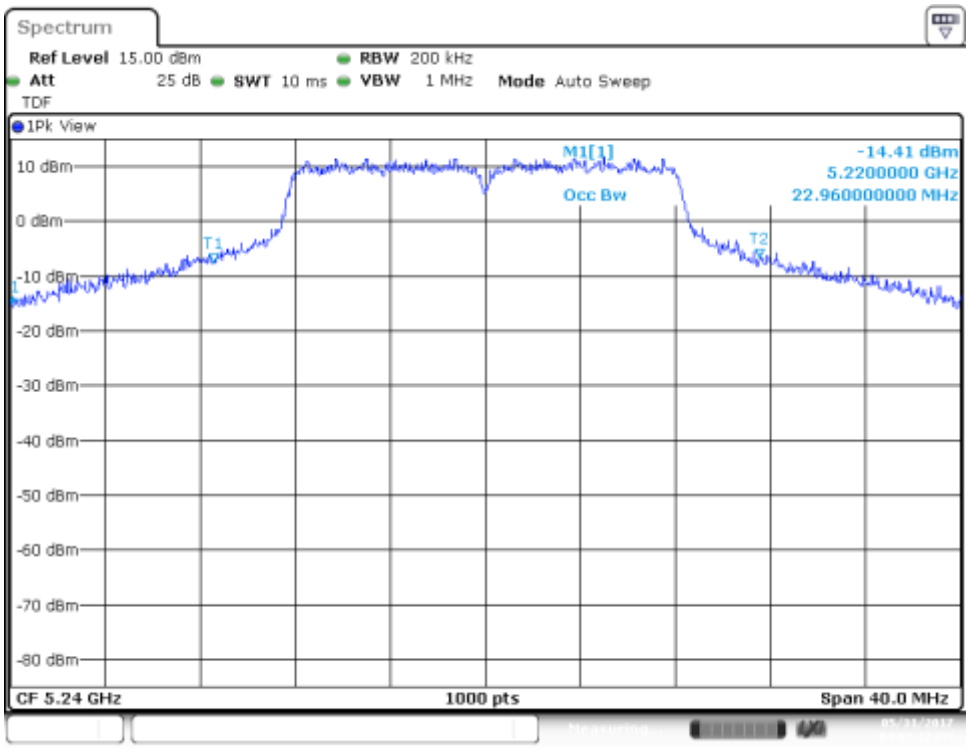
Channel 50ac160



B.3.2 99% Bandwidth

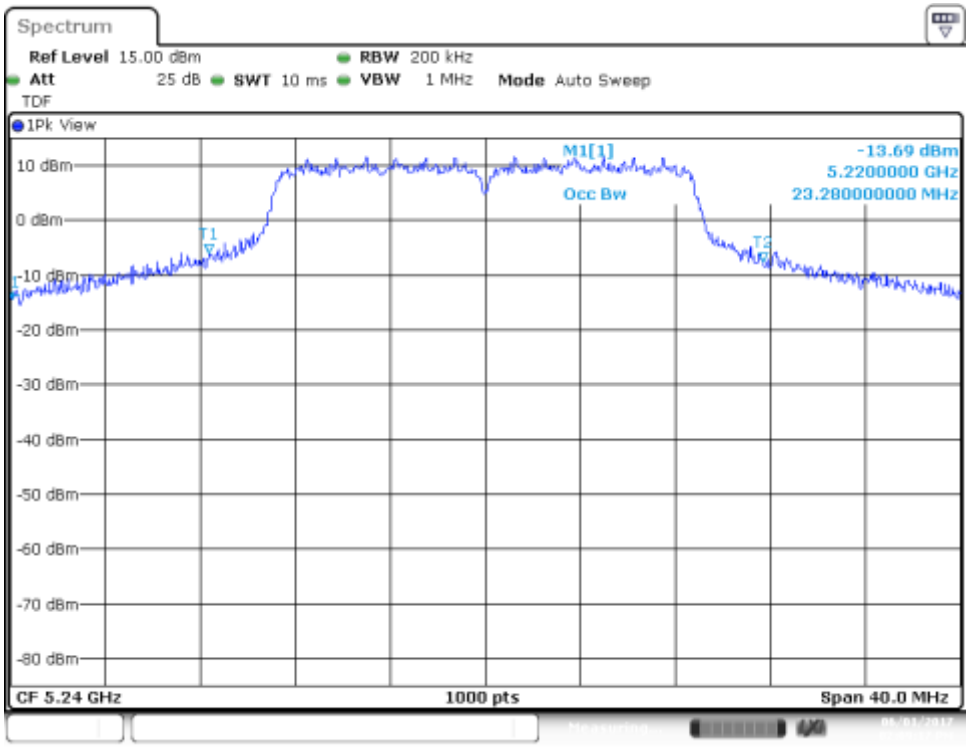
SISO-B, 802.11a, 6Mbps

Channel 48



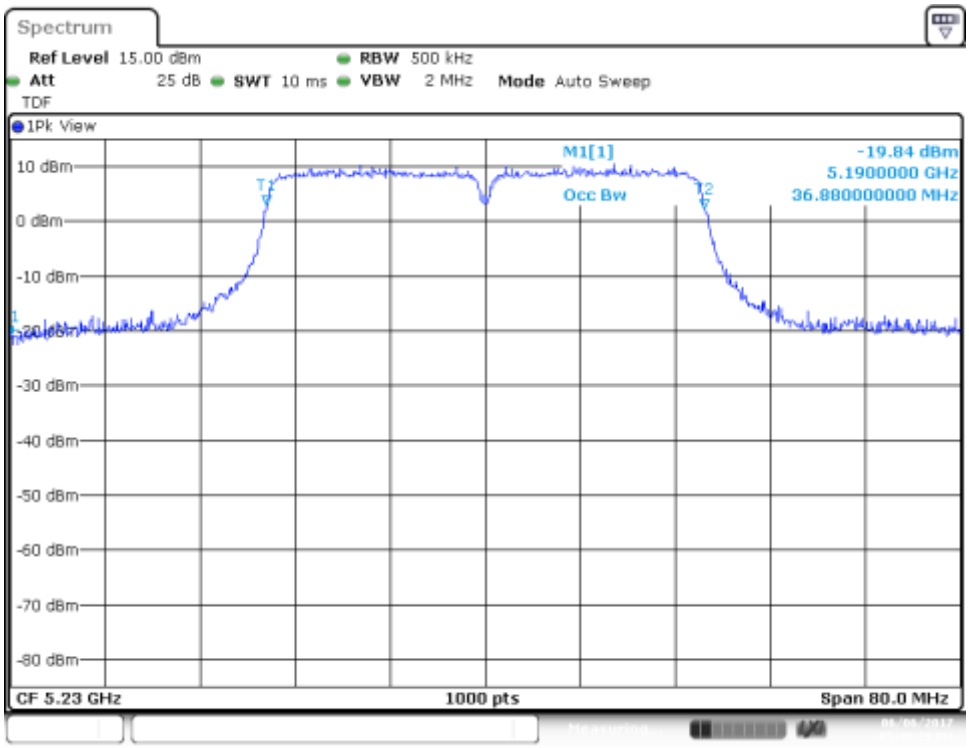
SISO-A, 802.11n20, HT0

Channel 48



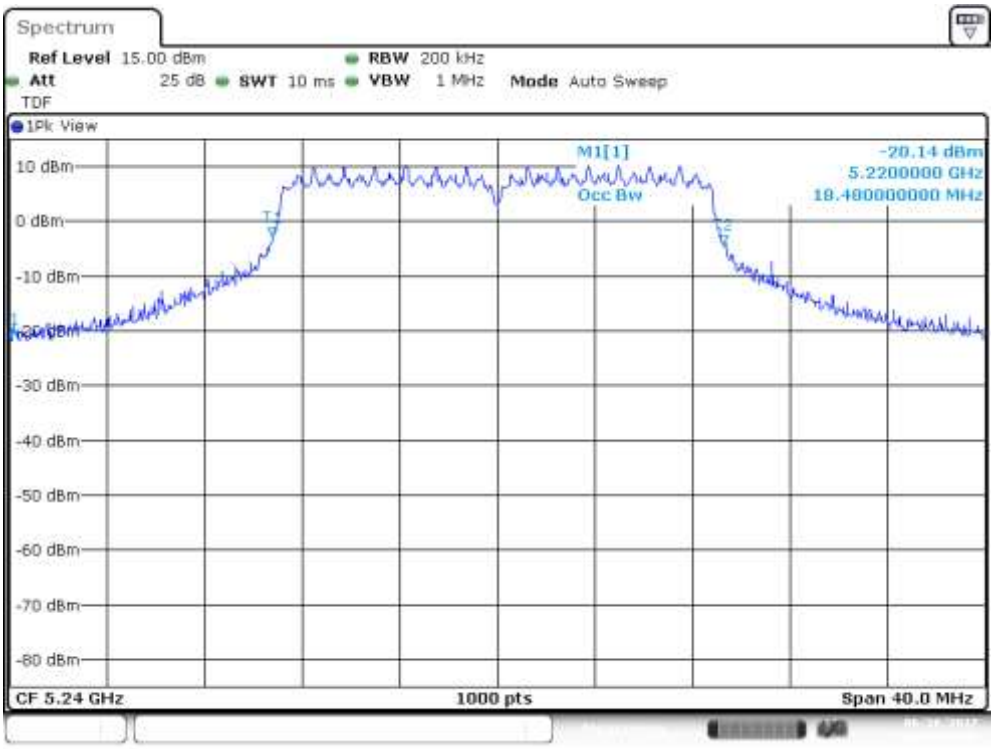
SISO-A, 802.11n40, HT0

Channel 46F



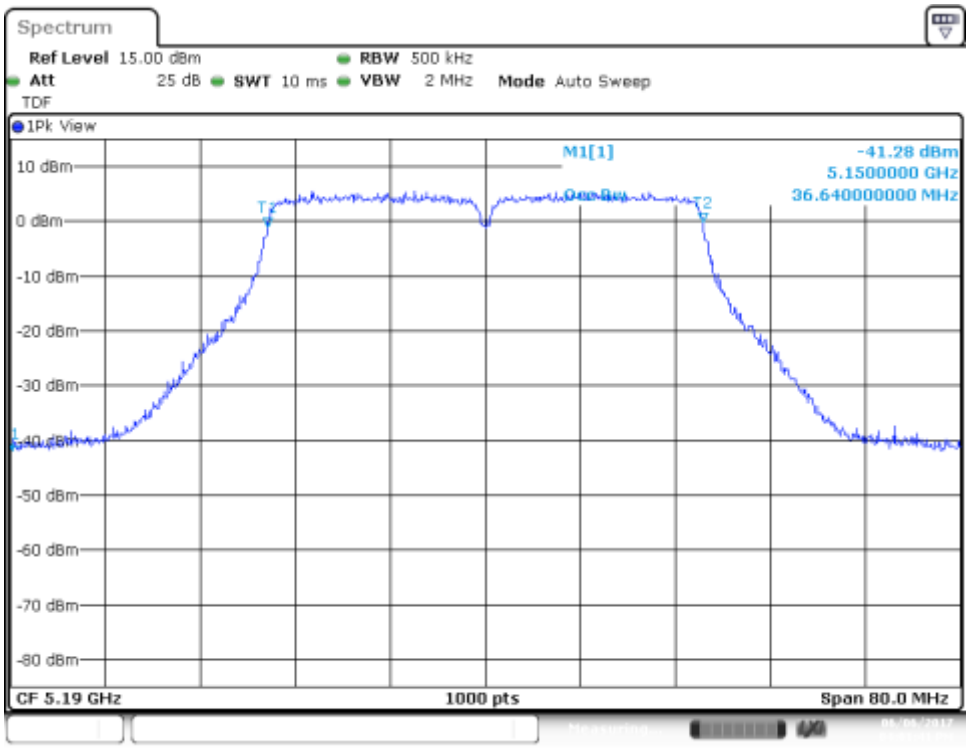
MIMO-B, 802.11n20, HT8

Channel 48



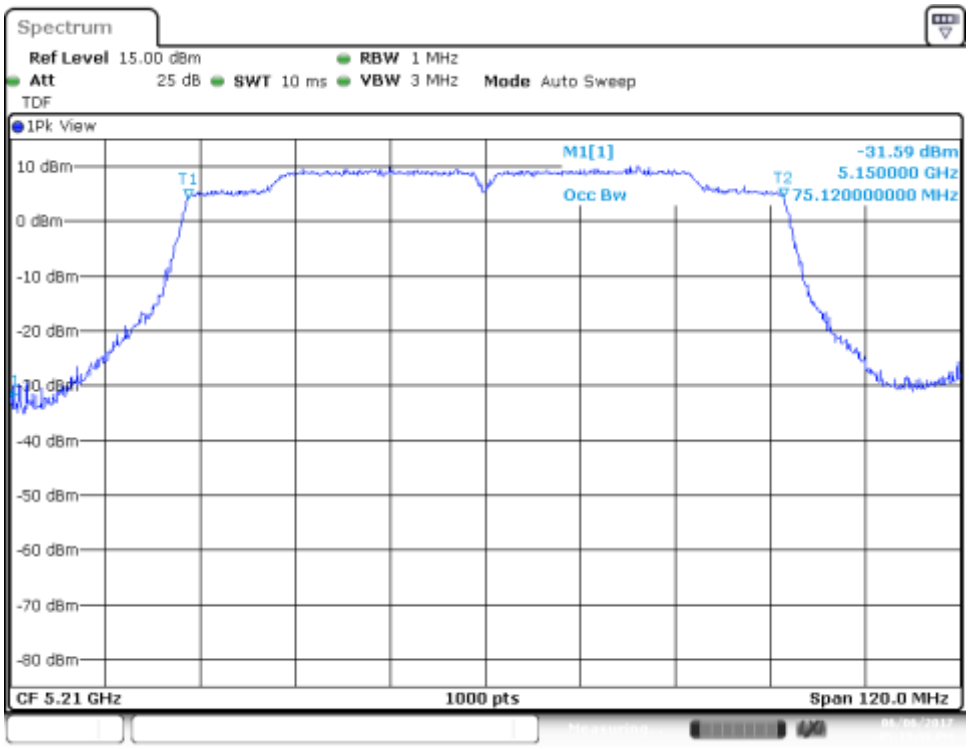
MIMO-A, 802.11n40, HT8

Channel 38F



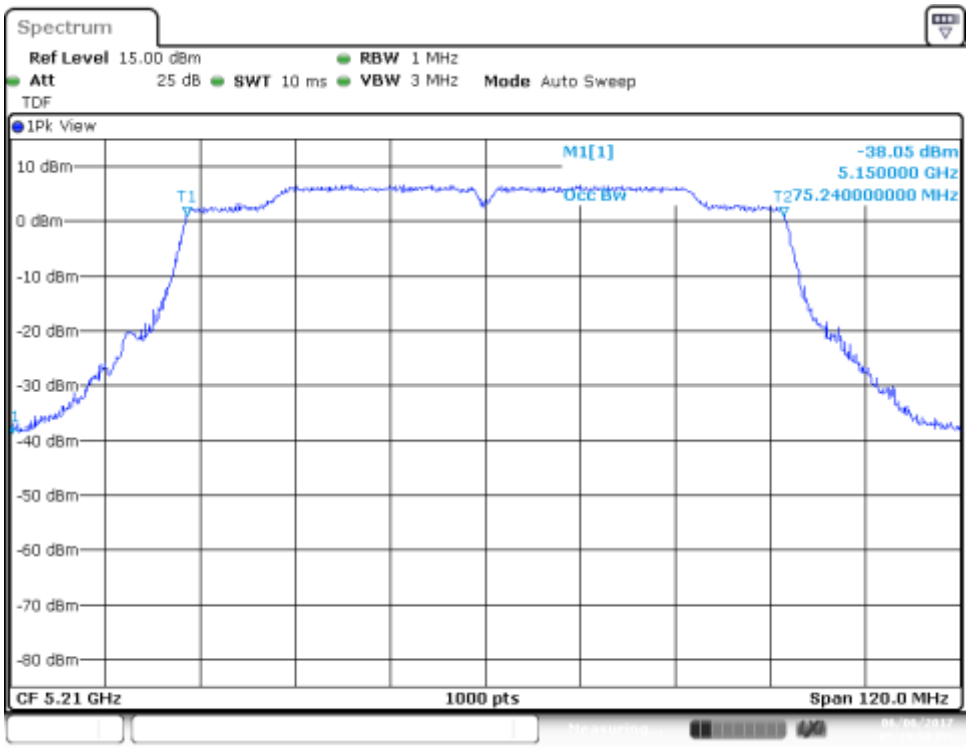
SISO-A, 802.11ac80, VHT0

Channel 42ac80



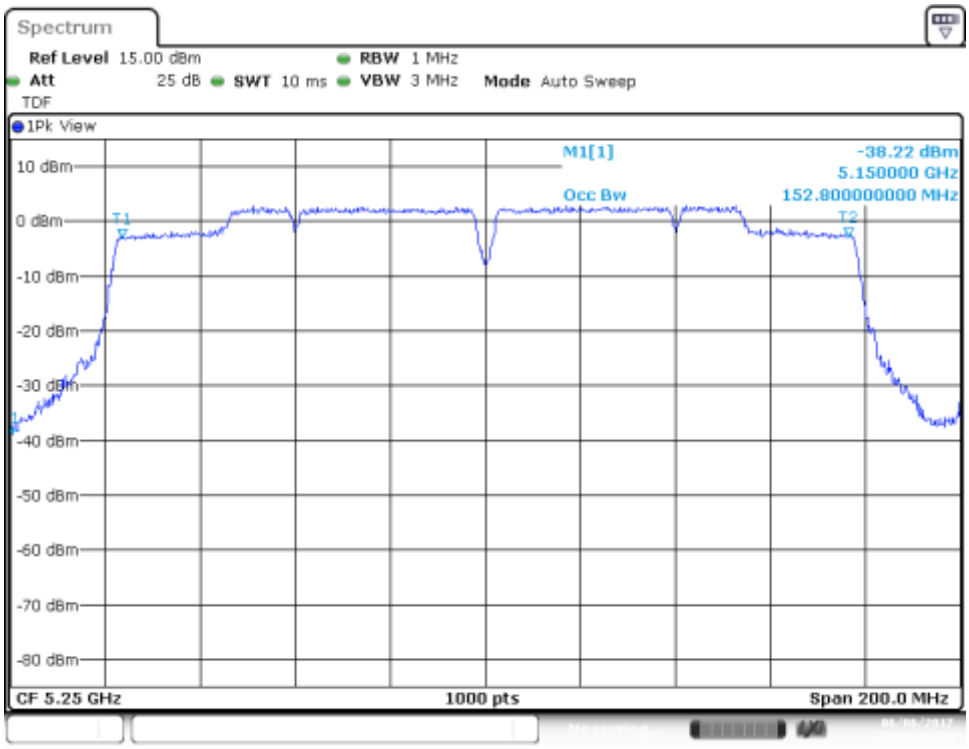
MIMO-A, 802.11ac80, VHT0

Channel 42ac80



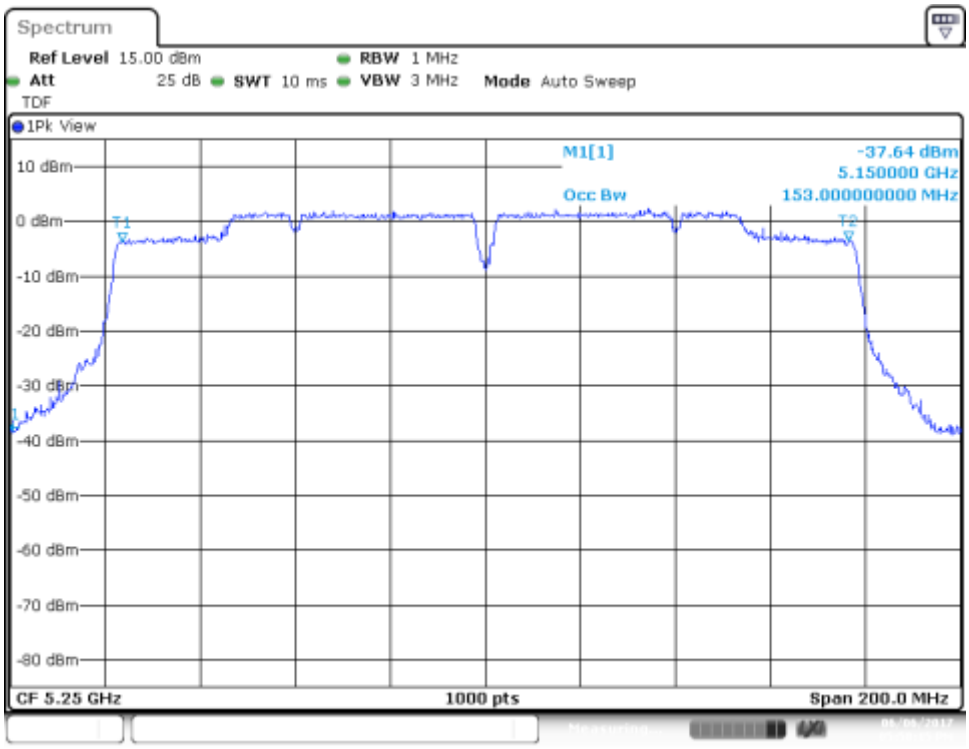
SISO-A, 802.11ac160, VHT0

Channel 50ac160



MIMO-A, 802.11ac160, VHT0

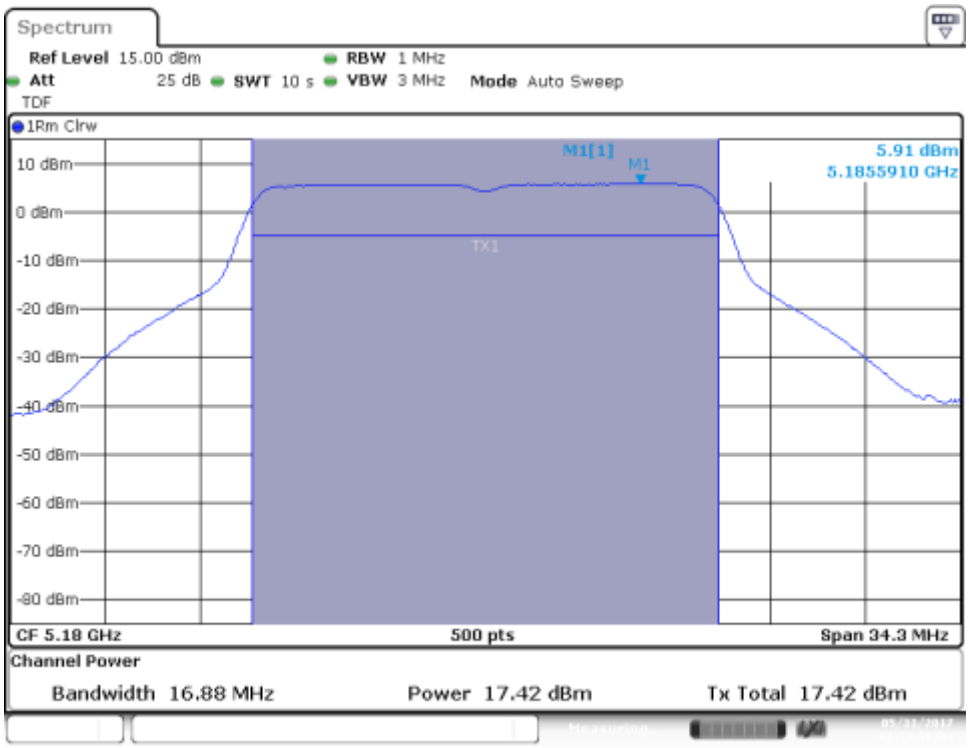
Channel 50ac160



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

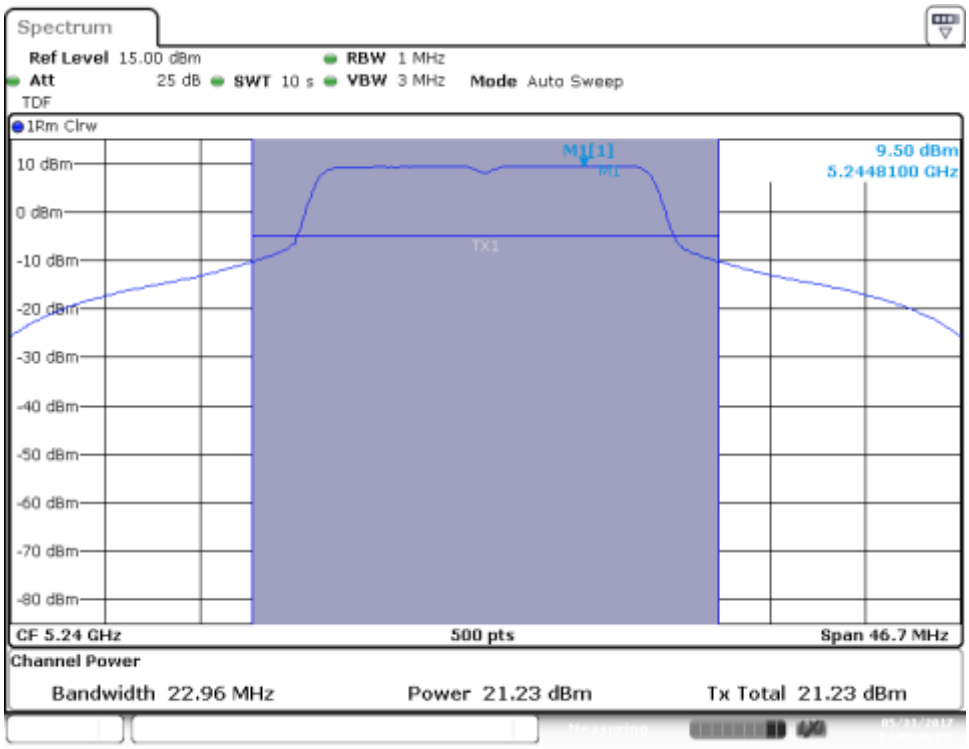
SISO-A, 802.11a, 6Mbps

Channel 36



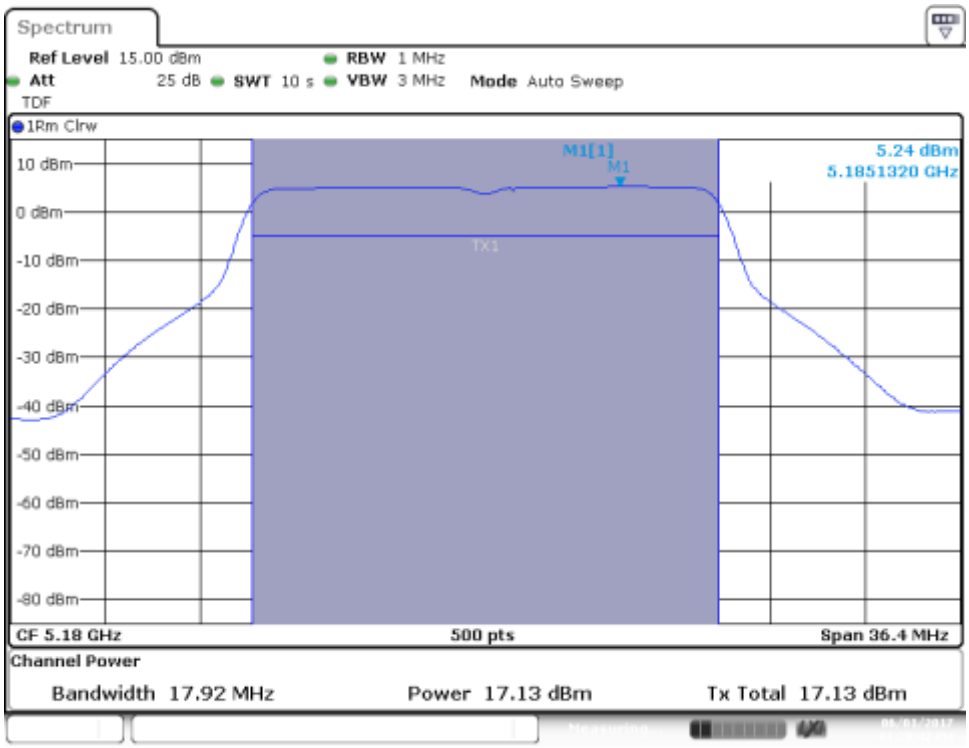
SISO-B, 802.11a, 6Mbps

Channel 48

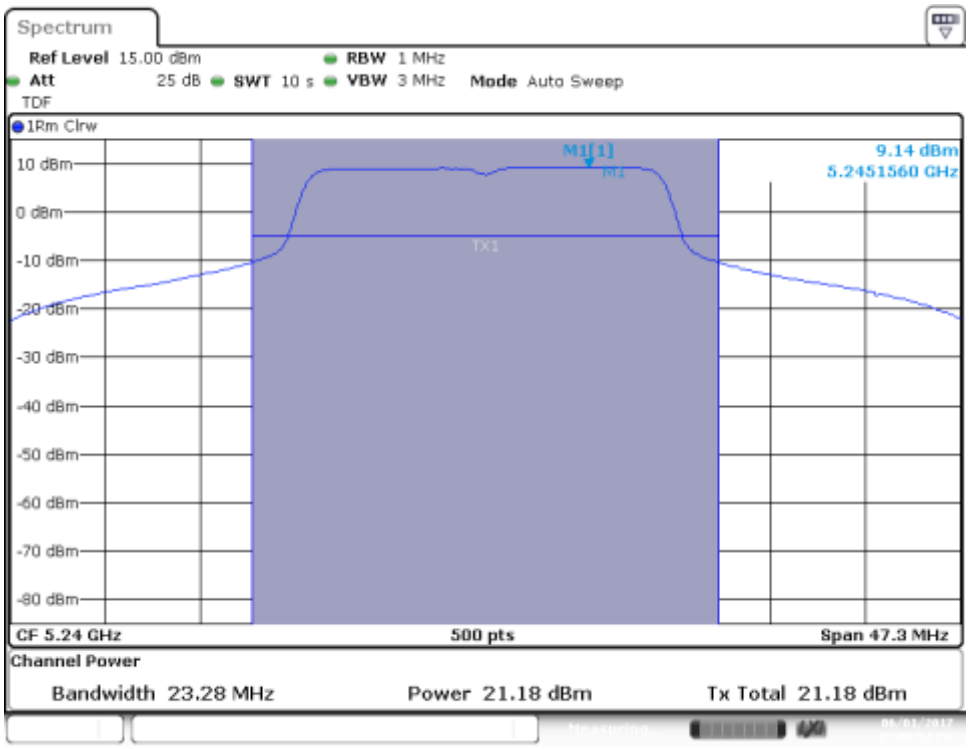


SISO-A, 802.11n20, HT0

Channel 36

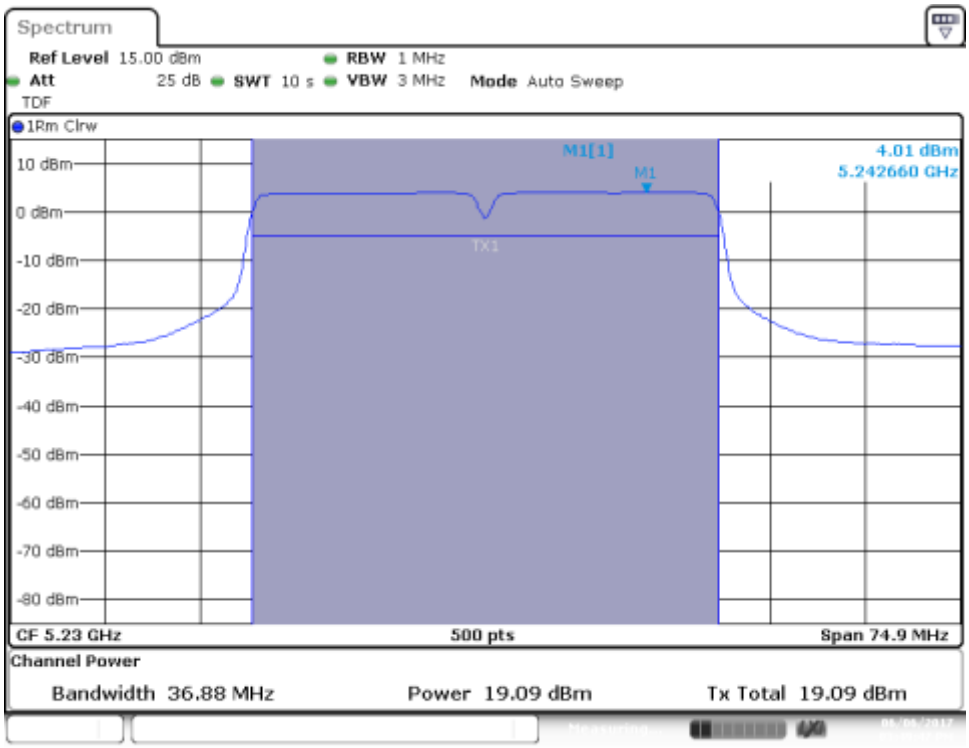


Channel 48



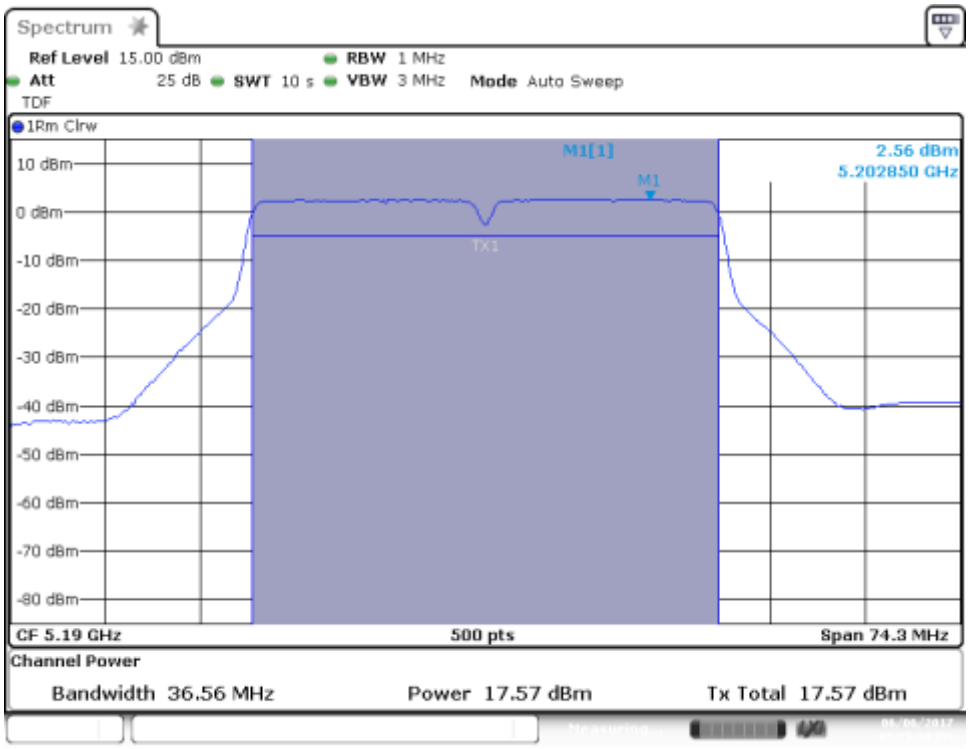
SISO-A, 802.11n40, HT0

Channel 46F



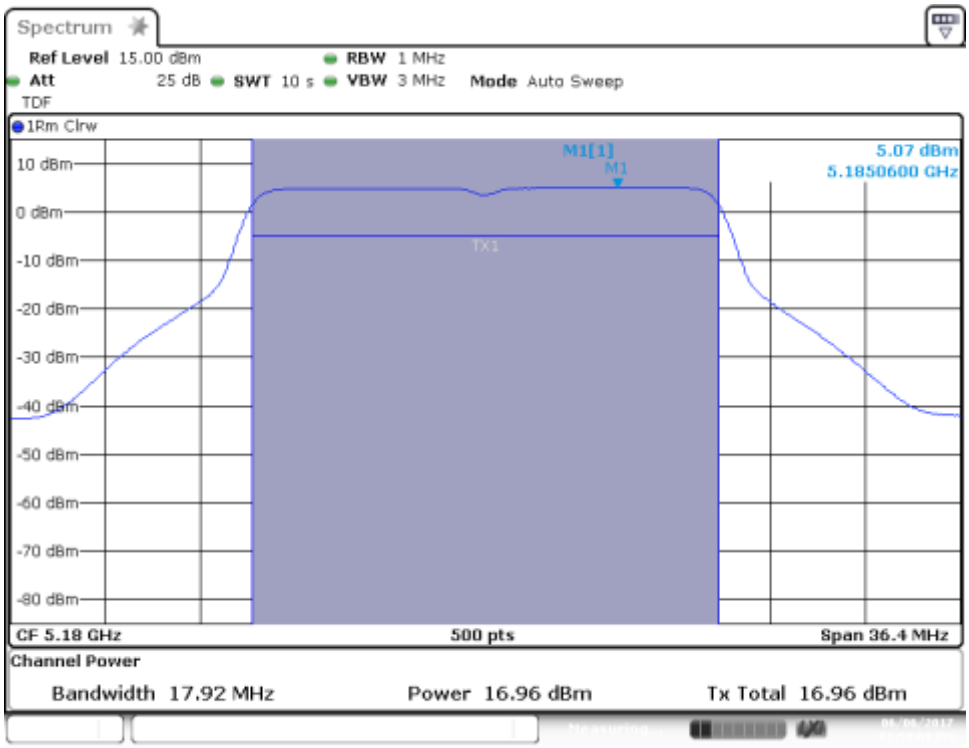
SISO-B, 802.11n40, HT0

Channel 38F



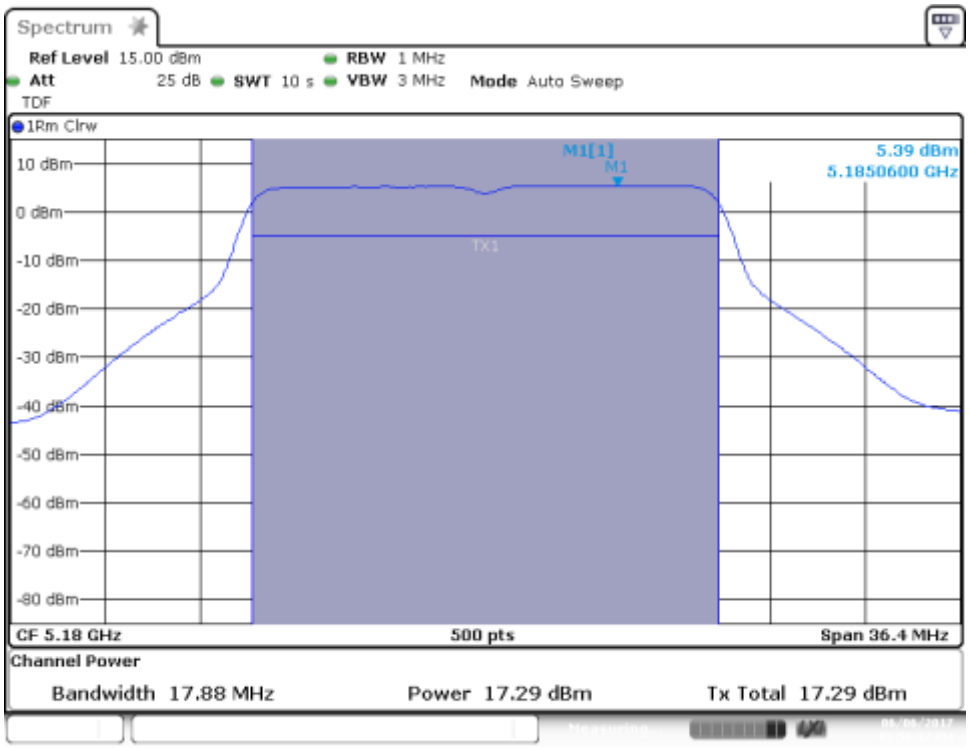
MIMO-A, 802.11n20, HT8

Channel 36



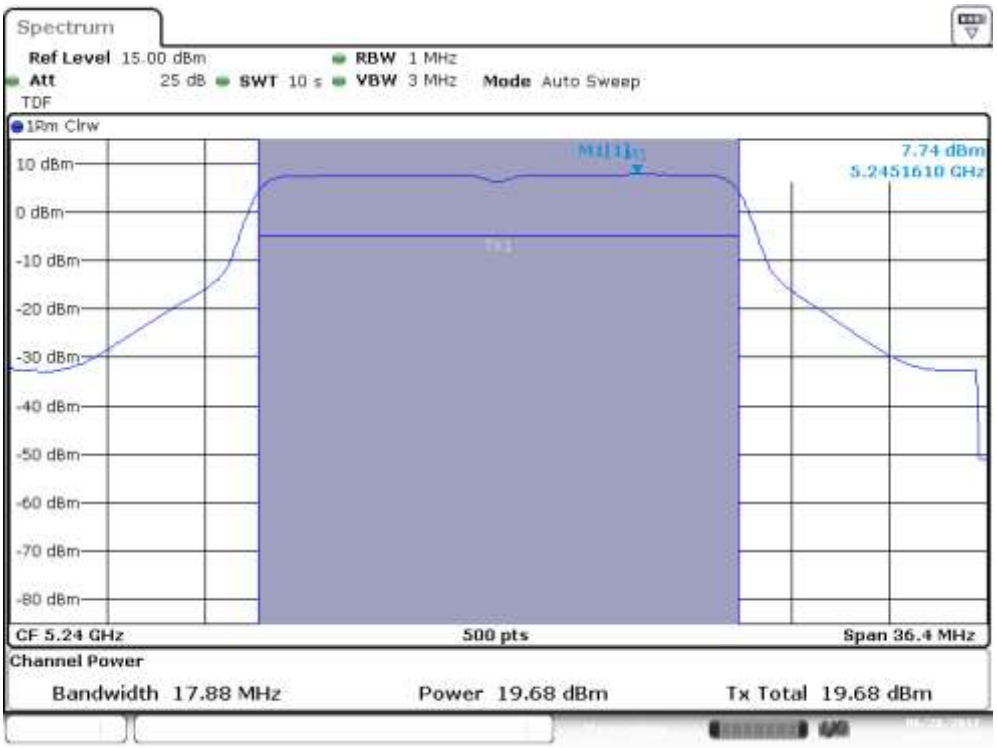
MIMO-B, 802.11n20, HT8

Channel 36



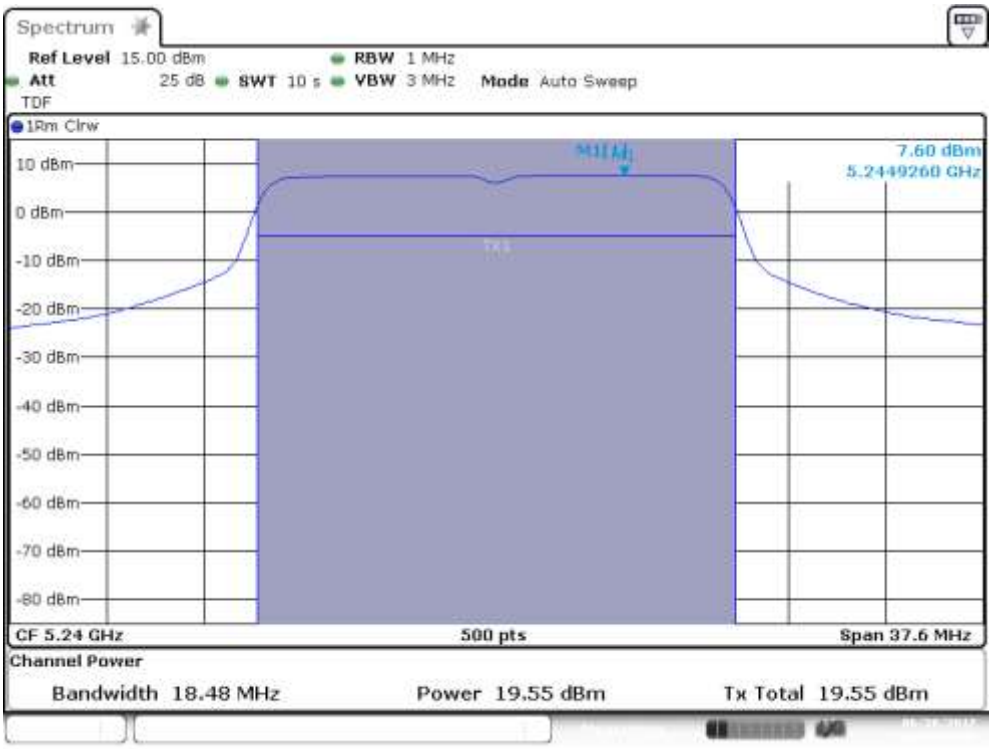
MIMO-A, 802.11n20, HT8

Channel 48



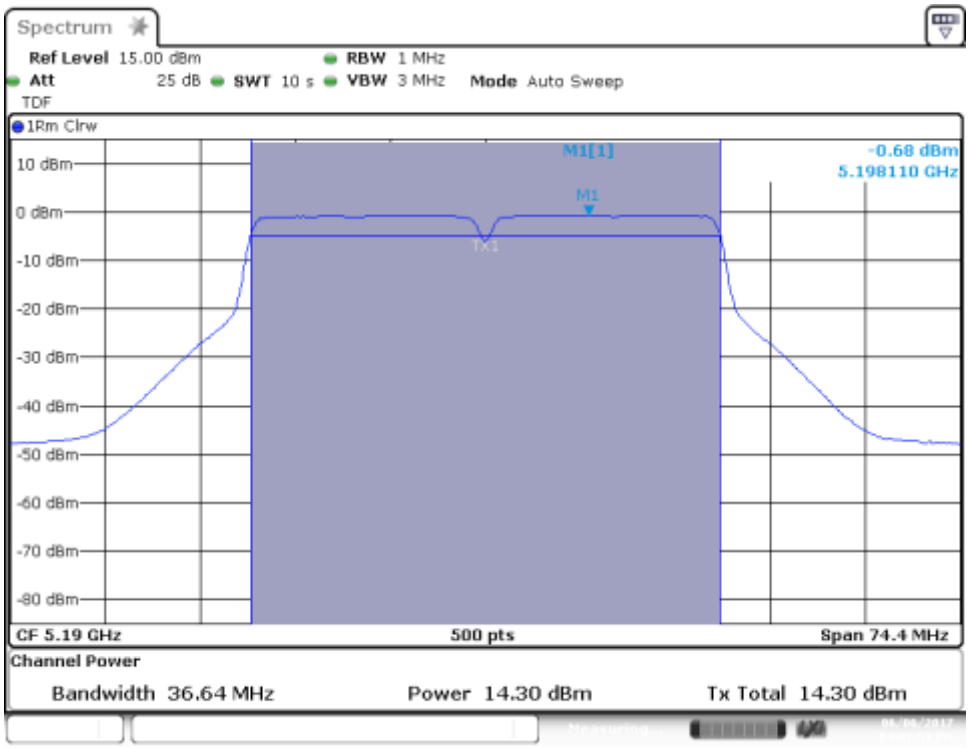
MIMO-B, 802.11n20, HT8

Channel 48



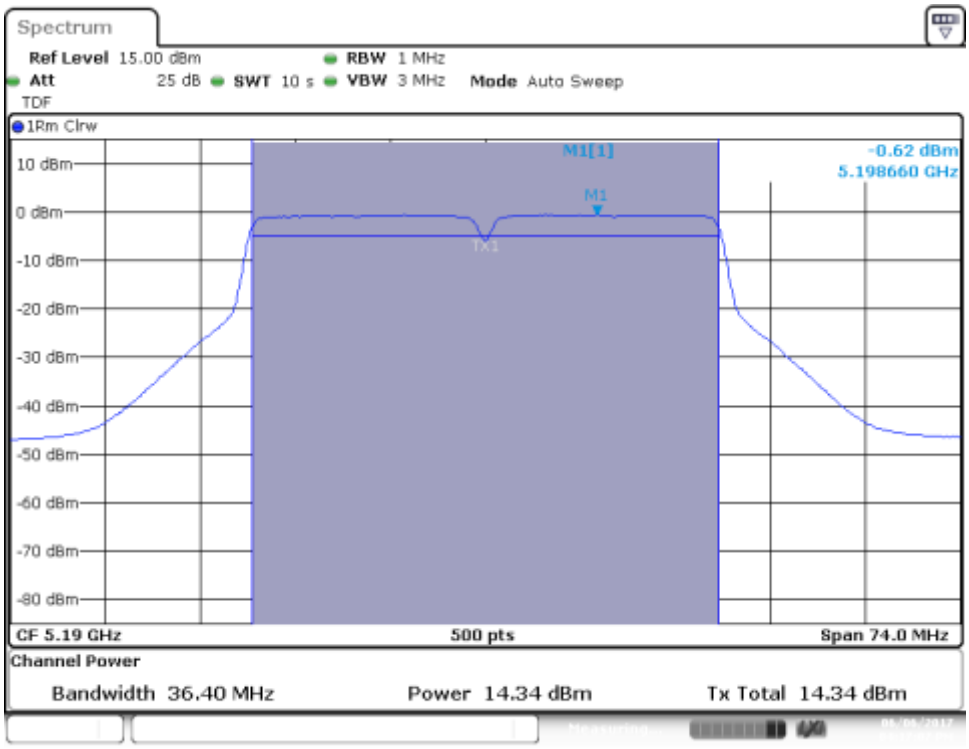
MIMO-A, 802.11n40, HT8

Channel 38F



MIMO-B, 802.11n40, HT8

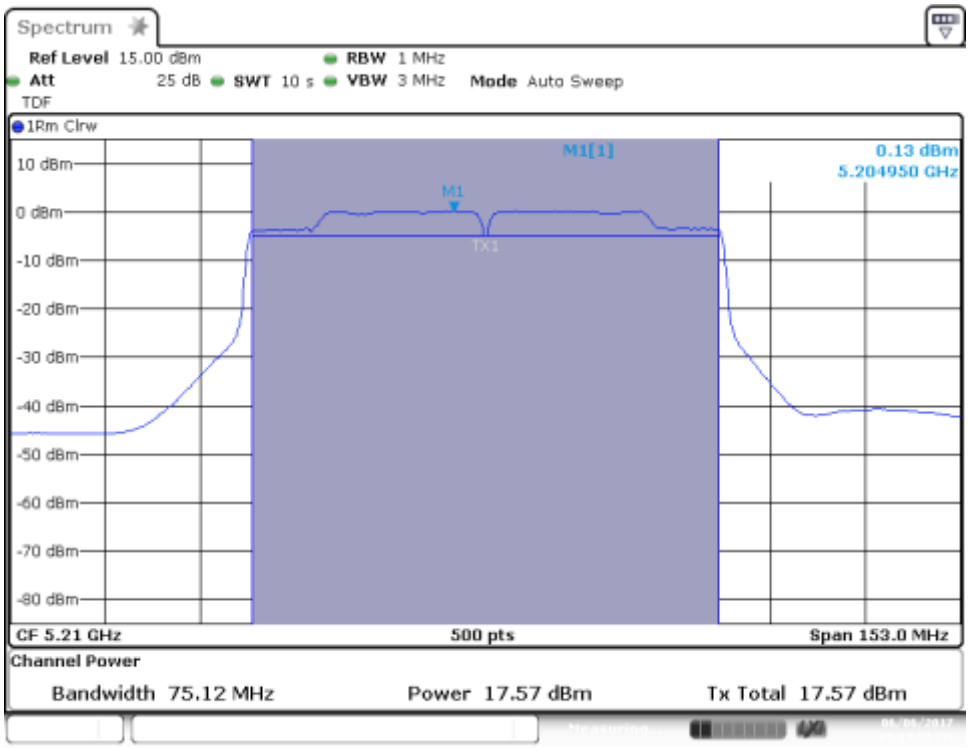
Channel 38F



Channel 46F

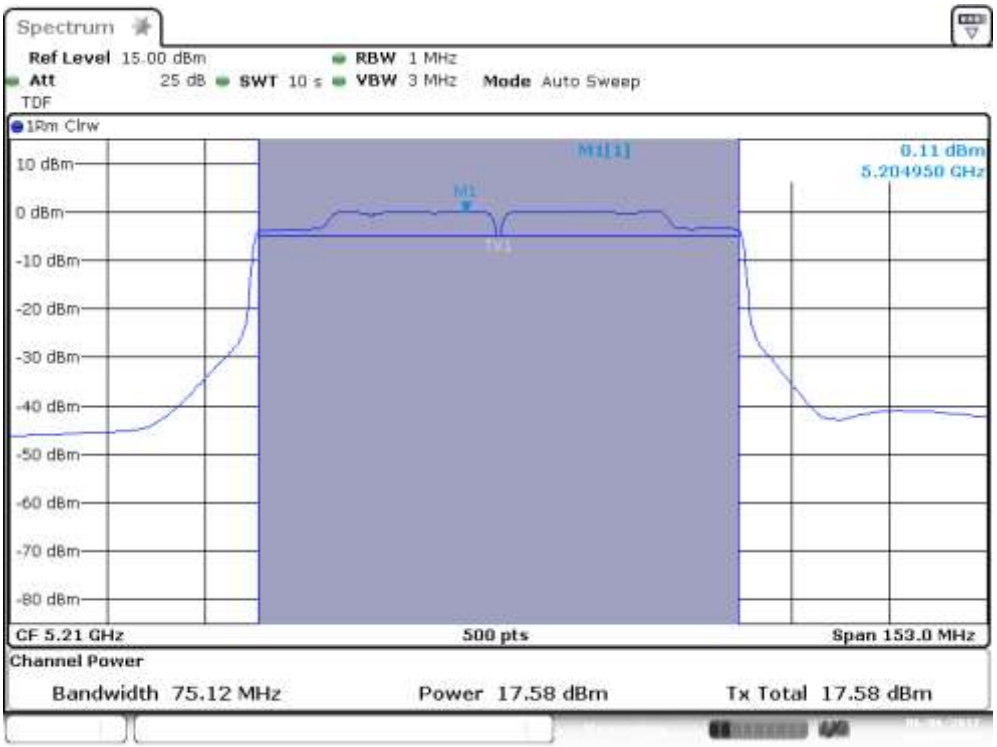
SISO-A, 802.11ac80, VHT0

Channel 42ac80



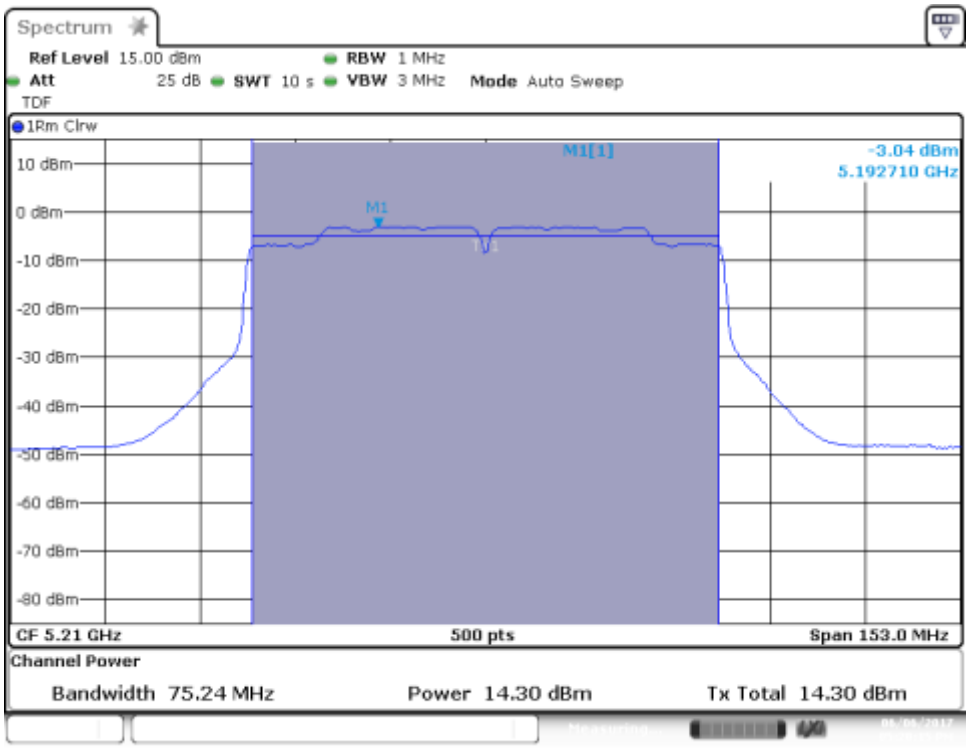
SISO-B, 802.11ac80, VHT0

Channel 42ac80



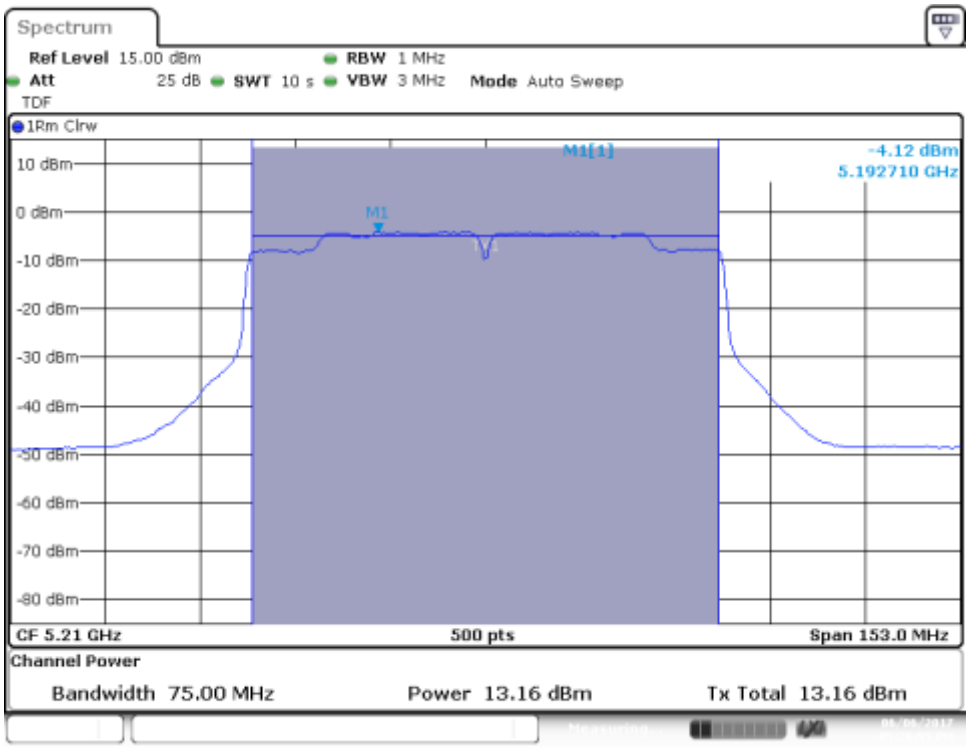
MIMO-A, 802.11ac80, VHT0

Channel 42ac80



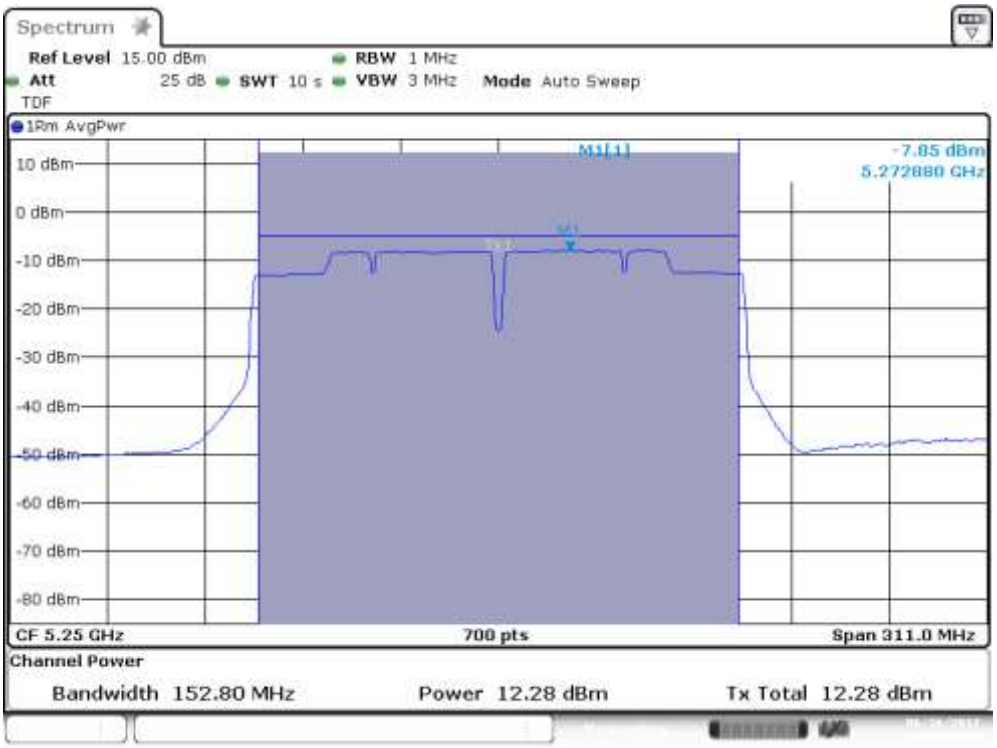
MIMO-B, 802.11ac80, VHT0

Channel 42ac80



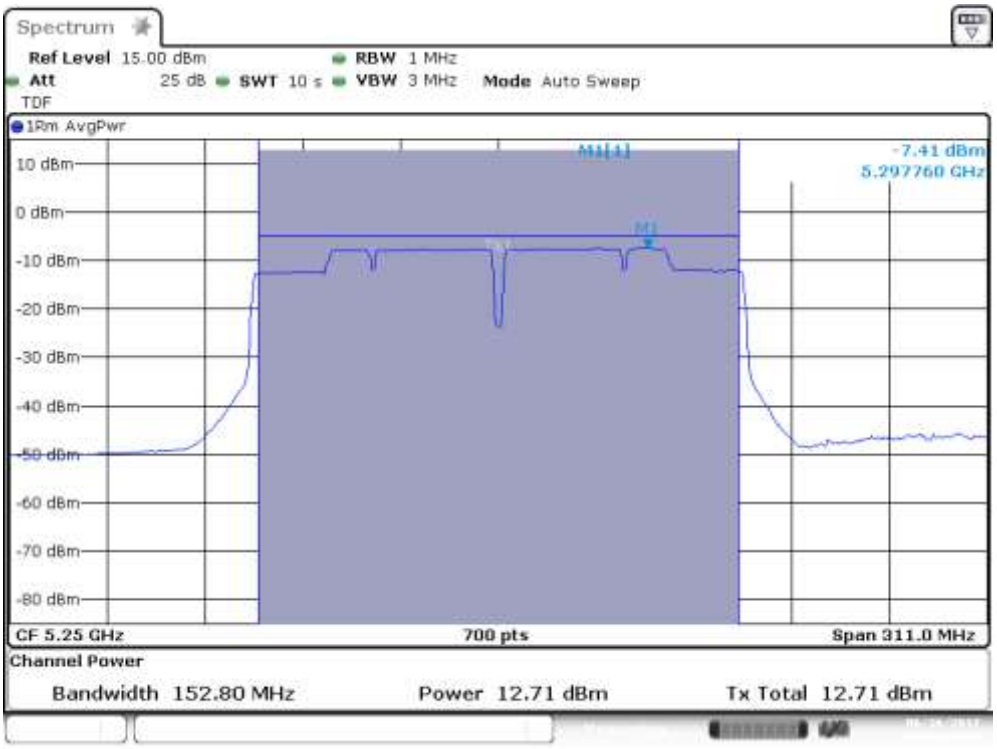
SISO-A, 802.11ac160, VHT0

Channel 50ac160



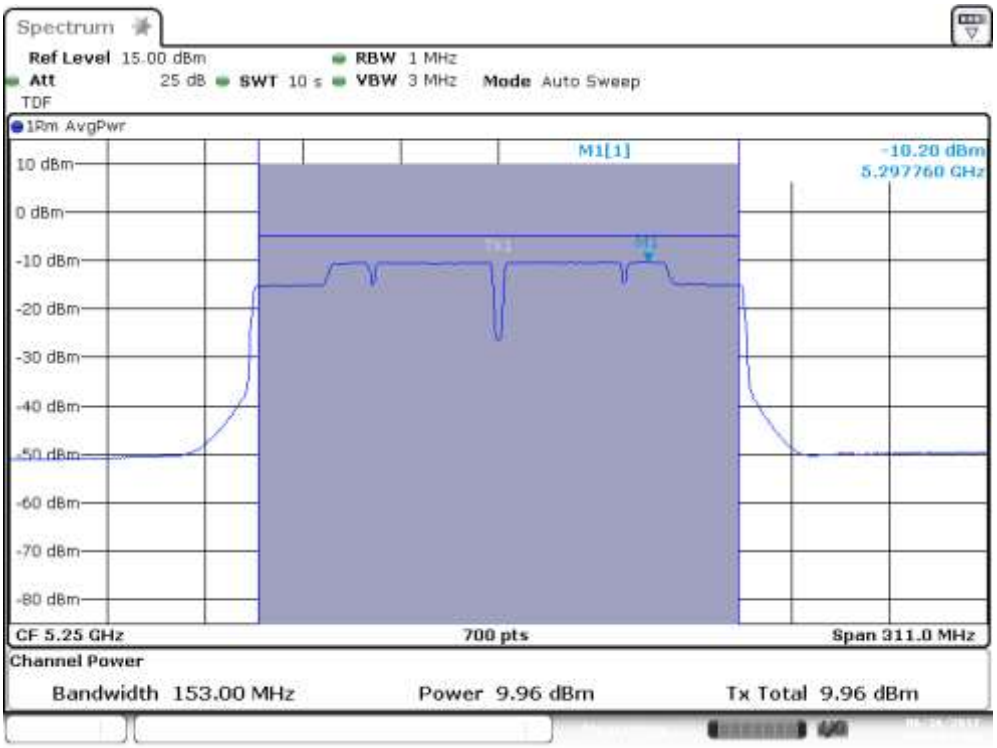
SISO-B, 802.11ac160, VHT0

Channel 50ac160



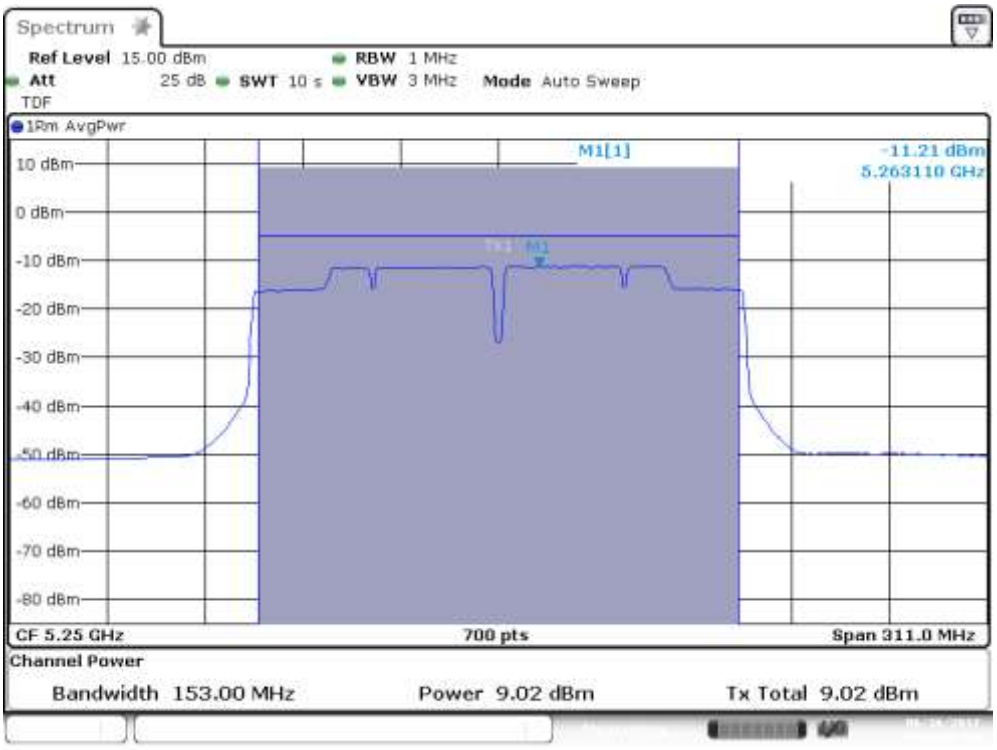
MIMO-A, 802.11ac160, VHT0

Channel 50ac160



MIMO-B, 802.11ac160, VHT0

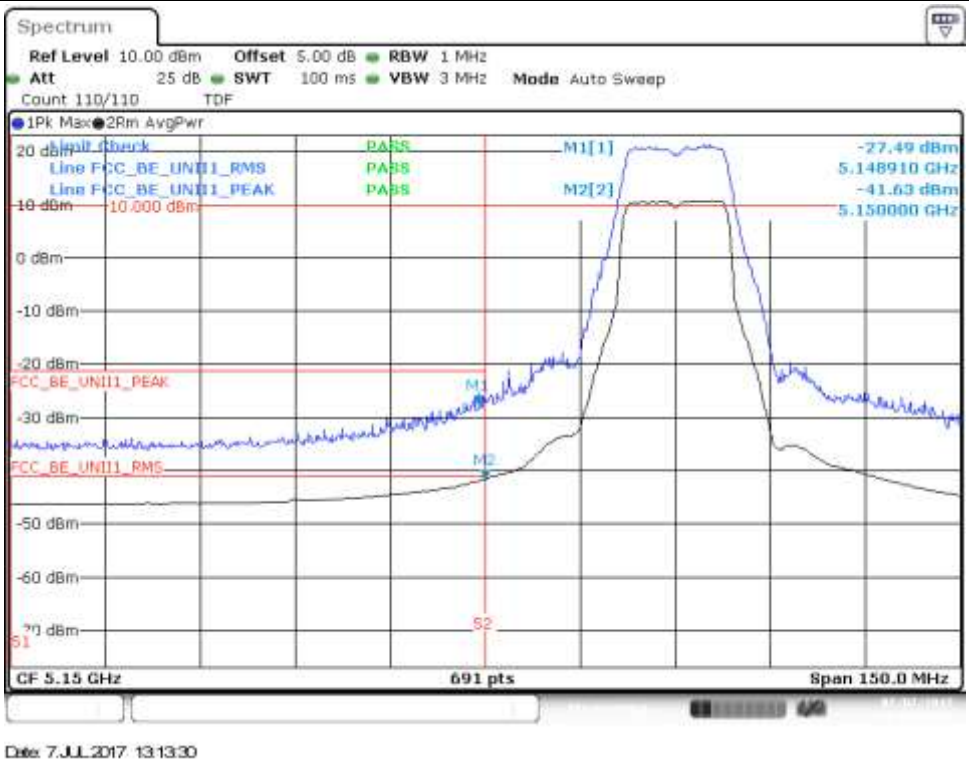
Channel 50ac160

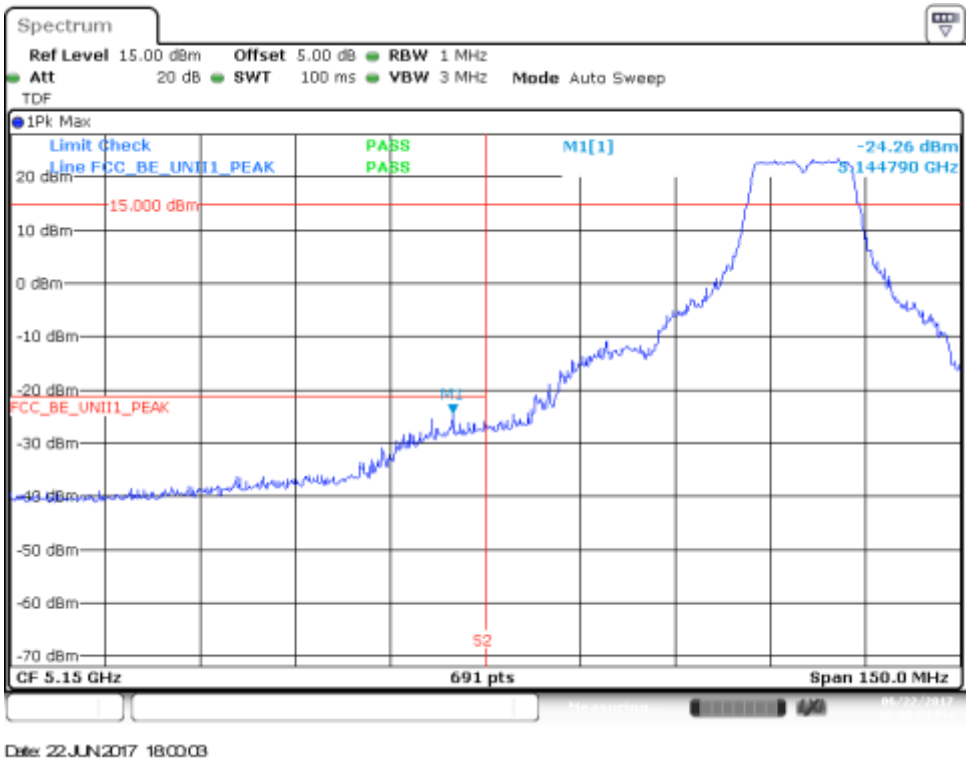


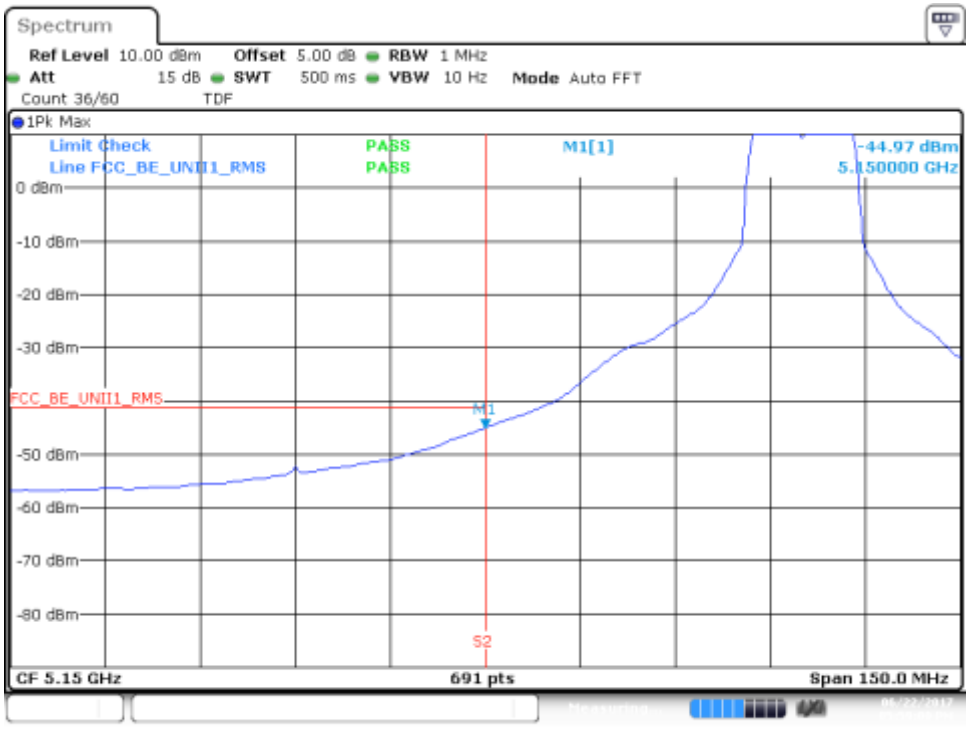
B.3.4 Undesirable emission limits : Band Edge (Conducted)

802.11a, 6Mbps – Chain A

BE Low Freq Section – CH36

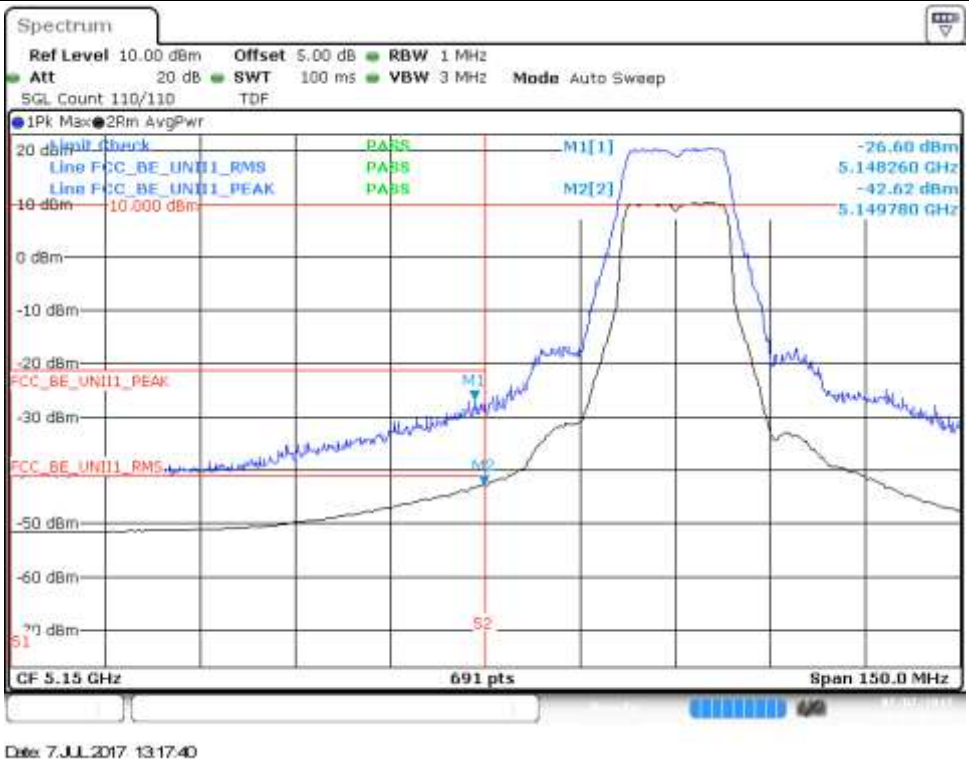


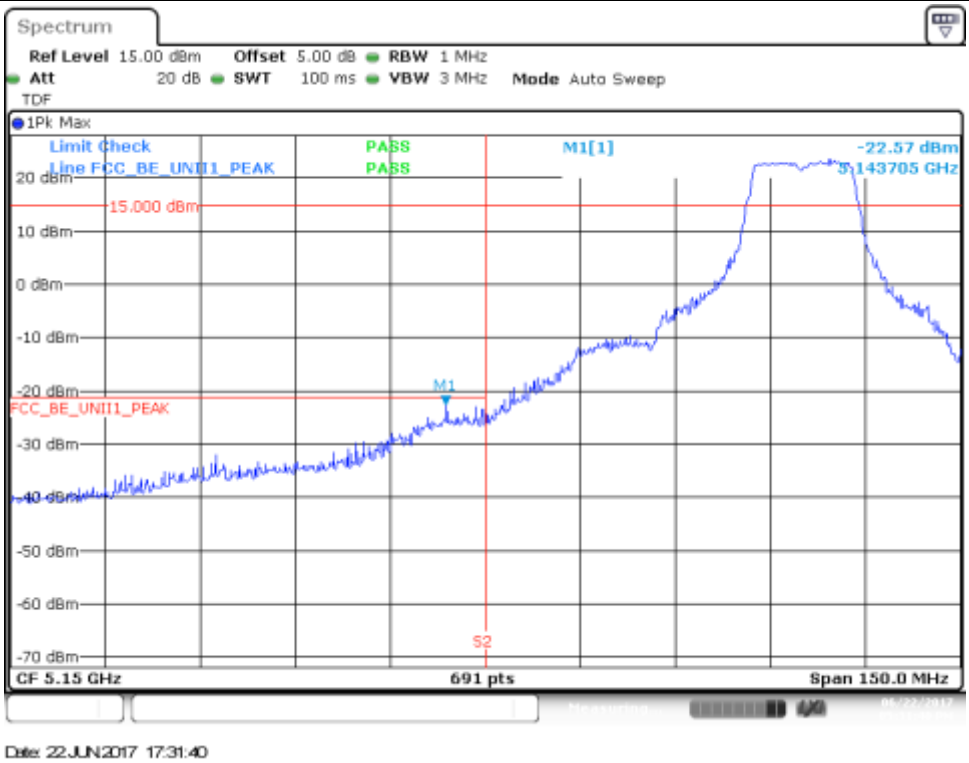
BE Low Freq Section, Peak – CH40


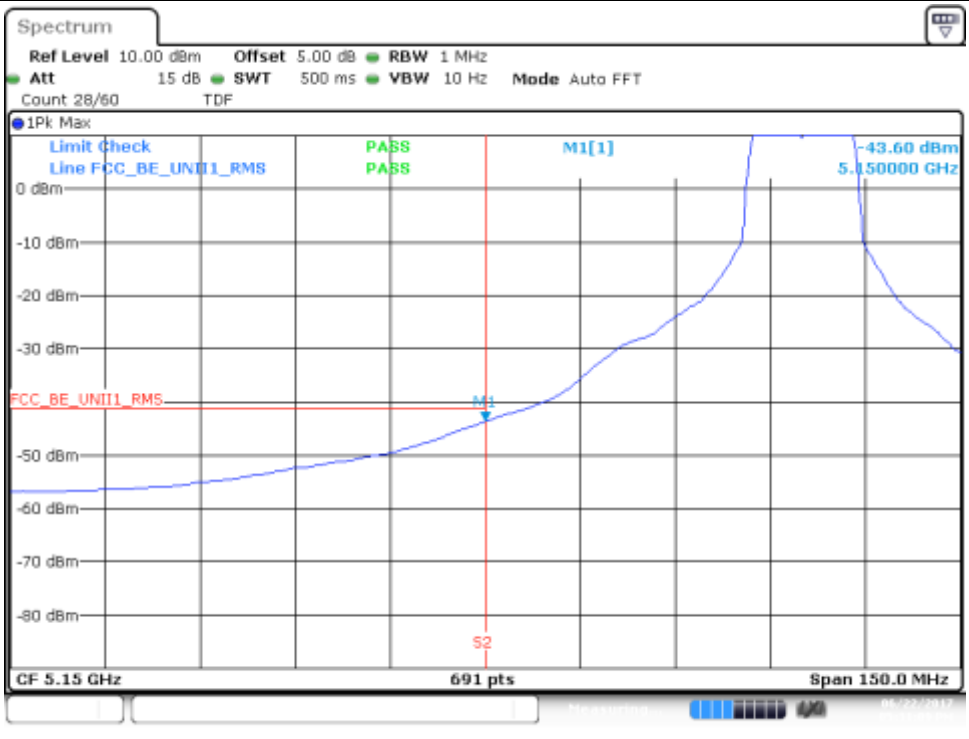
BE Low Freq Section, RMS – CH40


802.11a, 6Mbps – Chain B

BE Low Freq Section , Peak, RMS – CH36

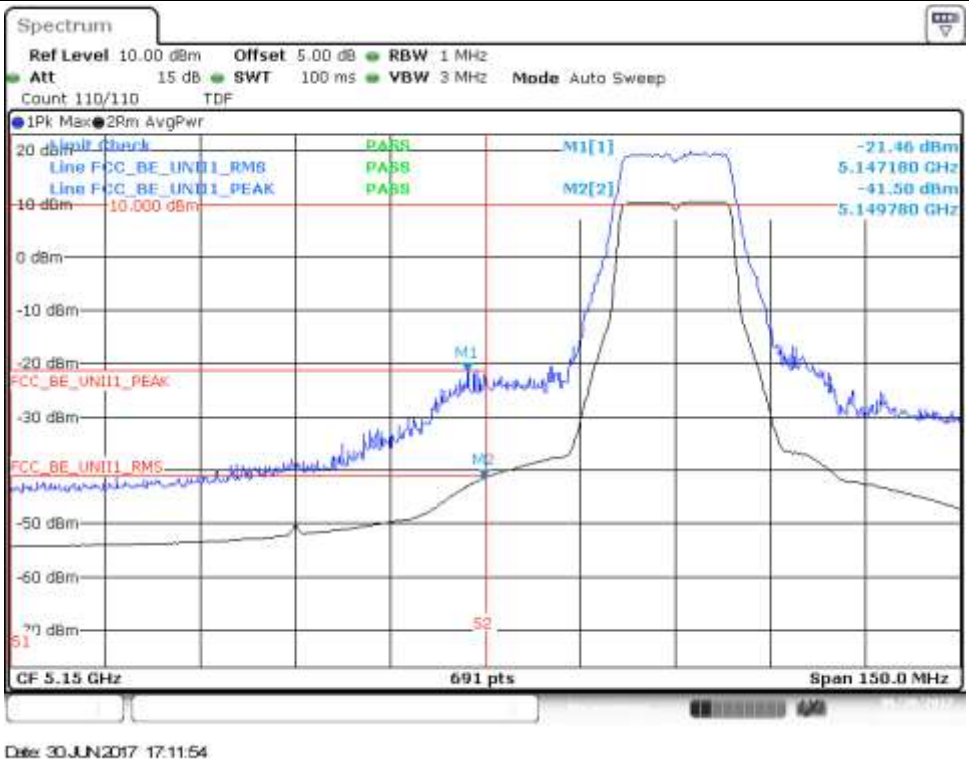


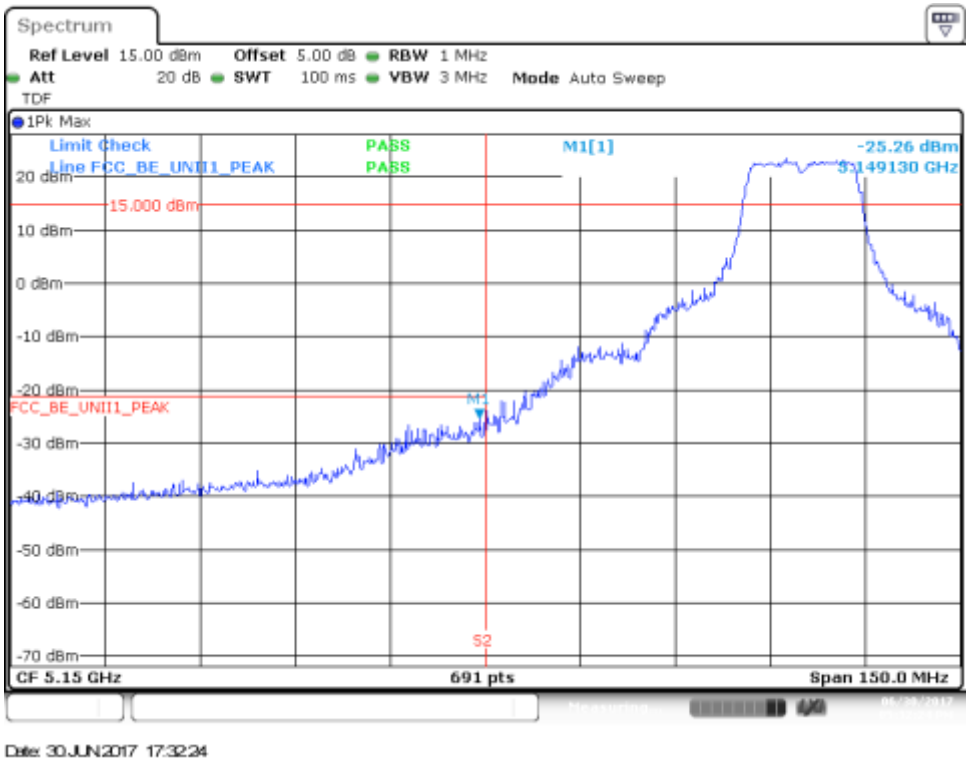
BE Low Freq Section, Peak – CH40


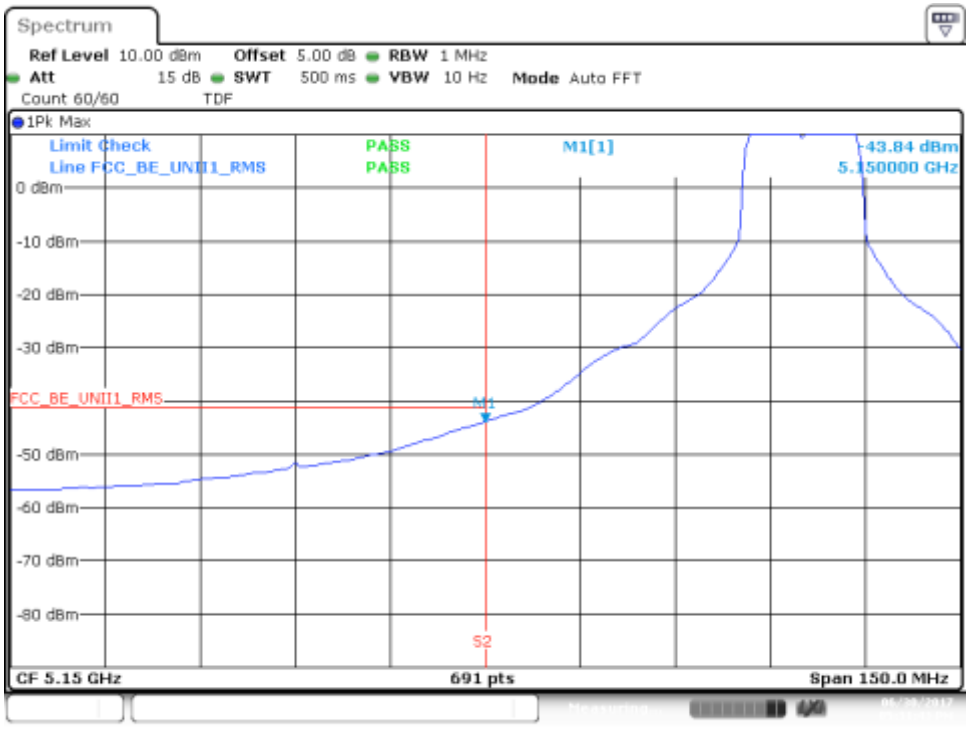
BE Low Freq Section, RMS – CH40


802.11n20, HT0 (SISO) – Chain A

BE Low Freq Section, Peak, RMS – CH36

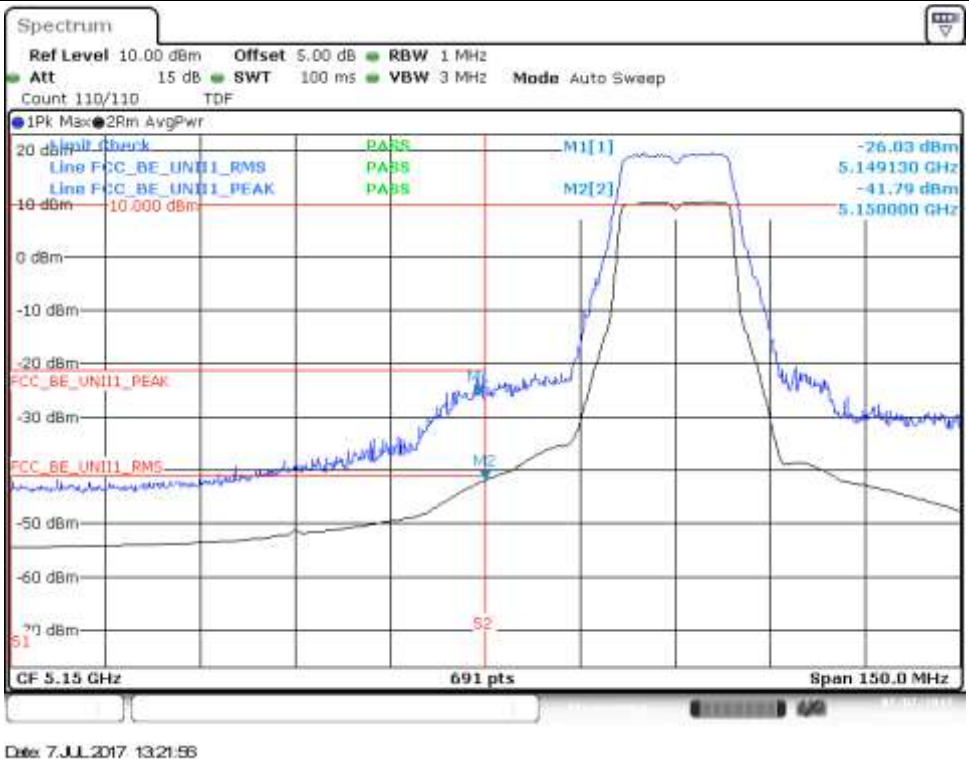


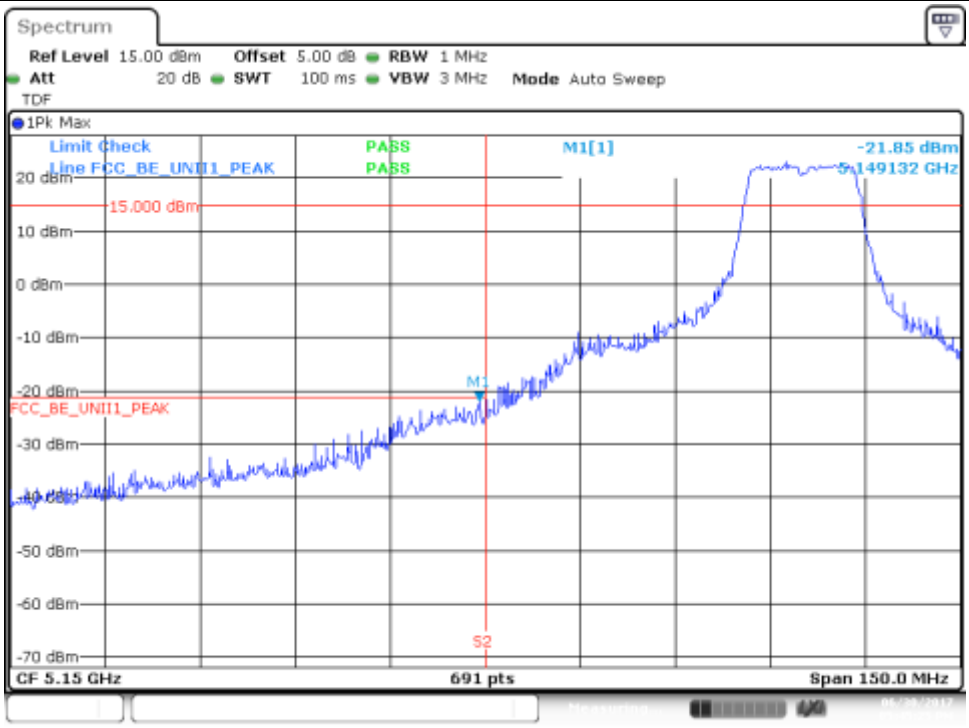
BE Low Freq Section, Peak – CH40


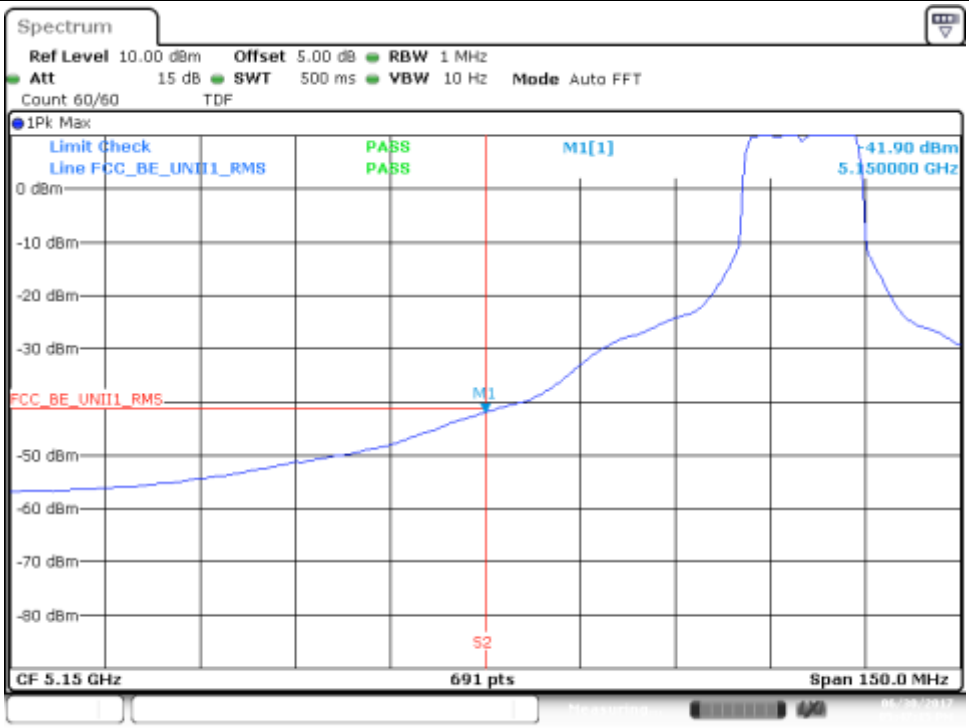
BE Low Freq Section, RMS – CH40


802.11n20, HT0 (SISO) – Chain B

BE Low Freq Section, Peak, RMS – CH36

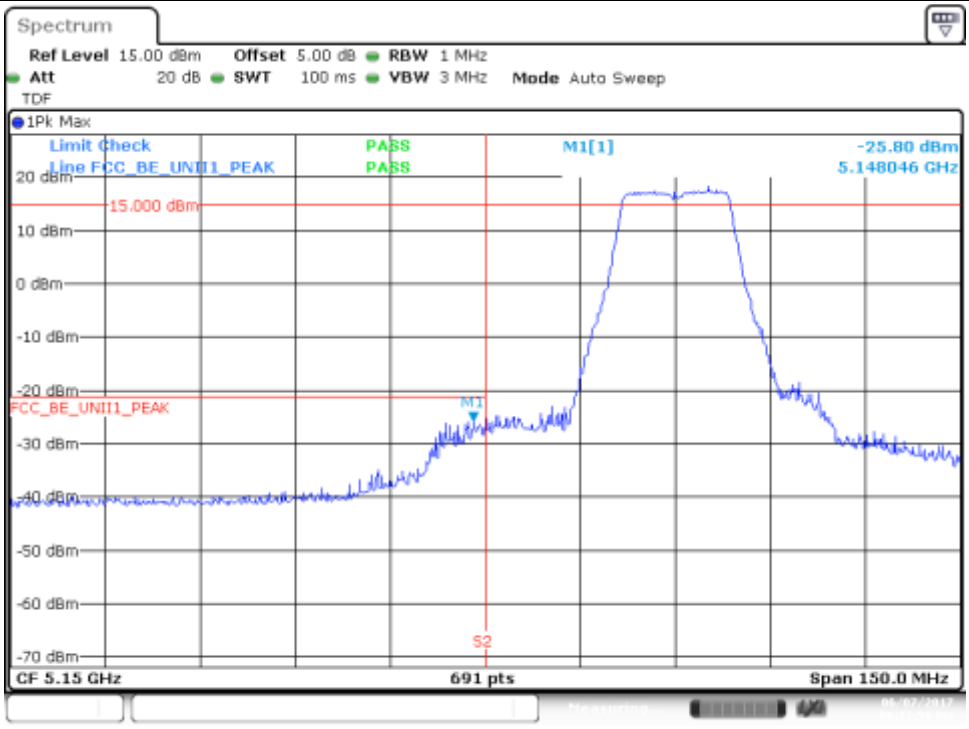


BE Low Freq Section, Peak – CH40


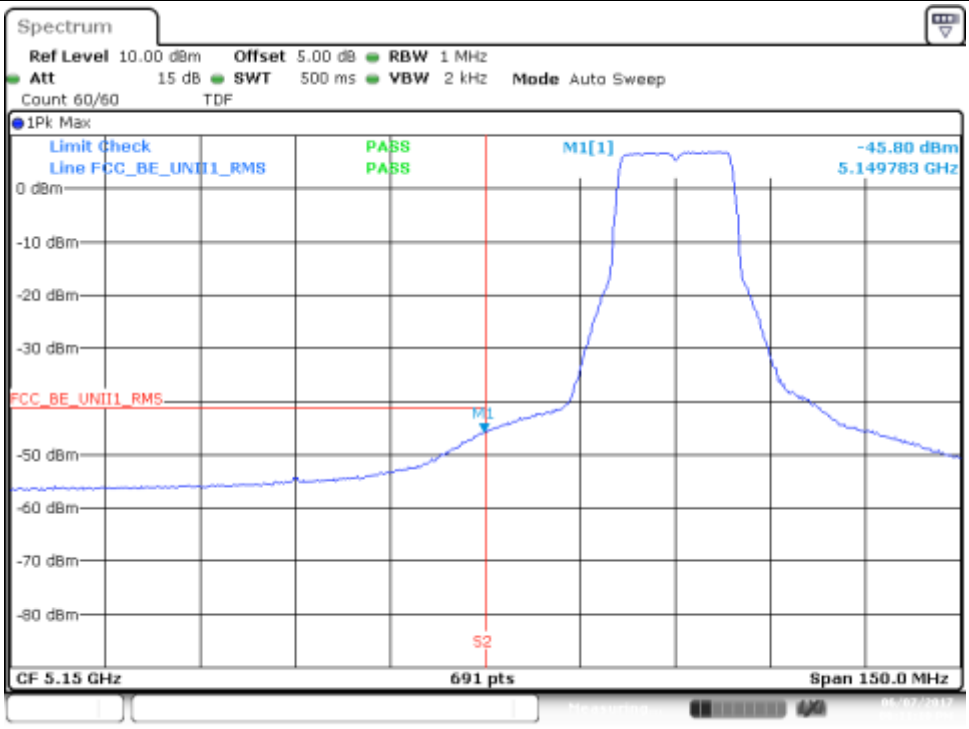
BE Low Freq Section, RMS – CH40


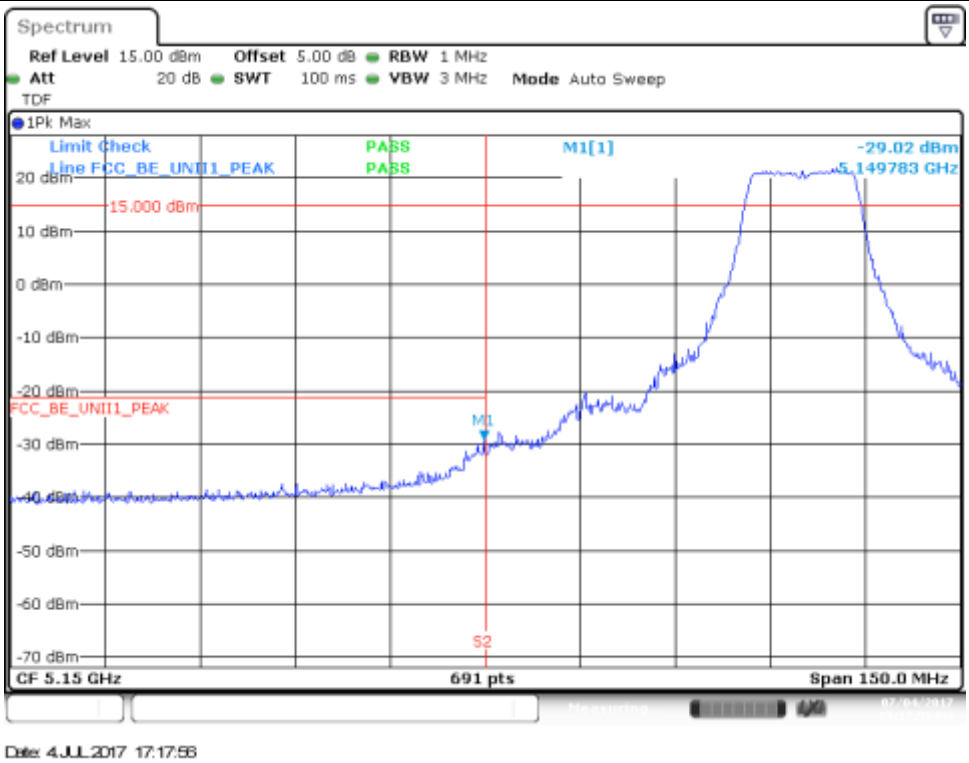
802.11n20, HT8 (MIMO) – Chain A

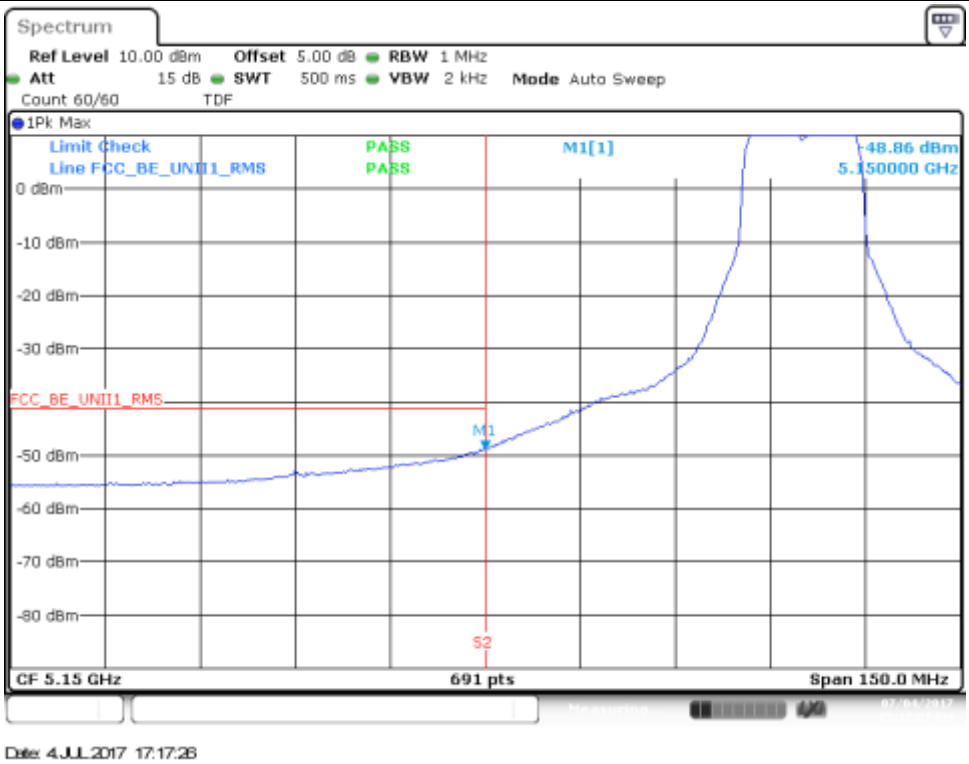
BE Low Freq Section, Peak – CH36



BE Low Freq Section, RMS – CH36

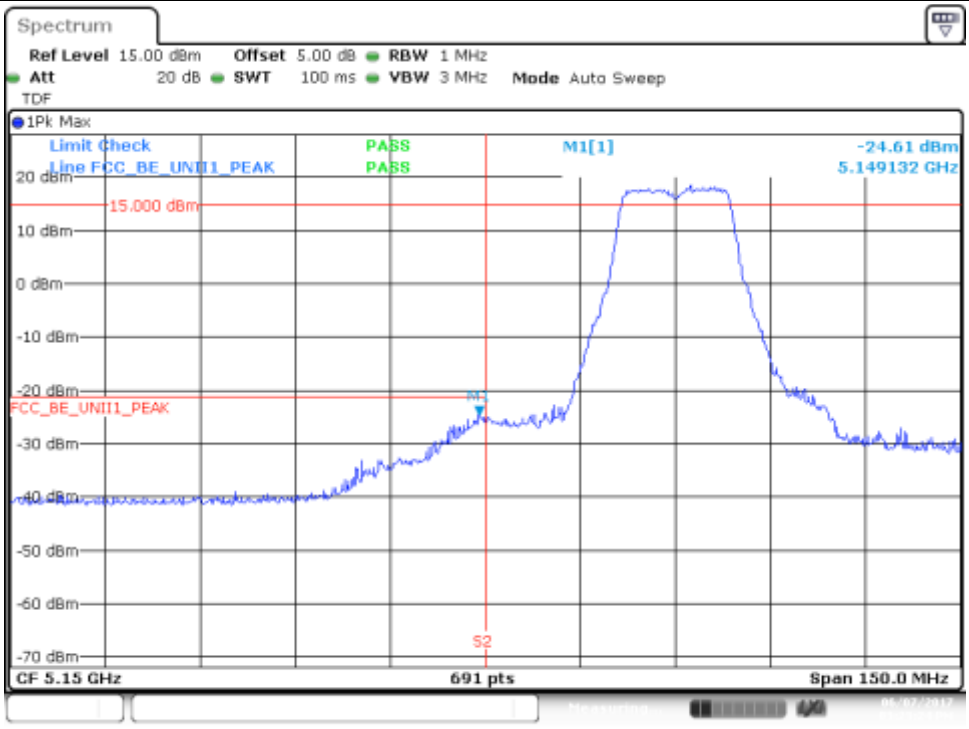


BE Low Freq Section, Peak – CH40


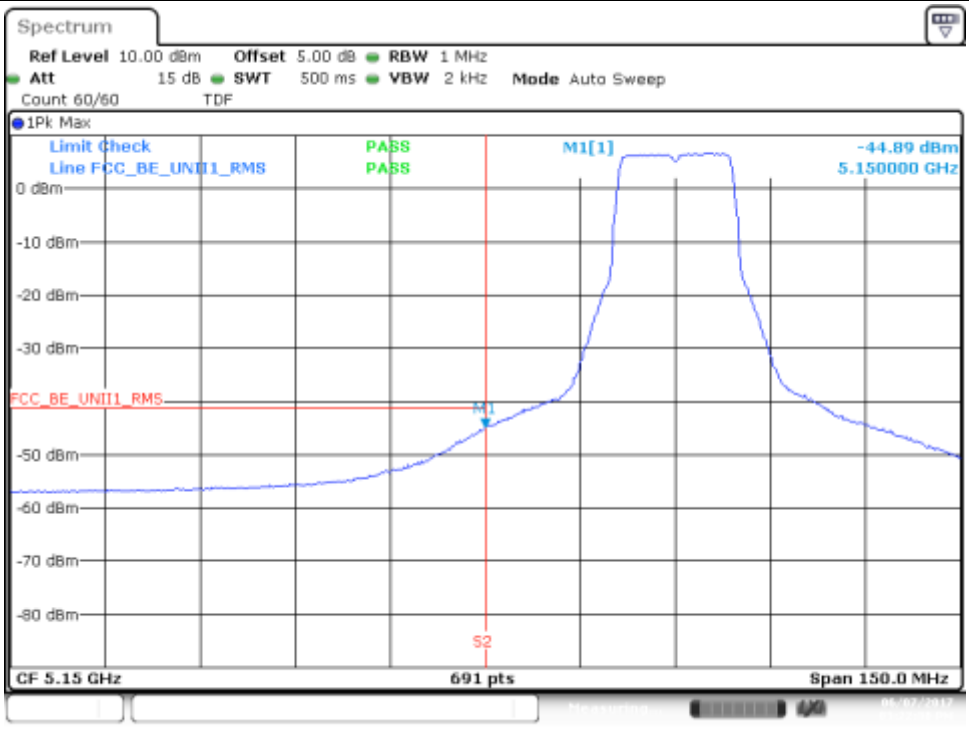
BE Low Freq Section, RMS – CH40


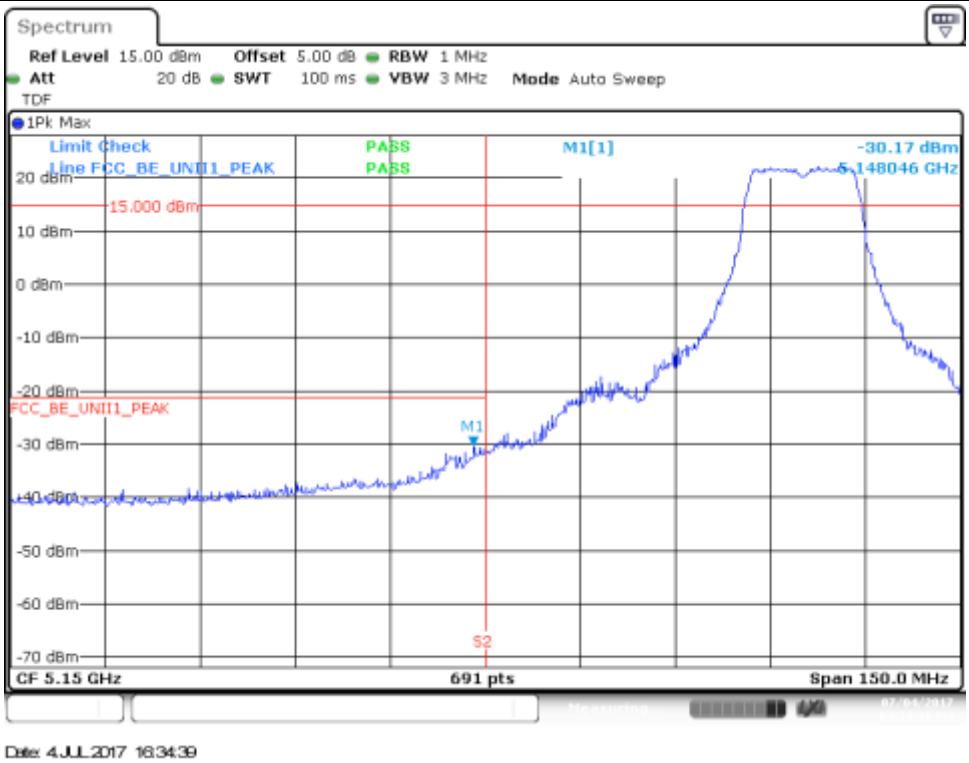
802.11n20, HT8 (MIMO) – Chain B

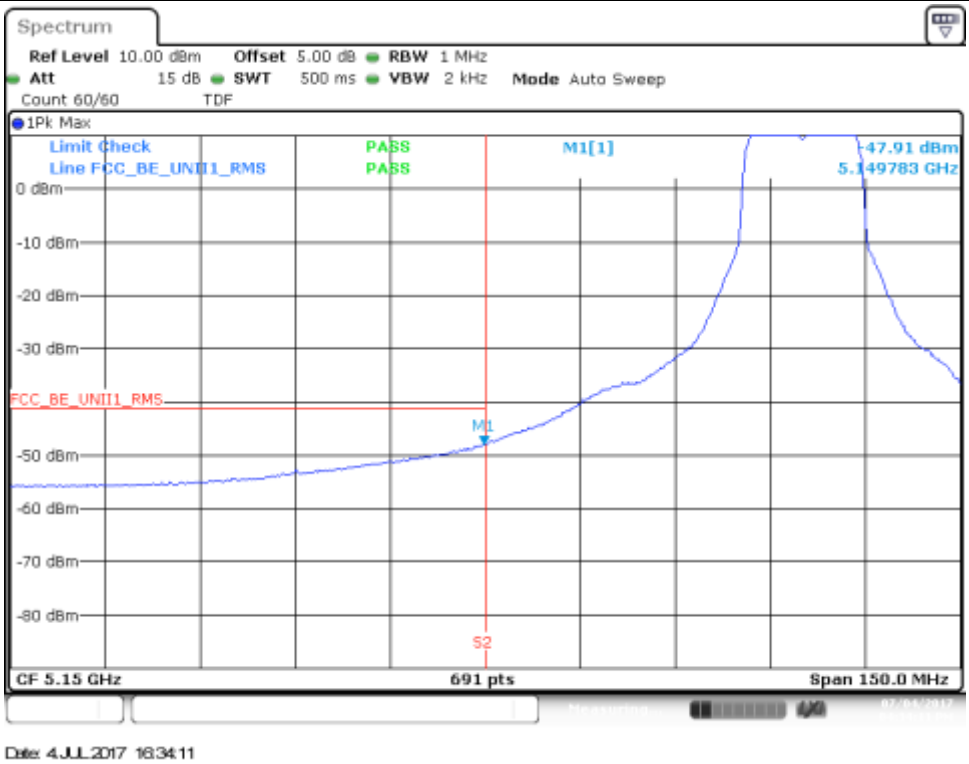
BE Low Freq Section, Peak – CH36



BE Low Freq Section, RMS – CH36

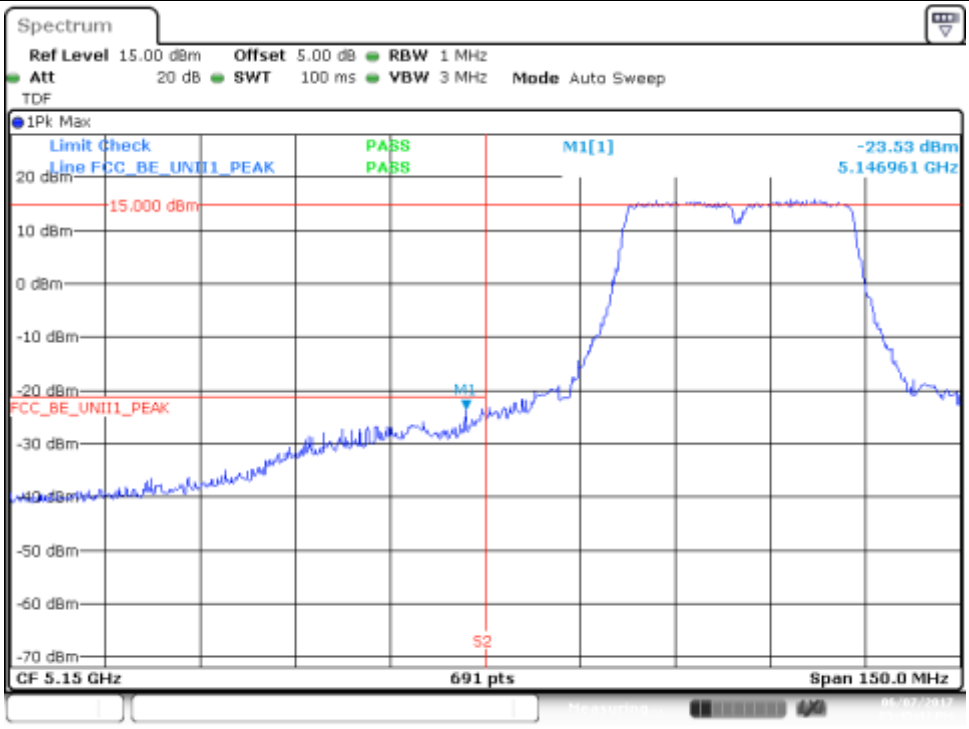


BE Low Freq Section, Peak – CH40


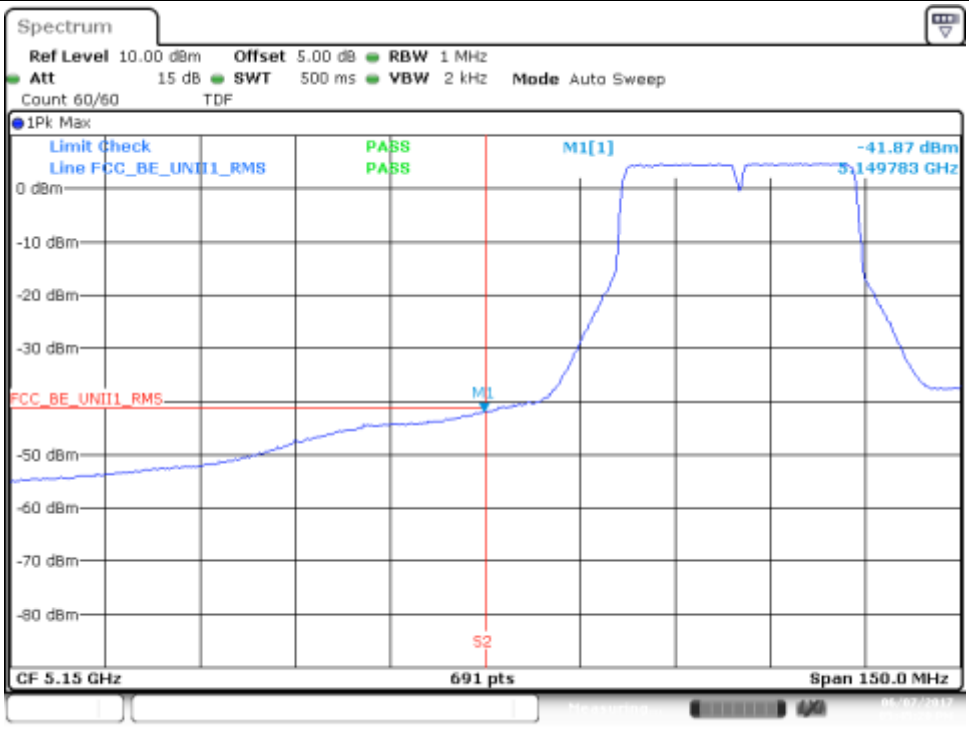
BE Low Freq Section, RMS – CH40


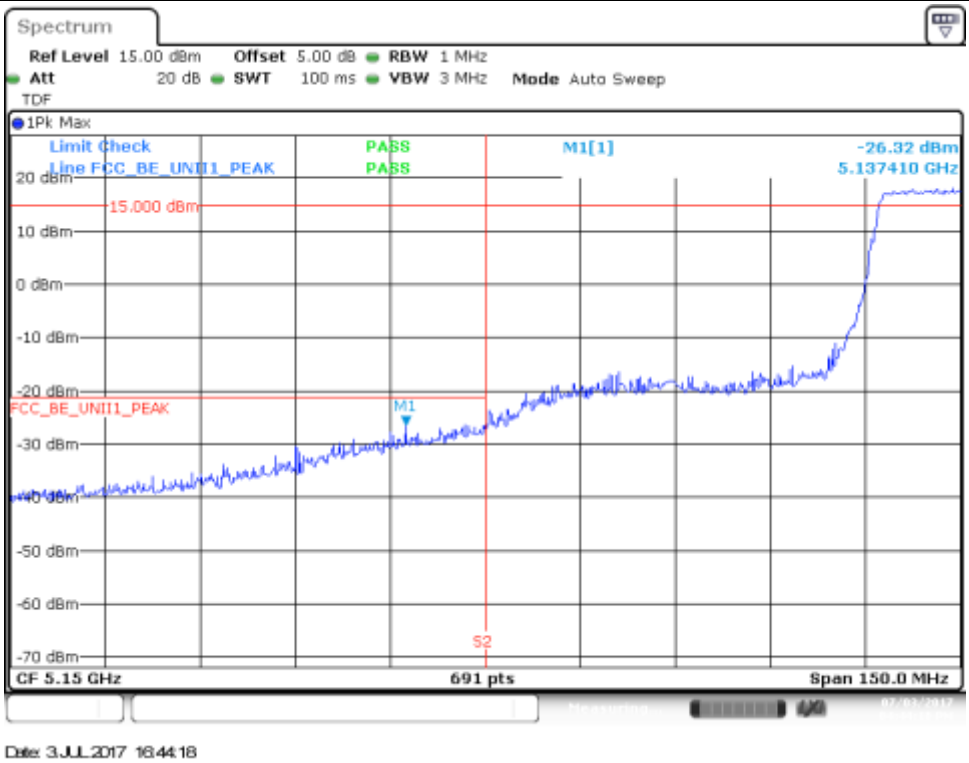
802.11n40, HT0 (SISO) – Chain A

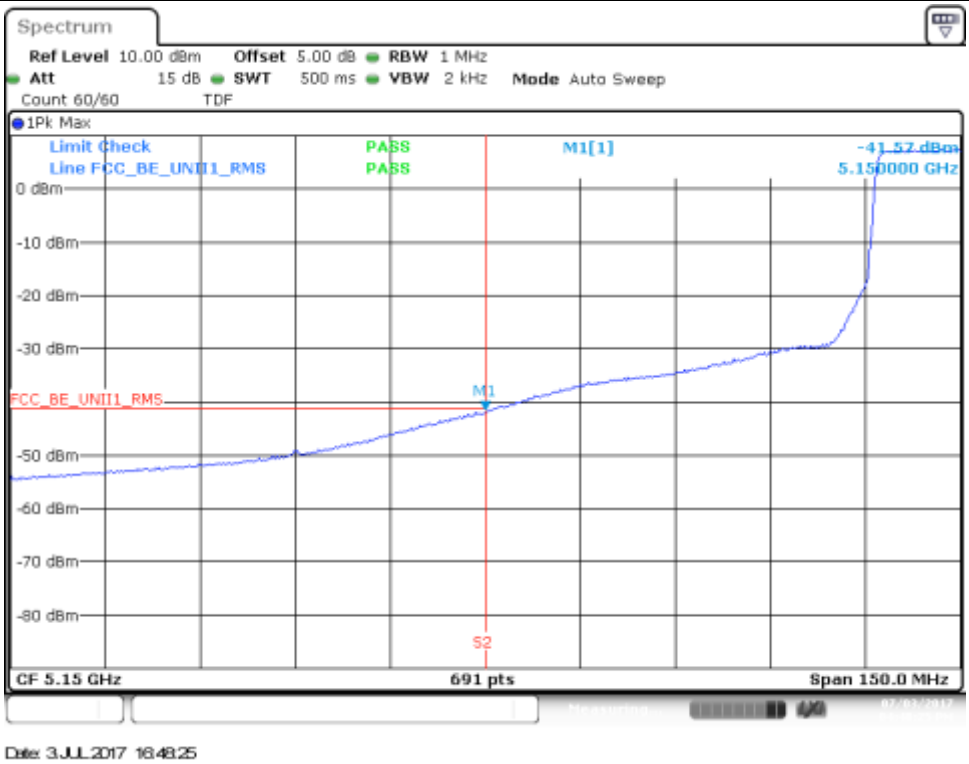
BE Low Freq Section, Peak – CH38F



BE Low Freq Section, RMS – CH38F

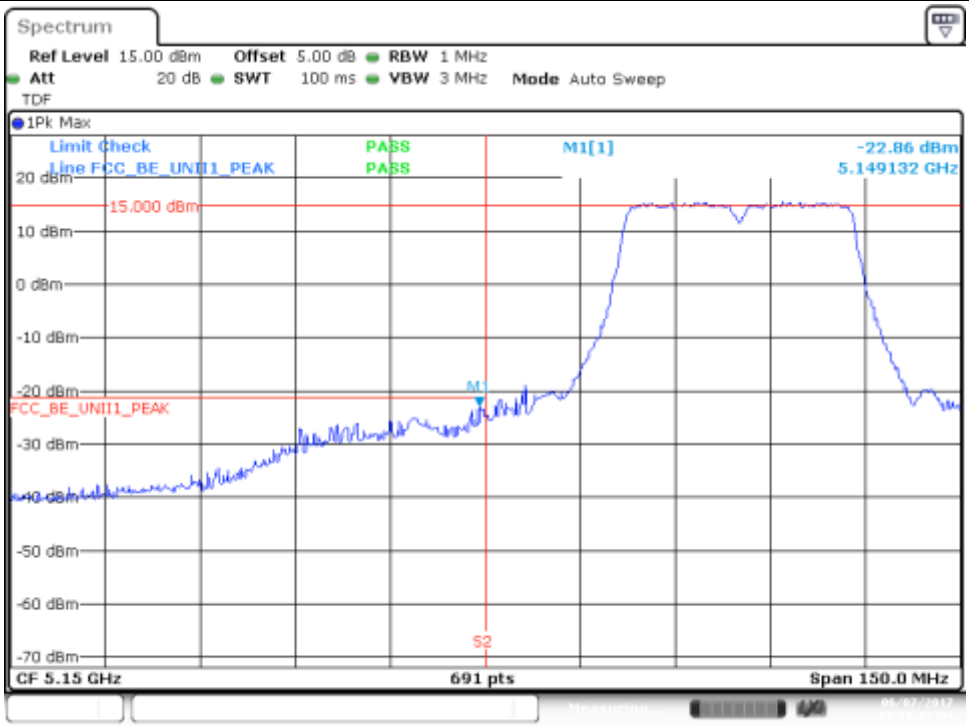


BE Low Freq Section, Peak – CH46F


BE Low Freq Section, RMS – CH46F


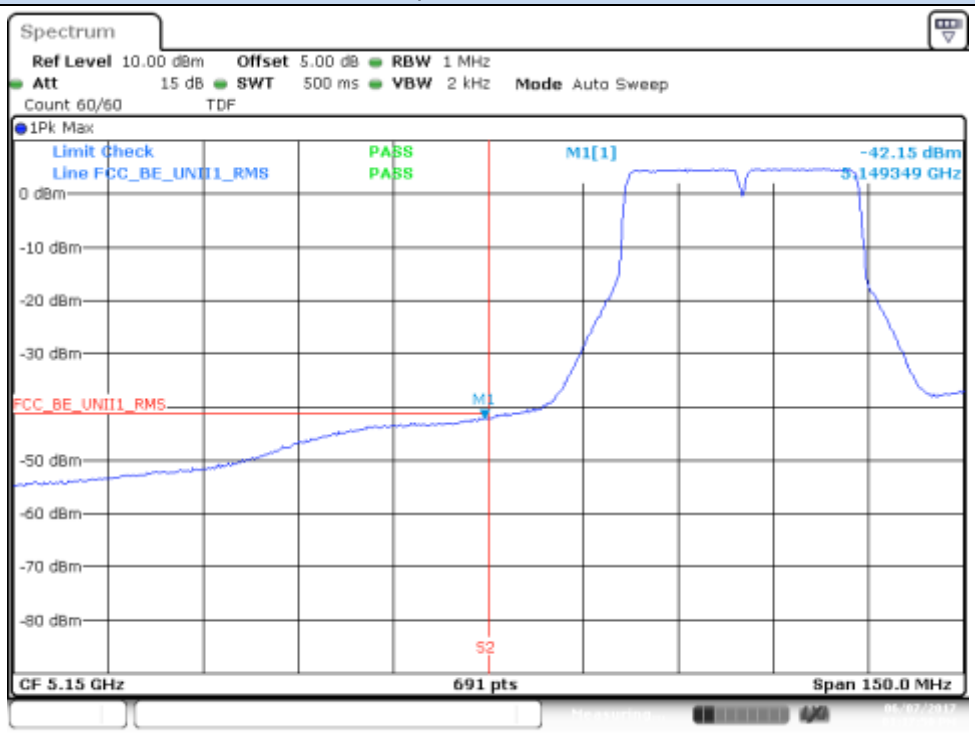
802.11n40, HT0 (SISO) – Chain B

BE Low Freq Section, Peak – CH38F



Date: 7.JUN.2017 13:18:14

BE Low Freq Section, RMS – CH38F



Date: 7.JUN.2017 13:17:50

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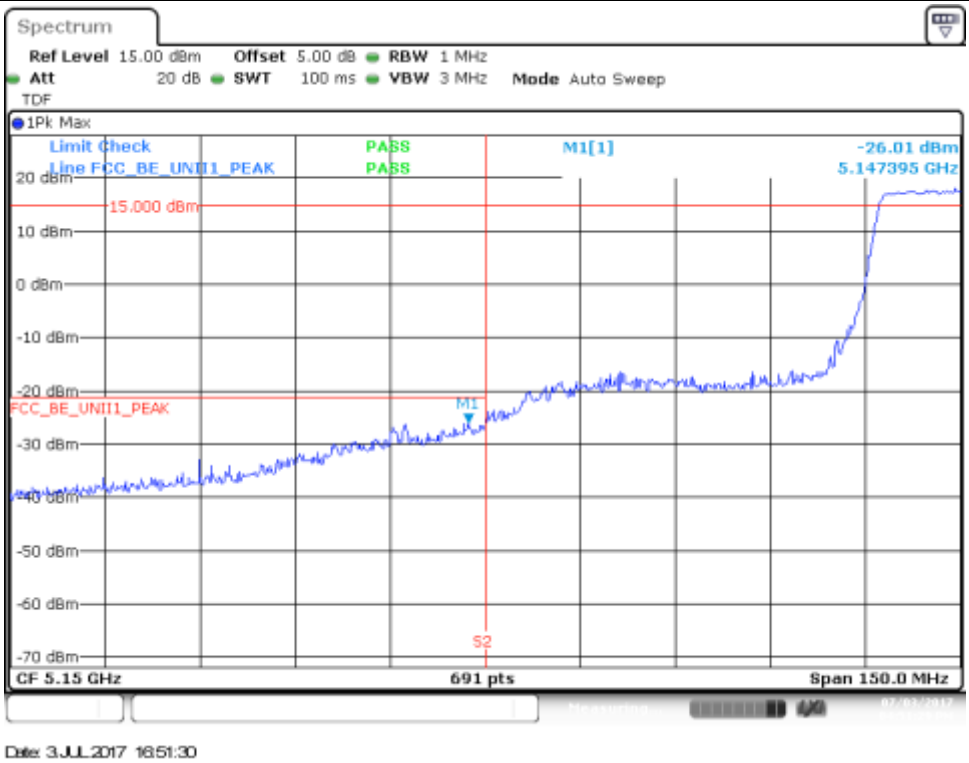
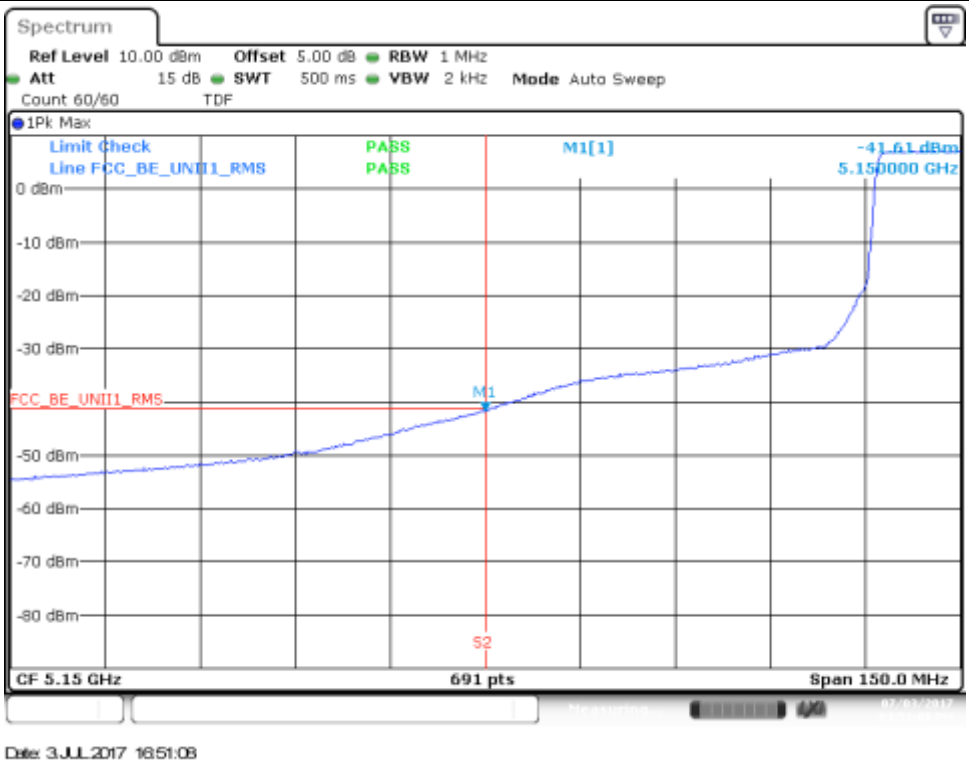
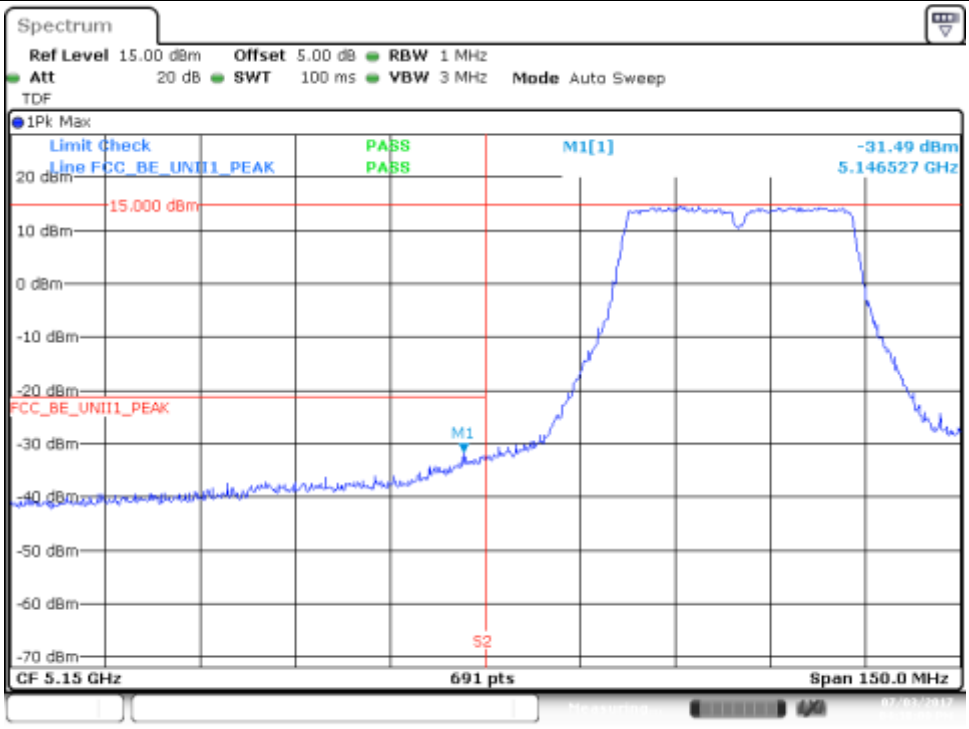


BE Low Freq Section, RMS – CH46F


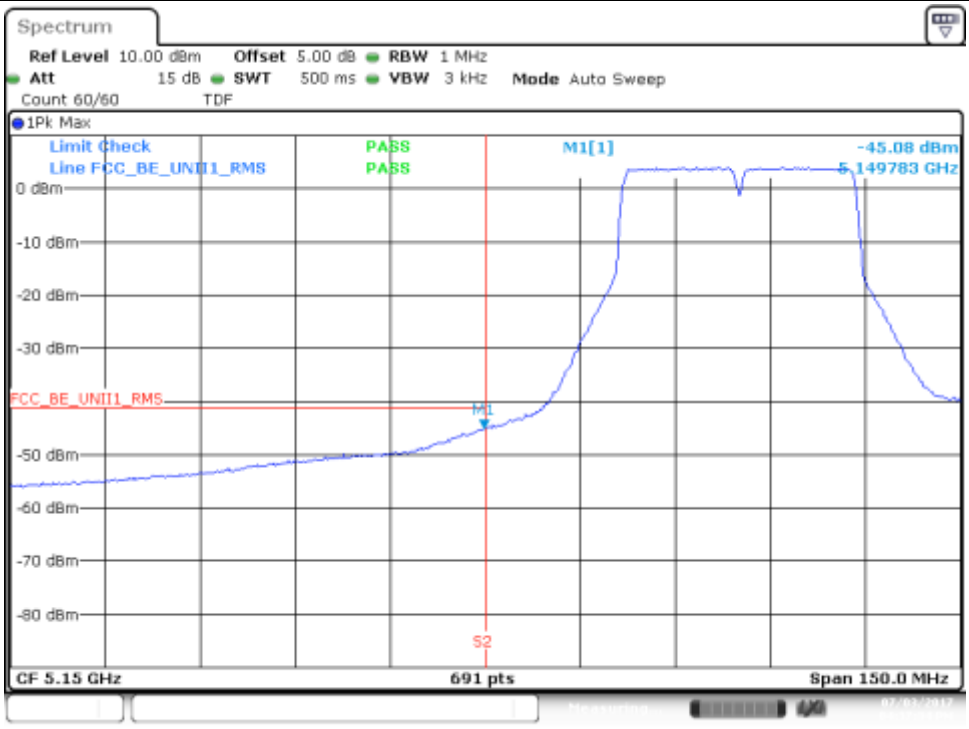
802.11n40, HT8 (MIMO) – Chain A

BE Low Freq Section, Peak – CH38F



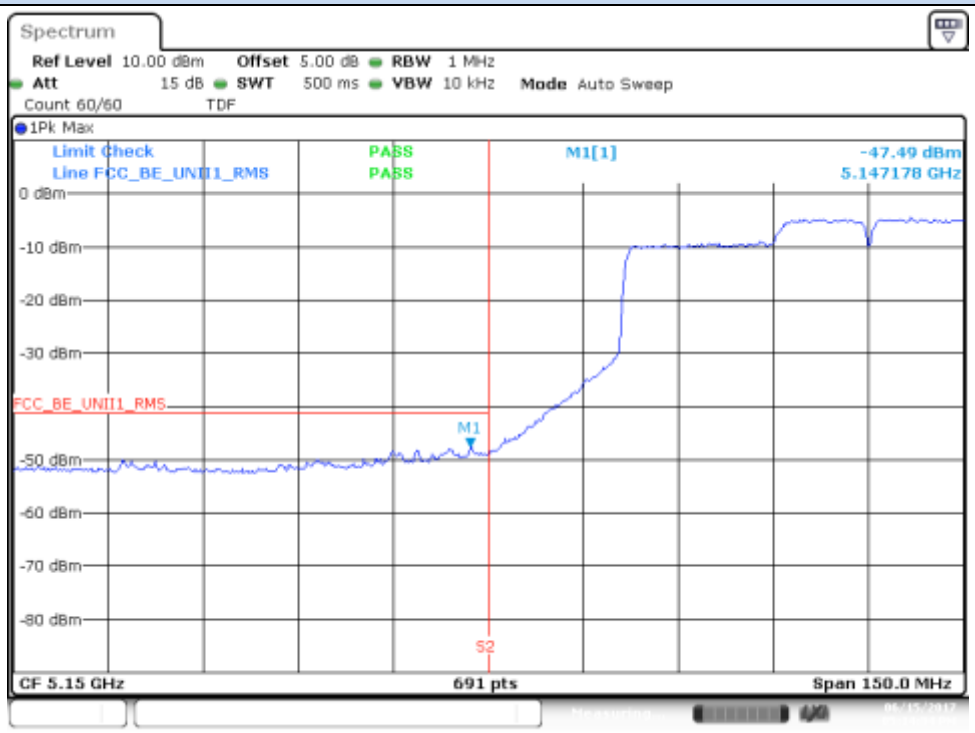
Date: 3.JUL.2017 16:38:01

BE Low Freq Section, RMS – CH38F



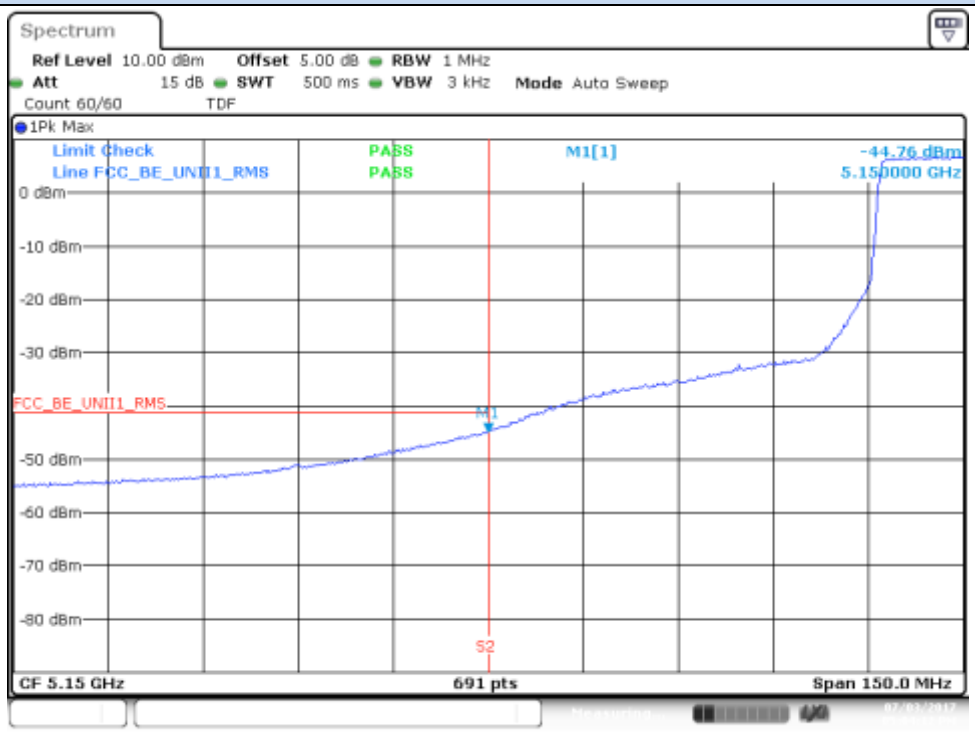
Date: 3.JUL.2017 16:37:34

BE Low Freq Section, Peak – CH46F



Date: 15.JUN.2017 17:14:34

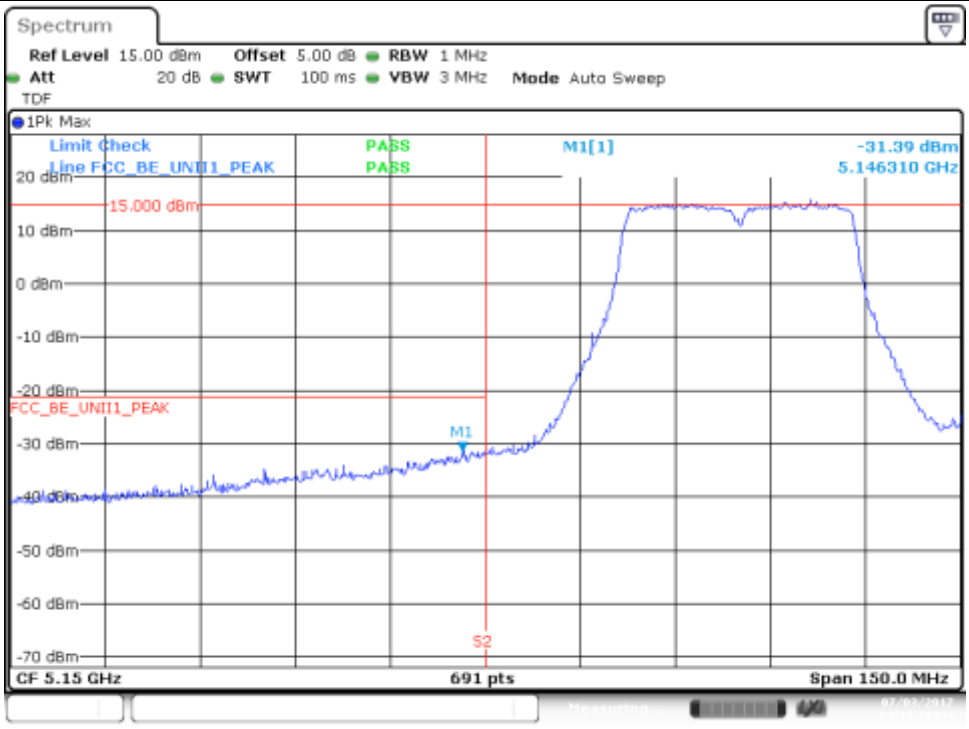
BE Low Freq Section, RMS – CH46F



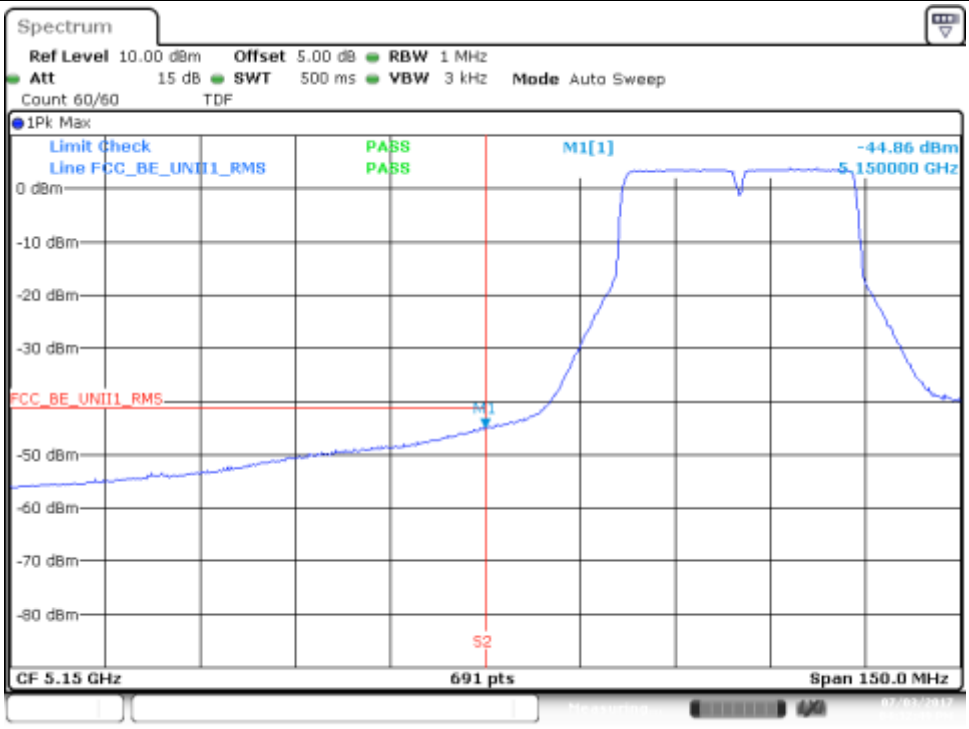
Date: 3.JUL.2017 17:04:12

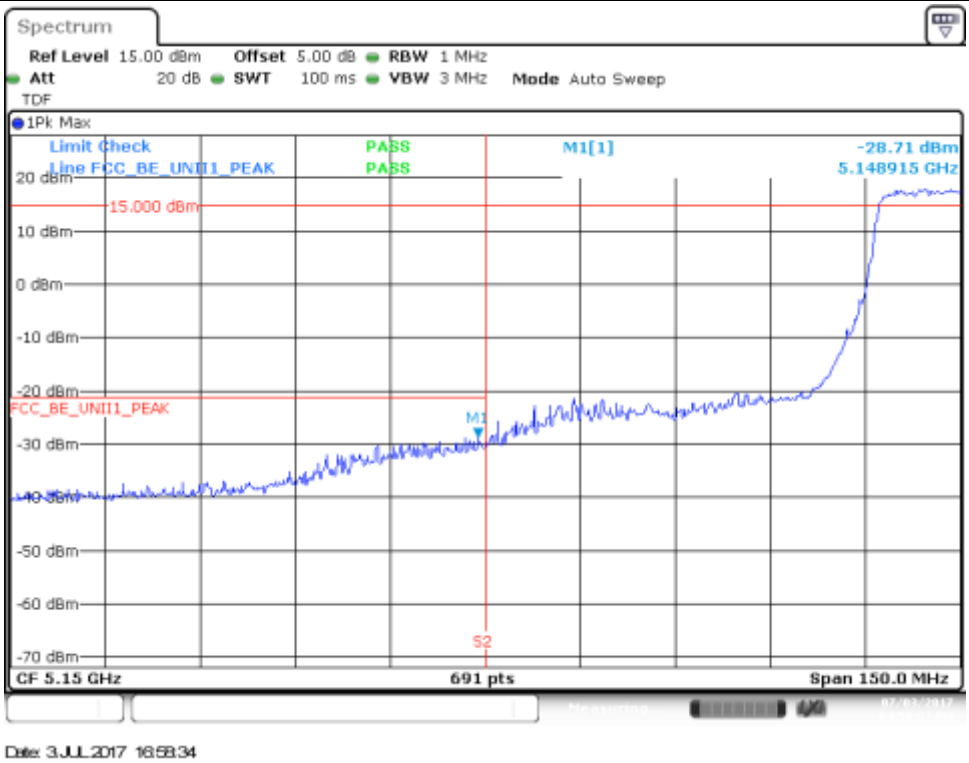
802.11n40, HT8 (MIMO) – Chain B

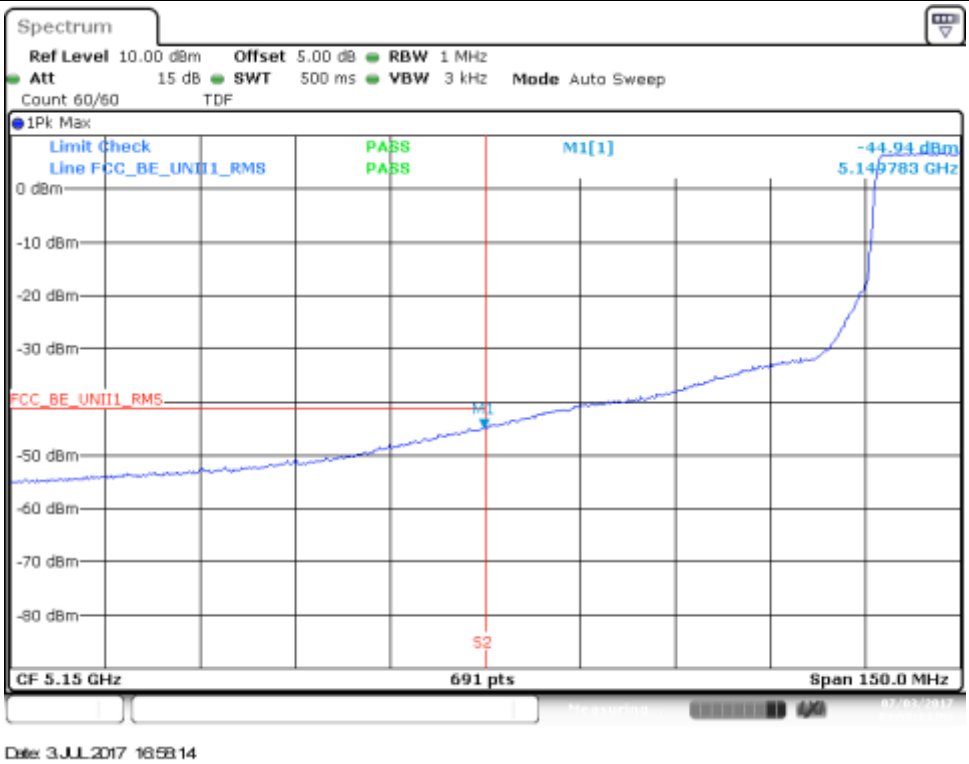
BE Low Freq Section, Peak – CH38F



BE Low Freq Section, RMS – CH38F

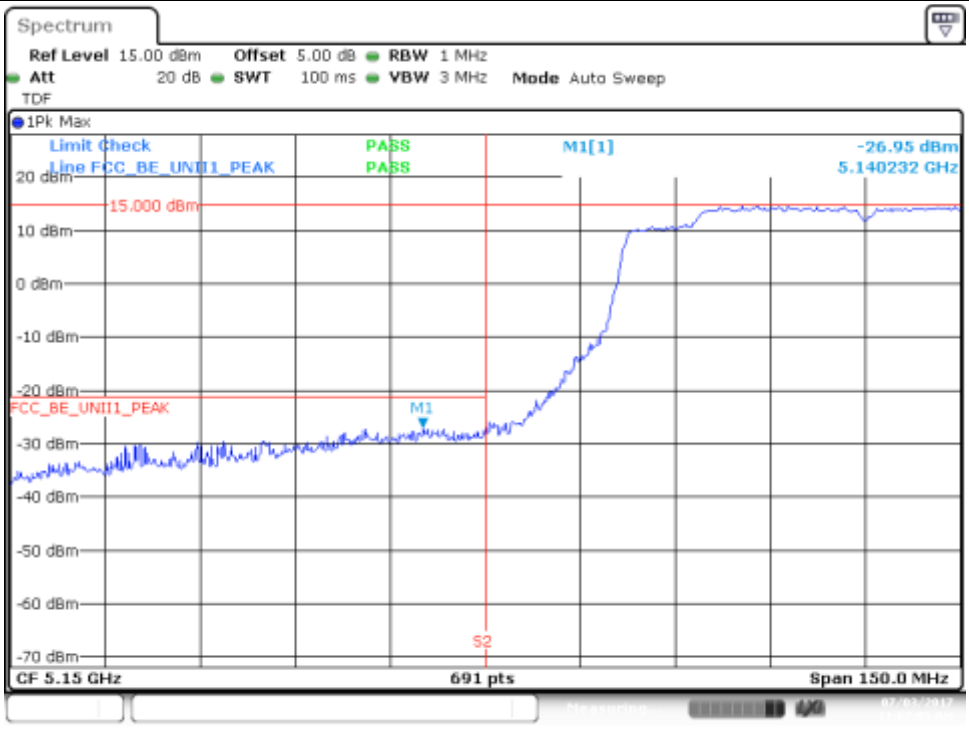


BE Low Freq Section, Peak – CH46F


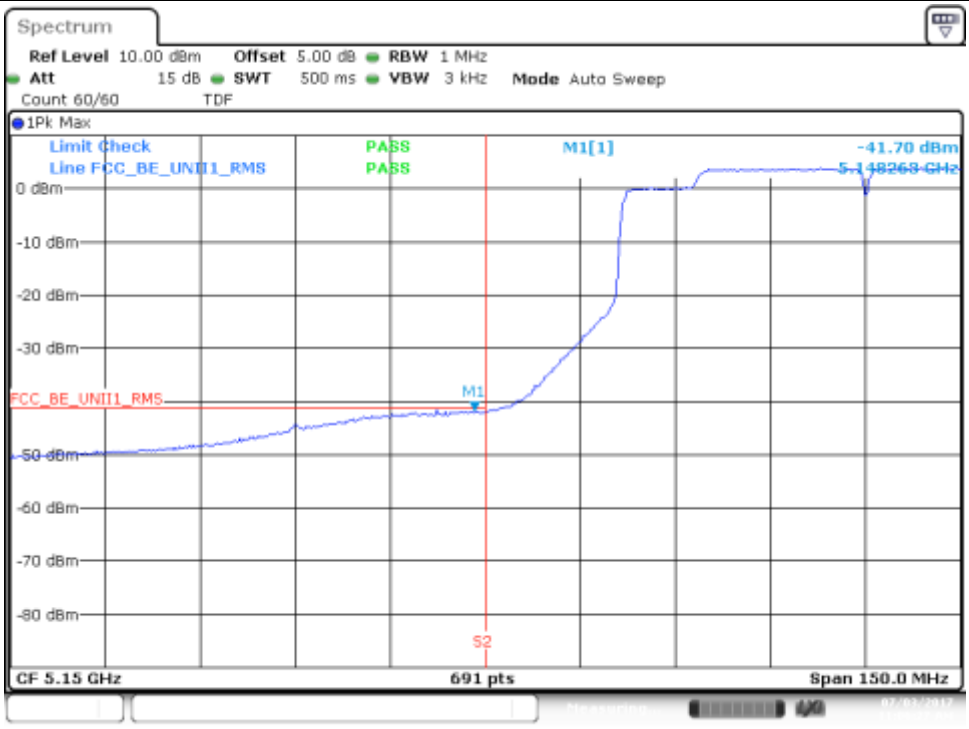
BE Low Freq Section, RMS – CH46F


802.11ac80, VHT0 (SISO) – Chain A

BE Low Freq Section, Peak – CH42ac80

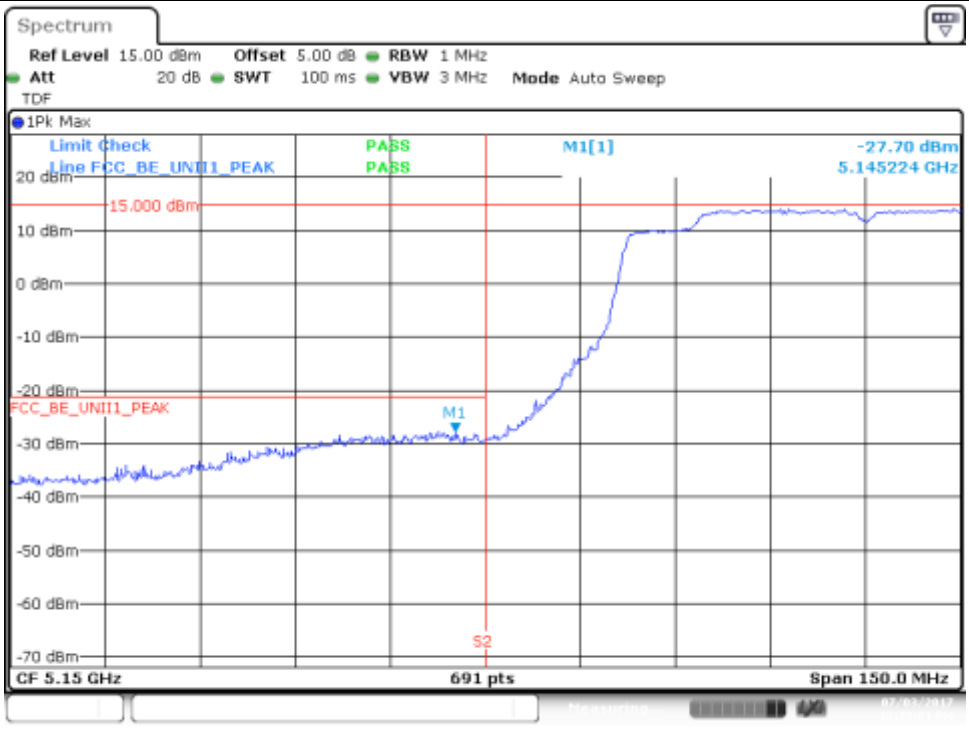


BE Low Freq Section, RMS – CH42ac80

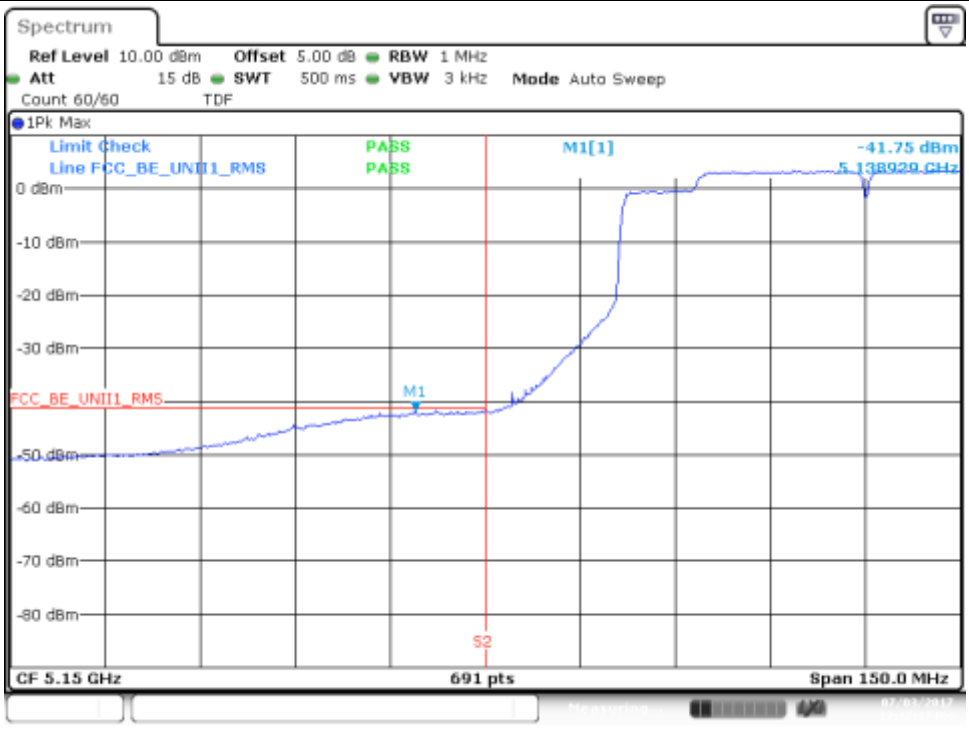


802.11ac80, VHT0 (SISO) – Chain B

BE Low Freq Section, Peak – CH42ac80

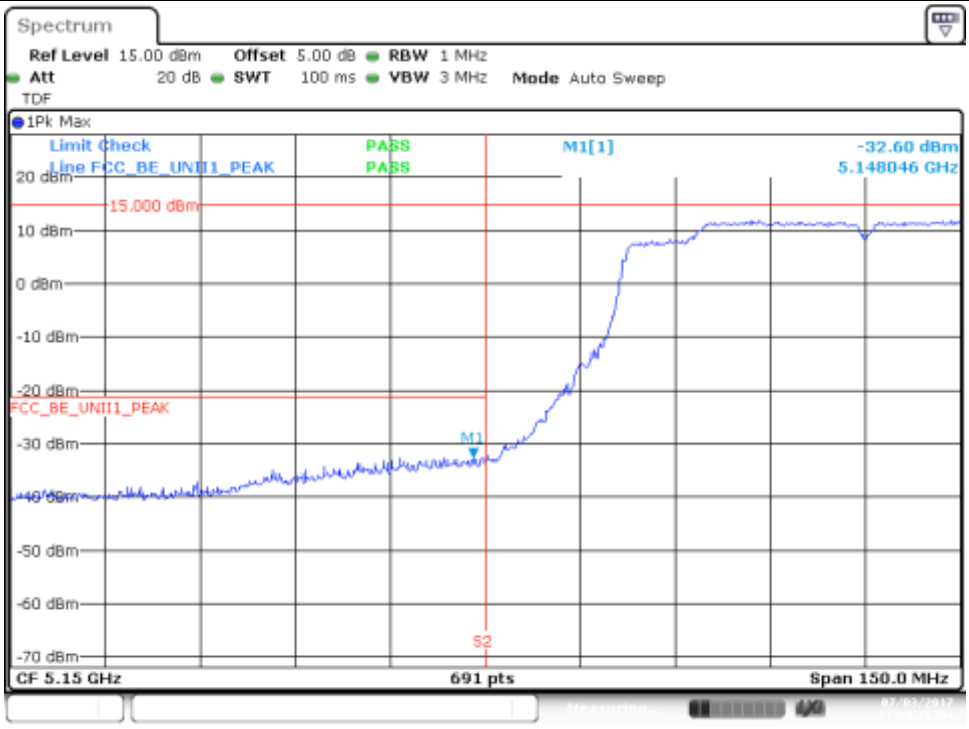


BE Low Freq Section, RMS – CH42ac80

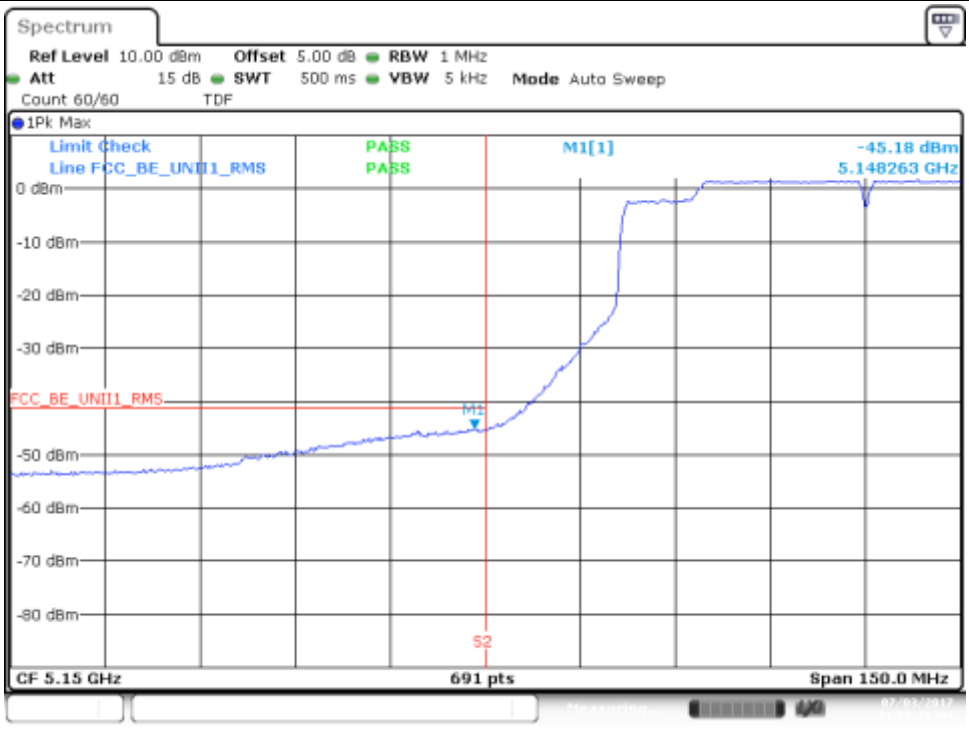


802.11ac80, VHT0 (MIMO) – Chain A

BE Low Freq Section, Peak – CH42ac80

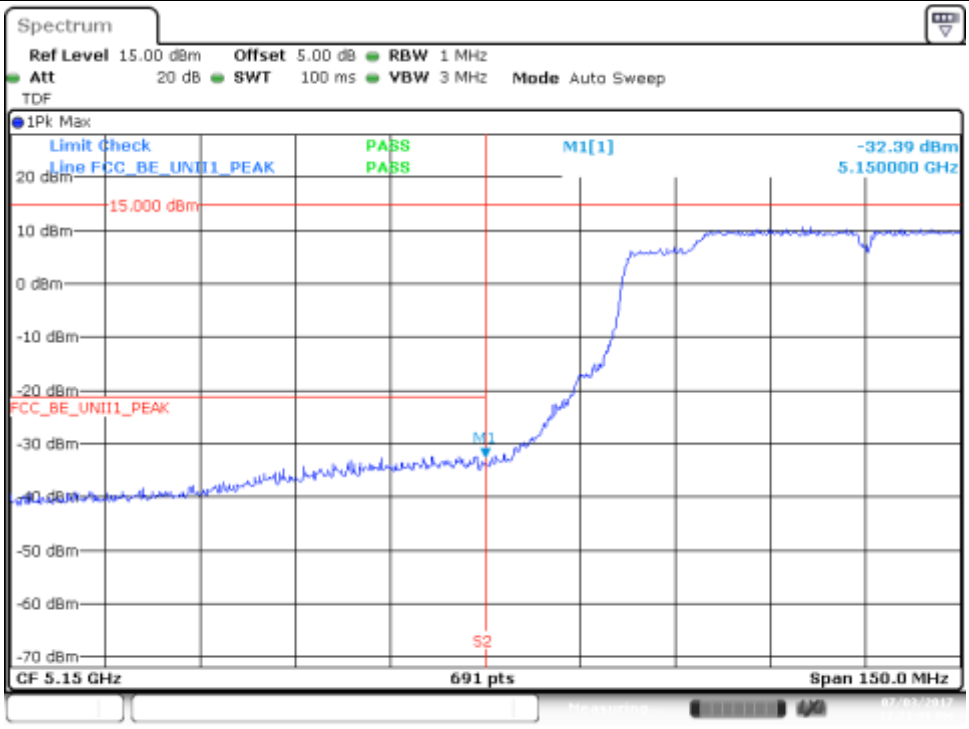


BE Low Freq Section, RMS – CH42ac80

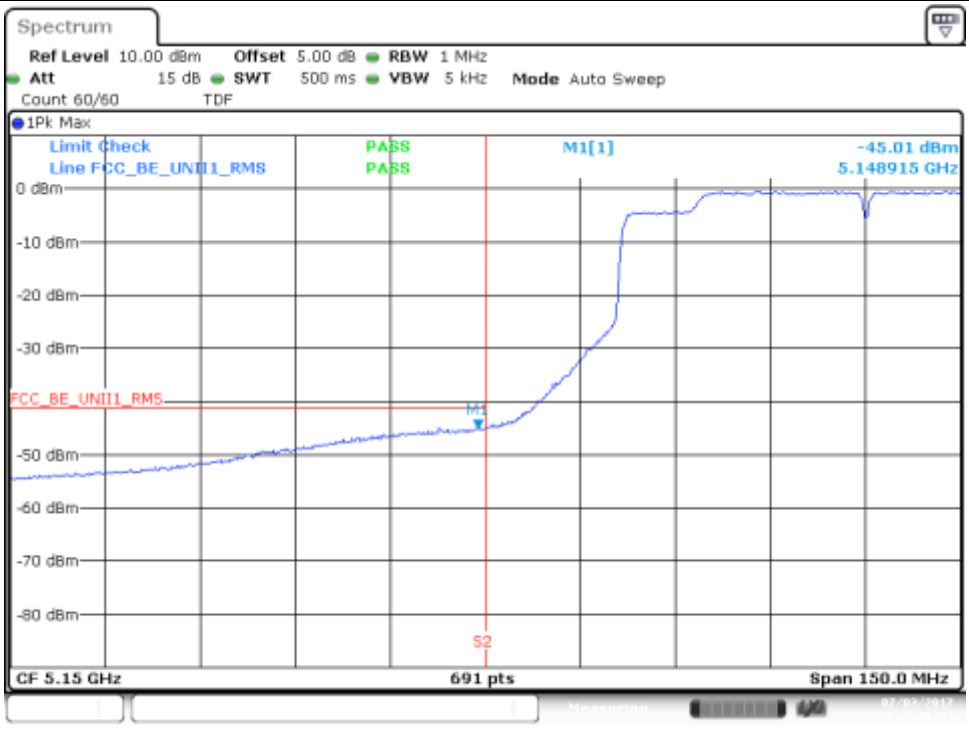


802.11ac80, VHT0 (MIMO) – Chain B

BE Low Freq Section, Peak – CH42ac80

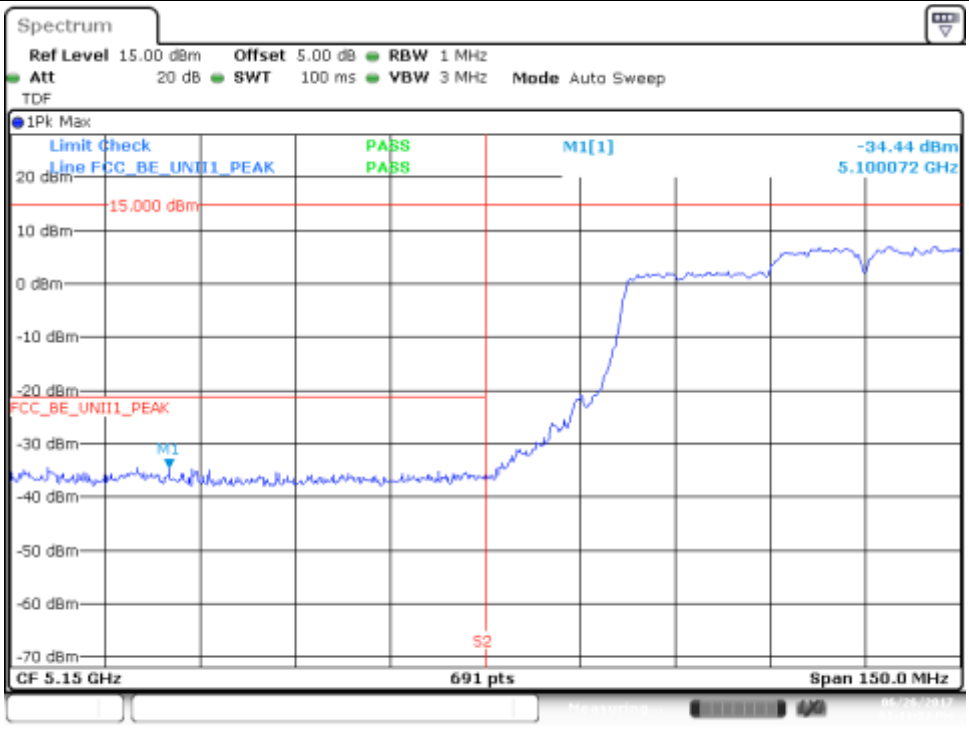


BE Low Freq Section, RMS – CH42ac80

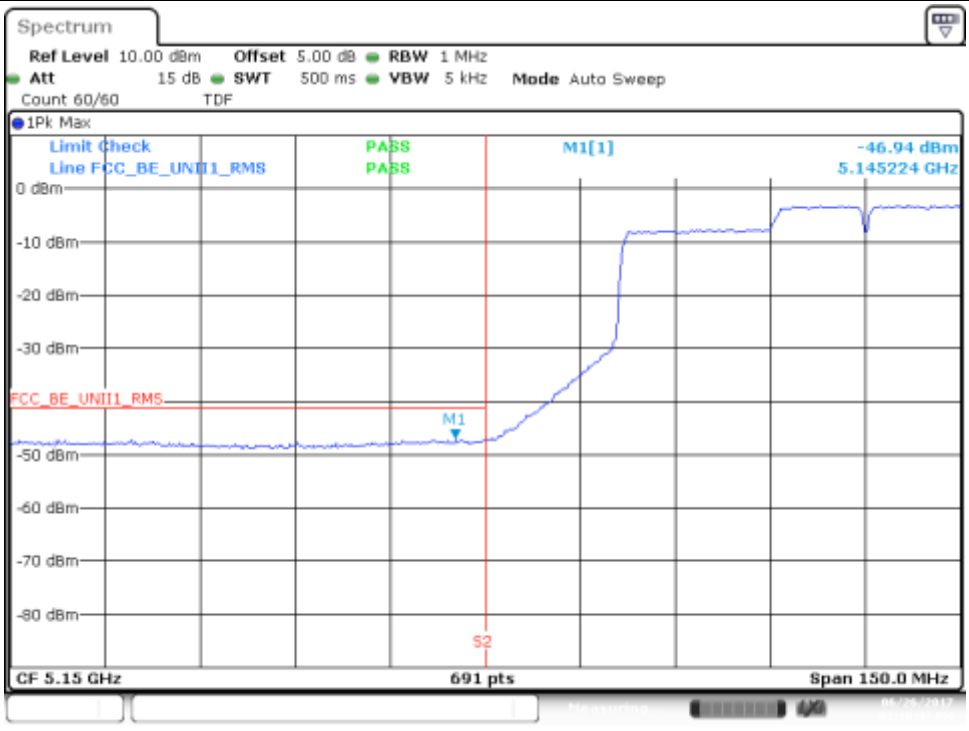


802.11ac160, VHT0 (SISO) – Chain A

BE Low Freq Section, Peak – CH50ac160

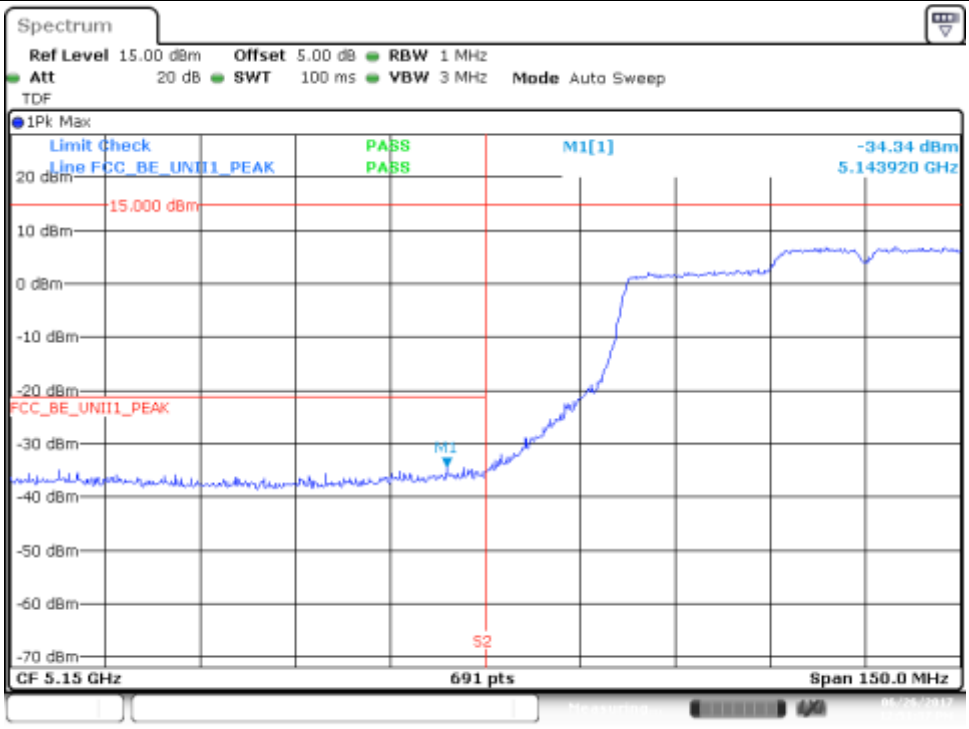


BE Low Freq Section, RMS – CH50ac160

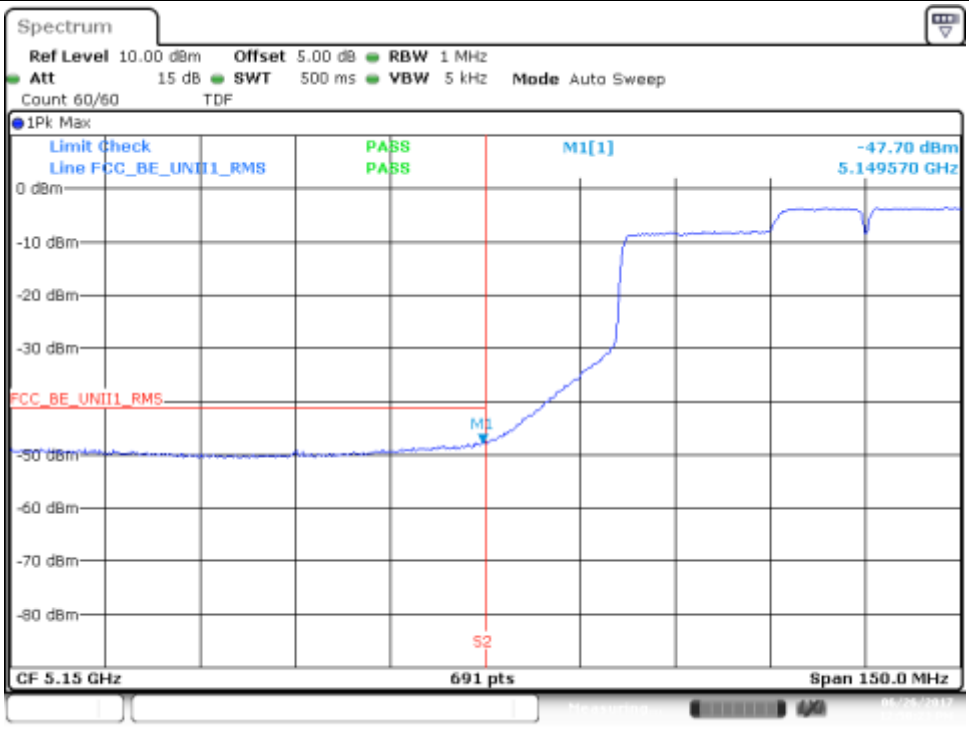


802.11ac160, VHT0 (SISO) – Chain B

BE Low Freq Section, Peak – CH50ac160

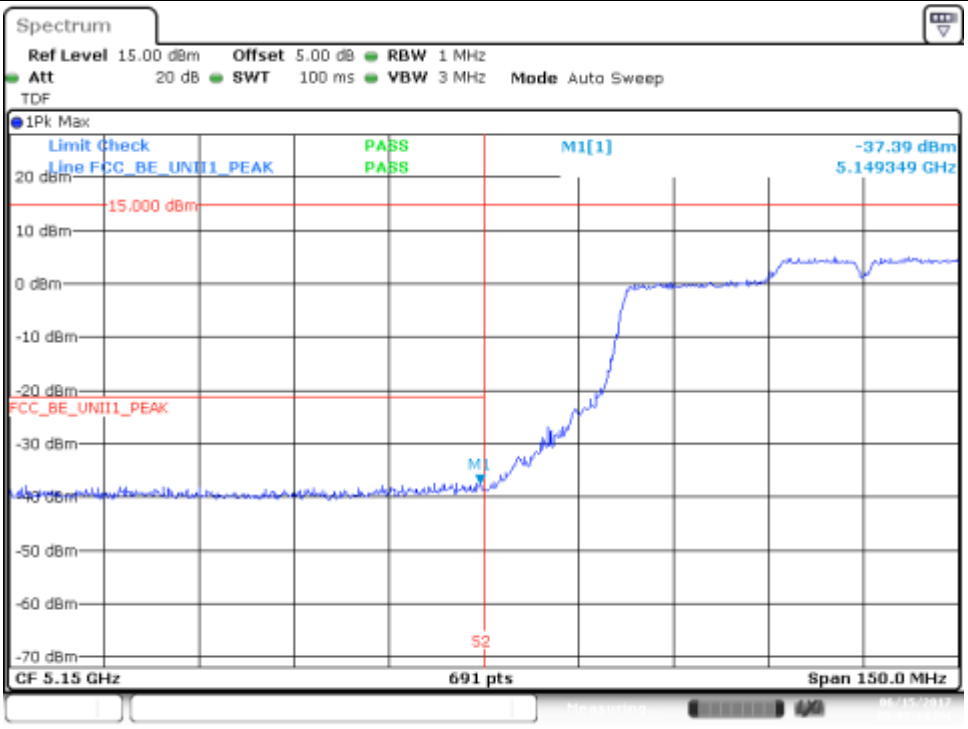


BE Low Freq Section, RMS – CH50ac160

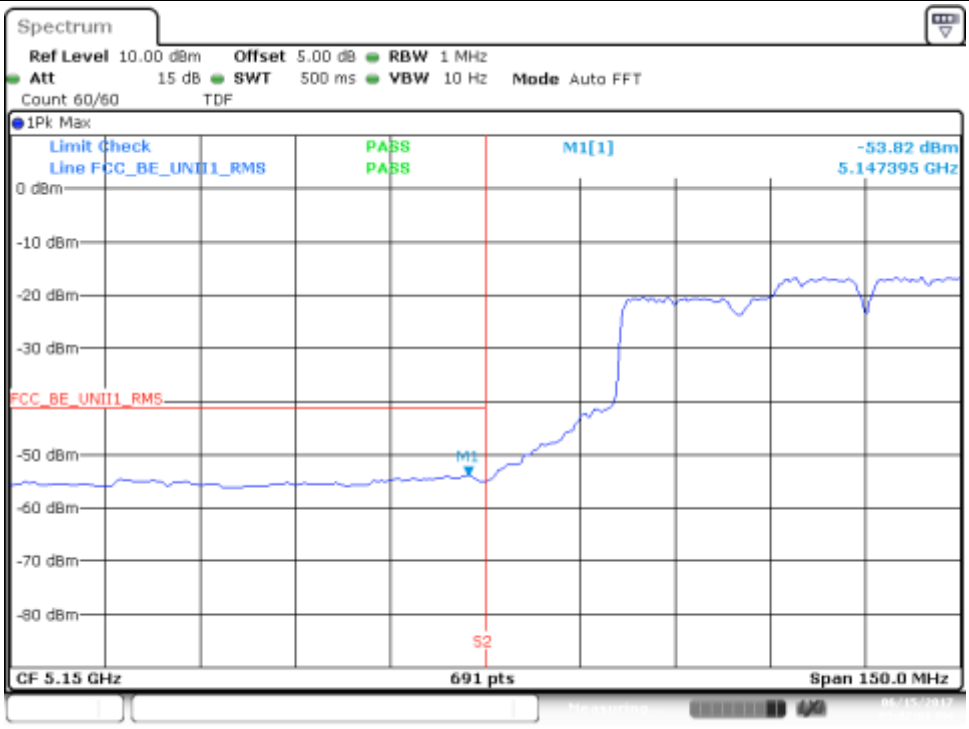


802.11ac160, VHT0 (MIMO) – Chain A

BE Low Freq Section, Peak – CH50ac160

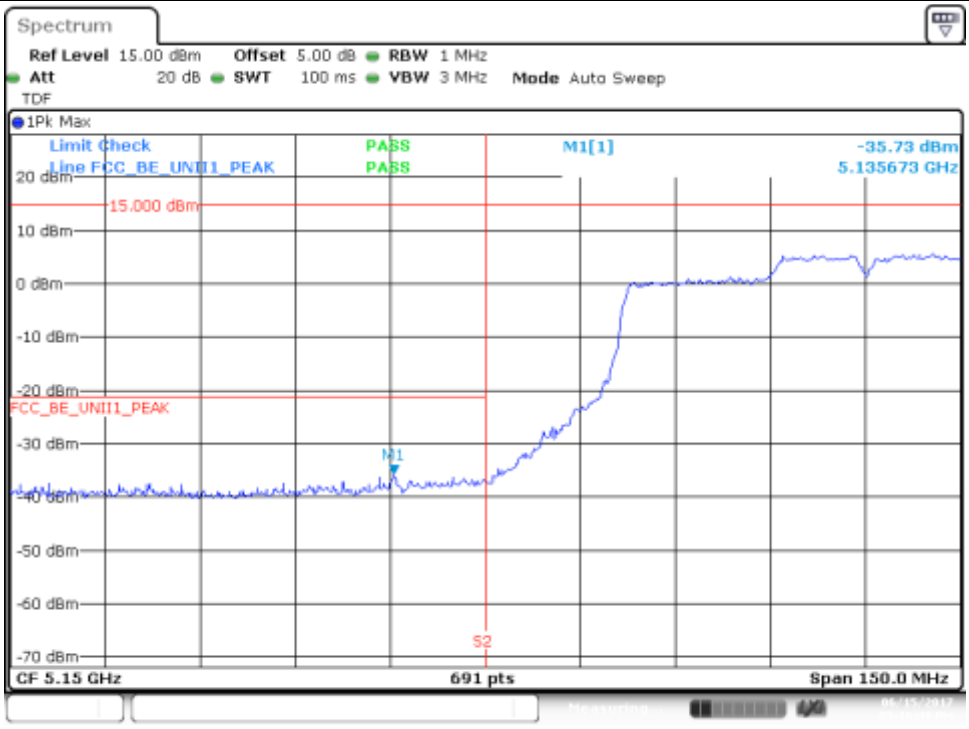


BE Low Freq Section, RMS – CH50ac160

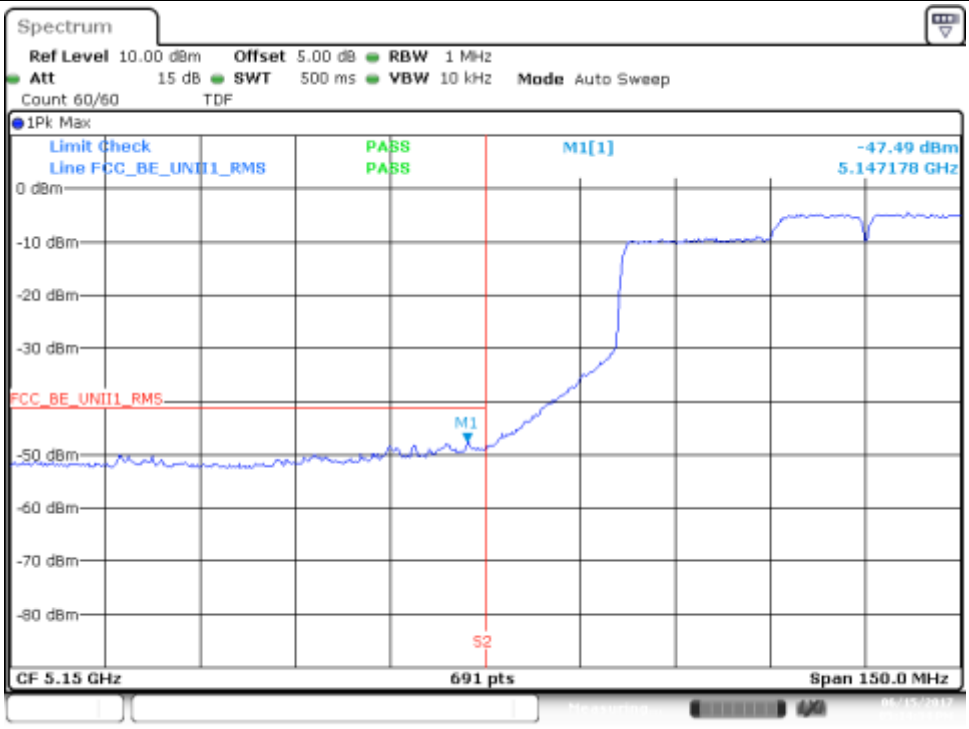


802.11ac160, VHT0 (MIMO) – Chain B

BE Low Freq Section, Peak – CH50ac160



BE Low Freq Section, RMS – CH50ac160

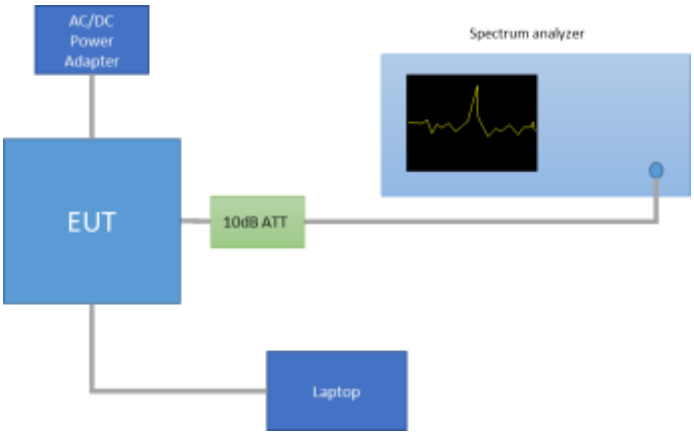


B.4 Test Results Tables U-NII-2A

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	SISO CHAIN A	52	5260	45.65	**28.64**
			56	5280	27.42	17.40
			64	5320	23.87	16.84
		SISO CHAIN B	52	5260	29.22	17.76
			56	5280	29.22	17.76
			64	5320	23.97	16.84
802.11n20	HT0	SISO CHAIN A	52	5260	49.00	29.04
			56	5280	28.22	18.20
			64	5320	24.87	17.92
		SISO CHAIN B	52	5260	48.95	**29.64**
			56	5280	29.28	18.32
			64	5320	24.62	17.92
	HT8	MIMO CHAIN A	52	5260	25.47	17.96
			56	5280	25.72	17.96
			64	5320	24.62	17.92
		MIMO CHAIN B	52	5260	25.87	18.04
			56	5280	25.67	18.00
			64	5320	24.72	17.92
802.11n40	HT0	SISO CHAIN A	54F	5270	42.97	**36.56**
			62F	5310	43.60	**36.56**
		SISO CHAIN B	54F	5270	42.24	**36.56**
			62F	5310	43.78	**36.56**
	HT8	MIMO CHAIN A	54F	5270	44.86	**36.56**
			62F	5310	44.50	**36.56**
		MIMO CHAIN B	54F	5270	43.15	36.40
			62F	5310	42.88	36.40
802.11ac80	VHT0	SISO CHAIN A	58ac80	5290	85.21	**75.24**
		SISO CHAIN B	58ac80	5290	85.40	**75.24**
		MIMO CHAIN A	58ac80	5290	87.30	**75.24**
		MIMO CHAIN B	58ac80	5290	87.49	75.12

Max Value

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.

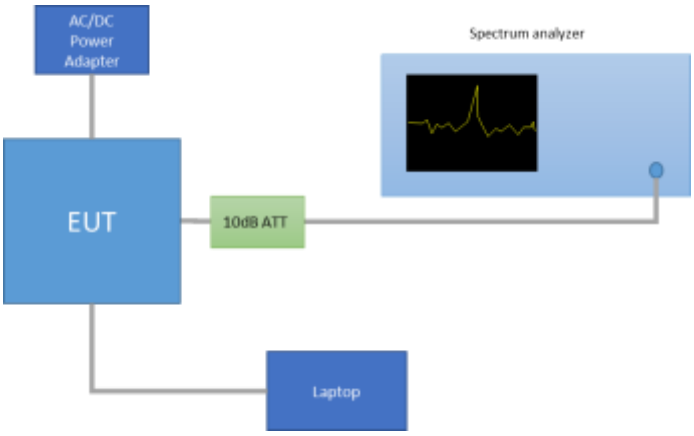
The maximum power spectral density (PSD) was measured using the method according to point F) (Method SA-2 Alternative) of KDB 789033 D02.

In the measure-and-sum approach for MIMO mode, the conducted emission level (e.g., transmit power or power in specified bandwidth) is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically in linear power units to determine the total emission level from the device.

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	SISO-A	2.04	2.07	98.31%
		SISO-B	2.04	2.07	98.36%
802.11n20	HT0	SISO-A	1.90	1.93	98.24%
		SISO-B	1.90	1.93	98.08%
	HT8	MIMO-A	0.97	1.01	96.06%
		MIMO-B	0.97	1.01	96.15%
802.11n40	HT0	SISO-A	0.93	0.97	96.69%
		SISO-B	0.94	0.98	96.52%
	HT8	MIMO-A	0.49	0.53	92.45%
		MIMO-B	0.49	0.53	92.82%
802.11ac80	VHT0	SISO-A	0.46	0.49	93.10%
		SISO-B	0.46	0.49	93.09%
		MIMO-A	0.26	0.29	87.03%
		MIMO-B	0.26	0.29	87.03%
802.11ac160	VHT0	SISO-A	0.25	0.28	88.65%
		SISO-B	0.25	0.28	88.34%
		MIMO-A	0.15	0.19	79.89%
		MIMO-B	0.15	0.19	79.89%

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	SISO CHAIN A	21.02	21.02	126.47	26.02
				SISO CHAIN B	21.43	21.43	139.00	26.43
		56	5280	SISO CHAIN A	21.48	21.48	140.60	26.48
				SISO CHAIN B	21.57	21.57	**143.55**	26.57
		64	5320	SISO CHAIN A	16.32	16.32	**42.85**	21.32
				SISO CHAIN B	16.86	16.86	48.53	21.86
802.11n20	HT0	52	5260	SISO CHAIN A	20.93	20.93	123.88	25.93
				SISO CHAIN B	21.38	21.38	137.40	26.38
		56	5280	SISO CHAIN A	21.41	21.41	138.36	26.41
				SISO CHAIN B	21.53	21.53	142.23	26.53
		64	5320	SISO CHAIN A	16.30	16.30	42.66	21.30
				SISO CHAIN B	16.72	16.72	46.99	21.72
	HT8	52	5260	MIMO CHAIN A	19.62	19.79	95.38	24.79
				MIMO CHAIN B	19.81	19.98	99.55	24.98
				Combined A+B	22.73	22.90	**194.94**	27.90
		56	5280	MIMO CHAIN A	19.58	19.75	94.51	24.75
				MIMO CHAIN B	19.64	19.81	95.73	24.81
				Combined A+B	22.62	22.79	190.24	27.79
		64	5320	MIMO CHAIN A	15.71	15.88	**38.77**	20.88
				MIMO CHAIN B	16.08	16.25	42.17	21.25
				Combined A+B	18.91	19.08	80.94	24.08
802.11n40	HT0	54F	5270	SISO CHAIN A	18.88	19.03	79.92	24.03
				SISO CHAIN B	18.68	18.83	76.45	23.83
		62F	5310	SISO CHAIN A	14.67	14.82	30.31	19.82
				SISO CHAIN B	14.68	14.83	30.44	19.83
	HT8	54F	5270	MIMO CHAIN A	17.61	17.95	62.38	22.95
				MIMO CHAIN B	17.43	17.75	59.62	22.75
				Combined A+B	20.53	20.86	**122.00**	25.86
		62F	5310	MIMO CHAIN A	14.30	14.64	29.11	19.64
				MIMO CHAIN B	14.27	14.59	**28.80**	19.59
				Combined A+B	17.30	17.63	57.91	22.63
802.11ac80	VHT0	58ac80	5290	SISO CHAIN A	15.60	15.91	39.00	20.91
				SISO CHAIN B	15.22	15.53	35.74	20.53
				MIMO CHAIN A	12.54	13.14	20.62	18.14
				MIMO CHAIN B	12.17	12.77	**18.94**	17.77
				Combined A+B	15.37	15.97	**39.56**	20.97

* 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	SISO CHAIN A	9.25	9.25
				SISO CHAIN B	9.66	9.66
		56	5300	SISO CHAIN A	9.80	9.80
				SISO CHAIN B	9.88	9.88
		64	5320	SISO CHAIN A	4.71	4.71
				SISO CHAIN B	5.29	5.29
802.11n20	HT0	52	5260	SISO CHAIN A	8.86	8.86
				SISO CHAIN B	9.30	9.30
		56	5300	SISO CHAIN A	9.48	9.48
				SISO CHAIN B	9.58	9.58
		64	5320	SISO CHAIN A	4.51	4.51
				SISO CHAIN B	4.82	4.82
	HT8	52	5260	MIMO CHAIN A	7.67	7.84
				MIMO CHAIN B	7.89	8.06
				Combined A+B	10.79	10.96
		56	5300	MIMO CHAIN A	7.65	7.82
				MIMO CHAIN B	7.72	7.89
				Combined A+B	10.70	10.87
		64	5320	MIMO CHAIN A	3.80	3.97
				MIMO CHAIN B	4.23	4.40
				Combined A+B	7.03	7.20
802.11n40	HT0	54F	5270	SISO CHAIN A	3.83	3.98
				SISO CHAIN B	3.64	3.79
		62F	5310	SISO CHAIN A	-0.41	-0.26
				SISO CHAIN B	-0.36	-0.21
	HT8	54F	5270	MIMO CHAIN A	2.56	2.90
				MIMO CHAIN B	2.47	2.79
				Combined A+B	5.53	5.86
		62F	5310	MIMO CHAIN A	-0.73	-0.39
				MIMO CHAIN B	-0.67	-0.35
				Combined A+B	2.31	2.64
802.11ac80	VHT0	58ac80	5290	SISO CHAIN A	-1.80	-1.49
				SISO CHAIN B	-2.17	-1.86
				MIMO CHAIN A	-4.73	-4.13
				MIMO CHAIN B	-5.11	-4.51
				Combined A+B	-1.91	-1.30

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

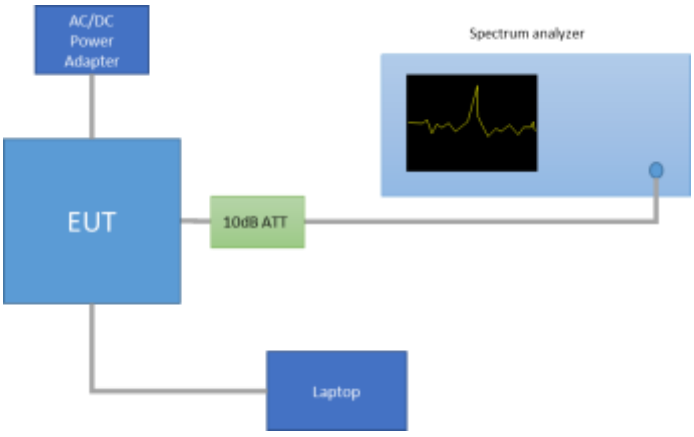
B.4.3 Undesirable emissions limits : Band Edge (Conducted)

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.



Band Edge measurements in average mode on the high frequency section was done with the primary and the Video Bandwidth Method according to section G) 6) (KDB 789033 D02), with the following parameters:

- When the duty cycle is > 98 %, VBW = 10Hz
- When the duty cycle is < 98 %, 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.

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

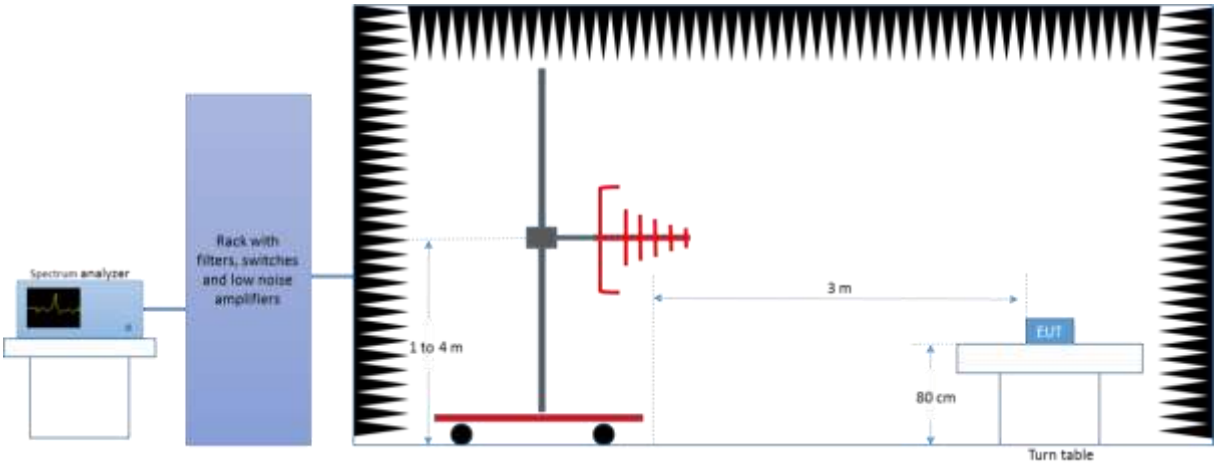
Standard references

<table>
<tr><th>FCC part</th><th>Limits</th></tr>
<tr><td>15.407 (a) (2)</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>

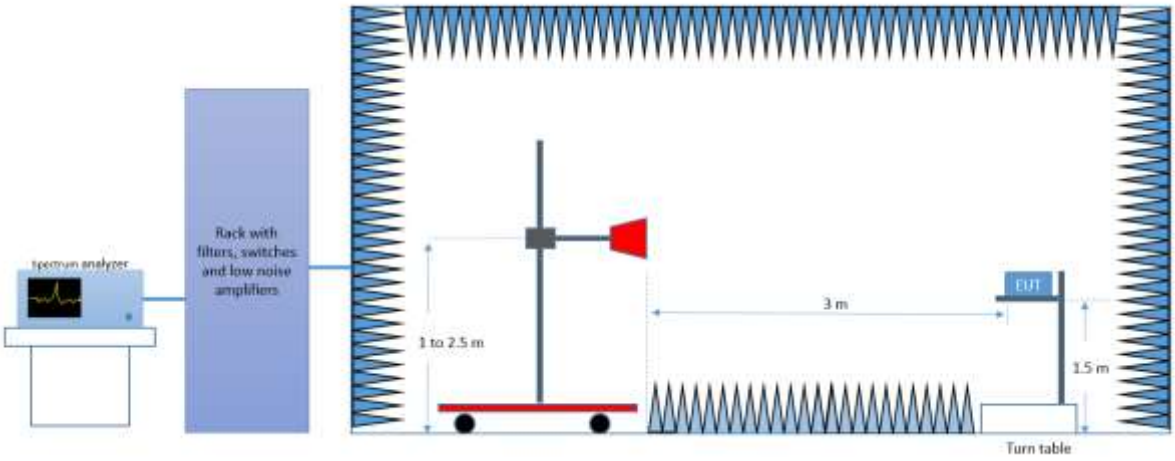
Test procedure

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.
For technologies 802.11n20, 802.11n40, 802.11ac80 and 802.11ac160 the worst case in terms of spurious emissions found among the low, mid and high channels when tested on chain A and B separately is used to perform the test in MIMO mode (Chain A+B).

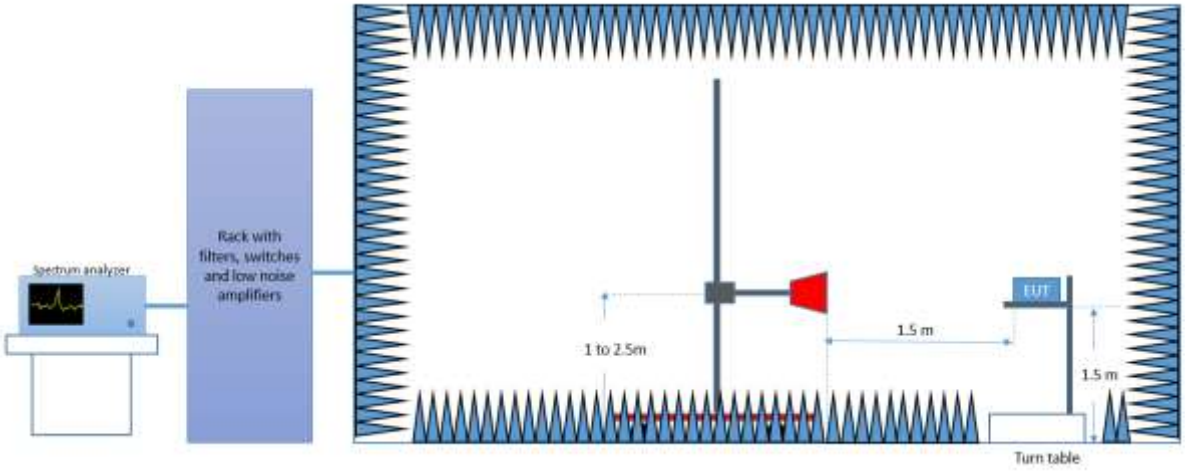
Radiated Setup < 1GHz



Radiated Setup 1 GHz - 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

Radiated Spurious – CH52

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	34.8	---	40	5.3
62.5	---	34.2	40	5.9
1000.0	---	39.0	54	15.1
1187.5	---	37.7	54	16.4
2144.1	49.1	---	74	25.0
2279.1	48.8	---	74	25.2
15779.9	---	44.9	54	9.2
15784.8	54.7	---	74	19.4
17994.6	61.2	---	74	12.9
17997.8	---	49.8	54	4.3
39816.4	57.4	---	74	16.6
39879.0	---	47.3	54	6.8
39948.1	58.1	---	74	15.9
39989.0	---	47.4	54	6.7

Radiated Spurious – CH56

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	---	33.7	40	6.4
62.5	33.1	---	40	7.0
1000.0	---	38.3	54	15.7
1125.2	---	37.8	54	16.2
2168.9	49.0	---	74	25.0
2253.5	48.6	---	74	25.5
15837.5	56.3	---	74	17.7
15837.9	---	45.1	54	9.0
17992.0	61.2	---	74	12.8
18000.0	---	50.0	54	4.1
39860.1	---	47.4	54	6.7
39895.5	---	47.1	54	7.0
39906.8	57.4	---	74	16.6
39996.6	58.0	---	74	16.1

Radiated Spurious – CH64

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	---	34.4	40	5.7
62.5	35.0	---	40	5.0
2149.2	---	41.3	54	12.8
2158.3	52.8	---	74	21.2
2159.3	---	41.3	54	12.8
2418.0	50.1	---	74	23.9
15960.6	57.3	---	74	16.7
15963.8	---	46.2	54	7.8
17979.0	61.5	---	74	12.5
17999.1	---	49.9	54	4.2
39818.5	---	47.5	54	6.5
39843.9	58.6	---	74	15.5
39858.0	57.4	---	74	16.7
39875.9	---	47.3	54	6.8

30 MHz – 40 GHz, 802.11a, 6Mbps, Chain B

Radiated Spurious – CH52

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	---	33.9	40	6.2
62.5	34.6	---	40	5.5
1000.0	---	37.6	54	16.5
1124.9	46.4	---	74	27.7
1187.5	---	37.5	54	16.5
2253.8	50.9	---	74	23.1
15775.0	---	43.8	54	10.3
15777.3	54.5	---	74	19.6
17984.8	61.1	---	74	12.9
17998.7	---	49.8	54	4.2
39792.4	57.6	---	74	16.4
39825.4	---	47.3	54	6.7
39825.7	57.4	---	74	16.7
39870.1	---	47.3	54	6.8

Radiated Spurious – CH56

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	36.2	---	40	3.9
62.5	---	34.5	40	5.6
1000.0	46.3	---	54	7.8
1000.0	---	39.5	54	14.6
1187.5	---	37.6	54	16.5
2142.6	51.8	---	74	22.3
15842.4	---	46.1	54	7.9
15857.1	56.0	---	74	18.1
17979.5	61.2	---	74	12.9
17999.6	---	50.1	54	4.0
39818.5	---	47.5	54	6.5
39843.9	58.6	---	74	15.5
39858.0	57.4	---	74	16.7
39875.9	---	47.3	54	6.8

Radiated Spurious – CH64

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	---	35.2	40	4.9
62.5	**36.6**	---	40	3.5
1000.2	---	38.3	54	15.7
1187.5	---	37.4	54	16.7
2146.3	50.7	---	74	23.4
2343.9	49.1	---	74	25.0
10639.8	---	41.7	54	12.3
10639.8	52.2	---	74	21.9
15963.3	---	46.8	54	7.3
15965.5	57.2	---	74	16.9
22527.0	48.1	---	74	26.0
26730.3	---	37.9	54	16.2
39861.2	---	47.0	54	7.0
39913.9	58.0	---	74	16.1

30 MHz – 40 GHz, 802.11n20, HT0, Chain A

Radiated Spurious – CH52

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.4	**37.2**	---	40	2.9
62.5	---	36.1	40	4.0
1124.9	---	37.4	54	16.7
1124.9	45.5	---	74	28.6
6345.0	---	45.4	54	8.7
6346.7	57.5	---	74	16.6
15779.0	55.8	---	74	18.2
15779.5	---	44.9	54	9.1
17989.7	---	50.0	54	4.0
17998.2	61.9	---	74	12.2
21039.8	---	40.2	54	13.8
39830.0	57.5	---	74	16.5
39857.0	---	47.5	54	6.6
39859.1	---	47.2	54	6.9

Radiated Spurious – CH56

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	---	36.1	40	4.0
62.5	37.3	---	40	2.8
1124.7	45.1	---	74	29.0
1124.9	---	36.9	54	17.2
6229.7	---	45.6	54	8.5
6232.6	58.1	---	74	16.0
15839.7	56.6	---	74	17.5
15841.1	---	45.3	54	8.7
17992.4	61.0	---	74	13.1
17994.6	---	49.8	54	4.3
26716.0	48.2	---	74	25.8
39853.2	---	47.2	54	6.9
39919.8	57.7	---	74	16.3
39992.8	57.5	---	74	16.6

Radiated Spurious – CH64

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
32.5	---	32.2	40	7.9
32.5	34.3	---	40	5.8
1124.9	---	37.0	54	17.1
1124.9	45.2	---	74	28.8
6232.1	---	45.9	54	8.1
6234.1	57.8	---	74	16.2
15960.2	---	46.2	54	7.9
15963.3	57.3	---	74	16.7
17997.3	61.3	---	74	12.7
17997.3	---	50.0	54	4.1
21280.2	---	39.2	54	14.9
25667.5	48.4	---	74	25.7
39865.4	---	47.3	54	6.8
39966.7	57.8	---	74	16.3

30 MHz – 40 GHz, 802.11n20, HT0, Chain B

Radiated Spurious – CH52

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.4	32.3	---	40	7.8
62.5	---	31.5	40	8.6
1124.7	45.0	---	74	29.1
1124.9	---	36.8	54	17.3
6319.2	---	45.5	54	8.6
6321.0	57.2	---	74	16.9
15779.9	---	44.1	54	10.0
15788.4	54.3	---	74	19.7
17985.7	61.1	---	74	13.0
17986.6	---	50.1	54	4.0
39823.2	---	47.0	54	7.1
39866.7	---	47.4	54	6.7
39925.8	57.7	---	74	16.4
39988.2	58.2	---	74	15.8

Radiated Spurious – CH56

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	---	30.5	40	9.6
62.5	32.8	---	40	7.3
1183.1	46.7	---	74	27.4
1187.5	---	37.6	54	16.4
6132.9	57.9	---	74	16.2
6214.9	---	45.9	54	8.1
15835.3	---	44.8	54	9.3
15851.8	55.7	---	74	18.3
17983.9	61.1	---	74	12.9
17996.4	---	50.0	54	4.1
26675.5	48.4	---	74	25.7
26718.1	---	37.9	54	16.2
39845.2	---	47.2	54	6.8
39884.0	57.9	---	74	16.2

Radiated Spurious – CH64

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
32.5	---	31.1	40	9.0
32.5	34.7	---	40	5.4
1124.9	---	36.3	54	17.7
1125.2	45.9	---	74	28.2
6252.2	---	46.0	54	8.1
6252.5	57.5	---	74	16.5
10632.7	50.9	---	74	23.2
10641.1	---	41.7	54	12.4
15966.4	---	46.0	54	8.1
15966.4	56.5	---	74	17.5
17984.4	61.5	---	74	12.5
17996.4	---	50.1	54	4.0
25299.9	48.5	---	74	25.5
26796.6	---	37.8	54	16.3
39889.5	---	47.3	54	6.7
39964.1	58.2	---	74	15.9

30 MHz – 40 GHz, 802.11n20, HT8, Chain A+B

Radiated Spurious – CH52

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	---	36.3	40	3.7
62.5	36.9	---	40	3.2
1000.2	47.5	---	74	26.6
1000.2	---	39.8	54	14.3
1187.5	---	38.5	54	15.5
2417.0	51.0	---	74	23.1
15782.6	---	46.7	54	7.3
15789.8	58.5	---	74	15.5
17983.0	61.2	---	74	12.8
17996.9	---	50.1	54	4.0
24605.6	48.3	---	74	25.8
39857.4	---	47.2	54	6.9
39878.9	---	47.2	54	6.8
39997.5	57.5	---	74	16.6

30 MHz – 40 GHz, 802.11n40, HT0, Chain A

Radiated Spurious – CH54F

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	---	33.8	40	6.2
62.5	35.0	---	40	5.1
1123.0	46.4	---	74	27.6
1124.7	---	36.1	54	18.0
6224.7	57.9	---	74	16.2
6256.7	---	46.1	54	8.0
15941.0	55.6	---	74	18.4
15943.2	---	42.9	54	11.1
17977.7	61.5	---	74	12.5
17992.9	---	50.0	54	4.1
21079.9	---	39.1	54	14.9
26659.5	48.4	---	74	25.6
39841.4	58.1	---	74	16.0
39860.4	---	47.1	54	7.0

Radiated Spurious – CH62F

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	---	35.4	40	4.7
62.5	**36.7**	---	40	3.4
1125.2	---	36.8	54	17.2
1149.2	46.0	---	74	28.0
6371.8	58.5	---	74	15.6
6378.9	---	45.7	54	8.3
15948.6	---	43.8	54	10.3
15951.3	54.9	---	74	19.1
17999.1	---	50.3	54	3.8
17999.1	61.2	---	74	12.8
21239.8	---	39.9	54	14.1
26715.2	48.6	---	74	25.5
39864.2	---	47.2	54	6.8
39882.3	58.4	---	74	15.7

30 MHz – 40 GHz, 802.11n40, HT0, Chain B

Radiated Spurious – CH54F

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
32.5	---	31.0	40	9.1
32.5	33.8	---	40	6.2
1124.9	---	36.4	54	17.7
1125.2	45.1	---	74	29.0
6224.3	---	45.7	54	8.3
6226.2	57.6	---	74	16.5
15804.9	53.8	---	74	20.2
15806.3	---	43.9	54	10.2
17991.1	---	50.0	54	4.0
17991.1	60.9	---	74	13.1
24338.3	48.0	---	74	26.0
26824.8	---	37.9	54	16.2
39873.0	---	47.1	54	6.9
39947.3	58.1	---	74	16.0

Radiated Spurious – CH62F

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
62.5	---	31.3	40	8.8
62.5	32.6	---	40	7.5
1124.7	45.5	---	74	28.5
1125.2	---	36.9	54	17.2
6215.4	---	45.7	54	8.4
6233.1	57.8	---	74	16.3
15946.4	---	43.7	54	10.3
15949.0	55.2	---	74	18.9
17995.1	60.9	---	74	13.2
17997.8	---	50.2	54	3.9
21239.8	---	38.2	54	15.9
24614.1	49.0	---	74	25.0
39837.2	---	47.4	54	6.7
39872.2	57.2	---	74	16.9

30 MHz – 40 GHz, 802.11n40, HT8, Chain A+B

Radiated Spurious – CH62F

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
32.6	---	30.4	40	9.7
32.6	32.7	---	40	7.4
1956.8	50.7	---	74	23.4
1957.8	---	44.1	54	9.9
6304.3	---	45.7	54	8.4
6369.8	57.4	---	74	16.7
10626.9	---	40.0	54	14.1
10628.6	50.9	---	74	23.1
17978.1	60.9	---	74	13.1
17997.3	---	49.9	54	4.1
21239.8	---	41.0	54	13.0
24593.3	48.5	---	74	25.5
39853.6	---	47.4	54	6.7
39893.7	57.7	---	74	16.4

30 MHz – 40 GHz, 802.11ac80, VHT0, Chain A

Radiated Spurious – CH58ac80

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
32.5	---	31.2	40	8.8
32.5	34.3	---	40	5.8
1178.7	45.4	---	74	28.6
1187.5	---	37.0	54	17.1
6260.1	58.2	---	74	15.9
6277.3	---	46.0	54	8.1
15934.3	54.5	---	74	19.5
15935.6	---	42.9	54	11.2
17967.9	61.0	---	74	13.1
17993.3	---	49.9	54	4.2
21159.9	---	39.6	54	14.4
26821.9	49.0	---	74	25.1
39819.9	58.2	---	74	15.8
39871.3	---	47.2	54	6.9

30 MHz – 40 GHz, 802.11ac80, VHT0, Chain B

Radiated Spurious – CH58ac80

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
32.5	---	28.0	40	12.1
32.5	33.4	---	40	6.7
1124.9	---	36.5	54	17.5
1125.2	45.3	---	74	28.8
6366.9	58.1	---	74	16.0
6370.1	---	45.6	54	8.4
15959.3	54.6	---	74	19.5
15960.2	---	42.7	54	11.3
17999.1	---	**50.0**	54	4.1
17999.6	62.1	---	74	12.0
24355.6	48.3	---	74	25.7
26826.5	---	37.9	54	16.1
39827.9	57.6	---	74	16.4
39846.4	---	47.2	54	6.9

30 MHz – 40 GHz, 802.11ac80, VHT0, Chain A+B

Radiated Spurious – CH58ac80

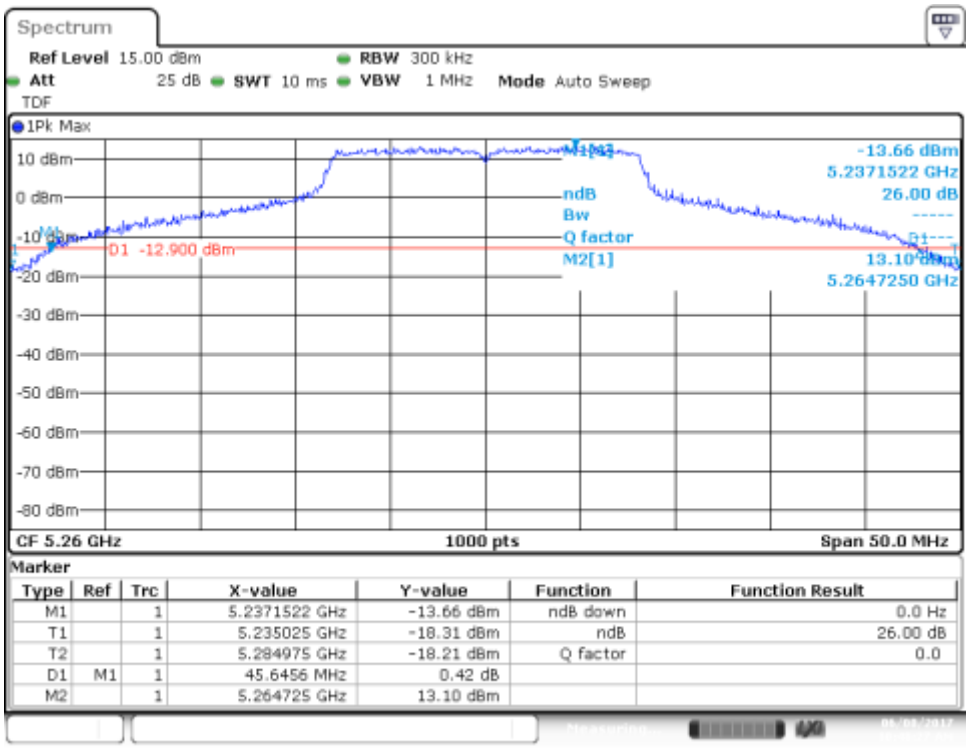
Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
32.5	---	28.6	40	11.5
32.5	34.0	---	40	6.1
1172.1	45.8	---	74	28.2
1187.5	---	36.5	54	17.5
6290.0	---	45.8	54	8.3
6358.0	57.7	---	74	16.4
12406.1	---	39.4	54	14.7
12407.5	51.0	---	74	23.0
17997.8	61.4	---	74	12.6
17999.1	---	49.9	54	4.2
21160.1	---	40.1	54	14.0
26773.8	49.4	---	74	24.6
39867.5	---	47.3	54	6.7
39920.3	57.0	---	74	17.1

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

B.5.1 26dB Bandwidth

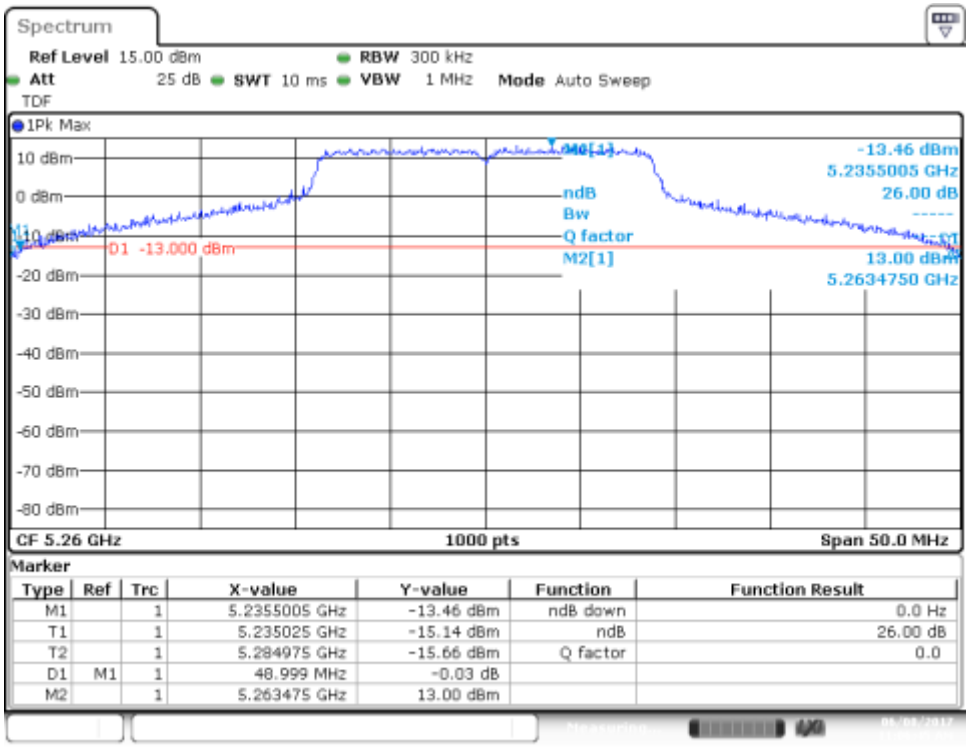
SISO-A, 802.11a, 6Mbps

Channel 52



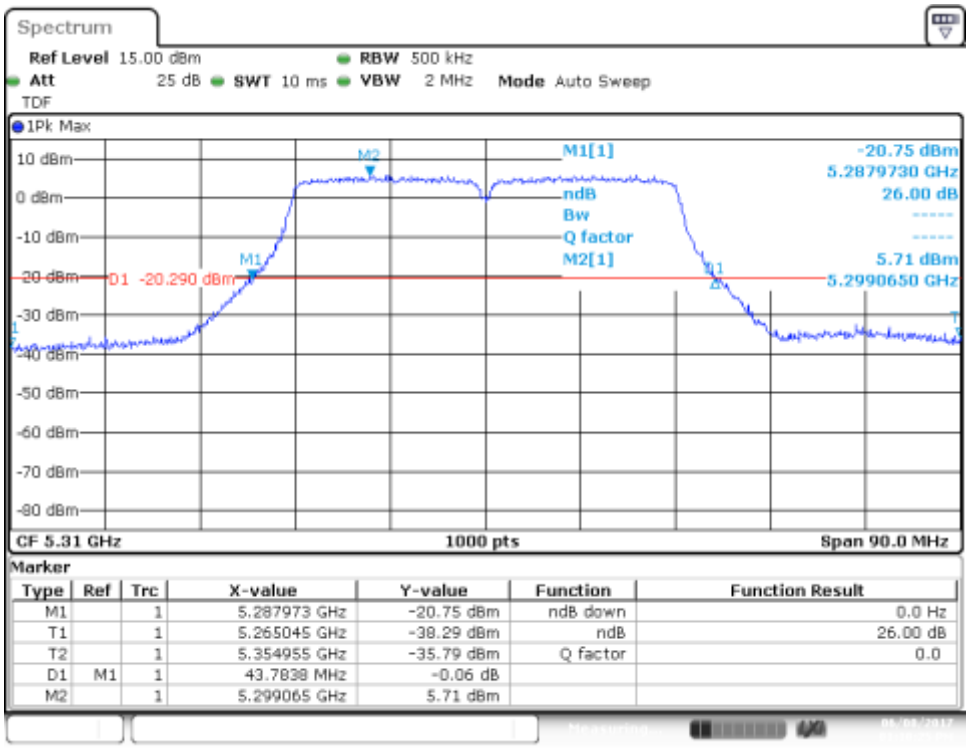
SISO-A, 802.11n20, HT0

Channel 52



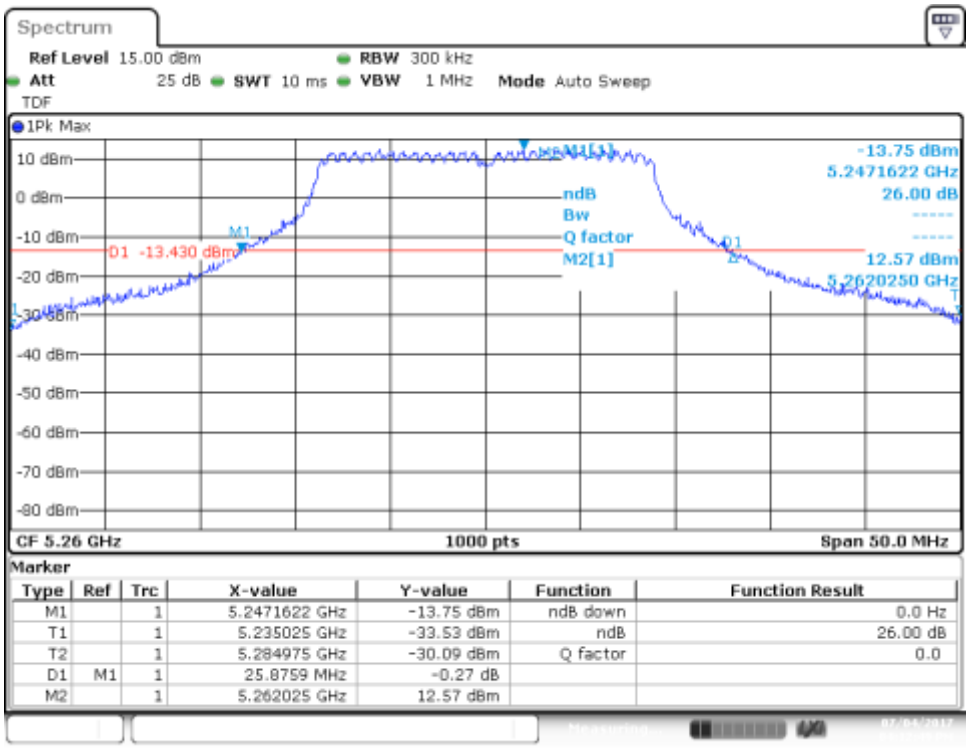
SISO-B, 802.11n40, HT0

Channel 62F



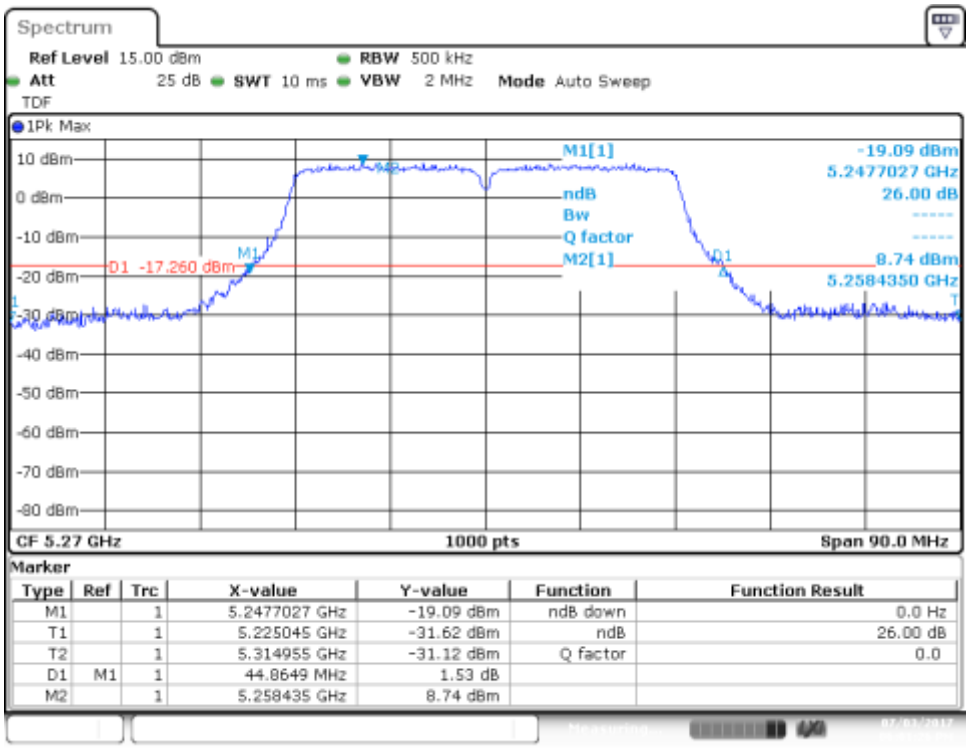
MIMO-B, 802.11n20, HT8

Channel 52



MIMO-A, 802.11n40, HT8

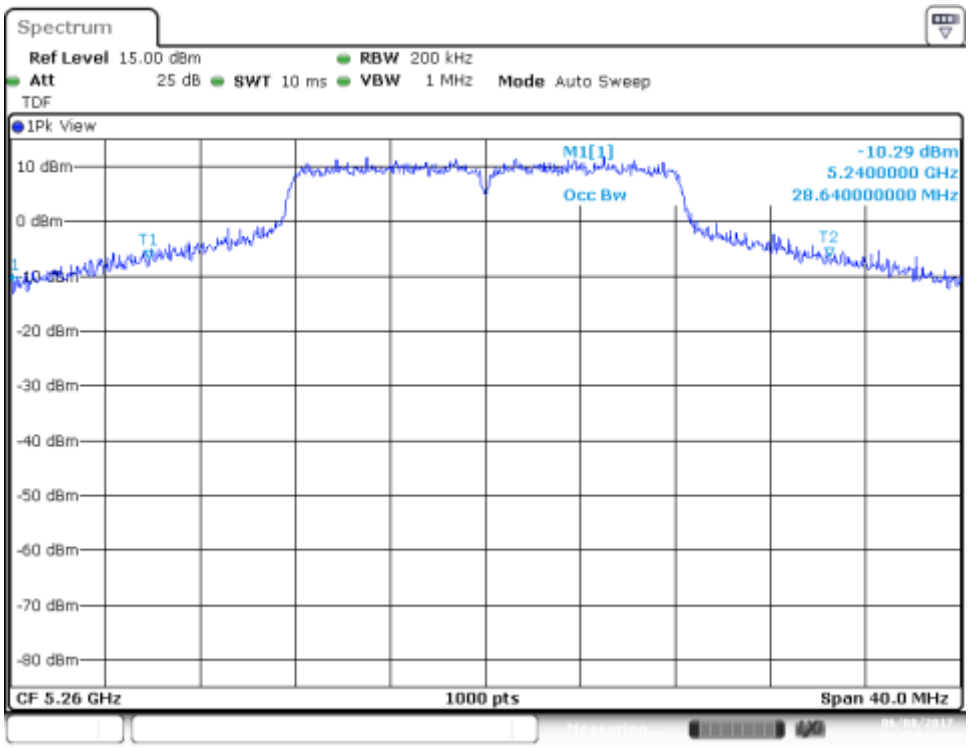
Channel 54F



B.5.2 99% Bandwidth

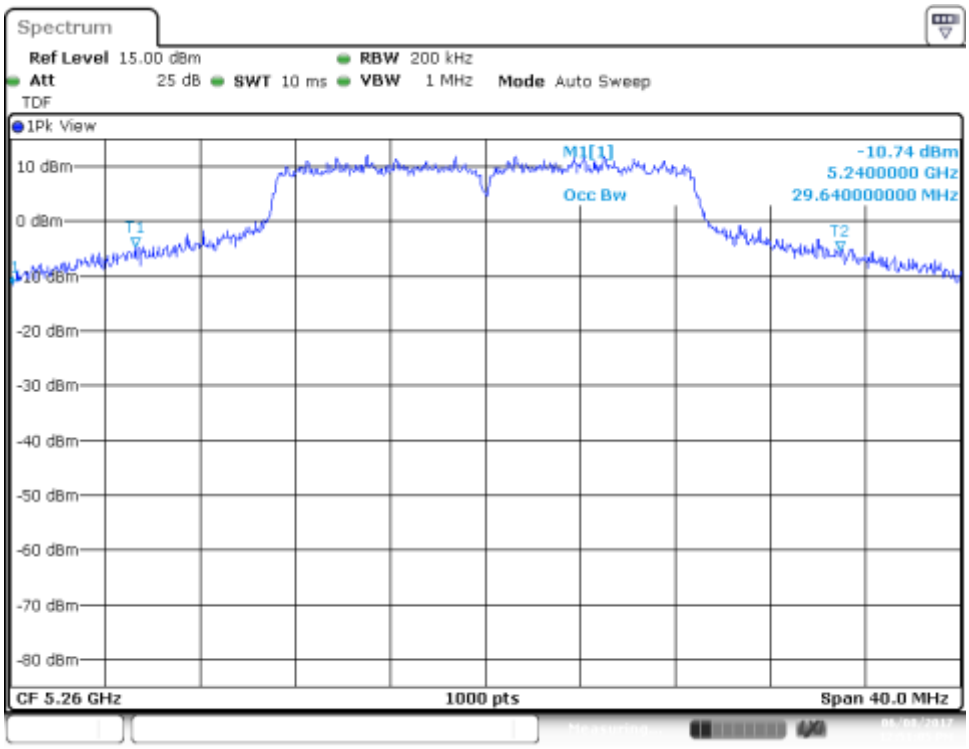
SISO-A, 802.11a, 6Mbps

Channel 52



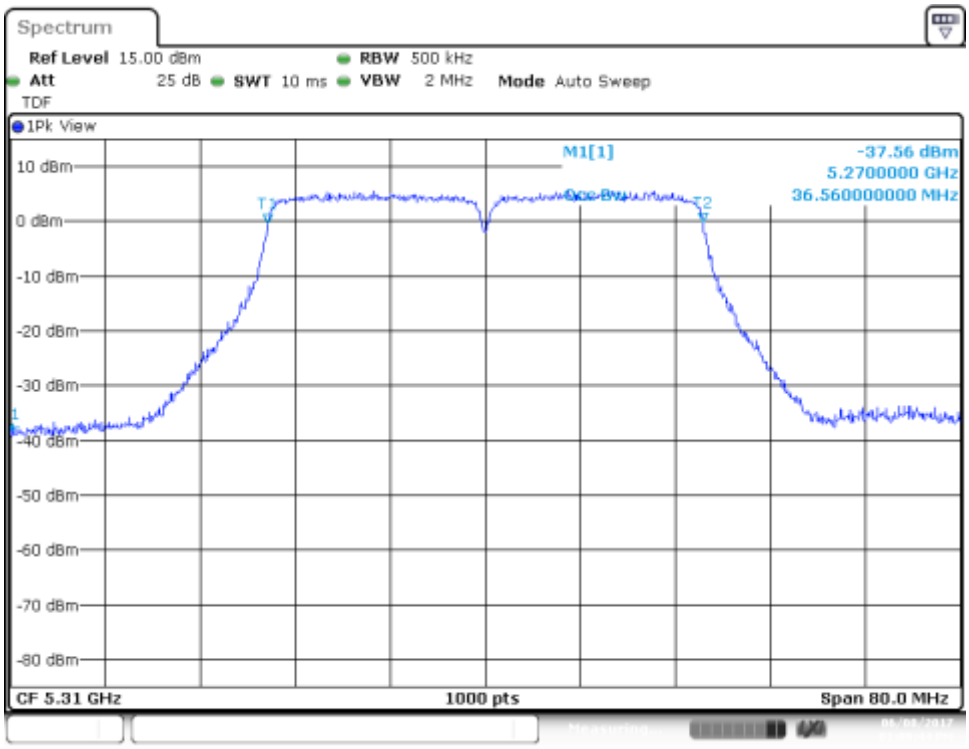
SISO-B, 802.11n20, HT0

Channel 52



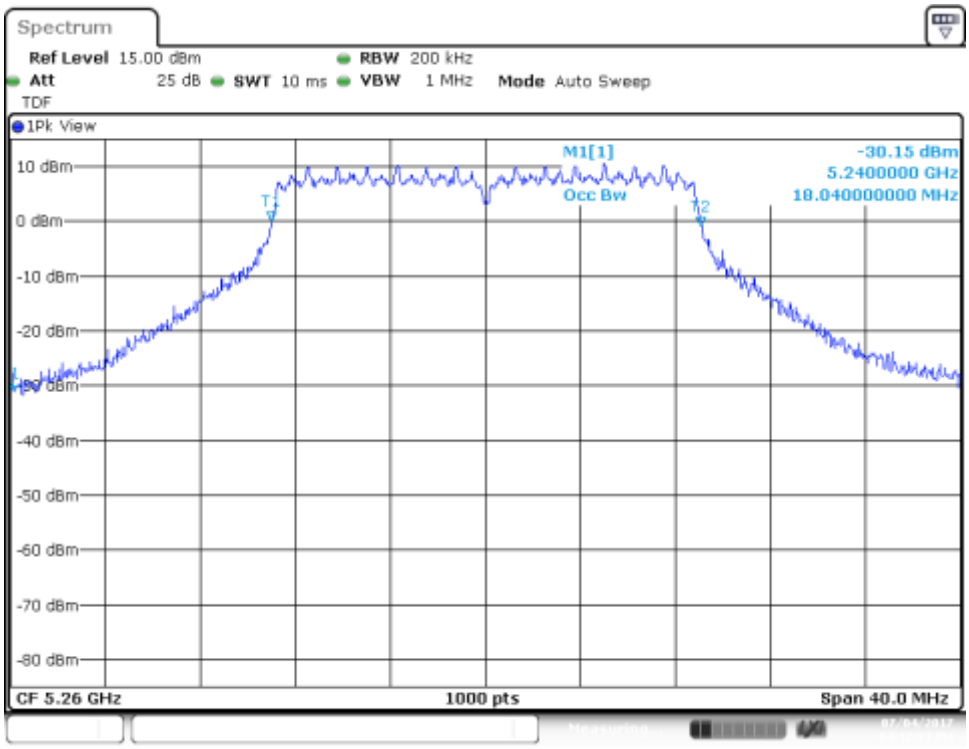
SISO-B, 802.11n40, HT0

Channel 62F



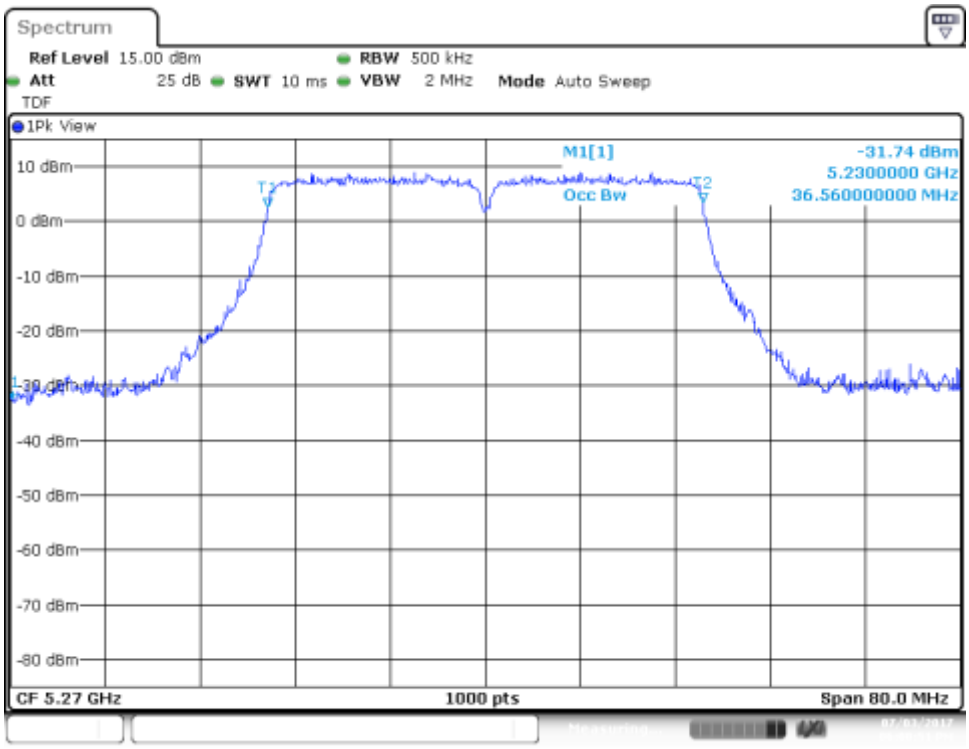
MIMO-B, 802.11n20, HT8

Channel 52



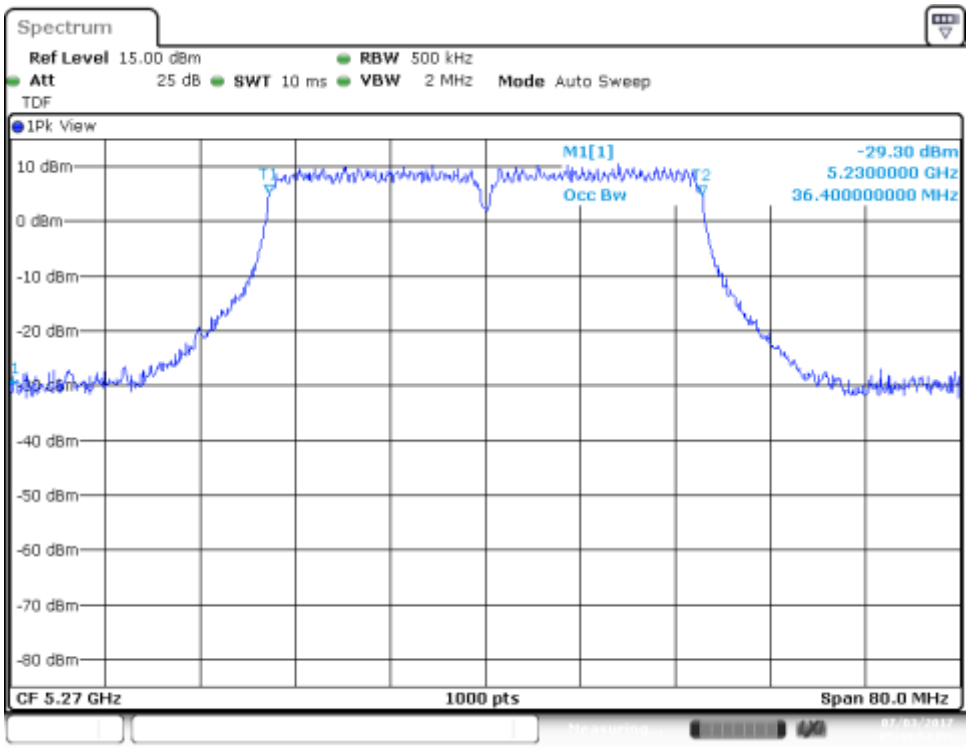
MIMO-A, 802.11n40, HT8

Channel 54F



MIMO-B, 802.11n40, HT8

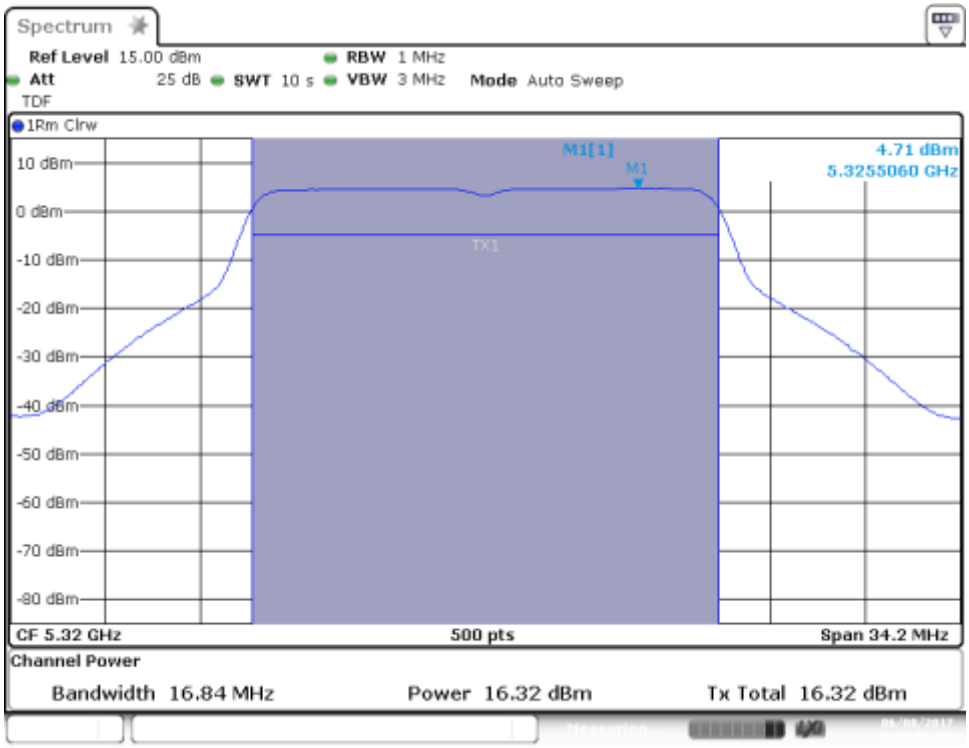
Channel 54F



B.5.3 Maximum output power & Peak power spectral density

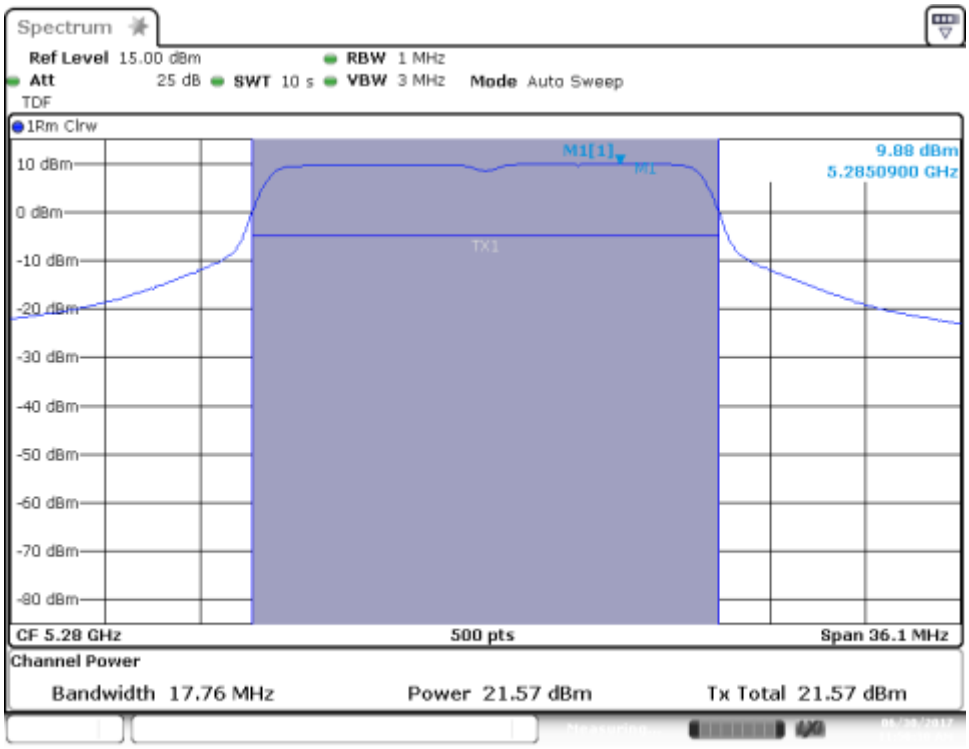
SISO-A, 802.11a, 6Mbps

Channel 64



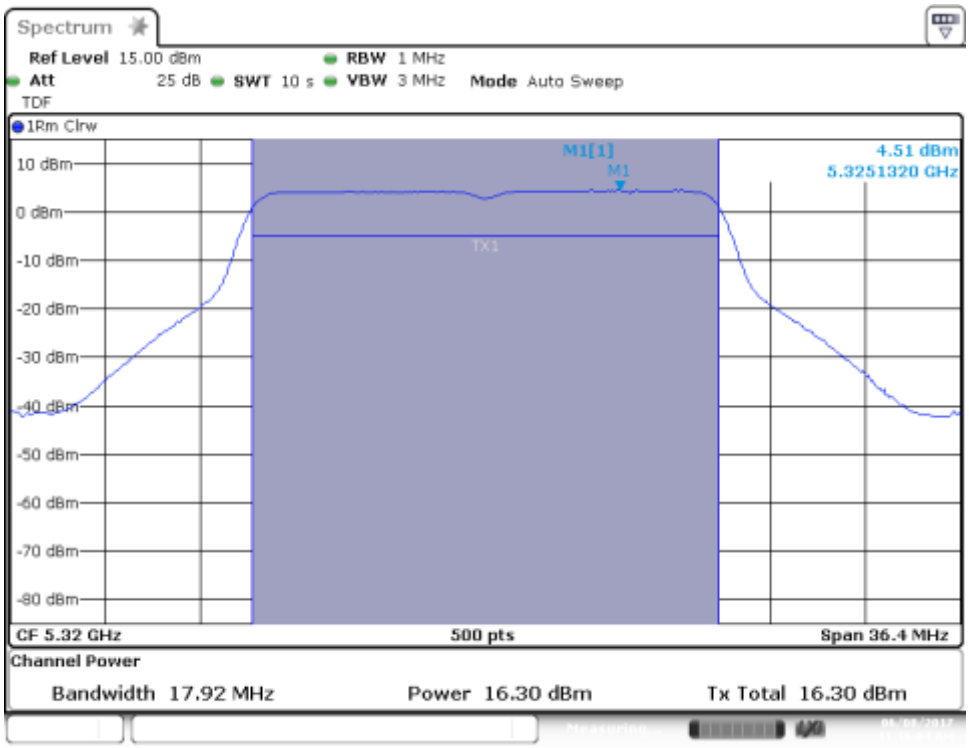
SISO-B, 802.11a, 6Mbps

Channel 56



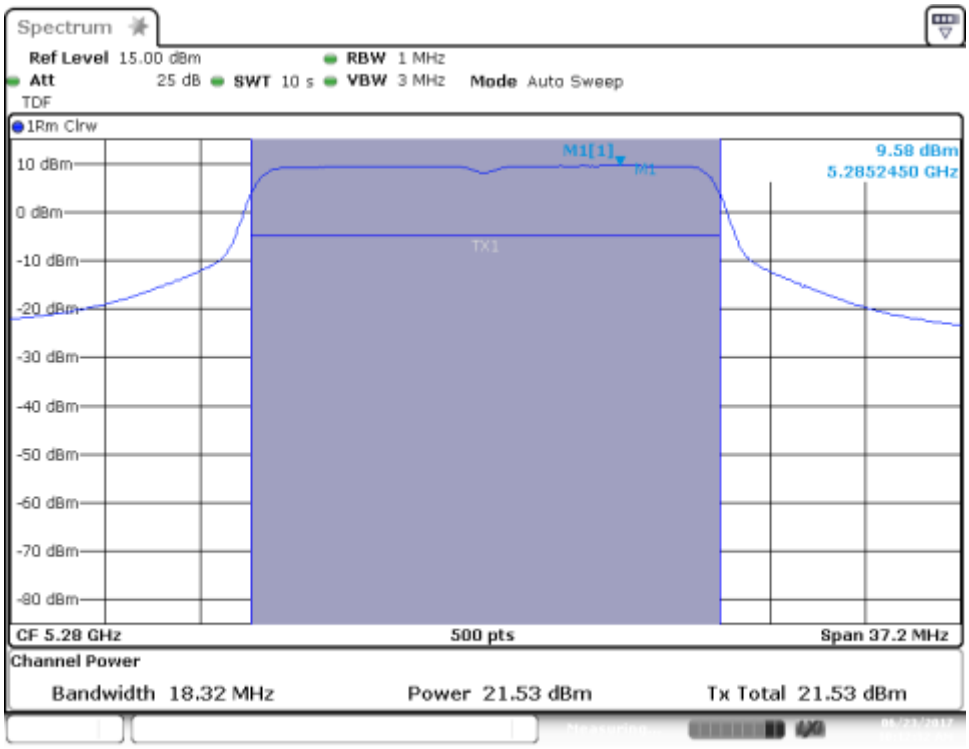
SISO-A, 802.11n20, HT0

Channel 64



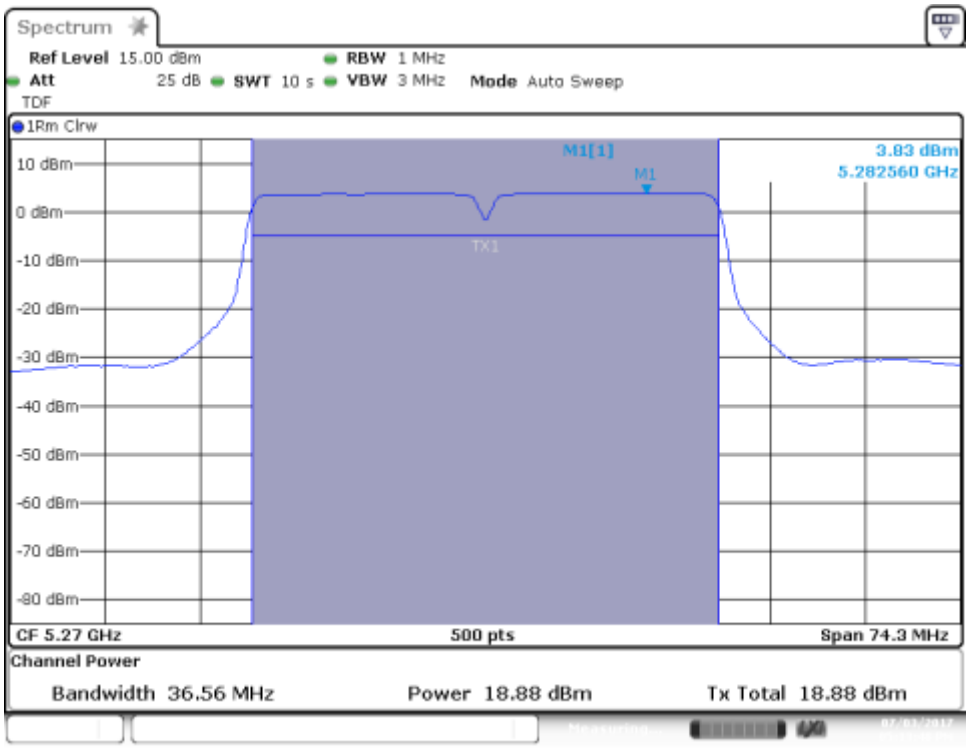
SISO-B, 802.11n20, HT0

Channel 56

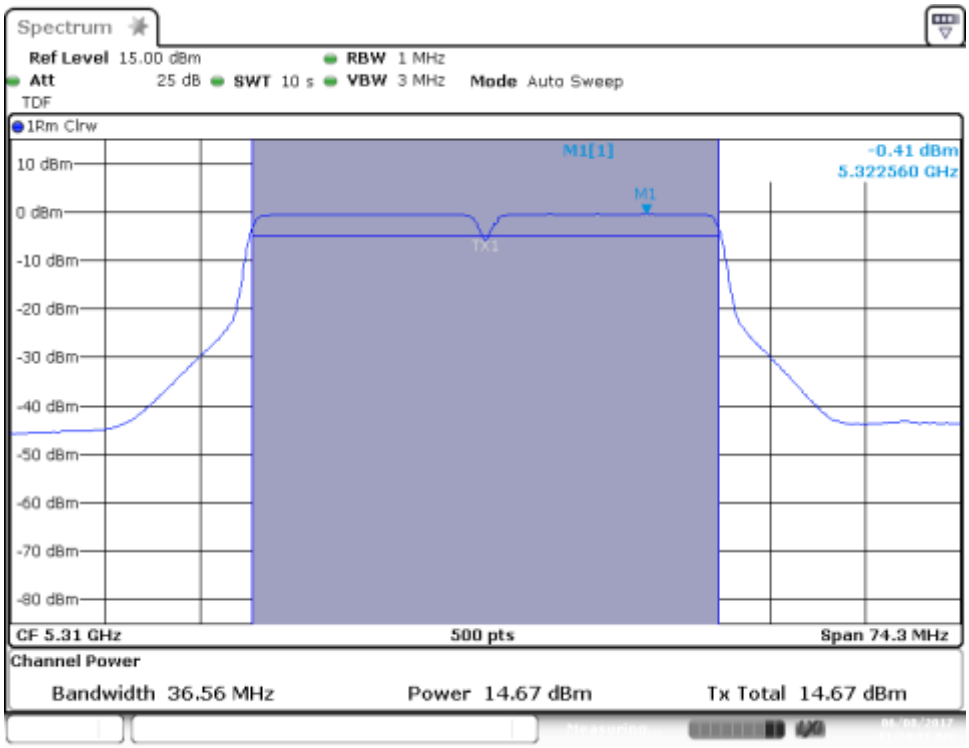


SISO-A, 802.11n40, HT0

Channel 54F

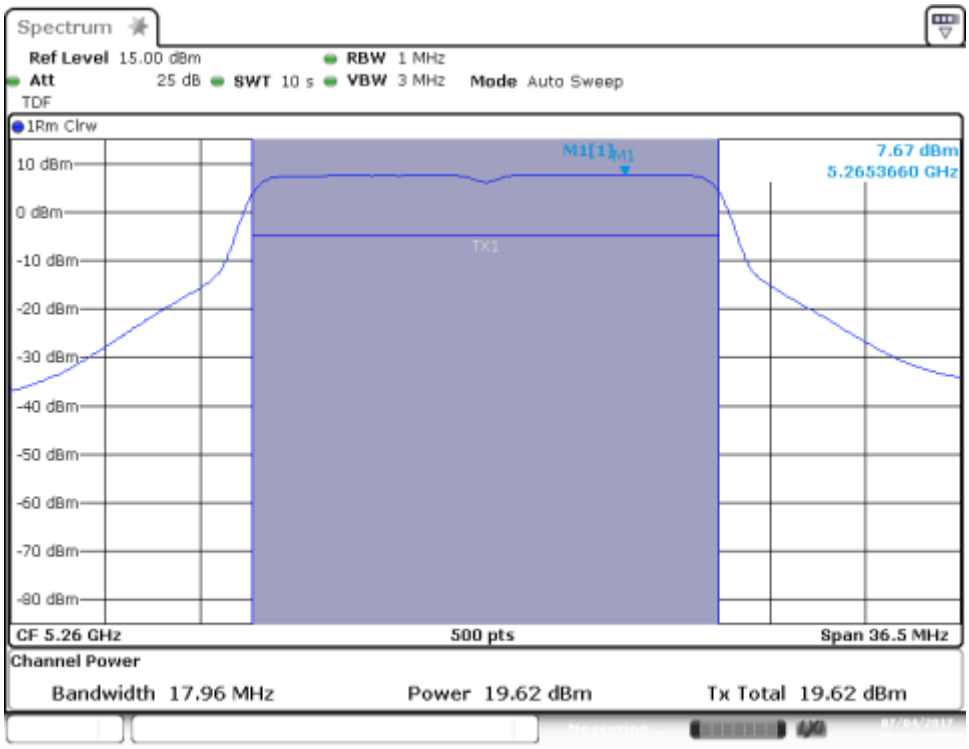


Channel 62F

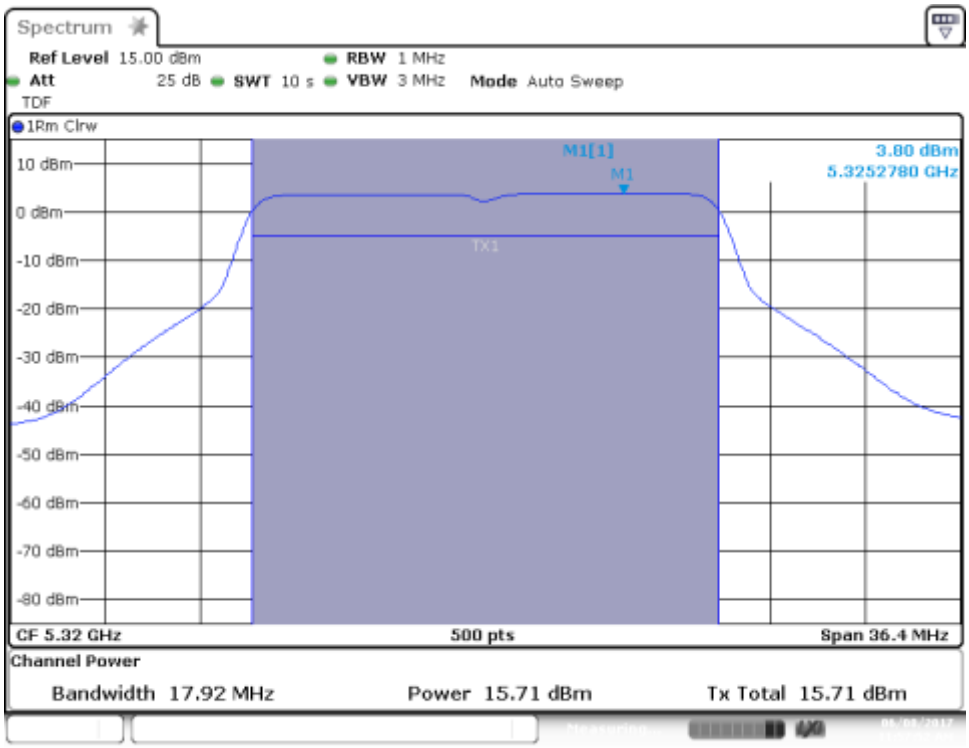


MIMO-A, 802.11n20, HT8

Channel 52

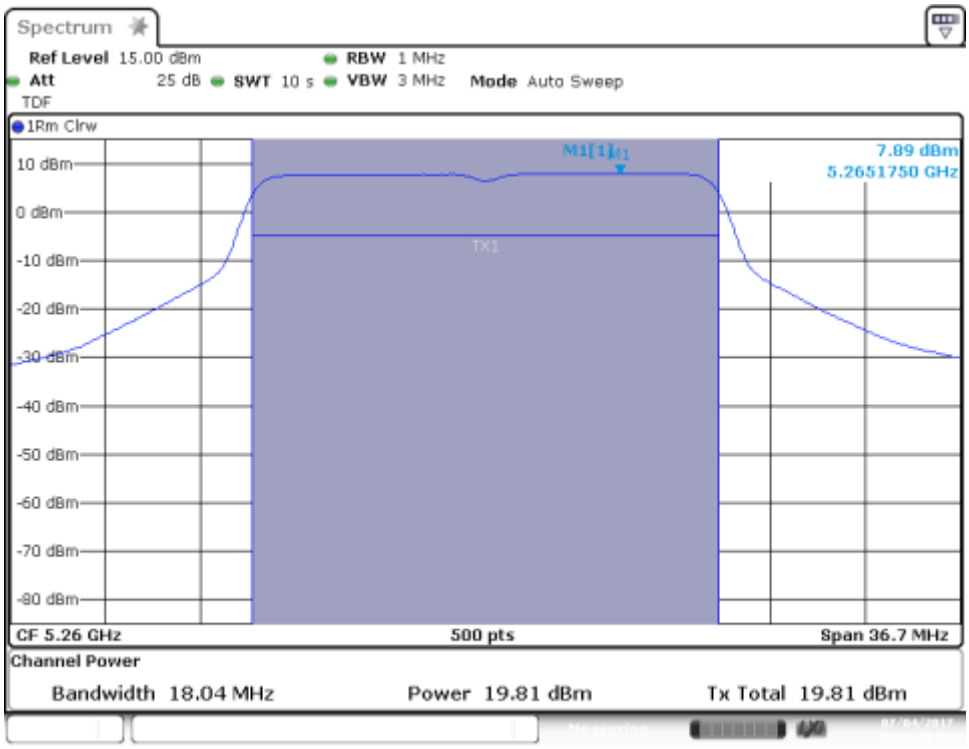


Channel 64



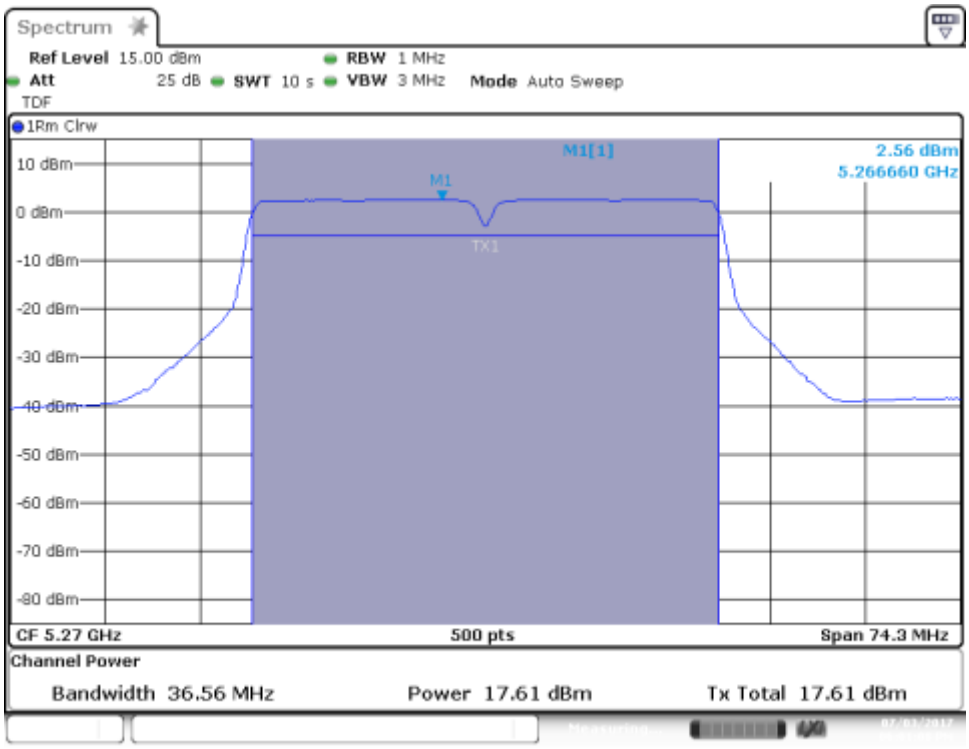
MIMO-B, 802.11n20, HT8

Channel 52



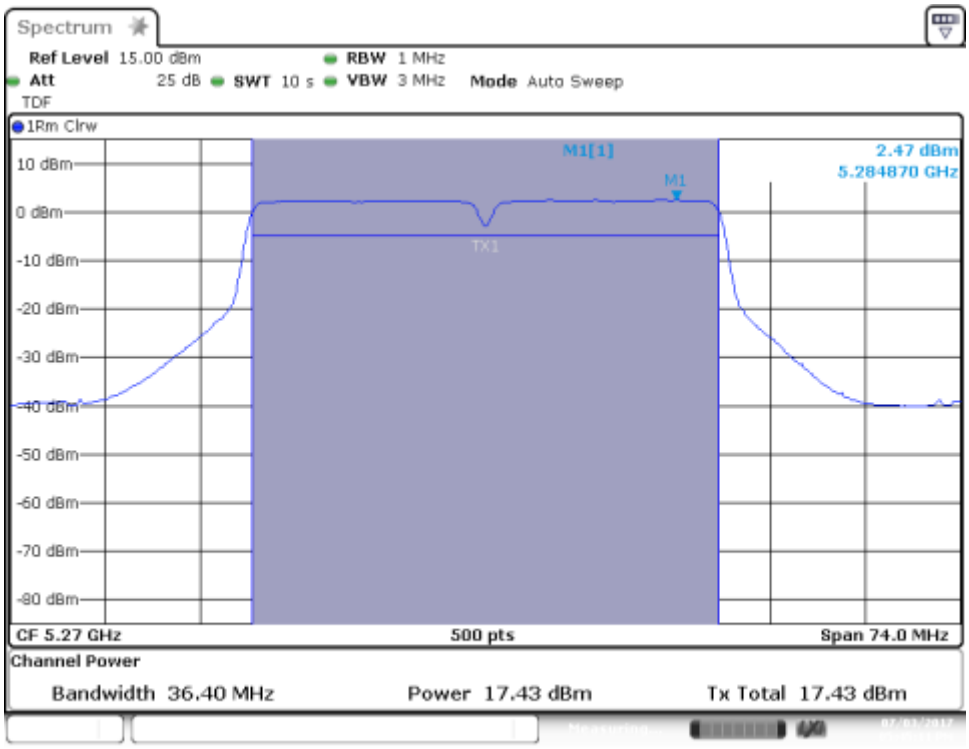
MIMO-A, 802.11n40, HT8

Channel 54F

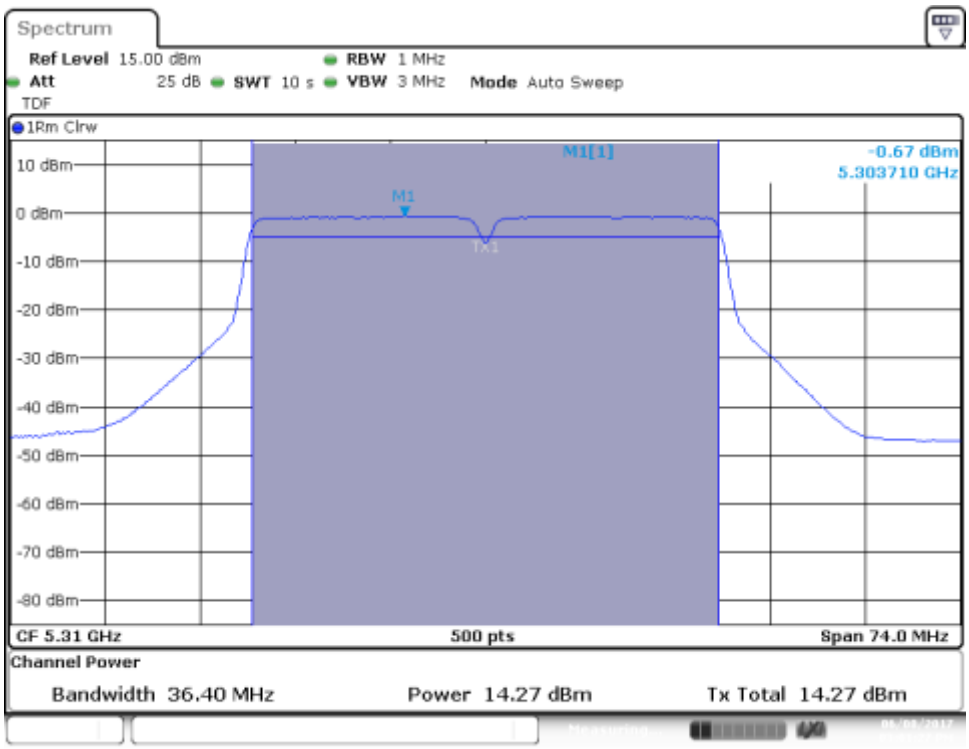


MIMO-B, 802.11n40, HT8

Channel 54F



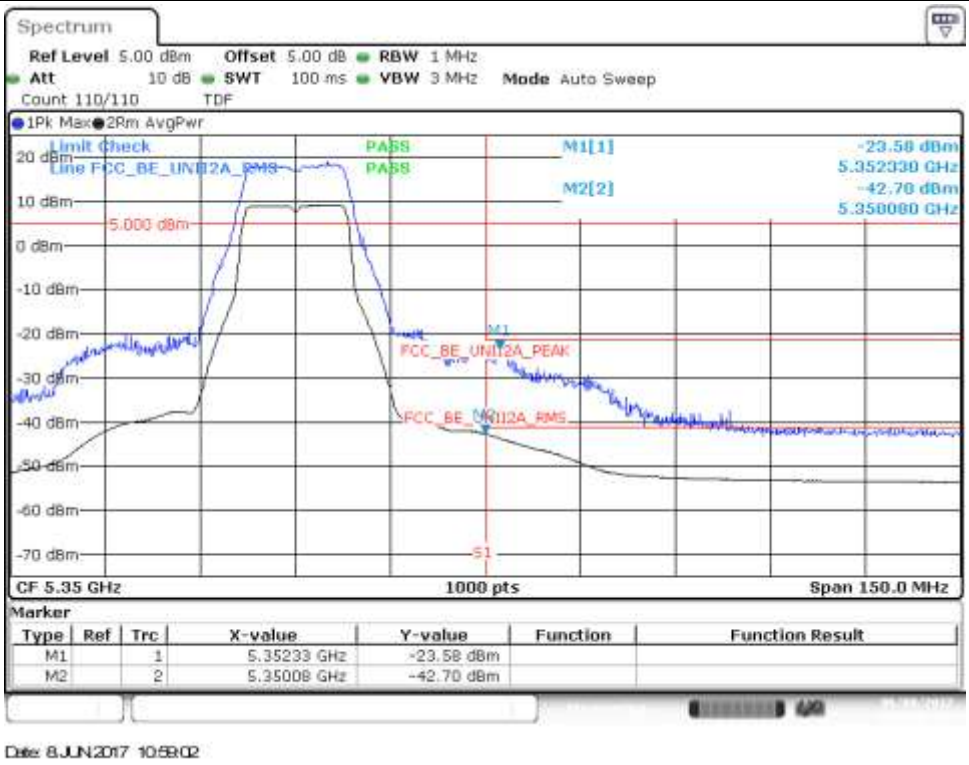
Channel 62F



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

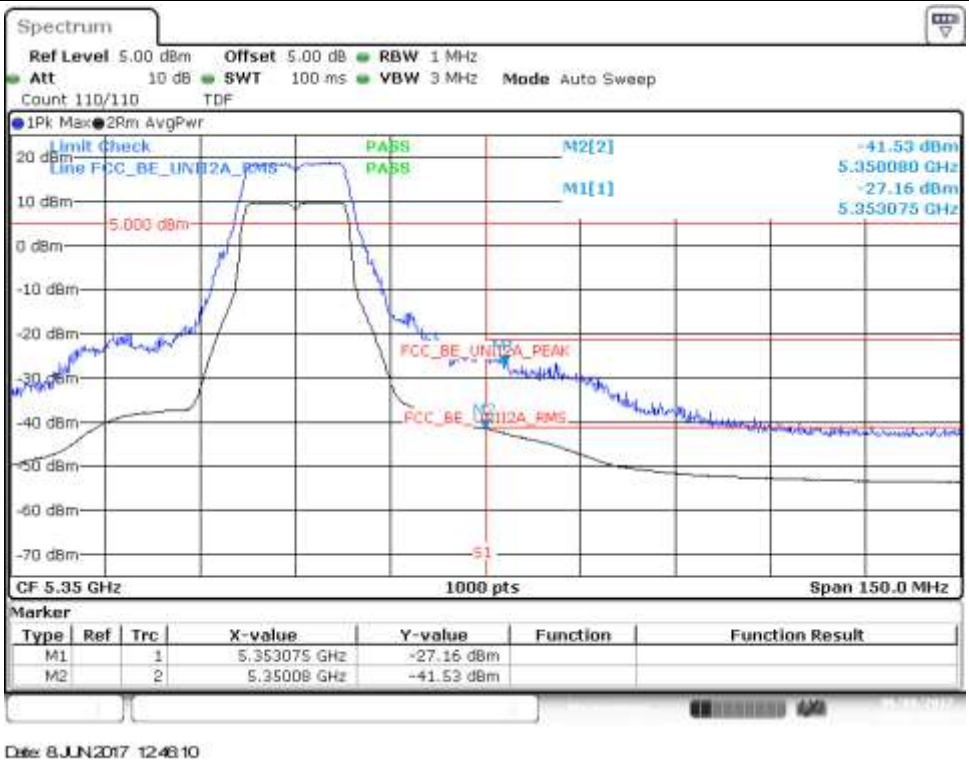
802.11a, 6Mbps – Chain A

BE High Freq Section, Peak, RMS – CH64



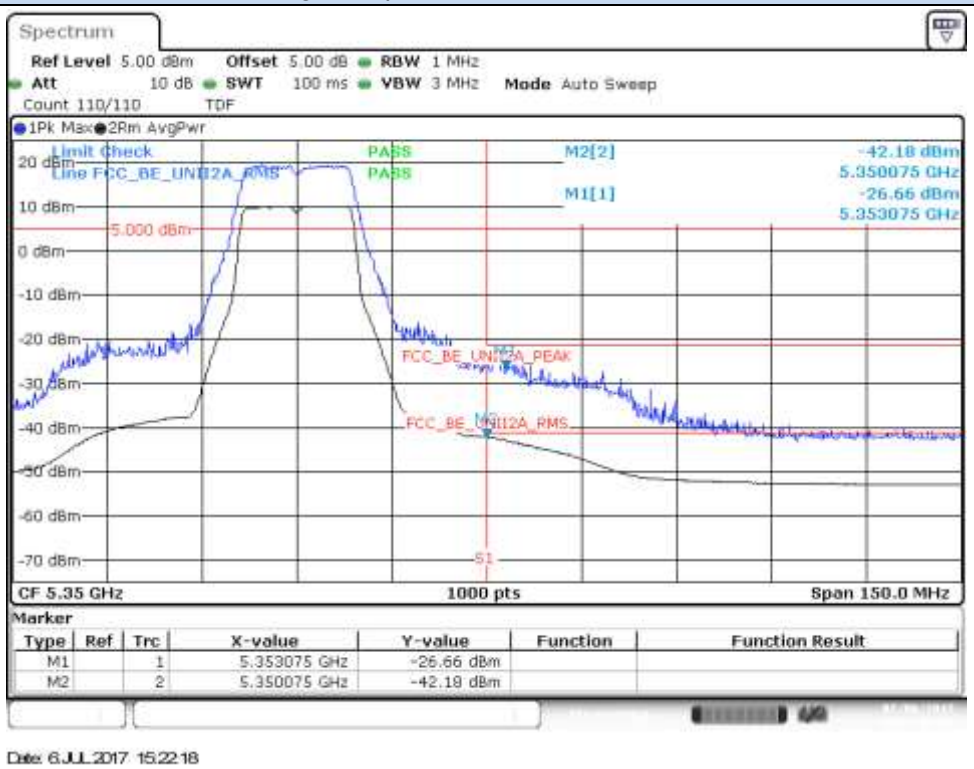
802.11a, 6Mbps – Chain B

BE High Freq Section, Peak, RMS – CH64



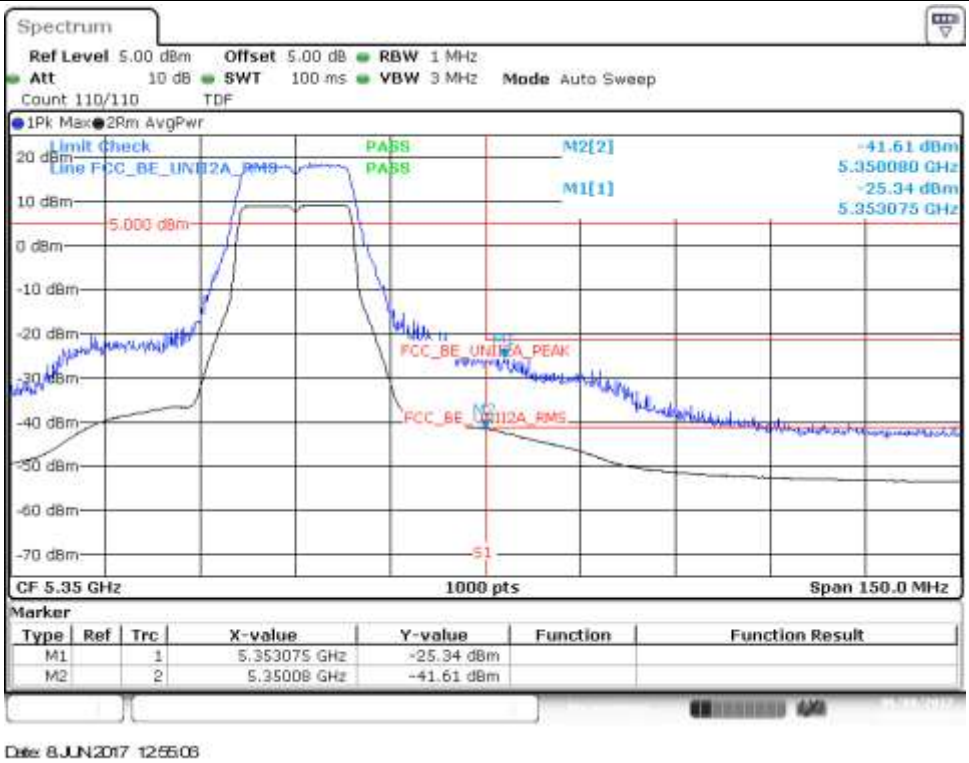
802.11n20, HT0 (SISO) - Chain A

BE High Freq Section, Peak, RMS – CH64



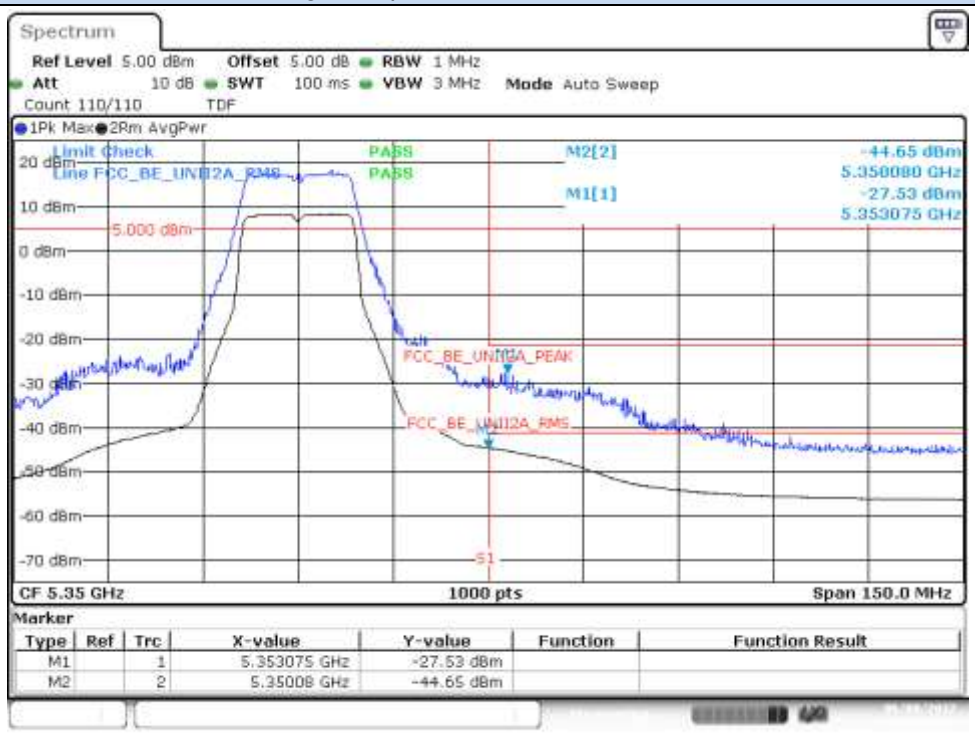
802.11n20, HT0 (SISO) - Chain B

BE High Freq Section, Peak, RMS – CH64



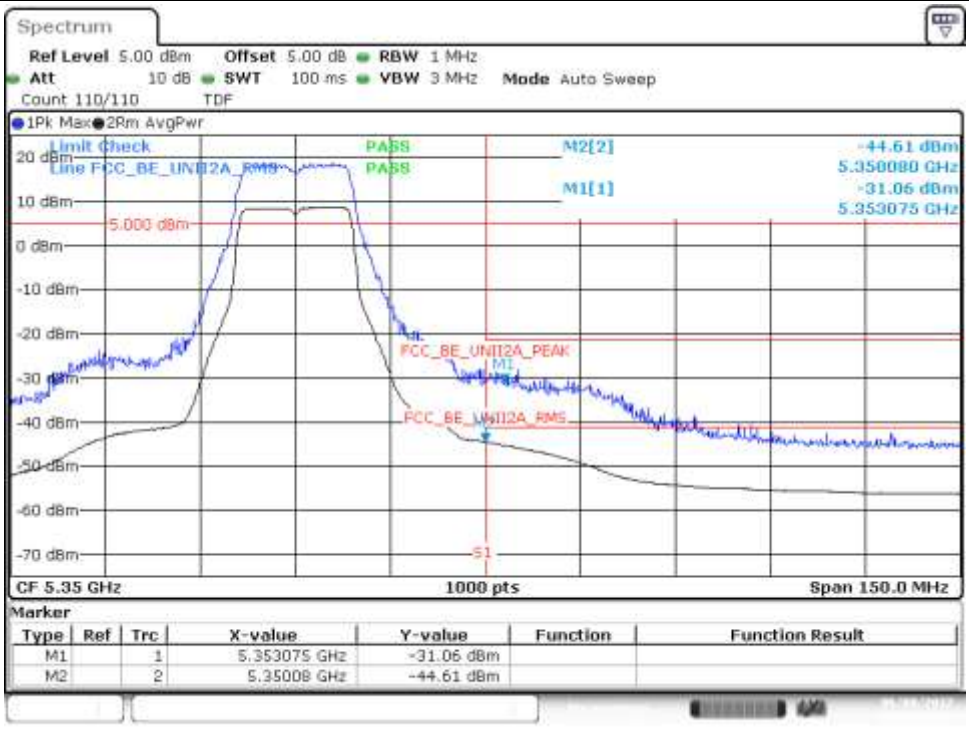
802.11n20, HT8 (MIMO)– Chain A

BE High Freq Section, Peak, RMS – CH64



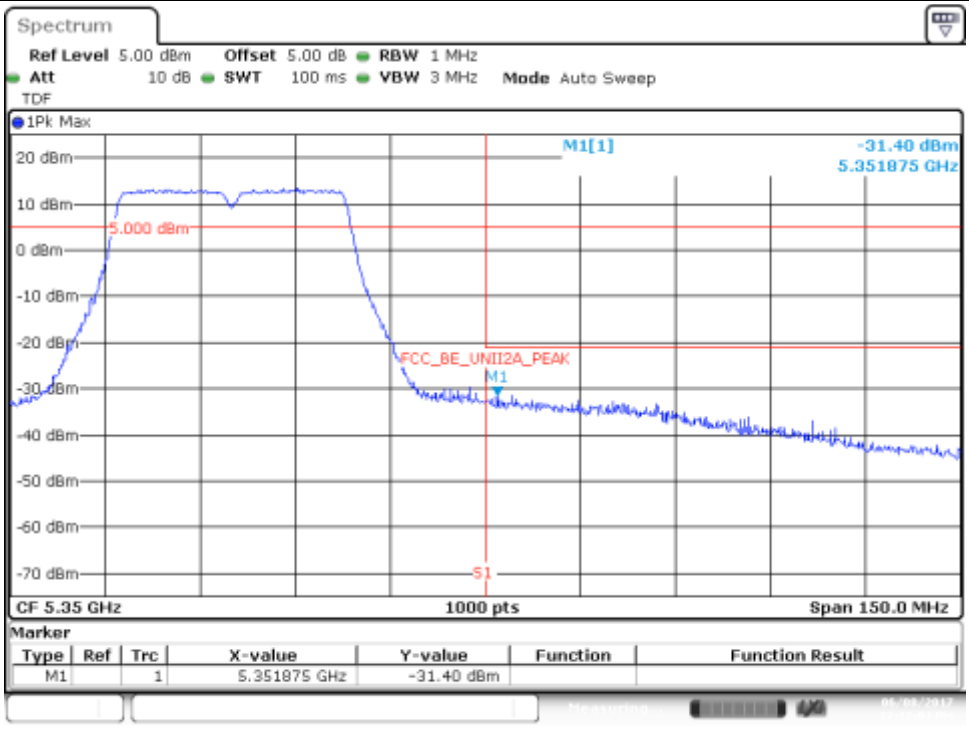
802.11n20, HT8 (MIMO)– Chain B

BE High Freq Section, Peak, RMS – CH64

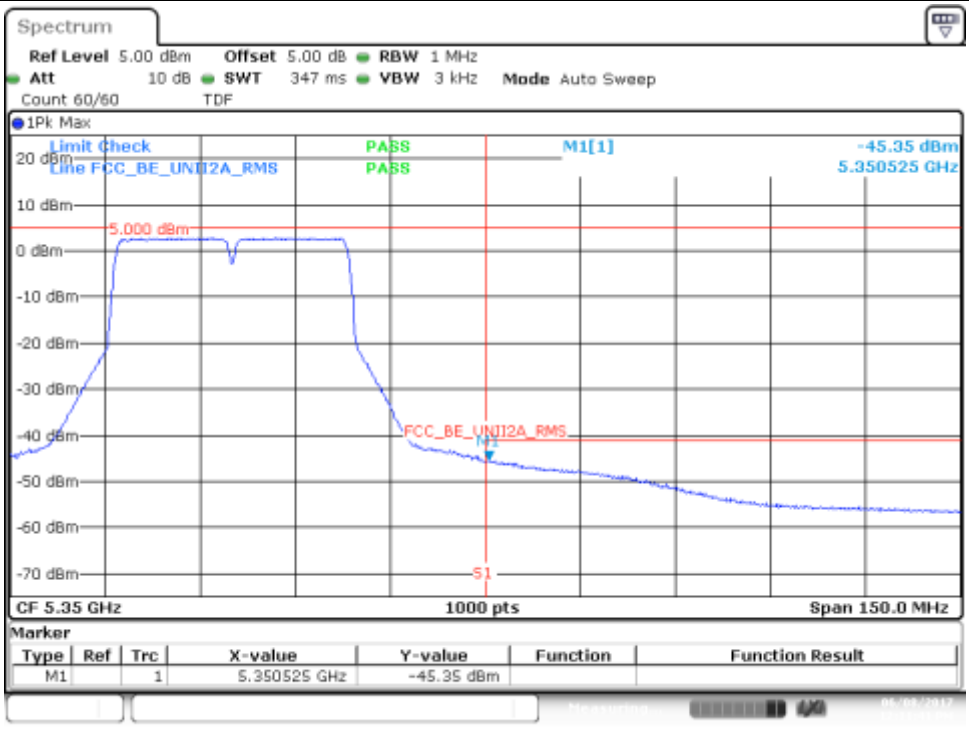


802.11n40, HT0 (SISO) - Chain A

BE High Freq Section, Peak – CH62F

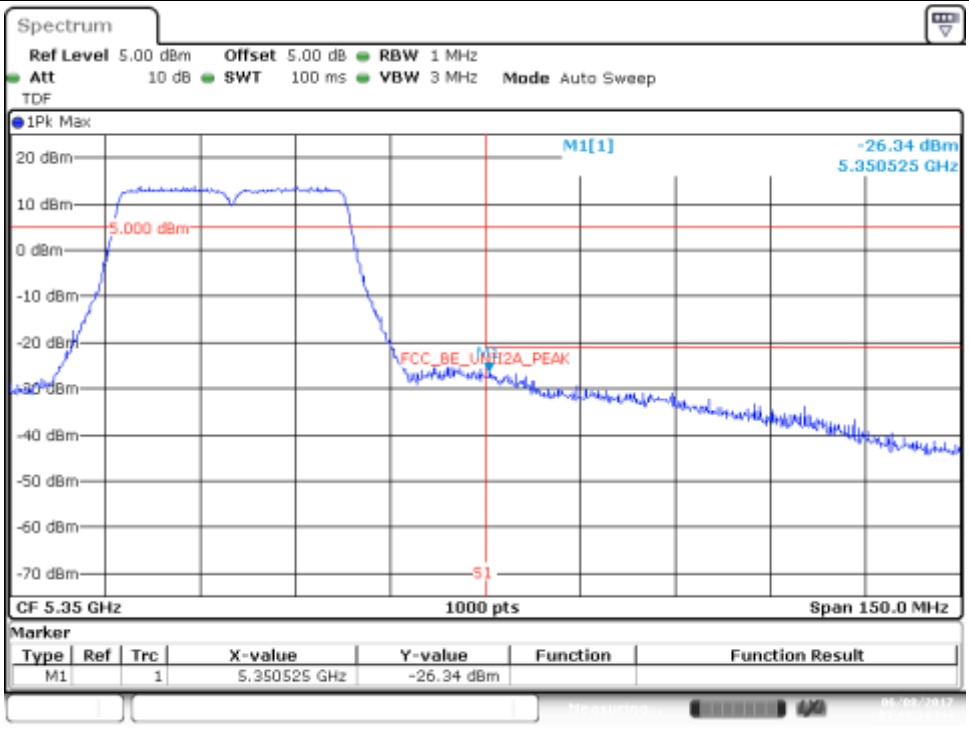


BE High Freq Section, RMS – CH62F

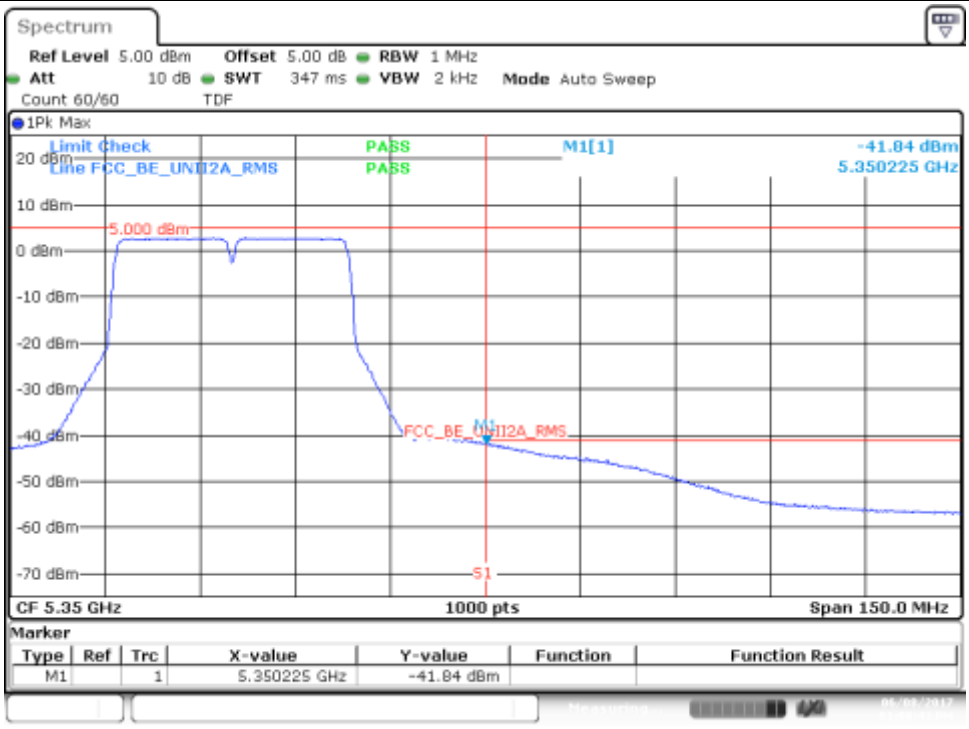


802.11n40, HT0 (SISO) - Chain B

BE High Freq Section, Peak – CH62F

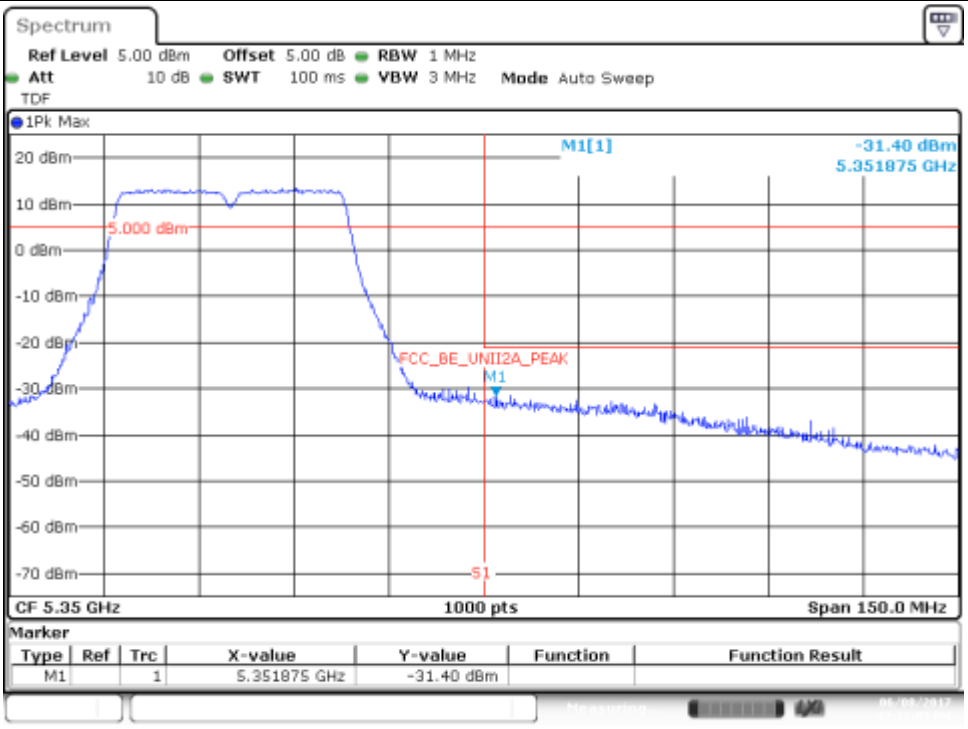


BE High Freq Section, RMS – CH62F

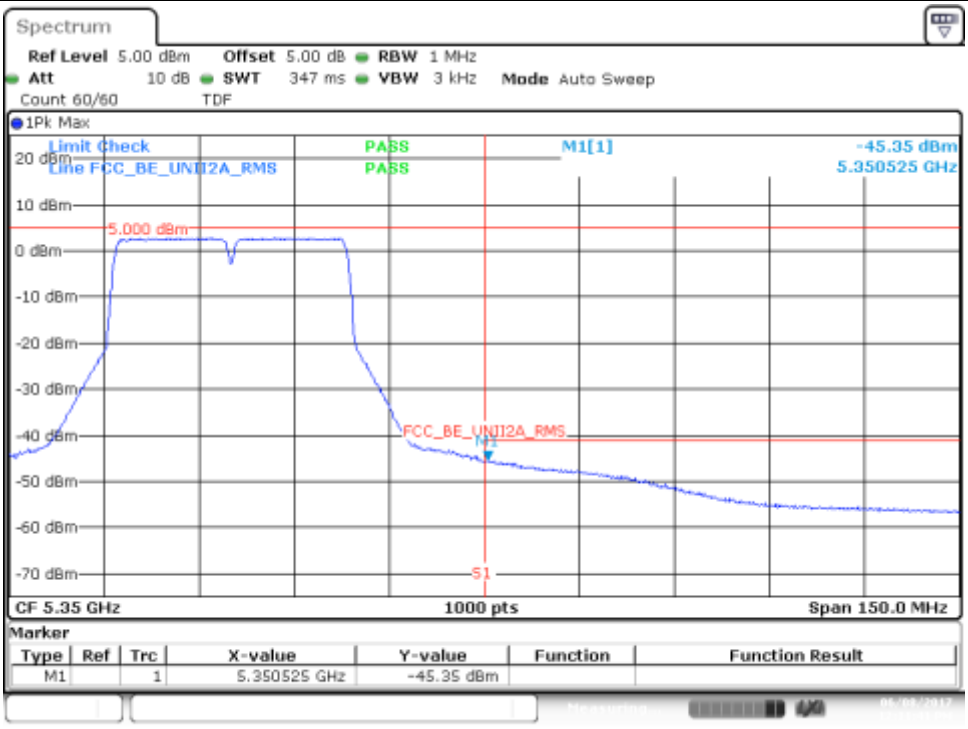


802.11n40, HT8 (MIMO) – Chain A

BE High Freq Section, Peak– CH62F

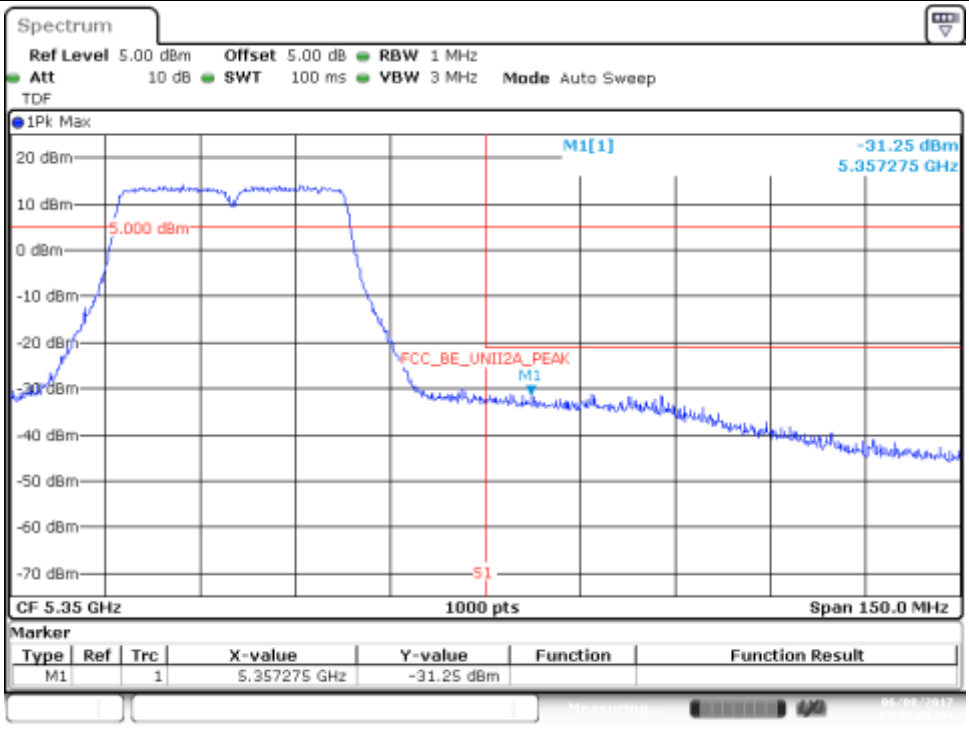


BE High Freq Section, RMS – CH62F



802.11n40, HT8 (MIMO) – Chain B

BE High Freq Section, Peak – CH62F



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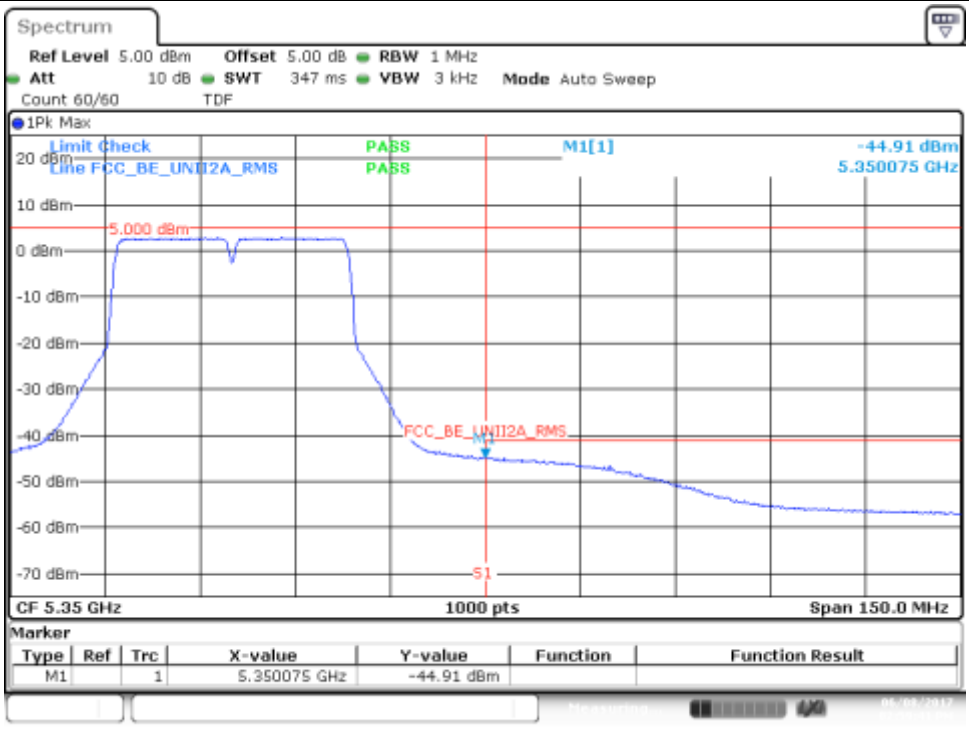
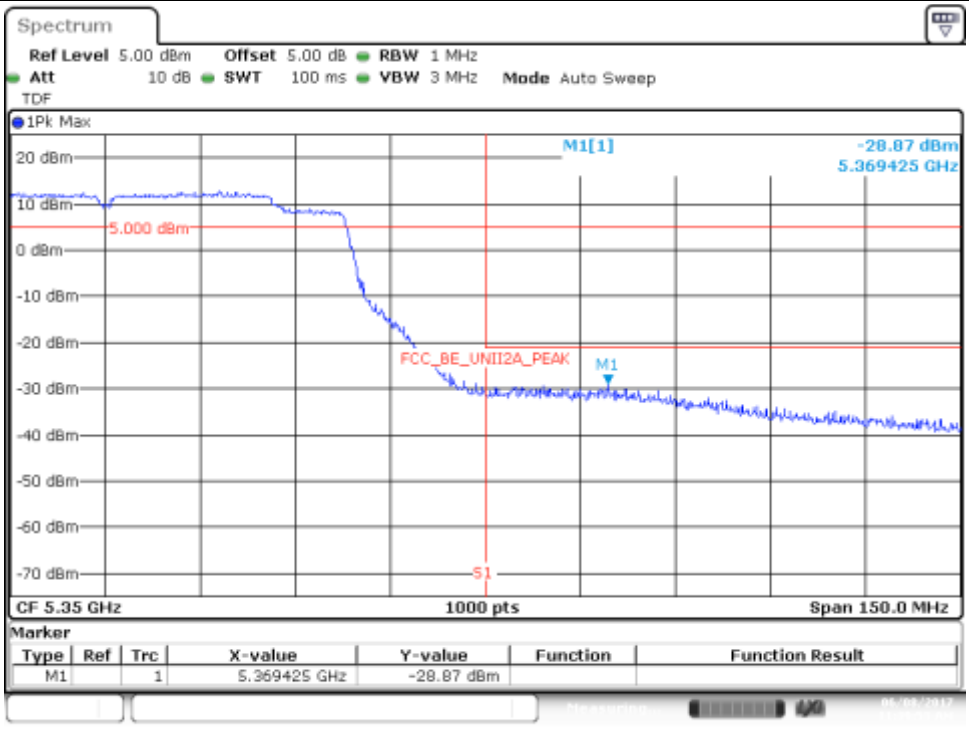
BE High Freq Section, RMS – CH62F



Date: 8.JUN.2017 14:59:41

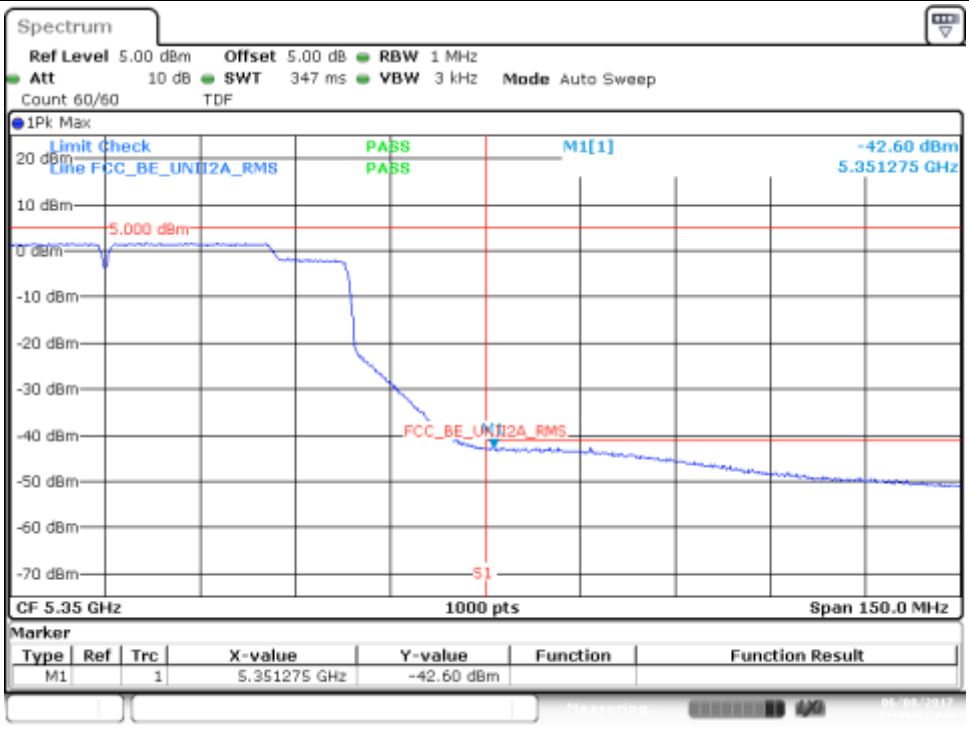
802.11ac80, VHT0 (SISO) - Chain A

BE High Freq Section, Peak – CH58ac80



Date: 8.JUN.2017 11:39:54

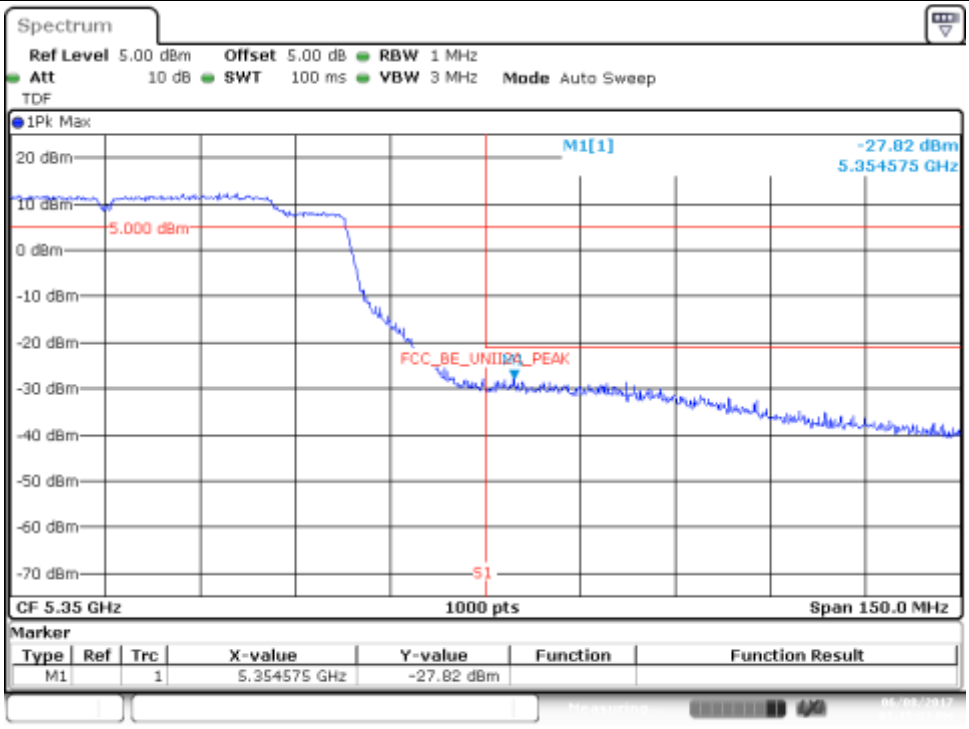
BE High Freq Section, RMS – CH58ac80



Date: 8.JUN.2017 11:39:11

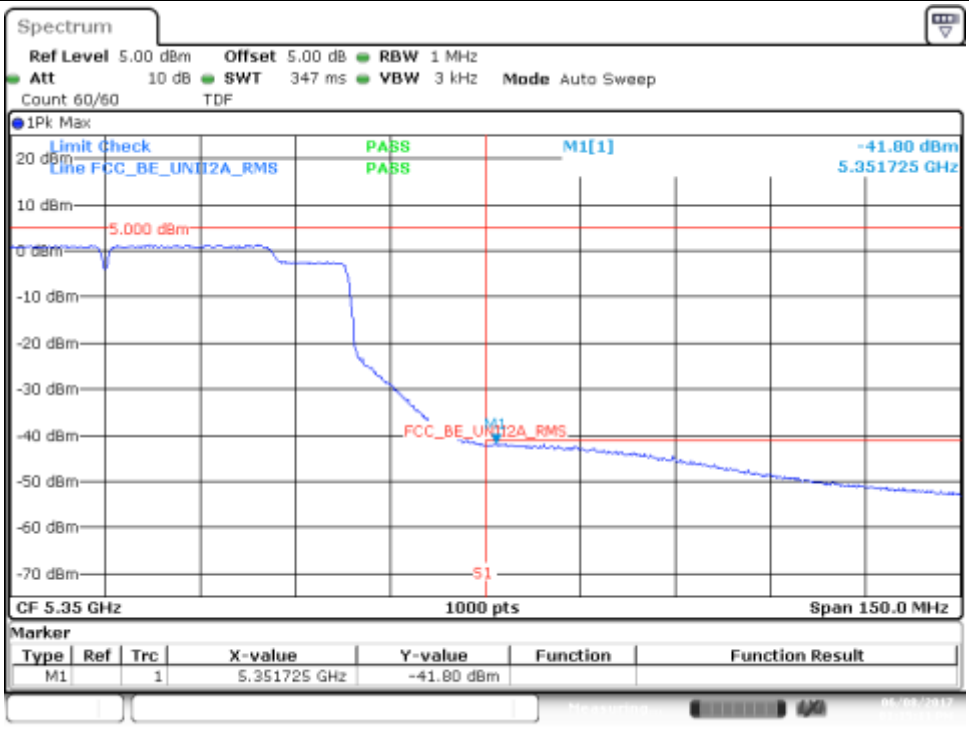
802.11ac80, VHT0 (SISO) - Chain B

BE High Freq Section, Peak – CH58ac80



Date: 8.JUN.2017 13:15:33

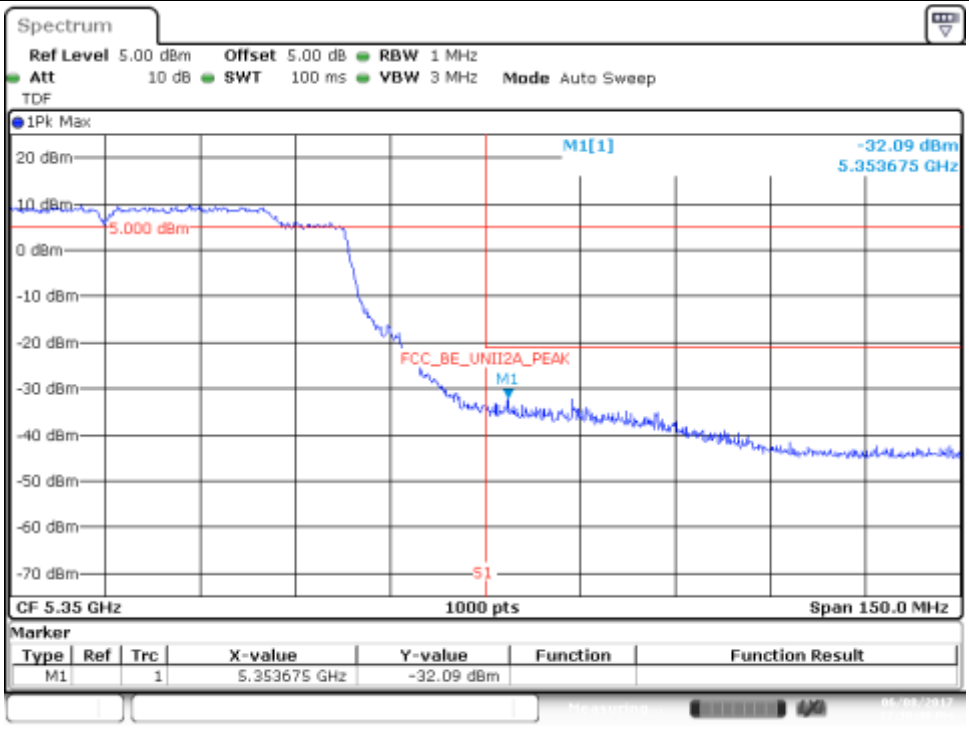
BE High Freq Section, RMS – CH58ac80



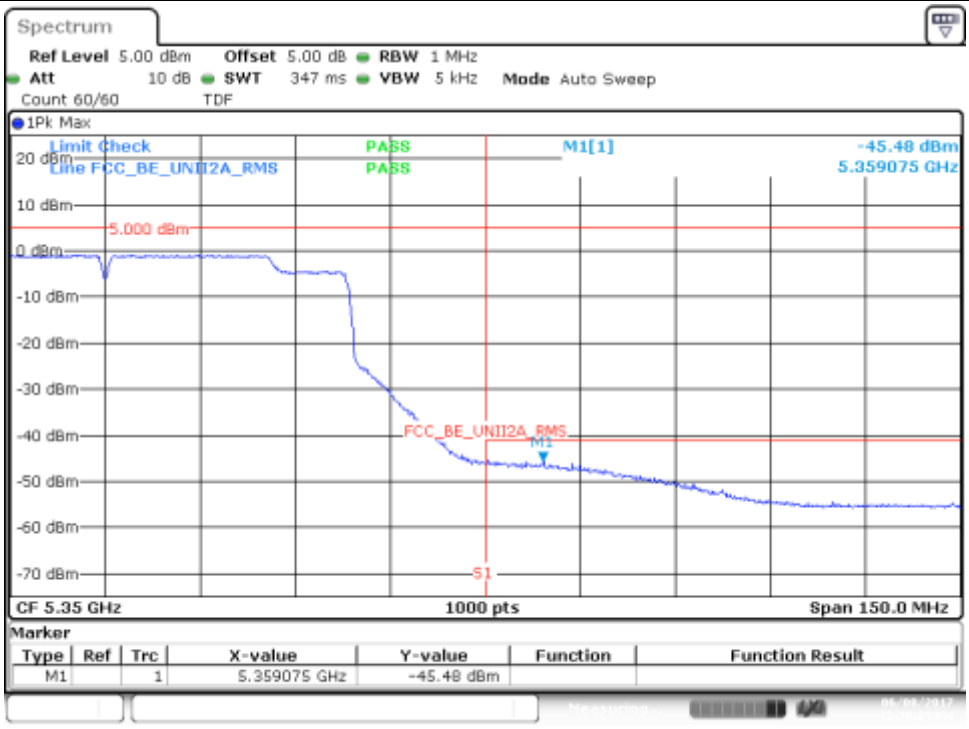
Date: 8.JUN.2017 13:15:12

802.11ac80, VHT0 (MIMO)– Chain A

BE High Freq Section, Peak – CH58ac80

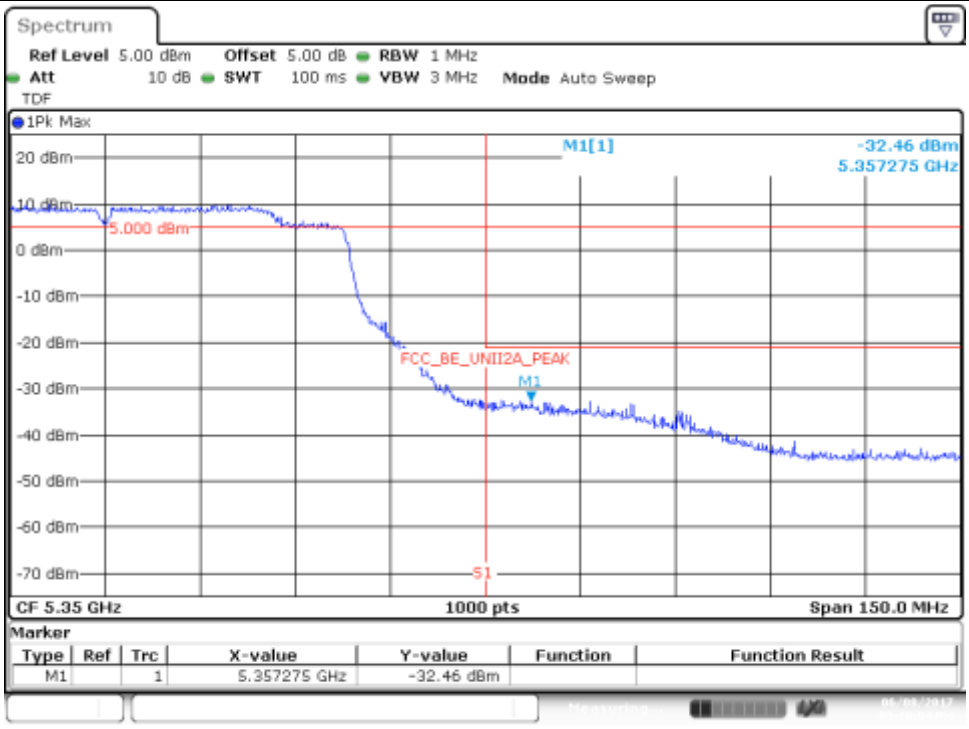


BE High Freq Section, RMS – CH58ac80



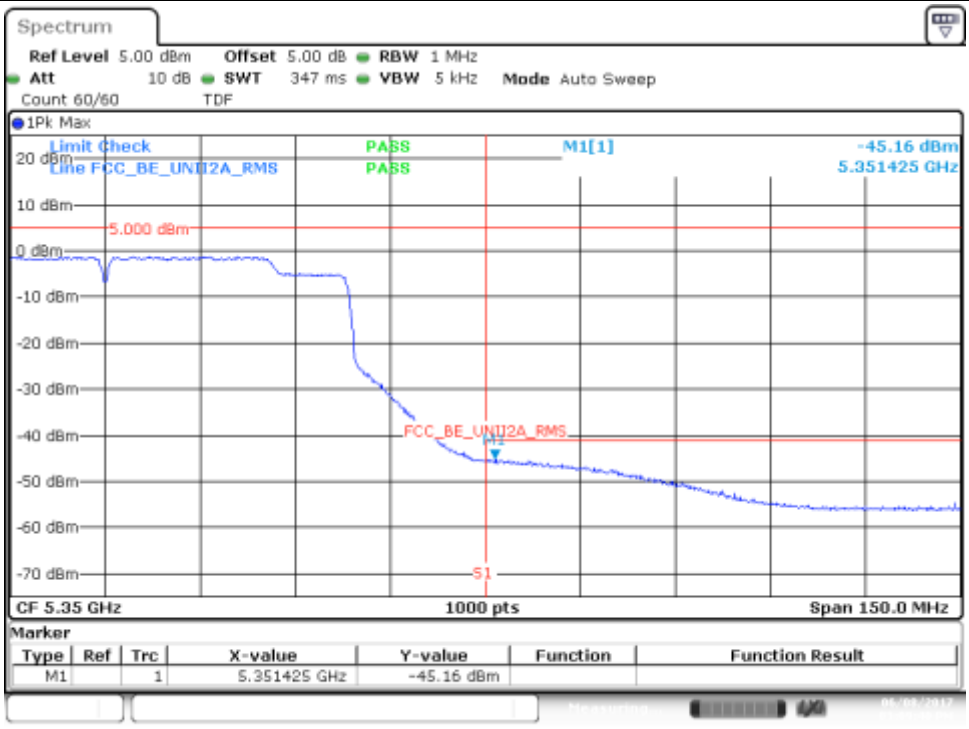
802.11ac80, VHT0 (MIMO)– Chain B

BE High Freq Section, Peak – CH58ac80



Date: 8.JUN.2017 15:10:05

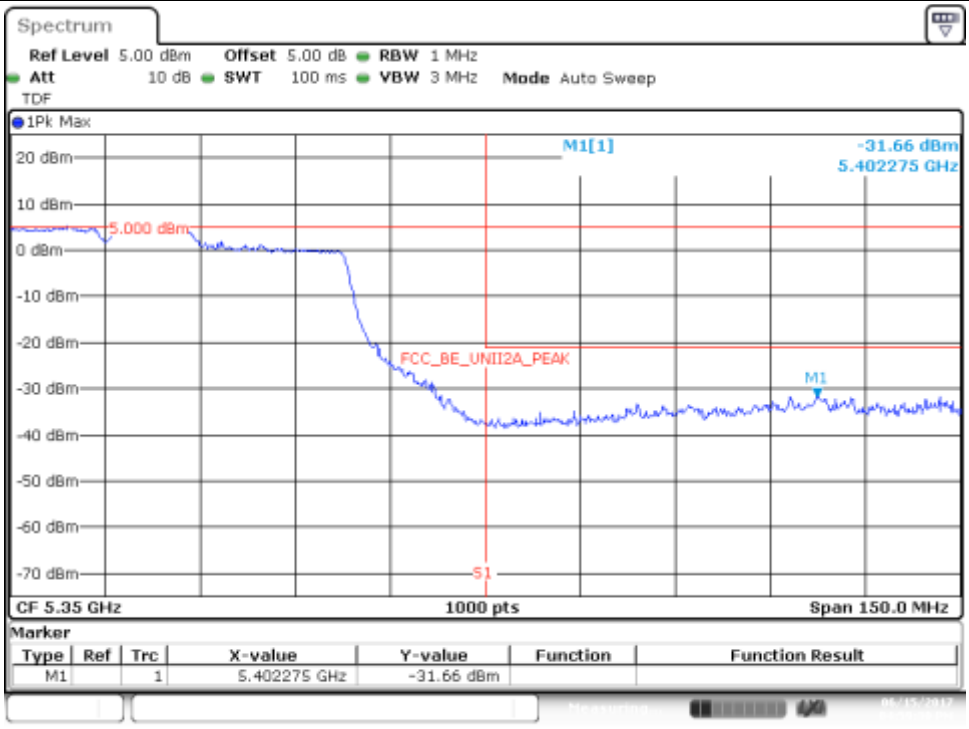
BE High Freq Section, Peak – CH58ac80



Date: 8.JUN.2017 15:09:40

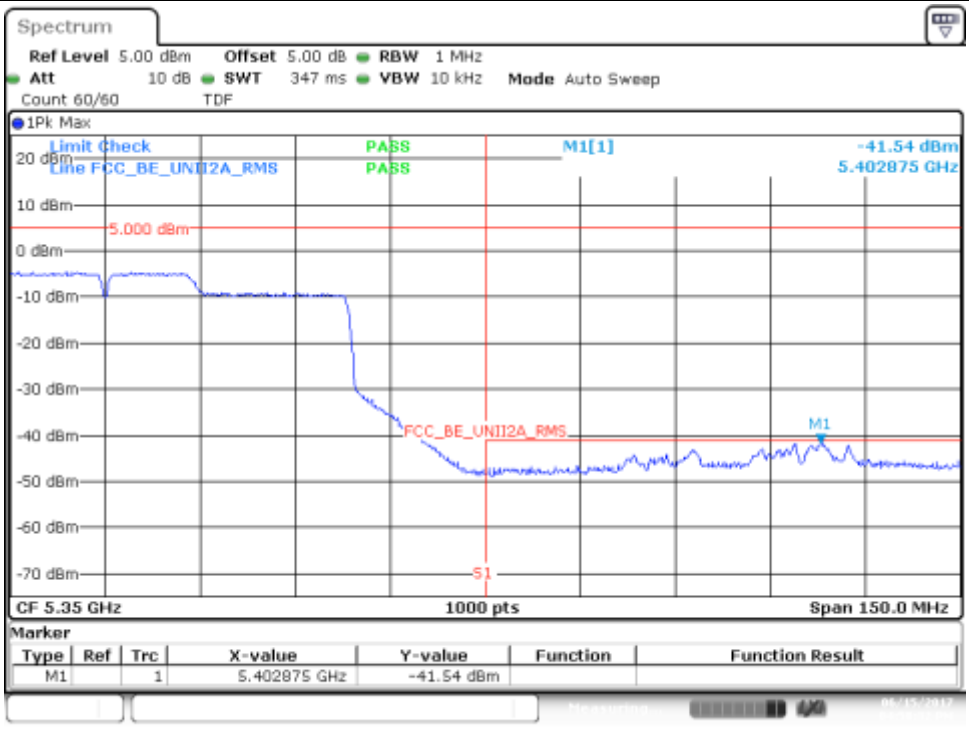
802.11ac160, VHT0 (MIMO)– Chain A

BE High Freq Section, Peak – CH50ac160



Date: 15.JUN.2017 16:59:30

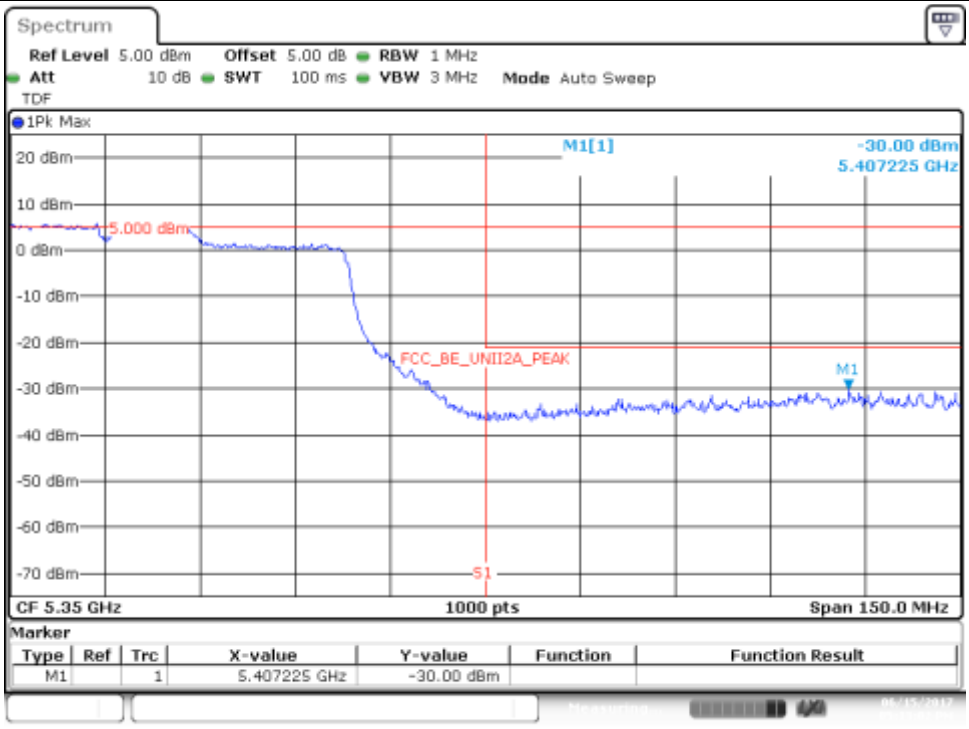
BE High Freq Section, Peak – CH50ac160



Date: 15.JUN.2017 16:58:33

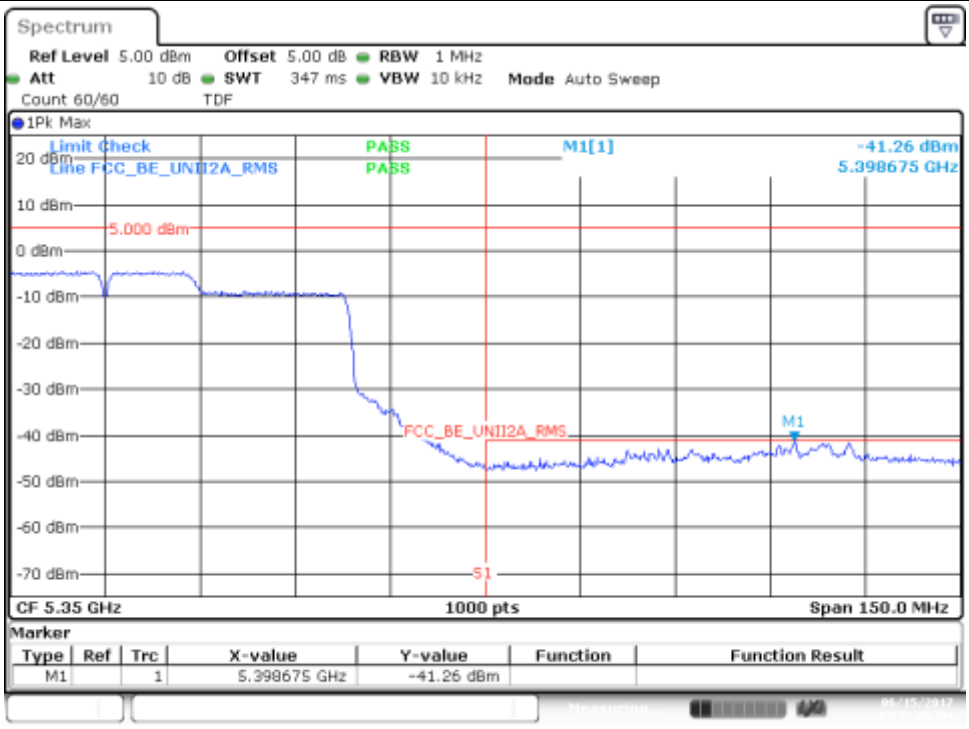
802.11ac160, VHT0 (MIMO)– Chain B

BE High Freq Section, Peak – CH50ac160



Date: 15.JUN.2017 17:13:03

BE High Freq Section, Peak – CH50ac160



Date: 15.JUN.2017 17:12:05