

TEST REPORT

EUT Description	WLAN and BT, 1x1 PCIe M.2 1216 SD adapter card
Brand Name	Intel® Wireless-AC 9462
Model Name	9462D2W
FCC ID	PD99462D2
ISED ID	1000M-9462D2
Date of Test Start/End	2017-10-25 / 2017-11-29
Features	802.11ac, Dual Band, 1x1 Wi-Fi + Bluetooth® 5, Diversity Antenna (see section 5)

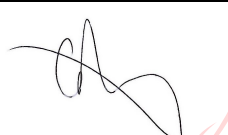
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Reference Standards	FCC CFR Title 47 Part 15 E RSS-247 issue 2, RSS-Gen issue 4 (see section 1)
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Test Report identification	170919-01.TR03
Revision Control	Rev. 00 This test report revision replaces any previous test report revision (see section 8)

The test results relate only to the samples tested.
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1. Standards, reference documents and applicable test methods

1. FCC 47 CFR part 15 – Subpart E – Unlicensed National Information Infrastructure Devices.
2. FCC 47 CFR part 15 - Subpart C – §15.209 Radiated emission limits; general requirements.
3. FCC OET KDB 789033 D02 General U-NII Test Procedures New Rules v01r04 – Guidelines for compliance testing of Unlicensed National Information Infrastructure (U-NII) Devices (Part 15, Subpart E)
4. FCC OET KDB 644545 D03 Guidance for IEEE 802.11ac v01 - GUIDANCE FOR IEEE Std 802.11ac™ DEVICES EMISSION TESTING.
5. ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.
6. RSS-247 Issue 2 - Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices.
7. RSS-Gen Issue 4 - General Requirements for Compliance of Radio Apparatus.

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 Mobile Communications France SAS Wireless RF Lab (Intel WRF Lab) is a Registered Test Site listed by ISED, with ISED Assigned Code 1000Y.
- ✓ Intel WRF Lab only provides testing services and is committed to providing reliable, unbiased test results and interpretations.
- ✓ Intel WRF Lab is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.
- ✓ Intel WRF Lab has developed calibration and proficiency programs for its measurement equipment to ensure correlated and reliable results to its customers.
- ✓ This report is only referred to the item that has undergone the test.
- ✓ This report does not imply an approval of the product by the Certification Bodies or competent Authorities.

3. Environmental Conditions

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

Temperature	21 °C ±3 °C
Humidity	35 % ± 10 %

4. Test samples

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

5. EUT Features

Brand Name	Intel® Wireless-AC 9462		
Model Name	9462D2W		
FCC ID	PD99462D2		
ISED ID	1000M-9462D2		
Software Version	10.1739.0-06012		
Driver Version	99.0.28.6		
Prototype / Production	Production		
Supported Radios	802.11b/g/n 2.4GHz (2400.0 – 2483.5 MHz) 802.11a/n/ac 5.2GHz (5150.0 – 5350.0 MHz) 5.6GHz (5470.0 – 5725.0 MHz) 5.8GHz (5725.0 – 5850.0 MHz) Bluetooth 5 2.4GHz (2400.0 – 2483.5 MHz)		
Antenna Information	CHAIN A Div1: PIFA antenna. WiFi 2.4GHz & 5GHz and BT CHAIN A Div2: PIFA antenna. WiFi 2.4GHz & 5GHz and BT		
Additional Information	-		

6. Remarks and comments

N/A

7. Test Verdicts summary

7.1. 802.11 a/n/ac – U-NII- 3

FCC part	RSS part	Test name	Verdict
15.407 (a) (3)	RSS-247 Clause 6.2.4.1	Power Limits. Maximum output power	P
15.407 (a) (3)	RSS-247 Clause 6.2.4.1	Peak power spectral density	P
15.407 (b) (3)	RSS-247 Clause 6.2.4.2	Undesirable emissions limits: Band Edge (conducted)	P
15.407 (b) (3) 15.209	RSS-247 Clause 6.2.4.2 RSS-GEN Clause 8.9	Undesirable emissions limits (radiated)	P

8. Document Revision History

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

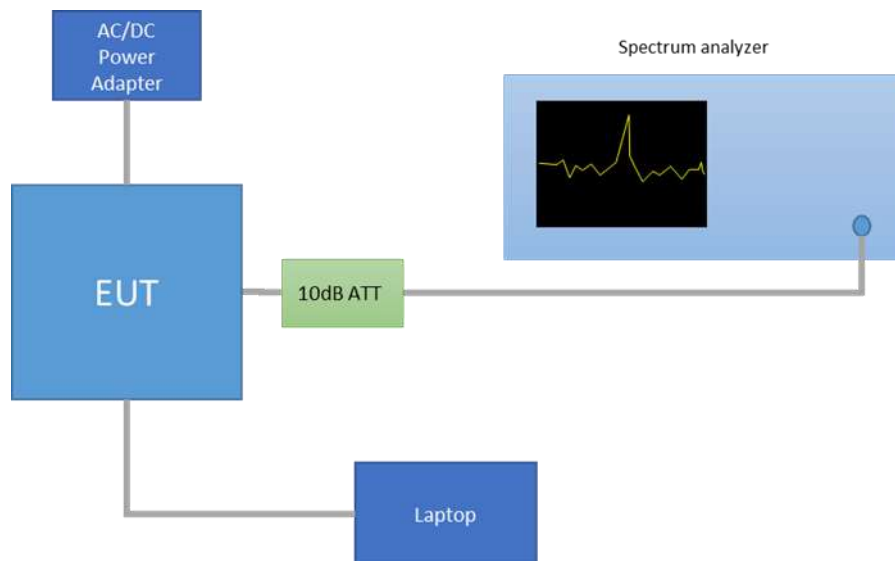
Annex A. Test & System Description

A.1 Measurement System

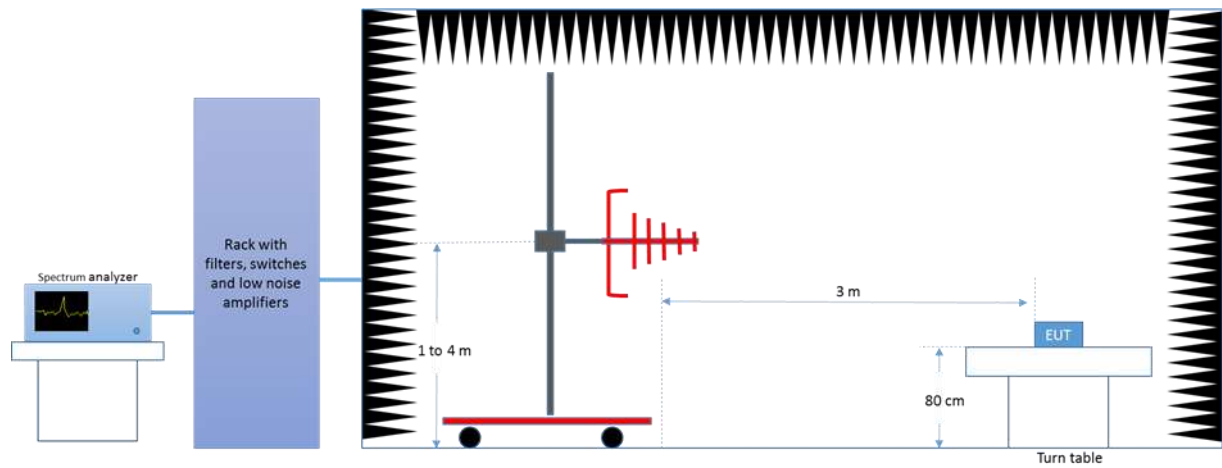
Measurements were performed using the following setups, made in accordance to the general provisions of FCC KDB 789033 D02 General UNII Test Procedures.

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

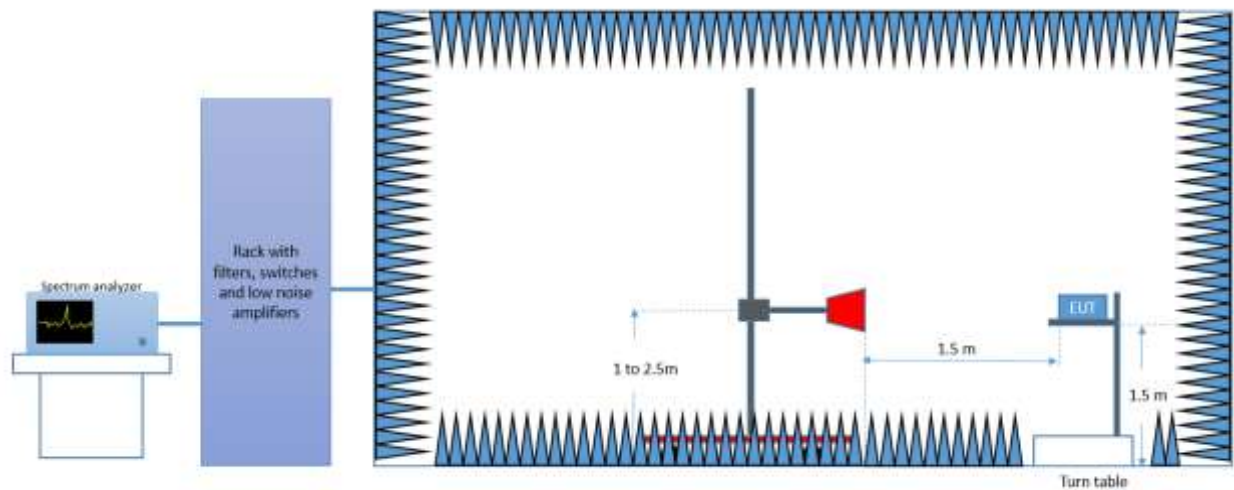
Conducted Setup



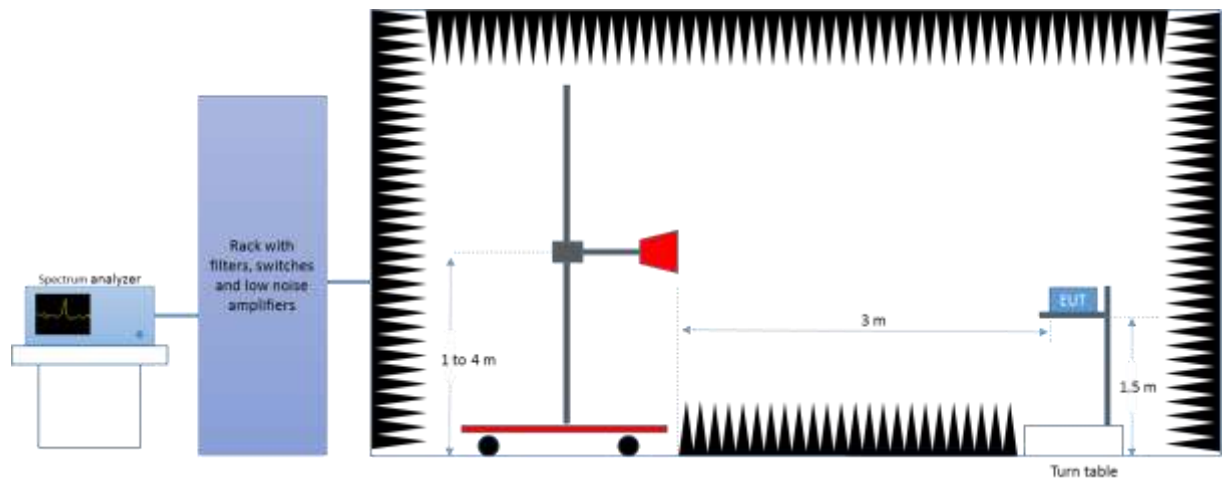
Radiated Setup 30 MHz-1GHz



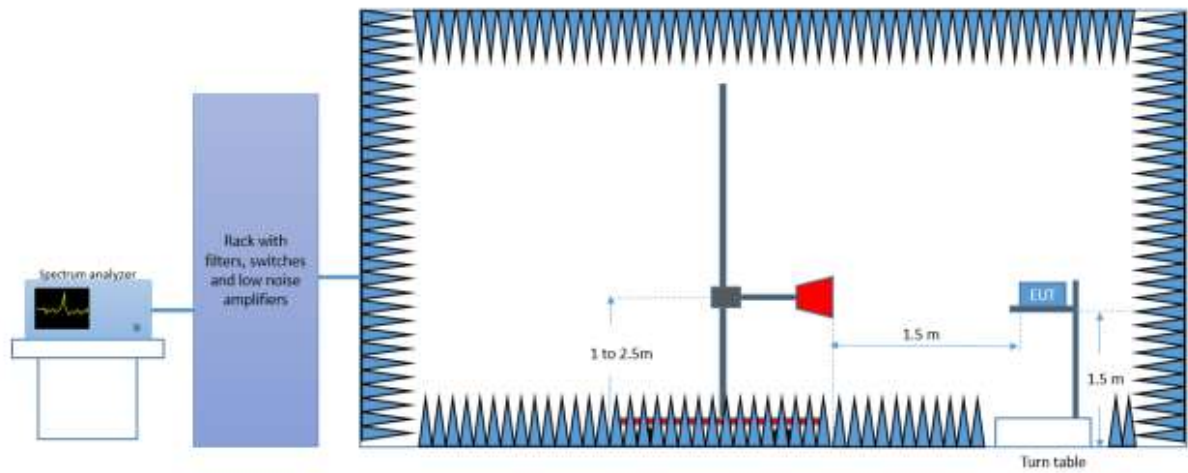
Radiated Setup 1 GHz – 6.4 GHz



Radiated Setup 6.4GHz – 18 GHz



Radiated Setup 18 GHz – 40 GHz



A.2 Test Equipment List

Conducted Setup

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

Radiated Setup-1

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

N/A: Not Applicable

Radiated Setup-2

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

N/A: Not Applicable

Radiated Setup - shared equipments

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

A.3 Measurement Uncertainty Evaluation

The system uncertainty evaluation is shown in the below table:

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

Annex B. Test Results U-NII-3

B.1 Test Conditions

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

The conducted RF output power at chain A Div1 and chain A Div2 was adjusted according to the client's supplied Target values (see following table) using the Intel DRTU tool and measuring the power by using a spectrum analyser with the channel integration method according to point II) E) 2) e) (Method SA-2 Alternative) of Guidance 789033 D02. Measured values for adjustment were within +/- 0.25 dB from the declared Target values.

U-NII-3					Conducted Power, Target Value (dBm)	
Mode	BW (MHz)	Data Rate	CH #	Freq. (MHz)	Chain A Div1	Chain A Div2
802.11a	20	6Mbps	149	5745	21.5	21.5
			157	5785	21.0	21.5
			165	5825	21.5	21.5
802.11n	20	HT0	149	5745	21.0	21.5
			157	5785	21.0	21.5
			165	5825	21.5	21.5
	40	HT0	151F	5755	16.0	16.0
			159F	5795	20.5	21.5
802.11ac	80	VHT0	155ac80	5775	14.5	15.0

Overlapped channels between UNII-2C and UNII-3					Conducted Power, Target Value (dBm)	
Mode	BW (MHz)	Data Rate	CH #	Freq. (MHz)	Chain A Div1	Chain A Div2
802.11n	20	HT0	144	5720	20.0	20.0
	40	HT0	142F	5710	19.5	20.0
802.11ac	80	VHT0	138ac80	5690	19.5	19.5

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

802.11a → 6Mbps

802.11n20 and 802.11n40 (SISO) → HT0

802.11ac80 (SISO) → VHT0

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

B.2 Test Results Tables

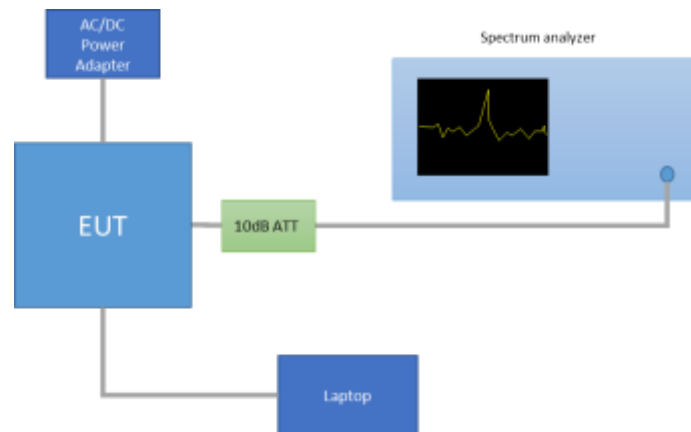
B.2.1 6dB & 99% Bandwidth

Test limits

FCC part	RSS part	Limits
15.407 (e)	RSS-247 Section 6.2.4.1	For equipment operating in the band 5725-5850 MHz, the minimum 6 dB bandwidth shall be at least 500 kHz.

Test procedure

The setup below was used to measure the 6dB & 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.



For the overlapped channels between U-NII-2C and U-NII-3 bands, and according to FCC KDB 644545 D03, the boundary frequency between the bands is used as one edge for defining the portion of the 6dB bandwidth that falls within a particular U-NII band. This rule is only applicable for the 6dB bandwidth and for those channels marked as overlapped.

Results tables

U-NII-3 channels

Mode	Rate	Antenna	Channel	Freq. [MHz]	6dB BW [MHz]	99% BW [MHz]
802.11a	6Mbps	CHAIN A DIV1	149	5745	16.33	24.76
			157	5785	16.33	21.60
			165	5825	16.35	26.36
		CHAIN A DIV2	149	5745	17.57	24.24
			157	5785	17.57	24.40
			165	5825	17.58	25.16
802.11n20	HT0	CHAIN A DIV1	149	5745	17.57	24.88
			157	5785	17.57	22.16
			165	5825	17.58	28.44
		CHAIN A DIV2	149	5745	17.57	24.88
			157	5785	17.57	24.44
			165	5825	17.58	25.60
802.11n40	HT0	CHAIN A DIV1	151F	5755	36.33	36.64
			159F	5795	36.33	37.92
		CHAIN A DIV2	151F	5755	36.33	36.56
			159F	5795	36.34	49.92
802.11ac80	VHT0	CHAIN A DIV1	155ac80	5775	72.72	75.12
		CHAIN A DIV2		5775	71.42	75.12

Max Value

Overlapped channels between U-NII-2C and U-NII-3

Mode	Rate	Antenna	Channel	Frequency	6dB BW [MHz]	26dB BW UNII-3
802.11n20	HT0	CHAIN A DIV1	144	5720	3.63	11.63
		CHAIN A DIV2			3.63	9.08
802.11n40	HT0	CHAIN A DIV1	142F	5710	3.18	8.54
		CHAIN A DIV2			3.18	8.18
802.11ac80	VHT0	CHAIN A DIV1	138ac80	5690	3.17	14.12
		CHAIN A DIV2			3.18	8.99

Max Value

Note, the 26dB bandwidth of the overlapped channels falling in U-NII-3 band is shown in the above table. These values were used to measure the maximum output power in the U-NII-3 band as specified in chapter B.2.2.

See Section B.3.1, B.3.2, B.3.3, and Section B.3.4 for the screenshot results.

B.2.2 Power Limits. Maximum output power & Peak power spectral Density

Test limits

FCC part	RSS part	Limits
15.407 (a) (3)	RSS-247 Clause 6.2.4.1	For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band

Test procedure

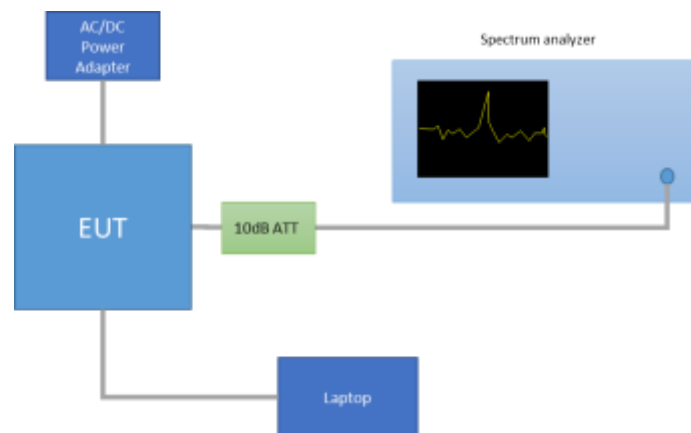
The Maximum Conducted Output Power was measured using the channel integration method according to point E) 2) e) (Method SA-2 Alternative) of KDB 789033 D02.

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

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

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

The declared maximum antenna gain is 5dBi.



For the overlapped channels between U-NII-2C and U-NII-3, and according to FCC KDB 644545 D03, the power is computed based on the portion of the emission bandwidth (26dB) contained within that band. This rule is only applicable for those channels marked as overlapped.

Results tables

Duty cycle

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

Maximum output power – U-NII-3 Channels

Mode	Rate	Channel	Frequency (MHz)	Antenna	Average Cond. Output Power [dBm]	Max.* Cond. Output Power [dBm]	Max.* Cond. Output Power [mW]	Max.* EIRP [dBm]
802.11a	6Mbps	149	5745	CHAIN A DIV1	21.25	21.25	133.35	26.25
				CHAIN A DIV2	21.39	21.39	137.72	26.39
		157	5785	CHAIN A DIV1	20.93	20.93	123.88	25.93
				CHAIN A DIV2	21.41	21.41	138.36	26.41
		165	5825	CHAIN A DIV1	21.41	21.41	138.36	26.41
				CHAIN A DIV2	21.38	21.38	137.40	26.38
802.11n20	HT0	149	5745	CHAIN A DIV1	21.00	21.00	125.89	26.00
				CHAIN A DIV2	21.37	21.37	137.09	26.37
		157	5785	CHAIN A DIV1	20.87	20.87	122.18	25.87
				CHAIN A DIV2	21.41	21.41	138.36	26.41
		165	5825	CHAIN A DIV1	21.55	21.55	142.89	26.55
				CHAIN A DIV2	21.43	21.43	139.00	26.43
802.11n40	HT0	151F	5755	CHAIN A DIV1	16.02	16.19	41.58	21.19
				CHAIN A DIV2	16.05	16.22	41.87	21.22
		159F	5795	CHAIN A DIV1	20.36	20.53	112.95	25.53
				CHAIN A DIV2	21.44	21.61	144.84	26.61
802.11ac80	VHT0	155ac80	5775	CHAIN A DIV1	13.98	14.28	26.80	19.28
				CHAIN A DIV2	14.53	14.83	30.41	19.83

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

Max Value

Min Value

Maximum output power – Overlapped channels between U-NII-2C and U-NII-3

Mode	Rate	Channel	Freq.	Antenna	Average Cond. Output Power UNII-3 [dBm]	Max.* Cond. Output Power UNII-3 [dBm]	Max.* Cond. Output Power UNII-3 [mW]	Max.* EIRP UNII-3 [dBm]
802.11n20	HT0	144	5720	CHAIN A DIV1	13.48	13.56	22.71	18.56
				CHAIN A DIV2	13.39	13.47	22.25	18.47
802.11n40	HT0	142F	5710	CHAIN A DIV1	8.96	9.13	8.18	14.13
				CHAIN A DIV2	9.29	9.46	8.83	14.46
802.11ac80	VHT0	138ac80	5690	CHAIN A DIV1	2.89	3.19	2.08	8.19
				CHAIN A DIV2	2.68	2.98	1.99	7.98

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

Max Value

Min Value

Maximum Power Spectral Density (PSD) – U-NII-3 channels

Mode	Rate	Channel	Freq. [MHz]	Antenna	Average conducted PSD [dBm/500kHz]	Max.* conducted PSD [dBm/500kHz]
802.11a	6Mbps	149	5745	CHAIN A DIV1	6.47	6.47
				CHAIN A DIV2	6.28	6.28
		157	5785	CHAIN A DIV1	6.14	6.14
				CHAIN A DIV2	6.32	6.32
		165	5825	CHAIN A DIV1	6.61	6.61
				CHAIN A DIV2	6.31	6.31
802.11n20	HT0	149	5745	CHAIN A DIV1	5.81	5.81
				CHAIN A DIV2	6.28	6.28
		157	5785	CHAIN A DIV1	5.83	5.83
				CHAIN A DIV2	6.36	6.36
		165	5825	CHAIN A DIV1	6.46	6.46
				CHAIN A DIV2	6.32	6.32
802.11n40	HT0	151F	5755	CHAIN A DIV1	-1.97	-1.80
				CHAIN A DIV2	-1.94	-1.77
		159F	5795	CHAIN A DIV1	2.33	2.50
				CHAIN A DIV2	3.46	3.63
802.11ac80	VHT0	155ac80	5775	CHAIN A DIV1	-6.16	-5.86
				CHAIN A DIV2	-5.61	-5.31

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

Max Value

Maximum Power Spectral Density (PSD) – Overlapped channels between U-NII-2C and U-NII-3

Mode	Rate	Channel	Freq. [MHz]	Antenna	Average conducted PSD UNII-2C [dBm/MHz]	Maximum* conducted PSD UNII-2C [dBm/MHz]
802.11n20	HT0	144	5720	CHAIN A DIV1	4.97	5.05
				CHAIN A DIV2	4.90	4.98
802.11n40	HT0	142F	5710	CHAIN A DIV1	1.19	1.36
				CHAIN A DIV2	1.55	1.72
802.11ac80	VHT0	138ac80	5690	CHAIN A DIV1	-4.83	-4.53
				CHAIN A DIV2	-5.01	-4.71

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

Max Value

See Section B.3.5, B.3.6, B.3.7, and Section B.3.8 for the screenshot results

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

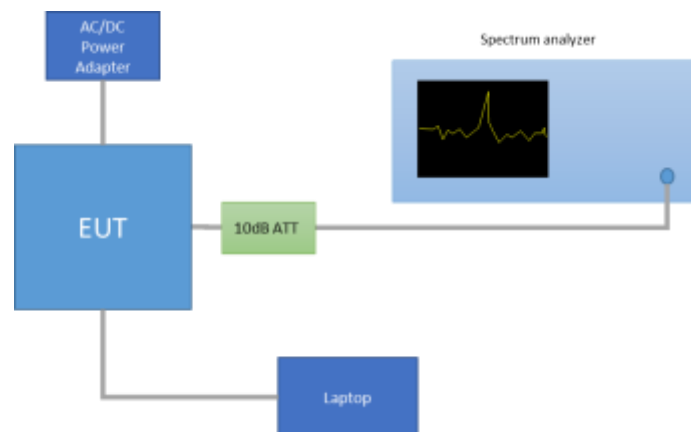
Test limits

FCC part	RSS part	Limits
15.407 (b) (4)	RSS-247 Clause 6.2.4.2	For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

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.

The declared maximum antenna gain is 5dBi.



See Section B.3.9 for the screenshot results.

B.2.4 Radiated spurious emission

Standard references

FCC part	RSS part	Limits																				
15.407 (b) (4)	RSS-247 Clause 6.2.4.2	For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.																				
15.209	RSS-GEN, Clause 8.9	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.	Freq Range (MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Meas. Distance (m)	30-88	100	40	3	88-216	150	43.5	3	216-960	200	46	3	Above 960	500	54	3
Freq Range (MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Meas. Distance (m)																			
30-88	100	40	3																			
88-216	150	43.5	3																			
216-960	200	46	3																			
Above 960	500	54	3																			

Test procedure

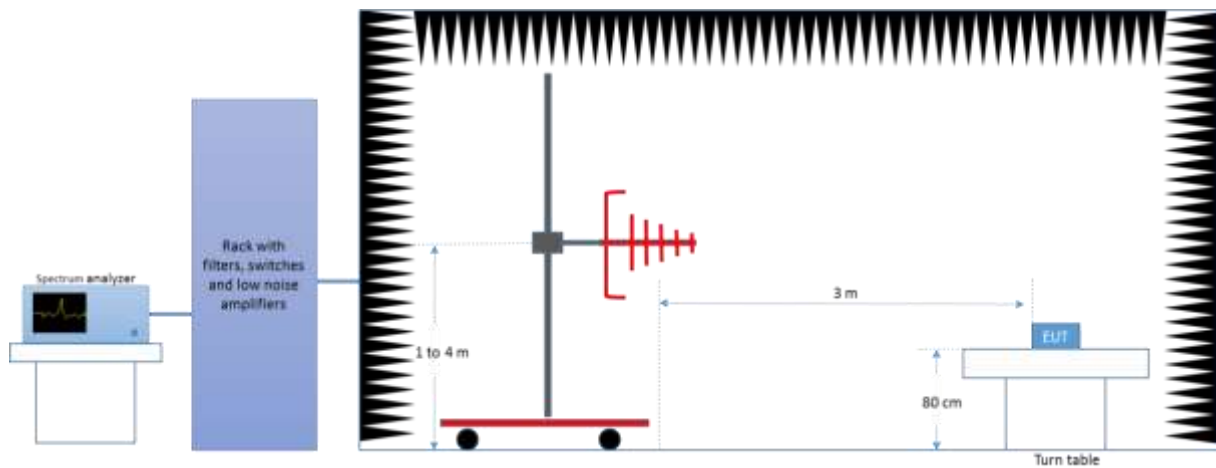
The setup below was used to measure the radiated spurious emissions.

Depending of the frequency range and bands being tested, different antennas and filters were used.

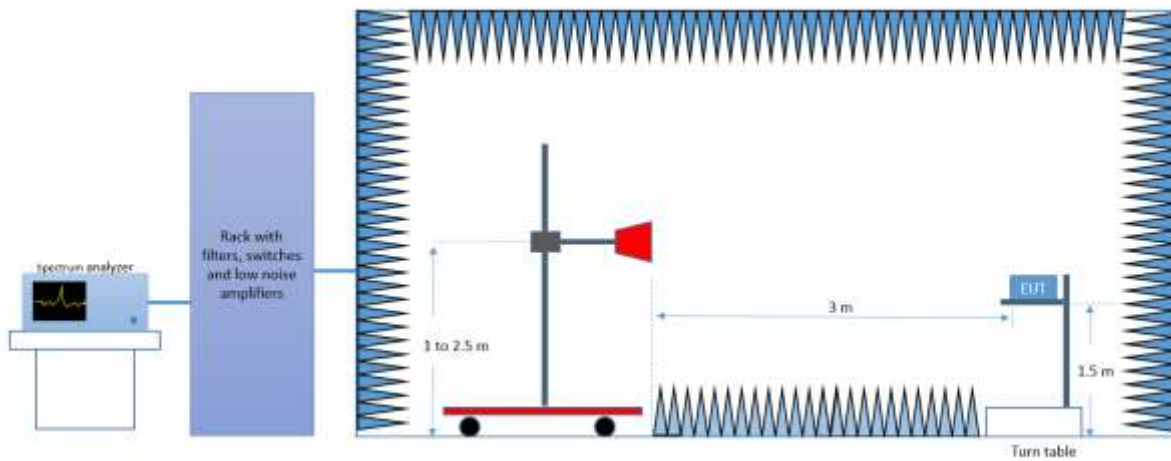
The final measurement is done by varying the antenna height, the EUT azimuth over 360° and for both Vertical and Horizontal polarizations.

The radiated spurious emission was measured on the worst case configuration selected from the chapter B.2.2 and using the low, middle and high channel.

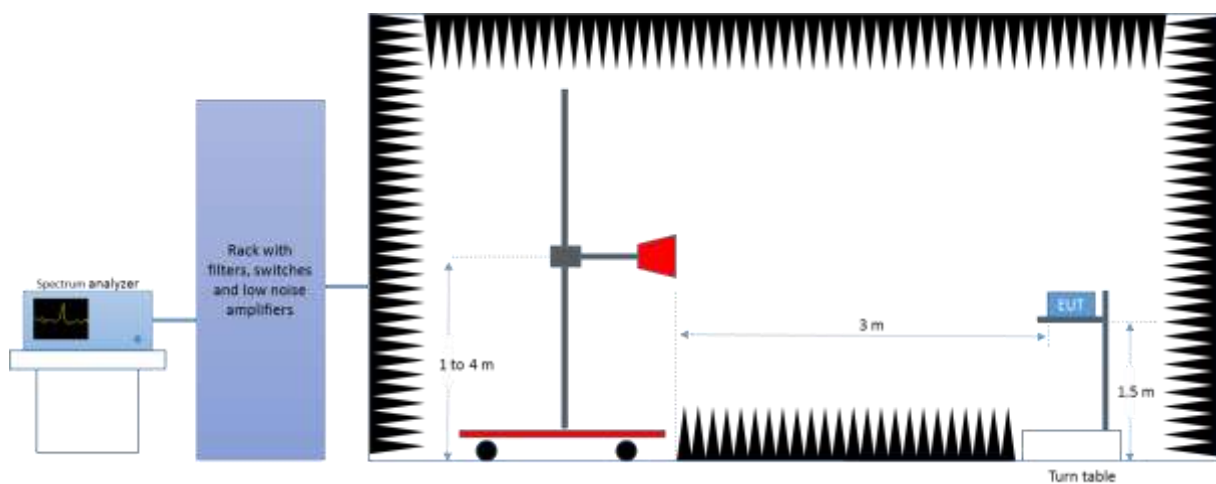
Radiated Setup 30 MHz – 1 GHz



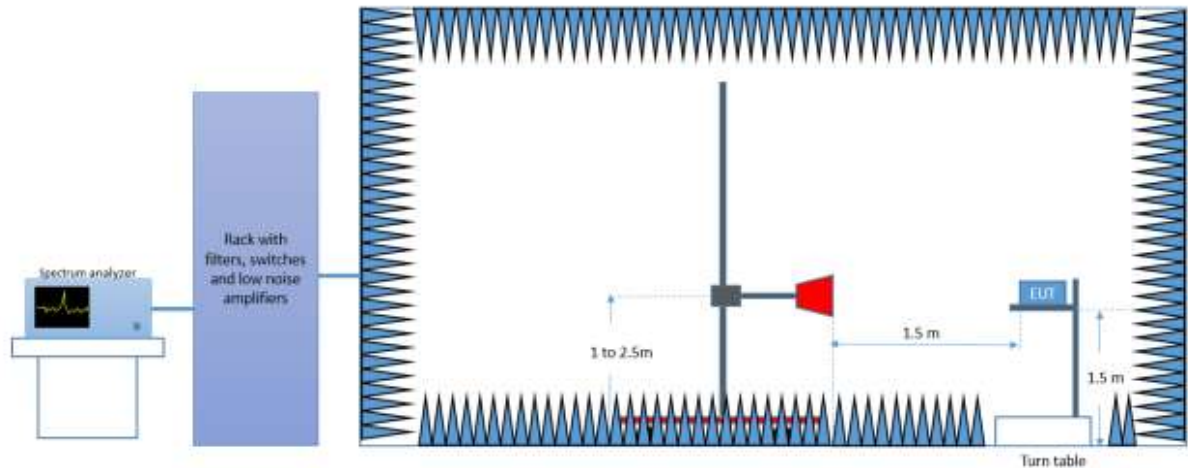
Radiated Setup 1 GHz – 6.4 GHz



Radiated Setup 6.4GHz – 18 GHz



Radiated Setup 18 GHz - 40 GHz



Sample Calculation

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

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

where

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

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

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

G is the gain of the test antenna, in dBi

NOTE – The measured power P includes all applicable instrument correction factors up to the connection to the test Antenna e.g. cable losses, amplifier gains.

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

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

where

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

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

D_{Meas} is the measurement distance, in m

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

Test Results

30 MHz – 40 GHz, 802.11a, 6Mbps, Chain A Div 1

Radiated Spurious – CH149

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
437.6	35.9	---	46.0	10.1
640.0	37.8	---	46.0	8.2
2124.9	55.2	---	74.0	18.8
2132.8	---	37.1	54.0	16.9
6083.6	---	48.9	54.0	5.1
6142.5	61.0	---	74.0	13.0
11487.6	52.7	---	74.0	21.3
11490.0	---	42.7	54.0	11.3
25911.1	---	37.0	54.0	17.0
25943.1	47.8	---	74.0	26.2

Radiated Spurious – CH157

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
437.6	35.6	---	46.0	10.4
640.0	37.0	---	46.0	9.0
2129.3	---	36.5	54.0	17.5
2130.6	50.9	---	74.0	23.1
11569.7	---	44.2	54.0	9.8
11569.7	58.0	---	74.0	16.0
23145.0	---	40.2	54.0	13.8
23145.5	50.9	---	74.0	23.1

Radiated Spurious – CH165

Frequency	MaxPeak	Avg	Limit	Margin
437.6	35.8	---	46.0	10.2
640.0	38.9	---	46.0	7.1
2129.8	---	36.8	54.0	17.2
2131.3	51.9	---	74.0	22.1
11649.5	---	49.1	54.0	4.9
11654.3	62.1	---	74.0	11.9
23298.0	---	38.7	54.0	15.4
23301.6	49.0	---	74.0	25.0

30 MHz – 40 GHz, 802.11a, 6Mbps, Chain A Div 2
Radiated Spurious – CH149

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
437.6	35.8	---	46.0	10.2
576.0	35.8	---	46.0	10.2
640.0	37.2	---	46.0	8.8
2130.3	---	36.7	54.0	17.3
2131.1	51.5	---	74.0	22.5
11489.5	---	51.0	54.0	3.0
11493.9	60.5	---	74.0	13.5
25943.4	---	37.0	54.0	17.1
25974.9	47.9	---	74.0	26.1

Radiated Spurious – CH157

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
437.6	35.4	---	46.0	10.6
640.0	38.3	---	46.0	7.7
2128.8	---	36.9	54.0	17.1
2128.8	52.2	---	74.0	21.8
11569.3	57.3	---	74.0	16.7
11569.3	---	43.8	54.0	10.2
17351.9	61.5	---	74.0	12.5
17354.3	---	48.4	54.0	5.6
23138.8	---	38.7	54.0	15.3
23149.2	49.6	---	74.0	24.4

Radiated Spurious – CH165

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
437.5	36.0	---	46.0	10.0
640.0	39.1	---	46.0	6.9
2126.9	---	37.6	54.0	16.4
2126.9	52.9	---	74.0	21.1
23294.6	47.8	---	74.0	26.2
23295.4	---	38.6	54.0	15.4

30 MHz – 40 GHz, 802.11n20, HT0, Chain A Div 1
Radiated Spurious – CH149

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
437.6	35.7	---	46.0	10.3
640.0	39.5	---	46.0	6.5
2129.8	---	37.0	54.0	17.0
2129.8	54.6	---	74.0	19.4
11489.5	53.4	---	74.0	20.6
11491.0	---	44.8	54.0	9.2
23797.2	47.8	---	74.0	26.2
25888.8	---	37.3	54.0	16.8

Radiated Spurious – CH157

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
312.0	34.6	---	46.0	11.5
437.5	35.2	---	46.0	10.8
640.0	37.7	---	46.0	8.3
2127.9	50.5	---	74.0	23.5
2139.9	---	37.0	54.0	17.0
11572.2	52.5	---	74.0	21.5
11572.6	---	42.7	54.0	11.3
23136.0	---	37.8	54.0	16.2
23153.7	47.6	---	74.0	26.4

Radiated Spurious – CH165

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
500.0	36.5	---	46.0	9.5
640.0	38.8	---	46.0	7.3
2131.3	---	36.9	54.0	17.1
2131.3	51.2	---	74.0	22.8
11647.6	51.2	---	74.0	22.8
11650.5	---	41.5	54.0	12.5
23284.8	49.3	---	74.0	24.7
23293.2	---	39.4	54.0	14.6

30 MHz – 40 GHz, 802.11n20, HT0, Chain A Div 2

Radiated Spurious – CH149

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
437.6	35.6	---	46.0	10.4
640.0	40.2	---	46.0	5.8
2132.8	---	38.3	54.0	15.7
2132.8	54.9	---	74.0	19.1
11487.1	---	47.2	54.0	6.8
11487.1	59.9	---	74.0	14.2
25898.1	47.7	---	74.0	26.3
25938.3	---	37.3	54.0	16.7

Radiated Spurious – CH157

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
437.6	35.2	---	46.0	10.8
640.0	37.9	---	46.0	8.1
2125.4	---	36.6	54.0	17.4
2130.1	51.0	---	74.0	23.0
23134.3	48.4	---	74.0	25.6
23143.3	---	39.4	54.0	14.6

Radiated Spurious – CH165

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
821.4	40.8	---	46.0	5.2
2129.1	---	37.7	54.0	16.3
2129.1	53.5	---	74.0	20.5
11647.6	---	44.2	54.0	9.8
11650.5	58.1	---	74.0	15.9
23296.0	---	39.3	54.0	14.7
23310.9	48.9	---	74.0	25.2

30 MHz – 40 GHz, 802.11n40, HT0, Chain A Div 1

Radiated Spurious – CH151F

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
225.2	29.2	---	46.0	16.8
398.9	31.3	---	46.0	14.7
826.9	40.7	---	46.0	5.3
830.0	36.4	---	46.0	9.6
2127.4	---	37.2	54.0	16.8
2127.4	54.3	---	74.0	19.7
11511.7	---	40.8	54.0	13.2
11512.7	50.7	---	74.0	23.3
23839.4	---	36.6	54.0	17.4
23910.5	48.0	---	74.0	26.0

Radiated Spurious – CH159F

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
224.6	29.3	---	46.0	16.7
837.9	40.6	---	46.0	5.4
1113.4	---	41.6	54.0	12.4
1151.9	---	40.3	54.0	13.7
1190.2	49.6	---	74.0	24.4
1190.2	---	44.5	54.0	9.5
1279.8	---	39.5	54.0	14.5
2131.3	---	38.5	54.0	15.5
2131.3	54.0	---	74.0	20.0
2655.1	---	39.1	54.0	14.9
3199.8	---	41.7	54.0	12.3
23180.1	47.7	---	74.0	26.3
23186.3	---	37.8	54.0	16.2

30 MHz – 40 GHz, 802.11n40, HT0, Chain A Div 2

Radiated Spurious – CH151F

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
225.2	29.9	---	46.0	16.1
834.4	40.6	---	46.0	5.4
2129.3	---	37.3	54.0	16.7
2129.3	56.8	---	74.0	17.2
25942.3	---	37.4	54.0	16.6
25943.1	47.4	---	74.0	26.6

Radiated Spurious – CH159F

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
226.2	29.3	---	46.0	16.7
822.0	40.4	---	46.0	5.6
1113.4	---	41.3	54.0	12.7
1151.9	---	40.1	54.0	13.9
1190.2	---	44.3	54.0	9.7
1190.2	49.3	---	74.0	24.7
1280.1	---	38.6	54.0	15.4
2127.4	50.5	---	74.0	23.5
23173.1	---	39.2	54.0	14.8
23173.4	48.8	---	74.0	25.2

30 MHz – 40 GHz, 802.11ac80, VHT0, Chain A Div 1

Radiated Spurious – CH155ac80

Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
226.3	28.9	---	46.0	17.1
815.0	40.5	---	46.0	5.5
1113.4	---	41.5	54.0	12.5
1113.6	48.0	---	74.0	26.0
1151.7	---	39.4	54.0	14.6
1190.0	48.7	---	74.0	25.3
1190.5	---	44.0	54.0	10.0
1279.8	---	38.8	54.0	15.2
22867.1	48.2	---	74.0	25.8
22882.8	---	36.4	54.0	17.6

30 MHz – 40 GHz, 802.11ac80, VHT0, Chain A Div 2

Radiated Spurious – CH155ac80

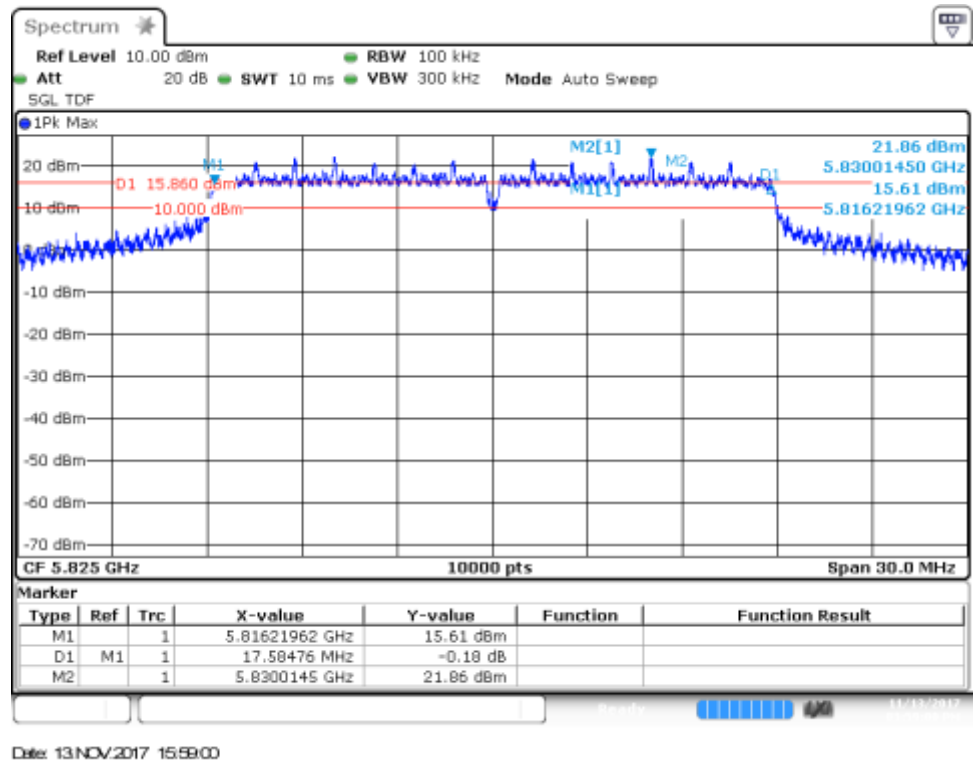
Frequency	MaxPeak	Avg	Limit	Margin
MHz	dBuV/m	dBuV/m	dBuV/m	dB
224.5	29.4	---	46.0	16.6
814.9	40.1	---	46.0	5.9
1113.6	---	41.6	54.0	12.4
1151.9	---	40.2	54.0	13.8
1190.2	48.9	---	74.0	25.1
1279.8	---	39.4	54.0	14.6
2130.3	52.9	---	74.0	21.1
25924.3	---	37.1	54.0	16.9
25935.3	48.1	---	74.0	25.9

B.3 Test Results Screenshot

B.3.1 6dB Bandwidth

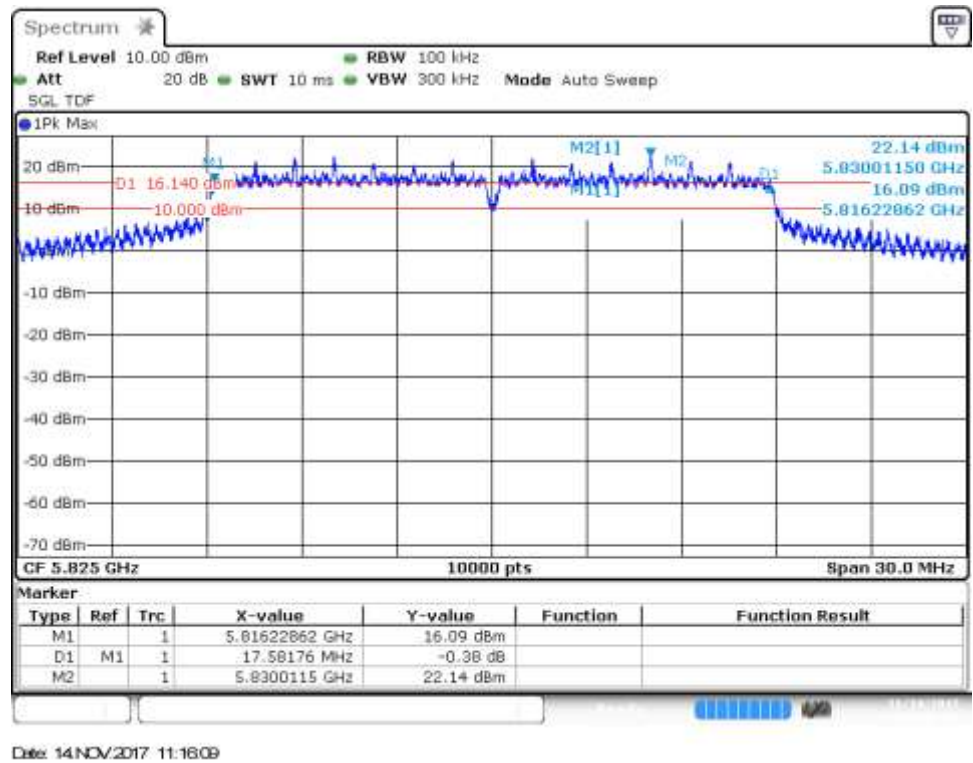
CHAIN A DIV2, 802.11a, 6Mbps

Channel 165



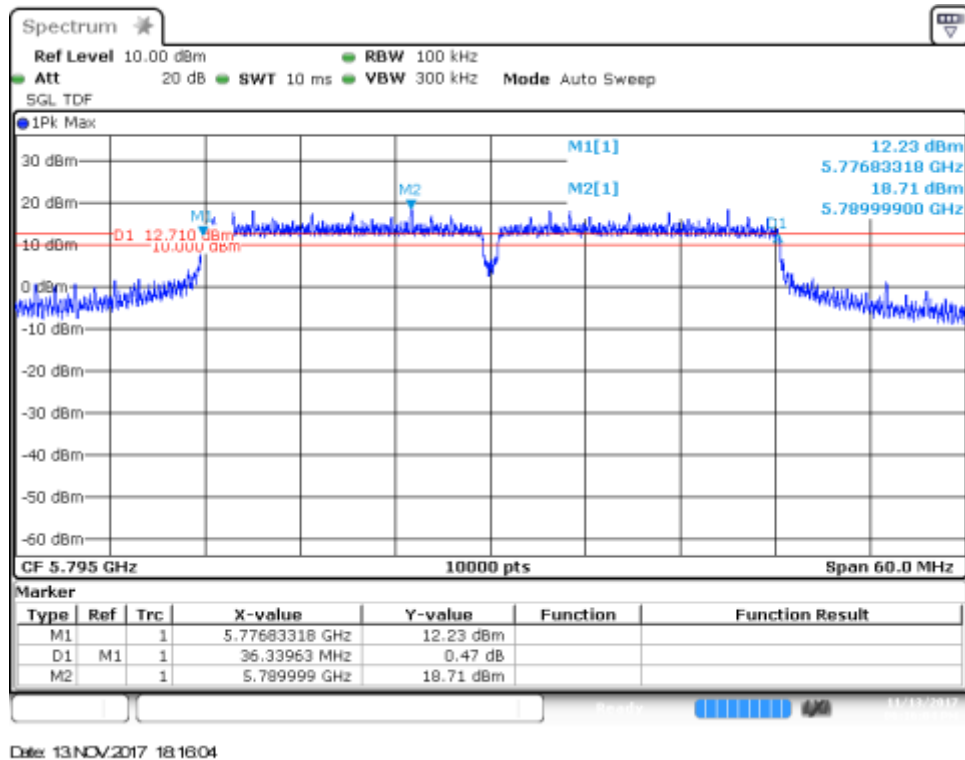
CHAIN A DIV1, 802.11n20, HT0

Channel 165



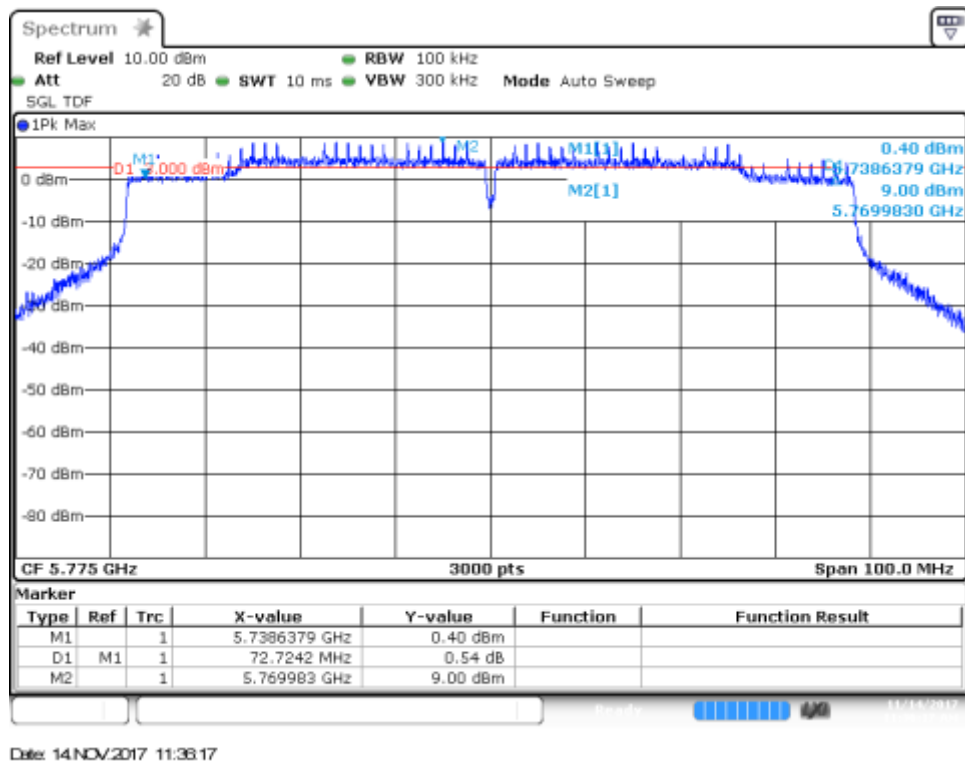
CHAIN A DIV2, 802.11n40, HT0

Channel 159F



CHAIN A DIV1, 802.11ac80, VHT0

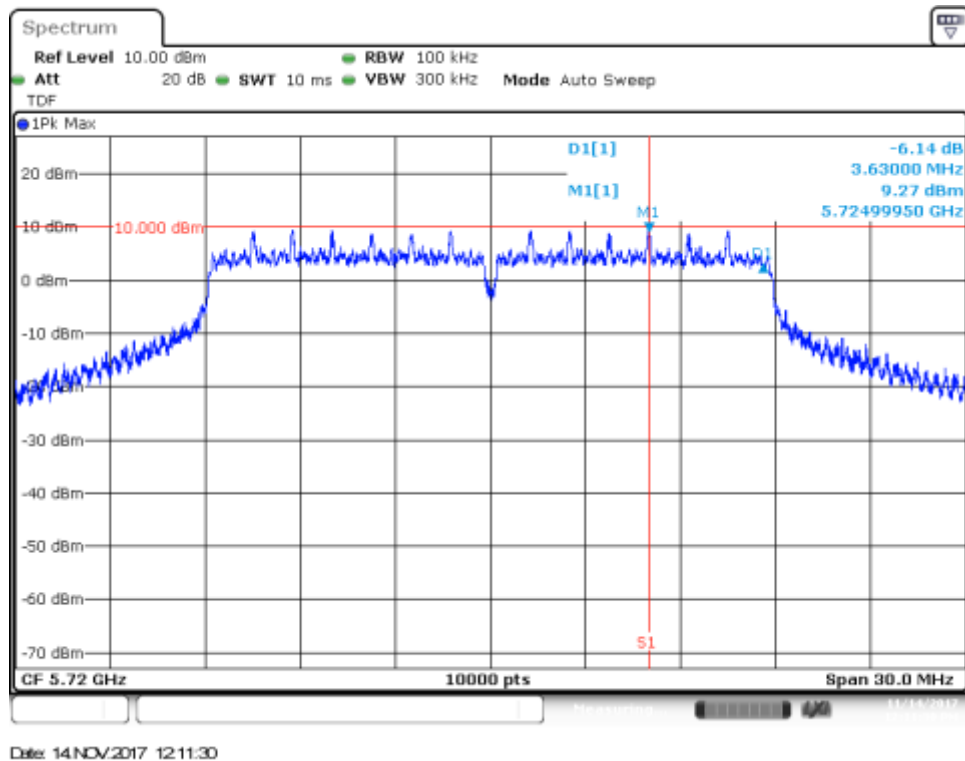
Channel 155ac80



B.3.2 6dB Bandwidth (Overlapped Channel)

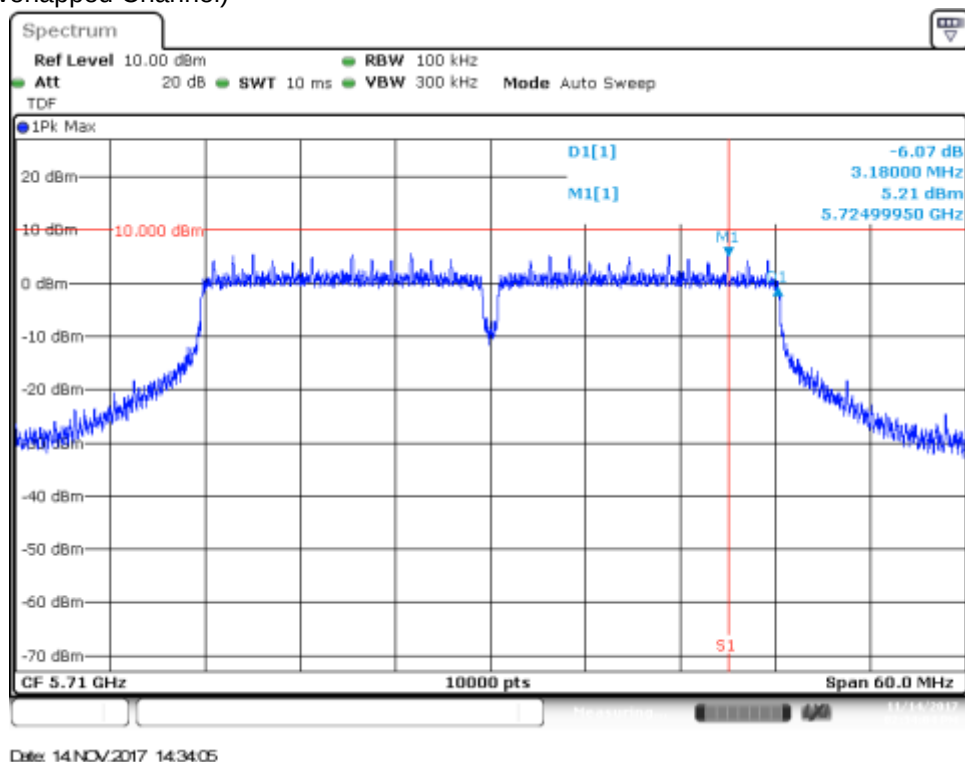
CHAIN A DIV1, 802.11n20, HT0

Channel 144 (Overlapped Channel)



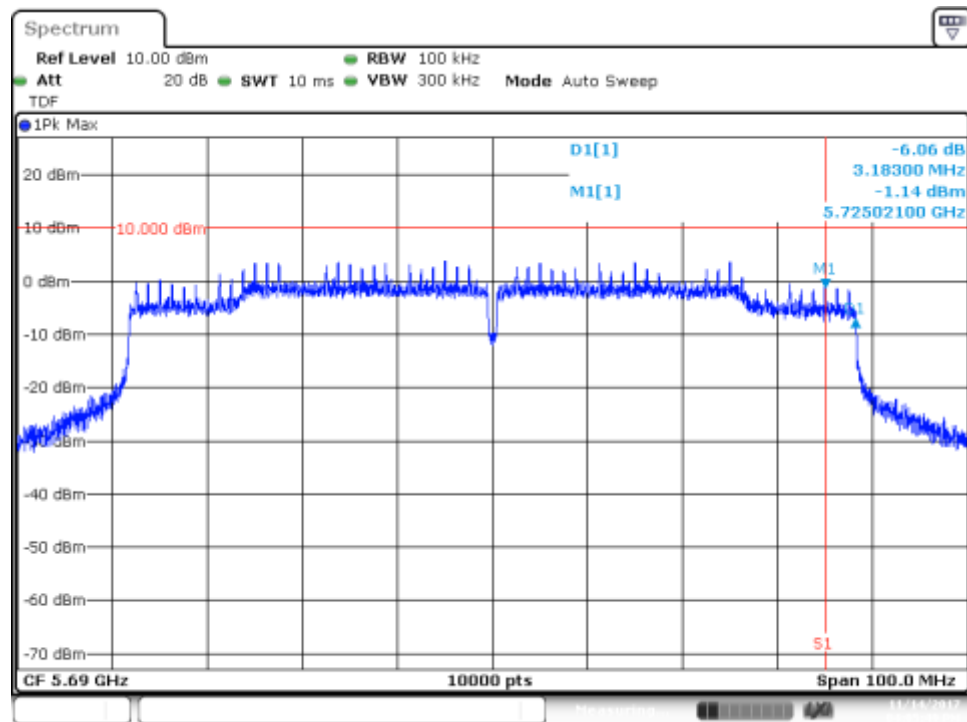
CHAIN A DIV1, 802.11n40, HT0

Channel 142F (Overlapped Channel)



CHAIN A DIV2, 802.11ac80, VHT0

Channel 138F (Overlapped Channel)

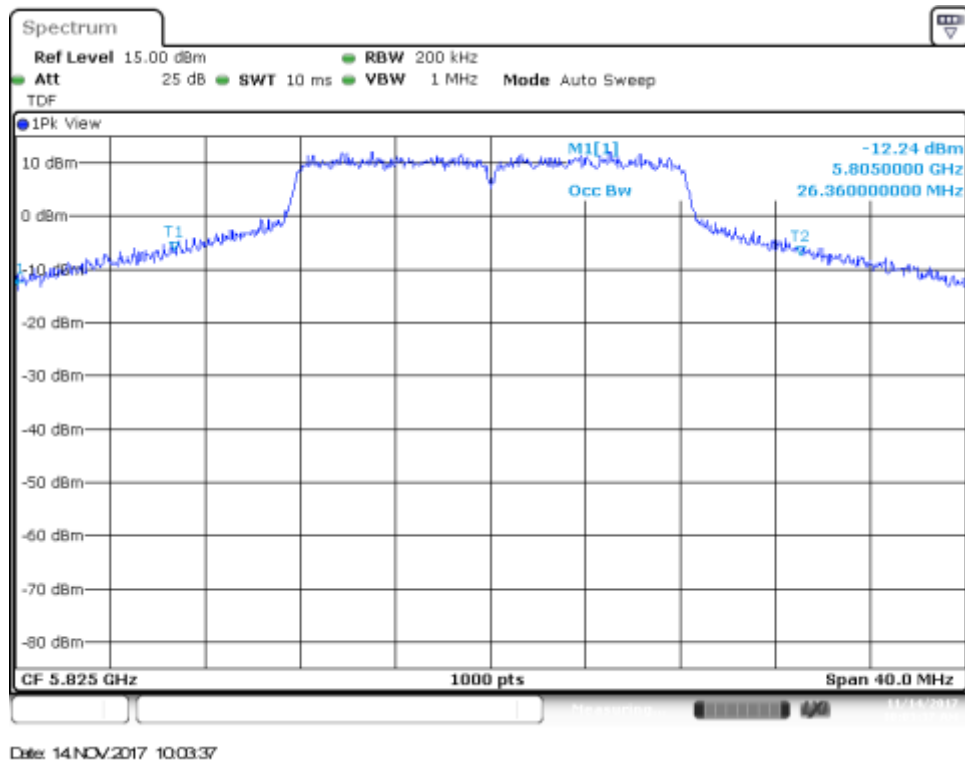


Date: 14 NOV 2017 16:05:50

B.3.3 99% Bandwidth

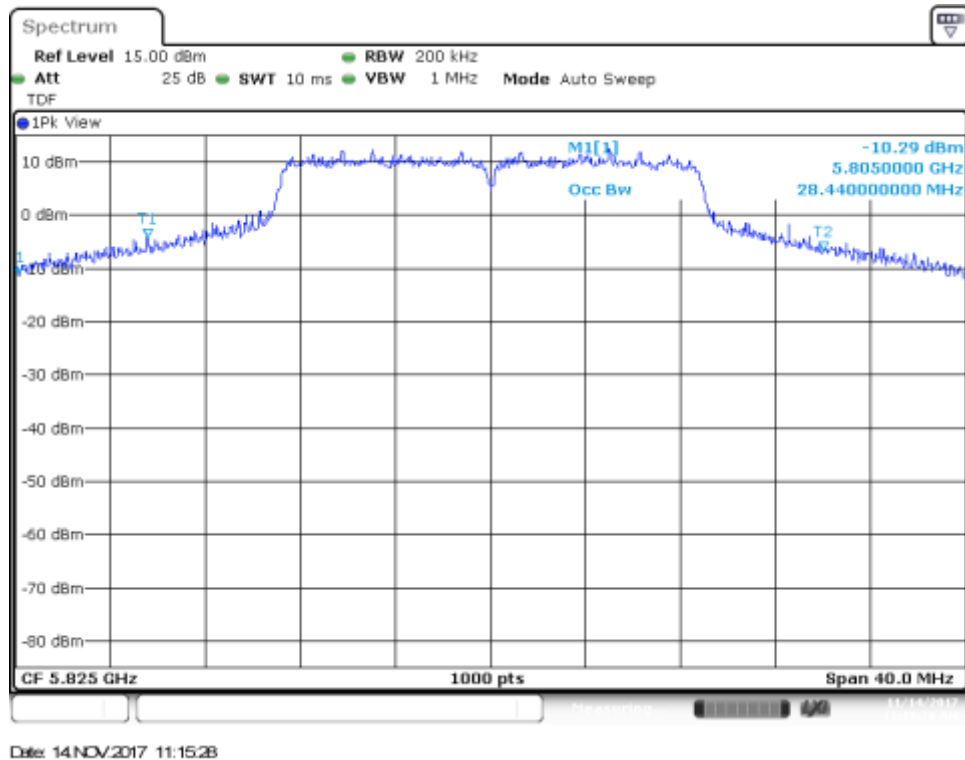
CHAIN A DIV1, 802.11a, 6Mbps

Channel 165



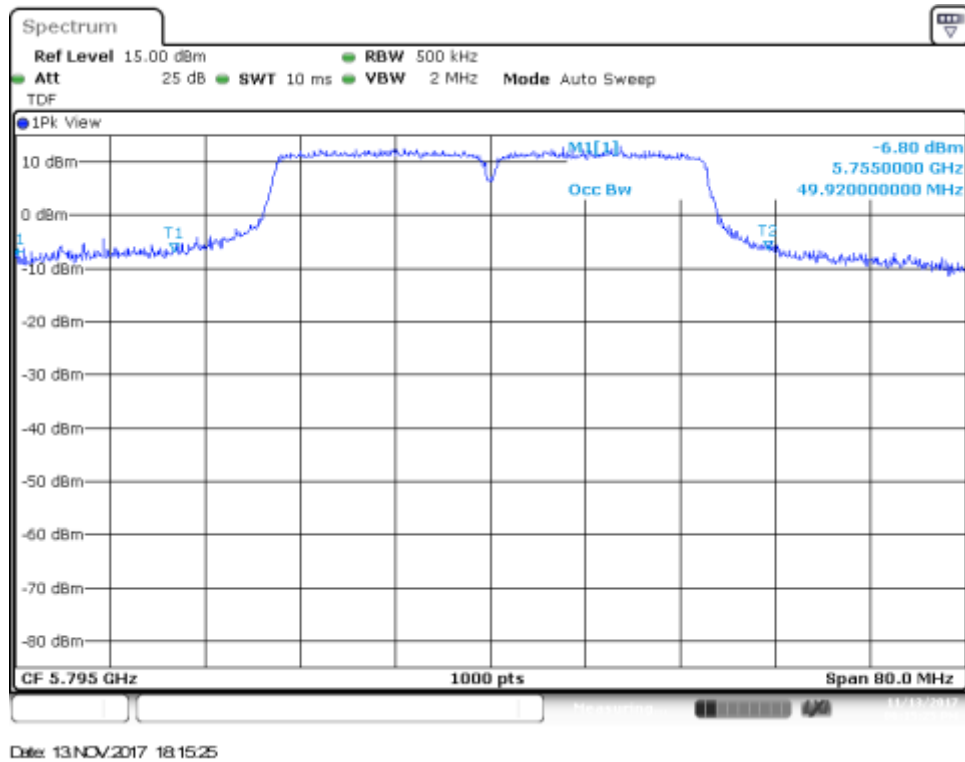
CHAIN A DIV1, 802.11n20, HT0

Channel 165



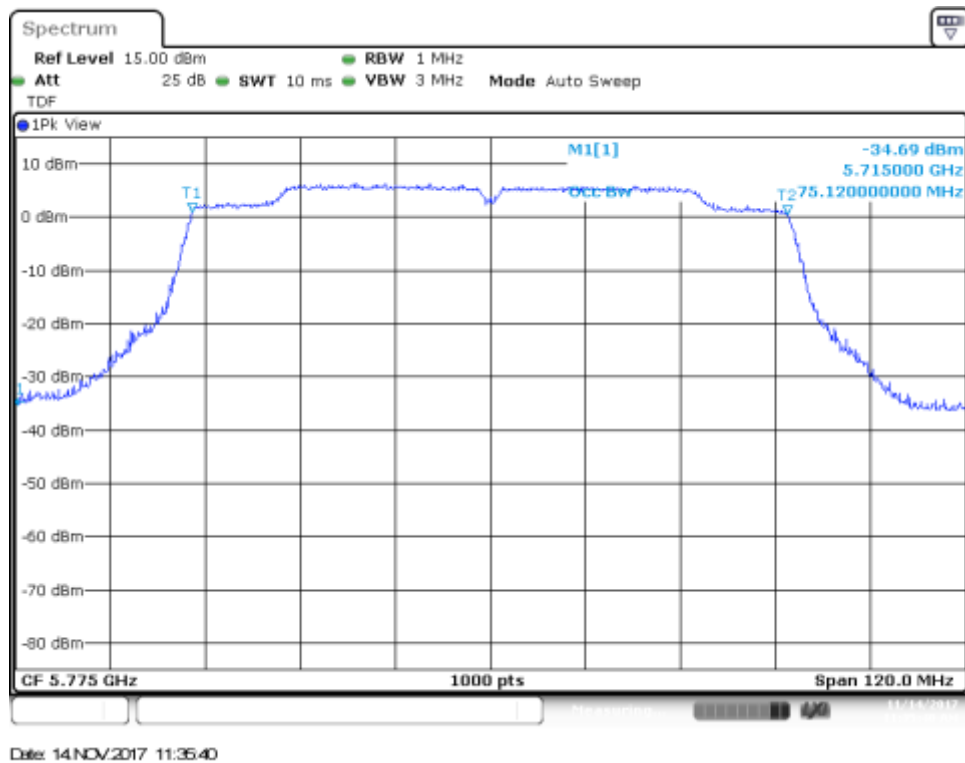
CHAIN A DIV2, 802.11n40, HT0

Channel 159F



CHAIN A DIV1, 802.11ac80, VHT0

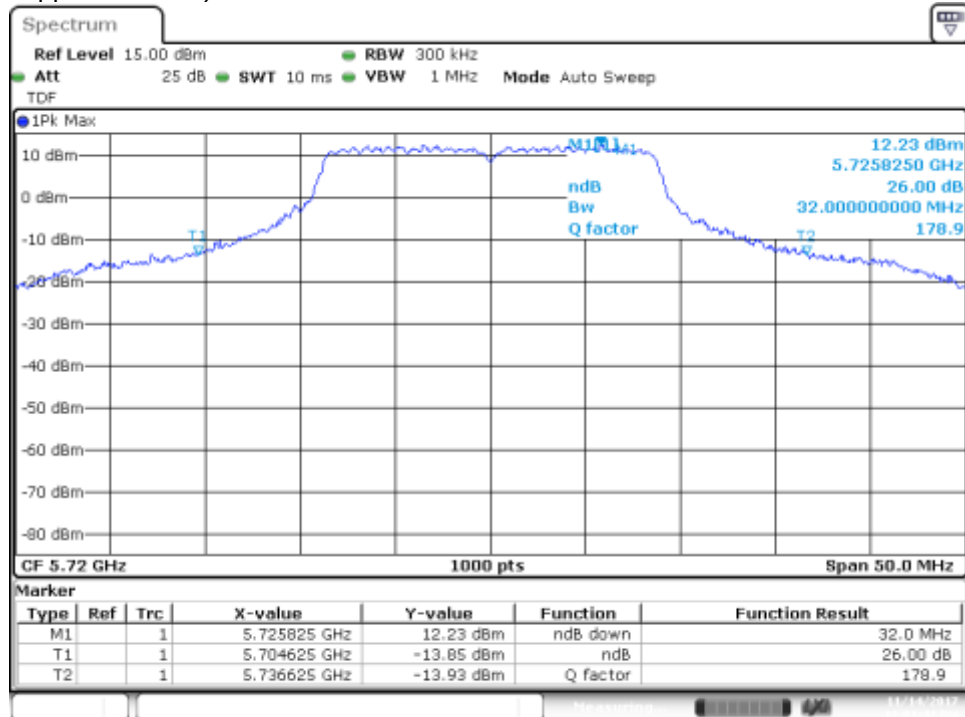
Channel 155ac80



B.3.4 26dB Bandwidth (Overlapped Channel)

CHAIN A DIV1, 802.11n20, HT0

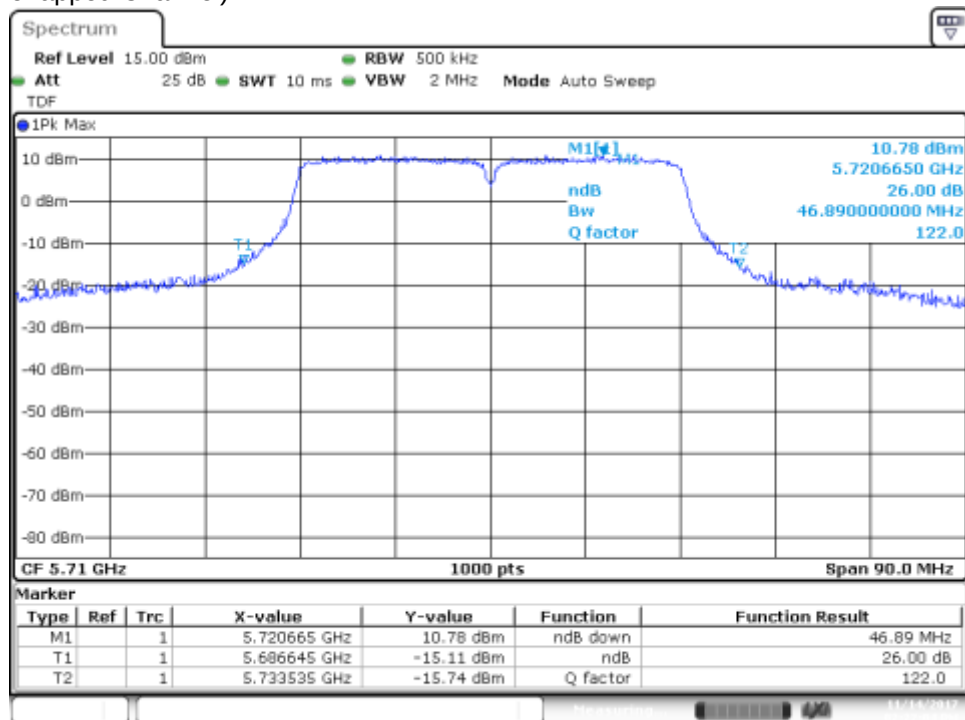
Channel 144 (Overlapped Channel)



Date: 14 NOV 2017 12:01:42

CHAIN A DIV1, 802.11n40, HT0

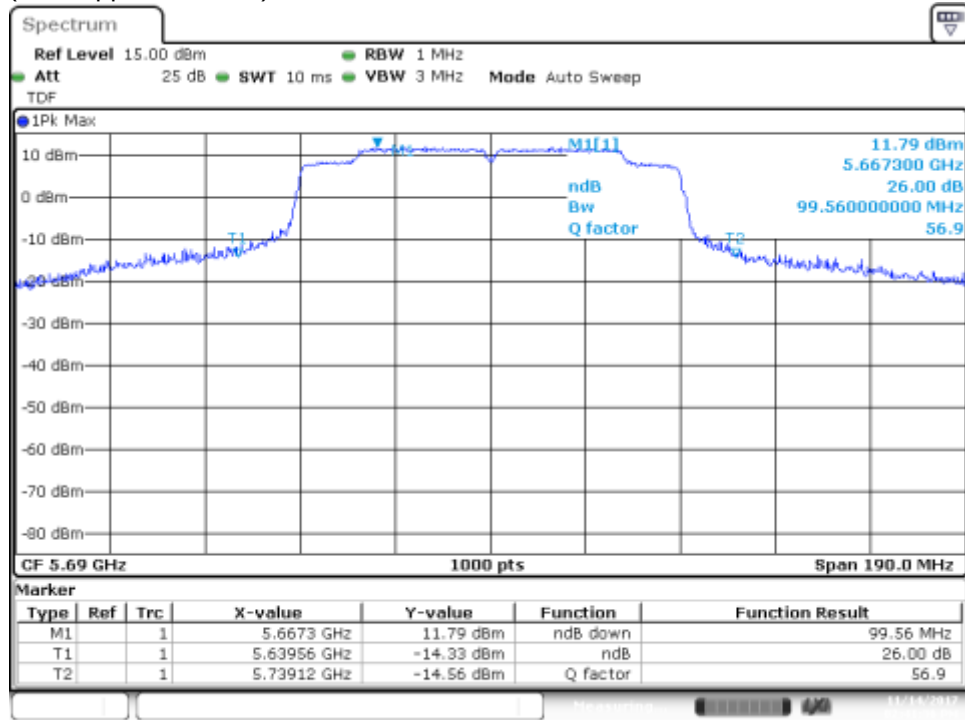
Channel 142F (Overlapped Channel)



Date: 14 NOV 2017 14:22:05

CHAIN A DIV1, 802.11ac80, HT0

Channel 138ac80 (Overlapped Channel)

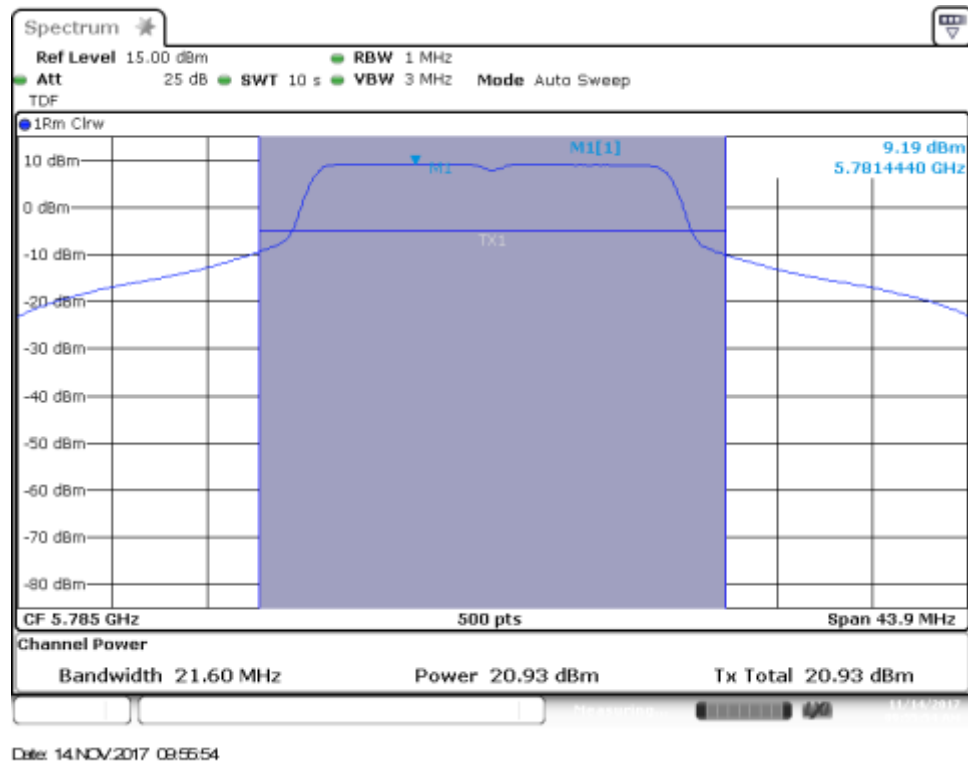


Date: 14 NOV 2017 14:41:38

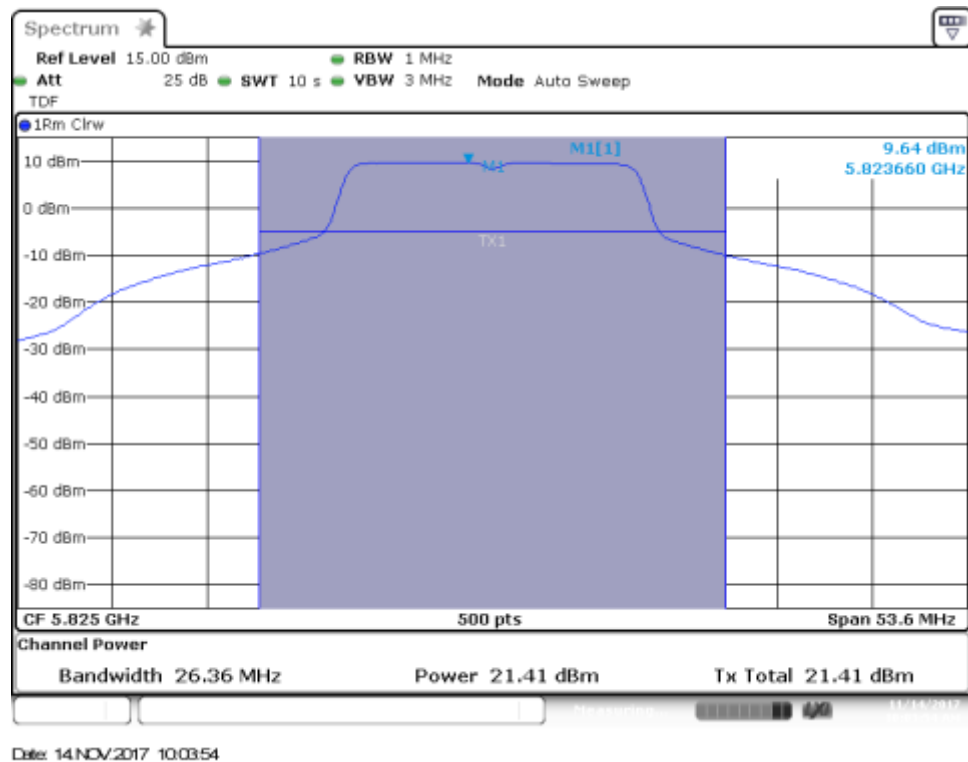
B.3.5 Maximum output power

CHAIN A DIV1, 802.11a, 6Mbps

Channel 157

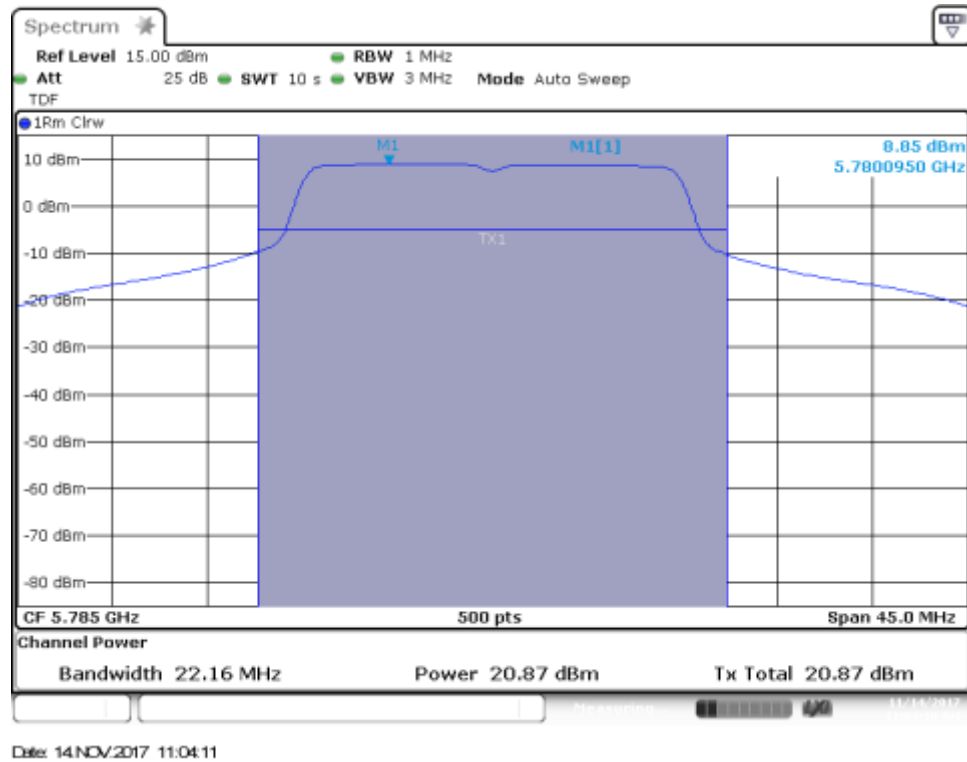


Channel 165

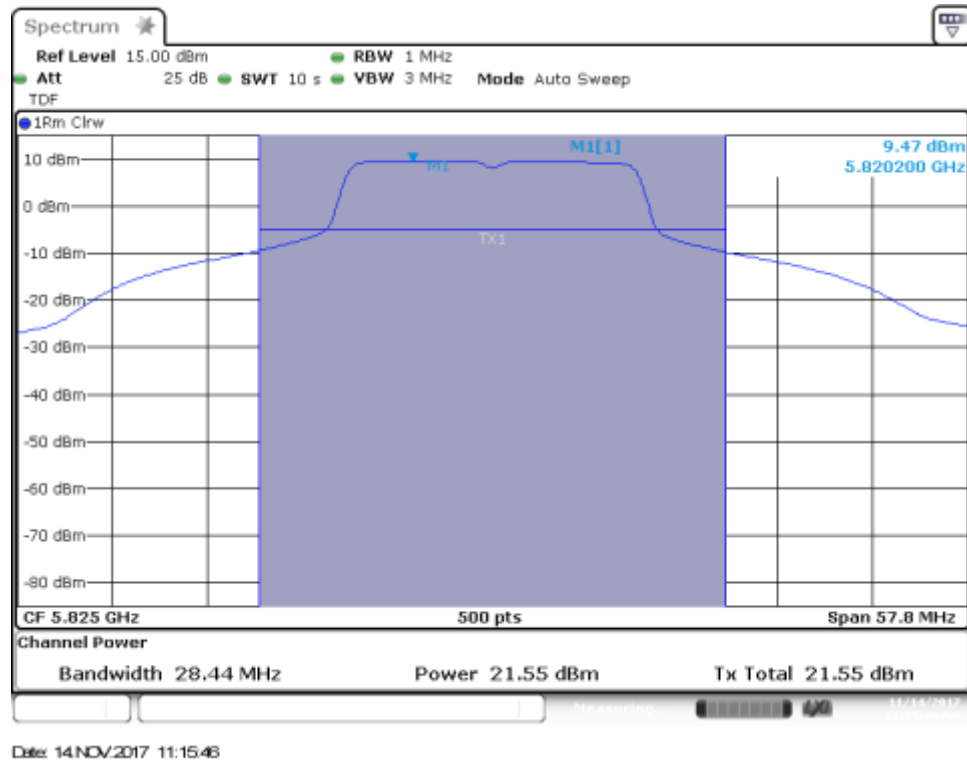


CHAIN A DIV1, 802.11n20, HT0

Channel 157

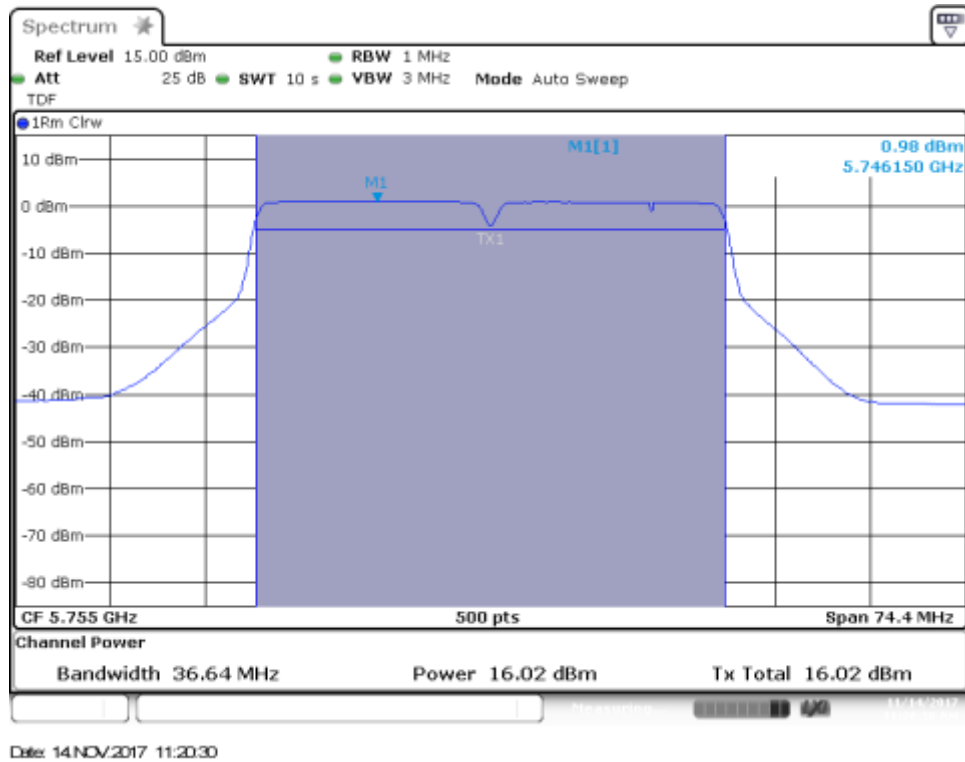


Channel 165



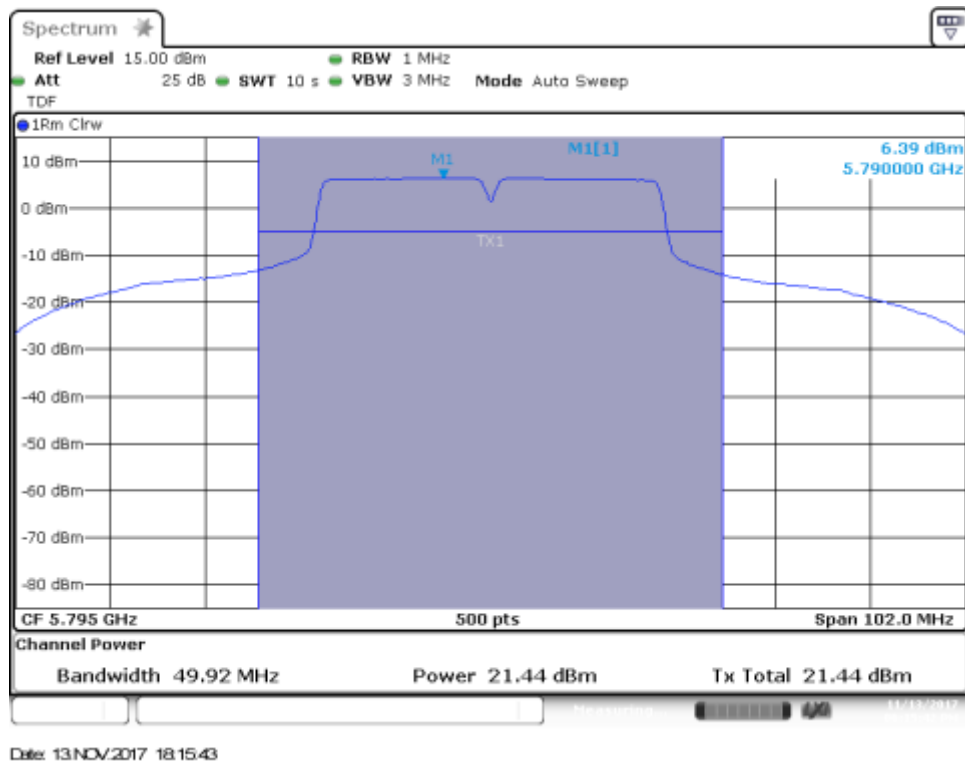
CHAIN A DIV1, 802.11n40, HT0

Channel 151F



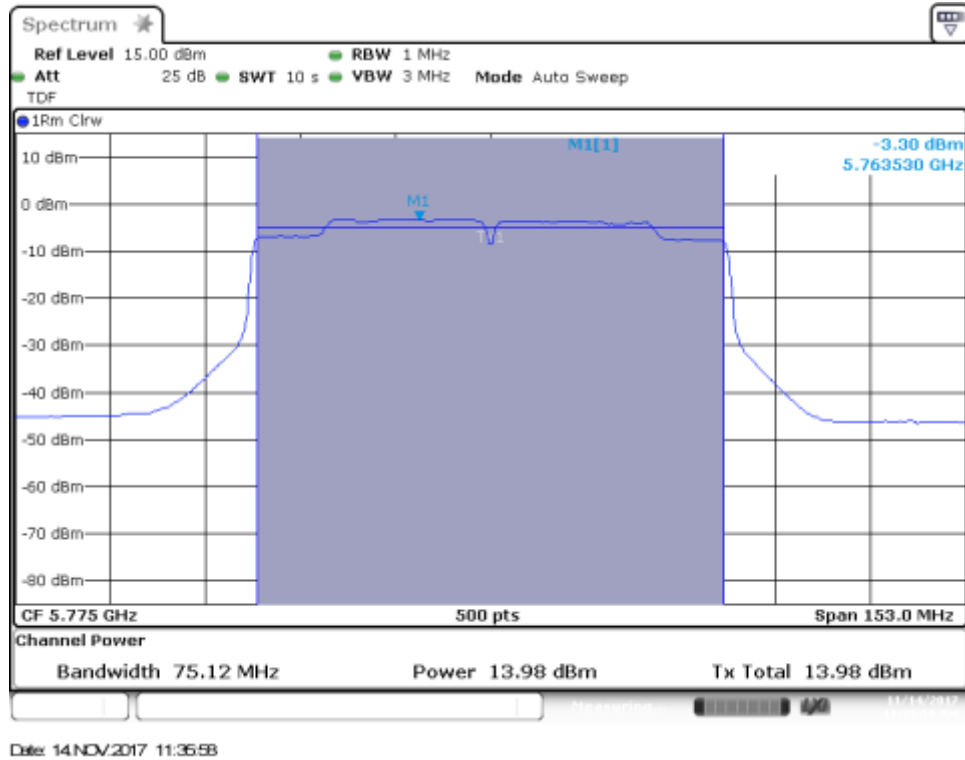
CHAIN A DIV2, 802.11n40, HT0

Channel 159F



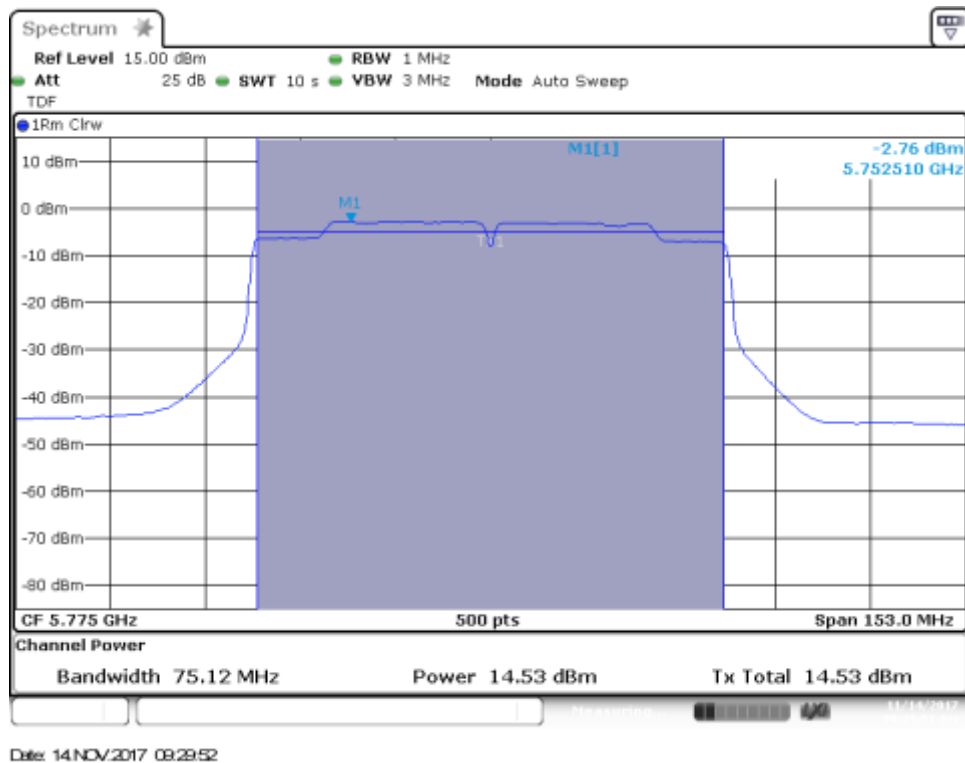
CHAIN A DIV1, 802.11ac80, VHT0

Channel 155ac80



CHAIN A DIV2, 802.11ac80, VHT0

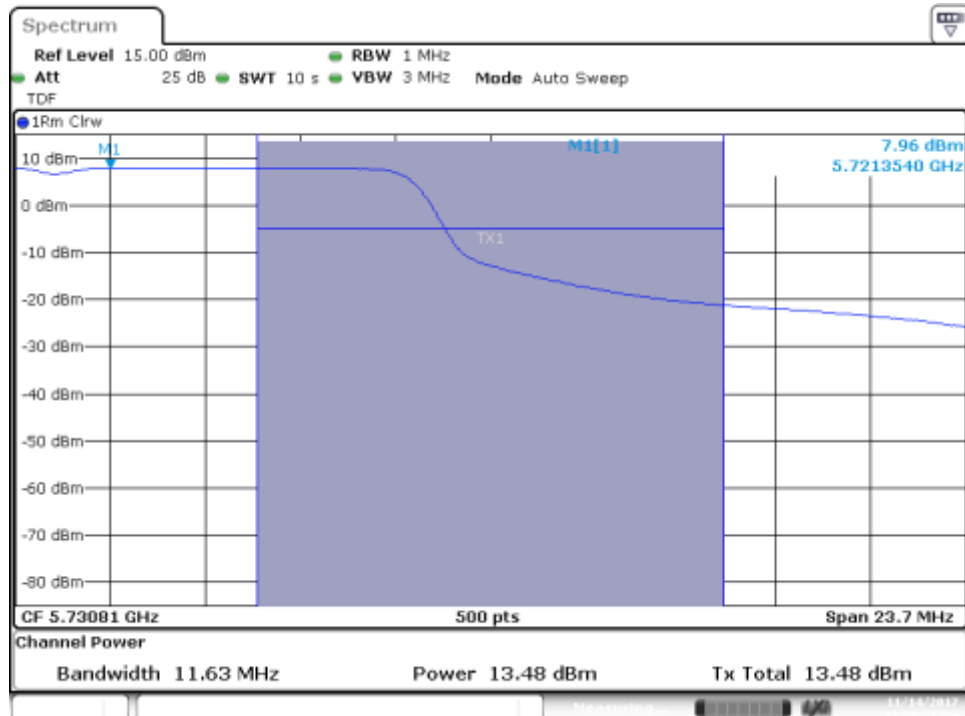
Channel 155ac80



B.3.6 Maximum output power (Overlapped Channel)

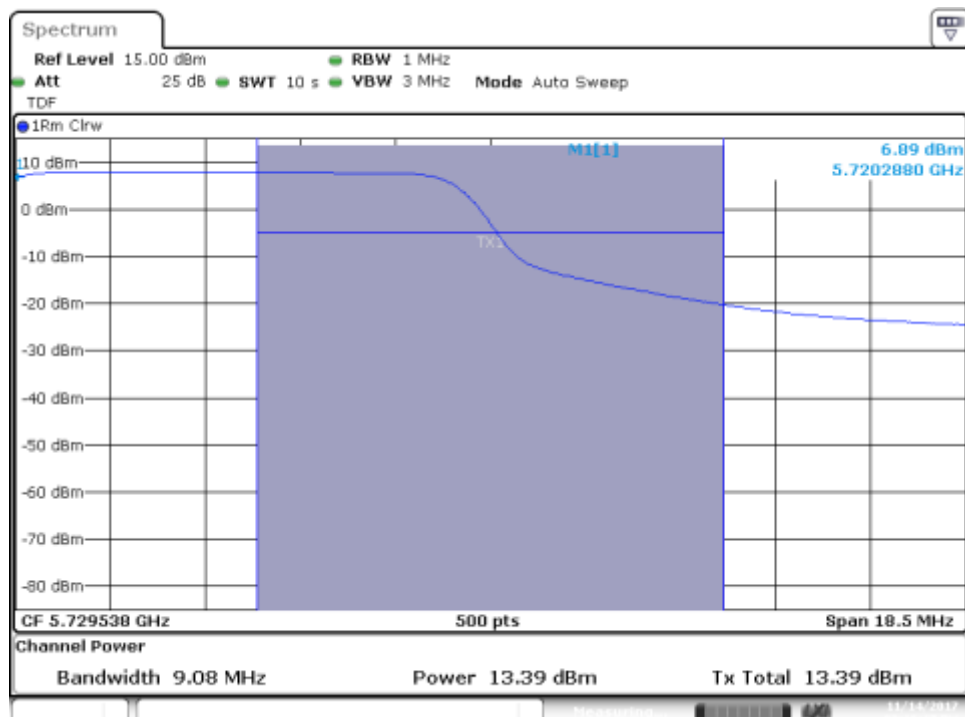
CHAIN A DIV1, 802.11n20, HT8

Channel 144 (Overlapped Channel)



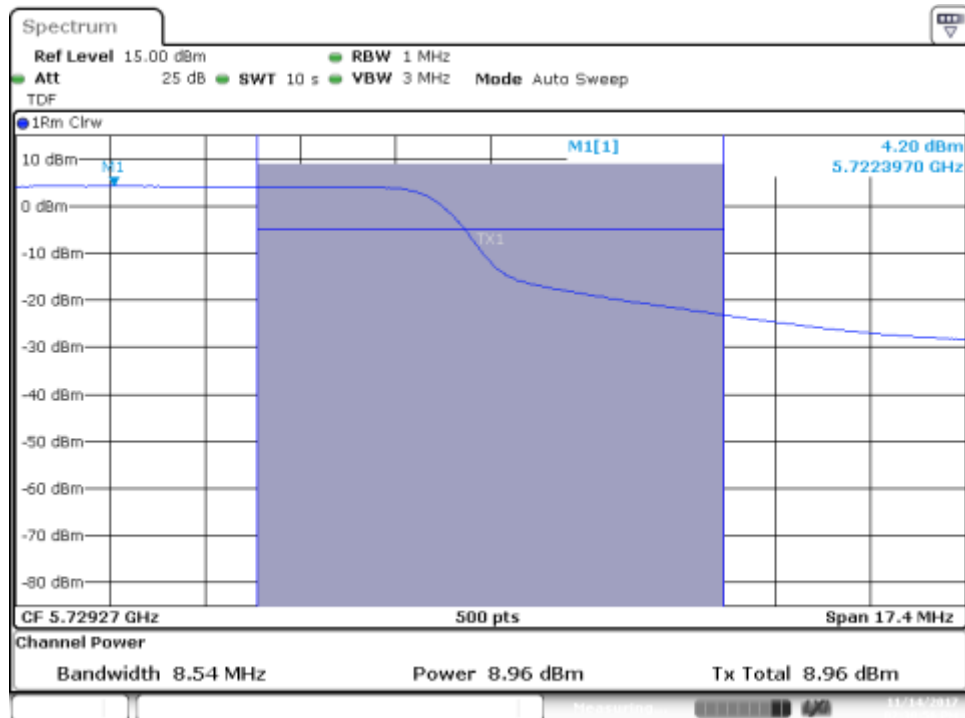
CHAIN A DIV2, 802.11n20, HT8

Channel 144 (Overlapped Channel)



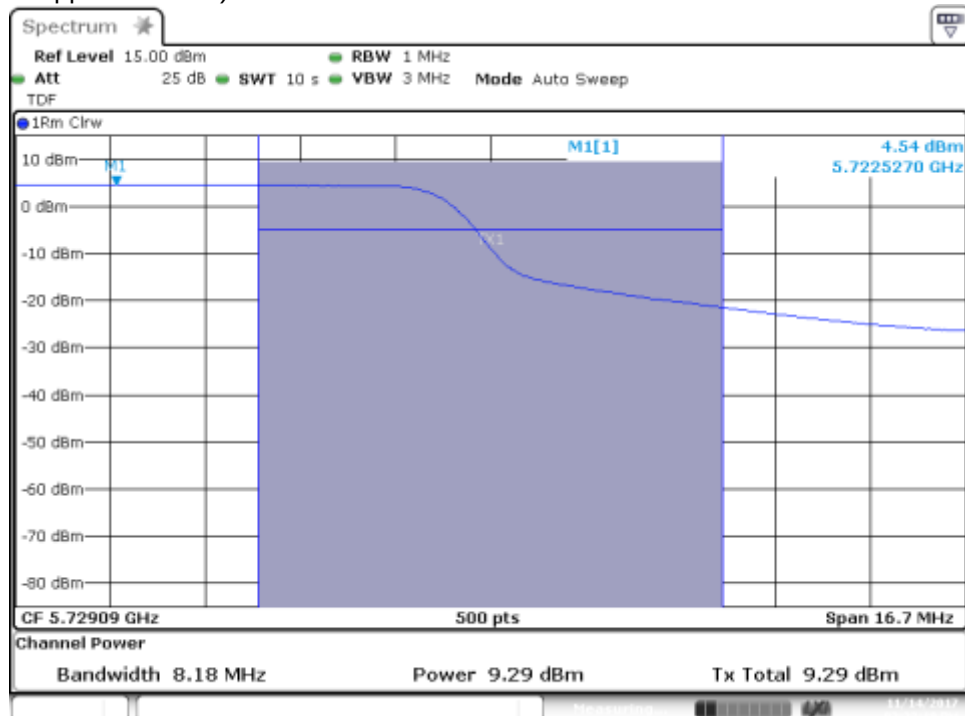
CHAIN A DIV1, 802.11n40, HT8

Channel 142F (Overlapped Channel)



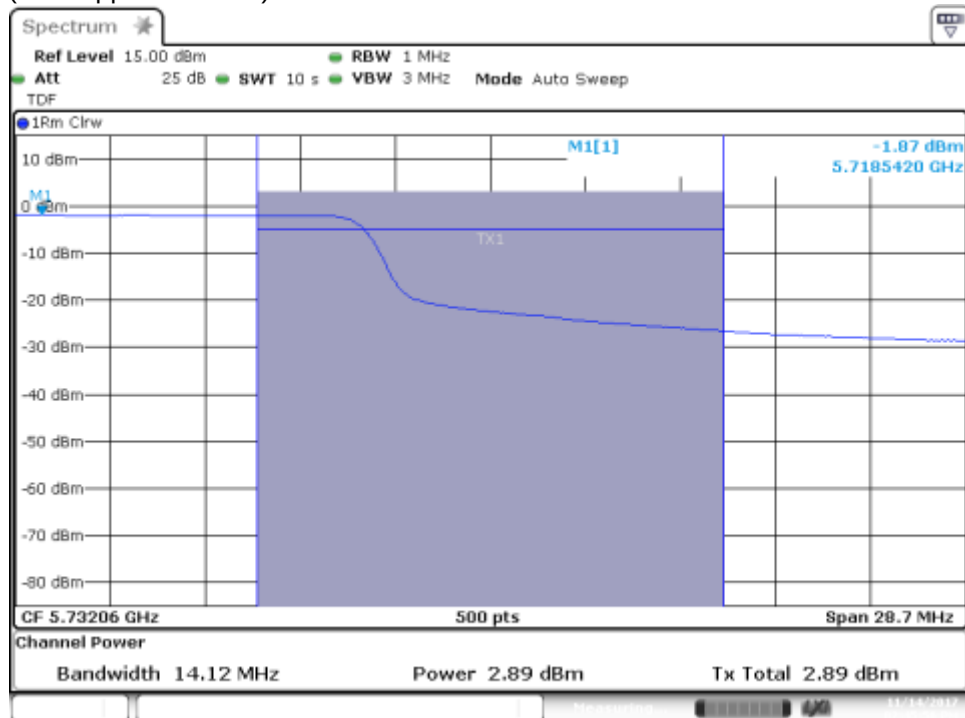
CHAIN A DIV2, 802.11n40, HT8

Channel 142F (Overlapped Channel)



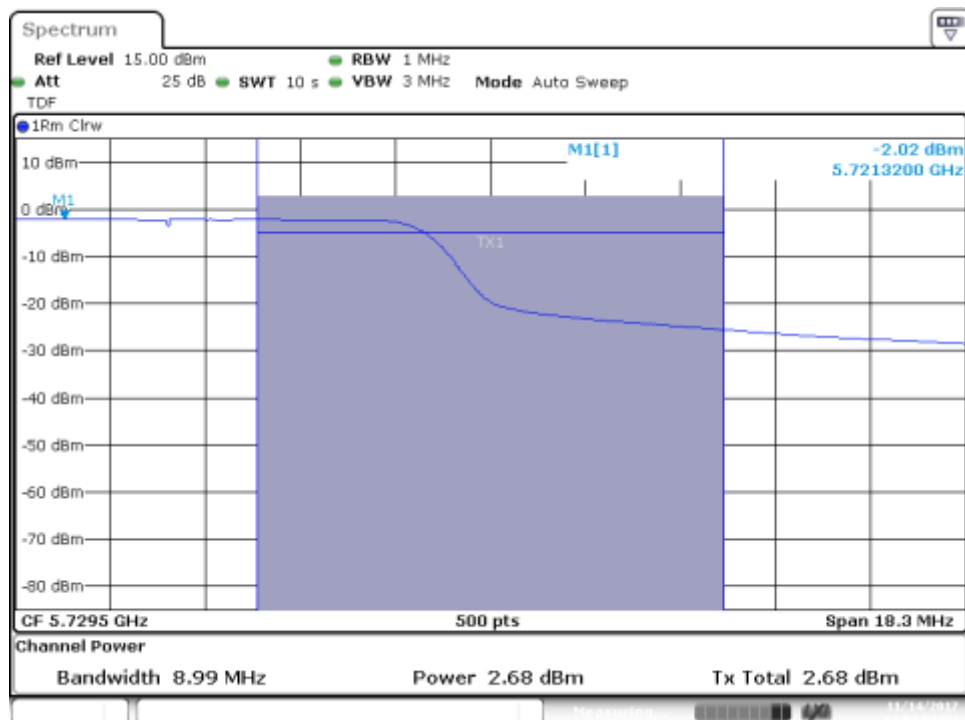
CHAIN A DIV1, 802.11ac80, VHT0

Channel 138ac80 (Overlapped Channel)



CHAIN A DIV2, 802.11ac80, VHT0

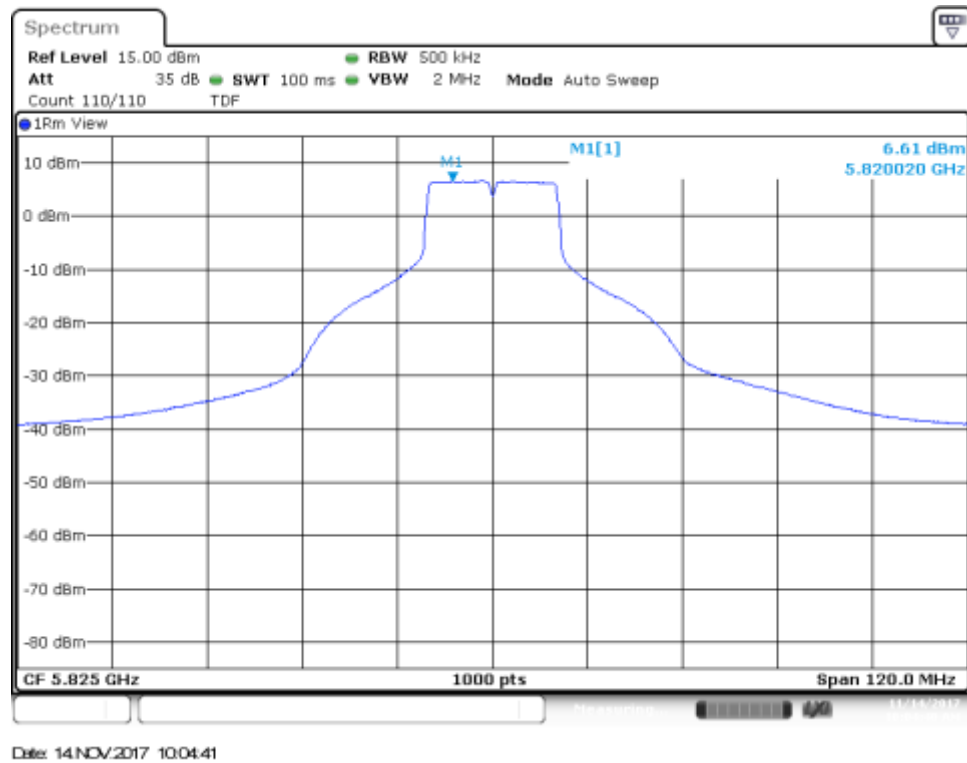
Channel 138ac80 (Overlapped Channel)



B.3.7 Peak power spectral Density

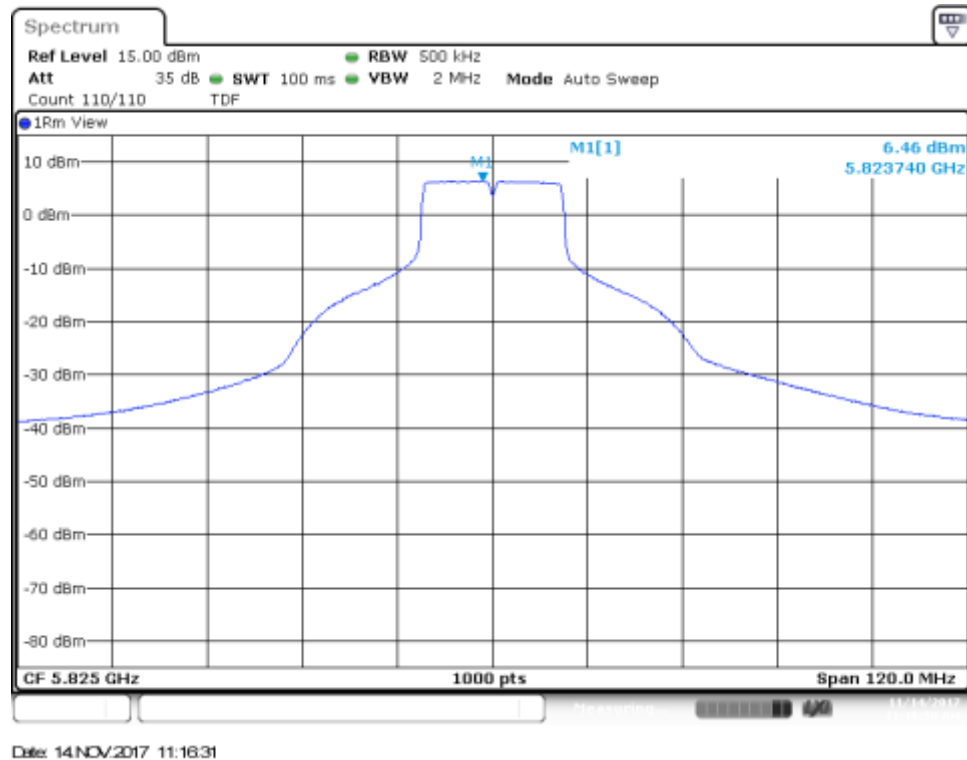
CHAIN A DIV1, 802.11a, 6Mbps

Channel 165



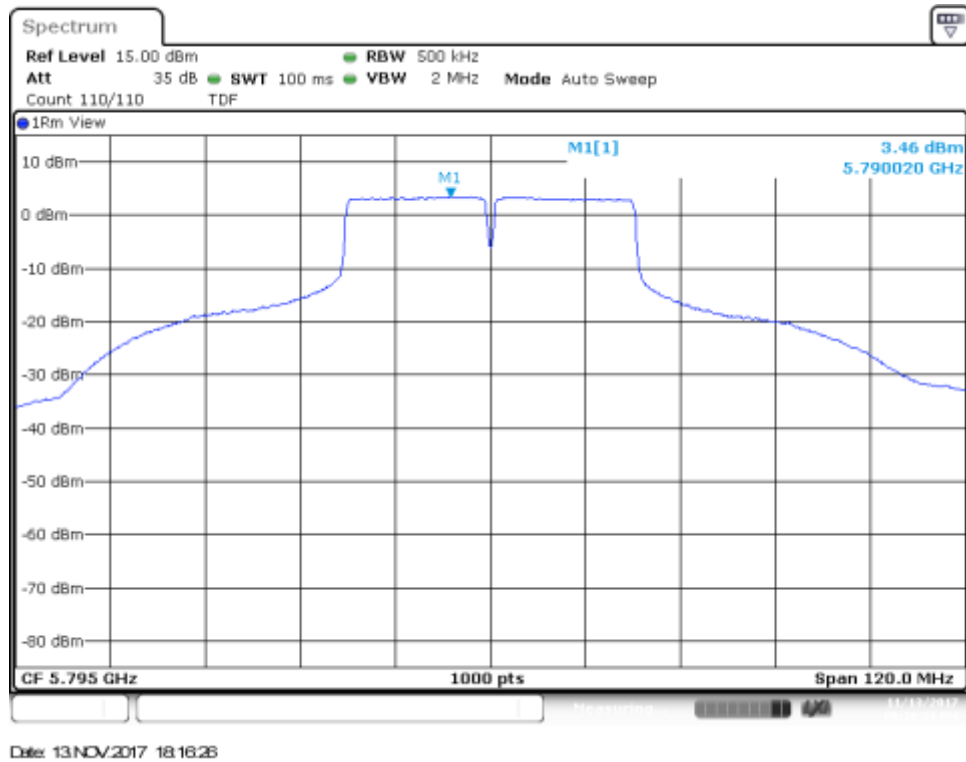
CHAIN A DIV1, 802.11n20, HT0

Channel 165



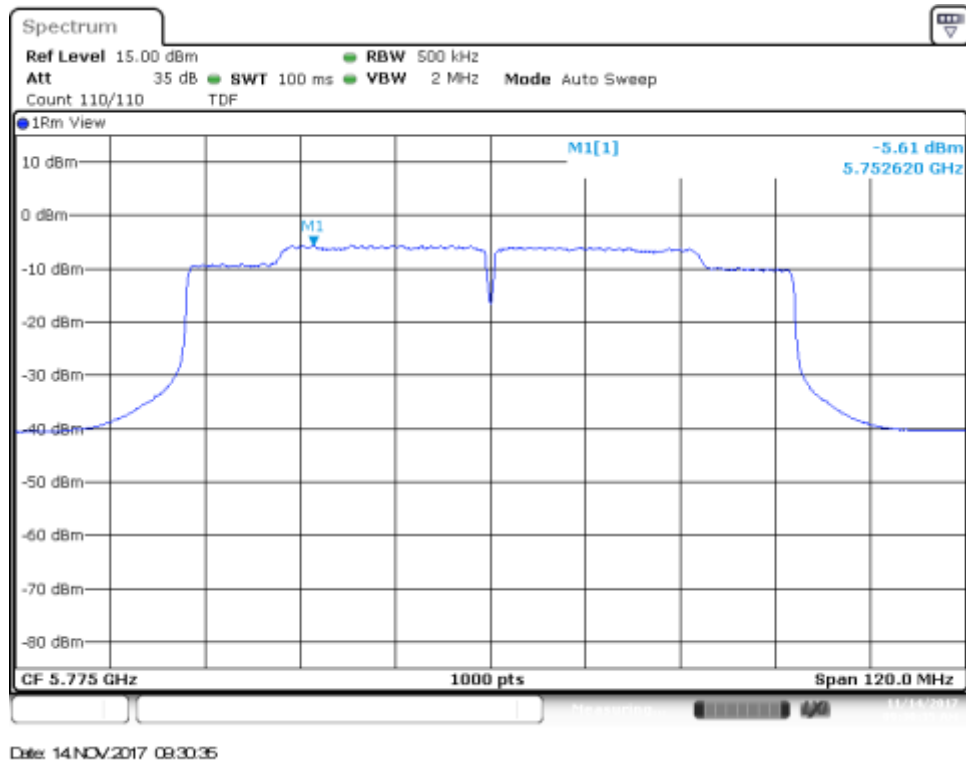
CHAIN A DIV2, 802.11n40, HT0

Channel 159F



CHAIN A DIV2, 802.11ac80, VHT0

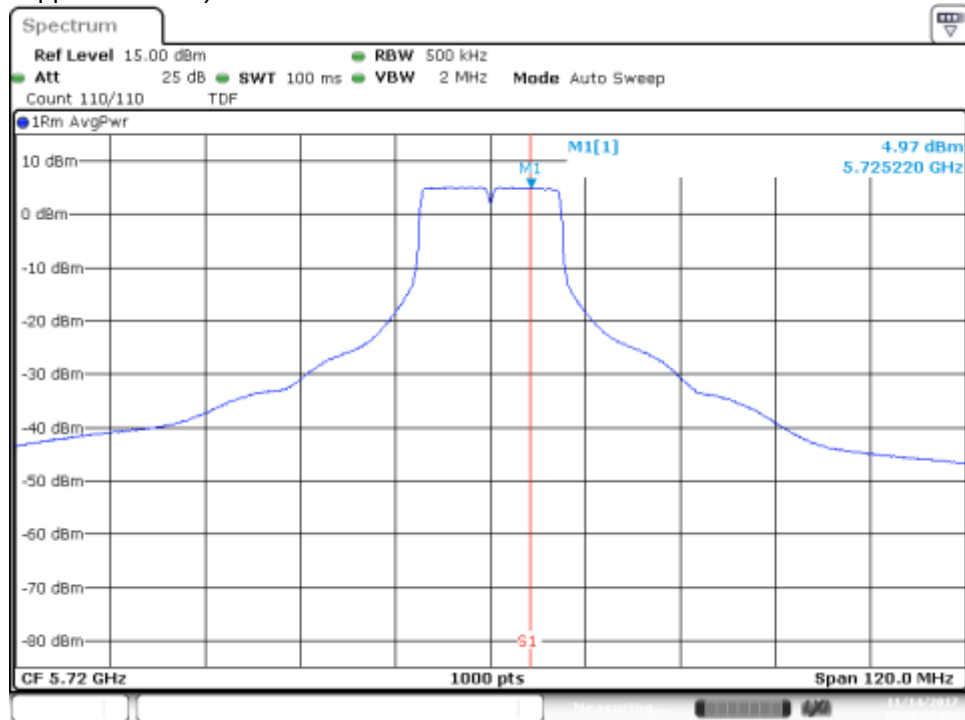
Channel 155ac80



B.3.8 Peak power spectral Density (Overlapped Channel)

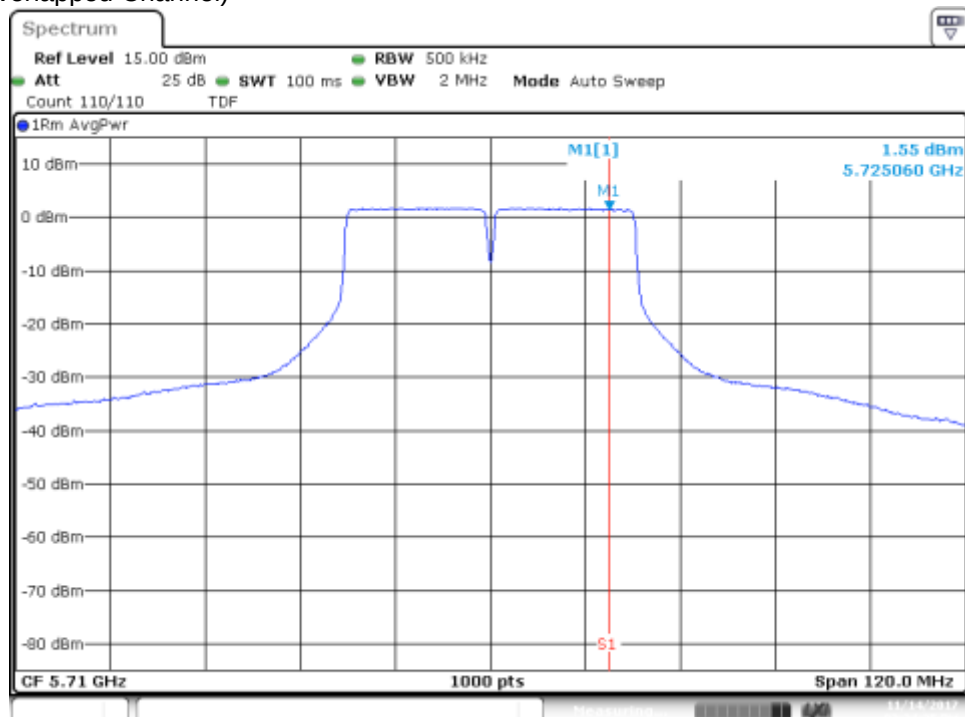
CHAIN A DIV1, 802.11n20, HT0

Channel 144 (Overlapped Channel)



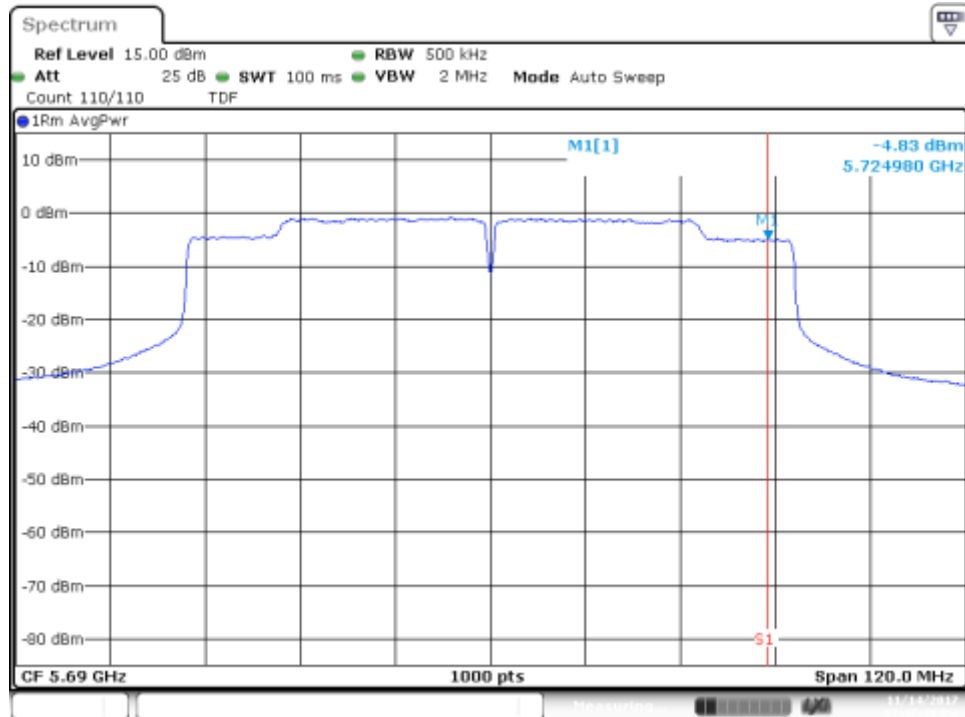
CHAIN A DIV2, 802.11n20, HT0

Channel 142F (Overlapped Channel)



CHAIN A DIV1, 802.11ac80, VHT0

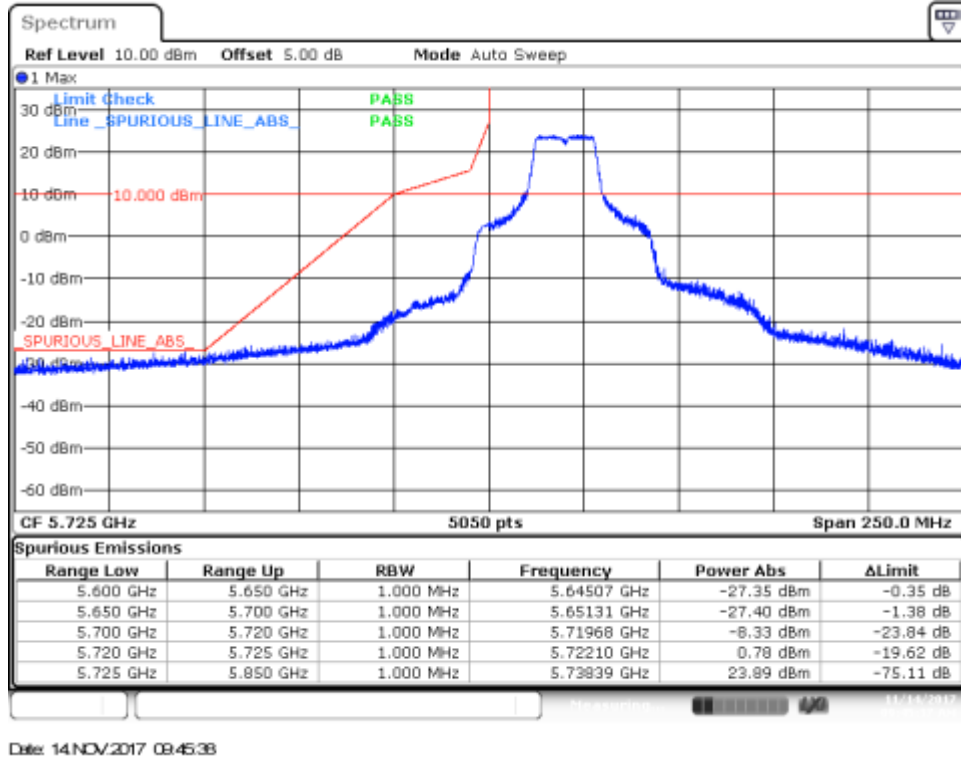
Channel 138ac80 (Overlapped Channel)



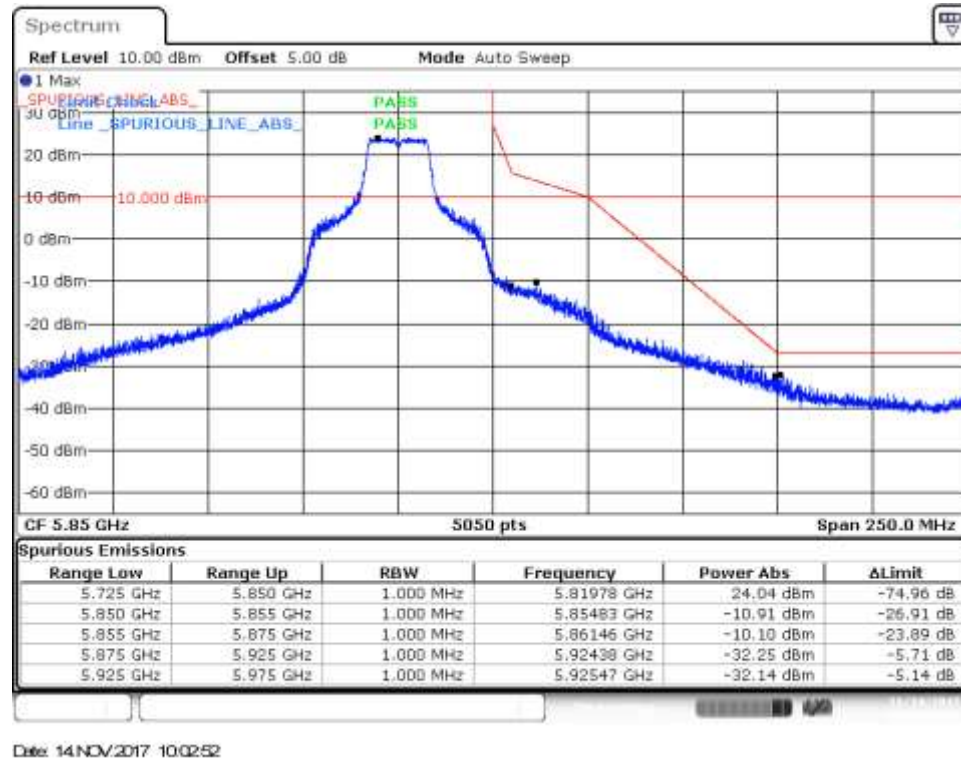
B.3.9 Undesirable emission limits : Band Edge (Conducted)

802.11a, 6Mbps – Chain A Div1

BE Low Freq Section, Peak – CH149

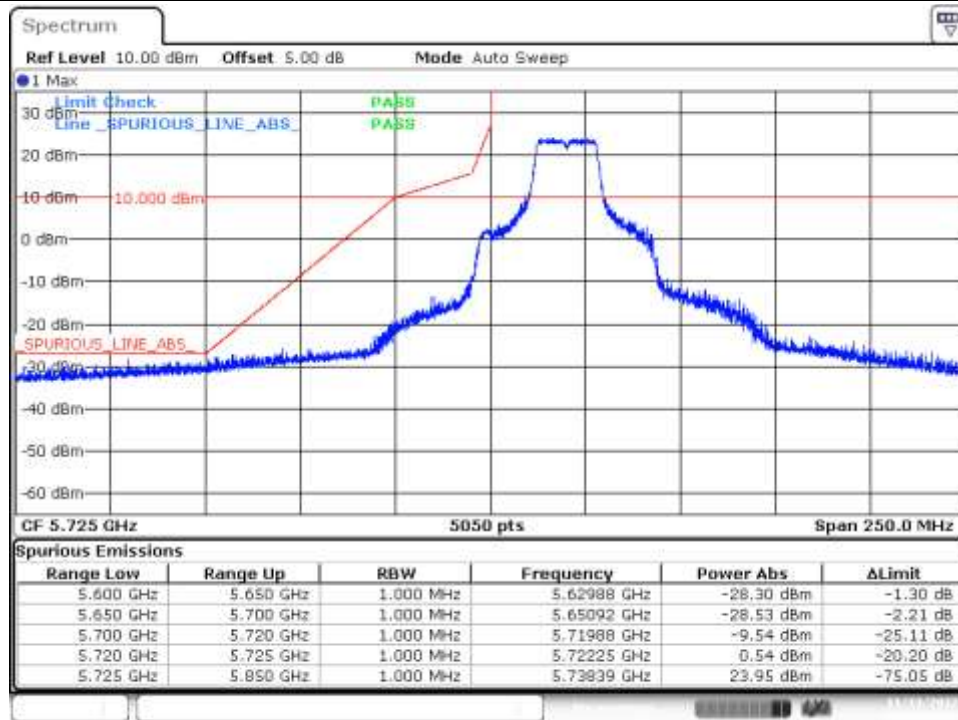


BE High Freq Section, Peak – CH165



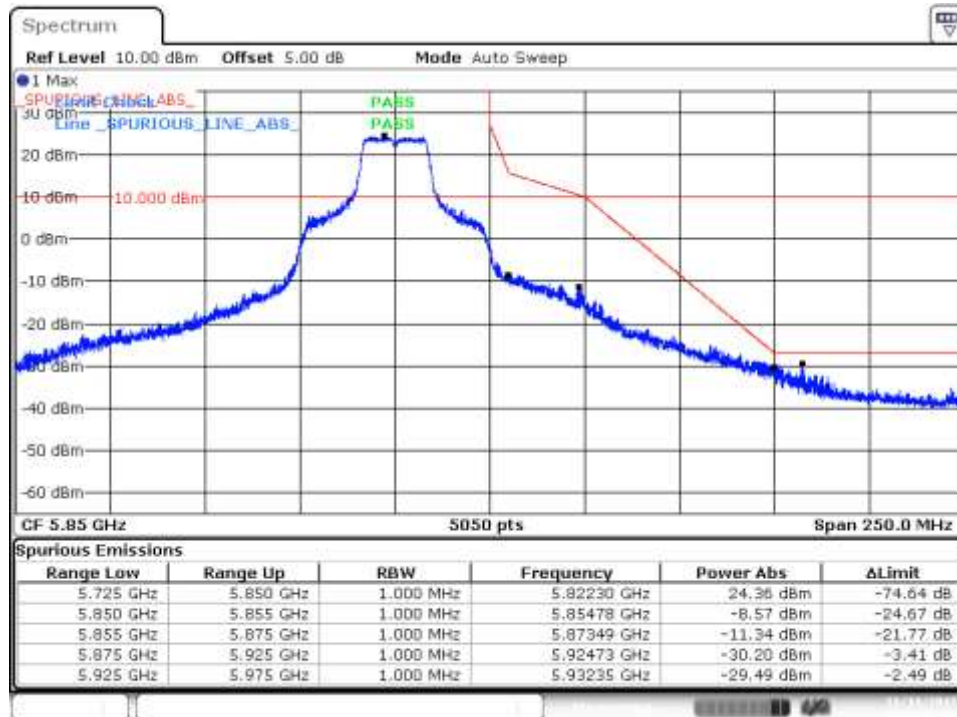
802.11a, 6Mbps – Chain A Div2

BE Low Freq Section, Peak – CH149



Date: 13 NOV 2017 15:34:35

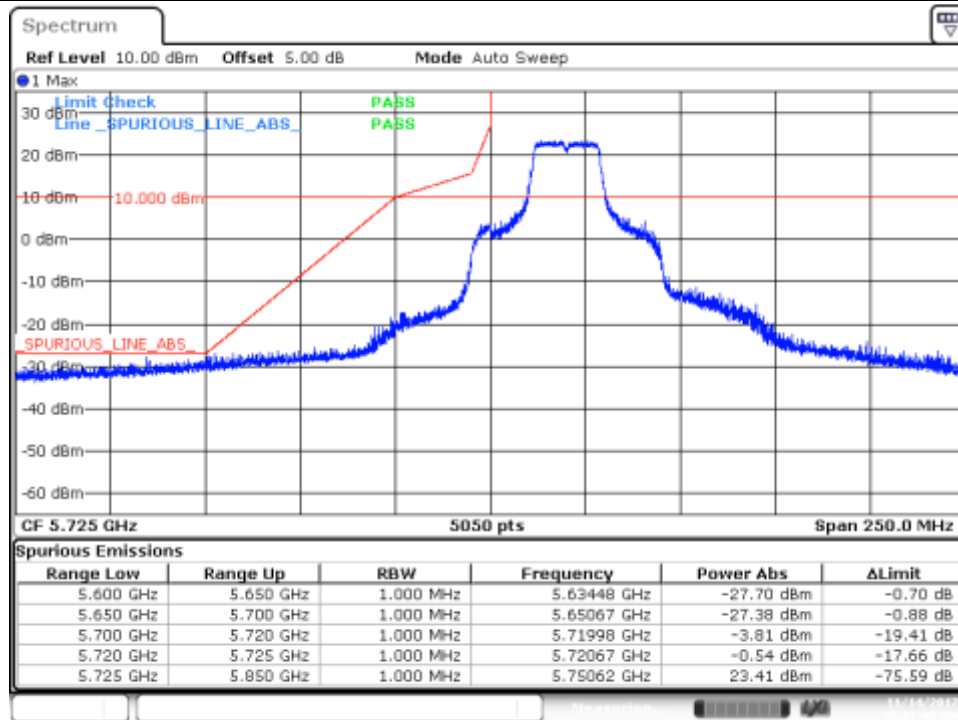
BE High Freq Section, Peak – CH165



Date: 13 NOV 2017 15:58:15

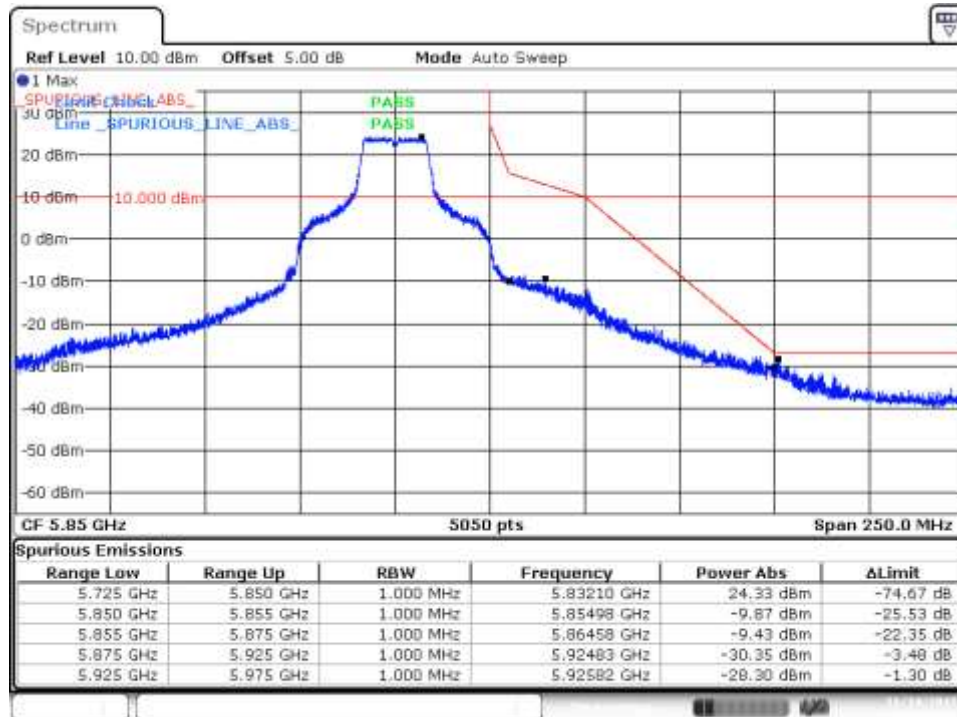
802.11n20, HT0 - Chain A Div1

BE Low Freq Section, Peak – CH149



Date: 14 NOV 2017 10:11:44

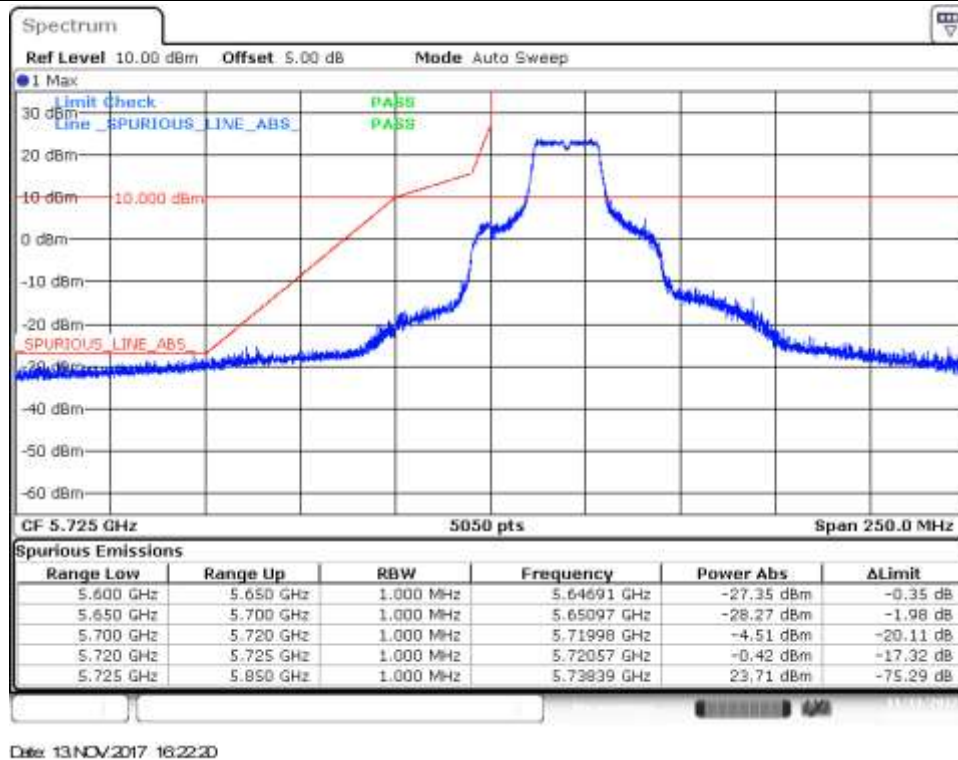
BE High Freq Section, Peak – CH165



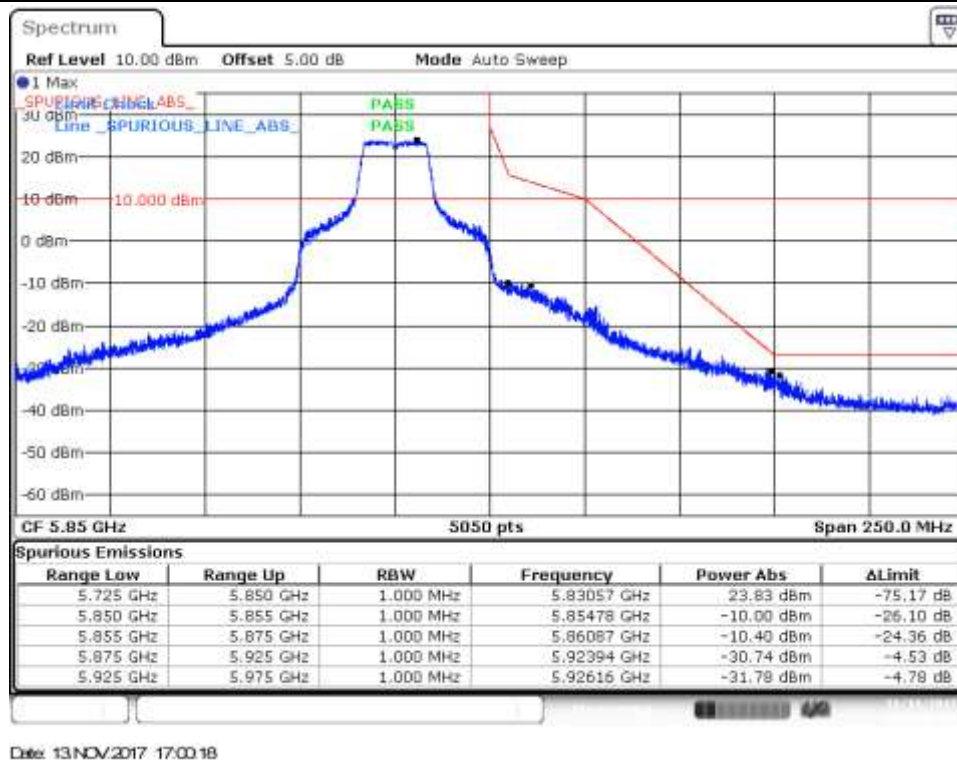
Date: 14 NOV 2017 11:14:54

802.11n20, HT0 - Chain A Div2

BE Low Freq Section, Peak – CH149

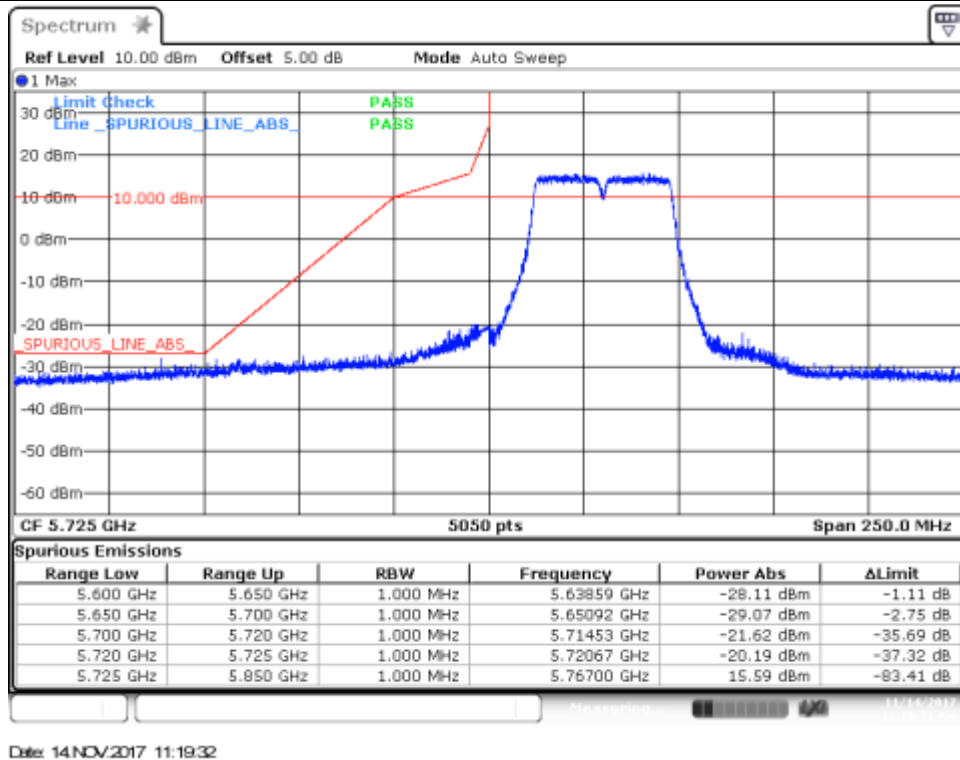


BE High Freq Section, Peak – CH165



802.11n40, HT0 - Chain A Div1

BE Low Freq Section, Peak – CH151F

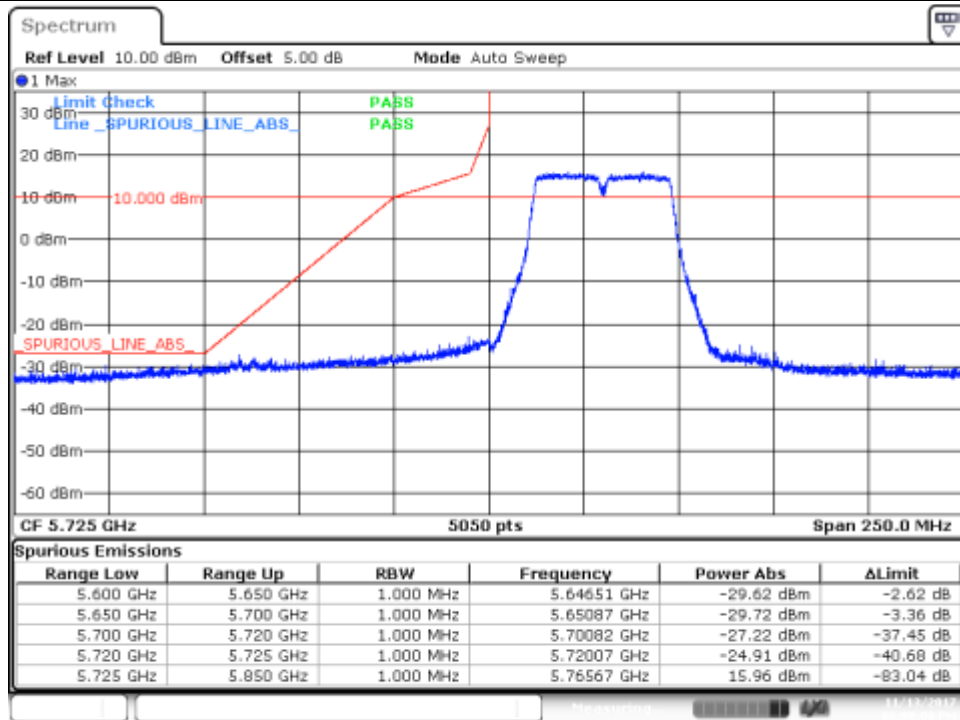


BE High Freq Section, Peak – CH159F



802.11n40, HT0 - Chain A Div2

BE Low Freq Section, Peak – CH151F



Date: 13 NOV 2017 18:08:00

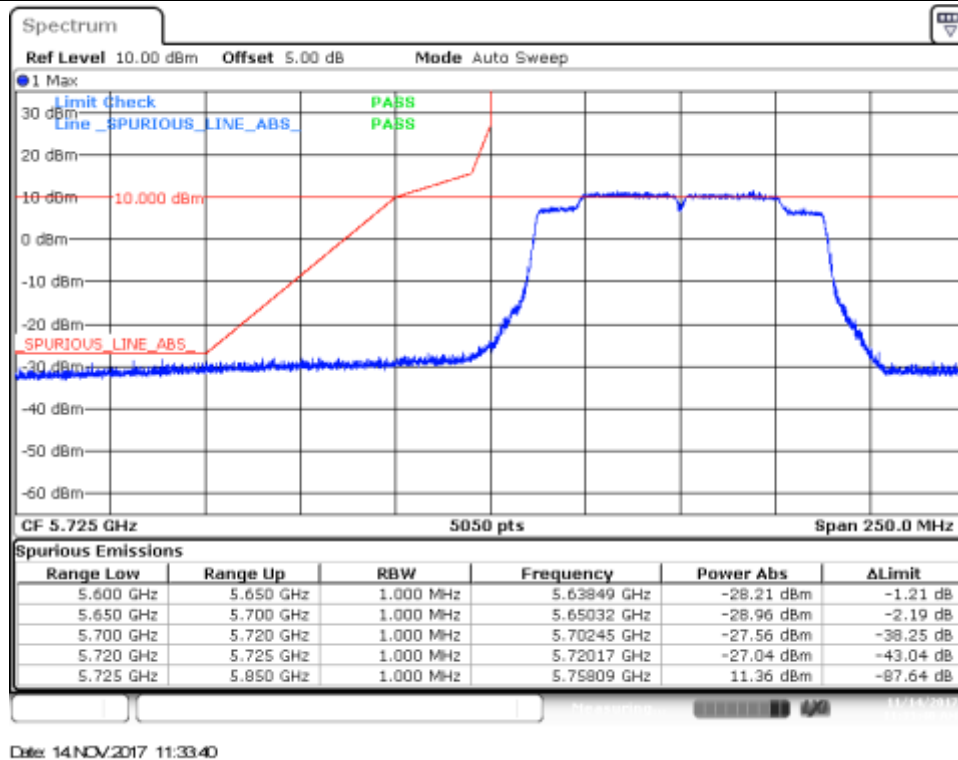
BE High Freq Section, Peak – CH159F



Date: 13 NOV 2017 18:14:48

802.11ac80, VHT0 - Chain A Div1

BE Low Freq Section, Peak – CH155ac80



802.11ac80, VHT0 - Chain A Div2

BE Low Freq Section, Peak – CH155ac80

