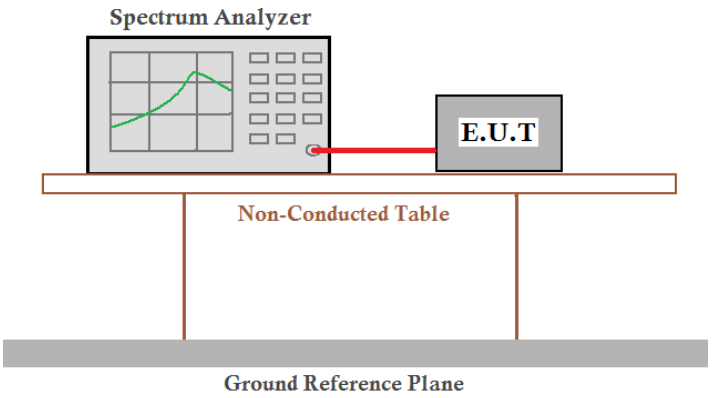
10. Power Spectral Density

Test Requirement:	FCC Part15 E Section 15.407
Test Method:	KDB 789033 D02 General UNII Test Procedures New Rules v02
Limit:	11dBm/MHz(Band I), 30 dBm(Band IV)
Test setup:	
Test procedure:	1) Create an average power spectrum for the EUT operating mode being tested by following the instructions in section E)2) for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-1, SA-2, SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, “Compute power…”. 2) Use the peak search function on the instrument to find the peak of the spectrum. 3) Make the following adjustments to the peak value of the spectrum, if applicable: a) If Method SA-2 or SA-2 Alternative was used, add 10 log(1/x), where x is the duty cycle, to the peak of the spectrum. b) If Method SA-3 Alternative was used and the linear mode was used in step E)2)g)(viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging. 4) The result is the PPSD.
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

10.1 Test Result and Data

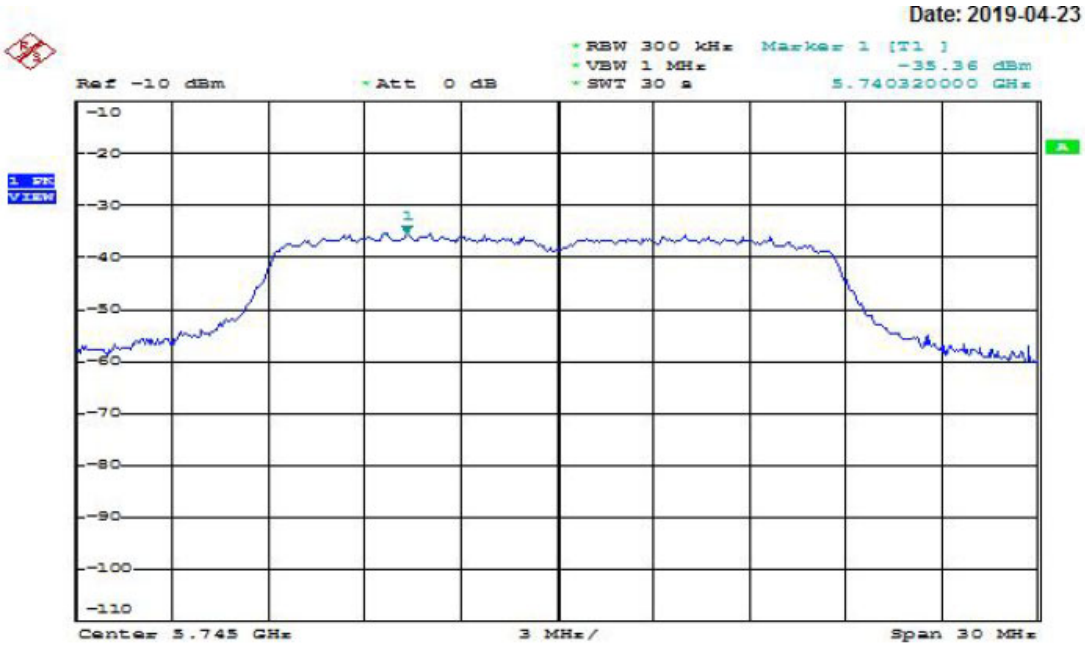
U-NII-3

Modulation Type	Channel	Frequency (MHz)	Maximum Power Density of 500 kHz Bandwidth (dBm)	
			ANT R	ANT L
802.11a	149	5745	-33.14	-29.95
	157	5785	-33.42	-30.23
	165	5825	-32.23	-29.21
802.11n,HT20	149	5745	-32.46	-29.34
	157	5785	-32.72	-29.71
	165	5825	-31.95	-28.94
802.11n,HT40	151	5755	-36.27	-32.25
	159	5795	-36.72	-33.72

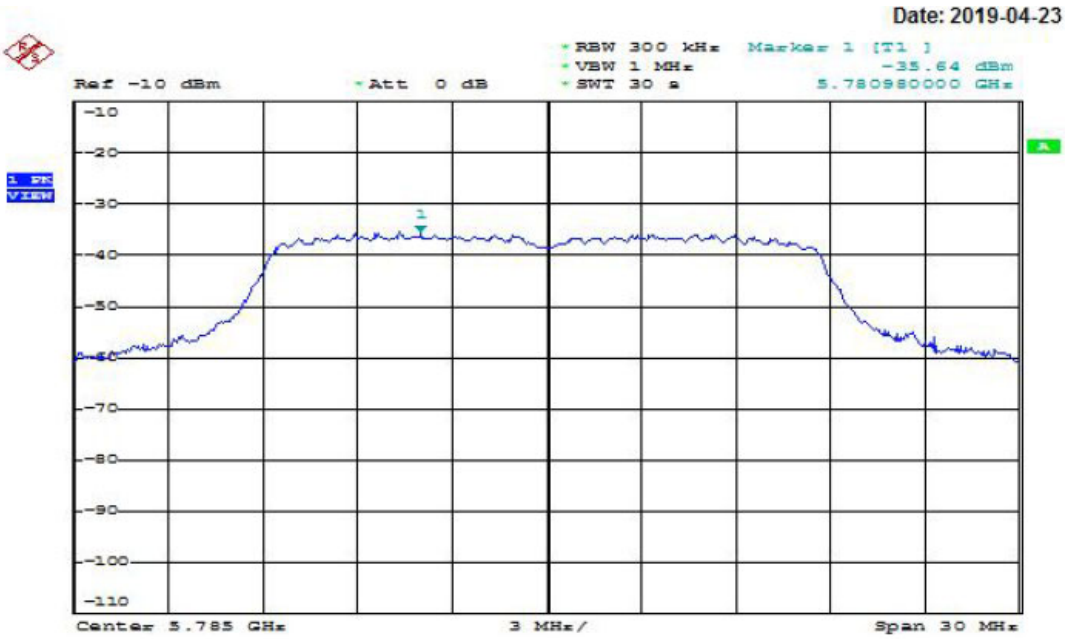
Note: Following pages of plots is 300kHz. Result of above table is data adding $10\log\left(\frac{500k}{300k}\right) \cong 2.22$ for transforming to 500kHz.

Test plots (RBW:300kHz,VBW:1MHz,Sweeptime:30s) **as followed:**
Antenna R

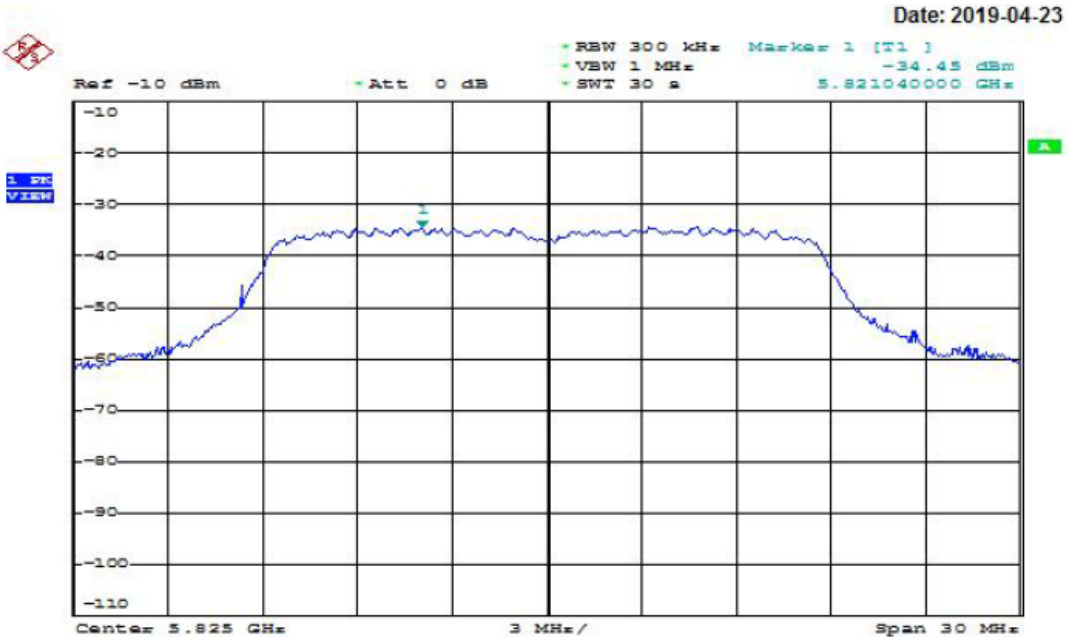
802.11a
Channel: 149



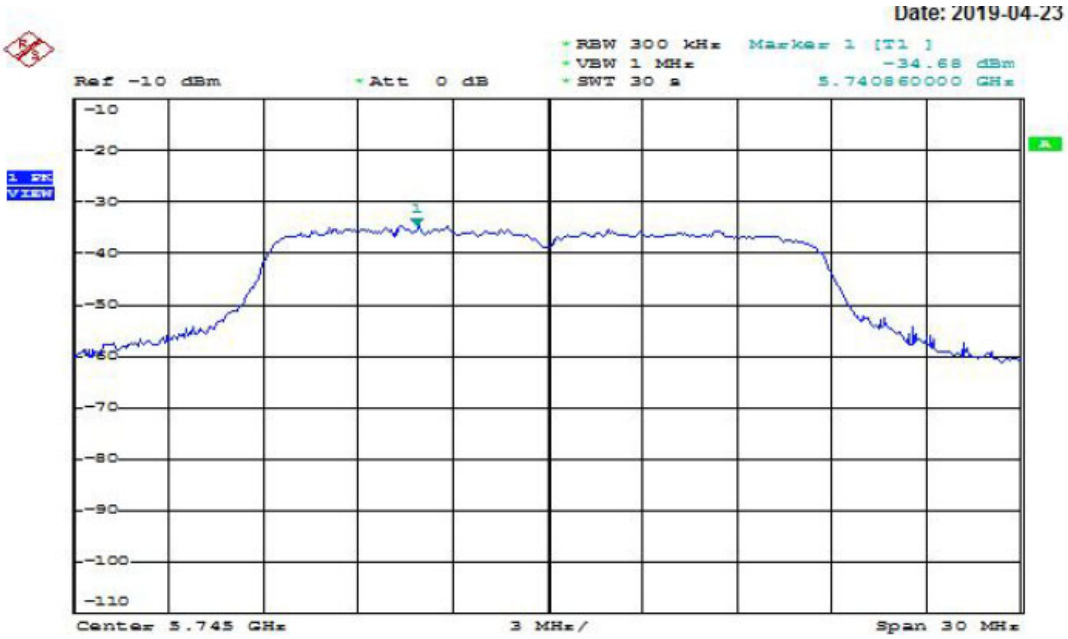
802.11a
Channel: 157



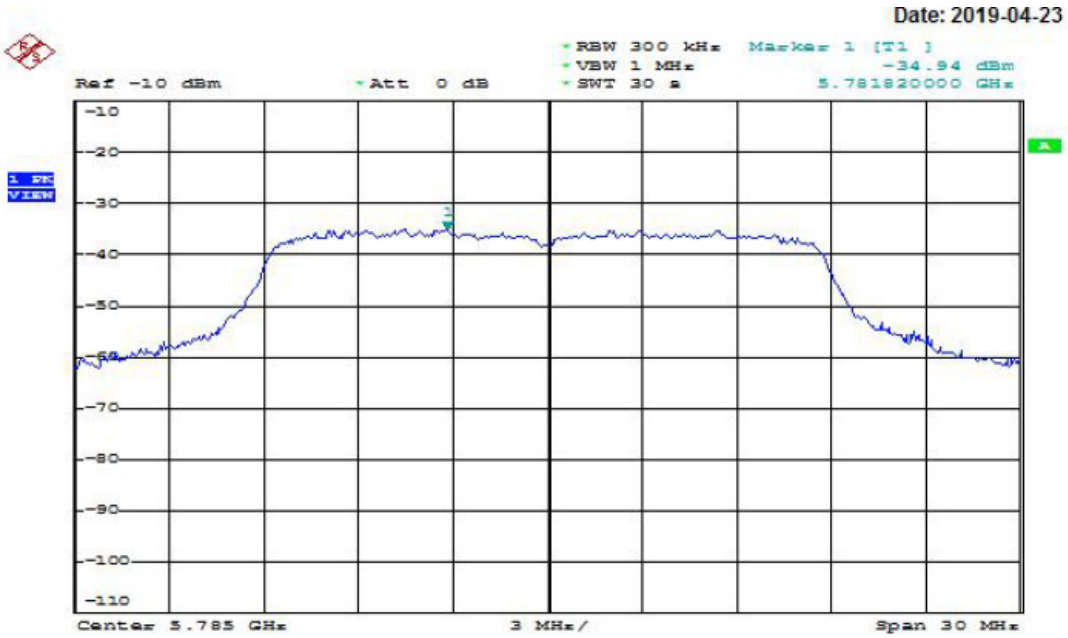
802.11a
Channel: 165



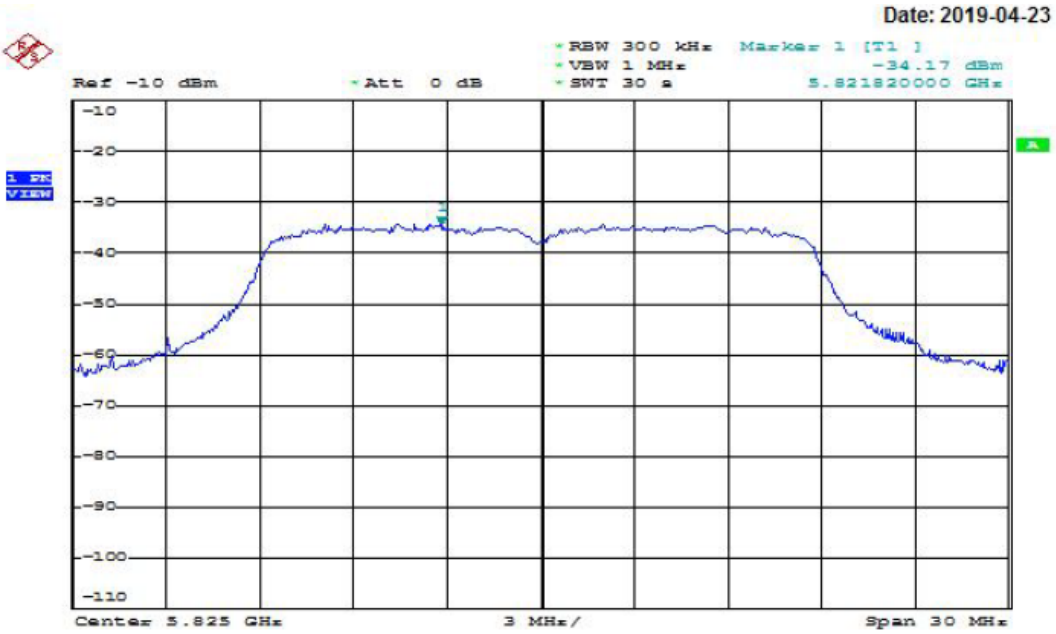
802.11n HT20
Channel: 149



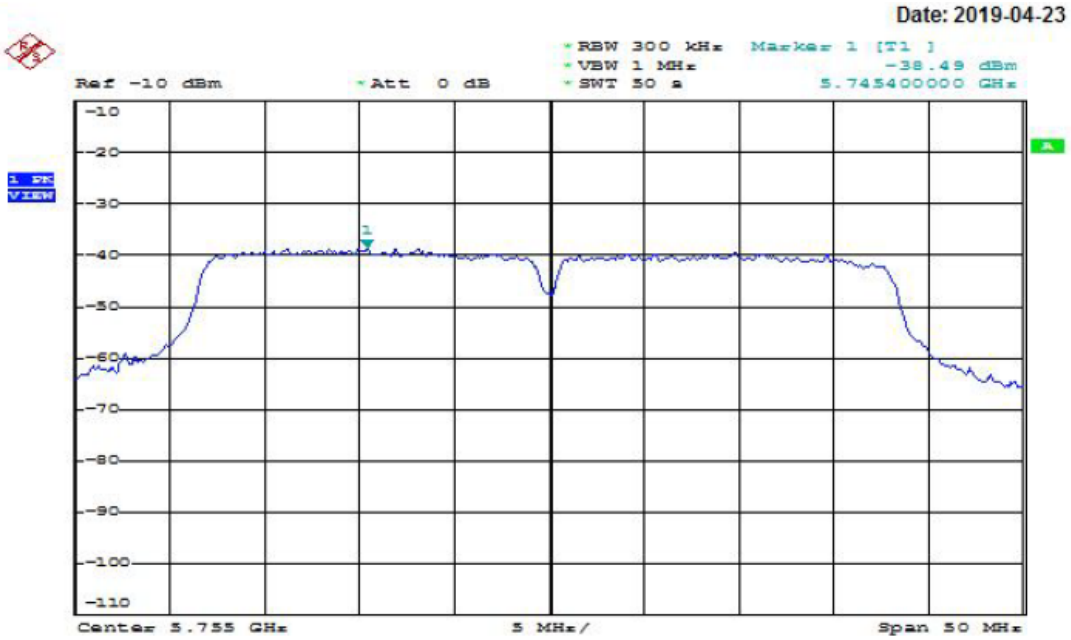
802.11n HT20
Channel: 157



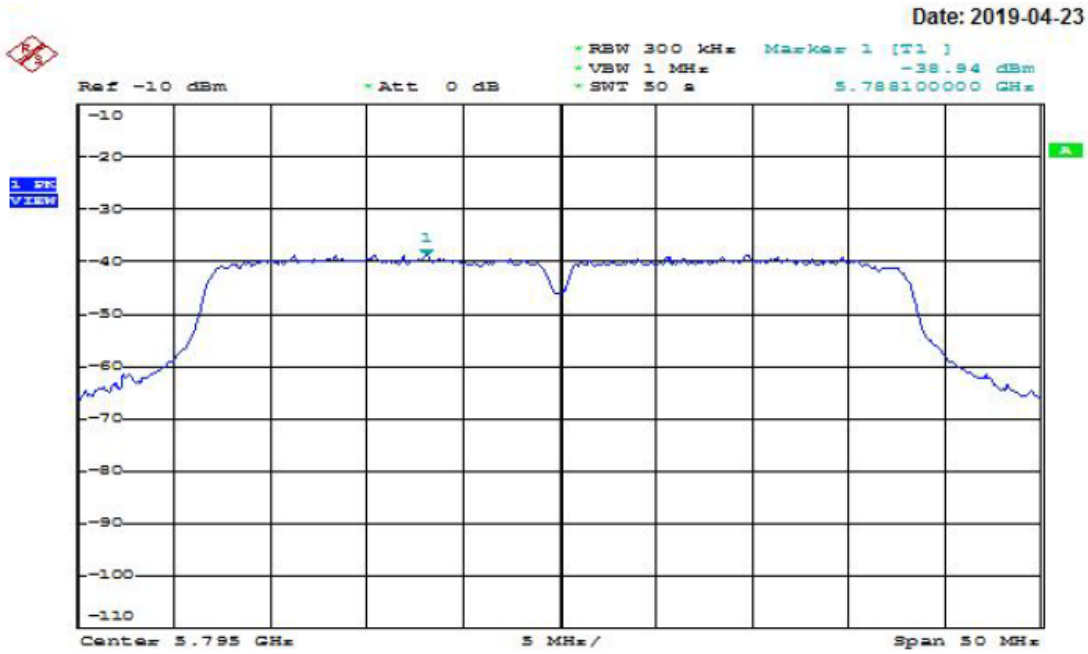
802.11n HT20
Channel: 165



802.11n HT40
Channel: 151

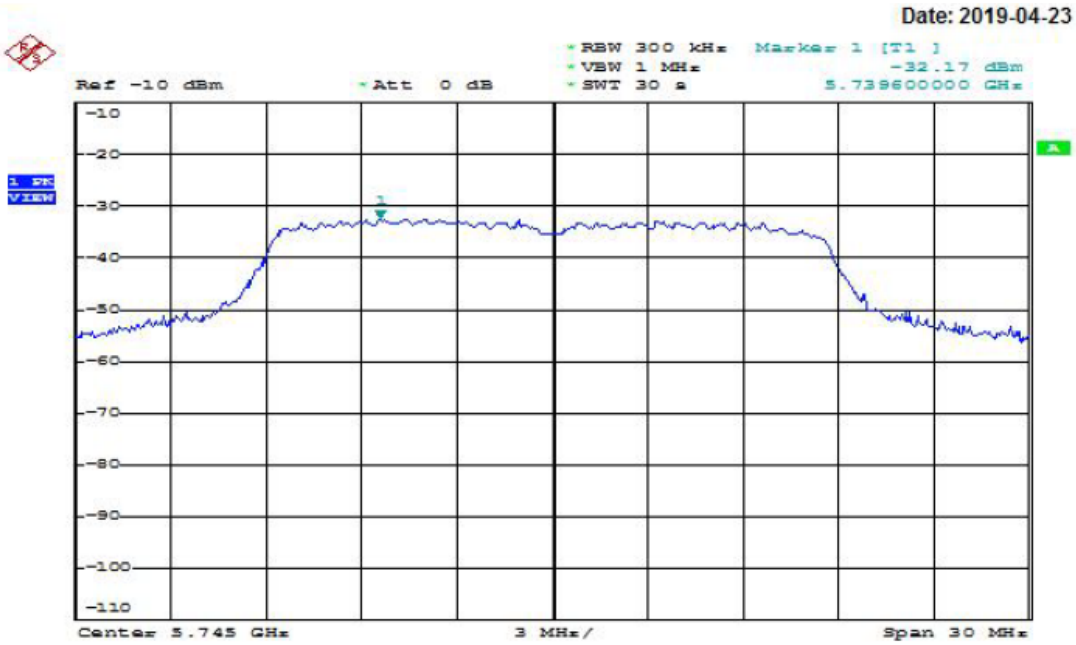


802.11n HT40
Channel: 159

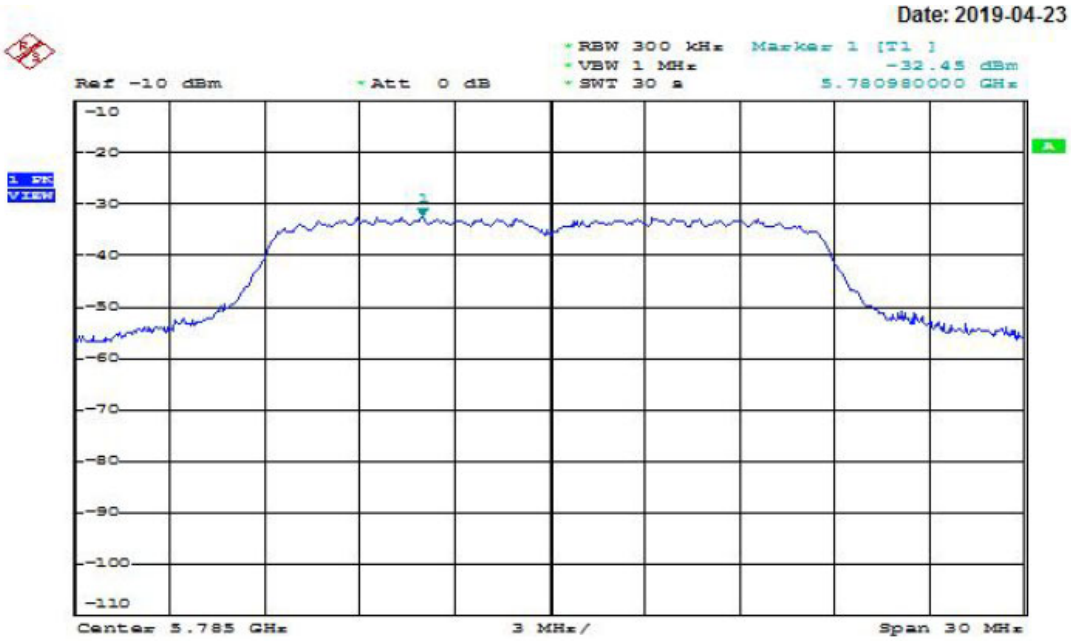


Antenna L

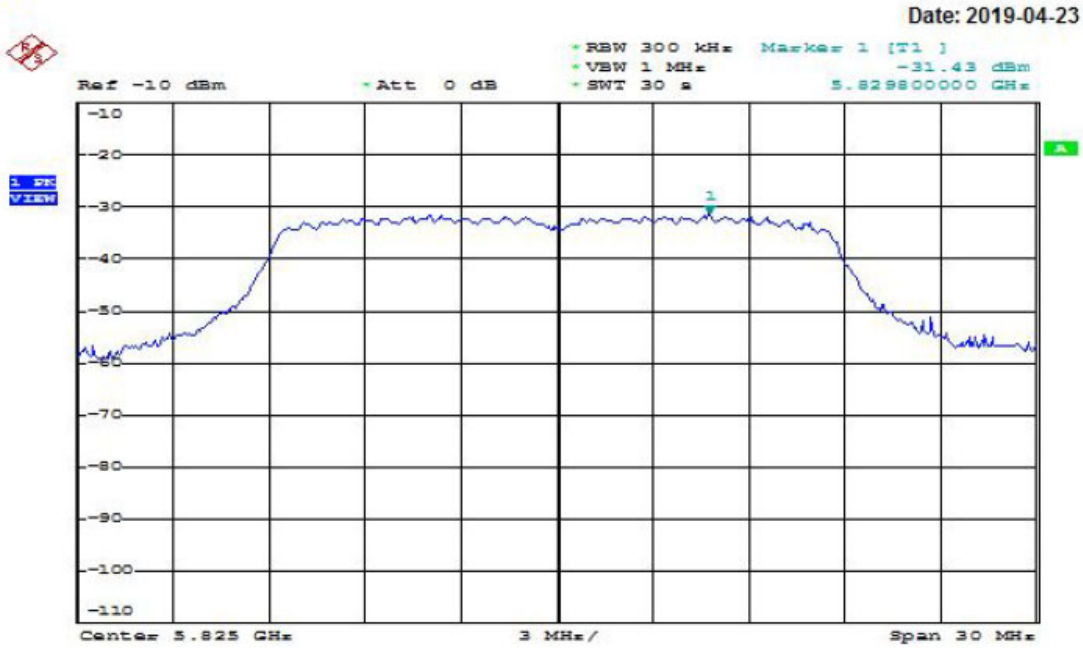
802.11a
Channel: 149



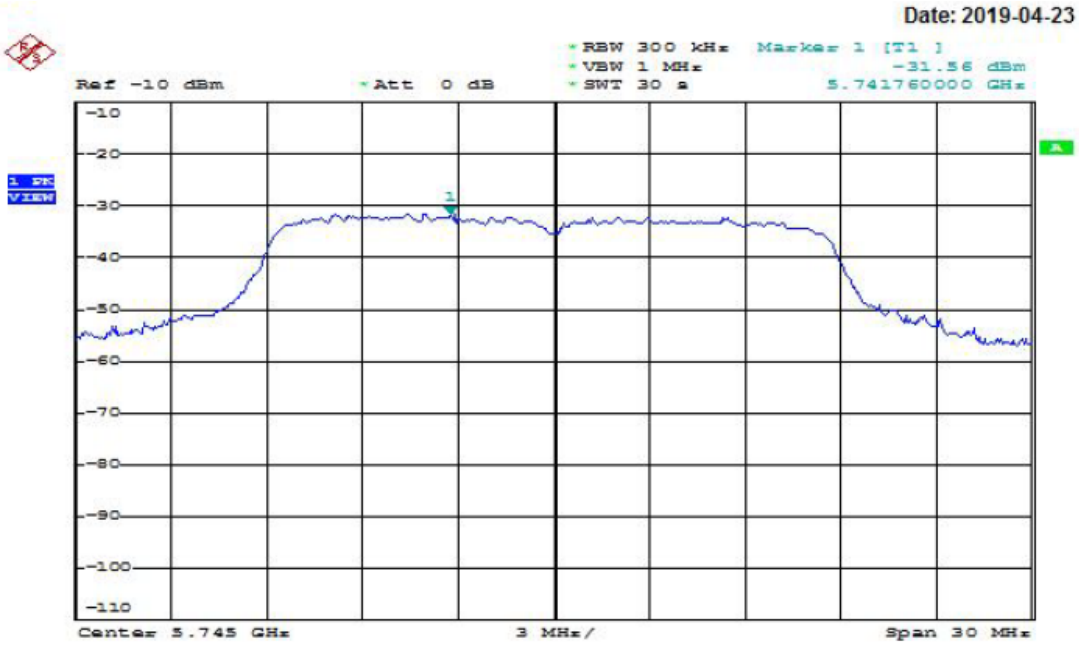
802.11a
Channel: 157



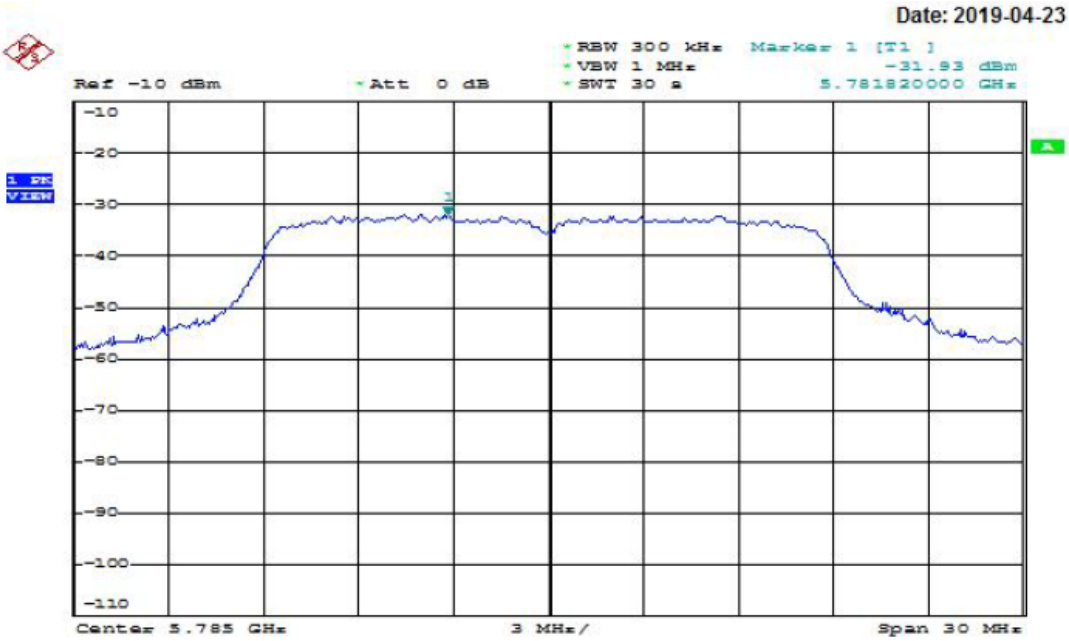
802.11a
Channel: 165



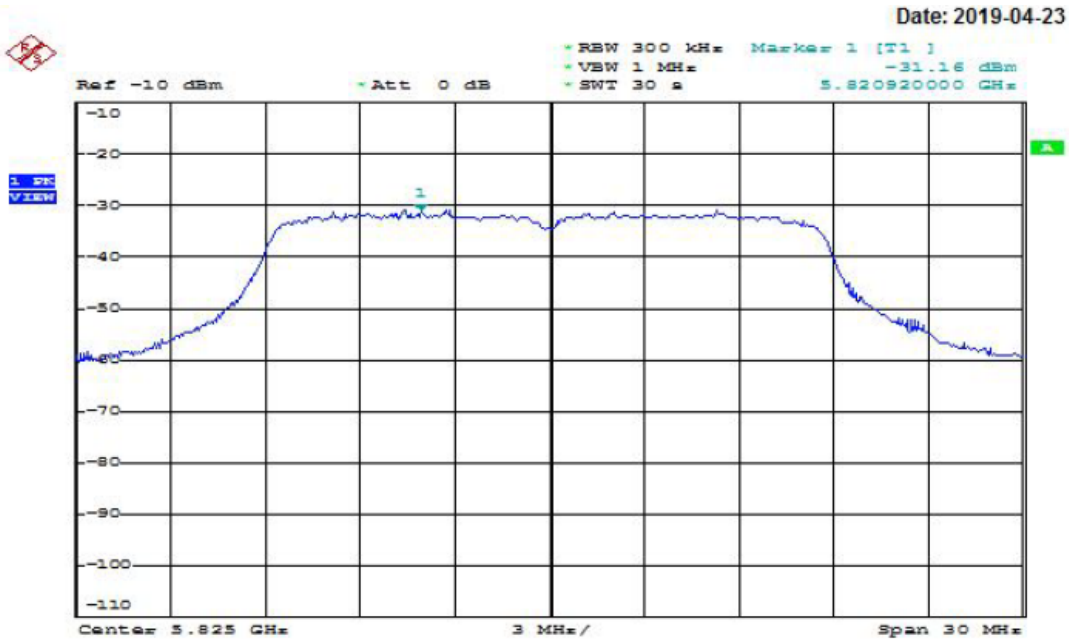
802.11n HT20
Channel: 149



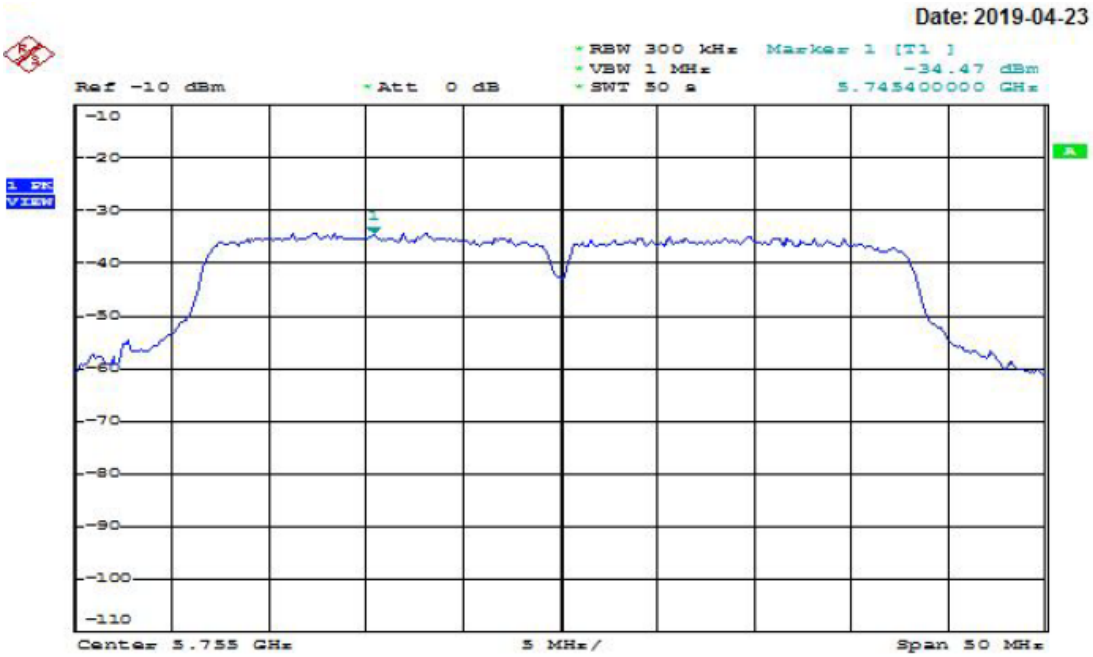
802.11n HT20
Channel: 157



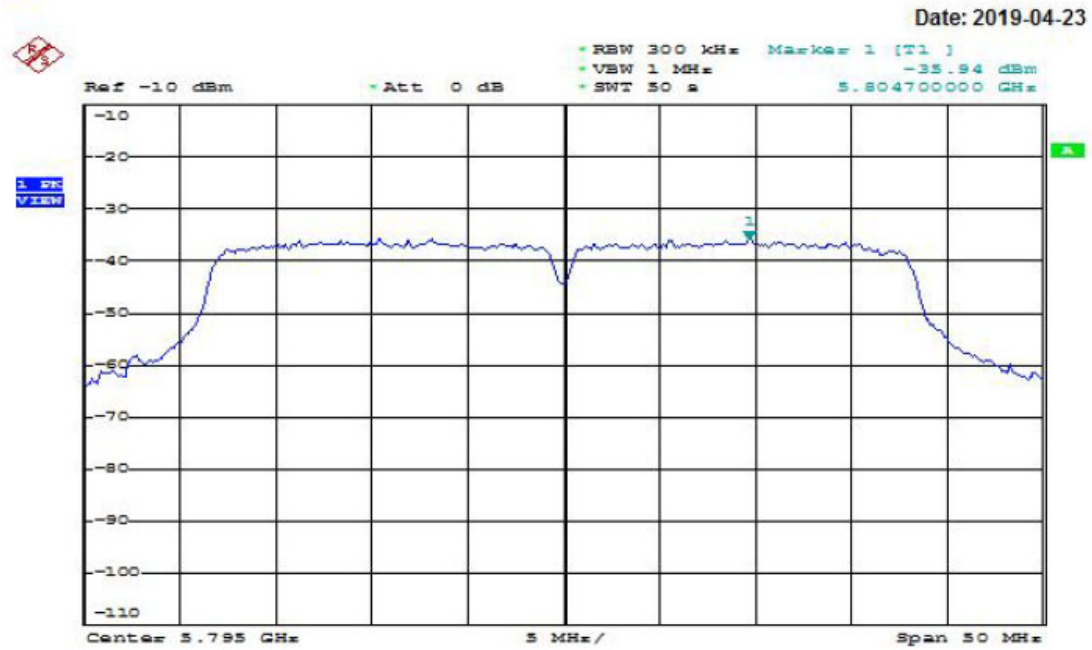
802.11n HT20
Channel: 165



802.11n HT40
Channel: 151



802.11n HT40
Channel: 159



11. Band Edges Measurement

Test Requirement:	FCC Part15 E Section 15.407 and 15.205
Test Method:	ANSI C63.10:2013
Test site:	Measurement Distance: 3m
Receiver setup:	

Frequency	Detector	RBW	VBW	Remark
30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak Value
Above 1GHz	Peak	1MHz	3MHz	Peak Value
	AV	1MHz	3MHz	Average Value

Limit:

Frequency	Limit (dBuV/m @3m)	Remark
30MHz-88MHz	40.0	Quasi-peak Value
88MHz-216MHz	43.5	Quasi-peak Value
216MHz-960MHz	46.0	Quasi-peak Value
960MHz-1GHz	54.0	Quasi-peak Value
Above 1GHz	54.0	Average Value
	74.0	Peak Value

Undesirable emission limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.

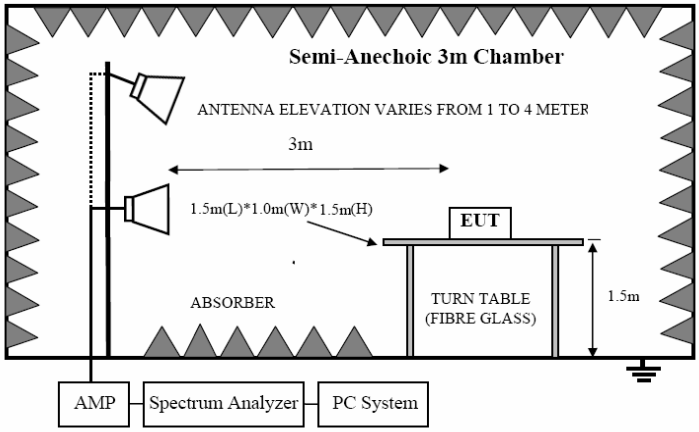
(2) For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.

(3) For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of −27 dBm/MHz.

(4) 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:	a. The EUT was placed on the top of a rotating table 1.5 m above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotable table was turned from 0 degrees to 360 degrees to find the maximum reading. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
Test setup:	Above 1GHz

	
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Remark:

According to KDB 789033 D02V02 section G) 1) (d), for For measurements above 1000 MHz @ 3m distance, the limit of field strength is computed as follows:

E[dBuV/m] = EIRP[dBm] + 95.2;

For example, if EIRP = -27dBm

E[dBuV/m] = -27 + 95.2 = 68.2dBuV/m.

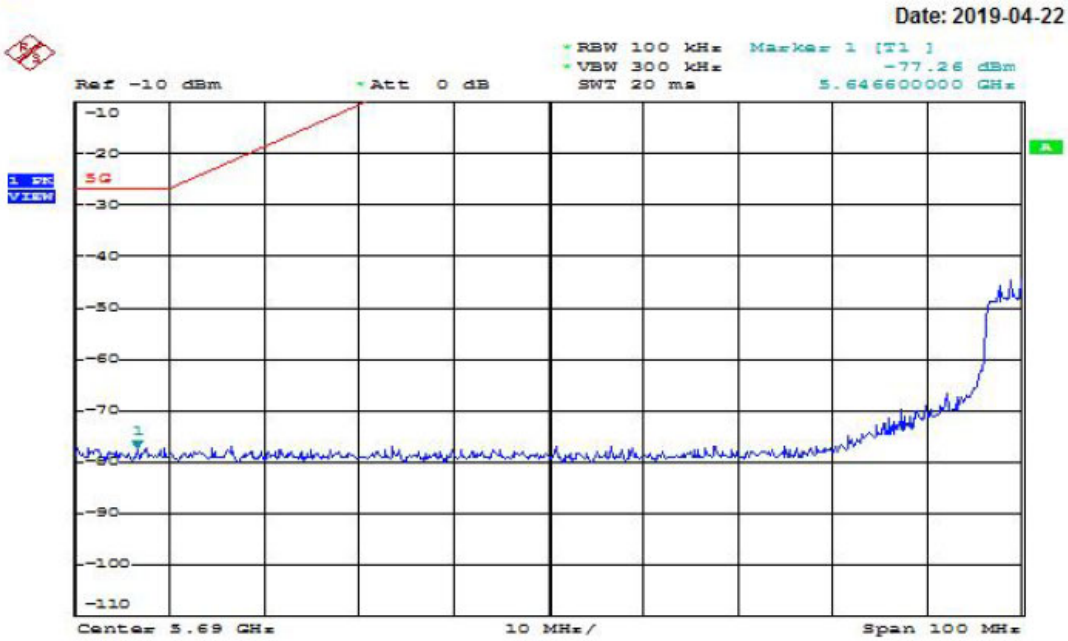
11.1 Test Result and Data

U-NII-3

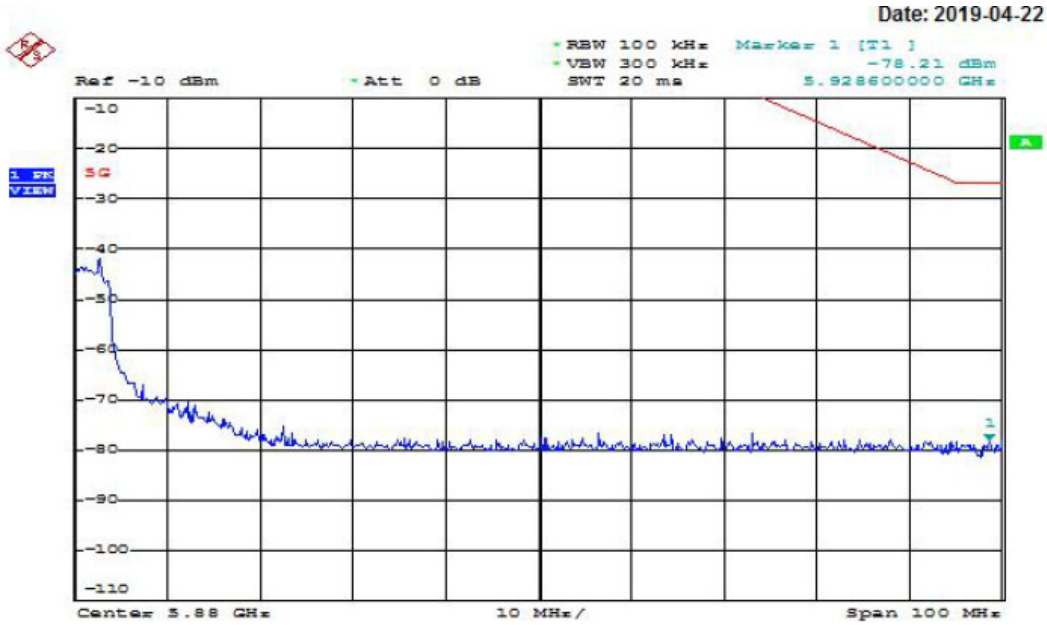
Modulation Type	Channel	Frequency (MHz)	Maximum value in frequency (MHz)		Maximum value (dBm)	
			ANT R	ANT L	ANT R	ANT L
IEEE 802.11a	149	5745	5646.6	5642.2	-77.26	-77.08
	165	5825	5928.6	5928.6	-78.21	-78.11
IEEE 802.11n,HT20	149	5745	5642.31	5643	-76.47	-77.49
	165	5825	5926	5926	-76.82	-77.73
IEEE 802.11n,HT40	151	5755	5643.4	5647.11	-77.33	-76.87
	159	5795	5965.6	5936	-77.67	-77.57

Antenna R

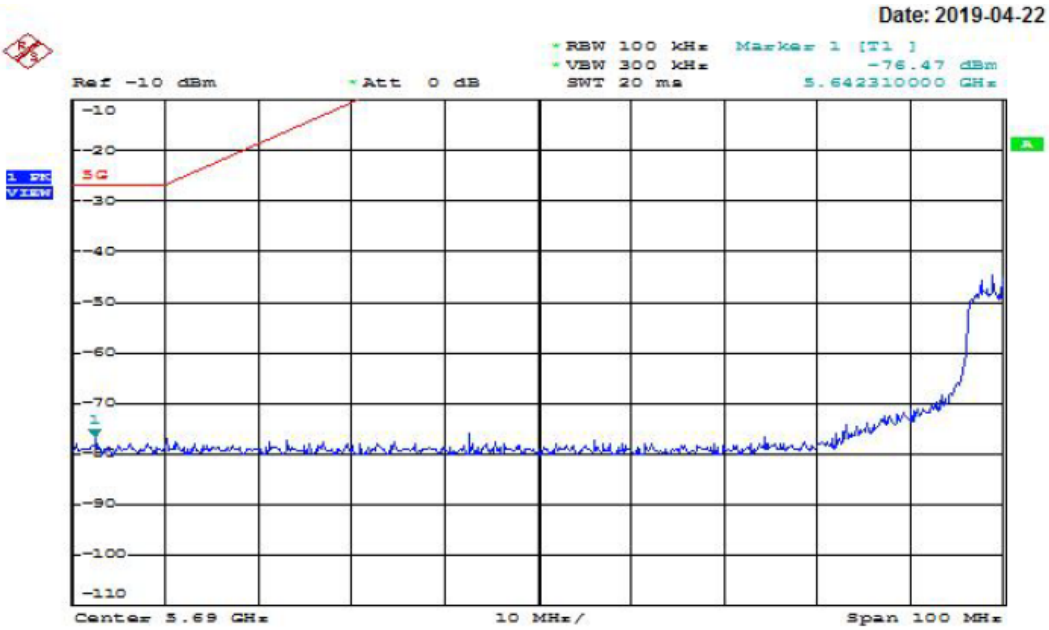
802.11a
Channel: 149



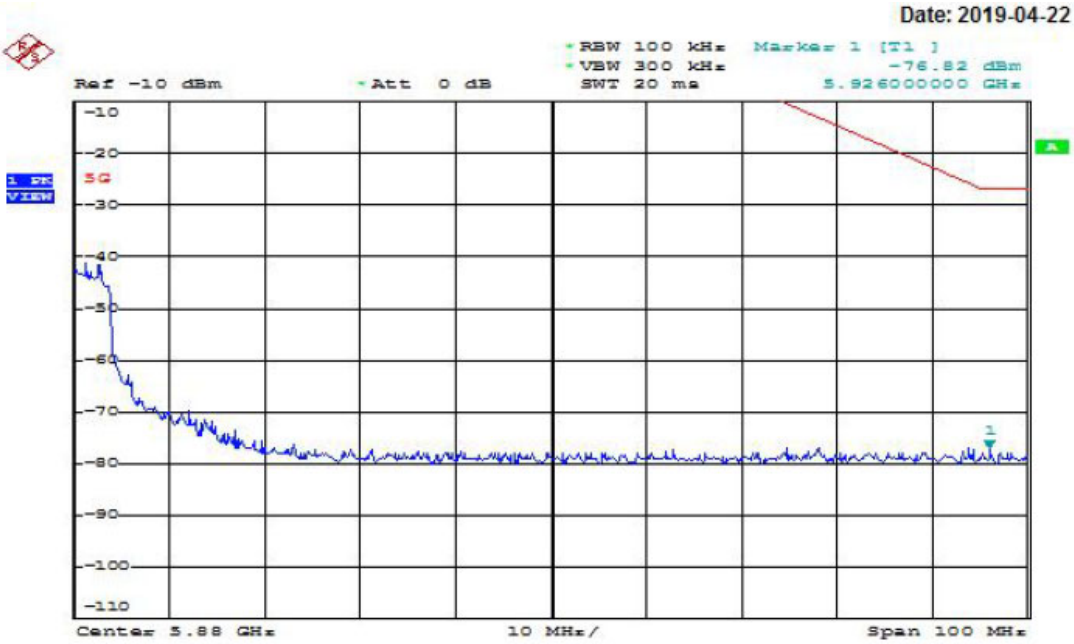
802.11a
Channel: 165



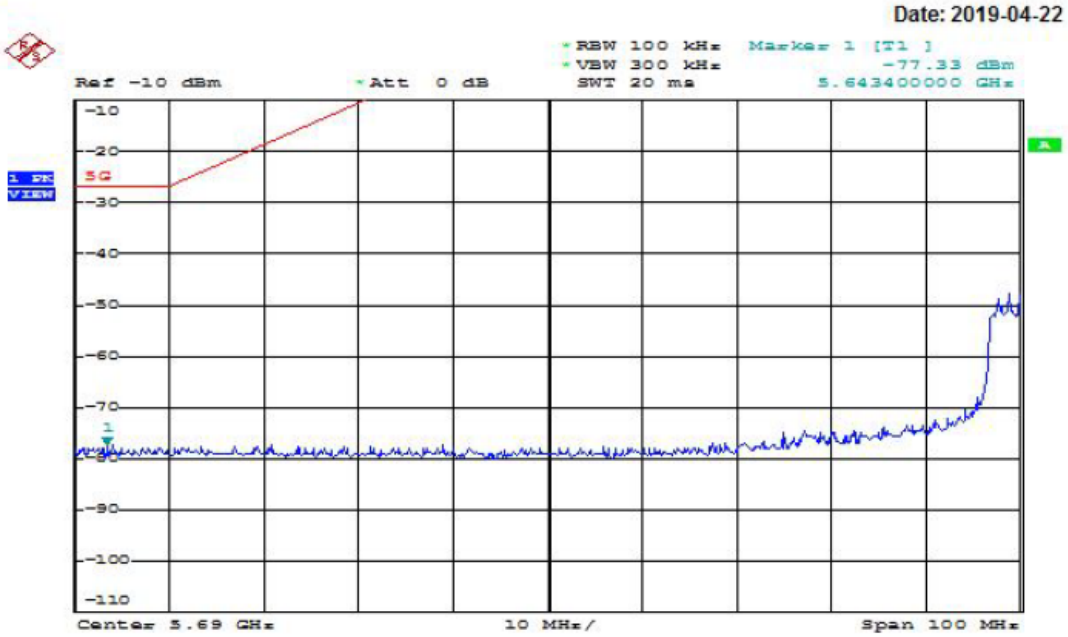
802.11n HT20
Channel: 149



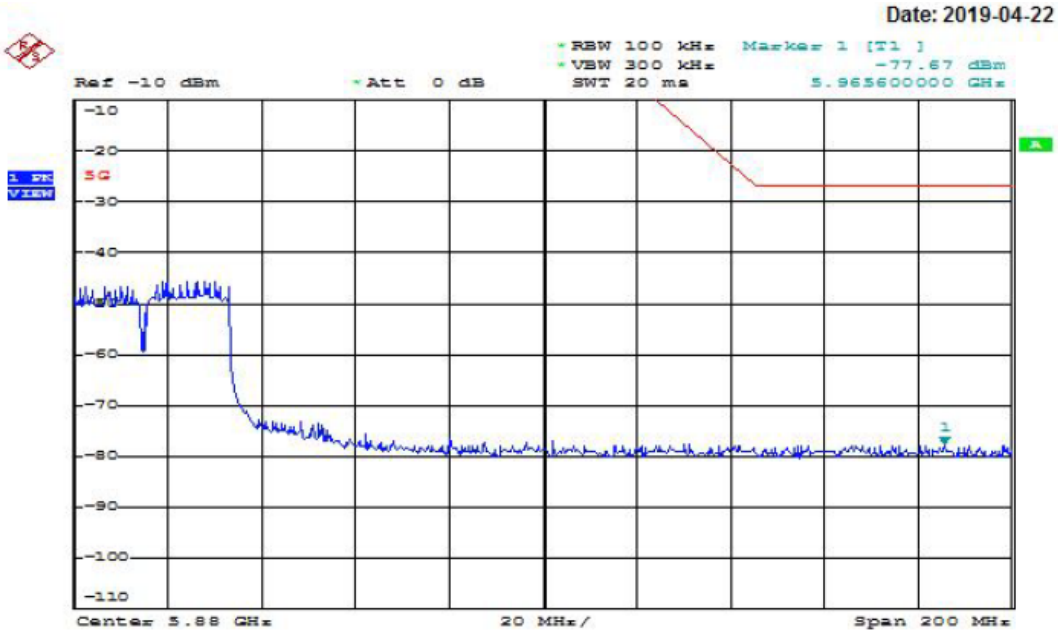
802.11n HT20
Channel: 165



802.11n HT40
Channel: 151

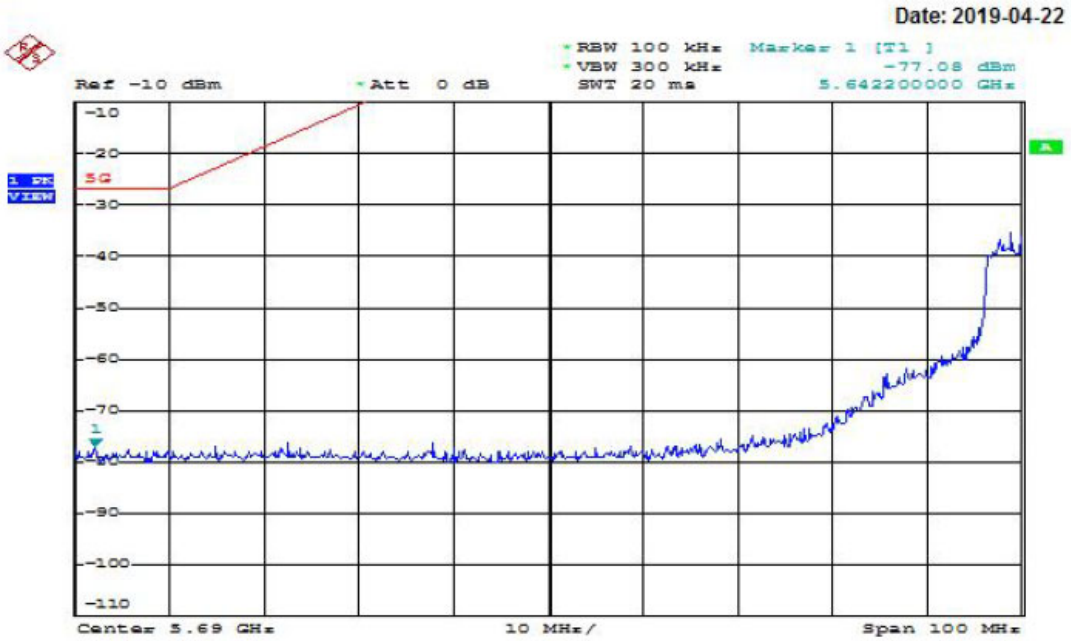
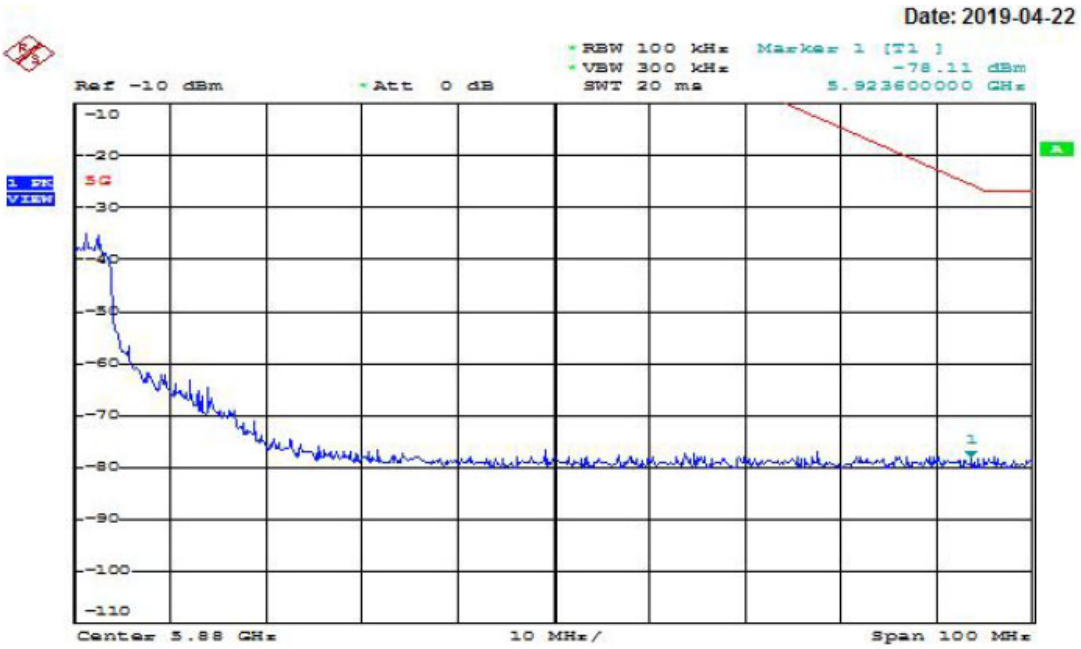


802.11n HT40
Channel: 159



Antenna L

802.11a
Channel: 149



802.11a
Channel: 165