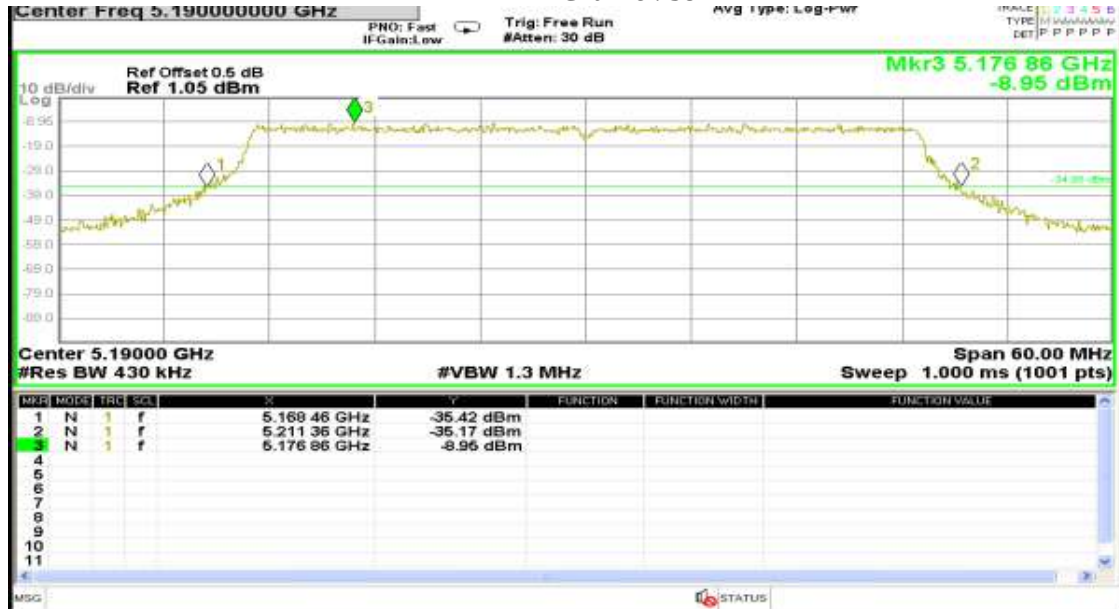


26dB BW 802.11ax40
Channel: 38

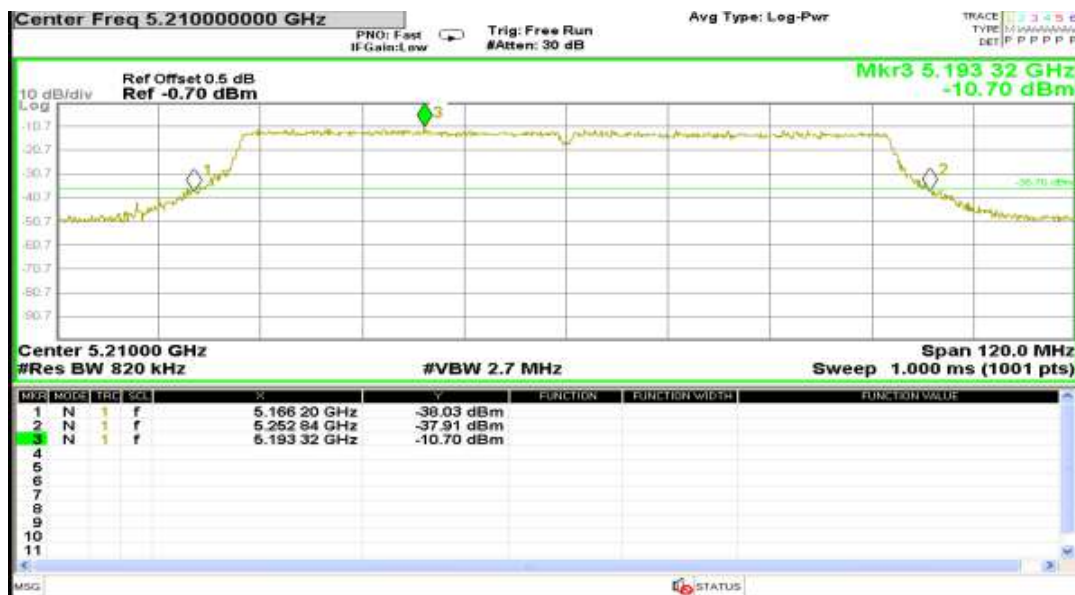


Channel: 46



26dB BW 802.11ax80

Channel: 42



6dB BW 802.11a
Channel: 149



Channel: 157



Channel: 165



6dB BW 802.11n20
Channel: 149



Channel: 157



Channel: 165



6dB BW 802.11n40
Channel: 151



Channel: 159



6dB BW 802.11ac20

Channel: 149



Channel: 157



Channel: 165

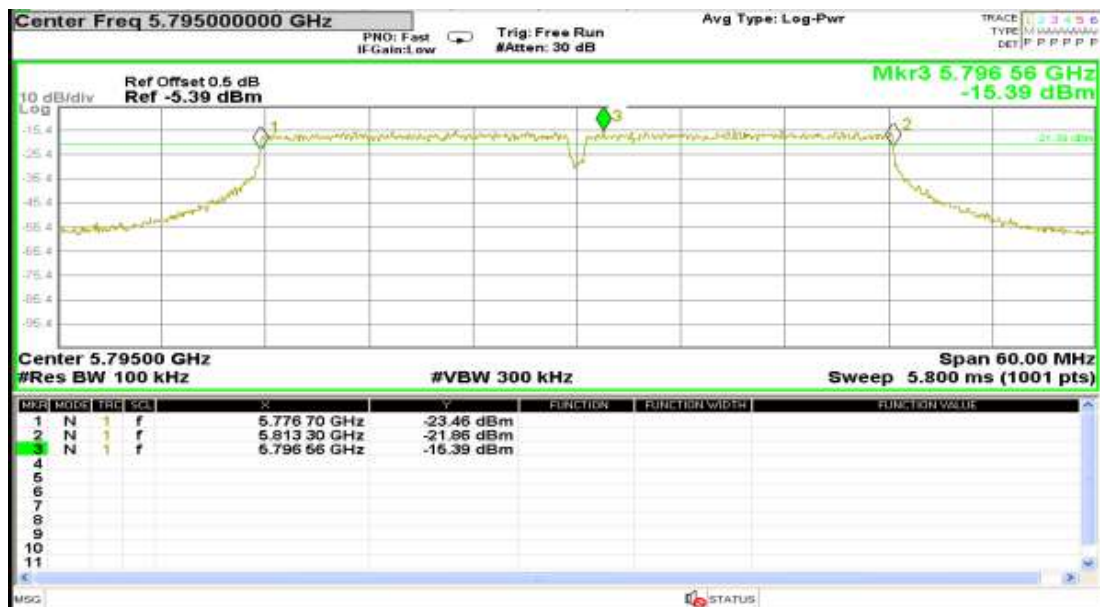


6dB BW 802.11ac40

Channel: 151



Channel: 159



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6dB BW 802.11ac80

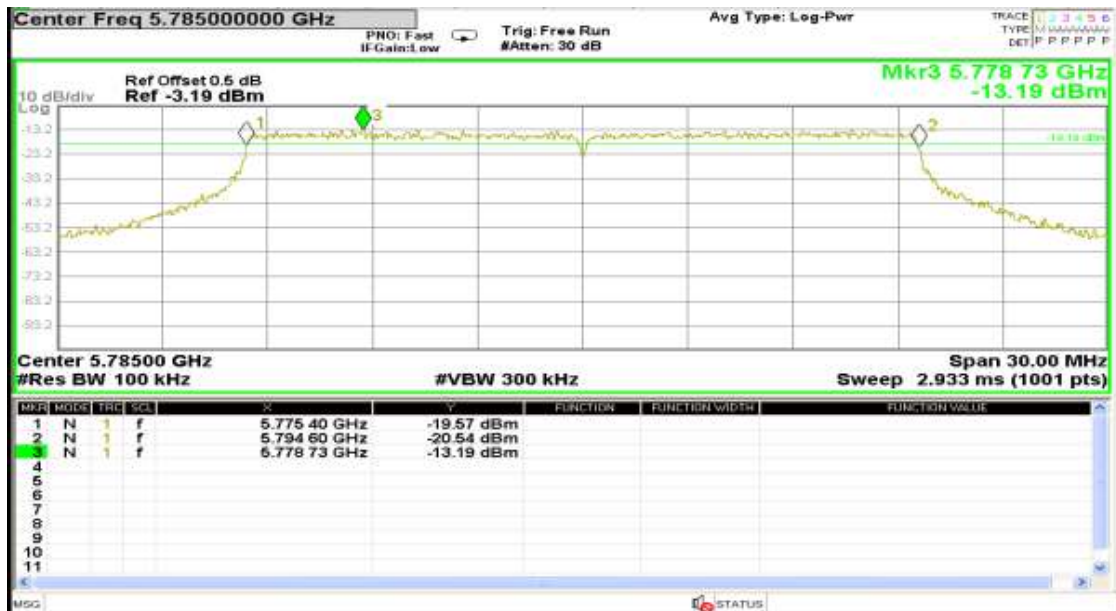
Channel: 155



6dB BW 802.11ax20
Channel: 149



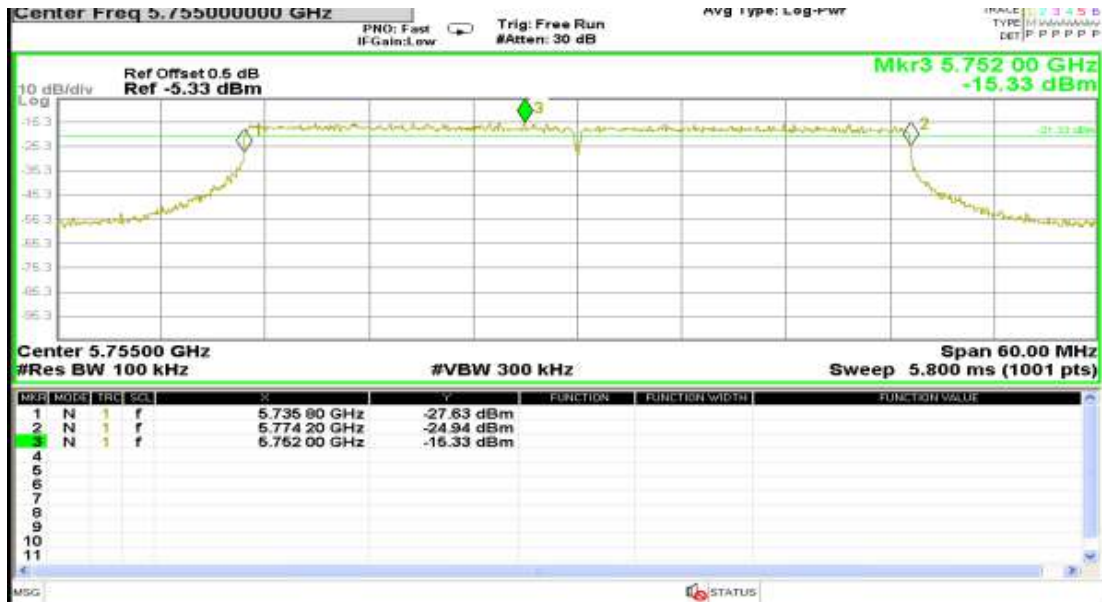
Channel: 157



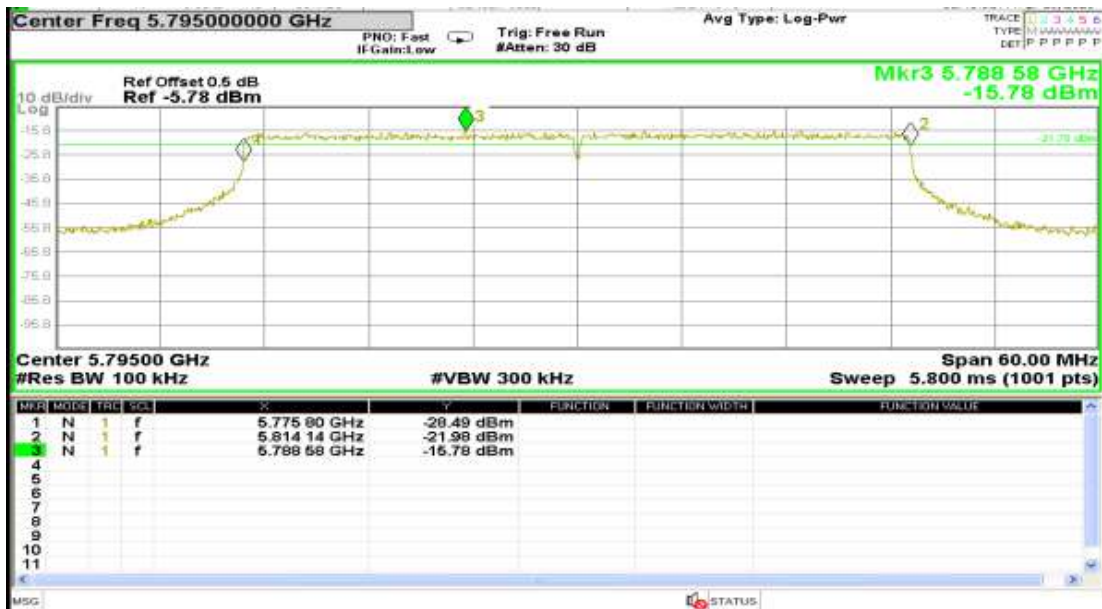
Channel: 165



6dB BW 802.11ax40
Channel: 151



Channel: 159

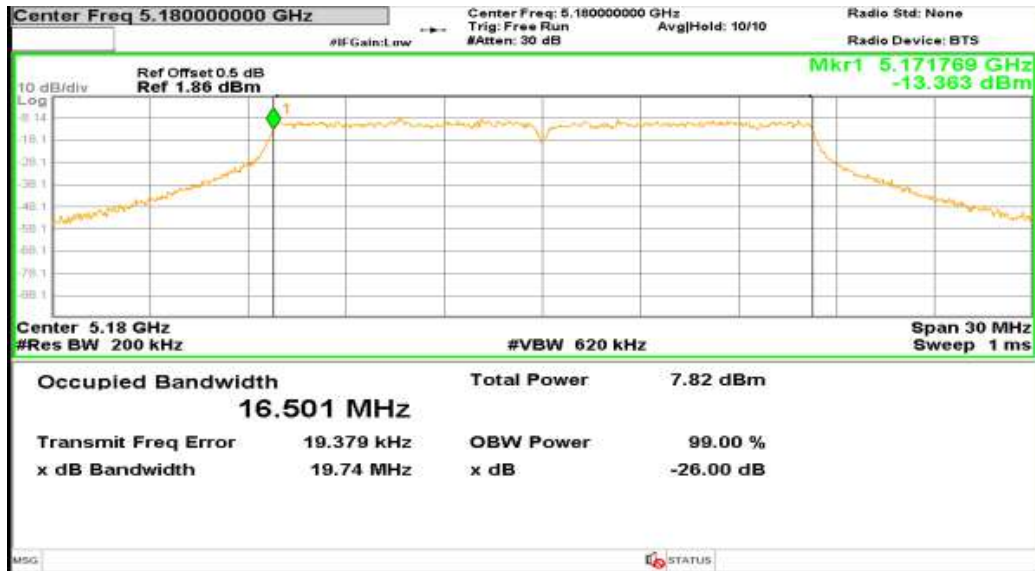


6dB BW 802.11ax80

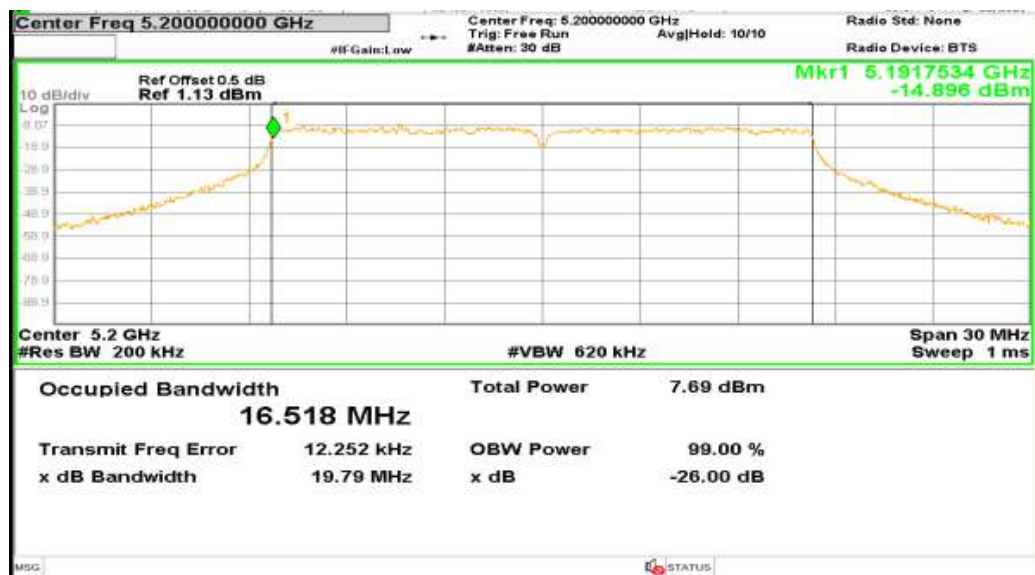
Channel: 155



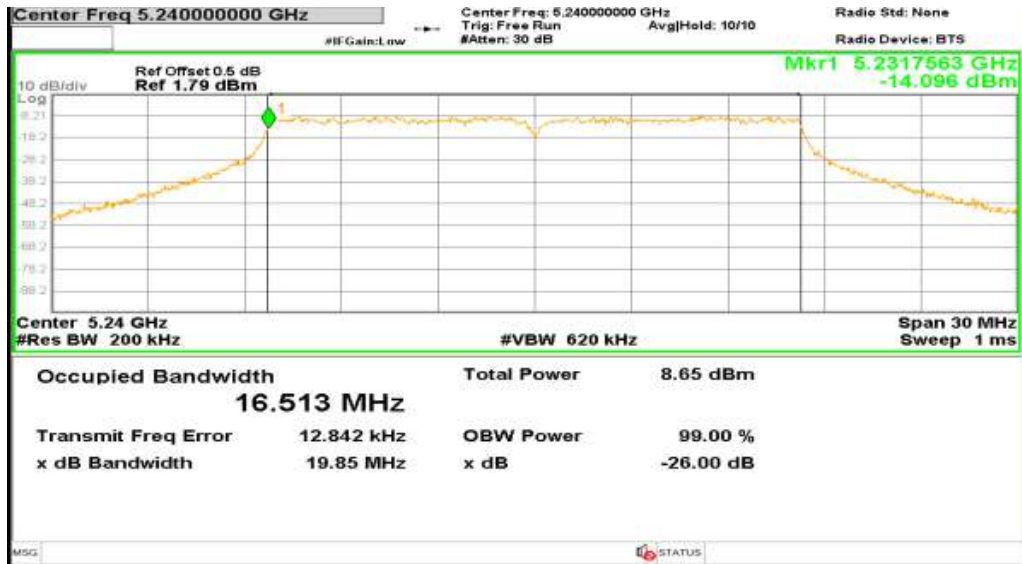
99% OBW 802.11a
Channel: 36



Channel: 40



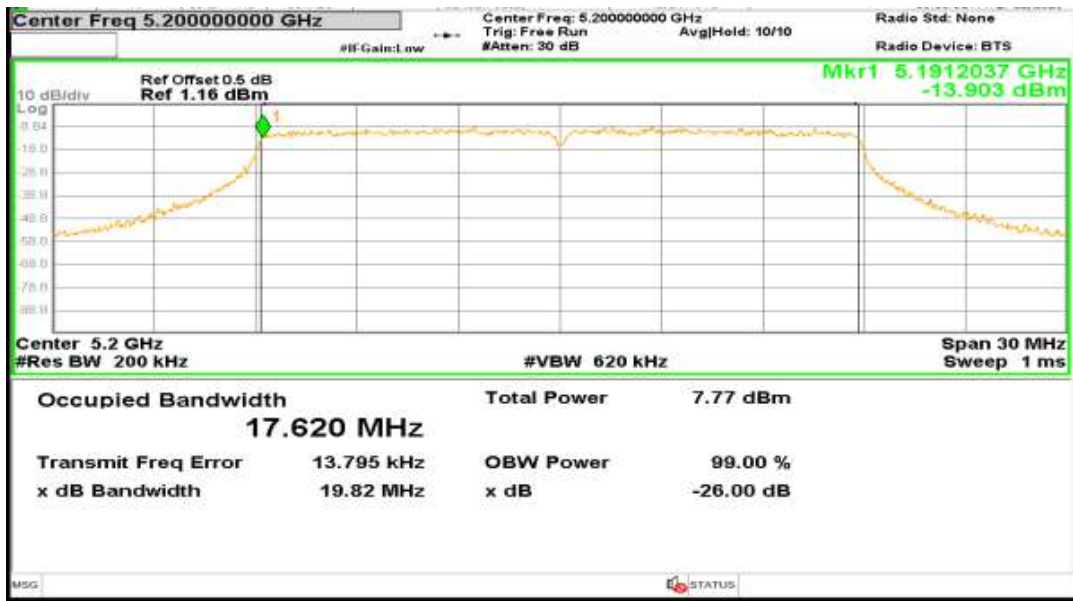
Channel: 48



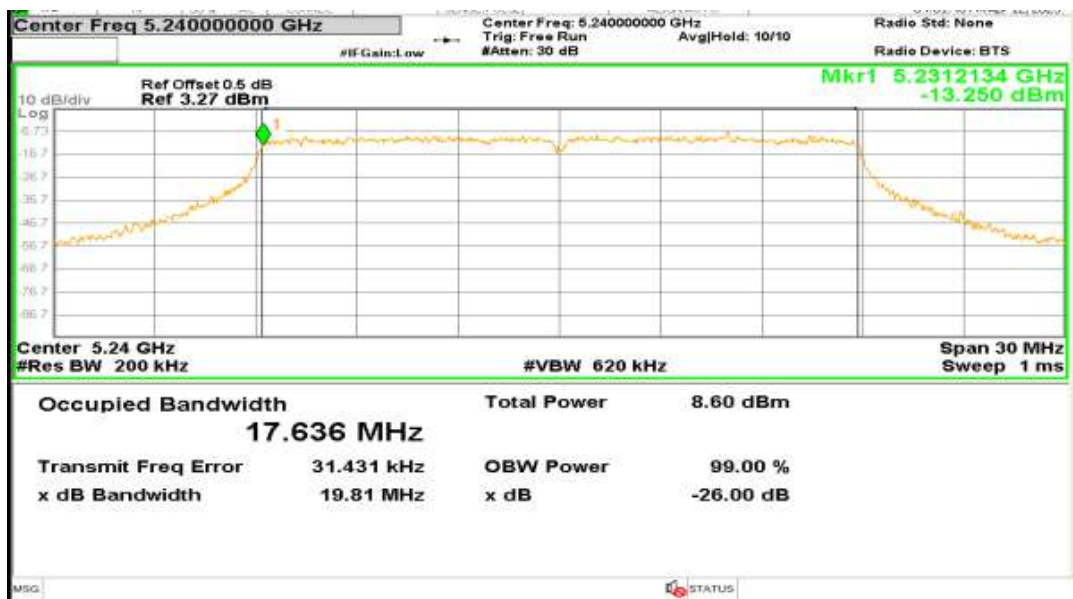
99% OBW 802.11n20
Channel: 36



Channel: 40

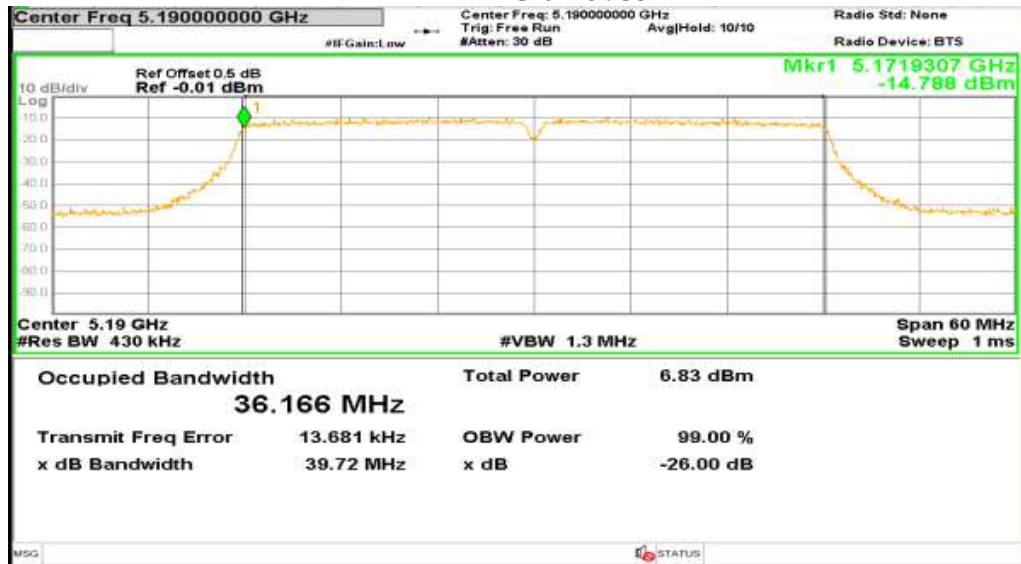


Channel: 48

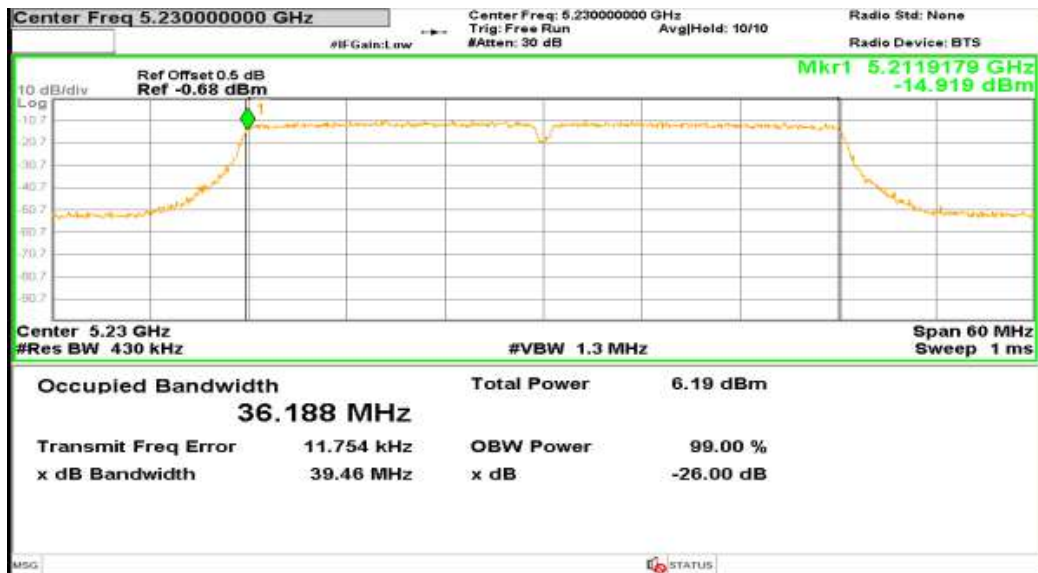


99% OBW 802.11n40

Channel: 38

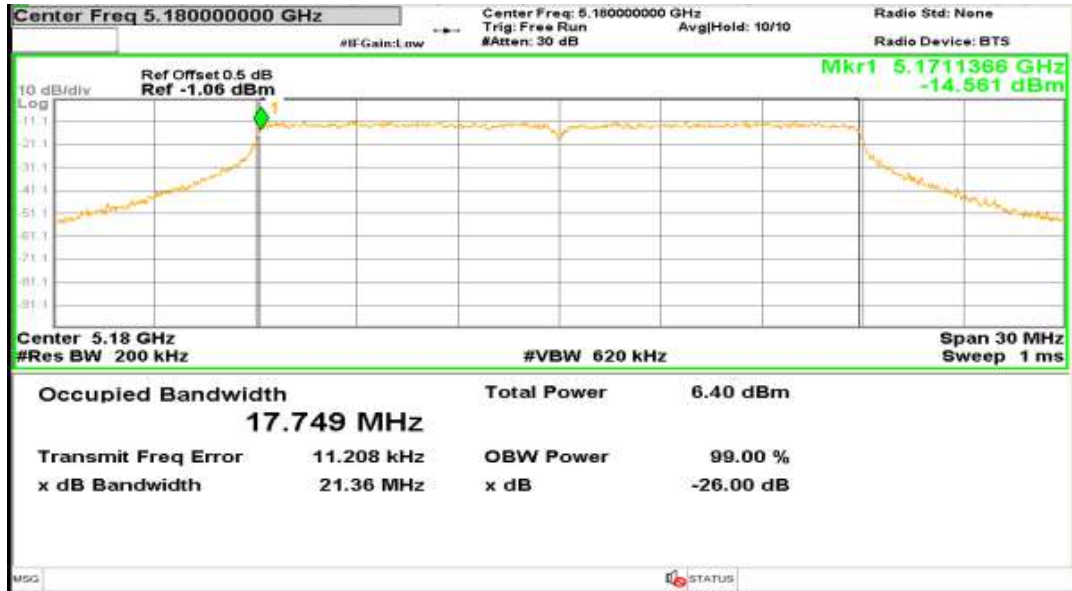


Channel: 46

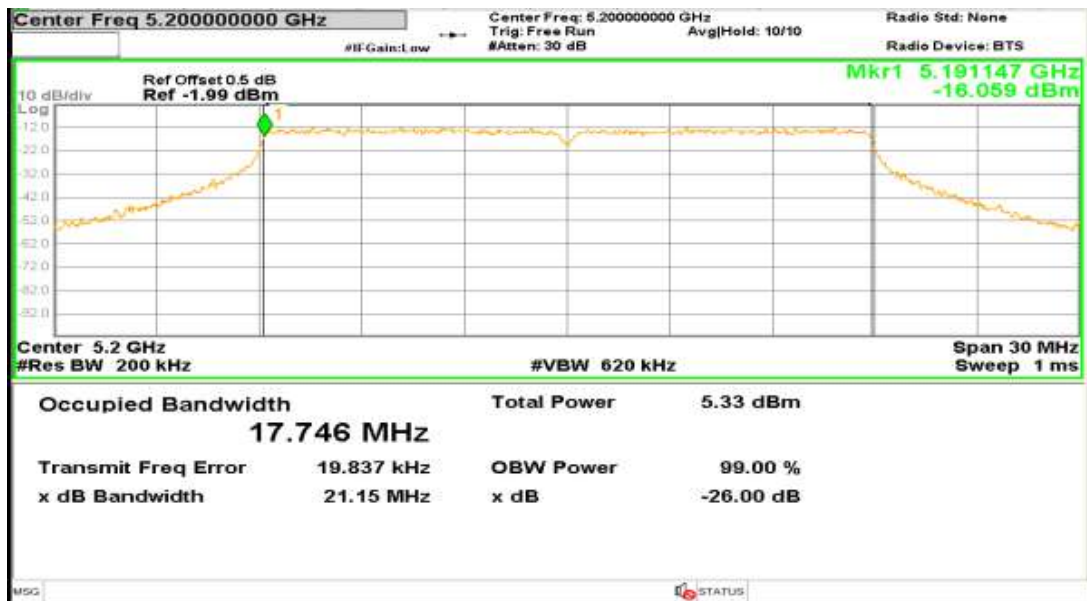


99% OBW 802.11ac20

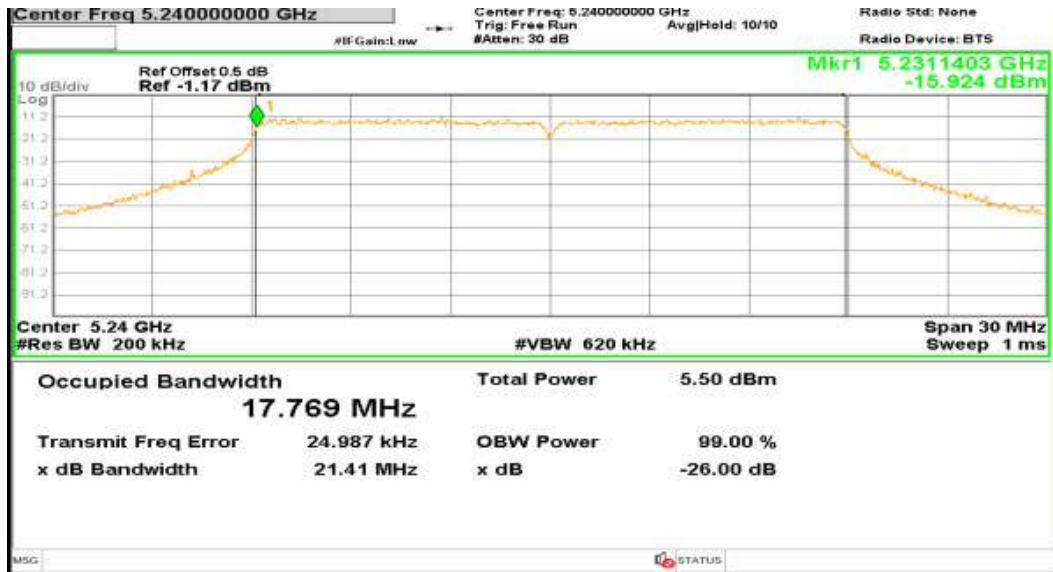
Channel: 36



Channel: 40



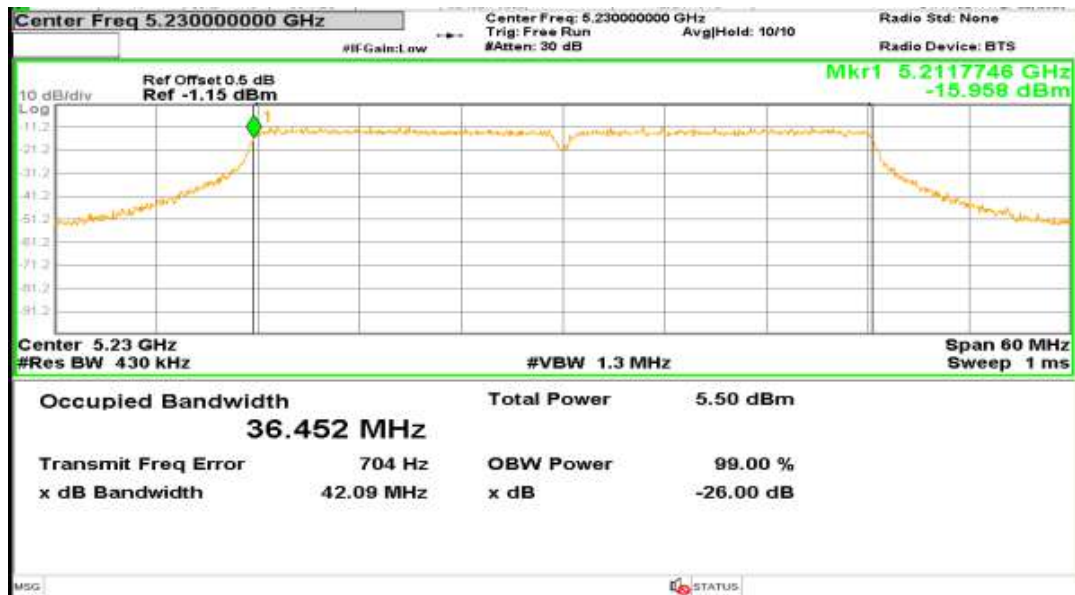
Channel: 48



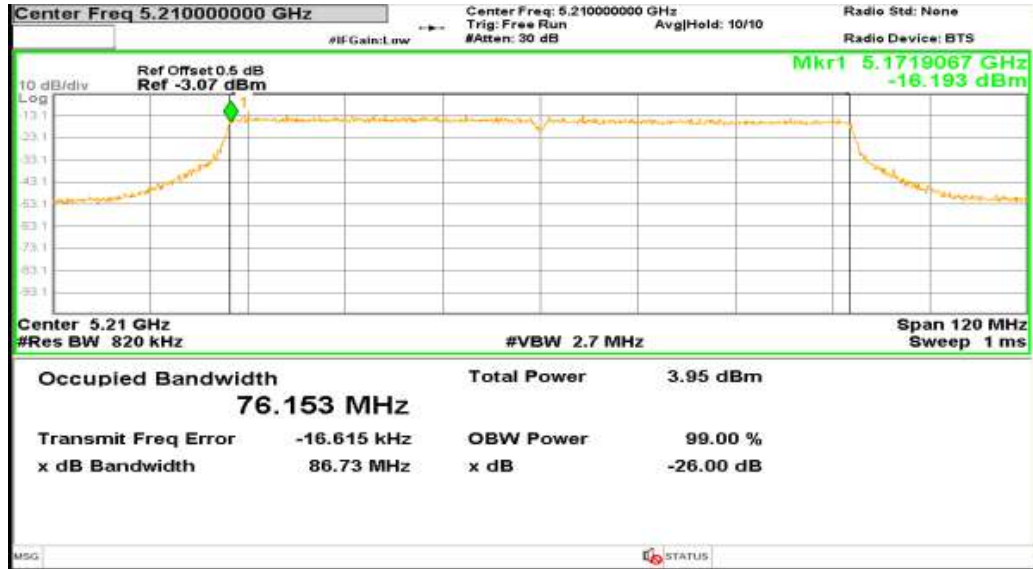
99% OBW 802.11ac40
Channel: 38



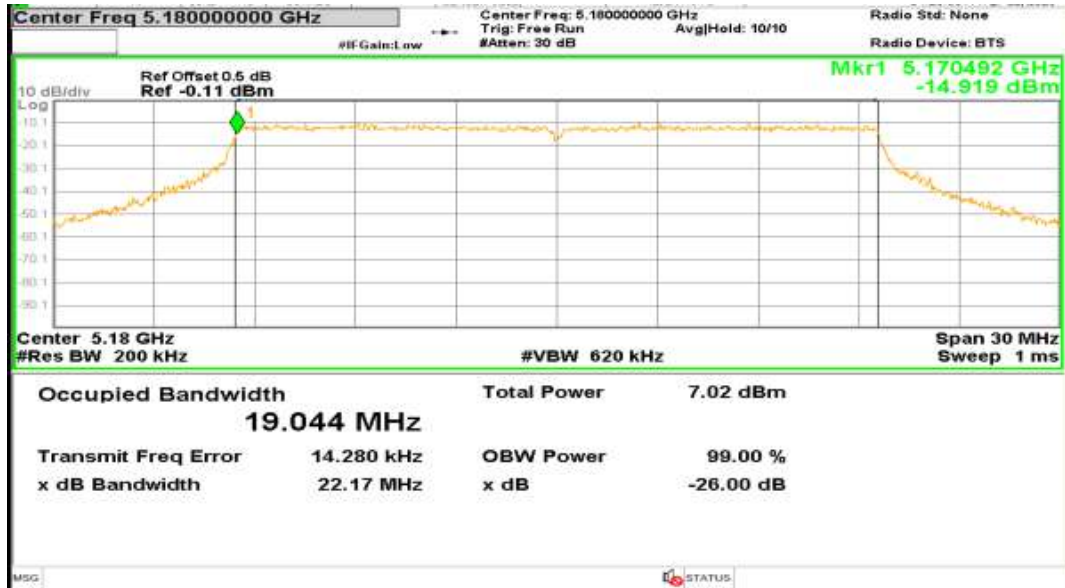
Channel: 46



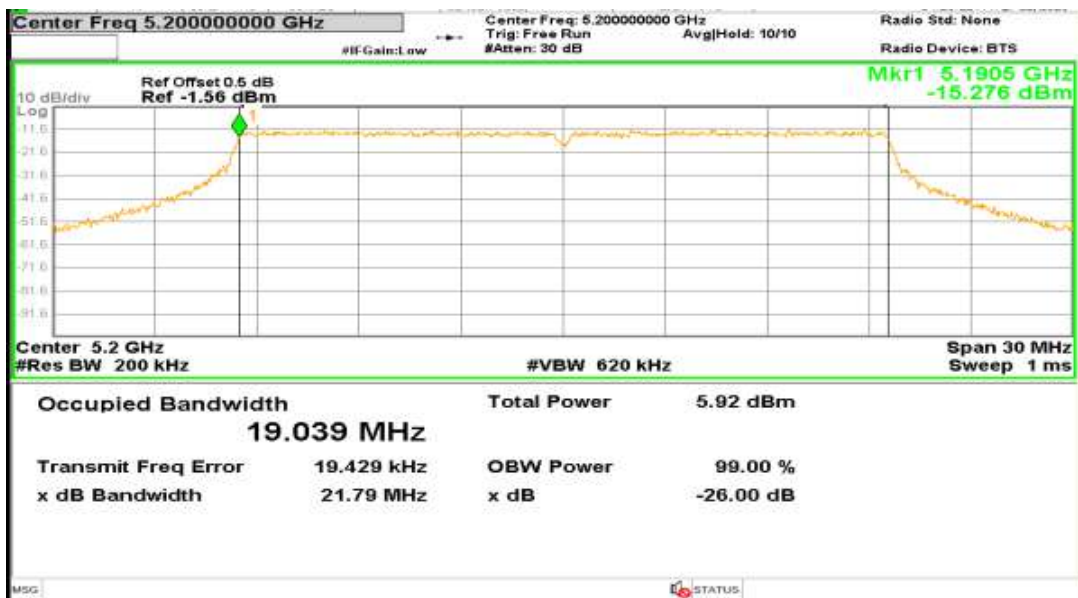
99% OBW 802.11ac80
Channel: 42



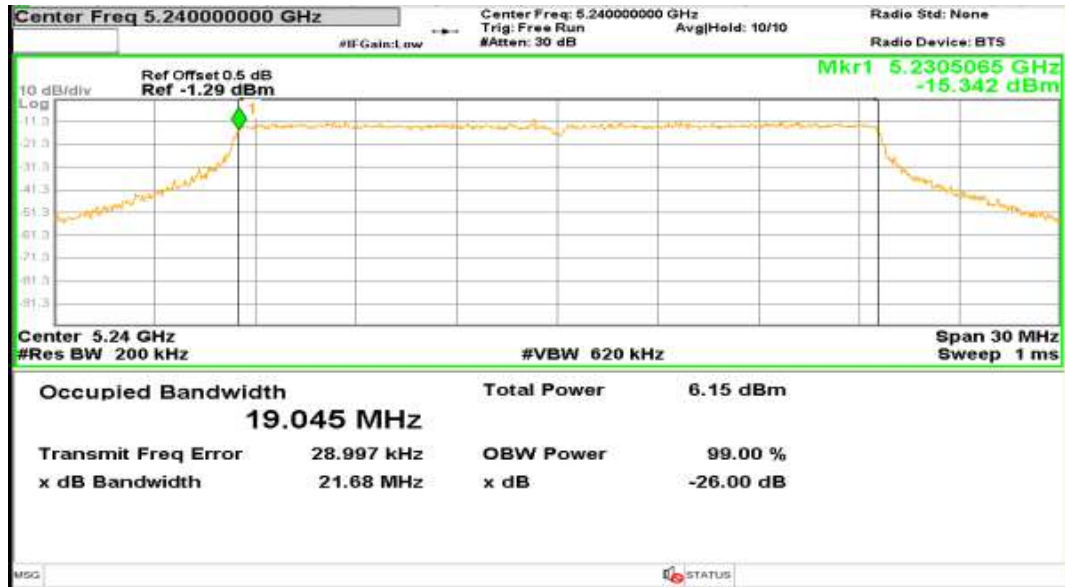
99% OBW 802.11ax20
Channel: 36



Channel: 40

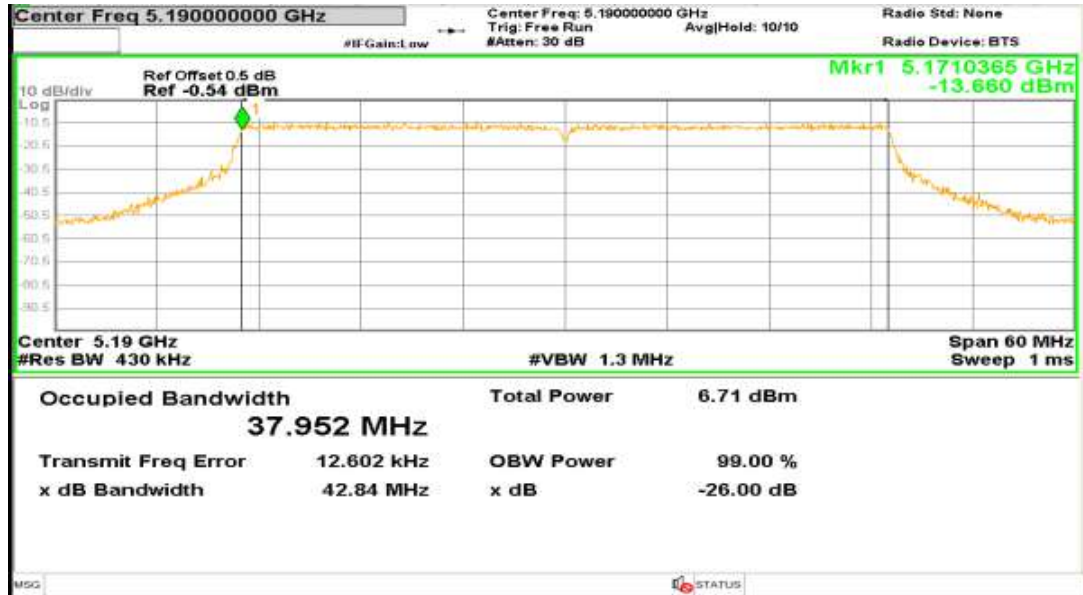


Channel: 48



99% OBW 802.11ax40

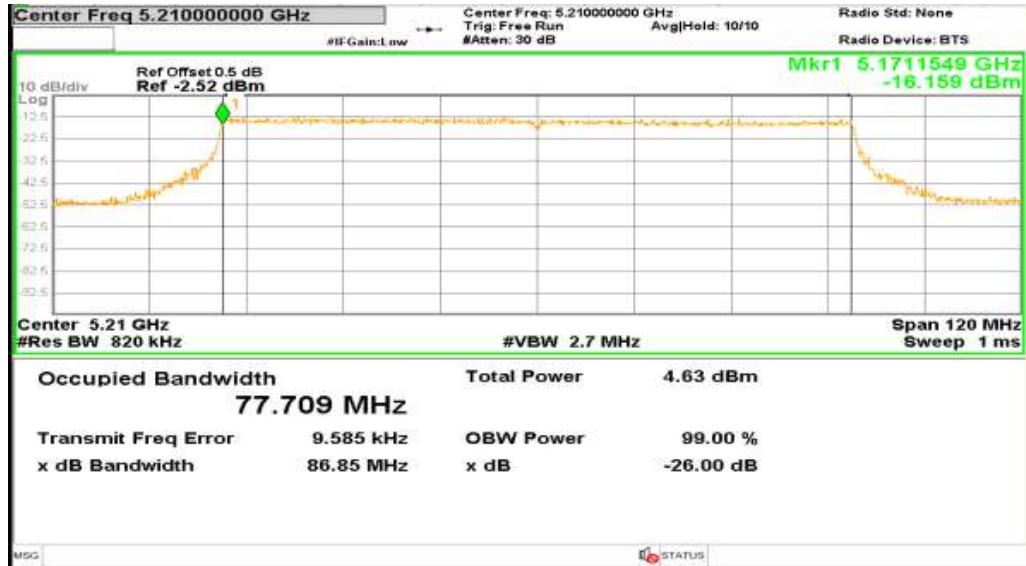
Channel: 38



Channel: 46



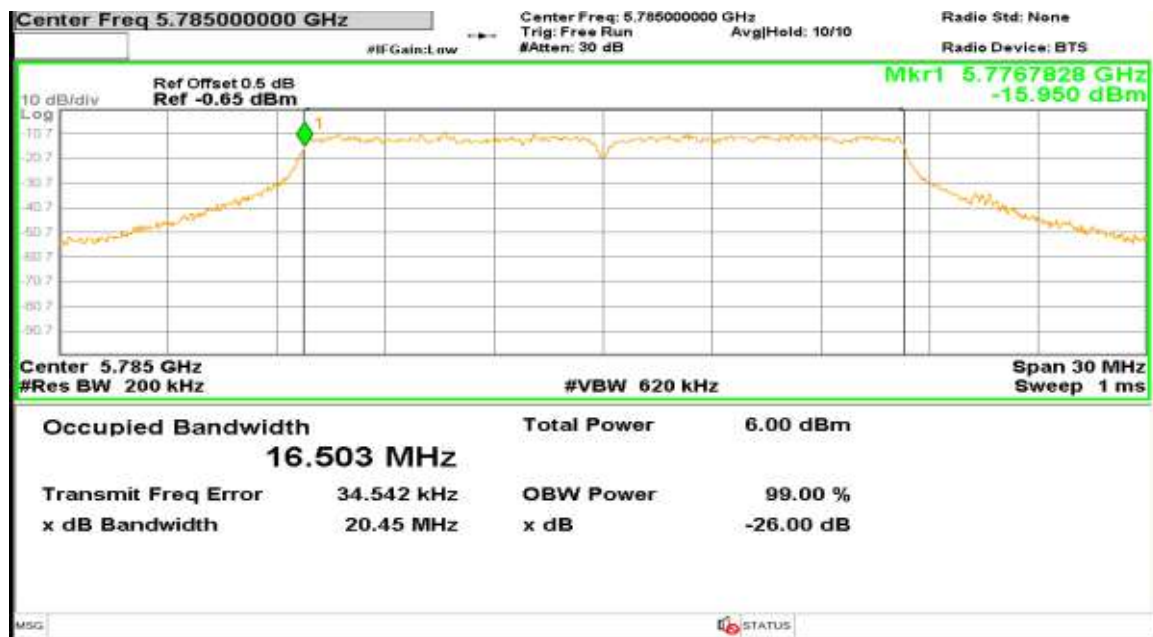
99% OBW 802.11ax80
Channel: 42



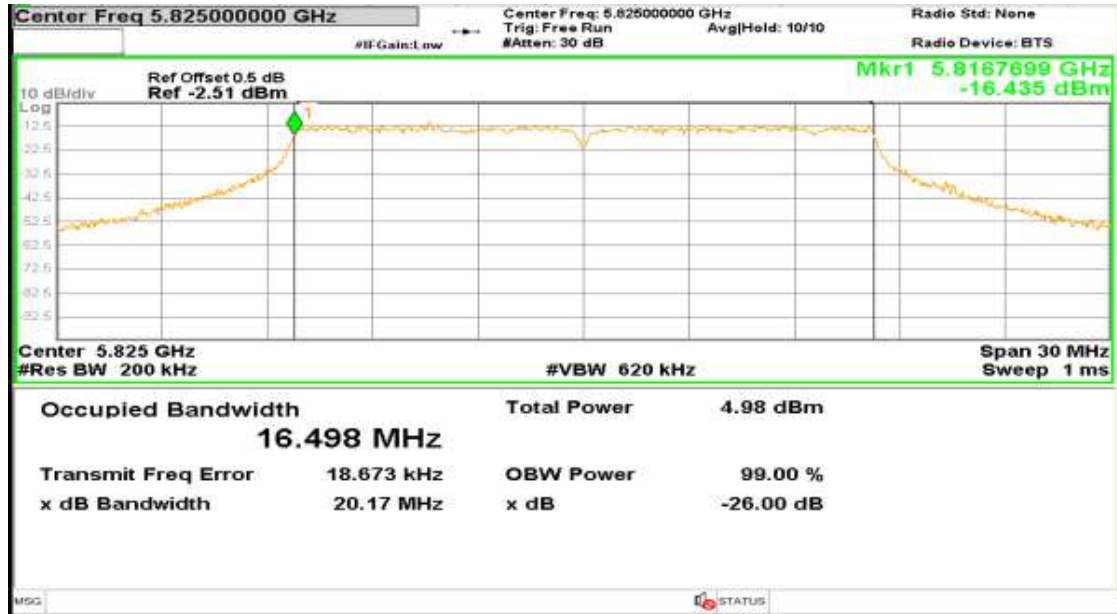
99% OBW 802.11a
Channel: 149



Channel: 157



Channel: 165



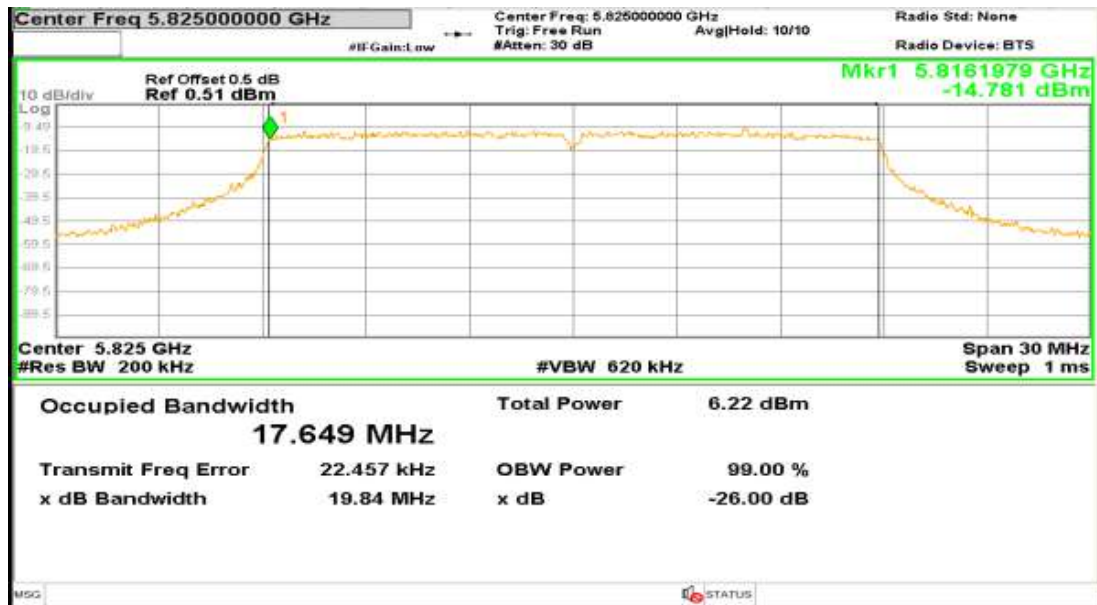
99% OBW 802.11n20
Channel: 149



Channel: 157

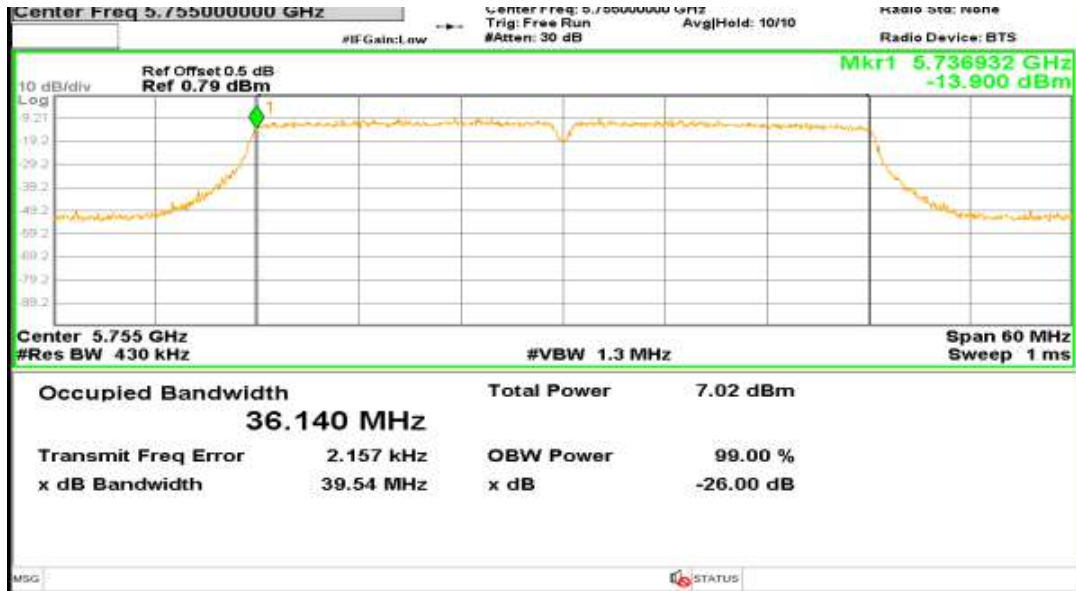


Channel: 165

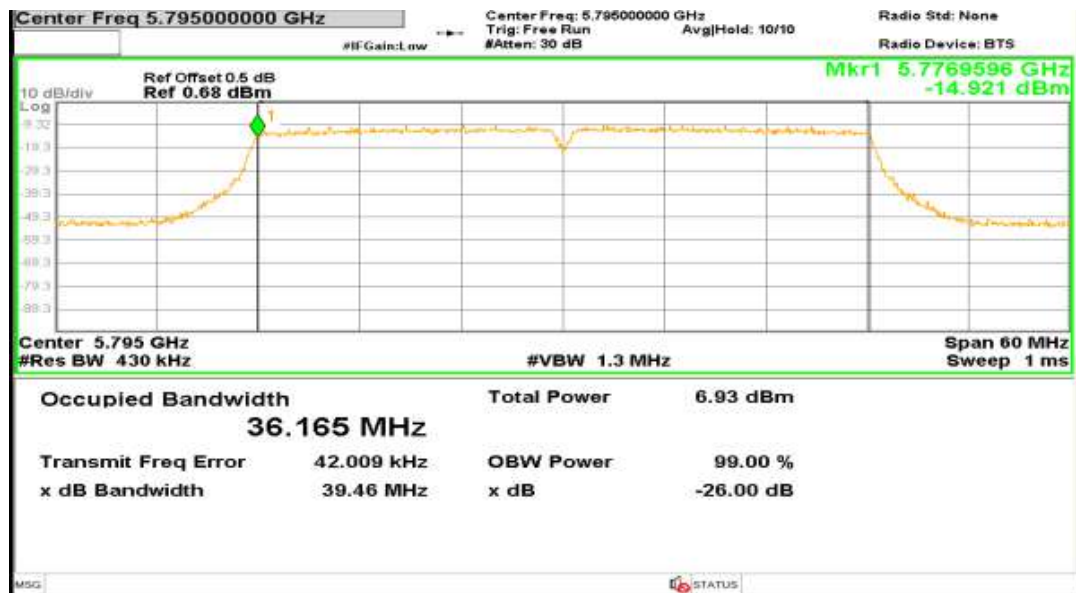


99% OBW 802.11n40

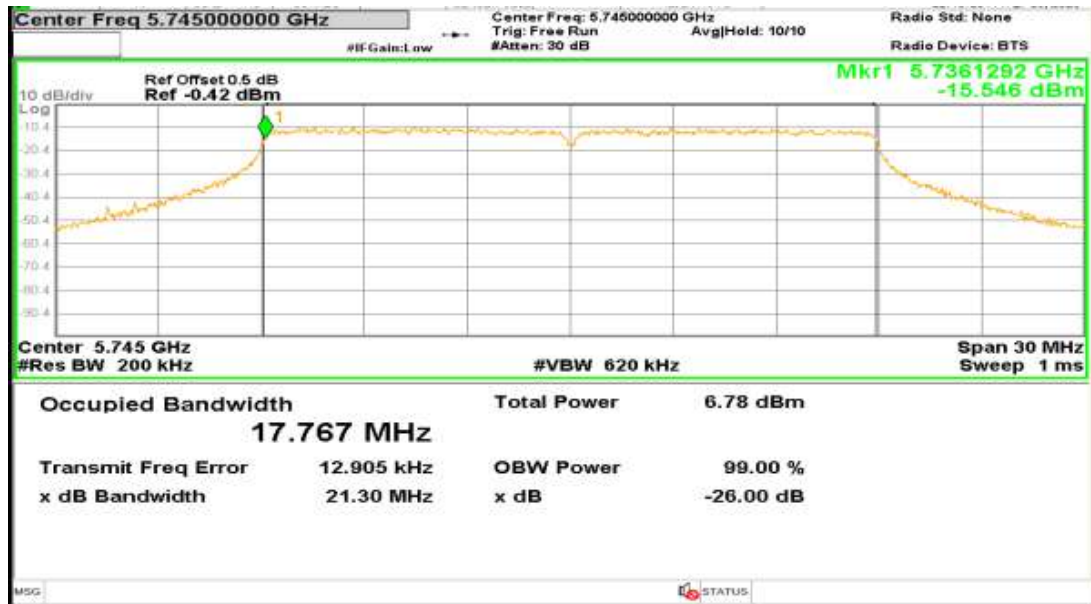
Channel: 151



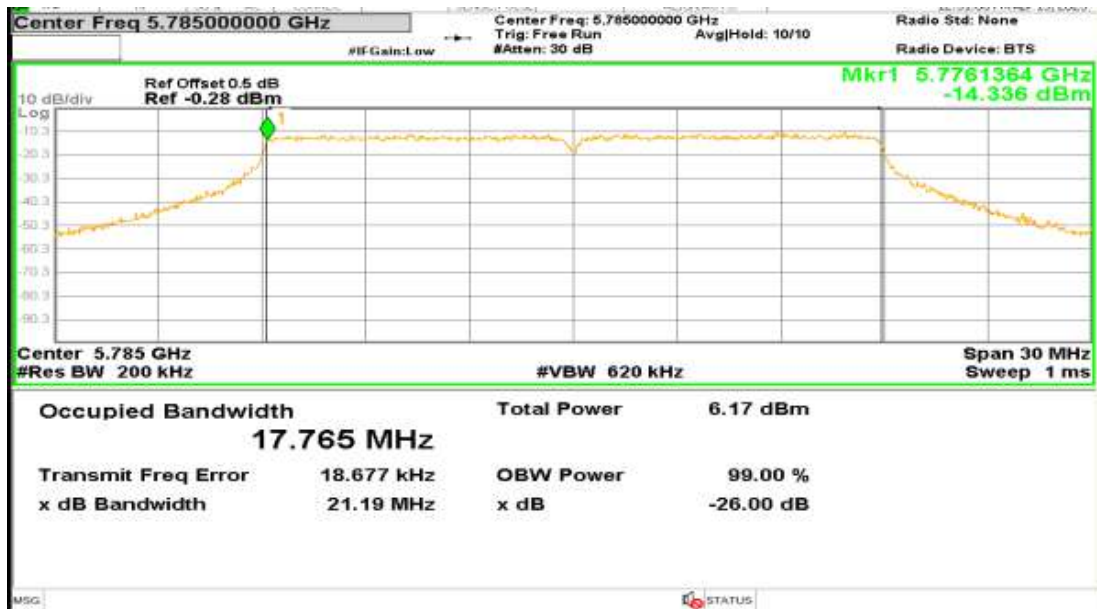
Channel: 159



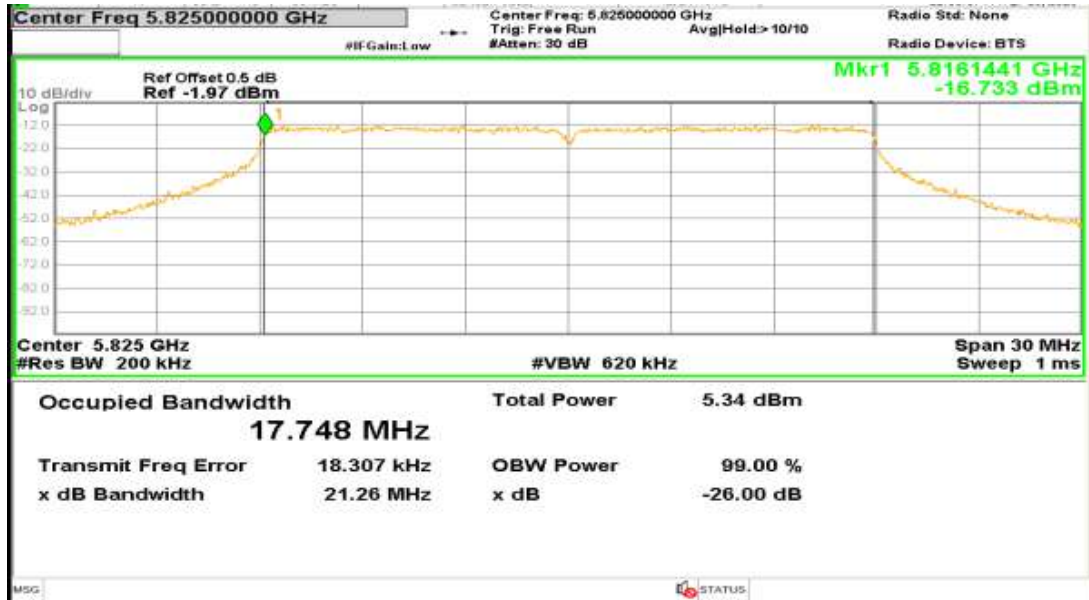
99% OBW 802.11ac20
Channel: 149



Channel: 157

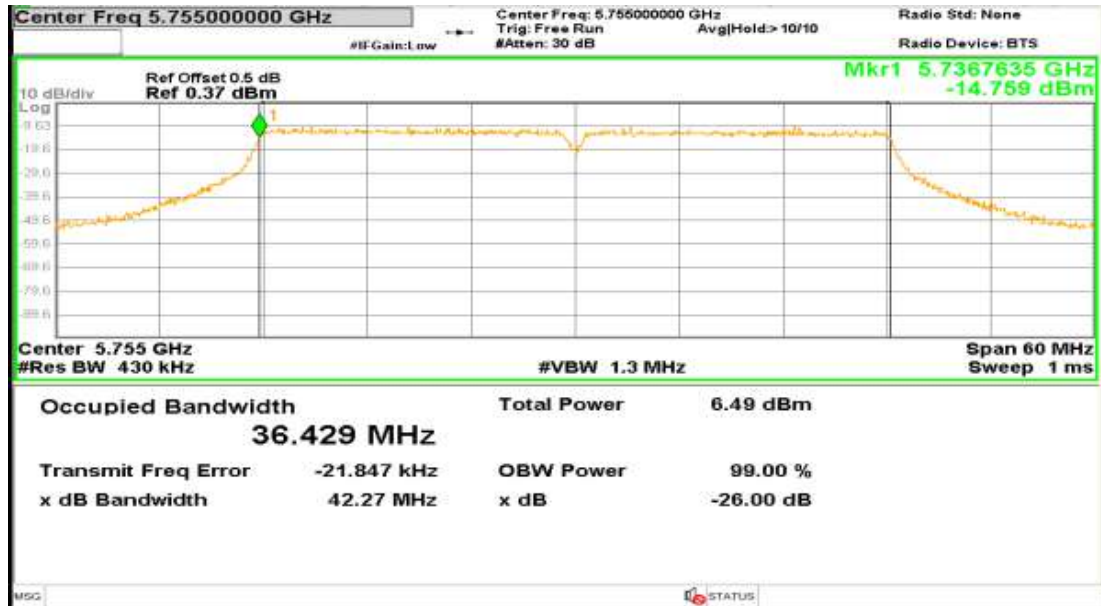


Channel:165

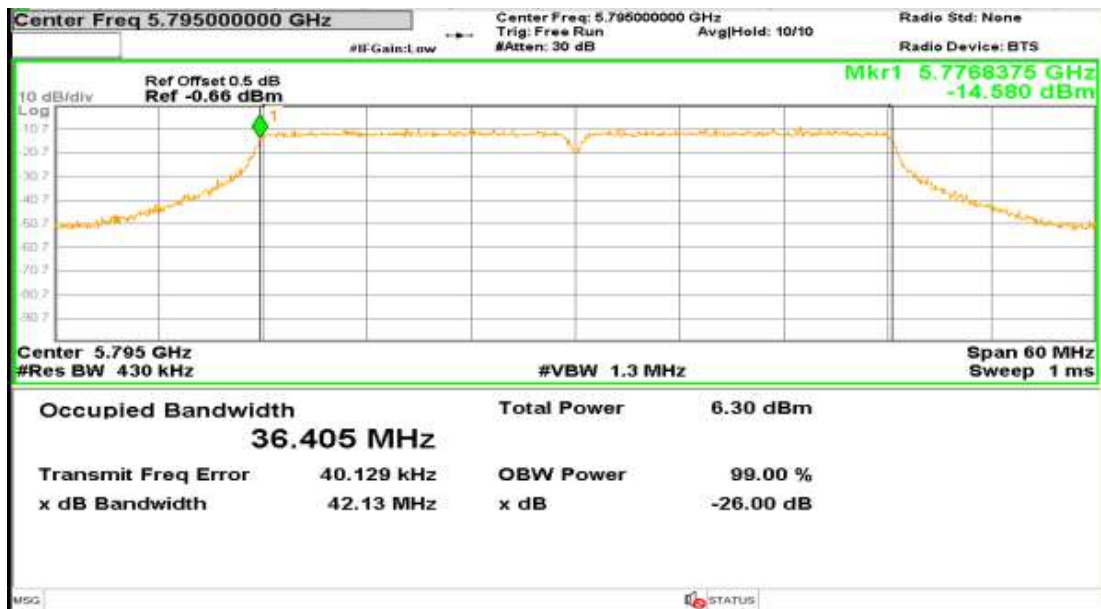


99% OBW 802.11ac40

Channel:151

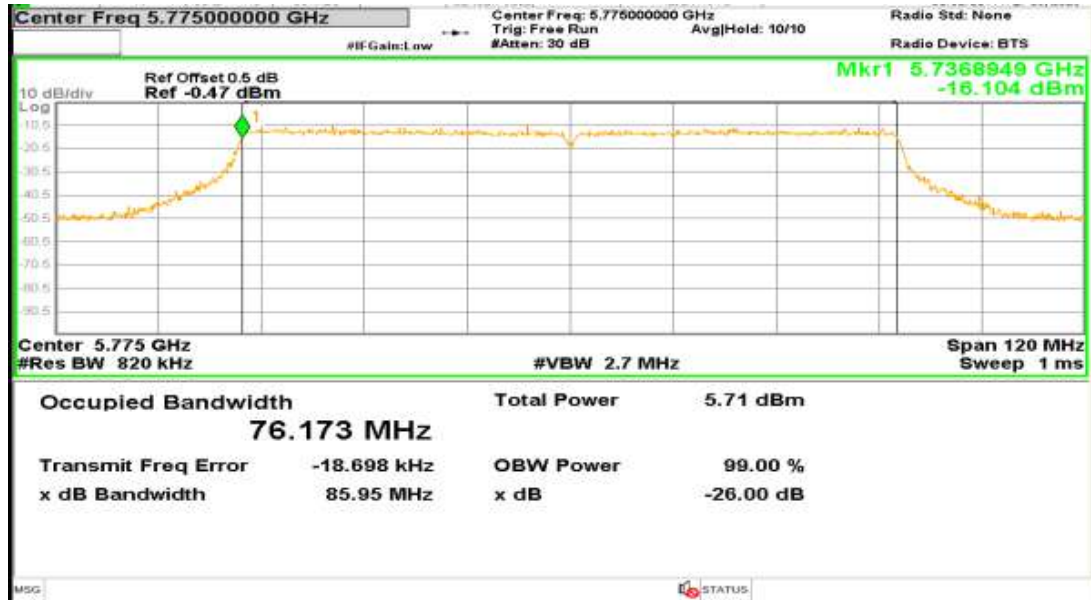


Channel:159



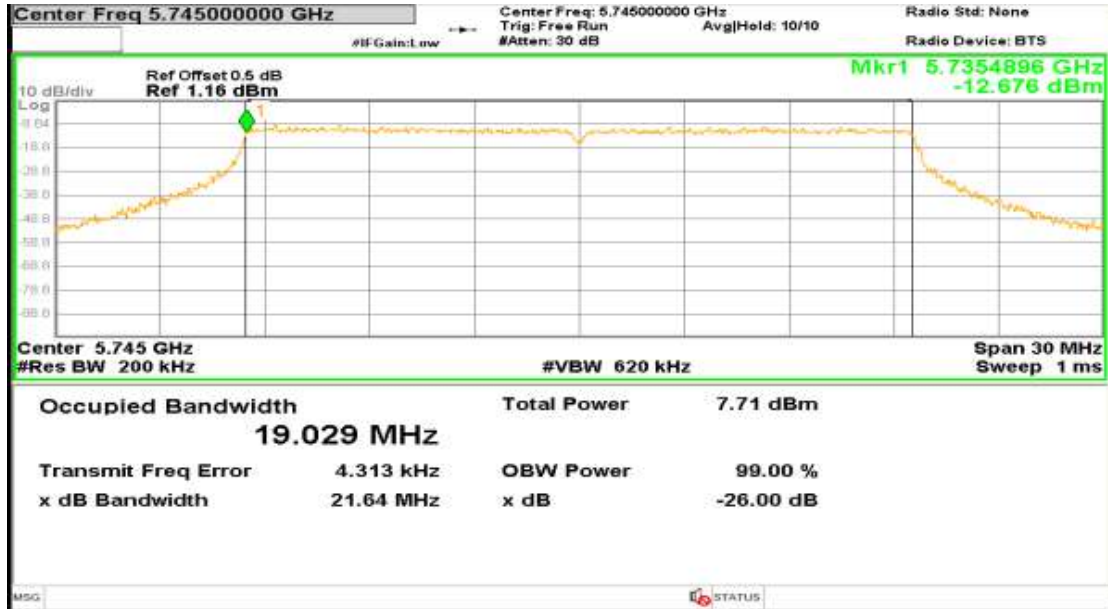
99% OBW 802.11ac80

Channel:155

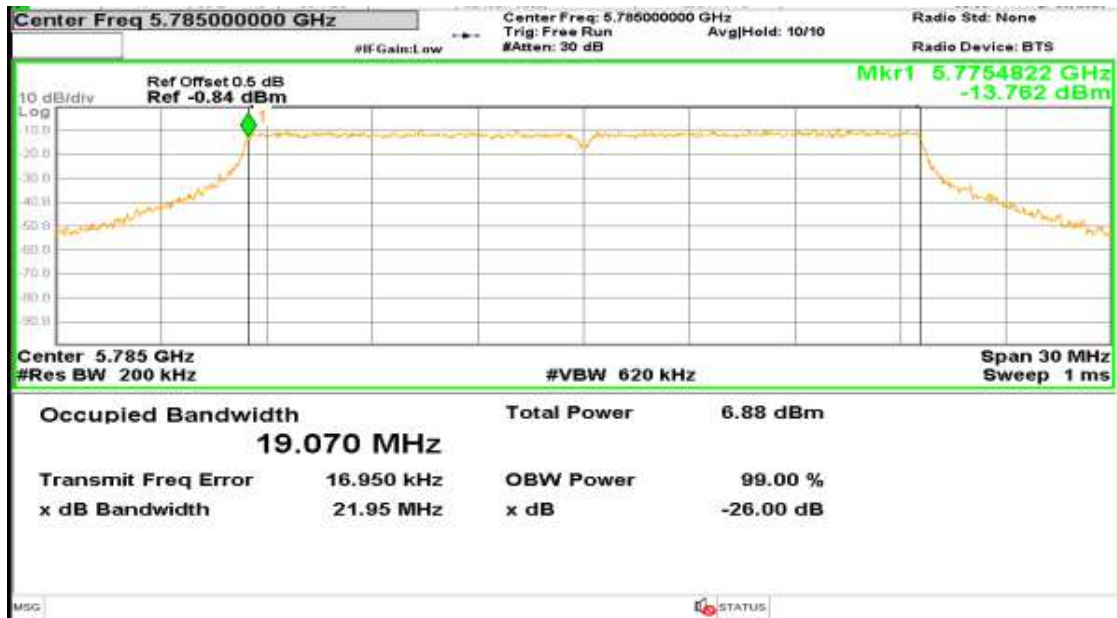


99% OBW 802.11ax20

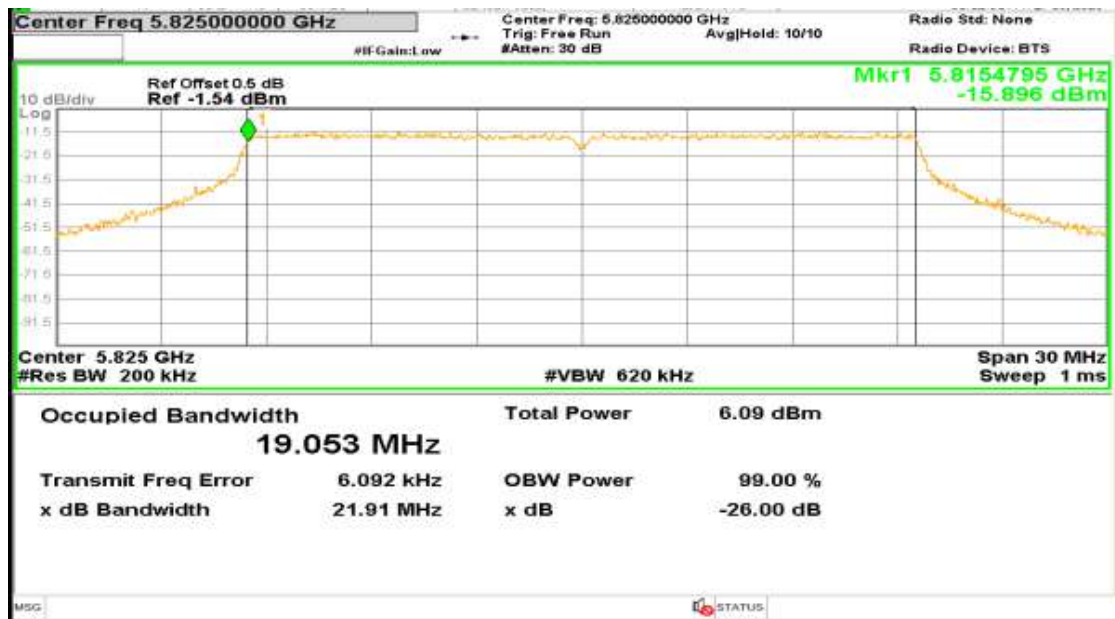
Channel:149



Channel: 157

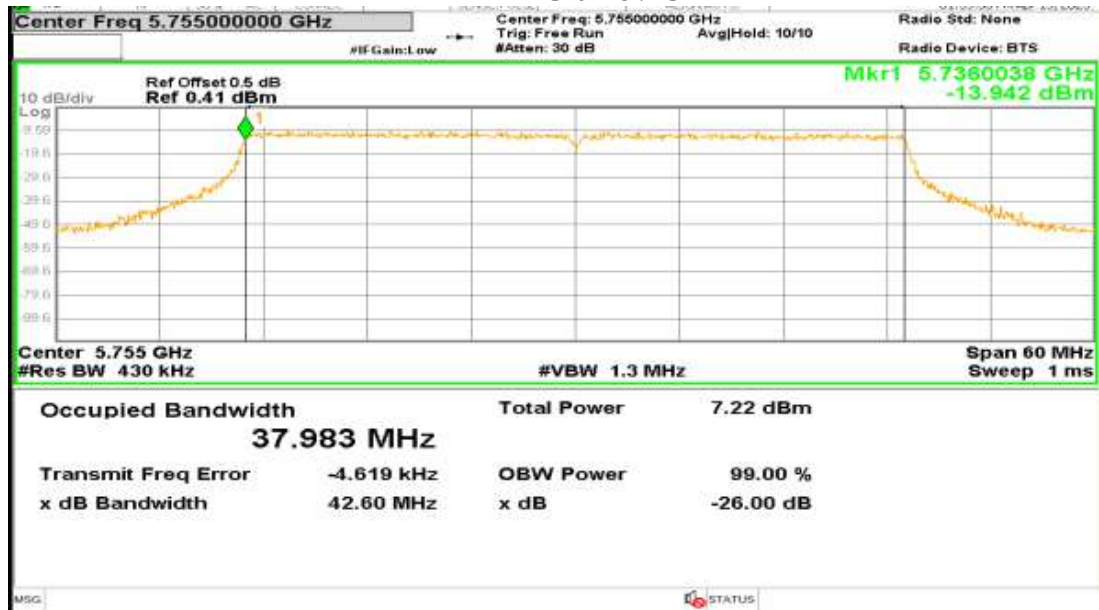


Channel: 165

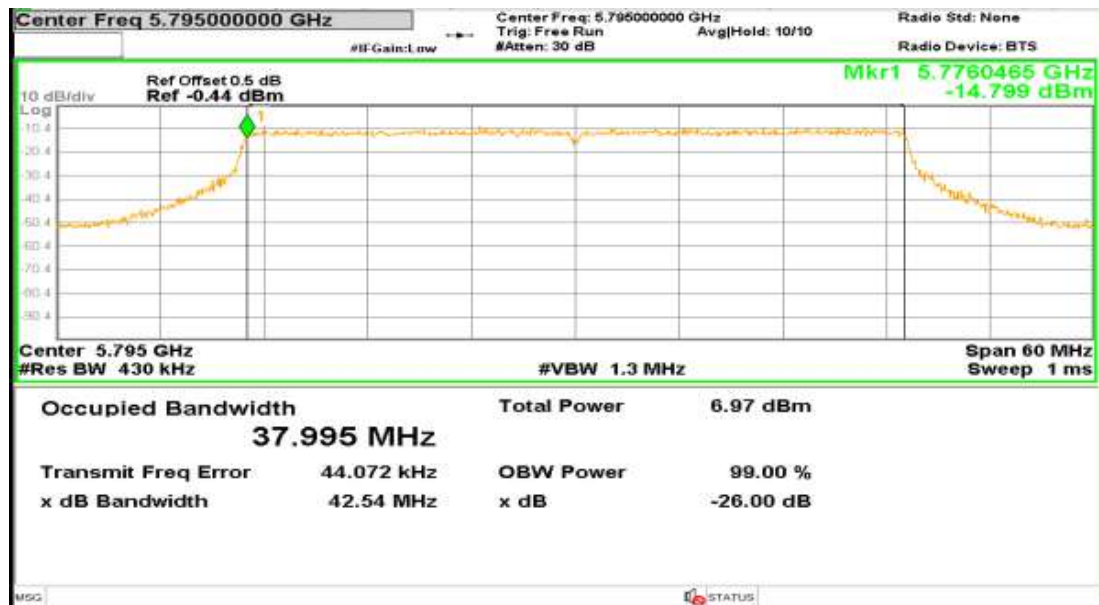


99% OBW 802.11ax40

Channel: 151

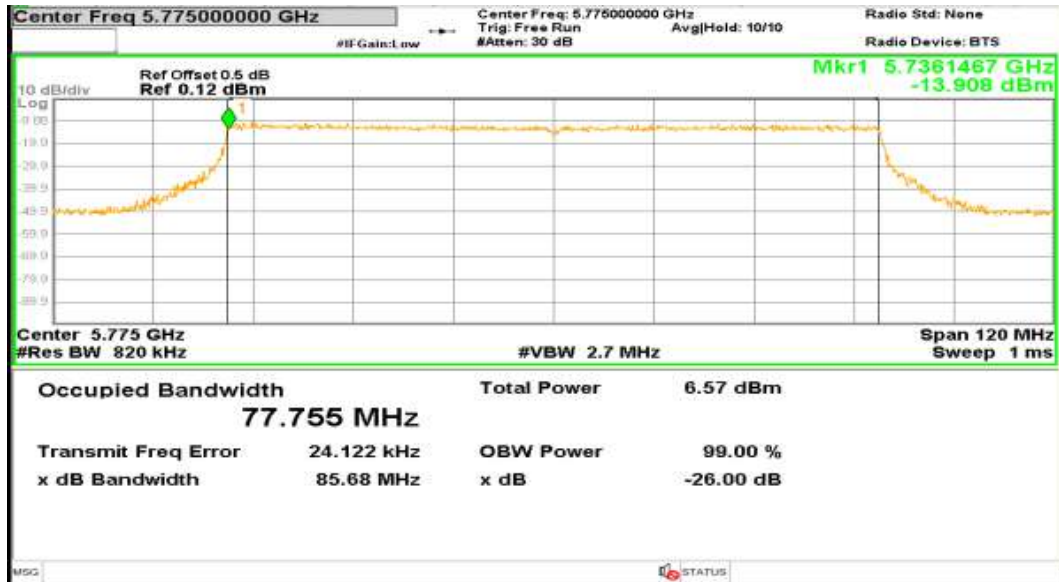


Channel: 159

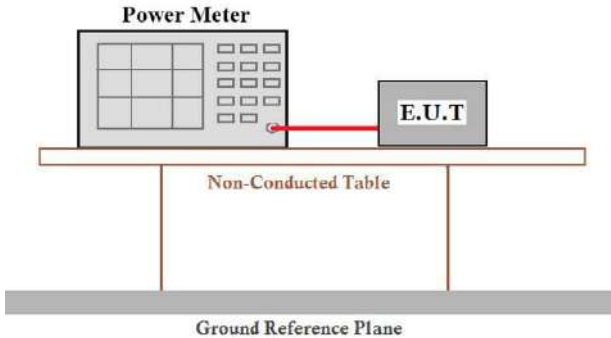


99% OBW 802.11ax80

Channel: 155



6. MAXIMUM CONDUCTED OUTPUT POWER

Test Requirement:	FCC Part15 E Section 15.407
Test Method:	KDB 789033 D02 General UNII Test Procedures New Rules v02r01
Limit:	For the band 5.15-5.25 GHz, the maximum conducted output power over the frequency bands of operation shall not exceed 1W. For the band 5.745-5.850 GHz, the maximum conducted output power over the frequency bands of operation shall not exceed 30dBm
Test setup:	
Test procedure:	Measurement using an RF average power meter (i) Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied a) The EUT is configured to transmit continuously or to transmit with a constant duty cycle. b) At all times when the EUT is transmitting, it must be transmitting at its maximum power control level. c) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five. (ii) If the transmitter does not transmit continuously, measure the duty cycle, x, of the transmitter output signal as described in section B). (iii) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter. (iv) Adjust the measurement in dBm by adding $10 \log(1/x)$ where x is the duty cycle (e.g., $10 \log(1/0.25)$ if the duty cycle is 25 percent).
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.3 for details

6.1. TEST RESULT

CH. No.	Frequency (MHz)	Output Power (dBm)				Limit(dBm)	Result
		802.11a	802.11n (HT20)	802.11ac (VHT20)	802.11ax (HE20)		
36	5180.00	11.27	11.18	11.63	11.34	30	Pass
44	5220.00	11.19	11.04	11.82	11.10	30	Pass
48	5240.00	12.89	11.17	11.21	11.39	30	Pass
149	5745.00	12.97	11.48	11.65	11.55	30	Pass
157	5785.00	12.01	12.02	11.32	11.18	30	Pass
165	5825.00	11.94	11.54	11.55	11.92	30	Pass

CH. No.	Frequency (MHz)	Output Power (dBm)			Limit(dBm)	Result
		802.11n (HT40)	802.11ac (VHT40)	802.11ax (HE40)		
38	5190.00	11.88	11.95	11.93	30	Pass
46	5230.00	11.24	11.16	12.19	30	Pass
151	5755.00	11.47	11.52	11.61	30	Pass
159	5795.00	11.82	11.75	10.92	30	Pass

CH. No.	Frequency (MHz)	Output Power (dBm)		Limit(dBm)	Result
		802.11ac(VHT80)	802.11ax(HE80)		
42	5210.00	10.29	11.16	30	Pass
155	5775.00	10.12	10.47	30	Pass

7. Band Edges Measurement

Test Requirement:	FCC Part15 E Section 15.407 and 5.205
Test Method:	ANSI C63.10:2013
Limit:	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 solely in the 5.725–5.850 GHz band: (i) 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 Transmitter output of EUT was connected to the spectrum analyzer. Equipment mode: Spectrum analyzer Detector function: Peak mode SPAN: 100MHz RBW: 1 MHz VBW: 1 MHz Sweep time= Auto. b. Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed. c. Find the next peak frequency outside the operation frequency band.
Test setup:	
Test results:	Pass

Remark:

7.1. TEST RESULT

802.11a (5.15GHz-5.25GHz) The Low Channel 36: 5180MHz



802.11a (5.15GHz-5.25GHz) The High Channel 48: 5240MHz



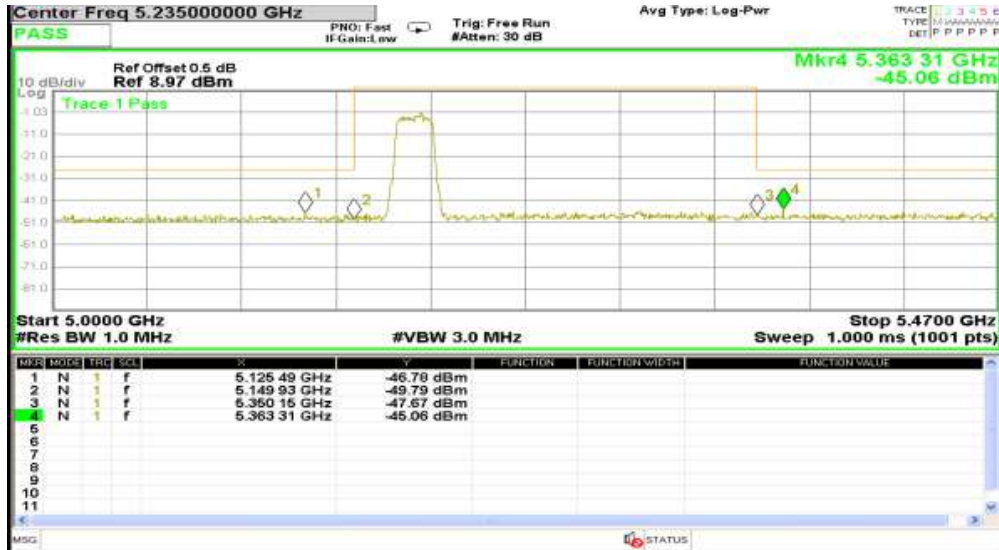
802.11a (5.725GHz-5.85GHz)
The Low Channel 149: 5745MHz



802.11a (5.725GHz-5.85GHz)
The High Channel 165: 5825MHz



802.11n(20M) (5.15GHz-5.25GHz)
The Lowest Channel 36: 5180MHz



802.11n(20M) (5.15GHz-5.25GHz)
The High Channel 48: 5240MHz



802.11n (20M) (5.725GHz-5.85GHz)

The Low Channel 149: 5745MHz



802.11n(20M) (5.725GHz-5.85GHz)

The High Channel 165: 5825MHz



802.11ac (20M) (5.15GHz-5.25GHz)
The Lowest Channel 36: 5180MHz



802.11ac(20M) (5.15GHz-5.25GHz)
The High Channel 48: 5240MHz



802.11ac(20M) (5.725GHz-5.85GHz)

The Low Channel 149: 5745MHz

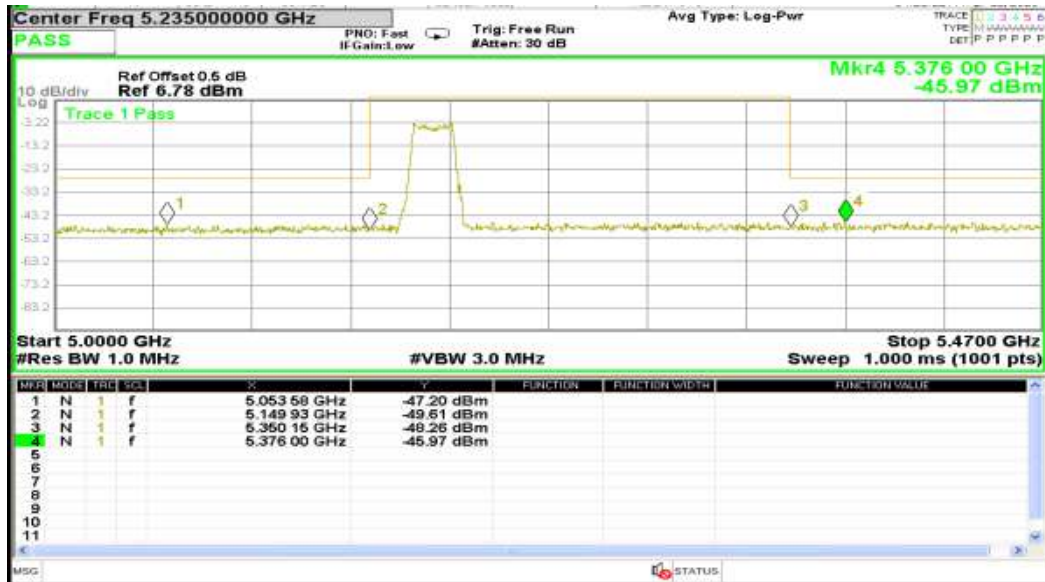


802.11ac(20M) (5.725GHz-5.85GHz)

The High Channel 165: 5825MHz



802.11ax (20M) (5.15GHz-5.25GHz)
The Lowest Channel 36: 5180MHz



802.11ax (20M) (5.15GHz-5.25GHz)
The High Channel 48: 5240MHz



802.11ax (20M) (5.725GHz-5.85GHz)

The Low Channel 149: 5745MHz



802.11ax (20M) (5.725GHz-5.85GHz)

The High Channel 165: 5825MHz



802.11n (40M) (5.15GHz-5.25GHz)
The Lowest Channel 38: 5190MHz



802.11n(40M) (5.15GHz-5.25GHz)
The High Channel 46: 5230MHz



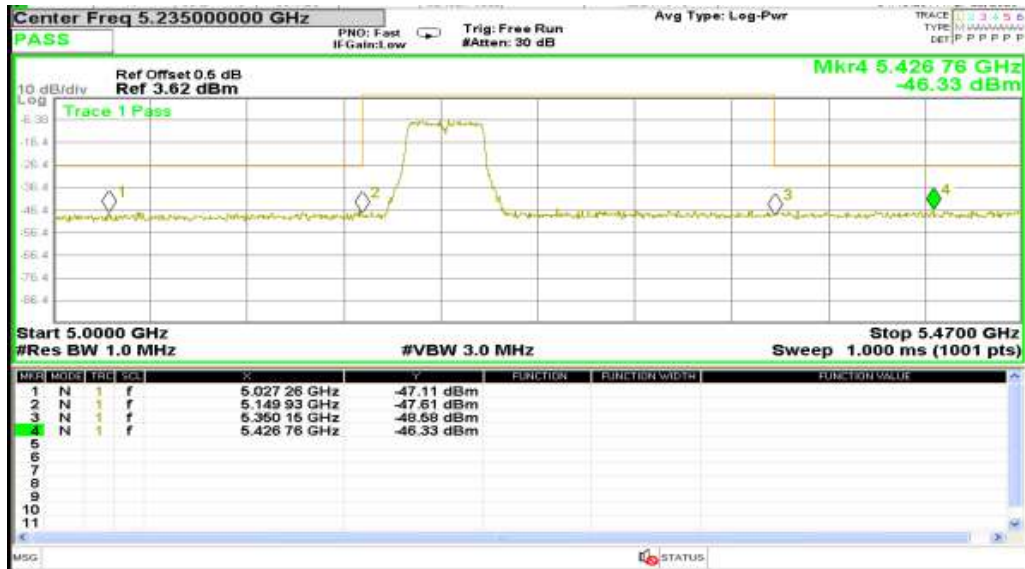
802.11n (40M) (5.725GHz-5.85GHz)
The Lowest Channel 151: 5755MHz



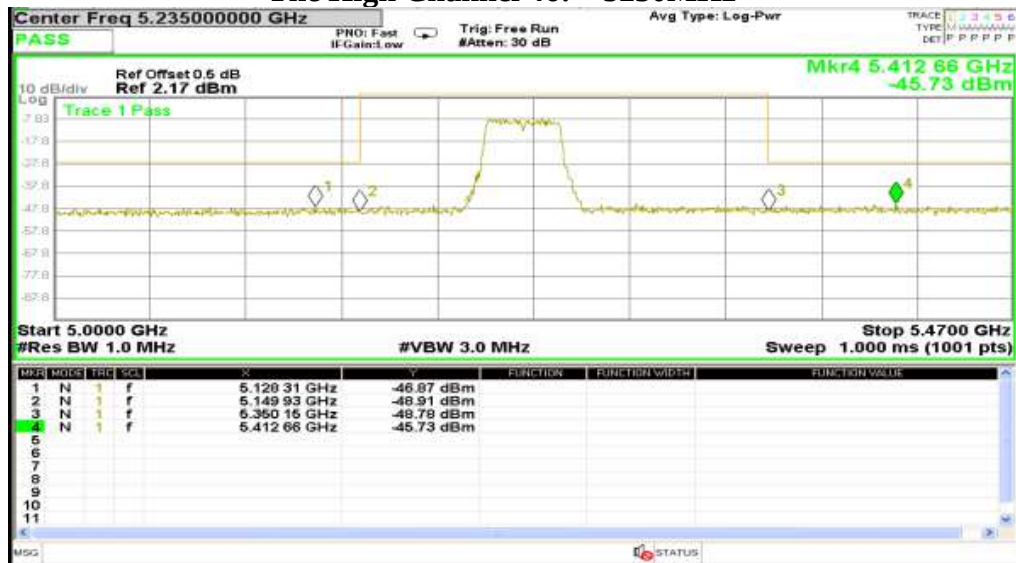
802.11n(40M) (5.725GHz-5.85GHz)
The High Channel 159: 5795MHz



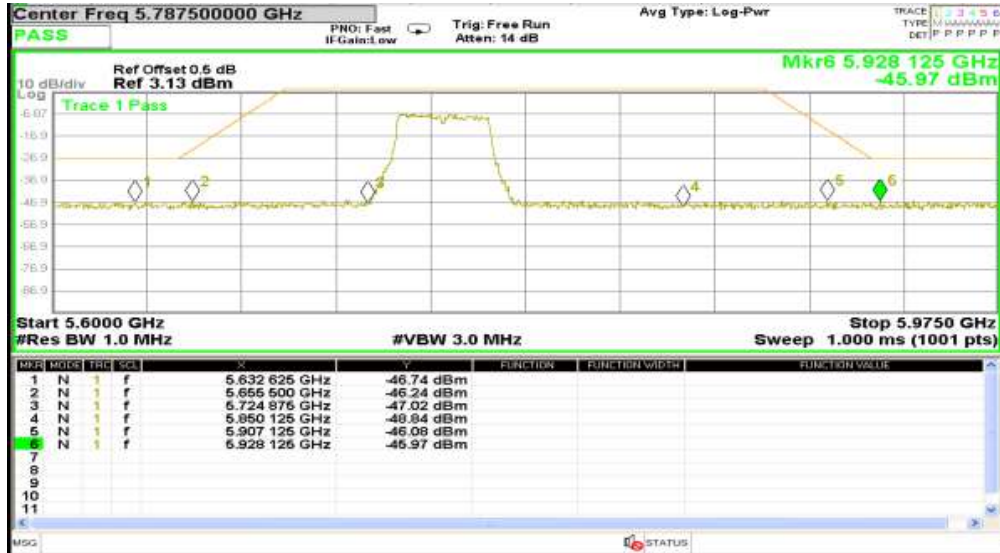
802.11ac(40M) (5.15GHz-5.25GHz)
The Lowest Channel 38: 5190MHz



802.11ac(40M) (5.15GHz-5.25GHz)
The High Channel 46: 5230MHz



802.11ac(40M) (5.725GHz-5.85GHz)
The Lowest Channel 151: 5755MHz



802.11ac(40M) (5.725GHz-5.85GHz)
The High Channel 159: 5795MHz



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802.11ax(40M) (5.15GHz-5.25GHz)
The Lowest Channel 38: 5190MHz



802.11ax(40M) (5.15GHz-5.25GHz)
The High Channel 46: 5230MHz



802.11ax (40M) (5.725GHz-5.85GHz)

The Lowest Channel 151: 5755MHz

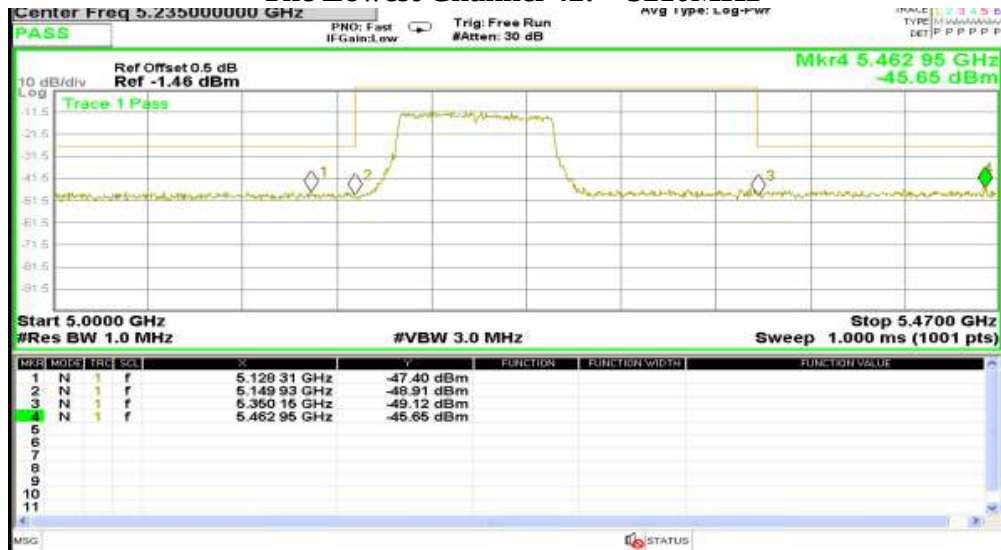


802.11ax(40M) (5.725GHz-5.85GHz)

The High Channel 159: 5795MHz



802.11ac(80M) (5.15GHz-5.25GHz)
The Lowest Channel 42: 5210MHz



802.11ac (80M) (5.725GHz-5.85GHz)
The High Channel 155: 5775MHz



802.11ax (80M) (5.15GHz-5.25GHz)
The Lowest Channel 42: 5210MHz



802.11ax(80M) (5.725GHz-5.85GHz)

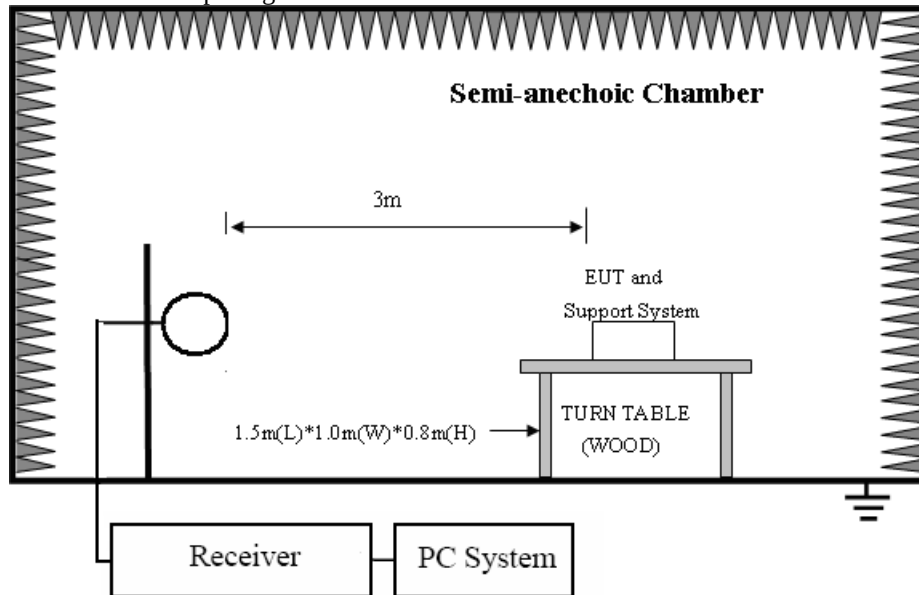
The High Channel 155: 5775MHz



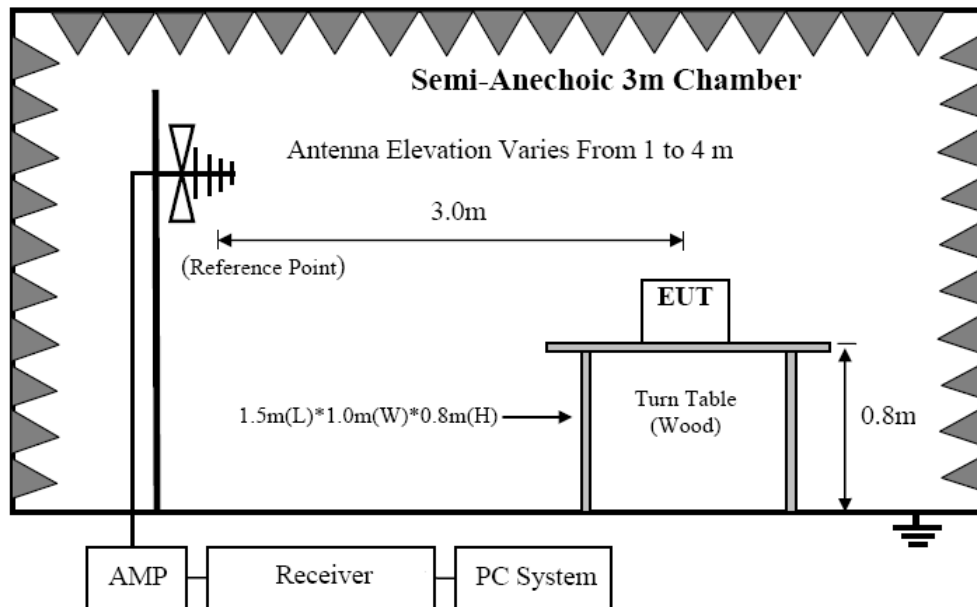
8. RADIATED EMISSION MEASUREMENT

8.1. Block diagram of test setup

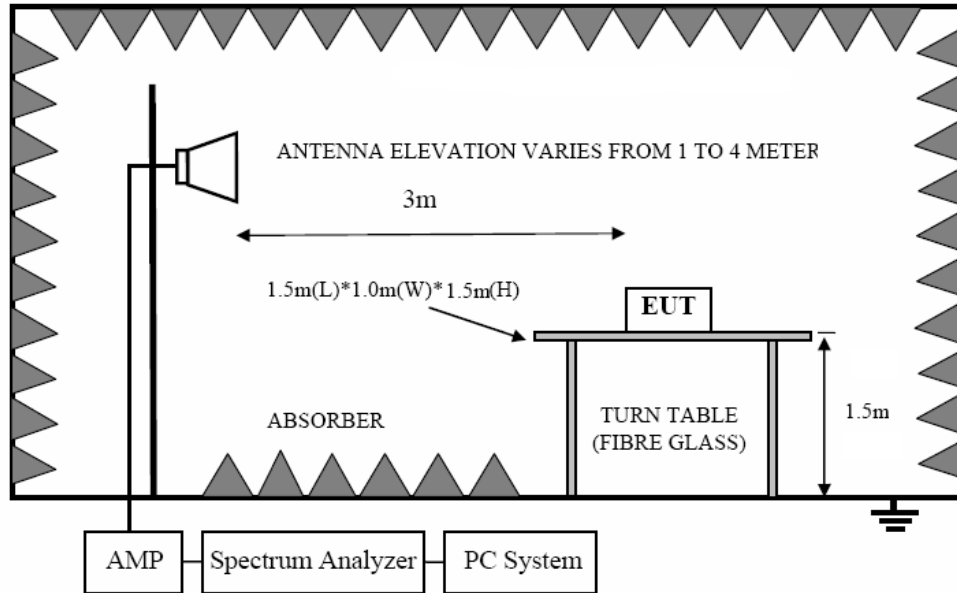
In 3m Anechoic Chamber Test Setup Diagram for 9KHz-30MHz



In 3m Anechoic Chamber Test Setup Diagram for 30MHz-1GHz



In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz



Note: For harmonic emissions test a appropriate high pass filter was inserted in the input port of AMP.

8.2. Limit

8.2.1 FCC 15.205 Restricted frequency band

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)

8.2.2. FCC 15.209 Limit.

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
0.009 ~ 0.490	300	2400/F(KHz)	67.6-20log(F)
0.490 ~ 1.705	30	24000/F(KHz)	87.6-20log(F)
1.705 ~ 30.0	30	30	29.54
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

Note: (1) The emission limits shown in the above table are based on measurements employing a CISPR QP detector except for the frequency bands 9-90KHz, 110-490KHz and above 1000MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

(2) At frequencies below 30MHz, measurement may be performed at a distance closer then that specified, and the limit at closer measurement distance can be extrapolated by below formula:

$$\text{Limit}_{3m}(\text{dBuV/m}) = \text{Limit}_{30m}(\text{dBuV/m}) + 40\text{Log}(30m/3m)$$

8.2.3. Limit for this EUT

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be comply with 15.209 limits.

8.3. Test Procedure

- (1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber.
- (2) Setup EUT and assistant system according clause 2.4 and 7.2
- (3) Test antenna was located 3m(except 18GHz-40GHz was 1m) from the EUT on an adjustable mast, and the antenna used as below table.

Test frequency range	Test antenna used
9KHz-30MHz	Active Loop antenna
30MHz-1GHz	Bilog Broadband Antenna
1GHz-18GHz	Double Ridged Horn Antenna(1GHz-18GHz)
18GHz-40GHz	Horn Antenna(18GHz-40GHz)

According ANSI C63.10:2013 clause 6.4.4.2 and 6.5.3, for measurements below 30 MHz, the loop antenna was positioned with its plane vertical from the EUT and rotated about its vertical axis for maximum response at each azimuth position around the EUT. And the loop antenna also be positioned with its plane horizontal at the specified distance from the EUT. The center of the loop is 1 m above the ground. for measurement above 30MHz, the Trilog Broadband Antenna or Horn Antenna was located 3m from EUT, Measurements were made with the antenna positioned in both the horizontal and vertical planes of Polarization, and the measurement antenna was varied from 1 m to 4 m. in height above the reference ground plane to obtain the maximum signal strength.

- (4) Below pre-scan procedure was first performed in order to find prominent frequency spectrum radiated emissions from 9KHz to 40GHz:
 - (a) Scanning the peak frequency spectrum with the antenna specified in step (3), and the EUT was rotated 360 degree, the antenna height was varied from 1m to 4m(Except loop antenna, it's fixed 1m above ground.)
 - (b) Change work frequency or channel of device if practicable.
 - (c) Change modulation type of device if practicable.
 - (d) new battery is used during testing
 - (e) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions.

Spectrum frequency from 9KHz to 40GHz (tenth harmonic of fundamental frequency) was investigated, and no any obvious emission were detected from 18GHz to 25GHz, so below final test was performed with frequency range from 9KHz to 40GHz.

- (5) For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10 2013 on Radiated Emission test.
- (6) The emissions from 9KHz to 1GHz were measured based on CISPR QP detector except for the frequency bands 9-90KHz, 110-490KHz, for emissions from 9KHz-90KHz, 110KHz-490KHz and above 1GHz were measured based on average detector, for emissions above 1GHz, peak emissions also be measured and need comply with Peak limit.
- (7) The emissions from 9KHz to 1GHz, QP or average values were measured with EMI receiver with below RBW

Frequency band	RBW
9KHz-150KHz	200Hz
150KHz-30MHz	9KHz
30MHz-1GHz	120KHz

- (8) For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure; RBW is set at 1MHz, VBW is set at 10Hz for Average measure (according ANSI C63.10:2013 clause 4.2.3.2.3 procedure for average measure). Peak detector is used for Peak and AV measurement both.

According to KDB 789033 v02r01 section G) 1) (d), for For measurements above 1000 MHz @ 3m distance, the limit of field strength is computed as follows:

$$E[\text{dBuV/m}] = \text{EIRP}[\text{dBm}] + 95.2;$$

For example, if EIRP = -27dBm

$$E[\text{dBuV/m}] = -27 + 95.2 = 68.2\text{dBuV/m}.$$

8.4. Test result(Below 30MHz)

EUT:	IO 5 GHz 1000 Mbps UBR with Integrated Antenna (23 dBi) with dying gasp feature	Model Name. :	ion4x12_d
Temperature:	24.7°C	Relative Humidity:	53%
Distance:	3m	Test Power:	AC 110V/60Hz
Polarization:	--	Test Result:	Pass
Test Mode:	Keeping TX mode	Test By:	Ankur

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	P
--	--	--	--	P

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $20 \log (\text{specific distance/test distance})$ (dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.

Note: N/A

TEST RESULTS (Between 30M – 1000 MHz)

EUT:	IO 5 GHz 1000 Mbps UBR with Integrated Antenna (23 dBi) with dying gasp feature	Model Name. :	ion4xl2_d
Temperature:	24.7°C	Relative Humidity:	53%
Distance:	3m	Test Power:	AC 110V/60Hz
Polarization:	Vertical	Test Result:	Pass
Standard:	(RE) FCC PART 15E	Test By:	Ankur
Test Mode:	Keeping TX mode		

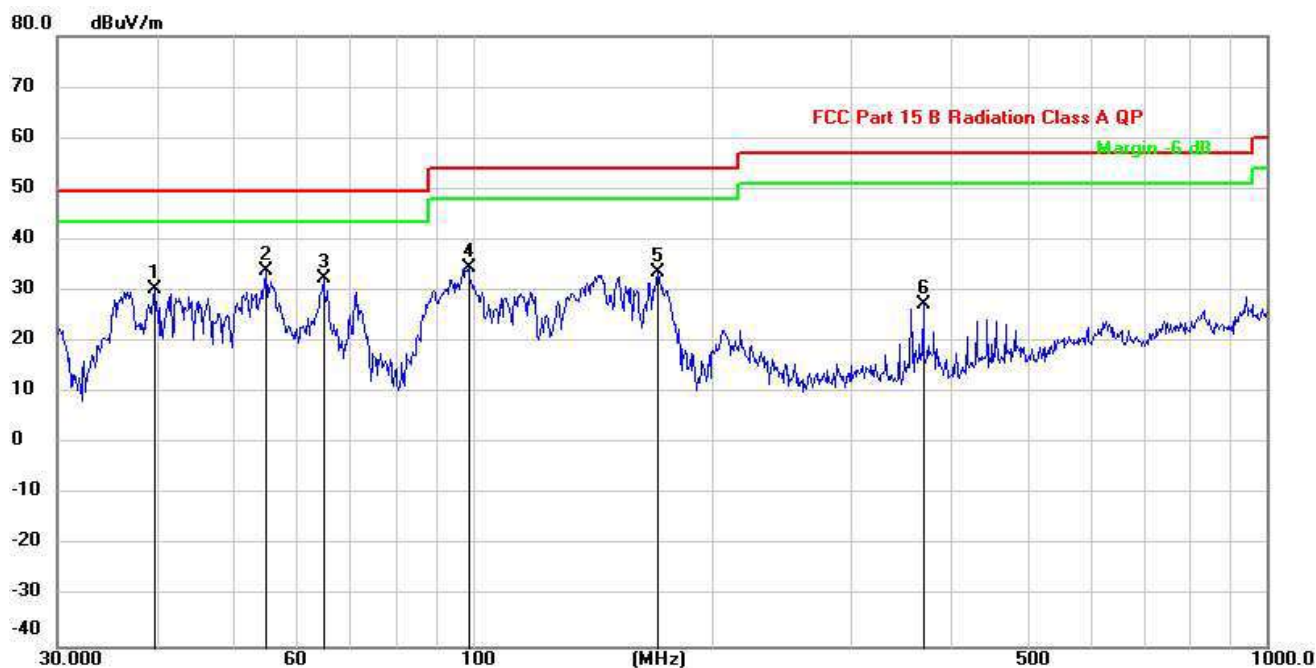


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		42.8998	42.91	-9.39	33.52	49.50	-15.98	QP
2	*	55.6094	44.87	-9.72	35.15	49.50	-14.35	QP
3		79.8003	47.03	-13.83	33.20	49.50	-16.30	QP
4		134.0882	42.30	-12.94	29.36	54.00	-24.64	QP
5		356.6758	25.62	-4.58	21.04	57.00	-35.96	QP
6		945.4399	24.84	6.02	30.86	57.00	-26.14	QP

The test result is calculated as the following:

- (1) Result = Reading + Correct Factor
- (2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
- (3) Margin = Result - Limit

EUT:	IO 5 GHz 1000 Mbps UBR with Integrated Antenna (23 dBi) with dying gasp feature	Model Name. :	ion4xl2_d
Temperature:	24.7°C	Relative Humidity:	53%
Distance:	3m	Test Power:	AC 110V/60Hz
Polarization:	Horizontal	Test Result:	Pass
Standard:	(RE)FCC PART 15E	Test By:	Ankur
Test Mode:	Keeping TX mode		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		39.7146	39.69	-9.47	30.22	49.50	-19.28	QP
2	*	55.0274	43.73	-9.68	34.05	49.50	-15.45	QP
3		64.8865	44.28	-11.88	32.40	49.50	-17.10	QP
4		98.8326	43.60	-9.15	34.45	54.00	-19.55	QP
5		170.7926	45.18	-11.67	33.51	54.00	-20.49	QP
6		369.4047	31.44	-4.21	27.23	57.00	-29.77	QP

The test result is calculated as the following:

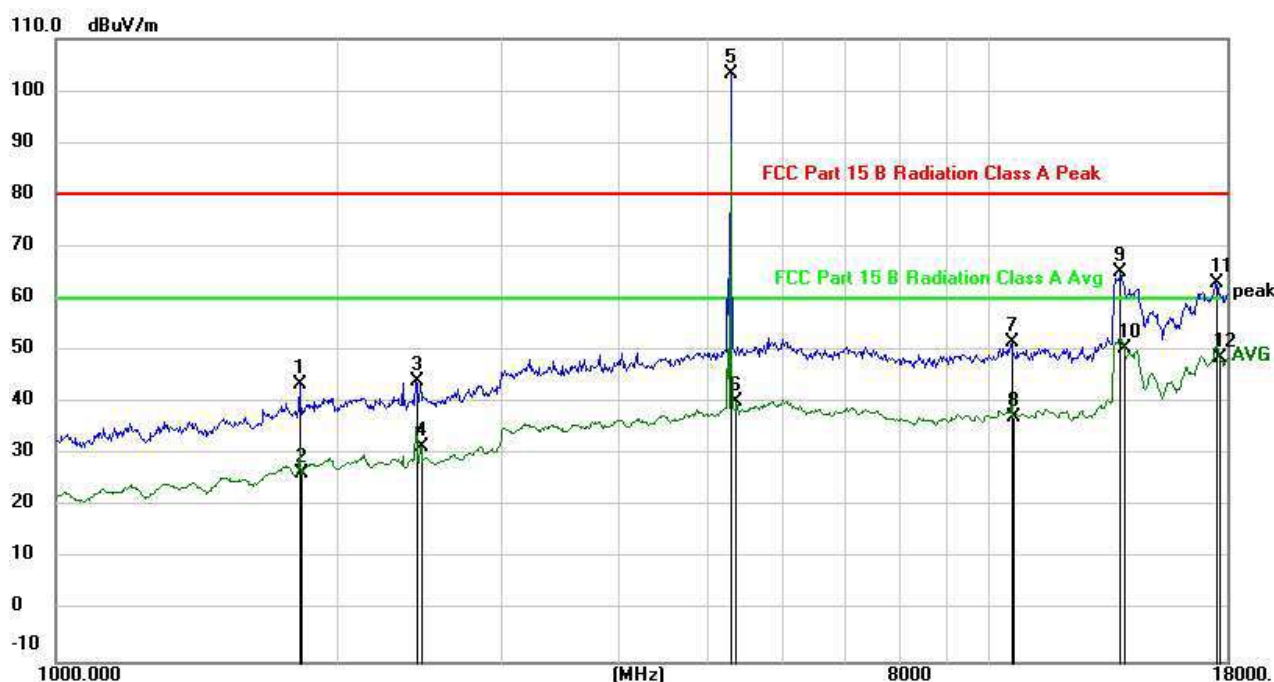
(4) Result = Reading + Correct Factor

(5) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator

(6) Margin = Result - Limit

TEST RESULTS (Between 1000M – 40000 MHz)

EUT:	IO 5 GHz 1000 Mbps UBR with Integrated Antenna (23 dBi) with dying gasp feature	Model Name. :	ion4xl2_d
Temperature:	24.7°C	Relative Humidity:	53%
Distance:	3m	Test Power:	AC 110V/60Hz
Polarization:	Vertical	Test Result:	Pass
Standard:	(RE)FCC PART 15E	Test By:	Ankur
Test Mode:	Keeping TX mode		

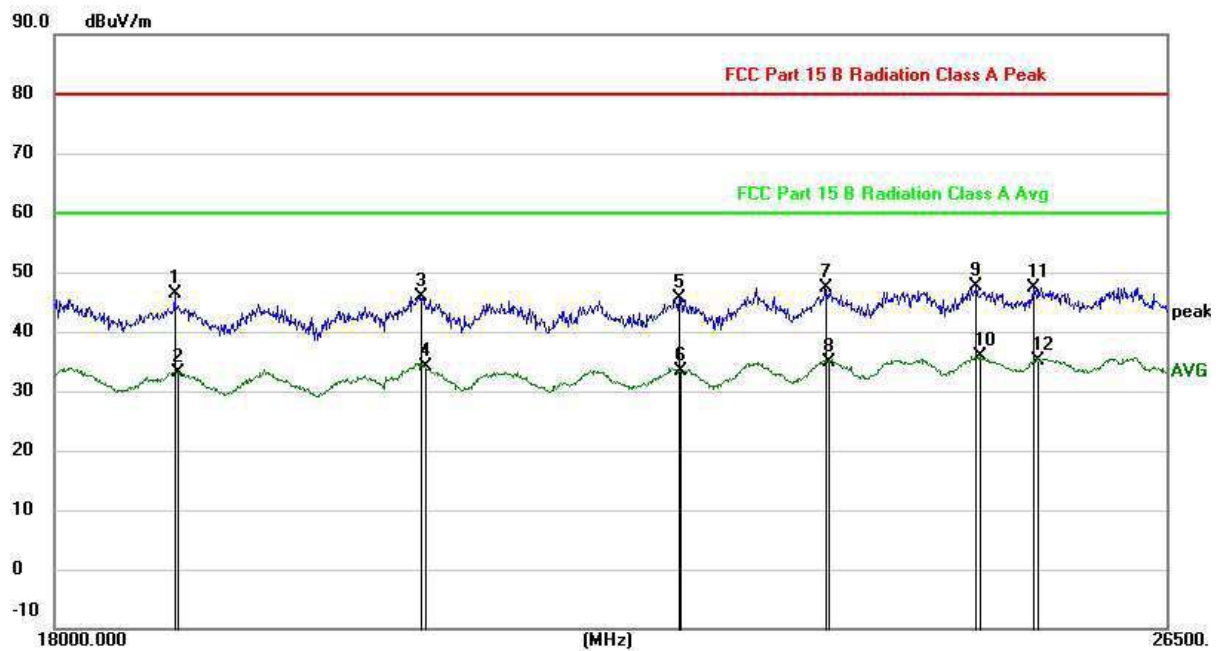


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		1824.302	38.92	4.50	43.42	80.00	-36.58	peak
2		1834.878	21.89	4.56	26.45	60.00	-33.55	AVG
3		2428.671	38.31	5.96	44.27	80.00	-35.73	peak
4		2456.913	25.44	6.00	31.44	60.00	-28.56	AVG
5	*	5284.902	91.04	12.07	103.11	80.00	23.11	peak
6		5361.833	28.05	12.20	40.25	60.00	-19.75	AVG
7		10575.53	38.78	12.73	51.51	80.00	-28.49	peak
8		10606.14	24.62	12.72	37.34	60.00	-22.66	AVG
9		13837.02	49.82	15.47	65.29	80.00	-14.71	peak
10		13957.52	34.90	15.57	50.47	60.00	-9.53	AVG
11		17487.18	47.67	15.37	63.04	80.00	-16.96	peak
12		17690.53	33.30	15.25	48.55	60.00	-11.45	AVG

Note: Marker 5 is the intentional frequency from EUT, Hence considered as pass.

The test result is calculated as the following:

- (1) Result = Reading + Correct Factor
- (2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
- (3) Margin = Result - Limit



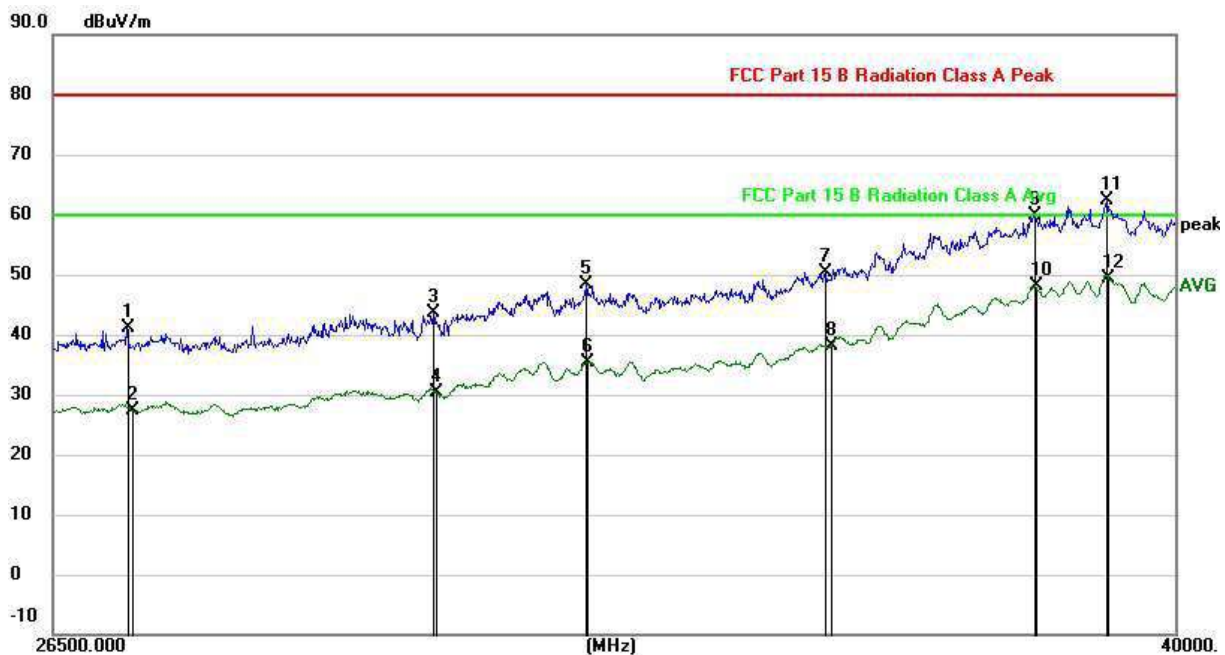
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		18767.81	46.48	-0.16	46.32	80.00	-33.68	peak
2		18782.33	33.23	-0.15	33.08	60.00	-26.92	AVG
3		20442.58	45.58	0.39	45.97	80.00	-34.03	peak
4		20474.23	33.74	0.40	34.14	60.00	-25.86	AVG
5		22370.38	44.52	1.14	45.66	80.00	-34.34	peak
6		22379.04	32.21	1.15	33.36	60.00	-26.64	AVG
7		23533.04	45.84	1.65	47.49	80.00	-32.51	peak
8		23551.25	33.16	1.65	34.81	60.00	-25.19	AVG
9		24804.04	45.58	2.02	47.60	80.00	-32.40	peak
10	*	24832.83	33.74	2.03	35.77	60.00	-24.23	AVG
11		25298.16	45.33	2.14	47.47	80.00	-32.53	peak
12		25327.53	32.93	2.15	35.08	60.00	-24.92	AVG

The test result is calculated as the following:

(1) Result = Reading + Correct Factor

(2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator

Margin = Result - Limit



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		27229.99	40.51	0.52	41.03	80.00	-38.97	peak
2		27286.11	26.76	0.54	27.30	60.00	-32.70	AVG
3		30469.39	42.22	1.37	43.59	80.00	-36.41	peak
4		30507.05	28.96	1.37	30.33	60.00	-29.67	AVG
5		32224.23	46.76	1.68	48.44	80.00	-31.56	peak
6		32237.50	33.66	1.68	35.34	60.00	-24.66	AVG
7		35192.39	48.30	2.15	50.45	80.00	-29.55	peak
8		35250.40	35.91	2.15	38.06	60.00	-21.94	AVG
9		37977.76	57.24	2.64	59.88	80.00	-20.12	peak
10		37993.40	45.40	2.64	48.04	60.00	-11.96	AVG
11		39007.87	59.61	2.79	62.40	80.00	-17.60	peak
12	*	39040.01	46.67	2.80	49.47	60.00	-10.53	AVG

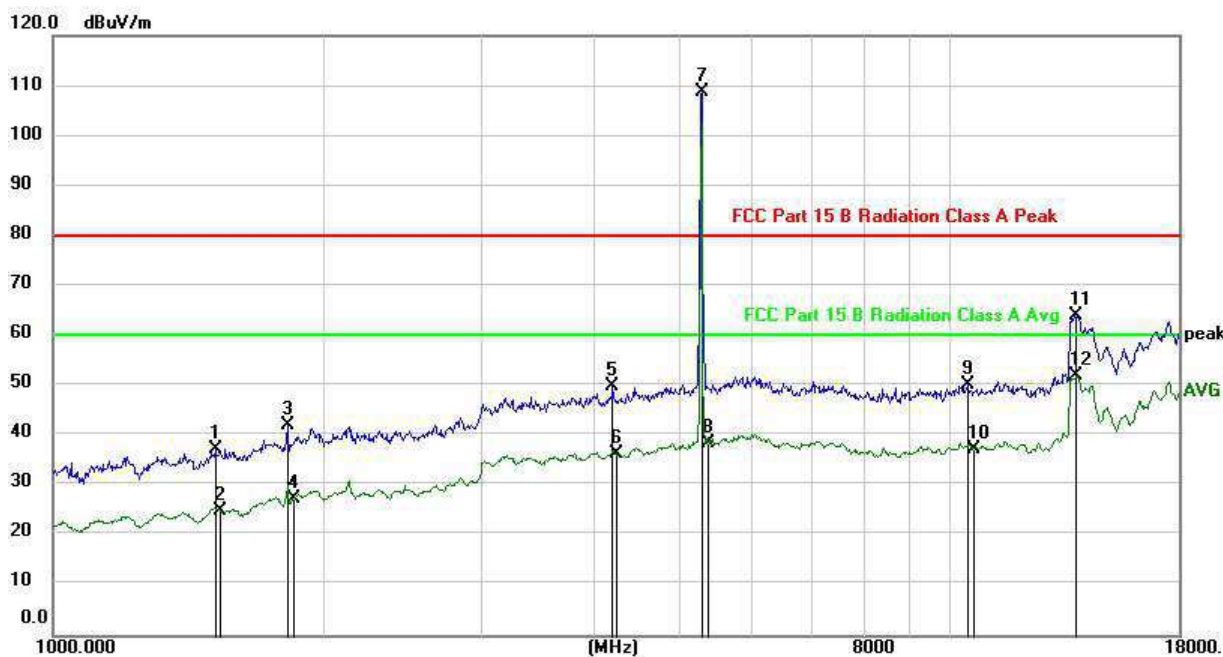
The test result is calculated as the following:

(1) Result = Reading + Correct Factor

(2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator

Margin = Result - Limit

EUT:	IO 5 GHz 1000 Mbps UBR with Integrated Antenna (23 dBi) with dying gasp feature	Model Name. :	ion4xl2_d
Temperature:	24.7°C	Relative Humidity:	53%
Distance:	3m	Test Power:	AC 110V/60Hz
Polarization:	Horizontal	Test Result:	Pass
Standard:	(RE)FCC PART 15E	Test By:	Ankur
Test Mode:	Keeping TX mode		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		1516.210	34.71	2.72	37.43	80.00	-42.57	peak
2		1533.841	22.30	2.82	25.12	60.00	-34.88	AVG
3		1824.302	37.58	4.50	42.08	80.00	-37.92	peak
4		1850.858	22.67	4.66	27.33	60.00	-32.67	AVG
5		4206.011	40.14	9.70	49.84	80.00	-30.16	peak
6		4242.641	26.61	9.78	36.39	60.00	-23.61	AVG
7	*	5284.902	96.54	12.07	108.61	80.00	28.61	peak
8		5361.834	26.41	12.20	38.61	60.00	-21.39	AVG
9		10453.97	37.42	12.72	50.14	80.00	-29.86	peak
10		10606.14	24.73	12.72	37.45	60.00	-22.55	AVG
11		13757.26	48.53	15.41	63.94	80.00	-16.06	peak
12		13837.02	36.71	15.47	52.18	60.00	-7.82	AVG

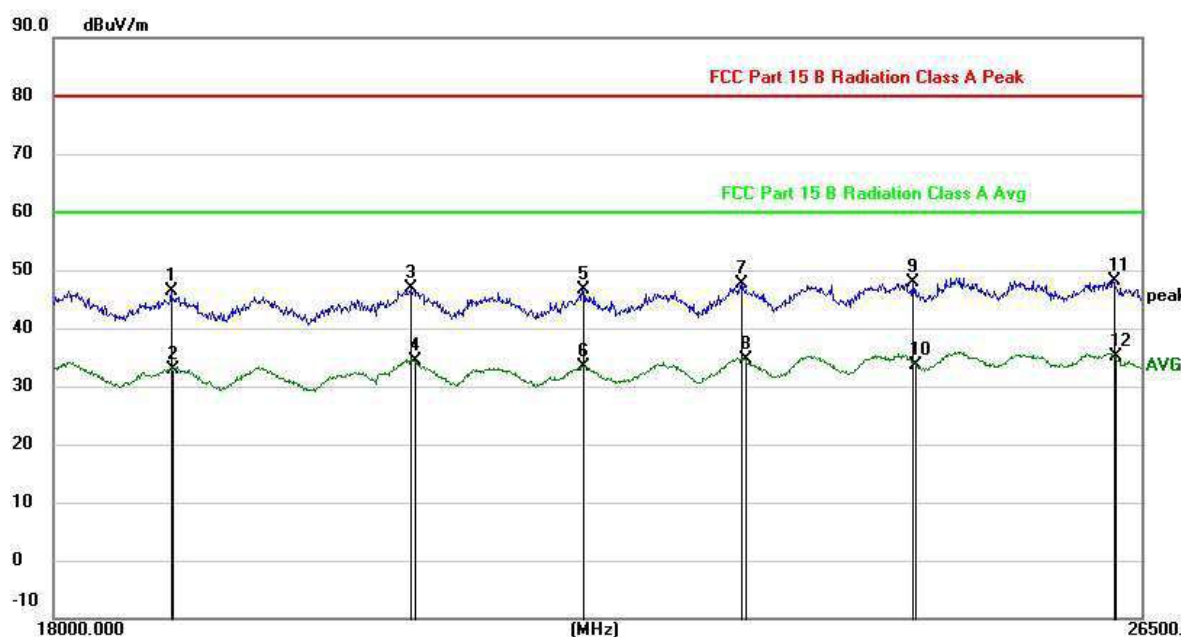
Note: Marker 7 is intentionally radiated frequency from the EUT.

The test result is calculated as the following:

(3) Result = Reading + Correct Factor

(4) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator

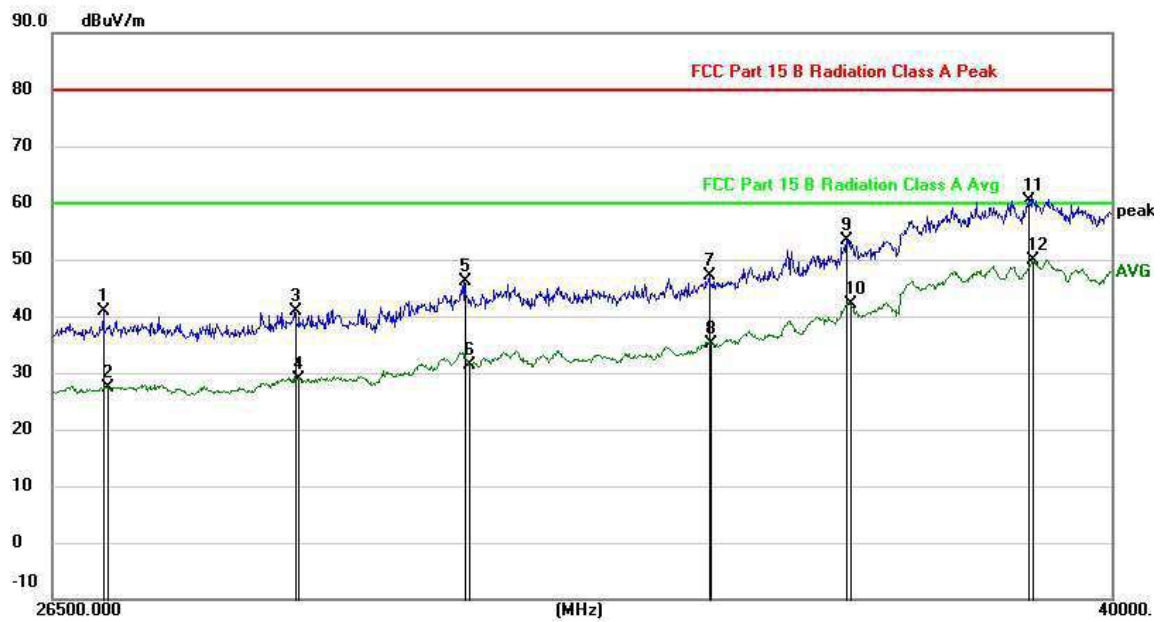
(5) Margin = Result – Limit



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		18767.81	46.48	-0.16	46.32	80.00	-33.68	peak
2		18775.07	33.08	-0.15	32.93	60.00	-27.07	AVG
3		20434.67	46.38	0.39	46.77	80.00	-33.23	peak
4		20466.31	33.89	0.40	34.29	60.00	-25.71	AVG
5		21722.38	45.85	0.81	46.66	80.00	-33.34	peak
6		21722.38	32.50	0.81	33.31	60.00	-26.69	AVG
7		22993.21	46.06	1.54	47.60	80.00	-32.40	peak
8		23019.90	33.02	1.54	34.56	60.00	-25.44	AVG
9		24432.70	45.99	1.89	47.88	80.00	-32.12	peak
10		24461.06	31.73	1.89	33.62	60.00	-26.38	AVG
11		26234.84	45.90	2.34	48.24	80.00	-31.76	peak
12	*	26244.99	32.76	2.34	35.10	60.00	-24.90	AVG

The test result is calculated as the following:

- (1) Result = Reading + Correct Factor
- (2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
- (3) Margin = Result – Limit



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		27028.93	40.43	0.47	40.90	80.00	-39.10	peak
2		27062.34	26.99	0.47	27.46	60.00	-32.54	AVG
3		29120.19	39.72	1.04	40.76	80.00	-39.24	peak
4		29156.18	27.81	1.04	28.85	60.00	-31.15	AVG
5		31103.16	44.57	1.48	46.05	80.00	-33.95	peak
6		31154.43	29.95	1.49	31.44	60.00	-28.56	AVG
7		34206.65	45.18	1.99	47.17	80.00	-32.83	peak
8		34234.83	33.08	1.99	35.07	60.00	-24.93	AVG
9		36087.47	51.07	2.31	53.38	80.00	-26.62	peak
10		36146.95	39.79	2.32	42.11	60.00	-17.89	AVG
11		38735.79	57.58	2.76	60.34	80.00	-19.66	peak
12	*	38783.67	47.09	2.76	49.85	60.00	-10.15	AVG

The test result is calculated as the following:

- (1) Result = Reading + Correct Factor
- (2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
- (3) Margin = Result – Limit

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor.

Average measurement was not performed if peak level lower than average limit.

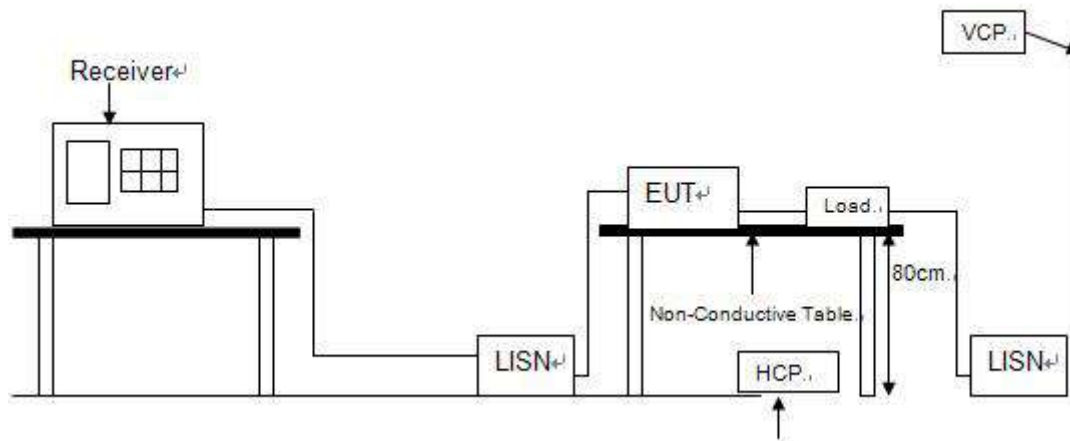
No any other emissions level very low which are attenuated less than 20dB below the limit.

According to 15.31(o), The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this Part.

Hence there no other emissions have been reported.

9. POWER LINE CONDUCTED EMISSION

9.1. Block diagram of test setup



9.2. Power Line Conducted Emission Limits

Frequency	Quasi-Peak Level dB(μ V)	Average Level dB(μ V)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Note 1: * Decreasing linearly with logarithm of frequency.

Note 2: The lower limit shall apply at the transition frequencies.

9.3. Test Procedure

The EUT and Support equipment, if needed, were put placed on a non-metallic table, 80cm above the ground plane.

Configuration EUT to simulate typical usage as described in clause 2.4 and test equipment as described in clause 10.2 of this report.

All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.

All support equipment power received from a second LISN.

Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.

The Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.

During the above scans, the emissions were maximized by cable manipulation.

The test mode(s) described in clause 2.4 were scanned during the preliminary test.

After the preliminary scan, we found the test mode producing the highest emission level.

The EUT configuration and worse cable configuration of the above highest emission levels were recorded for reference of the final test.

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.

A scan was taken on both power lines, Neutral and Line, recording at least the six highest emissions.

Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.

The test data of the worst-case condition(s) was recorded.

The bandwidth of test receiver is set at 9 KHz.

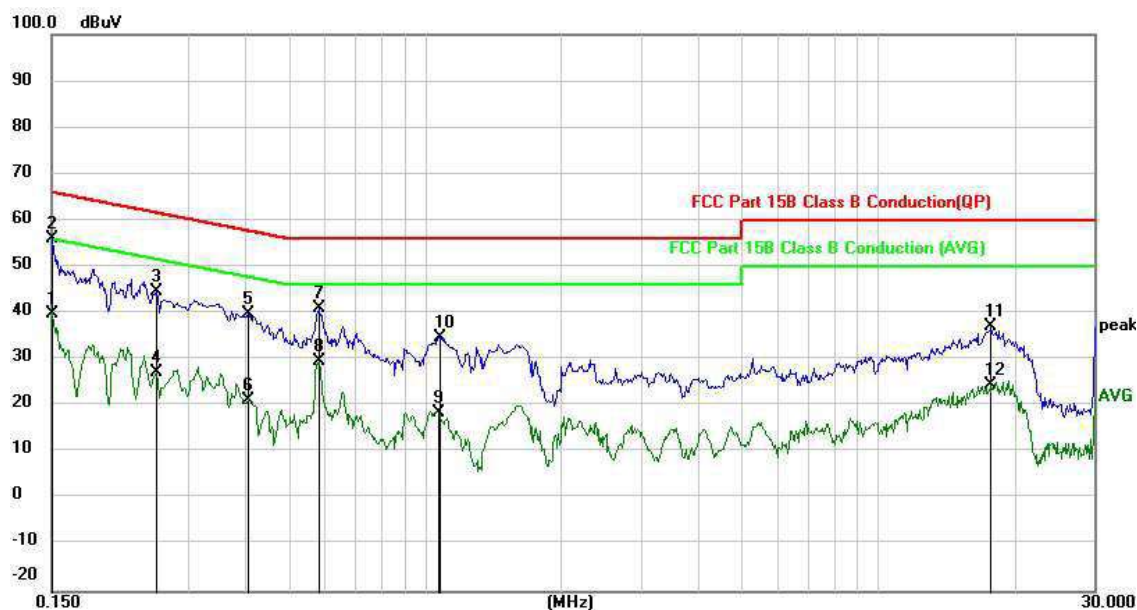
9.4. Test Result

PASS. (See below detailed test result)

Note1: All emissions not reported below are too low against the prescribed limits.

Note2: “-----” means peak detection; “-----” means average detection

EUT:	IO 5 GHz 1000 Mbps UBR with Integrated Antenna (23 dBi) with dying gasp feature	Model Name. :	ion4xl2_d
Temperature:	24.5°C	Relative Humidity:	52%
Probe:	Line	Test Power:	AC 110V/60Hz
Test Mode:	TX	Test Result:	Pass
Standard:	(CE)FCC PART 15 E_QP		

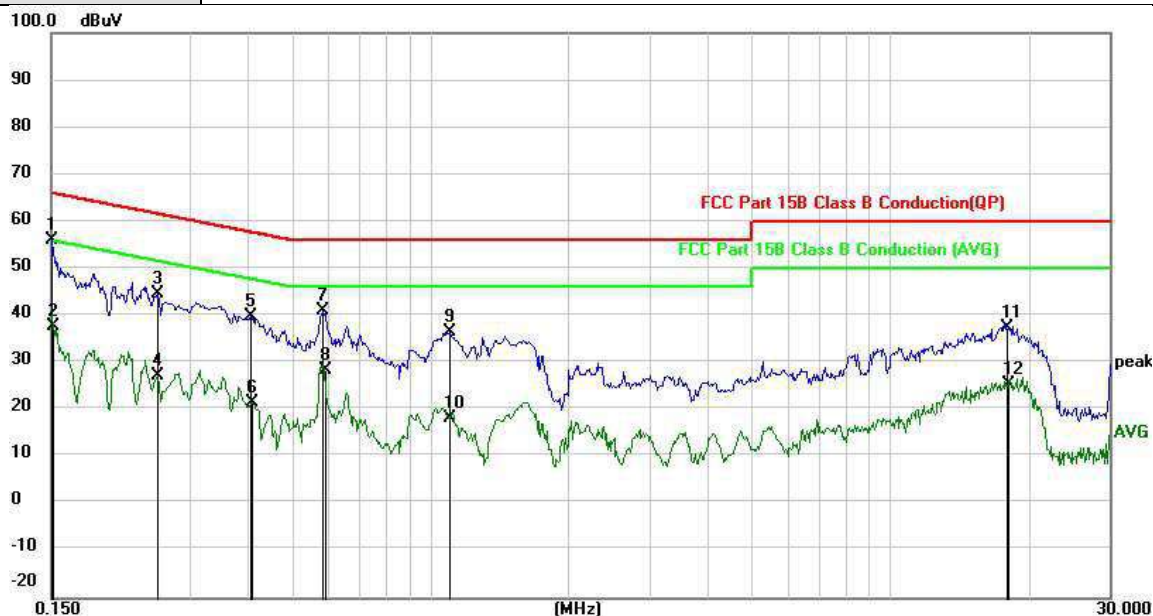


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1		0.1499	28.13	11.75	39.88	56.00	-16.12	AVG
2	*	0.1507	44.31	11.75	56.06	65.96	-9.90	QP
3		0.2560	34.42	10.19	44.61	61.56	-16.95	QP
4		0.2560	17.11	10.19	27.30	51.56	-24.26	AVG
5		0.4061	28.95	10.77	39.72	57.73	-18.01	QP
6		0.4061	10.61	10.77	21.38	47.73	-26.35	AVG
7		0.5823	30.11	10.81	40.92	56.00	-15.08	QP
8		0.5823	18.75	10.81	29.56	46.00	-16.44	AVG
9		1.0704	7.77	10.90	18.67	46.00	-27.33	AVG
10		1.0766	23.84	10.90	34.74	56.00	-21.26	QP
11		17.7545	26.06	11.07	37.13	60.00	-22.87	QP
12		17.7545	13.58	11.07	24.65	50.00	-25.35	AVG

The test result is calculated as the following:

- (1) Result = Reading + Correct Factor
- (2) Correct Factor = (LISN, ISN, PLC or Current Probe) Factor + Cable Loss +Attenuator
- (3) Margin = Result - Limit

EUT:	IO 5 GHz 1000 Mbps UBR with Integrated Antenna (23 dBi) with dying gasp feature	Model Name. :	ion4xl2_d
Temperature:	24.5°C	Relative Humidity:	52%
Probe:	Neutral	Test Power:	AC 110V/60Hz
Test Mode:	TX	Test Result:	Pass
Standard:	(CE)FCC PART 15 C_QP		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1	*	0.1507	44.31	11.75	56.06	65.96	-9.90	QP
2		0.1514	25.96	11.76	37.72	55.92	-18.20	AVG
3		0.2560	34.42	10.19	44.61	61.56	-16.95	QP
4		0.2560	17.11	10.19	27.30	51.56	-24.26	AVG
5		0.4061	28.95	10.77	39.72	57.73	-18.01	QP
6		0.4097	10.82	10.77	21.59	47.65	-26.06	AVG
7		0.5854	30.34	10.81	41.15	56.00	-14.85	QP
8		0.5897	17.67	10.81	28.48	46.00	-17.52	AVG
9		1.1000	25.54	10.90	36.44	56.00	-19.56	QP
10		1.1048	7.40	10.90	18.30	46.00	-27.70	AVG
11		17.8900	26.36	11.07	37.43	60.00	-22.57	QP
12		18.0393	14.52	11.07	25.59	50.00	-24.41	AVG

The test result is calculated as the following:

- (1) Result = Reading + Correct Factor
- (2) Correct Factor = (LISN, ISN, PLC or Current Probe) Factor + Cable Loss + Attenuator
- (3) Margin = Result - Limit

10. CONDUCTED SPURIOUS EMISSIONS

Test Requirement:

FCC Part 15 E section 15.407b

Test Limit:

- (1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (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 e.i.r.p. of -27 dBm/MHz.
- (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 e.i.r.p. of -27 dBm/MHz.
- (4) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of -27 dBm/MHz.

Test Method:

ANSI C63.10: 2013 Clause 12.7.5

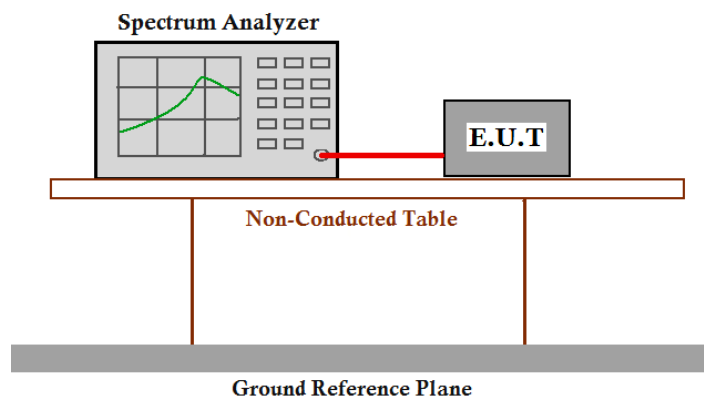
Test Status:

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.

Pre-test the EUT under 2 modes: power-supplied by using the AC adapter and power-supplied by using internal battery.

After pre-testing, we found the worst case is the test mode of EUT power-supplied by using internal battery.

Test Configuration:

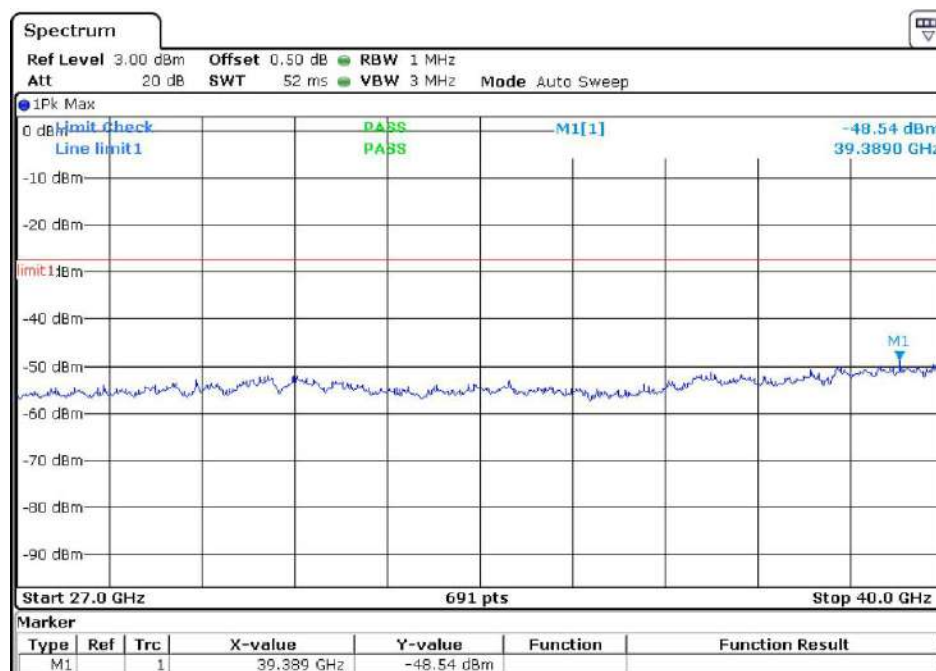
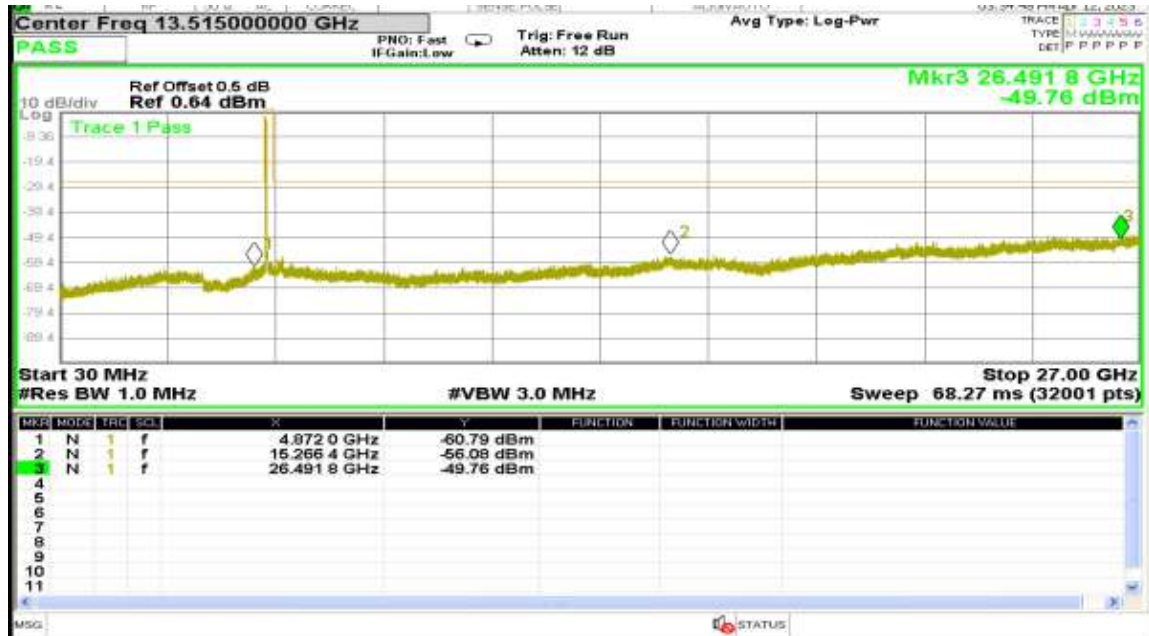


Test Procedure:

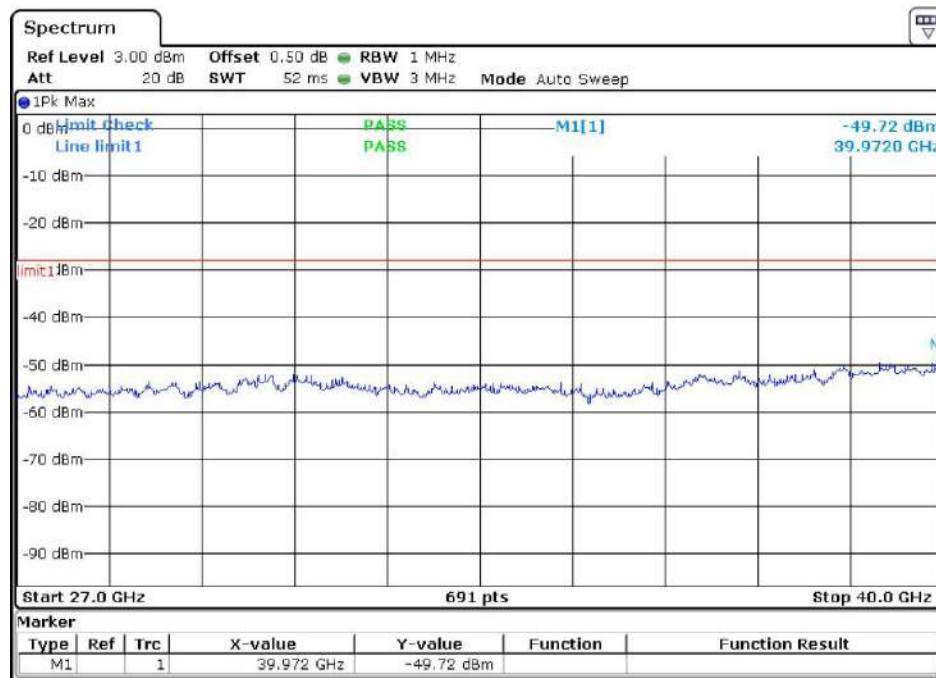
1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer via a RF combiner.
2. Set the spectrum analyzer as RBW = 100kHz/1MHz, VBW=300kHz/3MHz, Sweep = auto
3. Set the Lowest, Middle and Highest Transmitting Channel, observed the outside band of 30MHz to 40GHz, then mark the higher-level emission for comparing with the FCC rules.

Result plot as follows:

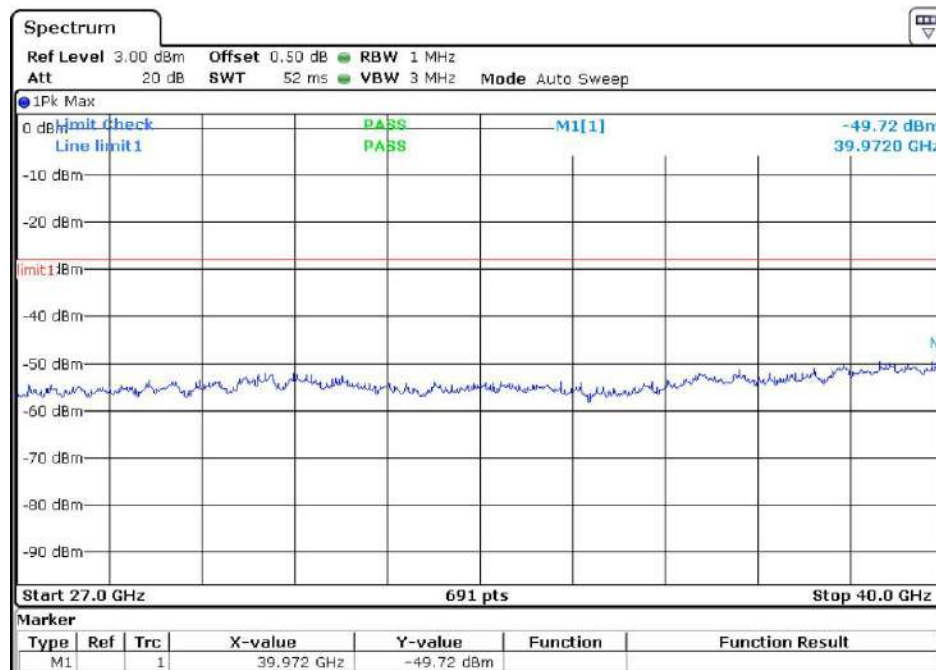
a20 5.180 GHz



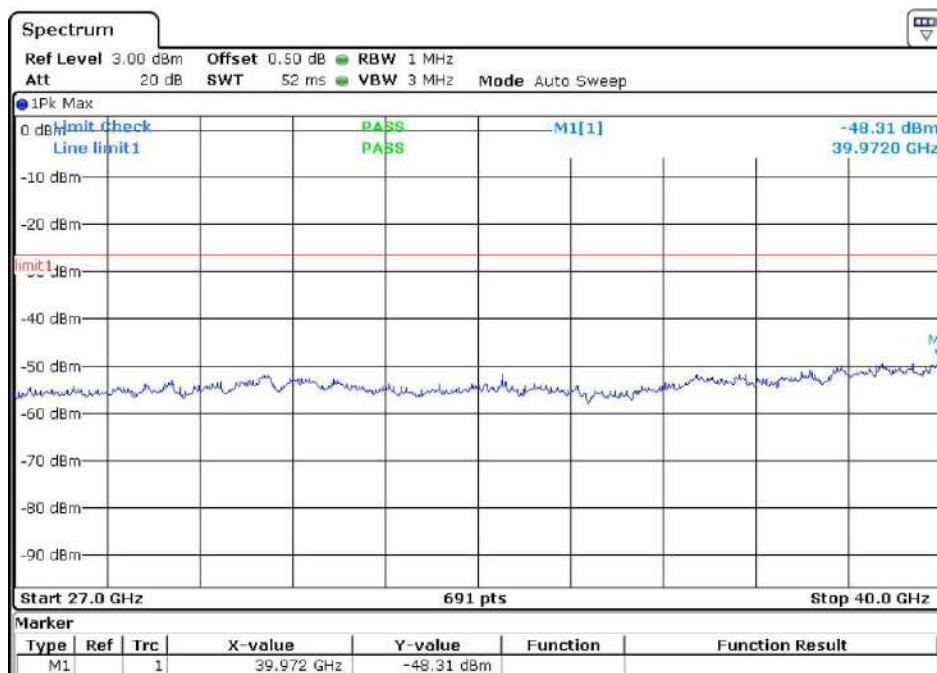
a20 5.240 GHz



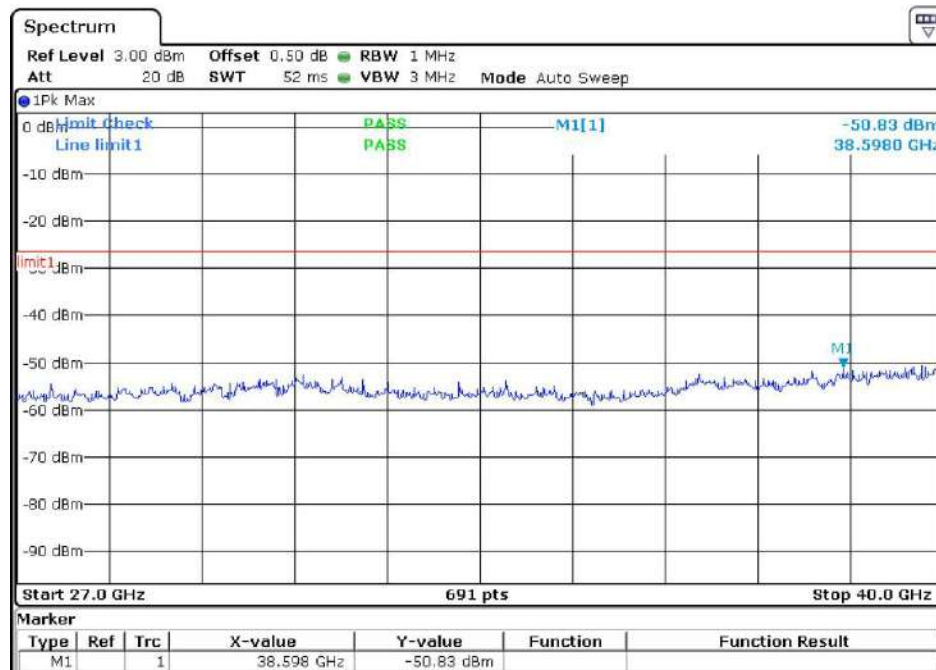
n20 5.180 GHz



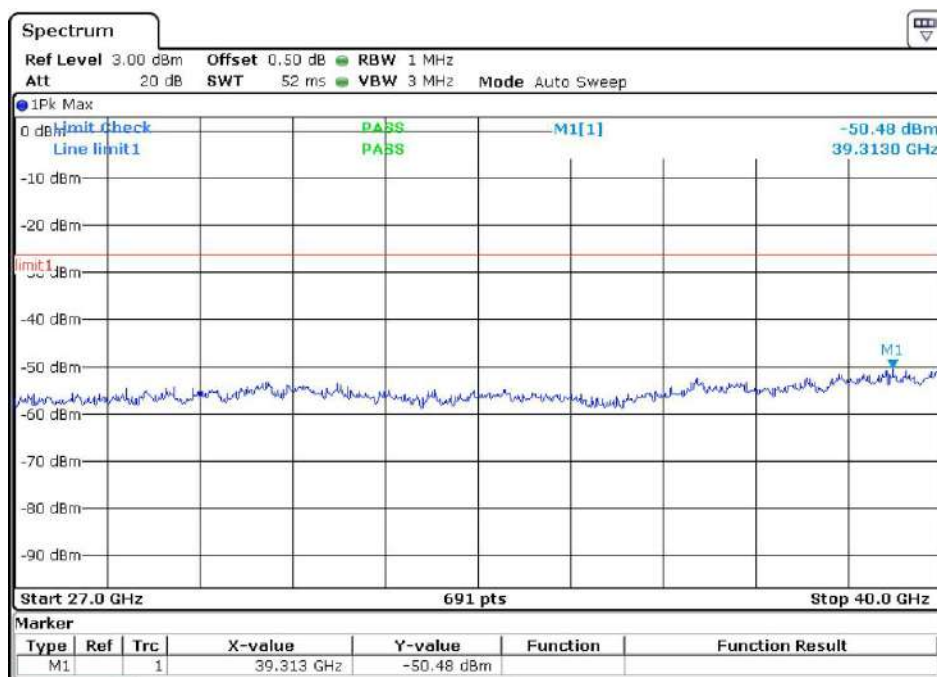
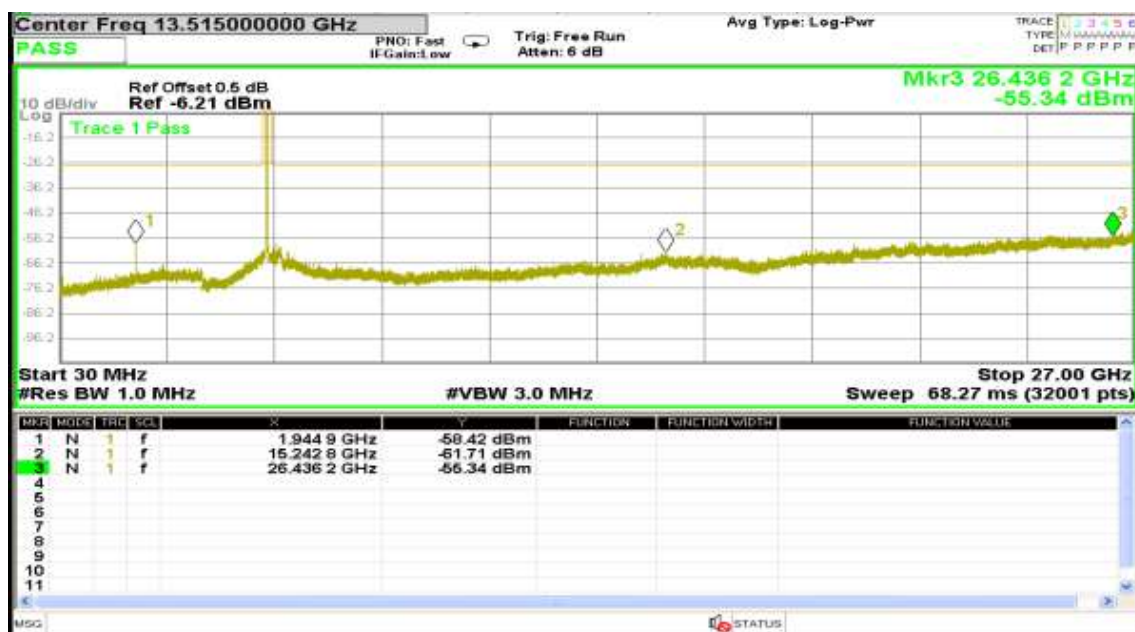
n20 5.240 GHz



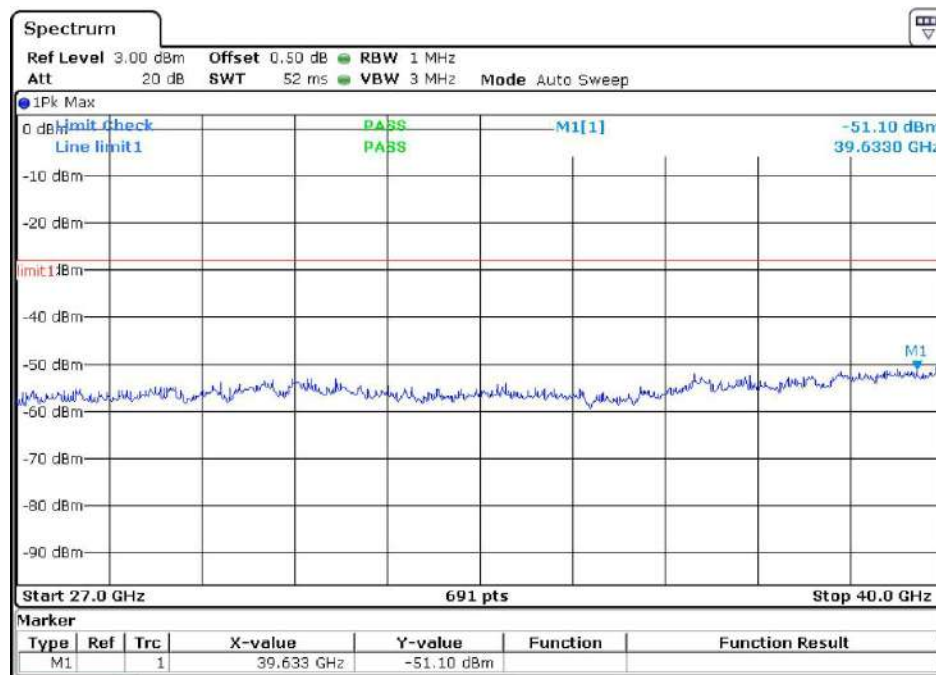
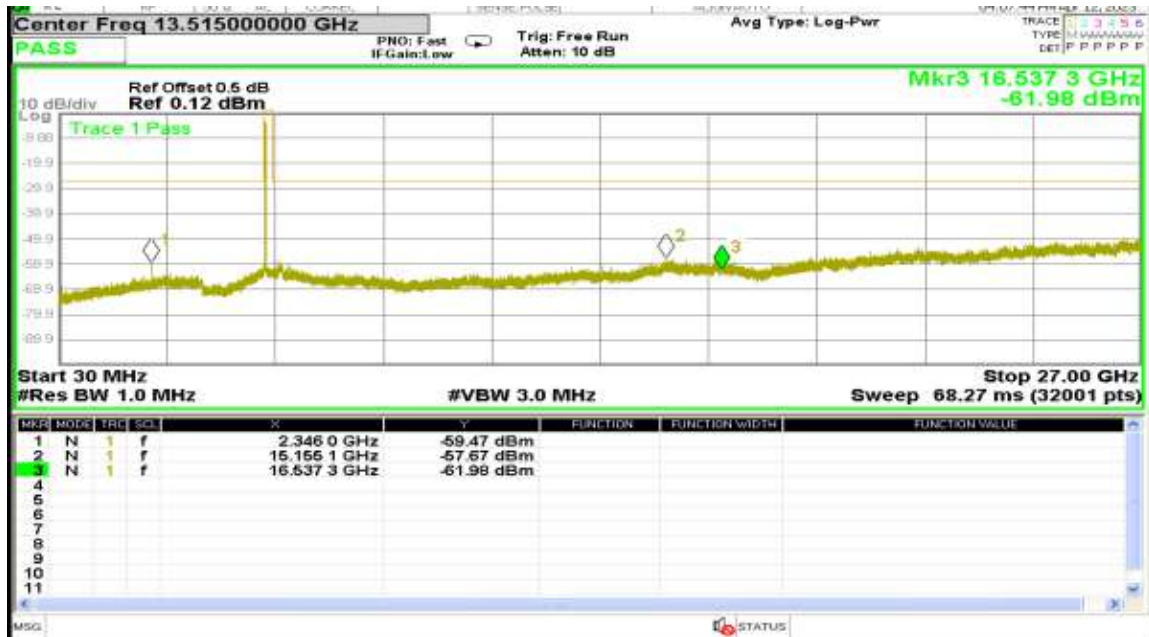
n40 5.190 GHz



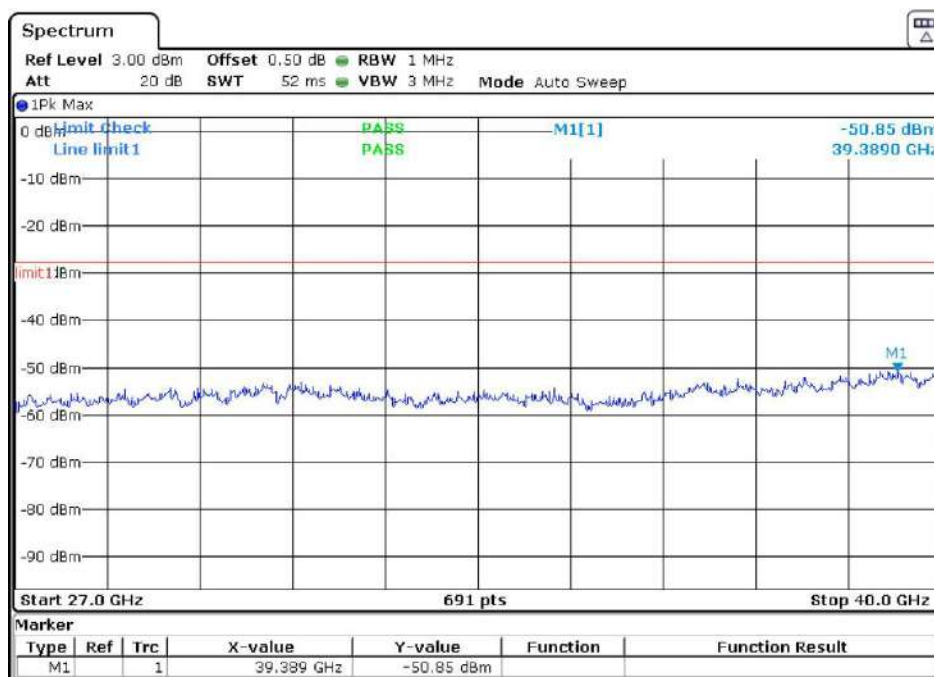
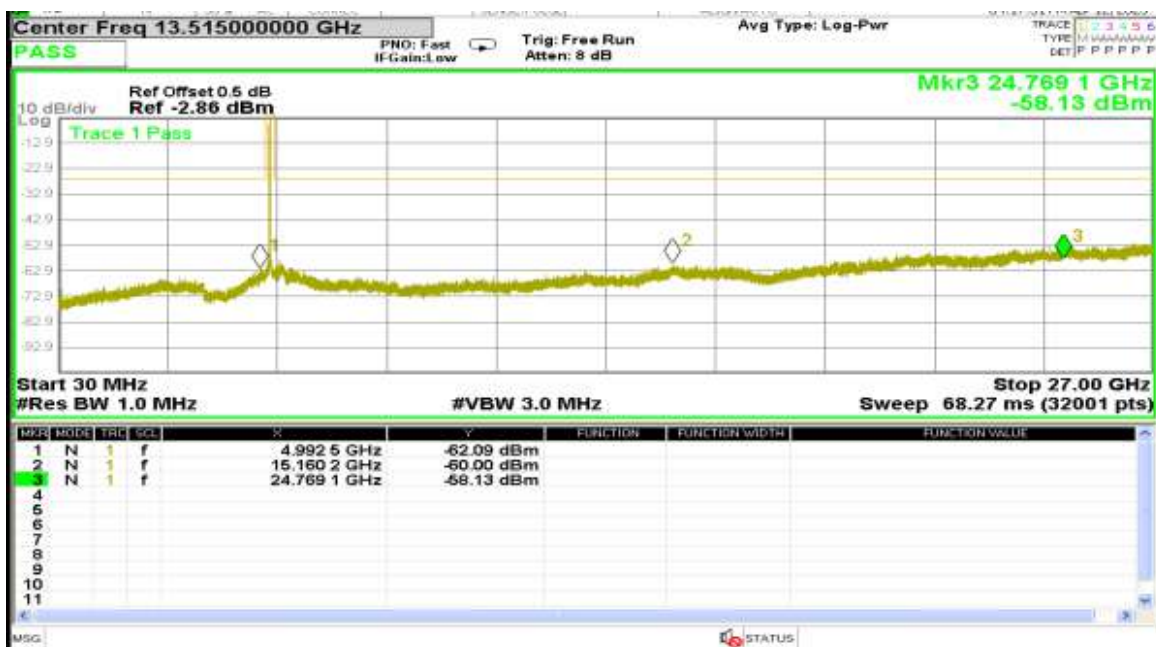
n40 5.230 GHz



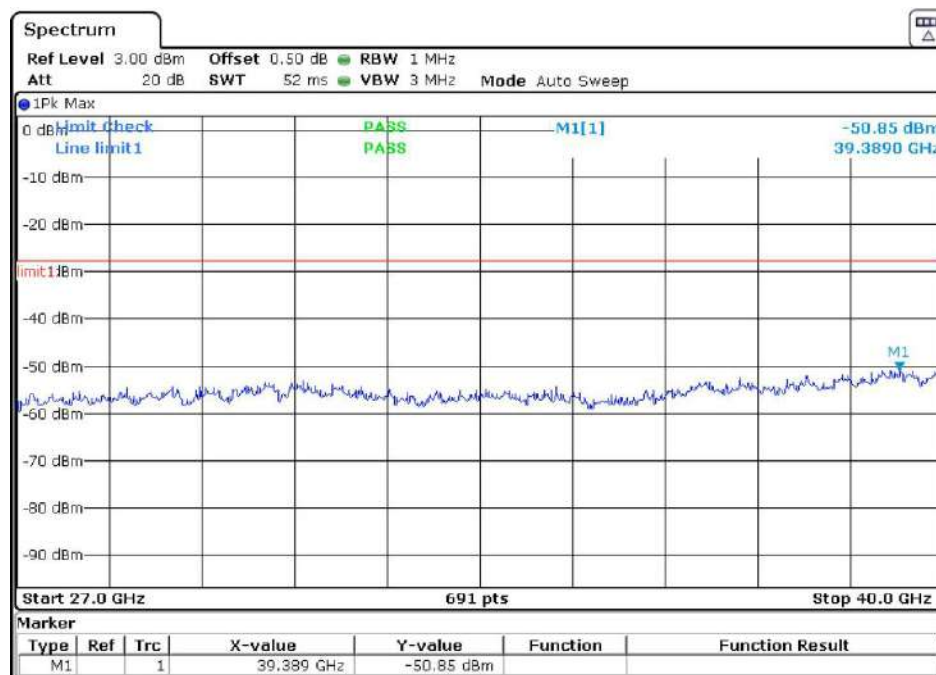
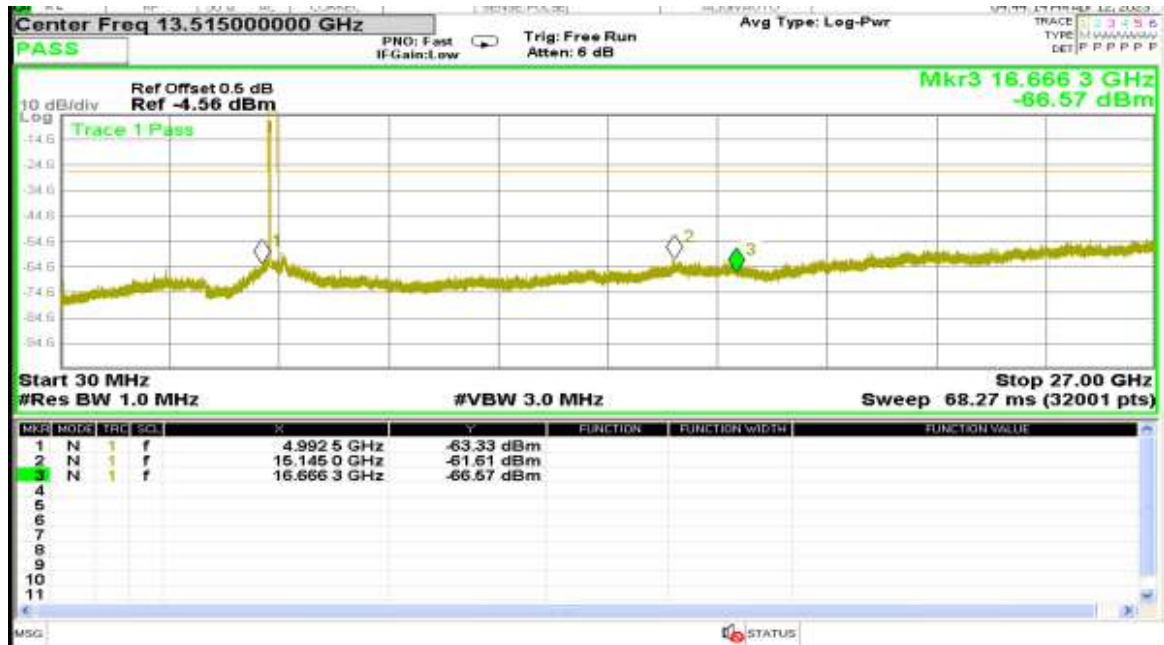
ac20 5.180 GHz



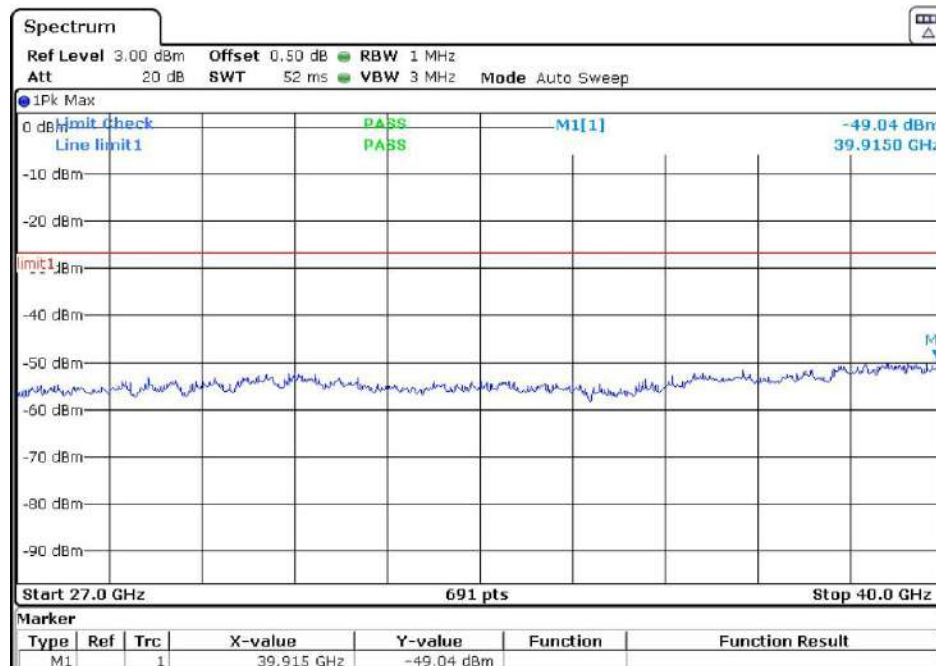
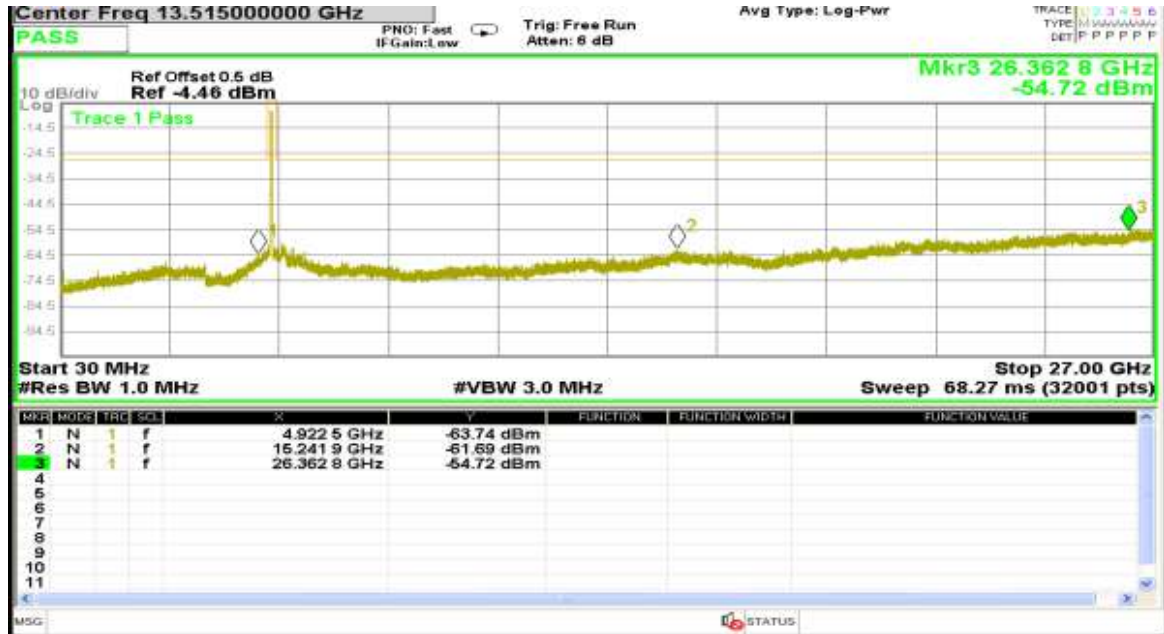
ac20 5.240 GHz



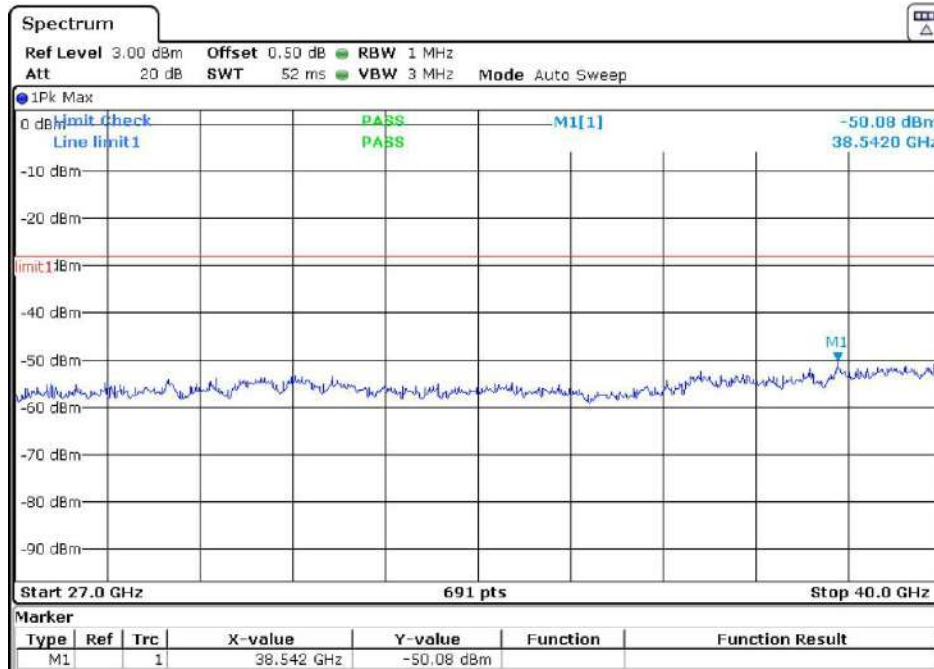
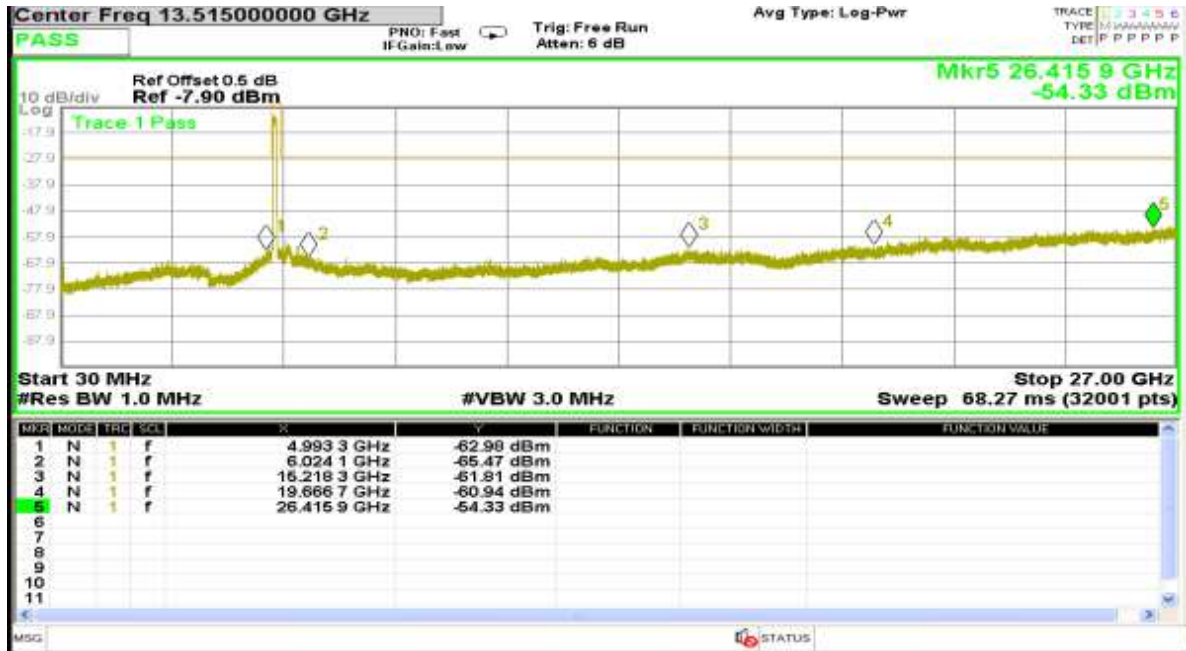
ac40 5.190 GHz



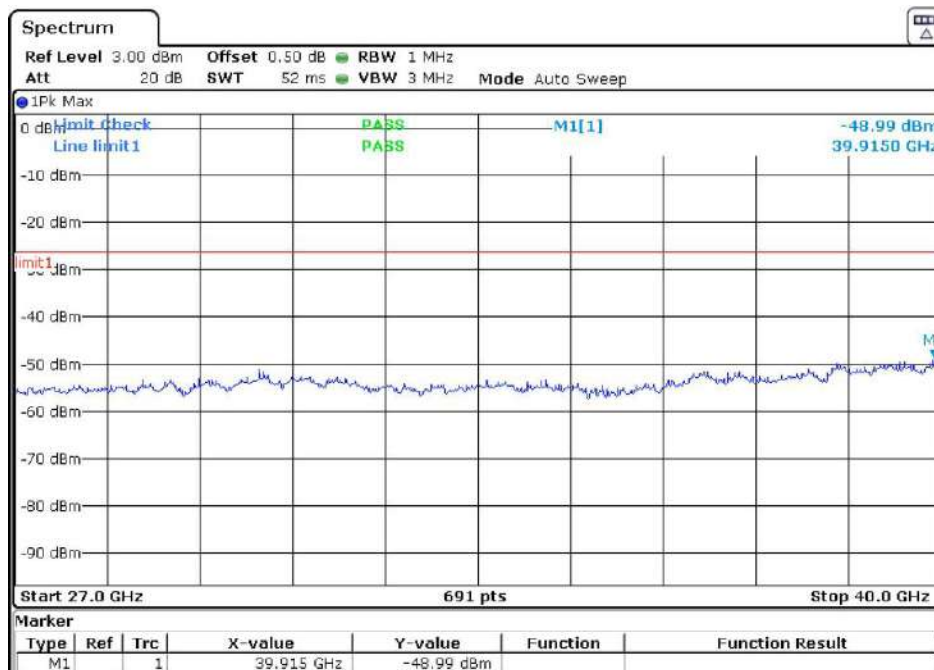
ac40 5.230 GHz



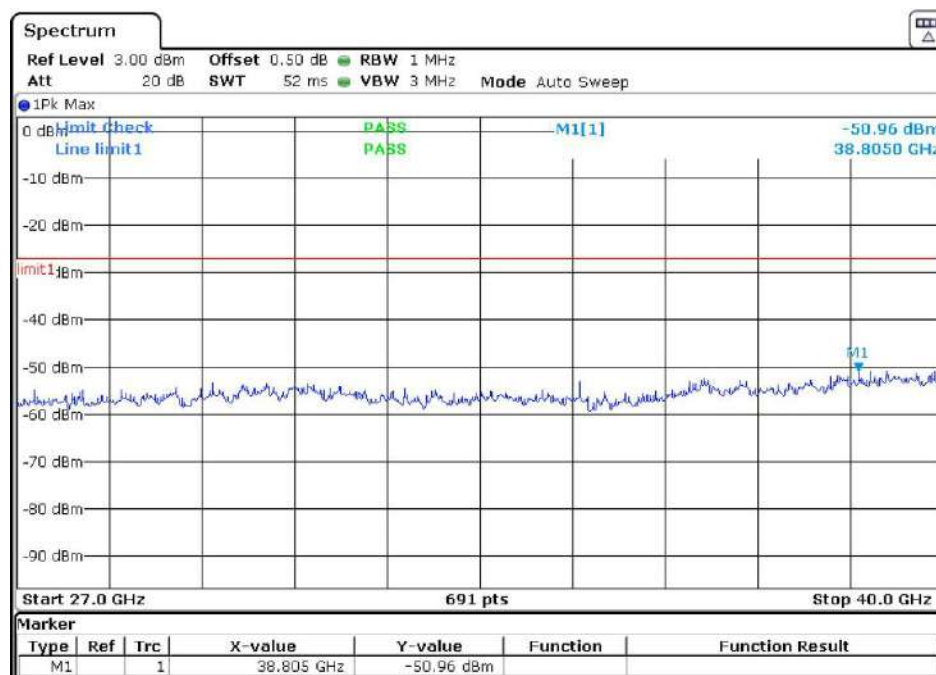
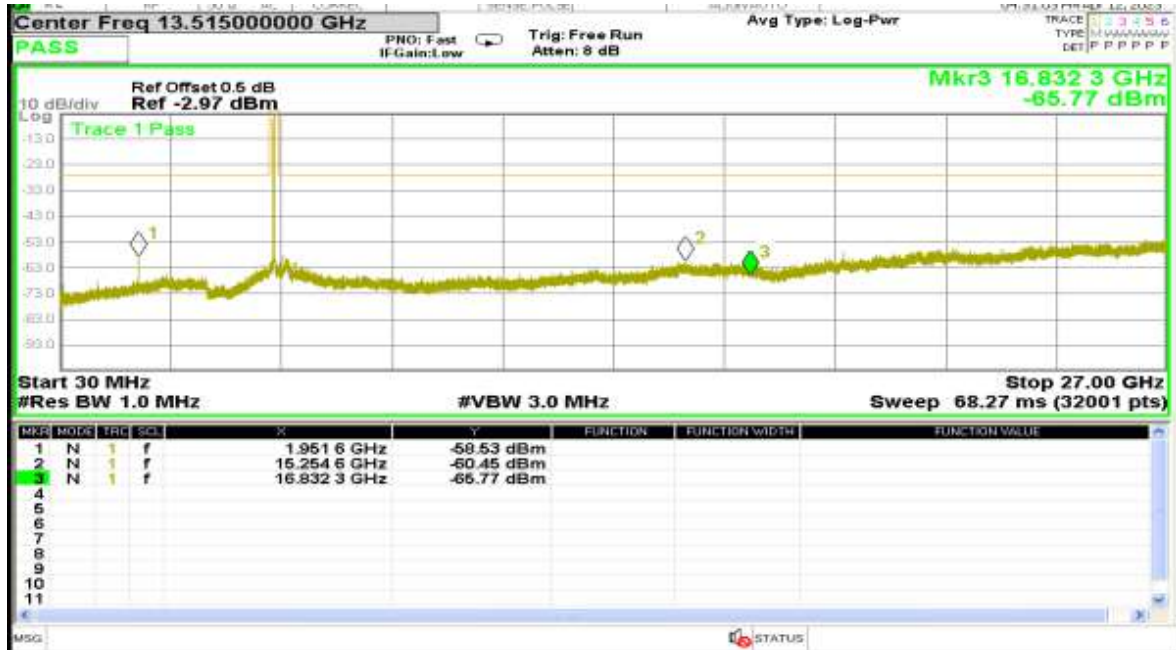
ac80 5.210 GHz



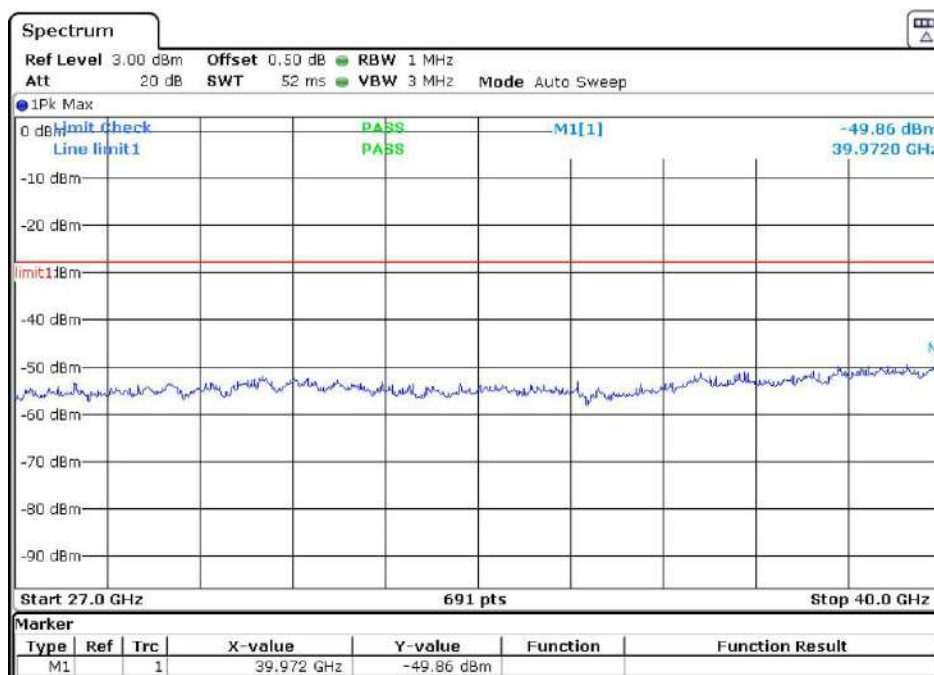
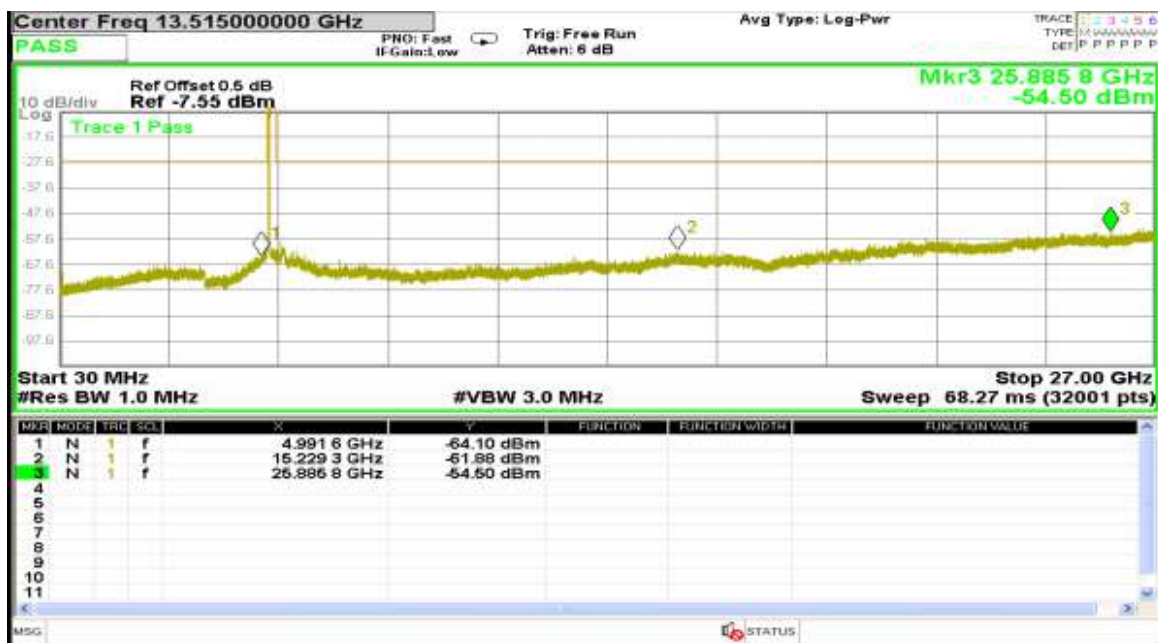
ax20 5.180 GHz



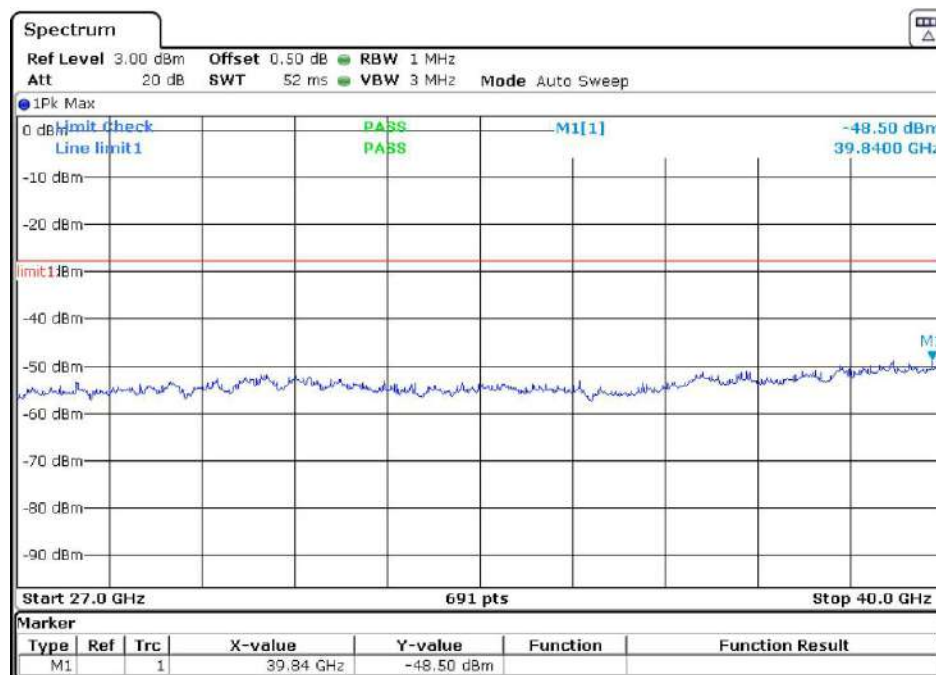
ax20 5.240 GHz



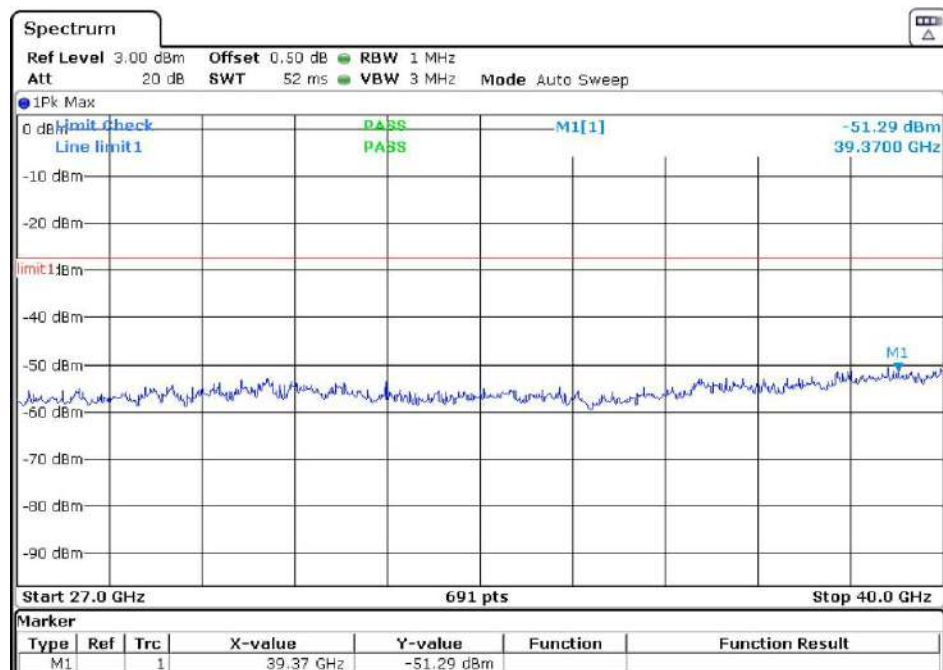
ax40 5.190 GHz



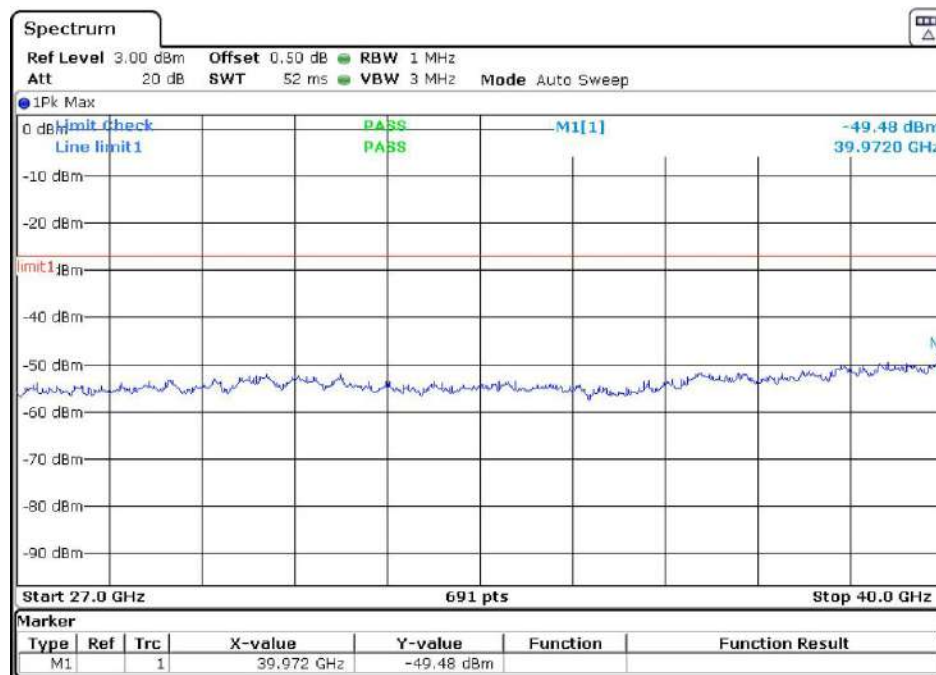
ax40 5.230 GHz



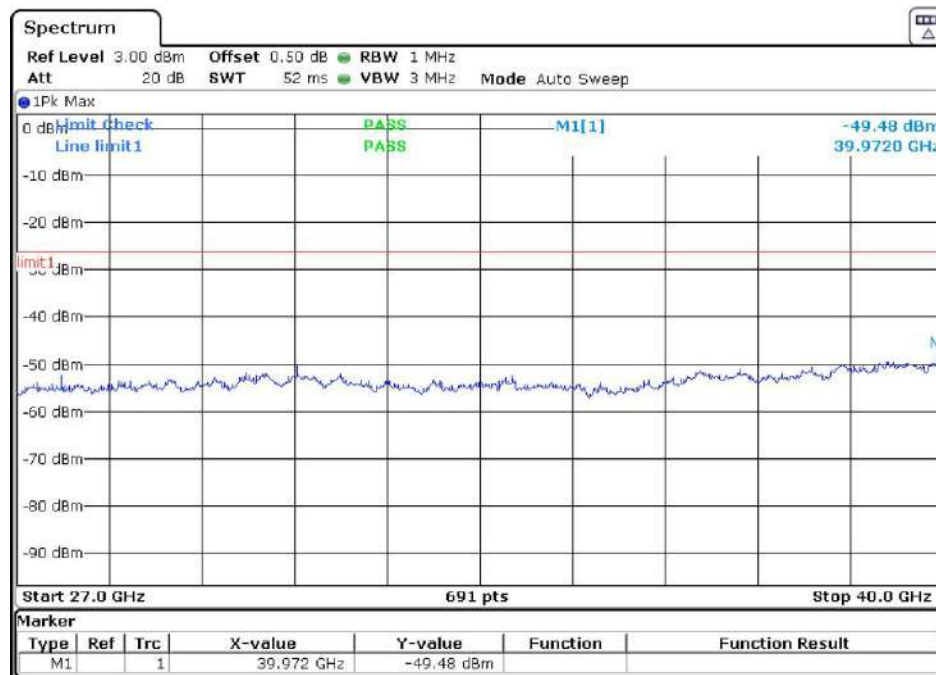
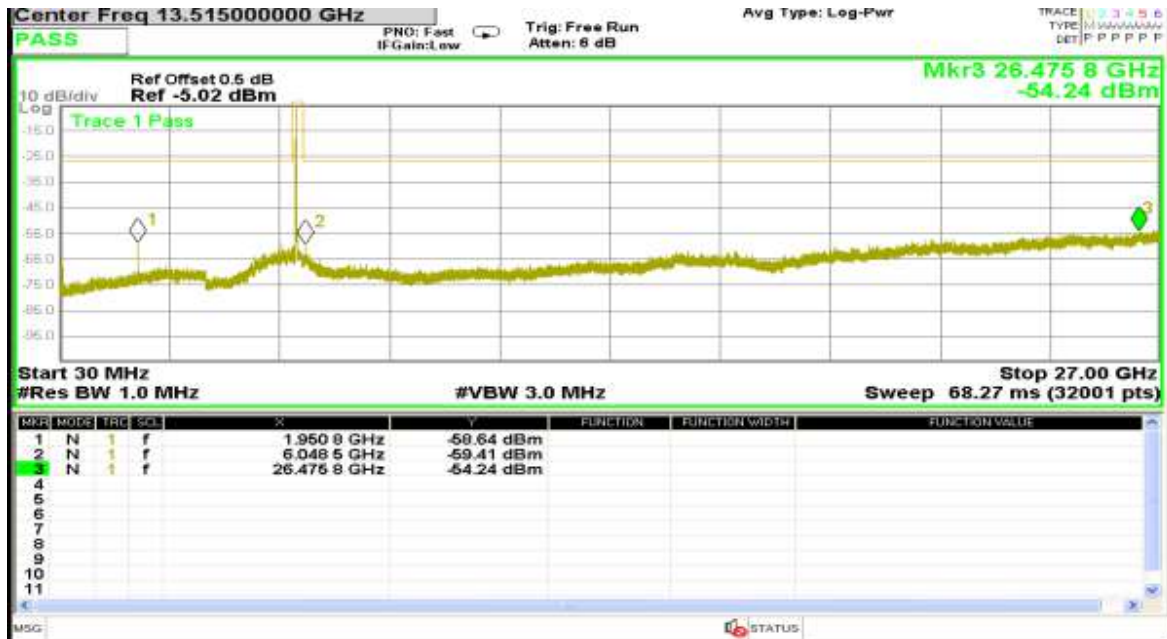
ax80 5.210 GHz



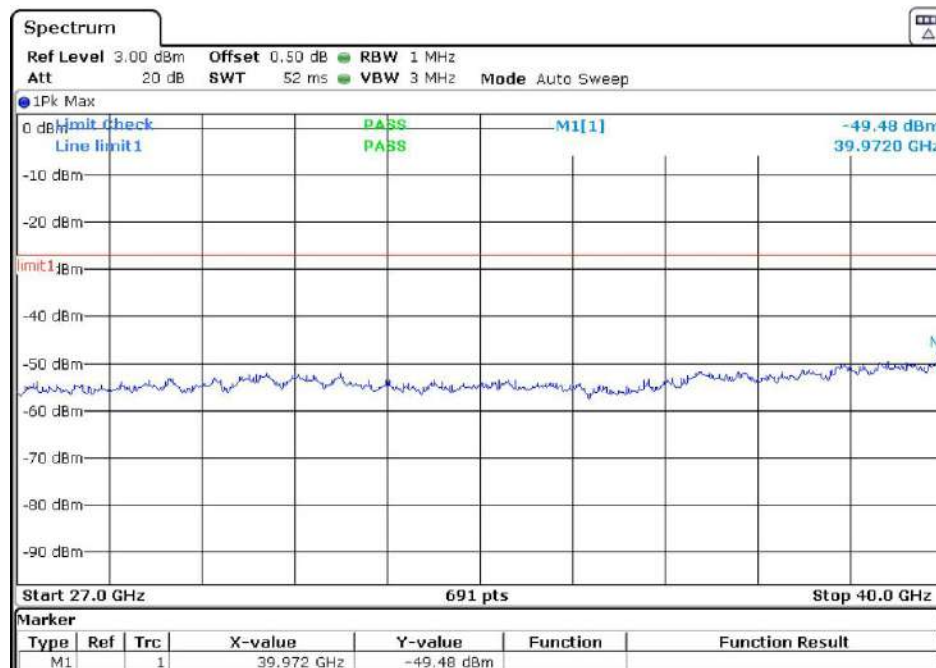
a20 5.745 GHz



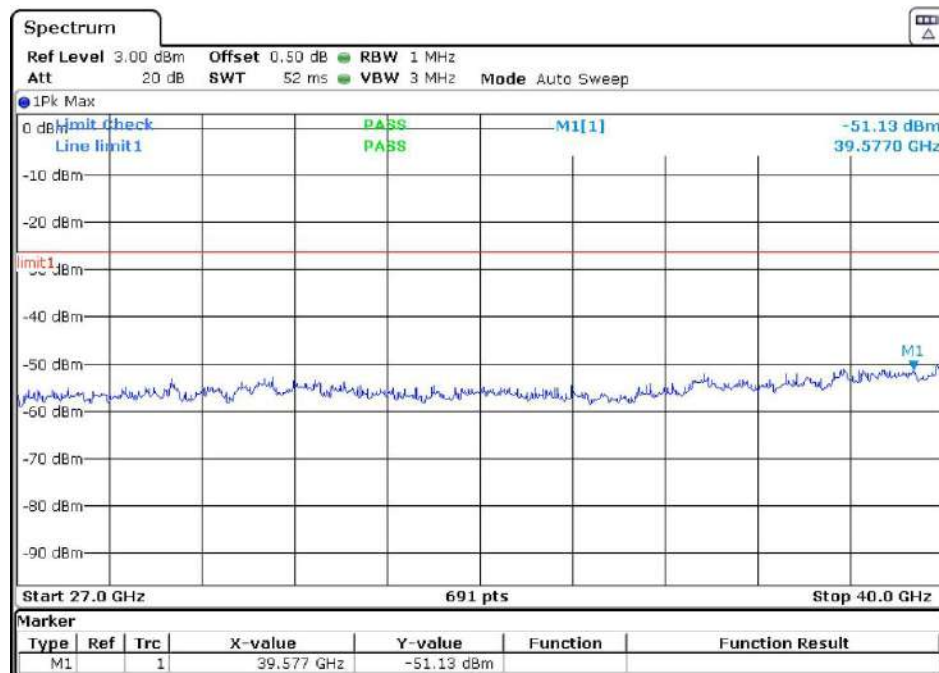
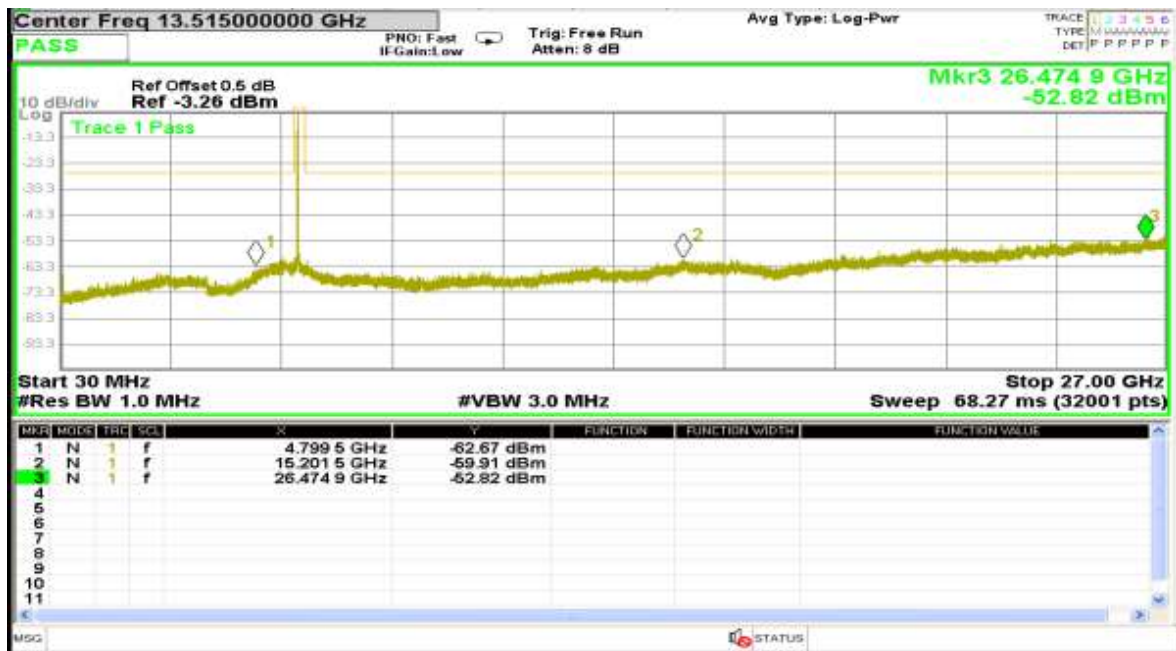
a20 5.825 GHz



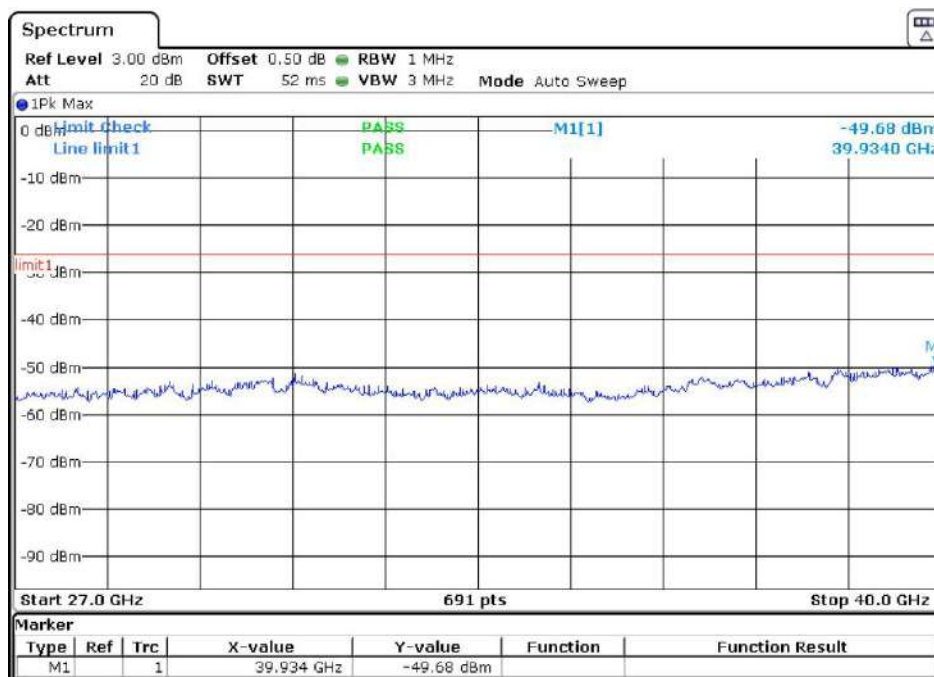
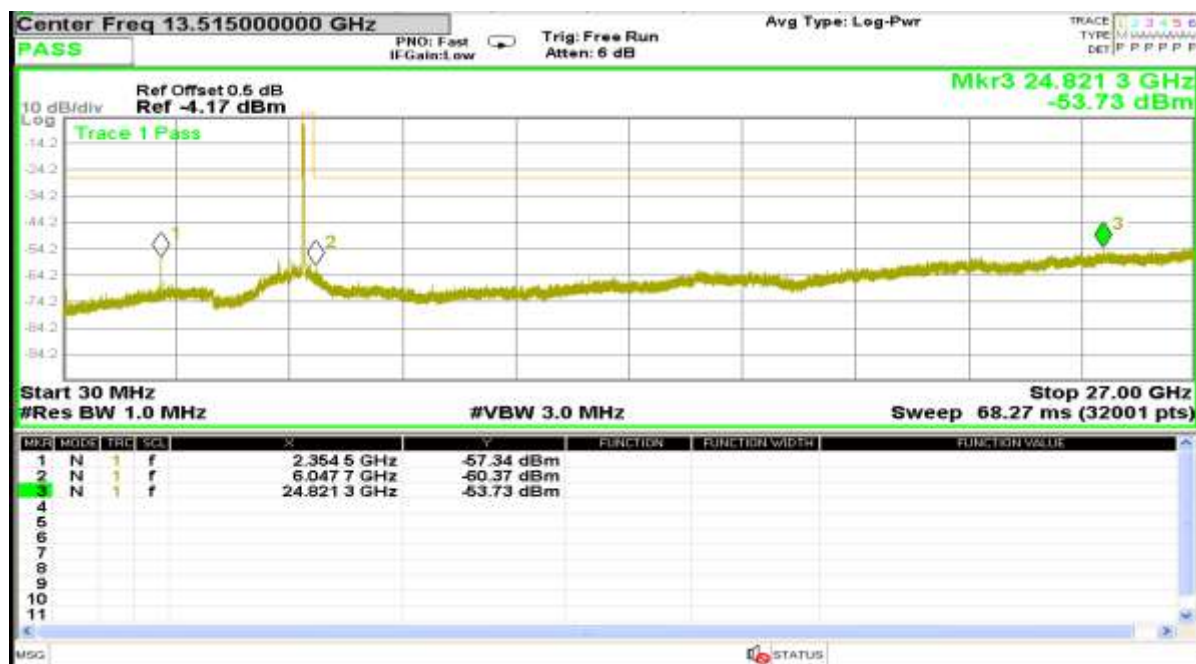
n20 5.745 GHz



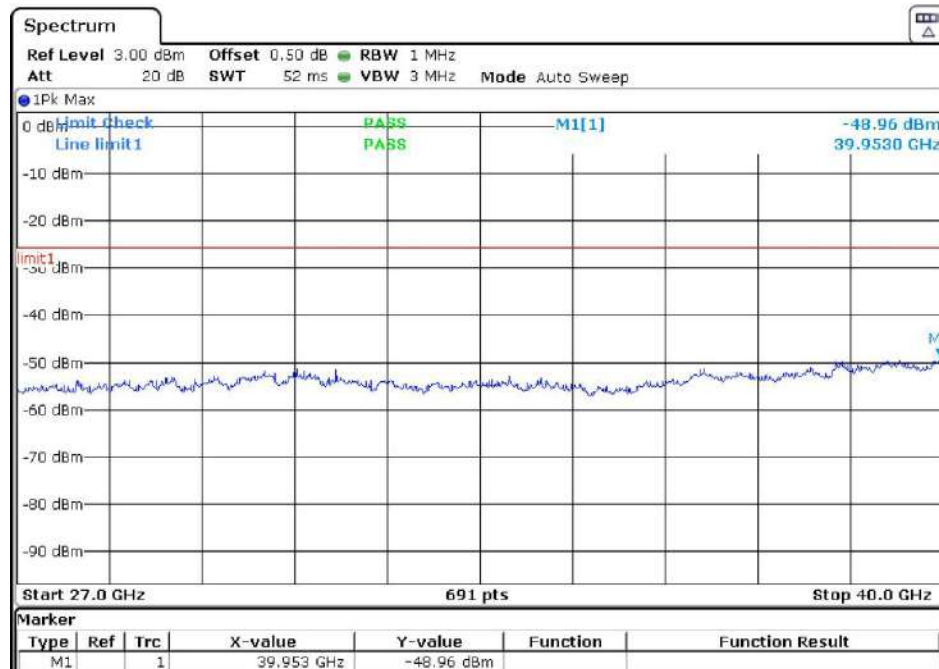
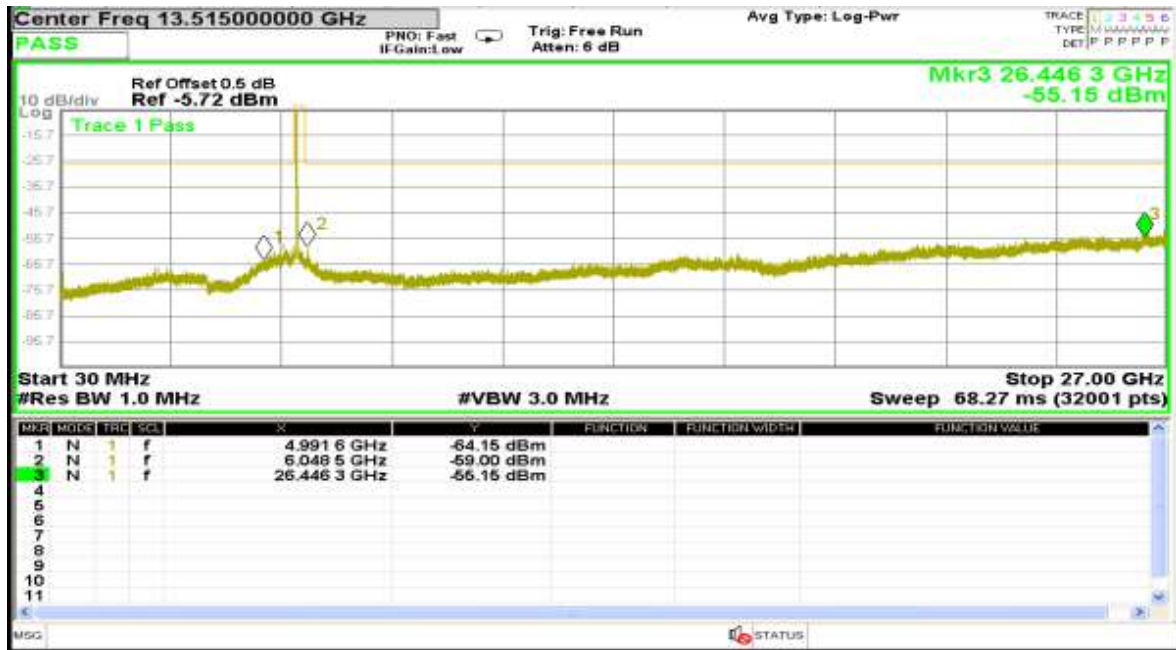
n20 5.825 GHz



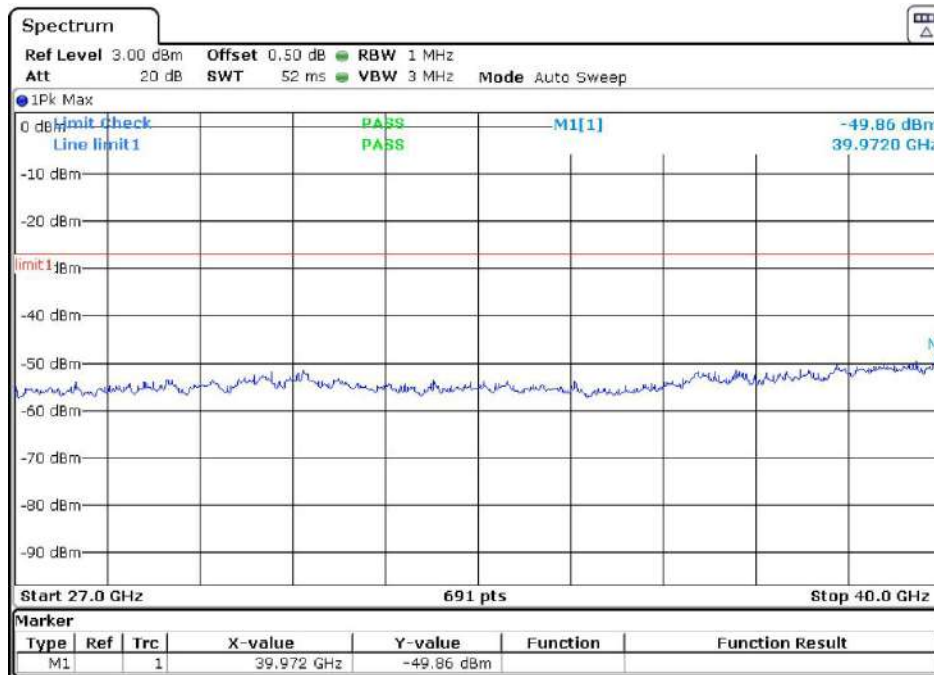
n40 5.755 GHz



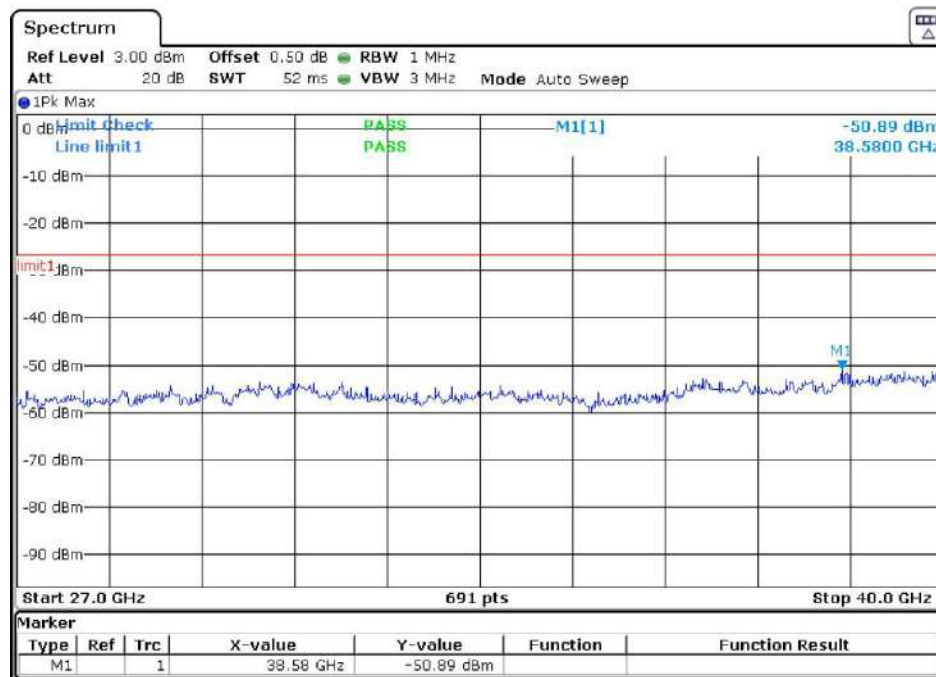
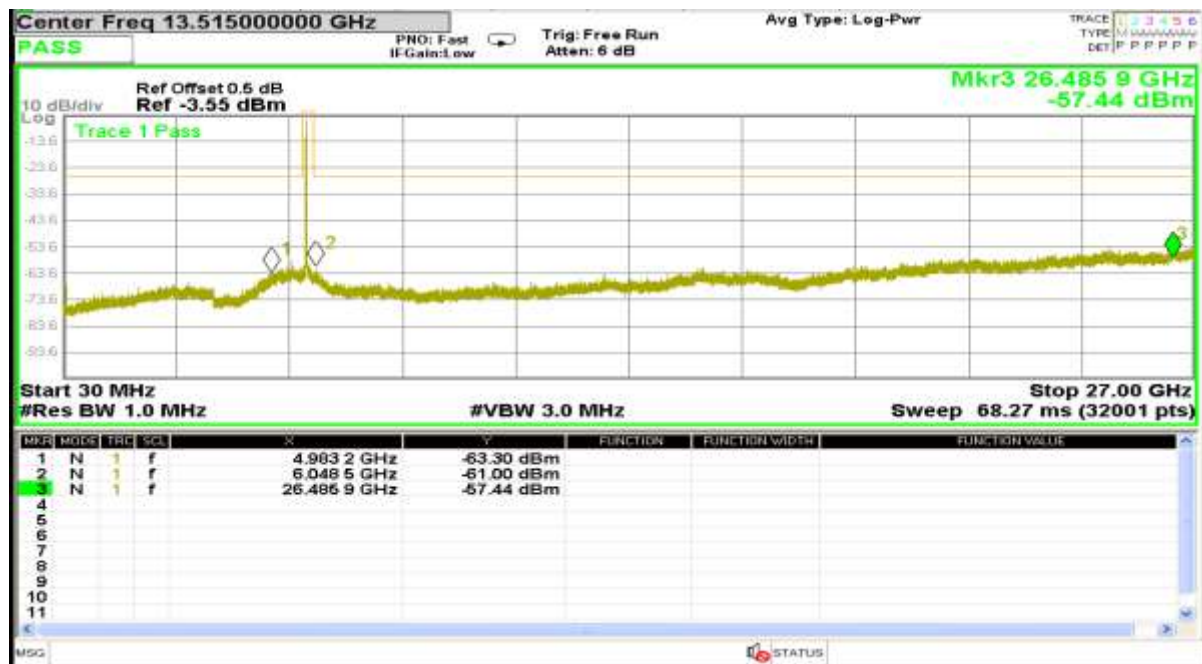
n40 5.795 GHz



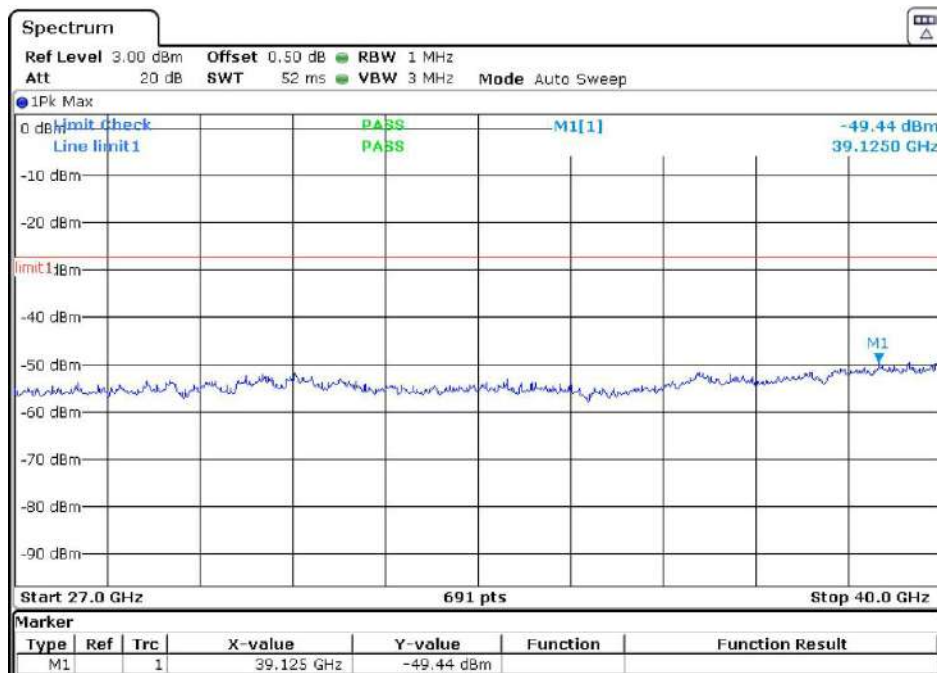
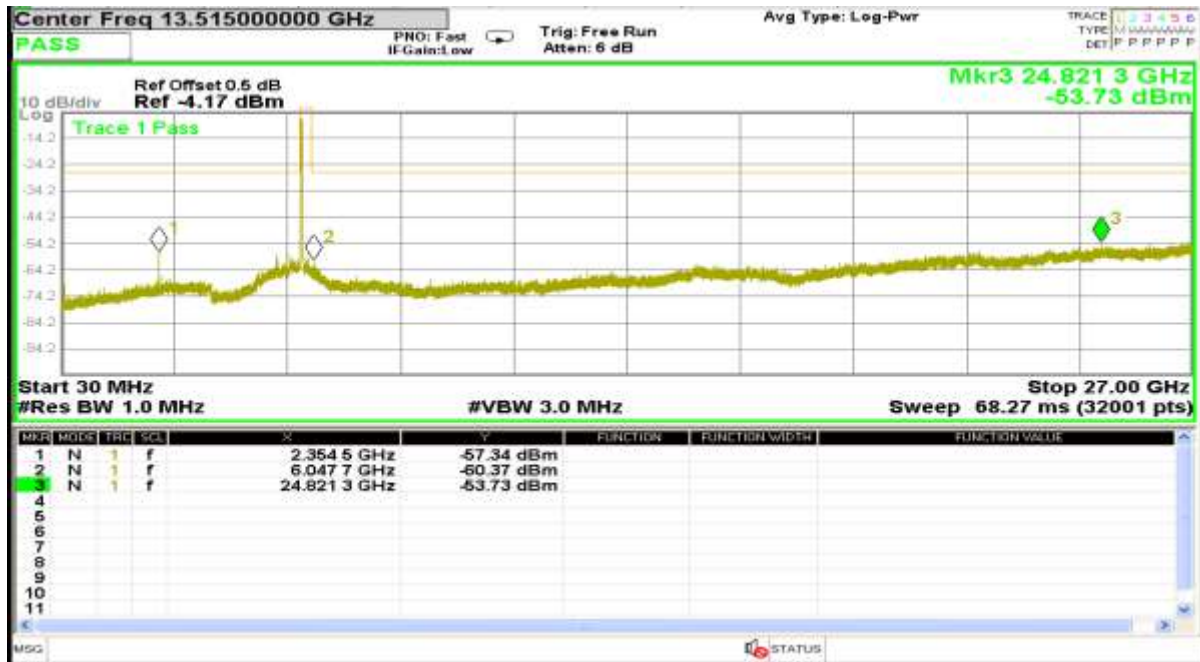
ac20 5.745 GHz



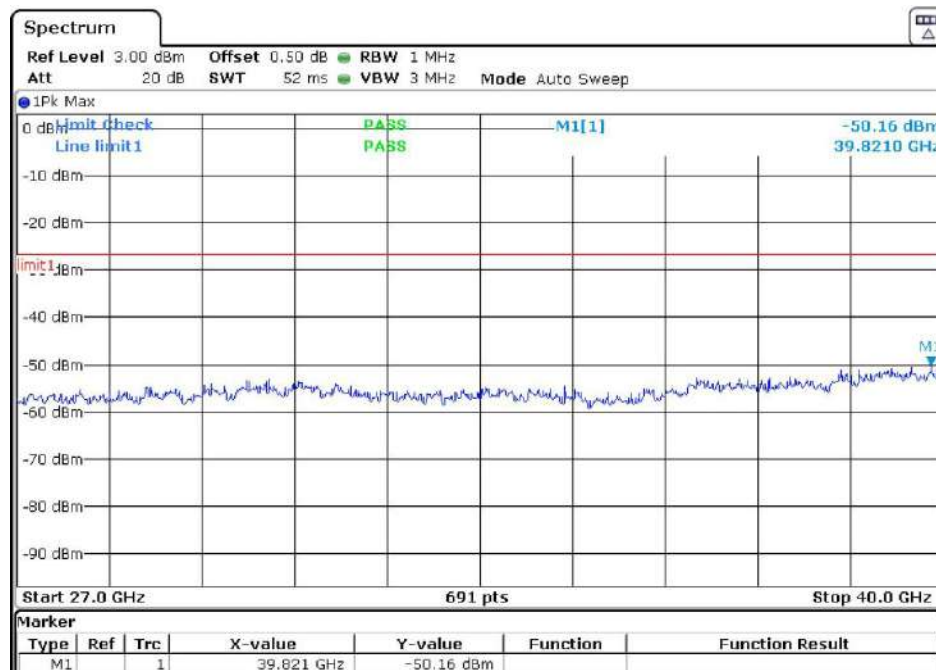
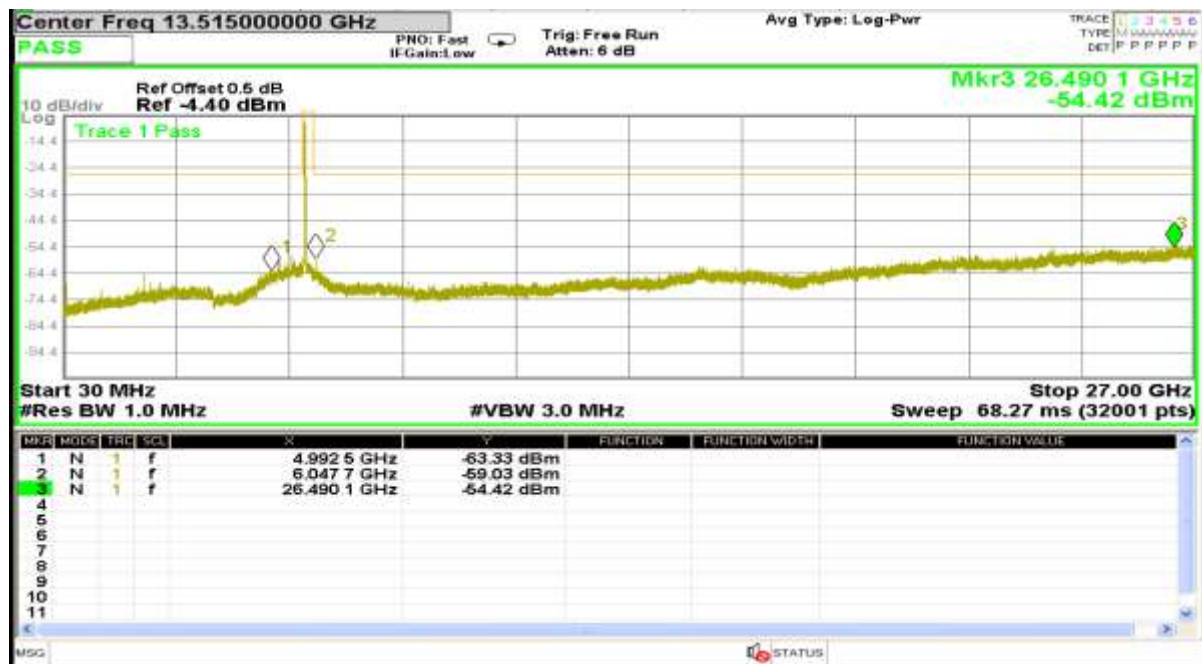
ac20 5.825 GHz



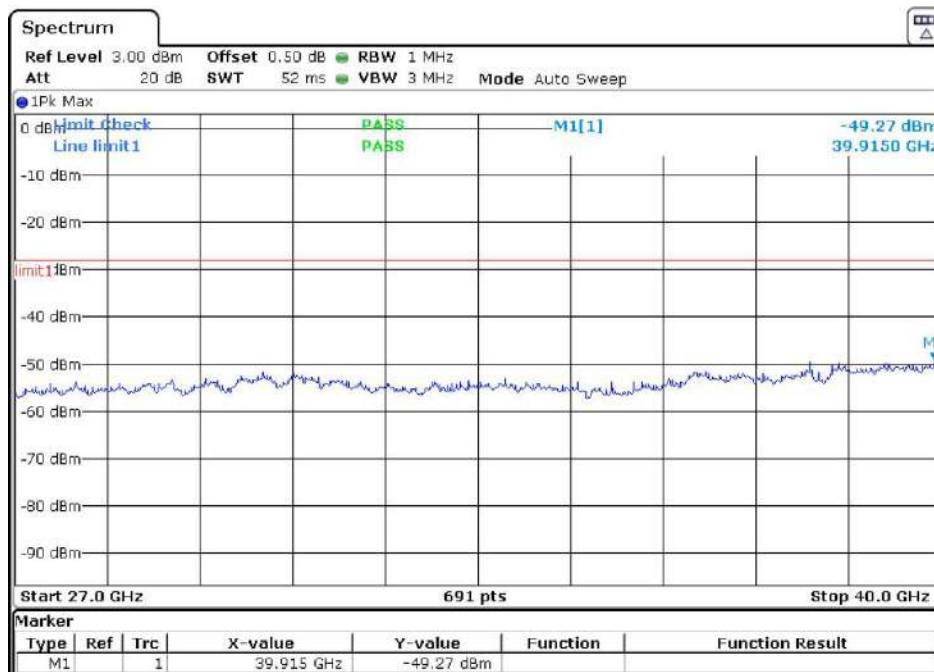
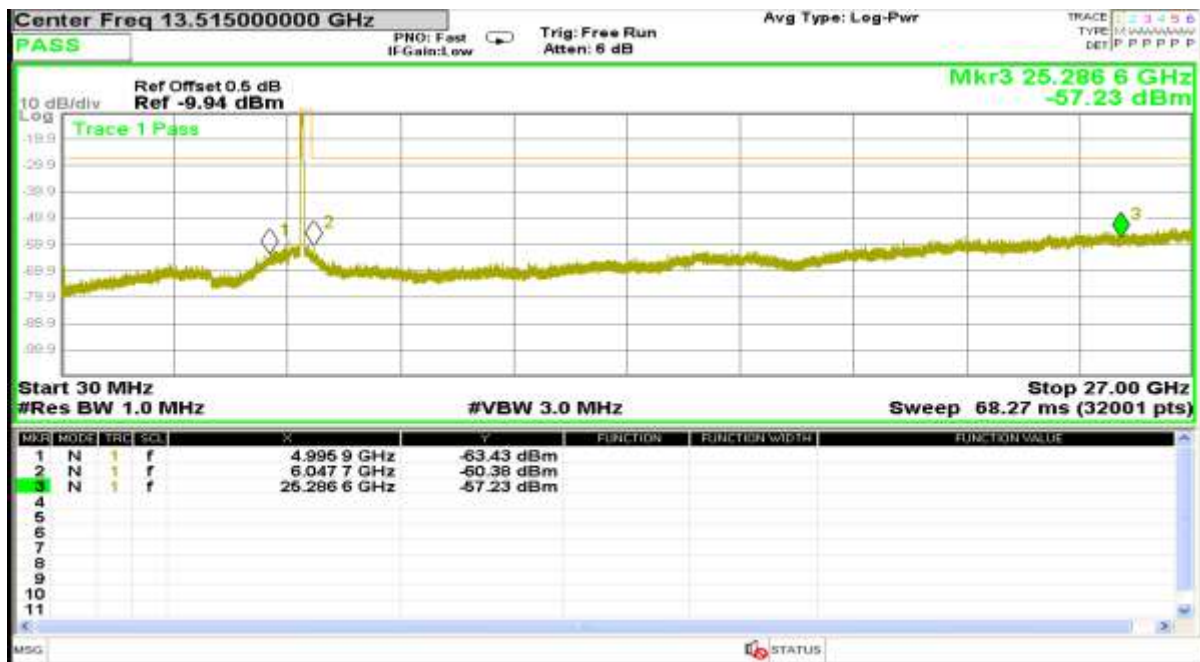
ac40 5.755 GHz



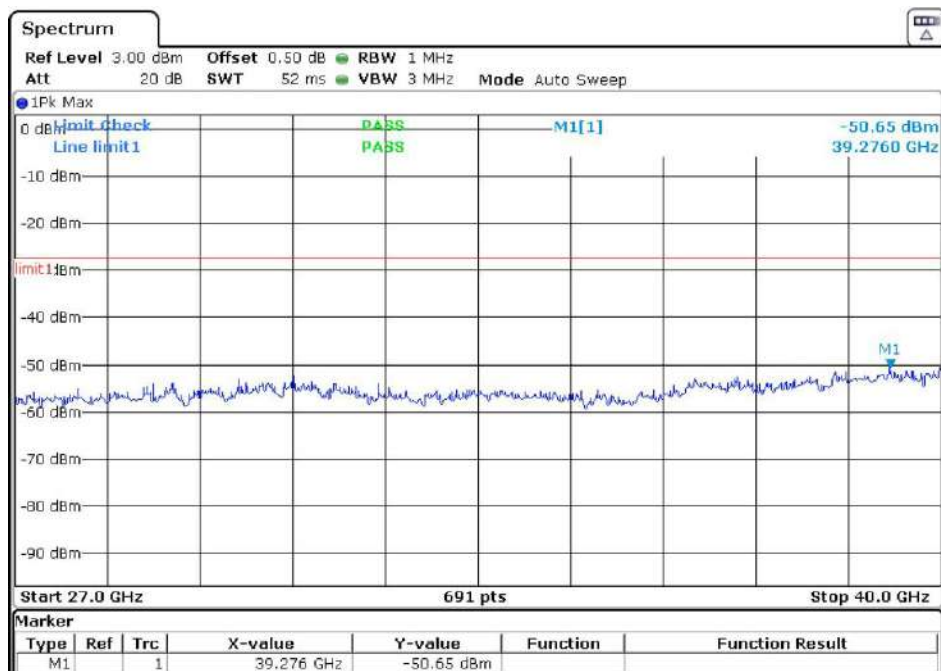
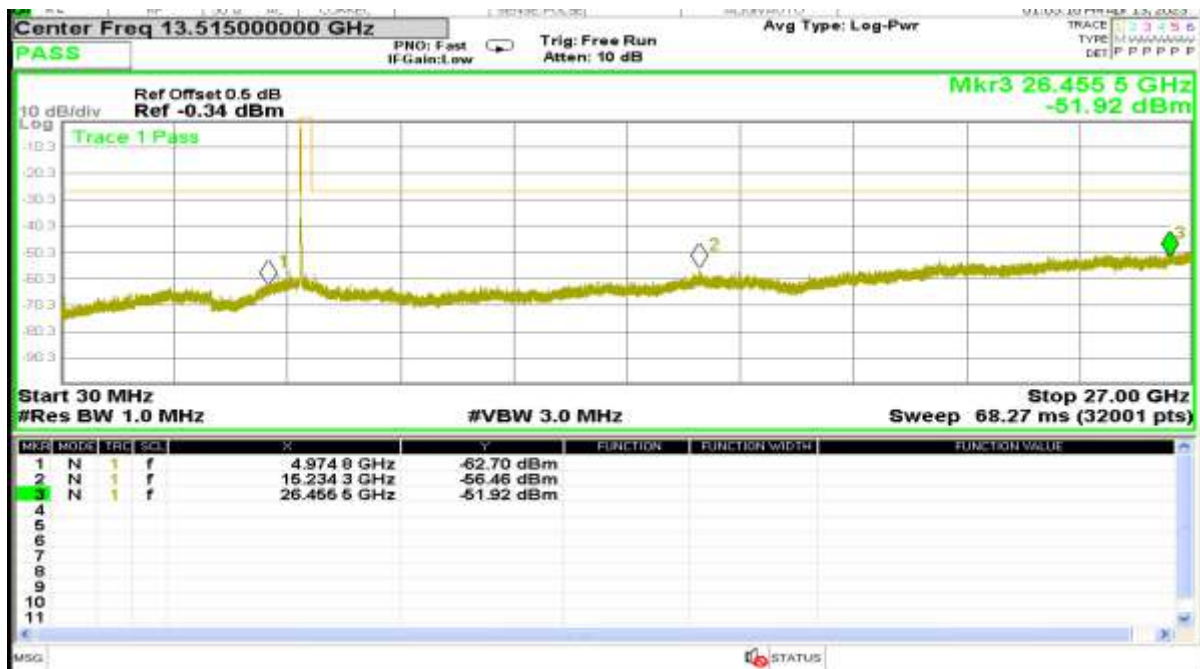
ac40 5.795 GHz



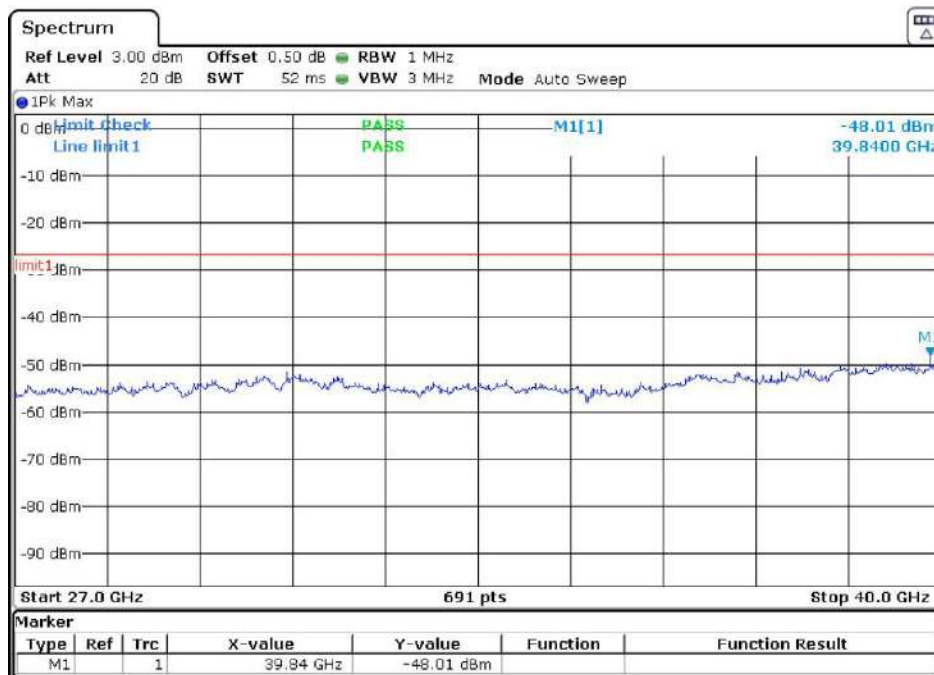
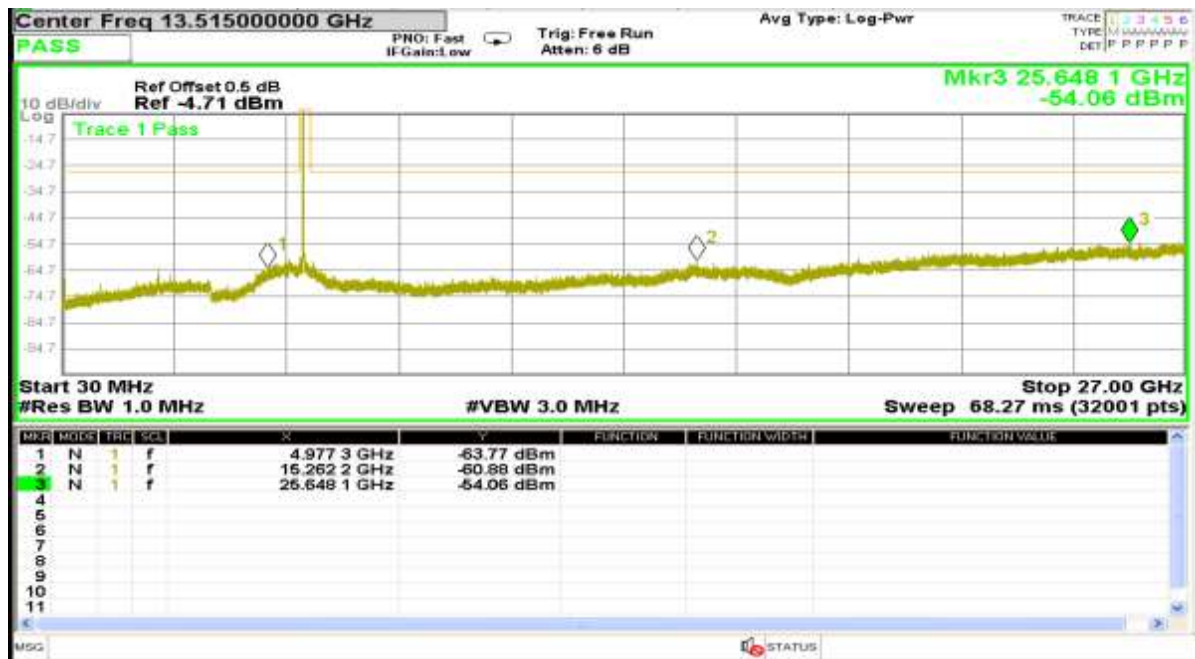
ac80 5.775 GHz



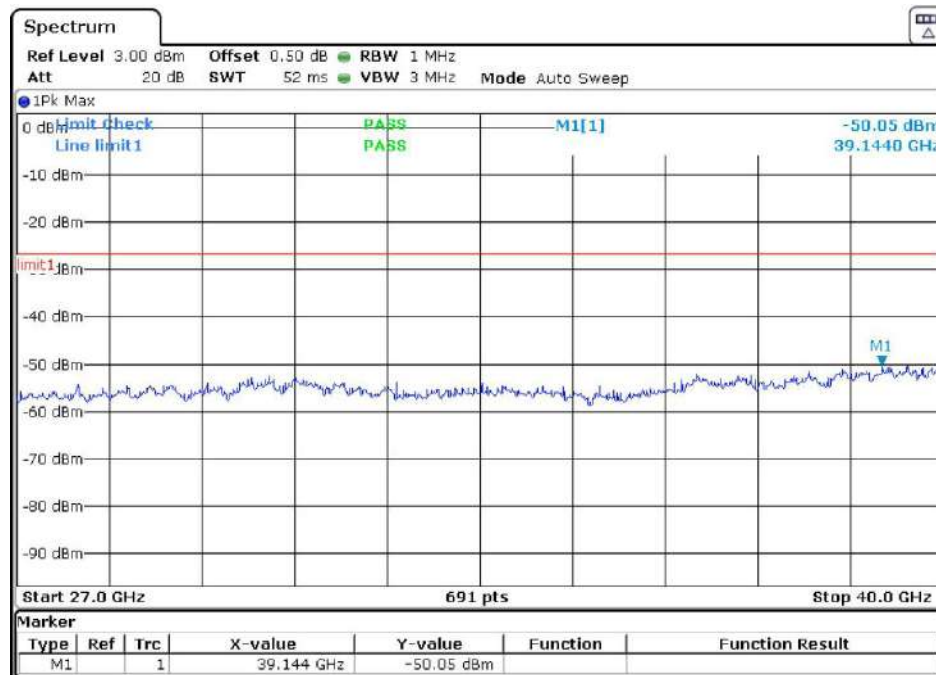
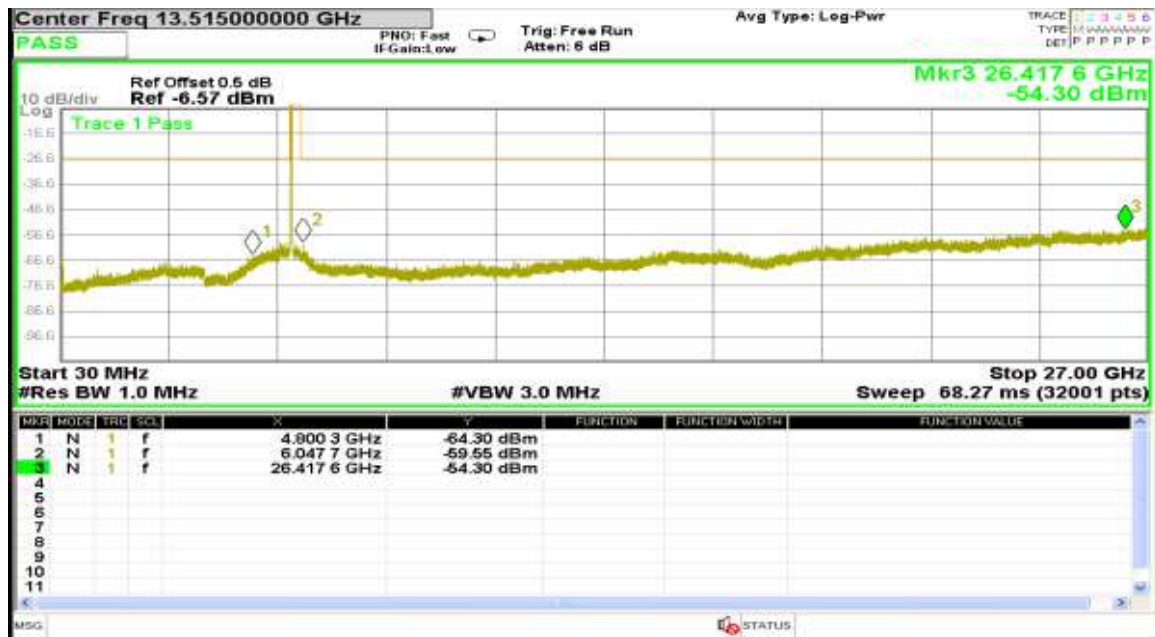
ax20 5.745 GHz



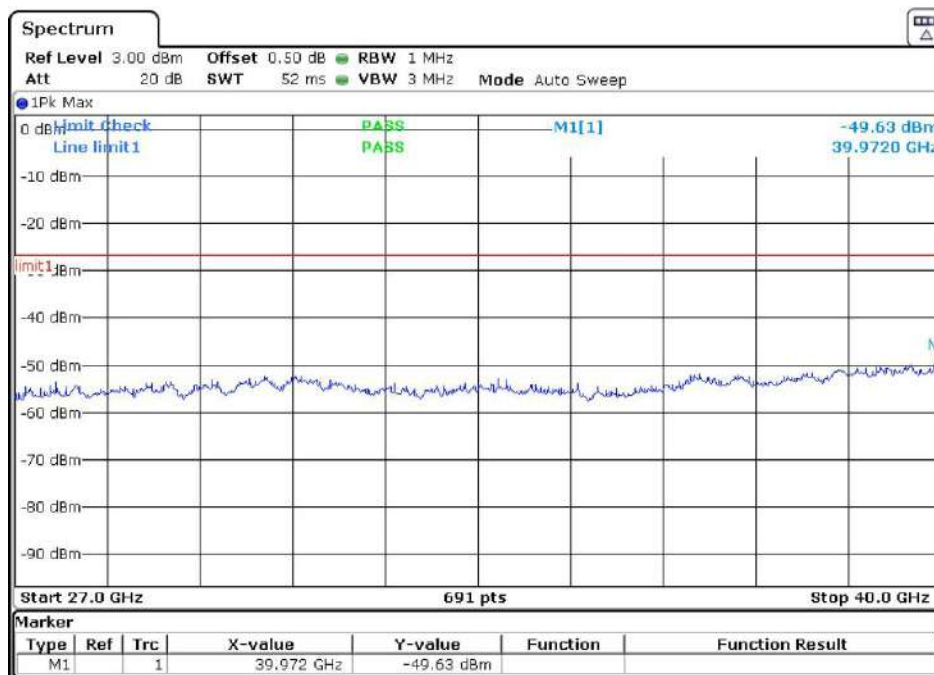
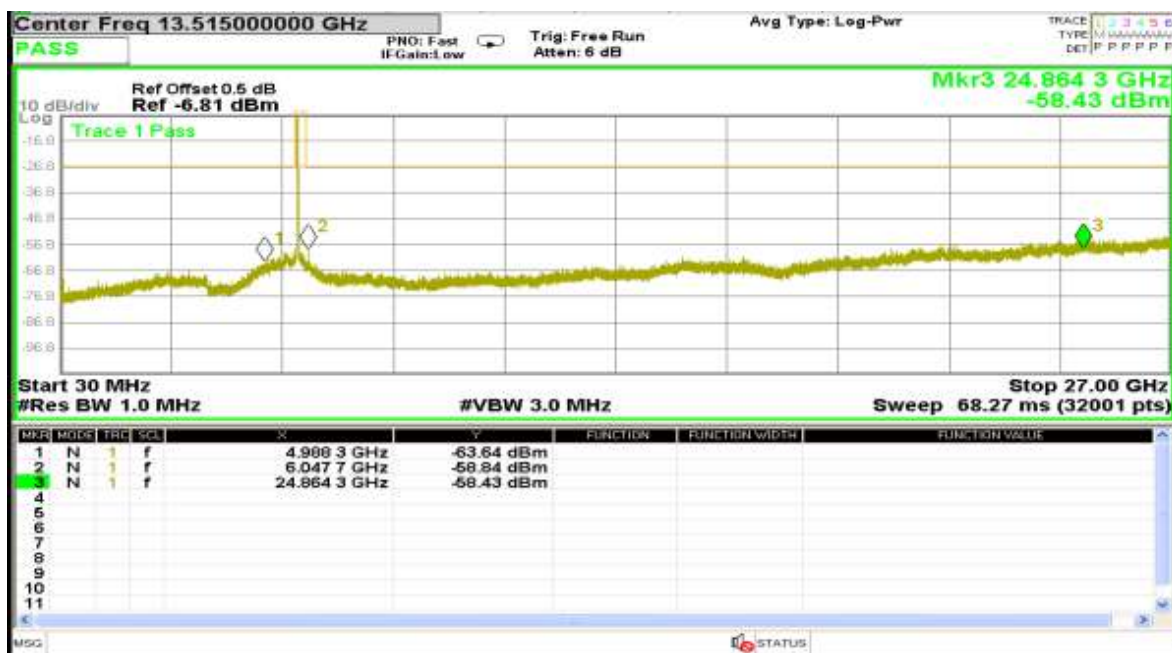
ax20 5.825 GHz



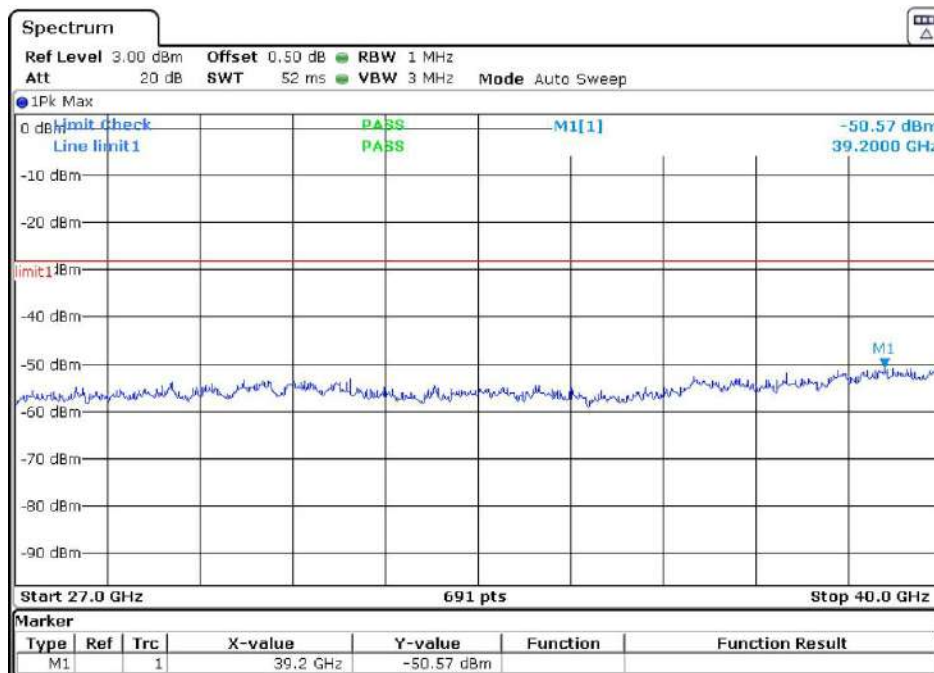
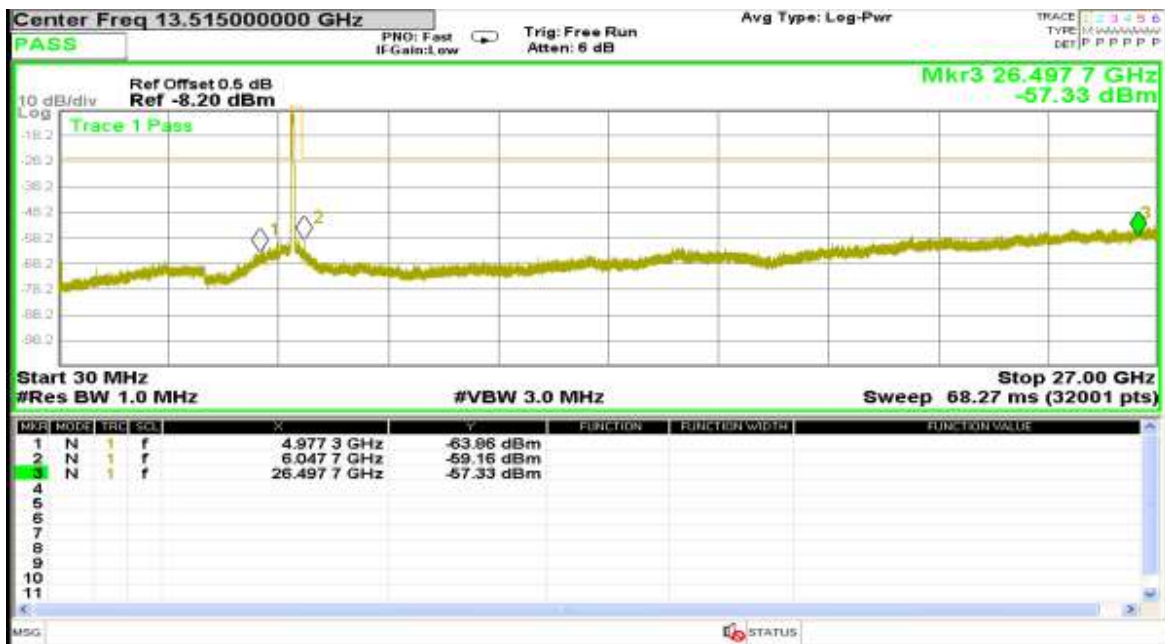
ax40 5.755 GHz



ax40 5.795 GHz



ax80 5.775 GHz



11. ANTENNA REQUIREMENTS

11.1. Limit

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

11.2. EUT ANTENNA

The antennas used for this product are dish type antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is 23 dBi. and the antenna connector is designed with permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.



****End of report****