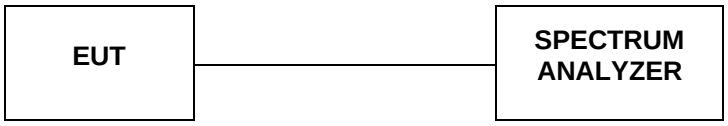
4.7. 26dBc Bandwidth

TEST CONFIGURATION



TEST PROCEDURE

According to KDB789033 D02 General UNII Test Procedures New Rules v01 for one of the following procedures may be used for Emission Bandwidth (EBW) measurement:

a. Set RBW = 300 kHz (approximately 1% of the emission bandwidth).
b. Set the video bandwidth (VBW) = 1000 KHz (VBW > RBW)
c. Detector = Peak.
d. Trace mode = max hold.
e. Sweep = auto couple.
f. Allow the trace to stabilize
g. Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described above.

LIMIT

No Limits for 26dBc Bandwith

TEST RESULTS

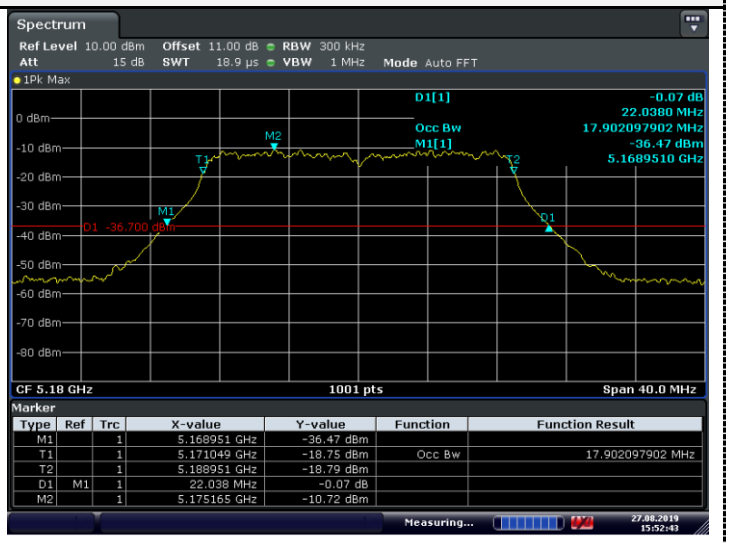
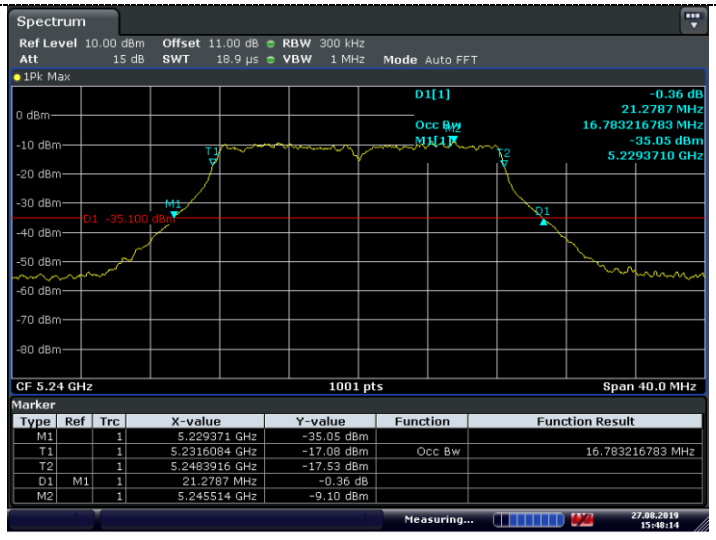
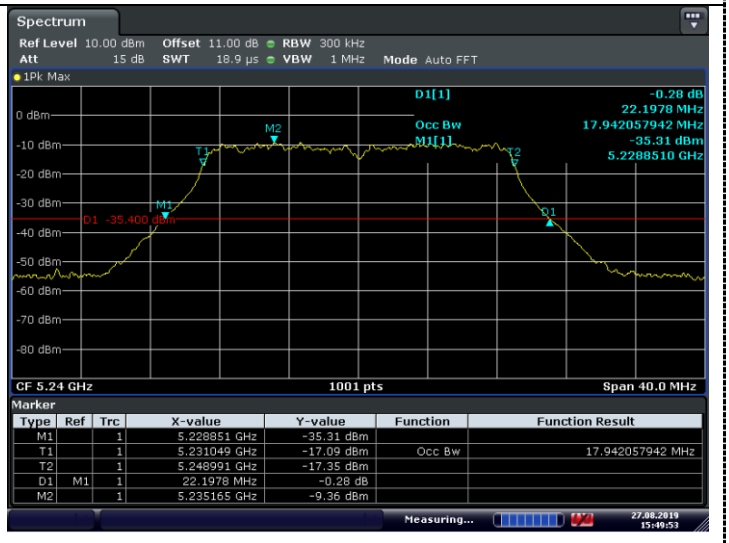
Antenna 0

Type	Channel	99%Bandwidth (MHz)	26dB Bandwidth (MHz)	Limit (KHz)	Result
802.11a	36	16.86	21.58	-	Pass
	40	16.86	21.32		
	48	16.78	21.28		
802.11nHT20	36	17.90	22.04	-	Pass
	40	17.90	22.00		
	48	17.94	22.20		
802.11ac20	36	17.90	22.00	-	Pass
	40	17.90	22.08		
	48	17.94	21.96		
802.11n40	38	36.68	44.00	-	Pass
	46	36.60	44.12		
802.11ac40	38	36.52	43.24	-	Pass
	46	36.52	43.40		
802.11ac80	42	75.12	82.08	-	Pass

Antenna 1

Type	Channel	99%Bandwidth (MHz)	26dB Bandwidth (MHz)	Limit (KHz)	Result
802.11a	36	16.86	21.34	-	Pass
	40	16.86	21.40		
	48	16.78	21.20		
802.11nHT20	36	17.90	22.16	-	Pass
	40	17.90	21.96		
	48	17.94	22.32		
802.11ac20	36	17.94	22.08	-	Pass
	40	17.94	22.16		
	48	17.94	22.04		
802.11n40	38	36.68	44.16	-	Pass
	46	36.60	44.28		
802.11ac40	38	36.52	43.40	-	Pass
	46	36.52	43.48		
802.11ac80	42	75.12	82.24	-	Pass

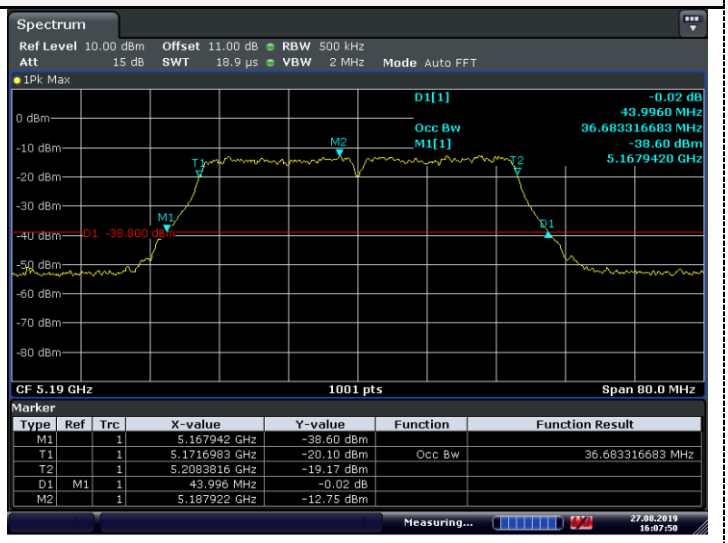
Antenna 0

802.11a	802.11n HT20
	
Date: 27.AUG.2019 15:42:49	Date: 27.AUG.2019 15:52:43
CH36	CH36
	
Date: 27.AUG.2019 15:46:53	Date: 27.AUG.2019 15:51:21
CH40	CH40
	
Date: 27.AUG.2019 15:48:14	Date: 27.AUG.2019 15:49:53
CH48	CH48

802.11ac20

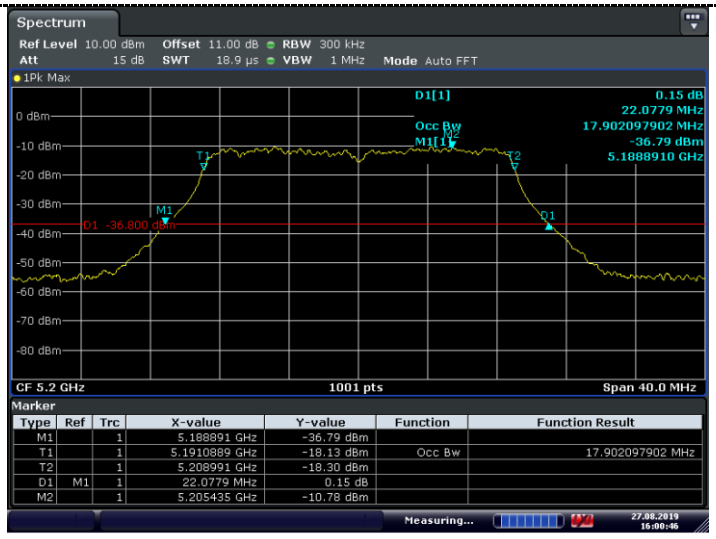
Date: 27.AUG.2019 15:59:33

802.11n HT40



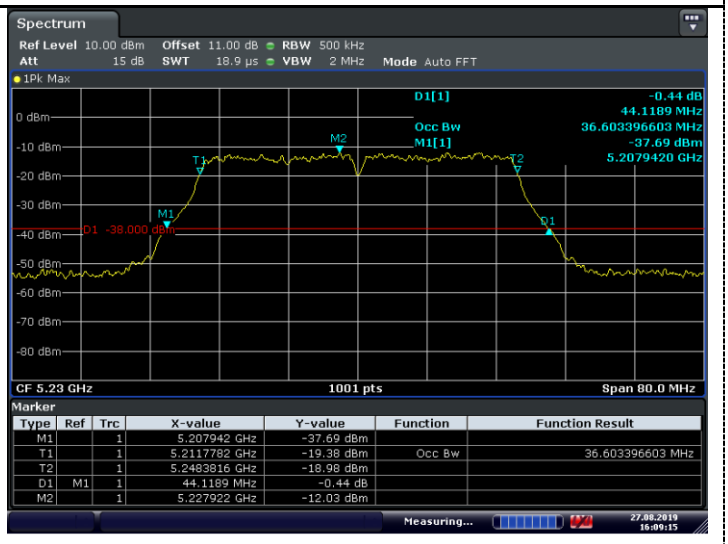
Date: 27.AUG.2019 16:07:50

CH36



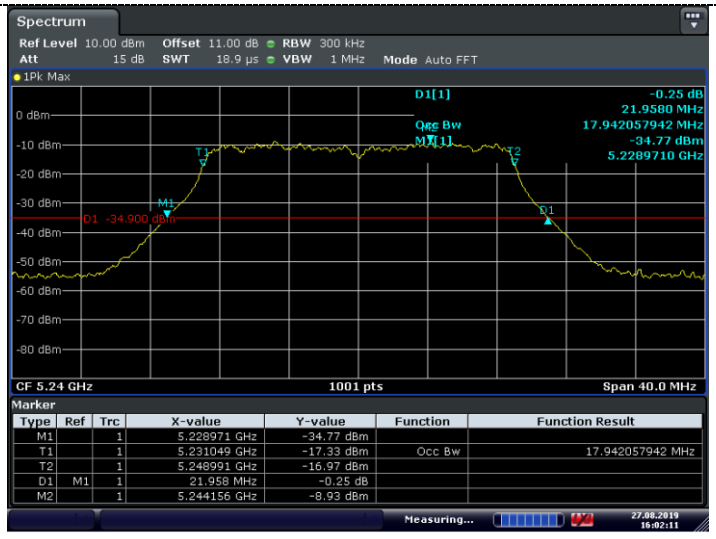
Date: 27.AUG.2019 16:00:46

CH38



Date: 27.AUG.2019 16:09:15

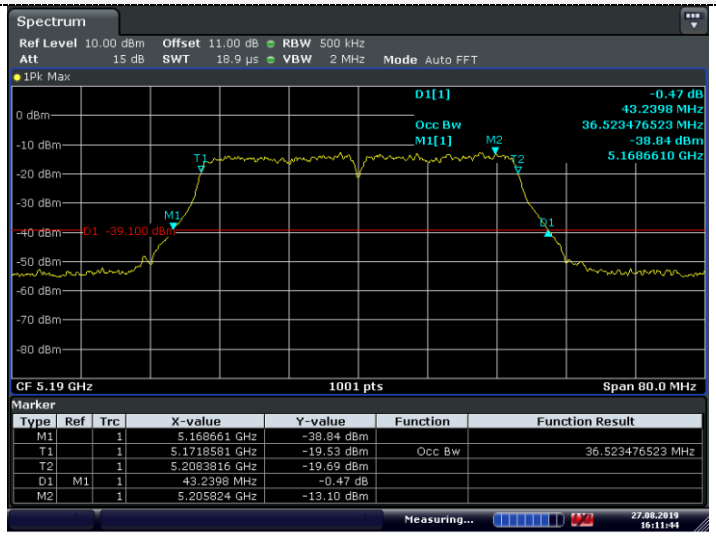
CH40



Date: 27.AUG.2019 16:02:11

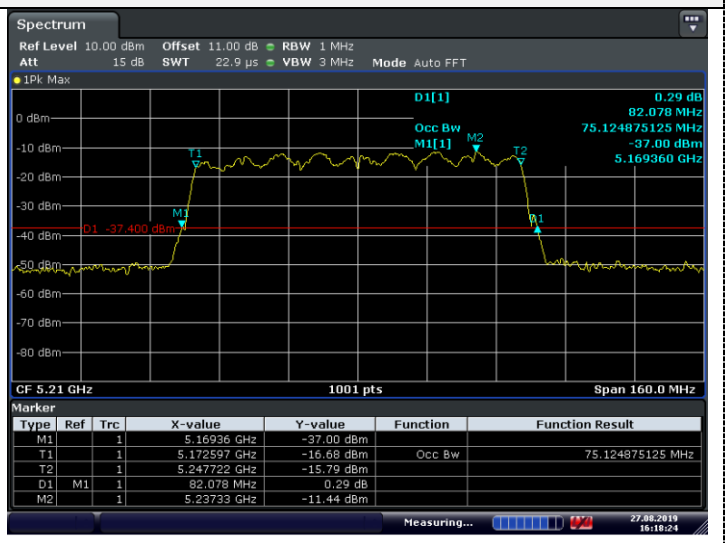
CH48

802.11ac40



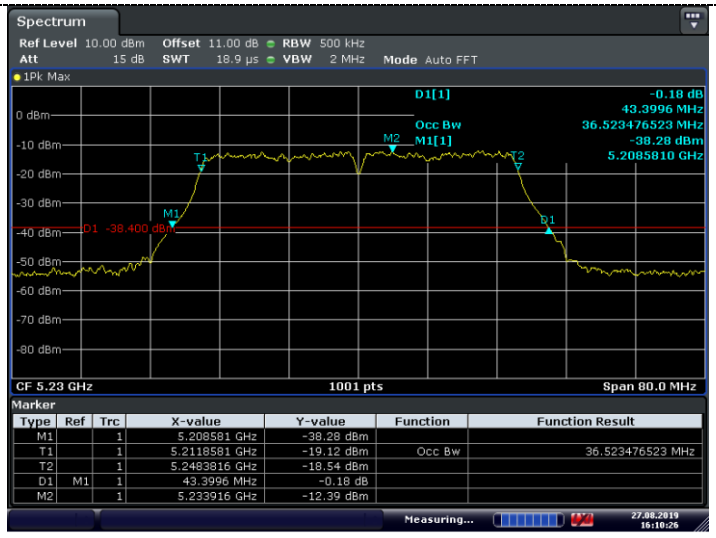
Date: 27.AUG.2019 16:11:44

802.11ac80



Date: 27.AUG.2019 16:18:24

CH38

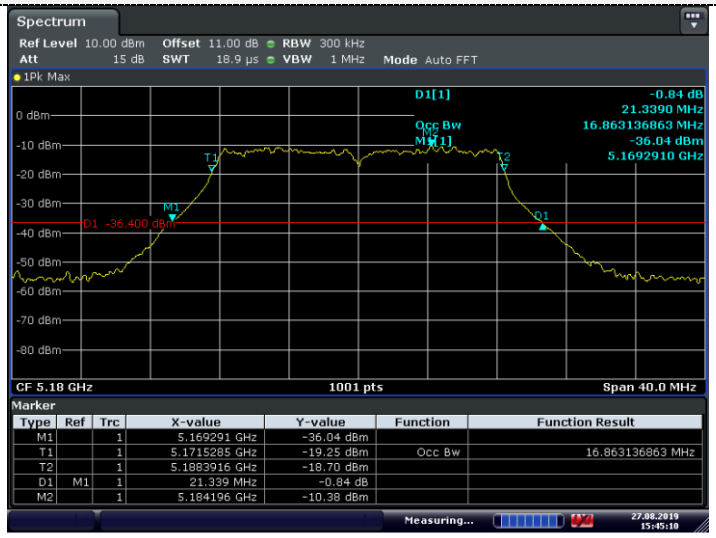


Date: 27.AUG.2019 16:10:27

CH46

Antenna 1

802.11a

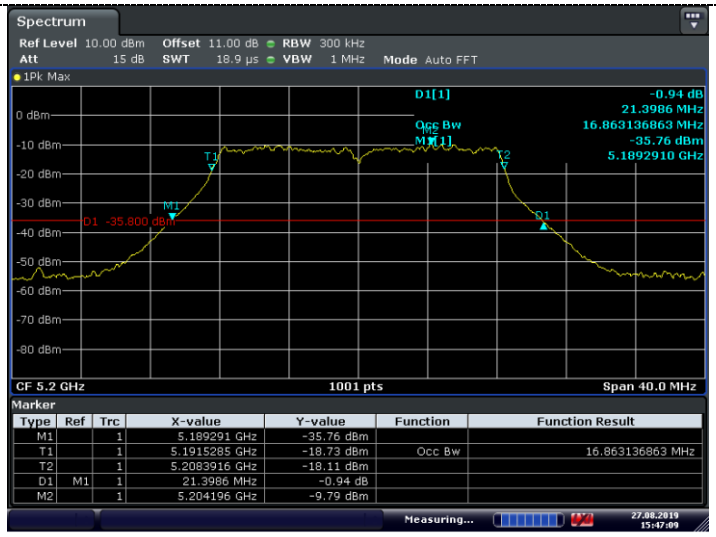


Date: 27.AUG.2019 15:45:10

802.11n HT20

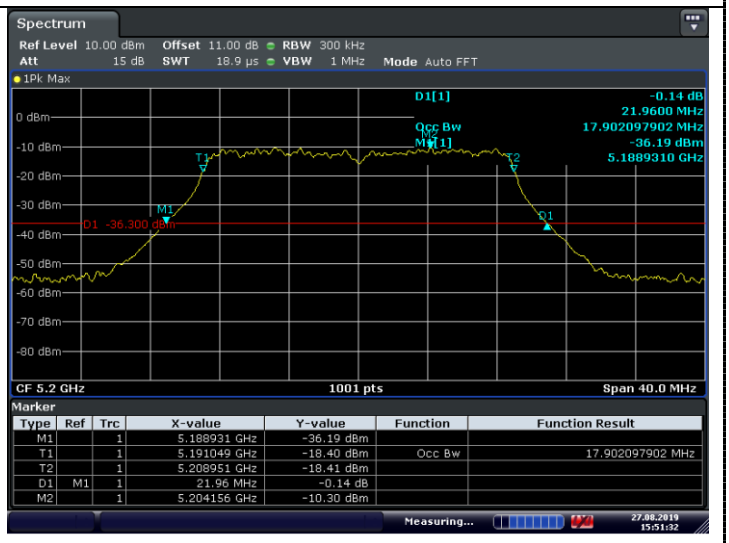
Date: 27.AUG.2019 15:52:55

CH36



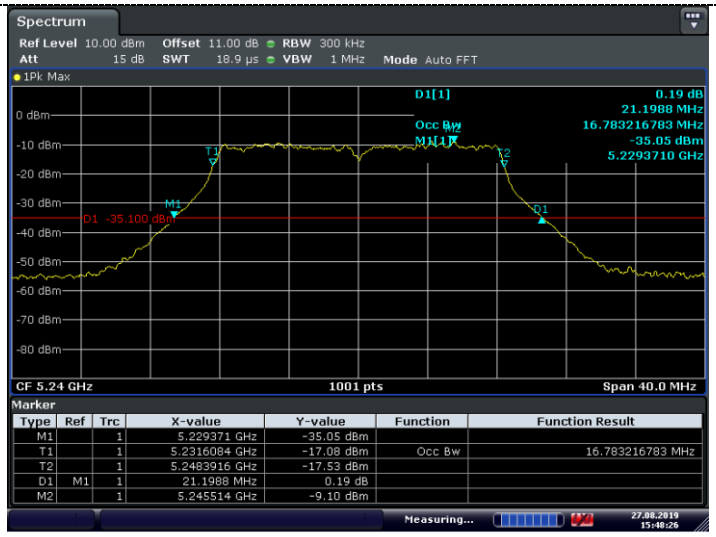
Date: 27.AUG.2019 15:47:09

CH36



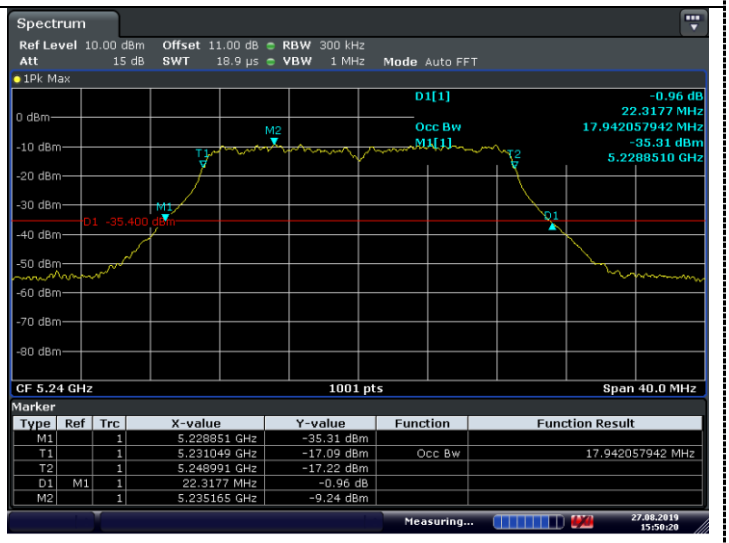
Date: 27.AUG.2019 15:51:32

CH40



Date: 27.AUG.2019 15:48:27

CH40



Date: 27.AUG.2019 15:50:20

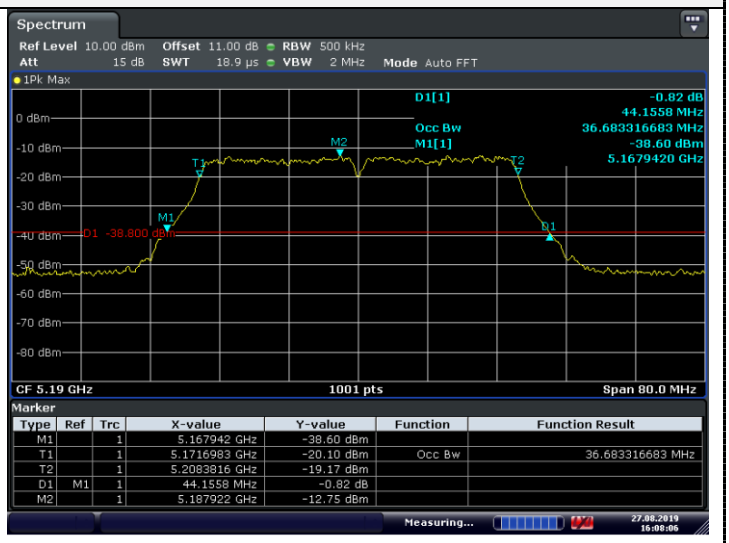
CH48

802.11ac20

Date: 27.AUG.2019 15:59:46

CH48

802.11n HT40

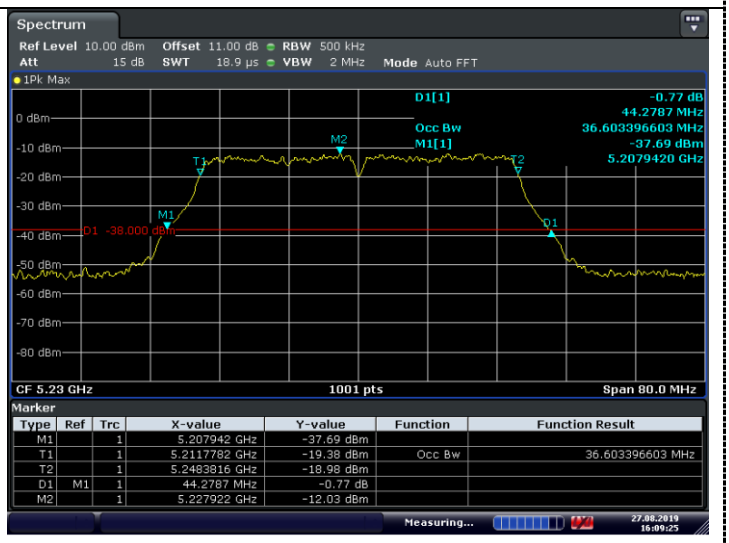


Date: 27.AUG.2019 16:08:06

CH36

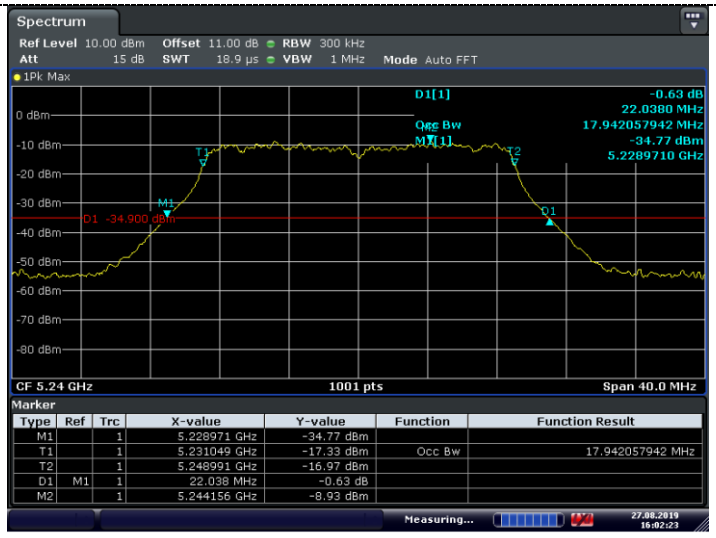
Date: 27.AUG.2019 16:00:57

CH38



Date: 27.AUG.2019 16:09:25

CH40

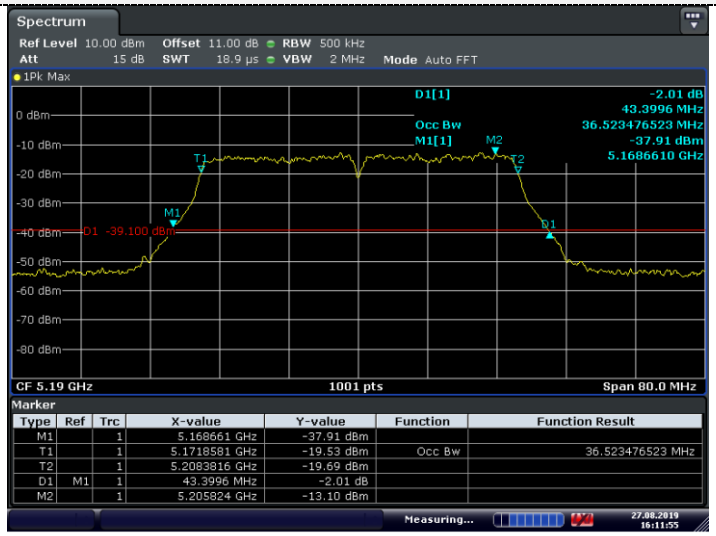


Date: 27.AUG.2019 16:02:23

CH46

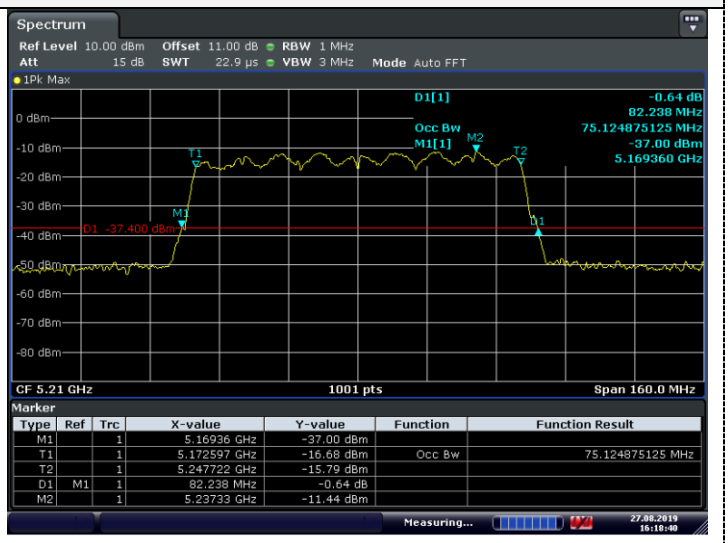
CH48

802.11ac40



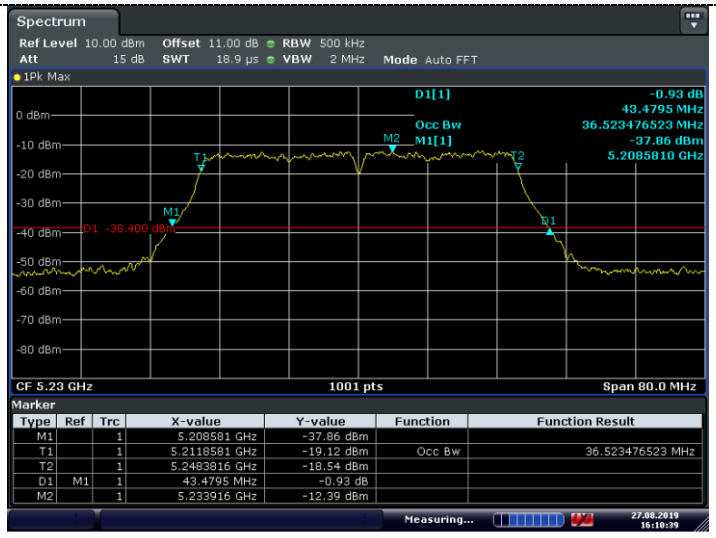
Date: 27.AUG.2019 16:11:55

802.11ac80



Date: 27.AUG.2019 16:18:40

CH38



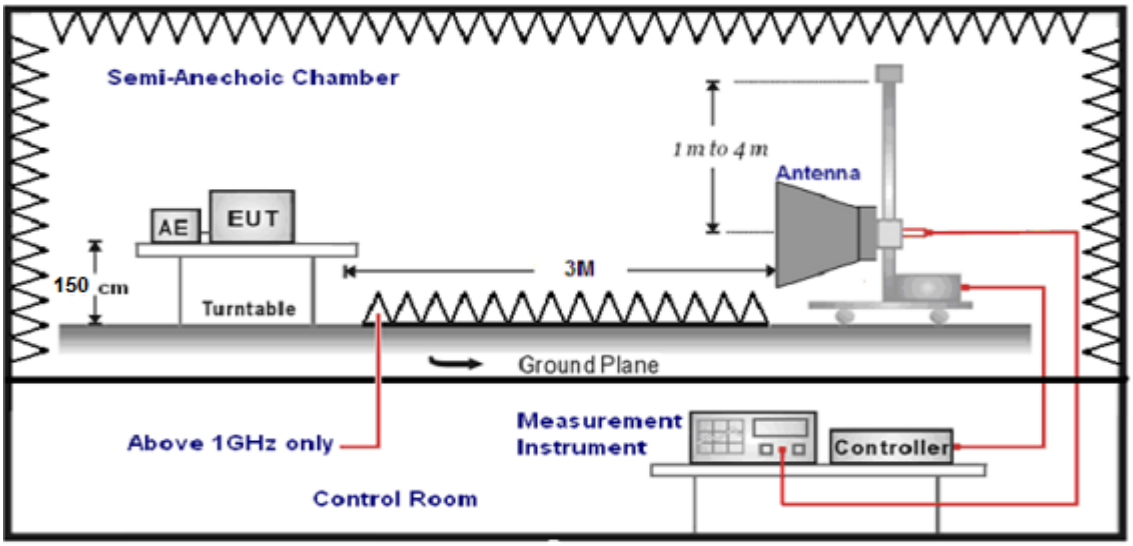
Date: 27.AUG.2019 16:10:39

CH46

CH42

4.8. Band Edge Compliance

TEST CONFIGURATION



LIMIT

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-30	3	20log(30)+ 40log(30/3)	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

According to §15.407 (b): Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits

Frequency (MHz)	EIRP Limit (dBm)	Equivalent Field Strength at 3m (dBμV/m)
5150-5250	-27	68.2
5250-5350	-27	68.2
5470-5725	-27	68.2
5725-5850	-27 (beyond 10MHz of the bandedge)	68.2
	-17 (within 10 MHz of band edge)	78.2

TEST PROCEDURE

1. The EUT was placed on a turn table which is 1.5m above 1GHz.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed..
5. The distance between test antenna and EUT as following table states:

Test Frequency range	Test Antenna Type	Test Distance
1GHz-18GHz	Double Ridged Horn Antenna	3

6. Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
1GHz-18GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto	Peak

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

TEST RESULTS

Remark:For radiated bandedge We measured at both mode, recorded worst case at MIMO 802.11 a mode;

For Radiated Bandedge Measurement

802.11 a/ Channel 36 :5180 MHz									
Freq (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBµV/m)	Limit Line (dBµV/m)	Margin (dB)	Detector	Polarization
5148.26	35.24	35.58	29.04	8.28	50.06	74	23.94	Peak	Horizontal
5148.26	24.45	35.58	29.04	8.28	39.27	54	14.73	AV	Horizontal

802.11 a/ Channel 48 :5240 MHz									
Freq (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBµV/m)	Limit Line (dBµV/m)	Margin (dB)	Detector	Polarization
5353.12	35.62	35.42	29.06	8.39	50.37	74	23.63	Peak	Horizontal
5353.12	25.35	35.42	29.06	8.39	40.10	54	13.90	AV	Horizontal

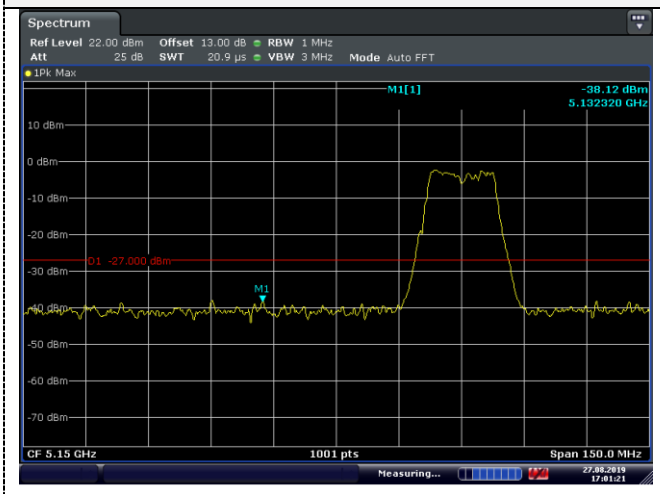
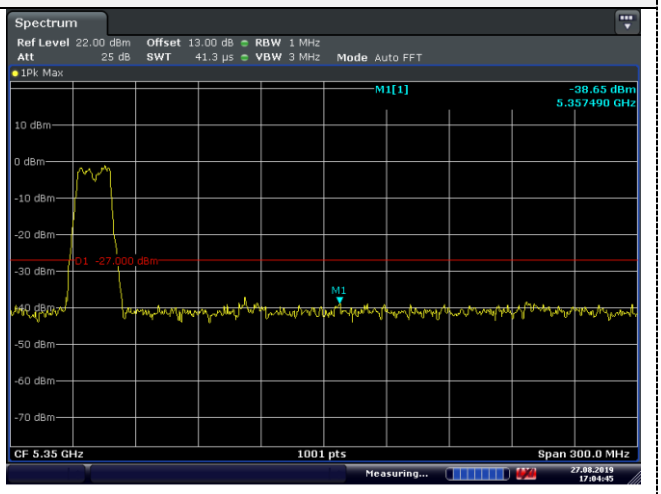
802.11 a/ Channel 149 :5745 MHz									
Freq (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBµV/m)	Limit Line (dBµV/m)	Margin (dB)	Detector	Polarization
5713.23	39.81	35.29	29.13	8.65	54.62	110.73	49.93	Peak	Horizontal

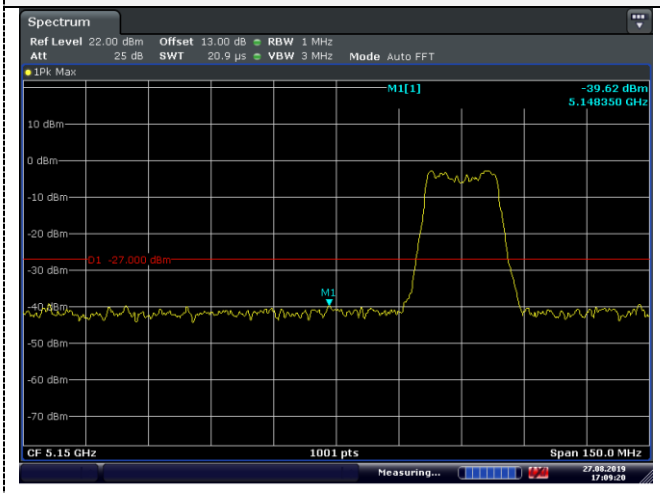
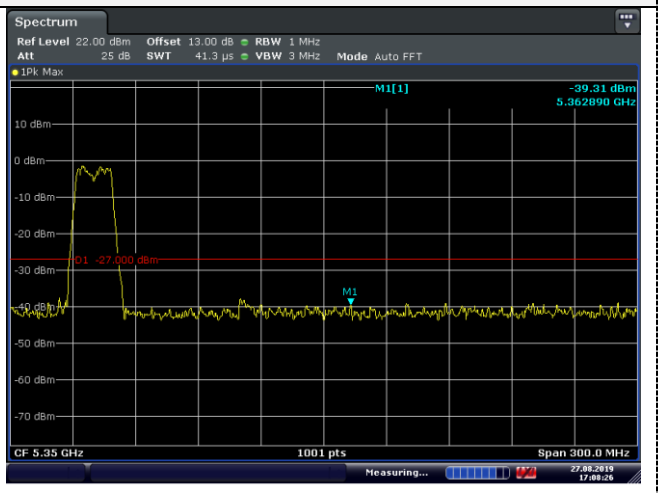
802.11 a/ Channel 165 :5825 MHz									
Freq (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBµV/m)	Limit Line (dBµV/m)	Margin (dB)	Detector	Polarization
5877.19	40.50	35.29	29.18	8.80	55.41	103.58	57.49	Peak	Horizontal

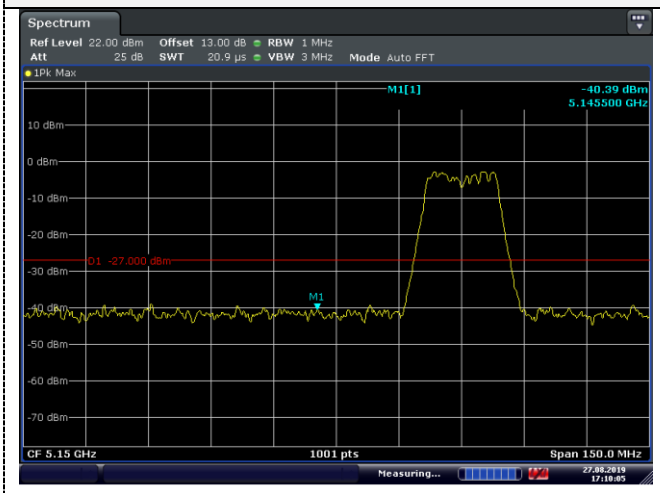
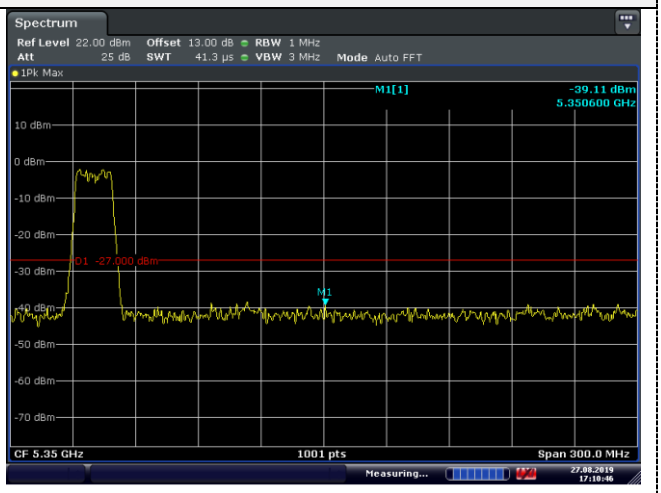
REMARKS:
1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. The other emission levels were very low against the limit.
3. The average measurement was not performed when the peak measured data under the limit of average detection.
4. Detector AV is setting spectrum/receiver. RBW=1MHz/VBW=10Hz/Sweep time=Auto/Detector=Peak;

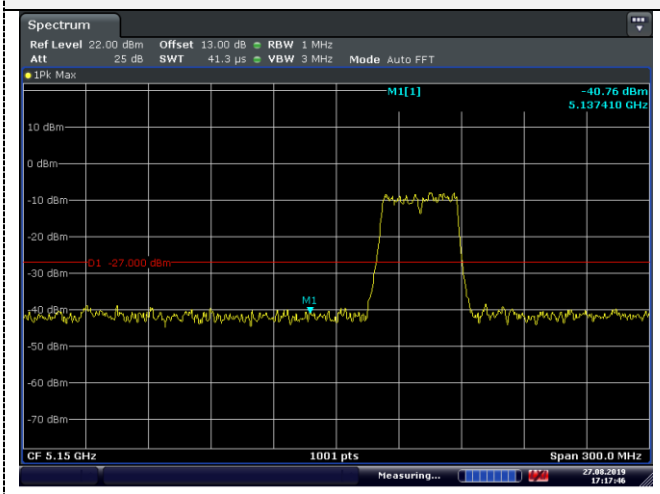
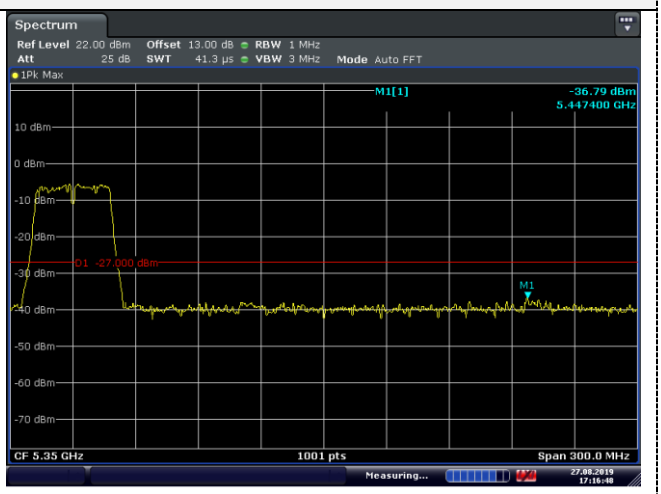
For Conducted Band edge Measurement
Note:each antenna port have 3dB margin from the limit,so the MIMO mode below the limit.
The test results have included the antenna gain

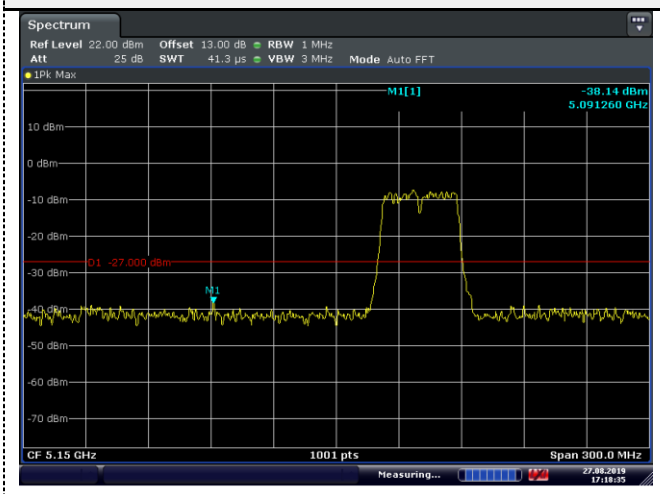
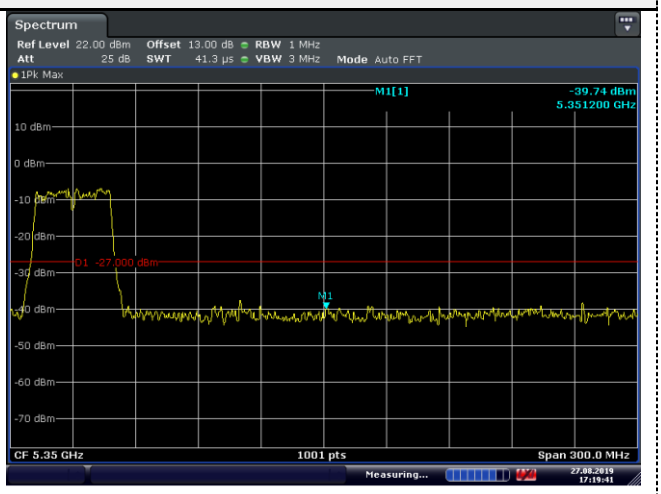
Antenna 0
5150-5250MHz:

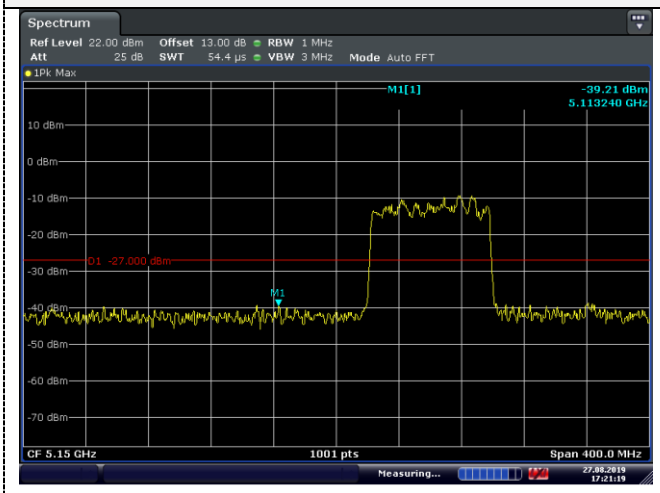
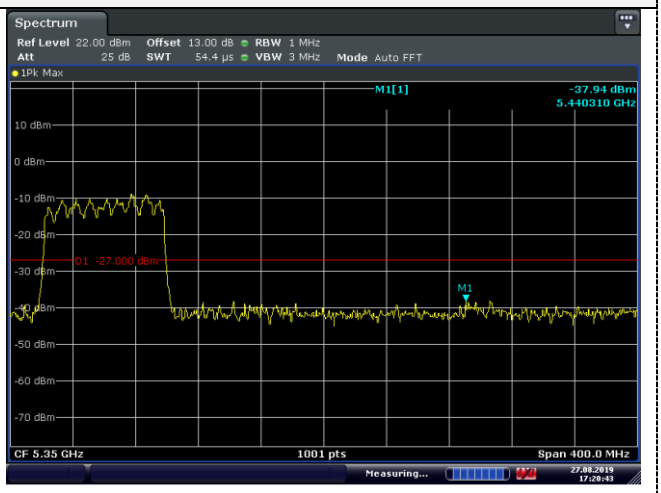
802.11a	
	
5180 MHz	5240 MHz

802.11n HT20	
	
5180 MHz	5240 MHz

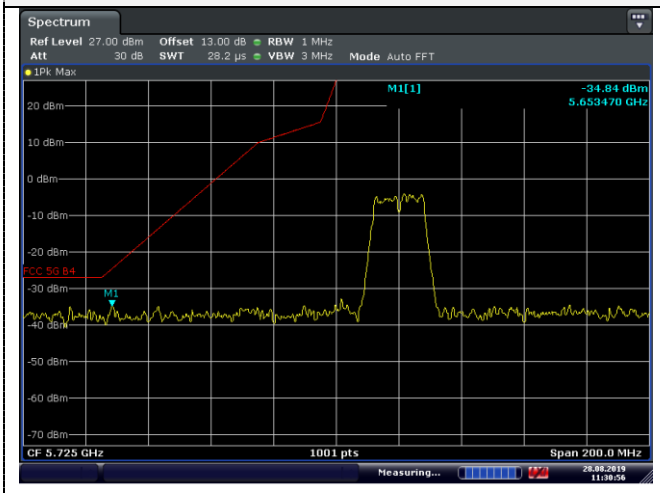
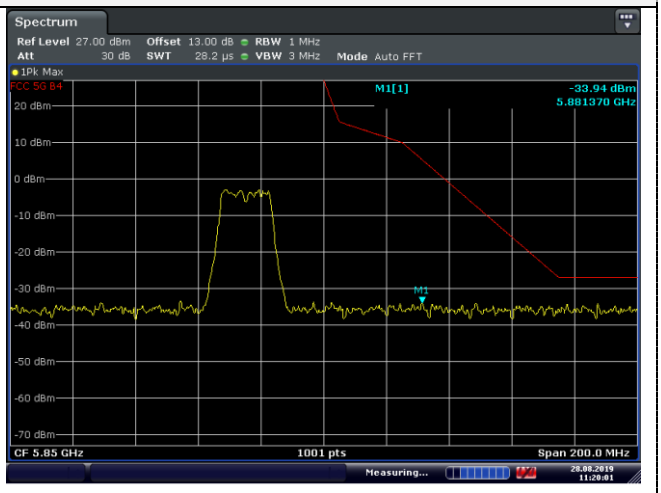
802.11ac20	
	
5180 MHz	5240 MHz

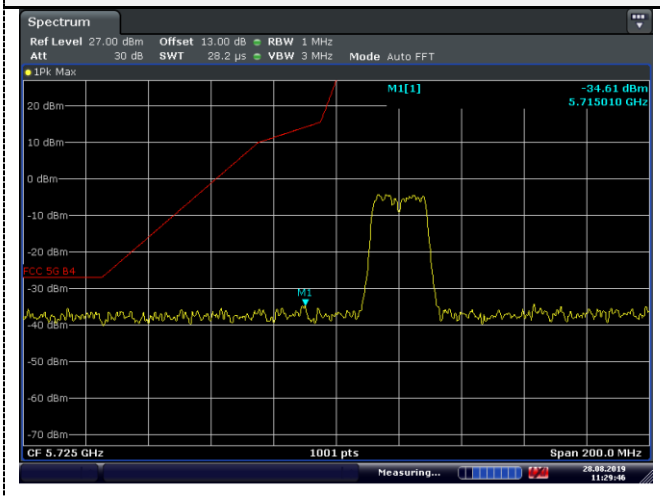
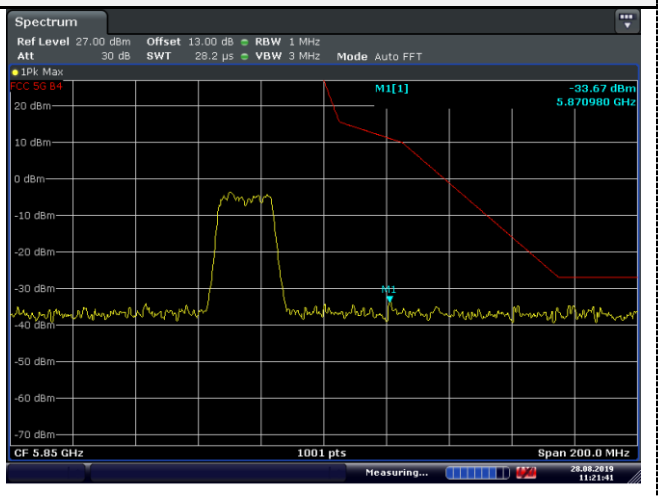
802.11n HT40	
	
5190 MHz	5230 MHz

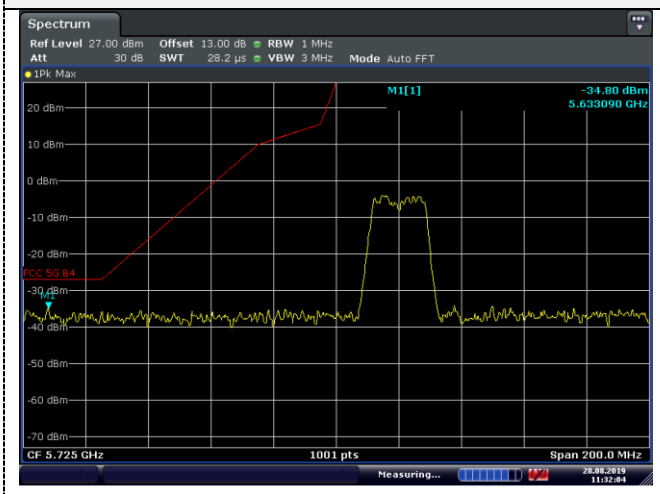
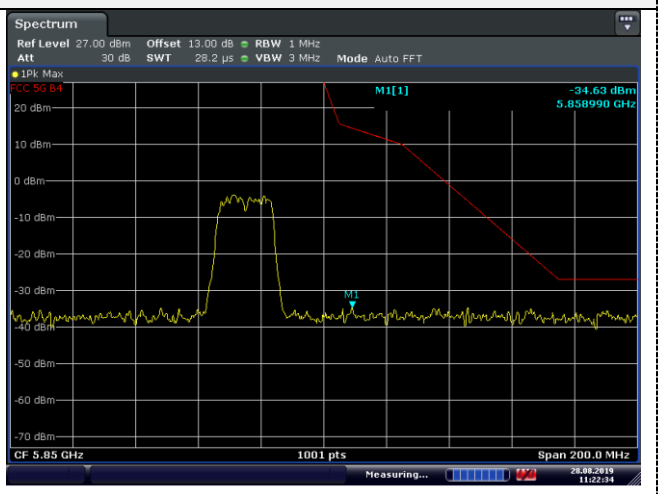
802.11ac40	
	
5190 MHz	5230 MHz

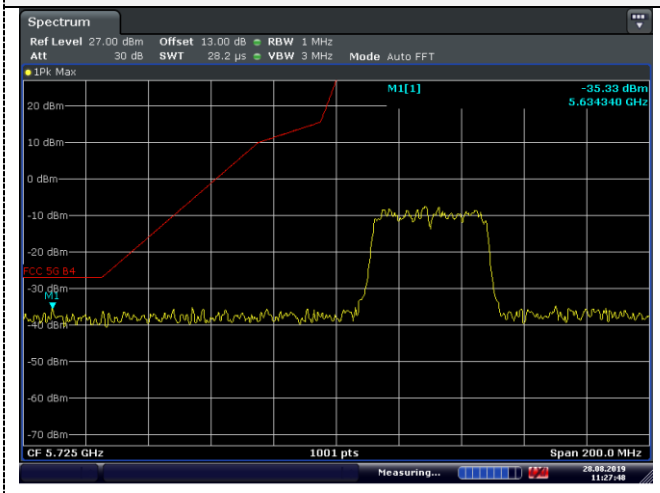
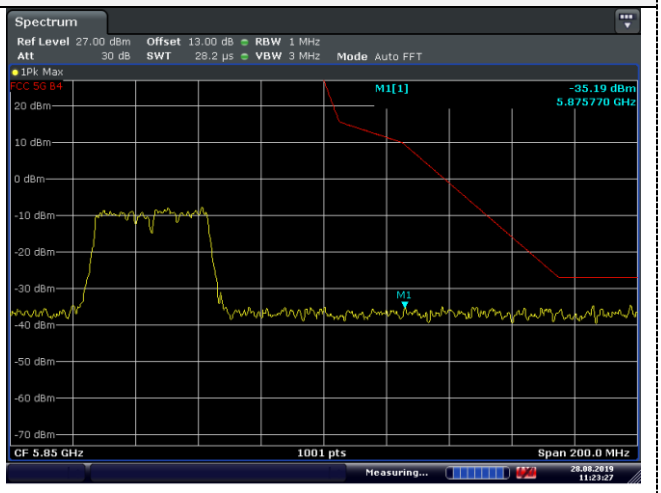
802.11ac80	
	
5210 MHz	5210 MHz

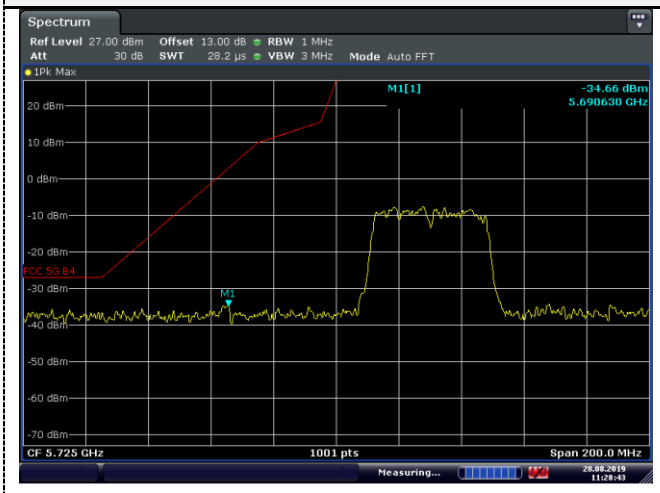
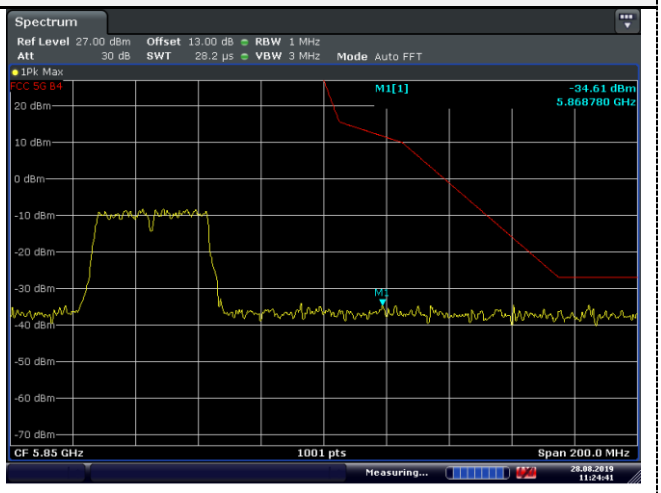
5725-5850MHz:

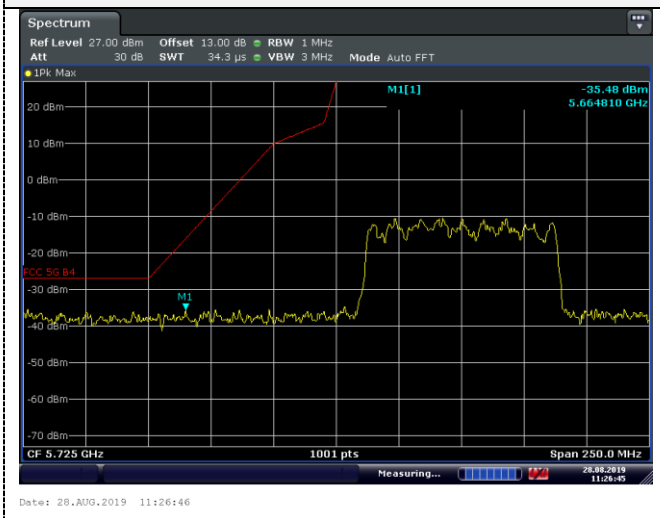
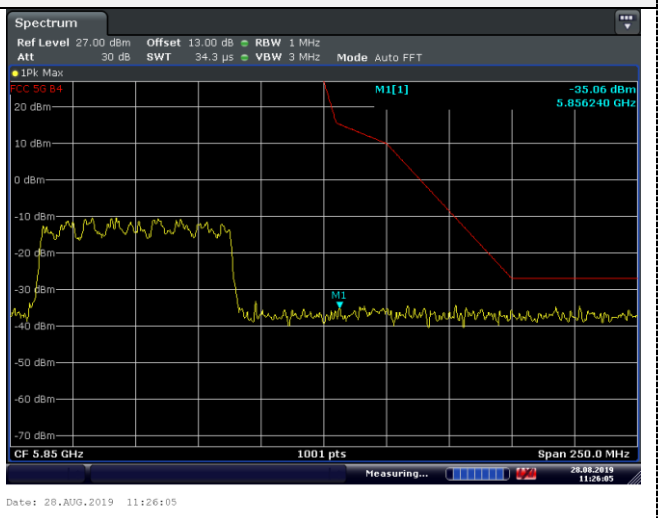
802.11a	
	
5745 MHz	5825 MHz

802.11n HT20	
	

5745 MHz	5825 MHz
802.11ac20	
	
5745 MHz	5825 MHz

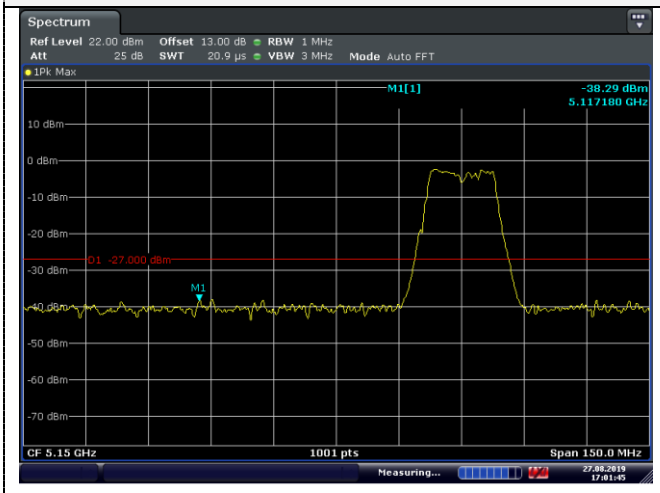
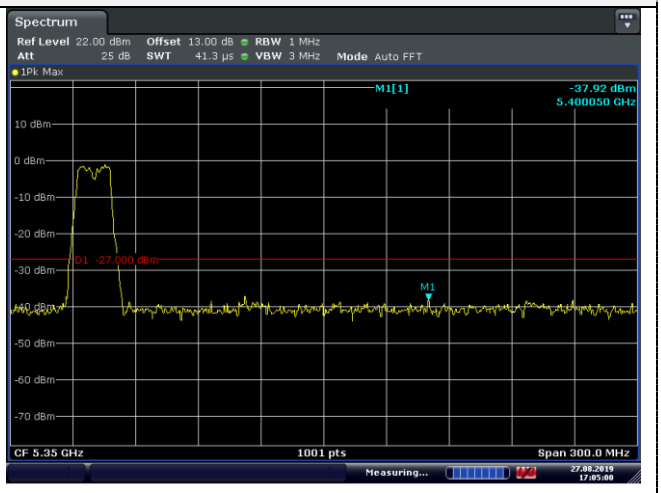
5755 MHz	5795 MHz
802.11n HT40	
	
5755 MHz	5795 MHz

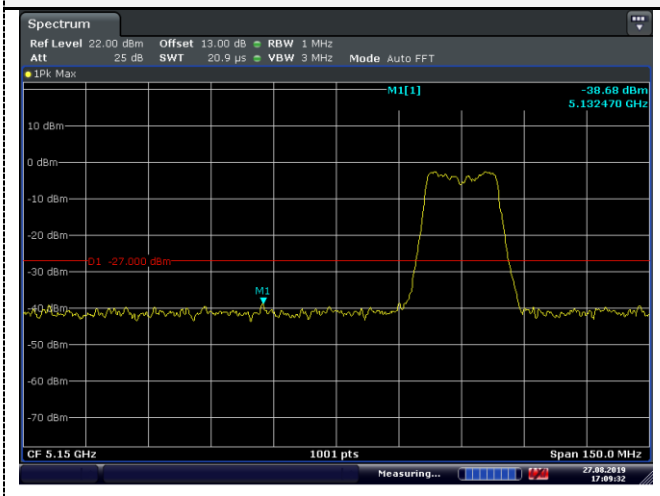
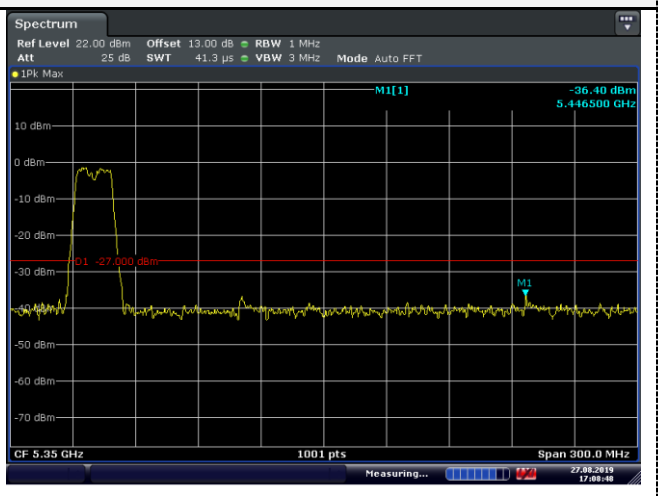
5755 MHz	5795 MHz
802.11ac40	
	
5755 MHz	5795 MHz

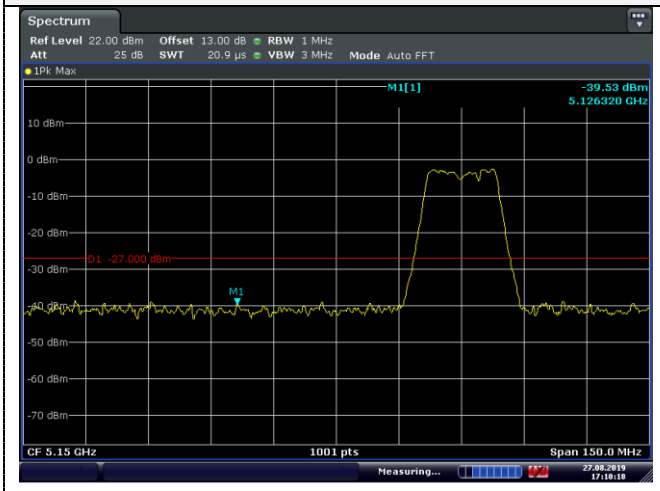
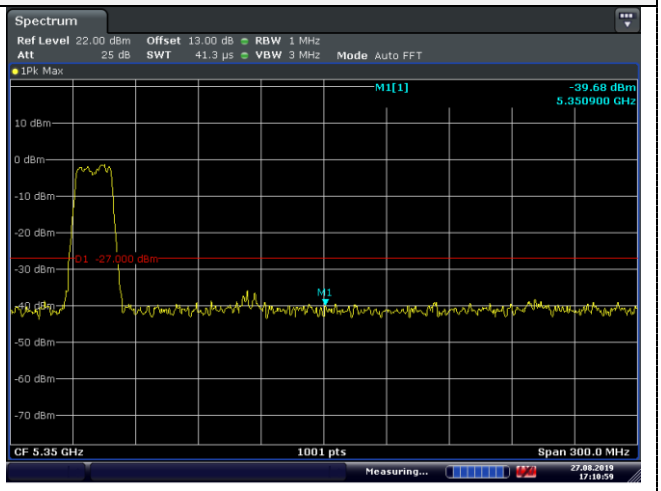
802.11ac80	
	
5775 MHz	5775 MHz

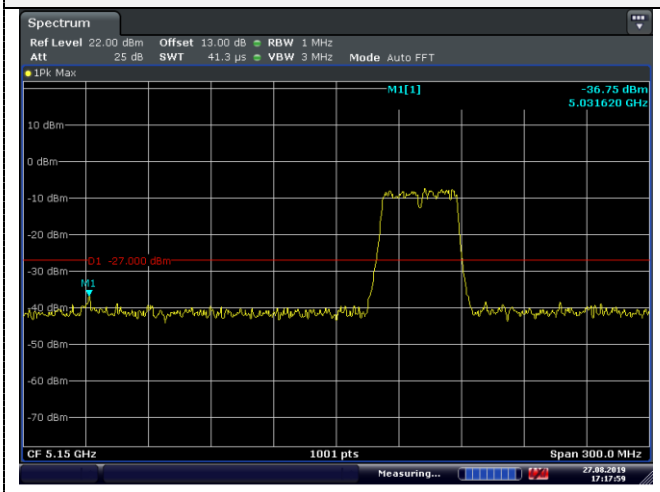
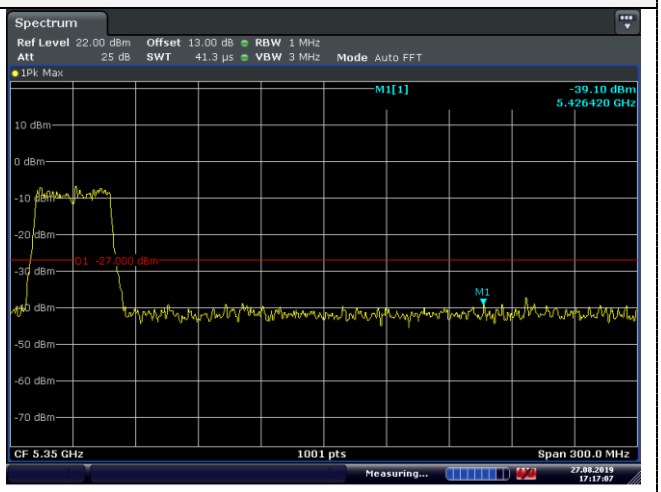
Antenna 1

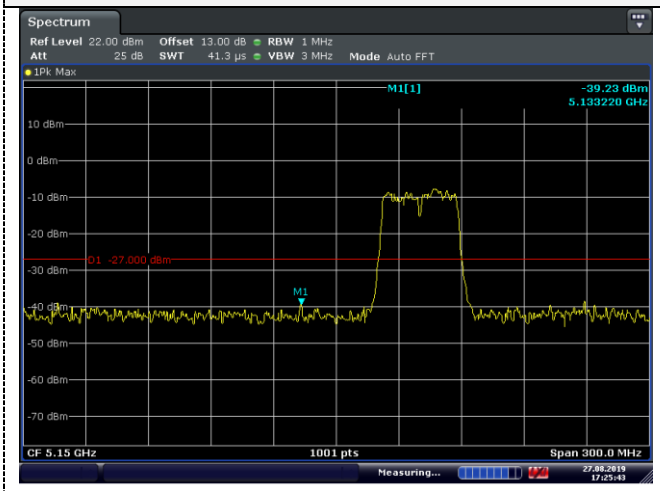
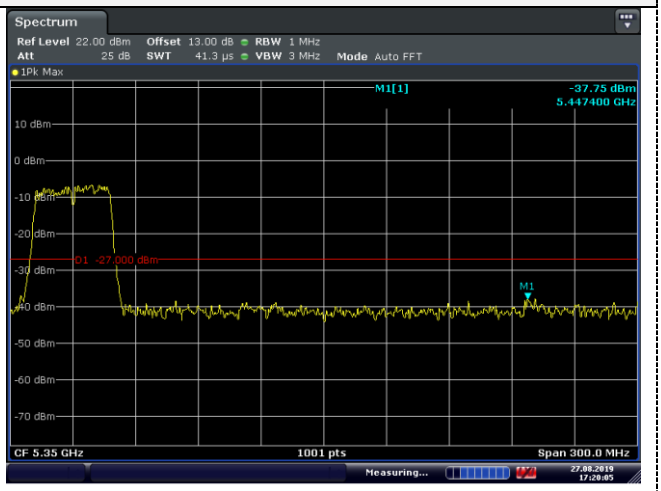
5150-5250MHz:

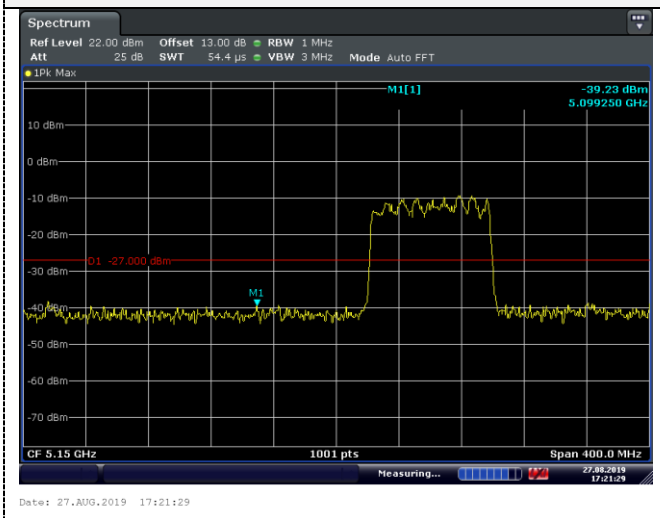
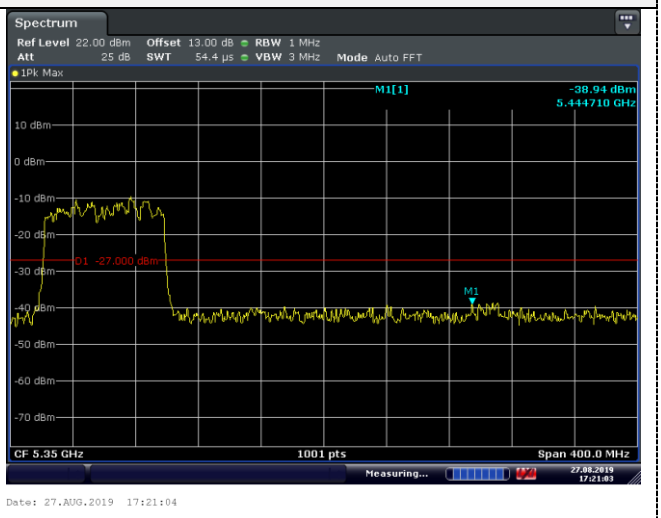
802.11a	
	
5180 MHz	5240 MHz

802.11n HT20	
	

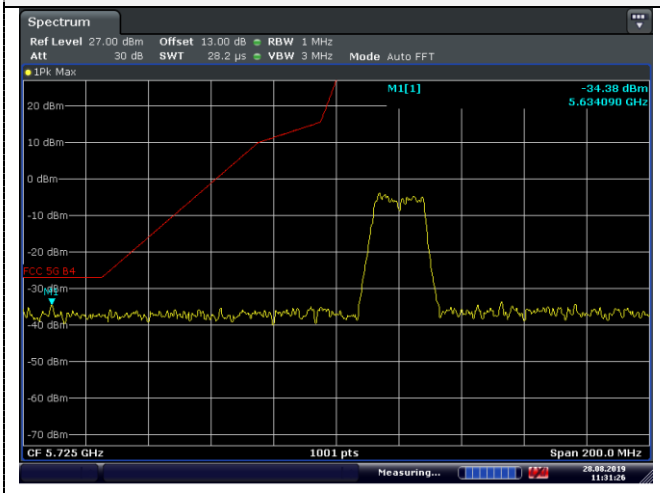
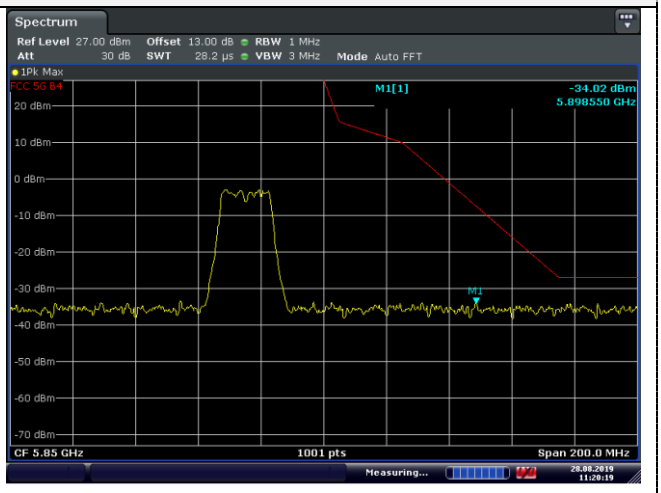
5180 MHz	5240 MHz
802.11ac20	
	
5180 MHz	5240 MHz

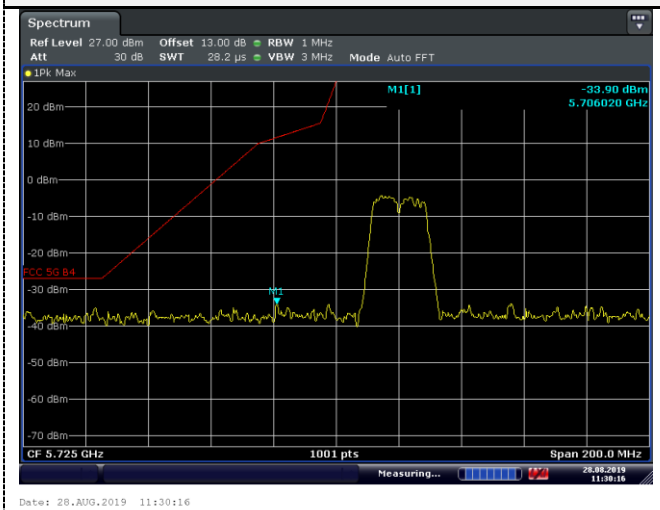
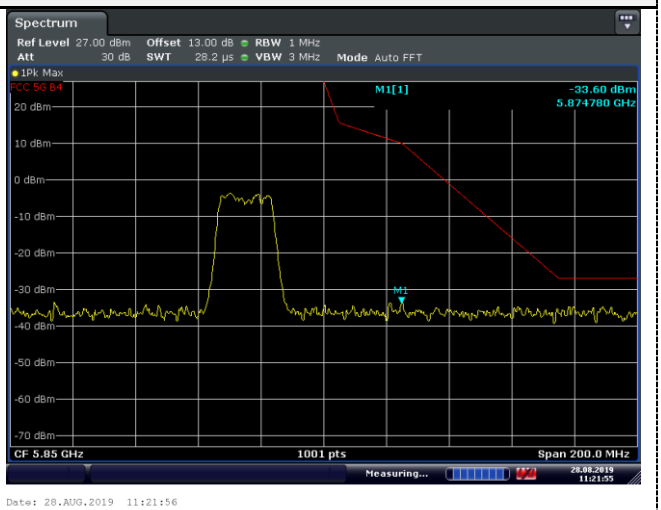
802.11n HT40	
	
5190 MHz	5230 MHz

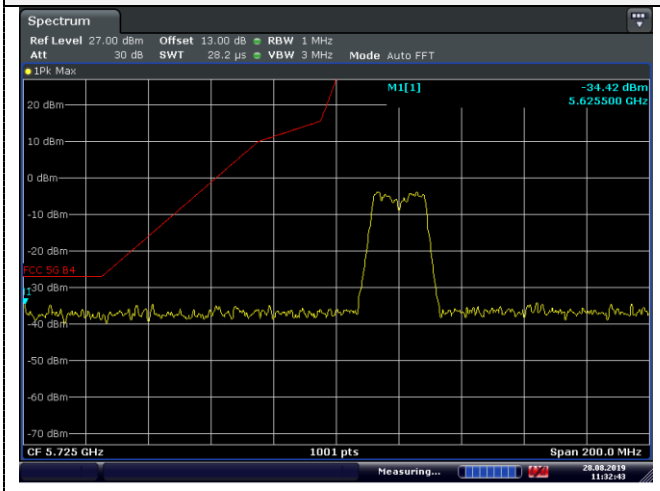
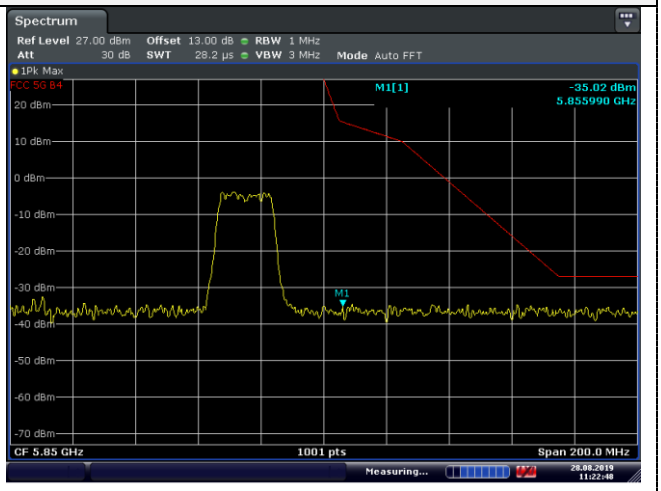
802.11ac40	
	
5190 MHz	5230 MHz

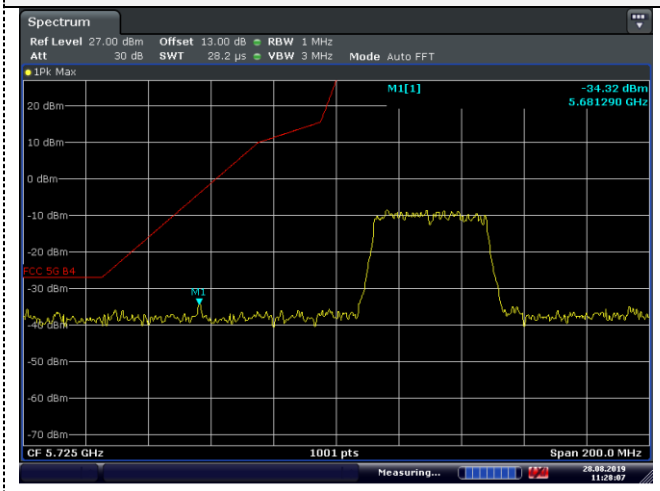
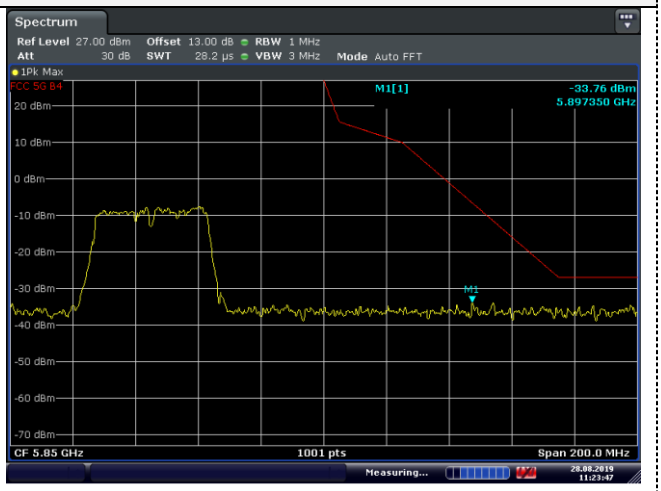
802.11ac80	
	
5210 MHz	5210 MHz

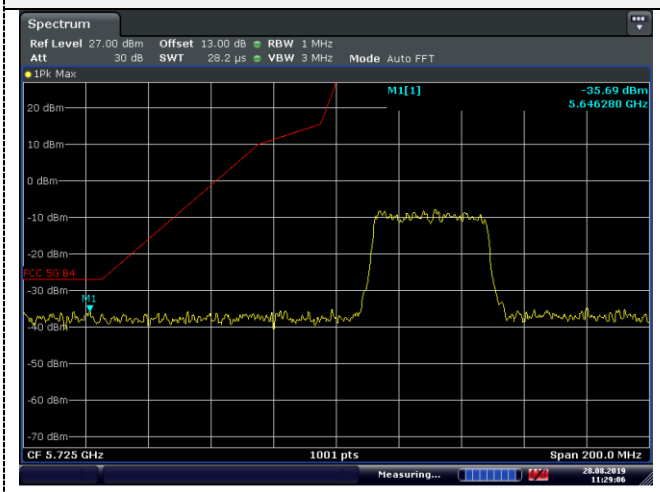
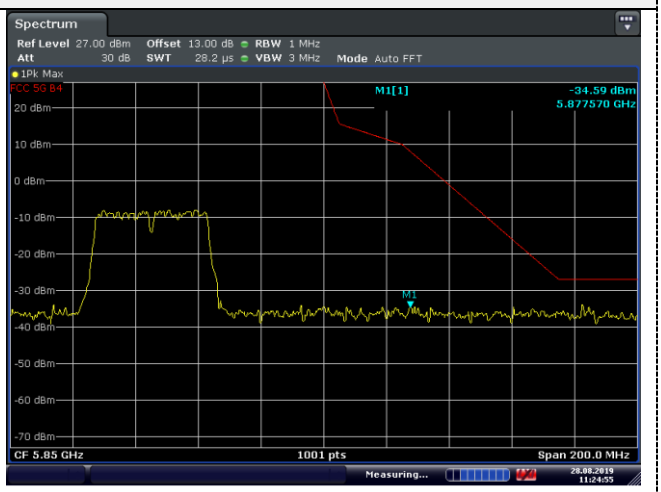
5725-5850MHz:

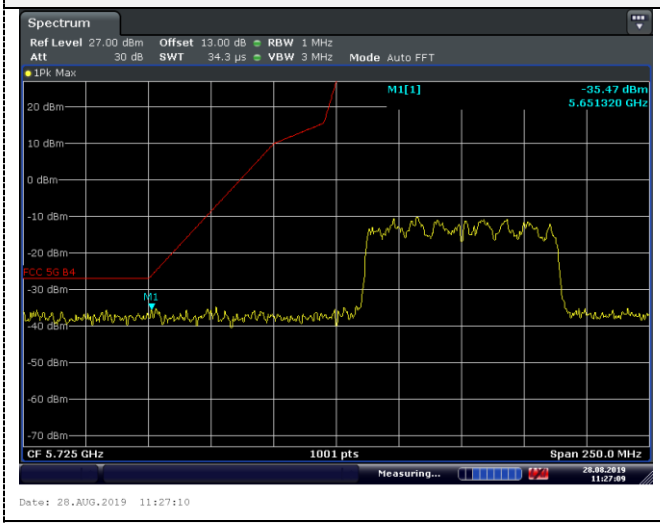
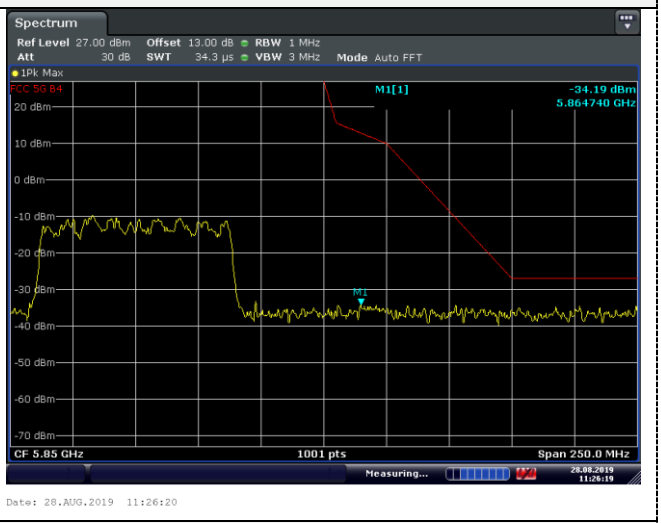
802.11a	
	
5745 MHz	5825 MHz

802.11n HT20	
	

5745 MHz	5825 MHz
802.11ac20	
	
5745 MHz	5825 MHz

5755 MHz	5795 MHz
802.11n HT40	
	
5755 MHz	5795 MHz

5755 MHz	5795 MHz
802.11ac40	
	
5755 MHz	5795 MHz

802.11ac80	
	
5775 MHz	5775 MHz

4.9. Antenna Requirement

Standard Applicable

For intentional device, according to FCC 47 CFR Section 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.

And according to FCC 47 CFR Section 15.407 (a), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

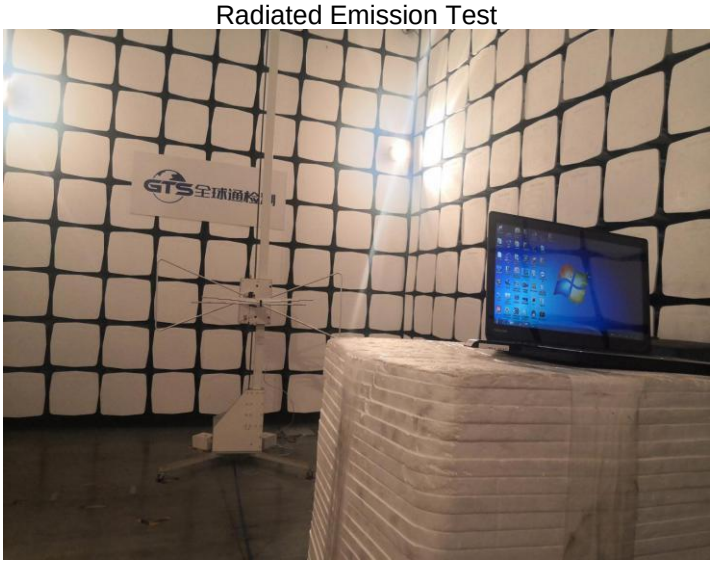
Antenna Information

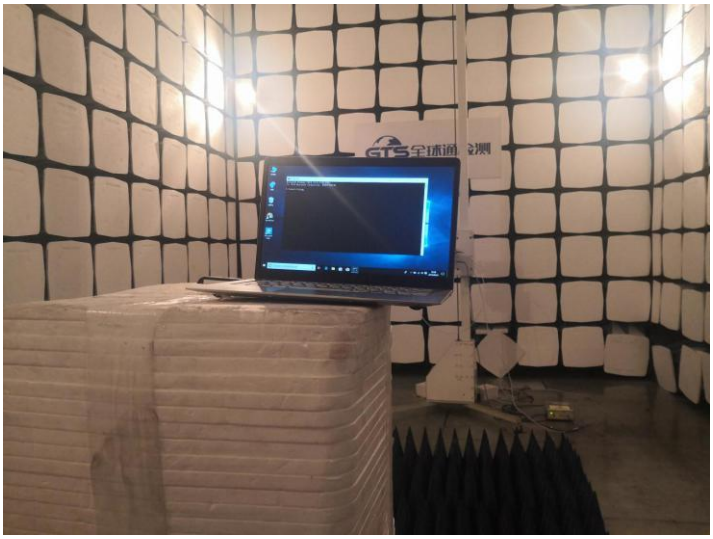
The antenna is PCB antenna, through the buckle stretched out, The directional gains of antenna used for transmitting is 2.00dBi.

Reference to the test report No. **GTS20190613008-1-7**

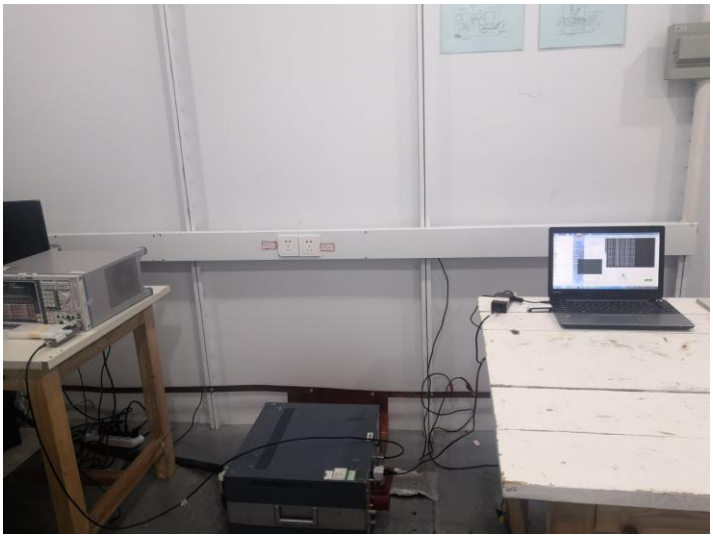
5. TEST SETUP PHOTOS OF THE EUT

Radiated Emission Test





Conducted Emission



6. EXTERNAL AND INTERNAL PHOTOS OF THE EUT

Please refer to separated files for External and Internal Photos of the EUT.

.....End of Report.....