



FCC Part 15E REPORT

FCC ID: Z8FMIMO11ABGN

Applicant : AirLink WiFi Networking Corp.

**Address : 3F-1 Room B , No.97, Sec 4, Chung ,Hsin Rd., San Chung
City, Taipei, Hsien 241,Taiwan, ROC**

Equipment Under Test(EUT):

Name : UltraSky MIMO 11abgn USB Dongle/CPE

Model : M27, M27C5, M27C5-16

In Accordance with Standards: FCC PART 15, SUBPART E: 2013 (Section 15.407)

Test Procedure Used: ANSI C63.10:2009; ANSI C63.4:2009; KDB 789033 D01
General UNII Test Procedures v01r03; KDB 662911 D01 Multiple Transmitter Output
v02r01

Report No : CST-TCB140307009-1

Date of Test : March 19-March 23, 2014

Date of Issue : March 24, 2014

Test Result: PASS

In the configuration tested, the EUT complied with the standards specified above

Authorized Signature

(Mark Zhu) General Manager

The manufacture should ensure that all the products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of Shenzhen Certification Technology Service Co., Ltd. Or test done by Shenzhen Certification Technology Service Co., Ltd. Approvals in connection with, distribution or use of the product described in this report must be approved by Shenzhen Certification Technology Service Co., Ltd. Approvals in writing.

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1 General Information

1.1 Description of Device (EUT)

Product Name	: UltraSky MIMO 11abgn USB Dongle/CPE
Trade Name	: AirLinkWiFi.Net
Model Number	: M27, M27C5, M27C5-16
DIFF.	: All model's the function, software and electric circuit are the same, only with a model named different. The test model: M27.
Power supply	: DC 5V from PC with AC 120V/60Hz
Operation Frequency	: IEEE 802.11b: 2412MHz-2462MHz IEEE 802.11g: 2412MHz-2462MHz IEEE 802.11n HT20: 2412-2462MHz, 5180MHz-5240MHz, 5745MHz-5825MHz IEEE 802.11n HT40:2422-2452MHz,5190MHz-5230MHz, 5755MHz-5795MHz IEEE 802.11a:5180MHz-5240MHz, 5.745GHz—5.825GHz
Channel Number	: IEEE 802.11b/g: 11 Channels IEEE 802.11n HT20 2.4GHz band: 11 Channels IEEE 802.11n HT20 5.2GHz band: 4 Channels IEEE 802.11n HT20 5.8GHz band: 5 Channels IEEE 802.11n HT40 2.4GHz band: 7Channels IEEE 802.11n HT40 5.2GHz band: 2Channels IEEE 802.11n HT40 5.8GHz band: 2Channels IEEE 802.11a 5.2GHz band :4Channels IEEE 802.11a 5.8GHz band :5Channels
Modulation Technology	: IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n :OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11a :OFDM(64QAM, 16QAM, QPSK, BPSK)
Data Rate	: IEEE 802.11b: 11/5.5/2/1Mbps. IEEE 802.11g: 54/48/36/24/18/12/9/6Mbps. IEEE 802.11a: 54/48/36/24/18/12/9/6Mbps IEEE 802.11n HT20: 130, 117 ,104, 78, 65, 58.5, 52, 39, 26, 19.5,13, 6.5 Mbps IEEE 802.11n HT40: 270, 243 ,216, 162, 135, 121.5, 108, 81,54,40.5, 27, 13.5Mbps

Antenna Assembly Gain : Reverse SMA connector, max gain 5 dBi for port 1
PCB Antenna, max gain 0 dBi for port 2

Applicant : AirLink WiFi Networking Corp.
3F-1 Room B , No.97, Sec 4, Chung ,Hsin Rd., San Chung City,
Taipei, Hsien 241,Taiwan, ROC

Manufacturer : AirLink iLife Inc.
3F-1 Room B , No.97, Sec 4, Chung ,Hsin Rd., San Chung City,
Taipei, Hsien 241,Taiwan, ROC

Sample Type : Prototype production

Note: 1. This report only test for WIFI 5.2G, for other radio test see other test report.

2. EUT has two antenna, port 1 and port2,port 1 and port 2 has simultaneously transmit WIFI, for simultaneously transmit WIFI only transmitter IEEE 802.11a, IEEE 802.11n HT20 and IEEE 802.11n HT40, simultaneously transmit WIFI only simultaneously the same model and same frequency, not support other simultaneously transmitter. Port 1 antenna and port 2 antenna see the EUT photo.

1.2 Description of Test Facility

Shenzhen Certification Technology Service Co., Ltd.
2F, Building B, East Area of Nanchang Second Industrial Zone,
Gushu 2nd Road, Bao'an District, Shenzhen 518126, P.R. China
FCC Registered No.:197647
IC Registered No.:8528B

2 EMC Equipment List

Equipment	Manufacture	Model No.	Serial No.	Last cal.	Cal Interval
3m Semi-Anechoic	ETS-LINDGRE N	N/A	SEL0017	Nov. 16, 13	1 Year
Spectrum analyzer	Agilent	E4407B	MY46185649	Oct. 31, 13	1 Year
Receiver	R&S	ESCI	100492	Oct. 31, 13	1 Year
Receiver	R&S	ESCI	101202	Oct. 31, 13	1 Year
Bilog Antenna	SCHWARZBE CK	VULB 9168	9168-438	Mar.11, 14	1 Year
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	BBHA 9120 D(1201)	Mar.11, 14	1 Year
ETS Horn Antenna	ETS	3160	SEL0076	Mar.11, 14	1 Year
Active Loop Antenna	Beijing Daze	ZN30900A	SEL0097	Feb.20, 14	1 Year
L.I.S.N.	SCHWARZBE CK	NSLK8126	8126466	Oct. 31, 13	1 Year
Cable	Resenberger	N/A	No.1	Oct. 31, 13	1 Year
Cable	SCHWARZBE CK	N/A	No.2	Oct. 31, 13	1 Year
Cable	SCHWARZBE CK	N/A	No.3	Oct. 31, 13	1 Year
Power Meter	Anritsu	ML2487A	6K00001491	Oct. 31, 13	1 Year
Power sensor	Anritsu	ML2491A	32516	Oct. 31, 13	1 Year
Pre-amplifier	SCHWARZBE CK	BBV9743	9743-019	Oct. 31, 13	1 Year
Pre-amplifier	Quietek	AP-180C	CHM-0602012	Oct. 31, 13	1 Year

3 Test Procedure

POWER LINE CONDUCTED INTERFERENCE: The test procedure used was ANSI Standard C63.4-2003 using a 50 u H LISN. Both Lines were observed. The bandwidth of the receiver was 10kHz with an appropriate sweep speed. The ambient temperature of the EUT was 25°C with a humidity of 58%.

RADIATION INTERFERENCE: The test procedure used was ANSI Standard C63.4-2003 using a ANRITSU spectrum analyzer with a pre-selector. The analyzer was calibrated in dB above a micro volt at the output of the antenna. The resolution bandwidth was 100kHz and the video bandwidth was 300 kHz up to 1 GHz and 1 MHz with a video BW of 3MHz above 1 GHz. The ambient temperature of the EUT was 25°C with a humidity of 58%.

FORMULA OF CONVERSION FACTORS: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer and cable loss. The antenna correction factors and cable loss are stated in terms of dB. The gain of the Pre-selector was accounted for in the Spectrum Analyzer Meter Reading.

Example:

Freq (MHz) METER READING + ACF + CABLE = FS

33.20 dBuV + 10.36 dB + 0.9 dB= 44.46 dBuV/m @ 3m

ANSI STANDARD C63.4-2003 10.1.7 MEASUREMENT PROCEDURES: The EUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The EUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation. When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes. The situation was similar for the conducted measurement except that the table did not rotate. The EUT was setup as described in ANSI Standard C63.4-2003 10.1.7 with the EUT 40 cm from the vertical ground wall.

4 Summary of Measurement

4.1 Summary of test result

The EUT have been tested according to the applicable standards as referenced below.		
Description of Test Item	Standard	Results
Peak Output Power	FCC Part 15: 15.407(a) ANSI C63.10: 2009 IC RSS-210 A8	PASS
Bandwidth	FCC Part 15: 15.407(a) ANSI C63.10: 2009 IC RSS-210 A8 IC RSS-210 A 4.6.1	PASS
Power Spectral Density	FCC Part 15: 15.407(a) ANSI C63.10: 2009 IC RSS-210 A8	PASS
Peak Excursion	FCC Part 15: 15.407(a) IC RSS-210 A8	PASS
Frequency Stability	FCC Part 15: 15.407(g) ANSI C63.10: 2009 IC RSS-210 A8	
Radiated Emission	FCC Part 15: 15.407(b) FCC Part 15: 15.209 ANSI C63.10: 2009 IC RSS-210 A8	PASS
Band Edge Compliance	FCC Part 15: 15.407(b) FCC Part 15: 15.209 ANSI C63.10: 2009 IC RSS-210 A8	PASS
Power Line Conducted Emission	FCC Part 15: 15.207 ANSI C63.10: 2009 IC RSS Gen 7.2.2	PASS
Antenna requirement	FCC Part 15: 15.203 IC RSS Gen 7.1.4	PASS

Note: The EUT has been tested as an independent unit. And Continual Transmitting in maximum power (The adapter be used during Test)
The EUT duty cycle was set to 100% during the test for all modes.

4.2 Test connection



4.3 Assistant equipment used for test

Description	:	Notebook
Manufacturer	:	Acer
Model No.	:	4552G

4.4 Test mode

The test software “RT3x7xQA.exe” was used to control EUT work in Continuous TX mode, and select test channel, wireless mode and data rate.

Tested mode, channel, and data rate information			
Mode	Data rate (Mbps) see Note	Channel	Frequency (MHz)
IEEE 802.11n HT20	6.5	CH36	5180
	6.5	CH40	5200
	6.5	CH48	5240
IEEE 802.11n HT40	13.5	CH38	5190
	13.5	CH46	5230
IEEE 802.11a	6	CH36	5180
	6	CH40	5200
	6	CH48	5240

Note: According exploratory test and product specification EUT will have maximum output power in those data rate, so those data rate were used for all test.

4.5 Channel list

For IEEE 802.11 a with 5.2G			
Channel	Frequency (MHz)	Channel	Frequency (MHz)
CH36	5180	CH44	5220
CH40	5200	CH48	5240

For IEEE 802.11 n/HT20 with 5.2G			
Channel	Frequency (MHz)	Channel	Frequency (MHz)
CH36	5180	CH44	5220
CH40	5200	CH48	5240

For IEEE 802.11 n/HT40 with 5.2G			
Channel	Frequency (MHz)	Channel	Frequency (MHz)
CH38	5190	CH46	5230

4.6 Test Conditions

Temperature range	21-25°C
Humidity range	40-75%
Pressure range	86-106kPa

4.7 Measurement Uncertainty (95% confidence levels, k=2)

Item	MU	Remark
Uncertainty for Power point Conducted Emissions Test	2.42dB	
Uncertainty for Radiation Emission test in 3m chamber (below 30MHz)	2.13 dB	Polarize: V
	2.57dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.54dB	Polarize: V
	4.1dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	2.08dB	Polarize: H
	2.56dB	Polarize: V
Uncertainty for radio frequency	1×10^{-9}	
Uncertainty for conducted RF Power	0.65dB	
Uncertainty for temperature	0.2°C	
Uncertainty for humidity	1%	
Uncertainty for DC and low frequency voltages	0.06%	

5 Peak Output power

5.1 Limit

For the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or $4 \text{ dBm} + 10\log B$, where B is the 26-dB emission bandwidth in MHz, If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.2 Test Procedure

1, Connected the EUT's antenna port to peak power meter by 20dB attenuator.

2, Measure out each mode and each bands peak output power of EUT.

Note: The cable loss and attenuator loss were offset into measure device as amplitude offset.

5.3 Test Result

EUT: UltraSky MIMO 11abgn USB Dongle/CPE			M/N: M27		
Test date: 2014-03-22		Test site: RF site		Tested by: Simple Guan	
Mode	Frequency (MHz)	Port 1 -26dB bandwidth (MHz)	Port 2 -26dB bandwidth (MHz)	Port 1 Limit (dBm)	Port 2 Limit (dBm)
IEEE 802.11 a with 5.2G	CH36:5180	19.12	18.46	16.81	16.66
	CH40:5200	19.13	18.50	16.82	16.67
	CH48:5240	18.43	18.50	16.66	16.67
IEEE 802.11 n/HT40 with 5.2G	CH36:5180	20.48	18.94	17.11	16.77
	CH40:5200	21.02	18.95	17.23	16.78
	CH48:5240	21.29	19.17	17.28	16.83
IEEE 802.11 n/HT40 with 5.2G	CH38:5190	38.53	39.04	19.86	19.92
	CH46:5230	38.50	39.30	19.85	19.94
Note: 1 Limit= $4 \text{ dBm} + 10\log B$, B is the 26-dB emission bandwidth in MHz. 2 26-dB emission bandwidth result see the section 6 bandwidth test result. 3 $50\text{mW}=17\text{dBm}$.					

EUT: UltraSky MIMO 11abgn USB Dongle/CPE		M/N: M27		
Test date: 2014-03-22		Test site: RF site		Tested by: Simple Guan
Mode	Frequency (MHz)	PK Output power (dBm)	Limit (dBm)	Margin (dB)
IEEE 802.11 a with 5.2G	CH36:5180	12.06	16.81	4.75
	CH40:5200	11.95	16.82	4.87
	CH48:5240	11.82	16.66	4.84
IEEE 802.11 n/HT20 with 5.2G	CH36:5180	12.79	17.00	4.21
	CH40:5200	12.68	17.00	4.32
	CH48:5240	12.43	17.00	4.57
IEEE 802.11 n/HT40 with 5.2G	CH38:5190	11.63	17.00	5.37
	CH46:5230	11.38	17.00	5.62
Note: This test with port 1 antenna.				
Conclusion: PASS				

EUT: UltraSky MIMO 11abgn USB Dongle/CPE		M/N: M27		
Test date: 2014-03-22		Test site: RF site		Tested by: Simple Guan
Mode	Frequency (MHz)	PK Output power (dBm)	Limit (dBm)	Margin (dB)
IEEE 802.11 a with 5.2G	CH36:5180	8.42	16.66	8.24
	CH40:5200	8.36	16.67	8.31
	CH48:5240	8.71	16.67	7.96
IEEE 802.11 n/HT20 with 5.2G	CH36:5180	9.12	16.77	7.65
	CH40:5200	9.04	16.78	7.74
	CH48:5240	9.08	16.83	7.75
IEEE 802.11 n/HT40 with 5.2G	CH38:5190	7.52	17.00	9.48
	CH46:5230	7.17	17.00	9.83
Note: This test with port 2 antenna.				
Conclusion: PASS				

EUT: UltraSky MIMO 11abgn USB Dongle/CPE		M/N: M27		
Test date: 2014-03-22		Test site: RF site		Tested by: Simple Guan
Mode	Frequency (MHz)	PK Output power (dBm)	Limit (dBm)	Margin (dB)
IEEE 802.11 a with 5.2G	CH36:5180	13.62	17.00	3.38
	CH40:5200	13.53	17.00	3.47
	CH48:5240	13.55	17.00	3.45
IEEE 802.11 n/HT20 with 5.2G	CH36:5180	14.34	17.00	2.66
	CH40:5200	14.24	17.00	2.76
	CH48:5240	14.08	17.00	2.92
IEEE 802.11 n/HT40 with 5.2G	CH38:5190	13.05	17.00	3.95
	CH46:5230	12.78	17.00	4.22
Note: 1 This result with port 1 and port 2 antenna. 2 According to KDB 662911, Result power = $10\log(10^{\text{ant1}/10} + 10^{\text{ant2}/10})$ 3 Result unit: W, The end PK Output power result is converted to units of dBm				
Conclusion: PASS				

6 bandwidth

6.1 Limit

No Limit, only for reference.

6.2 Test Procedure

The transmitter output was connected to a spectrum analyzer, The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100kHz RBW and 300 kHz VBW. The 26dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 26dB.

6.3 Test Result

EUT: UltraSky MIMO 11abgn USB Dongle/CPE		M/N:M27
Power: DC 5V From PC with AC 120V/60Hz		
Data Rate: 11n HT20: 6.5Mbps; 11n HT40: 13.5Mbps;11a:6MHz		
Ambient Temperature:24℃		Relative Humidity: 62%
Test date:2014-03-22		Test by: Simple Guan

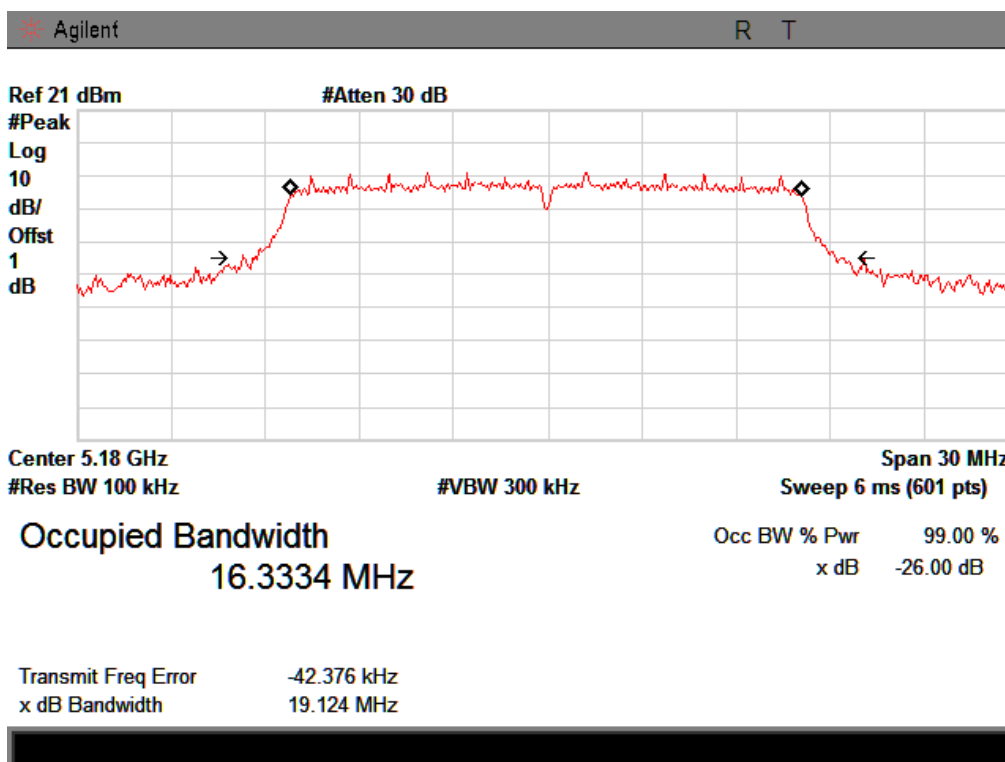
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Limit (MHz)	Result
IEEE 802.11 a with 5.2G:					
Low	5180	19.12	16.33	/	PASS
Mid	5200	19.13	16.35	/	PASS
High	5240	18.43	16.33	/	PASS
IEEE 802.11 n/HT20 with 5.2G:					
Low	5180	20.48	17.45	/	PASS
Mid	5200	21.02	17.44	/	PASS
High	5240	21.29	17.45	/	PASS
IEEE 802.11 n/HT40 with 5.2G:					
Low	5190	38.53	35.67	/	PASS
High	5230	38.50	35.66	/	PASS
Note: This test with port 1 antenna.					

Channel	Frequency (MHz)	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Limit (MHz)	Result
IEEE 802.11 a with 5.2G:					
Low	5180	18.46	16.32	/	PASS
Mid	5200	18.50	16.32	/	PASS
High	5240	18.50	16.32	/	PASS
IEEE 802.11 n/HT20 with 5.2G:					
Low	5180	18.94	17.37	/	PASS
Mid	5200	18.95	17.41	/	PASS
High	5240	19.17	17.37	/	PASS
IEEE 802.11 n/HT40 with 5.2G:					
Low	5190	39.04	35.72	/	PASS
High	5230	39.30	35.76	/	PASS
Note: This test with port 2 antenna.					

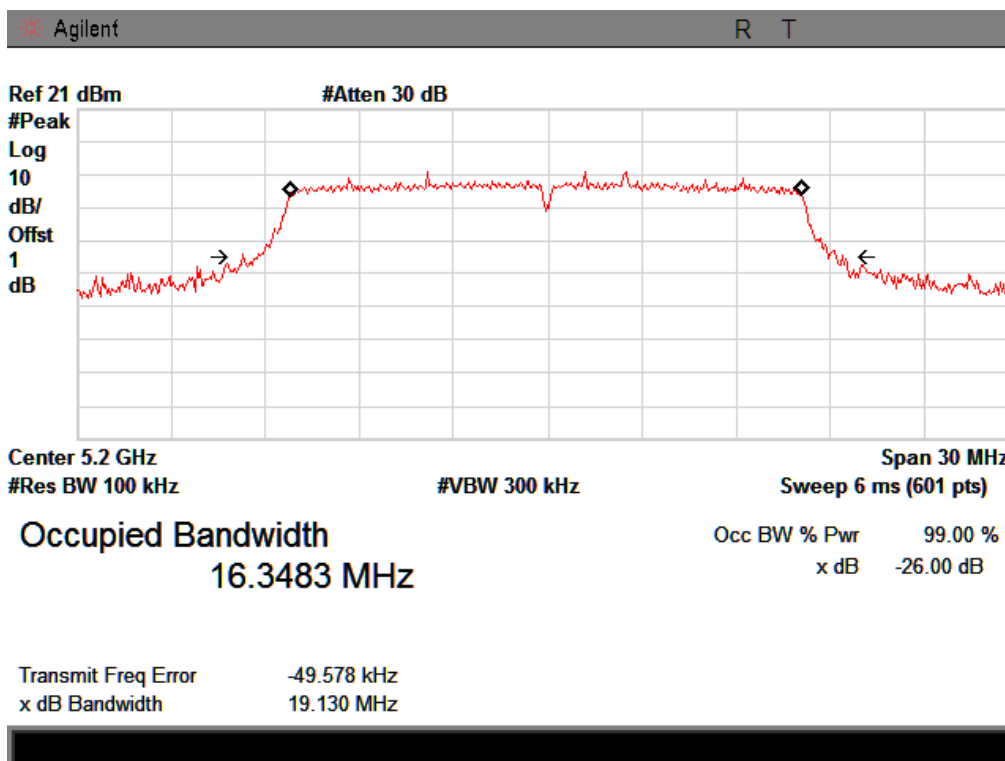
From 1G-25GHz with port 1 antenna

IEEE 802.11a with 5.2G:

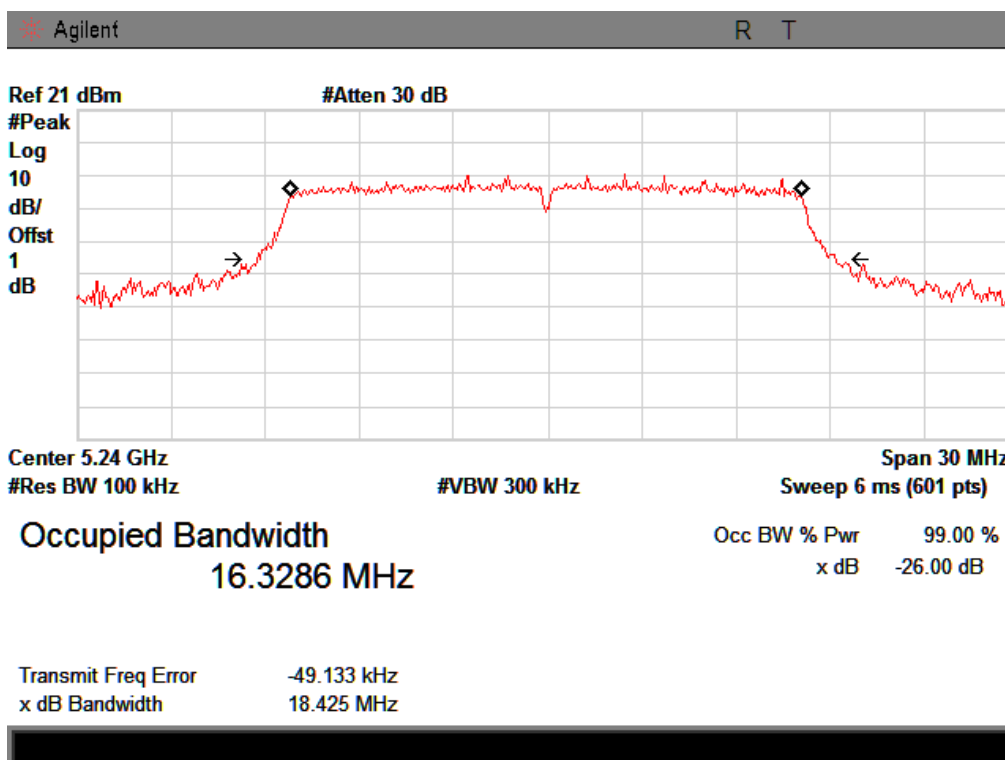
CH Low :



CH Mid :

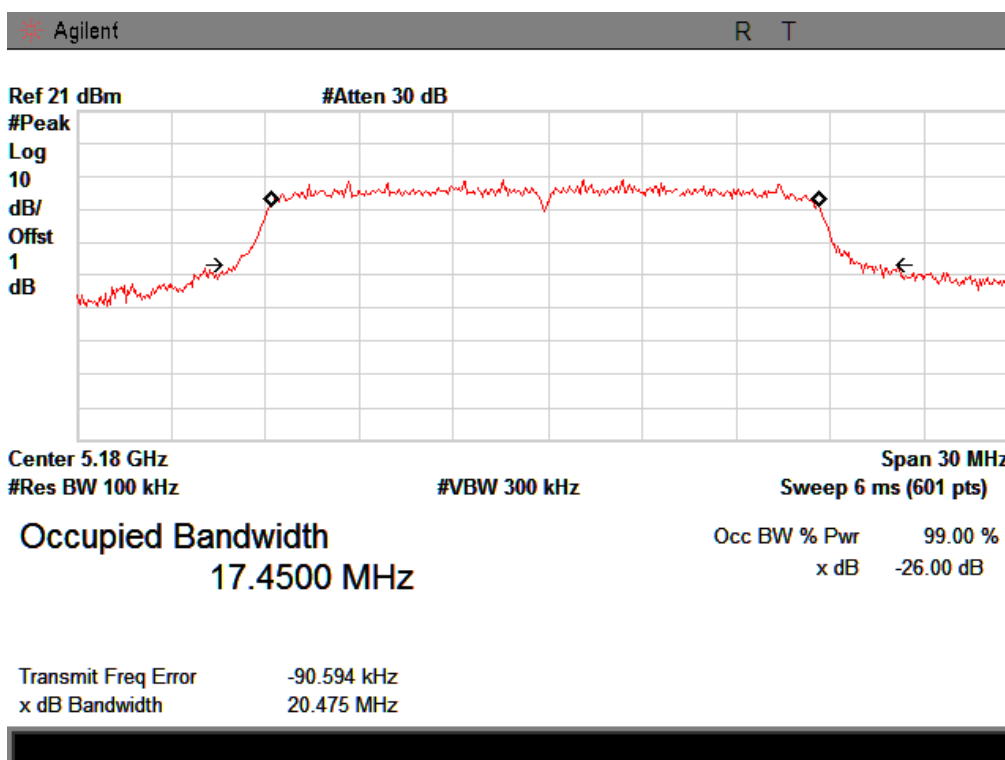


CH High :

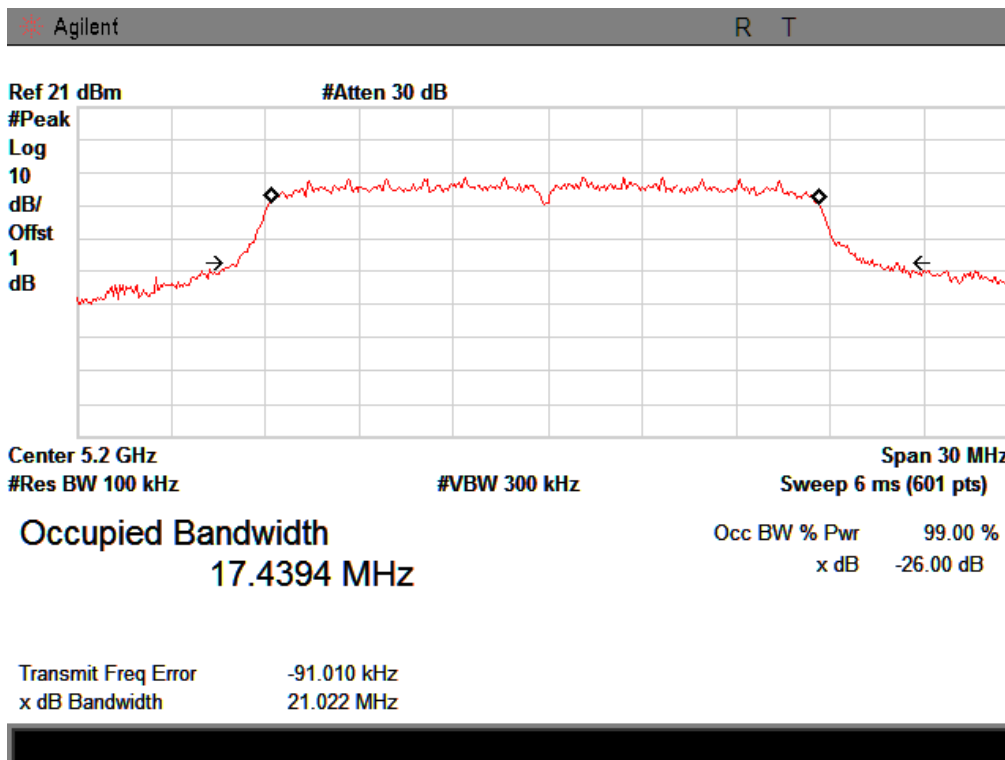


IEEE 802.11n/HT20 with 5.2G:

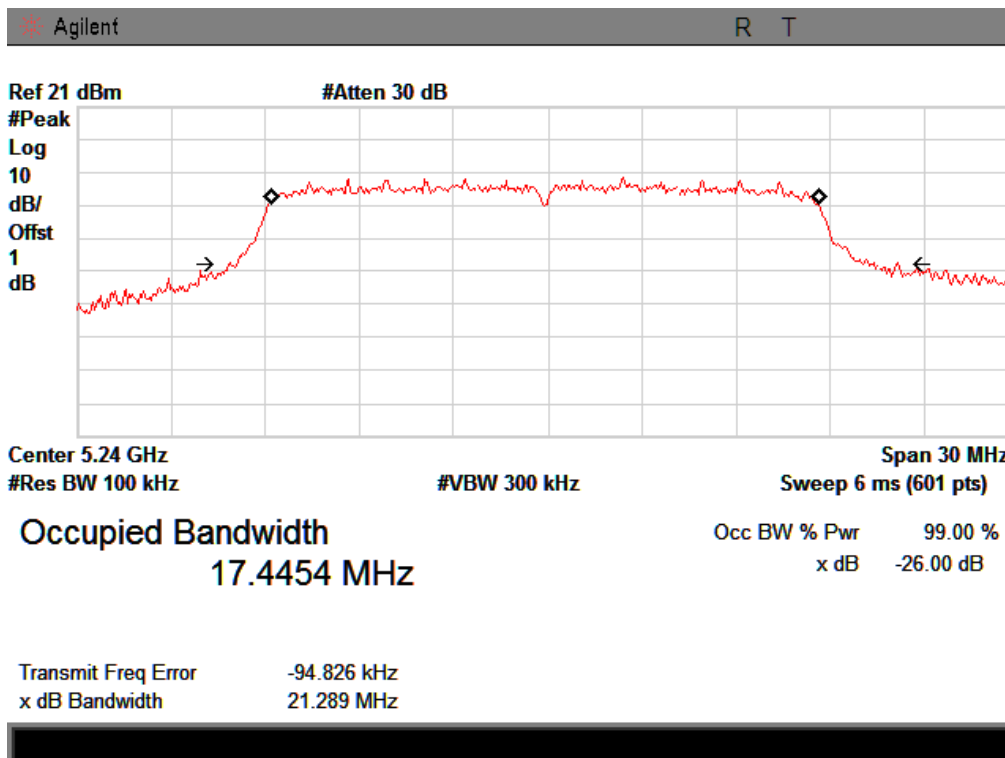
CH Low :



CH Mid :

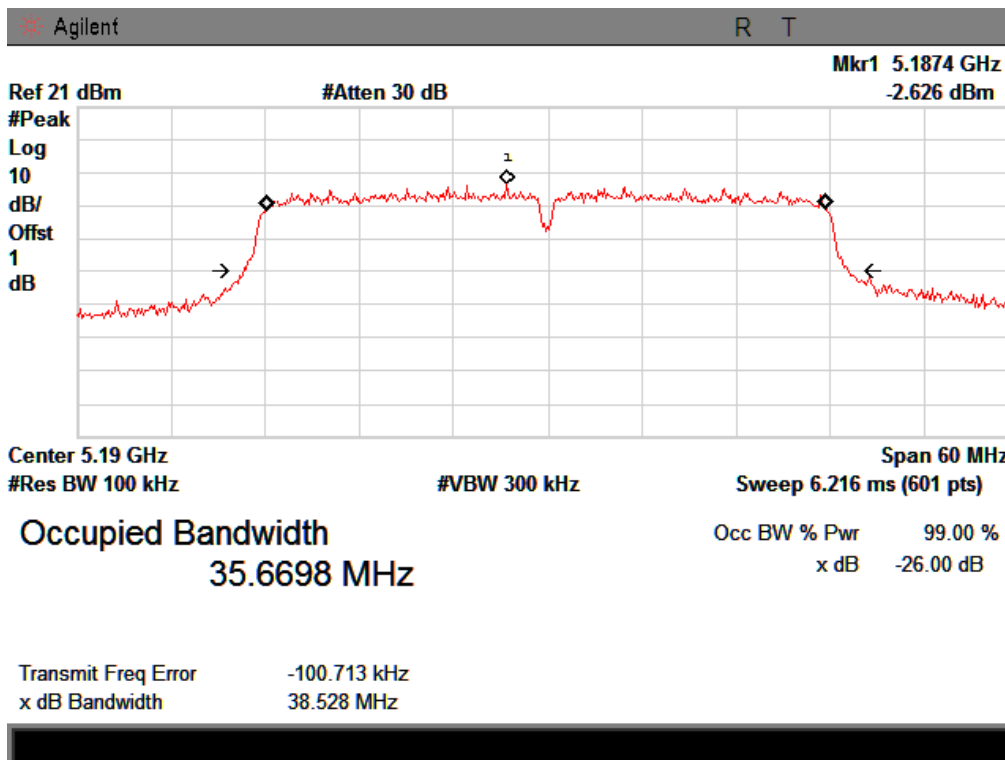


CH High :

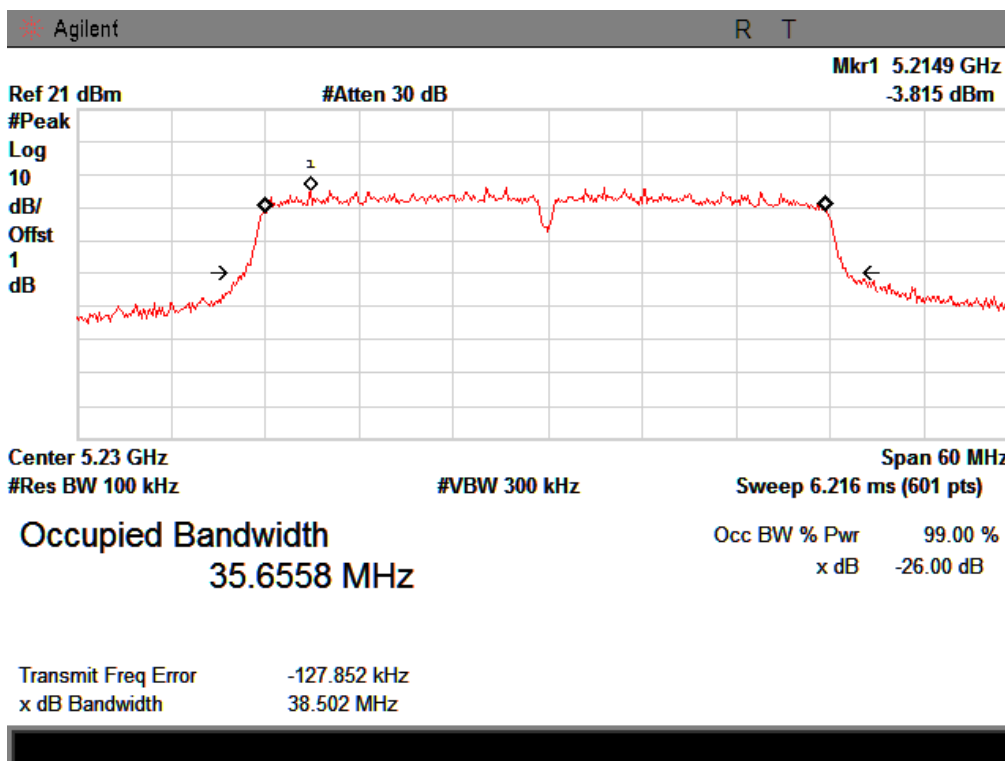


IEEE 802.11n/HT40 with 5.2G:

CH Low :



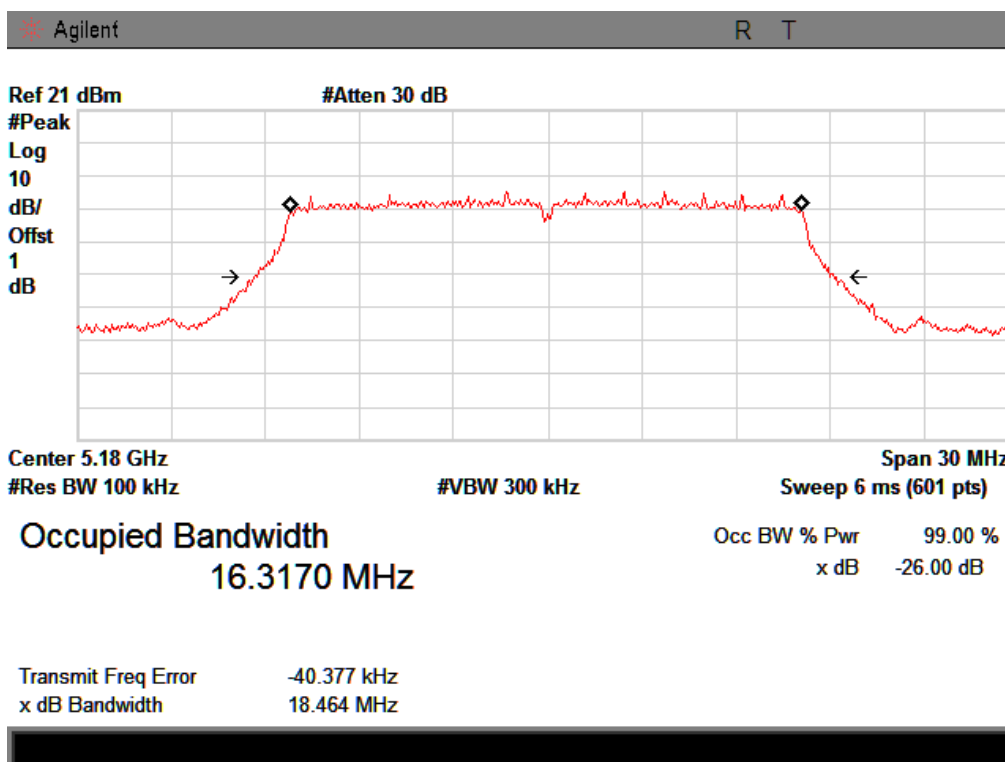
CH High :



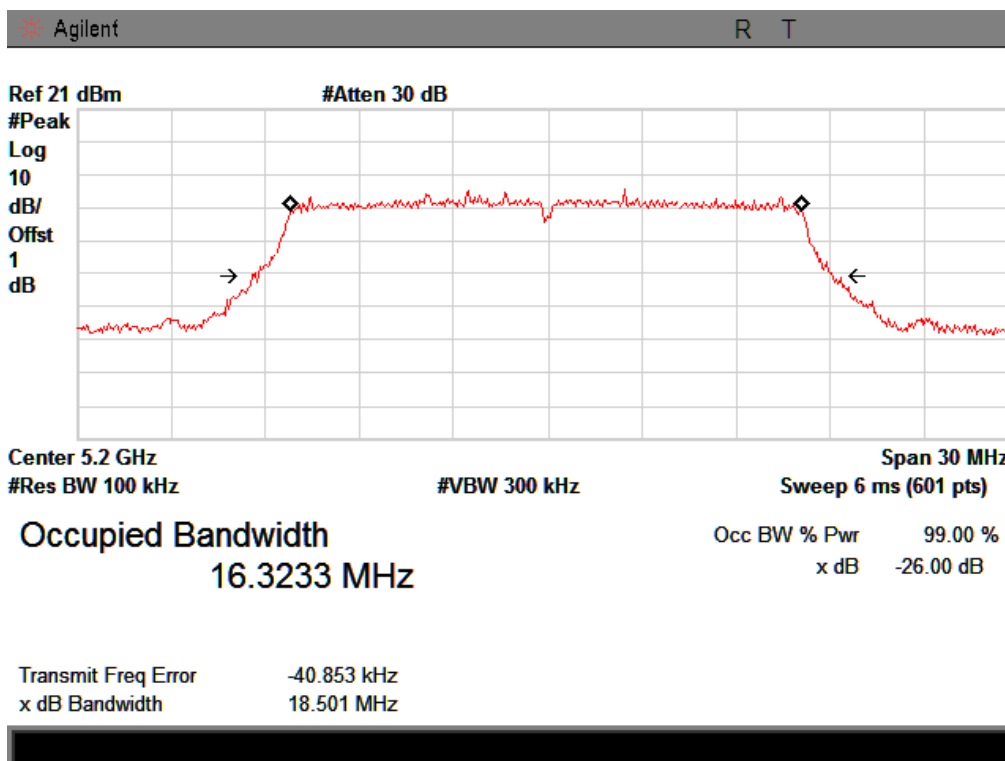
From 1G-25GHz with port 2 antenna

IEEE 802.11a with 5.2G:

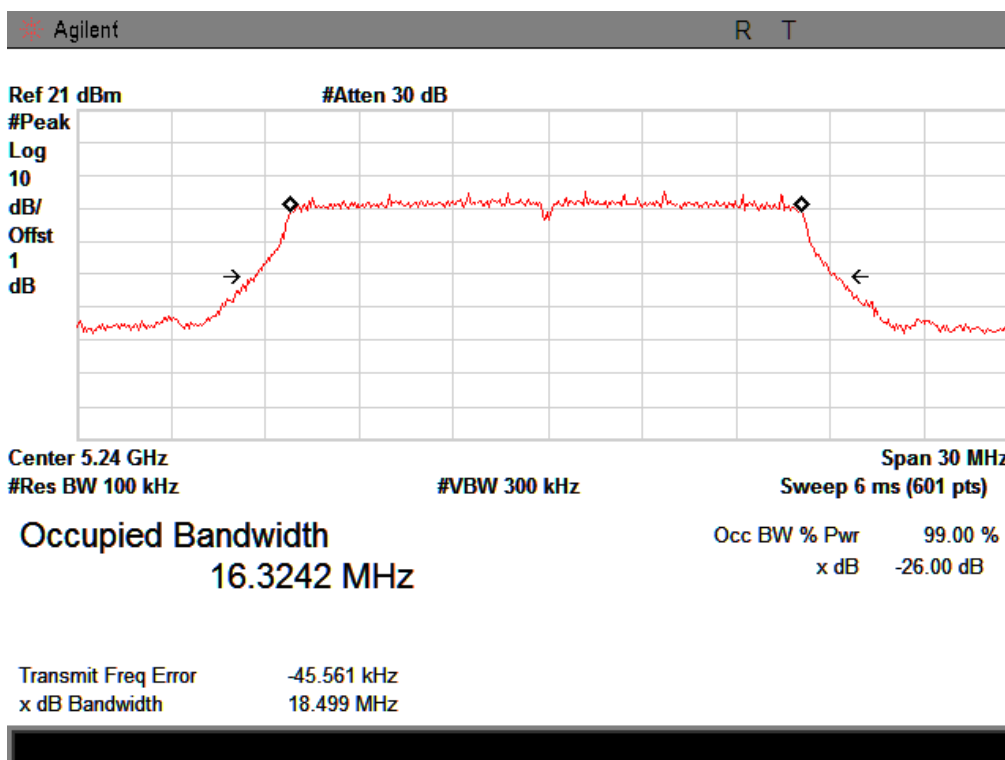
CH Low :



CH Mid :

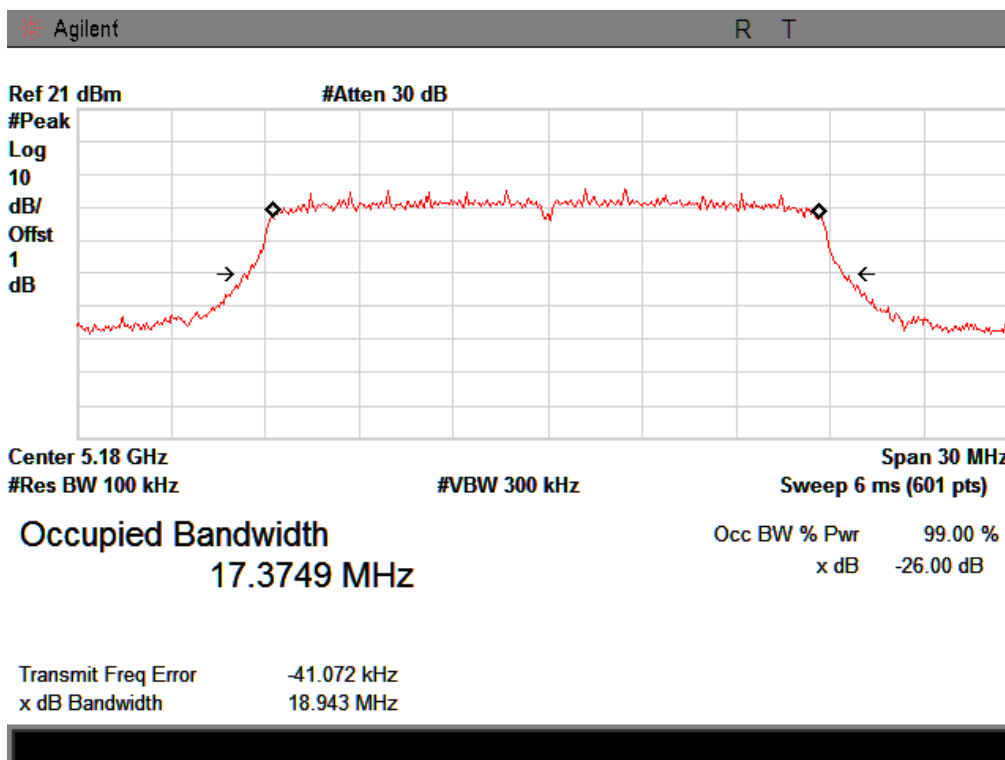


CH High :

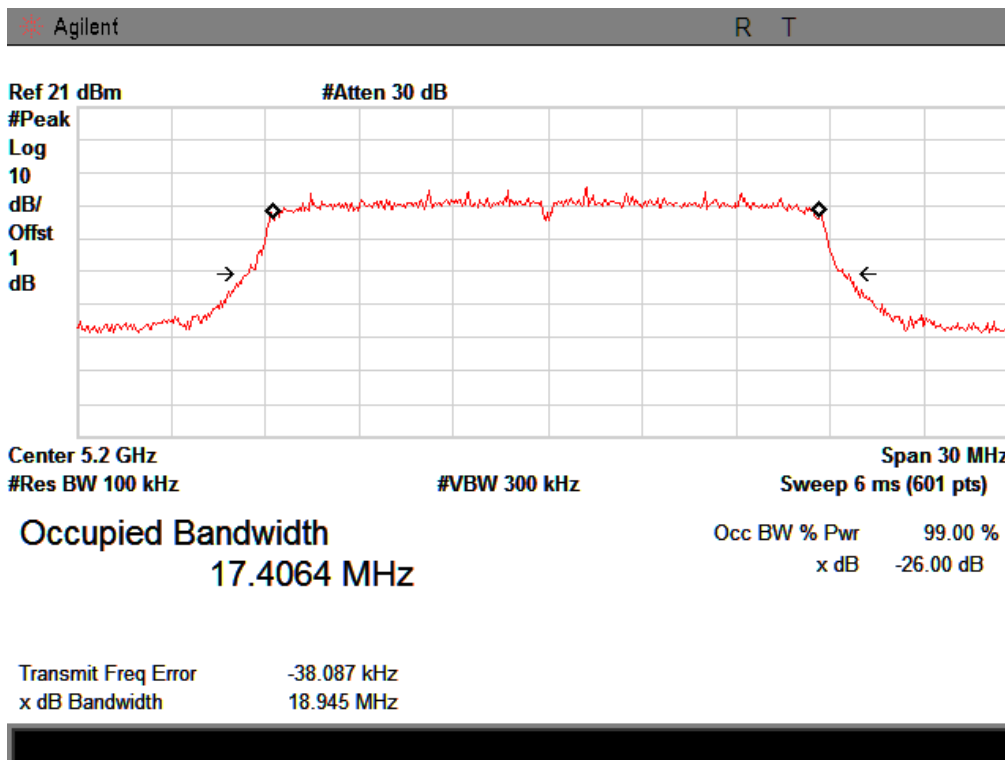


IEEE 802.11n/HT20 with 5.2G:

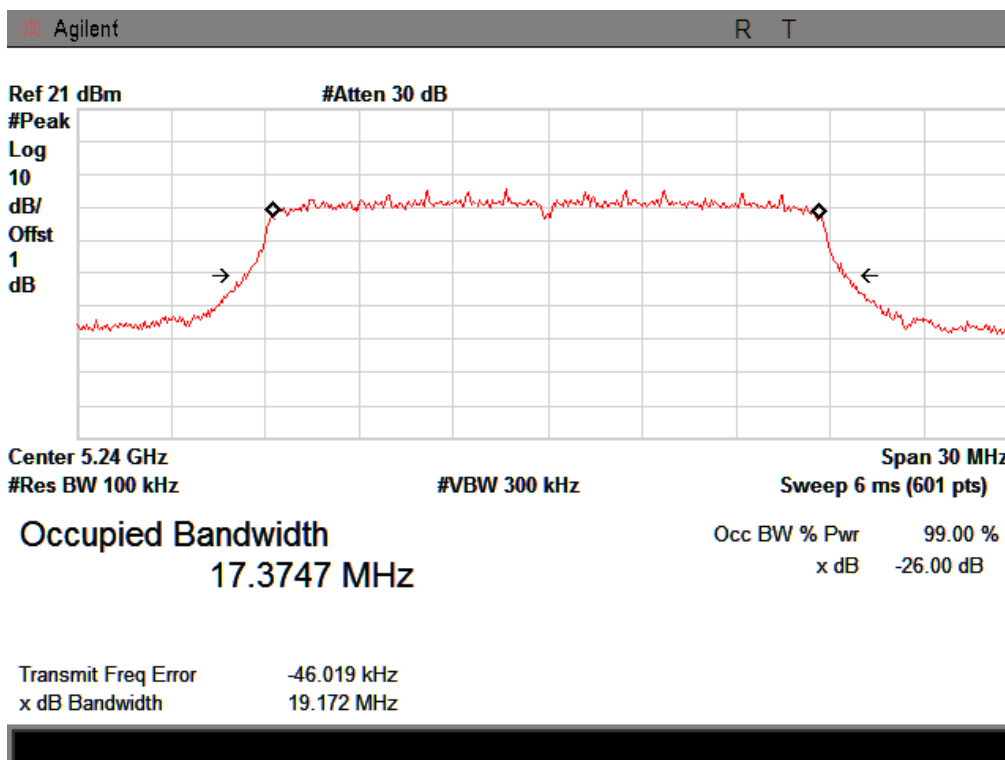
CH Low :



CH Mid :

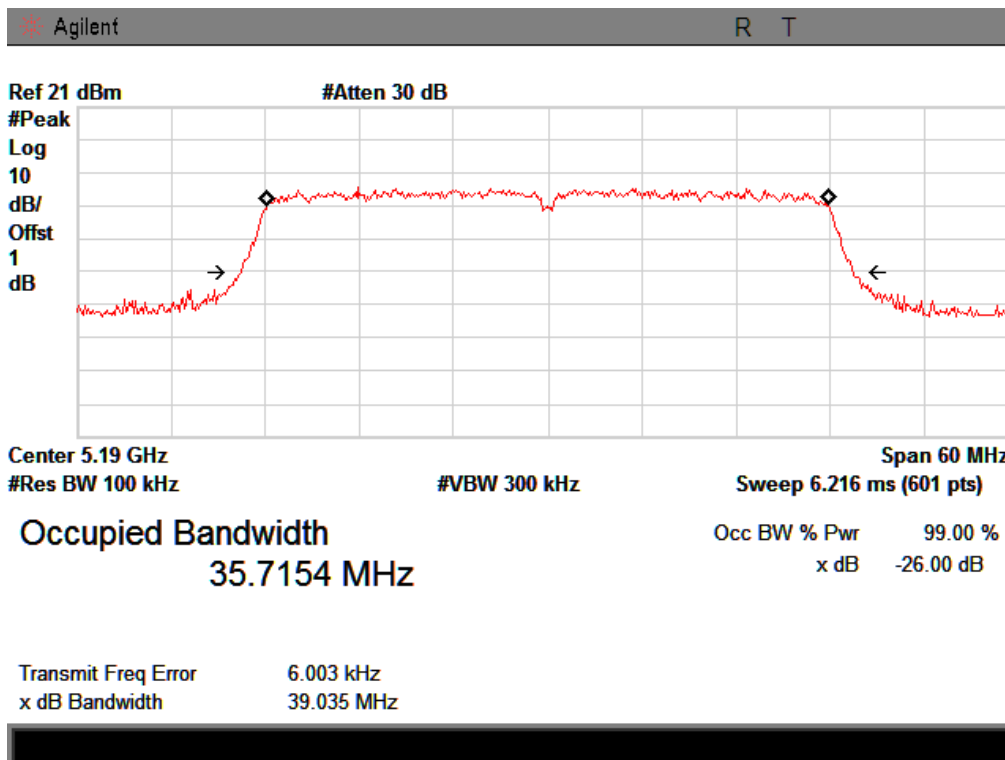


CH High :

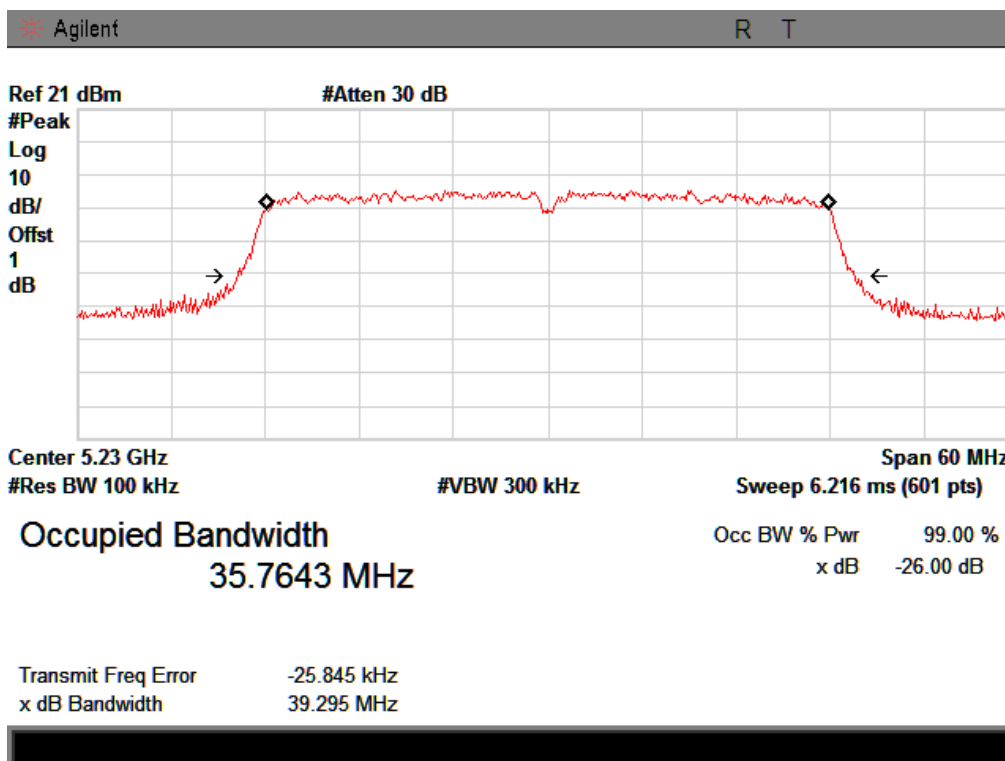


IEEE 802.11n/HT40 with 5.2G:

CH Low :



CH High :



7 Power Spectral Density

7.1 Limit

For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

7.2 Test Procedure

Place the EUT on the table and set it in transmitting mode.

- 7.2.2 Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 7.2.3 Set the spectrum analyzer as RBW = 1MHz, VBW = 3MHz, span=5-30%EBW, detail see the test plot.
- 7.2.4 Record the max reading.
- 7.2.5 Repeat the above procedure until the measurements for all frequencies are completed.

7.3 Test Result

PASS.

Detailed information please see the following page.

Channel	Frequency (MHz)	Power Spectral Density (dBm)	Limit (dBm)	Result
IEEE 802.11 a with 5.2G:				
Low	5180	-7.45	4	PASS
Mid	5200	-6.86	4	PASS
High	5240	-6.57	4	PASS
IEEE 802.11 n/HT40 with 5.2G:				
Low	5180	-7.02	4	PASS
Mid	5200	-6.42	4	PASS
High	5240	-7.88	4	PASS
IEEE 802.11 n/HT40 with 5.2G:				
Low	5190	-10.12	4	PASS
High	5230	-10.75	4	PASS
Note: This test with port 1 antenna.				

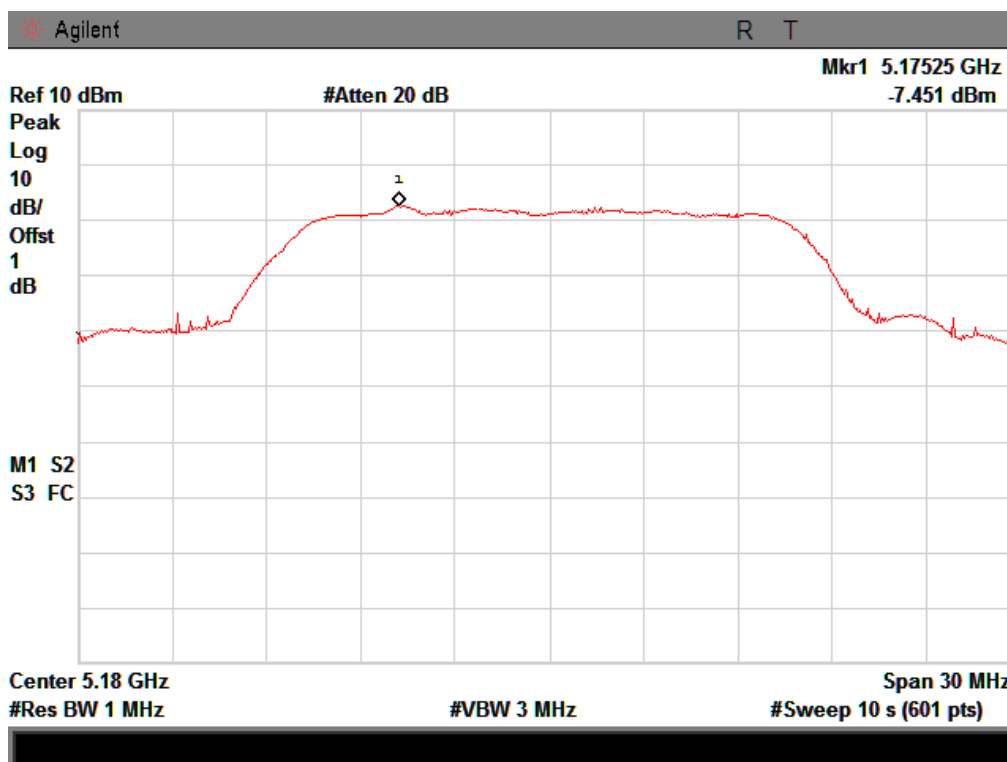
Channel	Frequency (MHz)	Power Spectral Density (dBm)	Limit (dBm)	Result
IEEE 802.11 a with 5.2G:				
Low	5180	-9.32	4	PASS
Mid	5200	-9.32	4	PASS
High	5240	-8.47	4	PASS
IEEE 802.11 n/HT40 with 5.2G:				
Low	5180	-8.99	4	PASS
Mid	5200	-9.16	4	PASS
High	5240	-9.96	4	PASS
IEEE 802.11 n/HT40 with 5.2G:				
Low	5190	-12.88	4	PASS
High	5230	-12.92	4	PASS
Note: This test with port 2 antenna.				

Channel	Frequency (MHz)	Power Spectral Density (dBm)	Limit (dBm)	Result
IEEE 802.11 a with 5.2G:				
Low	5180	-5.27	4	PASS
Mid	5200	-4.91	4	PASS
High	5240	-4.41	4	PASS
IEEE 802.11 n/HT40 with 5.2G:				
Low	5180	-4.88	4	PASS
Mid	5200	-4.57	4	PASS
High	5240	-5.79	4	PASS
IEEE 802.11 n/HT40 with 5.2G:				
Low	5190	-8.27	4	PASS
High	5230	-8.69	4	PASS
<p>Note: 1 This result with port 1 and port 2 antenna.</p> <p>2 According to KDB 662911, Result power = $10\log(10^{\text{ant1}/10} + 10^{\text{ant2}/10})$</p> <p>3 Result unit: W, The end PK Output power result is converted to units</p>				

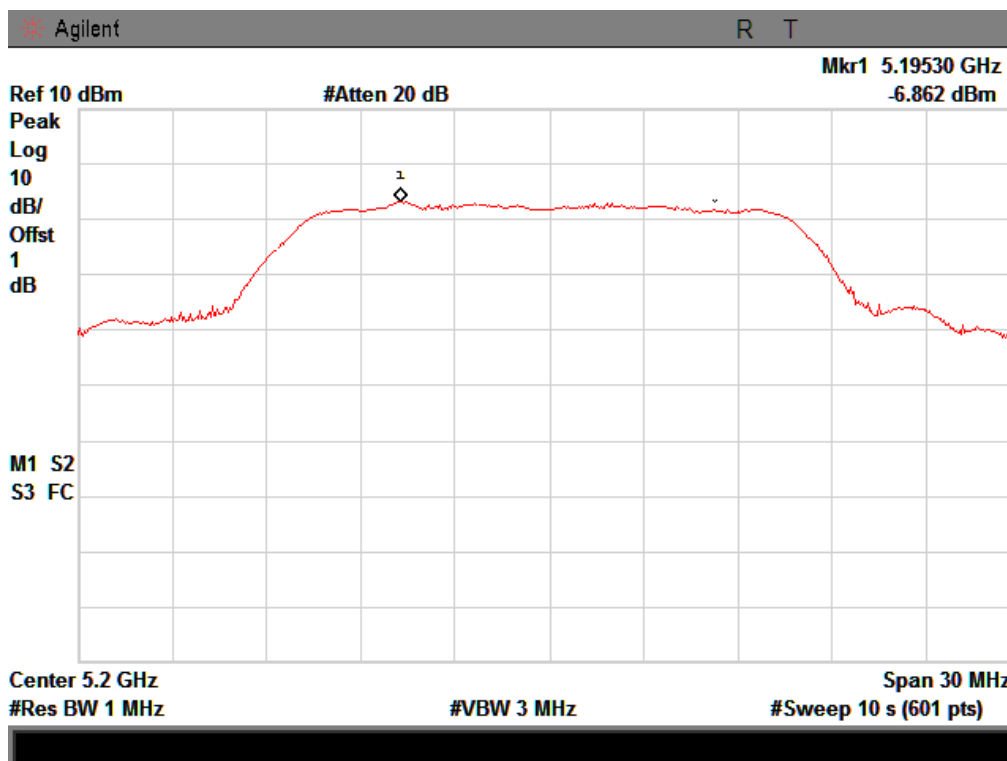
From 1G-25GHz with port 1 antenna

IEEE 802.11a with 5.2G:

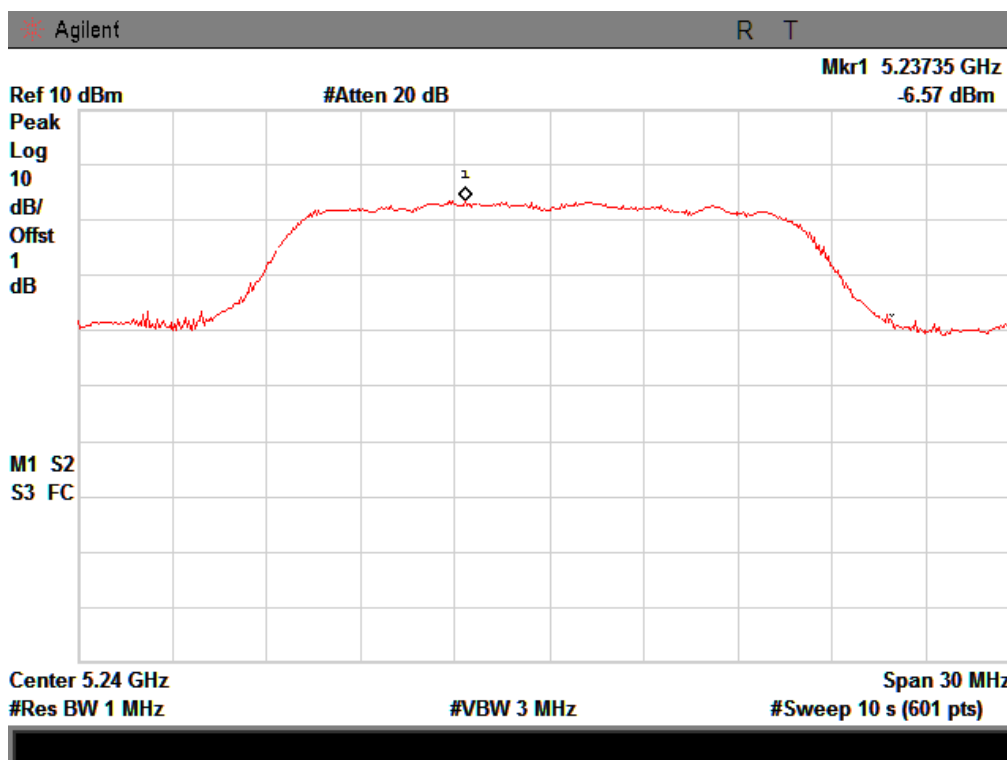
CH Low :



CH Mid :

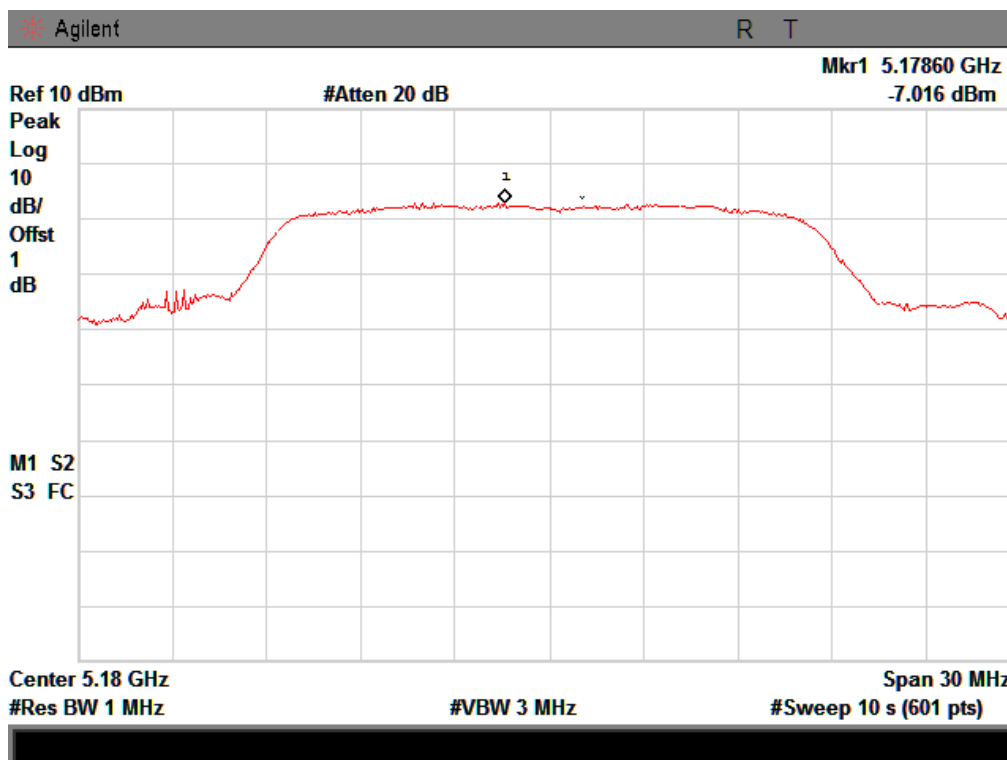


CH High :

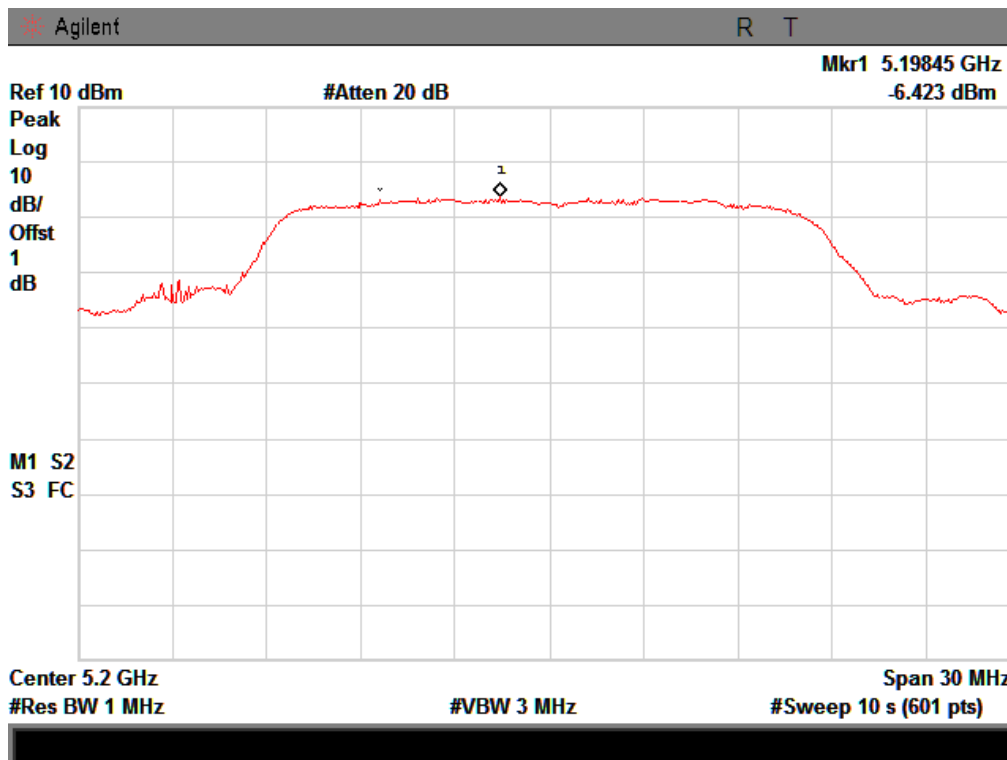


IEEE 802.11n/HT20 with 5.2G:

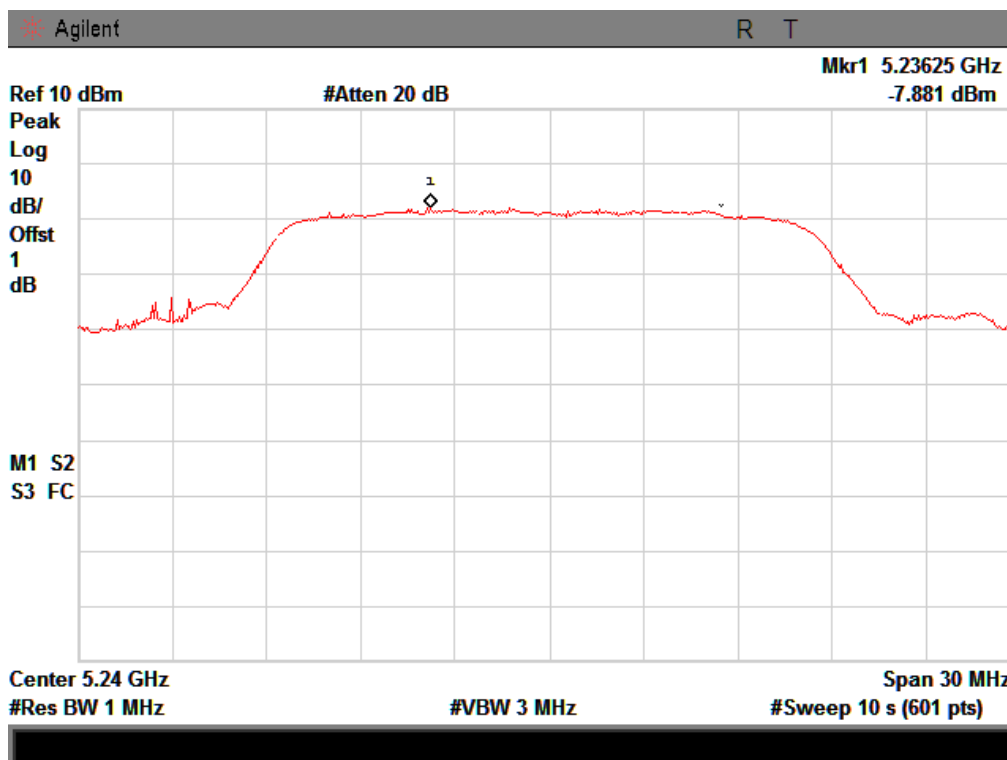
CH Low :



CH Mid :

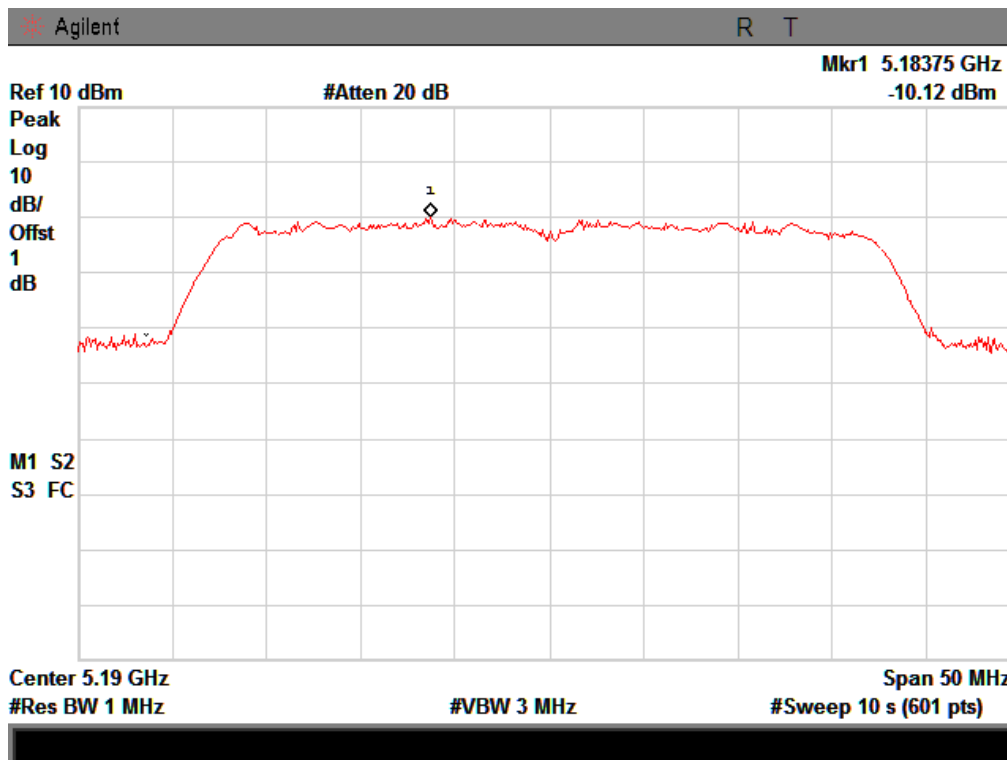


CH High :

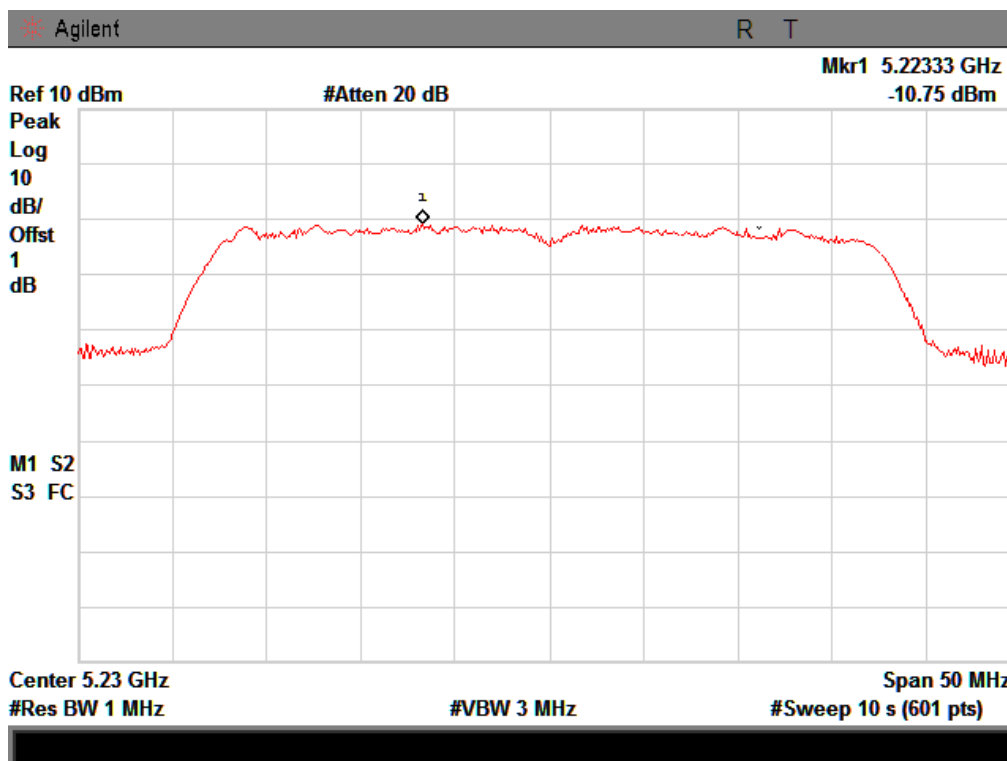


IEEE 802.11n/HT40 with 5.2G:

CH Low :



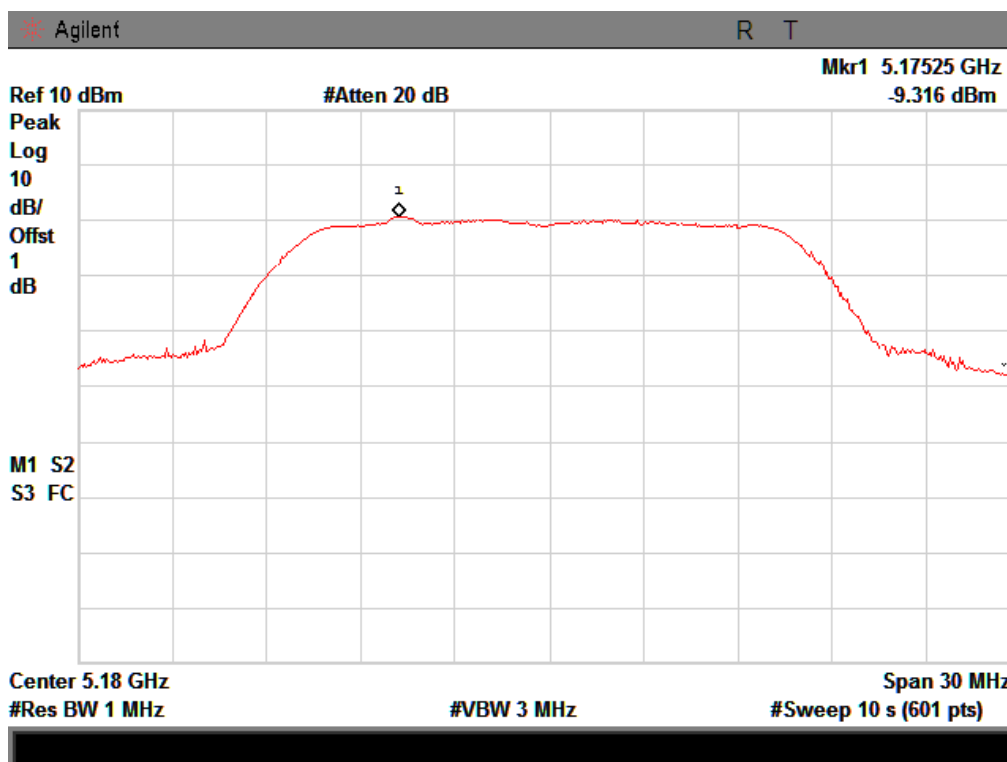
CH High :



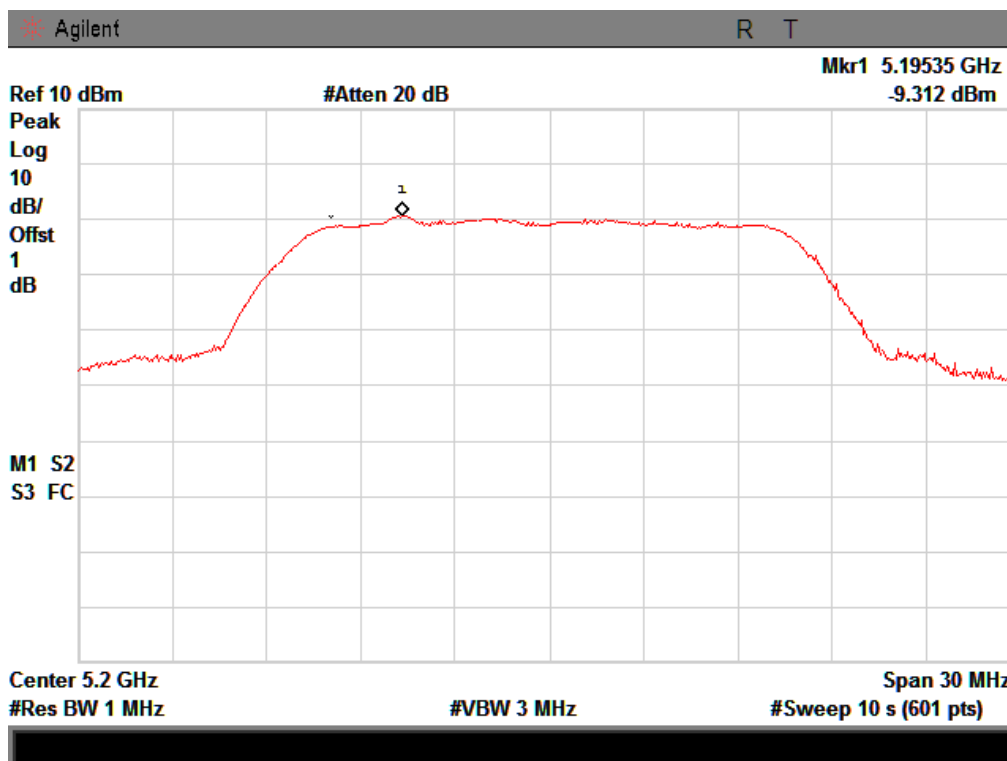
From 1G-25GHz with port 2 antenna

IEEE 802.11a with 5.2G:

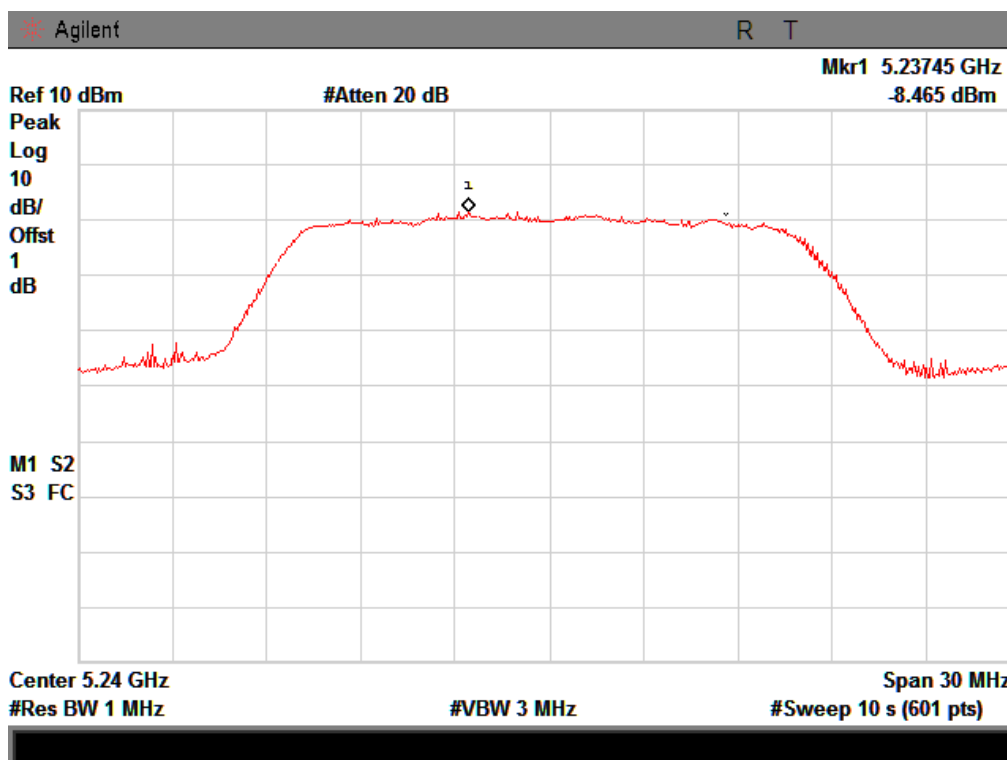
CH Low :



CH Mid :

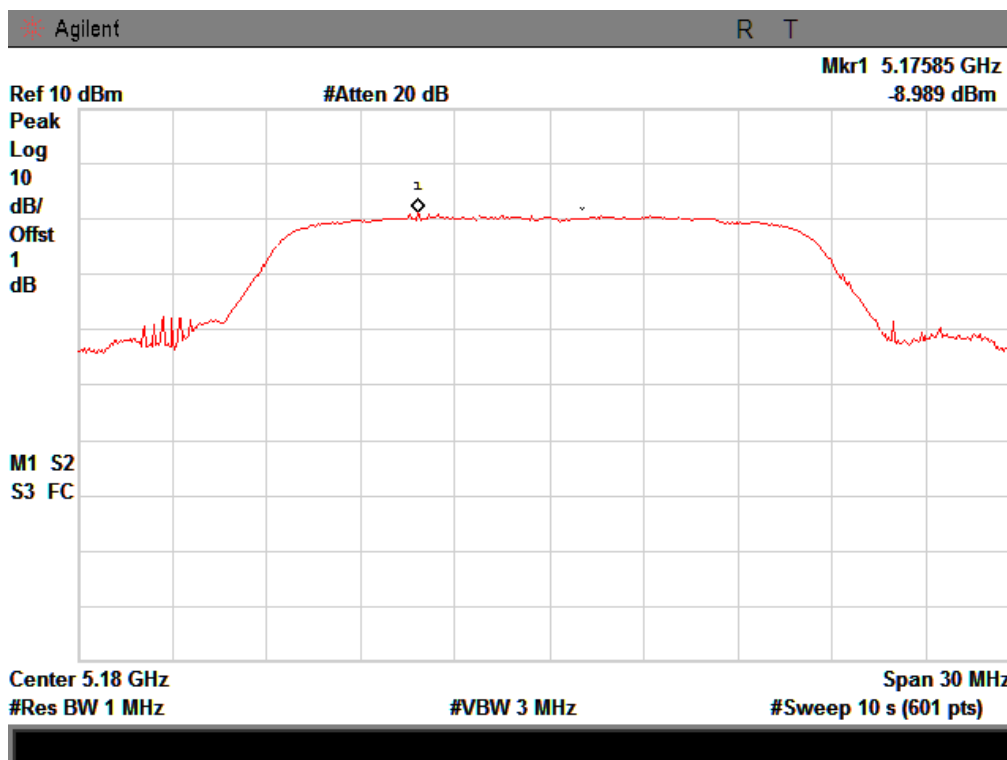


CH High :

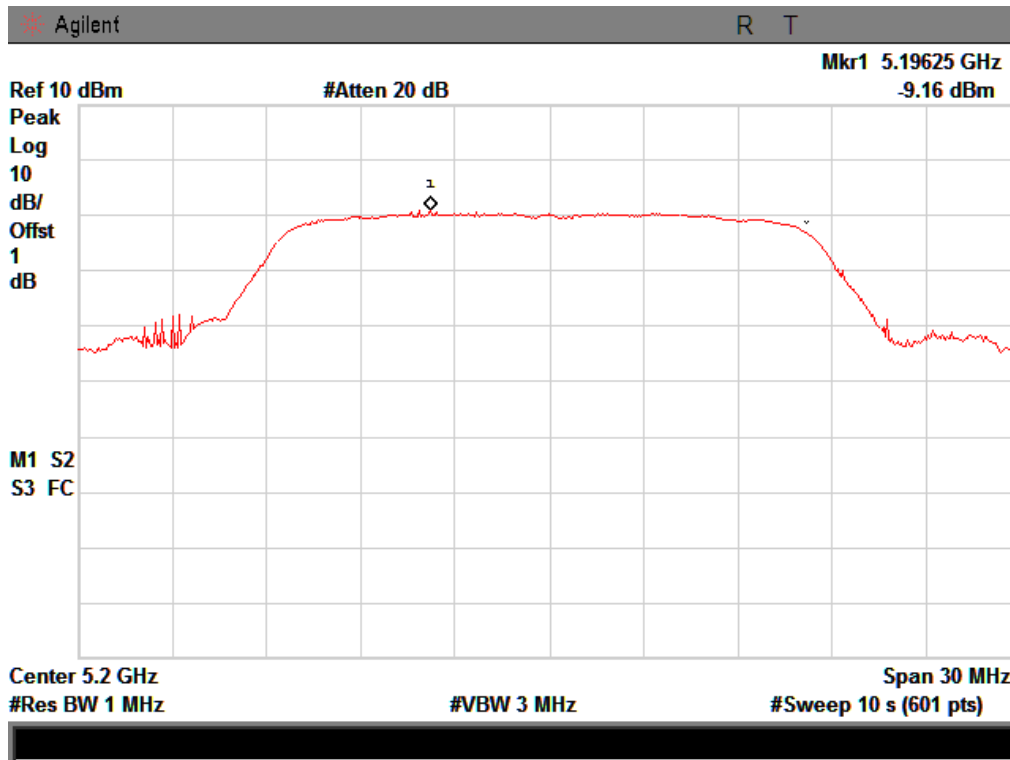


IEEE 802.11n/HT20 with 5.2G:

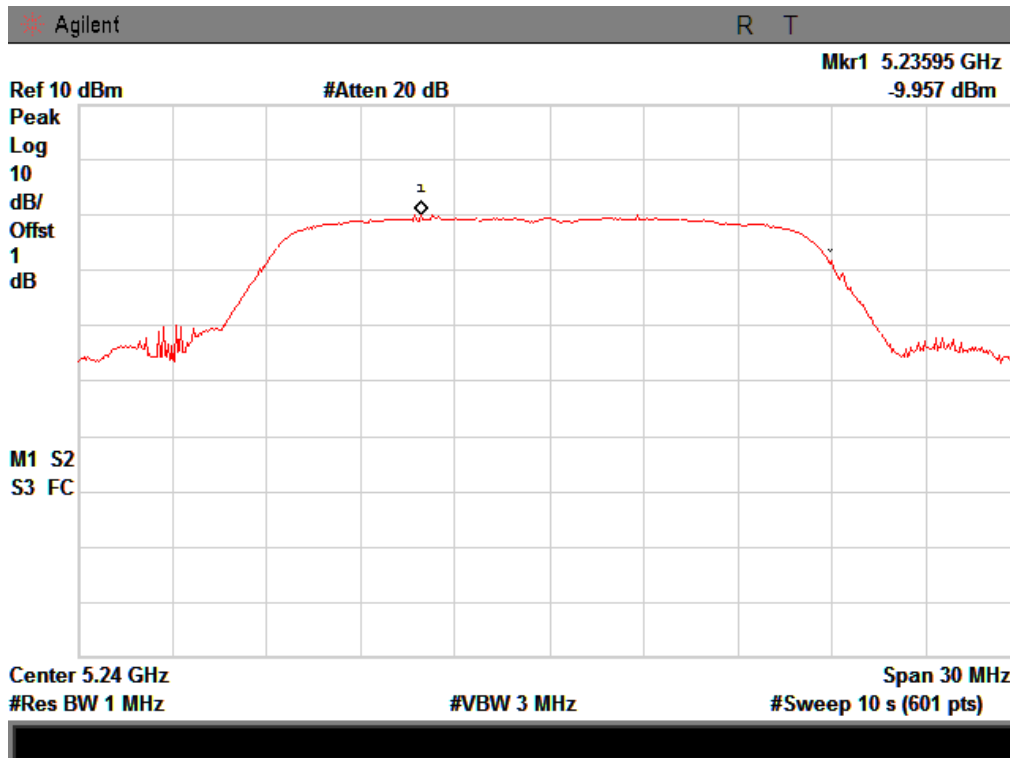
CH Low :



CH Mid :

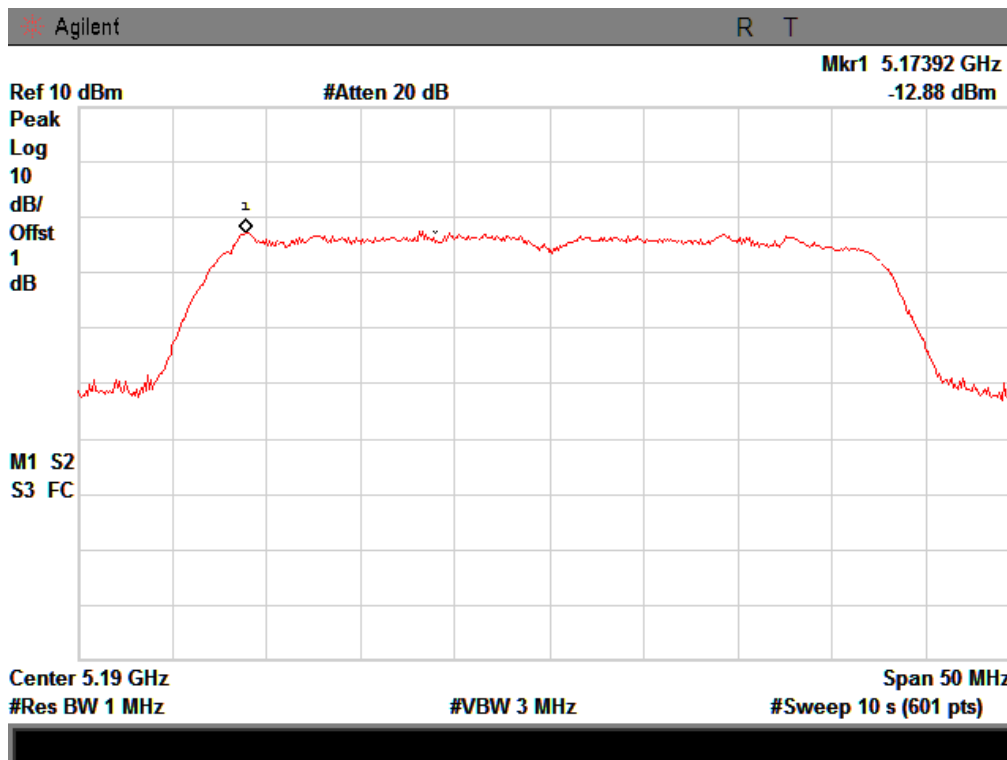


CH High :

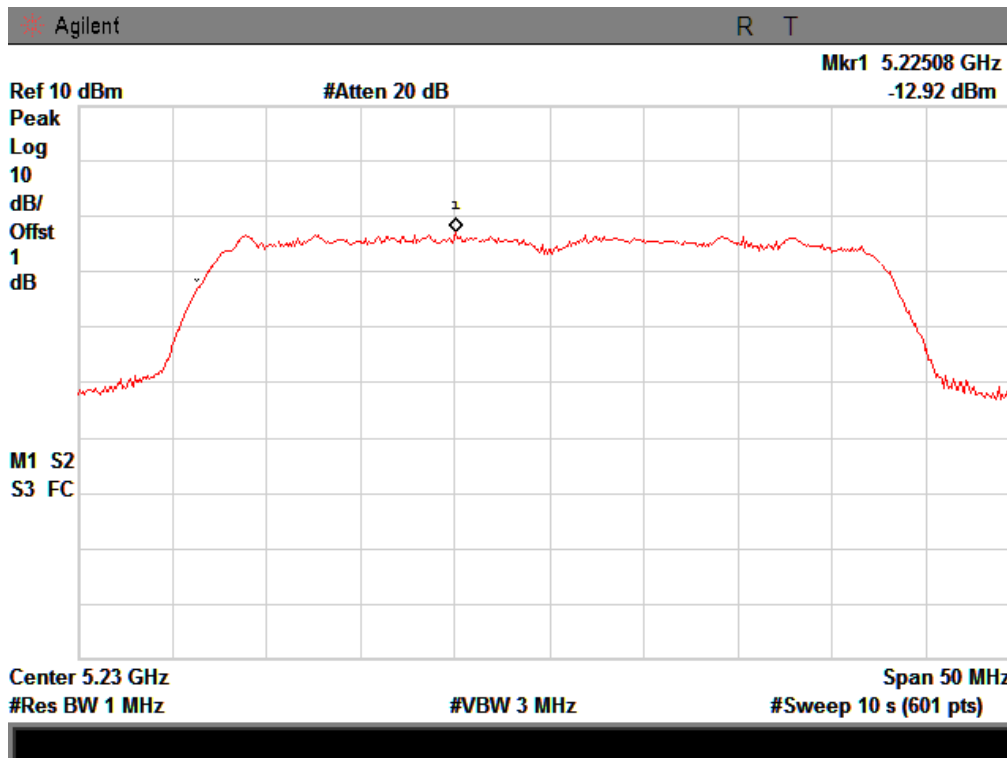


IEEE 802.11n/HT40 with 5.2G:

CH Low :



CH High :



8 Peak Excursion

8.1 Limit

The ratio of the peak excursion of modulation envelope (measured using a peak hold function) to the maximum conducted power (measured as specified above) shall not exceed 13 dB across any 1MHz bandwidth whichever is less.

8.2 Test Procedure

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Set the spectrum analyzer span to view the entire emissions bandwidth. The largest difference between the following two traces (Peak Trace and Average Trace) must be ≤ 13 dB for all frequencies across the emissions bandwidth. Submit a plot.
3. Peak Trace: Set RBW = 1 MHz, VBW ≥ 3 MHz with peak detector and max-hold settings.
4. Average Trace: Method #3—video averaging with max hold--and sum power across the band. Set span to encompass the entire emissions bandwidth (EBW) of the signal. Set sweep trigger to “free run”. Set RBW = 1 MHz. Set VBW $\geq 1/T$ (Draft n VBW = 300kHz $\geq 1/4 \mu$ s). Use sample detector mode if bin width (i.e., span/number of points in spectrum) < 0.5 RBW. Otherwise use peak detector mode. Set max hold. Allow max hold to run for 60 seconds.

8.3 Test Result

PASS.

Detailed information please see the following page.

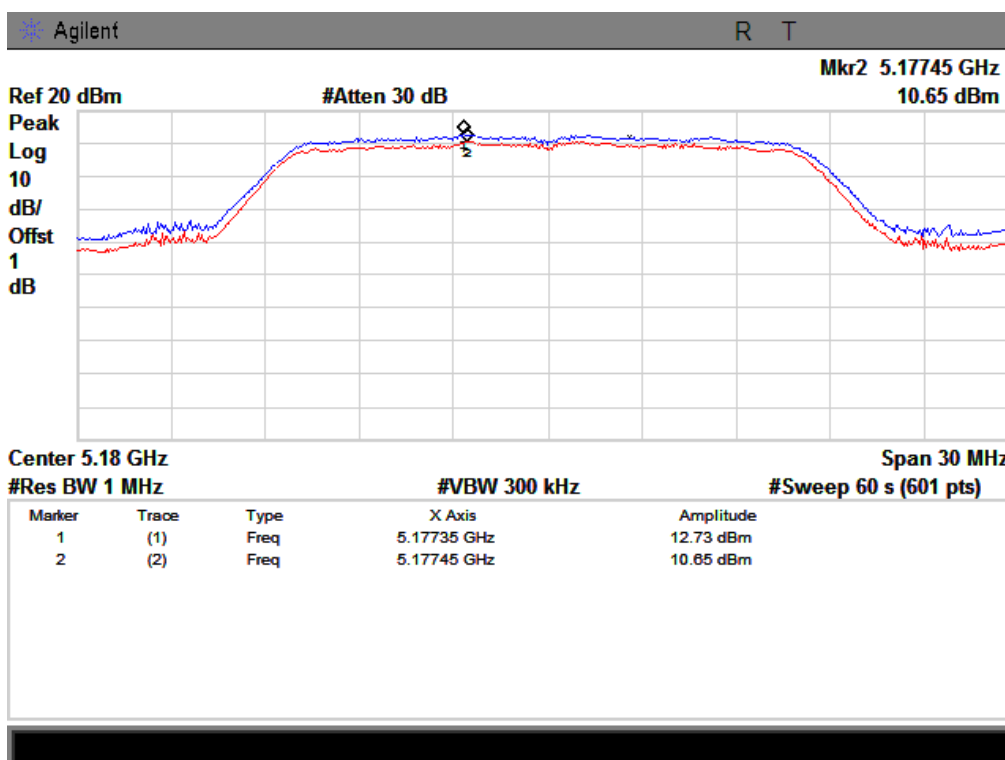
Channel	Frequency (MHz)	Trace 1 (dBm)	Trace 2 (dBm)	Peak Excursion (dB)	Limit (MHz)	Result
IEEE 802.11 a with 5.2G:						
Low	5180	12.73	10.65	2.080	13	PASS
Mid	5200	12.23	9.66	2.570	13	PASS
High	5240	11.43	8.63	2.800	13	PASS
IEEE 802.11 n/HT20 with 5.2G:						
Low	5180	12.51	10.21	2.300	13	PASS
Mid	5200	11.37	9.58	1.790	13	PASS
High	5240	11.22	9.56	1.660	13	PASS
IEEE 802.11 n/HT40 with 5.2G:						
Low	5190	9.01	7.51	1.500	13	PASS
High	5230	9.28	7.41	1.870	13	PASS
Note: This test with port 1 antenna.						

Channel	Frequency (MHz)	Trace 1 (dBm)	Trace 2 (dBm)	Peak Excursion (dB)	Limit (MHz)	Result
IEEE 802.11 a with 5.2G:						
Low	5180	4.48	1.59	2.890	13	PASS
Mid	5200	4.07	1.52	2.550	13	PASS
High	5240	4.29	1.52	2.770	13	PASS
IEEE 802.11 n/HT20 with 5.2G:						
Low	5180	3.99	1.96	2.030	13	PASS
Mid	5200	4.56	1.48	3.080	13	PASS
High	5240	3.39	1.15	2.240	13	PASS
IEEE 802.11 n/HT40 with 5.2G:						
Low	5190	2.33	0.54	1.790	13	PASS
High	5230	2.54	0.23	2.310	13	PASS
Note: This test with port 2 antenna.						

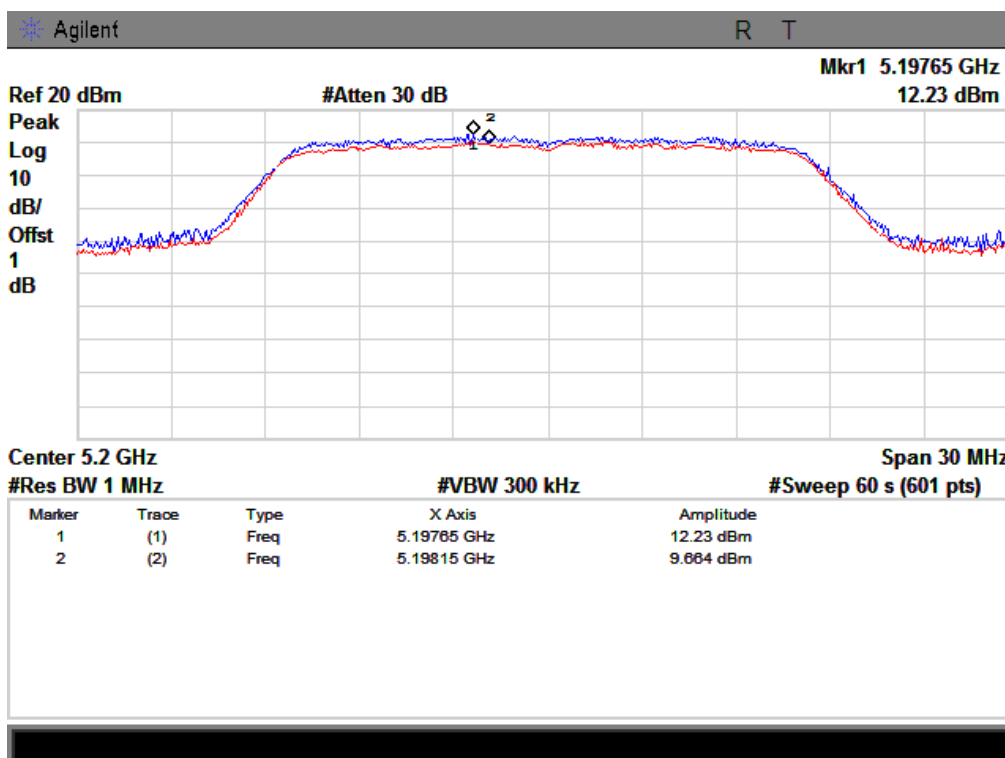
From 1G-25GHz with port 1 antenna

IEEE 802.11a with 5.2G:

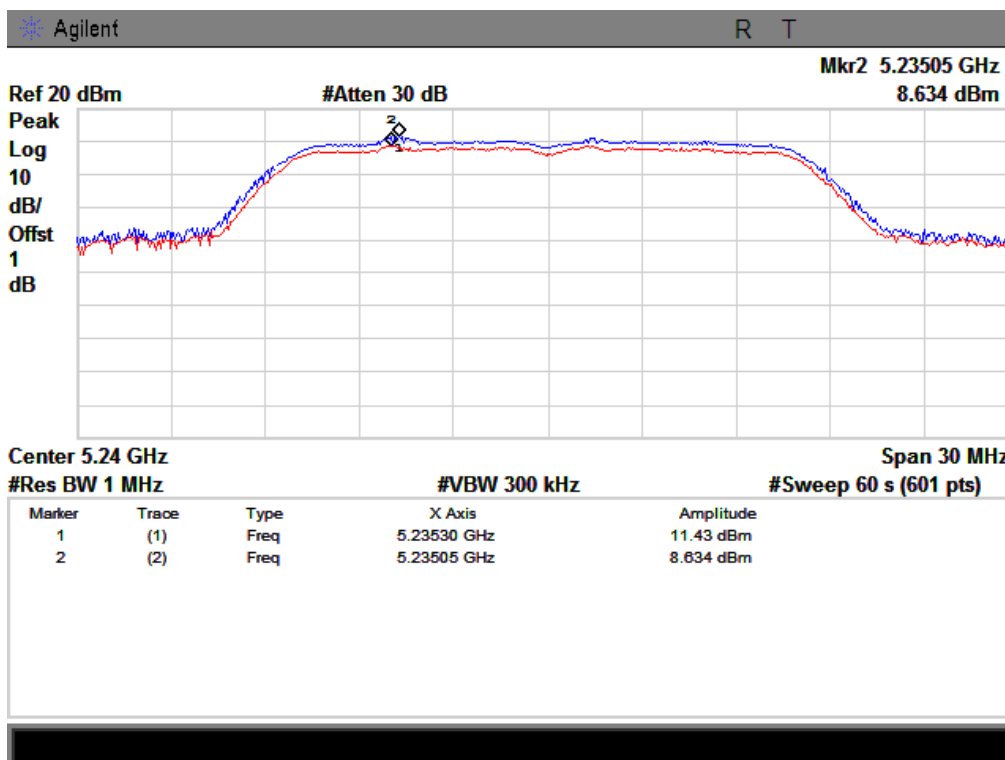
CH Low :



CH Mid :

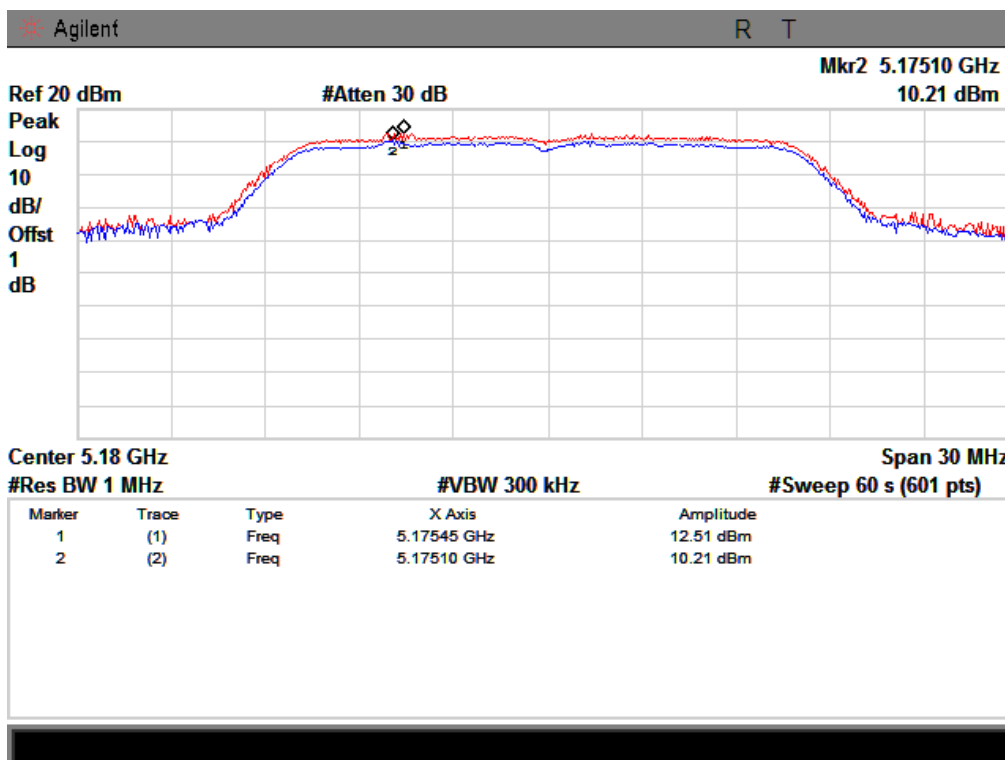


CH High :

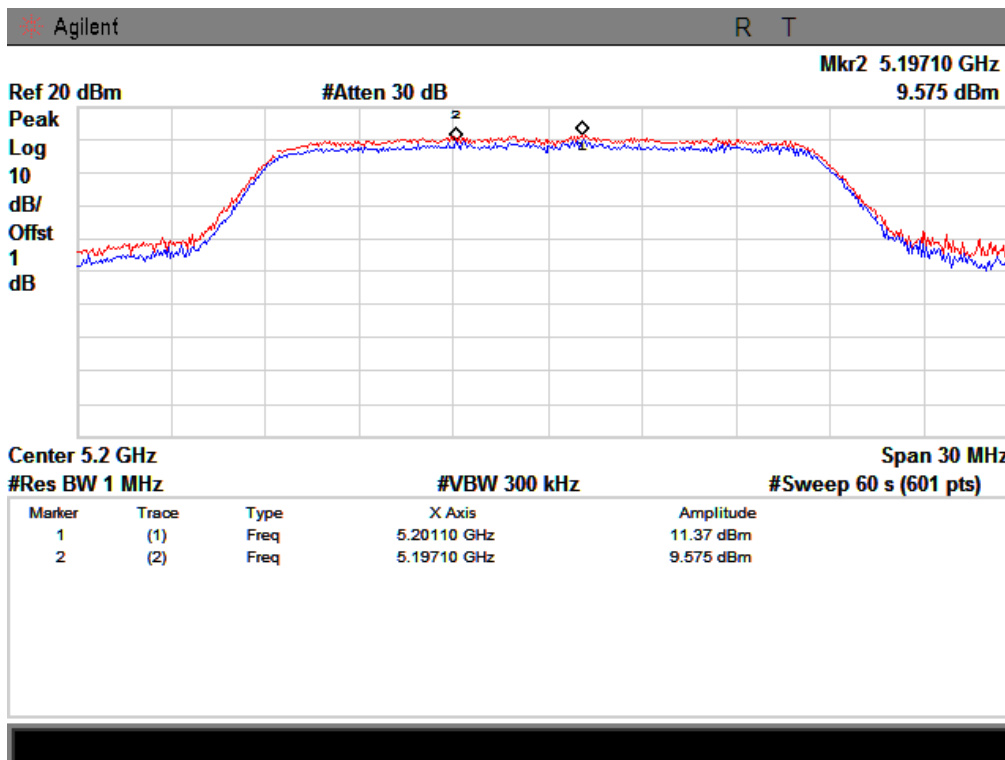


IEEE 802.11n/HT20 with 5.2G:

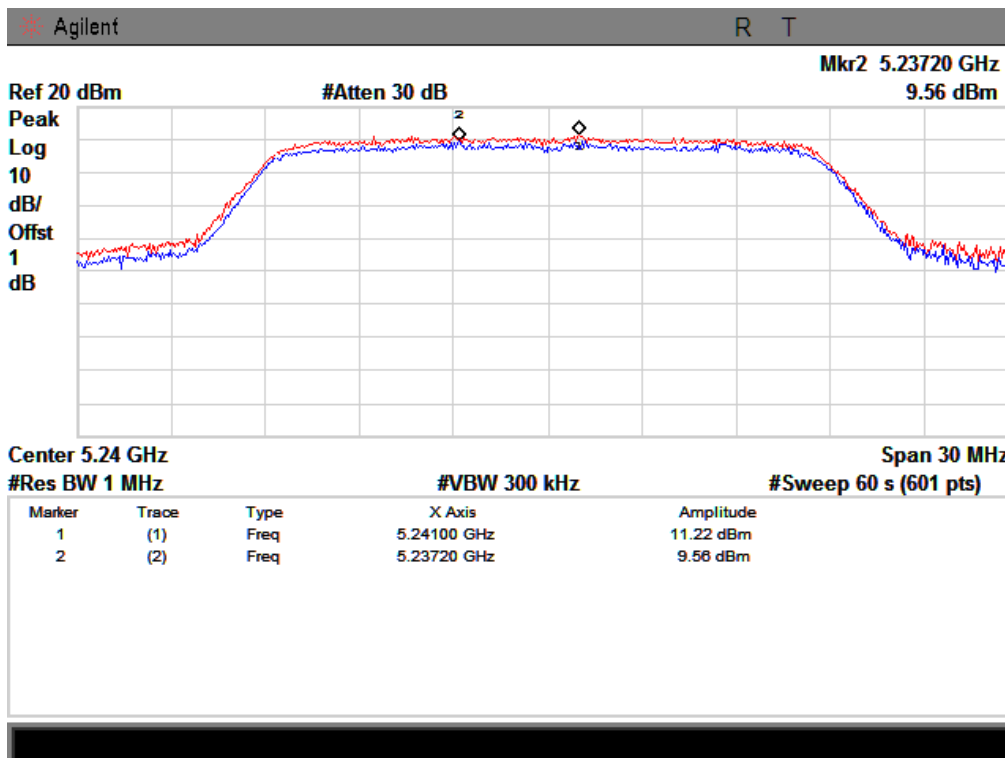
CH Low :



CH Mid :

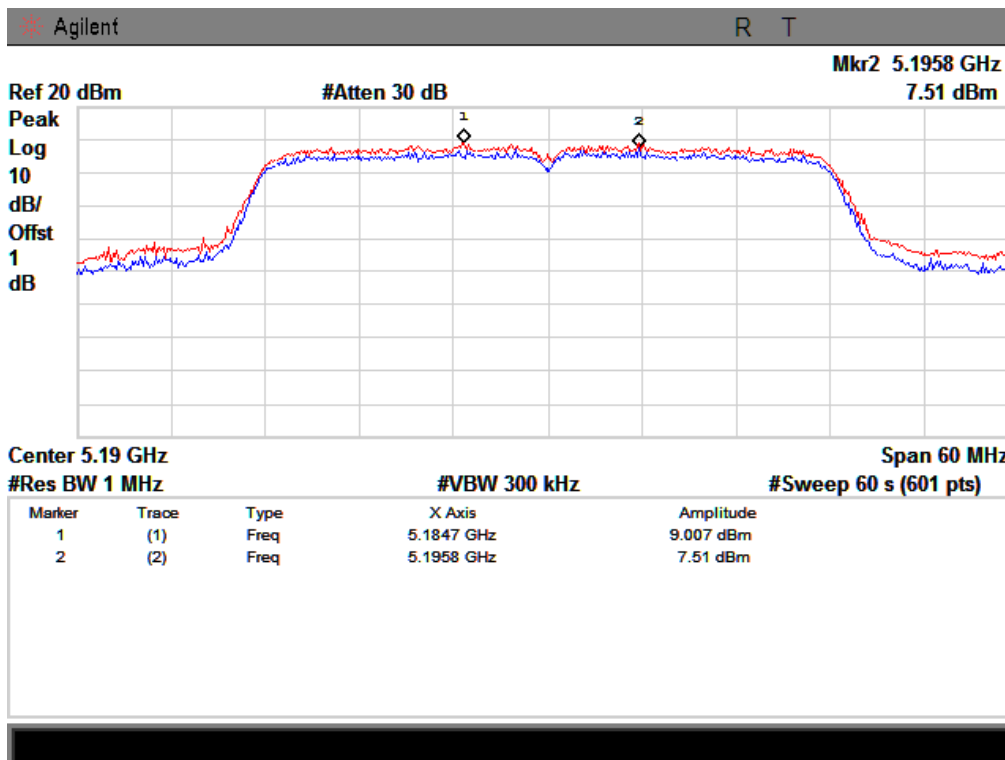


CH High :

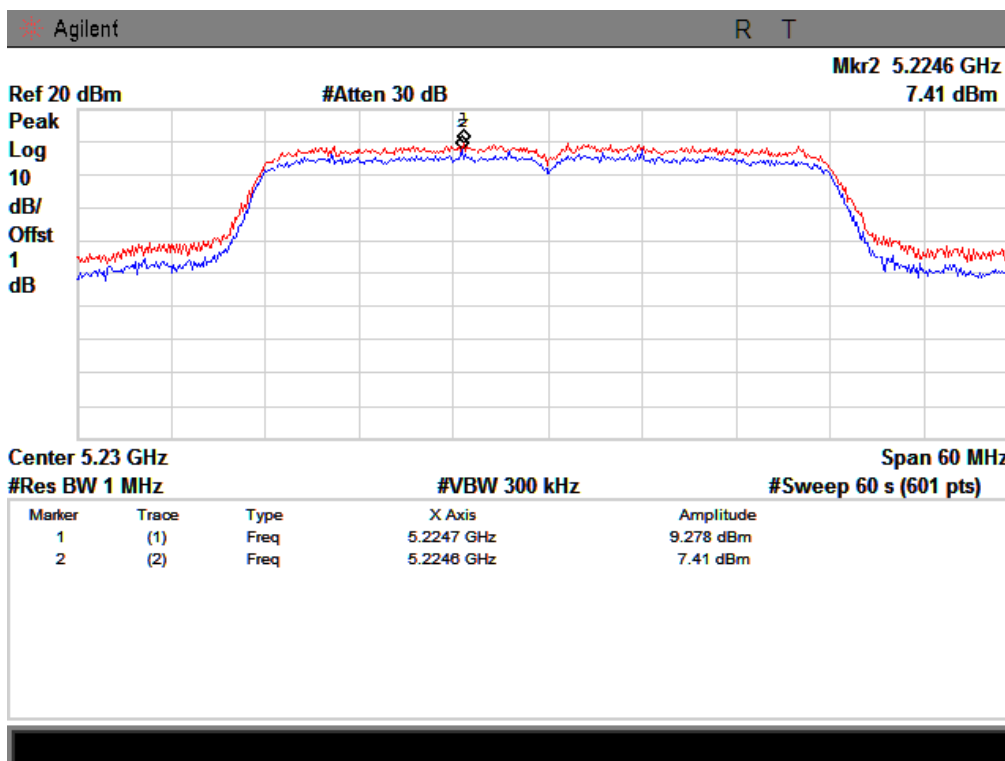


IEEE 802.11n/HT40 with 5.2G:

CH Low :



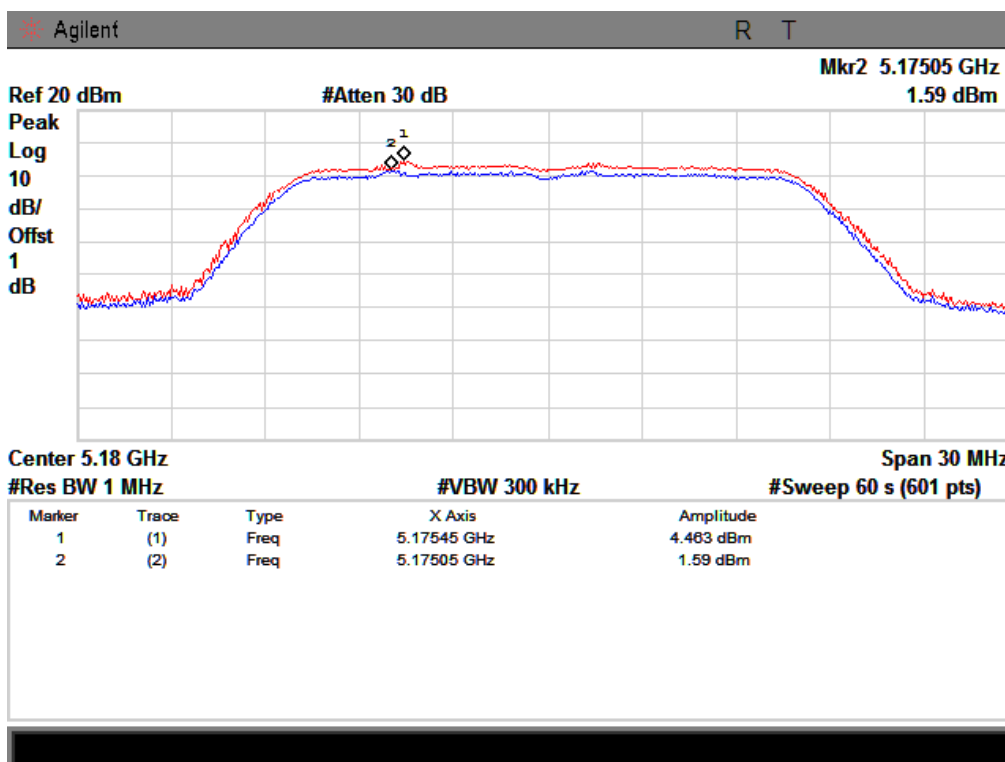
CH High :



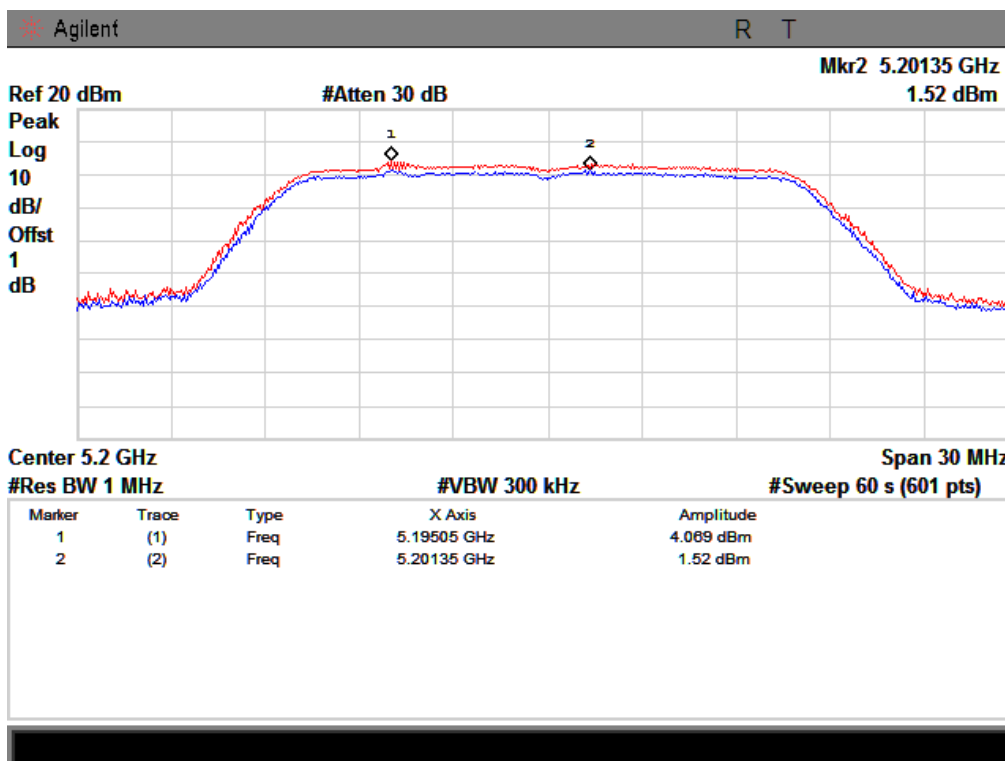
From 1G-25GHz with port 2 antenna

IEEE 802.11a with 5.2G:

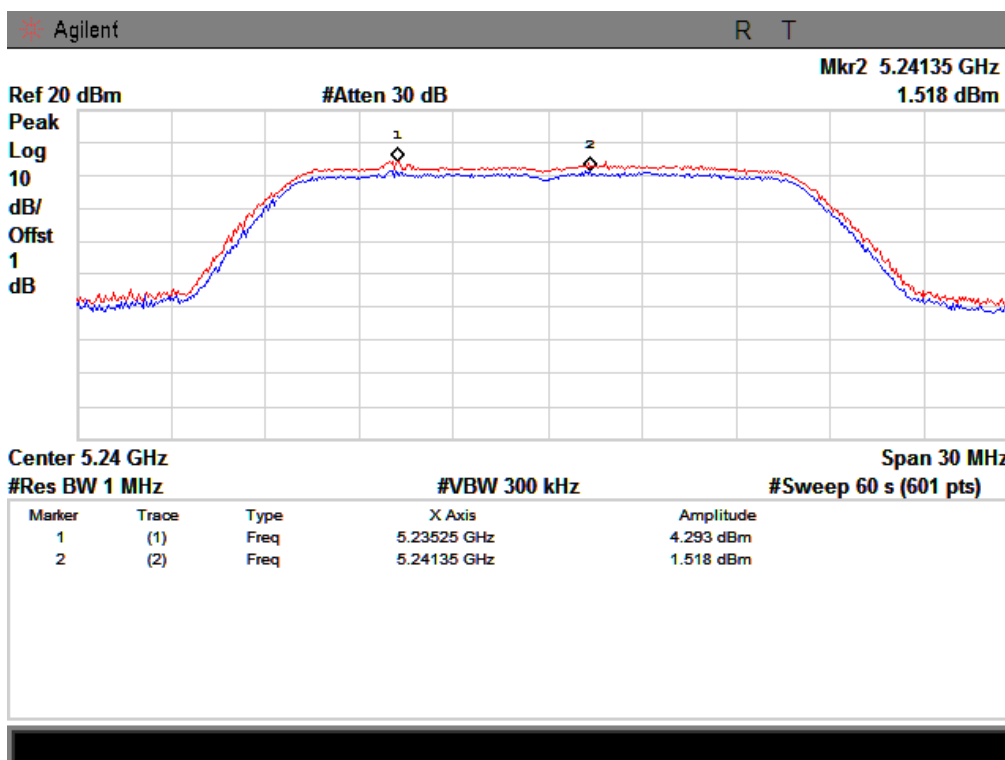
CH Low :



CH Mid :

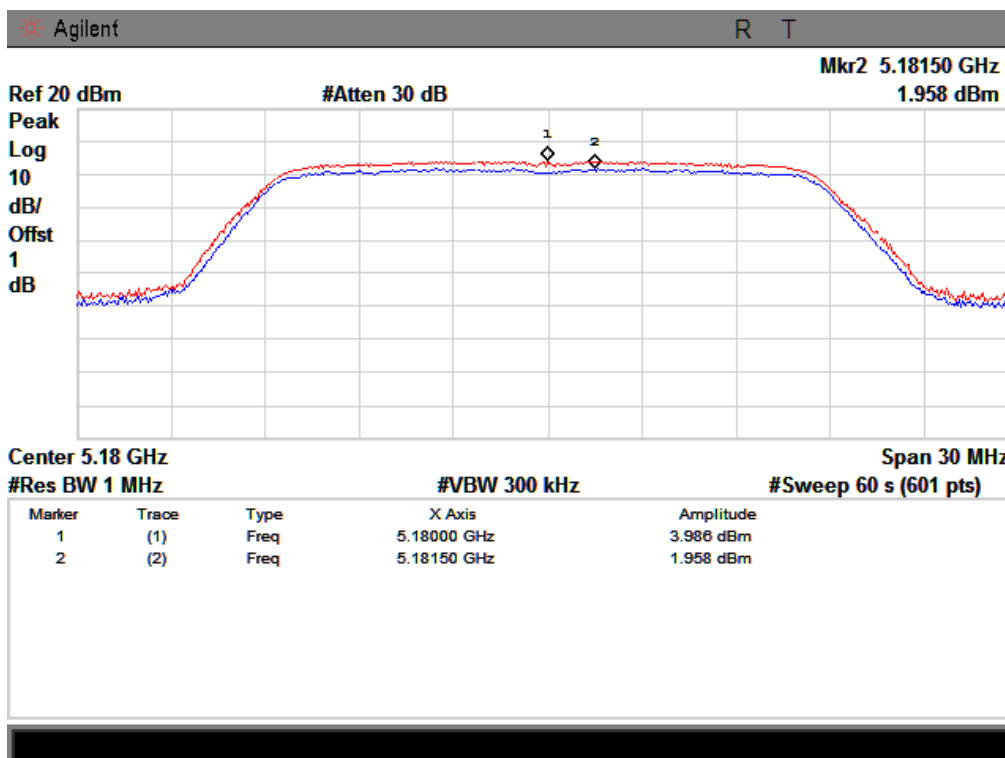


CH High :

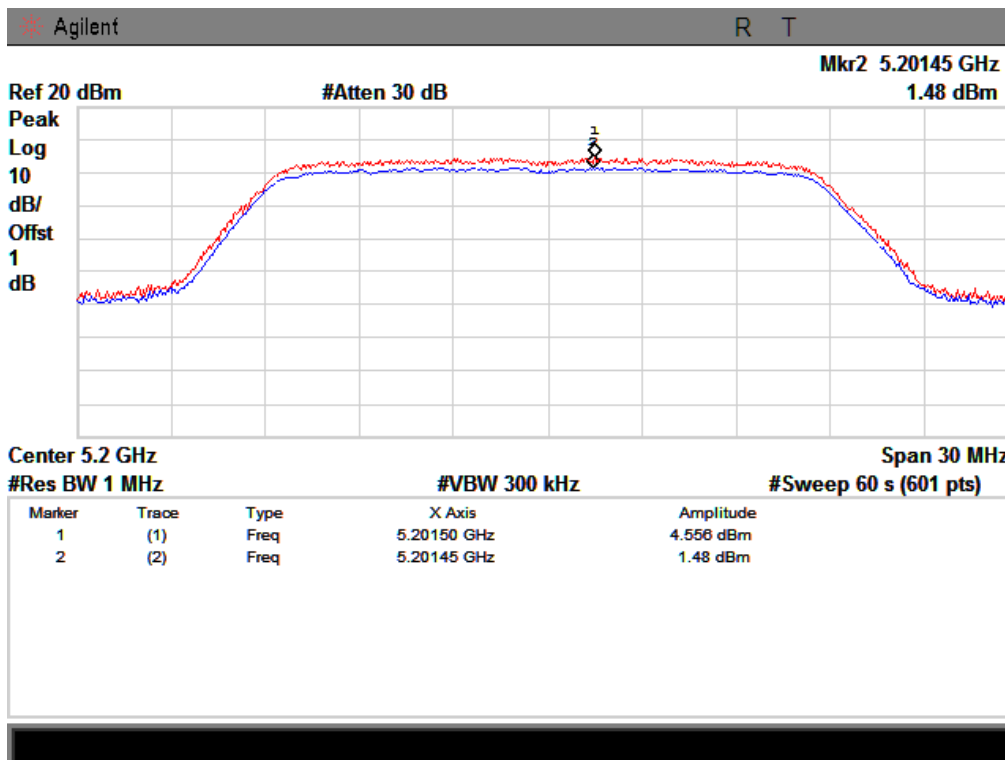


IEEE 802.11n/HT20 with 5.2G:

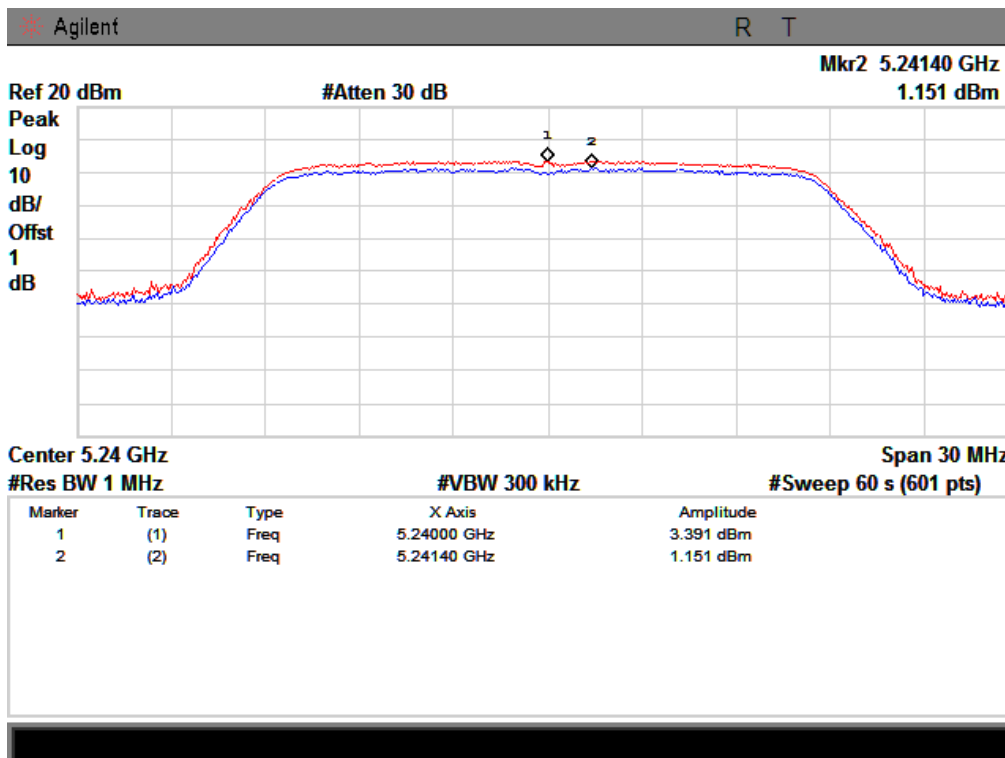
CH Low :



CH Mid :

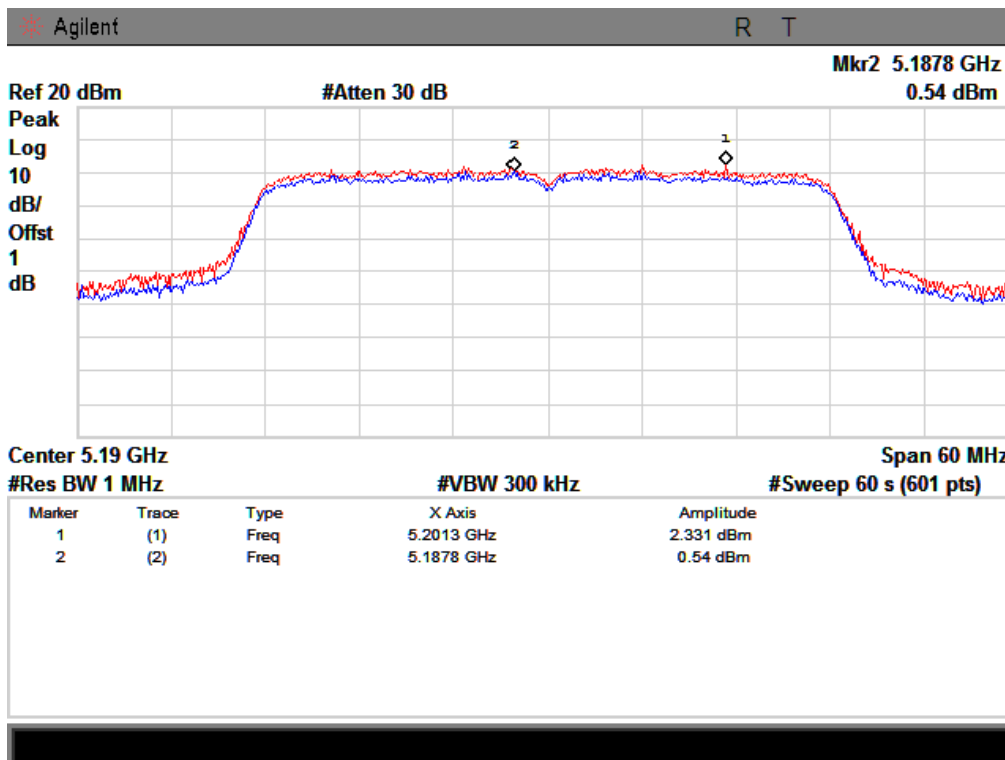


CH High :

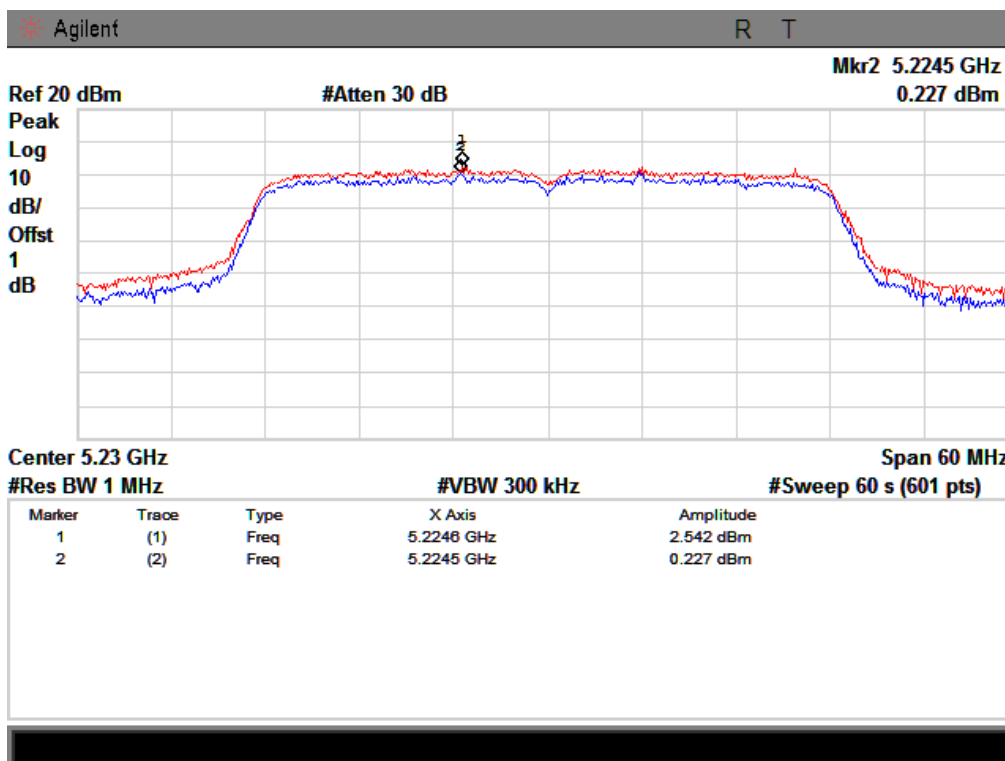


IEEE 802.11n/HT40 with 5.2G:

CH Low :



CH High :



9 Frequency Stability

9.1 Limit

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emissions is maintained within the band of operation under all conditions of normal operation as specified in the user's manual or ± 20 ppm (IEEE 802.11a specification).

9.2 Test Procedure

1. The transmitter output (antenna port) was connected to the spectrum analyser. EUT have transmitted absence of modulation signal and fixed channelize. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings. f_c is declaring of channel frequency. Then the frequency error formula is $(f_c - f) / f_c \times 10^6$ ppm and the limit is less than ± 20 ppm (IEEE 802.11a specification). The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value.
2. Extreme temperature rule is $-30^\circ\text{C} \sim 50^\circ\text{C}$.

9.3 Test Result

EUT: UltraSky MIMO 11abgn USB Dongle/CPE		M/N:M27
Power: DC 5V From PC with AC 120V/60Hz		
Data Rate: 11n HT20: 6.5Mbps; 11n HT40: 13.5Mbps; 11a:6MHz		
Ambient Temperature: 24°C		Relative Humidity: 62%
Test date: 2013-03-22		Test by: Simple guan

For port 1 antenna

Voltage vs Frequency Stability :

Mode	Voltage (V)	Test Frequency(MHz)	Measured Frequency(MHz)	Max Deviation(MHz)	Max Deviation(ppm)	Limit (ppm)
11a	102	5180	5180.0159	0.0162	3.13	+/-20
	120		5180.0162			+/-20
	138		5180.0148			+/-20
	102	5200	5200.0212	0.0231	4.44	+/-20
	120		5200.0231			+/-20
	138		5200.0209			+/-20
	102	5240	5240.0218	0.0226	4.31	+/-20
	120		5240.0226			+/-20
	138		5240.0185			+/-20

Mode	Voltage (V)	Test Frequency(MHz)	Measured Frequency(MHz)	Max Deviation(MHz)	Max Deviation(ppm)	Limit (ppm)
11n HT20	102	5180	5180.0172	0.0229	4.42	+/-20
	120		5180.0216			+/-20
	138		5180.0229			+/-20
	102	5200	5200.0237	0.0258	4.96	+/-20
	120		5200.0258			+/-20
	138		5200.0231			+/-20
	102	5240	5240.0245	0.0264	5.04	+/-20
	120		5240.0239			+/-20
	138		5240.0264			+/-20
11n HT40	102	5190	5190.0312	0.0312	6.01	+/-20
	120		5190.0283			+/-20
	138		5190.0262			+/-20
	102	5230	5230.0271	0.0271	5.18	+/-20
	120		5230.0198			+/-20
	138		5230.0252			+/-20
Conclusion : PASS						

Temperature vs Frequency Stability:

Mode	Voltage (V)	Test Frequency(MHz)	Measured Frequency(MHz)	Max Deviation(MHz)	Max Deviation(ppm)	Limit (ppm)
11a	-30°C	5180	5180.0463	0.0463	8.93	+/-20
	-20°C		5180.0385			
	-10°C		5180.0364			
	0°C		5180.0297			
	10°C		5179.9882			
	20°C		5179.9875			
	30°C		5179.9763			
	40°C		5179.9842			
	50°C		5179.9731			
	-30°C	5200	5200.0419	0.0419	8.06	+/-20
	-20°C		5200.0325			
	-10°C		5200.0311			
	0°C		5200.0127			
	10°C		5199.9845			
	20°C		5199.9738			
	30°C		5199.9764			
	40°C		5199.9717			
	50°C		5199.9839			

Mode	Voltage (V)	Test Frequency(MHz)	Measured Frequency(MHz)	Max Deviation(MHz)	Max Deviation(ppm)	Limit (ppm)
11a	-30°C	5240	5240.0528	0.0528	10.07	+/-20
	-20°C		5240.0462			
	-10°C		5240.0357			
	0°C		5240.0288			
	10°C		5239.9864			
	20°C		5239.9815			
	30°C		5239.9757			
	40°C		5239.9738			
	50°C		5239.9643			

Mode	Voltage (V)	Test Frequency(MHz)	Measured Frequency(MHz)	Max Deviation(MHz)	Max Deviation(ppm)	Limit (ppm)
11n HT20	-30°C	5180	5180.0435	0.0435	8.40	+/-20
	-20°C		5180.0361			
	-10°C		5180.0328			
	0°C		5180.0241			
	10°C		5179.9963			
	20°C		5179.9847			
	30°C		5179.9821			
	40°C		5179.9739			
	50°C		5179.9683			
	-30°C	5200	5200.0562	0.0562	10.81	+/-20
	-20°C		5200.0417			
	-10°C		5200.0295			
	0°C		5200.0211			
	10°C		5199.9937			
	20°C		5199.9873			
	30°C		5199.9797			
	40°C		5199.9784			
	50°C		5199.9652			

Mode	Voltage (V)	Test Frequency(MHz)	Measured Frequency(MHz)	Max Deviation(MHz)	Max Deviation(ppm)	Limit (ppm)
11n HT20	-30°C	5240	5240.0436	0.0436	8.32	+/-20
	-20°C		5240.0358			
	-10°C		5240.0275			
	0°C		5240.0146			
	10°C		5239.9939			
	20°C		5239.9863			
	30°C		5239.9813			
	40°C		5239.9726			
	50°C		5239.9758			

Mode	Voltage (V)	Test Frequency(MHz)	Measured Frequency(MHz)	Max Deviation(MHz)	Max Deviation(ppm)	Limit (ppm)
11n HT40	-30°C	5190	5190.0517	0.0517	9.96	+/-20
	-20°C		5190.0465			
	-10°C		5190.0392			
	0°C		5190.0258			
	10°C		5190.0237			
	20°C		5189.9932			
	30°C		5189.9849			
	40°C		5189.9826			
	50°C		5189.9713			
	-30°C	5230	5230.0464	0.0464	8.87	+/-20
	-20°C		5230.0352			
	-10°C		5230.0281			
	0°C		5230.0233			
	10°C		5229.9854			
	20°C		5229.9811			
	30°C		5229.9752			
	40°C		5229.9736			
50°C	5229.9676					

For port 2 antenna

Voltage vs Frequency Stability :

Mode	Voltage (V)	Test Frequency(MHz)	Measured Frequency(MHz)	Max Deviation(MHz)	Max Deviation(ppm)	Limit (ppm)
11a	102	5180	5180.0296	0.0296	5.71	+/-20
	120		5180.0214			+/-20
	138		5180.0235			+/-20
	102	5200	5200.0218	0.0235	4.52	+/-20
	120		5200.0147			+/-20
	138		5200.0235			+/-20
	102	5240	5240.0264	0.0271	5.17	+/-20
	120		5240.0224			+/-20
	138		5240.0271			+/-20

Mode	Voltage (V)	Test Frequency(MHz)	Measured Frequency(MHz)	Max Deviation(MHz)	Max Deviation(ppm)	Limit (ppm)
11n HT20	102	5180	5180.0258	0.0258	4.98	+/-20
	120		5180.0173			+/-20
	138		5180.0152			+/-20
	102	5200	5200.0237	0.0321	6.17	+/-20
	120		5200.0165			+/-20
	138		5200.0321			+/-20
	102	5240	5240.0284	0.0284	5.42	+/-20
	120		5240.0211			+/-20
	138		5240.0272			+/-20
11n HT40	102	5190	5190.0306	0.0306	5.90	+/-20
	120		5190.0235			+/-20
	138		5190.0248			+/-20
	102	5230	523.0294	0.0294	5.62	+/-20
	120		5230.0182			+/-20
	138		5230.0216			+/-20

Conclusion : PASS

Temperature vs Frequency Stability:

Mode	Voltage (V)	Test Frequency(MHz)	Measured Frequency(MHz)	Max Deviation(MHz)	Max Deviation(ppm)	Limit (ppm)
11a	-30°C	5180	5180.0627	0.0627	12.10	+/-20
	-20°C		5180.0635			
	-10°C		5180.0511			
	0°C		5180.0194			
	10°C		5179.9853			
	20°C		5179.9792			
	30°C		5179.9764			
	40°C		5179.9702			
	50°C		5179.9681			
	-30°C	5200	5200.0543	0.0543	10.44	+/-20
	-20°C		5200.0426			
	-10°C		5200.0311			
	0°C		5200.0258			
	10°C		5199.9921			
	20°C		5199.9854			
	30°C		5199.9813			
	40°C		5199.9738			
	50°C		5199.9617			

Mode	Voltage (V)	Test Frequency(MHz)	Measured Frequency(MHz)	Max Deviation(MHz)	Max Deviation(ppm)	Limit (ppm)
11a	-30°C	5240	5240.0417	0.0625	11.93	+/-20
	-20°C		5240.0625			
	-10°C		5240.0468			
	0°C		5240.0319			
	10°C		5239.9877			
	20°C		5239.9794			
	30°C		5239.9719			
	40°C		5239.9664			
	50°C		5239.9603			

Mode	Voltage (V)	Test Frequency(MHz)	Measured Frequency(MHz)	Max Deviation(MHz)	Max Deviation(ppm)	Limit (ppm)
11n HT20	-30°C	5180	5180.0529	0.0529	10.21	+/-20
	-20°C		5180.0438			
	-10°C		5180.0477			
	0°C		5180.0218			
	10°C		5179.9831			
	20°C		5179.9795			
	30°C		5179.9743			
	40°C		5179.9682			
	50°C		5179.9508			
	-30°C	5200	5200.0412	0.0473	9.10	+/-20
	-20°C		5200.0352			
	-10°C		5200.0189			
	0°C		5200.0117			
	10°C		5199.9843			
	20°C		5199.9752			
	30°C		5199.9644			
	40°C		5199.9608			
	50°C		5199.9527			

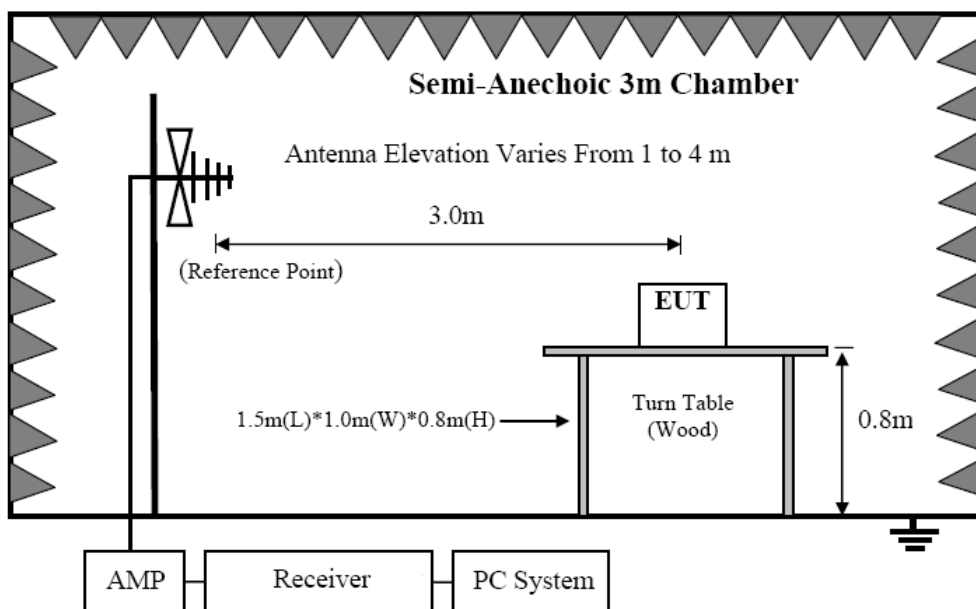
Mode	Voltage (V)	Test Frequency(MHz)	Measured Frequency(MHz)	Max Deviation(MHz)	Max Deviation(ppm)	Limit (ppm)
11n HT20	-30°C	5240	5240.0395	0.0395	7.54	+/-20
	-20°C		5240.0257			
	-10°C		5240.0218			
	0°C		5240.0174			
	10°C		5239.9929			
	20°C		5239.9836			
	30°C		5239.9774			
	40°C		5239.9705			
	50°C		5239.9682			

Mode	Voltage (V)	Test Frequency(MHz)	Measured Frequency(MHz)	Max Deviation(MHz)	Max Deviation(ppm)	Limit (ppm)
11n HT40	-30°C	5190	5190.0517	0.0517	9.96	+/-20
	-20°C		5190.0428			
	-10°C		5190.0331			
	0°C		5190.0197			
	10°C		5190.0108			
	20°C		5189.9916			
	30°C		5189.9873			
	40°C		5189.9814			
	50°C		5189.9732			
	-30°C	5230	5230.0428	0.0428	8.18	+/-20
	-20°C		5230.0395			
	-10°C		5230.0266			
	0°C		5230.0175			
	10°C		5229.984			
	20°C		5229.9739			
	30°C		5229.9684			
	40°C		5229.9612			
50°C	5229.9558					

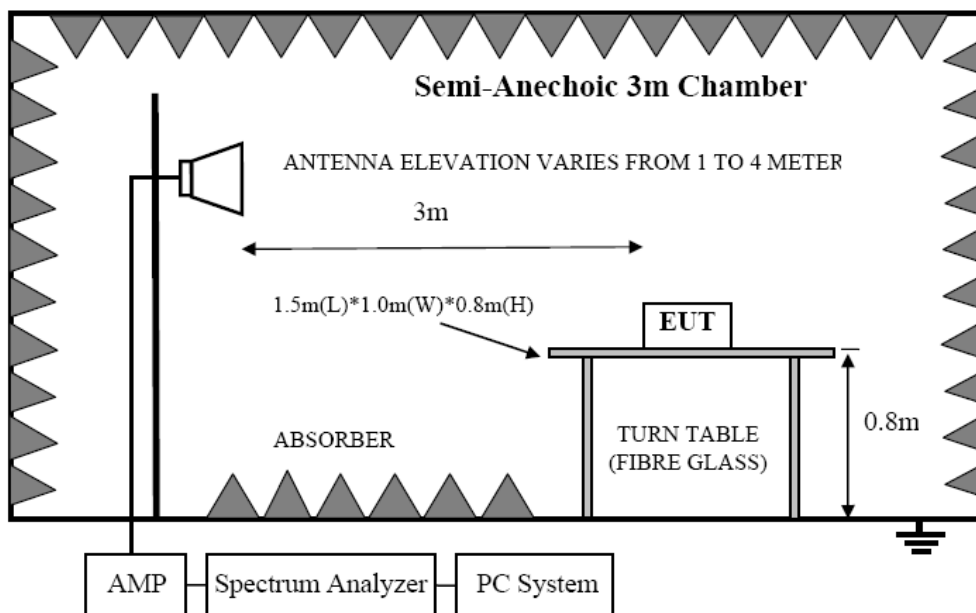
10 Radiated Emission

10.1 Block Diagram of Test Setup

In 3m Anechoic Chamber Test Setup Diagram for below 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.

10.2 Radiated Emission Limit

6.2.1 15.205 Restricted bands of operation

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
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)

6.2.2 FCC Part 15C 15.209 limit

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V}/\text{m}$	$\text{dB}(\mu\text{V})/\text{m}$
0.009 ~ 0.490	300	2400/F(KHz)	/
0.490 ~ 1.705	30	24000/F(KHz)	/
1.705 ~ 30.0	30	30	30
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	PK: 5000	74
		Average: 500	54

Remark: (1) Emission level $\text{dB}\mu\text{V} = 20 \log$ Emission level $\mu\text{V}/\text{m}$

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system

(4) For frequency above 1GHz, the level of emissions shall comply both with PK limit and Average limit. And if peak level comply with average limit, then the average level is deemed to comply with average limit.

(5) This limit not applies to fundamental emissions of device.

6.2.3 Radiated emissions limit for this reported device

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.

Test at 3 meters distance:

$$\text{EIRP[dBm]} = \text{E[dB}\mu\text{V/m]} - 95.2$$

$$\text{E [dB}\mu\text{V/m]} = \text{EIRP[dBm]} + 95.2 = -27 + 95.2 = 68.2 \text{ dB}\mu\text{V/m}$$

The limit of peak value is 68.2 dB μ V/m

Unwanted emissions below 1 GHz and those emissions appearing within 15.205 restricted frequency bands must comply with the general field strength limits set forth in Section 15.209

10.3 Test Procedure

The EUT was set to MIMO mode for 802.11a, 802.11n HT20 and HT 40 during radiated emissions test.

EUT and its simulators are placed on a turn table, which is 0.8 meter high above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. Power on the EUT and let it working in test mode, then test it. EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna. Both horizontal and vertical polarization of the antenna are set on test.

For emissions below 1GHz and those emissions appearing within 15.205 restricted frequency bands use below procedure:

(1).The bandwidth of the EMI test receiver (R&S ESVS10) is set at 120kHz for frequency range from 30MHz to 1000 MHz.

(2).The bandwidth of the Spectrum's VBW is set at 1MHz and RBW is set at 1MHz for peak emissions measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emissions measure above 1GHz.

For the emissions above 1GHz and not appearing within 15.205 restricted frequency bands use below procedure:

(1).The maximum emission at 3m distance was measured and recorded with receive antenna in both vertical and horizontal by rotating the turntable and by lowering the receive antenna.

(2).The EUT was then removed and replaced with a substitution antenna in the same position and the substitution antenna must have the same polarization with the receive antenna.

(3). A signal which have the same frequency obtained in step 2 was fed to the substitution, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver, the level of the signal generator was adjusted until the measured field strength level in step 2 was obtained, recorded the level of the signal generator.

(4).Repeated step 4 with both antenna polarizations

(5).The spurious emissions is equal to the power supplied by the signal generator and corrections due to the gain of the substitution antenna and the cable loss between the signal generator and the substitution antenna.

10.4 Radiated Emission Test Results

PASS. (See below detailed test data)

We have scanned the 9KHz from 25GHz to the EUT.

Detailed information please see the following page.

From 9KHz to 30MHz: Conclusion: PASS

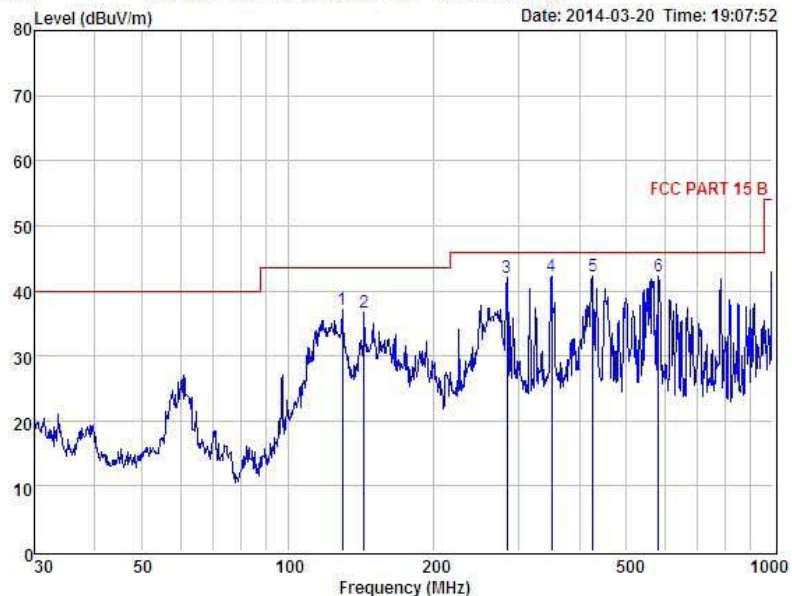
Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Frequency Range 30MHz-1GHz



Shenzhen Certification Technology Service Co., Ltd.
 2F, Building B, East Area of Nanchang Second Industrial Zone,
 Gushu 2nd Road, Bao'an District, Shenzhen 518126, P.R. China
 Tel: 4006786199 FAX: +86-755-26736857
 Website: <http://www.cessz.com> Email: Service@cessz.com

Data: 1 File: D:\REPORT DATA\AirLink\M27-14.03.20.EM6 (2) Date: 2014-03-20 Time: 19:07:52



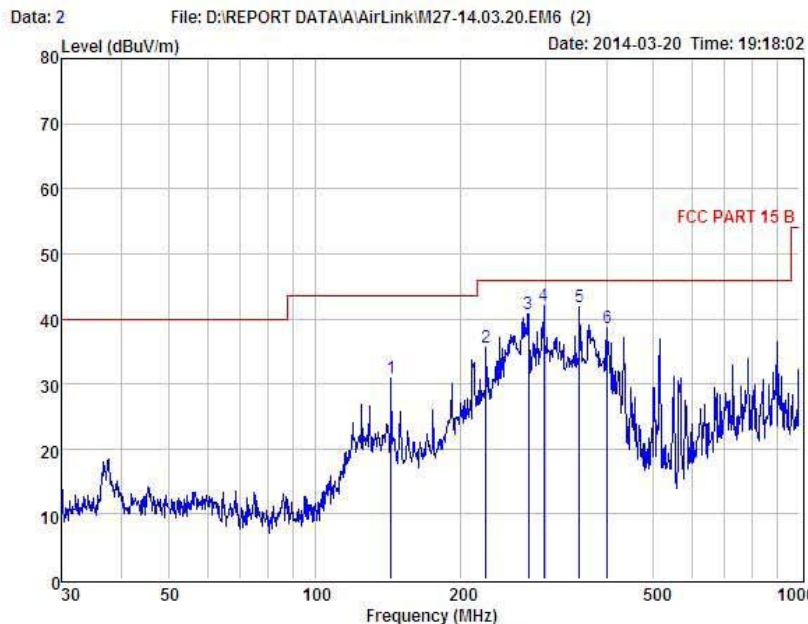
Condition : FCC PART 15 B 3m POL: VERTICAL
 EUT : UltraSky MIMO 11abgn USB Dongle/CPE
 Model No : M27
 Test Mode : Link mode
 Power : DC 5V for PC with AC 120V/60Hz
 Test Engineer : Simple
 Remark :
 Temp : 24.2°C
 Hum : 54%

Item	Freq MHz	Read Level dBuV	Antenna Factor dB	Preamp Factor dB	Cable Loss dB	Level dBuV	Limit dBuV	Margin dBuV	Remark
1	129.47	50.93	12.68	26.89	0.44	37.16	43.50	-6.34	QP
2	143.83	49.37	13.77	26.90	0.38	36.62	43.50	-6.88	QP
3	282.99	53.19	12.45	24.16	0.56	42.04	46.00	-3.96	QP
4	350.48	52.09	13.83	24.27	0.58	42.23	46.00	-3.77	QP
5	426.52	50.59	15.38	24.46	0.67	42.18	46.00	-3.82	QP
6	580.70	50.42	17.93	26.94	0.90	42.31	46.00	-3.69	QP

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss



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 2F, Building B, East Area of Nanchang Second Industrial Zone,
 Gushu 2nd Road, Bao'an District, Shenzhen 518126, P.R. China
 Tel: 4006786199 FAX: +86-755-26736857
 Website: <http://www.cessz.com> Email: Service@cessz.com



Condition : FCC PART 15 B 3m POL: HORIZONTAL
 EUT : UltraSky MIMO 11abgn USB Dongle/CPE
 Model No : M27
 Test Mode : Link mode
 Power : DC 5V for PC with AC 120V/60Hz
 Test Engineer : Simple
 Remark :
 Temp : 24.2°C
 Hum : 54%

Item	Freq MHz	Read Level dBuV	Antenna Factor dB	Preamp Factor dB	Cable Loss dB	Level dBuV	Limit dBuV	Margin dBuV	Remark
1	143.83	43.55	13.77	26.90	0.38	30.80	43.50	-12.70	QP
2	225.31	50.84	10.98	26.77	0.55	35.60	46.00	-10.40	QP
3	276.12	52.21	12.26	24.15	0.51	40.83	46.00	-5.17	QP
4	297.22	52.86	12.76	24.19	0.94	42.07	46.00	-3.93	QP
5	351.71	51.61	13.87	24.28	0.66	41.86	46.00	-4.14	QP
6	401.84	47.49	14.79	24.43	0.72	38.57	46.00	-7.43	QP

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss

From 1G-25GHz with port 1 antenna and port 2 antenna MIMO mode:

Note: This report only test simultaneously transmit IEEE 802.11a, IEEE 802.11n HT20 5.2G, IEEE 802.11n HT40 5.2G, other simultaneously transmit see other test report.

IEEE 802.11a with 5.2G

EUT	UltraSky MIMO 11abgn USB Dongle/CPE	Model Name	M27
Temperature	26°C	Relative Humidity	56%
Pressure	960hPa	Test voltage	DC 5V From PC
Test Mode	TX Low		

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
10360	V	38.37	---	2.36	40.73	---	74.00	54.00	-13.27	Peak
15540	V	37.21	---	4.52	41.73	---	74.00	54.00	-12.27	Peak
20720	V	35.23	---	6.14	41.37	---	74.00	54.00	-12.63	Peak
N/A										

EUT	UltraSky MIMO 11abgn USB Dongle/CPE	Model Name	M27
Temperature	26°C	Relative Humidity	56%
Pressure	960hPa	Test voltage	DC 5V From PC
Test Mode	TX Low		

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
10360	H	38.07	---	2.36	40.43	---	74.00	54.00	-13.57	Peak
15540	H	36.64	---	4.52	41.16	---	74.00	54.00	-12.84	Peak
20720	H	35.94	---	6.14	42.08	---	74.00	54.00	-11.92	Peak
N/A										

Notes: AV Means AV detector test data, Peak Means Peak detector test data.

Emissions attenuated more than 20 dB below the permissible value are not reported.

EUT	UltraSky MIMO 11 abgn USB Dongle/CPE	Model Name	M27
Temperature	26°C	Relative Humidity	56%
Pressure	960hPa	Test voltage	DC 5V From PC
Test Mode	TX Mid		

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
10400	V	38.18	---	2.36	40.54	---	74.00	54.00	-13.46	Peak
15600	V	36.90	---	4.52	41.42	---	74.00	54.00	-12.58	Peak
20800	V	34.11	---	6.14	40.25	---	74.00	54.00	-13.75	Peak
N/A										

EUT	UltraSky MIMO 11 abgn USB Dongle/CPE	Model Name	M27
Temperature	26°C	Relative Humidity	56%
Pressure	960hPa	Test voltage	DC 5V From PC
Test Mode	TX Mid		

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
10400	H	38.81	---	2.36	41.17	---	74.00	54.00	-12.83	Peak
15600	H	37.21	---	4.52	41.73	---	74.00	54.00	-12.27	Peak
20800	H	37.27	---	6.14	43.41	---	74.00	54.00	-10.59	Peak
N/A										

Notes: AV Means AV detector test data, Peak Means Peak detector test data.

Emissions attenuated more than 20 dB below the permissible value are not reported.

EUT	UltraSky MIMO 11abgn USB Dongle/CPE	Model Name	M27
Temperature	26°C	Relative Humidity	56%
Pressure	960hPa	Test voltage	DC 5V From PC
Test Mode	TX High		

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
10480	V	39.90	---	2.36	42.26	---	74.00	54.00	-11.74	Peak
15720	V	37.12	---	4.52	41.64	---	74.00	54.00	-12.36	Peak
20960	V	37.01	---	6.14	43.15	---	74.00	54.00	-10.85	Peak
N/A										

EUT	UltraSky MIMO 11abgn USB Dongle/CPE	Model Name	M27
Temperature	26°C	Relative Humidity	56%
Pressure	960hPa	Test voltage	DC 5V From PC
Test Mode	TX High		

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
10480	H	37.88	---	2.36	40.24	---	74.00	54.00	-13.76	Peak
15720	H	37.00	---	4.52	41.52	---	74.00	54.00	-12.48	Peak
20960	H	38.07	---	6.14	44.21	---	74.00	54.00	-9.79	Peak
N/A										

Notes: AV Means AV detector test data, Peak Means Peak detector test data.

Emissions attenuated more than 20 dB below the permissible value are not reported.

IEEE 802.11n/HT20 with 5.2G

EUT	UltraSky MIMO 11abgn USB Dongle/CPE	Model Name	M27
Temperature	26°C	Relative Humidity	56%
Pressure	960hPa	Test voltage	DC 5V From PC
Test Mode	TX Low		

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
10360	V	40.71	---	2.36	43.07	---	74.00	54.00	-10.93	Peak
15540	V	40.73	---	4.52	45.25	---	74.00	54.00	-8.75	Peak
20720	V	38.24	---	6.14	44.38	---	74.00	54.00	-9.62	Peak
N/A										

EUT	UltraSky MIMO 11abgn USB Dongle/CPE	Model Name	M27
Temperature	26°C	Relative Humidity	56%
Pressure	960hPa	Test voltage	DC 5V From PC
Test Mode	TX Low		

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
10360	H	40.37	---	2.36	42.73	---	74.00	54.00	-11.27	Peak
15540	H	38.90	---	4.52	43.42	---	74.00	54.00	-10.58	Peak
20720	H	37.83	---	6.14	43.97	---	74.00	54.00	-10.03	Peak
N/A										

Notes: AV Means AV detector test data, Peak Means Peak detector test data.

Emissions attenuated more than 20 dB below the permissible value are not reported.

EUT	UltraSky MIMO 11abgn USB Dongle/CPE	Model Name	M27
Temperature	26°C	Relative Humidity	56%
Pressure	960hPa	Test voltage	DC 5V From PC
Test Mode	TX Mid		

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
10400	V	39.00	---	2.36	41.36	---	74.00	54.00	-12.64	Peak
15600	V	40.74	---	4.52	45.26	---	74.00	54.00	-8.74	Peak
20800	V	37.88	---	6.14	44.02	---	74.00	54.00	-9.98	Peak
N/A										

EUT	UltraSky MIMO 11abgn USB Dongle/CPE	Model Name	M27
Temperature	26°C	Relative Humidity	56%
Pressure	960hPa	Test voltage	DC 5V From PC
Test Mode	TX Mid		

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
10400	H	41.38	---	2.36	43.74	---	74.00	54.00	-10.26	Peak
15600	H	37.65	---	4.52	42.17	---	74.00	54.00	-11.83	Peak
20800	H	39.18	---	6.14	45.32	---	74.00	54.00	-8.68	Peak
N/A										

Notes: AV Means AV detector test data, Peak Means Peak detector test data.

Emissions attenuated more than 20 dB below the permissible value are not reported.

EUT	UltraSky MIMO 11abgn USB Dongle/CPE	Model Name	M27
Temperature	26°C	Relative Humidity	56%
Pressure	960hPa	Test voltage	DC 5V From PC
Test Mode	TX High		

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
10480	V	38.89	---	2.36	41.25	---	74.00	54.00	-12.75	Peak
15720	V	38.09	---	4.52	42.61	---	74.00	54.00	-11.39	Peak
20960	V	37.40	---	6.14	43.54	---	74.00	54.00	-10.46	Peak
N/A										

EUT	UltraSky MIMO 11abgn USB Dongle/CPE	Model Name	M27
Temperature	26°C	Relative Humidity	56%
Pressure	960hPa	Test voltage	DC 5V From PC
Test Mode	TX High		

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
10480	H	38.89	---	2.36	41.25	---	74.00	54.00	-12.75	Peak
15720	H	37.64	---	4.52	42.16	---	74.00	54.00	-11.84	Peak
20960	H	37.09	---	6.14	43.23	---	74.00	54.00	-10.77	Peak
N/A										

Notes: AV Means AV detector test data, Peak Means Peak detector test data.

Emissions attenuated more than 20 dB below the permissible value are not reported.

IEEE 802.11n/HT40 with 5.2G

EUT	UltraSky MIMO 11abgn USB Dongle/CPE	Model Name	M27
Temperature	26°C	Relative Humidity	56%
Pressure	960hPa	Test voltage	DC 5V From PC
Test Mode	TX Low		

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
10380	V	38.99	---	2.36	41.35	---	74.00	54.00	-12.65	Peak
15570	V	38.14	---	4.52	42.66	---	74.00	54.00	-11.34	Peak
20760	V	37.01	---	6.14	43.15	---	74.00	54.00	-10.85	Peak
N/A										

EUT	UltraSky MIMO 11abgn USB Dongle/CPE	Model Name	M27
Temperature	26°C	Relative Humidity	56%
Pressure	960hPa	Test voltage	DC 5V From PC
Test Mode	TX Low		

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
10380	H	38.88	---	2.36	41.24	---	74.00	54.00	-12.76	Peak
15570	H	37.90	---	4.52	42.42	---	74.00	54.00	-11.58	Peak
20760	H	37.13	---	6.14	43.27	---	74.00	54.00	-10.73	Peak
N/A										

Notes: AV Means AV detector test data, Peak Means Peak detector test data.

Emissions attenuated more than 20 dB below the permissible value are not reported.

EUT	UltraSky MIMO 11abgn USB Dongle/CPE	Model Name	M27
Temperature	26°C	Relative Humidity	56%
Pressure	960hPa	Test voltage	DC 5V From PC
Test Mode	TX High		

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
10460	V	39.00	---	2.36	41.36	---	74.00	54.00	-12.64	Peak
15690	V	38.10	---	4.52	42.62	---	74.00	54.00	-11.38	Peak
20920	V	37.44	---	6.14	43.58	---	74.00	54.00	-10.42	Peak
N/A										

EUT	UltraSky MIMO 11abgn USB Dongle/CPE	Model Name	M27
Temperature	26°C	Relative Humidity	56%
Pressure	960hPa	Test voltage	DC 5V From PC
Test Mode	TX High		

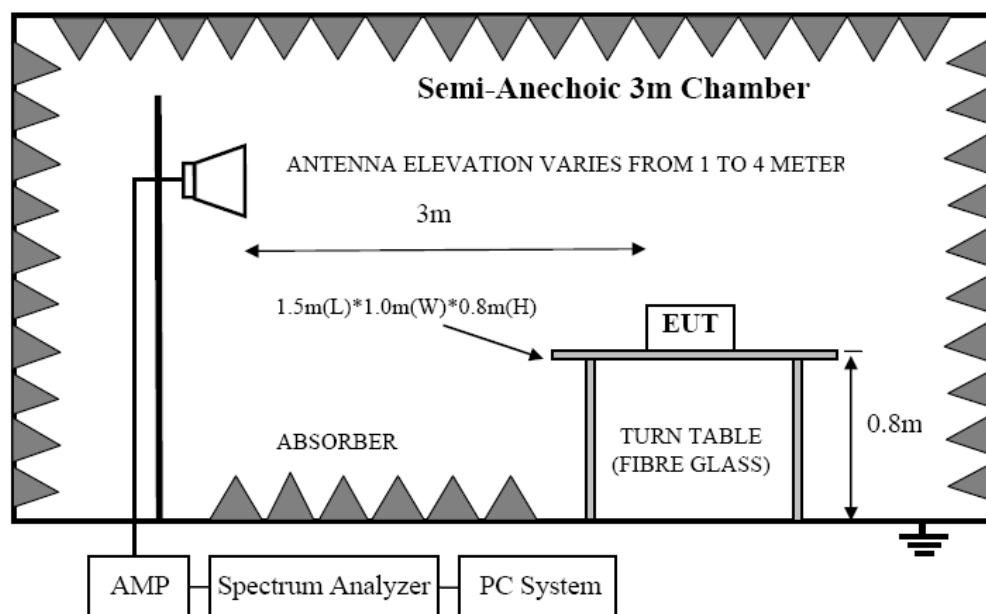
Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
10460	H	40.30	---	2.36	42.66	---	74.00	54.00	-11.34	Peak
15690	H	40.32	---	4.52	44.84	---	74.00	54.00	-9.16	Peak
20920	H	40.40	---	6.14	46.54	---	74.00	54.00	-7.46	Peak
N/A										

Notes: AV Means AV detector test data, Peak Means Peak detector test data.

Emissions attenuated more than 20 dB below the permissible value are not reported.

11 Band Edge Compliance

11.1 Block Diagram of Test Setup



11.2 Limit

All the lower and upper band-edges emissions appearing within restricted frequency bands shall not exceed the limits shown in 15.209, all the emissions outside operation frequency band shall comply with 15.407(b)(1) requirement.

Test at 3 meters distance:

$$\text{EIRP}[\text{dBm}] = E[\text{dB}\mu\text{V}/\text{m}] - 95.2$$

$$E[\text{dB}\mu\text{V}/\text{m}] = \text{EIRP}[\text{dBm}] + 95.2 = -27 + 95.2 = 68.2 \text{ dB}\mu\text{V}/\text{m}$$

The limit of peak value is 68.2 dB μ V/m.

11.3 Test Procedure

1. The EUT was set to MIMO mode for 802.11a, 802.11n HT20 and HT 40 during radiated emissions test 1. The EUT is placed on a turntable, which is 0.8m above the ground plane and worked at highest radiated power.

2. The turntable was rotated for 360 degrees to determine the position of maximum emission level.

3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.

4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:

(a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO

5. The maximum emission at 3m distance was measured and recorded with receive antenna in both vertical and horizontal by rotating the turntable and by lowering the receive antenna.

6. The EUT was then removed and replaced with a substitution antenna in the same position and the substitution antenna must have the same polarization with the receive antenna.

7. A signal which have the same frequency obtained in step 2 was fed to the substitution, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver, the level of the signal generator was adjusted until the measured field strength level in step 2 was obtained, recorded the level of the signal generator.

8. Repeated step 4 with both antenna polarizations

9. The spurious emissions is equal to the power supplied by the signal generator and corrections due to the gain of the substitution antenna and the cable loss between the signal generator and the substitution antenna.

11.4 Test Results

PASS.

Detailed information please see the following page.

Note: This report only test simultaneously transmit IEEE 802.11a, IEEE 802.11n HT20 5.2G, IEEE 802.11n HT40 5.2G, other simultaneously transmit see other test report.

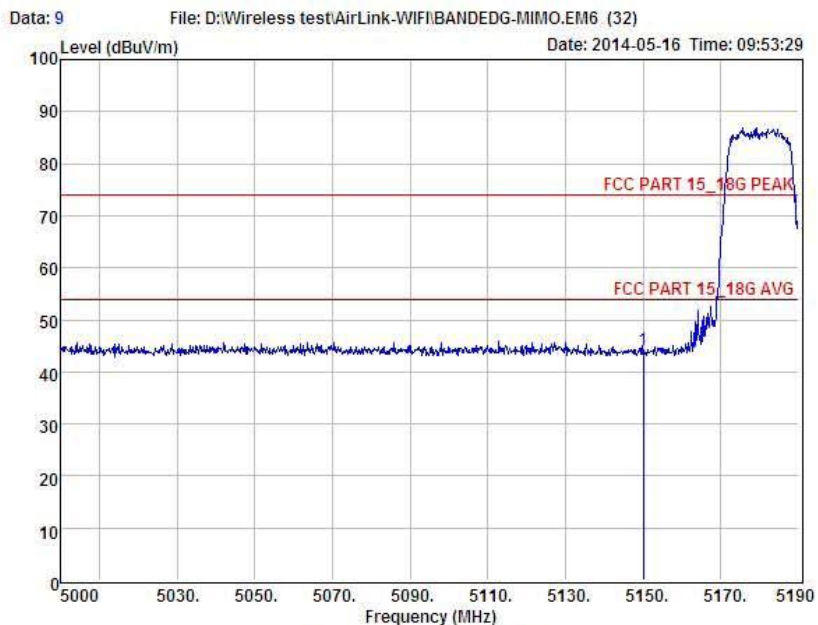
From 1G-25GHz with port 1 antenna and port 2 antenna MIMO mode:

IEEE 802.11a with 5.2G:

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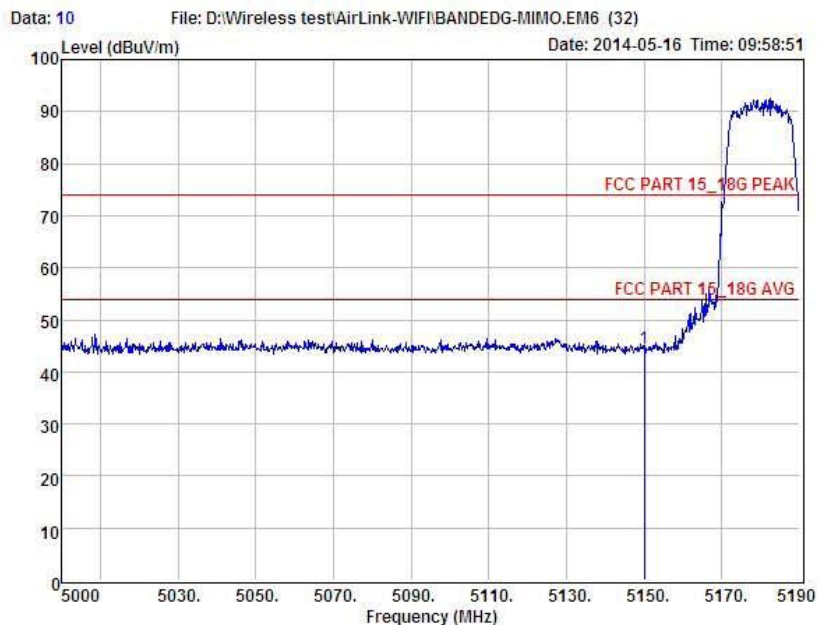
Condition : FCC PART 15_18G PEAK 3m POL: HORIZONTAL
 EUT : UltraSky MIMO 11abgn USB Dongle/CPE
 Model No : M27
 Test Mode : MIMO mode for IEEE802.11 A 5180MHz
 Power : DC 5V for PC with AC 120V/60Hz
 Test Engineer : Simple
 Remark :
 Temp : 24.2°C
 Hum : 54%

Item	Freq MHz	Read Level dBUV	Antenna Factor dB	Preamp Factor dB	Cable Loss dB	Level dBUV	Limit dBUV	Margin dBUV	Remark
1	5150.00	40.68	31.65	33.90	5.92	44.35	74.00	-29.65	Peak

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss



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Condition : FCC PART 15_18G PEAK 3m POL: VERTICAL
 EUT : UltraSky MIMO 11abgn USB Dongle/CPE
 Model No : M27
 Test Mode : MIMO mode for IEEE802.11 A 5180MHz
 Power : DC 5V for PC with AC 120V/60Hz
 Test Engineer : Simple
 Remark :
 Temp : 24.2°C
 Hum : 54%

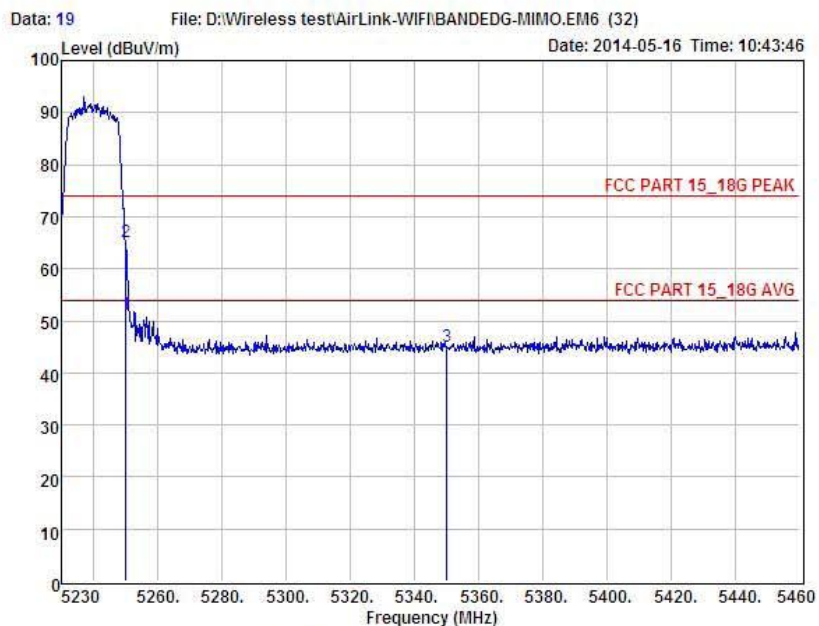
Item	Freq MHz	Read Level dBuV	Antenna Factor dB	Preamp Factor dB	Cable Loss dB	Level dBuV	Limit dBuV	Margin dBuV	Remark
1	5180.00	40.75	31.65	33.90	5.92	44.42	74.00	-29.58	Peak

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss

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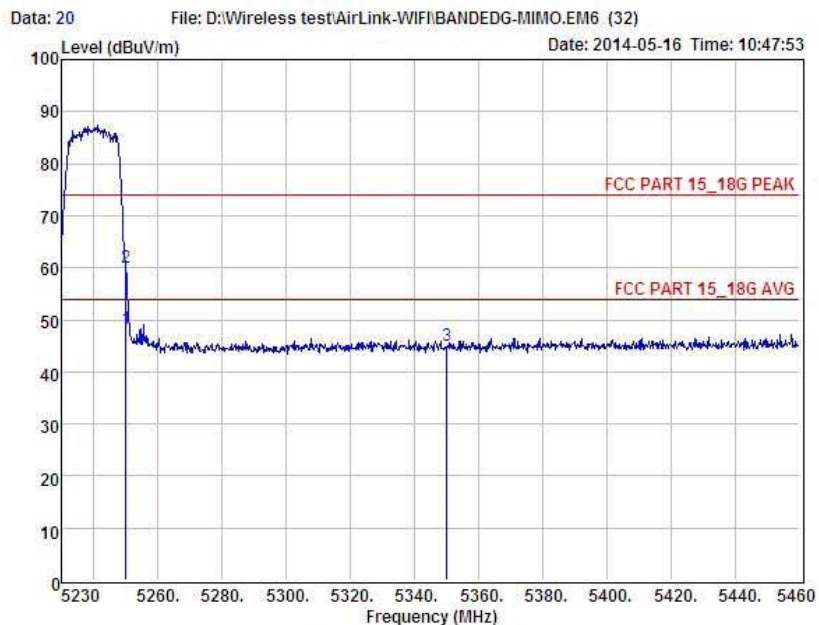
Condition : FCC PART 15_18G PEAK 3m POL: VERTICAL
 EUT : UltraSky MIMO 11abgn USB Dongle/CPE
 Model No : M27
 Test Mode : MIMO mode for IEEE802.11 A 5240MHz
 Power : DC 5V for PC with AC 120V/60Hz
 Test Engineer : Simple
 Remark :
 Temp : 24.2°C
 Hum : 54%

Item	Freq MHz	Read Level dBuV	Antenna Factor dB	Preamp Factor dB	Cable Loss dB	Level dBuV	Limit dBuV	Margin dBuV	Remark
1	5250.00	47.49	31.69	33.82	5.98	51.34	54.00	-2.66	Average
2	5250.00	61.22	31.69	33.82	5.98	65.07	74.00	-8.93	Peak
3	5350.00	40.87	31.73	33.73	6.05	44.92	74.00	-29.08	Peak

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss



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Condition : FCC PART 15_18G PEAK 3m POL: HORIZONTAL
 EUT : UltraSky MIMO 11abgn USB Dongle/CPE
 Model No : M27
 Test Mode : MIMO mode for IEEE802.11 A 5240MHz
 Power : DC 5V for PC with AC 120V/60Hz
 Test Engineer : Simple
 Remark :
 Temp : 24.2°C
 Hum : 54%

Item	Freq MHz	Read Level dBuV	Antenna Factor dB	Preamp Factor dB	Cable Loss dB	Level dBuV	Limit dBuV	Margin dBuV	Remark
1	5250.00	44.39	31.69	33.82	5.98	48.24	54.00	-5.76	Average
2	5250.00	56.29	31.69	33.82	5.98	60.14	74.00	-13.86	Peak
3	5350.00	40.87	31.73	33.73	6.05	44.92	74.00	-29.08	Peak

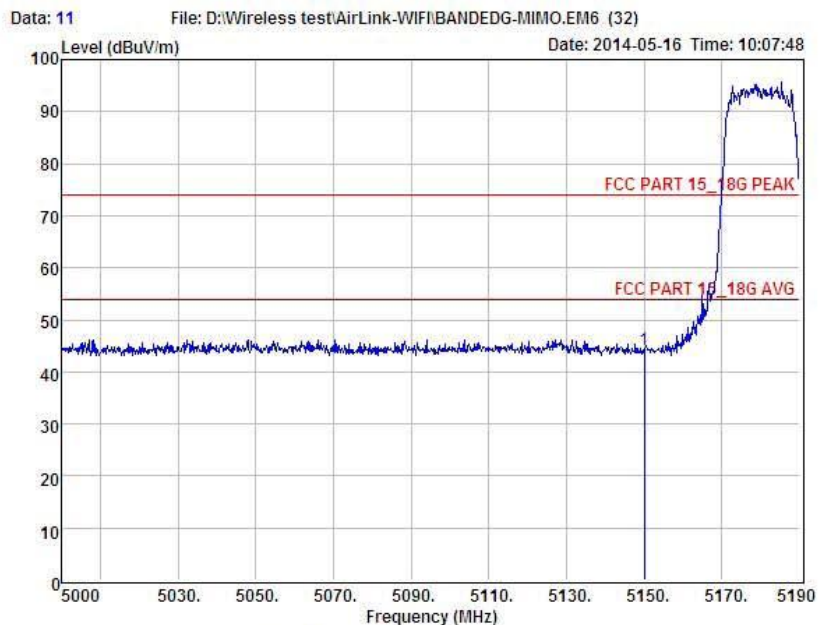
Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss

IEEE 802.11n/HT20 with 5.2G:

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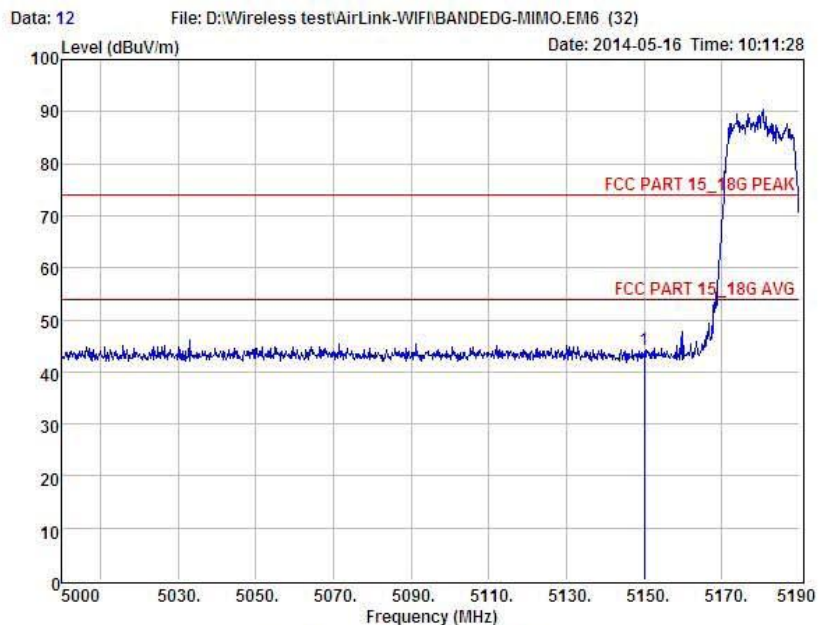
Condition : FCC PART 15_18G PEAK 3m POL: VERTICAL
 EUT : UltraSky MIMO 11abgn USB Dongle/CPE
 Model No : M27
 Test Mode : MIMO mode for IEEE802.11 N20 5180MHz
 Power : DC 5V for PC with AC 120V/60Hz
 Test Engineer : Simple
 Remark :
 Temp : 24.2°C
 Hum : 54%

Item	Freq MHz	Read Level dBuV	Antenna Factor dB	Preamp Factor dB	Cable Loss dB	Level dBuV	Limit dBuV	Margin dBuV	Remark
1	5150.00	40.64	31.65	33.90	5.92	44.31	74.00	-29.69	Peak

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss



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Condition : FCC PART 15_18G PEAK 3m POL: HORIZONTAL
 EUT : UltraSky MIMO 11abgn USB Dongle/CPE
 Model No : M27
 Test Mode : MIMO mode for IEEE802.11 N20 5180MHz
 Power : DC 5V for PC with AC 120V/60Hz
 Test Engineer : Simple
 Remark :
 Temp : 24.2°C
 Hum : 54%

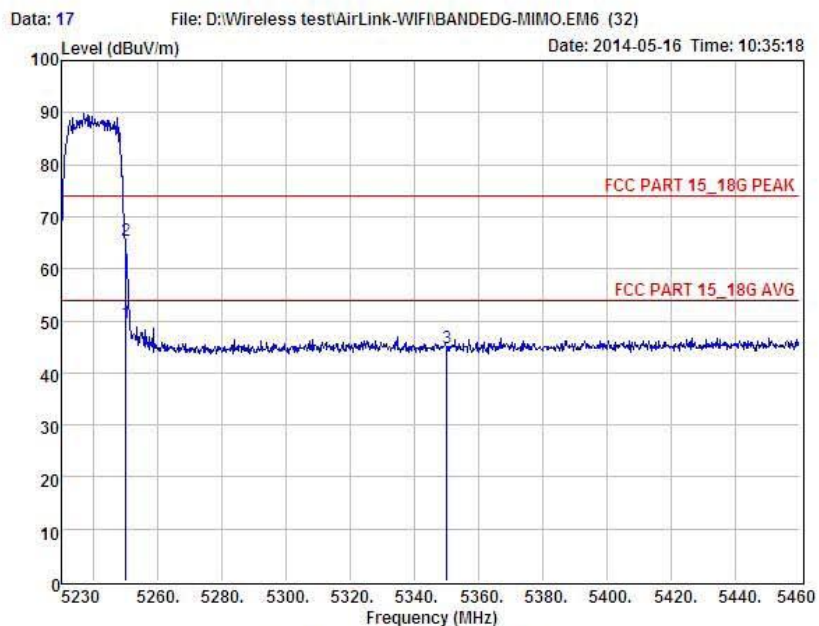
Item	Freq MHz	Read Level dBuV	Antenna Factor dB	Preamp Factor dB	Cable Loss dB	Level dBuV	Limit dBuV	Margin dBuV	Remark
1	5180.00	40.61	31.66	33.90	5.92	44.18	74.00	-29.82	Peak

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss

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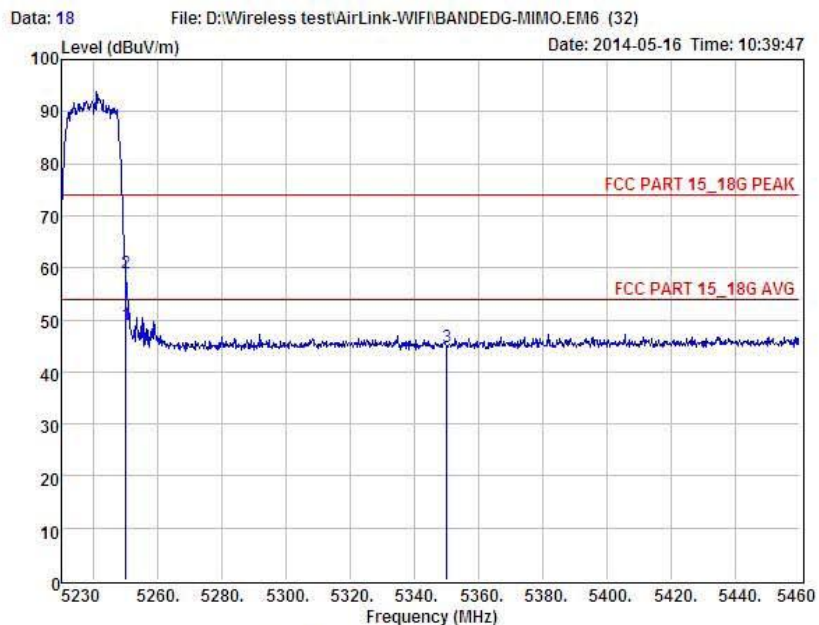
Condition : FCC PART 15_18G PEAK 3m POL: HORIZONTAL
 EUT : UltraSky MIMO 11abgn USB Dongle/CPE
 Model No : M27
 Test Mode : MIMO mode for IEEE802.11 N20 5240MHz
 Power : DC 5V for PC with AC 120V/60Hz
 Test Engineer : Simple
 Remark :
 Temp : 24.2°C
 Hum : 54%

Item	Freq MHz	Read Level dBuV	Antenna Factor dB	Preamp Factor dB	Cable Loss dB	Level dBuV	Limit dBuV	Margin dBuV	Remark
1	5250.00	45.63	31.69	33.82	5.98	49.48	54.00	-4.52	Average
2	5250.00	61.62	31.69	33.82	5.98	65.47	74.00	-8.53	Peak
3	5350.00	40.65	31.73	33.73	6.05	44.73	74.00	-29.27	Peak

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss



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Condition : FCC PART 15_18G PEAK 3m POL: VERTICAL
 EUT : UltraSky MIMO 11abgn USB Dongle/CPE
 Model No : M27
 Test Mode : MIMO mode for IEEE802.11 N20 5240MHz
 Power : DC 5V for PC with AC 120V/60Hz
 Test Engineer : Simple
 Remark :
 Temp : 24.2°C
 Hum : 54%

Item	Freq MHz	Read Level dBuV	Antenna Factor dB	Preamp Factor dB	Cable Loss dB	Level dBuV	Limit dBuV	Margin dBuV	Remark
1	5250.00	45.24	31.69	33.82	5.98	49.09	54.00	-4.91	Average
2	5250.00	55.08	31.69	33.82	5.98	58.93	74.00	-15.07	Peak
3	5350.00	40.69	31.73	33.73	6.05	44.74	74.00	-29.26	Peak

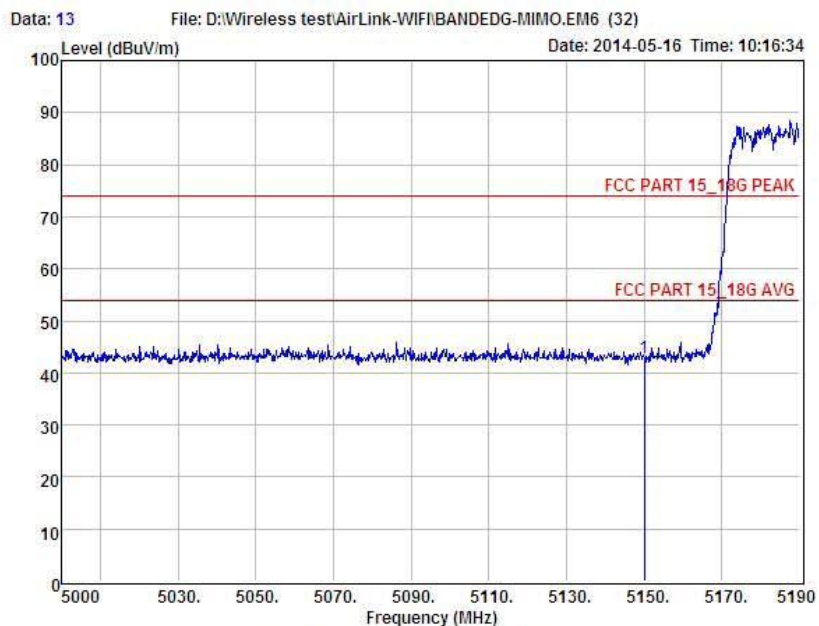
Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss

IEEE 802.11n/HT40 with 5.2G:

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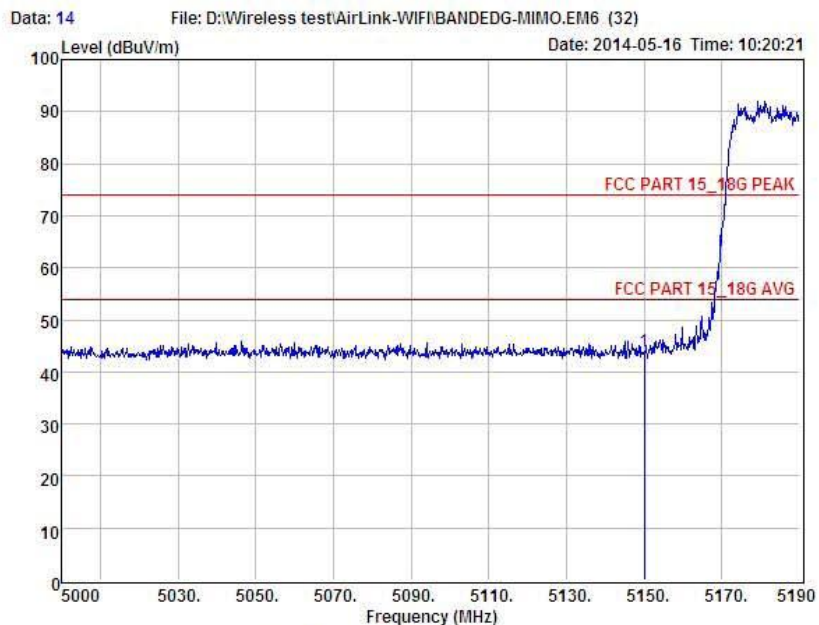
Condition : FCC PART 15_18G PEAK 3m POL: HORIZONTAL
 EUT : UltraSky MIMO 11abgn USB Dongle/CPE
 Model No : M27
 Test Mode : MIMO mode for IEEE802.11 N40 5190MHz
 Power : DC 5V for PC with AC 120V/60Hz
 Test Engineer : Simple
 Remark :
 Temp : 24.2°C
 Hum : 54%

Item	Freq MHz	Read Level dBuV	Antenna Factor dB	Preamp Factor dB	Cable Loss dB	Level dBuV	Limit dBuV	Margin dBuV	Remark
1	5150.00	39.27	31.65	33.90	5.92	42.94	74.00	-31.06	Peak

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss



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Condition : FCC PART 15_18G PEAK 3m POL: VERTICAL
 EUT : UltraSky MIMO 11abgn USB Dongle/CPE
 Model No : M27
 Test Mode : MIMO mode for IEEE802.11 N40 5190MHz
 Power : DC 5V for PC with AC 120V/60Hz
 Test Engineer : Simple
 Remark :
 Temp : 24.2°C
 Hum : 54%

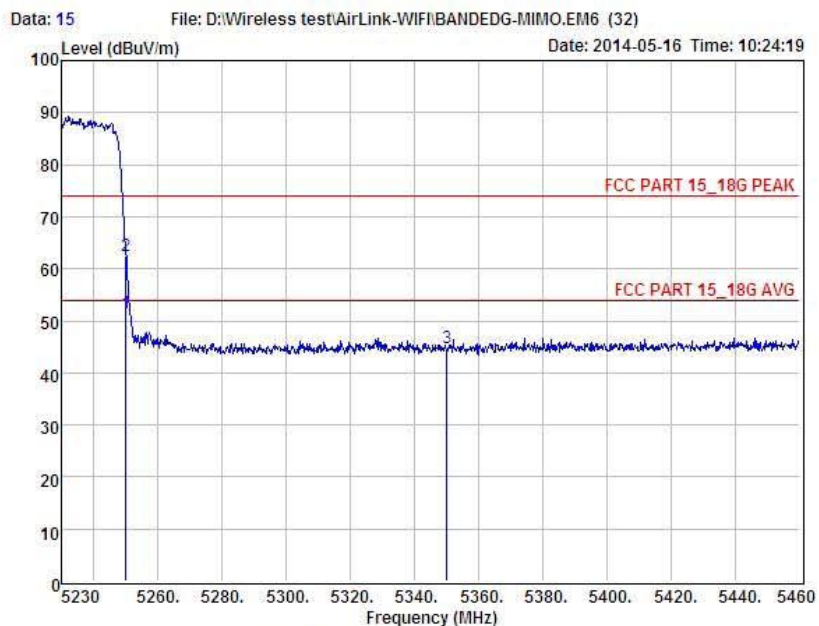
Item	Freq MHz	Read Level dBuV	Antenna Factor dB	Preamp Factor dB	Cable Loss dB	Level dBuV	Limit dBuV	Margin dBuV	Remark
1	5190.00	40.19	31.65	33.90	5.92	43.86	74.00	-30.14	Peak

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss

CH High :



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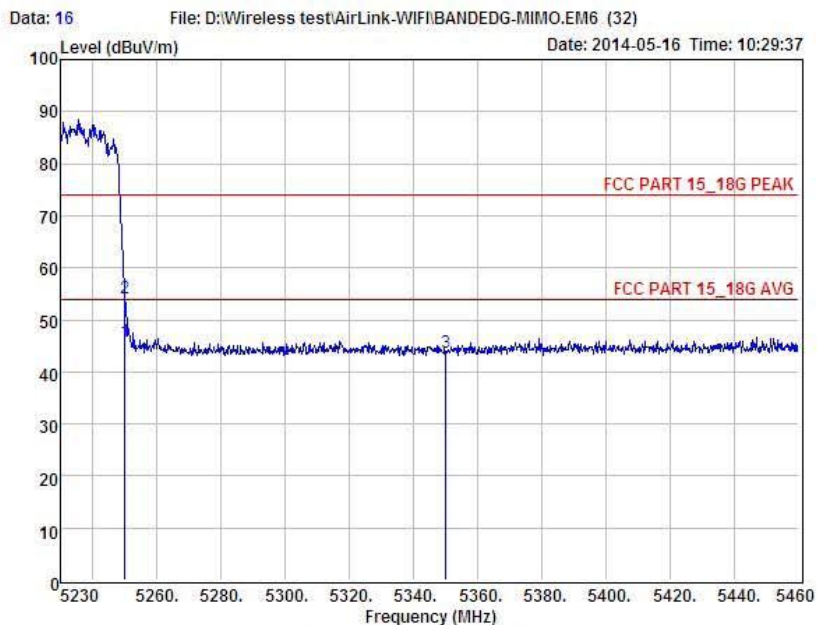
Condition : FCC PART 15_18G PEAK 3m POL: VERTICAL
 EUT : UltraSky MIMO 11abgn USB Dongle/CPE
 Model No : M27
 Test Mode : MIMO mode for IEEE802.11 N40 5230MHz
 Power : DC 5V for PC with AC 120V/60Hz
 Test Engineer : Simple
 Remark :
 Temp : 24.2°C
 Hum : 54%

Item	Freq MHz	Read Level dBuV	Antenna Factor dB	Preamp Factor dB	Cable Loss dB	Level dBuV	Limit dBuV	Margin dBuV	Remark
1	5250.00	47.72	31.69	33.82	5.98	51.57	54.00	-2.43	Average
2	5250.00	55.63	31.69	33.82	5.98	62.48	74.00	-11.52	Peak
3	5350.00	40.69	31.73	33.73	6.05	44.74	74.00	-29.26	Peak

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss



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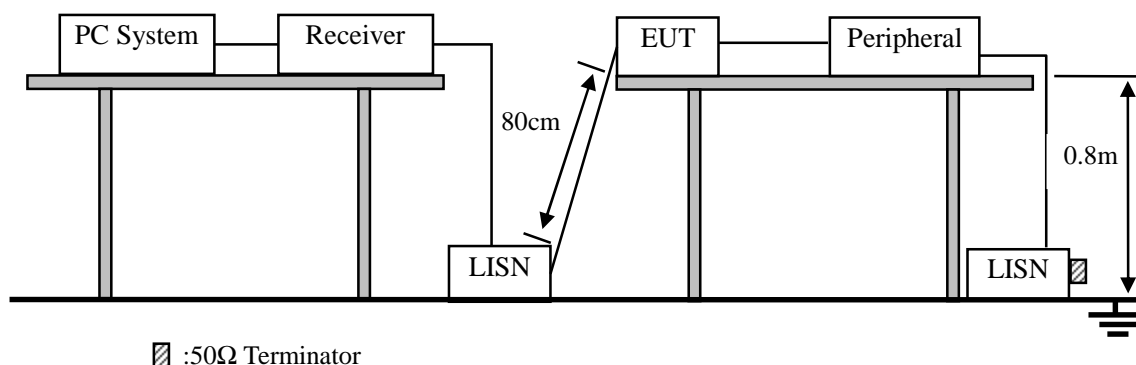
Condition : FCC PART 15_18G PEAK 3m POL: HORIZONTAL
 EUT : UltraSky MIMO 11abgn USB Dongle/CPE
 Model No : M27
 Test Mode : MIMO mode for IEEE802.11 N40 5230MHz
 Power : DC 5V for PC with AC 120V/60Hz
 Test Engineer : Simple
 Remark :
 Temp : 24.2°C
 Hum : 54%

Item	Freq MHz	Read Level dBuV	Antenna Factor dB	Preamp Factor dB	Cable Loss dB	Level dBuV	Limit dBuV	Margin dBuV	Remark
1	5250.00	42.04	31.69	33.82	5.98	45.89	54.00	-8.11	Average
2	5290.00	50.36	31.69	33.82	5.98	54.21	74.00	-19.79	Peak
3	5350.00	39.69	31.73	33.73	6.05	43.74	74.00	-30.26	Peak

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss

12 Power Line Conducted Emissions

12.1 Block Diagram of Test Setup



12.2 Limit

Frequency	Maximum RF Line Voltage	
	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

- Notes: 1. * Decreasing linearly with logarithm of frequency.
 2. The lower limit shall apply at the transition frequencies.

12.3 Test Procedure

- (1) The EUT was placed on a non-metallic table, 80cm above the ground plane.
- (2) Setup the EUT and simulator as shown in section 1.4 and 8.1
- (3) The EUT Power connected to the power mains through PC and a line impedance stabilization network (L.I.S.N1). The other peripheral devices power cord connected to the power mains through a line impedance stabilization network (L.I.S.N1), this provided a 50-ohm coupling impedance for the EUT (Please refer to the block diagram of the test setup and photographs). Both sides of power line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.4 2009 and ANSI C64.10:2009 on conducted Emission test.

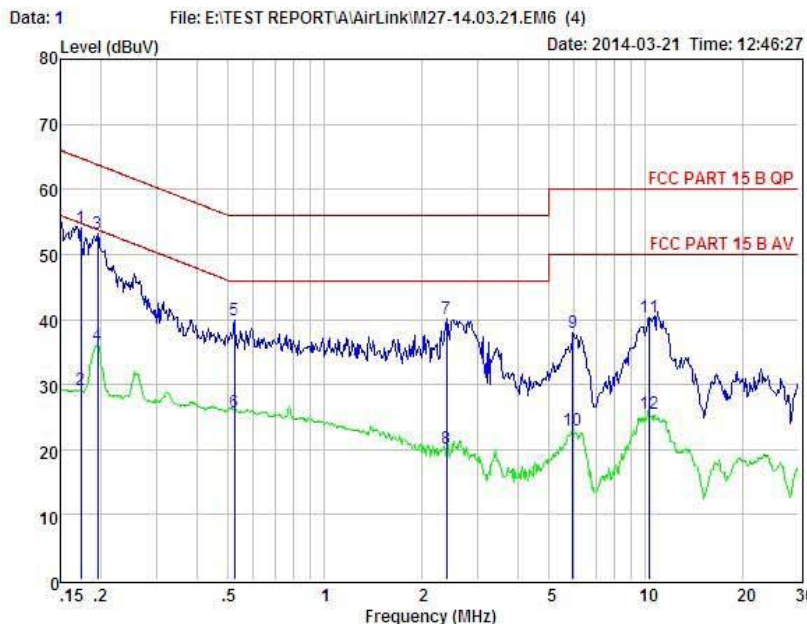
- (4) The bandwidth of test receiver is set at 10KHz.
- (5) The frequency range from 150 KHz to 30MHz is checked.

12.4 Test Result

PASS. (See below detailed test data)



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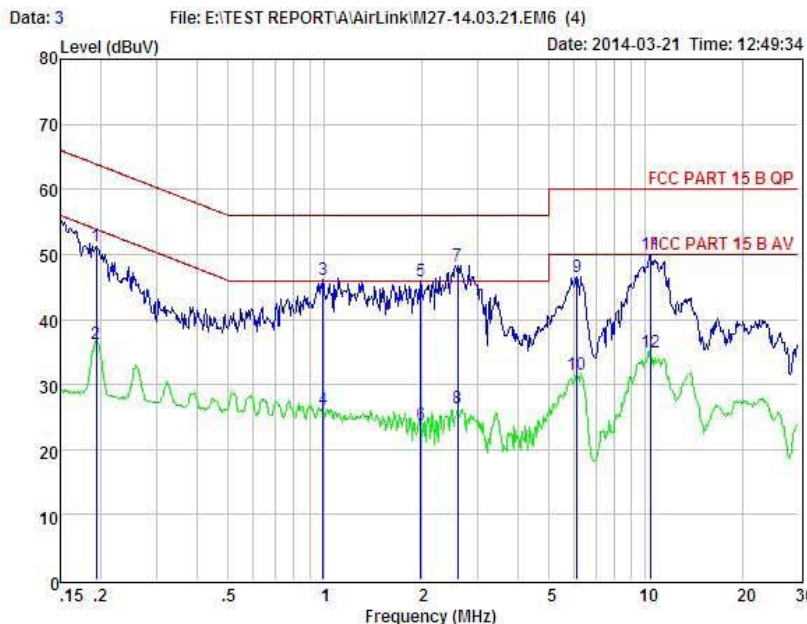
Condition : FCC PART 15 B QP POL: NEUTRAL Temp:24 °C Hum:56 %
 EUT : UltraSky MIMO 11abgn USB Dongle/CPE
 Model No : M27
 Test Mode : Link mode
 Power : DC 5V from PC with AC 120V/60Hz
 Test Engineer: Simple
 Remark :

Item	Freq MHz	Read dBuV	LISN Factor dB	Preamp Factor dB	Cable Loss dB	Level dBuV	Limit dBuV	Margin dBuV	Remark
1	0.174	44.26	0.03	-9.72	0.10	54.11	64.77	-10.66	QP
2	0.174	19.26	0.03	-9.72	0.10	29.11	54.77	-25.66	Average
3	0.197	43.25	0.03	-9.72	0.10	53.10	63.76	-10.66	QP
4	0.197	26.25	0.03	-9.72	0.10	36.10	53.76	-17.66	Average
5	0.524	29.94	0.03	-9.72	0.10	39.79	56.00	-16.21	QP
6	0.524	15.94	0.03	-9.72	0.10	25.79	46.00	-20.21	Average
7	2.396	30.30	0.06	-9.70	0.11	40.17	56.00	-15.83	QP
8	2.396	10.30	0.06	-9.70	0.11	20.17	46.00	-25.83	Average
9	5.929	28.11	0.11	-9.62	0.14	37.98	60.00	-22.02	QP
10	5.929	13.11	0.11	-9.62	0.14	22.98	50.00	-27.02	Average
11	10.233	30.52	0.19	-9.51	0.21	40.43	60.00	-19.57	QP
12	10.233	15.52	0.19	-9.51	0.21	25.43	50.00	-24.57	Average

Remarks: Level = Read + LISN Factor - Preamp Factor + Cable loss



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Condition : FCC PART 15 B QP POL: LINE Temp:24 °C Hum:56 %
 EUT : UltraSky MIMO 11abgn USB Dongle/CPE
 Model No : M27
 Test Mode : Link mode
 Power : DC 5V from PC with AC 120V/60Hz
 Test Engineer: Simple
 Remark :

Item	Freq	Read	LISN	Preamp	Cable	Level	Limit	Margin	Remark
	MHz	dBuV	Factor	Factor	Loss	dBuV	dBuV	dBuV	
			dB	dB	dB				
1	0.194	41.42	0.03	-9.72	0.10	51.27	63.84	-12.57	QP
2	0.194	26.42	0.03	-9.72	0.10	36.27	53.84	-17.57	Average
3	0.989	36.28	0.04	-9.71	0.10	46.13	56.00	-9.87	QP
4	0.989	16.28	0.04	-9.71	0.10	26.13	46.00	-19.87	Average
5	1.991	36.04	0.06	-9.70	0.10	45.90	56.00	-10.10	QP
6	1.991	14.04	0.06	-9.70	0.10	23.90	46.00	-22.10	Average
7	2.594	38.44	0.06	-9.70	0.11	48.31	56.00	-7.69	QP
8	2.594	16.44	0.06	-9.70	0.11	26.31	46.00	-19.69	Average
9	6.121	36.68	0.11	-9.60	0.14	46.53	60.00	-13.47	QP
10	6.121	21.68	0.11	-9.60	0.14	31.53	50.00	-18.47	Average
11	10.342	40.03	0.20	-9.51	0.21	49.95	60.00	-10.05	QP
12	10.342	25.03	0.20	-9.51	0.21	34.95	50.00	-15.05	Average

Remarks: Level = Read + LISN Factor - Preamp Factor + Cable loss

13 Antenna Requirements

13.1 Limit

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 15.247 (b), 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.

13.2 Result

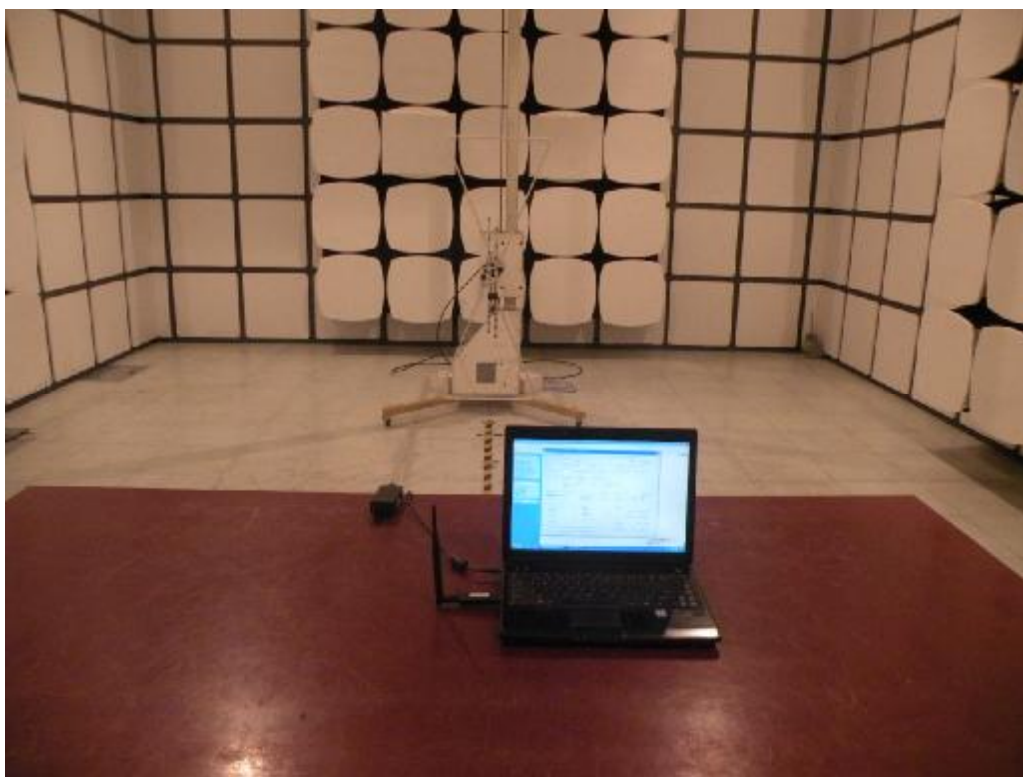
The directional gains of antenna used for transmitting is 5 dBi for port 1 Reverse SMA connector antenna and 0 dBi for port 2 PCB antenna, and the antenna connector is de-signed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

The EUT antenna is Reverse SMA connector antenna and PCB antenna. It comply with the standard requirement.

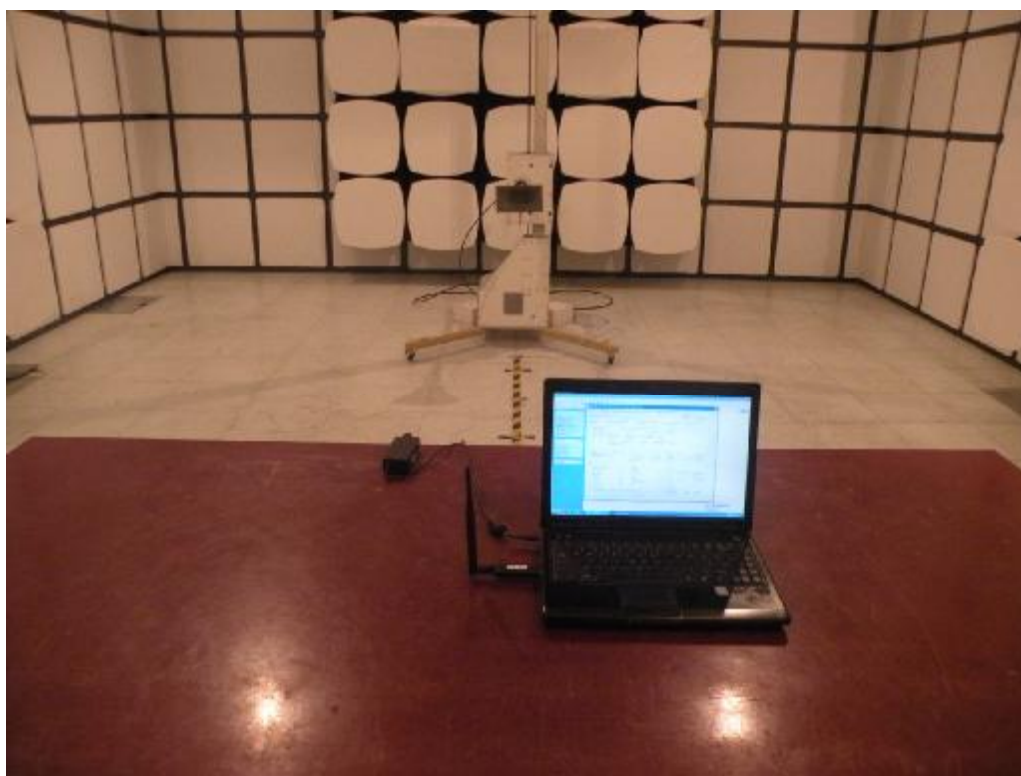
14 Testsetup photo

Photographs-Radiated Emission Test Setup in Chamber

Below 1G



Above 1G



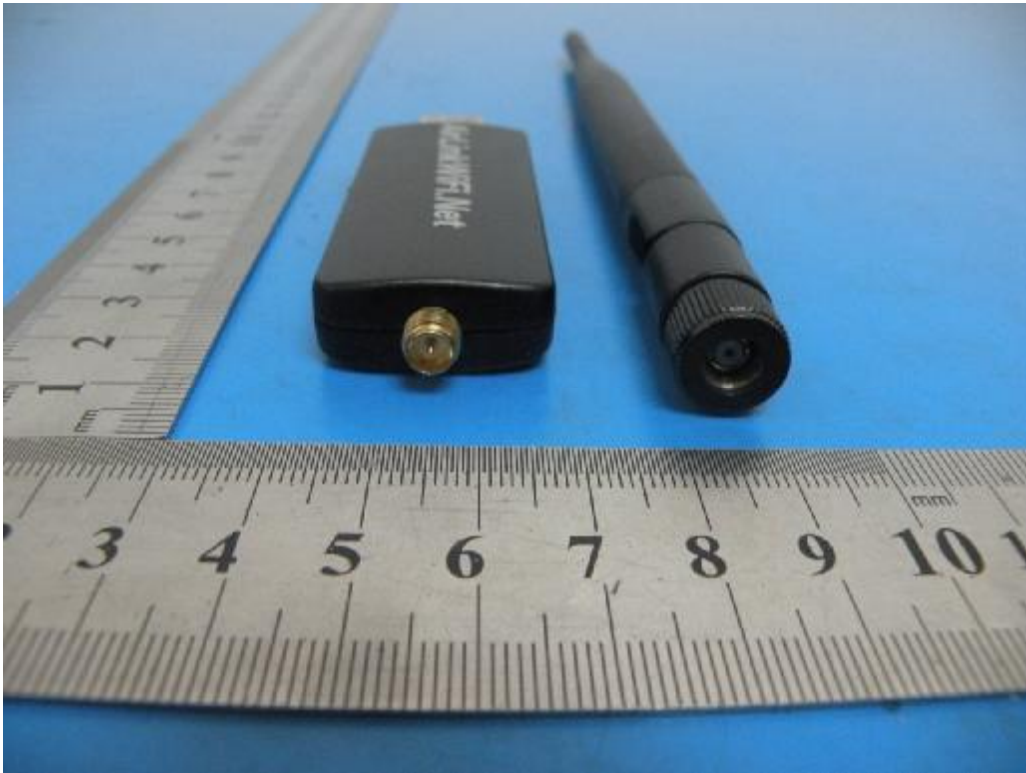
Photographs-Conducted Emission Test Setup



15 Photos of EUT

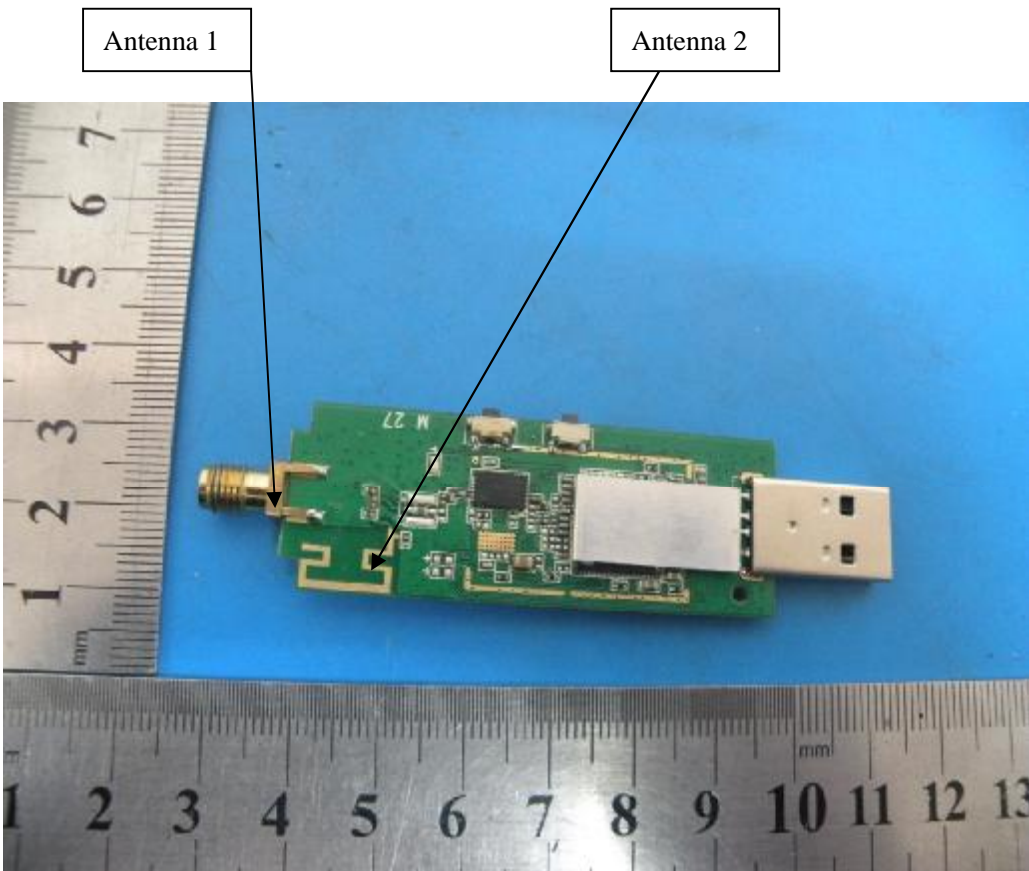


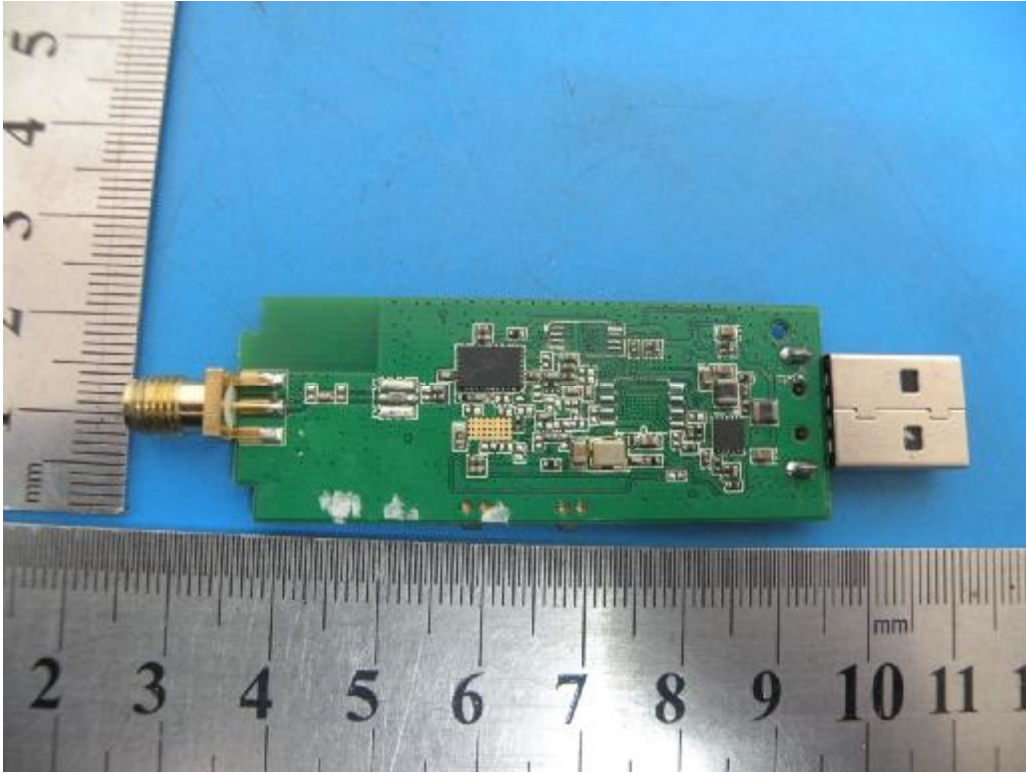












-----END OF THE REPORT-----