

FCC 15.407 NII 5 GHz WLAN Report

for

VoxMicro LTD.

**20955 Pathfinder Rd., STE100, Diamond Bar,
CA 91765 United States**

Brand : AIRETOS
**Product Name : 450Mbps Three Chain,
Dual-Band, 802.11abgn
WLAN , Full Size MiniPCI
Express Module**
**Model Name : (1)AEX-AR95X
(2)AEX-AR9590-NX
(3)AEX-AR9590-NI
(4)AEX-AR9590-NIB
(5)AEX-AR9580-NX**
FCC ID : 2AE3B-AEX-AR95X

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TEST REPORT CERTIFICATION

Applicant : VoxMicro LTD.
Manufacture : VoxMicro LTD.
Product Name : 450Mbps Three Chain, Dual-Band, 802.11abgn WLAN , Full
Size MiniPCI Express Module
Model No. : (1)AEX-AR95X (2)AEX-AR9590-NX (3)AEX-AR9590-NI
(4)AEX-AR9590-NIB (5)AEX-AR9580-NX
Serial No. : N/A
Brand : AIRETOS

Applicable Standards:

47 CFR FCC Part 15 Subpart E
ANSI C63.10:2013
789033 D02 General UNII Test Procedures New Rules v01r02

AUDIX Technology Corp. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report. **AUDIX Technology Corp.** does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens and samples.

Date of Test: 2016. 04. 14 ~ 05. 20

Date of Report: 2016. 05. 20

Producer: Annie Yu
(Annie Yu/Administrator)

Signatory: Ben Cheng
(Ben Cheng/Manager)

1. REPORT HISTORY

Revision	Date	Revision Summary	Report Number
0	2016. 05. 20	Original Report.	EM-F160311

2. SUMMARY OF TEST RESULTS

Rule	Description	Results
15.207	Conducted Emission	PASS
15.205	Radiated Band Edge and Radiated Spurious Emission	PASS
15.407(a)(5)/15.407(e)	Emission Bandwidth Measurement	PASS
15.407(a)	Maximum Output Power	PASS
15.407(b)	Conducted Band Edges and Conducted Spurious Emission	PASS
15.407(a)	Power Spectral Density	PASS
15.203	Antenna Requirement	PASS

3. GENERAL INFORMATION

3.1. Description of EUT

Product	450Mbps Three Chain, Dual-Band, 802.11abgn WLAN , Full Size MiniPCI Express Module																		
Model Number	(1)AEX-AR95X (2)AEX-AR9590-NX (3)AEX-AR9590-NI (4)AEX-AR9590-NIB (5)AEX-AR9580-NX All models are identical except than for their market assignment classification. The model AEX-AR9590-NI was tested in this report.																		
Serial Number	N/A																		
Brand Name	AIRETOS																		
Applicant	VoxMicro LTD. 20955 Pathfinder Rd., STE100, Diamond Bar, CA 91765 United States																		
Manufacture	VoxMicro LTD. 37F, No 7 Section 5 XinYi Road, Taipei, Taiwan																		
RF Features	802.11a/b/g/n																		
Transmit Type	<table><thead><tr><th colspan="2">2.4 GHz</th></tr></thead><tbody><tr><td>802.11b</td><td>1T1R</td></tr><tr><td>802.11g</td><td>1T1R</td></tr><tr><td>802.11n-HT20</td><td>3T3R</td></tr><tr><td>802.11n-HT40</td><td>3T3R</td></tr></tbody></table> <table><thead><tr><th colspan="2">UNII Bands</th></tr></thead><tbody><tr><td>802.11a</td><td>1T1R</td></tr><tr><td>802.11n-HT20</td><td>3T3R</td></tr><tr><td>802.11n-HT40</td><td>3T3R</td></tr></tbody></table>	2.4 GHz		802.11b	1T1R	802.11g	1T1R	802.11n-HT20	3T3R	802.11n-HT40	3T3R	UNII Bands		802.11a	1T1R	802.11n-HT20	3T3R	802.11n-HT40	3T3R
2.4 GHz																			
802.11b	1T1R																		
802.11g	1T1R																		
802.11n-HT20	3T3R																		
802.11n-HT40	3T3R																		
UNII Bands																			
802.11a	1T1R																		
802.11n-HT20	3T3R																		
802.11n-HT40	3T3R																		
Device Category	☐ Outdoor Access Point ☐ Fixed point-to-point Access Point ☐ Indoor Access Point ☒ Mobile and Portable client device																		
Date of Receipt of Sample	2016. 03. 31																		

3.2. EUT Specifications Assessed in Current Report

Mode	UNII Band	Fundamental Range (MHz)	Channel Number	Modulation	Data Rate (Mbps)
802.11a	I	5180-5240	4	OFDM Modulation (BPSK/QPSK/16QAM/64QAM)	Up to 54
	II-2A	5260-5320	4		
	III	5745-5825	5		
802.11n-HT20	I	5180-5240	4	OFDM Modulation (BPSK/QPSK/16QAM/64QAM)	Up to 450
	II-2A	5260-5320	4		
	III	5745-5825	5		
802.11n-HT40	I	5190-5230	2	OFDM Modulation (BPSK/QPSK/16QAM/64QAM)	
	II-2A	5270-5310	2		
	III	5755-5795	2		
Remark: UNII Band II (DFS Function, Slave/no In service monitor, no Ad-Hoc mode)					

Channel List					
802.11a/n-HT20					
UNII Band	Channel Number	Frequency (MHz)	UNII Band	Channel Number	Frequency (MHz)
I	36	5180	III	149	5745
	40	5200		153	5765
	44	5220		157	5785
	48	5240		161	5805
II-2A	52	5260		165	5825
	56	5280			
	60	5300			
	64	5320			

Channel List					
802.11n-HT40					
UNII Band	Channel Number	Frequency (MHz)	UNII Band	Channel Number	Frequency (MHz)
I	38	5190	III	151	5755
	46	5230		159	5795
II-2A	54	5270			
	62	5310			

Note : Test modes are presented at section 3.5.

3.3. Antenna Information

No.	Antenna Part Number	Manufacture	Antenna Type	Frequency (MHz)	Max Gain (dBi)	Directional Gain (3T3R) (dBi)
1	WAE-ISO3	OxfordTec	Omni-directional	2.4GHz	2.65	7.42
				5GHz	1.84	6.61
2	WAND2DBI-SMA	OxfordTec	Omni	2.4GHz	2.0	6.77
				5GHz	3.0	7.77
3	WAND5DBI-SMA	OxfordTec	Dipole	2.4GHz	3.0	7.77
				5GHz	5.0	9.77
4	WAPH-2DBI-26 (Integrated Antenna)	OxfordTec	PCB Antenna	2.4GHz	2.0	6.77
				5GHz	2.5	7.27
Note 1. Directional gain = $10 \log[(10^{2.65/20} + 10^{2.65/20} + 10^{2.64/20})^2 / 3]$ =7.42Bi						
Note 2. Directional gain = $10 \log[(10^{1.84/20} + 10^{1.84/20} + 10^{1.84/20})^2 / 3]$ =6.61dBi						
Note 3. Directional gain = $10 \log[(10^{2.0/20} + 10^{2.0/20} + 10^{2.0/20})^2 / 3]$ =6.77dBi						
Note 4. Directional gain = $10 \log[(10^{3.0/20} + 10^{3.0/20} + 10^{3.0/20})^2 / 3]$ =7.77dBi						
Note 5. Directional gain = $10 \log[(10^{5.0/20} + 10^{5.0/20} + 10^{5.0/20})^2 / 3]$ =9.77dBi						

3.4. Data Rate Relative to Output Power

802.11a			
Channel	Modulation	Date Rate	Power (dBm)
36	BPSK	6	14.46
36	QPSK	9	14.31
36	QPSK	12	14.29
36	16-QAM	18	14.18
36	16-QAM	24	14.32
36	64-QAM	36	14.38
36	64-QAM	48	14.4
36	64-QAM	54	14.26

802.11n-HT20							
Channel	Modulation	Date Rate	Power (dBm)	Channel	Modulation	Date Rate	Power (dBm)
36	BPSK	MCS0	15.15	36	BPSK	MCS8	14.99
36	QPSK	MCS1	15.37	36	QPSK	MCS9	15.07
36	QPSK	MCS2	15.25	36	QPSK	MCS10	15.13
36	16-QAM	MCS3	15.03	36	16-QAM	MCS11	14.96
36	16-QAM	MCS4	15.29	36	16-QAM	MCS12	15.27
36	64-QAM	MCS5	15.22	36	64-QAM	MCS13	15.1
36	64-QAM	MCS6	15.37	36	64-QAM	MCS14	15.35
36	64-QAM	MCS7	15.05	36	64-QAM	MCS15	15.12
Channel	Modulation	Date Rate	Power (dBm)				
36	BPSK	MCS16	15.4				
36	QPSK	MCS17	15.08				
36	QPSK	MCS18	15.24				
36	16-QAM	MCS19	14.97				
36	16-QAM	MCS20	15.36				
36	64-QAM	MCS21	14.94				
36	64-QAM	MCS22	15.32				
36	64-QAM	MCS23	15.29				

Note: Above results are assessed in average power.

802.11n-HT40							
Channel	Modulation	Date Rate	Power (dBm)	Channel	Modulation	Date Rate	Power (dBm)
38	BPSK	MCS0	14.72	38	BPSK	MCS8	14.85
38	QPSK	MCS1	14.86	38	QPSK	MCS9	14.81
38	QPSK	MCS2	14.91	38	QPSK	MCS10	14.67
38	16-QAM	MCS3	14.96	38	16-QAM	MCS11	14.8
38	16-QAM	MCS4	14.86	38	16-QAM	MCS12	14.73
38	64-QAM	MCS5	14.79	38	64-QAM	MCS13	14.59
38	64-QAM	MCS6	14.69	38	64-QAM	MCS14	14.73
38	64-QAM	MCS7	14.62	38	64-QAM	MCS15	14.52
Channel	Modulation	Date Rate	Power (dBm)				
36	BPSK	MCS16	15.04				
36	QPSK	MCS17	14.98				
36	QPSK	MCS18	14.88				
36	16-QAM	MCS19	14.63				
36	16-QAM	MCS20	14.75				
36	64-QAM	MCS21	14.92				
36	64-QAM	MCS22	14.55				
36	64-QAM	MCS23	14.79				

Note: Above results are assessed in average power.

3.5. Test Configuration

Mode	Duty Cycle (x)	T (ms)	Duty Cycle Factor (dB)
802.11a	0.92	1.340	0.22
802.11n-HT20	0.89	0.455	0.51
802.11n-HT40	0.84	0.240	0.76

Note: When duty cycle is less than 98% (0.98) that duty cycle factor $10\log(1/x)$ is needed to add in conducted test items measured in average detector.

AC Conduction	
Test Case	Normal operation

Item		Mode	Data Rate	Test Channel
Radiated Test Case	Radiated Band Edge ^{Note1}	802.11a	6 Mbps	36/64/149/165
		802.11n-HT20	MCS16	
		802.11n-HT40	MCS16	
	Radiated Spurious Emission ^{Note1 & 2}	802.11a	6 Mbps	36/56/157
		802.11n-HT20	MCS16	40/56/157
		802.11n-HT40	MCS16	46/54/159
Conducted Test Case ^{Note3}	Emission Bandwidth	802.11a	6 Mbps	36/40/48/52/56/64 149/157/165
		802.11n-HT20	MCS16	
		802.11n-HT40	MCS16	38/46/54/62//151/159
	Maximum output power	802.11a	6 Mbps	36/40/48/52/56/64 149/157/165
		802.11n-HT20	MCS16	
		802.11n-HT40	MCS16	38/46/54/62//151/159
	Emission Limitations	802.11a	6 Mbps	36/40/48/52/56/64 149/157/165
		802.11n-HT20	MCS16	
		802.11n-HT40	MCS16	38/46/54/62//151/159
Conducted Test Case ^{Note3}	Power spectral density	802.11a	6 Mbps	36/40/48/52/56/64
		802.11n-HT20	MCS16	149/157/165
		802.11n-HT40	MCS16	38/46/54/62//151/159

Note 1:

☐ Mobile Device

☒ Portable Device, and 3 axis were assessed. The worst scenario for Radiated Spurious Emission as follow:

☐ Lie

☐ Side

☒ Stand

Note 2: Low, mid, and high channels were measured, only the worst channel of each modulation was presented in this report.

Note 3: We performed testing of the highest Antenna Type WAND5DBI-SMA (Dipole).

3.6. Tested Supporting System List

3.6.1. Support Peripheral Unit

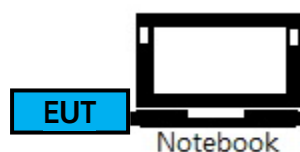
No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	Notebook PC	Lenovo	TP00034A	895097	By DoC
2.	Test JIG	N/A	N/A	N/A	N/A

3.6.2. Cable Lists

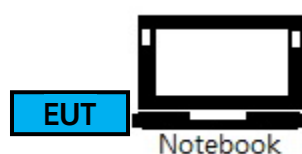
No.	Cable Description Of The Above Support Units
1.	Adapter: Lenovo, M/N: ADX65NCT3A AC Power Cord: Unshielded, Detachable, 1.7m DC Power Cord: Unshielded, Detachable, 1.7m, Bonded a ferrite core
2.	N/A

3.7. Setup Configuration

3.7.1. EUT Configuration for Power Line Emission



3.7.2. EUT Configuration for Conducted Test Items



3.8. Operating Condition of EUT

Test program “artgui” is used for enabling EUT WLAN function under continues transmitting and choosing data rate/ channel.

3.9. Description of Test Facility

Test Firm Name	:	AUDIX Technology Corporation EMC Department No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan
Test Location & Facility	:	No. 8 Shielded Room Semi-Anechoic Chamber & Fully Anechoic Chamber No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan
NVLAP Lab. Code	:	200077-0
TAF Accreditation No	:	1724

3.10. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty
Conduction Test	150kHz~30MHz	±3.5dB
Radiation Test (Distance: 3m)	30MHz~1000MHz	± 3.68dB
	Above 1GHz	± 5.82dB

Remark : Uncertainty = $ku_c(y)$

Test Item	Uncertainty
Emission Bandwidth	± 0.2kHz
Maximum output power	± 0.33dB
Power spectral density	± 0.13dB
Conducted Emission Limitations	± 0.13dB

4. MEASUREMENT EQUIPMENT LIST

4.1. Conducted Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Test Receiver	R&S	ESR3	101774	2016. 02. 04	1 Year
2.	A.M.N.	R&S	ENV4200	100169	2015. 11. 17	1 Year
3.	L.I.S.N.	Kyoritsu	KNW-407	8-855-9	2015. 12. 23	1 Year
4.	Pulse Limiter	R&S	ESH3-Z2	100354	2016. 01. 17	1 Year
5.	Test Software	Audix	e3	V.6.120424	N.C.R.	N.C.R.

4.2. Radiated Emission Measurement

4.2.1. Frequency Range 30MHz~1000MHz

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2015. 09. 14	1 Year
2.	Test Receiver	R & S	ESCS30	100338	2015. 06. 24	1 Year
3.	Amplifier	HP	8447D	2944A06305	2016. 02. 23	1 Year
4.	Bilog Antenna	TESEQ	CBL6112D	33821	2016. 01. 30	1 Year
5.	Loop Antenna	R&S	HFH2-Z2	891847/27	2015. 12. 24	1 Year
6.	Test Software	Audix	e3	V.6.110601	N.C.R.	N.C.R.

4.2.2. Frequency Range Above 1GHz

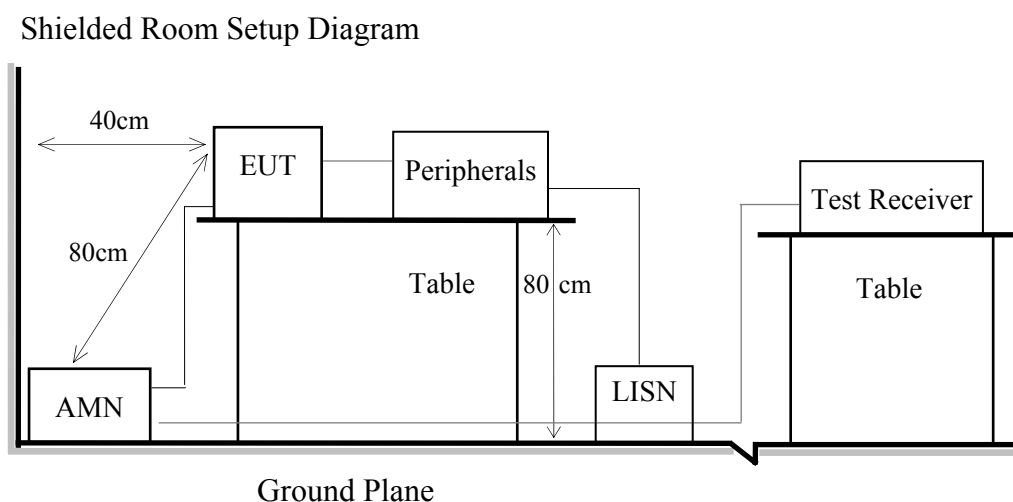
Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	E4446A	US44300366	2015. 08. 20	1 Year
3.	Amplifier	Sonoma	310N	187161	2015. 06. 17	1 Year
4.	5G Notch Filter	Microwave Circuits	N0452502	459775	2016. 01. 28	1 Year
5.	5G Notch Filter	Microwave Circuits	N0258771	459776	2016. 01. 28	1 Year
6.	Double-Ridged Waveguide Horn	ETS-Lindgren	3117	00135902	2016. 03. 05	1 Year
7.	Horn Antenna	EMCO	3116	2653	2015. 10. 20	1 Year
8.	Test Software	Audix	e3	V.6.110601	N.C.R.	N.C.R.

4.3. RF Conducted Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9030A-544	US51350140	2015. 06. 10	1 Year
2.	Power Meter	Anritsu	ML2495A	1145008	2015. 10. 23	1 Year
3.	Power Sensor	Anritsu	MA2411B	1126096	2015. 10. 23	1 Year

5. CONDUCTED EMISSION MEASUREMENT

5.1. Block Diagram of Test Setup



5.2. Power Line Conducted Emission Limit

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

Remark 1.: If the average limit is met when using a Quasi-Peak detector, the measurement using the average detector is not required.

2.: The lower limit applies to the band edges.

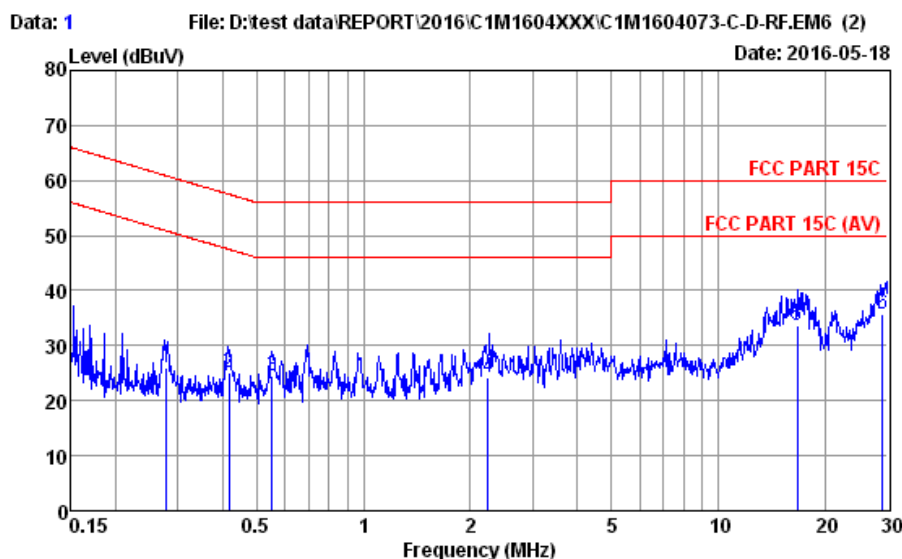
5.3. Test Procedure

- 5.3.1. To set up the EUT as indicated in ANSI C 63.10. The EUT was placed on the table which has 80 cm height to the ground and 40 cm distance to the conducting wall.
- 5.3.2. Power supplier of the EUT was connected to the AC mains through an Artificial Mains Network (A.M.N.).
- 5.3.3. The AC power supplies to all peripheral devices must be provided through line impedance stabilization network (L.I.S.N.)
- 5.3.4. Checking frequency range from 150 kHz to 30 MHz and record the emission which does not have 20 dB below limit.

5.4. Conducted Emission Measurement Results

PASSED.

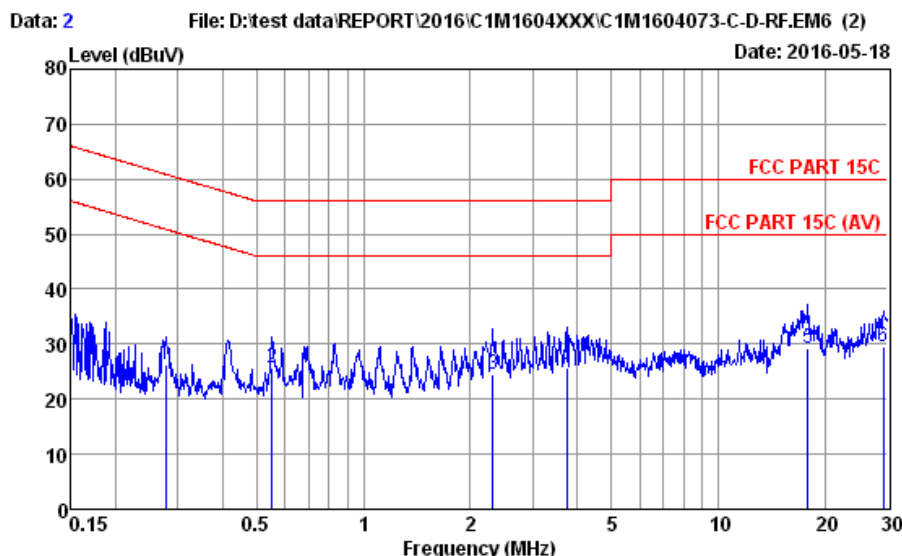
Test Date	2016/05/18	Temp./Hum.	25 /61%
Test Voltage	DC 3.3V		



Site no. : No.8 Shielded Room Data no. : 1
Condition : ENV4200 100169 Phase : NEUTRAL
Limit : FCC PART 15C
Env. / Ins. : 25°C / 61% ESR3 (1774) Engineer : Tim
EUT : AEX-AR9590-NI
Power Rating : DC 3.3V
Test Mode : Operating

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.279	11.13	0.03	9.86	4.87	25.89	60.85	34.96	QP
2	0.417	11.00	0.03	9.86	4.19	25.08	57.51	32.43	QP
3	0.552	10.98	0.04	9.86	3.72	24.60	56.00	31.40	QP
4	2.237	11.03	0.09	9.86	3.31	24.29	56.00	31.71	QP
5	16.661	13.66	0.26	9.91	9.84	33.67	60.00	26.33	QP
6	29.061	16.55	0.31	9.99	8.87	35.72	60.00	24.28	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
2. If the average limit is met when using a quasi-peak detector,
the EUT shall be deemed to meet both limits and measurement
with average detector is unnecessary.



Site no. : No.8 Shielded Room Data no. : 2
Condition : ENV4200 100169 Phase : LINE
Limit : FCC PART 15C
Env. / Ins. : 25°C / 61% ESR3 (1774) Engineer : Tim
EUT : AEX-AR9590-NI
Power Rating : DC 3.3V
Test Mode : Operating

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.277	10.62	0.03	9.86	5.84	26.35	60.90	34.55	QP
2	0.552	10.55	0.04	9.86	5.21	25.66	56.00	30.34	QP
3	2.309	10.59	0.09	9.86	3.90	24.44	56.00	31.56	QP
4	3.740	10.64	0.12	9.87	5.10	25.73	56.00	30.27	QP
5	17.849	12.80	0.26	9.92	6.23	29.21	60.00	30.79	QP
6	29.216	15.69	0.32	9.99	3.63	29.63	60.00	30.37	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
2. If the average limit is met when using a quasi-peak detector,
the EUT shall be deemed to meet both limits and measurement
with average detector is unnecessary.

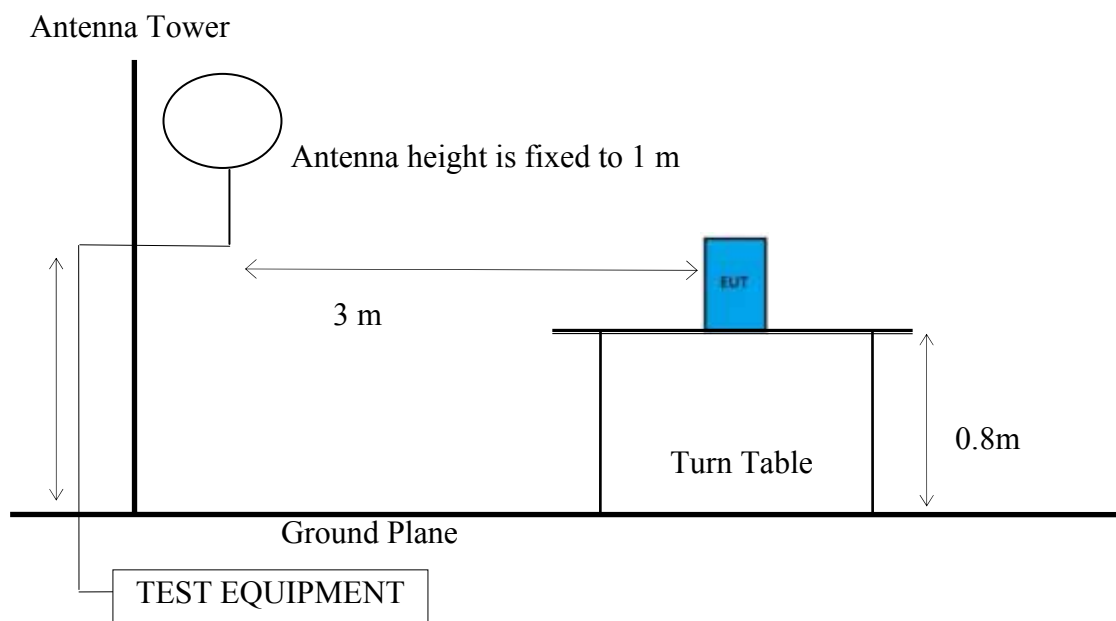
6. RADIATED EMISSION MEASUREMENT

6.1. Block Diagram of Test Setup

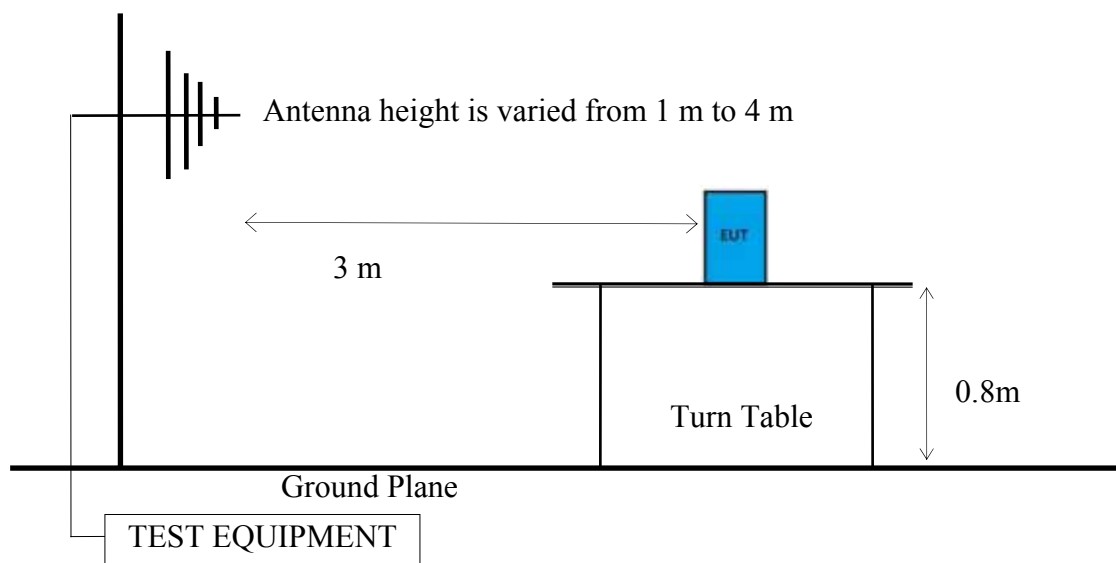
6.1.1. Block Diagram of connection between EUT and simulators

Indicated as section 3.7

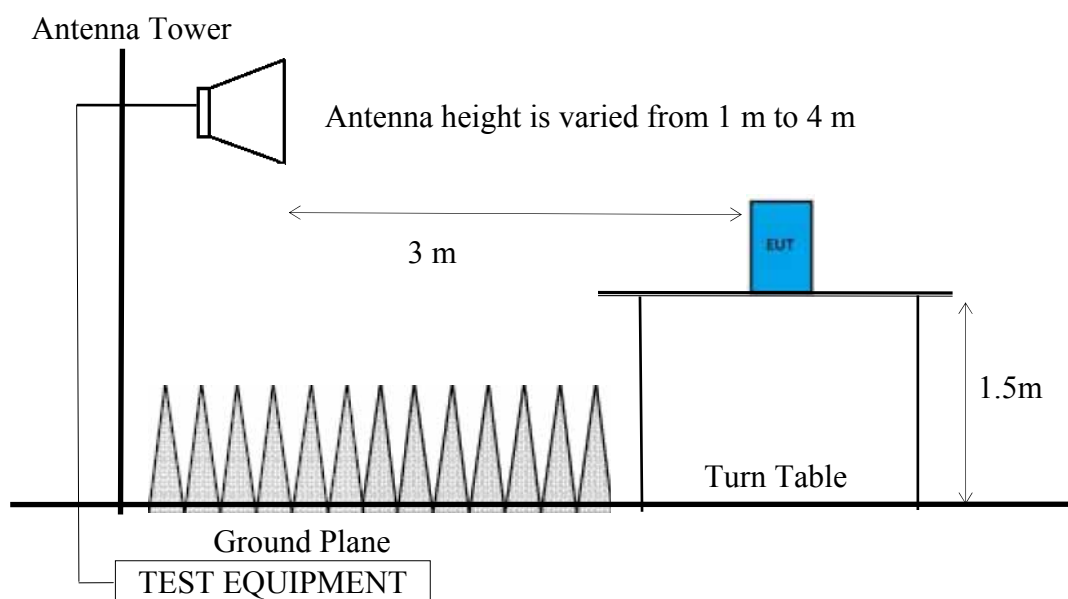
6.1.2. Semi-Anechoic Chamber (3m) Setup Diagram for 9kHz-30MHz



6.1.3. Semi-Anechoic Chamber (3m) Setup Diagram for 30-1000 MHz



6.1.4. Fully Anechoic Chamber (3m) Setup Diagram for above 1GHz



6.2. Radiated Emission Limits

Radiated emissions fall in restricted bands, as defined in Section 15.205 must be in compliance with the radiated emission limits specified in 15.209 as below.

6.2.1. General Limit

Frequency (MHz)	Distance (m)	Field Strengths Limits	
		$\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$
0.009 - 0.490	300	67.6	2400/kHz
0.490 - 1.705	30	87.6	24000/kHz
1.705 - 30	30	29.5	30
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
Above 960	3	500	54.0
Above 1000	3	74.0 $\text{dB}\mu\text{V/m}$ (Peak) 54.0 $\text{dB}\mu\text{V/m}$ (Average)	

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

- (2) The tighter limit applies to the edge between two frequency bands.
- (3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
- (4) Fundamental and emission fall within operation band are exempted from this section.
- (5) Pursuant to ANSI C63.10: 6.6.4.3, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.

6.2.2. Limit for non-restricted frequency above 1 GHz

Frequency Band (MHz)	E.I.R.P. Limit	Field Strength Limit at 3 m
5150 to 5250	-27 dBm	68.2
5250 to 5350		68.2
5470 to 5725		68.2
5725 to 5850	-17 dBm/MHz ^{Note 1} -27 dBm/MHz ^{Note 2}	78.2 ^{Note 1} 68.2 ^{Note 2}

Note 1: Applicable to frequency within 10MHz to band edge.

2: Applicable to frequency beyond 10 MHz out of band edge.

3: Field Strength at 3 m= E.I.R.P. + 95.2 dB

6.3. Test Procedure

Frequency Range 9kHz~30MHz:

The EUT setup on the turn table which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

- (1) RBW = 9kHz with peak and average detector.
- (2) Detector: average and peak (9kHz-490kHz)
Q.P. (490kHz-30MHz)

Frequency Range 30MHz ~ 40GHz:

The EUT setup on the turn table which has 0.8m (For 30-1000MHz) or 1.5m (For Above 1GHz) height to the ground. The turn table rotated 360 degrees and antenna varied from 1 m to 4 m to find the maximum emission level. Both horizontal and vertical polarization are required. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

Frequency below 1 GHz:

Spectrum Analyzer is used for pre-testing with following setting:

- (1) RBW = 120 kHz
- (2) VBW $\geq 3 \times$ RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.
- (7) When peak-detected value is lower than limit that the measurement using the Q.P. detector is not required. Otherwise using Q.P. for finally measurement.

Frequency above 1GHz to 10th harmonic (up to 40 GHz):**Peak Detector:**

- (1) RBW = 1 MHz
- (2) VBW $\geq 3 \times$ RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.
- (7) When peak-detected value is lower than limit that the measurement using the average detector is not required. Otherwise using average for finally measurement.

Average Detector:**■ Option 1:**

- (1) RBW = 1 MHz
- (2) VBW $\geq 1/T$.

Modulation Type	T (ms)	1/T (Hz)	VBW Setting
802.11a	1.340	0.746	0.746
802.11n-HT20	0.455	2.198	2.198
802.11n-HT40	0.240	4.167	4.167

N/A: 1/T is not implemented when duty cycle presented in section 3.5 is $\geq 98\%$.

- (1) Detector = Peak.
- (2) Sweep time = auto.
- (3) Trace mode = max hold.
- (4) Allow sweeps to continue until the trace stabilizes.

□ Option 2:

Average Emission Level = Peak Emission Level + D.C.C.F.

6.4. Measurement Result Explanation

- Peak Emission Level = Antenna Factor + Cable Loss + Meter Reading
- Average Emission Level = Antenna Factor + Cable Loss + Meter Reading
- Average Emission Level = Peak Emission Level + DCCF
Duty Cycle Correction Factor (DCCF) = $20\log(TX_{on}/TX_{on+off})$ presented in section 3.5

6.5. Test Results

PASSED.

Test Date	2015/05/19	Temp./Hum.	24 / 51%
Test Voltage	DC 3.3V		

6.5.1. Emissions within Restricted Frequency Bands**6.5.1.1. Frequency 9kHz~30MHz**

The emissions (9kHz~30MHz) not reported for there is no emission be found.

6.5.1.2. Frequency 30MHz~1000MHz

[Note: We performed testing of the highest Antenna Type]

Mode	802.11a	UNII Band	I
		Frequency	TX 5180MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
99.84	11.93	2.64	23.90	38.47	43.50	5.03	Peak
298.69	13.74	4.57	26.80	45.11	46.00	0.89	Peak
566.41	18.02	6.72	2.92	27.66	46.00	18.34	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
99.84	11.93	2.64	13.03	27.60	43.50	15.90	Peak
299.66	13.76	4.58	20.33	38.67	46.00	7.33	Peak
499.48	17.13	6.49	7.04	30.66	46.00	15.34	Peak

Mode	802.11a	UNII Band	II-2A
		Frequency	TX 5280MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
99.84	11.93	2.64	22.56	37.13	43.50	6.37	Peak
198.78	9.46	3.66	20.54	33.66	43.50	9.84	Peak
298.69	13.74	4.57	26.94	45.25	46.00	0.75	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
99.84	11.93	2.64	12.49	27.06	43.50	16.44	Peak
299.66	13.76	4.58	21.47	39.81	46.00	6.19	Peak
497.54	17.11	6.48	7.20	30.79	46.00	15.21	Peak

Mode	802.11a	UNII Band	III
		Frequency	TX 5785MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
99.84	11.93	2.64	23.57	38.14	43.50	5.36	Peak
198.78	9.46	3.66	18.61	31.73	43.50	11.77	Peak
299.66	13.76	4.58	25.60	43.94	46.00	2.06	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
99.84	11.93	2.64	14.18	28.75	43.50	14.75	Peak
298.69	13.74	4.57	12.55	30.86	46.00	15.14	Peak
497.54	17.11	6.48	8.66	32.25	46.00	13.75	Peak

Mode	802.11n-HT20	UNII Band	I
		Frequency	TX 5200MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
99.84	11.93	2.64	22.90	37.47	43.50	6.03	Peak
199.75	9.47	3.67	19.47	32.61	43.50	10.89	Peak
298.69	13.74	4.57	27.05	45.36	46.00	0.64	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
99.84	11.93	2.64	13.15	27.72	43.50	15.78	Peak
299.66	13.76	4.58	20.81	39.15	46.00	6.85	Peak
499.48	17.13	6.49	7.38	31.00	46.00	15.00	Peak

Mode	802.11n-HT20	UNII Band	II-2A
		Frequency	TX 5280MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
99.84	11.93	2.64	22.66	37.23	43.50	6.27	Peak
198.78	9.46	3.66	20.37	33.49	43.50	10.01	Peak
298.69	13.74	4.57	26.11	44.42	46.00	1.58	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
99.84	11.93	2.64	12.85	27.42	43.50	16.08	Peak
298.69	13.74	4.57	19.82	38.13	46.00	7.87	Peak
497.54	17.11	6.48	7.03	30.62	46.00	15.38	Peak

Mode	802.11n-HT20	UNII Band	III
		Frequency	TX 5785MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
99.84	11.93	2.64	24.72	39.29	43.50	4.21	Peak
198.78	9.46	3.66	18.35	31.47	43.50	12.03	Peak
298.69	13.74	4.57	23.65	41.96	46.00	4.04	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
99.84	11.93	2.64	15.06	29.63	43.50	13.87	Peak
299.66	13.76	4.58	16.04	34.38	46.00	11.62	Peak
497.54	17.11	6.48	8.64	32.23	46.00	13.77	Peak

Mode	802.11n-HT40	UNII Band	I
		Frequency	TX 5230MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
99.84	11.93	2.64	22.77	37.34	43.50	6.16	Peak
198.78	9.46	3.66	19.98	33.10	43.50	10.40	Peak
299.66	13.76	4.58	26.38	44.72	46.00	1.28	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
99.84	11.93	2.64	12.60	27.17	43.50	16.33	Peak
299.66	13.76	4.58	21.10	39.44	46.00	6.56	Peak
497.54	17.11	6.48	7.40	30.99	46.00	15.01	Peak

Mode	802.11n-HT40	UNII Band	II-2A
		Frequency	TX 5270MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
99.84	11.93	2.64	23.02	37.59	43.50	5.91	Peak
198.78	9.46	3.66	19.26	32.38	43.50	11.12	Peak
298.69	13.74	4.57	26.39	44.70	46.00	1.30	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
99.84	11.93	2.64	14.10	28.67	43.50	14.83	Peak
299.66	13.76	4.58	18.02	36.36	46.00	9.64	Peak
499.48	17.13	6.49	7.65	31.27	46.00	14.73	Peak

Mode	802.11n-HT40	UNII Band	III
		Frequency	TX 5795MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
99.84	11.93	2.64	24.67	39.24	43.50	4.26	Peak
198.78	9.46	3.66	17.73	30.85	43.50	12.65	Peak
298.69	13.74	4.57	23.85	42.16	46.00	3.84	Peak

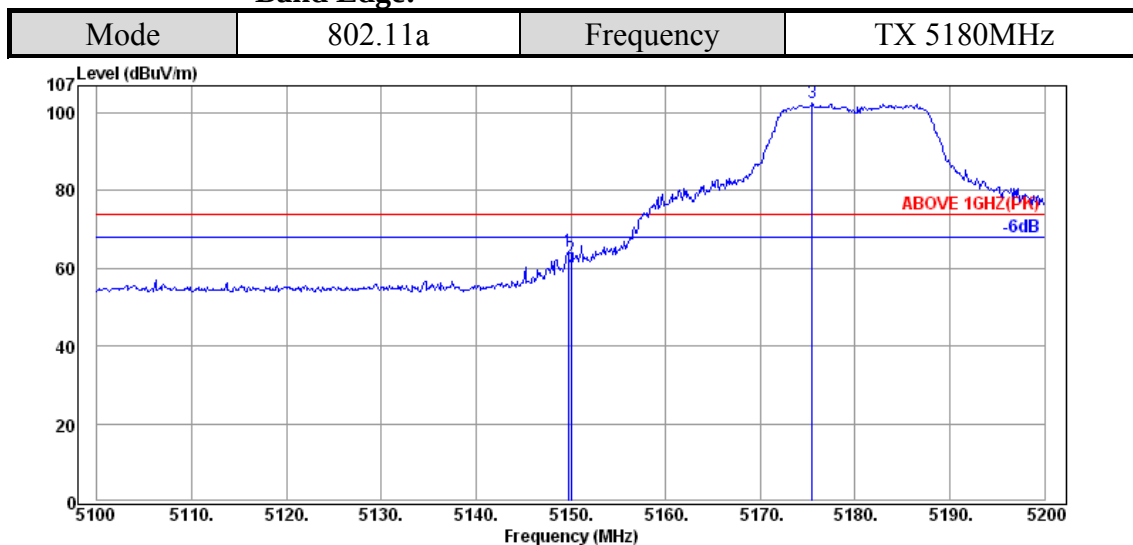
Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
99.84	11.93	2.64	14.17	28.74	43.50	14.76	Peak
299.66	13.76	4.58	17.41	35.75	46.00	10.25	Peak
497.54	17.11	6.48	8.40	31.99	46.00	14.01	Peak

6.5.1.3. Frequency Above 1 GHz to 10th harmonics

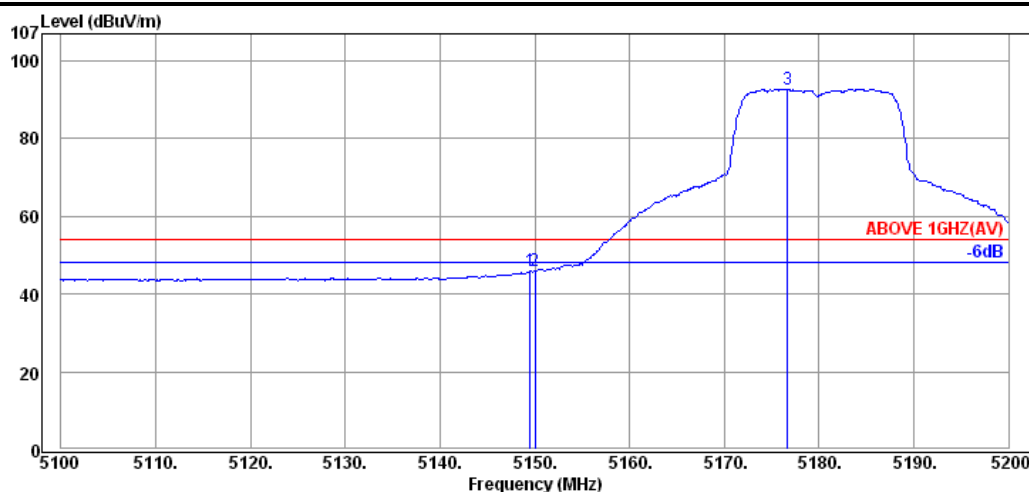
[Note: We performed testing of the highest Antenna Type]

Band Edge:



Antenna at Horizontal Polarization

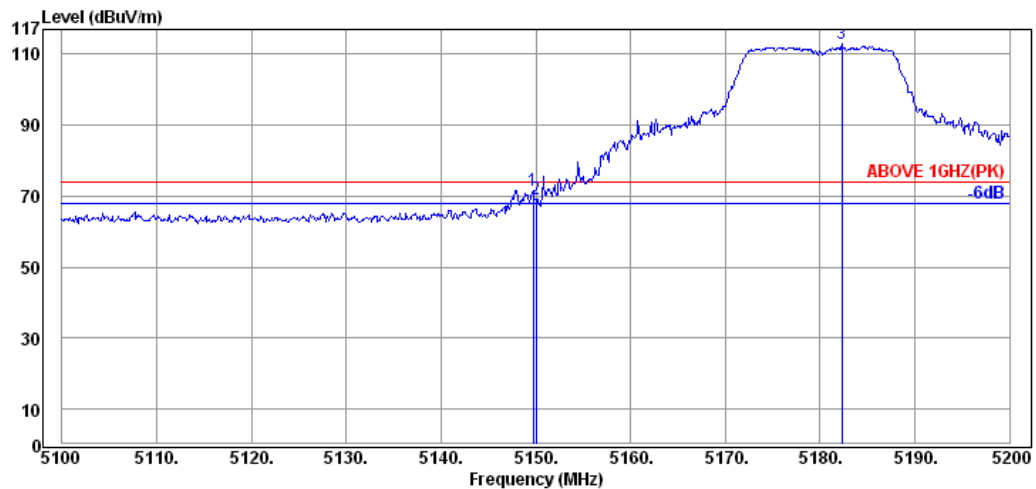
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5149.70	34.45	9.41	20.67	64.53	74.00	9.47	Peak
5150.00	34.45	9.41	18.69	62.55	74.00	11.45	Peak
5175.50	34.48	9.39	58.90	102.77	---	---	Peak



Antenna at Horizontal Polarization

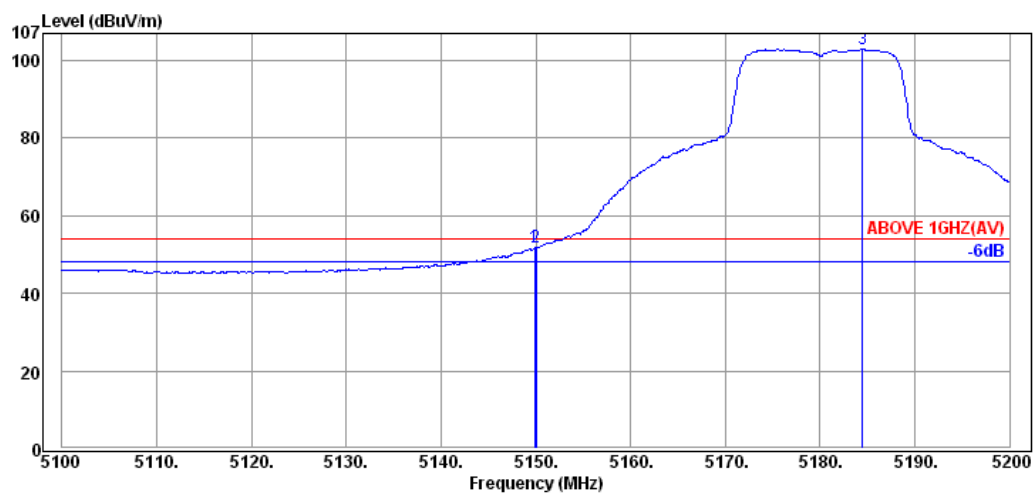
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5149.50	34.45	9.41	1.99	45.85	54.00	8.15	Average
5150.00	34.45	9.41	2.02	45.88	54.00	8.12	Average
5176.70	34.48	9.39	48.90	92.77	---	---	Average

Mode	802.11a	Frequency	TX 5180MHz
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Antenna at Vertical Polarization

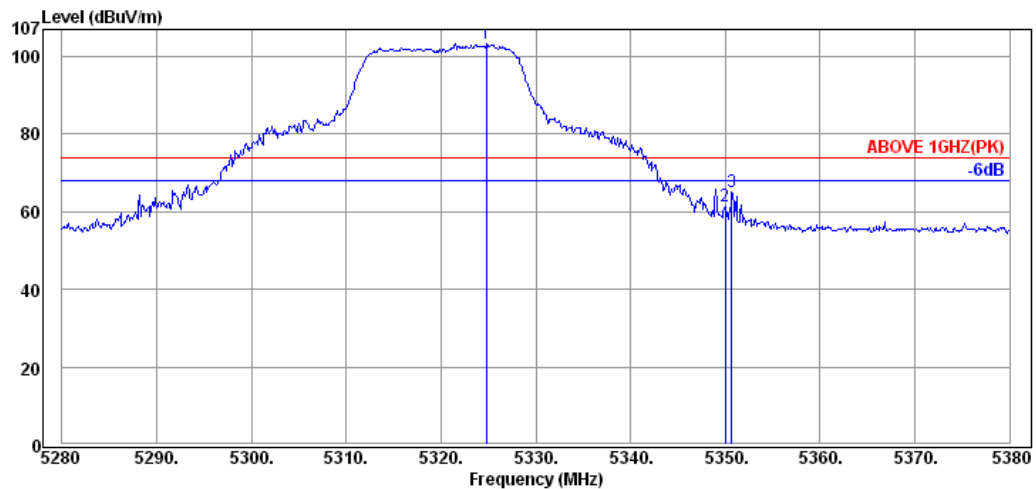
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5149.70	34.45	9.41	27.71	71.57	74.00	2.43	Peak
5150.00	34.45	9.41	25.24	69.10	74.00	4.90	Peak
5182.30	34.48	9.39	69.28	113.15	---	---	Peak



Antenna at Vertical Polarization

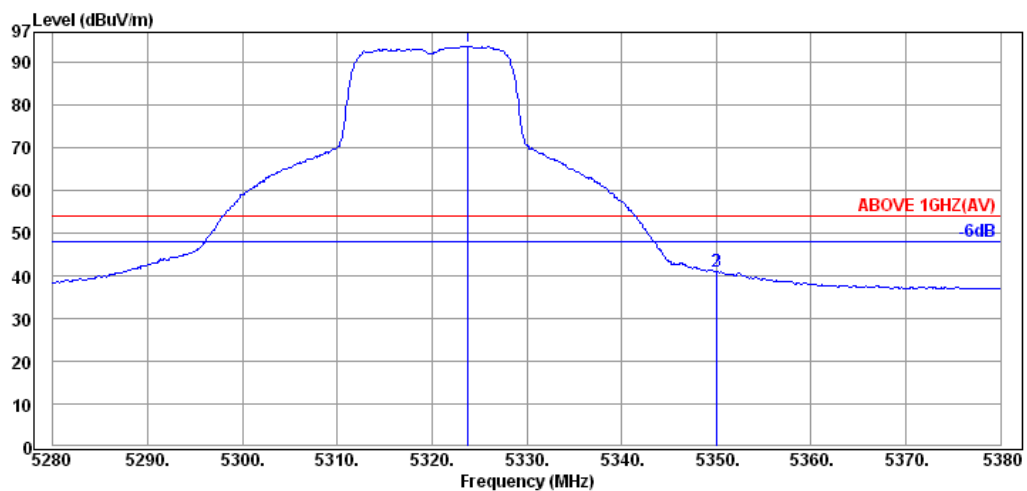
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5149.90	34.45	9.41	7.81	51.67	54.00	2.33	Average
5150.00	34.45	9.41	7.91	51.77	54.00	2.23	Average
5184.50	34.48	9.39	59.10	102.97	---	---	Average

Mode	802.11a	Frequency	TX 5320MHz
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Antenna at Horizontal Polarization

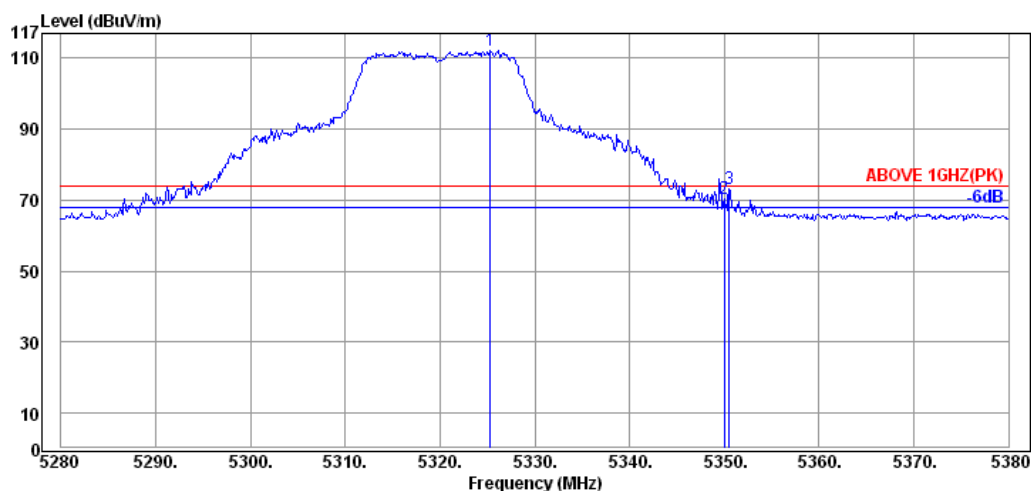
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5324.80	34.62	9.38	59.22	103.22	---	---	Peak
5350.00	34.65	9.40	17.52	61.57	74.00	12.43	Peak
5350.70	34.65	9.40	20.92	64.97	74.00	9.03	Peak



Antenna at Horizontal Polarization

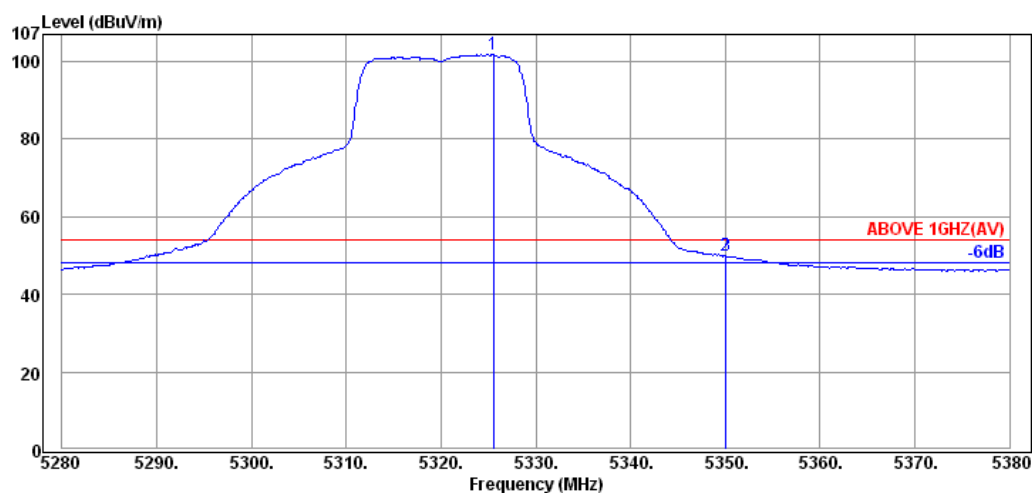
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5323.80	34.62	9.38	49.73	93.73	---	---	Average
5350.00	34.65	9.40	-3.07	40.98	54.00	13.02	Average
5350.10	34.65	9.40	-3.12	40.93	54.00	13.07	Average

Mode	802.11a	Frequency	TX 5320MHz
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Antenna at Vertical Polarization

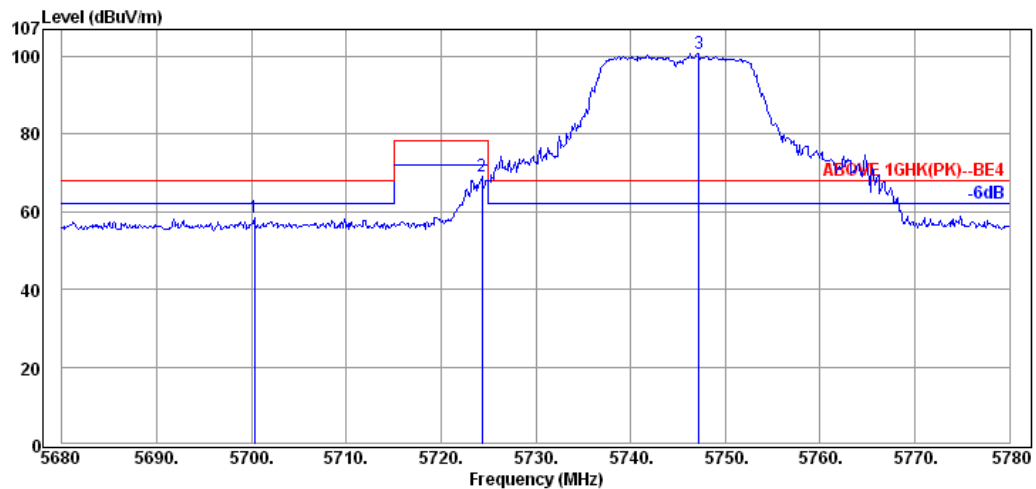
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5325.30	34.62	9.38	68.24	112.24	---	---	Peak
5350.00	34.65	9.40	26.21	70.26	74.00	3.74	Peak
5350.50	34.65	9.40	29.00	73.05	74.00	0.95	Peak



Antenna at Vertical Polarization

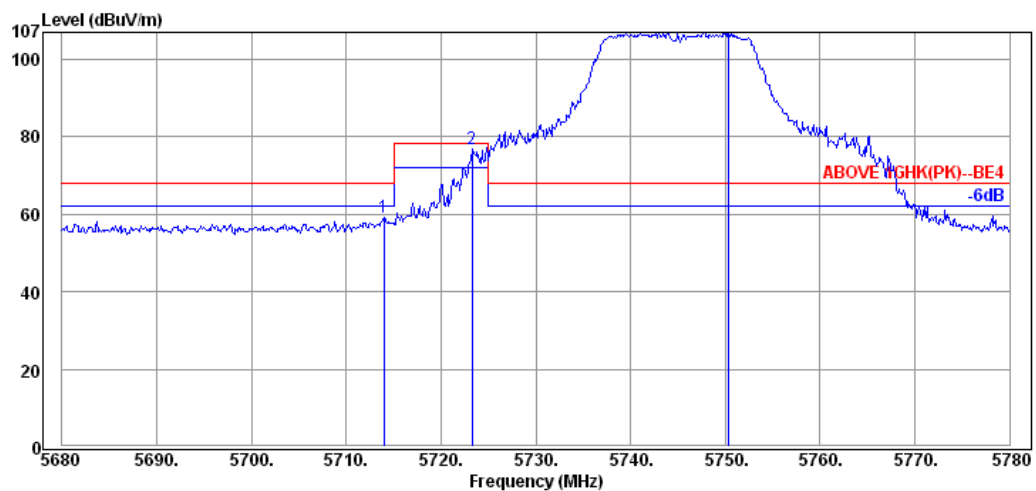
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5325.50	34.62	9.38	57.71	101.71	---	---	Average
5350.00	34.65	9.40	5.91	49.96	54.00	4.04	Average
5350.10	34.65	9.40	5.78	49.83	54.00	4.17	Average

Mode	802.11a	Frequency	TX 5745MHz
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Antenna at Horizontal Polarization

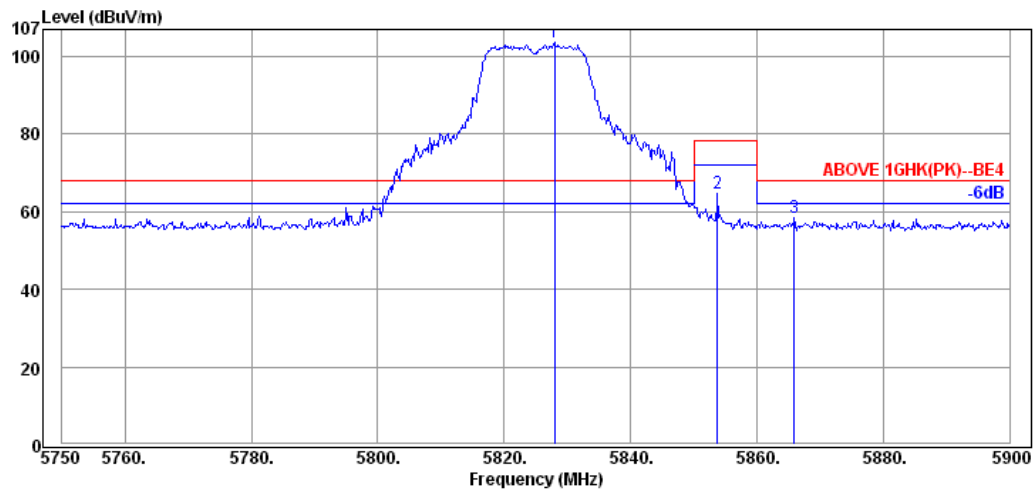
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5700.30	35.03	10.22	13.05	58.30	68.20	9.90	Peak
5724.30	35.07	10.29	23.89	69.25	78.20	8.95	Peak
5747.20	35.09	10.42	55.24	100.75	---	---	Peak



Antenna at Vertical Polarization

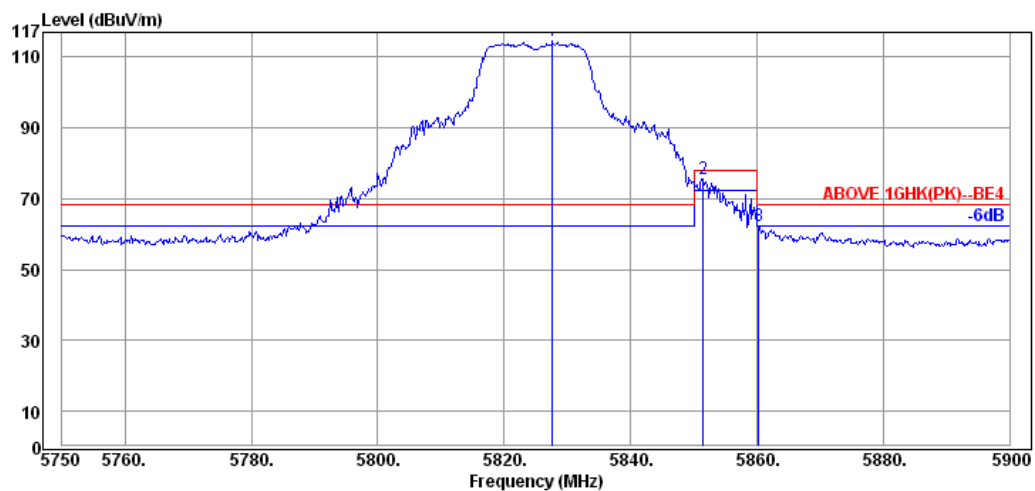
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5714.00	35.05	10.29	13.69	59.03	68.20	9.17	Peak
5723.30	35.07	10.29	31.46	76.82	78.20	1.38	Peak
5750.30	35.09	10.42	62.79	108.30	---	---	Peak

Mode	802.11a	Frequency	TX 5825MHz
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Antenna at Horizontal Polarization

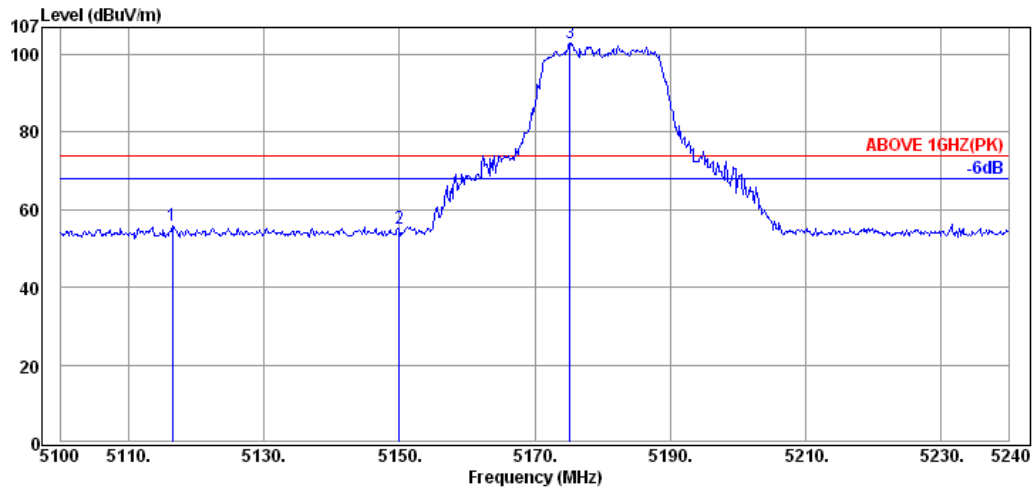
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5828.00	35.19	10.26	58.41	103.86	---	---	Peak
5853.80	35.23	10.22	19.16	64.61	78.20	13.59	Peak
5865.95	35.23	10.18	12.99	58.40	68.20	9.80	Peak



Antenna at Vertical Polarization

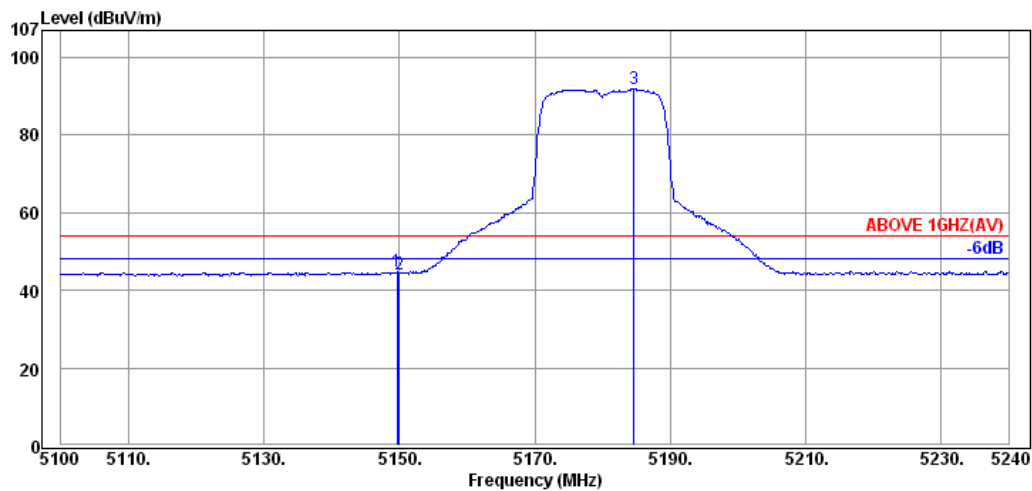
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5827.70	35.19	10.26	68.95	114.40	---	---	Peak
5851.55	35.21	10.22	30.23	75.66	78.20	2.54	Peak
5860.25	35.23	10.18	16.99	62.40	68.20	5.80	Peak

Mode	802.11n-HT20	Frequency	TX 5180MHz
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Antenna at Horizontal Polarization

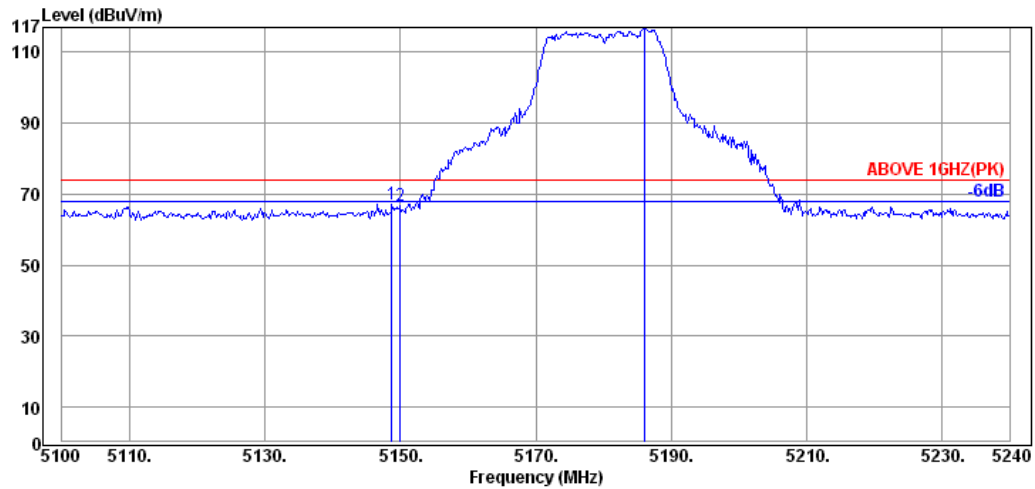
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5116.52	34.42	9.43	11.88	55.73	74.00	18.27	Peak
5149.98	34.45	9.41	11.18	55.04	74.00	18.96	Peak
5175.18	34.48	9.39	59.01	102.88	---	---	Peak



Antenna at Horizontal Polarization

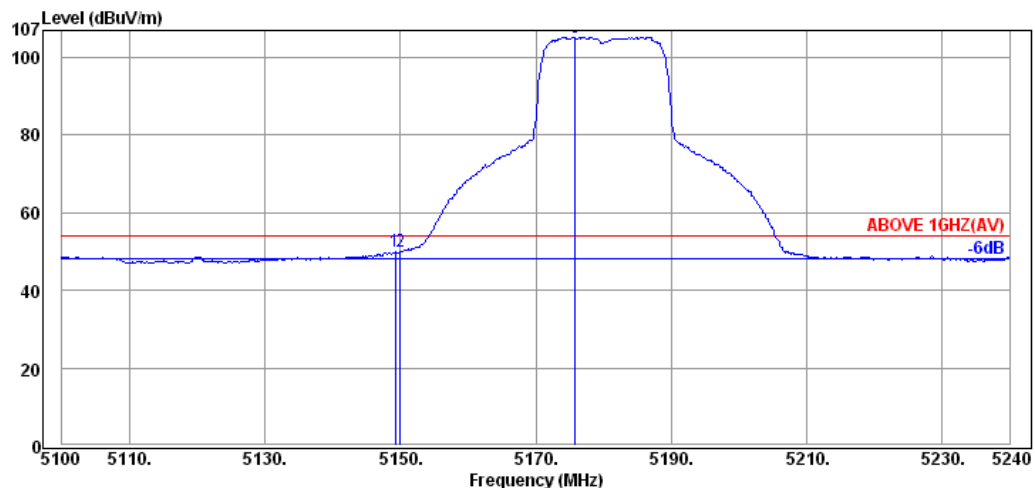
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5149.70	34.45	9.41	0.82	44.68	54.00	9.32	Average
5149.98	34.45	9.41	0.43	44.29	54.00	9.71	Average
5184.70	34.48	9.39	48.03	91.90	---	---	Average

Mode	802.11n-HT20	Frequency	TX 5180MHz
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Antenna at Vertical Polarization

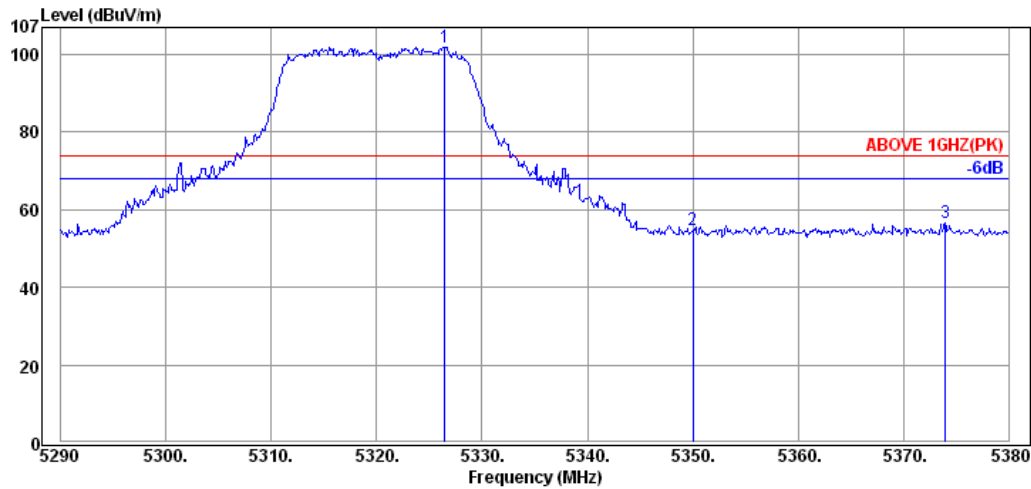
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5148.72	34.05	9.41	23.61	67.07	74.00	6.93	Peak
5149.98	34.05	9.41	23.42	66.88	74.00	7.12	Peak
5186.10	34.48	9.39	72.90	116.77	---	---	Peak



Antenna at Vertical Polarization

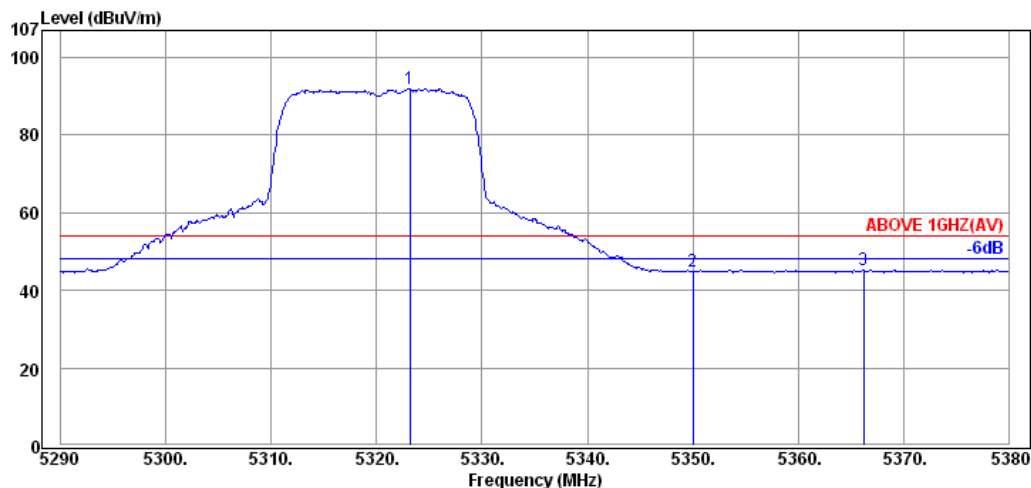
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5149.28	34.45	9.41	6.04	49.90	54.00	4.10	Average
5149.98	34.45	9.41	6.01	49.87	54.00	4.13	Average
5175.88	34.48	9.39	61.46	105.33	---	---	Average

Mode	802.11n-HT20	Frequency	TX 5320MHz
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Antenna at Horizontal Polarization

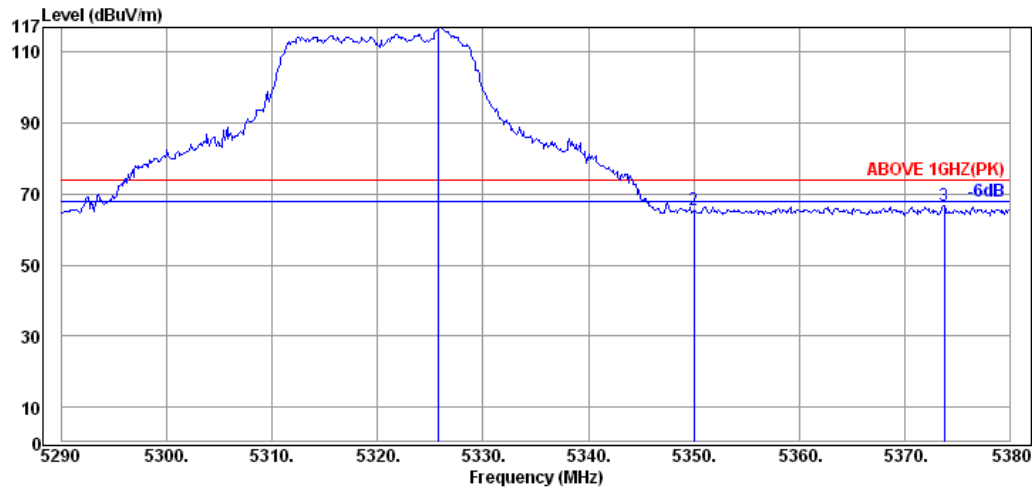
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5326.45	34.62	9.38	57.94	101.94	---	---	Peak
5350.03	34.65	9.40	10.58	54.63	74.00	19.37	Peak
5373.97	34.67	9.41	12.59	56.67	74.00	17.33	Peak



Antenna at Horizontal Polarization

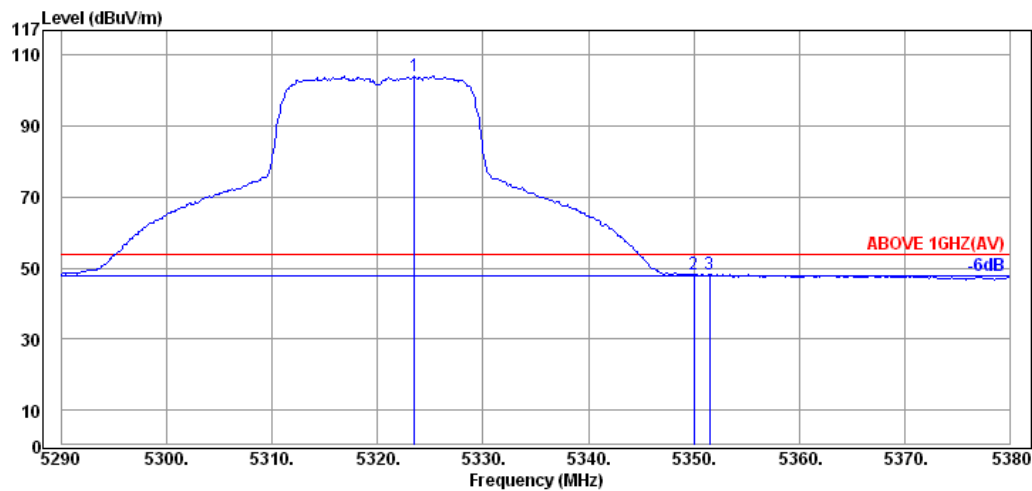
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5323.12	34.62	9.38	47.97	91.97	---	---	Average
5350.03	34.65	9.40	0.92	44.97	54.00	9.03	Average
5366.23	34.67	9.41	1.18	45.26	54.00	8.74	Average

Mode	802.11n-HT20	Frequency	TX 5320MHz
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Antenna at Vertical Polarization

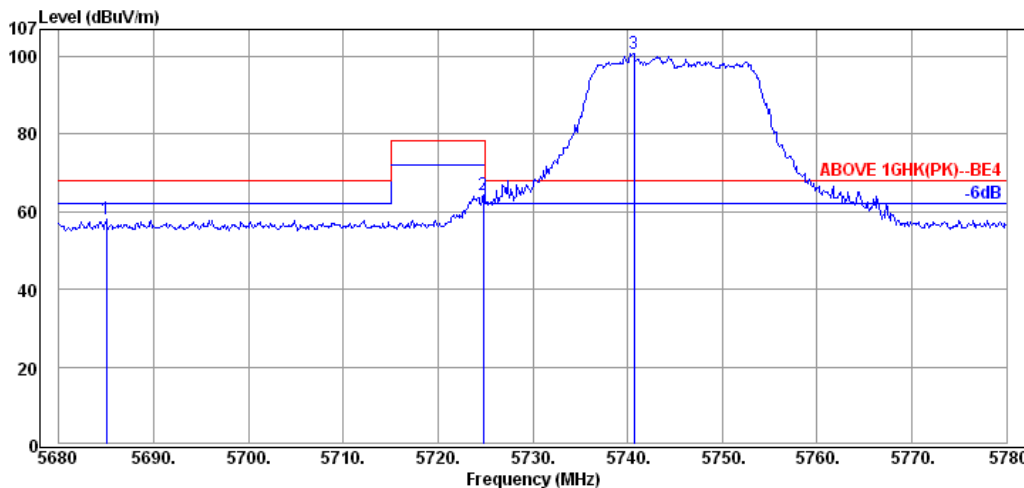
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5325.80	34.62	9.38	73.06	117.06	---	---	Peak
5350.00	34.65	9.40	21.52	65.57	74.00	8.43	Peak
5373.80	34.67	9.41	22.72	66.80	74.00	7.20	Peak



Antenna at Vertical Polarization

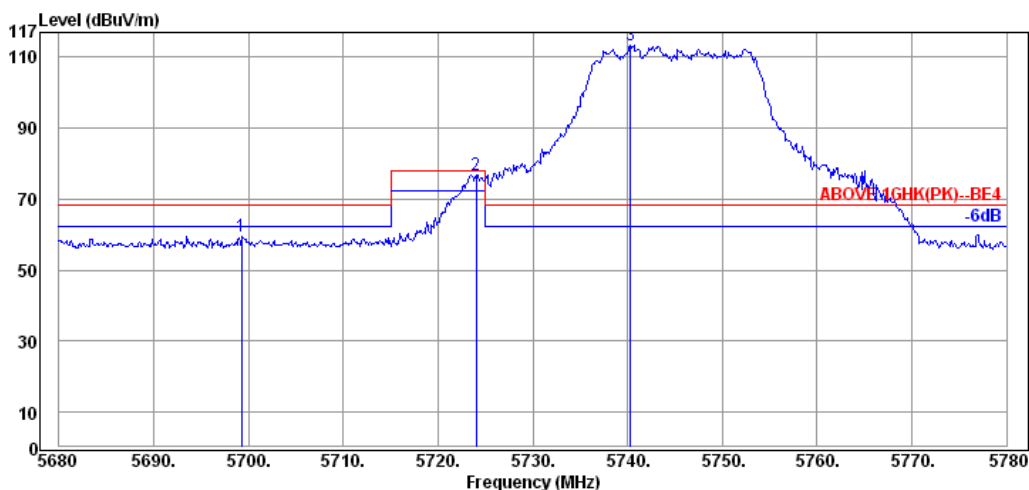
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5323.50	34.62	9.38	60.27	104.27	---	---	Average
5350.00	34.65	9.40	4.04	48.09	54.00	5.91	Average
5351.50	34.65	9.40	4.22	48.27	54.00	5.73	Average

Mode	802.11n-HT20	Frequency	TX 5745MHz
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Antenna at Horizontal Polarization

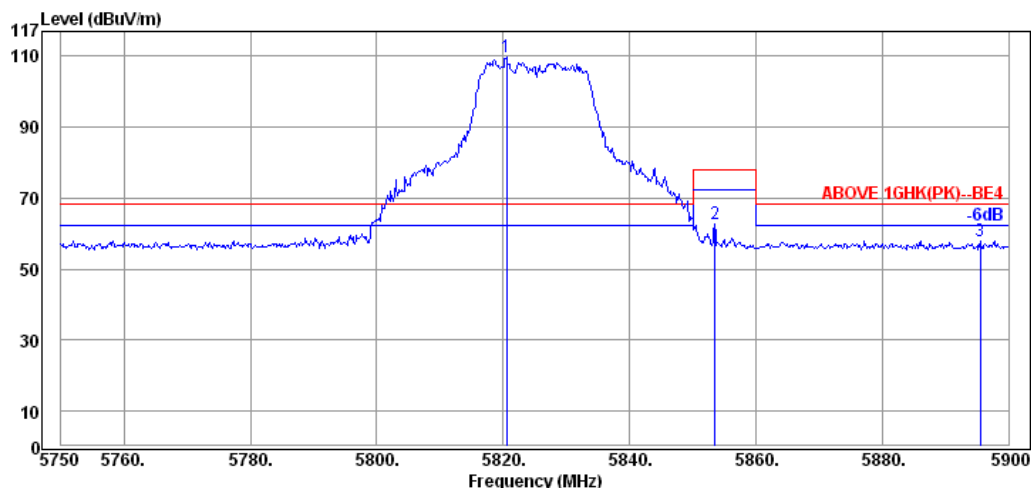
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5685.00	35.03	10.15	12.93	58.11	68.20	10.09	Peak
5724.80	35.07	10.29	19.00	64.36	78.20	13.84	Peak
5740.70	35.09	10.35	55.22	100.66	---	---	Peak



Antenna at Vertical Polarization

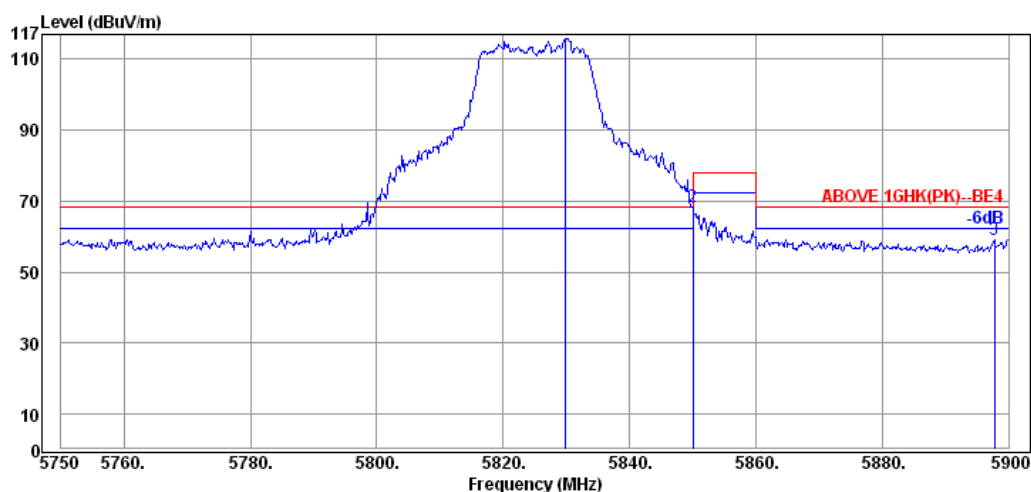
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5699.30	35.03	10.22	14.29	59.54	68.20	8.66	Peak
5724.00	35.07	10.29	31.51	76.87	78.20	1.33	Peak
5740.30	35.09	10.35	67.94	113.38	---	---	Peak

Mode	802.11n-HT20	Frequency	TX 5825MHz
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Antenna at Horizontal Polarization

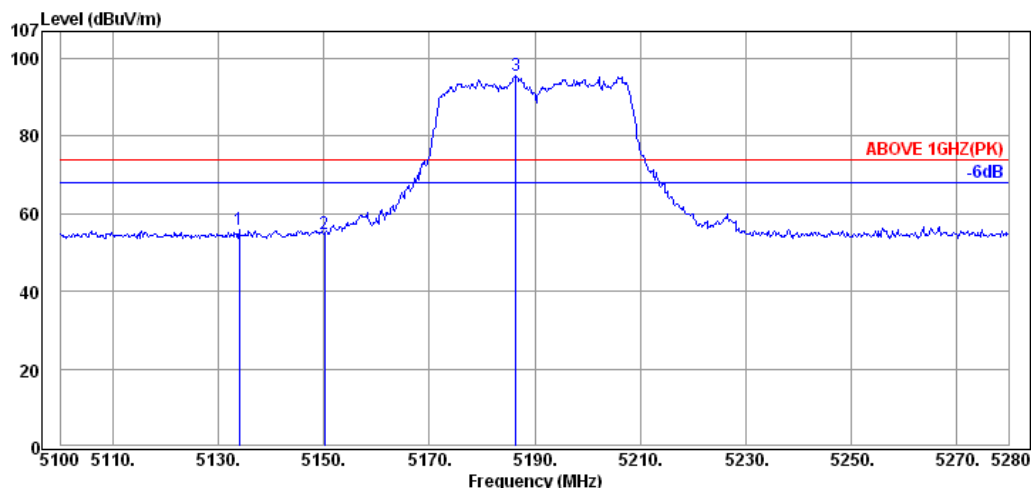
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5820.50	35.19	10.30	64.15	109.64	---	---	Peak
5853.50	35.23	10.22	17.27	62.72	78.20	15.48	Peak
5895.50	35.28	10.15	12.60	58.03	68.20	10.17	Peak



Antenna at Vertical Polarization

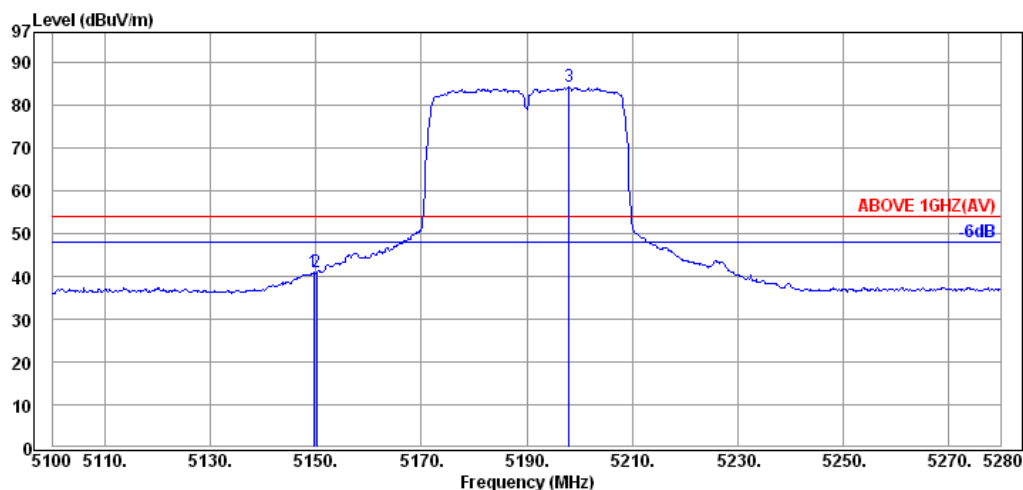
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5829.80	35.19	10.26	70.47	115.92	---	---	Peak
5850.05	35.21	10.22	23.11	68.54	78.20	9.66	Peak
5897.75	35.28	10.15	13.75	59.18	68.20	9.02	Peak

Mode	802.11n-HT40	Frequency	TX 5190MHz
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Antenna at Horizontal Polarization

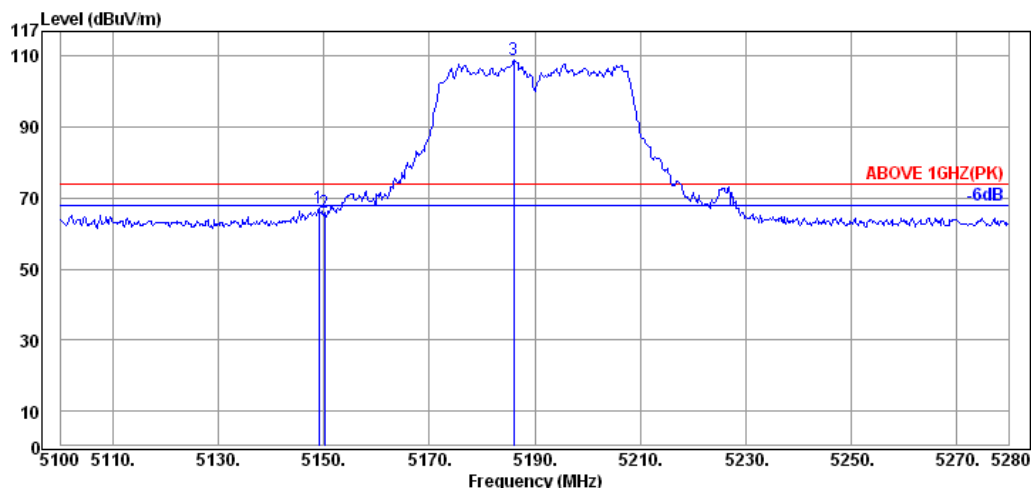
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5133.84	34.43	9.42	11.88	55.73	74.00	18.27	Peak
5150.04	34.45	9.41	11.10	54.96	74.00	19.04	Peak
5186.40	34.48	9.39	51.62	95.49	---	---	Peak



Antenna at Horizontal Polarization

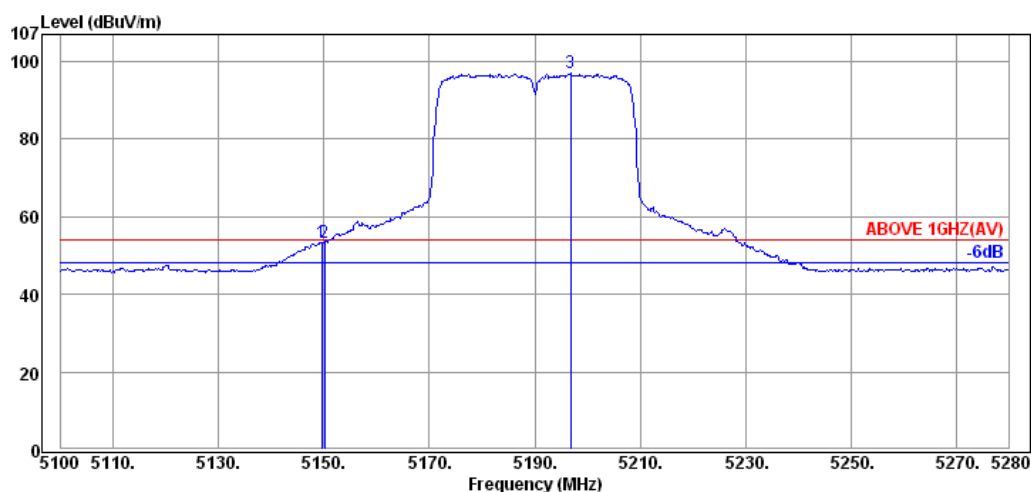
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5149.50	34.45	9.41	-3.01	40.85	54.00	13.15	Average
5150.04	34.45	9.41	-2.92	40.94	54.00	13.06	Average
5198.10	34.50	9.37	40.38	84.25	---	---	Average

Mode	802.11n-HT40	Frequency	TX 5190MHz
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Antenna at Vertical Polarization

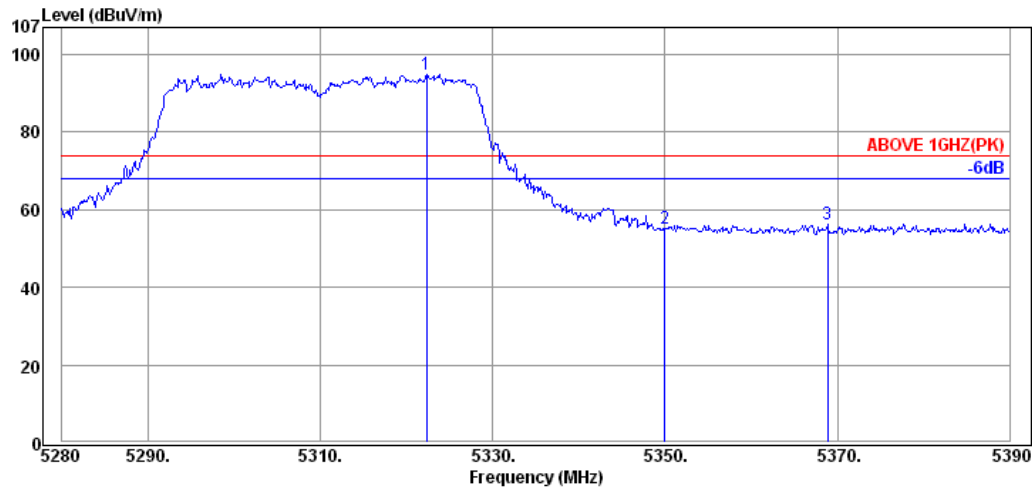
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5148.96	34.45	9.41	23.25	67.11	74.00	6.89	Peak
5150.04	34.45	9.41	21.89	65.75	74.00	8.25	Peak
5186.04	34.48	9.39	65.01	108.88	---	---	Peak



Antenna at Vertical Polarization

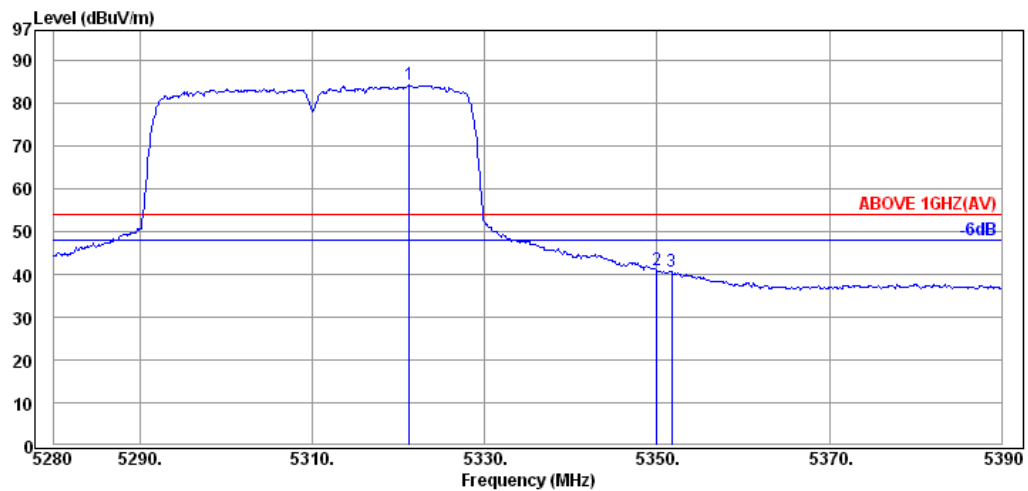
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5149.50	34.45	9.41	9.31	53.17	54.00	0.83	Average
5150.04	34.45	9.41	9.52	53.38	54.00	0.62	Average
5196.84	34.50	9.37	53.04	96.91	---	---	Average

Mode	802.11n-HT40	Frequency	TX 5310MHz
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Antenna at Horizontal Polarization

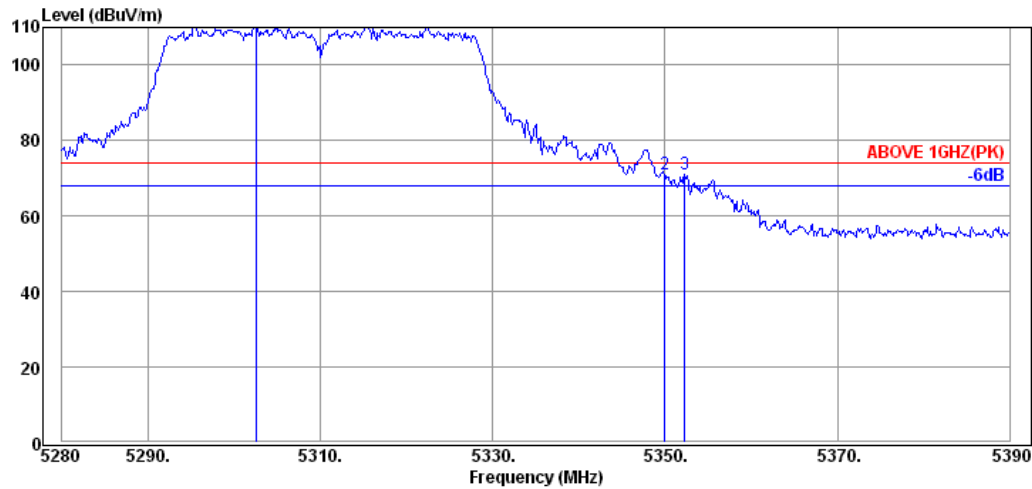
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5322.35	34.62	9.38	50.96	94.96	---	---	Peak
5349.96	34.65	9.40	11.10	55.15	74.00	18.85	Peak
5368.88	34.67	9.41	12.32	56.40	74.00	17.60	Peak



Antenna at Horizontal Polarization

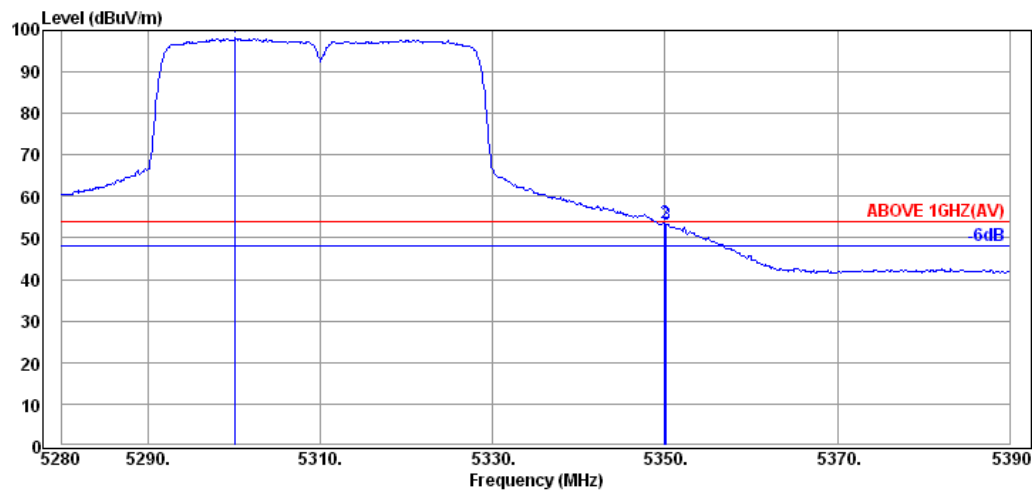
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5321.25	34.62	9.38	40.28	84.28	---	---	Average
5349.96	34.65	9.40	-2.98	41.07	54.00	12.93	Average
5351.72	34.65	9.40	-3.25	40.80	54.00	13.20	Average

Mode	802.11n-HT40	Frequency	TX 5310MHz
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Antenna at Vertical Polarization

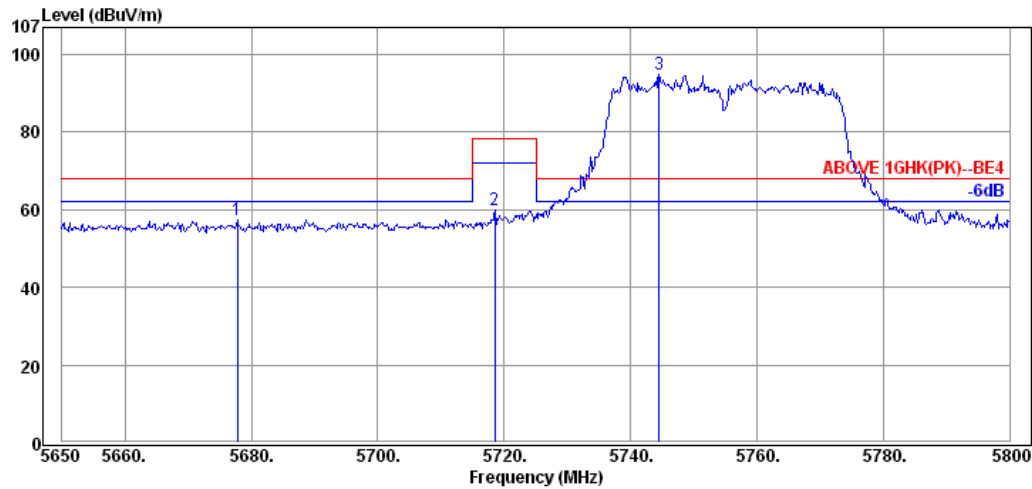
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5302.55	34.60	9.37	66.42	110.39	---	---	Peak
5349.96	34.65	9.40	27.12	71.17	74.00	2.83	Peak
5352.27	34.65	9.40	27.10	71.15	74.00	2.85	Peak



Antenna at Vertical Polarization

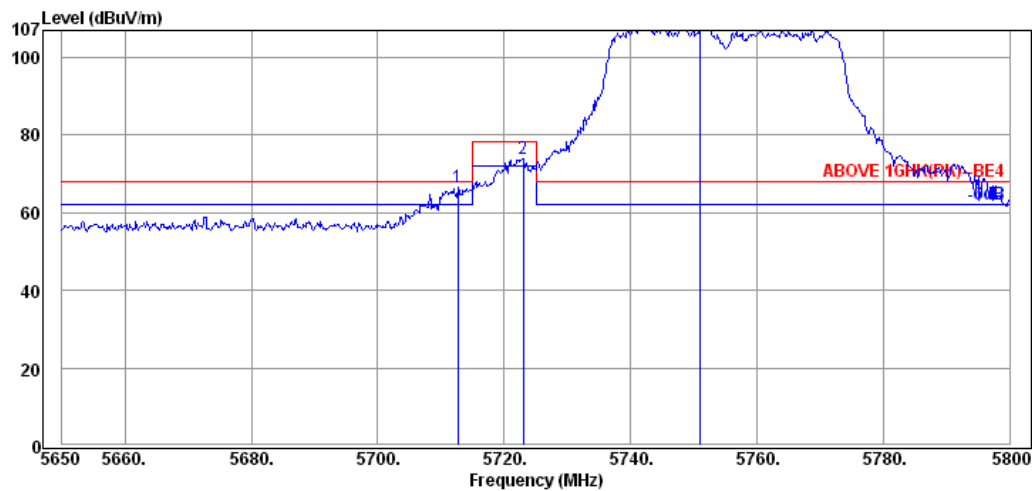
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5300.13	34.60	9.37	54.24	98.21	---	---	Average
5349.96	34.65	9.40	9.44	53.49	54.00	0.51	Average
5350.18	34.65	9.40	9.22	53.27	54.00	0.73	Average

Mode	802.11n-HT40	Frequency	TX 5755MHz
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Antenna at Horizontal Polarization

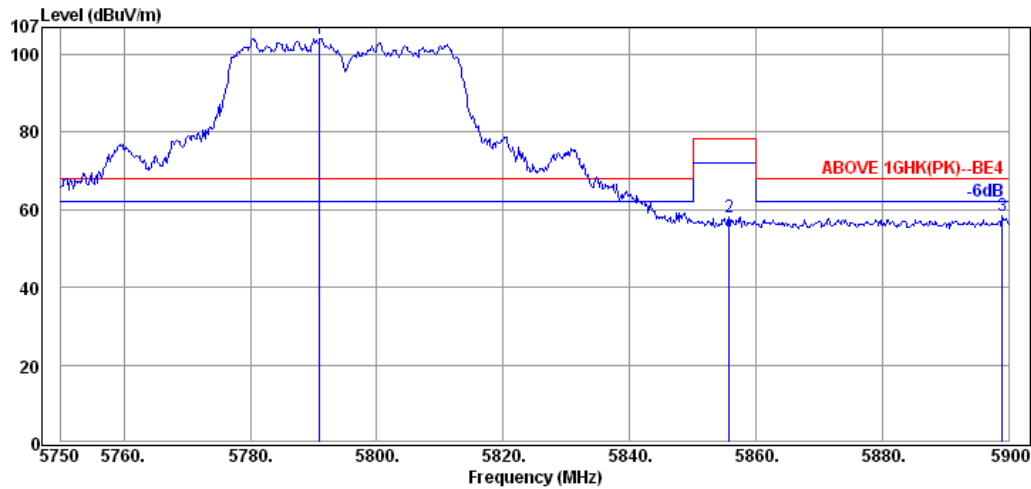
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5677.75	35.01	10.15	12.29	57.45	68.20	10.75	Peak
5718.55	35.07	10.29	14.69	60.05	78.20	18.15	Peak
5744.50	35.09	10.35	49.46	94.90	---	---	Peak



Antenna at Vertical Polarization

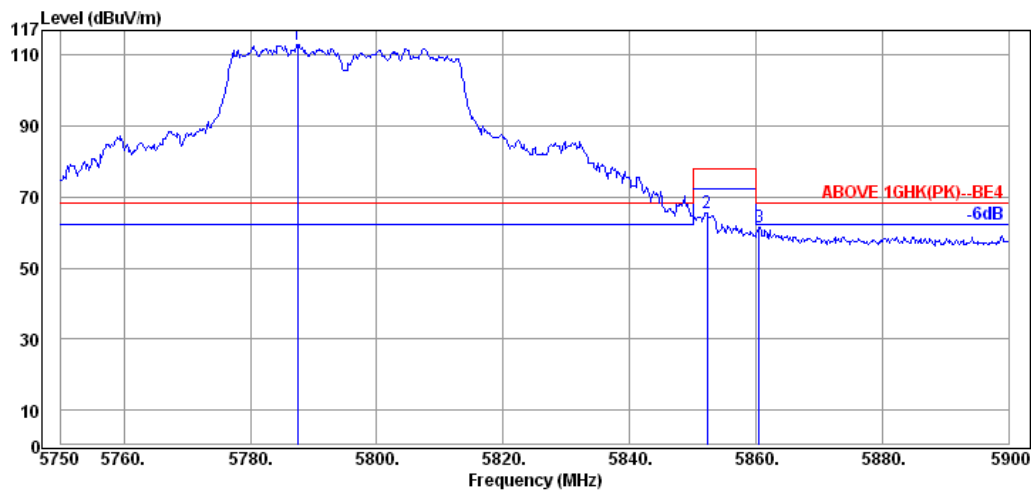
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5712.70	35.05	10.29	21.11	66.45	68.20	1.75	Peak
5723.05	35.07	10.29	28.63	73.99	78.20	4.21	Peak
5750.95	35.09	10.42	62.88	108.39	---	---	Peak

Mode	802.11n-HT40	Frequency	TX 5795MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5790.95	35.15	10.34	58.68	104.17	---	---	Peak
5855.75	35.23	10.22	12.68	58.13	78.20	20.07	Peak
5898.95	35.28	10.11	12.97	58.36	68.20	9.84	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
5787.50	35.15	10.34	67.59	113.08	---	---	Peak
5852.30	35.21	10.22	20.23	65.66	78.20	12.54	Peak
5860.55	35.23	10.18	16.19	61.60	68.20	6.60	Peak

6.5.2. Emissions outside the frequency band:

[Note: We performed testing of the highest Antenna Type]

The emissions (up to 40GHz) not reported for there is no emission be found.

Mode	802.11a	UNII Band	I
		Frequency	TX 5180MHz

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1596.00	28.72	4.67	9.66	43.05	54.00	10.95	Peak
4980.00	34.29	9.46	-0.12	43.63	54.00	10.37	Average
4980.00	34.29	9.46	14.02	57.77	74.00	16.23	Peak
5440.00	34.73	9.45	-0.03	44.15	54.00	9.85	Average
5440.00	34.73	9.45	12.53	56.71	74.00	17.29	Peak

Mode	802.11a	UNII Band	II-2A
		Frequency	TX 5280MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
10553.00	37.43	12.96	0.06	50.45	54.00	3.55	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1594.00	28.72	4.66	12.06	45.44	54.00	8.56	Peak
5000.00	34.30	9.51	8.94	52.75	54.00	1.25	Peak
5540.00	34.84	9.61	7.26	51.71	54.00	2.29	Peak
6000.00	35.40	9.91	2.46	47.77	54.00	6.23	Peak
10553.00	37.71	12.96	1.46	52.13	54.00	1.87	Peak

Mode	802.11a	UNII Band	III
		Frequency	TX 5785MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1756.00	29.80	4.89	8.30	42.99	54.00	11.01	Peak
1924.00	31.00	5.17	6.70	42.87	54.00	11.13	Peak
4988.00	34.30	9.46	1.09	44.85	54.00	9.15	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1600.00	28.72	4.67	11.23	44.62	54.00	9.38	Peak
1756.00	29.80	4.89	10.96	45.65	54.00	8.35	Peak
4988.00	34.30	8.78	-2.97	40.11	54.00	13.89	Average
4988.00	34.30	8.78	13.63	56.71	74.00	17.29	Peak

Mode	802.11n-HT20	UNII Band	I
		Frequency	TX 5200MHz

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1600.00	28.72	4.67	13.01	46.40	54.00	7.60	Peak
1770.00	29.92	4.91	13.15	47.98	54.00	6.02	Peak
4960.00	34.29	9.40	3.15	46.84	54.00	7.16	Average
4960.00	34.29	9.40	9.96	53.65	74.00	20.35	Peak
5000.00	34.30	9.51	1.93	45.74	54.00	8.26	Average
5000.00	34.30	9.51	11.30	55.11	74.00	18.89	Peak
5440.00	34.73	9.45	3.47	47.65	54.00	6.35	Average
5440.00	34.73	9.45	12.41	56.59	74.00	17.41	Peak
5480.00	34.78	9.47	3.38	47.63	54.00	6.37	Average
5480.00	34.78	9.47	11.77	56.02	74.00	17.98	Peak

Mode	802.11n-HT20	UNII Band	II-2A
		Frequency	TX 5280MHz

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1596.00	28.72	4.67	11.48	44.87	54.00	9.13	Peak
2066.00	31.70	5.45	9.67	46.82	54.00	7.18	Peak
4992.00	34.30	9.51	10.08	53.89	54.00	0.11	Peak
5520.00	34.82	9.55	8.43	52.80	54.00	1.20	Peak
5680.00	35.01	10.15	7.52	52.68	54.00	1.32	Peak

Mode	802.11n-HT20	UNII Band	III
		Frequency	TX 5785MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1756.00	29.80	4.89	12.44	47.13	54.00	6.87	Peak
5000.00	34.30	9.51	4.55	48.36	54.00	5.64	Peak
5360.00	34.65	9.40	5.83	49.88	54.00	4.12	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1596.00	28.47	4.67	11.33	44.47	54.00	9.53	Peak
4920.00	34.27	9.24	8.21	51.72	74.00	22.28	Peak
5000.00	34.30	9.51	-0.25	43.56	54.00	10.44	Average
5000.00	34.30	9.51	16.55	60.36	74.00	13.64	Peak

Mode	802.11n-HT40	UNII Band	I
		Frequency	TX 5230MHz

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4960.00	34.29	9.40	8.68	52.37	54.00	1.63	Peak
5000.00	34.30	9.51	2.51	46.32	54.00	7.68	Average
5000.00	34.30	9.51	10.43	54.24	74.00	19.76	Peak
5520.00	34.82	9.55	9.24	53.61	54.00	0.39	Peak
5680.00	35.01	10.15	7.14	52.30	54.00	1.70	Peak

Mode	802.11n-HT40	UNII Band	II-2A
		Frequency	TX 5270MHz

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4980.00	34.29	9.46	9.22	52.97	54.00	1.03	Peak
5520.00	34.82	9.55	9.00	53.37	54.00	0.63	Peak
5680.00	35.01	10.15	5.44	50.60	54.00	3.40	Peak
1596.00	28.72	4.67	10.76	44.15	54.00	9.85	Peak

Mode	802.11n-HT40	UNII Band	III
		Frequency	TX 5795MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1756.00	29.80	4.89	8.69	43.38	54.00	10.62	Peak
5532.00	34.84	9.61	5.58	50.03	54.00	3.97	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1596.00	28.72	4.67	10.50	43.89	54.00	10.11	Peak
5000.00	34.30	9.51	8.55	52.36	54.00	1.64	Average
5000.00	34.30	9.51	13.84	57.65	74.00	16.35	Peak
5160.00	34.47	9.40	7.88	51.75	54.00	2.25	Average
5160.00	34.47	9.40	13.68	57.55	74.00	16.45	Peak
5440.00	34.73	9.45	8.23	52.41	54.00	1.59	Average
5440.00	34.73	9.45	14.84	59.02	74.00	14.98	Peak

6.5.3. Emissions in Non-restricted Frequency Bands

[Note: We performed testing of the highest Antenna Type]

Mode	802.11a	UNII Band	I
		Frequency	TX 5180MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
6932.00	35.84	10.84	4.84	51.52	68.20	16.68	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
6932.00	35.84	10.84	15.19	61.87	68.20	6.33	Peak

Mode	802.11a	UNII Band	II-2A
		Frequency	TX 5280MHz

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
7033.00	35.69	10.66	4.31	50.66	68.20	17.54	Peak

Mode	802.11n-HT20	UNII Band	I
		Frequency	TX 5200MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
6932.00	35.84	10.84	5.65	52.33	68.20	15.87	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
6932.00	35.84	10.84	15.34	62.02	68.20	6.18	Peak

Mode	802.11n-HT20	UNII Band	II-2A
		Frequency	TX 5280MHz

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
7033.00	35.69	10.66	4.31	50.66	68.20	17.54	Peak

Mode	802.11n-HT40	UNII Band	I
		Frequency	TX 5230MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
6972.00	35.82	10.67	8.71	55.20	68.20	13.00	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
6972.00	35.82	10.67	10.55	57.04	68.20	11.16	Peak

Mode	802.11n-HT40	UNII Band	II-2A
		Frequency	TX 5270MHz

Antenna at Horizontal Polarization

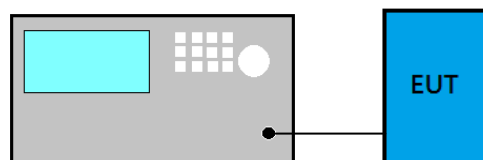
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
7022.00	35.80	10.66	6.38	52.84	68.20	15.36	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
7022.00	35.80	10.66	4.90	51.36	68.20	16.84	Peak

7. EMISSION BANDWIDTH MEASUREMENT

7.1. Block Diagram of Test Setup



7.2. Specification Limits

Frequency Band (MHz)	Limit
5150 to 5250	Reference only
5250 to 5350	
5470 to 5725	
5725 to 5850	$\geq 500\text{kHz}$

7.3. Test Procedure

Following measurement procedure is reference to KDB 789033 D02 General UNII Test Procedures New Rules v01r02:

- Applicable to all bands except to 5725 MHz- 5850 MHz

- (1) Set RBW= 1% of the emission bandwidth
- (2) Set VBW > RBW
- (3) Detector = Peak
- (4) Trace mode = max hold
- (5) Setting channel bandwidth function x dB to -26 dB to record the final bandwidth.

- 5725 MHz- 5850 MHz

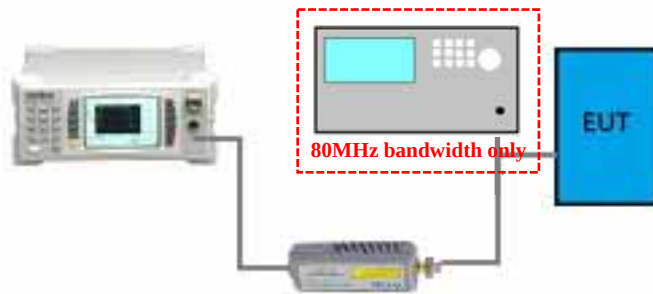
- (1) Set RBW = 100 kHz.
- (2) Set the video bandwidth (VBW) $\geq 3 \times \text{RBW}$.
- (3) Detector = Peak.
- (4) Trace mode = max hold.
- (5) Sweep = auto couple.
- (6) Allow the trace to stabilize.
- (7) Setting channel bandwidth function x dB to -6 dB to record the final bandwidth.

7.4. Test Results

Please refer to Appendix A

8. MAXIMUM OUTPUT POWER MEASUREMENT

8.1. Block Diagram of Test Setup



8.2. Specification Limits

Frequency Band (MHz)	Category	Limit
5150 to 5250	Outdoor Access Point	1 W(30 dBm)/ Max e.i.r.p. ≤ 125 mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon
	Fixed point-to-point Access Point	1 W(30 dBm)
	Indoor Access Point	1 W(30 dBm)
	Mobile and Portable client device	250 mW(24 dBm)
5250 to 5350	N/A	250 mW or $11 \text{ dBm} + 10 \log B$ ^{Note1}
5470 to 5725		250 mW or $11 \text{ dBm} + 10 \log B$ ^{Note1}
5725 to 5850		1 W(30 dBm)

Note 1: B is the 26 dB emission bandwidth, which presented in section 7 and appendix A.1.

8.3. Test Procedure

Following measurement procedure is reference to KDB 789033 D02 General UNII Test Procedures New Rules v01r02:

■ **Method AVGPM (Measurement using an RF average power meter):**

EUT is connected to power sensor and record the maximum average output power and duty cycle factor is added when duty cycle presented in section 3.5 is < 98%.

■ **Method AVGSA-2 (Spectrum channel power)**

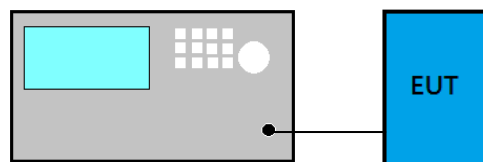
- (1) Set span to at least 1.5 times the OBW
- (2) Set RBW = 1 MHz
- (3) Set the video bandwidth (VBW) $\geq$ 3 MHz.
- (4) Detector = RMS.
- (5) Trace mode = trace average at least 100 traces
- (6) Sweep = auto couple.
- (7) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges.
- (8) Duty cycle factor is added when duty cycle presented in section 3.5 is < 98%.

8.4. Test Results

Please refer to Appendix A

9. EMISSION LIMITATIONS MEASUREMENT

9.1. Block Diagram of Test Setup



9.2. Specification Limits

Frequency Band (MHz)	E.I.R.P. Limit
5150 to 5250	-27 dBm
5250 to 5350	
5470 to 5725	
5725 to 5850	-17 dBm/MHz ^{Note 1} -27 dBm/MHz ^{Note 2}

Note 1: Applicable to frequency within 10MHz to band edge.

2: Applicable to frequency beyond 10 MHz out of band edge.

9.3. Test Procedure

Following measurement procedure is reference to KDB 789033 D02 General UNII Test Procedures New Rules v01r02:

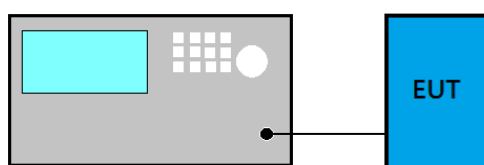
- (1) RBW = 1 MHz
- (2) VBW $\geq 3 \times$ RBW
- (3) Detector = Peak
- (4) Sweep time = auto
- (5) Trace mode = max hold
- (6) Allow sweeps to continue until the trace stabilizes.

9.4. Test Results

Please refer to Appendix A

10. POWER SPECTRAL DENSITY MEASUREMENT

10.1. Block Diagram of Test Setup



10.2. Specification Limits

Frequency Band (MHz)	Category	Limit
5150 to 5250	Outdoor Access Point	17dBm)
	Fixed point-to-point Access Point	
	Indoor Access Point	
	Mobile and Portable client device	11 dBm/MHz
5250 to 5350	N/A	11 dBm/MHz
5470 to 5725		11 dBm/MHz
5725 to 5850		30dBm/500 kHz

10.3. Test Procedure

Following measurement procedure is reference to KDB 789033 D02 General UNII Test Procedures New Rules v01r02:

■ Method AVGSA-2 (Spectrum channel power)

- (1) Set span to at least 1.5 times the OBW
- (2) Set RBW = 1 MHz
- (3) Set the video bandwidth (VBW) ≥ 3 MHz.
- (4) Detector = RMS.
- (5) Trace mode = trace average at least 100 traces
- (6) Sweep = auto couple.
- (7) Use peak search function to find out the maximum power density.
- (8) Duty cycle factor is added when duty cycle presented in section 3.5 is $< 98\%$.

10.4. Test Results

Please refer to Appendix A

11.DEVIATION TO TEST SPECIFICATIONS

【NONE】