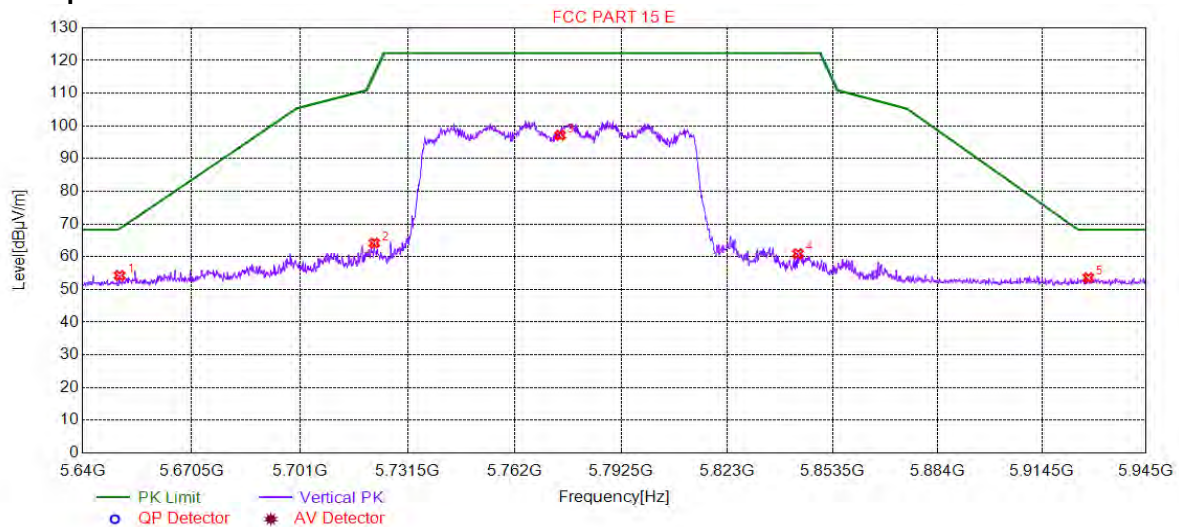


4.10.1.148 802.11AX80_Channel 155 MIMO

Test Graph



Suspected List

Suspected List							
NO.	Freq. [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	5650.375	54.25	68.58	14.33	132	192	Vertical
2	5722.086	64.20	115.66	51.46	130	174	Vertical
3	5775.000	97.14	122.30	25.16	188	188	Vertical
4	5843.384	60.95	122.30	61.35	201	192	Vertical
5	5928.064	53.56	68.30	14.74	141	170	Vertical

Final Data List

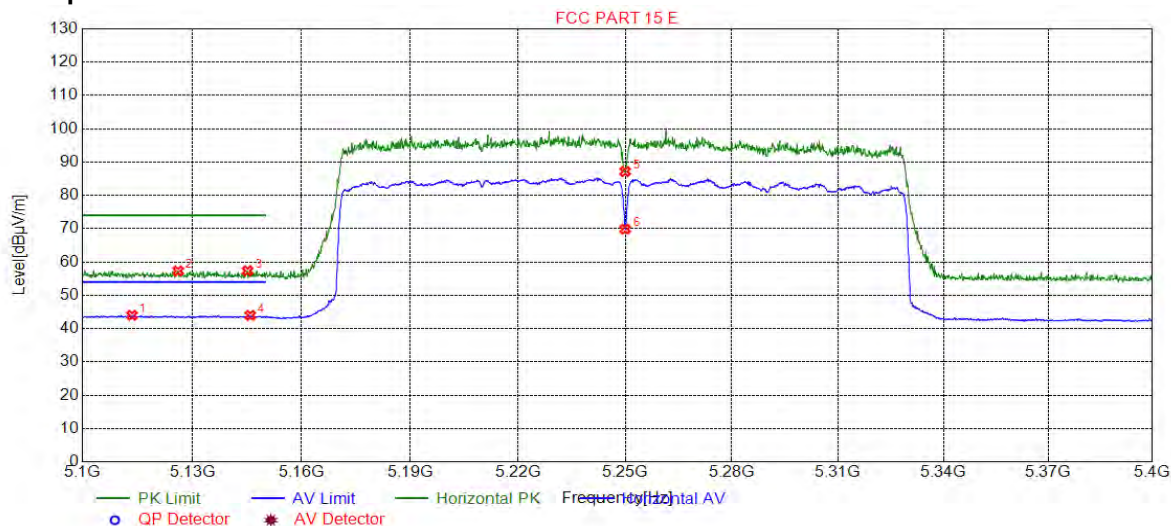


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4.10.1.149 802.11AX160_Channel 50 MIMO

Test Graph



Suspected List

Suspected List							
NO.	Freq. [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	5113.506	44.01	54.00	9.99	195	43	Horizontal
2	5126.113	57.31	74.00	16.69	123	17	Horizontal
3	5145.172	57.38	74.00	16.62	197	153	Horizontal
4	5145.923	43.99	54.00	10.01	209	58	Horizontal
5	5250.000	87.15	0.00	-87.15	232	51	Horizontal
6	5250.000	69.89	0.00	-69.89	220	47	Horizontal

Final Data List



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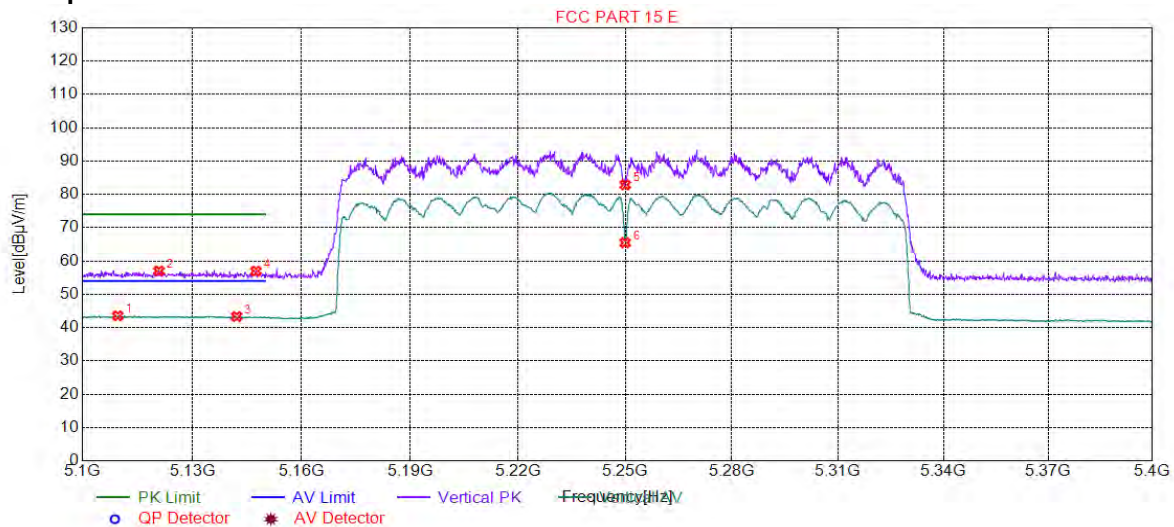
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4.10.1.150 802.11AX160_Channel 50 MIMO

Test Graph



Suspected List

Suspected List							
NO.	Freq. [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	5109.604	43.57	54.00	10.43	179	256	Vertical
2	5120.860	57.05	74.00	16.95	223	60	Vertical
3	5142.171	43.36	54.00	10.64	291	335	Vertical
4	5147.423	56.98	74.00	17.02	212	195	Vertical
5	5250.000	82.89	0.00	-82.89	293	256	Vertical
6	5250.000	65.48	0.00	-65.48	162	271	Vertical

Final Data List

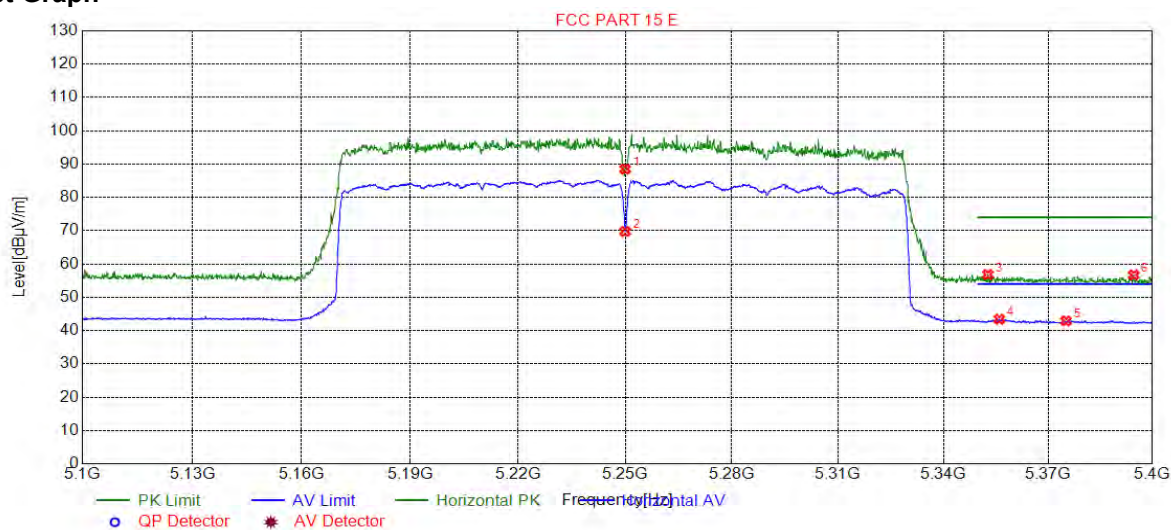
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4.10.1.151 802.11AX160_Channel 50 MIMO

Test Graph



Suspected List

Suspected List							
NO.	Freq. [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	5250.000	88.51	0.00	-88.51	105	55	Horizontal
2	5250.000	69.75	0.00	-69.75	198	52	Horizontal
3	5352.726	56.82	74.00	17.18	180	44	Horizontal
4	5356.028	43.43	54.00	10.57	129	327	Horizontal
5	5375.087	42.94	54.00	11.06	198	55	Horizontal
6	5394.597	56.72	74.00	17.28	166	135	Horizontal

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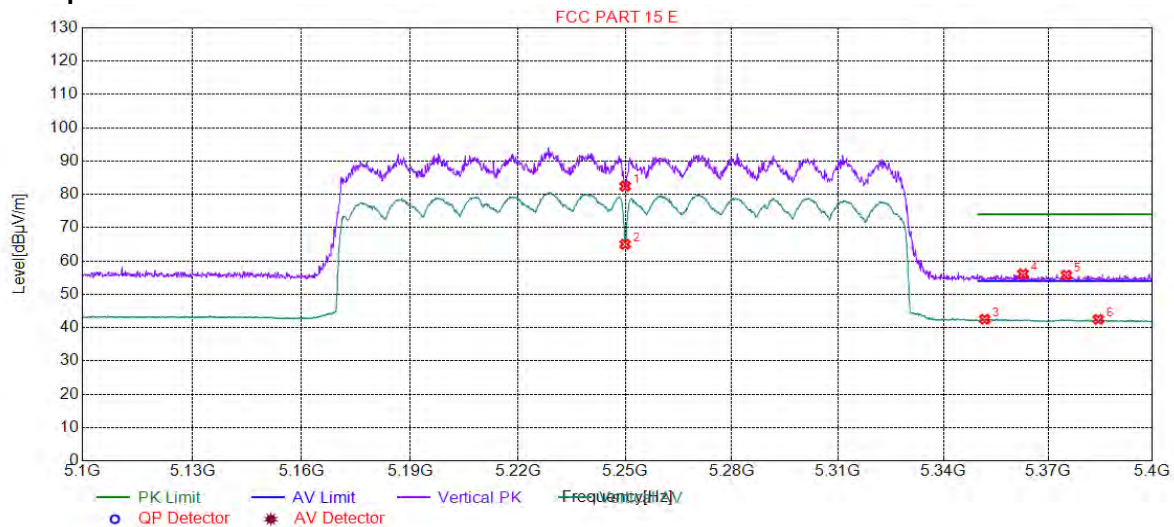


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4.10.1.152 802.11AX160_Channel 50 MIMO

Test Graph



Suspected List

Suspected List							
NO.	Freq. [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	5250.000	82.46	0.00	-82.46	220	275	Vertical
2	5250.000	65.03	0.00	-65.03	217	267	Vertical
3	5351.825	42.53	54.00	11.47	249	161	Vertical
4	5362.781	56.13	74.00	17.87	152	100	Vertical
5	5375.237	55.78	74.00	18.22	244	195	Vertical
6	5384.392	42.51	54.00	11.49	262	301	Vertical

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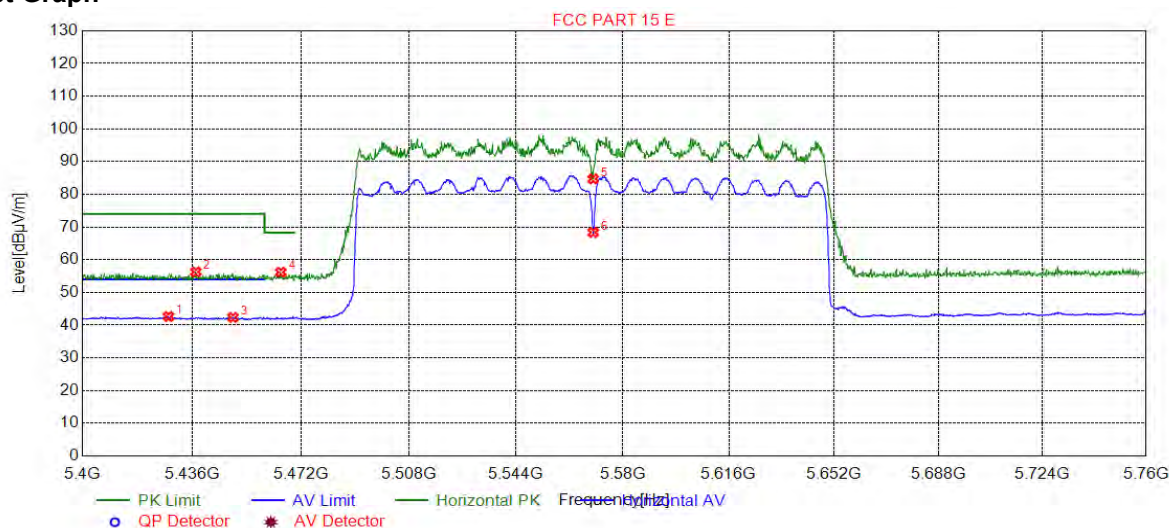
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4.10.1.153 802.11AX160_Channel 114 MIMO

Test Graph



Suspected List

Suspected List							
NO.	Freq. [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	5428.274	42.66	54.00	11.34	186	86	Horizontal
2	5437.278	56.30	74.00	17.70	122	323	Horizontal
3	5449.524	42.38	54.00	11.62	200	329	Horizontal
4	5465.372	56.22	68.30	12.08	188	340	Horizontal
5	5570.000	84.71	0.00	-84.71	199	323	Horizontal
6	5570.000	68.37	0.00	-68.37	145	42	Horizontal

Final Data List

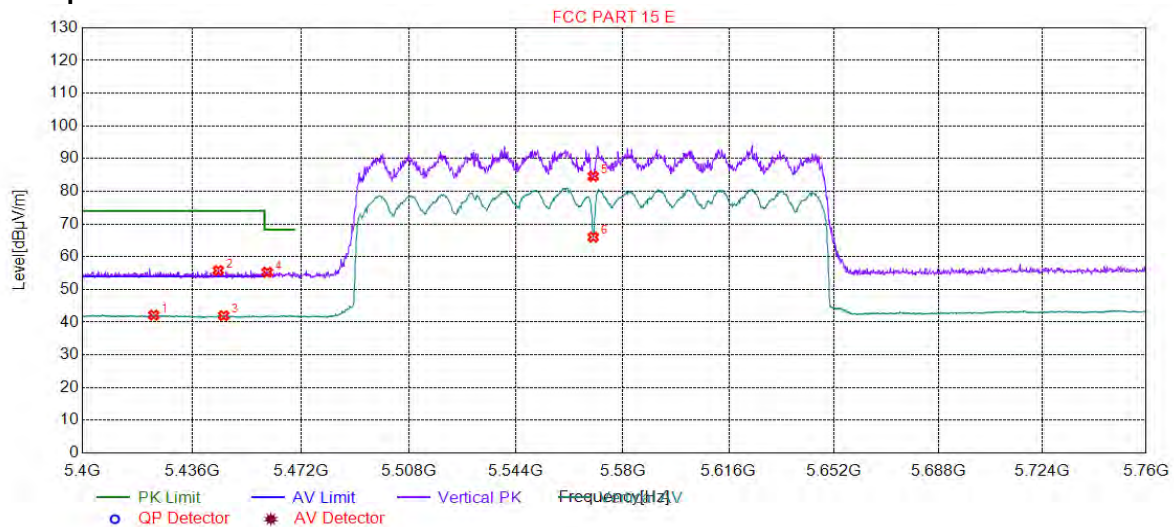
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4.10.1.154 802.11AX160_Channel 114 MIMO

Test Graph



Suspected List

Suspected List							
NO.	Freq. [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	5423.411	42.16	54.00	11.84	195	258	Vertical
2	5444.662	55.82	74.00	18.18	231	176	Vertical
3	5446.463	42.00	54.00	12.00	242	247	Vertical
4	5460.870	55.28	68.30	13.02	218	317	Vertical
5	5570.000	84.59	0.00	-84.59	159	264	Vertical
6	5570.000	66.00	0.00	-66.00	211	264	Vertical

Final Data List

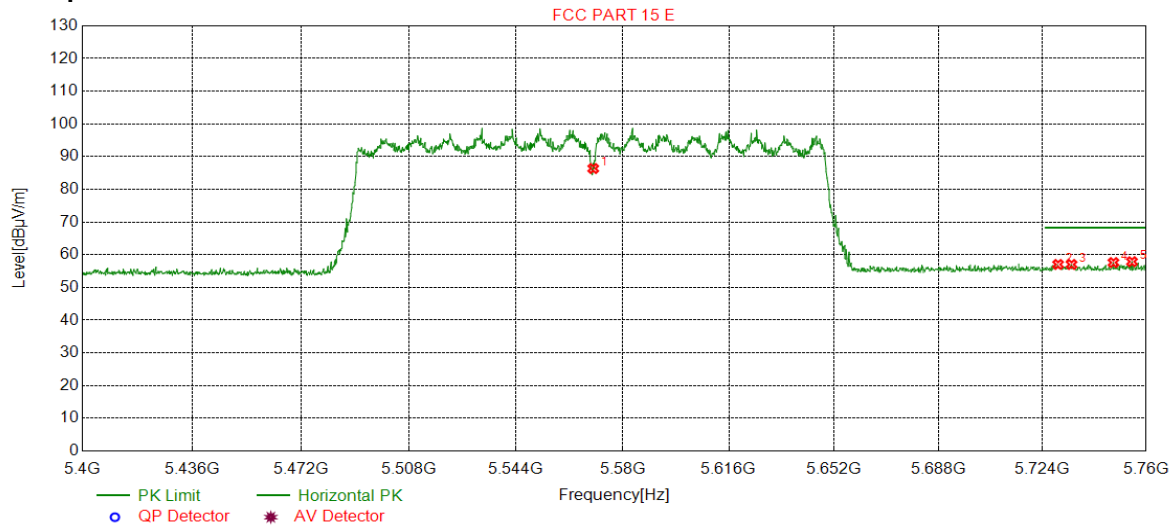


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4.10.1.155 802.11AX160_Channel 114 MIMO

Test Graph



Suspected List

Suspected List							
NO.	Freq. [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	5570.000	86.37	0.00	-86.37	186	327	Horizontal
2	5729.384	57.05	68.30	11.25	126	309	Horizontal
3	5734.067	57.04	68.30	11.26	107	16	Horizontal
4	5748.654	57.62	68.30	10.68	162	320	Horizontal
5	5755.137	57.90	68.30	10.40	246	83	Horizontal

Final Data List

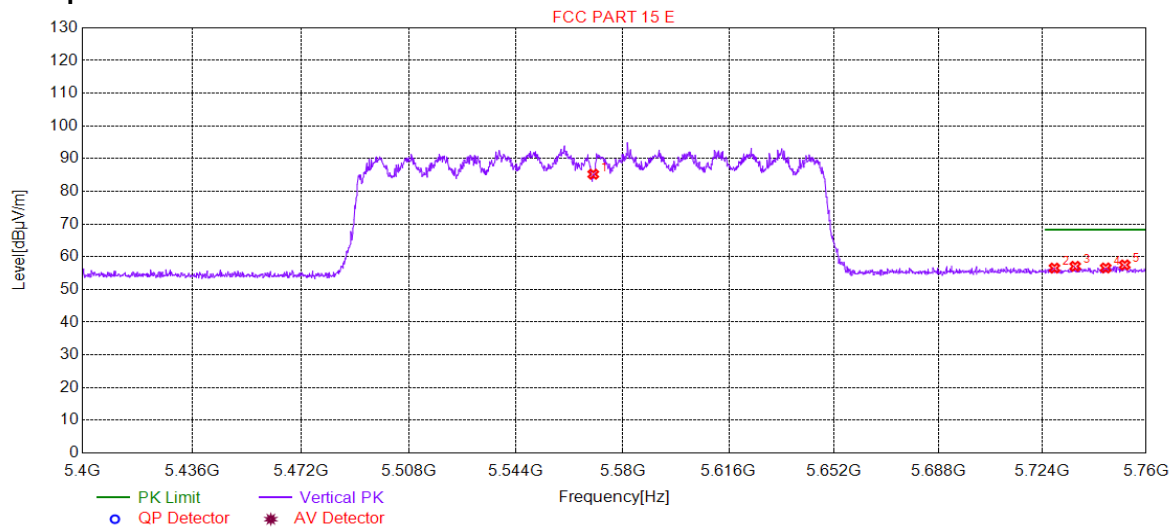


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4.10.1.156 802.11AX160_Channel 114 MIMO

Test Graph



Suspected List

Suspected List							
NO.	Freq. [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	5570.000	85.25	0.00	-85.25	184	263	Vertical
2	5728.124	56.55	68.30	11.75	267	74	Vertical
3	5735.327	57.09	68.30	11.21	272	106	Vertical
4	5745.953	56.59	68.30	11.71	188	0	Vertical
5	5752.616	57.52	68.30	10.78	238	266	Vertical

Final Data List

Remark:

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

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

All modes have been tested, but only the worst case data displayed in this report.



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4.11 Frequencies Stability

4.11.1 Frequency Error vs. Voltage

Test Conditions	Measured Frequency (MHz)	
	5180	5825
V nom(V)	5180.008761	5825.001488
V max(V)	5180.011777	5825.005426
V min(V)	5180.013760	5825.008191
Max. Deviation Frequency	0.013760	0.008191
Max. Frequency Error (ppm)	2.656369	1.406182

4.11.2 Frequency Error vs. Temperature

Test Conditions	Measured Frequency (MHz)	
	5180	5825
-5	5180.005256	5825.002030
5	5180.007452	5825.011671
15	5180.008559	5825.014320
25	5180.013291	5825.021843
35	5180.020829	5825.025467
45	5180.027159	5825.029174
50	5180.035957	5825.029324
Max. Deviation Frequency	0.035957	0.029324
Max. Frequency Error (ppm)	6.941452	5.034110



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4.12 Dynamic Frequency Selection

4.12.1 DFS Overview

Table 1: Applicability of DFS Requirements Prior to Use of a Channel

Requirement	Operational Mode		
	Master	Client Without Radar Detection	Client With Radar Detection
<i>Non-Occupancy Period</i>	Yes	Not required	Yes
<i>DFS Detection Threshold</i>	Yes	Not required	Yes
<i>Channel Availability Check Time</i>	Yes	Not required	Not required
<i>U-NII Detection Bandwidth</i>	Yes	Not required	Yes

Table 2: Applicability of DFS requirements during normal operation

Requirement	Operational Mode	
	Master Device or Client with Radar Detection	Client Without Radar Detection
<i>DFS Detection Threshold</i>	Yes	Not required
<i>Channel Closing Transmission Time</i>	Yes	Yes
<i>Channel Move Time</i>	Yes	Yes
<i>U-NII Detection Bandwidth</i>	Yes	Not required
Additional requirements for devices with multiple bandwidth modes	Master Device or Client with Radar Detection	Client Without Radar Detection
<i>U-NII Detection Bandwidth and Statistical Performance Check</i>	All BW modes must be tested	Not required
<i>Channel Move Time and Channel Closing Transmission Time</i>	Test using widest BW mode available	Test using the widest BW mode available for the link
<i>All other tests</i>	Any single BW mode	Not required
Note: Frequencies selected for statistical performance check (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in each of the bonded 20 MHz channels and the channel center frequency.		



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4.12.2 DFS Detection Thresholds

Table 3: DFS Detection Thresholds for Master Devices and Client Devices with Radar Detection

Maximum Transmit Power	Value (See Notes 1, 2, and 3)
EIRP $\geq$ 200 milliwatt	-64 dBm
EIRP < 200 milliwatt and power spectral density < 10 dBm/MHz	-62 dBm
EIRP < 200 milliwatt that do not meet the power spectral density requirement	-64 dBm
Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna. Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response. Note3: EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.	

4.12.3 Response Requirements

Table 4: DFS Response Requirement Values

Parameter	Value
<i>Non-occupancy period</i>	Minimum 30 minutes
<i>Channel Availability Check Time</i>	60 seconds
<i>Channel Move Time</i>	10 seconds See Note 1.
<i>Channel Closing Transmission Time</i>	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
<i>U-NII Detection Bandwidth</i>	Minimum 100% of the U-NII 99% transmission power bandwidth. See Note 3.
Note 1: <i>Channel Move Time</i> and the <i>Channel Closing Transmission Time</i> should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst. Note 2: The <i>Channel Closing Transmission Time</i> is comprised of 200 milliseconds starting at the beginning of the <i>Channel Move Time</i> plus any additional intermittent control signals required to facilitate a <i>Channel move</i> (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions. Note 3: During the <i>U-NII Detection Bandwidth</i> detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.	



4.12.4 Test plots
4.12.4.1 DFS Detection Thresholds
Test Result

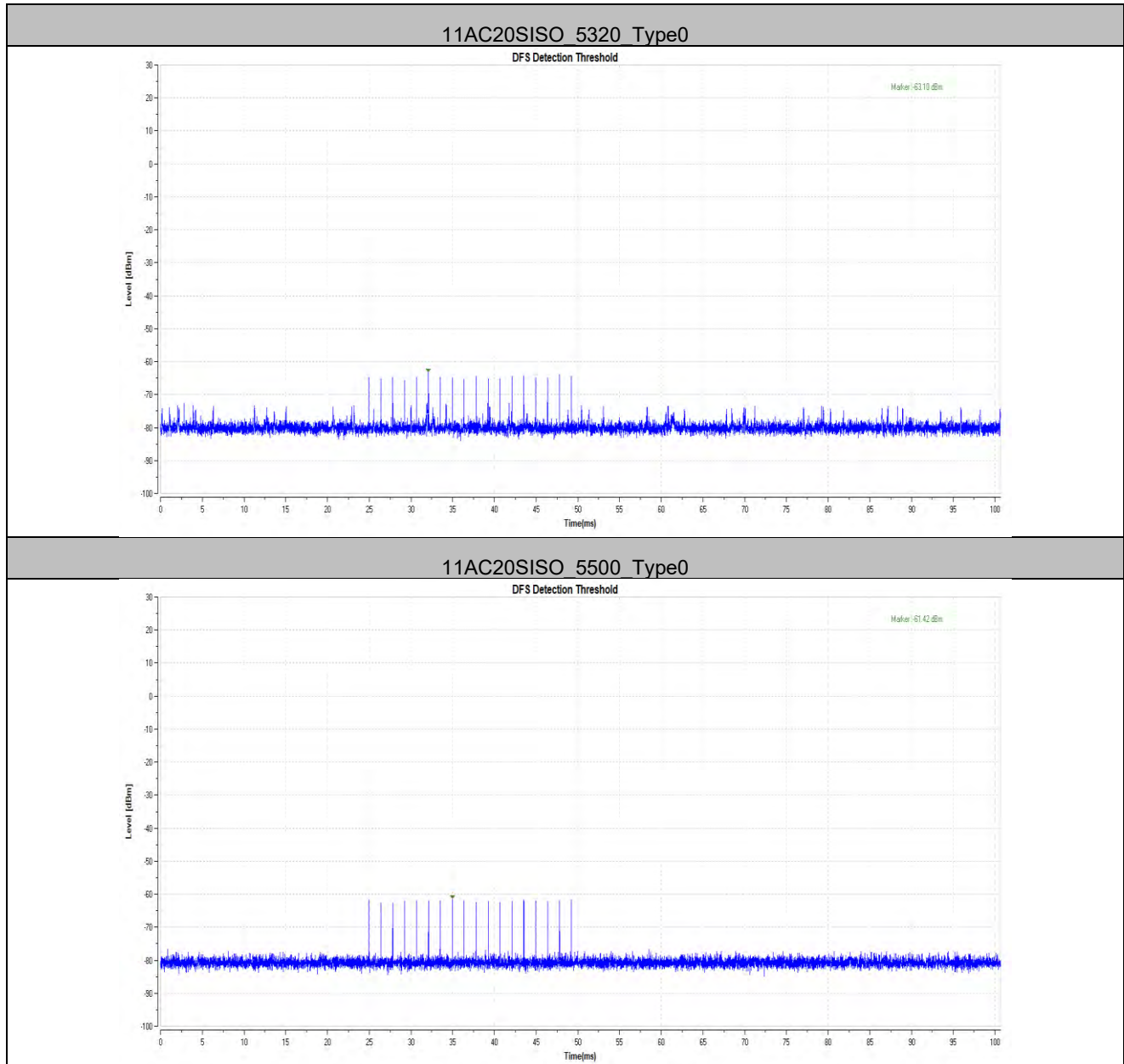
TestMode	Channel	Radar Type	Result	Limit[dbm]	Verdict
11AC20SISO	5320	Type0	-63.10	-61.00	PASS
	5500	Type0	-61.42	-61.00	PASS
11AC80SISO	5290	Type0	-63.49	-61.00	PASS
	5530	Type0	-61.61	-61.00	PASS



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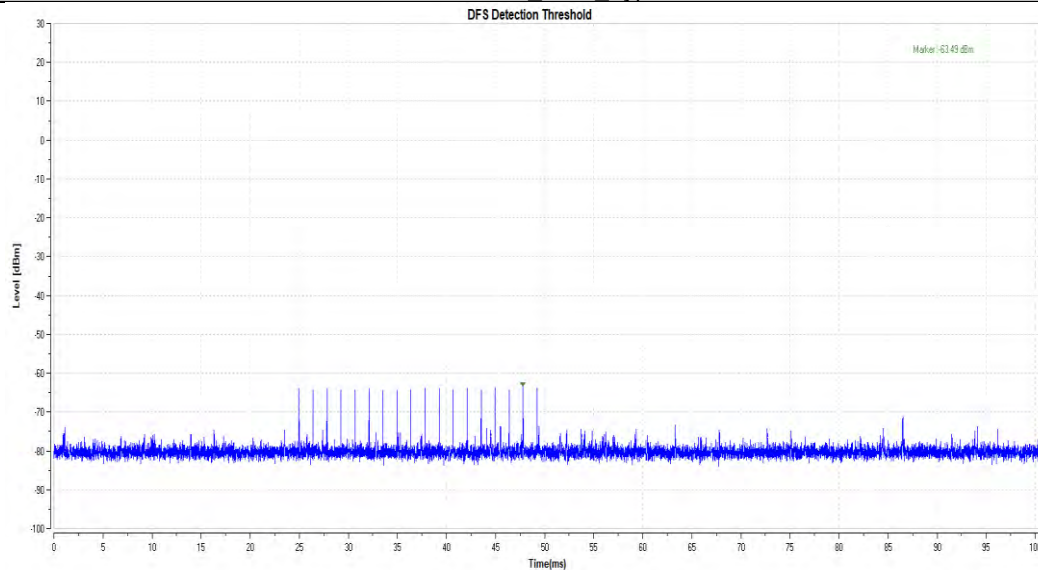
Test Graphs



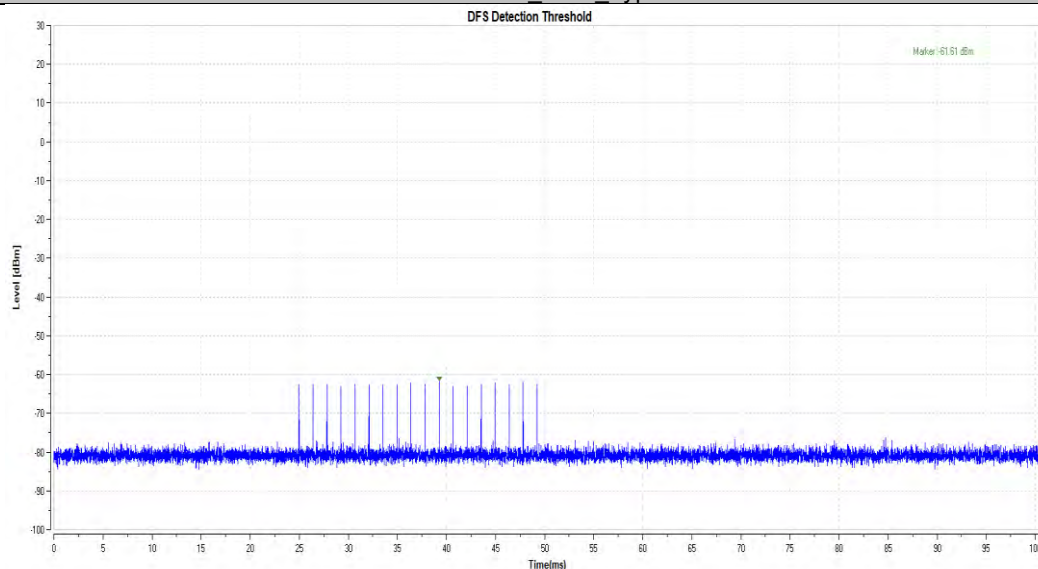
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11AC80SISO_5290_Type0



11AC80SISO_5530_Type0



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4.12.4.2 Channel Move Time and Channel Closing Transmission Time
Test Result

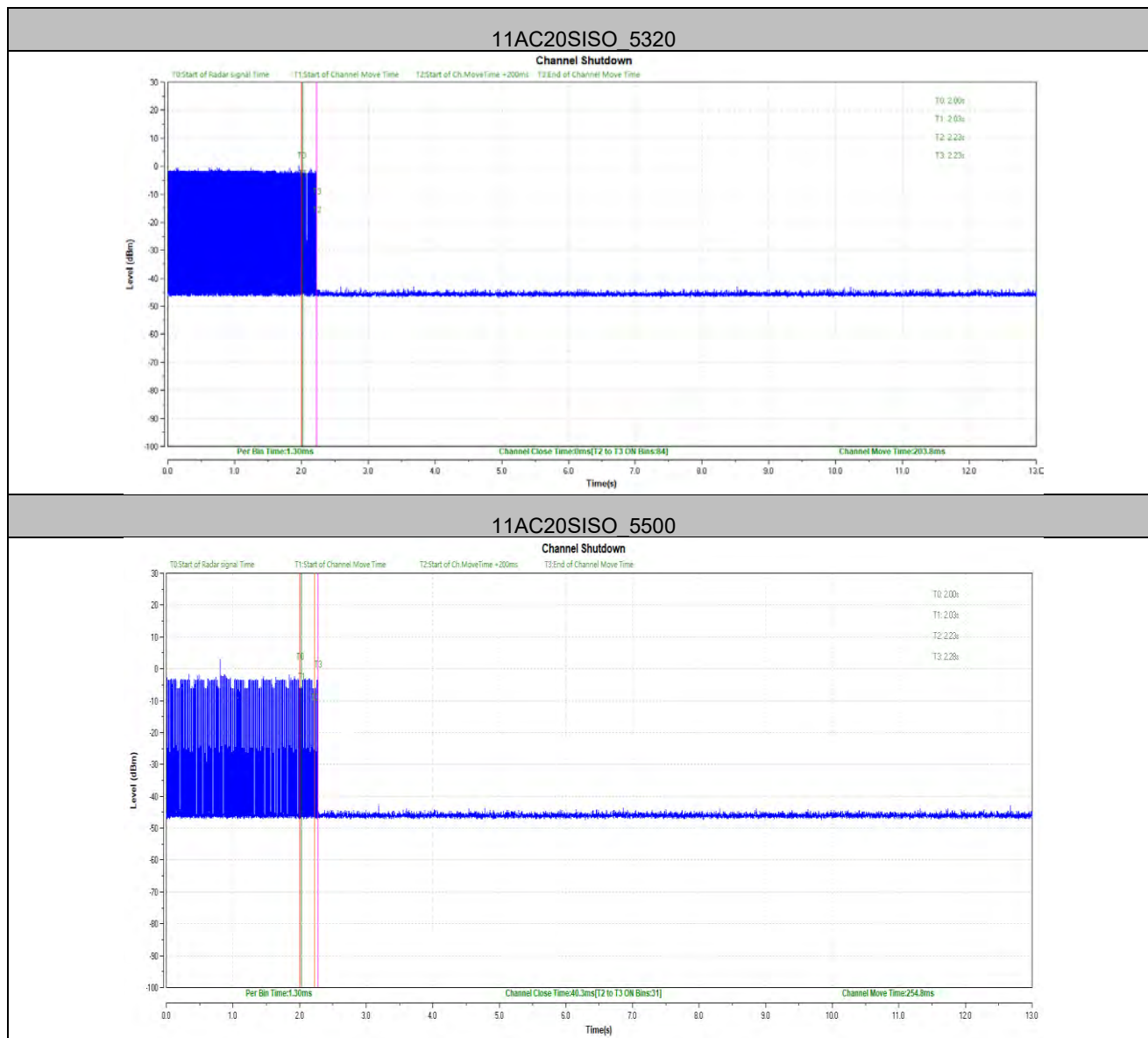
TestMode	Channel	CCT[ms]	Limit[ms]	CMT[ms]	Limit[ms]	Verdict
11AC20SISO	5320	0	60	203.8	10000	PASS
	5500	40.3	60	254.8	10000	PASS
11AC80SISO	5290	0	60	206.7	10000	PASS
	5530	53.3	60	343.2	10000	PASS



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Test Graphs



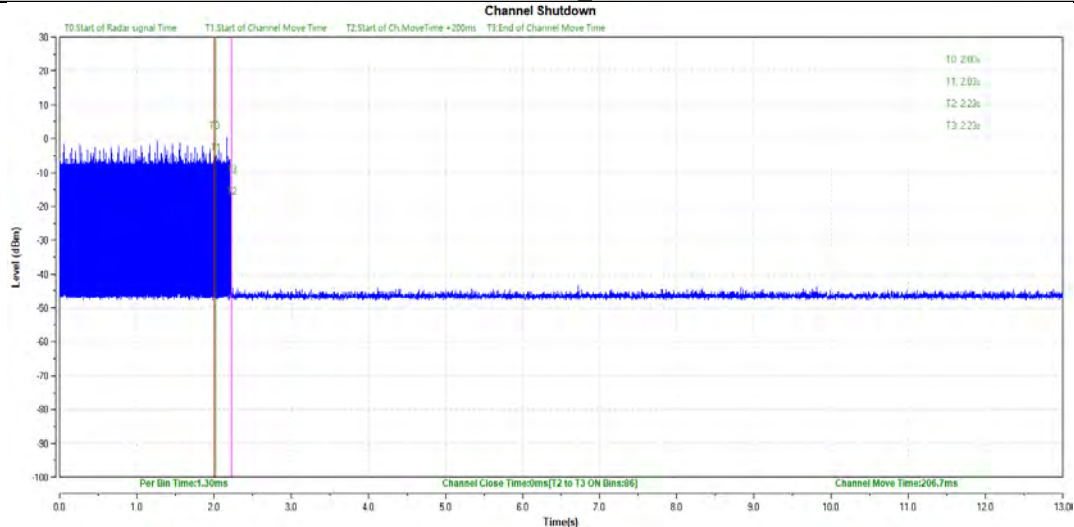
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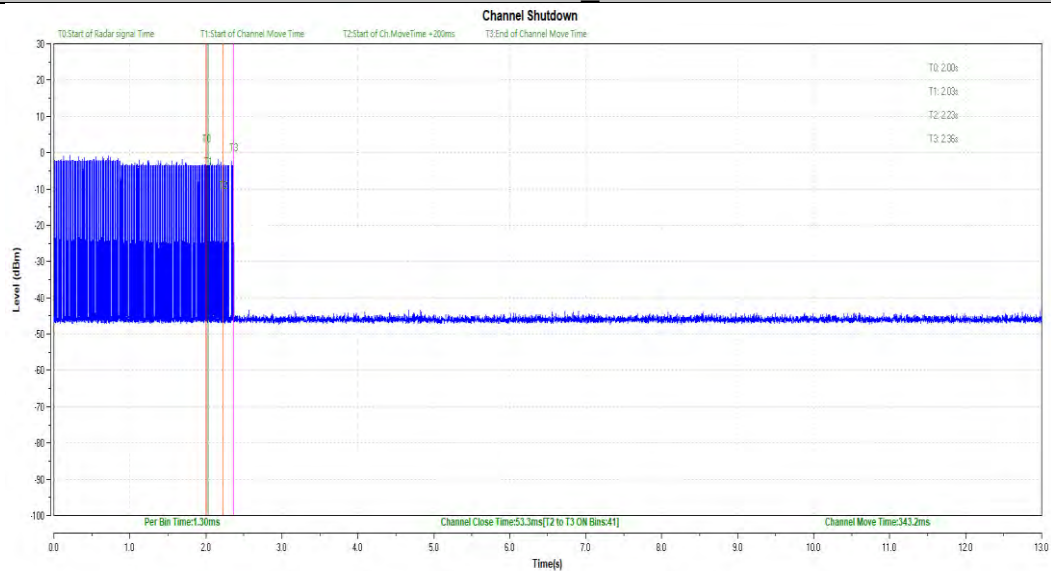
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11AC80SISO_5290



11AC80SISO_5530



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4.12.4.3 Non-Occupancy Period

Test Result

TestMode	Channel	Result	Limit[s]	Verdict
11AC20SISO	5320	see test graph	>=1800	PASS
	5500	see test graph	>=1800	PASS
11AC80SISO	5290	see test graph	>=1800	PASS
	5530	see test graph	>=1800	PASS

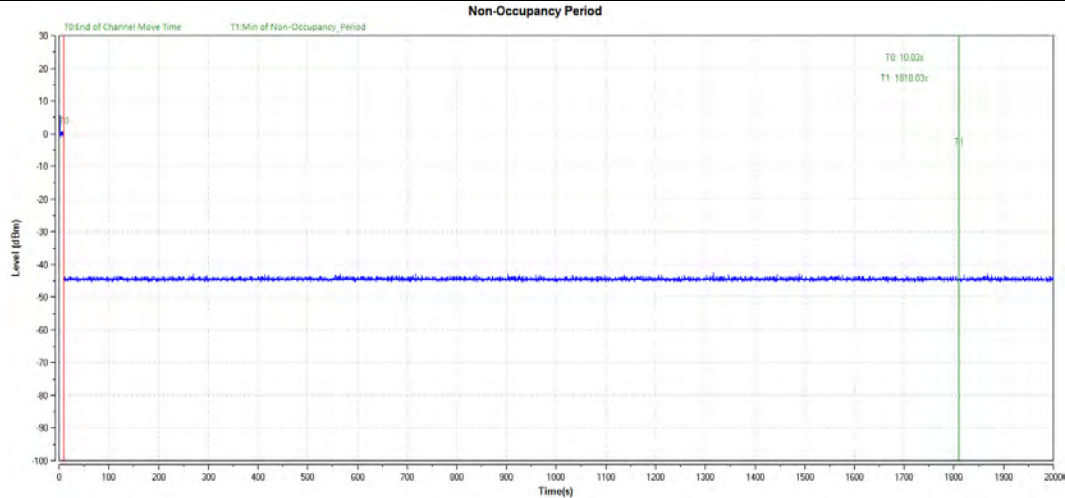


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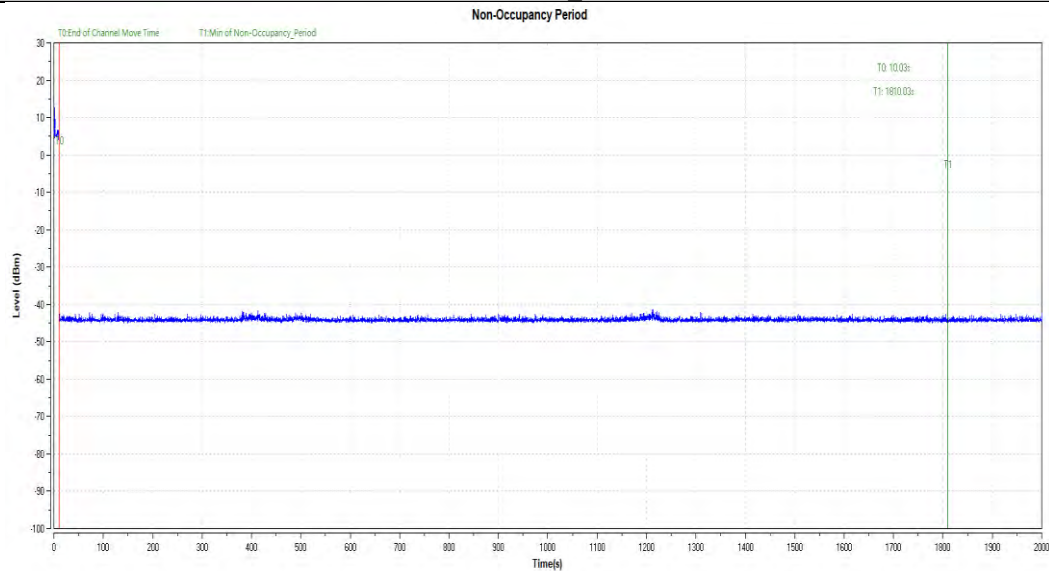
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Test Graphs

11AC20SISO 5320



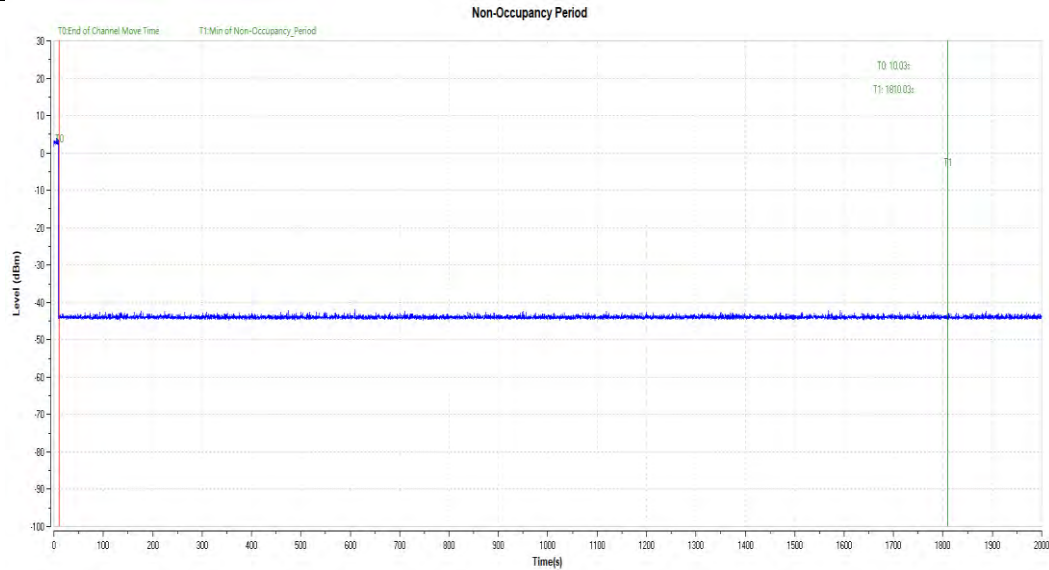
11AC20SISO 5500



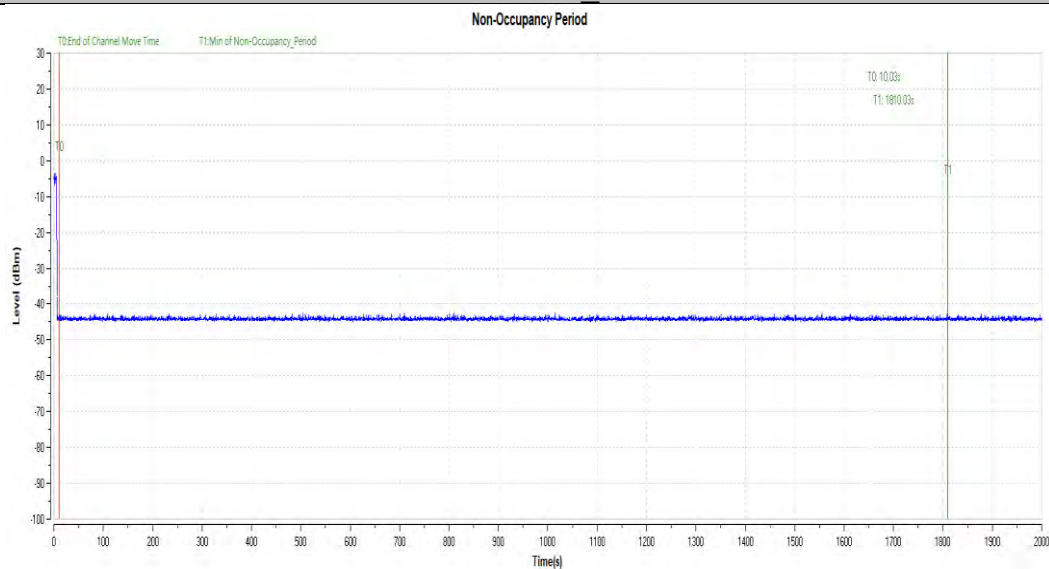
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11AC80SISO 5290



11AC80SISO 5530



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

Lab A:

No.	Item	Measurement Uncertainty
1	Total RF power, conducted	$\pm 0.75\text{dB}$
2	RF power density, conducted	$\pm 2.84\text{dB}$
3	Spurious emissions, conducted	$\pm 0.75\text{dB}$
4	Temperature test	$\pm 1^{\circ}\text{C}$
5	Humidity test	$\pm 3\%$
6	DC and low frequency voltages	$\pm 0.5\%$

Lab B:

No.	Item	Measurement Uncertainty
1	Conduction Emission	$\pm 3.0\text{dB}$ (150kHz to 30MHz)
2	Radiated Emission	$\pm 4.8\text{dB}$ (Below 1GHz)
		$\pm 4.8\text{dB}$ (1GHz to 6GHz)
		$\pm 4.5\text{dB}$ (6GHz to 18GHz)
		$\pm 5.02\text{dB}$ (Above 18GHz)



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6 Equipment List

RF conducted test					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (yyyy-mm-dd)	Cal. Due date (yyyy-mm-dd)
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2020/7/14	2021/7/14
Signal Analyzer	Rohde & Schwarz	FSV	W025-05	2020/3/2	2021/3/1
Coaxial Cable	SGS	N/A	SEM031-01	2020/6/12	2021/6/11
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2020/7/14	2021/7/14
Temperature Chamber	GIANT FORCE	ICT-150-40-CP-AR	W027-03	2020/10/27	2021/10/27
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2020/7/14	2021/7/14
Master Device	Linksys pte.Ltd	WRT32X	FCC ID:Q87-WRT3200ACM IC ID:3839A-WRT3200ACM	N/A	N/A

CE Test System					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Shielding Room	Brilliant-emc	N/A	XAW03-35-01	2019-09-11	2022-09-10
Test receiver	ROHDE&SCHWARZ	ESR	XAW01-08-01	2020-09-11	2021-09-10
Artificial network	ROHDE&SCHWARZ	ENV216	XAW01-04-01	2020-08-04	2021-08-03
Temperature and humidity meter	MingGao	TH101B	XAW01-01-01	2020-11-06	2021-11-05
Measurement Software	Tonscend	TS+ CE V2.5	XAW02-05-02	NCR	NCR



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RSE Test System					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Semi-Anechoic Chamber	Brilliant-emc	N/A	XAW03-35-01	2019-09-11	2022-09-10
MXA signal analyzer	Keysight	N9020A	XAW01-06-01	2020-04-02	2021-04-01
Test receiver	ROHDE&SCHWARZ	ESR	XAW01-08-01	2020-09-11	2021-09-10
Receiving antenna (30MHz-3GHz)	Schwarzbeck	VULB 9163	XAW01-09-01	2019-10-13	2021-10-12
Receiving antenna (1GHz~18GHz)	Schwarzbeck	BBHA 9120D	XAW01-09-02	2019-10-13	2021-10-12
Receiving antenna (15GHz~40GHz)	Schwarzbeck	BBHA 9170	XAW01-09-03	2019-10-13	2021-10-12
Directional antenna rack controller	Max-Full	MF-7802BS	XAW03-03-01	NCR	NCR
High-speed antenna rack controller	Max-Full	MF-7802	XAW03-04-01	NCR	NCR
Filter bank	Tonscend	JS0806-F	XAW03-05-01	NCR	NCR
Filter bank	Tonscend	JS0806s	XAW03-05-02	NCR	NCR
Amplifier	Tonscend	TAP00903040	XAW01-41-01	2020-10-26	2021-10-25
Amplifier	Tonscend	TAP01018048	XAW01-41-02	2020-10-26	2021-10-25
Amplifier	Tonscend	TAP18040048	XAW01-41-03	2020-10-27	2021-10-26
Amplifier	Shanghai Steed	YX28980930	XAW01-41-06	2020-10-26	2021-10-25
Temperature and humidity meter	MingGao	TH101B	XAW01-01-01	2020-11-06	2021-11-05
Measurement Software	Tonscend	TS+ RSE V3.0.0.2	XAW02-05-01	NCR	NCR



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7 Photographs - EUT Constructional Details

Refer to Appendix A - Photographs of Set-Up for ZR/2020/B0036.

The End



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