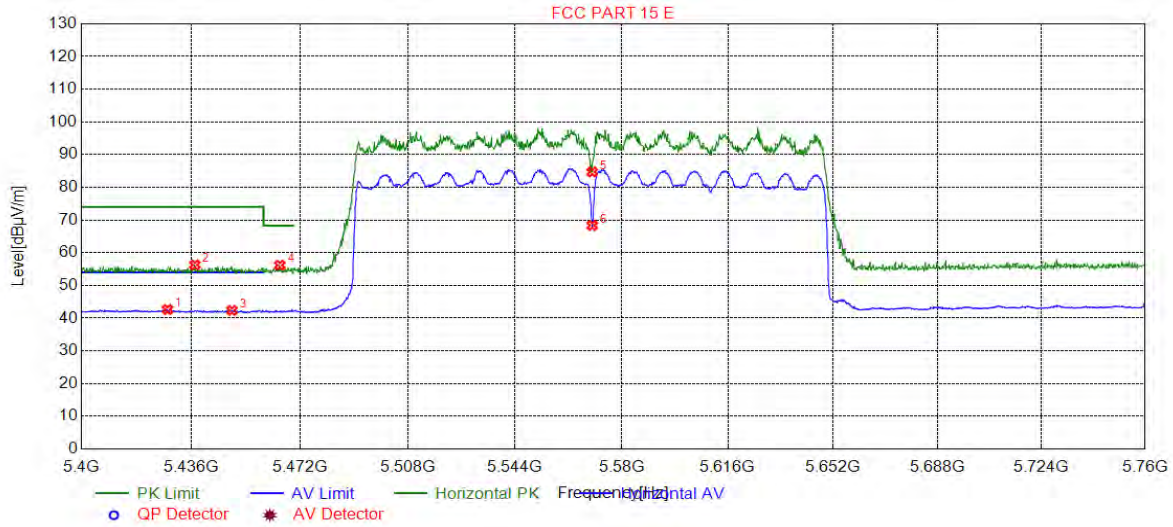


4.10.1.153 802.11AX160_Channel 114 MIMO

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	150	86	Horizontal
2	5437.278	56.30	74.00	17.70	150	323	Horizontal
3	5449.524	42.38	54.00	11.62	150	329	Horizontal
4	5465.372	56.22	68.30	12.08	150	340	Horizontal
5	5570.000	84.71	0.00	-84.71	150	323	Horizontal
6	5570.000	68.37	0.00	-68.37	150	42	Horizontal

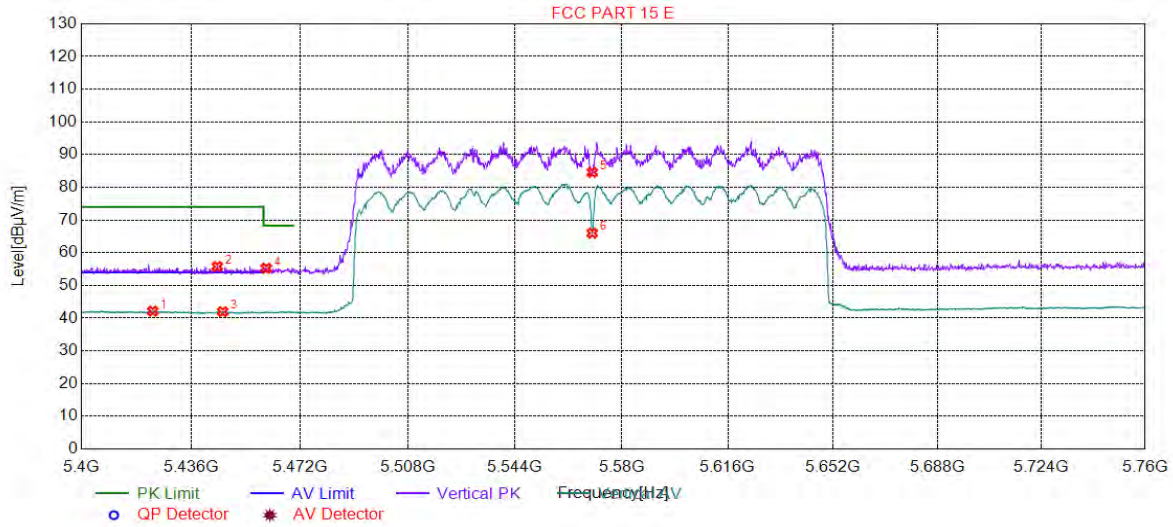
Final Data List



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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	150	258	Vertical
2	5444.662	55.82	74.00	18.18	150	176	Vertical
3	5446.463	42.00	54.00	12.00	150	247	Vertical
4	5460.870	55.28	68.30	13.02	150	317	Vertical
5	5570.000	84.59	0.00	-84.59	150	264	Vertical
6	5570.000	66.00	0.00	-66.00	150	264	Vertical

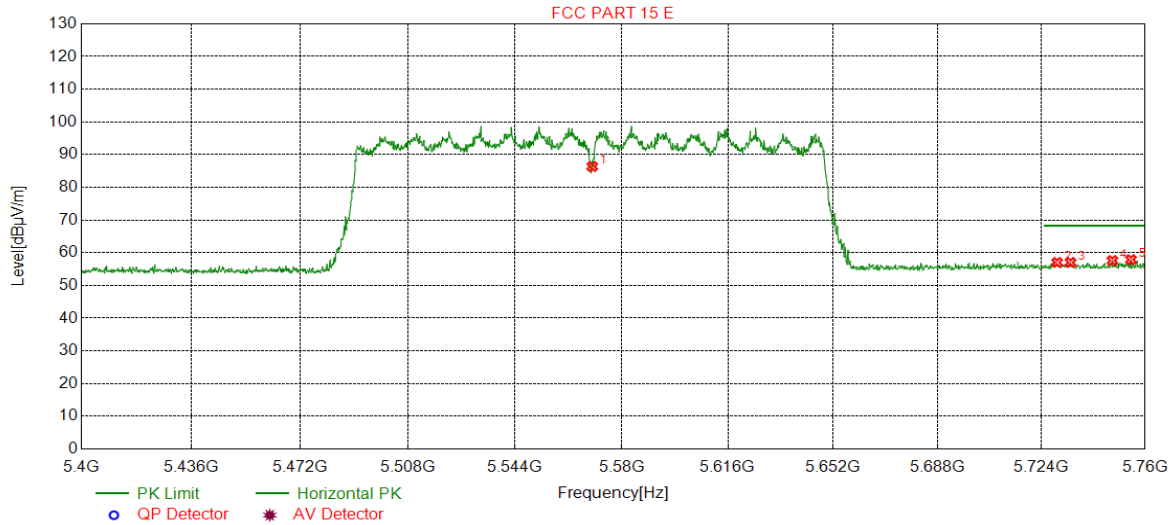
Final Data List



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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	150	327	Horizontal
2	5729.384	57.05	68.30	11.25	150	309	Horizontal
3	5734.067	57.04	68.30	11.26	150	16	Horizontal
4	5748.654	57.62	68.30	10.68	150	320	Horizontal
5	5755.137	57.90	68.30	10.40	150	83	Horizontal

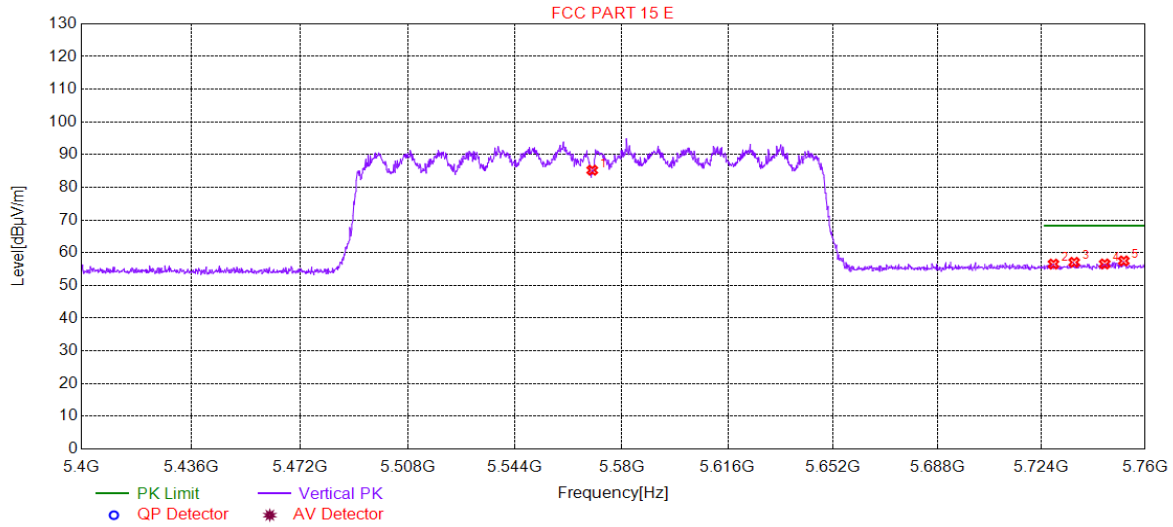
Final Data List



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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	150	263	Vertical
2	5728.124	56.55	68.30	11.75	150	74	Vertical
3	5735.327	57.09	68.30	11.21	150	106	Vertical
4	5745.953	56.59	68.30	11.71	150	0	Vertical
5	5752.616	57.52	68.30	10.78	150	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
<p>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.</p>		



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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 ≥ 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
<p>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. Note 3: EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.</p>	

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.
<p>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</i> move (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.</p>	



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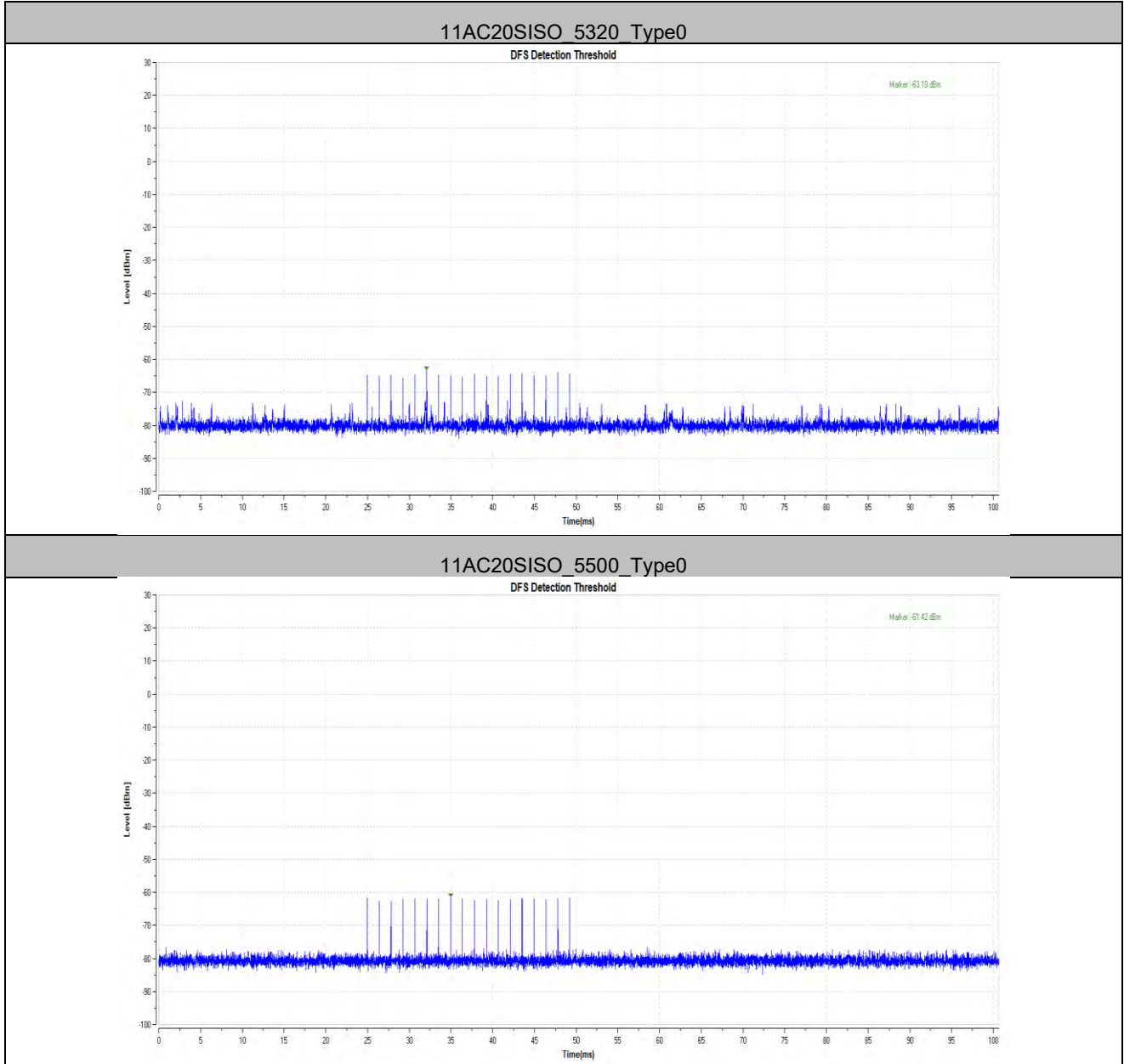
4.12.4 Test plots
4.12.4.1 DFS Detection Thresholds
Test Result

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

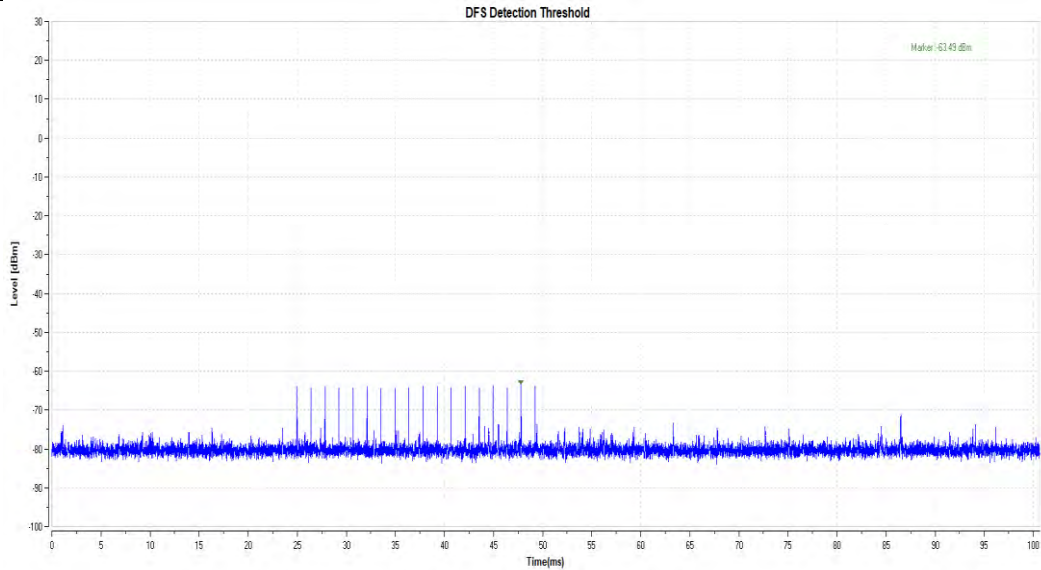


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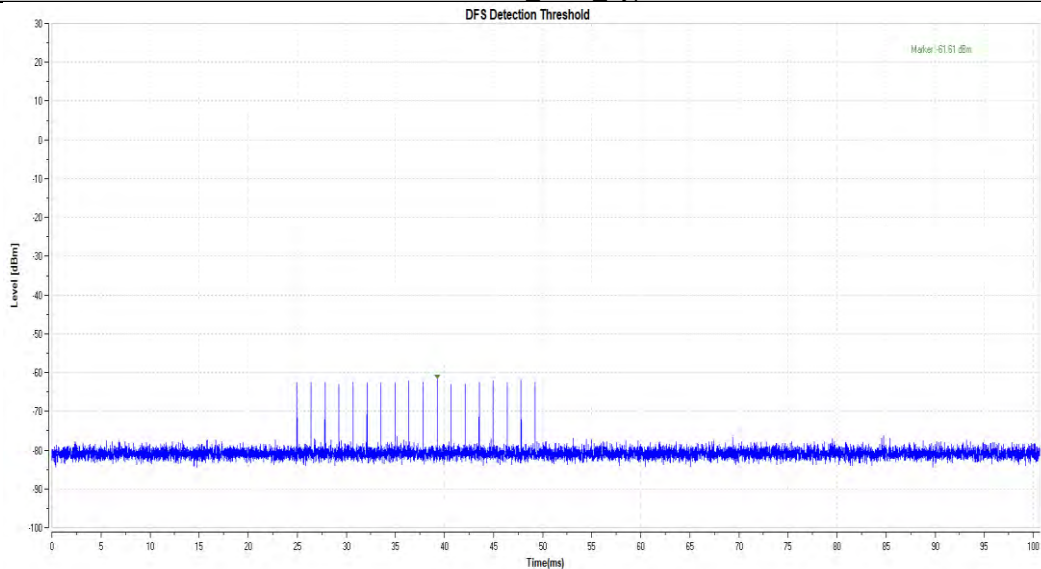
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11AC80SISO_5290_Type0



11AC80SISO_5530_Type0



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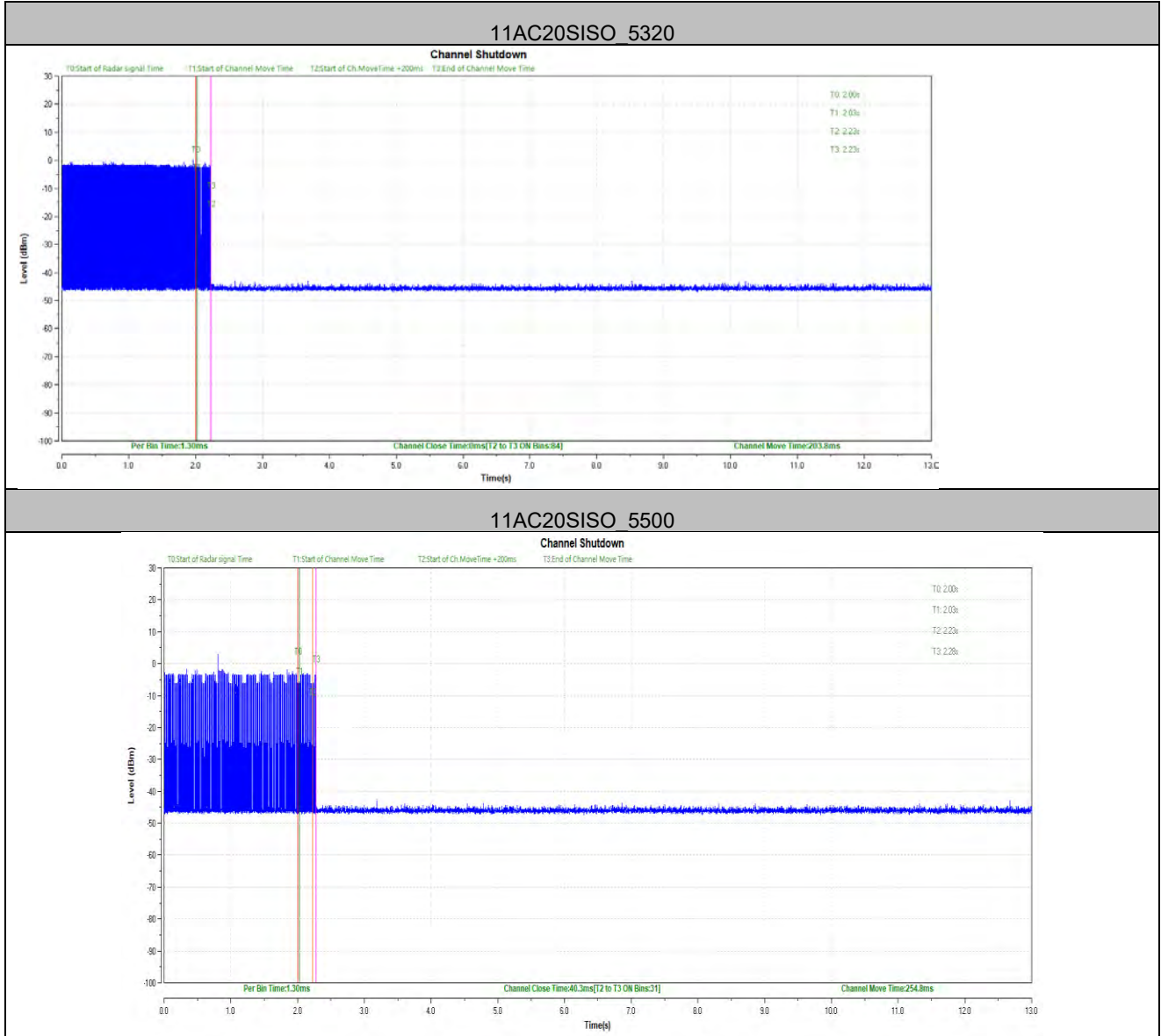
4.12.4.2 Channel Move Time and Channel Closing Transmission Time Test Result

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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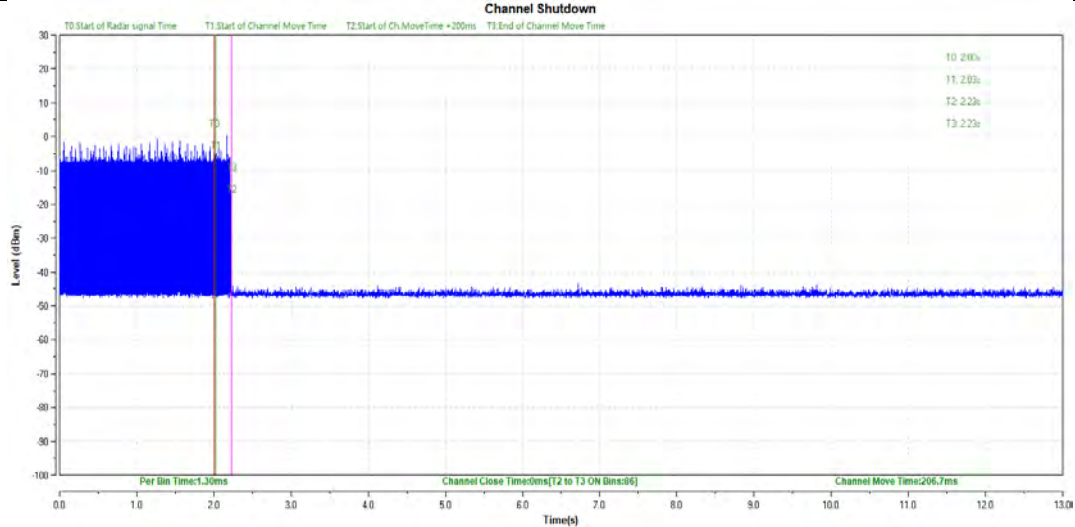
Test Graphs



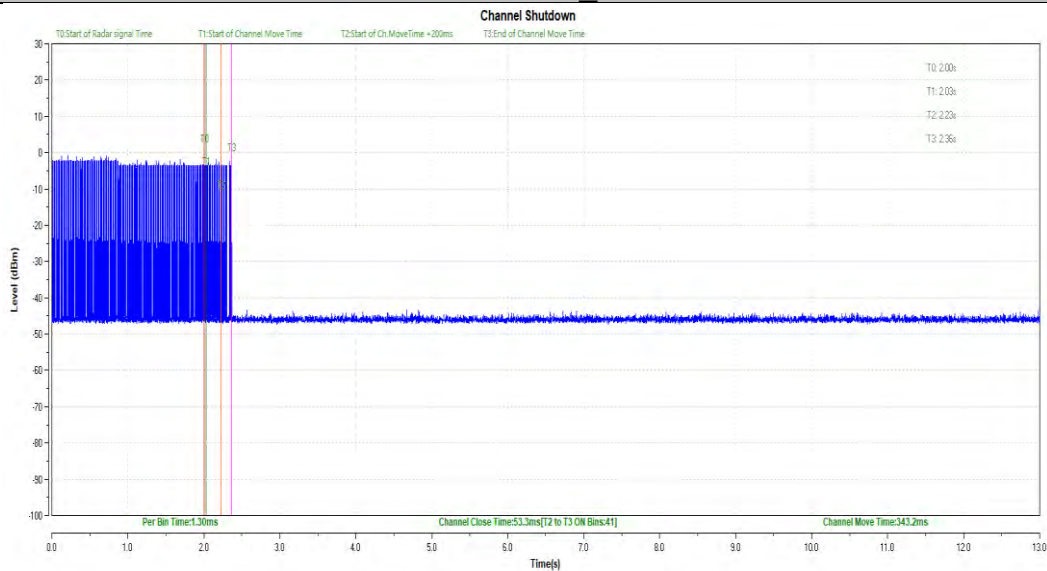
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11AC80SISO 5290



11AC80SISO 5530



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4.12.4.3 Non-Occupancy Period

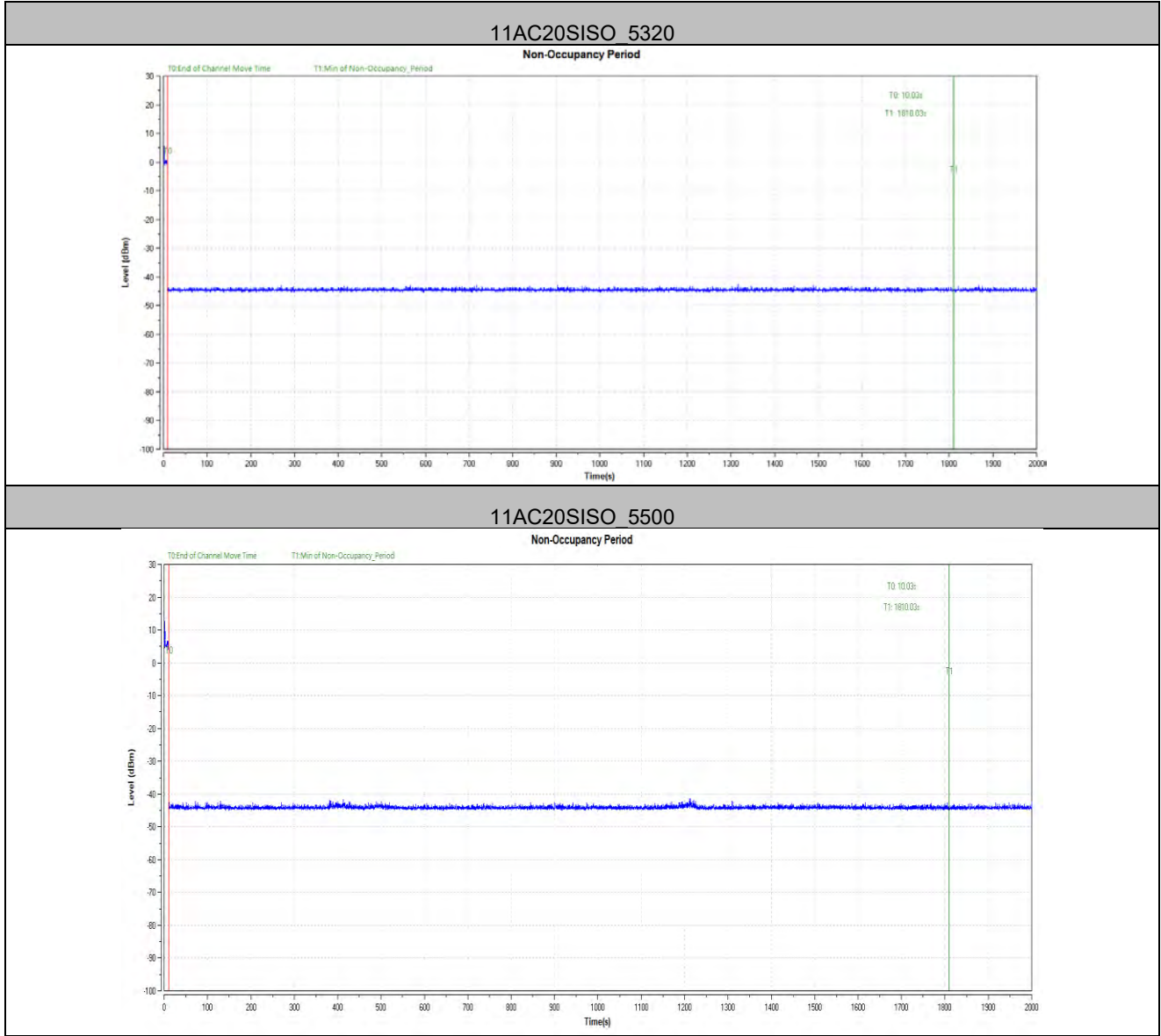
Test Result

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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Test Graphs



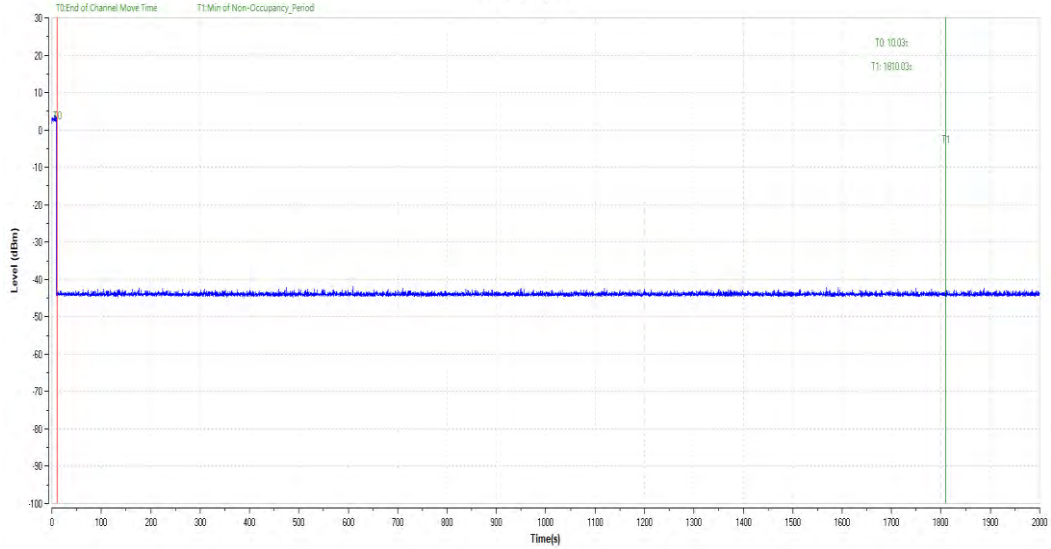
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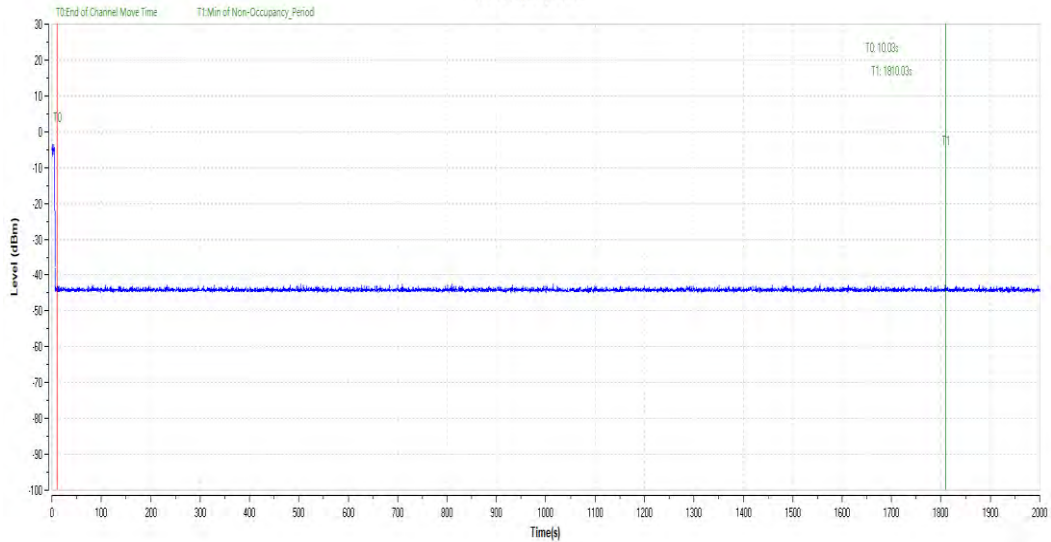
11AC80SISO 5290

Non-Occupancy Period



11AC80SISO 5530

Non-Occupancy Period



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

No.	Item	Measurement Uncertainty
1	Total RF power, conducted	±0.75dB
2	RF power density, conducted	±2.84dB
3	Spurious emissions, conducted	±0.75dB
4	Radiated Spurious emission test	±4.5dB (30MHz-1GHz)
		±4.8dB (1GHz-25GHz)
5	Conduct emission test	±3.12 dB(9KHz- 30MHz)
6	Temperature test	±1°C
7	Humidity test	±3%
8	DC and low frequency voltages	±0.5%



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6 Equipment List

Conducted Emission					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (yyyy-mm-dd)	Cal. Due date (yyyy-mm-dd)
Shielding Room	ZhongYu Electron	GB-88	SEM001-06	2020/5/10	2023/5/9
LISN	Rohde & Schwarz	ENV216	SEM007-01	2020/7/14	2021/7/14
LISN	ETS-LINDGREN	Feb-16	SEM007-02	2020/3/2	2021/3/1
Measurement Software	AUDIX	e3 V5.4.1221d	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM024-01	2020/6/12	2021/6/11
8 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T8-02	EMC0120	2020/2/11	2021/2/10
4 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T4-02	EMC0121	2020/2/11	2021/2/10
2 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T2-02	EMC0122	2020/2/11	2021/2/10
EMI Test Receiver	Rohde & Schwarz	ESCI	SEM004-02	2020/3/2	2021/3/1
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



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RE in Chamber					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (yyyy-mm-dd)	Cal. Due date (yyyy-mm-dd)
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2020/8/5	2023/8/4
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM025-01	2020/6/12	2021/6/11
MXE EMI Receiver (20Hz-8.4GHz)	Agilent Technologies	N9038A	SEM004-05	2020/7/14	2021/7/14
BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEM003-01	2020/6/27	2023/6/26
Pre-amplifier (0.1-1.3GHz)	Agilent Technologies	8447D	SEM005-01	2020/3/2	2021/3/1
RE in Chamber					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (yyyy-mm-dd)	Cal. Due date (yyyy-mm-dd)
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2018/3/13	2021/3/12
Spectrum Analyzer (20Hz-43GHz)	Rohde & Schwarz	FSU43	SEM004-08	2020/3/2	2021/3/1
BiConiLog Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-01	2020/6/27	2023/6/26
Horn Antenna (800MHz-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2018/4/13	2021/4/12
Horn Antenna (15-40GHz)	Schwarzbeck	BBHA 9170	SEM003-15	2020/10/17	2023/10/16
Amplifier(0.1-1300MHz)	HP	8447D	SEM005-02	2020/7/14	2021/7/14
Low Noise Amplifier (100MHz-18GHz)	Black Diamond Series	BDLNA-0118-352810	SEM005-05	2020/7/14	2021/7/14
Pre-Amplifier(0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	EMC2063	2020/10/20	2021/10/19
Pre-amplifier(26-40GHz)	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2020/3/2	2021/3/1
Band filter	N/A	N/A	N/A	N/A	N/A
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2020/6/12	2021/6/11



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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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