

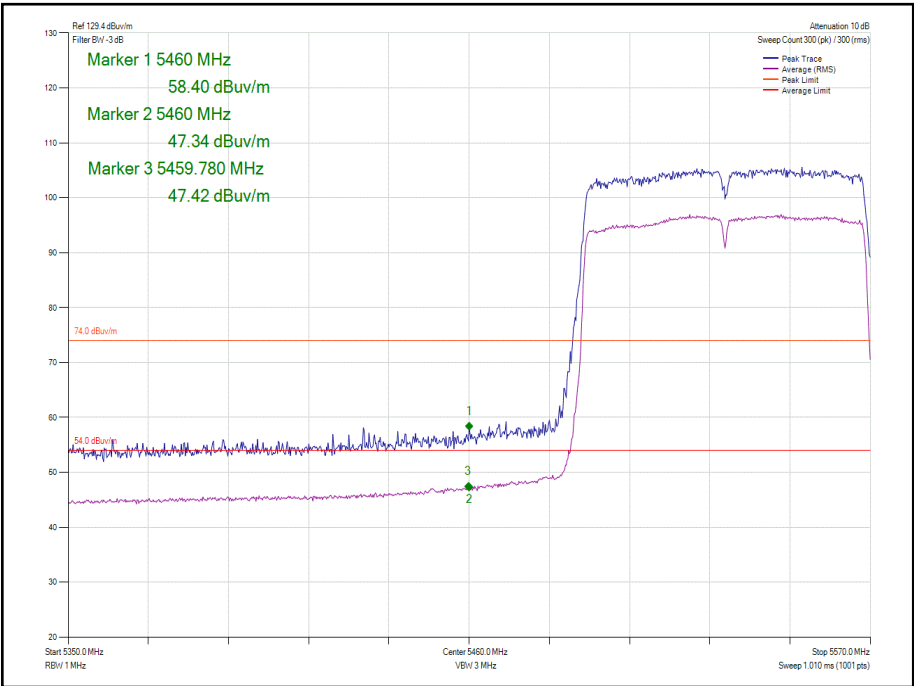


Figure 1126 - 802.11ac VHT80 TxBF Cores 0-1 - 5530 MHz
Band Edge Frequency 5460 MHz



Main - 80 MHz Bandwidth (3TX)

Mode	Data Rate	Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBμV/m)	Average Level (dBμV/m)
802.11ac VHT80 CDD Cores 0-1-2	MCS0	5210	5150	65.30	47.53
802.11ac VHT80 SDM Cores 0-1-2	MCS0	5210	5150	59.70	49.03
802.11ac VHT80 TxBF Cores 0-1-2	MCS0	5210	5150	60.50	46.50
802.11ac VHT80 CDD Cores 0-1-2	MCS0	5210	5350	56.28	46.12
802.11ac VHT80 SDM Cores 0-1-2	MCS0	5210	5350	57.51	47.20
802.11ac VHT80 TxBF Cores 0-1-2	MCS0	5210	5350	56.32	45.47
802.11ac VHT80 CDD Cores 0-1-2	MCS0	5290	5150	54.98	44.72
802.11ac VHT80 SDM Cores 0-1-2	MCS0	5290	5150	55.44	44.85
802.11ac VHT80 TxBF Cores 0-1-2	MCS0	5290	5150	55.24	44.54
802.11ac VHT80 CDD Cores 0-1-2	MCS0	5290	5350	63.87	48.25
802.11ac VHT80 SDM Cores 0-1-2	MCS0	5290	5350	61.53	48.16
802.11ac VHT80 TxBF Cores 0-1-2	MCS0	5290	5350	60.28	48.20
802.11ac VHT80 CDD Cores 0-1-2	MCS0	5530	5460	57.76	46.93
802.11ac VHT80 SDM Cores 0-1-2	MCS0	5530	5460	56.89	47.07
802.11ac VHT80 TxBF Cores 0-1-2	MCS0	5530	5460	58.66	48.04

Table 462

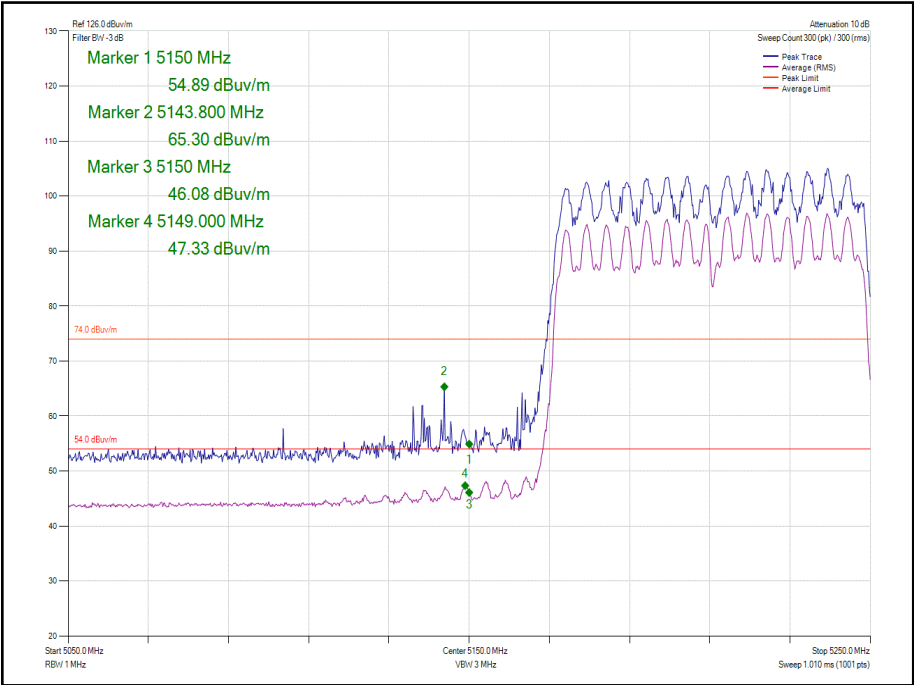


Figure 1127 - 802.11ac VHT80 CDD Cores 0-1-2 - 5210 MHz
Band Edge Frequency 5150 MHz

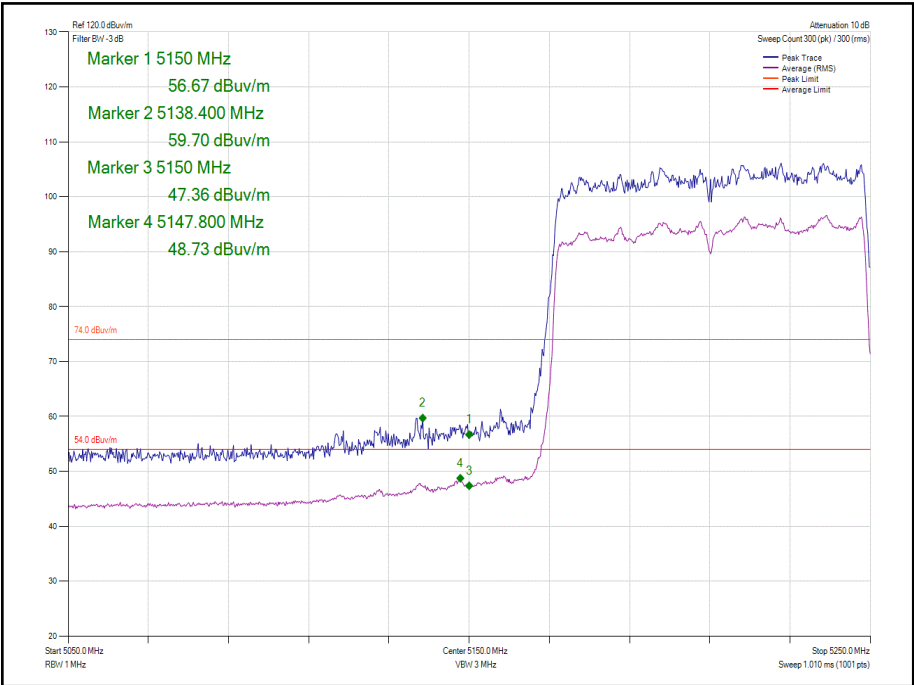


Figure 1128 - 802.11ac VHT80 SDM Cores 0-1-2 - 5210 MHz
Band Edge Frequency 5150 MHz

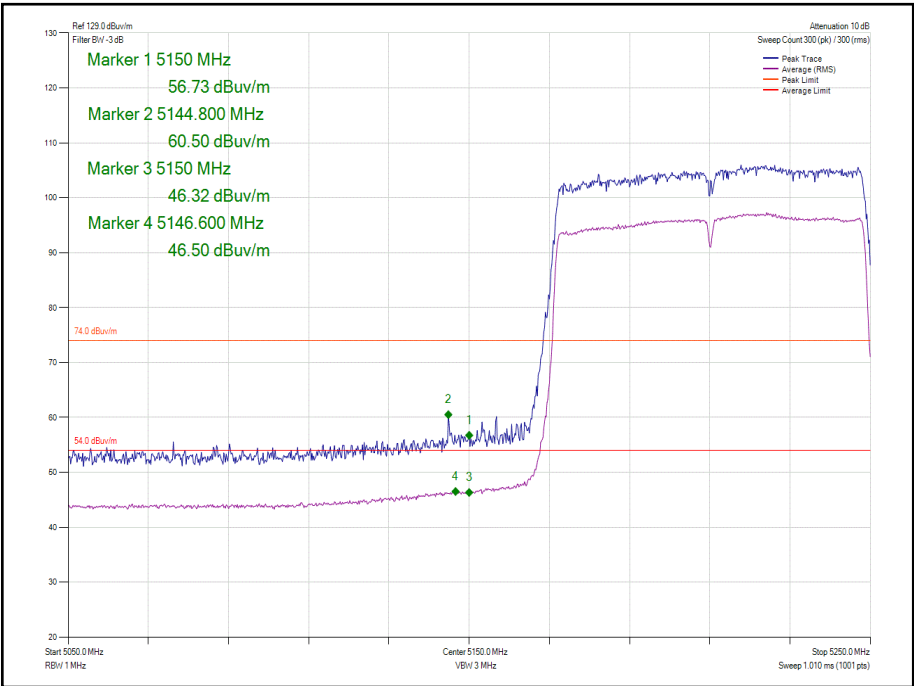


Figure 1129 - 802.11ac VHT80 TxBF Cores 0-1-2 - 5210 MHz
Band Edge Frequency 5150 MHz

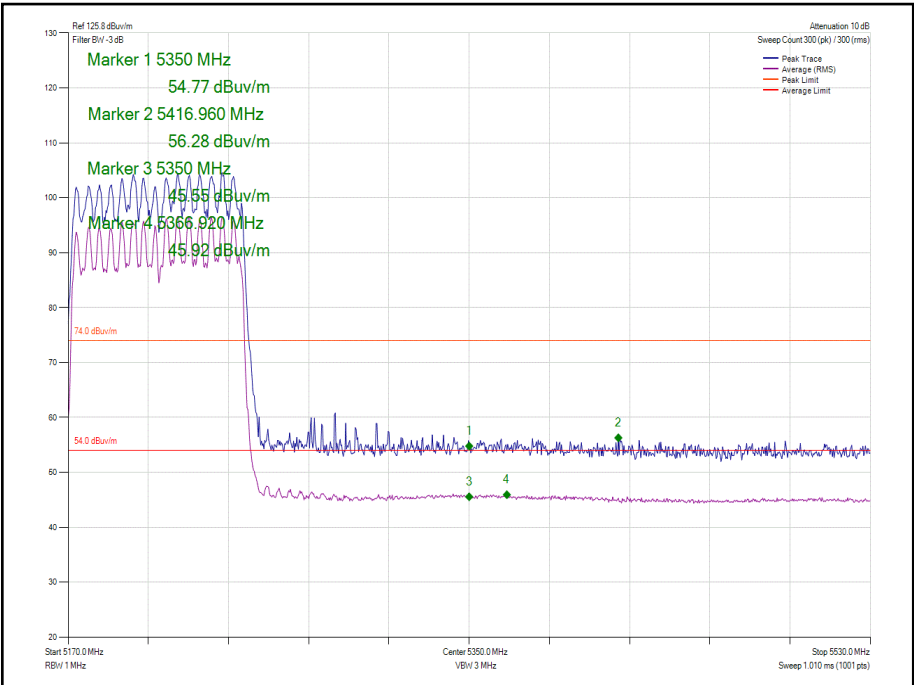
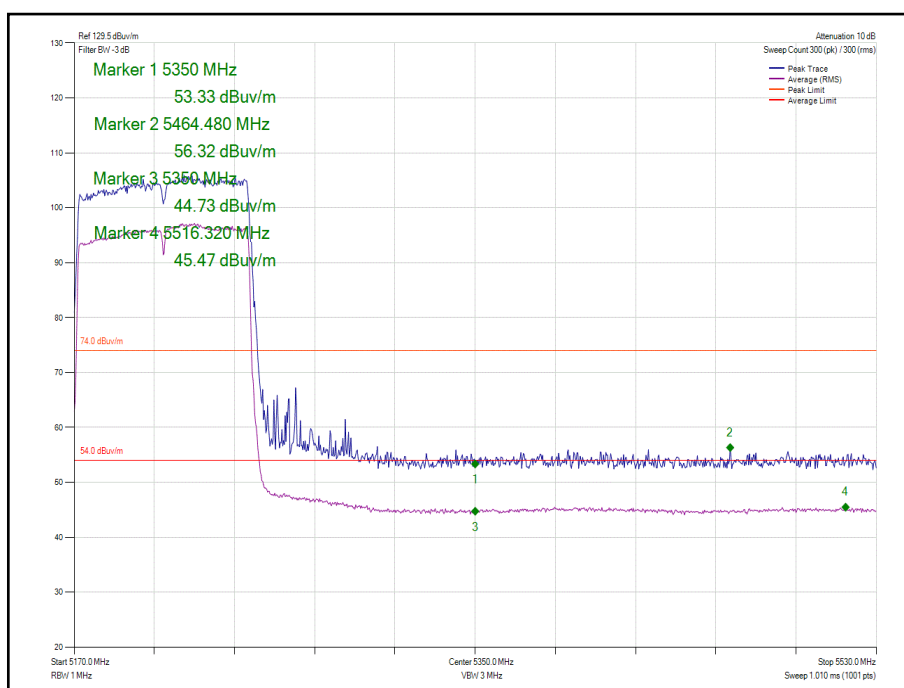
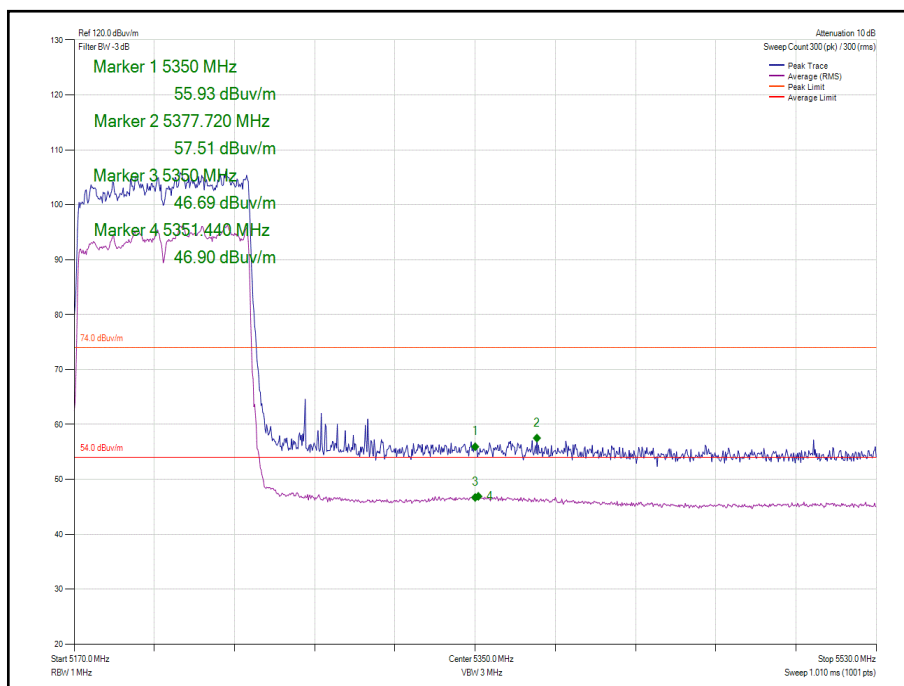


Figure 1130 - 802.11ac VHT80 CDD Cores 0-1-2 - 5210 MHz
Band Edge Frequency 5350 MHz



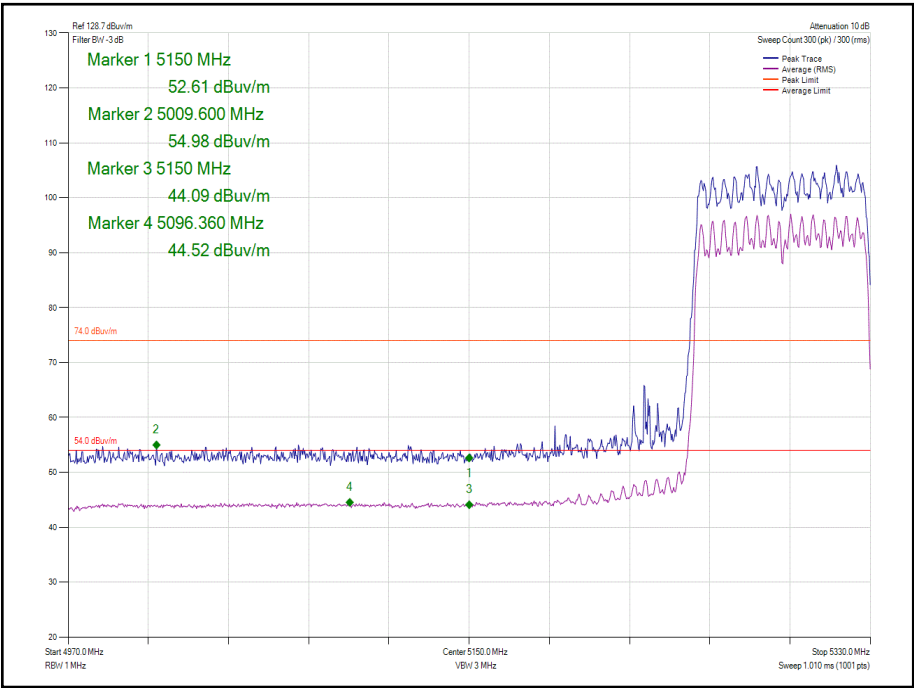


Figure 1133 - 802.11ac VHT80 CDD Cores 0-1-2 - 5290 MHz
Band Edge Frequency 5150 MHz

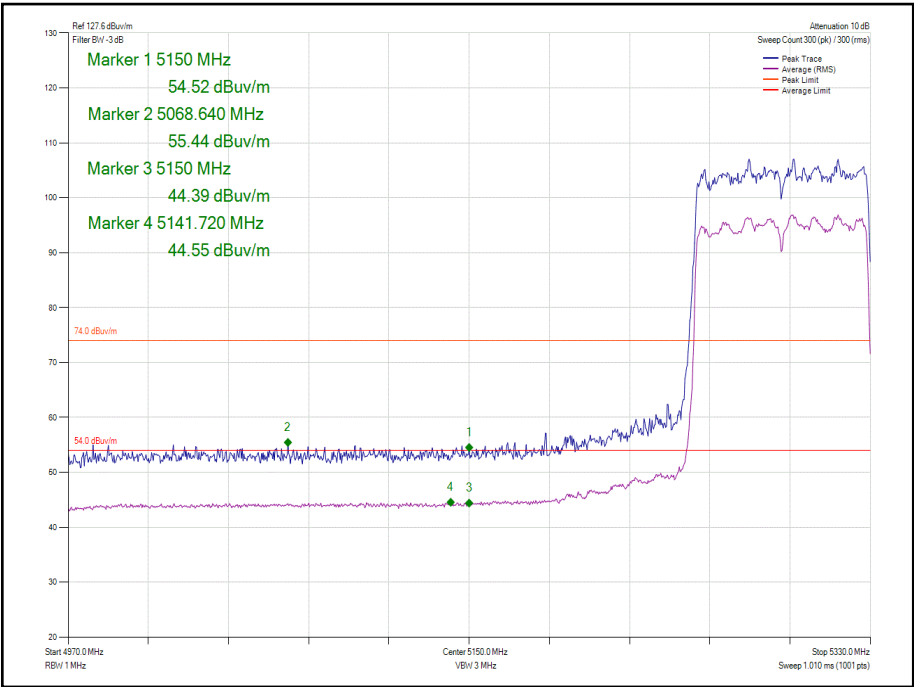


Figure 1134 - 802.11ac VHT80 SDM Cores 0-1-2 - 5290 MHz
Band Edge Frequency 5150 MHz

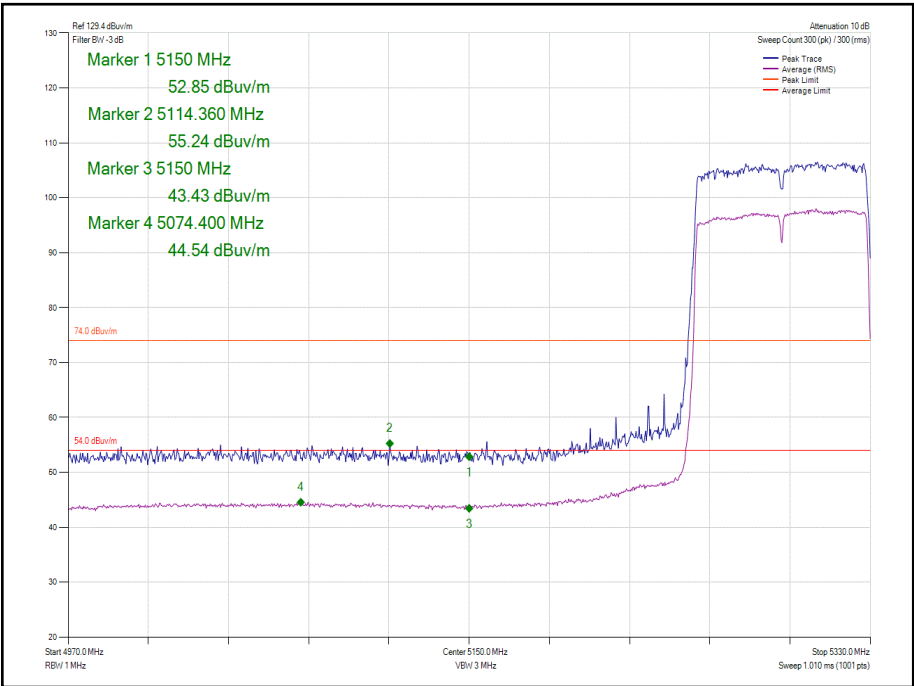


Figure 1135 - 802.11ac VHT80 TxBF Cores 0-1-2 - 5290 MHz
Band Edge Frequency 5150 MHz

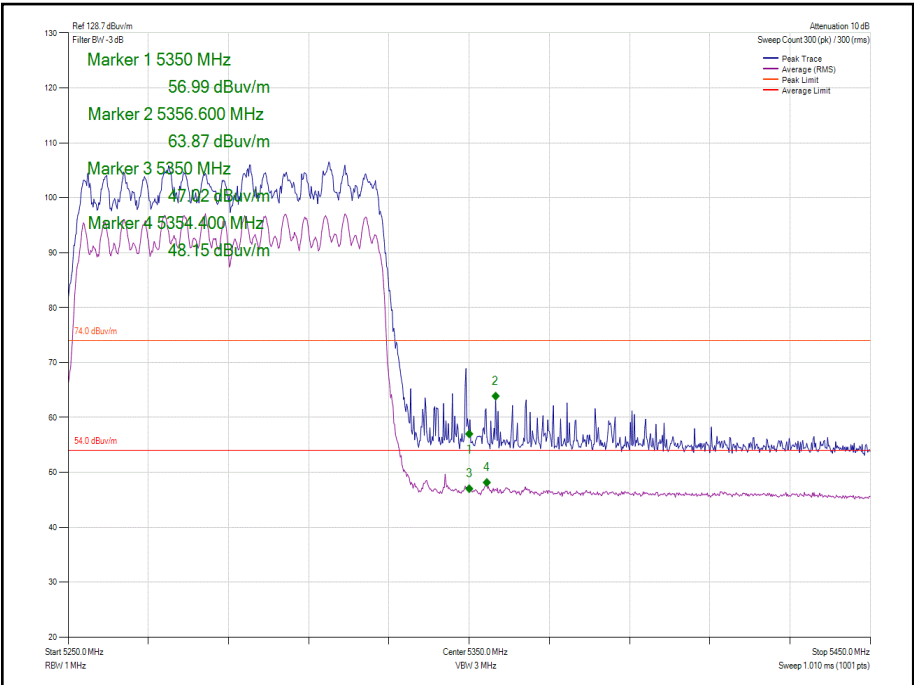


Figure 1136 - 802.11ac VHT80 CDD Cores 0-1-2 - 5290 MHz
Band Edge Frequency 5350 MHz

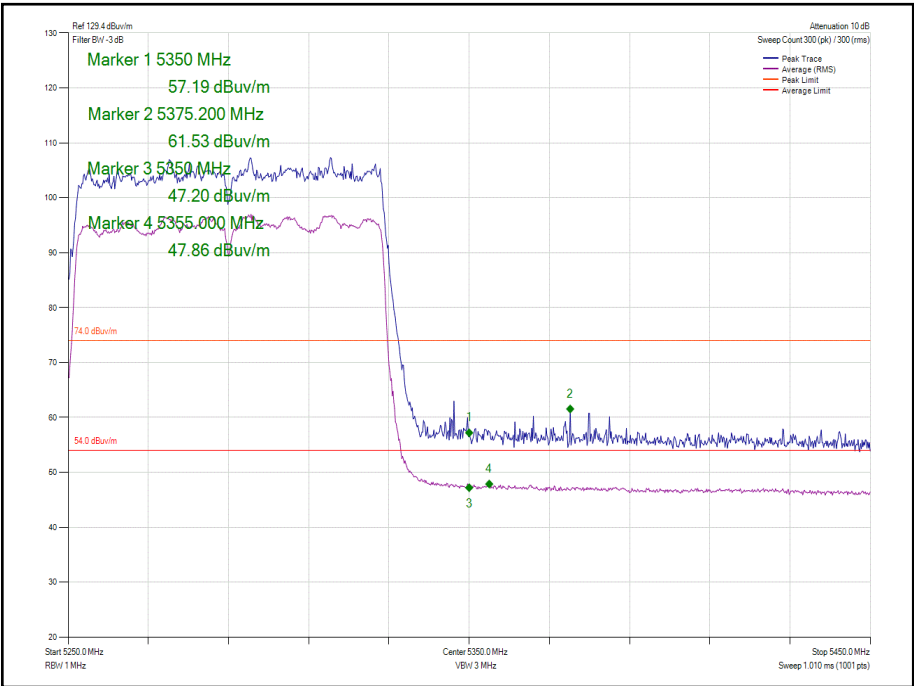


Figure 1137 - 802.11ac VHT80 SDM Cores 0-1-2 - 5290 MHz
Band Edge Frequency 5350 MHz

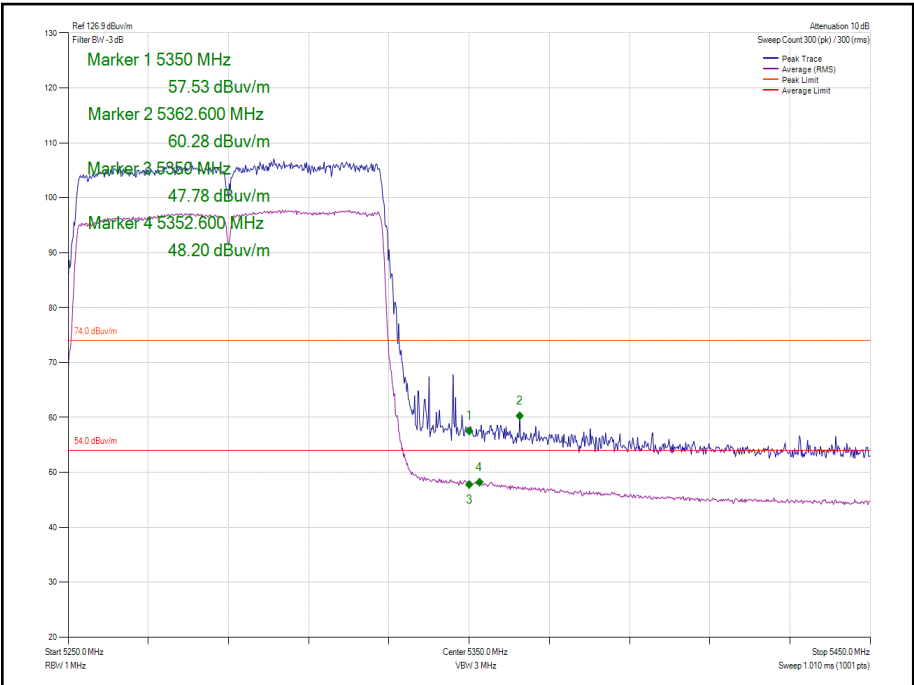


Figure 1138 - 802.11ac VHT80 TxBF Cores 0-1-2 - 5290 MHz
Band Edge Frequency 5350 MHz

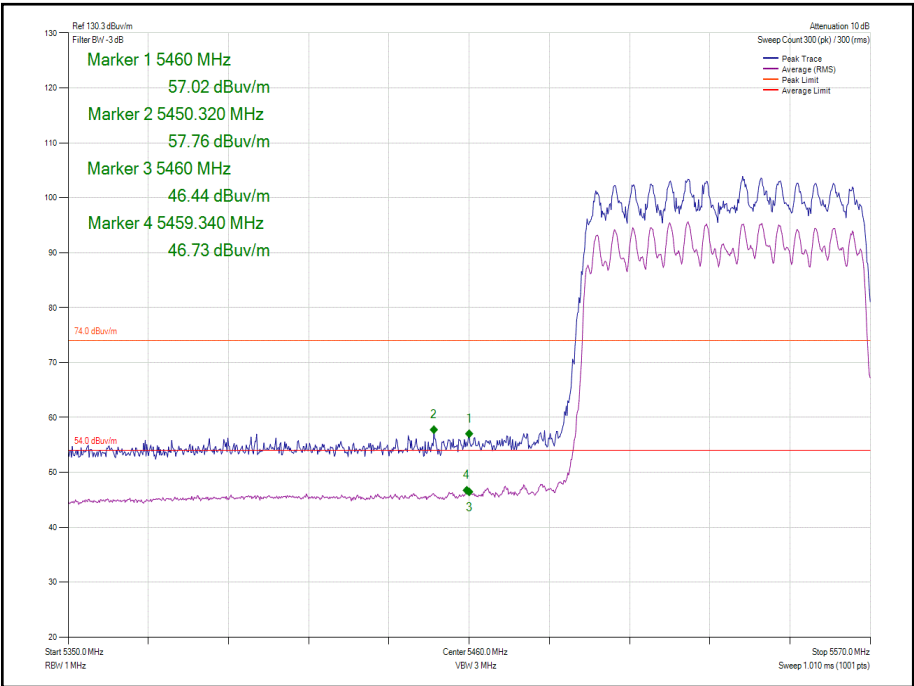


Figure 1139 - 802.11ac VHT80 CDD Cores 0-1-2 - 5530 MHz
Band Edge Frequency 5460 MHz

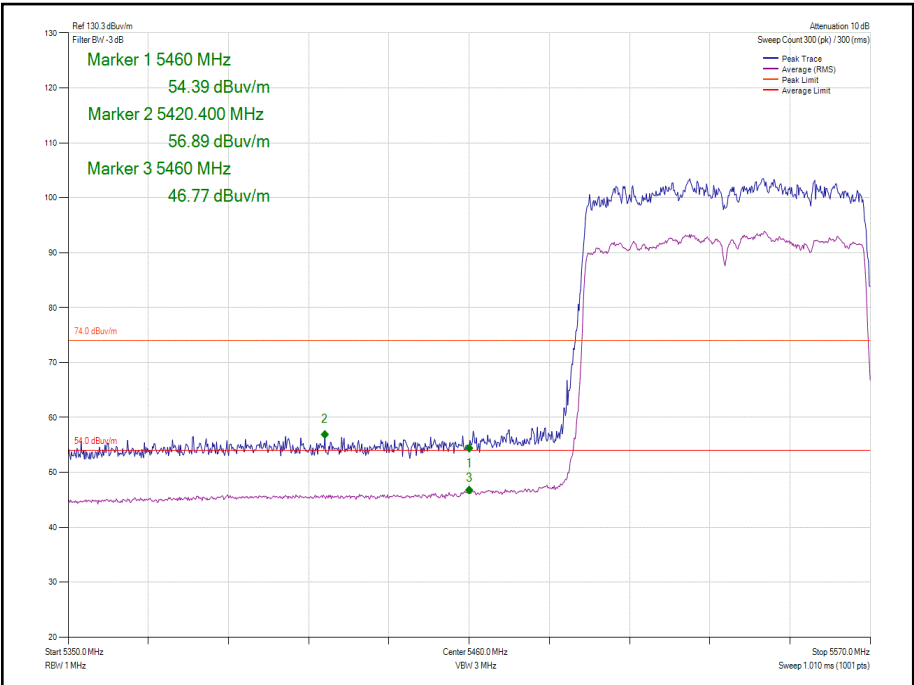
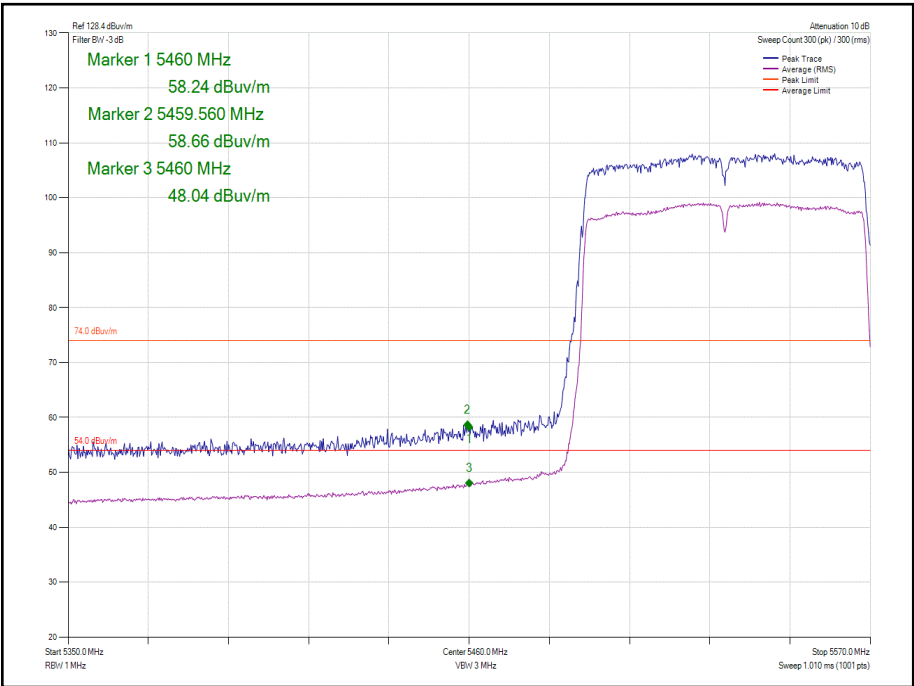


Figure 1140 - 802.11ac VHT80 SDM Cores 0-1-2 - 5530 MHz
Band Edge Frequency 5460 MHz



**Figure 1141 - 802.11ac VHT80 TxBF Cores 0-1-2 - 5530 MHz
Band Edge Frequency 5460 MHz**



Aux - 20 MHz Bandwidth

Mode	Data Rate	Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dB μ V/m)	Average Level (dB μ V/m)
802.11a Aux	6 Mbps	5180	5150	63.96	47.91
802.11n HT20 Aux	MCS0	5180	5150	60.46	47.63
802.11a Aux	6 Mbps	5240	5350	56.43	45.01
802.11n HT20 Aux	MCS0	5240	5350	57.40	46.17
802.11a Aux	6 Mbps	5260	5150	55.71	44.32
802.11n HT20 Aux	MCS0	5260	5150	55.37	44.11
802.11a Aux	6 Mbps	5320	5350	68.53	50.24
802.11n HT20 Aux	MCS0	5320	5350	65.67	50.15
802.11a Aux	6 Mbps	5500	5460	58.51	46.88
802.11n HT20 Aux	MCS0	5500	5460	57.69	47.44

Table 463

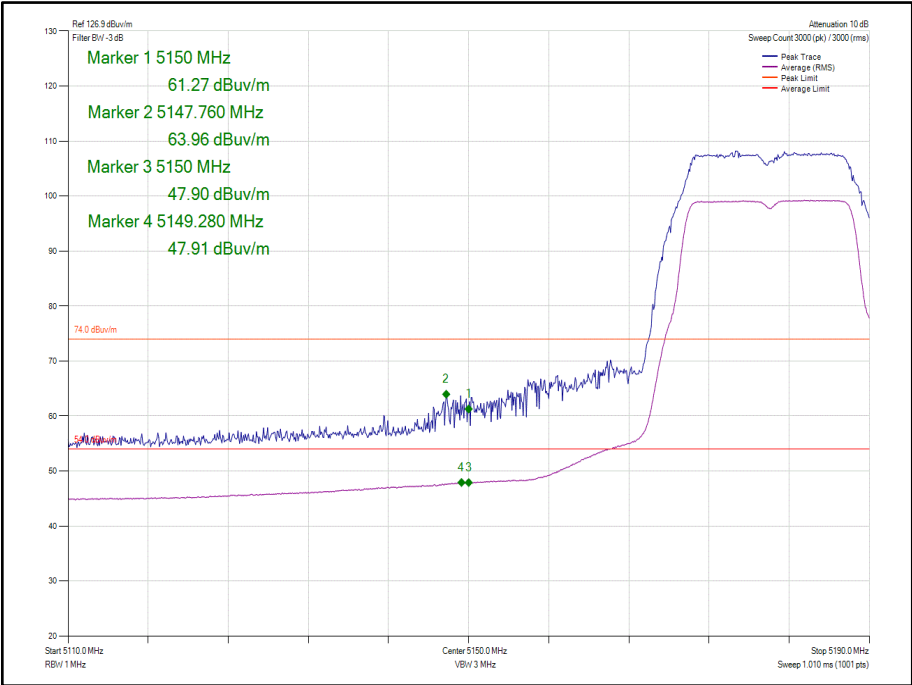


Figure 1142 - 802.11a Aux - 5180 MHz
Band Edge Frequency 5150 MHz

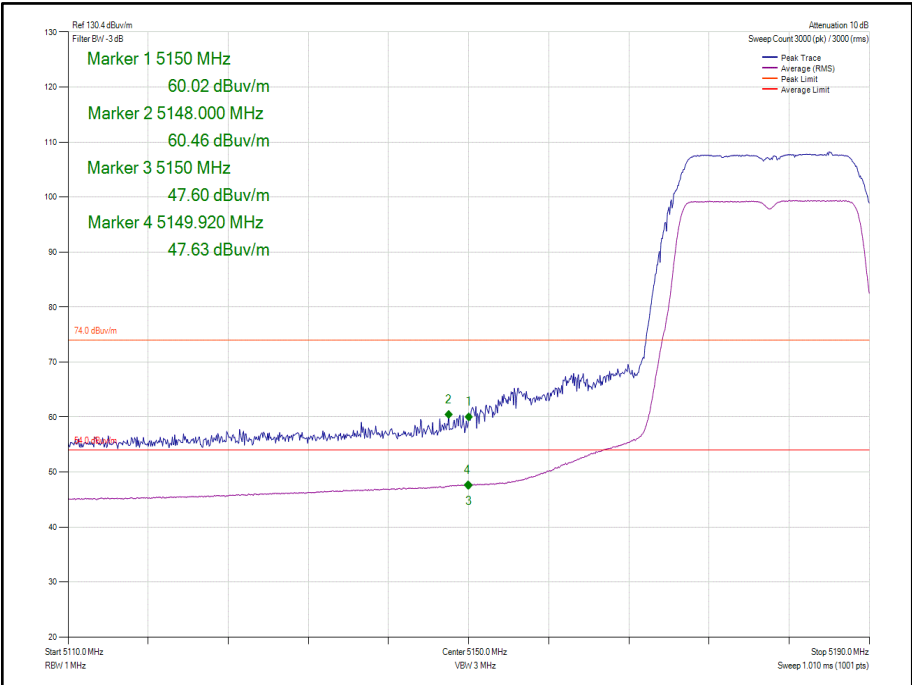


Figure 1143 - 802.11n HT20 Aux - 5180 MHz
Band Edge Frequency 5150 MHz

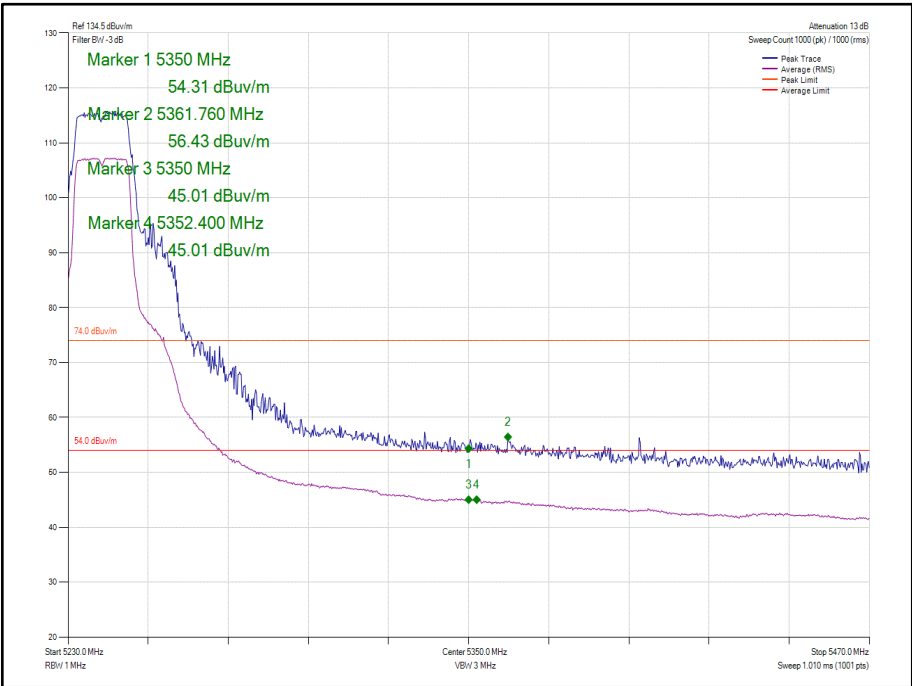


Figure 1144 - 802.11a Aux - 5240 MHz
Band Edge Frequency 5350 MHz

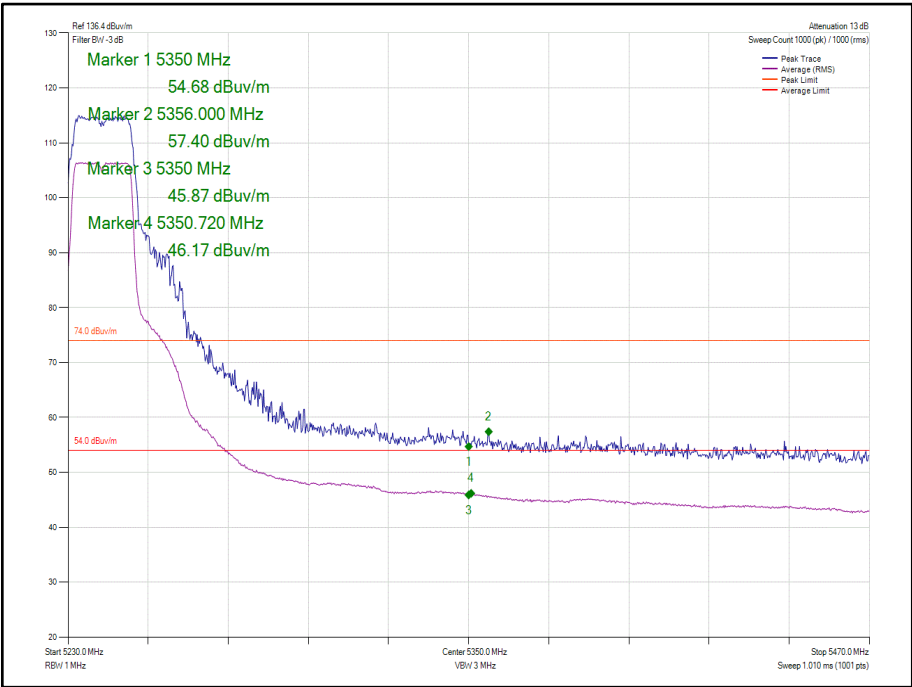


Figure 1145 - 802.11n HT20 Aux - 5240 MHz
Band Edge Frequency 5350 MHz

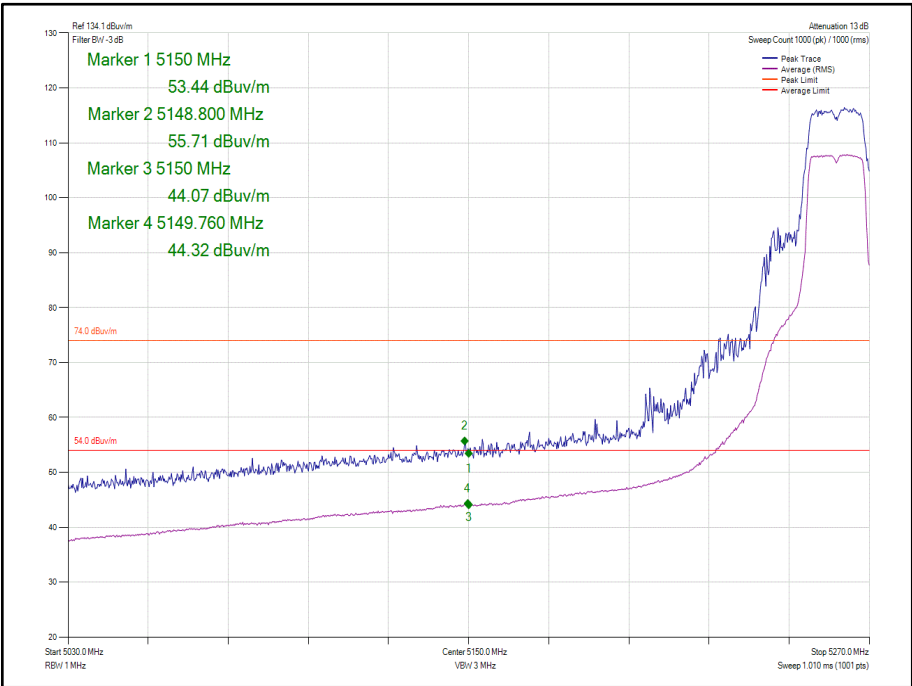


Figure 1146 - 802.11a Aux - 5260 MHz
Band Edge Frequency 5150 MHz

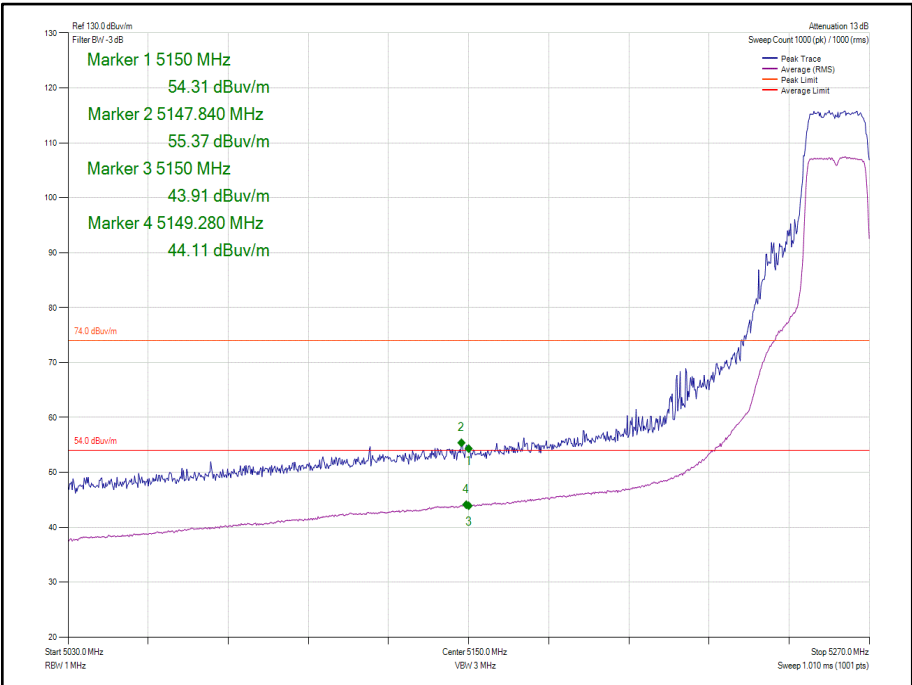


Figure 1147 - 802.11n HT20 Aux - 5260 MHz
Band Edge Frequency 5150 MHz

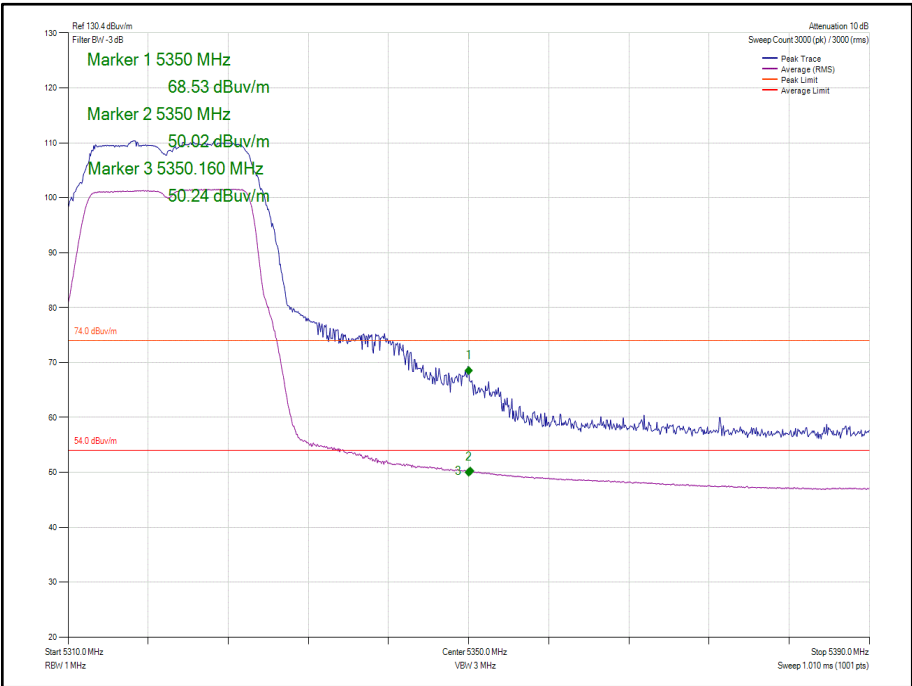


Figure 1148 - 802.11a Aux - 5320 MHz
Band Edge Frequency 5350 MHz

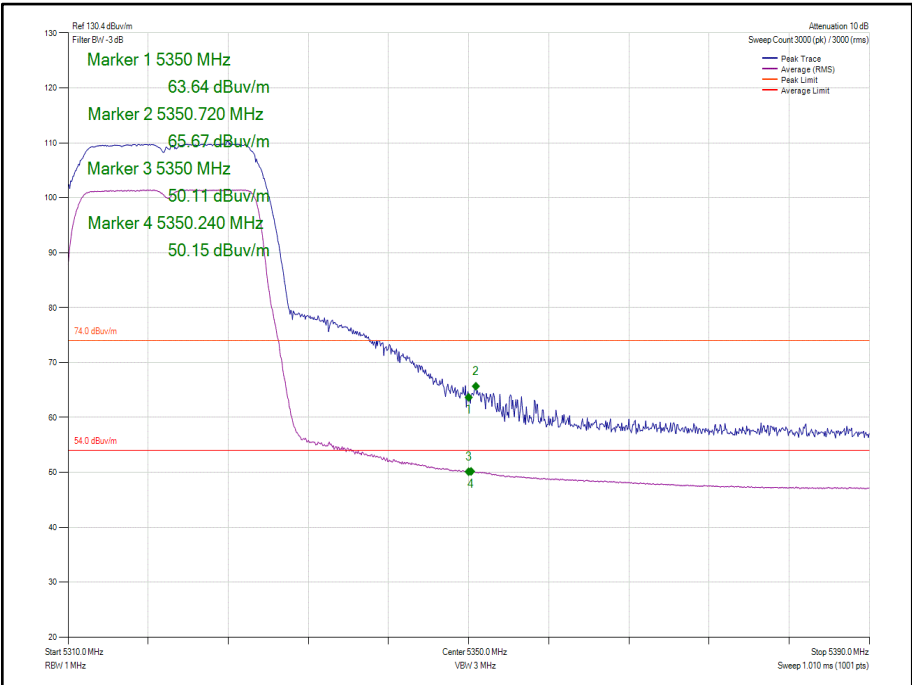


Figure 1149 - 802.11n HT20 Aux - 5320 MHz
Band Edge Frequency 5350 MHz

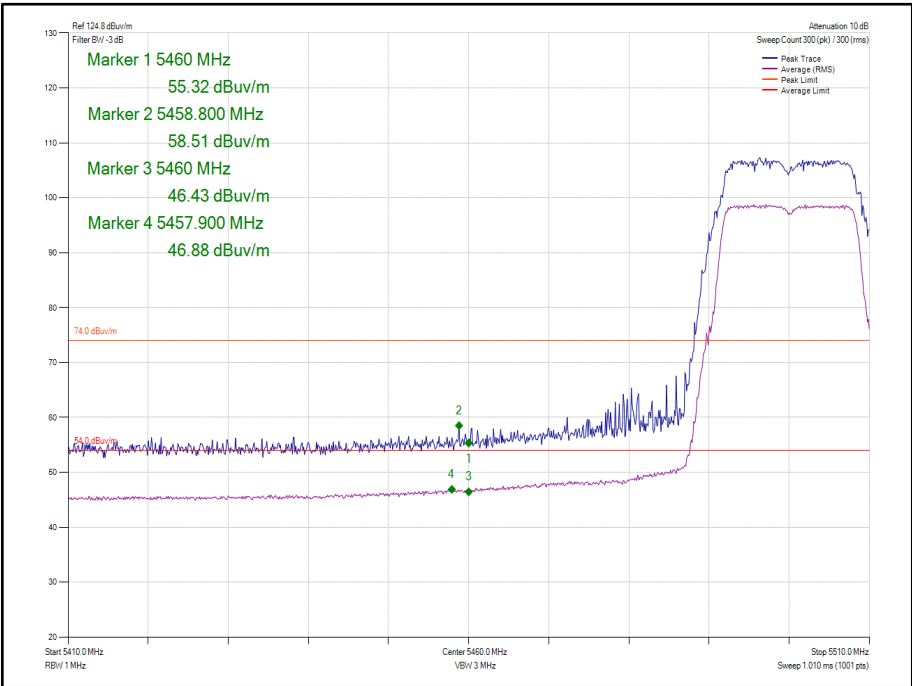


Figure 1150 - 802.11a Aux - 5500 MHz
Band Edge Frequency 5460 MHz

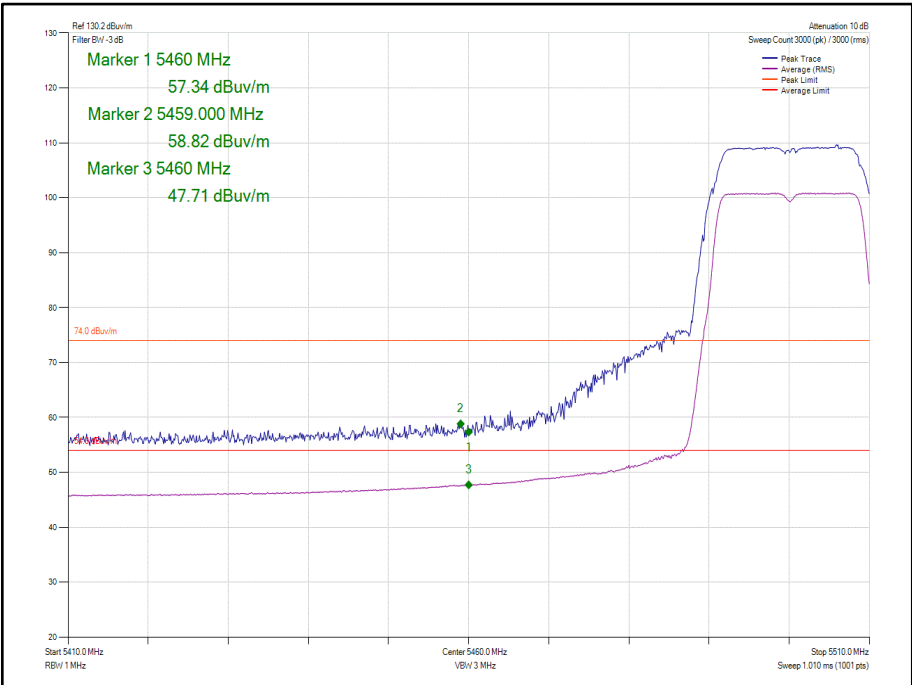


Figure 1151 - 802.11n HT20 Aux - 5500 MHz
Band Edge Frequency 5460 MHz



Aux - 40 MHz Bandwidth

Mode	Data Rate	Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)
802.11n HT40 Aux Core	MCS0	5190	5150	61.62	49.33
802.11n HT40 Aux Core	MCS0	5230	5350	57.85	47.27
802.11n HT40 Aux Core	MCS0	5270	5150	55.61	45.92
802.11n HT40 Aux Core	MCS0	5310	5350	60.54	49.15
802.11n HT40 Aux Core	MCS0	5510	5460	58.86	47.08

Table 464

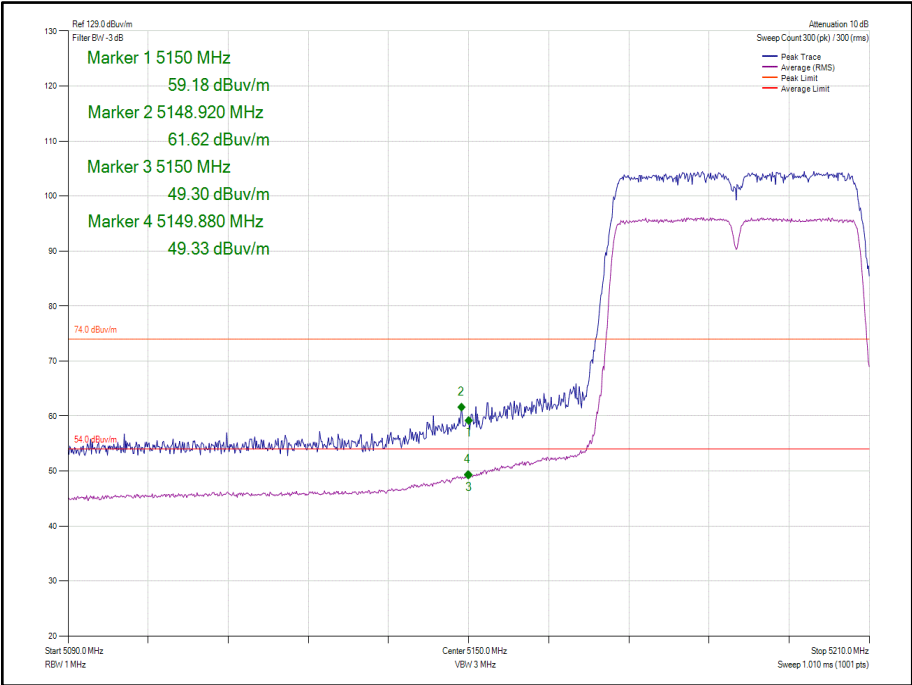


Figure 1152 – 802.11n HT40 Aux Core - 5190 MHz
Band Edge Frequency 5150 MHz

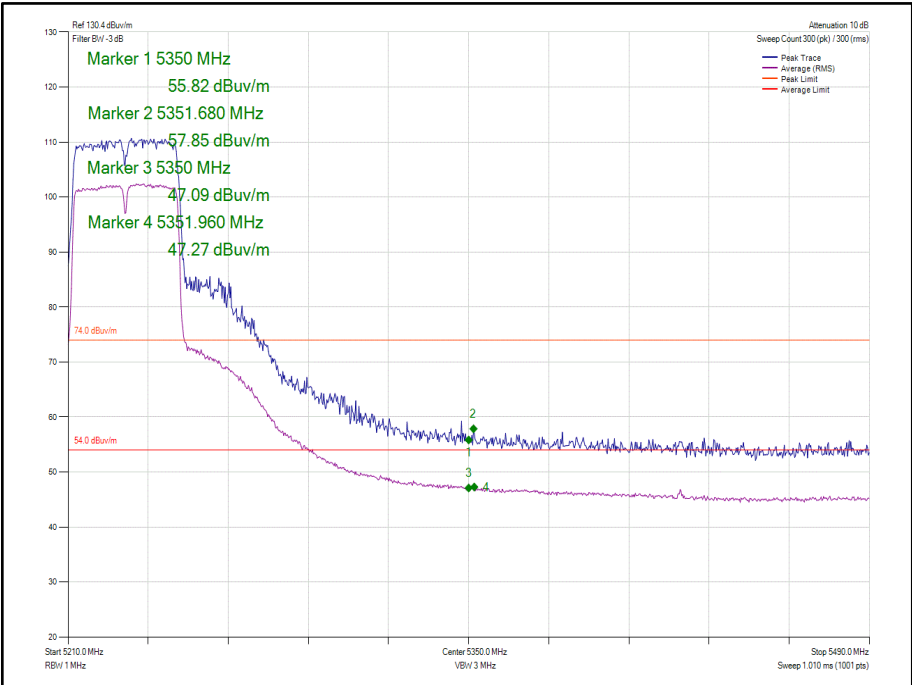


Figure 1153 – 802.11n HT40 Aux Core - 5230 MHz
Band Edge Frequency 5350 MHz

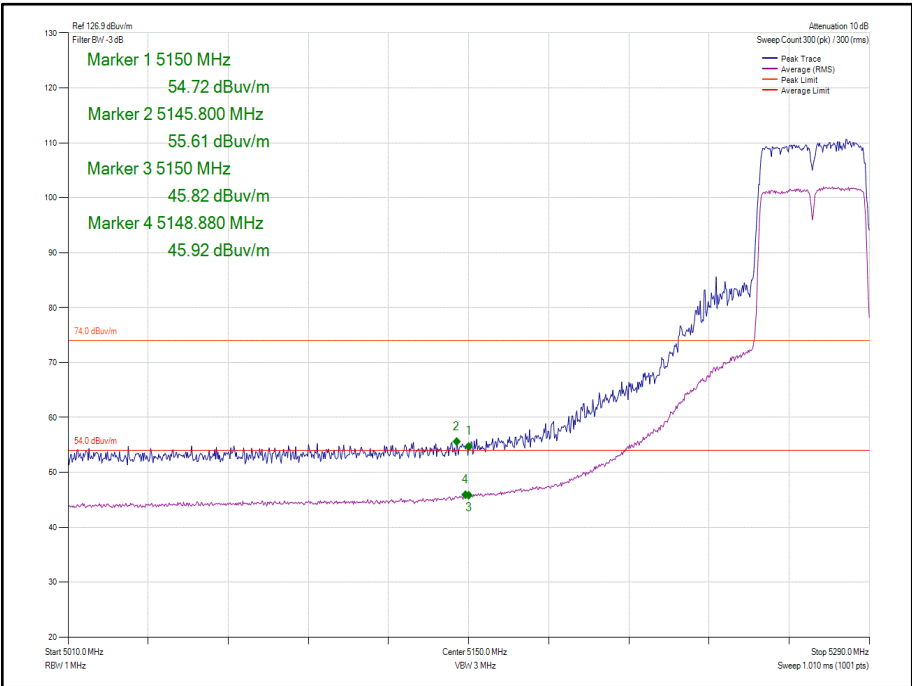


Figure 1154 – 802.11n HT40 Aux Core - 5270 MHz
Band Edge Frequency 5150 MHz

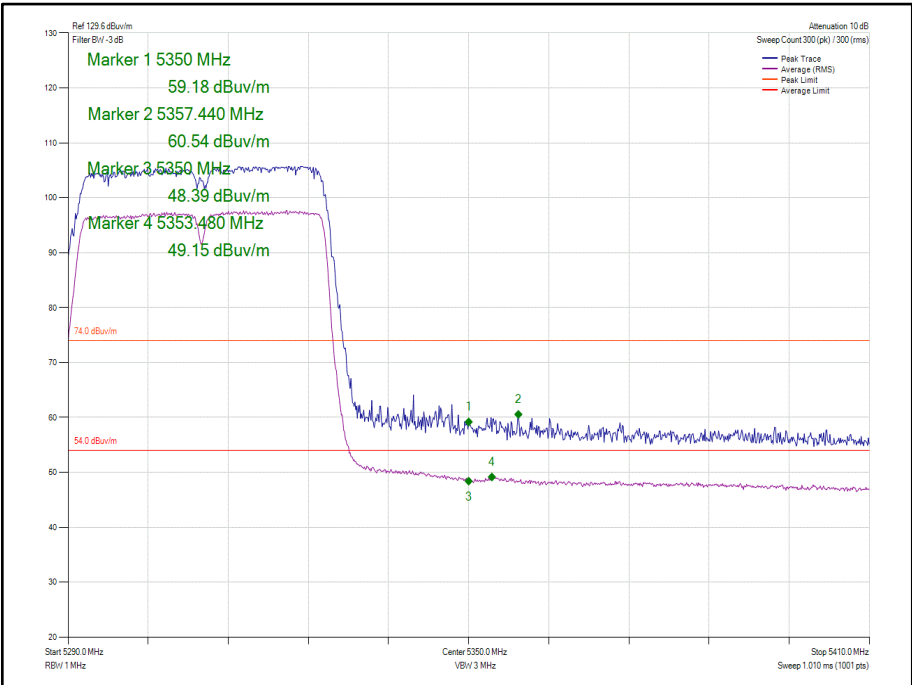


Figure 1155 – 802.11n HT40 Aux Core - 5310 MHz
Band Edge Frequency 5350 MHz

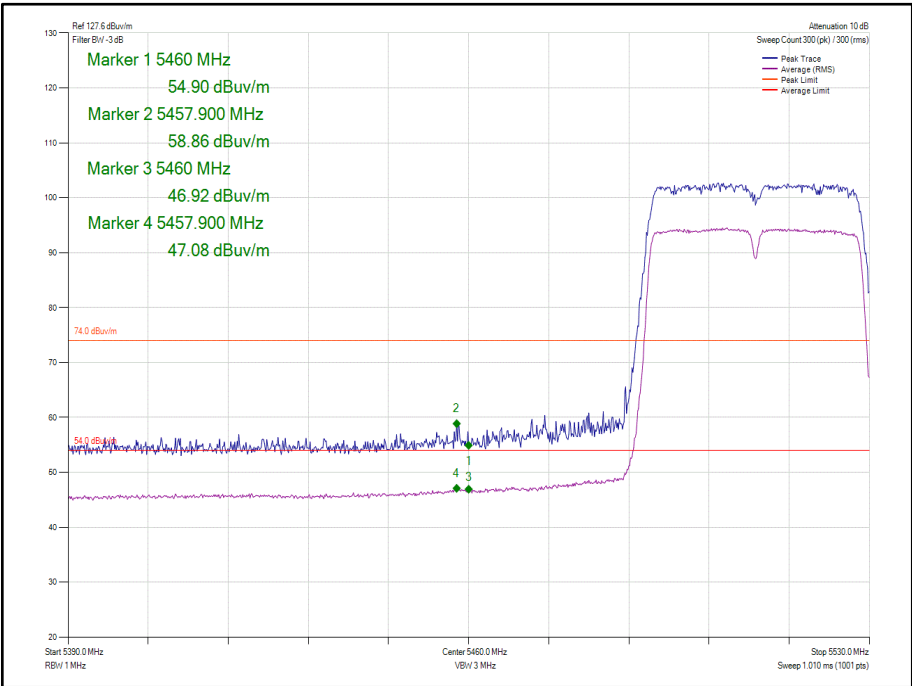


Figure 1156 – 802.11n HT40 Aux Core - 5510 MHz
Band Edge Frequency 5460 MHz



Aux - 80 MHz Bandwidth

Mode	Data Rate	Frequency (MHz)	Band Edge Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)
802.11ac VHT80 Aux Core	MCS0	5210	5150	59.23	48.16
802.11ac VHT80 Aux Core	MCS0	5210	5350	61.40	49.83
802.11ac VHT80 Aux Core	MCS0	5290	5150	53.52	42.24
802.11ac VHT80 Aux Core	MCS0	5290	5350	60.12	48.89
802.11ac VHT80 Aux Core	MCS0	5530	5460	57.13	46.45

Table 465

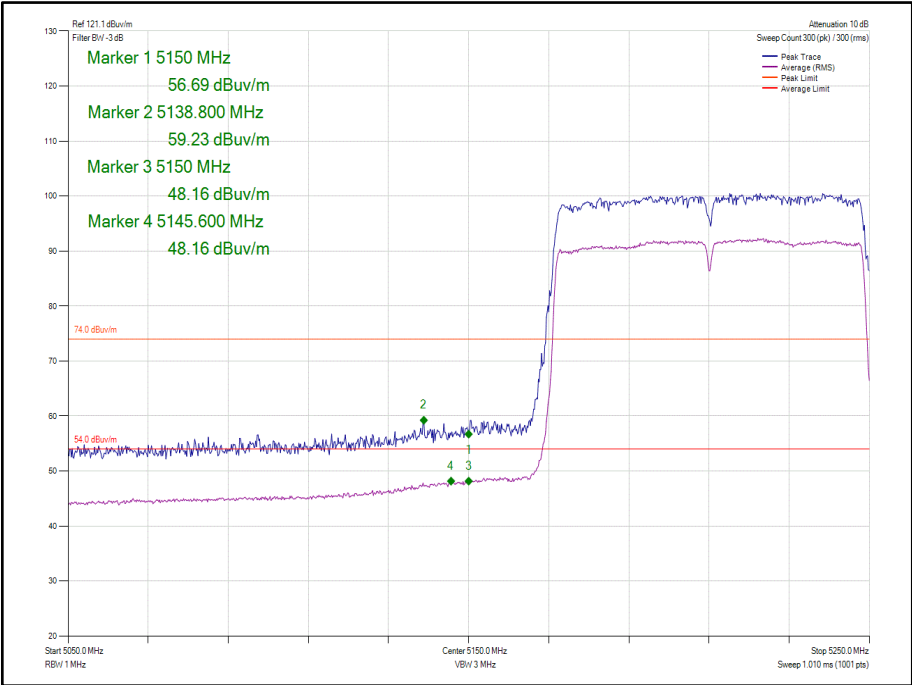


Figure 1157 - 802.11ac VHT80 Aux Core - 5210 MHz
Band Edge Frequency 5150 MHz

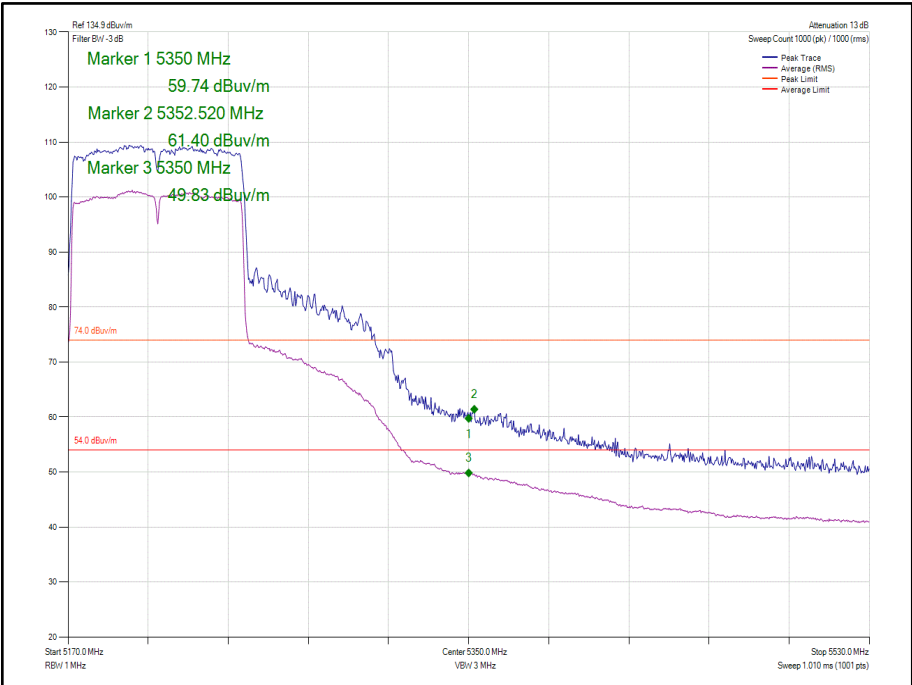


Figure 1158 - 802.11ac VHT80 Aux Core - 5210 MHz
Band Edge Frequency 5350 MHz

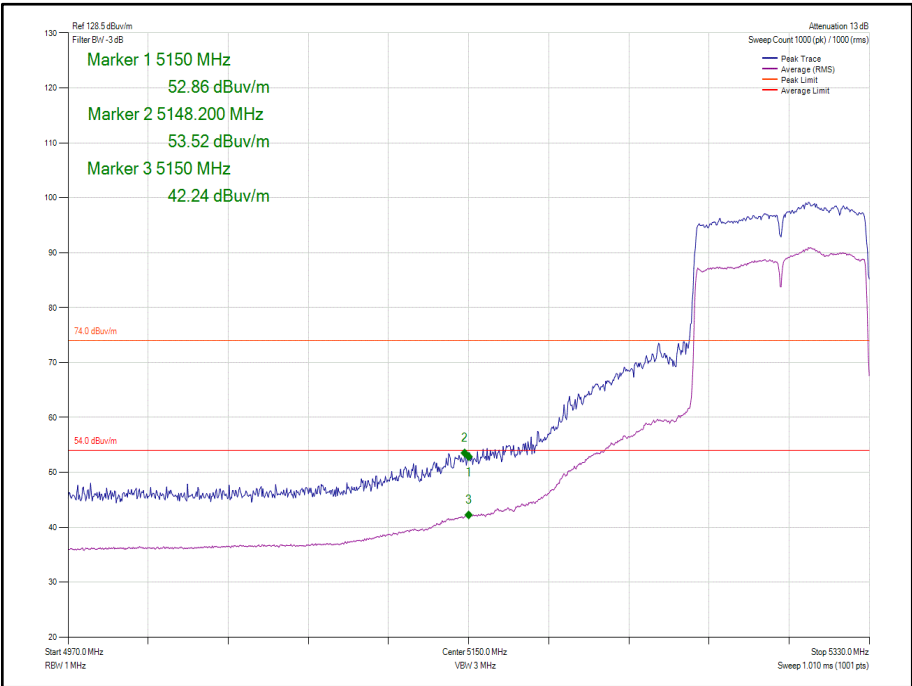


Figure 1159 - 802.11ac VHT80 Aux Core - 5290 MHz
Band Edge Frequency 5150 MHz

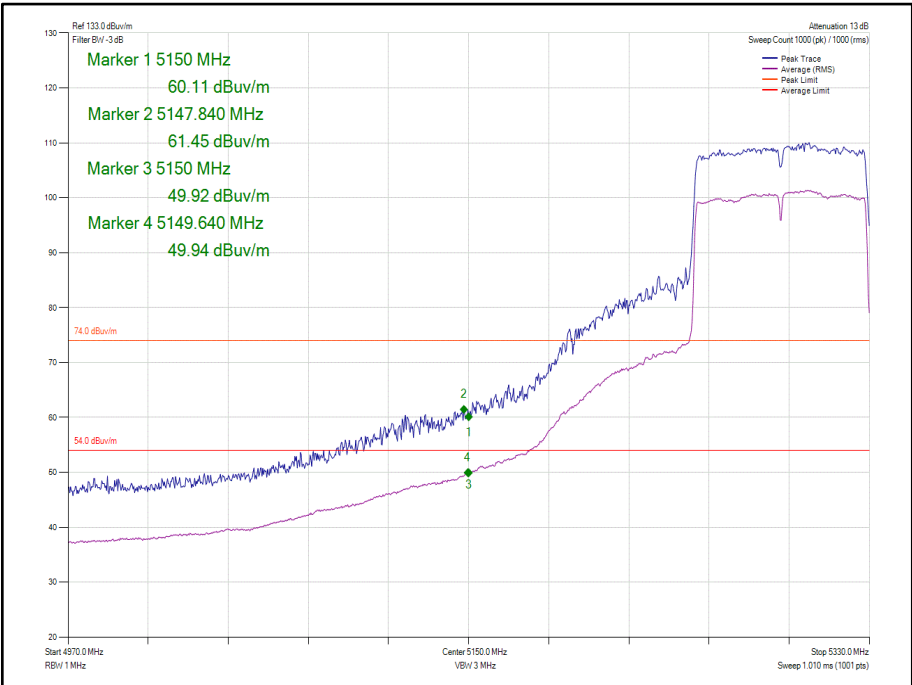


Figure 1160 - 802.11ac VHT80 Aux Core - 5290 MHz
Band Edge Frequency 5150 MHz

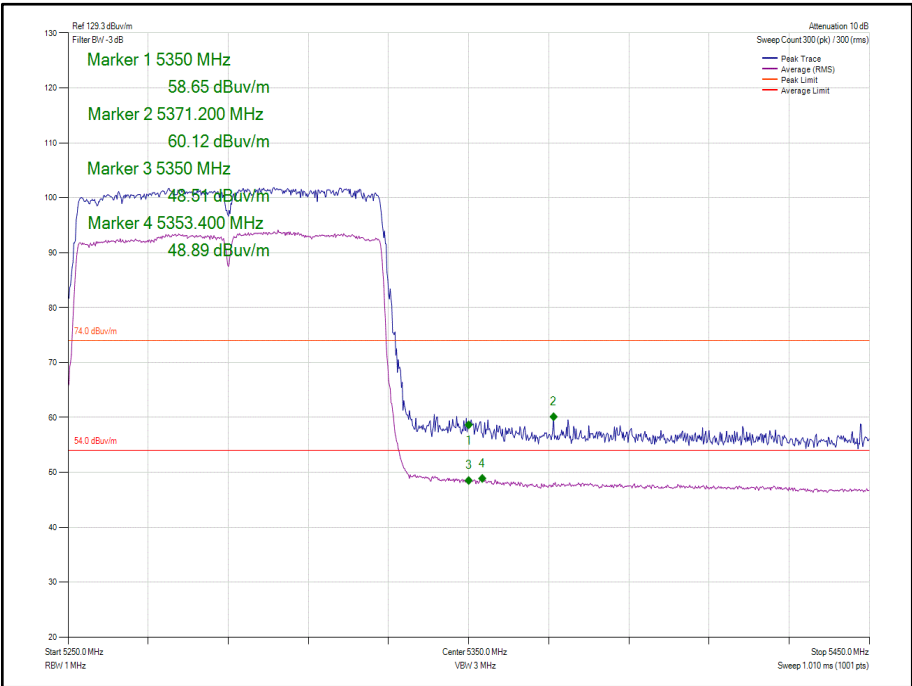


Figure 1161 - 802.11ac VHT80 Aux Core - 5290 MHz
Band Edge Frequency 5350 MHz

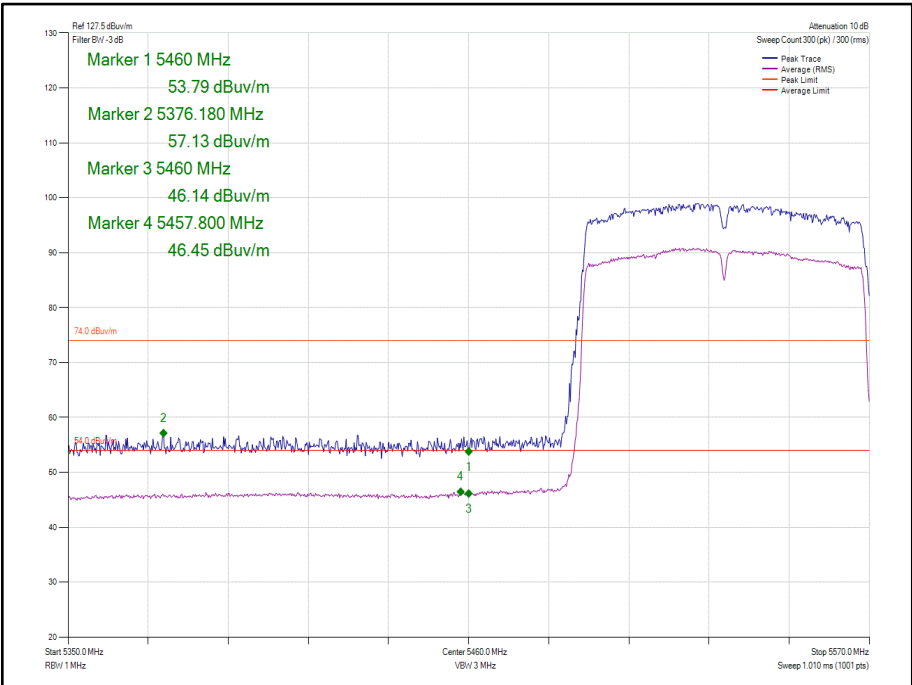


Figure 1162 - 802.11ac VHT80 Aux Core - 5530 MHz
Band Edge Frequency 5350 MHz



2.6.7 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 5 and EMC Chamber 11.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Screened Room (5)	Rainford	Rainford	1545	36	23-Jan-2021
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Hygrometer	Rotronic	HYGROPALM 1	2338	12	15-Nov-2019
Tilt Antenna Mast	Maturo GmbH	TAM 4.0-P	3916	-	TU
DC - 12.4 GHz 10 dB Attenuator	Suhner	6810.17.A	3965	12	07-Aug-2020
Cable (Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4526	6	11-Dec-2019
Double Ridged Waveguide Horn Antenna	ETS-Lindgren	3117	4722	12	5-Mar-2020
Tilt Antenna Mast	Maturo GmbH	TAM 4.0-P	4811	-	TU
Double Ridge Broadband Horn Antenna	Schwarzbeck	BBHA 9120 B	4848	12	11-Mar-2020
8 - 18 GHz pre amp	Wright Technologies	PS06-0061	4971	12	7-Dec-2019
EMI Test Receiver	Rohde & Schwarz	ESW44	5084	12	12-Sep-2019*
8m N-Type RF Cable	Teledyne	PR90-088-8MTR	5095	12	4-Oct-2019*
Cable (18 GHz)	Rosenberger	LU7-071-1000	5102	12	4-Oct-2019*
Cable (18 GHz)	Rosenberger	LU7-071-1000	5104	12	5-Oct-2019*
Cable (18 GHz)	Rosenberger	LU7-071-1000	5105	12	5-Oct-2019*
Cable (18 GHz)	Rosenberger	LU7-071-2000	5107	12	5-Oct-2019*
EmX Software V.1.4.8.3	TUV SUD	EmX	5125	-	Software
1.5m 40GHz RF Cable	Scott Cables	KPS-1501-2000-KPS	5127	6	11-Dec-2019
Screened Room (11)	Rainford	Rainford	5136	36	1-Nov-2021
Mast	Maturo	TAM 4.0-P	5158	-	TU
Mast and Turntable Controller	Maturo	Maturo NCD	5159	-	TU
Turntable	Maturo	TT 15WF	5160	-	TU
8 meter cable	Teledyne	PR90-088-8MTR	5212	12	30-Aug-2020
Preamplifier (30dB 1GHz to 18GHz)	Schwarzbeck	BBV 9718 C	5261	12	26-Mar-2020

Table 466

TU – Traceability Unscheduled

*This item was in calibration at the time of test.



2.7 Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period

2.7.1 Specification Reference

FCC 47 CFR Part 15E (DFS), Clause 15.407 (h)(2)(iii)(iv)
ISED RSS-247, Clause 6.3.2(c)(d)(e)

2.7.2 Equipment Under Test and Modification State

A2141, S/N: C02YT008L513 - Modification State 0

2.7.3 Date of Test

12-August-2019

2.7.4 Test Method

This test was performed in accordance with FCC KDB 905462 D02, clause 7.8.3.

A computer was connected via an Ethernet cable to the Master device and the FCC defined audio/video file was streamed from the Client device using Windows Media Player.

Radar Pulse Type 0 was then transmitted, and the Spectrum monitored. The transmissions from the UUT were observed for a period of 12 seconds after the final injected Radar Pulse.

It was checked that all transmissions stopped within the 10 second period defined from the point of the end of the final Radar pulse + 10 seconds. In addition, the aggregate on time during the first 200ms and the following 9.8 seconds of the Channel Move Time was computed by the Aeroflex DFS Software.

The markers on the trace data correspond to the following time periods:

Red - End Of Radar Burst, (T0)
Purple - End Of 200ms Period, (T0 + 200 ms)
Orange - End Of Channel Move Time, (T0 + 10 seconds)

To verify the non-occupancy period, the PXI digitiser was replaced with a Spectrum Analyser. The external trigger from the Aeroflex DFS test system was used to trigger a 30-minute sweep from the moment the radar burst sequence was injected. It was verified that no transmissions occurred on the test channel during this time period.

2.7.5 Environmental Conditions

Ambient Temperature	22.9 °C
Relative Humidity	52.4 %

2.7.6 Test Results

802.11ac (80 MHz Bandwidth)

The equipment was set up as shown in the diagram below. The EUT was configured to run iPerf, transmitting UDP to the client laptop. The channel loading was set to >17% by adjusting the bandwidth specified in the iPerf UDP transfer.

To calibrate the level of the radar at the input to the companion device, the companion device was replaced by the spectrum analyser and the output of the PXI RF generator adjusted to give -62 dBm.

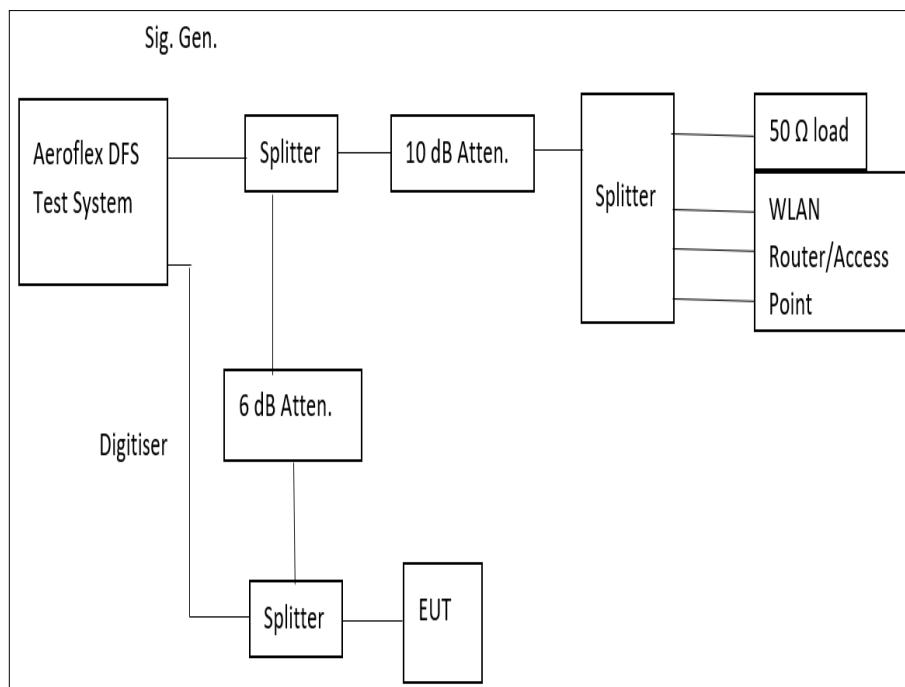


Figure 1163 - Test Equipment Setup for Client Without Radar Detection with Injection at the Master



Radar Type	Pulse Width (μs)	PRI (μs)	Number of Pulses
0	1	1428	18

Table 467 - Radar Pulse Type 0 Characteristics

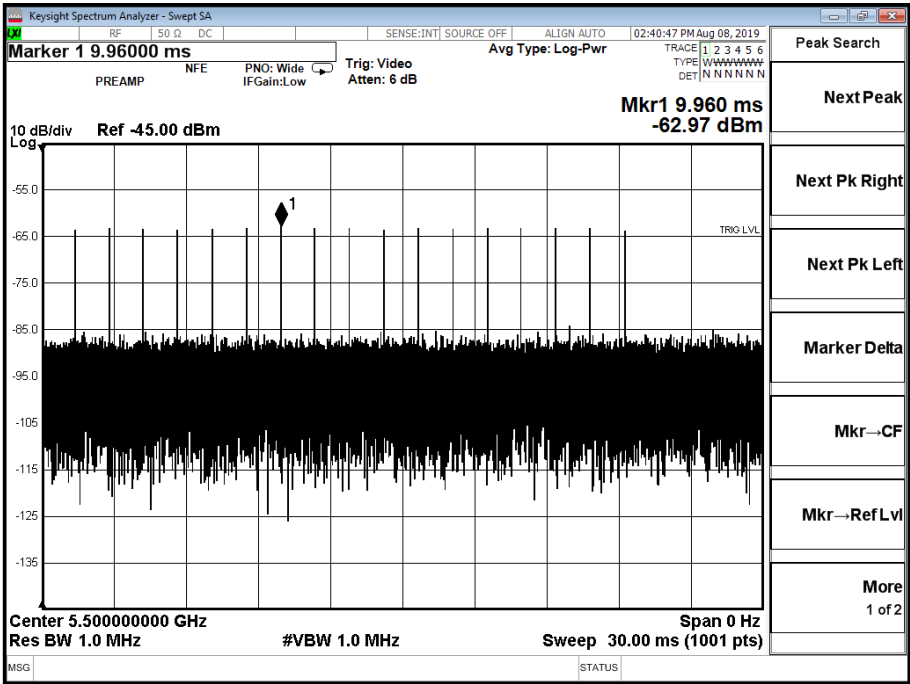


Figure 1164 - Verification of Radar Type 0

Maximum Transmit Power	Value (Notes 1 and 2)
≥ 200 milliwatt	-64 dBm
< 200 milliwatt	-62 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.

Table 468 - DFS Detection Thresholds for Master Devices and Client Devices with Radar Detection

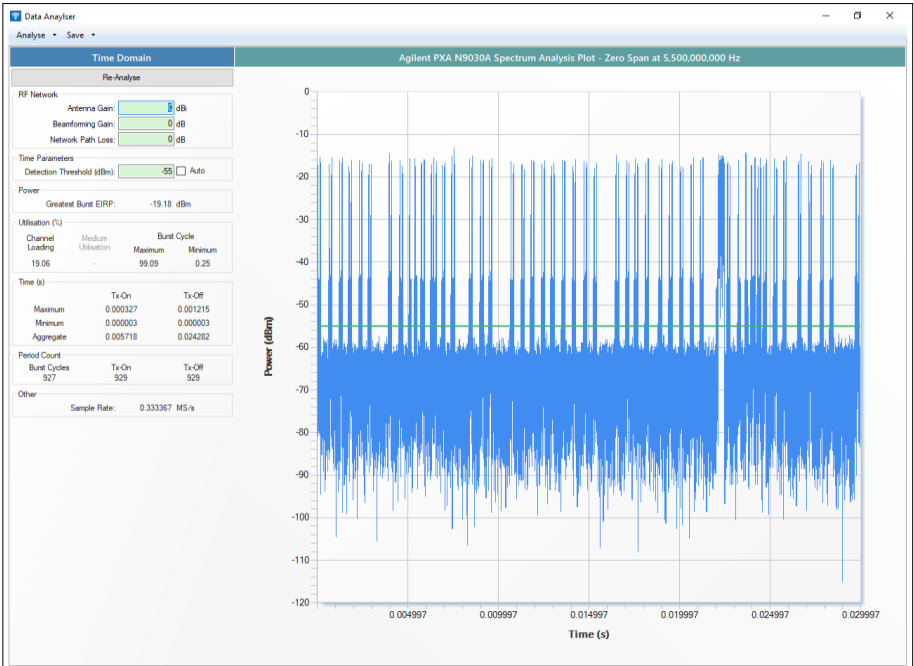


Figure 1165 - Channel Loading

The channel loading was measured as 19.06%



2.7.7 Test Results

Main (VHT80) - ac (SISO)

Test Parameter	Result
Channel Move Time	4.087 s
Channel Closing Time (Aggregate Time During 200 ms)	14.553 ms
Channel Closing Time (Aggregate Time During 200 ms to 10 s)	0.004 ms
Channel Closing Time (Aggregate Time During 10 s)	14.557 ms
Transmission Observed During Non-Occupancy Period	None

Table 469 - In-Service Monitoring Test Results

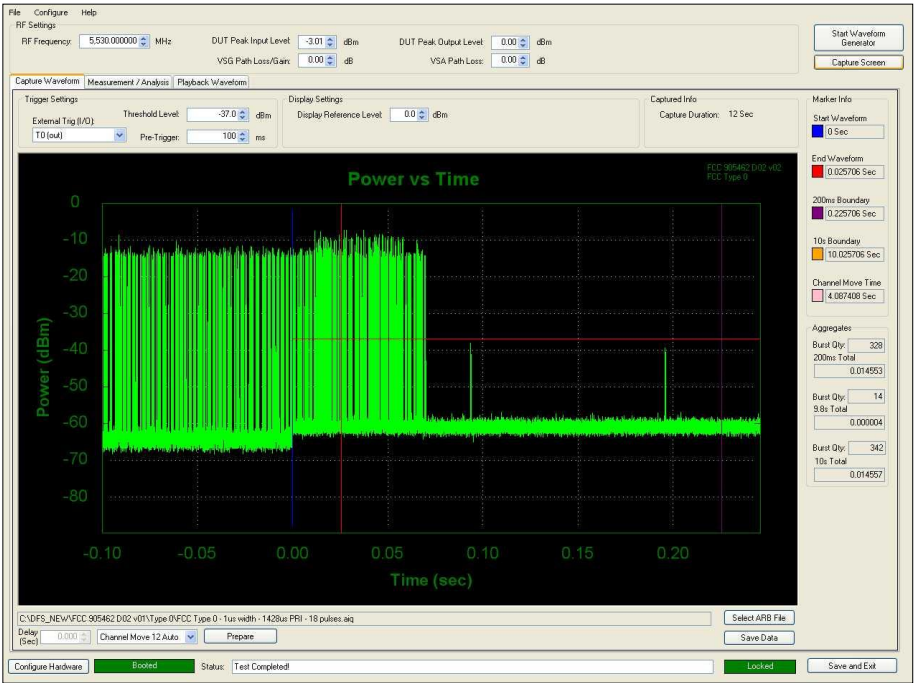


Figure 1166 - First 200 ms of Channel Shutdown Period

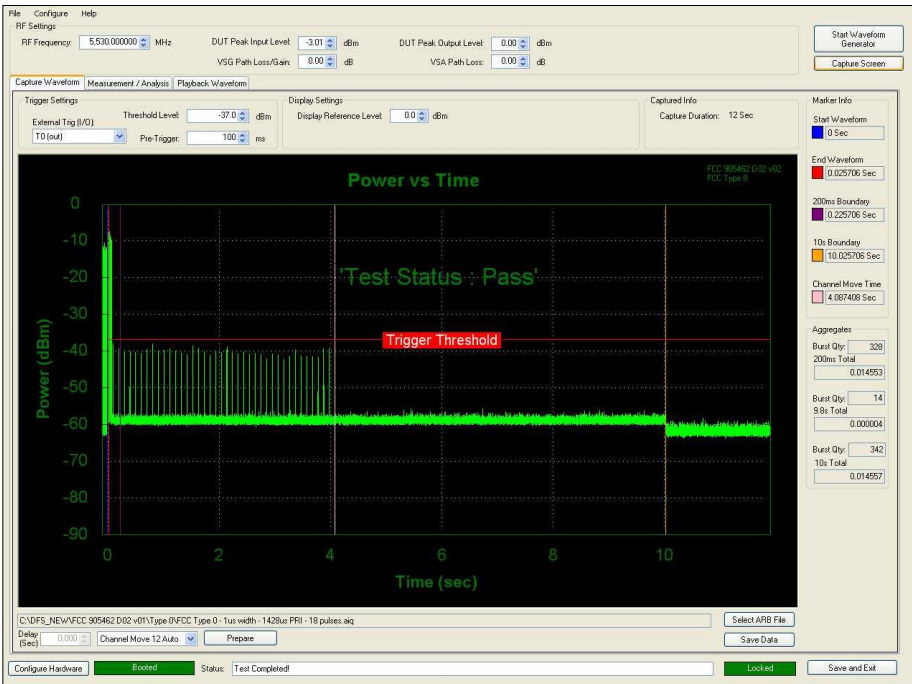


Figure 1167 - 10 s Channel Shutdown

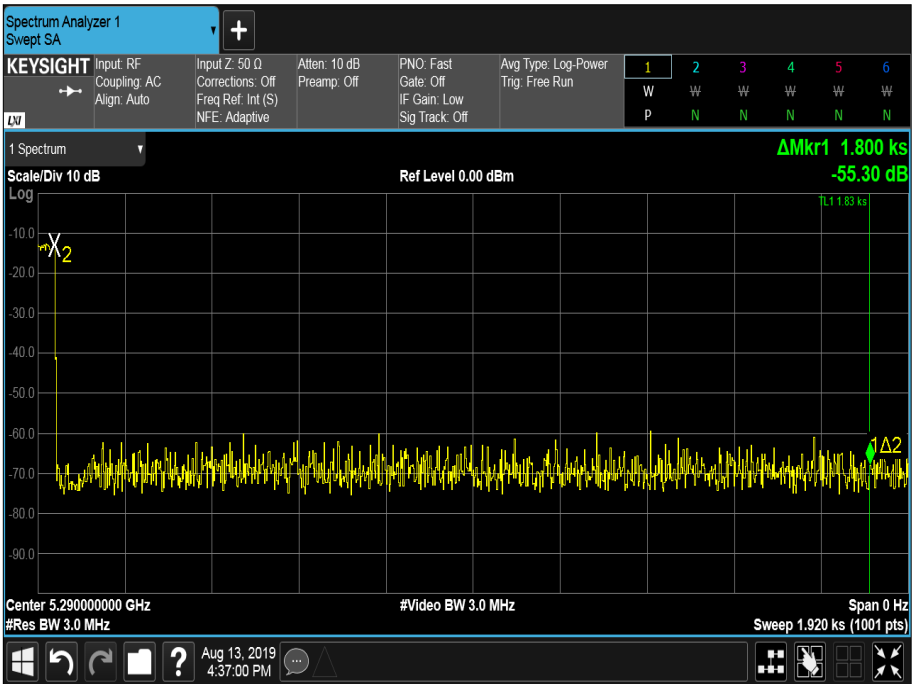


Figure 1168 - Non - Occupancy Period



FCC 47 CFR Part 15, Limit Clause 15.407 (h)(2)(iii)

Channel Move Time	<10 seconds
Channel Closing Time (Aggregate Time During 200ms)	<200 ms
Channel Closing Time (Aggregate Time During +200ms to 10s)	<60 ms

Table 470

FCC 47 CFR Part 15, Limit Clause 15.407 (h)(2)(iv)

Non-occupancy Period	> 30 minutes
----------------------	--------------

Table 471

2.7.8 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 3.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Hygrometer	Rotronic	I-1000	2891	12	18-Sep-2019
PXI RF Digitizer	Aeroflex	3035	4012	24	15-Mar-2020
PXI RF Synthesizer	Aeroflex	3010	4013	24	15-Mar-2020
PXI RF Synthesizer	Aeroflex	3011	4014	24	15-Mar-2020
PXI Digital RF Signal Generator	Aeroflex	3025	4015	24	15-Mar-2020
PSA Signal Analyser	Keysight Technologies	N9030A	4654	12	08-Oct-2019
Power splitter - 2 port	Mini-Circuits	ZN2PD-63-S+	4742	12	19-Sep-2019
Wireless Router - AC 1900, Dual-band	Asus	RT-AC68U	4881	-	TU
Cable (18 GHz)	Rosenberger	LU7-071-1000	5096	12	04-Oct-2019
Cable (18 GHz)	Rosenberger	LU7-071-2000	5106	12	05-Oct-2019
Power Splitter, 4 way	Mini-Circuits	ZN4PD1-63-S+	5236	-	O/P Mon
Power Splitter, 2 way	Mini-Circuits	ZN2PD2-63-S+	5239	-	O/P Mon

Table 472

TU - Traceability Unscheduled

O/P Mon – Output Monitored using calibrated equipment



3 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Test Name	Measurement Uncertainty
Maximum Conducted Output Power	± 3.2 dB
Maximum Conducted Power Spectral Density	± 3.2 dB
Emission Bandwidth	± 2.028 MHz
Authorised Band Edges	± 6.3 dB
Spurious Radiated Emissions	30 MHz to 1 GHz: ± 5.2 dB 1 GHz to 40 GHz: ± 6.3 dB
Restricted Band Edges	± 6.3 dB
Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period	Time: ± 0.47 % Power: ± 1.29 dB

Table 473