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TEST REPORT

SCOPE OF WORK
FCC TESTING–834-5

REPORT NUMBER
210304050SZN-005

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TEST REPORT

Report No.:	210304050SZN-005
Product:	WiFi 5 Gigabit Router
Model No.:	834-5
Brand Name:	ADTRAN
FCC ID:	HDC17600021F1

Applicant:	Adtran 901 Explorer Boulevard, Huntsville, Alabama 35806-2807, United States
Test Method(s)/ Standard(s):	FCC Part 15 Subpart E; KDB 789033 D02 v02r01; KDB 662911 D01 v02r01; KDB 905462 D02 v02; ANSI C63.10-2013
Conclusion:	The sample as received complied with the FCC Part 15 Subpart E requirement.
Test By:	Intertek Testing Services Shenzhen Ltd. Longhua Branch 101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community, GuanHu Subdistrict, LongHua District, Shenzhen, P.R. China.

Sample Receipt Date:	04 March 2021
Test Conducted Date:	04 March 2021 to 30 July 2021
Issue Date:	23 August 2021

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Summary of Tests

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15.407 a (1)/(3)	Power Spectrum Density test	4	Pass
15.407 e	6dB Bandwidth	5	Pass
15.407 b, 15.205, 15.209	Radiated spurious emission test	6	Pass
15.207	AC line conducted emission test	7	Pass
15.407 g	Frequency Stability	8	Pass
15.407 h	Dynamic Frequency Selection (DFS)	9.3	Pass

1. General information

1.1 Identification of the EUT

Product:	WiFi 5 Gigabit Router
Model No.:	834-5
Type of Device:	Master device
Nominal Channel Bandwidth:	802.11a/n-HT20(20MHz), 802.11n-HT40(40MHz), 802.11ac(20/40/80MHz)
Operating Frequency:	5150MHz~5250 MHz, 5250MHz~5350MHz, 5470MHz-5725MHZ, 5725MHz~5850MHz
Channel Number:	4 channels for 5180 MHz ~ 5240 MHz (802.11 a/n20/ac-HT20); 2 channels for 5190 MHz ~ 5230 MHz (802.11 n40/ac-HT40); 1 channels for 5210 MHz (802.11ac-HT80); 4 channels for 5260 MHz ~ 5320 MHz (802.11 a/n20/ac-HT20); 2 channels for 5270 MHz ~ 5310 MHz (802.11 n40/ac-HT40); 1 channels for 5290 MHz (802.11ac-HT80); 8 channels for 5500 MHz ~ 5580 & 5660MHz ~ 5700 MHz (802.11a/n20/ac-HT20); 3 channels for 5510 MHz ~ 5550MHz & 5670 MHz (802.11n40/ac-HT40); 1 channels for 5530 MHz (802.11ac-HT80); 5 channels for 5745 MHz ~ 5825 MHz (802.11a/n20/ac-HT20); 2 channels for 5755 MHz ~ 5795 MHz (802.11n40/ac-HT40); 1 channels for 5775 MHz (802.11ac-HT80);
Modulation:	802.11a: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
Rated Power:	12Vdc via adapter Input: AC100~240V, 50/60Hz, 1.0A, Output 12Vdc, 3.0A
Note 1:	This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.
Note 2:	When determining the test conclusion, the Measurement Uncertainty of test has been considered.

1.2 Additional information about the EUT

The equipment under test (EUT) is a WiFi 5 Gigabit Router with Bluetooth 5.0 (dual-mode) function operating in 2402-2480MHz, 2.4G WIFI function operating in 2412-2462MHz and 5G WIFI function operating in 5150MHz~5250 MHz, 5250MHz~5350MHz, 5470MHz- 5725MHZ, 5725MHz~5850MHz. The EUT is powered by 12Vdc via adapter Input: AC100~240V, 50/60Hz, 1.0A, Output 12Vdc, 3.0A. For more detail information pls. refer to the user manual.

For more detail features, please refer to User's description as file name “descri.pdf”.

Related Submittal(s) Grants
This is an application for certification of U–NII device (5GHz Wi-Fi transmitter portion).
For the BT classic function was tested and demonstrated in report 210304050SZN-002.
For the BT BLE function was tested and demonstrated in report 210304050SZN-003.
For the 2.4GHz WIFI function was tested and demonstrated in report 210304050SZN-004.
For the Digital Function: Subject to FCC Part 15B SDOC.

1.3 Antenna description (15.203)

The EUT uses Integral Antenna which in accordance to Section 15.203 is considered sufficient to comply with the provisions of this section.

Transmit Path	Chain 1	Chain 2	Chain 3	Chain 4	Beamforming Gain
Max. ANT Gain (5G)	4.8dBi	5.0dBi	4.2dBi	4.6dBi	10.68dBi
Antenna Type	Integral antenna	Integral antenna	Integral antenna	Integral antenna	/

1.4 Peripherals equipment

Description	Manufacturer	Model No.
Portable computer	DELL	Latitude 3410
Network Cable	/	Unshielded, 150cm
AC/DC adapter	/	Model: S36B52-120A300-C4-6 Input: AC100~240V, 50/60Hz, 1.0A, Output 12Vdc, 3.0A

2. Test specifications

2.1 Test standard

The EUT was performed according to the procedures in FCC Part 15 E, Section15.203, 15.207, 15.209, 15.407 and ANSI C63.10/2013, method of measurement: KDB 789033.

The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of this frequency band was all meet limit requirement, thus we evaluate the EUT pass the specified test.

The AC power conducted emissions was invested over the frequency range from 0.15 MHz to 30 MHz using a receiver bandwidth of 9 kHz (15.207 paragraph).

Radiated emissions were invested cover the frequency range from 9KHz to 30MHz using a receiver RBW of 9kHz, from 30 MHz to 1000 MHz using a receiver RBW of 120 kHz record QP reading, and the frequency over 1 GHz using a spectrum analyzer RBW of 1 MHz, VBW of 3MHz, Detector=Peak record for Peak reading, RBW of 1 MHz, VBW of 3MHz, Detector=RMS record for Average reading recorded on the report.

The EUT setup configurations please refer to the photo of radiated setup photos.pdf & conducted setup photos.pdf.

2.2 Operation mode

The EUT was supplied by and it was run in TX mode that was controlled by client provided RF testing program.

The EUT was transmitted continuously during the test. The worst case test result was showed in the report.

With individual verifying, the maximum output power was found at 6 Mbps data rate for 802.11a mode, 6.5 Mbps data rate for 802.11n-HT20 mode, 13.5 Mbps data rate for 802.11n-HT40 mode, 29.3Mbps data rate for 802.11ac. The final tests were executed under these conditions and recorded in this report individually.

2.3 EUT Exercising Software

The EUT exercise program (provided by client) used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The worst case configuration is used in all specified testing.

Table for Parameters of Test Software Setting
During testing, Channel & Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Test software: MT7622 QA 0.0.1.93. exe

3. Maximum Output Power test (FCC 15.407)

3.1 Operating environment

Temperature: 25 ℃
Relative Humidity: 55 %
Atmospheric Pressure: 1011 hPa

3.2 Test setup & procedure

The power output per FCC §15.407(a) was measured on the EUT using a 50 ohm SMA cable connected to Power Meter and the measurement method refer to 789033 D02. Power was read directly and cable loss correction (1.0dB) was added to the reading to obtain power at the EUT antenna terminals.

3.3 Limit

Operating Frequency (MHz)	Max Conducted TX Power	Max EIRP
5150~5250	30dBm (1W) for master device	4W (36dBm) with 6dBi antenna
	24dBm (250mW) for client device	
5250~5350	24dBm (250mW) or 11dBm+ 10logB*	1W (30dBm) with 6dBi antenna
5470~5725	24dBm (250mW) or 11dBm+ 10logB*	
5725~5850	30dBm (1W)	4W (36dBm) with 6dBi antenna

Remark:

1)*Where B is the 26dB emission Bandwidth in MHz.

2)The device was declared as master device.

3)The device can operate with only one spatial stream, that is means the lowest value NSS for this device is 1.

4)Tx Power Reduction (dBm-by-dBi) required when antenna exceeds 6dBi.

5) In CDD mode (4Tx), Ant1+Ant2+Ant3+Ant4 Directional gain = 5.0dBi < 6 dBi.

6) In Beamforming mode (4Tx), Ant1+Ant2+Ant3+Ant4

Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / N_{ANT}]$ dBi

$= 10 \log[(10^{4.8/20} + 10^{5.0/20} + 10^{4.2/20} + 10^{4.6/20})^2 / 4_{ANT}]$ dBi

=10.68dBi> 6 dBi.

Therefore, in beamforming Mode,

In Band 1 & Band 4 the conducted power limit is 30-(10.68-6)dBi=25.32dBm

In Band 2 & Band 3 the conducted power limit is 23.98-(10.68-6)dBi=19.30dBm

3.4 Measured data of Maximum Output Power test results

Max Conducted TX Power

The more detail please refer to “Appendix of 210304050SZN-005” Appendix B1.

Max EIRP TX Power

The more detail please refer to “Appendix of 210304050SZN-005” Appendix B2.

4. Power Spectrum Density test (FCC 15.407)

4.1 Operating environment

Temperature:	25	℃
Relative Humidity:	50	%
Atmospheric Pressure:	1013	hPa

4.2 Test setup & procedure

Method of Measurement:

The power spectrum density per FCC §15.407(a) was measured from the antenna port of the EUT using a 50 ohm spectrum analyzer with the resolution bandwidth set at 1MHz/500KHz, the video bandwidth set at 3 MHz/2MHz (measurement method refer to KDB 789033 D02). Power spectrum density was read directly and cable loss reading to obtain power at the EUT antenna terminals.

4.3 Limit

Operating Frequency (MHz)	Max Conducted Power Spectral Density
5150~5250	*17dBm/MHz for master device
	11dBm/MHz for mobile/portable client device
5250~5350	11dBm/MHz
5470~5725	11dBm/MHz
5725~5850	30dBm/500KHz

Remark:

1) *The device was declared as Master device.
2) The device can operate with only one spatial stream, that is means the lowest value NSS for this device is 1.
3) Tx Power Reduction (dBm-by-dBi) required when antenna exceeds 6dBi.
4) In CDD mode (4Tx), Ant1+Ant2+Ant3+Ant4 Directional gain = 5.0dBi < 6 dBi.
5) In Beamforming mode (4Tx), Ant1+Ant2+Ant3+Ant4

   Directional gain $= 10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / N_{ANT}]$ dBi

   $= 10 \log[(10^{4.8/20} + 10^{5.0/20} + 10^{4.2/20} + 10^{4.6/20})^2 / 4_{ANT}]$ dBi

   = 10.68dBi> 6 dBi.

   Therefore, in beamforming Mode,
   In Band 1 the conducted power limit is 17-(10.68-6)dBi=12.32dBm
   In Band 2 & Band 3 the conducted power limit is 11-(10.68-6)dBi=6.32dBm
   In Band 4 the conducted power limit is 30-(10.68-6)dBi=25.32dBm

4.4 Measured data of Power Spectrum Density test results

The more detail please refer to “Appendix of 210304050SZN-005” Appendix C.

5. Minimum 6 dB RF Bandwidth (FCC 15.407)

5.1 Operating environment

Temperature:	25	℃
Relative Humidity:	50	%
Atmospheric Pressure:	1011	hPa

5.2 Test setup & procedure

The Minimum 6 dB RF Bandwidth per 789033 D02 was measured from the antenna port of the EUT using a 50 ohm spectrum analyzer with the resolution bandwidth set at 100KHz, and set the video bandwidth (VBW) ≥ 3 x RBW. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 6 dB lower than PEAK level. The 6dB bandwidth was determined from where the channel output spectrum intersected the display line.

For 26dB down Emission Bandwidth

The 26dB down Emission Bandwidth per 789033 D02 was measured from the antenna port of the EUT using a 50 ohm spectrum analyzer with the resolution bandwidth set RBW = approximately 1% of the emission bandwidth. Set the VBW > RBW, Detector = Peak, Trace mode = max hold (Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%).

For 99% Occupied Bandwidth

The 99% Occupied Bandwidth per 789033 D02 was measured from the antenna port of the EUT using a 50 ohm spectrum analyzer with the resolution bandwidth set center frequency to the nominal EUT channel center frequency, set span = 1.5 times to 5.0 times the OBW, set RBW = 1 % to 5 % of the OBW, set VBW ≥ 3x RBW, The 99% occupied bandwidth was determined from where the channel output spectrum intersected the display line.

5.3 Limit

Operating Frequency (MHz)	Minimum 6 dB RF Bandwidth Limit
5150~5250	N/A
5250~5350	N/A
5470~5725	N/A
5725~ 5850	≥500KHz

5.4 Measured data of Emission Bandwidth test results

Note: 99% Occupied Bandwidth and 26dB Emission Bandwidth for reference, the more detail please refer to “Appendix of 210304050SZN-005” Appendix A2 and Appendix A1.

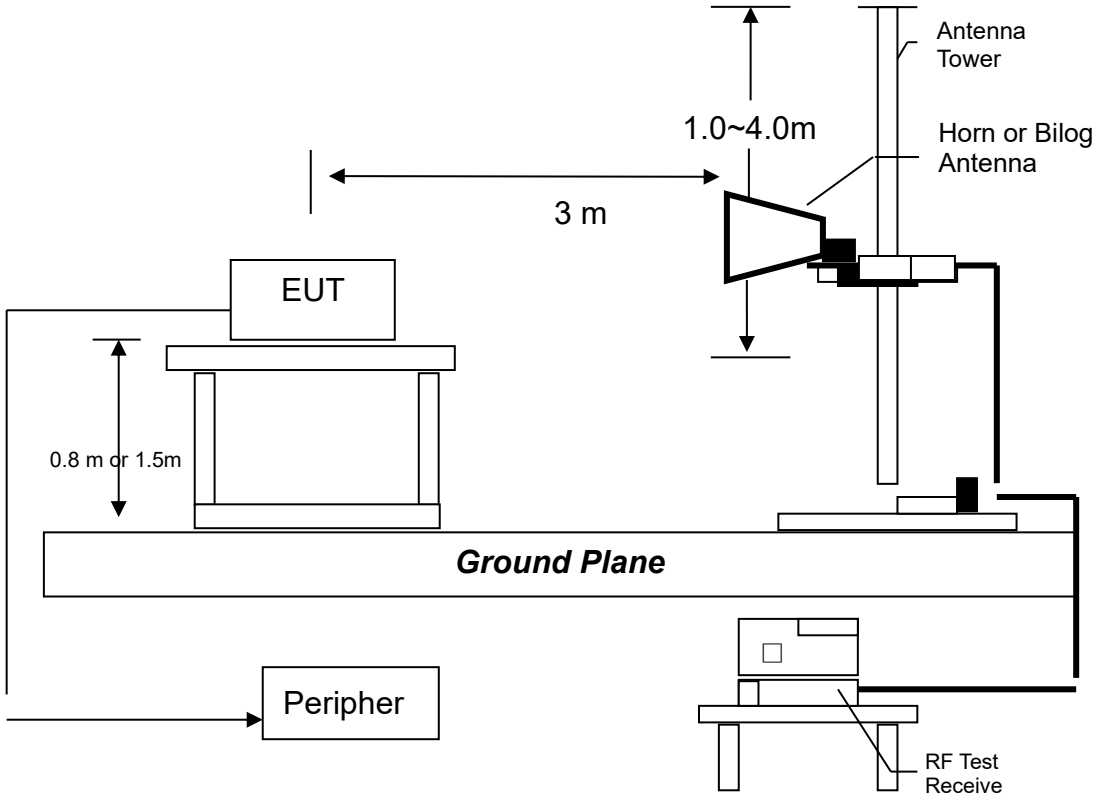
6. Radiated Emission test (FCC 15.205 & 15.209 & 15.407)

6.1 Operating environment

Temperature:	23	℃
Relative Humidity:	56	%
Atmospheric Pressure	1011	hPa

6.2 Test setup & procedure

The Diagram below shows the test setup, which is utilized to make these measurements.



Radiated emission measurements were performed from 9KHz to tenth harmonic or 40GHz.

The EUT for testing is arranged on a styrene turntable with the height of 0.8m up to 1GHz and 1.5m above 1GHz. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

Testing settings (refer to KDB 789033 D02)
Peak Measurements below 1GHz
1, Analyzer center frequency was set to the frequency of the radiated spurious emission.
2, Span=encompass the entire emission
3, RBW=120KHz
4, Detector=Quasi-Peak
5, Trace was allowed to stabilize

Peak Measurements above 1GHz
1, Analyzer center frequency was set to the frequency of the radiated spurious emission.
2, Span=encompass the entire emission
3, RBW=1MHz
4, VBW=3MHz
4, Detector= Peak (Max-hold)
5, Trace was allowed to stabilize

Average Measurements above 1GHz
1, Analyzer center frequency was set to the frequency of the radiated spurious emission.
2, Span=encompass the entire emission
3, RBW=1MHz
4, VBW=3MHz
4, Detector= RMS (Max-hold)
5, Trace was allowed to stabilize

6.3 Limit

The spurious Emission shall test through the 10th harmonic or 40GHz (whichever is lower). In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

Notes:

1, All emission out-side of the 5.15-5.35GHz & 5.47-5.725GHz band shall not exceed an EIRP of -27dBm/MHz (68.2dBuV/m, test distance: 3 meter), For the band 5.725-5.85GHz, all emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

2, The spectrum is measured from 9KHz to the 10th harmonic of the fundamental frequency of the transmitter using QP detector below 1GHz, above 1GHz, average & peak measurements were taken using for test. The worst-case emission are reported however emission whose levels were not within 20dB of the respective limited were not reported.

3, The test was performed on EUT under 802.11a/n-HT20/n-HT40/ac-HT20/HT40/HT80 continuously transmitting mode. Simultaneous transmitting was considered during the testing. All mode had been tested, but only the worst-case is recorded in the following graph and table.

6.3.1 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

FS = RA + AF + CF - AG + PD

Where FS = Field Strength in dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB
PD = Pulse Desensitization in dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

FS = RA + AF + CF - AG + PD

Example

Assume a receiver reading of 62.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB. The net field strength for comparison to the appropriate emission limit is 32 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 62.0 dBμV
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
PD = 0 dB
FS = 62 + 7.4 + 1.6 - 29 + 0 = 42 dBμV/m

Level in mV/m = Common Antilogarithm [(42 dBμV/m)/20] = 125.9 μV/m

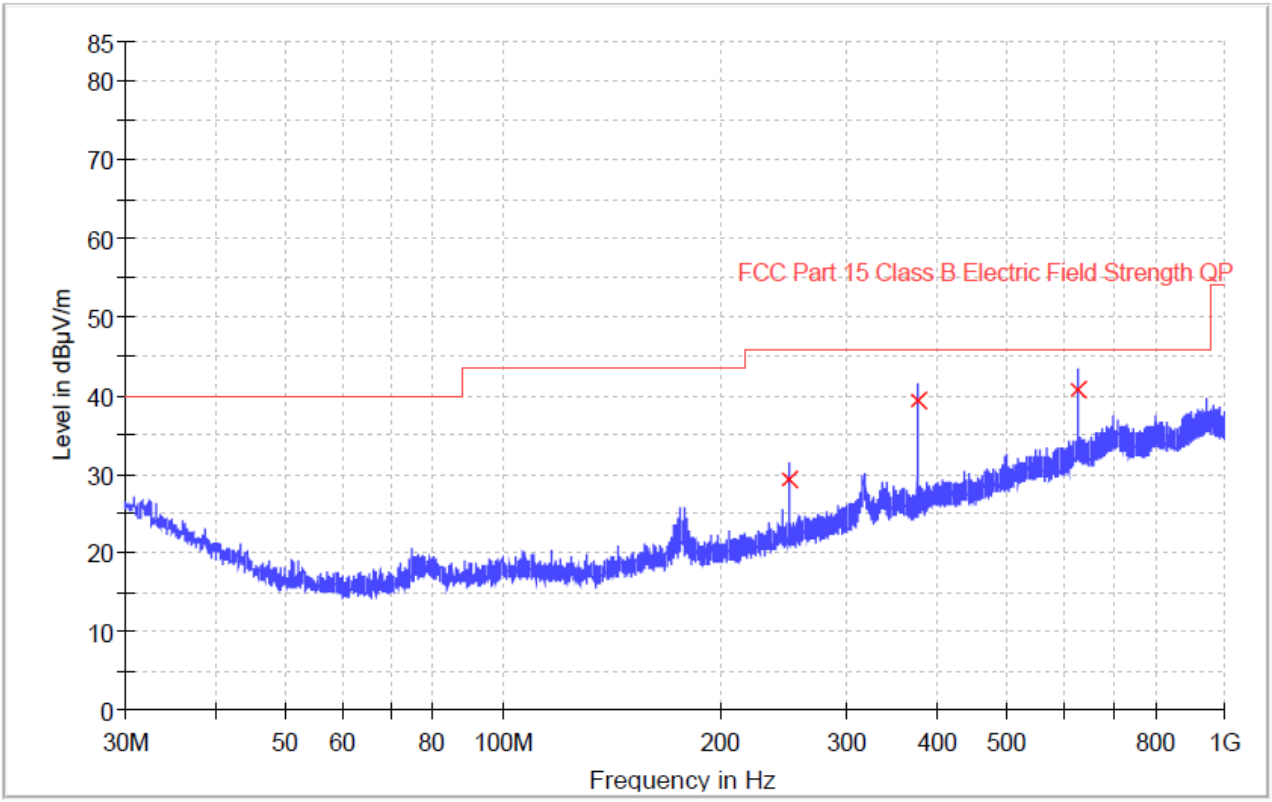
6.4 Radiated spurious emission test data

6.4.1 Measurement results: frequencies equal to or less than 1 GHz

Applicant: Adtran
Date of Test: 27 May 2021 Model: 834-5
Worst Case Operating Mode: Simultaneous transmission

Radiated Emissions

ANT Polarity: Horizontal



Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
249.963667	29.4	1000.0	120.000	H	14.2	16.7	46.0
374.996667	39.4	1000.0	120.000	H	17.3	6.6	46.0
624.998000	40.8	1000.0	120.000	H	24.3	5.2	46.0

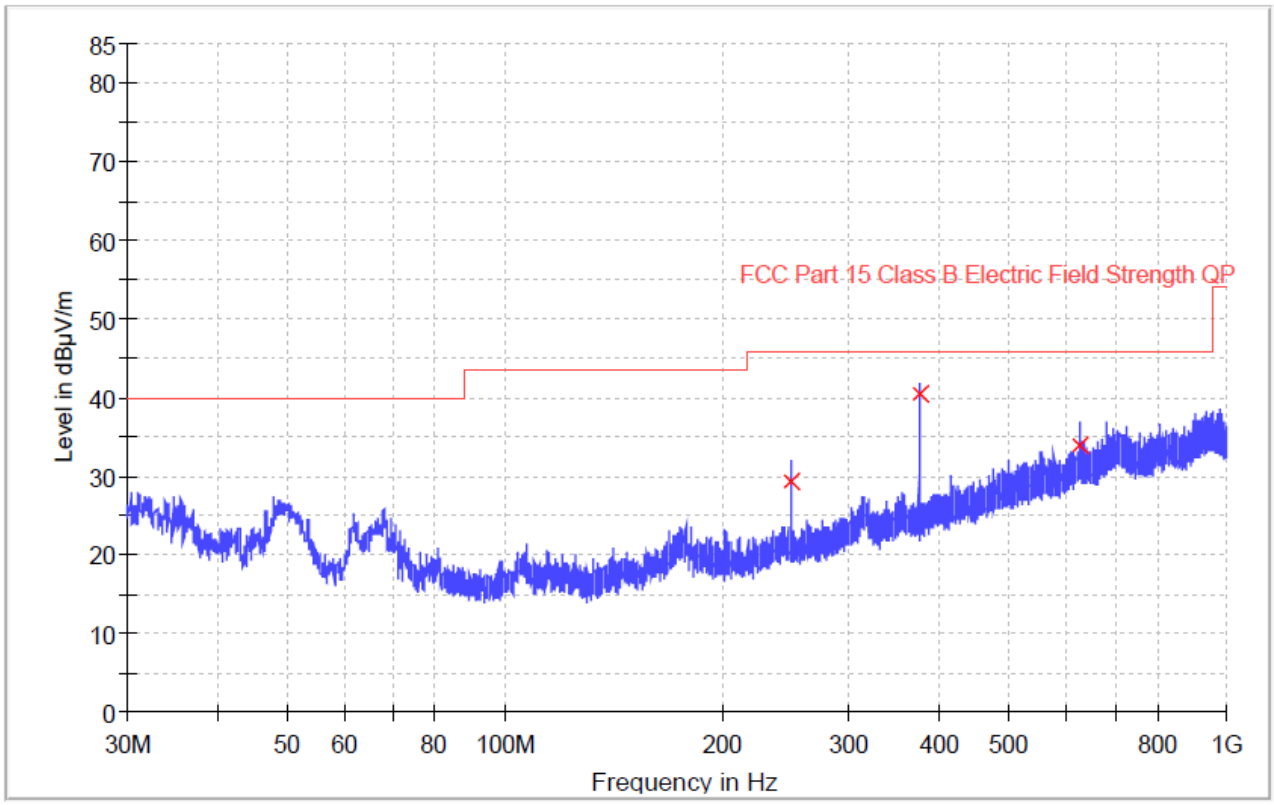
NOTES:

1. Quasi-Peak detector is used for frequency below 1GHz.
2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. All emissions are below the QP limit.

Applicant: Adtran
Date of Test: 27 May 2021 Model: 834-5
Worst Case Operating Mode: Simultaneous transmission

Radiated Emissions

ANT Polarity: Vertical



Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
249.996000	29.3	1000.0	120.000	V	14.2	16.7	46.0
375.029000	40.3	1000.0	120.000	V	17.3	5.7	46.0
625.030333	33.9	1000.0	120.000	V	24.3	12.1	46.0

NOTES:

1. Quasi-Peak detector is used for frequency below 1GHz.
2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. All emissions are below the QP limit.

6.4.2 Measurement results: frequency above 1GHz

The worst case occurred at 802.11n40_MIMO

Channel 54/27Mbps

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	5146.000	46.2	36.3	38.9	48.8	74.0	-25.2
Horizontal	15810.000	40.2	34.7	41.0	46.5	74.0	-27.5

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	5146.000	38.4	36.3	38.9	41.0	54.0	-13.0
Horizontal	15810.000	37.7	34.7	41.0	44.0	54.0	-10.0

Channel 62/27Mbps

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	5351.000	48.3	36.3	38.9	50.9	74.0	-23.1
Horizontal	15930.000	44.0	34.7	41.0	50.3	74.0	-23.7

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	5351.000	40.5	36.3	38.9	43.1	54.0	-10.9
Horizontal	15930.000	39.2	34.7	41.0	45.5	54.0	-8.5

Channel 102/27Mbps

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	5450.000	49.3	36.3	38.9	51.9	74.0	-22.1
Horizontal	16530.000	43.5	34.7	41.0	49.8	68.2	-18.4

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	5450.000	42.2	36.3	38.9	44.8	54.0	-9.2
Horizontal	16530.000	39.6	34.7	41.0	45.9	54.0	-8.1

Channel 110/27Mbps

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	11100.000	48.9	36.3	38.9	51.5	74.0	-22.5
Horizontal	16650.000	46.5	34.7	41.0	52.8	68.2	-15.4

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	11100.000	39.1	36.3	38.9	41.7	54.0	-12.3
Horizontal	16650.000	36.0	34.7	41.0	42.3	54.0	-11.7

Channel 134/27Mbps

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	5741.000	50.0	36.3	39.0	52.7	68.2	-15.5
Horizontal	17010.000	45.4	34.7	41.2	51.9	68.2	-16.3

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	5741.000	--	--	--	--	--	--
Horizontal	17010.000	37.8	34.7	41.2	44.3	54.0	-9.7

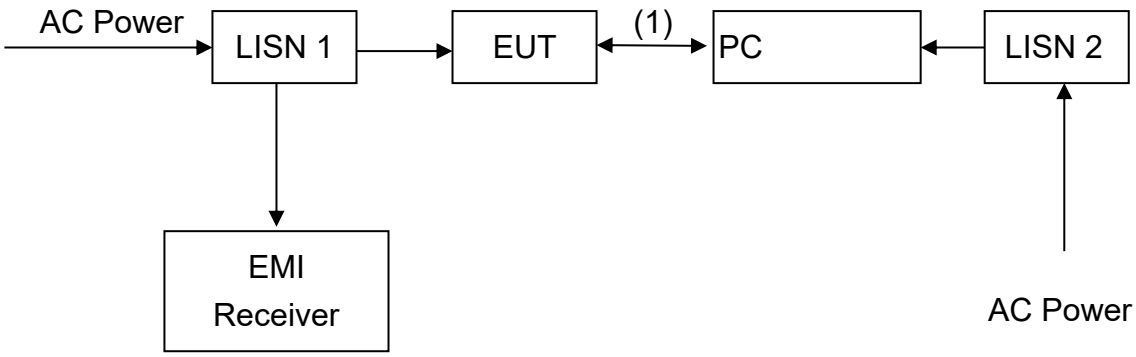
* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function. All unwanted emissions outside of the 5.15-5.35GHz & 5.47-5.725GHz & 5725-5850 bands are complied with the limit.

7. Power Line Conducted Emission test

7.1 Operating environment

Temperature:	23	℃
Relative Humidity:	55	%
Atmospheric Pressure	1011	hPa

7.2 Test setup & procedure



The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50 ohm/50 uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50 ohm/50 uH coupling impedance with 50 ohm termination.

Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10/2013 on conducted measurement.

The bandwidth of the field strength meter (R & S Test Receiver ESCI 30) is set at 9 kHz.

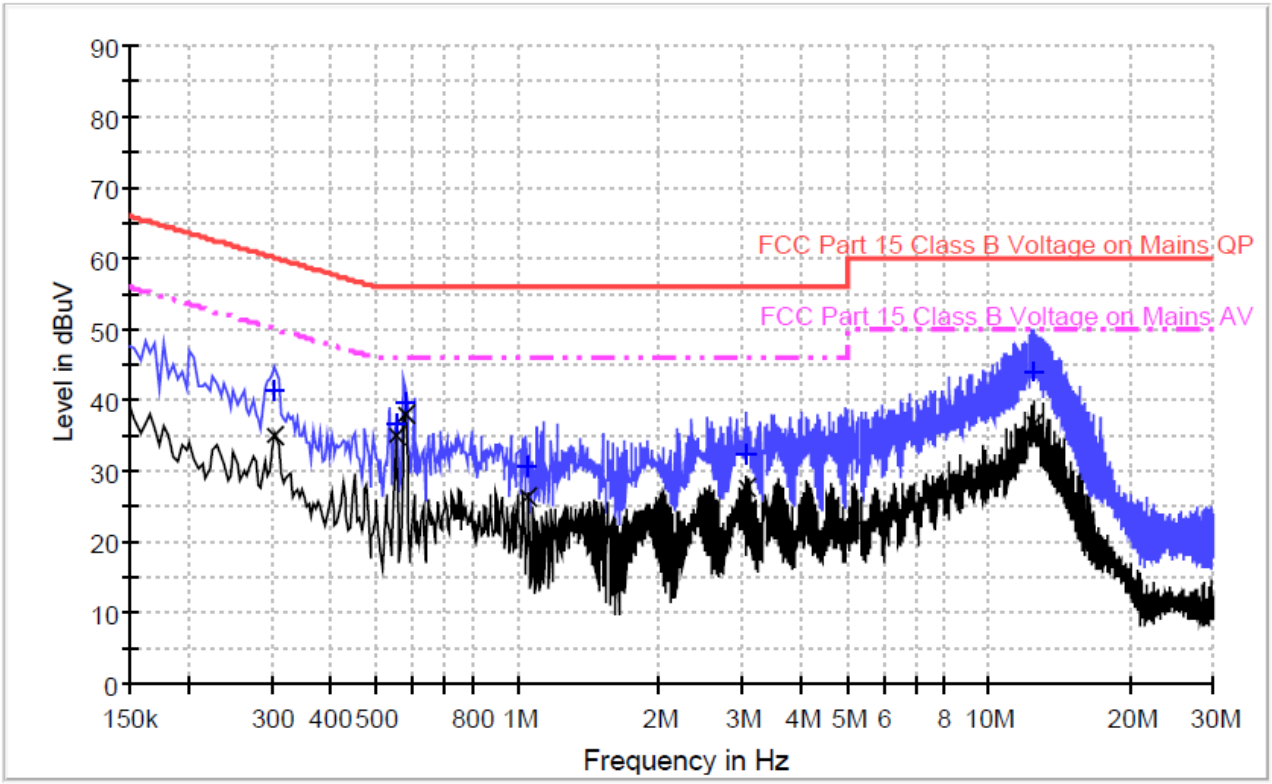
7.3 Limit

Frequency (MHz)	Conducted Limit (dBuV)	
	Q.P.	Ave.
0.15~0.50	66 – 56*	56 – 46*
0.50~5.00	56	46
5.00~30.0	60	50

*Decreases with the logarithm of the frequency.

7.4 Power Line Conducted Emission test data

Applicant: Adtran
Date of Test: 13 April 2021 Model: 834-5
Worst Case Operating Mode: Simultaneous transmission
Phase: Live



Result Table QP

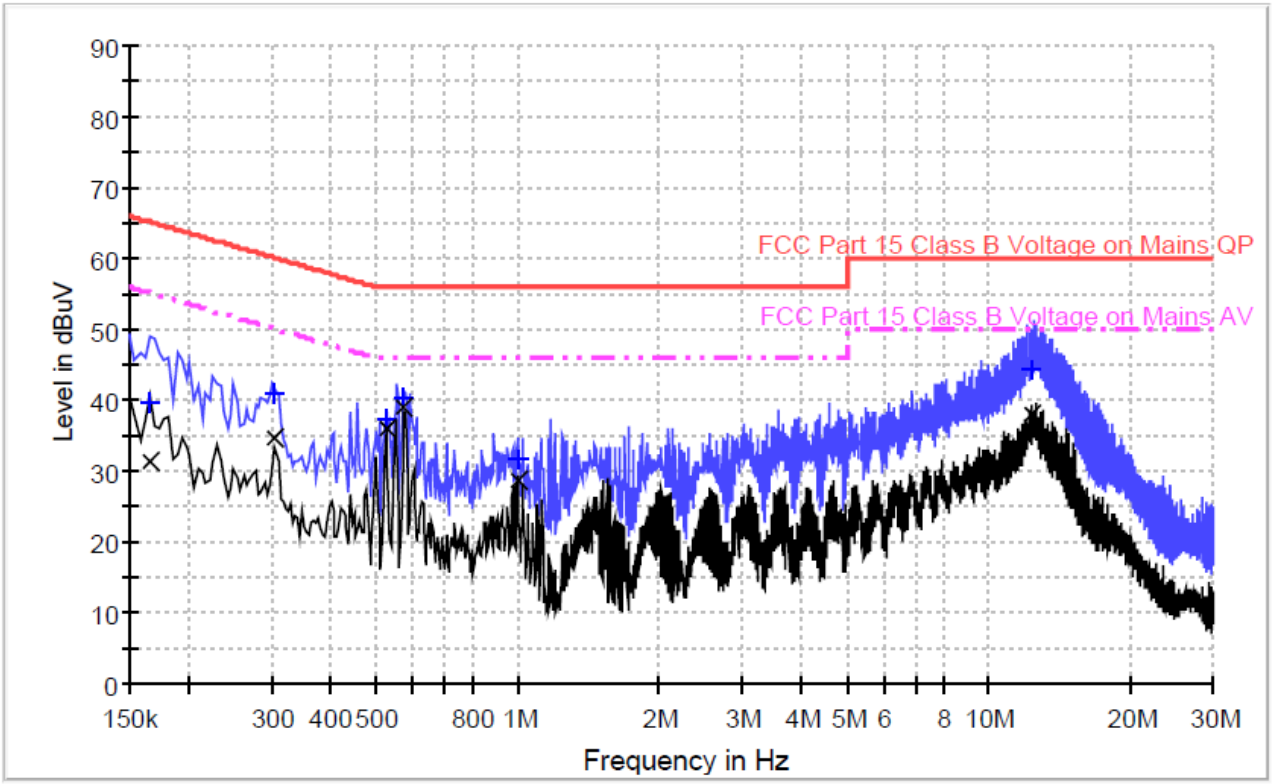
Frequency (MHz)	QuasiPeak (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.306000	41.3	L	9.6	18.8	60.1
0.550000	36.8	L	9.6	19.2	56.0
0.578000	39.7	L	9.6	16.3	56.0
1.054000	30.7	L	9.7	25.3	56.0
3.058000	32.4	L	9.7	23.6	56.0
12.482000	43.9	L	9.9	16.1	60.0

Result Table AV

Frequency (MHz)	Average (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.306000	35.1	L	9.6	15.0	50.1
0.550000	35.1	L	9.6	10.9	46.0
0.578000	37.9	L	9.6	8.1	46.0
1.054000	26.3	L	9.7	19.7	46.0
3.058000	27.6	L	9.7	18.4	46.0
12.482000	36.5	L	9.9	13.5	50.0

Remark:
1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Limit (dBuV) – Level (dBuV)

Applicant: Adtran
Date of Test: 13 April 2021
Model: 834-5
Worst Case Operating Mode: Simultaneous transmission
Phase: Neutral



Result Table QP

Frequency (MHz)	QuasiPeak (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.166000	39.7	N	9.5	25.5	65.2
0.306000	41.1	N	9.5	19.0	60.1
0.526000	37.3	N	9.5	18.7	56.0
0.574000	40.4	N	9.5	15.6	56.0
1.002000	31.6	N	9.5	24.4	56.0
12.370000	44.3	N	9.9	15.7	60.0

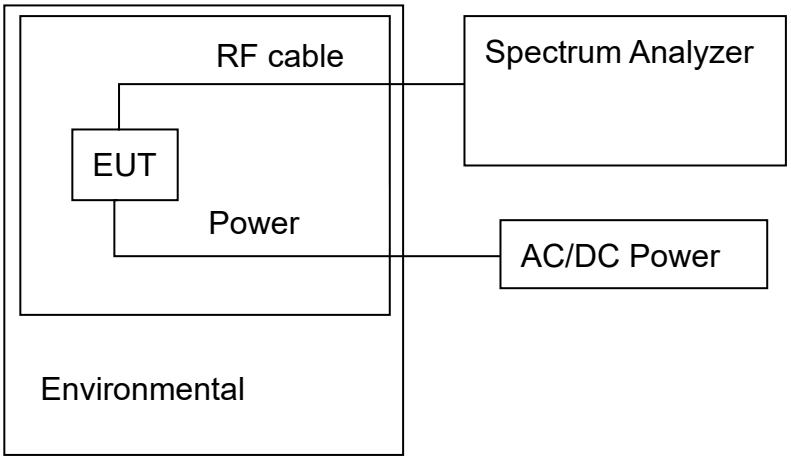
Result Table AV

Frequency (MHz)	Average (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.166000	31.3	N	9.5	23.9	55.2
0.306000	34.7	N	9.5	15.4	50.1
0.526000	36.2	N	9.5	9.8	46.0
0.574000	39.1	N	9.5	6.9	46.0
1.002000	28.8	N	9.5	17.2	46.0
12.370000	37.9	N	9.9	12.1	50.0

Remark:
1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Limit (dBuV) – Level (dBuV)

8. Frequency Stability Test

8.1 Test setup & procedure



Note1: The frequency stability is measured with the temperature variation range of 0℃ to +40℃, and voltage supply variation range of 85% to 115% of nominal DC supply voltage.

Note2: To ensure emission at the band-edge is maintained within the authorized band, the frequency 802.11a/n-HT20/n-HT40/ac-HT20/HT40/HT80 channel 36, 48, 52, 64, 100, 140, 149, 165, 38, 46, 54, 62, 102, 134, 151, 159, 42, 58, 106, 155 are selected to test and the worst case was reported.

8.2 Frequency Stability Test Data

20℃ is taken as temperature in normal condition (NT).

12.0 VDC is normal voltage (NV)

10.2 VDC is low voltage (LV)

13.8 VDC is high voltage (HV)

The more detail please refer to “Appendix of 210304005SZN-005” Appendix D.

Note: All emissions are maintained within the band of operation under all conditions of normal operation as specified in the user manual. It fulfills the requirement of 15.407(g).

9. Dynamic Frequency Selection (DFS) (FCC 15.407)

9.1 Requirement

Applicability of DFS Requirements Prior to Use of a Channel

Requirement	Operational Mode Mode		
	Master	Client Without Radar Detection	
Non-Occupancy Period	Yes	Not Required	Yes
DFS Detection Threshold	Yes	Not Required	Yes
Channel Availability Check Time	Yes	Not Required	Not Required
U-NII Detection Bandwidth	Yes	Not Required	Yes

Applicability of DFS requirements during normal operation

Requirement	Operational Mode	
	Master Device or Client with Radar Detection	Client Without Radar Detection
DFS Detection Threshold	Yes	Not Required
Channel Closing Transmission Time	Yes	Yes
Channel Move Time	Yes	Yes
U-NII Detection Bandwidth	Yes	Not Required

Additional requirements for devices with multiple bandwidth modes	Master Device or Client with Radar Detection	Client Without Radar Detection
U-NII Detection Bandwidth and Statistical Performance Check	All BW modes must be tested	Not required
Channel Move Time and Channel Closing Transmission Time	Test using widest BW mode available	Test using the widest BW mode available for the link
All other tests	Any single BW mode	Not required
Note: Frequencies selected for statistical performance check 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.		

Note: EUT is a Master device and with DFS detection capabilities.

9.1.1 DFS Detection Thresholds for Master or Client Devices with DFS Detection

Maximum Transmit Power	Values (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

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.

Parameter	Value
Non-Occupancy Period	Minimum 30 minutes
Channel Availability Check Time	60 Seconds
Channel Move Time	10 seconds (see note 1)
Channel Closing Transmission Time	200 ms + an aggregate of 60 ms over remaining 10 Second period. (see note 1 and 2)
U-NII Detection Bandwidth	Minimum 100% of the U-NII 99% transmission power bandwidth. (see note 3)

Note 1: Channel Move Time and the Channel Closing Transmission Time should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst.

Note 2: The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate a Channel 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 U-NII Detection Bandwidth 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.

9.1.2 Radar Test Waveforms

Test procedures were made in accordance to KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02, for more radar test waveform details please refer section 6 of KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02.

Radar Type 0

Trial List

	Trial Id	Radar Type	Pulse Width (us)	PRI (us)	Number of Pulses	Waveform Length (us)
Download	0	Type 0	1.0	1428.0	18	25704.0
Download	1	Type 0	1.0	1428.0	18	25704.0
Download	2	Type 0	1.0	1428.0	18	25704.0
Download	3	Type 0	1.0	1428.0	18	25704.0
Download	4	Type 0	1.0	1428.0	18	25704.0
Download	5	Type 0	1.0	1428.0	18	25704.0
Download	6	Type 0	1.0	1428.0	18	25704.0
Download	7	Type 0	1.0	1428.0	18	25704.0
Download	8	Type 0	1.0	1428.0	18	25704.0
Download	9	Type 0	1.0	1428.0	18	25704.0
Download	10	Type 0	1.0	1428.0	18	25704.0
Download	11	Type 0	1.0	1428.0	18	25704.0
Download	12	Type 0	1.0	1428.0	18	25704.0
Download	13	Type 0	1.0	1428.0	18	25704.0
Download	14	Type 0	1.0	1428.0	18	25704.0
Download	15	Type 0	1.0	1428.0	18	25704.0
Download	16	Type 0	1.0	1428.0	18	25704.0
Download	17	Type 0	1.0	1428.0	18	25704.0
Download	18	Type 0	1.0	1428.0	18	25704.0
Download	19	Type 0	1.0	1428.0	18	25704.0
Download	20	Type 0	1.0	1428.0	18	25704.0
Download	21	Type 0	1.0	1428.0	18	25704.0
Download	22	Type 0	1.0	1428.0	18	25704.0
Download	23	Type 0	1.0	1428.0	18	25704.0
Download	24	Type 0	1.0	1428.0	18	25704.0
Download	25	Type 0	1.0	1428.0	18	25704.0
Download	26	Type 0	1.0	1428.0	18	25704.0
Download	27	Type 0	1.0	1428.0	18	25704.0
Download	28	Type 0	1.0	1428.0	18	25704.0
Download	29	Type 0	1.0	1428.0	18	25704.0

Radar Type 1

Trial List

	Trial Id	Radar Type	Pulse Width (us)	PRI (us)	Number of Pulses	Waveform Length (us)
Download	0	Type 1	1.0	938.0	57	53466.0
Download	1	Type 1	1.0	698.0	76	53048.0
Download	2	Type 1	1.0	618.0	86	53148.0
Download	3	Type 1	1.0	538.0	99	53262.0
Download	4	Type 1	1.0	878.0	61	53558.0
Download	5	Type 1	1.0	3066.0	18	55188.0
Download	6	Type 1	1.0	638.0	83	52954.0
Download	7	Type 1	1.0	918.0	58	53244.0
Download	8	Type 1	1.0	838.0	63	52794.0
Download	9	Type 1	1.0	858.0	62	53196.0
Download	10	Type 1	1.0	798.0	67	53466.0
Download	11	Type 1	1.0	718.0	74	53132.0
Download	12	Type 1	1.0	578.0	92	53176.0
Download	13	Type 1	1.0	598.0	89	53222.0
Download	14	Type 1	1.0	558.0	95	53010.0
Download	15	Type 1	1.0	2536.0	21	53256.0
Download	16	Type 1	1.0	966.0	55	53130.0
Download	17	Type 1	1.0	827.0	64	52928.0
Download	18	Type 1	1.0	2501.0	22	55022.0
Download	19	Type 1	1.0	2595.0	21	54495.0
Download	20	Type 1	1.0	1114.0	48	53472.0
Download	21	Type 1	1.0	1302.0	41	53382.0
Download	22	Type 1	1.0	3045.0	18	54810.0
Download	23	Type 1	1.0	1624.0	33	53592.0
Download	24	Type 1	1.0	2878.0	19	54682.0
Download	25	Type 1	1.0	1027.0	52	53404.0
Download	26	Type 1	1.0	2485.0	22	54670.0
Download	27	Type 1	1.0	1600.0	33	52800.0
Download	28	Type 1	1.0	1172.0	46	53912.0
Download	29	Type 1	1.0	1177.0	45	52965.0

Radar Type 2

Trial List

	Trial Id	Radar Type	Pulse Width (us)	PRI (us)	Number of Pulses	Waveform Length (us)
Download	0	Type 2	3.2	179.0	26	4654.0
Download	1	Type 2	1.1	207.0	23	4761.0
Download	2	Type 2	2.1	230.0	24	5520.0
Download	3	Type 2	4.8	200.0	29	5800.0
Download	4	Type 2	3.9	214.0	28	5992.0
Download	5	Type 2	2.9	222.0	26	5772.0
Download	6	Type 2	3.2	204.0	26	5304.0
Download	7	Type 2	2.5	192.0	25	4800.0
Download	8	Type 2	3.1	164.0	26	4264.0
Download	9	Type 2	1.2	156.0	23	3588.0
Download	10	Type 2	3.9	210.0	27	5670.0
Download	11	Type 2	4.6	201.0	29	5829.0
Download	12	Type 2	3.2	162.0	26	4212.0
Download	13	Type 2	2.2	197.0	25	4925.0
Download	14	Type 2	4.5	163.0	29	4727.0
Download	15	Type 2	3.0	203.0	26	5278.0
Download	16	Type 2	5.0	168.0	29	4872.0
Download	17	Type 2	2.4	217.0	25	5425.0
Download	18	Type 2	2.9	191.0	26	4966.0
Download	19	Type 2	2.3	166.0	25	4150.0
Download	20	Type 2	3.7	150.0	27	4050.0
Download	21	Type 2	2.2	176.0	25	4400.0
Download	22	Type 2	4.9	195.0	29	5655.0
Download	23	Type 2	2.9	202.0	26	5252.0
Download	24	Type 2	2.5	178.0	25	4450.0
Download	25	Type 2	1.1	206.0	23	4738.0
Download	26	Type 2	3.8	155.0	27	4185.0
Download	27	Type 2	4.7	157.0	29	4553.0
Download	28	Type 2	2.4	224.0	25	5600.0
Download	29	Type 2	4.2	159.0	28	4452.0

Radar Type 3

Trial List

	Trial Id	Radar Type	Pulse Width (us)	PRI (us)	Number of Pulses	Waveform Length (us)
Download	0	Type 3	8.2	355.0	17	6035.0
Download	1	Type 3	6.1	487.0	16	7792.0
Download	2	Type 3	7.1	344.0	16	5504.0
Download	3	Type 3	9.8	288.0	18	5184.0
Download	4	Type 3	8.9	230.0	18	4140.0
Download	5	Type 3	7.9	432.0	17	7344.0
Download	6	Type 3	8.2	207.0	17	3519.0
Download	7	Type 3	7.5	443.0	17	7531.0
Download	8	Type 3	8.1	439.0	17	7463.0
Download	9	Type 3	6.2	223.0	16	3568.0
Download	10	Type 3	8.9	208.0	18	3744.0
Download	11	Type 3	9.6	463.0	18	8334.0
Download	12	Type 3	8.2	441.0	17	7497.0
Download	13	Type 3	7.2	323.0	16	5168.0
Download	14	Type 3	9.5	297.0	18	5346.0
Download	15	Type 3	8.0	412.0	17	7004.0
Download	16	Type 3	10.0	324.0	18	5832.0
Download	17	Type 3	7.4	271.0	17	4607.0
Download	18	Type 3	7.9	349.0	17	5933.0
Download	19	Type 3	7.3	409.0	16	6544.0
Download	20	Type 3	8.7	373.0	18	6714.0
Download	21	Type 3	7.2	254.0	16	4064.0
Download	22	Type 3	9.9	274.0	18	4932.0
Download	23	Type 3	7.9	278.0	17	4726.0
Download	24	Type 3	7.5	317.0	17	5389.0
Download	25	Type 3	6.1	260.0	16	4160.0
Download	26	Type 3	8.8	211.0	18	3798.0
Download	27	Type 3	9.7	272.0	18	4896.0
Download	28	Type 3	7.4	264.0	17	4488.0
Download	29	Type 3	9.2	284.0	18	5112.0

Radar Type 4

Trial List

	Trial Id	Radar Type	Pulse Width (us)	PRI (us)	Number of Pulses	Waveform Length (us)
Download	0	Type 4	16.0	355.0	14	4970.0
Download	1	Type 4	11.3	487.0	12	5844.0
Download	2	Type 4	13.5	344.0	13	4472.0
Download	3	Type 4	19.4	288.0	16	4608.0
Download	4	Type 4	17.5	230.0	15	3450.0
Download	5	Type 4	15.3	432.0	14	6048.0
Download	6	Type 4	15.9	207.0	14	2898.0
Download	7	Type 4	14.3	443.0	13	5759.0
Download	8	Type 4	15.8	439.0	14	6146.0
Download	9	Type 4	11.5	223.0	12	2676.0
Download	10	Type 4	17.4	208.0	15	3120.0
Download	11	Type 4	19.0	463.0	16	7408.0
Download	12	Type 4	16.0	441.0	14	6174.0
Download	13	Type 4	13.8	323.0	13	4199.0
Download	14	Type 4	18.9	297.0	16	4752.0
Download	15	Type 4	15.5	412.0	14	5768.0
Download	16	Type 4	19.9	324.0	16	5184.0
Download	17	Type 4	14.1	271.0	13	3523.0
Download	18	Type 4	15.2	349.0	14	4886.0
Download	19	Type 4	13.8	409.0	13	5317.0
Download	20	Type 4	17.1	373.0	15	5595.0
Download	21	Type 4	13.8	254.0	13	3302.0
Download	22	Type 4	19.8	274.0	16	4384.0
Download	23	Type 4	15.3	278.0	14	3892.0
Download	24	Type 4	14.5	317.0	13	4121.0
Download	25	Type 4	11.3	260.0	12	3120.0
Download	26	Type 4	17.3	211.0	15	3165.0
Download	27	Type 4	19.2	272.0	16	4352.0
Download	28	Type 4	14.2	264.0	13	3432.0
Download	29	Type 4	18.2	284.0	15	4260.0

Radar Type 5

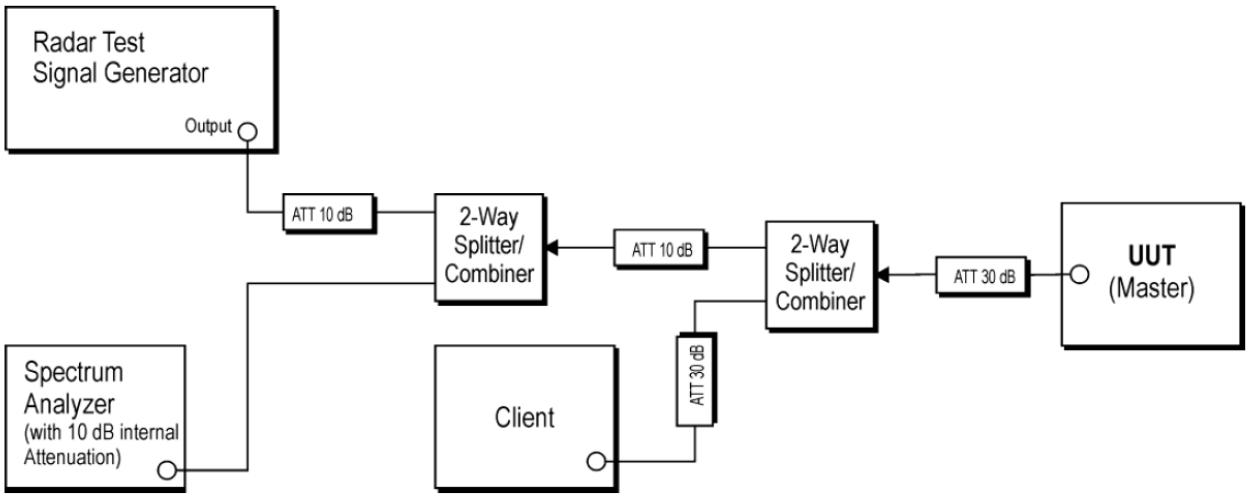
Trial List

	Trial Id	Radar Type	Number of Bursts	Burst Period (s)	Waveform Length (s)	Center Frequency (GHz)
Download	0	Type 5	15	0.8000000	12.0000000	5.530000000
Download	1	Type 5	8	1.5000000	12.0000000	5.530000000
Download	2	Type 5	11	1.0909091	12.0000000	5.530000000
Download	3	Type 5	20	0.6000000	12.0000000	5.530000000
Download	4	Type 5	17	0.7058824	12.0000000	5.530000000
Download	5	Type 5	14	0.8571429	12.0000000	5.530000000
Download	6	Type 5	15	0.8000000	12.0000000	5.530000000
Download	7	Type 5	12	1.0000000	12.0000000	5.530000000
Download	8	Type 5	14	0.8571429	12.0000000	5.530000000
Download	9	Type 5	8	1.5000000	12.0000000	5.530000000
Download	10	Type 5	17	0.7058824	12.0000000	5.496400000
Download	11	Type 5	19	0.6315789	12.0000000	5.497600000
Download	12	Type 5	15	0.8000000	12.0000000	5.495200000
Download	13	Type 5	12	1.0000000	12.0000000	5.494000000
Download	14	Type 5	19	0.6315789	12.0000000	5.497200000
Download	15	Type 5	14	0.8571429	12.0000000	5.494800000
Download	16	Type 5	20	0.6000000	12.0000000	5.498000000
Download	17	Type 5	12	1.0000000	12.0000000	5.494000000
Download	18	Type 5	14	0.8571429	12.0000000	5.494800000
Download	19	Type 5	12	1.0000000	12.0000000	5.494000000
Download	20	Type 5	16	0.7500000	12.0000000	5.564000000
Download	21	Type 5	12	1.0000000	12.0000000	5.566400000
Download	22	Type 5	20	0.6000000	12.0000000	5.562000000
Download	23	Type 5	14	0.8571429	12.0000000	5.565200000
Download	24	Type 5	13	0.9230769	12.0000000	5.565600000
Download	25	Type 5	8	1.5000000	12.0000000	5.568000000
Download	26	Type 5	17	0.7058824	12.0000000	5.563600000
Download	27	Type 5	19	0.6315789	12.0000000	5.562400000
Download	28	Type 5	12	1.0000000	12.0000000	5.566000000
Download	29	Type 5	18	0.6666667	12.0000000	5.563200000

Radar Type 6

Trial Id	Radar Type	Pulse Width (us)	PRI (us)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (ms)	Visible Frequency Number
0	Type 6	1.0	333.3	9	0.3333	300.0000000	17
1	Type 6	1.0	333.3	9	0.3333	300.0000000	14
2	Type 6	1.0	333.3	9	0.3333	300.0000000	16
3	Type 6	1.0	333.3	9	0.3333	300.0000000	19
4	Type 6	1.0	333.3	9	0.3333	300.0000000	11
5	Type 6	1.0	333.3	9	0.3333	300.0000000	13
6	Type 6	1.0	333.3	9	0.3333	300.0000000	15
7	Type 6	1.0	333.3	9	0.3333	300.0000000	17
8	Type 6	1.0	333.3	9	0.3333	300.0000000	15
9	Type 6	1.0	333.3	9	0.3333	300.0000000	17
10	Type 6	1.0	333.3	9	0.3333	300.0000000	16
11	Type 6	1.0	333.3	9	0.3333	300.0000000	23
12	Type 6	1.0	333.3	9	0.3333	300.0000000	22
13	Type 6	1.0	333.3	9	0.3333	300.0000000	17
14	Type 6	1.0	333.3	9	0.3333	300.0000000	15
15	Type 6	1.0	333.3	9	0.3333	300.0000000	22
16	Type 6	1.0	333.3	9	0.3333	300.0000000	14
17	Type 6	1.0	333.3	9	0.3333	300.0000000	22
18	Type 6	1.0	333.3	9	0.3333	300.0000000	13
19	Type 6	1.0	333.3	9	0.3333	300.0000000	17
20	Type 6	1.0	333.3	9	0.3333	300.0000000	21
21	Type 6	1.0	333.3	9	0.3333	300.0000000	18
22	Type 6	1.0	333.3	9	0.3333	300.0000000	24
23	Type 6	1.0	333.3	9	0.3333	300.0000000	14
24	Type 6	1.0	333.3	9	0.3333	300.0000000	13
25	Type 6	1.0	333.3	9	0.3333	300.0000000	16
26	Type 6	1.0	333.3	9	0.3333	300.0000000	15
27	Type 6	1.0	333.3	9	0.3333	300.0000000	20
28	Type 6	1.0	333.3	9	0.3333	300.0000000	19
29	Type 6	1.0	333.3	9	0.3333	300.0000000	16

9.2 Test setup



Note:

1. The 4 antennas are combined into one by the combiner.
2. The Measurement instrument is matched to 50 ohms, and the conversion loss is taken into account.
3. The type of system architecture used by U-NII device is IP based systems.
4. To show compliance, all tests must be performed with waveforms randomly generated as specified with test results meeting the required percentage of successful detection criteria.
5. Timing plots are required with calculations demonstrating a minimum channel loading of approximately 17% or greater.
6. EUT is a Master device and with DFS detection capabilities. Test procedures were made in accordance to KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02. DFS testing was setup as a client with injection into the master.
7. The hopping type 6 pulse parameters are fixed while the hopping sequence is based on the August 2005 NTIA Hopping Frequency List. The initial starting point randomized at run-time and each subsequent starting point is incremented by 475. Each frequency in the 100-length segment is compared to the boundaries of the EUT Detection Bandwidth and the software creates a hopping burst pattern in accordance with Section 7.4.1.3 Method #2 Simulated Frequency Hopping Radar Waveform Generating Subsystem of FCC 06-96. The frequency of the signal generator is incremented in 1 MHz steps from FL to FH for each successive trial. This incremental sequence is repeated as required to generate a minimum of 30 total trials and to maintain a uniform frequency distribution over the entire Detection Bandwidth.

9.3 Statement of Manufacturer

Manufacturer statement confirming that information regarding the parameters of the detected Radar Waveforms is not available to the end user.

9.4 Test Result

9.4.1 Test Procedure

The EUT was configured to communicate with a master device. The test file was streamed from the Master to the Client (EUT) on the selected test channel. Measurements were made while utilizing the widest bandwidth of the EUT.

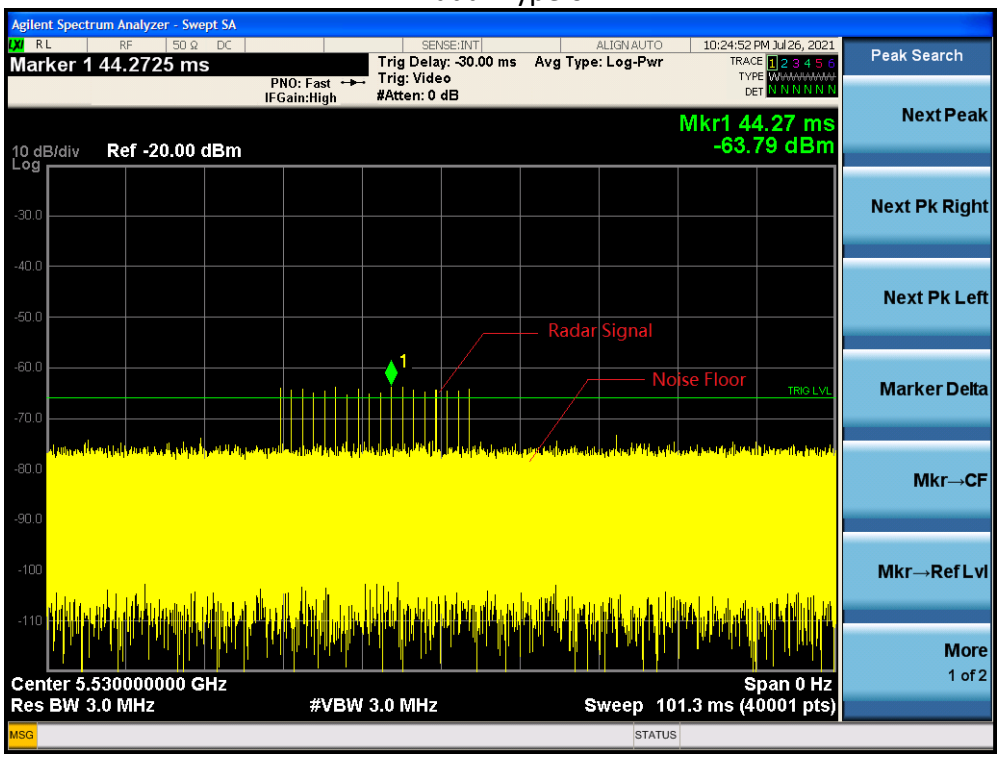
Channel closing transmission time and channel move time were measured by applying a radar type 0 at threshold + 1dB to the EUT. The EUT transmissions were observed on the EUT center channel. The time between the end of the applied radar waveform and the final transmission on the channel is the channel move time. The channel closing transmission time comprises only those fragments of the channel move time during which the EUT transmits.

The Channel Move time shall be less than 10 seconds
The Channel Close time shall be 200ms +60ms of aggregate time.
The Non-occupancy time shall 30 minutes or greater.

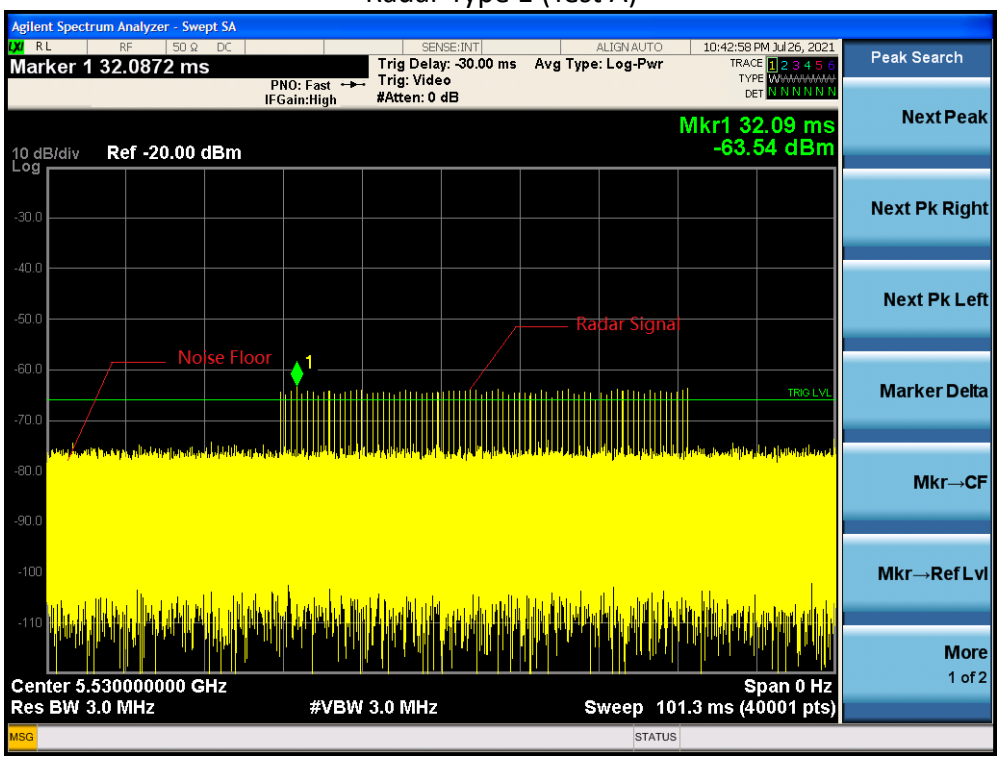
9.4.2 DFS Detection Threshold

Frequency	Radar Type	Detection Threshold level (dBm)
5530MHz	Type 0	-63.79
	Type 1 (Test A)	-63.54
	Type 1 (Test B)	-63.40
	Type 2	-63.52
	Type 3	-63.15
	Type 4	-63.18
	Type 5	-63.37
	Type 5 (Single Burst)	-63.83
	Type 6	-63.55

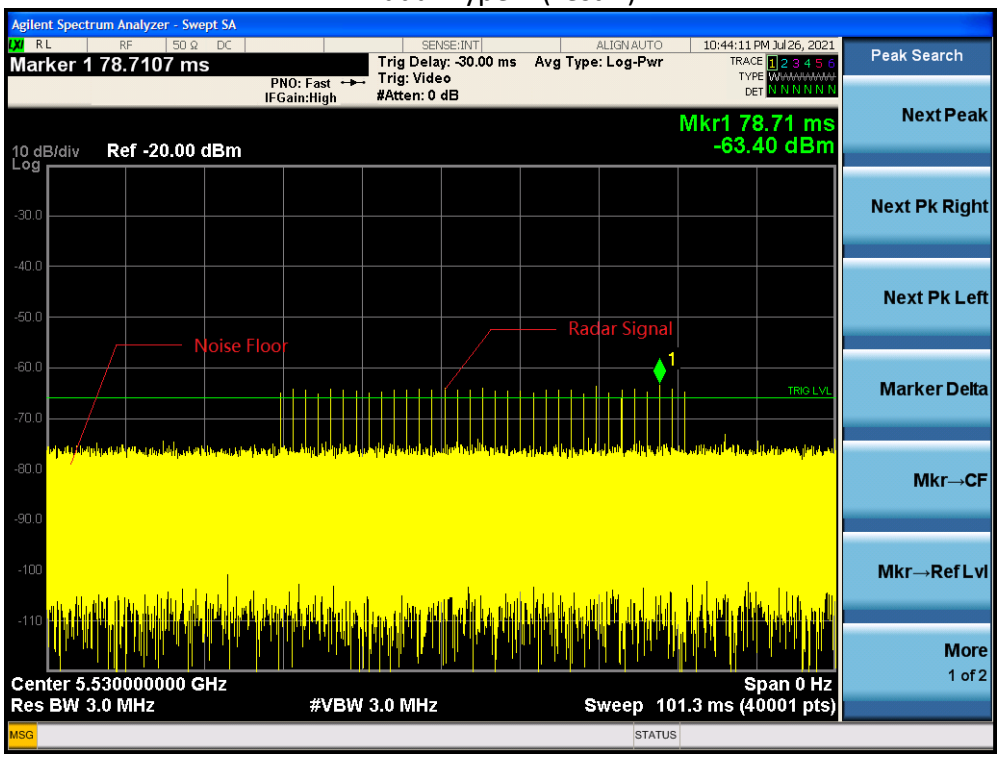
Radar Type 0



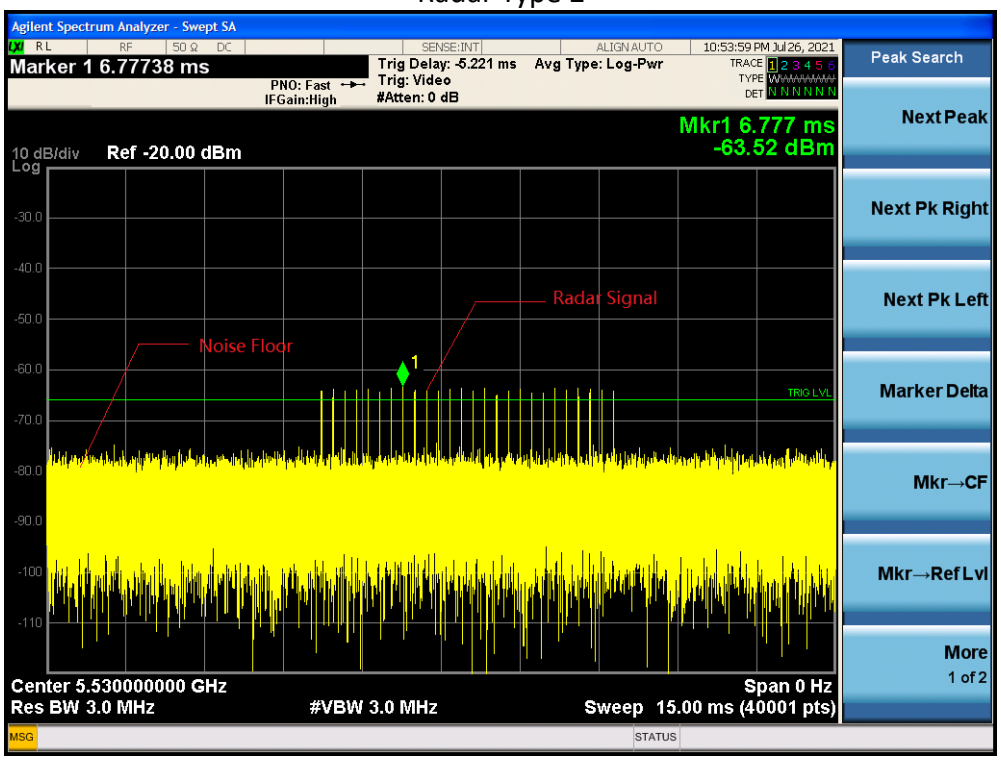
Radar Type 1 (Test A)



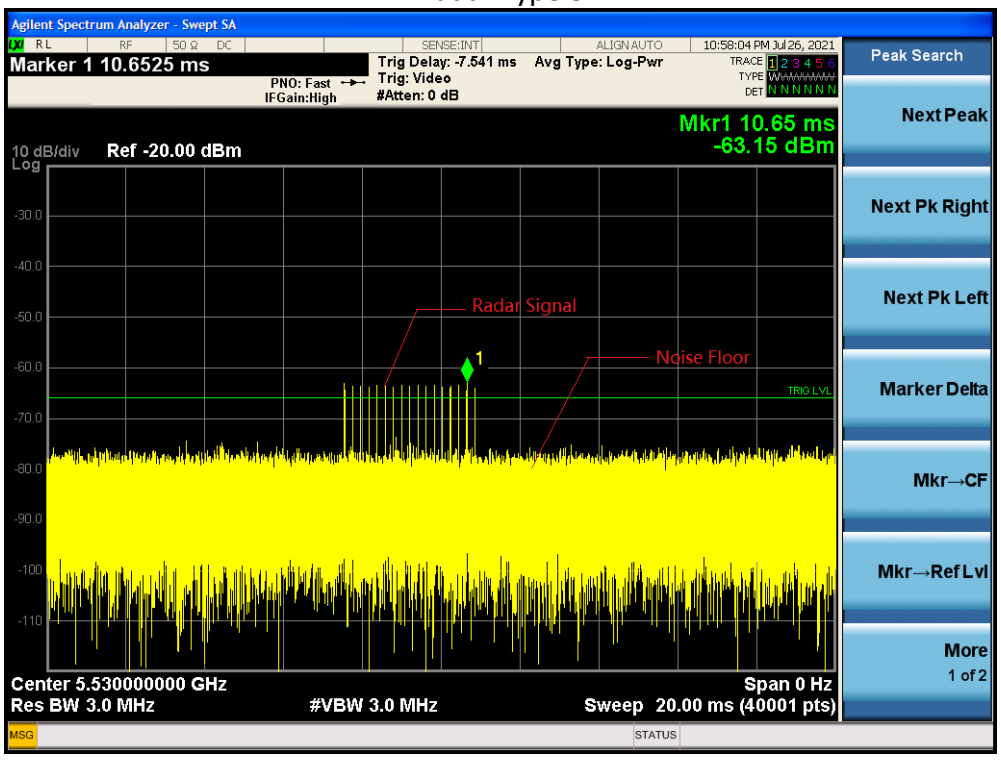
Radar Type 1 (Test B)



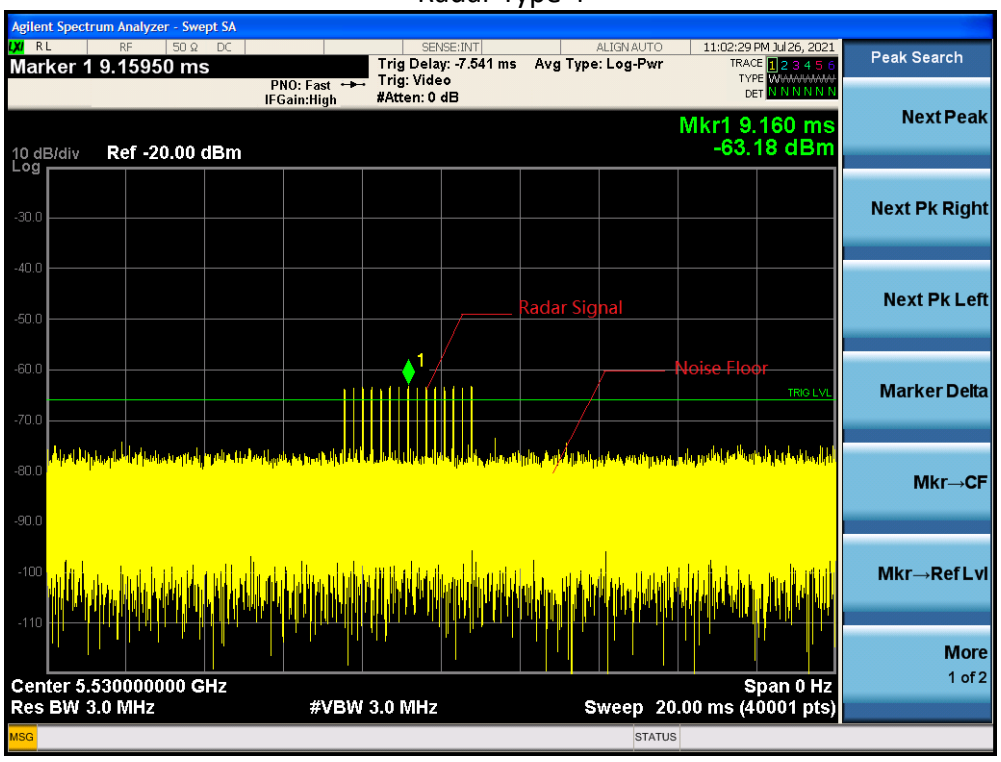
Radar Type 2



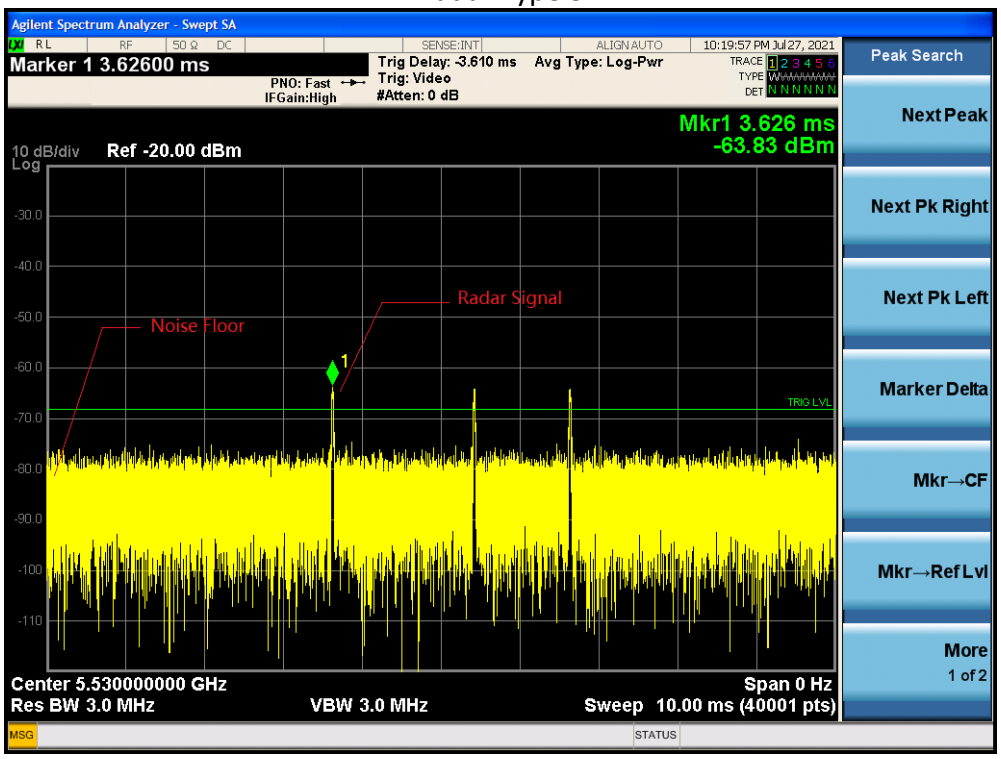
Radar Type 3



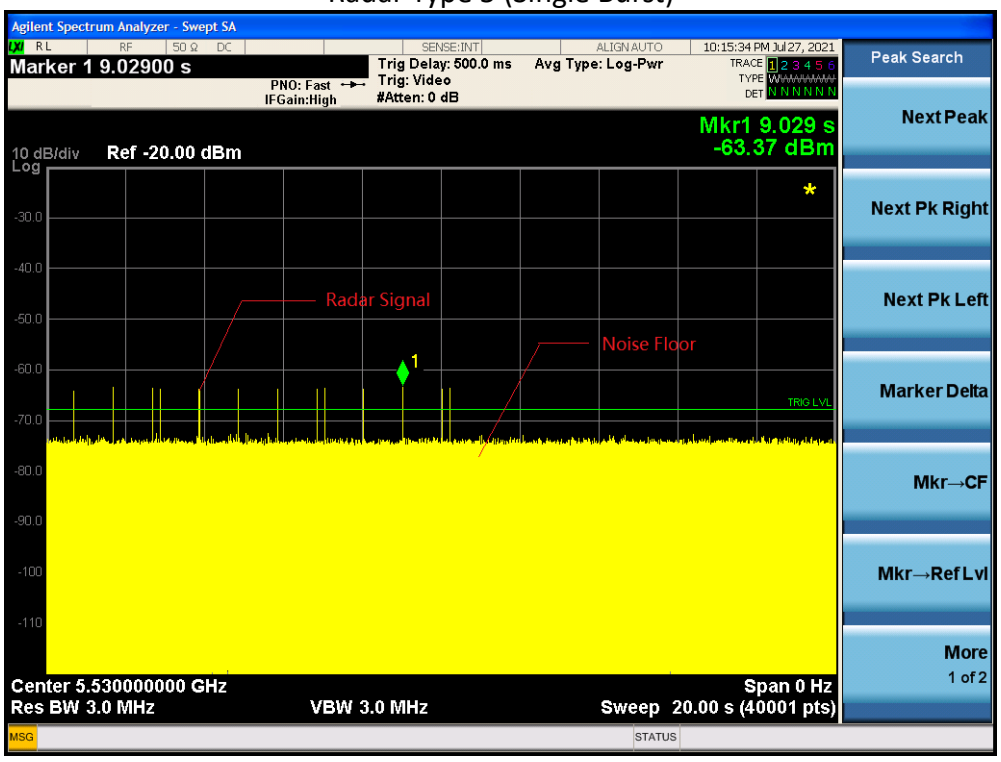
Radar Type 4



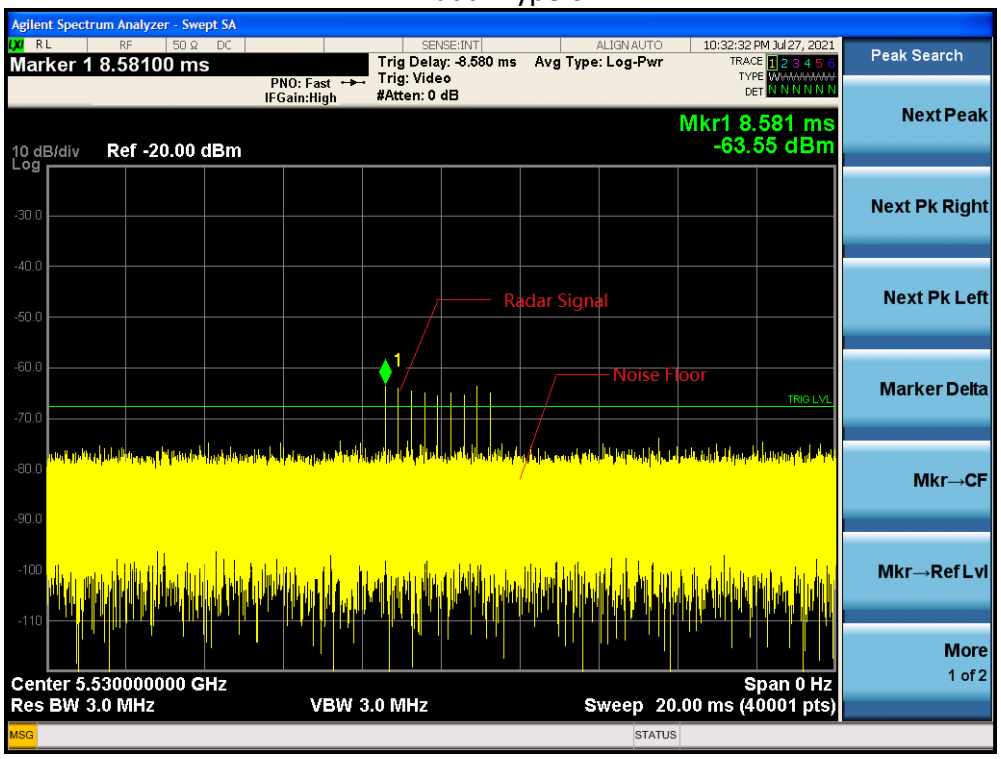
Radar Type 5



Radar Type 5 (Single Burst)



Radar Type 6



9.4.3 U-NII Detection Bandwidth

Detection Bandwidth test transmission 20M											
EUT frequency: 5500M EUT power bandwidth: 18MHz Detection Bandwidth limit (100%of EUT 99% bandwidth): 18 Detection Bandwidth (5491(FL)-5509(FH)): 18 Test Result: PASS											
Radar Frequency (MHz)	DFS Detection Trials (1=Detection,0=No Detection)										Detection Rate (%)
	1	2	3	4	5	6	7	8	9	10	
5488	0	0	0	0	0	0	0	0	0	0	0
5489	0	0	1	0	1	0	0	0	0	1	30
5490	1	0	1	1	0	1	1	0	0	0	40
5491(FL)	1	1	1	1	1	1	1	1	1	1	100
5492	1	1	1	1	1	1	1	1	1	1	100
5493	1	1	1	1	1	1	1	1	1	1	100
5494	1	1	1	1	1	1	1	1	1	1	100
5495	1	1	1	1	1	1	1	1	1	1	100
5496	1	1	1	1	1	1	1	1	1	1	100
5497	1	1	1	1	1	1	1	1	1	1	100
5498	1	1	1	1	1	1	1	1	1	1	100
5499	1	1	1	1	1	1	1	1	1	1	100
5500	1	1	1	1	1	1	1	1	1	1	100
5501	1	1	1	1	1	1	1	1	1	1	100
5502	1	1	1	1	1	1	1	1	1	1	100
5503	1	1	1	1	1	1	1	1	1	1	100
5504	1	1	1	1	1	1	1	1	1	1	100
5505	1	1	1	1	1	1	1	1	1	1	100
5506	1	1	1	1	1	1	1	1	1	1	100
5507	1	1	1	1	1	1	1	1	1	1	100
5508	1	1	1	1	1	1	1	1	1	1	100
5509(FH)	1	1	1	1	1	1	1	1	1	1	100
5510	1	0	0	0	0	0	1	1	0	0	30
5511	0	1	0	1	0	1	0	0	0	0	30
5512	0	0	0	0	0	0	0	0	0	0	0

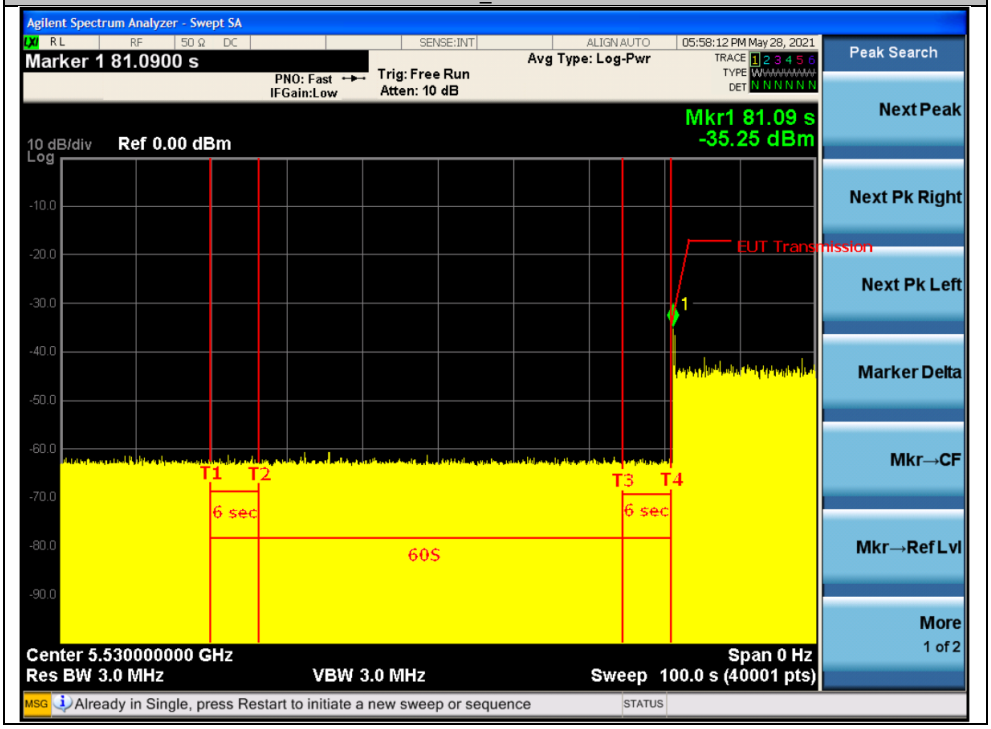
Detection Bandwidth test transmission 40M											
EUT frequency: 5510M EUT power bandwidth: 36MHz Detection Bandwidth limit (100%of EUT 99% bandwidth): 36.3 Detection Bandwidth (5492(FL)-5528(FH)): 36 Test Result: PASS											
Radar Freq (MHz)	DFS Detection Trials (1=Detection,0=No Detection)										Detection Rate (%)
	1	2	3	4	5	6	7	8	9	10	
5489	0	0	0	0	0	0	0	0	0	0	0
5490	0	0	0	0	0	0	1	0	0	0	10
5491	1	0	0	1	1	0	0	0	0	1	40
5492(FL)	1	1	1	1	1	1	1	1	1	1	100
5493	1	1	1	1	1	1	1	1	1	1	100
5494	1	1	1	1	1	1	1	1	1	1	100
5495	1	1	1	1	1	1	1	1	1	1	100
5496	1	1	1	1	1	1	1	1	1	1	100
5497	1	1	1	1	1	1	1	1	1	1	100
5498	1	1	1	1	1	1	1	1	1	1	100
5499	1	1	1	1	1	1	1	1	1	1	100
5500	1	1	1	1	1	1	1	1	1	1	100
5501	1	1	1	1	1	1	1	1	1	1	100
5502	1	1	1	1	1	1	1	1	1	1	100
5503	1	1	1	1	1	1	1	1	1	1	100
5504	1	1	1	1	1	1	1	1	1	1	100
5505	1	1	1	1	1	1	1	1	1	1	100
5506	1	1	1	1	1	1	1	1	1	1	100
5507	1	1	1	1	1	1	1	1	1	1	100
5508	1	1	1	1	1	1	1	1	1	1	100
5509	1	1	1	1	1	1	1	1	1	1	100
5510	1	1	1	1	1	1	1	1	1	1	100
5511	1	1	1	1	1	1	1	1	1	1	100
5512	1	1	1	1	1	1	1	1	1	1	100
5513	1	1	1	1	1	1	1	1	1	1	100
5514	1	1	1	1	1	1	1	1	1	1	100
5515	1	1	1	1	1	1	1	1	1	1	100
5516	1	1	1	1	1	1	1	1	1	1	100
5517	1	1	1	1	1	1	1	1	1	1	100
5518	1	1	1	1	1	1	1	1	1	1	100
5519	1	1	1	1	1	1	1	1	1	1	100
5520	1	1	1	1	1	1	1	1	1	1	100
5521	1	1	1	1	1	1	1	1	1	1	100
5522	1	1	1	1	1	1	1	1	1	1	100
5523	1	1	1	1	1	1	1	1	1	1	100
5524	1	1	1	1	1	1	1	1	1	1	100
5525	1	1	1	1	1	1	1	1	1	1	100
5526	1	1	1	1	1	1	1	1	1	1	100
5527	1	1	1	1	1	1	1	1	1	1	100
5528(FH)	1	1	1	1	1	1	1	1	1	1	100
5529	0	0	1	0	0	1	0	1	0	0	30
5530	0	0	0	0	1	0	0	0	0	1	20
5531	0	0	0	0	0	0	0	0	0	0	0

Detection Bandwidth test transmission 80M											
EUT frequency: 5530M EUT power bandwidth: 76MHz Detection Bandwidth limit (100%of EUT 99% bandwidth): 75.9 Detection Bandwidth (5492(FL)-5568(FL)): 76 Test Result: PASS											
Radar Freq (MHz)	DFS Detection Trials (1=Detection,0=No Detection)										Detection Rate (%)
	1	2	3	4	5	6	7	8	9	10	
5488	0	0	0	0	0	0	0	0	0	0	0
5489	0	0	0	0	0	0	0	0	0	0	0
5490	0	0	0	0	1	0	0	0	1	0	20
5491	1	0	1	0	0	0	1	0	1	0	40
5492(FL)	1	1	1	1	1	1	1	1	1	1	100
5493	1	1	1	1	1	1	1	1	1	1	100
5494	1	1	1	1	1	1	1	1	1	1	100
5495	1	1	1	1	1	1	1	1	1	1	100
5496	1	1	1	1	1	1	1	1	1	1	100
5497	1	1	1	1	1	1	1	1	1	1	100
5498	1	1	1	1	1	1	1	1	1	1	100
5499	1	1	1	1	1	1	1	1	1	1	100
5500	1	1	1	1	1	1	1	1	1	1	100
5501	1	1	1	1	1	1	1	1	1	1	100
5502	1	1	1	1	1	1	1	1	1	1	100
5503	1	1	1	1	1	1	1	1	1	1	100
5504	1	1	1	1	1	1	1	1	1	1	100
5505	1	1	1	1	1	1	1	1	1	1	100
5506	1	1	1	1	1	1	1	1	1	1	100
5507	1	1	1	1	1	1	1	1	1	1	100
5508	1	1	1	1	1	1	1	1	1	1	100
5509	1	1	1	1	1	1	1	1	1	1	100
5510	1	1	1	1	1	1	1	1	1	1	100
5511	1	1	1	1	1	1	1	1	1	1	100
5512	1	1	1	1	1	1	1	1	1	1	100
5513	1	1	1	1	1	1	1	1	1	1	100
5514	1	1	1	1	1	1	1	1	1	1	100
5515	1	1	1	1	1	1	1	1	1	1	100
5516	1	1	1	1	1	1	1	1	1	1	100
5517	1	1	1	1	1	1	1	1	1	1	100
5518	1	1	1	1	1	1	1	1	1	1	100
5519	1	1	1	1	1	1	1	1	1	1	100
5520	1	1	1	1	1	1	1	1	1	1	100
5521	1	1	1	1	1	1	1	1	1	1	100
5522	1	1	1	1	1	1	1	1	1	1	100
5523	1	1	1	1	1	1	1	1	1	1	100
5524	1	1	1	1	1	1	1	1	1	1	100
5525	1	1	1	1	1	1	1	1	1	1	100
5526	1	1	1	1	1	1	1	1	1	1	100
5527	1	1	1	1	1	1	1	1	1	1	100
5528	1	1	1	1	1	1	1	1	1	1	100
5529	1	1	1	1	1	1	1	1	1	1	100
5530	1	1	1	1	1	1	1	1	1	1	100
5531	1	1	1	1	1	1	1	1	1	1	100

Detection Bandwidth test transmission 80M											
EUT frequency: 5530M EUT power bandwidth: 76MHz Detection Bandwidth limit (100%of EUT 99% bandwidth): 75.9 Detection Bandwidth (5492(FL)-5568(FL)): 76 Test Result: PASS											
Radar Freq (MHz)	DFS Detection Trials (1=Detection,0=No Detection)										Detection Rate (%)
	1	2	3	4	5	6	7	8	9	10	
5532	1	1	1	1	1	1	1	1	1	1	100
5533	1	1	1	1	1	1	1	1	1	1	100
5534	1	1	1	1	1	1	1	1	1	1	100
5535	1	1	1	1	1	1	1	1	1	1	100
5536	1	1	1	1	1	1	1	1	1	1	100
5537	1	1	1	1	1	1	1	1	1	1	100
5538	1	1	1	1	1	1	1	1	1	1	100
5539	1	1	1	1	1	1	1	1	1	1	100
5540	1	1	1	1	1	1	1	1	1	1	100
5541	1	1	1	1	1	1	1	1	1	1	100
5542	1	1	1	1	1	1	1	1	1	1	100
5543	1	1	1	1	1	1	1	1	1	1	100
5544	1	1	1	1	1	1	1	1	1	1	100
5545	1	1	1	1	1	1	1	1	1	1	100
5546	1	1	1	1	1	1	1	1	1	1	100
5547	1	1	1	1	1	1	1	1	1	1	100
5548	1	1	1	1	1	1	1	1	1	1	100
5549	1	1	1	1	1	1	1	1	1	1	100
5550	1	1	1	1	1	1	1	1	1	1	100
5551	1	1	1	1	1	1	1	1	1	1	100
5552	1	1	1	1	1	1	1	1	1	1	100
5553	1	1	1	1	1	1	1	1	1	1	100
5554	1	1	1	1	1	1	1	1	1	1	100
5555	1	1	1	1	1	1	1	1	1	1	100
5556	1	1	1	1	1	1	1	1	1	1	100
5557	1	1	1	1	1	1	1	1	1	1	100
5558	1	1	1	1	1	1	1	1	1	1	100
5559	1	1	1	1	1	1	1	1	1	1	100
5560	1	1	1	1	1	1	1	1	1	1	100
5561	1	1	1	1	1	1	1	1	1	1	100
5562	1	1	1	1	1	1	1	1	1	1	100
5563	1	1	1	1	1	1	1	1	1	1	100
5564	1	1	1	1	1	1	1	1	1	1	100
5565	1	1	1	1	1	1	1	1	1	1	100
5566	1	1	1	1	1	1	1	1	1	1	100
5567	1	1	1	1	1	1	1	1	1	1	100
5568(FH)	1	1	1	1	1	1	1	1	1	1	100
5569	0	0	1	1	0	1	0	1	1	0	50
5570	0	1	0	0	0	0	0	1	0	1	30
5571	0	0	0	0	0	0	0	0	0	0	0
5572	0	0	0	0	0	0	0	0	0	0	0

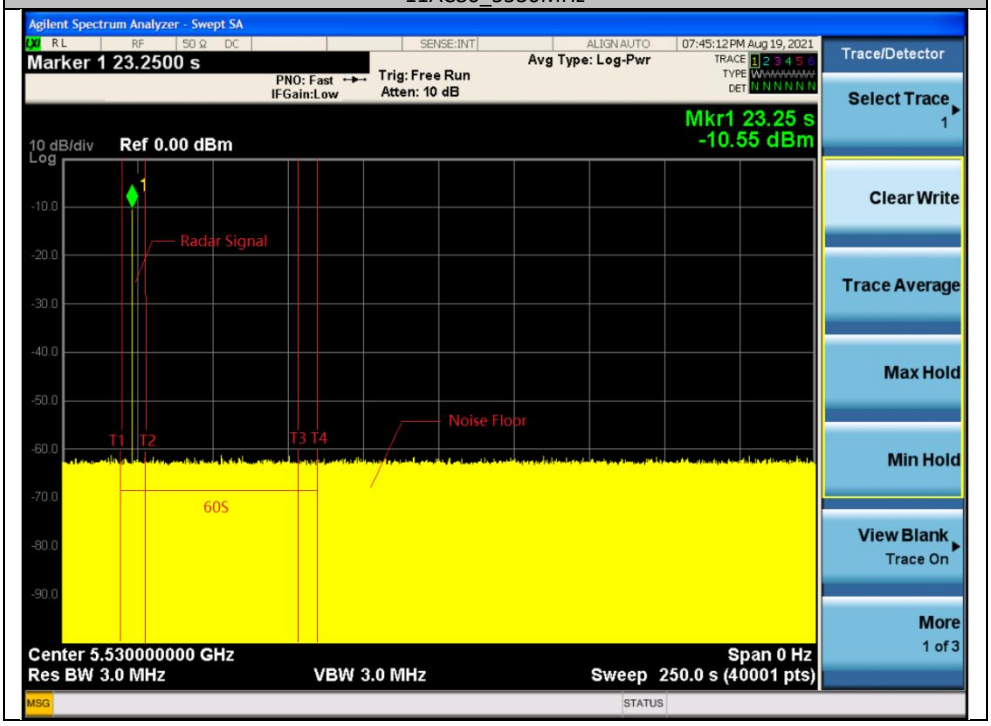
9.4.4 Channel Availability Check Time

Initial Channel Availability Check Time
11AC80_5530MHz



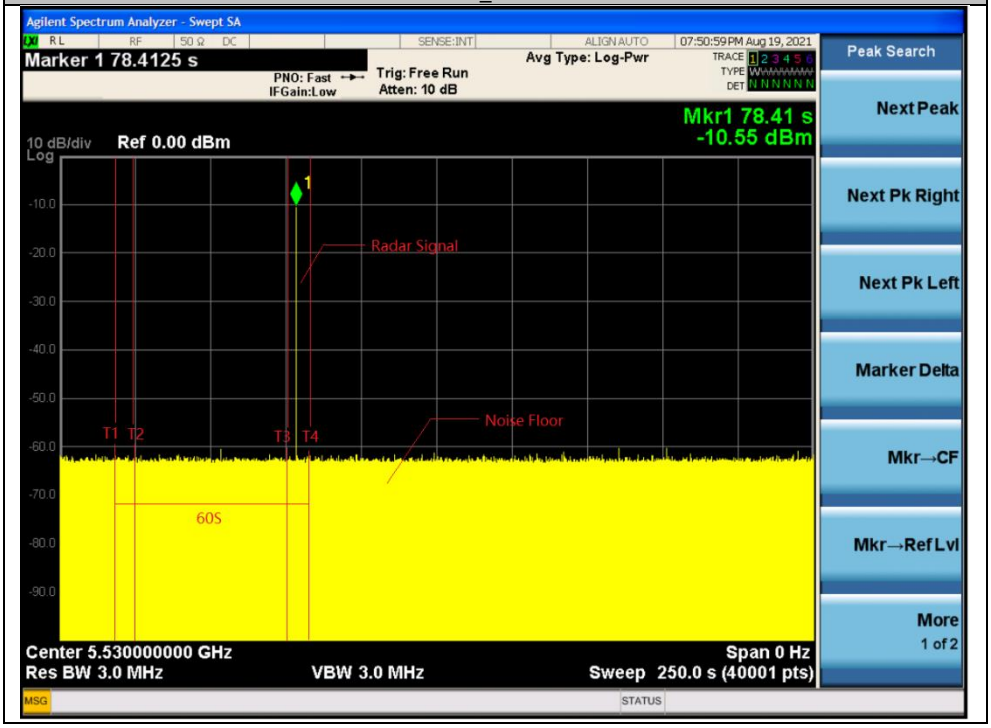
Note: T1 denotes the end of power-up time period is 21.09th second. T4 denotes the end of Channel Availability Check time is 81.09th seconds. Channel Availability Check time is equal to T4 - T1 = 60 seconds.

Beginning of Channel Availability Check Time
11AC80_5530MHz



Note: T1 denotes the end of power-up time period is 21.09th second. T2 denotes 27.09th second and the radar burst was commenced within a 6 second window starting from the end of power-up sequence.

End of Channel Availability Check Time
11AC80_5530MHz



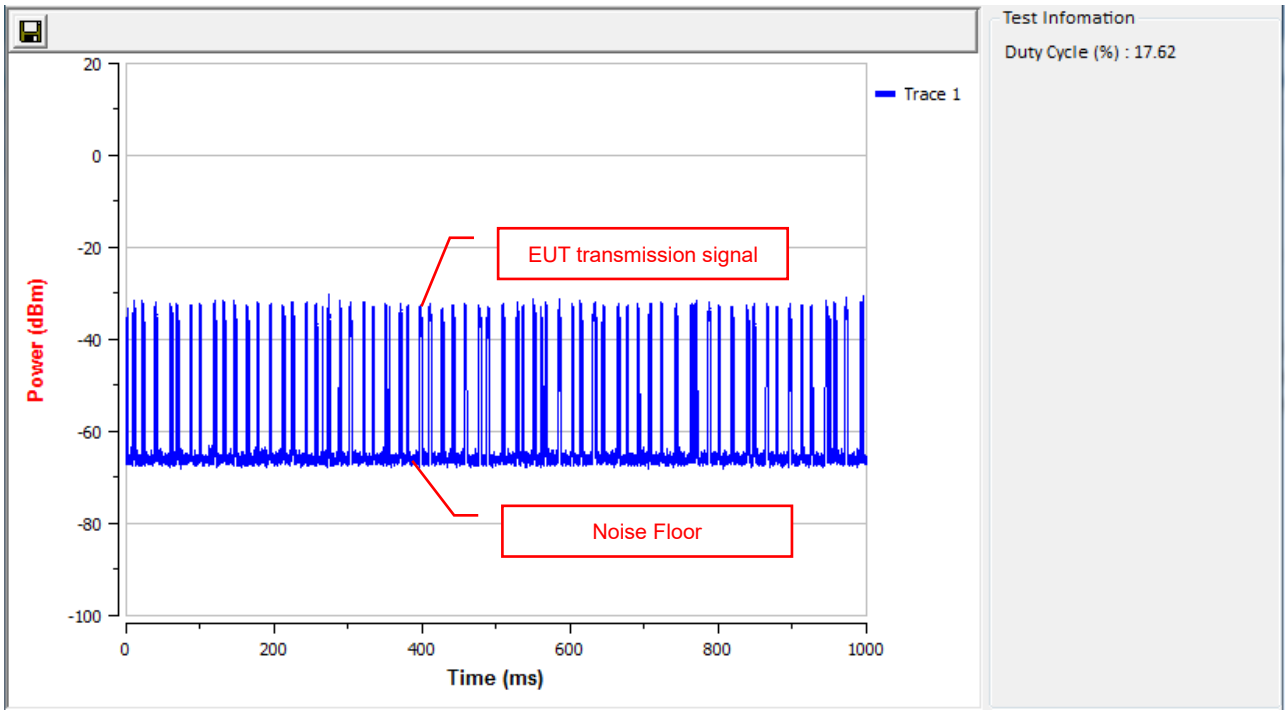
Note: T1 denotes the end of power-up time period is 21.09th second. T3 denotes 75.09th second and the radar burst was commenced within 54th second to 60th second window starting from the end of power-up sequence. T4 denotes the 81.09th second.

9.4.5 Channel Closing Transmission and Channel Move Time

Wireless Traffic Loading

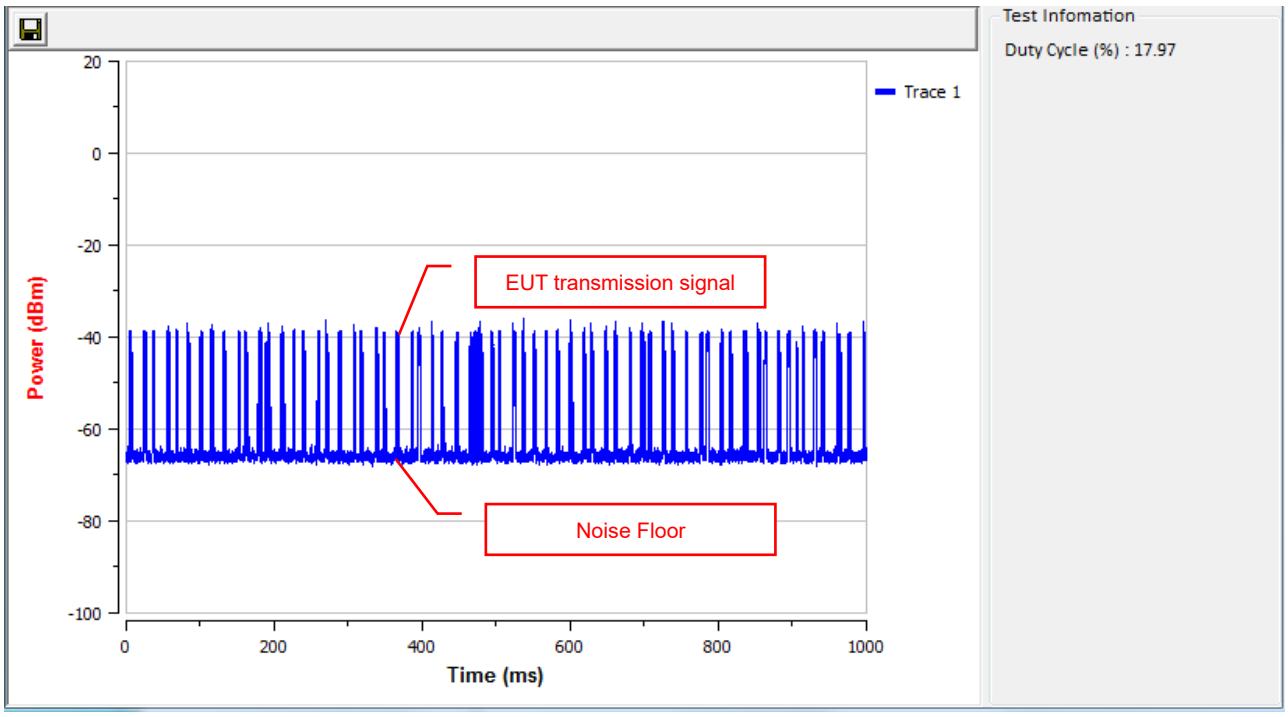
802.11ac (VHT20)

Duty Cycle



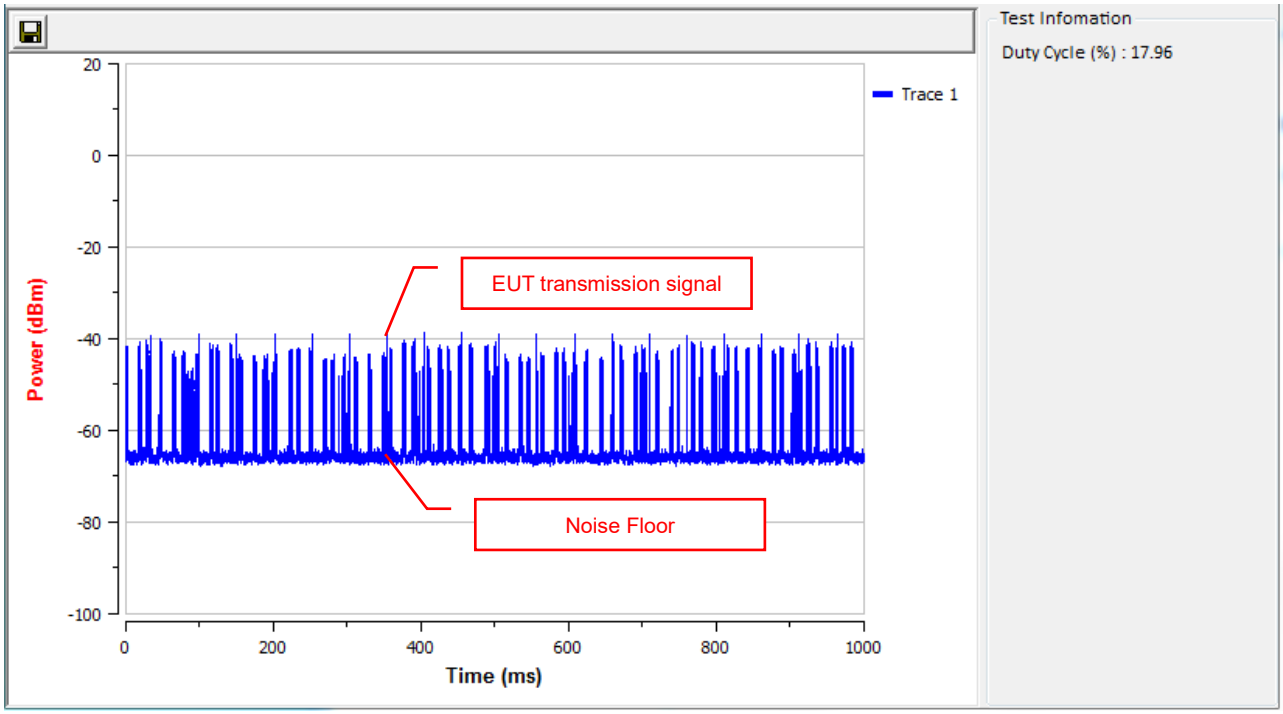
802.11ac (VHT40)

Duty Cycle



802.11ac (VHT80)

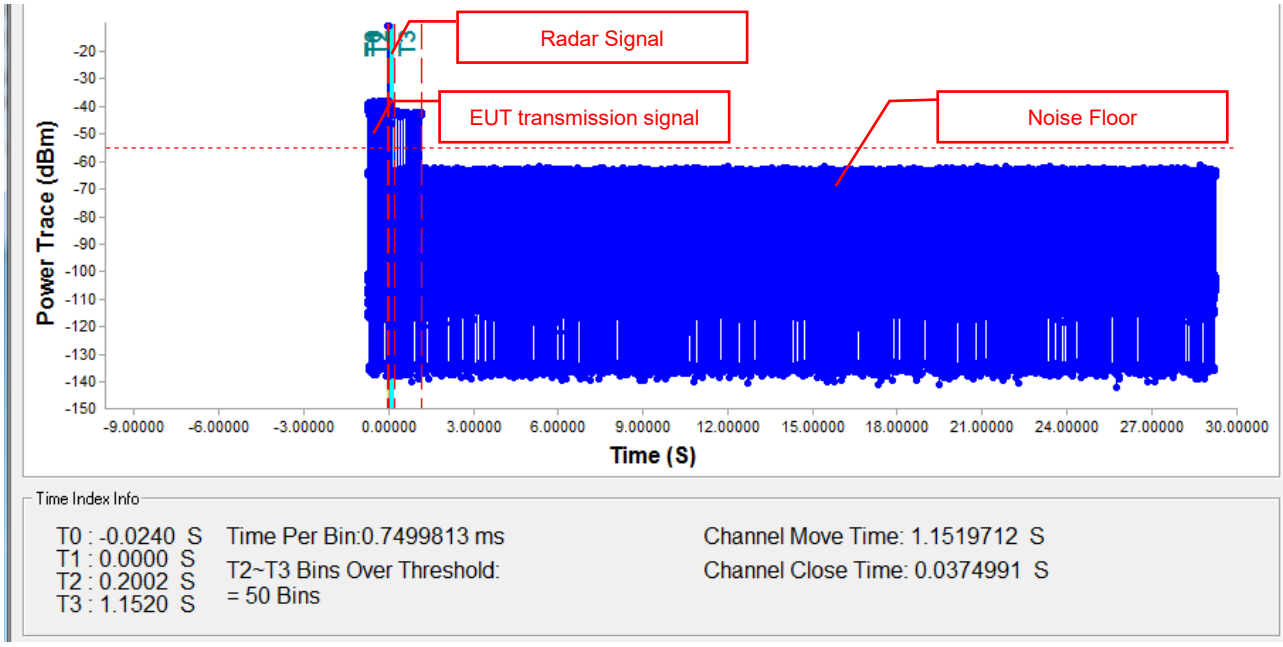
Duty Cycle



Channel Closing Transmission time and Channel Move Time

Worse case radar signal: Type 0

Worse case transmission mode: 802.11ac (VHT80)



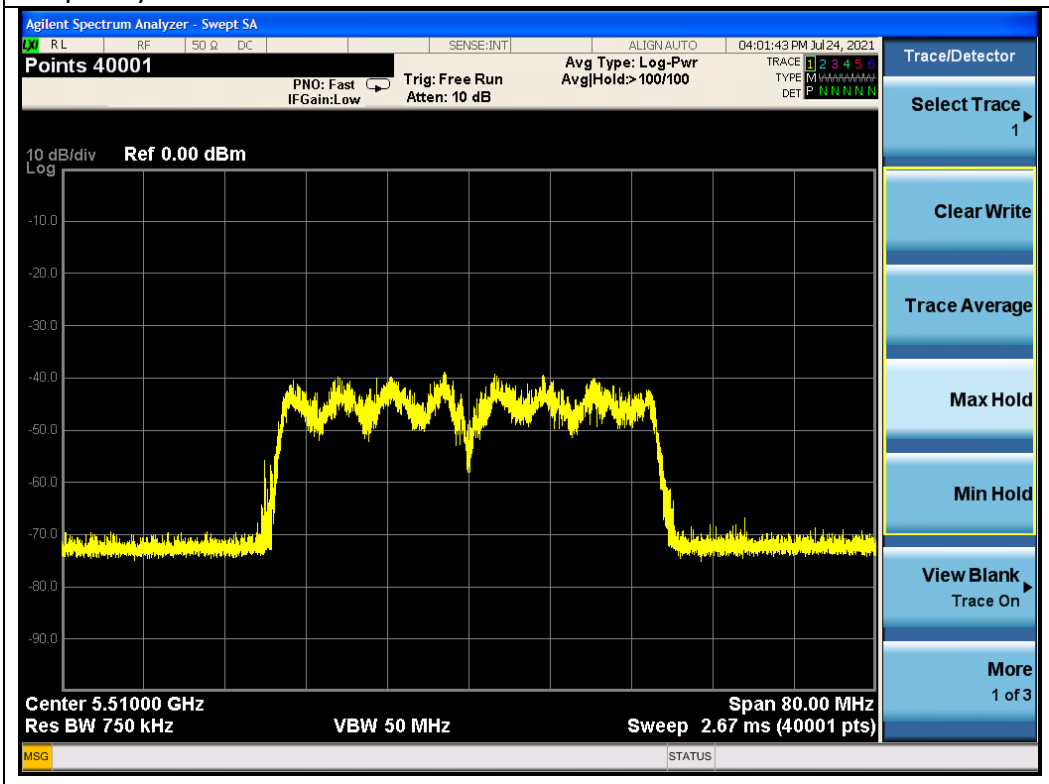
Note: T1 denotes the start of Channel Move Time upon the end of the last Radar burst. T2 denotes the data transmission time of 200ms from T0. T3 denotes the end of Channel Move Time.

9.4.6 Statistical Performance Check

Modulation Mode	Freq. (MHz)	Radar Test Signal (#)	Pass times	Fail times	Detection Probability (%)	Detection Probability Limit (%)	Result
11ac (20MHz)	5500	1	24	6	80%	60	Pass
		2	24	6	80%	60	Pass
		3	26	4	87%	60	Pass
		4	25	5	83%	60	Pass
		Aggregate of Radar Types 1-4 (80% + 80% + 87% + 83%)/4 = 82.5%					
		5	26	4	87%	80	Pass
		6	28	2	93%	70	Pass
11ac (40MHz)	5510	1	25	5	83%	60	Pass
		2	24	6	80%	60	Pass
		3	26	4	87%	60	Pass
		4	25	5	83%	60	Pass
		Aggregate of Radar Types 1-4 (83% + 80% + 87% + 83%)/4 = 83.25%					
		5	25	5	83%	80	Pass
		6	27	3	90%	70	Pass
11ac (80MHz)	5530	1	27	3	90%	60	Pass
		2	25	5	83%	60	Pass
		3	25	5	83%	60	Pass
		4	24	6	80%	60	Pass
		Aggregate of Radar Types 1-4 (90% + 83% + 83% + 80%)/4 = 84.0%					
		5	28	2	93%	80	Pass
		6	27	3	90%	70	Pass

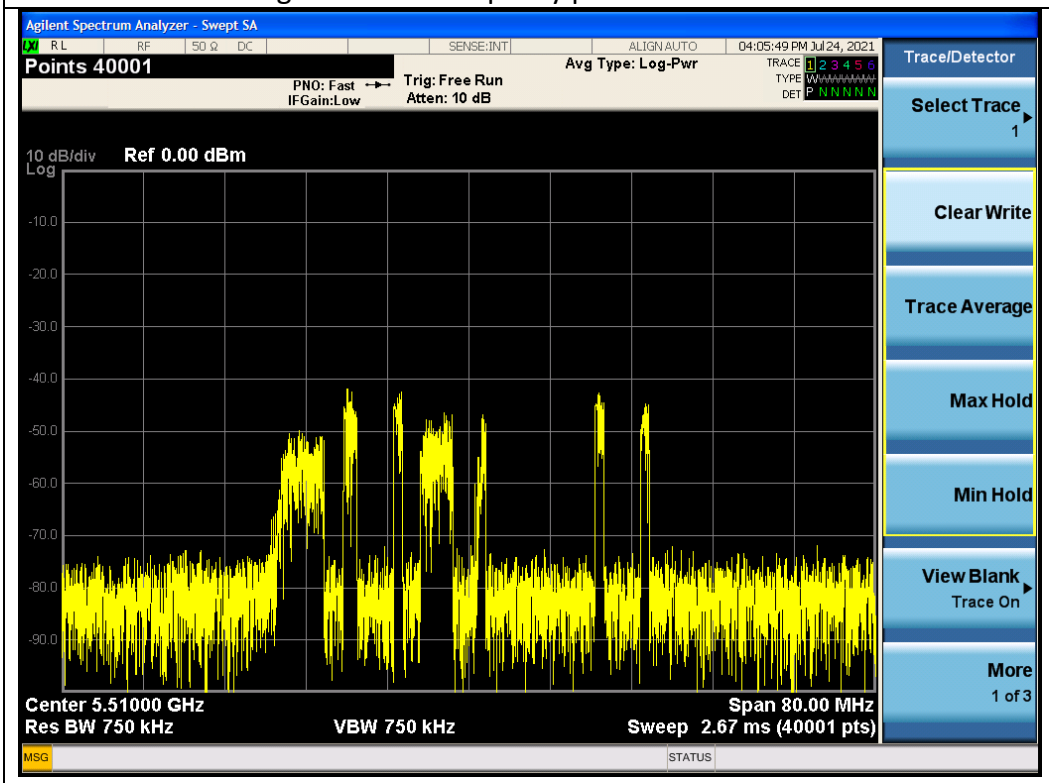
9.4.7 Non-Occupancy Period

1. Test results demonstrating an associated client link is established with the master on a test frequency.



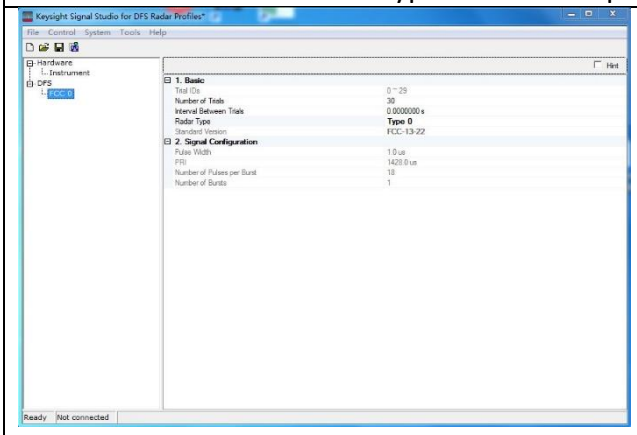
Note: EUT (master) links with Client on 5510MHz

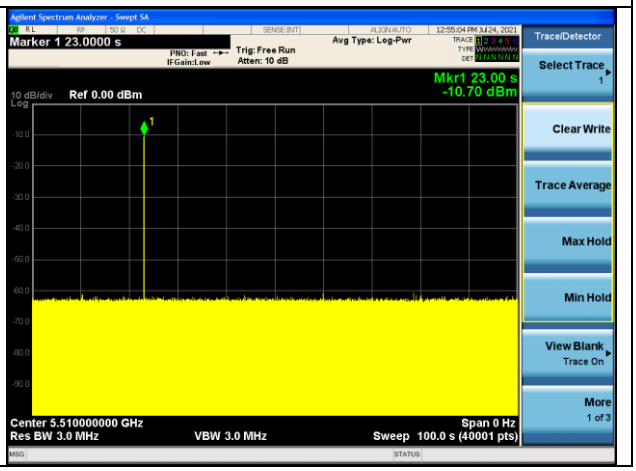
2. The master and DFS-certified client device are associated, and system testing will be performed with channel-loading for a non-occupancy period test.



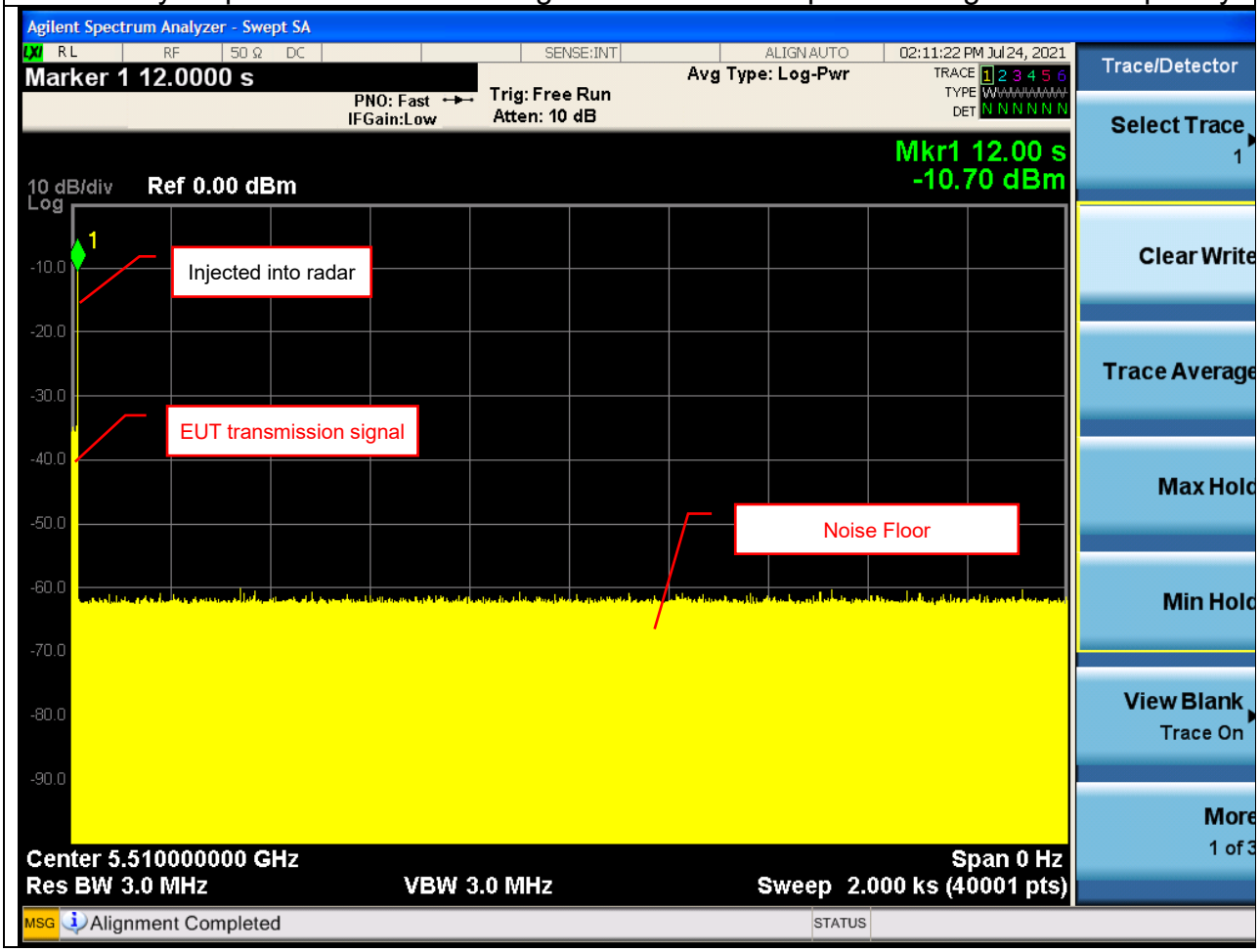
Note: Client performed with channel-loading via master.

3. The device transmits one type of radar as specified in the DFS Order.





4. The test frequency has been monitored to ensure no transmission of any type has occurred for 30 minutes;
Note: If the client moves with the master, the device is considered compliant if nothing appears in the client non-occupancy period test. For devices that shut down (rather than moving channels), no beacons should appear;
5. An analyzer plot that contains a single 30-minute sweep on the original test frequency.



Appendix A: Test equipment list

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ182-02	RF Power Meter	Anritsu	ML2496A	1302005	2020-05-27 2021-05-10	2021-05-27 2022-05-10
SZ182-02-01	Pulse Power Sensor	Anritsu	MA2411B	1207429	2020-05-27 2021-05-10	2021-05-27 2022-05-10
SZ070-24	Open Switch and Control Unit with TS8997 option for power measurement test	R&S	OSP120+B157	---	2020-10-17	2021-10-17
SZ070-20	Combiner	Mini-Circuits	ZN2PD-63-S+	---	2020-05-27 2021-05-11	2021-05-27 2022-05-11
SZ070-21	Combiner	Mini-Circuits	ZN2PD-63-S+	---	2020-05-27 2021-05-11	2021-05-27 2022-05-11
SZ056-05	Spectrum Analyzer	Agilent	E4407B	US40522113	2020-12-22	2021-12-22
SZ180-13	MXG Vector Signal Generator	Keysight	N5182B	MY53051328	2020-10-17	2021-10-17
SZ061-03	BiConiLog Antenna	ETS	3142E	00217919	2019-06-10 2021-06-01	2021-06-10 2023-06-01
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	2019-05-24 2021-05-18	2021-05-24 2023-05-18
SZ061-09	Horn Antenna	ETS	3115	00092346	2019-09-07	2021-09-07
SZ061-07	Pyramidal Horn Antenna	ETS	3160-09	00083067	2019-08-13	2021-08-13
SZ185-01	EMI Receiver	R&S	ESCI	100547	2020-12-22	2021-12-22
SZ056-07	Signal Analyzer	R&S	FSV40	101214	2020-10-17	2021-10-17
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	2020-05-27 2021-05-10	2021-05-27 2022-05-10
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	2018-12-15	2021-12-15
SZ062-02	RF Cable	RADIALL	RG 213U	--	2020-12-01 2021-06-01	2021-06-01 2022-12-01
SZ062-05	RF Cable	RADIALL	0.04-26.5GHz	--	2020-12-01 2021-06-01	2021-06-01 2022-12-01
SZ062-12	RF Cable	RADIALL	0.04-26.5GHz	--	2020-12-01 2021-06-01	2021-06-01 2022-12-01
SZ067-25	Notch Filter	Micro-Tronics	BRM50716	--	2020-03-20 2021-03-20	2021-03-20 2022-03-20
SZ067-04	Notch Filter	Micro-Tronics	BRM50702-02	--	2020-05-27 2021-05-11	2021-05-27 2022-05-11
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	2020-10-27	2021-10-27
SZ187-02	Two-Line V-Network	R&S	ENV216	100073	2020-05-27 2021-05-12	2021-05-27 2022-05-12
SZ188-03	Shielding Room	ETS	RFD-100	4100	2018-12-15	2021-12-15
SZ016-12	Programmable Temperature & Humidity Chamber	Taili	MHK-120NK	AB0105	2021-01-12	2022-01-12
SZ006-30	DC Power Supply	Guwei	SPS-3610	GEQ920551	2021-01-05	2022-01-05

Expanded uncertainty of radiated emission measurement is ±4.9 dB.

Expanded uncertainty of conducted emission measurement is ±3.6 dB.

********** End of Report**********