Dynamic Frequency Selection (DFS) Test Report

FCC Part15 Subpart E

Product Name	:	Wireless Access Point
Model No.	:	AP305C
FCC ID	:	QXO-AP305CNB

Applicant	:	Extreme Networks, Inc
Address	:	6480 Via Del Oro, San Jose, CA 95119

Date of Receipt	:	Apr. 11, 2022
Test Date	:	Apr. 12, 2022~ Apr. 27, 2022
Issued Date	:	May. 19, 2022
Report No.	:	2230990R-DFS-US-P08V01
Report Version	:	V1.1

NOTE: The EUT and 1962097R-DFS-US-P08V01 reports used in this report are the same model. The difference is that the EUT used this time removes the BLE chip. Therefore, this version of the report is based on the 1962097R-DFS-US-P08V01 update report.

DFS Test Report

Issued Date: May. 19, 2022
Report No. : 2230990R-DFS-US-P08V01

Product Name	:	Wireless Access Point
Applicant	:	Extreme Networks, Inc
Address	:	6480 Via Del Oro, San Jose, CA 95119
Manufacturer	:	Extreme Networks, Inc
Address	:	6480 Via Del Oro, San Jose, CA 95119
Model No.	:	AP305C
FCC ID	:	QXO-AP305CNB
EUT Voltage	:	DC37-57V
Brand Name	:	Extreme Networks
Applicable Standard	:	RSS-Gen Issue 5; RSS-247 Issue 2; ANSI C63.10:2013;
Test Result	:	Pass
Performed Location	:	DEKRA Testing & Certification (Suzhou) Co., Ltd. No.99 Hongye Rd., Suzhou Industrial Park, Suzhou, 215006, Jiangsu, China TEL: +86-512-6251-5088 / FAX: +86-512-6251-5098; FCC Designation Number: CN1199; ISED Lab Code: 4075B
Operation Mode (5250~5350MHz 5470~5725MHz)	:	☒ Master device ☐ Slaver device with radar detection function ☐ Slaver device without radar detection function

Documented By : Tim. Cao

(Project Engineer: Tim Cao)

Approved By : Jack Zhang

(Engineer Supervisor: Jack Zhang)

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1. General Information

Product Name	Wireless Access Point						
Model No.	AP305C						
EUT Voltage	DC37-57V						
Type of Modulation	OFDM-BPSK, QPSK, 16QAM, 64QAM, 128QAM, 256QAM, 1024QAM						
Data Rate	802.11a: 6/9/12/18/24/36/48/54Mbps						
	802.11n: up to 300Mbps						
	802.11ac: up to 866.6Mbps						
	802.11ax: up to 1.2Gbps						
Channel Control	Auto						
Transmit modes	☒	802.11a	☒	802.11n(20MHz)	☒	802.11n(40MHz)	
	☒	802.11ac(20MHz)	☒	802.11ac(40MHz)	☒	802.11ac(80MHz)	
	☒	802.11ax(20MHz)	☒	802.11ax(40MHz)	☒	802.11ax(80MHz)	
	☐	802.11ax(160MHz)					
Support Bands	☒	5150MHz~5250MHz	☐	Outdoor AP			
			☒	Indoor AP			
			☐	Fixed point-to-point AP			
			☐	Mobile and Portable Client			
	☒	5250MHz~5350MHz					
	☒	5470MHz~5725MHz （For FCC）	☒	With TDWR Channels			
			☐	Without TDWR Channels			
	☒	5470MHz~5600MHz, 5650MHz~5725MHz(For ISED)					
	☒	5725MHz~5850MHz					

Note1: The device contains two 5GHz modules, and called eth1 and eth2, eth2 can work separately and eth1 can only transmit with eth2 which at 5150~5350MHz and eth2 work at 5470~5850MHz.

Note2: The device contains two 5GHz modules, and called eth1 and eth2, Eth1 only supports band2 in DFS band, while eth2 supports band2 and band3 in DFS band. We have evaluated the two modules, and only the worst of the two modules was shown in the report.

AP305C:

Antenna Model No.	N/A						
Antenna Manufacturer	N/A						
Antenna Delivery	☒	1*TX+1*RX	☒	2*TX+2*RX	☐	3*TX+3*RX	
Antenna Technology	☒	SISO					
	☒	MIMO	☐	Basic methodology			
			☐	Sectorized antenna systems			
			☐	Cross-polarized antennas			
			☐	Unequal antenna gains, with equal transmit powers			
			☒	Spatial Multiplexing			
			☒	Cyclic Delay Diversity (CDD)			
Antenna Type	PIFA						
Antenna Gain							
Antenna Technology				Ant Gain(eth1) (dBi)			
☒ SISO		☒ Ant1		3.97			
		☒ Ant2		3.45			
☒ CDD				3.97dBi for Power; 6.97dBi for PSD			
☒ Beam-forming				6.97dBi for Power; 6.97dBi for PSD			
Antenna Technology				Ant Gain(eth2) (dBi)			
☒ SISO		☒ Ant3		3.75			
		☒ Ant4		2.95			
☒ CDD				3.75dBi for Power; 6.75dBi for PSD			
☒ Beam-forming				6.75dBi for Power; 6.75dBi for PSD			

The UUT operates in the following bands:

1. 5250-5350 MHz
2. 5470-5725 MHz for FCC (5470-5600, 5650~5725MHz for ISED)

The maximum mean EIRP of the device for 5GHz band is more than 23dBm.

System test was performed with the designated MPEG test file (download from NTIA) that streams full motion video at 30 frames per second from the Master to the Client IP based system.

The UUT utilizes 802.11a/n/ac/ax IP based architecture. One nominal channel bandwidth, 20 MHz, 40MHz, 80MHz are implemented.

The slaver device is Intel WiFi module AX200NGW.

Information regarding the parameters of the detected Radar Waveforms is not available to the end user.

For the 5250~5350 MHz band, the Master device provides, on aggregate, uniform loading of the spectrum across all devices by selecting an operating channel among the available channels using a random algorithm.

The DFS test software is N7607C 1.0.0.0

2. Test Equipment

Dynamic Frequency Selection (DFS) / AC-8

Instrument	Manufacturer	Type No.	Serial No	Cal. Date
Spectrum Analyzer	Agilent	E4440A	MY49420128	2020.03.28
Vector Signal Generator	Agilent	E4438C	MY49070163	2020.03.28
Preamplifier	Miteq	NSP1800-25	1364185	2020.05.06
Preamplifier	DEKRA Testing & Certification (Suzhou) Co., Ltd.	AP-040G	CHM-0906001	2020.05.06
DRG Horn	ETS-Lindgren	3117	00123988	2020.01.22
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	294	2019.11.25
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C1	2020.03.02
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C2	2020.03.02
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	AC5-C3	2020.03.02
EMI Receiver	Agilent	N9038A	MY51210196	2020.06.10
Temperature/Humidity Meter	Zhichen	ZC1-2	AC5-TH	2020.01.04

Instrument	Manufacturer	Type No.	Serial No
Splitter/Combiner (Qty: 2)	Mini-Circuits	ZAPD-50W 4.2-6.0 GHz	NN256400424
Splitter/Combiner (Qty: 2)	MCLI	PS3-7	4463/4464
ATT (Qty: 1)	Mini-Circuits	VAT-30+	30912
Laptop PC	Asus	N80V	8BN0AS226971468
RF Cable (Qty: 6)	Mini-Circuits	N/A	DFS-1~6
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	737
DRG Horn	ETS-Lindgren	3117	00167055

Software	Manufacturer	Function
Pulse Building	Agilent	Radar Signal Generation Software
DFS Tool	Agilent	DFS Test Software

3. DFS Detection Threshold and Response Requirement

1. Interference Threshold values, Master or Client incorporating In-Service Monitoring

Maximum Transmit Power	Value (see note)
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	-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. Note3: EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.	

2. DFS Response requirement values

Parameter	Value
Non-Occupancy Period	Minimum 30 minutes
Channel Availability Check Time	60 Seconds
Channel Move Time	10 Seconds (See Note1)
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. (See Notes 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.	

4. Radar Wave Parameters

Short Pulse Radar Test Waveforms

Table 5 – Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (µsec)	PRI (µsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
0	1	1428	18	See Note 1	See Note 1
1	1	Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a	Roundup $\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot 10^6}{PRI_{\mu sec}}\right)\right\}$	60%	30
		Test B: 15 unique PRI values randomly selected within the range of 518-3066 µ sec, with a minimum increment of 1 µ sec, excluding PRI values selected in Test A			
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120
Note 1: Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests.					

A minimum of 30 unique waveforms are required for each of the Short Pulse Radar Types 2 through 4. If more than 30 waveforms are used for Short Pulse Radar Types 2 through 4, then each additional waveform must also be unique and not repeated from the previous waveforms. If more than 30 waveforms are used for Short Pulse Radar Type 1, then each additional waveform is generated with Test B and must also be unique and not repeated from the previous waveforms in Tests A or B.

For example if in Short Pulse Radar Type 1 Test B a PRI of 3066 usec is selected, the number of pulses would be = Roundup $\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot 10^6}{3066}\right)\right\} = \text{Roundup}\{17.2\} = 18.$

Table 5a - Pulse Repetition Intervals Values for Test A

Pulse Repetition Frequency Number	Pulse Repetition Frequency (Pulses Per Second)	Pulse Repetition Interval (Microseconds)
1	1930. 5	518
2	1858. 7	538
3	1792. 1	558
4	1730. 1	578
5	1672. 2	598
6	1618. 1	618
7	1567. 4	638
8	1519. 8	658
9	1474. 9	678
10	1432. 7	698
11	1392. 8	718
12	1355	738
13	1319. 3	758
14	1285. 3	778
15	1253. 1	798
16	1222. 5	818
17	1193. 3	838
18	1165. 6	858
19	1139	878
20	1113. 6	898
21	1089. 3	918
22	1066. 1	938
23	326. 2	3066

The aggregate is the average of the percentage of successful detections of Short Pulse Radar Types 1-4.

Long Pulse Radar Test Waveform

Radar Type	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µsec)	Number of Pulses per Burst	Number of Bursts	Minimum Percentage of Successful Detection	Minimum Number of Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

The parameters for this waveform are randomly chosen. Thirty unique waveforms are required for theLong Pulse Radar Type waveforms. If more than 30 waveforms are used for the Long Pulse Radar Type waveforms, then each additional waveform must also be unique and not repeated from the previous waveforms.

Each waveform is defined as follows:

1) The transmission period for the Long Pulse Radar test signal is 12 seconds.

2) There are a total of 8 to 20 Bursts in the 12 second period, with the number of Bursts being randomly chosen. This number is Burst Count.

3) Each Burst consists of 1 to 3 pulses, with the number of pulses being randomly chosen. Each Burst within the 12 second sequence may have a different number of pulses.

4) The pulse width is between 50 and 100 microseconds, with the pulse width being randomly chosen. Each pulse within a Burst will have the same pulse width. Pulses in different Bursts may have different pulse widths.

5) Each pulse has a linear frequency modulated chirp between 5 and 20 MHz, with the chirp width being randomly chosen. Each pulse within a transmission period will have the same chirp width. The chirp is centered on the pulse. For example, with a radar frequency of 5300 MHz and a 20 MHz chirped signal, the chirp starts at 5290 MHz and ends at 5310 MHz.

6) If more than one pulse is present in a Burst, the time between the pulses will be between 1000 and 2000 microseconds, with the time being randomly chosen. If three pulses are present in a Burst, the random time interval between the first and second pulses is chosen independently of the random time interval between the second and third pulses.

7) The 12 second transmission period is divided into even intervals. The number of intervals is equal to Burst Count. Each interval is of length (12,000,000 / Burst Count) microseconds. Each interval contains one Burst. The start time for the Burst, relative to the beginning of the interval, is between 1 and [(12,000,000 / Burst Count) – (Total Burst Length) + (One Random PRI Interval)] microseconds, with the start time being randomly chosen. The step interval for the start time is 1 microsecond. The start time for each Burst is chosen randomly.

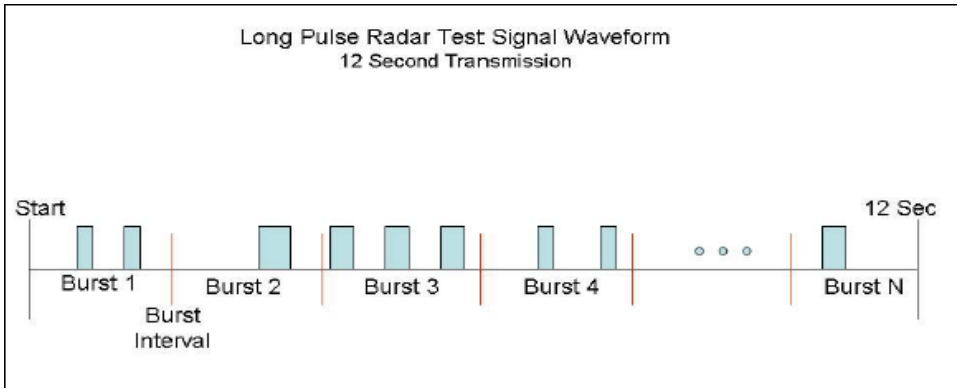
A representative example of a Long Pulse Radar Type waveform:

1) The total test waveform length is 12 seconds.

2) Eight (8) Bursts are randomly generated for the Burst Count.

3) Burst 1 has 2 randomly generated pulses.

4) The pulse width (for both pulses) is randomly selected to be 75 microseconds.
5) The PRI is randomly selected to be at 1213 microseconds.
6) Bursts 2 through 8 are generated using steps 3 – 5.
7) Each Burst is contained in even intervals of 1,500,000 microseconds. The starting location for Pulse 1, Burst 1 is randomly generated (1 to 1,500,000 minus the total Burst 1 length + 1 random PRI interval) at the 325,001 microsecond step. Bursts 2 through 8 randomly fall in successive1,500,000 microsecond intervals (i.e. Burst 2 falls in the 1,500,001 – 3,000,000 microsecondrange).
Figure 1 provides a graphical representation of the Long Pulse Radar Test Waveform.



Frequency Hopping Radar Test Waveform

Radar Type	Pulse Width (µsec)	PRI (µsec)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Number of Trials
6	1	333	9	0.333	300	70%	30

For the Frequency Hopping Radar Type, the same Burst parameters are used for each waveform. The hopping sequence is different for each waveform and a 100-length segment is selected from the hopping sequence defined by the following algorithm: 4

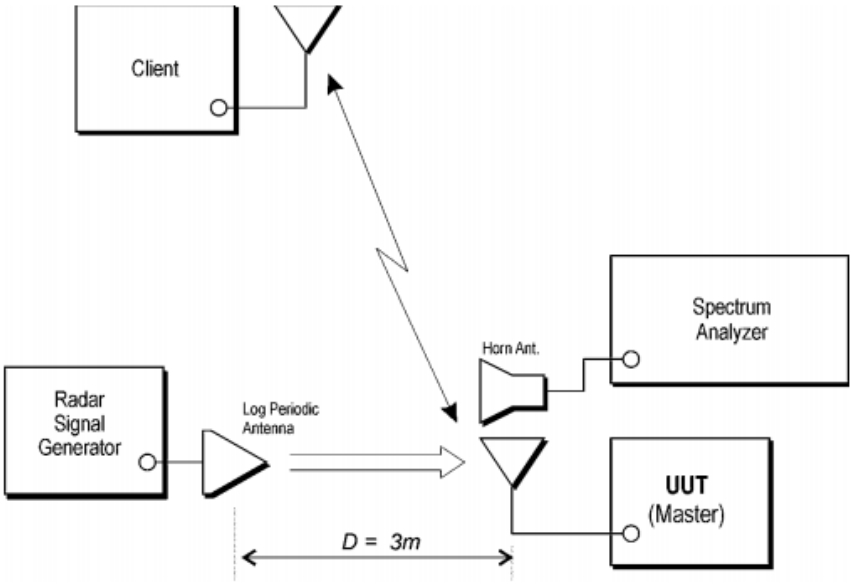
The first frequency in a hopping sequence is selected randomly from the group of 475 integer frequencies from 5250 – 5724 MHz. Next, the frequency that was just chosen is removed from the group and a frequency is randomly selected from the remaining 474 frequencies in the group. This process continues until all 475 frequencies are chosen for the set. For selection of a random frequency, the frequencies remaining within the group are always treated as equally likely.

5. Test Setup

Radiated Test Setup

The subsections below contain simplified block diagrams that illustrate the Radar Waveform injection path for each of the different radiated setups to be used. The basic setup is identical for all cases.

Figure 1



DFS Set-up Photo

6. Radar Waveform Calibration

1. Description of calibration setup

a. Block diagram of equipment setup, clearly identifying if a radiated or conducted method was used.

2. Description of calibration procedure

a. Verify DFS Detection Threshold levels

i. Indicate DFS Detection Threshold levels used.

ii. Consider output power range and antenna gain.

b. For the Short Pulse Radar Types, spectrum analyzer plots of the burst of pulses on the Channel frequency should be provided.

c. For the Long Pulse Radar Type, spectrum analyzer plot of a single burst (1-3 pulses) on the Channel frequency should be provided.

d. Describe method used to generate frequency hopping signal.

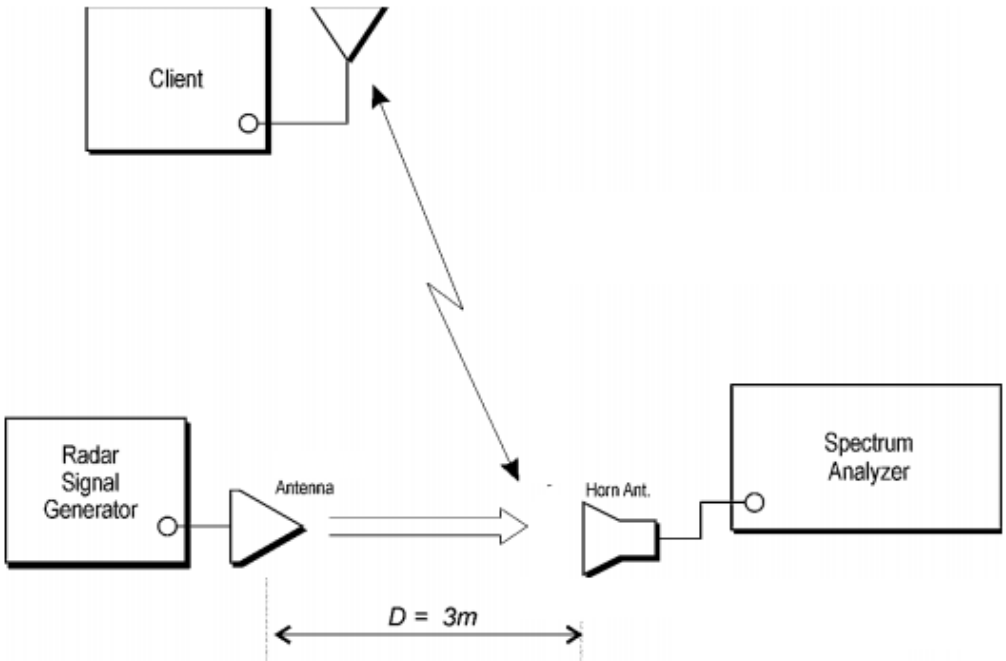
e. The U-NII Detection Bandwidth

f. For the Frequency Hopping waveform, a spectrum analyzer plot showing 9 pulses on one frequency within the U-NII Detection Bandwidth should be provided.

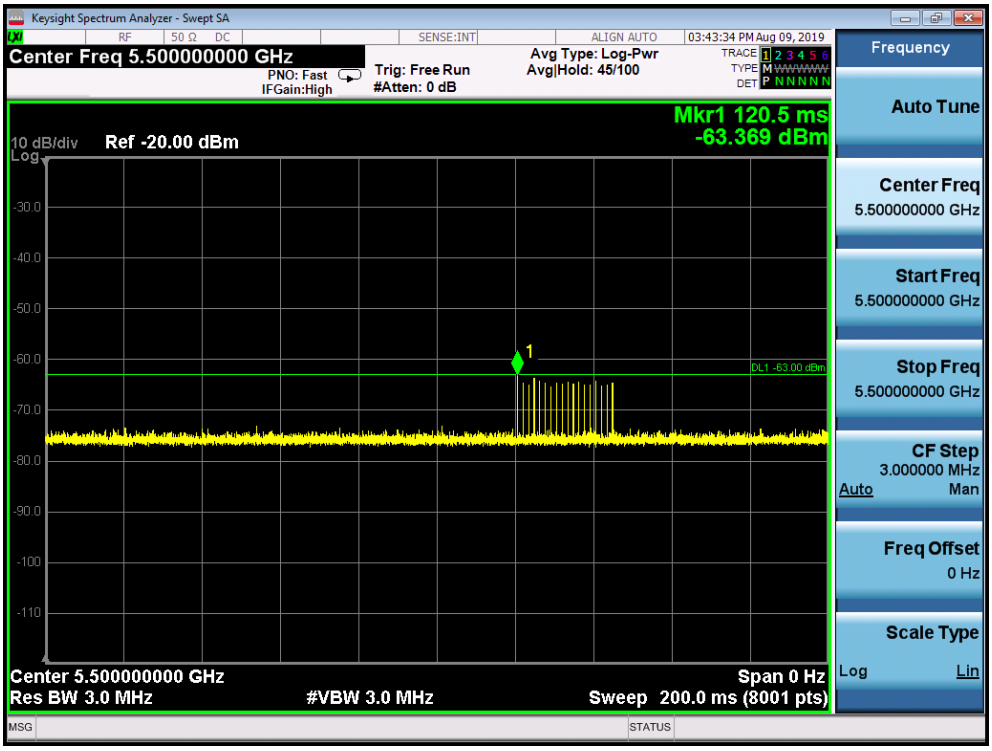
g. Verify use of vertical polarization for testing when using a radiated test method.

3. When testing a Client Device with radar detection capability, verify that the Client Device is responding independently based on the Client Device's self-detection rather than responding to the Master Device. If required, provide a description of the method used to isolate the client from the transmissions from the Master Device to ensure Client Device self detection of the Radar Waveform.

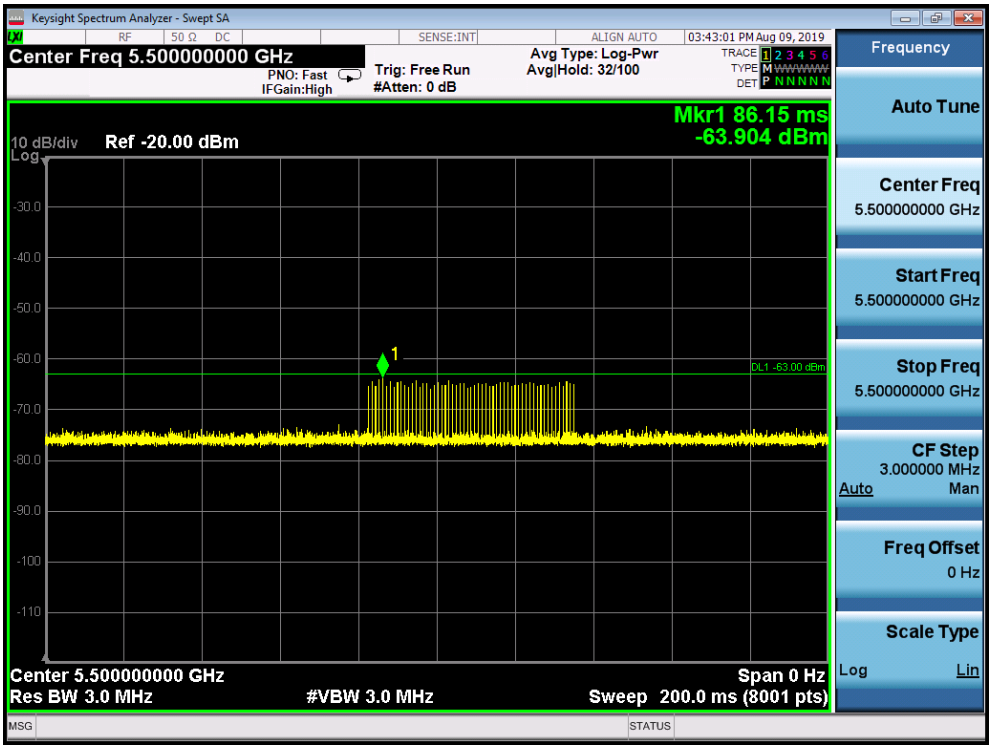
Figure 2: Radiated Calibration Setup



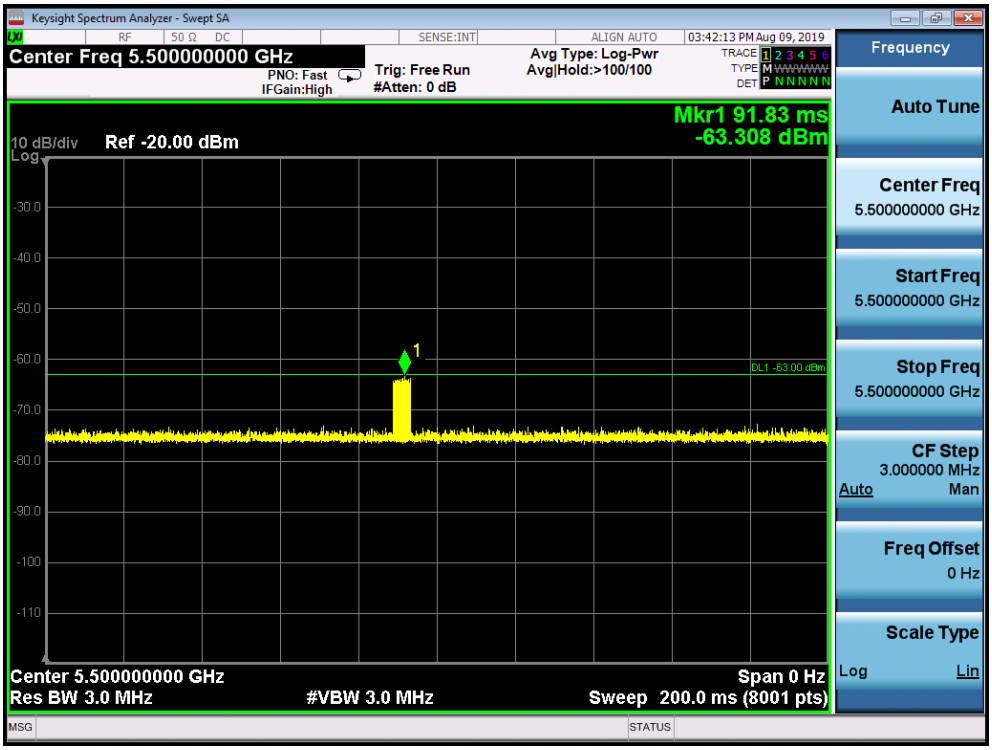
11a CH100 5500MHz Radar Type 0 Calibration Plot



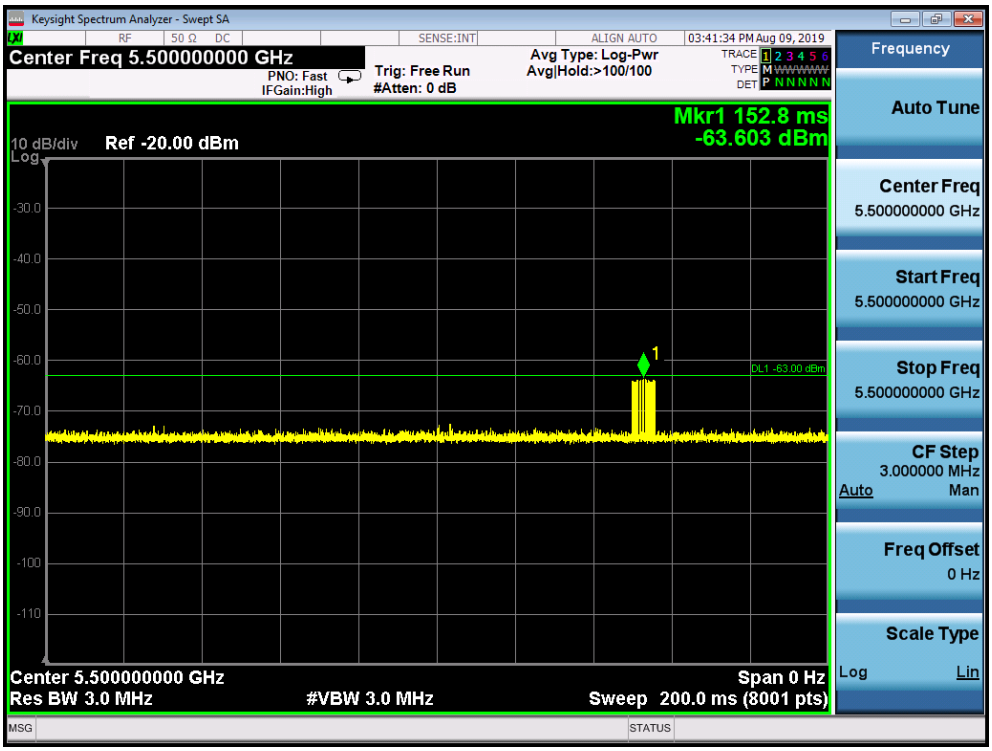
11a CH100 5500MHz Radar Type 1 Calibration Plot



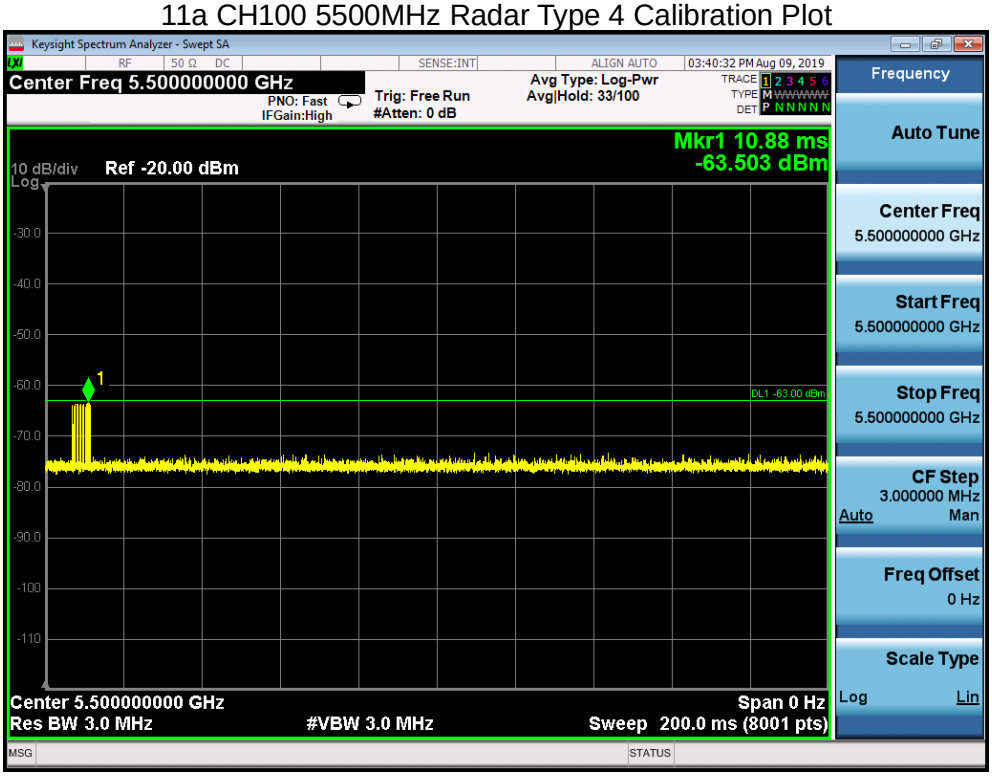
11a CH100 5500MHz Radar Type 2 Calibration Plot



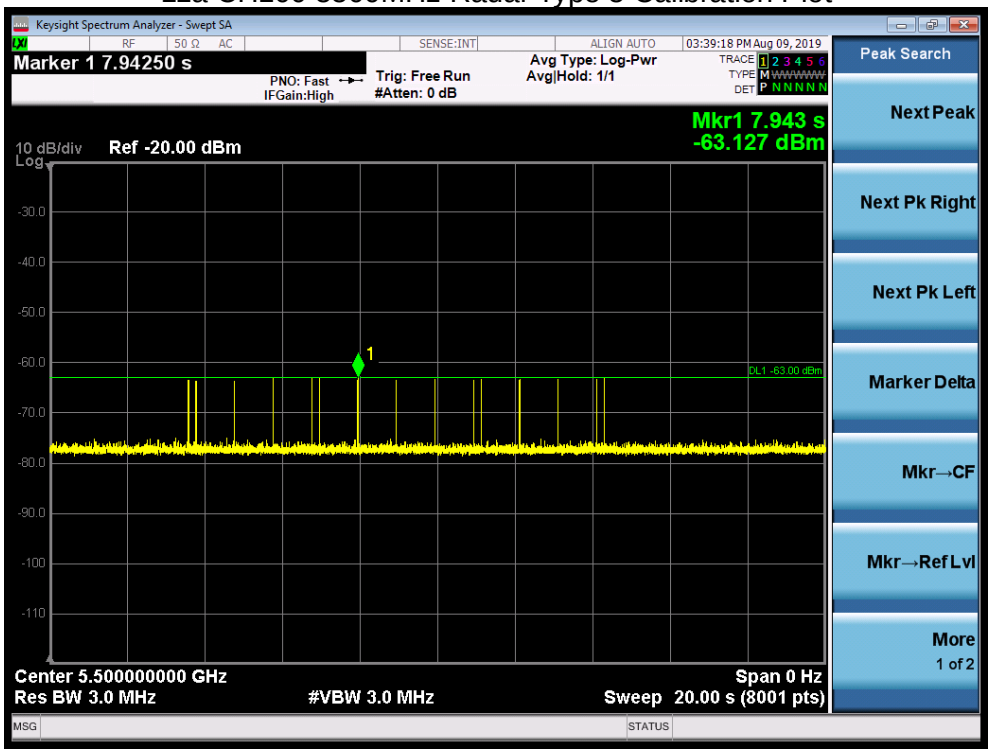
11a CH100 5500MHz Radar Type 3 Calibration Plot



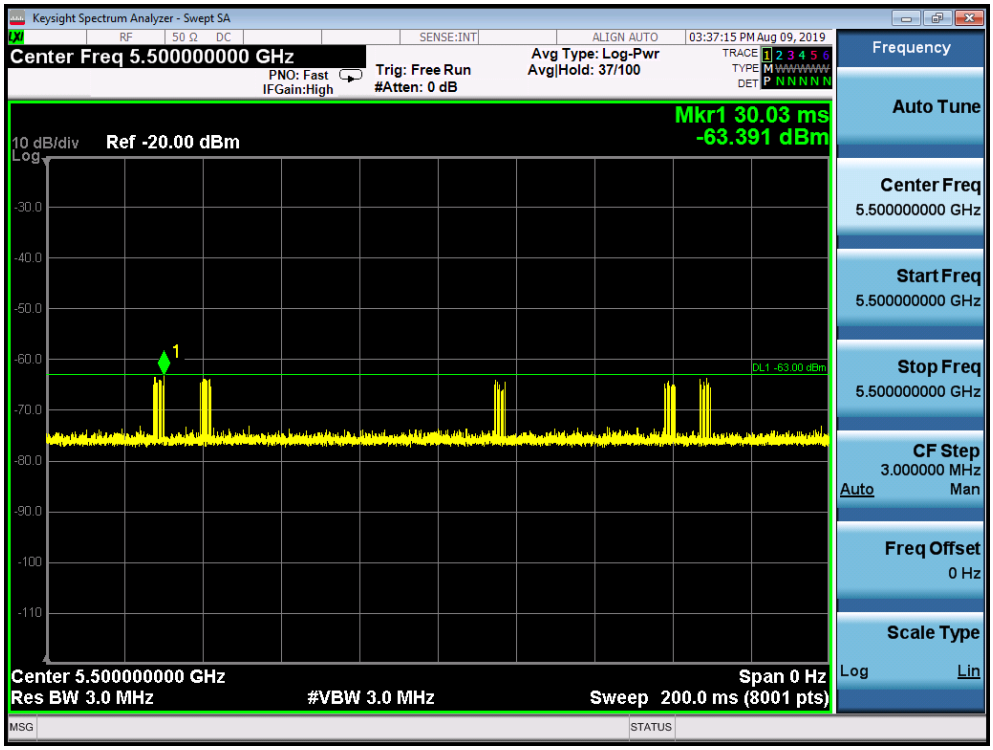
11a CH100 5500MHz Radar Type 4 Calibration Plot



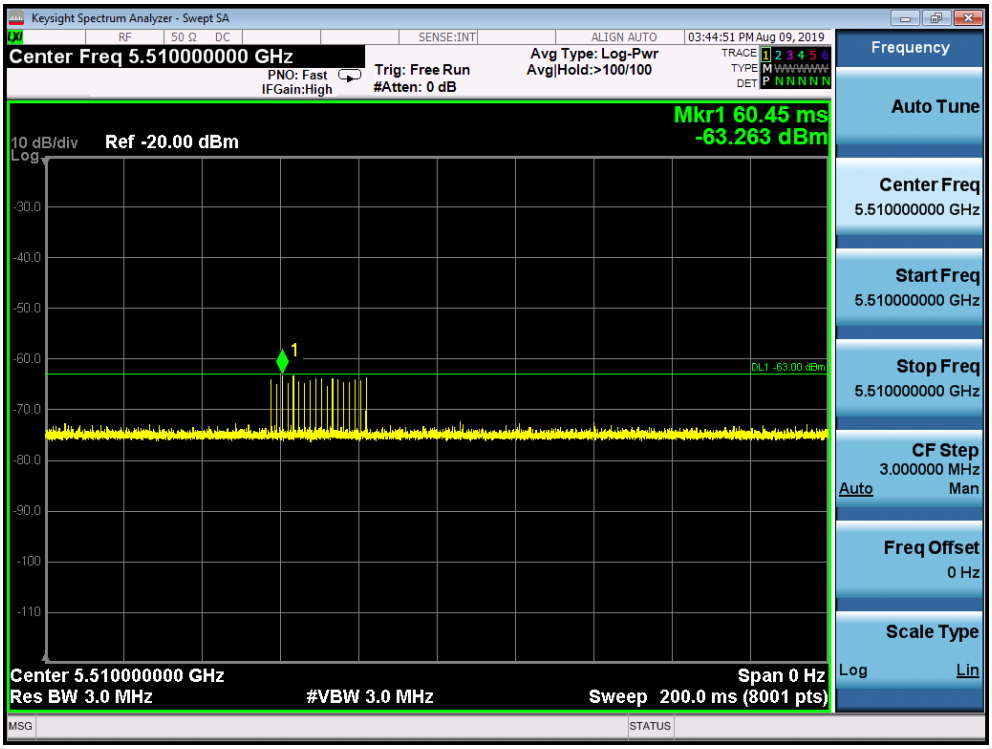
11a CH100 5500MHz Radar Type 5 Calibration Plot



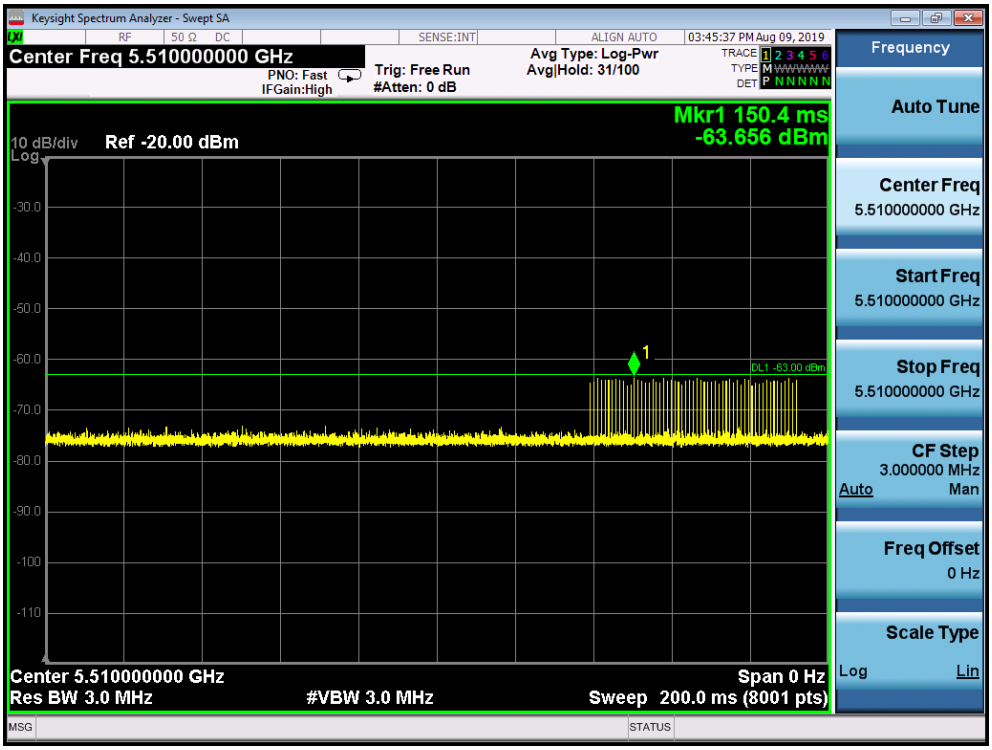
11a CH100 5500MHz Radar Type 6 Calibration Plot



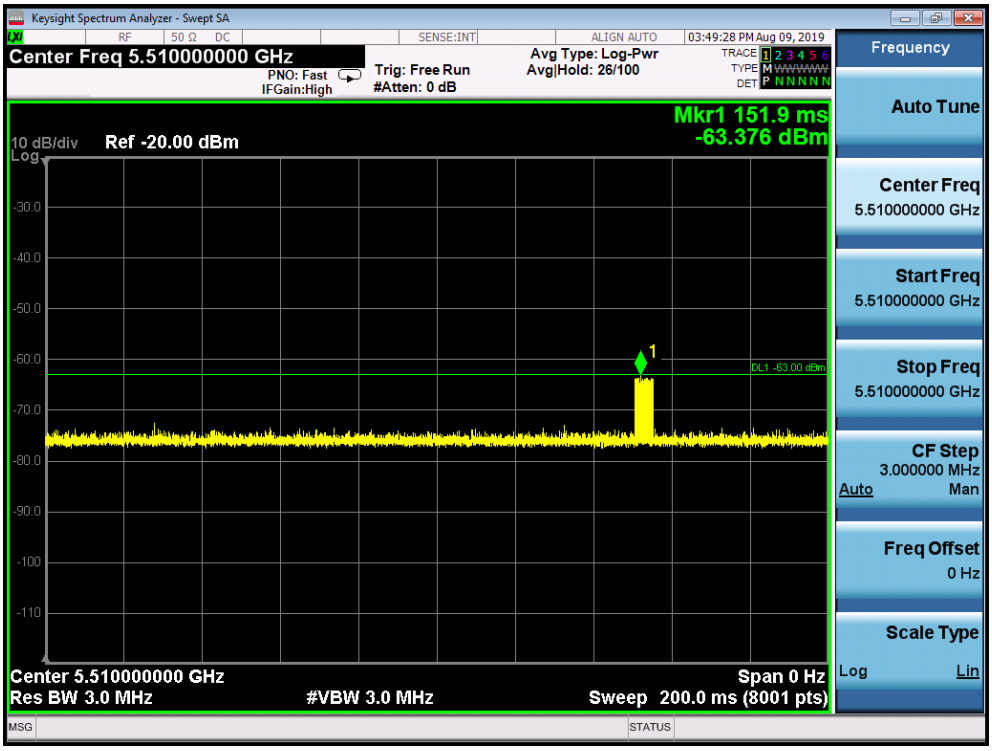
11ac40 CH102 5510MHz Radar Type 0 Calibration Plot



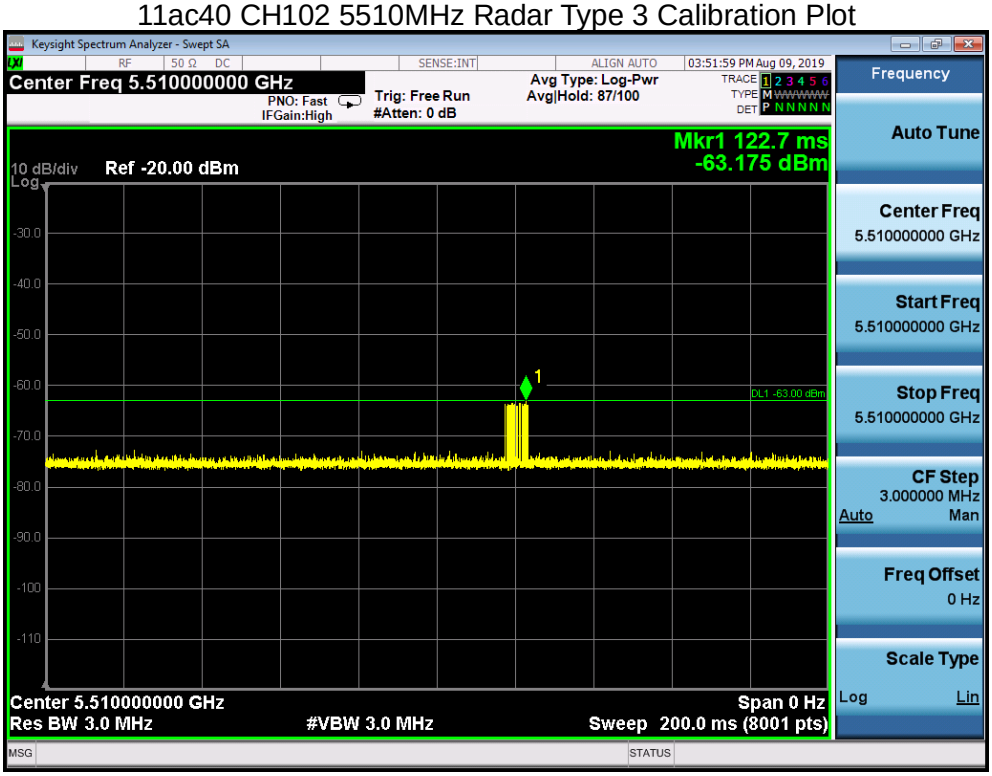
11ac40 CH102 5510MHz Radar Type 1 Calibration Plot



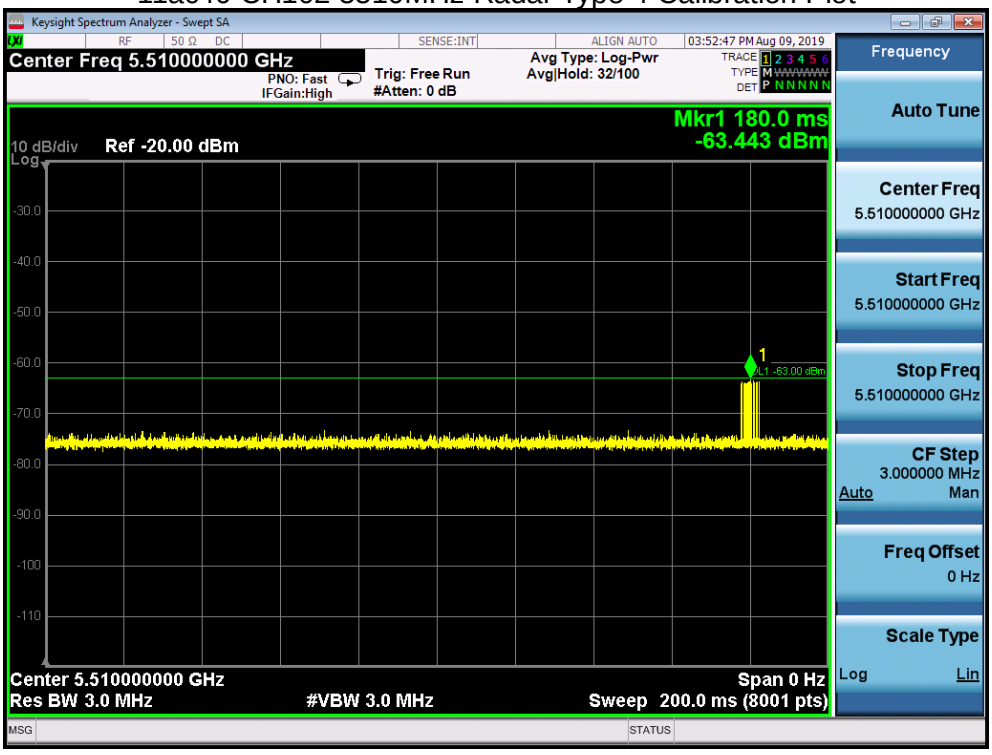
11ac40 CH102 5510MHz Radar Type 2 Calibration Plot



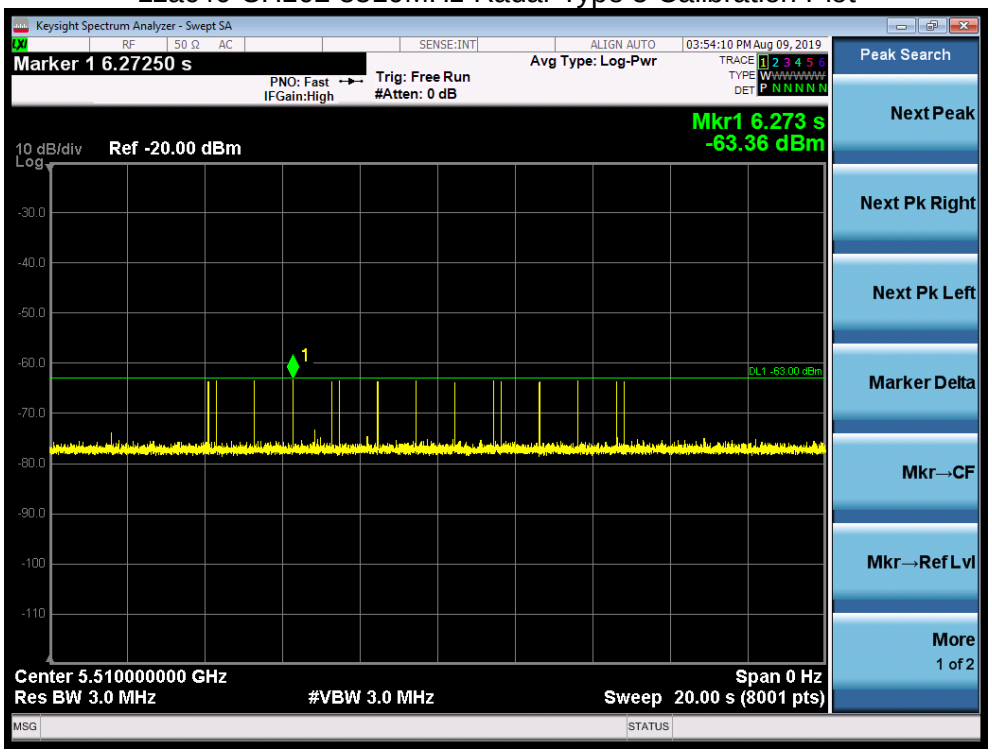
11ac40 CH102 5510MHz Radar Type 3 Calibration Plot



11ac40 CH102 5510MHz Radar Type 4 Calibration Plot

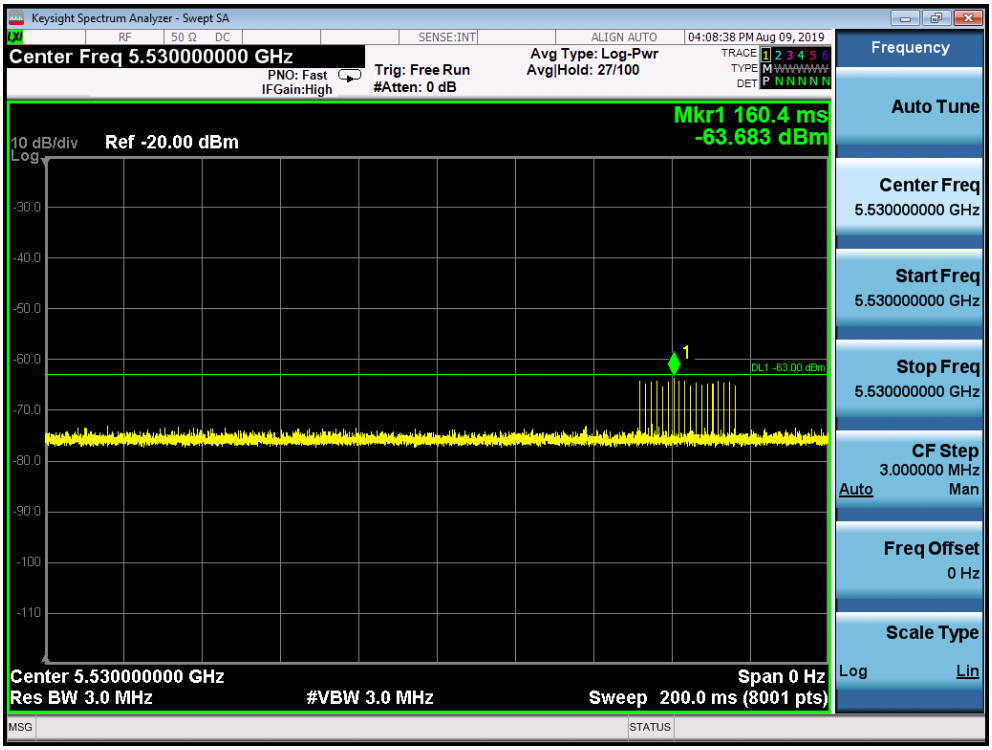


11ac40 CH102 5510MHz Radar Type 5 Calibration Plot

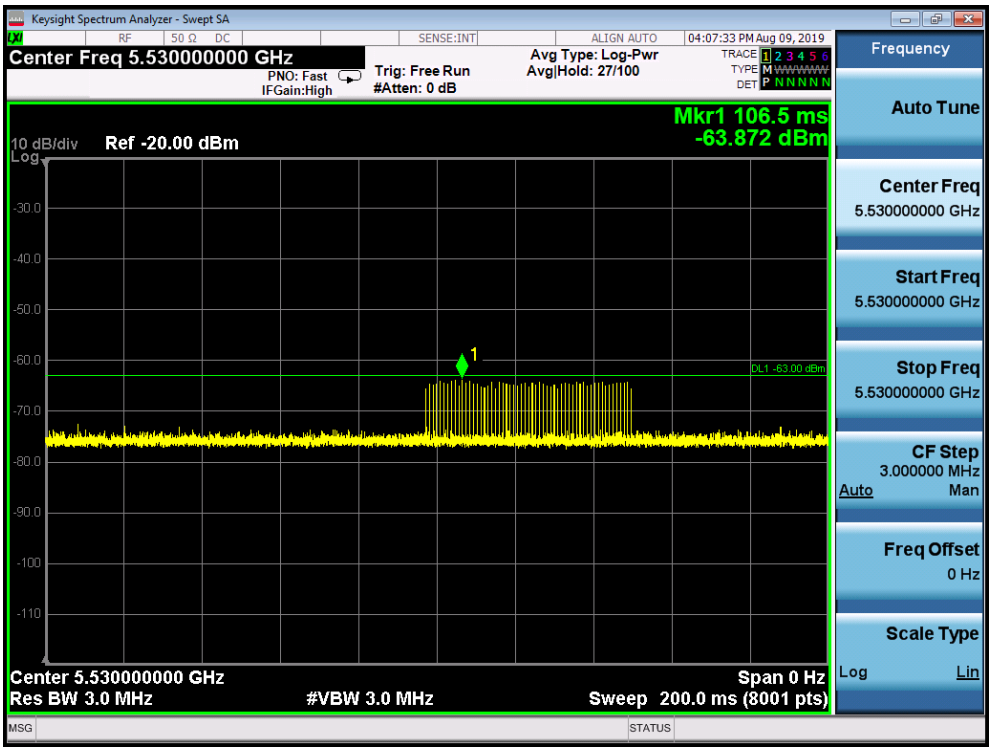


11ac40 CH102 5510MHz Radar Type 6 Calibration Plot

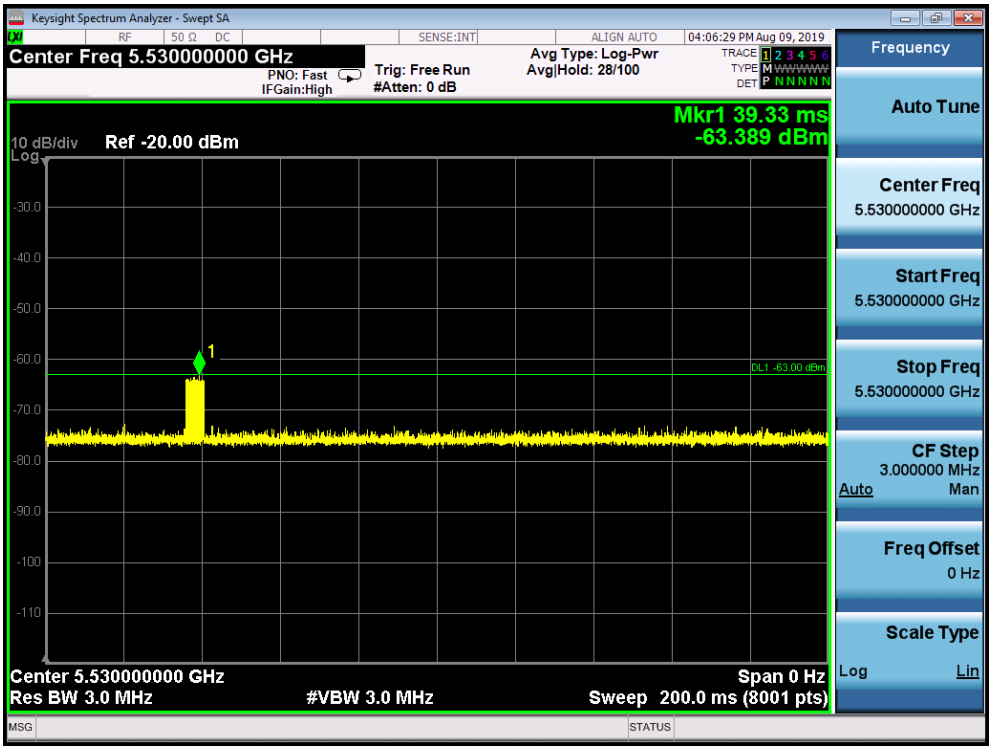
11ac80 CH106 5530MHz Radar Type 0 Calibration Plot



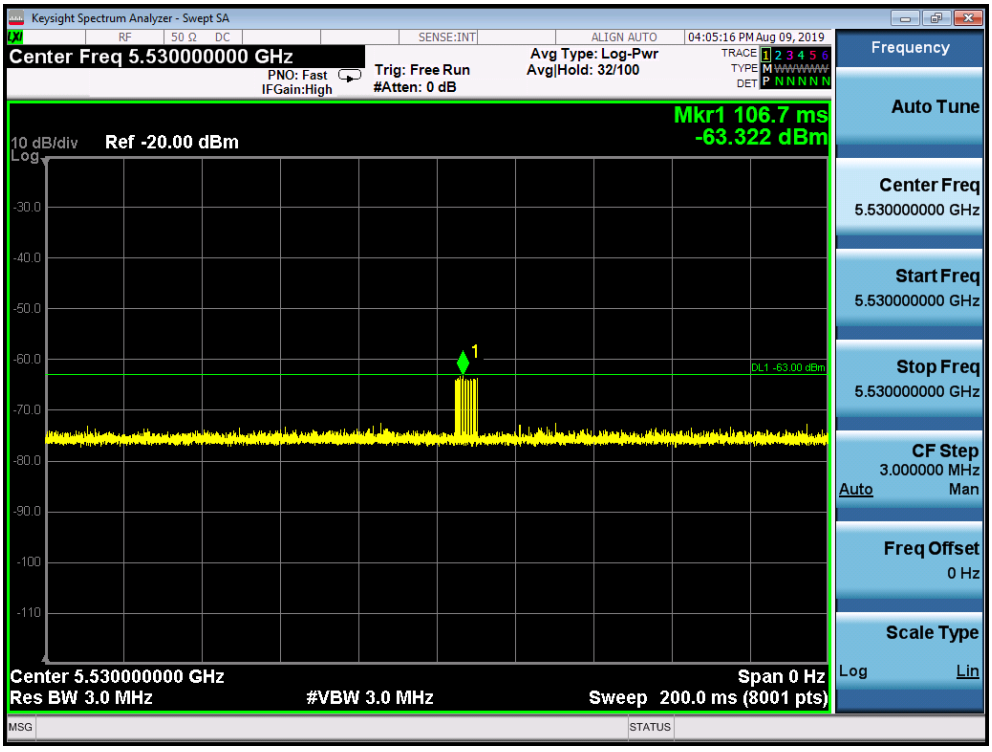
11ac80 CH106 5530MHz Radar Type 1 Calibration Plot



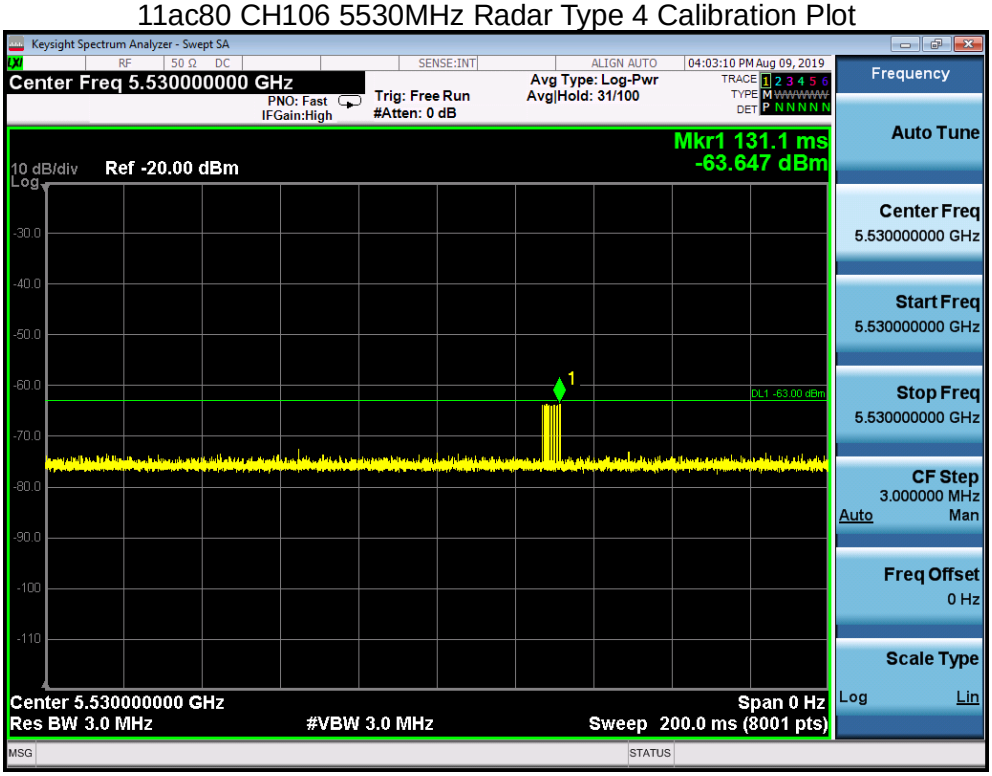
11ac80 CH106 5530MHz Radar Type 2 Calibration Plot



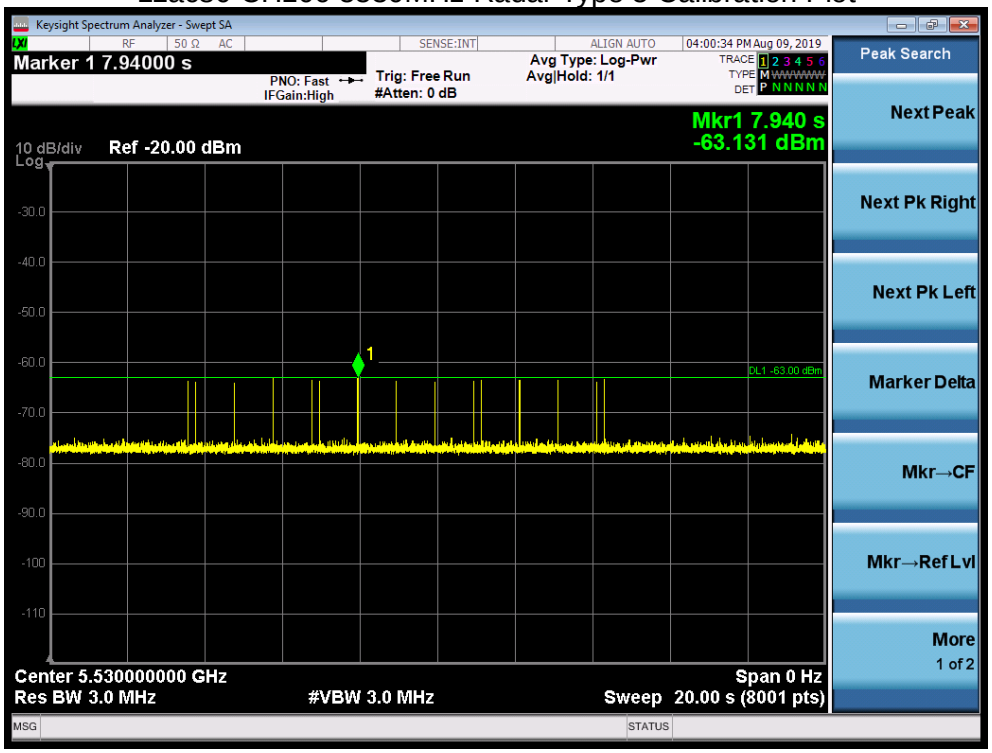
11ac80 CH106 5530MHz Radar Type 3 Calibration Plot



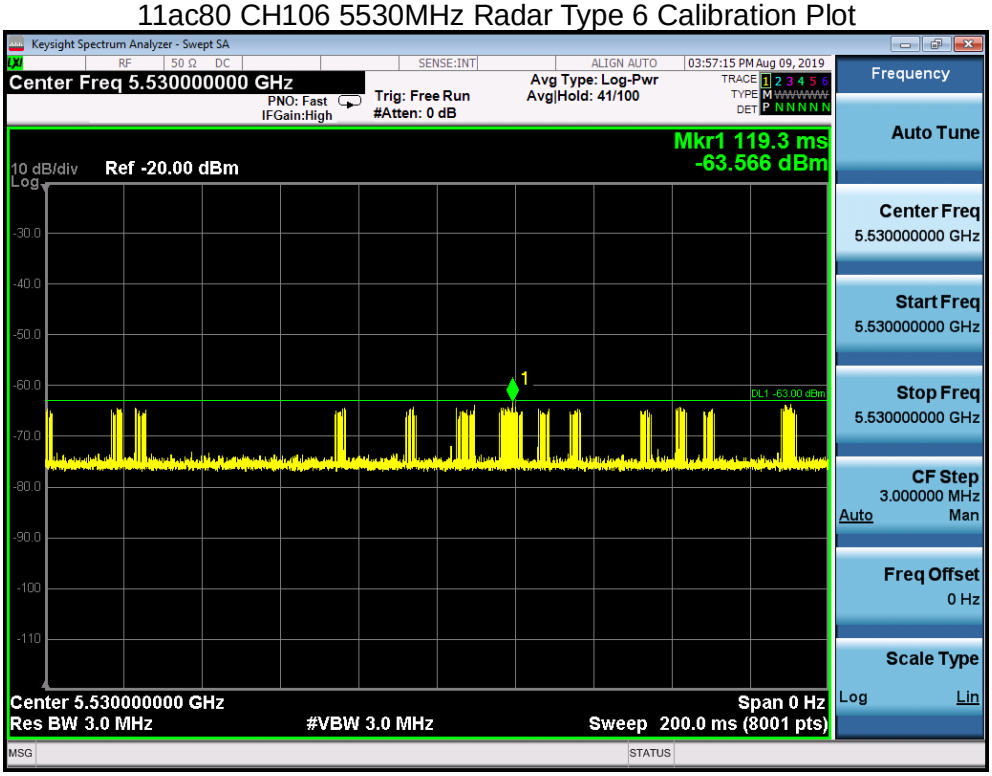
11ac80 CH106 5530MHz Radar Type 4 Calibration Plot



11ac80 CH106 5530MHz Radar Type 5 Calibration Plot



11ac80 CH106 5530MHz Radar Type 6 Calibration Plot



7. Channel Loading

System testing will be performed with channel-loading using means appropriate to the data types that are used by the unlicensed device. The following requirements apply:

a) The data file must be of a type that is typical for the device (i.e., MPEG-2, MPEG-4, WAV, MP3, MP4, AVI, etc.) and must generally be transmitting in a streaming mode.

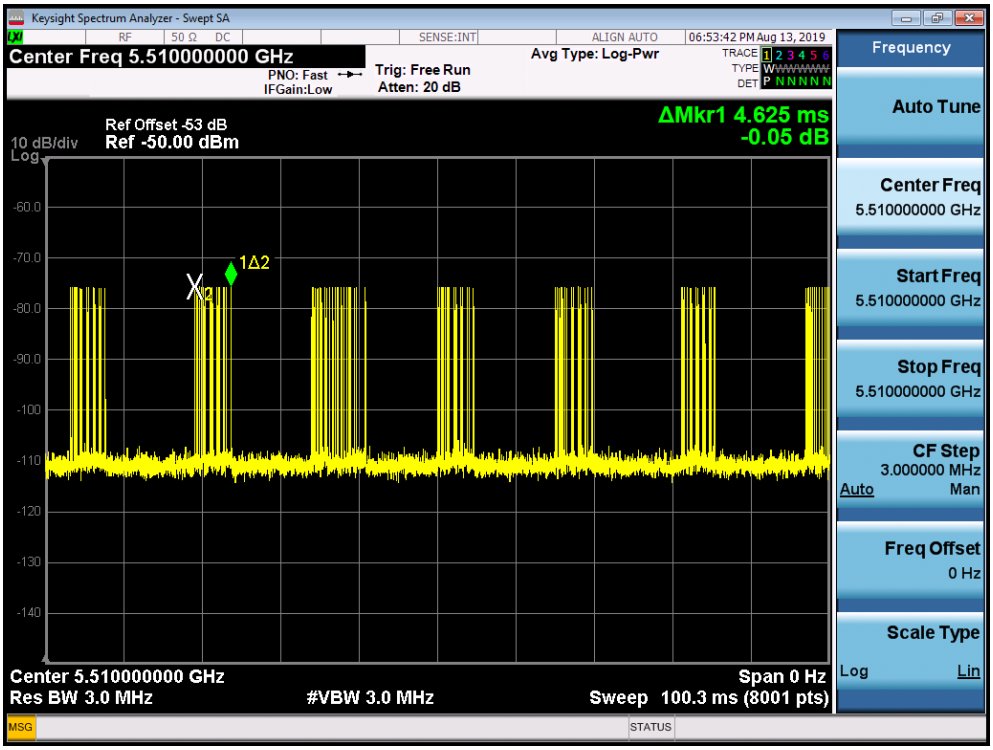
b) Software to ping the client is permitted to simulate data transfer but must have random ping intervals.

c) Timing plots are required with calculations demonstrating a minimum channel loading of approximately 17% or greater. For example, you can zero span the spectrum analyzer and approximate the transmission time.

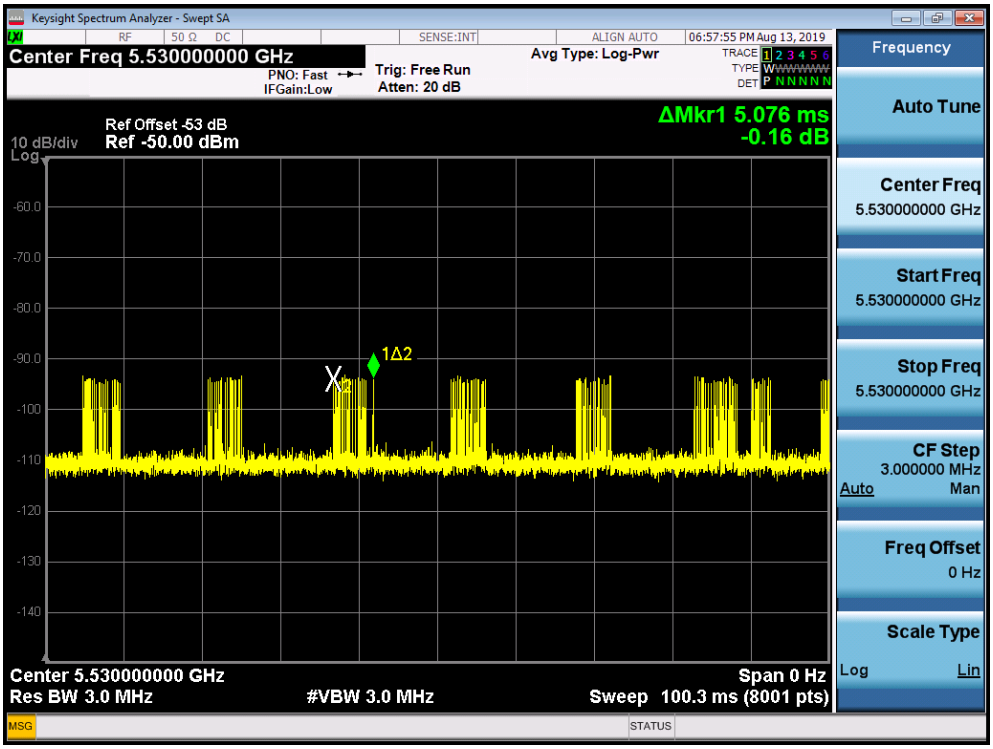
d) Unicast or Multicast protocols are preferable but other protocols may be used. The appropriate protocol used must be described in the test procedures.

Channel Loading Plot - 802.11a-5500MHz

Channel Loading Plot - 802.11n-HT40 5510MHz



Channel Loading Plot - 802.11ac-VHT80 5530MHz



Test Mode	Packet ratio	Requirement ratio	Test Result
802.11a	24.4%	>17%	Pass
802.11n-HT40	27.8%	>17%	Pass
802.11ac-VHT80	30.5%	>17%	Pass

8. Test Procedures

a) U-NII Detection Bandwidth

Set up the generating equipment as shown in Figure 1, or equivalent. Set up the DFS timing monitoring equipment as shown in Figure 1. Set up the overall system for either radiated or conducted coupling to the UUT.

Adjust the equipment to produce a single Burst of the Short Pulse Radar Type 1 at the center frequency of the UUT Operating Channel at the specified DFS Detection Threshold level.

Set the UUT up as a standalone device (no associated Client or Master, as appropriate) and no traffic. Frame based systems will be set to a talk/listen ratio of 0%/100% during this test. Generate a single radar Burst, and note the response of the UUT. Repeat for a minimum of 10 trials. The UUT must detect the Radar Waveform using the specified U-NII Detection Bandwidth criterion.

Starting at the center frequency of the UUT operating Channel, increase the radar frequency in 1 MHz steps, repeating the above test sequence, until the detection rate falls below the U-NII Detection Bandwidth criterion. Record the highest frequency (denote as FH) at which detection is greater than or equal to the U-NII Detection Bandwidth criterion. Recording the detection rate at frequencies above FH is not required to demonstrate compliance.

Starting at the center frequency of the UUT operating Channel, decrease the radar frequency in 1 MHz steps, repeating the above test sequence, until the detection rate falls below the U-NII Detection Bandwidth criterion specified in Table 4. Record the lowest frequency (denote as FL) at which detection is greater than or equal to the U-NII Detection Bandwidth criterion. Recording the detection rate at frequencies below FL is not required to demonstrate compliance. The U-NII Detection Bandwidth is calculated as follows:

$$U\text{-}NII\ Detection\ Bandwidth = FH - FL$$

The U-NII Detection Bandwidth must meet the U-NII Detection Bandwidth criterion. Otherwise, the UUT does not comply with DFS requirements. This is essential to ensure that the UUT is capable of detecting Radar Waveforms across the same frequency spectrum that contains the significant energy from the system. In the case that the U-NII Detection Bandwidth is greater than or equal to the 99 percent power bandwidth for the measured FH and FL, the test can be truncated and the U-NII Detection Bandwidth can be reported as the measured FH and FL.

b) Channel Availability Check

The Initial Channel Availability Check Time tests that the UUT does not emit beacon, control, or data signals on the test Channel until the power-up sequence has been completed and the U-NII device checks for Radar Waveforms for one minute on the test Channel. This test does not use any Radar Waveforms and only needs to be performed one time.

a) The U-NII devices will be powered on and be instructed to operate on the appropriate U-NII Channel that must incorporate DFS functions. At the same time the UUT is powered on, the spectrum analyzer will be set to zero span modes with a 3 MHz RBW and 3 MHz VBW on the Channel occupied by the radar (Chr) with a 2.5 minute sweep time. The spectrum analyzer's sweep will be started at the same time power is applied to the U-NII device.

b) The UUT should not transmit any beacon or data transmissions until at least 1 minute after the completion of the power-on cycle. This measurement can be used to determine the length of the power-on cycle if it is not supplied by the manufacturer. If the spectrum analyzer sweep is started at the same time the UUT is powered on and the UUT does not begin transmissions until it has completed the cycle, the power-on time can be determined
by comparing the two times.

Radar Burst at the Beginning of the Channel Availability Check Time

The steps below define the procedure to verify successful radar detection on the test Channel during a period equal to the Channel Availability Check Time and avoidance of operation on that Channel when a radar Burst with a level equal to the DFS Detection Threshold + 1 dB occurs at the beginning of the Channel Availability Check Time. This is illustrated as shown below.

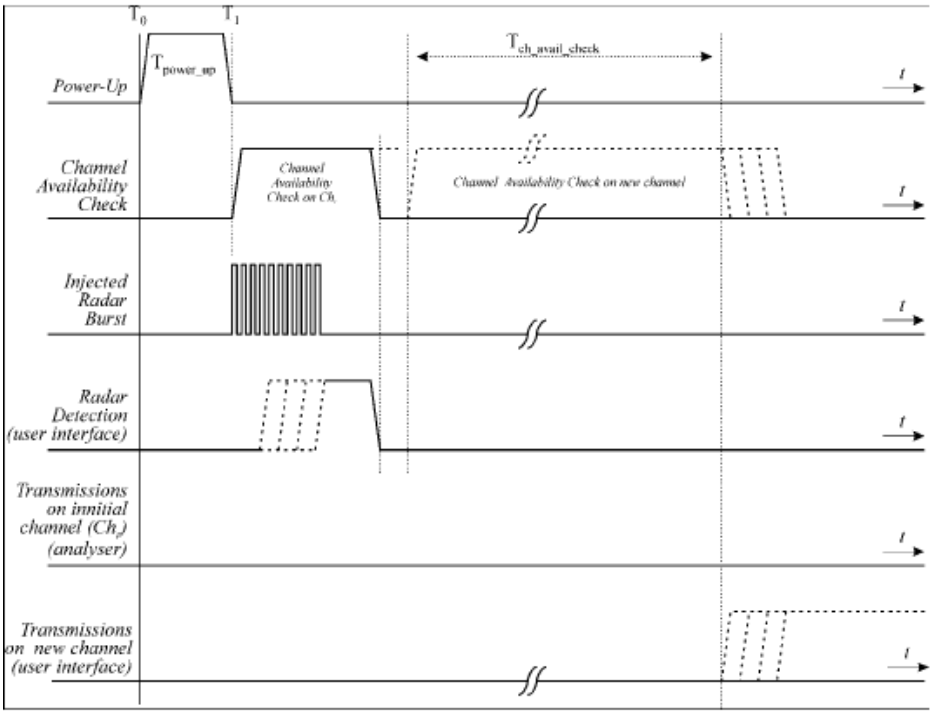
a) The Radar Waveform generator and UUT are connected using the applicable test setup described in the sections on configuration for Conducted Tests (7.2) or Radiated Tests (7.3) and the power of the UUT is switched off.

b) The UUT is powered on at T0. T1 denotes the instant when the UUT has completed its power-up sequence (Tpower_up). The Channel Availability Check Time commences on Chr at instant T1 and will end no sooner than T1 + Tch_avail_check.

c) A single Burst of one of the Short Pulse Radar Types 1-4 will commence within a 6 second window starting at T1. An additional 1 dB is added to the radar test signal to ensure it is at or above the DFS Detection Threshold, accounting for equipment variations/errors.

d) Visual indication or measured results on the UUT of successful detection of the radar Burst will be recorded and reported. Observation of Chr for UUT emissions will continue for 2.5 minutes after the radar Burst has been generated.

e) Verify that during the 2.5 minute measurement window no UUT transmissions occurred on Chr. The Channel Availability Check results will be recorded.



Radar Burst at the End of the Channel Availability Check Time

The steps below define the procedure to verify successful radar detection on the test Channel during a period equal to the Channel Availability Check Time and avoidance of operation on that Channel when a radar Burst with a level equal to the DFS Detection Threshold + 1dB occurs at the end of the Channel Availability Check Time. This is illustrated as shown below.

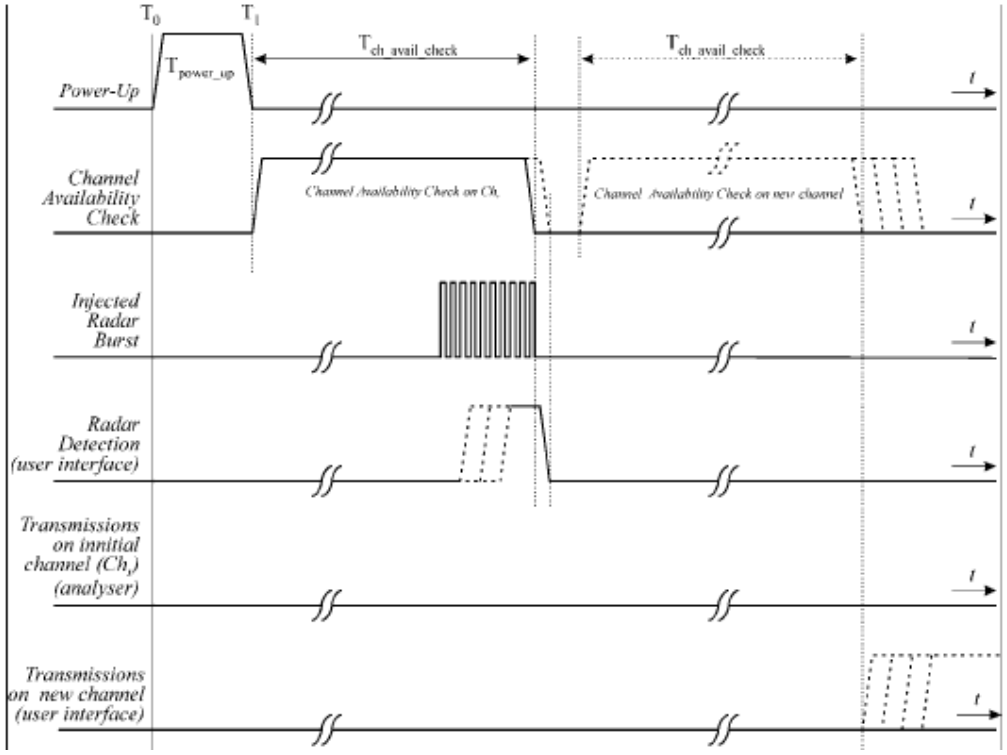
a) The Radar Waveform generator and UUT are connected using the applicable test setup described in the sections for Conducted Tests (7.2) or Radiated Tests (7.3) and the power of the UUT is switched off.

b) The UUT is powered on at T0. T1 denotes the instant when the UUT has completed its power-up sequence (Tpower_up). The Channel Availability Check Time commences on Chr at instant T1 and will end no sooner than T1 + Tch_avail_check.

c) A single Burst of one of the Short Pulse Radar Types 1-4 will commence within a 6 second window starting at T1 + 54 seconds. An additional 1 dB is added to the radar test signal to ensure it is at or above the DFS Detection Threshold, accounting for equipment variations/errors.

d) Visual indication or measured results on the UUT of successful detection of the radar Burst will be recorded and reported. Observation of Chr for UUT emissions will continue for 2.5 minutes after the radar Burst has been generated.

e) Verify that during the 2.5 minute measurement window no UUT transmissions occurred on Chr. The Channel Availability Check results will be recorded.



c) In-Service Monitoring for Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period

These tests define how the following DFS parameters are verified during In-Service Monitoring;

- Channel Closing Transmission Time
- Channel Move Time
- Non-Occupancy Period

The steps below define the procedure to determine the above mentioned parameters when a radar Burst with a level equal to the DFS Detection Threshold + 1dB is generated on the Operating Channel of the UNII device (In- Service Monitoring).

a) One frequency will be chosen from the Operating Channels of the UUT within the 5250-5350 MHz or 5470-5725 MHz bands.

b) In case the UUT is a U-NII device operating as a Client Device (with or without DFS), a UNII device operating as a Master Device will be used to allow the UUT (Client device) to Associate with the Master Device. In case the UUT is a Master Device, a U-NII device operating as a Client Device will be used and it is assumed that the Client will associate with the UUT (Master). In both cases for conducted tests, the Radar Waveform generator will be connected to the Master Device. For radiated tests, the emissions of the Radar Waveform generator will be directed towards the Master Device. If the Master Device has antenna gain, the main beam of the antenna will be directed toward the radar emitter. Vertical polarization is used for testing.

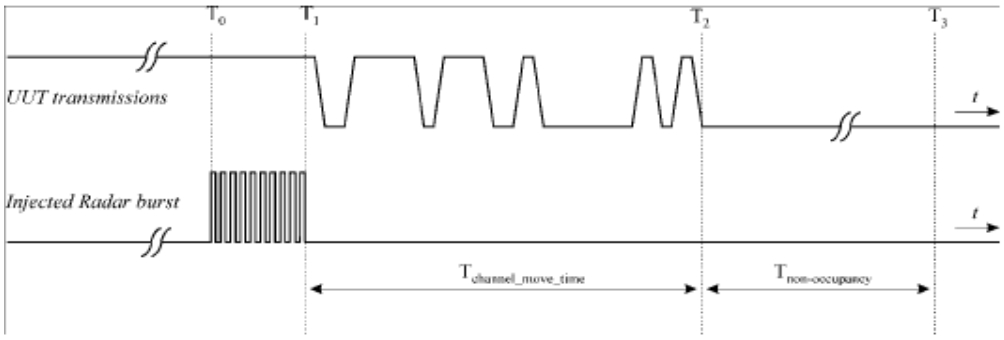
c) Stream the MPEG test file from the Master Device to the Client Device on the test Channel for the entire period of the test.

d) At time T0 the Radar Waveform generator sends a Burst of pulses for one of the Short Pulse Radar Types 1-4, on the Operating Channel. An additional 1 dB is added to the radar test signal to ensure it is at or above the DFS Detection Threshold, accounting for equipment variations/errors.

e) Observe the transmissions of the UUT at the end of the radar Burst on the Operating Channel for duration greater than 10 seconds. Measure and record the transmissions from the UUT during the observation time (Channel Move Time). Measure and record the Channel Move Time and Channel Closing Transmission Time if radar detection occurs. Figure shown below illustrates Channel Closing Transmission Time.

f) When operating as a Master Device, monitor the UUT for more than 30 minutes following instant T2 to verify that the UUT does not resume any transmissions on this Channel. Perform this test once and record the measurement result.

g) In case the UUT is U-NII device operating as Client Device with In-Service Monitoring, perform steps a) to f).



d) Statistical Performance Check

The steps below define the procedure to determine the minimum percentage of successful detection requirements when a radar burst with a level equal to the DFS Detection Threshold + 1dB is generated on the Operating Channel of the U-NII device (In- Service Monitoring).

a) One frequency will be chosen from the Operating Channels of the UUT within the 5250-5350 MHz or 5470-5725 MHz bands.

b) In case the UUT is a U-NII device operating as a Client Device (with or without Radar Detection), a U-NII device operating as a Master Device will be used to allow the UUT (Client device) to Associate with the Master Device. In case the UUT is a Master Device, a U-NII device operating as a Client Device will be used and it is assumed that the Client will associate with the UUT (Master). In both cases for conducted tests, the Radar Waveform generator will be connected to the Master Device. For radiated tests, the emissions of the Radar Waveform generator will be directed towards the Master Device. If the Master Device has antenna gain, the main beam of the antenna will be directed toward the radar emitter. Vertical polarization is used for testing.

c) Stream the MPEG test file from the Master Device to the Client Device on the test Channel for the

entire period of the test.

d) At time T0 the Radar Waveform generator sends the individual waveform for each of the Radar Types 1-6, at levels defined shown above, on the Operating Channel. An additional 1 dB is added to the radar test signal to ensure it is at or above the DFS Detection Threshold, accounting for equipment variations/errors.

e) Observe the transmissions of the UUT at the end of the Burst on the Operating Channel for duration greater than 10 seconds for Short Pulse Radar Types 1-4 and 6 to ensure detection occurs.

f) Observe the transmissions of the UUT at the end of the Burst on the Operating Channel for duration greater than 22 seconds for Long Pulse Radar Type 5 to ensure detection occurs.

g) In case the UUT is a U-NII device operating as a Client Device with In-Service Monitoring, perform steps a) to f).

9. Test Result

a) Detection Bandwidth

20 MHz Signal Bandwidth											
EUT Frequency = 5500MHz											
Radar Frequency (MHz)	DFS Detection Trials (1=Detection, Blank= No Detection)										
	1	2	3	4	5	6	7	8	9	10	Detection Rate (%)
5489	0	0	0	0	0	0	0	0	0	0	0%
5490 Fl	1	1	1	1	1	1	1	1	1	1	100%
5491	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	1	1	1	1	1	1	1	1	1	1	100%
5510 Fh	1	1	1	1	1	1	1	1	1	1	100%
5511	0	0	0	0	0	0	0	0	0	0	0%
Detection Bandwidth = Fh-Fl = 5510MHz - 5490MHz = 20MHz											
EUT 99% Bandwidth = 16.987MHz											

40 MHz Signal Bandwidth											
EUT Frequency = 5510MHz											
Radar Frequency (MHz)	DFS Detection Trials (1=Detection, Blank= No Detection)										
	1	2	3	4	5	6	7	8	9	10	Detection Rate (%)
5489	0	0	0	0	0	0	0	0	0	0	0%
5490 Fl	1	1	1	1	1	1	1	1	1	1	100%
5491	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	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 Fh	1	1	1	1	1	1	1	1	1	1	100%
5531	0	0	0	0	0	0	0	0	0	0	0%
Detection Bandwidth = Fh-Fl = 5530MHz - 5490MHz = 40MHz											
EUT 99% Bandwidth = 36.389MHz											

80 MHz Signal Bandwidth											
EUT Frequency = 5530MHz											
Radar Frequency (MHz)	DFS Detection Trials (1=Detection, Blank= No Detection)										
	1	2	3	4	5	6	7	8	9	10	Detection Rate (%)
5489	0	0	0	0	0	0	0	0	0	0	0%
5490 Fl	1	1	1	1	1	1	1	1	1	1	100%
5491	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	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%
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%
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%

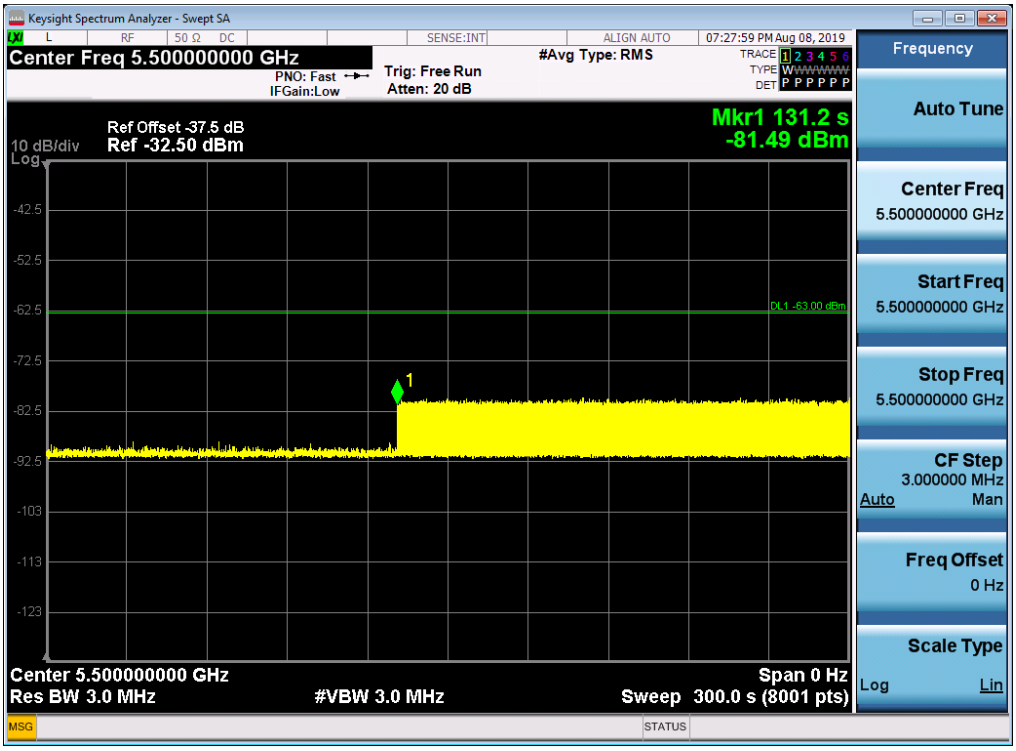
5558	1	1	1	1	1	1	1	1	1	1	100%
5559	1	1	1	1	1	1	1	1	1	1	100%
5560	1	1	1	1	1	1	1	1	1	1	100%
5561	1	1	1	1	1	1	1	1	1	1	100%
5562	1	1	1	1	1	1	1	1	1	1	100%
5563	1	1	1	1	1	1	1	1	1	1	100%
5564	1	1	1	1	1	1	1	1	1	1	100%
5565	1	1	1	1	1	1	1	1	1	1	100%
5566	1	1	1	1	1	1	1	1	1	1	100%
5567	1	1	1	1	1	1	1	1	1	1	100%
5568	1	1	1	1	1	1	1	1	1	1	100%
5569	1	1	1	1	1	1	1	1	1	1	100%
5570 Fh	1	1	1	1	1	1	1	1	1	1	100%
5571	0	0	0	0	0	0	0	0	0	0	0%
Detection Bandwidth = Fh-Fl = 5570MHz - 5490MHz = 80MHz											
EUT 99% Bandwidth =75.822MHz											

b) Channel Available Check

The following results reflect all 20 MHz, 40 MHz and 80 MHz Channel Bandwidth operation.

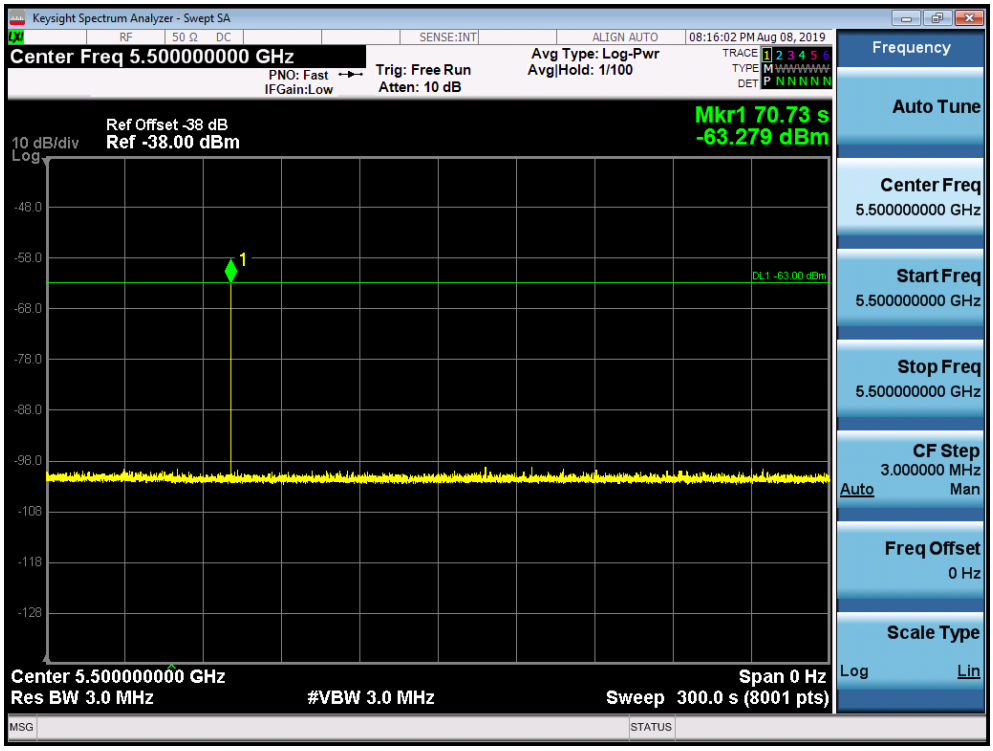
Initial Channel Availability Check Time

11a CH100 5500MHz

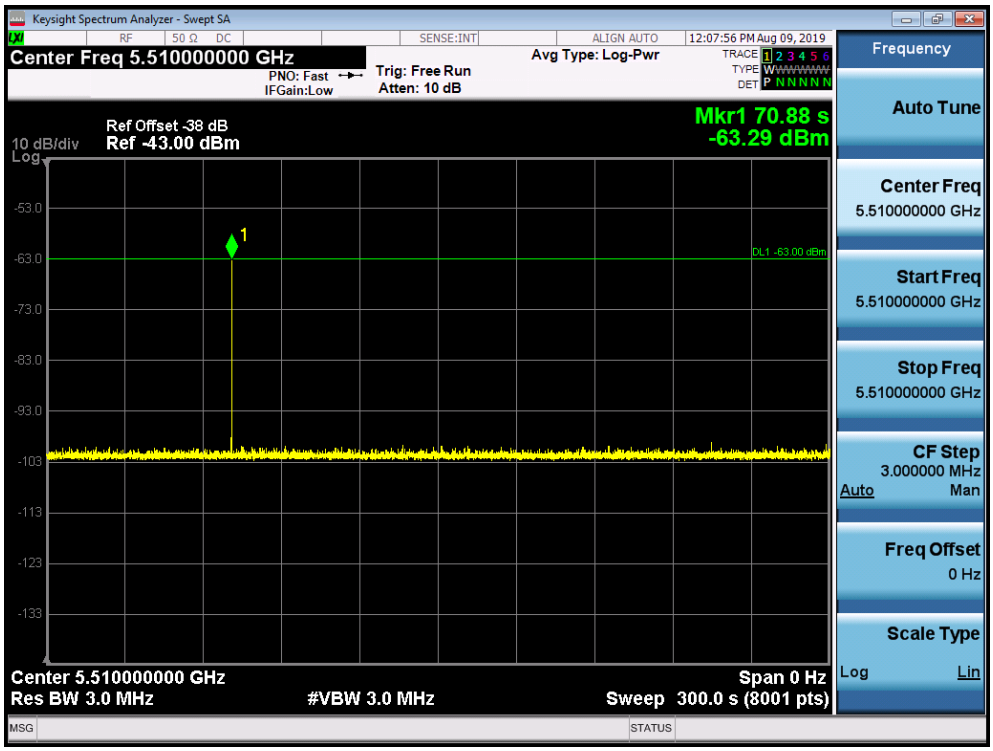


Test result with a radar burst at the beginning of the Channel Availability Check Time

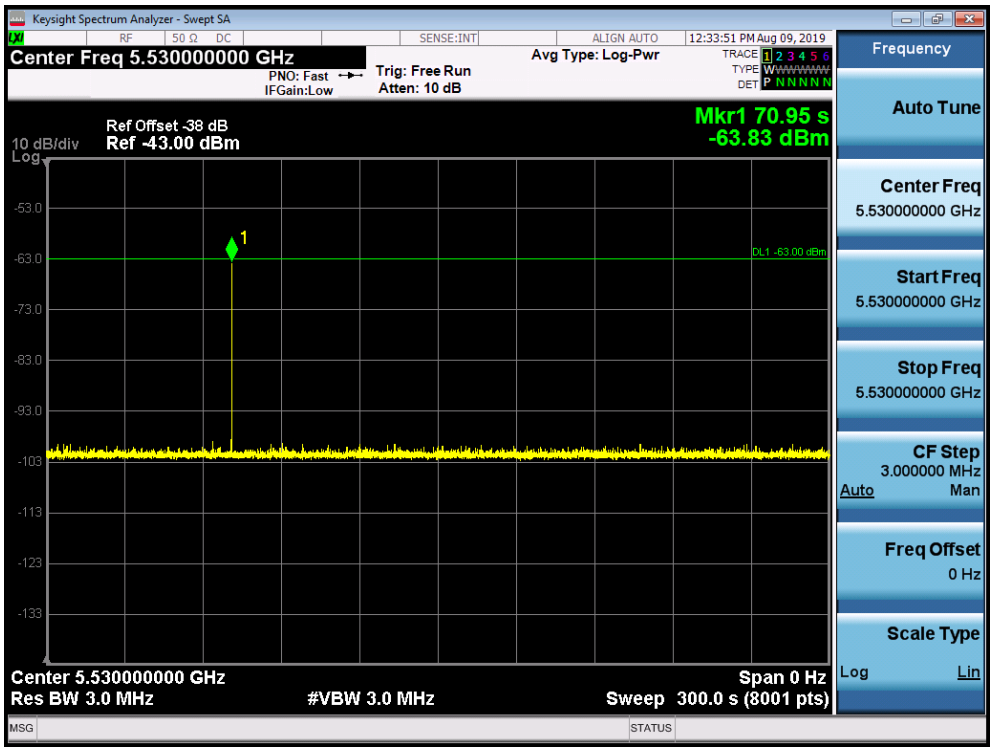
11a CH 100 5500MHz



11n40MHz CH 102 5510MHz

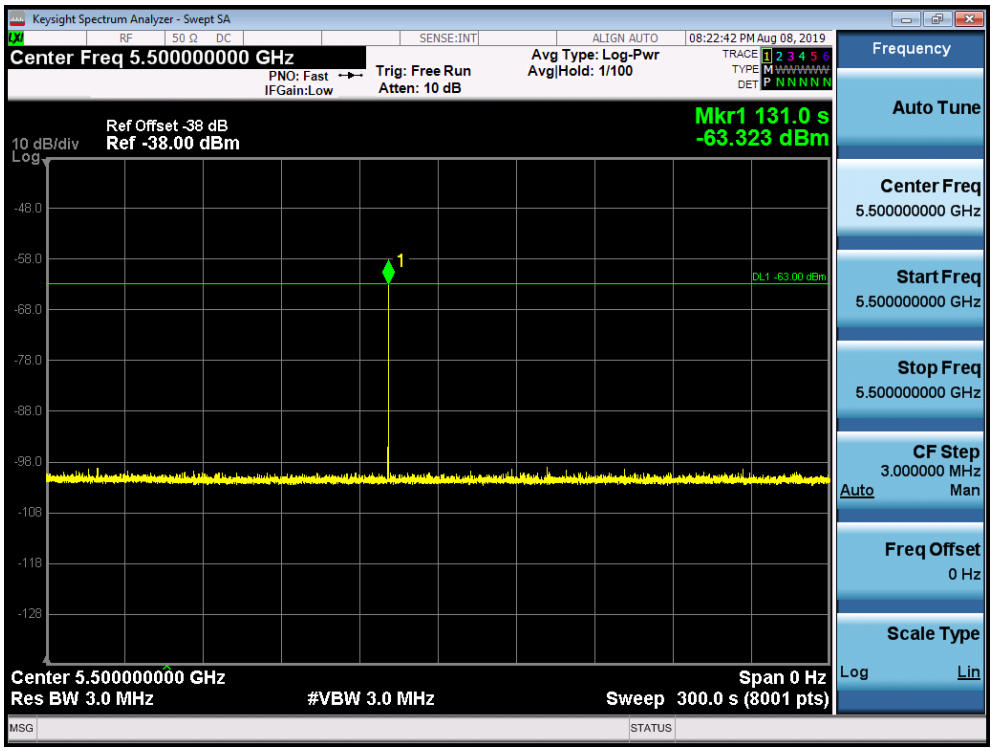


11ac80MHz CH 106 5530MHz

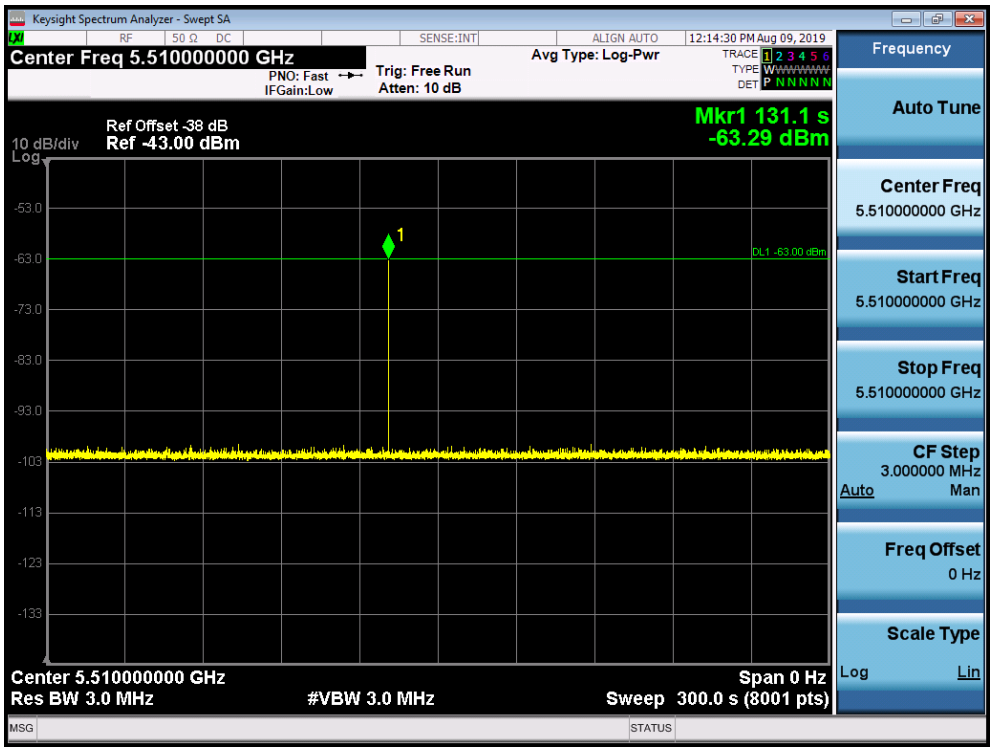


Test result with radar burst at the end of the Channel Availability Check Time

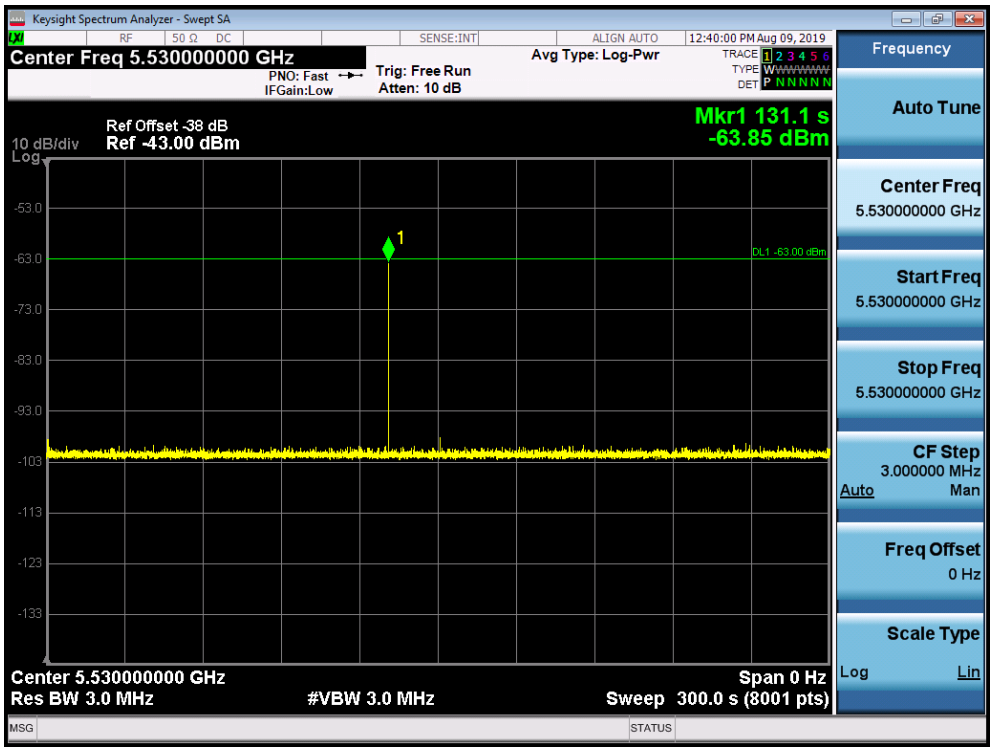
11a CH 100 5500MHz



11n40MHz CH 102 5510MHz



11ac80MHz CH 106 5530MHz



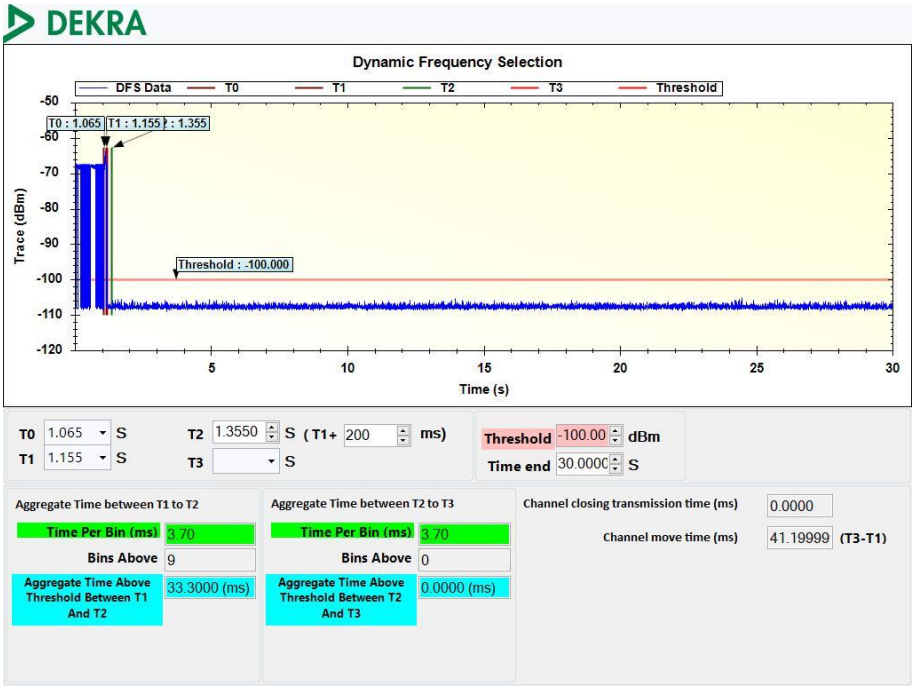
Test Item	Limit	Results
Channel Availability Check Time	60 s	Pass

c) In-Service Monitoring for Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period

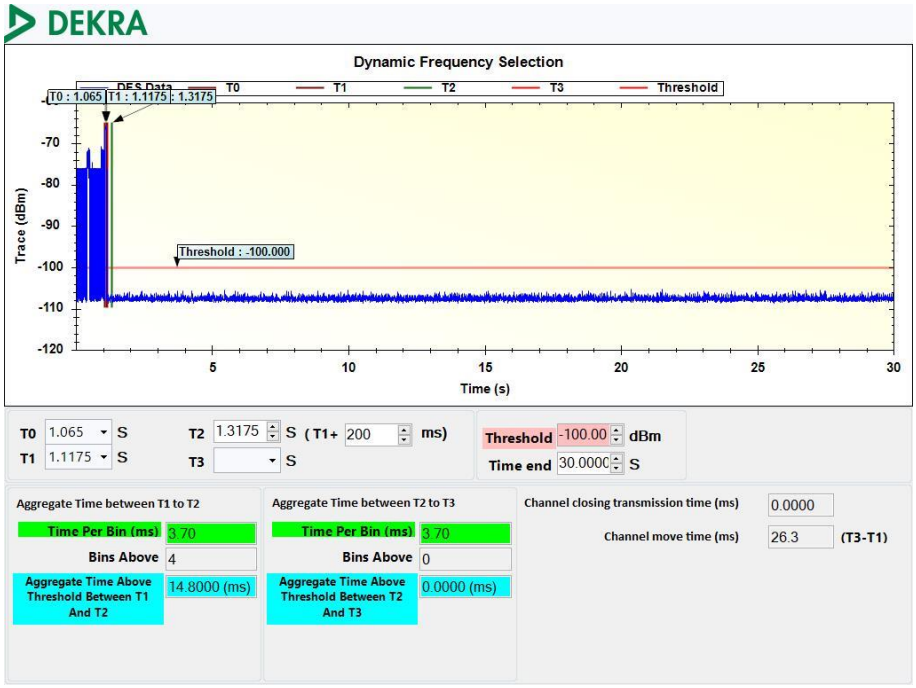
The following results reflect all 20 MHz, 40 MHz and 80MHz Channel Bandwidth operation.

i. Channel Move Time and Closing Transmission Time

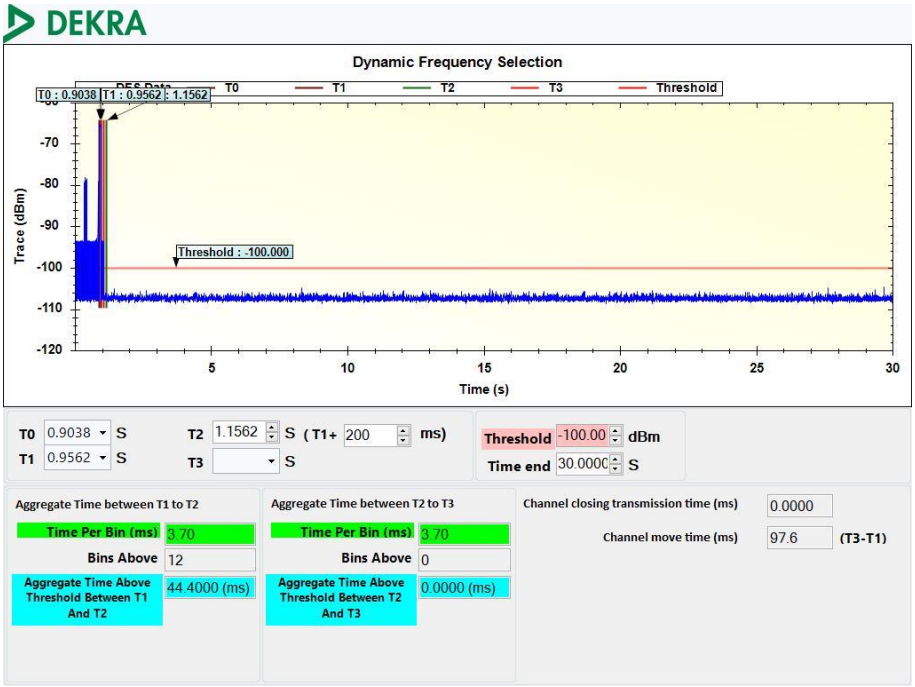
11a CH 100 5500MHz



11n40MHz CH102 5510MHz



11ac80MHz CH106 5530MHz

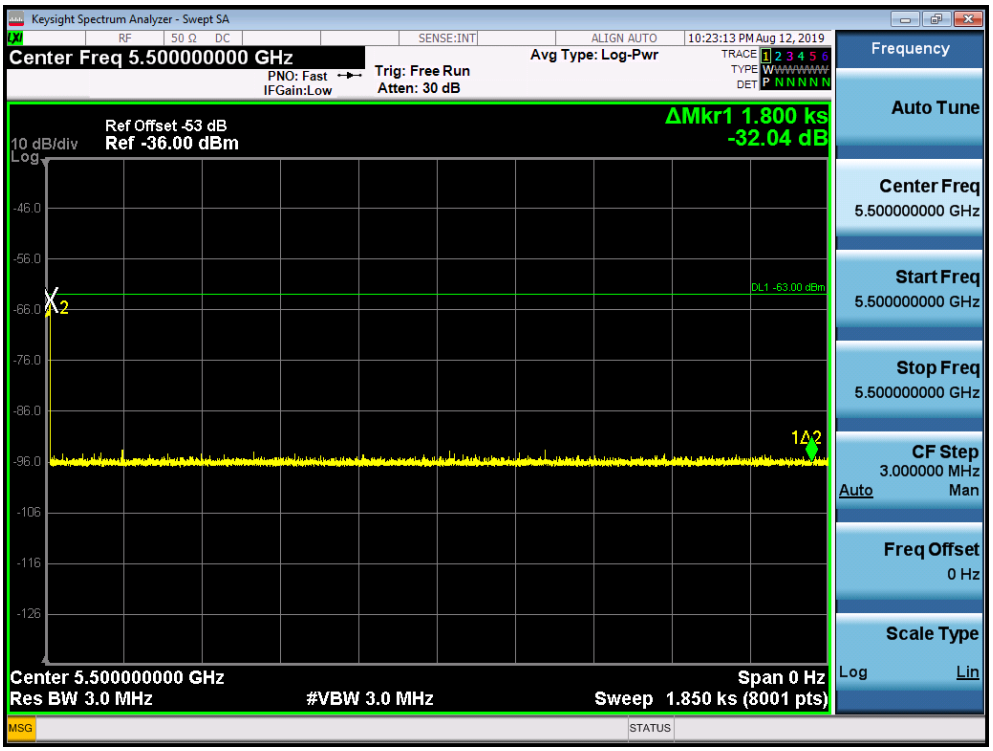


Test Item	Limit	Results
Channel Move Time	10 s	Pass
Channel Closing Transmission Time	200ms + an aggregate of 60ms over remaining 10 second period.	Pass

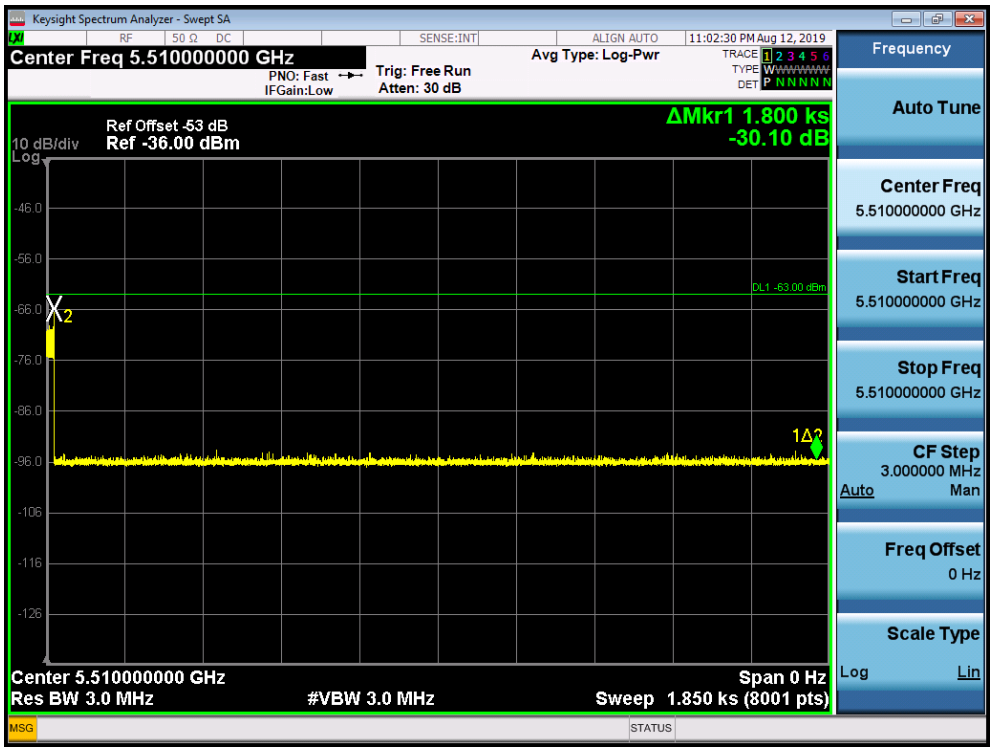
ii. Non-Occupancy Period

30 Minute Non-Occupancy Period

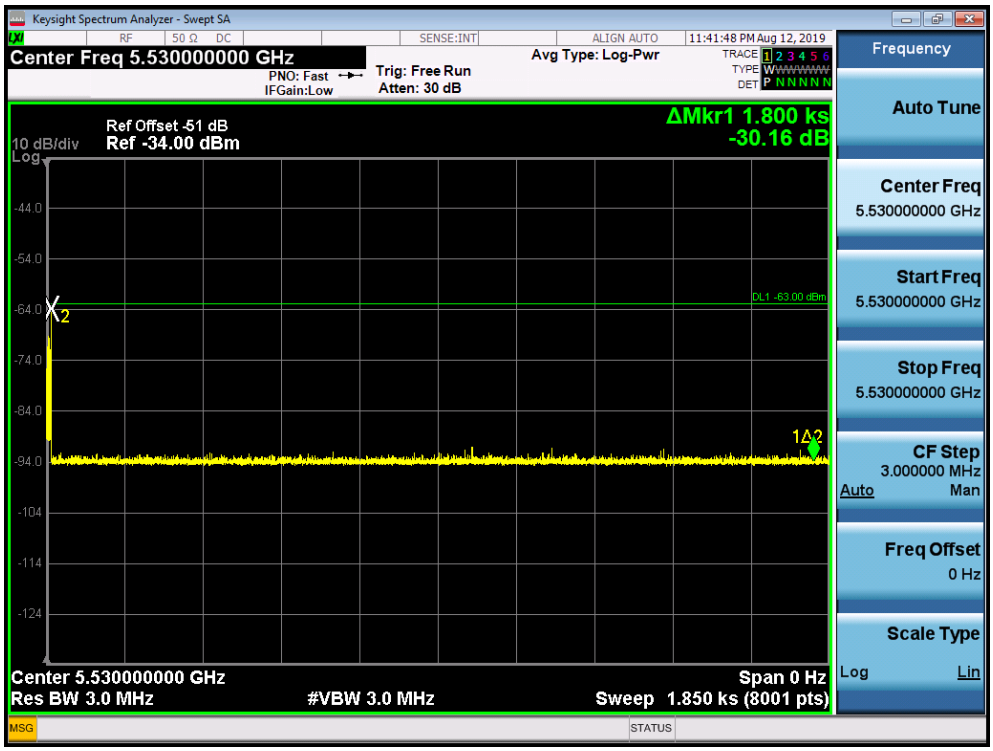
11a CH100 5500MHz



11n40MHz CH102 5510MHz



11ac80MHz CH106 5530MHz



Test Item	Limit	Results
Non-Occupancy Period	30 minutes	Pass

d) Statistical Performance Check

A U-NII device operating as a Client Device associates with the UUT (Master) at 5500 MHz&5510MHz. Stream the MPEG test file from the Master Device to the Client Device on the selected Channel for the entire period of the test. The device can also utilize a test mode to demonstrate when detection occurs to prevent the need to reset the device between trial runs.

The Radar Waveform generator sends the individual waveform for each of radar type 1~6 with a level equal to the DFS detection threshold level + 1dB (-63dBm).

The following results reflect both 20 MHz, 40 MHz and 80MHz Channel Bandwidth operation.

11a CH100 5500MHz

Type 1 Radar Statistical Performance

Trial Number	Freq(MHz)	Pulse Width (us)	PRI (us)	Pulses/Burst	Waveform Length(us)	1=Detection Blank=No Detection
1	5500	1	938.0	57	53466.0	1
2	5501	1	698.0	76	53048.0	1
3	5502	1	618.0	86	53148.0	1
4	5503	1	538.0	99	53262.0	1
5	5504	1	878.0	61	53558.0	1
6	5505	1	3066.0	18	55188.0	1
7	5506	1	638.0	83	52954.0	1
8	5507	1	918.0	58	53244.0	1
9	5508	1	838.0	63	52794.0	1
10	5509	1	858.0	62	53196.0	1
11	5490	1	798.0	67	53466.0	1
12	5492	1	718.0	74	53132.0	1
13	5493	1	578.0	92	53176.0	1
14	5494	1	598.0	89	53222.0	1
15	5495	1	558.0	95	53010.0	1
16	5496	1	2536.0	21	53256.0	1
17	5497	1	966.0	55	53130.0	1
18	5498	1	827.0	64	52928.0	1
19	5499	1	2501.0	22	55022.0	1
20	5500	1	2595.0	21	54495.0	1

21	5501	1	1114.0	48	53472.0	1
22	5502	1	1302.0	41	53382.0	1
23	5503	1	3045.0	18	54810.0	1
24	5504	1	1624.0	33	53592.0	1
25	5505	1	2878.0	19	54682.0	1
26	5506	1	1027.0	52	53404.0	1
27	5507	1	2485.0	22	54670.0	1
28	5508	1	1600.0	33	52800.0	1
29	5509	1	1172.0	46	53912.0	1
30	5500	1	1177.0	45	52965.0	1
Detection Percentage						100% (>60%)

Type 2 Radar Statistical Performance

Trial Number	Freq(MHz)	Pulse Width (us)	PRI (us)	Pulses/Burst	Waveform Length(us)	1=Detection Blank=No Detection
1	5500	3.2	179.0	26	4654.0	1
2	5501	1.1	207.0	23	4761.0	1
3	5502	2.1	230.0	24	5520.0	1
4	5503	4.8	200.0	29	5800.0	1
5	5504	3.9	214.0	28	5992.0	1
6	5505	2.9	222.0	26	5772.0	
7	5506	3.2	204.0	26	5304.0	1
8	5507	2.5	192.0	25	4800.0	1
9	5508	3.1	164.0	26	4264.0	1
10	5509	1.2	156.0	23	3588.0	1
11	5490	3.9	210.0	27	5670.0	
12	5492	4.6	201.0	29	5829.0	1
13	5493	3.2	162.0	26	4212.0	1
14	5494	2.2	197.0	25	4925.0	1
15	5495	4.5	163.0	29	4727.0	1
16	5496	3.0	203.0	26	5278.0	1
17	5497	5.0	168.0	29	4872.0	1
18	5498	2.4	217.0	25	5425.0	1
19	5499	2.9	191.0	26	4966.0	1
20	5500	2.3	166.0	25	4150.0	1
21	5501	3.7	150.0	27	4050.0	1
22	5502	2.2	176.0	25	4400.0	1
23	5503	4.9	195.0	29	5655.0	
24	5504	2.9	202.0	26	5252.0	1
25	5505	2.5	178.0	25	4450.0	1
26	5506	1.1	206.0	23	4738.0	1
27	5507	3.8	155.0	27	4185.0	1
28	5508	4.7	157.0	29	4553.0	1
29	5509	2.4	224.0	25	5600.0	1
30	5500	4.2	159.0	28	4452.0	1
Detection Percentage						90% (>60%)

Type 3 Radar Statistical Performance

Trial Number	Freq(MHz)	Pulse Width (us)	PRI (us)	Pulses/Burst	Waveform Length(us)	1=Detection Blank=No Detection
1	5500	8.2	355.0	17	6035.0	1
2	5501	6.1	487.0	16	7792.0	1
3	5502	7.1	344.0	16	5504.0	1
4	5503	9.8	288.0	18	5184.0	
5	5504	8.9	230.0	18	4140.0	1
6	5505	7.9	432.0	17	7344.0	1
7	5506	8.2	207.0	17	3519.0	1
8	5507	7.5	443.0	17	7531.0	
9	5508	8.1	439.0	17	7463.0	1
10	5509	6.2	223.0	16	3568.0	1
11	5490	8.9	208.0	18	3744.0	1
12	5492	9.6	463.0	18	8334.0	
13	5493	8.2	441.0	17	7497.0	1
14	5494	7.2	323.0	16	5168.0	1
15	5495	9.5	297.0	18	5346.0	1
16	5496	8.0	412.0	17	7004.0	1
17	5497	10.0	324.0	18	5832.0	1
18	5498	7.4	271.0	17	4607.0	
19	5499	7.9	349.0	17	5933.0	1
20	5500	7.3	409.0	16	6544.0	1
21	5501	8.7	373.0	18	6714.0	1
22	5502	7.2	254.0	16	4064.0	1
23	5503	9.9	274.0	18	4932.0	1
24	5504	7.9	278.0	17	4726.0	1
25	5505	7.5	317.0	17	5389.0	
26	5506	6.1	260.0	16	4160.0	1
27	5507	8.8	211.0	18	3798.0	1
28	5508	9.7	272.0	18	4896.0	
29	5509	7.4	264.0	17	4488.0	1
30	5500	9.2	284.0	18	5112.0	1
Detection Percentage						80% (>60%)

Type 4 Radar Statistical Performance

Trial Number	Freq(MHz)	Pulse Width (us)	PRI (us)	Pulses/Burst	Waveform Length(us)	1=Detection Blank=No Detection
1	5500	16.0	355.0	14	4970.0	1
2	5501	11.3	487.0	12	5844.0	1
3	5502	13.5	344.0	13	4472.0	1
4	5503	19.4	288.0	16	4608.0	1
5	5504	17.5	230.0	15	3450.0	1
6	5505	15.3	432.0	14	6048.0	1
7	5506	15.9	207.0	14	2898.0	
8	5507	14.3	443.0	13	5759.0	1
9	5508	15.8	439.0	14	6146.0	1
10	5509	11.5	223.0	12	2676.0	1
11	5490	17.4	208.0	15	3120.0	1
12	5492	19.0	463.0	16	7408.0	1
13	5493	16.0	441.0	14	6174.0	1
14	5494	13.8	323.0	13	4199.0	1
15	5495	18.9	297.0	16	4752.0	1
16	5496	15.5	412.0	14	5768.0	1
17	5497	19.9	324.0	16	5184.0	1
18	5498	14.1	271.0	13	3523.0	1
19	5499	15.2	349.0	14	4886.0	
20	5500	13.8	409.0	13	5317.0	1
21	5501	17.1	373.0	15	5595.0	1
22	5502	13.8	254.0	13	3302.0	1
23	5503	19.8	274.0	16	4384.0	
24	5504	15.3	278.0	14	3892.0	1
25	5505	14.5	317.0	13	4121.0	1
26	5506	11.3	260.0	12	3120.0	1
27	5507	17.3	211.0	15	3165.0	1
28	5508	19.2	272.0	16	4352.0	1
29	5509	14.2	264.0	13	3432.0	1
30	5500	18.2	284.0	15	4260.0	1
Detection Percentage						90% (>60%)

In addition an average minimum percentage of successful detection across all four Short pulse radar test waveforms is as follows: $\frac{P_d1+P_d2+P_d3+P_d4}{4}$ = (100%+90%+80%+90%)/4 = 90% (>80%)

Type 5 Radar Statistical Performance

Trial Number	Center Frequency(Ghz)	Number of Bursts	Burst Period(s)	Waveform Length(s)	1=Detection Blank=No Detection
0	5.500000000	15	0.8000000	12.0000000	1
1	5.500000000	8	1.5000000	12.0000000	1
2	5.500000000	11	1.0909091	12.0000000	1
3	5.500000000	20	0.6000000	12.0000000	1
4	5.500000000	17	0.7058824	12.0000000	
5	5.500000000	14	0.8571429	12.0000000	1
6	5.500000000	15	0.8000000	12.0000000	1
7	5.500000000	12	1.0000000	12.0000000	1
8	5.500000000	14	0.8571429	12.0000000	1
9	5.500000000	8	1.5000000	12.0000000	
10	5.496400000	17	0.7058824	12.0000000	1
11	5.497600000	19	0.6315789	12.0000000	1
12	5.495200000	15	0.8000000	12.0000000	1
13	5.494000000	12	1.0000000	12.0000000	
14	5.497200000	19	0.6315789	12.0000000	1
15	5.494800000	14	0.8571429	12.0000000	1
16	5.498000000	20	0.6000000	12.0000000	1
17	5.494000000	12	1.0000000	12.0000000	
18	5.494800000	14	0.8571429	12.0000000	1
19	5.494000000	12	1.0000000	12.0000000	1
20	5.504000000	16	0.7500000	12.0000000	
21	5.506400000	12	1.0000000	12.0000000	1
22	5.502000000	20	0.6000000	12.0000000	1
23	5.505200000	14	0.8571429	12.0000000	1
24	5.505600000	13	0.9230769	12.0000000	1
25	5.508000000	8	1.5000000	12.0000000	1
26	5.503600000	17	0.7058824	12.0000000	1
27	5.502400000	19	0.6315789	12.0000000	1
28	5.506000000	12	1.0000000	12.0000000	1
29	5.503200000	18	0.6666667	12.0000000	1
Detection Percentage					82.76% (>80%)

Type 6 Radar Statistical Performance

Trial Number	Pulse Width (us)	PRI (us)	Pulse per Hop	Hopping Rate (kHz)	Hopping Sequence Length (ms)	Visible Frequency Number	1=Detection Blank=No Detection
0	1.0	333.3	9	0.3333	300.0000000	4	1
1	1.0	333.3	9	0.3333	300.0000000	1	1
2	1.0	333.3	9	0.3333	300.0000000	3	1
3	1.0	333.3	9	0.3333	300.0000000	5	
4	1.0	333.3	9	0.3333	300.0000000	4	1
5	1.0	333.3	9	0.3333	300.0000000	3	1
6	1.0	333.3	9	0.3333	300.0000000	5	1
7	1.0	333.3	9	0.3333	300.0000000	5	1
8	1.0	333.3	9	0.3333	300.0000000	6	1
9	1.0	333.3	9	0.3333	300.0000000	1	1
10	1.0	333.3	9	0.3333	300.0000000	5	1
11	1.0	333.3	9	0.3333	300.0000000	6	1
12	1.0	333.3	9	0.3333	300.0000000	4	
13	1.0	333.3	9	0.3333	300.0000000	6	1
14	1.0	333.3	9	0.3333	300.0000000	5	1
15	1.0	333.3	9	0.3333	300.0000000	5	1
16	1.0	333.3	9	0.3333	300.0000000	5	1
17	1.0	333.3	9	0.3333	300.0000000	3	1
18	1.0	333.3	9	0.3333	300.0000000	3	
19	1.0	333.3	9	0.3333	300.0000000	3	1
20	1.0	333.3	9	0.3333	300.0000000	5	1
21	1.0	333.3	9	0.3333	300.0000000	6	1
22	1.0	333.3	9	0.3333	300.0000000	5	1
23	1.0	333.3	9	0.3333	300.0000000	4	1
24	1.0	333.3	9	0.3333	300.0000000	3	1
25	1.0	333.3	9	0.3333	300.0000000	5	1
26	1.0	333.3	9	0.3333	300.0000000	3	1
27	1.0	333.3	9	0.3333	300.0000000	5	1
28	1.0	333.3	9	0.3333	300.0000000	6	1
29	1.0	333.3	9	0.3333	300.0000000	6	1
Detection Percentage							89.66% (>70%)

11n40 CH102 5510MHz

Type 1 Radar Statistical Performance

Trial Number	Freq(MHz)	Pulse Width (us)	PRI (us)	Pulses/Burst	Waveform Length(us)	1=Detection Blank=No Detection
1	5496	1.0	938.0	57	53466.0	1
2	5497	1.0	698.0	76	53048.0	1
3	5498	1.0	618.0	86	53148.0	1
4	5499	1.0	538.0	99	53262.0	1
5	5500	1.0	878.0	61	53558.0	1
6	5501	1.0	3066.0	18	55188.0	1
7	5502	1.0	638.0	83	52954.0	1
8	5503	1.0	918.0	58	53244.0	1
9	5504	1.0	838.0	63	52794.0	1
10	5505	1.0	858.0	62	53196.0	1
11	5506	1.0	798.0	67	53466.0	
12	5507	1.0	718.0	74	53132.0	1
13	5508	1.0	578.0	92	53176.0	1
14	5509	1.0	598.0	89	53222.0	1
15	5510	1.0	558.0	95	53010.0	1
16	5511	1.0	2536.0	21	53256.0	1
17	5512	1.0	966.0	55	53130.0	1
18	5513	1.0	827.0	64	52928.0	
19	5514	1.0	2501.0	22	55022.0	1
20	5515	1.0	2595.0	21	54495.0	1
21	5516	1.0	1114.0	48	53472.0	1
22	5517	1.0	1302.0	41	53382.0	1
23	5518	1.0	3045.0	18	54810.0	
24	5519	1.0	1624.0	33	53592.0	1
25	5520	1.0	2878.0	19	54682.0	1
26	5521	1.0	1027.0	52	53404.0	1
27	5522	1.0	2485.0	22	54670.0	1
28	5523	1.0	1600.0	33	52800.0	1
29	5524	1.0	1172.0	46	53912.0	1
30	5525	1.0	1177.0	45	52965.0	1
Detection Percentage						90% (>60%)

Type 2 Radar Statistical Performance

Trial Number	Freq(MHz)	Pulse Width (us)	PRI (us)	Pulses/Burst	Waveform Length(us)	1=Detection Blank=No Detection
1	5496	3.2	179.0	26	4654.0	1
2	5497	1.1	207.0	23	4761.0	1
3	5498	2.1	230.0	24	5520.0	1
4	5499	4.8	200.0	29	5800.0	1
5	5500	3.9	214.0	28	5992.0	1
6	5501	2.9	222.0	26	5772.0	1
7	5502	3.2	204.0	26	5304.0	1
8	5503	2.5	192.0	25	4800.0	
9	5504	3.1	164.0	26	4264.0	1
10	5505	1.2	156.0	23	3588.0	1
11	5506	3.9	210.0	27	5670.0	1
12	5507	4.6	201.0	29	5829.0	1
13	5508	3.2	162.0	26	4212.0	
14	5509	2.2	197.0	25	4925.0	1
15	5510	4.5	163.0	29	4727.0	1
16	5511	3.0	203.0	26	5278.0	1
17	5512	5.0	168.0	29	4872.0	1
18	5513	2.4	217.0	25	5425.0	
19	5514	2.9	191.0	26	4966.0	1
20	5515	2.3	166.0	25	4150.0	1
21	5516	3.7	150.0	27	4050.0	1
22	5517	2.2	176.0	25	4400.0	1
23	5518	4.9	195.0	29	5655.0	1
24	5519	2.9	202.0	26	5252.0	1
25	5520	2.5	178.0	25	4450.0	1
26	5521	1.1	206.0	23	4738.0	1
27	5522	3.8	155.0	27	4185.0	1
28	5523	4.7	157.0	29	4553.0	1
29	5524	2.4	224.0	25	5600.0	1
30	5525	4.2	159.0	28	4452.0	1
Detection Percentage						90.0% (>60%)

Type 3 Radar Statistical Performance

Trial Number	Freq(MHz)	Pulse Width (us)	PRI (us)	Pulses/Burst	Waveform Length(us)	1=Detection Blank=No Detection
1	5496	8.2	355.0	17	6035.0	1
2	5497	6.1	487.0	16	7792.0	1
3	5498	7.1	344.0	16	5504.0	1
4	5499	9.8	288.0	18	5184.0	1
5	5500	8.9	230.0	18	4140.0	1
6	5501	7.9	432.0	17	7344.0	1
7	5502	8.2	207.0	17	3519.0	
8	5503	7.5	443.0	17	7531.0	1
9	5504	8.1	439.0	17	7463.0	1
10	5505	6.2	223.0	16	3568.0	1
11	5506	8.9	208.0	18	3744.0	
12	5507	9.6	463.0	18	8334.0	1
13	5508	8.2	441.0	17	7497.0	1
14	5509	7.2	323.0	16	5168.0	
15	5510	9.5	297.0	18	5346.0	1
16	5511	8.0	412.0	17	7004.0	1
17	5512	10.0	324.0	18	5832.0	1
18	5513	7.4	271.0	17	4607.0	
19	5514	7.9	349.0	17	5933.0	1
20	5515	7.3	409.0	16	6544.0	1
21	5516	8.7	373.0	18	6714.0	1
22	5517	7.2	254.0	16	4064.0	
23	5518	9.9	274.0	18	4932.0	1
24	5519	7.9	278.0	17	4726.0	1
25	5520	7.5	317.0	17	5389.0	1
26	5521	6.1	260.0	16	4160.0	1
27	5522	8.8	211.0	18	3798.0	
28	5523	9.7	272.0	18	4896.0	1
29	5524	7.4	264.0	17	4488.0	1
30	5525	9.2	284.0	18	5112.0	1
Detection Percentage						80% (>60%)

Type 4 Radar Statistical Performance

Trial Number	Freq(MHz)	Pulse Width (us)	PRI (us)	Pulses/Burst	Waveform Length(us)	1=Detection Blank=No Detection
1	5496	16.0	355.0	14	4970.0	1
2	5497	11.3	487.0	12	5844.0	1
3	5498	13.5	344.0	13	4472.0	1
4	5499	19.4	288.0	16	4608.0	1
5	5500	17.5	230.0	15	3450.0	1
6	5501	15.3	432.0	14	6048.0	1
7	5502	15.9	207.0	14	2898.0	1
8	5503	14.3	443.0	13	5759.0	1
9	5504	15.8	439.0	14	6146.0	1
10	5505	11.5	223.0	12	2676.0	1
11	5506	17.4	208.0	15	3120.0	1
12	5507	19.0	463.0	16	7408.0	1
13	5508	16.0	441.0	14	6174.0	1
14	5509	13.8	323.0	13	4199.0	1
15	5510	18.9	297.0	16	4752.0	1
16	5511	15.5	412.0	14	5768.0	1
17	5512	19.9	324.0	16	5184.0	1
18	5513	14.1	271.0	13	3523.0	1
19	5514	15.2	349.0	14	4886.0	1
20	5515	13.8	409.0	13	5317.0	1
21	5516	17.1	373.0	15	5595.0	1
22	5517	13.8	254.0	13	3302.0	1
23	5518	19.8	274.0	16	4384.0	1
24	5519	15.3	278.0	14	3892.0	1
25	5520	14.5	317.0	13	4121.0	1
26	5521	11.3	260.0	12	3120.0	1
27	5522	17.3	211.0	15	3165.0	1
28	5523	19.2	272.0	16	4352.0	1
29	5524	14.2	264.0	13	3432.0	1
30	5525	18.2	284.0	15	4260.0	1
Detection Percentage						100% (>60%)

In addition an average minimum percentage of successful detection across all four Short pulse radar test waveforms is as follows: $\frac{P_d1+P_d2+P_d3+P_d4}{4}$ = (90%+90%+80%+100%)/4 = 90% (>80%)

Type 5 Radar Statistical Performance

Trial Number	Center Frequency(Ghz)	Number of Bursts	Burst Period(s)	Waveform Length(s)	1=Detection Blank=No Detection
0	5.510000000	15	0.8000000	12.0000000	1
1	5.510000000	8	1.5000000	12.0000000	1
2	5.510000000	11	1.0909091	12.0000000	
3	5.510000000	20	0.6000000	12.0000000	1
4	5.510000000	17	0.7058824	12.0000000	1
5	5.510000000	14	0.8571429	12.0000000	1
6	5.510000000	15	0.8000000	12.0000000	1
7	5.510000000	12	1.0000000	12.0000000	1
8	5.510000000	14	0.8571429	12.0000000	1
9	5.510000000	8	1.5000000	12.0000000	1
10	5.496400000	17	0.7058824	12.0000000	
11	5.497600000	19	0.6315789	12.0000000	1
12	5.495200000	15	0.8000000	12.0000000	1
13	5.494000000	12	1.0000000	12.0000000	1
14	5.497200000	19	0.6315789	12.0000000	1
15	5.494800000	14	0.8571429	12.0000000	1
16	5.498000000	20	0.6000000	12.0000000	
17	5.494000000	12	1.0000000	12.0000000	1
18	5.494800000	14	0.8571429	12.0000000	1
19	5.494000000	12	1.0000000	12.0000000	1
20	5.524000000	16	0.7500000	12.0000000	1
21	5.526400000	12	1.0000000	12.0000000	
22	5.522000000	20	0.6000000	12.0000000	1
23	5.525200000	14	0.8571429	12.0000000	1
24	5.525600000	13	0.9230769	12.0000000	1
25	5.528000000	8	1.5000000	12.0000000	
26	5.523600000	17	0.7058824	12.0000000	1
27	5.522400000	19	0.6315789	12.0000000	1
28	5.526000000	12	1.0000000	12.0000000	1
29	5.523200000	18	0.6666667	12.0000000	1
Detection Percentage					82.76% (>80%)

Type 6 Radar Statistical Performance

Trial Number	Pulse Width (us)	PRI (us)	Pulse per Hop	Hopping Rate (kHz)	Hopping Sequence Length (ms)	Visible Frequency Number	1=Detection Blank=No Detection
0	1.0	333.3	9	0.3333	300.0000000	4	1
1	1.0	333.3	9	0.3333	300.0000000	1	1
2	1.0	333.3	9	0.3333	300.0000000	3	1
3	1.0	333.3	9	0.3333	300.0000000	5	1
4	1.0	333.3	9	0.3333	300.0000000	4	1
5	1.0	333.3	9	0.3333	300.0000000	3	1
6	1.0	333.3	9	0.3333	300.0000000	5	1
7	1.0	333.3	9	0.3333	300.0000000	5	
8	1.0	333.3	9	0.3333	300.0000000	6	1
9	1.0	333.3	9	0.3333	300.0000000	1	1
10	1.0	333.3	9	0.3333	300.0000000	5	1
11	1.0	333.3	9	0.3333	300.0000000	6	1
12	1.0	333.3	9	0.3333	300.0000000	4	1
13	1.0	333.3	9	0.3333	300.0000000	6	1
14	1.0	333.3	9	0.3333	300.0000000	5	
15	1.0	333.3	9	0.3333	300.0000000	5	1
16	1.0	333.3	9	0.3333	300.0000000	5	1
17	1.0	333.3	9	0.3333	300.0000000	3	1
18	1.0	333.3	9	0.3333	300.0000000	3	1
19	1.0	333.3	9	0.3333	300.0000000	3	
20	1.0	333.3	9	0.3333	300.0000000	5	1
21	1.0	333.3	9	0.3333	300.0000000	6	1
22	1.0	333.3	9	0.3333	300.0000000	5	1
23	1.0	333.3	9	0.3333	300.0000000	4	1
24	1.0	333.3	9	0.3333	300.0000000	3	1
25	1.0	333.3	9	0.3333	300.0000000	5	1
26	1.0	333.3	9	0.3333	300.0000000	3	1
27	1.0	333.3	9	0.3333	300.0000000	5	1
28	1.0	333.3	9	0.3333	300.0000000	6	1
29	1.0	333.3	9	0.3333	300.0000000	6	1
Detection Percentage							89.66% (>70%)

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Type 1 Radar Statistical Performance

Trial Number	Freq(MHz)	Pulse Width (us)	PRI (us)	Pulses/Burst	Waveform Length(us)	1=Detection Blank=No Detection
1	5516	1	938.0	57	53466.0	1
2	5517	1	698.0	76	53048.0	1
3	5518	1	618.0	86	53148.0	1
4	5519	1	538.0	99	53262.0	1
5	5520	1	878.0	61	53558.0	
6	5521	1	3066.0	18	55188.0	1
7	5522	1	638.0	83	52954.0	1
8	5523	1	918.0	58	53244.0	1
9	5524	1	838.0	63	52794.0	1
10	5525	1	858.0	62	53196.0	
11	5526	1	798.0	67	53466.0	1
12	5527	1	718.0	74	53132.0	1
13	5528	1	578.0	92	53176.0	
14	5529	1	598.0	89	53222.0	1
15	5530	1	558.0	95	53010.0	1
16	5531	1	2536.0	21	53256.0	1
17	5532	1	966.0	55	53130.0	1
18	5533	1	827.0	64	52928.0	1
19	5534	1	2501.0	22	55022.0	
20	5535	1	2595.0	21	54495.0	1
21	5536	1	1114.0	48	53472.0	
22	5537	1	1302.0	41	53382.0	1
23	5538	1	3045.0	18	54810.0	1
24	5539	1	1624.0	33	53592.0	1
25	5540	1	2878.0	19	54682.0	1
26	5541	1	1027.0	52	53404.0	1
27	5542	1	2485.0	22	54670.0	
28	5543	1	1600.0	33	52800.0	1
29	5544	1	1172.0	46	53912.0	1
30	5545	1	1177.0	45	52965.0	1
Detection Percentage						80% (>60%)

Type 2 Radar Statistical Performance

Trial Number	Freq(MHz)	Pulse Width (us)	PRI (us)	Pulses/Burst	Waveform Length(us)	1=Detection Blank=No Detection
1	5516	3.2	179.0	26	4654.0	1
2	5517	1.1	207.0	23	4761.0	1
3	5518	2.1	230.0	24	5520.0	1
4	5519	4.8	200.0	29	5800.0	1
5	5520	3.9	214.0	28	5992.0	
6	5521	2.9	222.0	26	5772.0	1
7	5522	3.2	204.0	26	5304.0	1
8	5523	2.5	192.0	25	4800.0	1
9	5524	3.1	164.0	26	4264.0	
10	5525	1.2	156.0	23	3588.0	1
11	5526	3.9	210.0	27	5670.0	
12	5527	4.6	201.0	29	5829.0	1
13	5528	3.2	162.0	26	4212.0	1
14	5529	2.2	197.0	25	4925.0	1
15	5530	4.5	163.0	29	4727.0	1
16	5531	3.0	203.0	26	5278.0	
17	5532	5.0	168.0	29	4872.0	1
18	5533	2.4	217.0	25	5425.0	1
19	5534	2.9	191.0	26	4966.0	1
20	5535	2.3	166.0	25	4150.0	1
21	5536	3.7	150.0	27	4050.0	1
22	5537	2.2	176.0	25	4400.0	1
23	5538	4.9	195.0	29	5655.0	
24	5539	2.9	202.0	26	5252.0	1
25	5540	2.5	178.0	25	4450.0	1
26	5541	1.1	206.0	23	4738.0	
27	5542	3.8	155.0	27	4185.0	1
28	5543	4.7	157.0	29	4553.0	1
29	5544	2.4	224.0	25	5600.0	1
30	5545	4.2	159.0	28	4452.0	1
Detection Percentage						80% (>60%)

Type 3 Radar Statistical Performance

Trial Number	Freq(MHz)	Pulse Width (us)	PRI (us)	Pulses/Burst	Waveform Length(us)	1=Detection Blank=No Detection
1	5516	8.2	355.0	17	6035.0	1
2	5517	6.1	487.0	16	7792.0	1
3	5518	7.1	344.0	16	5504.0	1
4	5519	9.8	288.0	18	5184.0	
5	5520	8.9	230.0	18	4140.0	1
6	5521	7.9	432.0	17	7344.0	1
7	5522	8.2	207.0	17	3519.0	1
8	5523	7.5	443.0	17	7531.0	
9	5524	8.1	439.0	17	7463.0	1
10	5525	6.2	223.0	16	3568.0	1
11	5526	8.9	208.0	18	3744.0	1
12	5527	9.6	463.0	18	8334.0	1
13	5528	8.2	441.0	17	7497.0	1
14	5529	7.2	323.0	16	5168.0	1
15	5530	9.5	297.0	18	5346.0	
16	5531	8.0	412.0	17	7004.0	1
17	5532	10.0	324.0	18	5832.0	1
18	5533	7.4	271.0	17	4607.0	1
19	5534	7.9	349.0	17	5933.0	1
20	5535	7.3	409.0	16	6544.0	1
21	5536	8.7	373.0	18	6714.0	1
22	5537	7.2	254.0	16	4064.0	1
23	5538	9.9	274.0	18	4932.0	1
24	5539	7.9	278.0	17	4726.0	1
25	5540	7.5	317.0	17	5389.0	1
26	5541	6.1	260.0	16	4160.0	1
27	5542	8.8	211.0	18	3798.0	1
28	5543	9.7	272.0	18	4896.0	1
29	5544	7.4	264.0	17	4488.0	1
30	5545	9.2	284.0	18	5112.0	1
Detection Percentage						90% (>60%)

Type 4 Radar Statistical Performance

Trial Number	Freq(MHz)	Pulse Width (us)	PRI (us)	Pulses/Burst	Waveform Length(us)	1=Detection Blank=No Detection
1	5516	16.0	355.0	14	4970.0	1
2	5517	11.3	487.0	12	5844.0	1
3	5518	13.5	344.0	13	4472.0	1
4	5519	19.4	288.0	16	4608.0	
5	5520	17.5	230.0	15	3450.0	1
6	5521	15.3	432.0	14	6048.0	1
7	5522	15.9	207.0	14	2898.0	1
8	5523	14.3	443.0	13	5759.0	1
9	5524	15.8	439.0	14	6146.0	1
10	5525	11.5	223.0	12	2676.0	
11	5526	17.4	208.0	15	3120.0	1
12	5527	19.0	463.0	16	7408.0	1
13	5528	16.0	441.0	14	6174.0	1
14	5529	13.8	323.0	13	4199.0	1
15	5530	18.9	297.0	16	4752.0	1
16	5531	15.5	412.0	14	5768.0	1
17	5532	19.9	324.0	16	5184.0	1
18	5533	14.1	271.0	13	3523.0	1
19	5534	15.2	349.0	14	4886.0	1
20	5535	13.8	409.0	13	5317.0	1
21	5536	17.1	373.0	15	5595.0	1
22	5537	13.8	254.0	13	3302.0	1
23	5538	19.8	274.0	16	4384.0	1
24	5539	15.3	278.0	14	3892.0	
25	5540	14.5	317.0	13	4121.0	1
26	5541	11.3	260.0	12	3120.0	1
27	5542	17.3	211.0	15	3165.0	1
28	5543	19.2	272.0	16	4352.0	1
29	5544	14.2	264.0	13	3432.0	1
30	5545	18.2	284.0	15	4260.0	1
Detection Percentage						90% (>60%)

In addition an average minimum percentage of successful detection across all four Short pulse radar test waveforms is as follows: $\frac{P_d1 + P_d2 + P_d3 + P_d4}{4}$ = (80%+80%+90%+90%)/4 = 85% (>80%)

Type 5 Radar Statistical Performance

Trial Number	Center Frequency(Ghz)	Number of Bursts	Burst Period(s)	Waveform Length(s)	1=Detection Blank=No Detection
0	5.530000000	15	0.8000000	12.0000000	1
1	5.530000000	8	1.5000000	12.0000000	1
2	5.530000000	11	1.0909091	12.0000000	1
3	5.530000000	20	0.6000000	12.0000000	
4	5.530000000	17	0.7058824	12.0000000	1
5	5.530000000	14	0.8571429	12.0000000	1
6	5.530000000	15	0.8000000	12.0000000	1
7	5.530000000	12	1.0000000	12.0000000	1
8	5.530000000	14	0.8571429	12.0000000	1
9	5.530000000	8	1.5000000	12.0000000	1
10	5.496400000	17	0.7058824	12.0000000	1
11	5.497600000	19	0.6315789	12.0000000	1
12	5.495200000	15	0.8000000	12.0000000	
13	5.494000000	12	1.0000000	12.0000000	1
14	5.497200000	19	0.6315789	12.0000000	1
15	5.494800000	14	0.8571429	12.0000000	1
16	5.498000000	20	0.6000000	12.0000000	1
17	5.494000000	12	1.0000000	12.0000000	
18	5.494800000	14	0.8571429	12.0000000	1
19	5.494000000	12	1.0000000	12.0000000	1
20	5.564000000	16	0.7500000	12.0000000	1
21	5.566400000	12	1.0000000	12.0000000	
22	5.562000000	20	0.6000000	12.0000000	1
23	5.565200000	14	0.8571429	12.0000000	1
24	5.565600000	13	0.9230769	12.0000000	1
25	5.568000000	8	1.5000000	12.0000000	
26	5.563600000	17	0.7058824	12.0000000	1
27	5.562400000	19	0.6315789	12.0000000	1
28	5.566000000	12	1.0000000	12.0000000	1
29	5.563200000	18	0.6666667	12.0000000	1
Detection Percentage					82.76% (>80%)

Type 6 Radar Statistical Performance

Trial Number	Pulse Width (us)	PRI (us)	Pulse per Hop	Hopping Rate (kHz)	Hopping Sequence Length(ms)	Visible Frequency Number	1=Detection Blank=No Detection
0	1.0	333.3	9	0.3333	300.0000000	4	1
1	1.0	333.3	9	0.3333	300.0000000	1	1
2	1.0	333.3	9	0.3333	300.0000000	3	1
3	1.0	333.3	9	0.3333	300.0000000	5	
4	1.0	333.3	9	0.3333	300.0000000	4	1
5	1.0	333.3	9	0.3333	300.0000000	3	1
6	1.0	333.3	9	0.3333	300.0000000	5	1
7	1.0	333.3	9	0.3333	300.0000000	5	1
8	1.0	333.3	9	0.3333	300.0000000	6	1
9	1.0	333.3	9	0.3333	300.0000000	1	1
10	1.0	333.3	9	0.3333	300.0000000	5	1
11	1.0	333.3	9	0.3333	300.0000000	6	1
12	1.0	333.3	9	0.3333	300.0000000	4	1
13	1.0	333.3	9	0.3333	300.0000000	6	
14	1.0	333.3	9	0.3333	300.0000000	5	1
15	1.0	333.3	9	0.3333	300.0000000	5	1
16	1.0	333.3	9	0.3333	300.0000000	5	1
17	1.0	333.3	9	0.3333	300.0000000	3	1
18	1.0	333.3	9	0.3333	300.0000000	3	1
19	1.0	333.3	9	0.3333	300.0000000	3	1
20	1.0	333.3	9	0.3333	300.0000000	5	1
21	1.0	333.3	9	0.3333	300.0000000	6	1
22	1.0	333.3	9	0.3333	300.0000000	5	1
23	1.0	333.3	9	0.3333	300.0000000	4	1
24	1.0	333.3	9	0.3333	300.0000000	3	1
25	1.0	333.3	9	0.3333	300.0000000	5	1
26	1.0	333.3	9	0.3333	300.0000000	3	1
27	1.0	333.3	9	0.3333	300.0000000	5	
28	1.0	333.3	9	0.3333	300.0000000	6	1
29	1.0	333.3	9	0.3333	300.0000000	6	1
Detection Percentage							89.66% (>70%)

The End