DFS PORTION of FCC 47 CFR PART 15 SUBPART E
DFS PORTION of INDUSTRY CANADA RSS-247 ISSUE 2

CERTIFICATION TEST REPORT

FOR

EXTREME ACCESS POINT, CEILING MOUNT

MODEL NUMBER: AP-7622

FCC ID: QXO-7622
IC: 4141B-7622

REPORT NUMBER: 11425801-E4V6

ISSUE DATE: JUNE 11, 2018

Prepared for
EXTREME NETWORKS INC.
6480 VIA DEL ORO DR.
SAN JOSE, CA 95119, U.S.A.

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	12/15/16	Initial Issue	Conan Cheung
V2	4/27/17	EIRP raised to 27.8 dBm from 25.8 dBm. Antenna gain reduced to 4.33 & 4.66 dBi from 5.77 & 5.54 dBi.	Henry Lau
V3	5/31/17	Update to Section 5.1.5, DESCRIPTION OF EUT	Grace Rincand
V4	12/7/2017	Revised the following: Company name and address, FCC/IC ID, Changed references from Zebra to Extreme	Grace Rincand
V5	05/24/18	Updated report from RSS-247 ISSUE 1 to RSS-247 ISSUE 2; Updated FCC/IC ID	Steven North
V6	06/11/18	Updated FCC and IC ID	Sol Kuwatani

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: EXTREME NETWORKS INC.
6480 VIA DEL ORO DR.
SAN JOSE, CA 95119, U.S.A.

EUT DESCRIPTION: EXTREME ACCESS POINT, CEILING MOUNT

MODEL: AP-7622

SERIAL NUMBER: 16251523300013

DATE TESTED: SEPTEMBER 28, 2016 – DECEMBER 15, 2016

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
DFS Portion of CFR 47 Part 15 Subpart E	Pass
INDUSTRY CANADA RSS-247 Issue 2	Pass

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

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PROJECT LEAD
UL Verification Services Inc.

Prepared By:

HENRY LAU
EMC ENGINEER
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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with the DFS portion of FCC CFR 47 Part 2, FCC CFR 47 Part 15, FCC 06-96, FCC KDB 789033, KDB 905462 D02 and D03, ANSI C63.10-2013, RSS-247 Issue 2.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL Verification Services, Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://ts.nist.gov/standards/scopes/2000650.htm.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	± 3.52 dB
Radiated Disturbance, 30 to 1000 MHz	± 4.94 dB
Radiated Disturbance, 1 to 6 GHz	± 3.86 dB
Radiated Disturbance, 6 to 18 GHz	± 4.23 dB
Radiated Disturbance, 18 to 26 GHz	± 5.30 dB
Radiated Disturbance, 26 to 40 GHz	± 5.23 dB

Uncertainty figures are valid to a confidence level of 95%.

5. DYNAMIC FREQUENCY SELECTION

5.1. OVERVIEW

5.1.1. LIMITS

INDUSTRY CANADA

IC RSS-247 is closely harmonized with FCC Part 15 DFS rules. The deviations are as follows:

RSS-247 Issue 2

Note: For the band 5600–5650 MHz, no operation is permitted.

Until further notice, devices subject to this annex shall not be capable of transmitting in the band 5600–5650 MHz. This restriction is for the protection of Environment Canada weather radars operating in this band.

FCC

§15.407 (h), FCC KDB 905462 D02 “COMPLIANCE MEASUREMENT PROCEDURES FOR UNLICENSED-NATIONAL INFORMATION INFRASTRUCTURE DEVICES OPERATING IN THE 5250-5350 MHz AND 5470-5725 MHz BANDS INCORPORATING DYNAMIC FREQUENCY SELECTION” and KDB 905462 D03 “U-NII CLIENT DEVICES WITHOUT RADAR DETECTION CAPABILITY”.

Table 1: Applicability of DFS requirements prior to use of a channel

Requirement	Operational Mode		
	Master	Client (without radar detection)	Client (with 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

Table 2: Applicability of DFS requirements during normal operation

Requirement	Operational Mode		
	Master	Client **(without DFS)**	Client **(with DFS)**
DFS Detection Threshold	Yes	Not required	Yes
Channel Closing Transmission Time	Yes	Yes	Yes
Channel Move Time	Yes	Yes	Yes
U-NII Detection Bandwidth	Yes	Not required	Yes

Additional requirements for devices with multiple bandwidth modes	Master Device or Client with Radar DFS	Client (without DFS)
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 (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in all 20 MHz channel blocks and a null frequency between the bonded 20 MHz channel blocks.		

Table 3: Interference Threshold values, Master or Client incorporating In-Service Monitoring

Maximum Transmit Power	Value (see notes)
E.I.R.P. ≥ 200 mill watt	-64 dBm
E.I.R.P. < 200 mill watt and power spectral density < 10 dBm/MHz	-62 dBm
E.I.R.P. < 200 mill watt that do not meet 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.
Note 3: E.I.R.P. is based on the highest antenna gain. For MIMO devices refer to KDB publication 662911 D01.

Table 4: DFS Response requirement values

Parameter	Value
Non-occupancy period	30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds (See Note 1)
Channel Closing Transmission Time	200 milliseconds + approx. 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.

Table 5 – Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (usec)	PRI (usec)	Pulses	Minimum Percentage of Successful Detection	Minimum 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: {(1/360) x (19 x 10^6 PRI_{usec})}	60%	30
		Test B: 15 unique PRI values randomly selected within the range of 518-3066 usec. With a minimum increment of 1 usec, 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.

Table 6 – Long Pulse Radar Test Signal

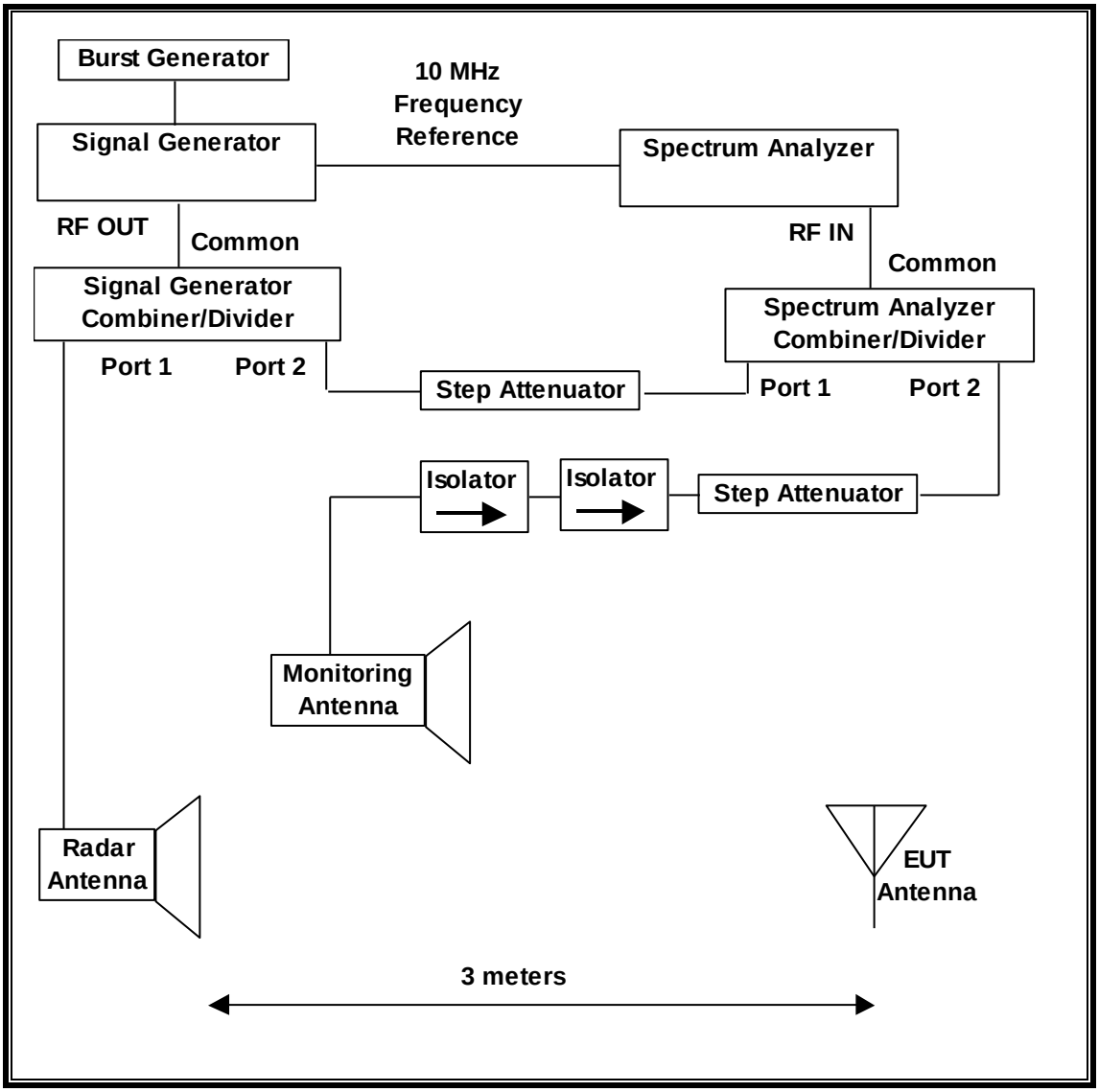
Radar Waveform Type	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µsec)	Pulses per Burst	Number of Bursts	Minimum Percentage of Successful Detection	Minimum Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

Table 7 – Frequency Hopping Radar Test Signal

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

5.1.2. TEST AND MEASUREMENT SYSTEM

RADIATED METHOD SYSTEM BLOCK DIAGRAM



SYSTEM OVERVIEW

The short pulse and long pulse signal generating system utilizes the NTIA software. The Vector Signal Generator has been validated by the NTIA. The hopping signal generating system utilizes the CCS simulated hopping method and system, which has been validated by the DoD, FCC and NTIA. The software selects waveform parameters from within the bounds of the signal type on a random basis using uniform distribution.

The short pulse types 1, 2, 3 and 4, and the long pulse type 5 parameters are randomized at run-time.

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 KDB 905462 D02. The frequency of the signal generator is incremented in 1 MHz steps from F_L to F_H 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.

The signal monitoring equipment consists of a spectrum analyzer. The aggregate ON time is calculated by multiplying the number of bins above a threshold during a particular observation period by the dwell time per bin, with the analyzer set to peak detection and max hold.

SYSTEM CALIBRATION

A 50-ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected to a horn antenna via a coaxial cable, with the reference level offset set to (horn antenna gain – coaxial cable loss). The signal generator is set to CW mode. The amplitude of the signal generator is adjusted to yield a level of –64 dBm as measured on the spectrum analyzer.

Without changing any of the instrument settings, the spectrum analyzer is reconnected to the Common port of the Spectrum Analyzer Combiner/Divider. The Reference Level Offset of the spectrum analyzer is adjusted so that the displayed amplitude of the signal is –64 dBm.

The spectrum analyzer displays the level of the signal generator as received at the antenna ports of the Master Device. The interference detection threshold may be varied from the calibrated value of –64 dBm and the spectrum analyzer will still indicate the level as received by the Master Device.

ADJUSTMENT OF DISPLAYED TRAFFIC LEVEL

A link is established between the Master and Slave and the distance between the units is adjusted as needed to provide a suitable received level at the Master and Slave devices. The video test file is streamed to generate WLAN traffic. The monitoring antenna is adjusted so that the WLAN traffic level, as displayed on the spectrum analyzer, is at lower amplitude than the radar detection threshold.

TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the DFS tests documented in this report:

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**Cal Due**
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight	N9030A	US51350187	06/13/17
Signal Generator, MXG X-Series RF Vector	Agilent	N5182B	MY51350337	03/11/17
Arbitrary Waveform Generator	Agilent / HP	33220A	MY44037572	04/11/17

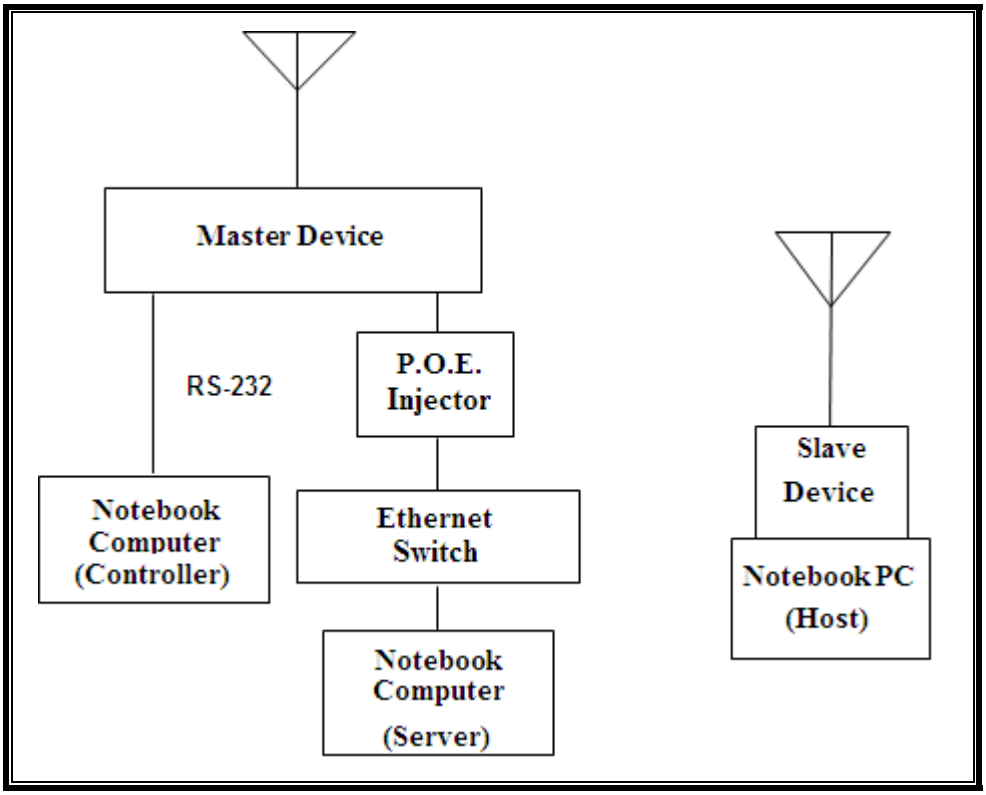
5.1.3. TEST AND MEASUREMENT SOFTWARE

The following test and measurement software was utilized for the tests documented in this report:

TEST SOFTWARE LIST		
Name	**Version**	**Test / Function**
Aggregate Time-PXA	3.0	Channel Loading and Aggregate Closing Time
FCC 2014 Detection	3.0	Detection Bandwidth in 5 MHz Steps
In Service Monitoring-PXA	3.0	In-Service Monitoring (Probability of Detection)
PXA Read	3.0.0.9	Signal Generator Screen Capture
SGXProject.exe	1.7	Radar Waveform Generation and Download

5.1.4. SETUP OF EUT

RADIATED METHOD EUT TEST SETUP



SUPPORT EQUIPMENT

The following support equipment was utilized for the DFS tests documented in this report:

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Gigabit P.O.E. Injector	Motorola	PD-7001G	D083164410001A4A01	DoC
Notebook PC (Server)	HP	Elitebook 8470p	CNU251B4RR	DoC
AC Adapter (Server PC)	Lite On Technology	PA-1900-32HT	WBGTK0A1RYQ6IO	DoC
Notebook PC (Controller)	HP	Elitebook 8460p	CNU2032CKJ	DoC
AC Adapter (Controller PC)	Lite On Technology	PA-1650-32HU	WCNXA0C3U3SEGF	DoC
802.11ac USB Converter (Slave Radio)	Zyxel Communications Corp.	NWD6505	S130F25008252	I88NWD6505
Notebook PC (Slave Host)	HP	Elitebook 8470p	CNU25193C2	PD962205ANH
AC Adapter (Host PC)	Lite On Technology	PA-1650-32HU	WCNXA0C4L3QDDL	DoC
Ethernet Switch	D-Link	DGS-100BG	AB202C2006577	DoC
AC Adapter (Switch)	D-Link	AMS47-0501000FU	12020317793	DoC

5.1.5. DESCRIPTION OF EUT

For FCC the EUT operates over the 5250-5350 MHz and 5470-5725 MHz ranges.

For IC the EUT operates over the 5250-5350 MHz and 5470-5725 MHz ranges, excluding the 5600-5650 MHz range.

The EUT can be configured as a Master Device or a Slave Device without Radar Detection.

The highest power level within these bands is 29.86 dBm EIRP in the 5250-5350 MHz and 29.79 dBm in the 5470-5725 MHz band.

The only antenna assembly utilized with the EUT has a gain of 4.33 dBi in the 5250-5350 MHz band and 4.66 dBi in the 5470-5725 MHz band.

Two identical antennas are utilized to meet the diversity and MIMO operational requirements.

The rated output power of the Master unit is > 23dBm (EIRP). Therefore the required interference threshold level is –64 dBm. After correction for procedural adjustments, the required radiated threshold at the antenna port is –64 + 1 = -63 dBm.

The calibrated radiated DFS Detection Threshold level is set to –64 dBm. The tested level is lower than the required level hence it provides a margin to the limit.

The EUT uses one or two transmitter/receiver chains, each connected to an antenna to perform radiated tests.

The Slave device associated with the EUT during these tests does not have radar detection capability.

WLAN traffic that meets or exceeds the minimum required loading was generated by transferring a data stream from the Master Device to the Slave Device using iPerf version 2.0.5 software package.

TPC is required since the maximum EIRP is greater than 500 mW (27 dBm).

The EUT employs a TPC mechanism via software and the TPC mechanism has the capability to operate at least 6dB below the highest RF output power.

The EUT utilizes the 802.11ac architecture. Three nominal channel bandwidths are implemented: 20 MHz, 40 MHz and 80 MHz.

The software installed in the EUT is AP7622 version 5.8.4.20-247388X.

UNIFORM CHANNEL SPREADING

This function is not required per KDB 905462.

OVERVIEW OF MASTER DEVICE WITH RESPECT TO §15.407 (h) REQUIREMENTS

The Master Device is an Extreme Technologies 802.11ac Access Point, FCC ID: UZ7AP7622. The minimum antenna gain for the Master Device is 5.3 dBi.

The rated output power of the Master unit is > 23dBm (EIRP). Therefore the required interference threshold level is –64 dBm. After correction for procedural adjustments, the required radiated threshold at the antenna port is –64 + 1 = -63 dBm.

The calibrated radiated DFS Detection Threshold level is set to –64 dBm. The tested level is lower than the required level hence it provides a margin to the limit.

5.2. RESULTS FOR 20 MHz BANDWIDTH

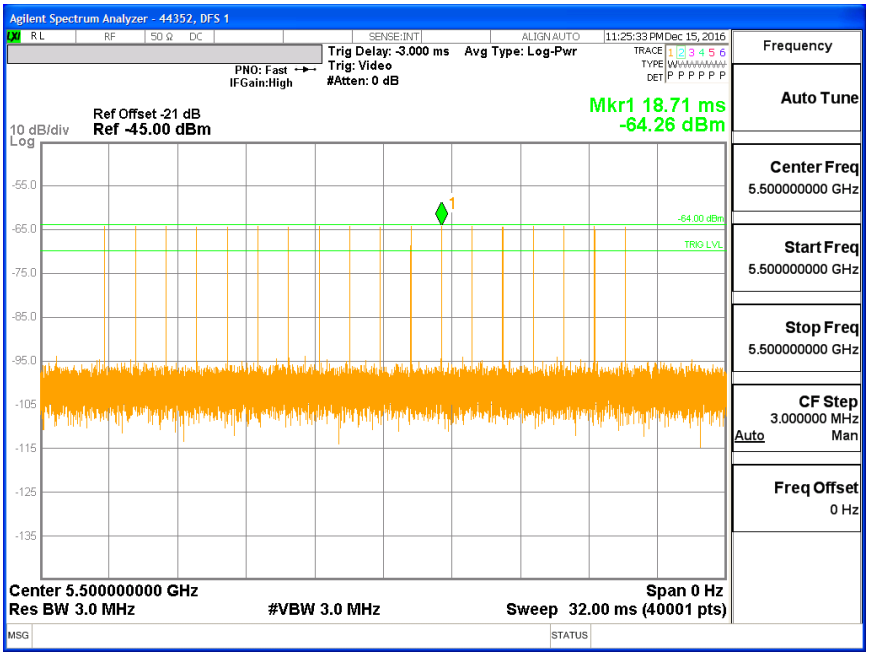
5.2.1. TEST CHANNEL

All tests were performed at a channel center frequency of 5500 MHz.

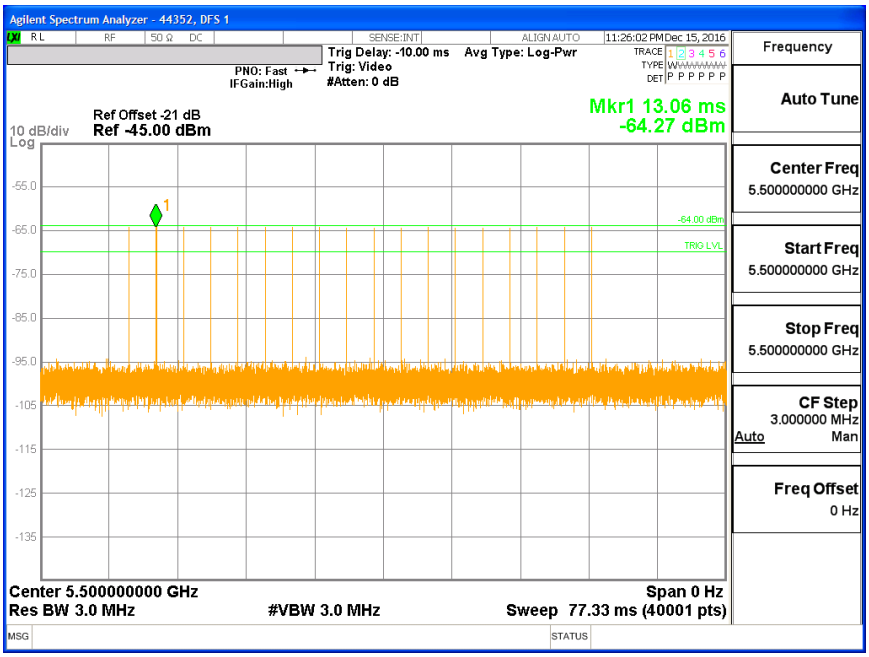
5.2.2. RADAR WAVEFORMS AND TRAFFIC

RADAR WAVEFORMS

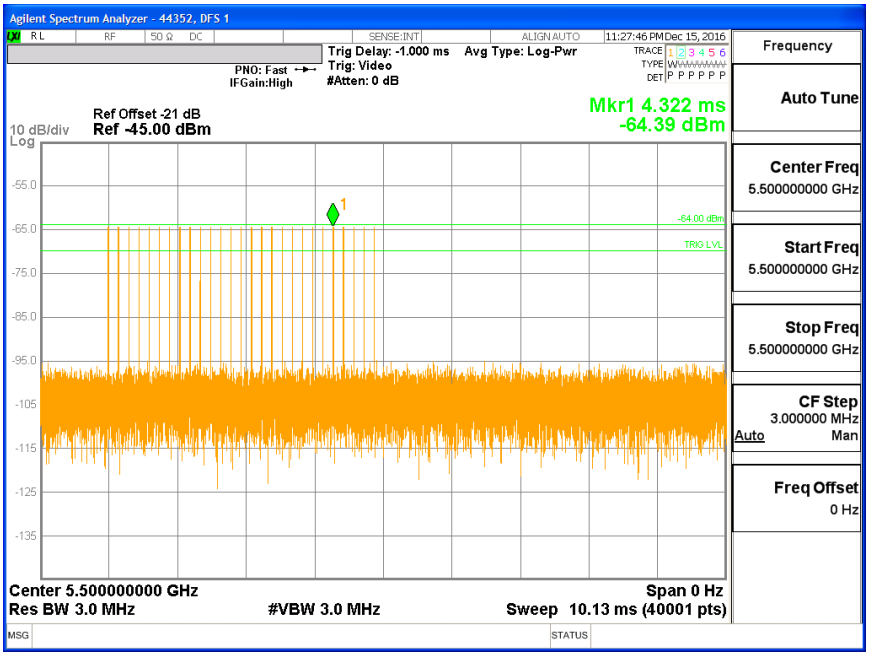
SHORT PULSE RADAR TYPE 0



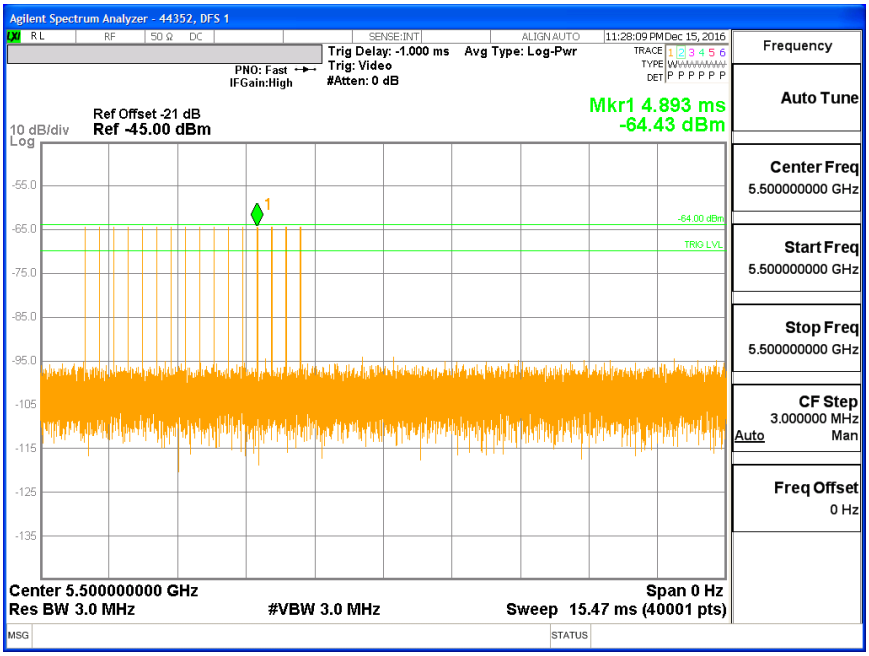
SAMPLE OF RADAR TYPE 1



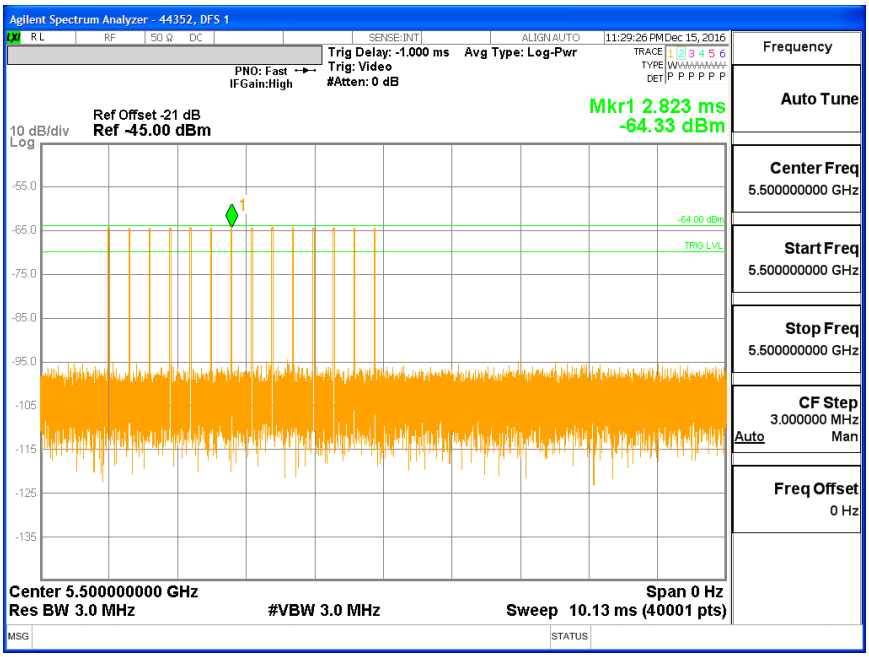
SAMPLE OF RADAR TYPE 2



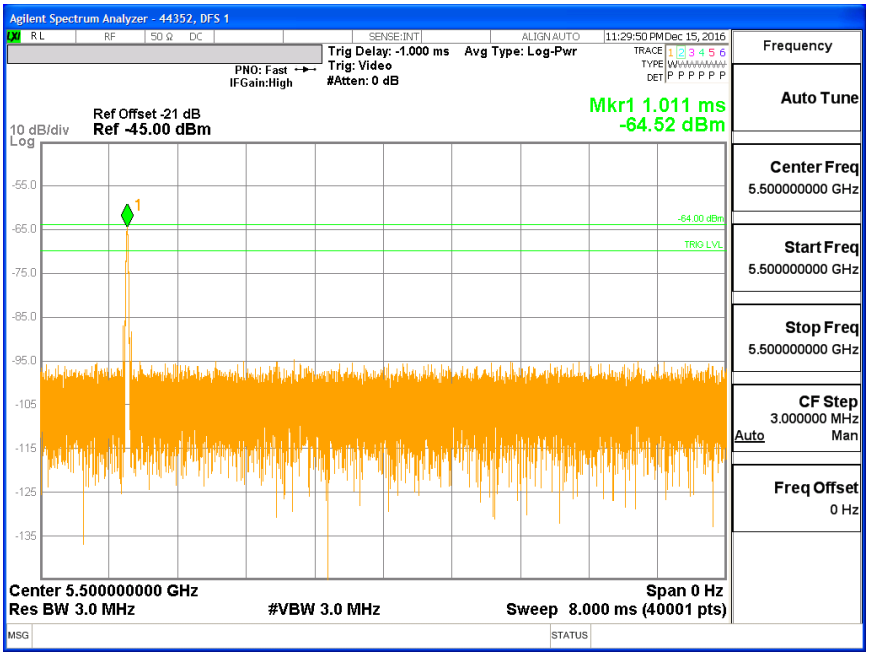
SAMPLE OF RADAR TYPE 3



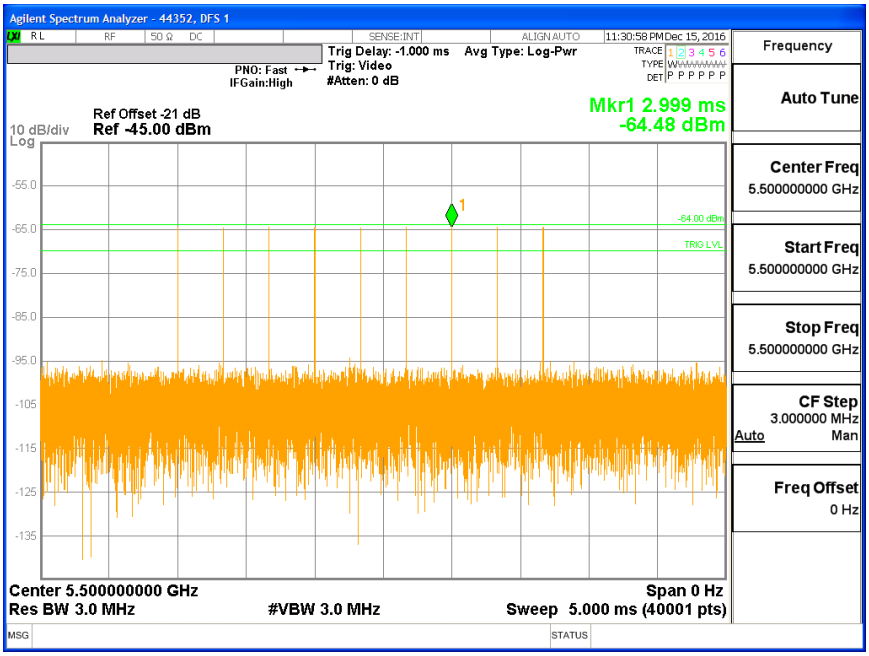
SAMPLE OF RADAR TYPE 4



SAMPLE OF SINGLE BURST OF RADAR TYPE 5

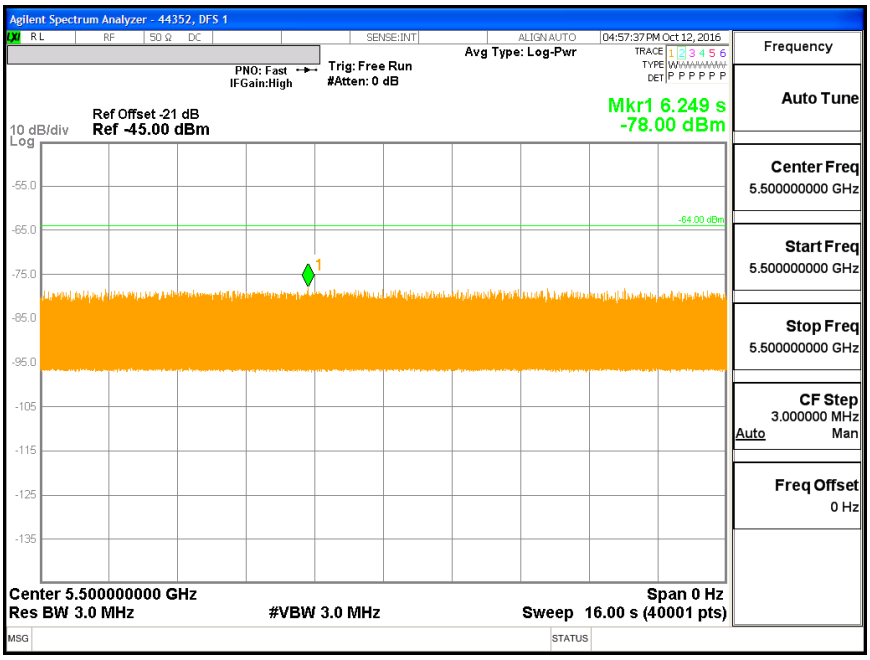


SINGLE BURST OF RADAR TYPE 6

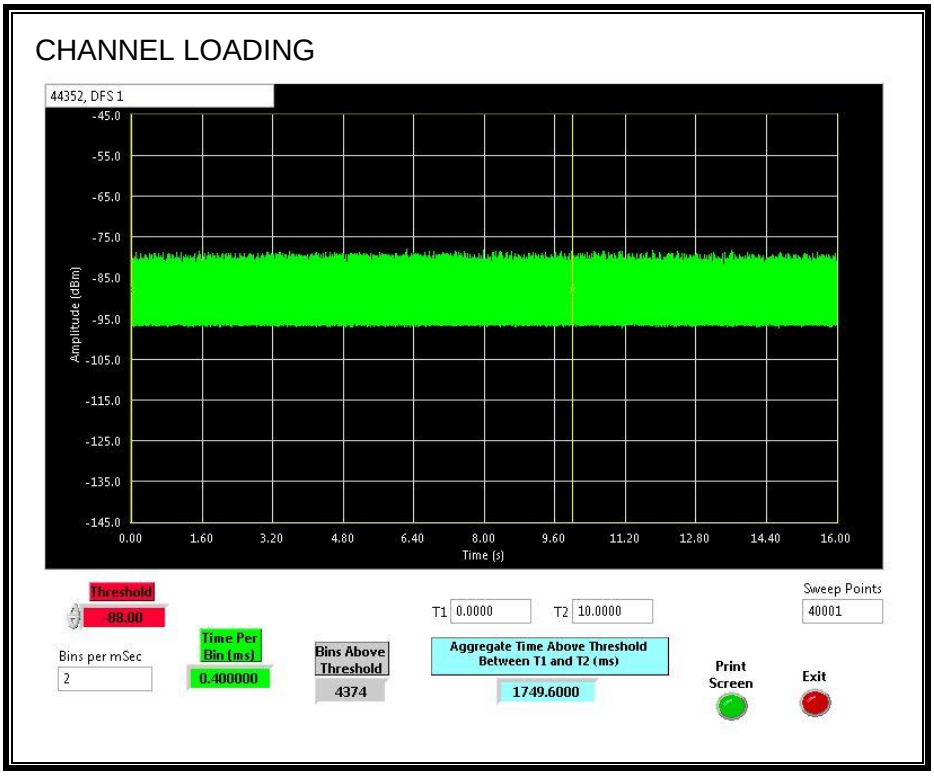


TRAFFIC

TRAFFIC



CHANNEL LOADING



The level of traffic loading on the channel by the EUT is 17.496%

5.2.3. CHANNEL AVAILABILITY CHECK TIME

PROCEDURE TO DETERMINE INITIAL POWER-UP CYCLE TIME

A sweep was started on the spectrum analyzer when a software command was issued to the EUT to change to 5500 MHz and commence a CAC period. The time to the re-initialization of traffic was measured as the time required for the EUT to complete the CAC period.

PROCEDURE FOR TIMING OF RADAR BURST

A sweep was started on the spectrum analyzer when a software command was issued to the EUT to change to 5500 MHz and commence a CAC period. A radar signal was triggered within 0 to 6 seconds after the beginning of the CAC period and transmissions on the channel were monitored on the spectrum analyzer.

The Non-Occupancy list was cleared. A sweep was started on the spectrum analyzer when a software command was issued to the EUT to change to 5500 MHz and commence a CAC period. A radar signal was triggered within 54 to 60 seconds after the beginning of the CAC period and transmissions on the channel were monitored on the spectrum analyzer.

QUANTITATIVE RESULTS BASED UPON SPECTRUM ANALYZER PLOTS

No Radar Triggered

Beginning of CAC (sec)	Timing of Start of Traffic (sec)	CAC Period Time (sec)
0	64.3	64.3

Radar Near Beginning of CAC

Beginning of CAC (sec)	Timing of Radar Burst (sec)	Radar Relative to Start of CAC (sec)
0	1.080	1.080

Radar Near End of CAC

Beginning of CAC (sec)	Timing of Radar Burst (sec)	Radar Relative to Start of CAC (sec)
0	58.46	58.46

QUANTITATIVE RESULTS BASED ON LOG FILE TIME STAMPS

No Radar Triggered

Beginning of CAC (hh:mm:ss)	End of CAC (hh:mm:ss)	CAC Time (hh:mm:ss)
6:43:03	6:44:07	0:01:04

Radar Near Beginning of CAC

Beginning of CAC (hh:mm:ss)	Radar Detected (hh:mm:ss)	Radar Relative to Start of CAC (hh:mm:ss)
6:51:09	6:51:10	0:00:01

Radar Near End of CAC

Beginning of CAC (hh:mm:ss)	Radar Detected (hh:mm:ss)	Radar Relative to Start of CAC (hh:mm:ss)
7:00:18	7:01:17	0:00:59

If a radar signal is detected during the channel availability check then the PC controlling the EUT displays a message stating that radar was detected.

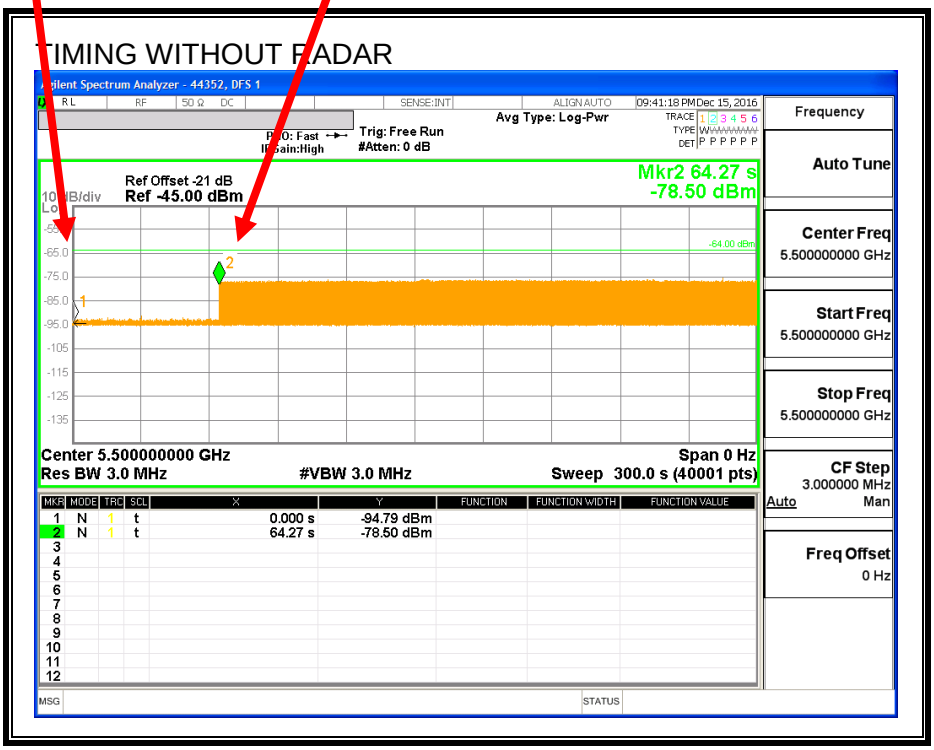
QUALITATIVE RESULTS

Timing of Radar Burst	Display on Control Computer	Spectrum Analyzer Display
No Radar Triggered	EUT marks Channel as active	Transmissions begin on channel after completion of the initial power-up cycle and the CAC
Within 0 to 6 second window	EUT indicates radar detected	No transmissions on channel
Within 54 to 60 second window	EUT indicates radar detected	No transmissions on channel

TIMING WITHOUT RADAR DURING CAC

Command to
Switch Channels
Start of CAC

End of CAC



Transmissions begin on channel after completion of the CAC period.

Log File of CAC Timing Without Radar

Jan 10 06:43:03 2016: DOT11: %%%%>dfs:DFS evt=chan_avail_chk,ch=100,ridx=1,curCh=100,state=dfs_idle,prev_state=chan_avail_chk (dfs.c:430)

Jan 10 06:43:03 2016: DOT11: dfs:CAC time 60 (dfs.c:694)

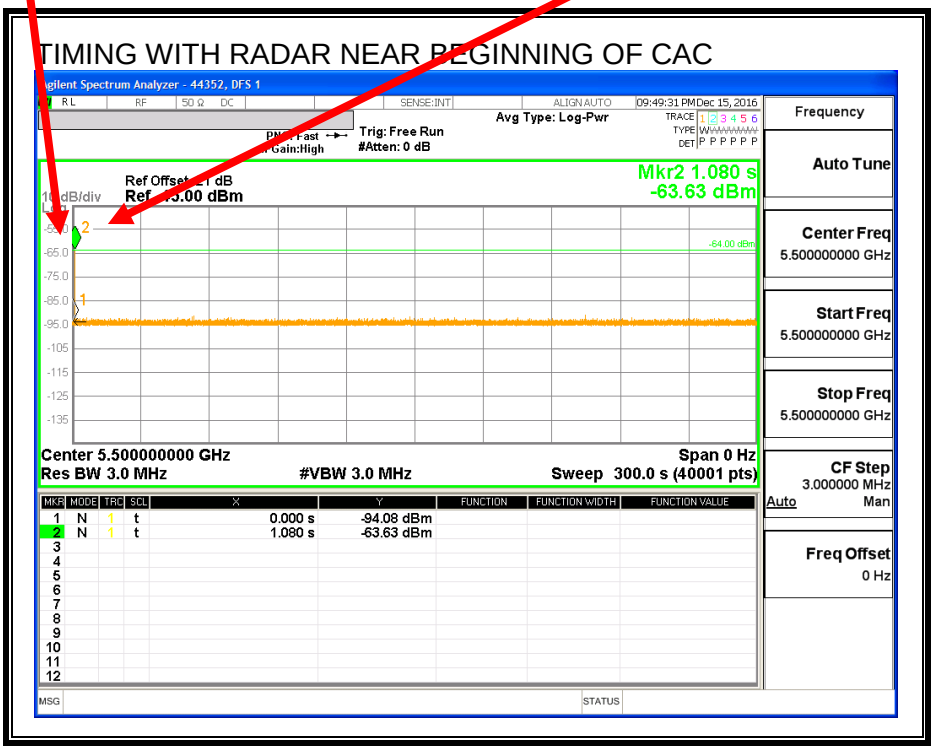
Jan 10 **06:43:03** 2016: ap7622-D19E81 : %RADIO-6-RADAR_SCAN_STARTED: Radar scan on primary channel 100 freq 5500 MHz for a duration 70 secs on radio 'ap7622-D19

Jan 10 **06:44:07** 2016: ap7622-D19E81 : %RADIO-6-RADAR_SCAN_COMPLETED: Radar scan done on primary channel 100 freq 5500 MHz on radio 'ap7622-D19E81:R2'

TIMING WITH RADAR NEAR BEGINNING OF CAC

Command to
Switch Channels
Start of CAC

Radar Signal Applied



No EUT transmissions were observed after the radar signal.

Log File of Radar at the Beginning of CAC

Jan 10 06:51:09 2016: DOT11: %%%%>dfs:DFS evt=chan_avail_chk,ch=100,ridx=1,curCh=100,state=dfs_idle,prev_state=chan_avail_chk (dfs.c:430)

Jan 10 06:51:09 2016: DOT11: dfs:CAC time 60 (dfs.c:694)

Jan 10 **06:51:09** 2016: ap7622-D19E81 : %RADIO-6-RADAR_SCAN_STARTED: Radar scan on primary channel 100 freq 5500 MHz for a duration 70 secs on radio 'ap7622-D19

Jan 10 06:51:10 2016: KERN: WL1: DFS: UNCLASSIFIED ########## radar detected on channel 100 ########## Intv=28559, min_pw=28, AT 900MS.

Jan 10 06:51:10 2016: KERN: wl1: dfs : state PRE-ISM Channel Availability Check, detected radar on channel 100: Activating jump channel: 153.

Jan 10 06:51:10 2016: DOT11: %%%%>dfs:Radar reported on channel 100 Freq 5500 MHz by radio_idx 1 (dfs.c:302)

Jan 10 06:51:10 2016: DOT11: dfs:Chosen Dfs jump channel:165 (dfs.c:1179)

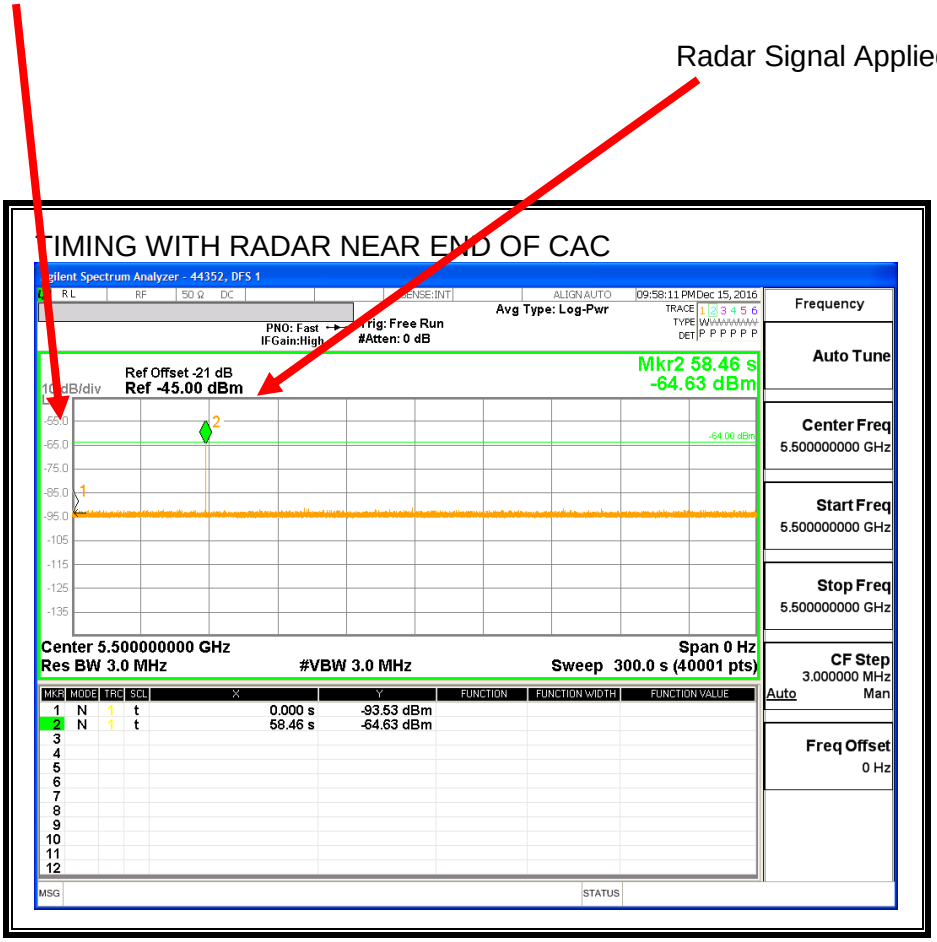
Jan 10 **06:51:10** 2016: ap7622-D19E81 : %RADIO-4-RADAR_DETECTED: Radar found on Radio 2 channel 100 width 20 freq 5500 MHz

Jan 10 06:51:10 2016: ap7622-D19E81 : %RADIO-4-RADAR_DET_INFO: Radar info: Radio: 'ap7622-D19E81:R2'. New channel: 153 freq 5765 MHz. Scan time: 0 secs

TIMING WITH RADAR NEAR END OF CAC

Command to
Switch Channels
Start of CAC

Radar Signal Applied



No EUT transmissions were observed after the radar signal.

Log File of Radar at the End of CAC

Jan 10 07:00:18 2016: DOT11: %%%%>dfs:DFS evt=chan_avail_chk,ch=100,ridx=1,curCh=100,state=dfs_idle,prev_state=chan_avail_chk (dfs.c:430)

Jan 10 07:00:18 2016: DOT11: dfs:CAC time 60 (dfs.c:694)

Jan 10 **07:00:18** 2016: ap7622-D19E81 : %RADIO-6-RADAR_SCAN_STARTED: Radar scan on primary channel 100 freq 5500 MHz for a duration 70 secs on radio 'ap7622-D19

Jan 10 07:01:17 2016: KERN: WL1: DFS: UNCLASSIFIED ########## radar detected on channel 100 ########## Intv=28560, min_pw=29, AT 54750MS.

Jan 10 07:01:17 2016: KERN: wl1: dfs : state PRE-ISM Channel Availability Check, detected radar on channel 100: Activating jump channel: 157.

Jan 10 07:01:17 2016: DOT11: %%%%>dfs:Radar reported on channel 100 Freq 5500 MHz by radio_idx 1 (dfs.c:302)

Jan 10 07:01:17 2016: DOT11: dfs:Chosen Dfs jump channel:153 (dfs.c:1179)

Jan 10 **07:01:17** 2016: ap7622-D19E81 : %RADIO-4-RADAR_DETECTED: Radar found on Radio 2 channel 100 width 20 freq 5500 MHz

Jan 10 07:01:17 2016: ap7622-D19E81 : %RADIO-4-RADAR_DET_INFO: Radar info: Radio: 'ap7622-D19E81:R2'. New channel: 157 freq 5785 MHz. Scan time: 0 secs

5.2.4. OVERLAPPING CHANNEL TESTS

RESULTS

The channel spacing is not less than the channel bandwidth therefore the EUT does not have an overlapping channel plan.

These tests are not applicable.

5.2.5. MOVE AND CLOSING TIME

REPORTING NOTES

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time =
(Number of analyzer bins showing transmission) * (dwell time per bin)

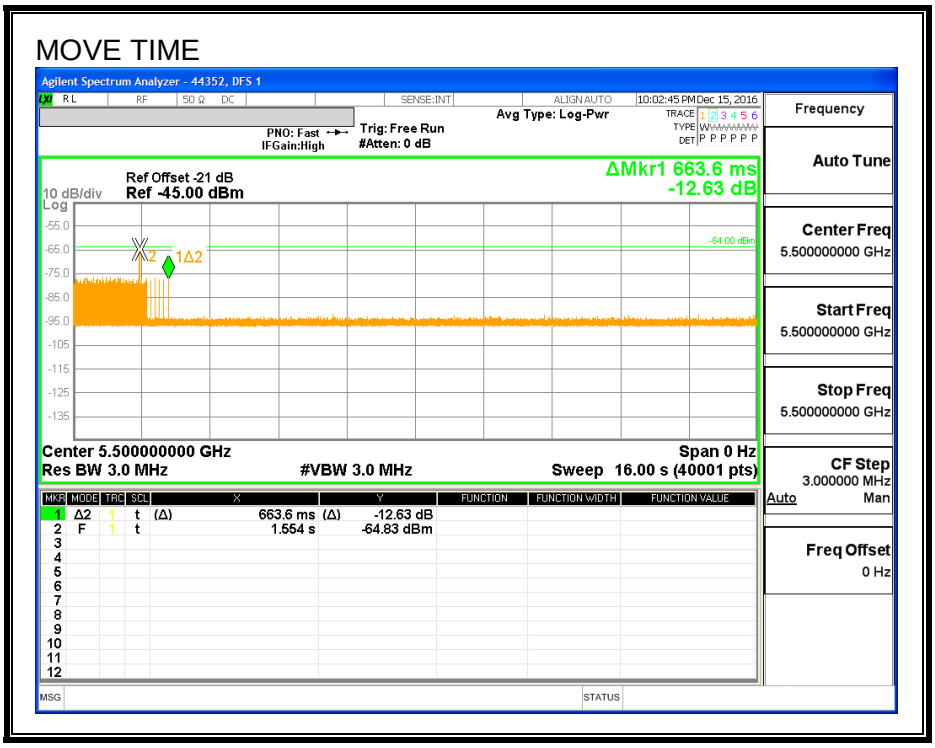
The observation period over which the aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

RESULTS

Channel Move Time (sec)	Limit (sec)
0.664	10

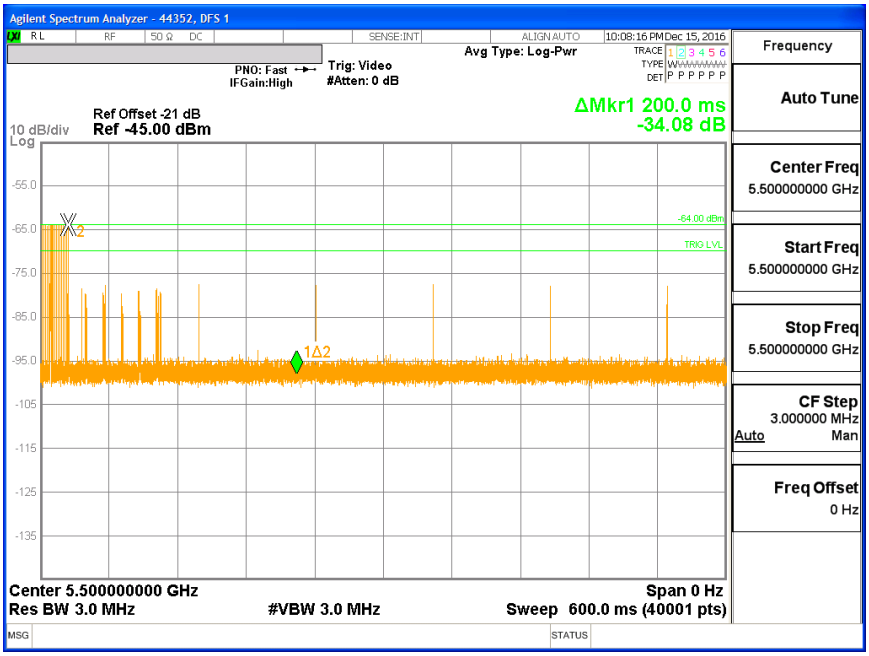
Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
4.0	60

MOVE TIME



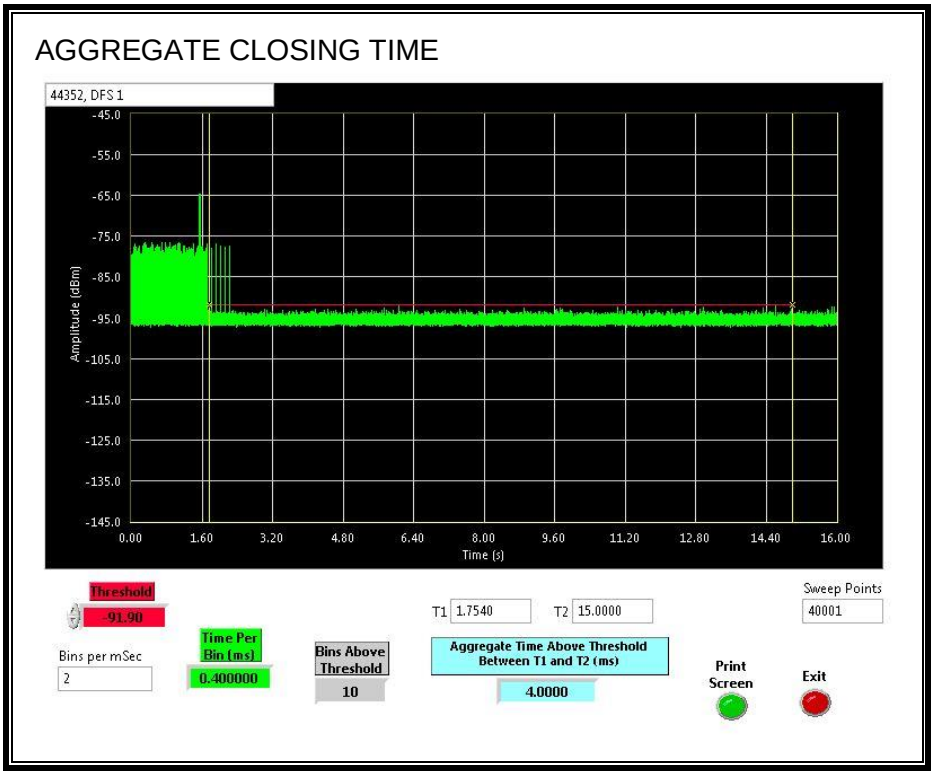
CHANNEL CLOSING TIME

CLOSING TIME



AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

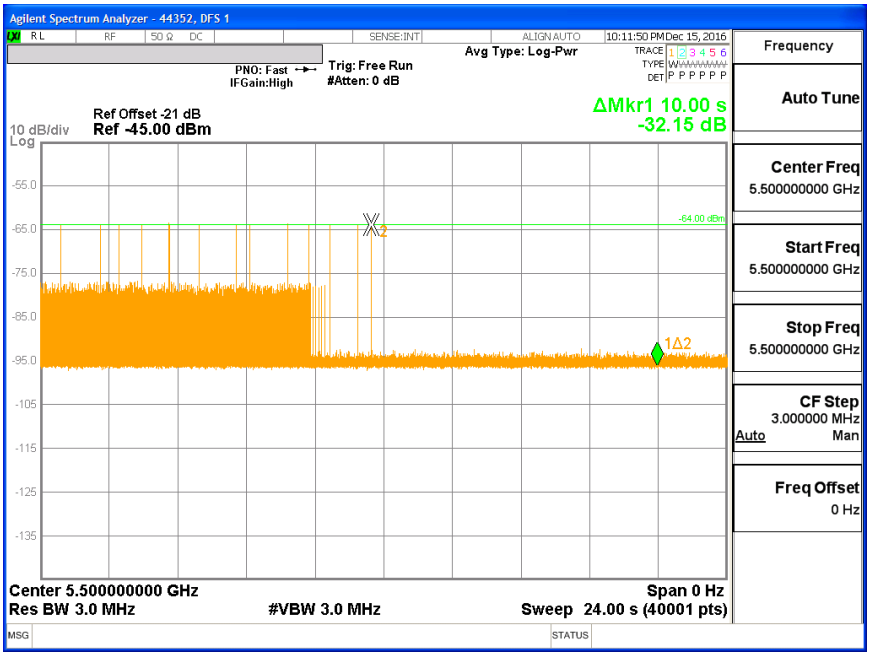
No transmissions are observed during the aggregate monitoring period.



LONG PULSE CHANNEL MOVE TIME

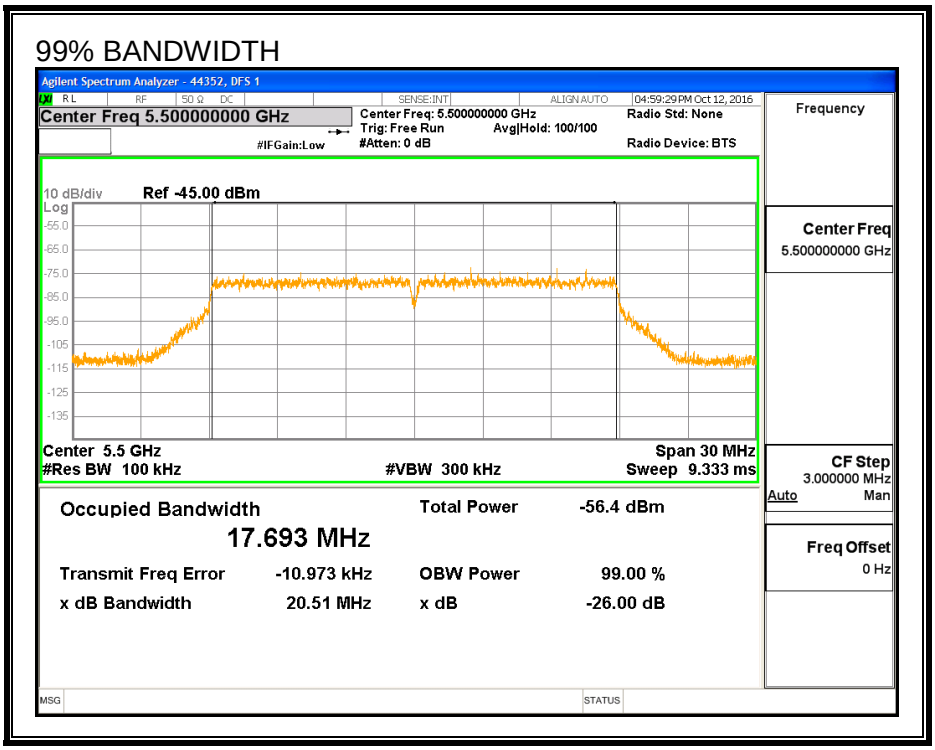
The traffic ceases prior to 10 seconds after the end of the radar waveform.

MOVE TIME FOR LONG PULSE RADAR



5.2.6. DETECTION BANDWIDTH

REFERENCE PLOT OF 99% POWER BANDWIDTH



RESULTS

FL (MHz)	FH (MHz)	Detection Bandwidth (MHz)	99% Power Bandwidth (MHz)	Ratio of Detection BW to 99% Power BW (%)	Minimum Limit (%)
5490	5510	20	17.693	113.0	100

DETECTION BANDWIDTH PROBABILITY

DETECTION BANDWIDTH PROBABILITY RESULTS

Detection Bandwidth Test Results		44352	DFS 1	
FCC Type 0 Waveform: 1 us Pulse Width, 1428 us PRI, 18 Pulses per Burst				
Frequency (MHz)	Number of Trials	Number Detected	Detection (%)	Mark
5489	10	0	0	
5490	10	10	100	FL
5495	10	10	100	
5500	10	10	100	
5505	10	10	100	
5510	10	10	100	FH
5511	10	0	0	

5.2.7. IN-SERVICE MONITORING

RESULTS

FCC Radar Test Summary

Signal Type	Number of Trials	Detection (%)	Limit (%)	Pass/Fail	Detection Bandwidth FL	Detection Bandwidth FH	80% of Det BW FL5	80% of Det BW FH5	OBW	Test Location	Employee Number	In-Service Monitoring Version
FCC Short Pulse Type 1	30	100.00	60	Pass	5490	5510			17.69	DFS 1	44352	Version 3.0
FCC Short Pulse Type 2	30	96.67	60	Pass	5490	5510			17.69	DFS 1	44352	Version 3.0
FCC Short Pulse Type 3	30	96.67	60	Pass	5490	5510			17.69	DFS 1	44352	Version 3.0
FCC Short Pulse Type 4	30	100.00	60	Pass	5490	5510			17.69	DFS 1	44352	Version 3.0
Aggregate		98.33	80	Pass								
FCC Long Pulse Type 5	30	86.67	80	Pass	5490	5510	5492	5508	17.69	DFS 1	44352	Version 3.0
FCC Hopping Type 6	42	100.00	70	Pass	5490	5510				DFS 1	44352	Version 3.0

TYPE 1 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 1						
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Test (A/B)	Frequency (MHz)	Successful Detection (Yes/No)
1001	1	3066	18	A	5500	Yes
1002	1	638	83	A	5500	Yes
1003	1	618	86	A	5500	Yes
1004	1	598	89	A	5500	Yes
1005	1	878	61	A	5500	Yes
1006	1	518	102	A	5500	Yes
1007	1	558	95	A	5500	Yes
1008	1	658	81	A	5500	Yes
1009	1	938	57	A	5500	Yes
1010	1	738	72	A	5500	Yes
1011	1	538	99	A	5500	Yes
1012	1	678	78	A	5500	Yes
1013	1	898	59	A	5500	Yes
1014	1	698	76	A	5500	Yes
1015	1	798	67	A	5500	Yes
1016	1	1529	35	B	5500	Yes
1017	1	1968	27	B	5500	Yes
1018	1	2730	20	B	5500	Yes
1019	1	1944	28	B	5500	Yes
1020	1	1641	33	B	5500	Yes
1021	1	985	54	B	5500	Yes
1022	1	811	66	B	5500	Yes
1023	1	1638	33	B	5500	Yes
1024	1	2947	18	B	5500	Yes
1025	1	1356	39	B	5500	Yes
1026	1	2794	19	B	5500	Yes
1027	1	2686	20	B	5500	Yes
1028	1	1706	31	B	5500	Yes
1029	1	1726	31	B	5500	Yes
1030	1	876	61	B	5500	Yes

TYPE 2 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 2

Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Frequency (MHz)	Successful Detection (Yes/No)
2001	4.1	151	27	5500	Yes
2002	4.9	202	26	5500	Yes
2003	4.2	209	23	5500	Yes
2004	1.1	226	29	5500	Yes
2005	4.8	194	26	5500	Yes
2006	4.1	178	23	5500	Yes
2007	3.8	150	24	5500	No
2008	3.3	219	28	5500	Yes
2009	1.4	157	29	5500	Yes
2010	3.3	192	27	5500	Yes
2011	1.5	215	25	5500	Yes
2012	3.6	173	27	5500	Yes
2013	2.1	162	26	5500	Yes
2014	4.4	205	27	5500	Yes
2015	1.1	199	26	5500	Yes
2016	1.7	165	25	5500	Yes
2017	2.8	206	25	5500	Yes
2018	3.6	219	24	5500	Yes
2019	2.9	183	28	5500	Yes
2020	3.9	201	27	5500	Yes
2021	3.5	169	28	5500	Yes
2022	2.8	152	28	5500	Yes
2023	2.5	205	29	5500	Yes
2024	2	193	26	5500	Yes
2025	4.2	174	27	5500	Yes
2026	2	166	28	5500	Yes
2027	4.3	189	23	5500	Yes
2028	2.3	228	24	5500	Yes
2029	4.9	218	23	5500	Yes
2030	3.1	180	25	5500	Yes

TYPE 3 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 3

Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Frequency (MHz)	Successful Detection (Yes/No)
3001	6.3	324	16	5500	Yes
3002	9.4	470	16	5500	Yes
3003	5.6	345	16	5500	Yes
3004	6.6	386	18	5500	Yes
3005	5.8	275	17	5500	Yes
3006	7	328	17	5500	Yes
3007	6.5	480	17	5500	Yes
3008	5.6	429	17	5500	Yes
3009	8	476	17	5500	Yes
3010	7.4	305	16	5500	Yes
3011	7.4	498	17	5500	Yes
3012	9.7	472	17	5500	Yes
3013	7.6	294	18	5500	Yes
3014	5	414	18	5500	Yes
3015	8.2	382	18	5500	Yes
3016	8.7	264	16	5500	No
3017	9.8	496	18	5500	Yes
3018	7.8	390	18	5500	Yes
3019	6.7	266	18	5500	Yes
3020	5	307	17	5500	Yes
3021	9.3	446	16	5500	Yes
3022	5.4	500	17	5500	Yes
3023	7.6	401	16	5500	Yes
3024	9.1	350	17	5500	Yes
3025	6.4	397	16	5500	Yes
3026	5.8	358	18	5500	Yes
3027	8.5	418	16	5500	Yes
3028	8.1	393	16	5500	Yes
3029	5.9	348	17	5500	Yes
3030	8.5	335	17	5500	Yes

TYPE 4 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 4

Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Frequency (MHz)	Successful Detection (Yes/No)
4001	18.6	302	14	5500	Yes
4002	14.2	436	15	5500	Yes
4003	16.3	416	15	5500	Yes
4004	12.3	444	14	5500	Yes
4005	10.3	438	13	5500	Yes
4006	16.9	478	13	5500	Yes
4007	15.4	367	15	5500	Yes
4008	13	420	13	5500	Yes
4009	12	455	16	5500	Yes
4010	14.9	270	13	5500	Yes
4011	19.8	318	16	5500	Yes
4012	18.5	279	14	5500	Yes
4013	13.7	339	13	5500	Yes
4014	12.9	313	16	5500	Yes
4015	18.8	268	12	5500	Yes
4016	13.8	255	13	5500	Yes
4017	15.5	474	12	5500	Yes
4018	11	356	14	5500	Yes
4019	13.1	337	13	5500	Yes
4020	19.2	365	12	5500	Yes
4021	17.2	358	15	5500	Yes
4022	19.1	399	14	5500	Yes
4023	12.2	287	14	5500	Yes
4024	19.9	341	16	5500	Yes
4025	18.9	376	14	5500	Yes
4026	11.7	442	12	5500	Yes
4027	16.6	489	15	5500	Yes
4028	15.3	451	15	5500	Yes
4029	10.5	260	16	5500	Yes
4030	19.8	485	14	5500	Yes

TYPE 5 DETECTION PROBABILITY

Data Sheet for FCC Long Pulse Radar Type 5		
Trial	Frequency (MHz)	Successful Detection (Yes/No)
1	5500	Yes
2	5500	Yes
3	5500	No
4	5500	Yes
5	5500	No
6	5500	Yes
7	5500	Yes
8	5500	Yes
9	5500	Yes
10	5500	Yes
11	5499	Yes
12	5495	Yes
13	5500	Yes
14	5498	No
15	5500	Yes
16	5497	Yes
17	5494	Yes
18	5497	Yes
19	5498	Yes
20	5496	Yes
21	5500	No
22	5501	Yes
23	5505	Yes
24	5506	Yes
25	5504	Yes
26	5505	Yes
27	5501	Yes
28	5504	Yes
29	5503	Yes
30	5503	Yes

Note: The Type 5 randomized parameters tested are shown in a separate document.

TYPE 6 DETECTION PROBABILITY

Data Sheet for FCC Hopping Radar Type 6
1 us Pulse Width, 333 us PRI, 9 Pulses per Burst, 1 Burst per Hop
NTIA August 2005 Hopping Sequence

Trial	Starting Index Within Sequence	Signal Generator Frequency (MHz)	Hops within Detection BW	Successful Detection (Yes/No)
1	152	5490	3	Yes
2	627	5491	6	Yes
3	1102	5492	4	Yes
4	1577	5493	1	Yes
5	2052	5494	4	Yes
6	2527	5495	4	Yes
7	3002	5496	4	Yes
8	3477	5497	4	Yes
9	3952	5498	6	Yes
10	4427	5499	3	Yes
11	4902	5500	7	Yes
12	5377	5501	6	Yes
13	5852	5502	7	Yes
14	6327	5503	3	Yes
15	6802	5504	4	Yes
16	7277	5505	6	Yes
17	7752	5506	5	Yes
18	8227	5507	7	Yes
19	8702	5508	5	Yes
20	9177	5509	5	Yes
21	9652	5510	6	Yes
22	10127	5490	2	Yes
23	10602	5491	4	Yes
24	11077	5492	5	Yes
25	11552	5493	3	Yes
26	12027	5494	5	Yes
27	12502	5495	5	Yes
28	12977	5496	8	Yes
29	13452	5497	6	Yes
30	13927	5498	2	Yes
31	14402	5499	2	Yes
32	14877	5500	3	Yes
33	15352	5501	4	Yes
34	15827	5502	3	Yes
35	16302	5503	2	Yes
36	16777	5504	6	Yes
37	17252	5505	4	Yes
38	17727	5506	6	Yes
39	18202	5507	8	Yes
40	18677	5508	5	Yes
41	19152	5509	7	Yes
42	19627	5510	3	Yes

5.3. RESULTS FOR 40 MHz BANDWIDTH

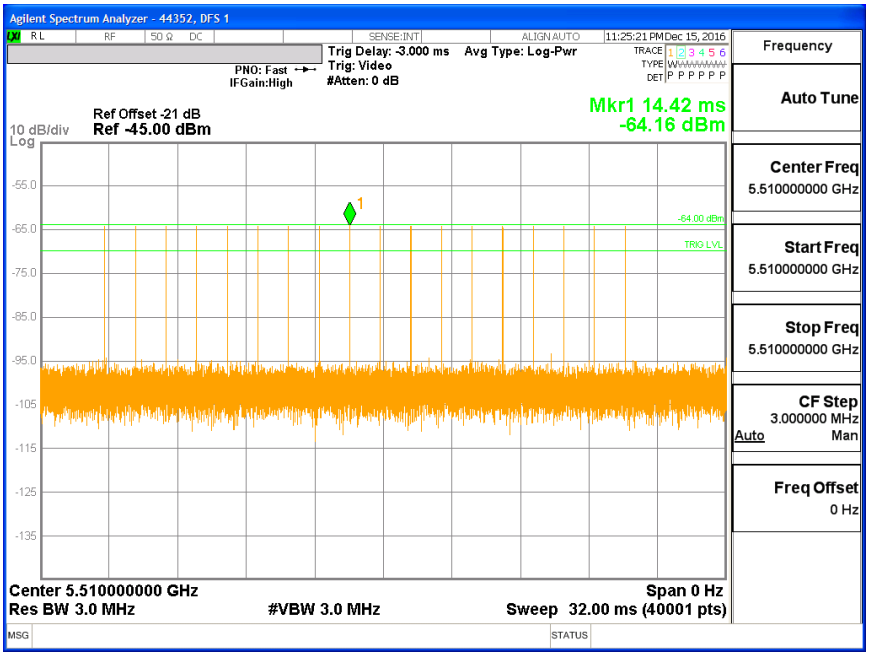
5.3.1. TEST CHANNEL

All tests were performed at a channel center frequency of 5510 MHz.

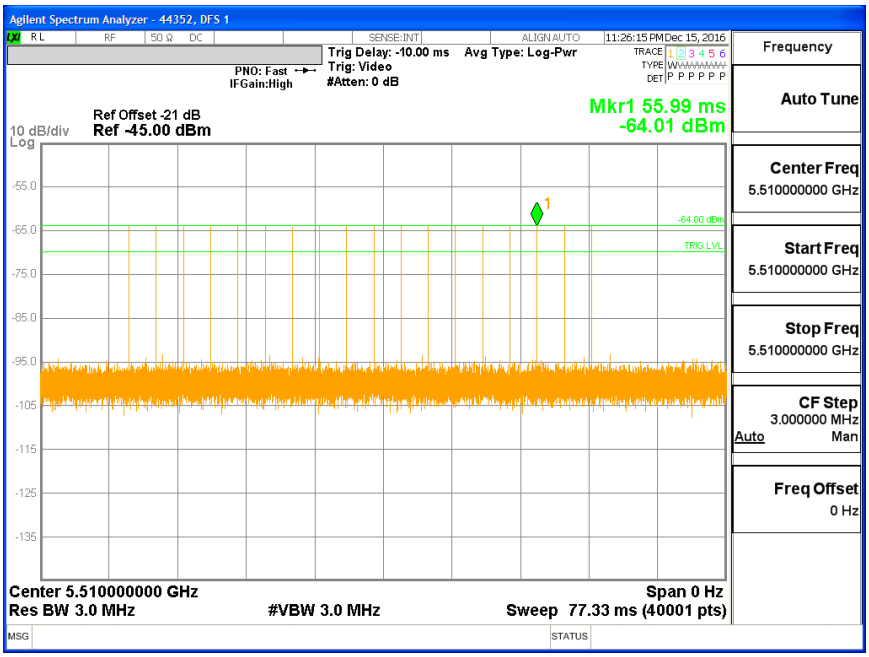
5.3.2. RADAR WAVEFORMS AND TRAFFIC

RADAR WAVEFORMS

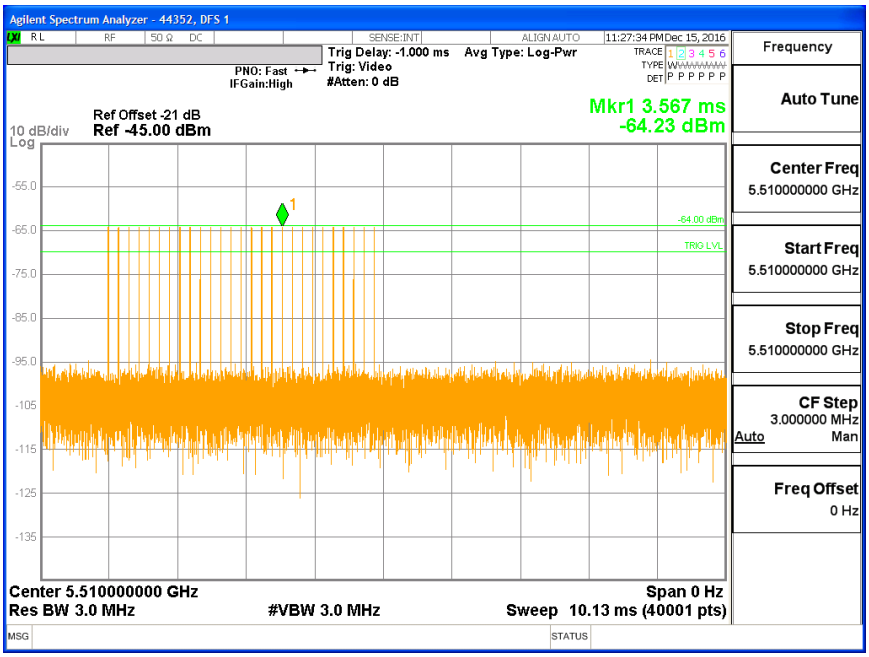
SHORT PULSE RADAR TYPE 0



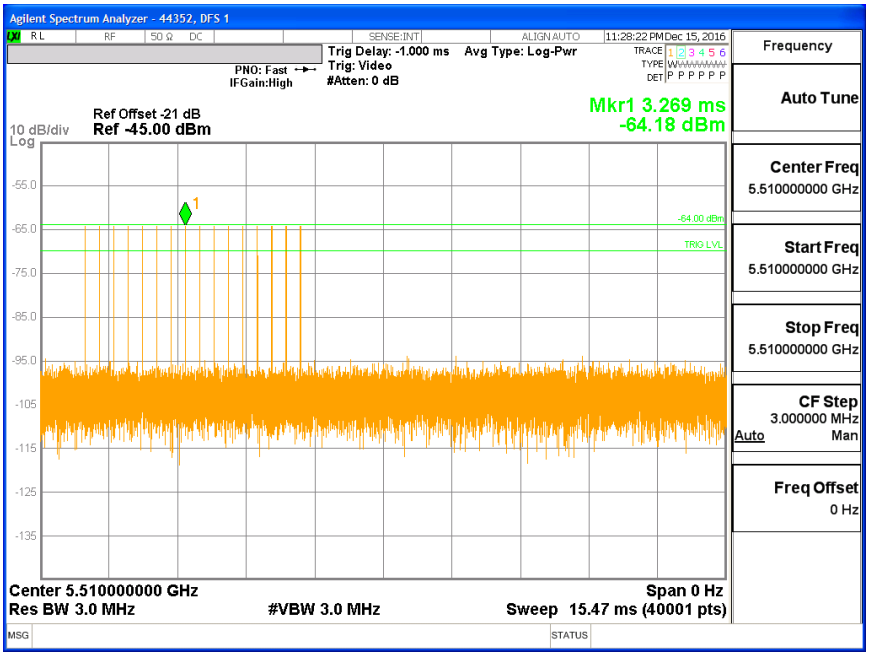
SAMPLE OF RADAR TYPE 1



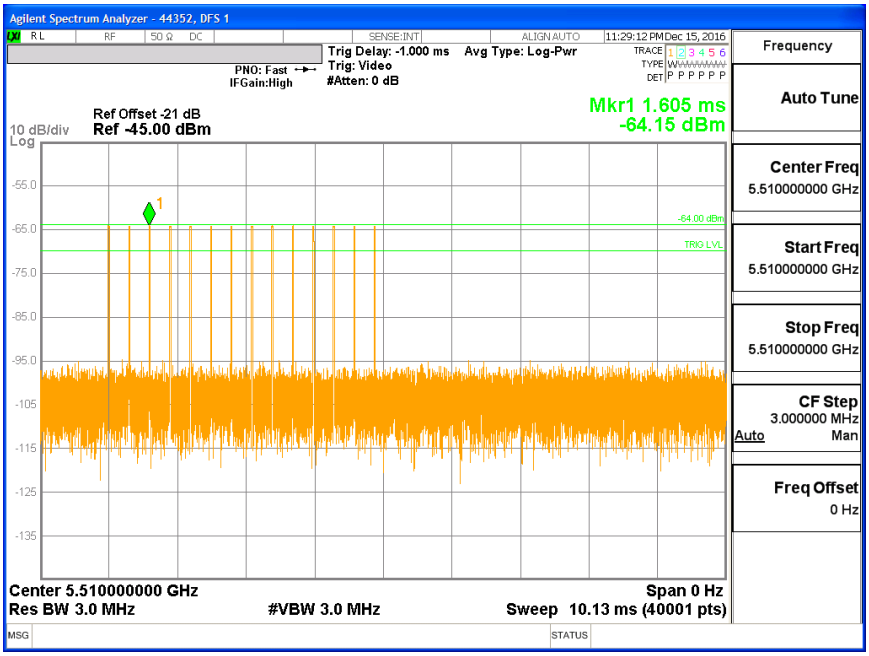
SAMPLE OF RADAR TYPE 2



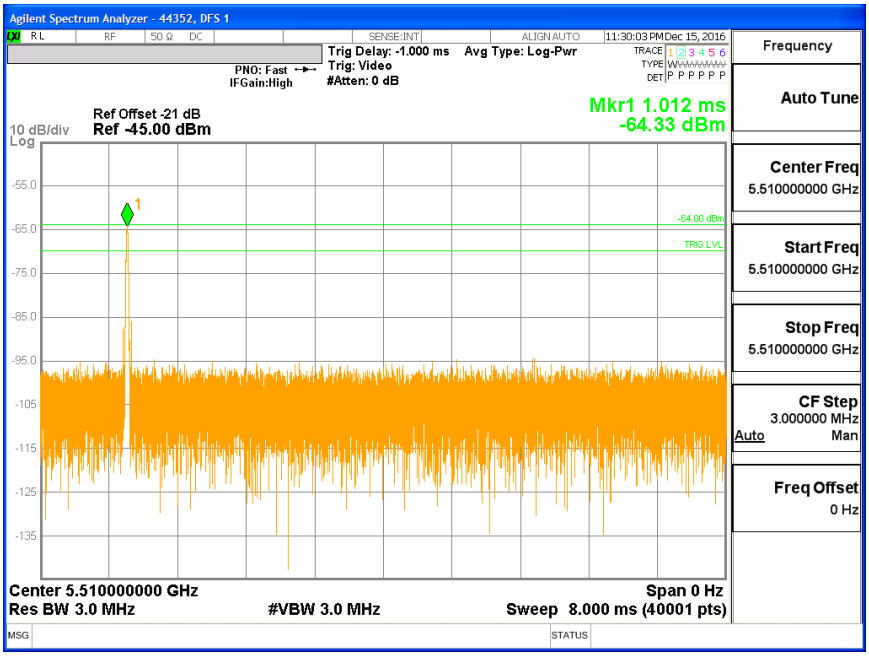
SAMPLE OF RADAR TYPE 3



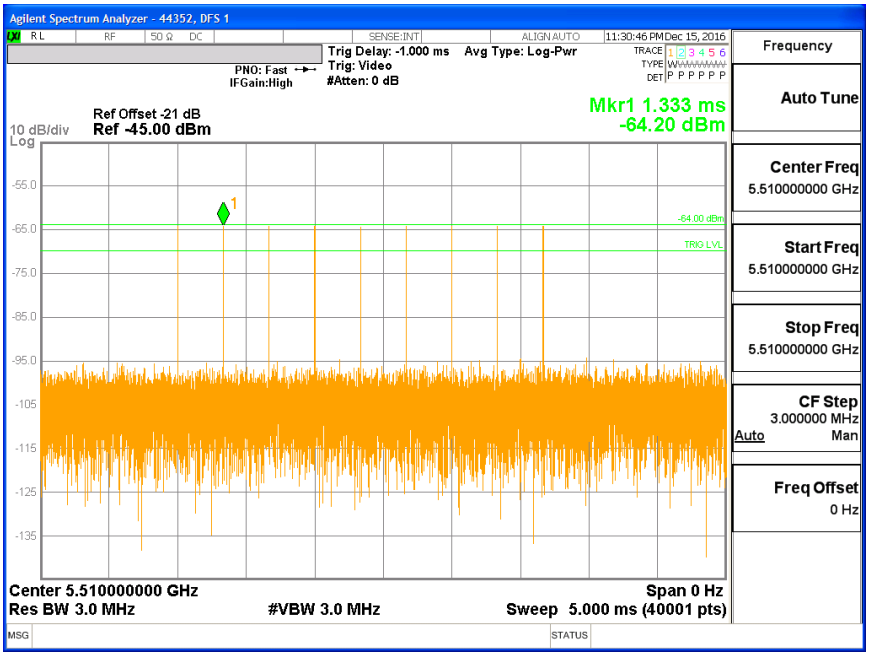
SAMPLE OF RADAR TYPE 4



SAMPLE OF SINGLE BURST OF RADAR TYPE 5

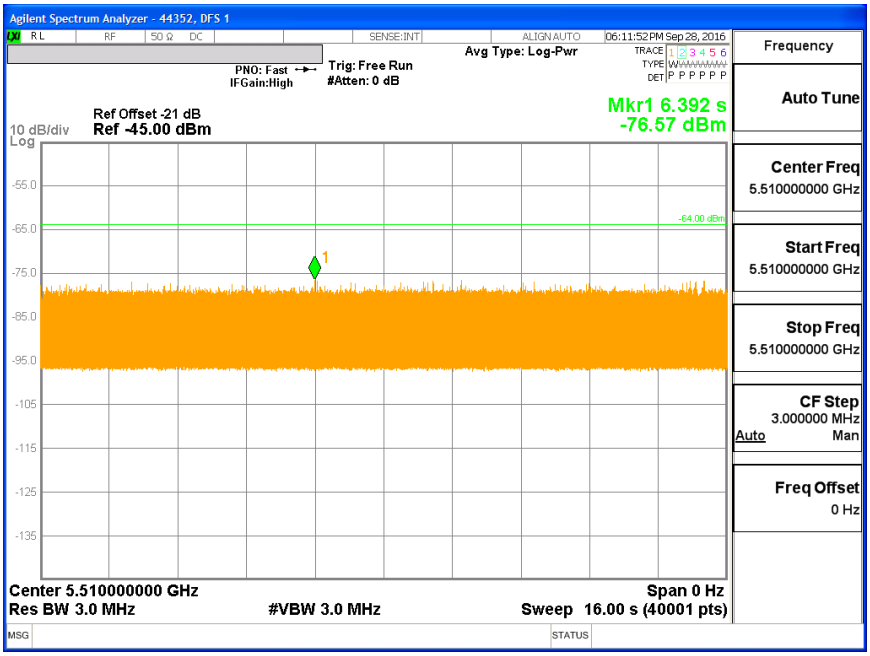


SINGLE BURST OF RADAR TYPE 6

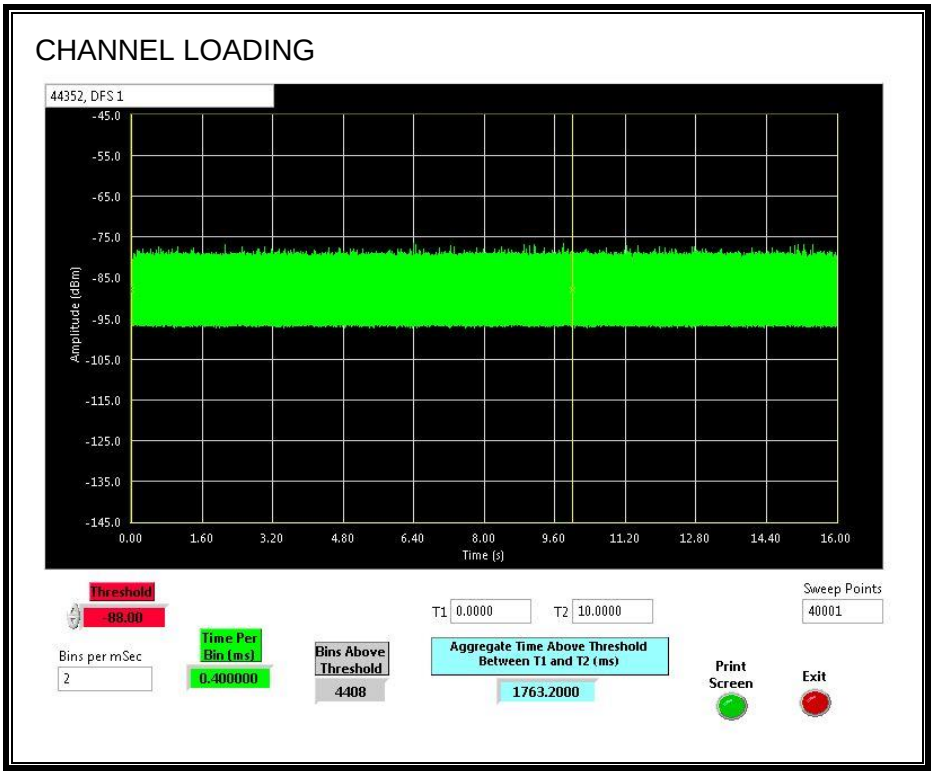


TRAFFIC

TRAFFIC



CHANNEL LOADING



The level of traffic loading on the channel by the EUT is 17.632%

5.3.3. CHANNEL AVAILABILITY CHECK TIME

PROCEDURE TO DETERMINE INITIAL POWER-UP CYCLE TIME

A sweep was started on the spectrum analyzer when a software command was issued to the EUT to change to 5510 MHz and commence a CAC period. The time to the re-initialization of traffic was measured as the time required for the EUT to complete the CAC period.

PROCEDURE FOR TIMING OF RADAR BURST

A sweep was started on the spectrum analyzer when a software command was issued to the EUT to change to 5510 MHz and commence a CAC period. A radar signal was triggered within 0 to 6 seconds after the beginning of the CAC period and transmissions on the channel were monitored on the spectrum analyzer.

The Non-Occupancy list was cleared. A sweep was started on the spectrum analyzer when a software command was issued to the EUT to change to 5510 MHz and commence a CAC period. A radar signal was triggered within 54 to 60 seconds after the beginning of the CAC period and transmissions on the channel were monitored on the spectrum analyzer.

QUANTITATIVE RESULTS BASED UPON SPECTRUM ANALYZER PLOTS

No Radar Triggered

Beginning of CAC (sec)	Timing of Start of Traffic (sec)	CAC Period Time (sec)
0	64.2	64.2

Radar Near Beginning of CAC

Beginning of CAC (sec)	Timing of Radar Burst (sec)	Radar Relative to Start of CAC (sec)
0	0.975	0.975

Radar Near End of CAC

Beginning of CAC (sec)	Timing of Radar Burst (sec)	Radar Relative to Start of CAC (sec)
0	58.41	58.41

QUANTITATIVE RESULTS BASED ON LOG FILE TIME STAMPS

No Radar Triggered

Beginning of CAC (hh:mm:ss)	End of CAC (hh:mm:ss)	CAC Time (hh:mm:ss)
7:29:40	7:30:44	0:01:04

Radar Near Beginning of CAC

Beginning of CAC (hh:mm:ss)	Radar Detected (hh:mm:ss)	Radar Relative to Start of CAC (hh:mm:ss)
7:35:43	7:35:44	0:00:01

Radar Near End of CAC

Beginning of CAC (hh:mm:ss)	Radar Detected (hh:mm:ss)	Radar Relative to Start of CAC (hh:mm:ss)
7:41:51	7:42:49	0:00:58

If a radar signal is detected during the channel availability check then the PC controlling the EUT displays a message stating that radar was detected.

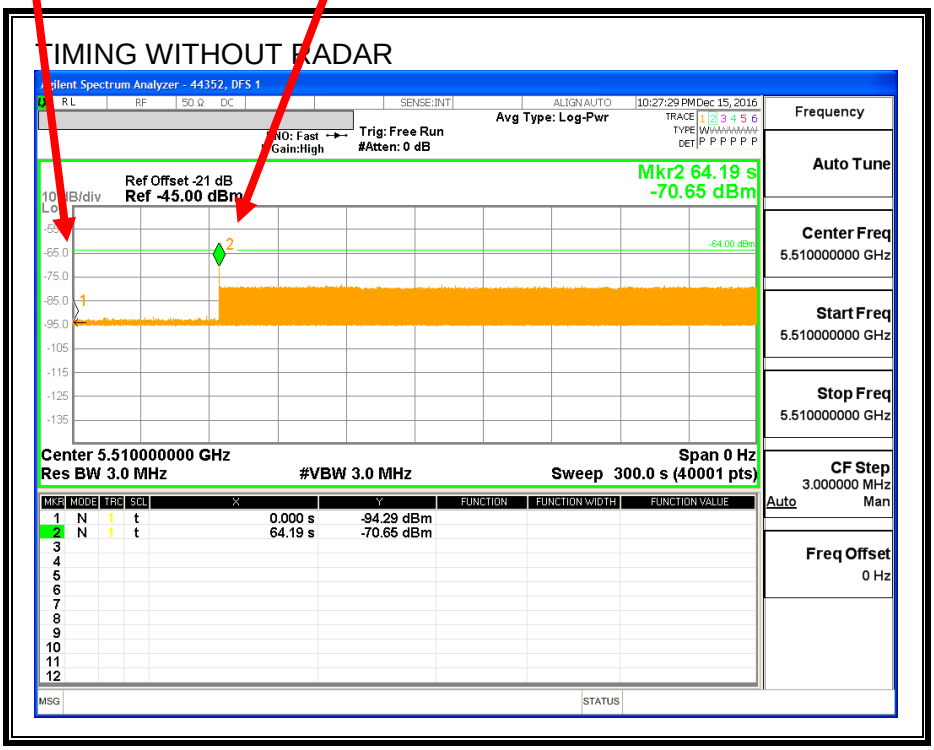
QUALITATIVE RESULTS

Timing of Radar Burst	Display on Control Computer	Spectrum Analyzer Display
No Radar Triggered	EUT marks Channel as active	Transmissions begin on channel after completion of the initial power-up cycle and the CAC
Within 0 to 6 second window	EUT indicates radar detected	No transmissions on channel
Within 54 to 60 second window	EUT indicates radar detected	No transmissions on channel

TIMING WITHOUT RADAR DURING CAC

Command to
Switch Channels
Start of CAC

End of CAC



Transmissions begin on channel after completion of the CAC period.

Log File of CAC Timing Without Radar

Jan 10 07:29:40 2016: DOT11: %%%%>dfs:DFS evt=chan_avail_chk,ch=100,ridx=1,curCh=100,state=dfs_idle,prev_state=dfs_idle (dfs.c:430)

Jan 10 07:29:40 2016: DOT11: dfs:CAC time 60 (dfs.c:690)

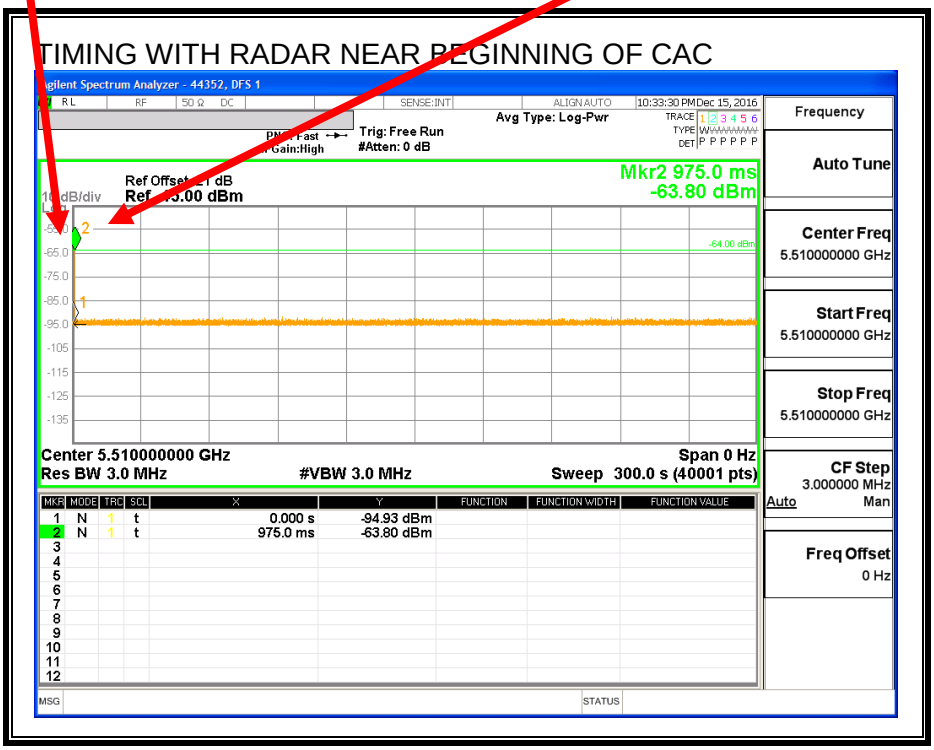
Jan 10 **07:29:40** 2016: ap7622-D19E81 : %RADIO-6-RADAR_SCAN_STARTED: Radar scan on primary channel 100 freq 5500 MHz for a duration 70 secs on radio 'ap7622-D19

Jan 10 **07:30:44** 2016: ap7622-D19E81 : %RADIO-6-RADAR_SCAN_COMPLETED: Radar scan done on primary channel 100 freq 5500 MHz on radio 'ap7622-D19E81:R2'

TIMING WITH RADAR NEAR BEGINNING OF CAC

Command to
Switch Channels
Start of CAC

Radar Signal Applied



No EUT transmissions were observed after the radar signal.

Log File of Radar at the Beginning of CAC

Jan 10 07:35:43 2016: DOT11: %%%%>dfs:DFS evt=chan_avail_chk,ch=100,ridx=1,curCh=100,state=dfs_idle,prev_state=chan_avail_chk (dfs.c:430)

Jan 10 07:35:43 2016: DOT11: dfs:CAC time 60 (dfs.c:690)

Jan 10 **07:35:43** 2016: ap7622-D19E81 : %RADIO-6-RADAR_SCAN_STARTED: Radar scan on primary channel 100 freq 5500 MHz for a duration 70 secs on radio 'ap7622-D19

Jan 10 07:35:44 2016: KERN: WL1: DFS: UNCLASSIFIED ########## radar detected on channel 100l ########## Intv=28560, min_pw=28, AT 900MS.

Jan 10 07:35:44 2016: KERN: wl1: dfs : state PRE-ISM Channel Availability Check, detected radar on channel 102: Activating jump channel: 149.

Jan 10 07:35:44 2016: DOT11: %%%%>dfs:Radar reported on channel 100 Freq 5500 MHz by radio_idx 1 (dfs.c:302)

Jan 10 07:35:44 2016: DOT11: dfs:Chosen Dfs jump channel:153 (dfs.c:1179)

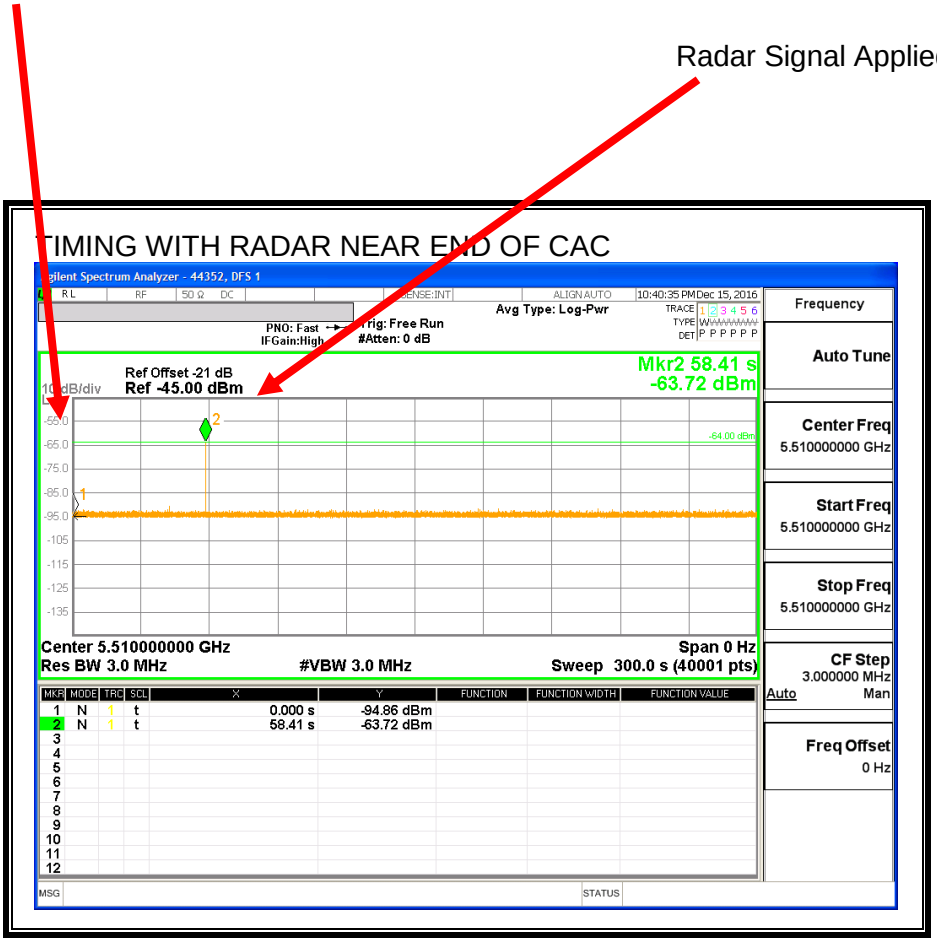
Jan 10 **07:35:44** 2016: ap7622-D19E81 : %RADIO-4-RADAR_DETECTED: Radar found on Radio 2 channel 100 width 40 freq 5500 MHz

Jan 10 07:35:44 2016: ap7622-D19E81 : %RADIO-4-RADAR_DET_INFO: Radar info: Radio: 'ap7622-D19E81:R2'. New channel: 149 freq 5745 MHz. Scan time: 0 secs

TIMING WITH RADAR NEAR END OF CAC

Command to
Switch Channels
Start of CAC

Radar Signal Applied



No EUT transmissions were observed after the radar signal.

Log File of Radar at the End of CAC

Jan 10 07:41:51 2016: DOT11: %%%%>dfs:DFS evt=chan_avail_chk,ch=100,ridx=1,curCh=100,state=dfs_idle,prev_state=dfs_idle (dfs.c:430)
Jan 10 07:41:51 2016: DOT11: dfs:CAC time 60 (dfs.c:690)

Jan 10 **07:41:51** 2016: ap7622-D19E81 : %RADIO-6-RADAR_SCAN_STARTED: Radar scan on primary channel 100 freq 5500 MHz for a duration 70 secs on radio 'ap7622-D19

Jan 10 07:42:49 2016: KERN: WL1: DFS: UNCLASSIFIED ########## radar detected on channel 100l ########## Intv=28560, min_pw=27, AT 54750MS.

Jan 10 07:42:49 2016: KERN: wl1: dfs : state PRE-ISM Channel Availability Check, detected radar on channel 102: Activating jump channel: 149.

Jan 10 07:42:49 2016: DOT11: %%%%>dfs:Radar reported on channel 100 Freq 5500 MHz by radio_idx 1 (dfs.c:302)

Jan 10 07:42:49 2016: DOT11: dfs:Chosen Dfs jump channel:40 (dfs.c:1179)

Jan 10 **07:42:49** 2016: ap7622-D19E81 : %RADIO-4-RADAR_DETECTED: Radar found on Radio 2 channel 100 width 40 freq 5500 MHz

Jan 10 07:42:49 2016: ap7622-D19E81 : %RADIO-4-RADAR_DET_INFO: Radar info: Radio: 'ap7622-D19E81:R2'. New channel: 149 freq 5745 MHz. Scan time: 0 secs

5.3.4. OVERLAPPING CHANNEL TESTS

RESULTS

The channel spacing is not less than the channel bandwidth therefore the EUT does not have an overlapping channel plan.

These tests are not applicable.

5.3.5. MOVE AND CLOSING TIME

REPORTING NOTES

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time =
(Number of analyzer bins showing transmission) * (dwell time per bin)

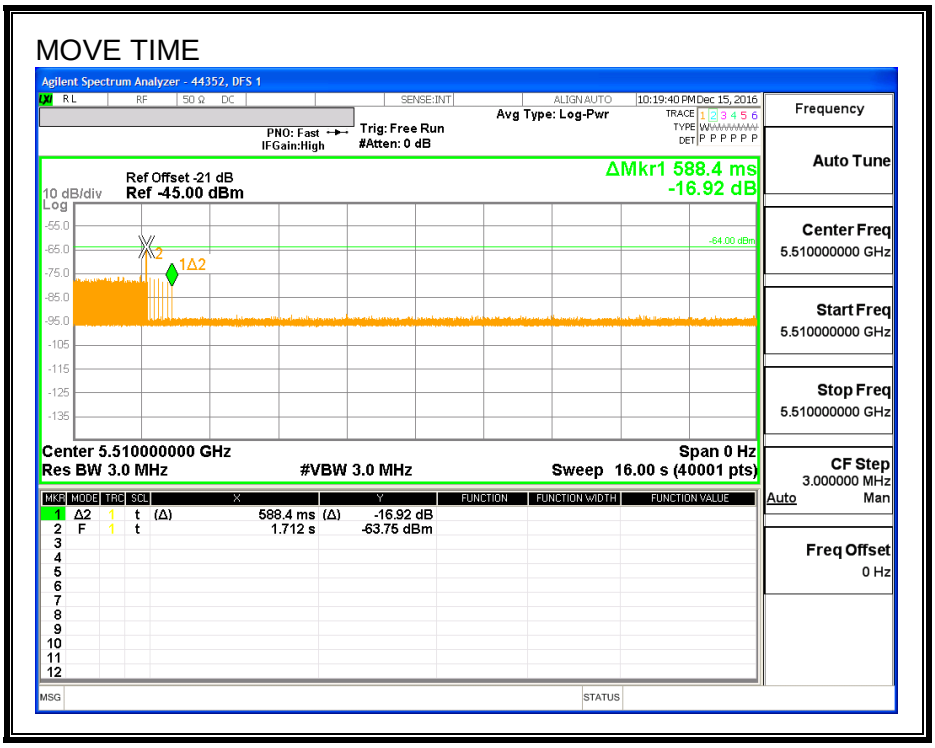
The observation period over which the aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

RESULTS

Channel Move Time (sec)	Limit (sec)
0.588	10

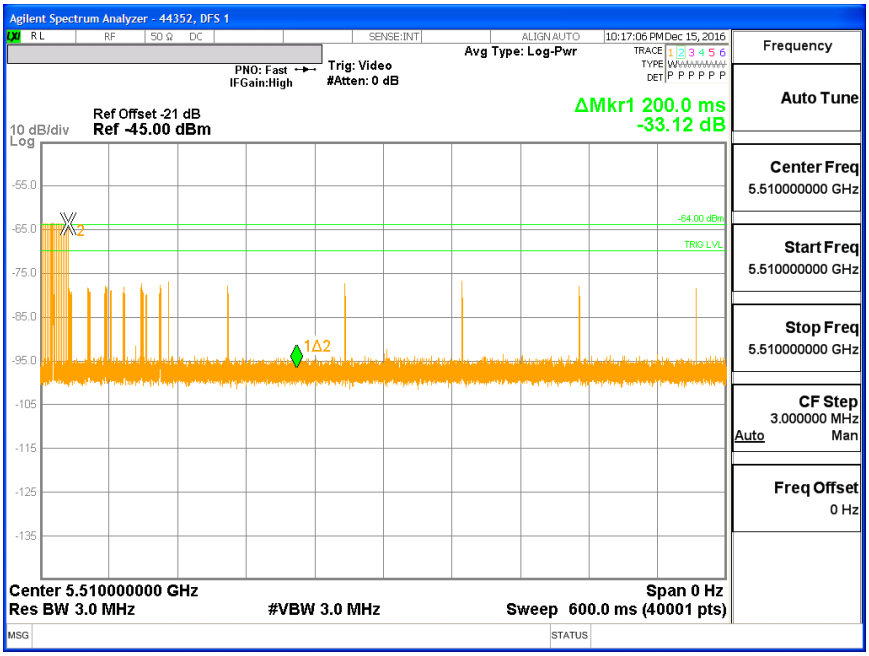
Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
3.2	60

MOVE TIME



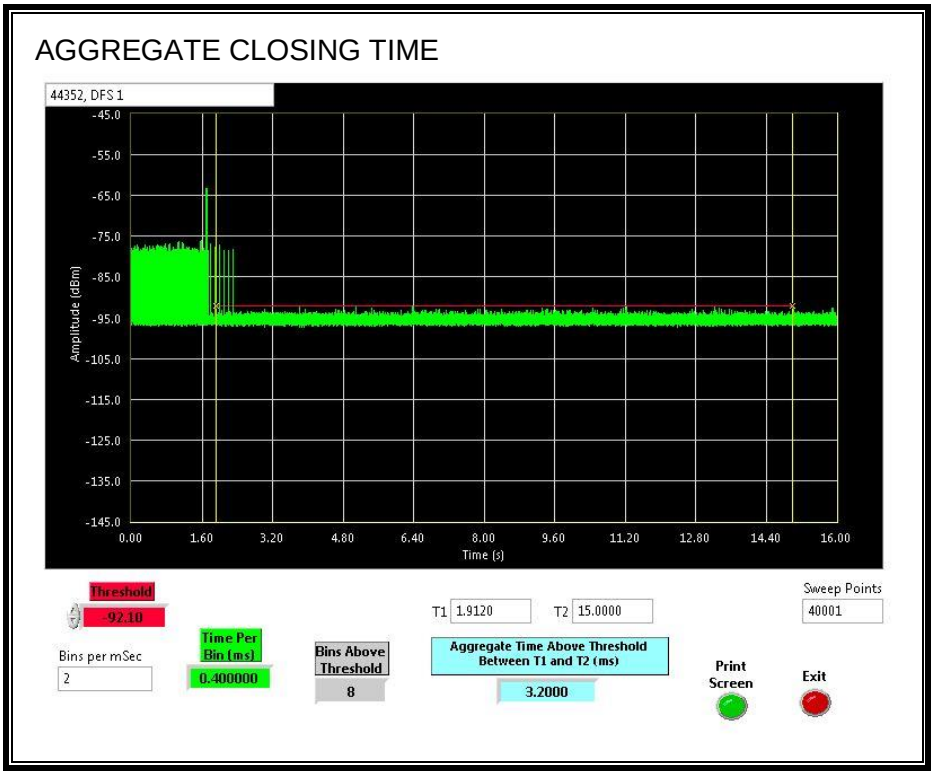
CHANNEL CLOSING TIME

CLOSING TIME



AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

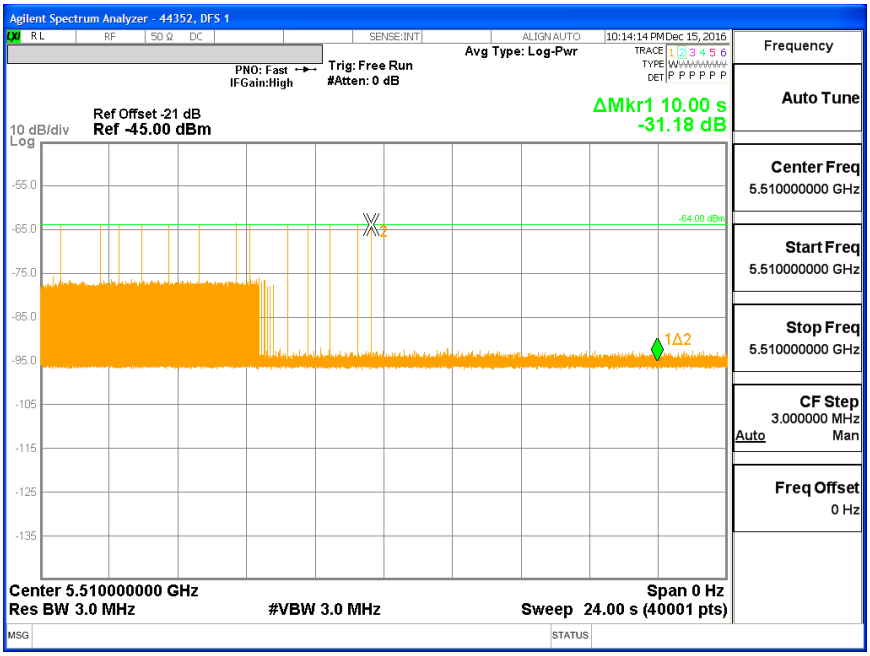
Only intermittent transmissions are observed during the aggregate monitoring period.



LONG PULSE CHANNEL MOVE TIME

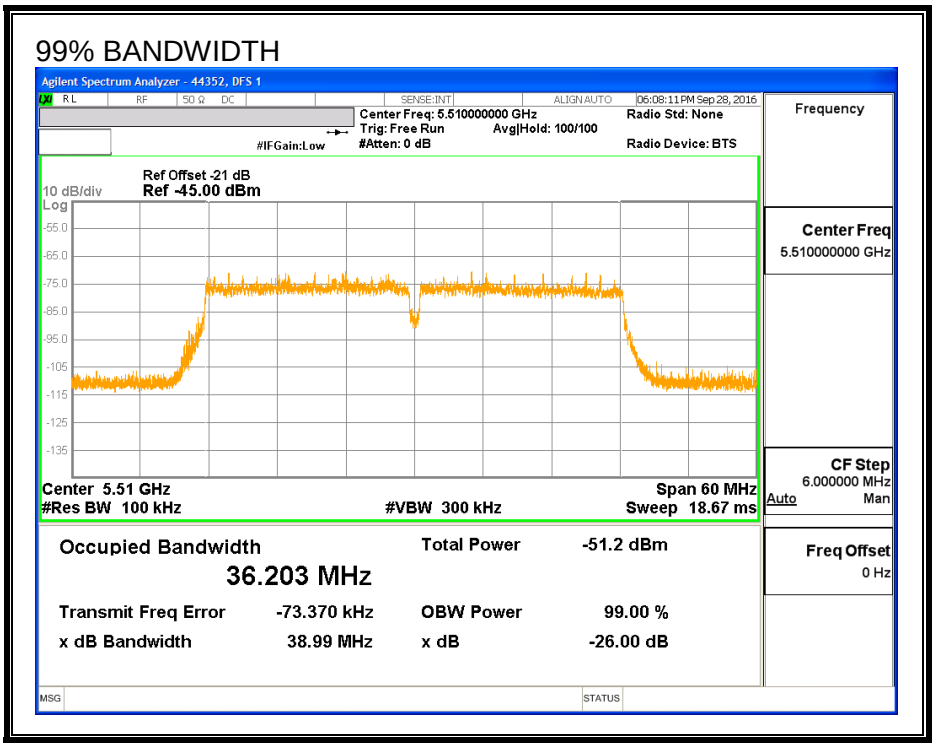
The traffic ceases prior to 10 seconds after the end of the radar waveform.

MOVE TIME FOR LONG PULSE RADAR



5.3.6. DETECTION BANDWIDTH

REFERENCE PLOT OF 99% POWER BANDWIDTH



RESULTS

FL (MHz)	FH (MHz)	Detection Bandwidth (MHz)	99% Power Bandwidth (MHz)	Ratio of Detection BW to 99% Power BW (%)	Minimum Limit (%)
5490	5530	40	36.203	110.5	100

DETECTION BANDWIDTH PROBABILITY

DETECTION BANDWIDTH PROBABILITY RESULTS

Detection Bandwidth Test Results		44352	DFS 1	
FCC Type 0 Waveform: 1 us Pulse Width, 1428 us PRI, 18 Pulses per Burst				
Frequency (MHz)	Number of Trials	Number Detected	Detection (%)	Mark
5489	10	0	0	
5490	10	10	100	FL
5495	10	10	100	
5500	10	10	100	
5505	10	10	100	
5510	10	10	100	
5515	10	10	100	
5520	10	10	100	
5525	10	10	100	
5530	10	10	100	FH
5531	10	0	0	

5.3.7. IN-SERVICE MONITORING

RESULTS

FCC Radar Test Summary

Signal Type	Number of Trials	Detection (%)	Limit (%)	Pass/Fail	Detection Bandwidth FL	Detection Bandwidth FH	80% of Det BW FL5	80% of Det BW FH5	OBW	Test Location	Employee Number	In-Service Monitoring Version
FCC Short Pulse Type 1	30	100.00	60	Pass	5490	5530			36.2	DFS 1	44352	Version 3.0
FCC Short Pulse Type 2	30	100.00	60	Pass	5490	5530			36.2	DFS 1	44352	Version 3.0
FCC Short Pulse Type 3	30	100.00	60	Pass	5490	5530			36.2	DFS 1	44352	Version 3.0
FCC Short Pulse Type 4	30	90.00	60	Pass	5490	5530			36.2	DFS 1	44352	Version 3.0
Aggregate		97.50	80	Pass								
FCC Long Pulse Type 5	30	100.00	80	Pass	5490	5530	5494	5526	36.2	DFS 1	44352	Version 3.0
FCC Hopping Type 6	41	100.00	70	Pass	5490	5530				DFS 1	44352	Version 3.0

TYPE 1 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 1						
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Test (A/B)	Frequency (MHz)	Successful Detection (Yes/No)
1001	1	3066	18	A	5510	Yes
1002	1	638	83	A	5510	Yes
1003	1	618	86	A	5510	Yes
1004	1	598	89	A	5510	Yes
1005	1	878	61	A	5510	Yes
1006	1	518	102	A	5510	Yes
1007	1	558	95	A	5510	Yes
1008	1	658	81	A	5510	Yes
1009	1	938	57	A	5510	Yes
1010	1	738	72	A	5510	Yes
1011	1	538	99	A	5510	Yes
1012	1	678	78	A	5510	Yes
1013	1	898	59	A	5510	Yes
1014	1	698	76	A	5510	Yes
1015	1	798	67	A	5510	Yes
1016	1	1529	35	B	5510	Yes
1017	1	1968	27	B	5510	Yes
1018	1	2730	20	B	5510	Yes
1019	1	1944	28	B	5510	Yes
1020	1	1641	33	B	5510	Yes
1021	1	985	54	B	5510	Yes
1022	1	811	66	B	5510	Yes
1023	1	1638	33	B	5510	Yes
1024	1	2947	18	B	5510	Yes
1025	1	1356	39	B	5510	Yes
1026	1	2794	19	B	5510	Yes
1027	1	2686	20	B	5510	Yes
1028	1	1706	31	B	5510	Yes
1029	1	1726	31	B	5510	Yes
1030	1	876	61	B	5510	Yes

TYPE 2 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 2

Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Frequency (MHz)	Successful Detection (Yes/No)
2001	4.1	151	27	5510	Yes
2002	4.9	202	26	5510	Yes
2003	4.2	209	23	5510	Yes
2004	1.1	226	29	5510	Yes
2005	4.8	194	26	5510	Yes
2006	4.1	178	23	5510	Yes
2007	3.8	150	24	5510	Yes
2008	3.3	219	28	5510	Yes
2009	1.4	157	29	5510	Yes
2010	3.3	192	27	5510	Yes
2011	1.5	215	25	5510	Yes
2012	3.6	173	27	5510	Yes
2013	2.1	162	26	5510	Yes
2014	4.4	205	27	5510	Yes
2015	1.1	199	26	5510	Yes
2016	1.7	165	25	5510	Yes
2017	2.8	206	25	5510	Yes
2018	3.6	219	24	5510	Yes
2019	2.9	183	28	5510	Yes
2020	3.9	201	27	5510	Yes
2021	3.5	169	28	5510	Yes
2022	2.8	152	28	5510	Yes
2023	2.5	205	29	5510	Yes
2024	2	193	26	5510	Yes
2025	4.2	174	27	5510	Yes
2026	2	166	28	5510	Yes
2027	4.3	189	23	5510	Yes
2028	2.3	228	24	5510	Yes
2029	4.9	218	23	5510	Yes
2030	3.1	180	25	5510	Yes

TYPE 3 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 3					
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Frequency (MHz)	Successful Detection (Yes/No)
3001	6.3	324	16	5510	Yes
3002	9.4	470	16	5510	Yes
3003	5.6	345	16	5510	Yes
3004	6.6	386	18	5510	Yes
3005	5.8	275	17	5510	Yes
3006	7	328	17	5510	Yes
3007	6.5	480	17	5510	Yes
3008	5.6	429	17	5510	Yes
3009	8	476	17	5510	Yes
3010	7.4	305	16	5510	Yes
3011	7.4	498	17	5510	Yes
3012	9.7	472	17	5510	Yes
3013	7.6	294	18	5510	Yes
3014	5	414	18	5510	Yes
3015	8.2	382	18	5510	Yes
3016	8.7	264	16	5510	Yes
3017	9.8	496	18	5510	Yes
3018	7.8	390	18	5510	Yes
3019	6.7	266	18	5510	Yes
3020	5	307	17	5510	Yes
3021	9.3	446	16	5510	Yes
3022	5.4	500	17	5510	Yes
3023	7.6	401	16	5510	Yes
3024	9.1	350	17	5510	Yes
3025	6.4	397	16	5510	Yes
3026	5.8	358	18	5510	Yes
3027	8.5	418	16	5510	Yes
3028	8.1	393	16	5510	Yes
3029	5.9	348	17	5510	Yes
3030	8.5	335	17	5510	Yes

TYPE 4 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 4

Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Frequency (MHz)	Successful Detection (Yes/No)
4001	18.6	302	14	5510	No
4002	14.2	436	15	5510	Yes
4003	16.3	416	15	5510	Yes
4004	12.3	444	14	5510	Yes
4005	10.3	438	13	5510	Yes
4006	16.9	478	13	5510	Yes
4007	15.4	367	15	5510	Yes
4008	13	420	13	5510	Yes
4009	12	455	16	5510	Yes
4010	14.9	270	13	5510	Yes
4011	19.8	318	16	5510	Yes
4012	18.5	279	14	5510	Yes
4013	13.7	339	13	5510	Yes
4014	12.9	313	16	5510	Yes
4015	18.8	268	12	5510	Yes
4016	13.8	255	13	5510	Yes
4017	15.5	474	12	5510	Yes
4018	11	356	14	5510	Yes
4019	13.1	337	13	5510	No
4020	19.2	365	12	5510	Yes
4021	17.2	358	15	5510	Yes
4022	19.1	399	14	5510	Yes
4023	12.2	287	14	5510	Yes
4024	19.9	341	16	5510	Yes
4025	18.9	376	14	5510	Yes
4026	11.7	442	12	5510	No
4027	16.6	489	15	5510	Yes
4028	15.3	451	15	5510	Yes
4029	10.5	260	16	5510	Yes
4030	19.8	485	14	5510	Yes

TYPE 5 DETECTION PROBABILITY

Data Sheet for FCC Long Pulse Radar Type 5		
Trial	Frequency (MHz)	Successful Detection (Yes/No)
1	5510	Yes
2	5510	Yes
3	5510	Yes
4	5510	Yes
5	5510	Yes
6	5510	Yes
7	5510	Yes
8	5510	Yes
9	5510	Yes
10	5510	Yes
11	5500	Yes
12	5496	Yes
13	5500	Yes
14	5498	Yes
15	5500	Yes
16	5498	Yes
17	5494	Yes
18	5498	Yes
19	5499	Yes
20	5496	Yes
21	5520	Yes
22	5521	Yes
23	5524	Yes
24	5526	Yes
25	5524	Yes
26	5525	Yes
27	5520	Yes
28	5524	Yes
29	5522	Yes
30	5522	Yes

Note: The Type 5 randomized parameters tested are shown in a separate document.

TYPE 6 DETECTION PROBABILITY

Data Sheet for FCC Hopping Radar Type 6
1 us Pulse Width, 333 us PRI, 9 Pulses per Burst, 1 Burst per Hop
NTIA August 2005 Hopping Sequence

Trial	Starting Index Within Sequence	Signal Generator Frequency (MHz)	Hops within Detection BW	Successful Detection (Yes/No)
1	313	5490	7	Yes
2	788	5491	4	Yes
3	1263	5492	10	Yes
4	1738	5493	7	Yes
5	2213	5494	9	Yes
6	2688	5495	7	Yes
7	3163	5496	8	Yes
8	3638	5497	7	Yes
9	4113	5498	8	Yes
10	4588	5499	2	Yes
11	5063	5500	5	Yes
12	5538	5501	8	Yes
13	6013	5502	7	Yes
14	6488	5503	8	Yes
15	6963	5504	11	Yes
16	7438	5505	9	Yes
17	7913	5506	5	Yes
18	8388	5507	7	Yes
19	8863	5508	11	Yes
20	9338	5509	11	Yes
21	9813	5510	10	Yes
22	10288	5511	9	Yes
23	10763	5512	8	Yes
24	11238	5513	12	Yes
25	11713	5514	5	Yes
26	12188	5515	10	Yes
27	12663	5516	13	Yes
28	13138	5517	7	Yes
29	13613	5518	6	Yes
30	14088	5519	10	Yes
31	14563	5520	7	Yes
32	15038	5521	10	Yes
33	15513	5522	9	Yes
34	15988	5523	8	Yes
35	16463	5524	10	Yes
36	16938	5525	5	Yes
37	17413	5526	8	Yes
38	17888	5527	8	Yes
39	18363	5528	6	Yes
40	18838	5529	8	Yes
41	19313	5530	10	Yes

5.4. RESULTS FOR 80 MHz BANDWIDTH

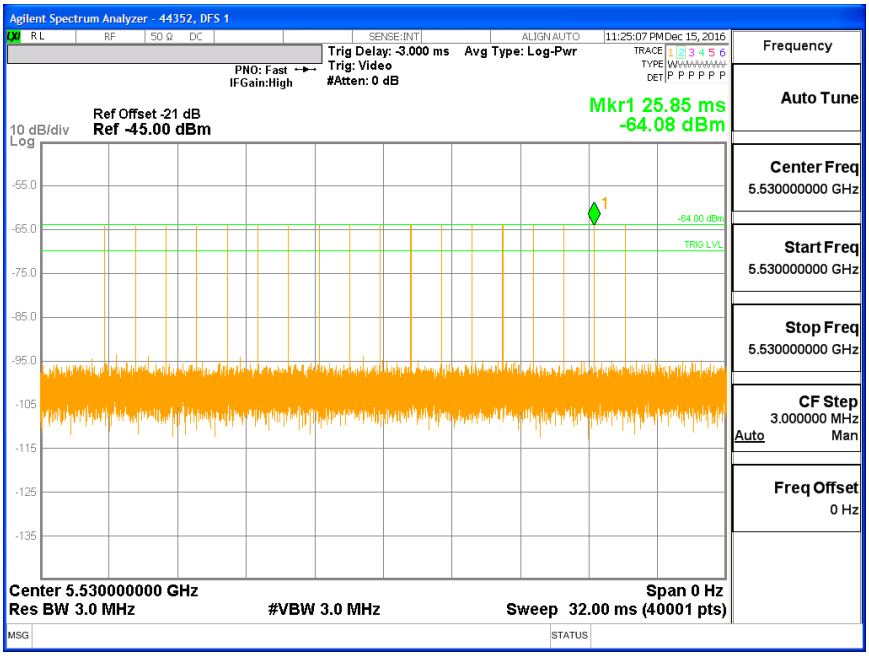
5.4.1. TEST CHANNEL

All tests were performed at a channel center frequency of 5530 MHz.

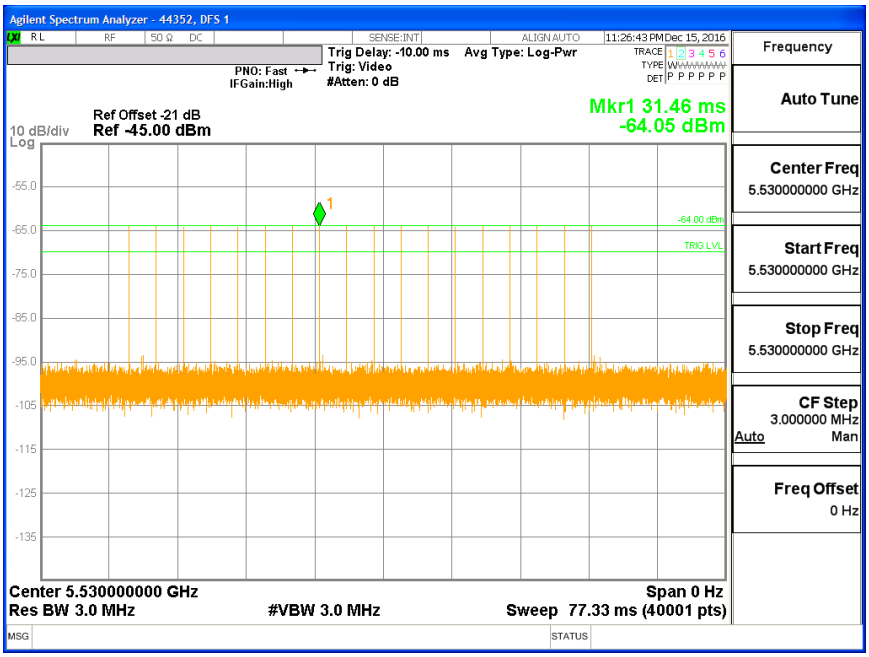
5.4.2. RADAR WAVEFORMS AND TRAFFIC

RADAR WAVEFORMS

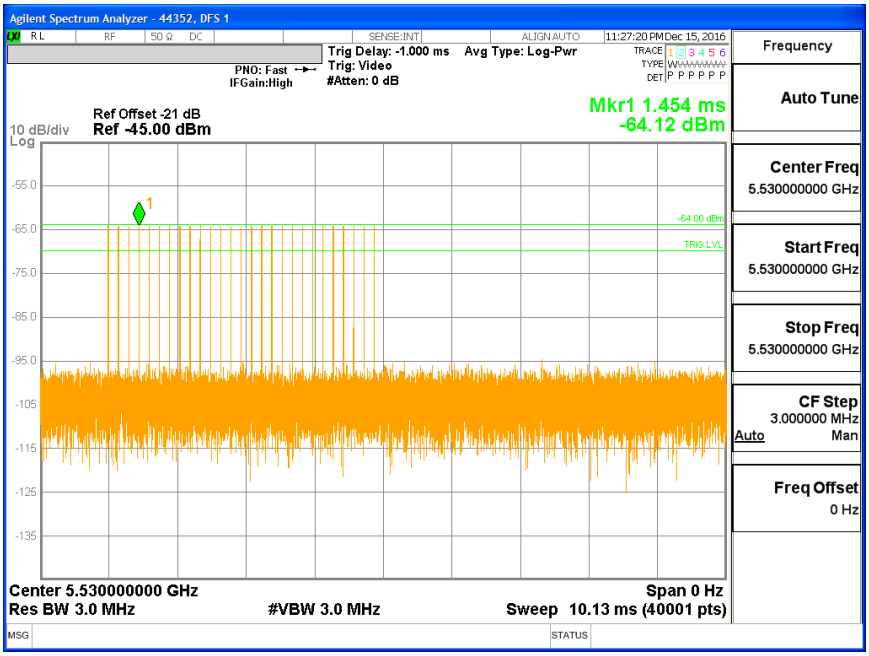
SHORT PULSE RADAR TYPE 0



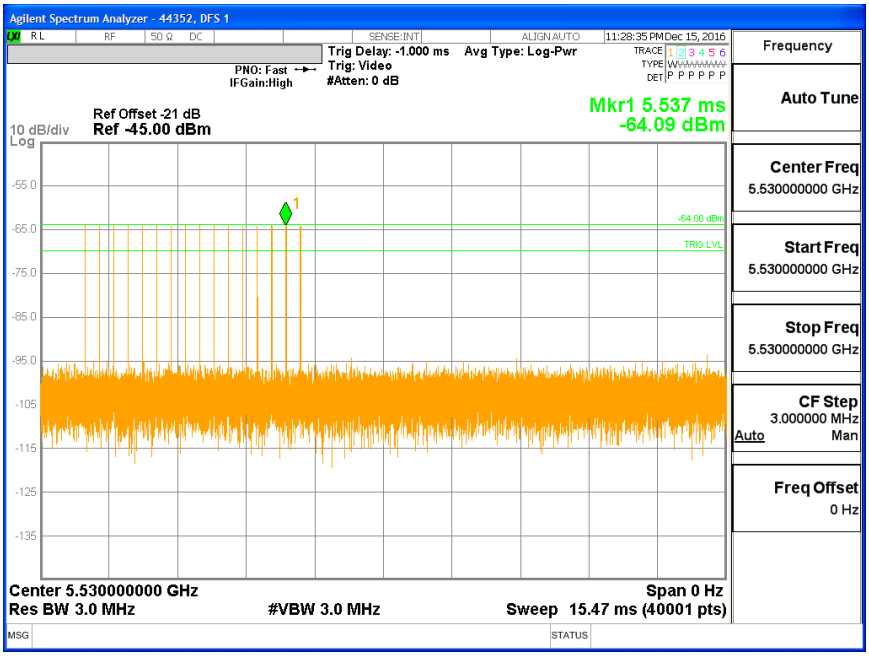
SAMPLE OF RADAR TYPE 1



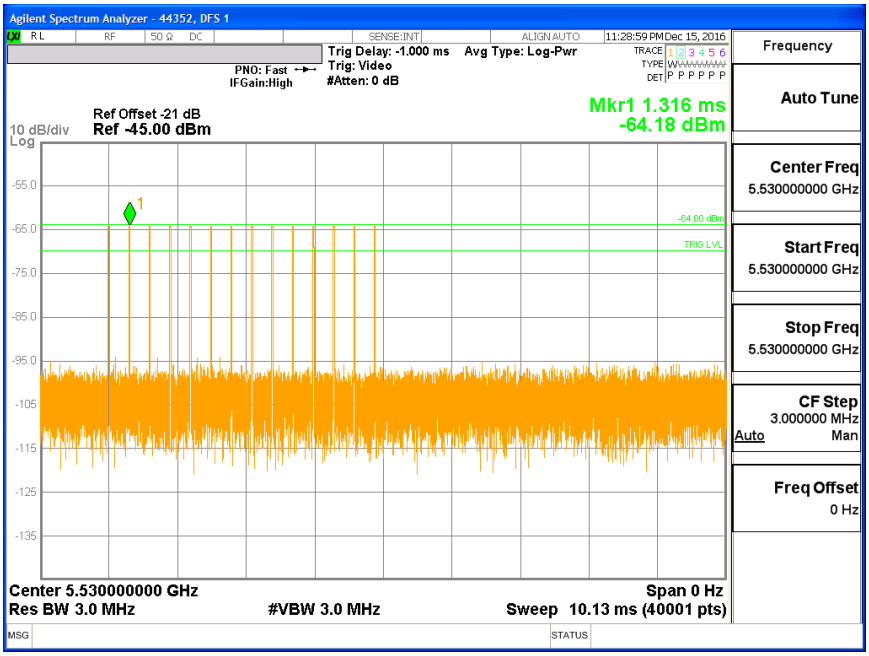
SAMPLE OF RADAR TYPE 2



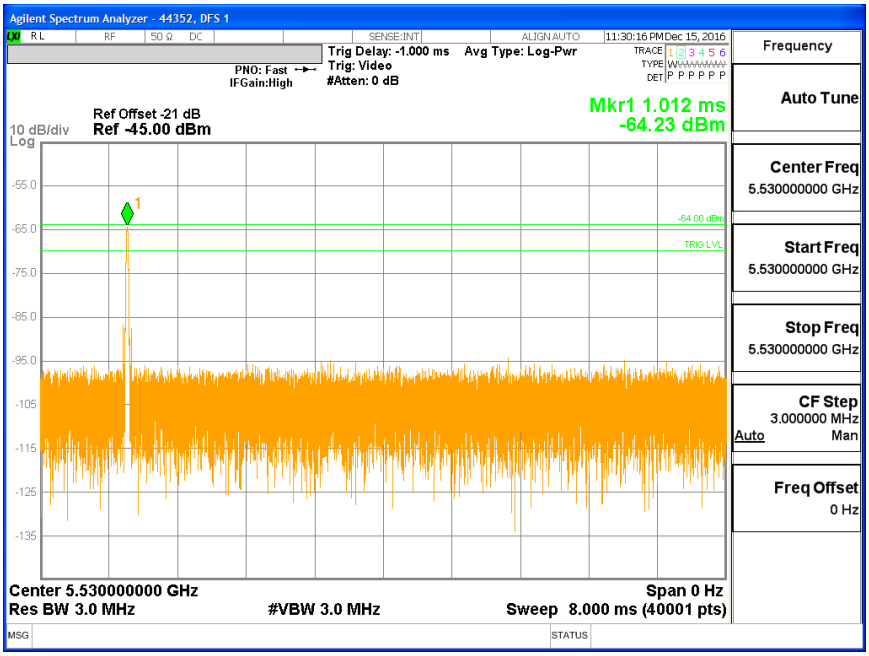
SAMPLE OF RADAR TYPE 3



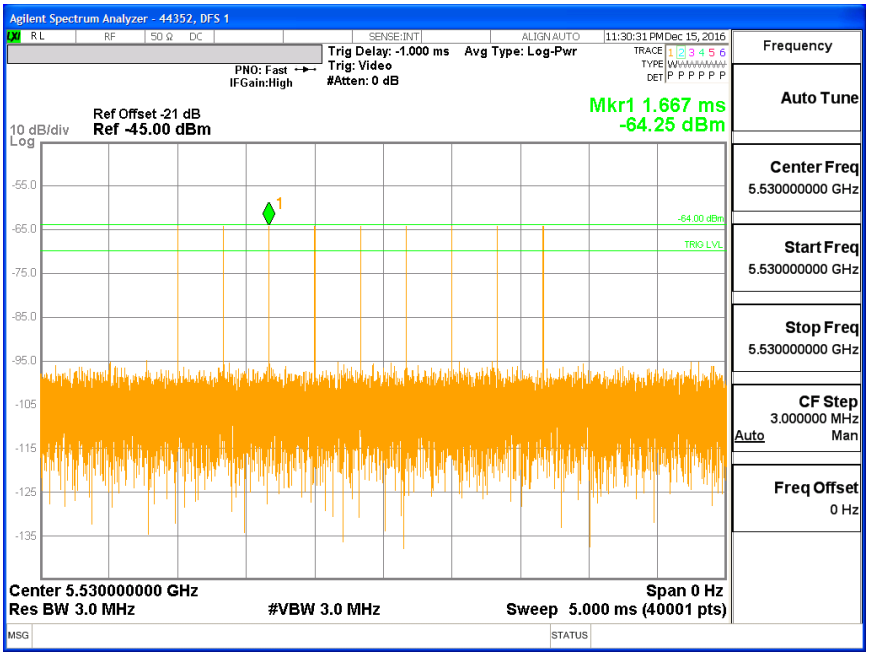
SAMPLE OF RADAR TYPE 4



SAMPLE OF SINGLE BURST OF RADAR TYPE 5

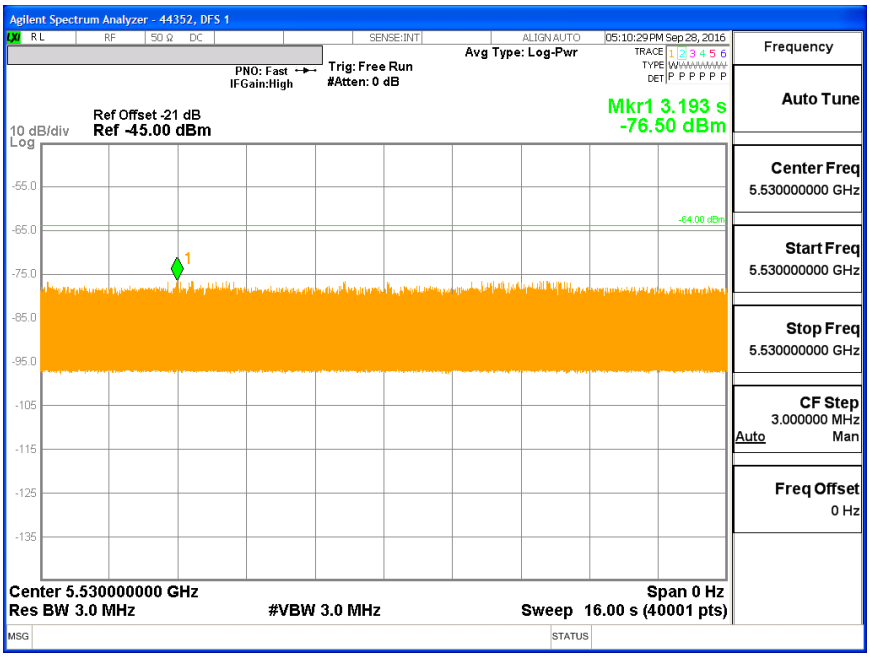


SINGLE BURST OF RADAR TYPE 6

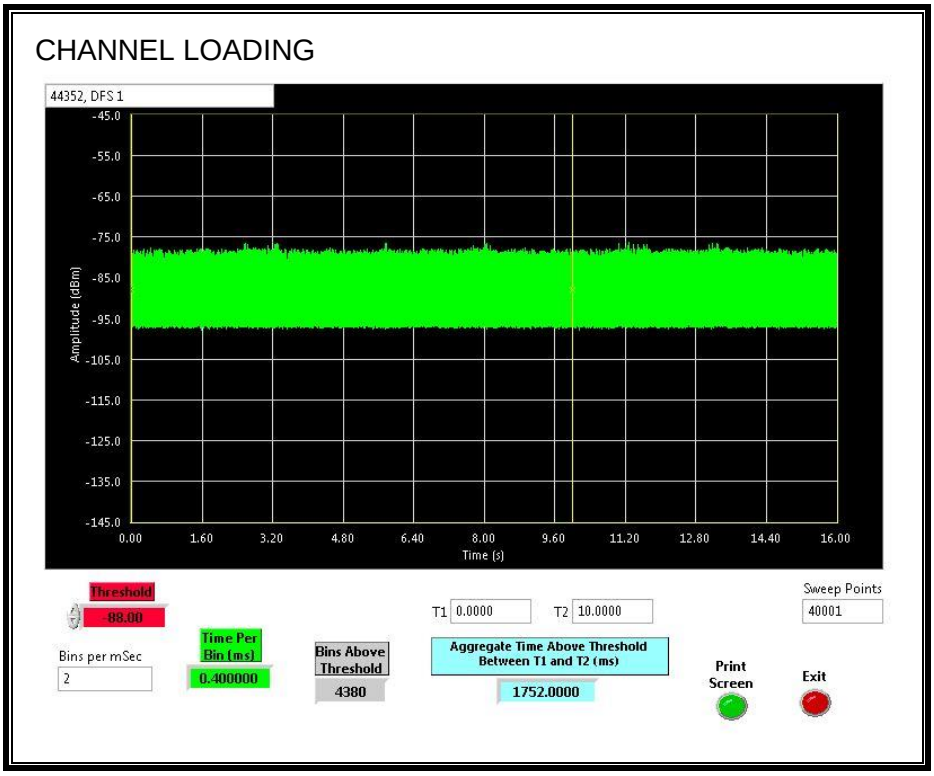


TRAFFIC

TRAFFIC



CHANNEL LOADING



The level of traffic loading on the channel by the EUT is 17.52%

5.4.3. CHANNEL AVAILABILITY CHECK TIME

PROCEDURE TO DETERMINE INITIAL POWER-UP CYCLE TIME

A sweep was started on the spectrum analyzer when a software command was issued to the EUT to change to 5530 MHz and commence a CAC period. The time to the re-initialization of traffic was measured as the time required for the EUT to complete the CAC period.

PROCEDURE FOR TIMING OF RADAR BURST

A sweep was started on the spectrum analyzer when a software command was issued to the EUT to change to 5530 MHz and commence a CAC period. A radar signal was triggered within 0 to 6 seconds after the beginning of the CAC period and transmissions on the channel were monitored on the spectrum analyzer.

The Non-Occupancy list was cleared. A sweep was started on the spectrum analyzer when a software command was issued to the EUT to change to 5530 MHz and commence a CAC period. A radar signal was triggered within 54 to 60 seconds after the beginning of the CAC period and transmissions on the channel were monitored on the spectrum analyzer.

QUANTITATIVE RESULTS BASED UPON SPECTRUM ANALYZER PLOTS

No Radar Triggered

Beginning of CAC (sec)	Timing of Start of Traffic (sec)	CAC Period Time (sec)
0	64.0	64.0

Radar Near Beginning of CAC

Beginning of CAC (sec)	Timing of Radar Burst (sec)	Radar Relative to Start of CAC (sec)
0	0.908	0.908

Radar Near End of CAC

Beginning of CAC (sec)	Timing of Radar Burst (sec)	Radar Relative to Start of CAC (sec)
0	58.40	58.40

QUANTITATIVE RESULTS BASED ON LOG FILE TIME STAMPS

No Radar Triggered

Beginning of CAC (hh:mm:ss)	End of CAC (hh:mm:ss)	CAC Time (hh:mm:ss)
7:51:01	7:52:05	0:01:04

Radar Near Beginning of CAC

Beginning of CAC (hh:mm:ss)	Radar Detected (hh:mm:ss)	Radar Relative to Start of CAC (hh:mm:ss)
7:57:15	7:57:16	0:00:01

Radar Near End of CAC

Beginning of CAC (hh:mm:ss)	Radar Detected (hh:mm:ss)	Radar Relative to Start of CAC (hh:mm:ss)
8:03:25	8:04:23	0:00:58

If a radar signal is detected during the channel availability check then the PC controlling the EUT displays a message stating that radar was detected.

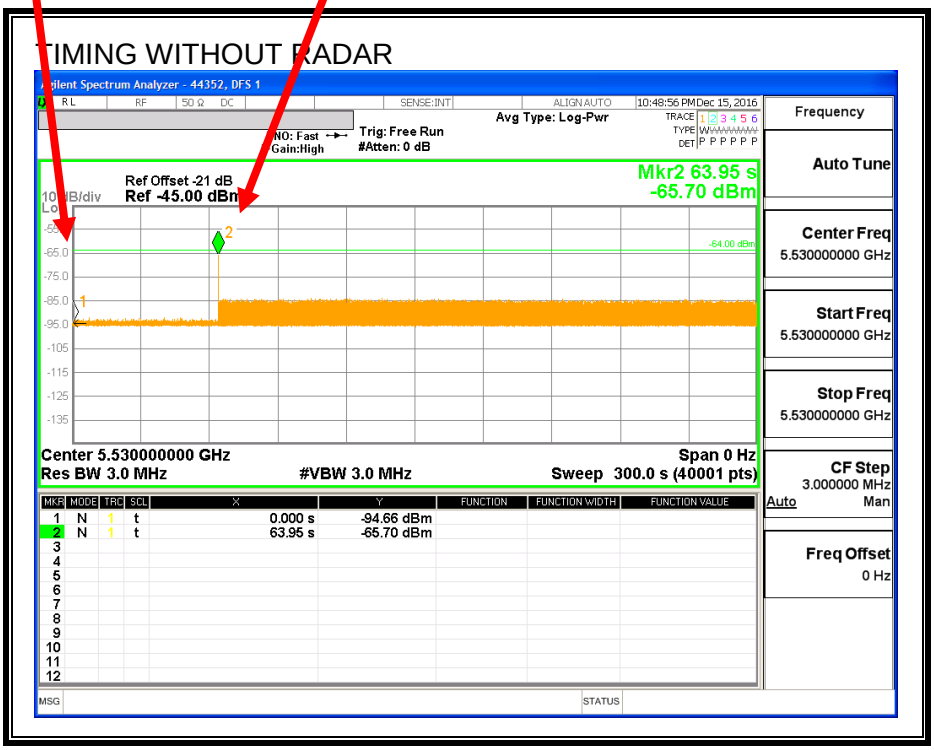
QUALITATIVE RESULTS

Timing of Radar Burst	Display on Control Computer	Spectrum Analyzer Display
No Radar Triggered	EUT marks Channel as active	Transmissions begin on channel after completion of the initial power-up cycle and the CAC
Within 0 to 6 second window	EUT indicates radar detected	No transmissions on channel
Within 54 to 60 second window	EUT indicates radar detected	No transmissions on channel

TIMING WITHOUT RADAR DURING CAC

Command to
Switch Channels
Start of CAC

End of CAC



Transmissions begin on channel after completion of the CAC period.

Log File of CAC Timing Without Radar

Jan 10 07:51:01 2016: DOT11: %%%%>dfs:DFS evt=chan_avail_chk,ch=100,ridx=1,curCh=100,state=dfs_idle,prev_state=chan_avail_chk (dfs.c:430)

Jan 10 07:51:01 2016: DOT11: dfs:CAC time 60 (dfs.c:687)

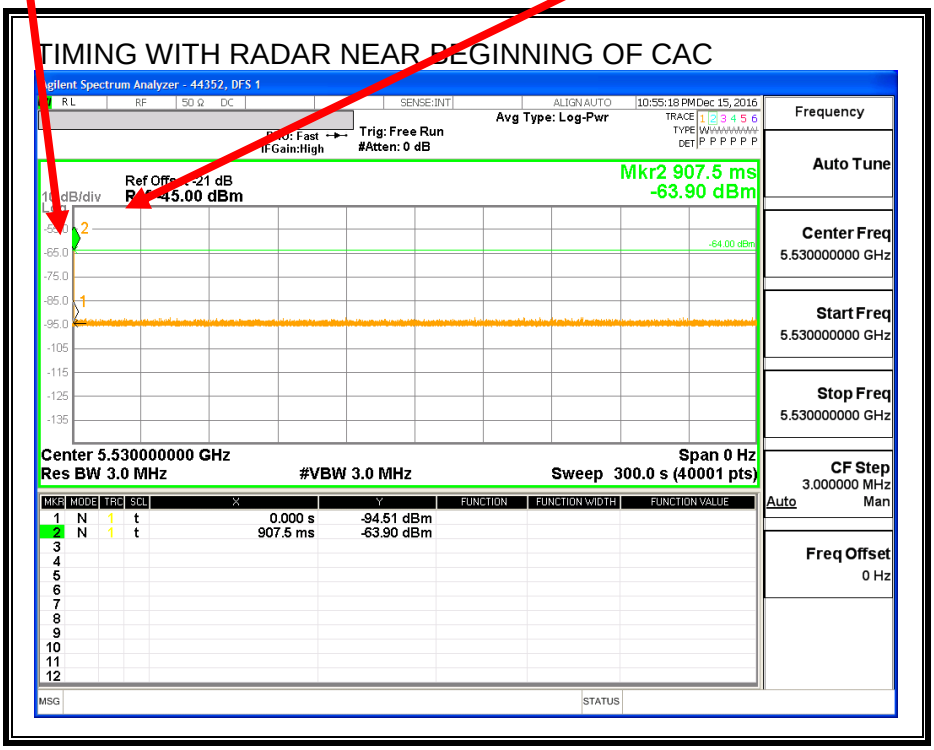
Jan 10 **07:51:01** 2016: ap7622-D19E81 : %RADIO-6-RADAR_SCAN_STARTED: Radar scan on primary channel 100 freq 5500 MHz for a duration 70 secs on radio 'ap7622-D19

Jan 10 **07:52:05** 2016: ap7622-D19E81 : %RADIO-6-RADAR_SCAN_COMPLETED: Radar scan done on primary channel 100 freq 5500 MHz on radio 'ap7622-D19E81:R2'

TIMING WITH RADAR NEAR BEGINNING OF CAC

Command to
Switch Channels
Start of CAC

Radar Signal Applied



No EUT transmissions were observed after the radar signal.

Log File of Radar at the Beginning of CAC

Jan 10 07:57:15 2016: DOT11: %%%%>dfs:DFS evt=chan_avail_chk,ch=100,ridx=1,curCh=100,state=dfs_idle,prev_state=chan_avail_chk (dfs.c:430)

Jan 10 07:57:15 2016: DOT11: dfs:CAC time 60 (dfs.c:687)

Jan 10 **07:57:15** 2016: ap7622-D19E81 : %RADIO-6-RADAR_SCAN_STARTED: Radar scan on primary channel 100 freq 5500 MHz for a duration 70 secs on radio 'ap7622-D19

Jan 10 07:57:16 2016: KERN: WL1: DFS: UNCLASSIFIED ########## radar detected on channel 100/80 ########## Intv=28560, min_pw=27, AT 900MS.

Jan 10 07:57:16 2016: KERN: wl1: dfs : state PRE-ISM Channel Availability Check, detected radar on channel 106: Activating jump channel: 157.

Jan 10 07:57:16 2016: DOT11: %%%%>dfs:Radar reported on channel 100 Freq 5500 MHz by radio_idx 1 (dfs.c:302)

Jan 10 07:57:16 2016: DOT11: dfs:Chosen Dfs jump channel:40 (dfs.c:1179)

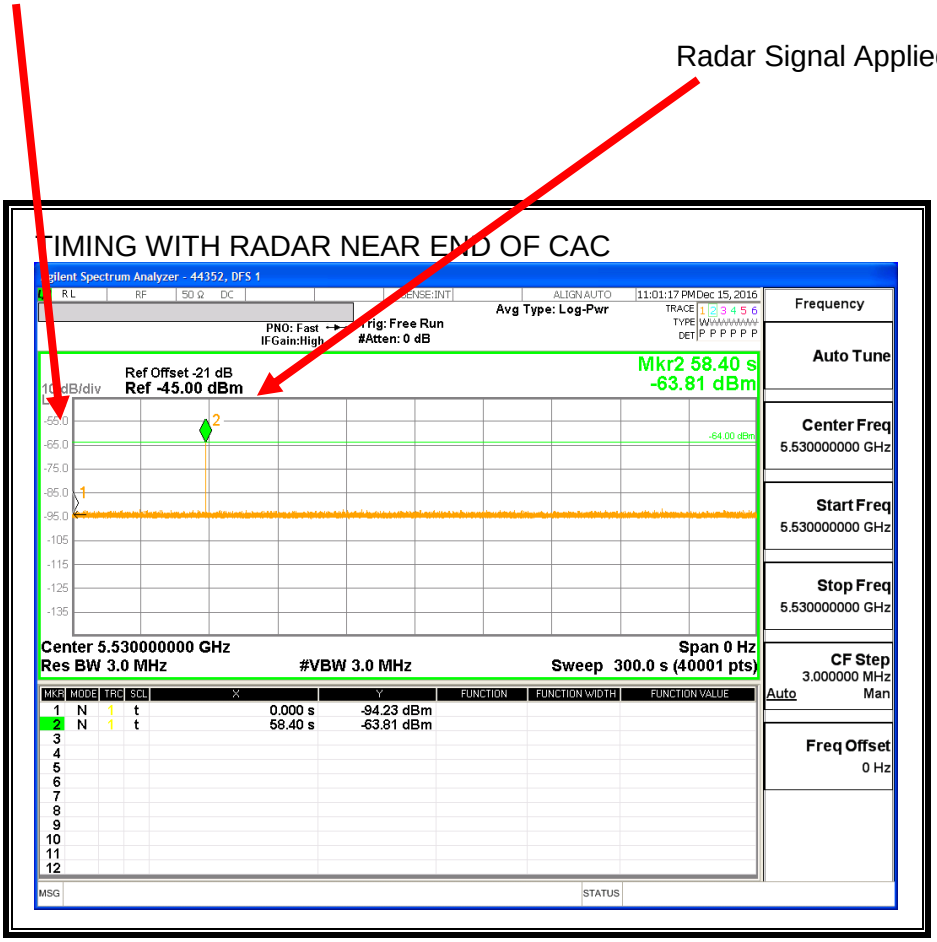
Jan 10 **07:57:16** 2016: ap7622-D19E81 : %RADIO-4-RADAR_DETECTED: Radar found on Radio 2 channel 100 width 80 freq 5500 MHz

Jan 10 07:57:16 2016: ap7622-D19E81 : %RADIO-4-RADAR_DET_INFO: Radar info: Radio: 'ap7622-D19E81:R2'. New channel: 157 freq 5785 MHz. Scan time: 0 secs

TIMING WITH RADAR NEAR END OF CAC

Command to
Switch Channels
Start of CAC

Radar Signal Applied



No EUT transmissions were observed after the radar signal.

Log File of Radar at the End of CAC

Jan 10 08:03:25 2016: DOT11: %%%%>dfs:DFS evt=chan_avail_chk,ch=100,ridx=1,curCh=100,state=dfs_idle,prev_state=dfs_idle (dfs.c:430)

Jan 10 08:03:25 2016: DOT11: dfs:CAC time 60 (dfs.c:687)

Jan 10 **08:03:25** 2016: ap7622-D19E81 : %RADIO-6-RADAR_SCAN_STARTED: Radar scan on primary channel 100 freq 5500 MHz for a duration 70 secs on radio 'ap7622-D19

Jan 10 08:04:23 2016: KERN: WL1: DFS: UNCLASSIFIED ########## radar detected on channel 100/80 ########## Intv=28560, min_pw=28, AT 54750MS.

Jan 10 08:04:23 2016: KERN: wl1: dfs : state PRE-ISM Channel Availability Check, detected radar on channel 106: Activating jump channel: 36.

Jan 10 08:04:23 2016: DOT11: %%%%>dfs:Radar reported on channel 100 Freq 5500 MHz by radio_idx 1 (dfs.c:302)

Jan 10 08:04:23 2016: DOT11: dfs:Chosen Dfs jump channel:48 (dfs.c:1179)

Jan 10 **08:04:23** 2016: ap7622-D19E81 : %RADIO-4-RADAR_DETECTED: Radar found on Radio 2 channel 100 width 80 freq 5500 MHz

Jan 10 08:04:23 2016: ap7622-D19E81 : %RADIO-4-RADAR_DET_INFO: Radar info: Radio: 'ap7622-D19E81:R2'. New channel: 36 freq 5180 MHz. Scan time: 0 secs

5.4.4. OVERLAPPING CHANNEL TESTS

RESULTS

The channel spacing is not less than the channel bandwidth therefore the EUT does not have an overlapping channel plan.

These tests are not applicable.

5.4.5. MOVE AND CLOSING TIME

REPORTING NOTES

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time =
(Number of analyzer bins showing transmission) * (dwell time per bin)

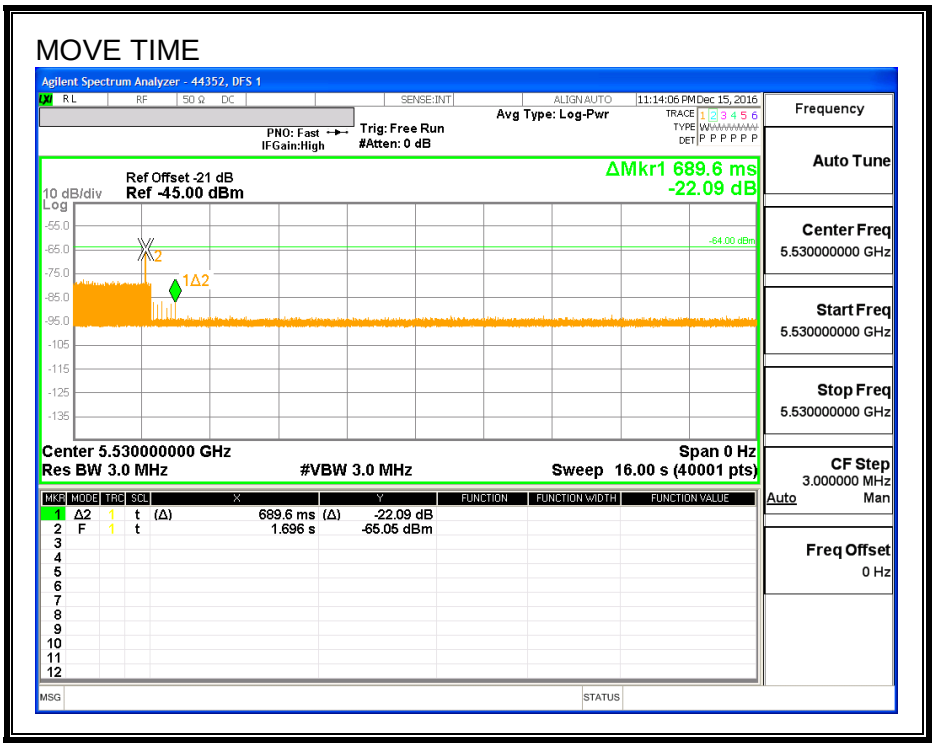
The observation period over which the aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

RESULTS

Channel Move Time (sec)	Limit (sec)
0.690	10

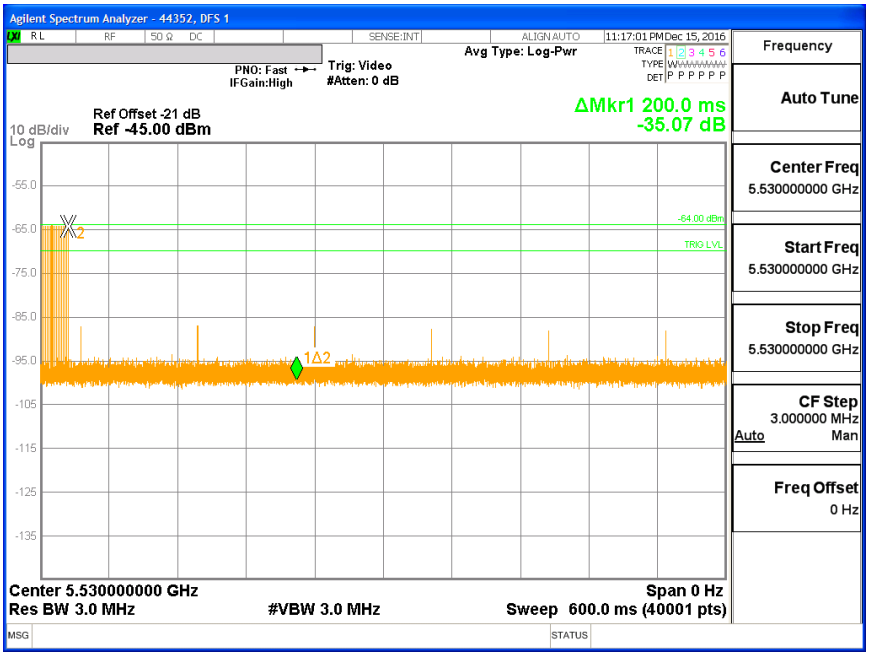
Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
2.0	60

MOVE TIME



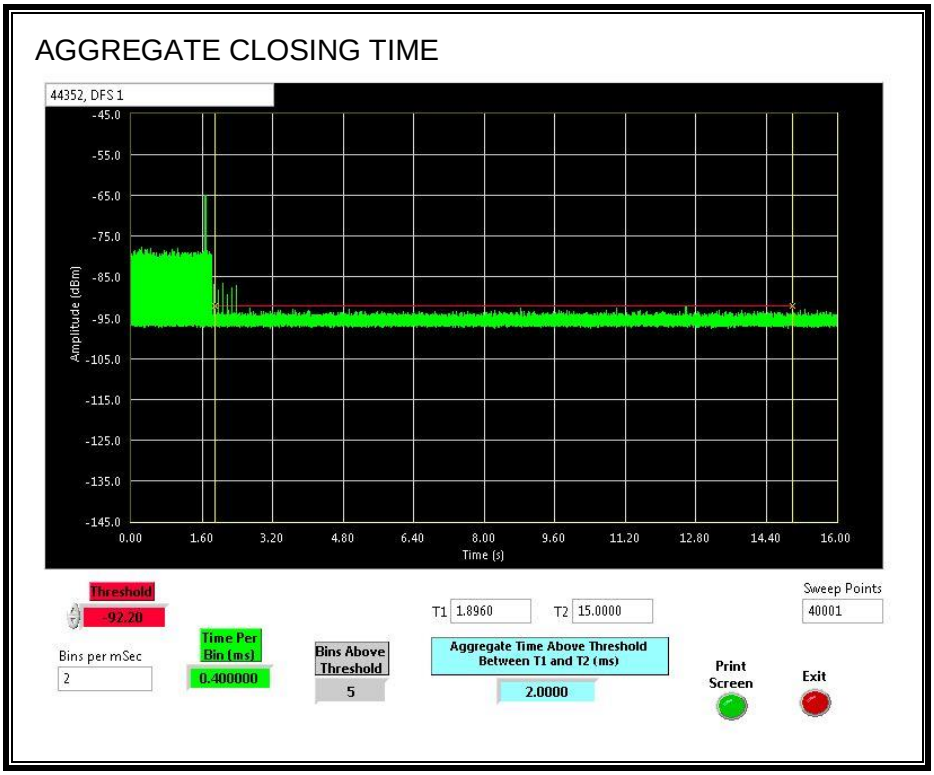
CHANNEL CLOSING TIME

CLOSING TIME



AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

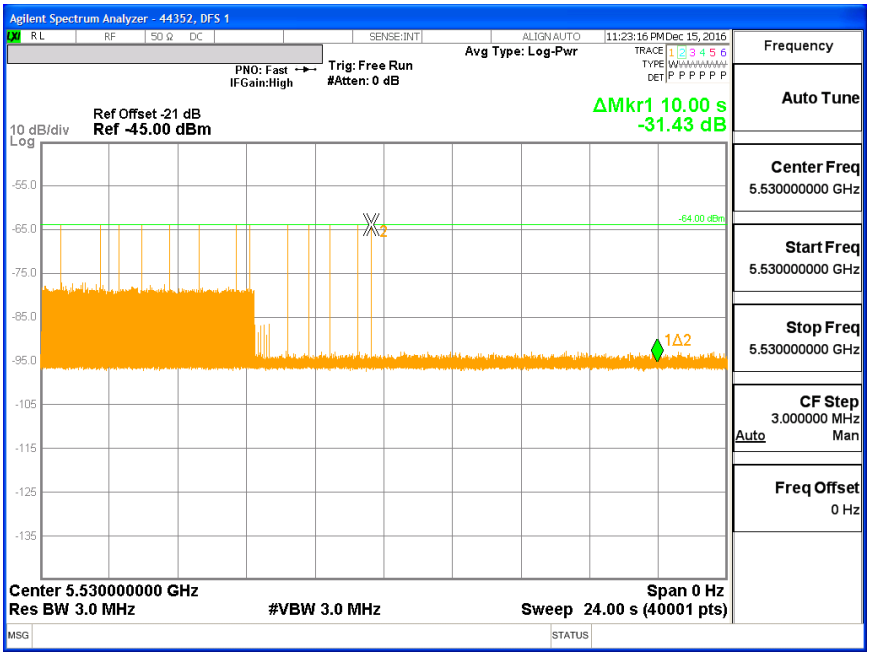
No transmissions are observed during the aggregate monitoring period.



LONG PULSE CHANNEL MOVE TIME

The traffic ceases prior to 10 seconds after the end of the radar waveform.

MOVE TIME FOR LONG PULSE RADAR

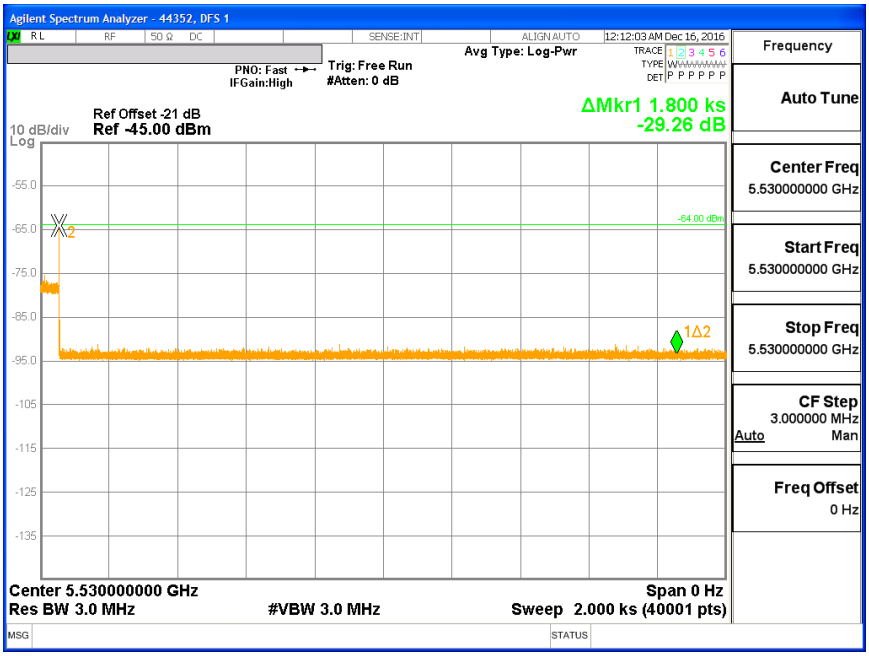


5.4.6. NON-OCCUPANCY PERIOD

RESULTS

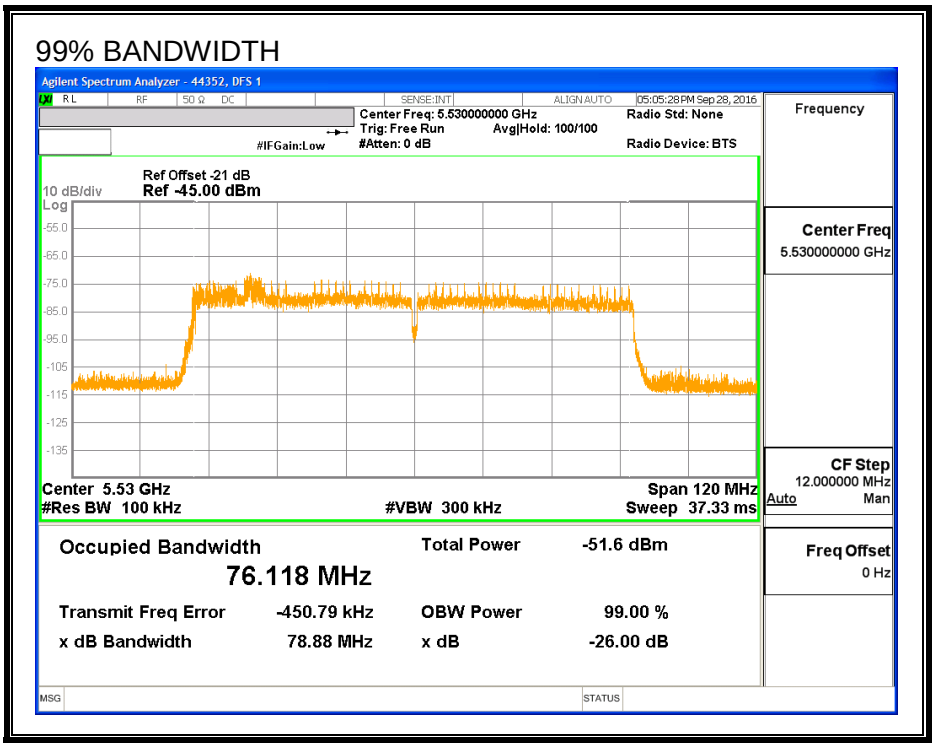
No EUT transmissions were observed on the test channel during the 30-minute observation time.

NON-OCCUPANCY PERIOD



5.4.7. DETECTION BANDWIDTH

REFERENCE PLOT OF 99% POWER BANDWIDTH



RESULTS

FL (MHz)	FH (MHz)	Detection Bandwidth (MHz)	99% Power Bandwidth (MHz)	Ratio of Detection BW to 99% Power BW (%)	Minimum Limit (%)
5491	5570	79	76.118	103.8	100

DETECTION BANDWIDTH PROBABILITY

DETECTION BANDWIDTH PROBABILITY RESULTS

Detection Bandwidth Test Results		44352	DFS 1	
FCC Type 0 Waveform: 1 us Pulse Width, 1428 us PRI, 18 Pulses per Burst				
Frequency (MHz)	Number of Trials	Number Detected	Detection (%)	Mark
5490	10	0	0	
5491	10	9	90	FL
5492	10	10	100	
5493	10	10	100	
5494	10	10	100	
5495	10	10	100	
5500	10	10	100	
5505	10	10	100	
5510	10	10	100	
5515	10	10	100	
5520	10	10	100	
5525	10	10	100	
5530	10	10	100	
5535	10	10	100	
5540	10	10	100	
5545	10	10	100	
5550	10	10	100	
5555	10	10	100	
5560	10	10	100	
5565	10	10	100	
5566	10	10	100	
5567	10	10	100	
5568	10	10	100	
5569	10	9	90	
5570	10	10	100	FH
5571	10	0	0	

5.4.8. IN-SERVICE MONITORING

RESULTS

FCC Radar Test Summary

Signal Type	Number of Trials	Detection (%)	Limit (%)	Pass/Fail	Detection Bandwidth FL	Detection Bandwidth FH	80% of Det BW FL5	80% of Det BW FH5	OBW	Test Location	Employee Number	In-Service Monitoring Version
FCC Short Pulse Type 1	30	93.33	60	Pass	5491	5570			76.12	DFS 1	44352	Version 3.0
FCC Short Pulse Type 2	30	100.00	60	Pass	5491	5570			76.12	DFS 1	44352	Version 3.0
FCC Short Pulse Type 3	30	100.00	60	Pass	5491	5570			76.12	DFS 1	44352	Version 3.0
FCC Short Pulse Type 4	30	96.67	60	Pass	5491	5570			76.12	DFS 1	44352	Version 3.0
Aggregate		97.50	80	Pass								
FCC Long Pulse Type 5	30	100.00	80	Pass	5491	5570	5499	5562	76.12	DFS 1	44352	Version 3.0
FCC Hopping Type 6	80	100.00	70	Pass	5491	5570				DFS 1	44352	Version 3.0

TYPE 1 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 1						
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Test (A/B)	Frequency (MHz)	Successful Detection (Yes/No)
1001	1	3066	18	A	5530	No
1002	1	638	83	A	5530	Yes
1003	1	618	86	A	5530	Yes
1004	1	598	89	A	5530	Yes
1005	1	878	61	A	5530	Yes
1006	1	518	102	A	5530	Yes
1007	1	558	95	A	5530	Yes
1008	1	658	81	A	5530	Yes
1009	1	938	57	A	5530	Yes
1010	1	738	72	A	5530	Yes
1011	1	538	99	A	5530	Yes
1012	1	678	78	A	5530	Yes
1013	1	898	59	A	5530	Yes
1014	1	698	76	A	5530	Yes
1015	1	798	67	A	5530	Yes
1016	1	1529	35	B	5530	Yes
1017	1	1968	27	B	5530	Yes
1018	1	2730	20	B	5530	Yes
1019	1	1944	28	B	5530	Yes
1020	1	1641	33	B	5530	Yes
1021	1	985	54	B	5530	No
1022	1	811	66	B	5530	Yes
1023	1	1638	33	B	5530	Yes
1024	1	2947	18	B	5530	Yes
1025	1	1356	39	B	5530	Yes
1026	1	2794	19	B	5530	Yes
1027	1	2686	20	B	5530	Yes
1028	1	1706	31	B	5530	Yes
1029	1	1726	31	B	5530	Yes
1030	1	876	61	B	5530	Yes

TYPE 2 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 2

Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Frequency (MHz)	Successful Detection (Yes/No)
2001	4.1	151	27	5530	Yes
2002	4.9	202	26	5530	Yes
2003	4.2	209	23	5530	Yes
2004	1.1	226	29	5530	Yes
2005	4.8	194	26	5530	Yes
2006	4.1	178	23	5530	Yes
2007	3.8	150	24	5530	Yes
2008	3.3	219	28	5530	Yes
2009	1.4	157	29	5530	Yes
2010	3.3	192	27	5530	Yes
2011	1.5	215	25	5530	Yes
2012	3.6	173	27	5530	Yes
2013	2.1	162	26	5530	Yes
2014	4.4	205	27	5530	Yes
2015	1.1	199	26	5530	Yes
2016	1.7	165	25	5530	Yes
2017	2.8	206	25	5530	Yes
2018	3.6	219	24	5530	Yes
2019	2.9	183	28	5530	Yes
2020	3.9	201	27	5530	Yes
2021	3.5	169	28	5530	Yes
2022	2.8	152	28	5530	Yes
2023	2.5	205	29	5530	Yes
2024	2	193	26	5530	Yes
2025	4.2	174	27	5530	Yes
2026	2	166	28	5530	Yes
2027	4.3	189	23	5530	Yes
2028	2.3	228	24	5530	Yes
2029	4.9	218	23	5530	Yes
2030	3.1	180	25	5530	Yes

TYPE 3 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 3

Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Frequency (MHz)	Successful Detection (Yes/No)
3001	6.3	324	16	5530	Yes
3002	9.4	470	16	5530	Yes
3003	5.6	345	16	5530	Yes
3004	6.6	386	18	5530	Yes
3005	5.8	275	17	5530	Yes
3006	7	328	17	5530	Yes
3007	6.5	480	17	5530	Yes
3008	5.6	429	17	5530	Yes
3009	8	476	17	5530	Yes
3010	7.4	305	16	5530	Yes
3011	7.4	498	17	5530	Yes
3012	9.7	472	17	5530	Yes
3013	7.6	294	18	5530	Yes
3014	5	414	18	5530	Yes
3015	8.2	382	18	5530	Yes
3016	8.7	264	16	5530	Yes
3017	9.8	496	18	5530	Yes
3018	7.8	390	18	5530	Yes
3019	6.7	266	18	5530	Yes
3020	5	307	17	5530	Yes
3021	9.3	446	16	5530	Yes
3022	5.4	500	17	5530	Yes
3023	7.6	401	16	5530	Yes
3024	9.1	350	17	5530	Yes
3025	6.4	397	16	5530	Yes
3026	5.8	358	18	5530	Yes
3027	8.5	418	16	5530	Yes
3028	8.1	393	16	5530	Yes
3029	5.9	348	17	5530	Yes
3030	8.5	335	17	5530	Yes

TYPE 4 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 4

Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Frequency (MHz)	Successful Detection (Yes/No)
4001	18.6	302	14	5530	Yes
4002	14.2	436	15	5530	Yes
4003	16.3	416	15	5530	Yes
4004	12.3	444	14	5530	Yes
4005	10.3	438	13	5530	Yes
4006	16.9	478	13	5530	Yes
4007	15.4	367	15	5530	Yes
4008	13	420	13	5530	Yes
4009	12	455	16	5530	Yes
4010	14.9	270	13	5530	Yes
4011	19.8	318	16	5530	No
4012	18.5	279	14	5530	Yes
4013	13.7	339	13	5530	Yes
4014	12.9	313	16	5530	Yes
4015	18.8	268	12	5530	Yes
4016	13.8	255	13	5530	Yes
4017	15.5	474	12	5530	Yes
4018	11	356	14	5530	Yes
4019	13.1	337	13	5530	Yes
4020	19.2	365	12	5530	Yes
4021	17.2	358	15	5530	Yes
4022	19.1	399	14	5530	Yes
4023	12.2	287	14	5530	Yes
4024	19.9	341	16	5530	Yes
4025	18.9	376	14	5530	Yes
4026	11.7	442	12	5530	Yes
4027	16.6	489	15	5530	Yes
4028	15.3	451	15	5530	Yes
4029	10.5	260	16	5530	Yes
4030	19.8	485	14	5530	Yes

TYPE 5 DETECTION PROBABILITY

Data Sheet for FCC Long Pulse Radar Type 5		
Trial	Frequency (MHz)	Successful Detection (Yes/No)
1	5530	Yes
2	5530	Yes
3	5530	Yes
4	5530	Yes
5	5530	Yes
6	5530	Yes
7	5530	Yes
8	5530	Yes
9	5530	Yes
10	5530	Yes
11	5500	Yes
12	5496	Yes
13	5501	Yes
14	5499	Yes
15	5501	Yes
16	5498	Yes
17	5495	Yes
18	5498	Yes
19	5499	Yes
20	5497	Yes
21	5560	Yes
22	5560	Yes
23	5564	Yes
24	5566	Yes
25	5564	Yes
26	5564	Yes
27	5560	Yes
28	5564	Yes
29	5562	Yes
30	5562	Yes

Note: The Type 5 randomized parameters tested are shown in a separate document.

TYPE 6 DETECTION PROBABILITY

Data Sheet for FCC Hopping Radar Type 6
1 us Pulse Width, 333 us PRI, 9 Pulses per Burst, 1 Burst per Hop
NTIA August 2005 Hopping Sequence

Trial	Starting Index Within Sequence	Signal Generator Frequency (MHz)	Hops within Detection BW	Successful Detection (Yes/No)
1	25	5491	19	Yes
2	500	5492	17	Yes
3	975	5493	19	Yes
4	1450	5494	16	Yes
5	1925	5495	26	Yes
6	2400	5496	21	Yes
7	2875	5497	17	Yes
8	3350	5498	21	Yes
9	3825	5499	22	Yes
10	4300	5500	17	Yes
11	4775	5501	17	Yes
12	5250	5502	14	Yes
13	5725	5503	18	Yes
14	6200	5504	20	Yes
15	6675	5505	10	Yes
16	7150	5506	18	Yes
17	7625	5507	16	Yes
18	8100	5508	14	Yes
19	8575	5509	9	Yes
20	9050	5510	15	Yes
21	9525	5511	16	Yes
22	10000	5512	19	Yes
23	10475	5513	13	Yes
24	10950	5514	22	Yes
25	11425	5515	16	Yes
26	11900	5516	18	Yes
27	12375	5517	13	Yes
28	12850	5518	14	Yes
29	13325	5519	25	Yes
30	13800	5520	14	Yes
31	14275	5521	17	Yes
32	14750	5522	17	Yes
33	15225	5523	16	Yes
34	15700	5524	20	Yes
35	16175	5525	13	Yes
36	16650	5526	13	Yes

TYPE 6 DETECTION PROBABILITY (CONTINUED)

37	17125	5527	21	Yes
38	17600	5528	16	Yes
39	18075	5529	16	Yes
40	18550	5530	19	Yes
41	19025	5531	12	Yes
42	19500	5532	16	Yes
43	19975	5533	13	Yes
44	20450	5534	19	Yes
45	20925	5535	17	Yes
46	21400	5536	15	Yes
47	21875	5537	18	Yes
48	22350	5538	14	Yes
49	22825	5539	17	Yes
50	23300	5540	20	Yes
51	23775	5541	23	Yes
52	24250	5542	21	Yes
53	24725	5543	20	Yes
54	25200	5544	15	Yes
55	25675	5545	16	Yes
56	26150	5546	20	Yes
57	26625	5547	17	Yes
58	27100	5548	18	Yes
59	27575	5549	19	Yes
60	28050	5550	13	Yes
61	28525	5551	17	Yes
62	29000	5552	15	Yes
63	29475	5553	13	Yes
64	29950	5554	14	Yes
65	30425	5555	16	Yes
66	30900	5556	13	Yes
67	31375	5557	19	Yes
68	31850	5558	16	Yes
69	32325	5559	16	Yes
70	32800	5560	17	Yes
71	33275	5561	21	Yes
72	33750	5562	22	Yes
73	34225	5563	20	Yes
74	34700	5564	9	Yes
75	35175	5565	14	Yes
76	35650	5566	13	Yes
77	36125	5567	16	Yes
78	36600	5568	13	Yes
79	37075	5569	18	Yes
80	37550	5570	15	Yes

6. BRIDGE MODE RESULTS

Per KDB 905462, Section 5.1 (footnote 1):

Networks Access Points with Bridge and/or MESH modes of operation are permitted to operate in the DFS bands but must employ a DFS function. The functionality of the Bridge mode as specified in §15.403(a) must be validated in the DFS test report. Devices operating as relays must also employ DFS function. The method used to validate the functionality must be documented and validation data must be documented. Bridge mode can be validated by performing a test statistical performance check (Section 7.8.4) on any one of the radar types. This is an abbreviated test to verify DFS functionality. MESH mode operational methodology must be submitted in the application for certification for evaluation by the FCC.

This device does not support Bridge Mode therefore this test was not performed.