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, WALL MOUNT

MODEL NUMBER: AP-7602

FCC ID: QXO-7602
IC: 4141B-7602

REPORT NUMBER: 11425795-E4V6

ISSUE DATE: JUNE 11, 2018

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

Prepared by
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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	04/27/17	EIRP raised to 27.91 dBm from 26 dBm	Henry Lau
V3	05/31/17	Update to section 5.1.5, DESCRIPTION OF EUT	Grace Rincand
V4	12/6/17	Revised the following: Company name, 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, WALL MOUNT

MODEL: AP-7602

SERIAL NUMBER: 16252523300014

DATE TESTED: OCTOBER 13 – 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
UL Verification Services Inc.

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

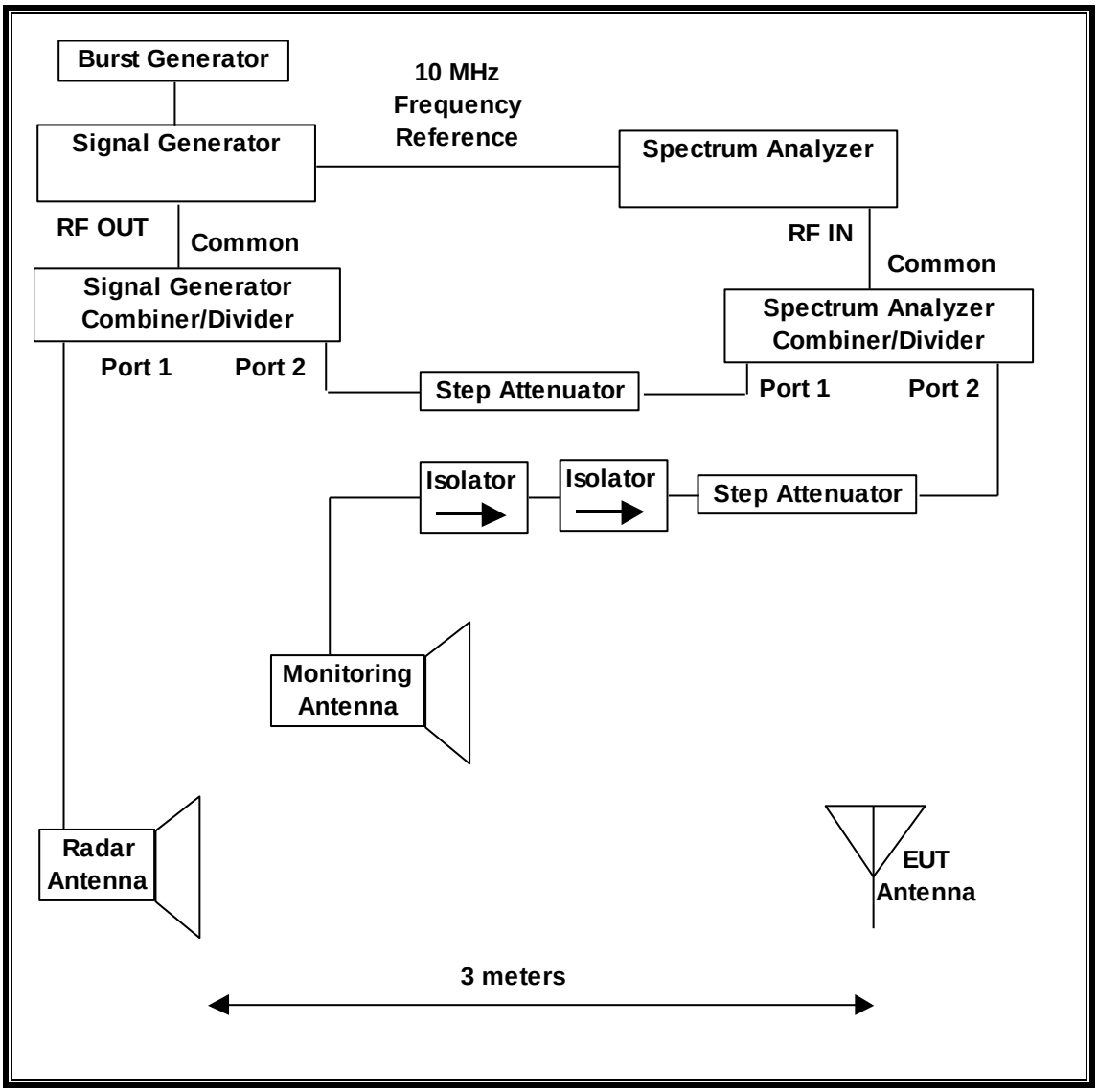
Radar Waveform Type	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µsec)	Pulses per Burst	Number of Bursts	Minimum Percentage of Successful Detection	Minimum Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

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

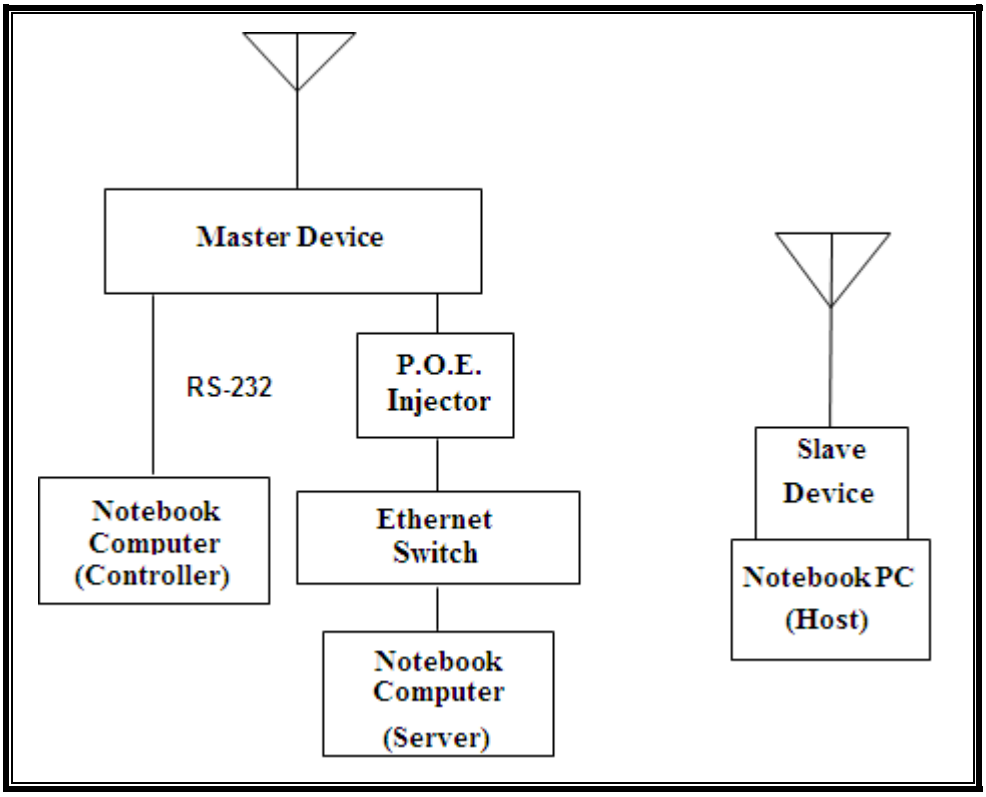
5.1.3. TEST AND MEASUREMENT SOFTWARE

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 29.87 dBm EIRP in the 5250-5350 MHz and 29.95 dBm in the 5470-5725 MHz band.

The only antenna assembly utilized with the EUT has a gain of 4.2 dBi in the 5250-5350 MHz band and 4.28 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 AP7602 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: UZ7AP7602. 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

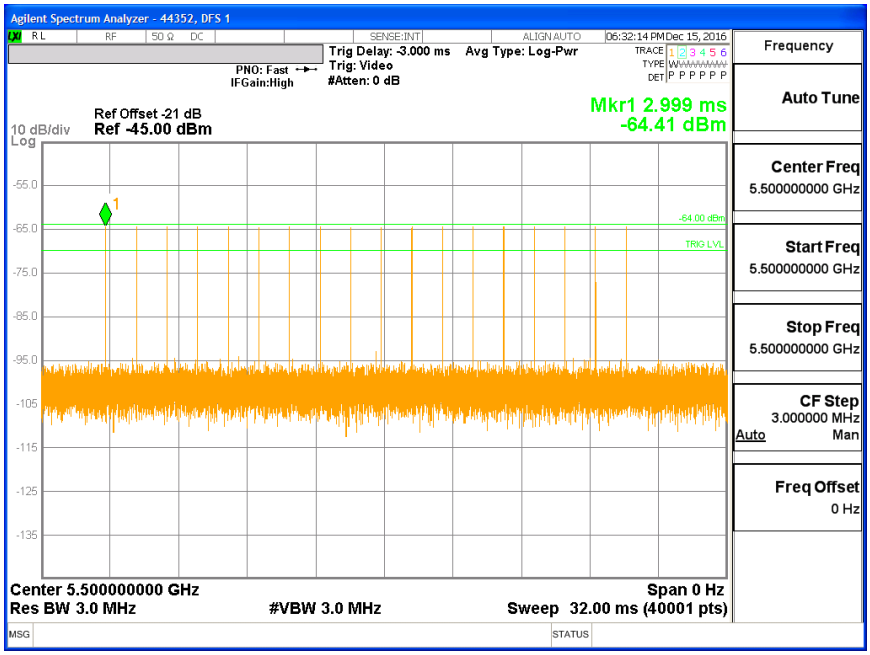
5.2.1. TEST CHANNEL

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

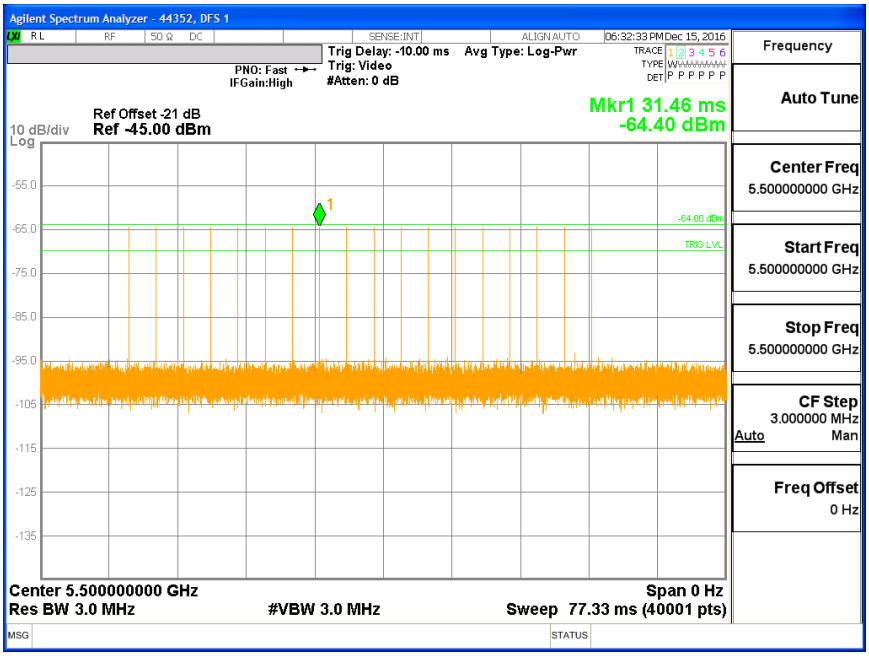
5.2.2. RADAR WAVEFORMS AND TRAFFIC

RADAR WAVEFORMS

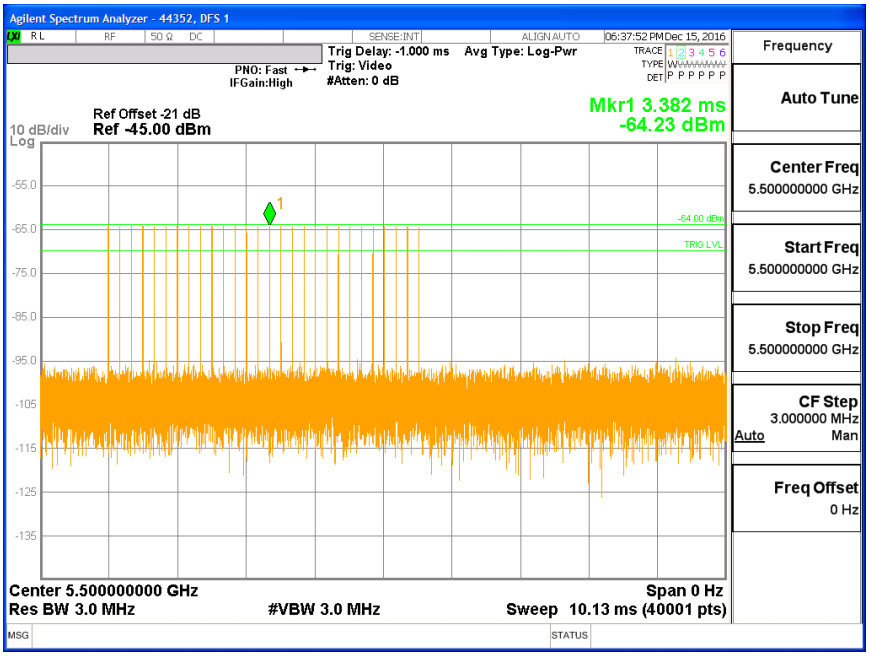
SHORT PULSE RADAR TYPE 0



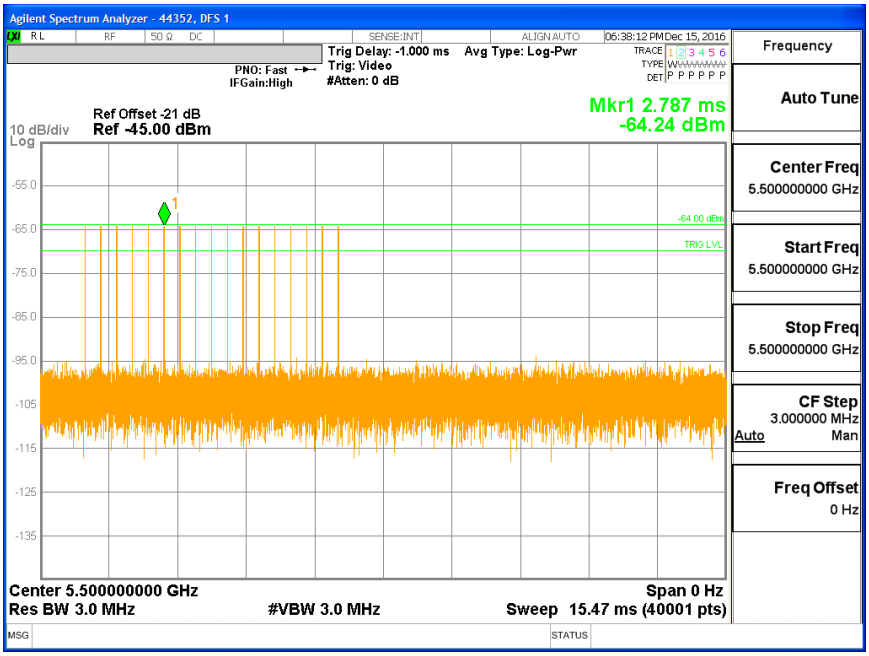
SAMPLE OF RADAR TYPE 1



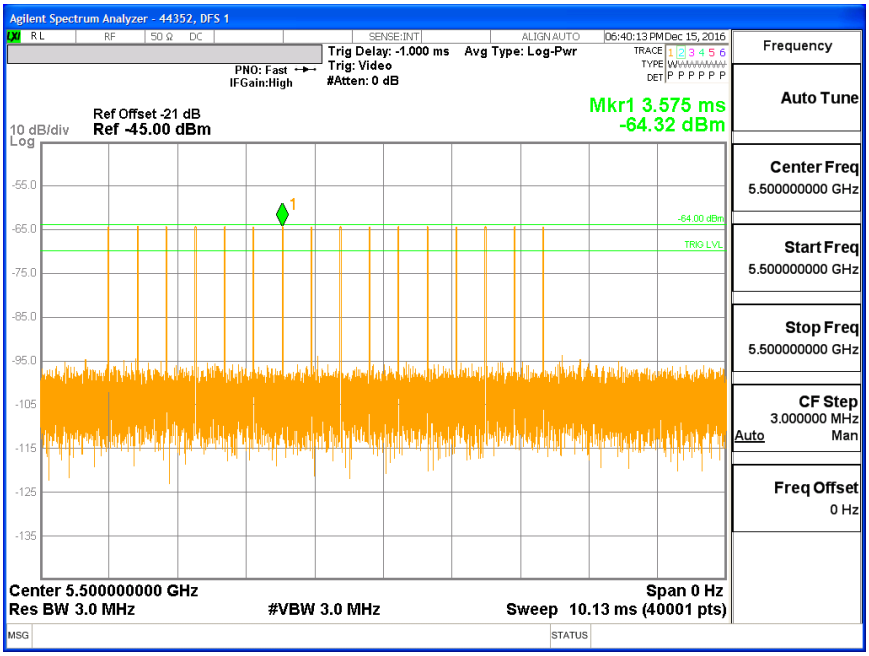
SAMPLE OF RADAR TYPE 2



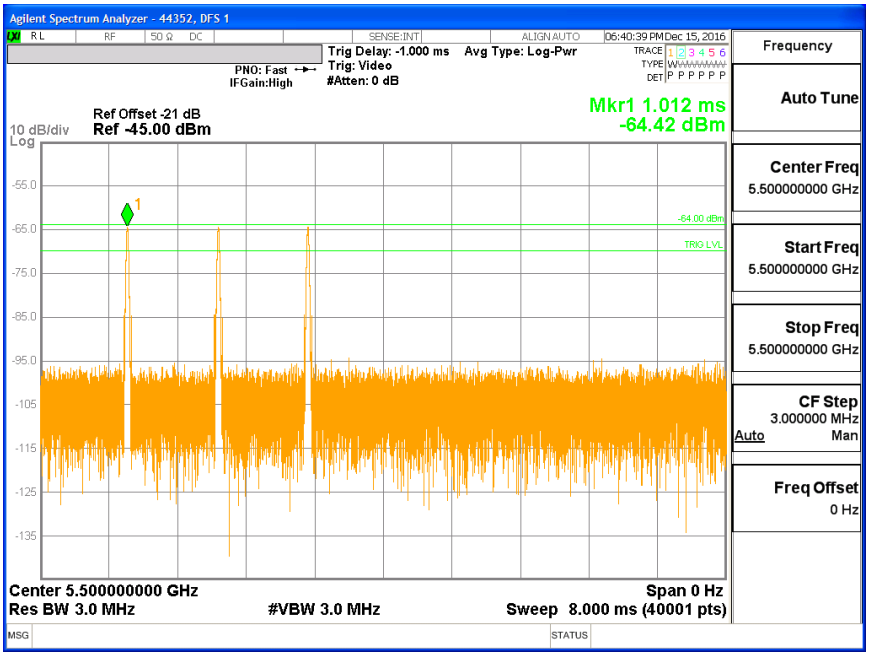
SAMPLE OF RADAR TYPE 3



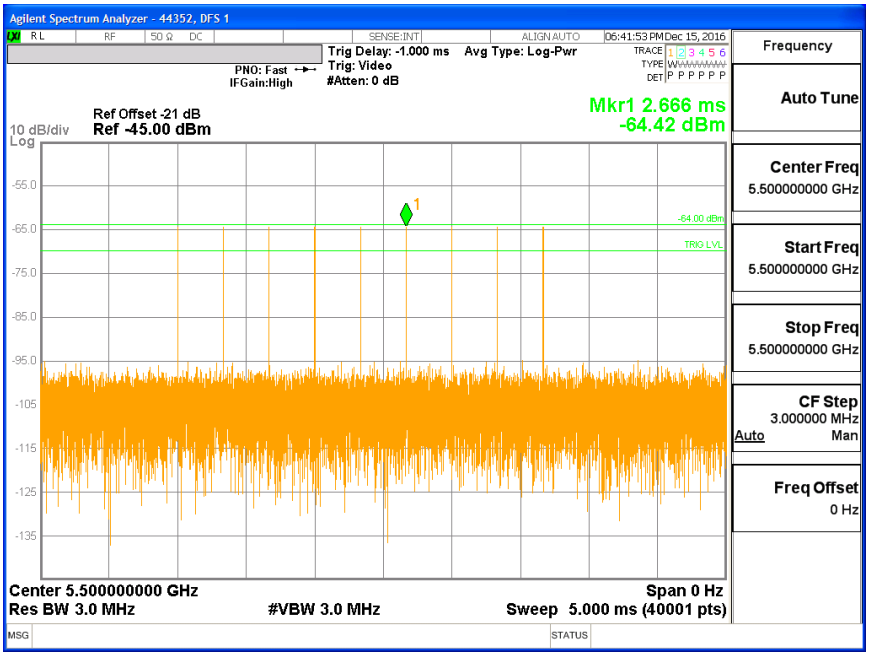
SAMPLE OF RADAR TYPE 4



SAMPLE OF SINGLE BURST OF RADAR TYPE 5

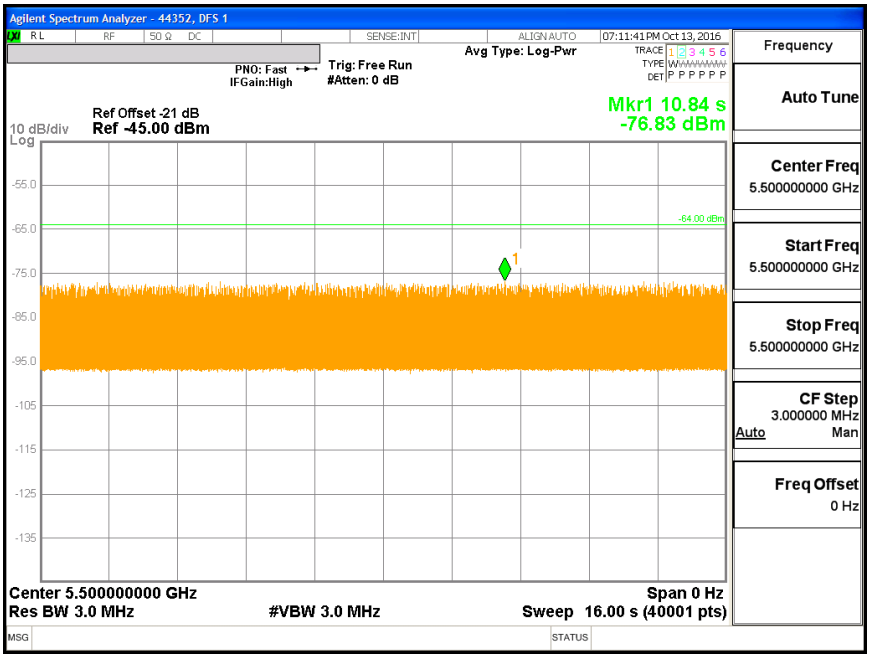


SINGLE BURST OF RADAR TYPE 6

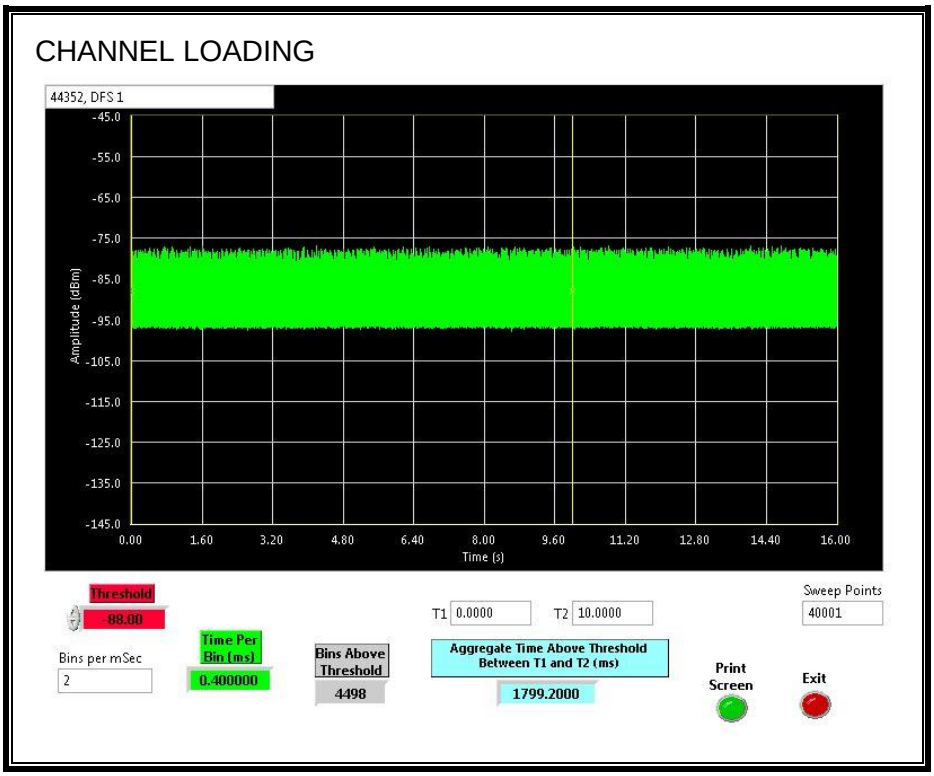


TRAFFIC

TRAFFIC



CHANNEL LOADING



The level of traffic loading on the channel by the EUT is 17.992%

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	64.5	64.5

Radar Near Beginning of CAC

Beginning of CAC (sec)	Timing of Radar Burst (sec)	Radar Relative to Start of CAC (sec)
0	1.043	1.043

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)
3:22:18	3:23:21	0:01:03

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)
3:30:33	3:30:34	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)
3:37:18	3:38:16	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.

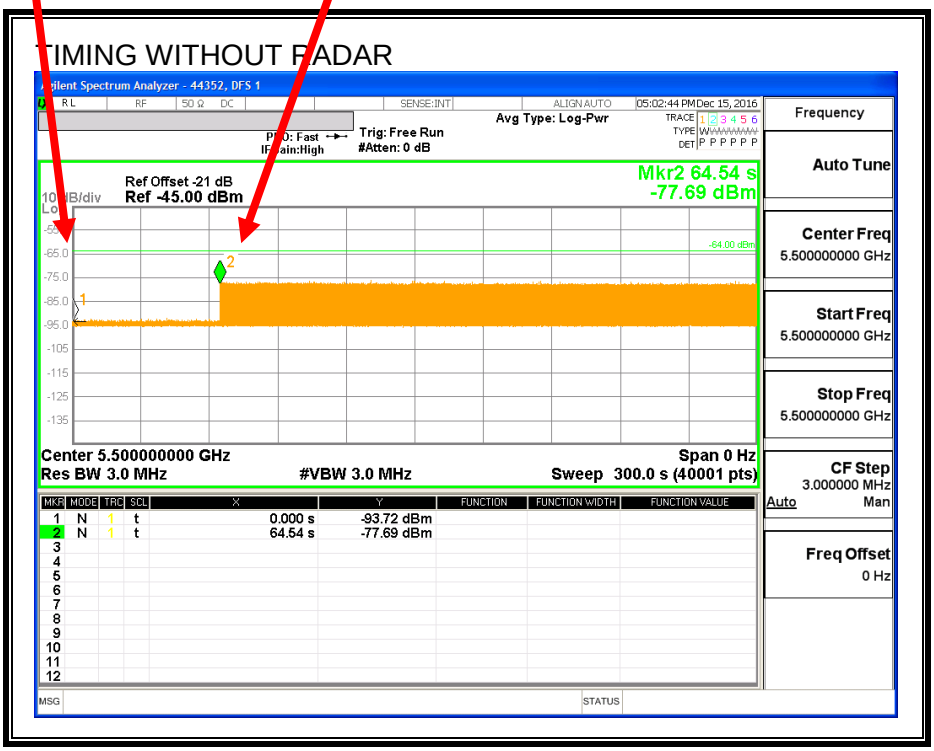
QUALITATIVE RESULTS

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 01 03:22:17 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 01 03:22:17 2016: DOT11: dfs:CAC time 60 (dfs.c:694)

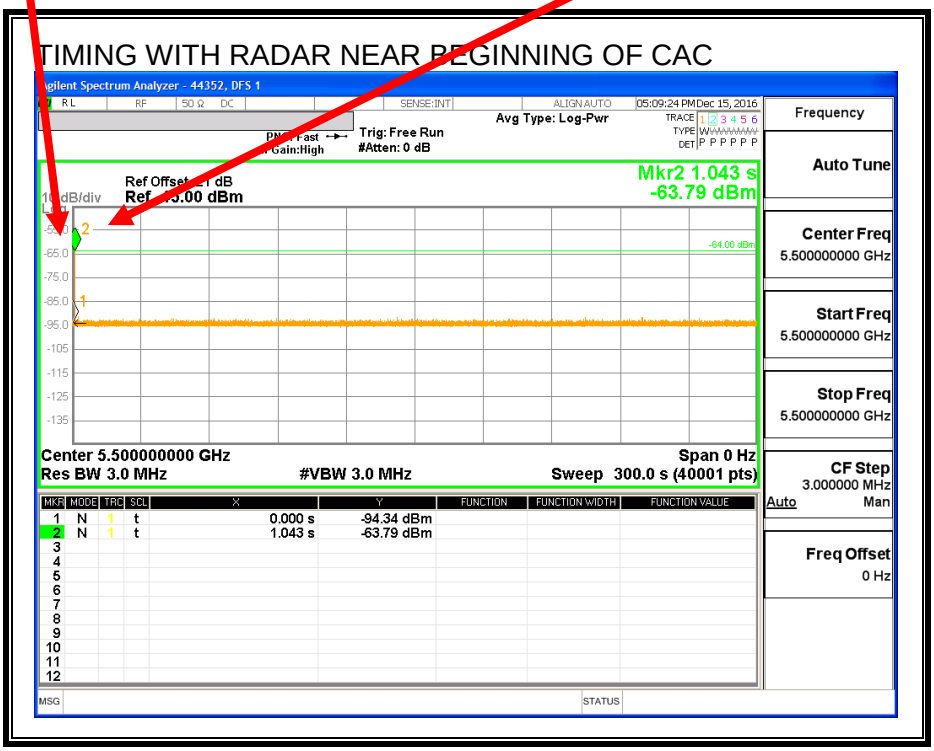
Jan 01 **03:22:18** 2016: ap7602-D19F6C : %RADIO-6-RADAR_SCAN_STARTED: Radar scan on primary channel 100 freq 5500 MHz for a duration 70 secs on radio 'ap7602-D19

Jan 01 **03:23:21** 2016: ap7602-D19F6C : %RADIO-6-RADAR_SCAN_COMPLETED: Radar scan done on primary channel 100 freq 5500 MHz on radio 'ap7602-D19F6C: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 01 03:30:33 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 01 03:30:33 2016: DOT11: dfs:CAC time 60 (dfs.c:694)

Jan 01 **03:30:33** 2016: ap7602-D19F6C : %RADIO-6-RADAR_SCAN_STARTED: Radar scan on primary channel 100 freq 5500 MHz for a duration 70 secs on radio 'ap7602-D19

Jan 01 03:30:34 2016: KERN: WL1: DFS: UNCLASSIFIED ########## radar detected on channel 100 ########## Intv=28561, min_pw=30, AT 750MS.

Jan 01 03:30:34 2016: KERN: wl1: dfs : state PRE-ISM Channel Availability Check, detected radar on channel 100: Activating jump channel: 153.

Jan 01 03:30:34 2016: DOT11: %%%%>dfs:Radar reported on channel 100 Freq 5500 MHz by radio_idx 1 (dfs.c:302)

Jan 01 03:30:34 2016: DOT11: dfs:Chosen Dfs jump channel:149 (dfs.c:1179)

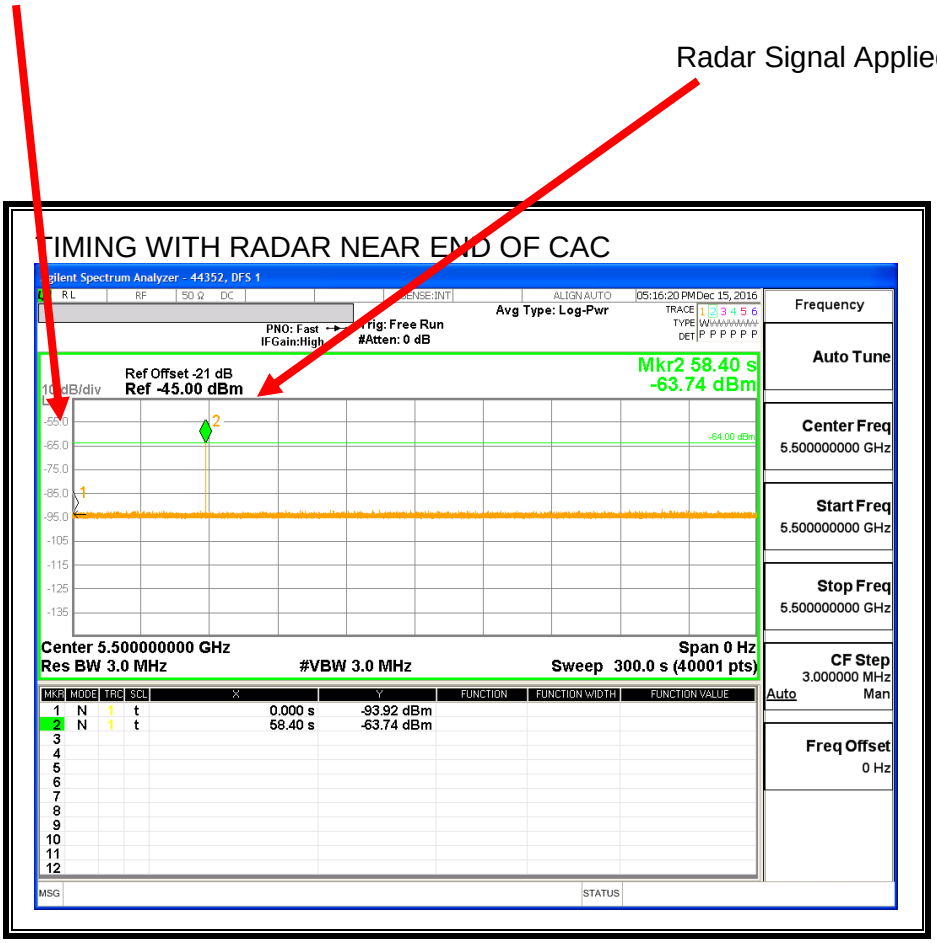
Jan 01 **03:30:34** 2016: ap7602-D19F6C : %RADIO-4-RADAR_DETECTED: Radar found on Radio 2 channel 100 width 20 freq 5500 MHz

Jan 01 03:30:34 2016: ap7602-D19F6C : %RADIO-4-RADAR_DET_INFO: Radar info: Radio: 'ap7602-D19F6C: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 01 03:37:18 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 01 03:37:18 2016: DOT11: dfs:CAC time 60 (dfs.c:694)

Jan 01 **03:37:18** 2016: ap7602-D19F6C : %RADIO-6-RADAR_SCAN_STARTED: Radar scan on primary channel 100 freq 5500 MHz for a duration 70 secs on radio 'ap7602-D19

Jan 01 03:38:16 2016: KERN: WL1: DFS: UNCLASSIFIED ########## radar detected on channel 100 ########## Intv=28560, min_pw=30, AT 54300MS.

Jan 01 03:38:16 2016: KERN: wl1: dfs : state PRE-ISM Channel Availability Check, detected radar on channel 100: Activating jump channel: 161.

Jan 01 03:38:16 2016: DOT11: %%%%>dfs:Radar reported on channel 100 Freq 5500 MHz by radio_idx 1 (dfs.c:302)

Jan 01 03:38:16 2016: DOT11: dfs:Chosen Dfs jump channel:165 (dfs.c:1179)

Jan 01 **03:38:16** 2016: ap7602-D19F6C : %RADIO-4-RADAR_DETECTED: Radar found on Radio 2 channel 100 width 20 freq 5500 MHz

Jan 01 03:38:16 2016: ap7602-D19F6C : %RADIO-4-RADAR_DET_INFO: Radar info: Radio: 'ap7602-D19F6C:R2'. New channel: 161 freq 5805 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)

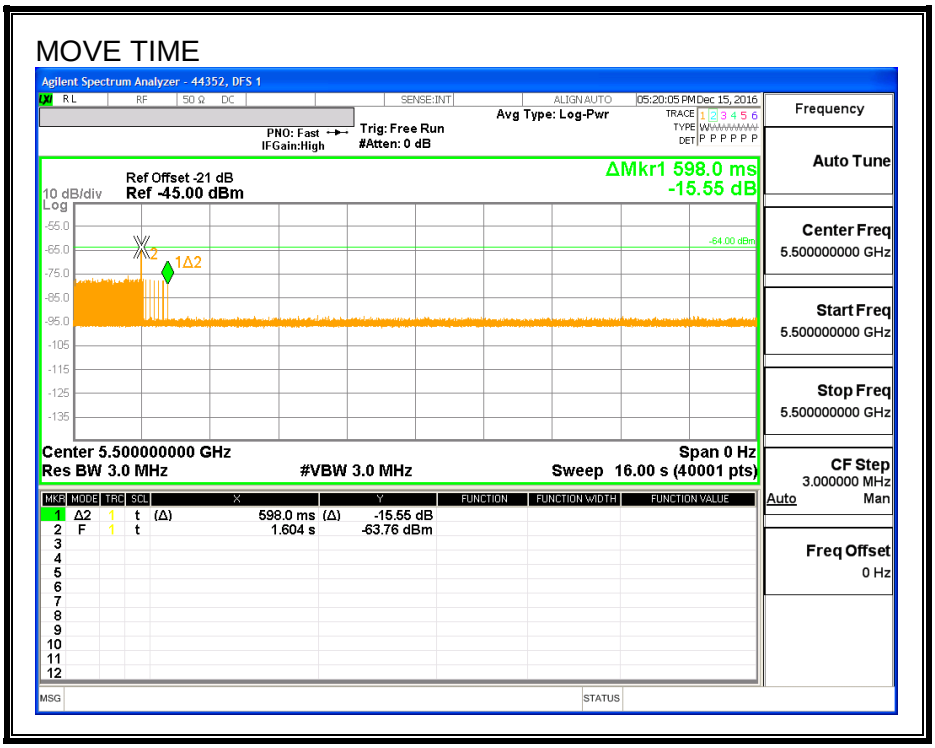
The observation period over which the aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

RESULTS

Channel Move Time (sec)	Limit (sec)
0.598	10

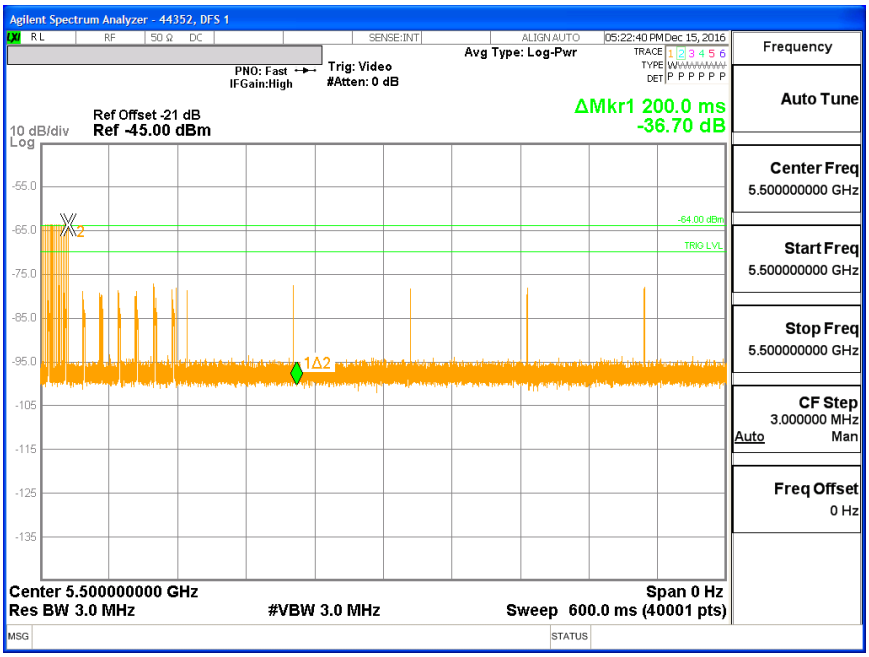
Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
4.8	60

MOVE TIME



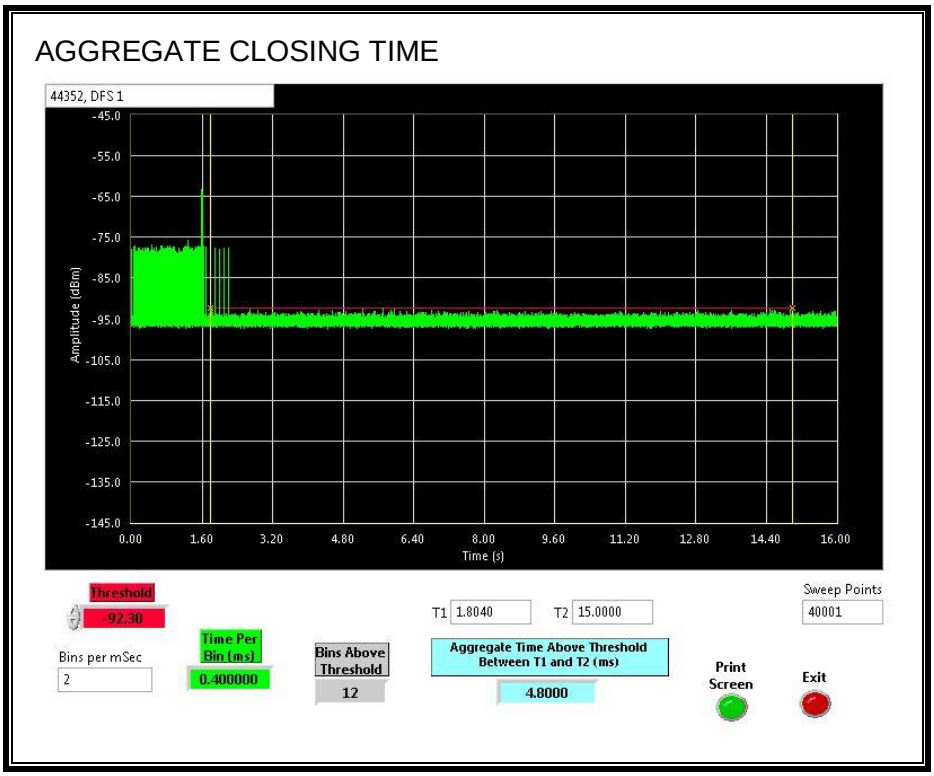
CHANNEL CLOSING TIME

CLOSING TIME



AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

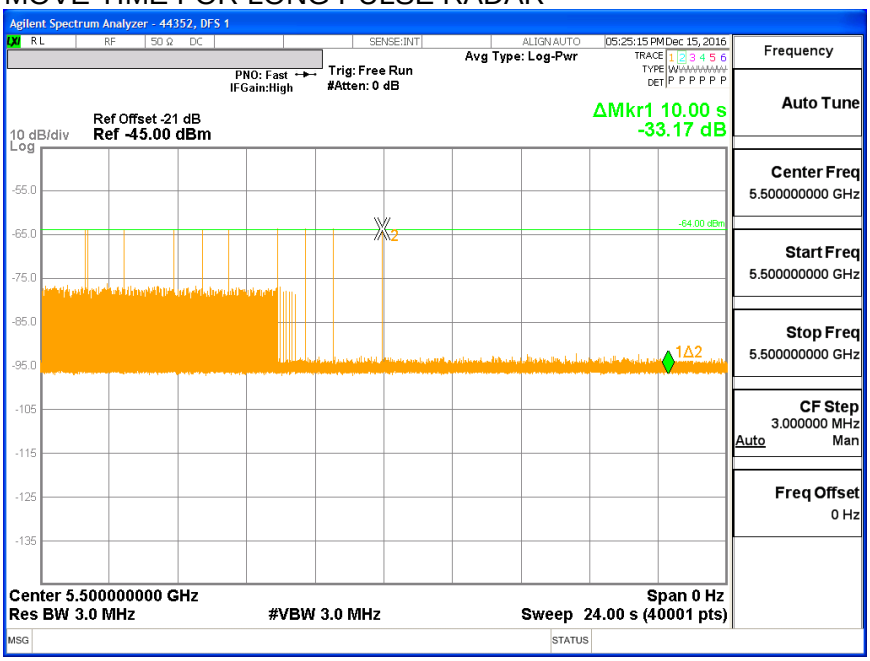
No transmissions are observed during the aggregate monitoring period.



LONG PULSE CHANNEL MOVE TIME

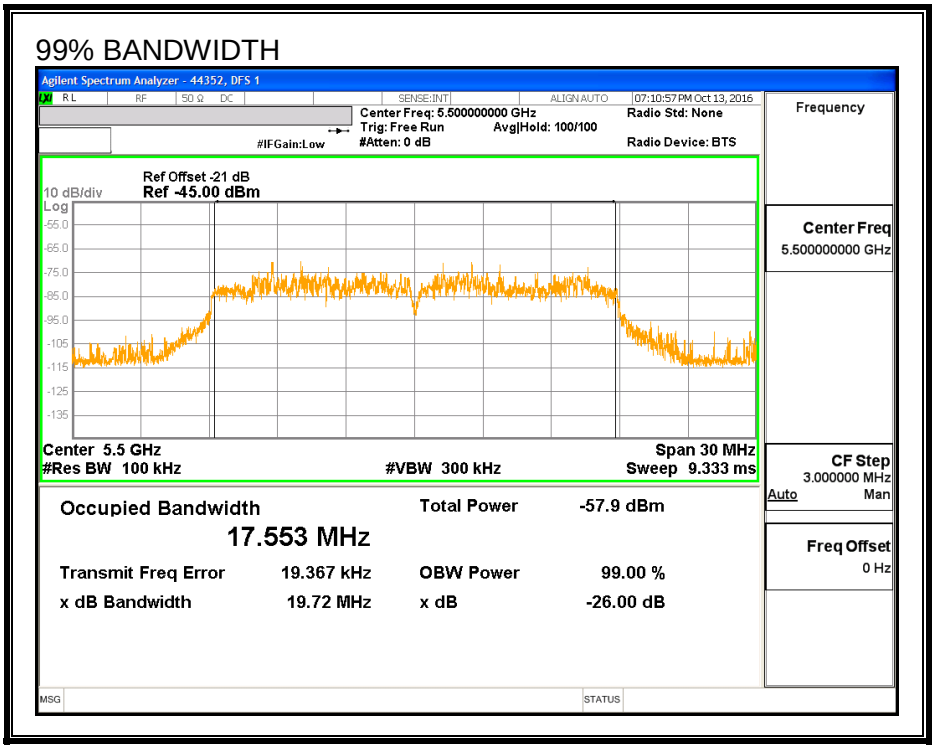
The traffic ceases prior to 10 seconds after the end of the radar waveform.

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	17.553	113.9	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	96.67	60	Pass	5490	5510			17.55	DFS 1	44352	Version 3.0
FCC Short Pulse Type 2	30	100.00	60	Pass	5490	5510			17.55	DFS 1	44352	Version 3.0
FCC Short Pulse Type 3	30	100.00	60	Pass	5490	5510			17.55	DFS 1	44352	Version 3.0
FCC Short Pulse Type 4	30	90.00	60	Pass	5490	5510			17.55	DFS 1	44352	Version 3.0
Aggregate		96.67	80	Pass								
FCC Long Pulse Type 5	30	90.00	80	Pass	5490	5510	5492	5508	17.55	DFS 1	44352	Version 3.0
FCC Hopping Type 6	42	92.86	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	No
1002	1	838	63	A	5500	Yes
1003	1	578	92	A	5500	Yes
1004	1	518	102	A	5500	Yes
1005	1	918	58	A	5500	Yes
1006	1	898	59	A	5500	Yes
1007	1	738	72	A	5500	Yes
1008	1	818	65	A	5500	Yes
1009	1	858	62	A	5500	Yes
1010	1	798	67	A	5500	Yes
1011	1	938	57	A	5500	Yes
1012	1	598	89	A	5500	Yes
1013	1	538	99	A	5500	Yes
1014	1	758	70	A	5500	Yes
1015	1	558	95	A	5500	Yes
1016	1	2493	22	B	5500	Yes
1017	1	1448	37	B	5500	Yes
1018	1	727	73	B	5500	Yes
1019	1	1166	46	B	5500	Yes
1020	1	1928	28	B	5500	Yes
1021	1	1142	47	B	5500	Yes
1022	1	839	63	B	5500	Yes
1023	1	2731	20	B	5500	Yes
1024	1	2557	21	B	5500	Yes
1025	1	836	64	B	5500	Yes
1026	1	2145	25	B	5500	Yes
1027	1	554	96	B	5500	Yes
1028	1	1992	27	B	5500	Yes
1029	1	1883	29	B	5500	Yes
1030	1	904	59	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	3.3	170	28	5500	Yes
2002	1.3	208	23	5500	Yes
2003	3.9	198	29	5500	Yes
2004	4.3	160	23	5500	Yes
2005	1	154	23	5500	Yes
2006	3.5	201	28	5500	Yes
2007	2.7	161	28	5500	Yes
2008	1.3	174	27	5500	Yes
2009	4.7	219	24	5500	Yes
2010	1.6	155	27	5500	Yes
2011	3.4	204	24	5500	Yes
2012	4.6	188	28	5500	Yes
2013	2.4	203	25	5500	Yes
2014	1.9	191	29	5500	Yes
2015	4.1	210	23	5500	Yes
2016	3.8	202	24	5500	Yes
2017	2	187	26	5500	Yes
2018	4.1	183	27	5500	Yes
2019	4.8	172	26	5500	Yes
2020	3	215	28	5500	Yes
2021	3.8	209	27	5500	Yes
2022	2.2	218	26	5500	Yes
2023	1.4	216	26	5500	Yes
2024	4.1	229	25	5500	Yes
2025	3.4	193	29	5500	Yes
2026	2.5	211	25	5500	Yes
2027	2.1	222	29	5500	Yes
2028	3.3	162	25	5500	Yes
2029	1.1	177	23	5500	Yes
2030	4.7	165	27	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	7.2	357	17	5500	Yes
3002	6.8	331	18	5500	Yes
3003	9.8	286	16	5500	Yes
3004	7.3	273	17	5500	Yes
3005	8.1	492	16	5500	Yes
3006	5.8	374	17	5500	Yes
3007	6.9	355	17	5500	Yes
3008	10	383	16	5500	Yes
3009	9	376	18	5500	Yes
3010	9.9	417	17	5500	Yes
3011	6.4	306	17	5500	Yes
3012	5.3	359	16	5500	Yes
3013	9.8	394	17	5500	Yes
3014	6.2	460	16	5500	Yes
3015	8.7	256	18	5500	Yes
3016	8	469	18	5500	Yes
3017	5.6	278	16	5500	Yes
3018	5.2	252	17	5500	Yes
3019	8.2	458	17	5500	Yes
3020	5.7	445	16	5500	Yes
3021	6.5	413	18	5500	Yes
3022	9.3	295	16	5500	Yes
3023	5.3	409	17	5500	Yes
3024	8.4	304	18	5500	Yes
3025	7.4	430	17	5500	Yes
3026	8.3	338	16	5500	Yes
3027	7.5	477	18	5500	Yes
3028	8.8	280	18	5500	Yes
3029	8.2	314	16	5500	Yes
3030	7.3	381	18	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	14.1	428	16	5500	Yes
4002	12.8	389	14	5500	Yes
4003	18.2	449	15	5500	Yes
4004	17.4	424	13	5500	Yes
4005	18.5	379	12	5500	Yes
4006	18.2	366	15	5500	Yes
4007	19.9	333	15	5500	Yes
4008	15.4	466	13	5500	Yes
4009	17.6	329	13	5500	Yes
4010	18.9	475	14	5500	Yes
4011	11.5	351	12	5500	Yes
4012	13.4	258	16	5500	Yes
4013	11.9	398	14	5500	Yes
4014	14.3	334	13	5500	Yes
4015	13.2	486	16	5500	Yes
4016	11.4	301	14	5500	Yes
4017	10.9	348	15	5500	Yes
4018	19.7	310	12	5500	Yes
4019	15	370	13	5500	No
4020	14.2	344	16	5500	Yes
4021	15.3	299	15	5500	Yes
4022	15.1	419	16	5500	Yes
4023	16.7	387	13	5500	Yes
4024	12.2	387	12	5500	Yes
4025	14.4	250	16	5500	Yes
4026	15.8	396	13	5500	No
4027	18.4	271	15	5500	No
4028	10.2	430	14	5500	Yes
4029	18.8	452	12	5500	Yes
4030	11.1	254	12	5500	Yes

TYPE 5 DETECTION PROBABILITY

Data Sheet for FCC Long Pulse Radar Type 5		
Trial	Frequency (MHz)	Successful Detection (Yes/No)
1	5500	No
2	5500	No
3	5500	No
4	5500	Yes
5	5500	Yes
6	5500	Yes
7	5500	Yes
8	5500	Yes
9	5500	Yes
10	5500	Yes
11	5499	Yes
12	5495	Yes
13	5494	Yes
14	5499	Yes
15	5498	Yes
16	5499	Yes
17	5496	Yes
18	5499	Yes
19	5498	Yes
20	5499	Yes
21	5502	Yes
22	5502	Yes
23	5502	Yes
24	5502	Yes
25	5502	Yes
26	5502	Yes
27	5502	Yes
28	5502	Yes
29	5502	Yes
30	5502	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	90	5490	2	Yes
2	565	5491	6	Yes
3	1040	5492	5	Yes
4	1515	5493	3	Yes
5	1990	5494	4	Yes
6	2465	5495	9	Yes
7	2940	5496	6	Yes
8	3415	5497	1	Yes
9	3890	5498	3	Yes
10	4365	5499	4	Yes
11	4840	5500	5	Yes
12	5315	5501	6	Yes
13	5790	5502	2	Yes
14	6265	5503	6	Yes
15	6740	5504	3	Yes
16	7215	5505	3	Yes
17	7690	5506	4	Yes
18	8165	5507	4	Yes
19	8640	5508	3	Yes
20	9115	5509	4	Yes
21	9590	5510	6	Yes
22	10065	5490	4	Yes
23	10540	5491	2	No
24	11015	5492	6	Yes
25	11490	5493	4	Yes
26	11965	5494	11	Yes
27	12440	5495	2	Yes
28	12915	5496	7	No
29	13390	5497	8	Yes
30	13865	5498	2	Yes
31	14340	5499	5	Yes
32	14815	5500	3	Yes
33	15290	5501	4	Yes
34	15765	5502	3	Yes
35	16240	5503	1	No
36	16715	5504	5	Yes
37	17190	5505	5	Yes
38	17665	5506	5	Yes
39	18140	5507	6	Yes
40	18615	5508	4	Yes
41	19090	5509	3	Yes
42	19565	5510	3	Yes

5.3. RESULTS FOR 40 MHz BANDWIDTH

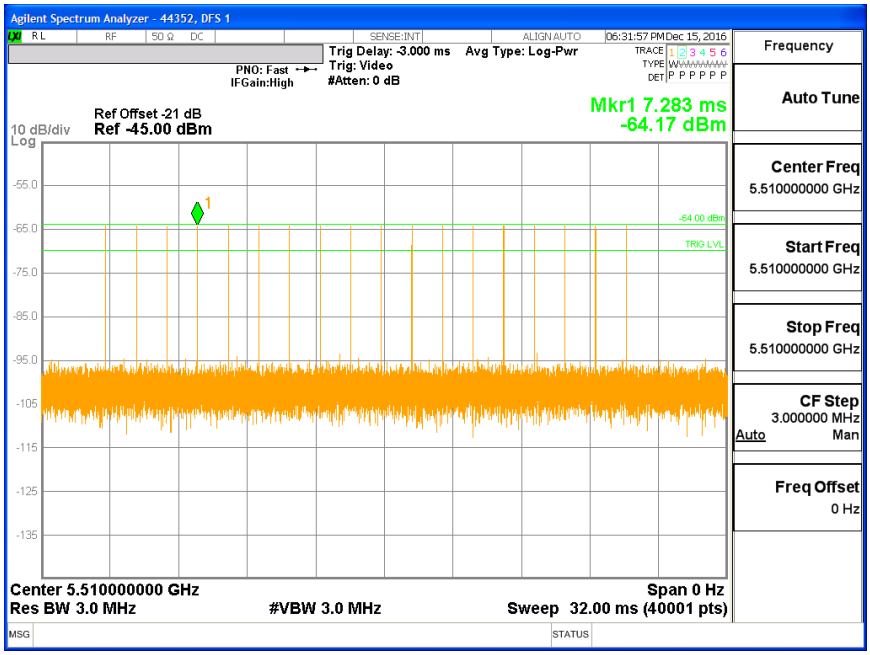
5.3.1. TEST CHANNEL

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

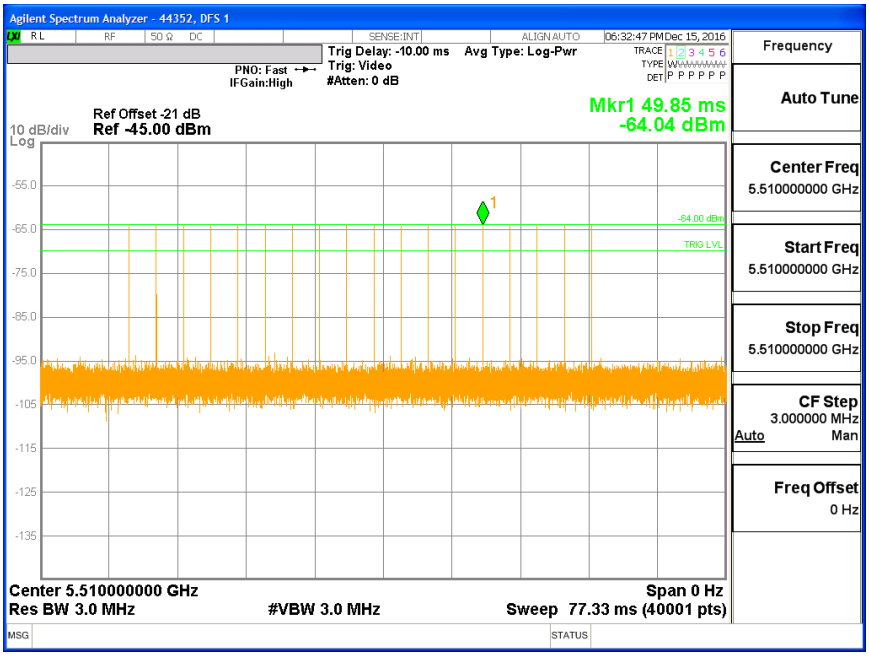
5.3.2. RADAR WAVEFORMS AND TRAFFIC

RADAR WAVEFORMS

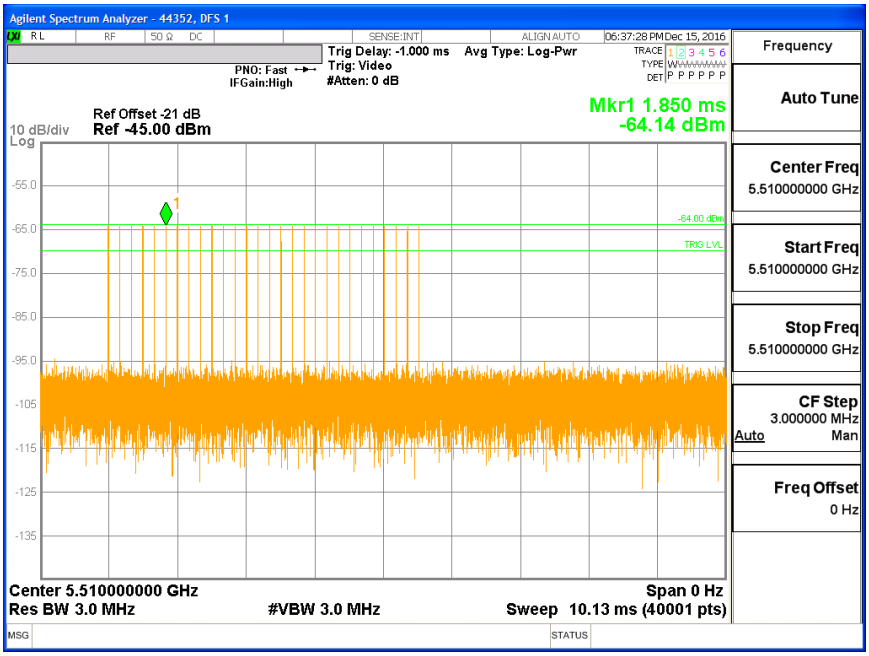
SHORT PULSE RADAR TYPE 0



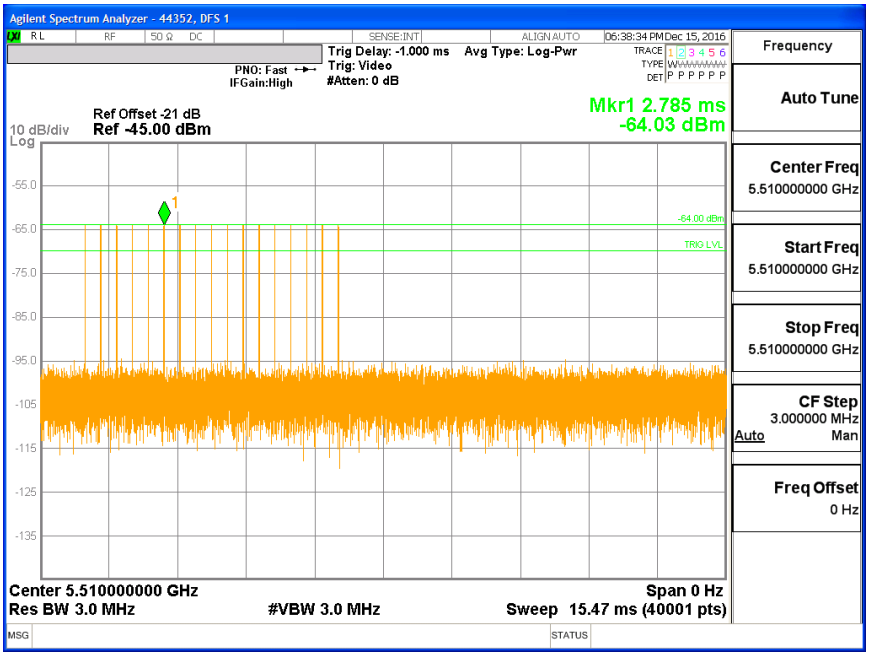
SAMPLE OF RADAR TYPE 1



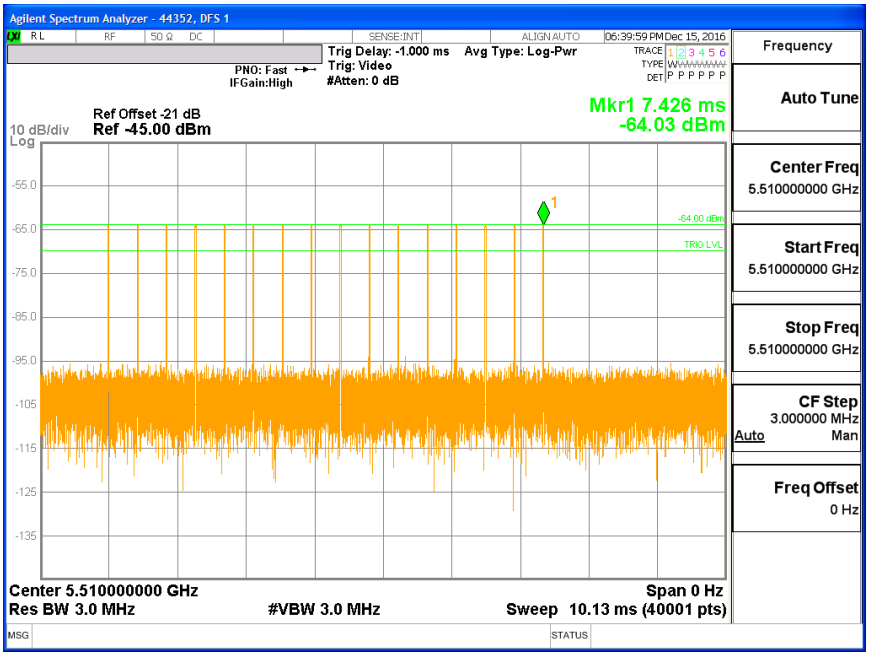
SAMPLE OF RADAR TYPE 2



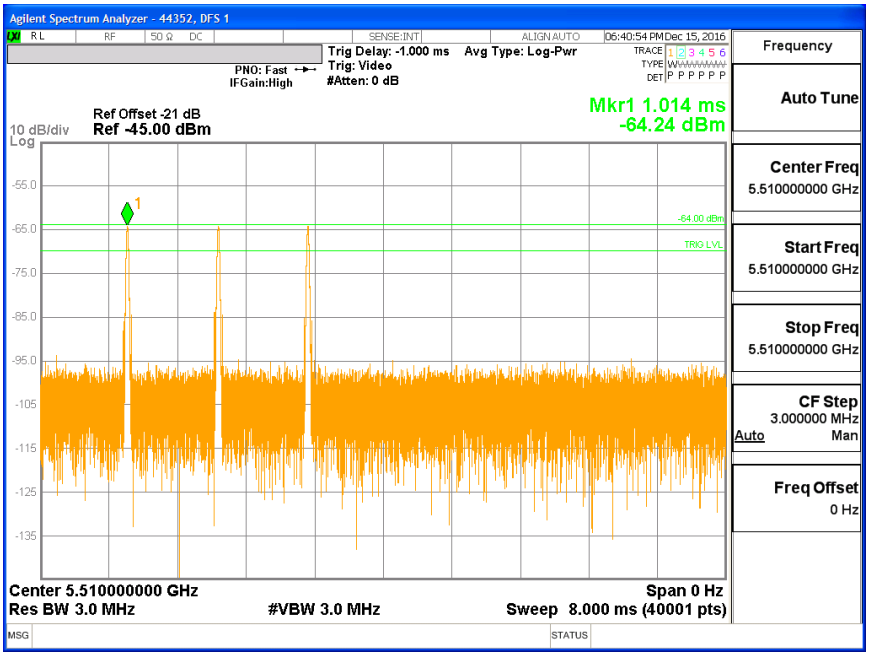
SAMPLE OF RADAR TYPE 3



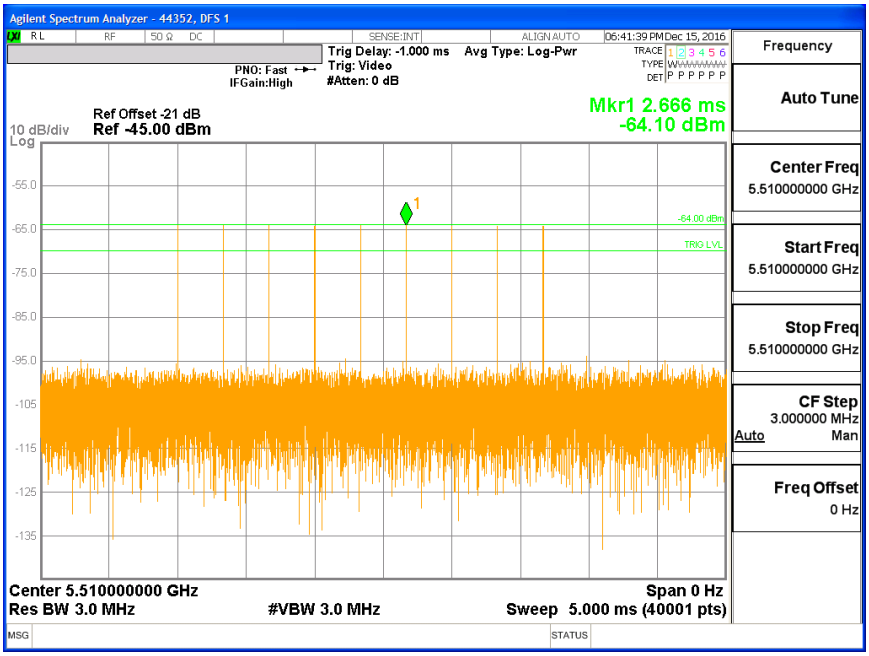
SAMPLE OF RADAR TYPE 4



SAMPLE OF SINGLE BURST OF RADAR TYPE 5

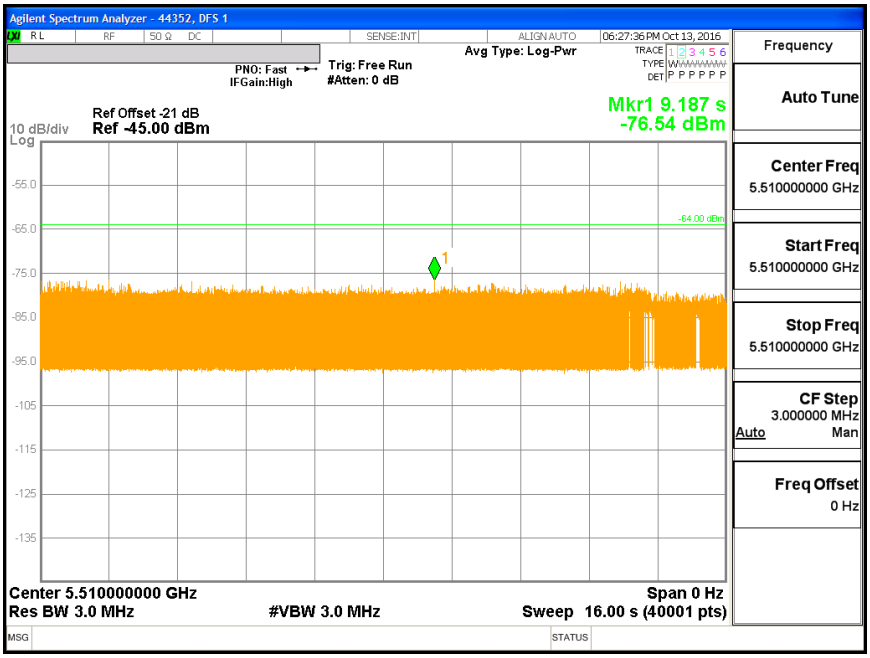


SINGLE BURST OF RADAR TYPE 6

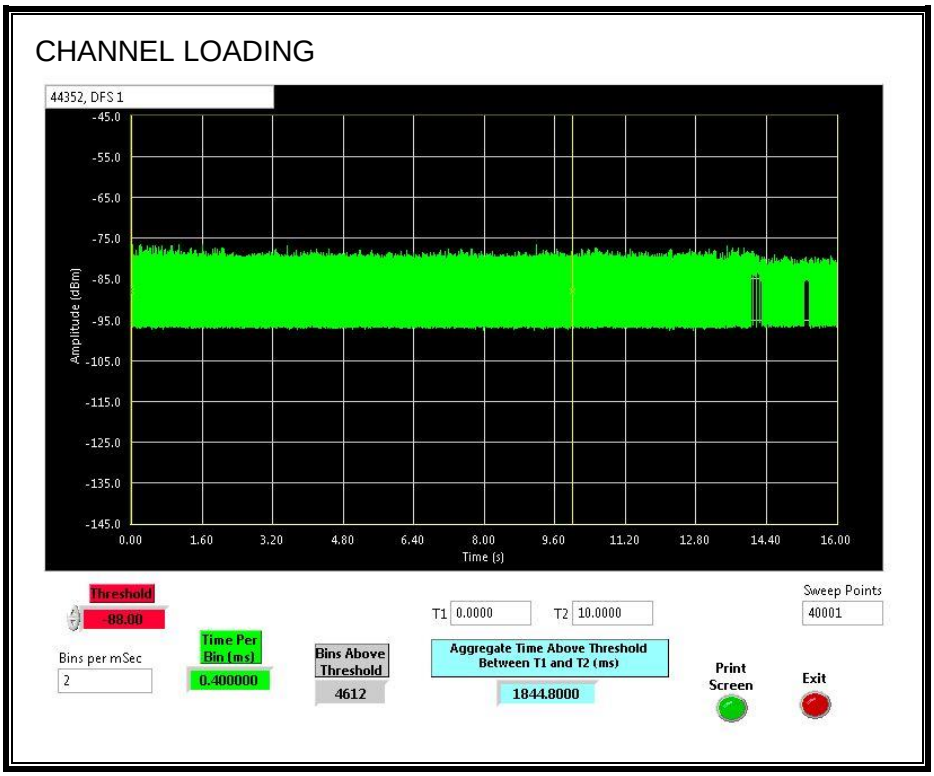


TRAFFIC

TRAFFIC



CHANNEL LOADING



The level of traffic loading on the channel by the EUT is 18.448%

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	64.3	64.3

Radar Near Beginning of CAC

Beginning of CAC (sec)	Timing of Radar Burst (sec)	Radar Relative to Start of CAC (sec)
0	0.713	0.713

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)
4:01:47	4:02:50	0:01:03

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)
4:11:47	4:11:48	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)
4:18:37	4:19:35	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.

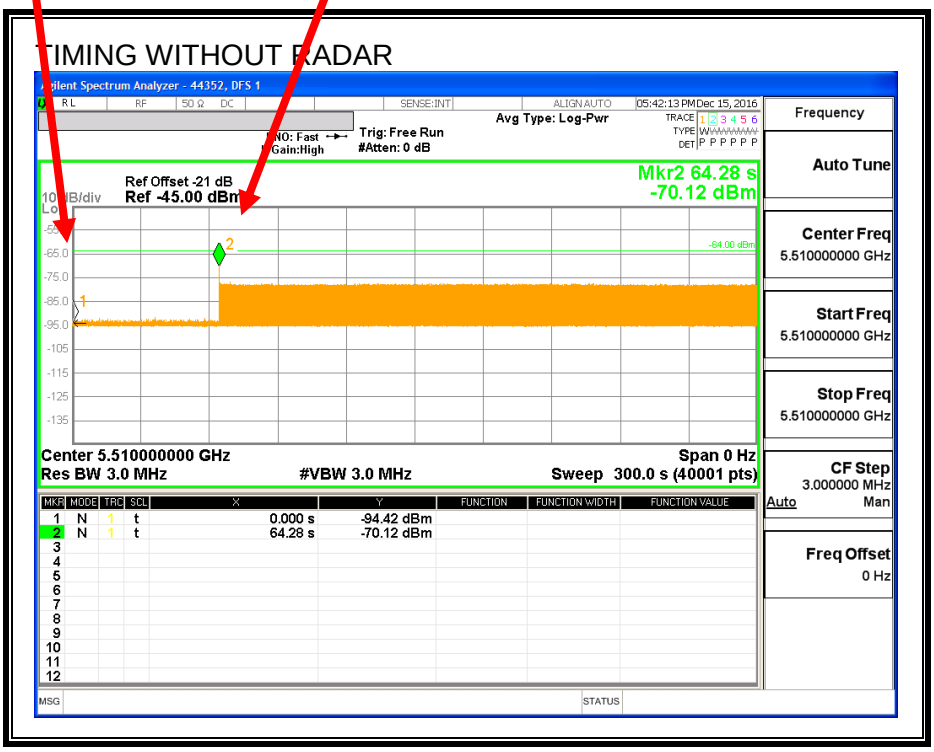
QUALITATIVE RESULTS

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 01 04:01:47 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 01 04:01:47 2016: DOT11: dfs:CAC time 60 (dfs.c:690)

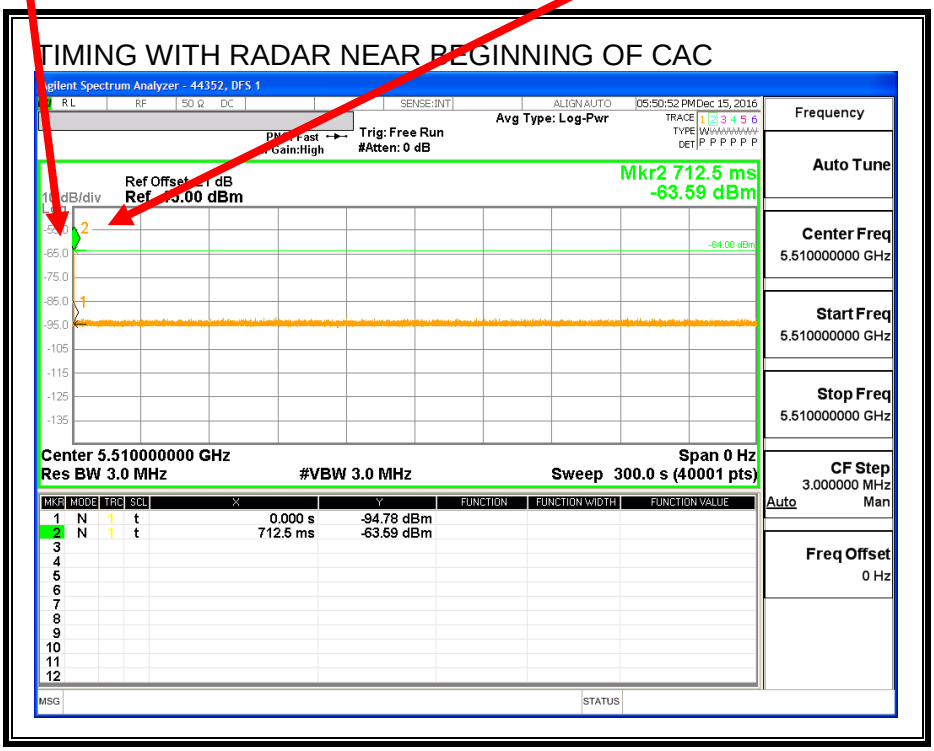
Jan 01 **04:01:47** 2016: ap7602-D19F6C : %RADIO-6-RADAR_SCAN_STARTED: Radar scan on primary channel 100 freq 5500 MHz for a duration 70 secs on radio 'ap7602-D19

Jan 01 **04:02:50** 2016: ap7602-D19F6C : %RADIO-6-RADAR_SCAN_COMPLETED: Radar scan done on primary channel 100 freq 5500 MHz on radio 'ap7602-D19F6C: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 01 04:11:47 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 01 04:11:47 2016: DOT11: dfs:CAC time 60 (dfs.c:690)

Jan 01 **04:11:47** 2016: ap7602-D19F6C : %RADIO-6-RADAR_SCAN_STARTED: Radar scan on primary channel 100 freq 5500 MHz for a duration 70 secs on radio 'ap7602-D19

Jan 01 04:11:48 2016: KERN: WL1: DFS: UNCLASSIFIED ########## radar detected on channel 100l ########## Intv=28560, min_pw=31, AT 1050MS.

Jan 01 04:11:48 2016: KERN: wl1: dfs : state PRE-ISM Channel Availability Check, detected radar on channel 102: Activating jump channel: 48.

Jan 01 04:11:48 2016: DOT11: %%%%>dfs:Radar reported on channel 100 Freq 5500 MHz by radio_idx 1 (dfs.c:302)

Jan 01 04:11:48 2016: DOT11: dfs:Chosen Dfs jump channel:40 (dfs.c:1179)

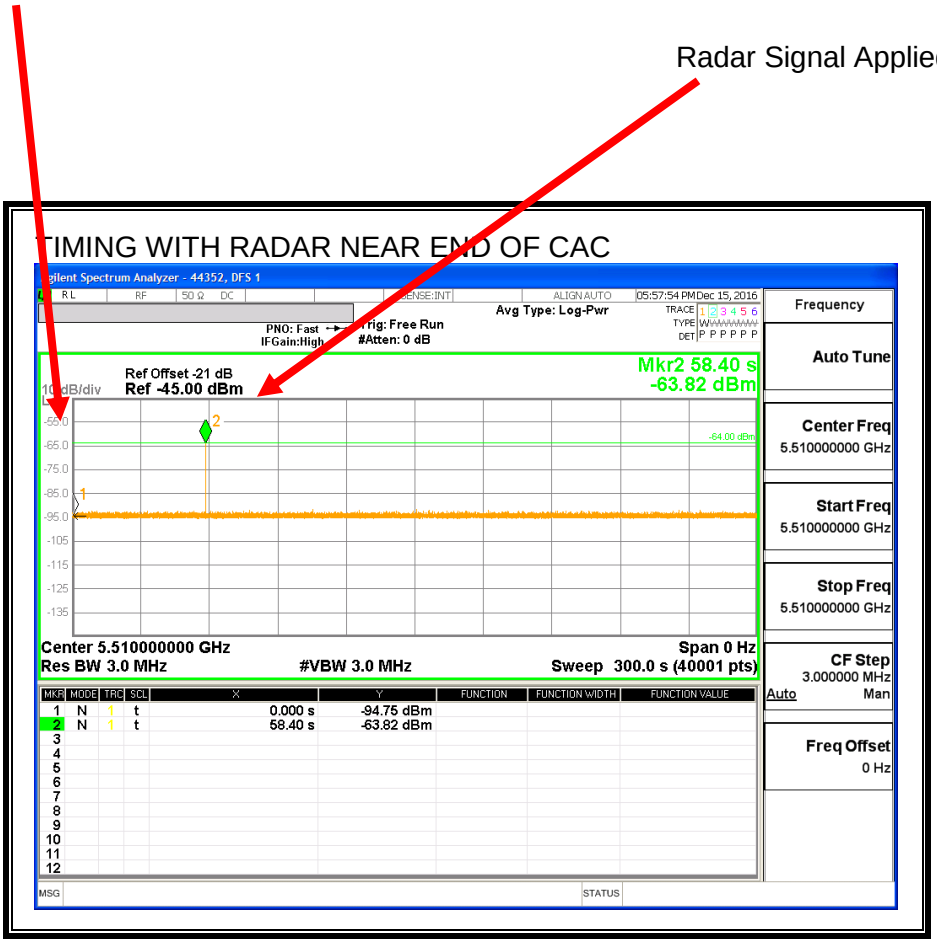
Jan 01 **04:11:48** 2016: ap7602-D19F6C : %RADIO-4-RADAR_DETECTED: Radar found on Radio 2 channel 100 width 40 freq 5500 MHz

Jan 01 04:11:48 2016: ap7602-D19F6C : %RADIO-4-RADAR_DET_INFO: Radar info: Radio: 'ap7602-D19F6C:R2'. New channel: 48 freq 5240 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 01 04:18:37 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 01 04:18:37 2016: DOT11: dfs:CAC time 60 (dfs.c:690)

Jan 01 **04:18:37** 2016: ap7602-D19F6C : %RADIO-6-RADAR_SCAN_STARTED: Radar scan on primary channel 100 freq 5500 MHz for a duration 70 secs on radio 'ap7602-D19

Jan 01 04:19:35 2016: KERN: WL1: DFS: UNCLASSIFIED ########## radar detected on channel 100l ########## Intv=28560, min_pw=30, AT 54450MS.

Jan 01 04:19:35 2016: KERN: wl1: dfs : state PRE-ISM Channel Availability Check, detected radar on channel 102: Activating jump channel: 36.

Jan 01 04:19:35 2016: DOT11: %%%%>dfs:Radar reported on channel 100 Freq 5500 MHz by radio_idx 1 (dfs.c:302)

Jan 01 04:19:35 2016: DOT11: dfs:Chosen Dfs jump channel:157 (dfs.c:1179)

Jan 01 **04:19:35** 2016: ap7602-D19F6C : %RADIO-4-RADAR_DETECTED: Radar found on Radio 2 channel 100 width 40 freq 5500 MHz

Jan 01 04:19:35 2016: ap7602-D19F6C : %RADIO-4-RADAR_DET_INFO: Radar info: Radio: 'ap7602-D19F6C:R2'. New channel: 36 freq 5180 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).

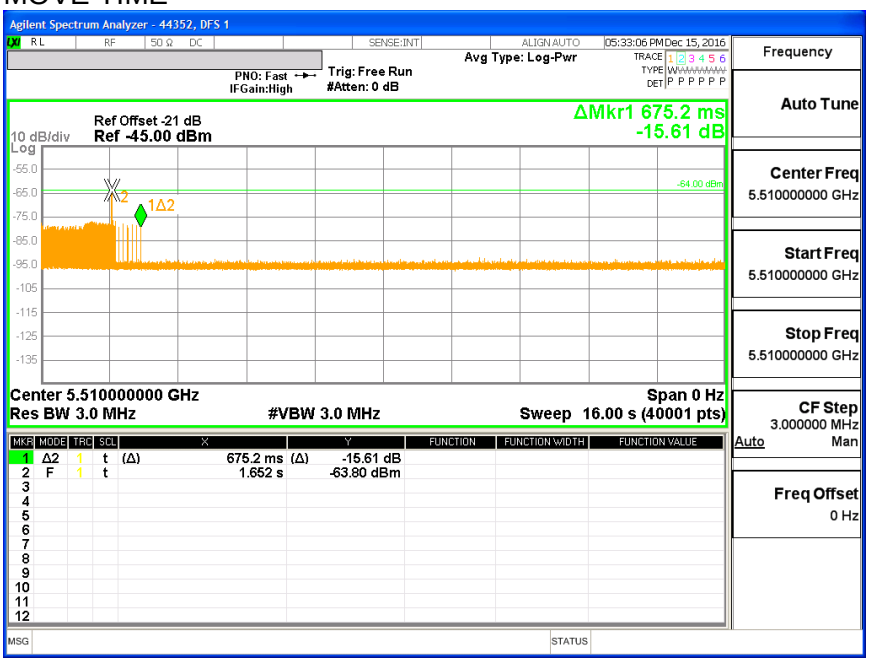
RESULTS

Channel Move Time (sec)	Limit (sec)
0.675	10

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

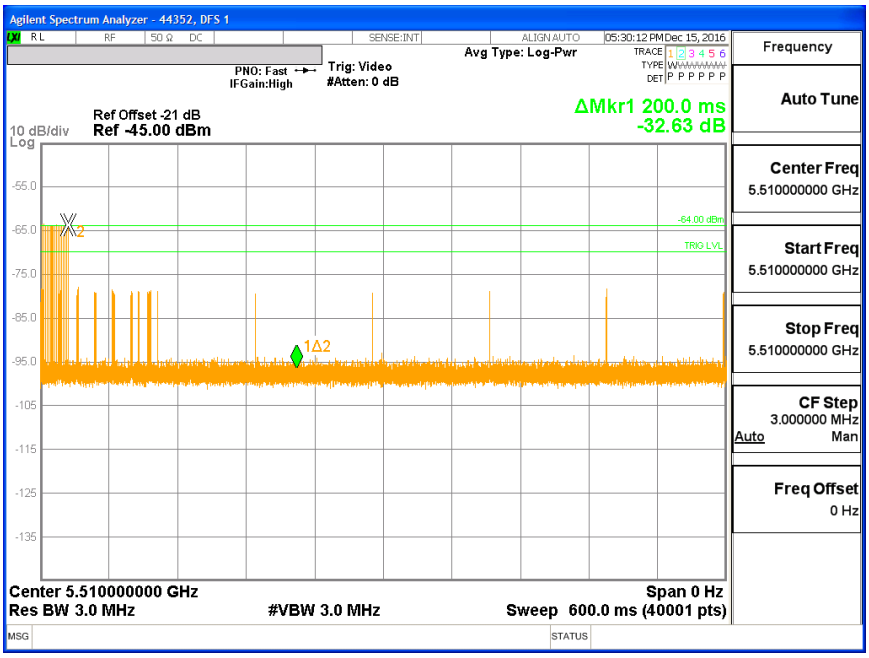
MOVE TIME

MOVE TIME



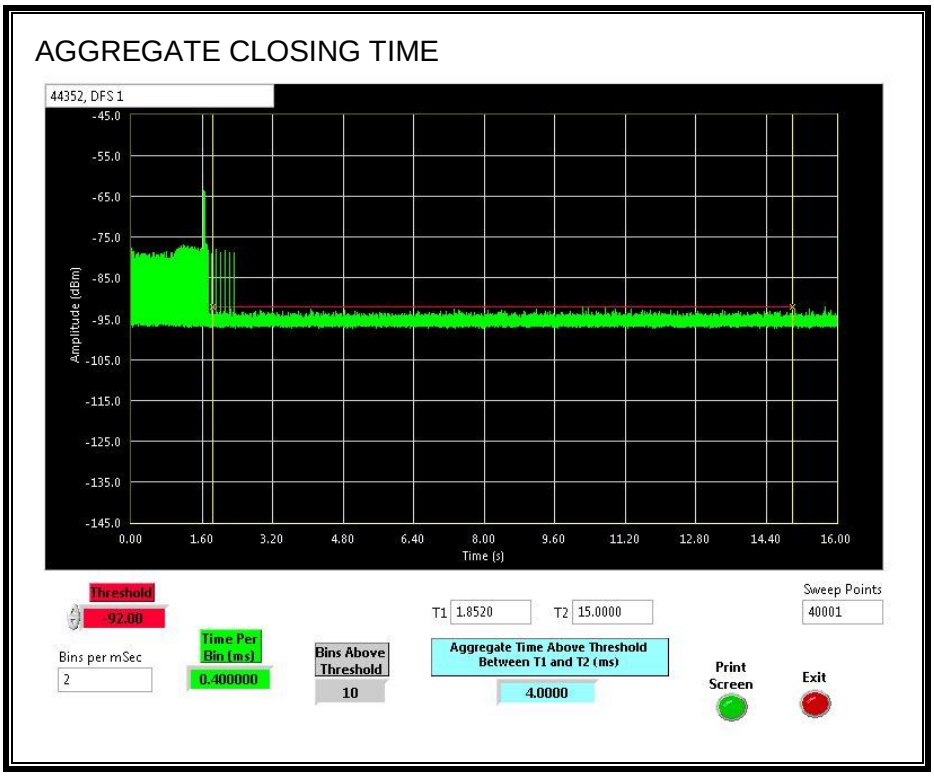
CHANNEL CLOSING TIME

CLOSING TIME



AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

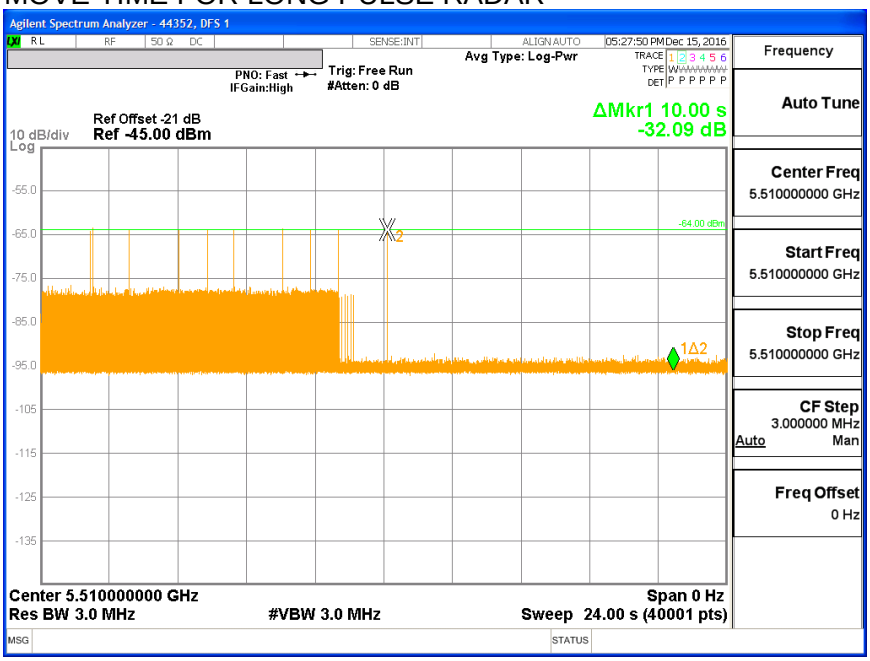
Only intermittent transmissions are observed during the aggregate monitoring period.



LONG PULSE CHANNEL MOVE TIME

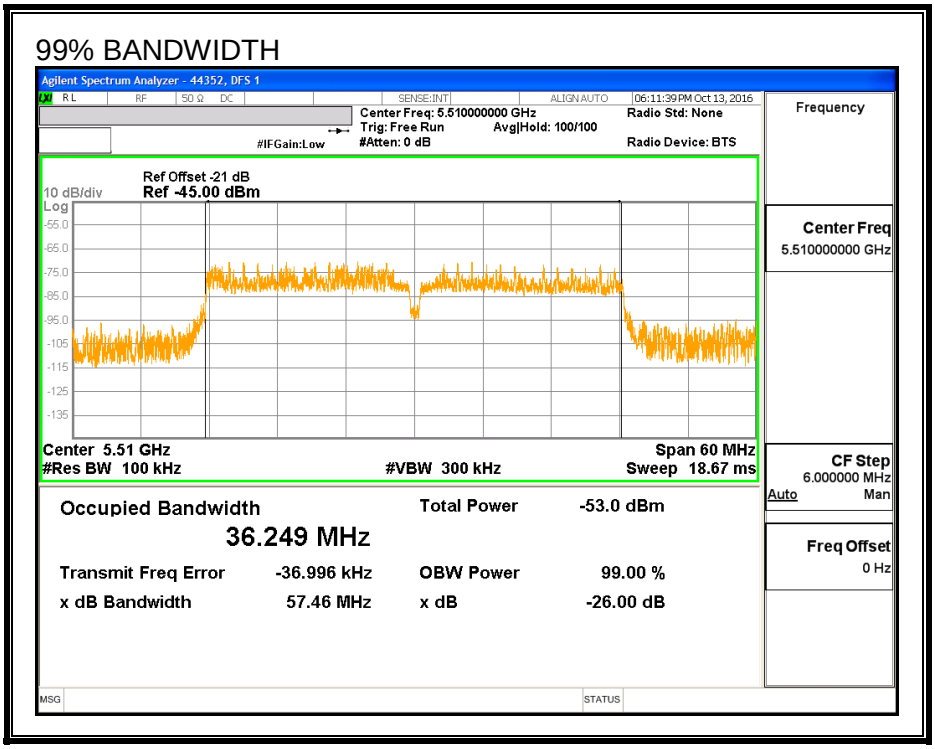
The traffic ceases prior to 10 seconds after the end of the radar waveform.

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	36.249	110.3	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	96.67	60	Pass	5490	5530			36.25	DFS 1	44352	Version 3.0
FCC Short Pulse Type 2	30	86.67	60	Pass	5490	5530			36.25	DFS 1	44352	Version 3.0
FCC Short Pulse Type 3	30	76.67	60	Pass	5490	5530			36.25	DFS 1	44352	Version 3.0
FCC Short Pulse Type 4	30	80.00	60	Pass	5490	5530			36.25	DFS 1	44352	Version 3.0
Aggregate		85.00	80	Pass								
FCC Long Pulse Type 5	30	80.00	80	Pass	5490	5530	5494	5526	36.25	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	838	63	A	5510	Yes
1003	1	578	92	A	5510	Yes
1004	1	518	102	A	5510	Yes
1005	1	918	58	A	5510	Yes
1006	1	898	59	A	5510	Yes
1007	1	738	72	A	5510	Yes
1008	1	818	65	A	5510	Yes
1009	1	858	62	A	5510	Yes
1010	1	798	67	A	5510	Yes
1011	1	938	57	A	5510	No
1012	1	598	89	A	5510	Yes
1013	1	538	99	A	5510	Yes
1014	1	758	70	A	5510	Yes
1015	1	558	95	A	5510	Yes
1016	1	2493	22	B	5510	Yes
1017	1	1448	37	B	5510	Yes
1018	1	727	73	B	5510	Yes
1019	1	1166	46	B	5510	Yes
1020	1	1928	28	B	5510	Yes
1021	1	1142	47	B	5510	Yes
1022	1	839	63	B	5510	Yes
1023	1	2731	20	B	5510	Yes
1024	1	2557	21	B	5510	Yes
1025	1	836	64	B	5510	Yes
1026	1	2145	25	B	5510	Yes
1027	1	554	96	B	5510	Yes
1028	1	1992	27	B	5510	Yes
1029	1	1883	29	B	5510	Yes
1030	1	904	59	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	3.3	170	28	5510	Yes
2002	1.3	208	23	5510	Yes
2003	3.9	198	29	5510	No
2004	4.3	160	23	5510	No
2005	1	154	23	5510	Yes
2006	3.5	201	28	5510	Yes
2007	2.7	161	28	5510	Yes
2008	1.3	174	27	5510	Yes
2009	4.7	219	24	5510	Yes
2010	1.6	155	27	5510	Yes
2011	3.4	204	24	5510	Yes
2012	4.6	188	28	5510	Yes
2013	2.4	203	25	5510	Yes
2014	1.9	191	29	5510	Yes
2015	4.1	210	23	5510	Yes
2016	3.8	202	24	5510	No
2017	2	187	26	5510	Yes
2018	4.1	183	27	5510	Yes
2019	4.8	172	26	5510	Yes
2020	3	215	28	5510	Yes
2021	3.8	209	27	5510	Yes
2022	2.2	218	26	5510	Yes
2023	1.4	216	26	5510	Yes
2024	4.1	229	25	5510	Yes
2025	3.4	193	29	5510	Yes
2026	2.5	211	25	5510	Yes
2027	2.1	222	29	5510	Yes
2028	3.3	162	25	5510	Yes
2029	1.1	177	23	5510	No
2030	4.7	165	27	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	7.2	357	17	5510	Yes
3002	6.8	331	18	5510	No
3003	9.8	286	16	5510	Yes
3004	7.3	273	17	5510	No
3005	8.1	492	16	5510	Yes
3006	5.8	374	17	5510	Yes
3007	6.9	355	17	5510	Yes
3008	10	383	16	5510	No
3009	9	376	18	5510	Yes
3010	9.9	417	17	5510	Yes
3011	6.4	306	17	5510	Yes
3012	5.3	359	16	5510	Yes
3013	9.8	394	17	5510	Yes
3014	6.2	460	16	5510	Yes
3015	8.7	256	18	5510	Yes
3016	8	469	18	5510	No
3017	5.6	278	16	5510	Yes
3018	5.2	252	17	5510	Yes
3019	8.2	458	17	5510	Yes
3020	5.7	445	16	5510	No
3021	6.5	413	18	5510	No
3022	9.3	295	16	5510	Yes
3023	5.3	409	17	5510	No
3024	8.4	304	18	5510	Yes
3025	7.4	430	17	5510	Yes
3026	8.3	338	16	5510	Yes
3027	7.5	477	18	5510	Yes
3028	8.8	280	18	5510	Yes
3029	8.2	314	16	5510	Yes
3030	7.3	381	18	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	14.1	428	16	5510	Yes
4002	12.8	389	14	5510	No
4003	18.2	449	15	5510	Yes
4004	17.4	424	13	5510	Yes
4005	18.5	379	12	5510	Yes
4006	18.2	366	15	5510	Yes
4007	19.9	333	15	5510	No
4008	15.4	466	13	5510	Yes
4009	17.6	329	13	5510	Yes
4010	18.9	475	14	5510	No
4011	11.5	351	12	5510	No
4012	13.4	258	16	5510	No
4013	11.9	398	14	5510	Yes
4014	14.3	334	13	5510	Yes
4015	13.2	486	16	5510	Yes
4016	11.4	301	14	5510	No
4017	10.9	348	15	5510	Yes
4018	19.7	310	12	5510	Yes
4019	15	370	13	5510	Yes
4020	14.2	344	16	5510	Yes
4021	15.3	299	15	5510	Yes
4022	15.1	419	16	5510	Yes
4023	16.7	387	13	5510	Yes
4024	12.2	387	12	5510	Yes
4025	14.4	250	16	5510	Yes
4026	15.8	396	13	5510	Yes
4027	18.4	271	15	5510	Yes
4028	10.2	430	14	5510	Yes
4029	18.8	452	12	5510	Yes
4030	11.1	254	12	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	No
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	No
12	5496	Yes
13	5494	No
14	5500	Yes
15	5498	No
16	5499	Yes
17	5497	No
18	5499	Yes
19	5499	Yes
20	5499	Yes
21	5521	Yes
22	5521	Yes
23	5521	Yes
24	5521	Yes
25	5521	Yes
26	5521	No
27	5521	Yes
28	5521	Yes
29	5521	Yes
30	5521	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	174	5490	6	Yes
2	649	5491	11	Yes
3	1124	5492	8	Yes
4	1599	5493	5	Yes
5	2074	5494	8	Yes
6	2549	5495	8	Yes
7	3024	5496	6	Yes
8	3499	5497	10	Yes
9	3974	5498	6	Yes
10	4449	5499	10	Yes
11	4924	5500	10	Yes
12	5399	5501	11	Yes
13	5874	5502	8	Yes
14	6349	5503	5	Yes
15	6824	5504	9	Yes
16	7299	5505	11	Yes
17	7774	5506	12	Yes
18	8249	5507	8	Yes
19	8724	5508	9	Yes
20	9199	5509	10	Yes
21	9674	5510	9	Yes
22	10149	5511	6	Yes
23	10624	5512	5	Yes
24	11099	5513	9	Yes
25	11574	5514	8	Yes
26	12049	5515	4	Yes
27	12524	5516	8	Yes
28	12999	5517	11	Yes
29	13474	5518	8	Yes
30	13949	5519	4	Yes
31	14424	5520	9	Yes
32	14899	5521	11	Yes
33	15374	5522	10	Yes
34	15849	5523	6	Yes
35	16324	5524	7	Yes
36	16799	5525	5	Yes
37	17274	5526	5	Yes
38	17749	5527	8	Yes
39	18224	5528	9	Yes
40	18699	5529	9	Yes
41	19174	5530	12	Yes

5.4. RESULTS FOR 80 MHz BANDWIDTH

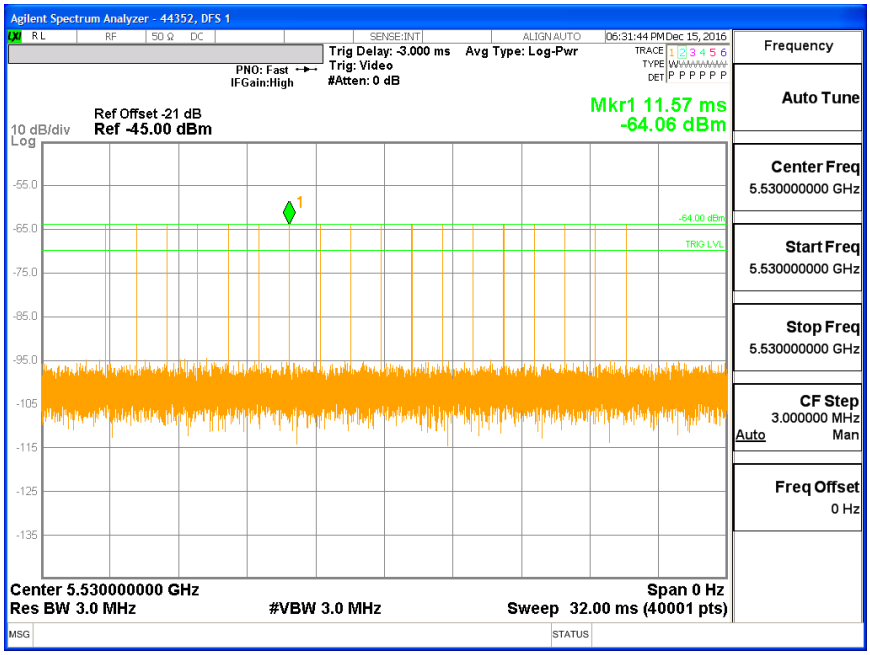
5.4.1. TEST CHANNEL

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

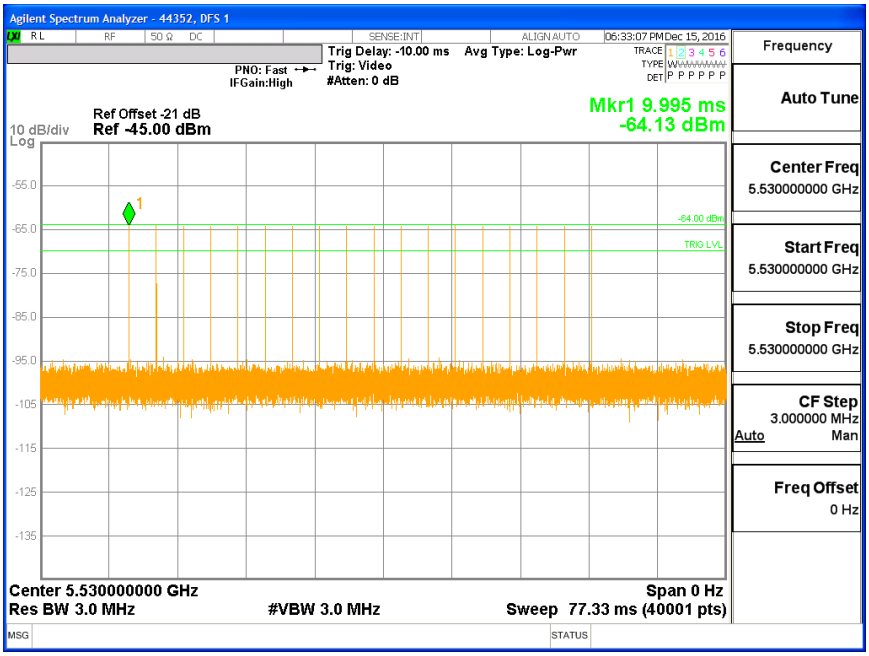
5.4.2. RADAR WAVEFORMS AND TRAFFIC

RADAR WAVEFORMS

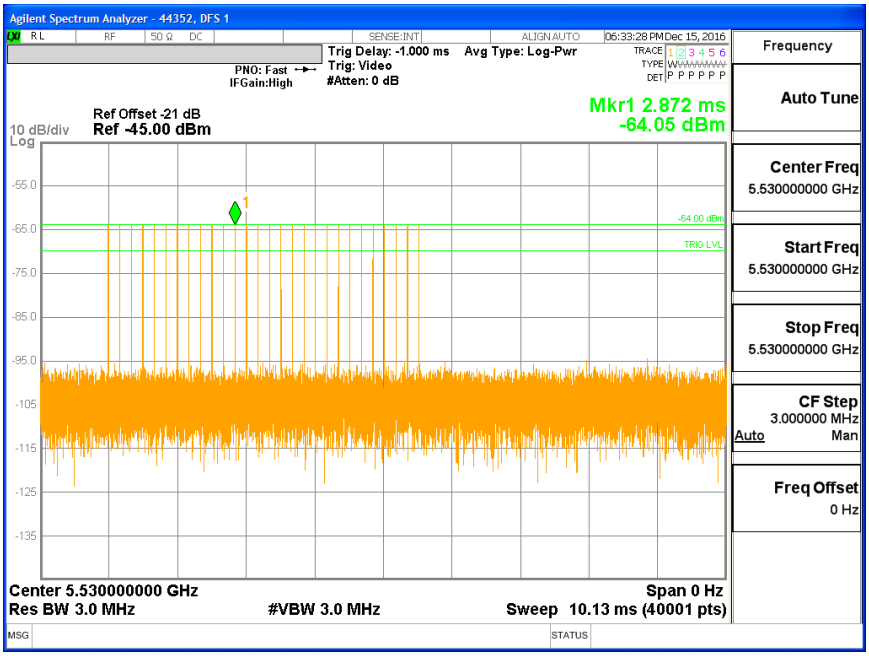
SHORT PULSE RADAR TYPE 0



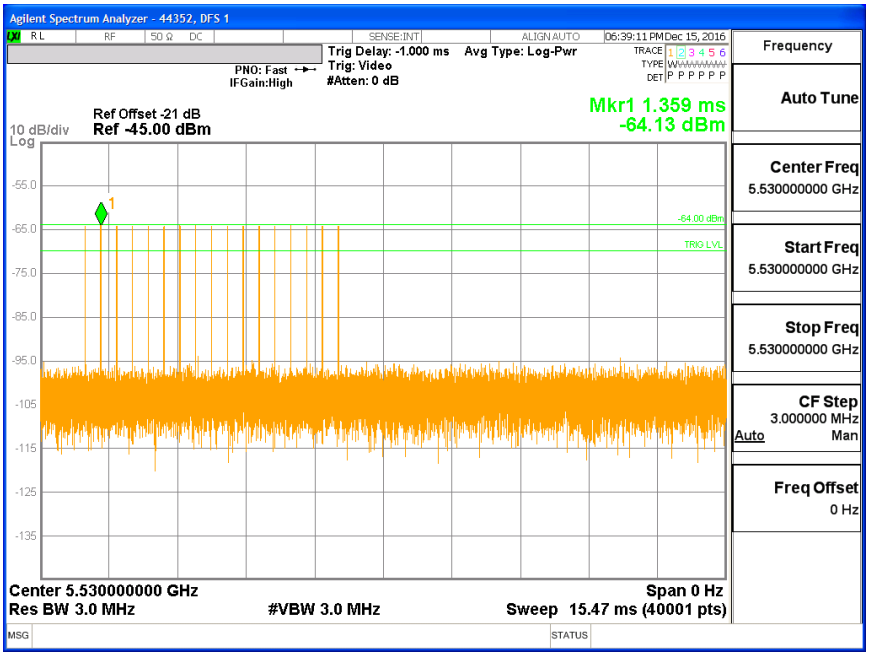
SAMPLE OF RADAR TYPE 1



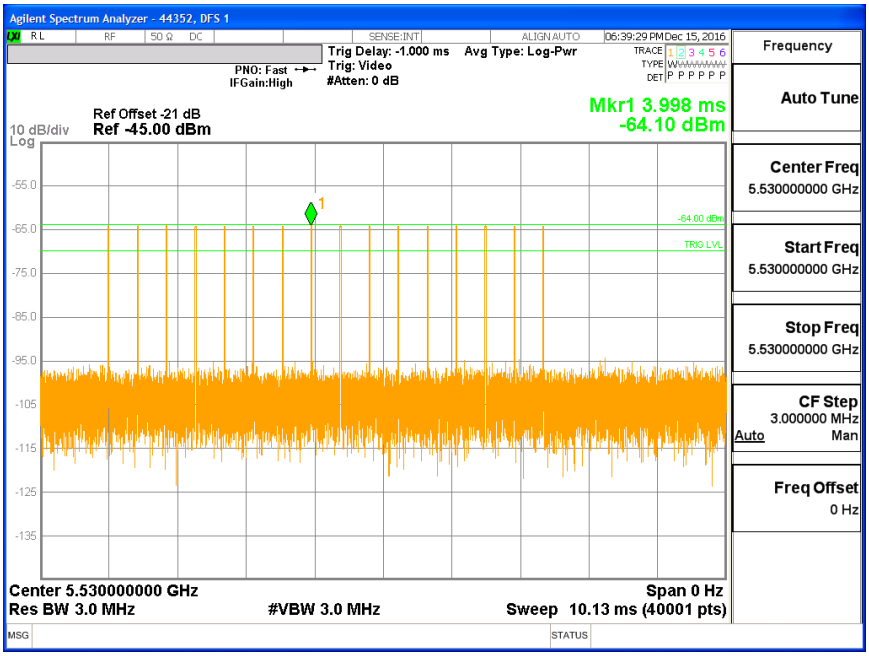
SAMPLE OF RADAR TYPE 2



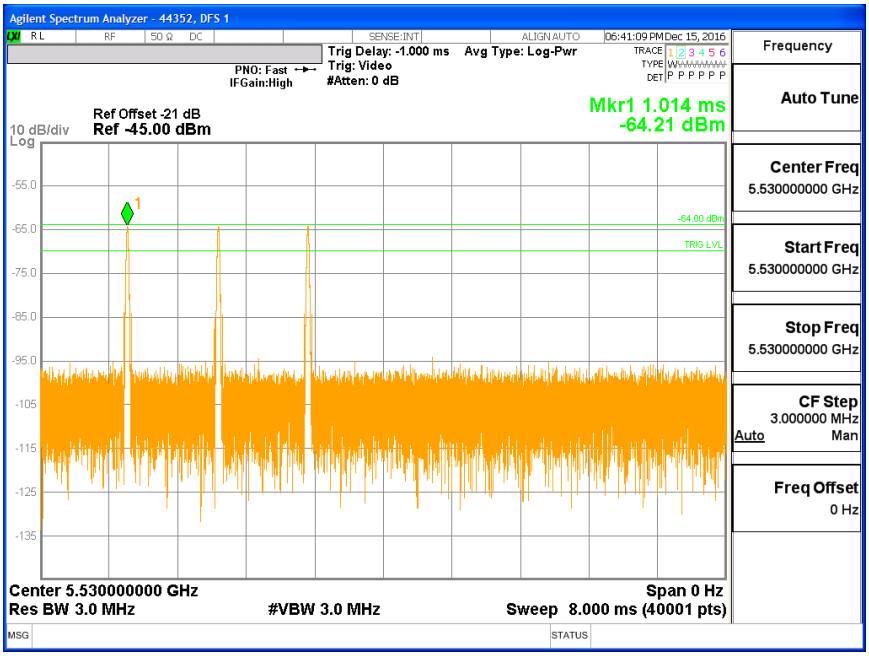
SAMPLE OF RADAR TYPE 3



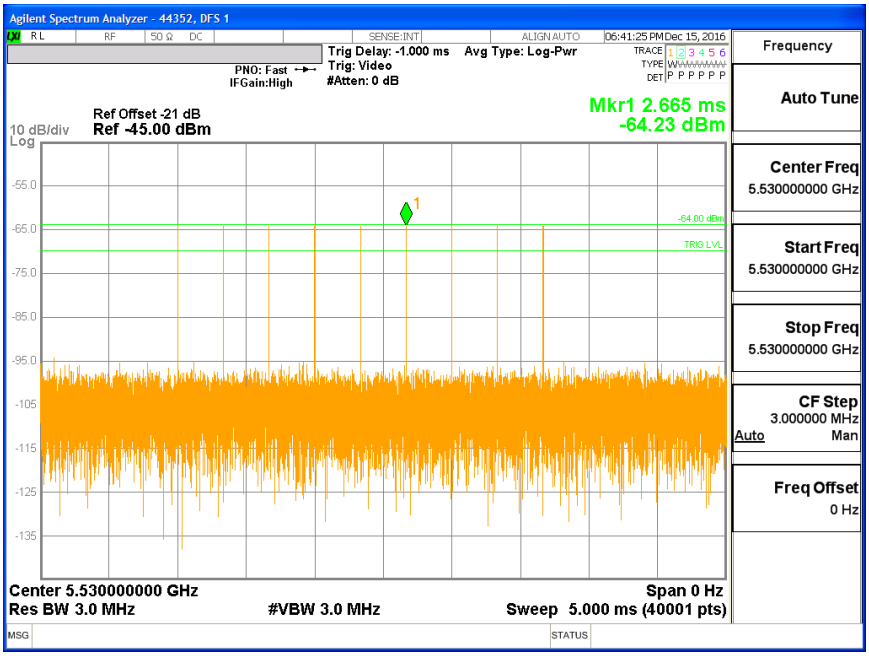
SAMPLE OF RADAR TYPE 4



SAMPLE OF SINGLE BURST OF RADAR TYPE 5

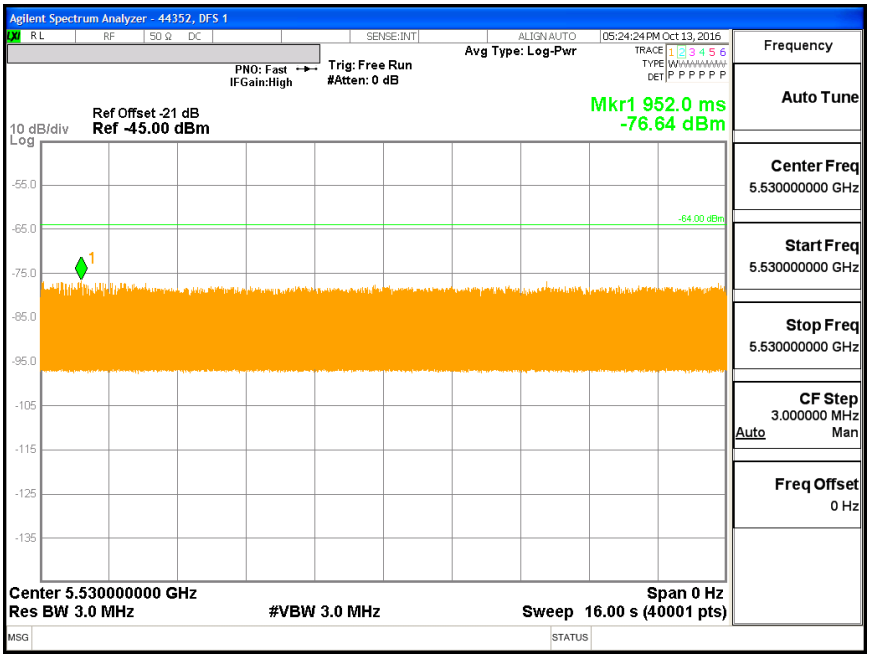


SINGLE BURST OF RADAR TYPE 6

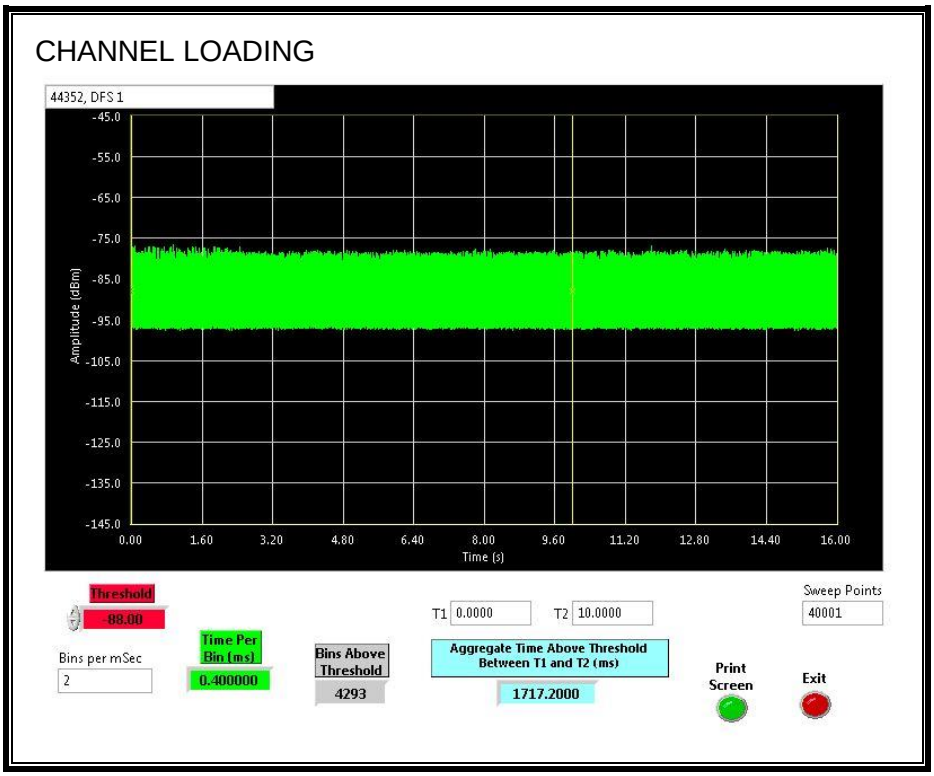


TRAFFIC

TRAFFIC



CHANNEL LOADING



The level of traffic loading on the channel by the EUT is 17.172%

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	64.5	64.5

Radar Near Beginning of CAC

Beginning of CAC (sec)	Timing of Radar Burst (sec)	Radar Relative to Start of CAC (sec)
0	0.968	0.968

Radar Near End of CAC

Beginning of CAC (sec)	Timing of Radar Burst (sec)	Radar Relative to Start of CAC (sec)
0	58.39	58.39

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)
4:26:36	4:27:40	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)
4:33:02	4:33:03	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)
4:39:51	4:40:49	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.

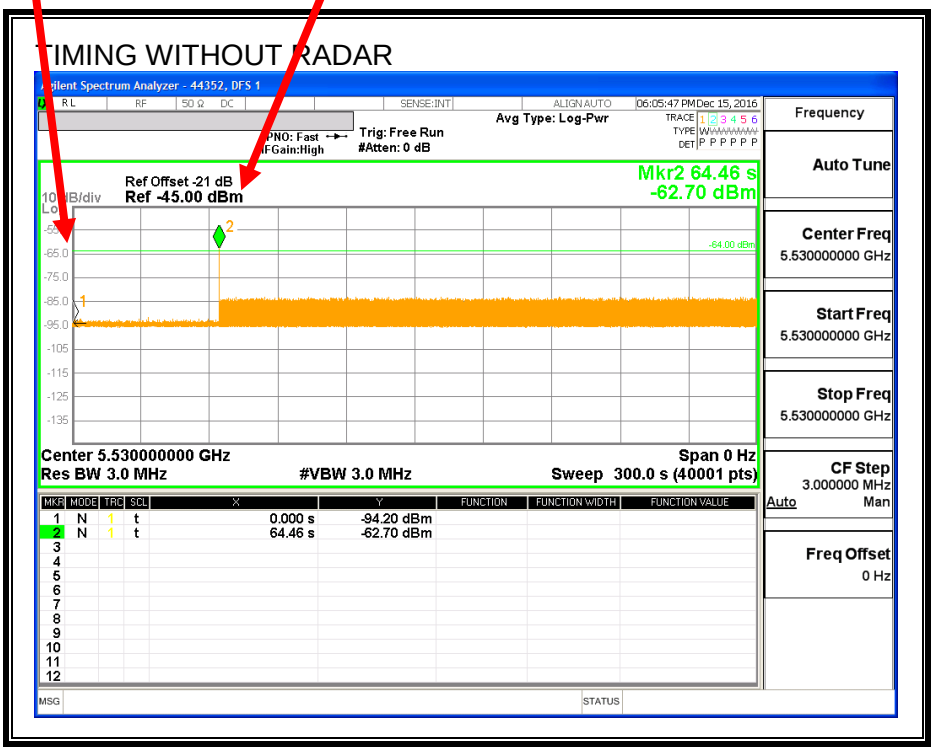
QUALITATIVE RESULTS

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 01 04:26:36 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 01 04:26:36 2016: DOT11: dfs:CAC time 60 (dfs.c:687)

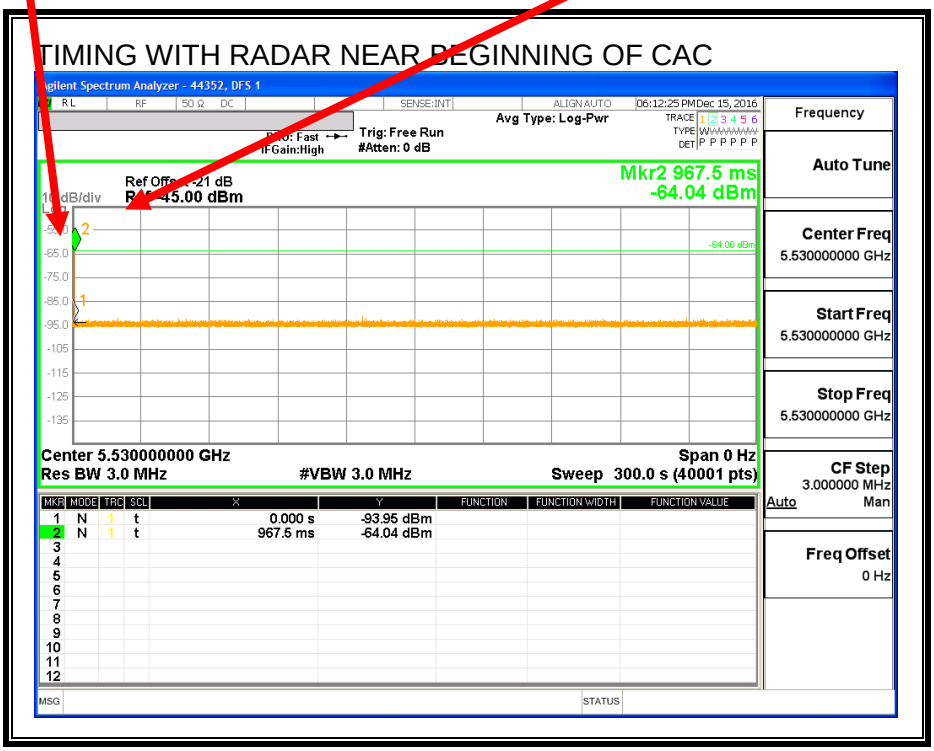
Jan 01 **04:26:36** 2016: ap7602-D19F6C : %RADIO-6-RADAR_SCAN_STARTED: Radar scan on primary channel 100 freq 5500 MHz for a duration 70 secs on radio 'ap7602-D19

Jan 01 **04:27:40** 2016: ap7602-D19F6C : %RADIO-6-RADAR_SCAN_COMPLETED: Radar scan done on primary channel 100 freq 5500 MHz on radio 'ap7602-D19F6C: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 01 04:33:02 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 01 04:33:02 2016: DOT11: dfs:CAC time 60 (dfs.c:687)

Jan 01 **04:33:02** 2016: ap7602-D19F6C : %RADIO-6-RADAR_SCAN_STARTED: Radar scan on primary channel 100 freq 5500 MHz for a duration 70 secs on radio 'ap7602-D19

Jan 01 04:33:03 2016: KERN: WL1: DFS: UNCLASSIFIED ########## radar detected on channel 100/80 ########## Intv=28560, min_pw=30, AT 900MS.

Jan 01 04:33:03 2016: KERN: wl1: dfs : state PRE-ISM Channel Availability Check, detected radar on channel 106: Activating jump channel: 40.

Jan 01 04:33:03 2016: DOT11: %%%%>dfs:Radar reported on channel 100 Freq 5500 MHz by radio_idx 1 (dfs.c:302)

Jan 01 04:33:03 2016: DOT11: dfs:Chosen Dfs jump channel:157 (dfs.c:1179)

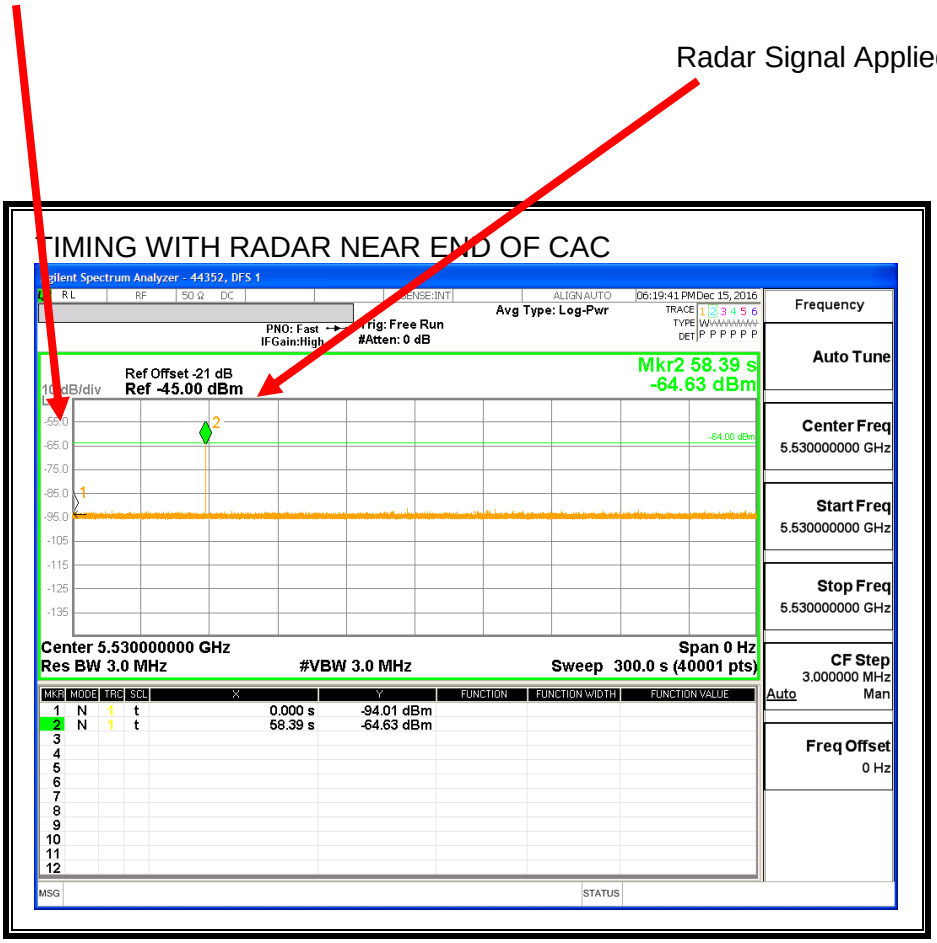
Jan 01 **04:33:03** 2016: ap7602-D19F6C : %RADIO-4-RADAR_DETECTED: Radar found on Radio 2 channel 100 width 80 freq 5500 MHz

Jan 01 04:33:03 2016: ap7602-D19F6C : %RADIO-4-RADAR_DET_INFO: Radar info: Radio: 'ap7602-D19F6C:R2'. New channel: 40 freq 5200 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 01 04:39:51 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 01 04:39:51 2016: DOT11: dfs:CAC time 60 (dfs.c:687)

Jan 01 **04:39:51** 2016: ap7602-D19F6C : %RADIO-6-RADAR_SCAN_STARTED: Radar scan on primary channel 100 freq 5500 MHz for a duration 70 secs on radio 'ap7602-D19

Jan 01 04:40:49 2016: KERN: WL1: DFS: UNCLASSIFIED ########## radar detected on channel 100/80 ########## Intv=28560, min_pw=30, AT 54450MS.

Jan 01 04:40:49 2016: KERN: wl1: dfs : state PRE-ISM Channel Availability Check, detected radar on channel 106: Activating jump channel: 165.

Jan 01 04:40:49 2016: DOT11: %%%%>dfs:Radar reported on channel 100 Freq 5500 MHz by radio_idx 1 (dfs.c:302)

Jan 01 04:40:49 2016: DOT11: dfs:Chosen Dfs jump channel:44 (dfs.c:1179)

Jan 01 **04:40:49** 2016: ap7602-D19F6C : %RADIO-4-RADAR_DETECTED: Radar found on Radio 2 channel 100 width 80 freq 5500 MHz

Jan 01 04:40:49 2016: ap7602-D19F6C : %RADIO-4-RADAR_DET_INFO: Radar info: Radio: 'ap7602-D19F6C:R2'. New channel: 165 freq 5825 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)

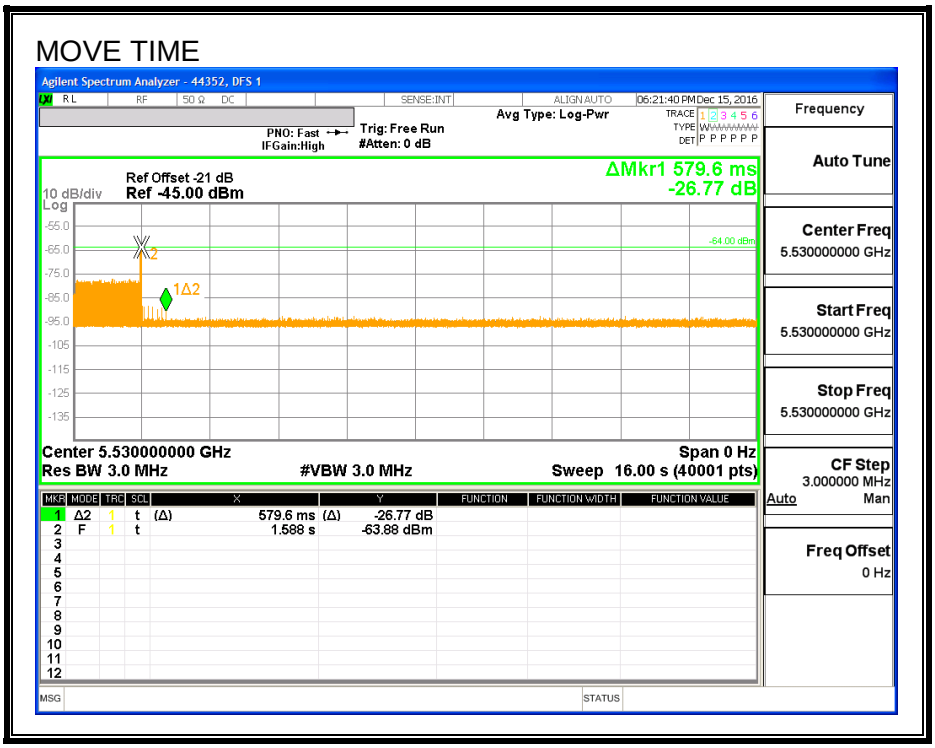
The observation period over which the aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

RESULTS

Channel Move Time (sec)	Limit (sec)
0.580	10

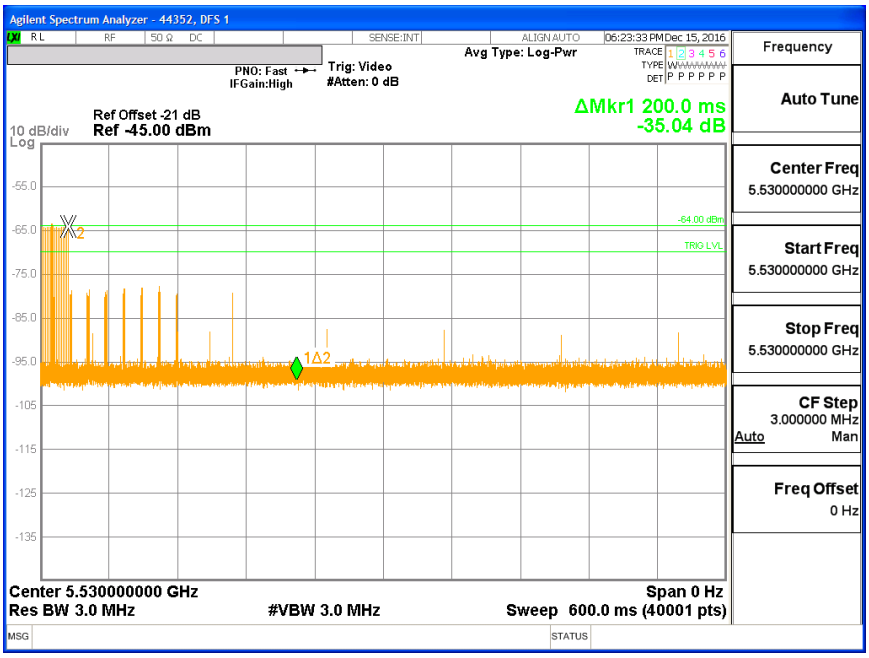
Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
1.6	60

MOVE TIME



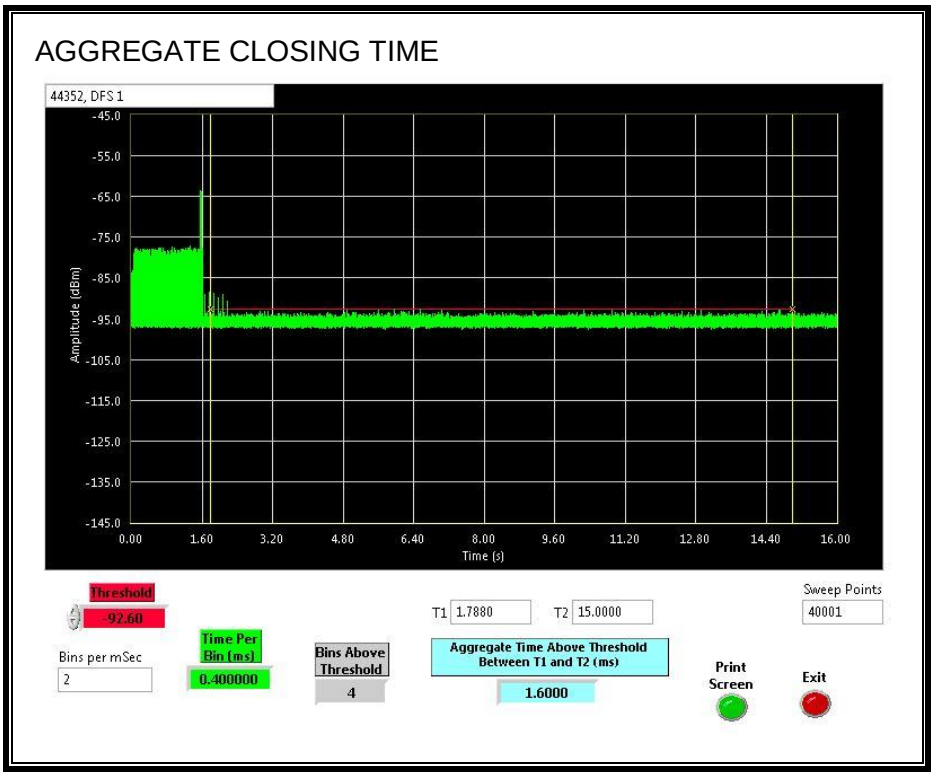
CHANNEL CLOSING TIME

CLOSING TIME



AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

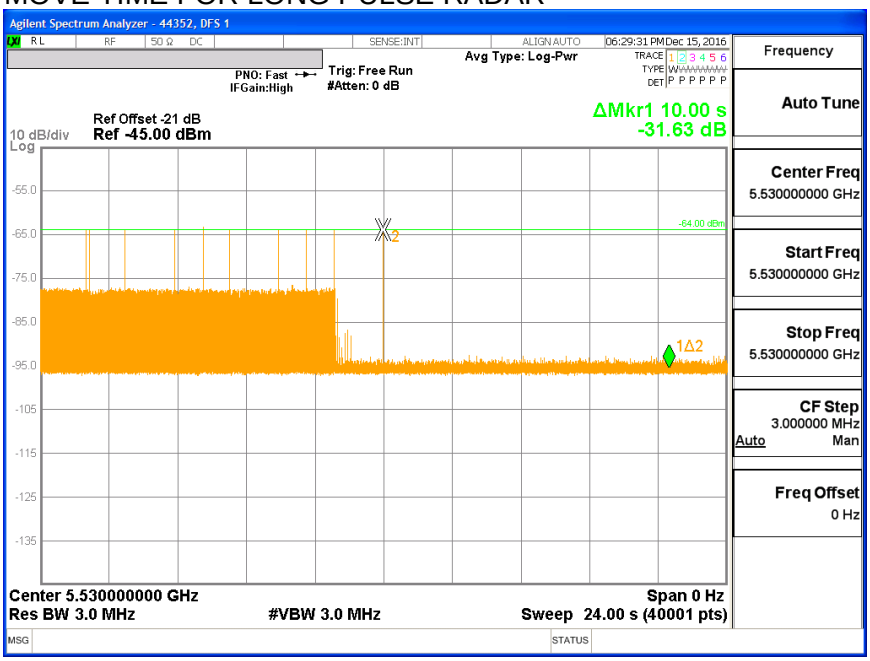
No transmissions are observed during the aggregate monitoring period.



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

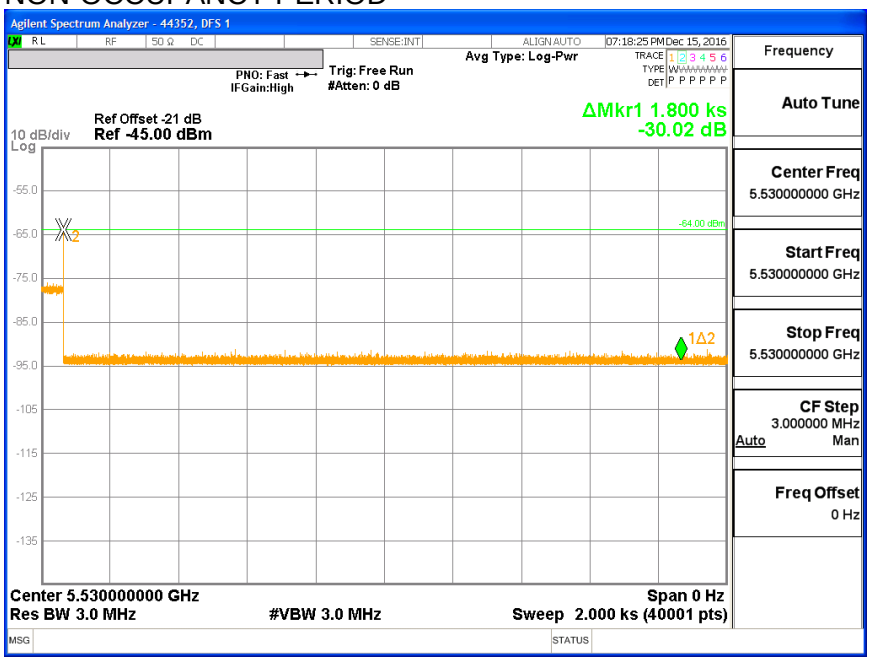


5.4.6. NON-OCCUPANCY PERIOD

RESULTS

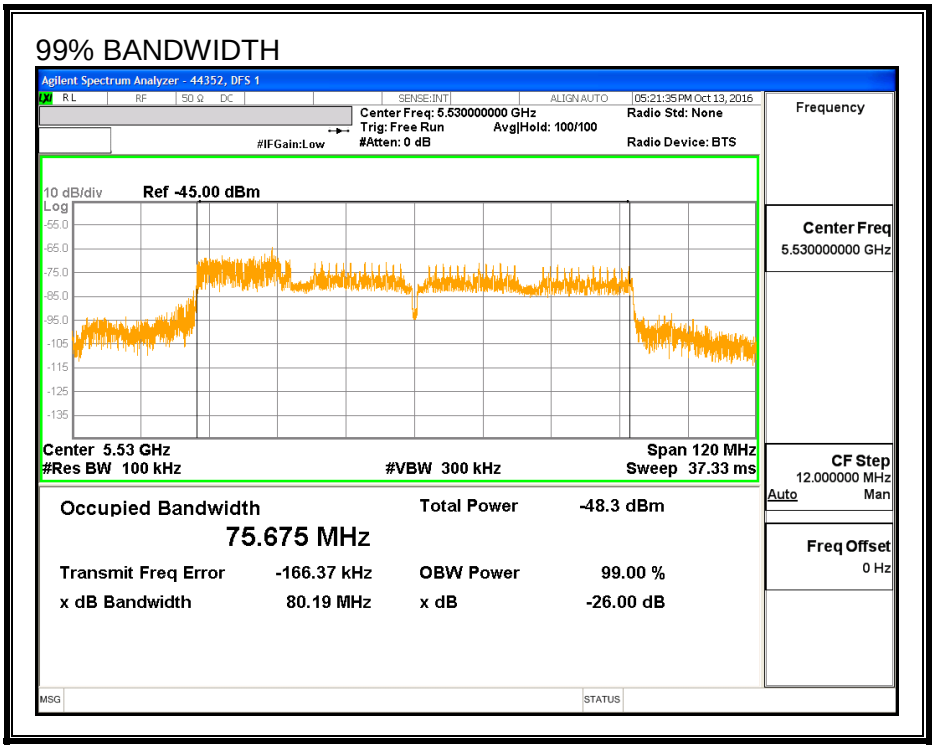
No EUT transmissions were observed on the test channel during the 30-minute observation time.

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 (%)
5490	5569	79	75.675	104.4	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
5491	10	10	100	
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	10	100	FH
5570	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	100.00	60	Pass	5490	5569			75.67	DFS 1	44352	Version 3.0
FCC Short Pulse Type 2	30	100.00	60	Pass	5490	5569			75.67	DFS 1	44352	Version 3.0
FCC Short Pulse Type 3	30	100.00	60	Pass	5490	5569			75.67	DFS 1	44352	Version 3.0
FCC Short Pulse Type 4	30	93.33	60	Pass	5490	5569			75.67	DFS 1	44352	Version 3.0
Aggregate		98.33	80	Pass								
FCC Long Pulse Type 5	30	83.33	80	Pass	5490	5569	5498	5561	75.67	DFS 1	44352	Version 3.0
FCC Hopping Type 6	80	98.75	70	Pass	5490	5569				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	Yes
1002	1	838	63	A	5530	Yes
1003	1	578	92	A	5530	Yes
1004	1	518	102	A	5530	Yes
1005	1	918	58	A	5530	Yes
1006	1	898	59	A	5530	Yes
1007	1	738	72	A	5530	Yes
1008	1	818	65	A	5530	Yes
1009	1	858	62	A	5530	Yes
1010	1	798	67	A	5530	Yes
1011	1	938	57	A	5530	Yes
1012	1	598	89	A	5530	Yes
1013	1	538	99	A	5530	Yes
1014	1	758	70	A	5530	Yes
1015	1	558	95	A	5530	Yes
1016	1	2493	22	B	5530	Yes
1017	1	1448	37	B	5530	Yes
1018	1	727	73	B	5530	Yes
1019	1	1166	46	B	5530	Yes
1020	1	1928	28	B	5530	Yes
1021	1	1142	47	B	5530	Yes
1022	1	839	63	B	5530	Yes
1023	1	2731	20	B	5530	Yes
1024	1	2557	21	B	5530	Yes
1025	1	836	64	B	5530	Yes
1026	1	2145	25	B	5530	Yes
1027	1	554	96	B	5530	Yes
1028	1	1992	27	B	5530	Yes
1029	1	1883	29	B	5530	Yes
1030	1	904	59	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	3.3	170	28	5530	Yes
2002	1.3	208	23	5530	Yes
2003	3.9	198	29	5530	Yes
2004	4.3	160	23	5530	Yes
2005	1	154	23	5530	Yes
2006	3.5	201	28	5530	Yes
2007	2.7	161	28	5530	Yes
2008	1.3	174	27	5530	Yes
2009	4.7	219	24	5530	Yes
2010	1.6	155	27	5530	Yes
2011	3.4	204	24	5530	Yes
2012	4.6	188	28	5530	Yes
2013	2.4	203	25	5530	Yes
2014	1.9	191	29	5530	Yes
2015	4.1	210	23	5530	Yes
2016	3.8	202	24	5530	Yes
2017	2	187	26	5530	Yes
2018	4.1	183	27	5530	Yes
2019	4.8	172	26	5530	Yes
2020	3	215	28	5530	Yes
2021	3.8	209	27	5530	Yes
2022	2.2	218	26	5530	Yes
2023	1.4	216	26	5530	Yes
2024	4.1	229	25	5530	Yes
2025	3.4	193	29	5530	Yes
2026	2.5	211	25	5530	Yes
2027	2.1	222	29	5530	Yes
2028	3.3	162	25	5530	Yes
2029	1.1	177	23	5530	Yes
2030	4.7	165	27	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	7.2	357	17	5530	Yes
3002	6.8	331	18	5530	Yes
3003	9.8	286	16	5530	Yes
3004	7.3	273	17	5530	Yes
3005	8.1	492	16	5530	Yes
3006	5.8	374	17	5530	Yes
3007	6.9	355	17	5530	Yes
3008	10	383	16	5530	Yes
3009	9	376	18	5530	Yes
3010	9.9	417	17	5530	Yes
3011	6.4	306	17	5530	Yes
3012	5.3	359	16	5530	Yes
3013	9.8	394	17	5530	Yes
3014	6.2	460	16	5530	Yes
3015	8.7	256	18	5530	Yes
3016	8	469	18	5530	Yes
3017	5.6	278	16	5530	Yes
3018	5.2	252	17	5530	Yes
3019	8.2	458	17	5530	Yes
3020	5.7	445	16	5530	Yes
3021	6.5	413	18	5530	Yes
3022	9.3	295	16	5530	Yes
3023	5.3	409	17	5530	Yes
3024	8.4	304	18	5530	Yes
3025	7.4	430	17	5530	Yes
3026	8.3	338	16	5530	Yes
3027	7.5	477	18	5530	Yes
3028	8.8	280	18	5530	Yes
3029	8.2	314	16	5530	Yes
3030	7.3	381	18	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	14.1	428	16	5530	Yes
4002	12.8	389	14	5530	Yes
4003	18.2	449	15	5530	No
4004	17.4	424	13	5530	Yes
4005	18.5	379	12	5530	Yes
4006	18.2	366	15	5530	Yes
4007	19.9	333	15	5530	Yes
4008	15.4	466	13	5530	Yes
4009	17.6	329	13	5530	Yes
4010	18.9	475	14	5530	Yes
4011	11.5	351	12	5530	Yes
4012	13.4	258	16	5530	Yes
4013	11.9	398	14	5530	Yes
4014	14.3	334	13	5530	Yes
4015	13.2	486	16	5530	Yes
4016	11.4	301	14	5530	Yes
4017	10.9	348	15	5530	Yes
4018	19.7	310	12	5530	Yes
4019	15	370	13	5530	No
4020	14.2	344	16	5530	Yes
4021	15.3	299	15	5530	Yes
4022	15.1	419	16	5530	Yes
4023	16.7	387	13	5530	Yes
4024	12.2	387	12	5530	Yes
4025	14.4	250	16	5530	Yes
4026	15.8	396	13	5530	Yes
4027	18.4	271	15	5530	Yes
4028	10.2	430	14	5530	Yes
4029	18.8	452	12	5530	Yes
4030	11.1	254	12	5530	Yes

TYPE 5 DETECTION PROBABILITY

Data Sheet for FCC Long Pulse Radar Type 5		
Trial	Frequency (MHz)	Successful Detection (Yes/No)
1	5530	No
2	5530	No
3	5530	Yes
4	5530	Yes
5	5530	Yes
6	5530	Yes
7	5530	Yes
8	5530	No
9	5530	Yes
10	5530	Yes
11	5500	Yes
12	5496	Yes
13	5495	Yes
14	5500	Yes
15	5499	Yes
16	5500	Yes
17	5497	Yes
18	5500	Yes
19	5499	No
20	5500	Yes
21	5561	Yes
22	5561	No
23	5561	Yes
24	5561	Yes
25	5561	Yes
26	5561	Yes
27	5561	Yes
28	5561	Yes
29	5561	Yes
30	5561	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	263	5490	17	No
2	738	5491	18	Yes
3	1213	5492	18	Yes
4	1688	5493	18	Yes
5	2163	5494	10	Yes
6	2638	5495	15	Yes
7	3113	5496	16	Yes
8	3588	5497	14	Yes
9	4063	5498	16	Yes
10	4538	5499	10	Yes
11	5013	5500	15	Yes
12	5488	5501	20	Yes
13	5963	5502	20	Yes
14	6438	5503	15	Yes
15	6913	5504	22	Yes
16	7388	5505	18	Yes
17	7863	5506	22	Yes
18	8338	5507	12	Yes
19	8813	5508	13	Yes
20	9288	5509	13	Yes
21	9763	5510	20	Yes
22	10238	5511	13	Yes
23	10713	5512	14	Yes
24	11188	5513	20	Yes
25	11663	5514	16	Yes
26	12138	5515	16	Yes
27	12613	5516	14	Yes
28	13088	5517	15	Yes
29	13563	5518	12	Yes
30	14038	5519	21	Yes
31	14513	5520	15	Yes
32	14988	5521	14	Yes
33	15463	5522	12	Yes
34	15938	5523	19	Yes
35	16413	5524	18	Yes
36	16888	5525	18	Yes
37	17363	5526	13	Yes
38	17838	5527	18	Yes
39	18313	5528	15	Yes

TYPE 6 DETECTION PROBABILITY (CONTINUED)

40	18788	5529	14	Yes
41	19263	5530	12	Yes
42	19738	5531	21	Yes
43	20213	5532	18	Yes
44	20688	5533	25	Yes
45	21163	5534	19	Yes
46	21638	5535	20	Yes
47	22113	5536	16	Yes
48	22588	5537	23	Yes
49	23063	5538	21	Yes
50	23538	5539	27	Yes
51	24013	5540	12	Yes
52	24488	5541	8	Yes
53	24963	5542	13	Yes
54	25438	5543	17	Yes
55	25913	5544	12	Yes
56	26388	5545	15	Yes
57	26863	5546	15	Yes
58	27338	5547	23	Yes
59	27813	5548	14	Yes
60	28288	5549	20	Yes
61	28763	5550	15	Yes
62	29238	5551	15	Yes
63	29713	5552	18	Yes
64	30188	5553	20	Yes
65	30663	5554	16	Yes
66	31138	5555	14	Yes
67	31613	5556	12	Yes
68	32088	5557	20	Yes
69	32563	5558	14	Yes
70	33038	5559	14	Yes
71	33513	5560	23	Yes
72	33988	5561	12	Yes
73	34463	5562	14	Yes
74	34938	5563	15	Yes
75	35413	5564	16	Yes
76	35888	5565	23	Yes
77	36363	5566	15	Yes
78	36838	5567	17	Yes
79	37313	5568	14	Yes
80	37788	5569	20	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.