DFS PORTION of FCC 47 CFR PART 15 SUBPART E
DFS PORTION of INDUSTRY CANADA RSS-247 ISSUE 1

CERTIFICATION TEST REPORT

FOR

e500 FIXED OUTDOOR 802.11ac ACCESS POINT

MODEL NUMBER: C000100P500A

FCC ID: Z8H89FT0023
IC: 109W-0023

REPORT NUMBER: 16N23120-E1V1

ISSUE DATE: MARCH 25, 2016

Prepared for
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3800 GOLF ROAD
ROLLING MEADOWS, IL 60008-4023, U.S.A.

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	03/25/16	Initial Issue	Conan Cheung

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: CAMBIUM NETWORKS
3800 GOLF ROAD
ROLLING MEADOWS, IL 60008-4023, U.S.A.

EUT DESCRIPTION: e500 FIXED OUTDOOR 802.11ac ACCESS POINT

MODEL: C000100P500A

SERIAL NUMBER: 000456AF8E60

DATE TESTED: March 02 to 03, 2016

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
DFS Portion of CFR 47 Part 15 Subpart E	Pass
INDUSTRY CANADA RSS-247 Issue 1	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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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 1.

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%.

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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 1

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”.

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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.		

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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.

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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

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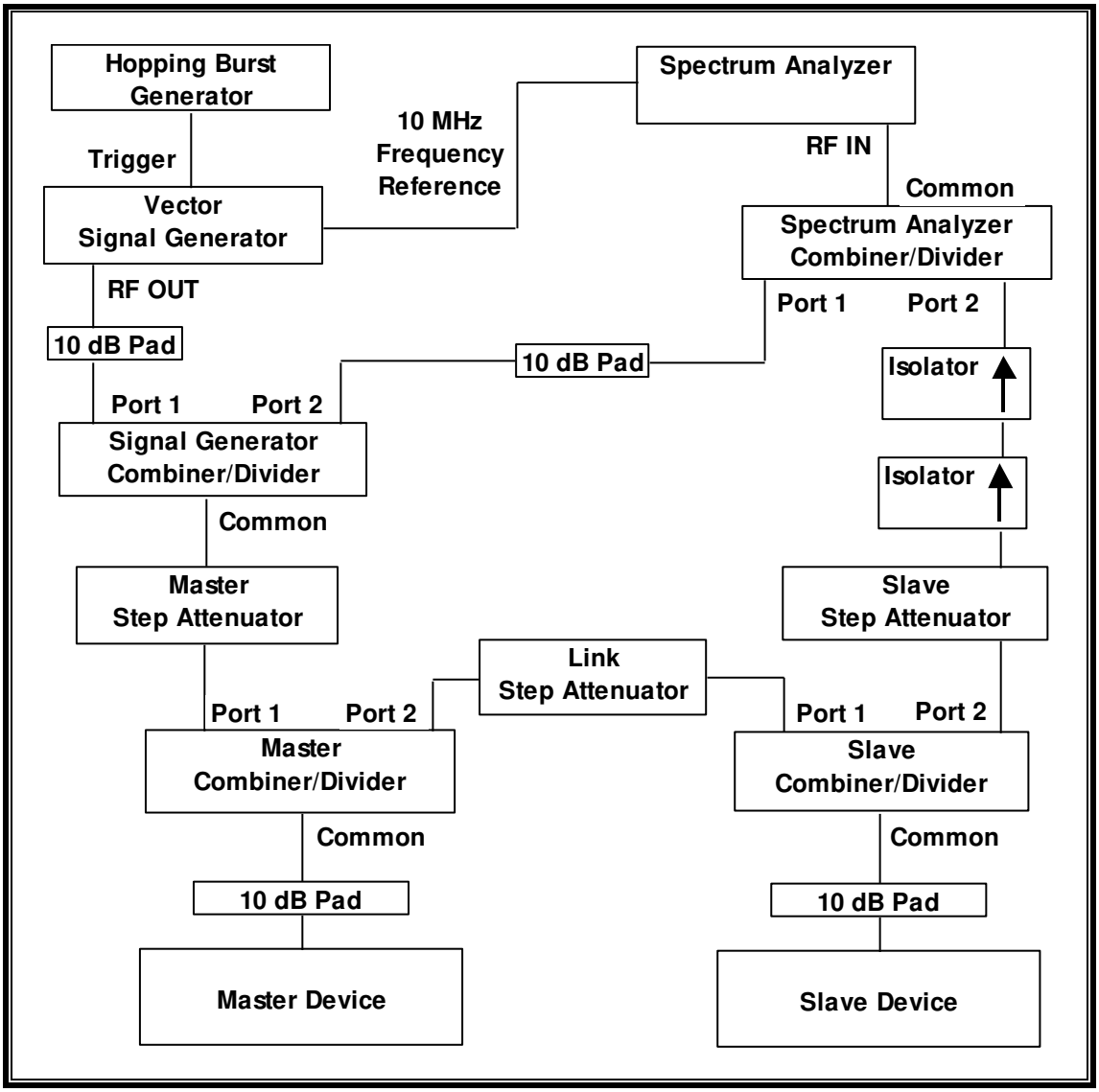
5.1.2. TEST AND MEASUREMENT SYSTEM

CONDUCTED METHOD SYSTEM BLOCK DIAGRAM



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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.

Should multiple RF ports be utilized for the Master and/or Slave devices (for example, for diversity or MIMO implementations), additional combiner/dividers are inserted between the Master Combiner/Divider and the pad connected to the Master Device (and/or between the Slave Combiner/Divider and the pad connected to the Slave Device). Additional pads are utilized such that there is one pad at each RF port on each EUT.

SYSTEM CALIBRATION

A 50-ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected in place of the master device. 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.

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ADJUSTMENT OF DISPLAYED TRAFFIC LEVEL

A link is established between the Master and Slave and the Link Step Attenuator 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 WLAN traffic level, as displayed on the spectrum analyzer, is confirmed to be at lower amplitude than the radar detection threshold and is confirmed to be the Radar Detection Device rather than the associated device. If a different setting of the Master Step Attenuator is required to meet the above conditions, a new System Calibration is performed for the new Master Step Attenuator setting.

TEST AND MEASUREMENT EQUIPMENT

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

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
P.O.E.Injector (EUT)	Cambium Networks	NET-P30-56	No Serial Number	DoC
Notebook PC (Controller)	Motorola	HK1322	3433JC0021	DoC
AC Adapter (Controller PC)	Motorola	AD-C019M-M	A050300091	DoC
High Gain Wifi 802.11ac USB Adapter (Slave)	Netgear	A6210	48415A5406120	PY313400249
Notebook PC (Host)	Motorola	ML900	3433FQ0285	DoC
AC Adapter (Hostt PC)	Hipro	HP-OW120F13	F3-070900274301	DoC

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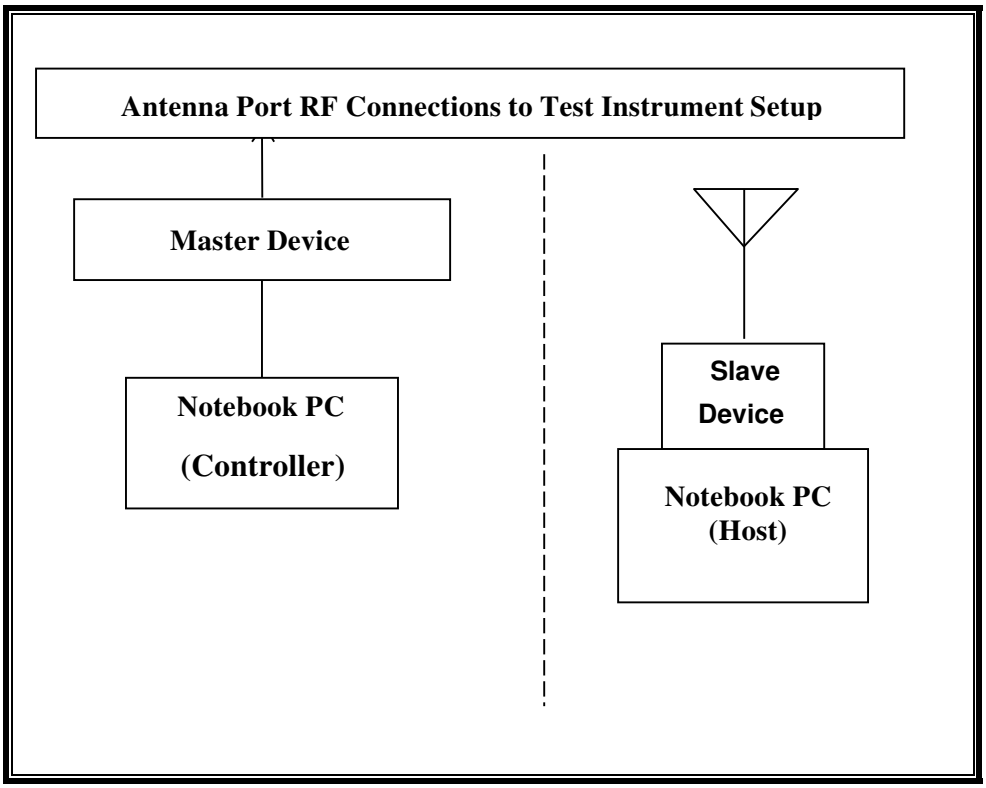
5.1.3. SETUP OF EUT

CONDUCTED 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**
P.O.E.Injector (EUT)	Cambium Networks	NET-P30-56	No Serial Number	DoC
Notebook PC (Controller)	Motorola	HK1322	3433JC0021	DoC
AC Adapter (Controller PC)	Motorola	AD-C019M-M	A050300091	DoC
High Gain Wifi 802.11ac USB Adapter (Slave)	Netgear	A6210	48415A5406120	PY313400249
Notebook PC (Host)	Motorola	ML900	3433FQ0285	DoC
AC Adapter (Hostt PC)	Hipro	HP-OW120F13	F3-070900274301	DoC

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5.1.1. 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 is a Master Device.

The highest power level within these bands is 30.0 dBm EIRP in the 5250-5350 MHz band and 30.0 dBm EIRP in the 5470-5725 MHz band.

The only antenna assembly utilized with the EUT has a gain of 5.0 dBi.

Two identical orthogonally polarized 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 antenna gain and procedural adjustments, the required conducted threshold at the antenna port is –64 + 5 + 1 = -58 dBm.

The EUT was tested with a client declared worst-case gain of 0 dBi.

The calibrated conducted DFS Detection Threshold level is set to –63 dBm. The tested level is lower than the required level hence it provides a margin to the limit.

The EUT uses one transmitter/receiver chain connected to a 50-ohm coaxial antenna port. All antenna ports are connected to the test system via a power divider to perform conducted 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 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 revision 2.0-A0 build 2016-02-17.

UNIFORM CHANNEL SPREADING

This function is not required per KDB 905462.

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5.2. RESULTS FOR 20 MHz BANDWIDTH

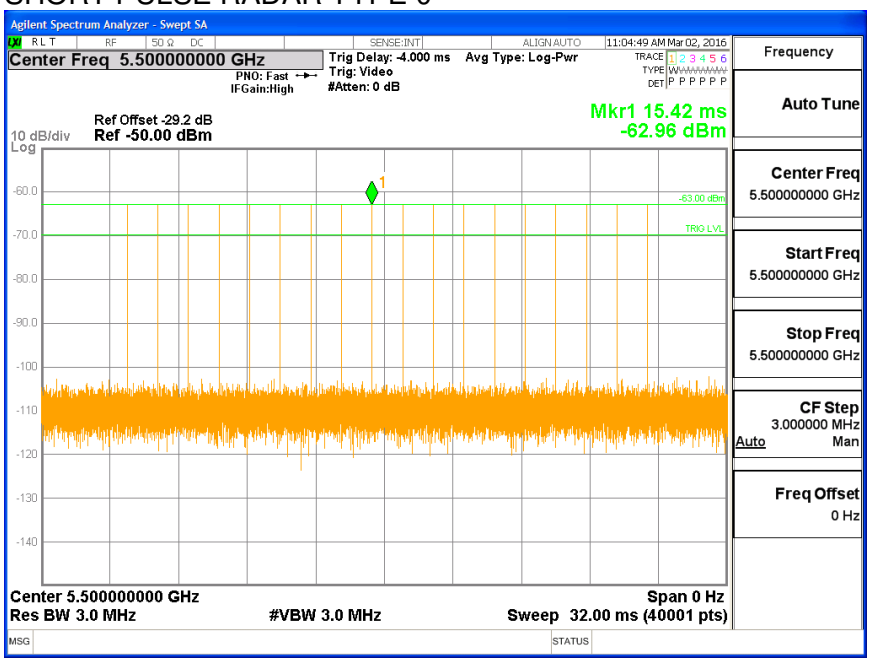
5.2.1. TEST CHANNEL

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



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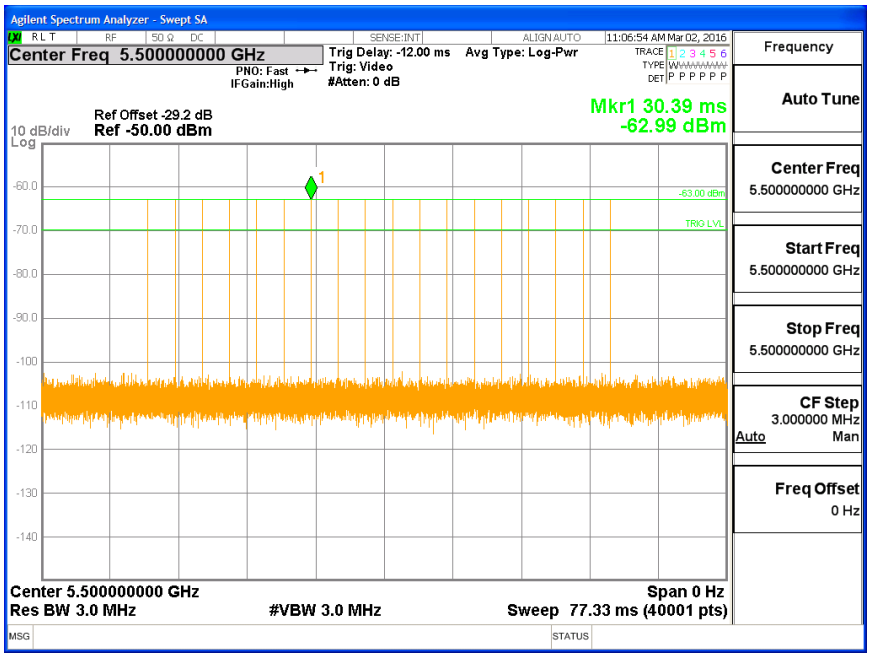
SAMPLE OF RADAR TYPE 1



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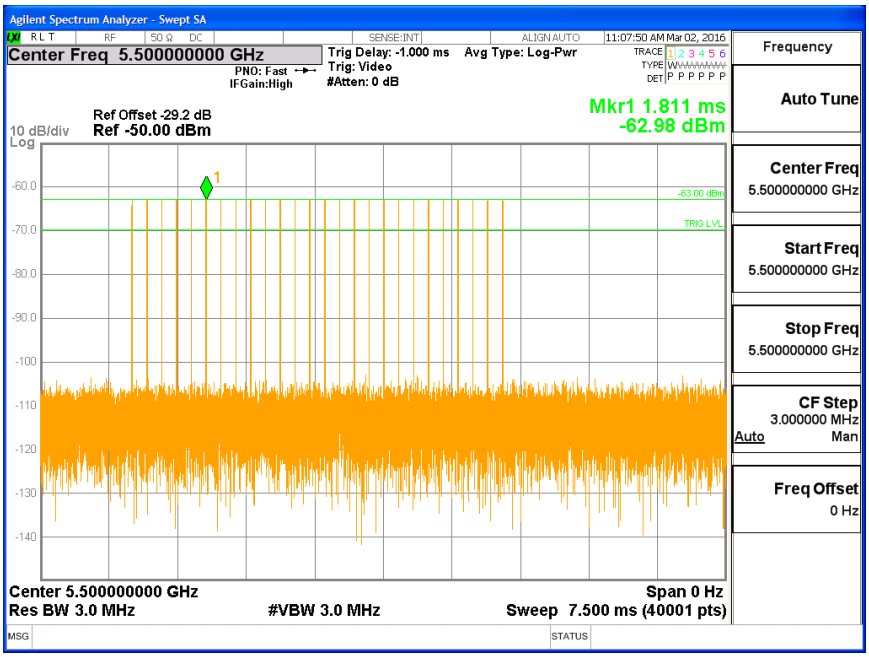
SAMPLE OF RADAR TYPE 2



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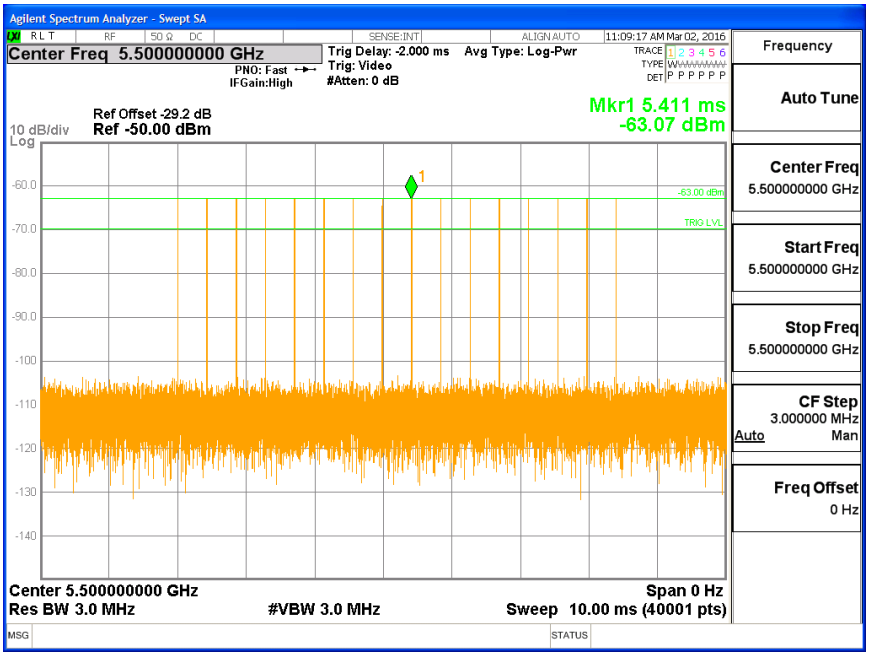
SAMPLE OF RADAR TYPE 3



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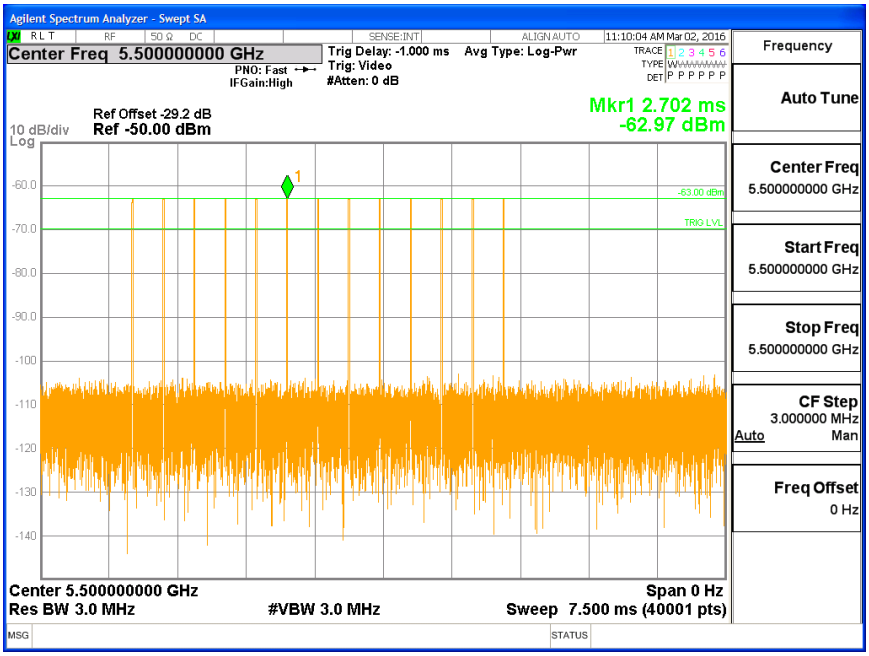
SAMPLE OF RADAR TYPE 4



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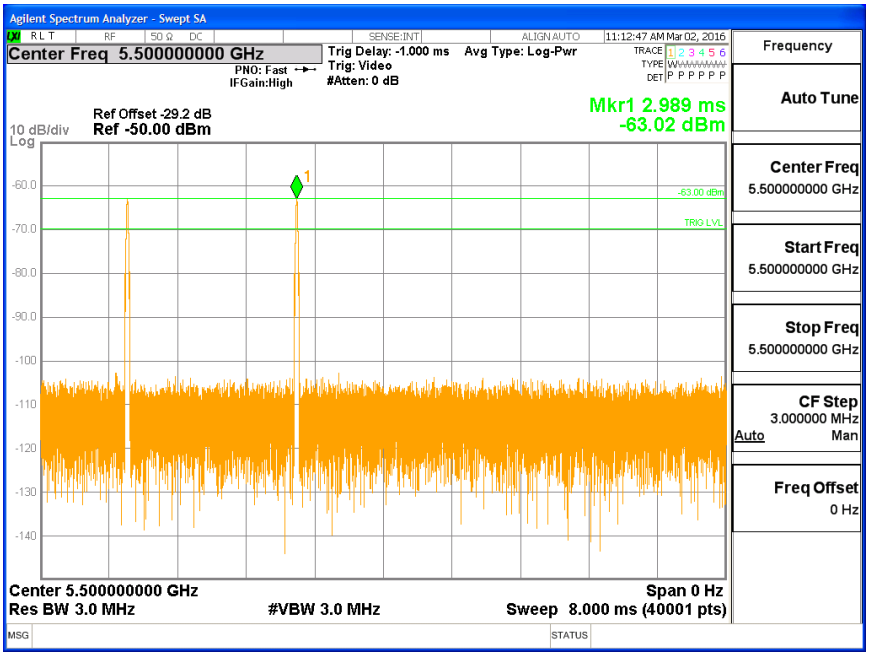
SAMPLE OF SINGLE BURST OF RADAR TYPE 5



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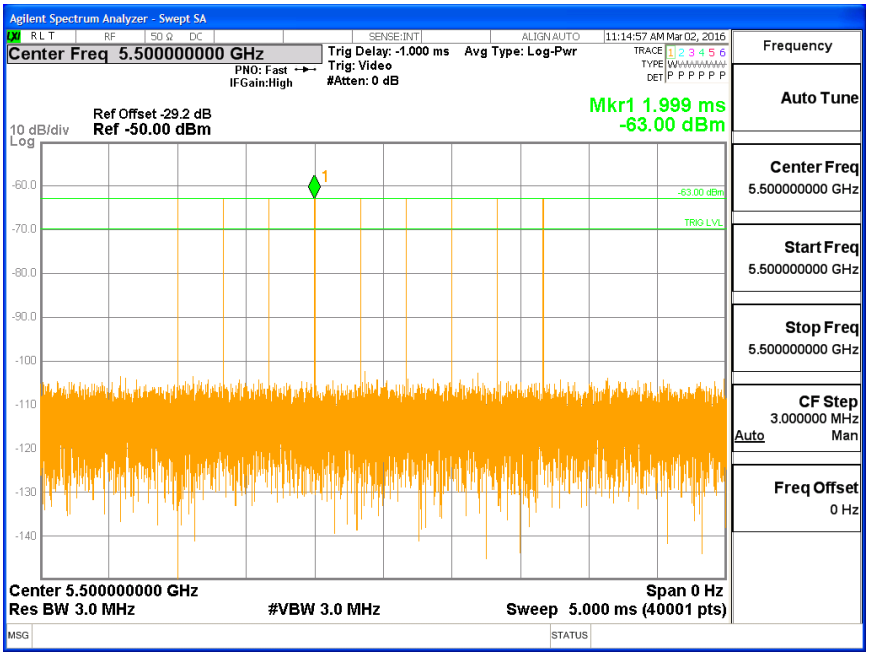
SINGLE BURST OF RADAR TYPE 6



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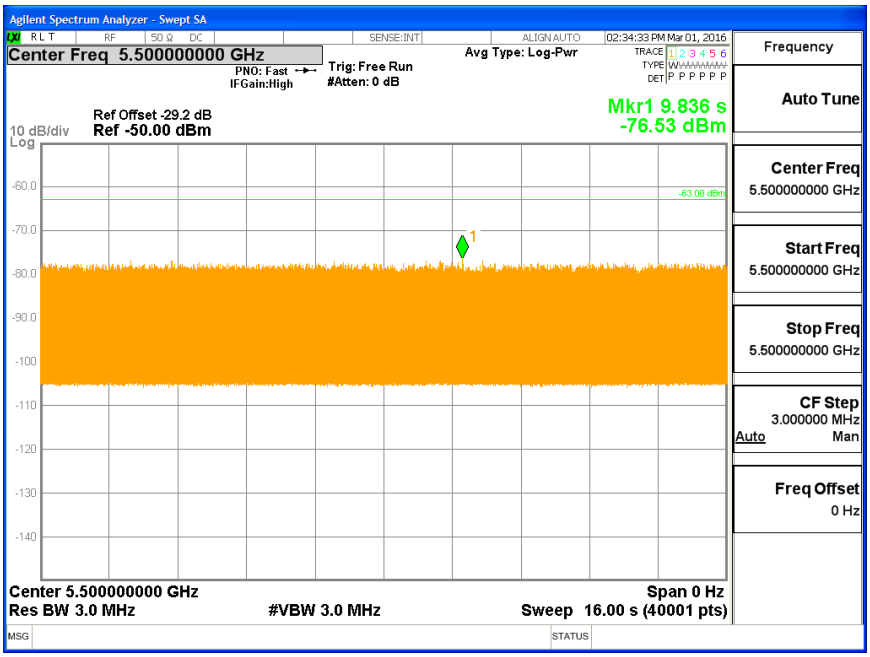
TRAFFIC

TRAFFIC



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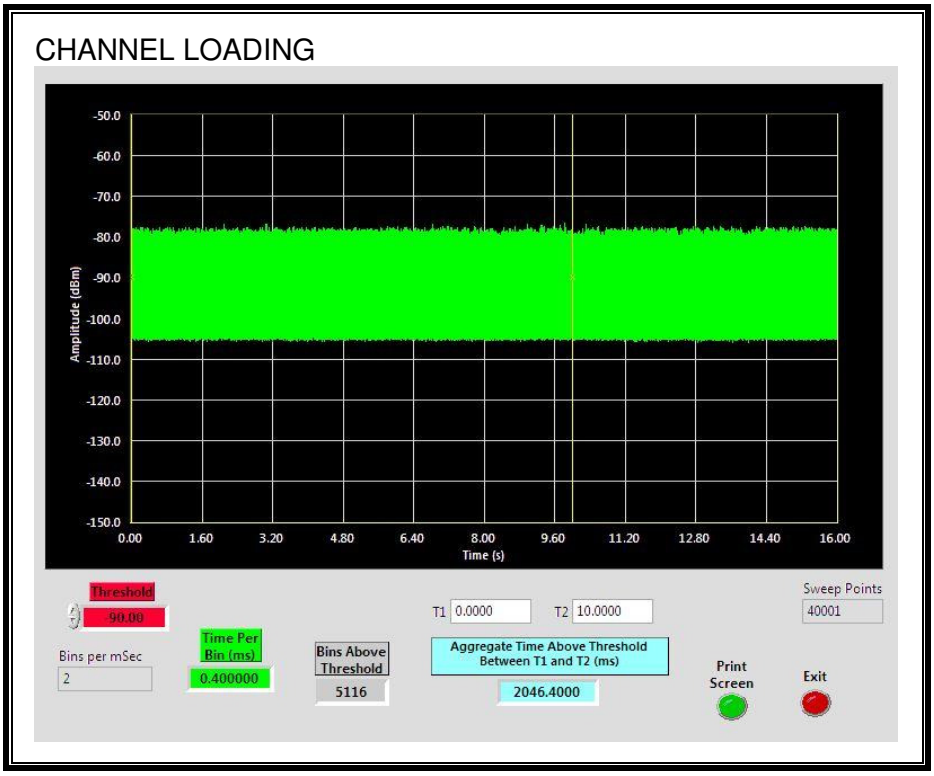
CHANNEL LOADING



The level of traffic loading on the channel by the EUT is 20.46%

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5.2.3. CHANNEL AVAILABILITY CHECK TIME

This test is not required for this channel bandwidth per table two, page five of KDB 905462, therefore it has not been performed.

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.

5.2.5. MOVE AND CLOSING TIME

This test is not required for this channel bandwidth per table two, page five of KDB 905462, therefore it has not been performed.

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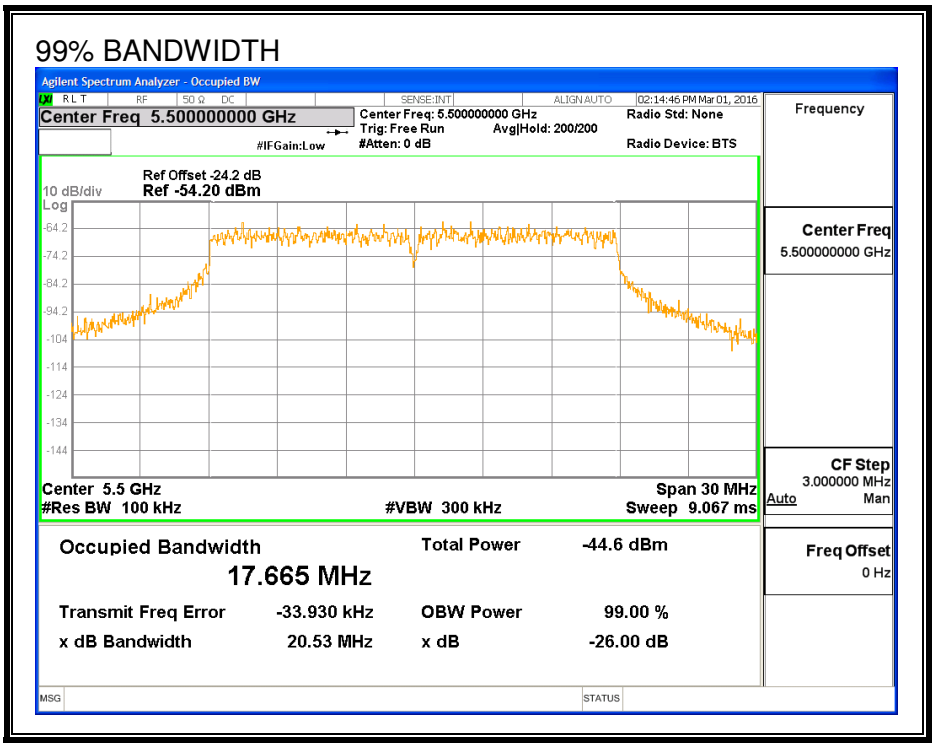
5.2.6. DETECTION BANDWIDTH

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	17.665	113.2	100

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DETECTION BANDWIDTH PROBABILITY

DETECTION BANDWIDTH PROBABILITY RESULTS

Detection Bandwidth Test Results				
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	10	100	FL
5495	10	10	100	
5500	10	10	100	
5505	10	10	100	
5510	10	10	100	FH

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5.2.7. IN-SERVICE MONITORING

RESULTS

FCC Radar Test Summary

Signal Type	Number of Trials	Detection (%)	Limit (%)	Pass/Fail	Detection Bandwidth		80% of Det BW	
					FL	FH	FL5	FH5
FCC Short Pulse Type 1	30	100.00	60	Pass	5490	5510		
FCC Short Pulse Type 2	30	96.67	60	Pass	5490	5510		
FCC Short Pulse Type 3	30	70.00	60	Pass	5490	5510		
FCC Short Pulse Type 4	30	90.00	60	Pass	5490	5510		
Aggregate		89.17	80	Pass				
FCC Long Pulse Type 5	30	100.00	80	Pass	5490	5510	5492	5508
FCC Hopping Type 6	42	100.00	70	Pass	5490	5510		

Note: Random radar frequencies with at least one trial at the channel center frequency were tested for FCC Types 1-4 at client request.

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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	5495	Yes
1002	1	618	86	A	5505	Yes
1003	1	778	68	A	5497	Yes
1004	1	898	59	A	5494	Yes
1005	1	878	61	A	5500	Yes
1006	1	578	92	A	5493	Yes
1007	1	558	95	A	5506	Yes
1008	1	518	102	A	5504	Yes
1009	1	538	99	A	5498	Yes
1010	1	798	67	A	5508	Yes
1011	1	698	76	A	5492	Yes
1012	1	858	62	A	5493	Yes
1013	1	638	83	A	5509	Yes
1014	1	918	58	A	5501	Yes
1015	1	598	89	A	5502	Yes
1016	1	2331	23	B	5490	Yes
1017	1	739	72	B	5492	Yes
1018	1	2178	25	B	5510	Yes
1019	1	2069	26	B	5507	Yes
1020	1	1089	49	B	5502	Yes
1021	1	1110	48	B	5491	Yes
1022	1	2807	19	B	5493	Yes
1023	1	1763	30	B	5501	Yes
1024	1	2396	23	B	5490	Yes
1025	1	1481	36	B	5507	Yes
1026	1	2242	24	B	5491	Yes
1027	1	1457	37	B	5494	Yes
1028	1	1154	46	B	5502	Yes
1029	1	1851	29	B	5491	Yes
1030	1	2872	19	B	5491	Yes

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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	4.3	162	26	5492	Yes
2002	2.4	205	27	5505	Yes
2003	3.3	199	26	5491	Yes
2004	1.7	208	25	5508	Yes
2005	5	206	29	5494	Yes
2006	1.6	219	28	5510	Yes
2007	2.9	183	28	5492	Yes
2008	2	200	24	5503	Yes
2009	1.6	211	28	5496	Yes
2010	2.7	152	24	5505	Yes
2011	4.7	167	29	5501	Yes
2012	4.2	155	29	5496	Yes
2013	2.3	174	24	5499	Yes
2014	1.9	166	28	5500	Yes
2015	4.3	151	27	5507	No
2016	2.3	228	24	5499	Yes
2017	3	218	23	5506	Yes
2018	1.1	179	25	5505	Yes
2019	2	216	28	5502	Yes
2020	4.5	182	23	5501	Yes
2021	3.7	223	26	5498	Yes
2022	4.4	193	25	5493	Yes
2023	3.8	157	29	5501	Yes
2024	4.8	175	29	5501	Yes
2025	4.4	186	26	5492	Yes
2026	3.6	207	29	5507	Yes
2027	3.4	222	23	5503	Yes
2028	2.9	210	27	5495	Yes
2029	1	229	29	5500	Yes
2030	4.7	221	26	5499	Yes

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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	5.1	426	16	5501	No
3002	5	413	18	5497	No
3003	5.8	381	18	5498	No
3004	8.7	263	17	5498	Yes
3005	9.8	377	17	5493	Yes
3006	5.4	272	18	5499	No
3007	6.7	398	16	5509	Yes
3008	7.7	306	16	5509	Yes
3009	6.9	445	17	5506	No
3010	8.1	381	17	5505	Yes
3011	7.6	282	16	5491	Yes
3012	6.7	349	17	5498	Yes
3013	6.4	396	18	5506	Yes
3014	5.7	357	17	5495	Yes
3015	8.4	417	17	5494	Yes
3016	8.1	392	16	5508	Yes
3017	8.6	347	18	5492	Yes
3018	8.5	467	16	5498	No
3019	9.3	435	17	5495	Yes
3020	7.1	434	16	5493	Yes
3021	8.1	297	16	5497	Yes
3022	8.8	443	17	5509	Yes
3023	5.1	319	18	5510	No
3024	6.1	477	18	5495	Yes
3025	5.3	499	16	5498	No
3026	6.5	302	16	5500	Yes
3027	6	454	18	5505	Yes
3028	5.1	403	16	5504	No
3029	9.9	316	17	5493	Yes
3030	9.2	278	16	5509	Yes

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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	13.7	338	13	5507	Yes
4002	18.3	445	16	5504	Yes
4003	14	267	15	5504	Yes
4004	19.1	387	16	5498	Yes
4005	15.4	355	15	5499	Yes
4006	10.9	488	16	5491	Yes
4007	13.1	469	16	5506	Yes
4008	14.5	364	15	5500	Yes
4009	17.1	490	15	5499	Yes
4010	19	280	14	5502	Yes
4011	17.5	420	12	5496	No
4012	19.9	473	16	5500	Yes
4013	18.9	374	12	5498	No
4014	17.1	323	12	5510	Yes
4015	16.5	488	12	5492	Yes
4016	15.2	450	15	5508	Yes
4017	10.5	392	16	5503	Yes
4018	15.1	366	12	5493	Yes
4019	10.8	439	13	5498	Yes
4020	15.9	308	14	5496	Yes
4021	12.2	276	13	5506	Yes
4022	17.8	409	15	5510	Yes
4023	15.2	390	14	5498	Yes
4024	11.3	284	13	5503	Yes
4025	13.9	411	13	5493	Yes
4026	15.8	452	12	5492	Yes
4027	14.3	340	15	5494	Yes
4028	16.7	394	15	5504	No
4029	15.7	295	15	5498	Yes
4030	13.9	495	15	5492	Yes

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TYPE 5 DETECTION PROBABILITY

Data Sheet for FCC Long Pulse Radar Type 5		
Trial	Frequency (MHz)	Successful Detection (Yes/No)
1	5508	Yes
2	5503	Yes
3	5493	Yes
4	5502	Yes
5	5505	Yes
6	5507	Yes
7	5503	Yes
8	5505	Yes
9	5502	Yes
10	5500	Yes
11	5496	Yes
12	5497	Yes
13	5493	Yes
14	5504	Yes
15	5501	Yes
16	5502	Yes
17	5500	Yes
18	5507	Yes
19	5503	Yes
20	5498	Yes
21	5502	Yes
22	5498	Yes
23	5496	Yes
24	5499	Yes
25	5505	Yes
26	5505	Yes
27	5498	Yes
28	5495	Yes
29	5494	Yes
30	5507	Yes

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

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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	161	5490	3	Yes
2	636	5491	6	Yes
3	1111	5492	3	Yes
4	1586	5493	1	Yes
5	2061	5494	4	Yes
6	2536	5495	5	Yes
7	3011	5496	3	Yes
8	3486	5497	4	Yes
9	3961	5498	6	Yes
10	4436	5499	4	Yes
11	4911	5500	7	Yes
12	5386	5501	7	Yes
13	5861	5502	6	Yes
14	6336	5503	3	Yes
15	6811	5504	4	Yes
16	7286	5505	6	Yes
17	7761	5506	6	Yes
18	8236	5507	7	Yes
19	8711	5508	4	Yes
20	9186	5509	5	Yes
21	9661	5510	5	Yes
22	10136	5490	2	Yes
23	10611	5491	4	Yes
24	11086	5492	5	Yes
25	11561	5493	4	Yes
26	12036	5494	4	Yes
27	12511	5495	5	Yes
28	12986	5496	7	Yes
29	13461	5497	6	Yes
30	13936	5498	2	Yes
31	14411	5499	2	Yes
32	14886	5500	4	Yes
33	15361	5501	5	Yes
34	15836	5502	4	Yes
35	16311	5503	2	Yes
36	16786	5504	4	Yes
37	17261	5505	5	Yes
38	17736	5506	6	Yes
39	18211	5507	7	Yes
40	18686	5508	5	Yes
41	19161	5509	8	Yes
42	19636	5510	4	Yes

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5.3. RESULTS FOR 40 MHz BANDWIDTH

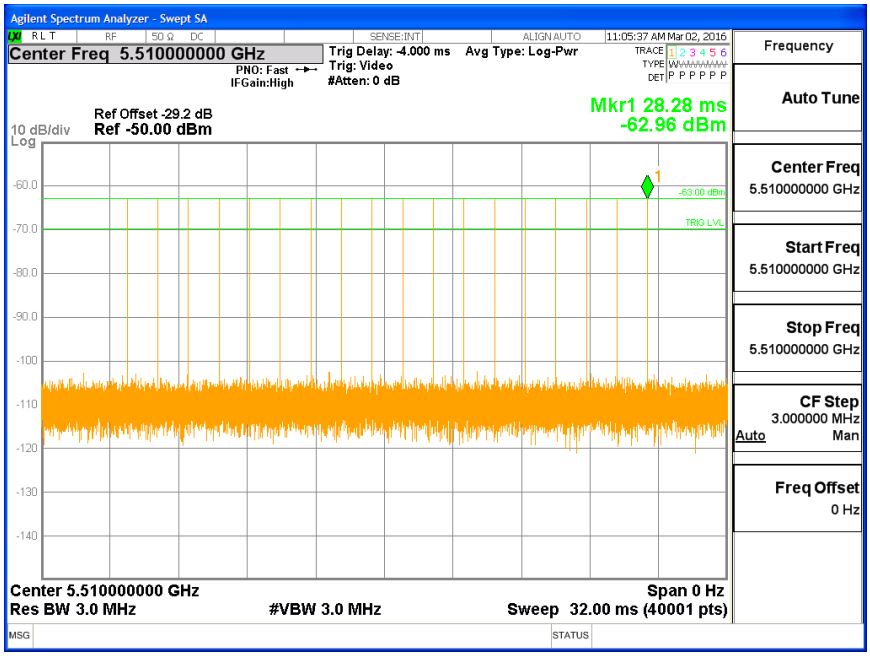
5.3.1. TEST CHANNEL

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



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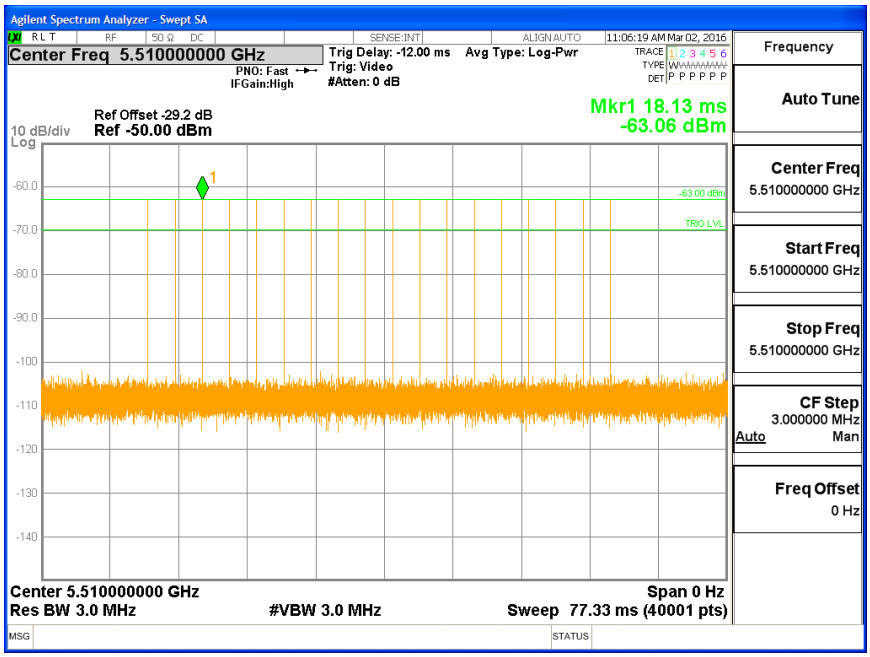
SAMPLE OF RADAR TYPE 1



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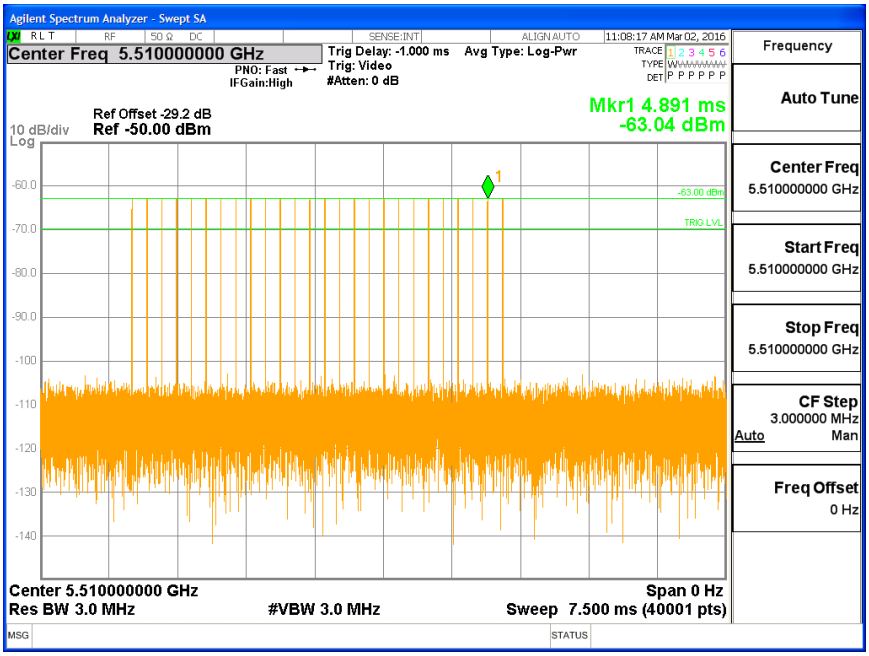
SAMPLE OF RADAR TYPE 2



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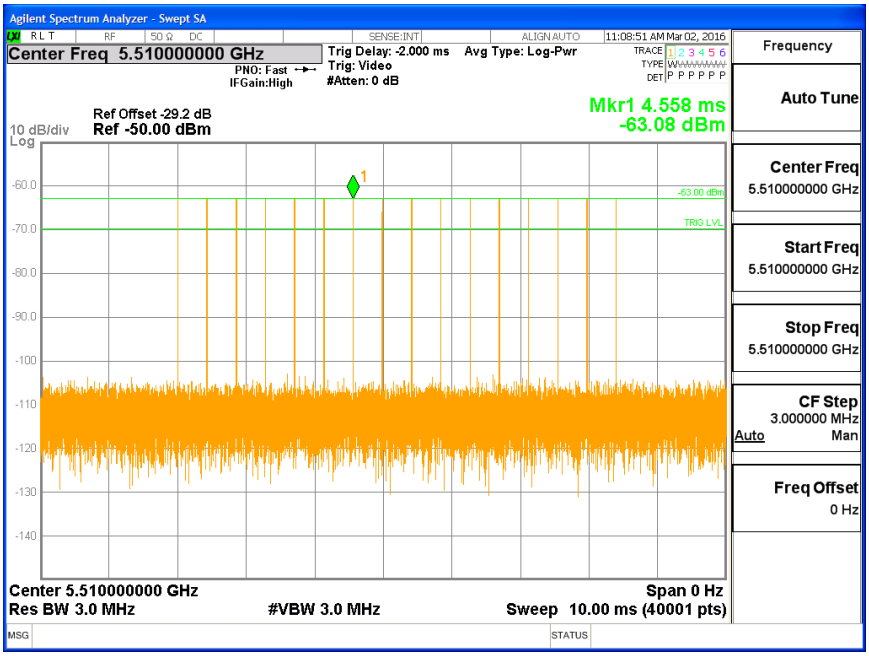
SAMPLE OF RADAR TYPE 3



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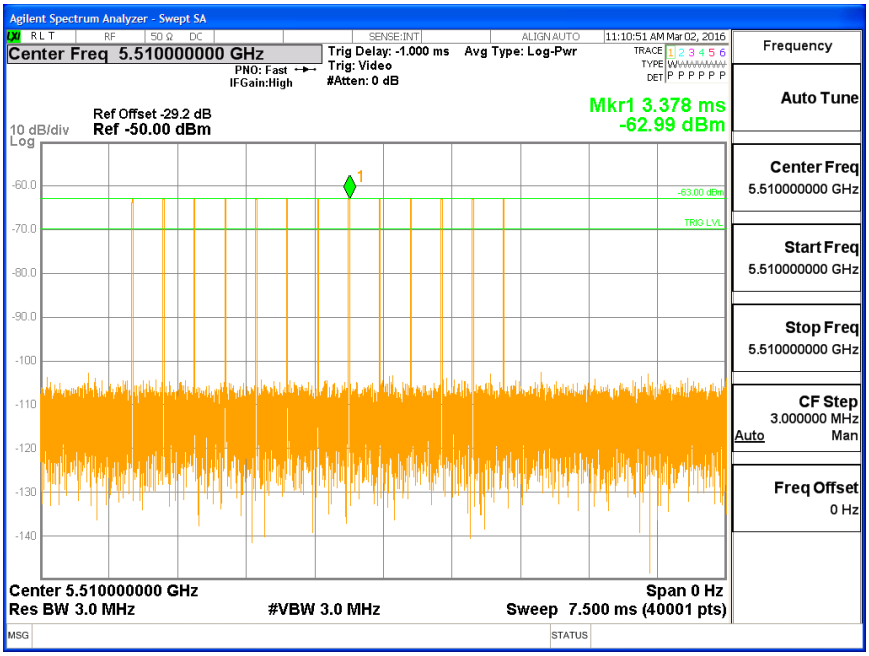
SAMPLE OF RADAR TYPE 4



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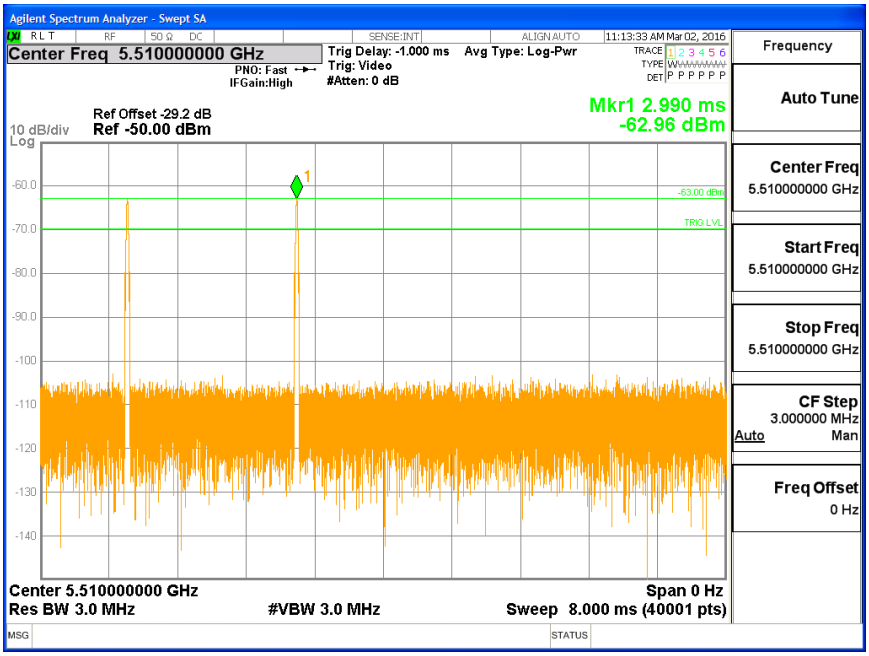
SAMPLE OF SINGLE BURST OF RADAR TYPE 5



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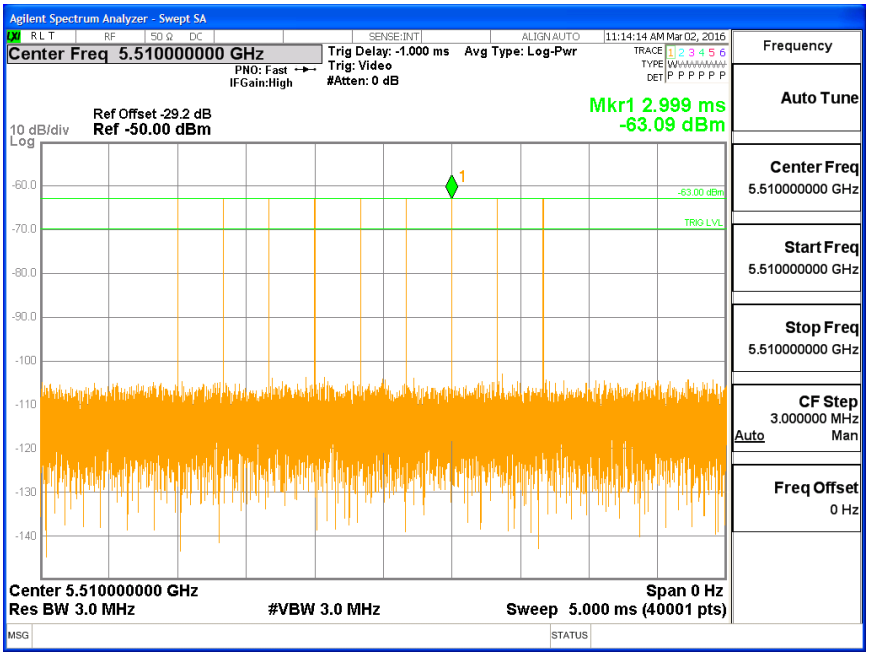
SINGLE BURST OF RADAR TYPE 6



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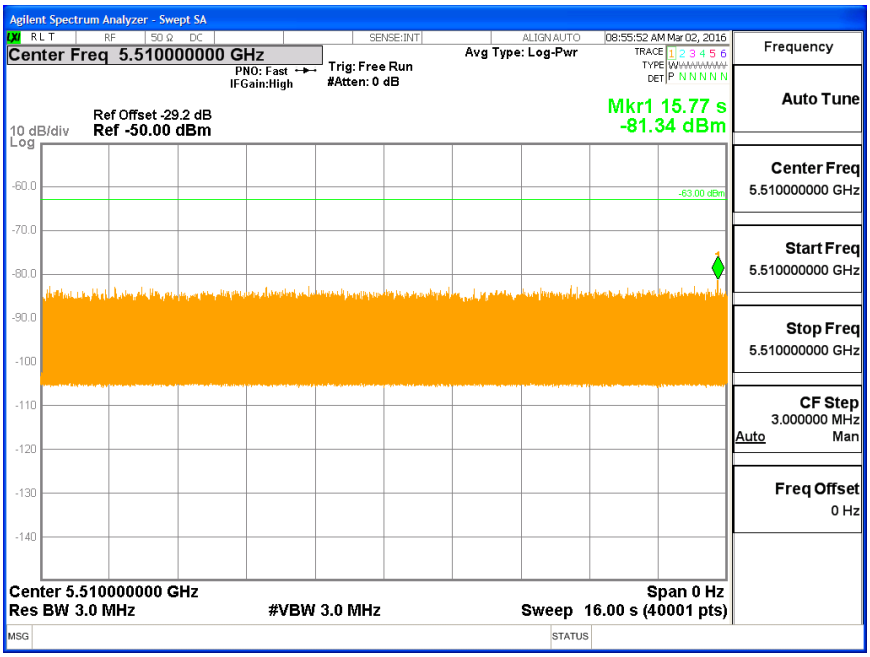
TRAFFIC

TRAFFIC



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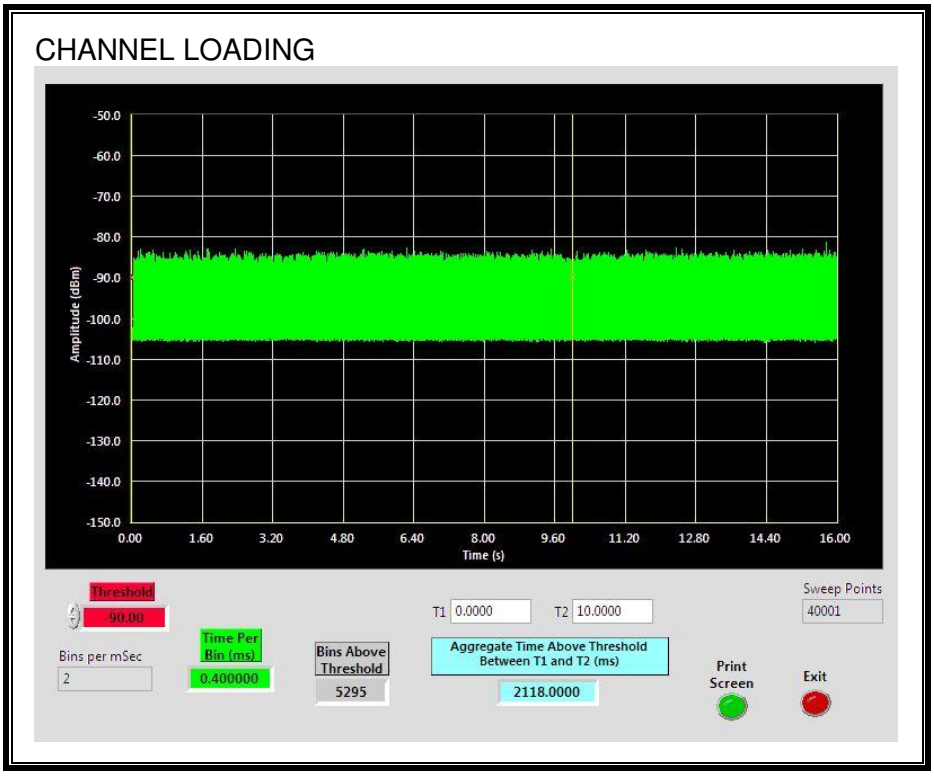
CHANNEL LOADING



The level of traffic loading on the channel by the EUT is 21.18%

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5.3.1. CHANNEL AVAILABILITY CHECK TIME

This test is not required for this channel bandwidth per table two, page five of KDB 905462, therefore it has not been performed.

5.3.2. OVERLAPPING CHANNEL TESTS

RESULTS

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

5.3.3. MOVE AND CLOSING TIME

This test is not required for this channel bandwidth per table two, page five of KDB 905462, therefore it has not been performed.

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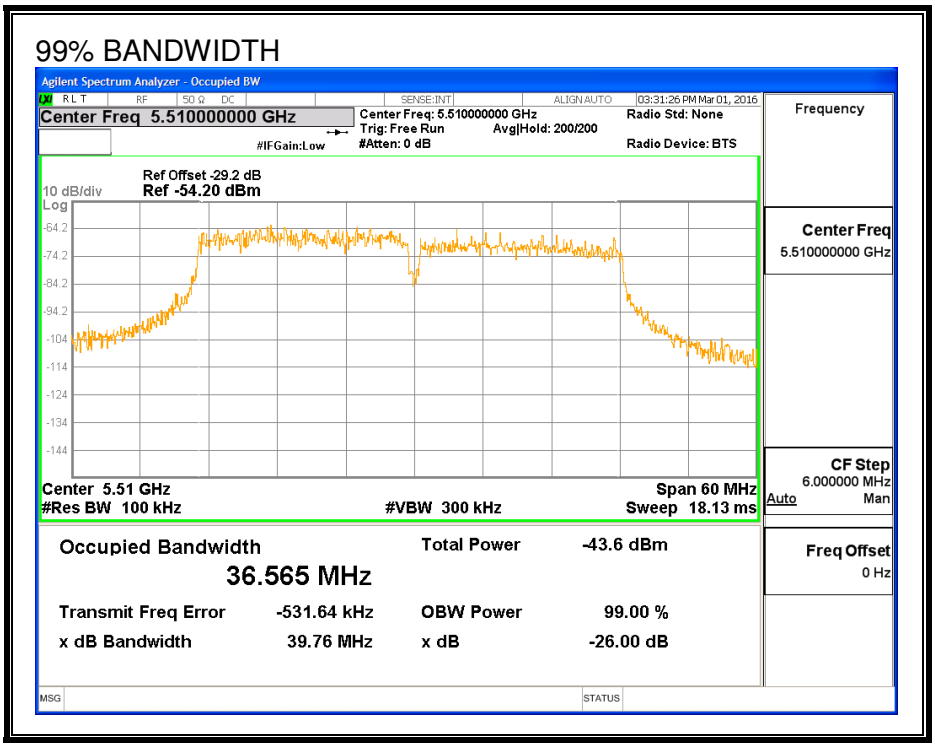
5.3.4. DETECTION BANDWIDTH

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	5529	39	36.565	106.7	100

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DETECTION BANDWIDTH PROBABILITY

DETECTION BANDWIDTH PROBABILITY RESULTS

Detection Bandwidth Test Results				
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	9	90	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	
5526	10	10	100	
5527	10	10	100	
5528	10	10	100	
5529	10	10	100	FH

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5.3.5. IN-SERVICE MONITORING

RESULTS

FCC Radar Test Summary

Signal Type	Number of Trials	Detection (%)	Limit (%)	Pass/Fail	Detection Bandwidth		80% of Det BW	
					FL	FH	FL5	FH5
FCC Short Pulse Type 1	30	96.67	60	Pass	5490	5529		
FCC Short Pulse Type 2	30	93.33	60	Pass	5490	5529		
FCC Short Pulse Type 3	30	76.67	60	Pass	5490	5529		
FCC Short Pulse Type 4	30	93.33	60	Pass	5490	5529		
Aggregate		90.00	80	Pass				
FCC Long Pulse Type 5	30	100.00	80	Pass	5490	5529	5494	5525
FCC Hopping Type 6	40	97.50	70	Pass	5490	5529		

Note: Random radar frequencies with at least one trial at the channel center frequency were tested for FCC Types 1-4 at client request.

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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	5518	Yes
1002	1	618	86	A	5516	Yes
1003	1	778	68	A	5493	Yes
1004	1	898	59	A	5511	Yes
1005	1	878	61	A	5506	Yes
1006	1	578	92	A	5505	Yes
1007	1	558	95	A	5506	Yes
1008	1	518	102	A	5505	Yes
1009	1	538	99	A	5490	No
1010	1	798	67	A	5517	Yes
1011	1	698	76	A	5501	Yes
1012	1	858	62	A	5503	Yes
1013	1	638	83	A	5503	Yes
1014	1	918	58	A	5505	Yes
1015	1	598	89	A	5525	Yes
1016	1	2331	23	B	5495	Yes
1017	1	739	72	B	5519	Yes
1018	1	2178	25	B	5517	Yes
1019	1	2069	26	B	5499	Yes
1020	1	1089	49	B	5503	Yes
1021	1	1110	48	B	5523	Yes
1022	1	2807	19	B	5496	Yes
1023	1	1763	30	B	5508	Yes
1024	1	2396	23	B	5524	Yes
1025	1	1481	36	B	5523	Yes
1026	1	2242	24	B	5503	Yes
1027	1	1457	37	B	5517	Yes
1028	1	1154	46	B	5510	Yes
1029	1	1851	29	B	5515	Yes
1030	1	2872	19	B	5504	Yes

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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	4.3	162	26	5501	No
2002	2.4	205	27	5502	Yes
2003	3.3	199	26	5521	No
2004	1.7	208	25	5510	Yes
2005	5	206	29	5519	Yes
2006	1.6	219	28	5492	Yes
2007	2.9	183	28	5497	Yes
2008	2	200	24	5518	Yes
2009	1.6	211	28	5514	Yes
2010	2.7	152	24	5500	Yes
2011	4.7	167	29	5498	Yes
2012	4.2	155	29	5492	Yes
2013	2.3	174	24	5509	Yes
2014	1.9	166	28	5512	Yes
2015	4.3	151	27	5495	Yes
2016	2.3	228	24	5491	Yes
2017	3	218	23	5520	Yes
2018	1.1	179	25	5514	Yes
2019	2	216	28	5510	Yes
2020	4.5	182	23	5512	Yes
2021	3.7	223	26	5506	Yes
2022	4.4	193	25	5503	Yes
2023	3.8	157	29	5523	Yes
2024	4.8	175	29	5516	Yes
2025	4.4	186	26	5513	Yes
2026	3.6	207	29	5525	Yes
2027	3.4	222	23	5524	Yes
2028	2.9	210	27	5529	Yes
2029	1	229	29	5519	Yes
2030	4.7	221	26	5528	Yes

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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	5.1	426	16	5511	No
3002	5	413	18	5504	No
3003	5.8	381	18	5525	Yes
3004	8.7	263	17	5506	Yes
3005	9.8	377	17	5527	Yes
3006	5.4	272	18	5492	No
3007	6.7	398	16	5519	Yes
3008	7.7	306	16	5523	Yes
3009	6.9	445	17	5497	Yes
3010	8.1	381	17	5515	Yes
3011	7.6	282	16	5495	Yes
3012	6.7	349	17	5526	Yes
3013	6.4	396	18	5498	Yes
3014	5.7	357	17	5518	No
3015	8.4	417	17	5515	Yes
3016	8.1	392	16	5510	Yes
3017	8.6	347	18	5498	Yes
3018	8.5	467	16	5497	Yes
3019	9.3	435	17	5508	Yes
3020	7.1	434	16	5515	Yes
3021	8.1	297	16	5528	Yes
3022	8.8	443	17	5494	Yes
3023	5.1	319	18	5525	No
3024	6.1	477	18	5525	Yes
3025	5.3	499	16	5517	No
3026	6.5	302	16	5512	Yes
3027	6	454	18	5500	Yes
3028	5.1	403	16	5524	No
3029	9.9	316	17	5512	Yes
3030	9.2	278	16	5507	Yes

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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	13.7	338	13	5517	Yes
4002	18.3	445	16	5512	Yes
4003	14	267	15	5505	Yes
4004	19.1	387	16	5522	Yes
4005	15.4	355	15	5509	Yes
4006	10.9	488	16	5525	Yes
4007	13.1	469	16	5510	Yes
4008	14.5	364	15	5503	Yes
4009	17.1	490	15	5519	Yes
4010	19	280	14	5513	Yes
4011	17.5	420	12	5518	Yes
4012	19.9	473	16	5502	Yes
4013	18.9	374	12	5496	Yes
4014	17.1	323	12	5513	No
4015	16.5	488	12	5499	Yes
4016	15.2	450	15	5507	Yes
4017	10.5	392	16	5504	Yes
4018	15.1	366	12	5527	Yes
4019	10.8	439	13	5492	Yes
4020	15.9	308	14	5503	Yes
4021	12.2	276	13	5509	Yes
4022	17.8	409	15	5506	Yes
4023	15.2	390	14	5495	No
4024	11.3	284	13	5524	Yes
4025	13.9	411	13	5505	Yes
4026	15.8	452	12	5508	Yes
4027	14.3	340	15	5502	Yes
4028	16.7	394	15	5505	Yes
4029	15.7	295	15	5528	Yes
4030	13.9	495	15	5509	Yes

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TYPE 5 DETECTION PROBABILITY

Data Sheet for FCC Long Pulse Radar Type 5		
Trial	Frequency (MHz)	Successful Detection (Yes/No)
1	5497	Yes
2	5525	Yes
3	5495	Yes
4	5515	Yes
5	5500	Yes
6	5503	Yes
7	5521	Yes
8	5497	Yes
9	5524	Yes
10	5507	Yes
11	5502	Yes
12	5500	Yes
13	5500	Yes
14	5495	Yes
15	5522	Yes
16	5522	Yes
17	5503	Yes
18	5514	Yes
19	5519	Yes
20	5506	Yes
21	5524	Yes
22	5504	Yes
23	5520	Yes
24	5519	Yes
25	5523	Yes
26	5503	Yes
27	5498	Yes
28	5510	Yes
29	5509	Yes
30	5510	Yes

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

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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	300	5490	8	No
2	775	5491	7	Yes
3	1250	5492	11	Yes
4	1725	5493	6	Yes
5	2200	5494	5	Yes
6	2675	5495	8	Yes
7	3150	5496	7	Yes
8	3625	5497	9	Yes
9	4100	5498	8	Yes
10	4575	5499	2	Yes
11	5050	5500	5	Yes
12	5525	5501	10	Yes
13	6000	5502	7	Yes
14	6475	5503	7	Yes
15	6950	5504	10	Yes
16	7425	5505	8	Yes
17	7900	5506	8	Yes
18	8375	5507	7	Yes
19	8850	5508	11	Yes
20	9325	5509	11	Yes
21	9800	5510	9	Yes
22	10275	5511	8	Yes
23	10750	5512	8	Yes
24	11225	5513	11	Yes
25	11700	5514	5	Yes
26	12175	5515	8	Yes
27	12650	5516	8	Yes
28	13125	5517	8	Yes
29	13600	5518	7	Yes
30	14075	5519	11	Yes
31	14550	5520	7	Yes
32	15025	5521	8	Yes
33	15500	5522	8	Yes
34	15975	5523	8	Yes
35	16450	5524	10	Yes
36	16925	5525	6	Yes
37	17400	5526	6	Yes
38	17875	5527	10	Yes
39	18350	5528	7	Yes
40	18825	5529	5	Yes

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5.4. RESULTS FOR 80 MHz BANDWIDTH

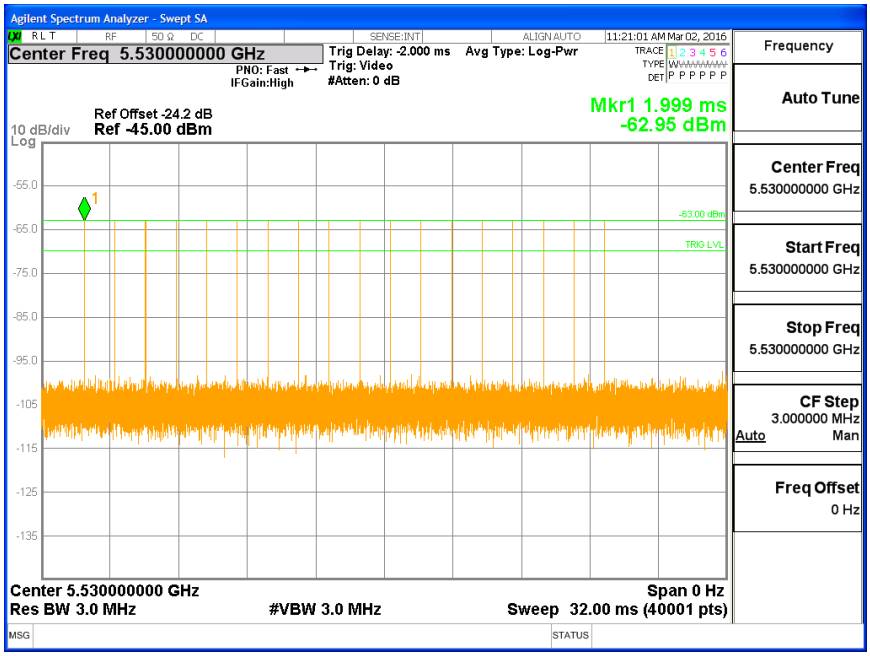
5.4.1. TEST CHANNEL

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



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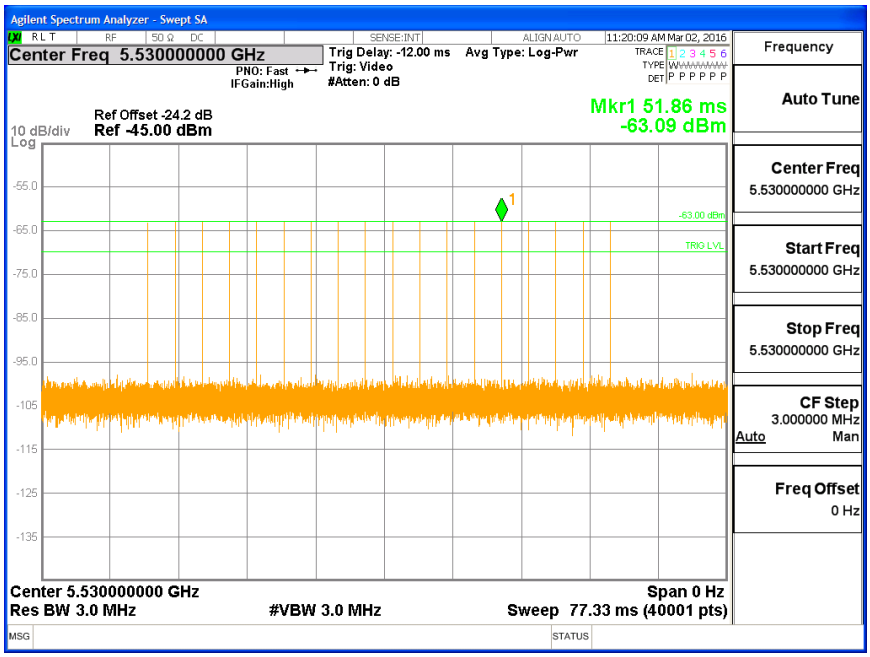
SAMPLE OF RADAR TYPE 1



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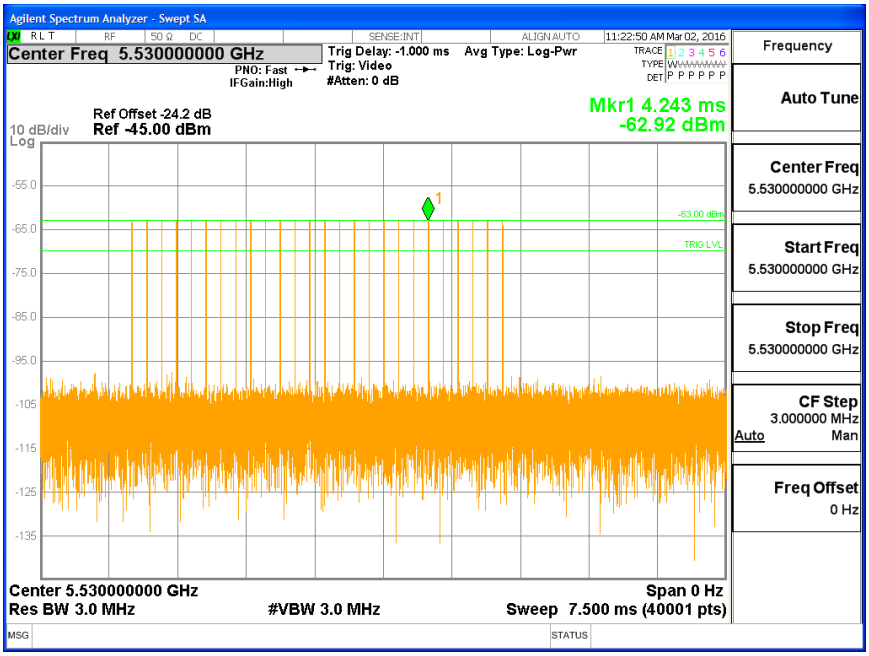
SAMPLE OF RADAR TYPE 2



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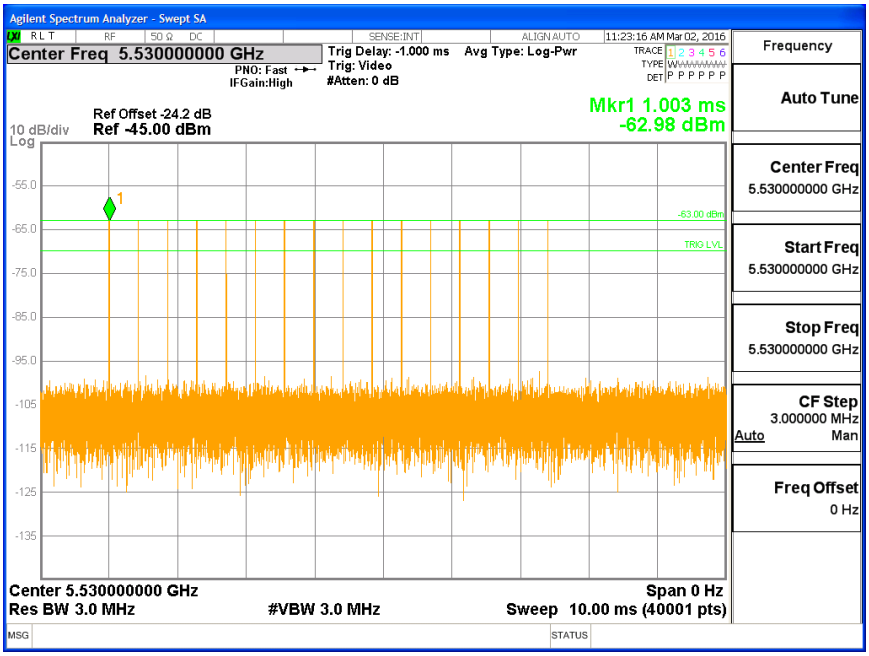
SAMPLE OF RADAR TYPE 3



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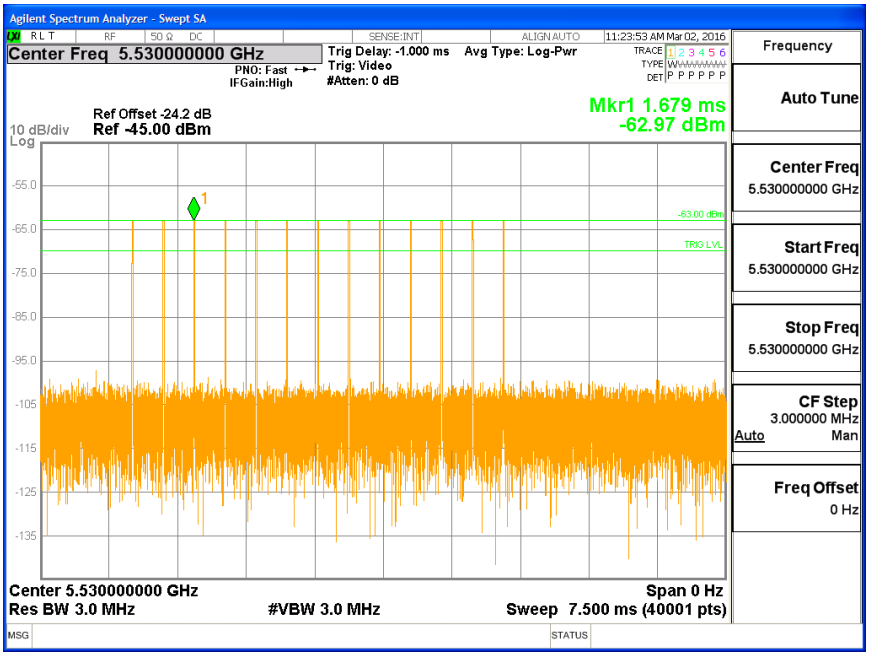
SAMPLE OF RADAR TYPE 4



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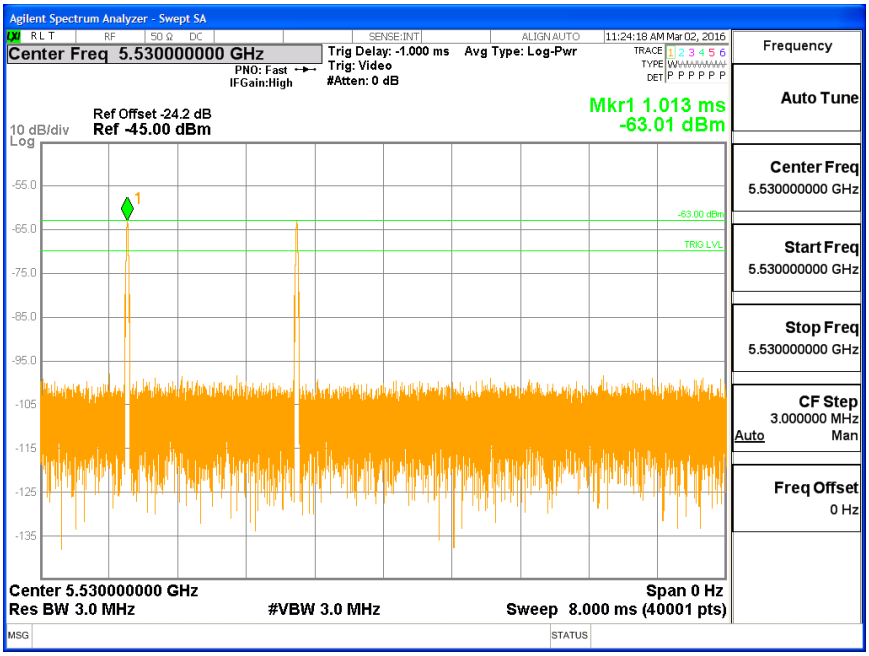
SAMPLE OF SINGLE BURST OF RADAR TYPE 5



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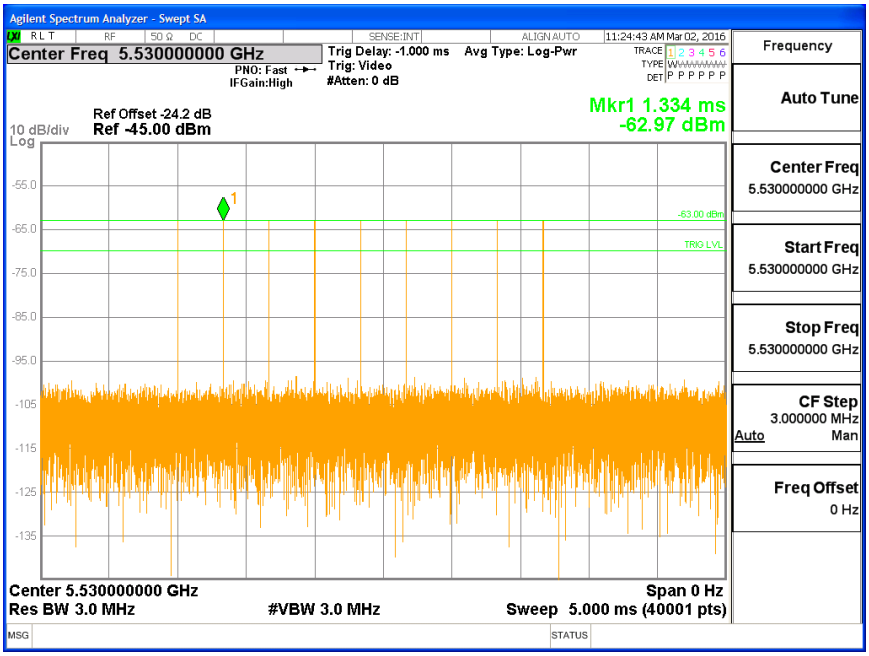
SINGLE BURST OF RADAR TYPE 6



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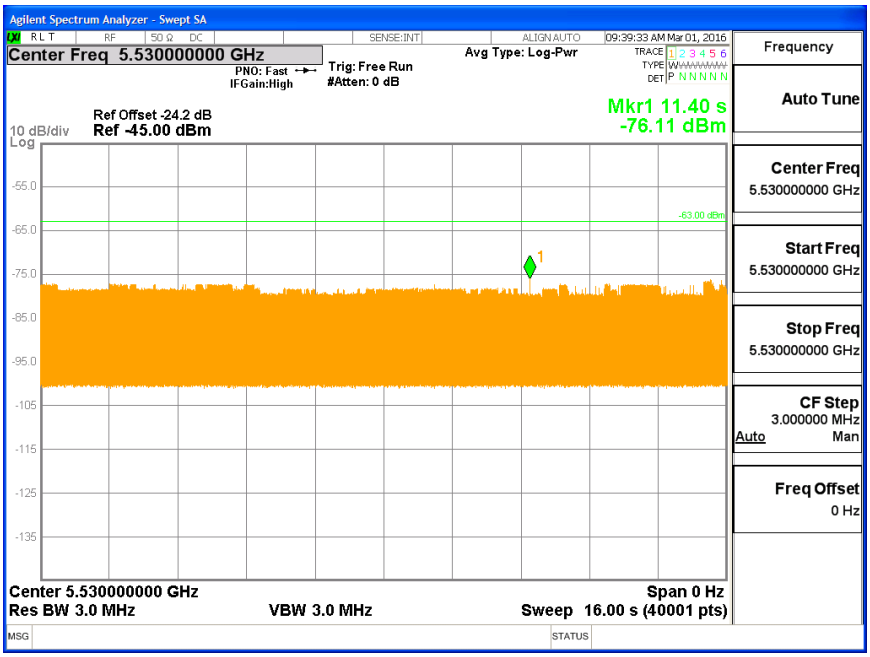
TRAFFIC

TRAFFIC



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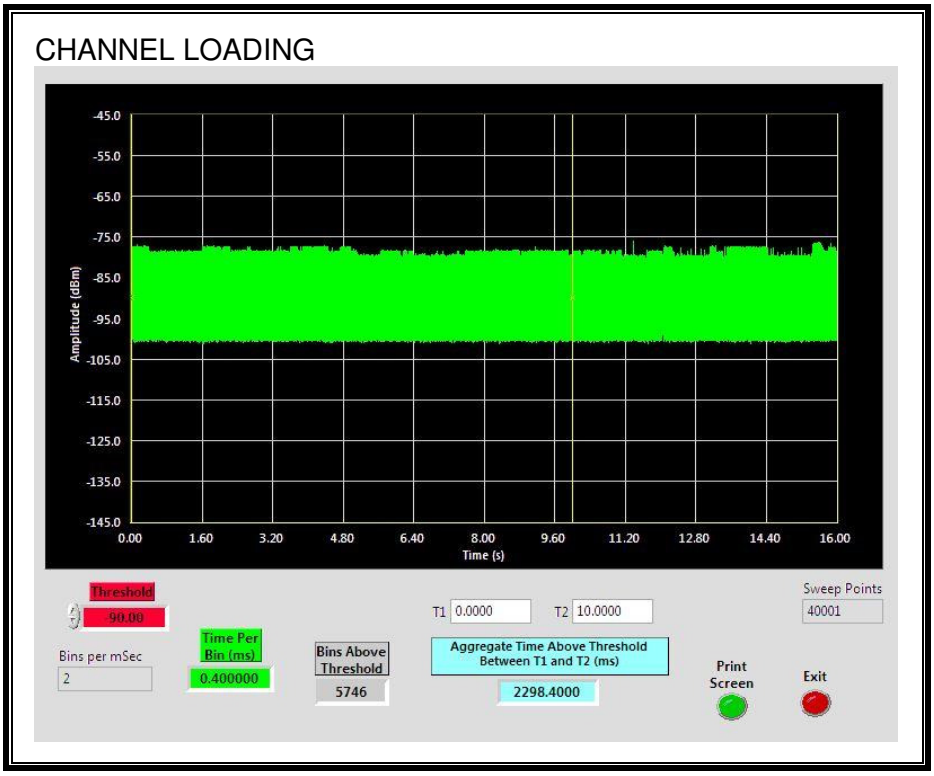
CHANNEL LOADING



The level of traffic loading on the channel by the EUT is 22.98%

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5.4.1. CHANNEL AVAILABILITY CHECK TIME

PROCEDURE TO DETERMINE INITIAL POWER-UP CYCLE TIME

A link was established on channel then the EUT was rebooted. The time from the cessation of traffic to the re-initialization of traffic was measured as the time required for the EUT to complete the total power-up cycle. The time to complete the initial power-up period is 60 seconds less than this total power-up time.

PROCEDURE FOR TIMING OF RADAR BURST

With a link established on channel, the EUT was rebooted. A radar signal was triggered within 0 to 6 seconds after the initial power-up period, and transmissions on the channel were monitored on the spectrum analyzer.

The Non-Occupancy list was cleared. With a link established on channel, the EUT was rebooted. A radar signal was triggered within 54 to 60 seconds after the initial power-up period, and transmissions on the channel were monitored on the spectrum analyzer.

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QUANTITATIVE RESULTS

No Radar Triggered

Timing of Reboot (sec)	Timing of Start of Traffic (sec)	Total Power-up Cycle Time (sec)	Initial Power-up Cycle Time (sec)
30.8	133.9	103.1	43.1

Radar Near Beginning of CAC

Timing of Reboot (sec)	Timing of Radar Burst (sec)	Radar Relative to Reboot (sec)	Radar Relative to Start of CAC (sec)
30.52	76.8	46.3	3.2

Radar Near End of CAC

Timing of Reboot (sec)	Timing of Radar Burst (sec)	Radar Relative to Reboot (sec)	Radar Relative to Start of CAC (sec)
30.29	130.6	100.3	57.2

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

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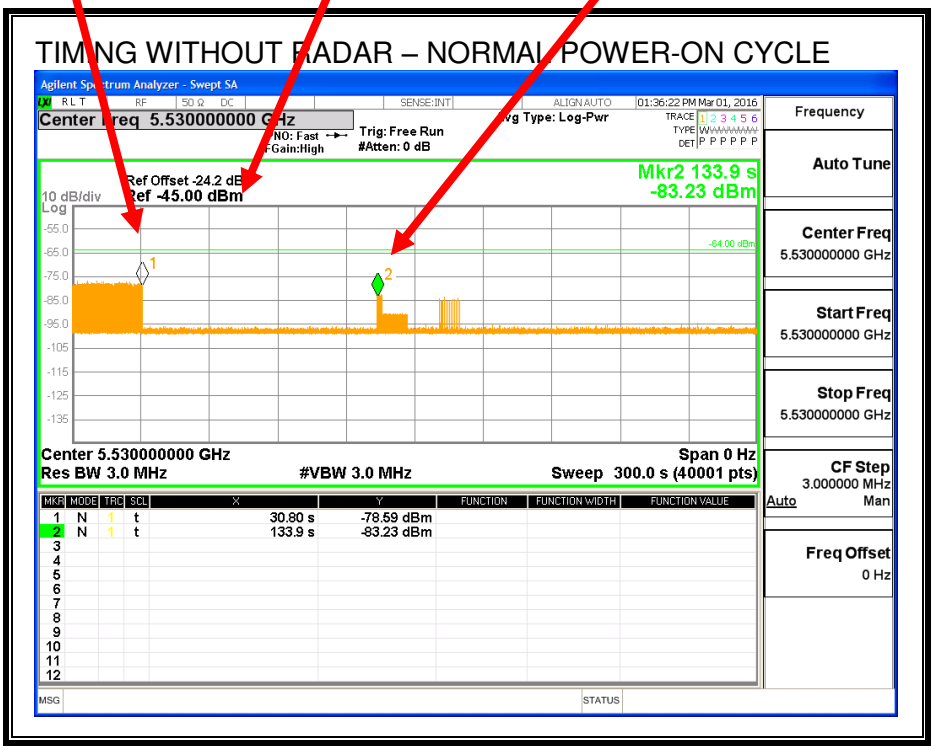
TIMING WITHOUT RADAR DURING CAC

AP is rebooted
Traffic ceases
Start of Initial Power-up cycle

End of Initial Power-up cycle
Start of CAC

End of CAC
Traffic is Initiated



Transmissions begin on channel after completion of the initial power-up cycle and the CAC.

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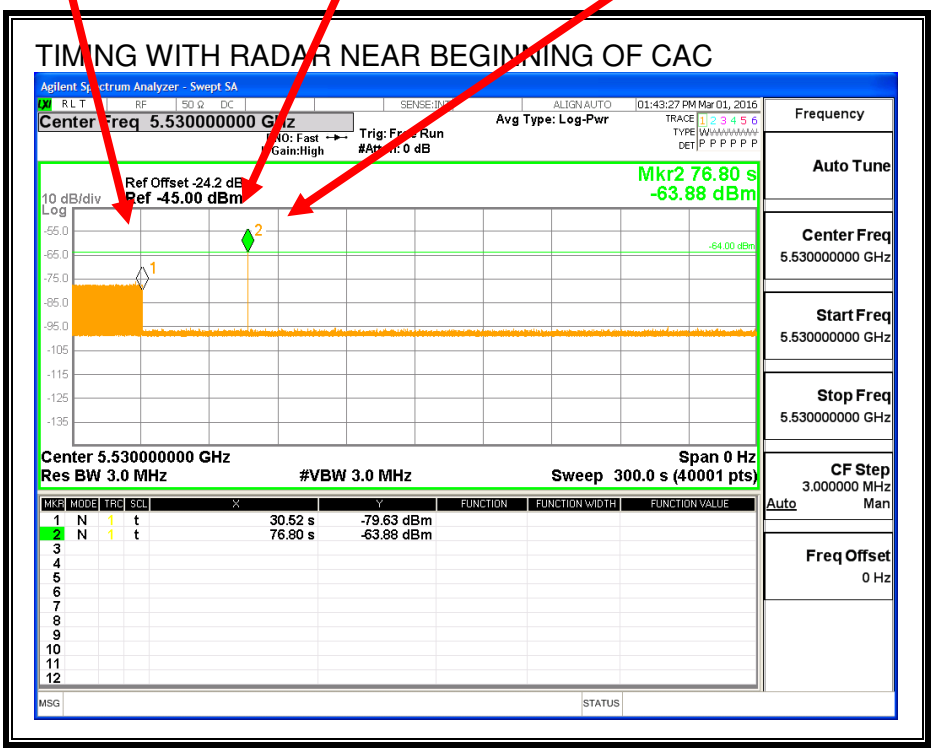
TIMING WITH RADAR NEAR BEGINNING OF CAC

AP is rebooted
Traffic ceases
Start of Initial Power-up cycle

End of Initial Power-up cycle
Start of CAC

Radar Signal Applied



No EUT transmissions were observed after the radar signal.

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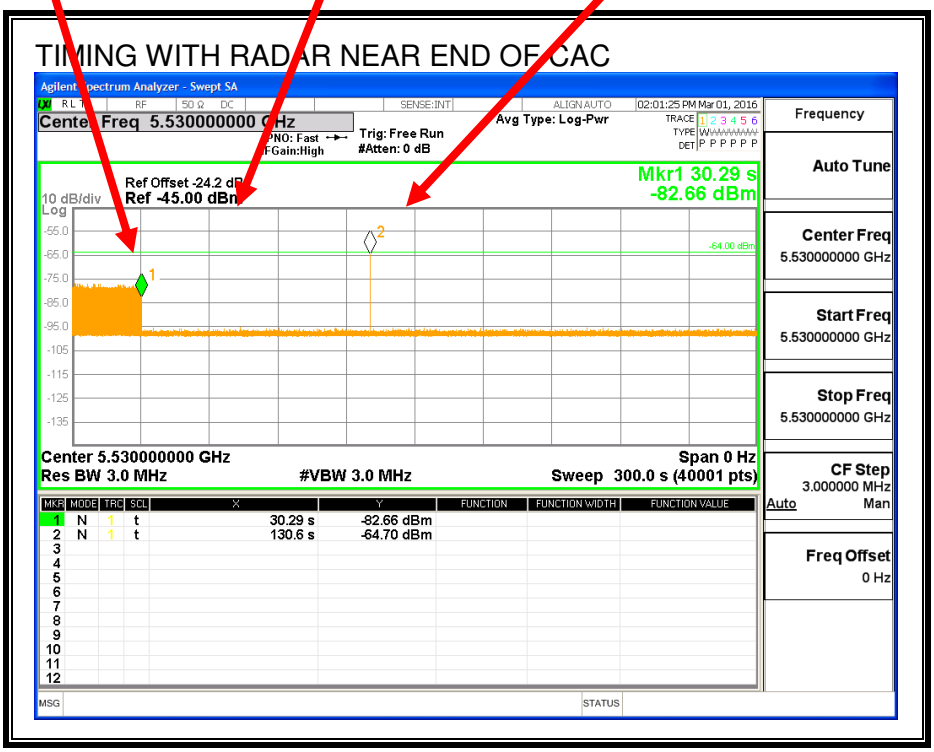
TIMING WITH RADAR NEAR END OF CAC

AP is rebooted
Traffic ceases
Start of Initial Power-up cycle

End of Initial Power-up cycle
Start of CAC

Radar Signal Applied



No EUT transmissions were observed after the radar signal.

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5.4.2. OVERLAPPING CHANNEL TESTS

RESULTS

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

5.4.3. 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)
0.000	10

Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
0.0	60

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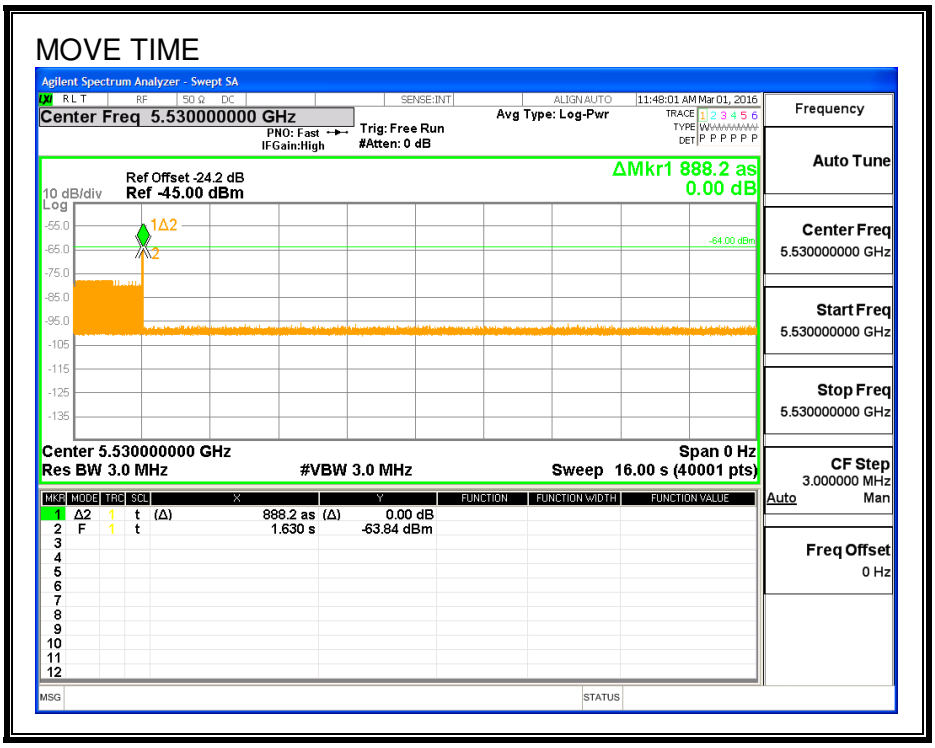
MOVE TIME



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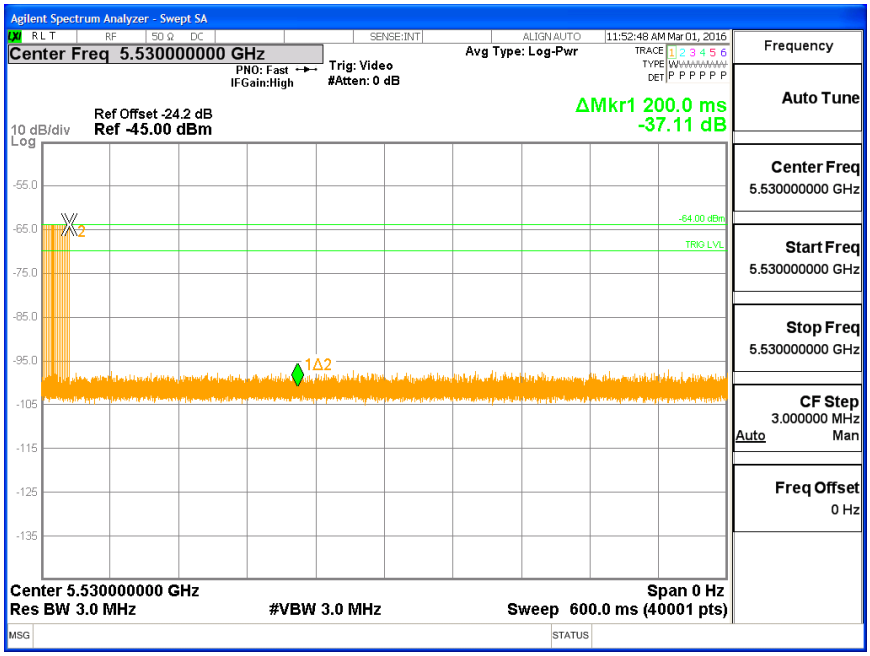
CHANNEL CLOSING TIME

CLOSING TIME



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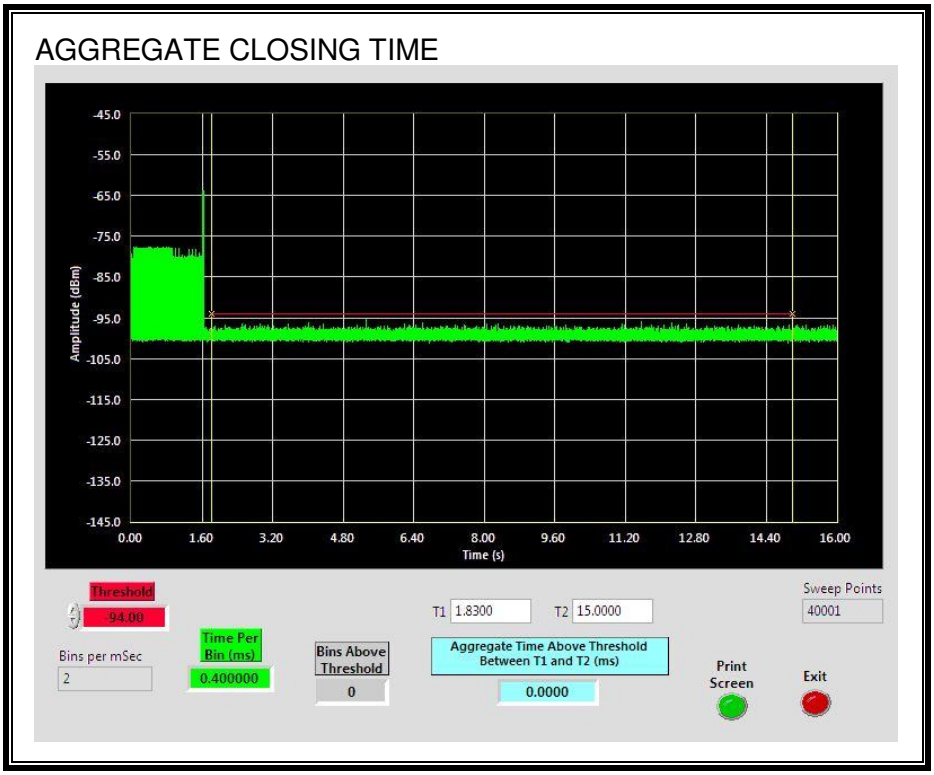
AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

No transmissions are observed during the aggregate monitoring period.



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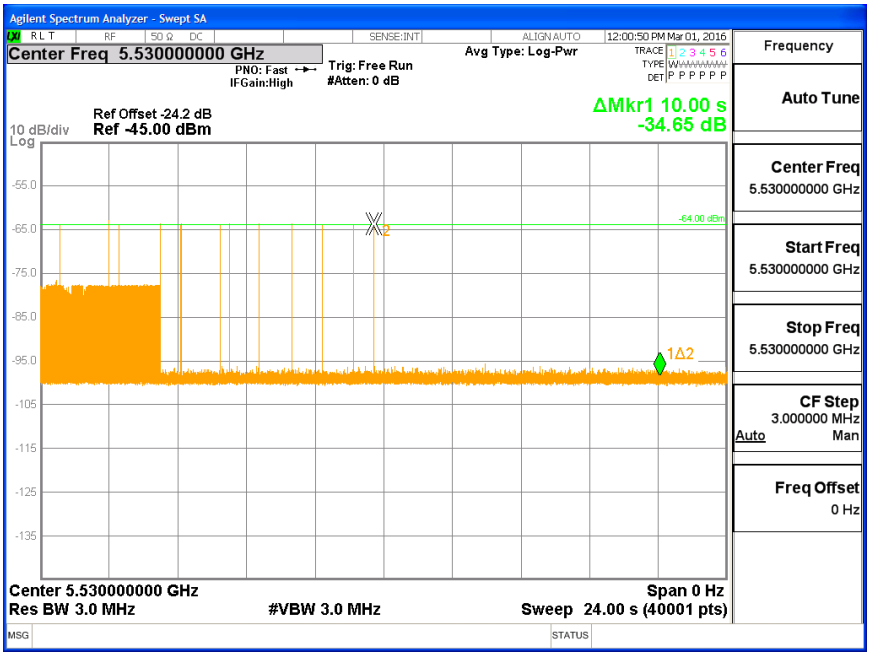
LONG PULSE CHANNEL MOVE TIME

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

MOVE TIME FOR LONG PULSE RADAR



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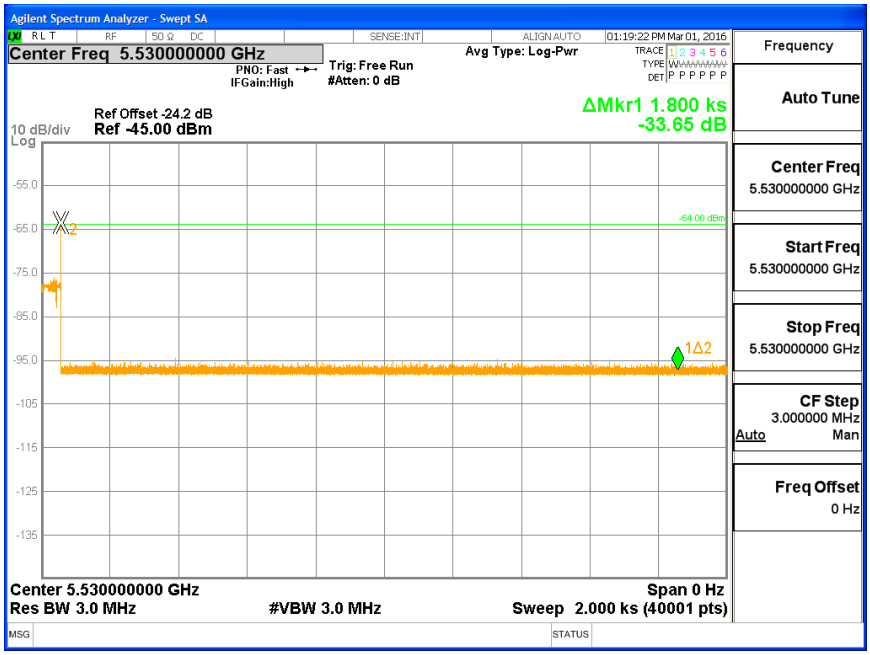
5.4.1. NON-OCCUPANCY PERIOD

RESULTS

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

NON-OCCUPANCY PERIOD



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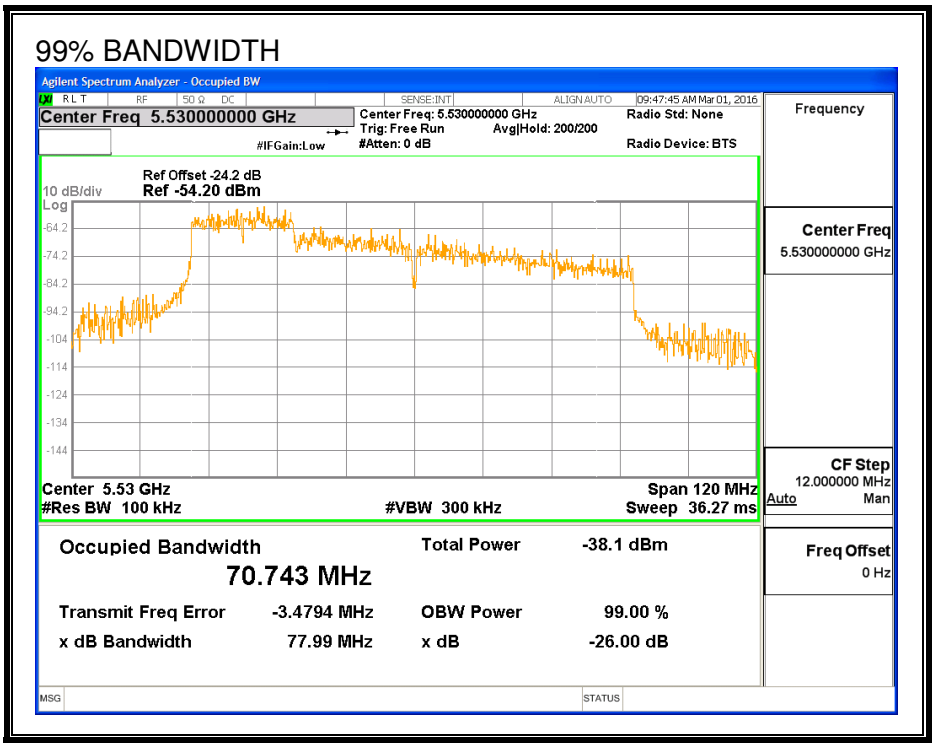
5.4.2. DETECTION BANDWIDTH

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	5570	80	70.743	113.1	100

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DETECTION BANDWIDTH PROBABILITY

DETECTION BANDWIDTH PROBABILITY RESULTS

Detection Bandwidth Test Results				
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	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	
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	
5570	10	10	100	FH

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5.4.3. IN-SERVICE MONITORING

RESULTS

FCC Radar Test Summary

Signal Type	Number of Trials	Detection (%)	Limit (%)	Pass/Fail	Detection Bandwidth		80% of Det BW	
					FL	FH	FL5	FH5
FCC Short Pulse Type 1	30	96.67	60	Pass	5490	5570		
FCC Short Pulse Type 2	30	93.33	60	Pass	5490	5570		
FCC Short Pulse Type 3	30	63.33	60	Pass	5490	5570		
FCC Short Pulse Type 4	30	86.67	60	Pass	5490	5570		
Aggregate		85.00	80	Pass				
FCC Long Pulse Type 5	30	100.00	80	Pass	5490	5570	5498	5562
FCC Hopping Type 6	81	100.00	70	Pass	5490	5570		

Note: Random radar frequencies with at least one trial at the channel center frequency were tested for FCC Types 1-4 at client request.

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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	5536	Yes
1002	1	618	86	A	5507	Yes
1003	1	778	68	A	5498	Yes
1004	1	898	59	A	5530	Yes
1005	1	878	61	A	5533	Yes
1006	1	578	92	A	5499	Yes
1007	1	558	95	A	5534	Yes
1008	1	518	102	A	5546	Yes
1009	1	538	99	A	5524	Yes
1010	1	798	67	A	5538	Yes
1011	1	698	76	A	5542	Yes
1012	1	858	62	A	5560	Yes
1013	1	638	83	A	5544	Yes
1014	1	918	58	A	5567	Yes
1015	1	598	89	A	5509	Yes
1016	1	2331	23	B	5503	Yes
1017	1	739	72	B	5549	Yes
1018	1	2178	25	B	5492	Yes
1019	1	2069	26	B	5565	Yes
1020	1	1089	49	B	5494	Yes
1021	1	1110	48	B	5537	Yes
1022	1	2807	19	B	5505	Yes
1023	1	1763	30	B	5511	No
1024	1	2396	23	B	5563	Yes
1025	1	1481	36	B	5543	Yes
1026	1	2242	24	B	5510	Yes
1027	1	1457	37	B	5500	Yes
1028	1	1154	46	B	5559	Yes
1029	1	1851	29	B	5527	Yes
1030	1	2872	19	B	5526	Yes

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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	4.3	162	26	5516	Yes
2002	2.4	205	27	5542	Yes
2003	3.3	199	26	5530	Yes
2004	1.7	208	25	5566	Yes
2005	5	206	29	5504	Yes
2006	1.6	219	28	5528	Yes
2007	2.9	183	28	5569	Yes
2008	2	200	24	5493	Yes
2009	1.6	211	28	5561	Yes
2010	2.7	152	24	5495	Yes
2011	4.7	167	29	5567	Yes
2012	4.2	155	29	5518	Yes
2013	2.3	174	24	5550	Yes
2014	1.9	166	28	5570	Yes
2015	4.3	151	27	5545	Yes
2016	2.3	228	24	5509	Yes
2017	3	218	23	5524	Yes
2018	1.1	179	25	5498	Yes
2019	2	216	28	5534	Yes
2020	4.5	182	23	5553	No
2021	3.7	223	26	5537	Yes
2022	4.4	193	25	5551	Yes
2023	3.8	157	29	5510	Yes
2024	4.8	175	29	5503	Yes
2025	4.4	186	26	5522	No
2026	3.6	207	29	5524	Yes
2027	3.4	222	23	5567	Yes
2028	2.9	210	27	5568	Yes
2029	1	229	29	5496	Yes
2030	4.7	221	26	5507	Yes

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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	5.1	426	16	5556	No
3002	5	413	18	5538	No
3003	5.8	381	18	5539	No
3004	8.7	263	17	5495	Yes
3005	9.8	377	17	5555	Yes
3006	5.4	272	18	5537	No
3007	6.7	398	16	5509	Yes
3008	7.7	306	16	5559	Yes
3009	6.9	445	17	5567	Yes
3010	8.1	381	17	5517	Yes
3011	7.6	282	16	5556	No
3012	6.7	349	17	5499	Yes
3013	6.4	396	18	5515	Yes
3014	5.7	357	17	5551	No
3015	8.4	417	17	5546	Yes
3016	8.1	392	16	5533	Yes
3017	8.6	347	18	5525	Yes
3018	8.5	467	16	5511	Yes
3019	9.3	435	17	5491	No
3020	7.1	434	16	5554	Yes
3021	8.1	297	16	5568	Yes
3022	8.8	443	17	5561	Yes
3023	5.1	319	18	5535	No
3024	6.1	477	18	5530	Yes
3025	5.3	499	16	5492	No
3026	6.5	302	16	5545	No
3027	6	454	18	5535	Yes
3028	5.1	403	16	5533	Yes
3029	9.9	316	17	5524	No
3030	9.2	278	16	5554	Yes

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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	13.7	338	13	5520	Yes
4002	18.3	445	16	5507	Yes
4003	14	267	15	5565	Yes
4004	19.1	387	16	5535	Yes
4005	15.4	355	15	5519	Yes
4006	10.9	488	16	5499	Yes
4007	13.1	469	16	5516	Yes
4008	14.5	364	15	5532	Yes
4009	17.1	490	15	5516	Yes
4010	19	280	14	5558	Yes
4011	17.5	420	12	5531	Yes
4012	19.9	473	16	5552	Yes
4013	18.9	374	12	5525	Yes
4014	17.1	323	12	5530	No
4015	16.5	488	12	5541	Yes
4016	15.2	450	15	5516	Yes
4017	10.5	392	16	5507	Yes
4018	15.1	366	12	5519	Yes
4019	10.8	439	13	5507	No
4020	15.9	308	14	5546	Yes
4021	12.2	276	13	5508	Yes
4022	17.8	409	15	5507	Yes
4023	15.2	390	14	5540	Yes
4024	11.3	284	13	5516	Yes
4025	13.9	411	13	5543	Yes
4026	15.8	452	12	5568	Yes
4027	14.3	340	15	5498	Yes
4028	16.7	394	15	5496	No
4029	15.7	295	15	5520	No
4030	13.9	495	15	5516	Yes

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TYPE 5 DETECTION PROBABILITY

Data Sheet for FCC Long Pulse Radar Type 5		
Trial	Frequency (MHz)	Successful Detection (Yes/No)
1	5506	Yes
2	5553	Yes
3	5539	Yes
4	5500	Yes
5	5513	Yes
6	5517	Yes
7	5553	Yes
8	5532	Yes
9	5542	Yes
10	5515	Yes
11	5527	Yes
12	5499	Yes
13	5526	Yes
14	5541	Yes
15	5517	Yes
16	5520	Yes
17	5529	Yes
18	5544	Yes
19	5504	Yes
20	5542	Yes
21	5524	Yes
22	5550	Yes
23	5548	Yes
24	5521	Yes
25	5500	Yes
26	5520	Yes
27	5525	Yes
28	5559	Yes
29	5562	Yes
30	5555	Yes

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

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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	202	5490	21	Yes
2	677	5491	15	Yes
3	1152	5492	16	Yes
4	1627	5493	12	Yes
5	2102	5494	18	Yes
6	2577	5495	16	Yes
7	3052	5496	21	Yes
8	3527	5497	17	Yes
9	4002	5498	13	Yes
10	4477	5499	23	Yes
11	4952	5500	18	Yes
12	5427	5501	19	Yes
13	5902	5502	19	Yes
14	6377	5503	16	Yes
15	6852	5504	22	Yes
16	7327	5505	18	Yes
17	7802	5506	22	Yes
18	8277	5507	14	Yes
19	8752	5508	14	Yes
20	9227	5509	21	Yes
21	9702	5510	19	Yes
22	10177	5511	14	Yes
23	10652	5512	15	Yes
24	11127	5513	19	Yes
25	11602	5514	17	Yes
26	12077	5515	18	Yes
27	12552	5516	17	Yes
28	13027	5517	16	Yes
29	13502	5518	16	Yes
30	13977	5519	15	Yes
31	14452	5520	22	Yes
32	14927	5521	19	Yes
33	15402	5522	17	Yes
34	15877	5523	15	Yes
35	16352	5524	22	Yes
36	16827	5525	19	Yes
37	17302	5526	16	Yes
38	17777	5527	16	Yes
39	18252	5528	13	Yes

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TYPE 6 DETECTION PROBABILITY (CONTINUED)

40	18727	5529	12	Yes
41	19202	5530	20	Yes
42	19677	5531	20	Yes
43	20152	5532	19	Yes
44	20627	5533	17	Yes
45	21102	5534	6	Yes
46	21577	5535	14	Yes
47	22052	5536	18	Yes
48	22527	5537	18	Yes
49	23002	5538	20	Yes
50	23477	5539	19	Yes
51	23952	5540	18	Yes
52	24427	5541	9	Yes
53	24902	5542	17	Yes
54	25377	5543	12	Yes
55	25852	5544	14	Yes
56	26327	5545	17	Yes
57	26802	5546	16	Yes
58	27277	5547	14	Yes
59	27752	5548	12	Yes
60	28227	5549	15	Yes
61	28702	5550	15	Yes
62	29177	5551	22	Yes
63	29652	5552	22	Yes
64	30127	5553	17	Yes
65	30602	5554	20	Yes
66	31077	5555	20	Yes
67	31552	5556	14	Yes
68	32027	5557	14	Yes
69	32502	5558	16	Yes
70	32977	5559	16	Yes
71	33452	5560	12	Yes
72	33927	5561	19	Yes
73	34402	5562	17	Yes
74	34877	5563	14	Yes
75	35352	5564	17	Yes
76	35827	5565	15	Yes
77	36302	5566	17	Yes
78	36777	5567	17	Yes
79	37252	5568	14	Yes
80	37727	5569	16	Yes
81	38202	5570	13	Yes

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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.

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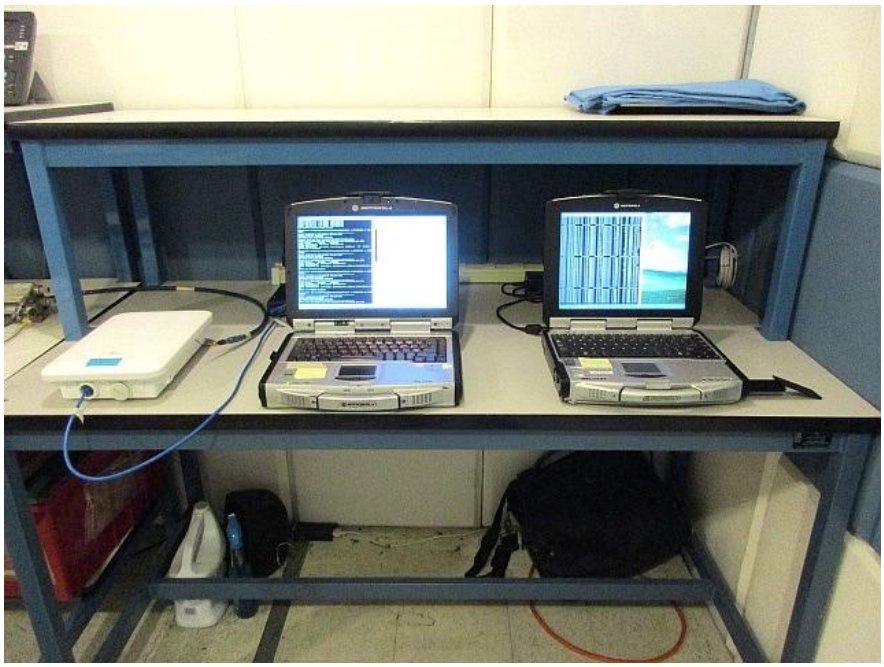
7. SETUP PHOTOS

DYNAMIC FREQUENCY SELECTION MEASUREMENT SETUP

DFS FRONT PHOTO



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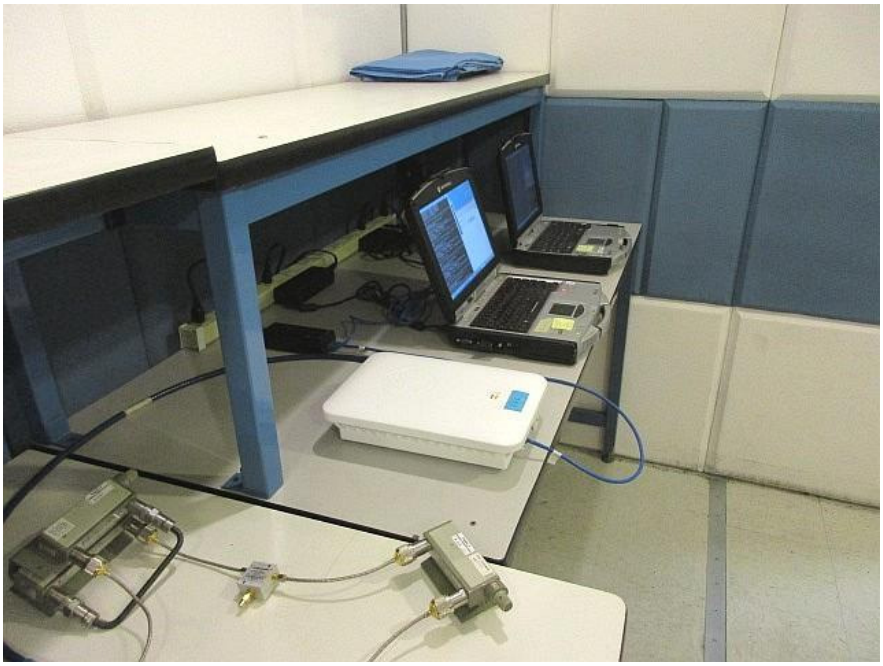
DFS BACK PHOTO



END OF REPORT

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