DFS PORTION of FCC 47 CFR PART 15 SUBPART E

CERTIFICATION TEST REPORT

FOR

802.11a/b/g/n/ac WIRELESS BONDED VDSL2 VOICE GATEWAY

MODEL NUMBER: NVG599

FCC ID: GZ5NVG599

REPORT NUMBER: 14U17955-3

ISSUE DATE: August 19, 2014

Prepared for

GENERAL INSTRUMENT CORPORATION (ARRIS)
46653 FREMONT BLVD.
FREMONT
CA., 94539, U.S.A

Prepared by

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	08/19/14	Initial Issue	T. Lee

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: GENERAL INSTRUMENT CORPORATION (ARRIS)
46653 FREMONT BLVD.
FREMONT, CA., 94539, U.S.A.

EUT DESCRIPTION: 802.11a/b/g/n/ac WIRELESS BONDED VDSL2 VOICE GATEWAY

MODEL: NVG599

SERIAL NUMBER: 180846645596272

DATE TESTED: JUNE 25 and JULY 11, 2014

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
DFS Portion of CFR 47 Part 15 Subpart E	Pass
INDUSTRY CANADA RSS-GEN Issue 8	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.

Approved & Released For
UL Verification Services Inc. By:

TIM LEE
PROGRAM MANAGER
UL Verification Services Inc.

Tested By:

DOUG ANDERSON
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, ANSI C63.10-2009, RSS-GEN Issue 8.

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

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-210 is closely harmonized with FCC Part 15 DFS rules. The deviations are as follows:

RSS-210 Issue 7 A9.4 (b) (ii) **Channel Availability Check Time:** …

Additional requirements for the band 5600-5650 MHz: Until further notice, devices subject to this Section shall not be capable of transmitting in the band 5600-5650 MHz, so that Environment Canada weather radars operating in this band are protected.

FCC

§15.407 (h) and FCC 06-96 APPENDIX "COMPLIANCE MEASUREMENT PROCEDURES FOR UNLICENSED-NATIONAL INFORMATION INFRASTRUCTURE DEVCIES OPERATING IN THE 5250-5350 MHz AND 5470-5725 MHz BANDS INCORPORATING DYNAMIC FREQUENCY SELECTION".

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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
Uniform Spreading	Yes	Not required	Not required

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

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

Maximum Transmit Power	Value (see note)
≥ 200 milliwatt	-64 dBm
< 200 milliwatt	-62 dBm
Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.	

Table 4: DFS Response requirement values

Parameter	Value
Non-occupancy period	30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds
Channel Closing Transmission Time	200 milliseconds + approx. 60 milliseconds over remaining 10 second period
The instant that the *Channel Move Time* and the *Channel Closing Transmission Time* begins is as follows: For the Short pulse radar Test Signals this instant is the end of the *Burst*. For the Frequency Hopping radar Test Signal, this instant is the end of the last radar burst generated. For the Long Pulse radar Test Signal this instant is the end of the 12-second period defining the radar transmission. 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 channel changes (an aggregate of approximately 60 milliseconds) during the remainder of the 10-second period. The aggregate duration of control signals will not count quiet periods in between transmissions.	

Table 5 – Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (Microseconds)	PRI (Microseconds)	Pulses	Minimum Percentage of Successful Detection	Minimum Trials
1	1	1428	18	60%	30
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

Table 6 – Long Pulse Radar Test Signal

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

Table 7 – Frequency Hopping Radar Test Signal

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

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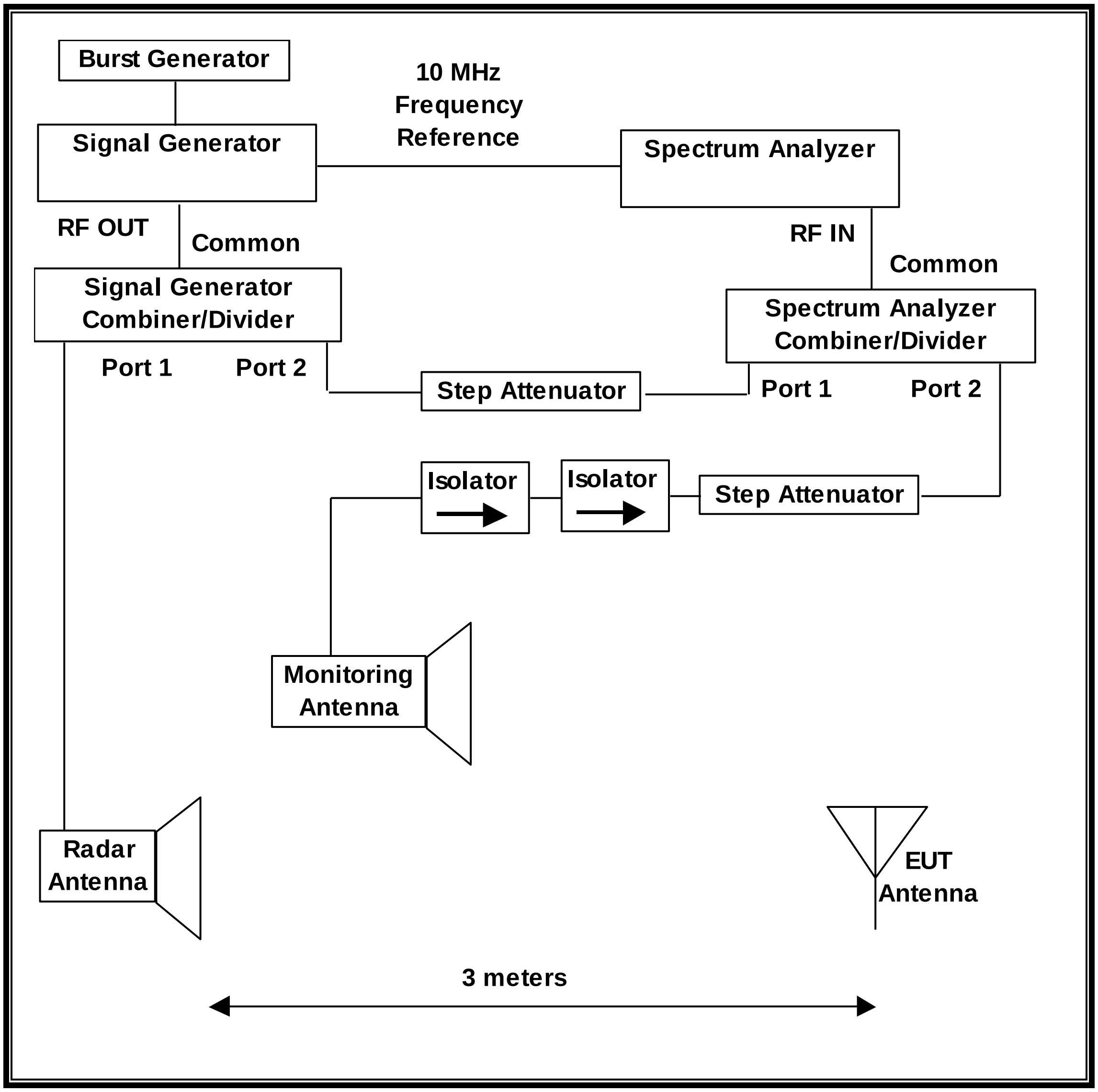
5.1.2. TEST AND MEASUREMENT SYSTEM

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 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 FCC 06-96 APPENDIX. 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.

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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.

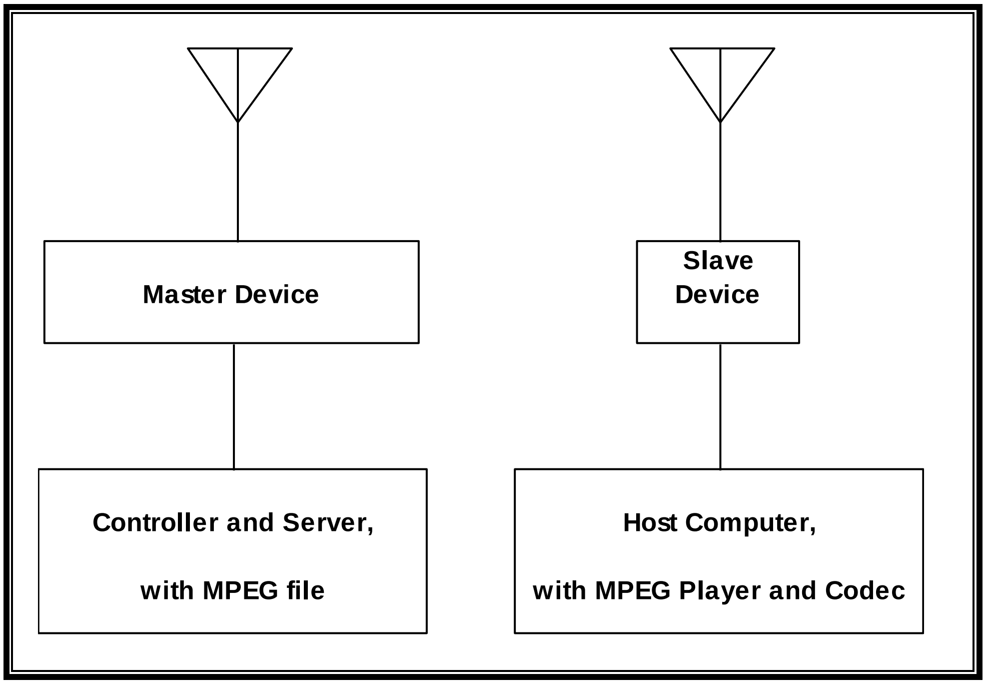
TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Asset Number**	**Cal Due**
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01178	09/10/14
Vector Signal Generator, 20GHz	Agilent / HP	E8267C	C01066	09/12/14
Arbitrary Waveform Generator	Agilent / HP	33220A	C01146	06/17/15

5.1.3. 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**
802.11a/b/g/n/ac Wireless USB Converter (Slave)	Cisco / Linksys	AE6000	12R10602406562	Q87-AE6000
AC Adapter (EUT)	Arris	NBS42A12035	579761-021-00	DoC
Notebook PC (Controller/Server)	Lenovo	Type 2356-LW5	R9-XHEV4 13/03	DoC
AC Adapter (Controller PC)	Lenovo	42T4430	11S42T4430Z1ZGW E2528BE	DoC
Notebook PC (Host)	HP	EliteBook 8530W	2CE934DG83	DoC
AC Adapter (Host PC)	HP	PA-1900-18H2	597950DLLVA97M	DoC

5.1.4. DESCRIPTION OF EUT

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 23.17 dBm EIRP in the 5250-5350 MHz band and 23.14 dBm EIRP in the 5470-5725 MHz band.

The only antenna assembly utilized with the EUT has a gain of 2 dBi.

Three 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 three 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 is generated by streaming the video file TestFile.mp2 “6 ½ Magic Hours” from the Master to the Slave in full motion video mode using the media player with the V2.61 Codec package.

TPC is not required since the maximum EIRP is less 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 access point is revision 9.1.6H0D20.

UNIFORM CHANNEL SPREADING

See Manufacturer’s Attestation.

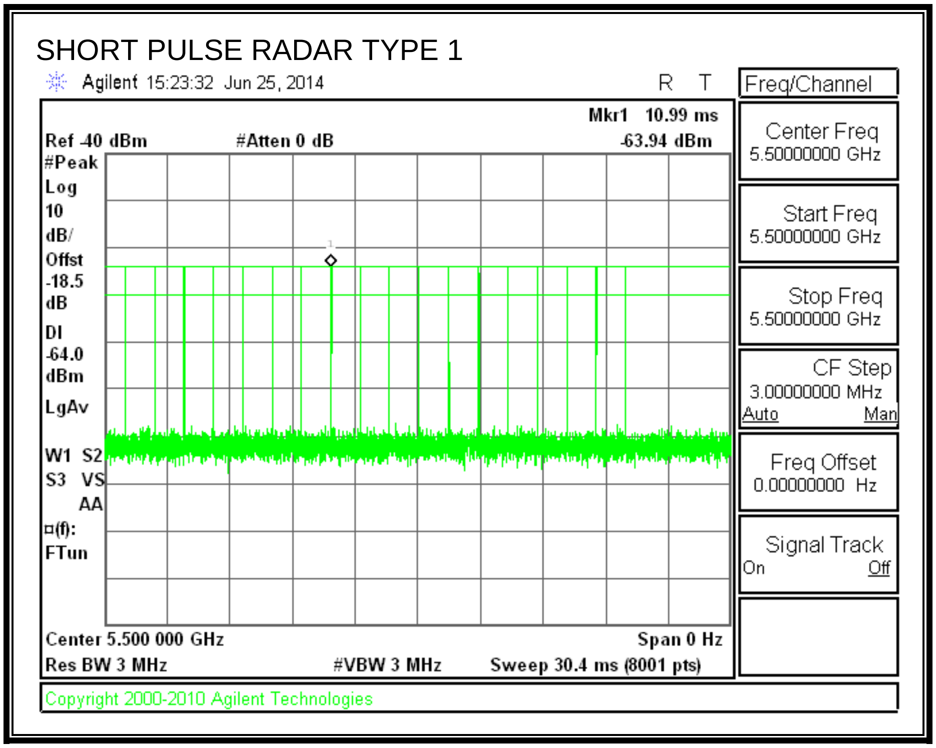
5.2. RESULTS FOR 20 MHz BANDWIDTH

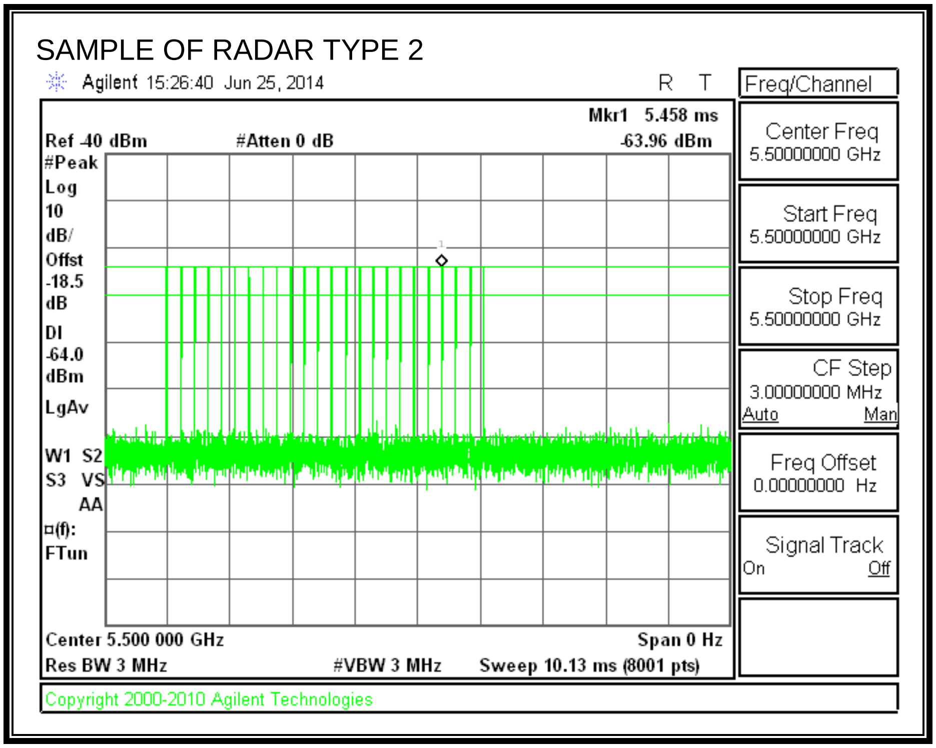
5.2.1. TEST CHANNEL

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

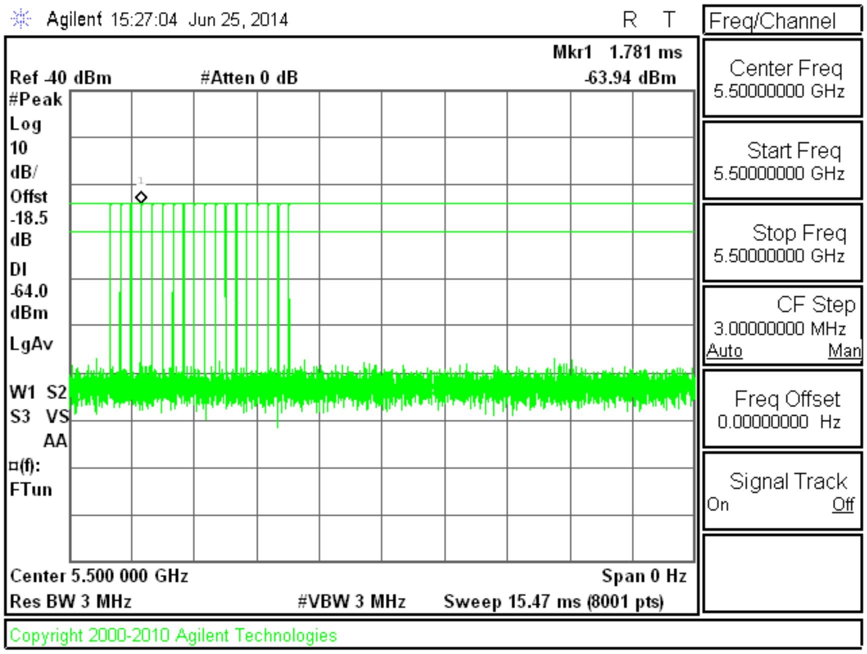
5.2.2. RADAR WAVEFORMS AND TRAFFIC

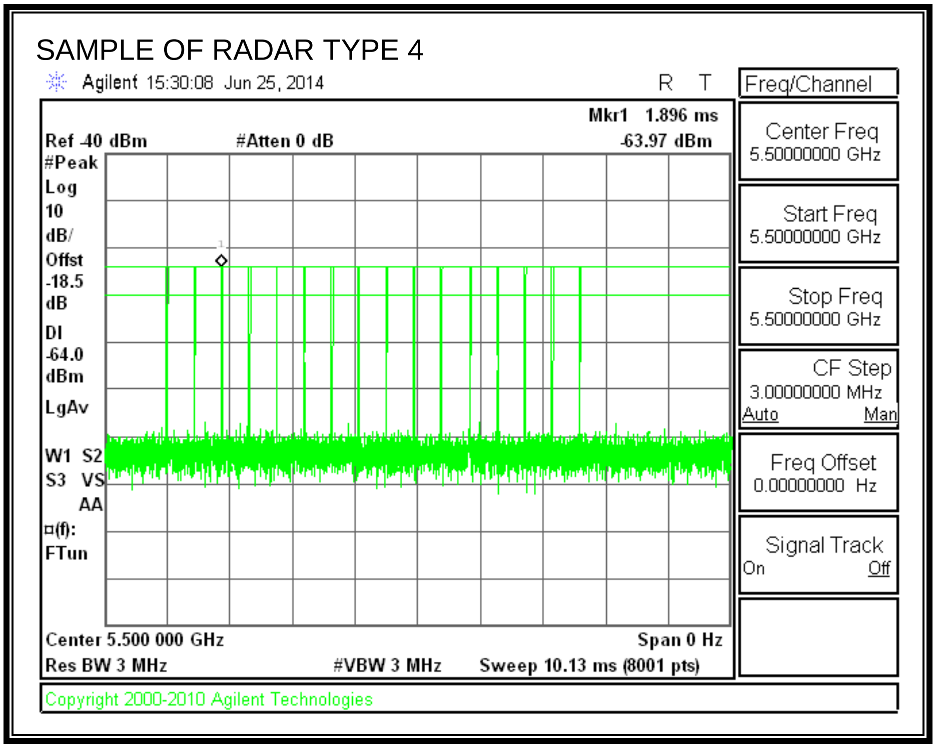
RADAR WAVEFORMS




SAMPLE OF RADAR TYPE 2
Agilent 15:26:40 Jun 25, 2014
R T
Freq/Channel
Mkr1 5.458 ms
Ref -40 dBm
#Atten 0 dB
-63.96 dBm
#Peak
Log
10
dB/
Offst
-18.5
dB
Dl
-64.0
dBm
LgAv
W1 S2
S3 VS
AA
¤(f):
FTun
Center Freq
5.50000000 GHz
Start Freq
5.50000000 GHz
Stop Freq
5.50000000 GHz
CF Step
3.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Center 5.500 000 GHz
Span 0 Hz
Res BW 3 MHz
#VBW 3 MHz
Sweep 10.13 ms (8001 pts)
Copyright 2000-2010 Agilent Technologies

SAMPLE OF RADAR TYPE 3




SAMPLE OF RADAR TYPE 4
Agilent 15:30:08 Jun 25, 2014
R T
Freq/Channel
Mkr1 1.896 ms
Ref -40 dBm
#Atten 0 dB
-63.97 dBm
#Peak
Log
10
dB/
Offst
-18.5
dB
Dl
-64.0
dBm
LgAv
W1 S2
S3 VS
AA
¤(f):
FTun
Center 5.500 000 GHz
Span 0 Hz
Res BW 3 MHz
#VBW 3 MHz
Sweep 10.13 ms (8001 pts)
Center Freq
5.50000000 GHz
Start Freq
5.50000000 GHz
Stop Freq
5.50000000 GHz
CF Step
3.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
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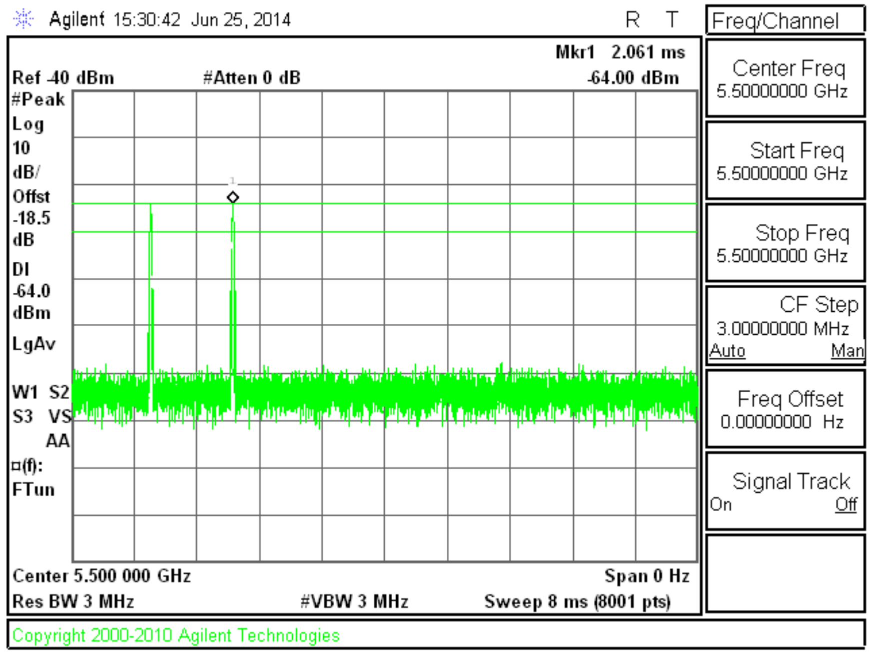
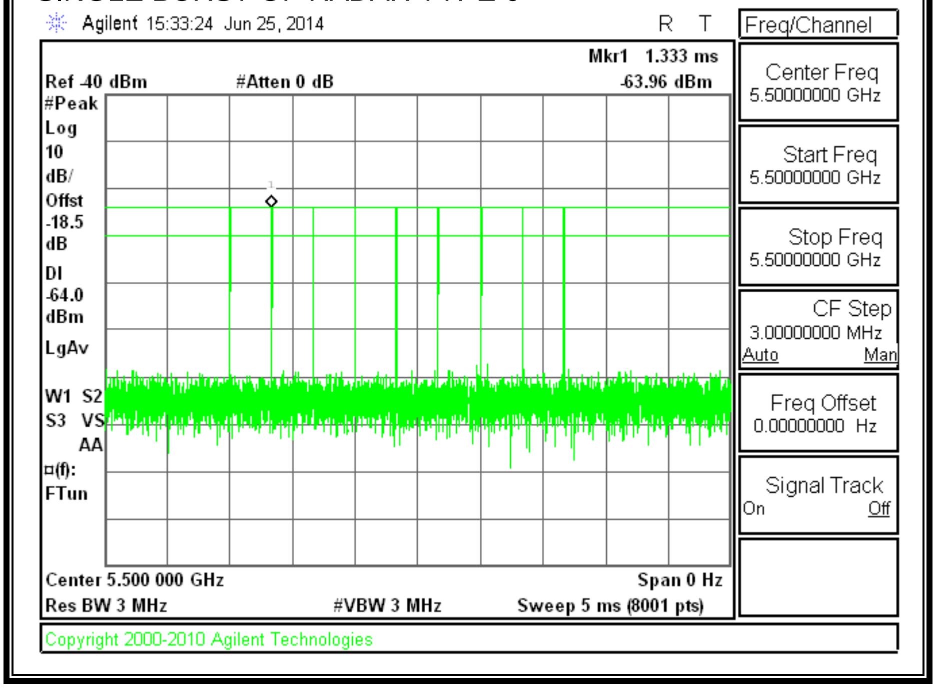
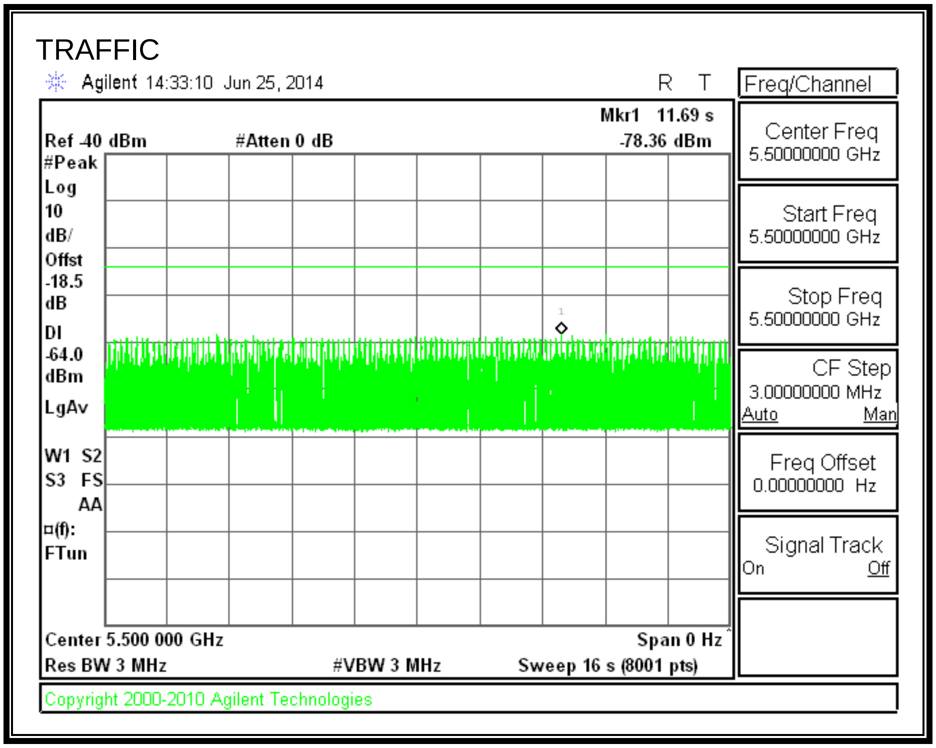
SAMPLE OF SINGLE BURST OF RADAR TYPE 5



SINGLE BURST OF RADAR TYPE 6



TRAFFIC


TRAFFIC
Agilent 14:33:10 Jun 25, 2014
R T
Freq/Channel
Mkr1 11.69 s
Ref -40 dBm #Atten 0 dB -78.36 dBm
#Peak
Log
10
dB/
Offst
-18.5
dB
Dl
-64.0
dBm
LgAv
W1 S2
S3 FS
AA
¤(f):
FTun
Center 5.500 000 GHz Span 0 Hz
Res BW 3 MHz #VBW 3 MHz Sweep 16 s (8001 pts)
Center Freq
5.50000000 GHz
Start Freq
5.50000000 GHz
Stop Freq
5.50000000 GHz
CF Step
3.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2010 Agilent Technologies

5.2.3. 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.

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)
36.41	225.5	189.1	129.1

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)
36.81	166.5	129.7	0.6

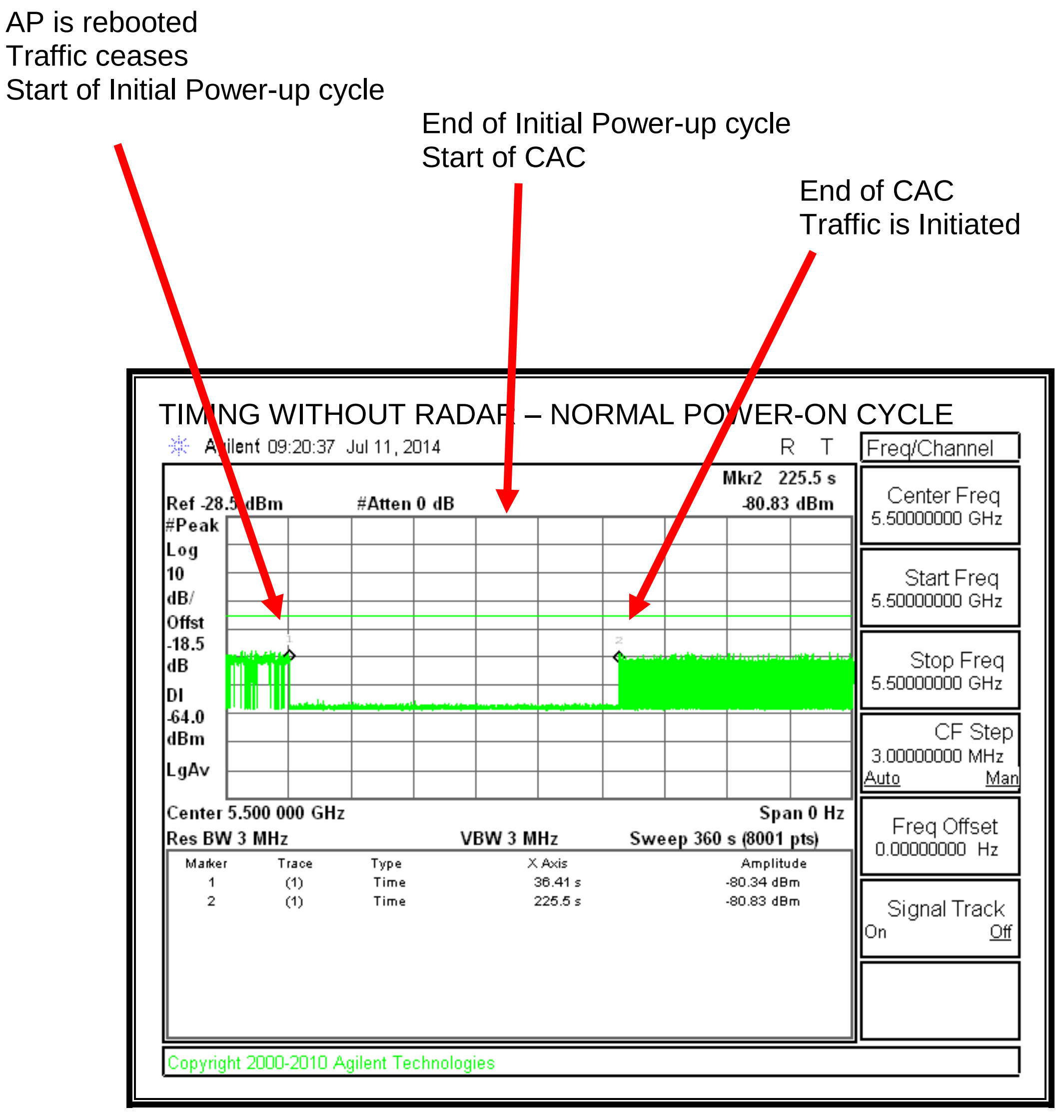
Radar Near End of CAC

Timing of Reboot (sec)	Timing of Radar Burst (sec)	Radar Relative to Reboot (sec)	Radar Relative to Start of CAC (sec)
36.27	224.3	188.0	58.9

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



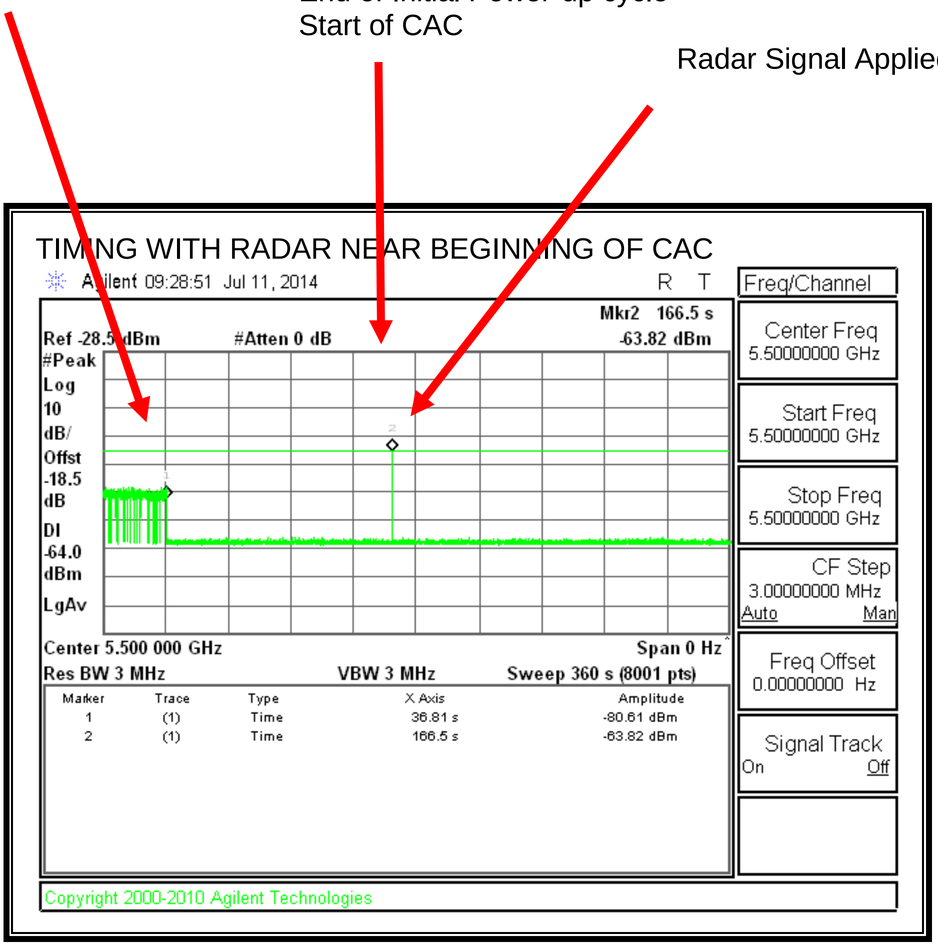
Transmissions begin on channel after completion of the initial power-up cycle and the CAC.

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



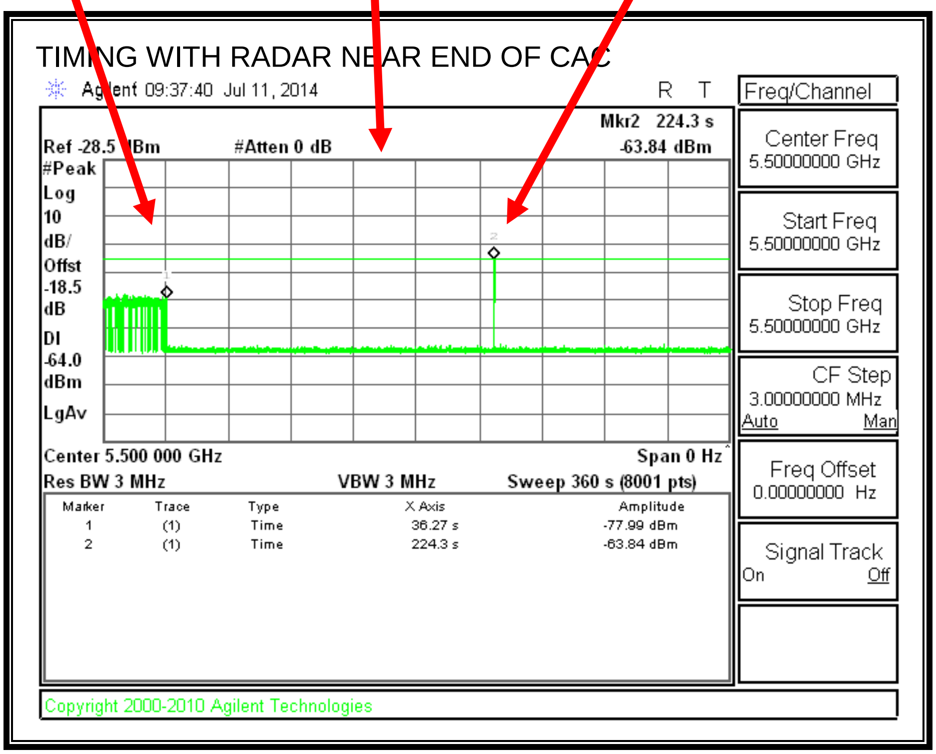
No EUT transmissions were observed after the radar signal.

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.

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

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)
4.070	10

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

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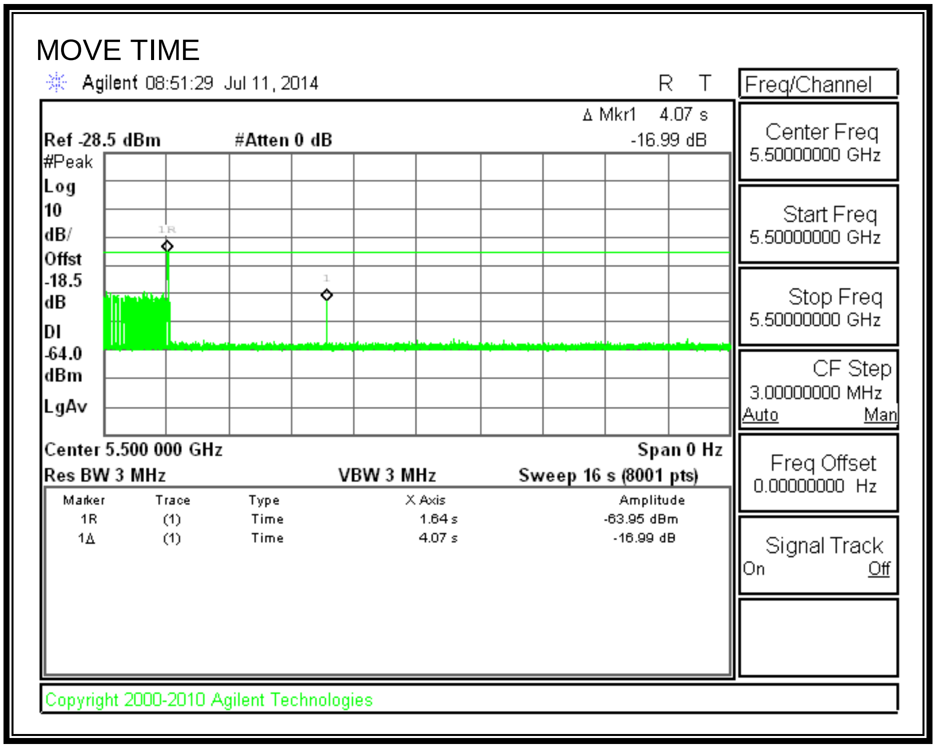
MOVE TIME


MOVE TIME
Agilent 08:51:29 Jul 11, 2014
R T
Freq/Channel
Δ Mkr1 4.07 s
Ref -28.5 dBm #Atten 0 dB
-16.99 dB
#Peak
Log
10
dB/
Offst
-18.5
dB
Dl
-64.0
dBm
LgAv
Center 5.500 000 GHz
Span 0 Hz
Res BW 3 MHz
VBW 3 MHz
Sweep 16 s (8001 pts)
Marker Trace Type X Axis Amplitude
1R (1) Time 1.64 s -63.95 dBm
1Δ (1) Time 4.07 s -16.99 dB
Center Freq
5.50000000 GHz
Start Freq
5.50000000 GHz
Stop Freq
5.50000000 GHz
CF Step
3.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
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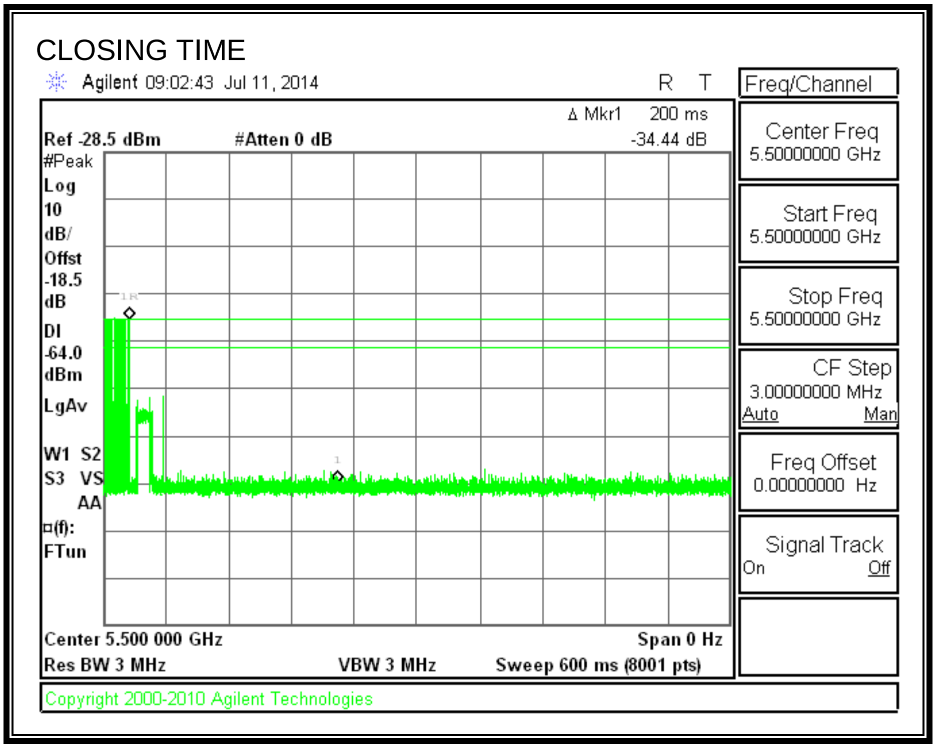
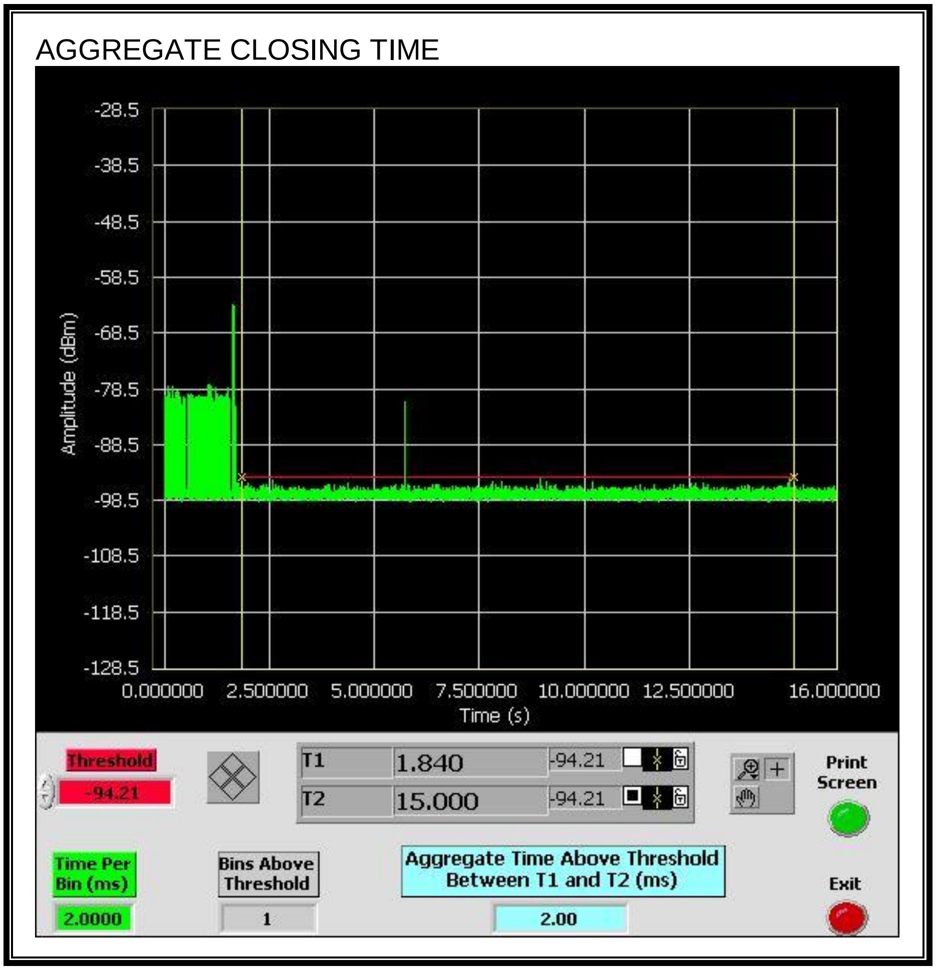
CHANNEL CLOSING TIME



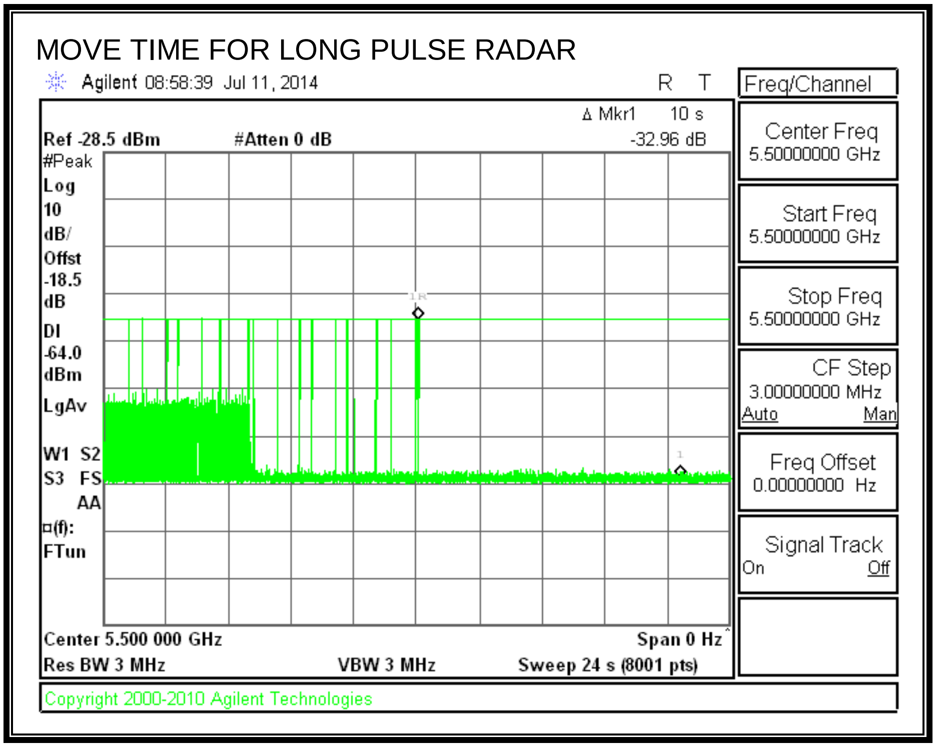
AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

Only intermittent transmissions are observed during the aggregate monitoring period.



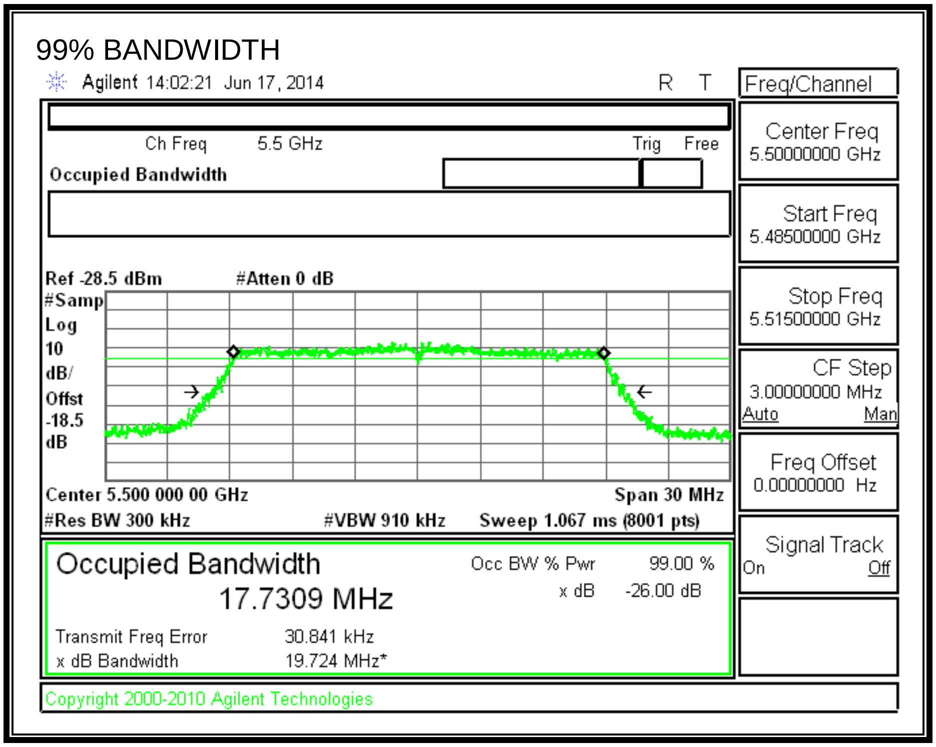
LONG PULSE CHANNEL MOVE TIME

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



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 (%)
5492	5508	16	17.731	90.2	80

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
5492	10	10	100	FL
5493	10	10	100	
5494	10	10	100	
5495	10	10	100	
5496	10	10	100	
5497	10	10	100	
5498	10	10	100	
5499	10	10	100	
5500	10	10	100	
5501	10	10	100	
5502	10	10	100	
5503	10	10	100	
5504	10	10	100	
5505	10	10	100	
5506	10	10	100	
5507	10	10	100	
5508	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**
FCC Short Pulse Type 1	30	100.00	60	Pass
FCC Short Pulse Type 2	30	86.67	60	Pass
FCC Short Pulse Type 3	30	86.67	60	Pass
FCC Short Pulse Type 4	30	86.67	60	Pass
Aggregate		90.00	80	Pass
FCC Long Pulse Type 5	30	100.00	80	Pass
FCC Hopping Type 6	34	100.00	70	Pass

TYPE 1 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 1 1 us Pulse Width, 1428 us PRI, 18 Pulses per Burst	
Trial	Successful Detection (Yes/No)
1	Yes
2	Yes
3	Yes
4	Yes
5	Yes
6	Yes
7	Yes
8	Yes
9	Yes
10	Yes
11	Yes
12	Yes
13	Yes
14	Yes
15	Yes
16	Yes
17	Yes
18	Yes
19	Yes
20	Yes
21	Yes
22	Yes
23	Yes
24	Yes
25	Yes
26	Yes
27	Yes
28	Yes
29	Yes
30	Yes

TYPE 2 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 2				
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Successful Detection (Yes/No)
2001	1.4	223.00	24	Yes
2002	1.6	206.00	23	Yes
2003	2.7	203.00	23	Yes
2004	2.9	208.00	29	Yes
2005	2.2	161.00	29	Yes
2006	3.9	195.00	28	Yes
2007	2	229.00	26	Yes
2008	3.5	182.00	27	No
2009	2.8	204.00	28	Yes
2010	3.6	152.00	28	Yes
2011	1.2	189.00	24	Yes
2012	1.3	173.00	25	Yes
2013	1.5	165.00	23	Yes
2014	2.7	214.00	24	Yes
2015	1.7	220.00	24	No
2016	3.5	181.00	24	Yes
2017	3.6	202.00	27	Yes
2018	4.6	220.00	26	Yes
2019	2.1	208.00	25	Yes
2020	4.9	204.00	23	Yes
2021	4.2	212.00	24	Yes
2022	3.2	206.00	23	Yes
2023	1.2	205.00	24	No
2024	4.1	175.00	28	Yes
2025	3.9	181.00	23	Yes
2026	1.6	206.00	25	Yes
2027	1.9	211.00	28	Yes
2028	1.6	221.00	25	Yes
2029	3.3	172.00	23	No
2030	4.7	206.00	23	Yes

TYPE 3 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 3				
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Successful Detection (Yes/No)
3001	6.4	261.00	18	Yes
3002	5.1	309.00	16	No
3003	6.4	300.00	16	Yes
3004	8	425.00	16	Yes
3005	5.6	357.00	18	No
3006	8.3	365.00	16	Yes
3007	5.9	343.00	18	Yes
3008	8.5	304.00	16	Yes
3009	9.8	331.00	17	Yes
3010	6.4	338.00	16	Yes
3011	6.1	286.00	18	Yes
3012	9.5	484.00	18	Yes
3013	9.2	379.00	17	Yes
3014	6.1	260.00	18	Yes
3015	6.9	402.00	18	Yes
3016	6.8	465.00	16	Yes
3017	8.5	394.00	17	Yes
3018	7.9	457.00	16	No
3019	8.1	301.00	17	Yes
3020	5.9	407.00	16	Yes
3021	5.8	492.00	17	Yes
3022	7.6	415.00	18	Yes
3023	8.3	283.00	17	Yes
3024	8.1	425.00	18	No
3025	8.8	467.00	17	Yes
3026	5.8	372.00	18	Yes
3027	7.7	483.00	17	Yes
3028	5	496.00	18	Yes
3029	7.8	359	18	Yes
3030	5.5	423	16	Yes

TYPE 4 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 4				
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Successful Detection (Yes/No)
4001	10.5	445.00	16	Yes
4002	13.1	355.00	12	Yes
4003	17.7	471.00	16	No
4004	12.7	482.00	15	Yes
4005	18.5	334.00	12	Yes
4006	12.8	466.00	16	No
4007	16.6	257.00	13	Yes
4008	15.4	302.00	14	Yes
4009	19.6	435.00	15	Yes
4010	13.5	340.00	12	Yes
4011	14.5	414.00	13	No
4012	19.1	339.00	16	Yes
4013	12.8	309.00	12	Yes
4014	17.3	455.00	12	Yes
4015	17.1	489.00	16	Yes
4016	10.4	329.00	15	No
4017	20	253.00	13	Yes
4018	15.9	311.00	12	Yes
4019	18.4	334.00	15	Yes
4020	19.8	377.00	12	Yes
4021	15.1	497.00	13	Yes
4022	13	268.00	16	Yes
4023	10.3	361.00	16	Yes
4024	17.8	286.00	13	Yes
4025	16.2	263.00	16	Yes
4026	15.1	273.00	16	Yes
4027	11.9	285.00	15	Yes
4028	11.1	480.00	14	Yes
4029	13.7	284.00	14	Yes
4030	15.2	478.00	13	Yes

TYPE 5 DETECTION PROBABILITY

Data Sheet for FCC Long Pulse Radar Type 5	
Trial	Successful Detection (Yes/No)
1	Yes
2	Yes
3	Yes
4	Yes
5	Yes
6	Yes
7	Yes
8	Yes
9	Yes
10	Yes
11	Yes
12	Yes
13	Yes
14	Yes
15	Yes
16	Yes
17	Yes
18	Yes
19	Yes
20	Yes
21	Yes
22	Yes
23	Yes
24	Yes
25	Yes
26	Yes
27	Yes
28	Yes
29	Yes
30	Yes

Note: The Type 5 randomized parameters 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	130	5492	6	Yes
2	1080	5493	2	Yes
3	1555	5494	2	Yes
4	2030	5495	2	Yes
5	2505	5496	3	Yes
6	2980	5497	5	Yes
7	3455	5498	1	Yes
8	3930	5499	1	Yes
9	4405	5500	3	Yes
10	4880	5501	6	Yes
11	5355	5502	4	Yes
12	5830	5503	5	Yes
13	6305	5504	4	Yes
14	6780	5505	4	Yes
15	7255	5506	1	Yes
16	7730	5507	3	Yes
17	8205	5508	6	Yes
18	8680	5492	3	Yes
19	9155	5493	4	Yes
20	9630	5494	5	Yes
21	10105	5495	3	Yes
22	10580	5496	2	Yes
23	11055	5497	2	Yes
24	11530	5498	5	Yes
25	12005	5499	6	Yes
26	12480	5500	6	Yes
27	12955	5501	7	Yes
28	13430	5502	5	Yes
29	13905	5503	2	Yes
30	14380	5504	3	Yes
31	14855	5505	3	Yes
32	15330	5506	3	Yes
33	15805	5507	3	Yes
34	16280	5508	2	Yes

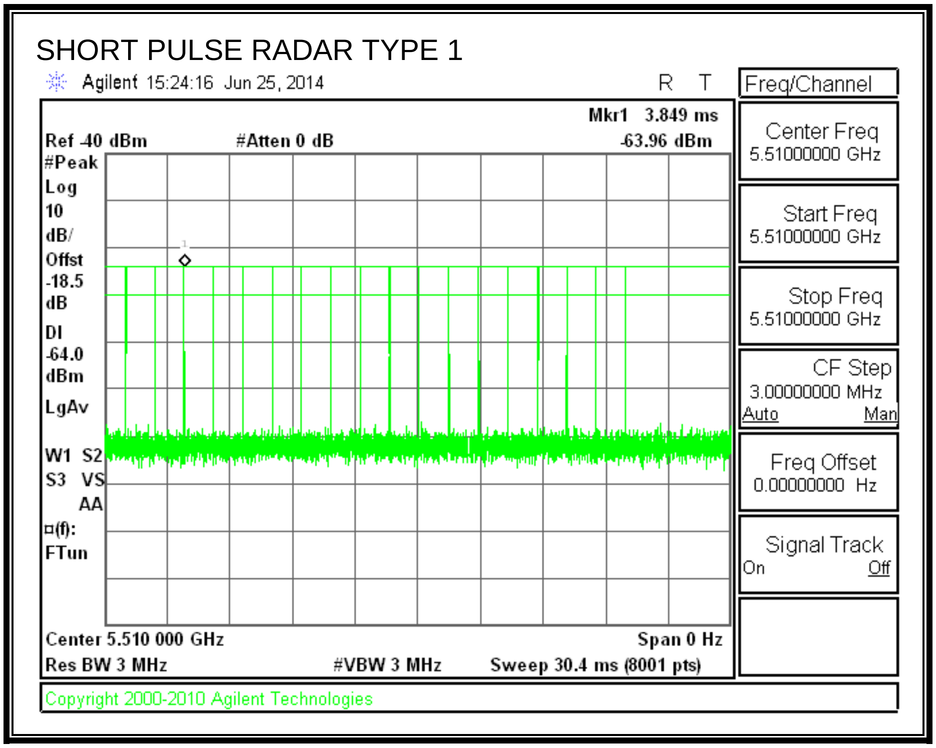
5.3. RESULTS FOR 40 MHz BANDWIDTH

5.3.1. TEST CHANNEL

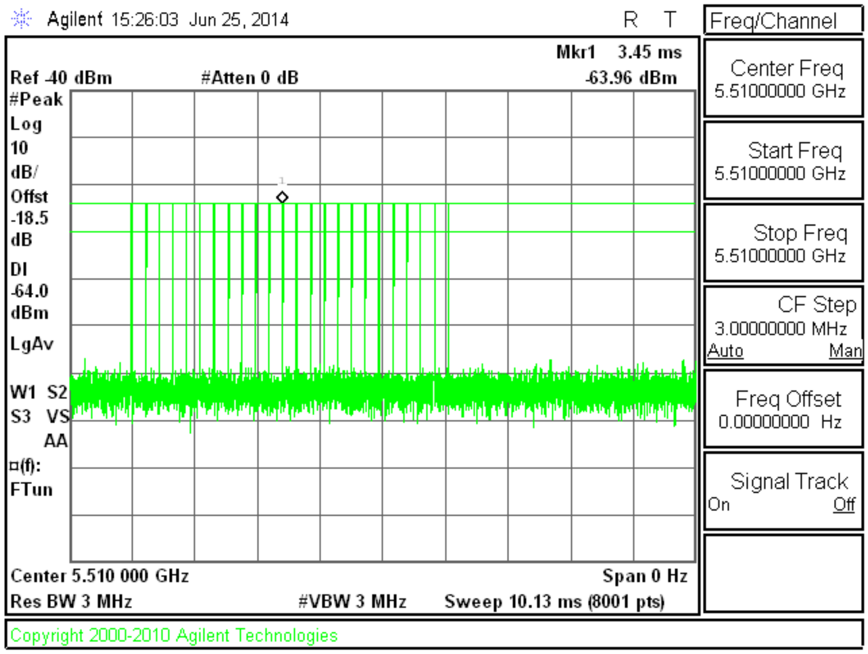
All tests were performed at a channel center frequency of 5510 MHz.

5.3.2. RADAR WAVEFORMS AND TRAFFIC

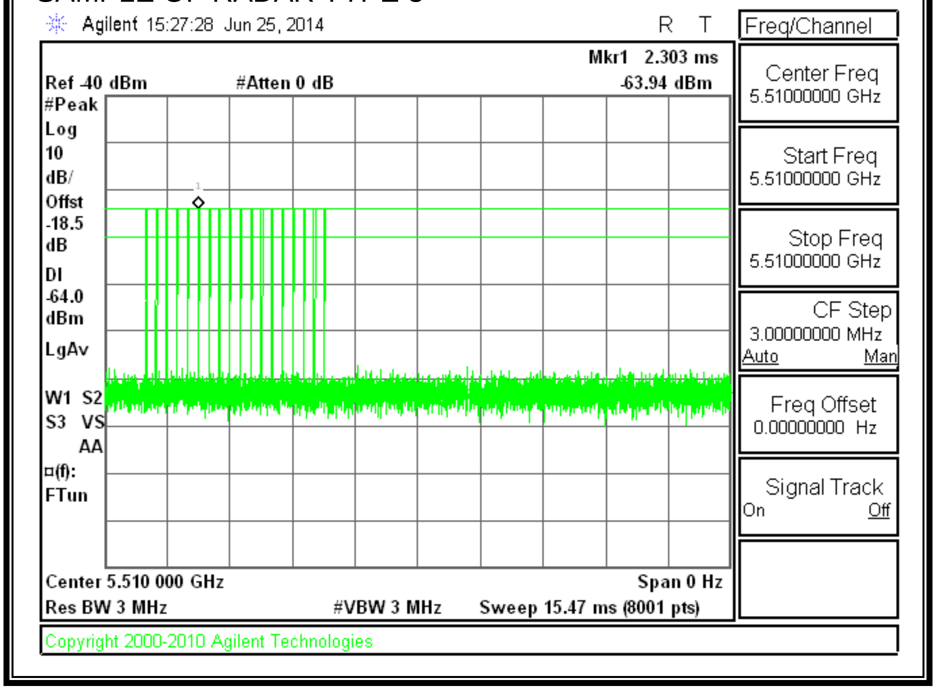
RADAR WAVEFORMS



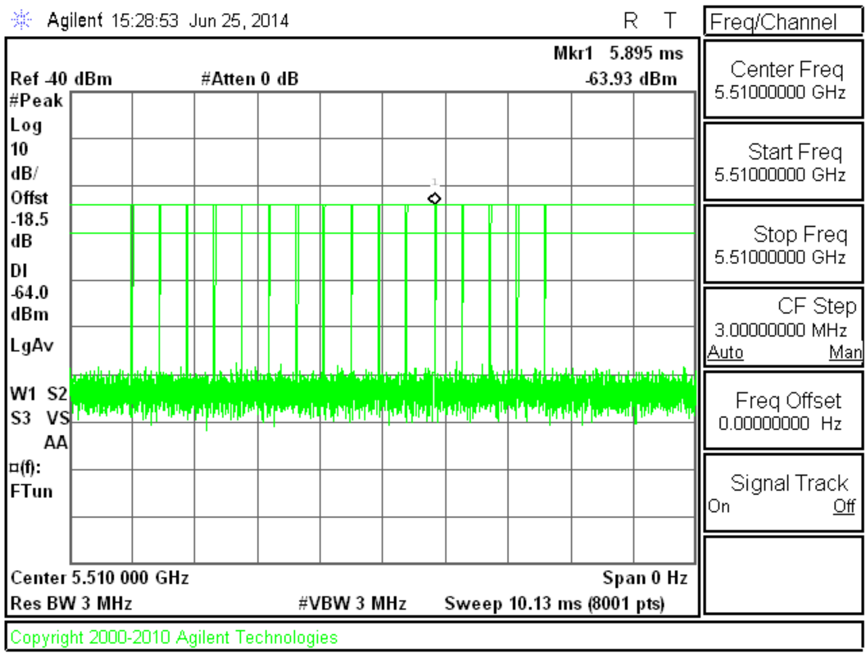
SAMPLE OF RADAR TYPE 2



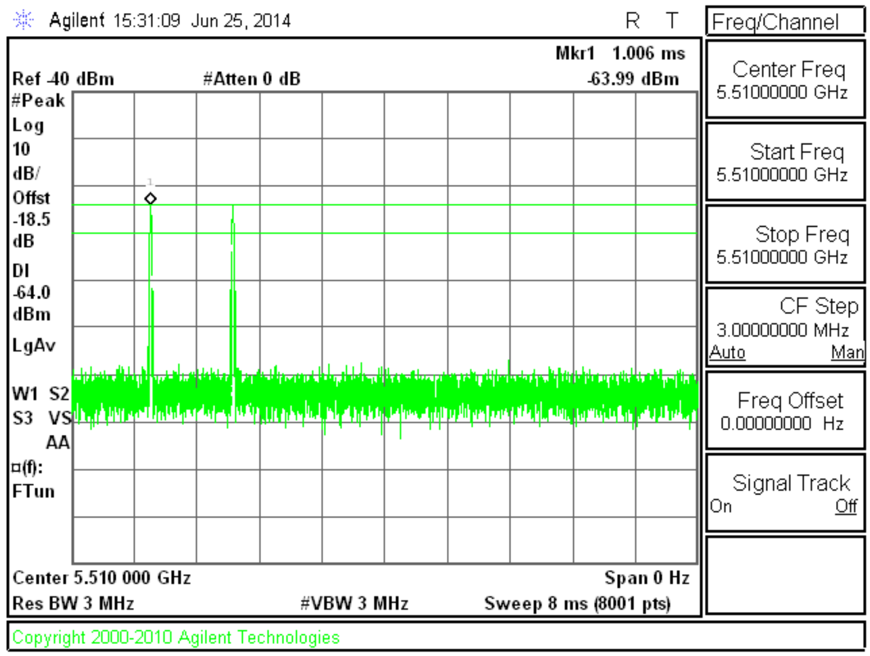
SAMPLE OF RADAR TYPE 3

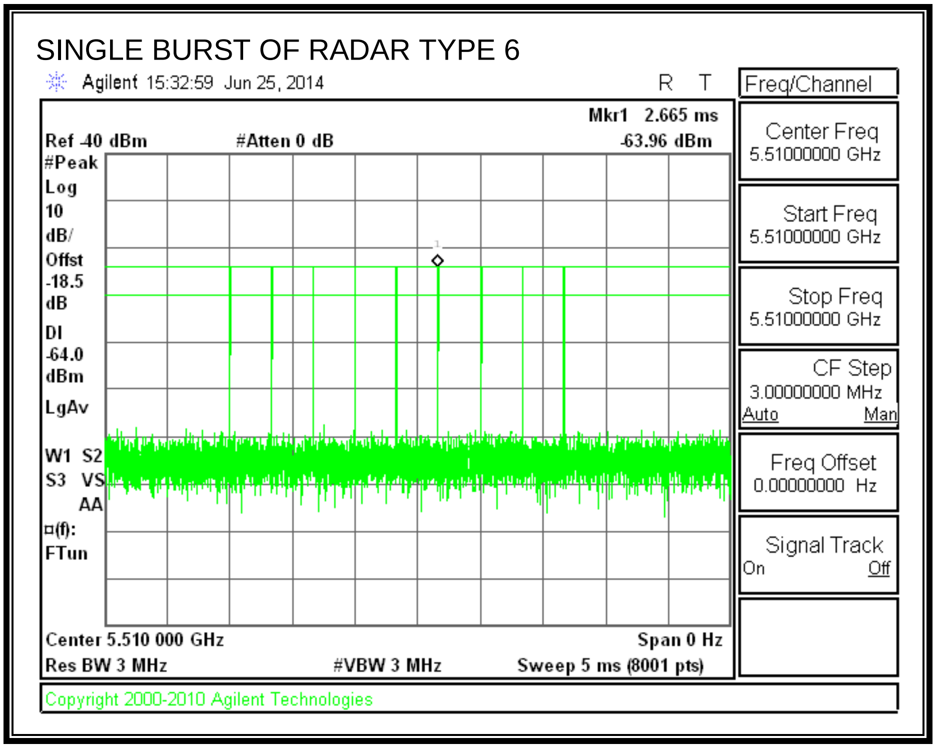


SAMPLE OF RADAR TYPE 4



SAMPLE OF SINGLE BURST OF RADAR TYPE 5




SINGLE BURST OF RADAR TYPE 6
Agilent 15:32:59 Jun 25, 2014
R T
Freq/Channel
Mkr1 2.665 ms
Ref -40 dBm
#Atten 0 dB
-63.96 dBm
#Peak
Log
10
dB/
Offst
-18.5
dB
Dl
-64.0
dBm
LgAv
W1 S2
S3 VS
AA
FTun
Center 5.510 000 GHz
Span 0 Hz
Res BW 3 MHz
#VBW 3 MHz
Sweep 5 ms (8001 pts)
Center Freq
5.51000000 GHz
Start Freq
5.51000000 GHz
Stop Freq
5.51000000 GHz
CF Step
3.00000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
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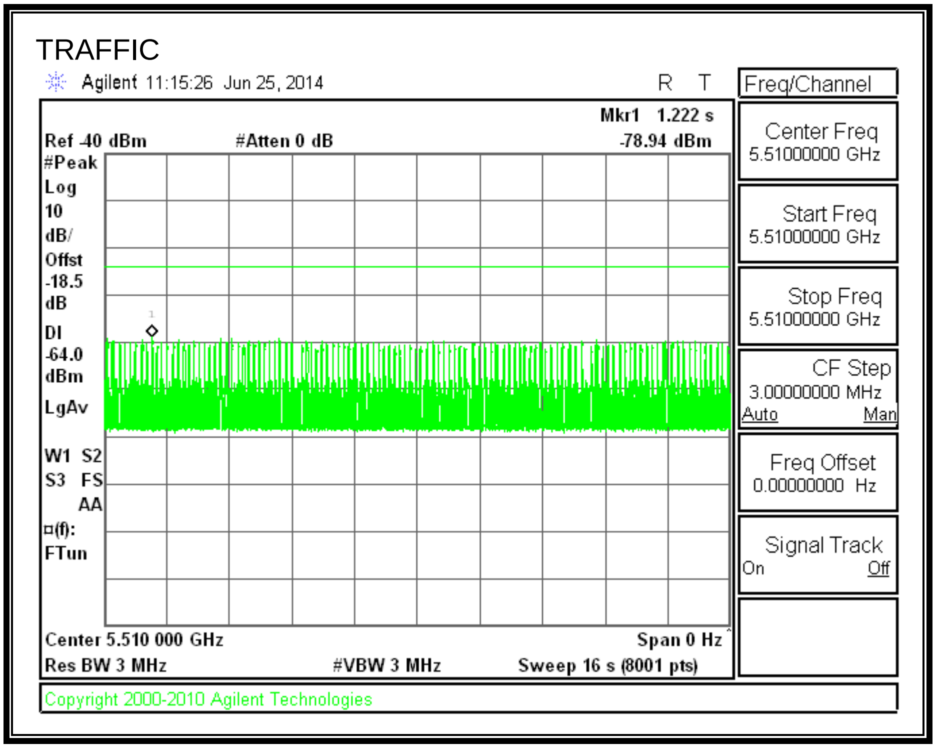
TRAFFIC


TRAFFIC
Agilent 11:15:26 Jun 25, 2014
R T
Mkr1 1.222 s
Ref -40 dBm #Atten 0 dB -78.94 dBm
#Peak
Log
10
dB/
Offst
-18.5
dB
Dl
-64.0
dBm
LgAv
W1 S2
S3 FS
AA
FTun
Center 5.510 000 GHz Span 0 Hz
Res BW 3 MHz #VBW 3 MHz Sweep 16 s (8001 pts)
Freq/Channel
Center Freq
5.51000000 GHz
Start Freq
5.51000000 GHz
Stop Freq
5.51000000 GHz
CF Step
3.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
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5.3.3. 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.

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)
36	224.9	188.9	128.9

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)
36.67	166.1	129.4	0.5

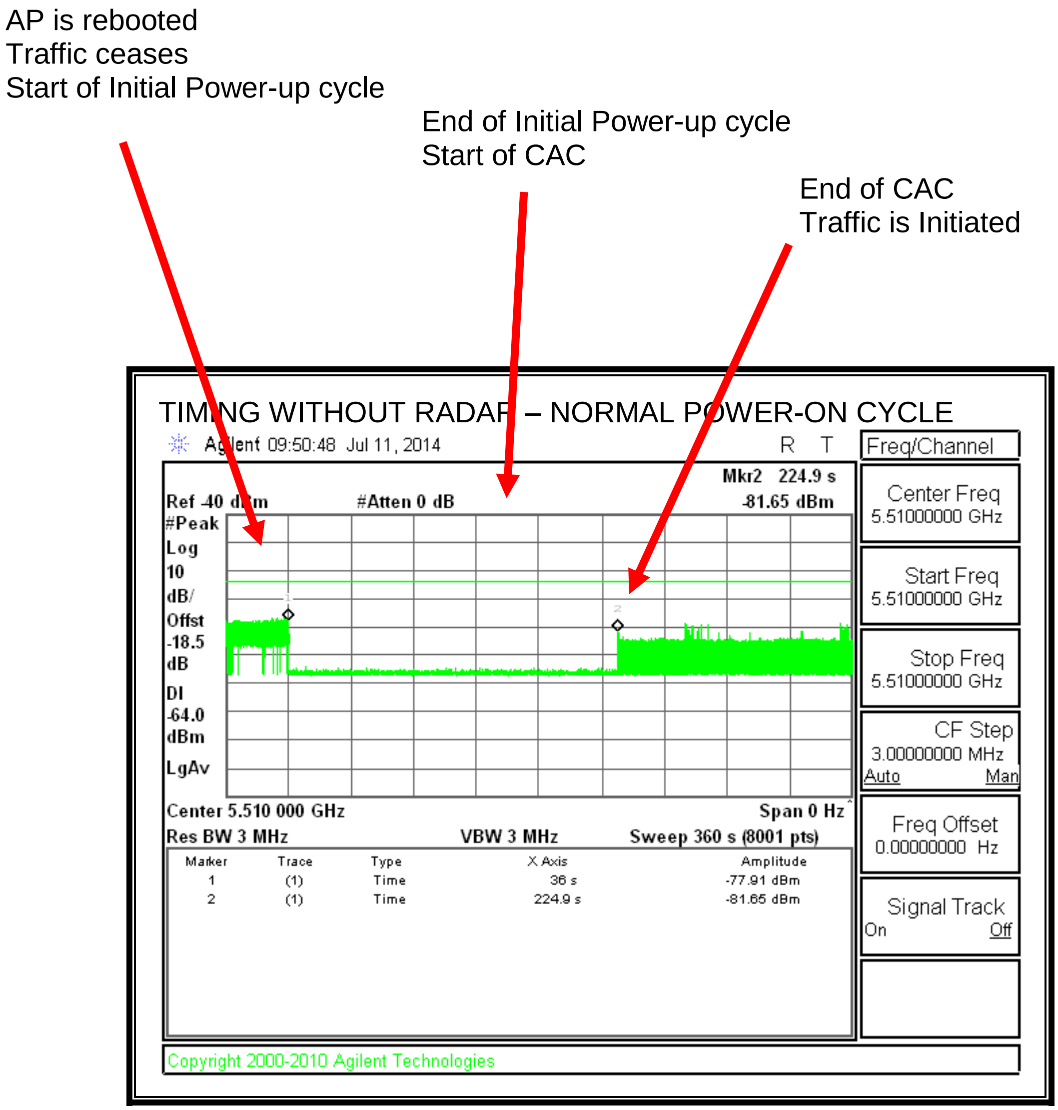
Radar Near End of CAC

Timing of Reboot (sec)	Timing of Radar Burst (sec)	Radar Relative to Reboot (sec)	Radar Relative to Start of CAC (sec)
37.62	225.0	187.4	58.5

QUALITATIVE RESULTS

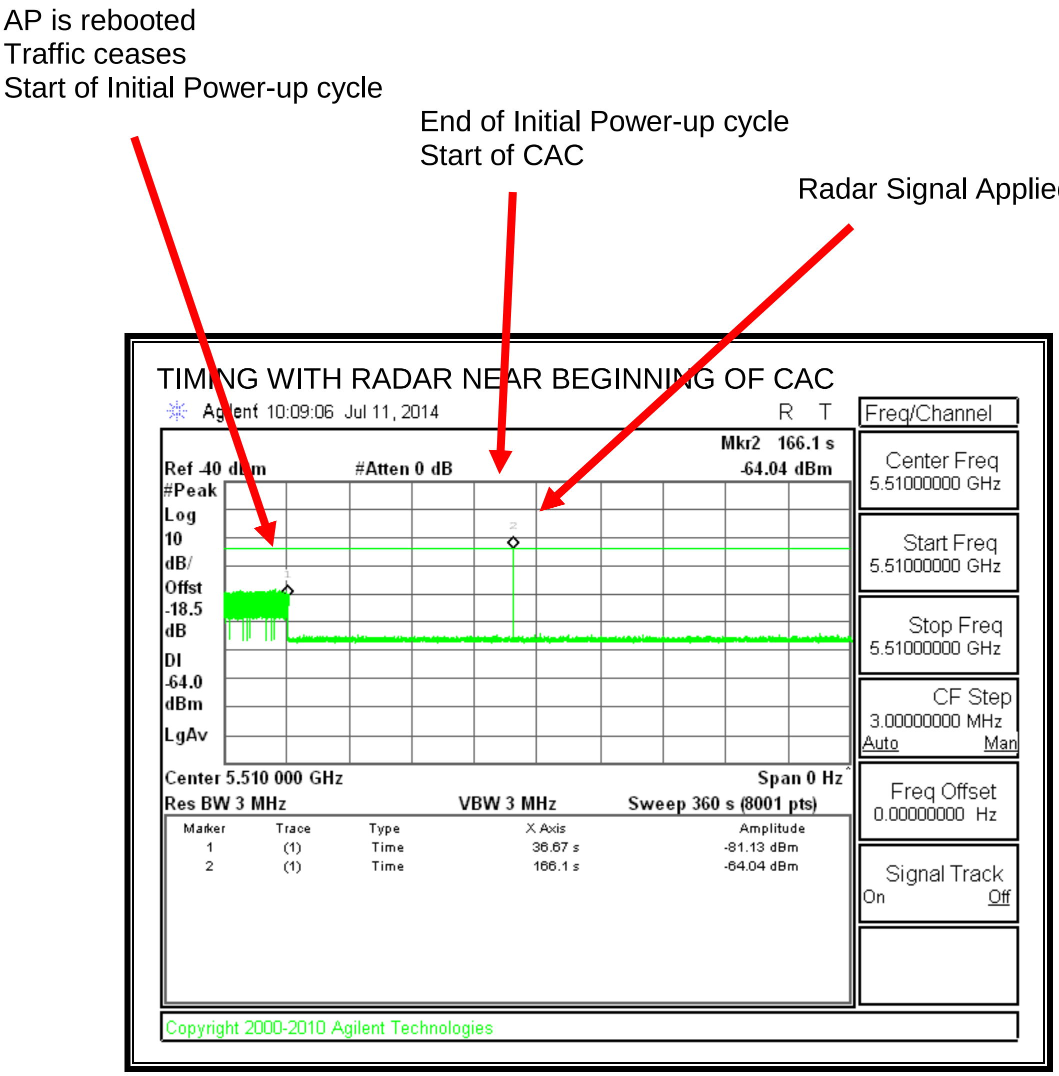
Timing of Radar Burst	Display on Control Computer	Spectrum Analyzer Display
No Radar Triggered	EUT marks Channel as active	Transmissions begin on channel after completion of the initial power-up cycle and the CAC
Within 0 to 6 second window	EUT indicates radar detected	No transmissions on channel
Within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

TIMING WITHOUT RADAR DURING CAC



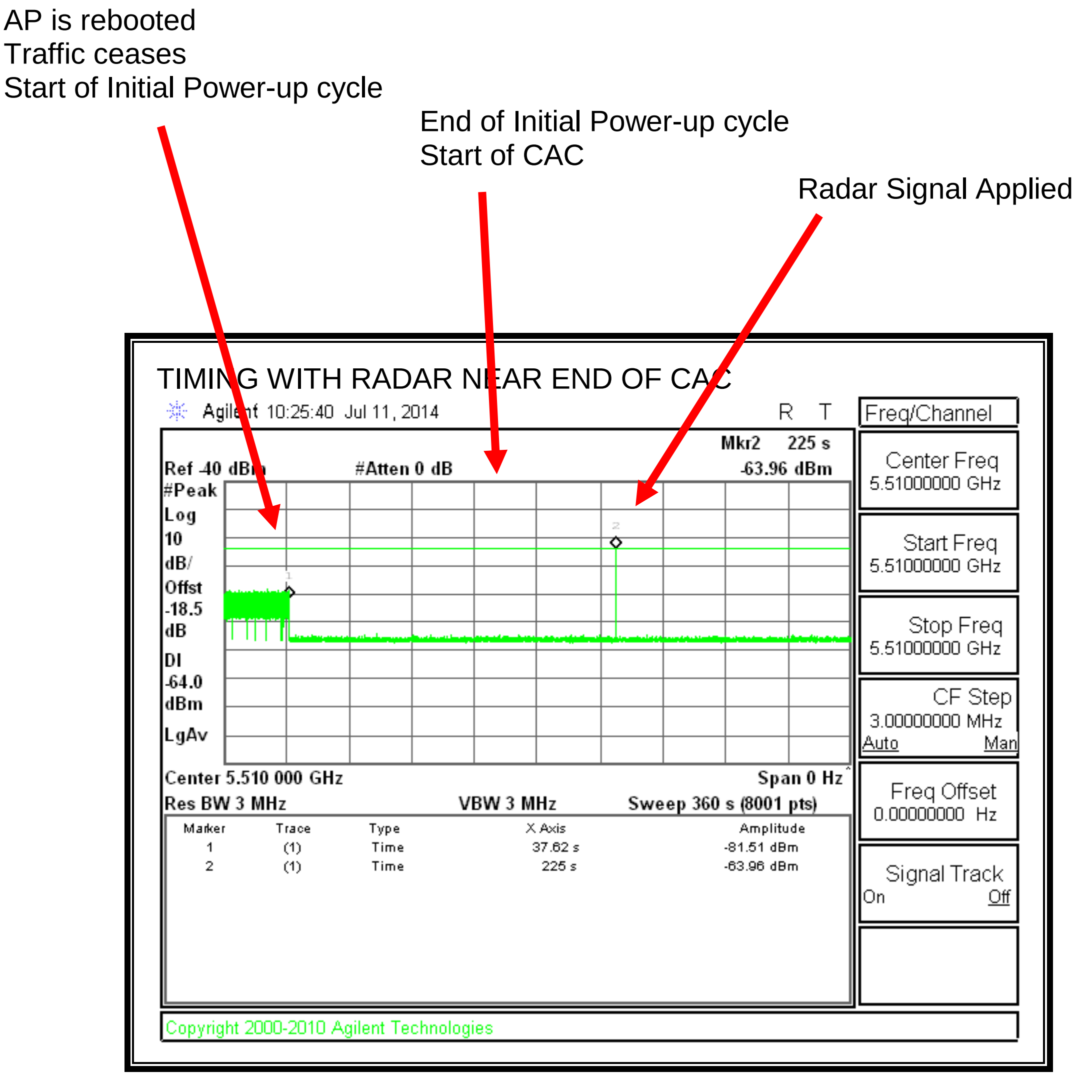
Transmissions begin on channel after completion of the initial power-up cycle and the CAC.

TIMING WITH RADAR NEAR BEGINNING OF CAC



No EUT transmissions were observed after the radar signal.

TIMING WITH RADAR NEAR END OF CAC



No EUT transmissions were observed after the radar signal.

5.3.1. OVERLAPPING CHANNEL TESTS

RESULTS

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

5.3.2. 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)
4.136	10

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

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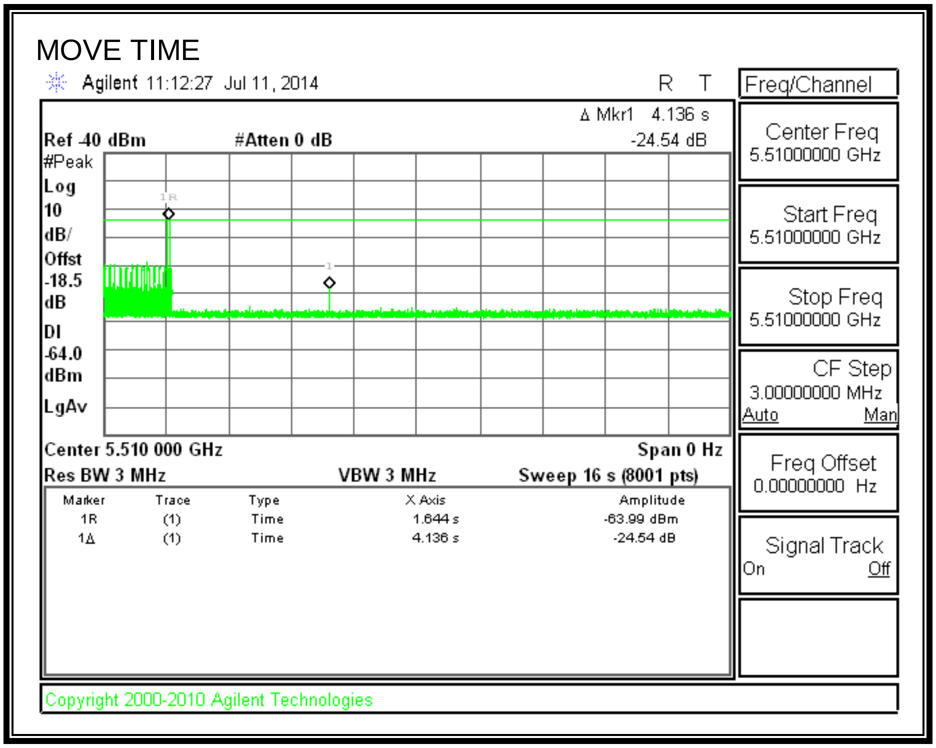
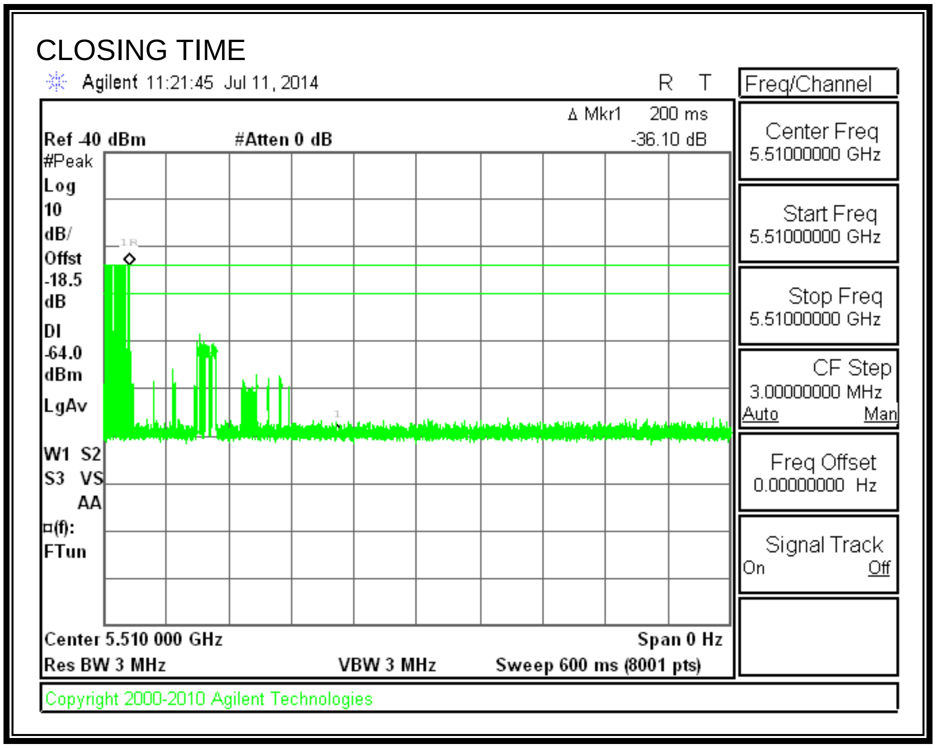
MOVE TIME

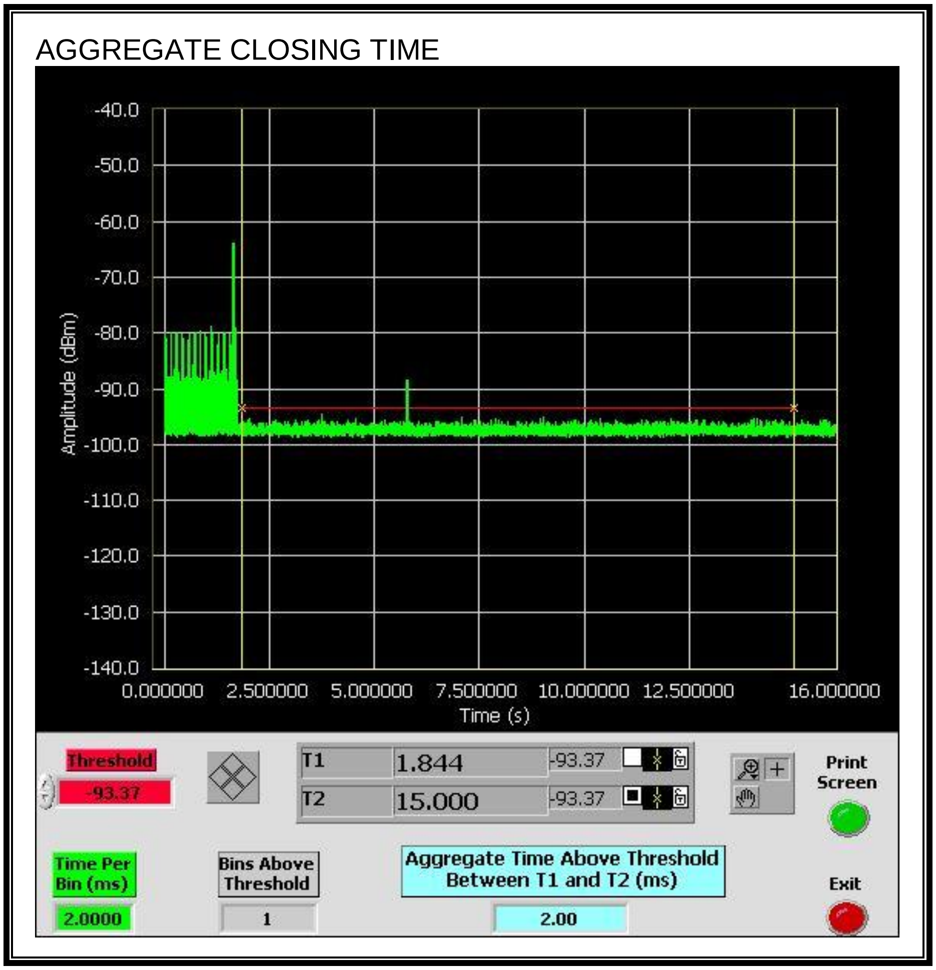

MOVE TIME
Agilent 11:12:27 Jul 11, 2014
R T
Freq/Channel
Δ Mkr1 4.136 s
Ref -40 dBm #Atten 0 dB -24.54 dB
#Peak
Log
10
dB/
Offst
-18.5
dB
Dl
-64.0
dBm
LgAv
Center 5.510 000 GHz Span 0 Hz
Res BW 3 MHz VBW 3 MHz Sweep 16 s (8001 pts)
Marker Trace Type X Axis Amplitude
1R (1) Time 1.644 s -63.99 dBm
1Δ (1) Time 4.136 s -24.54 dB
Center Freq
5.51000000 GHz
Start Freq
5.51000000 GHz
Stop Freq
5.51000000 GHz
CF Step
3.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2010 Agilent Technologies

CHANNEL CLOSING TIME



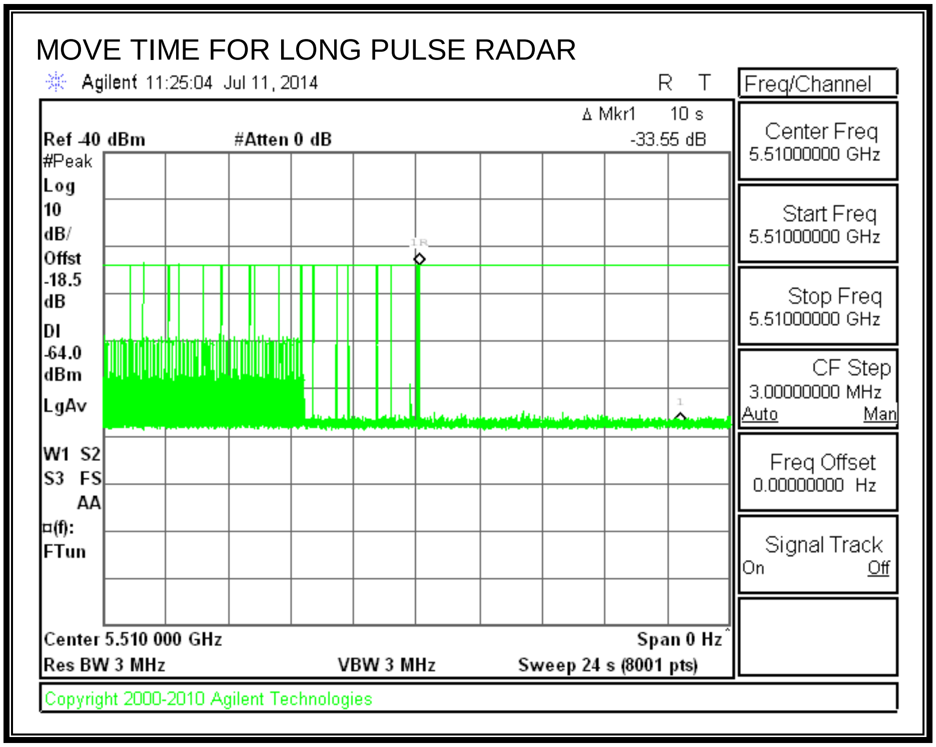
AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

Only intermittent transmissions are observed during the aggregate monitoring period.



LONG PULSE CHANNEL MOVE TIME

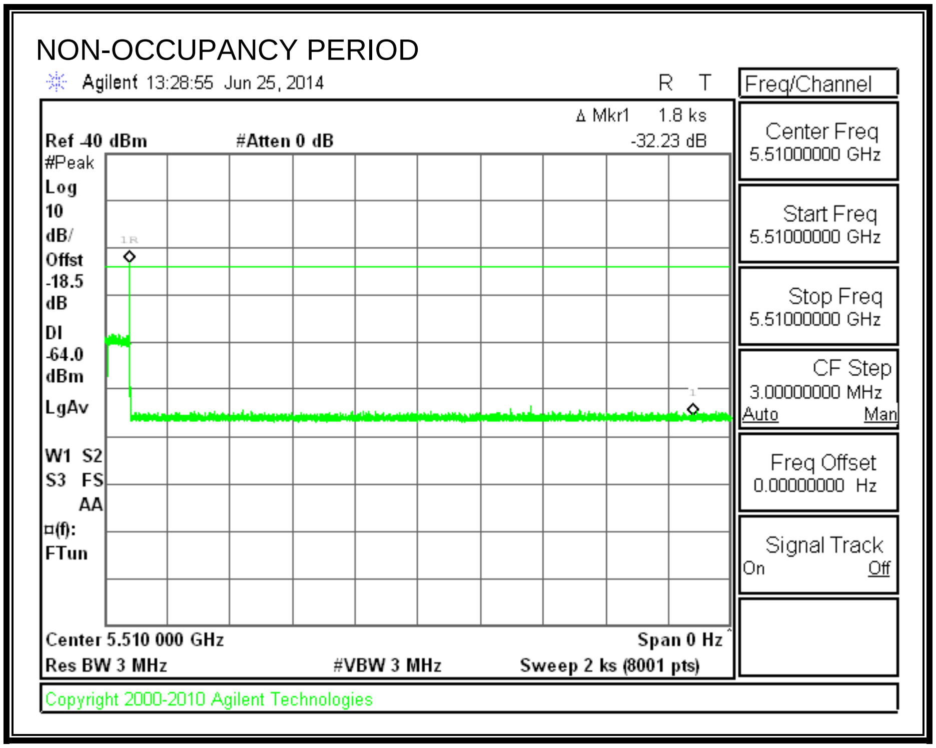
The traffic ceases prior to 10 seconds after the end of the radar waveform.



5.3.1. NON-OCCUPANCY PERIOD

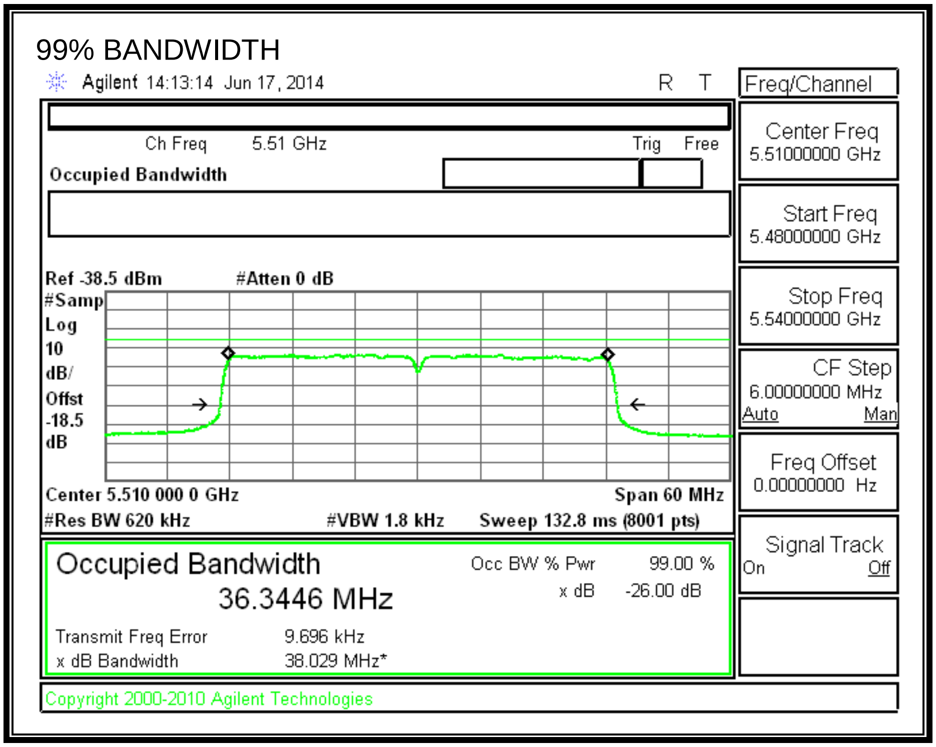
RESULTS

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



5.3.2. 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 (%)
5492	5528	36	36.345	99.1	80

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
5492	10	10	100	FL
5493	10	10	100	
5494	10	10	100	
5495	10	10	100	
5496	10	10	100	
5497	10	10	100	
5498	10	10	100	
5499	10	10	100	
5500	10	10	100	
5501	10	10	100	
5502	10	10	100	
5503	10	9	90	
5504	10	9	90	
5505	10	10	100	
5506	10	10	100	
5507	10	10	100	
5508	10	10	100	
5509	10	10	100	
5510	10	9	90	
5511	10	10	100	
5512	10	10	100	
5513	10	10	100	
5514	10	10	100	
5515	10	10	100	
5516	10	10	100	
5517	10	10	100	
5518	10	10	100	
5519	10	10	100	
5520	10	10	100	
5521	10	10	100	
5522	10	10	100	
5523	10	10	100	
5524	10	10	100	
5525	10	10	100	
5526	10	9	90	
5527	10	10	100	
5528	10	10	100	FH

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5.3.3. IN-SERVICE MONITORING

RESULTS

FCC Radar Test Summary				
Signal Type	Number of Trials	Detection (%)	Limit (%)	Pass/Fail
FCC Short Pulse Type 1	30	100.00	60	Pass
FCC Short Pulse Type 2	30	83.33	60	Pass
FCC Short Pulse Type 3	30	83.33	60	Pass
FCC Short Pulse Type 4	30	86.67	60	Pass
Aggregate		88.33	80	Pass
FCC Long Pulse Type 5	30	96.67	80	Pass
FCC Hopping Type 6	37	100.00	70	Pass

TYPE 1 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 1	
1 us Pulse Width, 1428 us PRI, 18 Pulses per Burst	
Trial	Successful Detection (Yes/No)
1	Yes
2	Yes
3	Yes
4	Yes
5	Yes
6	Yes
7	Yes
8	Yes
9	Yes
10	Yes
11	Yes
12	Yes
13	Yes
14	Yes
15	Yes
16	Yes
17	Yes
18	Yes
19	Yes
20	Yes
21	Yes
22	Yes
23	Yes
24	Yes
25	Yes
26	Yes
27	Yes
28	Yes
29	Yes
30	Yes

TYPE 2 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 2				
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Successful Detection (Yes/No)
2001	1.4	223.00	24	Yes
2002	1.6	206.00	23	Yes
2003	2.7	203.00	23	No
2004	2.9	208.00	29	No
2005	2.2	161.00	29	Yes
2006	3.9	195.00	28	Yes
2007	2	229.00	26	Yes
2008	3.5	182.00	27	Yes
2009	2.8	204.00	28	No
2010	3.6	152.00	28	Yes
2011	1.2	189.00	24	Yes
2012	1.3	173.00	25	Yes
2013	1.5	165.00	23	Yes
2014	2.7	214.00	24	No
2015	1.7	220.00	24	Yes
2016	3.5	181.00	24	Yes
2017	3.6	202.00	27	No
2018	4.6	220.00	26	Yes
2019	2.1	208.00	25	Yes
2020	4.9	204.00	23	Yes
2021	4.2	212.00	24	Yes
2022	3.2	206.00	23	Yes
2023	1.2	205.00	24	Yes
2024	4.1	175.00	28	Yes
2025	3.9	181.00	23	Yes
2026	1.6	206.00	25	Yes
2027	1.9	211.00	28	Yes
2028	1.6	221.00	25	Yes
2029	3.3	172.00	23	Yes
2030	4.7	206.00	23	Yes

TYPE 3 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 3				
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Successful Detection (Yes/No)
3001	6.4	261.00	18	Yes
3002	5.1	309.00	16	Yes
3003	6.4	300.00	16	Yes
3004	8	425.00	16	No
3005	5.6	357.00	18	Yes
3006	8.3	365.00	16	Yes
3007	5.9	343.00	18	Yes
3008	8.5	304.00	16	Yes
3009	9.8	331.00	17	Yes
3010	6.4	338.00	16	Yes
3011	6.1	286.00	18	Yes
3012	9.5	484.00	18	Yes
3013	9.2	379.00	17	Yes
3014	6.1	260.00	18	No
3015	6.9	402.00	18	Yes
3016	6.8	465.00	16	Yes
3017	8.5	394.00	17	No
3018	7.9	457.00	16	No
3019	8.1	301.00	17	Yes
3020	5.9	407.00	16	Yes
3021	5.8	492.00	17	Yes
3022	7.6	415.00	18	Yes
3023	8.3	283.00	17	No
3024	8.1	425.00	18	Yes
3025	8.8	467.00	17	Yes
3026	5.8	372.00	18	Yes
3027	7.7	483.00	17	Yes
3028	5	496.00	18	Yes
3029	7.8	359	18	Yes
3030	5.5	423	16	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	Successful Detection (Yes/No)
4001	10.5	445.00	16	Yes
4002	13.1	355.00	12	Yes
4003	17.7	471.00	16	Yes
4004	12.7	482.00	15	Yes
4005	18.5	334.00	12	Yes
4006	12.8	466.00	16	Yes
4007	16.6	257.00	13	Yes
4008	15.4	302.00	14	Yes
4009	19.6	435.00	15	Yes
4010	13.5	340.00	12	Yes
4011	14.5	414.00	13	No
4012	19.1	339.00	16	Yes
4013	12.8	309.00	12	No
4014	17.3	455.00	12	Yes
4015	17.1	489.00	16	Yes
4016	10.4	329.00	15	No
4017	20	253.00	13	Yes
4018	15.9	311.00	12	Yes
4019	18.4	334.00	15	Yes
4020	19.8	377.00	12	Yes
4021	15.1	497.00	13	Yes
4022	13	268.00	16	Yes
4023	10.3	361.00	16	Yes
4024	17.8	286.00	13	No
4025	16.2	263.00	16	Yes
4026	15.1	273.00	16	Yes
4027	11.9	285.00	15	Yes
4028	11.1	480.00	14	Yes
4029	13.7	284.00	14	Yes
4030	15.2	478.00	13	Yes

TYPE 5 DETECTION PROBABILITY

Data Sheet for FCC Long Pulse Radar Type 5	
Trial	Successful Detection (Yes/No)
1	Yes
2	Yes
3	Yes
4	Yes
5	Yes
6	Yes
7	Yes
8	Yes
9	Yes
10	Yes
11	Yes
12	Yes
13	Yes
14	Yes
15	Yes
16	Yes
17	Yes
18	Yes
19	Yes
20	Yes
21	Yes
22	Yes
23	Yes
24	Yes
25	Yes
26	Yes
27	No
28	Yes
29	Yes
30	Yes

Note: The Type 5 randomized parameters 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	306	5492	9	Yes
2	781	5493	5	Yes
3	1256	5494	9	Yes
4	1731	5495	7	Yes
5	2206	5496	7	Yes
6	2681	5497	7	Yes
7	3156	5498	7	Yes
8	3631	5499	7	Yes
9	4106	5500	7	Yes
10	4581	5501	2	Yes
11	5056	5502	4	Yes
12	5531	5503	7	Yes
13	6006	5504	7	Yes
14	6481	5505	7	Yes
15	6956	5506	10	Yes
16	7431	5507	6	Yes
17	7906	5508	7	Yes
18	8381	5509	7	Yes
19	8856	5510	10	Yes
20	9331	5511	10	Yes
21	9806	5512	8	Yes
22	10281	5513	7	Yes
23	10756	5514	8	Yes
24	11231	5515	10	Yes
25	11706	5516	4	Yes
26	12181	5517	8	Yes
27	12656	5518	10	Yes
28	13131	5519	8	Yes
29	13606	5520	7	Yes
30	14081	5521	9	Yes
31	14556	5522	7	Yes
32	15031	5523	8	Yes
33	15506	5524	9	Yes
34	15981	5525	8	Yes
35	16456	5526	11	Yes
36	16931	5527	5	Yes
37	17406	5528	6	Yes

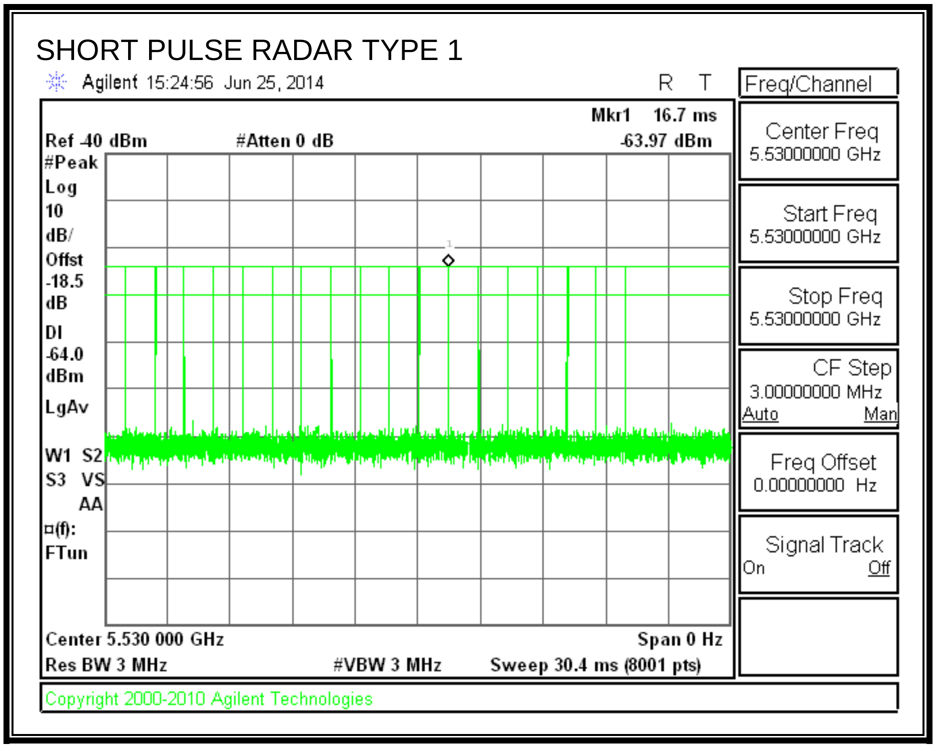
5.4. RESULTS FOR 80 MHz BANDWIDTH

5.4.1. TEST CHANNEL

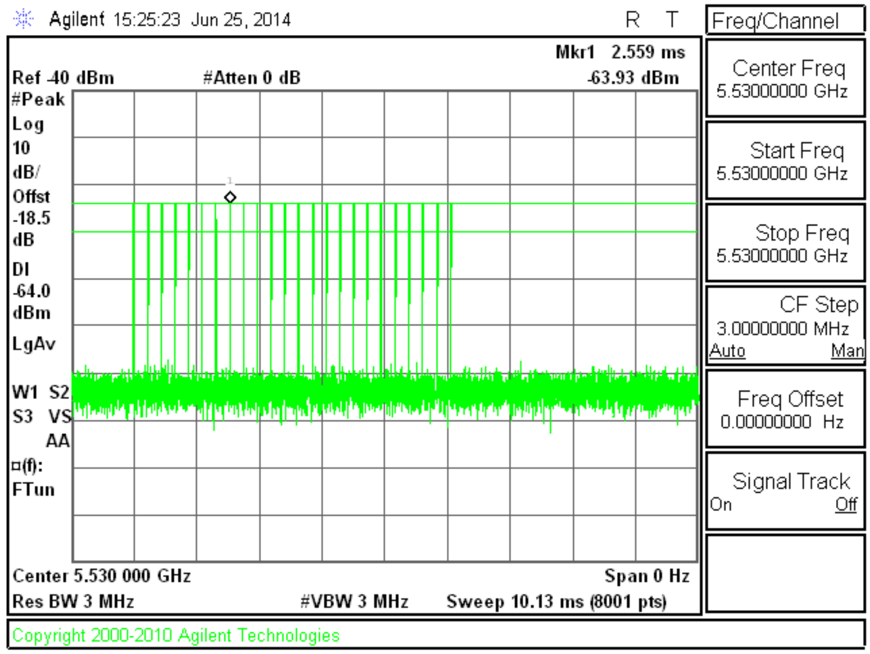
All tests were performed at a channel center frequency of 5530 MHz.

5.4.2. RADAR WAVEFORMS AND TRAFFIC

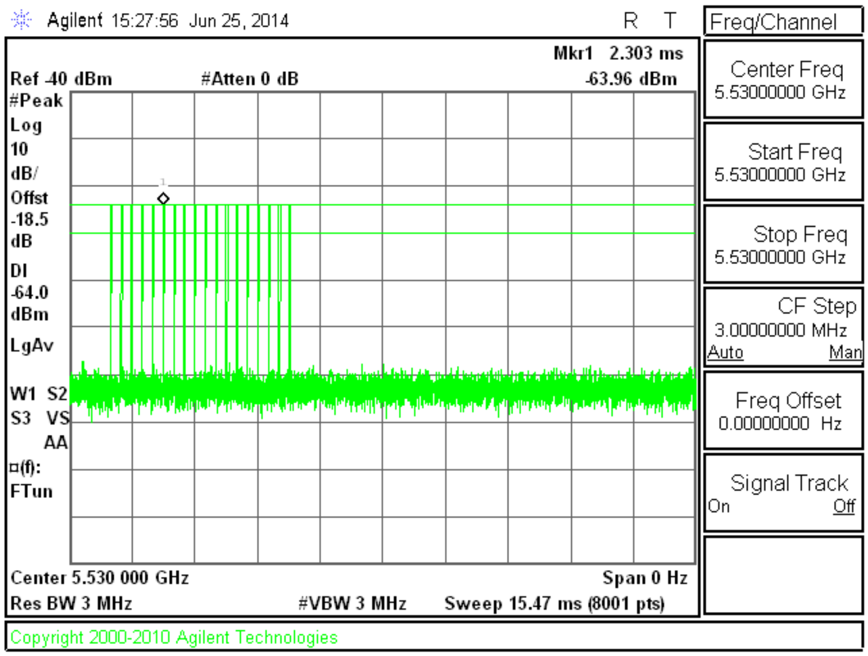
RADAR WAVEFORMS



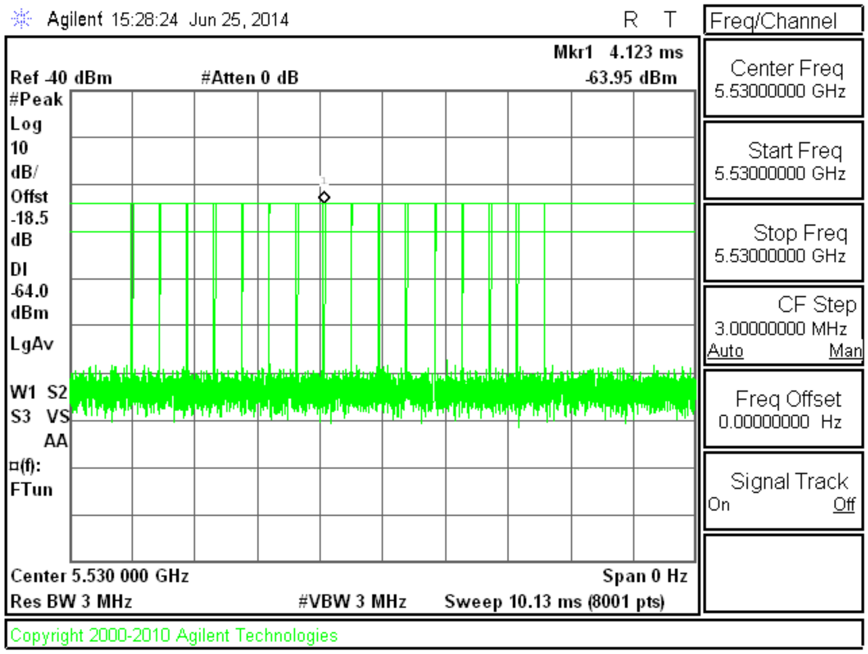
SAMPLE OF RADAR TYPE 2



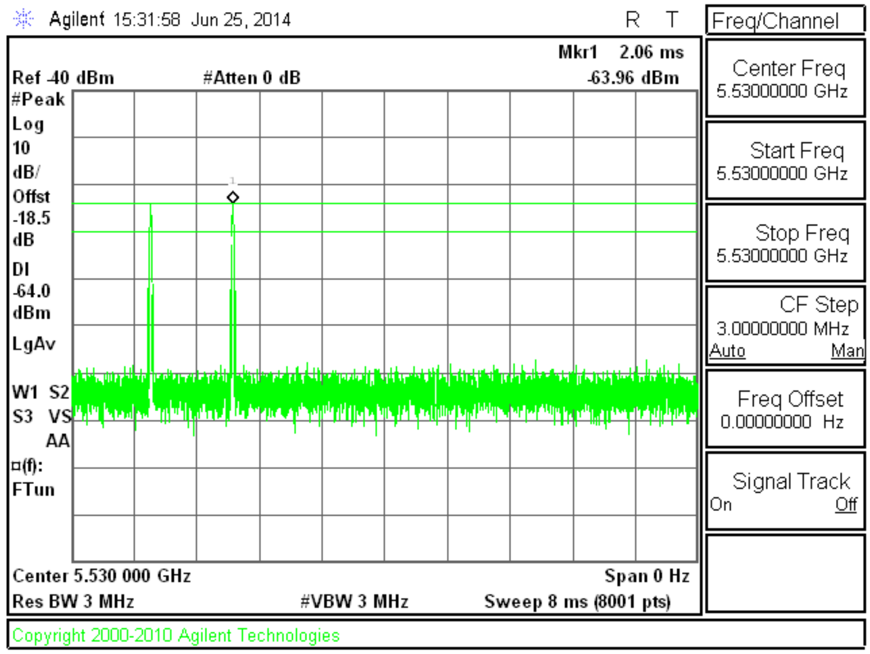
SAMPLE OF RADAR TYPE 3



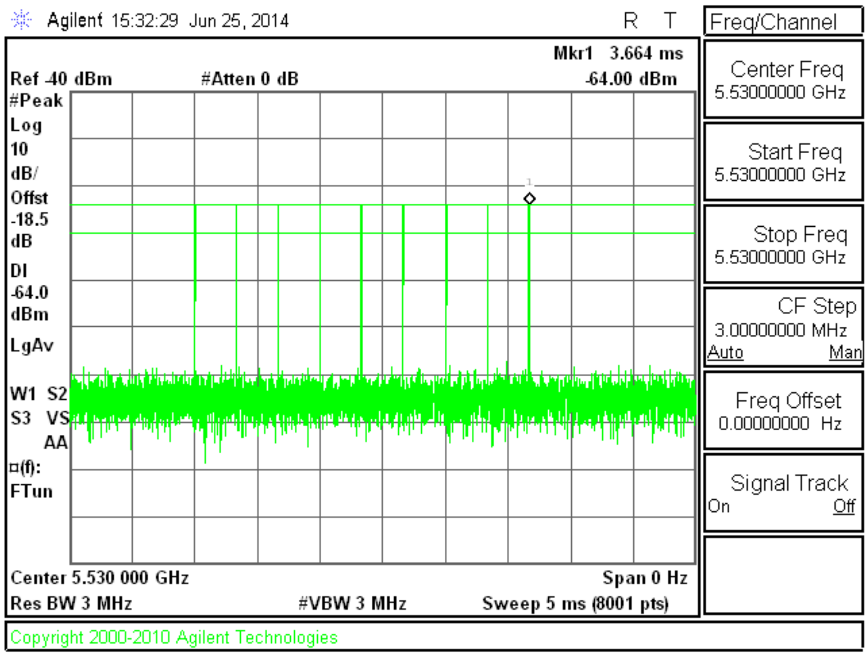
SAMPLE OF RADAR TYPE 4



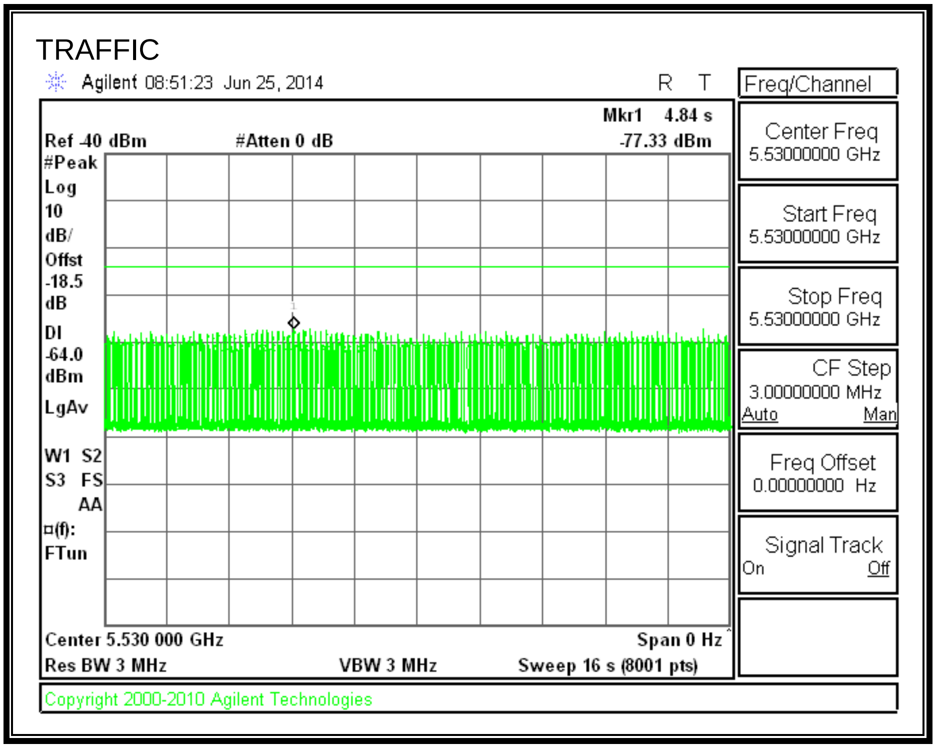
SAMPLE OF SINGLE BURST OF RADAR TYPE 5



SINGLE BURST OF RADAR TYPE 6



TRAFFIC


TRAFFIC
Agilent 08:51:23 Jun 25, 2014
R T
Freq/Channel
Mkr1 4.84 s
Ref -40 dBm
#Atten 0 dB
-77.33 dBm
#Peak
Log
10
dB/
Offst
-18.5
dB
Dl
-64.0
dBm
LgAv
W1 S2
S3 FS
AA
¤(f):
FTun
Center Freq
5.53000000 GHz
Start Freq
5.53000000 GHz
Stop Freq
5.53000000 GHz
CF Step
3.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Center 5.530 000 GHz
Span 0 Hz
Res BW 3 MHz
VBW 3 MHz
Sweep 16 s (8001 pts)
Copyright 2000-2010 Agilent Technologies

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)
36.18	224.9	188.7	128.7

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)
35.82	165.6	129.8	1.1

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)
36.41	223.2	186.8	58.1

QUALITATIVE RESULTS

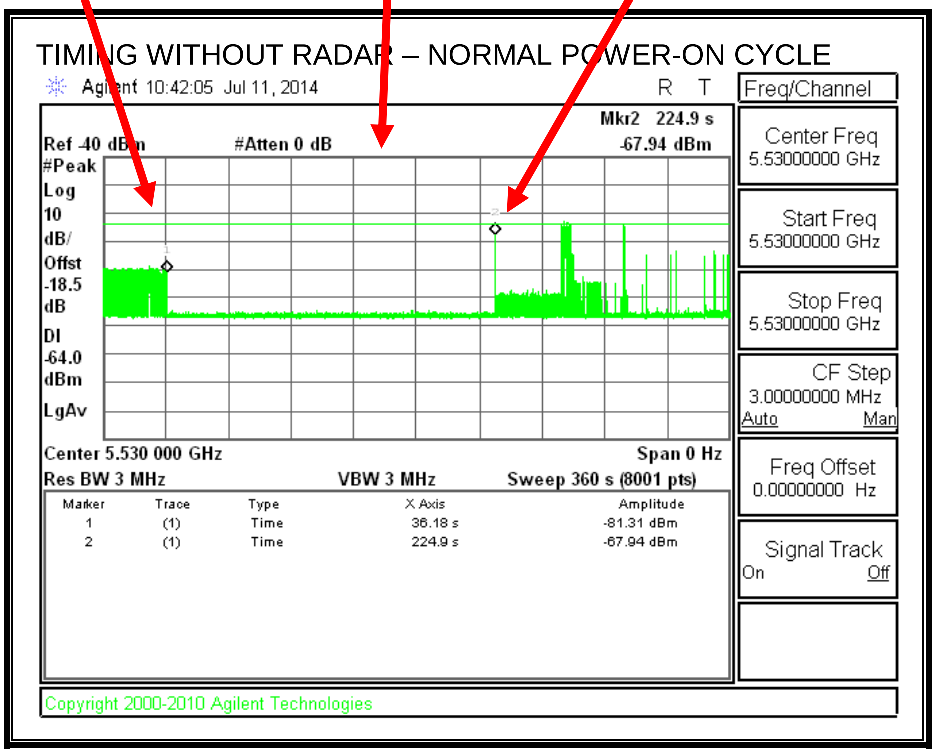
Timing of Radar Burst	Display on Control Computer	Spectrum Analyzer Display
No Radar Triggered	EUT marks Channel as active	Transmissions begin on channel after completion of the initial power-up cycle and the CAC
Within 0 to 6 second window	EUT indicates radar detected	No transmissions on channel
Within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

TIMING WITHOUT RADAR DURING CAC

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



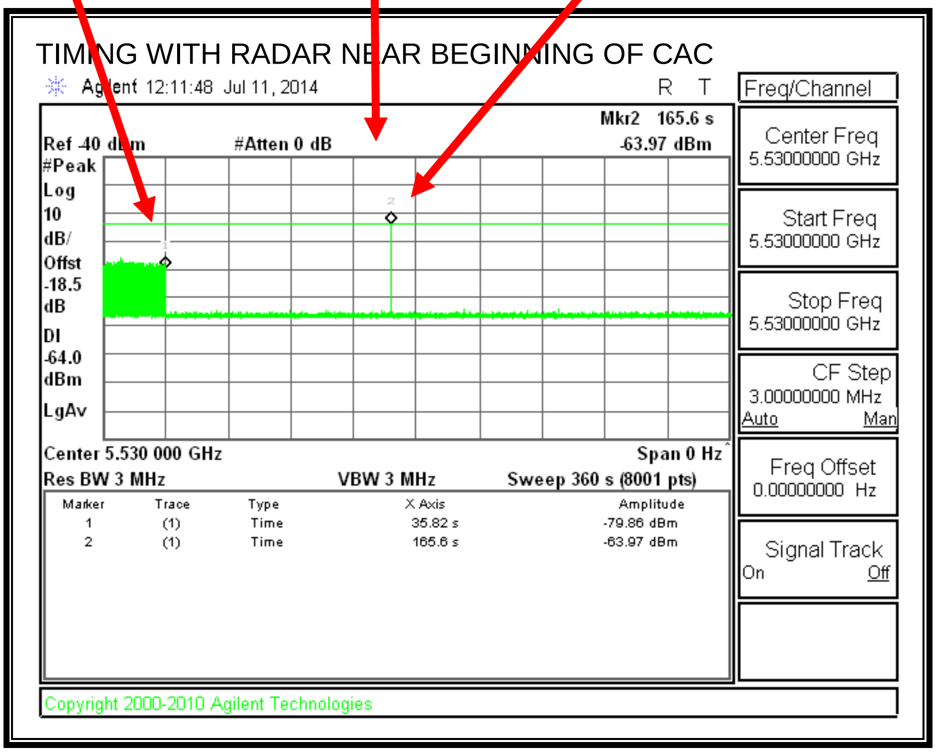
Transmissions begin on channel after completion of the initial power-up cycle and the CAC.

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



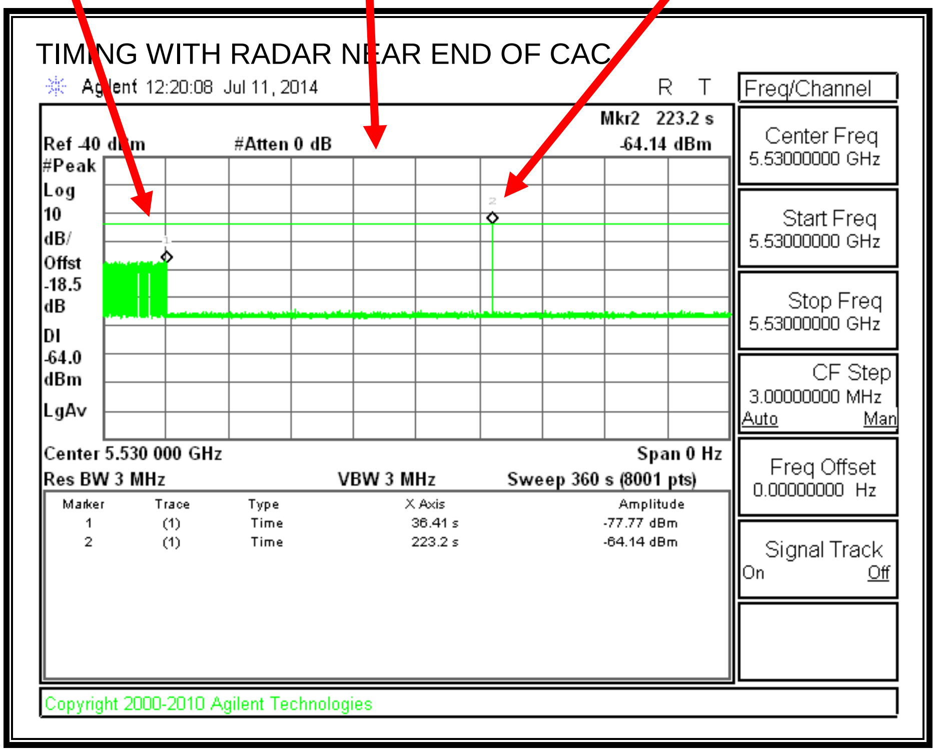
No EUT transmissions were observed after the radar signal.

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.

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)

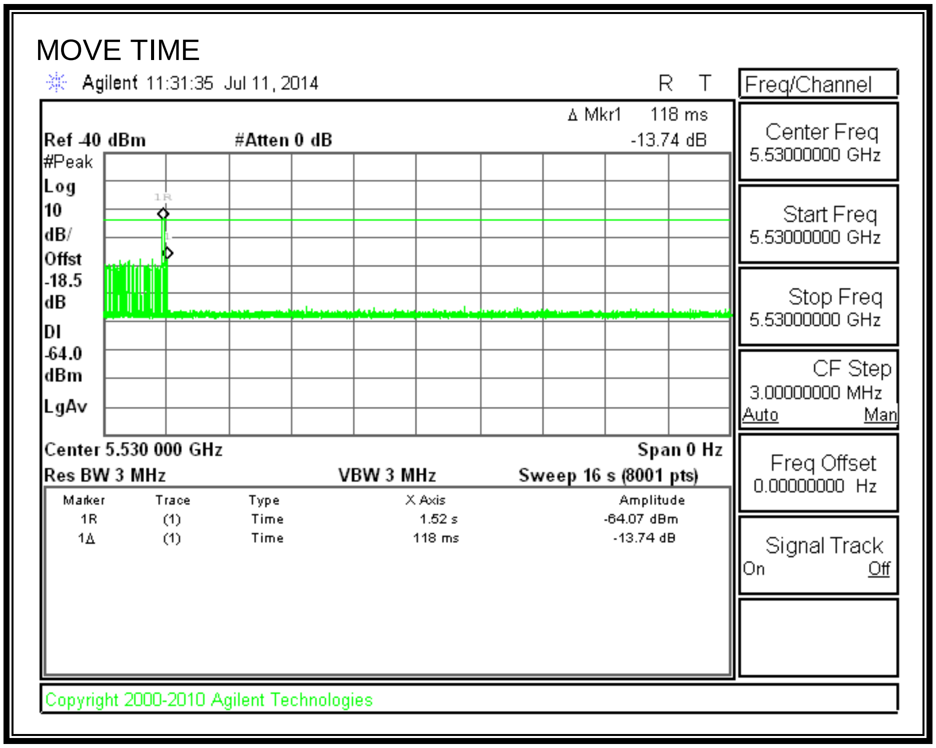
The observation period over which the aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

RESULTS

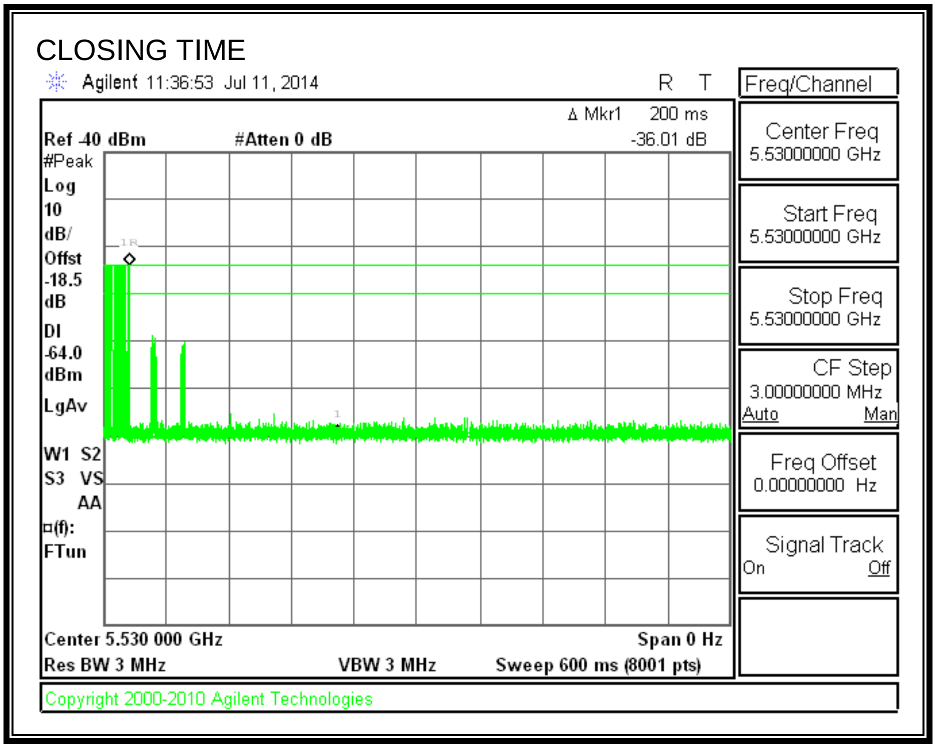
Channel Move Time (sec)	Limit (sec)
0.118	10

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

MOVE TIME

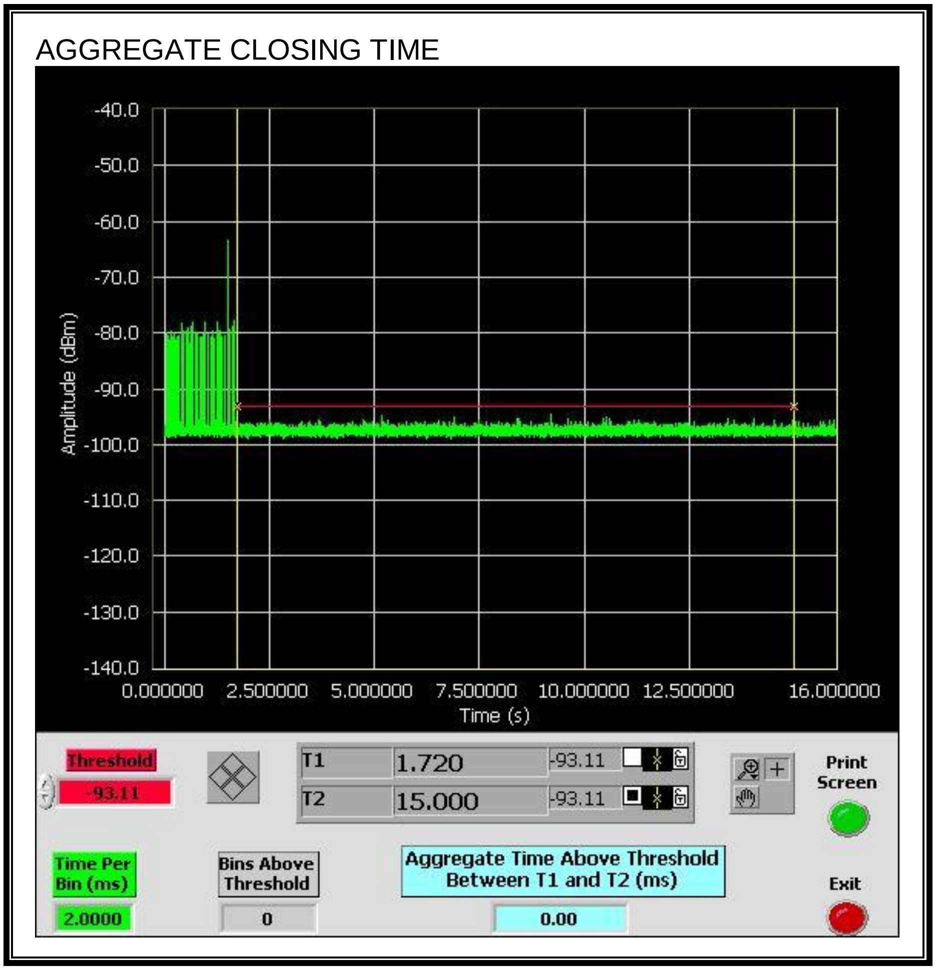

MOVE TIME
Agilent 11:31:35 Jul 11, 2014
R T
Δ Mkr1 118 ms
-13.74 dB
Ref -40 dBm #Atten 0 dB
#Peak
Log
10
dB/
Offst
-18.5
dB
DI
-64.0
dBm
LgAv
Center 5.530 000 GHz Span 0 Hz
Res BW 3 MHz VBW 3 MHz Sweep 16 s (8001 pts)
Marker Trace Type X Axis Amplitude
1R (1) Time 1.52 s -64.07 dBm
1Δ (1) Time 118 ms -13.74 dB
Freq/Channel
Center Freq 5.53000000 GHz
Start Freq 5.53000000 GHz
Stop Freq 5.53000000 GHz
CF Step 3.00000000 MHz Auto Man
Freq Offset 0.00000000 Hz
Signal Track On Off
Copyright 2000-2010 Agilent Technologies

CHANNEL CLOSING TIME



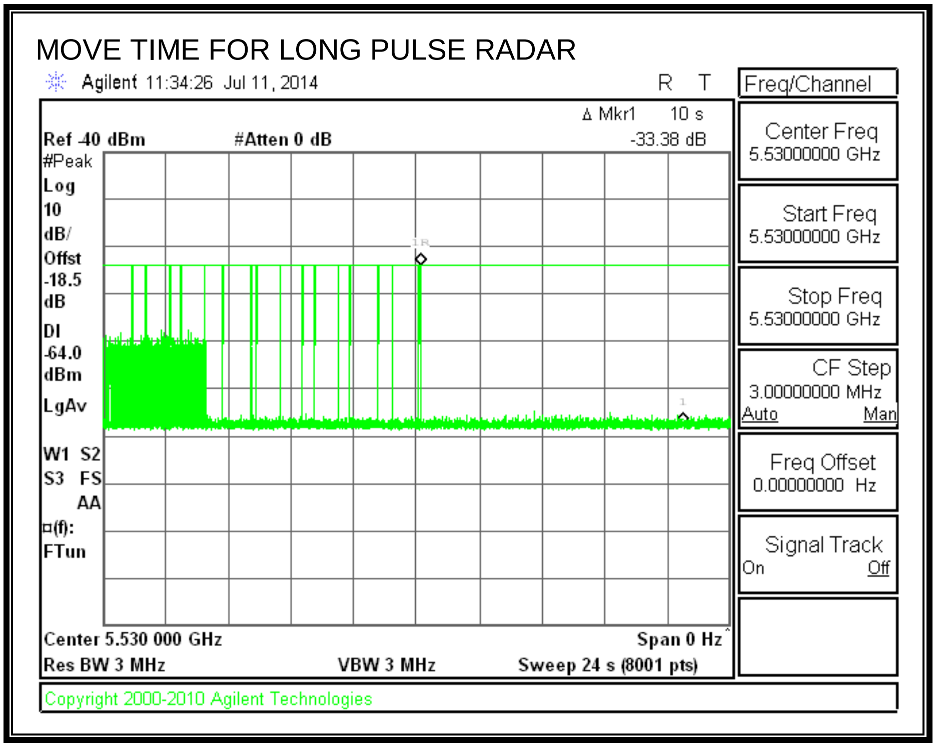
AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

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.

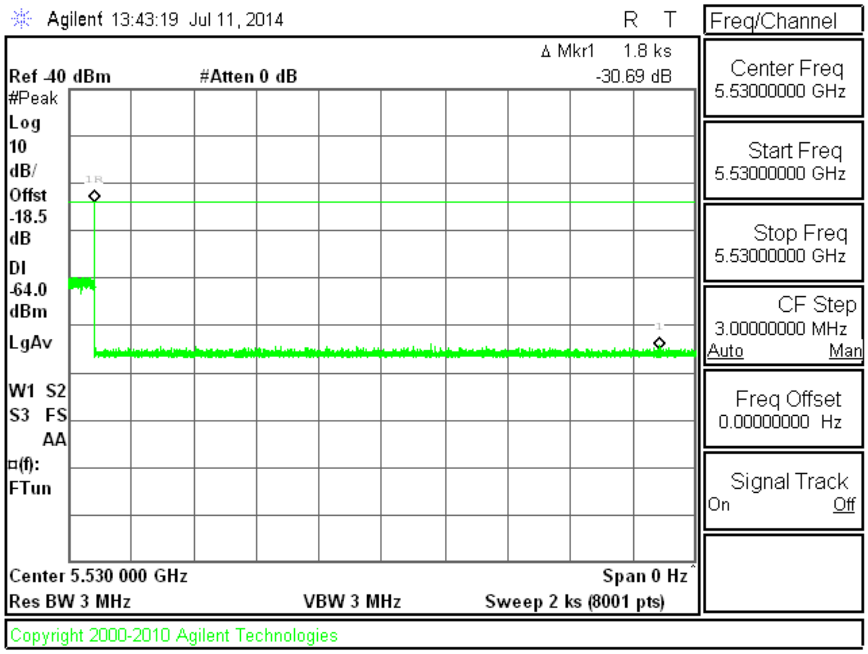


5.4.1. NON-OCCUPANCY PERIOD

RESULTS

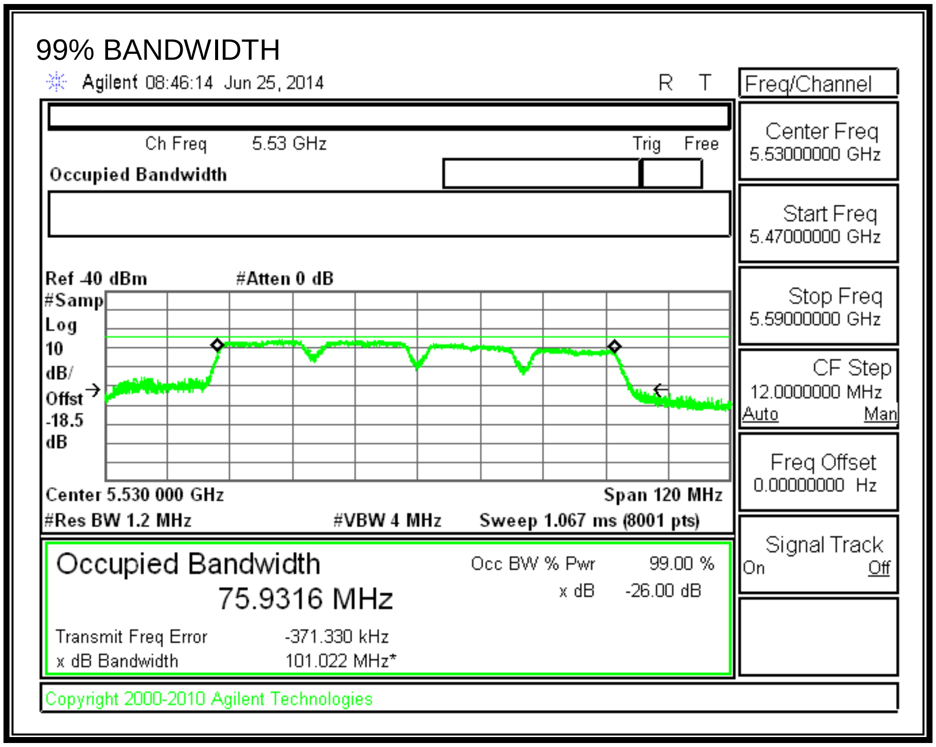
No EUT transmissions were observed on the test channel during the 30-minute observation time.

NON-OCCUPANCY PERIOD



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 (%)
5498	5561	63	75.9316	83.0	80

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
5498	10	10	100	FL
5499	10	10	100	
5500	10	10	100	
5501	10	10	100	
5502	10	10	100	
5503	10	10	100	
5504	10	10	100	
5505	10	10	100	
5506	10	10	100	
5507	10	10	100	
5508	10	10	100	
5509	10	9	90	
5510	10	10	100	
5511	10	10	100	
5512	10	10	100	
5513	10	10	100	
5514	10	10	100	
5515	10	10	100	
5516	10	10	100	
5517	10	10	100	
5518	10	10	100	
5519	10	10	100	
5520	10	9	90	
5521	10	10	100	
5522	10	10	100	
5523	10	10	100	
5524	10	10	100	
5525	10	10	100	
5526	10	10	100	
5527	10	10	100	
5528	10	10	100	
5529	10	10	100	

DETECTION BANDWIDTH PROBABILITY (CONTINUED)

DETECTION BANDWIDTH PROBABILITY RESULTS

5530	10	10	100	
5531	10	10	100	
5532	10	10	100	
5533	10	10	100	
5534	10	10	100	
5535	10	10	100	
5536	10	10	100	
5537	10	10	100	
5538	10	10	100	
5539	10	10	100	
5540	10	9	90	
5541	10	10	100	
5542	10	10	100	
5543	10	10	100	
5544	10	10	100	
5545	10	10	100	
5546	10	10	100	
5547	10	10	100	
5548	10	10	100	
5549	10	10	100	
5550	10	9	90	
5551	10	10	100	
5552	10	10	100	
5553	10	10	100	
5554	10	10	100	
5555	10	10	100	
5556	10	10	100	
5557	10	10	100	
5558	10	10	100	
5559	10	10	100	
5560	10	10	100	
5561	10	10	100	
5562	10	10	100	FH

5.4.3. IN-SERVICE MONITORING

RESULTS

FCC Radar Test Summary				
Signal Type	**Number of Trials**	**Detection (%)**	**Limit (%)**	**Pass/Fail**
FCC Short Pulse Type 1	30	90.00	60	Pass
FCC Short Pulse Type 2	30	80.00	60	Pass
FCC Short Pulse Type 3	30	86.67	60	Pass
FCC Short Pulse Type 4	30	76.67	60	Pass
Aggregate		83.33	80	Pass
FCC Long Pulse Type 5	30	96.67	80	Pass
FCC Hopping Type 6	65	100.00	70	Pass

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TYPE 1 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 1	
1 us Pulse Width, 1428 us PRI, 18 Pulses per Burst	
Trial	**Successful Detection (Yes/No)**
1	Yes
2	Yes
3	Yes
4	Yes
5	Yes
6	Yes
7	No
8	Yes
9	Yes
10	Yes
11	Yes
12	Yes
13	No
14	No
15	Yes
16	Yes
17	Yes
18	Yes
19	Yes
20	Yes
21	Yes
22	Yes
23	Yes
24	Yes
25	Yes
26	Yes
27	Yes
28	Yes
29	Yes
30	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	Successful Detection (Yes/No)
2001	1.4	223.00	24	No
2002	1.6	206.00	23	Yes
2003	2.7	203.00	23	Yes
2004	2.9	208.00	29	Yes
2005	2.2	161.00	29	Yes
2006	3.9	195.00	28	Yes
2007	2	229.00	26	Yes
2008	3.5	182.00	27	Yes
2009	2.8	204.00	28	Yes
2010	3.6	152.00	28	Yes
2011	1.2	189.00	24	No
2012	1.3	173.00	25	Yes
2013	1.5	165.00	23	Yes
2014	2.7	214.00	24	Yes
2015	1.7	220.00	24	Yes
2016	3.5	181.00	24	No
2017	3.6	202.00	27	Yes
2018	4.6	220.00	26	Yes
2019	2.1	208.00	25	Yes
2020	4.9	204.00	23	No
2021	4.2	212.00	24	No
2022	3.2	206.00	23	Yes
2023	1.2	205.00	24	Yes
2024	4.1	175.00	28	No
2025	3.9	181.00	23	Yes
2026	1.6	206.00	25	Yes
2027	1.9	211.00	28	Yes
2028	1.6	221.00	25	Yes
2029	3.3	172.00	23	Yes
2030	4.7	206.00	23	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	Successful Detection (Yes/No)
3001	6.4	261.00	18	No
3002	5.1	309.00	16	Yes
3003	6.4	300.00	16	Yes
3004	8	425.00	16	Yes
3005	5.6	357.00	18	Yes
3006	8.3	365.00	16	Yes
3007	5.9	343.00	18	Yes
3008	8.5	304.00	16	No
3009	9.8	331.00	17	Yes
3010	6.4	338.00	16	No
3011	6.1	286.00	18	Yes
3012	9.5	484.00	18	Yes
3013	9.2	379.00	17	Yes
3014	6.1	260.00	18	No
3015	6.9	402.00	18	Yes
3016	6.8	465.00	16	Yes
3017	8.5	394.00	17	Yes
3018	7.9	457.00	16	Yes
3019	8.1	301.00	17	Yes
3020	5.9	407.00	16	Yes
3021	5.8	492.00	17	Yes
3022	7.6	415.00	18	Yes
3023	8.3	283.00	17	Yes
3024	8.1	425.00	18	Yes
3025	8.8	467.00	17	Yes
3026	5.8	372.00	18	Yes
3027	7.7	483.00	17	Yes
3028	5	496.00	18	Yes
3029	7.8	359	18	Yes
3030	5.5	423	16	Yes

TYPE 4 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 4				
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Successful Detection (Yes/No)
4001	10.5	445.00	16	No
4002	13.1	355.00	12	Yes
4003	17.7	471.00	16	Yes
4004	12.7	482.00	15	Yes
4005	18.5	334.00	12	Yes
4006	12.8	466.00	16	Yes
4007	16.6	257.00	13	Yes
4008	15.4	302.00	14	No
4009	19.6	435.00	15	No
4010	13.5	340.00	12	Yes
4011	14.5	414.00	13	Yes
4012	19.1	339.00	16	Yes
4013	12.8	309.00	12	No
4014	17.3	455.00	12	Yes
4015	17.1	489.00	16	No
4016	10.4	329.00	15	Yes
4017	20	253.00	13	Yes
4018	15.9	311.00	12	No
4019	18.4	334.00	15	Yes
4020	19.8	377.00	12	Yes
4021	15.1	497.00	13	Yes
4022	13	268.00	16	Yes
4023	10.3	361.00	16	Yes
4024	17.8	286.00	13	No
4025	16.2	263.00	16	Yes
4026	15.1	273.00	16	Yes
4027	11.9	285.00	15	Yes
4028	11.1	480.00	14	Yes
4029	13.7	284.00	14	Yes
4030	15.2	478.00	13	Yes

TYPE 5 DETECTION PROBABILITY

Data Sheet for FCC Long Pulse Radar Type 5	
Trial	Successful Detection (Yes/No)
1	Yes
2	Yes
3	Yes
4	Yes
5	No
6	Yes
7	Yes
8	Yes
9	Yes
10	Yes
11	Yes
12	Yes
13	Yes
14	Yes
15	Yes
16	Yes
17	Yes
18	Yes
19	Yes
20	Yes
21	Yes
22	Yes
23	Yes
24	Yes
25	Yes
26	Yes
27	Yes
28	Yes
29	Yes
30	Yes

Note: The Type 5 randomized parameters 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	172	5498	14	Yes
2	647	5499	15	Yes
3	1122	5500	10	Yes
4	1597	5501	9	Yes
5	2072	5502	13	Yes
6	2547	5503	15	Yes
7	3022	5504	14	Yes
8	3497	5505	15	Yes
9	3972	5506	11	Yes
10	4447	5507	18	Yes
11	4922	5508	10	Yes
12	5397	5509	11	Yes
13	5872	5510	12	Yes
14	6347	5511	14	Yes
15	6822	5512	15	Yes
16	7297	5513	14	Yes
17	7772	5514	20	Yes
18	8247	5515	11	Yes
19	8722	5516	15	Yes
20	9197	5517	23	Yes
21	9672	5518	14	Yes
22	10147	5519	8	Yes
23	10622	5520	12	Yes
24	11097	5521	15	Yes
25	11572	5522	12	Yes
26	12047	5523	12	Yes
27	12522	5524	14	Yes
28	12997	5525	20	Yes
29	13472	5526	14	Yes
30	13947	5527	5	Yes
31	14422	5528	17	Yes
32	14897	5529	17	Yes

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TYPE 6 DETECTION PROBABILITY (CONTINUED)

33	15372	5530	13	Yes
34	15847	5531	11	Yes
35	16322	5532	16	Yes
36	16797	5533	10	Yes
37	17272	5534	13	Yes
38	17747	5535	16	Yes
39	18222	5536	13	Yes
40	18697	5537	11	Yes
41	19172	5538	18	Yes
42	19647	5539	13	Yes
43	20122	5540	20	Yes
44	20597	5541	10	Yes
45	21072	5542	9	Yes
46	21547	5543	10	Yes
47	22022	5544	13	Yes
48	22497	5545	13	Yes
49	22972	5546	12	Yes
50	23447	5547	13	Yes
51	23922	5548	11	Yes
52	24397	5549	13	Yes
53	24872	5550	13	Yes
54	25347	5551	12	Yes
55	25822	5552	17	Yes
56	26297	5553	16	Yes
57	26772	5554	19	Yes
58	27247	5555	8	Yes
59	27722	5556	10	Yes
60	28197	5557	13	Yes
61	28672	5558	17	Yes
62	29147	5559	18	Yes
63	29622	5560	15	Yes
64	30097	5561	17	Yes
65	30572	5562	17	Yes