**DFS PORTIONS OF**

**FCC CFR47 PART 15 SUBPART E**
**INDUSTRY CANADA RSS-210 ISSUE 7**

**CERTIFICATION TEST REPORT**

**FOR**

**802.11 a/b/g/n Master Device with Radar Detection (Indoor Model)**

**MODEL NUMBER: ZF7363**

**FCC ID: U2M-ZF73XX-1**
**IC ID: 3616C-ZF73XX-1**

**REPORT NUMBER: 09U12792-2**

**ISSUE DATE: OCTOBER 15, 2009**

*Prepared for*
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NVLAP LAB CODE 200065-0

Revision History

| Rev. | Issue Date | Revisions | Revised By |
|---|---|---|---|
| -- | 10/15/09 | Initial Issue | M. Heckrotte |

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# 1. ATTESTATION OF TEST RESULTS

| | |
|---|---|
| **COMPANY NAME:** | RUCKUS WIELESS<br>880 WEST MAUDE AVENUE<br>SUNNYVALE, CA 94085 |
| **EUT DESCRIPTION:** | 802.11 a/b/g/n Master Device with Radar Detection (Indoor Model) |
| **MODEL:** | ZF7363 |
| **SERIAL NUMBER:** | 270955000138 |
| **DATE TESTED:** | SEPTEMBER 23 to 24, 2009 |

| APPLICABLE STANDARDS | |
|---|---|
| **STANDARD** | **TEST RESULTS** |
| DFS Portion of CFR 47 Part 15 Subpart E | Pass |
| DFS Portion of INDUSTRY CANADA RSS-210 Issue 7 Annex 9 | Pass |

Compliance Certification Services, Inc. (CCS) 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 CCS 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 CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS 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 CCS By:

MICHAEL HECKROTTE
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COMPLIANCE CERTIFICATION SERVICES

Tested By:

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COMPLIANCE CERTIFICATION SERVICES

# 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 15, FCC 06-96 and RSS-210 Issue 7.

# 3. FACILITIES AND ACCREDITATION

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

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

# 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.

RSS-210 Issue 7 A9.4 (b) (iv) **Channel closing time:** the maximum channel closing time is 260 ms.

**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".

**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<br>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:<br>For the Short pulse radar Test Signals this instant is the end of the *Burst*.<br>For the Frequency Hopping radar Test Signal, this instant is the end of the last radar burst generated.<br>For the Long Pulse radar Test Signal this instant is the end of the 12 second period defining the radar transmission.<br>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**

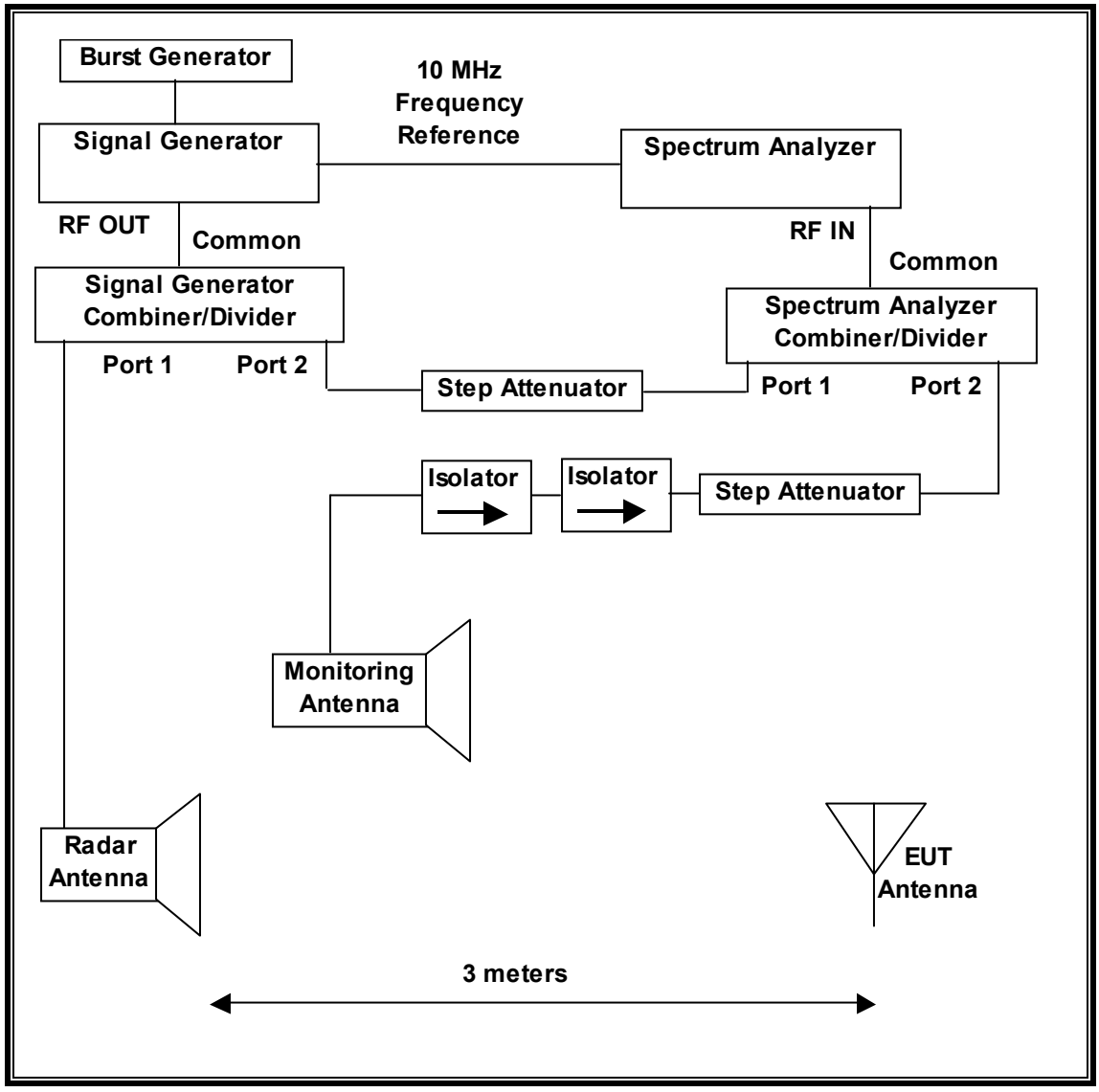
| Radar Waveform | Bursts | Pulses per Burst | Pulse Width (µsec) | Chirp Width (MHz) | PRI (µsec) | Minimum Percentage of Successful Detection | Minimum Trials |
|---|---|---|---|---|---|---|---|
| 5 | 8-20 | 1-3 | 50-100 | 5-20 | 1000-2000 | 80% | 30 |

**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 |

## 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 Freqeuncy 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. Measure the amplitude and calculate the difference from –64 dBm. Adjust the Reference Level Offset of the spectrum analyzer to this difference.

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

## ADJUSTMENT OF DISPLAYED TRAFFIC LEVEL

Establish a link between the Master and Slave, adjusting the distance between the units as needed to provide a suitable received level at the Master and Slave devices. Stream the video test file to generate WLAN traffic. Confirm that the WLAN traffic level, as displayed on the spectrum analyzer, is at lower amplitude than the radar detection threshold.

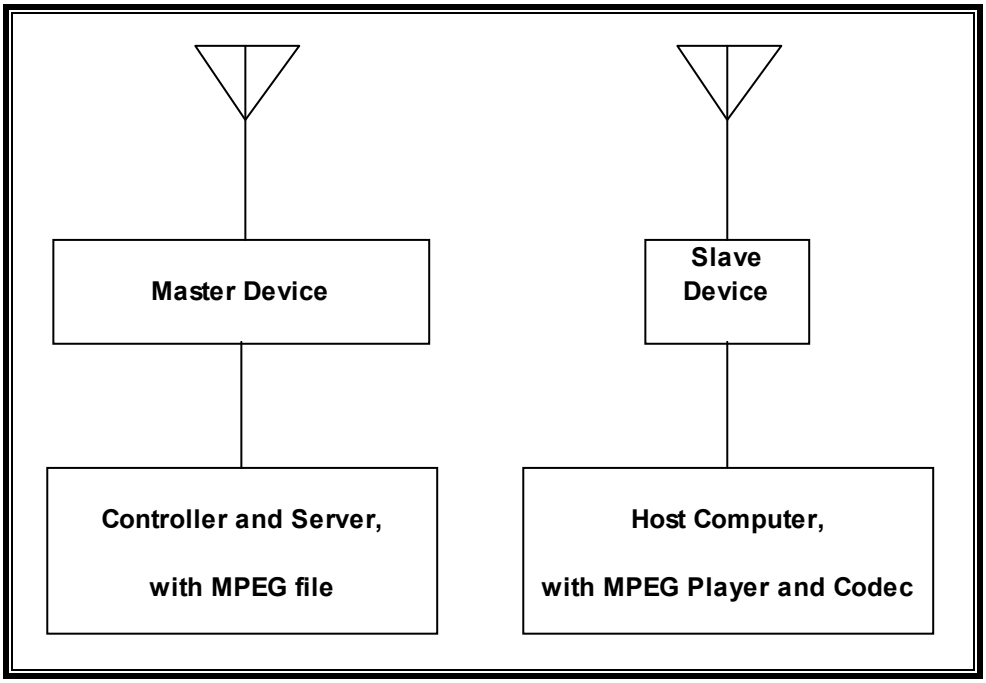
## TEST AND MEASUREMENT EQUIPMENT

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, 44 GHz | Agilent / HP | E4446A | C00996 | 04/20/10 |
| Vector signal generator, 20GHz | Agilent / HP | E8267C | C01066 | 11/16/09 |
| Arbitrary Waveform Generator | Agilent / HP | 33220A | C01146 | 05/04/10 |

### 5.1.3. SETUP OF EUT

**RADIATED METHOD EUT TEST SETUP**




**SUPPORT 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** |
| AC Adapter (EUT) | Asian Power Devices, Inc. | DA-24B12 AC | 399239872 | DoC |
| Notebook PC (Host) | IBM | Type 1849-4WU | LV-N2110 05/06 | DoC |
| AC Adapter (Host PC) | IBM | 08K8204 | 11S08K8204Z1Z9V 04931RH | DoC |
| 802.11a/n Multi-Media Adapter (Slave Device) | Ruckus Wireless | VF7111 | 02292 | S9GVF7XX1 |
| AC Adapter (Slave Device) | CUI Inc. | HK-H1-A12 | 110SCLF | DoC |
| Notebook PC (Client) | Dell | PP18L | 24863465053 | DoC |
| AC Adapter (Client PC) | Delta Electronics | DA65NS0-00 | CN-0CF745-48661-6BD-1KDN | DoC |

### 5.1.4. DESCRIPTION OF EUT

The EUT operates over the 5250-5350 MHz and 5470-5725 MHz ranges, excluding operation in the band 5600 to 5650 MHz.

The EUT is a Master Device.

The highest power level within these bands is 22 dBm EIRP in the 5250-5350 MHz band and 21 dBm EIRP in the 5470-5725 MHz band.

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

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

The calibrated radiated DFS Detection Threshold level is set to –64 dBm.

The EUT uses two transmitter/receiver chains each connected to a 50-ohm coaxial antenna port. All antenna ports are connected to antennas 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 VLC version 0.8.5 media player.

TPC is not required since the maximum EIRP is less than 500 mW (27 dBm).

The EUT utilizes the 802.11a/n architecture. Two nominal channel bandwidths are implemented: 20 MHz and 40 MHz.

The software installed in the access point is 8.2 revision 48.

**MANUFACTURER’S STATEMENT REGARDING UNIFORM CHANNEL SPREADING**

This statement is in a separate document.

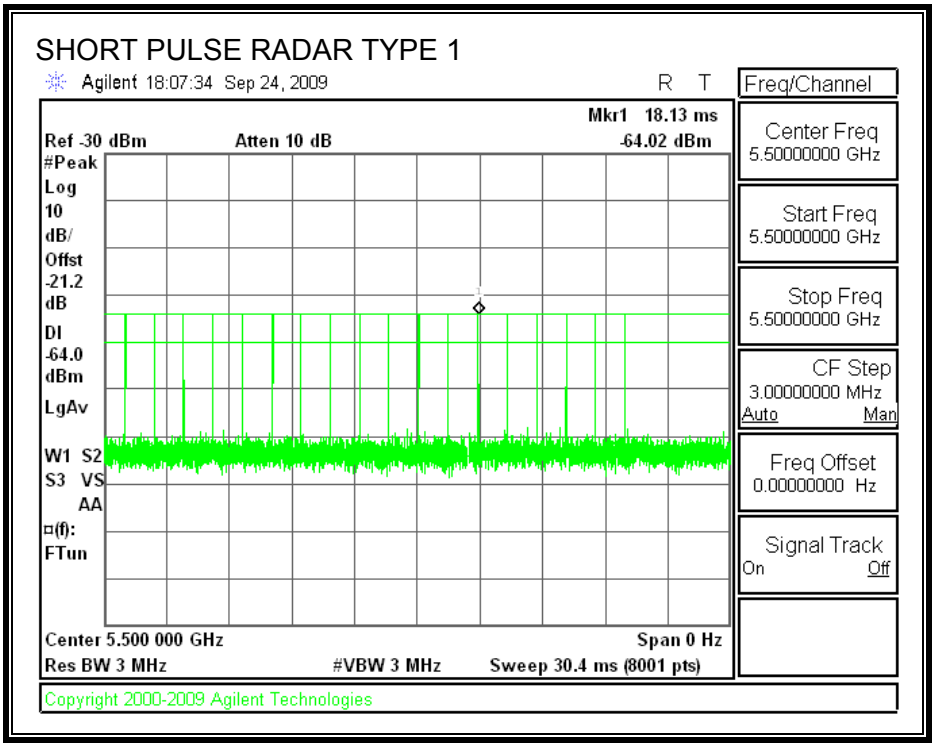
## 5.2. RESULTS FOR 20 MHz BANDWIDTH

### 5.2.1. TEST CHANNEL

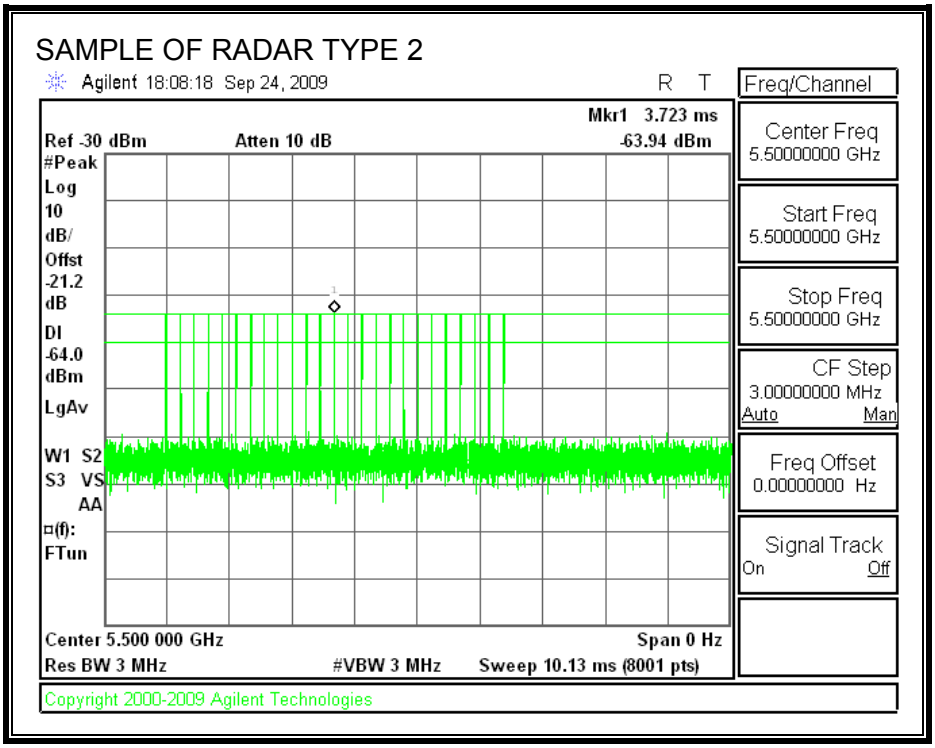
All tests were performed at a channel center frequency of 5500 MHz.

### 5.2.2. PLOTS OF RADAR WAVEFORMS AND WLAN TRAFFIC

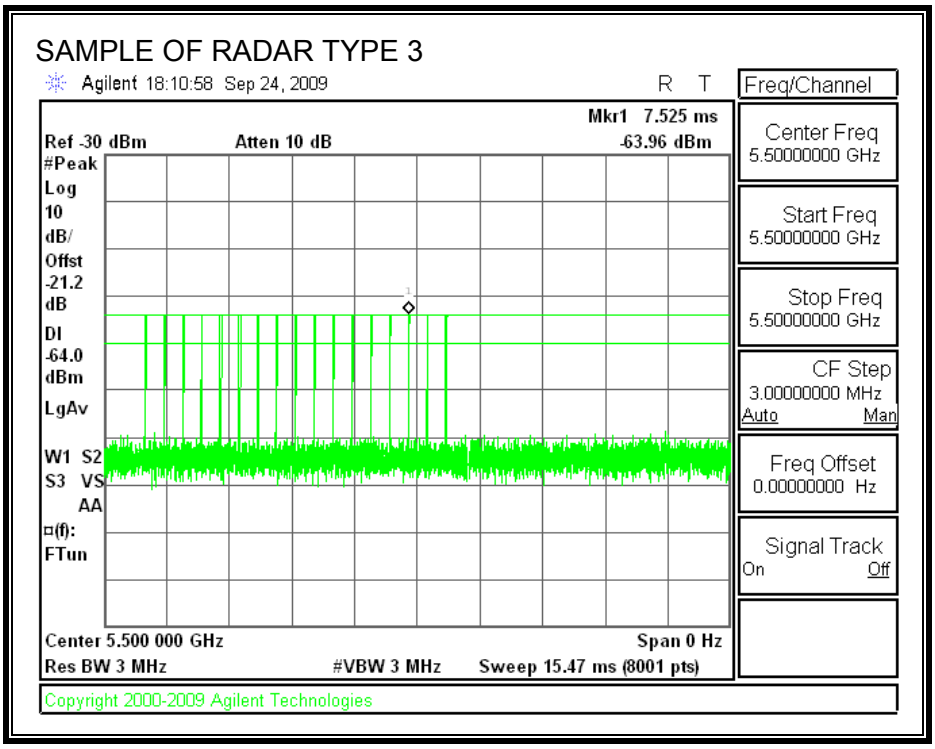
**PLOTS OF RADAR WAVEFORMS**



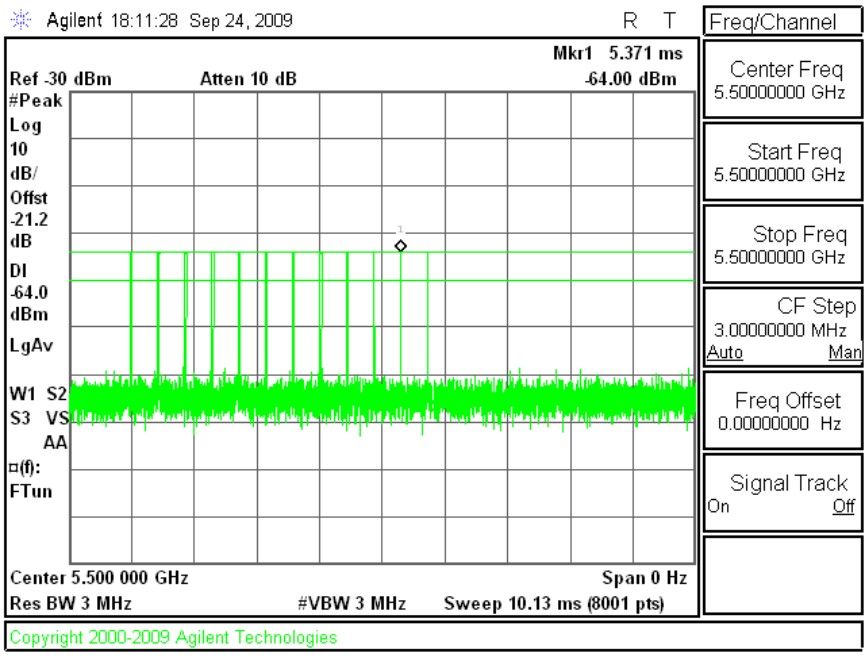
SAMPLE OF RADAR TYPE 2

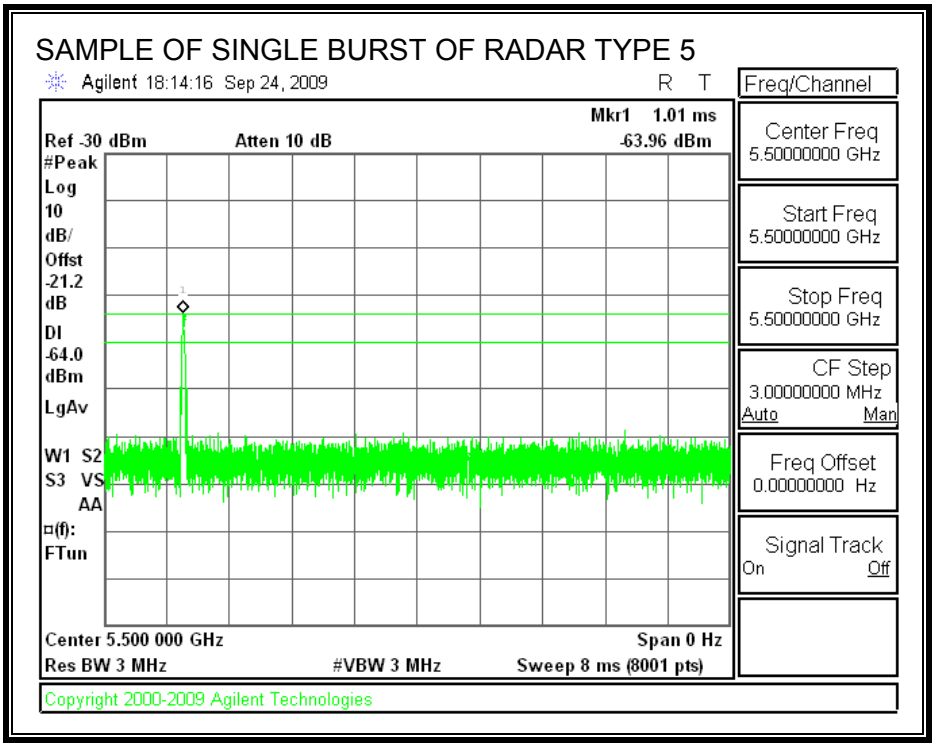


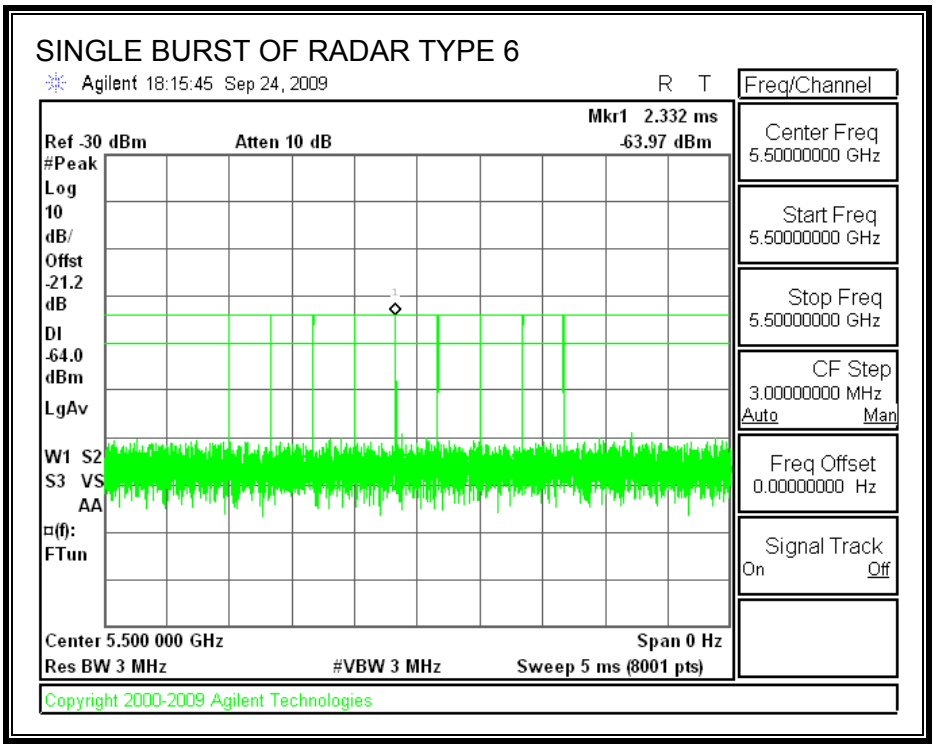
SAMPLE OF RADAR TYPE 3



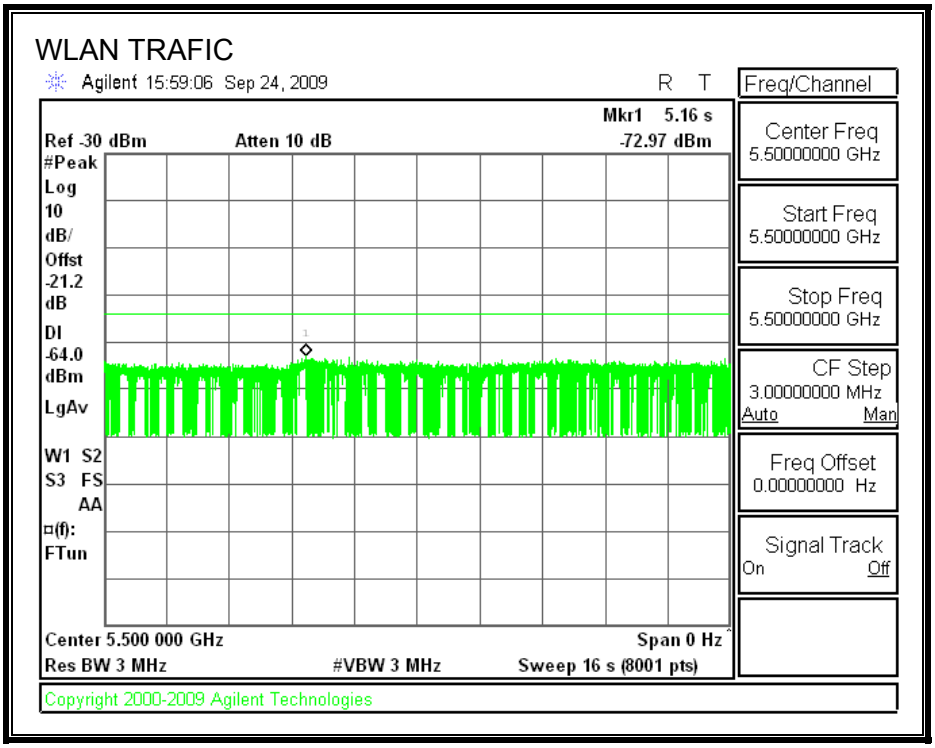
SAMPLE OF RADAR TYPE 4







**PLOT OF WLAN TRAFFIC FROM MASTER**



## 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) |
|---|---|---|---|
| 20.84 | 114.5 | 93.7 | 33.7 |

**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) |
|---|---|---|---|
| 20.89 | 55.9 | 35.0 | 1.4 |

**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) |
|---|---|---|---|
| 21.37 | 114.2 | 92.8 | 59.2 |

**QUALITATIVE RESULTS**

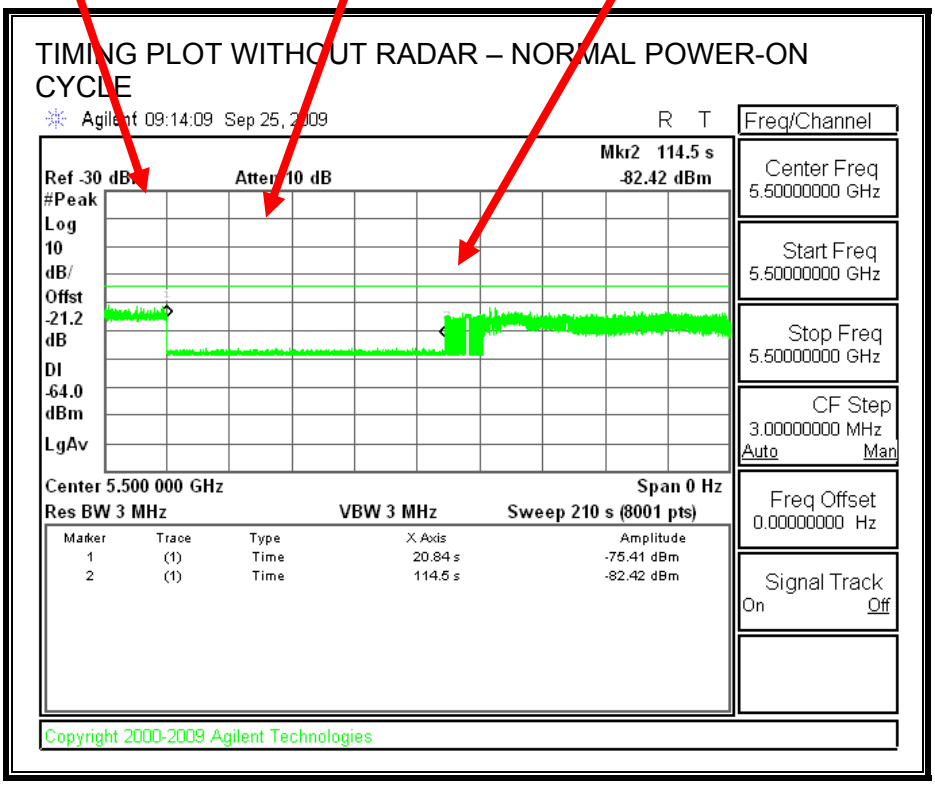
| Timing of Radar Burst | Display on Control Computer | Spectrum Analyzer Display |
|---|---|---|
| No Radar Triggered | EUT marks Channel as active | Transmissions begin on channel after completion of the initial power-up cycle and the CAC |
| Within 0 to 6 second window | EUT indicates radar detected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

**TIMING PLOT WITHOUT RADAR DURING CAC**

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

End of Initial Power-up cycle
Start of CAC

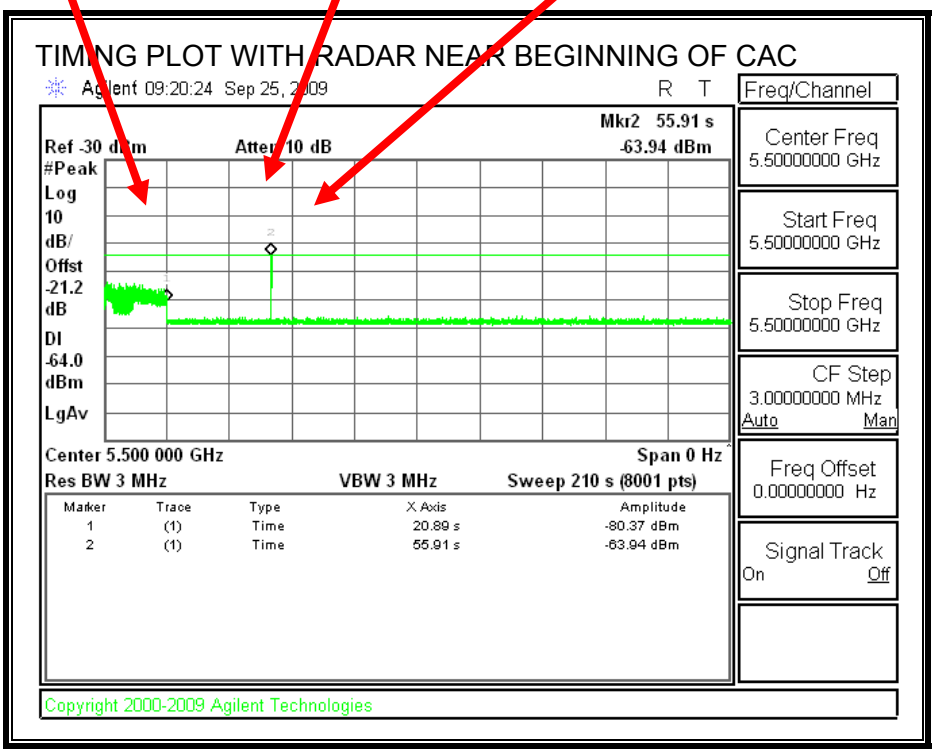
End of CAC
Traffic is Initiated




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

**TIMING PLOT 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



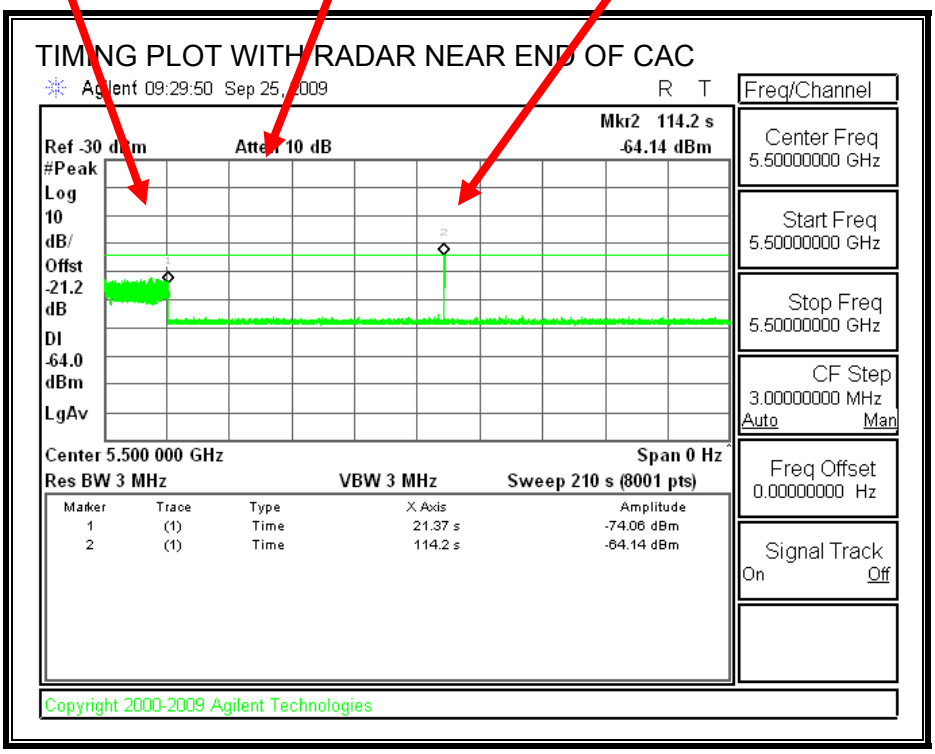

No EUT transmissions were observed after the radar signal.

**TIMING PLOT 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**

These tests are not applicable.

### 5.2.5. MOVE AND CLOSING TIME

**REPORTING NOTES**

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

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

The aggregate channel closing transmission time is calculated as follows:

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

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

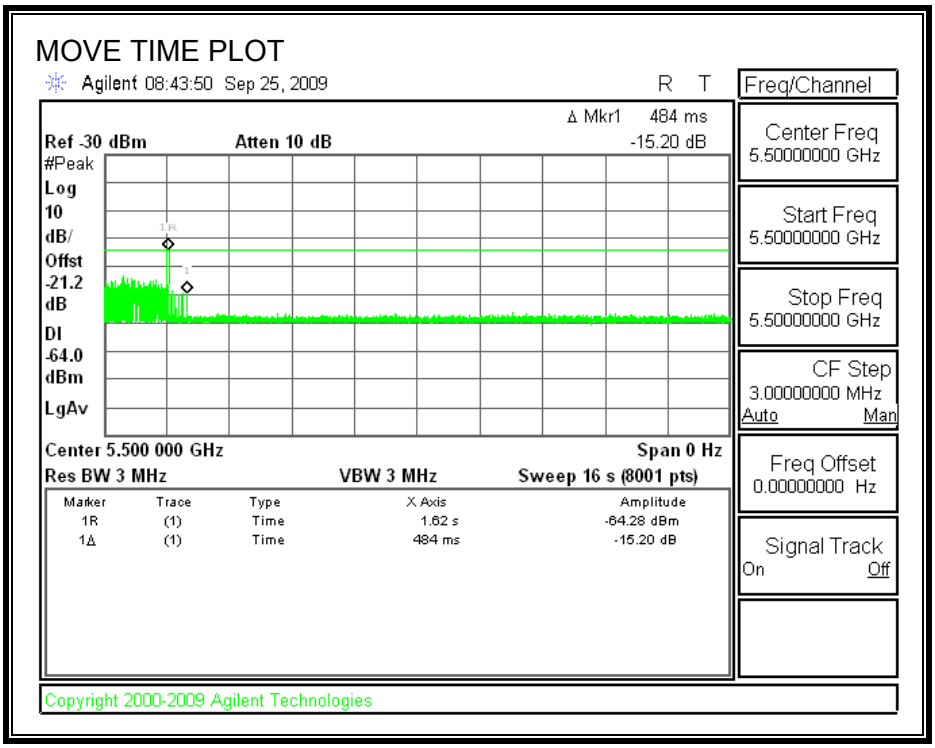
The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

**RESULTS**

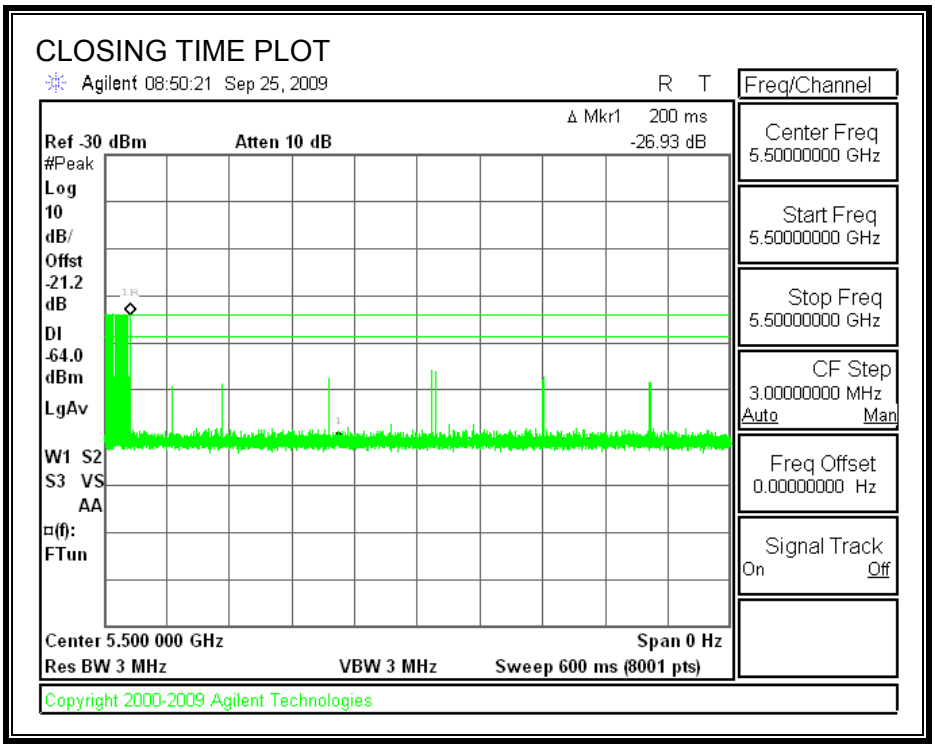
| Agency | Channel Move Time (sec) | Limit (sec) |
|---|---|---|
| FCC / IC | 0.484 | 10 |

| Agency | Aggregate Channel Closing Transmission Time (msec) | Limit (msec) |
|---|---|---|
| FCC | 10.0 | 60 |
| IC | 18.0 | 260 |

**MOVE TIME**



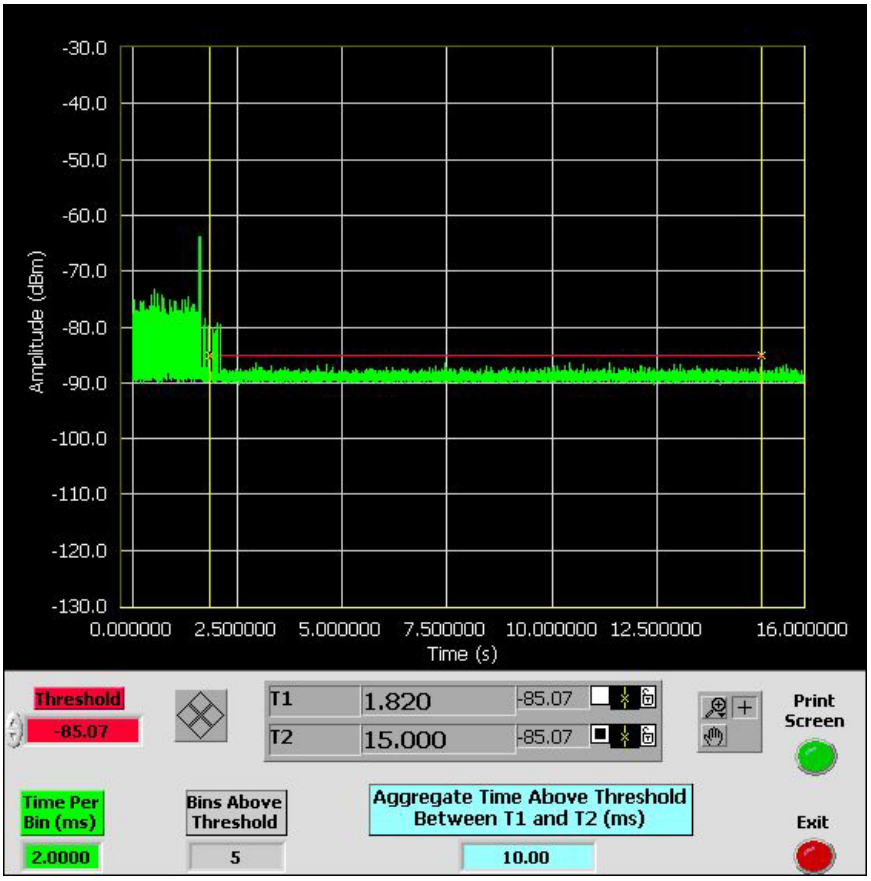
**CHANNEL CLOSING TIME**



**AGGREGATE CHANNEL CLOSING TRANSMISSION TIME**

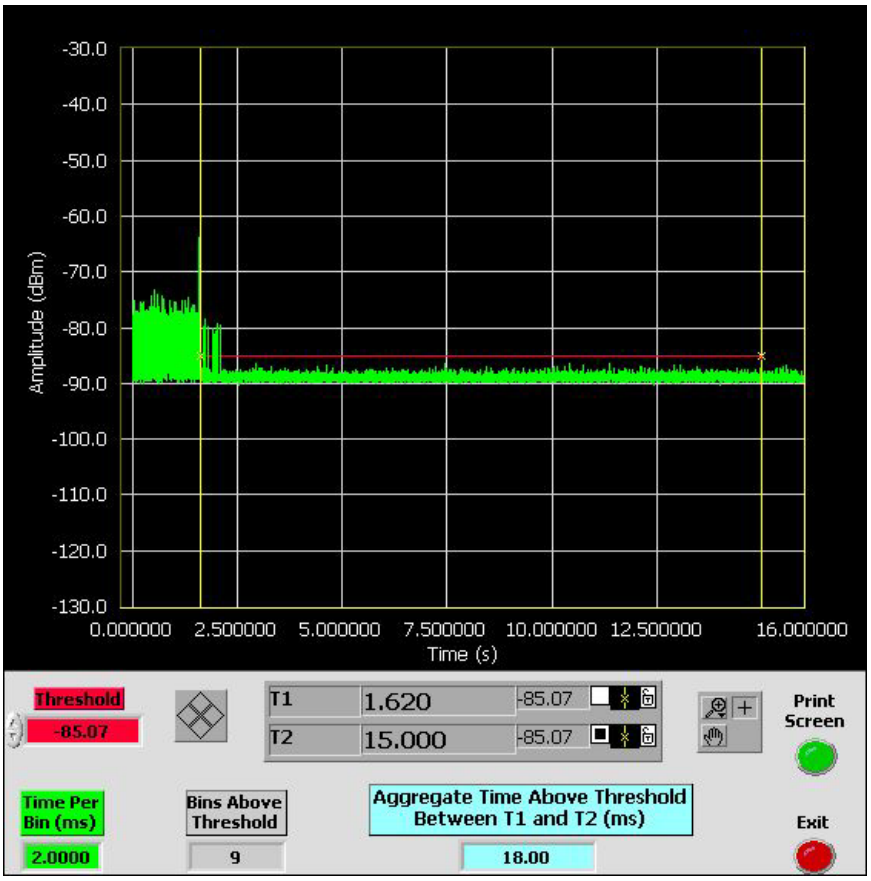
Only intermittent transmissions are observed during the FCC aggregate monitoring period.

FCC AGGREGATE CLOSING TIME PLOT



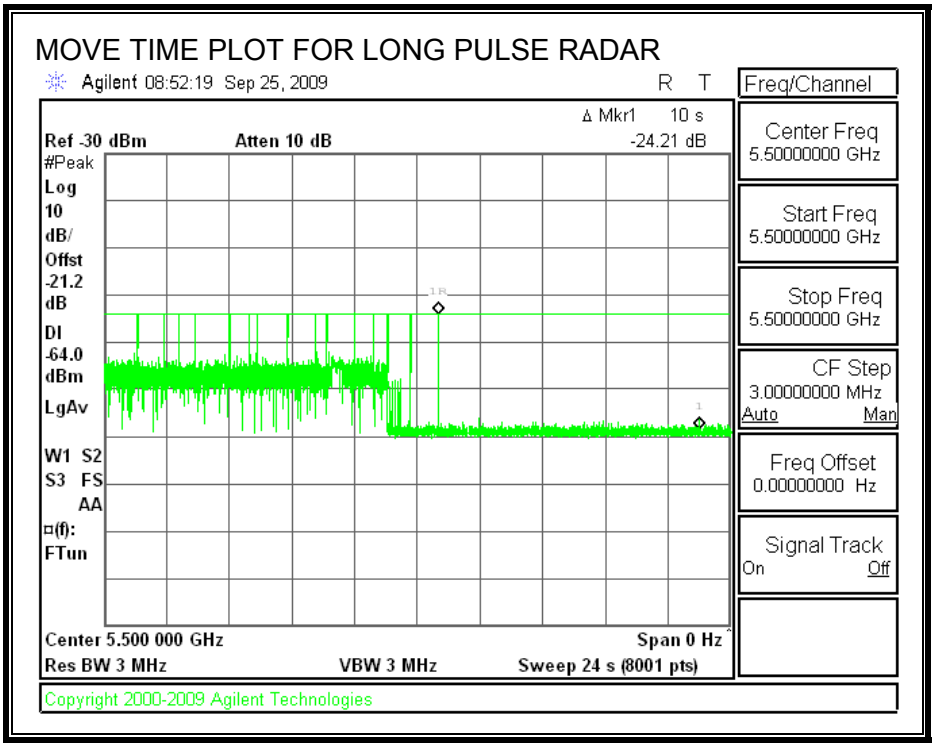
Only intermittent transmissions are observed during the IC aggregate monitoring period.

IC AGGREGATE CLOSING TIME PLOT



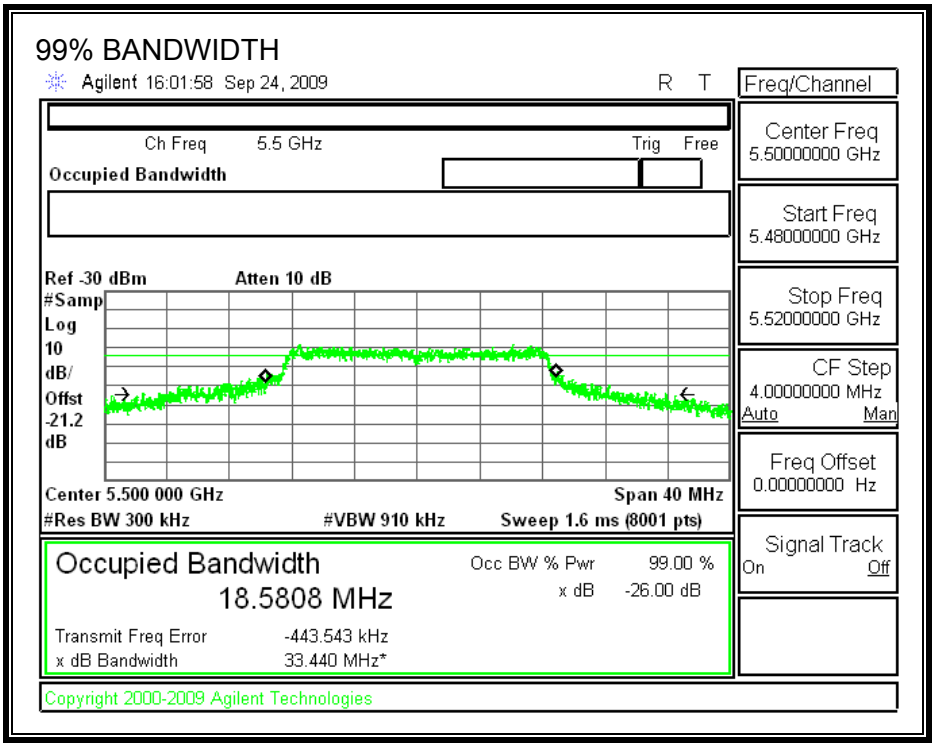
**LONG PULSE CHANNEL MOVE TIME**

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 | 18.581 | 86.1 | 80 |

**DETECTION BANDWIDTH PROBABILITY**

DETECTION BANDWIDTH PROBABILITY RESULTS

| Detection Bandwidth Test Results | | | | |
|---|---|---|---|---|
| FCC Type 1 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 | 9 | 90 | |
| 5506 | 10 | 10 | 100 | |
| 5507 | 10 | 10 | 100 | |
| 5508 | 10 | 10 | 100 | FH |

## 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 | 100.00 | 60 | Pass |
| FCC Short Pulse Type 3 | 30 | 100.00 | 60 | Pass |
| FCC Short Pulse Type 4 | 30 | 100.00 | 60 | Pass |
| Aggregate | | 100.00 | 80 | Pass |
| FCC Long Pulse Type 5 | 30 | 96.67 | 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 | 227.00 | 25 | Yes |
| 2002 | 3 | 167.00 | 29 | Yes |
| 2003 | 4.5 | 197.00 | 29 | Yes |
| 2004 | 4.1 | 162.00 | 28 | Yes |
| 2005 | 1.7 | 191.00 | 25 | Yes |
| 2006 | 1.4 | 157.00 | 23 | Yes |
| 2007 | 1.4 | 225.00 | 25 | Yes |
| 2008 | 3.7 | 178.00 | 25 | Yes |
| 2009 | 4.2 | 217.00 | 27 | Yes |
| 2010 | 3.3 | 183.00 | 27 | Yes |
| 2011 | 1.6 | 210.00 | 29 | Yes |
| 2012 | 1.5 | 192.00 | 29 | Yes |
| 2013 | 4.6 | 174.00 | 27 | Yes |
| 2014 | 3.2 | 170.00 | 26 | Yes |
| 2015 | 1.4 | 212.00 | 29 | Yes |
| 2016 | 1.6 | 192.00 | 23 | Yes |
| 2017 | 1.3 | 157.00 | 28 | Yes |
| 2018 | 5 | 205.00 | 24 | Yes |
| 2019 | 1.8 | 189.00 | 27 | Yes |
| 2020 | 4.7 | 153.00 | 28 | Yes |
| 2021 | 3.3 | 189.00 | 23 | Yes |
| 2022 | 4.8 | 187.00 | 25 | Yes |
| 2023 | 2.9 | 198.00 | 27 | Yes |
| 2024 | 3.5 | 174.00 | 27 | Yes |
| 2025 | 4.7 | 221.00 | 28 | Yes |
| 2026 | 4.1 | 165.00 | 26 | Yes |
| 2027 | 4.9 | 163.00 | 23 | Yes |
| 2028 | 4.3 | 229.00 | 26 | Yes |
| 2029 | 4.6 | 178.00 | 25 | Yes |
| 2030 | 3.8 | 222.00 | 29 | 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 | 8 | 466.00 | 17 | Yes |
| 3002 | 6.5 | 402.00 | 16 | Yes |
| 3003 | 7.7 | 277.00 | 17 | Yes |
| 3004 | 5.8 | 333.00 | 18 | Yes |
| 3005 | 9.3 | 457.00 | 17 | Yes |
| 3006 | 7.6 | 426.00 | 16 | Yes |
| 3007 | 6.7 | 293.00 | 16 | Yes |
| 3008 | 6.3 | 477.00 | 18 | Yes |
| 3009 | 9.3 | 382.00 | 16 | Yes |
| 3010 | 6 | 389.00 | 17 | Yes |
| 3011 | 8.9 | 302.00 | 18 | Yes |
| 3012 | 6.4 | 481.00 | 17 | Yes |
| 3013 | 8.3 | 344.00 | 16 | Yes |
| 3014 | 7 | 327.00 | 17 | Yes |
| 3015 | 5.7 | 314.00 | 18 | Yes |
| 3016 | 6 | 491.00 | 16 | Yes |
| 3017 | 5.5 | 494.00 | 17 | Yes |
| 3018 | 9 | 443.00 | 16 | Yes |
| 3019 | 5 | 317.00 | 18 | Yes |
| 3020 | 6.1 | 466.00 | 16 | Yes |
| 3021 | 8 | 438.00 | 16 | Yes |
| 3022 | 5.5 | 277.00 | 18 | Yes |
| 3023 | 8.9 | 273.00 | 16 | Yes |
| 3024 | 5.2 | 305.00 | 16 | Yes |
| 3025 | 6.5 | 276.00 | 16 | Yes |
| 3026 | 5 | 449.00 | 17 | Yes |
| 3027 | 10 | 436.00 | 16 | Yes |
| 3028 | 5.2 | 416.00 | 17 | Yes |
| 3029 | 5.5 | 466 | 16 | Yes |
| 3030 | 6.5 | 463 | 17 | 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 | 15.3 | 437.00 | 12 | Yes |
| 4002 | 13.9 | 460.00 | 14 | Yes |
| 4003 | 10.7 | 319.00 | 16 | Yes |
| 4004 | 10.4 | 379.00 | 14 | Yes |
| 4005 | 19.6 | 482.00 | 16 | Yes |
| 4006 | 19.1 | 253.00 | 13 | Yes |
| 4007 | 10.5 | 382.00 | 12 | Yes |
| 4008 | 17.6 | 277.00 | 13 | Yes |
| 4009 | 12.7 | 310.00 | 12 | Yes |
| 4010 | 19.8 | 439.00 | 13 | Yes |
| 4011 | 18.7 | 272.00 | 16 | Yes |
| 4012 | 16.7 | 500.00 | 13 | Yes |
| 4013 | 14.9 | 393.00 | 15 | Yes |
| 4014 | 11.2 | 448.00 | 16 | Yes |
| 4015 | 16 | 278.00 | 13 | Yes |
| 4016 | 19.8 | 422.00 | 13 | Yes |
| 4017 | 14.6 | 337.00 | 14 | Yes |
| 4018 | 16.9 | 365.00 | 15 | Yes |
| 4019 | 12 | 391.00 | 13 | Yes |
| 4020 | 13 | 496.00 | 13 | Yes |
| 4021 | 12.6 | 375.00 | 15 | Yes |
| 4022 | 19.2 | 499.00 | 14 | Yes |
| 4023 | 11.2 | 263.00 | 14 | Yes |
| 4024 | 15 | 377.00 | 15 | Yes |
| 4025 | 19.3 | 394.00 | 16 | Yes |
| 4026 | 12.2 | 319.00 | 13 | Yes |
| 4027 | 13.6 | 469.00 | 16 | Yes |
| 4028 | 10.7 | 286.00 | 14 | Yes |
| 4029 | 14.2 | 266.00 | 13 | Yes |
| 4030 | 20 | 383.00 | 16 | 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 | No |
| 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 | 148 | 5492 | 3 | Yes |
| 2 | 623 | 5493 | 5 | Yes |
| 3 | 1098 | 5494 | 2 | Yes |
| 4 | 1573 | 5495 | 2 | Yes |
| 5 | 2048 | 5496 | 2 | Yes |
| 6 | 2523 | 5497 | 3 | Yes |
| 7 | 2998 | 5498 | 2 | Yes |
| 8 | 3473 | 5499 | 2 | Yes |
| 9 | 3948 | 5500 | 5 | Yes |
| 10 | 4423 | 5501 | 1 | Yes |
| 11 | 4898 | 5502 | 6 | Yes |
| 12 | 5373 | 5503 | 5 | Yes |
| 13 | 5848 | 5504 | 6 | Yes |
| 14 | 6323 | 5505 | 2 | Yes |
| 15 | 6798 | 5506 | 4 | Yes |
| 16 | 7273 | 5507 | 3 | Yes |
| 17 | 7748 | 5508 | 3 | Yes |
| 18 | 8223 | 5492 | 6 | Yes |
| 19 | 8698 | 5493 | 5 | Yes |
| 20 | 9173 | 5494 | 4 | Yes |
| 21 | 9648 | 5495 | 5 | Yes |
| 22 | 10123 | 5496 | 2 | Yes |
| 23 | 10598 | 5497 | 3 | Yes |
| 24 | 11073 | 5498 | 3 | Yes |
| 25 | 11548 | 5499 | 4 | Yes |
| 26 | 12023 | 5500 | 5 | Yes |
| 27 | 12498 | 5501 | 6 | Yes |
| 28 | 12973 | 5502 | 7 | Yes |
| 29 | 13448 | 5503 | 4 | Yes |
| 30 | 13923 | 5504 | 1 | Yes |
| 31 | 14398 | 5505 | 2 | Yes |
| 32 | 14873 | 5506 | 3 | Yes |
| 33 | 15348 | 5507 | 2 | Yes |
| 34 | 15823 | 5508 | 2 | Yes |

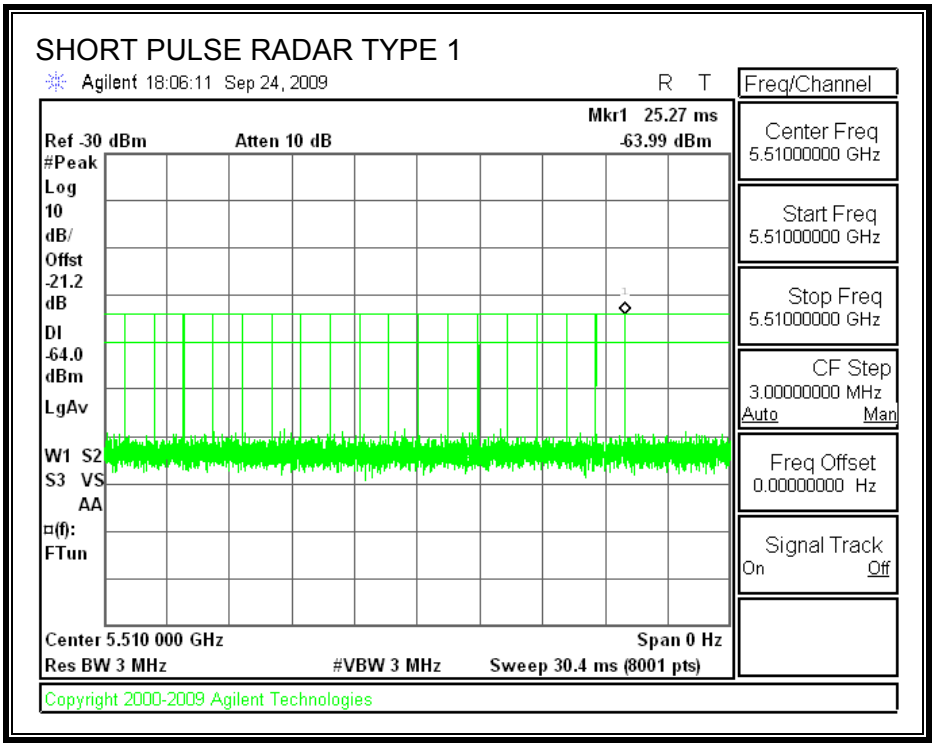
## 5.3. RESULTS FOR 40 MHz BANDWIDTH

### 5.3.1. TEST CHANNEL

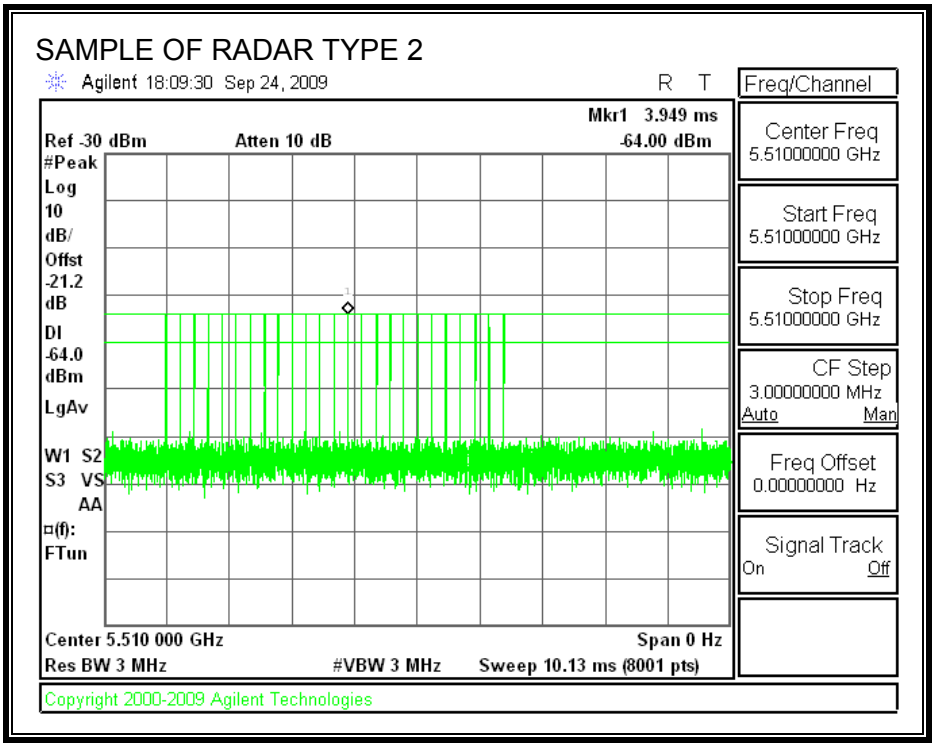
All tests were performed at a channel center frequency of 5510 MHz.

### 5.3.2. PLOTS OF RADAR WAVEFORMS AND WLAN TRAFFIC

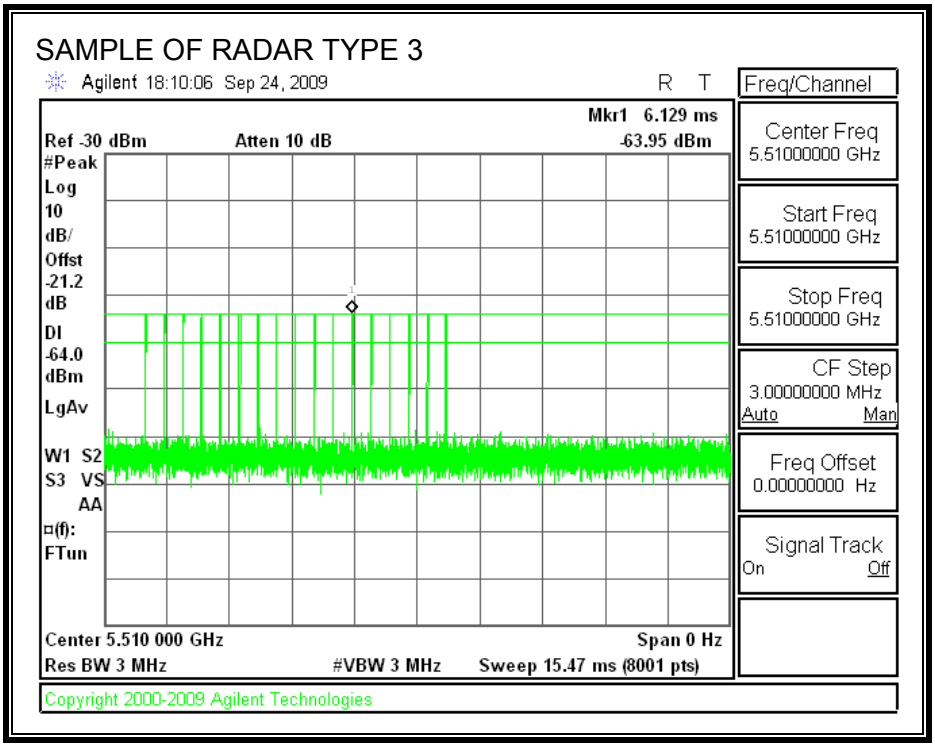
**PLOTS OF RADAR WAVEFORMS**



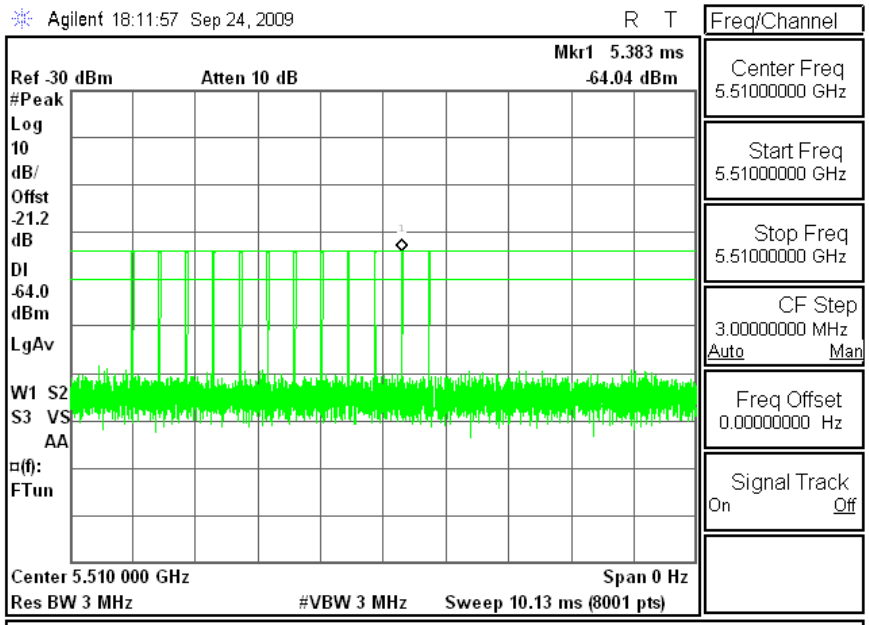
SAMPLE OF RADAR TYPE 2



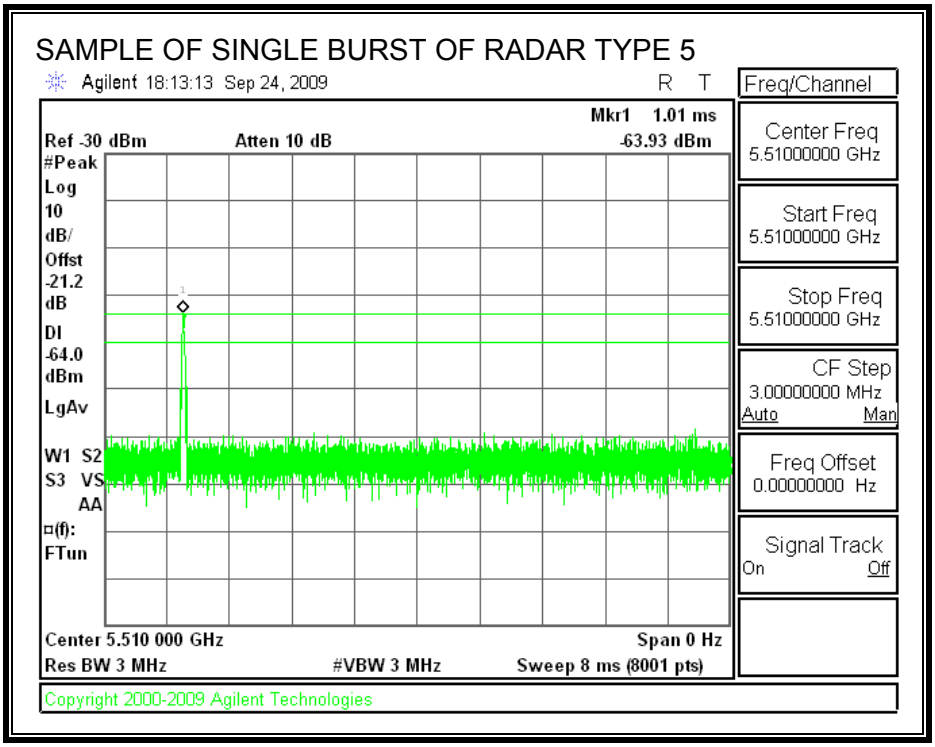
SAMPLE OF RADAR TYPE 3

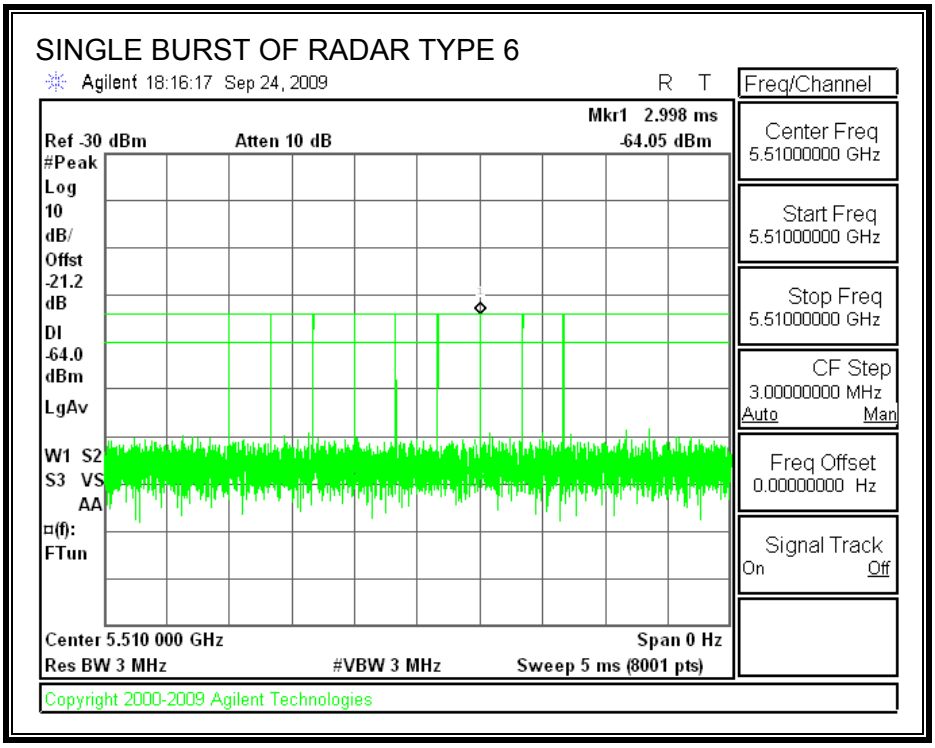


SAMPLE OF RADAR TYPE 4

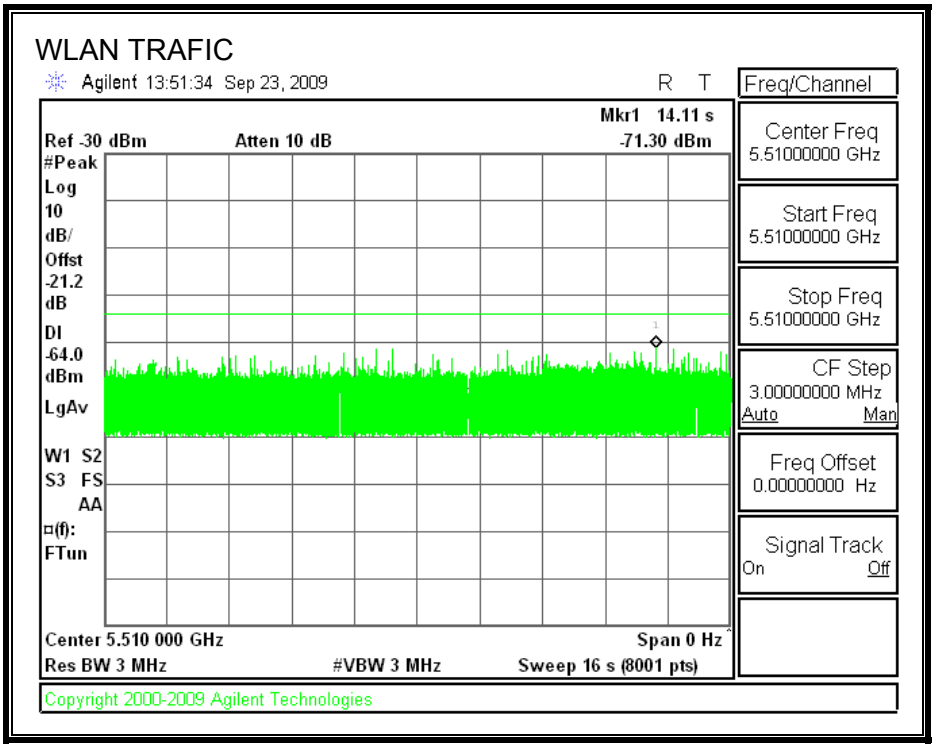


SAMPLE OF SINGLE BURST OF RADAR TYPE 5





**PLOT OF WLAN TRAFFIC FROM MASTER**



## 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) |
|---|---|---|---|
| 20.61 | 114.9 | 94.3 | 34.3 |

**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) |
|---|---|---|---|
| 21.55 | 57.3 | 35.8 | 1.5 |

**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) |
|---|---|---|---|
| 21.21 | 114.8 | 93.6 | 59.3 |

## QUALITATIVE RESULTS

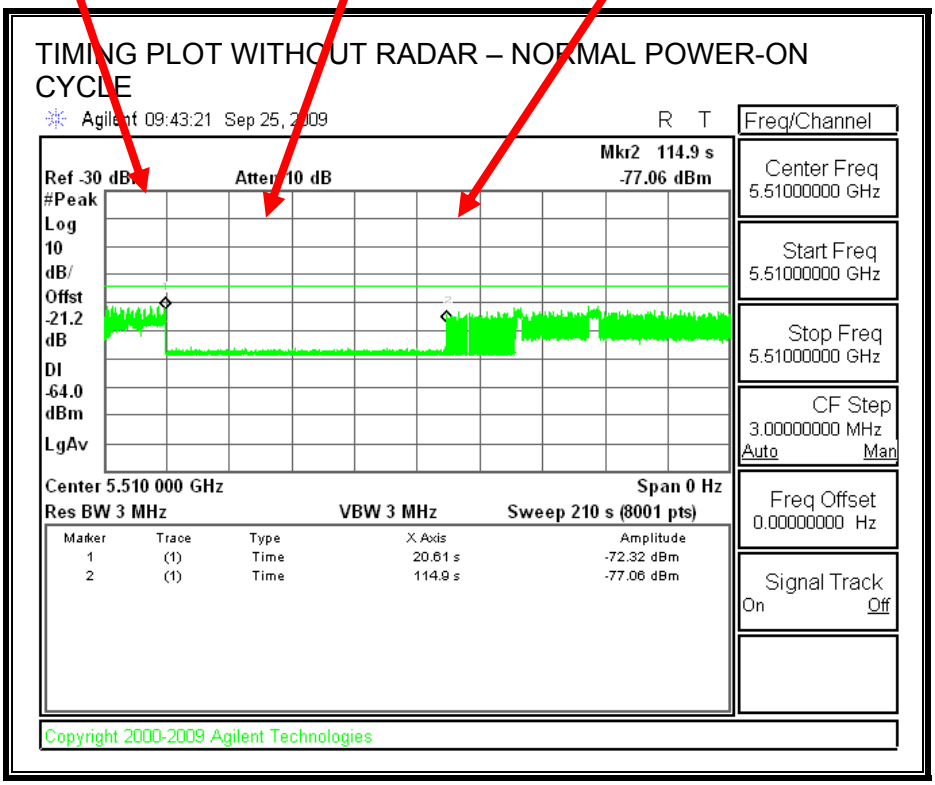
| Timing of Radar Burst | Display on Control Computer | Spectrum Analyzer Display |
|---|---|---|
| No Radar Triggered | EUT marks Channel as active | Transmissions begin on channel after completion of the initial power-up cycle and the CAC |
| Within 0 to 6 second window | EUT indicates radar detected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

**TIMING PLOT WITHOUT RADAR DURING CAC**

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

End of Initial Power-up cycle
Start of CAC

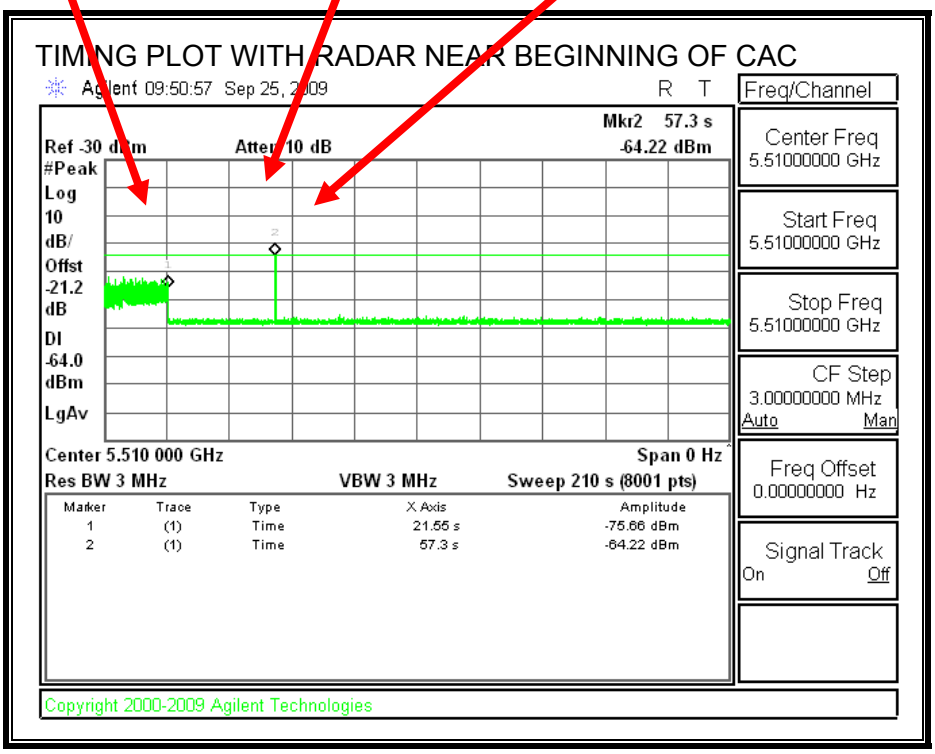
End of CAC
Traffic is Initiated




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

**TIMING PLOT 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



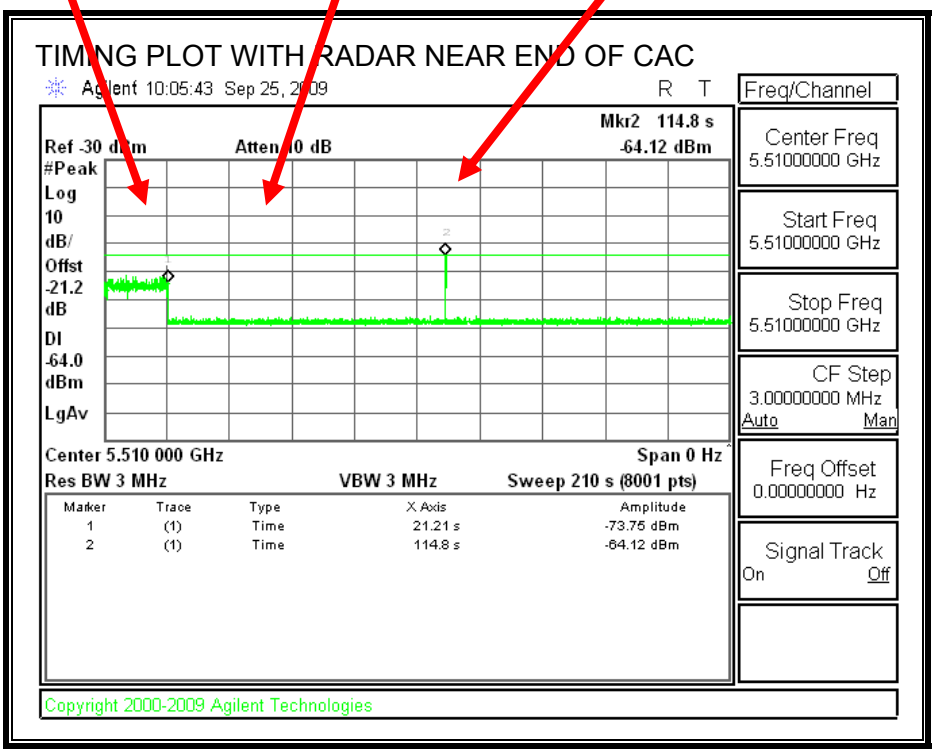

No EUT transmissions were observed after the radar signal.

**TIMING PLOT 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.

### 5.3.4. OVERLAPPING CHANNEL TESTS

**RESULTS**

These tests are not applicable.

### 5.3.5. MOVE AND CLOSING TIME

**REPORTING NOTES**

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

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

The aggregate channel closing transmission time is calculated as follows:

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

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

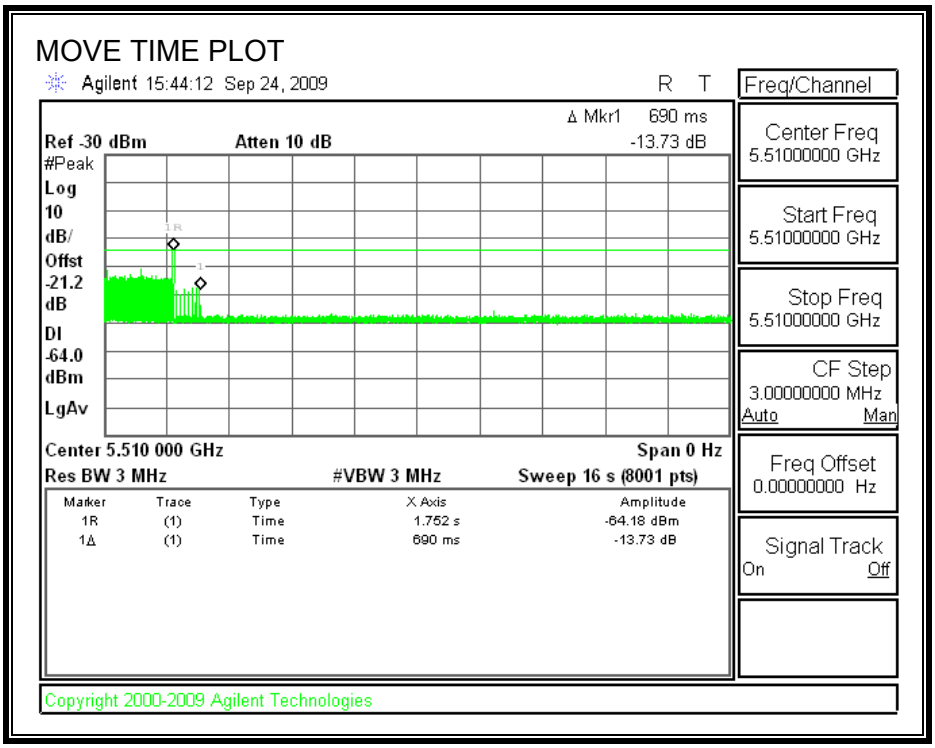
The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

**RESULTS**

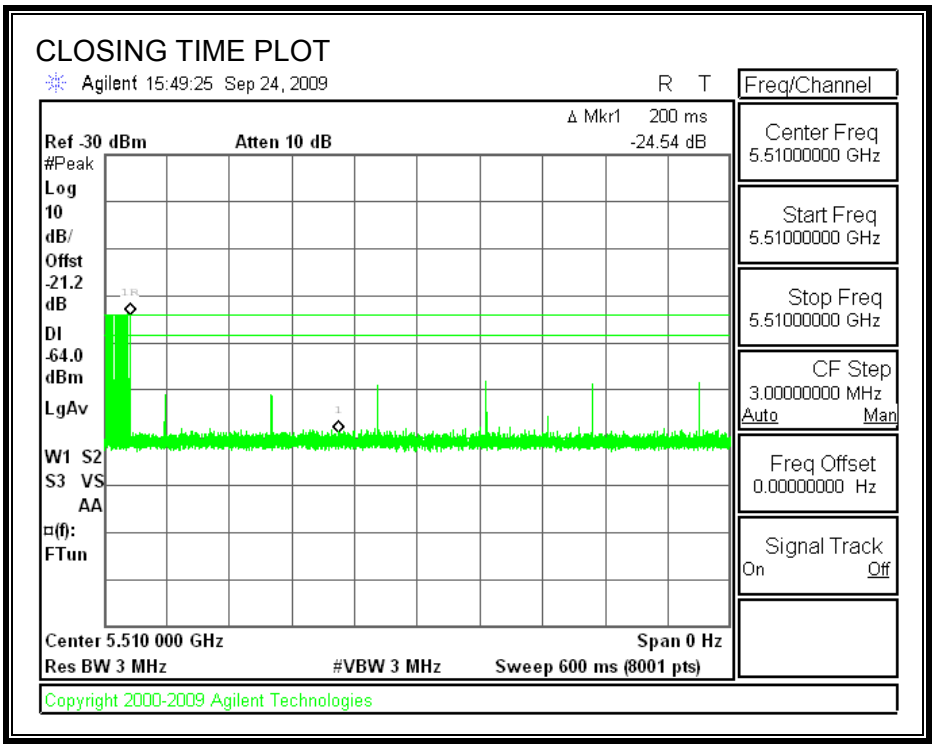
| Agency | Channel Move Time (sec) | Limit (sec) |
|---|---|---|
| FCC / IC | 0.690 | 10 |

| Agency | Aggregate Channel Closing Transmission Time (msec) | Limit (msec) |
|---|---|---|
| FCC | 10.0 | 60 |
| IC | 14.0 | 260 |

**MOVE TIME**



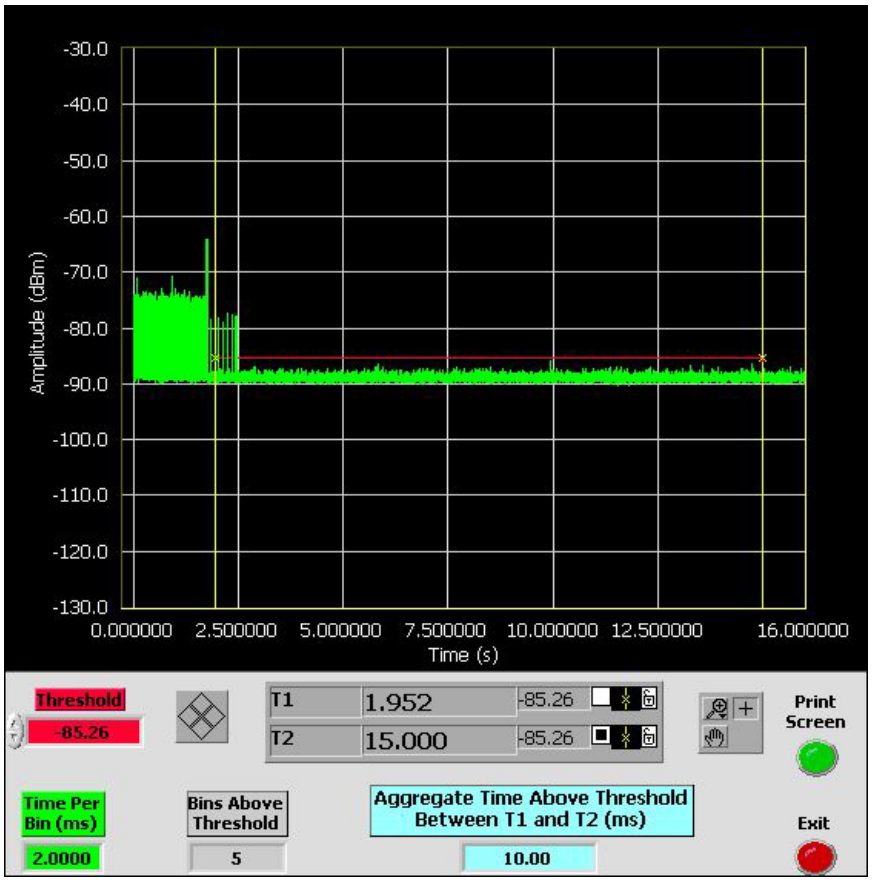
**CHANNEL CLOSING TIME**



**AGGREGATE CHANNEL CLOSING TRANSMISSION TIME**

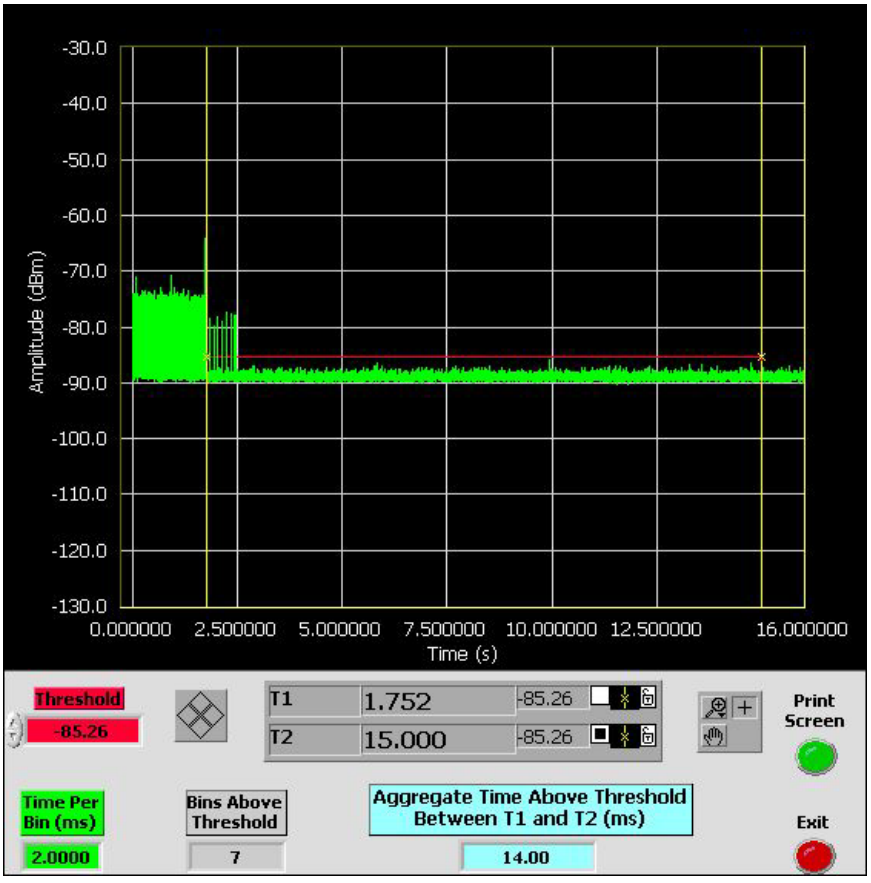
Only intermittent transmissions are observed during the FCC aggregate monitoring period.

FCC AGGREGATE CLOSING TIME PLOT



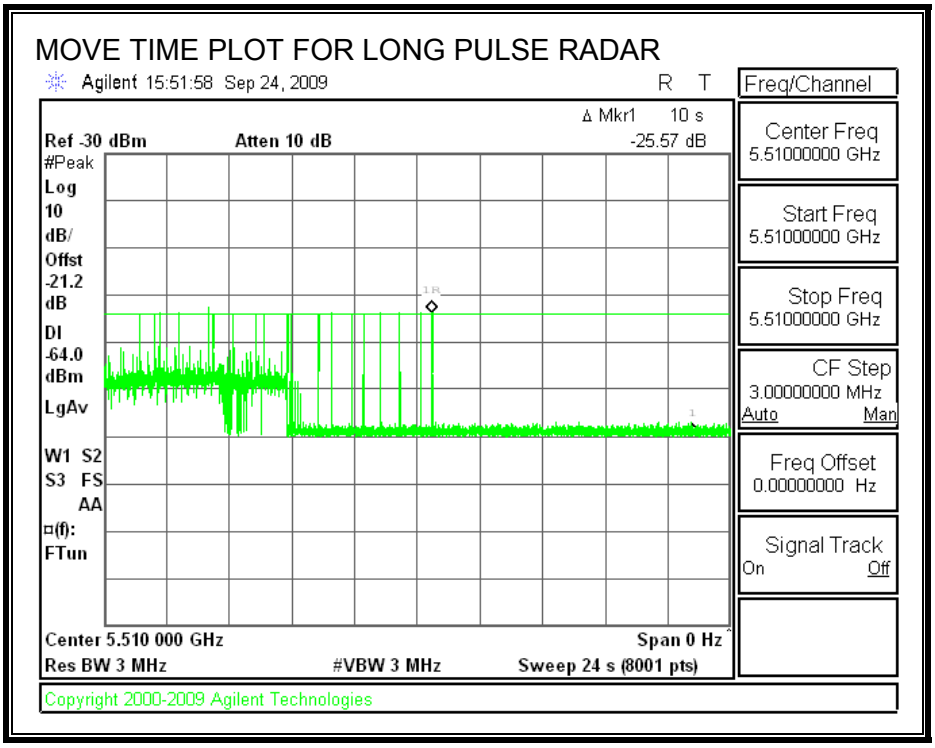
Only intermittent transmissions are observed during the FCC aggregate monitoring period.

IC AGGREGATE CLOSING TIME PLOT



**LONG PULSE CHANNEL MOVE TIME**

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

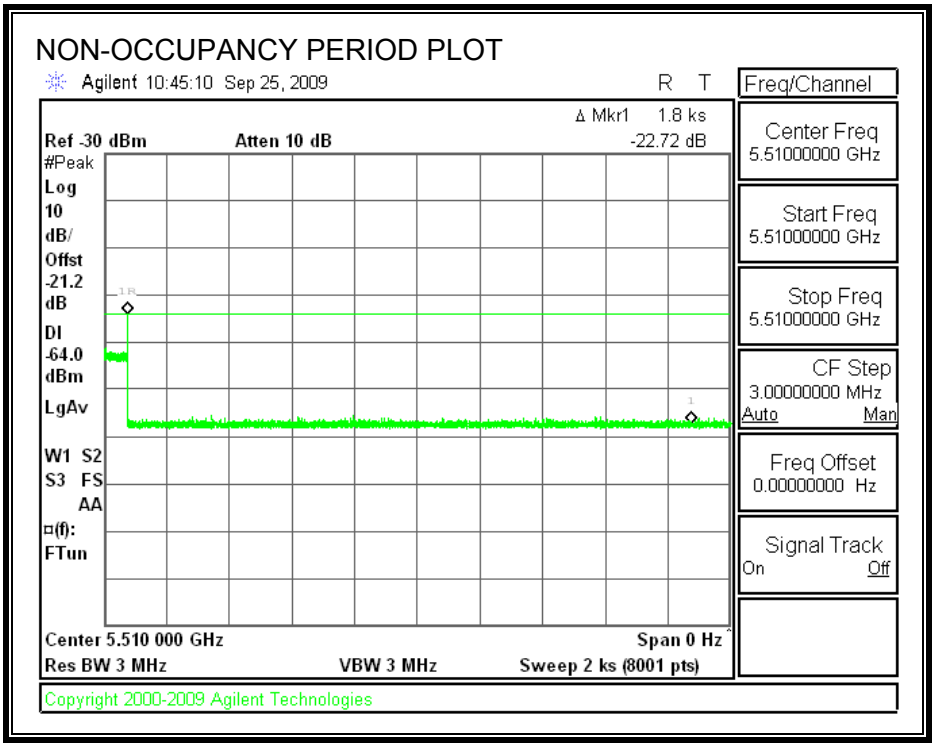


### 5.3.6. NON-OCCUPANCY PERIOD

**RESULTS**

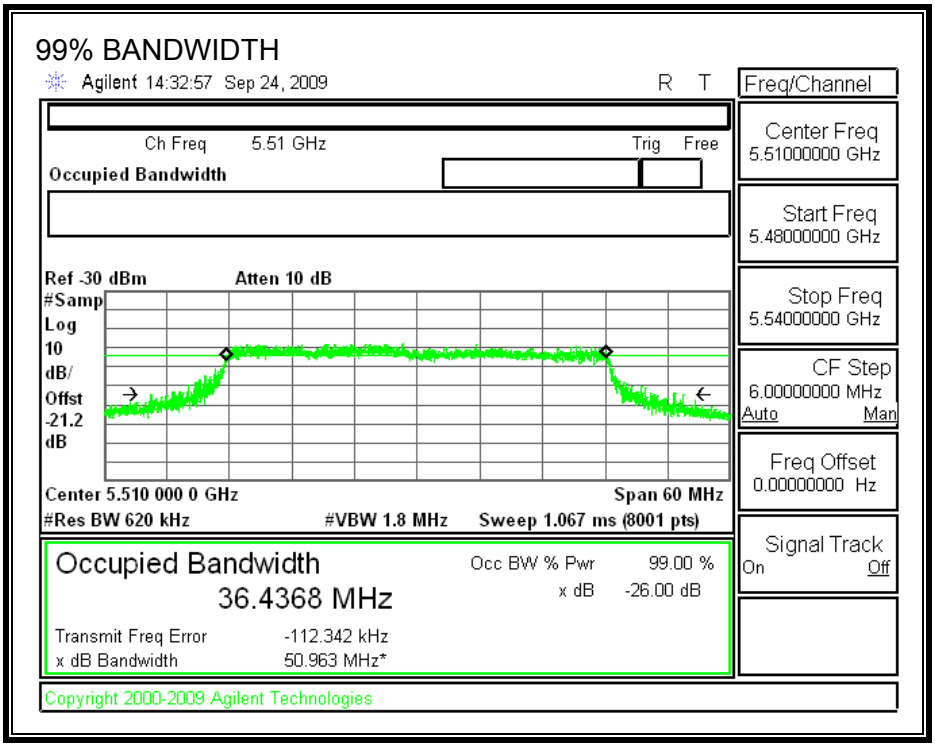
No EUT transmissions were observed on the test channel during the 30-minute observation time.

NON-OCCUPANCY PERIOD PLOT



## 5.3.7. DETECTION BANDWIDTH

**REFERENCE PLOT OF 99% POWER BANDWIDTH**




**RESULTS**

| FL (MHz) | FH (MHz) | Detection Bandwidth (MHz) | 99% Power Bandwidth (MHz) | Ratio of Detection BW to 99% Power BW (%) | Minimum Limit (%) |
|---|---|---|---|---|---|
| 5493 | 5527 | 34 | 36.437 | 93.3 | 80 |

**DETECTION BANDWIDTH PROBABILITY**

DETECTION BANDWIDTH PROBABILITY RESULTS

| Detection Bandwidth Test Results | | | | |
|---|---|---|---|---|
| FCC Type 1 Waveform: 1 us Pulse Width, 1428 us PRI, 18 Pulses per Burst | | | | |
| Frequency (MHz) | Number of Trials | Number Detected | Detection (%) | Mark |
| 5493 | 10 | 10 | 100 | FL |
| 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 | |
| 5509 | 10 | 10 | 100 | |
| 5510 | 10 | 10 | 100 | |
| 5511 | 10 | 10 | 100 | |
| 5512 | 10 | 10 | 100 | |
| 5513 | 10 | 10 | 100 | |
| 5514 | 10 | 10 | 100 | |
| 5515 | 10 | 9 | 90 | |
| 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 | 10 | 100 | |
| 5527 | 10 | 9 | 90 | FH |

## 5.3.8. 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 | 100.00 | 60 | Pass |
| FCC Short Pulse Type 4 | 30 | 86.67 | 60 | Pass |
| Aggregate | | 92.50 | 80 | Pass |
| FCC Long Pulse Type 5 | 30 | 93.33 | 80 | Pass |
| FCC Hopping Type 6 | 35 | 97.14 | 70 | Pass |

**TYPE 1 DETECTION PROBABILITY**

| Data Sheet for FCC Short Pulse Radar Type 1<br>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 | 227.00 | 25 | Yes |
| 2002 | 3 | 167.00 | 29 | Yes |
| 2003 | 4.5 | 197.00 | 29 | No |
| 2004 | 4.1 | 162.00 | 28 | Yes |
| 2005 | 1.7 | 191.00 | 25 | Yes |
| 2006 | 1.4 | 157.00 | 23 | Yes |
| 2007 | 1.4 | 225.00 | 25 | Yes |
| 2008 | 3.7 | 178.00 | 25 | Yes |
| 2009 | 4.2 | 217.00 | 27 | Yes |
| 2010 | 3.3 | 183.00 | 27 | Yes |
| 2011 | 1.6 | 210.00 | 29 | Yes |
| 2012 | 1.5 | 192.00 | 29 | Yes |
| 2013 | 4.6 | 174.00 | 27 | Yes |
| 2014 | 3.2 | 170.00 | 26 | No |
| 2015 | 1.4 | 212.00 | 29 | Yes |
| 2016 | 1.6 | 192.00 | 23 | Yes |
| 2017 | 1.3 | 157.00 | 28 | Yes |
| 2018 | 5 | 205.00 | 24 | Yes |
| 2019 | 1.8 | 189.00 | 27 | Yes |
| 2020 | 4.7 | 153.00 | 28 | Yes |
| 2021 | 3.3 | 189.00 | 23 | Yes |
| 2022 | 4.8 | 187.00 | 25 | No |
| 2023 | 2.9 | 198.00 | 27 | Yes |
| 2024 | 3.5 | 174.00 | 27 | Yes |
| 2025 | 4.7 | 221.00 | 28 | Yes |
| 2026 | 4.1 | 165.00 | 26 | No |
| 2027 | 4.9 | 163.00 | 23 | No |
| 2028 | 4.3 | 229.00 | 26 | Yes |
| 2029 | 4.6 | 178.00 | 25 | Yes |
| 2030 | 3.8 | 222.00 | 29 | 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 | 8 | 466.00 | 17 | Yes |
| 3002 | 6.5 | 402.00 | 16 | Yes |
| 3003 | 7.7 | 277.00 | 17 | Yes |
| 3004 | 5.8 | 333.00 | 18 | Yes |
| 3005 | 9.3 | 457.00 | 17 | Yes |
| 3006 | 7.6 | 426.00 | 16 | Yes |
| 3007 | 6.7 | 293.00 | 16 | Yes |
| 3008 | 6.3 | 477.00 | 18 | Yes |
| 3009 | 9.3 | 382.00 | 16 | Yes |
| 3010 | 6 | 389.00 | 17 | Yes |
| 3011 | 8.9 | 302.00 | 18 | Yes |
| 3012 | 6.4 | 481.00 | 17 | Yes |
| 3013 | 8.3 | 344.00 | 16 | Yes |
| 3014 | 7 | 327.00 | 17 | Yes |
| 3015 | 5.7 | 314.00 | 18 | Yes |
| 3016 | 6 | 491.00 | 16 | Yes |
| 3017 | 5.5 | 494.00 | 17 | Yes |
| 3018 | 9 | 443.00 | 16 | Yes |
| 3019 | 5 | 317.00 | 18 | Yes |
| 3020 | 6.1 | 466.00 | 16 | Yes |
| 3021 | 8 | 438.00 | 16 | Yes |
| 3022 | 5.5 | 277.00 | 18 | Yes |
| 3023 | 8.9 | 273.00 | 16 | Yes |
| 3024 | 5.2 | 305.00 | 16 | Yes |
| 3025 | 6.5 | 276.00 | 16 | Yes |
| 3026 | 5 | 449.00 | 17 | Yes |
| 3027 | 10 | 436.00 | 16 | Yes |
| 3028 | 5.2 | 416.00 | 17 | Yes |
| 3029 | 5.5 | 466 | 16 | Yes |
| 3030 | 6.5 | 463 | 17 | 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 | 15.3 | 437.00 | 12 | Yes |
| 4002 | 13.9 | 460.00 | 14 | Yes |
| 4003 | 10.7 | 319.00 | 16 | Yes |
| 4004 | 10.4 | 379.00 | 14 | Yes |
| 4005 | 19.6 | 482.00 | 16 | No |
| 4006 | 19.1 | 253.00 | 13 | Yes |
| 4007 | 10.5 | 382.00 | 12 | Yes |
| 4008 | 17.6 | 277.00 | 13 | Yes |
| 4009 | 12.7 | 310.00 | 12 | Yes |
| 4010 | 19.8 | 439.00 | 13 | No |
| 4011 | 18.7 | 272.00 | 16 | Yes |
| 4012 | 16.7 | 500.00 | 13 | Yes |
| 4013 | 14.9 | 393.00 | 15 | Yes |
| 4014 | 11.2 | 448.00 | 16 | Yes |
| 4015 | 16 | 278.00 | 13 | Yes |
| 4016 | 19.8 | 422.00 | 13 | No |
| 4017 | 14.6 | 337.00 | 14 | Yes |
| 4018 | 16.9 | 365.00 | 15 | Yes |
| 4019 | 12 | 391.00 | 13 | Yes |
| 4020 | 13 | 496.00 | 13 | Yes |
| 4021 | 12.6 | 375.00 | 15 | Yes |
| 4022 | 19.2 | 499.00 | 14 | No |
| 4023 | 11.2 | 263.00 | 14 | Yes |
| 4024 | 15 | 377.00 | 15 | Yes |
| 4025 | 19.3 | 394.00 | 16 | Yes |
| 4026 | 12.2 | 319.00 | 13 | Yes |
| 4027 | 13.6 | 469.00 | 16 | Yes |
| 4028 | 10.7 | 286.00 | 14 | Yes |
| 4029 | 14.2 | 266.00 | 13 | Yes |
| 4030 | 20 | 383.00 | 16 | Yes |

**TYPE 5 DETECTION PROBABILITY**

| Data Sheet for FCC Long Pulse Radar Type 5 | |
|---|---|
| Trial | Successful Detection (Yes/No) |
| 1 | Yes |
| 2 | Yes |
| 3 | No |
| 4 | Yes |
| 5 | Yes |
| 6 | No |
| 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**

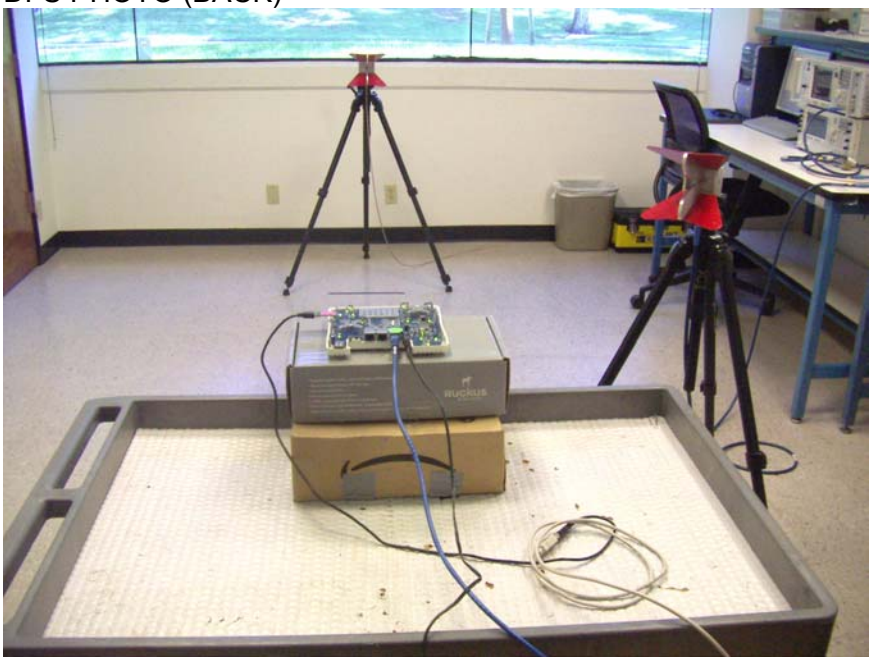
| Data Sheet for FCC Hopping Radar Type 6 | | | | |
|---|---|---|---|---|
| 1 us Pulse Width, 333 us PRI, 9 Pulses per Burst, 1 Burst per Hop | | | | |
| NTIA August 2005 Hopping Sequence | | | | |
| Trial | Starting Index Within Sequence | Signal Generator Frequency (MHz) | Hops within Detection BW | Successful Detection (Yes/No) |
| 1 | 299 | 5493 | 8 | Yes |
| 2 | 774 | 5494 | 7 | Yes |
| 3 | 1249 | 5495 | 8 | Yes |
| 4 | 1724 | 5496 | 6 | Yes |
| 5 | 2199 | 5497 | 5 | Yes |
| 6 | 2674 | 5498 | 8 | Yes |
| 7 | 3149 | 5499 | 7 | Yes |
| 8 | 3624 | 5500 | 7 | Yes |
| 9 | 4099 | 5501 | 6 | Yes |
| 10 | 4574 | 5502 | 2 | Yes |
| 11 | 5049 | 5503 | 4 | Yes |
| 12 | 5524 | 5504 | 9 | Yes |
| 13 | 5999 | 5505 | 7 | Yes |
| 14 | 6474 | 5506 | 6 | Yes |
| 15 | 6949 | 5507 | 8 | Yes |
| 16 | 7424 | 5508 | 4 | Yes |
| 17 | 7899 | 5509 | 7 | Yes |
| 18 | 8374 | 5510 | 6 | Yes |
| 19 | 8849 | 5511 | 9 | Yes |
| 20 | 9324 | 5512 | 10 | Yes |
| 21 | 9799 | 5513 | 7 | Yes |
| 22 | 10274 | 5514 | 7 | Yes |
| 23 | 10749 | 5515 | 7 | Yes |
| 24 | 11224 | 5516 | 11 | Yes |
| 25 | 11699 | 5517 | 5 | No |
| 26 | 12174 | 5518 | 7 | Yes |
| 27 | 12649 | 5519 | 8 | Yes |
| 28 | 13124 | 5520 | 8 | Yes |
| 29 | 13599 | 5521 | 7 | Yes |
| 30 | 14074 | 5522 | 9 | Yes |
| 31 | 14549 | 5523 | 6 | Yes |
| 32 | 15024 | 5524 | 6 | Yes |
| 33 | 15499 | 5525 | 7 | Yes |
| 34 | 15974 | 5526 | 8 | Yes |
| 35 | 16449 | 5527 | 8 | Yes |

# 6. SETUP PHOTOS

**DYNAMIC FREQUENCY SELECTION**

DFS PHOTO (FRONT)

DFS PHOTO (BACK)



# END OF REPORT