MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*
914 WEST PATAPSCO AVENUE ● BALTIMORE, MARYLAND 21230-3432 ● PHONE (410) 354-3300 ● FAX (410) 354-3313
33439 WESTERN AVENUE ● UNION CITY, CALIFORNIA 94587 ● PHONE (510) 489-6300 ● FAX (510) 489-6372
3162 BELICK STREET ● SANTA CLARA, CALIFORNIA 95054 ● PHONE (408 748-3585 ● FAX (510) 489-6372

December 2, 2009

Amimon, Ltd.
2 Maskit St.
Herzelia, Israel 46733

Dear Ronen Korman,

Enclosed is the EMC Wireless test report for compliance testing of the Amimon, Ltd., Shaldag RX (VDU) as tested to the requirements of Title 47 of the CFR, Ch. 1 (10-1-06 ed.), Title 47 of the CFR, Part 15, Subpart B for Unintentional Radiators and Part 15.407 for Intentional Radiators.

Thank you for using the services of MET Laboratories, Inc. If you have any questions regarding these results or if MET can be of further service to you, please feel free to contact me.

Sincerely yours,
MET LABORATORIES, INC.

Jennifer Warnell
Documentation Department

Reference: (\Amimon, Ltd.\EMC27656B-FCC407 Rev. 1)

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Electromagnetic Compatibility Criteria
Test Report

for the

Amimon, Ltd.
Model Shaldag RX (VDU)

Tested under
the Certification Rules
contained in
Title 47 of the CFR, Part 15, Subpart B
for Unintentional Radiators
and
Title 47 of the CFR, Part 15.407
for Intentional Radiators

MET Report: EMC27656B-FCC407 Rev. 1

December 2, 2009

Prepared For:

Amimon, Ltd.
2 Maskit St.
Herzelia, Israel 46733

Prepared By:
MET Laboratories, Inc.
914 W. Patapsco Ave.
Baltimore, MD 21230

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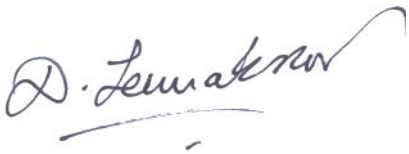

Dusmantha Tennakoon, Project Engineer
Electromagnetic Compatibility Lab

Jennifer Warnell
Documentation Department

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Parts 15B, 15.407, of the FCC Rules under normal use and maintenance.

Shawn McMillen, Wireless Manager
Electromagnetic Compatibility Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
0	November 19, 2009	Initial Issue.
1	December 2, 2009	Editorial corrections.

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List of Terms and Abbreviations

AC	**A**lternating **C**urrent
ACF	**A**ntenna **C**orrection **F**actor
Cal	**Cal**ibration
d	**M**easurement **D**istance
dB	**D**eci**b**els
dBµA	**D**eci**b**els above one **micro**amp
dBµV	**D**eci**b**els above one **micro**volt
dBµA/m	**D**eci**b**els above one **micro**amp **per m**eter
dBµV/m	**D**eci**b**els above one **micro**volt **per m**eter
DC	**D**irect **C**urrent µ
E	**E**lectric Field
DSL	**D**igital **S**ubscriber **L**ine
ESD	**E**lectro**s**tatic **D**ischarge
EUT	**E**quipment **U**nder **T**est
f	**F**requency
FCC	**F**ederal **C**ommunications **C**ommission
GRP	**G**round **R**eference **P**lane
H	Magnetic Field
HCP	**H**orizontal **C**oupling **P**lane
Hz	**H**ert**z**
IEC	**I**nternational **E**lectrotechnical **C**ommission
kHz	**k**ilo**h**ert**z**
kPa	**k**ilo**pa**scal
kV	**k**ilovolt
LISN	**L**ine **I**mpedance **S**tabilization **N**etwork
MHz	**M**ega**h**ertz
µH	**micro**henry
µ	**microf**arad
µs	**micros**econds
PRF	**P**ulse **R**epetition **F**requency
RF	**R**adio **F**requency
RMS	**R**oot-**M**ean-**S**quare
TWT	**T**raveling **W**ave **T**ube
V/m	**V**olts **per m**eter
VCP	**V**ertical **C**oupling **P**lane

I. Executive Summary

A. Purpose of Test

An EMC evaluation was performed to determine compliance of the Amimon, Ltd. Shaldag RX (VDU), with the requirements of Part 15, §15.407. All references are to the most current version of Title 47 of the Code of Federal Regulations in effect. In accordance with §2.1033, the following data is presented in support of the Certification of the Shaldag RX (VDU). Amimon, Ltd. should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the Shaldag RX (VDU), has been **permanently** discontinued.

B. Executive Summary

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, §15.407, in accordance with Amimon, Ltd., purchase order number 90203. All tests were conducted using measurement procedure ANSI C63.4-2003.

FCC Reference	Description	Results
15.107	Conducted Emissions	Compliant
15.109	Radiated Emissions	Compliant
15.203	Antenna Requirements	Compliant
15.205/15.209	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Compliant
15.207	AC Conducted Emissions 150KHz – 30MHz	Compliant
15.403 (i)	26dB Occupied Bandwidth	Compliant
15.407 (a)(2)	Conducted Transmitter Output Power	Compliant
15.407 (a)(2)	Power Spectral Density	Compliant
15.407 (a)(6)	Peak Excursion	Compliant
15.407 (b)(2), (3), (5), (6)	Undesirable Emissions	Compliant
15.407(f)	RF Exposure	Compliant
15.407(g)	Frequency Stability	Compliant
15.407 (h)(1)	Transmit Power Control (TPC)	N/A-device operates with e.i.r.p of less than 500 mW
15.407 (h)(2)(ii)	Channel Availability Check Time	Compliant
15.407 (h)(2)(iii)	Channel Move Time and Channel Closing Time	Compliant
15.407 (h)(2)(iv)	Non-Occupancy Period	Compliant
15.407 (h)(2)	Radar Detection Function of Dynamic Frequency Selection (DFS)	Compliant

Table 1. Executive Summary of EMC Part 15.407 ComplianceTesting

II. Equipment Configuration

A. Overview

MET Laboratories, Inc. was contracted by Amimon, Ltd. to perform testing on the Shaldag RX (VDU), under Amimon, Ltd.'s purchase order number 90203.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Amimon, Ltd. Shaldag RX (VDU).

The results obtained relate only to the item(s) tested.

Model(s) Tested:	Shaldag RX (VDU)	
Model(s) Covered:	Shaldag RX (VDU)	
EUT Specifications:	Primary Power: 120 VAC, 60 Hz	
	FCC ID: VQSAMN32100	
	Type of Modulations:	OFDM
	Emission Designators:	37M5D7D
	Equipment Code:	NII
	Peak RF Output Power:	13.68 dBm
	EUT Frequency Tested:	5300 MHz and 5500 MHz
Analysis:	The results obtained relate only to the item(s) tested.	
Environmental Test Conditions:	Temperature: 15-35º C	
	Relative Humidity: 30-60%	
	Barometric Pressure: 860-1060 mbar	
Evaluated by:	Dusmantha Tennakoon	
Report Date(s):	December 2, 2009	

Table 2. EUT Summary

B. References

CFR 47, Part 15, Subpart B	Electromagnetic Compatibility: Criteria for Radio Frequency Devices
CFR 47, Part 15, Subpart E	Unlicensed National Information Infrastructure Devices (UNII)
ANSI C63.4:2003	Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI/NCSL Z540-1-1994	Calibration Laboratories and Measuring and Test Equipment - General Requirements
ANSI/ISO/IEC 17025:2000	General Requirements for the Competence of Testing and Calibration Laboratories

Table 3. References

C. Test Site

All testing was performed at MET Laboratories, Inc., 914 W. Patapsco Ave., Baltimore, MD 21230. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

Radiated Emissions measurements were performed in a 3 meter semi-anechoic chamber (equivalent to an Open Area Test Site). In accordance with §2.948(a)(3), a complete site description is contained at MET Laboratories.

D. Description of Test Sample

The Amimon, Ltd. Shaldag RX (VDU), is a WHDI Video Destination Unit (VDU) that is designed to be at the receiver end of the WHDI downstream. The EUT receives wireless downstream transmission, demodulates it and regenerates the video, audio and control content transmitted by the Saldag TX. The receiver works at the 5 GHz unlicensed band. The EUT transmits low-rate upstream data content. The EUT has 1x5 spatial multiplexing MIMO.

Photograph 1. Amimon, Ltd. Shaldag RX (VDU)

E. Equipment Configuration

All cards, racks, etc., incorporated as part of the EUT is included in the following list.

Name / Description	Model Number	Part Number	Serial Number	Rev. #
1x4 MIMO Transceiver Module (Shaldag RX – VDU)	AMN 32100	N/A	T110430016	4.0

Table 4. Equipment Configuration

F. Support Equipment

Shaldag RX (VDU) supplied support equipment necessary for the operation and testing of the Shaldag RX (VDU). All support equipment supplied is listed in the following Support Equipment List.

Ref. ID	Name / Description	Manufacturer	Serial Number	Rev. #
N/A	Shaldag Regulation Board	Amimon	A01153692	1.0

Table 5. Support Equipment

G. Mode of Operation

The EUT was configured to transmit continuously on channels 5300 MHz and 5550 MHz for testing.

H. Method of Monitoring EUT Operation

A Spectrum Analyzer and a Power Meter was use to monitor the EUT's transmitter channel and power output.

I. Modifications

a) Modifications to EUT

No modifications were made to the EUT.

b) Modifications to Test Standard

No modifications were made to the test standard.

J. Disposition of EUT

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to Amimon, Ltd. upon completion of testing.

III. Electromagnetic Compatibility Criteria for Unintentional Radiators

Electromagnetic Compatibility Criteria

§ 15.107 Conducted Emissions Limits

Test Requirement(s):

15.107 (a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in Table 6. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals.

15.107 (b) For a Class A digital device that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in Table 6. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals. The lower limit applies at the band edges.

Frequency range (MHz)	Class A Conducted Limits (dBµV)		*Class B Conducted Limits (dBµV)	
	Quasi-Peak	Average	Quasi-Peak	Average
* 0.15- 0.45	79	66	66 - 56	56 - 46
0.45 - 0.5	79	66	56	46
0.5 - 30	73	60	60	50
Note 1 — The lower limit shall apply at the transition frequencies. Note 2 — The limit decreases linearly with the logarithm if the frequency in the range 0.15 MHz to 0.5 MHz. * -- Limits per Subsection 15.207(a).				

Table 6. Conducted Limits for Radio Frequency Devices calculated from FCC Part 15 Subsections 15.107(a) (b) and 15.207(a)

Test Results: The EUT was found compliant with the Class B requirement(s) of this section. Measured emissions were below applicable limits.

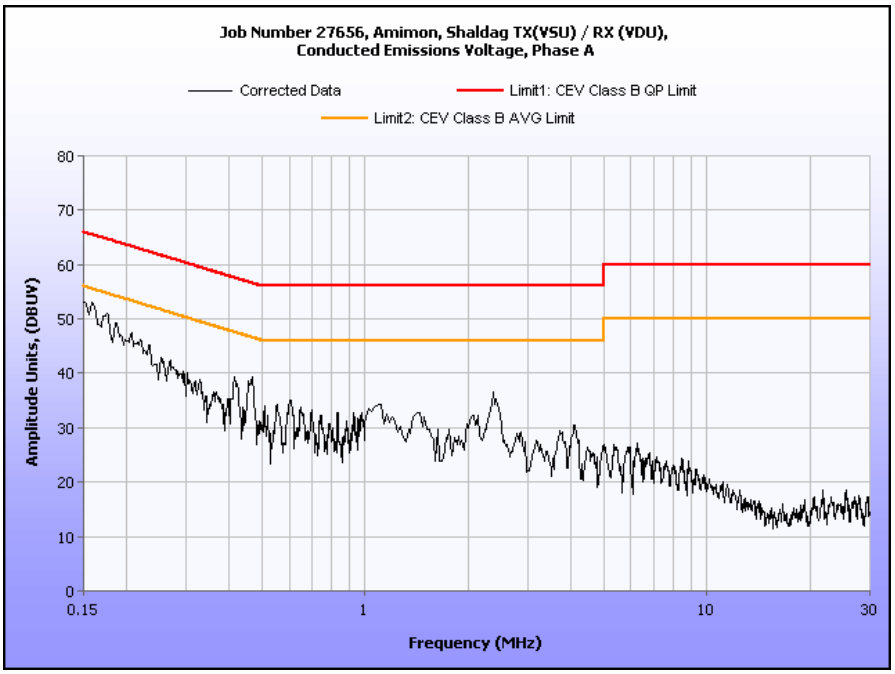
Test Engineer(s): Dusmantha Tennakoon

Test Date(s): 09/08/09

Conducted Emissions - Voltage, AC Power, Phase Line (120 VAC, 60 Hz)

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) Avg.	Limit (dBuV) Avg.	Margin (dB) Avg.
0.1512	40.13	0.08704	40.21704	65.93	-25.713	28.51	0.08704	28.59704	55.93	-27.333
0.2038	23.07	0.17	23.24	63.45	-40.21	13.74	0.17	13.91	53.45	-39.54
0.65	27.94	0.17	28.11	56	-27.89	15.27	0.17	15.44	46	-30.56
2.373	27.1	0.17	27.27	56	-28.73	15.91	0.17	16.08	46	-29.92
10.5	10.89	0.33	11.22	60	-48.78	5.46	0.33	5.79	50	-44.21
24.56	15.52	0.25704	15.77704	60	-44.223	12.54	0.25704	12.79704	50	-37.203

Table 7. Conducted Emissions - Voltage, AC Power, Phase Line (120 VAC, 60 Hz)

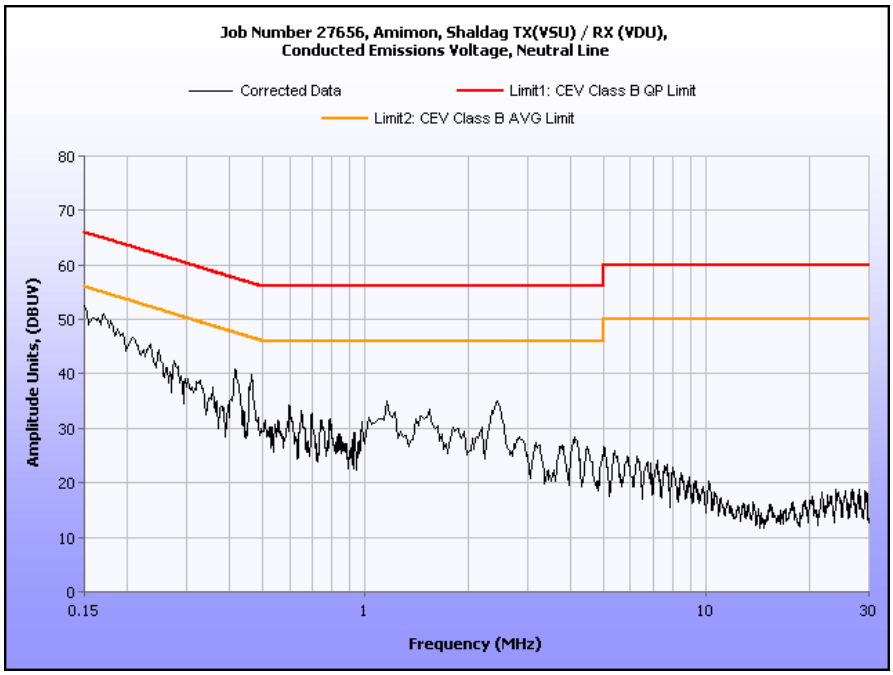


Plot 1. Conducted Emission, Phase Line Plot

Conducted Emissions - Voltage, AC Power, Neutral Line (120 VAC, 60 Hz)

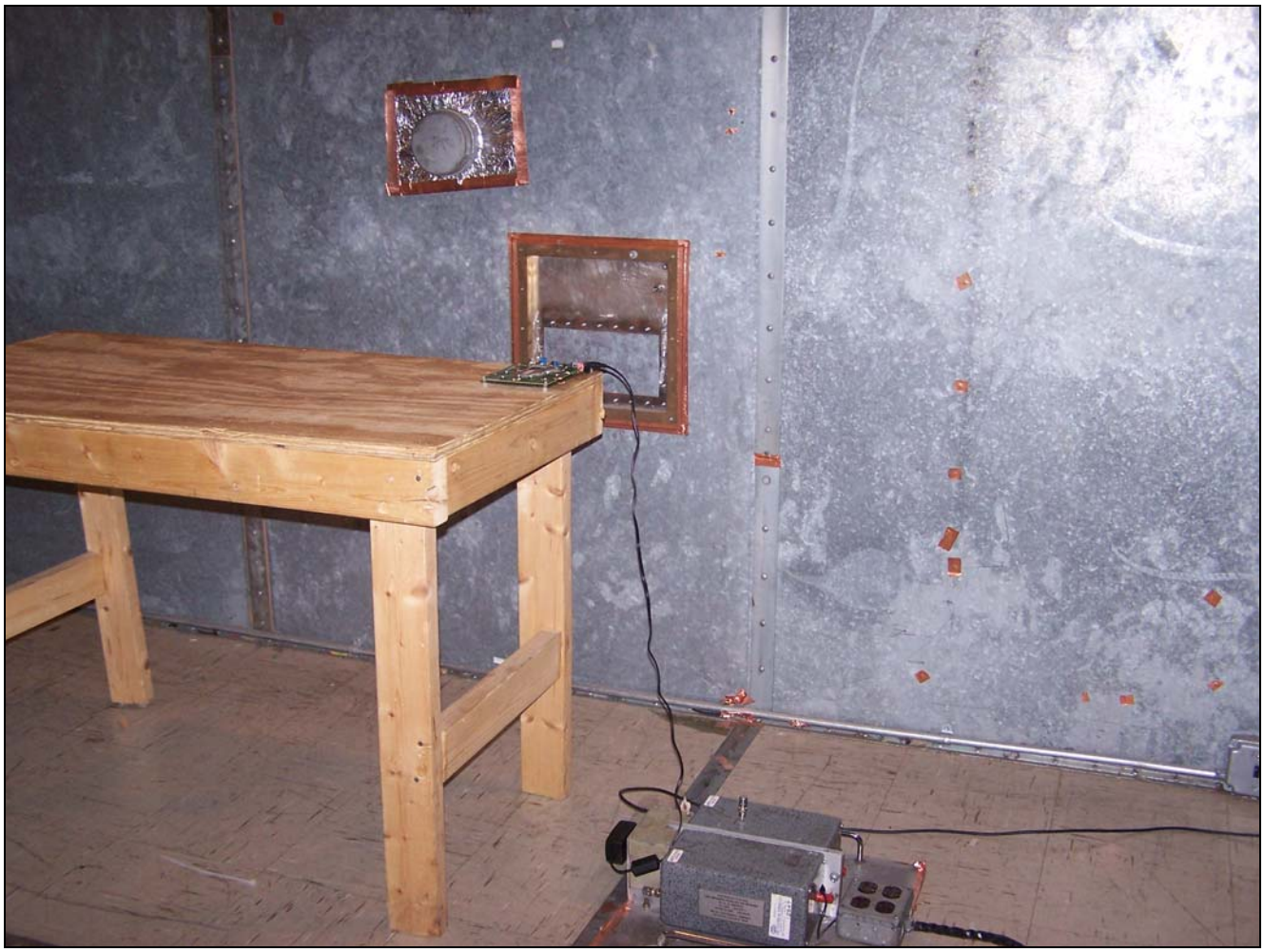
Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) Avg.	Limit (dBuV) Avg.	Margin (dB) Avg.
0.1561	38.63	0.09537	38.72537	65.67	-26.9446	24.56	0.09537	24.65537	55.67	-31.0146
0.604	27.07	0.17	27.24	56	-28.76	26.22	0.17	26.39	46	-19.61
2.44	30.12	0.17	30.29	56	-25.71	28.56	0.17	28.73	46	-17.27
10.18	12.22	0.33	12.55	60	-47.45	6.8	0.33	7.13	50	-42.87
26.85	11.2	0.2204	11.4204	60	-48.5796	6.5	0.2204	6.7204	50	-43.2796
0.2038	22.31	0.17	22.48	63.45	-40.97	14.52	0.17	14.69	53.45	-38.76

Table 8. Conducted Emissions - Voltage, AC Power, Neutral Line (120 VAC, 60 Hz)



Plot 2. Conducted Emission, Neutral Line Plot

Conducted Emission Limits Test Setup



Photograph 2. Conducted Emissions, Test Setup

Radiated Emission Limits

§ 15.109 Radiated Emissions Limits

Test Requirement(s): **15.109 (a)** Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the Class B limits expressed in Table 9.

15.109 (b) The field strength of radiated emissions from a Class A digital device, as determined at a distance of 10 meters, shall not exceed the Class A limits expressed in Table 9.

Frequency (MHz)	Field Strength (dBµV/m)	
	§15.109 (b), Class A Limit (dBµV) @ 10m	§15.109 (a),Class B Limit (dBµV) @ 3m
30 - 88	39.00	40.00
88 - 216	43.50	43.50
216 - 960	46.40	46.00
Above 960	49.50	54.00

Table 9. Radiated Emissions Limits calculated from FCC Part 15, §15.109 (a) (b)

Test Procedures: The EUT was placed on a 0.8m-high acrylic table inside a semi-anechoic chamber. The method of testing and test conditions of ANSI C63.4 were used. An antenna was located 10 m from the EUT on an adjustable mast. A pre-scan was first performed in order to find prominent radiated emissions. For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1 m and 4 m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. Unless otherwise specified, measurements were made using a quasi-peak detector with a 120 kHz bandwidth.

Test Results: The EUT was found to comply with the Class B requirement(s) of this section. Measured emissions were below applicable limits

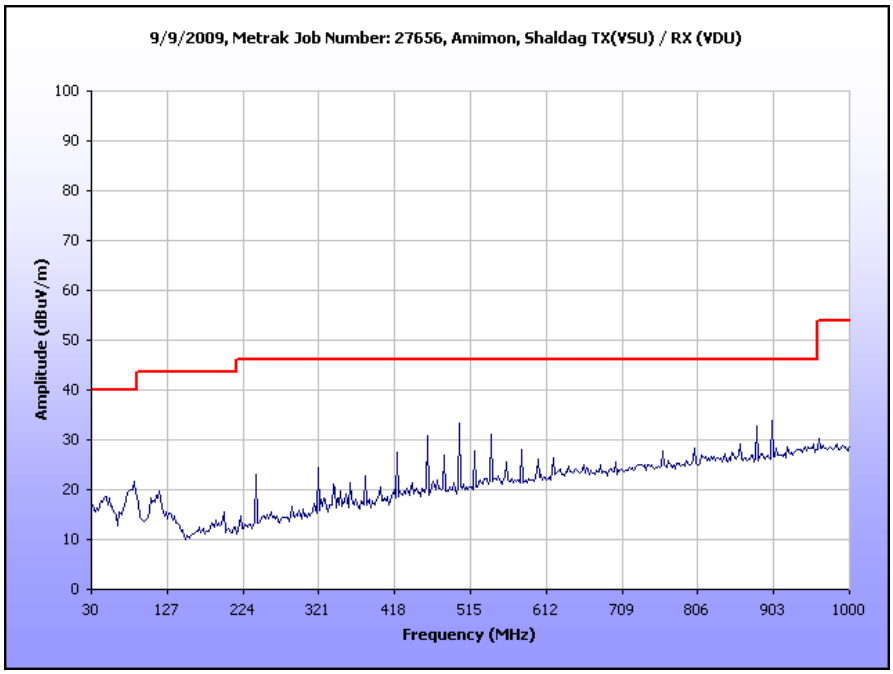
Test Engineer(s): Dusmantha Tennakoon

Test Date(s): 09/09/09

Radiated Emissions Limits Test Results, Class B

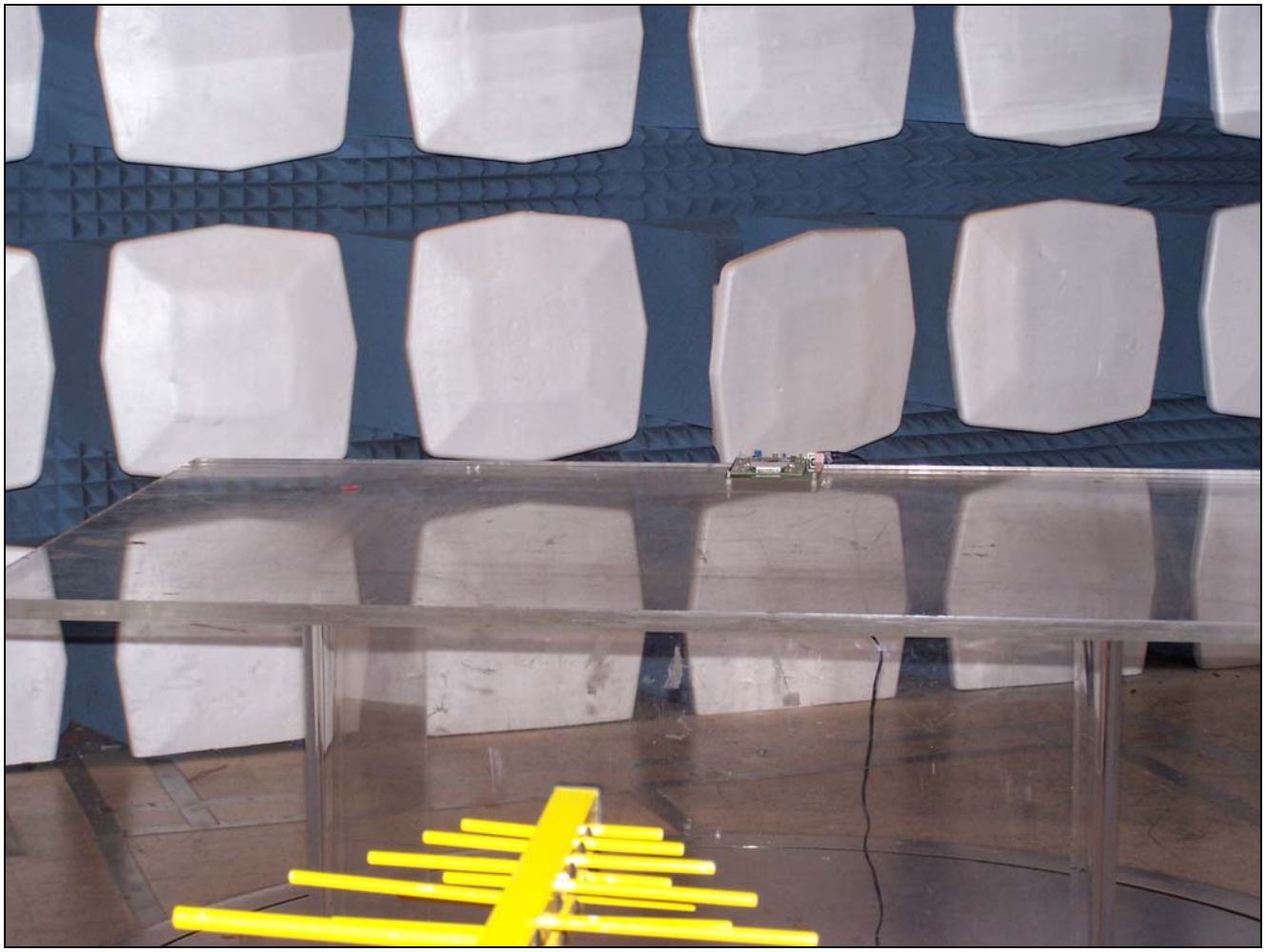
Frequency (MHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna HEIGHT (m)	Uncorrected Amplitude (dBuV)	Antenna Correction Factor (dB) (+)	Cable Loss (dB) (+)	Distance Correction Factor (dB) (-)	Corrected Amplitude (dBuV/m)	Limit (dBuV/m)	Margin (dB)
86.024	0	H	1.00	5.95	6.52	1.30	0.00	13.77	40.00	-26.23
86.024	360	V	1.00	13.07	6.94	1.30	0.00	21.30	40.00	-18.70
240.023	79	H	2.20	10.01	11.50	2.07	0.00	23.59	46.00	-22.41
240.023	349	V	1.00	9.25	11.80	2.07	0.00	23.13	46.00	-22.87
460.033	44	H	1.00	10.24	16.70	3.24	0.00	30.18	46.00	-15.82
460.033	339	V	1.10	12.83	17.30	3.24	0.00	33.37	46.00	-12.63
500.038	84	H	1.00	10.75	17.10	3.26	0.00	31.11	46.00	-14.89
500.038	15	V	1.00	15.22	17.20	3.26	0.00	35.68	46.00	-10.32
540.047	69	H	1.00	9.04	18.10	3.46	0.00	30.60	46.00	-15.40
540.047	308	V	2.00	11.97	18.30	3.46	0.00	33.73	46.00	-12.27
900.080	57	H	1.94	7.96	22.30	5.04	0.00	35.30	46.00	-10.70
900.080	299	V	1.00	10.37	22.10	5.04	0.00	37.51	46.00	-8.49

Table 10. Radiated Emissions Limits Test Results



Plot 3. Radiated Emissions, Pre-Scan

Radiated Emission Limits Test Setup



Photograph 3. Radiated Emission, Test Setup

IV. Electromagnetic Compatibility Criteria for Intentional Radiators

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.203 Antenna Requirement

Test Requirement: **§ 15.203:** An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

The structure and application of the EUT were analyzed to determine compliance with Section 15.203 of the Rules. Section 15.203 states that the subject device must meet at least one of the following criteria:

a.) Antenna must be permanently attached to the unit.

b.) Antenna must use a unique type of connector to attach to the EUT.

c.) Unit must be professionally installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.

Results: The antenna is a Planar Inverted F antenna (PIFA) that is permanently mounted. Therefore, the EUT as tested is compliant with the criteria of §15.203.

Gain/Model	Manufacturer
1.9 dBi	Amimon

Test Engineer(s): Dusmantha Tennakoon

Test Date(s): 09/08/09

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.207 Conducted Emissions Limits

Test Requirement(s): **§ 15.207 (a):** For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 Ω line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency range (MHz)	§ 15.207(a), Conducted Limit (dBμV)	
	Quasi-Peak	Average
* 0.15- 0.45	66 - 56	56 - 46
0.45 - 0.5	56	46
0.5 - 30	60	50

Table 11. Conducted Limits for Intentional Radiators from FCC Part 15 § 15.207(a)

Test Procedure: The EUT was placed on a 0.8 m-high wooden table inside a semi-anechoic chamber. The EUT was situated such that the back of the EUT was 0.4 m from one wall of the vertical ground plane, and the remaining sides of the EUT were no closer than 0.8 m from any other conductive surface. The EUT was powered from a 50 Ω/50 μH Line Impedance Stabilization Network (LISN). The EMC receiver scanned the frequency range from 150 kHz to 30 MHz. Conducted Emissions measurements were made in accordance with *ANSI C63.4-1992 "Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40 GHz"*. The measurements were performed over the frequency range of 0.15 MHz to 30 MHz using a 50 Ω/50 μH LISN as the input transducer to an EMC/field intensity meter.

Test Results: The EUT was found to comply with the Class B requirement(s) of this section. Pre-scans revealed that the emission profiles and amplitudes were similar on channel 5300 MHz and 5550 MHz. Therefore, final measurements were made on channel 5550 MHz.

Test Engineer(s): Dusmantha Tennakoon

Test Date(s): 09/08/09

Conducted Emissions - Voltage, AC Power, (120 VAC, 60 Hz)

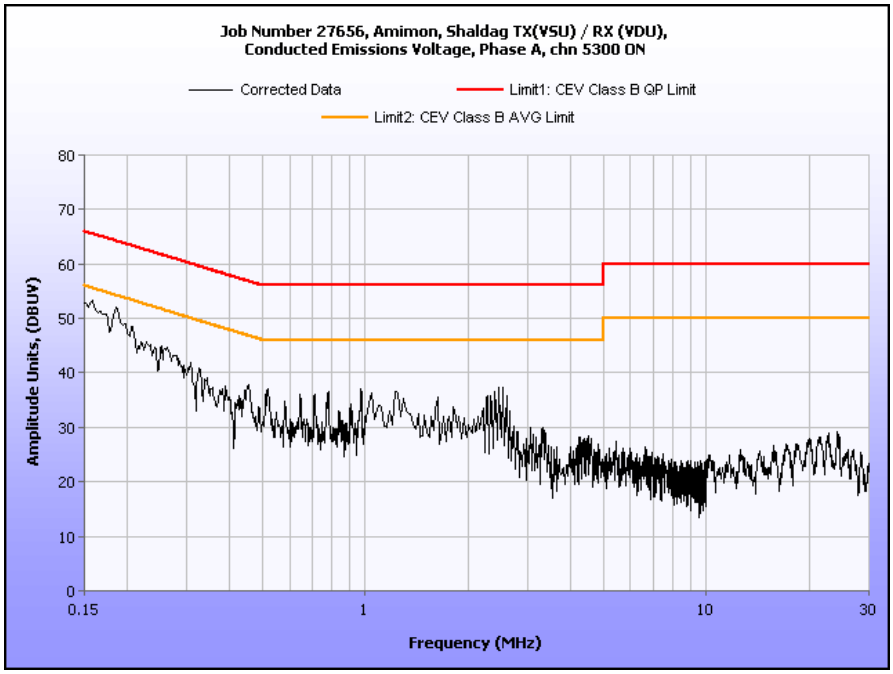
Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) Avg.	Limit (dBuV) Avg.	Margin (dB) Avg.
0.1578	38.73	0.09826	38.82826	65.58	-26.7517	20.56	0.09826	20.65826	55.58	-34.9217
0.2032	30.27	0.17	30.44	63.48	-33.04	16.52	0.17	16.69	53.48	-36.79
0.7772	30.16	0.17	30.33	56	-25.67	28.75	0.17	28.92	46	-17.08
2.515	34.91	0.17	35.08	56	-20.92	31.98	0.17	32.15	46	-13.85
19.6	21.15	0.33	21.48	60	-38.52	18.89	0.33	19.22	50	-30.78
22.25	22.06	0.294	22.354	60	-37.646	18.2	0.294	18.494	50	-31.506

Table 12. Conducted Emissions - Voltage, AC Power, Phase Line (120 VAC, 60 Hz)

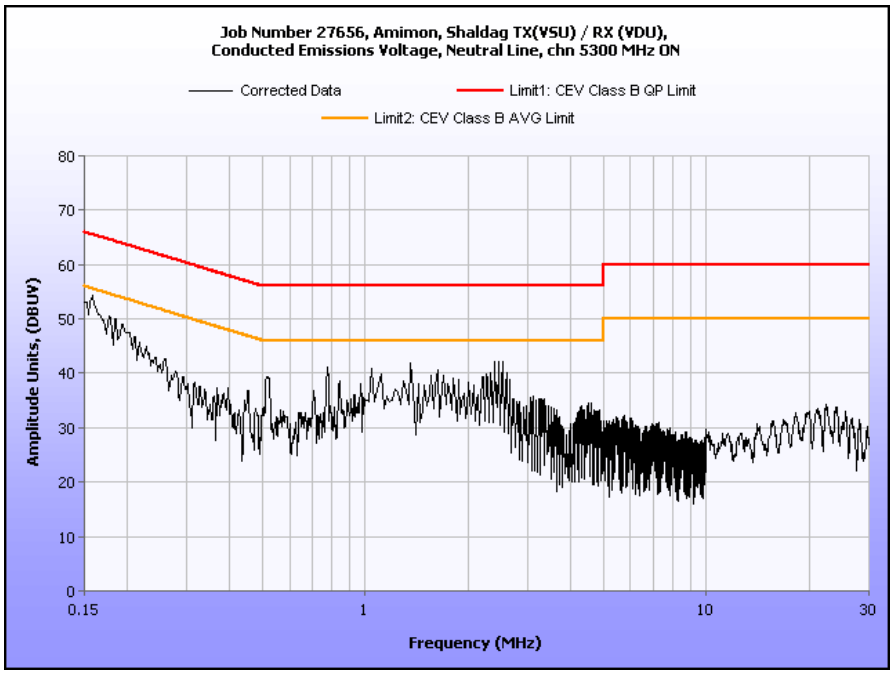
Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) Avg.	Limit (dBuV) Avg.	Margin (dB) Avg.
0.1516	38.22	0.08772	38.30772	65.91	-27.6023	21.47	0.08772	21.55772	55.91	-34.3523
0.2322	22.21	0.17	22.38	62.37	-39.99	6.7	0.17	6.87	52.37	-45.5
0.7712	27.73	0.17	27.9	56	-28.1	10.52	0.17	10.69	46	-35.31
1.405	16.59	0.17	16.76	56	-39.24	7.4	0.17	7.57	46	-38.43
19.48	22.25	0.33	22.58	60	-37.42	19.93	0.33	20.26	50	-29.74
23.52	24.5	0.27368	24.77368	60	-35.2263	21.62	0.27368	21.89368	50	-28.1063

Table 13. Conducted Emissions - Voltage, AC Power, Neutral Line (120 VAC, 60 Hz)

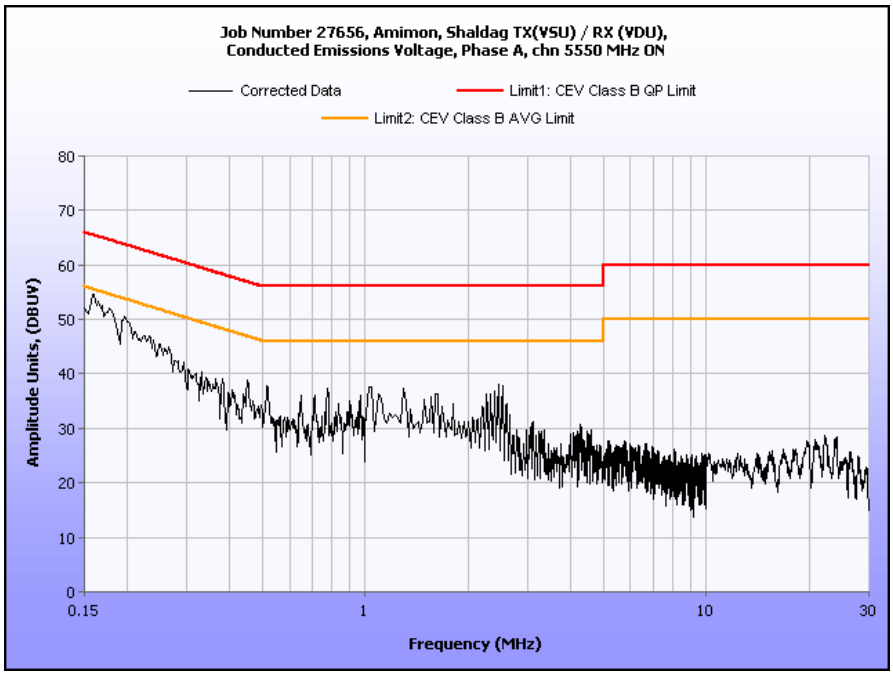
Conducted Emissions - Voltage, Worst Case Emissions, AC Power, (120 VAC, 60 Hz)



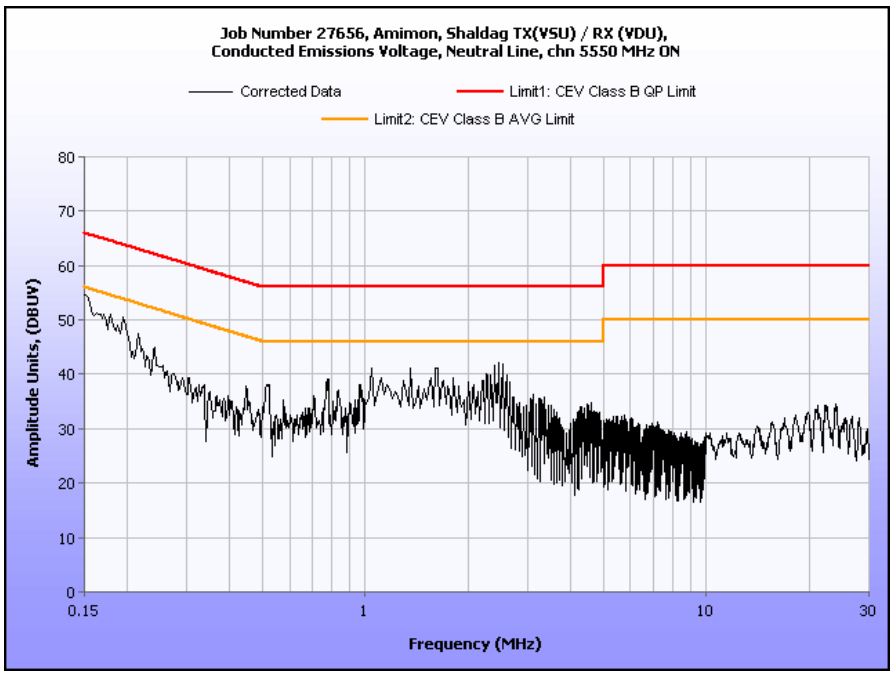
Plot 4. Conducted Emission, Phase Line Plot, 5300 MHz



Plot 5. Conducted Emission, Neutral Line Plot, 5300 MHz

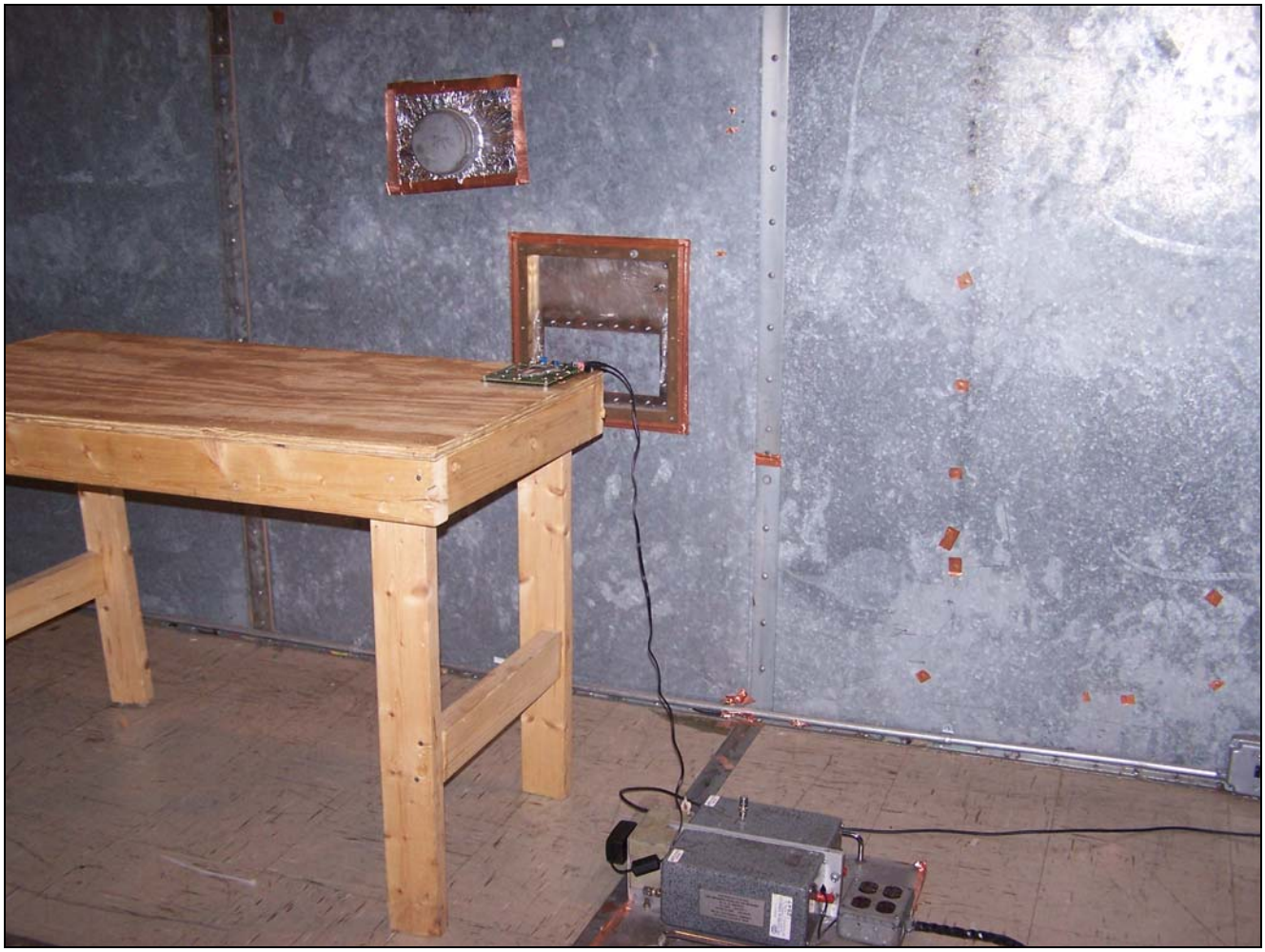


Plot 6. Conducted Emission, Phase Line Plot, 5550 MHz



Plot 7. Conducted Emission, Neutral Line Plot, 5550 MHz

Conducted Emission Limits Test Setup



Photograph 4. Conducted Emissions, Test Setup

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15. 403(c) 26dB Bandwidth

Test Requirements: **§ 15.403 (i):** For purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth is based on the use of measurement instrumentation employing a peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

Test Procedure: The transmitter was set to both operating frequencies at the highest output power and connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using a RBW approximately equal to 1% of the total emission bandwidth, VBW > RBW. The 26 dB Bandwidth was measured and recorded.

Test Results The 26 dB Bandwidth was determined from the plots on the following pages.

Frequency (MHz)	Antenna Port #	26 dB Bandwidth (MHz)
5300	4	40.406
5550	4	40.506

Table 14. Occupied Bandwidth, Test Results

Test Engineer(s): Dusmantha Tennakoon

Test Date(s): 09/08/09

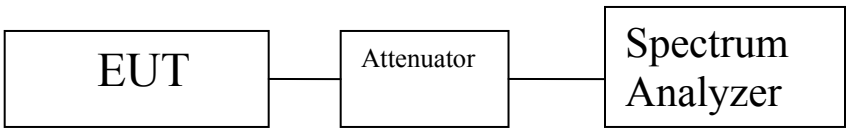
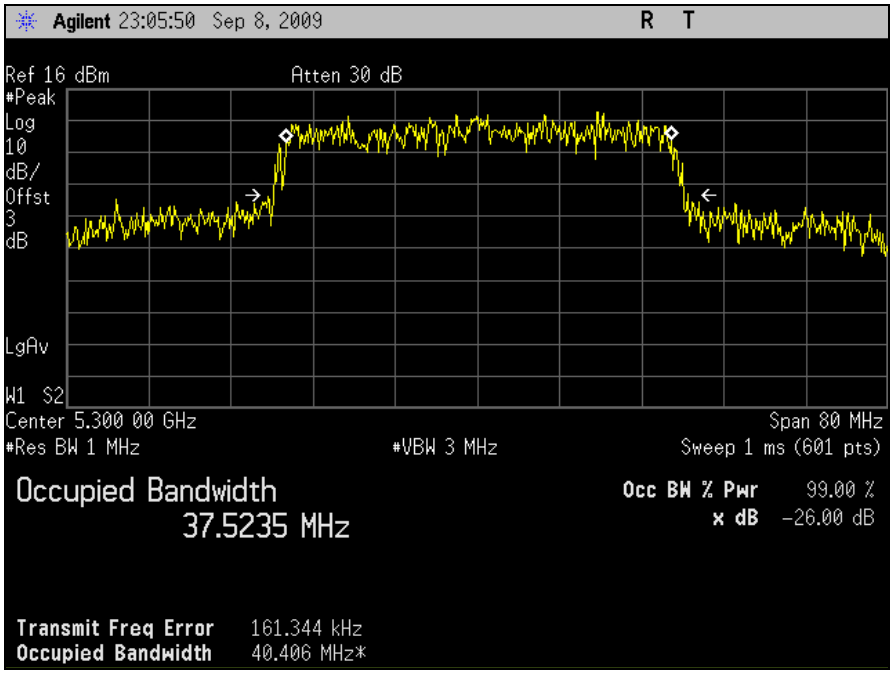
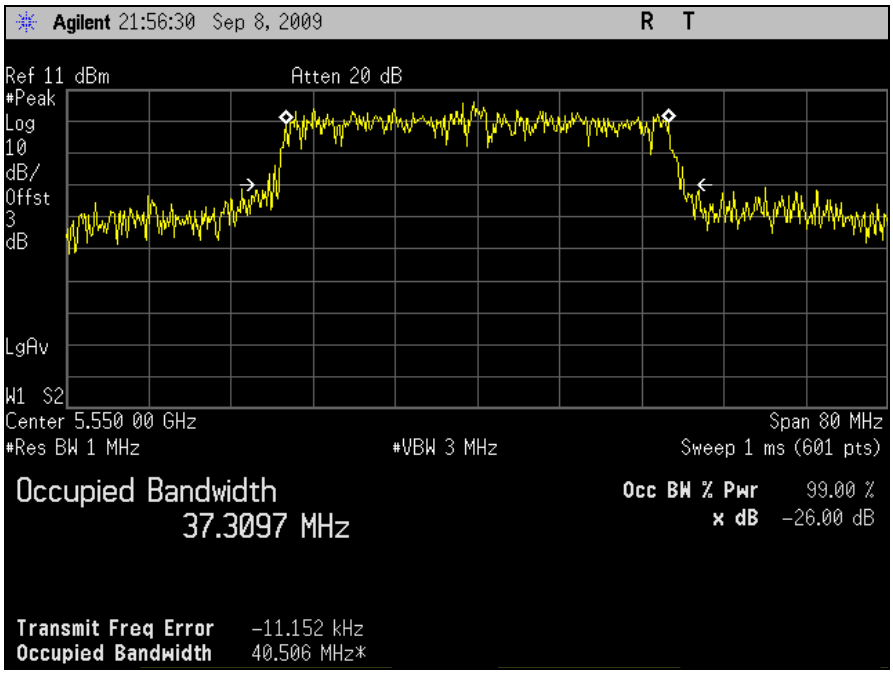


Figure 1. Occupied Bandwidth Test Setup

Electromagnetic Compatibility Criteria for Intentional Radiators



Plot 8. Occupied Bandwidth, 5300 MHz



Plot 9. Occupied Bandwidth, 5550 MHz

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15. 407(a)(2) RF Power Output

Test Requirements: **§15.407(a)(2):** The maximum output power of the intentional radiator shall not exceed the following:

§15.407(a) (2): For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10log B, where B is the 26 dB emission bandwidth in megahertz.

Test Procedure: The EUT was connected to a Spectrum Analyzer. The power was measured on both channels.

Test Results: Equipment complies with the Peak Power Output limits of **§ 15.401(a)(2)**.

Test Engineer(s): Dusmantha Tennakoon

Test Date(s): 09/11/09

Frequency (MHz)	Antenna Port #	Conducted power (dBm)	Conducted power (mW)
5300	4	10.22	10.5
5550	4	13.68	23.3

Table 15. RF Power Output, Test Results

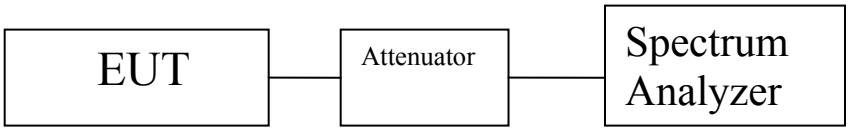
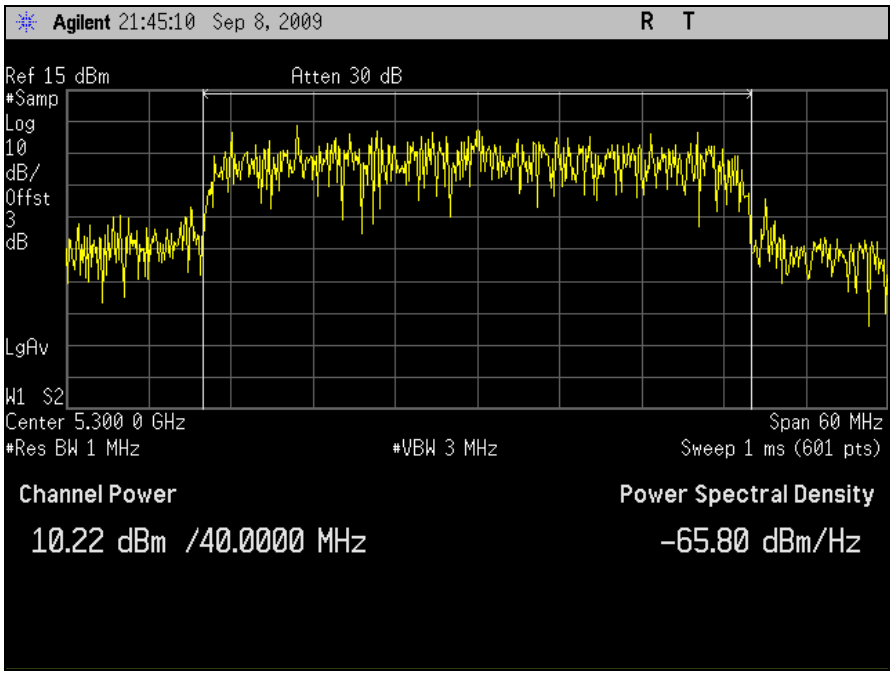
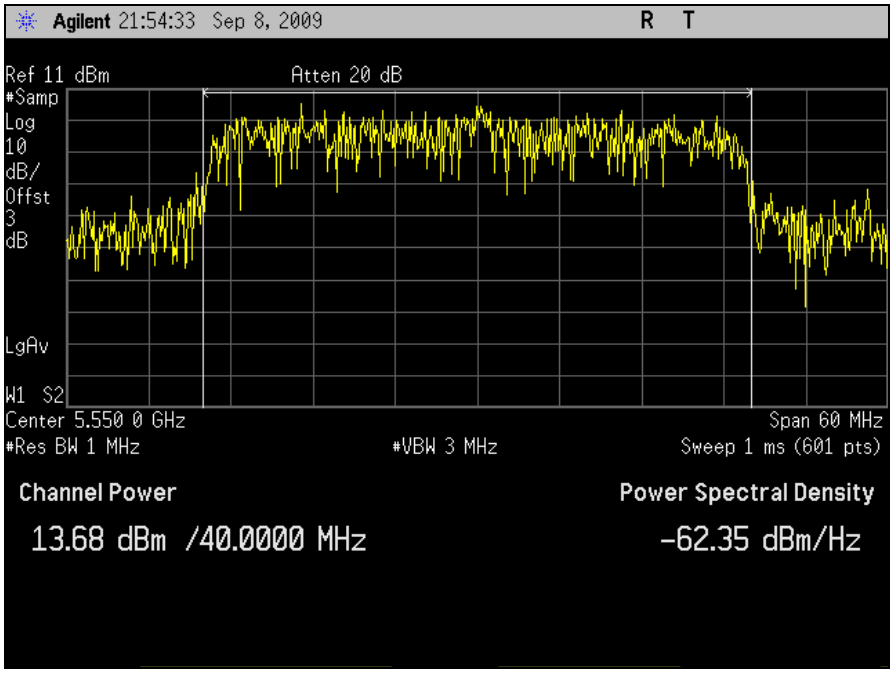


Figure 2. Power Output Test Setup



Plot 10. RF Power Output, 5300 MHz



Plot 11. RF Power Output, 5550 MHz

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.407(a)(2) Peak Power Spectral Density

Test Requirements: **§ 15.407(a)(2):** In addition, the peak power spectral density shall not exceed 11 dBm in any 1 megahertz band.

Test Procedure: The transmitter was connected directly to a Spectrum Analyzer through an attenuator. The power level was set to the maximum level on the EUT. The RBW was set to 1MHz and the VBW was set to 3MHz. The method of measurement #2 from the FCC Public Notice DA 02-2138 was used.

Test Results: Equipment complies with the peak power spectral density limits of **§ 15.407 (a)(2).** The peak power spectral density was determined from plots on the following page(s).

Test Engineer(s): Dusmantha Tennakoon

Test Date(s): 09/08/09

Frequency (MHz)	Antenna Port #	PSD (dBm)
5300	4	-0.211
5550	4	3.341

Table 16. Power Spectral Density, Test Results

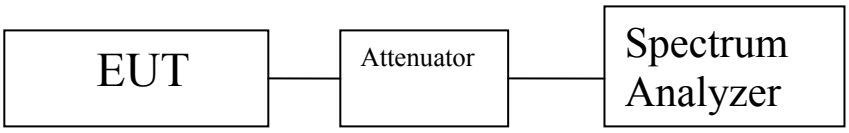
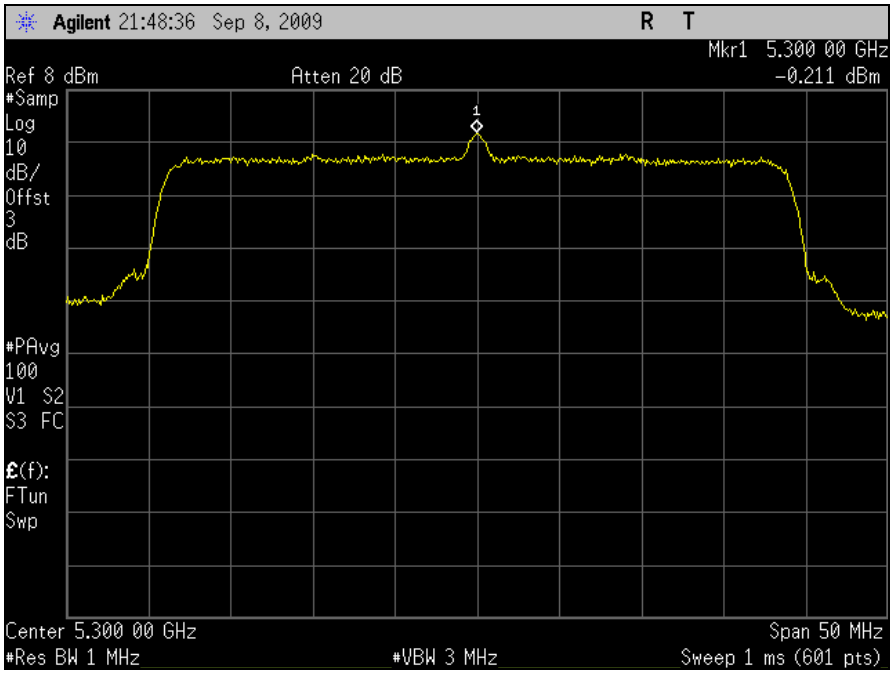
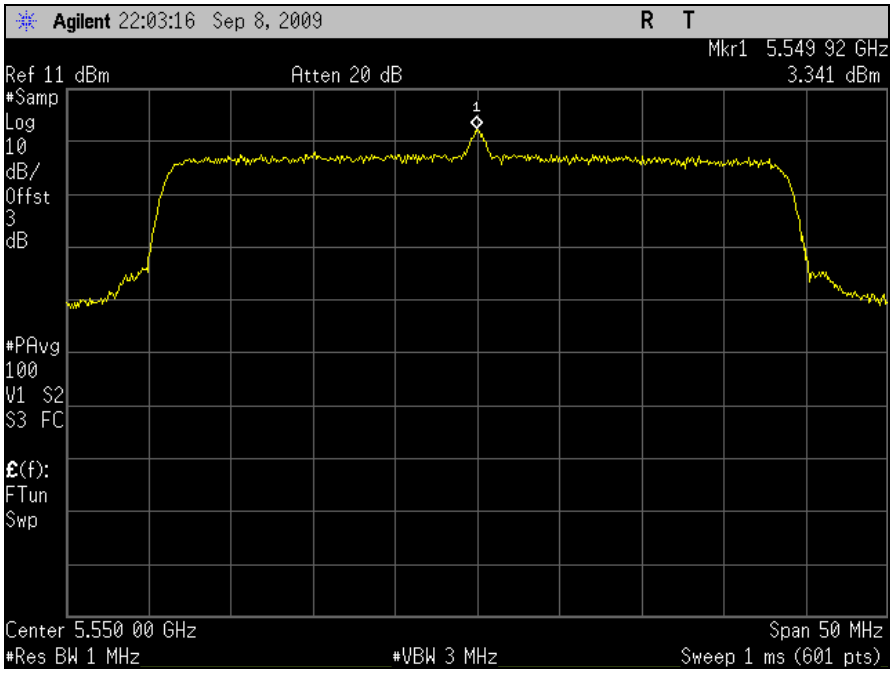


Figure 3. Power Spectral Density Test Setup

Electromagnetic Compatibility Criteria for Intentional Radiators



Plot 12. Power Spectral Density, 5300 MHz



Plot 13. Power Spectral Density, 5550 MHz

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.407(a)(6) Peak Excursion Ratio

Test Requirements: **§ 15.407(a)(6):** The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

Test Procedure: The EUT was connected directly to the spectrum analyzer through cabling and attenuation. The 1st trace on the spectrum analyzer was set to RBW=1MHz, VBW=3MHz. The peak detector mode was used and the trace max held. The 2nd trace on the spectrum analyzer was set according to measurement method #1 from the FCC Public Notice DA 02-2138 for making conducted power measurements.

Test Results: Equipment complies with the peak excursion ratio limits of **§ 15.407(a)(6).** The peak excursion ratio was determined from plots on the following page(s).

Test Engineer(s): Dusmantha Tennakoon

Test Date(s): 09/08/09

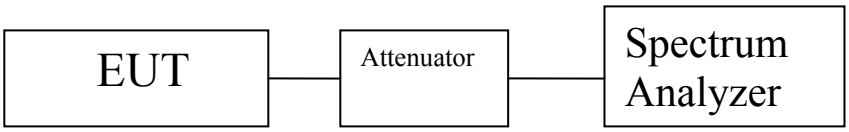
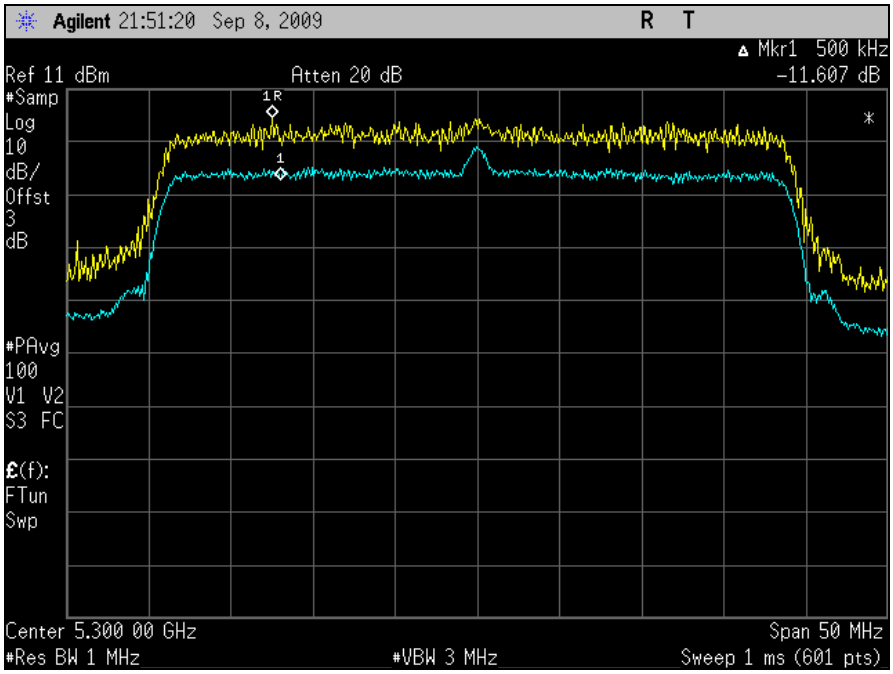
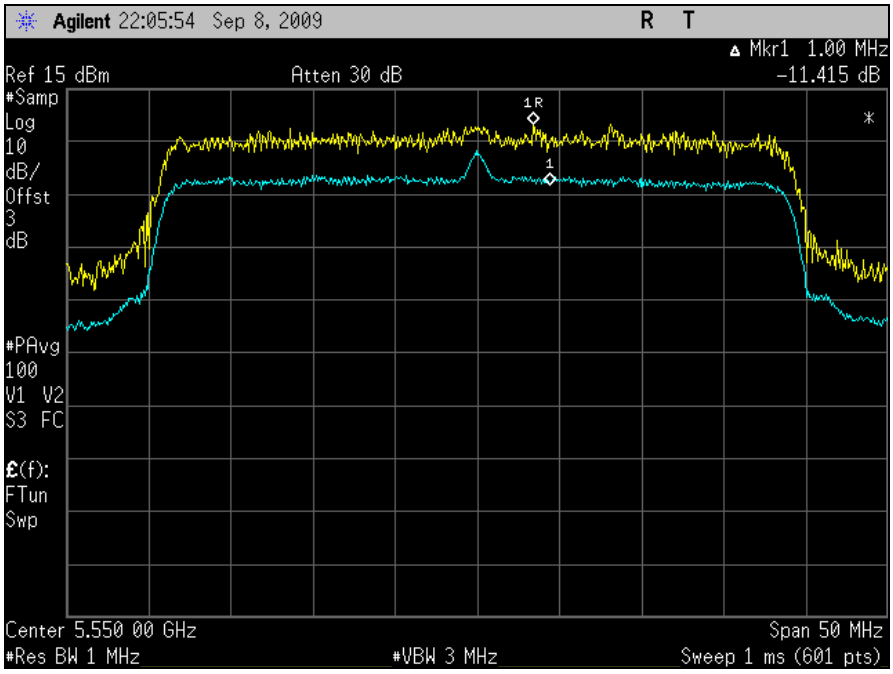


Figure 4. Peak Excursion Ration Test Setup



Plot 14. Peak Excursion Ratio, 5300 MHz



Plot 15. Peak Excursion Ratio, 5550 MHz

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.407(b)(2), (3), (6), (7) Undesirable Emissions

Test Requirements: **§ 15.407(b)(2), (3), (6), (7)**; **§15.205:** Emissions outside the frequency band.

§ 15.407(b)(2): For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.

§ 15.407(b)(3): For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz**.**

§ 15.407(b)(6): Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in Section 15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in Section 15.207.

§ 15.407(b)(7): The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.

Test Procedure: The transmitter was placed on an acrylic stand inside in a semi-anechoic chamber. Measurements were performed with the EUT rotated 360 degrees and varying the adjustable antenna mast height to determine worst case orientation for maximum emissions.

For frequencies from 30 MHz to 1 GHz, measurements were made using a quasi-peak detector with a 120 kHz bandwidth.

For measurements above 1 GHz, measurements were made with a Peak detector with 1 MHz resolution bandwidth. Where the spurious emissions fell into a restricted band, measurements were also made with an average detector to make sure they complied with 15.209 limits. Emissions were explored up to 40 GHz.
The equation, **EIRP= E + 20 log D – 104.8** was used to convert an EIRP limit to a field strength limit.
E = field strength (dBUv/m)
D = Reference measurement distance

Test Results: The EUT was found compliant with the Radiated Emission limits for Intentional Radiators. See following pages for detailed test results.

Test Engineer(s): Dusmantha Tennakoon

Test Date(s): 09/11/09

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.407(b)(1): Harmonic Emissions Requirements – Radiated

Frequency (GHz)	Measured value (corrected) @ 3m dBuV/m	Limit @ 3m	Margin	Remark	Restricted band
5.25	68.07	68.3	-0.23	Peak	No
5.35	49.54	54	-4.46	Avg.	Yes
5.35	62.68	74	-11.32	Peak	
5.4665	60.78	68.3	-7.52	Peak	No
10	66.49	68.3	-1.81	Peak	No
10.6	45.36	54	-8.64	Avg.	Yes
10.6	64.53	74	-9.47	Peak	
15.9	24.99	54	-29.01	Avg.	Yes
15.9	56.91	74	-17.09	Peak	

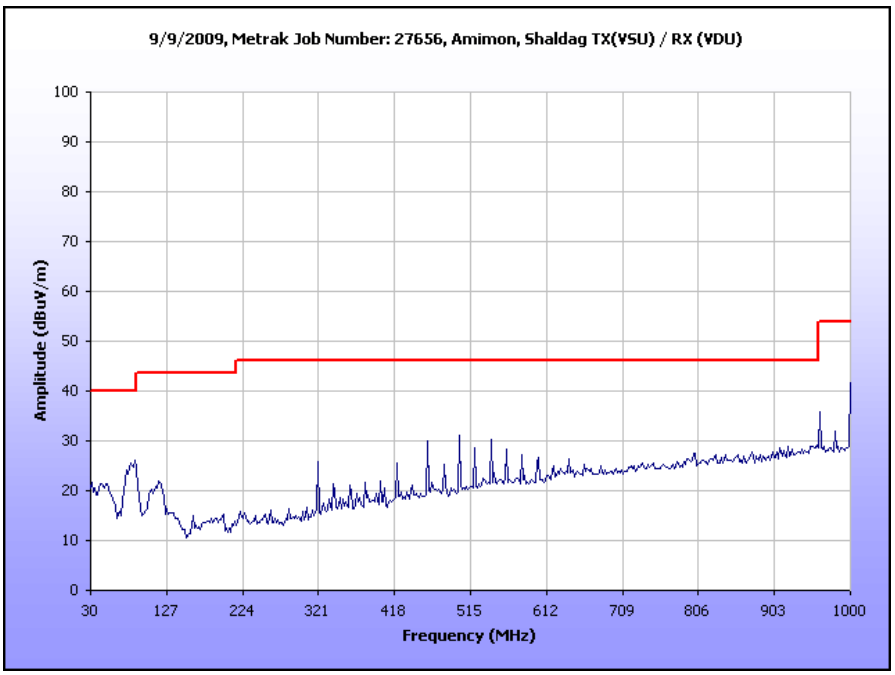
Table 17. Radiated Spurs, Test Results, 5300 MHz

Note: All other emissions were measured at the noise floor of the spectrum analyzer.

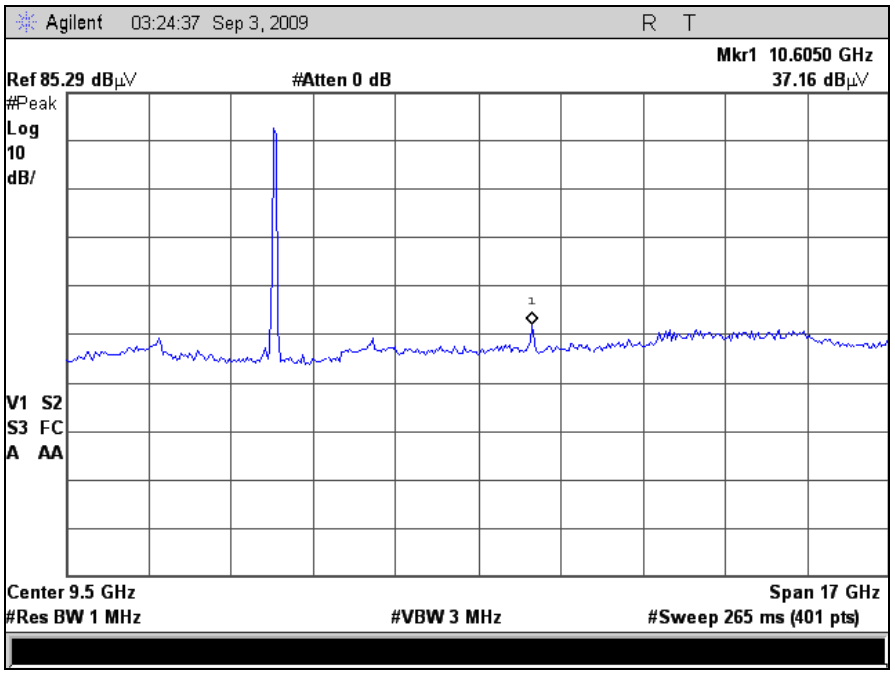
Frequency (GHz)	Measured value (corrected) @ 3m dBuV/m	Limit @ 3m	Margin	Remark	Restricted band
2.9684	57.17	68.3	-11.13	Peak	No
5.46	47.64	54	-6.36	Avg.	Yes
5.46	57.85	74	-16.15	Peak	
5.4654	59.27	68.3	-9.03	Peak	No
9.8076	62.31	68.3	-5.99	Peak	No
11.1	52.99	54	-1.01	Avg.	Yes
11.1	68.73	74	-5.27	Peak	
16.65	66.53	74	-7.47	Peak	No

Table 18. Radiated Spurs, Test Results, 5550 MHz

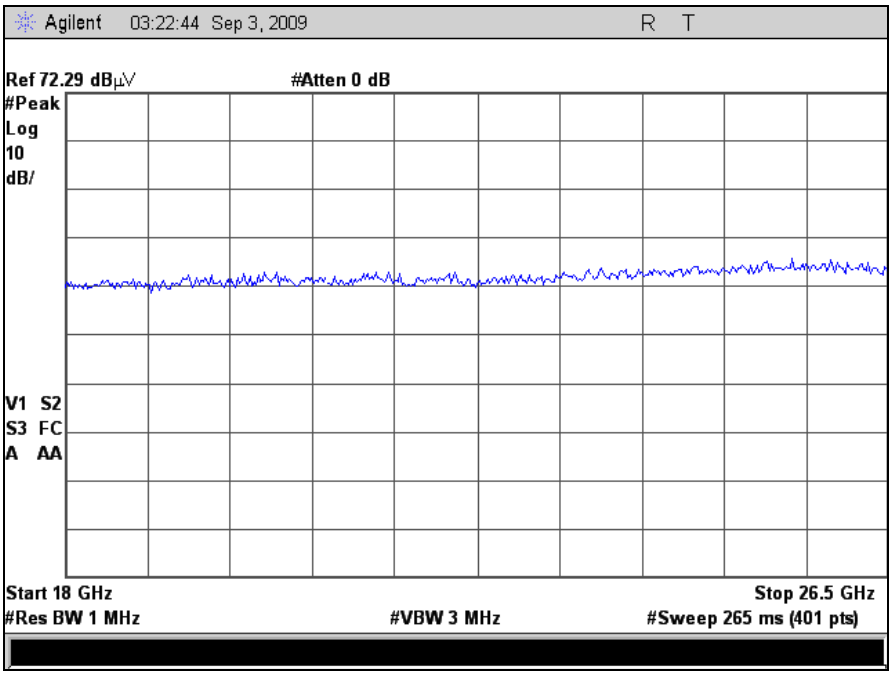
Note: All other emissions were measured at the noise floor of the spectrum analyzer.



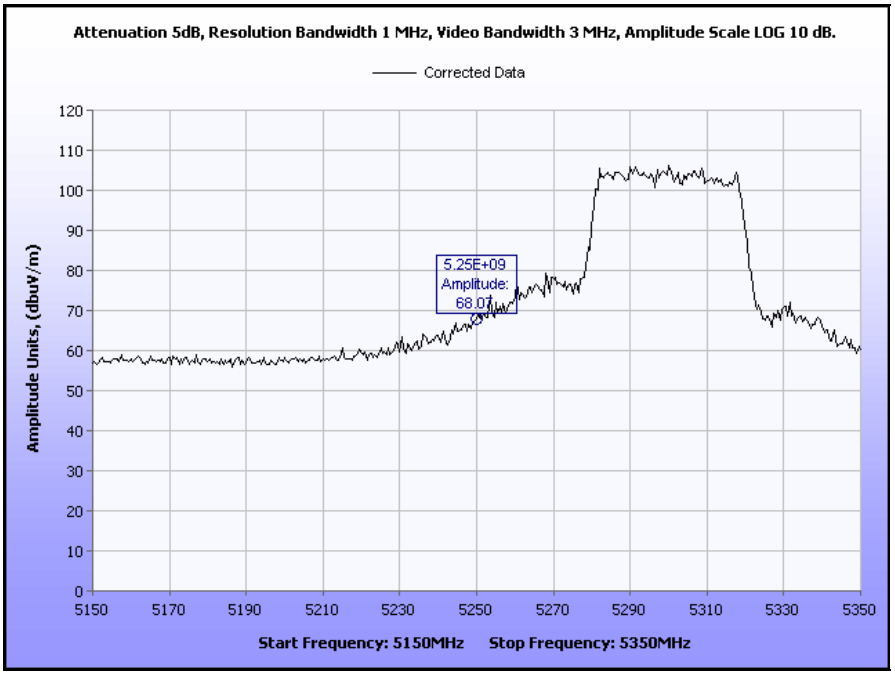
Plot 16. Pre-Scan of Radiated Spurs below 1 GHz, ch. 5300 MHz



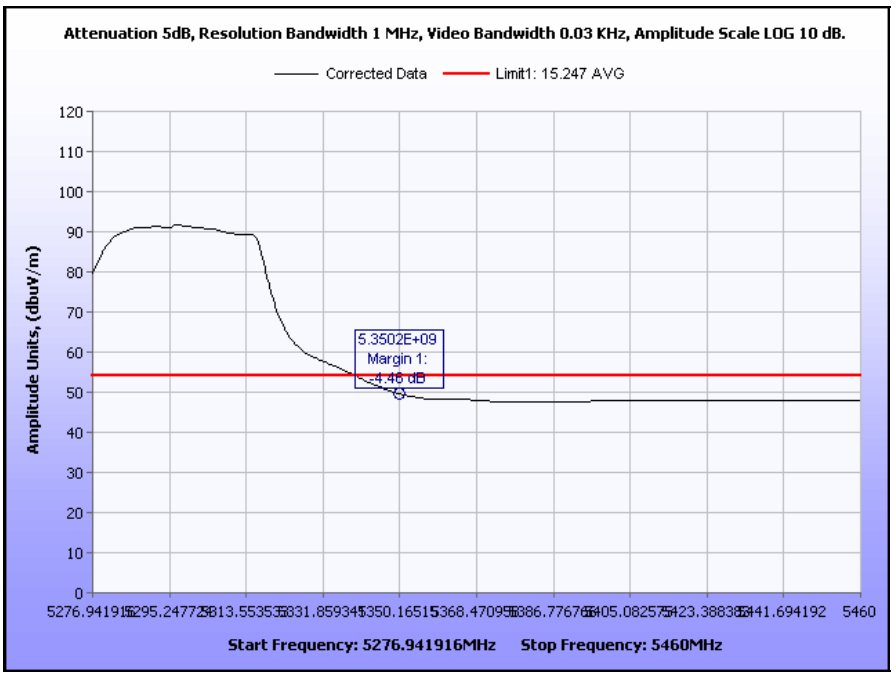
Plot 17. Pre-Scan of Radiated Spurs between 1 and 18 GHz, ch. 5300 MHz



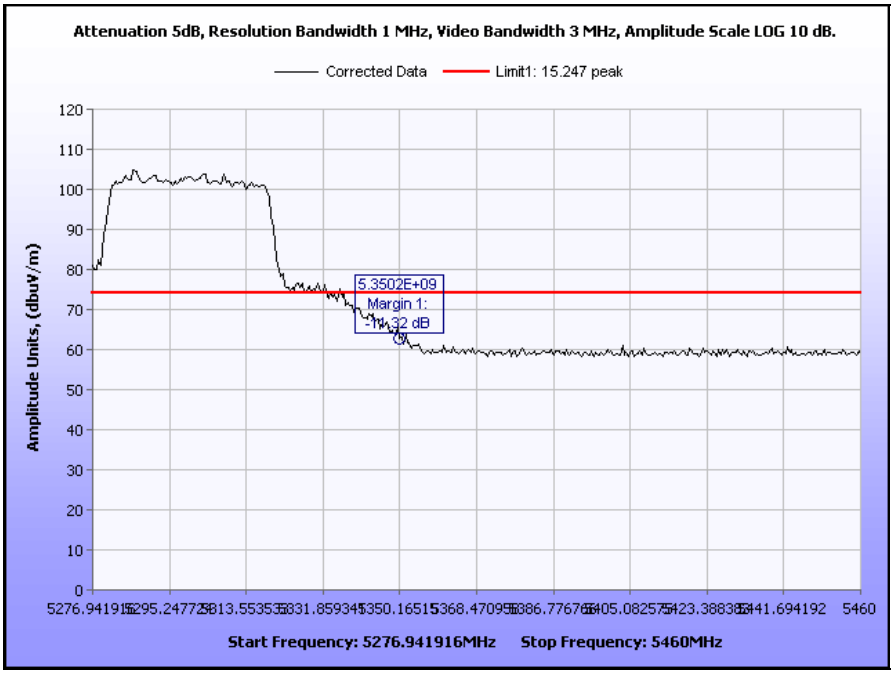
Plot 18. Pre-Scan of Radiated Spurs between 18 and 26.5 GHz, ch. 5300 MHz



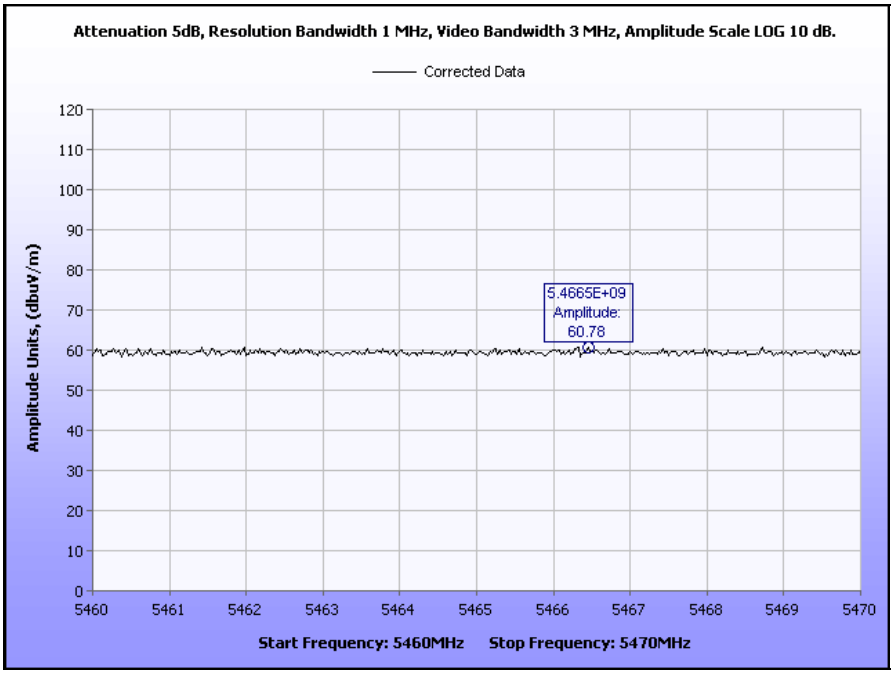
Plot 19. Radiated Spurs, 5150 MHz – 5350 MHz, ch. 5300 MHz



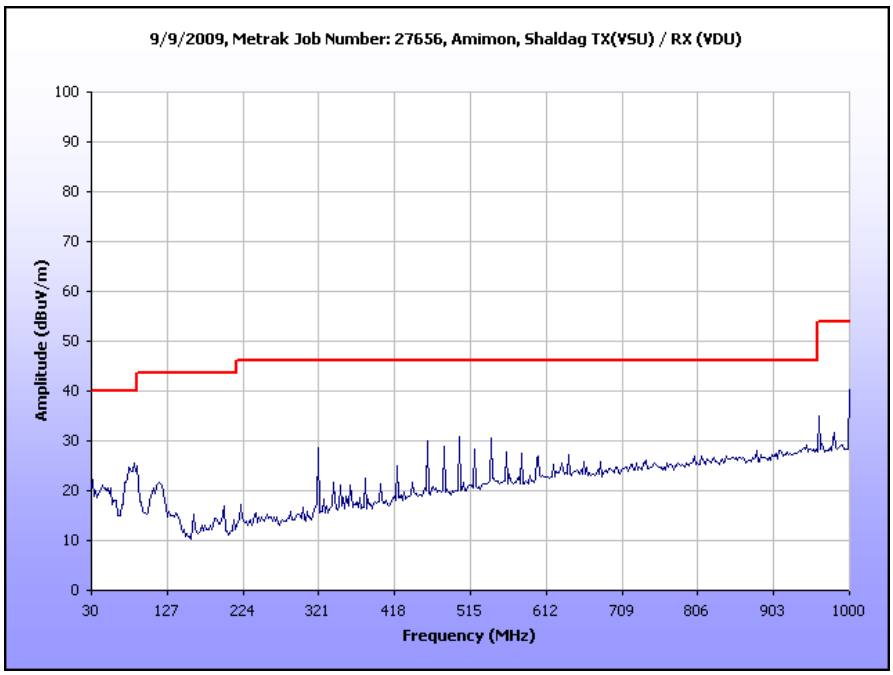
Plot 20. Radiated Spurs, 5350 MHz – 5460 MHz, Avg., ch. 5300 MHz



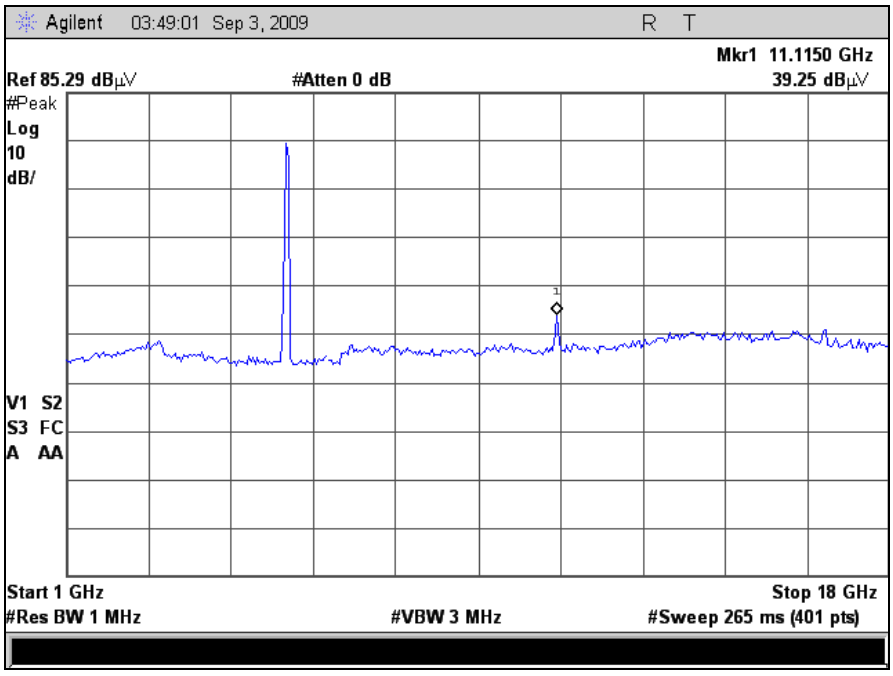
Plot 21. Radiated Spurs, 5350 MHz – 5460 MHz, Peak, ch. 5300 MHz



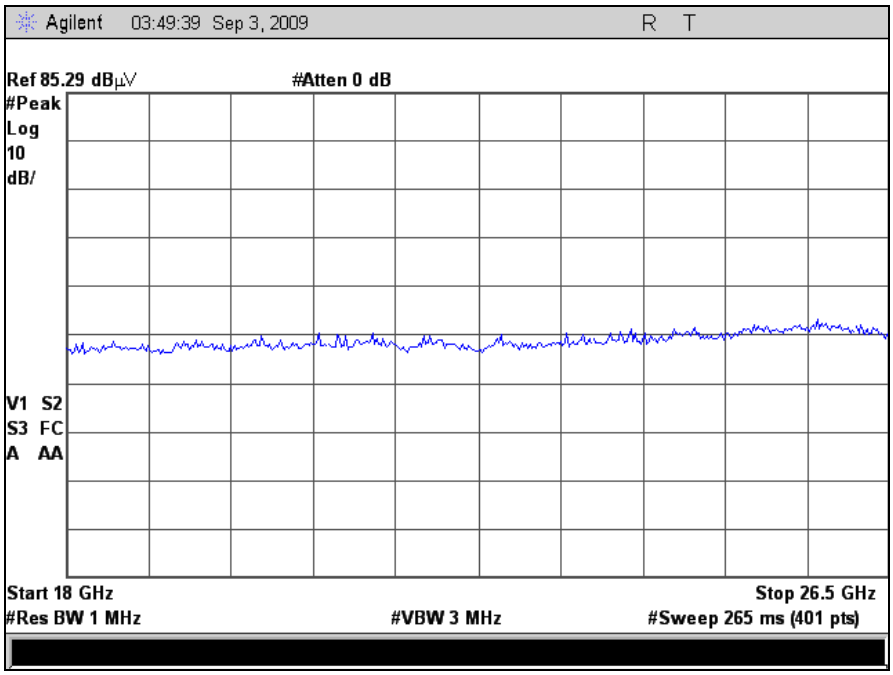
Plot 22. Radiated Spurs, 5460 MHz – 5470 MHz, ch. 5300 MHz



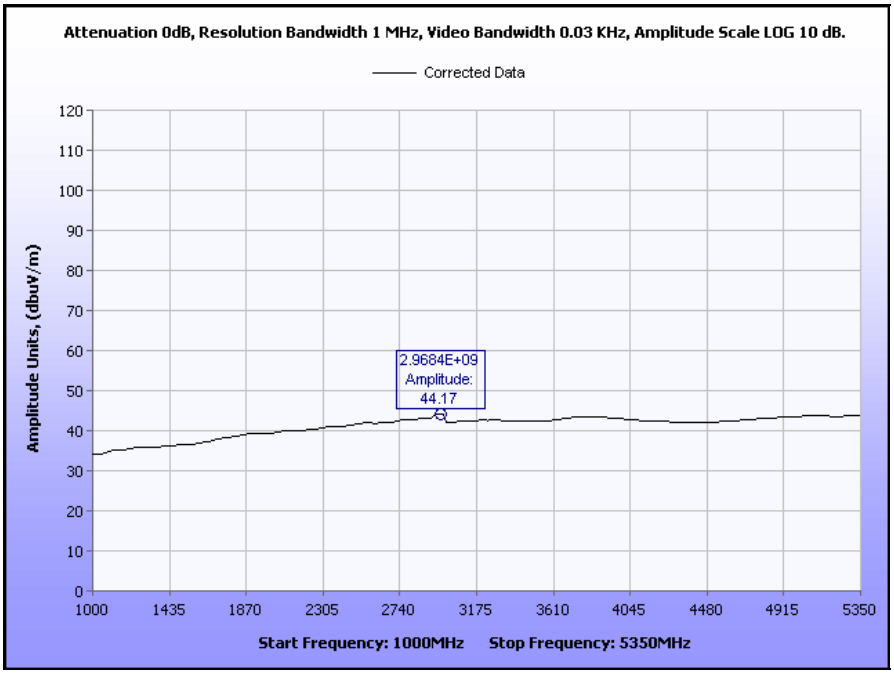
Plot 23. Pre-Scan of Radiated Spurs below 1 GHz, ch. 5550 MHz



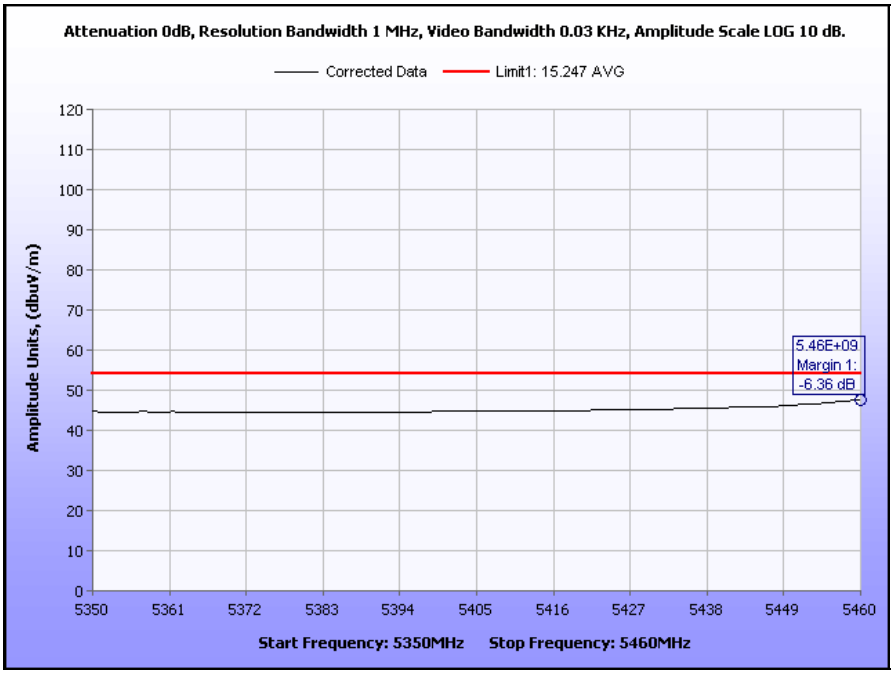
Plot 24. Pre-Scan of Radiated Spurs between 1 and 18 GHz, ch. 5550 MHz



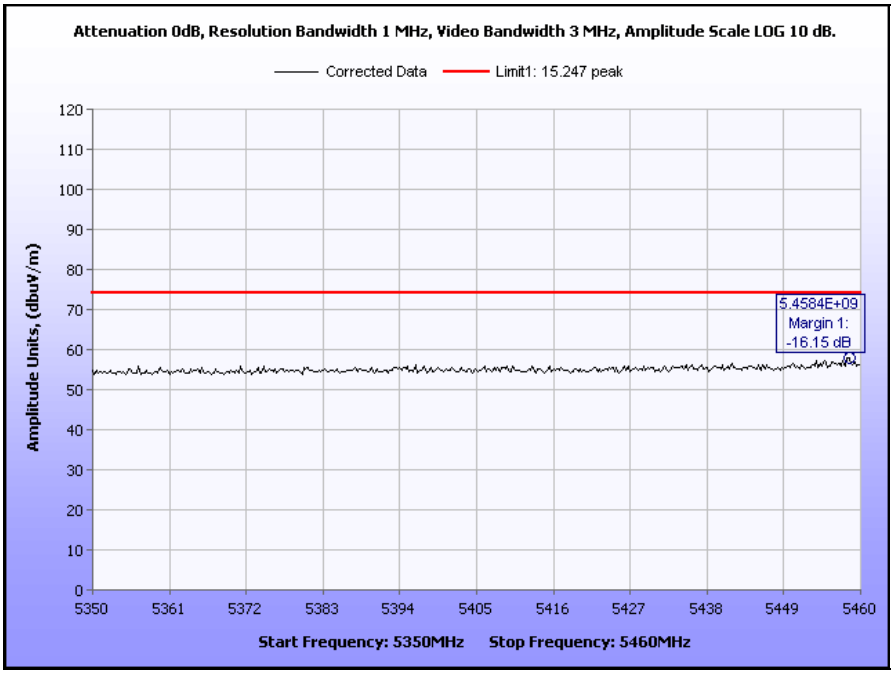
Plot 25. Pre-Scan of Radiated Spurs between 18 and 26.5 GHz, ch. 5550 MHz



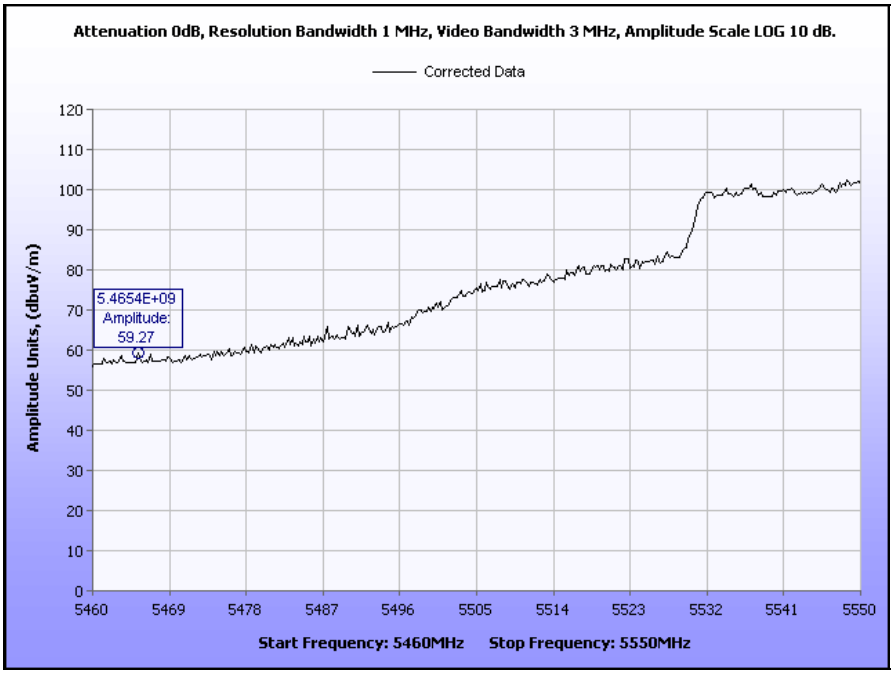
Plot 26. Radiated Spurs, 1000 MHz – 5350 MHz, ch. 5550 MHz



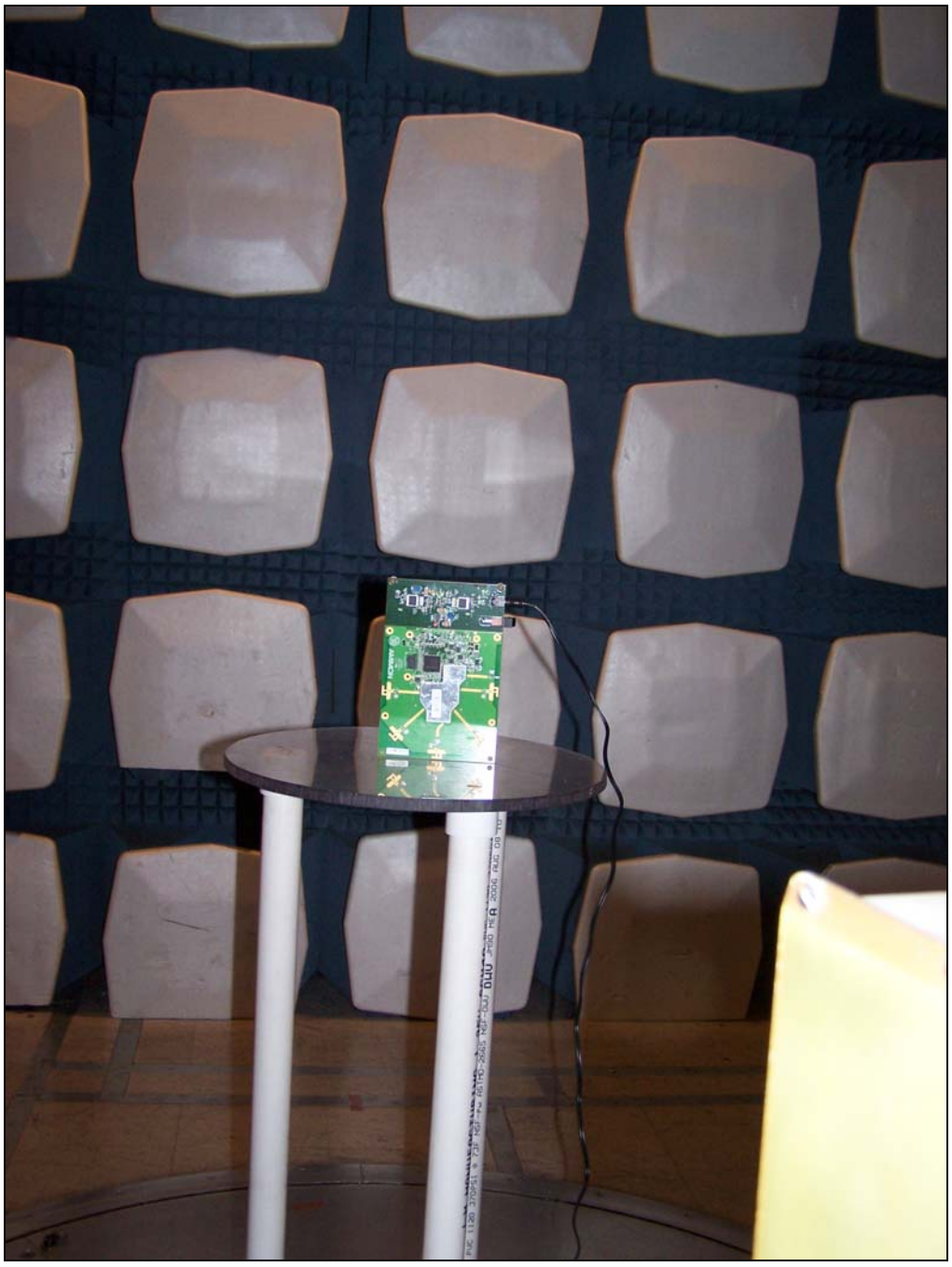
Plot 27. Radiated Spurs, 5350 MHz – 5460 MHz, Avg., ch. 5550 MHz



Plot 28. Radiated Spurs, 5350 MHz – 5460 MHz, Peak, ch. 5550 MHz



Plot 29. Radiated Spurs, 5460 MHz – 5470 MHz, ch. 5550 MHz



Photograph 5. Radiated Spurs, Test Setup

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.407(f) RF Exposure

RF Exposure Requirements: **§1.1307(b)(1) and §1.1307(b)(2):** Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

RF Radiation Exposure Limit: **§1.1310:** As specified in this section, the Maximum Permissible Exposure (MPE) Limit shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in Sec. 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of Sec. 2.1093 of this chapter.

MPE Limit Calculation: EUT's operating frequency is 5300 MHz and 5550 MHz;. Highest conducted power = 23.33 mW (i.e. 13.68 dBm). Therefore, **Limit for Uncontrolled exposure: 1 mW/cm^2.**

Equation from page 18 of OET 65, Edition 97-01

$$S = P G / 4\pi R^2$$

where,

S = Power Density mW/m^2
P = Power (mW)
R = Distance to the center of radiation of the antenna
G = Maximum antenna gain

Maximum antenna gain for EUT = 1.9 dBi = 1.55

P = 23.33 mW
R = 20 cm
G = 1.55

$$S = 23.33*1.55 / 4(3.1416)(20)^2$$

$$S = 0.0072 \text{ mW/cm}^2$$

Therefore, EUT meets the Uncontrolled Exposure limit at 20cm.

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.407(g) Frequency Stability

Test Requirements: **§ 15.407(g):** Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

Test Procedure: The EUT was connected directly to a spectrum analyzer through a attenuator. The resolution band width of the spectrum analyzer was set to 10 KHz. The 1st trace of the Spectrum Analyzer was used as a reference at 23°C. A 2nd trace was used to show the drift of the carrier at extreme conditions. A delta marker was used to find the drift at a given extreme condition. The two frequencies (i.e. 5300 MHz and 5550 MHz) are derived from one oscillator. Therefore, only one channel was investigated for frequency stability.

Test Results: The EUT was found compliant with the requirements of **§15.407(g)**.

Test Engineer(s): Dusmantha Tennakoon

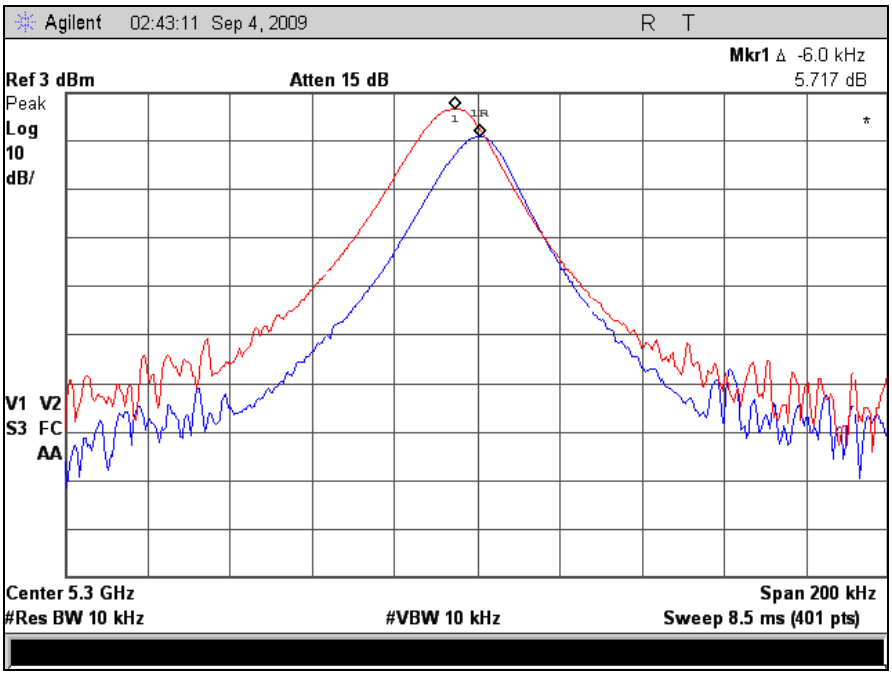
Test Date(s): 09/10/09

Temperature (centigrade)	Drift (kHz)	Drift (ppm)
50	-2.5	0.5
40	-3.5	0.7
30	1.5	0.3
23	ref	ref
20	8.5	1.6
10	15.0	2.8
0	20.5	3.9
-10	21.0	4.0
-20	12.5	2.4
-30	-6.0	1.1

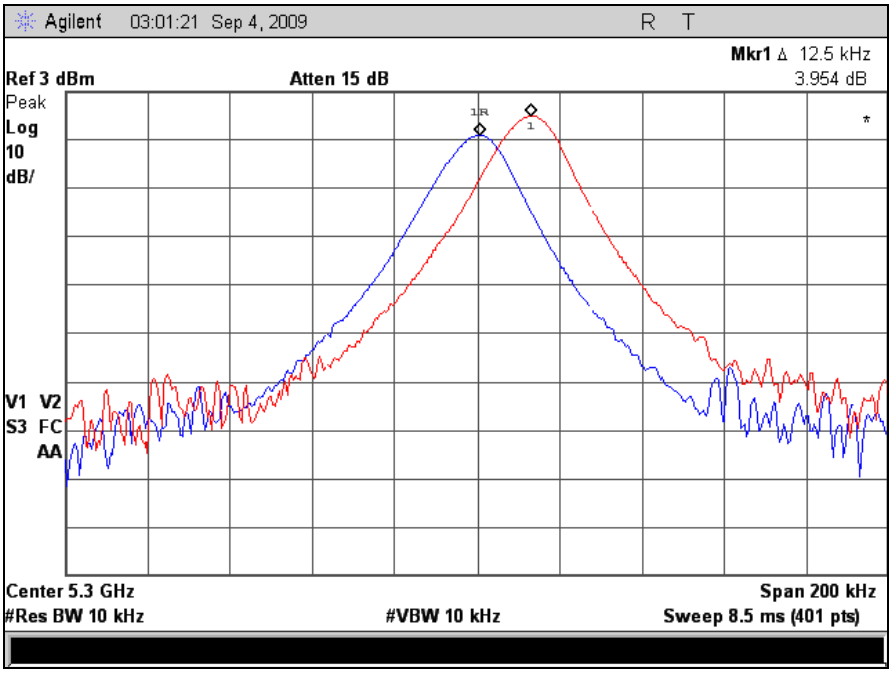
Table 19. Frequency Stability, Reference 5300 MHz at 23°C, Test Results

Measured voltage (+/- 15% of nominal)	Drift (kHz)	Drift (ppm)
102	0.075	0.01
138	0.075	0.01

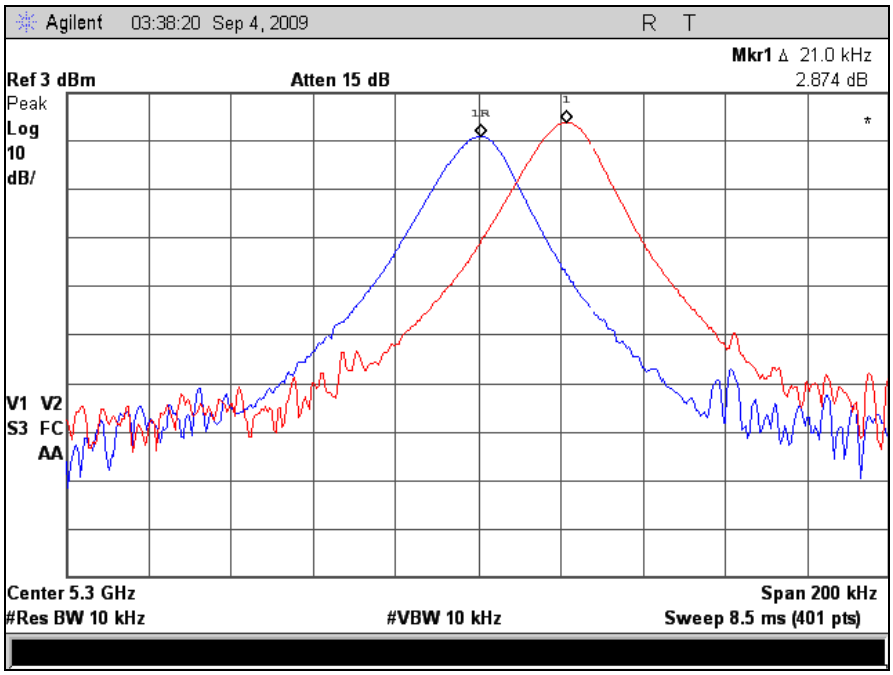
Table 20. Frequency Stability, Reference 5300 MHz at 120 VAC and 23°C, Test Results



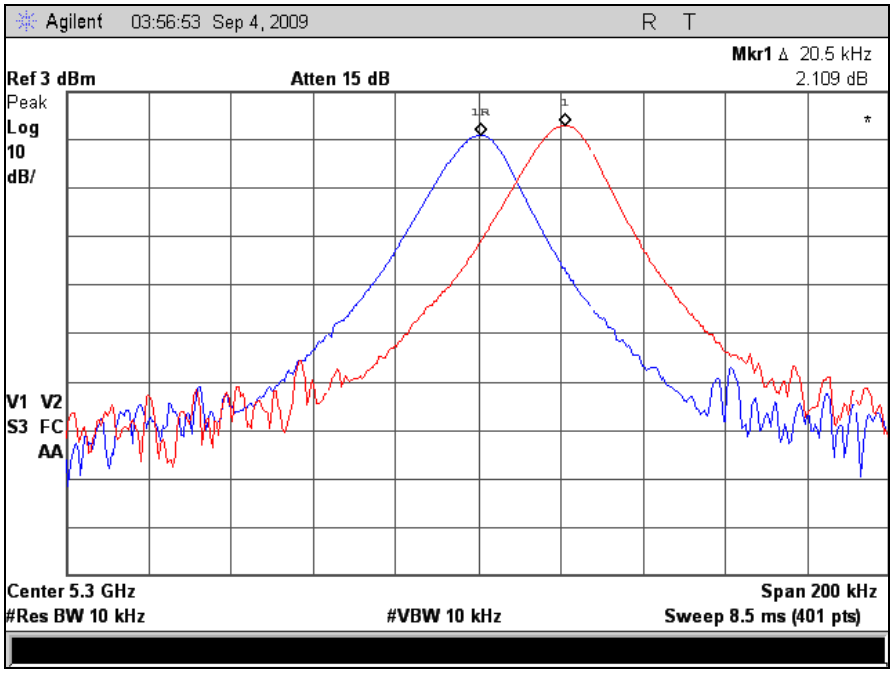
Plot 30. Frequency Stability, -30°C



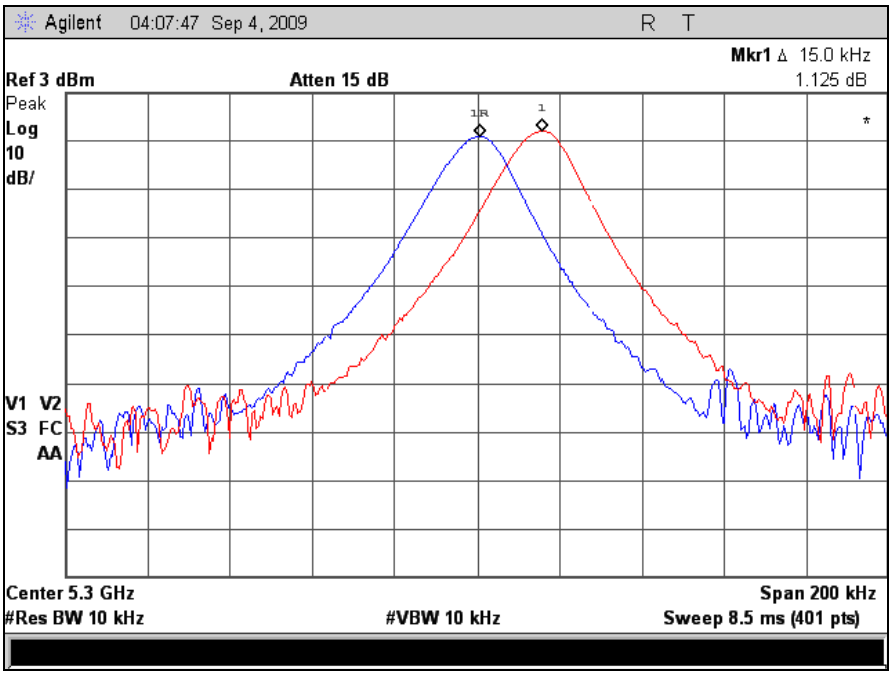
Plot 31. Frequency Stability, -20°C



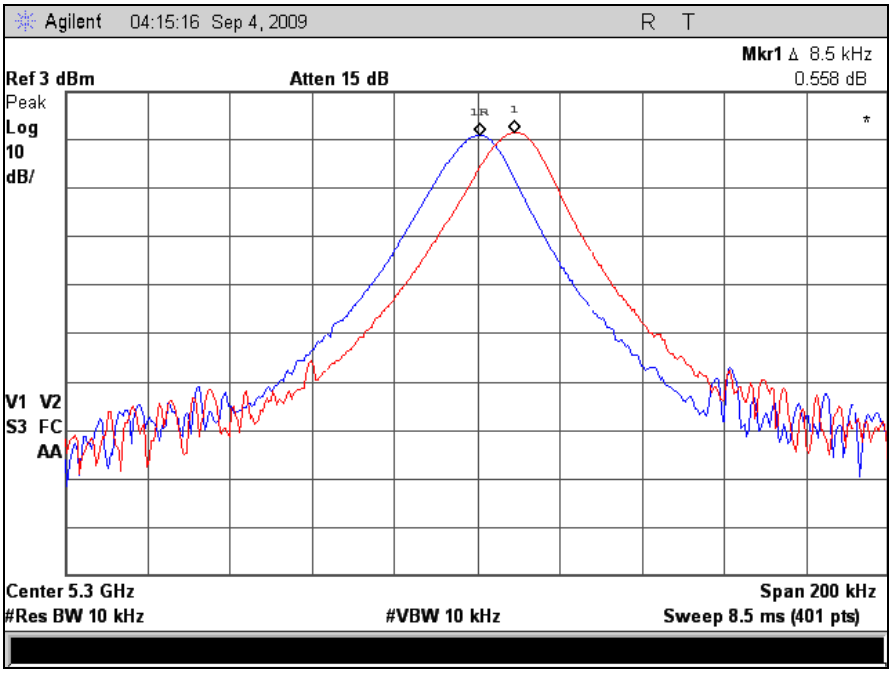
Plot 32. Frequency Stability, -10°C



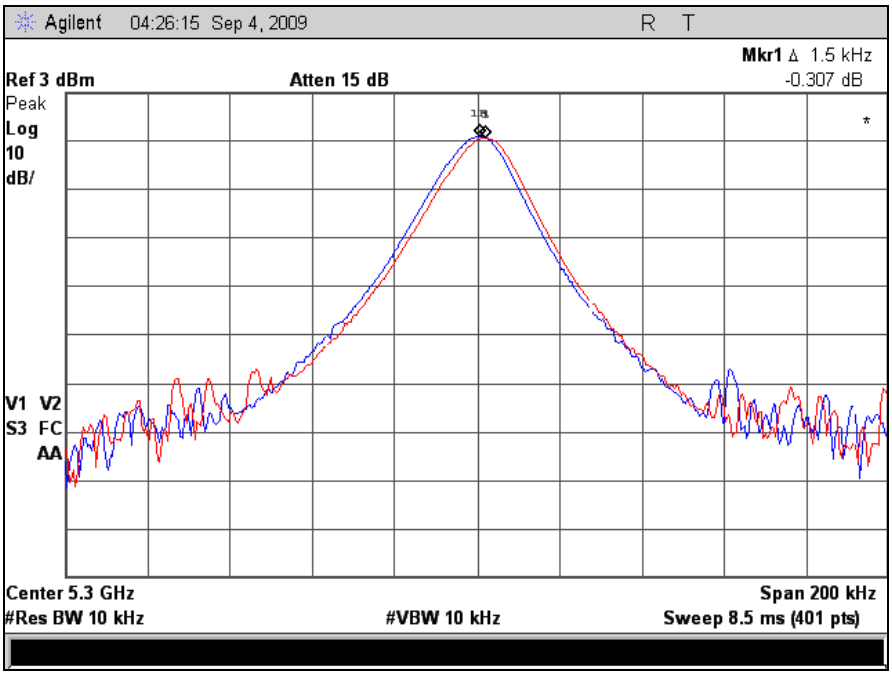
Plot 33. Frequency Stability, 0°C



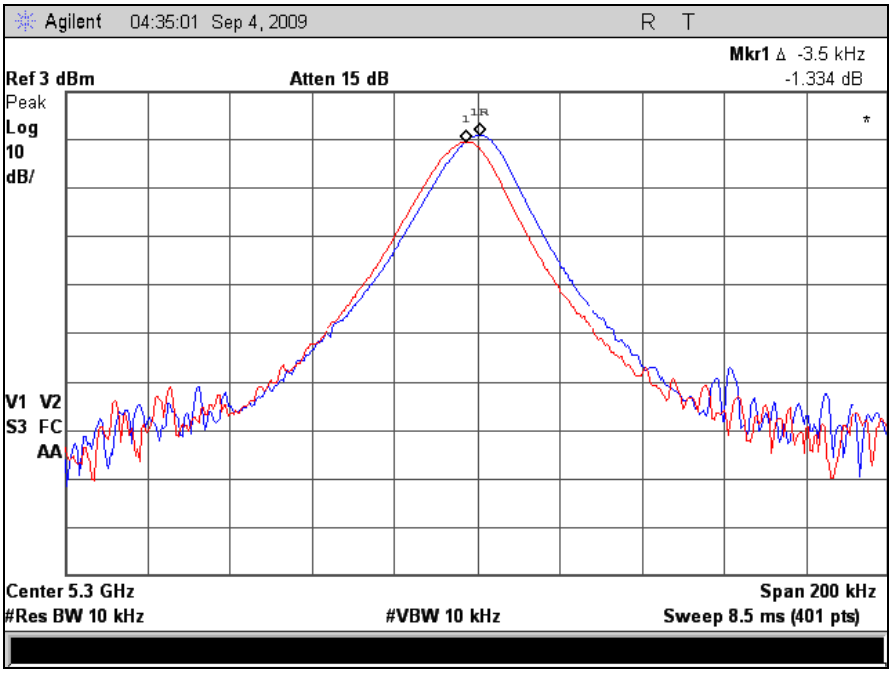
Plot 34. Frequency Stability, 10°C



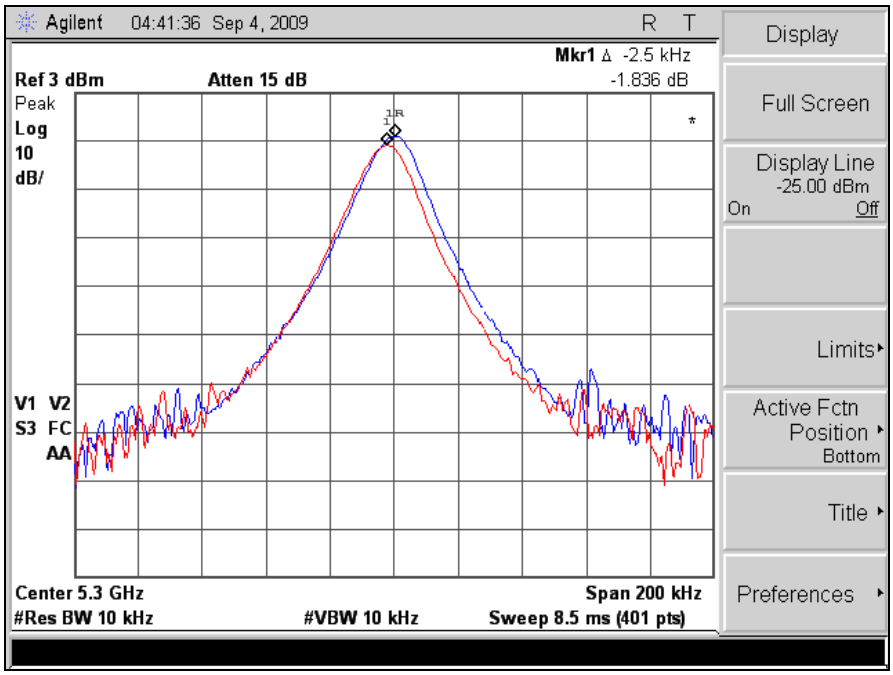
Plot 35. Frequency Stability, 20°C



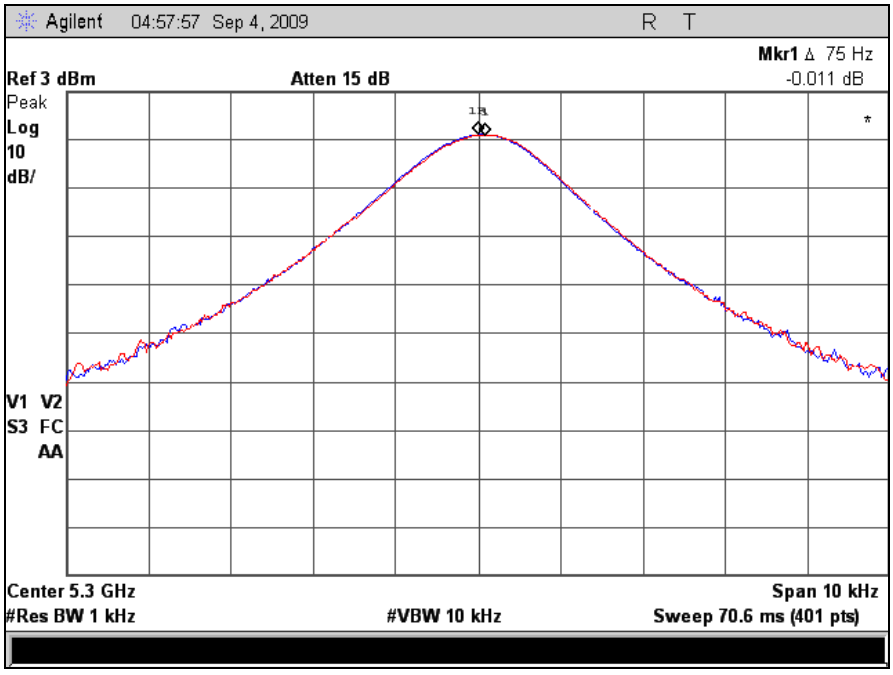
Plot 36. Frequency Stability, 30°C



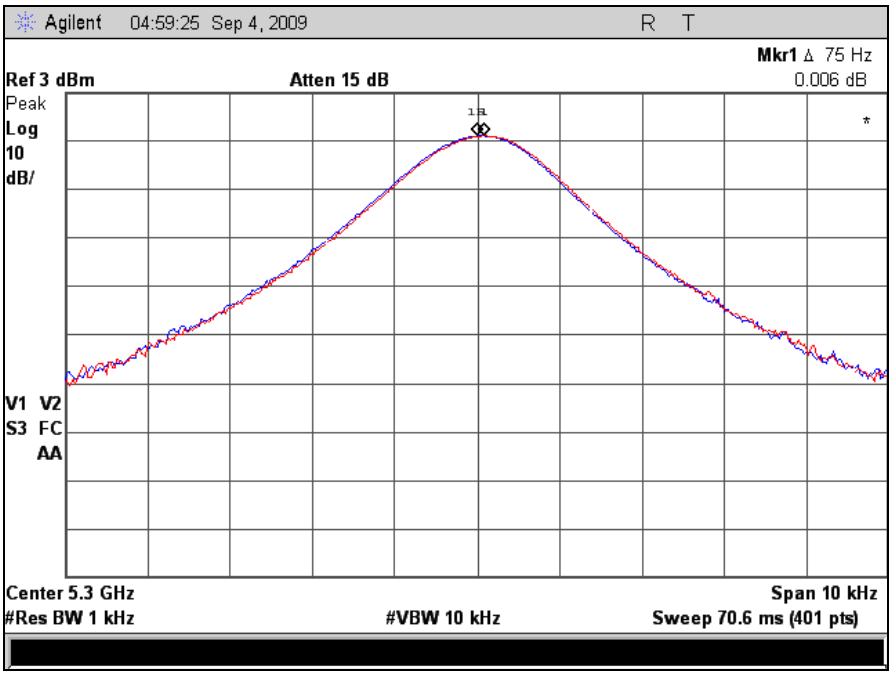
Plot 37. Frequency Stability, 40°C



Plot 38. Frequency Stability, 50°C



Plot 39. Frequency Stability, 102 VAC



Plot 40. Frequency Stability, 138 VAC

Photograph 6. Frequency Stability, Test Setup

V. DFS Requirements and Radar Waveform Description & Calibration

A. DFS Requirements

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
U-NII Detection Bandwidth	Yes	Not required	Yes

Table 21. Applicability of DFS Requirements Prior to Use of a Channel

Requirement	Operational Mode		
	Master	Client Without Radar Detection	Client With Radar Detection
DFS Detection Threshold	Yes	Not required	Yes
Channel Closing Transmission Time	Yes	Yes	Yes
Channel Move Time	Yes	Yes	Yes
U-NII Detection Bandwidth	Yes	Not required	Yes

Table 22. Applicability of DFS Requirements During Normal Operation

Maximum Transmit Power	Value
≥ 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 23. DFS Detection Thresholds for Master or Client Devices Incorporating DFS

Parameter	Value
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds See Note 1
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2
U-NII Detection Bandwidth	Minimum 80% of the 99% power bandwidth. See Note 3.

Note 1: 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.

Note 2: The *Channel Closing Transmission Time* is comprised of 200 milliseconds starting at the beginning of the *Channel Move Time* plus any additional intermittent control signals required facilitating *Channel* changes (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.

Note 3: During the *U-NII Detection Bandwidth* detection test, radar type 1 is used and for each frequency step the minimum percentage of detection is 90%. Measurements are performed with no data traffic.

Table 24. DFS Response Requirement Values

B. Radar Test Waveforms

This section provides the parameters for required test waveforms, minimum percentage of successful detections, and the minimum number of trials that must be used for determining DFS conformance. Step intervals of 0.1 microsecond for Pulse Width, 1 microsecond for PRI, 1 MHz for chirp width and 1 for the number of pulses will be utilized for the random determination of specific test waveforms.

Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (µsec)	PRI (µsec)	Number of 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

A minimum of 30 unique waveforms are required for each of the short pulse radar types 2 through 4. For short pulse radar type 1, the same waveform is used a minimum of 30 times. If more than 30 waveforms are used for short pulse radar types 2 through 4, then each additional waveform must also be unique and not repeated from the previous waveforms. The aggregate is the average of the percentage of successful detections of short pulse radar types 1-4.

Long Pulse Radar Test Waveform

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

The parameters for this waveform are randomly chosen. Thirty unique waveforms are required for the Long Pulse radar test signal. If more than 30 waveforms are used for the Long Pulse radar test signal, then each additional waveform must also be unique and not repeated from the previous waveforms.

Each waveform is defined as follows:

1) The transmission period for the Long Pulse Radar test signal is 12 seconds.
2) There are a total of 8 to 20 Bursts in the 12 second period, with the number of Bursts being randomly chosen. This number is Burst_Count.
3) Each Burst consists of 1 to 3 pulses, with the number of pulses being randomly chosen. Each Burst within the 12 second sequence may have a different number of pulses.
4) The pulse width is between 50 and 100 microseconds, with the pulse width being randomly chosen. Each pulse within a Burst will have the same pulse width. Pulses in different Bursts may have different pulse widths.
5) Each pulse has a linear FM chirp between 5 and 20 MHz, with the chirp width being randomly chosen. Each pulse within a Burst will have the same chirp width. Pulses in different Bursts may have different chirp widths. The chirp is centered on the pulse. For example, with radar frequency of 5300 MHz and a 20 MHz chirped signal, the chirp starts at 5290 MHz and ends at 5310 MHz.
6) If more than one pulse is present in a Burst, the time between the pulses will be between 1000 and 2000 microseconds, with the time being randomly chosen. If three pulses are present in a Burst, the time between the first and second pulses is chosen independently of the time between the second and third pulses.
7) The 12 second transmission period is divided into even intervals. The number of intervals is equal to Burst_Count. Each interval is of length (12,000,000 / Burst_Count) microseconds. Each interval contains one Burst. The start time for the Burst, relative to the beginning of the interval, is between 1 and [(12,000,000 / Burst_Count) – (Total Burst Length) + (One Random PRI Interval)] microseconds, with the start time being randomly chosen. The step interval for the start time is 1 microsecond. The start time for each Burst is chosen independently.

A representative example of a Long Pulse radar test waveform:

1) The total test signal length is 12 seconds.
2) 8 Bursts are randomly generated for the Burst_Count.
3) Burst 1 has 2 randomly generated pulses.
4) The pulse width (for both pulses) is randomly selected to be 75 microseconds.
5) The PRI is randomly selected to be at 1213 microseconds.
6) Bursts 2 through 8 are generated using steps 3 – 5.
7) Each Burst is contained in even intervals of 1,500,000 microseconds. The starting location for Pulse 1, Burst 1 is randomly generated (1 to 1,500,000 minus the total Burst 1 length + 1 random PRI interval) at the 325,001 microsecond step. Bursts 2 through 8 randomly fall in successive 1,500,000 microsecond intervals (i.e. Burst 2 falls in the 1,500,001 – 3,000,000 microsecond range).

Graphical Representation of a Long Pulse radar Test Waveform

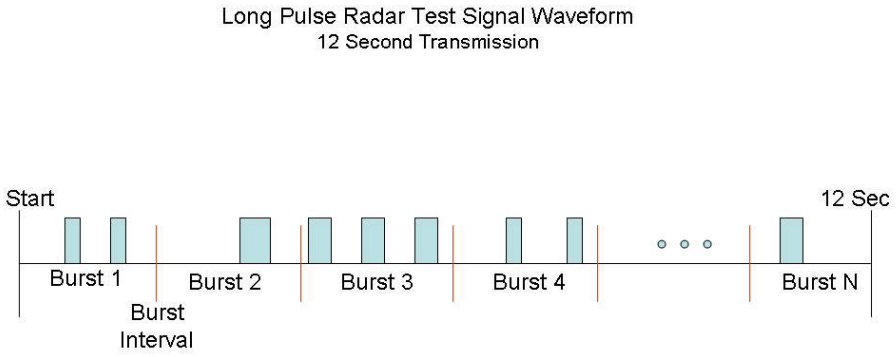


Figure 5. Long Pulse Radar Test Signal Waveform

Frequency Hopping Radar Test Waveform

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

For the Frequency Hopping Radar Type, the same *Burst* parameters are used for each waveform. The hopping sequence is different for each waveform and a 100-length segment is selected1 from the hopping sequence defined by the following algorithm:

The first frequency in a hopping sequence is selected randomly from the group of 475 integer frequencies from 5250 – 5724 MHz. Next, the frequency that was just chosen is removed from the group and a frequency is randomly selected from the remaining 474 frequencies in the group. This process continues until all 475 frequencies are chosen for the set. For selection of a random frequency, the frequencies remaining within the group are always treated as equally likely.

C. Radar Waveform Calibration

The following equipment setup was used to calibrate the radiated Radar Waveform. A spectrum analyzer was used to establish the test signal level for each radar type. During this process there were no transmissions by either the Master or Client Device. The spectrum analyzer was switched to the zero span (Time Domain) mode at the frequency of the Radar Waveform generator. Peak detection was utilized. The spectrum analyzer's resolution bandwidth (RBW) was set to 3 MHz and the video bandwidth (VBW) was set to 3 MHz. The calibration setup is diagrammed in Figure 6, and the radar test signal generator is shown in Photograph 7.

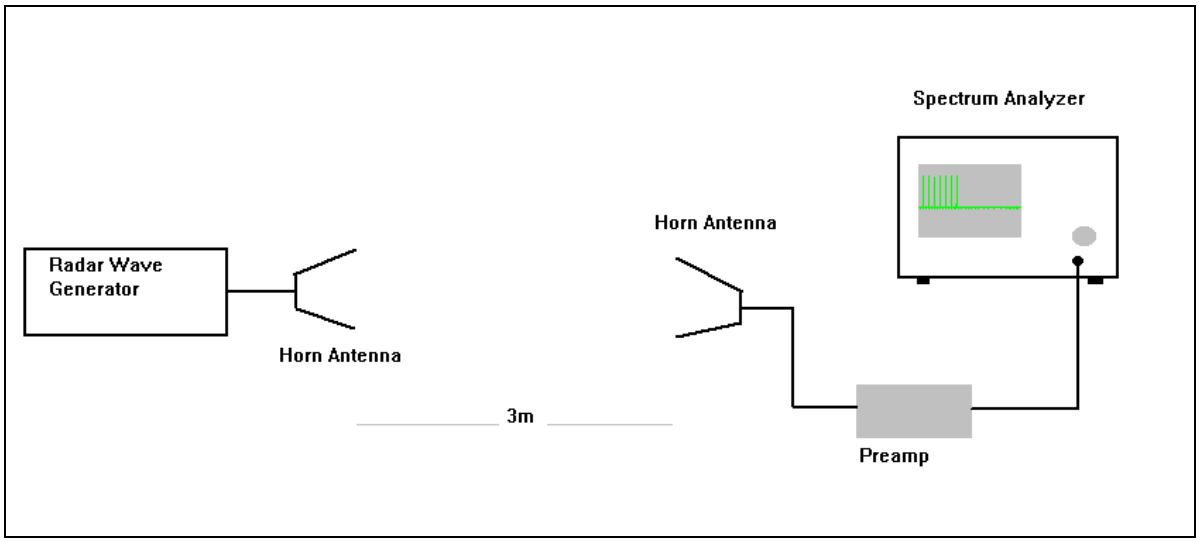
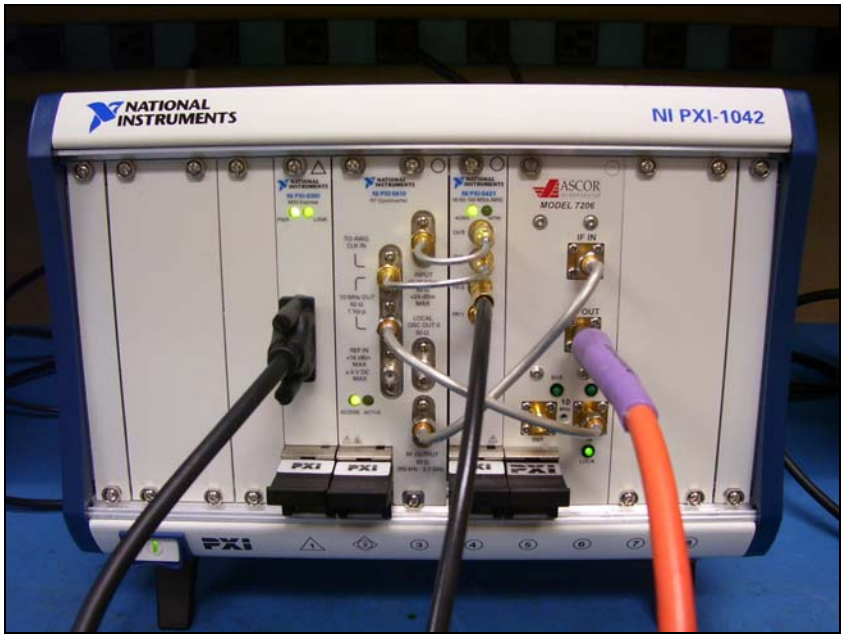
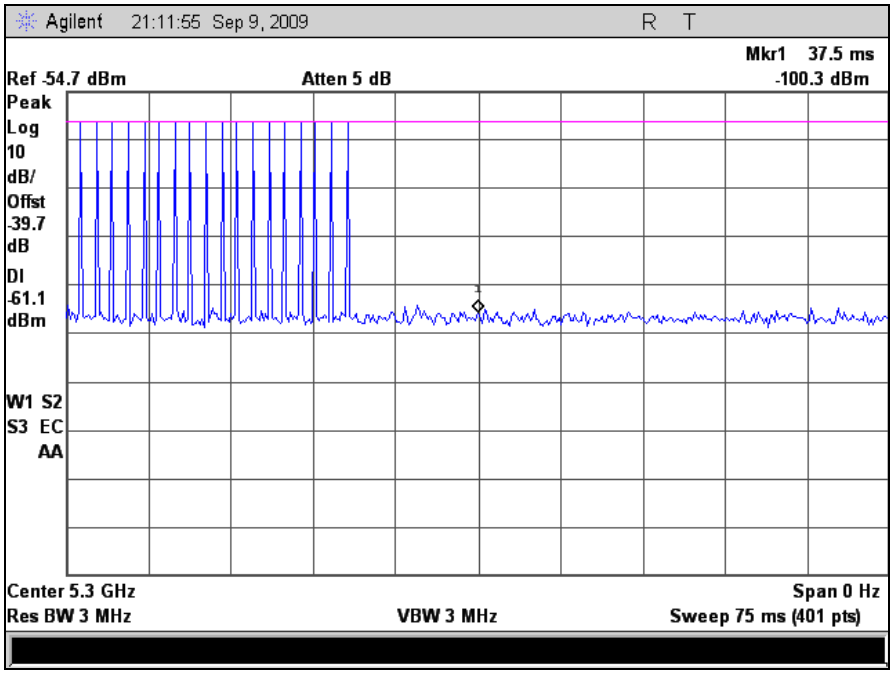


Figure 6. Calibration Test setup

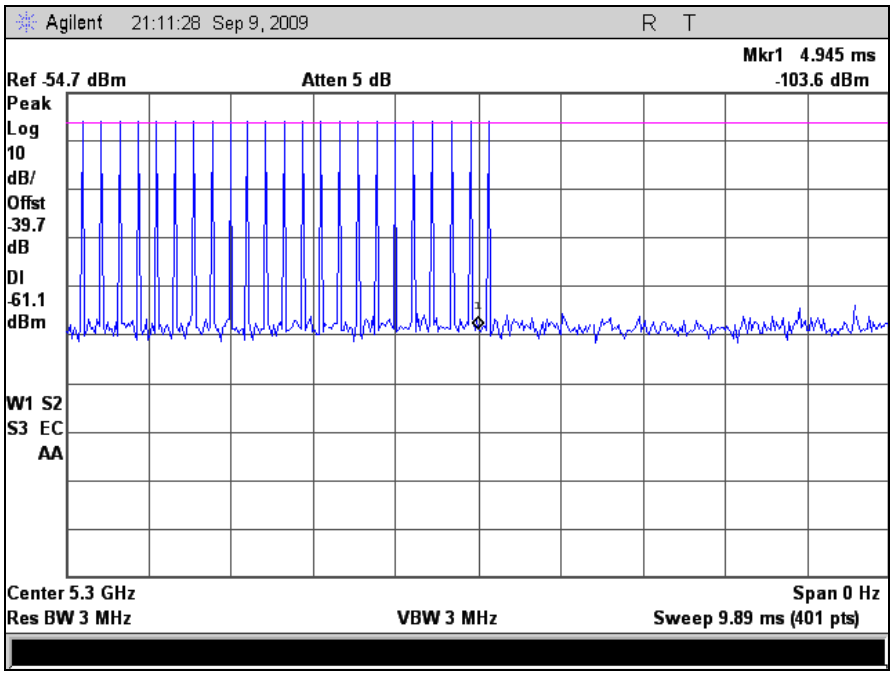


Photograph 7. DFS Radar Test Signal Generator

Radar Waveform Calibration

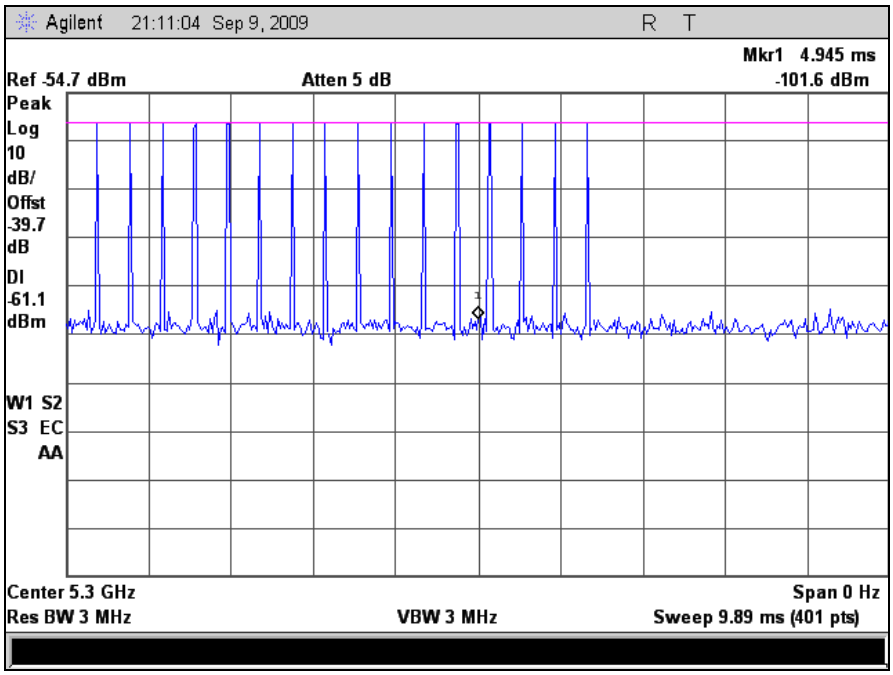


Plot 41. Radar Type 1 Calibration, 5300 MHz

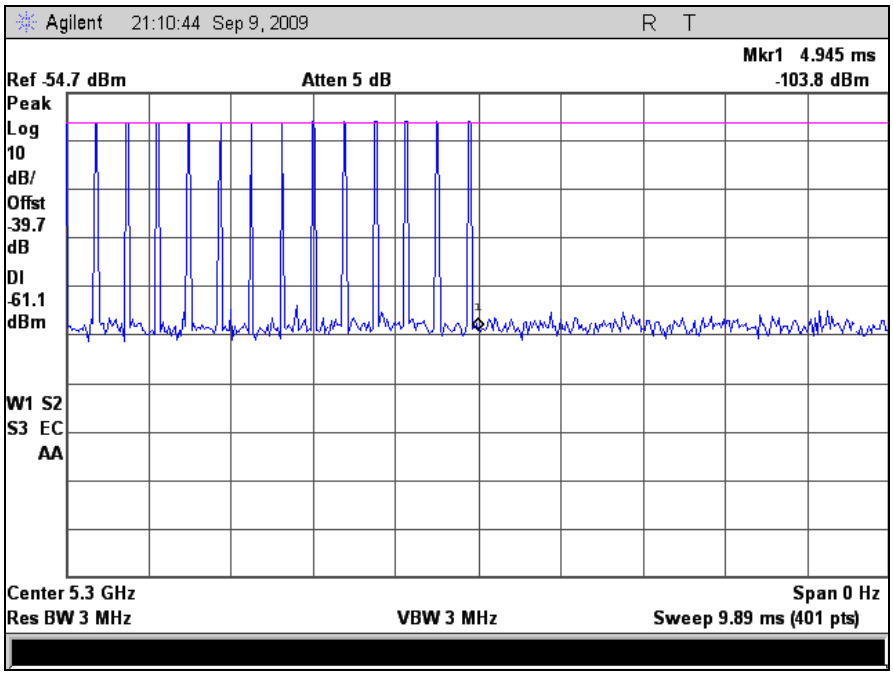


Plot 42. Radar Type 2 Calibration, 5300 MHz

Radar Waveform Calibration

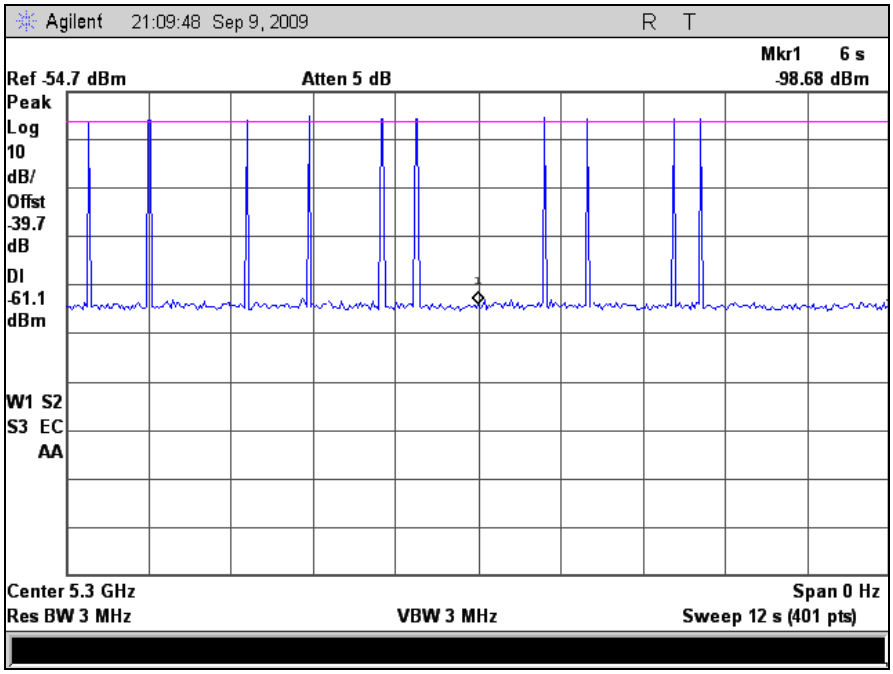


Plot 43. Radar Type 3 Calibration, 5300 MHz

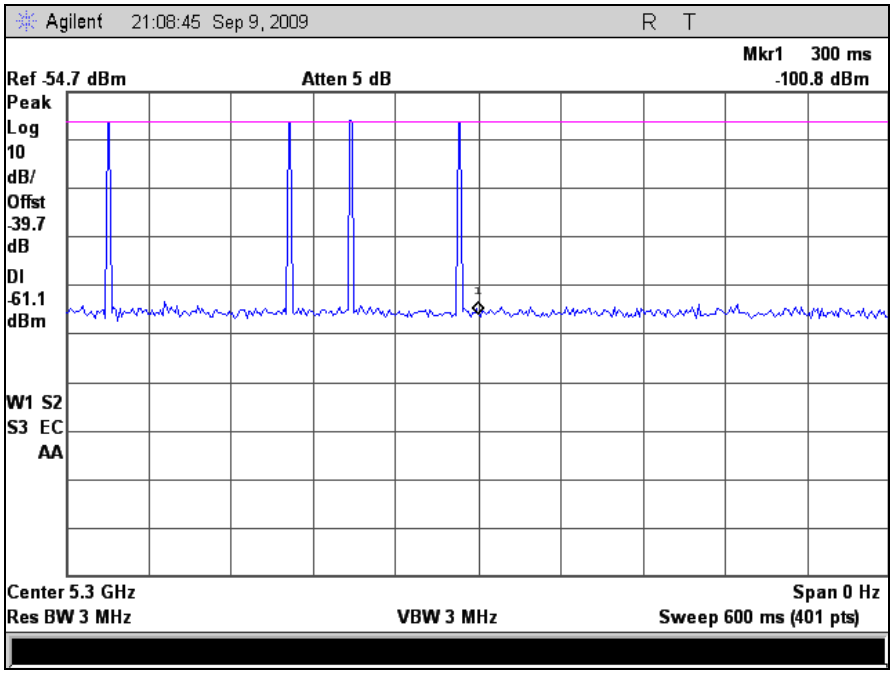


Plot 44. Radar Type 4 Calibration, 5300 MHz

Radar Waveform Calibration

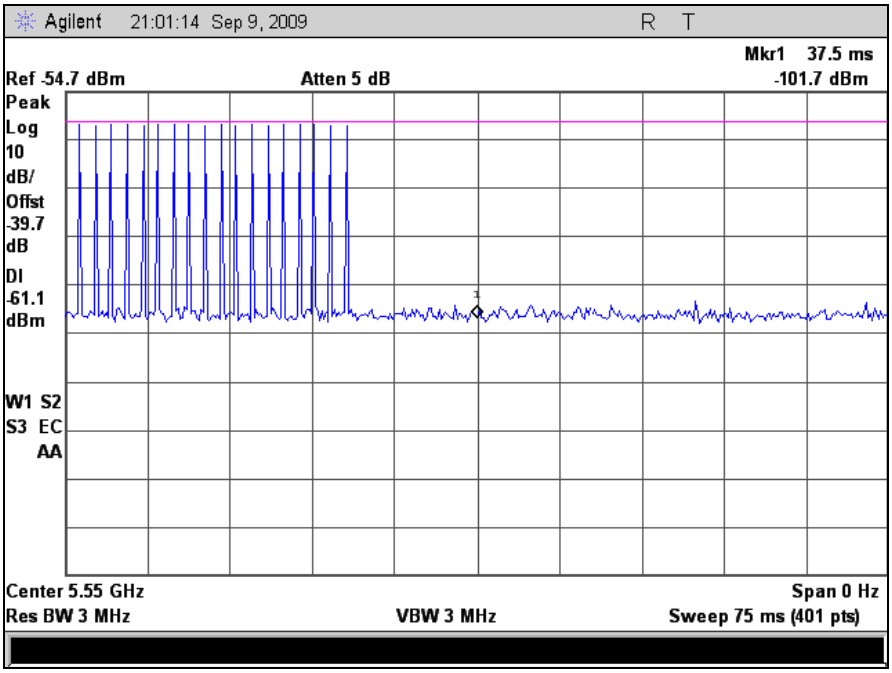


Plot 45. Radar Type 5 Calibration, 5300 MHz

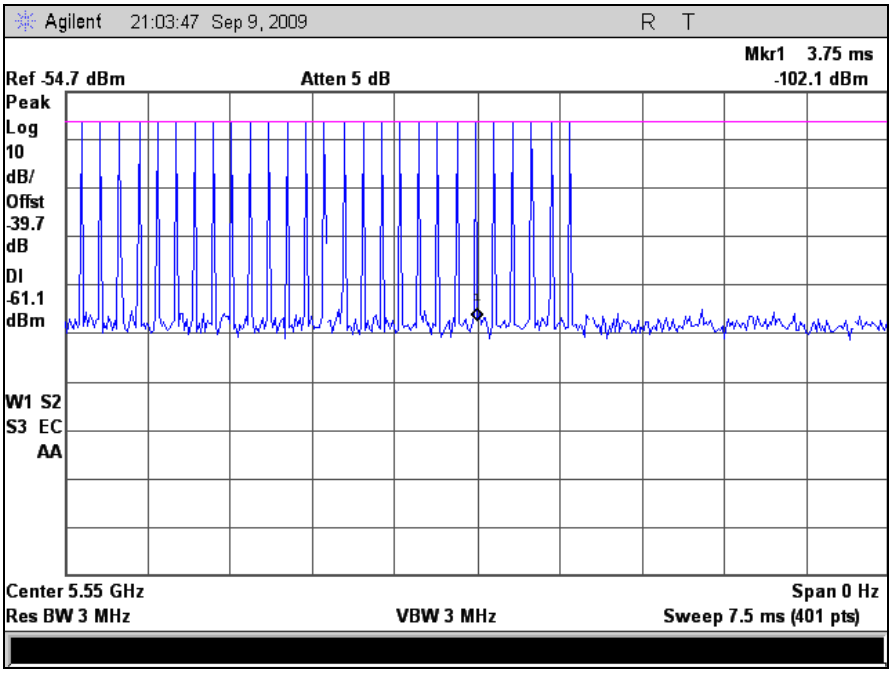


Plot 46. Radar Type 6 Calibration, 5300 MHz

Radar Waveform Calibration

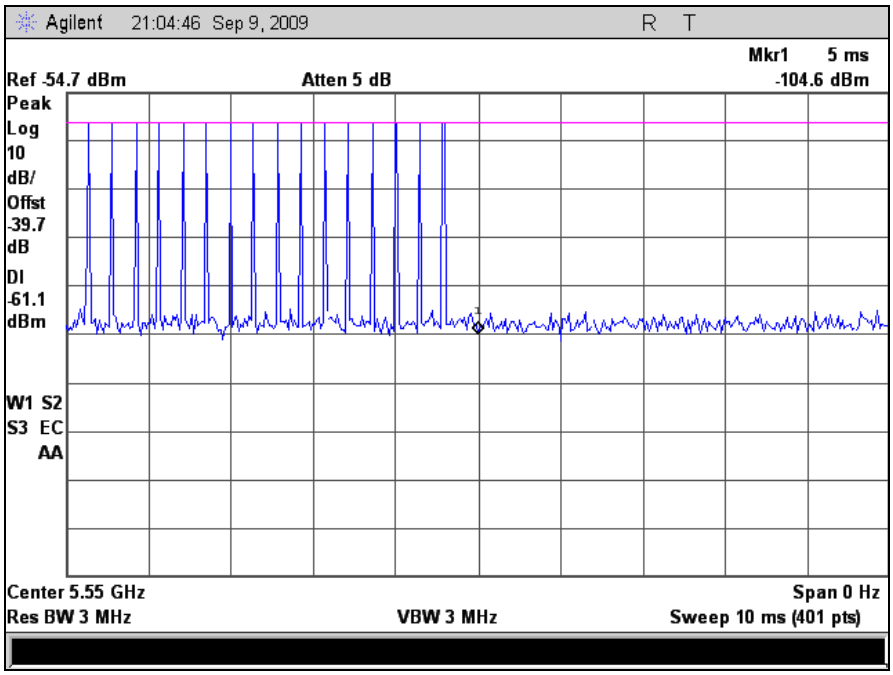


Plot 47. Radar Type 1 Calibration, 5550 MHz

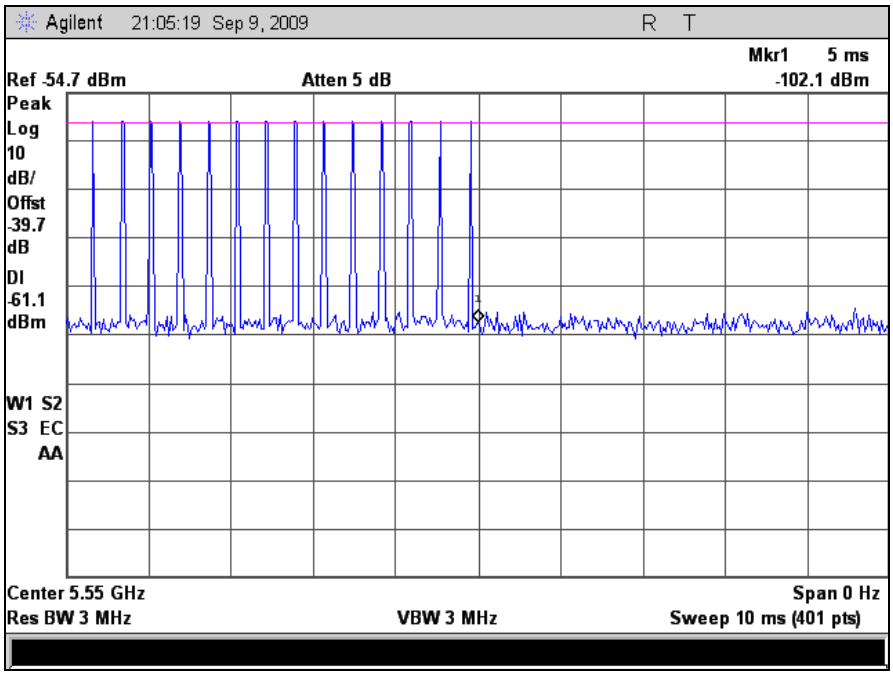


Plot 48. Radar Type 2 Calibration, 5550 MHz

Radar Waveform Calibration

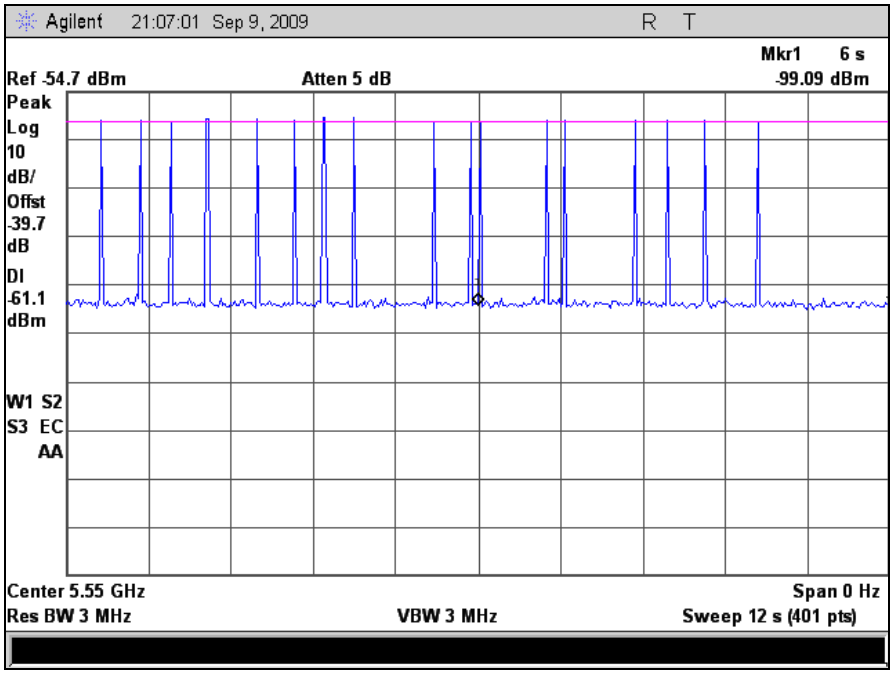


Plot 49. Radar Type 3 Calibration, 5550 MHz

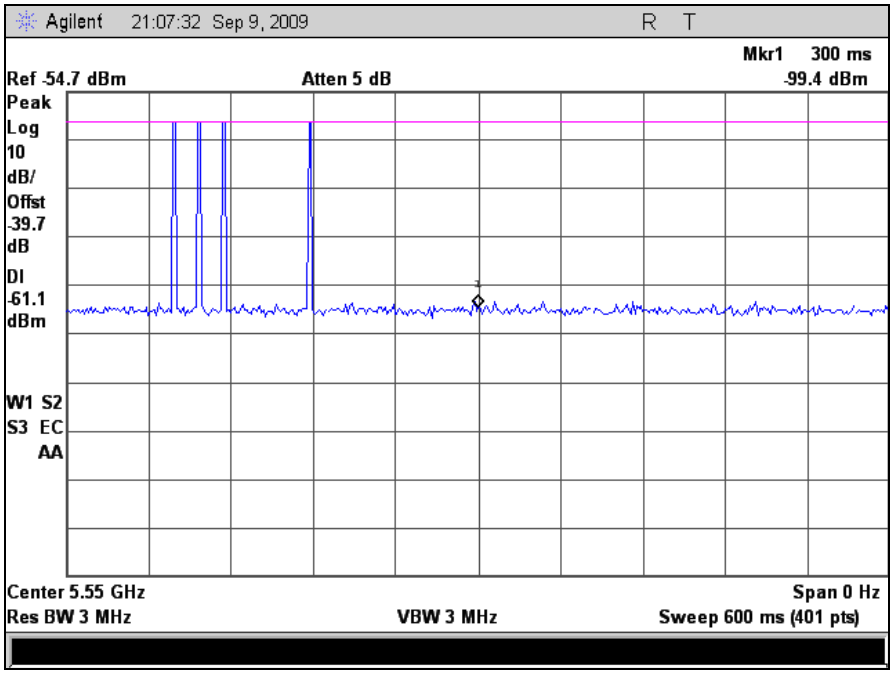


Plot 50. Radar Type 4 Calibration, 5550 MHz

Radar Waveform Calibration



Plot 51. Radar Type 5 Calibration, 5550 MHz



Plot 52. Radar Type 6 Calibration, 5550 MHz

VI. DFS Test Procedure and Test Results

A. DFS Test Setup

1. A spectrum analyzer is used as a monitor to verify that the Unit Under Test (UUT) has vacated the Channel within the Channel Closing Transmission Time and Channel Move Time, and does not transmit on a Channel during the Non-Occupancy Period after the detection and subsequent Channel move. It is also used to monitor UUT transmissions during the Channel Availability Check Time.
2. The test setup, which consists of test equipment and equipment under test (EUT), is diagrammed in Figure 7 and pictured in Photograph 8

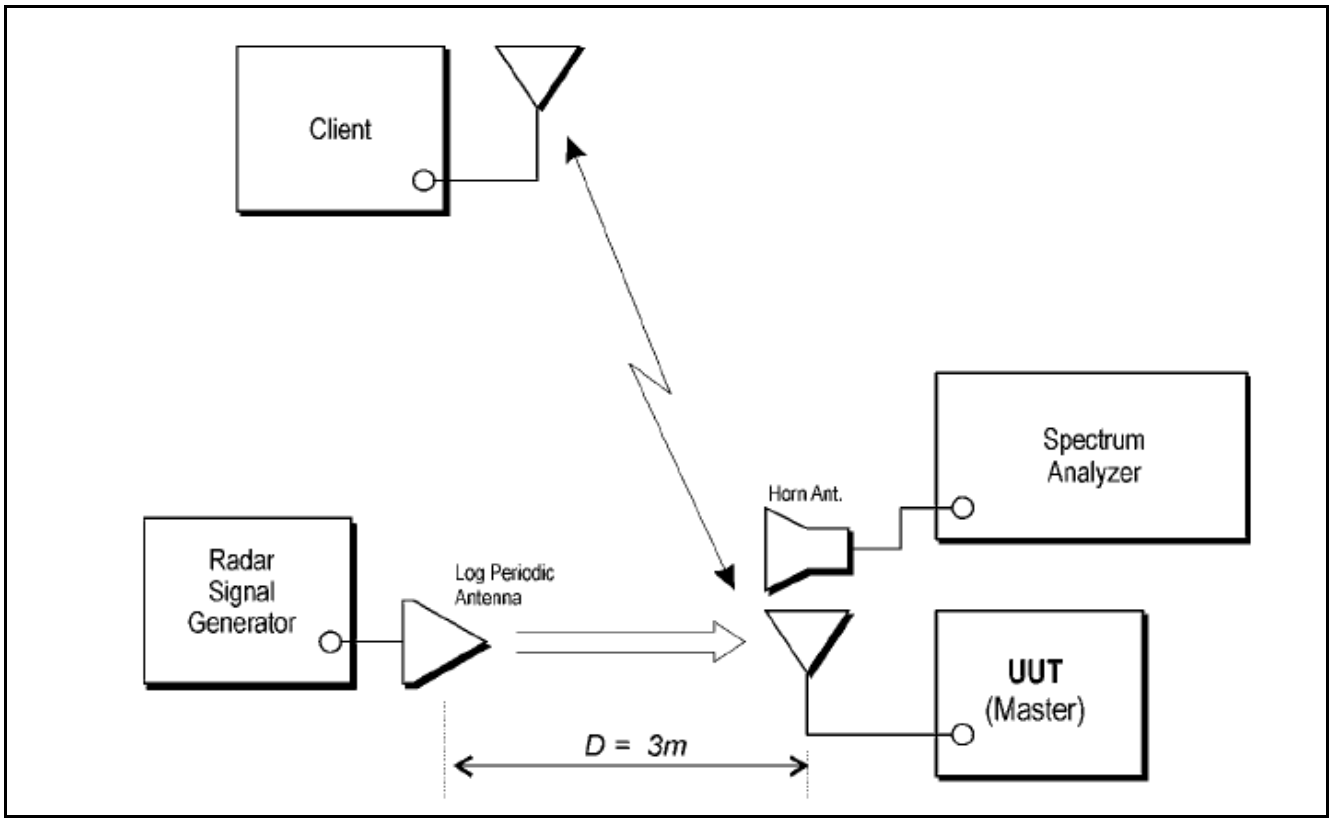


Figure 7. Test Setup Diagram

Note: A horn antenna was used to transmit the Radar Signals instead of a Log Periodic antenna.

Photograph 8. Test Setup Photo

B. Description of Master Device

1. Operating Frequency Range – 5300 MHz and 5550 MHz
2. Modes of Operation – Master Device
3. Highest and Lowest EIRP – Highest = 13.68 dBm; Lowest = 2 dBm
4. Antennas gain – PIFA, 1.9 dBi
5. Antenna impedance – 50 Ohms
6. Antenna gain verification – Use antenna datasheet
7. Test file that is transmitted is the designated MPEG test file that streams full motion video at 30 frames per second from the Master to the Client
8. TPC not required for UNII devices with less than 500 mW EIRP
9. Time for master to complete its power-on-cycle is about 10s
10. The EUT's uniform channel spreading is as follows:

    There are two operating channels, and a block in MAC layer that is responsible for choosing randomly one of these two operating channels. Each channel has 50% chance to be chosen.

C. UNII Detection Bandwidth

Test Requirement(s): **§ 15.407** A minimum 80% detection rate is required across an EUT's 99% bandwidth.

Test Procedure: All UNII channels for this device have identical channel bandwidths.

A single burst of the short pulse radar type 1 is produced at 5300 MHz, at the -63dBm test level. The UUT is set up as a standalone device (no associated client, and no data traffic).

A single radar burst is generated for a minimum of 10 trials, and the response of the UUT is recorded. The UUT must detect the radar waveform 90% or more of the time.

The radar frequency is increased in 1 MHz steps, repeating the above test sequence, until the detection rate falls below 90%. The highest frequency at which detection is greater than or equal to 90% is denoted F_H.

The radar frequency is decreased in 1 MHz steps, repeating the above test sequence, until the detection rate falls below 90%. The lowest frequency at which detection is greater than or equal to 90% is denoted F_L.

The U-NII Detection Bandwidth is calculated as follows:

$$\text{U-NII Detection Bandwidth} = F_H - F_L$$

Test Engineer: Jeffrey Hazen

Test Date: 09/09/09

UNII Detection Bandwidth – Test Results

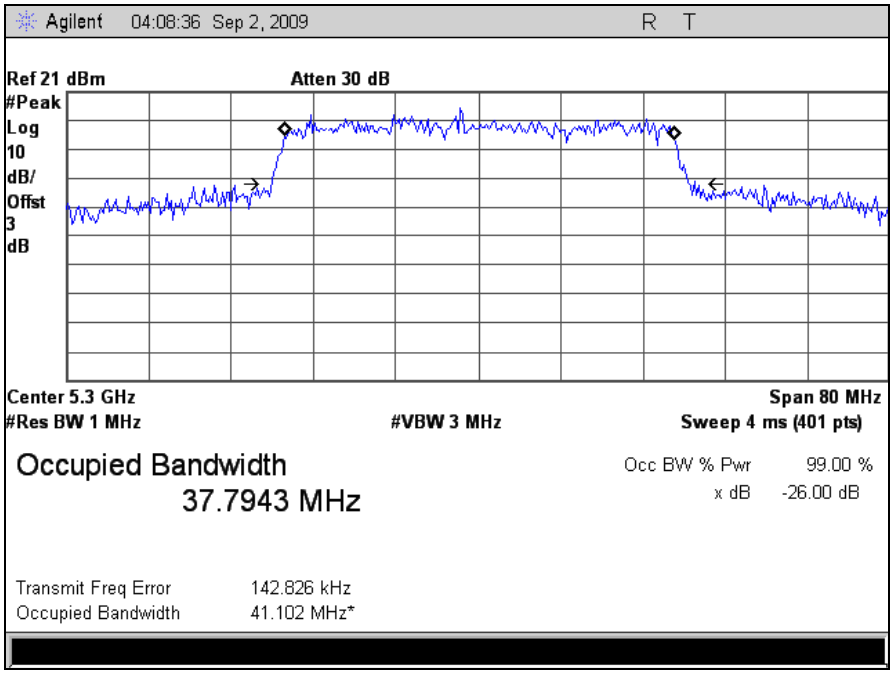
EUT Frequency- 5300MHz											
	DFS Detection Trials (1=Detection, 0= No Detection)										
Radar Frequency (MHz)	1	2	3	4	5	6	7	8	9	10	Detection Rate (%)
5279	0	0	0	0	0	0	0	0	0	0	0%
5280(f_l)	1	1	1	1	1	1	1	0	1	1	90%
5281	1	1	1	1	1	1	1	1	1	1	100%
5282	1	1	1	1	1	1	1	1	1	1	100%
5283	1	1	1	1	1	1	1	1	1	1	100%
5284	1	1	1	1	1	1	1	1	1	1	100%
5285	1	1	1	1	1	1	1	1	1	1	100%
5286	1	1	1	1	1	1	1	1	1	1	100%
5287	1	1	1	1	1	1	1	1	1	1	100%
5288	1	1	1	1	1	1	1	1	1	1	100%
5289	1	1	1	1	1	1	1	1	1	1	100%
5290	1	1	1	1	1	1	1	1	1	1	100%
5291	1	1	1	1	1	1	1	1	1	1	100%
5292	1	1	1	1	1	1	1	1	1	1	100%
5293	1	1	1	1	1	1	1	1	1	1	100%
5294	1	1	1	1	1	1	1	1	1	1	100%
5295	1	1	1	1	1	1	0	1	1	1	90%
5296	1	1	1	1	1	1	1	1	1	1	100%
5297	1	1	1	1	1	1	1	1	1	1	100%
5298	1	1	1	1	1	1	1	1	1	1	100%
5299	1	1	1	1	1	1	1	1	1	1	100%
5300	1	1	0	1	1	1	1	1	1	1	90 %
5301	1	1	1	1	1	1	1	1	1	1	100 %
5302	1	1	1	1	1	1	1	1	1	1	100 %
5303	1	1	1	1	1	1	0	1	1	1	90%
5304	1	1	1	1	1	1	1	1	1	1	100%
5305	1	1	1	1	1	1	1	1	1	1	100 %
5306	1	1	1	1	1	1	1	1	1	1	100 %
5307	1	1	1	1	1	1	1	1	1	1	100%
5308	1	1	1	1	1	1	1	1	1	1	100%
5309	1	1	1	1	1	1	1	1	1	1	100%
5310	1	1	1	1	1	1	1	1	1	1	100 %
5311	1	1	1	1	1	1	1	1	1	1	100%
5312	1	1	1	1	1	1	1	1	1	1	100%
5313	1	1	1	1	1	1	1	1	1	1	100%
5314	1	1	1	1	1	1	1	1	1	1	100%
5315	1	1	1	1	1	1	1	1	1	1	100%
5316	1	1	1	1	1	1	1	1	1	1	100%
5317	1	1	1	1	1	1	1	1	1	1	100%
5318	1	1	1	1	1	1	1	1	1	1	100%
5319	1	1	1	1	1	1	1	1	1	1	100%
5320	1	1	1	1	1	1	1	1	1	1	100%
5320	1	1	1	1	1	1	1	1	1	1	100%
5321(f_h)	1	1	1	1	1	1	1	1	1	1	100%
5322	0	1	1	0	0	0	0	0	1	1	40%
Overall Detection Percentage											99.5 %
Detection Bandwidth = f_h - f_l = 5321 MHz - 5280 MHz = 41 MHz											
EUT 99% Bandwidth = 37.8 MHz											
37.8 MHz * 80 % = 30.2 MHz: Therefore detection bandwidth > 30.2 MHz											

Table 25. UNII Detection Bandwidth, Test Results, 5300 MHz

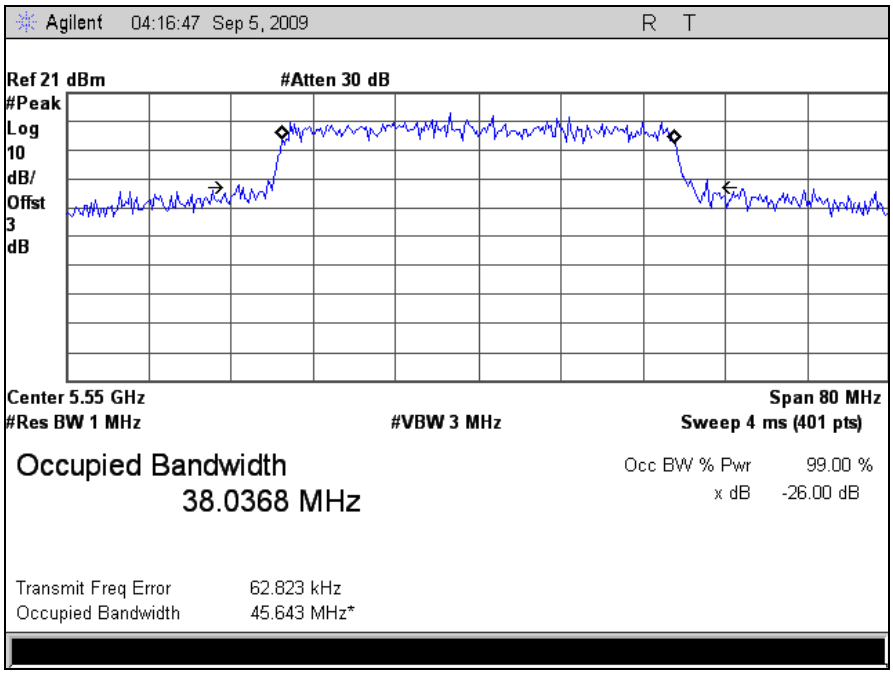
EUT Frequency- 5550MHz											
	DFS Detection Trials (1=Detection, 0= No Detection)										
Radar Frequency (MHz)	1	2	3	4	5	6	7	8	9	10	Detection Rate (%)
5531	0	1	1	0	0	0	0	0	0	0	
5532(f_l)	1	1	1	1	1	1	1	1	1	1	100%
5533	1	1	1	1	1	1	1	1	1	1	100%
5534	1	1	1	1	1	1	1	1	1	1	100%
5535	1	1	1	1	1	1	1	1	1	1	100 %
5536	1	1	1	1	1	1	1	1	1	1	100%
5537	1	1	1	1	1	1	1	1	1	1	100%
5538	1	1	1	1	1	1	1	1	1	1	100%
5539	1	1	1	1	1	1	1	1	1	1	100%
5540	1	1	1	1	1	1	1	1	1	1	100%
5541	1	1	1	1	1	1	1	1	1	1	100%
5542	1	1	1	1	1	1	1	1	1	1	100%
5543	1	1	0	1	1	1	1	1	1	1	90%
5544	1	1	1	1	1	1	1	1	1	1	100%
5545	1	1	1	1	1	1	1	1	1	1	100%
5546	1	1	1	1	1	1	1	1	1	1	100%
5547	1	1	1	1	1	1	1	1	1	1	100%
5548	1	1	1	1	1	1	1	1	1	1	100%
5549	1	1	1	1	1	1	1	1	1	1	100%
5550	1	1	1	1	1	1	1	1	1	1	100%
5551	1	1	1	1	1	1	1	1	1	1	100%
5552	1	1	1	1	1	1	1	1	1	1	100%
5553	1	1	1	1	1	1	1	1	1	1	100%
5554	1	1	1	1	1	1	1	1	1	1	100%
5555	1	1	1	1	1	1	1	1	1	1	100%
5556	1	1	1	1	1	1	1	1	1	1	100%
5557	1	1	1	1	1	1	1	1	1	1	100%
5558	1	1	1	1	1	1	1	1	1	1	100%
5559	1	1	1	1	1	1	1	1	1	1	100%
5560	1	1	1	1	1	1	1	1	1	1	100%
5561	1	1	1	1	1	1	1	1	1	1	100%
5562	1	1	1	1	1	1	1	1	1	1	100%
5563	1	1	1	1	1	1	1	1	1	0	90%
5564	1	1	1	1	1	1	1	1	1	1	100%
5565	1	1	1	1	1	1	1	1	1	1	100%
5566	1	1	1	1	1	1	1	0	1	1	90%
5567(f_h)	0	1	1	1	1	1	1	1	1	1	100%
5568	0	1	0	0	0	0	0	1	0	0	20%
Overall Detection Percentage											99.5 %
Detection Bandwidth = f_h - f_l = 5567 MHz - 5532 MHz = 35 MHz											
EUT 99% Bandwidth = 38 MHz											
38 MHz * 80 % = 30.4 MHz : Therefore detection bandwidth is > 30.4 MHz											

Table 26. UNII Detection Bandwidth, Test Results, 5550 MHz

UNII Detection Bandwidth Plots



Plot 53. Occupied Bandwidth, 5300 MHz



Plot 54. Occupied Bandwidth, 5550 MHz

D. Initial Channel Availability Check Time

Test Requirements: **§ 15.407** The Initial Channel Availability Check Time tests that the UUT does not emit beacon, control, or data signals on the test channel until the power-up sequence has been completed and the U-NII device has checked for radar waveforms, for one minute, on the test channel. This test does not use any of the radar waveforms and only needs to be performed once.

The UUT should not make any transmissions over the test channel, for at least 1 minute after completion of its power-on cycle.

Test Procedure: The U-NII device is powered on and instructed to operate at 5300 MHz. At the same time the UUT is powered on, the spectrum analyzer is set to 5300MHz with a zero span and a 2.5 minute sweep time. The analyzer is triggered at the same time power is applied to the U-NII device.

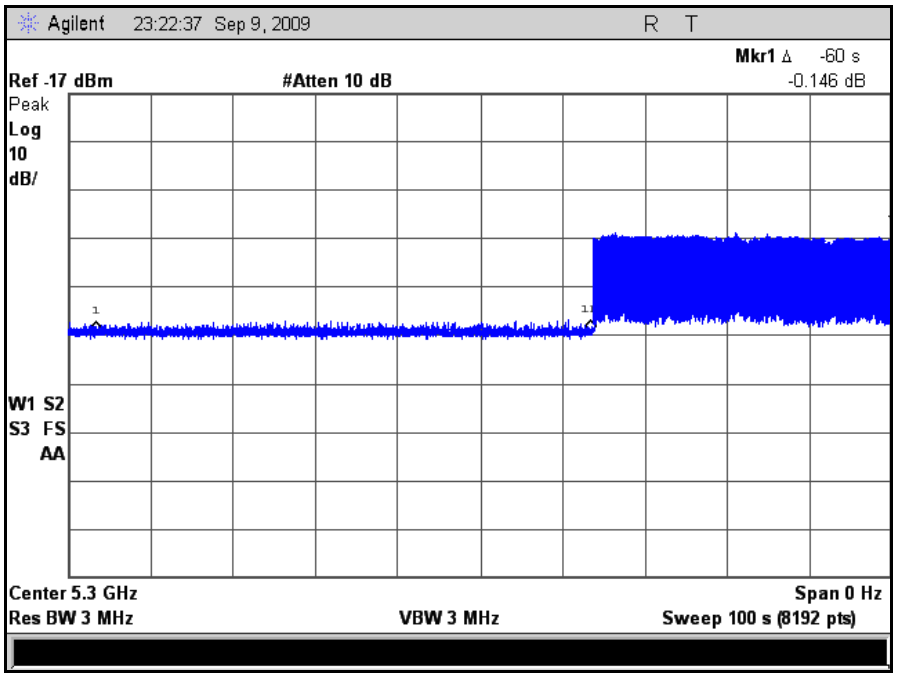
Test Results: Marker 1 on plots 55 and 56 indicate the start of the channel availability check time. Initial beacon/data transmission is indicated by marker 1R.

The Equipment complies with § 15.407 Initial Channel Availability Check Time.

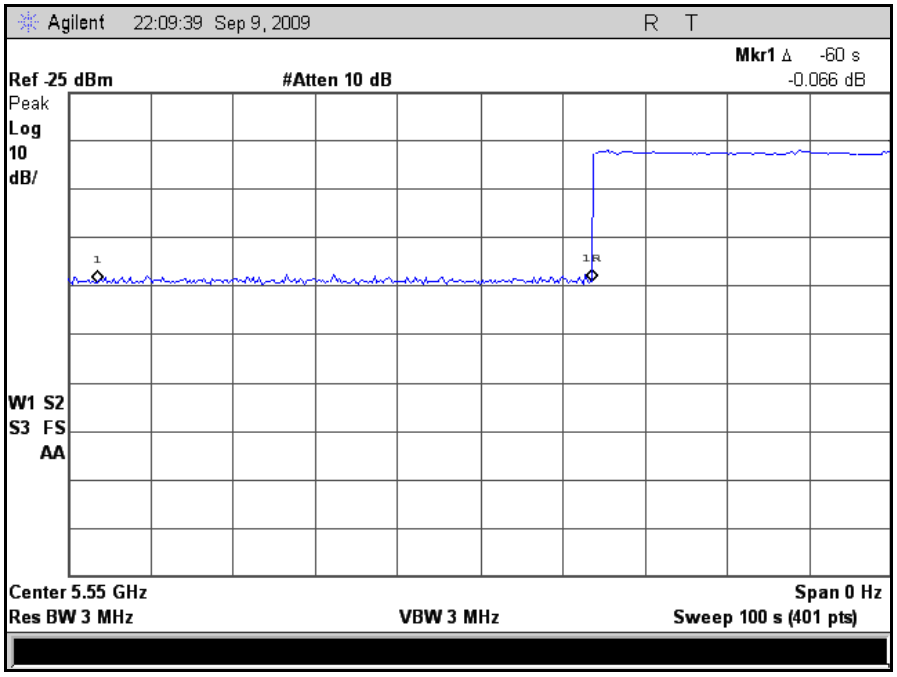
Test Engineer: Jeffrey Hazen

Test Date: 09/09/09

Initial Channel Availability Check Time – Plot



Plot 55. Initial Channel Availability Check Time, 5300 MHz



Plot 56. Initial Channel Availability Check Time, 5550 MHz

E. Radar Burst at the Beginning of Channel Availability Check Time

Test Requirements: **§ 15.407** A Radar Burst at the Beginning of the Channel Availability Check Time tests that the UUT does not emit beacon, control, or data signals on the test Channel if it has detected a radar burst during that time period until the power-up sequence has been completed and the U-NII device checks for Radar Waveforms for one minute on the test Channel. The steps below define the procedure to verify successful radar detection on the selected Channel during a period equal to the Channel Availability Check Time and avoidance of operation on that Channel when a radar Burst with a level equal to the DFS Detection Threshold + 1 dB (-63dBm) occurs at the beginning of the Channel Availability Check Time.

Test Procedure: The UUT is powered on at T0. T1 denotes the instant when the UUT has completed its power-up sequence. The Channel Availability Check Time commences at instant T1 and will end no sooner than T1 + 60 seconds.

A single Burst of short pulse radar type 1, at -63 dBm, will commence within a 6 second window starting at T1.

Visual indication of the UUT of successful detection of the radar Burst will be recorded and reported. Observation of transmission at 5300MHz will continue for 2.5 minutes after the radar Burst has been generated.

Verify that during the 2.5 minute measurement window, no UUT transmissions occurr at 5300MHz.

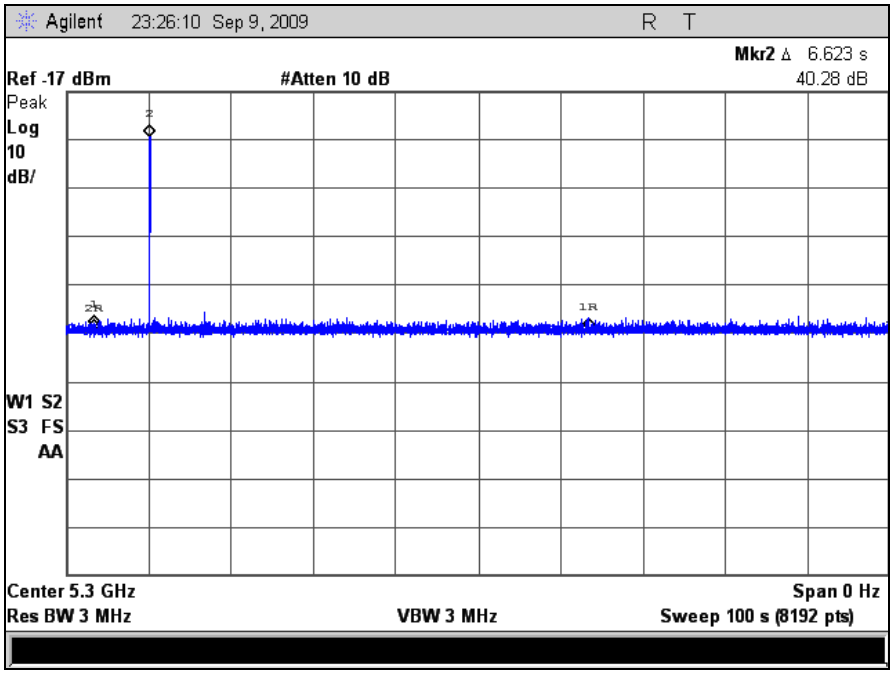
Test Results Plots 57 and 58 below indicates that there were no UUT transmissions during the 2.5 minute measurement window when a radar burst was injected 6 seconds into the CACT. Therefore, the UUT detected the presence of a radar during the CACT and moved away from that channel.

The equipment complies with § 15.407 Radar Burst at the Beginning of the Channel Availability Check Time.

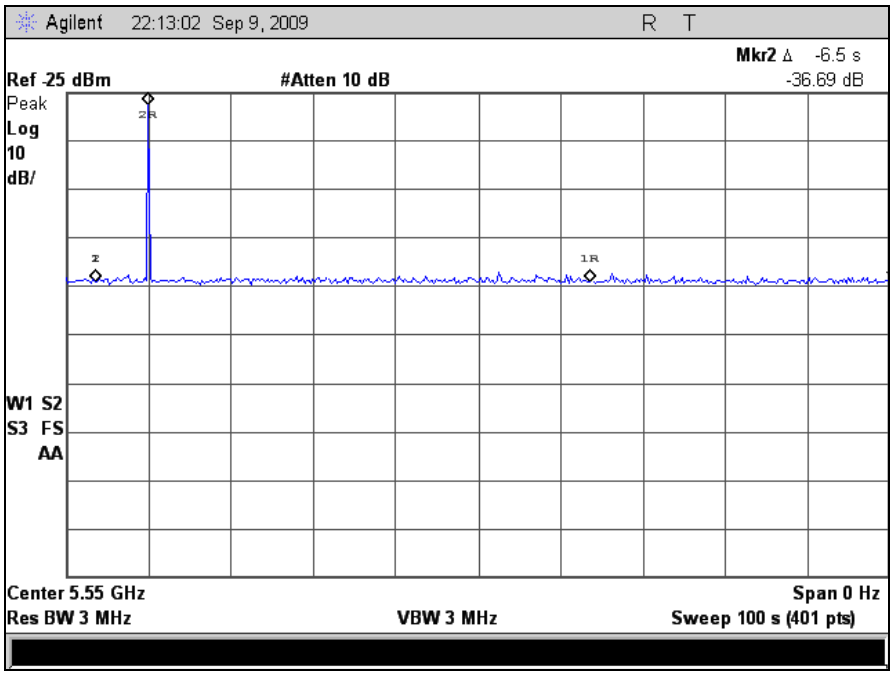
Test Engineer: Jeffrey Hazen

Test Date: 09/09/09

Radar Burst at the Beginning of Channel Availability Check Time – Plot



Plot 57. Radar Burst at the Beginning of CACT, 5300 MHz



Plot 58. Radar Burst at the Beginning of CACT, 5550 MHz

F. Radar Burst at the End of Channel Availability Check Time

Test Requirements: **§ 15.407** A Radar Burst at the End of the Channel Availability Check Time tests that the UUT does not emit beacon, control, or data signals on the test Channel if it has detected a radar burst during that time period until the power-up sequence has been completed and the U-NII device checks for Radar Waveforms for one minute on the test Channel. The steps below define the procedure to verify successful radar detection on the selected Channel during a period equal to the Channel Availability Check Time and avoidance of operation on that Channel when a radar Burst with a level equal to the DFS Detection Threshold + 1 dB (-63dBm) occurs at the end of the Channel Availability Check Time.

Test Procedure: The steps below define the procedure to verify successful radar detection on the selected Channel during a period equal to the Channel Availability Check Time and avoidance of operation on that Channel when a radar Burst with a level equal to the DFS Detection Threshold + 1 dB (-63dBm) occurs at the end of the Channel Availability Check Time.

The UUT is powered on at T0. T1 denotes the instant when the UUT has completed its power-up sequence. The Channel Availability Check Time commences at instant T1 and will end no sooner than T1 + 60 seconds.

A single Burst of short pulse of radar type 1 at -63 dBm will commence within a 6 second window starting at T1+ 54 seconds.

Visual indication on the UUT of successful detection of the radar Burst will be recorded and reported. Observation of emissions at 5300MHz will continue for 2.5 minutes after the radar Burst has been generated.

Verify that during the 2.5 minute measurement window no UUT transmissions occurred at 5300MHz.

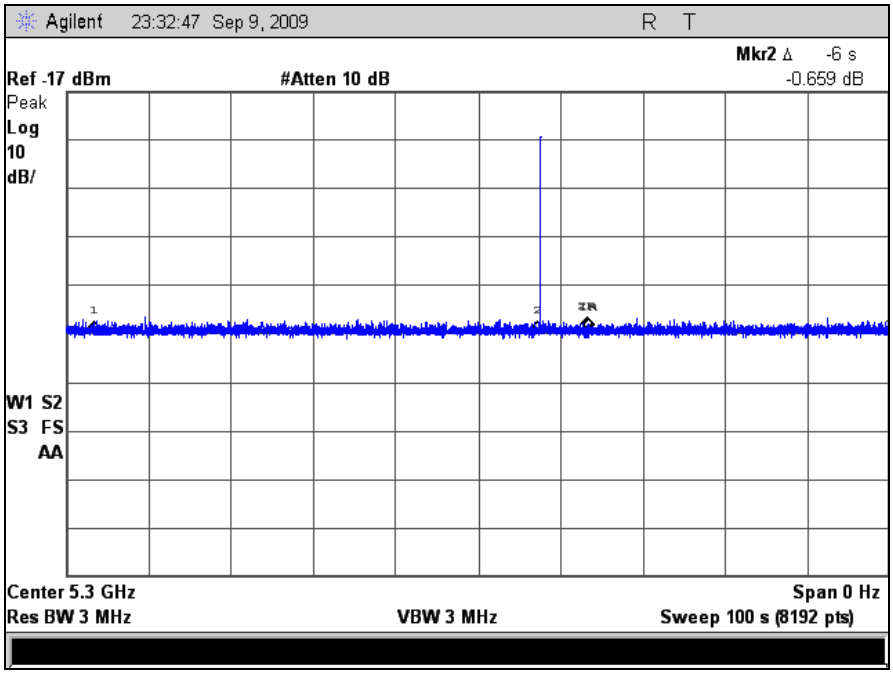
Test Results: Pots 59 and 60 indicates that no UUT transmissions occurred during the 2.5 minute measurement window when a radar burst was injected 6 seconds before the end of the CACT. Therefore, the UUT detected the presence of a radar and moved away from that channel.

The equipment complies with § 15.407 Radar Burst at the End of the Channel Availability Check Time.

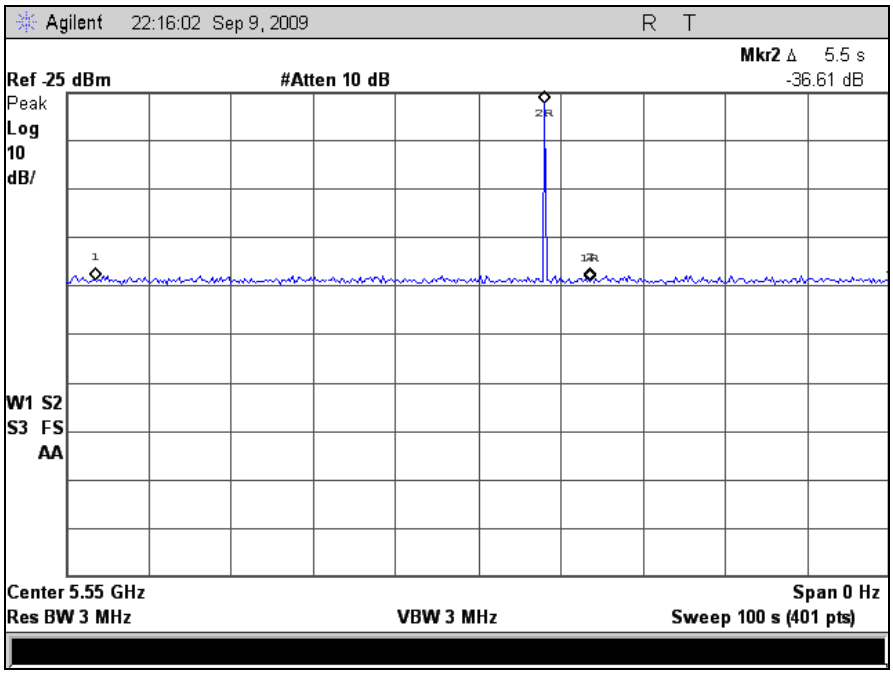
Test Engineer: Jeffrey Hazen

Test Date: 09/09/09

Radar Burst at the End of Channel Availability Check Time – Plot



Plot 59. Radar Burst at the End of CACT, 5300 MHz



Plot 60. Radar Burst at the End of CACT, 5550 MHz

G. In-Service Monitoring for Channel Move Time, Channel Closing Transmission Time, and Non-Occupancy Period

Test Requirements:

§ 15.407 (Refer to DFS Response Requirement Values table in section III-A of this report.) The UUT shall continuously monitor for radar transmissions in the operating test channel. When a radar burst occurs in the test channel, it has 10 seconds to move to another channel. This 10 second window is termed Channel Move Time (CMT).

When a radar burst occurs, the UUT has 200 milliseconds, plus an aggregate of 60 milliseconds, to cease transmission in the operating test channel. This 200 ms + 60 ms requirement is termed Channel Closing Transmission Time (CCT).

After radar burst and subsequent move to another channel, the UUT shall not resume transmission, on the channel it moved from, for a period of 30 minutes. This requirement is termed Non-Occupancy Period (NOP).

Test Procedure:

These tests define how the following DFS parameters are verified during In-Service Monitoring: Channel Closing Transmission Time, Channel Move Time, and Non-Occupancy Period.

The steps below define the procedure to determine the above mentioned parameters when a radar Burst with a level equal to the DFS Detection Threshold + 1dB (-63dBm) is generated on the Operating Channel of the U-NII device.

A U-NII device operating as a Client Device will associate with the UUT (Master) at 5300 MHz. Stream the MPEG test file from the Master Device to the Client Device on the selected Channel for the entire period of the test.

At time T0 the Radar Waveform generator sends a Burst of pulses for each of the radar types at -63dBm.

Observe the transmissions of the UUT at the end of the radar Burst on the Operating Channel for duration greater than 10 seconds. Measure and record the transmissions from the UUT during the observation time (Channel Move Time). Compare the Channel Move Time and Channel Closing Transmission Time results to the limits defined in the *DFS Response Requirement Values table*.

Test Results:

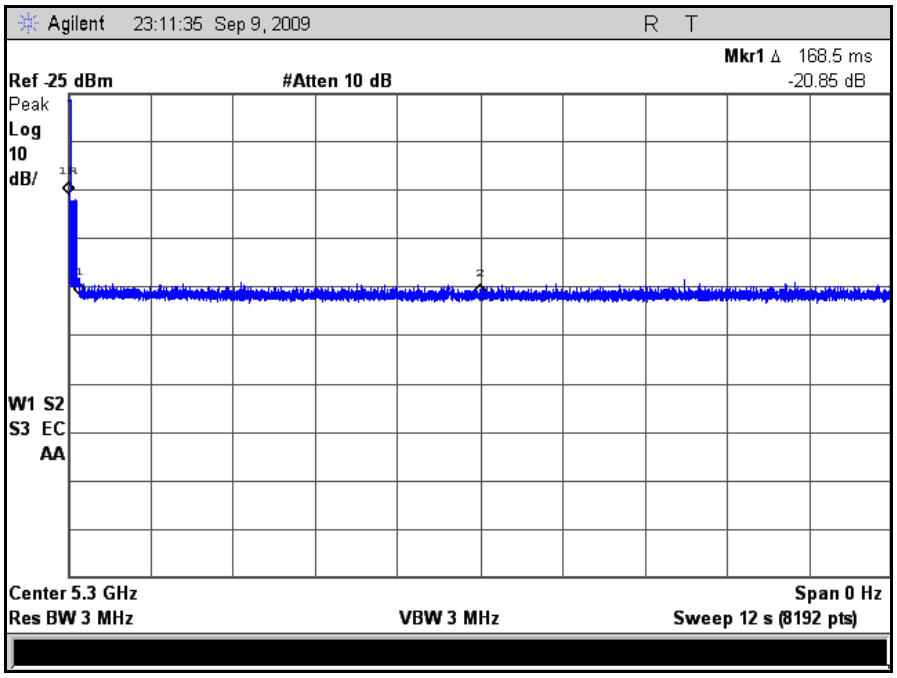
Plots 61 through 64 indicate cessation of transmission for more than 10 seconds after a radar burst. Plots 65 through 68 shows that all transmissions cease well within 200 ms. Finally, plot 69 shows that transmissions have not resumed within 30 minutes of channel move.

The UUT complies with § 15.407 In-Service Monitoring for Channel Move Time, Channel Closing Transmission Time, and Non-Occupancy Period.

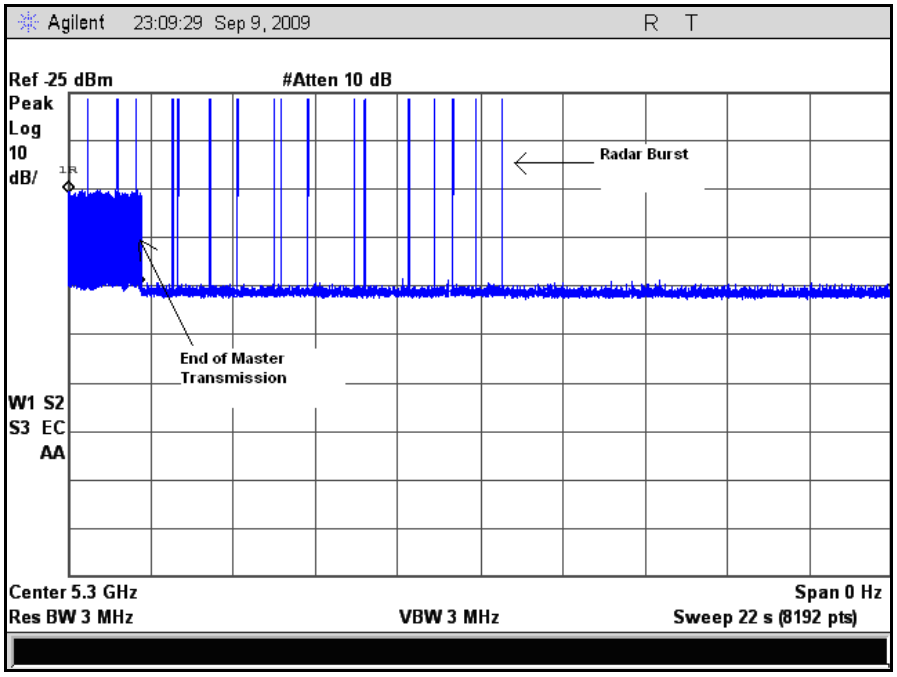
Test Engineer: Jeffrey Hazen

Test Date: 09/09/09

Channel Move Time – Plots

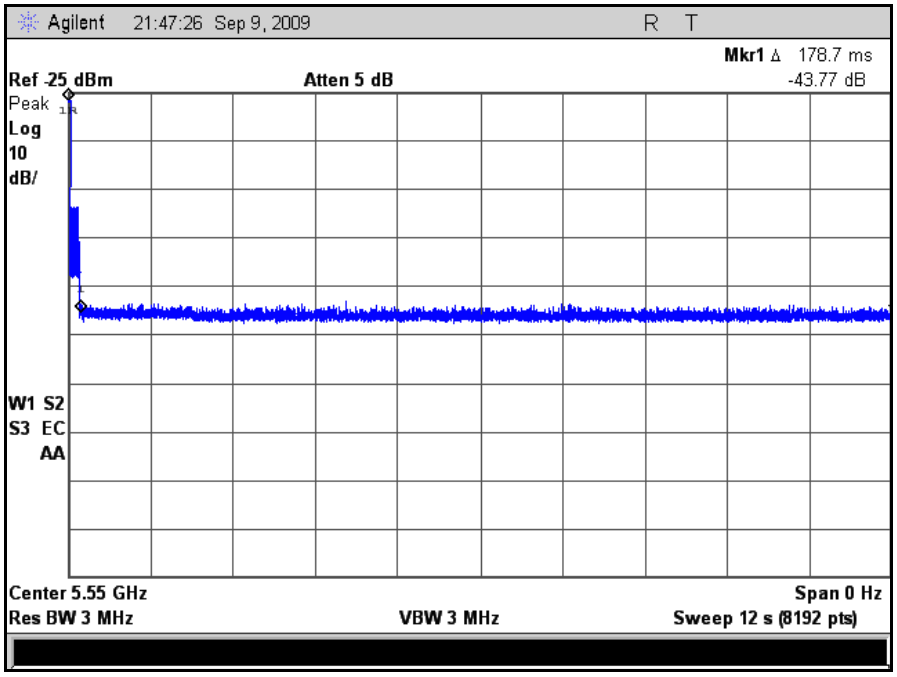


Plot 61. Channel Move Time for Radar Type 1, 12 seconds, 5300 MHz

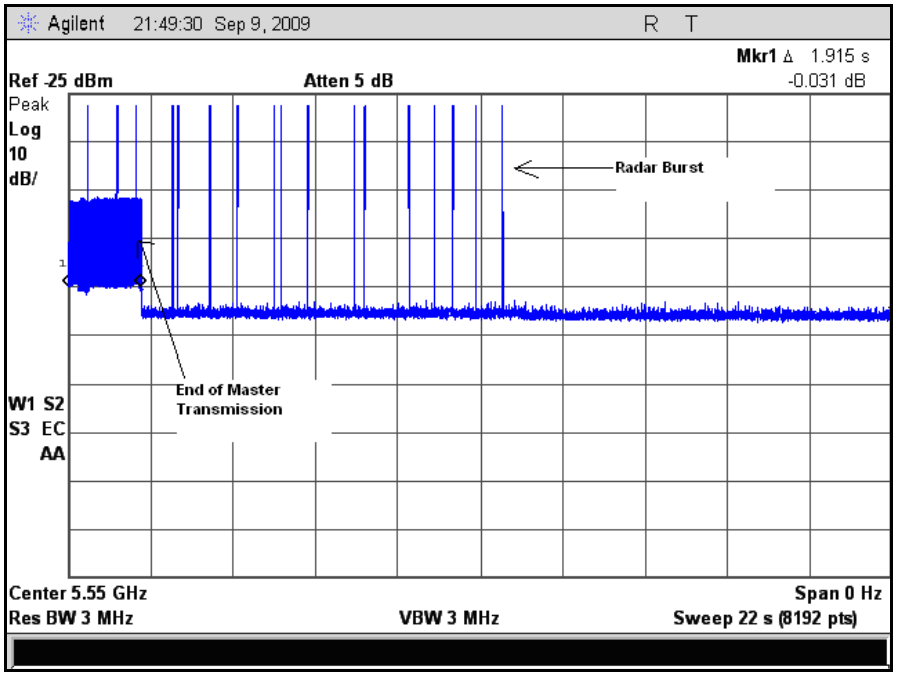


Plot 62. Channel Move Time for Radar Type 5, 22 seconds, 5300 MHz

Channel Move Time – Plots

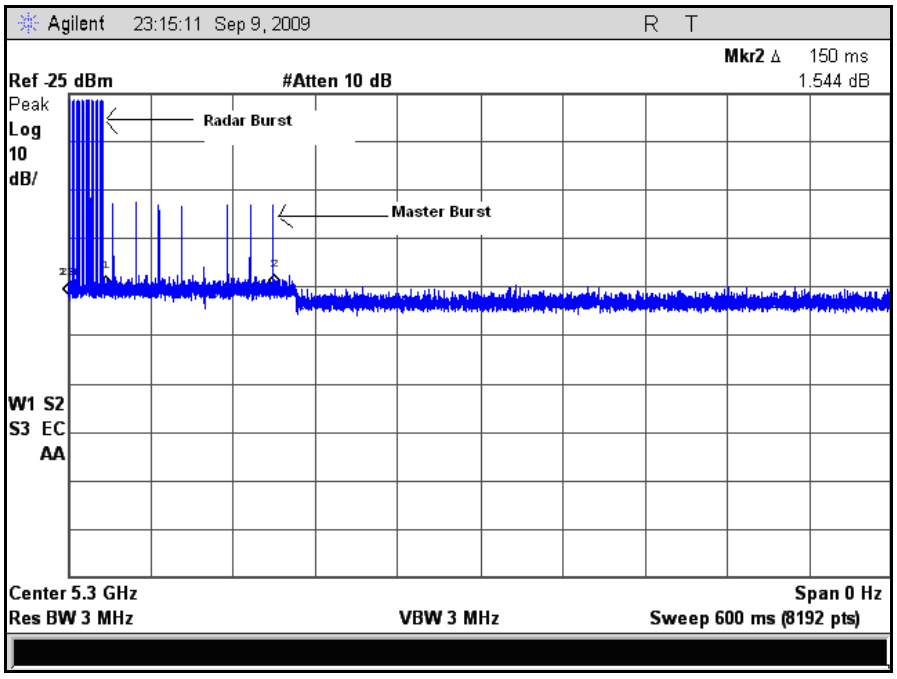


Plot 63. Channel Move Time for Radar Type 1, 12 seconds, 5550 MHz

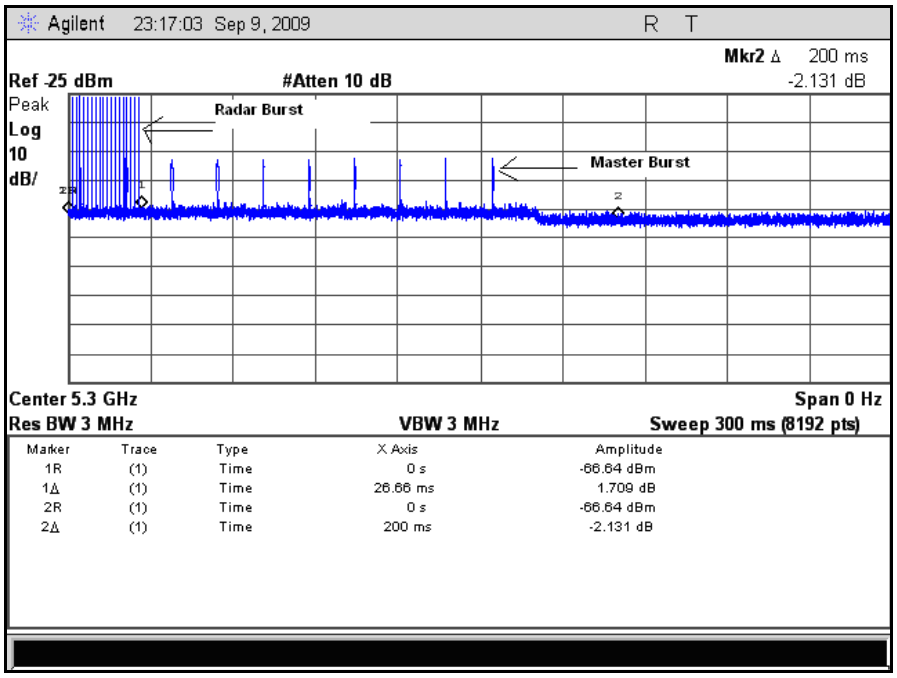


Plot 64. Channel Move Time for Radar Type 5, 22 seconds, 5550 MHz

Channel Closing Transmission Time – Plots

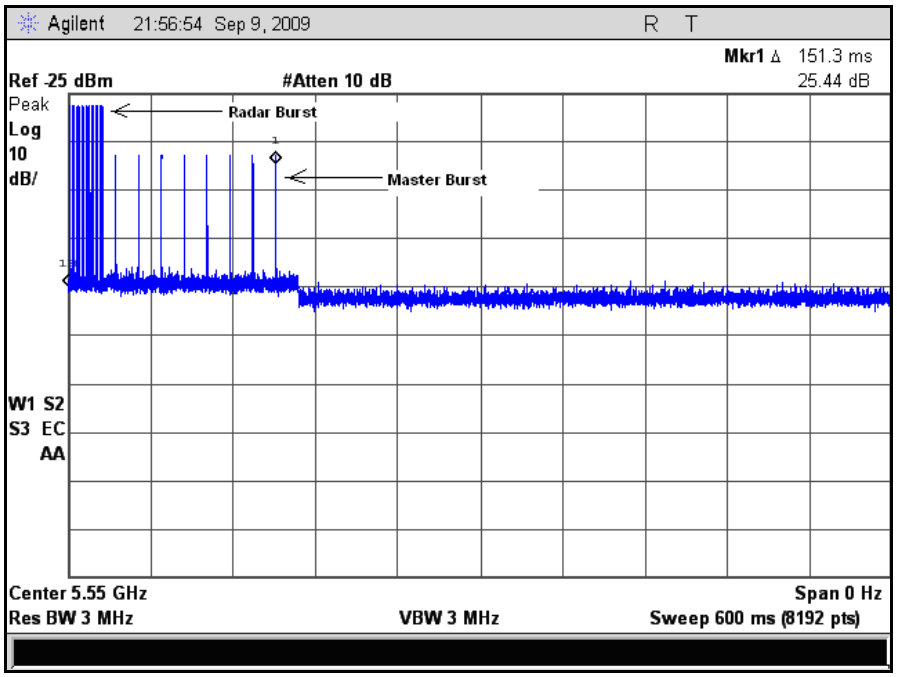


Plot 65. Channel Closing Transmission Time, 600 milliseconds, 5300 MHz

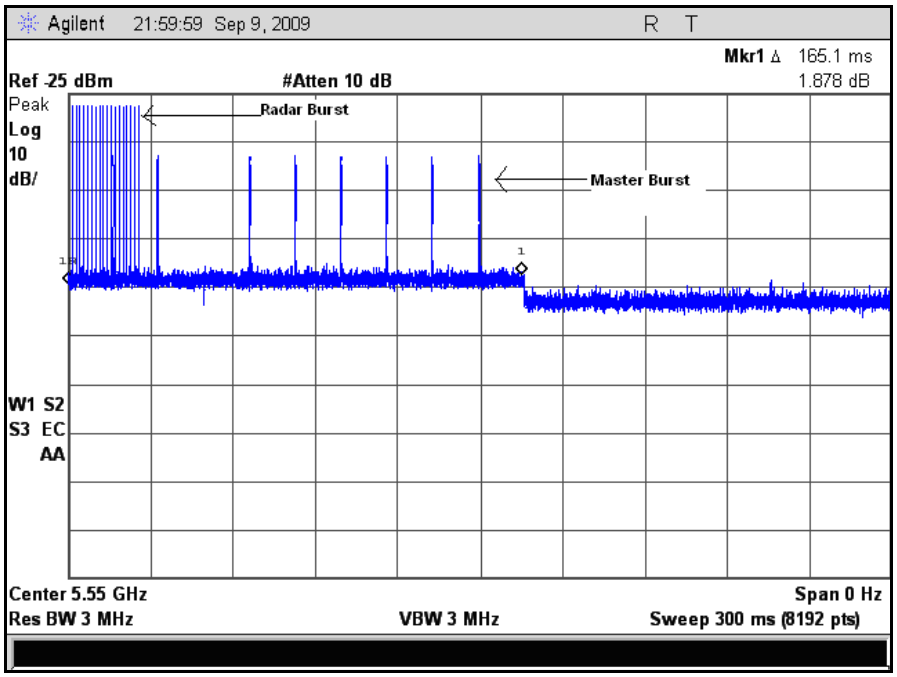


Plot 66. Channel Closing Transmission Time, 300 milliseconds, 5300 MHz

Channel Closing Transmission Time – Plots

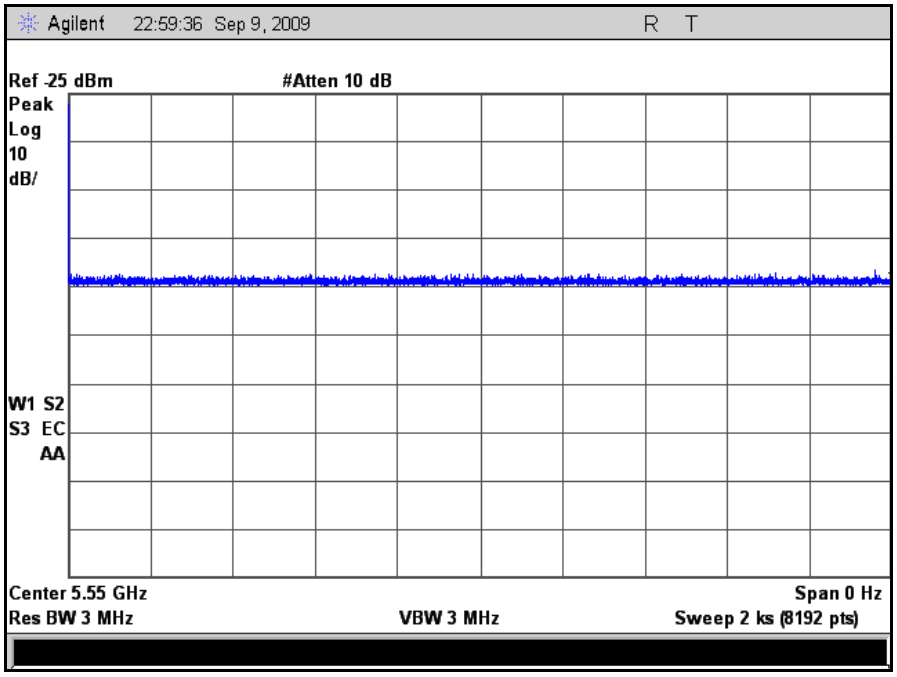


Plot 67. Channel Closing Transmission Time, 600 milliseconds, 5550 MHz



Plot 68. Channel Closing Transmission Time, 300 milliseconds, 5550 MHz

Non-Occupancy Period – Plot



Plot 69. Non-Occupancy Period, 30minutes

H. Statistical Performance Check

Test Requirements: **§ 15.407** During In-Service Monitoring, the EUT requires a minimum percentage of successful radar detections from all required radar waveforms at a level equal to the DFS Detection Threshold + 1dB.

Test Procedure: Stream the MPEG test file from the Master Device to the Client Device on the selected Channel for the entire period of the test. The Radar Waveform generator sends the individual waveform for each of the radar types 1-6 at -63dbm. Statistical data is gathered to determine the ability of the device to detect the radar test waveforms. The device can utilize a test mode to demonstrate when detection occurs to prevent the need to reset the device between trial runs. The percentage of successful detection is calculated by:

$$\frac{TotalWaveformDetections}{TotalWaveformTrials} \times 100$$

The Minimum number of trails, minimum percentage of successful detection and the average minimum percentage of successful detection are found in the Radar Test Waveforms section.

Test Results: Statistical performance for radar type 1 is tabulated in Table 27.

The equipment complies with § 15.407 Statistical Performance Check.

Test Engineer: Jeffrey Hazen

Test Date: 09/09/09

Note: The aggregate detection percentage of radar types 1-4 is greater than 80% as can be seen in the following tables.

Statistical Performance Check – Radar Type 1

Radar Type	Trial #	Pulses per Burst	Pulse Width (µsec)	PRI (µsec)	Detection
					1 = Yes, 0 = No
1	1	18	1	1428	1
	2	18	1	1428	1
	3	18	1	1428	1
	4	18	1	1428	1
	5	18	1	1428	1
	6	18	1	1428	1
	7	18	1	1428	0
	8	18	1	1428	1
	9	18	1	1428	1
	10	18	1	1428	1
	11	18	1	1428	1
	12	18	1	1428	1
	13	18	1	1428	0
	14	18	1	1428	1
	15	18	1	1428	1
	16	18	1	1428	1
	17	18	1	1428	0
	18	18	1	1428	1
	19	18	1	1428	1
	20	18	1	1428	0
	21	18	1	1428	1
	22	18	1	1428	0
	23	18	1	1428	1
	24	18	1	1428	1
	25	18	1	1428	1
	26	18	1	1428	1
	27	18	1	1428	1
	28	18	1	1428	1
	29	18	1	1428	1
	30	18	1	1428	0
	Detection Percentage				80% (> 60%)

Table 27. Statistical Performance Check – Radar Type 1, 5300 MHz

Statistical Performance Check – Radar Type 2

Radar Type	Trial #	Pulse Width 1 to 5 µsec	PRI 150 to 230 µsec	Pulses per Burst 23 to 29	Detection 1 = Yes, 0 = No
2	1	2.6	221	24	1
	2	3.7	170	28	1
	3	4.4	159	23	1
	4	3.5	187	24	1
	5	4.4	168	23	1
	6	3.5	156	23	1
	7	1.9	164	25	1
	8	3	198	26	1
	9	4.8	224	28	1
	10	2.6	180	27	1
	11	2.1	206	28	1
	12	1.4	191	24	1
	13	1.9	187	26	1
	14	4.1	160	29	1
	15	2.8	213	28	1
	16	4.7	202	26	1
	17	2.8	184	24	1
	18	4.8	211	23	1
	19	1.2	187	29	1
	20	4.3	208	23	1
	21	1.9	218	26	1
	22	4.4	161	29	1
	23	1.7	161	24	1
	24	1.6	204	25	1
	25	2.8	171	24	1
	26	2.7	207	24	1
	27	2.9	204	23	1
	28	1.4	219	29	1
	29	4.9	199	24	1
	30	2.3	191	26	1
	Detection Percentage				100% (> 60%)

Table 28. Statistical Performance Check – Radar Type 2, 5300 MHz

Statistical Performance Check – Radar Type 3

Radar Type	Trial #	Pulse Width 6 to 10 µsec	PRI 200 to 500 µsec	Pulses per Burst 16 to 18	Detection 1 = Yes, 0 = No
3	1	7.8	392	17	1
	2	7.8	364	17	1
	3	6.4	461	17	1
	4	8.1	419	16	1
	5	5.6	379	18	1
	6	8.1	439	16	1
	7	7.5	271	16	1
	8	7	278	16	1
	9	9.4	491	18	1
	10	7.6	260	18	1
	11	7.4	462	18	1
	12	8.3	344	17	1
	13	7.7	324	17	1
	14	9.8	308	16	1
	15	8.1	288	17	1
	16	9.2	368	16	1
	17	7.5	305	16	1
	18	9.3	292	17	1
	19	5	292	16	1
	20	5.3	460	16	1
	21	8.8	464	18	1
	22	7.7	461	16	1
	23	7.2	257	16	1
	24	6.1	328	18	1
	25	5.3	324	17	1
	26	6.1	452	16	1
	27	7.8	454	18	1
	28	5.8	287	16	1
	29	5.1	440	17	1
	30	8.4	441	16	1
	Detection Percentage				100% (> 60%)

Table 29. Statistical Performance Check – Radar Type 3, 5300 MHz

Statistical Performance Check – Radar Type 4

Radar Type	Trial #	Pulse Width 11 to 20 µsec	PRI 200 to 500 µsec	Pulses per Burst 12 to 16	Detection 1 = Yes, 0 = No
4	1	19.2	250	16	1
	2	18.7	307	15	1
	3	19.5	418	14	1
	4	13.2	351	15	1
	5	19.4	373	14	1
	6	13.3	355	16	1
	7	18.3	375	13	1
	8	13.9	370	13	1
	9	19.9	472	14	1
	10	18.4	354	12	1
	11	18.3	282	14	1
	12	19	413	16	1
	13	16.2	317	14	1
	14	10.5	375	14	1
	15	16.1	411	15	1
	16	15.9	412	13	1
	17	11.5	386	16	1
	18	10.3	321	12	1
	19	16.8	344	14	1
	20	15.8	324	14	1
	21	19	390	16	1
	22	14.3	261	13	1
	23	19.8	484	12	1
	24	14.1	380	13	1
	25	15.5	368	14	1
	26	13.9	293	14	1
	27	17	299	12	1
	28	12.9	292	14	1
	29	19.8	421	14	1
	30	17.8	335	14	1
	Detection Percentage				100% (> 60%)

Table 30. Statistical Performance Check – Radar Type 4, 5300 MHz

Statistical Performance Check – Radar Type 5

Radar Type	Trial #	Filename*	Detection
			1 = Yes, 0 = No
5	1	bin5-trial 1	1
	2	bin5-trial 2	1
	3	bin5-trial 3	1
	4	bin5-trial 4	1
	5	bin5-trial 5	1
	6	bin5-trial 6	1
	7	bin5-trial 7	1
	8	bin5-trial 8	1
	9	bin5-trial 9	1
	10	bin5-trial 10	1
	11	bin5-trial 11	1
	12	bin5-trial 12	1
	13	bin5-trial 13	1
	14	bin5-trial 14	1
	15	bin5-trial 15	1
	16	bin5-trial 16	1
	17	bin5-trial 17	1
	18	bin5-trial 18	1
	19	bin5-trial 19	1
	20	bin5-trial 20	1
	21	bin5-trial 21	1
	22	bin5-trial 22	1
	23	bin5-trial 23	1
	24	bin5-trial 24	1
	25	bin5-trial 25	1
	26	bin5-trial 26	1
	27	bin5-trial 27	1
	28	bin5-trial 28	1
	29	bin5-trial 29	1
	30	bin5-trial 30	1
	Detection Percentage		**100% (> 60%)**

Table 31. Statistical Performance Check – Radar Type 5, 5300 MHz

Note: See Appendix for Bin 5 test data.

Statistical Performance Check – Radar Type 6

Radar Type	Trial #	Frequency (MHz)	Pulses/Hop	Pulse Width (µsec)	PRI (µsec)	Detection
						1 = Yes, 0 = No
6	1	5580	9	1	333	1
	2	5580	9	1	333	1
	3	5580	9	1	333	1
	4	5580	9	1	333	1
	5	5580	9	1	333	1
	6	5580	9	1	333	1
	7	5580	9	1	333	1
	8	5580	9	1	333	1
	9	5580	9	1	333	1
	10	5580	9	1	333	1
	11	5580	9	1	333	1
	12	5580	9	1	333	0
	13	5580	9	1	333	1
	14	5580	9	1	333	1
	15	5580	9	1	333	1
	16	5580	9	1	333	1
	17	5580	9	1	333	1
	18	5580	9	1	333	1
	19	5580	9	1	333	1
	20	5580	9	1	333	1
	21	5580	9	1	333	1
	22	5580	9	1	333	1
	23	5580	9	1	333	1
	24	5580	9	1	333	1
	25	5580	9	1	333	1
	26	5580	9	1	333	1
	27	5580	9	1	333	1
	28	5580	9	1	333	1
	29	5580	9	1	333	1
	30	5580	9	1	333	1
	Detection Percentage					96.7% (> 60%)

Table 32. Statistical Performance Check – Radar Type 6, 5300 MHz

Statistical Performance Check – Radar Type 1

Radar Type	Trial #	Pulses per Burst	Pulse Width (µsec)	PRI (µsec)	Detection
					1 = Yes, 0 = No
1	1	18	1	1428	1
	2	18	1	1428	1
	3	18	1	1428	1
	4	18	1	1428	1
	5	18	1	1428	1
	6	18	1	1428	1
	7	18	1	1428	1
	8	18	1	1428	1
	9	18	1	1428	1
	10	18	1	1428	1
	11	18	1	1428	1
	12	18	1	1428	1
	13	18	1	1428	1
	14	18	1	1428	1
	15	18	1	1428	1
	16	18	1	1428	1
	17	18	1	1428	1
	18	18	1	1428	1
	19	18	1	1428	1
	20	18	1	1428	1
	21	18	1	1428	1
	22	18	1	1428	1
	23	18	1	1428	1
	24	18	1	1428	1
	25	18	1	1428	1
	26	18	1	1428	1
	27	18	1	1428	0
	28	18	1	1428	1
	29	18	1	1428	1
	30	18	1	1428	1
	Detection Percentage				96.7% (> 60%)

Table 33. Statistical Performance Check – Radar Type 1, 5550 MHz

Statistical Performance Check – Radar Type 2

Radar Type	Trial #	Pulse Width 1 to 5 µsec	PRI 150 to 230 µsec	Pulses per Burst 23 to 29	Detection 1 = Yes, 0 = No
2	1	2.6	221	24	1
	2	3.7	170	28	1
	3	4.4	159	23	1
	4	3.5	187	24	1
	5	4.4	168	23	1
	6	3.5	156	23	1
	7	1.9	164	25	1
	8	3	198	26	1
	9	4.8	224	28	1
	10	2.6	180	27	1
	11	2.1	206	28	1
	12	1.4	191	24	1
	13	1.9	187	26	1
	14	4.1	160	29	1
	15	2.8	213	28	1
	16	4.7	202	26	1
	17	2.8	184	24	1
	18	4.8	211	23	1
	19	1.2	187	29	1
	20	4.3	208	23	1
	21	1.9	218	26	1
	22	4.4	161	29	1
	23	1.7	161	24	1
	24	1.6	204	25	1
	25	2.8	171	24	1
	26	2.7	207	24	1
	27	2.9	204	23	1
	28	1.4	219	29	1
	29	4.9	199	24	1
	30	2.3	191	26	1
	Detection Percentage				100% (> 60%)

Table 34. Statistical Performance Check – Radar Type 2, 5550 MHz

Statistical Performance Check – Radar Type 3

Radar Type	Trial #	Pulse Width 6 to 10 µsec	PRI 200 to 500 µsec	Pulses per Burst 16 to 18	Detection 1 = Yes, 0 = No
3	1	7.8	392	17	1
	2	7.8	364	17	1
	3	6.4	461	17	1
	4	8.1	419	16	1
	5	5.6	379	18	1
	6	8.1	439	16	1
	7	7.5	271	16	1
	8	7	278	16	1
	9	9.4	491	18	1
	10	7.6	260	18	1
	11	7.4	462	18	1
	12	8.3	344	17	1
	13	7.7	324	17	1
	14	9.8	308	16	1
	15	8.1	288	17	1
	16	9.2	368	16	1
	17	7.5	305	16	1
	18	9.3	292	17	1
	19	5	292	16	1
	20	5.3	460	16	1
	21	8.8	464	18	1
	22	7.7	461	16	1
	23	7.2	257	16	1
	24	6.1	328	18	1
	25	5.3	324	17	1
	26	6.1	452	16	1
	27	7.8	454	18	1
	28	5.8	287	16	1
	29	5.1	440	17	1
	30	8.4	441	16	1
	Detection Percentage				100% (> 60%)

Table 35. Statistical Performance Check – Radar Type 3, 5550 MHz

Statistical Performance Check – Radar Type 4

Radar Type	Trial #	Pulse Width 11 to 20 µsec	PRI 200 to 500 µsec	Pulses per Burst 12 to 16	Detection 1 = Yes, 0 = No
4	1	19.2	250	16	1
	2	18.7	307	15	1
	3	19.5	418	14	1
	4	13.2	351	15	1
	5	19.4	373	14	1
	6	13.3	355	16	1
	7	18.3	375	13	1
	8	13.9	370	13	1
	9	19.9	472	14	1
	10	18.4	354	12	1
	11	18.3	282	14	1
	12	19	413	16	1
	13	16.2	317	14	1
	14	10.5	375	14	1
	15	16.1	411	15	1
	16	15.9	412	13	1
	17	11.5	386	16	1
	18	10.3	321	12	1
	19	16.8	344	14	1
	20	15.8	324	14	1
	21	19	390	16	1
	22	14.3	261	13	1
	23	19.8	484	12	1
	24	14.1	380	13	1
	25	15.5	368	14	1
	26	13.9	293	14	1
	27	17	299	12	1
	28	12.9	292	14	1
	29	19.8	421	14	1
	30	17.8	335	14	1
	Detection Percentage				100% (> 60%)

Table 36. Statistical Performance Check – Radar Type 4, 5550 MHz

Statistical Performance Check – Radar Type 5

Radar Type	Trial #	Filename*	Detection
			1 = Yes, 0 = No
5	1	bin5-trial 1	1
	2	bin5-trial 2	1
	3	bin5-trial 3	1
	4	bin5-trial 4	1
	5	bin5-trial 5	1
	6	bin5-trial 6	1
	7	bin5-trial 7	1
	8	bin5-trial 8	1
	9	bin5-trial 9	1
	10	bin5-trial 10	1
	11	bin5-trial 11	1
	12	bin5-trial 12	1
	13	bin5-trial 13	1
	14	bin5-trial 14	1
	15	bin5-trial 15	1
	16	bin5-trial 16	1
	17	bin5-trial 17	1
	18	bin5-trial 18	1
	19	bin5-trial 19	1
	20	bin5-trial 20	1
	21	bin5-trial 21	1
	22	bin5-trial 22	1
	23	bin5-trial 23	1
	24	bin5-trial 24	1
	25	bin5-trial 25	1
	26	bin5-trial 26	1
	27	bin5-trial 27	1
	28	bin5-trial 28	1
	29	bin5-trial 29	1
	30	bin5-trial 30	1
	Detection Percentage		**100% (> 60%)**

Table 37. Statistical Performance Check – Radar Type 5, 5550 MHz

Note: See Appendix for Bin 5 test data.

Statistical Performance Check – Radar Type 6

Radar Type	Trial #	Frequency (MHz)	Pulses/Hop	Pulse Width (µsec)	PRI (µsec)	Detection
						1 = Yes, 0 = No
6	1	5580	9	1	333	1
	2	5580	9	1	333	1
	3	5580	9	1	333	1
	4	5580	9	1	333	1
	5	5580	9	1	333	1
	6	5580	9	1	333	1
	7	5580	9	1	333	1
	8	5580	9	1	333	1
	9	5580	9	1	333	1
	10	5580	9	1	333	1
	11	5580	9	1	333	1
	12	5580	9	1	333	1
	13	5580	9	1	333	1
	14	5580	9	1	333	1
	15	5580	9	1	333	1
	16	5580	9	1	333	1
	17	5580	9	1	333	1
	18	5580	9	1	333	1
	19	5580	9	1	333	1
	20	5580	9	1	333	1
	21	5580	9	1	333	1
	22	5580	9	1	333	1
	23	5580	9	1	333	1
	24	5580	9	1	333	1
	25	5580	9	1	333	1
	26	5580	9	1	333	1
	27	5580	9	1	333	1
	28	5580	9	1	333	1
	29	5580	9	1	333	1
	30	5580	9	1	333	1
	Detection Percentage					100% (> 60%)

Table 38. Statistical Performance Check – Radar Type 6, 5550 MHz

IV. Appendix A

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Waveform Num = 1
Num of Bursts = 13
Burst Interval (us) = 923077.0

Burst #	Off Time (us)	# Pulses	Chirp (MHz)	PW (us)	Pulse 1 Pri(us)	Pulse 2 Pri(us)	Pulse 3 Pri(us)	Start Loc (us)	Start Burst Interval(us)	End Burst Interval(us)
	414938									
1		3	5.0	58	1294	1056	1685	414938	0	923076
	784092									
2		1	19.0	90	1716	0	0	1203065	923077	1846153
	687327									
3		3	20.0	88	1058	1531	1586	1892108	1846154	2769230
	1673346									
4		2	6.0	82	1246	1083	0	3569629	2769231	3692307
	364146									
5		3	12.0	54	1736	1385	1674	3936104	3692308	4615384
	983619									
6		2	12.0	58	1422	1403	0	4924518	4615385	5538461
	1144259									
7		3	7.0	80	1695	1602	1791	6071602	5538462	6461538
	890810									
8		2	17.0	60	1648	1052	0	6967500	6461539	7384615
	827939									
9		2	16.0	92	1282	1165	0	7798139	7384616	8307692
	543508									
10		3	7.0	83	1420	1992	1379	8344094	8307693	9230769
	1021174									
11		2	15.0	61	1256	1322	0	9370059	9230770	10153846
	1130316									
12		2	18.0	98	1355	1147	0	10502953	10153847	11076923
	730427									
13		3	17.0	87	1299	1720	1521	11235882	11076924	12000000

Total number of pulses in waveform = 31

Waveform Num = 2
Num of Bursts = 15
Burst Interval (us) = 800000.0

Burst #	Off Time (us)	# Pulses	Chirp (MHz)	PW (us)	Pulse 1 Pri(us)	Pulse 2 Pri(us)	Pulse 3 Pri(us)	Start Loc (us)	Start Burst Interval(us)	End Burst Interval(us)
	492918									
1		1	6.0	86	1208	0	0	492918	0	799999
	437812									
2		3	14.0	95	1213	1548	1729	931938	800000	1599999
	994049									
3		1	15.0	86	1199	0	0	1930477	1600000	2399999
	1156255									
4		1	10.0	67	1133	0	0	3087931	2400000	3199999

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574396									
5	2	12.0	61	1879	1072	0	3663460	3200000	3999999
1061533									
6	2	16.0	61	1951	1690	0	4727944	4000000	4799999
719977									
7	2	7.0	85	1529	1548	0	5451562	4800000	5599999
331164									
8	3	6.0	88	1177	1487	1421	5785803	5600000	6399999
619185									
9	3	5.0	67	1554	1515	1000	6409073	6400000	7199999
1464192									
10	1	17.0	89	1238	0	0	7877334	7200000	7999999
130425									
11	1	8.0	78	1723	0	0	8008997	8000000	8799999
1081596									
12	1	5.0	52	1361	0	0	9092316	8800000	9599999
1289453									
13	2	10.0	50	1574	1898	0	10383130	9600000	10399999
195359									
14	3	20.0	65	1337	1258	1360	10581961	10400000	11199999
1264263									
15	2	10.0	70	1066	1317	0	11850179	11200000	11999999

Total number of pulses in waveform = 28

Waveform Num = 3
Num of Bursts = 16
Burst Interval (us) = 750000.0

Burst #	Off Time (us)	# Pulses	Chirp (MHz)	PW (us)	Pulse 1 Pri(us)	Pulse 2 Pri(us)	Pulse 3 Pri(us)	Start Loc (us)	Start Burst Interval(us)	End Burst Interval(us)
	90271									
1		2	11.0	61	1333	1203	0	90271	0	749999
	681146									
2		1	8.0	92	1242	0	0	773953	750000	1499999
	1283985									
3		1	11.0	72	1368	0	0	2059180	1500000	2249999
	832587									
4		3	19.0	97	1834	1174	1717	2893135	2250000	2999999
	163186									
5		1	5.0	78	1518	0	0	3061046	3000000	3749999
	950216									
6		3	18.0	65	1807	1074	1797	4012780	3750000	4499999
	577013									
7		2	19.0	96	1262	1953	0	4594471	4500000	5249999
	1096395									
8		1	12.0	92	1451	0	0	5694081	5250000	5999999
	677758									
9		1	6.0	50	1530	0	0	6373290	6000000	6749999

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10	954299	3	14.0	75	1336	1294	1889	7329119	6750000	7499999
11	192679	2	5.0	73	1996	1122	0	7526317	7500000	8249999
12	1431327	1	8.0	99	1343	0	0	8960762	8250000	8999999
13	409403	1	14.0	100	1453	0	0	9371508	9000000	9749999
14	767960	1	5.0	56	1845	0	0	10140921	9750000	10499999
15	737688	3	13.0	84	1107	1936	1554	10880454	10500000	11249999
16	998044	3	18.0	100	1629	1504	1648	11883095	11250000	11999999

Total number of pulses in waveform = 29

Waveform Num = 4
Num of Bursts = 12
Burst Interval (us) = 1000000.0

Burst #	Off Time (us)	# Pulses	Chirp (MHz)	PW (us)	Pulse 1 Pri(us)	Pulse 2 Pri(us)	Pulse 3 Pri(us)	Start Loc (us)	Start Burst Interval(us)	End Burst Interval(us)
1	168701	3	8.0	89	1372	1278	1289	168701	0	999999
2	1032886	2	20.0	63	1729	1706	0	1205526	1000000	1999999
3	1250497	2	16.0	60	1680	1462	0	2459458	2000000	2999999
4	1389693	3	15.0	86	1331	1682	1669	3852293	3000000	3999999
5	471132	2	10.0	70	1779	1112	0	4328107	4000000	4999999
6	1180325	3	14.0	80	1266	1244	1898	5511323	5000000	5999999
7	988233	1	5.0	91	1730	0	0	6503964	6000000	6999999
8	821855	2	9.0	92	1437	1447	0	7327549	7000000	7999999
9	1514790	1	14.0	72	1216	0	0	8845223	8000000	8999999
10	1045921	2	14.0	60	1740	1922	0	9892360	9000000	9999999
11	574413	3	17.0	70	1578	1155	1387	10470435	10000000	10999999
12	1010451	3	12.0	99	1271	1229	1752	11485006	11000000	11999999

Total number of pulses in waveform = 27

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Waveform Num = 5
Num of Bursts = 10
Burst Interval (us) = 1200000.0

Burst #	Off Time (us)	# Pulses	Chirp (MHz)	PW (us)	Pulse 1 Pri(us)	Pulse 2 Pri(us)	Pulse 3 Pri(us)	Start Loc (us)	Start Burst Interval(us)	End Burst Interval(us)
	936839									
1		2	8.0	85	1532	1682	0	936839	0	1199999
	1001021									
2		1	20.0	86	1443	0	0	1941074	1200000	2399999
	946979									
3		3	17.0	65	1433	1125	1329	2889496	2400000	3599999
	1520829									
4		1	15.0	79	1320	0	0	4414212	3600000	4799999
	588530									
5		2	16.0	76	1026	1950	0	5004062	4800000	5999999
	2065898									
6		2	8.0	67	1061	1005	0	7072936	6000000	7199999
	275447									
7		3	11.0	54	1279	1390	1579	7350449	7200000	8399999
	2053206									
8		3	19.0	83	1816	1015	1836	9407903	8400000	9599999
	1309313									
9		3	18.0	85	1601	1213	1150	10721883	9600000	10799999
	685814									
10		1	19.0	78	1844	0	0	11411661	10800000	11999999

Total number of pulses in waveform = 21

Waveform Num = 6
Num of Bursts = 15
Burst Interval (us) = 800000.0

Burst #	Off Time (us)	# Pulses	Chirp (MHz)	PW (us)	Pulse 1 Pri(us)	Pulse 2 Pri(us)	Pulse 3 Pri(us)	Start Loc (us)	Start Burst Interval(us)	End Burst Interval(us)
	702490									
1		2	11.0	90	1676	1955	0	702490	0	799999
	642032									
2		1	19.0	94	1627	0	0	1348153	800000	1599999
	373246									
3		3	14.0	75	1131	1040	1372	1723026	1600000	2399999
	1111397									
4		2	16.0	94	1888	1117	0	2837966	2400000	3199999
	633487									
5		2	16.0	96	1659	1985	0	3474458	3200000	3999999
	1087418									
6		3	16.0	50	1514	1260	1093	4565520	4000000	4799999
	519960									
7		3	6.0	58	1486	1234	1595	5089347	4800000	5599999

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8	675122	3	18.0	97	1098	1033	1876	5768784	5600000	6399999
9	879860	2	15.0	88	1202	1495	0	6652651	6400000	7199999
10	852725	1	13.0	56	1489	0	0	7508073	7200000	7999999
11	1063868	1	15.0	62	1978	0	0	8573430	8000000	8799999
12	618392	1	8.0	61	1431	0	0	9193800	8800000	9599999
13	1143574	1	13.0	52	1596	0	0	10338805	9600000	10399999
14	760543	2	13.0	60	1836	1006	0	11100944	10400000	11199999
15	267725	3	10.0	78	1943	1416	1195	11371511	11200000	11999999

Total number of pulses in waveform = 30

Waveform Num = 7
Num of Bursts = 16
Burst Interval (us) = 750000.0

Burst #	Off Time (us)	# Pulses	Chirp (MHz)	PW (us)	Pulse 1 Pri(us)	Pulse 2 Pri(us)	Pulse 3 Pri(us)	Start Loc (us)	Start Burst Interval(us)	End Burst Interval(us)
1	261618	3	5.0	52	1684	1616	1176	261618	0	749999
2	976621	3	14.0	83	1063	1186	1408	1242715	750000	1499999
3	789089	2	19.0	58	1218	1388	0	2035461	1500000	2249999
4	726379	2	13.0	57	1593	1126	0	2764446	2250000	2999999
5	583831	3	16.0	54	1230	1366	1124	3350996	3000000	3749999
6	582541	2	11.0	96	1622	1368	0	3937257	3750000	4499999
7	1107312	1	12.0	88	1996	0	0	5047559	4500000	5249999
8	709330	1	13.0	96	1305	0	0	5758885	5250000	5999999
9	888610	2	15.0	56	1931	1736	0	6648800	6000000	6749999
10	620969	2	15.0	75	1950	1113	0	7273436	6750000	7499999
11	827348	3	15.0	83	1382	1592	1400	8103847	7500000	8249999
12	296898	2	17.0	78	1003	1824	0	8405119	8250000	8999999

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685671									
13	1	17.0	81	1022	0	0	9093617	9000000	9749999
746116									
14	2	11.0	65	1900	1042	0	9840755	9750000	10499999
1174050									
15	2	19.0	94	1141	1797	0	11017747	10500000	11249999
268227									
16	3	17.0	76	1154	1609	1115	11288912	11250000	11999999

Total number of pulses in waveform = 34

Waveform Num = 8
Num of Bursts = 15
Burst Interval (us) = 800000.0

Burst #	Off Time (us)	# Pulses	Chirp (MHz)	PW (us)	Pulse 1 Pri(us)	Pulse 2 Pri(us)	Pulse 3 Pri(us)	Start Loc (us)	Start Burst Interval(us)	End Burst Interval(us)
	623190									
1		1	13.0	69	1924	0	0	623190	0	799999
	522422									
2		2	15.0	63	1288	1689	0	1147536	800000	1599999
	749626									
3		3	6.0	67	1427	1118	1333	1900139	1600000	2399999
	603252									
4		1	19.0	80	1529	0	0	2507269	2400000	3199999
	1298721									
5		1	5.0	67	1719	0	0	3807519	3200000	3999999
	219315									
6		2	14.0	66	1287	1643	0	4028553	4000000	4799999
	778429									
7		3	17.0	61	1848	1846	1611	4809912	4800000	5599999
	1339582									
8		2	8.0	81	1521	1563	0	6154799	5600000	6399999
	1034044									
9		1	11.0	84	1643	0	0	7191927	6400000	7199999
	561474									
10		3	20.0	67	1935	1639	1278	7755044	7200000	7999999
	943730									
11		1	7.0	52	1701	0	0	8703626	8000000	8799999
	188530									
12		2	7.0	87	1743	1408	0	8893857	8800000	9599999
	1454905									
13		3	13.0	97	1175	1620	1371	10351913	9600000	10399999
	64608									
14		3	14.0	97	1920	2000	1568	10420687	10400000	11199999
	1227550									
15		1	19.0	64	1094	0	0	11653725	11200000	11999999

Total number of pulses in waveform = 29

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Waveform Num = 9
Num of Bursts = 15
Burst Interval (us) = 800000.0

Burst #	Off Time (us)	# Pulses	Chirp (MHz)	PW (us)	Pulse 1 Pri(us)	Pulse 2 Pri(us)	Pulse 3 Pri(us)	Start Loc (us)	Start Burst Interval(us)	End Burst Interval(us)
1	624587	2	7.0	65	1105	1263	0	624587	0	799999
2	647552	1	5.0	75	1996	0	0	1274507	800000	1599999
3	798237	2	19.0	64	1526	1262	0	2074740	1600000	2399999
4	633603	1	10.0	51	1946	0	0	2711131	2400000	3199999
5	917878	1	19.0	81	1925	0	0	3630955	3200000	3999999
6	816543	1	12.0	85	1206	0	0	4449423	4000000	4799999
7	797923	3	12.0	50	1326	1142	1538	5248552	4800000	5599999
8	424232	1	18.0	77	1578	0	0	5676790	5600000	6399999
9	1233843	3	5.0	91	1619	1913	1908	6912211	6400000	7199999
10	575945	2	10.0	99	1544	1946	0	7493596	7200000	7999999
11	525751	3	9.0	50	1264	1673	1404	8022837	8000000	8799999
12	1376266	2	20.0	80	1639	1935	0	9403444	8800000	9599999
13	486952	1	6.0	67	1707	0	0	9893970	9600000	10399999
14	942684	1	17.0	58	1779	0	0	10838361	10400000	11199999
15	951634	1	5.0	69	1653	0	0	11791774	11200000	11999999

Total number of pulses in waveform = 25

Waveform Num = 10
Num of Bursts = 17
Burst Interval (us) = 705882.0

Burst #	Off Time (us)	# Pulses	Chirp (MHz)	PW (us)	Pulse 1 Pri(us)	Pulse 2 Pri(us)	Pulse 3 Pri(us)	Start Loc (us)	Start Burst Interval(us)	End Burst Interval(us)
1	162902	2	15.0	92	1954	1560	0	162902	0	705881
2	994900	1	7.0	68	1008	0	0	1161316	705882	1411763

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3	869715	1	12.0	65	1948	0	0	2032039	1411764	2117645
4	699173	2	16.0	91	1756	1999	0	2733160	2117646	2823527
5	191711	2	19.0	93	1681	1228	0	2928626	2823528	3529409
6	938090	3	6.0	84	1663	1672	1903	3869625	3529410	4235291
7	506790	2	14.0	57	1875	1817	0	4381653	4235292	4941173
8	716034	1	10.0	81	1529	0	0	5101379	4941174	5647055
9	742864	3	13.0	95	1871	1810	1344	5845772	5647056	6352937
10	740419	1	8.0	50	1936	0	0	6591216	6352938	7058819
11	604212	3	5.0	88	1233	1355	1558	7197364	7058820	7764701
12	578749	1	9.0	100	1467	0	0	7780259	7764702	8470583
13	1325160	1	6.0	70	1435	0	0	9106886	8470584	9176465
14	293966	1	11.0	70	1882	0	0	9402287	9176466	9882347
15	541109	1	15.0	63	1380	0	0	9945278	9882348	10588229
16	642587	1	13.0	81	1468	0	0	10589245	10588230	11294111
17	897391	1	11.0	90	1709	0	0	11488104	11294112	11999993

Total number of pulses in waveform = 27

Waveform Num = 11
Num of Bursts = 17
Burst Interval (us) = 705882.0

Burst #	Off Time (us)	# Pulses	Chirp (MHz)	PW (us)	Pulse 1 Pri(us)	Pulse 2 Pri(us)	Pulse 3 Pri(us)	Start Loc (us)	Start Burst Interval(us)	End Burst Interval(us)
1	500755	1	7.0	98	1174	0	0	500755	0	705881
2	839025	1	5.0	94	1462	0	0	1340954	705882	1411763
3	336979	1	20.0	62	1851	0	0	1679395	1411764	2117645
4	850913	1	9.0	68	1457	0	0	2532159	2117646	2823527
5	837688	1	12.0	86	1850	0	0	3371304	2823528	3529409

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601760									
6	1	10.0	80	1369	0	0	3974914	3529410	4235291
293226									
7	1	18.0	57	1452	0	0	4269509	4235292	4941173
882185									
8	2	13.0	71	1583	1720	0	5153146	4941174	5647055
883782									
9	2	10.0	57	1642	1768	0	6040231	5647056	6352937
906693									
10	3	12.0	75	1761	1165	1037	6950334	6352938	7058819
633429									
11	2	16.0	64	1912	1524	0	7587726	7058820	7764701
706145									
12	1	9.0	75	1452	0	0	8297307	7764702	8470583
271585									
13	1	19.0	64	1589	0	0	8570344	8470584	9176465
846922									
14	3	13.0	62	1718	1417	1923	9418855	9176466	9882347
925578									
15	1	15.0	71	1132	0	0	10349491	9882348	10588229
786328									
16	3	16.0	91	1021	1618	1738	11136951	10588230	11294111
772411									
17	3	10.0	91	1047	1071	1383	11913739	11294112	11999993

Total number of pulses in waveform = 28

Waveform Num = 12
Num of Bursts = 19
Burst Interval (us) = 631579.0

Burst #	Off Time (us)	# Pulses	Chirp (MHz)	PW (us)	Pulse 1 Pri(us)	Pulse 2 Pri(us)	Pulse 3 Pri(us)	Start Loc (us)	Start Burst Interval(us)	End Burst Interval(us)
	267006									
1		1	16.0	74	1015	0	0	267006	0	631578
	673921									
2		2	11.0	95	1914	1093	0	941942	631579	1263157
	669991									
3		3	9.0	64	1910	1867	1603	1614940	1263158	1894736
	800742									
4		2	5.0	63	1383	1403	0	2421062	1894737	2526315
	311868									
5		3	15.0	62	1916	1865	1387	2735716	2526316	3157894
	886416									
6		2	18.0	58	1915	1121	0	3627300	3157895	3789473
	426299									
7		2	9.0	70	1376	1613	0	4056635	3789474	4421052
	773367									
8		1	5.0	82	1547	0	0	4832991	4421053	5052631

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9	692943	2	15.0	79	1422	1861	0	5527481	5052632	5684210
10	282583	3	18.0	97	1427	1996	1612	5813347	5684211	6315789
11	732837	2	19.0	71	1305	1121	0	6551219	6315790	6947368
12	805512	1	19.0	50	1763	0	0	7359157	6947369	7578947
13	434282	2	14.0	80	1057	1287	0	7795202	7578948	8210526
14	884888	1	18.0	69	1492	0	0	8682434	8210527	8842105
15	754666	2	5.0	59	1124	1808	0	9438592	8842106	9473684
16	231396	3	16.0	62	1168	1768	1754	9672920	9473685	10105263
17	916858	3	20.0	61	1451	1061	1516	10594468	10105264	10736842
18	161510	1	15.0	99	1111	0	0	10760006	10736843	11368421
19	1088512	3	20.0	79	1335	1600	1754	11849629	11368422	12000000

Total number of pulses in waveform = 39

Waveform Num = 13
Num of Bursts = 10
Burst Interval (us) = 1200000.0

Burst #	Off Time (us)	# Pulses	Chirp (MHz)	PW (us)	Pulse 1 Pri(us)	Pulse 2 Pri(us)	Pulse 3 Pri(us)	Start Loc (us)	Start Burst Interval(us)	End Burst Interval(us)
1	864717	2	8.0	86	1942	1987	0	864717	0	1199999
2	1027037	3	12.0	70	1279	1254	1115	1895683	1200000	2399999
3	1489924	3	14.0	81	1656	1740	1286	3389255	2400000	3599999
4	759257	3	11.0	97	1227	1688	1668	4153194	3600000	4799999
5	1271913	2	15.0	57	1699	1022	0	5429690	4800000	5999999
6	656618	3	18.0	81	1745	1804	1432	6089029	6000000	7199999
7	2008734	1	16.0	100	1202	0	0	8102744	7200000	8399999
8	497291	2	19.0	69	1020	1840	0	8601237	8400000	9599999
9	1578429	1	6.0	54	1191	0	0	10182526	9600000	10799999

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	776067								
10		3	18.0	92	1550	1038	1229	10959784	10800000	11999999

Total number of pulses in waveform = 23

Waveform Num = 14
Num of Bursts = 15
Burst Interval (us) = 800000.0

Burst #	Off Time (us)	# Pulses	Chirp (MHz)	PW (us)	Pulse 1 Pri(us)	Pulse 2 Pri(us)	Pulse 3 Pri(us)	Start Loc (us)	Start Burst Interval(us)	End Burst Interval(us)
	55476									
1		1	13.0	56	1455	0	0	55476	0	799999
	1301623									
2		3	17.0	92	1866	1396	1979	1358554	800000	1599999
	807093									
3		2	18.0	84	1490	1710	0	2170888	1600000	2399999
	444071									
4		1	6.0	78	1600	0	0	2618159	2400000	3199999
	1276985									
5		3	15.0	73	1440	1949	1135	3896744	3200000	3999999
	738097									
6		2	13.0	100	1001	1949	0	4639365	4000000	4799999
	861729									
7		2	9.0	94	1103	1954	0	5504044	4800000	5599999
	254872									
8		2	13.0	52	1977	1529	0	5761973	5600000	6399999
	886734									
9		2	6.0	60	1430	1108	0	6652213	6400000	7199999
	758509									
10		2	18.0	70	1232	1755	0	7413260	7200000	7999999
	868331									
11		3	11.0	58	1158	1692	1935	8284578	8000000	8799999
	702470									
12		1	16.0	86	1762	0	0	8991833	8800000	9599999
	1224336									
13		3	17.0	55	1358	1513	1754	10217931	9600000	10399999
	659294									
14		1	6.0	65	1525	0	0	10881850	10400000	11199999
	1104541									
15		3	7.0	91	1961	1244	1339	11987916	11200000	11999999

Total number of pulses in waveform = 31

Waveform Num = 15
Num of Bursts = 15
Burst Interval (us) = 800000.0

Burst #	Off Time (us)	# Pulses	Chirp (MHz)	PW (us)	Pulse 1 Pri(us)	Pulse 2 Pri(us)	Pulse 3 Pri(us)	Start Loc (us)	Start Burst Interval(us)	End Burst Interval(us)

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1	471596	1	8.0	75	1290	0	0	471596	0	799999
2	548997	2	13.0	98	1401	1183	0	1021883	800000	1599999
3	749442	2	15.0	74	1351	1479	0	1773909	1600000	2399999
4	1390970	3	19.0	65	1148	1265	1992	3167709	2400000	3199999
5	136002	2	10.0	95	1903	1051	0	3308116	3200000	3999999
6	1434436	1	19.0	92	1747	0	0	4745506	4000000	4799999
7	469005	2	11.0	57	1874	1048	0	5216258	4800000	5599999
8	726711	3	15.0	71	1682	1406	1209	5945891	5600000	6399999
9	544683	3	20.0	50	1848	1273	1633	6494871	6400000	7199999
10	1120874	2	15.0	52	1629	1721	0	7620499	7200000	7999999
11	471366	1	13.0	73	1096	0	0	8095215	8000000	8799999
12	822860	1	17.0	51	1052	0	0	8919171	8800000	9599999
13	714751	3	13.0	96	1239	1381	1374	9634974	9600000	10399999
14	1490806	1	9.0	61	1551	0	0	11129774	10400000	11199999
15	423634	2	18.0	72	1282	1770	0	11554959	11200000	11999999

Total number of pulses in waveform = 29

Waveform Num = 16
Num of Bursts = 15
Burst Interval (us) = 800000.0

Burst #	Off Time (us)	# Pulses	Chirp (MHz)	PW (us)	Pulse 1 Pri(us)	Pulse 2 Pri(us)	Pulse 3 Pri(us)	Start Loc (us)	Start Burst Interval(us)	End Burst Interval(us)
1	152451	1	7.0	55	1978	0	0	152451	0	799999
2	958771	2	15.0	65	1843	1665	0	1113200	800000	1599999
3	925128	2	13.0	87	1024	1462	0	2041836	1600000	2399999
4	935728	3	17.0	66	1852	1364	1926	2980050	2400000	3199999
5	703816	1	9.0	73	1378	0	0	3689008	3200000	3999999

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6	881583	2	19.0	60	1885	1854	0	4571969	4000000	4799999
7	951941	1	10.0	54	1103	0	0	5527649	4800000	5599999
8	82174	1	17.0	54	1289	0	0	5610926	5600000	6399999
9	949984	1	7.0	87	1034	0	0	6562199	6400000	7199999
10	1404442	1	12.0	78	1180	0	0	7967675	7200000	7999999
11	249814	3	9.0	78	1693	1644	1356	8218669	8000000	8799999
12	1236648	3	13.0	98	1070	1301	1605	9460010	8800000	9599999
13	383064	2	20.0	84	1037	1411	0	9847050	9600000	10399999
14	1115191	3	10.0	94	1050	1670	1438	10964689	10400000	11199999
15	641943	1	9.0	69	1259	0	0	11610790	11200000	11999999

Total number of pulses in waveform = 27

Waveform Num = 17
Num of Bursts = 16
Burst Interval (us) = 750000.0

Burst #	Off Time (us)	# Pulses	Chirp (MHz)	PW (us)	Pulse 1 Pri(us)	Pulse 2 Pri(us)	Pulse 3 Pri(us)	Start Loc (us)	Start Burst Interval(us)	End Burst Interval(us)
1	398711	3	13.0	61	1250	1285	1467	398711	0	749999
2	716593	3	17.0	80	1012	1863	1822	1119306	750000	1499999
3	579106	2	5.0	64	1373	1964	0	1703109	1500000	2249999
4	731171	1	10.0	99	1222	0	0	2437617	2250000	2999999
5	574289	3	15.0	58	1669	1281	1272	3013128	3000000	3749999
6	850616	3	16.0	81	1389	1599	1698	3867966	3750000	4499999
7	728842	3	5.0	81	1180	1851	1237	4601494	4500000	5249999
8	759848	2	9.0	56	1220	1016	0	5365610	5250000	5999999
9	1222484	2	9.0	54	1074	1608	0	6590330	6000000	6749999
10	762425	1	18.0	66	1429	0	0	7355437	6750000	7499999

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193674									
11	1	13.0	56	1992	0	0	7550540	7500000	8249999
1002851									
12	3	15.0	76	1876	1493	1748	8555383	8250000	8999999
1153650									
13	1	11.0	54	1341	0	0	9714150	9000000	9749999
660492									
14	3	20.0	100	1852	1488	1491	10375983	9750000	10499999
820859									
15	3	6.0	75	1561	1304	1355	11201673	10500000	11249999
178670									
16	3	14.0	77	1815	1170	1830	11384563	11250000	11999999

Total number of pulses in waveform = 37

Waveform Num = 18
Num of Bursts = 8
Burst Interval (us) = 1500000.0

Burst #	Off Time (us)	# Pulses	Chirp (MHz)	PW (us)	Pulse 1 Pri(us)	Pulse 2 Pri(us)	Pulse 3 Pri(us)	Start Loc (us)	Start Burst Interval(us)	End Burst Interval(us)
	345365									
1		3	14.0	71	1585	1742	1216	345365	0	1499999
	2186850									
2		2	13.0	53	1842	1292	0	2536758	1500000	2999999
	473492									
3		3	19.0	100	1548	1886	1135	3013384	3000000	4499999
	2337626									
4		3	11.0	69	1083	1390	1926	5355579	4500000	5999999
	1691738									
5		2	16.0	71	1648	1065	0	7051716	6000000	7499999
	1814924									
6		1	18.0	91	1283	0	0	8869353	7500000	8999999
	221108									
7		3	20.0	96	1313	1033	1291	9091744	9000000	10499999
	2791284									
8		2	19.0	82	1122	1417	0	11886665	10500000	11999999

Total number of pulses in waveform = 19

Waveform Num = 19
Num of Bursts = 13
Burst Interval (us) = 923077.0

Burst #	Off Time (us)	# Pulses	Chirp (MHz)	PW (us)	Pulse 1 Pri(us)	Pulse 2 Pri(us)	Pulse 3 Pri(us)	Start Loc (us)	Start Burst Interval(us)	End Burst Interval(us)
	771612									
1		1	10.0	57	1606	0	0	771612	0	923076
	845251									
2		1	16.0	50	1029	0	0	1618469	923077	1846153

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3	550523	3	5.0	63	1645	1400	1712	2170021	1846154	2769230
4	807145	1	5.0	91	1199	0	0	2981923	2769231	3692307
5	1593615	1	18.0	51	1181	0	0	4576737	3692308	4615384
6	765811	3	5.0	78	1127	1188	1881	5343729	4615385	5538461
7	802897	1	16.0	58	1270	0	0	6150822	5538462	6461538
8	1103448	1	12.0	79	1281	0	0	7255540	6461539	7384615
9	667957	2	14.0	69	1742	1001	0	7924778	7384616	8307692
10	921187	1	7.0	52	1704	0	0	8848708	8307693	9230769
11	645436	2	20.0	74	1081	1713	0	9495848	9230770	10153846
12	976466	3	7.0	99	1990	1847	1468	10475108	10153847	11076923
13	1338297	1	8.0	66	1567	0	0	11818710	11076924	12000000

Total number of pulses in waveform = 21

Waveform Num = 20
Num of Bursts = 12
Burst Interval (us) = 1000000.0

Burst #	Off Time (us)	# Pulses	Chirp (MHz)	PW (us)	Pulse 1 Pri(us)	Pulse 2 Pri(us)	Pulse 3 Pri(us)	Start Loc (us)	Start Burst Interval(us)	End Burst Interval(us)
1	248251	1	13.0	94	1900	0	0	248251	0	999999
2	968246	1	10.0	87	1659	0	0	1218397	1000000	1999999
3	855978	1	11.0	93	1508	0	0	2076034	2000000	2999999
4	1014524	2	7.0	75	1815	1240	0	3092066	3000000	3999999
5	1109557	3	15.0	52	1771	1083	1996	4204678	4000000	4999999
6	1650895	1	20.0	86	1966	0	0	5860423	5000000	5999999
7	538712	2	11.0	65	1838	1935	0	6401101	6000000	6999999
8	695963	2	19.0	84	1328	1644	0	7100837	7000000	7999999
9	1582344	3	12.0	71	1586	1504	1226	8686153	8000000	8999999

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826613									
10	2	6.0	53	1471	1271	0	9517082	9000000	9999999
733779									
11	2	19.0	52	1522	1670	0	10253603	10000000	10999999
1323538									
12	3	19.0	81	1874	1573	1810	11580333	11000000	11999999

Total number of pulses in waveform = 23

Waveform Num = 21
Num of Bursts = 19
Burst Interval (us) = 631579.0

Burst #	Off Time (us)	# Pulses	Chirp (MHz)	PW (us)	Pulse 1 Pri(us)	Pulse 2 Pri(us)	Pulse 3 Pri(us)	Start Loc (us)	Start Burst Interval(us)	End Burst Interval(us)
	582120									
1		1	7.0	74	1856	0	0	582120	0	631578
	349814									
2		3	14.0	70	1490	1836	1285	933790	631579	1263157
	640998									
3		1	16.0	96	1690	0	0	1579399	1263158	1894736
	504560									
4		2	10.0	93	1867	1106	0	2085649	1894737	2526315
	796624									
5		2	19.0	54	1218	1439	0	2885246	2526316	3157894
	509210									
6		3	14.0	68	1601	1288	1021	3397113	3157895	3789473
	420879									
7		3	13.0	75	1497	1019	1537	3821902	3789474	4421052
	1153949									
8		2	5.0	50	1247	1552	0	4979904	4421053	5052631
	442295									
9		1	7.0	92	1614	0	0	5424998	5052632	5684210
	515300									
10		3	15.0	70	1473	1944	1844	5941912	5684211	6315789
	823139									
11		1	15.0	89	1146	0	0	6770312	6315790	6947368
	507294									
12		2	16.0	91	1311	1499	0	7278752	6947369	7578947
	752217									
13		2	8.0	53	1758	1845	0	8033779	7578948	8210526
	248199									
14		3	20.0	92	1887	1848	1290	8285581	8210527	8842105
	879500									
15		2	11.0	77	1272	1521	0	9170106	8842106	9473684
	641691									
16		1	17.0	66	1328	0	0	9814590	9473685	10105263
	739571									
17		2	5.0	100	1105	1169	0	10555489	10105264	10736842

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	235399								
18		3	13.0	58	1642	1873	1615	10793162	10736843	11368421
	1085059								
19		1	10.0	51	1515	0	0	11883351	11368422	12000000

Total number of pulses in waveform = 38

Waveform Num = 22
Num of Bursts = 10
Burst Interval (us) = 1200000.0

Burst #	Off Time (us)	# Pulses	Chirp (MHz)	PW (us)	Pulse 1 Pri(us)	Pulse 2 Pri(us)	Pulse 3 Pri(us)	Start Loc (us)	Start Burst Interval(us)	End Burst Interval(us)
	658814									
1		1	8.0	55	1127	0	0	658814	0	1199999
	723695									
2		3	14.0	83	1207	1568	1920	1383636	1200000	2399999
	1792926									
3		1	9.0	63	1936	0	0	3181257	2400000	3599999
	550225									
4		3	8.0	91	1163	1419	1968	3733418	3600000	4799999
	2180477									
5		2	13.0	55	1125	1814	0	5918445	4800000	5999999
	148121									
6		1	18.0	75	1842	0	0	6069505	6000000	7199999
	1288641									
7		2	13.0	80	1905	1949	0	7359988	7200000	8399999
	1419672									
8		1	9.0	53	1779	0	0	8783514	8400000	9599999
	1894907									
9		1	13.0	66	1208	0	0	10680200	9600000	10799999
	1248782									
10		1	9.0	61	1471	0	0	11930190	10800000	11999999

Total number of pulses in waveform = 16

Waveform Num = 23
Num of Bursts = 9
Burst Interval (us) = 1333333.0

Burst #	Off Time (us)	# Pulses	Chirp (MHz)	PW (us)	Pulse 1 Pri(us)	Pulse 2 Pri(us)	Pulse 3 Pri(us)	Start Loc (us)	Start Burst Interval(us)	End Burst Interval(us)
	13366									
1		2	10.0	62	1906	1124	0	13366	0	1333332
	2084236									
2		3	18.0	56	1496	1347	1771	2100632	1333333	2666665
	1221381									
3		2	12.0	80	1542	1415	0	3326627	2666666	3999998
	1599524									
4		1	9.0	92	1572	0	0	4929108	3999999	5333331

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500246									
5	2	19.0	75	1183	1345	0	5430926	5333332	6666664
1836918									
6	1	11.0	65	1222	0	0	7270372	6666665	7999997
2028043									
7	2	6.0	79	1553	1271	0	9299637	7999998	9333330
845417									
8	3	15.0	93	1038	1920	1825	10147878	9333331	10666663
630084									
9	1	18.0	96	1883	0	0	10782745	10666664	11999996

Total number of pulses in waveform = 17

Waveform Num = 24
Num of Bursts = 14
Burst Interval (us) = 857143.0

Burst #	Off Time (us)	# Pulses	Chirp (MHz)	PW (us)	Pulse 1 Pri(us)	Pulse 2 Pri(us)	Pulse 3 Pri(us)	Start Loc (us)	Start Burst Interval(us)	End Burst Interval(us)
	8437									
1		3	7.0	80	1315	1860	1934	8437	0	857142
	1641779									
2		1	20.0	92	1505	0	0	1655325	857143	1714285
	111989									
3		1	10.0	58	1897	0	0	1768819	1714286	2571428
	1622189									
4		2	6.0	60	1692	1694	0	3392905	2571429	3428571
	677929									
5		3	9.0	60	1858	1747	1953	4074220	3428572	4285714
	893252									
6		3	15.0	52	1990	1993	1145	4973030	4285715	5142857
	801836									
7		3	6.0	78	1721	1459	1693	5779994	5142858	6000000
	1048597									
8		2	9.0	77	1585	1843	0	6833464	6000001	6857143
	126774									
9		1	10.0	66	1357	0	0	6963666	6857144	7714286
	1440631									
10		3	20.0	97	1924	1830	1428	8405654	7714287	8571429
	291828									
11		2	20.0	99	1290	1327	0	8702664	8571430	9428572
	1057684									
12		2	17.0	72	1037	1705	0	9762965	9428573	10285715
	1101322									
13		2	14.0	91	1158	1190	0	10867029	10285716	11142858
	973354									
14		3	15.0	90	1228	1518	1260	11842731	11142859	12000001

Total number of pulses in waveform = 31

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Waveform Num = 25
Num of Bursts = 12
Burst Interval (us) = 1000000.0

Burst #	Off Time (us)	# Pulses	Chirp (MHz)	PW (us)	Pulse 1 Pri(us)	Pulse 2 Pri(us)	Pulse 3 Pri(us)	Start Loc (us)	Start Burst Interval(us)	End Burst Interval(us)
	978074									
1		3	8.0	66	1347	1800	1360	978074	0	999999
	556012									
2		3	5.0	53	1592	1863	1368	1538593	1000000	1999999
	690940									
3		3	14.0	70	1203	1880	1818	2234356	2000000	2999999
	1194540									
4		2	17.0	95	1919	1806	0	3433797	3000000	3999999
	1414644									
5		2	8.0	90	1346	1162	0	4852166	4000000	4999999
	566128									
6		3	14.0	95	1796	1121	1893	5420802	5000000	5999999
	1396706									
7		1	6.0	100	1822	0	0	6822318	6000000	6999999
	454478									
8		1	7.0	67	1958	0	0	7278618	7000000	7999999
	780901									
9		1	10.0	74	1864	0	0	8061477	8000000	8999999
	1505294									
10		2	14.0	83	1057	1998	0	9568635	9000000	9999999
	570410									
11		3	13.0	95	1343	1108	1956	10142100	10000000	10999999
	1182006									
12		2	19.0	74	1027	1884	0	11328513	11000000	11999999

Total number of pulses in waveform = 26

Waveform Num = 26
Num of Bursts = 14
Burst Interval (us) = 857143.0

Burst #	Off Time (us)	# Pulses	Chirp (MHz)	PW (us)	Pulse 1 Pri(us)	Pulse 2 Pri(us)	Pulse 3 Pri(us)	Start Loc (us)	Start Burst Interval(us)	End Burst Interval(us)
	545488									
1		1	20.0	91	1213	0	0	545488	0	857142
	884007									
2		3	20.0	100	1131	1175	1398	1430708	857143	1714285
	682357									
3		1	11.0	61	1889	0	0	2116769	1714286	2571428
	1150637									
4		3	7.0	68	1419	1468	1737	3269295	2571429	3428571
	439835									
5		1	5.0	84	1370	0	0	3713754	3428572	4285714

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6	847750	1	17.0	86	1319	0	0	4562874	4285715	5142857
7	948383	2	9.0	61	1922	1366	0	5512576	5142858	6000000
8	890808	1	13.0	68	1284	0	0	6406672	6000001	6857143
9	1282940	1	17.0	54	1522	0	0	7690896	6857144	7714286
10	347880	3	16.0	52	1848	1682	1670	8040298	7714287	8571429
11	1058998	1	5.0	82	1283	0	0	9104496	8571430	9428572
12	1006758	2	18.0	73	1411	1956	0	10112537	9428573	10285715
13	317433	3	18.0	85	1137	1103	1791	10433337	10285716	11142858
14	1359626	3	9.0	85	1601	1958	1598	11796994	11142859	12000001

Total number of pulses in waveform = 26

Waveform Num = 27
Num of Bursts = 16
Burst Interval (us) = 750000.0

Burst #	Off Time (us)	# Pulses	Chirp (MHz)	PW (us)	Pulse 1 Pri(us)	Pulse 2 Pri(us)	Pulse 3 Pri(us)	Start Loc (us)	Start Burst Interval(us)	End Burst Interval(us)
1	243512	3	16.0	76	1971	1363	1545	243512	0	749999
2	518112	1	12.0	68	1493	0	0	766503	750000	1499999
3	1059726	1	20.0	51	1412	0	0	1827722	1500000	2249999
4	816815	1	8.0	57	1726	0	0	2645949	2250000	2999999
5	463457	1	9.0	72	1782	0	0	3111132	3000000	3749999
6	1313953	2	16.0	69	1788	1778	0	4426867	3750000	4499999
7	235570	2	10.0	80	1807	1542	0	4666003	4500000	5249999
8	1187266	2	15.0	66	1204	1335	0	5856618	5250000	5999999
9	166850	1	7.0	98	1145	0	0	6026007	6000000	6749999
10	1034731	3	8.0	54	1225	1770	1799	7061883	6750000	7499999
11	734681	3	12.0	96	1726	1899	1034	7801358	7500000	8249999

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12	511831	3	15.0	60	1997	1803	1278	8317848	8250000	8999999
13	761809	1	17.0	69	1206	0	0	9084735	9000000	9749999
14	1150474	2	5.0	89	1940	1836	0	10236415	9750000	10499999
15	397117	1	18.0	66	1946	0	0	10637308	10500000	11249999
16	721341	1	20.0	85	1835	0	0	11360595	11250000	11999999

Total number of pulses in waveform = 28

Waveform Num = 28
Num of Bursts = 19
Burst Interval (us) = 631579.0

Burst #	Off Time (us)	# Pulses	Chirp (MHz)	PW (us)	Pulse 1 Pri(us)	Pulse 2 Pri(us)	Pulse 3 Pri(us)	Start Loc (us)	Start Burst Interval(us)	End Burst Interval(us)
1	497744	1	14.0	94	1088	0	0	497744	0	631578
2	320917	1	11.0	66	1640	0	0	819749	631579	1263157
3	705079	3	16.0	94	1971	1492	1388	1526468	1263158	1894736
4	845617	2	14.0	90	1788	1477	0	2376936	1894737	2526315
5	440766	3	15.0	81	1539	1018	1924	2820967	2526316	3157894
6	548971	3	20.0	68	1050	1319	1725	3374419	3157895	3789473
7	675945	3	14.0	72	1141	1105	1367	4054458	3789474	4421052
8	497902	1	6.0	84	1139	0	0	4555973	4421053	5052631
9	693157	3	10.0	78	1734	1918	1390	5250269	5052632	5684210
10	720282	3	10.0	80	1926	1247	1835	5975593	5684211	6315789
11	579592	1	14.0	94	1851	0	0	6560193	6315790	6947368
12	594548	3	17.0	99	1617	1052	1984	7156592	6947369	7578947
13	921330	3	13.0	69	1391	1746	1201	8082575	7578948	8210526
14	612692	1	13.0	86	1501	0	0	8699605	8210527	8842105
15	574495	2	10.0	95	1161	1536	0	9275601	8842106	9473684

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	229767								
16		2	13.0	91	1723	1154	0	9508065	9473685	10105263
	1059426								
17		3	16.0	87	1444	1059	1441	10570368	10105264	10736842
	537211								
18		3	16.0	57	1169	1439	1782	11111523	10736843	11368421
	360602								
19		3	16.0	85	1255	1425	1062	11476515	11368422	12000000

Total number of pulses in waveform = 44

Waveform Num = 29
Num of Bursts = 12
Burst Interval (us) = 1000000.0

Burst #	Off Time (us)	# Pulses	Chirp (MHz)	PW (us)	Pulse 1 Pri(us)	Pulse 2 Pri(us)	Pulse 3 Pri(us)	Start Loc (us)	Start Burst Interval(us)	End Burst Interval(us)
	11820									
1		2	10.0	54	1435	1593	0	11820	0	999999
	1505538									
2		1	14.0	88	1014	0	0	1520386	1000000	1999999
	600335									
3		3	10.0	100	1740	1287	1841	2121735	2000000	2999999
	1323938									
4		2	17.0	61	1375	1464	0	3450541	3000000	3999999
	977637									
5		1	10.0	100	1722	0	0	4431017	4000000	4999999
	1160562									
6		3	6.0	50	1145	1058	1681	5593301	5000000	5999999
	931307									
7		1	10.0	99	1985	0	0	6528492	6000000	6999999
	1318972									
8		1	18.0	66	1187	0	0	7849449	7000000	7999999
	627758									
9		3	11.0	56	1037	1349	1224	8478394	8000000	8999999
	1060972									
10		2	13.0	54	1206	1345	0	9542976	9000000	9999999
	1025107									
11		1	5.0	88	1539	0	0	10570634	10000000	10999999
	1068784									
12		2	13.0	70	1406	1111	0	11640957	11000000	11999999

Total number of pulses in waveform = 22

Waveform Num = 30
Num of Bursts = 11
Burst Interval (us) = 1090909.0

Burst #	Off Time (us)	# Pulses	Chirp (MHz)	PW (us)	Pulse 1 Pri(us)	Pulse 2 Pri(us)	Pulse 3 Pri(us)	Start Loc (us)	Start Burst Interval(us)	End Burst Interval(us)

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1	385371	3	11.0	84	1342	1935	1566	385371	0	1090908
2	826681	1	5.0	82	1524	0	0	1216895	1090909	2181817
3	1476110	3	17.0	67	1319	1940	1423	2694529	2181818	3272726
4	1378546	1	6.0	51	1552	0	0	4077757	3272727	4363635
5	1277233	3	11.0	75	1434	1381	1399	5356542	4363636	5454544
6	591103	3	10.0	97	1465	1704	1067	5951859	5454545	6545453
7	1534907	1	19.0	74	1696	0	0	7491002	6545454	7636362
8	793501	3	13.0	63	1071	1811	1050	8286199	7636363	8727271
9	1343142	2	20.0	50	1836	1095	0	9633273	8727272	9818180
10	494927	2	11.0	86	1478	1318	0	10131131	9818181	10909089
11	1510989	3	13.0	80	1328	1321	1298	11644916	10909090	11999998

Total number of pulses in waveform = 25

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V. Test Equipment

Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ANSI/NCSL Z540-1-1994 and ANSI/ISO/IEC 17025:2000.

MET ASSET #	EQUIPMENT	MANUFACTURER	MODEL	LAST CAL DATE	CAL DUE DATE
1T4214	SHIELD ROOM #4	UNIVERSAL SHIELD INC	N/A	SEE NOTE	
1T4621	ESA-E SERIES SPECTRUM ANALYZER	AGILENT	E4402B	03/20/2009	03/20/2010
1T4563	LISN (10 AMP)	SOLAR ELECTRONICS	9322-50-R-10-BNC	09/25/2008	09/25/2009
1T4578	THERMO/HYGROMETER	CONTROL COMPANY	S6-627-9	11/06/2008	11/06/2010
1T4300	SEMI-ANECHOIC CHAMBER # 1	EMC TEST SYSTEMS	NONE	08/24/2007	08/24/2010
1T4303	ANTENNA; BILOG	SCHAFNER - CHASE EMC	CBL6140A	07/29/2009	07/29/2010
1T4409	EMI RECEIVER	ROHDE & SCHWARZ	ESIB7	05/07/2009	05/07/2010
1T4632	THERMO/HYGROMETER	CONTROL COMPANY	S6-627-9	09/25/2007	09/25/2009
1T4505	TEMPERATURE CHAMBER	TEST EQUITY	115	09/02/2008	10/02/2009
1T4548	AC POWER SOURCE	CALIFORNIA INSTRUMENTS	1251P	SEE NOTE	
S/N:MY45108123	ESA-E SERIES SPECTRUM ANALYZER	AGILENT	E4407B	06/01/2009	06/01/2010
1T2665	HORN ANTENNA	EMCO	3115	07/06/2009	07/06/2010
1T2511	ANTENNA; HORN	EMCO	3115	08/21/2009	08/21/2010
1T4442	PRE-AMPLIFIER, MICROWAVE	MITEQ	AFS42-01001800-30-10P	SEE NOTE	
1T4592	RF FILTER KIT	VARIOUS	N/A	SEE NOTE	
1T4688	HORN ANTENNA	CUSTOM MICROWAVE, INC.	HO42S	SEE NOTE	
1T4609	4-PORT MICROWAVE SIGNAL COMBINER/SPLITTER	MINI-CIRCUITS	ZN4PD1-63-S+	SEE NOTE	

Table 39. Test Equipment List

Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.

MET ASSET #	EQUIPMENT	MANUFACTURER	LAST CAL DATE	CAL DUE DATE
1S2243	NI PXI-1042 8-SLOT 3U CHASSIS	NATIONAL INSTRUMENTS	SEE NOTE	
1S2460	NI PXI-5421 16-BIT 100MS/S ARBITRARY WAVEFORM GENERATOR	NATIONAL INSTRUMENTS	SEE NOTE	
1S2278	NI PXI-5610 2.7GHZ RF UPCONVERTER	NATIONAL INSTRUMENTS	SEE NOTE	
1S2069	UPCONVERTER, 7206 PXI 4.9 TO 6GHZ	ASCOR	SEE NOTE	
N/A	SPLITTER/COMBINER, ZFSC-2-9G (QTY 2)	MINI-CIRCUITS	SEE NOTE	
N/A	30DB ATTENUATOR, BW-S30W2 (QTY 2)	PASTERNAK	SEE NOTE	
N/A	10DB ATTENUATOR, BW-S10W2 (QTY 2)	PASTERNAK	SEE NOTE	
1T4414	MICROWAVE PRE-AMPLIFIER	AH SYSTEMS	SEE NOTE	
1T4612	SPECTRUM ANALYZER, E4407B	AGILENT	02/17/09	02/17/10

Table 40. DFS Test Equipment List

Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.

VI. Certification & User's Manual Information

Certification & User's Manual Information

A. Certification Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart I — Marketing of Radio frequency devices:

§ 2.801 Radio-frequency device defined.

As used in this part, a radio-frequency device is any device which in its operation is capable of Emitting radio-frequency energy by radiation, conduction, or other means. Radio- frequency devices include, but are not limited to:

(a) The various types of radio communication transmitting devices described throughout this chapter.

(b) The incidental, unintentional and intentional radiators defined in Part 15 of this chapter.

(c) The industrial, scientific, and medical equipment described in Part 18 of this chapter.

(d) Any part or component thereof which in use emits radio-frequency energy by radiation, conduction, or other means.

§ 2.803 Marketing of radio frequency devices prior to equipment authorization.

(a) Except as provided elsewhere in this chapter, no person shall sell or lease, or offer for sale or lease (including advertising for sale or lease), or import, ship or distribute for the purpose of selling or leasing or offering for sale or lease, any radio frequency device unless:

(1) In the case of a device subject to certification, such device has been authorized by the Commission in accordance with the rules in this chapter and is properly identified and labeled as required by §2.925 and other relevant sections in this chapter; or

(2) In the case of a device that is not required to have a grant of equipment authorization issued by the Commission, but which must comply with the specified technical standards prior to use, such device also complies with all applicable administrative (including verification of the equipment or authorization under a Declaration of Conformity, where required), technical, labeling and identification requirements specified in this chapter.

(d) Notwithstanding the provisions of paragraph (a) of this section, the offer for sale solely to business, commercial, industrial, scientific or medical users (but not an offer for sale to other parties or to end users located in a residential environment) of a radio frequency device that is in the conceptual, developmental, design or pre-production stage is permitted prior to equipment authorization or, for devices not subject to the equipment authorization requirements, prior to a determination of compliance with the applicable technical requirements *provided* that the prospective buyer is advised in writing at the time of the offer for sale that the equipment is subject to the FCC rules and that the equipment will comply with the appropriate rules before delivery to the buyer or to centers of distribution.

(e)(1) Notwithstanding the provisions of paragraph (a) of this section, prior to equipment authorization or determination of compliance with the applicable technical requirements any radio frequency device may be operated, but not marketed, for the following purposes and under the following conditions:

(i) Compliance testing;

(ii) Demonstrations at a trade show provided the notice contained in paragraph (c) of this section is displayed in a conspicuous location on, or immediately adjacent to, the device;

(iii) Demonstrations at an exhibition conducted at a business, commercial, industrial, scientific or medical location, but excluding locations in a residential environment, provided the notice contained in paragraphs (c) or (d) of this section, as appropriate, is displayed in a conspicuous location on, or immediately adjacent to, the device;

(iv) Evaluation of product performance and determination of customer acceptability, provided such operation takes place at the manufacturer's facilities during developmental, design or pre-production states; or

(v) Evaluation of product performance and determination of customer acceptability where customer acceptability of a radio frequency device cannot be determined at the manufacturer's facilities because of size or unique capability of the device, provided the device is operated at a business, commercial, industrial, scientific or medical user's site, but not at a residential site, during the development, design or pre-production stages.

(e)(2) For the purpose of paragraphs (e)(1)(iv) and (e)(1)(v) of this section, the term *manufacturer's facilities* includes the facilities of the party responsible for compliance with the regulations and the manufacturer's premises, as well as the facilities of other entities working under the authorization of the responsible party in connection with the development and manufacture, but not the marketing, of the equipment.

(f) For radio frequency devices subject to verification and sold solely to business, commercial, industrial, scientific and medical users (excluding products sold to other parties or for operation in a residential environment), parties responsible for verification of the devices shall have the option of ensuring compliance with the applicable technical specifications of this chapter at each end user's location after installation, provided that the purchase or lease agreement includes a proviso that such a determination of compliance be made and is the responsibility of the party responsible for verification of the equipment.

Certification & User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart J — Equipment Authorization Procedures:

§ 2.901 Basis and Purpose

(a) In order to carry out its responsibilities under the Communications Act and the various treaties and international regulations, and in order to promote efficient use of the radio spectrum, the Commission has developed technical standards for radio frequency equipment and parts or components thereof. The technical standards applicable to individual types of equipment are found in that part of the rules governing the service wherein the equipment is to be operated.[1] *In addition to the technical standards provided, the rules governing the service may require that such equipment be verified by the manufacturer or importer*, be authorized under a Declaration of Conformity, or receive an equipment authorization from the Commission by one of the following procedures: certification or registration.

(b) The following sections describe the verification procedure, the procedure for a Declaration of Conformity, and the procedures to be followed in obtaining certification from the Commission and the conditions attendant to such a grant.

§ 2.907 Certification.

(a) Certification is an equipment authorization issued by the Commission, based on representation and test data submitted by the applicant.

(b) Certification attaches to all units subsequently marketed by the grantee which are identical (see Section 2.908) to the sample tested except for permissive changes or other variations authorized by the Commission pursuant to Section 2.1043.

[1] In this case, the equipment is subject to the rules of Part 15. More specifically, the equipment falls under Subpart B (of Part 15), which deals with unintentional radiators.

Certification & User's Manual Information

§ 2.948 Description of measurement facilities.

(a) Each party making measurements of equipment that is subject to an equipment authorization under Part 15 or Part 18 of this chapter, regardless of whether the measurements are filed with the Commission or kept on file by the party responsible for compliance of equipment marketed within the U.S. or its possessions, shall compile a description of the measurement facilities employed.

(1) If the measured equipment is subject to the verification procedure, the description of the measurement facilities shall be retained by the party responsible for verification of the equipment.

(i) If the equipment is verified through measurements performed by an independent laboratory, it is acceptable for the party responsible for verification of the equipment to rely upon the description of the measurement facilities retained by or placed on file with the Commission by that laboratory. In this situation, the party responsible for the verification of the equipment is not required to retain a duplicate copy of the description of the measurement facilities.

(ii) If the equipment is verified based on measurements performed at the installation site of the equipment, no specific site calibration data is required. It is acceptable to retain the description of the measurement facilities at the site at which the measurements were performed.

(2) If the equipment is to be authorized by the Commission under the certification procedure, the description of the measurement facilities shall be filed with the Commission's Laboratory in Columbia, Maryland. The data describing the measurement facilities need only be filed once but must be updated as changes are made to the measurement facilities or as otherwise described in this section. At least every three years, the organization responsible for filing the data with the Commission shall certify that the data on file is current.

Certification & User's Manual Information

Label and User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart A — General:

§ 15.19 Labeling requirements.

(a) In addition to the requirements in Part 2 of this chapter, a device subject to certification or verification shall be labeled as follows:

(1) Receivers associated with the operation of a licensed radio service, e.g., FM broadcast under Part 73 of this chapter, land mobile operation under Part 90, etc., shall bear the following statement in a conspicuous location on the device:

This device complies with Part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

(2) A stand-alone cable input selector switch, shall bear the following statement in a conspicuous location on the device:

This device is verified to comply with Part 15 of the FCC Rules for use with cable television service.

(3) All other devices shall bear the following statement in a conspicuous location on the device:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

(4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified under paragraph (a) of this section is required to be affixed only to the main control unit.

(5) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

§ 15.21 Information to user.

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Verification & User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart B — Unintentional Radiators:

§ 15.105 Information to the user.

(a) For a Class A digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at own expense.

(b) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

– Reorient or relocate the receiving antenna.

– Increase the separation between the equipment and receiver.

– Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

– Consult the dealer or an experienced radio/TV technician for help.

End of Report

