

Test of PremierWave 802.11 Wireless Card

To: FCC 47 CFR Part 15.407

Test Report Serial No.: AGSL01-U1 Rev A



TEST REPORT

FROM



Test of PremierWave 802.11 Wireless Card

To: FCC 47 CFR Part 15.407 & IC RSS-210

Test Report Serial No.: AGSL01-U1 Rev A

This report supersedes None

Applicant: Lantronix Inc
167 Technology Drive
Irvine
California 92618, USA

Product Function: 802.11 Wireless Device Server
Client device without radar detection

Copy No: pdf Issue Date: 18th April 2011

This Test Report is Issued Under the Authority of:

MiCOM Labs, Inc.
440 Boulder Court, Suite 200
Pleasanton, CA 94566 USA
Phone: +1 (925) 462-0304
Fax: +1 (925) 462-0306
www.micomlabs.com



TESTING CERTIFICATE #2381.01

MiCOM Labs is an ISO 17025 Accredited Testing Laboratory



Title: PremierWave 802.11 Wireless Card
To: FCC 47 CFR Part 15.407
Serial #: AGSL01-U1 Rev A
Issue Date: 18th April 2011
Page: 3 of 36

This page has been left intentionally blank

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.



TABLE OF CONTENTS

1. ACCREDITATION, LISTINGS & RECOGNITION	5
TESTING ACCREDITATION	5
RECOGNITION	6
2. DOCUMENT HISTORY	8
3. TEST RESULT CERTIFICATE	9
4. REFERENCES AND MEASUREMENT UNCERTAINTY	10
Normative References	10
Test and Uncertainty Procedures	11
5. PRODUCT DETAILS AND TEST CONFIGURATIONS	12
6.1. EUT Details	12
5.1. Scope of Test Program	13
5.2. Equipment Model(s) and Serial Number(s)	14
5.3. Antenna Details	14
5.4. Cabling and I/O Ports	15
5.5. Test Configurations	15
5.6. Equipment Modifications	15
5.7. Deviations from the Test Standard	15
6. TEST SUMMARY	16
7. Dynamic Frequency Selection (DFS)	17
7.1. Test Procedure and Setup	17
7.1.1. <i>Interference Threshold values, Master or Client incorporating In-Service Monitoring</i>	17
7.1.2. <i>DFS Response requirement values</i>	17
7.1.3. <i>Radar Test Waveforms</i>	18
7.1.4. <i>Frequency Hopping Radar Test Waveform</i>	21
7.1.5. <i>Test Set Up</i>	22
7.2. Dynamic Frequency Selection (DFS) Test Results	25
7.2.1. <i>In-Service Monitoring for Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period</i>	25
7.2.2. <i>30 Minute Non-Occupancy Period</i>	32
8. PHOTOGRAPHS	34
8.1. Dynamic Frequency Selection Test Set-Up	34
9. TEST EQUIPMENT DETAILS	35



Title: PremierWave 802.11 Wireless Card
To: FCC 47 CFR Part 15.407
Serial #: AGSL01-U1 Rev A
Issue Date: 18th April 2011
Page: 5 of 36

1. ACCREDITATION, LISTINGS & RECOGNITION

TESTING ACCREDITATION

MiCOM Labs, Inc. is an accredited Electrical testing laboratory per the international standard EN ISO/IEC 17025. The company is accredited by the American Association for Laboratory Accreditation (A2LA) www.a2la.org test laboratory number 2381.01. MiCOM Labs test schedule is available at the following URL; <http://www.a2la.org/scopepdf/2381-01.pdf>



The American Association for Laboratory Accreditation

World Class Accreditation

Accredited Laboratory

A2LA has accredited

MICOM LABS

Pleasanton, CA

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009).

Presented this 14th day of April 2010.



President & CEO
For the Accreditation Council
Certificate Number 2381.01
Valid to November 30, 2011

For the tests or types of tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.



RECOGNITION

MiCOM Labs, Inc has widely recognized Electrical testing capabilities. Our international recognition includes Conformity Assessment Body designation by APEC MRA** countries. Our test reports are widely accepted for global type approvals.

Country	Recognition Body	Status	Phase	Identification No.
USA	Federal Communications Commission (FCC)	TCB	-	Listing #: 102167
Canada	Industry Canada (IC)	FCB	APEC MRA 2	Listing #: 4143A
Japan	MIC	CAB	APEC MRA 2	210
	VCCI	--	--	No. 2959
Europe	European Commission	NB	EU MRA	NB 2280
Australia	Australian Communications and Media Authority (ACMA)	CAB	APEC MRA 1	US0159
Hong Kong	Office of the Telecommunication Authority (OFTA)	CAB	APEC MRA 1	
Korea	Ministry of Information and Communication Radio Research Laboratory (RRL)	CAB	APEC MRA 1	
Singapore	Infocomm Development Authority (IDA)	CAB	APEC MRA 1	
Taiwan	National Communications Commission (NCC) Bureau of Standards, Metrology and Inspection (BSMI)	CAB	APEC MRA 1	
Vietnam	Ministry of Communication (MIC)	CAB	APEC MRA 1	

**APEC MRA – Asia Pacific Economic Community Mutual Recognition Agreement. Is a recognition agreement under which test lab is accredited to regulatory standards of the APEC member countries.

Phase I - recognition for product testing

Phase II – recognition for both product testing and certification

N/A – Not Applicable

**EU MRA – European Union Mutual Recognition Agreement.

Is a recognition agreement under which test lab is accredited to regulatory standards of the EU member countries.

**NB – Notified Body

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.



Title: PremierWave 802.11 Wireless Card
To: FCC 47 CFR Part 15.407
Serial #: AGSL01-U1 Rev A
Issue Date: 18th April 2011
Page: 7 of 36

PRODUCT CERTIFICATION

MiCOM Labs, Inc. is an accredited Product Certification Body per the international standard EN ISO/IEC Guide 65. The company is accredited by the American Association for Laboratory Accreditation (A2LA) www.a2la.org test laboratory number 2381.02. MiCOM Labs test schedule is available at the following URL; <http://www.a2la.org/scopepdf/2381-02.pdf>



The American Association for Laboratory Accreditation

World Class Accreditation

Accredited Product Certification Body

A2LA has accredited

MICOM LABS

Pleasanton, CA

for technical competence as a

Product Certification Body

This product certification body is accredited in accordance with the recognized International Standard ISO/IEC Guide 65:1996 *General requirements for bodies operating product certification systems*. This accreditation demonstrates technical competence for a defined scope and the operation of a quality management system for a Telecommunications Certification Body (TCB) meeting FCC (U.S.), and IC (Canada) requirements.



Presented this 24th day of June 2010.

President & CEO
For the Accreditation Council
Certificate Number 2381.02
Valid to November 30, 2011

For the product certification schemes to which this accreditation applies, please refer to the organization's Product Certification Scope of Accreditation.

United States of America – Telecommunication Certification Body (TCB)

TCB Identifier – US0159

Industry Canada – Certification Body

CAB Identifier – US0159

Europe – Notified Body

Notified Body Identifier - 2280

Japan – Recognized Certification Body (RCB)

RCB Identifier - 210

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.



Title: PremierWave 802.11 Wireless Card
To: FCC 47 CFR Part 15.407
Serial #: AGSL01-U1 Rev A
Issue Date: 18th April 2011
Page: 8 of 36

2. DOCUMENT HISTORY

Document History		
Revision	Date	Comments
Draft		
Rev A	18 th April 2011	Initial release.

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.



Title: PremierWave 802.11 Wireless Card
To: FCC 47 CFR Part 15.407
Serial #: AGSL01-U1 Rev A
Issue Date: 18th April 2011
Page: 9 of 36

3. TEST RESULT CERTIFICATE

Applicant:	Lantronix Inc 167 Technology Drive Irvine California 92618, USA	Tested By:	MiCOM Labs, Inc. 440 Boulder Court Suite 200 Pleasanton California, 94566, USA
EUT:	802.11 Wireless Device Server	Tel:	+1 925 462 0304
Model:	PremierWave	Fax:	+1 925 462 0306
S/N:	N/A		
Test Date(s):	17th - 19th January 2011	Website:	www.micomlabs.com

STANDARD(S)	TEST RESULTS
FCC 47 CFR Part 15.407 The PremierWave will not operate in the weather radar band 5600 – 5650 MHz.	EQUIPMENT COMPLIES

MiCOM Labs, Inc. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

Notes:

1. This document reports conditions under which testing was conducted and the results of testing performed.
2. Details of test methods used have been recorded and kept on file by the laboratory.
3. Test results apply only to the item(s) tested.

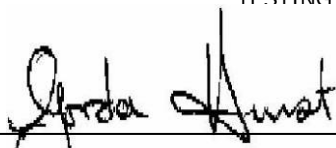
Approved & Released for MiCOM Labs, Inc. by:



TESTING CERTIFICATE #2381.01



Graeme Grieve
Quality Manager MiCOM Labs,



Gordon Hurst
President & CEO MiCOM Labs, Inc.

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.



Title: PremierWave 802.11 Wireless Card
To: FCC 47 CFR Part 15.407
Serial #: AGSL01-U1 Rev A
Issue Date: 18th April 2011
Page: 10 of 36

4. REFERENCES AND MEASUREMENT UNCERTAINTY

Normative References

Ref.	Publication	Year	Title
(i)	FCC 47 CFR Part 15.407	2010	Code of Federal Regulations
(ii)	FCC 06-96	June 2006	Memorandum Opinion and Order
(iii)	Industry Canada RSS-210	Issue 8 Dec 2010	Low Power License-Exempt Radiocommunication Devices (All Frequency Bands): Category 1 Equipment
(iv)	Industry Canada RSS-Gen	Issue 3 Dec 2010	General Requirements and Information for the Certification of Radiocommunication Equipment
(v)	ANSI C63.4	2009	American National Standards for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
(vi)	CISPR 22/ EN 55022	2008 2006+A1:2007 1998	Limits and Methods of Measurements of Radio Disturbance Characteristics of Information Technology Equipment
(vii)	M 3003	Edition 1 Dec. 1997	Expression of Uncertainty and Confidence in Measurements
(viii)	LAB34	Edition 1 Aug 2002	The expression of uncertainty in EMC Testing
(ix)	ETSI TR 100 028	2001	Parts 1 and 2 Electromagnetic compatibility and Radio Spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics
(x)	A2LA	9 th June 2010	Reference to A2LA Accreditation Status – A2LA Advertising Policy
(xi)	FCC Public Notice – DA 02-2138	2002	Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.



Title: PremierWave 802.11 Wireless Card
To: FCC 47 CFR Part 15.407
Serial #: AGSL01-U1 Rev A
Issue Date: 18th April 2011
Page: 11 of 36

Test and Uncertainty Procedures

Conducted and radiated emission measurements were conducted in accordance with American National Standards Institute ANSI C63.4, listed in the Normative References section of this report.

Measurement uncertainty figures are calculated in accordance with ETSI TR 100 028 Parts 1 and 2.

Measurement uncertainties stated are based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95 % in accordance with UKAS document M 3003 listed in the Normative References section of this report.

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.



Title: PremierWave 802.11 Wireless Card
To: FCC 47 CFR Part 15.407
Serial #: AGSL01-U1 Rev A
Issue Date: 18th April 2011
Page: 12 of 36

5. PRODUCT DETAILS AND TEST CONFIGURATIONS

6.1. EUT Details

Detail	Description
Purpose:	Testing of the PremierWave 802.11 Wireless Card for compliance against the Dynamic Frequency Selection (DFS) requirements for a client device without radar detection of FCC 47 CFR Part 15.407.
Applicant:	Lantronix Inc 167 Technology Drive Irvine, California 92618, USA
Manufacturer:	As Applicant
Test Laboratory:	MiCOM Labs, Inc. 440 Boulder Court, Suite 200 Pleasanton, California 94566 USA
Test report reference number:	AGSL01-U1 Rev A
Date EUT received:	14th January 2011
Dates of test (from - to):	17th - 19th January 2011
No of Units Tested:	1
Product Name:	Wireless Device Server
Model No.:	PremierWave
Type of Equipment:	802.11 Wireless Card
Construction/Location for Use:	Outdoor / Indoor
Software Release	7.0.0.0R8
Hardware Release	Rev D.
Transmit/Receive Operation:	Legacy 802.11a; 802.11n HT-20
Output Power Type	Fixed
Automatic Transmit Power Control Available:	N/A
Long Term Frequency Stability:	±20 ppm
Equipment Dimensions	2.165" x 1.181" x 0.248"
Weight:	8.5 grams
Primary Function:	Wireless Device Server. The PremierWave will not operate in the weather radar band 5600 – 5650 MHz.

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

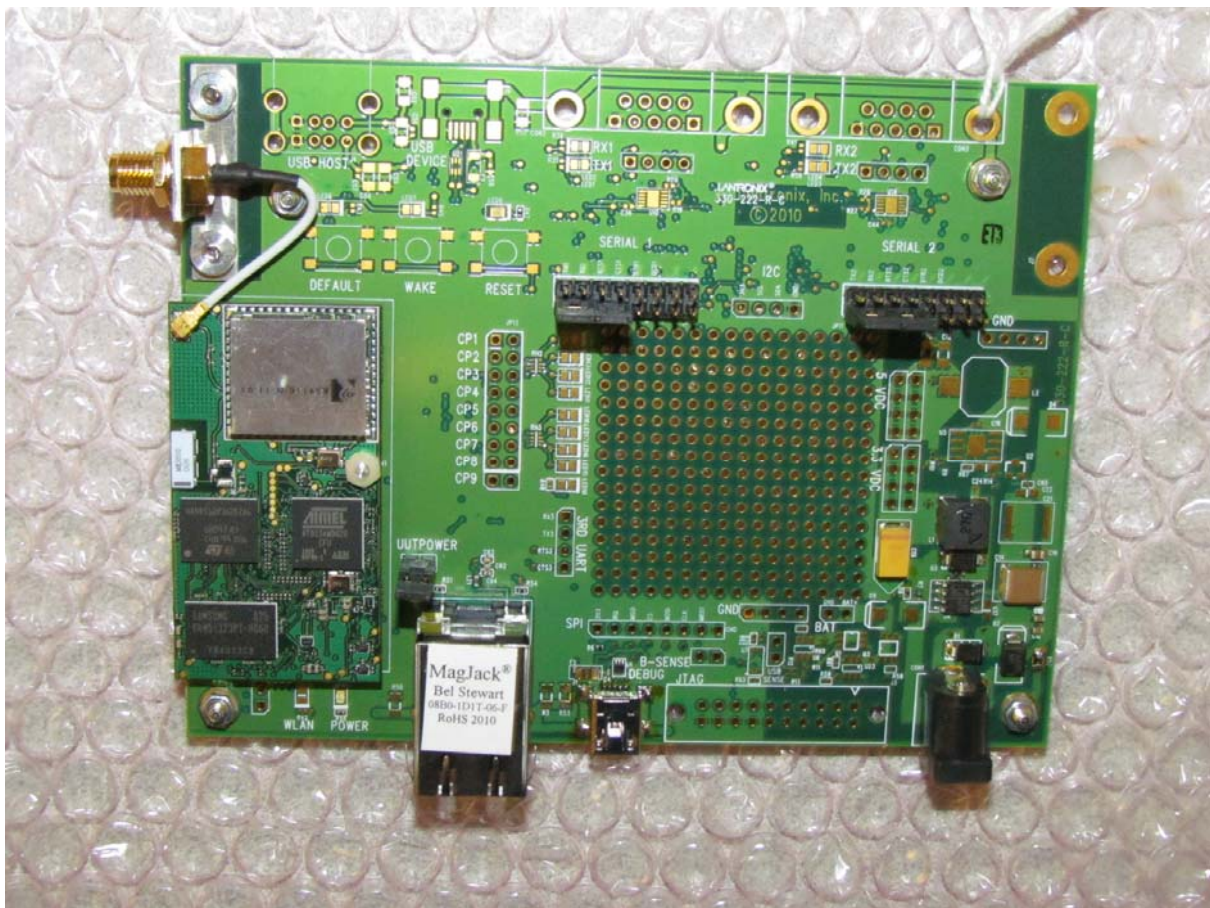
5.1. Scope of Test Program

The scope of the test program was to test the Lantronix Inc PremierWave 802.11 Wireless Card for compliance against the Dynamic Frequency Selection (DFS) requirements for a Client device without radar detection of FCC 47 CFR Part 15.407 & IC RSS-210.

The customer declared that PremierWave Client device without radar detection will not operate in the weather radar band 5600 – 5650 MHz.

The DFS testing of the PremierWave wireless card was performed using a host development card, laptop PC and Cisco wireless access point model acting as a master device.

Lantronix Inc PremierWave 802.11 Wireless Card



This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.



Title: PremierWave 802.11 Wireless Card
To: FCC 47 CFR Part 15.407
Serial #: AGSL01-U1 Rev A
Issue Date: 18th April 2011
Page: 14 of 36

5.2. Equipment Model(s) and Serial Number(s)

Type (EUT/Support)	Equipment Description (Including Brand Name)	Mfr	Model No.	Serial No.
EUT	802.11 Wireless Access Card	Lantronix Inc	PremierWave	--
Support	Host Device - Wireless Development Card	Lantronix Inc		
Support	802.11 Wireless Access Point	Cisco	AIR-AP1252AG-A-K9	FTX143290KZ
Support	Laptop PC – EUT MFR EliteBook	Lenova	ThinkPad T60	L3-AY457

5.3. Antenna Details

No antennas were tested as part of this program.

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.



Title: PremierWave 802.11 Wireless Card
To: FCC 47 CFR Part 15.407
Serial #: AGSL01-U1 Rev A
Issue Date: 18th April 2011
Page: 15 of 36

5.4. Cabling and I/O Ports

Number and type of I/O ports on supporting development card.

1. DATA; 1 X RJ-45 , 10/100 BASE-T Ethernet
2. Console; 1 X USB

5.5. Test Configurations

The following channel was exercised during DFS testing;

Channel 135 (5580 MHz) .

Internal WLAN test traffic was generated between the Master and Client devices by using the requisite MPEG video file ("TestFile.mpg" available on the NTIA website at the following link <http://ntiacsd.ntia.doc.gov/dfs/>) streamed from the master device to the client.

5.6. Equipment Modifications

The following modifications were required to bring the equipment into compliance:

1. NONE

5.7. Deviations from the Test Standard

The following deviations from the test standard were required in order to complete the test program:

1. NONE

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.



Title: PremierWave 802.11 Wireless Card
To: FCC 47 CFR Part 15.407
Serial #: AGSL01-U1 Rev A
Issue Date: 18th April 2011
Page: 16 of 36

6. TEST SUMMARY

List of Measurements

Dynamic Frequency Selection (DFS)

The following table represents the list of measurements required under the **FCC CFR47 Part 15.407(h)(2)** and **FCC Memorandum Opinion and Order FCC 06-96 (Compliance Measurement procedures for Unlicensed National Information Infrastructure devices operating in the 5250-5350 MHz and 5470-5725 MHz bands incorporating dynamic frequency selection)**.

Tests performed on Master Device

Section	Test Items	Description	Condition	Result	Test Report Section
7.8.3	In-Service Monitoring	In-Service Monitoring for Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period	Conducted	Complies	7.2.1

Note 1: Test results reported in this document relate only to the items tested

Note 2: The required tests demonstrated compliance as per client declaration of test configuration, monitoring methodology and associated pass/fail criteria

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.



7. Dynamic Frequency Selection (DFS)

7.1. Test Procedure and Setup

FCC, Part 15 Subpart C §15.407(h)
FCC 06-96 Memorandum Opinion and Order
Industry Canada RSS-210 A9.4

7.1.1. Interference Threshold values, Master or Client incorporating In-Service Monitoring

Maximum Transmit Power	Value (see note)
≥ 200 milliwatt	-64 dBm
< 200 milliwatt	-62 dBm

Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna

7.1.2. DFS Response requirement values

Parameter	Value
<i>Non-occupancy period</i>	Minimum 30 minutes
<i>Channel Availability Check Time</i>	60 seconds
<i>Channel Move Time</i>	10 seconds See Note 1.
<i>Channel Closing Transmission Time</i>	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
<i>U-NII Detection Bandwidth</i>	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 to facilitate *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.



7.1.3. 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 Burst	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.



Title: PremierWave 802.11 Wireless Card
To: FCC 47 CFR Part 15.407
Serial #: AGSL01-U1 Rev A
Issue Date: 18th April 2011
Page: 19 of 36

Each waveform is defined as follows:

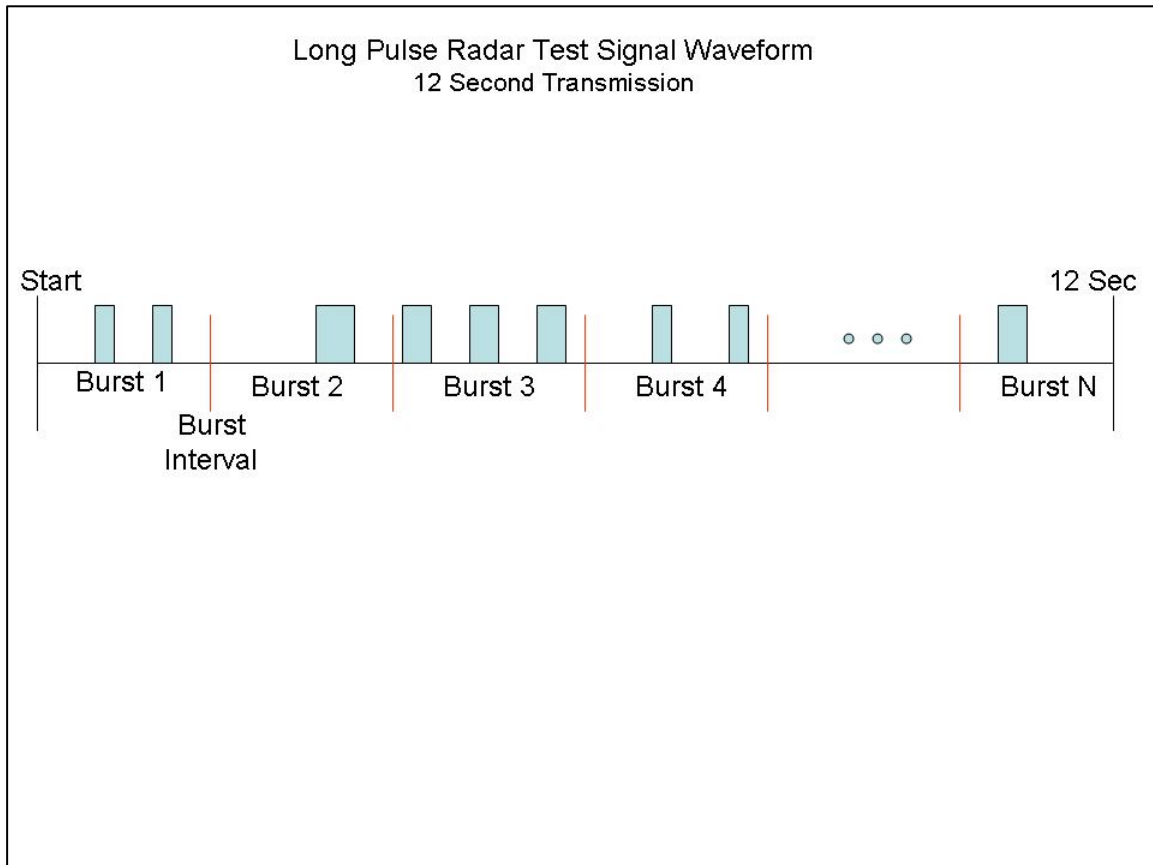
- 1) The transmission period for the Long Pulse Radar test signal is 12 seconds.
- 2) There are a total of 8 to 20 *Bursts* in the 12 second period, with the number of *Bursts* being randomly chosen. This number is *Burst Count*.
- 3) Each *Burst* consists of 1 to 3 pulses, with the number of pulses 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 a 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 $(12,000,000 / \textit{Burst_Count})$ microseconds. Each interval contains one *Burst*. The start time for the *Burst*, relative to the beginning of the interval, is between 1 and $[(12,000,000 / \textit{Burst_Count}) - (\textit{Total Burst Length}) + (\textit{One Random PRI Interval})]$ 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.

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

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 the Long Pulse radar Test Waveform.





7.1.4. Frequency Hopping Radar Test Waveform

Frequency Hopping Radar Test Waveform

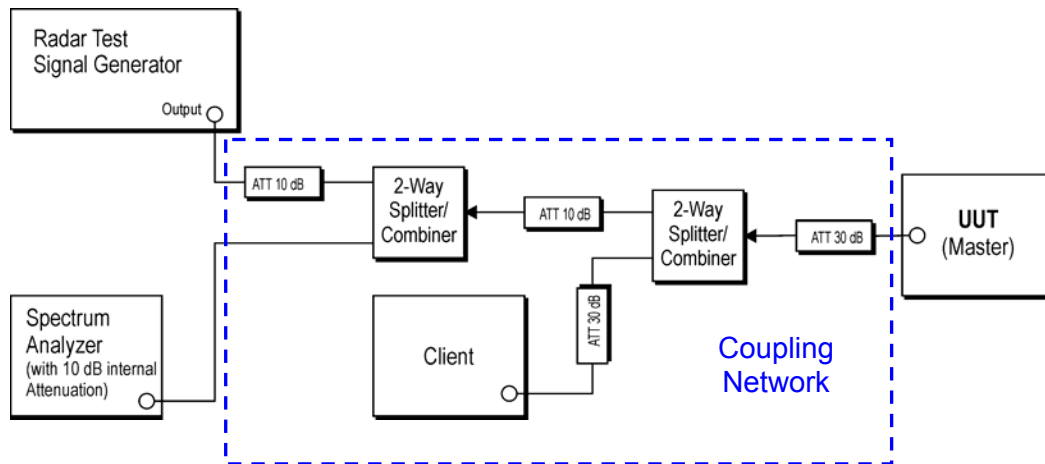
Radar Type	Pulse Width (µsec)	PRI (µsec)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Trials
6	1	333	9	.333	300	70%	30

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 selected from the hopping sequence defined by the following algorithm:

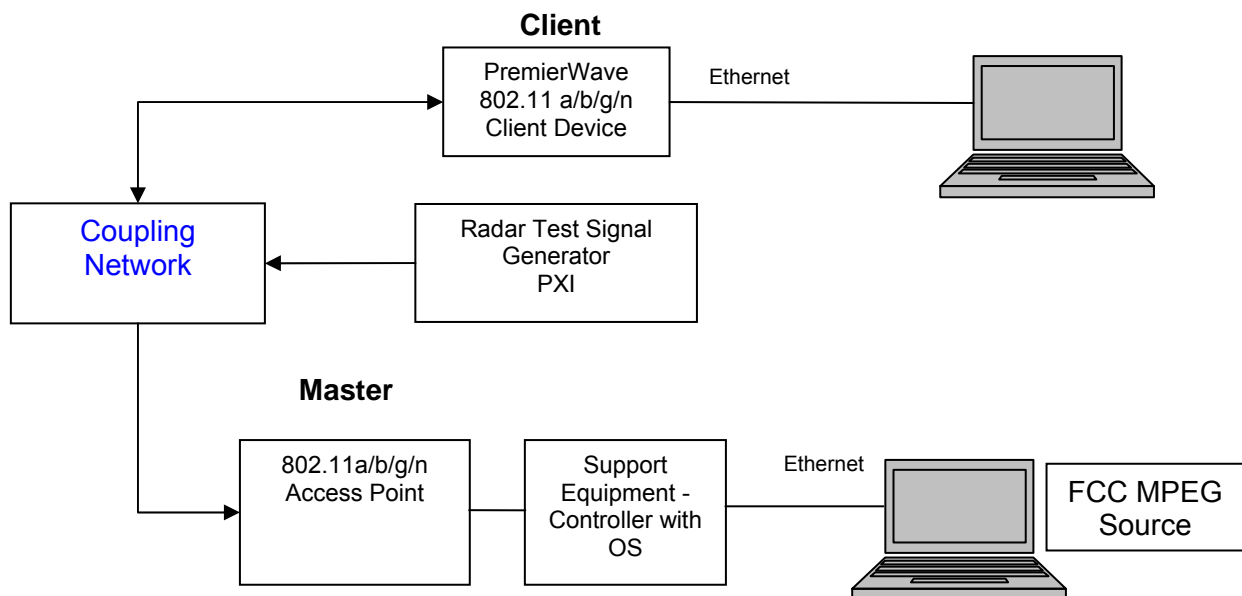
7.1.5. Test Set Up:

Block Diagram(s) of Test Setup

Setup for Conducted Measurements where the EUT is the Master with injection of Radar Test Waveforms at the Master.



Support Equipment Configuration



This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.



The EUT is a Client Device without radar detection.

Applicability of DFS Requirements Prior to Use of a Channel
(Ref Table 1 of FCC 06-96)

Requirement	Operational Mode		
	Master	Client Without Radar Detection	Client With Radar Detection
<i>Non-Occupancy Period</i>	Yes	Not required	Yes
<i>DFS Detection Threshold</i>	Yes	Not required	Yes
<i>Channel Availability Check Time</i>	Yes	Not required	Not required
<i>Uniform Spreading</i>	Yes	Not required	Not required
<i>U-NII Detection Bandwidth</i>	Yes	Not required	Yes

Applicability of DFS requirements during normal operation
(Ref Table 2 of FCC 06-96)

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

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.



Title: PremierWave 802.11 Wireless Card
To: FCC 47 CFR Part 15.407
Serial #: AGSL01-U1 Rev A
Issue Date: 18th April 2011
Page: 24 of 36

Declared minimum antenna gain 0 dBi.

Radar receive signal level = -62 dBm + minimum antenna gain + 1 dB = -61 dBm
= -62 + 0 + 1

Radar receive signal level = -61 dBm

Measurement Results - Dynamic Frequency Selection (DFS)

Ambient conditions.

Temperature: 17 to 23 °C Relative humidity: 31 to 57% Pressure: 999 to 1012 mbar

Radio parameters.

Test methodology: Conducted

Device Type: Client device without Radar detection

Transmit Power: Maximum

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.



Title: PremierWave 802.11 Wireless Card
To: FCC 47 CFR Part 15.407
Serial #: AGSL01-U1 Rev A
Issue Date: 18th April 2011
Page: 25 of 36

7.2. Dynamic Frequency Selection (DFS) Test Results

7.2.1. In-Service Monitoring for Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period FCC §15.407(h)(2)(iii)

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 is generated on the Operating Channel of the U-NII device.

A U-NII device operating as a Client Device will associate with the EUT (Master). The requisite MPEG video file ("TestFile.mpg" available on the NTIA website at the following link <http://ntiacsd.ntia.doc.gov/dfs/>) is streamed from the master device (AP) to the client.

Channel Closing Transmission Time - Measurement

A Type 1 waveform was introduced to the EUT, from which a 12 second transmission record was digitally captured, collecting nearly 250M samples of data, which included in excess of 600 ms of pre-trigger data. This Type 1 waveform had an integral marker built into its construction, marking the start of the radar waveform play, which directly triggered the PXI digitizer's data capture via the PXI backplane trigger bus.

The test system was set-up to capture all transmission data for access point events above a threshold level of -50 dBm. The test equipment time stamps all captured events with respect to T_0 (zero time indicating the start of the measurements sequence) starting the 612.1 ms pre-trigger period followed by the radar type 1 burst period.

Radar (Type 1) Pre-trigger period 612.1 ms

Type 1 burst period 25.7 ms

Channel Closing Transmission Time starts immediately after the last radar pulse is transmitted i.e. 637.8 ms after the start of the trace capture period.

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

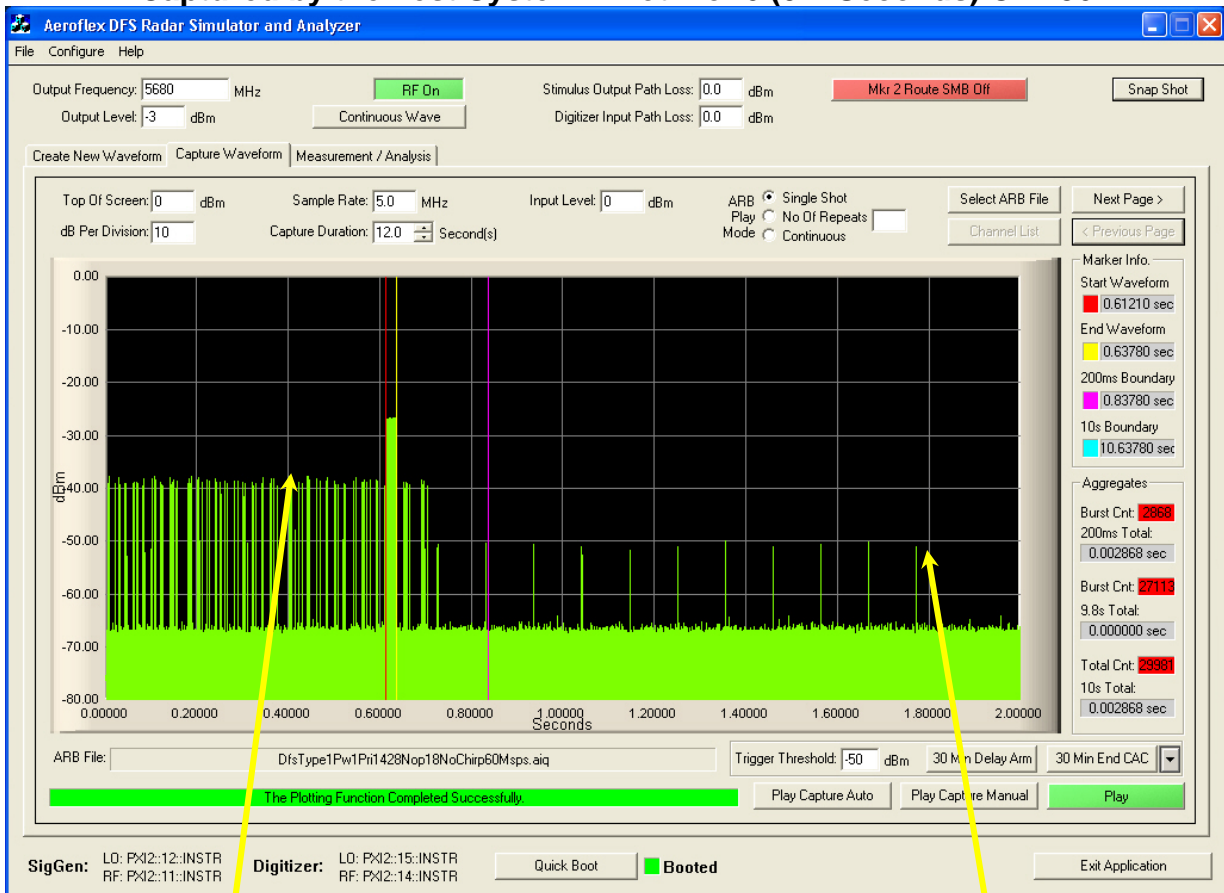


Title: PremierWave 802.11 Wireless Card
To: FCC 47 CFR Part 15.407
Serial #: AGSL01-U1 Rev A
Issue Date: 18th April 2011
Page: 26 of 36

Therefore, pulses seen after this 637.8 ms boundary are identified and totaled to provide an aggregate total of transmissions in order to determine whether the EUT is compliant with the Channel Closing Transmission Time requirements as described in MO&O FCC 06-96. In this case, it was found that an aggregate total of 2.868 ms of transmission time accrued. This value is found at the right hand side at the foot of the following plot (10s Total).

Channel Closing Transmission Time 5680 MHz = 2.868 mSecs (limit 260 mSecs)

Channel Move Time, Channel Closing Transmission Time for Type 1 Radar Captured by the Test System - Plot 1 of 6 (0-2 Seconds) Ch 136



EUT - Client Device

Master Device

The above plot shows that the Master device (Cisco Router) continues to beacon for a further approximately 1.1 seconds after the EUT has stop transmitting.

From the plot above it can be seen that the transmission activity within the 200 mS window is 2.868 mS (see 200 mS Total). From the following plots which shows all additional activity within the remained of the 10 sec measurement window it can be determined that the aggregate transmission within this period for the EUT is 0.00 mS. This is less than the 60 mS limit.

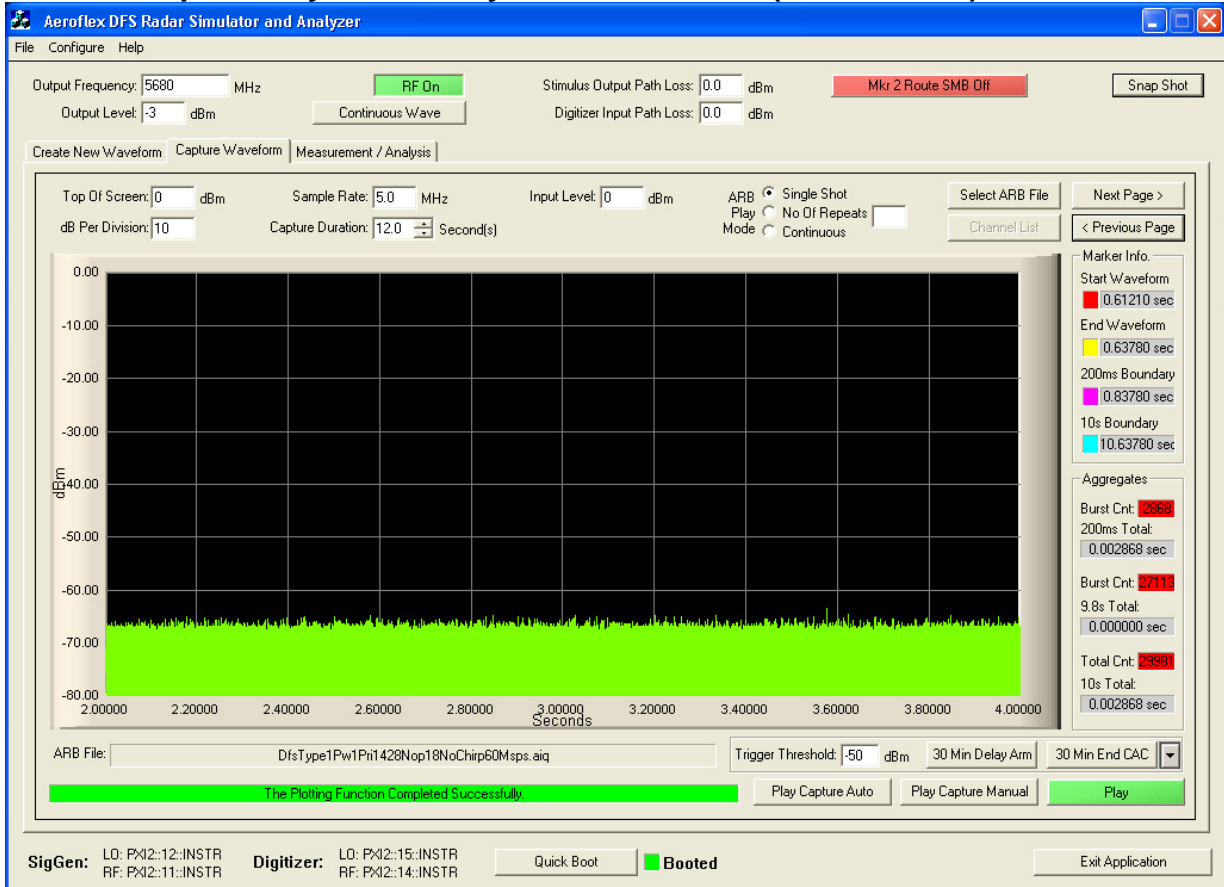
This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.



Title: PremierWave 802.11 Wireless Card
To: FCC 47 CFR Part 15.407
Serial #: AGSL01-U1 Rev A
Issue Date: 18th April 2011
Page: 27 of 36

Channel Move Time = 0.0622 Secs (limit is 10 seconds)

Channel Move Time, Channel Closing Transmission Time for Type 1 Radar Captured by the Test System - Plot 2 of 6 (2-4 Seconds) Ch 136

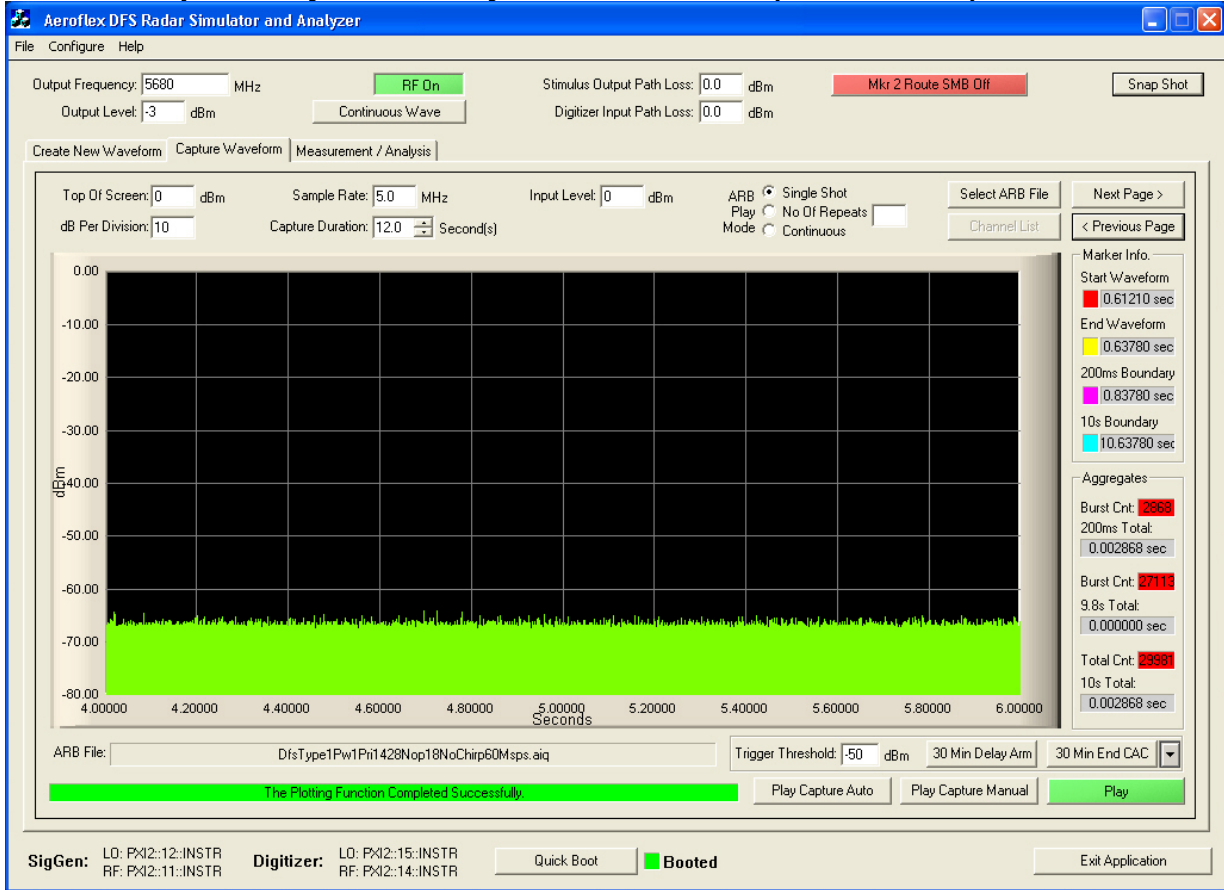


This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.



Title: PremierWave 802.11 Wireless Card
To: FCC 47 CFR Part 15.407
Serial #: AGSL01-U1 Rev A
Issue Date: 18th April 2011
Page: 28 of 36

Channel Move Time, Channel Closing Transmission Time for Type 1 Radar Captured by the Test System - Plot 3 of 6 (4-6 Seconds) Ch 136

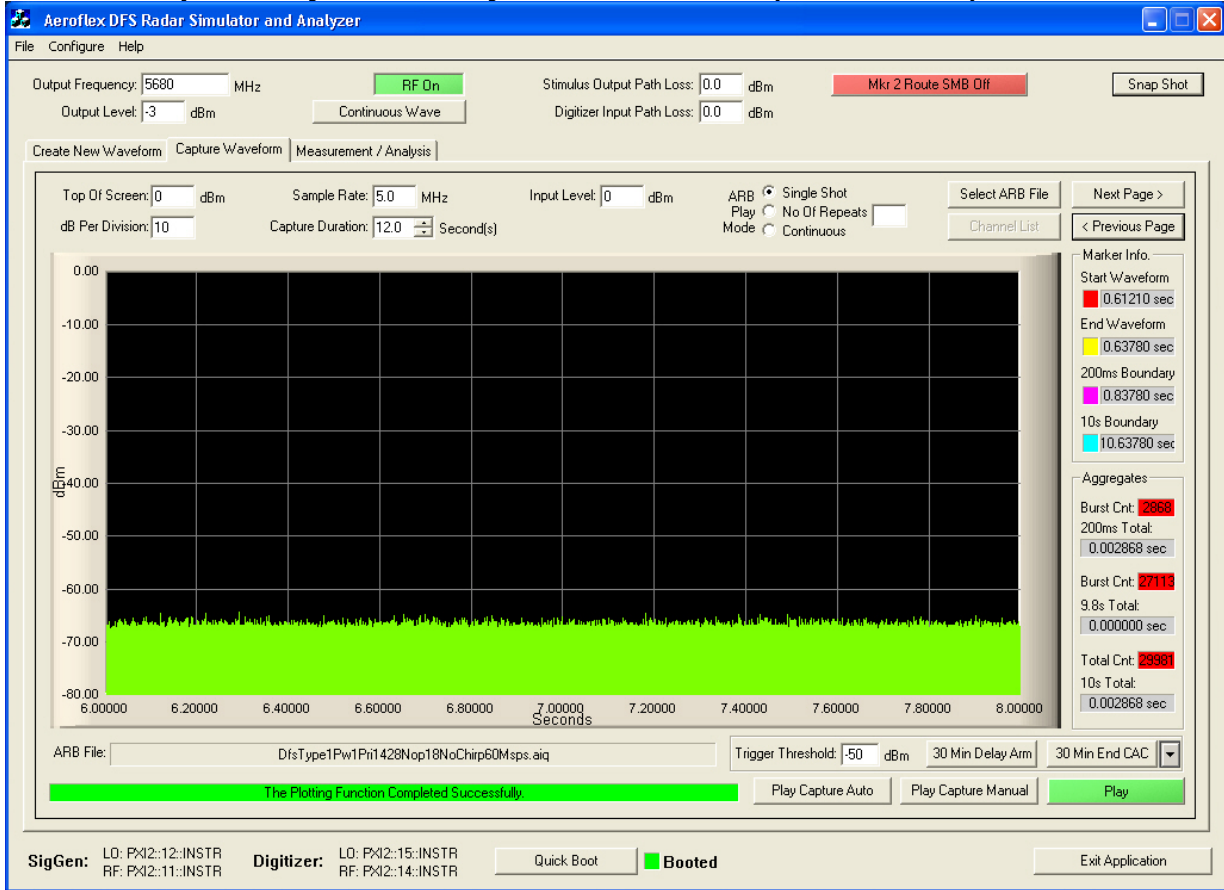


This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.



Title: PremierWave 802.11 Wireless Card
To: FCC 47 CFR Part 15.407
Serial #: AGSL01-U1 Rev A
Issue Date: 18th April 2011
Page: 29 of 36

Channel Move Time, Channel Closing Transmission Time for Type 1 Radar Captured by the Test System - Plot 4 of 6 (6-8 Seconds) Ch 136

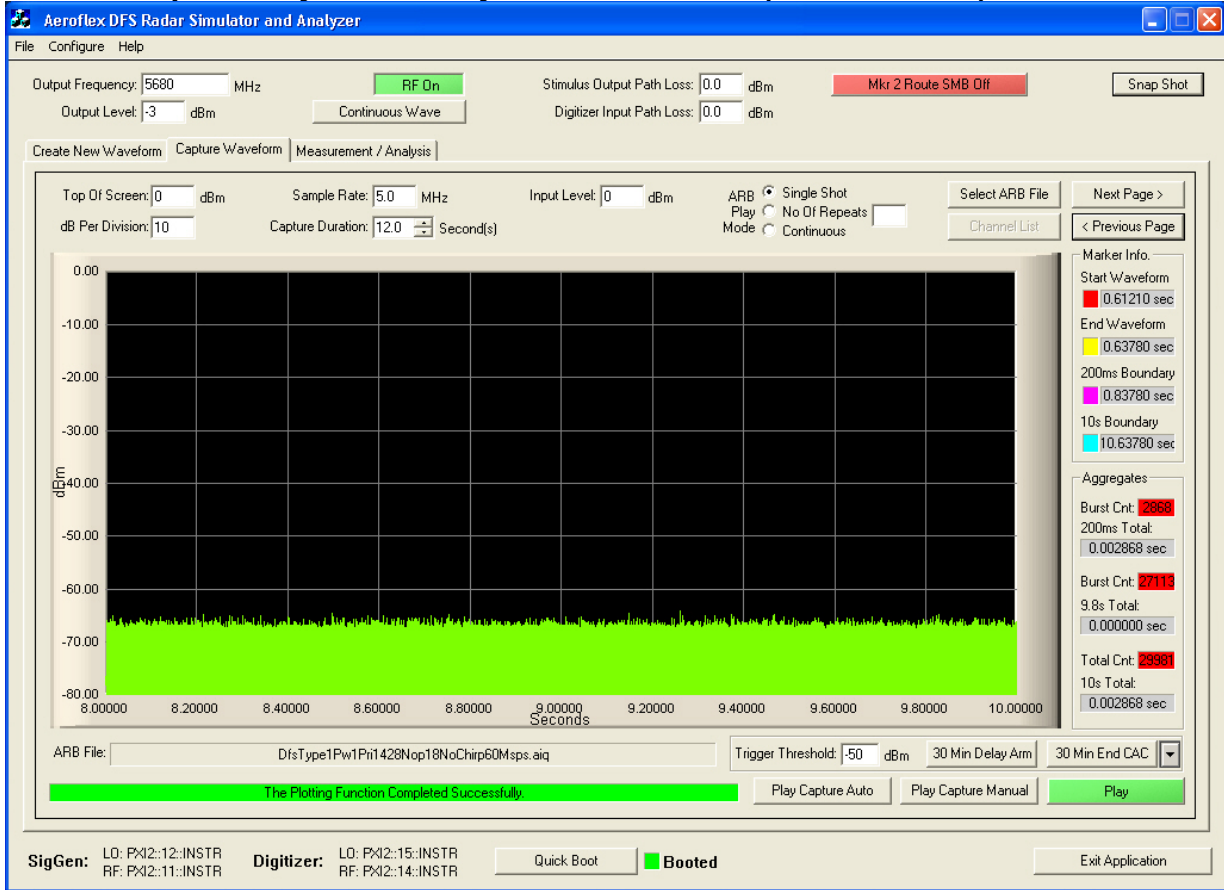


This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.



Title: PremierWave 802.11 Wireless Card
To: FCC 47 CFR Part 15.407
Serial #: AGSL01-U1 Rev A
Issue Date: 18th April 2011
Page: 30 of 36

Channel Move Time, Channel Closing Transmission Time for Type 1 Radar Captured by the Test System - Plot 5 of 6 (8-10 Seconds) Ch 136

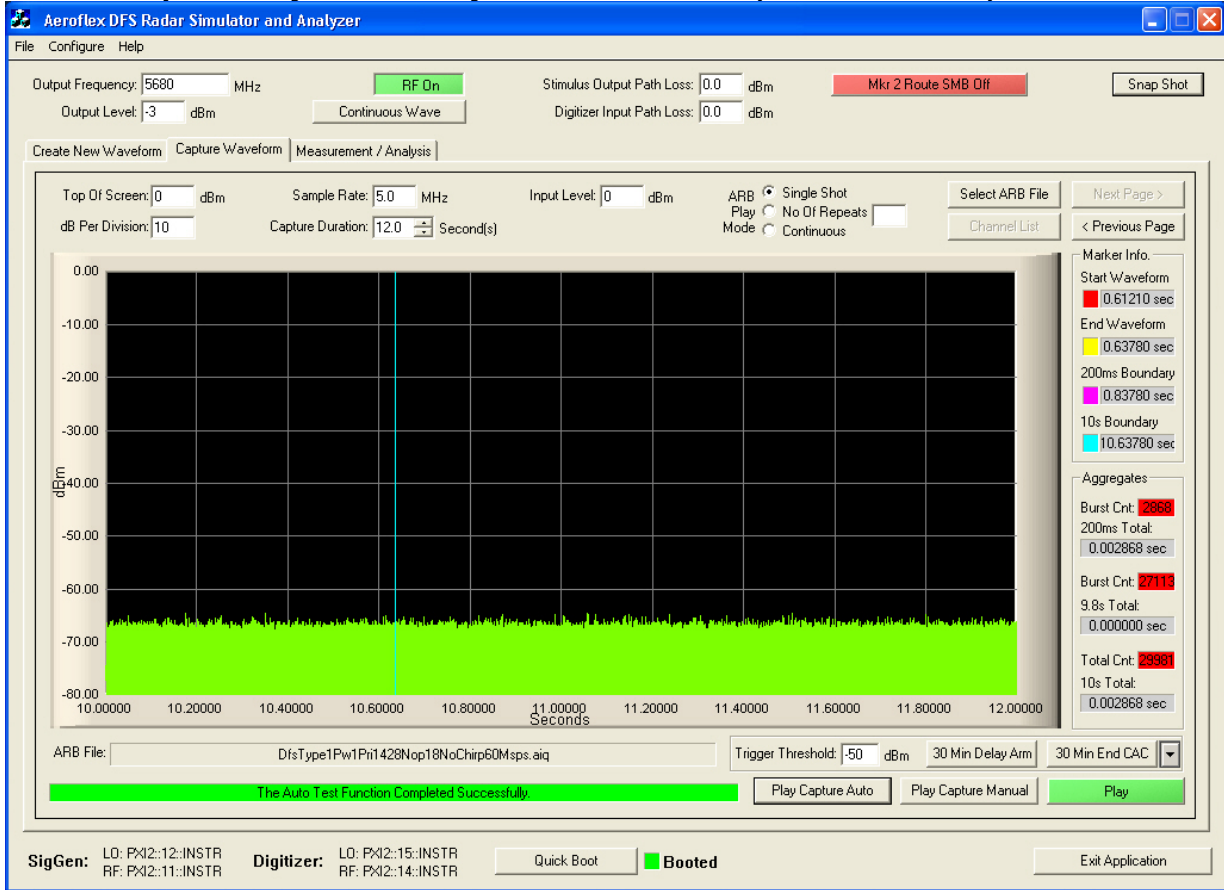


This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.



Title: PremierWave 802.11 Wireless Card
To: FCC 47 CFR Part 15.407
Serial #: AGSL01-U1 Rev A
Issue Date: 18th April 2011
Page: 31 of 36

Channel Move Time, Channel Closing Transmission Time for Type 1 Radar Captured by the Test System - Plot 6 of 6 (10-12 Seconds) Ch 136



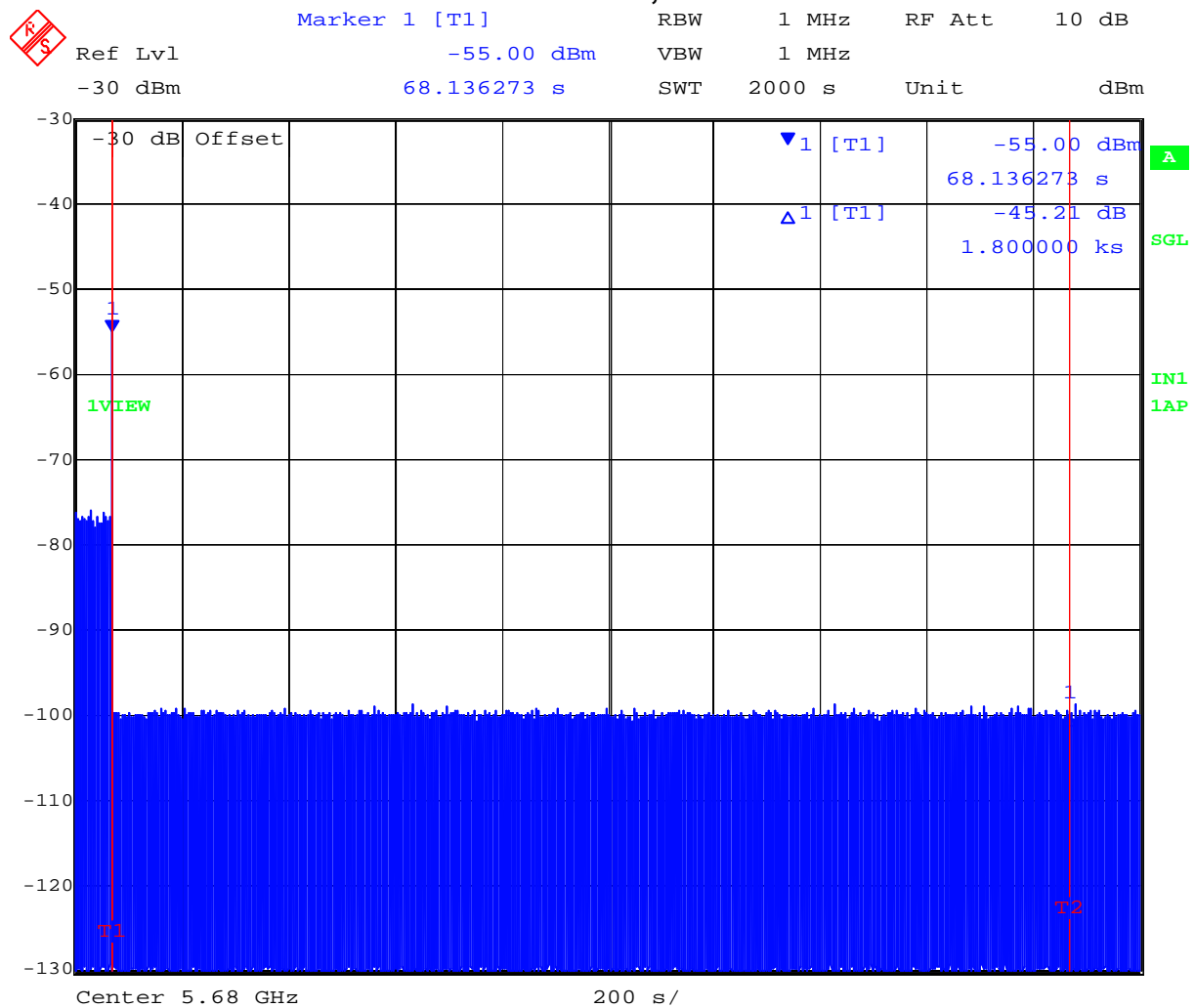
This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.



7.2.2. 30 Minute Non-Occupancy Period

The EUT is monitored for more than 30 minutes following the channel close/move time to verify no transmissions resume on this Channel.

30 Minute Non-Occupancy Period Type 1 Radar 11a mode Ch 5,680 MHz



Date: 20.JAN.2011 09:23:12

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.



Title: PremierWave 802.11 Wireless Card
To: FCC 47 CFR Part 15.407
Serial #: AGSL01-U1 Rev A
Issue Date: 18th April 2011
Page: 33 of 36

Measurement Uncertainty Time/Power

Measurement uncertainty		
- Time		4%
- Power		1.33dB

Traceability

Test Equipment Used

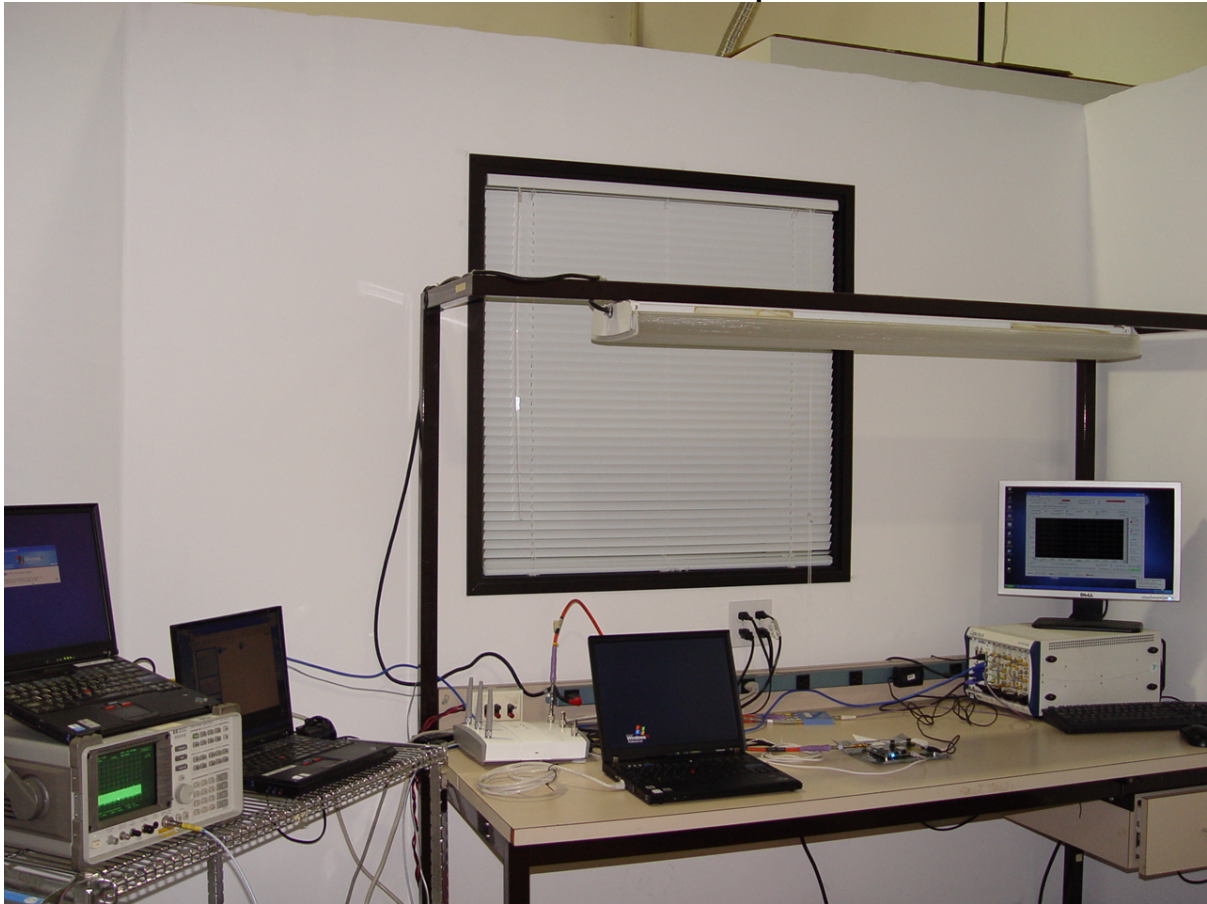
0072, 0083, 0098, 0116, 0132, 0158, 0313, 0314, 0193, 0223, 0252, 0253, 0251, 0256, 0328, 0329

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

8. PHOTOGRAPHS

8.1. Dynamic Frequency Selection Test Set-Up

General DFS Test Setup





Title: PremierWave 802.11 Wireless Card
To: FCC 47 CFR Part 15.407
Serial #: AGSL01-U1 Rev A
Issue Date: 18th April 2011
Page: 35 of 36

9. TEST EQUIPMENT DETAILS

Asset #	Instrument	Manufacturer	Part #	Serial #
0134	Amplifier	Com Power	PA 122	181910
0158	Barometer /Thermometer	Control Co.	4196	E2846
0287	EMI Receiver	Rhode & Schwartz	ESIB 40	100201
0252	SMA Cable	Megaphase	Sucoflex 104	None
0310	2m SMA Cable	Micro-Coax	UFA210A-0-0787-3G03G0	209089-001
0312	3m SMA Cable	Micro-Coax	UFA210A-1-1181-3G0300	209092-001
0313	Coupler	Hewlett Packard	86205A	3140A01285
0314	30dB N-Type Attenuator	ARRA	N9444-30	1623
0070	Power Meter	Hewlett Packard	437B	3125U11552
0116	Power Sensor	Hewlett Packard	8485A	3318A19694
0117	Power Sensor	Hewlett Packard	8487D	3318A00371
0184	Pulse Limiter	Rhode & Schwartz	ESH3Z2	357.8810.52
0190	LISN	Rhode & Schwartz	ESH3Z5	836679/006
0293	BNC Cable	Megaphase	1689 1GVT4	15F50B001
0301	5.6 GHz Notch Filter	Micro-Tronics	RBC50704	001
0302	5.25 GHz Notch Filter	Micro-Tronics	BRC50703	002
0303	5.8 GHz Notch Filter	Micro-Tronics	BRC50705	003
0304	2.4GHzHz Notch Filter	Micro-Tronics	--	001
0307	BNC Cable	Megaphase	1689 1GVT4	15F50B002
0335	1-18GHz Horn Antenna	ETS- Lindgren	3117	00066580
0337	Amplifier	MiCOM Labs	--	--
0338	Antenna	Sunol Sciences	JB-3	A052907

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.



440 Boulder Court, Suite 200
Pleasanton, CA 94566, USA
Tel: 1.925.462.0304
Fax: 1.925.462.0306
www.micomlabs.com