Test of: Hewlett Packard MRLBB-1303 Wireless Module

To: FCC 47 CFR Part 15.407

Test Report Serial No.: HPWD78-U3 Rev A

MiCOM Labs

opening wireless markets

TEST REPORT

FROM

Test of: Hewlett Packard MRLBB-1303 Wireless Module

to

To: FCC 47 CFR Part 15.407

Test Report Serial No.: HPWD78-U3 Rev A

Note: this report contains data with regard to the 5,150 - 5,250, 5,250 - 5,350, 5,470 - 5,725 and 5,725 – 5850 MHz frequency bands for Hewlett Packard, MRLBB-1303 Wireless Access module.

This report supersedes None

Applicant: Hewlett Packard
8000 Foothills Blvd
Roseville, 95747 California
USA

Product Function: WLAN 802.11a/n/ac Module

Copy No: pdf

Issue Date: 22nd February 2016

This Test Report is Issued Under the Authority of;

MiCOM Labs, Inc.
575 Boulder Court
Pleasanton, CA 94566 USA
Phone: +1 (925) 462-0304
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TESTING CERT #2381.01

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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

ilac-MRA a2la

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 4th day of February 2016.

Senior Director of Quality & Communications
For the Accreditation Council
Certificate Number 2381.01
Valid to November 30, 2017

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

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	-	US0159 Listing #: 102167
Canada	Industry Canada (IC)	FCB	APEC MRA 2	US0159 Listing #: 4143A-2
Japan	MIC (Ministry of Internal Affairs and Communication)	CAB	APEC MRA 2	RCB 210
	VCCI	--	--	A-0012
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

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

Accredited Product Certification Body

A2LA has accredited

MICOM LABS

Pleasanton, CA

This product certification body is accredited in accordance with the recognized International Standard ISO/IEC 17065:2012 *Requirements for bodies certifying products, processes and services*. This accreditation demonstrates technical competence for a defined scope and the operation of a management system.

Presented this 4th day of February 2016.

Senior Director of Quality & Communications
For the Accreditation Council
Certificate Number 2381.02
Valid to November 30, 2017

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

USA Telecommunication Certification Body (TCB) - TCB Identifier – US0159

Industry Canada Certification Body - CAB Identifier – US0159

European Notified Body - Notified Body Identifier - 2280

Japan – Recognized Certification Body (RCB) - RCB Identifier - 210

DOCUMENT HISTORY

Document History		
Revision	**Date**	**Comments**
Draft	21st February 2016	
Rev A	22nd February 2016	Update to original report to align with new FCC rules. Frequency band 5725 – 5850 MHz was tested under the UNII Band for the following series of tests; 1).. Conducted 2).. Radiated 3).. DFS radar testing; - tested new Type 1 radar signature - spot checked the existing DFS signatures
This report was originally release as HPWD41-U6, see below		
Draft	13th September 2013	
Rev A	1st October 2013	Initial release
Rev B	16th October 2013	Implemented FCC KDB 644545 "Guidance for IEEE 802.11ac and Pre-ac Device Emissions Testing"

1. TEST RESULT CERTIFICATE

Applicant:	Hewlett Packard 8000 Foothills Blvd Roseville, 95747 California USA	Tested By:	MiCOM Labs, Inc. 575 Boulder Court Pleasanton California, 94566, USA
EUT:	WLAN 802.11a/n/ac Module	Tel:	+1 925 462 0304
Model:	MRLBB-1303	Fax:	+1 925 462 0306
S/N:	Not Available		
Test Date(s):	18th June - 16th October 2013 12th February 2016	Website:	www.micomlabs.com

STANDARD(S)	TEST RESULTS
FCC 47 CFR Part 15.407	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.

ACCREDITED
TESTING CERT #2381.01

Approved & Released for MiCOM Labs, Inc. by:

Graeme Grieve
Quality Manager MiCOM Labs,

Gordon Hurst
President & CEO MiCOM Labs, Inc.

2. REFERENCES AND MEASUREMENT UNCERTAINTY

2.1. Normative References

Ref.	Publication	Year	Title
(i)	FCC 47 CFR Part 15.407	2012	Code of Federal Regulations
(ii)	FCC 06-96	June 2006	Memorandum Opinion and Order
(iii)	FCC OET KDB 662911	4th April 2011	Emissions Testing of Transmitters with Multiple Outputs in the Same Band
(iv)	Industry Canada RSS-210	2010	Low Power License-Exempt Radiocommunication Devices (All Frequency Bands): Category 1 Equipment
(v)	Industry Canada RSS-Gen	2010	General Requirements and Information for the Certification of Radiocommunication Equipment
(vi)	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
(vii)	CISPR 22/ EN 55022	2008 2006+A1:2007	Limits and Methods of Measurements of Radio Disturbance Characteristics of Information Technology Equipment
(viii)	M 3003	Edition 1 Dec. 1997	Expression of Uncertainty and Confidence in Measurements
(ix)	LAB34	Edition 1 Aug 2002	The expression of uncertainty in EMC Testing
(x)	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
(xi)	A2LA	July 2012	Reference to A2LA Accreditation Status – A2LA Advertising Policy
(xii)	FCC Public Notice – DA 02-2138	2002	Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices

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2.2. 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.

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3. PRODUCT DETAILS AND TEST CONFIGURATIONS

3.1. Technical Details

Details	Description
Purpose:	Test of the Hewlett Packard MRLBB-1303 Wireless Module in the frequency range 5,150 - 5,250, 5,250 – 5,350 and 5,470 - 5725 MHz to FCC Part 15.407 and Industry Canada RSS-210 regulations.
Applicant:	Hewlett Packard 8000 Foothills Blvd Roseville, 95747 California,USA
Manufacturer:	As applicant
Laboratory performing the tests:	MiCOM Labs, Inc. 575 Boulder Court Pleasanton, California 94566 USA
Test report reference number:	HPWD78-U3 Rev A
Date EUT received:	12th June 2013
Standard(s) applied:	FCC 47 CFR Part 15.407 & IC RSS-210
Dates of test (from - to):	18th June - 16th October 2013
No of Units Tested:	One
Type of Equipment:	802.11a/n/ac Wireless Access Point 3x3 Spatial Multiplexing MIMO configuration
Applicants Trade Name:	Wireless Access Point
Model(s):	MRLBB-1303
Location for use:	Indoor only
Declared Frequency Range(s):	5150–5250, 5250- 5350, 5470 – 5725, 5725-5850 MHz
Hardware Rev	LP2
Software Rev	LSDK 10.1.357
Type of Modulation:	Per 802.11 – OFDM
EUT Modes of Operation:	802.11a, 802.11n HT-20, HT-40, VHT-40, VHT-80
Declared Nominal Output Power: (Average Power)	802.11a Legacy, HT-20: +20 dBm 802.11n: HT-40/VHT-40 +20 dBm 802.11n: VHT-80 +20 dBm
Transmit/Receive Operation:	Time Division Duplex
Rated Input Voltage and Current:	3.3 Vdc ±10%
Operating Temperature Range:	Declared range 0° to +55°C
ITU Emission Designator:	802.11a 16M9D1D 802.11n HT-20 18M0D1D 802.11n HT-40 36M5D1D 802.11ac-40 36M5D1D 802.11ac-80 76M6D1D
Equipment Dimensions:	50mm wide, 55.8mm length, 4mm thick
Weight:	0.40 ounces
Primary function of equipment:	Wireless Access Point for transmitting data and voice.

3.2. Scope of Test Program

Hewlett Packard MRLBB-1303 Wireless Module RF Testing
The scope of the test program was to test the Hewlett Packard MRLBB-1303Wireless LAN Access Point, 3X3 Spatial Multiplexing MIMO configurations in the frequency range 5,150 - 5,250, 5,250 – 5,350 5,470 – 5,725 and 5,725 – 5,850 MHz for compliance against FCC 47 CFR Part 15.407 specification.

FCC OET KDB Implementation
This test program implements the following FCC KDB – 662911 4/4/2011;
Emissions Testing of Transmitters with Multiple Outputs in the Same Band

The KDB document provides guidance for measurements of conducted output emissions of devices that employ a single transmitter with multiple outputs in the same band, with the outputs occupying the same or overlapping frequency ranges. It applies to EMC compliance measurements on devices that transmit on multiple antennas simultaneously in the same or overlapping frequency ranges through a coordinated process. Examples include, but are not limited to, devices employing beam forming or multiple-input and multiple-output (MIMO.) This guidance applies to both licensed and unlicensed devices wherever the FCC rules call for conducted output measurements. Guidance is provided for in-band, out-of-band and spurious emission measurements.

This guidance does not apply to the multiple transmitters included in a composite device, such as a device that combines an 802.11 modem with a cell phone in one enclosure with each driving its own antenna.

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Hewlett Packard Inc
MRLBB-1303 802.11 a/n/ac Wireless Module

Hewlett Packard Inc
MRLBB-1303 802.11 a/n/ac Wireless Module

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

Equipment Type	Equipment Description (Including Brand Name)	Mfr	Model No.	Serial No.
EUT	Wireless LAN Access Point	Hewlett Packard	MRLBB-1303	Not Available
Support	Laptop PC	IBM	Thinkpad	None

3.4. Antenna Details

Model	Type	Gain	Freq. Band	Note
		dBi	MHz	
5184-6684	PIFA	7.4	5150 - 5350	
5184-6684	PIFA	7.81	5470 - 5725	
5184-6684	PIFA	7.79	5725 - 5850	

3.5. Cabling and I/O Ports

Number and type of I/O ports

1. 3 x u.FL RF connectors

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3.6. Test Configurations

Testing was performed to determine the highest power level versus bit rate. The variant with the highest power was used to exercise the product.

Matrix of test configurations

Operational Mode(s) (802.11)	Variant	Data Rates with Highest Power	Frequencies (MHz)
5150-5250	802.11a	6 MBit/s	5180, 5200, 5240
	HT-20	6.5 MBit/s	
	HT-40	13.5 MBit/s	5190, 5230
	VHT-40		
	VHT-80	29.3 MBit/s	5,210
5250-5350 5470-5725	802.11a	6 MBit/s	5260,5280,5300,5320 5500,5580,5720*
	802.11n HT-20	6.5 MBit/s	
	802.11n HT-40	13.5 MBit/s	5270,5310 5510,5550,5710*
	VHT-40		
	VHT-80	29.3 MBit/s	5290 5530, 5690*
5725-5850	802.11a	6 MBit/s	5745, 5785, 5825
	802.11n HT-20	6.5 MBit/s	
	802.11n HT-40	13.5 MBit/s	5755, 5795
	VHT-40		
	VHT-80	29.3 MBit/s	5775

***Note:** Testing 802.11 a, n (HT-20, HT-40), VHT-40, VHT-80 all straddles the 5725 MHz band-edge. This is recognized by the FCC and is covered under FCC KDB 644545 Guidance for 802.11ac and Pre-ac Device Emission Testing

Spurious Emission and Band-Edge Test Strategy
Bands 5,150 – 5250

11a	11n HT-20	11n HT-40	11ac-40	11ac-80
SE 5180	SE 5180	SE 5190	SE 5190	SE 5210
SE 5200	SE 5200	--	--	--
SE 5240	SE 5240	SE 5230	SE 5230	--
BE 5150	BE 5150	BE 5150	BE 5150	BE 5150

Bands 5,250 – 5,350

11a	11n HT-20	11n HT-40	11ac-40	11ac-80
SE 5260	SE 5260	SE 5270	SE 5270	SE 5290
SE 5300	SE 5300	--	--	--
SE 5320	SE 5320	SE 5310	SE 5310	--
BE 5350	BE 5350	BE 5350	BE 5350	BE 5350

Band 5,470 – 5,725

11a	11n HT-20	11n HT-40	11ac-40	11ac-80
SE 5500	SE 5500	SE 5510	SE 5510	SE 5530
SE 5580	SE 5580	SE 5550	SE 5550	--
SE 5720	SE 5720	SE 5710	SE 5710	SE 5690
BE 5470	BE 5470	BE 5470	BE 5470	BE 5470

Band 5,725 – 5,850

11a	11n HT-20	11n HT-40	11ac-40	11ac-80
SE 5745	--	--	--	--
SE 5785	--	--	--	--
SE 5825	--	--	--	--
BE 5725	BE 5725	BE 5725	BE 5725	BE 5725
BE 5850	BE 5850	BE 5850	BE 5850	BE 5850

KEY:-

SE – Spurious Emissions

BE – Band-Edge

3.7. Equipment Modifications

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

1. NONE

3.8. Deviations from the Test Standard

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

1. NONE

3.9. Subcontracted Testing or Third Party Data

1. NONE

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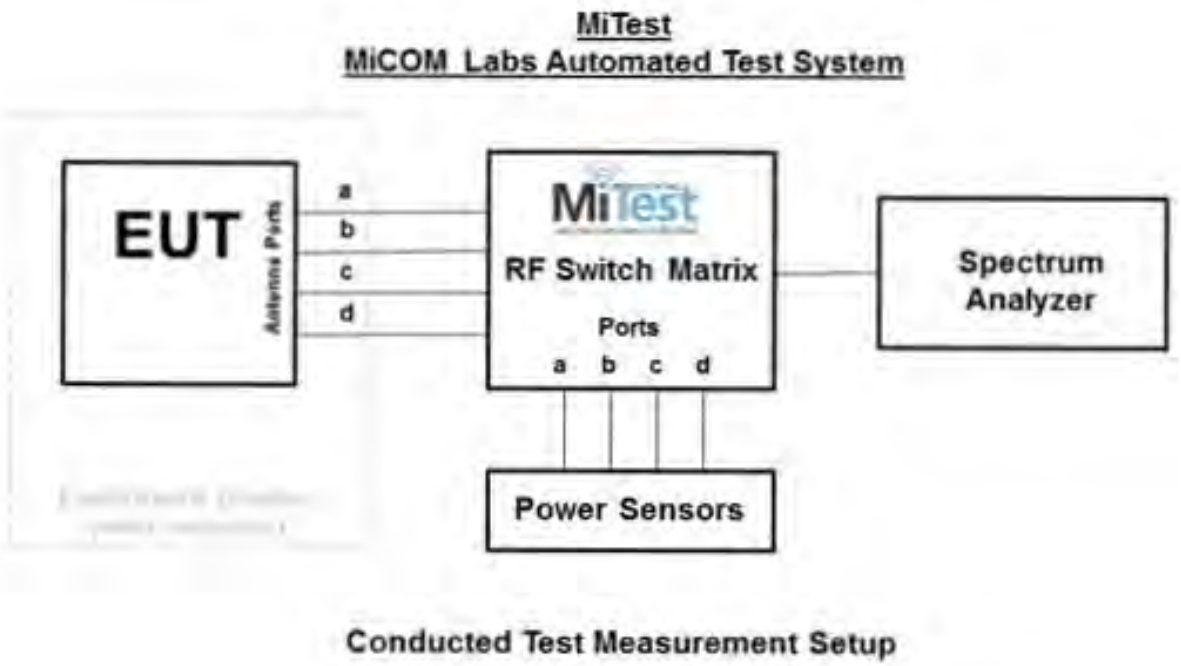
4. TESTING EQUIPMENT CONFIGURATION(S)

4.1. Conducted RF Emission Test Set-up

The following tests were performed using the conducted test set-up shown in the diagram below.

1. Section 7.1.1.1. 26 dB and 99% Bandwidth
2. Section 7.1.1.2. Maximum Conducted Output Power
3. Section 7.1.1.3. Peak Power Spectral Density

Conducted Test Set-Up Pictorial Representation



A full system calibration was performed on the test station and any resulting system losses (or gains) were taken into account in the production of all final measurement data.

Asset#	Description	Manufacturer	Model#	Serial#	Calibration Due Date
158	Barometer/Thermometer	Control Company	4196	E2846	01 Dec 2016
287	Rohde & Schwarz 40 GHz Receiver	Rhode & Schwarz	ESIB40	100201	27 Aug 2016
376	USB 10MHz - 18GHz Average Power Sensor	Agilent	U2000A	MY51440005	23 Oct 2016
381	4x4 RF Switch Box	MiCOM Labs	MiTest RF Switch Box	MIC002	18 Jun 2016
419	Laptop with Labview Software	Lenova	W520	TS02	Not Required
420	USB to GPIB Interface	National Instruments	GPIB-USB HS	1346738	Not Required
435	USB Wideband Power Sensor	Boonton	55006	8730	31 Jul 2016
440	USB Wideband Power Sensor	Boonton	55006	9178	25 Sep 2016
441	USB Wideband Power Sensor	Boonton	55006	9179	25 Sep 2016
442	USB Wideband Power Sensor	Boonton	55006	9181	25 Sep 2016
460	Dell Computer with installation of MiTest executable.	Dell	Optiplex330	BC944G1	Not Required
RF#2 GPIB#1	GPIB cable to Power Supply	HP	GPIB	None	Not Required
RF#2 SMA#1	EUT to Mitest box port 1	Flexco	SMA Cable port1	None	18 Jun 2016
RF#2 SMA#2	EUT to Mitest box port 2	Flexco	SMA Cable port2	None	18 Jun 2016
RF#2 SMA#3	EUT to Mitest box port 3	Flexco	SMA Cable port3	None	18 Jun 2016
RF#2 SMA#4	EUT to Mitest box port 4	Flexco	SMA Cable port4	None	18 Jun 2016
RF#2 SMA#SA	Mitest box to SA	Flexco	SMA Cable SA	None	18 Jun 2016
RF#2 USB#1	USB Cable to Mitest Box	Dynex	USB Cable	None	Not Required

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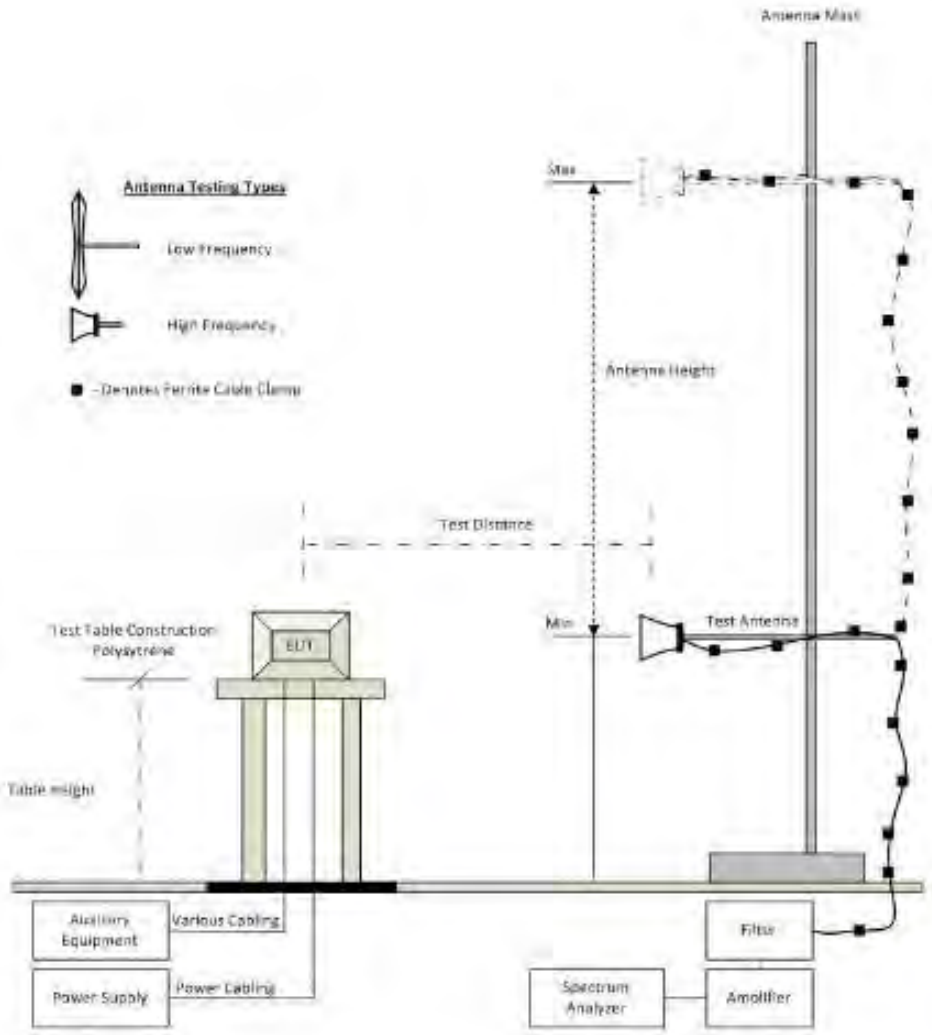
4.2. Radiated Spurious Emission Test Set-up

The following tests were performed using the conducted test set-up shown in the diagram below.

1. Section 7.1.2 Radiated Emissions

Radiated Emission Measurement Setup



Radiated Emission Test Setup

A full system calibration was performed on the test station and any resulting system losses (or gains) were taken into account in the production of all final measurement data.

Asset#	Description	Manufacturer	Model#	Serial#	Calibration Due Date
158	Barometer/Thermometer	Control Company	4196	E2846	01 Dec 2016
170	Video System Controller for Semi Anechoic Chamber	Panasonic	WV-CY101	04R08507	Not Required
377	Band Rejection Filter 5150 to 5880MHz	Microtronics	BRM50716	034	18 Aug 2016
378	Rohde & Schwarz 40 GHz Receiver with Generator	Rhode & Schwarz	ESIB40	100107/040	04 Aug 2016
399	ETS 1-18 GHz Horn Antenna	ETS	3117	00154575	10 Oct 2016
406	Amplifier for Radiated Emissions	MiCOM Labs	40dB 1 to 18GHz Amp	0406	28 May 2016
410	Desktop Computer	Dell	Inspiron 620	WS38	Not Required
411	Mast/Turntable Controller	Sunol Sciences	SC98V	060199-1D	Not Required
412	USB to GPIB Interface	National Instruments	GPIB-USB HS	11B8DC2	Not Required
413	Mast Controller	Sunol Science	TWR95-4	030801-3	Not Required
415	Turntable Controller	Sunol Sciences	Turntable Controller	None	Not Required
416	Gigabit ethernet filter	ETS-Lingren	Gigafoil 260366	None	Not Required
447	Rad Emissions Test Software	MiCOM	Rad Emissions Test Software Version 1.0.73	447	Not Required
462	Schwarzbeck cable from Antenna to Amplifier.	Schwarzbeck	AK 9513	462	25 Feb 2016
463	Schwarzbeck cable from Amplifier to Bulkhead.	Schwarzbeck	AK 9513	463	25 Feb 2016
464	Schwarzbeck cable from Bulkhead to Receiver	Schwarzbeck	AK 9513	464	25 Feb 2016
480	Cable - Bulkhead to Amp	SRC Haverhill	157-157-3050360	480	11 Aug 2016
481	Cable - Bulkhead to Receiver	SRC Haverhill	151-151-3050787	481	11 Aug 2016
482	Cable - Amp to Antenna	SRC Haverhill	157-157-3051574	482	11 Aug 2016

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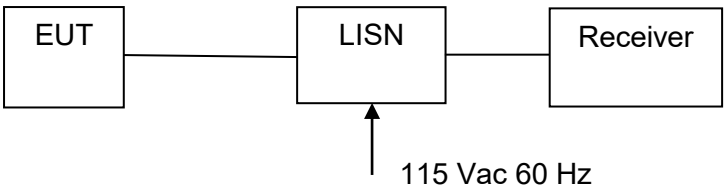
4.3. ac Wireline Emission Test Set-up

The following tests were performed using the conducted test set-up shown in the diagram below.

1. Section 7.1.3 ac Wireline Conducted Emissions

Conducted Test Set-Up Pictorial Representation



Measurement set up for ac Wireline Conducted Emissions Test

Asset#	Description	Manufacturer	Model#	Serial#	Calibration Due Date
158	Barometer/Thermometer	Control Company	4196	E2846	01 Dec 2016
184	Pulse Limiter	Rhode & Schwarz	ESH3Z2	357.8810.52	13 Mar 2016
190	LISN (two-line V-network)	Rhode & Schwarz	ESH3Z5	836679/006	29 Oct 2016
287	Rohde & Schwarz 40 GHz Receiver	Rhode & Schwarz	ESIB40	100201	27 Aug 2016
307	BNC-CABLE	Megaphase	1689 1GVT4	15F50B002	13 Mar 2016
316	Dell desktop computer workstation with Vasona	Dell	Desktop	WS04	Not Required
351	Data Impedance Stabilization Network	Teseq	ISN T800	24809	30 Nov 2016
372	AC Variable PS	California Instruments	1251P	L06951	Cal when used
378	Rohde & Schwarz 40 GHz Receiver with Generator	Rhode & Schwarz	ESIB40	100107/040	04 Aug 2016
388	LISN (3 Phase) 9kHz - 30MHz	Rohde & Schwarz	ESH2-Z5	892107/022	30 Oct 2016
ADAPT SMA#1	SMA Cable	Megaphase	SMA Cable #1	None	13 Aug 2016

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5. MEASUREMENT AND PRESENTATION OF TEST DATA

The measurement and graphical data presented in this test report was generated automatically using state-of-the-art technology creating an easy to read report structure. Numerical measurement data is separated from supporting graphical data (plots) through hyperlinks. Numerical measurement data can be reviewed without scrolling through numerous graphical pages to arrive at the next data matrix.

Plots have been relegated into the Appendix 'Graphical Images.

Test and report automation was performed by MiTest. MiTest is an automated test system developed by MiCOM Labs. MiTest is the first cloud based modular test system enabling end-to-end automation of regulatory compliance testing for conducted RF testing.

The MiCOM Labs "MiTest" Automated Test System" (Patent Pending)

6. TEST SUMMARY

List of Measurements

The following table represents the list of measurements required under the FCC CFR47 Part 15.407.

Section(s)	Test Items	Description	Condition	Result	Test Report Section
15.407(a)	26dB and 99% Emission BW	Emission bandwidth measurement	Conducted	Complies	6.1.1.1 A.1.1
15.407(a)	Maximum Conducted Output Power	Power Measurement	Conducted	Complies	6.1.1.2
15.407(a)	Peak Power Spectral Density	PPSD	Conducted	Complies	6.1.1.3 A.1.2
15.407(g)	Frequency Stability	Limits: contained within band of operation at all times.	Applicant declaration	Complies	6.1.1.4
15.407(f)	Radio Frequency Radiation Exposure	Exposure to radio frequency energy levels, Maximum Permissible Exposure (MPE)	Conducted	See included MPE exhibit	--

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List of Measurements (continued)

The following table represents the list of measurements required under the FCC CFR47 Part 15.407

Section(s)	Test Items	Description	Condition	Result	Test Report Section
15.407(b)(2) **15.205(a)** **15.209(a)**	Radiated Emissions		Radiated		6.1.2
	Transmitter Radiated Spurious Emissions	Emissions above 1 GHz		Complies	*6.1.2.1* *6.1.2.2* *6.1.2.3*
	Radiated Band Edge	Band edge results		Complies	*6.1.2.1* *6.1.2.2* *6.1.2.3*
15.407(b)(6) **15.205(a)** **15.209(a)**	Radiated Emissions	Emissions <1 GHz (30M-1 GHz)		Complies	*6.1.2.4*
15.407(b)(6) **15.207**	AC Wireline Conducted Emissions 150 kHz–30 MHz	Conducted Emissions	Conducted	Complies ac/dc adaptor only, POE not marketed with equipment	6.1.3

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

Note 3: Section 3.7 Equipment Modifications highlights the equipment modifications that were required to bring the product into compliance with the above test matrix

List of Measurements (cont'd)

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
	DFS	Dynamic Frequency Selection	Conducted		6.1.4
7.8.1	Detection Bandwidth	UNII Detection Bandwidth	Conducted	Complies	
7.8.2.1	Performance Requirements Check	Initial Channel Availability Check Time	Conducted	Complies	
7.8.2.2		Radar Burst at the Beginning of the Channel Availability Check Time	Conducted	Complies	
7.8.2.3		Radar Burst at the End of the Channel Availability Check Time	Conducted	Complies	
7.8.3	In-Service Monitoring	In-Service Monitoring for Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period	Conducted	Complies	
7.8.4	Radar Detection	Statistical Performance Check	Conducted	Complies	

7. TEST RESULTS

7.1. Device Characteristics

7.1.1. Conducted Testing

7.1.1.1. 26 dB and 99 % Bandwidth

Conducted Test Conditions for 26 dB and 99% Bandwidth			
Standard:	FCC CFR 47:15.407	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	26 dB and 99 % Bandwidth	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.407 (a)	**Pressure (mBars):**	999 - 1001
Reference Document(s):	KDB 789033 - D01 DTS General UNII Test Procedures v01		

Test Procedure for 26 dB and 99% Bandwidth Measurement

The bandwidth at 26 dB and 99 % is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency. KDB 789033 Section 5.1 Emission Bandwidth was used in order to prove compliance. The Resolution Bandwidth was set to approximately 1% of the emission bandwidth.

Limits 26 dB and 99% Bandwidth

Operating Frequency Band 5150-5250 MHz

15. 407 (a)(1)
(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Operating Frequency Band 5250-5350 and 5470 – 5725 MHz

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 + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Operating Frequency Band 5725 – 5850 MHz

15. 407 (a)(3)
For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

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Measurement Results for 26 dB and 99 % Operational Bandwidth(s)

Equipment Configuration for 26 dB & 99% Occupied Bandwidth			
Variant:	802.11a	**Duty Cycle (%):**	100
Data Rate:	6 MBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 26 dB Bandwidth (MHz)				26 dB Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5180.0	24.449	23.948	24.248	--	24.449	23.948		
5200.0	24.349	23.948	24.248	--	24.349	23.948		
5240.0	24.048	23.848	24.349	--	24.349	23.848		

Test Frequency	Measured 99% Bandwidth (MHz)				99% Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5180.0	16.834	16.834	16.934	--	16.934	16.834		
5200.0	16.834	16.934	16.934	--	16.934	16.834		
5240.0	16.733	16.733	16.834	--	16.834	16.733		

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the link in the above results matrix to view the plot

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Equipment Configuration for 26 dB & 99% Occupied Bandwidth			
Variant:	802.11n HT-20	**Duty Cycle (%):**	100
Data Rate:	6.5 MBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 26 dB Bandwidth (MHz)				26 dB Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5180.0	24.950	24.549	25.351	--	25.351	24.549		
5200.0	25.150	24.148	25.351	--	25.351	24.148		
5240.0	25.050	24.349	25.251	--	25.251	24.349		

Test Frequency	Measured 99% Bandwidth (MHz)				99% Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5180.0	18.036	17.936	17.936	--	18.036	17.936		
5200.0	17.936	17.936	17.936	--	17.936	17.936		
5240.0	18.036	17.836	17.936	--	18.036	17.836		

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the link in the above results matrix to view the plot

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Equipment Configuration for 26 dB & 99% Occupied Bandwidth			
Variant:	802.11n HT-40	**Duty Cycle (%):**	100
Data Rate:	13.5 MBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 26 dB Bandwidth (MHz)				26 dB Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5190.0	48.898	46.894	49.098	--	49.098	46.894		
5230.0	48.497	47.695	48.297	--	48.497	47.695		

Test Frequency	Measured 99% Bandwidth (MHz)				99% Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5190.0	36.473	36.473	36.473	--	36.473	36.473		
5230.0	36.473	36.473	36.473	--	36.473	36.473		

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the link in the above results matrix to view the plot

Equipment Configuration for 26 dB & 99% Occupied Bandwidth			
Variant:	802.11ac-40	**Duty Cycle (%):**	100
Data Rate:	13.5 MBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 26 dB Bandwidth (MHz)				26 dB Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5190.0	48.297	46.894	48.297	--	48.297	46.894		
5230.0	48.497	49.098	48.898	--	49.098	48.497		

Test Frequency	Measured 99% Bandwidth (MHz)				99% Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5190.0	36.473	36.473	36.473	--	36.473	36.473		
5230.0	36.473	36.473	36.473	--	36.473	36.473		

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the link in the above results matrix to view the plot

Equipment Configuration for 26 dB & 99% Occupied Bandwidth			
Variant:	802.11ac-80	**Duty Cycle (%):**	100
Data Rate:	29.3 MBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 26 dB Bandwidth (MHz)				26 dB Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5210.0	100.601	101.002	100.200	--	101.002	100.200		

Test Frequency	Measured 99% Bandwidth (MHz)				99% Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5210.0	76.152	76.152	76.553	--	76.553	76.152		

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the link in the above results matrix to view the plot

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Equipment Configuration for 26 dB & 99% Occupied Bandwidth			
Variant:	802.11a	**Duty Cycle (%):**	100
Data Rate:	6 MBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 26 dB Bandwidth (MHz)				26 dB Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5260.0	24.549	24.248	24.649	--	24.649	24.248		
5300.0	24.349	24.048	24.850	--	24.850	24.048		
5320.0	24.349	22.946	24.248	--	24.349	22.946		

Test Frequency	Measured 99% Bandwidth (MHz)				99% Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5260.0	16.934	16.934	16.834	--	16.934	16.834		
5300.0	16.934	16.934	16.934	--	16.934	16.934		
5320.0	16.934	16.733	16.934	--	16.934	16.733		

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the link in the above results matrix to view the plot

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Equipment Configuration for 26 dB & 99% Occupied Bandwidth			
Variant:	802.11n HT-20	**Duty Cycle (%):**	100
Data Rate:	6.5 MBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 26 dB Bandwidth (MHz)				26 dB Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5260.0	25.050	23.948	25.351	--	25.351	23.948		
5300.0	25.150	23.948	25.150	--	25.150	23.948		
5320.0	24.749	24.248	25.351	--	25.351	24.248		

Test Frequency	Measured 99% Bandwidth (MHz)				99% Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5260.0	18.036	17.836	17.936	--	18.036	17.836		
5300.0	17.836	17.836	17.936	--	17.936	17.836		
5320.0	17.936	18.036	17.936	--	18.036	17.936		

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the link in the above results matrix to view the plot

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Equipment Configuration for 26 dB & 99% Occupied Bandwidth			
Variant:	802.11n HT-40	**Duty Cycle (%):**	100
Data Rate:	13.5 MBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 26 dB Bandwidth (MHz)				26 dB Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5270.0	47.295	46.693	49.098	--	49.098	46.693		
5310.0	47.695	46.894	48.497	--	48.497	46.894		

Test Frequency	Measured 99% Bandwidth (MHz)				99% Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5270.0	36.273	36.473	36.473	--	36.473	36.273		
5310.0	36.473	36.273	36.273	--	36.473	36.273		

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the link in the above results matrix to view the plot

Equipment Configuration for 26 dB & 99% Occupied Bandwidth			
Variant:	802.11ac-40	**Duty Cycle (%):**	100
Data Rate:	144 MBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 26 dB Bandwidth (MHz)				26 dB Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5270.0	47.896	47.695	48.697	--	48.697	47.695		
5310.0	47.295	47.094	48.297	--	48.297	47.094		
Test Frequency	Measured 99% Bandwidth (MHz)				99% Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5270.0	36.273	36.473	36.273	--	36.473	36.273		
5310.0	36.273	36.473	36.473	--	36.473	36.273		

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the link in the above results matrix to view the plot

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Equipment Configuration for 26 dB & 99% Occupied Bandwidth			
Variant:	802.11ac-80	**Duty Cycle (%):**	100
Data Rate:	192 MBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 26 dB Bandwidth (MHz)				26 dB Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5290.0	95.391	95.792	99.399	--	99.399	95.391		

Test Frequency	Measured 99% Bandwidth (MHz)				99% Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5290.0	76.152	76.152	75.752	--	76.152	75.752		

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the link in the above results matrix to view the plot

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Equipment Configuration for 26 dB & 99% Occupied Bandwidth			
Variant:	802.11a	**Duty Cycle (%):**	100
Data Rate:	6 MBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 26 dB Bandwidth (MHz)				26 dB Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5500.0	23.948	23.747	23.447	--	23.948	23.447		
5580.0	23.948	23.547	23.447	--	23.948	23.447		
5720.0	24.850	24.048	24.048	--	24.859	24.048		

Test Frequency	Measured 99% Bandwidth (MHz)				99% Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5500.0	16.834	16.834	16.733	--	16.834	16.733		
5580.0	16.733	16.834	16.733	--	16.834	16.733		
5720.0	17.034	16.834	16.934	--	17.034	16.834		

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the link in the above results matrix to view the plot

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Equipment Configuration for 26 dB & 99% Occupied Bandwidth			
Variant:	802.11n HT-20	**Duty Cycle (%):**	100
Data Rate:	6.5 MBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 26 dB Bandwidth (MHz)				26 dB Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5500.0	24.950	24.048	24.449	--	24.950	18.437		
5580.0	24.449	24.449	24.248	--	24.449	24.248		
5720.0	24.749	24.248	24.148	--	24.749	24.148		

Test Frequency	Measured 99% Bandwidth (MHz)				99% Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5500.0	17.936	17.936	17.936	--	17.936	17.936		
5580.0	17.936	17.936	17.836	--	17.936	17.836		
5720.0	16.834	16.834	16.834	--	16.834	16.834		

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the link in the above results matrix to view the plot

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Equipment Configuration for 26 dB & 99% Occupied Bandwidth			
Variant:	802.11n HT-40	**Duty Cycle (%):**	100
Data Rate:	13.5 MBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 26 dB Bandwidth (MHz)				26 dB Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5510.0	47.695	46.493	47.495	--	47.695	46.493		
5550.0	47.695	46.693	47.094	--	47.695	46.693		
5710.0	47.695	49.098	47.495	--	49.098	47.495		

Test Frequency	Measured 99% Bandwidth (MHz)				99% Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5510.0	36.273	36.273	36.273	--	36.273	36.273		
5550.0	36.273	36.273	36.273	--	36.273	36.273		
5710.0	36.473	36.473	36.473	--	36.473	36.473		

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the link in the above results matrix to view the plot

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Equipment Configuration for 26 dB & 99% Occupied Bandwidth			
Variant:	802.11ac-40	**Duty Cycle (%):**	100
Data Rate:	13.5 MBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 26 dB Bandwidth (MHz)				26 dB Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5510.0	48.297	45.691	47.295	--	48.297	45.691		
5550.0	47.695	46.894	46.894	--	47.695	46.894		
5710.0	47.094	49.499	46.894	--	46.092	45.691		

Test Frequency	Measured 99% Bandwidth (MHz)				99% Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5510.0	36.273	36.273	36.273	--	36.273	36.273		
5550.0	36.273	36.273	36.273	--	36.273	36.273		
5710.0	36.473	36.473	36.473	--	36.273	36.273		

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the link in the above results matrix to view the plot

Equipment Configuration for 26 dB & 99% Occupied Bandwidth			
Variant:	802.11ac-80	**Duty Cycle (%):**	100
Data Rate:	192 MBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 26 dB Bandwidth (MHz)				26 dB Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5530.0	96.593	93.387	95.792	--	96.593	93.387		
5690.0	95.792	93.788	92.986	--	95.792	92.986		

Test Frequency	Measured 99% Bandwidth (MHz)				99% Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5530.0	75.752	75.752	75.752	--	75.752	75.752		
5690.0	75.752	76.152	75.752	--	76.152	75.752		

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the link in the above results matrix to view the plot

Equipment Configuration for 26 dB & 99% Occupied Bandwidth			
Variant:	802.11a	**Duty Cycle (%):**	96.6
Data Rate:	6.00 MBit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	GMH
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 26 dB Bandwidth (MHz)				26 dB Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5745.0	23.146	23.287	23.146	--	23.287	23.146		
5785.0	22.866	23.146	23.146	--	23.146	22.866		
5825.0	23.707	23.427	22.866	--	23.707	22.866		

Test Frequency	Measured 99% Bandwidth (MHz)				99% Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5745.0	16.834	16.834	16.834	--	16.834	16.834		
5785.0	16.834	16.834	16.834	--	16.834	16.834		
5825.0	16.834	16.834	16.693	--	16.834	16.693		

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the links in the above matrix to view the graphical image (plot).

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Equipment Configuration for 26 dB & 99% Occupied Bandwidth			
Variant:	802.11ac-40	**Duty Cycle (%):**	92.0
Data Rate:	13.50 MBit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	GMH
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 26 dB Bandwidth (MHz)				26 dB Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5755.0	47.415	47.415	47.695	--	47.695	47.415		
5795.0	47.976	47.134	48.257	--	48.257	47.134		

Test Frequency	Measured 99% Bandwidth (MHz)				99% Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5755.0	36.754	36.754	36.754	--	36.754	36.754		
5795.0	36.754	36.754	36.754	--	36.754	36.754		

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the links in the above matrix to view the graphical image (plot).

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Equipment Configuration for 26 dB & 99% Occupied Bandwidth			
Variant:	802.11ac-80	**Duty Cycle (%):**	84.1
Data Rate:	29.30 MBit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	GMH
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 26 dB Bandwidth (MHz)				26 dB Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5775.0	95.391	92.024	92.585	--	95.391	92.024		

Test Frequency	Measured 99% Bandwidth (MHz)				99% Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5775.0	76.874	76.313	76.874	--	76.874	76.313		

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the links in the above matrix to view the graphical image (plot).

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Equipment Configuration for 26 dB & 99% Occupied Bandwidth			
Variant:	802.11n HT-20	**Duty Cycle (%):**	96.4
Data Rate:	6.50 MBit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	GMH
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 26 dB Bandwidth (MHz)				26 dB Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5745.0	23.567	24.269	23.848	--	24.269	23.567		
5785.0	23.707	24.409	23.287	--	24.409	23.287		
5825.0	23.567	24.689	23.146	--	24.689	23.146		

Test Frequency	Measured 99% Bandwidth (MHz)				99% Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5745.0	17.816	17.956	17.956	--	17.956	17.816		
5785.0	17.956	17.816	17.816	--	17.956	17.816		
5825.0	17.816	17.816	17.956	--	17.956	17.816		

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the links in the above matrix to view the graphical image (plot).

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Equipment Configuration for 26 dB & 99% Occupied Bandwidth			
Variant:	802.11n HT-40	**Duty Cycle (%):**	92.0
Data Rate:	13.50 MBit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	GMH
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 26 dB Bandwidth (MHz)				26 dB Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5755.0	47.134	46.854	47.695	--	47.695	46.854		
5795.0	47.695	47.134	48.257	--	48.257	47.134		

Test Frequency	Measured 99% Bandwidth (MHz)				99% Bandwidth (MHz)			
	Port(s)							
MHz	a	b	c	d	Highest	Lowest		
5755.0	36.754	36.754	37.034	--	37.034	36.754		
5795.0	36.754	36.754	36.754	--	36.754	36.754		

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the links in the above matrix to view the graphical image (plot).

7.1.1.2. Maximum Conducted Output Power

Conducted Test Conditions for Maximum Conducted Output Power			
Standard:	FCC CFR 47:15.407	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	Maximum Conducted Output Power	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.407 (a)	**Pressure (mBars):**	999 - 1001
Reference Document(s):	KDB 789033 - D01 DTS General UNII Test Procedures v01		

Test Procedure for Maximum Conducted Output Power Measurement
Method PM (Measurement using an RF average power meter). KDB 789033 defines a methodology using an average wideband power meter. Measurements were made while the EUT was operating in a continuous transmission mode (100% duty cycle) at the appropriate center frequency. All operational modes and frequency bands were measured independently and the resultant calculated. Where the device operated with multiple antenna ports i.e. MIMO device, each port was measured and reported separately. A summation (Σ) of each antenna port output power is provided which includes any offset due to Duty Cycle Correction Factor (DCCF). Testing was performed under ambient conditions at nominal voltage.

Test configuration and setup used for the measurement was per the Conducted Test Set-up section specified in this document.
Supporting Information
Calculated Power = A + G + Y+ 10 log (1/x) dBm

A = Total Power [10*Log10 ($10^{a/10}$ + $10^{b/10}$ + $10^{c/10}$ + $10^{d/10}$)]
G = Antenna Gain
Y = Beamforming Gain
x = Duty Cycle (average power measurements only)

Limits Maximum Conducted Output Power

Operating Frequency Band 5150-5250 MHz

15. 407 (a)(1)
(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Operating Frequency Band 5250-5350 and 5470 – 5725 MHz

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 + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Operating Frequency Band 5725 – 5850 MHz

15. 407 (a)(3)
For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

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Antenna Beam and Non-Beam Forming Power Levels

The MRLBB-1303 does not implement beam-forming

Maximum Transmit (Conducted) Power, FCC Limits

Bands 5250 – 5350

Limit lesser of: 250 mW or 11 dBm + 10 log (B) dBm.

Mode	Frequency Range (MHz)	Maximum 26 dB Bandwidth (MHz)	11 + 10 Log (B) (dBm)	Limit (dBm)
a	5250 – 5350 5470 – 5725	24.9	25.0	+24.0
HT-20		25.4	25.0	+24.0
HT-40		49.1	27.9	+24.0
VCT-40		48.7	27.9	+24.0
VCT-80		99.4	31.0	+24.0

Bands 5470 – 5725 MHz

Limit lesser of: 250 mW or 11 dBm + 10 log (B) dBm.

Mode	Frequency Range (MHz)	Maximum 26 dB Bandwidth (MHz)	11 + 10 Log (B) (dBm)	Limit (dBm)
a	5250 – 5350 5470 – 5725	24.6	24.9	+24.0
HT-20		25.0	25.0	+24.0
HT-40		47.7	27.8	+24.0
VCT-40		48.3	27.8	+24.0
VCT-80		96.6	30.8	+24.0

Frequency Band 5150 – 5250 MHz

Equipment Configuration for Peak Transmit Power			
Variant:	802.11a	**Duty Cycle (%):**	100
Data Rate:	6 MBit/s	**Antenna Gain (dBi):**	7.40
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Conducted Output Power (dBm) Port(s)				Calculated Total Power	Minimum 26 dB Bandwidth	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	Σ Port(s) dBm	MHz	dBm	dBm	
5180.0	9.29	9.67	8.47	--	13.94	23.948	15.60	-3.06	9.00
5200.0	9.36	9.74	8.71	--	14.06	23.948	15.60	-2.94	9.00
5240.0	9.74	9.92	8.78	--	14.28	23.848	15.60	-2.72	9.00

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Equipment Configuration for Peak Transmit Power			
Variant:	802.11n HT-20	**Duty Cycle (%):**	100
Data Rate:	6.5 MBit/s	**Antenna Gain (dBi):**	7.40
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Conducted Output Power (dBm) Port(s)				Calculated Total Power	Minimum 26 dB Bandwidth	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	Σ Port(s) dBm	MHz	dBm	dBm	
5180.0	9.28	9.42	8.45	--	13.84	24.549	15.60	-3.16	9.00
5200.0	9.62	9.70	8.63	--	14.11	24.148	15.60	-2.89	9.00
5240.0	9.57	9.67	8.60	--	14.08	24.349	15.60	-2.92	9.00

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Equipment Configuration for Peak Transmit Power			
Variant:	802.11n HT-40	**Duty Cycle (%):**	100
Data Rate:	13.5 MBit/s	**Antenna Gain (dBi):**	7.40
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Conducted Output Power (dBm) Port(s)				Calculated Total Power	Minimum 26 dB Bandwidth	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	Σ Port(s) dBm	MHz	dBm	dBm	
5190.0	10.53	11.10	10.57	--	15.51	46.894	15.60	-0.09	11.00
5230.0	10.60	11.17	10.43	--	15.52	47.695	15.60	-0.08	11.00

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Equipment Configuration for Peak Transmit Power			
Variant:	802.11ac-40	**Duty Cycle (%):**	100
Data Rate:	13.5 MBit/s	**Antenna Gain (dBi):**	7.40
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Conducted Output Power (dBm) Port(s)				Calculated Total Power	Minimum 26 dB Bandwidth	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	Σ Port(s) dBm	MHz	dBm	dBm	
5190.0	10.68	10.97	10.41	--	15.46	46.894	15.60	-0.14	11.00
5230.0	10.71	11.17	10.33	--	15.52	48.497	15.60	-0.08	11.00

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Measurement Uncertainty:	±2.81 dB

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Variant:	802.11ac-80	**Duty Cycle (%):**	100
Data Rate:	29.3 MBit/s	**Antenna Gain (dBi):**	7.40
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Conducted Output Power (dBm) Port(s)				Calculated Total Power	Minimum 26 dB Bandwidth	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	Σ Port(s) dBm	MHz	dBm	dBm	
5210.0	10.44	10.89	10.14	--	15.27	100.200	15.60	-0.73	11.00

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Measurement Uncertainty:	±2.81 dB

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Frequency Band 5250 – 5350 MHz

Equipment Configuration for Peak Transmit Power			
Variant:	802.11a	**Duty Cycle (%):**	100
Data Rate:	6 MBit/s	**Antenna Gain (dBi):**	7.40
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Conducted Output Power (dBm) Port(s)				Calculated Total Power	Minimum 26 dB Bandwidth	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	Σ Port(s) dBm	MHz	dBm	dBm	
5260.0	17.58	17.57	16.96	--	22.15	24.248	22.60	-0.45	15.50
5300.0	17.73	17.67	16.91	--	22.22	24.048	22.60	-0.38	15.00
5320.0	17.83	17.87	16.89	--	22.32	22.946	22.60	-0.28	15.50

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Equipment Configuration for Peak Transmit Power			
Variant:	802.11n HT-20	**Duty Cycle (%):**	100
Data Rate:	6.5 MBit/s	**Antenna Gain (dBi):**	7.40
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Conducted Output Power (dBm) Port(s)				Calculated Total Power	Minimum 26 dB Bandwidth	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	Σ Port(s) dBm	MHz	dBm	dBm	
5260.0	17.53	17.78	16.85	--	22.18	23.948	22.60	-0.42	15.50
5300.0	17.94	17.97	16.96	--	22.42	23.948	22.60	-0.18	15.50
5320.0	17.94	17.82	16.96	--	22.37	24.248	22.60	-0.23	16.00

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Equipment Configuration for Peak Transmit Power			
Variant:	802.11n HT-40	**Duty Cycle (%):**	100
Data Rate:	13.5 MBit/s	**Antenna Gain (dBi):**	7.40
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Conducted Output Power (dBm) Port(s)				Calculated Total Power	Minimum 26 dB Bandwidth	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	Σ Port(s) dBm	MHz	dBm	dBm	
5270.0	17.18	17.82	16.89	--	22.09	46.693	22.60	-0.51	17.50
5310.0	17.73	18.14	17.18	--	22.47	46.894	22.60	-0.13	17.50

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Measurement Uncertainty:	±2.81 dB

Equipment Configuration for Peak Transmit Power			
Variant:	802.11ac-40	**Duty Cycle (%):**	100
Data Rate:	13.5 MBit/s	**Antenna Gain (dBi):**	7.40
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Conducted Output Power (dBm) Port(s)				Calculated Total Power	Minimum 26 dB Bandwidth	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	Σ Port(s) dBm	MHz	dBm	dBm	
5270.0	17.53	17.91	17.08	--	22.29	47.695	22.60	-0.31	17.50
5310.0	17.75	18.12	17.53	--	22.58	47.094	22.60	-0.02	17.50

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Measurement Uncertainty:	±2.81 dB

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Equipment Configuration for Peak Transmit Power			
Variant:	802.11ac-80	**Duty Cycle (%):**	100
Data Rate:	29.3 MBit/s	**Antenna Gain (dBi):**	7.40
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Conducted Output Power (dBm) Port(s)				Calculated Total Power	Minimum 26 dB Bandwidth	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	Σ Port(s) dBm	MHz	dBm	dBm	
5290.0	17.49	17.87	17.20	--	22.30	95.391	22.60	-0.30	17.50

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Measurement Uncertainty:	±2.81 dB

Frequency Band 5470 – 5700 MHz

Equipment Configuration for Peak Transmit Power			
Variant:	802.11a	**Duty Cycle (%):**	100
Data Rate:	6 MBit/s	**Antenna Gain (dBi):**	7.80
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Conducted Output Power (dBm) Port(s)				Calculated Total Power	Minimum 26 dB Bandwidth	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	Σ Port(s) dBm	MHz	dBm	dBm	
5500.0	16.81	15.95	16.11	--	21.08	23.447	22.20	-1.12	16.00
5580.0	17.10	16.89	16.12	--	21.49	23.447	22.20	-0.71	16.00
5720.0	17.65	17.45	16.36	--	21.96	23.747	22.20	-0.24	15.00

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Equipment Configuration for Peak Transmit Power			
Variant:	802.11n HT-20	**Duty Cycle (%):**	100
Data Rate:	6.5 MBit/s	**Antenna Gain (dBi):**	7.80
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Conducted Output Power (dBm) Port(s)				Calculated Total Power	Minimum 26 dB Bandwidth	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	Σ Port(s) dBm	MHz	dBm	dBm	
5500.0	16.92	15.90	15.82	--	21.01	18.437	22.20	-1.19	16.50
5580.0	17.04	16.92	16.06	--	21.47	24.248	22.20	-0.73	16.00
5720.0	17.44	17.52	16.27	--	21.88	24.048	22.20	-0.32	15.50

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Equipment Configuration for Peak Transmit Power			
Variant:	802.11n HT-40	**Duty Cycle (%):**	100
Data Rate:	13.5 MBit/s	**Antenna Gain (dBi):**	7.80
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Conducted Output Power (dBm) Port(s)				Calculated Total Power	Minimum 26 dB Bandwidth	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	Σ Port(s) dBm	MHz	dBm	dBm	
5510.0	17.01	17.68	16.97	--	22.00	46.493	22.20	-0.20	17.50
5550.0	16.65	17.88	16.99	--	21.98	46.693	22.20	-0.22	17.50
5710.0	16.99	17.74	17.29		22.12	47.495	24.00	-0.08	16.50

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Measurement Uncertainty:	±2.81 dB

Equipment Configuration for Peak Transmit Power			
Variant:	802.11ac-40	**Duty Cycle (%):**	100
Data Rate:	13.5 MBit/s	**Antenna Gain (dBi):**	7.80
Modulation:	OFDM	**Beam Forming Gain (Y):**	N/A
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Conducted Output Power (dBm) Port(s)				Calculated Total Power	Minimum 26 dB Bandwidth	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	Σ Port(s) dBm	MHz	dBm	dBm	
5510.0	17.06	17.69	16.85		21.99	45.691	22.20	-0.21	17.50
5550.0	16.75	17.77	16.84		21.92	46.894	22.20	-0.28	17.50
5710.0	16.95	17.75	17.20		22.08	46.894	22.20	-0.12	16.50

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Measurement Uncertainty:	±2.81 dB

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Equipment Configuration for Peak Transmit Power			
Variant:	802.11ac-80	**Duty Cycle (%):**	100
Data Rate:	29.3 MBit/s	**Antenna Gain (dBi):**	7.80
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Conducted Output Power (dBm) Port(s)				Calculated Total Power	Minimum 26 dB Bandwidth	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	Σ Port(s) dBm	MHz	dBm	dBm	
5530.0	16.65	17.34	16.82	--	21.72	93.387	22.20	-0.48	17.50
5690.0	17.17	17.77	17.09	--	22.13	92.986	22.20	-0.07	17.50

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Measurement Uncertainty:	±2.81 dB

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Equipment Configuration for Peak Transmit Power			
Variant:	802.11a	**Duty Cycle (%):**	96.6
Data Rate:	6.00 MBit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	GMH
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Conducted Output Power + DCCF (+0.13 dB) (dBm)				Calculated Total Power	Minimum 26 dB Bandwidth	Limit	Margin	EUT Power Setting
	Port(s)								
MHz	a	b	c	d	Σ Port(s) dBm	MHz	dBm	dB	
5745.0	19.58	20.52	20.15	--	24.87	--	28.21	-3.34	20.00
5785.0	19.78	20.04	20.06	--	24.73	--	28.21	-3.48	20.00
5825.0	20.12	20.08	20.21	--	24.91	--	28.21	-3.30	20.00

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Measurement Uncertainty:	±1.33 dB

DCCF - Duty Cycle Correction Factor

Equipment Configuration for Peak Transmit Power			
Variant:	802.11ac-40	**Duty Cycle (%):**	92.0
Data Rate:	13.50 MBit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	GMH
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Conducted Output Power + DCCF (+0.36 dB) (dBm)				Calculated Total Power	Minimum 26 dB Bandwidth	Limit	Margin	EUT Power Setting
	Port(s)								
MHz	a	b	c	d	Σ Port(s) dBm	MHz	dBm	dB	
5755.0	19.75	20.48	20.33	--	24.97	--	28.21	-3.24	20.00
5795.0	19.90	20.22	20.30	--	24.92	--	28.21	-3.29	20.00

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Measurement Uncertainty:	±1.33 dB

DCCF - Duty Cycle Correction Factor

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Equipment Configuration for Peak Transmit Power			
Variant:	802.11ac-80	**Duty Cycle (%):**	84.1
Data Rate:	29.30 MBit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	GMH
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Conducted Output Power + DCCF (+0.76 dB) (dBm)				Calculated Total Power	Minimum 26 dB Bandwidth	Limit	Margin	EUT Power Setting
	Port(s)								
MHz	a	b	c	d	Σ Port(s) dBm	MHz	dBm	dB	
5775.0	19.84	20.31	20.38	--	24.96	--	28.21	-3.25	20.00

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Measurement Uncertainty:	±1.33 dB

DCCF - Duty Cycle Correction Factor

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Equipment Configuration for Peak Transmit Power			
Variant:	802.11n HT-20	**Duty Cycle (%):**	96.4
Data Rate:	6.50 MBit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	GMH
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Conducted Output Power + DCCF (+0.18 dB) (dBm)				Calculated Total Power	Minimum 26 dB Bandwidth	Limit	Margin	EUT Power Setting
	Port(s)								
MHz	a	b	c	d	Σ Port(s) dBm	MHz	dBm	dB	
5745.0	19.51	20.53	20.06	--	24.82	--	28.21	-3.39	20.00
5785.0	19.60	20.01	19.95	--	24.63	--	28.21	-3.58	20.00
5825.0	19.90	20.10	20.50	--	24.94	--	28.21	-3.27	20.00

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Measurement Uncertainty:	±1.33 dB

DCCF - Duty Cycle Correction Factor

Equipment Configuration for Peak Transmit Power			
Variant:	802.11n HT-40	**Duty Cycle (%):**	92.0
Data Rate:	13.50 MBit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	GMH
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Conducted Output Power + DCCF (+0.36 dB) (dBm)				Calculated Total Power	Minimum 26 dB Bandwidth	Limit	Margin	EUT Power Setting
	Port(s)								
MHz	a	b	c	d	Σ Port(s) dBm	MHz	dBm	dB	
5755.0	19.81	20.46	20.33	--	24.98	--	28.21	-3.23	20.00
5795.0	19.84	20.32	20.33	--	24.94	--	28.21	-3.27	20.00

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Measurement Uncertainty:	±1.33 dB

DCCF - Duty Cycle Correction Factor

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7.1.1.3. Peak Power Spectral Density

Conducted Test Conditions for Power Spectral Density			
Standard:	FCC CFR 47:15.407	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	Power Spectral Density	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.247 (a)	**Pressure (mBars):**	999 - 1001
Reference Document(s):	KDB 789033 - D01 DTS General UNII Test Procedures v01		

Test Procedure for Power Spectral Density
The in-band power spectral density was measured using the test technique specified in KDB 789033. A 1 MHz measurement bandwidth was implemented for the analyzer sweep. Once the sweep is complete the analyzer trace data is downloaded and used for post processing purposes.
Where the device operated with multiple antenna ports i.e. MIMO device, each port was measured separately. The Peak Power Spectral Density is the highest level found across the emission bandwidth. With multiple antenna port measurements the numerical analyzer data from each port is summed (å) and a link to this additional graphic is provided.

Test configuration and setup used for the measurement was per the Conducted Test Set-up section specified in this document.

Measure and sum the spectra across the outputs. With this technique, spectra are measured at each output of the device at the required resolution bandwidth. The individual spectra are then summed mathematically in linear power units. Unlike in-band power measurements, in which the sum involves a single measured value (output power) from each output, measurements for compliance with PSD limits involve summing entire spectra across corresponding frequency bins on the various outputs. Consistency is maintained for any device with multiple transmitter outputs to be certain the individual outputs are all aligned with the same span and same number of points. In this instance, the linear power spectrum value within the first spectral bin of output 0 is summed with that in the first spectral bin of output 1, and the first spectral bin of output 2, and so on up to the Nth output to obtain the true value for the first frequency bin of the summed spectrum. The summed spectrum value for each frequency bin is computed in this fashion. These summed spectral values were post processed and the resulting numerical and graphical data presented.

NOTE: It may be observed that spectrum in some plots break the limit line however this in itself does NOT constitute a failure. In all cases a spectrum summation plot is provided in order to prove compliance. A failure occurs only after the summation of all spectrum plots have been summed and are found to be greater than the limit line.

Supporting Information
Calculated Power = A + 10 log (1/x) dBm
A = Total Power Spectral Density [10*Log10 ($10^{a/10}$ + $10^{b/10}$ + $10^{c/10}$ + $10^{d/10}$)]
x = Duty Cycle

Limits Power Spectral Density

Operating Frequency Band 5150-5250 MHz

15. 407 (a)(1)
(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and

maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Operating Frequency Band 5250-5350 and 5470 – 5725 MHz

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 + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Operating Frequency Band 5725 – 5850 MHz

15. 407 (a)(3)
For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

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Equipment Configuration for Peak Power Spectral Density			
Variant:	802.11a	**Duty Cycle (%):**	100
Data Rate:	6 MBit/s	**Antenna Gain (dBi):**	7.40
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Power Spectral Density Port(s) (dBm/MHz)				Calculated Power Spectral Density Σ Port(s)	Limit	Margin
MHz	a	b	c	d	dBm/MHz	dBm/MHz	dB
5180.0	-1.745	-1.442	-3.100	--	2.733	15.6	-12.9
5200.0	-1.855	-1.551	-3.043	--	2.668	15.6	-12.9
5240.0	-2.030	-1.850	-2.980	--	2.512	15.6	-13.1

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Power Spectral Density Summation Ports A+B+C+D

Equipment Configuration for Peak Power Spectral Density			
Variant:	802.11a	**Duty Cycle (%):**	100
Data Rate:	6 MBit/s	**Antenna Gain (dBi):**	7.40
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Frequency	Measured Power Spectral Density Port(s) (dBm/MHz)	Limit	Margin
MHz	Summation A+B+C+D	dBm/MHz	dB
5180.0	2.353	2.6	-0.25
5200.0	2.489	2.6	-0.11
5240.0	2.351	2.6	-0.25

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the link in the above results matrix to view the plot

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Equipment Configuration for Peak Power Spectral Density			
Variant:	802.11n HT-20	**Duty Cycle (%):**	100
Data Rate:	6.5 MBit/s	**Antenna Gain (dBi):**	7.40
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Power Spectral Density Port(s) (dBm/MHz)				Calculated Power Spectral Density Σ Port(s)	Limit	Margin
MHz	a	b	c	d	dBm/MHz	dBm/MHz	dB
5180.0	-1.684	-1.686	-2.926	--	2.711	2.6	0.1
5200.0	-1.859	-1.779	-3.067	--	2.575	2.6	0.0
5240.0	-2.115	-2.041	-3.250	--	2.337	2.6	-0.3

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Power Spectral Density Summation Ports A+B+C+D

Equipment Configuration for Peak Power Spectral Density			
Variant:	802.11n HT-20	**Duty Cycle (%):**	100
Data Rate:	6.5 MBit/s	**Antenna Gain (dBi):**	7.40
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Frequency	Measured Power Spectral Density Port(s) (dBm/MHz)	Limit	Margin
MHz	Summation A+B+C+D	dBm/MHz	dB
5180.0	2.352	2.6	-0.25
5200.0	2.203	2.6	-0.40
5240.0	2.092	2.6	-0.51

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the link in the above results matrix to view the plot

Equipment Configuration for Peak Power Spectral Density			
Variant:	802.11n HT-40	**Duty Cycle (%):**	100
Data Rate:	13.5 MBit/s	**Antenna Gain (dBi):**	7.40
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Power Spectral Density Port(s) (dBm/MHz)				Calculated Power Spectral Density Σ Port(s)	Limit	Margin
MHz	**a**	**b**	**c**	**d**	**dBm/MHz**	**dBm/MHz**	**dB**
5190.0	-2.499	-1.924	-3.450	--	2.192	2.6	-0.4
5230.0	-2.546	-2.055	-3.851	--	2.018	2.6	-0.6

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Equipment Configuration for Peak Power Spectral Density			
Variant:	802.11ac-40	**Duty Cycle (%):**	100
Data Rate:	13.5 MBit/s	**Antenna Gain (dBi):**	7.40
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Power Spectral Density Port(s) (dBm/MHz)				Calculated Power Spectral Density Σ Port(s)	Limit	Margin
MHz	**a**	**b**	**c**	**d**	**dBm/MHz**	**dBm/MHz**	**dB**
5190.0	-2.781	-1.823	-3.563	--	2.107	2.6	-0.5
5230.0	-2.701	-2.153	-3.735	--	1.957	2.6	-0.6

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the link in the above results matrix to view the plot

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Equipment Configuration for Peak Power Spectral Density			
Variant:	802.11ac-80	**Duty Cycle (%):**	100
Data Rate:	29.3 MBit/s	**Antenna Gain (dBi):**	7.40
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Power Spectral Density Port(s) (dBm/MHz)				Calculated Power Spectral Density Σ Port(s)	Limit	Margin
MHz	**a**	**b**	**c**	**d**	**dBm/MHz**	**dBm/MHz**	**dB**
5210.0	-5.946	-5.809	-7.219	--	-1.509	2.6	-4.1

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Equipment Configuration for Peak Power Spectral Density			
Variant:	802.11a	**Duty Cycle (%):**	100
Data Rate:	6 MBit/s	**Antenna Gain (dBi):**	7.40
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Power Spectral Density Port(s) (dBm/MHz)				Calculated Power Spectral Density Σ Port(s)	Limit	Margin
MHz	**a**	**b**	**c**	**d**	**dBm/MHz**	**dBm/MHz**	**dB**
5260.0	4.462	5.008	4.716	--	9.506	9.6	-0.1
5300.0	3.875	4.634	4.260	--	9.039	9.6	-0.6
5320.0	4.412	4.778	4.824	--	9.446	9.6	-0.2

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the link in the above results matrix to view the plot

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Equipment Configuration for Peak Power Spectral Density			
Variant:	802.11n HT-20	**Duty Cycle (%):**	100
Data Rate:	6.5 MBit/s	**Antenna Gain (dBi):**	7.40
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Power Spectral Density Port(s) (dBm/MHz)				Calculated Power Spectral Density Σ Port(s)	Limit	Margin
MHz	a	b	c	d	dBm/MHz	dBm/MHz	dB
5260.0	4.256	4.880	4.559	--	9.344	9.6	-0.3
5300.0	4.083	4.531	4.541	--	9.161	9.6	-0.4
5320.0	4.549	5.329	4.845	--	9.691	9.6	0.1

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Power Spectral Density Summation A+B+C+D

Equipment Configuration for Peak Power Spectral Density			
Variant:	802.11n HT-20	**Duty Cycle (%):**	100
Data Rate:	6.5 MBit/s	**Antenna Gain (dBi):**	7.40
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Frequency	Measured Power Spectral Density Port(s) (dBm/MHz)	Limit	Margin
MHz	Summation A+B+C+D	dBm/MHz	dB
5320.0	9.550	9.6	-0.1

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the link in the above results matrix to view the plot

Equipment Configuration for Peak Power Spectral Density			
Variant:	802.11n HT-40	**Duty Cycle (%):**	100
Data Rate:	13.5 MBit/s	**Antenna Gain (dBi):**	7.40
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Power Spectral Density Port(s) (dBm/MHz)				Calculated Power Spectral Density Σ Port(s)	Limit	Margin
MHz	a	b	c	d	dBm/MHz	dBm/MHz	dB
5270.0	4.137	4.006	2.974	--	8.507	9.6	-1.1
5310.0	3.948	4.460	2.958	--	8.604	9.6	-1.0

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Equipment Configuration for Peak Power Spectral Density			
Variant:	802.11ac-40	**Duty Cycle (%):**	100
Data Rate:	144 MBit/s	**Antenna Gain (dBi):**	7.40
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Power Spectral Density Port(s) (dBm/MHz)				Calculated Power Spectral Density Σ Port(s)	Limit	Margin
MHz	a	b	c	d	dBm/MHz	dBm/MHz	dB
5270.0	3.835	4.098	3.032	--	8.449	9.6	-1.2
5310.0	3.894	4.170	2.753	--	8.419	9.6	-1.2

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the link in the above results matrix to view the plot

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Equipment Configuration for Peak Power Spectral Density			
Variant:	802.11ac-80	**Duty Cycle (%):**	100
Data Rate:	192 MBit/s	**Antenna Gain (dBi):**	7.40
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Power Spectral Density Port(s) (dBm/MHz)				Calculated Power Spectral Density Σ Port(s)	Limit	Margin
MHz	**a**	**b**	**c**	**d**	**dBm/MHz**	**dBm/MHz**	**dB**
5290.0	0.226	0.567	-0.703	--	4.834	9.6	-4.8

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the link in the above results matrix to view the plot

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Equipment Configuration for Peak Power Spectral Density			
Variant:	802.11a	**Duty Cycle (%):**	100
Data Rate:	6 MBit/s	**Antenna Gain (dBi):**	7.80
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Power Spectral Density Port(s) (dBm/MHz)				Calculated Power Spectral Density Σ Port(s)	Limit	Margin
MHz	a	b	c	d	dBm/MHz	dBm/MHz	dB
5500.0	4.577	4.828	3.437	--	9.093	9.2	-0.1
5580.0	4.574	4.962	3.977	--	9.294	9.2	0.1
5720.0	3.926	4.789	3.954	--	9.013	9.2	-0.2

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Power Spectral Density Summation A+B+C+D

Equipment Configuration for Peak Power Spectral Density			
Variant:	802.11a	**Duty Cycle (%):**	100
Data Rate:	6 MBit/s	**Antenna Gain (dBi):**	7.80
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Frequency	Measured Power Spectral Density Port(s) (dBm/MHz)	Limit	Margin
MHz	Summation A+B+C+D	dBm/MHz	dB
5580	9.080	9.2	-1.2

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the link in the above results matrix to view the plot

Equipment Configuration for Peak Power Spectral Density			
Variant:	802.11n HT-20	**Duty Cycle (%):**	100
Data Rate:	6.5 MBit/s	**Antenna Gain (dBi):**	7.80
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Power Spectral Density Port(s) (dBm/MHz)				Calculated Power Spectral Density Σ Port(s)	Limit	Margin
MHz	a	b	c	d	dBm/MHz	dBm/MHz	dB
5500.0	4.636	4.927	3.749	--	9.237	9.2	0.0
5580.0	4.126	4.644	3.328	--	8.837	9.2	-0.4
5720.0	3.825	4.606	3.826	--	8.874	9.2	-0.3

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Power Spectral Density Summation A+B+C+D

Equipment Configuration for Peak Power Spectral Density			
Variant:	802.11n HT-20	**Duty Cycle (%):**	100
Data Rate:	6.5 MBit/s	**Antenna Gain (dBi):**	7.80
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Frequency	Measured Power Spectral Density Port(s) (dBm/MHz)	Limit	Margin
MHz	Summation A+B+C+D	dBm/MHz	dB
5500.0	9.150	9.2	0.5

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the link in the above results matrix to view the plot

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Equipment Configuration for Peak Power Spectral Density			
Variant:	802.11n HT-40	**Duty Cycle (%):**	100
Data Rate:	13.5 MBit/s	**Antenna Gain (dBi):**	7.80
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Power Spectral Density Port(s) (dBm/MHz)				Calculated Power Spectral Density Σ Port(s)	Limit	Margin
MHz	a	b	c	d	dBm/MHz	dBm/MHz	dB
5510.0	3.377	3.625	2.112	--	7.858	9.2	-1.3
5550.0	3.557	3.883	1.796	--	7.942	9.2	-1.3
5710.0	3.262	3.659	3.051	--	8.103	9.2	-1.1

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Equipment Configuration for Peak Power Spectral Density			
Variant:	802.11ac-40	**Duty Cycle (%):**	100
Data Rate:	13.5 MBit/s	**Antenna Gain (dBi):**	7.80
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Power Spectral Density Port(s) (dBm/MHz)				Calculated Power Spectral Density Σ Port(s)	Limit	Margin
MHz	a	b	c	d	dBm/MHz	dBm/MHz	dB
5510.0	3.544	3.580	2.182	--	7.920	9.2	-1.3
5550.0	3.664	3.750	1.836	--	7.940	9.2	-1.3
5710.0	2.986	3.683	3.113	--	8.043	9.2	-1.2

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the link in the above results matrix to view the plot

Equipment Configuration for Peak Power Spectral Density			
Variant:	802.11ac-80	**Duty Cycle (%):**	100
Data Rate:	29.3 MBit/s	**Antenna Gain (dBi):**	7.80
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable		
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Power Spectral Density Port(s) (dBm/MHz)				Calculated Power Spectral Density Σ Port(s)	Limit	Margin
MHz	a	b	c	d	dBm/MHz	dBm/MHz	dB
5530.0	0.823	0.389	-0.752	--	4.974	9.2	-4.2

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Equipment Configuration for Peak Power Spectral Density			
Variant:	802.11ac-80	**Duty Cycle (%):**	100
Data Rate:	29.3 MBit/s	**Antenna Gain (dBi):**	7.80
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	SB
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Power Spectral Density Port(s) (dBm/MHz)				Calculated Power Spectral Density Σ Port(s)	Limit	Margin
MHz	a	b	c	d	dBm/MHz	dBm/MHz	dB
5690.0	-1.440	-1.688	-1.408	--	3.261	9.2	-5.9

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the link in the above results matrix to view the plot

Equipment Configuration for Power Spectral Density			
Variant:	802.11a	**Duty Cycle (%):**	96.6
Data Rate:	6.00 MBit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	GMH
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Power Spectral Density Port(s) (dBm/500 KHz)				Amplitude Summation + DCCF (+0.13 dB)	Limit	Margin
MHz	a	b	c	d	dBm/500 KHz	dBm/500 KHz	dB
5745.0	5.209	6.202	5.534	--	10.184	28.2	-18.0
5785.0	5.311	5.935	5.718	--	9.955	28.2	-18.2
5825.0	5.593	5.872	6.481	--	10.480	28.2	-17.7

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

DCCF - Duty Cycle Correction Factor

Note: click the links in the above matrix to view the graphical image (plot).

Equipment Configuration for Power Spectral Density			
Variant:	802.11ac-40	**Duty Cycle (%):**	92.0
Data Rate:	13.50 MBit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	GMH
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Power Spectral Density Port(s) (dBm/500 KHz)				Amplitude Summation + DCCF (+0.36 dB)	Limit	Margin
MHz	a	b	c	d	dBm/500 KHz	dBm/500 KHz	dB
5755.0	1.652	2.343	1.663	--	5.952	28.2	-22.2
5795.0	1.272	1.390	1.833	--	5.903	28.2	-22.3

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

DCCF - Duty Cycle Correction Factor

Note: click the links in the above matrix to view the graphical image (plot).

Equipment Configuration for Power Spectral Density			
Variant:	802.11ac-80	**Duty Cycle (%):**	84.1
Data Rate:	29.30 MBit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	GMH
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Power Spectral Density Port(s) (dBm/500 KHz)				Amplitude Summation + DCCF (+0.76 dB)	Limit	Margin
MHz	a	b	c	d	dBm/500 KHz	dBm/500 KHz	dB
5775.0	-3.476	-2.466	-3.152	--	1.184	28.2	-27.0

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

DCCF - Duty Cycle Correction Factor

Note: click the links in the above matrix to view the graphical image (plot).

Equipment Configuration for Power Spectral Density			
Variant:	802.11n HT-20	**Duty Cycle (%):**	96.4
Data Rate:	6.50 MBit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	GMH
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Power Spectral Density Port(s) (dBm/500 KHz)				Amplitude Summation + DCCF (+0.18 dB)	Limit	Margin
MHz	a	b	c	d	dBm/500 KHz	dBm/500 KHz	dB
5745.0	4.670	5.705	5.433	--	9.603	28.2	-18.6
5785.0	4.834	5.549	5.167	--	9.823	28.2	-18.3
5825.0	5.398	5.700	6.191	--	10.227	28.2	-17.9

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

DCCF - Duty Cycle Correction Factor

Note: click the links in the above matrix to view the graphical image (plot).

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Equipment Configuration for Power Spectral Density			
Variant:	802.11n HT-40	**Duty Cycle (%):**	92.0
Data Rate:	13.50 MBit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	GMH
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Power Spectral Density Port(s) (dBm/500 KHz)				Amplitude Summation + DCCF (+0.36 dB)	Limit	Margin
MHz	a	b	c	d	dBm/500 KHz	dBm/500 KHz	dB
5755.0	1.403	1.836	1.770	--	6.014	28.2	-22.2
5795.0	1.390	1.882	2.187	--	5.978	28.2	-22.2

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

DCCF - Duty Cycle Correction Factor

Note: click the links in the above matrix to view the graphical image (plot).

7.1.1.4. Frequency Stability

FCC, Part 15 Subpart C §15.407(g)

Test Procedure

The manufacturer of the equipment is responsible for ensuring that the frequency stability is such that emissions are always maintained within the band of operation under all conditions.

Manufacturer Declaration

The frequency stability of the reference oscillator sets the frequency stability of the RF transceiver signals. Therefore all of the RF signals should have ±20ppm stability.
This stability accounts for room temp tolerance of the crystal oscillator circuit, frequency variation across temperature, and crystal ageing.

±20ppm at 5.250 GHz translates to a maximum frequency shift of ±105 KHz. As the edge of the channels is at least one MHz from either of the band edges, ±105 KHz is more than sufficient to guarantee that the intentional emission will remain in the band over the entire operating range of the EUT.

Specification

Limits

§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 user's manual.

7.1.2. Radiated Emission Testing

FCC, Part 15 Subpart C §15.407(b)(2), §15.205(a)/15.209(a)

Test Procedure
Testing was performed in a 3-meter anechoic chamber. Preliminary radiated emissions were measured on every azimuth and with the receiving antenna in both horizontal and vertical polarizations. Preliminary emissions were recorded with in Spectrum Analyzer mode, using a maximum peak detector while in peak hold mode. Depending on the frequency band spanned a notch filter and/or waveguide filter was used to remove the fundamental frequency.

Emissions nearest the limits were chosen for maximization and formal measurement using a CISPR compliant receiver. Emissions above 1000 MHz are measured utilizing a CISPR compliant average detector with a tuned receiver, using a bandwidth of 1 MHz. Emissions from 30 MHz – 1000 MHz are measured utilizing a CISPR compliant quasi-peak detector with a tuned receiver, using a bandwidth of 120 kHz. Only the highest emissions relative to the limit are listed.

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. All factors are included in the reported data.

FS = R + AF + CORR – FO

FS = Field Strength
R = Measured Spectrum analyzer Input Amplitude
AF = Antenna Factor

CORR = Correction Factor = CL – AG + NFL

CL = Cable Loss
AG = Amplifier Gain
FO = Distance Falloff Factor
NFL = Notch Filter Loss or Waveguide Loss

Field Strength Calculation Example:

Given receiver input reading of 51.5 dBμV; Antenna Factor of 8.5 dB; Cable Loss of 1.3 dB; Falloff Factor of 0 dB, an Amplifier Gain of 26 dB and Notch Filter Loss of 1 dB. The Field Strength of the measured emission is:

FS = 51.5 + 8.5 + 1.3 - 26.0 +1 = 36.3 dBμV/m

Conversion between dBμV/m (or dBμV) and μV/m (or μV) are done as:

Level (dBμV/m) = 20 * Log (level (μV/m))

40 dBμV/m = 100 μV/m
48 dBμV/m = 250 μV/m

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength (dBµV/m);

$$E = 1000000 \times \sqrt{30P} / 3 \ \mu V/m$$

where P is the EIRP in Watts

Therefore: -27 dBm/MHz = 68.23 dBuV/m

Note: The data in this Section identifies that the EUT is in compliance with the -27dBm/MHz EIRP limit (68.23 dBµV/m) for out of band emissions. All out of band emissions are less than 68.23 dB µV/m.

Specification

Radiated Spurious Emissions

15.407 (b)(2). All emissions outside of the 5,150-5,350MHz band shall not exceed an EIRP of -27dBm/MHz.

FCC §15.205 (a) Except as shown in paragraph (d) of 15.205 (a), only spurious emissions are permitted in any of the frequency bands listed.

FCC §15.205 (a) Except as shown in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

FCC §15.209 (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table.

Table 1: FCC 15.209 Spurious Emissions Limits

Frequency (MHz)	Field Strength (µV/m)	Field Strength (dBµV/m)	Measurement Distance (meters)
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

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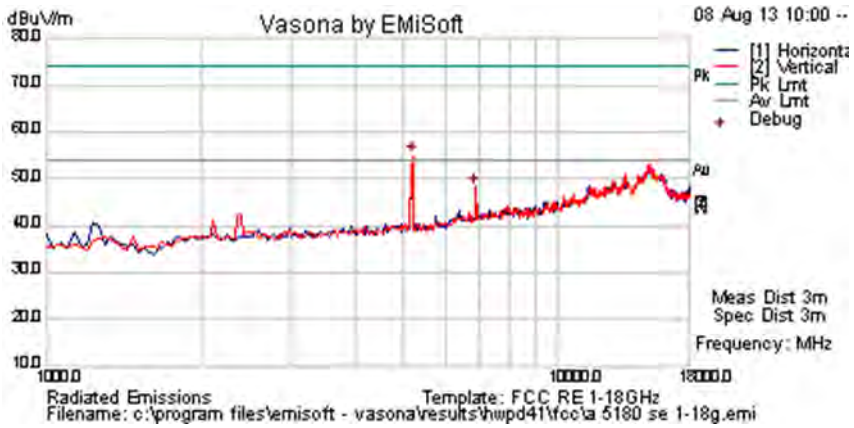
7.1.2.1. Integral Antenna – Spurious Emissions

Test Freq.	5180 MHz	**Engineer**	SB
Variant	802.11a; 6 Mbs	**Temp (ºC)**	24
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	30
Power Setting	18	**Press. (mBars)**	1010
Antenna	integral	**Duty Cycle (%)**	100
Test Notes 1			
Test Notes 2			

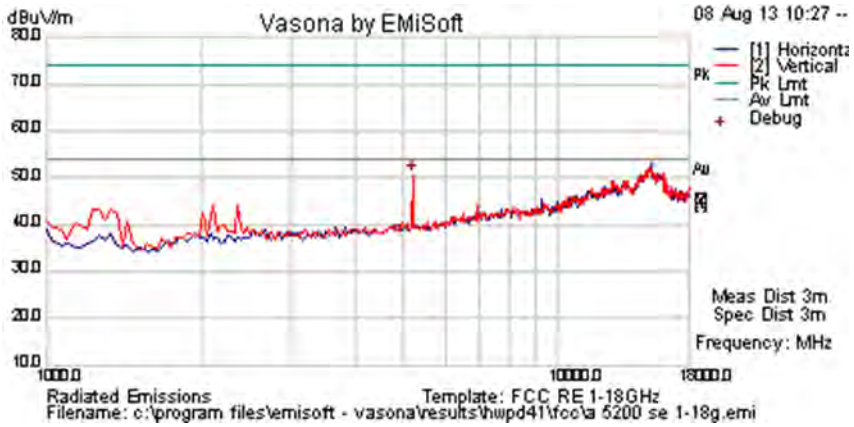


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5190.381	60.1	4.8	-9.9	55.0	Peak [Scan]	V	100	0				FUND
6893.787	49.3	5.6	-6.5	48.4	Peak [Scan]	V	100	0	54.0	-5.6	Pass	NRB

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

Test Freq.	5200 MHz	**Engineer**	SB
Variant	802.11a; 6 Mbs	**Temp (ºC)**	24
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	30
Power Setting	9	**Press. (mBars)**	1010
Antenna	integral	**Duty Cycle (%)**	100
Test Notes 1			
Test Notes 2			

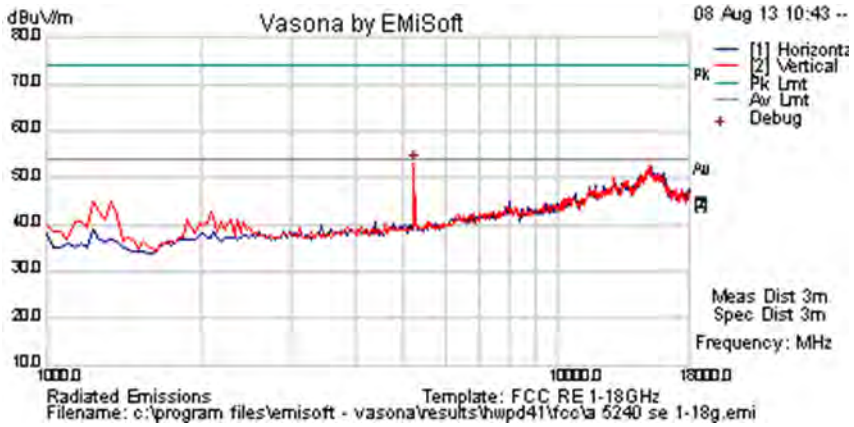


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5190.381	55.8	4.8	-9.9	50.7	Peak [Scan]	V	100	0				FUND

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

Test Freq.	5240 MHz	**Engineer**	SB
Variant	802.11a; 6 Mbs	**Temp (ºC)**	24
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	30
Power Setting	9	**Press. (mBars)**	1010
Antenna	integral	**Duty Cycle (%)**	100
Test Notes 1			
Test Notes 2			



Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5224.449	58.0	4.8	-9.8	53.0	Peak [Scan]	V	100	0				FUND

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

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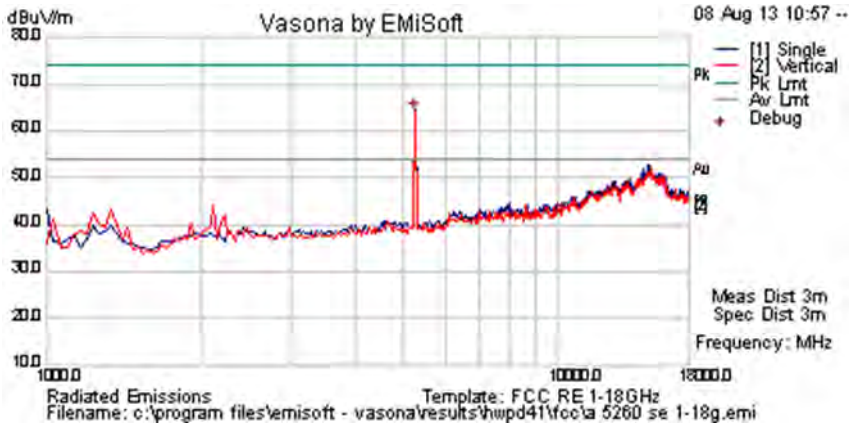
Test Freq.	5260 MHz	**Engineer**	SB
Variant	802.11a; 6 Mbs	**Temp (ºC)**	24
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	30
Power Setting	16.5	**Press. (mBars)**	1010
Antenna	integral	**Duty Cycle (%)**	100
Test Notes 1			
Test Notes 2			

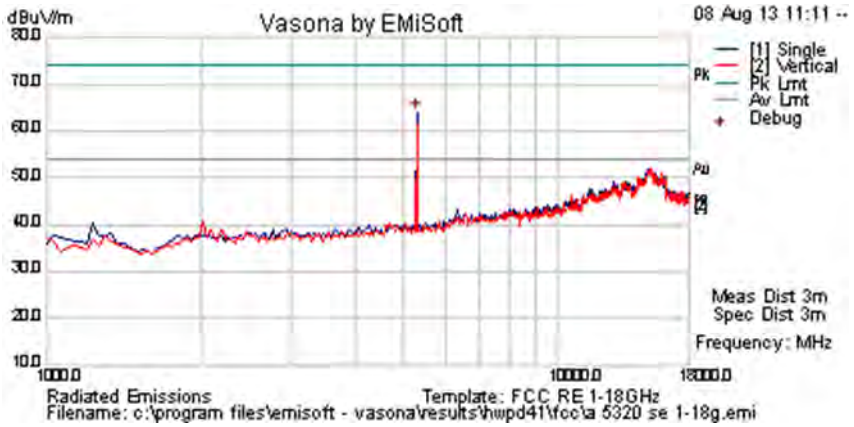


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5258.517	69.0	4.8	-9.7	64.1	Peak [Scan]	V	0	0				FUND

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

Test Freq.	5300 MHz	**Engineer**	SB
Variant	802.11a; 6 Mbs	**Temp (ºC)**	24
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	30
Power Setting	16.5	**Press. (mBars)**	1010
Antenna	integral	**Duty Cycle (%)**	100
Test Notes 1			
Test Notes 2			

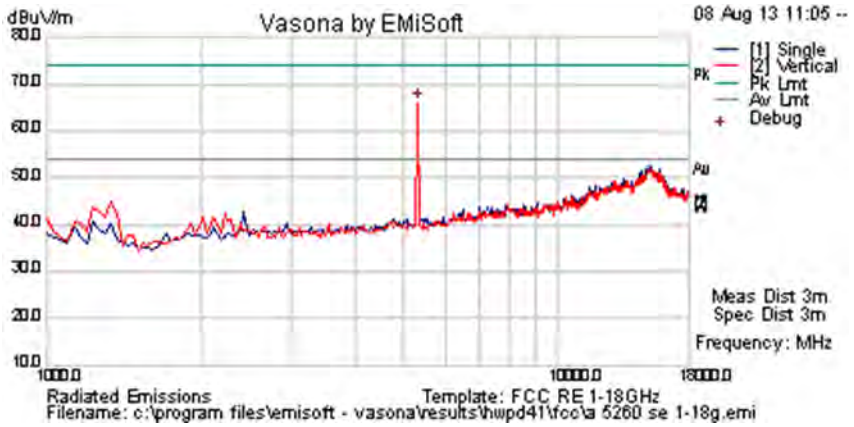


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5292.585	68.7	4.8	-9.6	63.9	Peak [Scan]		0	0				FUND

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

Test Freq.	5320 MHz	**Engineer**	SB
Variant	802.11a; 6 Mbs	**Temp (ºC)**	24
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	30
Power Setting	16.5	**Press. (mBars)**	1010
Antenna	integral	**Duty Cycle (%)**	100
Test Notes 1			
Test Notes 2			

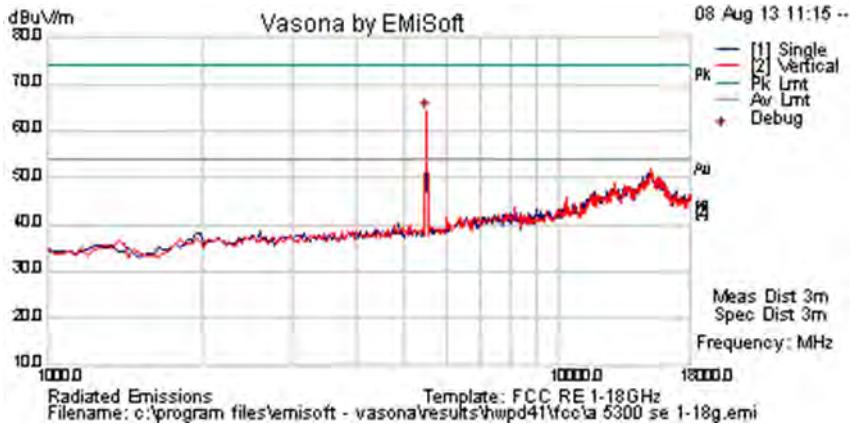


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5326.653	70.8	4.9	-9.5	66.1	Peak [Scan]	V	0	0				FUND

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

Test Freq.	5500 MHz	**Engineer**	SB
Variant	802.11a; 6 Mbs	**Temp (ºC)**	24
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	30
Power Setting	16.5	**Press. (mBars)**	1010
Antenna	integral	**Duty Cycle (%)**	100
Test Notes 1			
Test Notes 2			

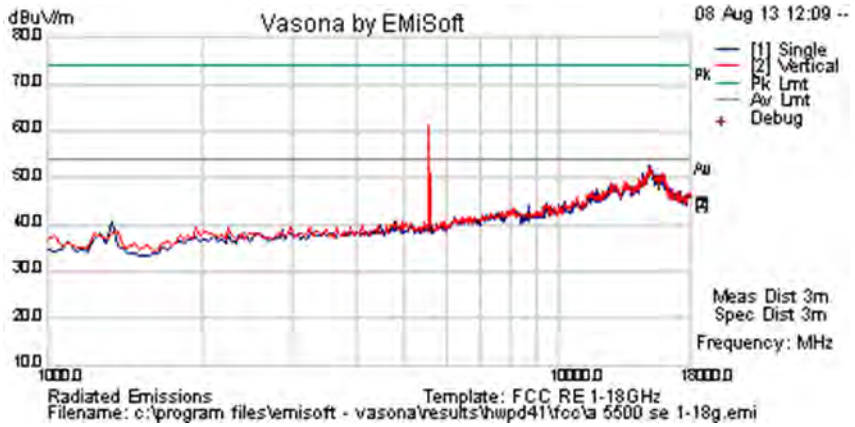


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5496.994	68.8	5.0	-9.6	64.2	Peak [Scan]	V	0	0				FUND

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

Test Freq.	5580 MHz	**Engineer**	SB
Variant	802.11a; 6 Mbs	**Temp (ºC)**	24
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	30
Power Setting	16.5	**Press. (mBars)**	1010
Antenna	integral	**Duty Cycle (%)**	100
Test Notes 1			
Test Notes 2			

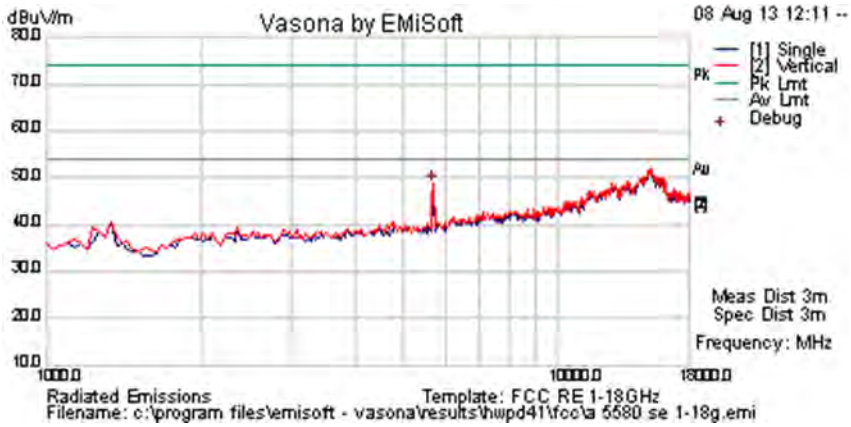


Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5565.130	66.1	4.9	-9.7	61.3	Peak [Scan]	V	0	0				FUND

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

Test Freq.	5720 MHz	**Engineer**	SB
Variant	802.11a; 6 Mbs	**Temp (ºC)**	24
Freq. Range	1000 MHz - 18000 MHz	**Rel. Hum.(%)**	30
Power Setting	16.5	**Press. (mBars)**	1010
Antenna	integral	**Duty Cycle (%)**	100
Test Notes 1			
Test Notes 2			



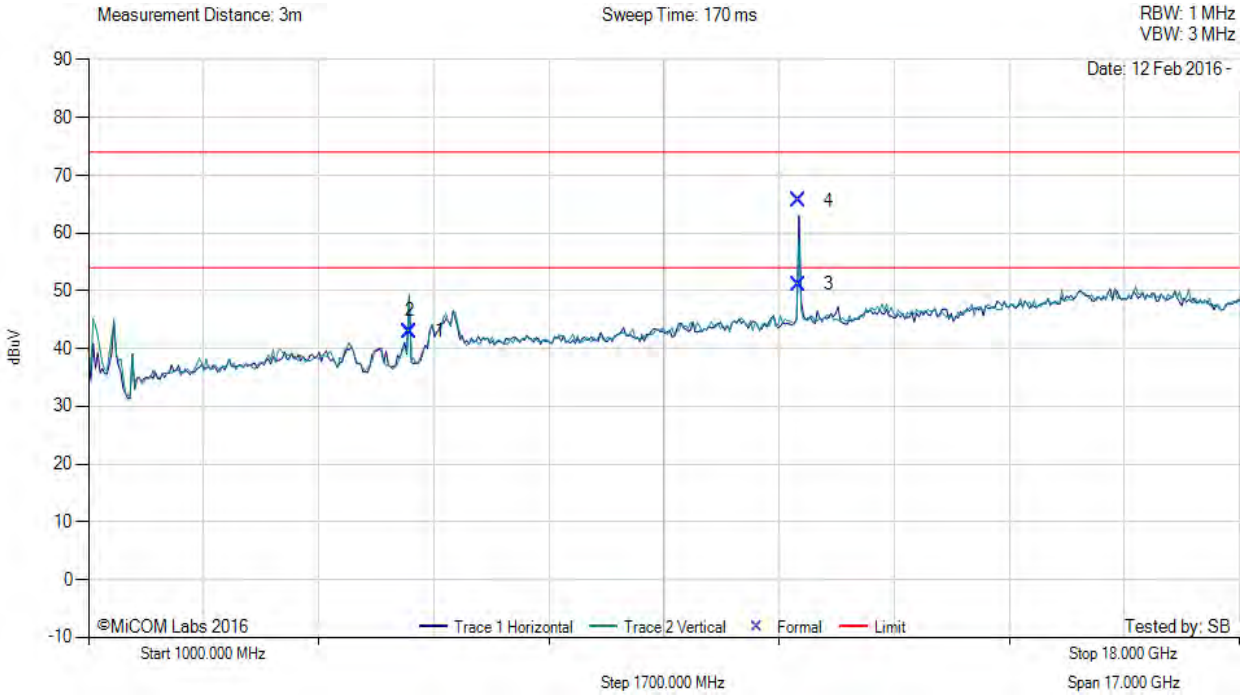
Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
5701.403	53.4	5.0	-9.6	48.8	Peak [Scan]	V	0	0				FUND

Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission
	NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

RADIATED SPURIOUS - RESTRICTED BAND EMISSIONS

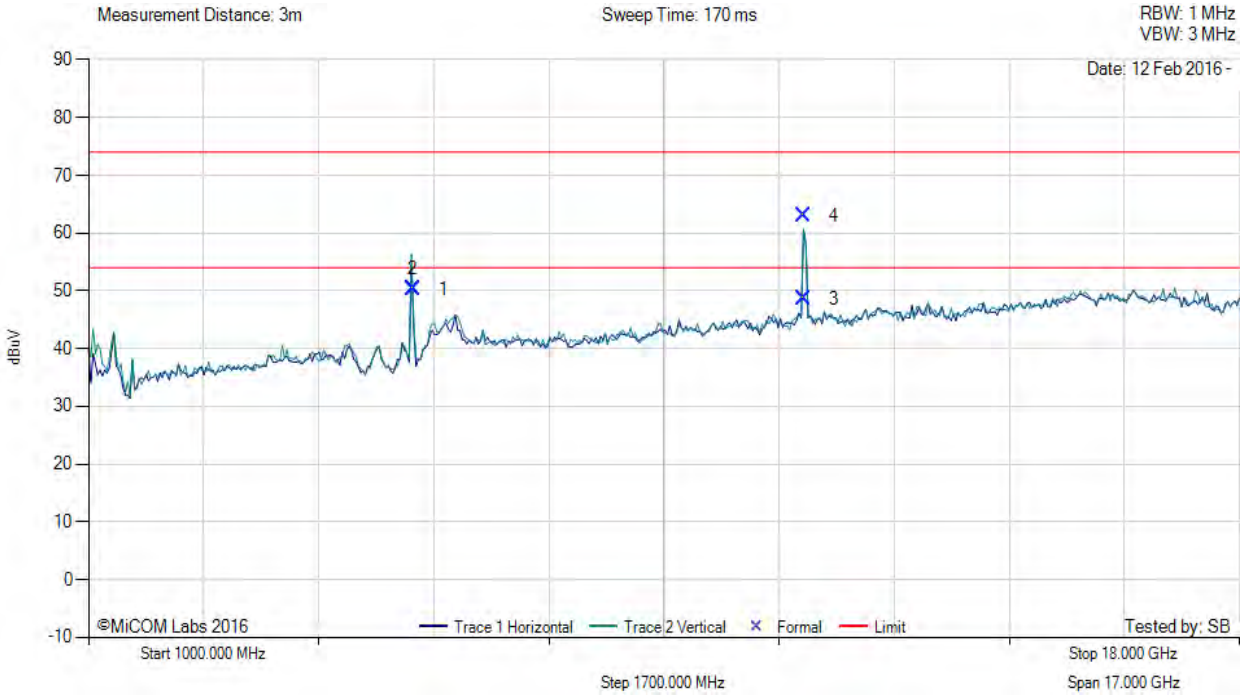
Variant: 802.11a, Test Freq: 5745.00 MHz, Antenna: 5184-6684, Power Setting: Target, Duty Cycle (%): 99



Num	Frequency MHz	Raw dBµV	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
1	5738.16	49.80	3.82	-10.67	42.95	Fundamental	Horizontal	100	1	--	--	
2	5738.16	49.80	3.82	-10.67	42.95	Peak (NRB)	Horizontal	100	1	--	--	Pass
3	11486.42	50.55	5.46	-4.86	51.15	Max Avg	Horizontal	187	1	54.0	-2.9	Pass
4	11486.42	65.02	5.46	-4.86	65.62	Max Peak	Horizontal	187	1	74.0	-8.4	Pass

RADIATED SPURIOUS - RESTRICTED BAND EMISSIONS

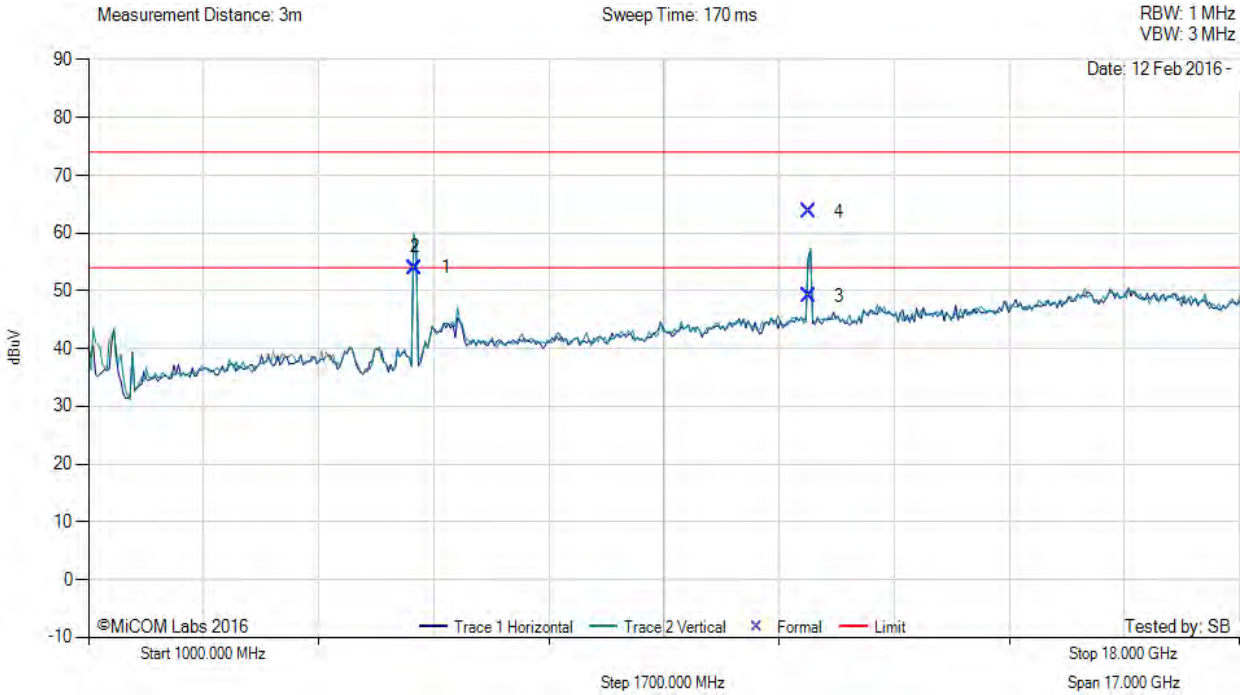
Variant: 802.11a, Test Freq: 5785.00 MHz, Antenna: 5184-6684, Power Setting: Target, Duty Cycle (%): 99



Num	Frequency MHz	Raw dBµV	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
1	5788.74	56.96	3.79	-10.42	50.33	Fundamental	Horizontal	101	1	--	--	
2	5788.74	56.96	3.79	-10.42	50.33	Peak (NRB)	Horizontal	101	1	--	--	Pass
3	11565.89	47.65	5.54	-4.65	48.54	Max Avg	Horizontal	100	60	54.0	-5.5	Pass
4	11565.89	62.08	5.54	-4.65	62.97	Max Peak	Horizontal	100	60	74.0	-11.0	Pass

RADIATED SPURIOUS - RESTRICTED BAND EMISSIONS

Variant: 802.11a, Test Freq: 5825.00 MHz, Antenna: 5184-6684, Power Setting: Target, Duty Cycle (%): 99



Num	Frequency MHz	Raw dBµV	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
1	5825.78	60.37	3.84	-10.24	53.97	Fundamental	Horizontal	101	1	--	--	
2	5825.78	60.37	3.84	-10.24	53.97	Peak (NRB)	Horizontal	101	1	--	--	Pass
3	11645.65	48.14	5.46	-4.47	49.13	Max Avg	Horizontal	118	60	54.0	-4.9	Pass
4	11645.65	62.70	5.46	-4.47	63.69	Max Peak	Horizontal	118	60	74.0	-10.3	Pass

7.1.2.2. Radiated Band-Edge - Integral Antenna

Peak Limit 74.0 dBµV, Peak Limit 54.0 dBµV

	5150 MHz			5350 MHz		
	dBµV		Power Setting	dBµV		Power Setting
Operational Mode	Peak	Average		Peak	Average	
a	52.73	33.58	9.0	64.88	37.80	16.5
n HT-20	54.00	33.26	9.0	64.64	36.50	16.5
n HT-40	50.83	37.50	9.0	63.90	49.11	18.0
VHT-40	51.79	35.26	12.0	63.65	49.22	18.0
VHT-80	61.92	46.64	12.0	62.68	48.60	18.0

	5460 MHz		
Operational Mode	Peak	Average	Power Setting
a	59.94	35.92	16.5
n HT-20	58.86	36.16	16.5
n HT-40	52.85	40.00	18.0
VHT-40	52.19	38.48	18.0
VHT-80	63.90	47.04	18.0

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5725 and 5850 MHz Restricted Band-Edge

Band-Edge Summary

5725 - 5850 MHz

5184-6684		Band-Edge Freq	Limit 68.2dBµV/m	Limit 78.2dBµV/m	Power Setting
Operational Mode	Operating Frequency (MHz)	MHz	dBµV/m	dBµV/m	
802.11a	5745.00	5725.00	55.13	56.49	20.00
802.11ac-40	5755.00	5725.00	68.23	78.23	20.00
802.11ac-80	5775.00	5725.00	68.23	78.23	20.00
802.11n HT-20	5745.00	5725.00	68.23	78.23	0.00
802.11n HT-40	5755.00	5725.00	68.23	78.23	0.00

5184-6684		Band-Edge Freq	Limit 78.2dBµV/m	Limit 68.2dBµV/m	Power Setting
Operational Mode	Operating Frequency (MHz)	MHz	dBµV/m	dBµV/m	
802.11a	5825.00	5850.00	56.82	55.50	20.00
802.11ac-40	5795.00	5850.00	78.23	68.23	20.00
802.11ac-80	5775.00	5850.00	78.23	68.23	20.00
802.11n HT-20	5825.00	5850.00	78.23	68.23	20.00
802.11n HT-40	5795.00	5850.00	78.23	68.23	20.00

Click on the links to view the data.

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Equipment Configuration for 5725 MHz Radiated Band-Edge Emissions

Antenna:	5184-6684	**Variant:**	802.11a
Antenna Gain (dBi):	7.79	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	5745.00	**Data Rate:**	6.00 MBit/s
Power Setting:	Target	**Tested By:**	SB

Test Measurement Results

Num	Frequency MHz	Raw dBµV	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
#1	5715.00	16.98	3.81	34.34	55.13	Marker	Horizontal	157	352	68.2	-13.1	Pass
#2	5725.00	18.35	3.79	34.35	56.49	Marker	Horizontal	157	352	78.2	-21.7	Pass
#3	5725.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Equipment Configuration for 5725 MHz Radiated Band-Edge Emissions

Antenna:	5184-6684	**Variant:**	802.11ac-40
Antenna Gain (dBi):	7.79	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	5755.00	**Data Rate:**	13.50 MBit/s
Power Setting:	Target	**Tested By:**	SB

Test Measurement Results

Num	Frequency MHz	Raw dBµV	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
#1	5715.00	22.25	3.81	34.34	60.40	Marker	Horizontal	157	352	68.2	-7.8	Pass
#2	5716.76	23.01	3.81	34.34	61.16	Marker	Horizontal	157	352	78.2	-17.1	Pass
#3	5725.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Equipment Configuration for 5725 MHz Radiated Band-Edge Emissions

Antenna:	5184-6684	**Variant:**	802.11ac-80
Antenna Gain (dBi):	7.79	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	5775.00	**Data Rate:**	29.30 MBit/s
Power Setting:	Target	**Tested By:**	SB

Test Measurement Results

Num	Frequency MHz	Raw dBµV	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
#1	5706.51	21.37	3.85	34.34	59.56	Marker	Horizontal	157	352	68.2	-8.7	Pass
#2	5725.00	29.05	3.79	34.35	67.19	Marker	Horizontal	157	352	78.2	-11.0	Pass
#3	5725.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

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Equipment Configuration for 5725 MHz Radiated Band-Edge Emissions

Antenna:	5184-6684	**Variant:**	802.11n HT-20
Antenna Gain (dBi):	7.79	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	5745.00	**Data Rate:**	6.50 MBit/s
Power Setting:	Target	**Tested By:**	SB

Test Measurement Results

Num	Frequency MHz	Raw dBµV	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
#1	5715.00	17.44	3.81	34.34	55.59	Marker	Horizontal	157	352	68.2	-12.6	Pass
#2	5725.00	19.05	3.79	34.35	57.19	Marker	Horizontal	157	352	78.2	-21.0	Pass
#3	5725.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Equipment Configuration for 5725 MHz Radiated Band-Edge Emissions

Antenna:	5184-6684	**Variant:**	802.11n HT-40
Antenna Gain (dBi):	7.79	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	5755.00	**Data Rate:**	13.50 MBit/s
Power Setting:	Target	**Tested By:**	SB

Test Measurement Results

Num	Frequency MHz	Raw dBµV	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
#1	5715.00	22.25	3.81	34.34	60.40	Marker	Horizontal	157	352	68.2	-7.8	Pass
#2	5717.48	23.01	3.81	34.34	61.16	Marker	Horizontal	157	352	78.2	-17.1	Pass
#3	5725.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Equipment Configuration for 5850 MHz Radiated Band-Edge Emissions

Antenna:	5184-6684	**Variant:**	802.11a
Antenna Gain (dBi):	7.79	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	5825.00	**Data Rate:**	6.00 MBit/s
Power Setting:	Target	**Tested By:**	SB

Test Measurement Results

Num	Frequency MHz	Raw dBµV	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
#2	5851.68	18.37	3.82	34.63	56.82	Marker	Horizontal	157	352	78.2	-21.4	Pass
#3	5861.05	16.98	3.86	34.66	55.50	Marker	Horizontal	157	352	68.2	-12.7	Pass
#1	5850.00	--	--	--	--	Band-Edge	--	--	--	--	--	--

Equipment Configuration for 5850 MHz Radiated Band-Edge Emissions

Antenna:	5184-6684	**Variant:**	802.11ac-40
Antenna Gain (dBi):	7.79	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	5795.00	**Data Rate:**	13.50 MBit/s
Power Setting:	Target	**Tested By:**	SB

Test Measurement Results

Num	Frequency MHz	Raw dBµV	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
#1	5850.00	--	--	--	--	Band-Edge	--	--	--	--	--	--
#2	5853.58	17.36	3.83	34.64	55.83	Marker	Horizontal	157	352	78.2	-22.4	Pass
#3	5860.00	15.99	3.86	34.65	54.50	Marker	Horizontal	157	352	78.2	-23.7	Pass

Equipment Configuration for 5850 MHz Radiated Band-Edge Emissions

Antenna:	5184-6684	**Variant:**	802.11ac-80
Antenna Gain (dBi):	7.79	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	5775.00	**Data Rate:**	29.30 MBit/s
Power Setting:	Target	**Tested By:**	SB

Test Measurement Results

Num	Frequency MHz	Raw dBµV	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
#1	5850.00	--	--	--	--	Band-Edge	--	--	--	--	--	--
#2	5853.58	21.45	3.83	34.64	59.92	Marker	Horizontal	157	352	78.2	-18.3	Pass
#3	5874.94	18.37	3.80	34.70	56.87	Marker	Horizontal	157	352	68.2	-11.4	Pass

Equipment Configuration for 5850 MHz Radiated Band-Edge Emissions

Antenna:	5184-6684	**Variant:**	802.11n HT-20
Antenna Gain (dBi):	7.79	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	5825.00	**Data Rate:**	6.50 MBit/s
Power Setting:	Target	**Tested By:**	SB

Test Measurement Results

Num	Frequency MHz	Raw dBµV	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
#1	5850.00	17.04	3.81	34.63	55.48	Marker	Horizontal	157	352	78.2	-22.8	Pass
#2	5850.00	--	--	--	--	Band-Edge	--	--	--	--	--	--
#3	5860.00	15.41	3.86	34.65	53.92	Marker	Horizontal	157	352	78.2	-24.3	Pass

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Equipment Configuration for 5850 MHz Radiated Band-Edge Emissions

Antenna:	5184-6684	**Variant:**	802.11n HT-40
Antenna Gain (dBi):	7.79	**Modulation:**	OFDM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	99
Channel Frequency (MHz):	5795.00	**Data Rate:**	13.50 MBit/s
Power Setting:	Target	**Tested By:**	SB

Test Measurement Results

Num	Frequency MHz	Raw dBµV	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
#1	5850.00	--	--	--	--	Band-Edge	--	--	--	--	--	--
#2	5850.84	17.04	3.81	34.63	55.48	Marker	Horizontal	157	352	78.2	-22.8	Pass
#3	5860.00	15.41	3.86	34.65	53.92	Marker	Horizontal	157	352	78.2	-24.3	Pass

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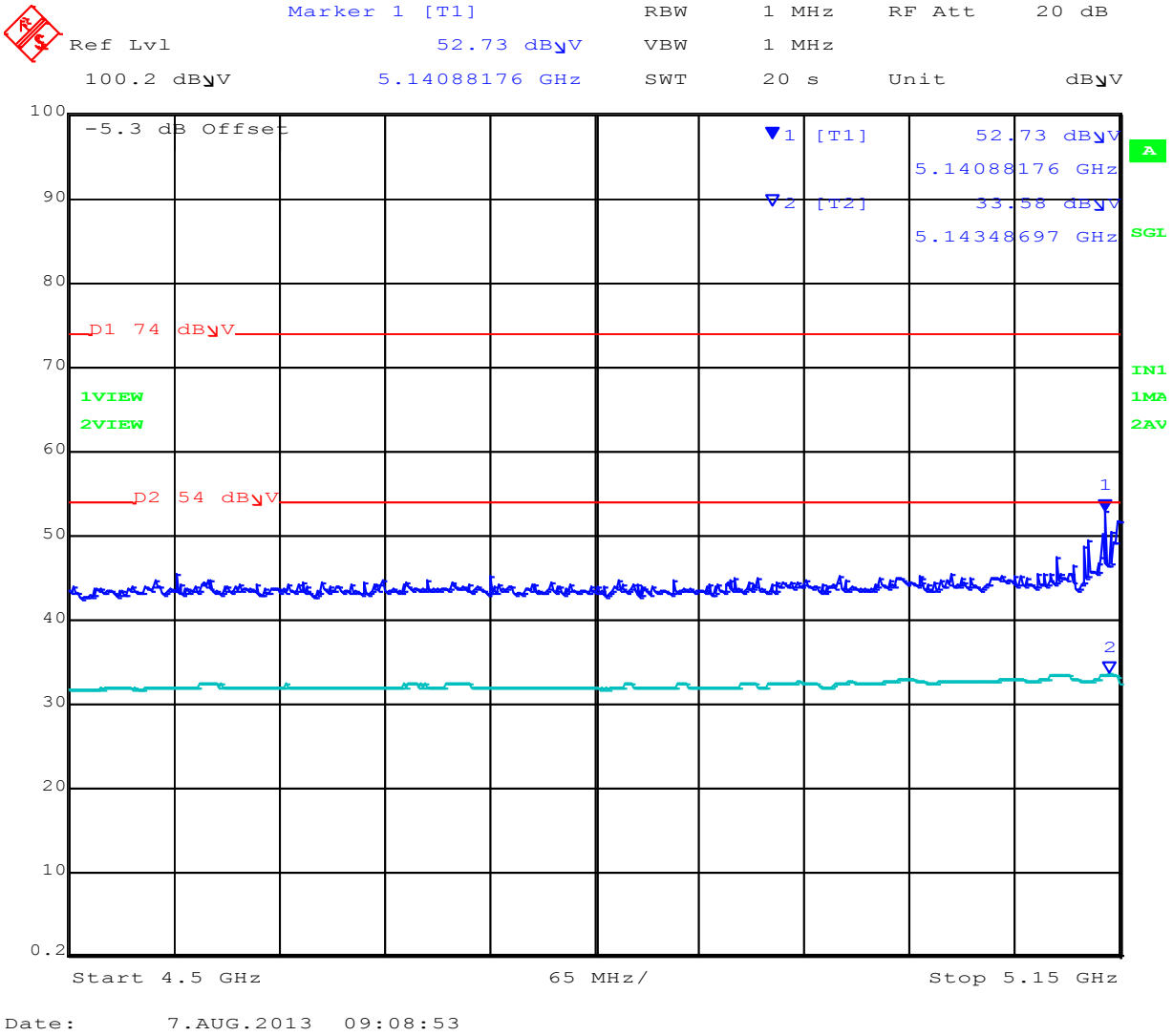
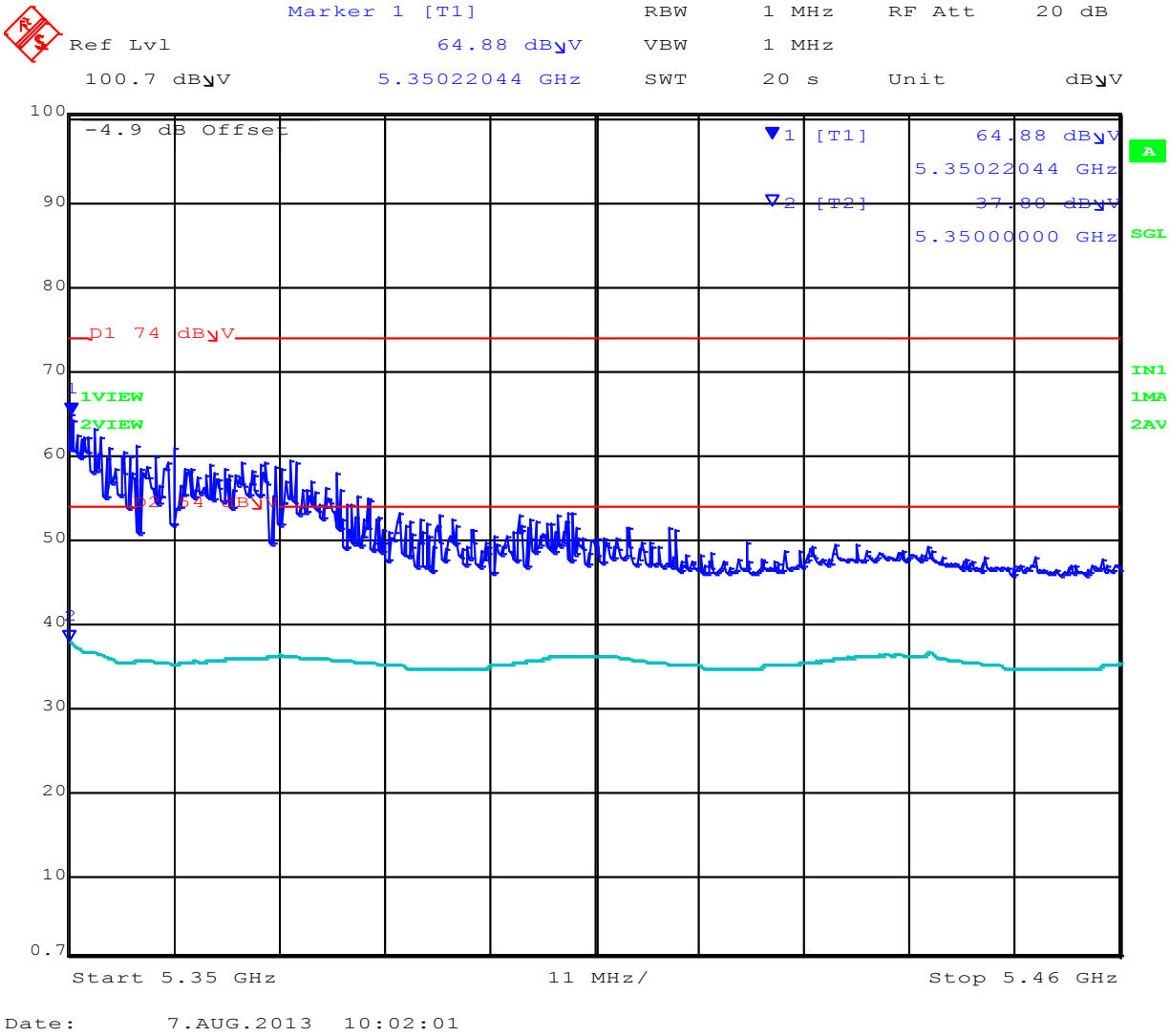
802.11a Frequency 5180 MHz Band-Edge Frequency 5150



802.11a Frequency 5320 MHz Band-Edge Frequency 5350



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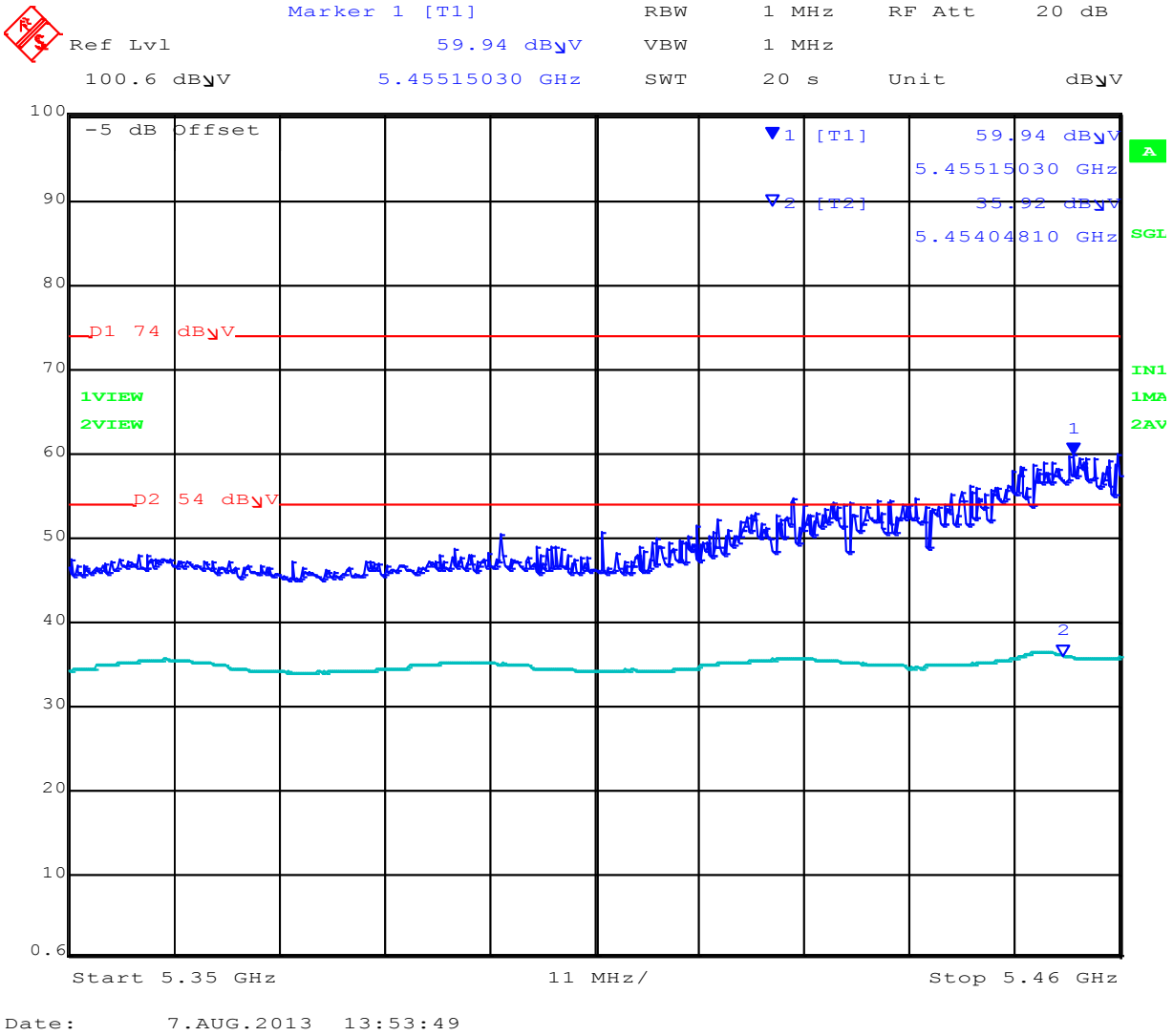
802.11a Frequency 5500 MHz Band-Edge Frequency 5460



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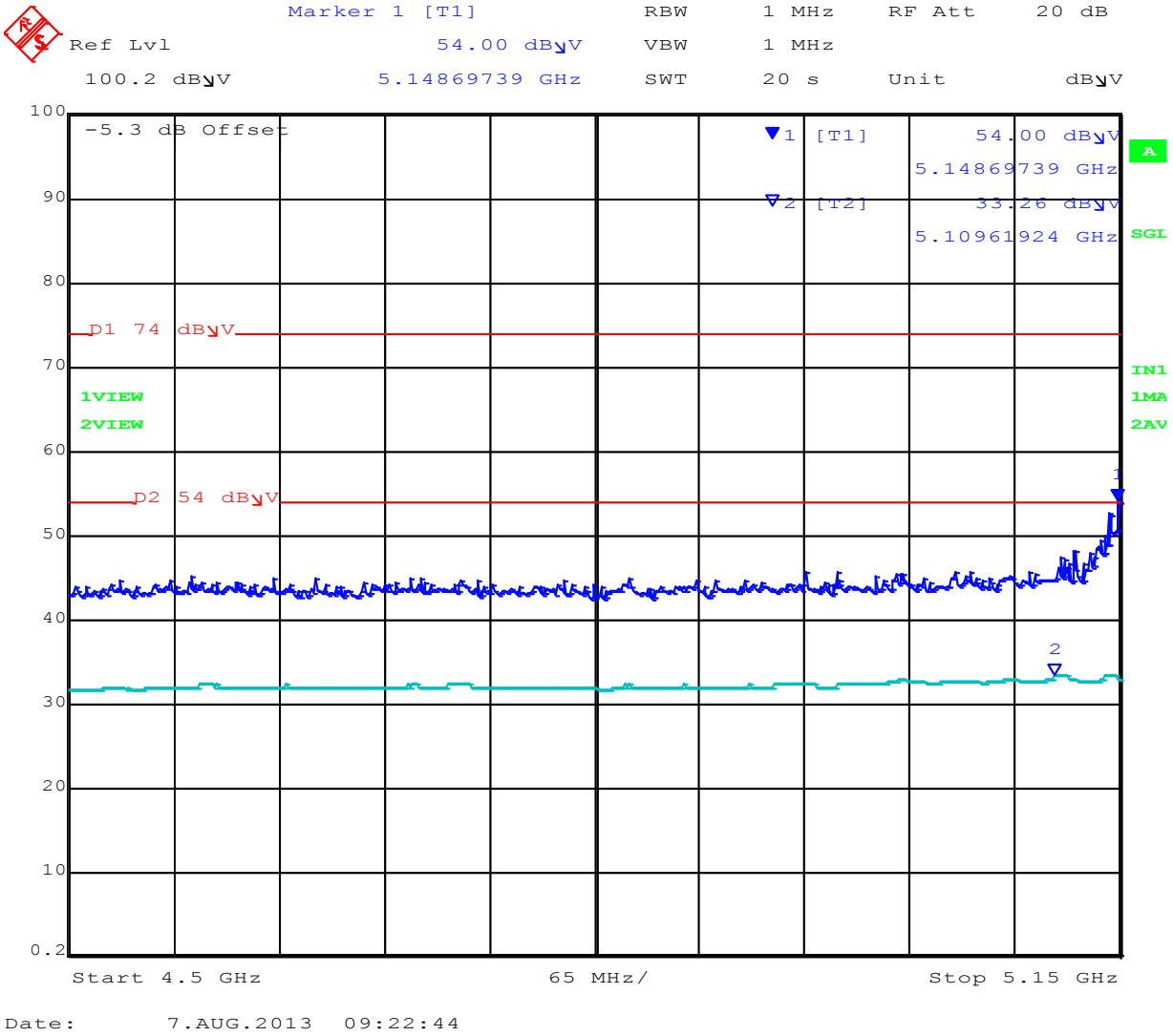
802.11n HT-20 Frequency 5180 MHz Band-Edge Frequency 5150



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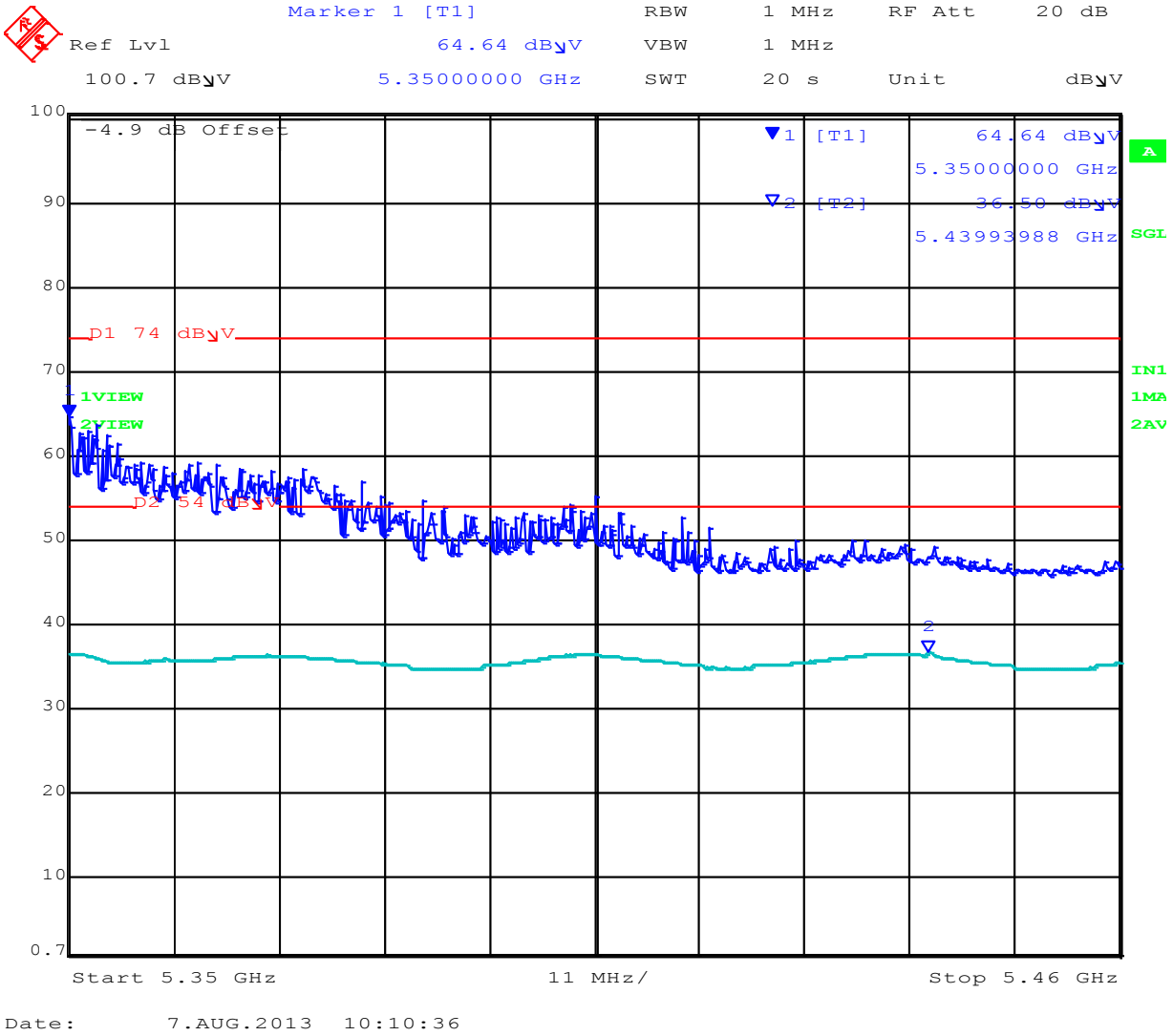
802.11n HT-20 Frequency 5320 MHz Band-Edge Frequency 5350



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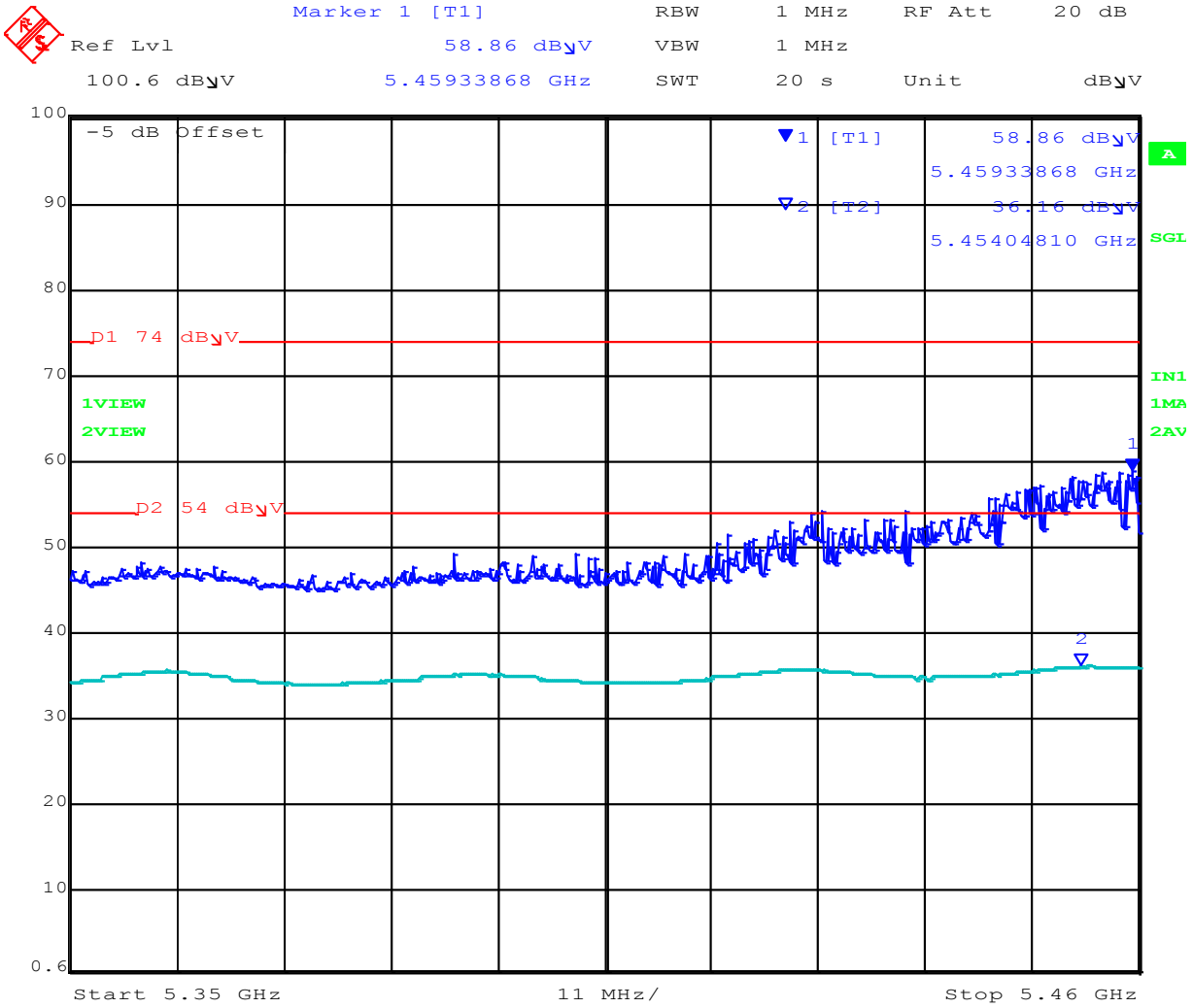
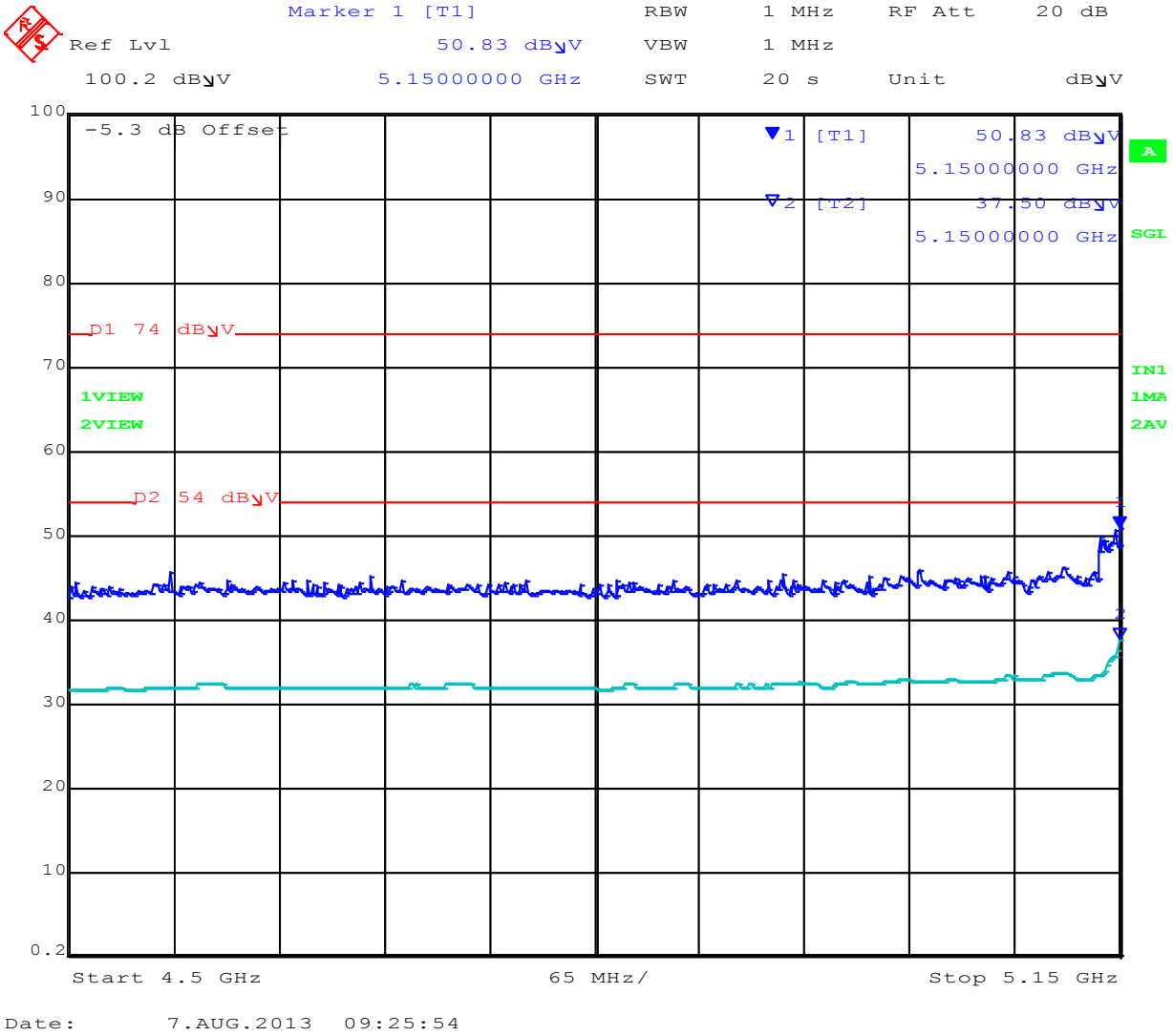
802.11n HT-20 Frequency 5500 MHz Band-Edge Frequency 5460



Date: 7.AUG.2013 13:48:43

802.11n HT-40 Frequency 5190 MHz Band-Edge Frequency 5150



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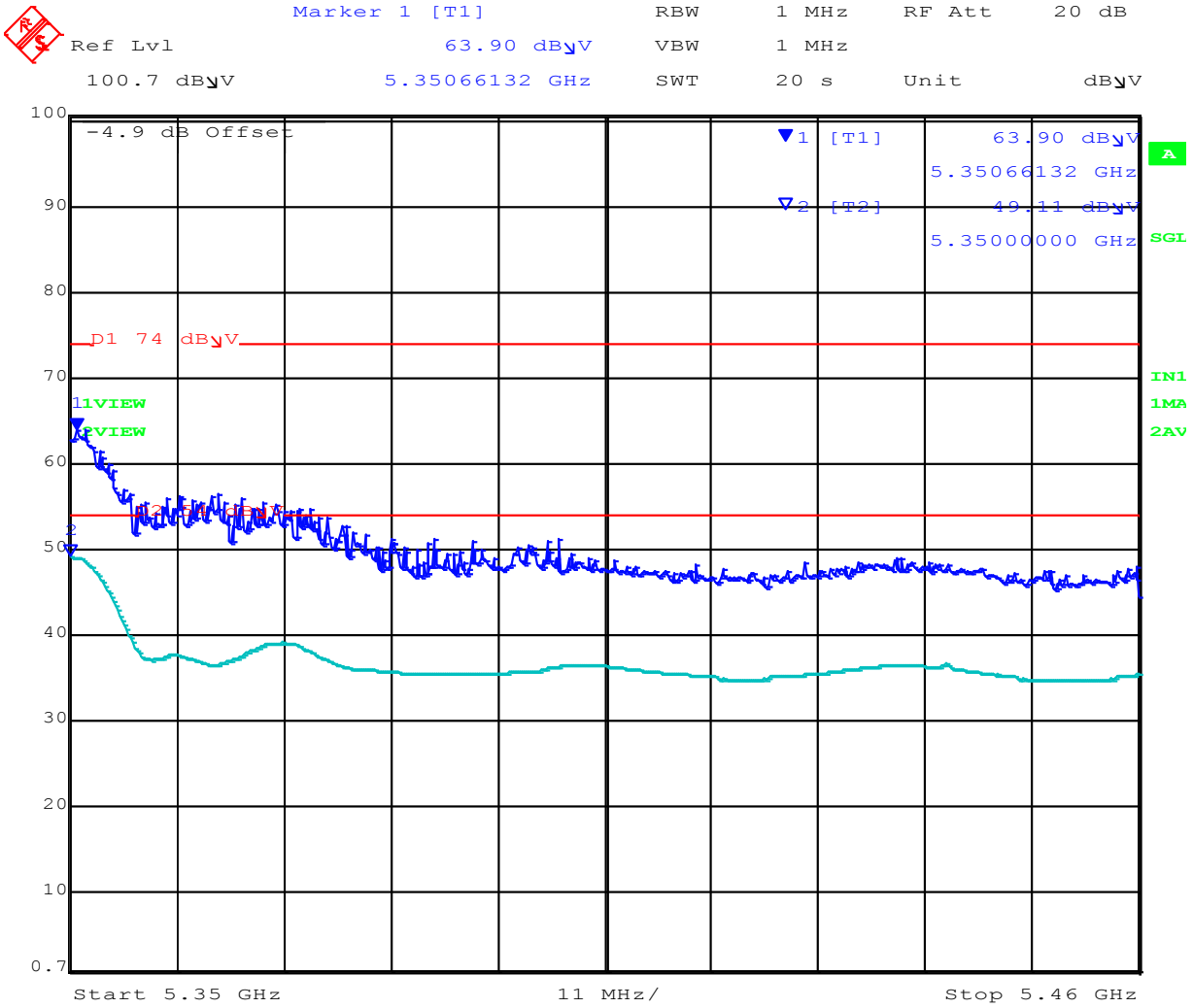
802.11n HT-40 Frequency 5310 MHz Band-Edge Frequency 5350



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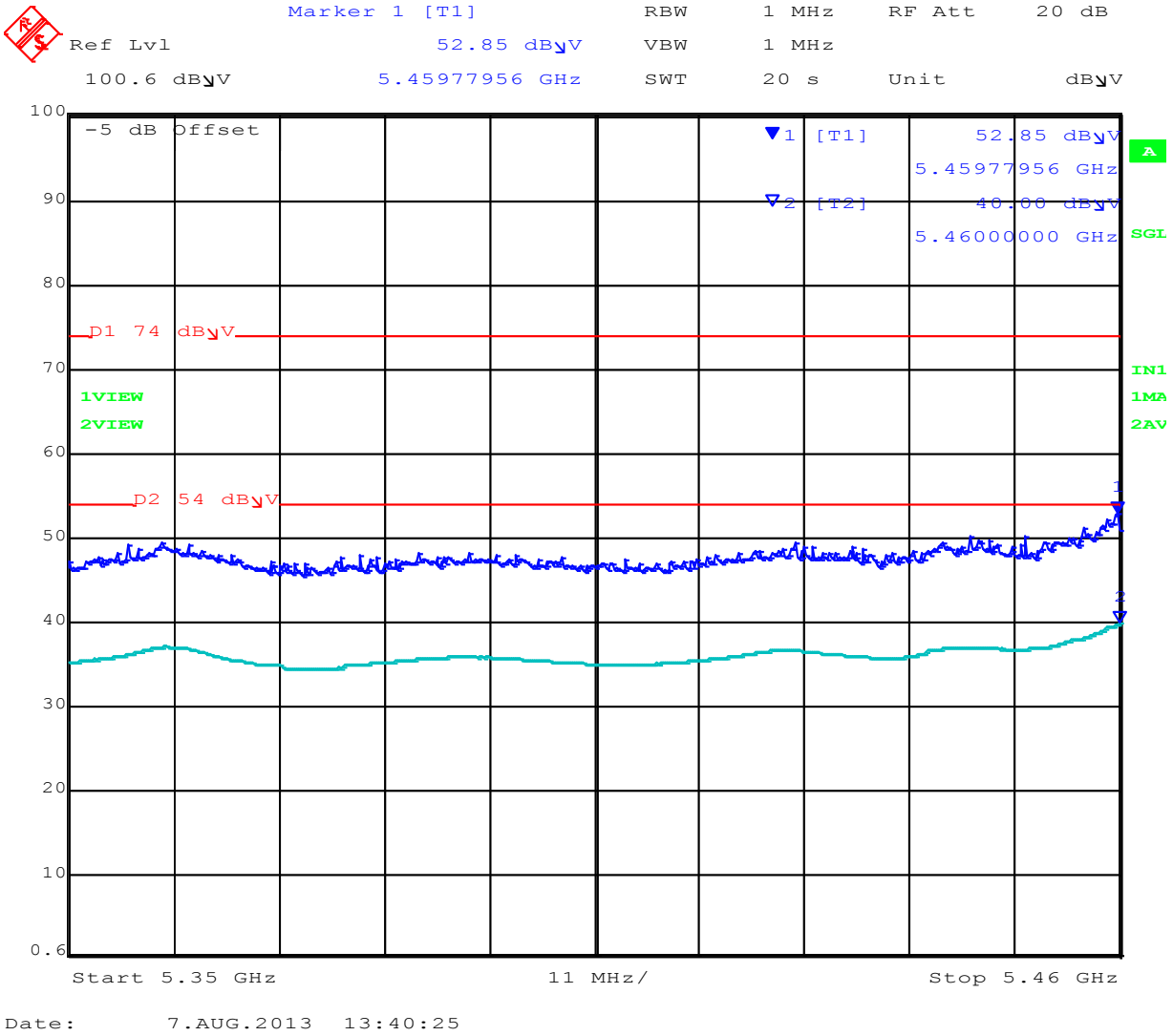
802.11n HT-40 Frequency 5510 MHz Band-Edge Frequency 5460



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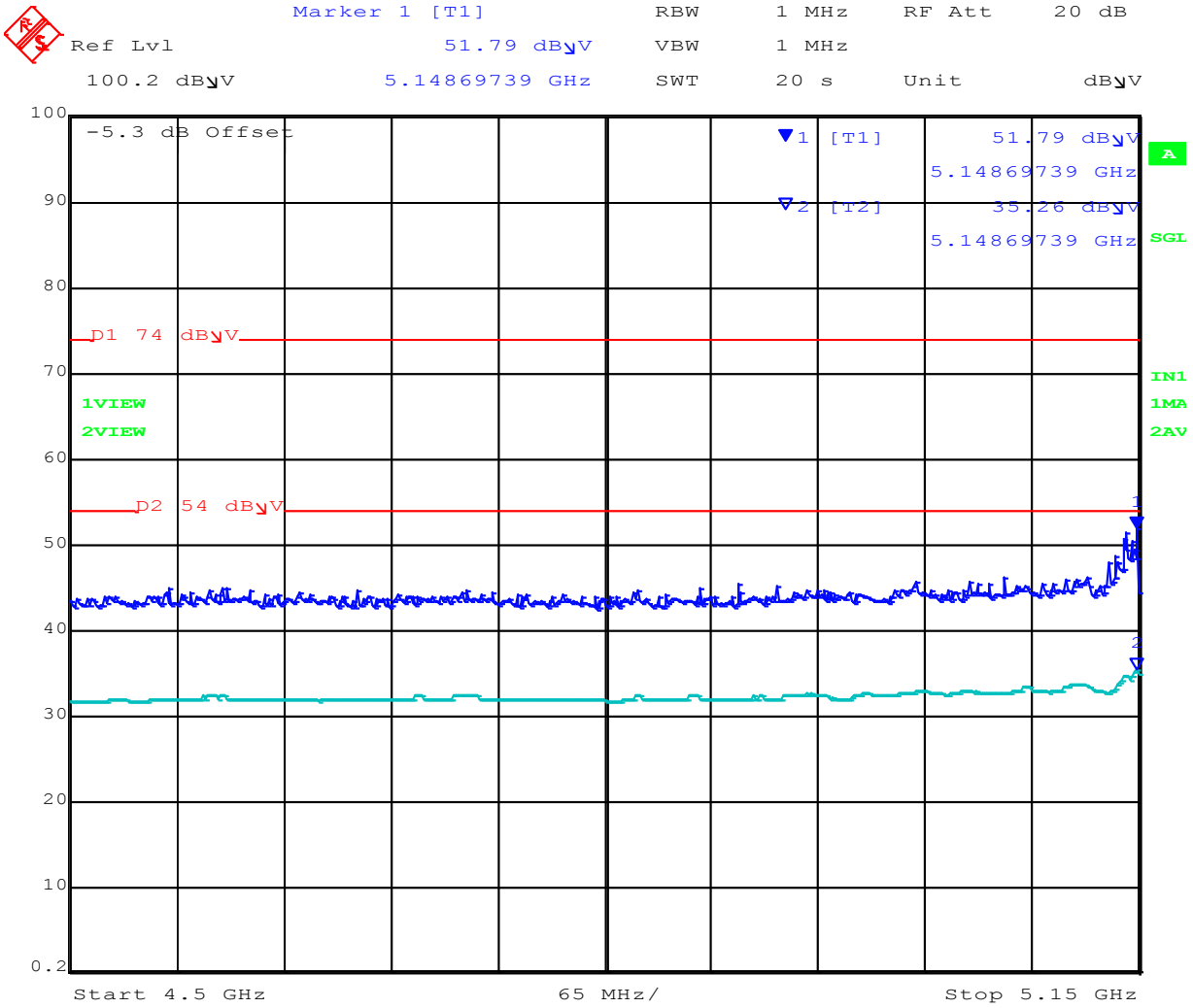
802.11VHT-40 Frequency 5190 MHz Band-Edge Frequency 5150



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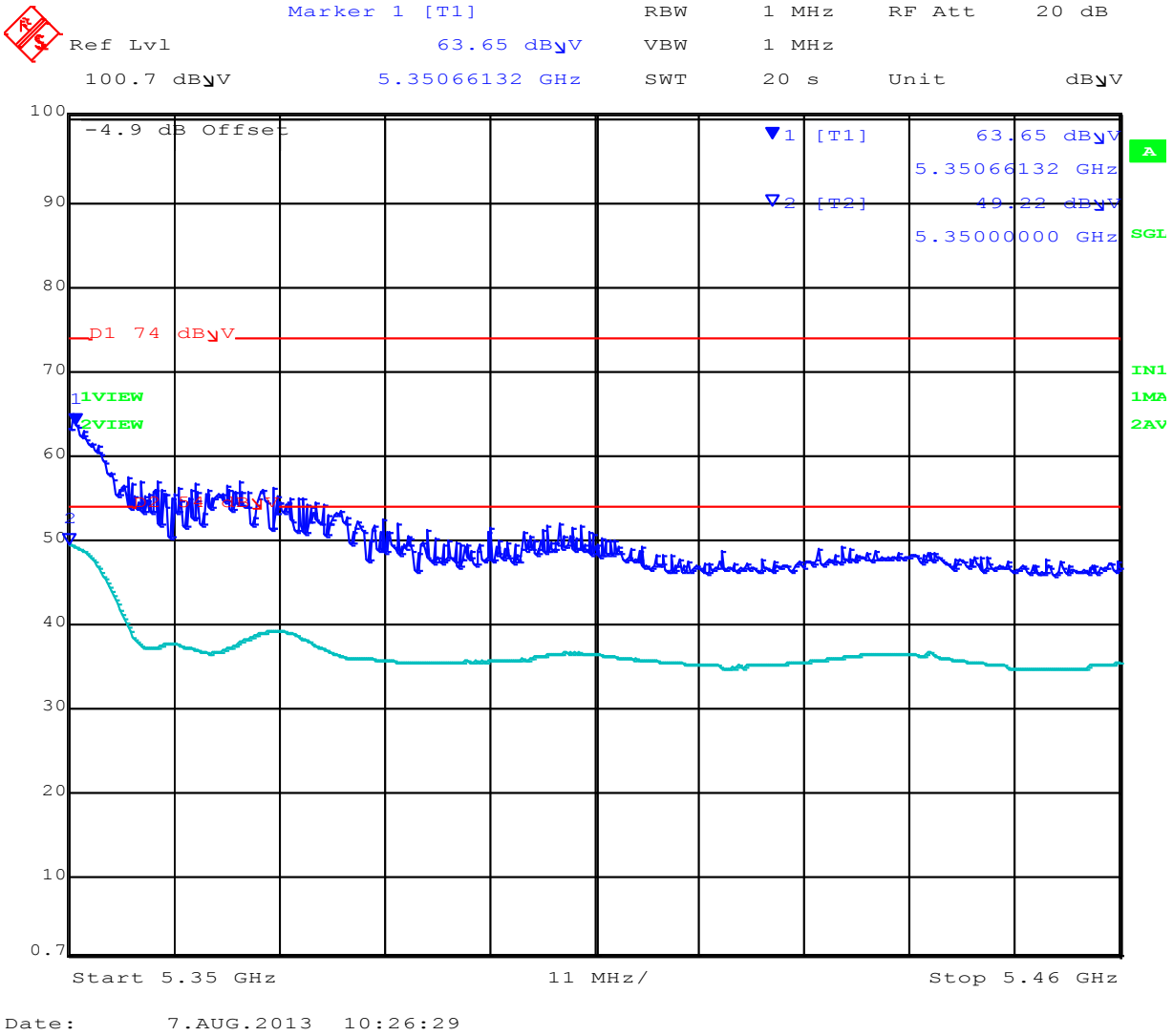

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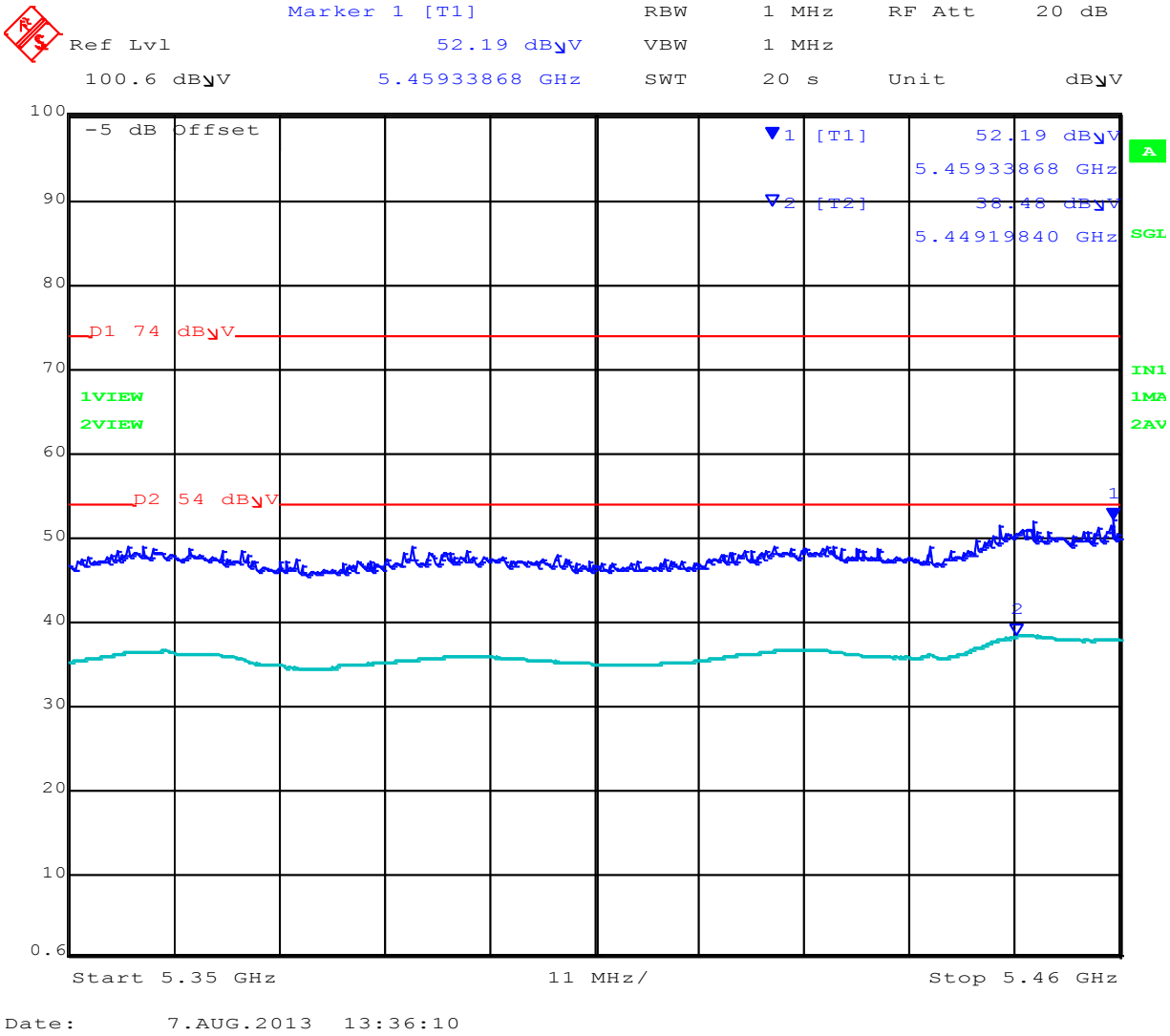
802.11VHT-40 Frequency 5510 MHz Band-Edge Frequency 5460



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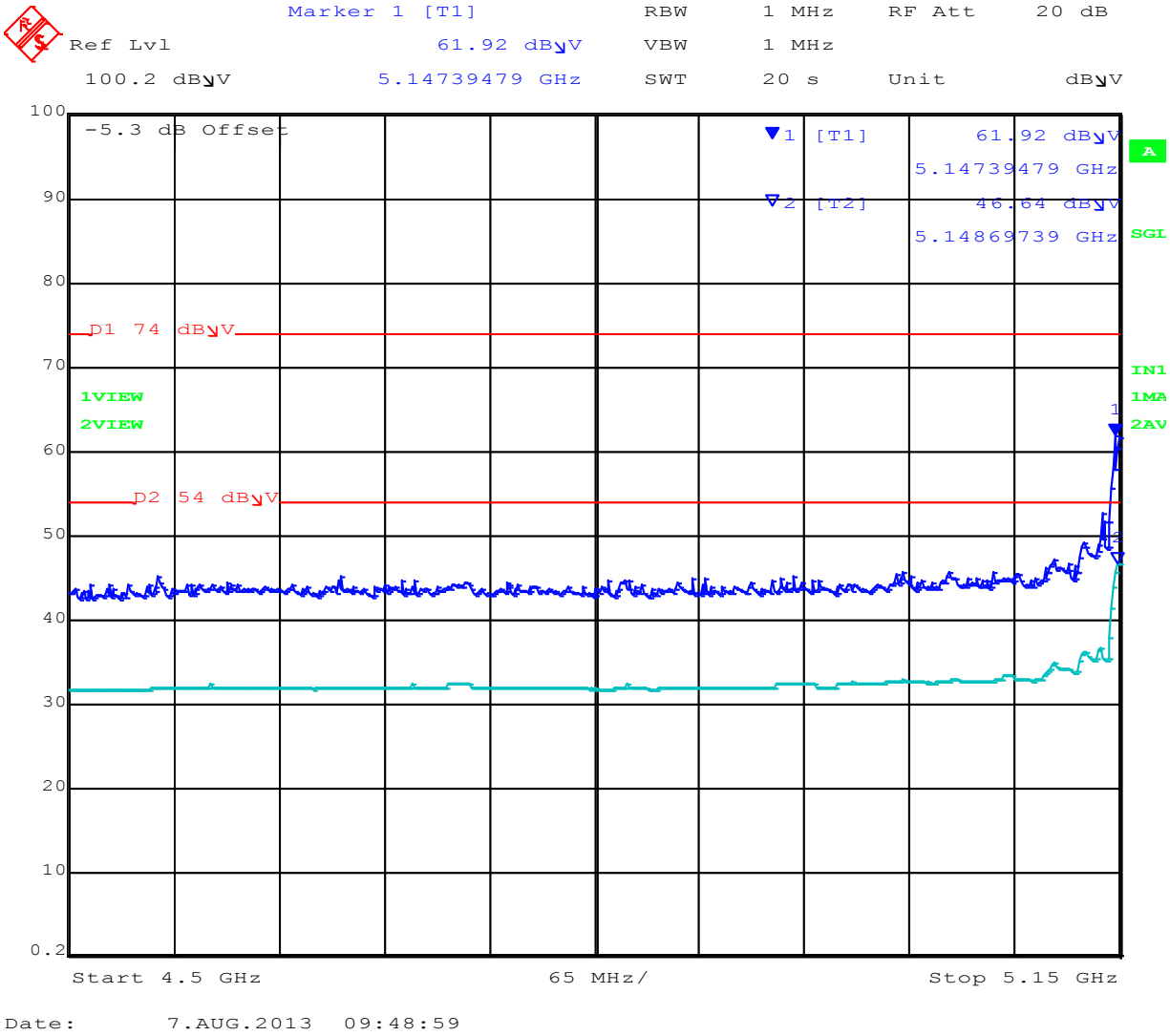
802.11VHT-80 Frequency 5210 MHz Band-Edge Frequency 5150



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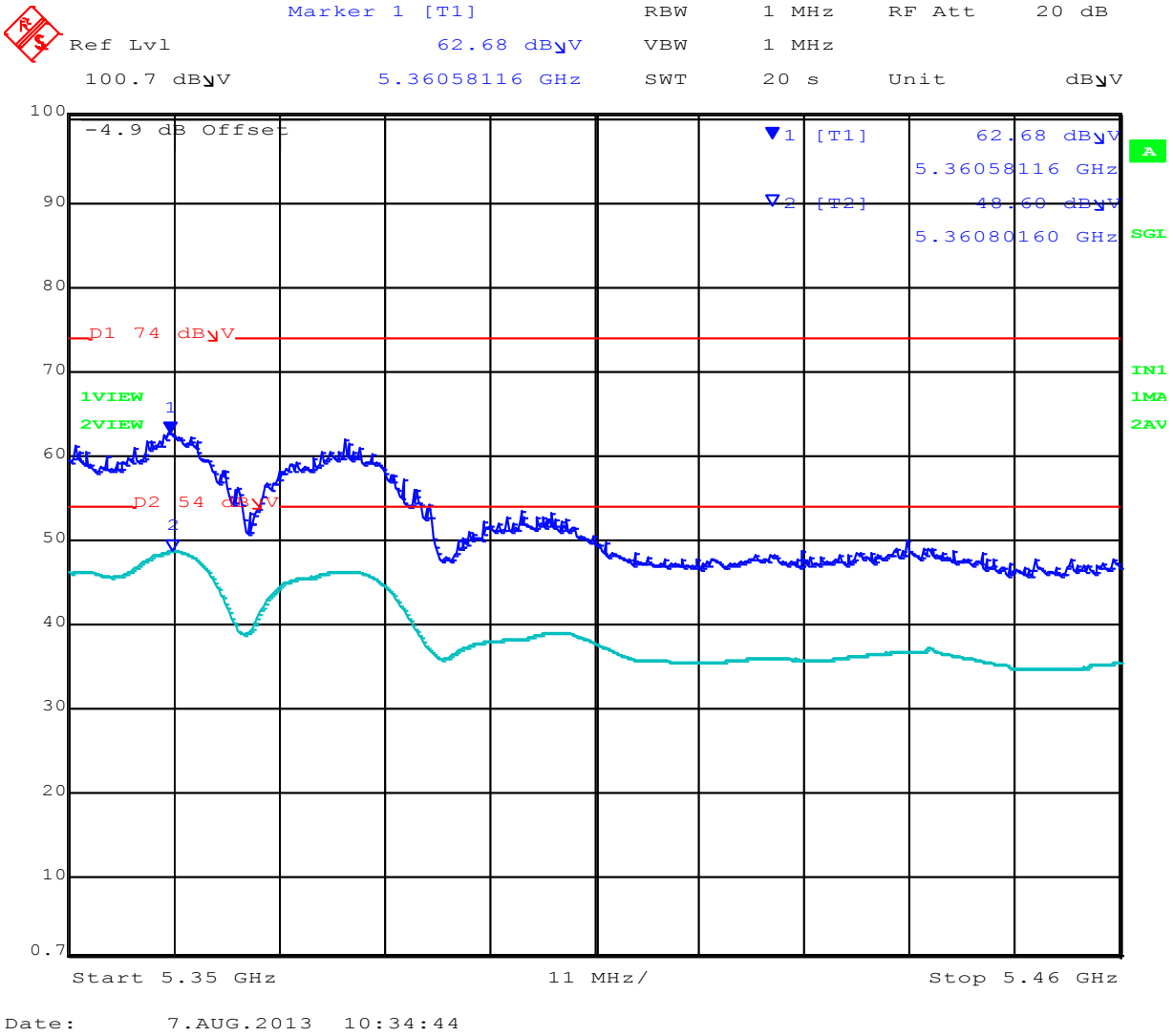
802.11VHT-80 Frequency 5290 MHz Band-Edge Frequency 5350



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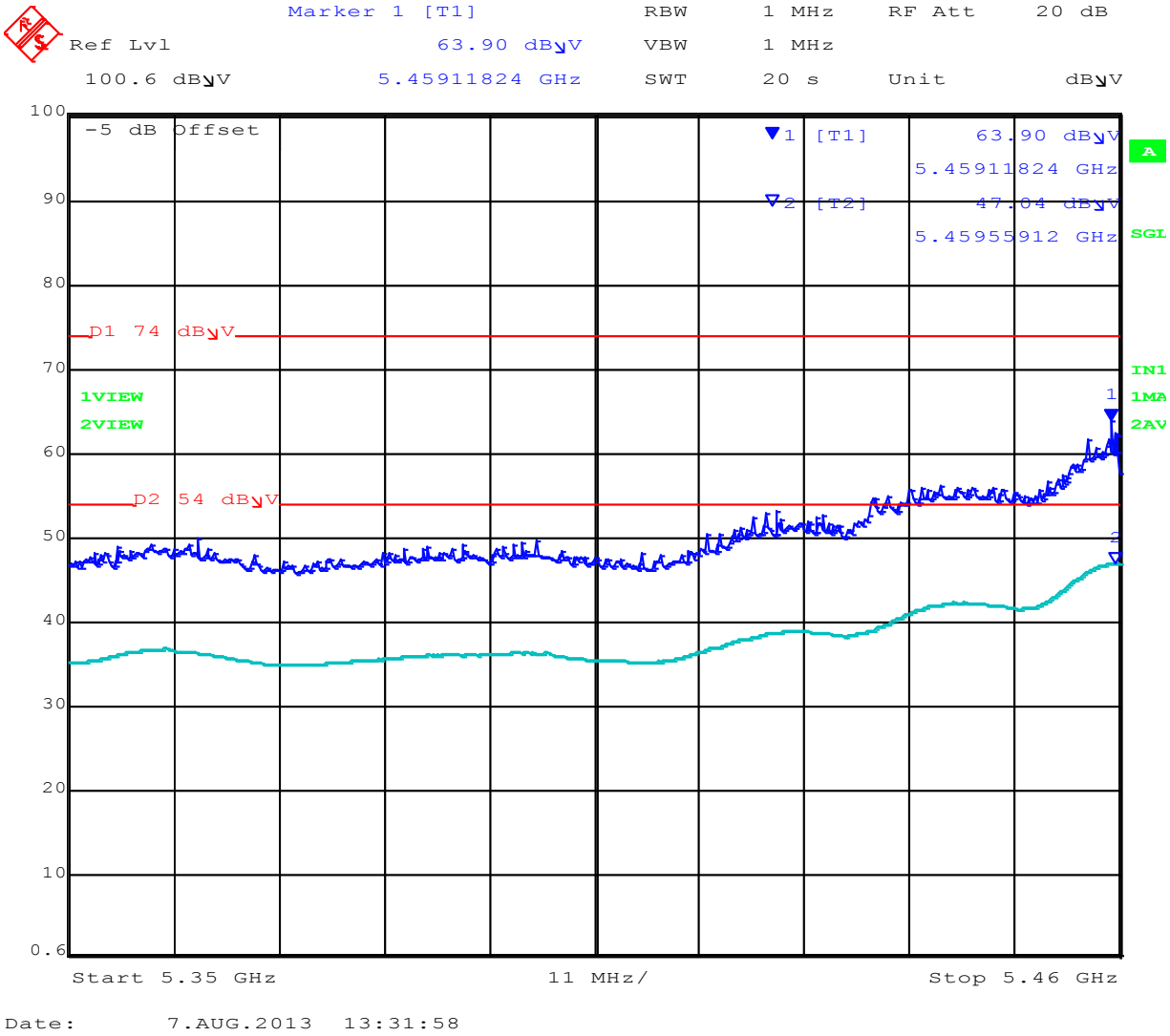
802.11VHT-80 Frequency 5530 MHz Band-Edge Frequency 5460 MHz



Date: 7.AUG.2013 13:31:58

7.1.2.3. Digital Emissions (30M-1 GHz)

FCC, Part 15 Subpart C §15.205/ §15.209
Industry Canada RSS-210 §2.2

Test Procedure
Testing 30M-1 GHz was performed in a 3-meter anechoic chamber using a CISPR compliant receiver. Preliminary radiated emissions were measured on every azimuth and with the receiving antenna in both horizontal and vertical polarizations. To further maximize emissions the receive antenna was varied between 1 and 4 meters. The emissions are recorded with receiver in peak hold mode. Emissions closest to the limits are measured in the quasi-peak mode with the tuned receiver using a bandwidth of 120 kHz. Only the highest emissions relative to the limit are listed. The anechoic chamber test set-up is identified in Section 6 Test Set-Up Photographs.

The EUT had two methods of powering on ac/dc converter and Power over Ethernet (POE). Both modes were tested for emissions below 1GHz.

Field Strength Calculation
The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. In this test facility, the Antenna Factor, Cable Loss, and Amplifier Gains are loaded into the Rohde & Schwarz Receiver and the corrected field strength can be read directly on the receiver.

$$FS = R + AF + CORR$$

where:

FS = Field Strength
R = Measured Receiver Input Amplitude
AF = Antenna Factor
CORR = Correction Factor = CL – AG + NFL
CL = Cable Loss
AG = Amplifier Gain

For example:
Given a Receiver input reading of 51.5dBμV; Antenna Factor of 8.5dB; Cable Loss of 1.3dB; Falloff Factor of 0dB, an Amplifier Gain of 26dB and Notch Filter Loss of 1dB. The Field Strength of the measured emission is:

$$FS = 51.5 + 8.5 + 1.3 - 26.0 + 1 = 36.3 dB\mu V/m$$

Conversion between dBμV/m (or dBμV) and μV/m (or μV) are done as:

$$Level\ (dB\mu V/m) = 20 * Log\ (level\ (\mu V/m))$$

40 dBμV/m = 100μV/m
48 dBμV/m = 250μV/m

Specification

Limits

§15.205 (a) Except as shown in paragraph (d) of 15.205 (a), only spurious emissions are permitted in any of the frequency bands listed.

§15.205 (a) Except as shown in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209 (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table.

§15.209 (a) and **RSS-Gen §2.2** Limit Matrix

Frequency(MHz)	Field Strength (µV/m)	Field Strength (dBµV/m)	Measurement Distance (meters)
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

Laboratory Measurement Uncertainty for Radiated Emissions

Measurement uncertainty	+5.6/ -4.5 dB

Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-03 'Measurement of Radiated Emissions'	0088, 0158, 0134, 0304, 0311, 0315, 0310, 0312

7.1.3. AC Wireline Conducted Emissions (150 kHz – 30 MHz)

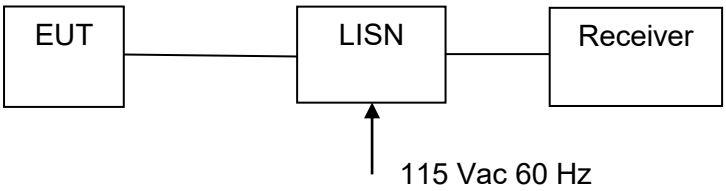
FCC, Part 15 Subpart C §15.207
Industry Canada RSS-Gen §7.2.2

Test Procedure
The EUT is configured in accordance with ANSI C63.4. The conducted emissions are measured in a shielded room with a spectrum analyzer in peak hold in the first instance. Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation. The highest emissions relative to the limit are listed.

Measurement Results for AC Wireline Conducted Emissions (150 kHz – 30 MHz)

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

Test Measurement Set up



Measurement set up for AC Wireline Conducted Emissions Test

Measurement Results for AC Wireline Conducted Emissions (150 kHz – 30 MHz)

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

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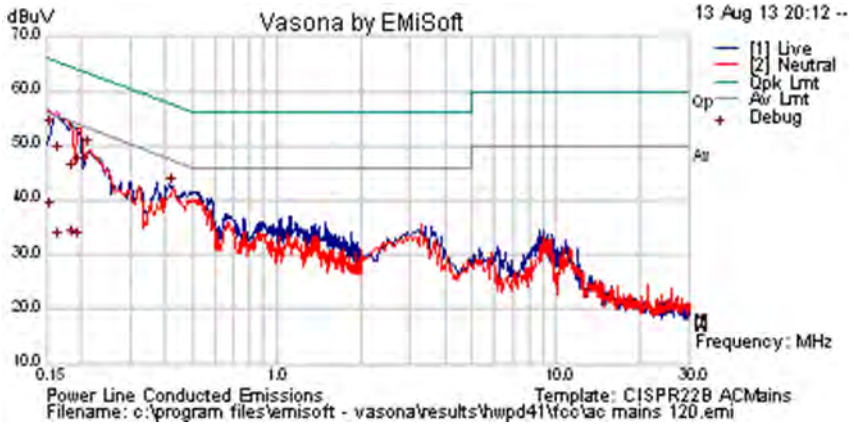
Laptop 120 Vac, 60 Hz Supply Voltage

Test Freq.	N/A	**Engineer**	JMH
Variant	AC Line Emissions	**Temp (ºC)**	28
Freq. Range	0.150 MHz - 30 MHz	**Rel. Hum.(%)**	37
Power Setting	Maximum	**Press. (mBars)**	998
Antenna	Terminated in 50 Ω		
Test Notes 1	120V 60 Ha, module installed in laptop		
Test Notes 2			



Formally measured emission peaks

Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB	Pass /Fail	Comments
0.155	43.3	9.9	0.1	53.2	Quasi Peak	Neutral	65.73	-12.5	Pass	
0.155	28.1	9.9	0.1	38.1	Average	Neutral	55.73	-17.6	Pass	
0.166	38.2	9.9	0.1	48.2	Quasi Peak	Neutral	65.16	-17.0	Pass	
0.166	22.6	9.9	0.1	32.6	Average	Neutral	55.16	-22.6	Pass	
0.187	23.0	9.9	0.1	32.9	Average	Live	54.17	-21.2	Pass	
0.187	35.1	9.9	0.1	45.1	Quasi Peak	Live	64.17	-19.1	Pass	
0.196	22.3	9.9	0.1	32.3	Average	Neutral	53.78	-21.5	Pass	
0.196	36.1	9.9	0.1	46.0	Quasi Peak	Neutral	63.78	-17.8	Pass	
0.213	39.3	9.9	0.1	49.3	Peak [Scan]	Neutral	53.09	-3.8	Pass	
0.426	32.5	9.9	0.1	42.5	Peak [Scan]	Live	47.33	-4.9	Pass	

Legend:	DIG = Digital Device Emission; TX = Transmitter Emission; FUND = Fundamental Frequency
	NRB = Non-Restricted Band, Limit is 20 dB below Fundamental; RB = Restricted Band

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Specification

Limit

§15.207 (a) Except as shown in paragraphs (b) and (c) of this section, 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 30 MHz shall not exceed the limits in the following table, as measured using a 50 μΩ line impedance stabilization network (LISN), see §15.207 (a) matrix below. 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.

RSS-Gen §7.2.2
The radio frequency voltage that is conducted back into the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in the table below. The tighter limit applies at the frequency range boundaries.

§15.207 (a) and **RSS-Gen §7.2.2** Limit Matrix
The lower limit applies at the boundary between frequency ranges

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency

Laboratory Measurement Uncertainty for Conducted Emissions

Measurement uncertainty	±2.64 dB

Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-EMC-01 'Measurement of Conducted Emissions'	0158, 0184, 0287, 0190, 0293, 0307

7.1.4. Dynamic Frequency Selection (DFS)

FCC, Part 15 Subpart C §15.407(h)
FCC 06-96 Memorandum Opinion and Order

7.1.4.1. 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	

7.1.4.2. DFS Response requirement values

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 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.

7.1.4.3. 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.

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 / *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.

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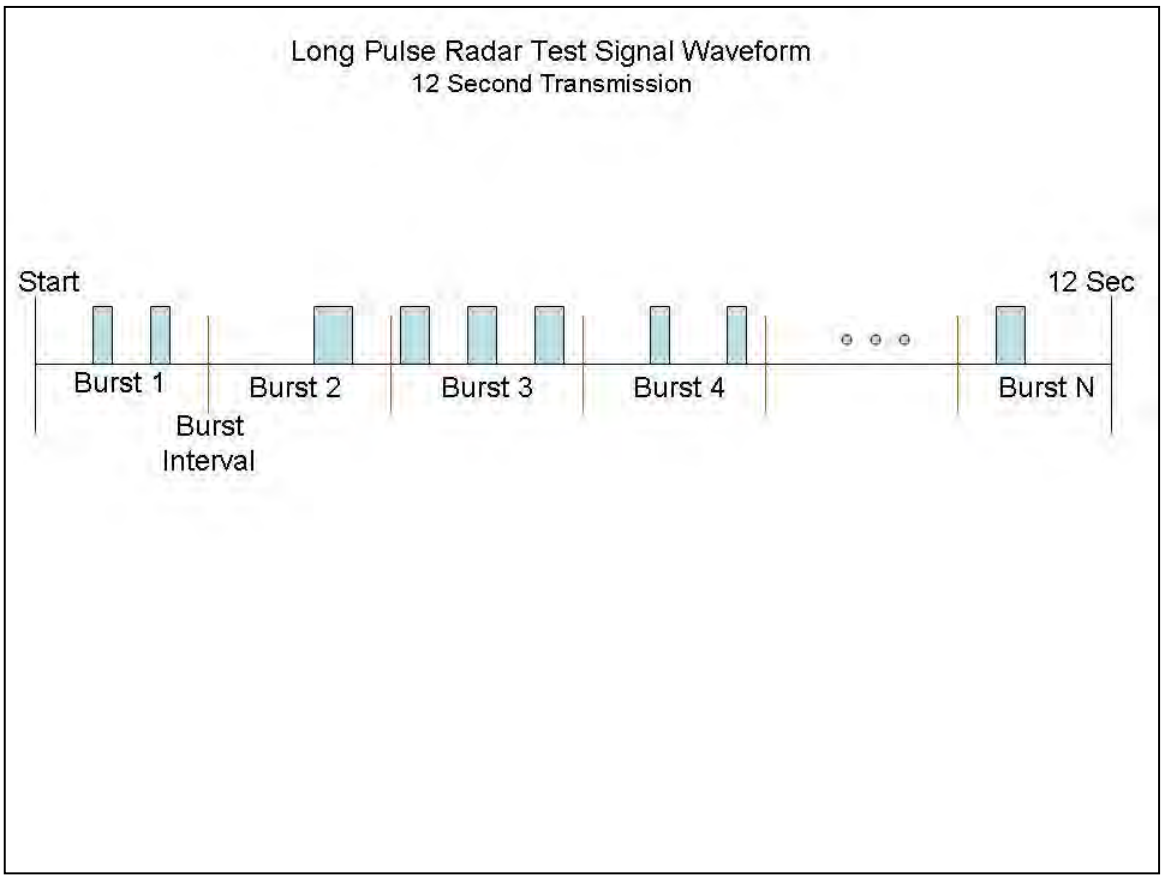
A representative example of a Long Pulse radar test waveform:

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.



7.1.4.4. Frequency Hopping Radar Test Waveform

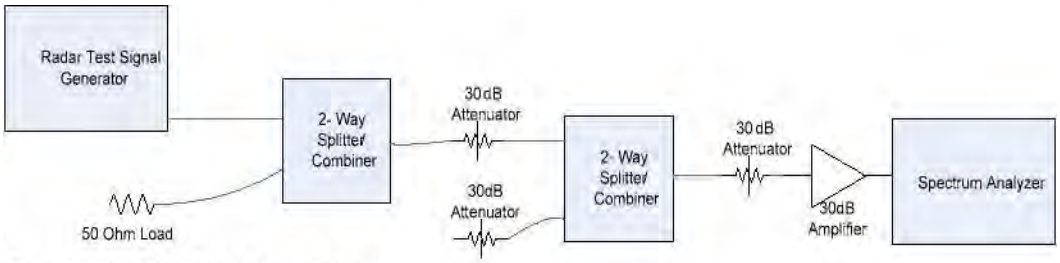
Frequency Hopping Radar Test Waveform

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:

7.1.4.5. Radar Waveform Calibration

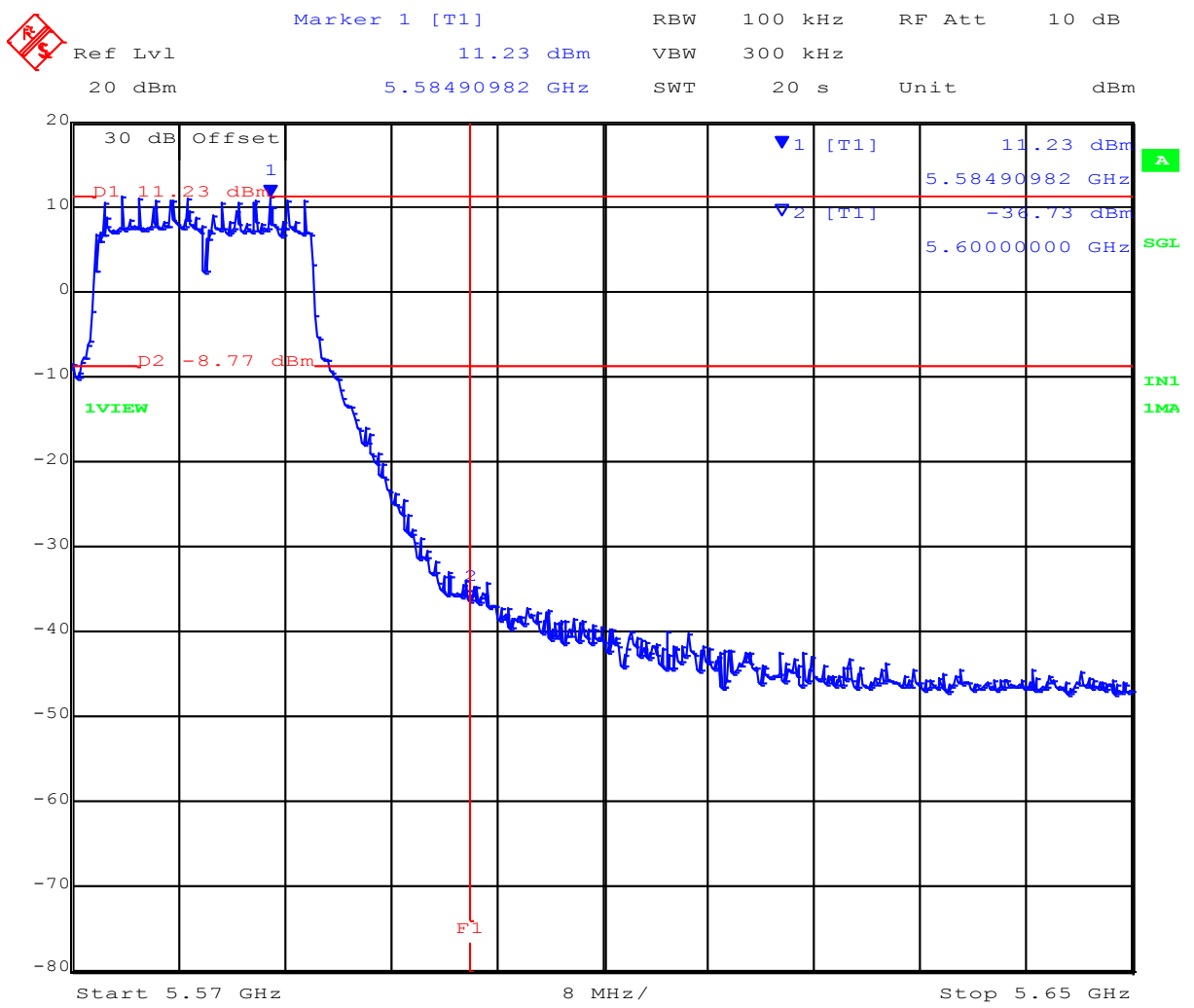
The following equipment setup was used to calibrate the conducted Radar Waveform. A spectrum analyzer was used to establish the test signal level for each radar type. During this process there were no transmissions by either the Master or Client Device. The spectrum analyzer was switched to the zero span (Time Domain) mode at the frequency of the Radar Waveform generator. Peak detection was utilized. The spectrum analyzer resolution bandwidth (RBW) and video bandwidth (VBW) were set to 3 MHz.
The signal generator amplitude was set so that the power level measured at the spectrum analyzer was -61dBm (Ref Section 5.1). The 30dB amplifier gain was entered as an amplitude offset on the spectrum analyzer.



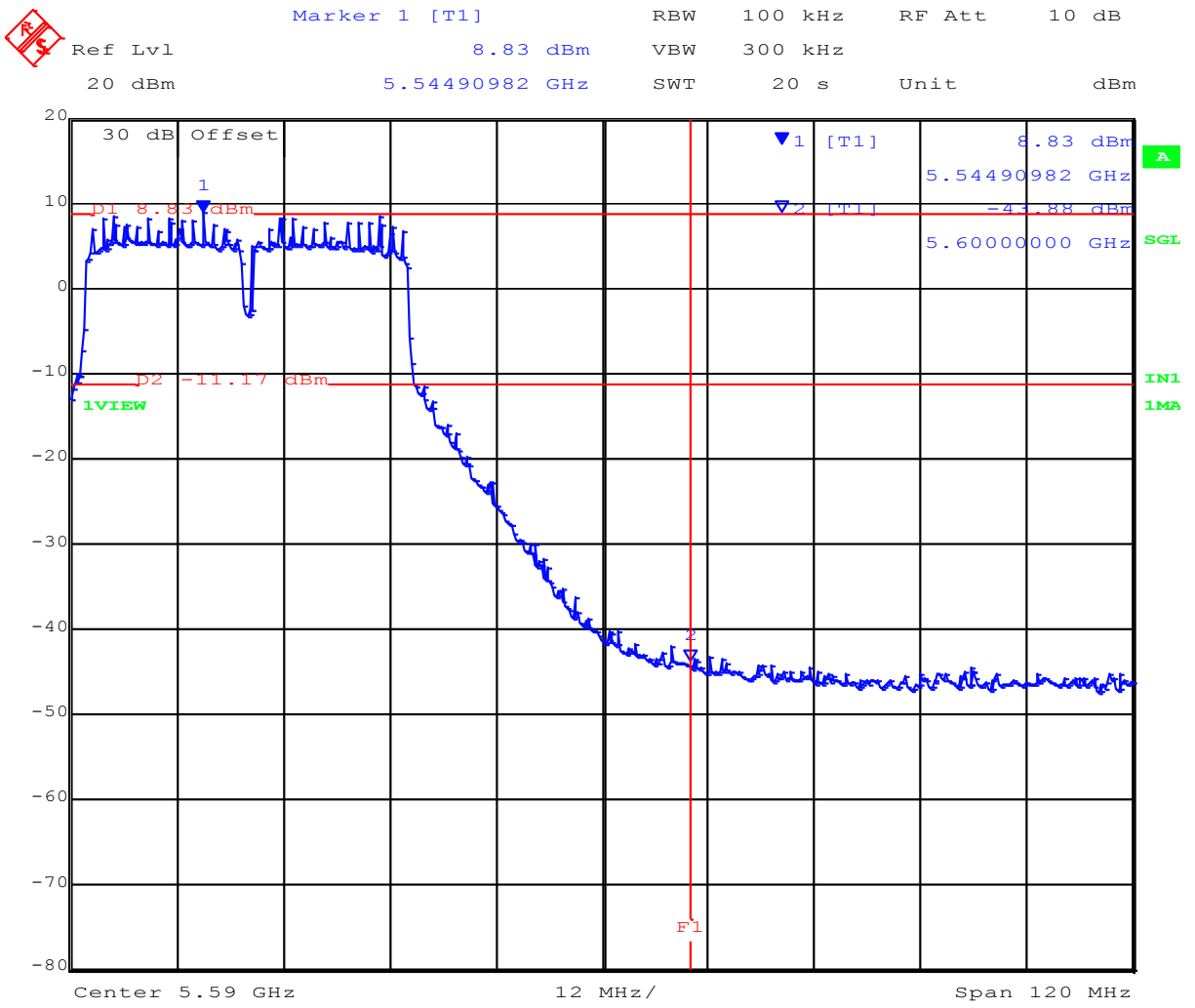
Conducted Calibration Setup

7.1.4.6. Weather Radar Band Edge Plots

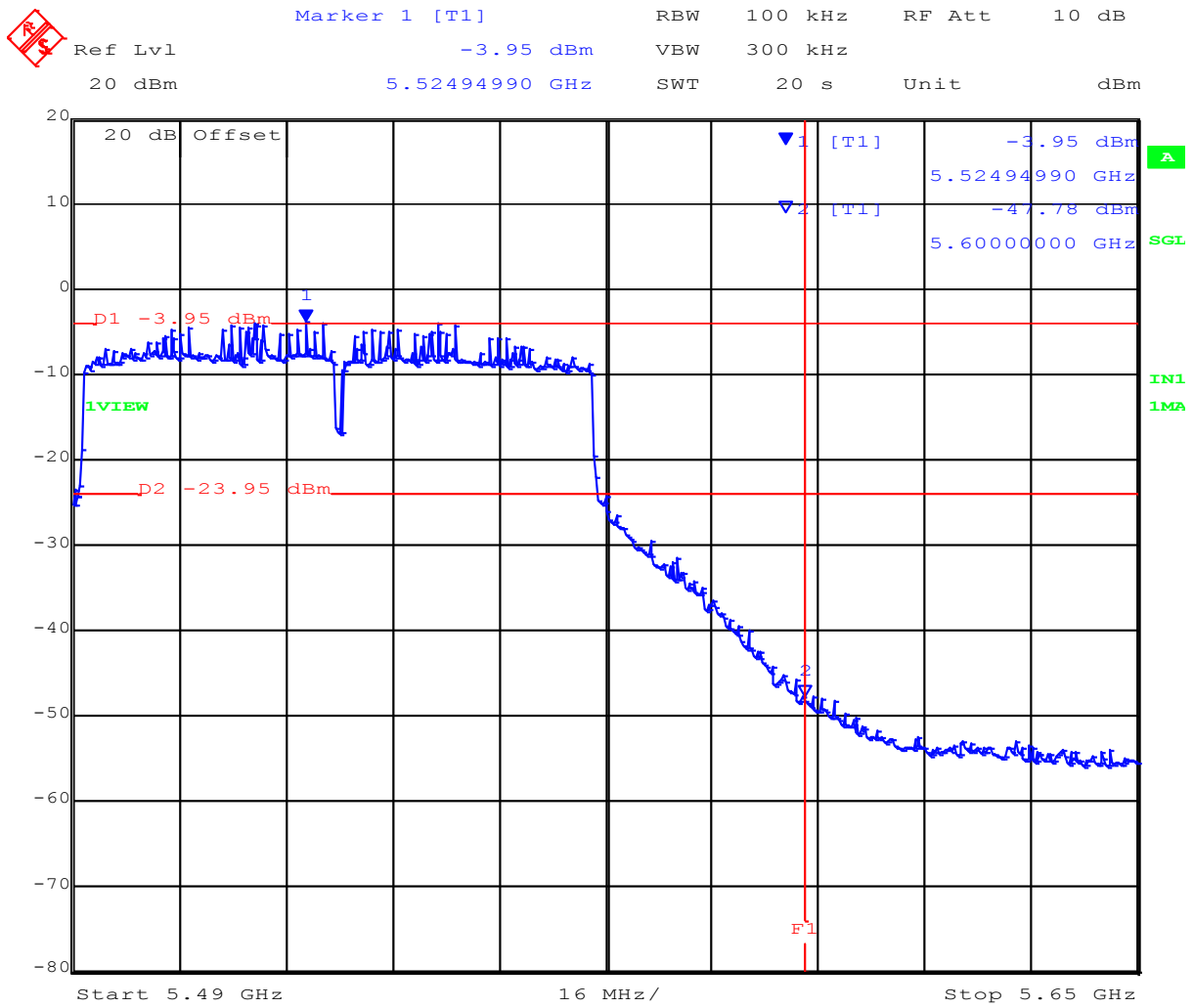
Center Frequency 5,580MHz 802.11a



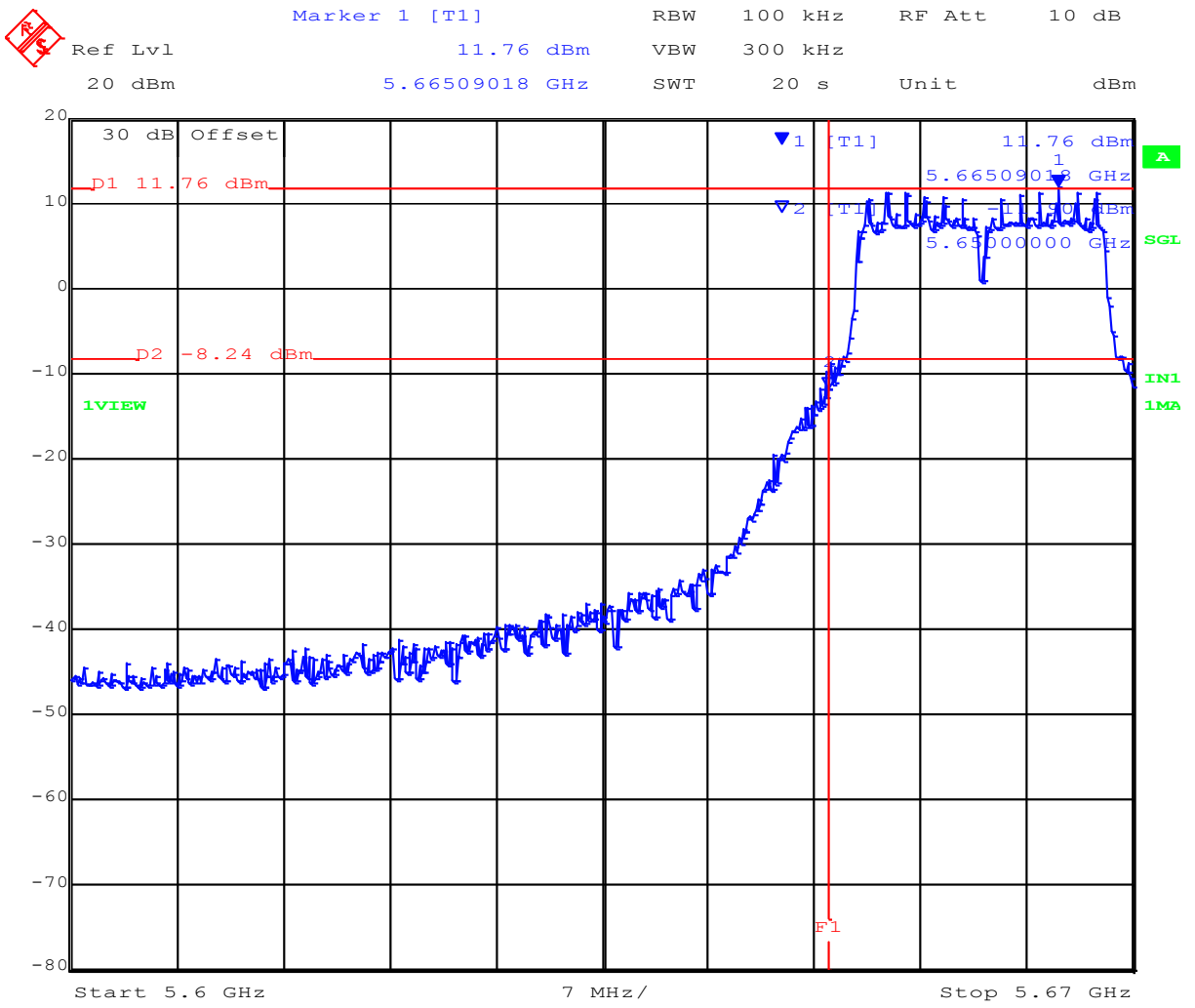
Center Frequency 5,550MHz 802.11n HT40



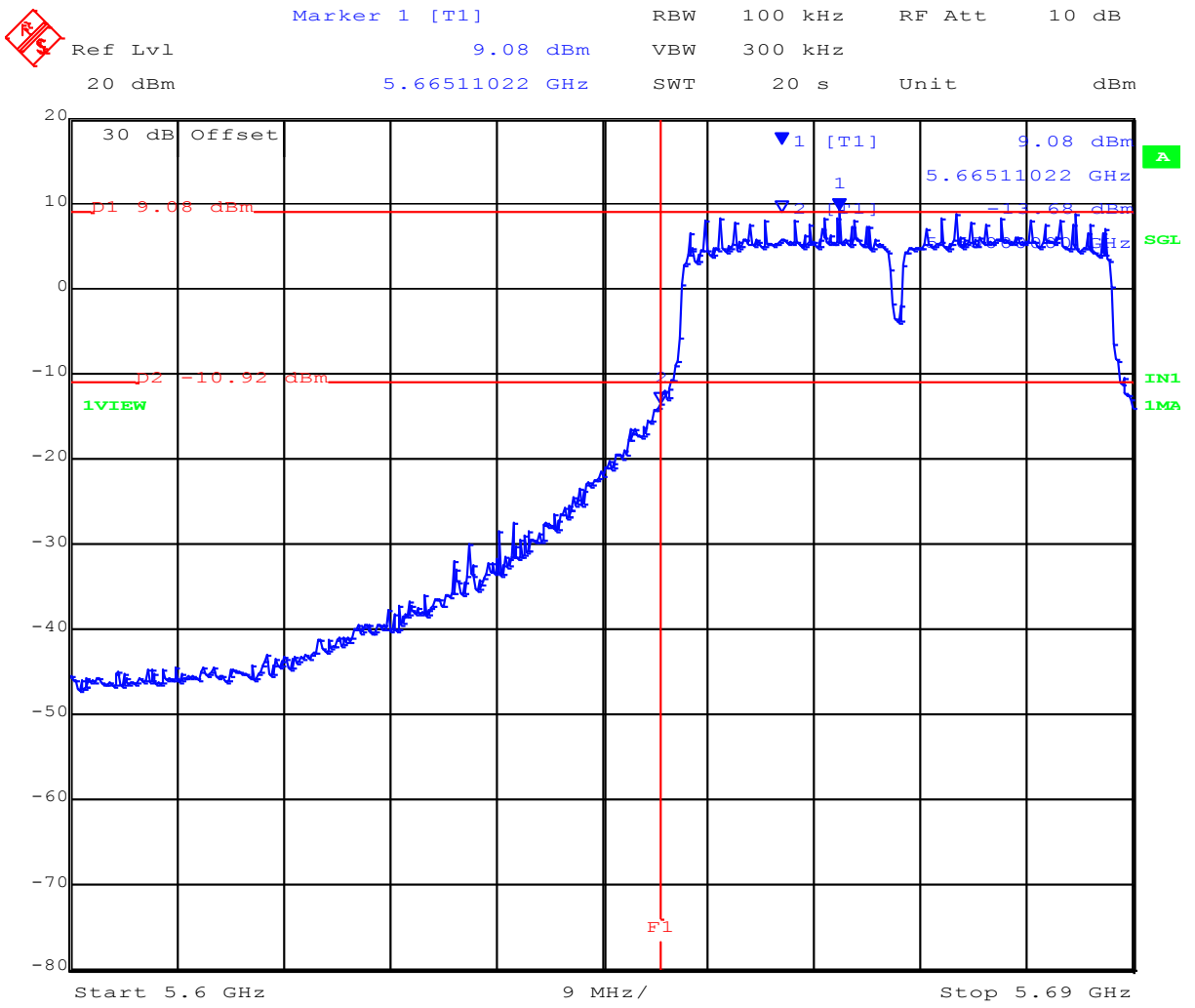
Center Frequency 5,530MHz 802.11AC 80



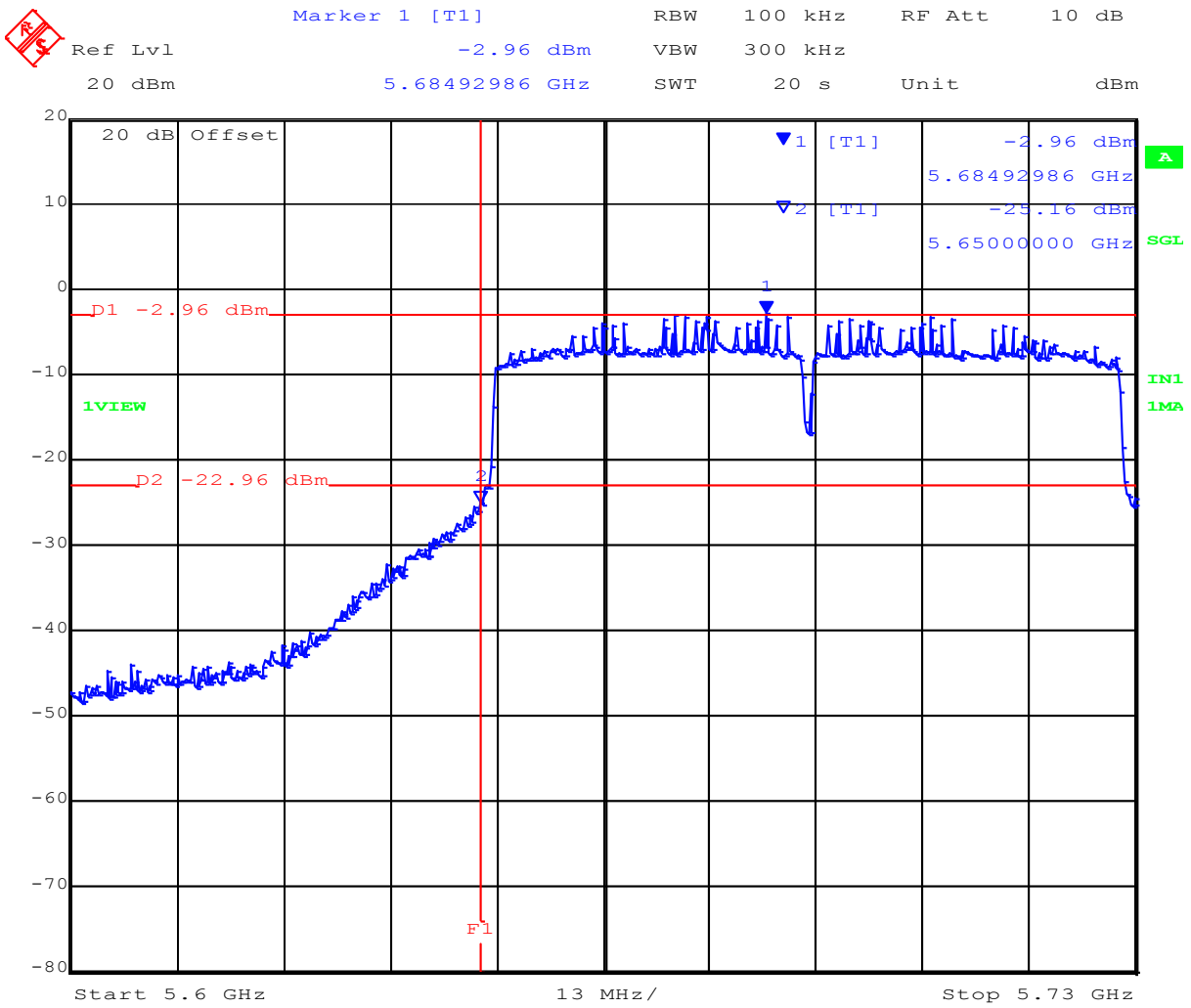
Center Frequency 5,660MHz 802.11a



Center Frequency 5,670MHz 802.11n HT40



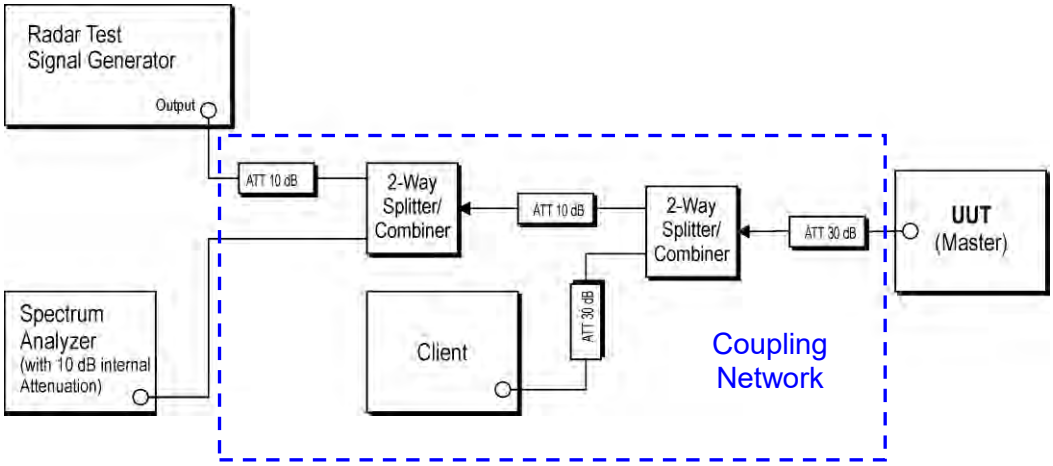
Center Frequency 5,690 MHz 802.11AC 80



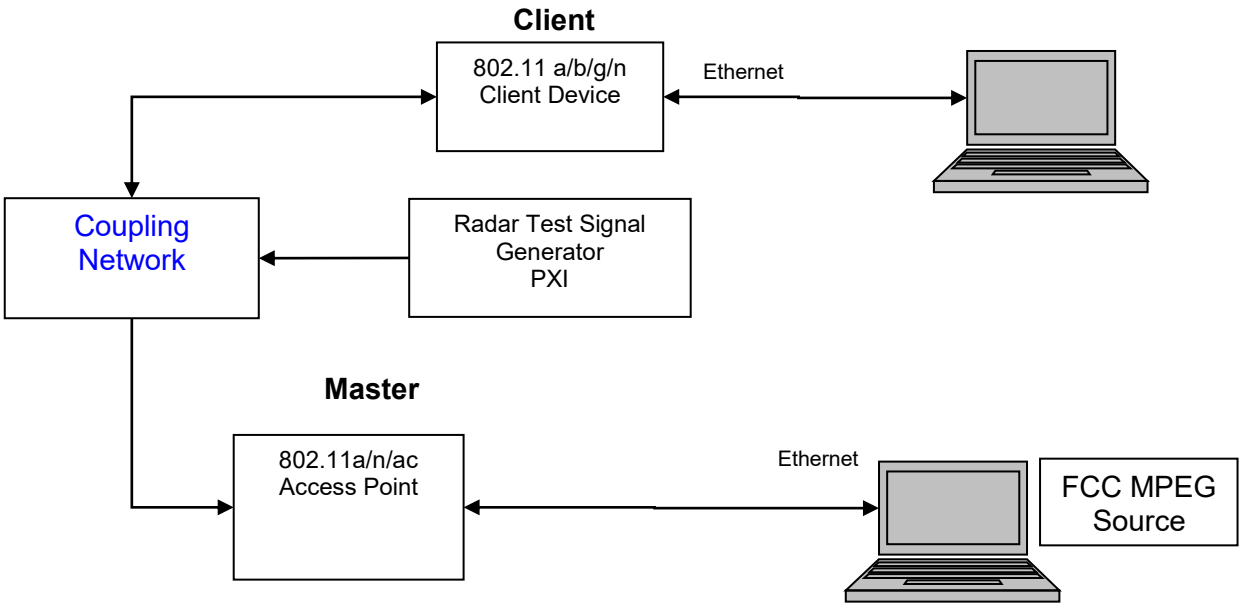
7.1.4.7. Test Set Up:

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



The EUT is a Master Device with 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**
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

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**
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

For the frequency band 5,470 – 5,725 MHz, the Master device provides, on aggregate, uniform loading of the spectrum across all devices by selecting an operating channel among the available channels using a random algorithm. The EUT was tested in HT-40 mode.

Declared minimum antenna gain 0 dBi. ;

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

= -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: Master
Transmit Power: Maximum

Operational Details - Dynamic Frequency Selection (DFS)

Operational Modes: 802.11a, 802.11n HT40, 802.11AC80

Data Rates: 6mpbs 802.11a, 0MCS 802.11n, MCS0 802.11AC

**Note* No video pixilation was observed during the video stream at these rates. Video frames per second were noted to be at 30fps.*

Video Streaming Method - Dynamic Frequency Selection (DFS)

Using the VideoLan player a video stream was setup on the master laptop with the destination being the client laptop. The video profile chosen for the video stream is “MPEG-2 + MPGA (TS)”. On the client laptop the VideoLan player was setup to listen to an incoming video stream from the master device.

The requisite MPEG video file (“TestFile.mpg” available on the NTIA website at the following link http://ntiacsd.ntia.doc.gov/dfs/) is used during this video stream.

7.1.4.8. UNII Detection Bandwidth:

All UNII channels for this device have identical channel bandwidths and DFS testing was completed on channel 5,500 MHz (802.11a) and 5510MHz (HT40).

The generating equipment is configured as shown in the Conducted Test Setup above. A single Burst of the short pulse radar Type 1 through 6 was produced at 5,500 MHz (802.11a) and 5,510 MHz (802.11n HT40) at a level of -61 dBm (Ref Section 5.1). The EUT is set up as a standalone device (no associated Client and no traffic).

A single radar Burst is generated for a minimum of 10 trials, and the response of the EUT is noted. The EUT 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 as 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 as F_L.

The U-NII Detection Bandwidth is calculated as follows:

U-NII Detection Bandwidth = $F_H – F_L$

The U-NII Detection Bandwidth must be at least 80% of the EUT transmitter 99% power
Table of results are continued on the next page.

EUT Frequency= 5,500 MHz 802.11a (Detection = √, No Detection = 0)											
Radar Frequency (MHz)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Detection Rate (%)**
-20											%
-19											%
-18											%
-17											%
-16											%
-15											%
-14											%
-13											%
-12											%
-11	0	0									<90%
-10	v	v	v	v	v	v	v	v	v	v	100%
-9	v	v	v	v	v	v	v	v	v	v	90%
-8	v	v	v	v	v	v	v	v	v	v	100%
-7	v	v	v	v	v	v	v	v	v	v	100%
-6	v	v	v	v	v	v	v	v	v	v	100%
-5	v	v	v	v	v	v	v	v	v	v	100%
-4	v	v	v	v	v	v	v	v	v	v	90%
-3	v	v	v	v	v	v	v	v	v	v	100%
-2	v	v	v	v	v	v	v	v	v	v	100%
-1	v	v	v	v	v	v	v	v	v	v	100%
F_0	v	v	v	v	v	v	v	v	v	v	100%
+1	v	v	v	v	v	v	v	v	v	v	100%
+2	v	v	v	v	v	v	v	v	v	v	90%
+3	v	v	v	v	v	v	v	v	v	v	100%
+4	v	v	v	v	v	v	v	v	v	v	100%
+5	v	v	v	v	v	v	v	v	v	v	100%
+6	v	v	v	v	v	v	v	v	v	v	100%
+7	v	v	v	v	v	v	v	v	v	v	100%
+8	v	v	v	v	v	v	v	v	v	v	100%
+9	v	v	v	v	v	v	v	v	v	v	100%
+10	v	v	v	v	v	v	v	v	v	v	100%
+11	0	0									<90%
+12											%
+13											%
+14											%
+15											%
+16											%
+17											%
Detection Bandwidth = F_H-F_L = 5590-5510 = 20 MHz											
EUT 99% Bandwidth = 17.134 MHz (ref. bandwidth channel 5500 MHz)											
17.134 MHz *80% = 13.707MHz											
For each frequency step the minimum percentage detection is 90%											

EUT Frequency= 5,510 MHz 802.11n HT40 (Detection = √, No Detection = 0)											
Radar Frequency (MHz)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Detection Rate (%)**
-21											%
-20	0	0									<90%
-19	v	v	v	v	v	v	v	v	v	v	100%
-18	v	v	v	v	v	v	v	v	v	v	100%
-17	v	v	v	v	v	v	v	v	v	v	100%
-16	v	v	v	v	v	v	v	v	v	v	100%
-15	v	v	v	v	v	v	v	v	v	v	100%
-14	v	v	v	v	v	v	v	v	v	v	100%
-13	v	v	v	v	v	v	v	v	v	v	100%
-12	v	v	v	v	v	v	v	v	v	v	100%
-11	v	v	v	v	v	v	v	v	v	v	100%
-10	v	v	v	v	v	v	v	v	v	v	100%
-9	v	v	v	v	v	v	v	v	v	v	100%
-8	v	v	v	v	v	v	v	v	v	v	100%
-7	v	v	v	v	v	v	v	v	v	v	100%
-6	v	v	v	v	v	v	v	v	v	v	100%
-5	v	v	v	v	v	v	v	v	v	v	100%
-4	v	v	v	v	v	v	v	v	v	v	100%
-3	v	v	v	v	v	v	v	v	v	v	100%
-2	v	v	v	v	v	v	v	v	v	v	100%
-1	v	v	v	v	v	v	v	v	v	v	100%
F_0	v	v	v	v	v	v	v	v	v	v	100%

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EUT Frequency= 5,510 MHz 802.11n HT40 (Detection = √, No Detection = 0)											
Radar Frequency (MHz)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Detection Rate (%)**
F_0	v	v	v	v	v	v	v	v	v	v	100%
+1	v	v	v	v	v	v	v	v	v	v	100%
+2	v	v	v	v	v	v	v	v	v	v	100%
+3	v	v	v	v	v	v	v	v	v	v	100%
+4	v	v	v	v	v	v	v	v	v	v	100%
+5	v	v	v	v	v	v	v	v	v	v	100%
+6	v	v	v	v	v	v	v	v	v	v	100%
+7	v	v	v	v	v	v	v	v	v	v	100%
+8	v	v	v	v	v	v	v	v	v	v	100%
+9	v	v	v	v	v	v	v	v	v	v	100%
+10	v	v	v	v	v	v	v	v	v	v	100%
+11	v	v	v	v	v	v	v	v	v	v	100%
+12	v	v	v	v	v	v	v	v	v	v	100%
+13	v	v	v	v	v	v	v	v	v	v	100%
+14	v	v	v	v	v	v	v	v	v	v	100%
+15	v	v	v	v	v	v	v	v	v	v	100%
+16	v	v	v	v	v	v	v	v	v	v	100%
+17	v	v	v	v	v	v	v	v	v	v	100%
+18	v	v	v	v	v	v	v	v	v	v	100%
+19	v	v	v	v	v	v	v	v	v	v	100%
+20	v	0	0								<90%
+21											%
Detection Bandwidth = F_H-F_L = 5590-5530 = 40 MHz											
EUT 99% Bandwidth = 36.472 MHz (ref. bandwidth channel 5510 MHz)											
36.472 MHz *80% = 29.177 MHz											

For each frequency step the minimum percentage detection is 90%

EUT Frequency= 5,530 MHz 802.11n HT80 (Detection = √, No Detection = 0)											
Radar Frequency (MHz)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Detection Rate (%)**
-41	0	0									<90%
-40	v	v	v	v	v	v	v	v	v	v	100%
-39	v	v	v	v	v	v	v	v	v	v	100%
-38	v	v	v	v	v	v	v	v	v	v	100%
-37	v	v	v	v	v	v	v	v	v	v	100%
-36	v	v	v	v	v	v	v	v	v	v	100%
-35	v	v	v	v	v	v	v	v	v	v	100%
-34	v	v	v	v	v	v	v	v	v	v	100%
-33	v	v	v	v	v	v	v	v	v	v	100%
-32	v	v	v	v	v	v	v	v	v	v	100%
-31	v	v	v	v	v	v	v	v	v	v	100%
-30	v	v	v	v	v	v	v	v	v	v	100%
-29	v	v	v	v	v	v	v	v	v	v	100%
-28	v	v	v	v	v	v	v	v	v	v	100%
-27	v	v	v	v	v	v	v	v	v	v	100%
-26	v	v	v	v	v	v	v	v	v	v	100%
-25	v	v	v	v	v	v	v	v	v	v	100%
-24	v	v	v	v	v	v	v	v	v	v	100%
-23	v	v	v	v	v	v	v	v	v	v	100%
-22	v	v	v	v	v	v	v	v	v	v	100%
-21	v	v	v	v	v	v	v	v	v	v	100%
-20	v	v	v	v	v	v	v	v	v	v	100%
-19	v	v	v	v	v	v	v	v	v	v	100%
-18	v	v	v	v	v	v	v	v	v	v	100%
-17	v	v	v	v	v	v	v	v	v	v	100%
-16	v	v	v	v	v	v	v	v	v	v	100%
-15	v	v	v	v	v	v	v	v	v	v	100%
-14	v	v	v	v	v	v	v	v	v	v	100%
-13	v	v	v	v	v	v	v	v	v	v	100%
-12	v	v	v	v	v	v	v	v	v	v	100%
-11	v	v	v	v	v	v	v	v	v	v	100%
-10	v	v	v	v	v	v	v	v	v	v	100%
-9	v	v	v	v	v	v	v	v	v	v	100%
-8	v	v	v	v	v	v	v	v	v	v	100%
-7	v	v	v	v	v	v	v	v	v	v	100%
-6	v	v	v	v	v	v	v	v	v	v	100%
-5	v	v	v	v	v	v	v	v	v	v	100%
-4	v	v	v	v	v	v	v	v	v	v	100%
-3	v	v	v	v	v	v	v	v	v	v	100%
-2	v	v	v	v	v	v	v	v	v	v	100%
-1	v	v	v	v	v	v	v	v	v	v	100%
F_0	v	v	v	v	v	v	v	v	v	v	100%

EUT Frequency= 5,530 MHz 802.11n HT80 (Detection = √, No Detection = 0)											
Radar Frequency (MHz)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Detection Rate (%)**
+1	v	v	v	v	v	v	v	v	v	v	100%
+2	v	v	v	v	v	v	v	v	v	v	100%
+3	v	v	v	v	v	v	v	v	v	v	100%
+4	v	v	v	v	v	v	v	v	v	v	100%
+5	v	v	v	v	v	v	v	v	v	v	100%
+6	v	v	v	v	v	v	v	v	v	v	100%
+7	v	v	v	v	v	v	v	v	v	v	100%
+8	v	v	v	v	v	v	v	v	v	v	100%
+9	v	v	v	v	v	v	v	v	v	v	100%
+10	v	v	v	v	v	v	v	v	v	v	100%
+11	v	v	v	v	v	v	v	v	v	v	100%
+12	v	v	v	v	v	v	v	v	v	v	100%
+13	v	v	v	v	v	v	v	v	v	v	100%
+14	v	v	v	v	v	v	v	v	v	v	100%
+15	v	v	v	v	v	v	v	v	v	v	100%
+16	v	v	v	v	v	v	v	v	v	v	100%
+17	v	v	v	v	v	v	v	v	v	v	100%
+18	v	v	v	v	v	v	v	v	v	v	100%
+19	v	v	v	v	v	v	v	v	v	v	100%
+20	v	v	v	v	v	v	v	v	v	v	100%
+21	v	v	v	v	v	v	v	v	v	v	100%
+22	v	v	v	v	v	v	v	v	v	v	100%
+23	v	v	v	v	v	v	v	v	v	v	100%
+24	v	v	v	v	v	v	v	v	v	v	100%
+25	v	v	v	v	v	v	v	v	v	v	100%
+26	v	v	v	v	v	v	v	v	v	v	100%
+27	v	v	v	v	v	v	v	v	v	v	100%
+28	v	v	v	v	v	v	v	v	v	v	100%
+29	v	v	v	v	v	v	v	v	v	v	100%
+30	v	v	v	v	v	v	v	v	v	v	100%
+31	v	v	v	v	v	v	v	v	v	v	100%
+32	v	v	v	v	v	v	v	v	v	v	100%
+33	v	v	v	v	v	v	v	v	v	v	100%
+34	v	v	v	v	v	v	v	v	v	v	100%
+35	v	v	v	v	v	v	v	v	v	v	100%
+36	v	v	v	v	v	v	v	v	v	v	100%
+37	v	v	v	v	v	v	v	v	v	v	100%
+38	v	v	v	v	v	v	v	v	v	v	100%
+39	v	v	v	v	v	v	v	v	v	v	100%
+40	v	v	v	v	v	v	0	v	v	v	90%
+41	0	0									< 90%
Detection Bandwidth = F_H-F_L = 5531-5489 = 42 MHz											
EUT 99% Bandwidth = 36.6 MHz (ref. bandwidth channel 5510 MHz)											
36.6 MHz *80% = 29.28 MHz											

7.1.4.9. Initial Channel Availability Check Time

This test verifies that the EUT does not emit pulse, control, or data signals on the test Channel until the power-up sequence has been completed and the U-NII device checks for Radar Waveforms for one minute on the test Channel. This test does not use any Radar Waveforms.

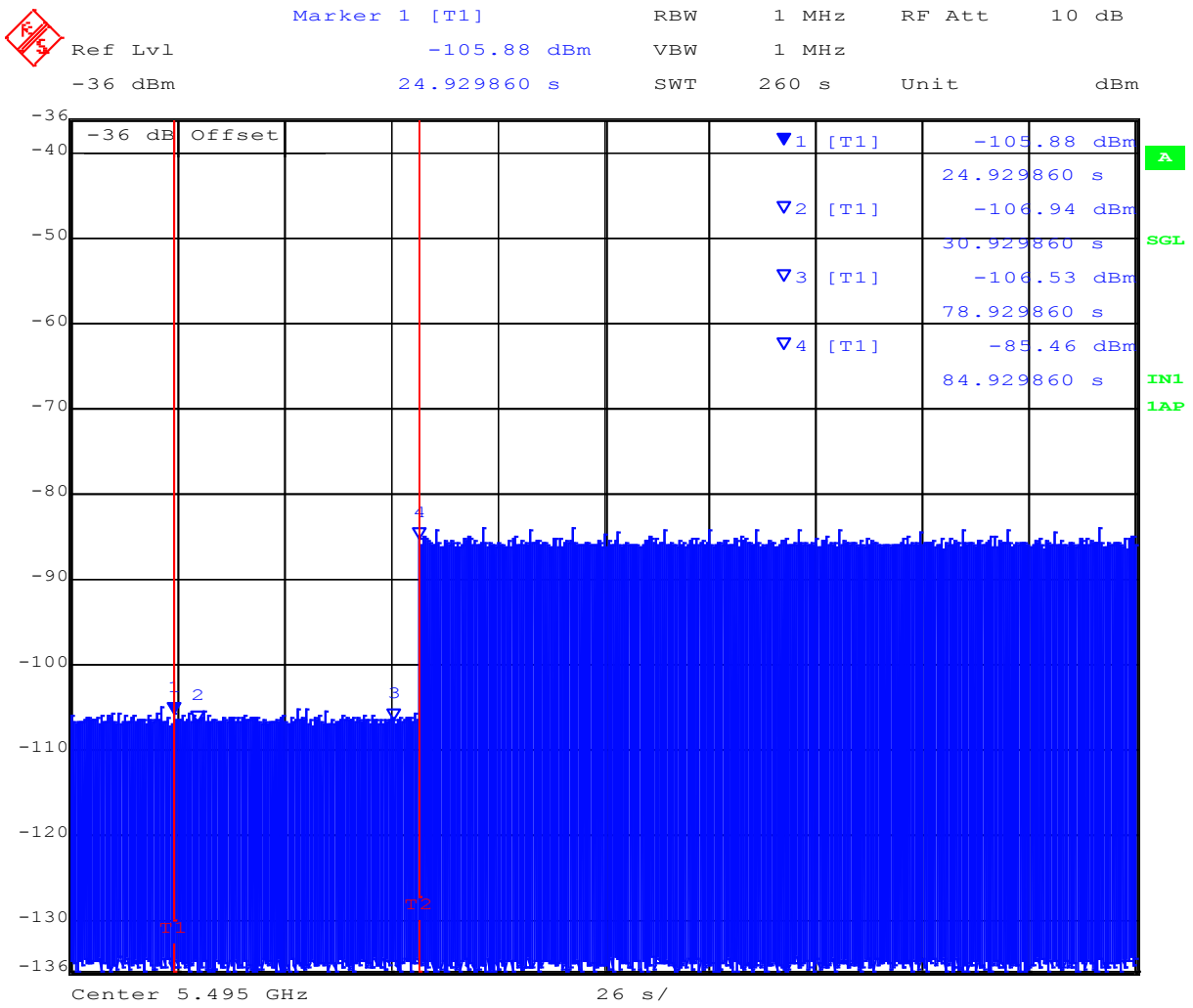
The U-NII device is powered on and be instructed to operate at 5,500MHz 802.11a, 5,510MHz 802.11n HT40, and 802.11AC 80.. At the same time the EUT is powered on, the spectrum analyzer is set for zero span with a 1 MHz resolution bandwidth at 5,500, 5,510, and 5530 MHz with a 260 second sweep time. The analyzer's sweep will be started the same time power is applied to the U-NII device.

The EUT should not transmit any pulse or data transmissions until at least 1 minute after the completion of the power-on cycle.

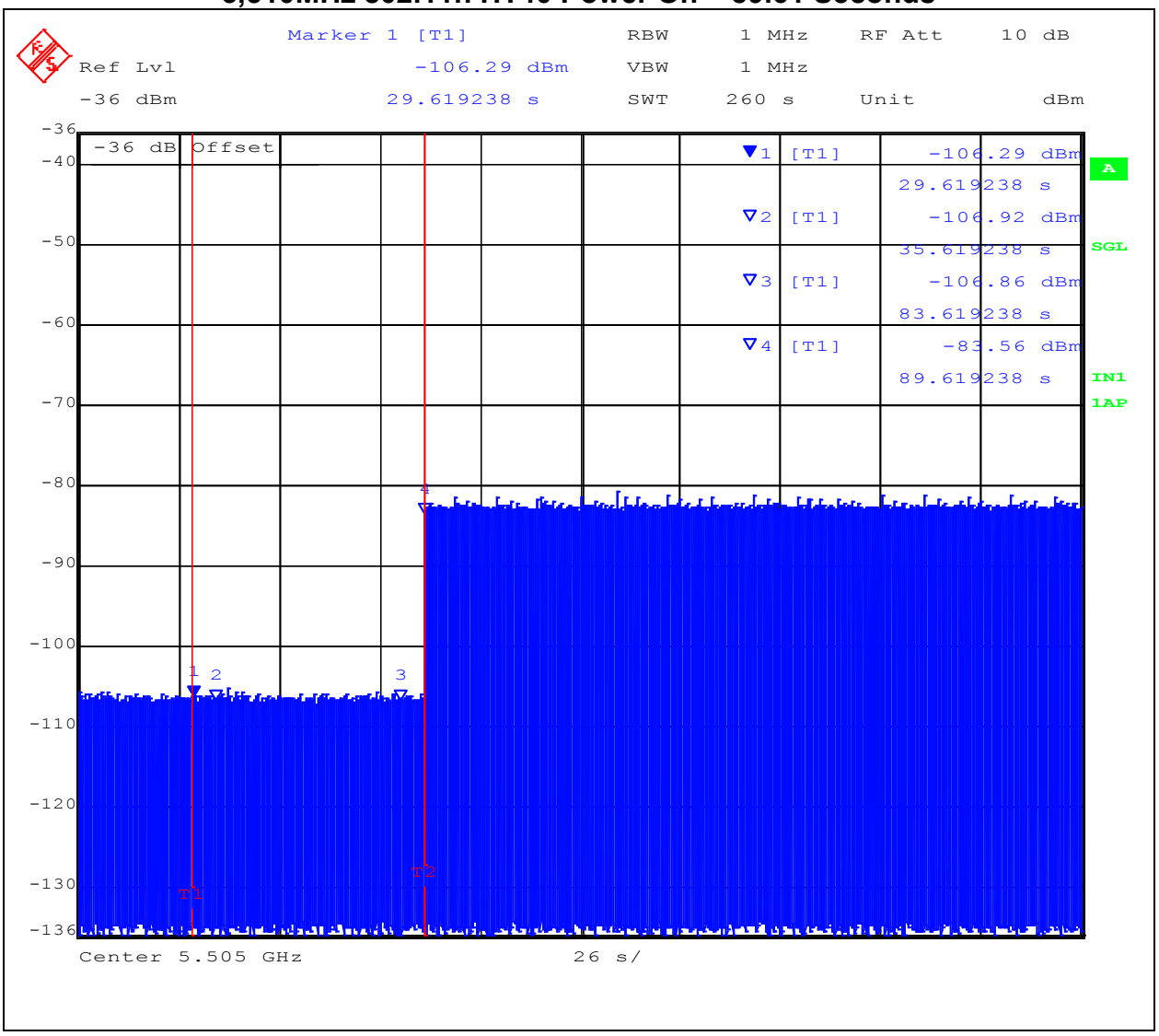
The first red marker line shown on the following plot denotes the instant when the EUT starts its power-up sequence i.e. T_0 (as defined within the FCC's MO&O 06-96 Normative Reference 2). The power-up reference T_0 is determined by the time it takes for the EUT to start "beaconing" i.e. initial beacon – 60 secs = end of power-up.

The Channel Availability Check Time commences at instant T_0 and will end no sooner than T_0 + 60 seconds.

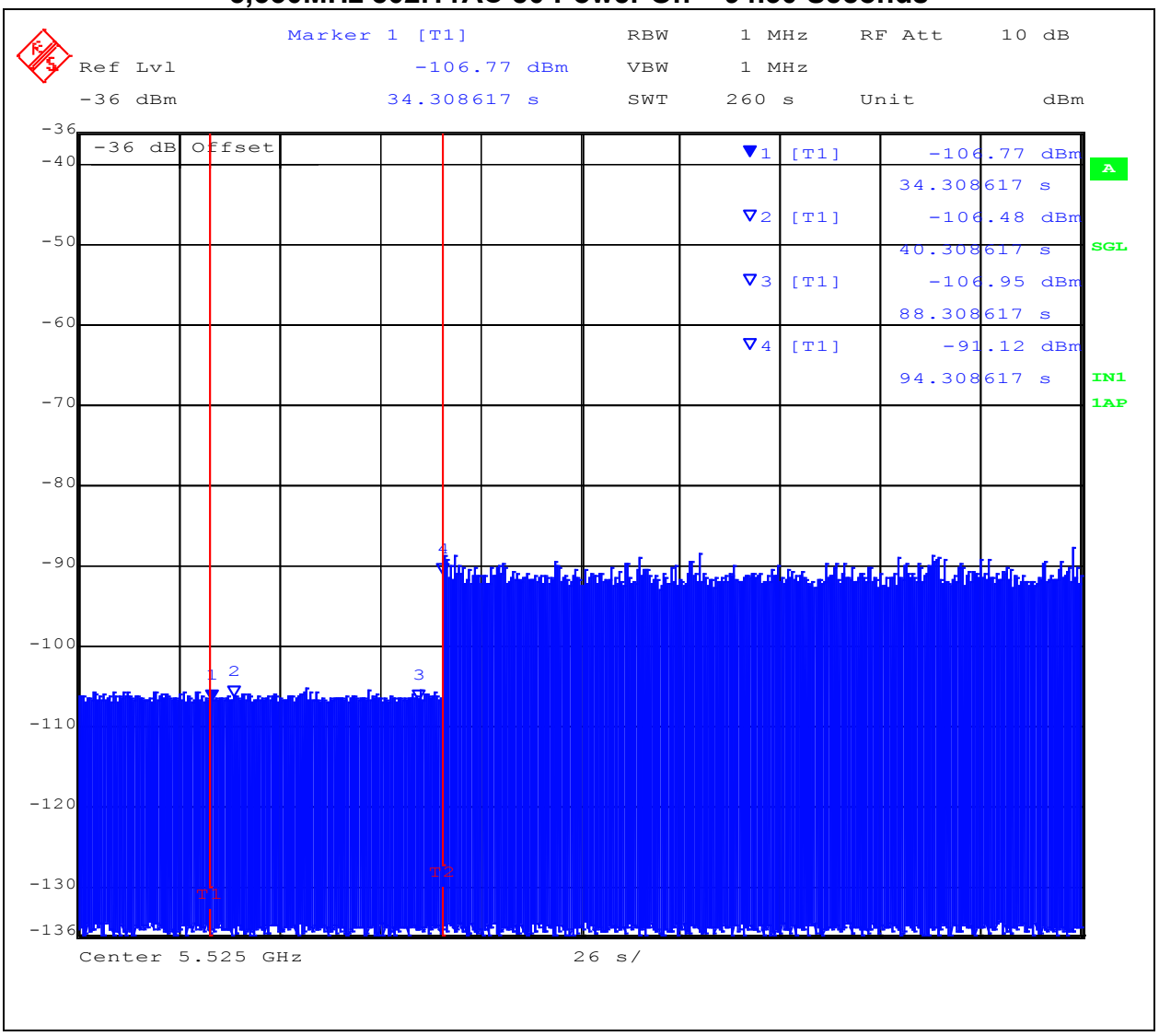
EUT power up and Initial Channel Availability Check Time
5,500MHz 802.11a Power On = 84.92 Seconds



EUT power up and Initial Channel Availability Check Time
5,510MHz 802.11n HT40 Power On = 89.61 Seconds



EUT power up and Initial Channel Availability Check Time
5,530MHz 802.11AC 80 Power On = 94.30 Seconds



7.1.4.10. Radar Burst at the Beginning of the Channel Availability Check Time:

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 +6 dB (-62 dBm Ref Section 6.1.7) occurs at the beginning of the Channel Availability Check Time.

A single Burst of short pulse of radar Type 1 will commence within a 6 second window starting at T_0 (first red marker line on the following plot).

Visual indication on the EUT of successful detection of the radar Burst will be recorded and reported. Observation of emissions at 5,500MHz 802.11a, 5,510MHz 802.11n HT40, and 802.11AC 80 will continue for 2.5 minutes after the radar burst has been generated.

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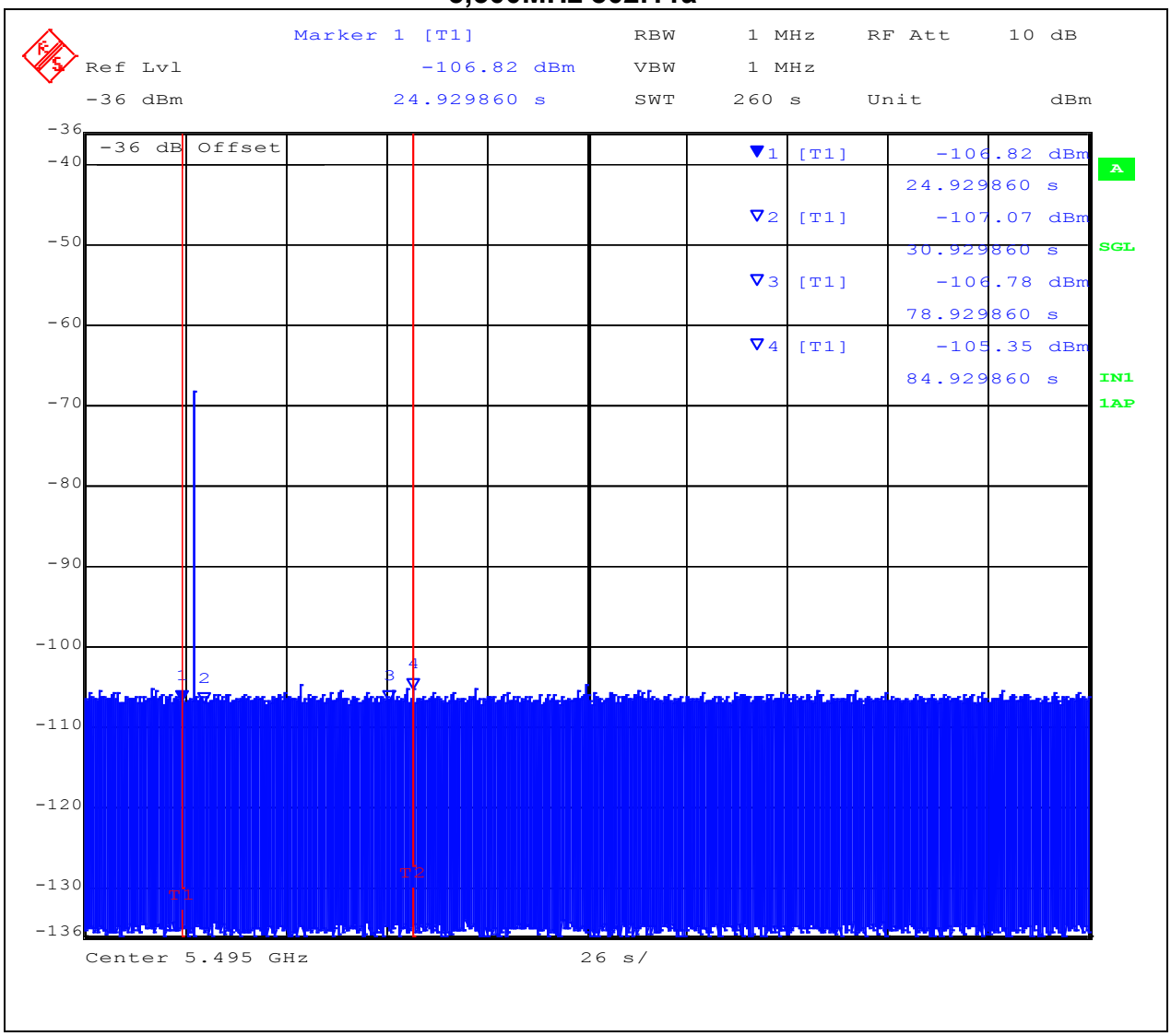
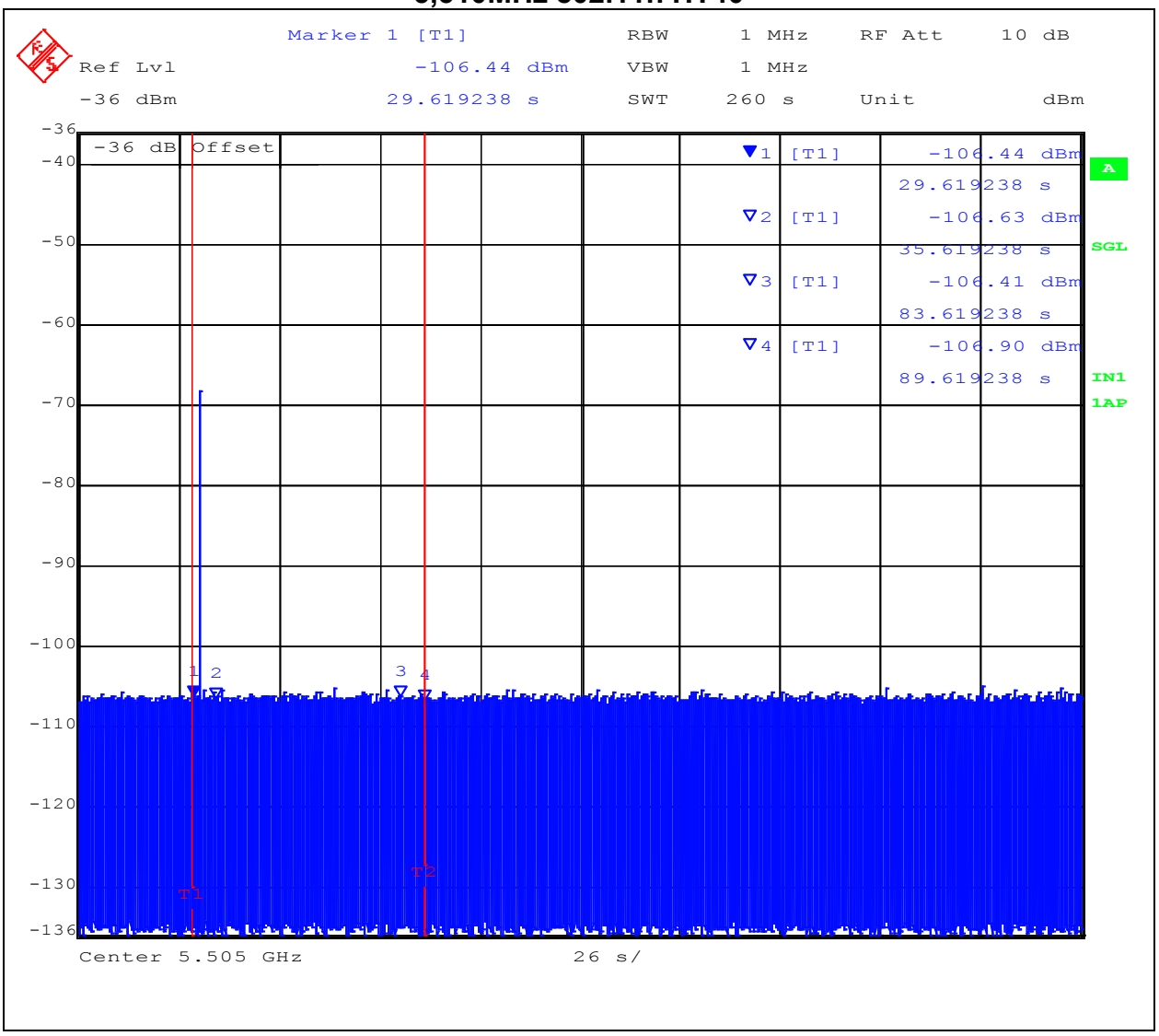
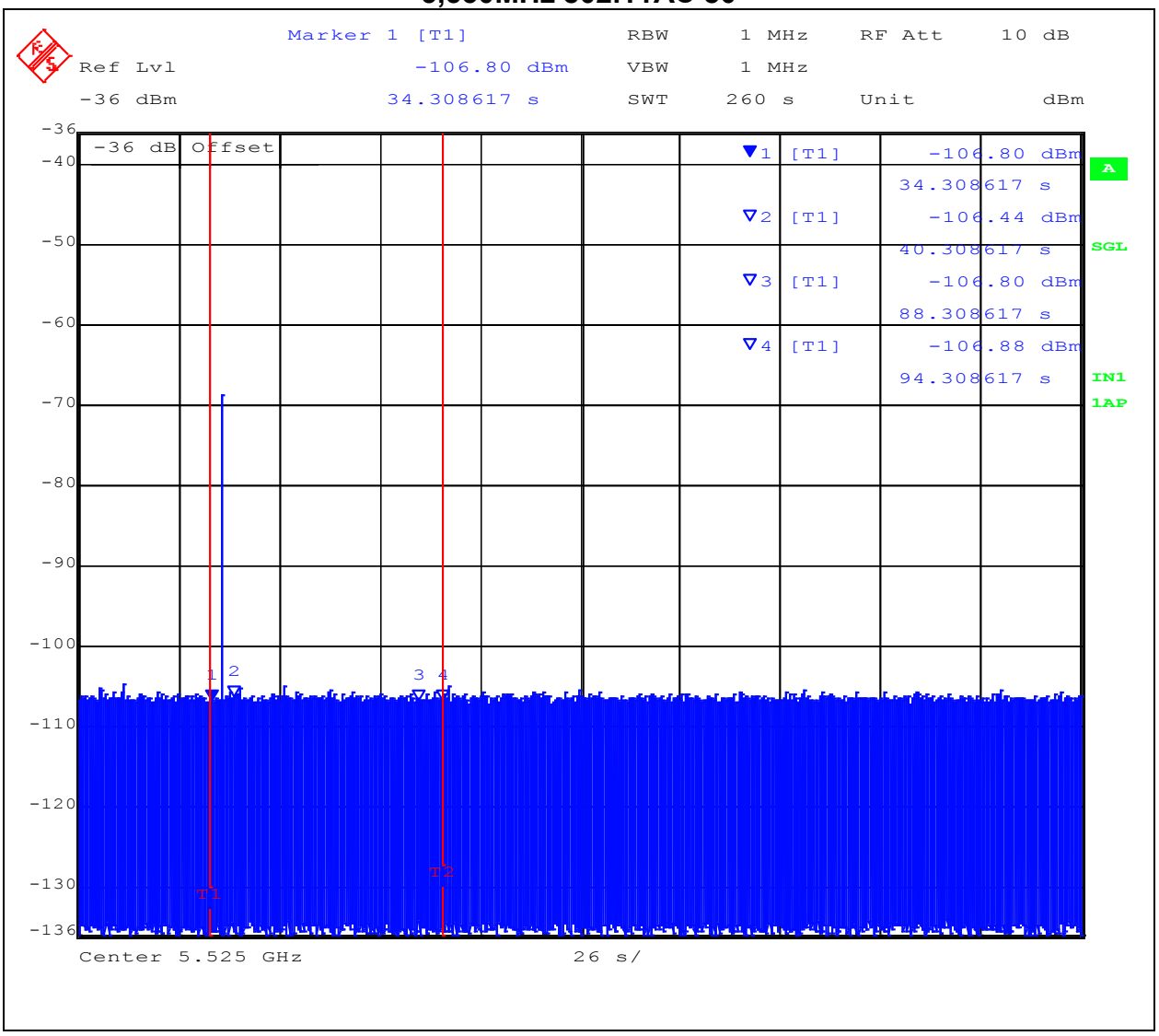
Channel Availability Check Time at the start T0 + 6 seconds Check Time 5,500MHz 802.11a



Channel Availability Check Time at the start T0 + 6 seconds Check Time 5,510MHz 802.11n HT40



Channel Availability Check Time at the start T0 + 6 seconds Check Time 5,530MHz 802.11AC 80



7.1.4.11.Radar Burst at the End of the Channel Availability Check Time:

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 occurs at the end of the Channel Availability Check Time.

A single Burst of short pulse of radar type 1 will commence within a 6 second window starting at T_0+ 54 seconds. The window will commence at marker 2 and end at the red frequency line T_2.

Visual indication on the EUT of successful detection of the radar Burst will be recorded and reported. Observation of emissions at 5,500MHz 802.11a, 5,510MHz 802.11n HT40, and 802.11AC 80 will continue for 2.5 minutes after the radar burst has been generated.

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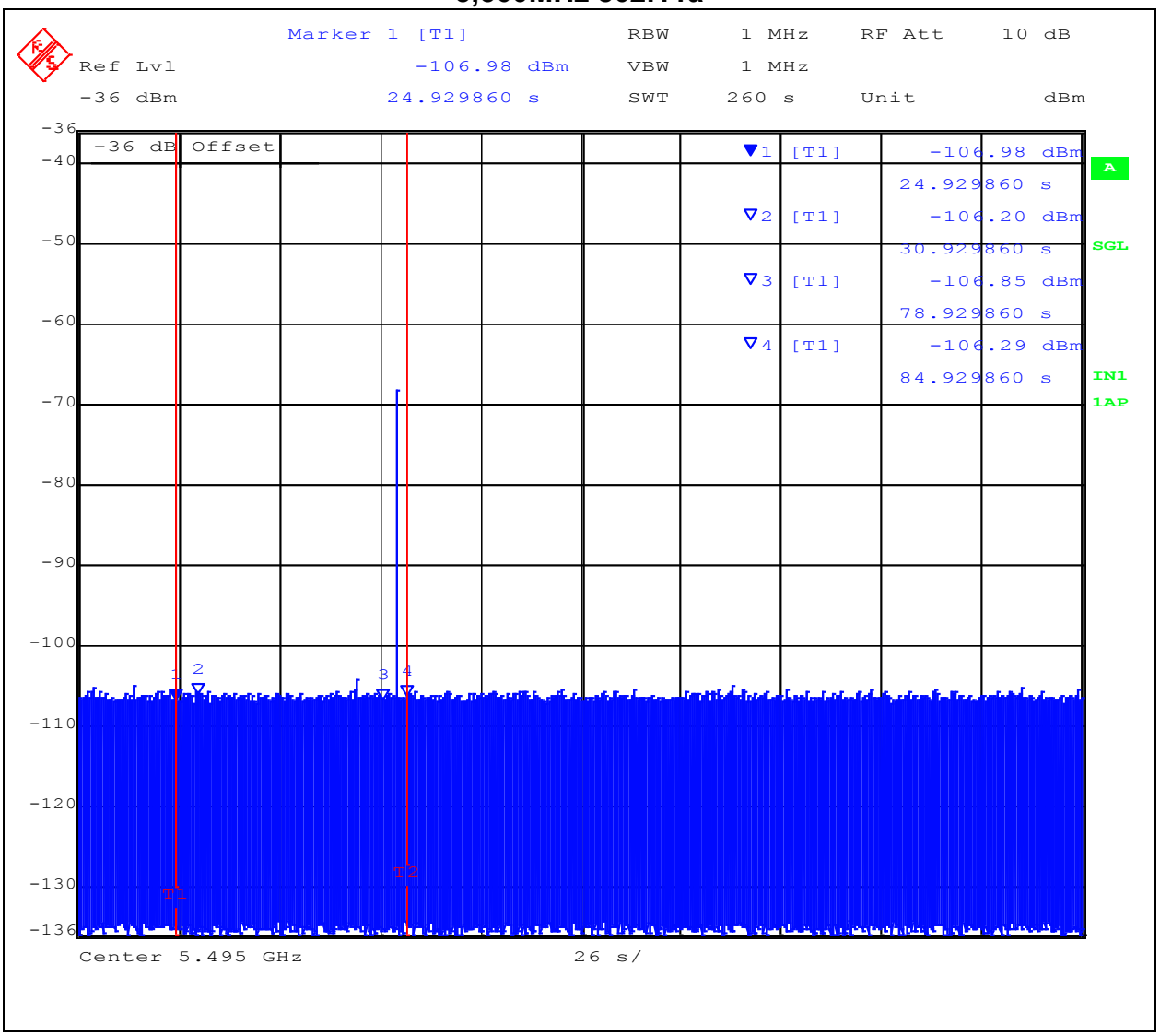
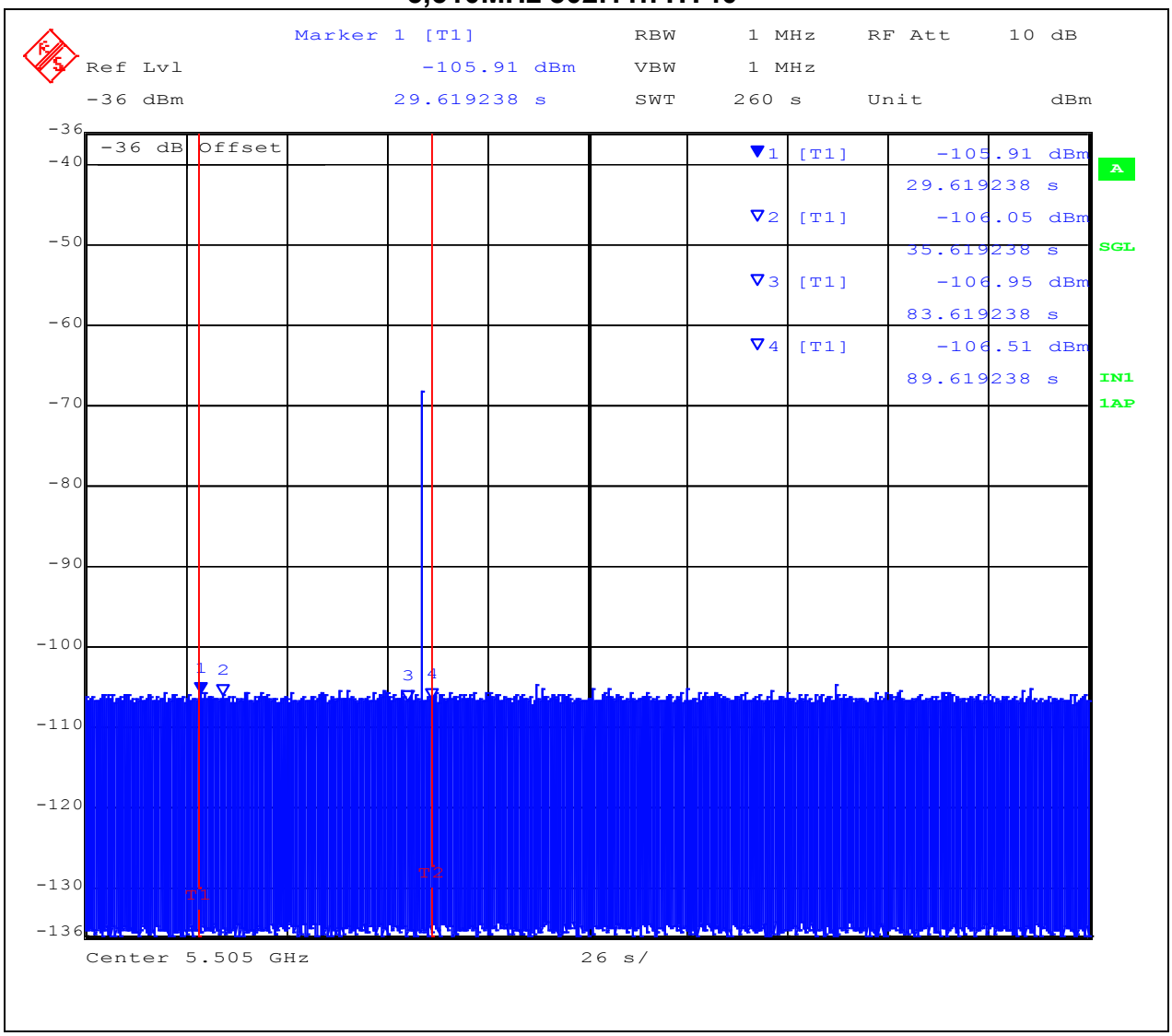
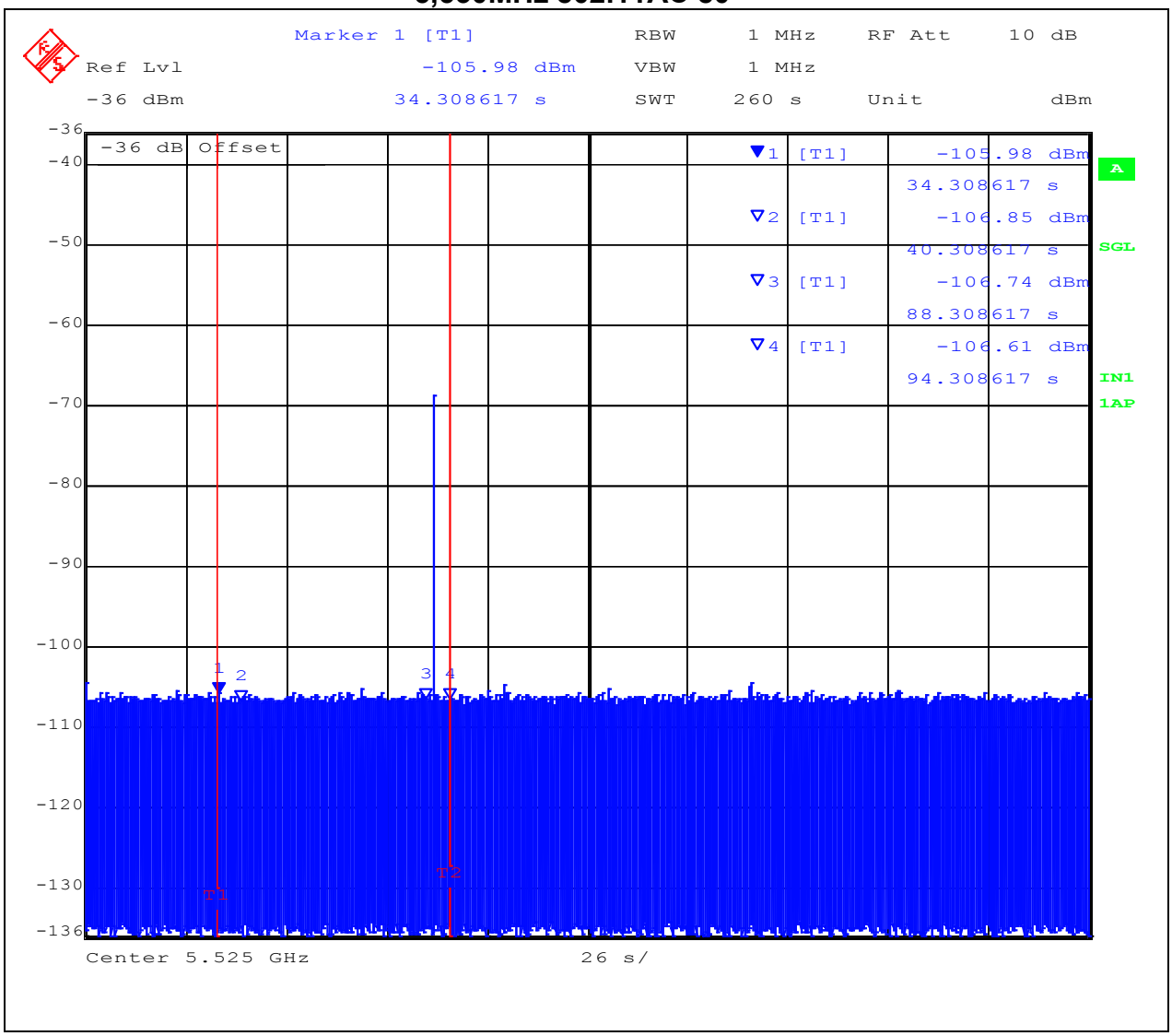
Channel Availability Check Time at T0 + 54 seconds Check Time 5,500MHz 802.11a



Channel Availability Check Time at T0 + 54 seconds Check Time 5,510MHz 802.11n HT40



Channel Availability Check Time at T0 + 54 seconds Check Time 5,530MHz 802.11AC 80



7.1.4.12. 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 25.70 ms

(The period of the 18 pulse burst includes [18 pulses *1.428mS PRI] = 25.704 ms. Then add 1 µs pulse width for the final pulse.)

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.

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 0.00 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 5,500 MHz (802.11a) = 0.237 mSecs (limit 260 mSecs)
Channel Move Time 5,500MHz (802.11a) = 0.8 Secs (limit 10 Secs)

Channel Move Time, Channel Closing Transmission Time for Type 1 Radar Captured by the Test System - 0 to 12 seconds

Channel Closing Transmission Time 5,510 MHz (802.11n HT40) = <u>1.061 mSecs (limit 260 mSecs)</u>

Channel Move Time 5,510 MHz (802.11n HT40) = <u>1.12 Secs (limit 10 Secs)</u>

Channel Move Time, Channel Closing Transmission Time for Type 1 Radar Captured by the Test System - 0 to 12 seconds

Channel Closing Transmission Time 5,530 MHz (802.11AC 80) = <u>0.001 uSecs (limit 260 mSecs)</u>

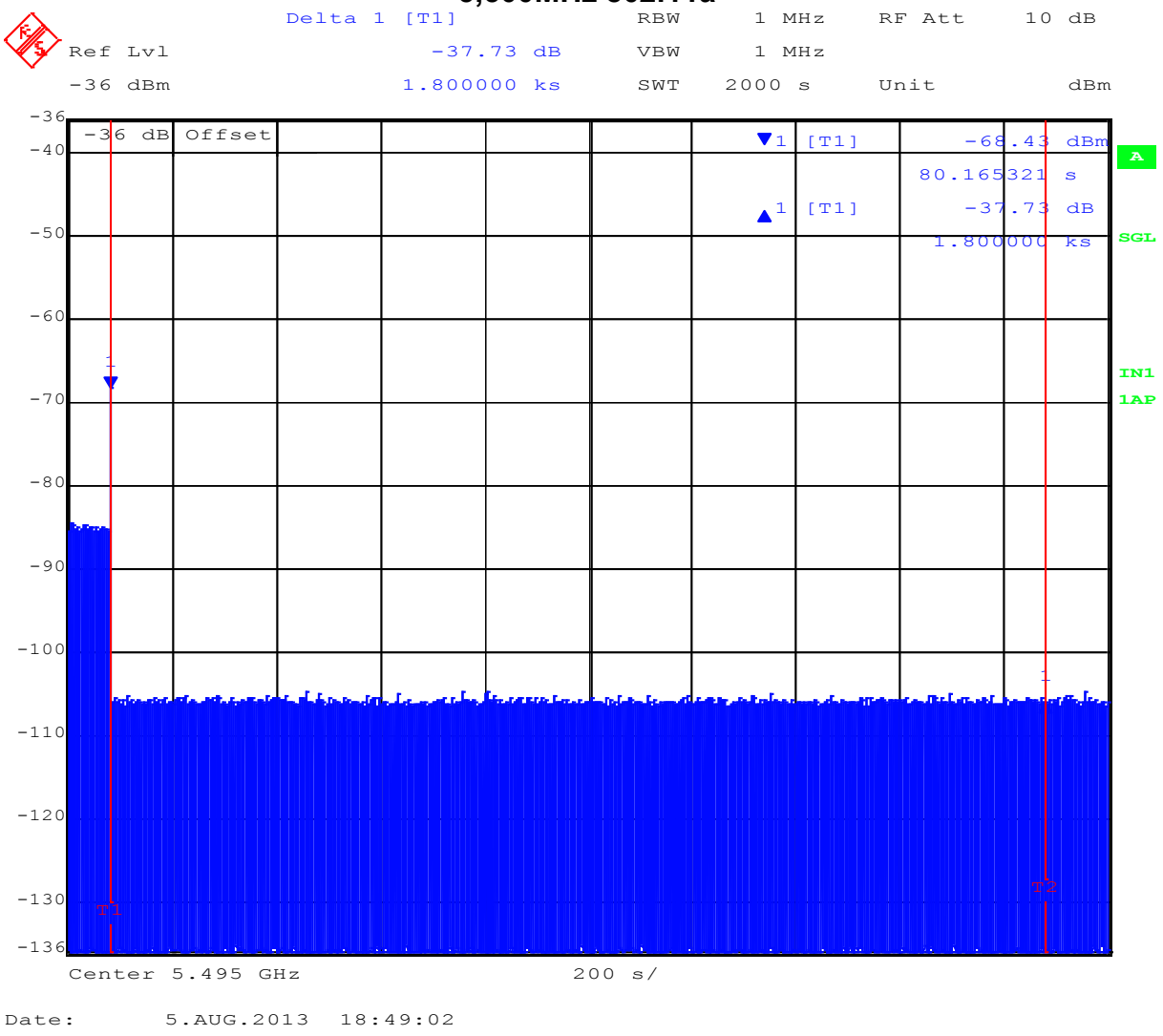
Channel Move Time 5,530 MHz (802.11AC 80) = <u>0.00001 Secs (limit 10 Secs)</u>

Channel Move Time, Channel Closing Transmission Time for Type 1 Radar Captured by the Test System - 0 to 12 seconds

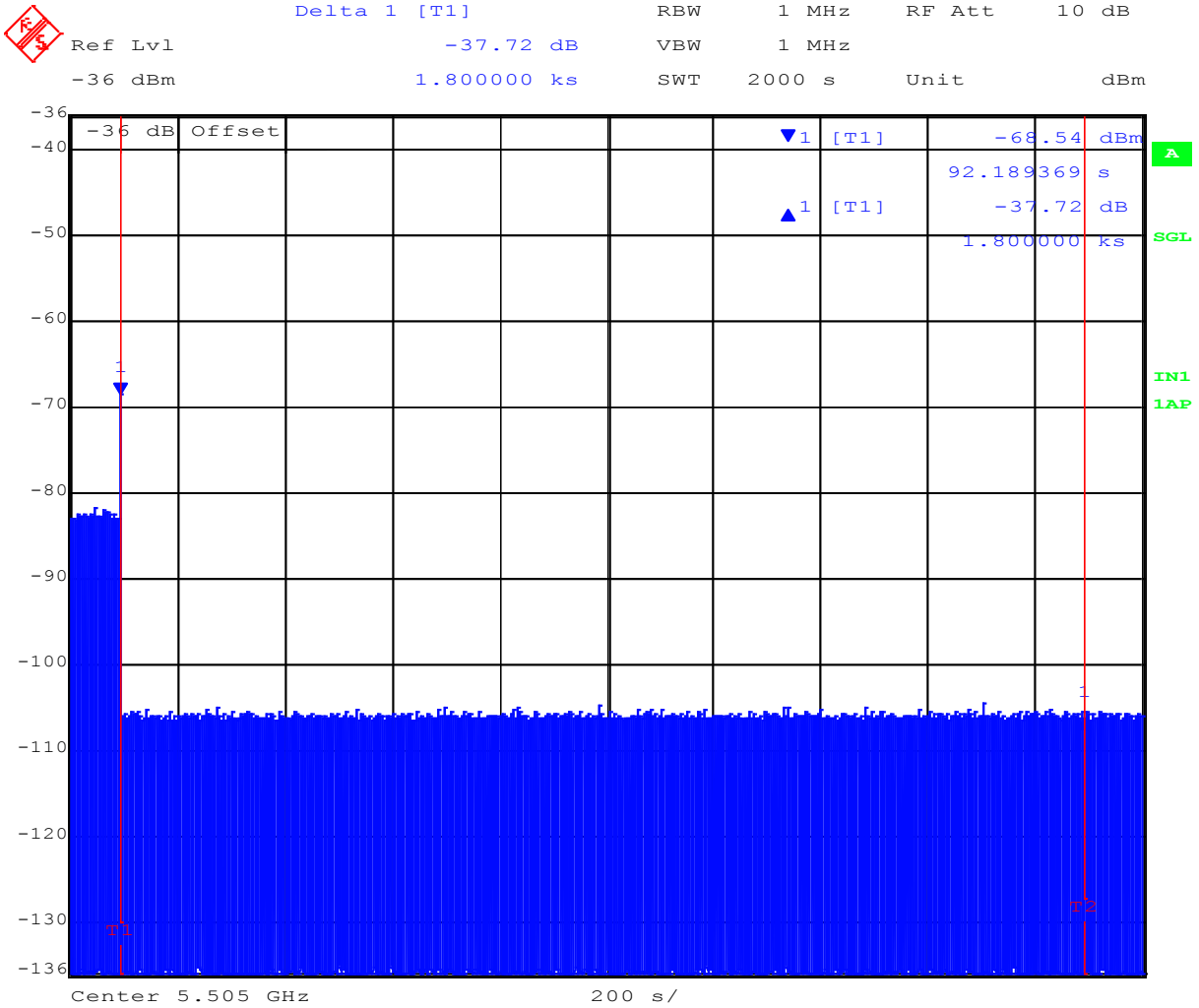
30 Minute Non-Occupancy Period

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
5,500MHz 802.11a

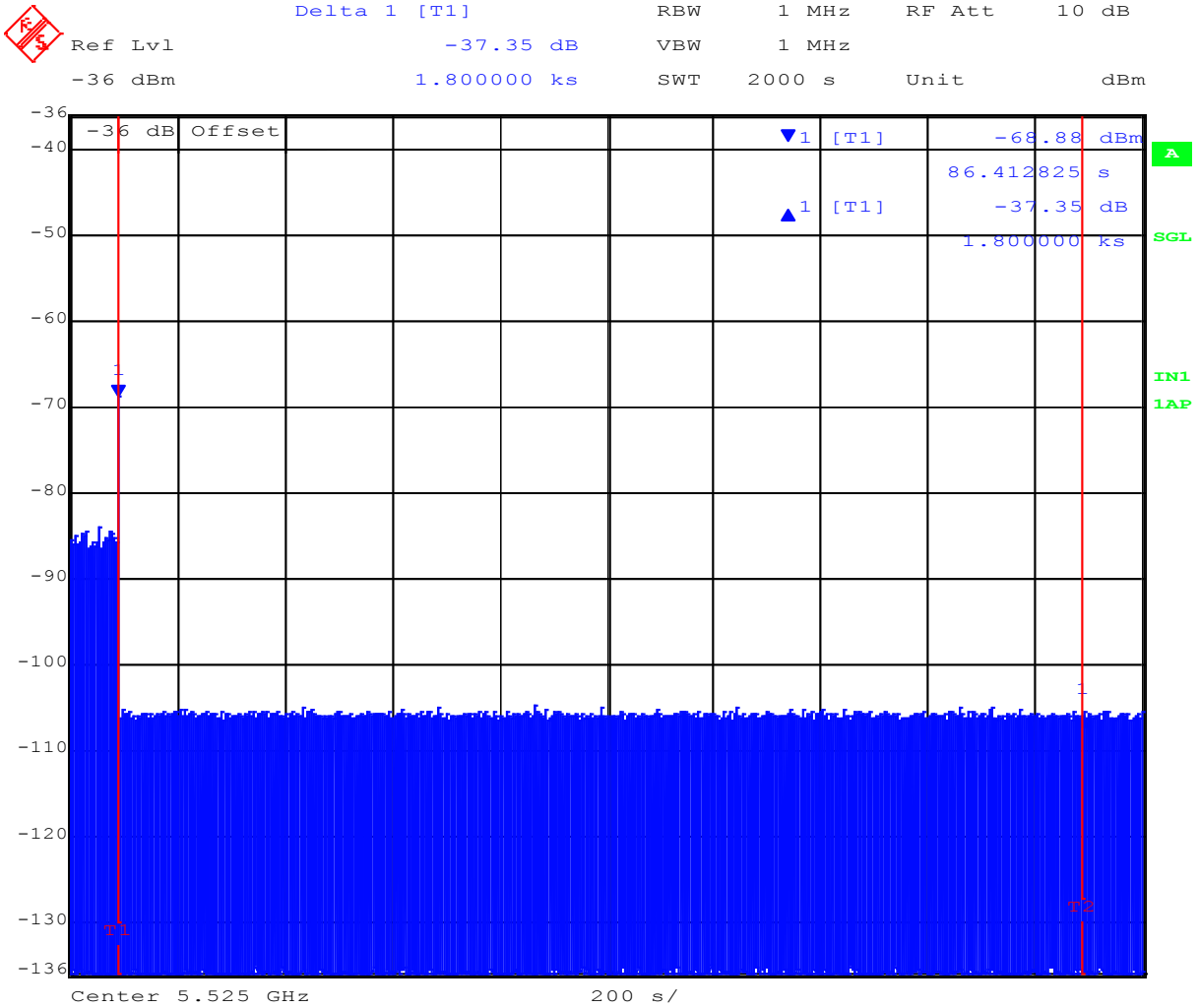


30 Minute Non-Occupancy Period Type 1 Radar
5,510 MHz802.11n HT40



Date: 5.AUG.2013 18:05:59

30 Minute Non-Occupancy Period Type 1 Radar
5,530 MHz802.11AC 80



Date: 8.AUG.2013 08:03:43

7.1.4.13.Statistical Performance Check

The steps below define the procedure to determine the minimum percentage of detection 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 UUT (Master) at 5,500MHz 802.11a, 5,510MHz 802.11n HT40, and 802.11AC 80.

The Radar Waveform generator sends the individual waveform for each of the radar types 1-6. Statistical data will be 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:

Total # of detections ÷ Total # of Trials × 100 = Probability of Detection

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.

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Verification of Detection 5,500MHz 802.11a

Trial #	Detection = √, No Detection = 0					
	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
1	√	√	√	√	√	√
2	√	√	√	√	√	√
3	√	√	√	√	√	√
4	√	√	√	√	√	√
5	√	√	√	√	√	√
6	√	√	√	√	√	√
7	√	√	√	√	√	√
8	√	√	√	√	√	√
9	√	√	√	√	√	√
10	√	√	√	√	√	√
11	√	√	√	√	√	√
12	√	√	√	√	√	√
13	√	√	√	√	√	√
14	√	√	√	√	√	√
15	√	√	√	√	√	√
16	√	√	√	√	√	√
17	√	√	√	√	√	√
18	√	√	√	√	√	√
19	√	√	√	√	√	√
20	√	√	√	√	√	√
21	√	√	√	**0**	√	√
22	√	√	√	**0**	√	√
23	√	√	√	√	√	√
24	√	√	√	√	√	√
25	√	√	√	√	**0**	√
26	√	√	√	√	√	√
27	√	√	√	√	√	√
28	√	√	√	√	√	√
29	√	√	√	√	√	√
30	√	√	√	√	√	√
Detection Percentage	100% (>60%)	100% (>60%)	100% (>60%)	93.3% (>60%)	96.6% (>80%)	100% (>70%)

In addition an average minimum percentage of successful detection across all four Short pulse radar test waveforms is required and calculated as follows;

$(P_d1 + P_d2 + P_d3 + P_d4) / 4 = 100\% + 100\% + 93.3\% + 96.6\%) / 4 = 97.5\%$ (> 80%)

Verification of Detection 5,510MHz 802.11n HT40

Trial #	Detection = √, No Detection = 0					
	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
1	√	√	√	√	√	√
2	√	√	√	√	√	√
3	√	√	√	√	√	√
4	√	√	√	√	√	√
5	√	√	√	√	√	√
6	√	√	√	√	√	√
7	√	√	√	√	√	√
8	√	√	√	√	√	√
9	√	√	√	√	√	√
10	√	√	√	√	√	√
11	√	√	√	√	√	√
12	√	√	√	√	√	√
13	√	√	√	√	√	√
14	√	√	√	√	√	√
15	√	√	√	√	√	√
16	√	√	√	√	√	√
17	√	√	√	√	√	√
18	√	√	√	√	√	√
19	√	√	√	√	√	√
20	√	√	√	√	√	√
21	√	√	√	√	√	√
22	√	√	√	√	√	√
23	√	√	√	√	√	√
24	√	√	√	√	√	√
25	√	√	√	√	√	√
26	√	√	√	√	√	√
27	√	√	√	√	√	√
28	√	√	√	√	√	√
29	√	√	√	√	√	√
30	√	√	√	√	√	√
Detection Percentage	100% (>60%)	100% (>60%)	100% (>60%)	100% (>60%)	100% (>80%)	100% (>70%)

In addition an average minimum percentage of successful detection across all four Short pulse radar test waveforms is required and calculated as follows;

$(P_d1 + P_d2 + P_d3 + P_d4) / 4 = (100\% + 100\% + 100\% + 100\%) / 4 = 100\%$ (> 80%)

Verification of Detection 5,530MHz 802.11n HT80

Trial #	Detection = √, No Detection = 0					
	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
1	√	√	√	√	√	√
2	√	√	√	√	√	√
3	√	√	√	√	√	√
4	√	√	√	√	√	√
5	√	√	√	√	√	√
6	√	√	√	√	√	√
7	√	√	√	√	√	√
8	√	√	√	√	√	√
9	√	√	√	√	√	√
10	√	√	√	√	√	√
11	√	√	**0**	√	√	√
12	√	√	√	√	√	√
13	√	√	√	√	√	√
14	√	√	√	√	√	√
15	√	√	√	√	√	√
16	√	√	√	√	√	√
17	√	√	√	√	√	√
18	√	√	√	√	√	√
19	**0**	√	√	√	√	√
20	√	√	√	√	√	√
21	√	√	√	√	√	√
22	√	√	√	√	√	√
23	√	√	√	√	√	√
24	√	√	√	√	√	√
25	√	√	√	√	√	√
26	√	√	√	√	√	√
27	√	√	√	√	√	√
28	√	√	√	√	√	√
29	√	√	√	√	√	√
30	√	√	√	√	√	√
Detection Percentage	96.67% (>60%)	100% (>60%)	96.67% (>60%)	100% (>60%)	100% (>80%)	100% (>70%)

In addition an average minimum percentage of successful detection across all four Short pulse radar test waveforms is required and calculated as follows;

$(P_d1 + P_d2 + P_d3 + P_d4) / 4 = (96.67\% + 100\% + 96.67\% + 100\%) / 4 = 98.3\%$ (> 80%)

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

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7.1.5. DFS New Rules

This section tests the new Type 1 radar signature and performs a spot check on the additional radar signatures. This DFS section addresses the update to the FCC's New Rules.

Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (µS)	PRI (µS)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
0	1	1428	18	See Note 1	See Note 1
1	1	Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a	$\text{Roundup}\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot 10^6}{\text{PRI}_{\mu sec}}\right)\right\}$	60%	30
		Test B: 15 unique PRI values randomly selected in the range 518-3066 µS, with a minimum increment of 1 µS, excluding PRI values selected in Test A			
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120

Note 1: Short Radar Pulse Type 0 should be used for the Detection Bandwidth test, Channel Move Time and Channel Closing Time tests

Type 1 short radar signature is the new FCC radar signature. All additional radar signatures and long pulse signatures were tested in the initial DFS test program.

A full test was performed on Type 1 Radar Signature with a spot-check on all others. For a description on the test strategy for each signature see Section 7.1.4 Dynamic Frequency Selection (DFS).

MiCOM Labs has a complete suite of tests for the DFS spot-check.

Test Program Details

EUT Type: Master with radar detection

Frequency band(s): 5,250 - 5,350 MHz and 5,470 – 5,725 MHz

Uniform Loading: For the above frequency band(s) the manufacturer declared that the device provides an aggregate uniform loading of the spectrum across all devices by selecting an operating channel among the available channels using a random algorithm.

Test Environment: Conducted
Antenna Gain used for Testing: 7.79 dBi

Radio parameters: 802.11a: Tx Power: +20 dBm Data Rate: 6 Mbit/s Duty Cycle: 22%
Radio parameters: 802.11ac-80: Tx Power: +20 dBm Data Rate: 23 Mbit/s Duty Cycle: 22%
Radio parameters: 802.11n HT-40: Tx Power: +20 dBm Data Rate: 13 Mbit/s Duty Cycle: 22%

Number of Antenna Chains: 3
Test Communication Throughput Methodology
The requisite MPEG video file ("TestFile.mpg" available on the NTIA website at the following link http://ntiacsd.ntia.doc.gov/dfs/) is used during this video stream.

EUT Software Version: 6.6.3.1-22869
Test Environmental Conditions - Ambient:
Temperature: 17 to 23 °C
Relative humidity: 31 to 57%
Pressure: 999 to 1012 mbar

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Probability of Detection

802.11a - 5500 MHz

Statistical Performance Check					
Radar Type	**Number of Trials**	**Number of Successful Detections**	**Percentage of Successful Detections**	**Result**	**Data Link**
Radar Type 1	30	30	100.00%	Complies	View Data
Radar Type 2	11	11	100.00%	Complies	View Data
Radar Type 3	11	11	100.00%	Complies	View Data
Radar Type 4	11	11	100.00%	Complies	View Data
Aggregate (100.00% + 100.00% + 100.00% + 100.00%)/4 = 100.00%				Complies	--
Radar Type 5				Complies	View Data
Radar Type 6				Complies	View Data

802.11ac 80 - 5530 MHz

Statistical Performance Check					
Radar Type	**Number of Trials**	**Number of Successful Detections**	**Percentage of Successful Detections**	**Result**	**Data Link**
Radar Type 1	30	30	100.00%	Complies	View Data
Radar Type 2	11	9	81.82%	Complies	View Data
Radar Type 3	10	10	100.00%	Complies	View Data
Radar Type 4	11	10	90.91%	Complies	View Data
Aggregate (100.00% + 81.82% + 100.00% + 90.91%)/4 = 93.18%				Complies	--
Radar Type 5				Complies	View Data
Radar Type 6				Complies	View Data

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802.11n HT40 - 5510 MHz

Statistical Performance Check					
Radar Type	**Number of Trials**	**Number of Successful Detections**	**Percentage of Successful Detections**	**Result**	**Data Link**
Radar Type 1	30	30	100.00%	Complies	View Data
Radar Type 2	11	11	100.00%	Complies	View Data
Radar Type 3	11	11	100.00%	Complies	View Data
Radar Type 4	11	11	100.00%	Complies	View Data
Aggregate (100.00% + 100.00% + 100.00% + 100.00%)/4 = 100.00%				Complies	--
Radar Type 5				Complies	View Data
Radar Type 6				Complies	View Data

Equipment Configuration for Radar Type 1

Variant:	802.11a	**Duty Cycle (%):**	22.00
Data Rate:	6 Mbit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
Channel Frequency:	5500.00 MHz	**Tested By:**	JK
Engineering Test Notes:			

Test Measurement Results

Pulse Width (us)	PRF (Hz)	PRI	# Pulses	Injections	Detections	Detection Rate	Result
1	326	3066	18	1	1	100.00%	DETECTED
1	1089	918	58	1	1	100.00%	DETECTED
1	1433	698	76	1	1	100.00%	DETECTED
1	1285	778	68	1	1	100.00%	DETECTED
1	1520	658	81	1	1	100.00%	DETECTED
1	1114	898	59	1	1	100.00%	DETECTED
1	1567	638	83	1	1	100.00%	DETECTED
1	1355	738	72	1	1	100.00%	DETECTED
1	1222	818	65	1	1	100.00%	DETECTED
1	1792	558	95	1	1	100.00%	DETECTED
1	1319	758	70	1	1	100.00%	DETECTED
1	1672	598	89	1	1	100.00%	DETECTED
1	1475	678	78	1	1	100.00%	DETECTED
1	1859	538	99	1	1	100.00%	DETECTED
1	1139	878	61	1	1	100.00%	DETECTED
1	978	1022	52	1	1	100.00%	DETECTED
1	1894	528	100	1	1	100.00%	DETECTED
1	329	3036	18	1	1	100.00%	DETECTED
1	332	3011	18	1	1	100.00%	DETECTED
1	739	1354	39	1	1	100.00%	DETECTED
1	360	2779	19	1	1	100.00%	DETECTED
1	828	1208	44	1	1	100.00%	DETECTED
1	623	1606	33	1	1	100.00%	DETECTED
1	577	1734	31	1	1	100.00%	DETECTED
1	1364	733	73	1	1	100.00%	DETECTED
1	382	2615	21	1	1	100.00%	DETECTED
1	347	2882	19	1	1	100.00%	DETECTED
1	524	1907	28	1	1	100.00%	DETECTED
1	414	2416	22	1	1	100.00%	DETECTED
1	816	1226	44	1	1	100.00%	DETECTED
			Aggregate:	**30**	**30**	**100.00%**	**Complies**

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Equipment Configuration for Radar Type 2

Variant:	802.11a	**Duty Cycle (%):**	22.00
Data Rate:	6 Mbit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
Channel Frequency:	5500.00 MHz	**Tested By:**	JK
Engineering Test Notes:	Radar type was spot checked for the update.		

Test Measurement Results

Pulse Width (us)	PRF (Hz)	PRI	# Pulses	Injections	Detections	Detection Rate	Result
1	5208	192	25	1	1	100.00%	DETECTED
1.3	4367	229	26			--	Not Tested
1.3	4739	211	27			--	Not Tested
1.4	5155	194	27	1	1	100.00%	DETECTED
1.5	6173	162	29			--	Not Tested
1.7	4566	219	25			--	Not Tested
1.9	5435	184	23	1	1	100.00%	DETECTED
2	5495	182	27			--	Not Tested
2.1	6024	166	25			--	Not Tested
2.3	4762	210	29	1	1	100.00%	DETECTED
2.4	4950	202	26			--	Not Tested
2.4	4878	205	29			--	Not Tested
2.6	6494	154	25	1	1	100.00%	DETECTED
2.8	5181	193	25			--	Not Tested
3.1	5952	168	29			--	Not Tested
3.2	4587	218	26	1	1	100.00%	DETECTED
3.3	4386	228	24			--	Not Tested
3.5	5747	174	23			--	Not Tested
3.5	6536	153	27	1	1	100.00%	DETECTED
3.5	5236	191	26			--	Not Tested
3.6	4854	206	27			--	Not Tested
3.8	4484	223	25	1	1	100.00%	DETECTED
4.1	4673	214	25			--	Not Tested
4.2	5780	173	24			--	Not Tested
4.2	6211	161	28	1	1	100.00%	DETECTED
4.3	6579	152	27			--	Not Tested
4.4	6369	157	29			--	Not Tested
4.9	6494	154	29	1	1	100.00%	DETECTED
4.9	5291	189	27			--	Not Tested
5	4464	224	27	1	1	100.00%	DETECTED
			Aggregate:	**11.00**	**11.00**	**100.00%**	**Pass**

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Equipment Configuration for Radar Type 3

Variant:	802.11a	**Duty Cycle (%):**	22.00
Data Rate:	6 Mbit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
Channel Frequency:	5500.00 MHz	**Tested By:**	JK
Engineering Test Notes:	Radar type was spot checked for the update.		

Test Measurement Results

Pulse Width (us)	PRF (Hz)	PRI	# Pulses	Injections	Detections	Detection Rate	Result
10	2732	366	18	1	1	100.00%	DETECTED
6	2326	430	17			--	Not Tested
6.1	2967	337	16			--	Not Tested
6.5	2110	474	18	1	1	100.00%	DETECTED
6.7	2062	485	18			--	Not Tested
6.7	3003	333	17			--	Not Tested
6.8	2227	449	16	1	1	100.00%	DETECTED
6.8	2959	338	18			--	Not Tested
6.9	2092	478	18			--	Not Tested
7	2079	481	18	1	1	100.00%	DETECTED
7.2	2747	364	16			--	Not Tested
7.6	2695	371	18			--	Not Tested
7.6	2123	471	18	1	1	100.00%	DETECTED
7.7	2227	449	16			--	Not Tested
8	4049	247	18			--	Not Tested
8.1	2778	360	18	1	1	100.00%	DETECTED
8.3	2494	401	17			--	Not Tested
8.5	2500	400	17			--	Not Tested
8.7	2551	392	17	1	1	100.00%	DETECTED
8.8	2451	408	16			--	Not Tested
8.9	2513	398	18			--	Not Tested
9	3215	311	17	1	1	100.00%	DETECTED
9.2	2114	473	18			--	Not Tested
9.2	2558	391	16			--	Not Tested
9.3	2660	376	18	1	1	100.00%	DETECTED
9.3	2941	340	18			--	Not Tested
9.4	2151	465	16			--	Not Tested
9.4	3086	324	16	1	1	100.00%	DETECTED
9.5	2062	485	18			--	Not Tested
9.7	2105	475	17	1	1	100.00%	DETECTED
			Aggregate:	**11**	**11**	**100.00%**	**Pass**

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Equipment Configuration for Radar Type 4

Variant:	802.11a	**Duty Cycle (%):**	22.00
Data Rate:	6 Mbit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
Channel Frequency:	5500.00 MHz	**Tested By:**	JK
Engineering Test Notes:	Radar type was spot checked for the update.		

Test Measurement Results

Pulse Width (us)	PRF (Hz)	PRI	# Pulses	Injections	Detections	Detection Rate	Result
11	2257	443	13	1	1	100.00%	DETECTED
11.2	3096	323	16			--	Not Tested
11.5	2591	386	16			--	Not Tested
12.8	2004	499	13	1	1	100.00%	DETECTED
12.8	3906	256	14			--	Not Tested
13.6	3831	261	16			--	Not Tested
13.6	2639	379	13	1	1	100.00%	DETECTED
14	3077	325	13			--	Not Tested
14.1	3125	320	15			--	Not Tested
14.6	3401	294	15	1	1	100.00%	DETECTED
14.6	3311	302	12			--	Not Tested
14.6	4292	233	15			--	Not Tested
14.7	2967	337	15	1	1	100.00%	DETECTED
15.3	2315	432	15			--	Not Tested
15.3	2817	355	13			--	Not Tested
15.5	2639	379	13	1	1	100.00%	DETECTED
16.1	4115	243	13			--	Not Tested
16.3	3165	316	12			--	Not Tested
16.8	3623	276	13	1	1	100.00%	DETECTED
16.9	2519	397	14			--	Not Tested
17	3106	322	16			--	Not Tested
17.4	2933	341	15	1	1	100.00%	DETECTED
17.4	2208	453	13			--	Not Tested
17.6	2653	377	12			--	Not Tested
18	2062	485	12	1	1	100.00%	DETECTED
18.2	4132	242	12			--	Not Tested
18.9	3049	328	14	1	1	100.00%	DETECTED
19.5	2283	438	12			--	Not Tested
19.6	3236	309	16			--	Not Tested
19.8	3012	332	12	1	1	100.00%	DETECTED
			Aggregate:	**11**	**11**	**100.00%**	**Pass**

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Equipment Configuration for Radar Type 5

Variant:	802.11a	**Duty Cycle (%):**	22.00
Data Rate:	6 Mbit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
Channel Frequency:	5500.00 MHz	**Tested By:**	JK
Engineering Test Notes:	Radar type was spot checked for the update.		

Test Measurement Results

Burst Segment	Injections	Detections	Detection Rate	Result
Type 5 #1 5506.79	1	1	100.00%	DETECTED
Type 5 #2 5503.23			--	Not Tested
Type 5 #3 5491.54			--	Not Tested
Type 5 #4 5500.59	1	1	100.00%	DETECTED
Type 5 #5 5504.85			--	Not Tested
Type 5 #6 5498.17			--	Not Tested
Type 5 #7 5504.09	1	1	100.00%	DETECTED
Type 5 #8 5506.21			--	Not Tested
Type 5 #9 5491.85			--	Not Tested
Type 5 #10 5490.51	1	0	0.00%	NOT DETECTED
Type 5 #11 5504.80			--	Not Tested
Type 5 #12 5490.49			--	Not Tested
Type 5 #13 5507.05	1	1	100.00%	DETECTED
Type 5 #14 5499.49			--	Not Tested
Type 5 #15 5502.79			--	Not Tested
Type 5 #16 5504.67	1	1	100.00%	DETECTED
Type 5 #17 5492.43			--	Not Tested
Type 5 #18 5509.65			--	Not Tested
Type 5 #19 5501.15	1	1	100.00%	DETECTED
Type 5 #20 5495.21			--	Not Tested
Type 5 #21 5507.23			--	Not Tested
Type 5 #22 5504.93	1	1	100.00%	DETECTED
Type 5 #23 5495.49			--	Not Tested
Type 5 #24 5491.09			--	Not Tested
Type 5 #25 5503.52	1	1	100.00%	DETECTED
Type 5 #26 5502.49			--	Not Tested
Type 5 #27 5492.84			--	Not Tested
Type 5 #28 5501.97	1	1	100.00%	DETECTED
Type 5 #29 5491.26	1	0	0.00%	NOT DETECTED
Type 5 #30 5501.32			--	Not Tested

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Equipment Configuration for Radar Type 6

Variant:	802.11a	**Duty Cycle (%):**	22.00
Data Rate:	6 Mbit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
Channel Frequency:	5500.00 MHz	**Tested By:**	JK
Engineering Test Notes:	Radar type was spot checked for the update.		

Test Measurement Results

Burst Segment	Detections	Injection #	Detection Rate	Pass/Fail
Type 6 #1	1	1	100.00%	DETECTED
Type 6 #2			--	Not Tested
Type 6 #3			--	Not Tested
Type 6 #4	1	1	100.00%	DETECTED
Type 6 #5			--	Not Tested
Type 6 #6			--	Not Tested
Type 6 #7	1	1	100.00%	DETECTED
Type 6 #8			--	Not Tested
Type 6 #9			--	Not Tested
Type 6 #10	1	1	100.00%	DETECTED
Type 6 #11			--	Not Tested
Type 6 #12			--	Not Tested
Type 6 #13	1	1	100.00%	DETECTED
Type 6 #14			--	Not Tested
Type 6 #15			--	Not Tested
Type 6 #16	1	1	100.00%	DETECTED
Type 6 #17			--	Not Tested
Type 6 #18			--	Not Tested
Type 6 #19	1	1	100.00%	DETECTED
Type 6 #20			--	Not Tested
Type 6 #21			--	Not Tested
Type 6 #22	1	1	100.00%	DETECTED
Type 6 #23			--	Not Tested
Type 6 #24			--	Not Tested
Type 6 #25	1	1	100.00%	DETECTED
Type 6 #26			--	Not Tested
Type 6 #27			--	Not Tested
Type 6 #28	1	1	100.00%	DETECTED
Type 6 #29			--	Not Tested
Type 6 #30	1	1	100.00%	DETECTED

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Equipment Configuration for Radar Type 1

Variant:	802.11ac 80	**Duty Cycle (%):**	22.00
Data Rate:	23 Mbit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
Channel Frequency:	5530.00 MHz	**Tested By:**	JK
Engineering Test Notes:			

Test Measurement Results

Pulse Width (us)	PRF (Hz)	PRI	# Pulses	Injections	Detections	Detection Rate	Result
1	326	3066	18	1	1	100.00%	DETECTED
1	1089	918	58	1	1	100.00%	DETECTED
1	1433	698	76	1	1	100.00%	DETECTED
1	1285	778	68	1	1	100.00%	DETECTED
1	1520	658	81	1	1	100.00%	DETECTED
1	1114	898	59	1	1	100.00%	DETECTED
1	1567	638	83	1	1	100.00%	DETECTED
1	1355	738	72	1	1	100.00%	DETECTED
1	1222	818	65	1	1	100.00%	DETECTED
1	1792	558	95	1	1	100.00%	DETECTED
1	1319	758	70	1	1	100.00%	DETECTED
1	1672	598	89	1	1	100.00%	DETECTED
1	1475	678	78	1	1	100.00%	DETECTED
1	1859	538	99	1	1	100.00%	DETECTED
1	1139	878	61	1	1	100.00%	DETECTED
1	978	1022	52	1	1	100.00%	DETECTED
1	1894	528	100	1	1	100.00%	DETECTED
1	329	3036	18	1	1	100.00%	DETECTED
1	332	3011	18	1	1	100.00%	DETECTED
1	739	1354	39	1	1	100.00%	DETECTED
1	360	2779	19	1	1	100.00%	DETECTED
1	828	1208	44	1	1	100.00%	DETECTED
1	623	1606	33	1	1	100.00%	DETECTED
1	577	1734	31	1	1	100.00%	DETECTED
1	1364	733	73	1	1	100.00%	DETECTED
1	382	2615	21	1	1	100.00%	DETECTED
1	347	2882	19	1	1	100.00%	DETECTED
1	524	1907	28	1	1	100.00%	DETECTED
1	414	2416	22	1	1	100.00%	DETECTED
1	816	1226	44	1	1	100.00%	DETECTED
			Aggregate:	**30**	**30**	**100.00%**	**Complies**

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Equipment Configuration for Radar Type 2

Variant:	802.11ac 80	**Duty Cycle (%):**	22.00
Data Rate:	23 Mbit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
Channel Frequency:	5530.00 MHz	**Tested By:**	JK
Engineering Test Notes:	Radar type was spot checked for the update.		

Test Measurement Results

Pulse Width (us)	PRF (Hz)	PRI	# Pulses	Injections	Detections	Detection Rate	Result
1	5208	192	25	1	1	100.00%	DETECTED
1.3	4367	229	26			--	Not Tested
1.3	4739	211	27			--	Not Tested
1.4	5155	194	27	1	1	100.00%	DETECTED
1.5	6173	162	29			--	Not Tested
1.7	4566	219	25			--	Not Tested
1.9	5435	184	23	1	1	100.00%	DETECTED
2	5495	182	27			--	Not Tested
2.1	6024	166	25			--	Not Tested
2.3	4762	210	29	1	1	100.00%	DETECTED
2.4	4950	202	26			--	Not Tested
2.4	4878	205	29			--	Not Tested
2.6	6494	154	25	1	1	100.00%	DETECTED
2.8	5181	193	25			--	Not Tested
3.1	5952	168	29			--	Not Tested
3.2	4587	218	26	1	1	100.00%	DETECTED
3.3	4386	228	24			--	Not Tested
3.5	5747	174	23			--	Not Tested
3.5	6536	153	27	1	1	100.00%	DETECTED
3.5	5236	191	26			--	Not Tested
3.6	4854	206	27			--	Not Tested
3.8	4484	223	25	1	0	0.00%	NOT DETECTED
4.1	4673	214	25			--	Not Tested
4.2	5780	173	24			--	Not Tested
4.2	6211	161	28	1	1	100.00%	DETECTED
4.3	6579	152	27			--	Not Tested
4.4	6369	157	29	1	0	0.00%	NOT DETECTED
4.9	6494	154	29			--	Not Tested
4.9	5291	189	27			--	Not Tested
5	4464	224	27	1	1	100.00%	DETECTED
			Aggregate:	**11**	**9**	**81.82%**	**Pass**

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Equipment Configuration for Radar Type 3

Variant:	802.11ac 80	**Duty Cycle (%):**	22.00
Data Rate:	23 Mbit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
Channel Frequency:	5530.00 MHz	**Tested By:**	JK
Engineering Test Notes:	Radar type was spot checked for the update.		

Test Measurement Results

Pulse Width (us)	PRF (Hz)	PRI	# Pulses	Injections	Detections	Detection Rate	Result
10	2732	366	18	1	1	100.00%	DETECTED
6	2326	430	17			--	Not Tested
6.1	2967	337	16			--	Not Tested
6.5	2110	474	18	1	1	100.00%	DETECTED
6.7	2062	485	18			--	Not Tested
6.7	3003	333	17			--	Not Tested
6.8	2227	449	16	1	1	100.00%	DETECTED
6.8	2959	338	18			--	Not Tested
6.9	2092	478	18			--	Not Tested
7	2079	481	18	1	1	100.00%	DETECTED
7.2	2747	364	16			--	Not Tested
7.6	2695	371	18			--	Not Tested
7.6	2123	471	18	1	1	100.00%	DETECTED
7.7	2227	449	16			--	Not Tested
8	4049	247	18			--	Not Tested
8.1	2778	360	18	1	1	100.00%	DETECTED
8.3	2494	401	17			--	Not Tested
8.5	2500	400	17			--	Not Tested
8.7	2551	392	17	1	1	100.00%	DETECTED
8.8	2451	408	16			--	Not Tested
8.9	2513	398	18			--	Not Tested
9	3215	311	17	1	1	100.00%	DETECTED
9.2	2114	473	18			--	Not Tested
9.2	2558	391	16			--	Not Tested
9.3	2660	376	18	1	1	100.00%	DETECTED
9.3	2941	340	18			--	Not Tested
9.4	2151	465	16			--	Not Tested
9.4	3086	324	16	1	1	100.00%	DETECTED
9.5	2062	485	18			--	Not Tested
9.7	2105	475	17			--	Not Tested
			Aggregate:	**10**	**10**	**100.00%**	**Pass**

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Equipment Configuration for Radar Type 4

Variant:	802.11ac 80	**Duty Cycle (%):**	22.00
Data Rate:	23 Mbit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
Channel Frequency:	5530.00 MHz	**Tested By:**	JK
Engineering Test Notes:	Radar type was spot checked for the update.		

Test Measurement Results

Pulse Width (us)	PRF (Hz)	PRI	# Pulses	Injections	Detections	Detection Rate	Result
11	2257	443	13	1	1	100.00%	DETECTED
11.2	3096	323	16			--	Not Tested
11.5	2591	386	16			--	Not Tested
12.8	2004	499	13	1	1	100.00%	DETECTED
12.8	3906	256	14			--	Not Tested
13.6	3831	261	16			--	Not Tested
13.6	2639	379	13	1	1	100.00%	DETECTED
14	3077	325	13			--	Not Tested
14.1	3125	320	15			--	Not Tested
14.6	3401	294	15	1	1	100.00%	DETECTED
14.6	3311	302	12			--	Not Tested
14.6	4292	233	15			--	Not Tested
14.7	2967	337	15	1	1	100.00%	DETECTED
15.3	2315	432	15			--	Not Tested
15.3	2817	355	13			--	Not Tested
15.5	2639	379	13	1	1	100.00%	DETECTED
16.1	4115	243	13			--	Not Tested
16.3	3165	316	12			--	Not Tested
16.8	3623	276	13	1	1	100.00%	DETECTED
16.9	2519	397	14			--	Not Tested
17	3106	322	16			--	Not Tested
17.4	2933	341	15	1	1	100.00%	DETECTED
17.4	2208	453	13			--	Not Tested
17.6	2653	377	12			--	Not Tested
18	2062	485	12	1	1	100.00%	DETECTED
18.2	4132	242	12			--	Not Tested
18.9	3049	328	14			--	Not Tested
19.5	2283	438	12	1	1	100.00%	DETECTED
19.6	3236	309	16			--	Not Tested
19.8	3012	332	12	1	0	0.00%	NOT DETECTED
			Aggregate:	**11**	**10**	**90.91%**	**Pass**

Equipment Configuration for Radar Type 5

Variant:	802.11ac 80	**Duty Cycle (%):**	22.00
Data Rate:	23 Mbit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
Channel Frequency:	5530.00 MHz	**Tested By:**	JK
Engineering Test Notes:	Radar type was spot checked for the update.		

Test Measurement Results

Burst Segment	Injections	Detections	Detection Rate	Result
Type 5 #1 5554.75	1	1	100.00%	DETECTED
Type 5 #2 5516.75			--	Not Tested
Type 5 #3 5557.16			--	Not Tested
Type 5 #4 5535.01	1	1	100.00%	DETECTED
Type 5 #5 5515.58			--	Not Tested
Type 5 #6 5514.57			--	Not Tested
Type 5 #7 5545.39	1	1	100.00%	DETECTED
Type 5 #8 5565.12			--	Not Tested
Type 5 #9 5512.96			--	Not Tested
Type 5 #10 5494.25	1	1	100.00%	DETECTED
Type 5 #11 5538.51			--	Not Tested
Type 5 #12 5532.10			--	Not Tested
Type 5 #13 5531.84	1	1	100.00%	DETECTED
Type 5 #14 5519.71			--	Not Tested
Type 5 #15 5505.65			--	Not Tested
Type 5 #16 5514.66	1	1	100.00%	DETECTED
Type 5 #17 5550.11			--	Not Tested
Type 5 #18 5515.41			--	Not Tested
Type 5 #19 5553.43	1	1	100.00%	DETECTED
Type 5 #20 5519.33			--	Not Tested
Type 5 #21 5511.31			--	Not Tested
Type 5 #22 5566.87	1	1	100.00%	DETECTED
Type 5 #23 5495.55			--	Not Tested
Type 5 #24 5525.26			--	Not Tested
Type 5 #25 5509.11	1	1	100.00%	DETECTED
Type 5 #26 5503.00			--	Not Tested
Type 5 #27 5490.85			--	Not Tested
Type 5 #28 5526.01	1	1	100.00%	DETECTED
Type 5 #29 5519.49			--	Not Tested
Type 5 #30 5491.72			--	Not Tested

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Equipment Configuration for Radar Type 6

Variant:	802.11ac 80	**Duty Cycle (%):**	22.00
Data Rate:	23 Mbit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
Channel Frequency:	5530.00 MHz	**Tested By:**	JK
Engineering Test Notes:	Radar type was spot checked for the update.		

Test Measurement Results

Burst Segment	Detections	Injection #	Detection Rate	Pass/Fail
Type 6 #1	1	1	100.00%	DETECTED
Type 6 #2			--	Not Tested
Type 6 #3			--	Not Tested
Type 6 #4	1	1	100.00%	DETECTED
Type 6 #5			--	Not Tested
Type 6 #6			--	Not Tested
Type 6 #7	1	1	100.00%	DETECTED
Type 6 #8			--	Not Tested
Type 6 #9			--	Not Tested
Type 6 #10	1	1	100.00%	DETECTED
Type 6 #11			--	Not Tested
Type 6 #12			--	Not Tested
Type 6 #13	1	1	100.00%	DETECTED
Type 6 #14			--	Not Tested
Type 6 #15			--	Not Tested
Type 6 #16	1	1	100.00%	DETECTED
Type 6 #17			--	Not Tested
Type 6 #18			--	Not Tested
Type 6 #19	1	1	100.00%	DETECTED
Type 6 #20			--	Not Tested
Type 6 #21			--	Not Tested
Type 6 #22	1	1	100.00%	DETECTED
Type 6 #23			--	Not Tested
Type 6 #24			--	Not Tested
Type 6 #25	1	1	100.00%	DETECTED
Type 6 #26			--	Not Tested
Type 6 #27			--	Not Tested
Type 6 #28	1	1	100.00%	DETECTED
Type 6 #29			--	Not Tested
Type 6 #30			--	Not Tested

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Equipment Configuration for Radar Type 1

Variant:	802.11n HT40	**Duty Cycle (%):**	22.00
Data Rate:	13 Mbit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
Channel Frequency:	5510.00 MHz	**Tested By:**	JK
Engineering Test Notes:			

Test Measurement Results

Pulse Width (us)	PRF (Hz)	PRI	# Pulses	Injections	Detections	Detection Rate	Result
1	326	3066	18	1	1	100.00%	DETECTED
1	1089	918	58	1	1	100.00%	DETECTED
1	1433	698	76	1	1	100.00%	DETECTED
1	1285	778	68	1	1	100.00%	DETECTED
1	1520	658	81	1	1	100.00%	DETECTED
1	1114	898	59	1	1	100.00%	DETECTED
1	1567	638	83	1	1	100.00%	DETECTED
1	1355	738	72	1	1	100.00%	DETECTED
1	1222	818	65	1	1	100.00%	DETECTED
1	1792	558	95	1	1	100.00%	DETECTED
1	1319	758	70	1	1	100.00%	DETECTED
1	1672	598	89	1	1	100.00%	DETECTED
1	1475	678	78	1	1	100.00%	DETECTED
1	1859	538	99	1	1	100.00%	DETECTED
1	1139	878	61	1	1	100.00%	DETECTED
1	978	1022	52	1	1	100.00%	DETECTED
1	1894	528	100	1	1	100.00%	DETECTED
1	329	3036	18	1	1	100.00%	DETECTED
1	332	3011	18	1	1	100.00%	DETECTED
1	739	1354	39	1	1	100.00%	DETECTED
1	360	2779	19	1	1	100.00%	DETECTED
1	828	1208	44	1	1	100.00%	DETECTED
1	623	1606	33	1	1	100.00%	DETECTED
1	577	1734	31	1	1	100.00%	DETECTED
1	1364	733	73	1	1	100.00%	DETECTED
1	382	2615	21	1	1	100.00%	DETECTED
1	347	2882	19	1	1	100.00%	DETECTED
1	524	1907	28	1	1	100.00%	DETECTED
1	414	2416	22	1	1	100.00%	DETECTED
1	816	1226	44	1	1	100.00%	DETECTED
			Aggregate:	**30**	**30**	**100.00%**	**Complies**

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Equipment Configuration for Radar Type 2

Variant:	802.11n HT40	**Duty Cycle (%):**	22.00
Data Rate:	13 Mbit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
Channel Frequency:	5510.00 MHz	**Tested By:**	JK
Engineering Test Notes:	Radar type was spot checked for the update.		

Test Measurement Results

Pulse Width (us)	PRF (Hz)	PRI	# Pulses	Injections	Detections	Detection Rate	Result
1	5208	192	25	1	1	100.00%	DETECTED
1.3	4367	229	26			--	Not Tested
1.3	4739	211	27			--	Not Tested
1.4	5155	194	27	1	1	100.00%	DETECTED
1.5	6173	162	29			--	Not Tested
1.7	4566	219	25			--	Not Tested
1.9	5435	184	23	1	1	100.00%	DETECTED
2	5495	182	27			--	Not Tested
2.1	6024	166	25			--	Not Tested
2.3	4762	210	29	1	1	100.00%	DETECTED
2.4	4950	202	26			--	Not Tested
2.4	4878	205	29			--	Not Tested
2.6	6494	154	25	1	1	100.00%	DETECTED
2.8	5181	193	25			--	Not Tested
3.1	5952	168	29			--	Not Tested
3.2	4587	218	26	1	1	100.00%	DETECTED
3.3	4386	228	24			--	Not Tested
3.5	5747	174	23			--	Not Tested
3.5	6536	153	27	1	1	100.00%	DETECTED
3.5	5236	191	26			--	Not Tested
3.6	4854	206	27			--	Not Tested
3.8	4484	223	25	1	1	100.00%	DETECTED
4.1	4673	214	25			--	Not Tested
4.2	5780	173	24			--	Not Tested
4.2	6211	161	28	1	1	100.00%	DETECTED
4.3	6579	152	27			--	Not Tested
4.4	6369	157	29			--	Not Tested
4.9	6494	154	29	1	1	100.00%	DETECTED
4.9	5291	189	27			--	Not Tested
5	4464	224	27	1	1	100.00%	DETECTED
			Aggregate:	**11**	**11**	**100.00%**	**Pass**

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Equipment Configuration for Radar Type 3

Variant:	802.11n HT40	**Duty Cycle (%):**	22.00
Data Rate:	13 Mbit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
Channel Frequency:	5510.00 MHz	**Tested By:**	JK
Engineering Test Notes:	Radar type was spot checked for the update.		

Test Measurement Results

Pulse Width (us)	PRF (Hz)	PRI	# Pulses	Injections	Detections	Detection Rate	Result
10	2732	366	18	1	1	100.00%	DETECTED
6	2326	430	17			--	Not Tested
6.1	2967	337	16			--	Not Tested
6.5	2110	474	18	1	1	100.00%	DETECTED
6.7	2062	485	18			--	Not Tested
6.7	3003	333	17			--	Not Tested
6.8	2227	449	16	1	1	100.00%	DETECTED
6.8	2959	338	18			--	Not Tested
6.9	2092	478	18			--	Not Tested
7	2079	481	18	1	1	100.00%	DETECTED
7.2	2747	364	16			--	Not Tested
7.6	2695	371	18			--	Not Tested
7.6	2123	471	18	1	1	100.00%	DETECTED
7.7	2227	449	16			--	Not Tested
8	4049	247	18			--	Not Tested
8.1	2778	360	18	1	1	100.00%	DETECTED
8.3	2494	401	17			--	Not Tested
8.5	2500	400	17			--	Not Tested
8.7	2551	392	17	1	1	100.00%	DETECTED
8.8	2451	408	16			--	Not Tested
8.9	2513	398	18			--	Not Tested
9	3215	311	17	1	1	100.00%	DETECTED
9.2	2114	473	18			--	Not Tested
9.2	2558	391	16			--	Not Tested
9.3	2660	376	18	1	1	100.00%	DETECTED
9.3	2941	340	18			--	Not Tested
9.4	2151	465	16			--	Not Tested
9.4	3086	324	16	1	1	100.00%	DETECTED
9.5	2062	485	18			--	Not Tested
9.7	2105	475	17	1	1	100.00%	DETECTED
			Aggregate:	**11**	**11**	**100.00%**	**Pass**

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Equipment Configuration for Radar Type 4

Variant:	802.11n HT40	**Duty Cycle (%):**	22.00
Data Rate:	13 Mbit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
Channel Frequency:	5510.00 MHz	**Tested By:**	JK
Engineering Test Notes:	Radar type was spot checked for the update.		

Test Measurement Results

Pulse Width (us)	PRF (Hz)	PRI	# Pulses	Injections	Detections	Detection Rate	Result
11	2257	443	13	1	1	100.00%	DETECTED
11.2	3096	323	16			--	Not Tested
11.5	2591	386	16			--	Not Tested
12.8	2004	499	13	1	1	100.00%	DETECTED
12.8	3906	256	14			--	Not Tested
13.6	3831	261	16			--	Not Tested
13.6	2639	379	13	1	1	100.00%	DETECTED
14	3077	325	13			--	Not Tested
14.1	3125	320	15			--	Not Tested
14.6	3401	294	15	1	1	100.00%	DETECTED
14.6	3311	302	12			--	Not Tested
14.6	4292	233	15			--	Not Tested
14.7	2967	337	15	1	1	100.00%	DETECTED
15.3	2315	432	15			--	Not Tested
15.3	2817	355	13			--	Not Tested
15.5	2639	379	13	1	1	100.00%	DETECTED
16.1	4115	243	13			--	Not Tested
16.3	3165	316	12			--	Not Tested
16.8	3623	276	13	1	1	100.00%	DETECTED
16.9	2519	397	14			--	Not Tested
17	3106	322	16			--	Not Tested
17.4	2933	341	15	1	1	100.00%	DETECTED
17.4	2208	453	13			--	Not Tested
17.6	2653	377	12			--	Not Tested
18	2062	485	12	1	1	100.00%	DETECTED
18.2	4132	242	12			--	Not Tested
18.9	3049	328	14			--	Not Tested
19.5	2283	438	12	1	1	100.00%	DETECTED
19.6	3236	309	16			--	Not Tested
19.8	3012	332	12	1	1	100.00%	DETECTED
			Aggregate:	**11**	**11**	**100.00%**	**Pass**

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Equipment Configuration for Radar Type 5

Variant:	802.11n HT40	**Duty Cycle (%):**	22.00
Data Rate:	13 Mbit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
Channel Frequency:	5510.00 MHz	**Tested By:**	JK
Engineering Test Notes:	Radar type was spot checked for the update.		

Test Measurement Results

Burst Segment	Injections	Detections	Detection Rate	Result
Type 5 #1 5521.23	1	1	100.00%	DETECTED
Type 5 #2 5512.55			--	Not Tested
Type 5 #3 5501.03			--	Not Tested
Type 5 #4 5527.58	1	1	100.00%	DETECTED
Type 5 #5 5498.03			--	Not Tested
Type 5 #6 5528.85			--	Not Tested
Type 5 #7 5508.46	1	1	100.00%	DETECTED
Type 5 #8 5503.91			--	Not Tested
Type 5 #9 5514.36			--	Not Tested
Type 5 #10 5524.20	1	1	100.00%	DETECTED
Type 5 #11 5521.73			--	Not Tested
Type 5 #12 5516.90			--	Not Tested
Type 5 #13 5520.31	1	1	100.00%	DETECTED
Type 5 #14 5507.83			--	Not Tested
Type 5 #15 5516.07			--	Not Tested
Type 5 #16 5527.18	1	1	100.00%	DETECTED
Type 5 #17 5505.90			--	Not Tested
Type 5 #18 5526.96			--	Not Tested
Type 5 #19 5513.88	1	1	100.00%	DETECTED
Type 5 #20 5509.63			--	Not Tested
Type 5 #21 5505.70			--	Not Tested
Type 5 #22 5499.83	1	1	100.00%	DETECTED
Type 5 #23 5510.31			--	Not Tested
Type 5 #24 5529.34			--	Not Tested
Type 5 #25 5497.22	1	1	100.00%	DETECTED
Type 5 #26 5498.40			--	Not Tested
Type 5 #27 5499.50			--	Not Tested
Type 5 #28 5523.01	1	1	100.00%	DETECTED
Type 5 #29 5514.27			--	Not Tested
Type 5 #30 5517.48			--	Not Tested

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Equipment Configuration for Radar Type 6

Variant:	802.11n HT40	**Duty Cycle (%):**	22.00
Data Rate:	13 Mbit/s	**Antenna Gain (dBi):**	7.79
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
Channel Frequency:	5510.00 MHz	**Tested By:**	JK
Engineering Test Notes:	Radar type was spot checked for the update.		

Test Measurement Results

Burst Segment	Detections	Injection #	Detection Rate	Pass/Fail
Type 6 #1	1	1	100.00%	DETECTED
Type 6 #2			--	Not Tested
Type 6 #3			--	Not Tested
Type 6 #4	1	1	100.00%	DETECTED
Type 6 #5			--	Not Tested
Type 6 #6			--	Not Tested
Type 6 #7	1	1	100.00%	DETECTED
Type 6 #8			--	Not Tested
Type 6 #9			--	Not Tested
Type 6 #10	1	1	100.00%	DETECTED
Type 6 #11			--	Not Tested
Type 6 #12			--	Not Tested
Type 6 #13	1	1	100.00%	DETECTED
Type 6 #14			--	Not Tested
Type 6 #15			--	Not Tested
Type 6 #16	1	1	100.00%	DETECTED
Type 6 #17			--	Not Tested
Type 6 #18			--	Not Tested
Type 6 #19	1	1	100.00%	DETECTED
Type 6 #20			--	Not Tested
Type 6 #21			--	Not Tested
Type 6 #22	1	1	100.00%	DETECTED
Type 6 #23			--	Not Tested
Type 6 #24			--	Not Tested
Type 6 #25	1	1	100.00%	DETECTED
Type 6 #26			--	Not Tested
Type 6 #27			--	Not Tested
Type 6 #28	1	1	100.00%	DETECTED
Type 6 #29			--	Not Tested
Type 6 #30			--	Not Tested

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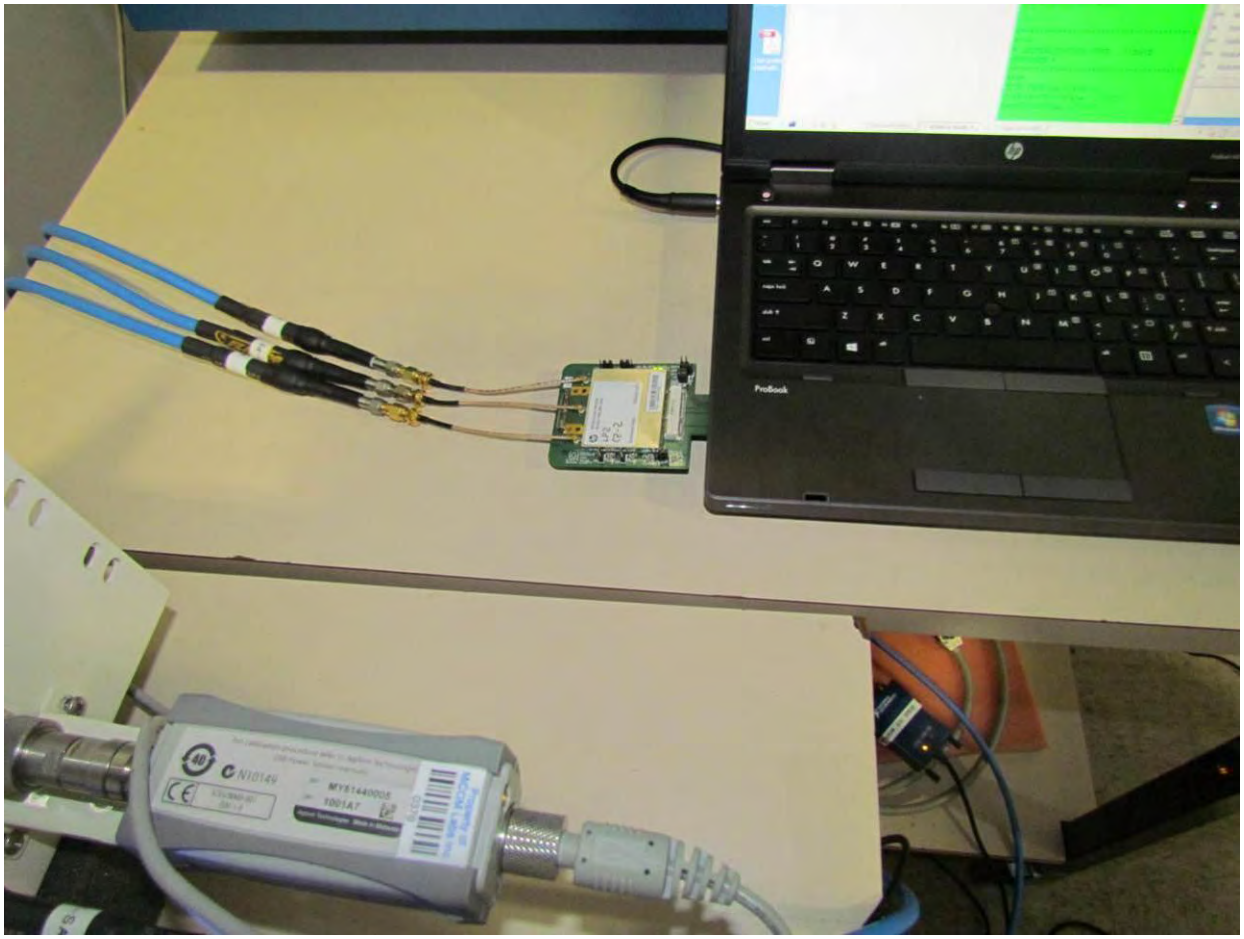
8. PHOTOGRAPHS

8.1. Test Setup - Conducted



8.2. Test Setup - Digital and Spurious Emissions Configuration

8.3. Dynamic Frequency Selection (DFS)

9. TEST EQUIPMENT DETAILS

Asset #	Instrument	Manufacturer	Part #	Serial #	Calibration Due Date
0070	Power Meter	Hewlett Packard	437B	3125U11552	28th Nov 13
0117	Power Sensor	Hewlett Packard	8487D	3318A00371	15th Nov 13
0223	Power Meter	Hewlett Packard	EPM-442A	US37480256	15th Nov 13
0374	Power Sensor	Hewlett Packard	8485A	3318A19694	29th Nov 13
0158	Barometer /Thermometer	Control Co.	4196	E2846	8th Dec 13
0193	EMI Receiver	Rhode & Schwartz	ESI 7	838496/007	2nd Dec 13
0287	EMI Receiver	Rhode & Schwartz	ESIB40	100201	16th Nov 13
0338	30 - 3000 MHz Antenna	Sunol	JB3	A052907	8th Nov 13
0335	1-18 GHz Horn Antenna	EMCO	3117	00066580	7th Nov 13
0252	SMA Cable	Megaphase	Sucoflex 104	None	N/A
0293	BNC Cable	Megaphase	1689 1GVT4	15F50B001	N/A
0307	BNC Cable	Megaphase	1689 1GVT4	15F50B002	N/A
0310	2m SMA Cable	Micro-Coax	UFA210A-0-0787-3G03G0	209089-001	N/A
0312	3m SMA Cable	Micro-Coax	UFA210A-1-1181-3G0300	209092-001	N/A
0314	30dB N-Type Attenuator	ARRA	N9444-30	1623	N/A
	EMC Test Software	EMISoft	Vasona	5.0051	N/A
	RF Conducted Test Software	National Instruments	Labview	Version 8.2	N/A
	RF Conducted Test Software	MiCOM Labs ATS		Version 1.5	N/A

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APPENDIX

A. SUPPORTING INFORMATION

A.1. CONDUCTED TEST PLOTS