166 South Carter, Genoa City, WI 53128

Company:	Ubiquiti Networks, Inc.
Model Tested:	AF5
Report Number:	20083
DLS Project:	6614

Code of Federal Regulations 47 Part 15 – Radio Frequency Devices

Subpart E – Unlicensed National Information Infrastructure Devices
Section 15.407
General Technical Requirements.

30 MHz Bandwidth Data

THE FOLLOWING **MEETS** THE ABOVE TEST SPECIFICATION
(DFS not tested by DLS Electronic Systems Inc.)

Formal Name:	Air Fiber 5 - 5.4GHz Radio
Kind of Equipment:	Point-to-Point Digital Transmission Transceiver
Frequency Range:	**5486 to 5709 MHz**
Test Configuration:	Pole Mounted
Model Number(s):	AF5
Model(s) Tested:	AF5
Serial Number(s):	RF Conducted Unit: MAC address: 02:27:22:DA:5F:24 Radiated Unit: MAC address: 02:27:22:DA:5F:29
Date of Tests:	May 12th to May 20th, 2014
Test Conducted For:	Ubiquiti Networks, Inc. 12F, No105, Song Ren Rd Taipei, Taiwan

NOTICE: "This test report relates only to the items tested and must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government". Please see the "Description of Test Sample" page listed inside of this report.

166 South Carter, Genoa City, WI 53128

Company:	Ubiquiti Networks, Inc.
Model Tested:	AF5
Report Number:	20083
DLS Project:	6614

SIGNATURE PAGE

Tested By:

Craig Brandt
Senior Test Engineer

Reviewed By:

William Stumpf
OATS Manager

Approved By:

Brian Mattson
General Manager

Table of Contents

United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 100276-0

D.L.S. Electronic Systems, Inc.
Wheeling, IL

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

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

2013-10-01 through 2014-09-30
Effective dates

For the National Institute of Standards and Technology

NVLAP-01C (REV. 2009-01-28)

1.0 Summary of Test Report

It was determined that the Ubiquiti Networks Air Fiber 5 - 5.4GHz Radio, Model: AF5 with a 30MHz channel bandwidth, complies with the requirements of CFR 47 Part 15 Subpart E Section 15.407 .

Subpart E Section 15.407 Applicable Technical Requirements Tested:

Section	Description	Procedure	Note	Compliant?
Informative 15.35(c)	Duty Cycle	FCC KDB 789033 D01 General UNII Test Procedures v01r03 Section B(2)(b)	1	NA
Informative	99 Percent Occupied Bandwidth	FCC KDB 789033 D01 General UNII Test Procedures v01r03 Section D	1	NA
15.407(a)(2)	Maximum Conducted Output Power	FCC KDB 789033 D01 General UNII Test Procedures v01r03 Section E(3)(a)	1	Yes
15.407(b)(7) & 15.205	Unwanted Emission Levels – Radiated Restricted Band-Edge (with antenna connected)	FCC KDB 789033 D01 General UNII Test Procedures v01r03 Sections H(1), H(3), H(5), H(6) & H(6)(c)	2	Yes
15.407(a)(2)	Peak Power Spectral Density - Conducted	FCC KDB 789033 D01 General UNII Test Procedures v01r03 Section E(2)(b)	1	Yes
15.407(a)(6)	Peak Excursion - Conducted	FCC KDB 789033 D01 General UNII Test Procedures v01r03 Section G	1	Yes
15.407(b)(3) & 15.407(b)(5)	Unwanted Emission Levels – Radiated Operating Band-Edge (with antenna connected)	FCC KDB 789033 D01 General UNII Test Procedures v01r03 Sections H, H(2), H(3), H(3)(d)(ii) & H(5)	2	Yes
15.407(b)(3) & 15.407(b)(6)	Unwanted Emission Levels – Radiated with integral antenna	FCC KDB 789033 D01 General UNII Test Procedures v01r03 Sections H(1), H(2), H(3)	2	Yes
15.407(h)(2)	Dynamic Frequency Selection (DFS)	Not tested by DLS		NA

Note 1: RF Conducted emission measurement.
Note 2: Radiated emission measurement.

2.0 Introduction

In May of 2014 the Air Fiber 5 - 5.4GHz Radio, Model: AF5, as provided from Ubiquiti Networks, was tested to the requirements of CFR 47 Part 15 Subpart E Section 15.407 to add a 30MHz channel bandwidth. To meet these requirements, the procedures contained within this report were performed by personnel of D.L.S Electronic Systems, Inc.

3.0 Test Facilities

D.L.S. Electronic Systems, Inc. is a full service EMC/Safety Testing Laboratory accredited to ISO 17025. NVLAP Certificate and Scope can be viewed at http://www.dlsemc.com/certificate. Our facilities are registered with the FCC, Industry Canada, and VCCI.

Wisconsin Test Facility:
D.L.S. Electronic Systems, Inc.
166 S. Carter Street
Genoa City, Wisconsin 53128

Wheeling Test Facility:
D.L.S. Electronic Systems, Inc.
1250 Peterson Drive
Wheeling, IL 60090

4.0 Description of Test Sample

Description:

The Ubiquiti Networks model AirFiber 5 is a 5.4Ghz and 5.8GHz Point-to-Point radio that uses OFDM with a 50MHz/40MHz/20MHz/10MHz and now a 30MHz bandwidth configuration. The EUT would be used outdoors and pole mounted. It is powered from a POE adapter. The integral antenna has a 23 dBi gain. This is an uncorrelated MIMO software defined radio. This report shows compliance of the addition of the 30MHz channel bandwidth.

Type of Equipment / Frequency Range:

Stand-Alone / 5476 to 5719 MHz (10 MHz bandwidth)
5481 to 5714 MHz (20 MHz bandwidth)
5486 to 5709 MHz (30 MHz bandwidth) (in this report)
5492 to 5703 MHz (40 MHz bandwidth)
5497 to 5698 MHz (50 MHz bandwidth)

(The 5.8 radio data is in a separate report.)

Physical Dimensions of Equipment Under Test:

Length: 93.8 cm. Width: 46.8 cm. Height: 28.1 cm.

Power Source:

50 VDC (Power Over Ethernet to Radio)
120 Vac, 60 Hz using Ubiquiti Networks power supply model: GP-C500-120G or
Ubiquiti Networks power supply model: PSA60M-500(G)-R
(for AC Line Conducted testing recorded in original test reports)

Internal Frequencies:

150 kHz (Switching Power Supply Frequency)
5.719 GHz (Highest Operating Frequency for the 5.4GHz radio)

Transmit / Receive Frequencies Used For Test Purpose:

10 MHz Channel Bandwidth:	Low channel: 5476 MHz, Middle channel: 5575 MHz, High channel: 5719 MHz
20 MHz Channel Bandwidth:	Low channel: 5481 MHz, Middle channel: 5575 MHz, High channel: 5714 MHz
30 MHz Channel Bandwidth:	Low channel: 5486 MHz, Middle channel: 5575 MHz, High channel: 5709 MHz

(Some testing performed at Low channel: 5485 MHz, High channel: 5710 MHz, but then the frequency range of operation was reduced for passing all the requirements.)

40 MHz Channel Bandwidth:	Low channel: 5492 MHz, Middle channel: 5575 MHz, High channel: 5703 MHz
50 MHz Channel Bandwidth:	Low channel: 5497 MHz, Middle channel: 5575 MHz, High channel: 5698 MHz

Type of Modulation(s):

OFDM: 1024QAM, 256QAM, 64QAM, 16QAM, QPSK

Description of Circuit Board(s) / Part Number:

Radio PC Board	11-02042-05 Rev 7

5.0 Test Equipment

A list of the equipment used can be found in the table below. All primary equipment was calibrated against known reference standards with a verified traceable path to NIST.

D.L.S. Wisconsin

1-18 GHz

Description	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Date	Cal Due Dates
Receiver	Rohde & Schwarz	ESI 40	837808/005	20 Hz – 40 GHz	7-23-13	7-23-14
Test Software	Rohde & Schwarz	ESK-1	V1.7.1	N/A	N/A	N/A
Horn Antenna	EMCO	3115	9903-5731	1-18GHz	7-11-13	7-11-15
Preamp	Miteq	AMF-7D-01001800-22-10P	17779900	1GHz-18GHz	2-12-14	2-12-15
Filter- High-Pass	Planar Filter Co.	HP8G-7Q8-CD-SFF	PF1226/0728	7.5GHz-18GHz	8-14-13	8-14-14

additional for 18-40 GHz

Description	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Date	Cal Due Dates
Preamp	Miteq	AMF-8B-180265-40-10P-H/S	438727	18GHz-26.5GHz	8-12-13	8-12-14
Preamp	Rohde & Schwarz	TS-PR40	052002/025	26GHz-40GHz	5-28-13	5-28-14
Horn Antenna	ETS Lindgren	3116	00062917	18 – 40GHz	8-15-13	8-15-15
High Pass Filter	K & l	11SH10-18000/T40000-K-K	8	18-40GHz	3-6-14	3-6-15

Other

Description	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Date	Cal Due Dates
20 dB attenuator	MCE/Weinschel	5955A-20	0256	DC – 40 GHz	8-16-13	8-16-14
20 dB attenuator	Aeroflex/Weinschel	75A-20-12	1071	DC – 40 GHz	8-16-13	8-16-14
Power Meter	Anritsu	ML2487A	6K00002069	N/A	2-27-14	2-27-15
Power Sensor	Anritsu	MA24002A	1204359	10 MHz – 18 GHz	2-28-14	2-28-15
50 Ohm Load	Pasternack	PE6039	NA	DC – 18 GHz	NA	NA
50 Ohm Load	Pasternack	PE6095	NA	DC – 18 GHz	NA	NA

6.0 Test Arrangements

RF Conducted Emissions Measurement Arrangement:

All RF conducted emission measurements were performed at D.L.S. Electronic Systems, Inc. and set up according to FCC Publication KDB 789033 D01 General UNII test Procedures v01r03 and ANSI C63.10-2009, unless otherwise noted. Description of procedures and measurements can be found in Appendix B – Measurement Data. See Appendix A for photos of the test set up.

Radiated Emissions Measurement Arrangement:

All radiated emission measurements were performed at D.L.S. Electronic Systems, Inc. and set up according to ANSI C63.10-2009, unless otherwise noted. Description of procedures and measurements can be found in Appendix B – Measurement Data. See Appendix A for photos of the test set up.

Unless otherwise noted, the bandwidth of the measuring receiver / analyzer used during testing is shown below.

Frequency Range	Bandwidth (-6 dB)
10 to 150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz
30 MHz to 1 GHz	120 kHz
Above 1 GHz	1 MHz

7.0 Test Conditions

Normal Test Conditions:

Temperature and Humidity:

73° F at 58 % RH (or noted on the test data)

Supply Voltage:

50 VDC (Power Over Ethernet to Radio)
120 Vac, 60 Hz using Ubiquiti Networks power supply model: GP-C500-120G or
Ubiquiti Networks power supply model: PSA60M-500(G)-R
(for AC Line Conducted testing recorded in original test reports)

8.0 Modifications Made To EUT For Compliance

No modifications were made to the EUT at the time of test.

9.0 Additional Descriptions

Testing was performed at low, mid, and high channels over the 30MHz modulation bandwidth. All 5 OFDM modulations types have been tested (1024QAM, 256QAM, 64QAM, 16QAM, & QPSK). The antenna ports were tested (Channel 0 & 1). AC line conducted testing was performed (in transmit mode) for the original certification testing of this radio.

Test Software: Telnet Command Line Interface and AF02 version 21

10.0 Results

Measurements were performed in accordance with FCC Publication KDB 789033 D01 General UNII test Procedures v01r03 and ANSI C63.10-2009. Graphical and tabular data can be found in Appendix B at the end of this report.

11.0 Conclusion

Dynamic Frequency Selection (DFS) testing was not performed by DLS Electronic Systems,Inc. Otherwise, the Air Fiber 5 - 5.4GHz Radio, Model: AF5 with a 30MHz channel bandwidth, as provided from Ubiquiti Networks tested in May 2014 **meets** the requirements of CFR 47 Part 15 Subpart E Section 15.407.

Appendix A – Test Photos

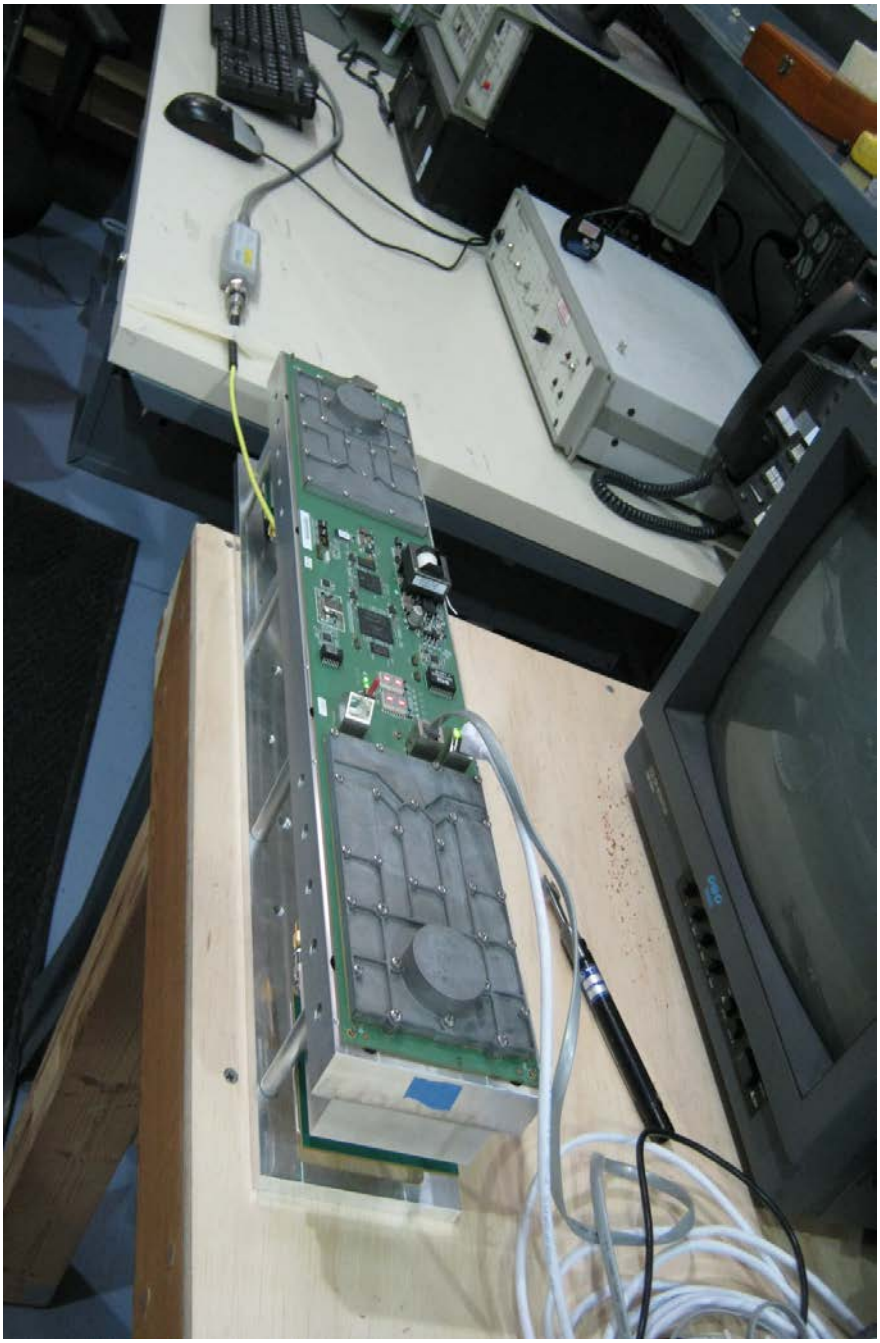
Photo Information and Test Setup:

Air Fiber 5 - 5.4GHz Radio, Model: AF5
with Shielded Power Over Ethernet Cable, 15 meters long

Radiated - above 1 GHz

Appendix A – Test Photos

RF Conducted / Output Power



Appendix A – Test Photos

RF Conducted / In Band Emissions

Appendix B – Measurement Data

B1.0 Duty Cycle of Test Unit

Rule Part: FCC Section 15.35(c)

Test Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r03 – *Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E*
Section B(2)(b) – Duty cycle (x)

Center frequency = center of emission
RBW ≥ OBW (otherwise, RBW = largest possible)
VBW ≥ RBW
Detector = Peak or Average
Span = Zero Span
Verify both RBW and VBW are > 50/minimum transmission duration (T)
Verify the number of sweep points across T exceeds 100

Limits: Informative. Use correction factor if duty cycle is less than 100% (x < 1).

Results: 30 MHz BW mode: Requires a correction factor of 0.088 dB

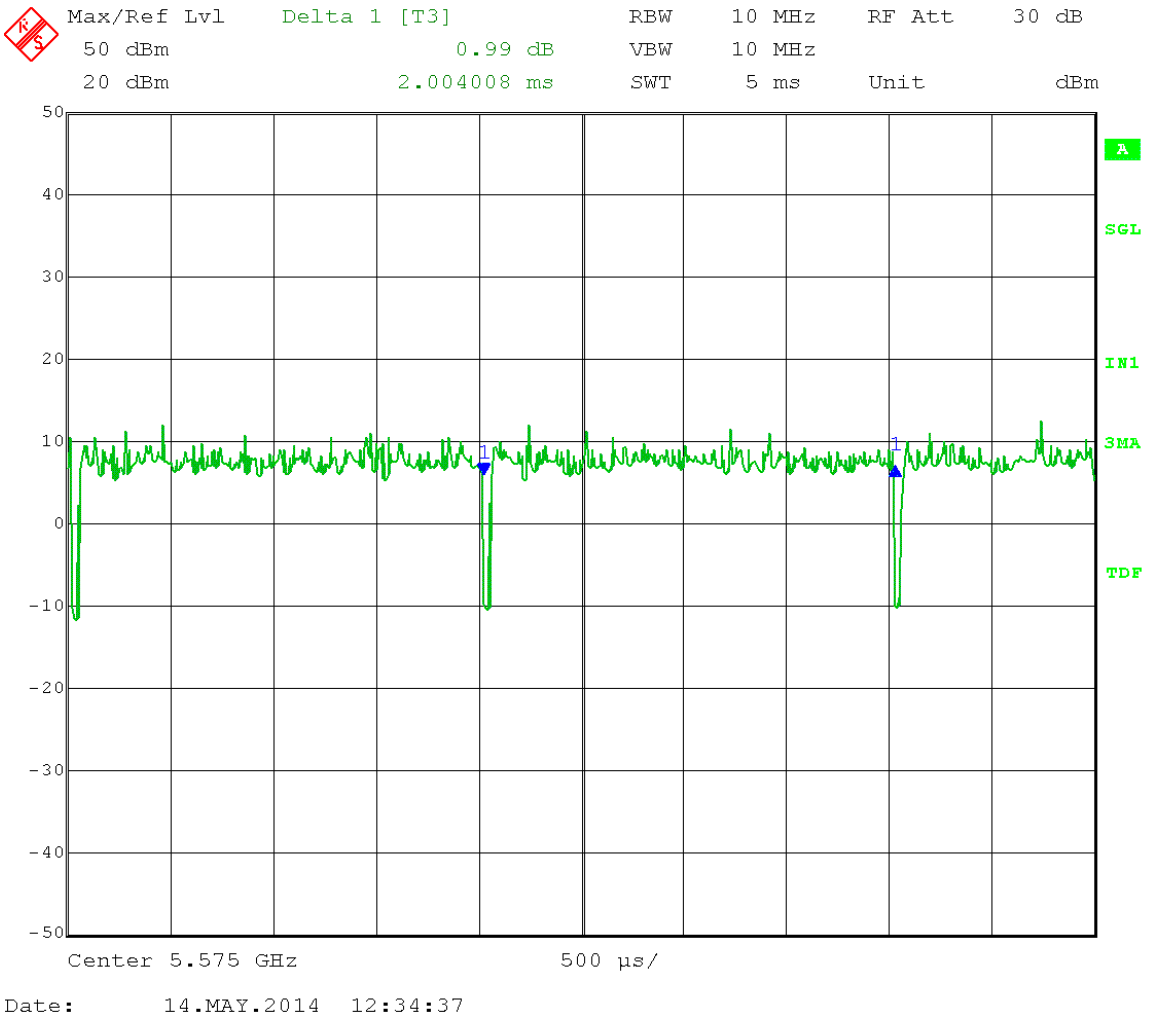
Sample Equations: Total Cycle time = 2.004008 ms
Total on Time = 1.96392784 ms
Duty cycle factor x = 1.96392784 / 2.004008 = 0.98
Correction for duty cycle = 10 log (1/x) = 0.088 dB

Notes: Measurements were taken for QPSK modulation at the middle channel of operation. EUT was set to transmit continuously.

Output power was set to 30 dBm eirp using special test software.

Test Date: 5-14-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: Duty Cycle during testing
Operator: Steve D
Comment: FCC UNII operating under 15.407 – OET 4/8/2013
- B)2)b) Duty Cycle measurement: zero-span method(Page 3)
RBW = 10 MHz VBW = 10 MHz
Span = 0 Hz SWT = 5 ms
Mid Channel: Transmit = 5.575GHz 30MHz BW QPSK
Total Cycle time = 2.004008
Total on Time = 2.004008ms-40.080160us = 1.96392784 ms

Duty cycle factor x = 1.96392784 / 2.004008= 0.98
Adjustment for duty cycle =10log(1/x) = 0.088



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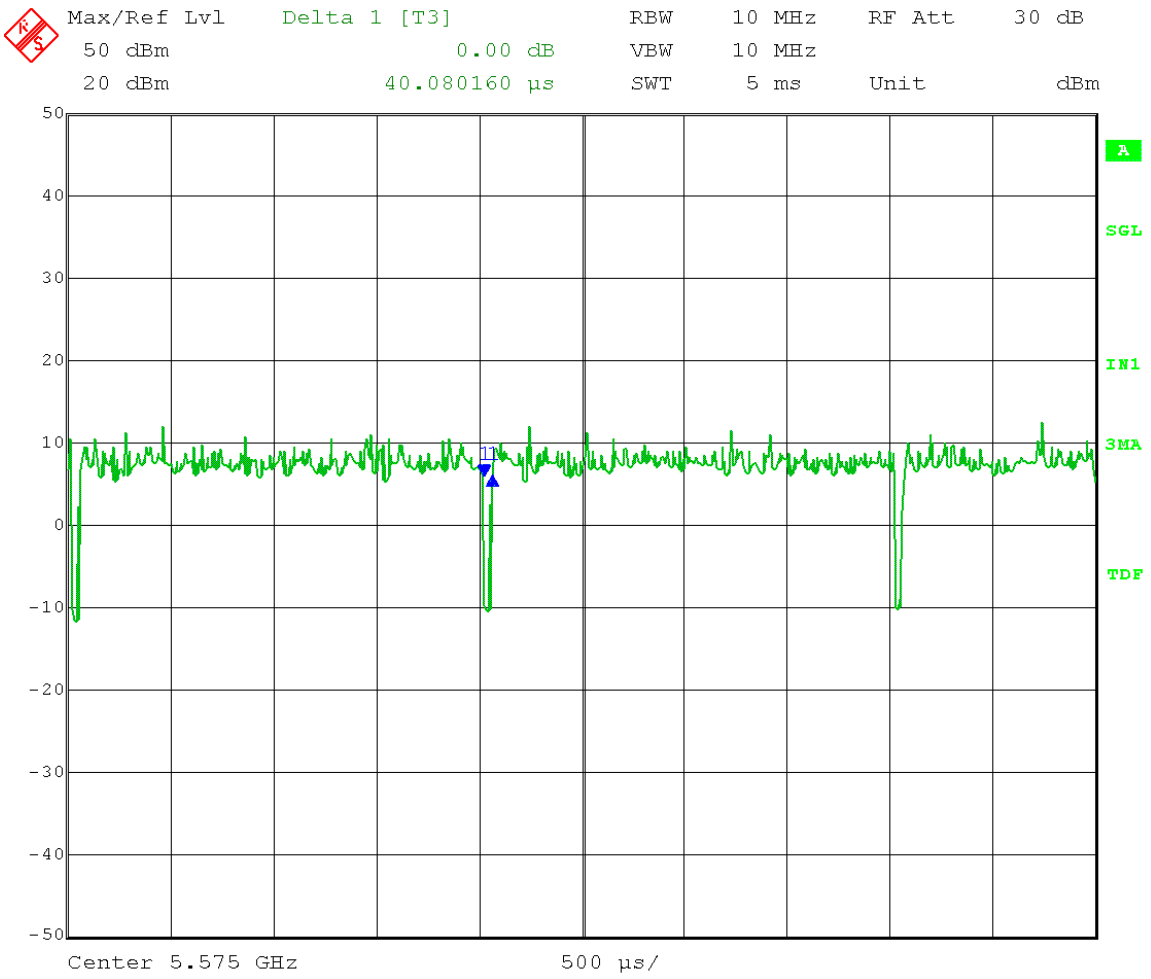


Date: 14.MAY.2014 12:35:43

Appendix B – Measurement Data

B2.0 99 Percent Occupied Bandwidth

Rule Section: Informative

Test Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r03 – *Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E*

Section D – 99 Percent Occupied Bandwidth

Description: SPAN = 1.5 to 5 times the OBW
RBW = 1% to 5% of OBW
VBW ≥ 3 x RBW
Detector = Peak
Trace mode = max hold

Measure the width of the emission using the 99% power bandwidth function of the spectrum analyzer

Limit: Informative.
The emission designator:
30 MHz BW: 30M0x1D

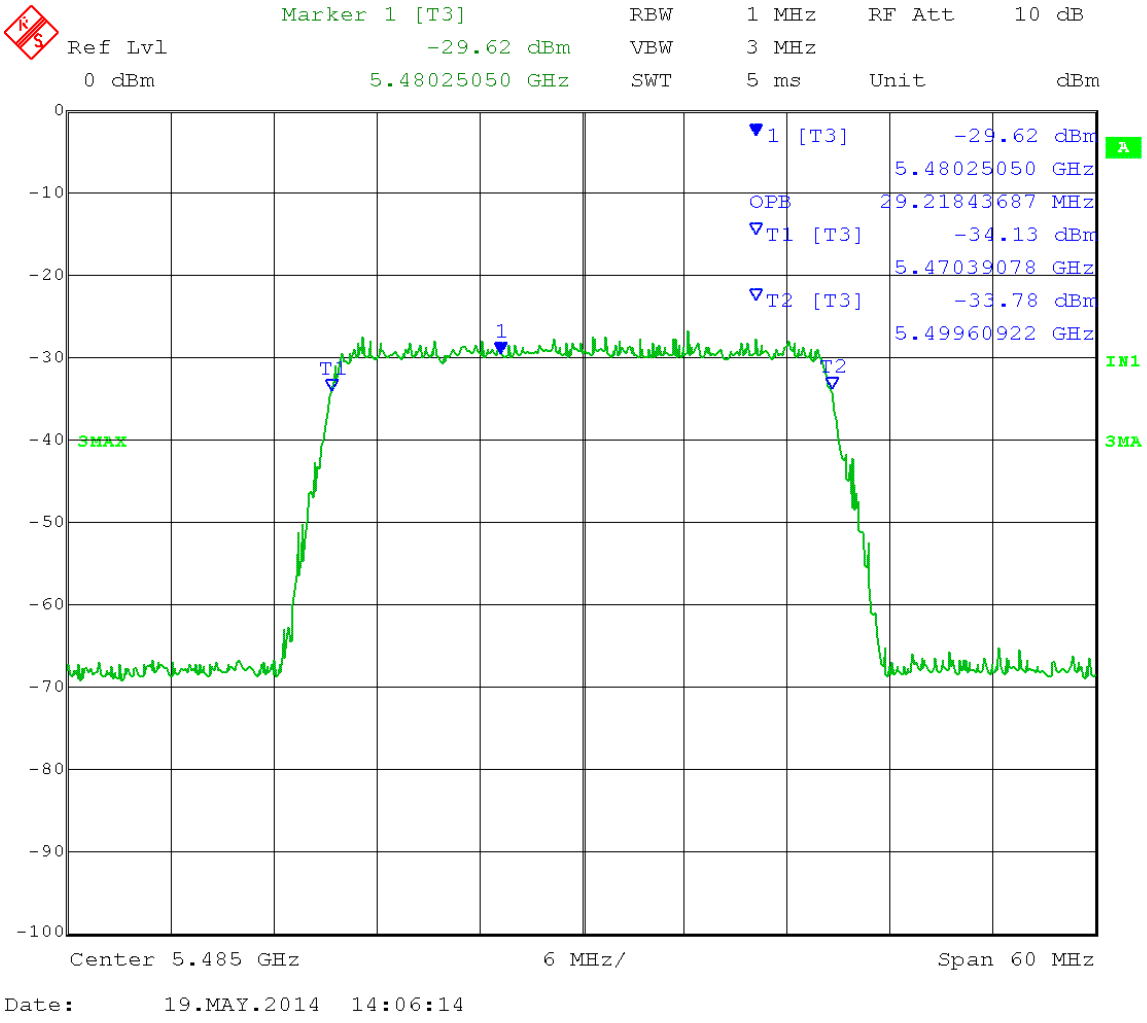
Notes: Measurements were taken for QPSK, 16QAM, 64QAM, 256QAM and 1024QAM modulations at the lowest, middle, and highest channels of operation. EUT was set to transmit continuously.

Output power was set to 30 dBm eirp using special test software.

Test Date: 5-14-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: 99% Occupied Bandwidth - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- D) 99% Occupied Bandwidth (Page 4)
RBW = 1 MHz VBW = 3 MHz
Low Channel: Transmit = 5.485 GHz 30MHz BW 16QAM
Output power setting: 30 dBm

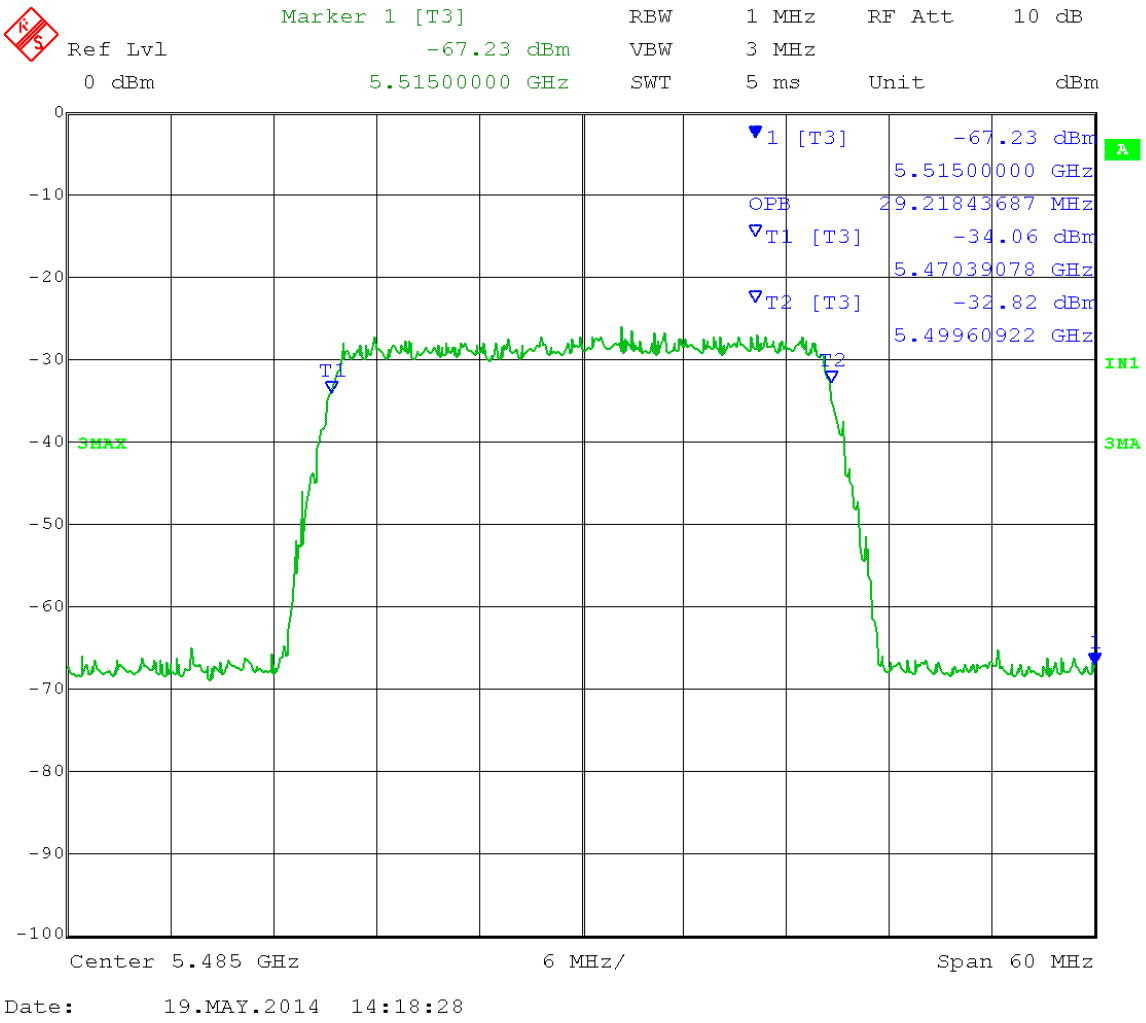
Channel 0:

99% OBW = 29.22MHz



Channel 1:

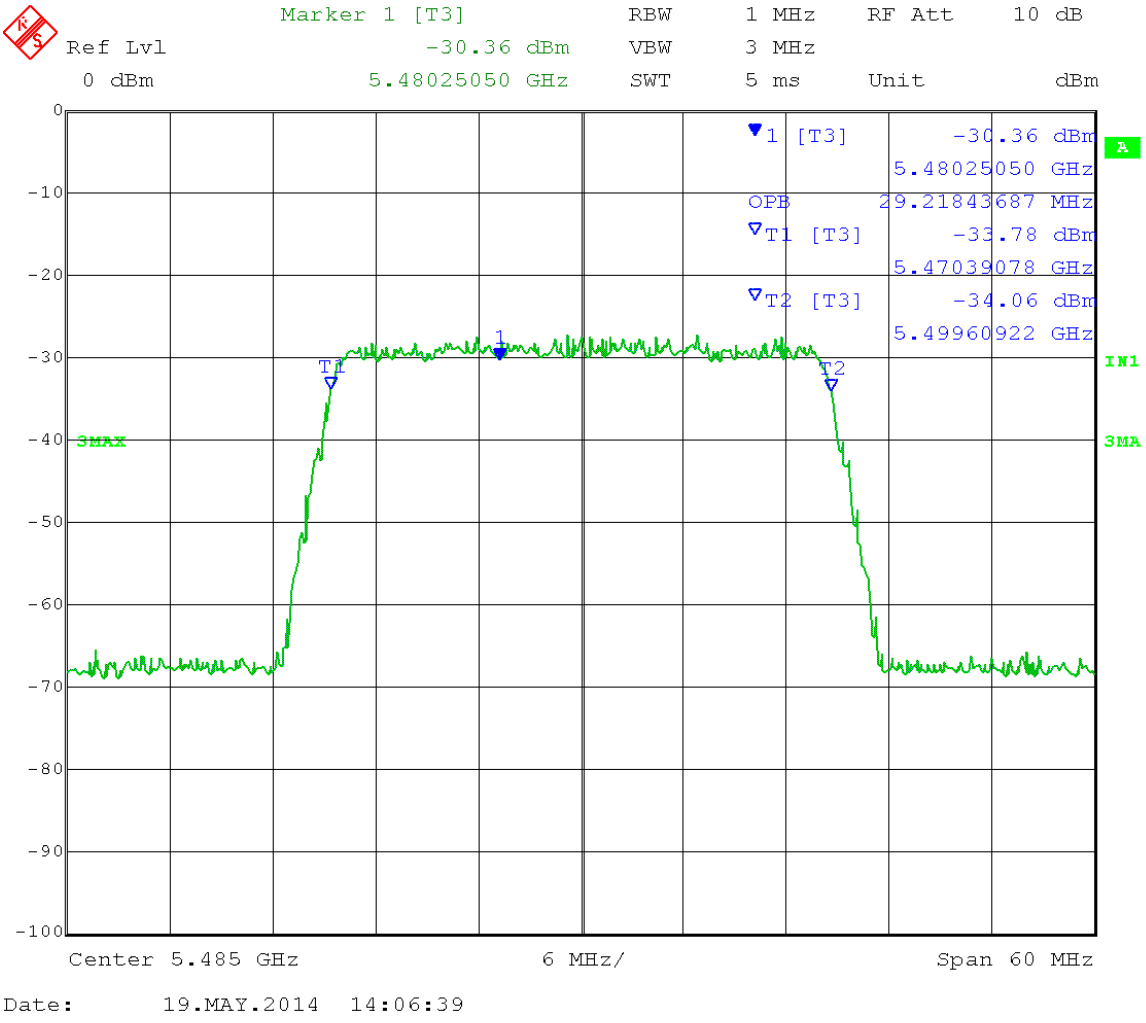
99% OBW = 29.22MHz



Test Date: 5-14-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: 99% Occupied Bandwidth - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- D) 99% Occupied Bandwidth (Page 4)
RBW = 1 MHz VBW = 3MHz
Low Channel: Transmit = 5.485 GHz 30MHz BW 64QAM
Output power setting: 30 dBm

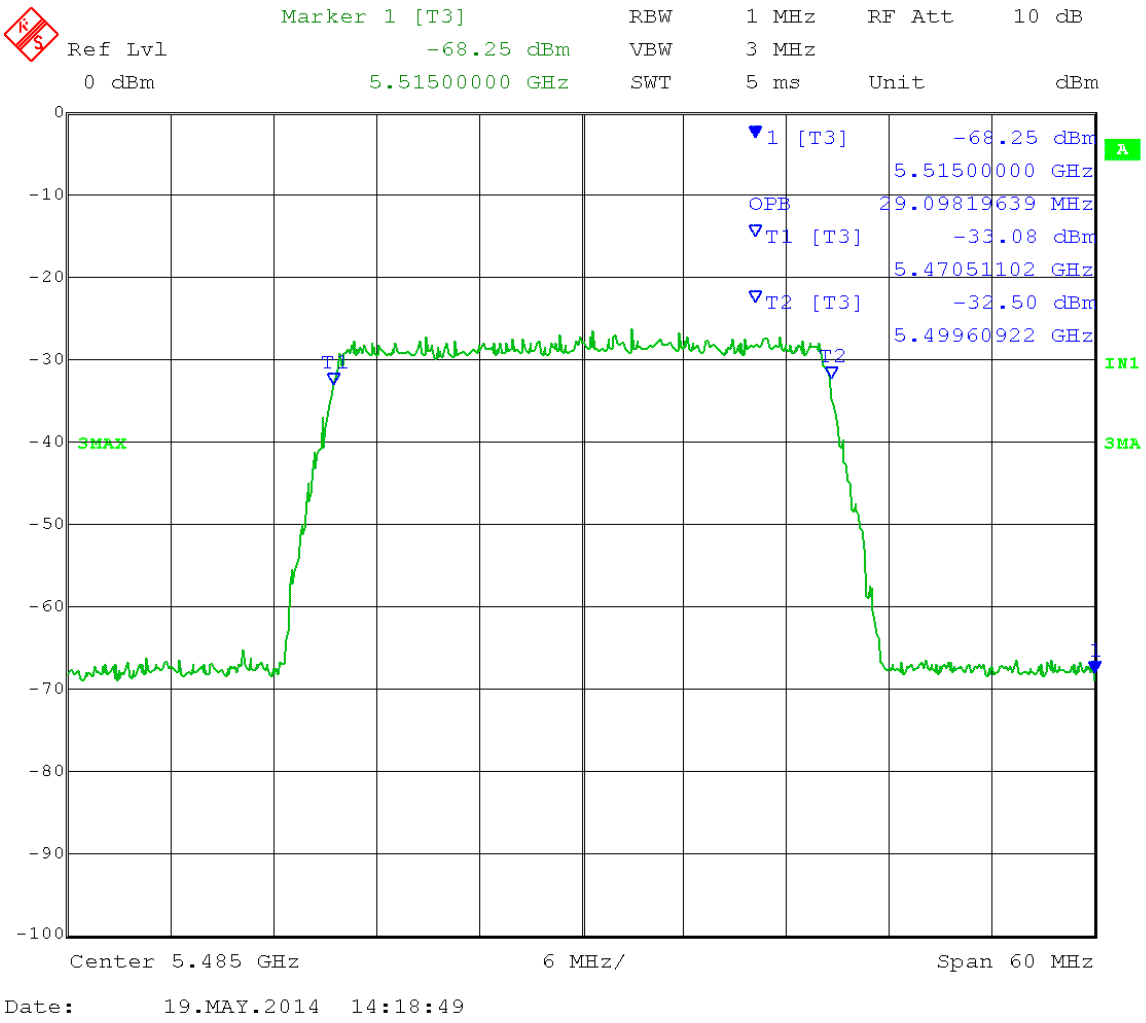
Channel 0:

99% OBW = 29.22 MHz



Channel 1:

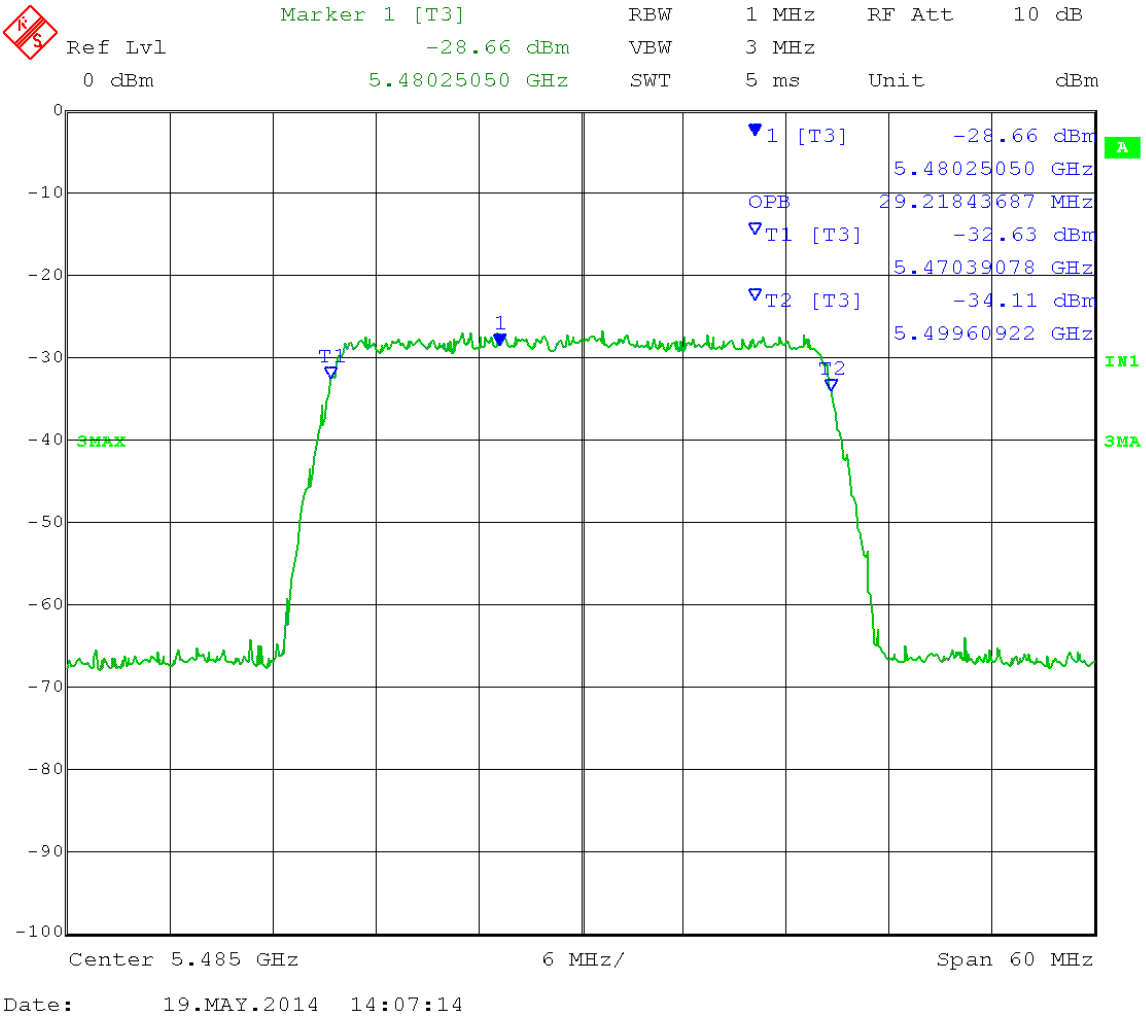
99% OBW = 29.10MHz



Test Date: 5-14-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: 99% Occupied Bandwidth - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- D) 99% Occupied Bandwidth (Page 4)
RBW = 1 MHz VBW = 3 MHz
Low Channel: Transmit = 5.485 GHz 30MHz BW 256QAM
Output power setting: 30 dBm

Channel 0:

99% OBW = 29.22 MHz



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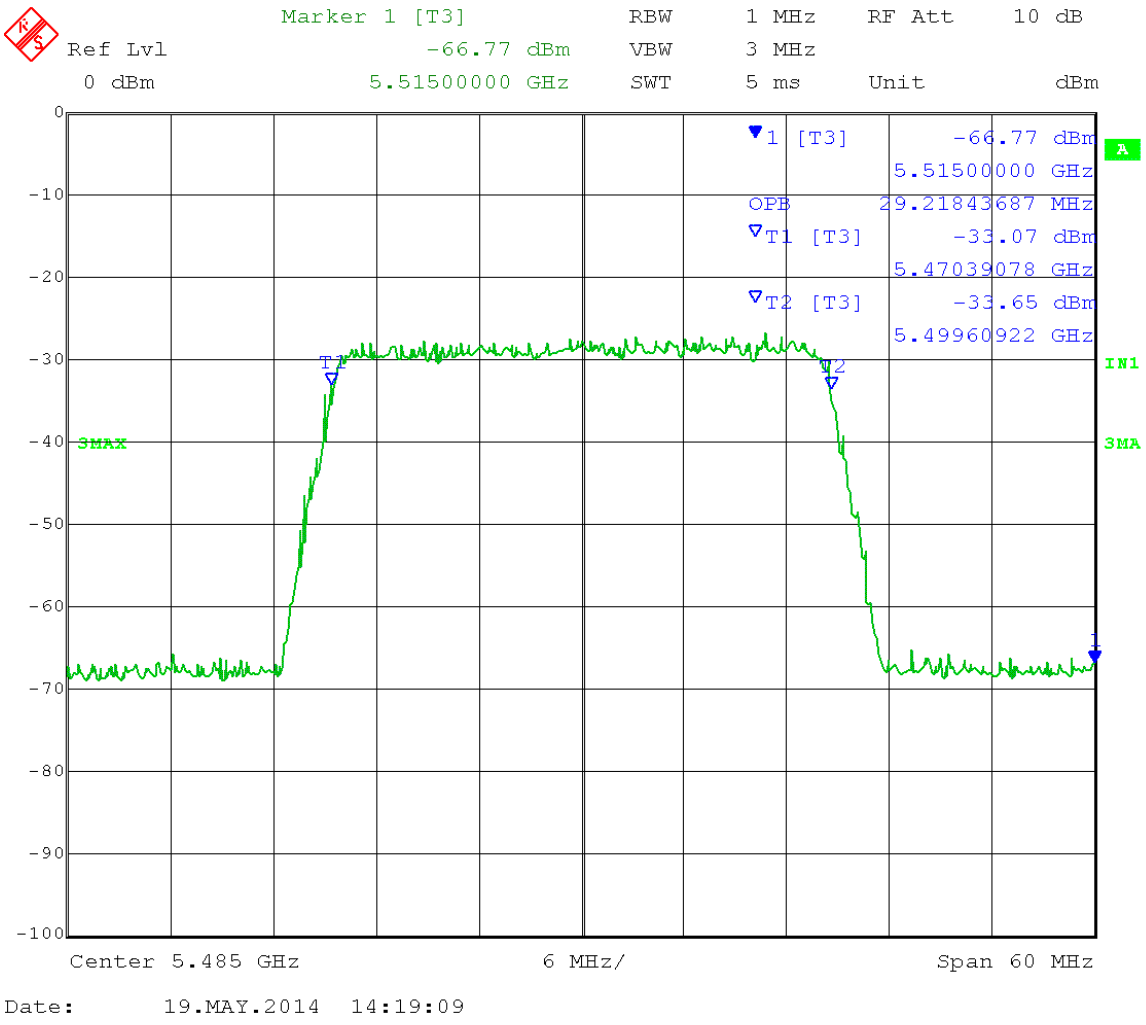
Channel 1:

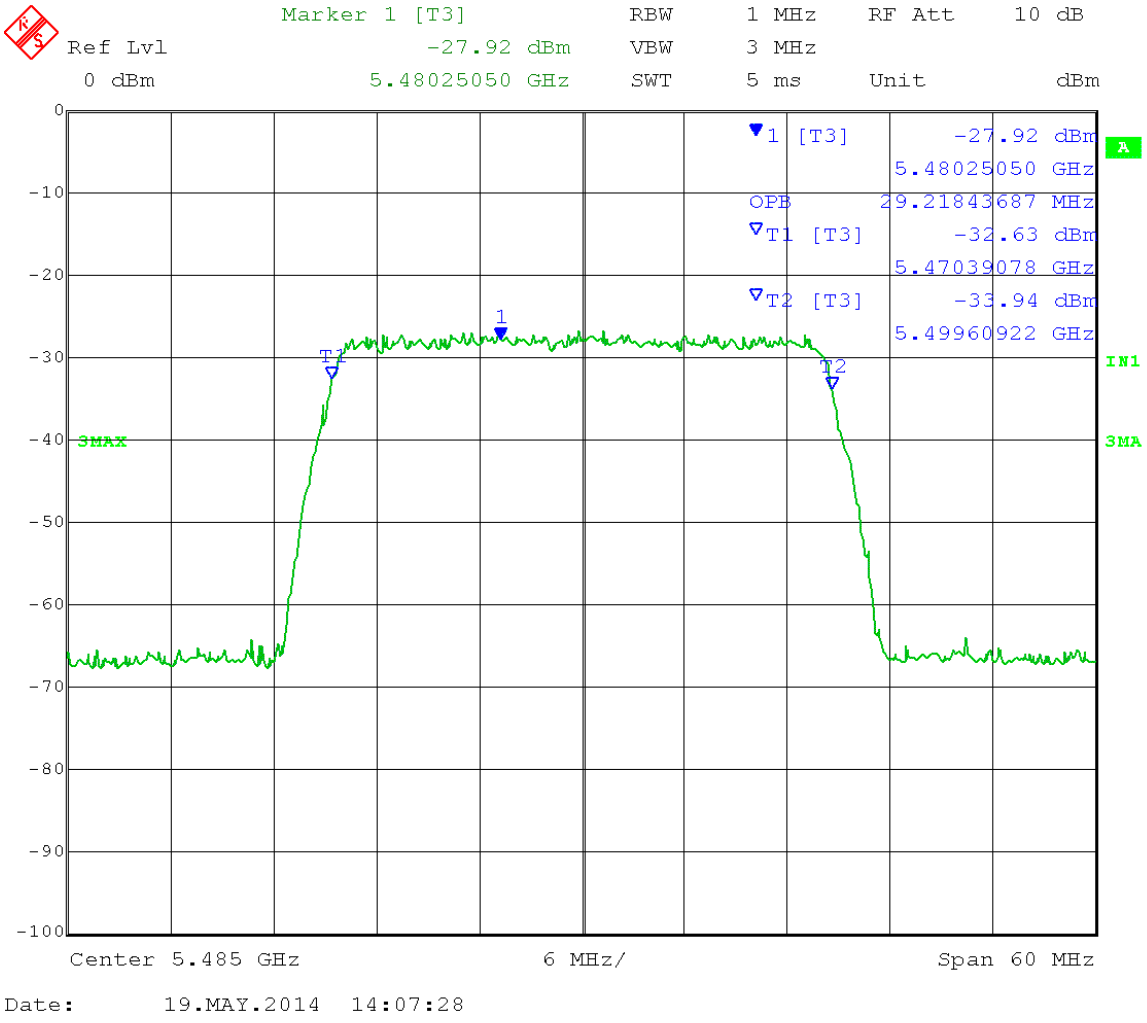
99% OBW = 29.22 MHz



Test Date: 5-14-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: 99% Occupied Bandwidth - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- D) 99% Occupied Bandwidth (Page 4)
RBW = 1 MHz VBW = 3MHz
Low Channel: Transmit = 5.485 GHz 30MHz BW 1024QAM
Output power setting: 30 dBm

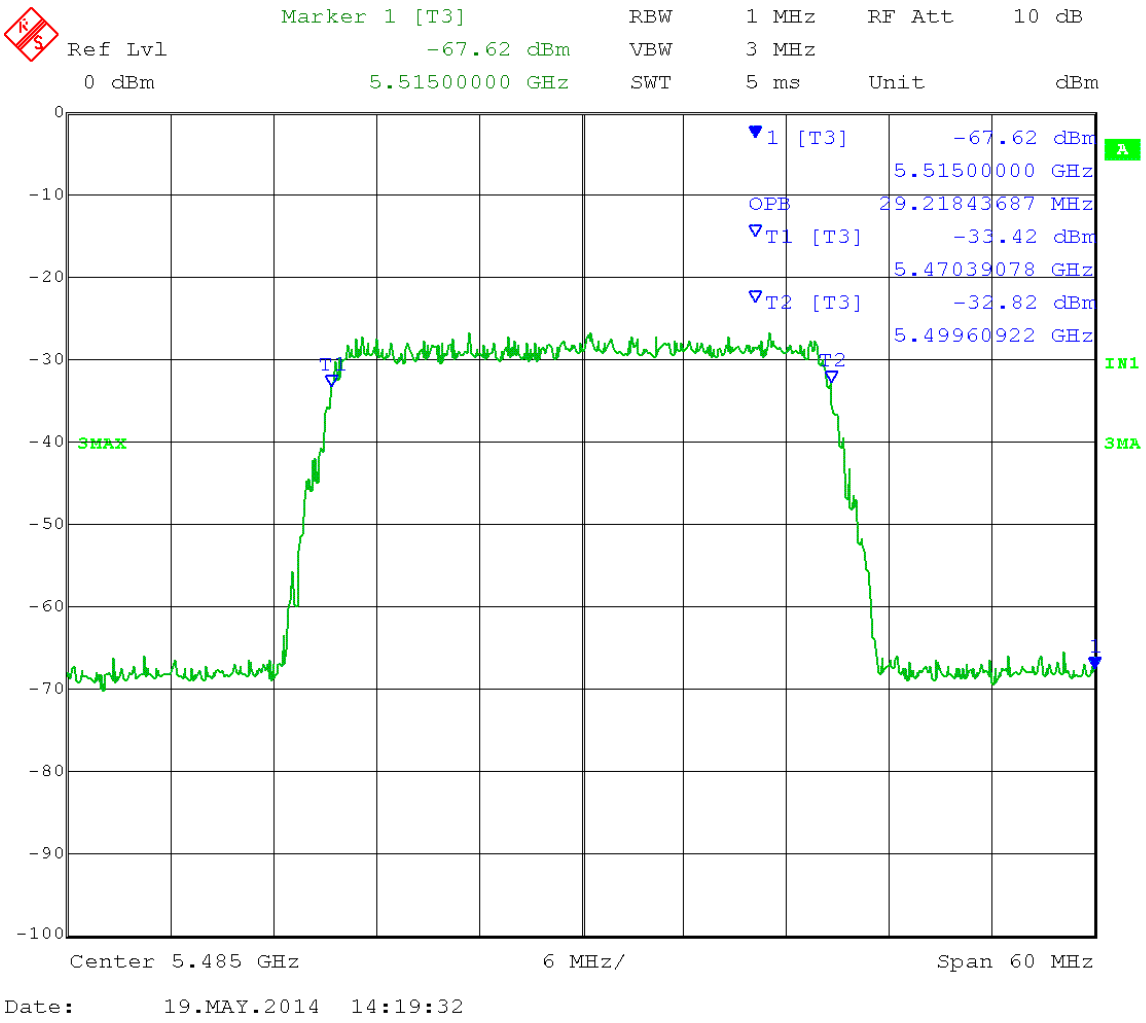
Channel 0:

99% OBW = 29.22 MHz



Channel 1:

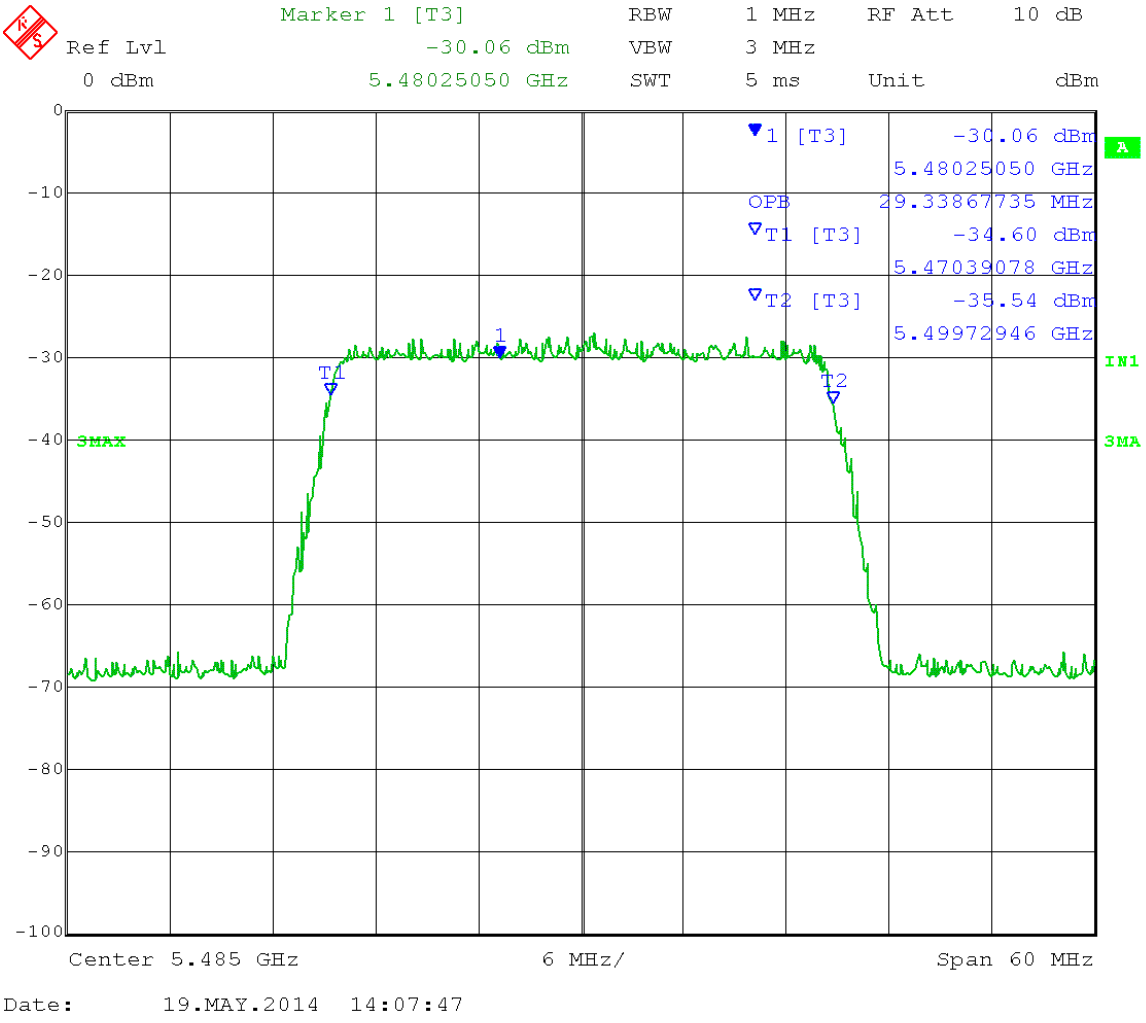
99% OBW = 29.22 MHz



Test Date: 5-14-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: 99% Occupied Bandwidth - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- D) 99% Occupied Bandwidth (Page 4)
RBW = 1 MHz VBW = 3 MHz
Low Channel: Transmit = 5.485 GHz 30MHz BW QPSK
Output power setting: 30 dBm

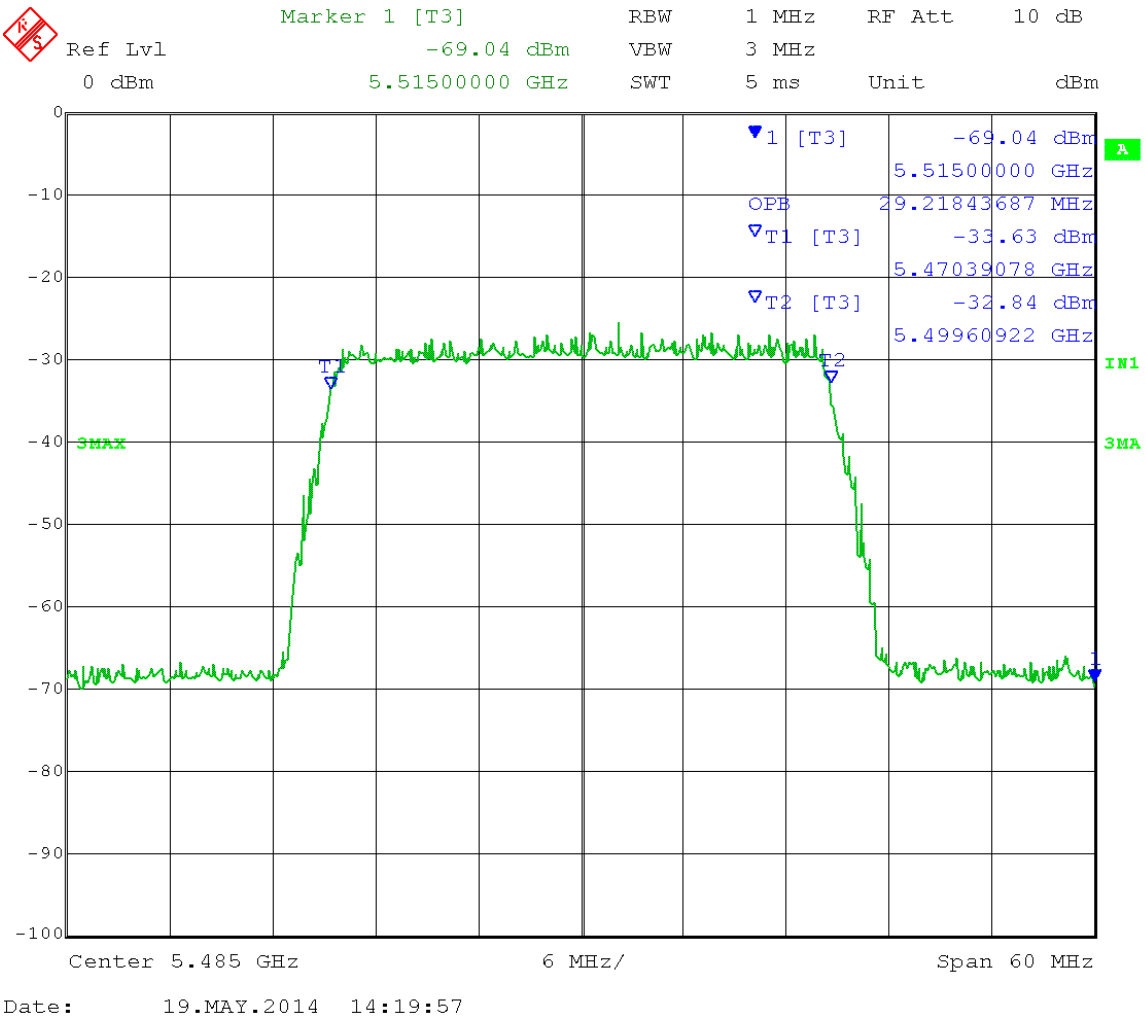
Channel 0:

99% OBW = 29.34MHz



Channel 1:

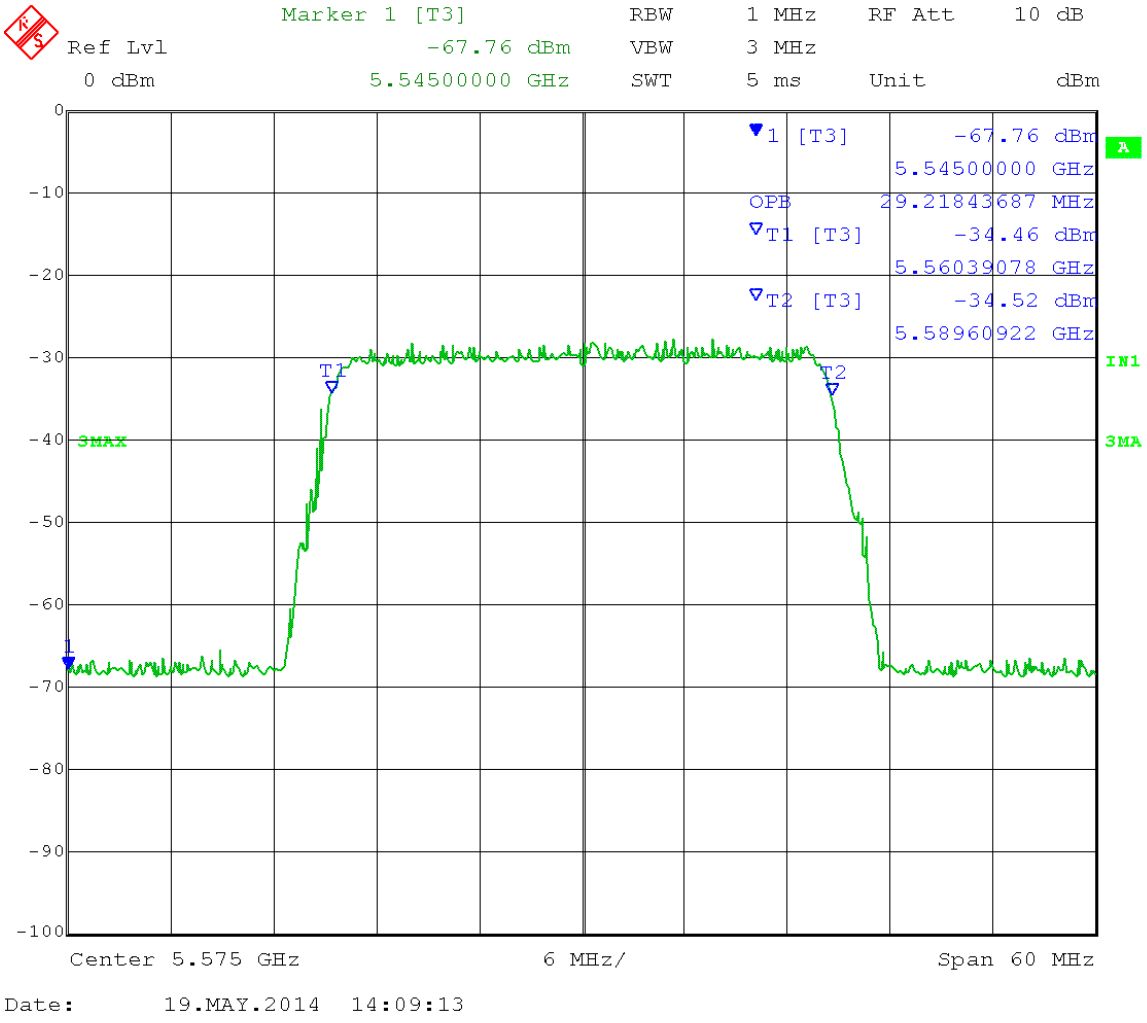
99% OBW = 29.22 MHz



Test Date: 5-14-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: 99% Occupied Bandwidth - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- D) 99% Occupied Bandwidth (Page 4)
RBW = 1 MHz VBW = 3MHz
Mid Channel: Transmit = 5.575 GHz 30MHz BW 16QAM
Output power setting: 30 dBm

Channel 0:

99% OBW = 29.22 MHz



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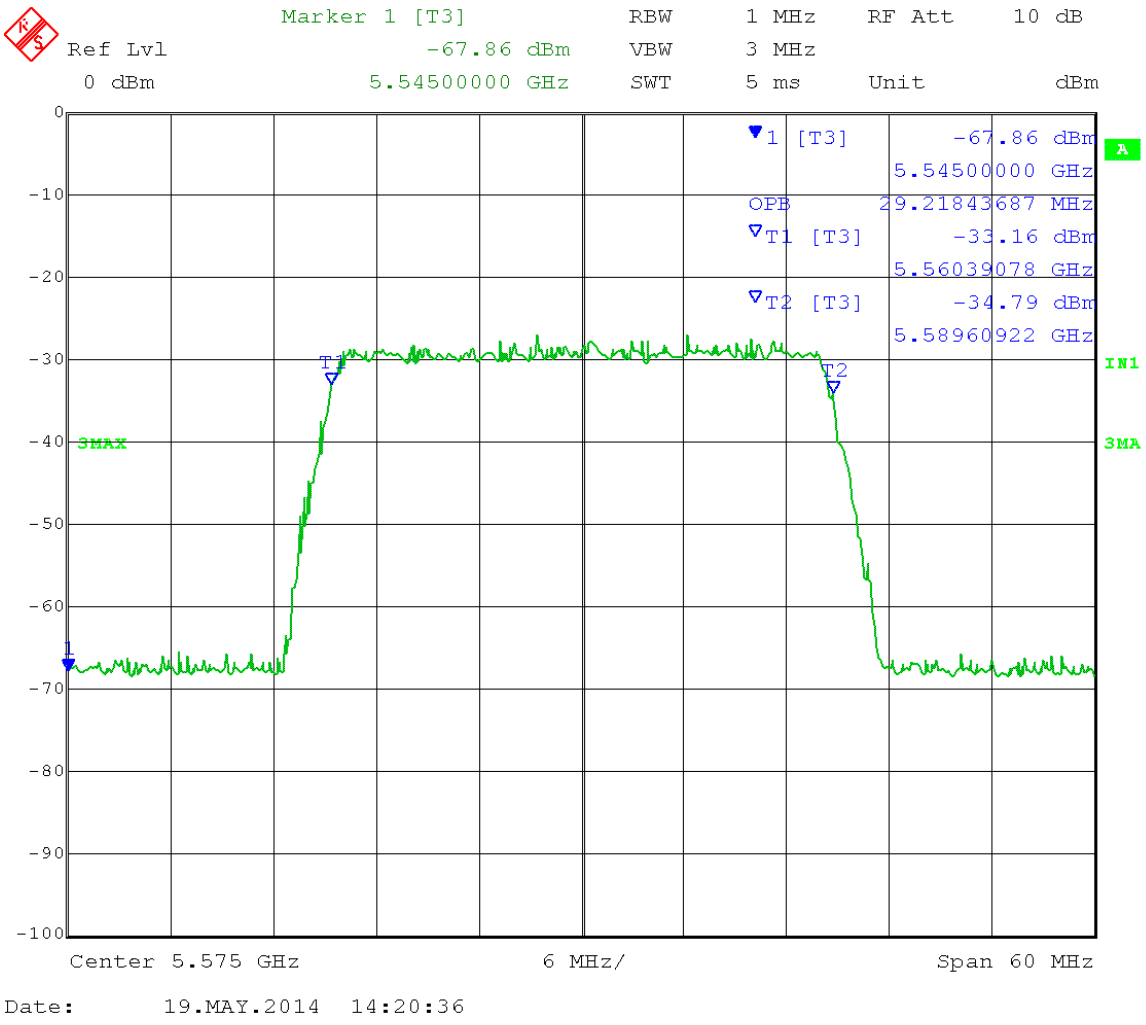
Channel 1:

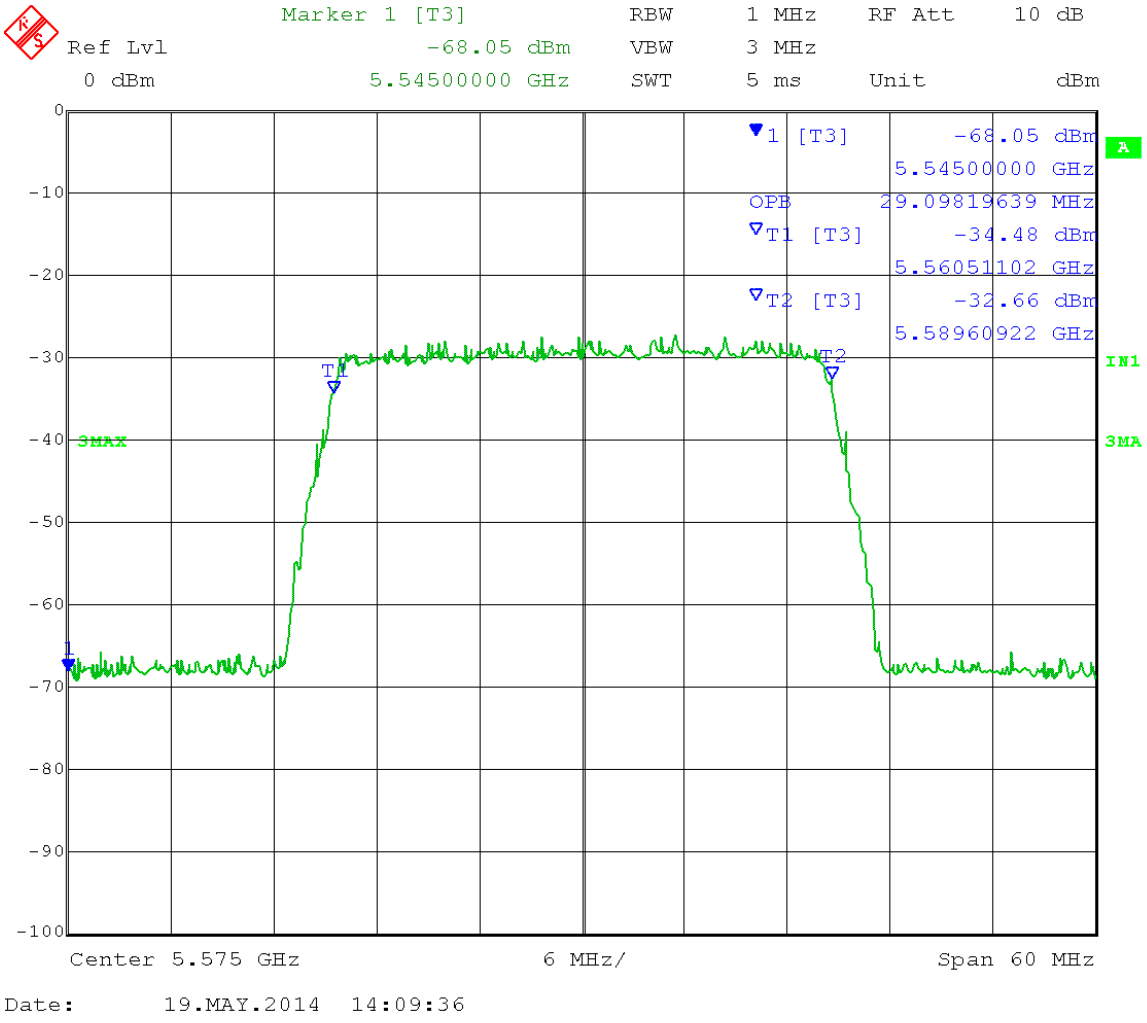
99% OBW = 29.22 MHz



Test Date: 5-14-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: 99% Occupied Bandwidth - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- D) 99% Occupied Bandwidth (Page 4)
RBW = 1 MHz VBW = 3MHz
Mid Channel: Transmit = 5.575 GHz 30MHz BW 64QAM
Output power setting: 30 dBm

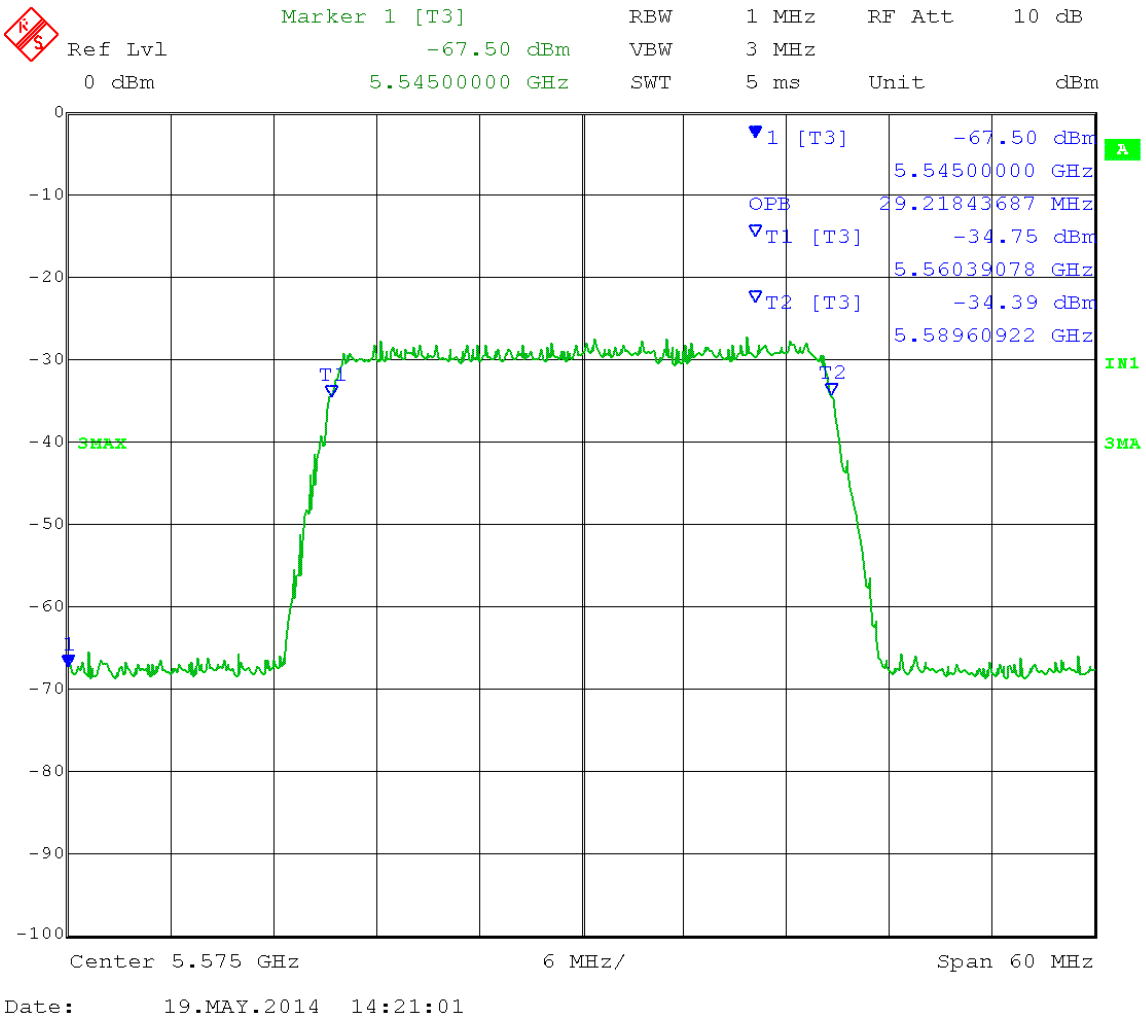
Channel 0:

99% OBW = 29.10 MHz



Channel 1:

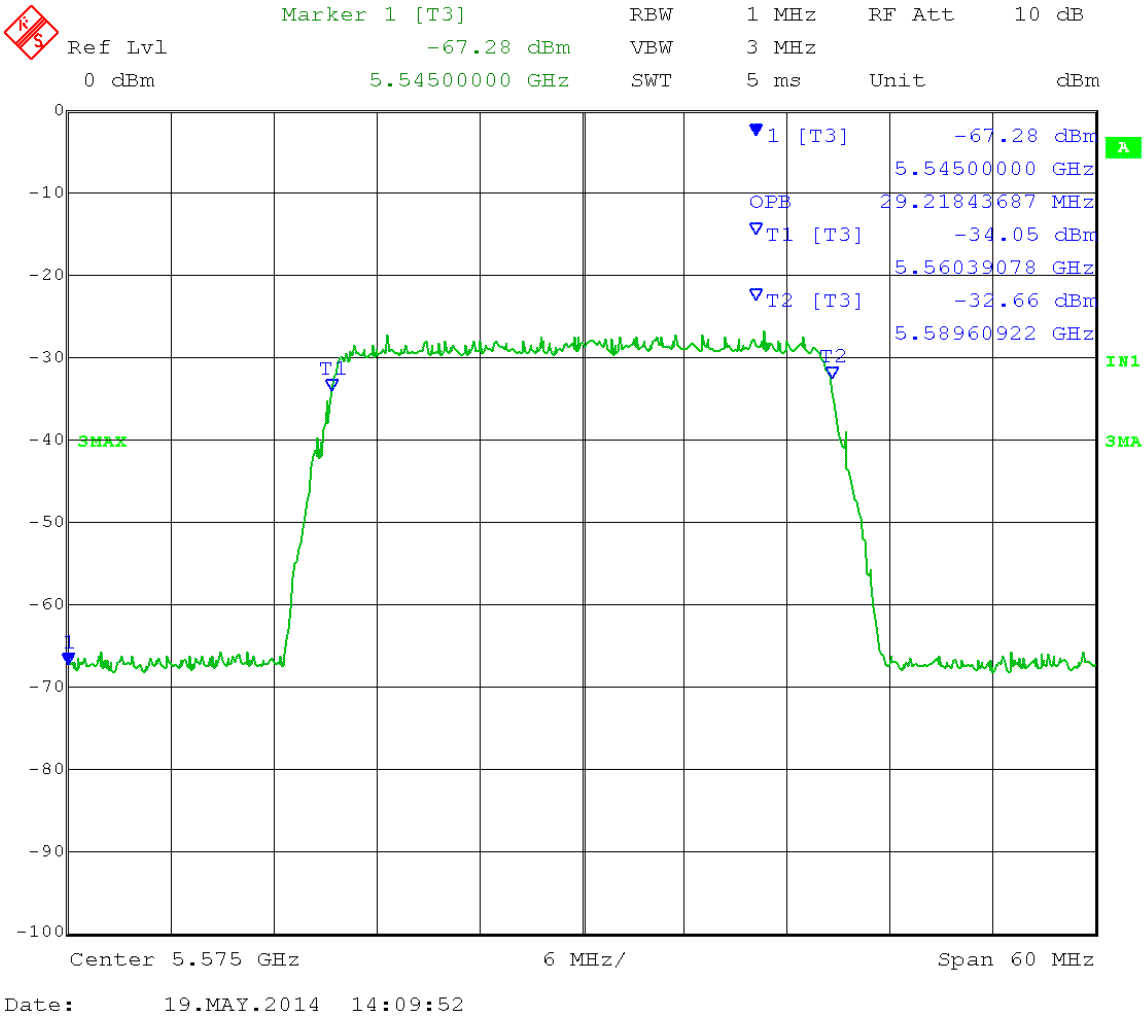
99% OBW = 29.22 MHz



Test Date: 5-14-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: 99% Occupied Bandwidth - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- D) 99% Occupied Bandwidth (Page 4)
RBW = 1 MHz VBW = 3 MHz
Mid Channel: Transmit = 5.575 GHz 30MHz BW 256QAM
Output power setting: 30 dBm

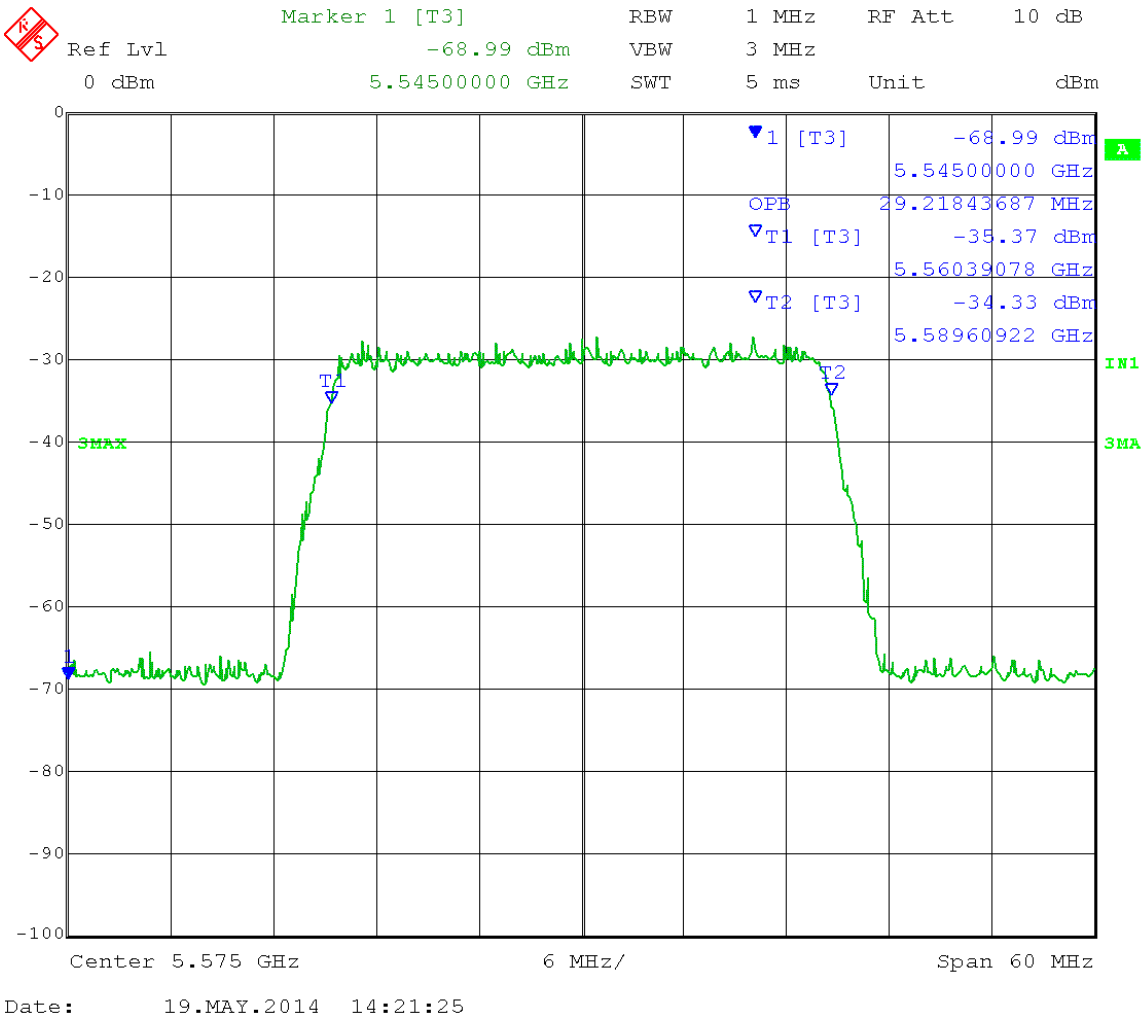
Channel 0:

99% OBW = 29.22 MHz



Channel 1:

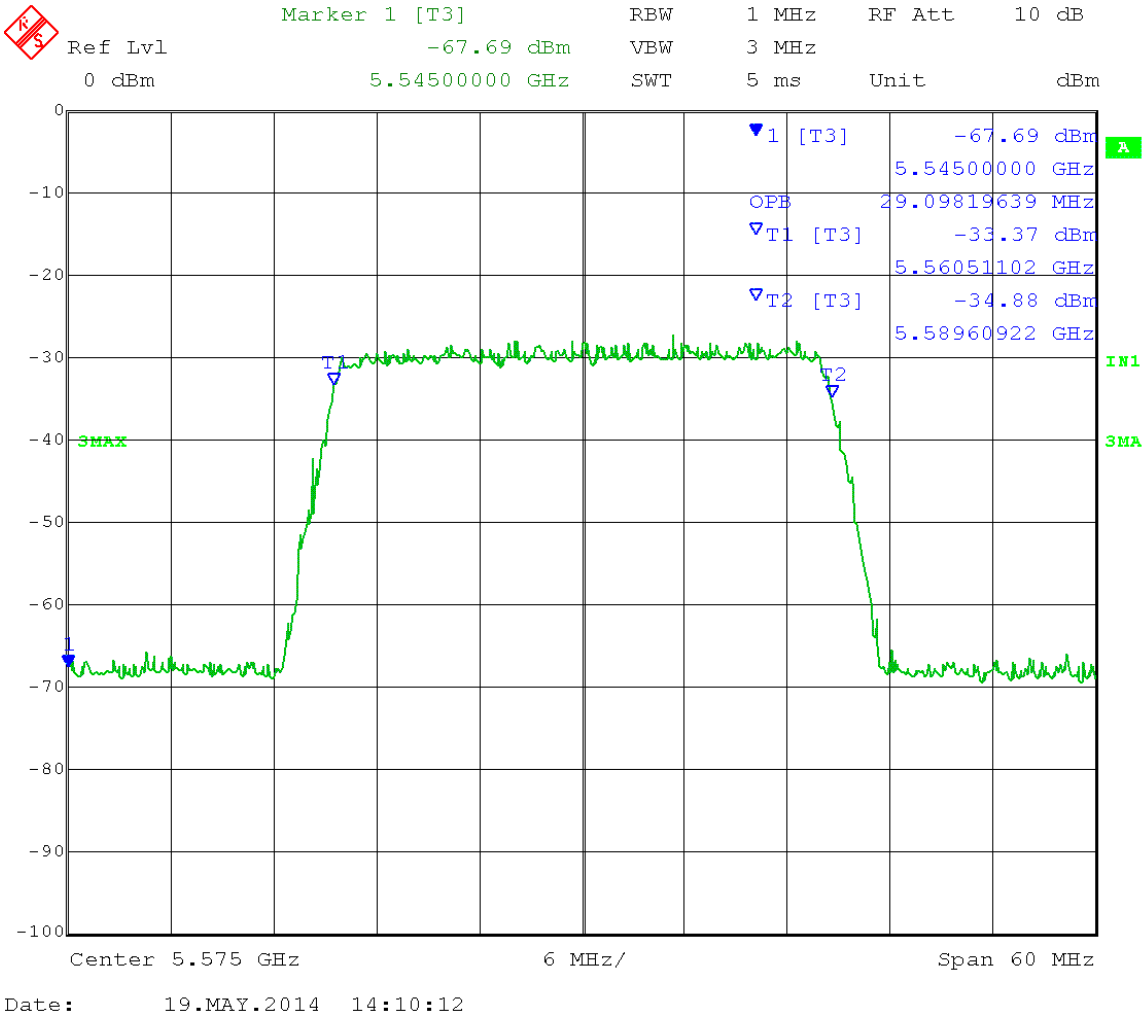
99% OBW = 29.22 MHz



Test Date: 5-14-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: 99% Occupied Bandwidth - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- D) 99% Occupied Bandwidth (Page 4)
RBW = 1 MHz VBW = 3MHz
Mid Channel: Transmit = 5.575 GHz 30MHz BW 1024QAM
Output power setting: 30 dBm

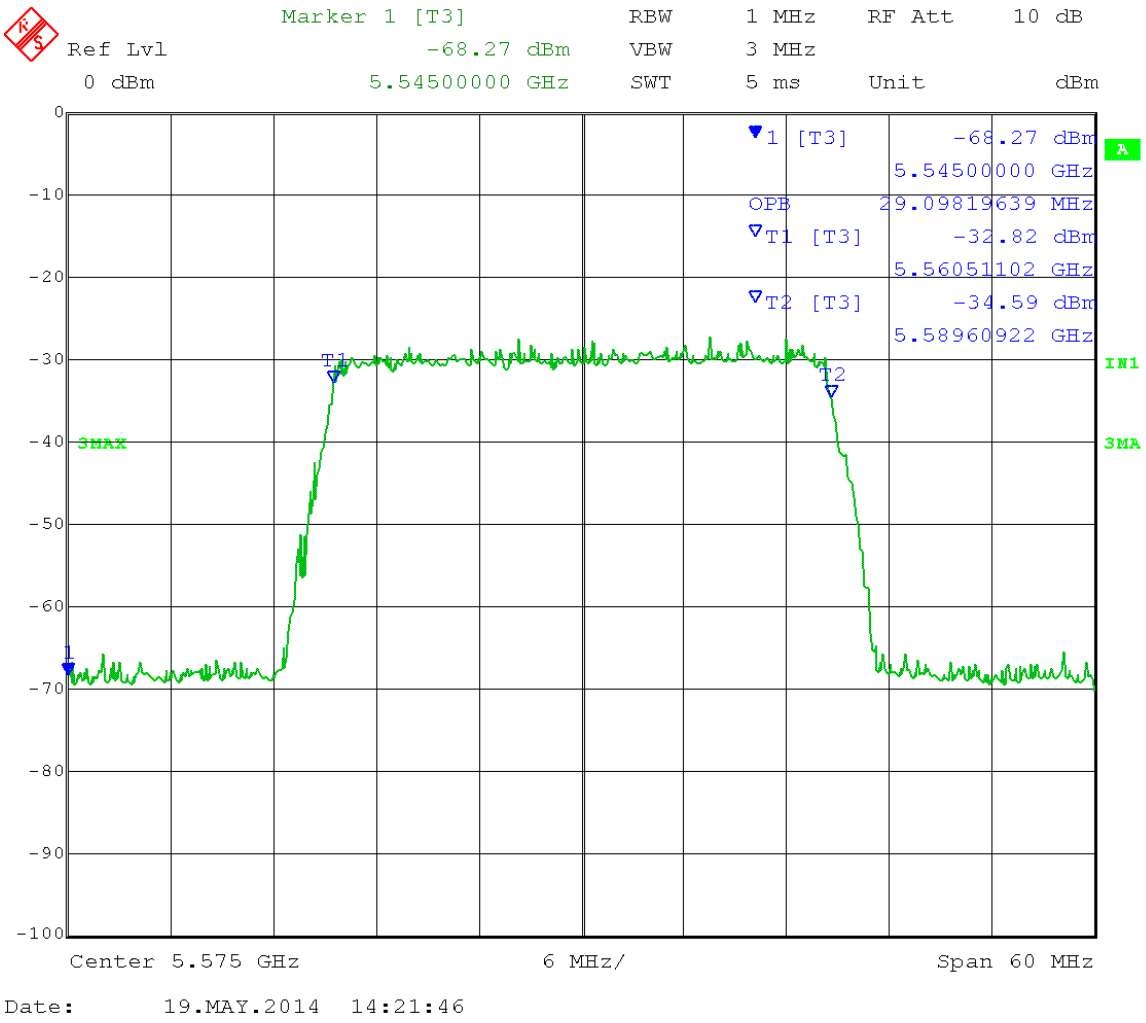
Channel 0:

99% OBW = 29.10 MHz



Channel 1:

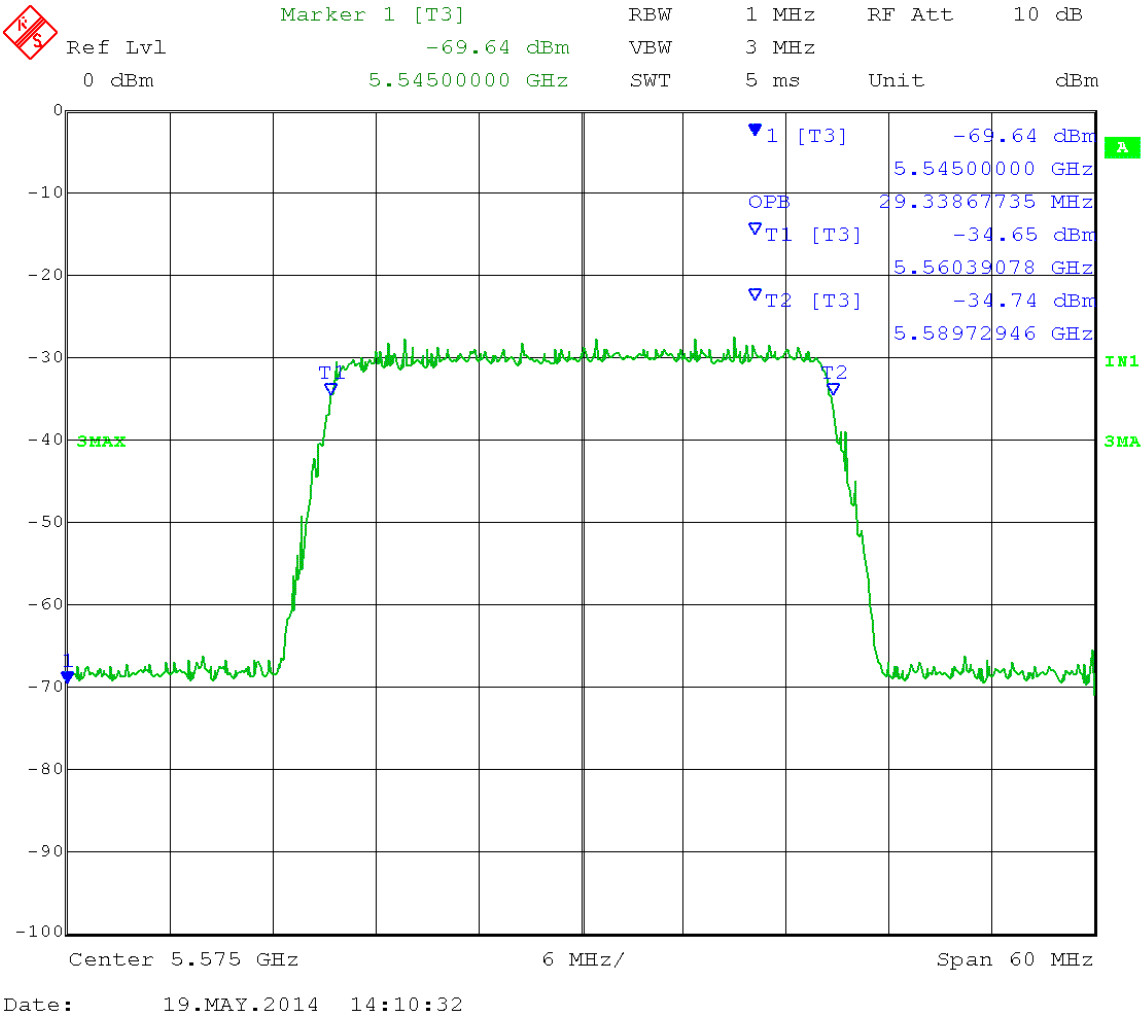
99% OBW = 29.10 MHz



Test Date: 5-14-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: 99% Occupied Bandwidth - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- D) 99% Occupied Bandwidth (Page 4)
RBW = 1 MHz VBW = 3 MHz
Mid Channel: Transmit = 5.575 GHz 30MHz BW QPSK
Output power setting: 30 dBm

Channel 0:

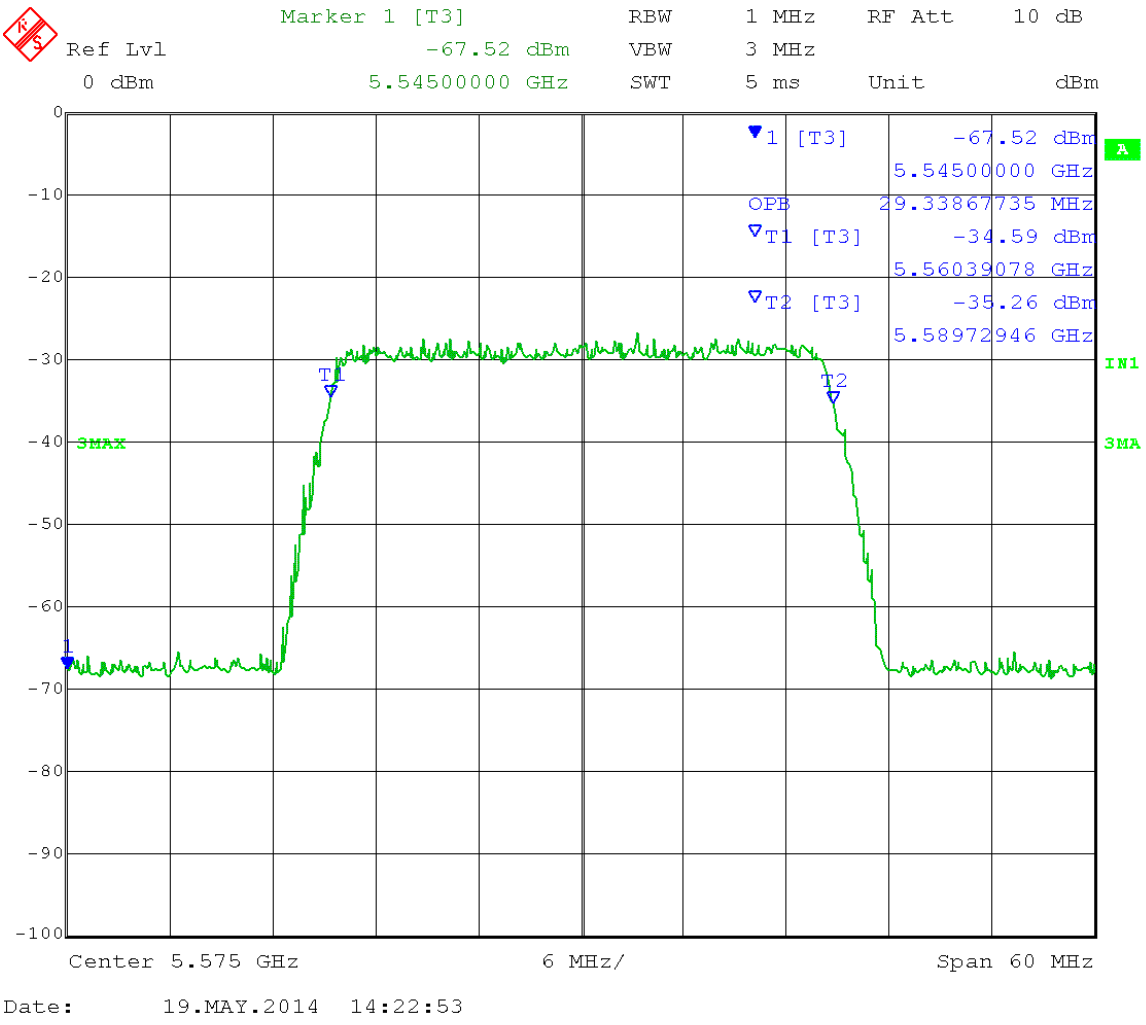
99% OBW = 29.34 MHz



Date: 19.MAY.2014 14:10:32

Channel 1:

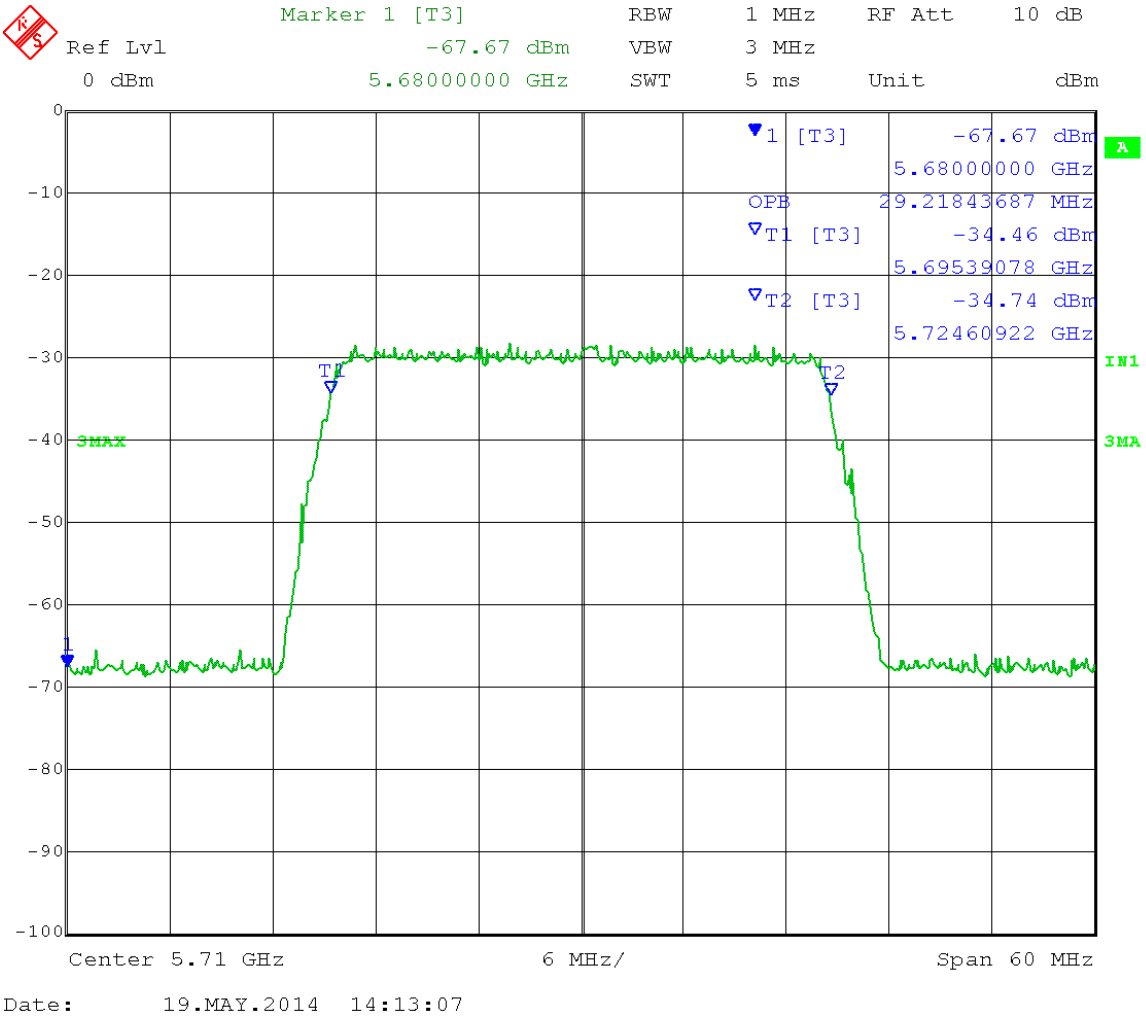
99% OBW = 29.34 MHz



Test Date: 5-14-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: 99% Occupied Bandwidth - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- D) 99% Occupied Bandwidth (Page 4)
RBW = 1 MHz VBW = 3MHz
High Channel: Transmit = 5.710 GHz 30MHz BW 16QAM
Output power setting: 30 dBm

Channel 0:

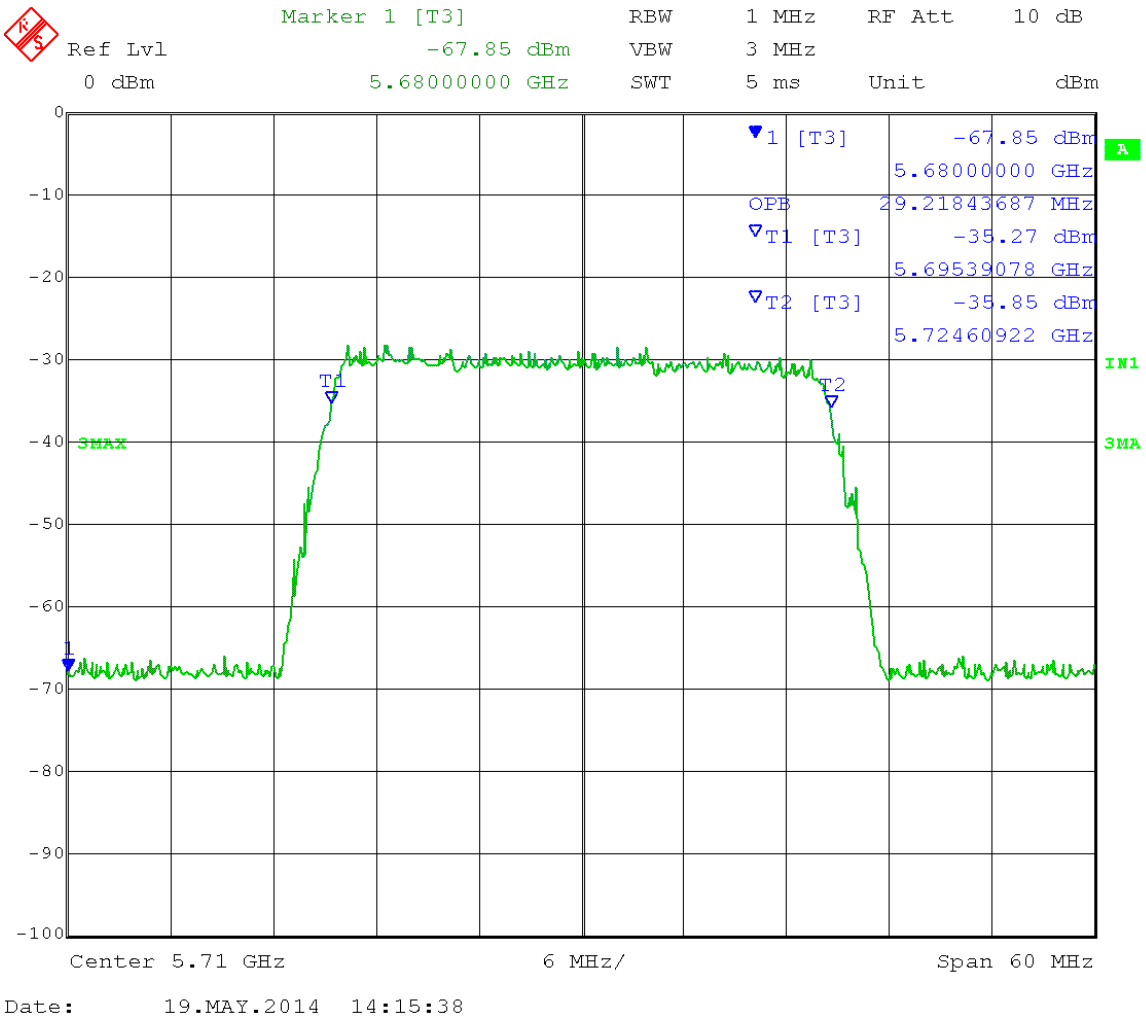
99% OBW = 29.22MHz



Date: 19.MAY.2014 14:13:07

Channel 1:

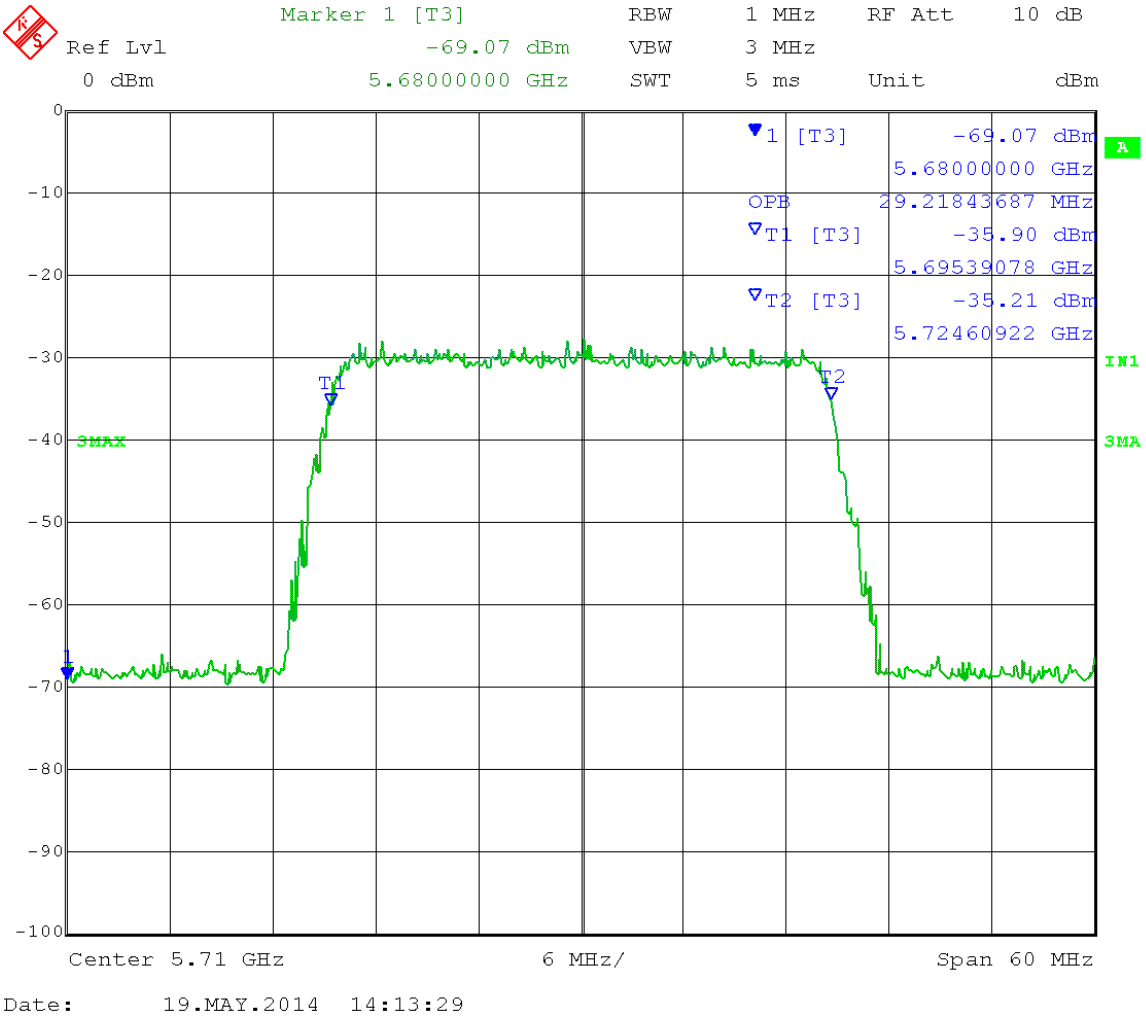
99% OBW = 29.22MHz



Test Date: 5-14-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: 99% Occupied Bandwidth - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- D) 99% Occupied Bandwidth (Page 4)
RBW = 1 MHz VBW = 3MHz
High Channel: Transmit = 5.710 GHz 30MHz BW 64QAM
Output power setting: 30 dBm

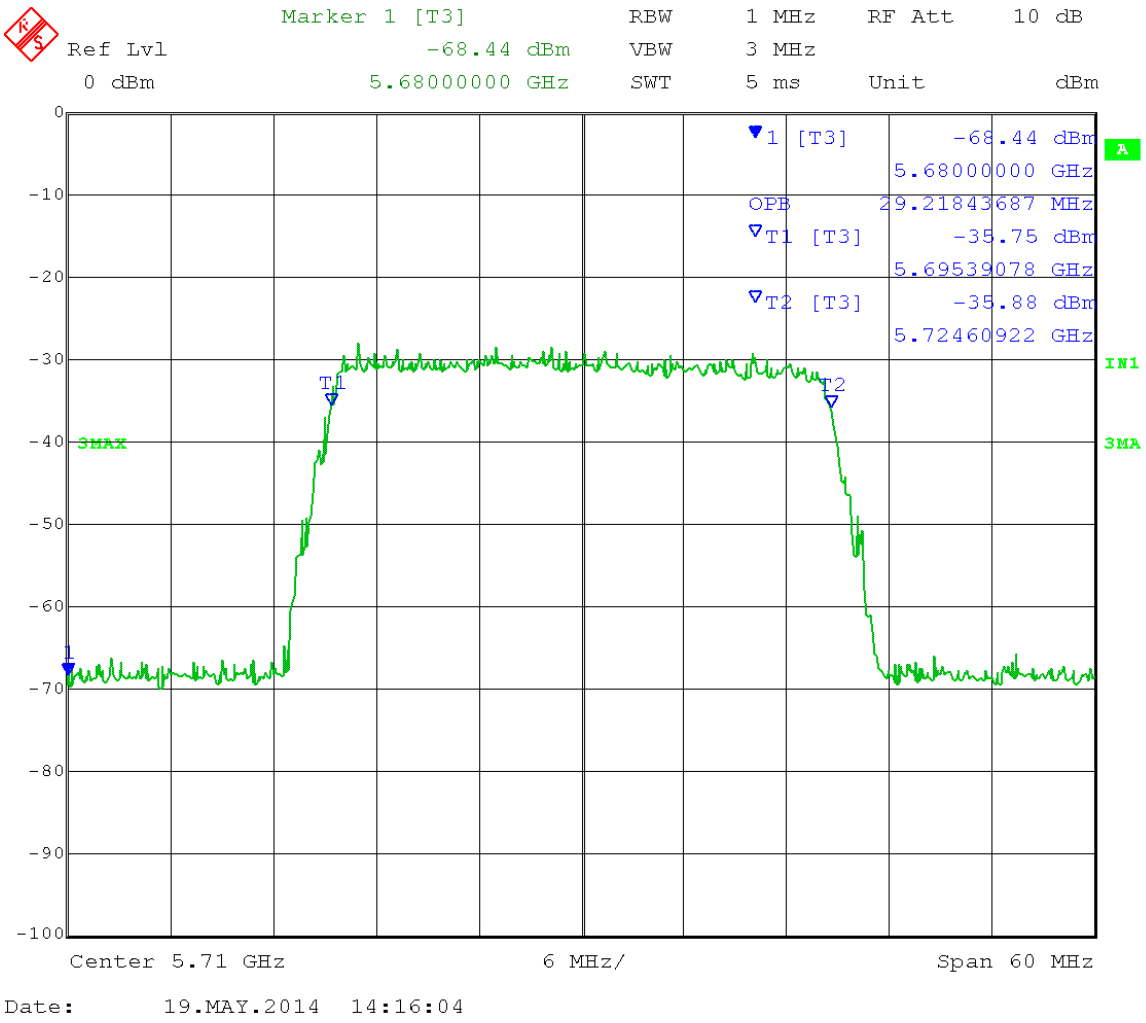
Channel 0:

99% OBW = 29.22MHz



Channel 1:

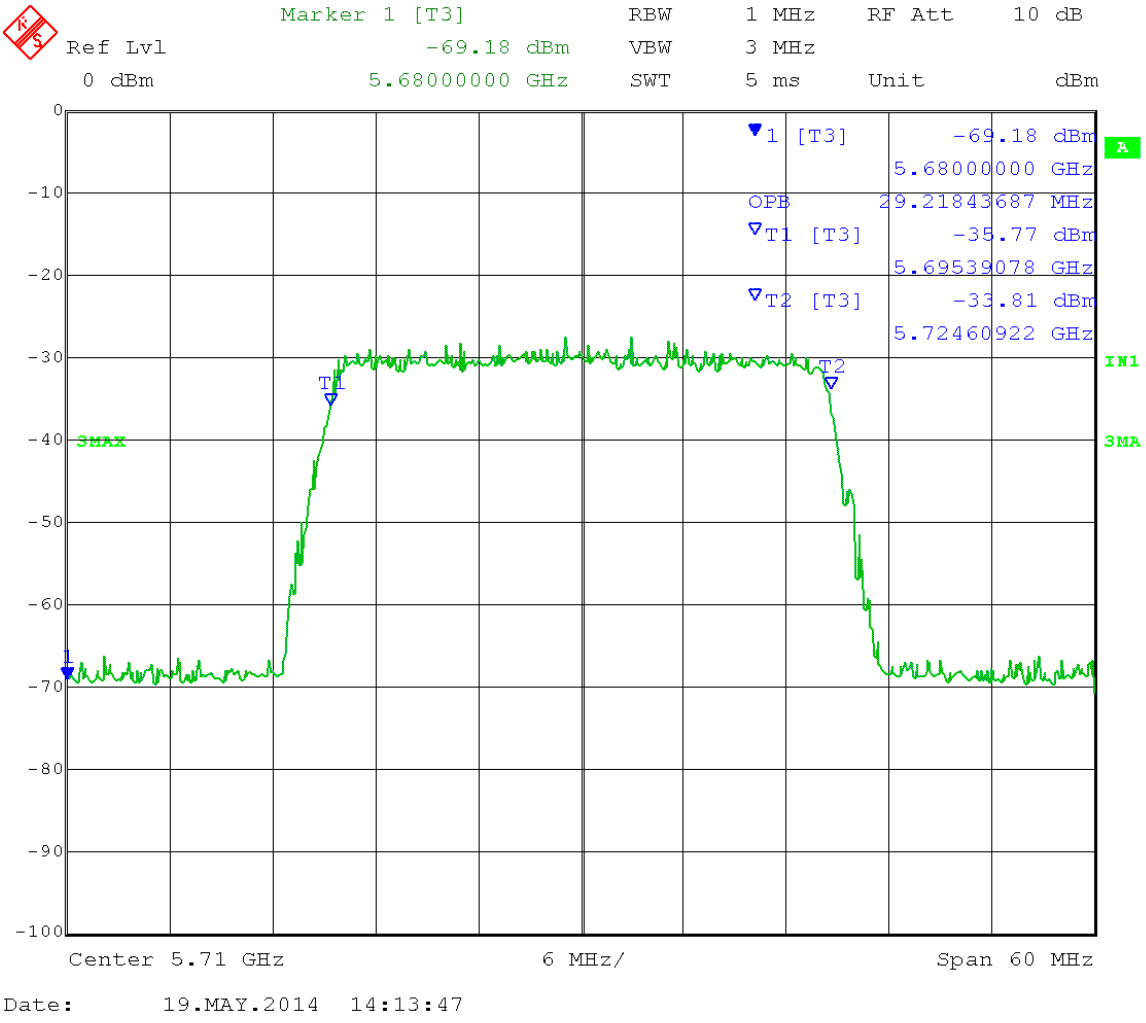
99% OBW = 29.22MHz



Test Date: 5-14-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: 99% Occupied Bandwidth - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- D) 99% Occupied Bandwidth (Page 4)
RBW = 1 MHz VBW = 3MHz
High Channel: Transmit = 5.710 GHz 30MHz BW 256QAM
Output power setting: 30 dBm

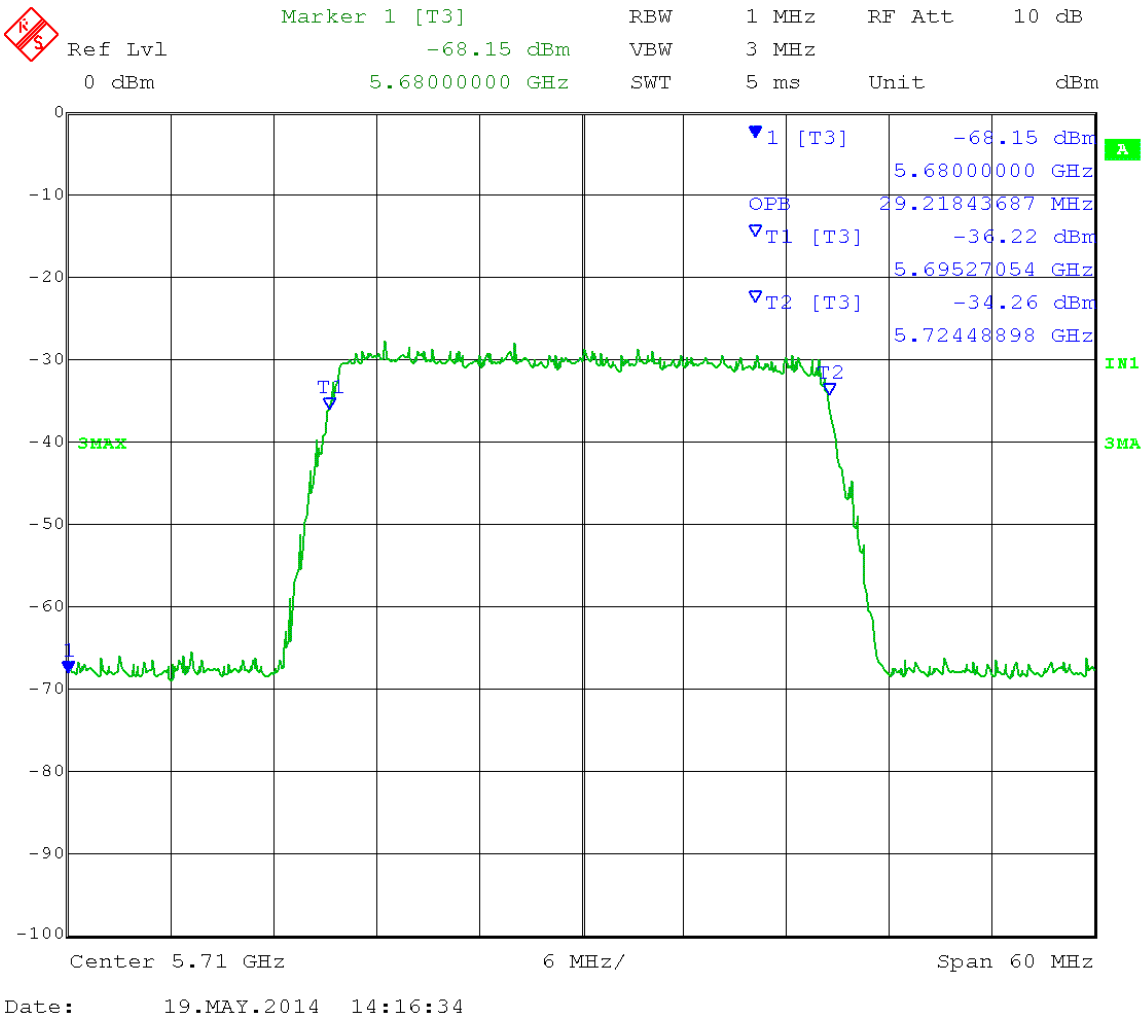
Channel 0:

99% OBW = 29.22MHz



Channel 1:

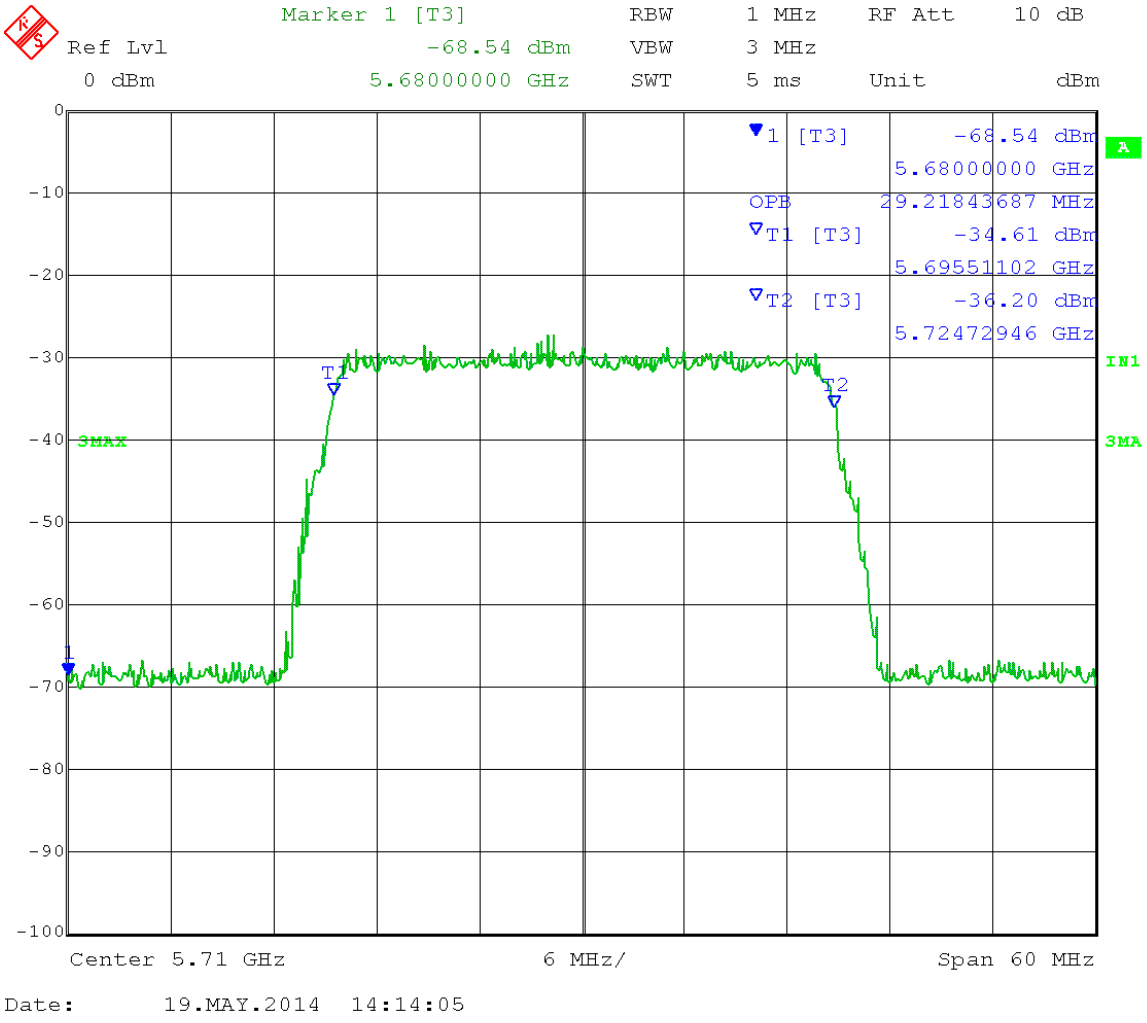
99% OBW = 29.22MHz



Test Date: 5-14-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: 99% Occupied Bandwidth - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- D) 99% Occupied Bandwidth (Page 4)
RBW = 1 MHz VBW = 3 MHz
High Channel: Transmit = 5.710 GHz 30MHz BW 1024QAM
Output power setting: 30 dBm

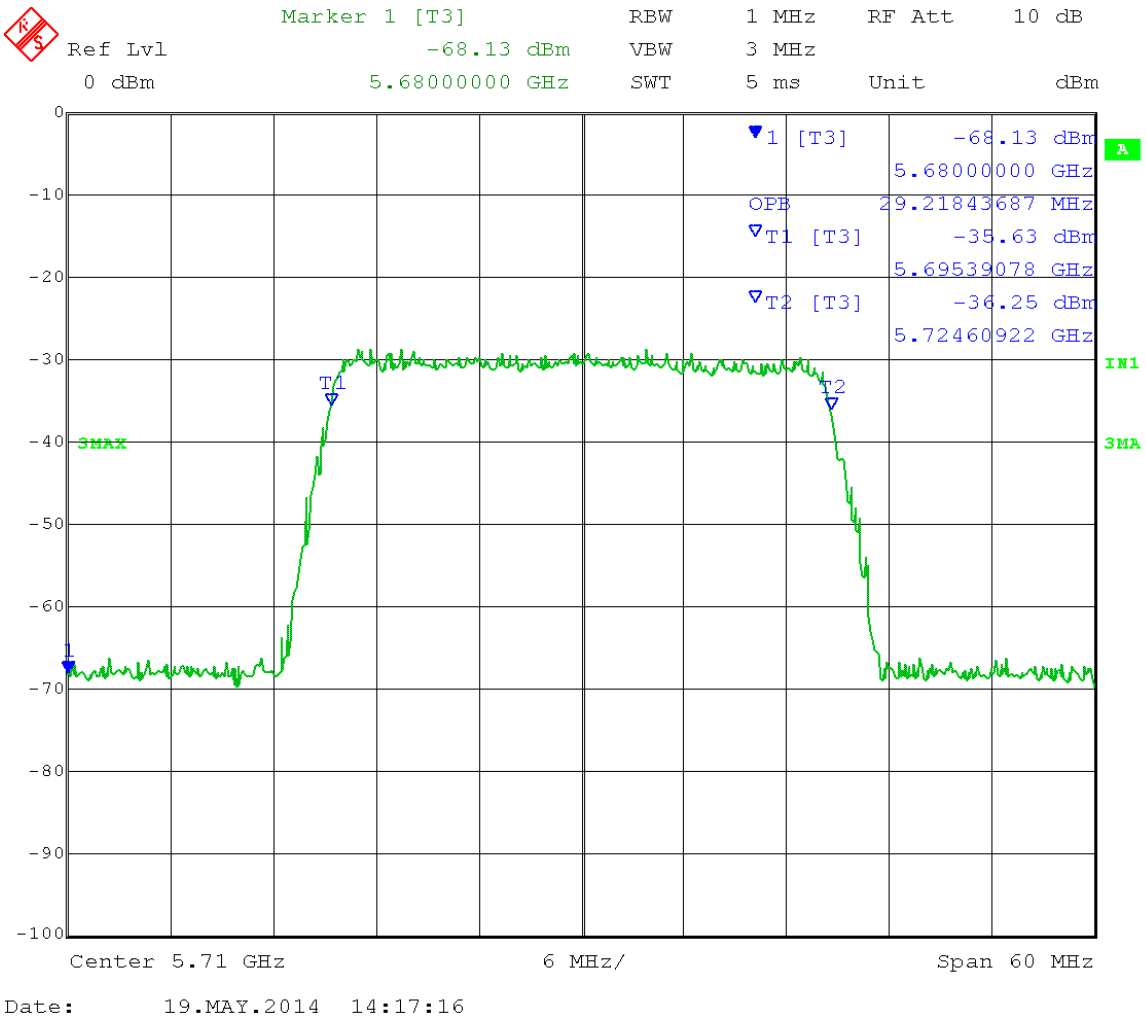
Channel 0:

99% OBW = 29.22 MHz



Channel 1:

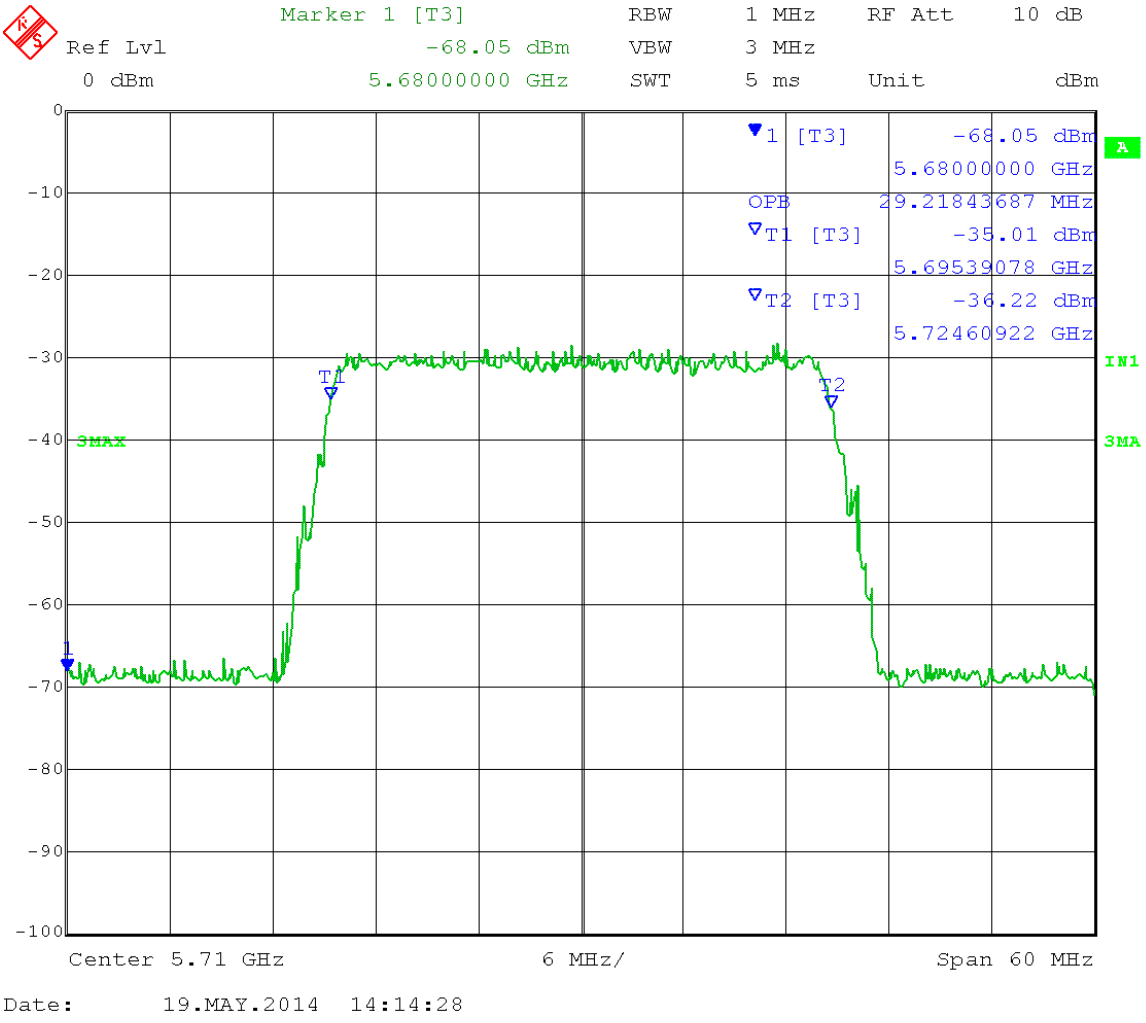
99% OBW = 29.22 MHz



Test Date: 5-14-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: 99% Occupied Bandwidth - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- D) 99% Occupied Bandwidth (Page 4)
RBW = 1 MHz VBW = 3MHz
High Channel: Transmit = 5.710 GHz 30MHz BW QPSK
Output power setting: 30 dBm

Channel 0:

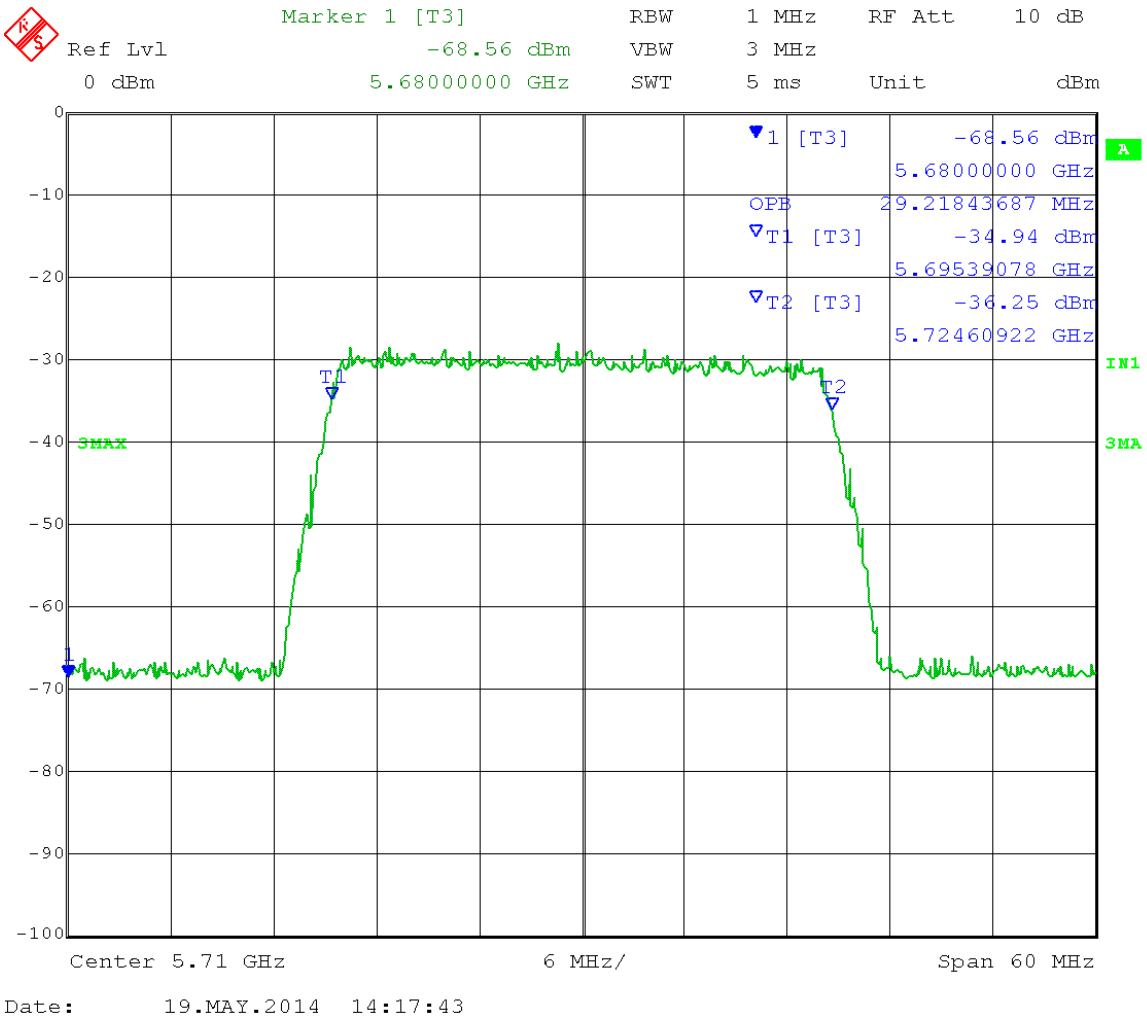
99% OBW = 29.22MHz



Date: 19.MAY.2014 14:14:28

Channel 1:

99% OBW = 29.22MHz



Appendix B – Measurement Data

B3.0 Maximum Conducted Output Power

Rule Section: Section 15.407(a)(2)

Test Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r03 – *Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E*

Section E(3)(a) Method PM (Measurement using an RF average power meter): Measurements performed using a wideband RF power meter with a thermocouple detector

Description: Measure the average power of each RF output port of the transmitter
Sum the powers of each port in linear power units
Convert linear power units to dBm
Add 10 log (1/x), where x is the duty cycle, to the measured power

Limit: Lesser of: 250 mW (24 dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz.
Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi

For 30 MHz channel bandwidth:
Limit = 24 dBm - 17 dB (the antenna gain exceeds 6 dBi by 17 dB) = 7 dBm

Results: Passed

Notes: Measurements were taken for QPSK, 16QAM, 64QAM, 256QAM and 1024QAM modulations at the lowest, middle, and highest channels of operation. EUT was set to transmit continuously.

Output power was set to 30 dBm eirp using special test software.

Test Date: 05-14-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: Maximum conducted output power – Conducted
Operator: Steve Dahmen
Test Procedure used: KDB 789033 D01 v01r03 – E)3)a) Method PM
Limit: [15.407(a)(2)]: lesser of 250mW or 11dBm+10log B (B=26dB EBW)
Operating Mode: Point-to-Point; Antenna Gain = 23 dBi
EUT Conducted Limit: = Limit - (23 dBi - 6 dB)
Duty Cycle correction = .088dB

30MHz Operating Bandwidth:

FCC Maximum Conducted Output Power		30M (*Adjustment for duty cycle =10log1/x = 0.088*)				
		QPSK	16QAM	64QAM	256QAM	1024Q
FCC limit ≤ 250mW	*EUT FCC limit:*	*7.00*	*7.00*	*7.00*	*7.00*	*7.00*
	TX0 (mW)	2.29	2.33	2.37	2.43	2.38
	TX1 (mW)	2.33	2.33	2.36	2.33	2.35
	total(mW)	4.62	4.66	4.73	4.76	4.73
	Total(dBm)	**6.65**	**6.68**	**6.75**	**6.78**	**6.75**
HCH = 5709 MHz	Margin(dBm)	0.35	0.32	0.25	0.22	0.25
	TX0	2.39	2.34	2.32	2.32	2.33
	TX1	2.58	2.52	2.52	2.54	2.51
	total(mW)	4.97	4.86	4.84	4.86	4.84
	Total(dBm)	**6.96**	**7.00**	**6.98**	**7.00**	**6.98**
MCH = 5575 MHz	Margin(dBm)	0.04	0.00	0.02	0.00	0.02
	TX0	2.29	2.28	2.3	2.27	2.24
	TX1	2.49	2.5	2.35	2.34	2.4
	total(mW)	4.78	4.78	4.65	4.61	4.64
	Total(dBm)	**6.92**	**6.92**	**6.80**	**6.77**	**6.80**
LCH = 5486 MHz	Margin(dBm)	0.08	0.08	0.20	0.23	0.20

Appendix B – Measurement Data

B4.0 Unwanted Emission Levels – Radiated Restricted Band-Edge
Radiated with antenna connected

Rule Part: FCC Part 15.407(b)(7) and FCC Part 15.205

Test Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r03 – *Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E*

Section H(1) – Unwanted emissions in the restricted bands
Section H(3) – General Requirements for Unwanted Emissions Measurements
Section H(5) – Procedure for Peak Unwanted Emissions Measurements Above 1 GHz
Section H(6) – Procedure for Average Unwanted Emissions Measurements Above 1 GHz
Section H(6)(c) – Average Detection method

Limit: FCC Part 15.209

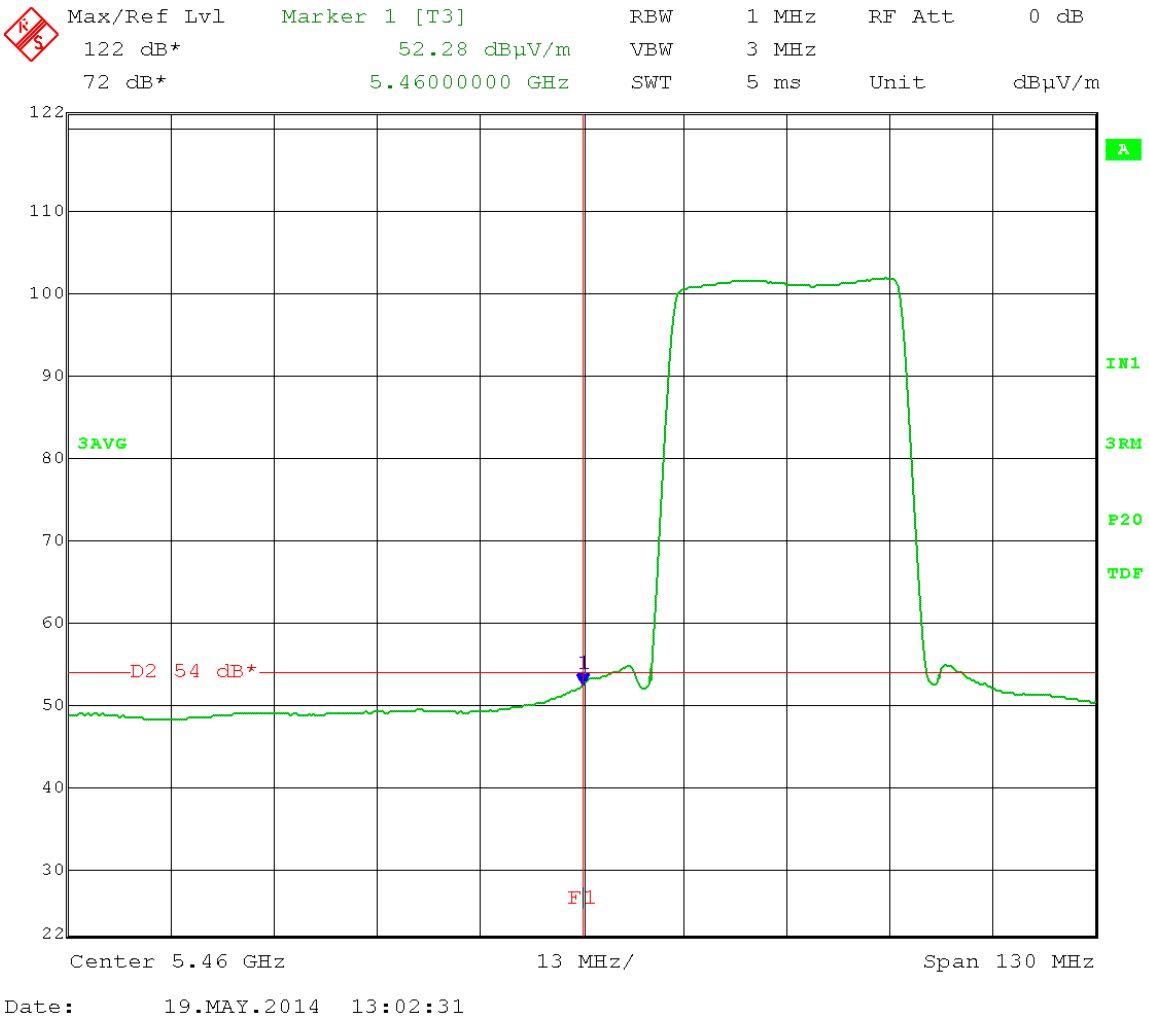
Results: Compliant

Notes: Because the lower operating band-edge is near a restricted band, compliance with this restricted band was determined by measuring the field strength of the lower channel emission at the restricted band edge.

Measurements were taken for QPSK, 16QAM, 64QAM, 256QAM and 1024QAM modulations at the lowest channel of operation. The EUT was set to transmit continuously.

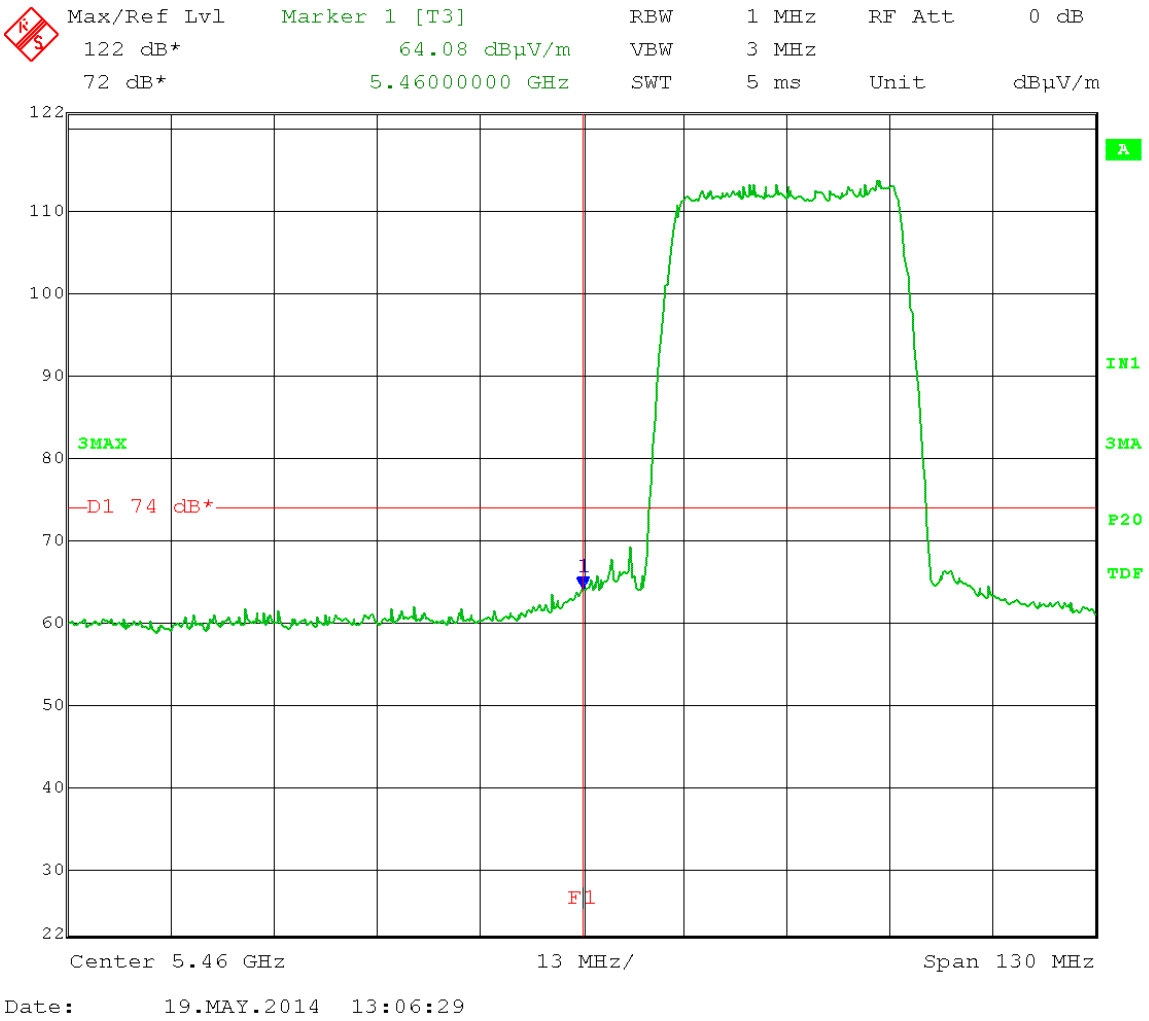
Both transmit chains active. Output power was set to 30 dBm eirp using special test software.

Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Lower Restricted Band-Edge Compliance - Radiated – AVG (FCC 15.407(b)(7))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
Low Channel: Frequency – 5486 MHz
Modulation: 16QAM
Horizontal
Restricted Band-Edge Frequency: 5460 MHz (F2)
Band-Edge Limit: 54 dBµV/m AVERAGE at a test distance of 3 meters.



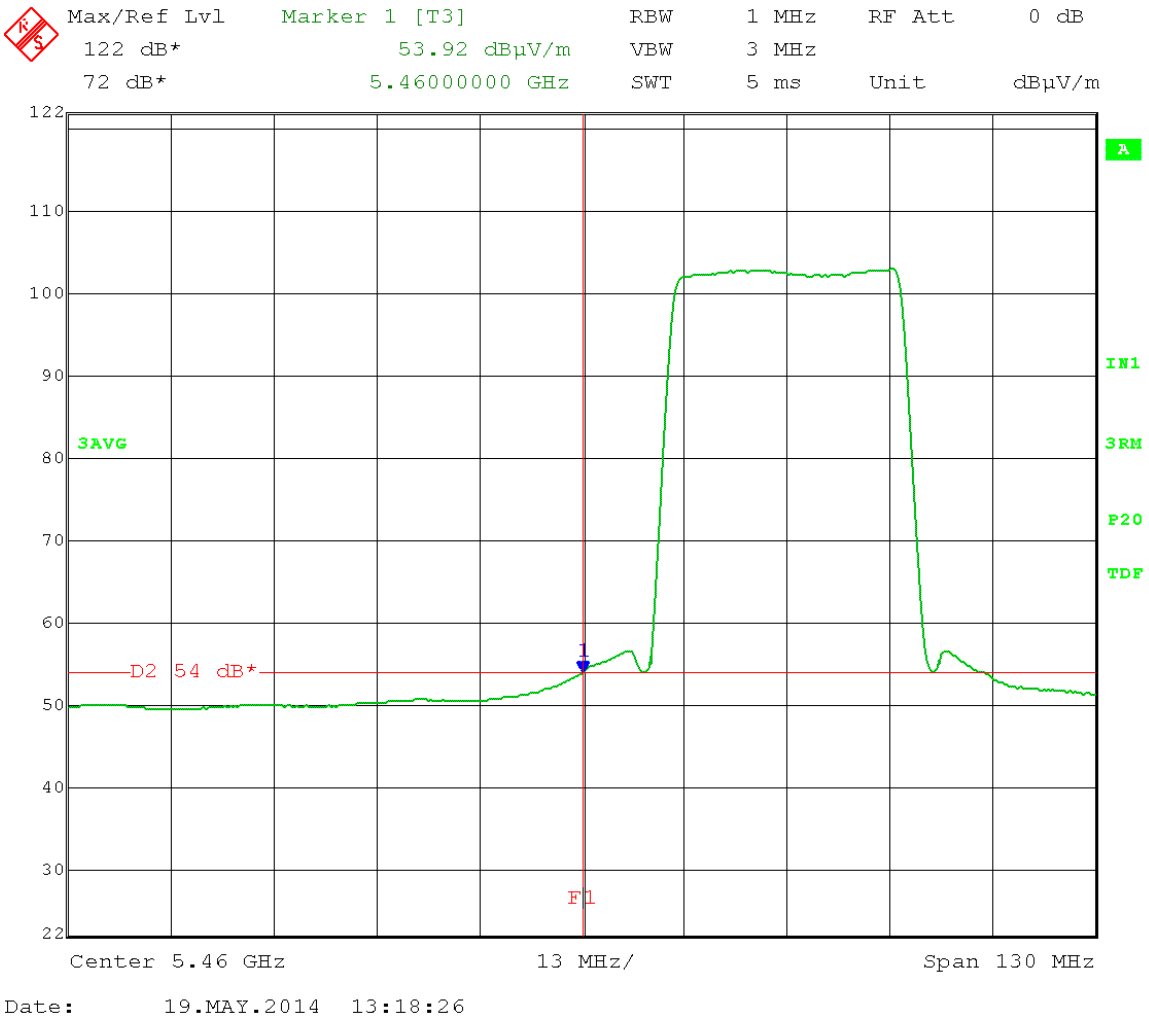
Date: 19.MAY.2014 13:02:31

Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Lower Restricted Band-Edge Compliance - Radiated – Peak (FCC 15.407(b)(7))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
Low Channel: Frequency – 5486 MHz
Modulation: 16QAM
Horizontal
Restricted Band-Edge Frequency: 5460 MHz (F2)
Band-Edge Limit: 74 dBµV/m PEAK at a test distance of 3 meters.



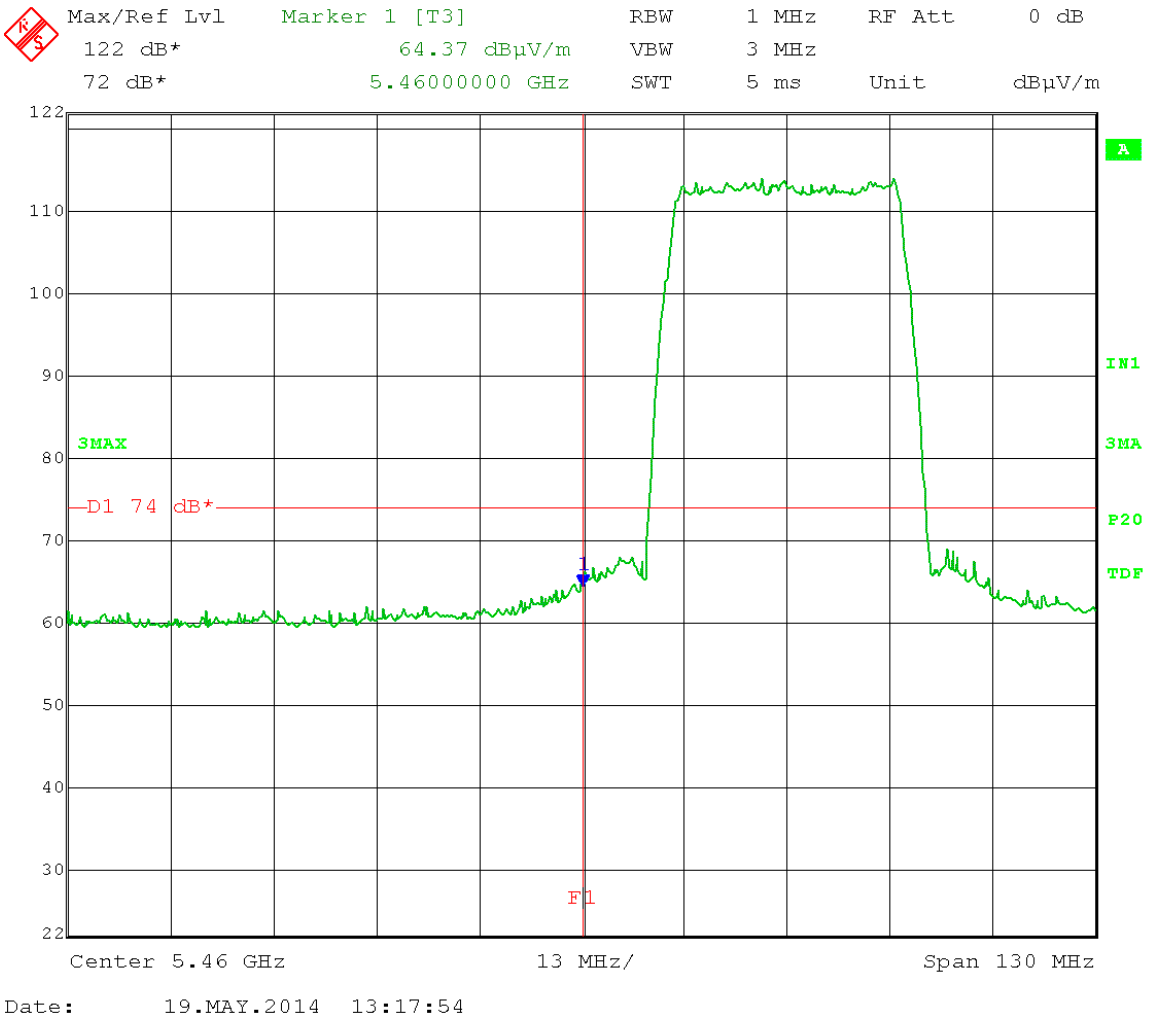
Date: 19.MAY.2014 13:06:29

Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Lower Restricted Band-Edge Compliance - Radiated – AVG (FCC 15.407(b)(7))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
Low Channel: Frequency – 5486 MHz
Modulation: 16QAM
Vertical
Restricted Band-Edge Frequency: 5460 MHz (F2)
Band-Edge Limit: 54 dBµV/m AVERAGE at a test distance of 3 meters.



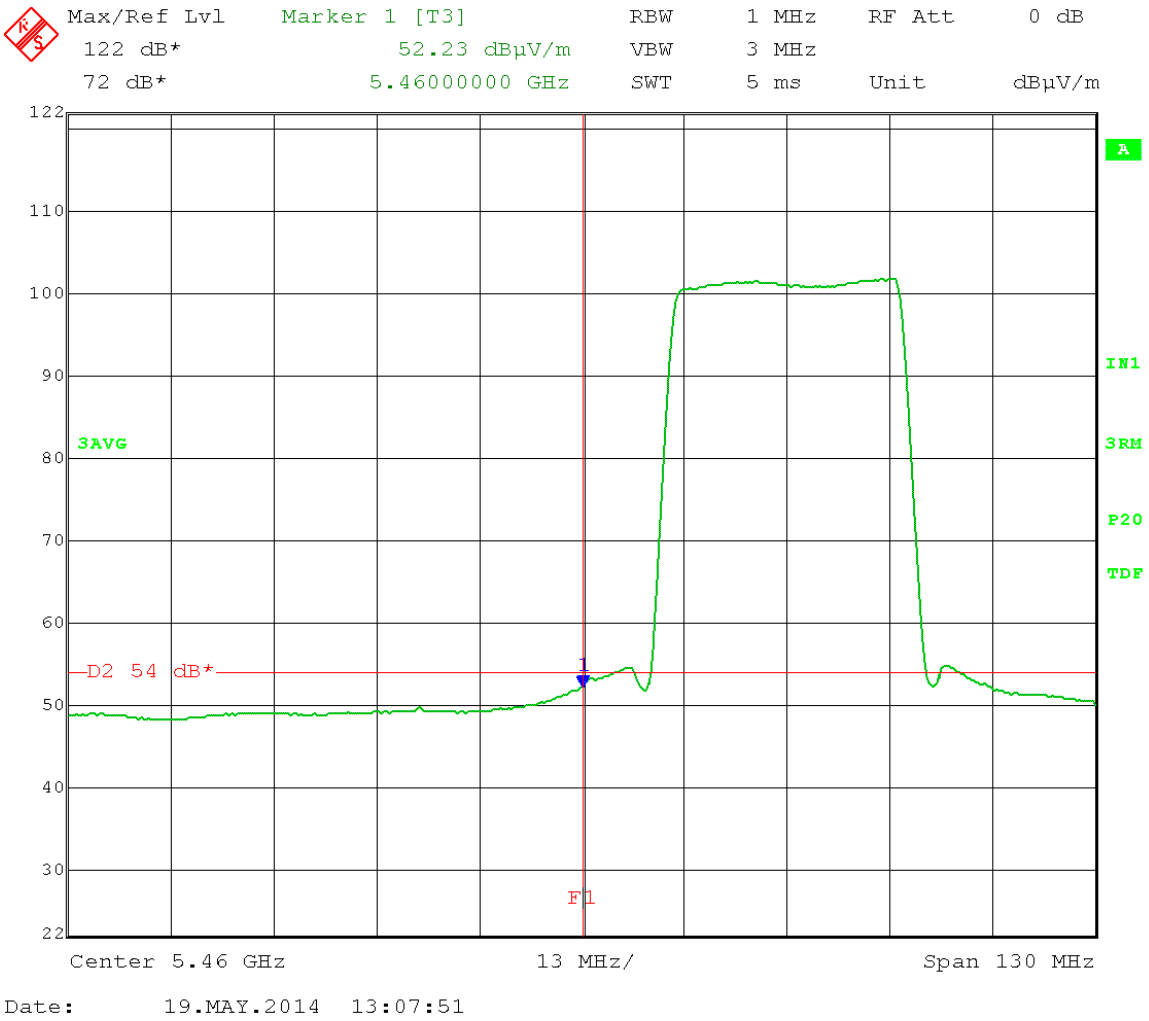
Date: 19.MAY.2014 13:18:26

Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Lower Restricted Band-Edge Compliance - Radiated – Peak (FCC 15.407(b)(7))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
Low Channel: Frequency – 5486 MHz
Modulation: 16QAM
Vertical
Restricted Band-Edge Frequency: 5460 MHz (F2)
Band-Edge Limit: 74 dBµV/m PEAK at a test distance of 3 meters.



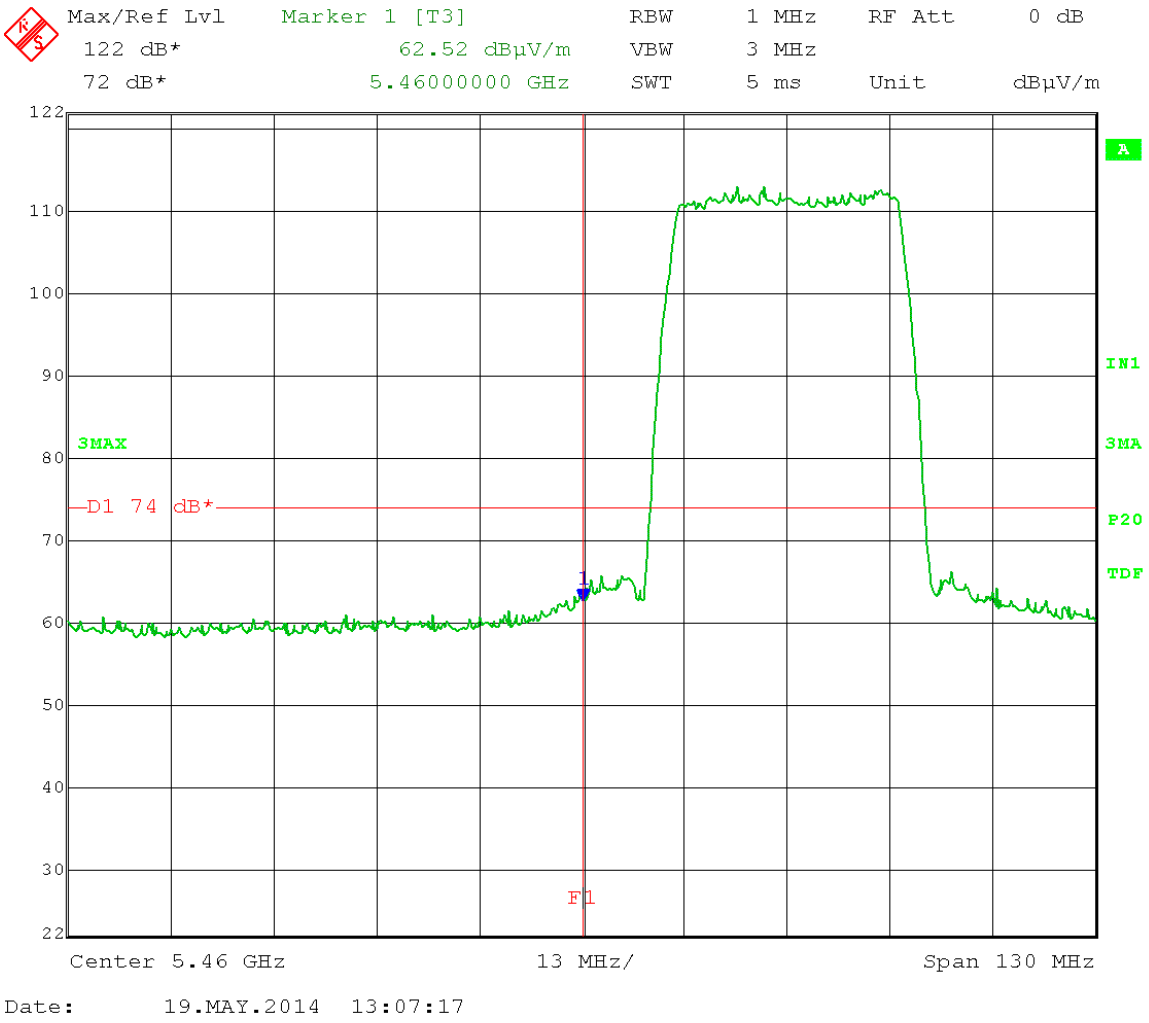
Date: 19.MAY.2014 13:17:54

Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Lower Restricted Band-Edge Compliance - Radiated – AVG (FCC 15.407(b)(7))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
Low Channel: Frequency – 5486 MHz
Modulation: 64QAM
Horizontal
Restricted Band-Edge Frequency: 5460 MHz (F2)
Band-Edge Limit: 54 dBµV/m AVERAGE at a test distance of 3 meters.



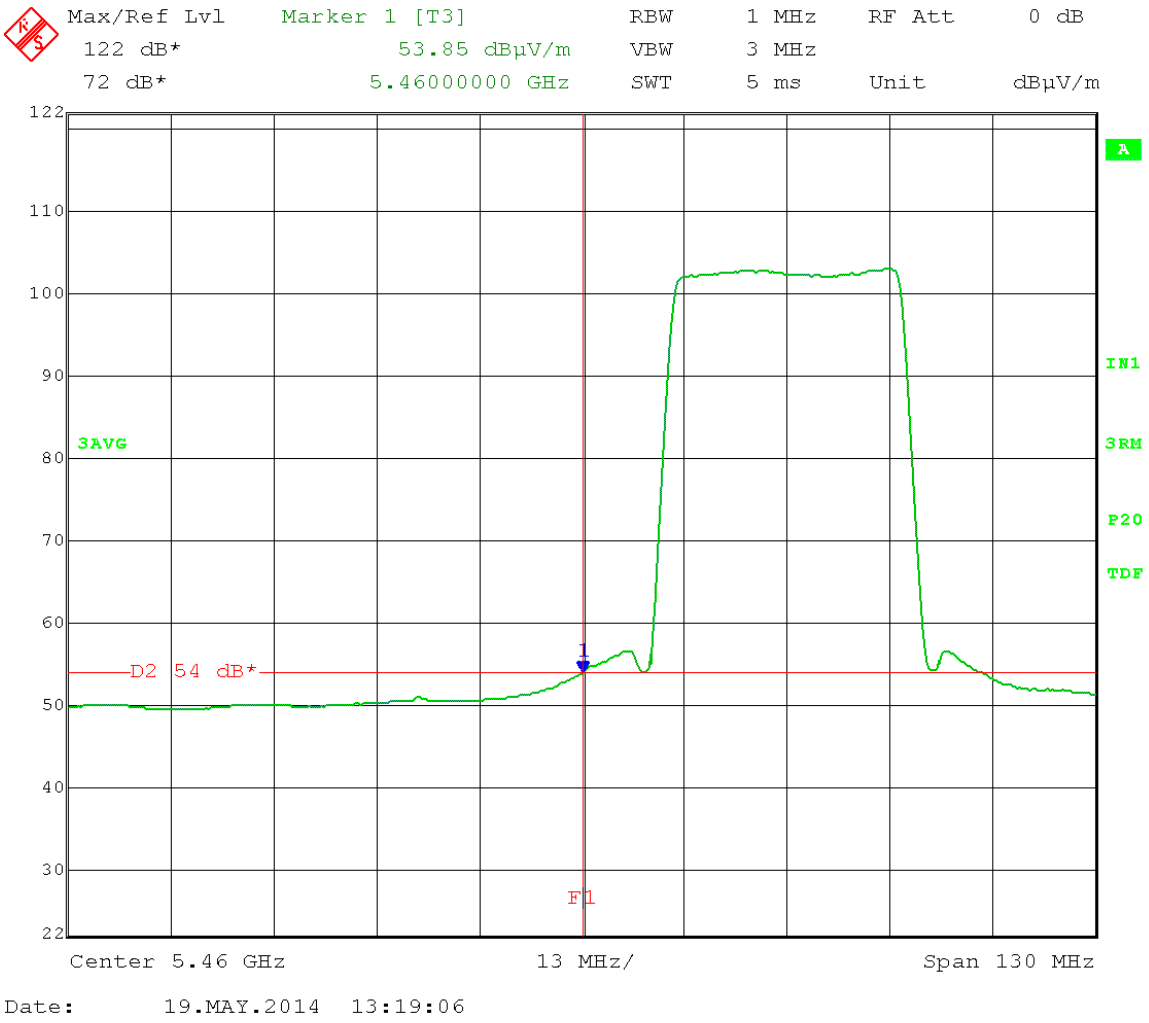
Date: 19.MAY.2014 13:07:51

Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Lower Restricted Band-Edge Compliance - Radiated – Peak (FCC 15.407(b)(7))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
Low Channel: Frequency – 5486 MHz
Modulation: 64QAM
Horizontal
Restricted Band-Edge Frequency: 5460 MHz (F2)
Band-Edge Limit: 74 dBµV/m PEAK at a test distance of 3 meters.



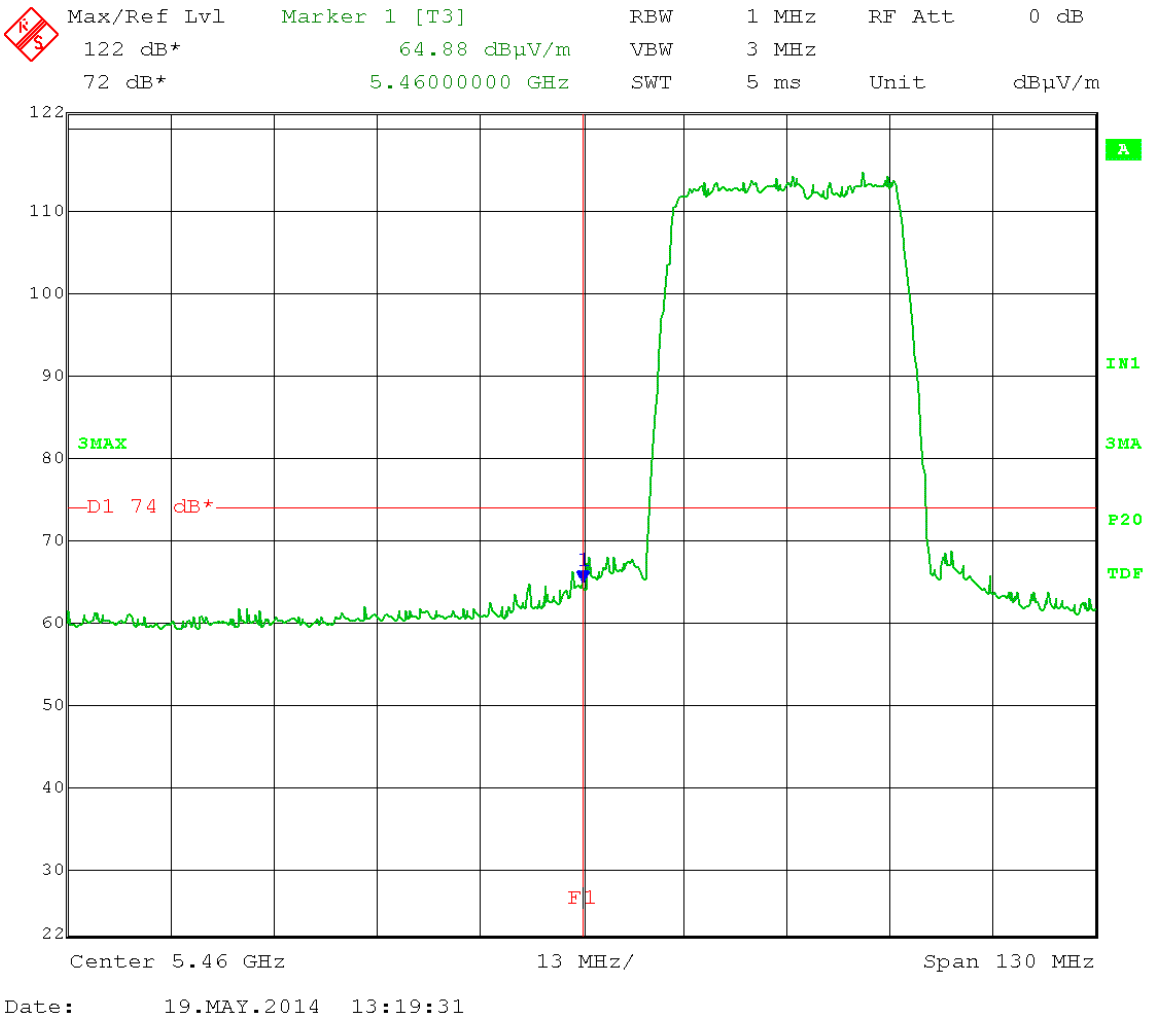
Date: 19.MAY.2014 13:07:17

Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Lower Restricted Band-Edge Compliance - Radiated – AVG (FCC 15.407(b)(7))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
Low Channel: Frequency – 5486 MHz
Modulation: 64QAM
Vertical
Restricted Band-Edge Frequency: 5460 MHz (F2)
Band-Edge Limit: 54 dBµV/m AVERAGE at a test distance of 3 meters.



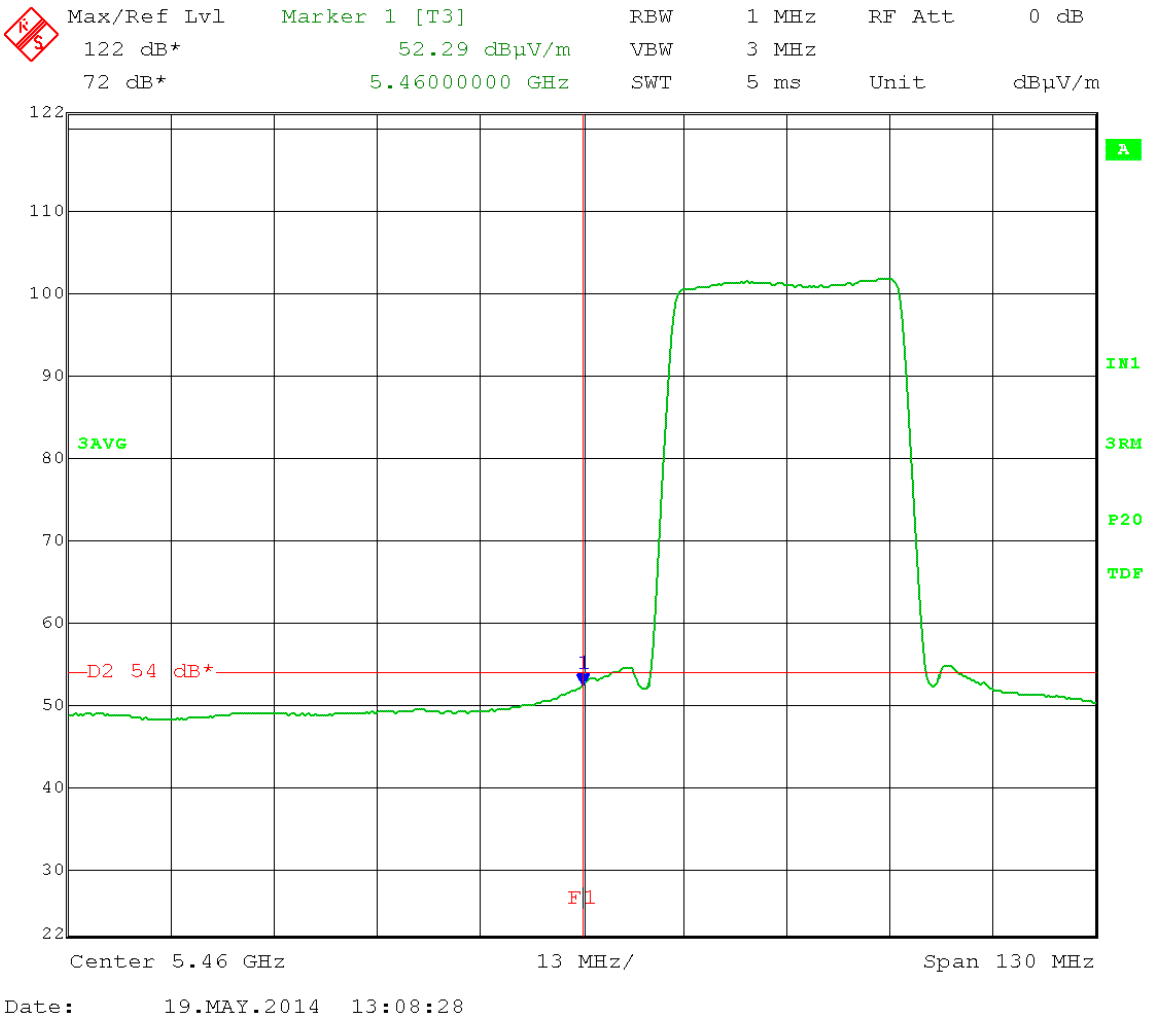
Date: 19.MAY.2014 13:19:06

Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Lower Restricted Band-Edge Compliance - Radiated – Peak (FCC 15.407(b)(7))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
Low Channel: Frequency – 5486 MHz
Modulation: 64QAM
Vertical
Restricted Band-Edge Frequency: 5460 MHz (F2)
Band-Edge Limit: 74 dBµV/m PEAK at a test distance of 3 meters.



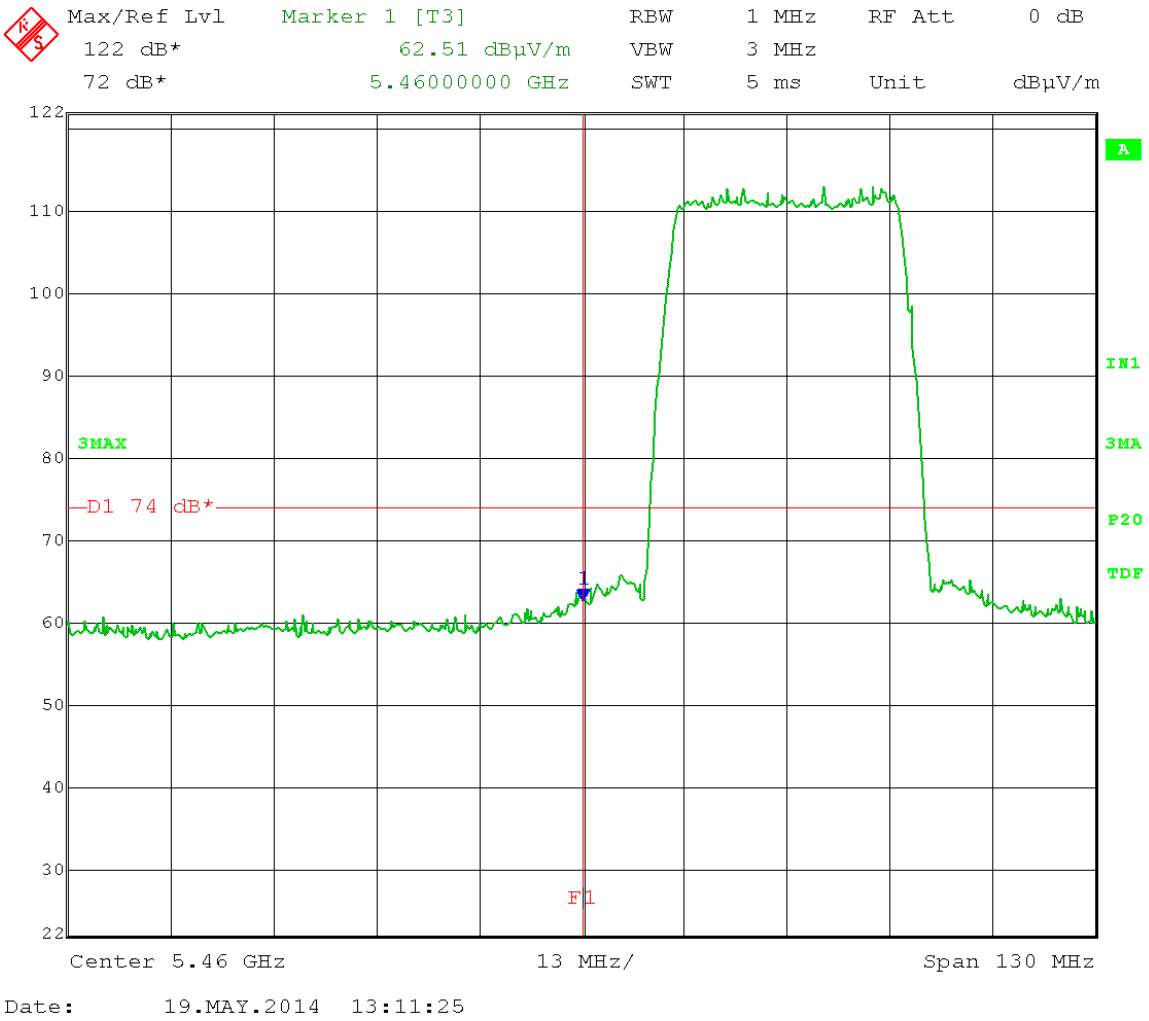
Date: 19.MAY.2014 13:19:31

Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Lower Restricted Band-Edge Compliance - Radiated – AVG (FCC 15.407(b)(7))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
Low Channel: Frequency – 5486 MHz
Modulation: 256QAM
Horizontal
Restricted Band-Edge Frequency: 5460 MHz (F2)
Band-Edge Limit: 54 dBµV/m AVERAGE at a test distance of 3 meters.



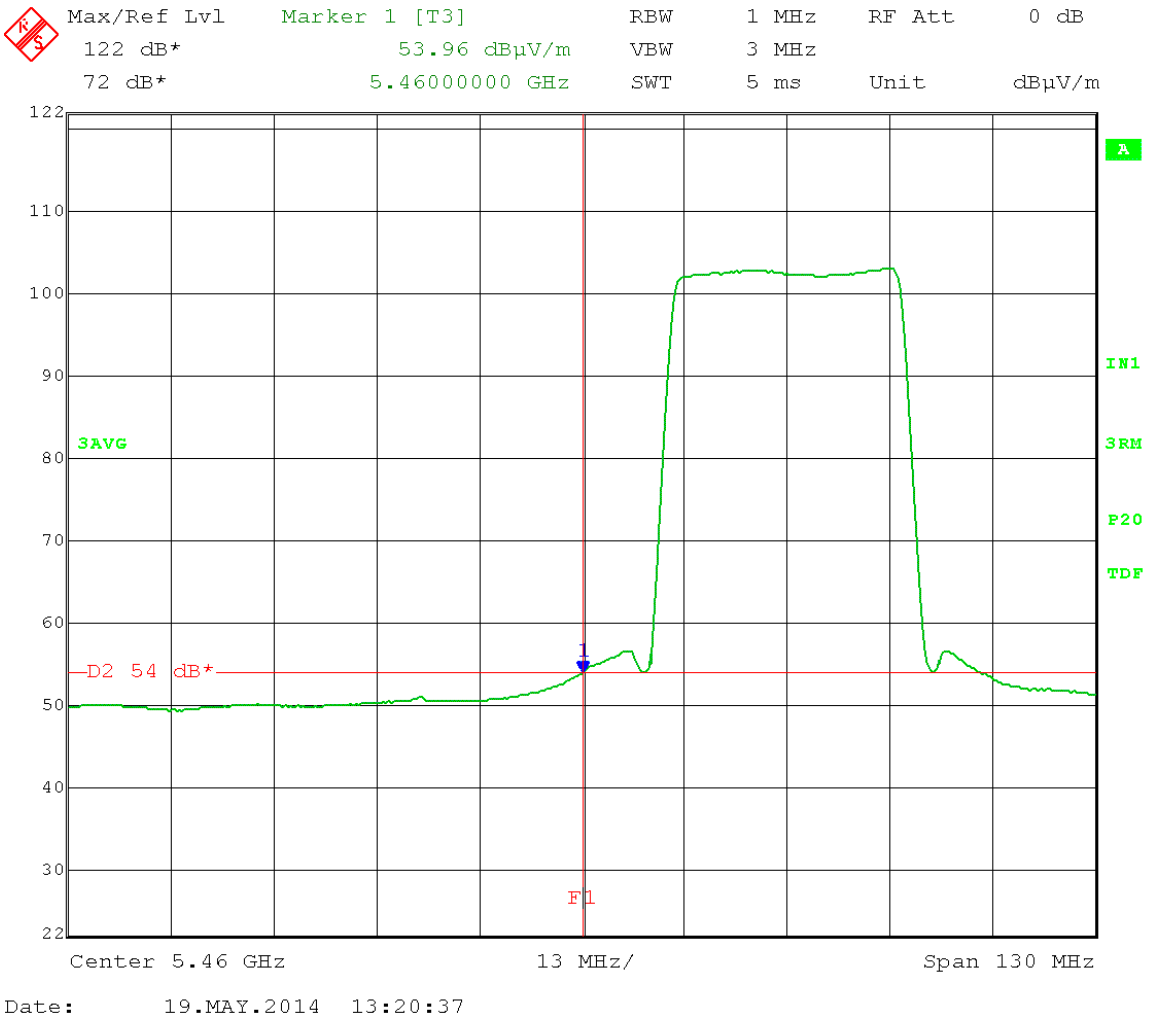
Date: 19.MAY.2014 13:08:28

Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Lower Restricted Band-Edge Compliance - Radiated – Peak (FCC 15.407(b)(7))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
Low Channel: Frequency – 5486 MHz
Modulation: 256QAM
Horizontal
Restricted Band-Edge Frequency: 5460 MHz (F2)
Band-Edge Limit: 74 dBµV/m PEAK at a test distance of 3 meters.



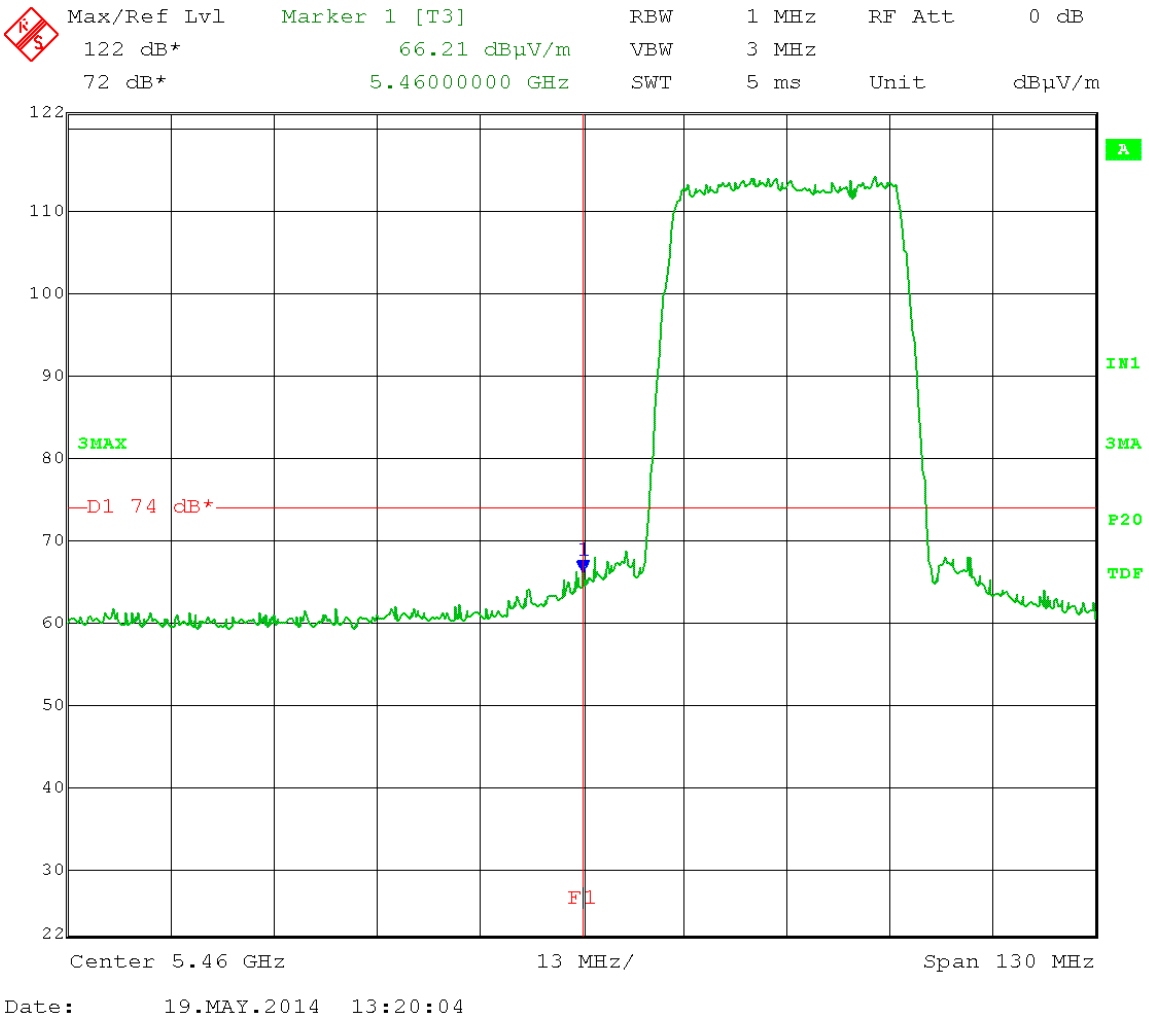
Date: 19.MAY.2014 13:11:25

Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Lower Restricted Band-Edge Compliance - Radiated – AVG (FCC 15.407(b)(7))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
Low Channel: Frequency – 5486 MHz
Modulation: 256QAM
Vertical
Restricted Band-Edge Frequency: 5460 MHz (F2)
Band-Edge Limit: 54 dBµV/m AVERAGE at a test distance of 3 meters.



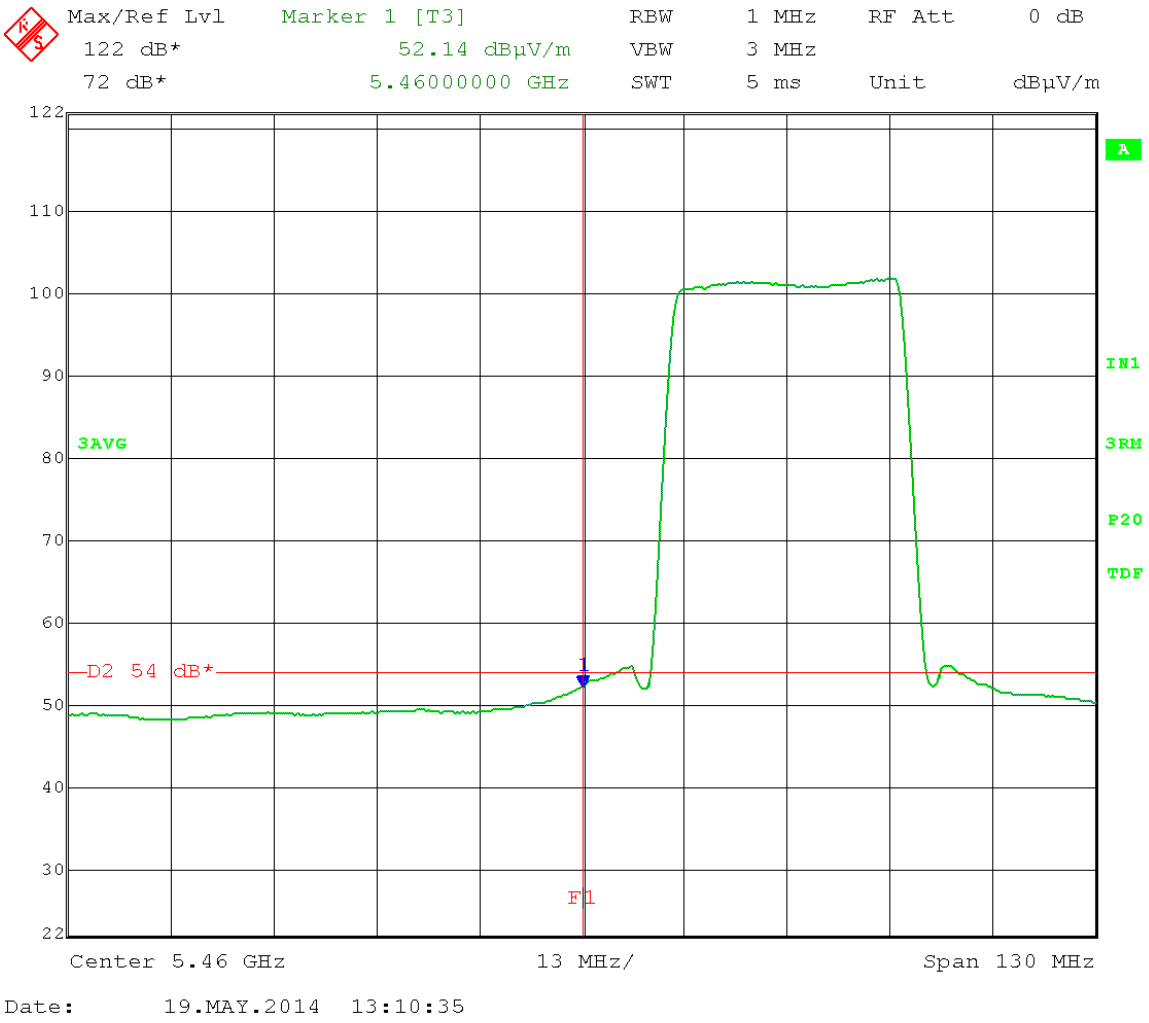
Date: 19.MAY.2014 13:20:37

Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Lower Restricted Band-Edge Compliance - Radiated – Peak (FCC 15.407(b)(7))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
Low Channel: Frequency – 5486 MHz
Modulation: 256QAM
Vertical
Restricted Band-Edge Frequency: 5460 MHz (F2)
Band-Edge Limit: 74 dBµV/m PEAK at a test distance of 3 meters.



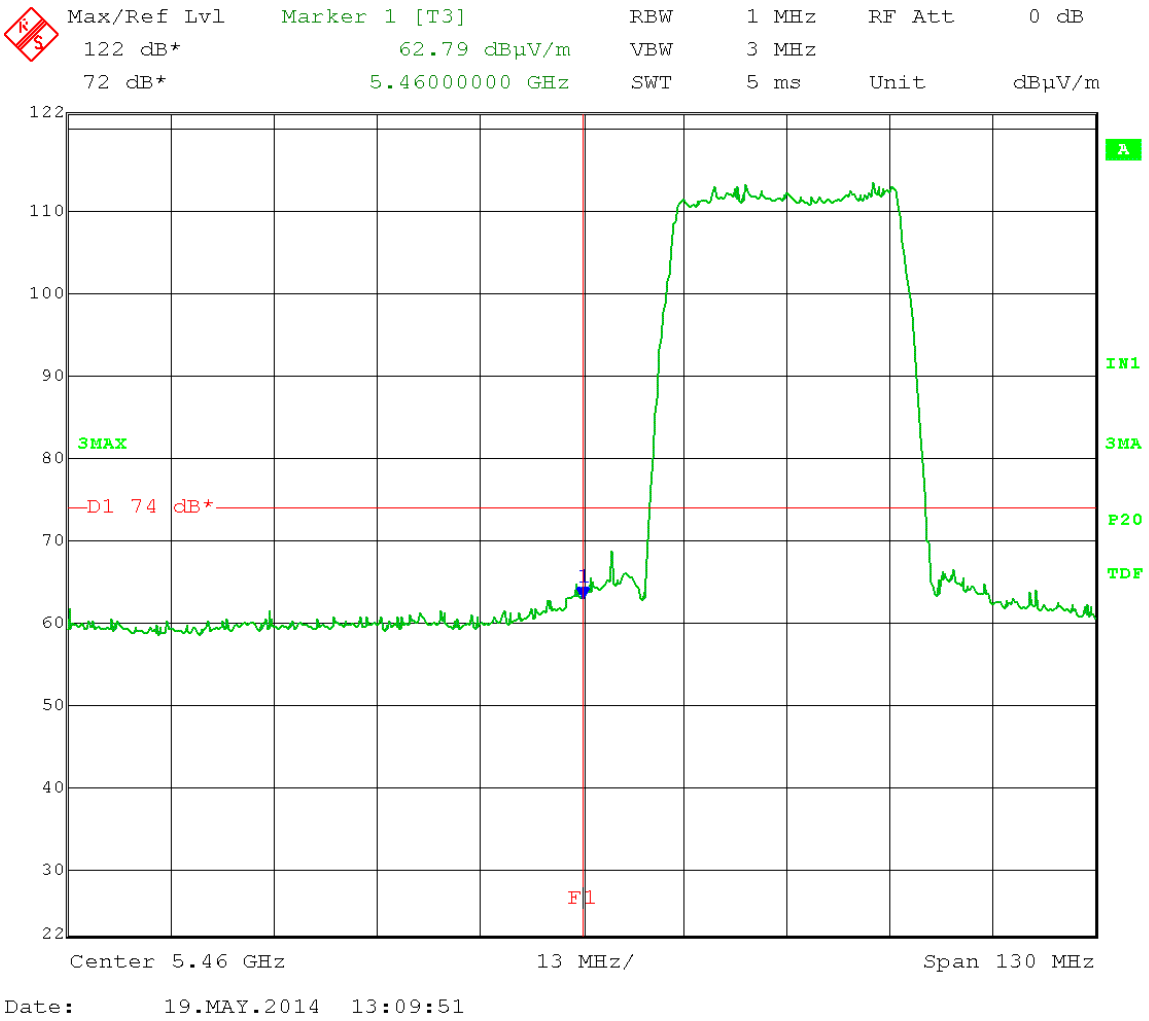
Date: 19.MAY.2014 13:20:04

Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Lower Restricted Band-Edge Compliance - Radiated – AVG (FCC 15.407(b)(7))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
Low Channel: Frequency – 5486 MHz
Modulation: 1024QAM
Horizontal
Restricted Band-Edge Frequency: 5460 MHz (F2)
Band-Edge Limit: 54 dBµV/m AVERAGE at a test distance of 3 meters.



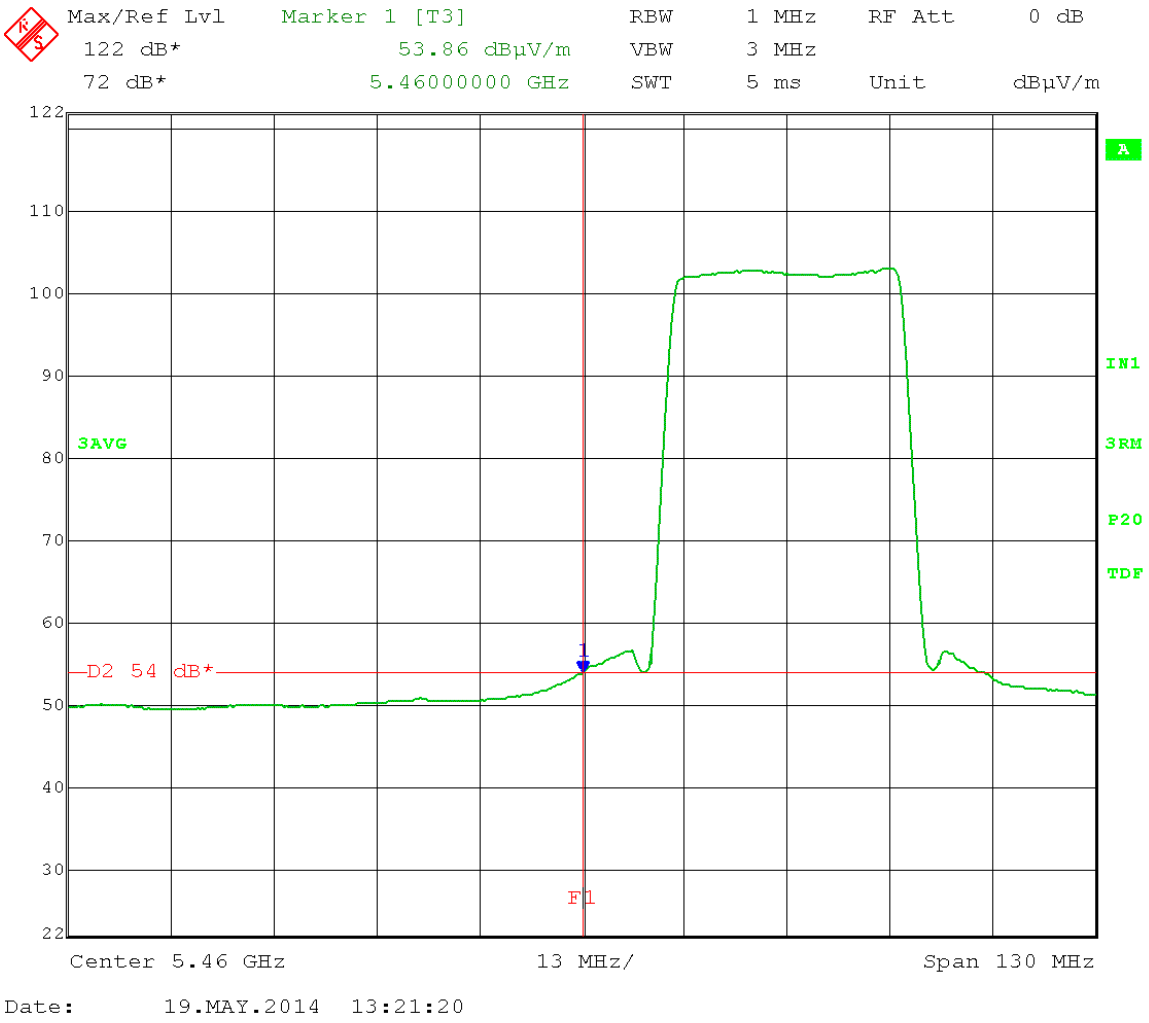
Date: 19.MAY.2014 13:10:35

Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Lower Restricted Band-Edge Compliance - Radiated – Peak (FCC 15.407(b)(7))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
Low Channel: Frequency – 5486 MHz
Modulation: 1024QAM
Horizontal
Restricted Band-Edge Frequency: 5460 MHz (F2)
Band-Edge Limit: 74 dBµV/m PEAK at a test distance of 3 meters.



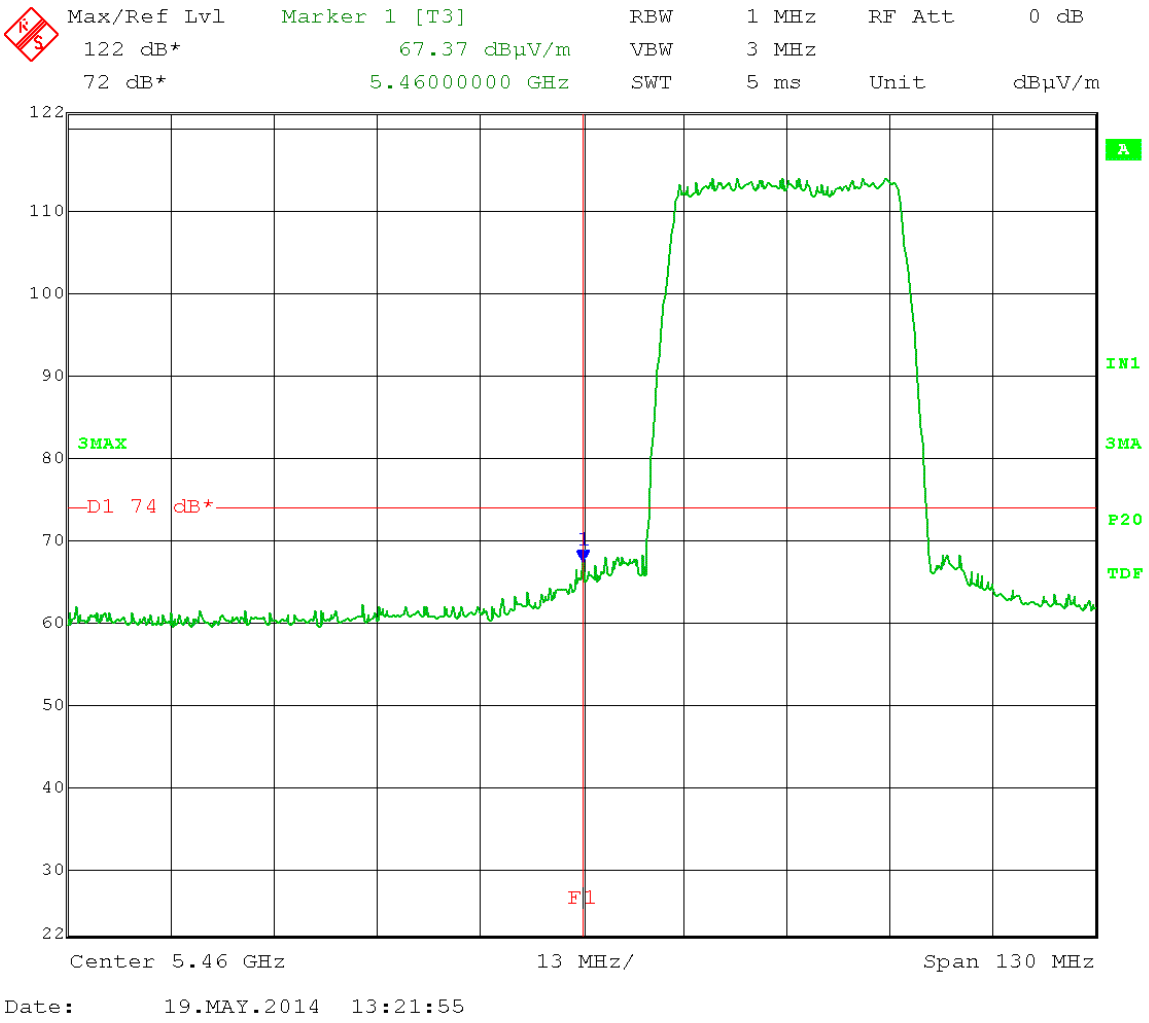
Date: 19.MAY.2014 13:09:51

Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Lower Restricted Band-Edge Compliance - Radiated – AVG (FCC 15.407(b)(7))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
Low Channel: Frequency – 5486 MHz
Modulation: 1024QAM
Vertical
Restricted Band-Edge Frequency: 5460 MHz (F2)
Band-Edge Limit: 54 dBµV/m AVERAGE at a test distance of 3 meters.



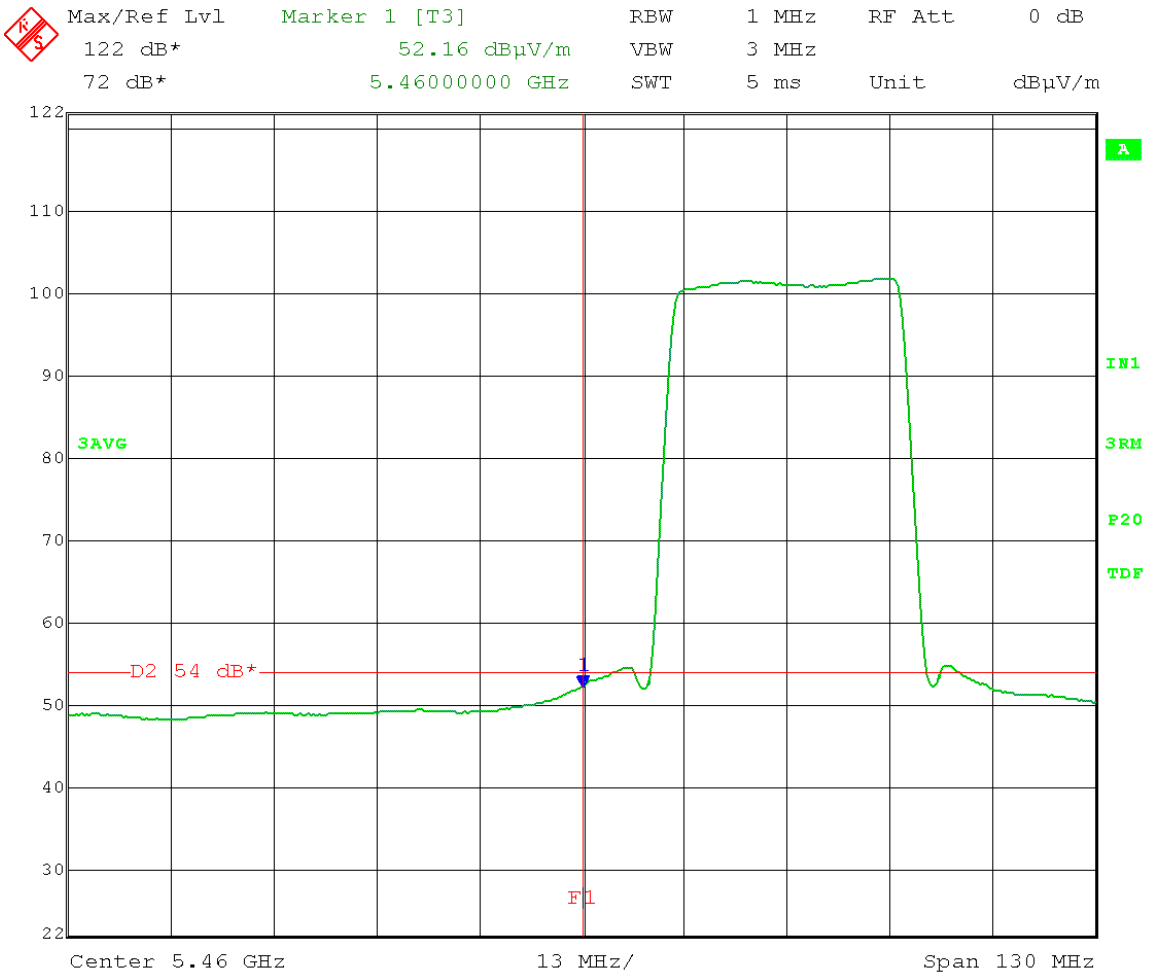
Date: 19.MAY.2014 13:21:20

Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Lower Restricted Band-Edge Compliance - Radiated – Peak (FCC 15.407(b)(7))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
Low Channel: Frequency – 5486 MHz
Modulation: 1024QAM
Vertical
Restricted Band-Edge Frequency: 5460 MHz (F2)
Band-Edge Limit: 74 dBµV/m PEAK at a test distance of 3 meters.



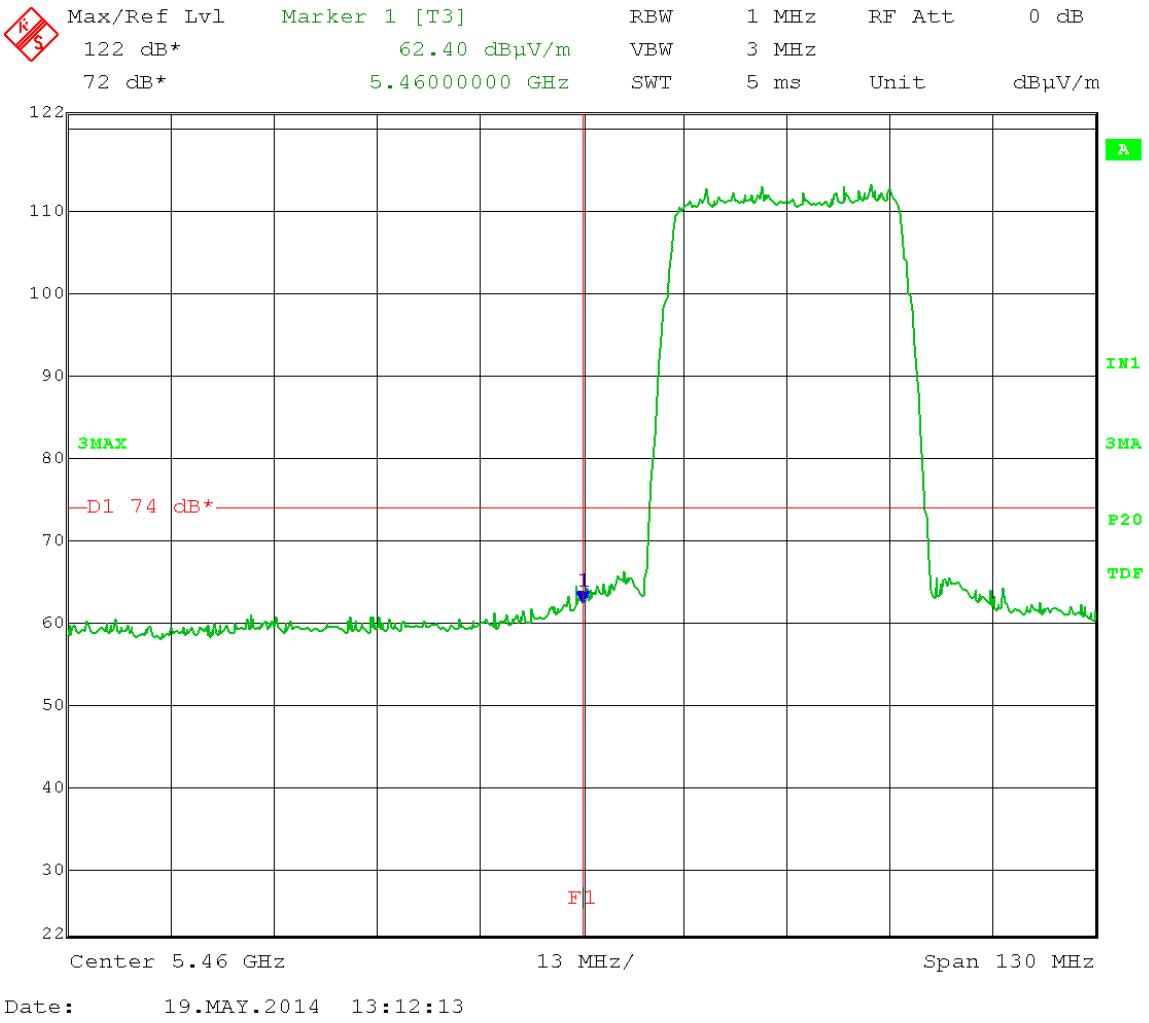
Date: 19.MAY.2014 13:21:55

Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Lower Restricted Band-Edge Compliance - Radiated – AVG (FCC 15.407(b)(7))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
Low Channel: Frequency – 5486 MHz
Modulation: QPSK
Horizontal
Restricted Band-Edge Frequency: 5460 MHz (F2)
Band-Edge Limit: 54 dBµV/m AVERAGE at a test distance of 3 meters.



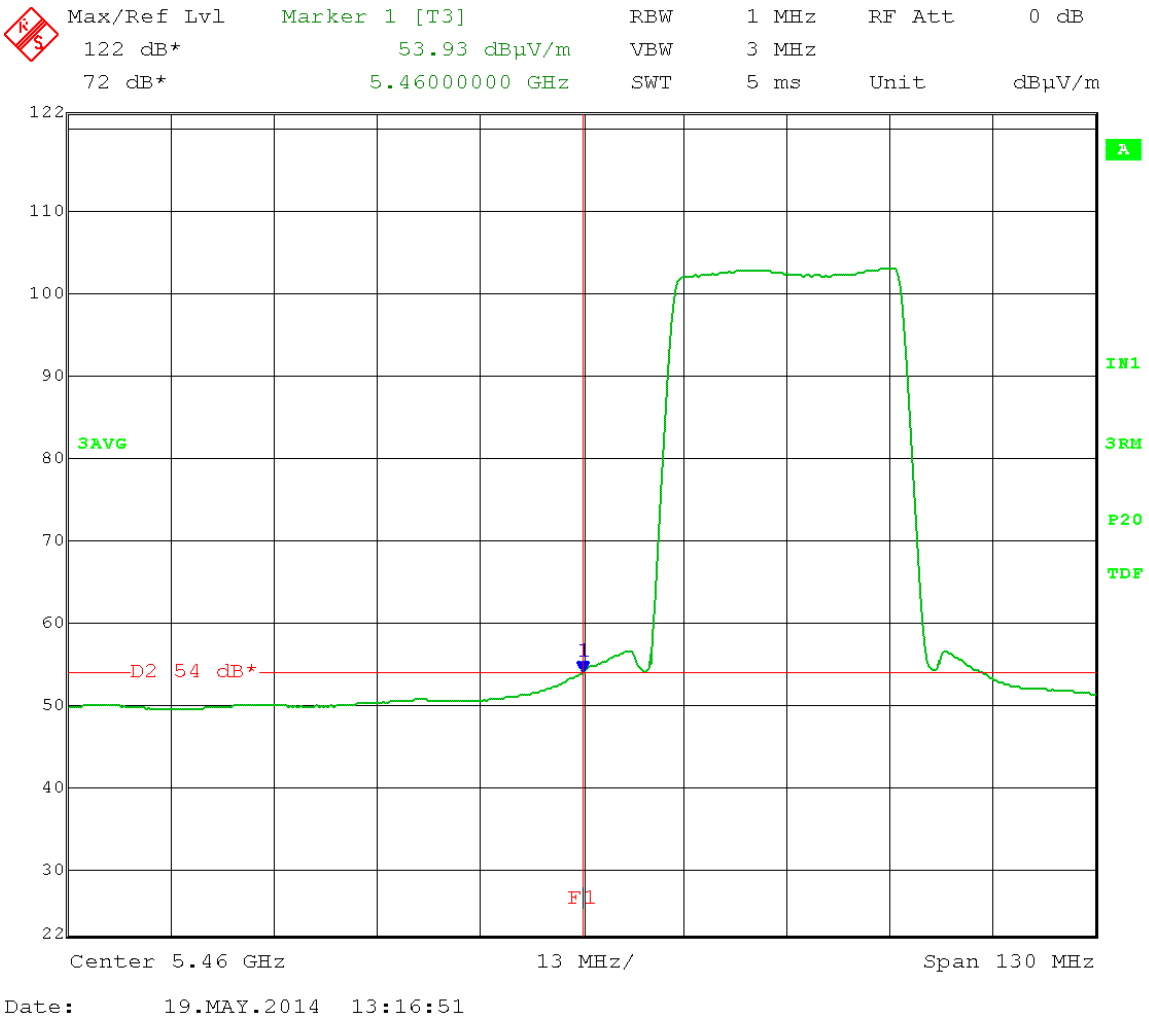
Date: 19.MAY.2014 13:12:46

Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Lower Restricted Band-Edge Compliance - Radiated – AVG (FCC 15.407(b)(7))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
Low Channel: Frequency – 5486 MHz
Modulation: QPSK
Horizontal
Restricted Band-Edge Frequency: 5460 MHz (F2)
Band-Edge Limit: 74 dBµV/m PEAK at a test distance of 3 meters.



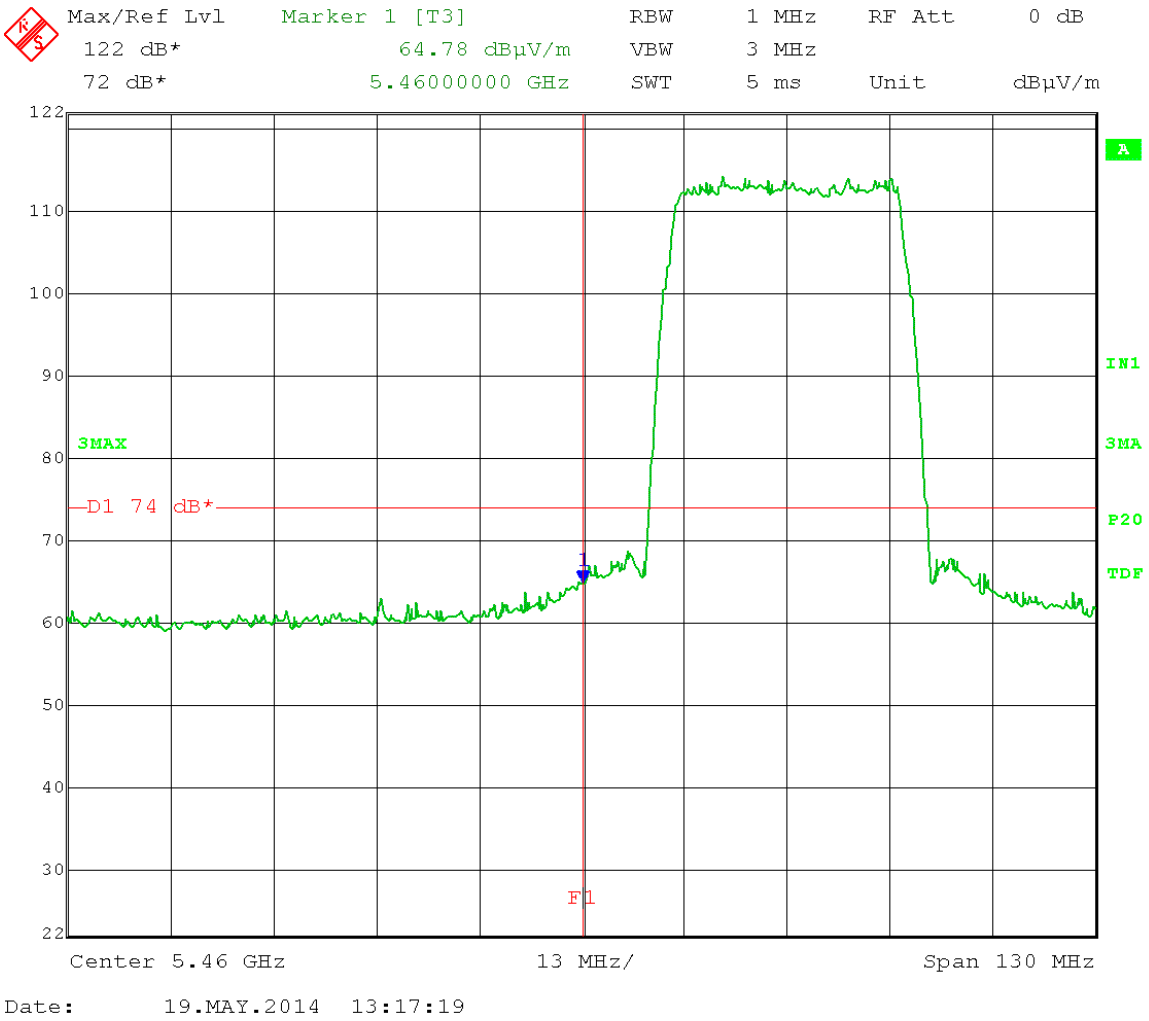
Date: 19.MAY.2014 13:12:13

Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Lower Restricted Band-Edge Compliance - Radiated – AVG (FCC 15.407(b)(7))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
Low Channel: Frequency – 5486 MHz
Modulation: QPSK
Vertical
Restricted Band-Edge Frequency: 5460 MHz (F2)
Band-Edge Limit: 54 dBµV/m AVERAGE at a test distance of 3 meters.



Date: 19.MAY.2014 13:16:51

Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Lower Restricted Band-Edge Compliance - Radiated – AVG (FCC 15.407(b)(7))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
Low Channel: Frequency – 5486 MHz
Modulation: QPSK
Vertical
Restricted Band-Edge Frequency: 5460 MHz (F2)
Band-Edge Limit: 74 dBµV/m PEAK at a test distance of 3 meters.



Date: 19.MAY.2014 13:17:19

Appendix B – Measurement Data

B5.0 Peak Power Spectral Density – Conducted

Rule Section: Section 15.407(a)(2)

Test Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r03 – *Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E*

Section F – Peak power spectral density (PPSD)
Using method E(2)(b) SA-1 for power spectrum (30 MHz BW)

Description: SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Number of points ≥ 2 x Span/RBW
Sweep time: auto
Detector = RMS
Sweep: trace average 200 sweeps in RMS mode
Use peak search to find the peak of the spectrum
Add 10 log (1/x) where x is the duty cycle when duty cycle is < 98%

Limit: 11 dBm in any 1 MHz band
Limit shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi

Limit = 11 dBm/MHz - 17 dB (the antenna gain exceeds 6 dBi by 17 dB)
= -6 dBm/MHz

Results: Passed

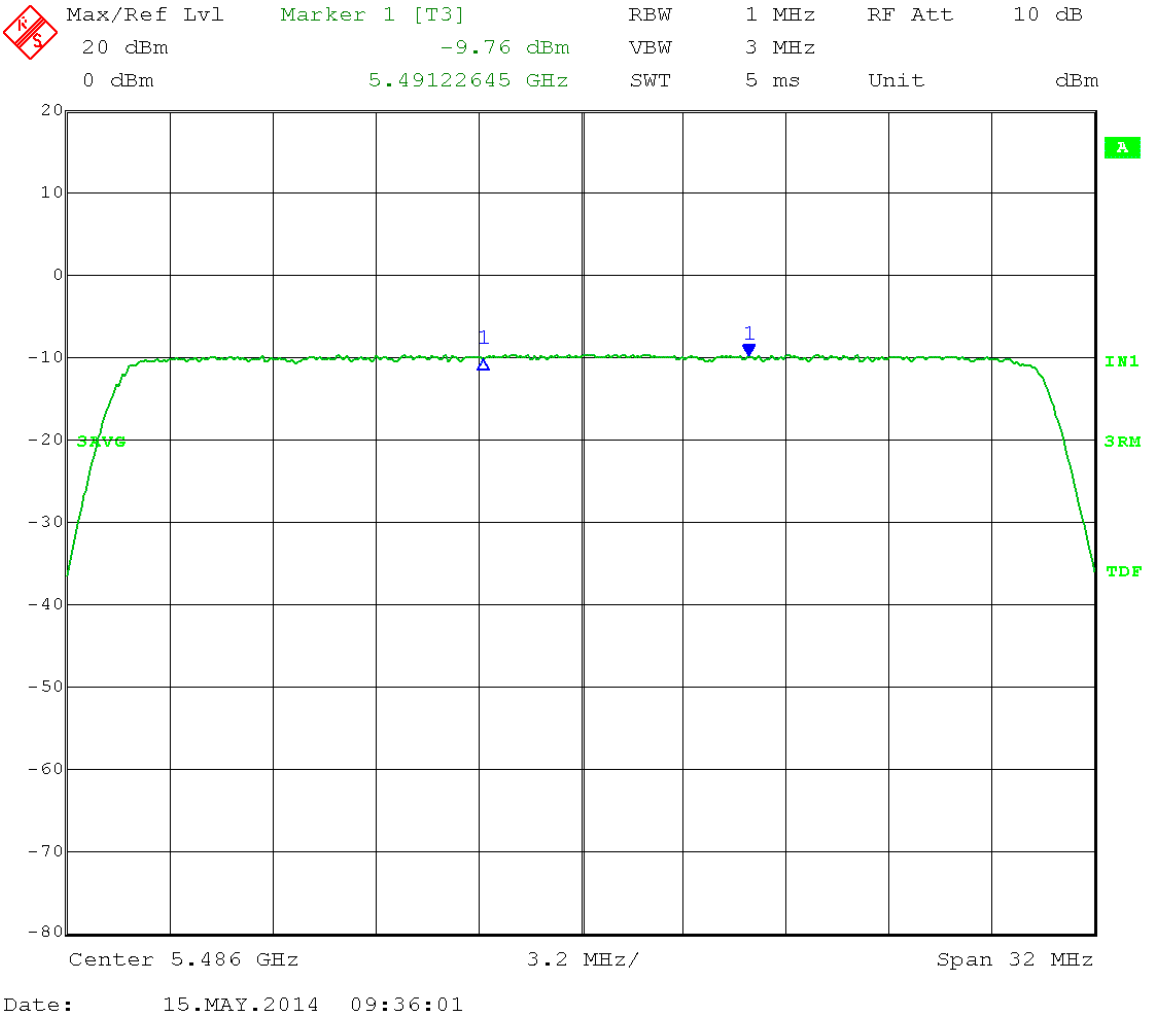
Notes: Measurements were taken for QPSK, 16QAM, 64QAM, 256QAM and 1024QAM modulations at the lowest, middle, and highest channels of operation. EUT was set to transmit continuously.

Output power was set to 30 dBm eirp using special test software.

Test Date: 5-15-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: Peak Power Spectral Density - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- F) PPSD (Page 9)
Limit:[15.407(a)(2)]: 11 – [20(antenna gain)+3(MIMO)-6]= -6dBm/1MHz
RBW = 1 MHz VBW = 3 MHz
Detector = RMS Trace = AVG
Sweep Time = Auto Sweep counts = 200
Low Channel: Transmit = 5.486 GHz 30MHz BW 16QAM
Output power setting: 30 dBm Output power setting: 30 dBm

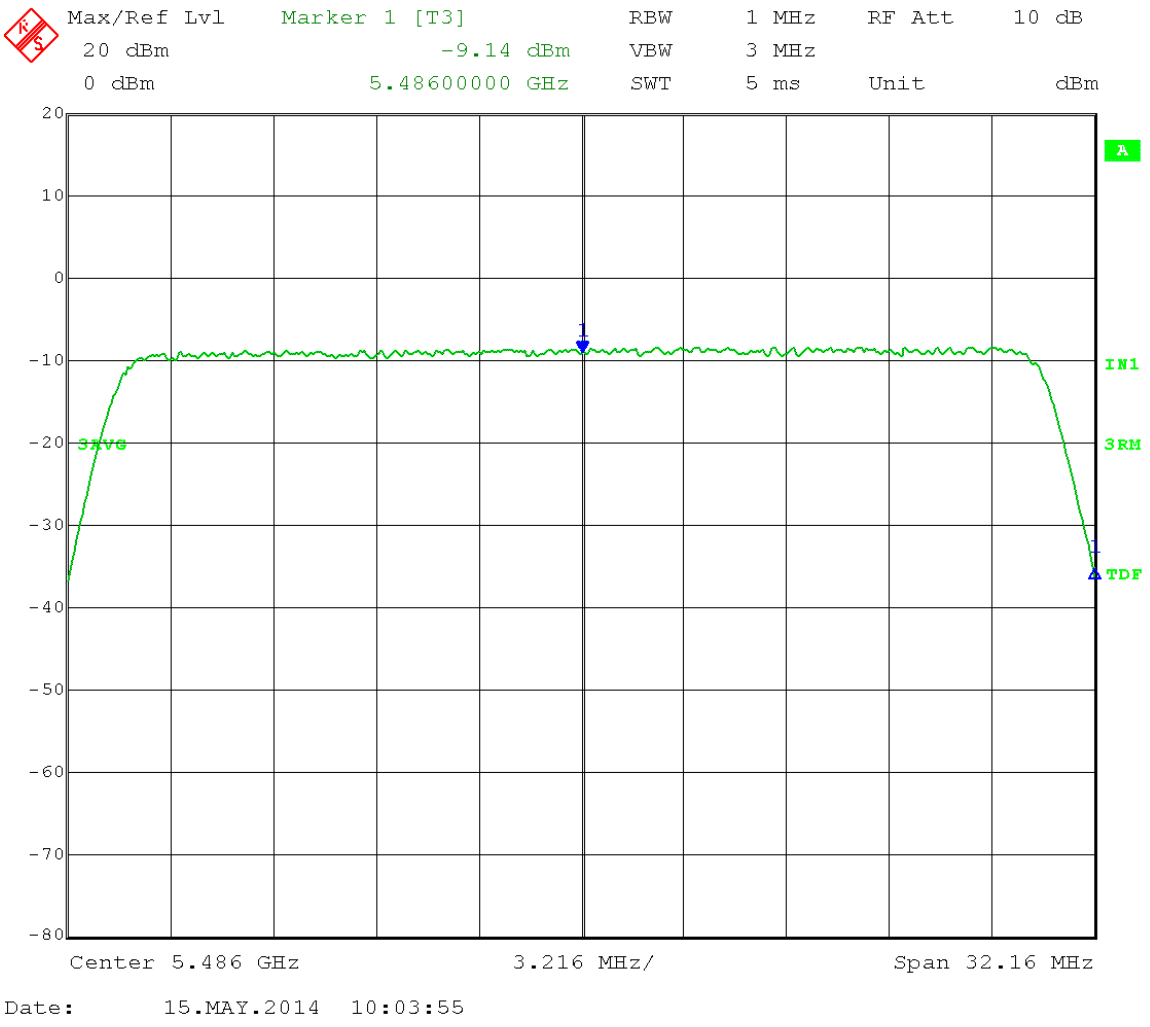
Channel 0:

26 dB Emission Bandwidth = 32.00MHz
PPSD = -9.76dBm < -6 dBm = Pass



Channel 1:

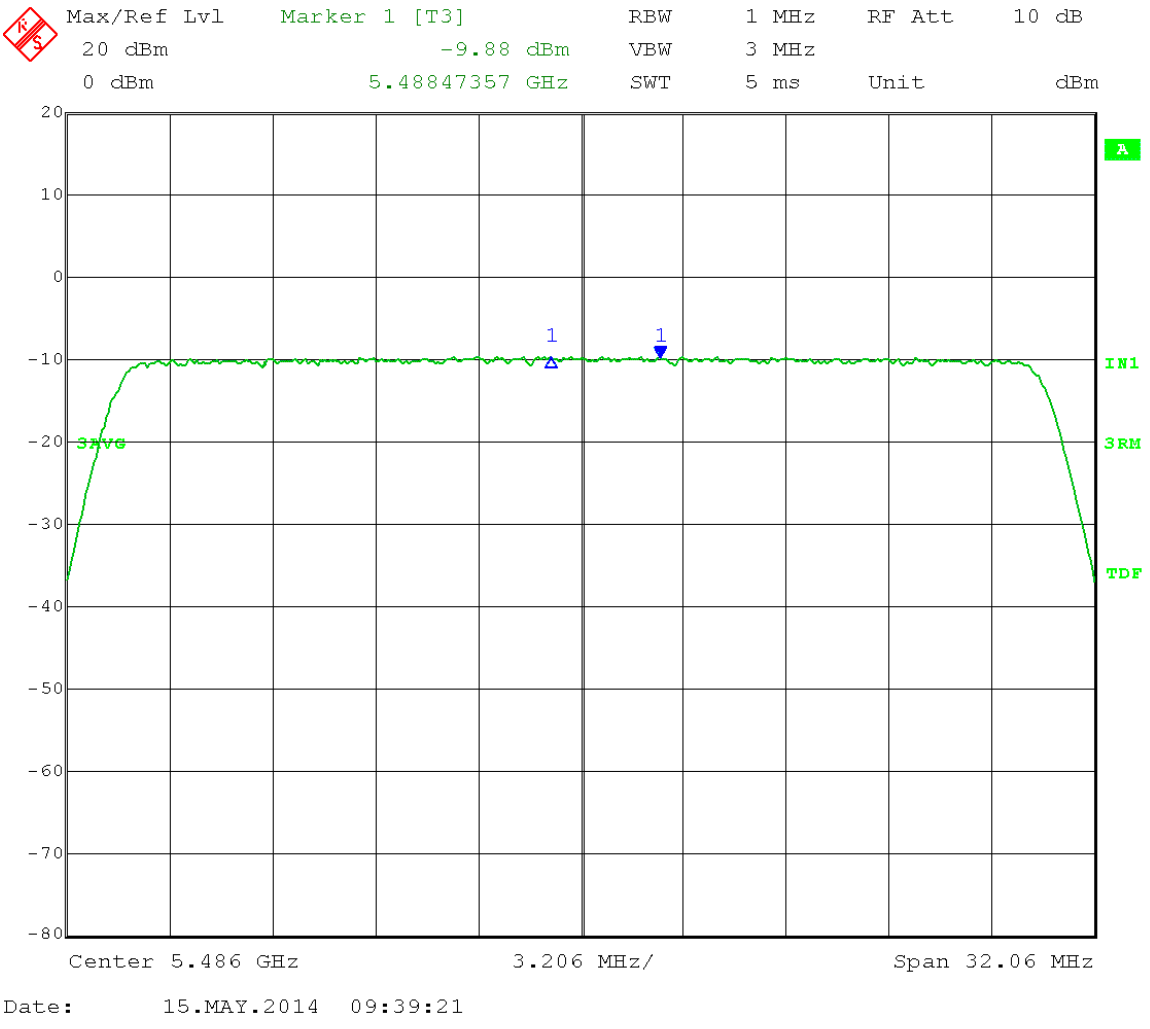
26 dB Emission Bandwidth = 32.16MHz
PPSD = -9.14dBm < -6 dBm = Pass



Test Date: 5-15-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: Peak Power Spectral Density - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- F) PPSD (Page 9)
Limit:[15.407(a)(2)]: 11 – [20(antenna gain)+3(MIMO)-6]= -6dBm/1MHz
RBW = 1 MHz VBW = 3 MHz
Detector = RMS Trace = AVG
Sweep Time = Auto Sweep counts = 200
Low Channel: Transmit = 5.486 GHz 30MHz BW 64QAM
Output power setting: 30 dBm

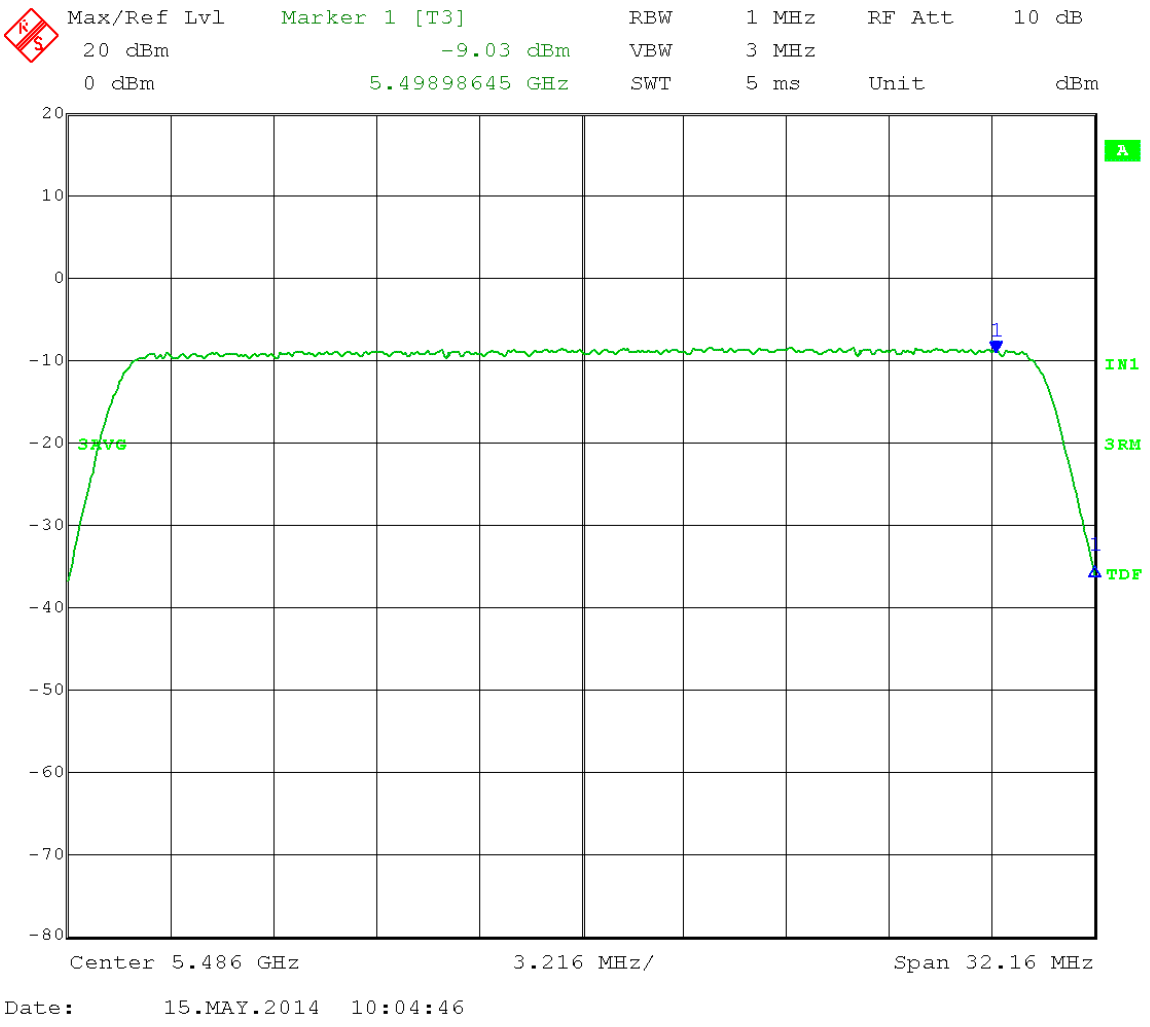
Channel 0:

26 dB Emission Bandwidth = 32.06MHz
PPSD = -9.88dBm < -6 dBm = Pass



Channel 1:

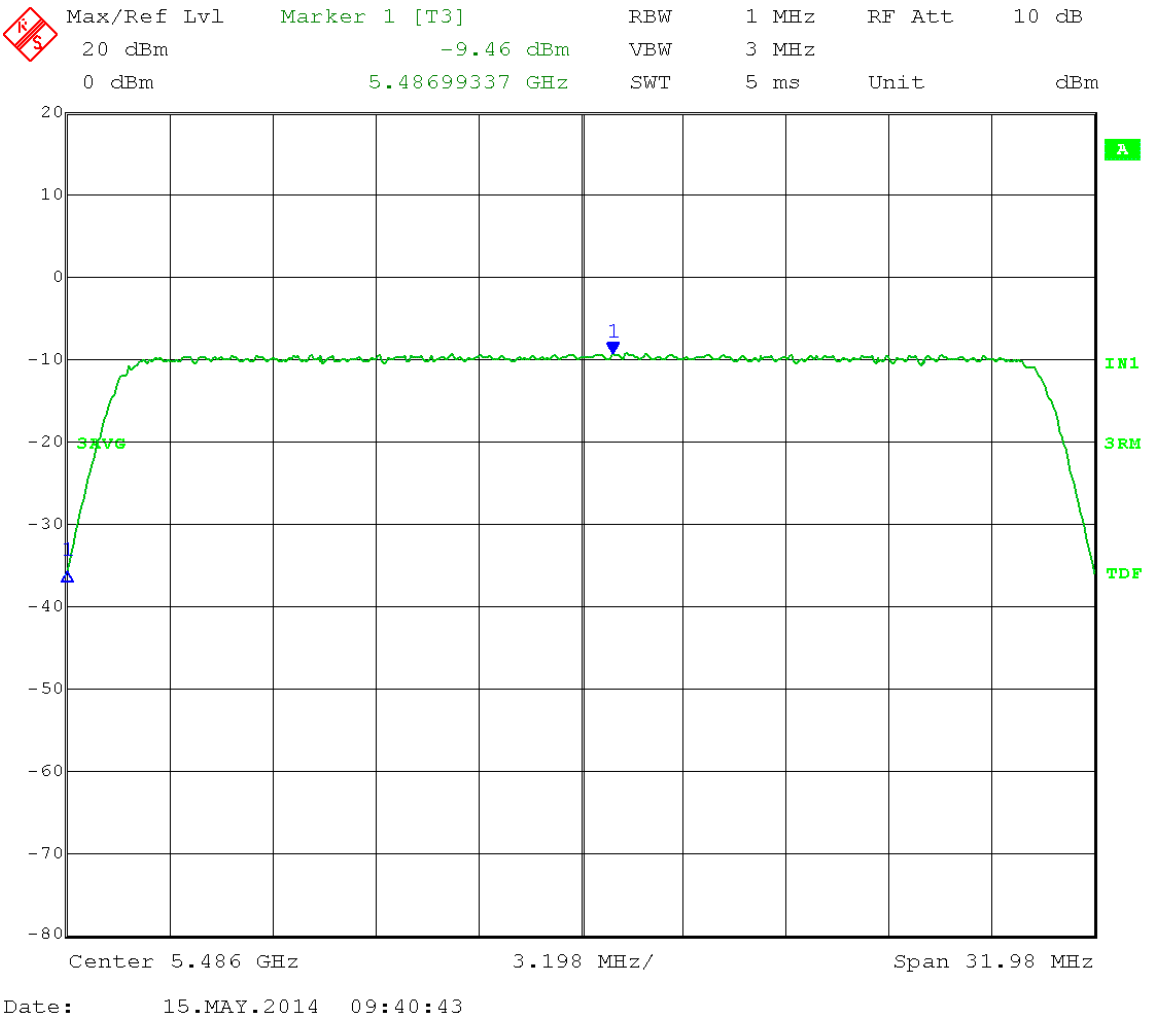
26 dB Emission Bandwidth = 32.16MHz
PPSD = -9.03dBm < -6 dBm = Pass



Test Date: 5-15-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: Peak Power Spectral Density - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- F) PPSD (Page 9)
Limit:[15.407(a)(2)]: 11 – [20(antenna gain)+3(MIMO)-6]= -6dBm/1MHz
RBW = 1 MHz VBW = 3 MHz
Detector = RMS Trace = AVG
Sweep Time = Auto Sweep counts = 200
Low Channel: Transmit = 5.486 GHz 30MHz BW 256QAM
Output power setting: 30 dBm

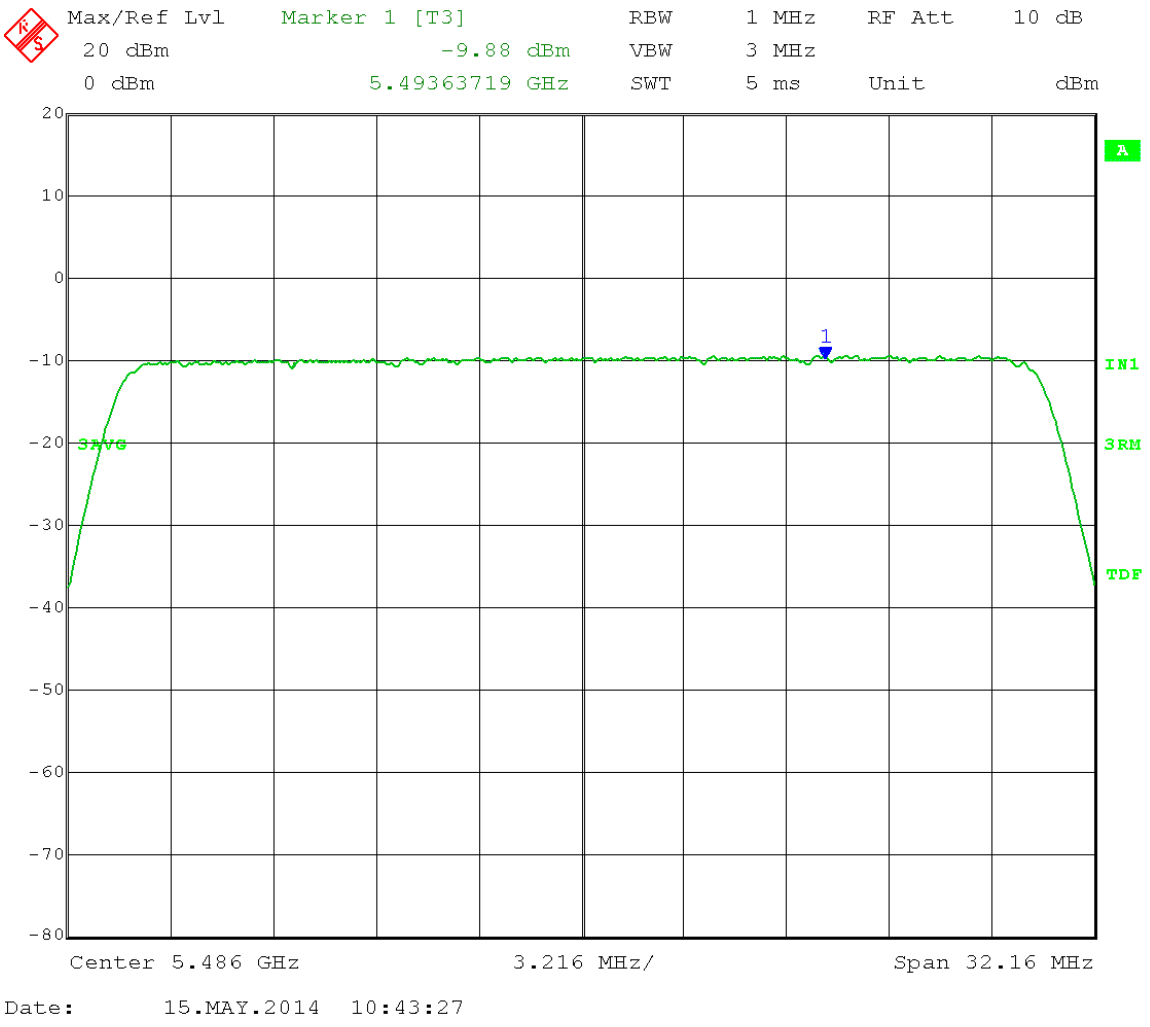
Channel 0:

26 dB Emission Bandwidth = 31.98MHz
PPSD = -9.46dBm < -6 dBm = Pass



Channel 1:

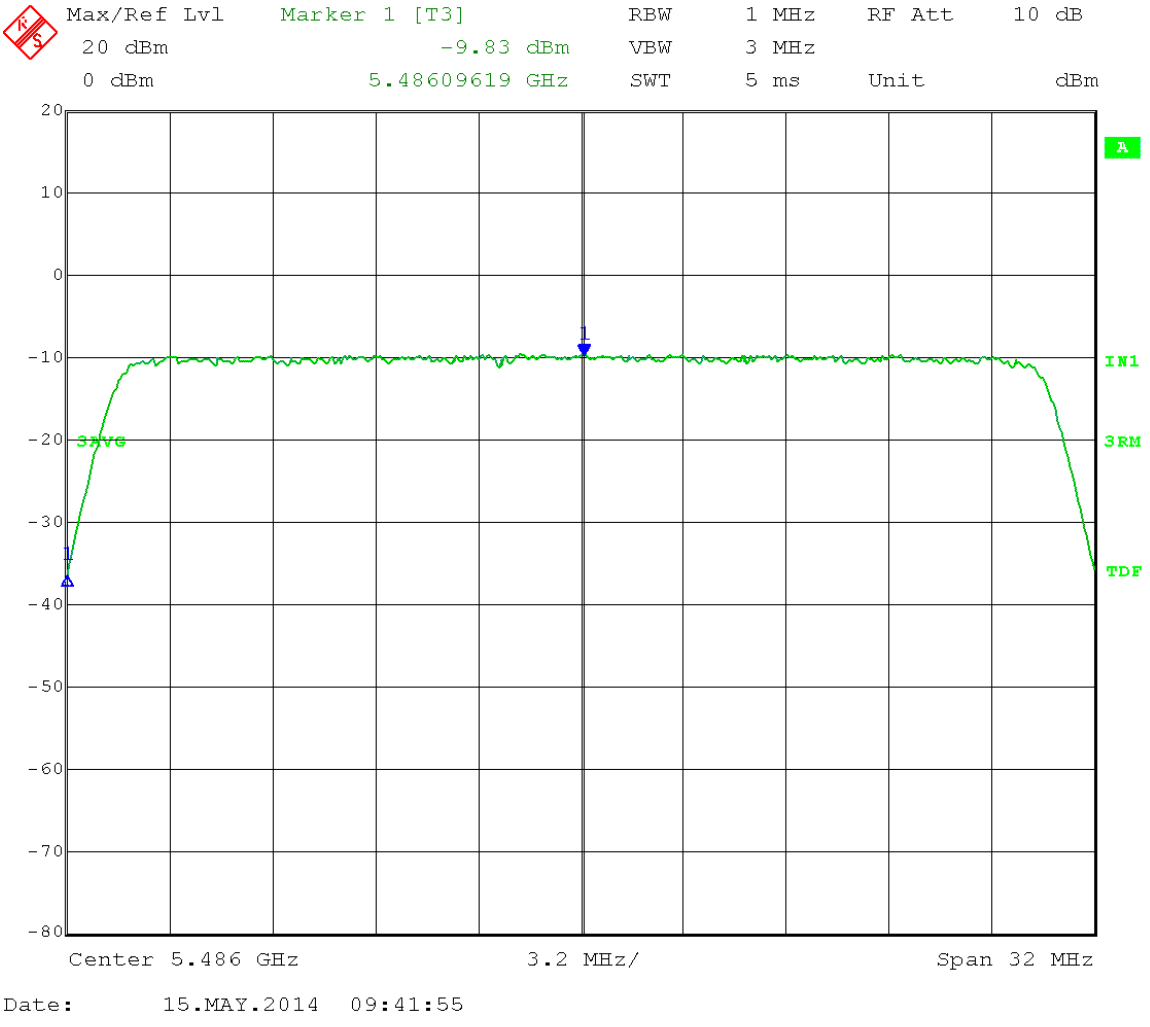
26 dB Emission Bandwidth = 32.16MHz
PPSD = -9.88dBm < -6 dBm = Pass



Test Date: 5-15-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: Peak Power Spectral Density - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- F) PPSD (Page 9)
Limit:[15.407(a)(2)]: 11 – [20(antenna gain)+3(MIMO)-6]= -6dBm/1MHz
RBW = 1 MHz VBW = 3 MHz
Detector = RMS Trace = AVG
Sweep Time = Auto Sweep counts = 200
Low Channel: Transmit = 5.486 GHz 30MHz BW 1024QAM
Output power setting: 30 dBm

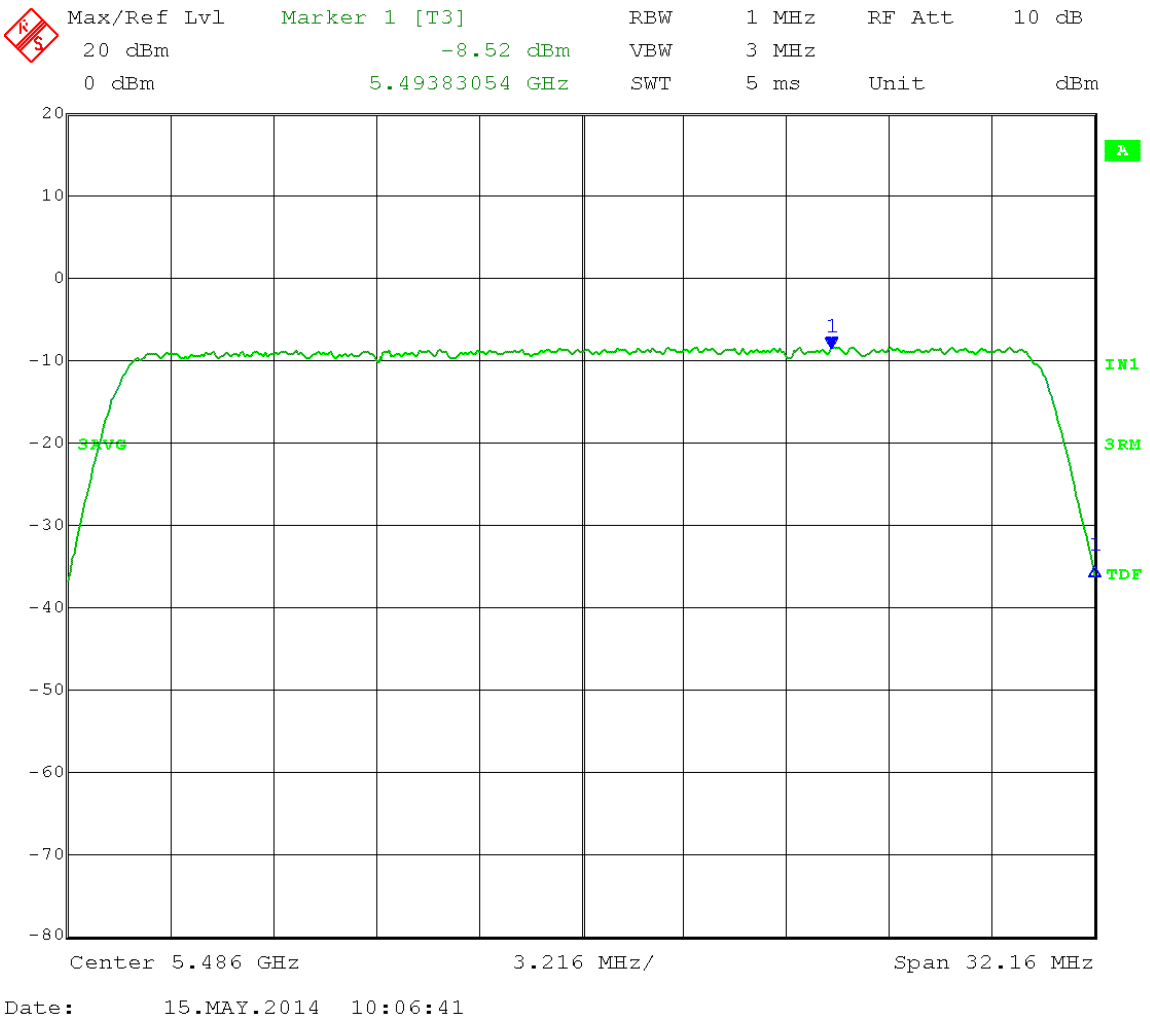
Channel 0:

26 dB Emission Bandwidth = 32MHz
PPSD = -9.83dBm < -6 dBm = Pass



Channel 1:

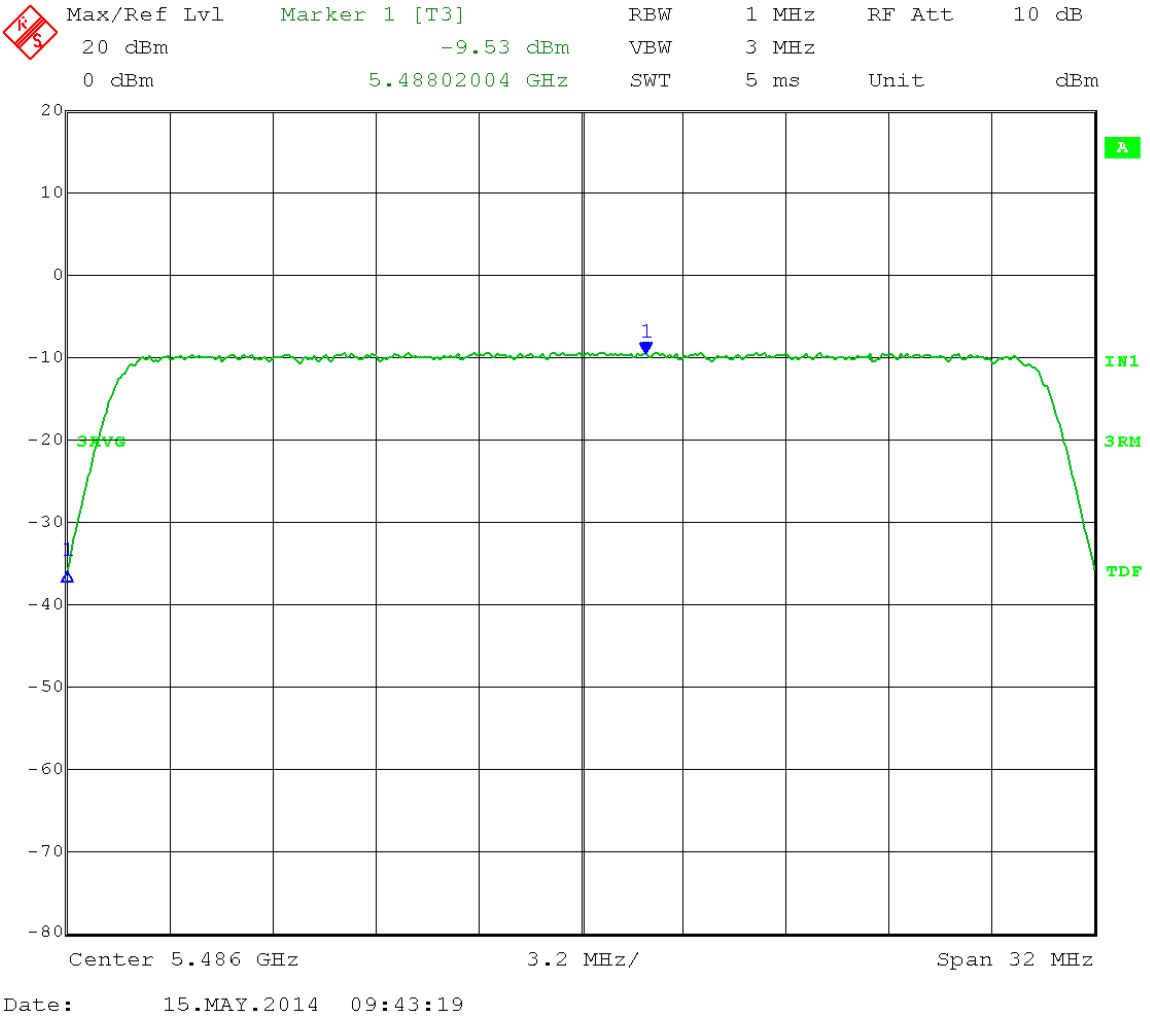
26 dB Emission Bandwidth = 32.16MHz
PPSD = -8.52dBm < -6 dBm = Pass



Test Date: 5-15-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: Peak Power Spectral Density - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- F) PPSD (Page 9)
Limit:[15.407(a)(2)]: 11 – [20(antenna gain)+3(MIMO)-6]= -6dBm/1MHz
RBW = 1 MHz VBW = 3 MHz
Detector = RMS Trace = AVG
Sweep Time = Auto Sweep counts = 200
Low Channel: Transmit = 5.486 GHz 30MHz BW QPSK
Output power setting: 30 dBm

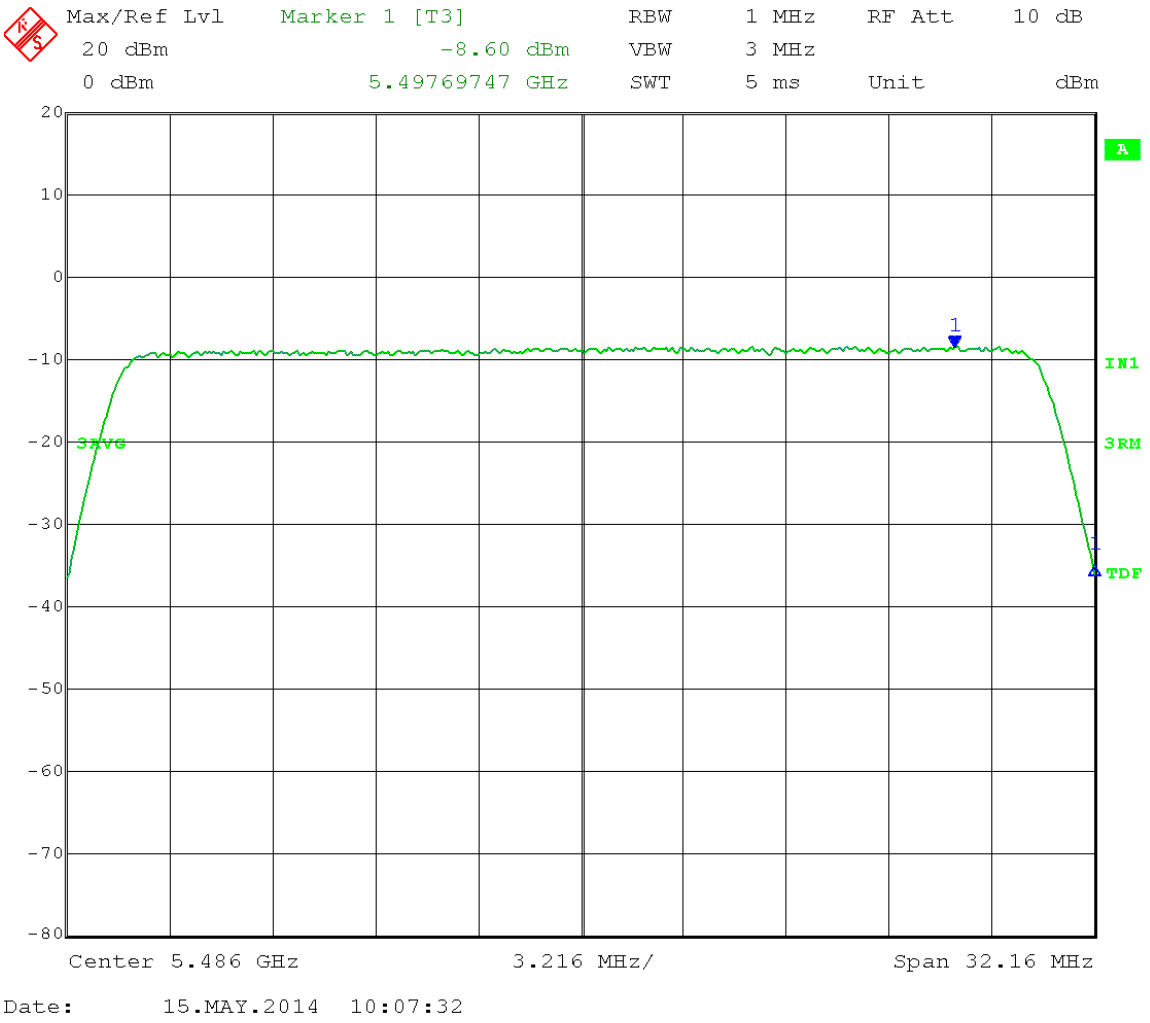
Channel 0:

26 dB Emission Bandwidth = 32MHz
PPSD = -9.53 dBm < -6 dBm = Pass



Channel 1:

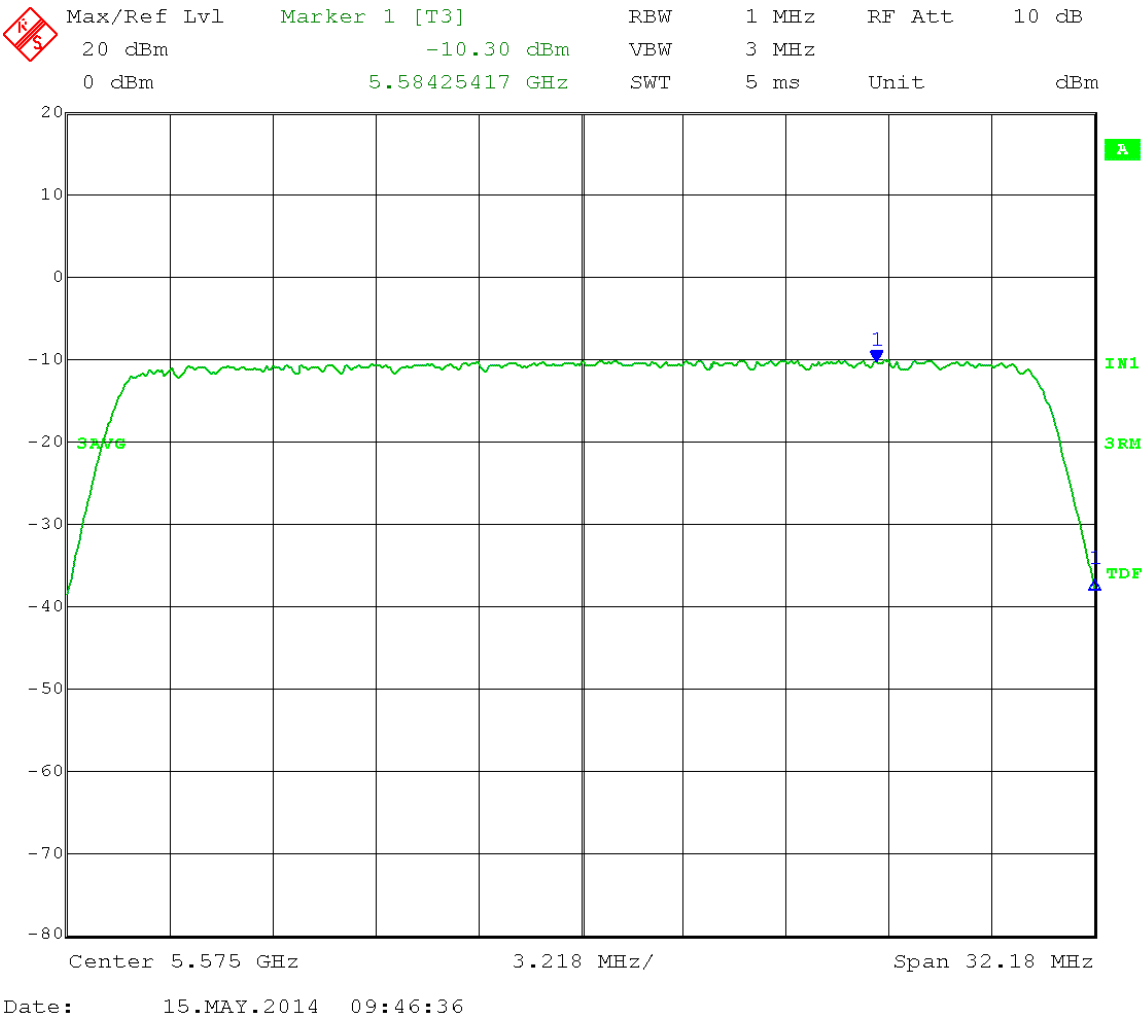
26 dB Emission Bandwidth = 32.16MHz
PPSD = -8.60dBm < -6 dBm = Pass



Test Date: 5-15-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: Peak Power Spectral Density - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- F) PPSD (Page 9)
Limit:[15.407(a)(2)]: 11 – [20(antenna gain)+3(MIMO)-6]= -6dBm/1MHz
RBW = 1 MHz VBW = 3 MHz
Detector = RMS Trace = AVG
Sweep Time = Auto Sweep counts = 200
Mid Channel: Transmit = 5.575 GHz 30MHz BW 16QAM
Output power setting: 30 dBm

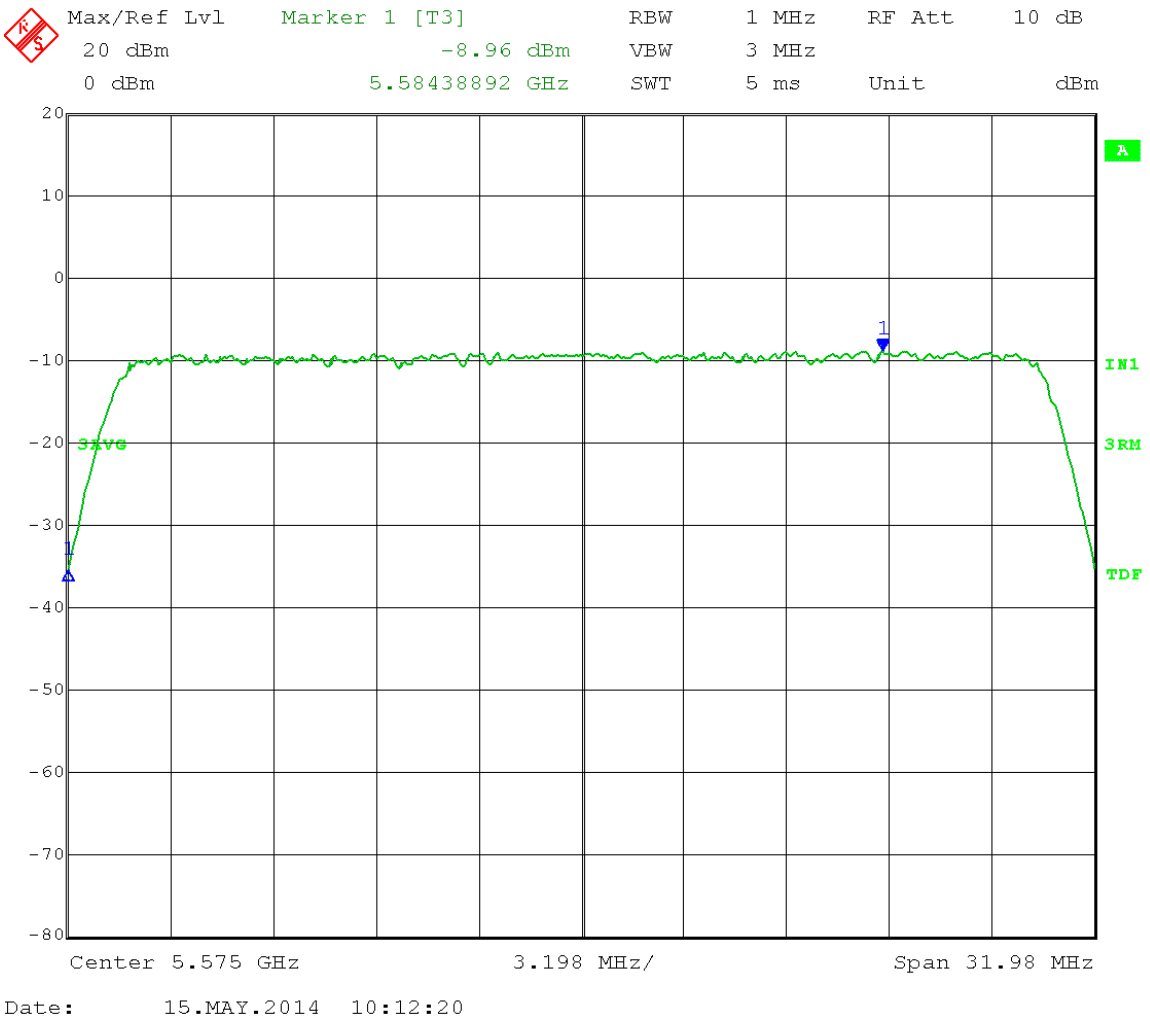
Channel 0:

26 dB Emission Bandwidth = 32.18MHz
PPSD = -10.30dBm < -6 dBm = Pass



Channel 1:

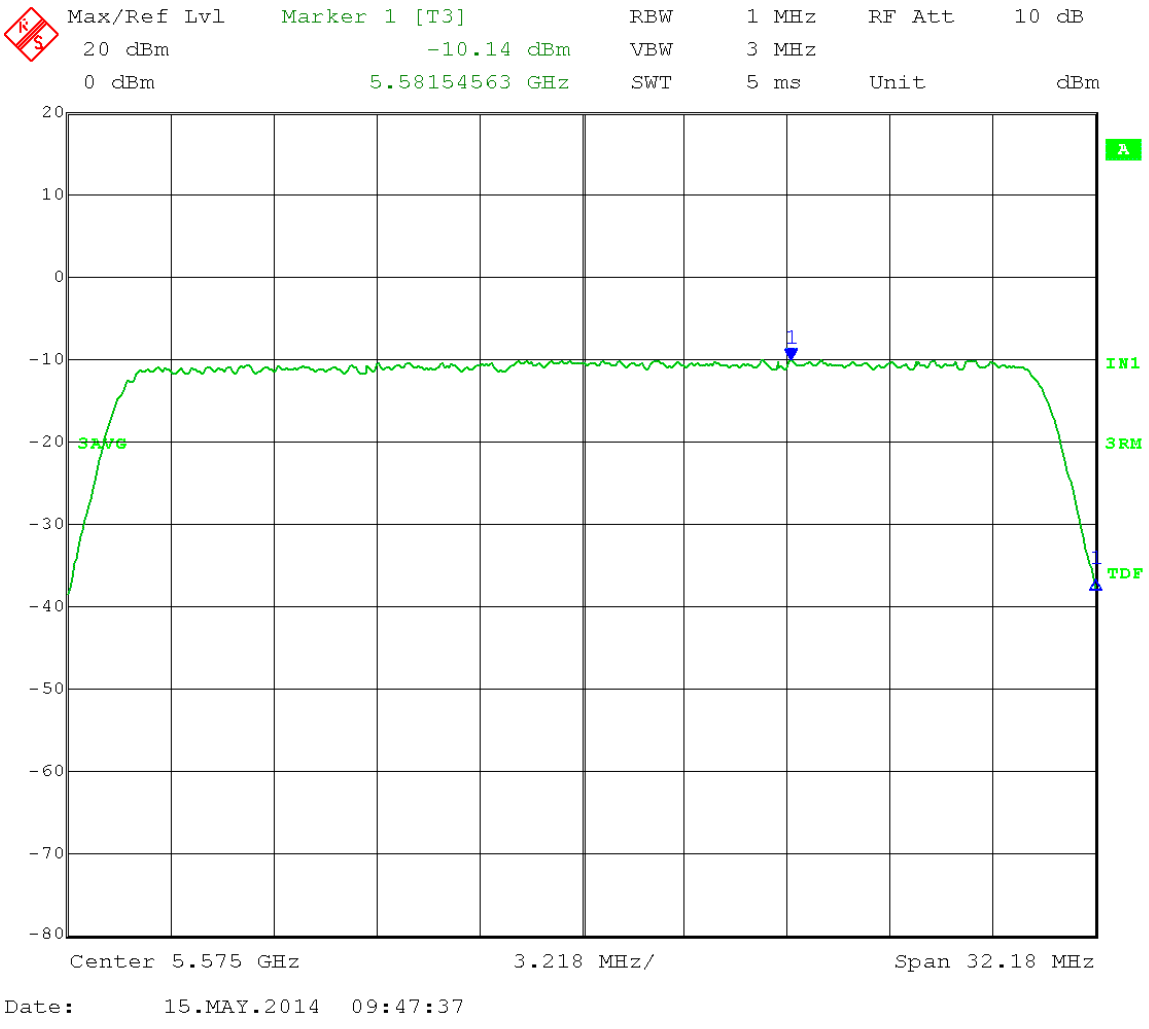
26 dB Emission Bandwidth = 31.98MHz
PPSD = -8.96dBm < -6 dBm = Pass



Test Date: 5-15-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: Peak Power Spectral Density - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- F) PPSD (Page 9)
Limit:[15.407(a)(2)]: 11 – [20(antenna gain)+3(MIMO)-6]= -6dBm/1MHz
RBW = 1 MHz VBW = 3 MHz
Detector = RMS Trace = AVG
Sweep Time = Auto Sweep counts = 200
Mid Channel: Transmit = 5.575 GHz 30MHz BW 64QAM
Output power setting: 30 dBm

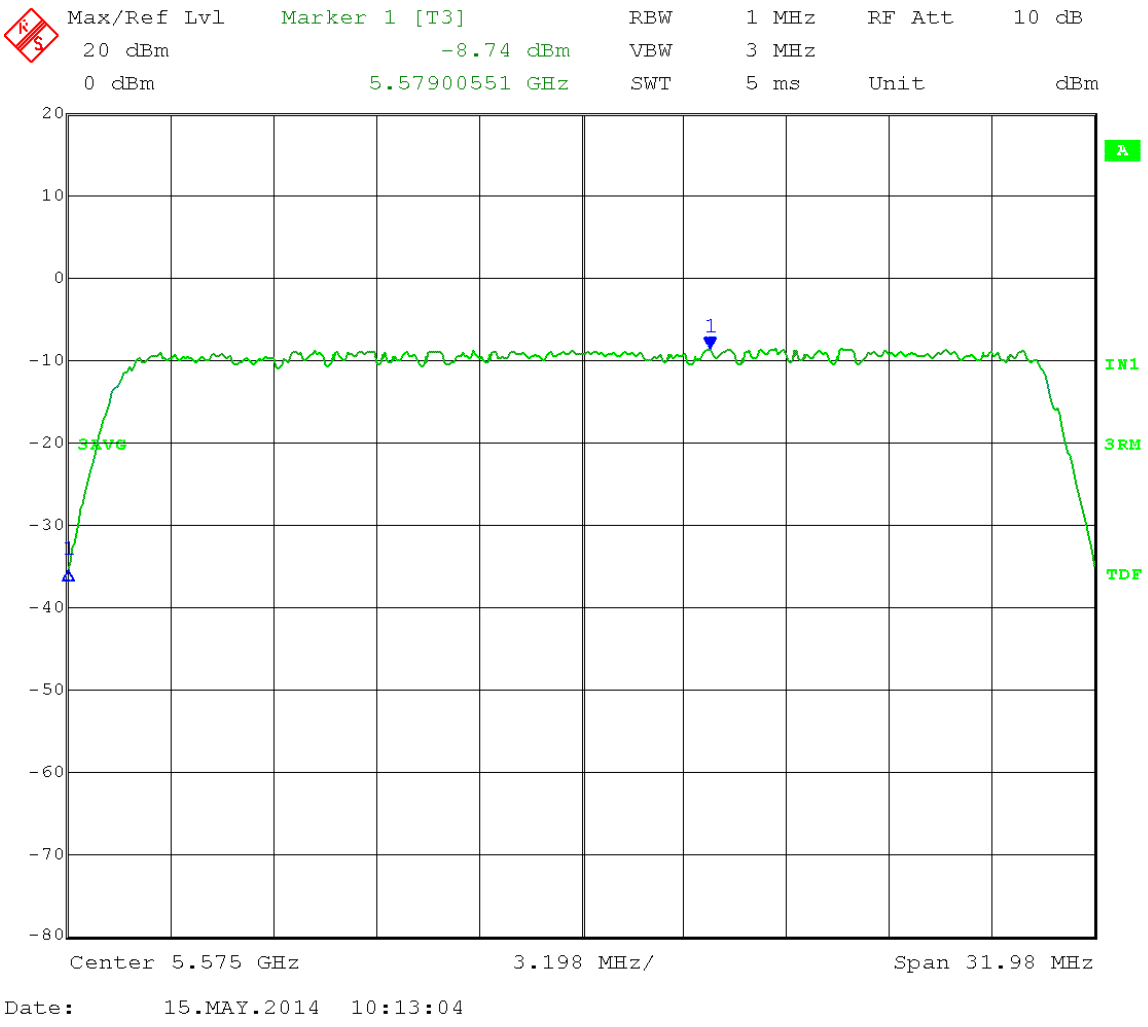
Channel 0:

26 dB Emission Bandwidth = 32.18MHz
PPSD = -10.14dBm < -6 dBm = Pass



Channel 1:

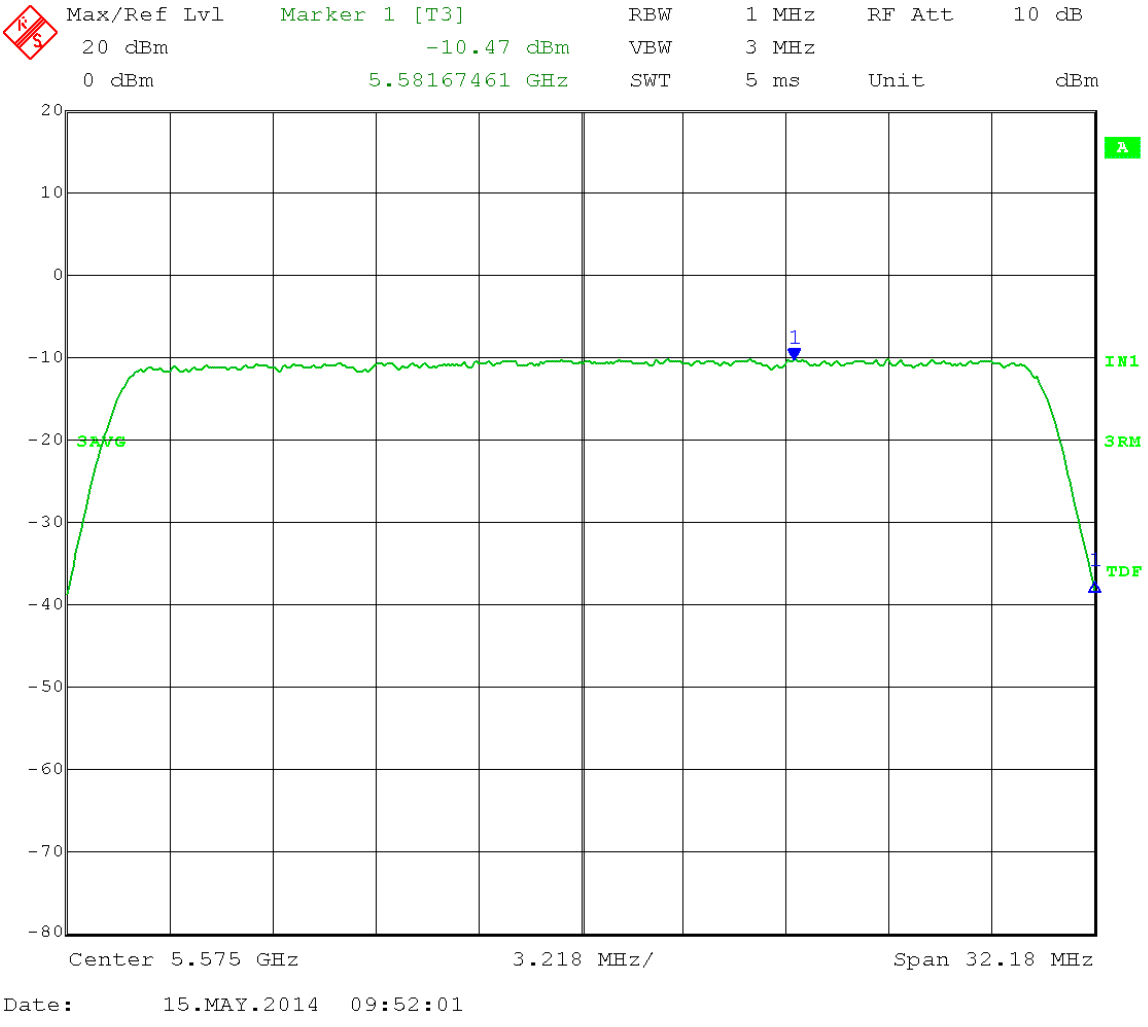
26 dB Emission Bandwidth = 31.98MHz
PPSD = -8.74dBm < -6 dBm = Pass



Test Date: 5-15-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: Peak Power Spectral Density - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- F) PPSD (Page 9)
Limit:[15.407(a)(2)]: 11 – [20(antenna gain)+3(MIMO)-6]= -6dBm/1MHz
RBW = 1 MHz VBW = 3 MHz
Detector = RMS Trace = AVG
Sweep Time = Auto Sweep counts = 200
Mid Channel: Transmit = 5.575 GHz 30MHz BW 256QAM
Output power setting: 30 dBm

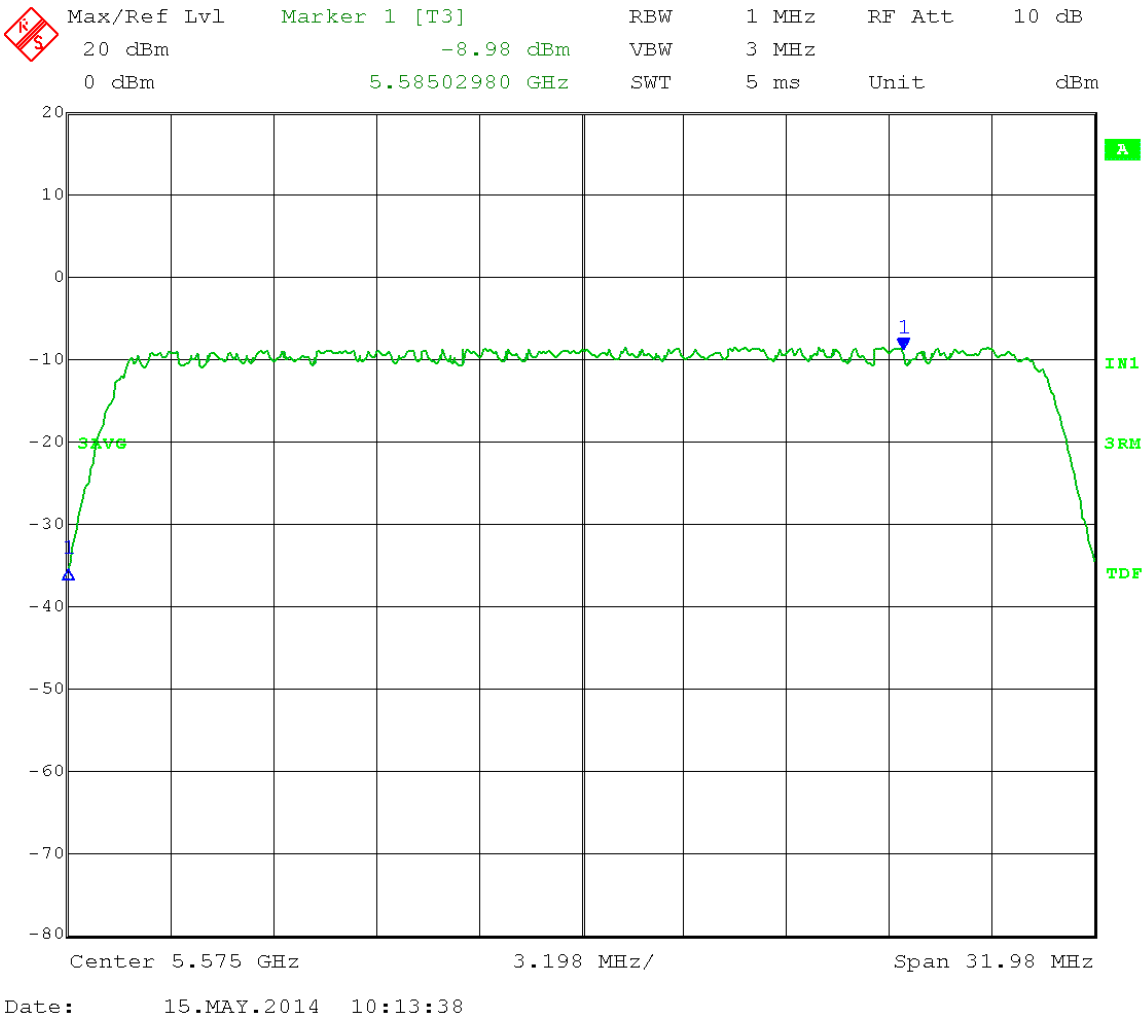
Channel 0:

26 dB Emission Bandwidth = 32.18MHz
PPSD = -10.47dBm < -6 dBm = Pass



Channel 1:

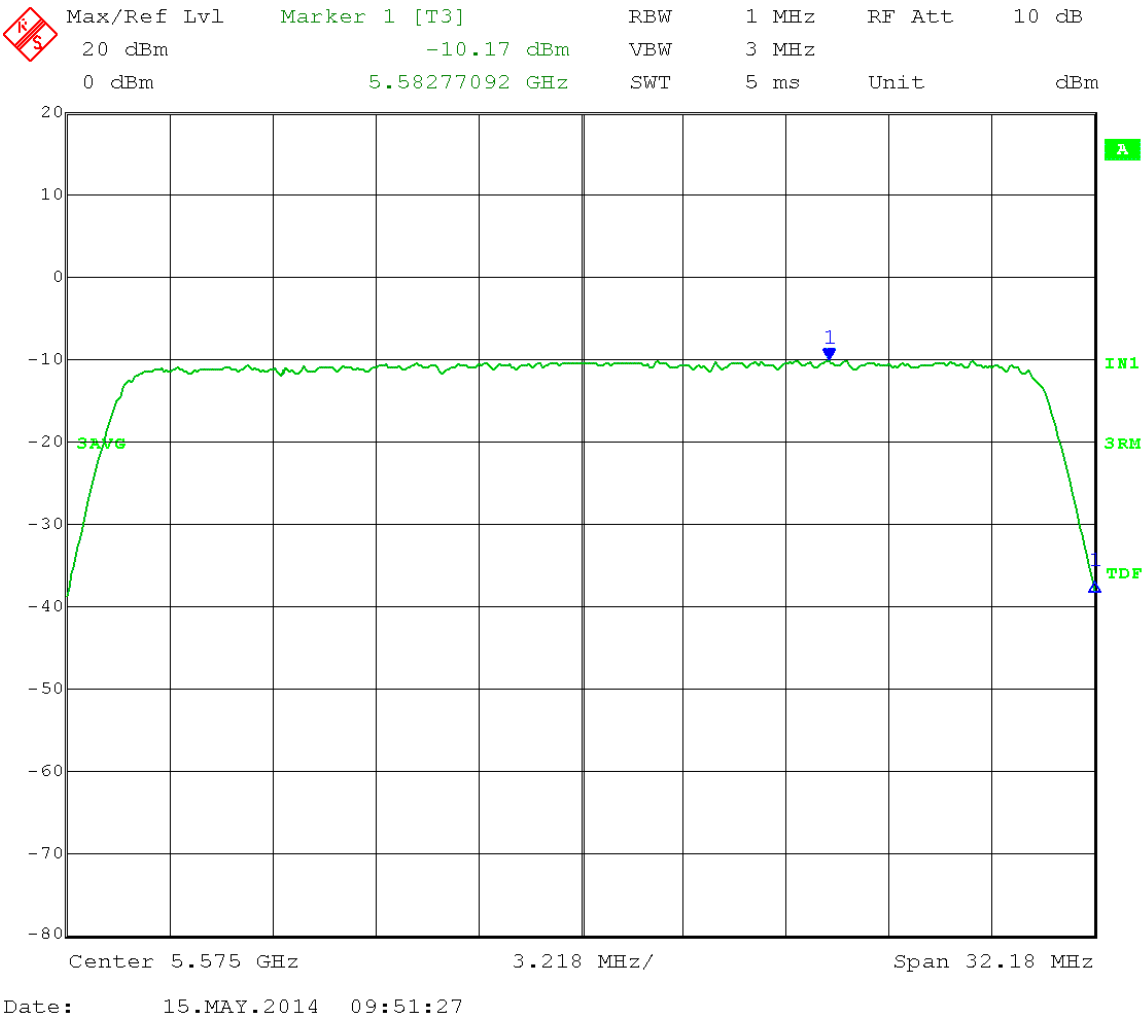
26 dB Emission Bandwidth = 31.98MHz
PPSD = -8.98dBm < -6 dBm = Pass



Test Date: 5-15-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: Peak Power Spectral Density - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- F) PPSD (Page 9)
Limit:[15.407(a)(2)]: 11 – [20(antenna gain)+3(MIMO)-6]= -6dBm/1MHz
RBW = 1 MHz VBW = 3 MHz
Detector = RMS Trace = AVG
Sweep Time = Auto Sweep counts = 200
Mid Channel: Transmit = 5.575 GHz 30MHz BW 1024QAM
Output power setting: 30 dBm

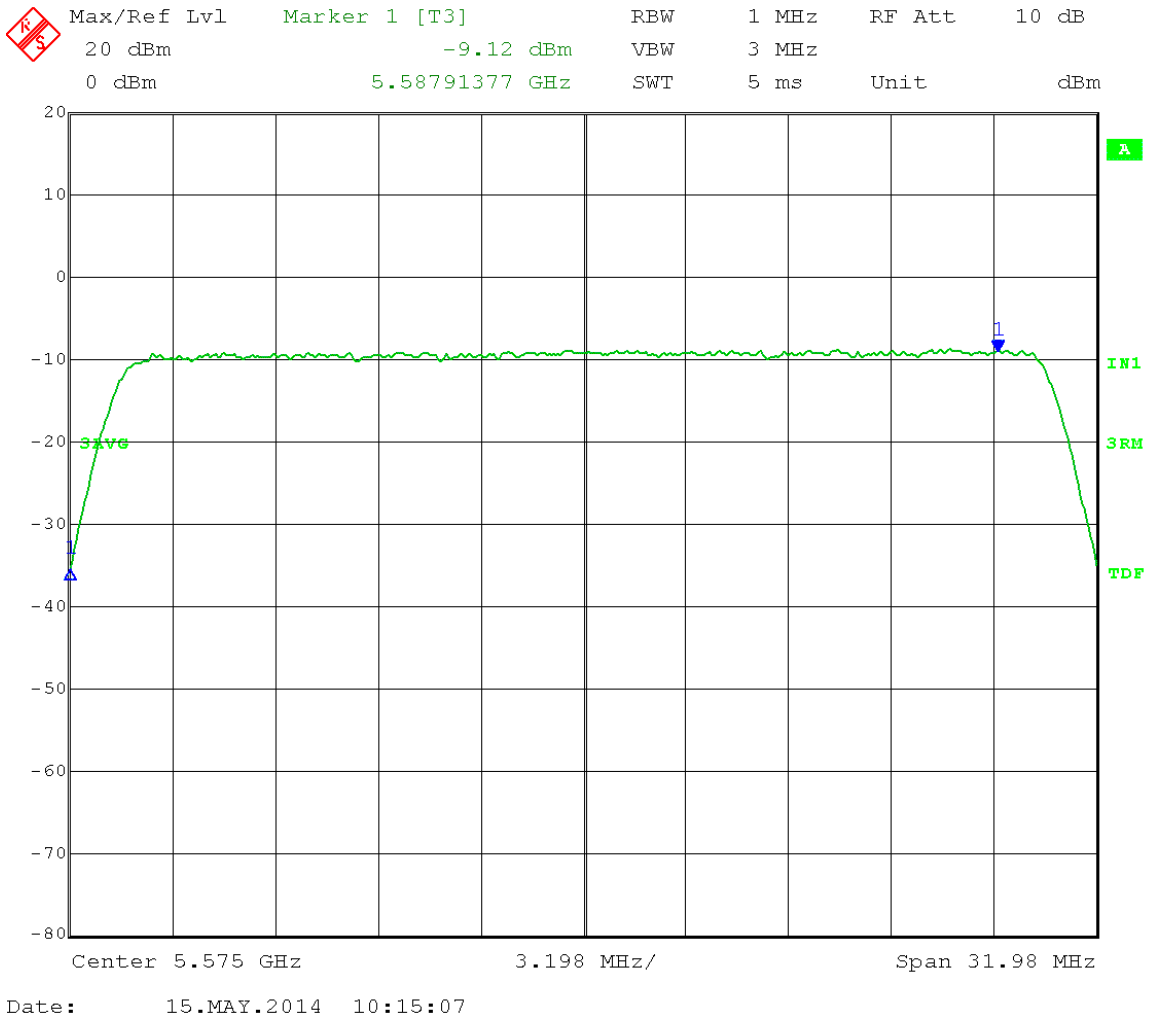
Channel 0:

26 dB Emission Bandwidth = 32.18MHz
PPSD = -10.17dBm < -6 dBm = Pass



Channel 1:

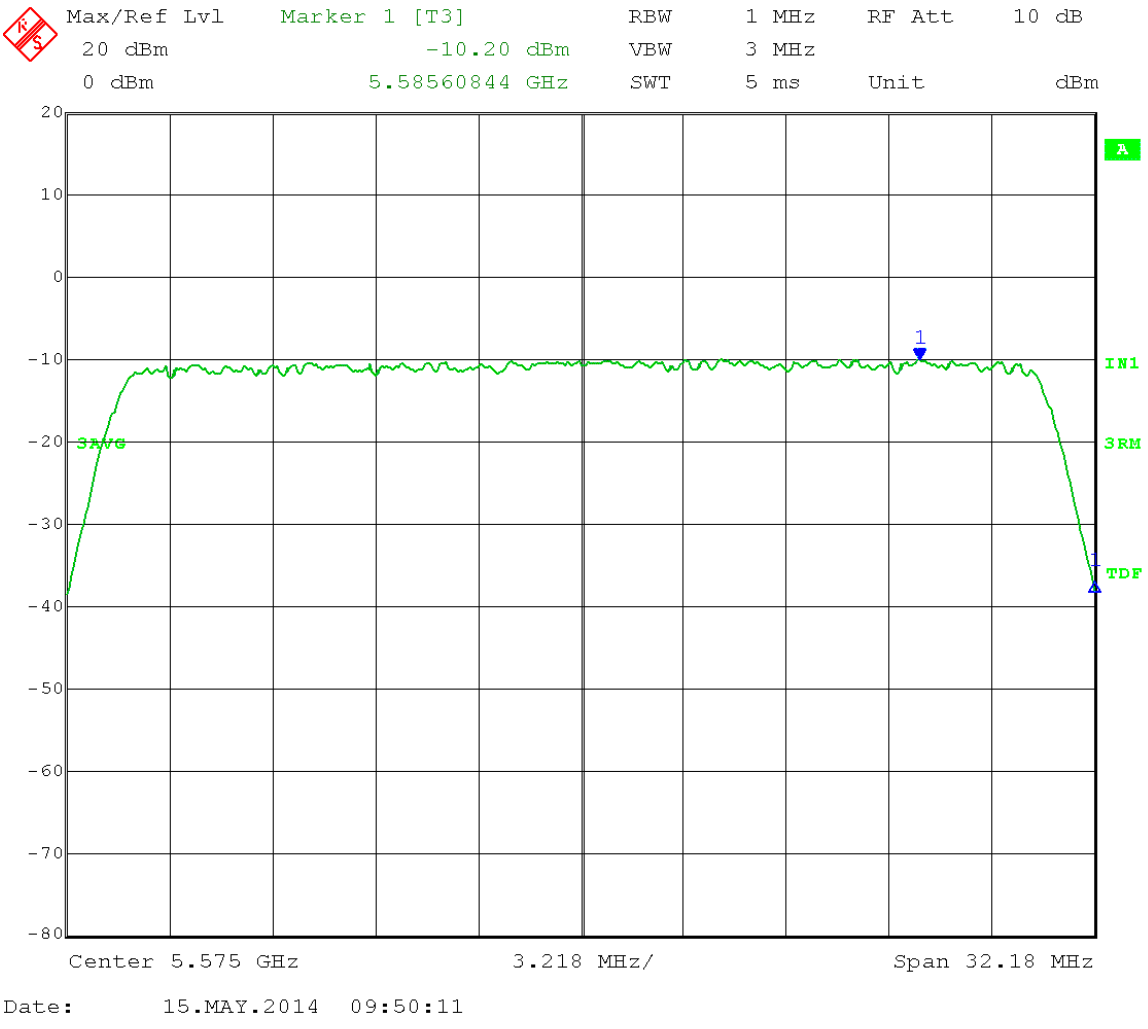
26 dB Emission Bandwidth = 31.98MHz
PPSD = -9.12dBm < -6 dBm = Pass



Test Date: 5-15-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: Peak Power Spectral Density - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- F) PPSD (Page 9)
Limit:[15.407(a)(2)]: 11 – [20(antenna gain)+3(MIMO)-6]= -6dBm/1MHz
RBW = 1 MHz VBW = 3 MHz
Detector = RMS Trace = AVG
Sweep Time = Auto Sweep counts = 200
Mid Channel: Transmit = 5.575 GHz 30MHz BW QPSK
Output power setting: 30 dBm

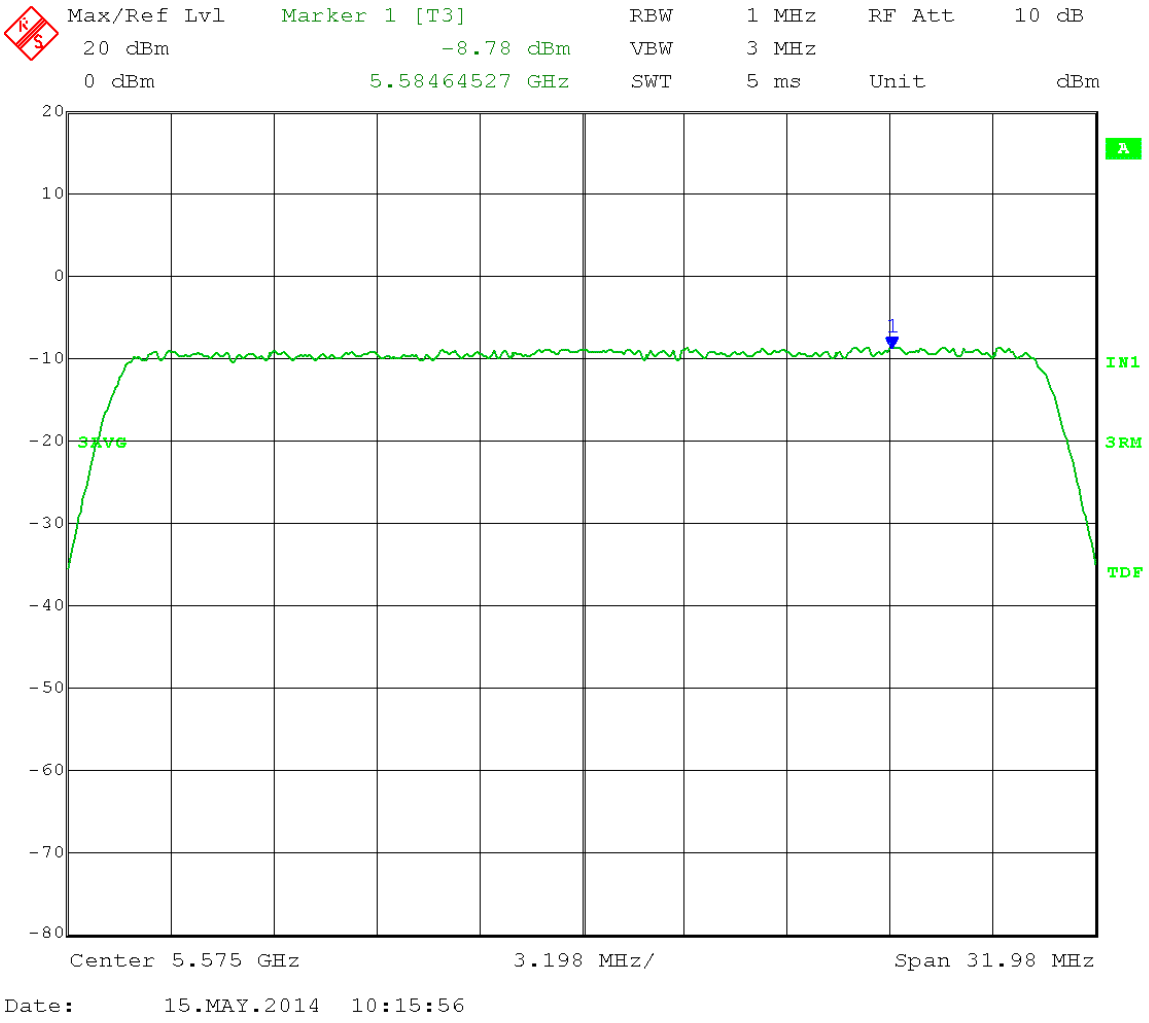
Channel 0:

26 dB Emission Bandwidth = 32.18MHz
PPSD = -10.20dBm < -6 dBm = Pass



Channel 1:

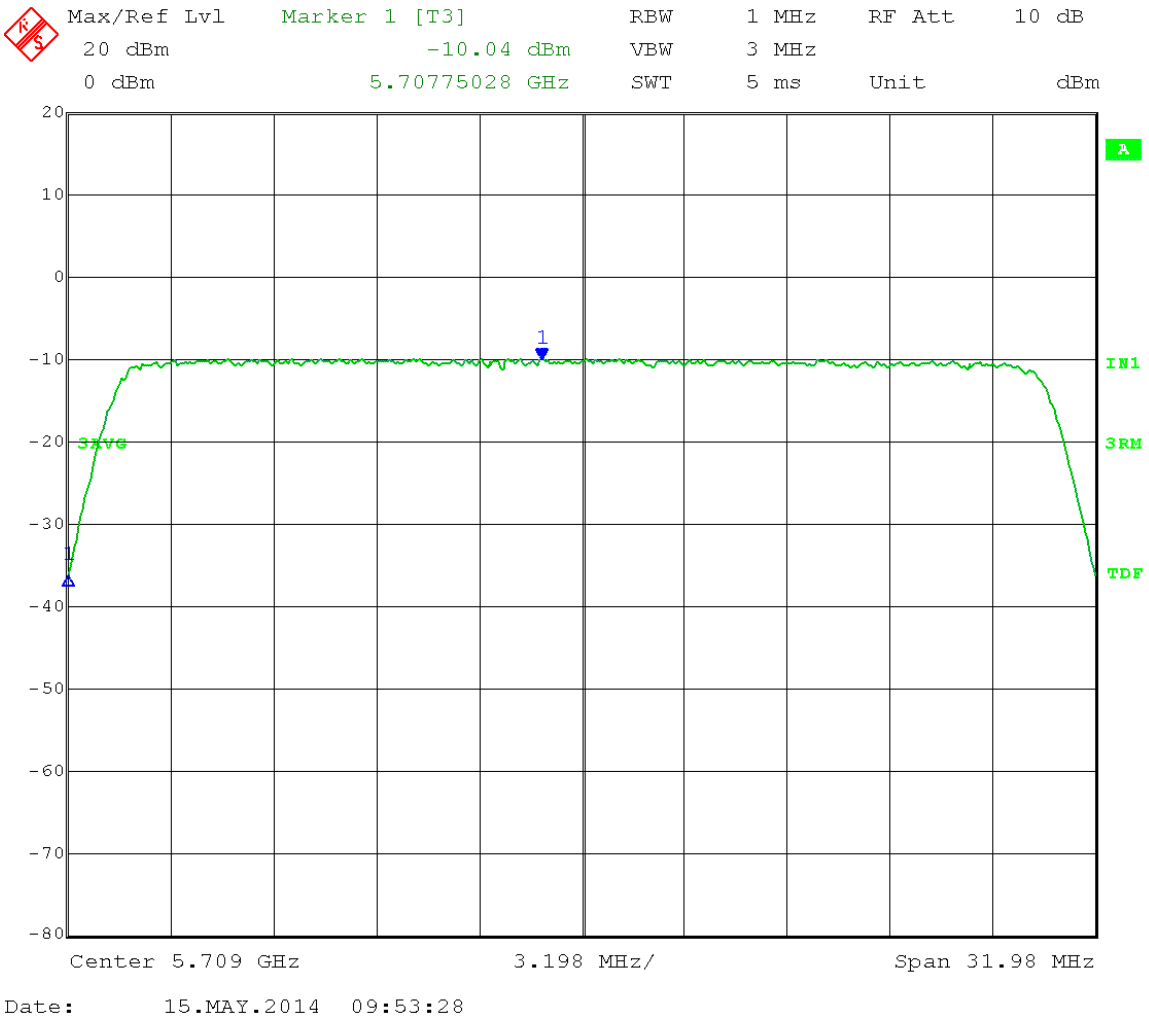
26 dB Emission Bandwidth = 31.98MHz
PPSD = -8.78dBm < -6 dBm = Pass



Test Date: 5-15-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: Peak Power Spectral Density - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- F) PPSD (Page 9)
Limit:[15.407(a)(2)]: 11 – [20(antenna gain)+3(MIMO)-6]= -6dBm/1MHz
RBW = 1 MHz VBW = 3 MHz
Detector = RMS Trace = AVG
Sweep Time = Auto Sweep counts = 200
High Channel: Transmit = 5.709 GHz 30MHz BW 16QAM
Output power setting: 30 dBm

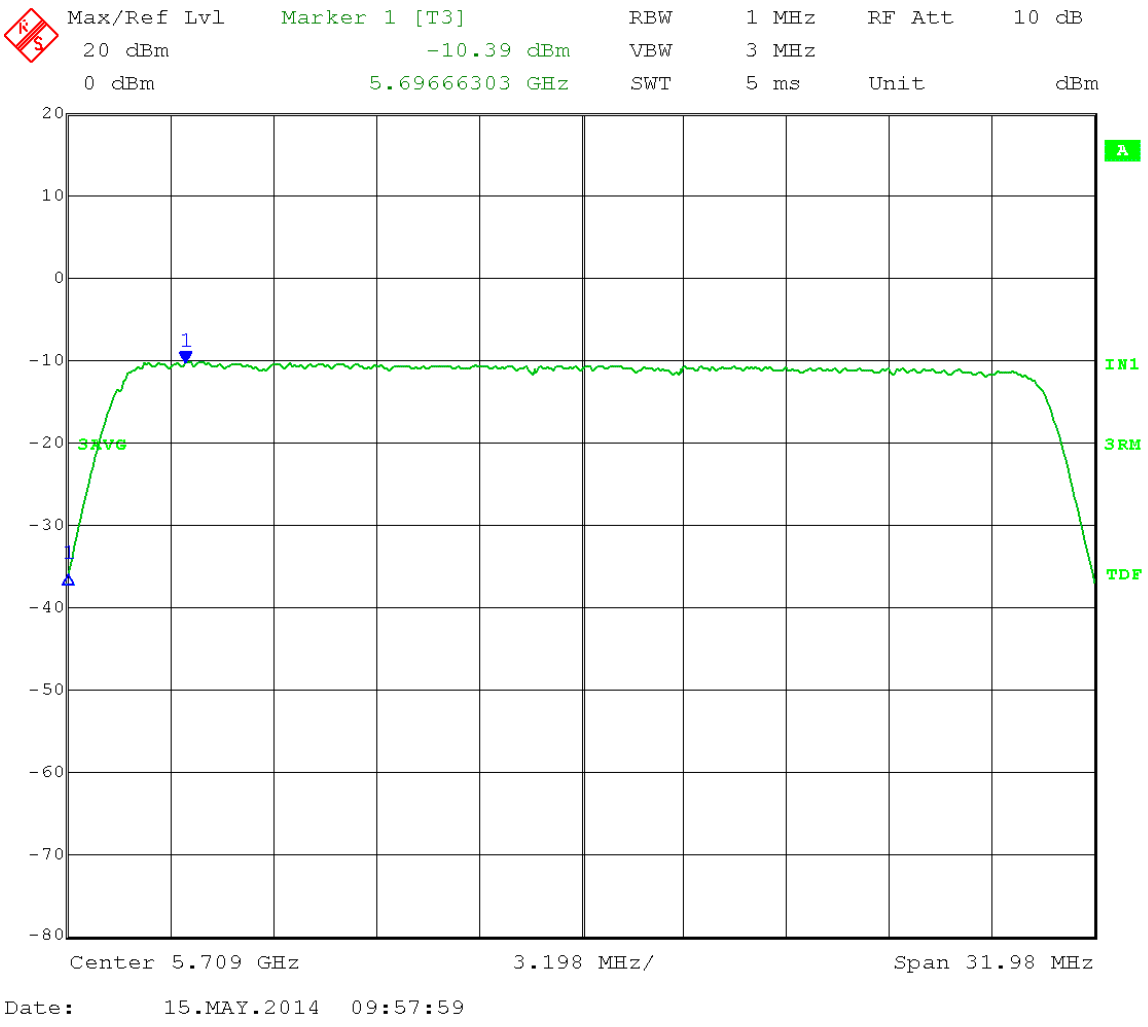
Channel 0:

26 dB Emission Bandwidth = 31.98 MHz
PPSD = -10.04dBm < -6 dBm = Pass



Channel 1:

26 dB Emission Bandwidth = 31.98MHz
PPSD = -10.39dBm < -6 dBm = Pass

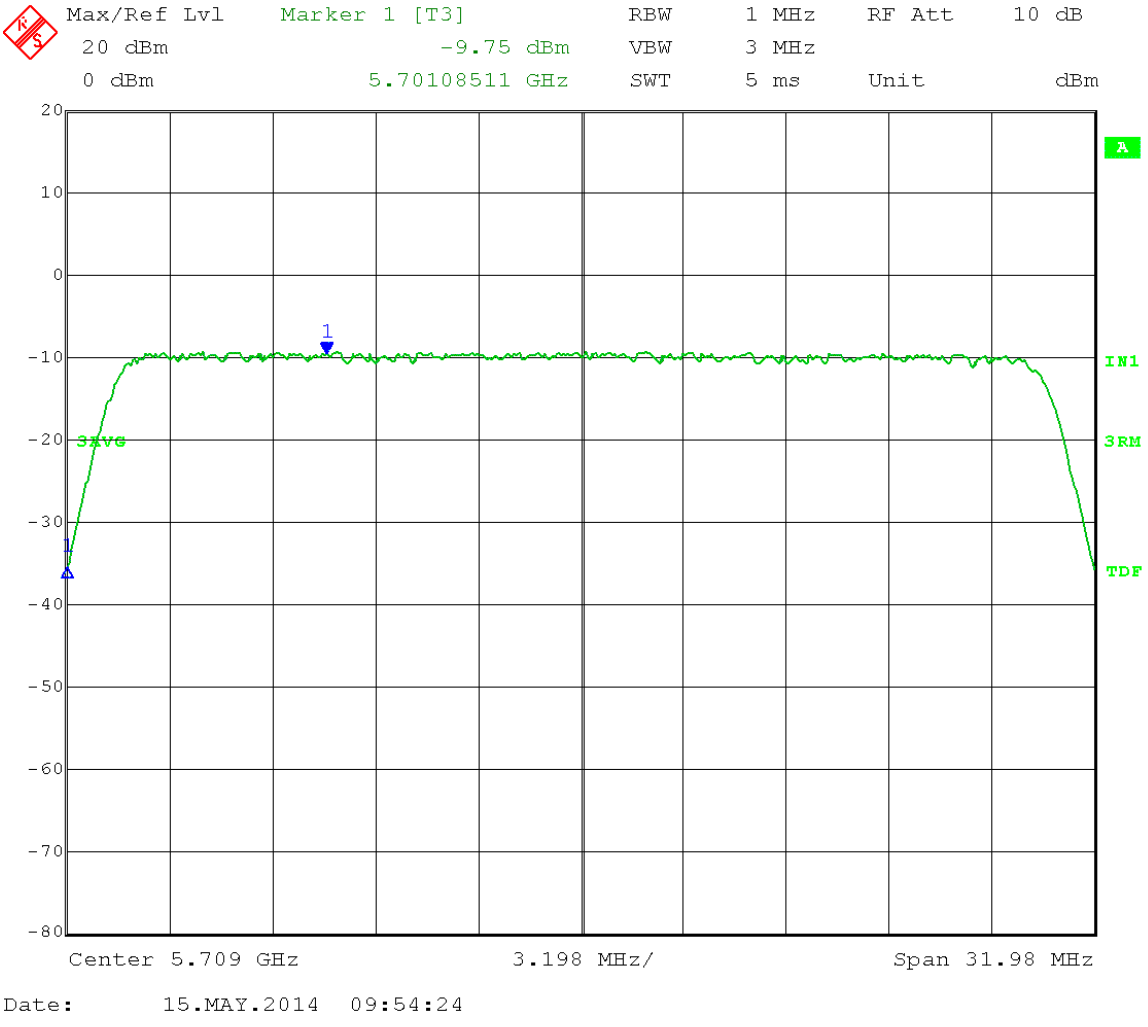


Date: 15.MAY.2014 09:57:59

Test Date: 5-15-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: Peak Power Spectral Density - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- F) PPSD (Page 9)
Limit:[15.407(a)(2)]: 11 – [20(antenna gain)+3(MIMO)-6]= -6dBm/1MHz
RBW = 1 MHz VBW = 3 MHz
Detector = RMS Trace = AVG
Sweep Time = Auto Sweep counts = 200
High Channel: Transmit = 5.709 GHz 30MHz BW 64QAM
Output power setting: 30 dBm Output power setting: 30 dBm

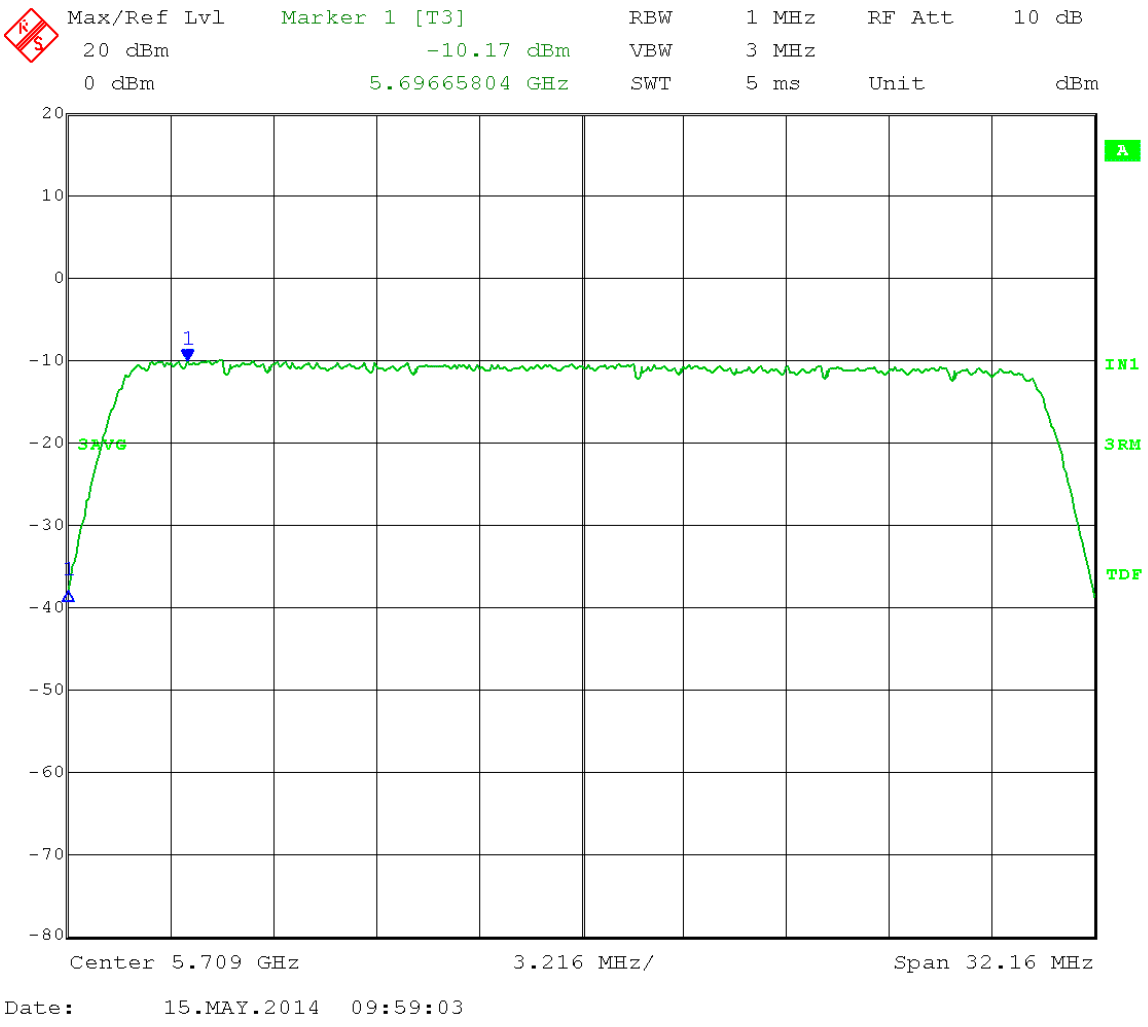
Channel 0:

26 dB Emission Bandwidth = 31.98MHz
PPSD = -9.785dBm < -6 dBm = Pass



Channel 1:

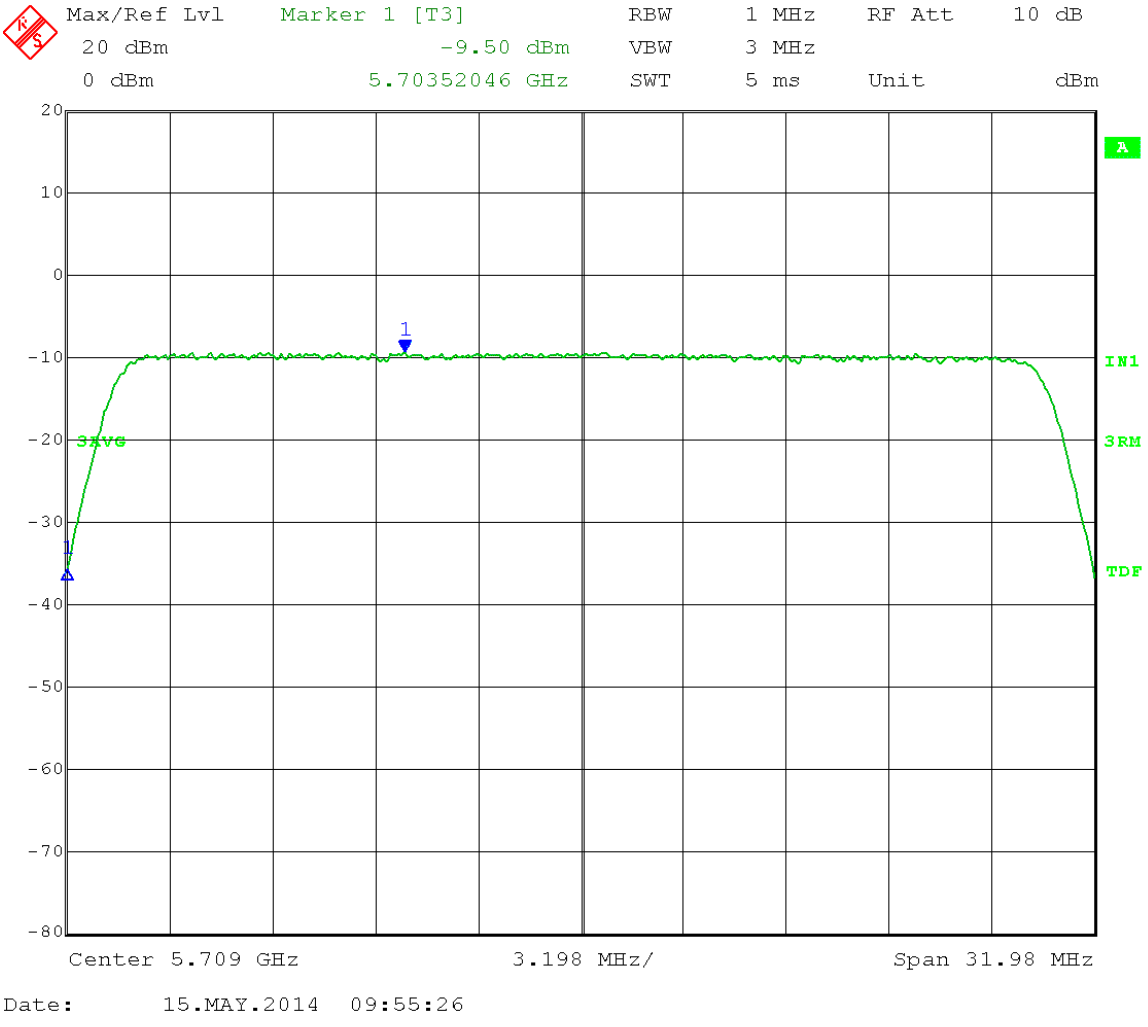
26 dB Emission Bandwidth = 32.16MHz
PPSD = -10.17dBm < -6 dBm = Pass



Test Date: 5-15-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: Peak Power Spectral Density - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- F) PPSD (Page 9)
Limit:[15.407(a)(2)]: 11 – [20(antenna gain)+3(MIMO)-6]= -6dBm/1MHz
RBW = 1 MHz VBW = 3 MHz
Detector = RMS Trace = AVG
Sweep Time = Auto Sweep counts = 200
High Channel: Transmit = 5.709 GHz 30MHz BW 256QAM
Output power setting: 30 dBm Output power setting: 30 dBm

Channel 0:

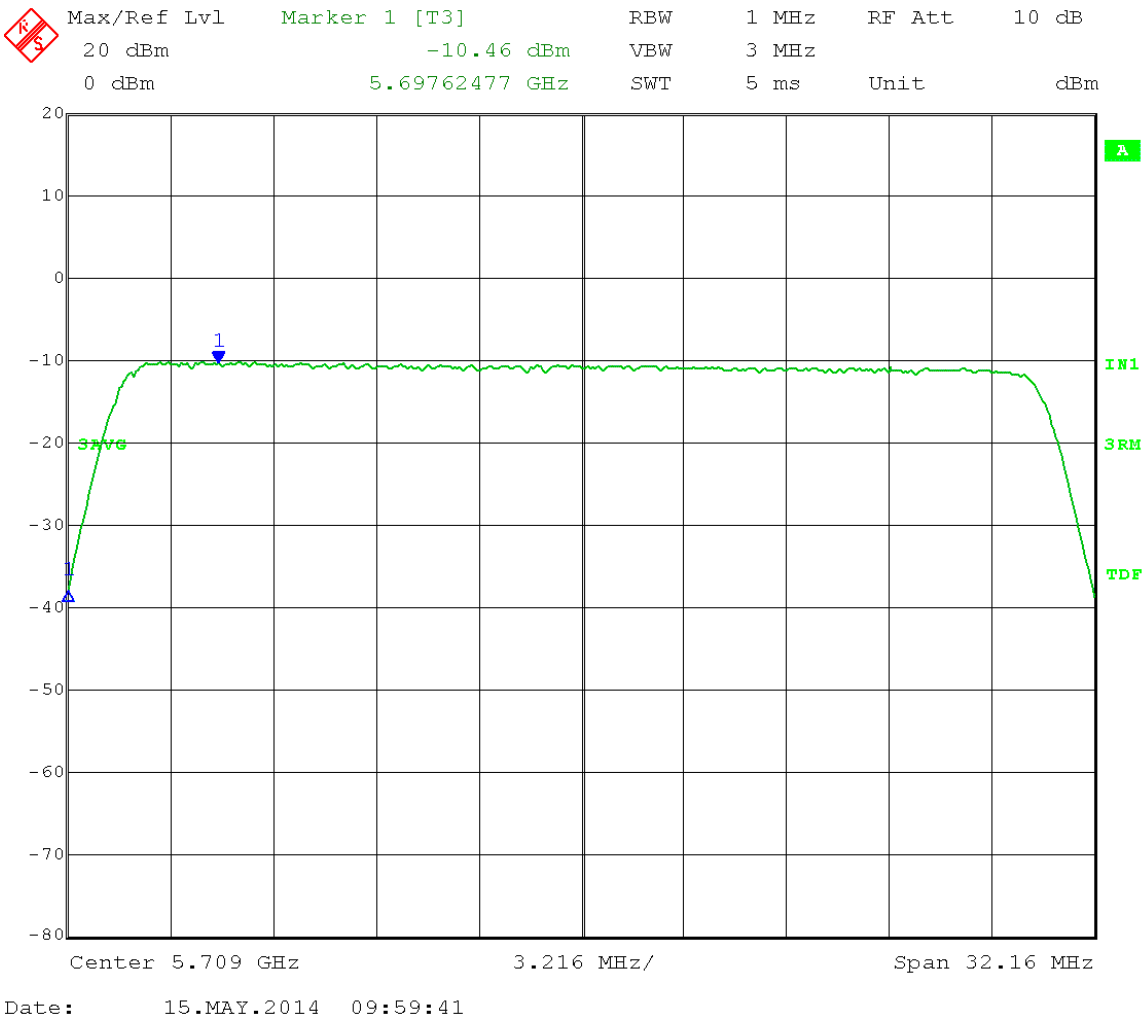
26 dB Emission Bandwidth = 31.98MHz
PPSD = -9.5dBm < -6 dBm = Pass



Date: 15.MAY.2014 09:55:26

Channel 1:

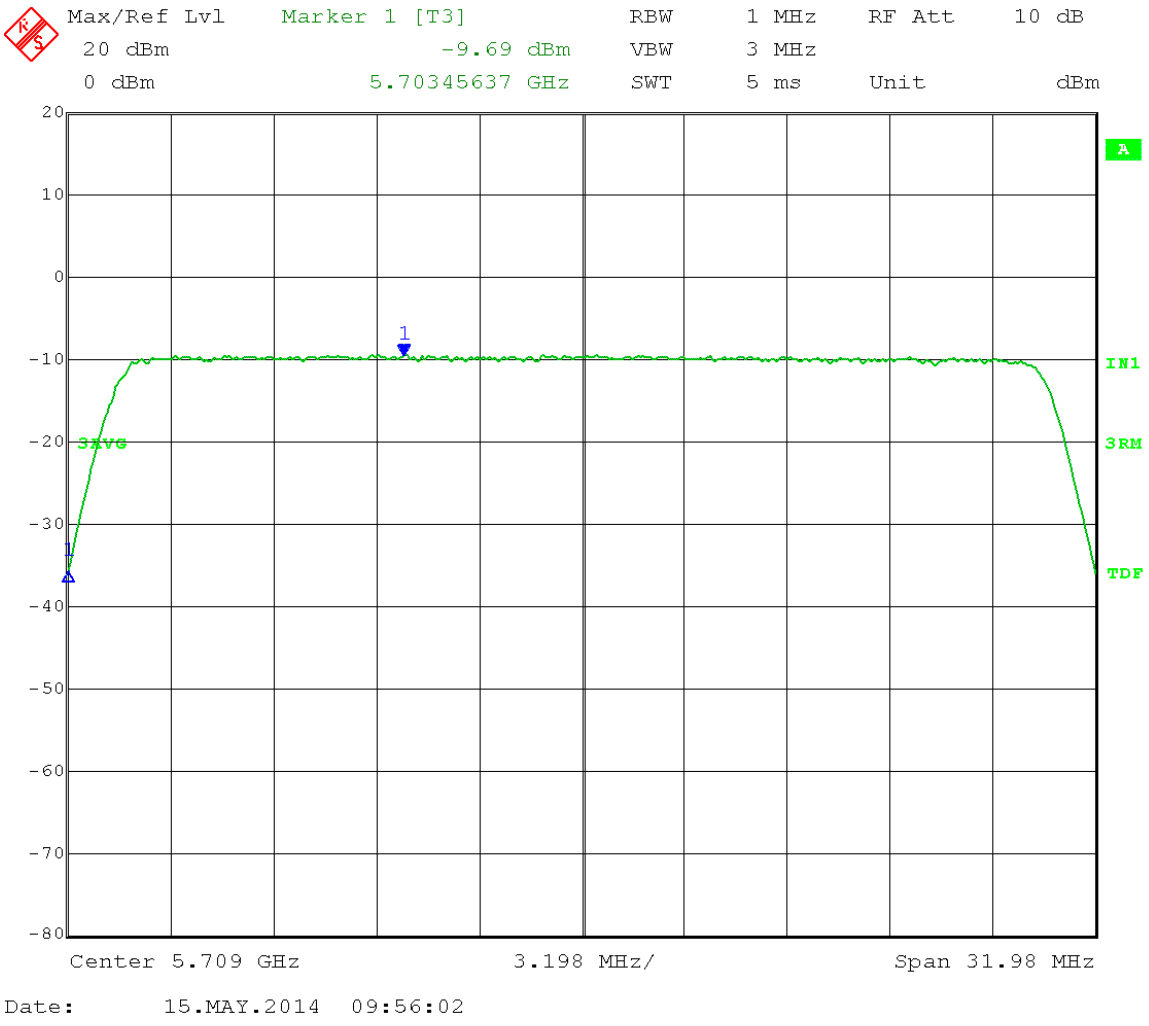
26 dB Emission Bandwidth = 32.16MHz
PPSD = -10.46dBm < -6 dBm = Pass



Test Date: 5-15-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: Peak Power Spectral Density - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- F) PPSD (Page 9)
Limit:[15.407(a)(2)]: 11 – [20(antenna gain)+3(MIMO)-6]= -6dBm/1MHz
RBW = 1 MHz VBW = 3 MHz
Detector = RMS Trace = AVG
Sweep Time = Auto Sweep counts = 200
High Channel: Transmit = 5.709 GHz 30MHz BW 1024QAM
Output power setting: 30 dBm Output power setting: 30 dBm

Channel 0:

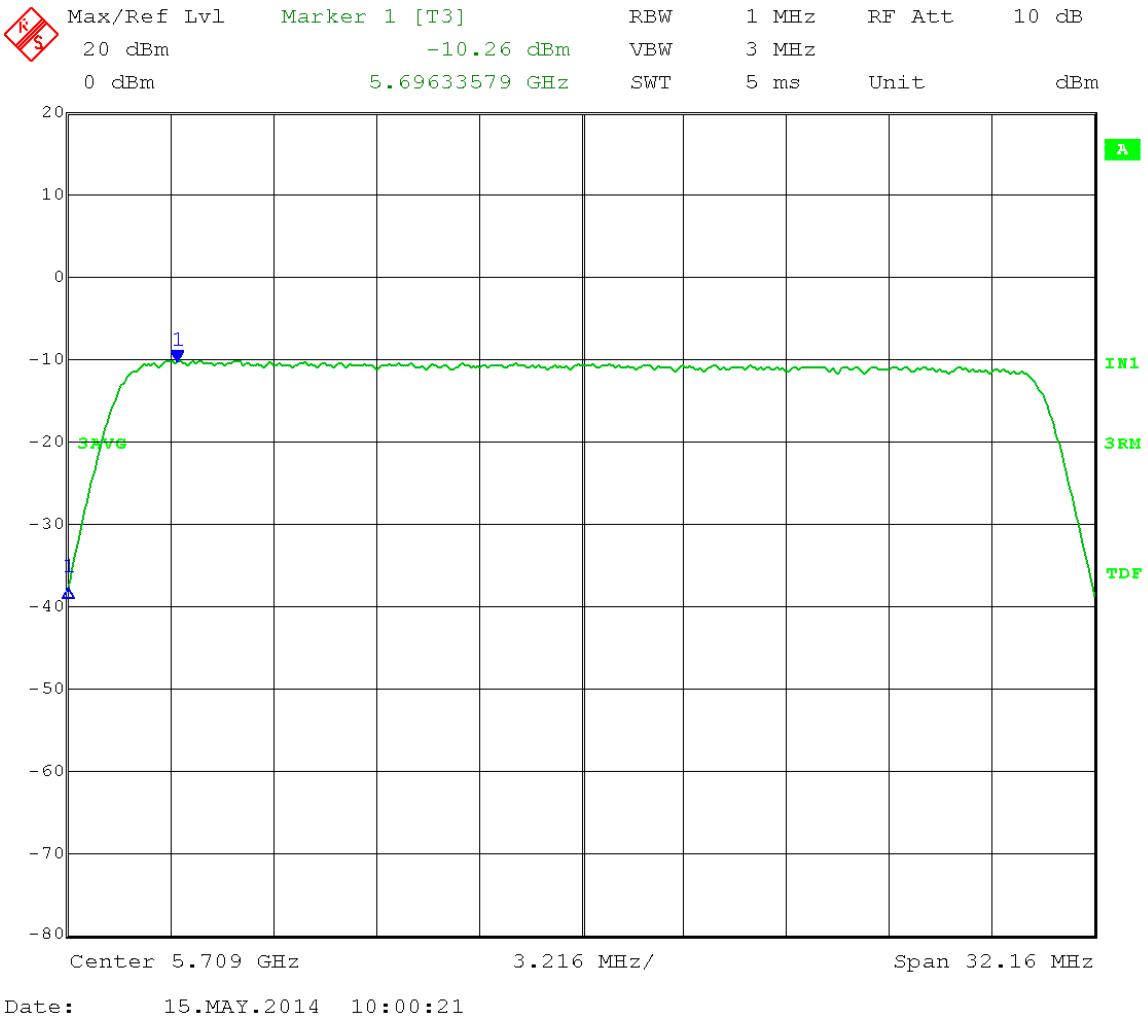
26 dB Emission Bandwidth = 31.98MHz
PPSD = -9.69dBm < -6 dBm = Pass



Date: 15.MAY.2014 09:56:02

Channel 1:

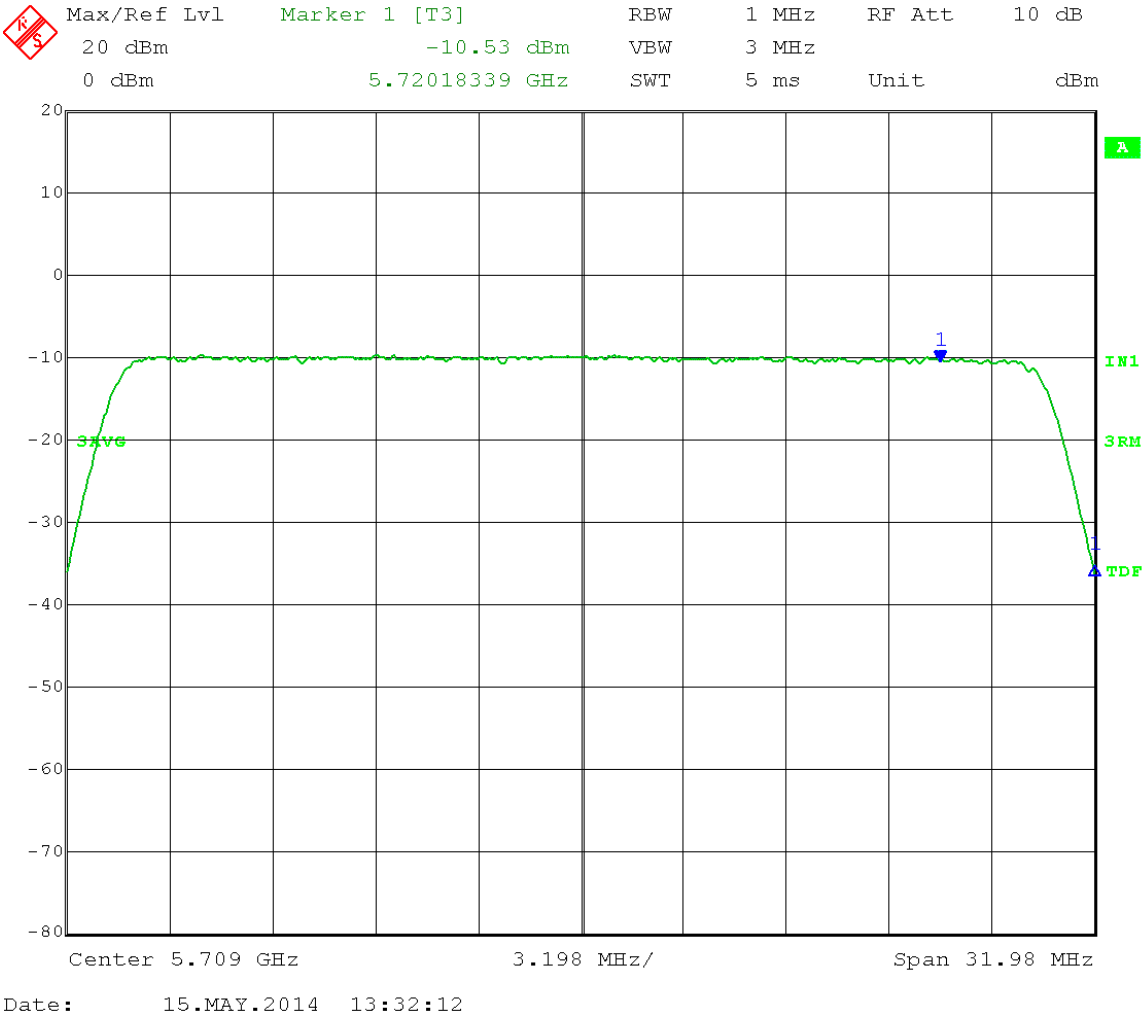
26 dB Emission Bandwidth = 32.16MHz
PPSD = -10.26dBm < -6 dBm = Pass



Test Date: 5-15-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: Peak Power Spectral Density - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- F) PPSD (Page 9)
Limit:[15.407(a)(2)]: 11 – [20(antenna gain)+3(MIMO)-6]= -6dBm/1MHz
RBW = 1 MHz VBW = 3 MHz
Detector = RMS Trace = AVG
Sweep Time = Auto Sweep counts = 200
High Channel: Transmit = 5.709 GHz 30MHz BW QPSK
Output power setting: 30 dBm Output power setting: 30 dBm

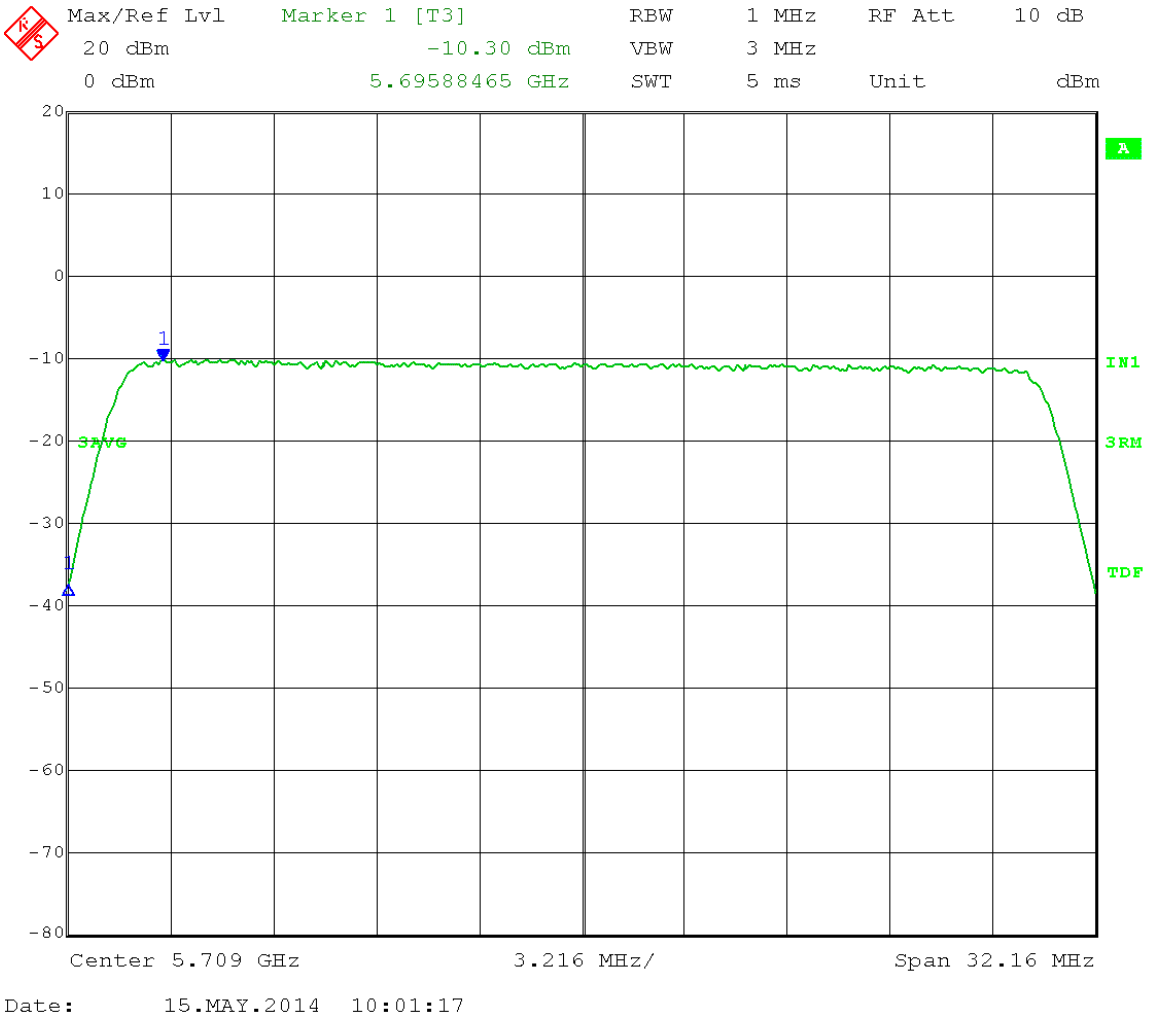
Channel 0:

26 dB Emission Bandwidth = 31.98MHz
PPSD = -10.53dBm < -6 dBm = Pass



Channel 1:

26 dB Emission Bandwidth = 32.16MHz
PPSD = -10.30dBm < -6 dBm = Pass



Appendix B – Measurement Data

B6.0 Peak Excursion – Conducted

Rule Section: Section 15.407(a)(6)

Test Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r03 – *Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E*

Section G – Peak excursion measurement

Description: SPAN: set to encompass entire emission bandwidth
RBW = 1 MHz
VBW ≥ 3 MHz
Detector = Peak
Trace mod = max hold
Use peak search to find the peak of the spectrum
Compute the ratio of the maximum of the peak-max-hold spectrum to the PPSD

Limit: 13 dB peak-to-average ratio across any 1 MHz bandwidth

Results: Passed

Notes: Measurements were taken for QPSK, 16QAM, 64QAM, 256QAM and 1024QAM modulations at the lowest, middle, and highest channels of operation. EUT was set to transmit continuously.

Output power was set to 30 dBm eirp using special test software.

166 South Carter, Genoa City, WI 53128

Company: Ubiquiti Networks, Inc.
Model Tested: AF5
Report Number: 20083
DLS Project: 6614

Test Date: 5-15-2014
Company: Ubiquiti Networks
EUT: Air Fiber 5 - 5.4GHz WiFi Radio
Test: Peak Excursion - Conducted
Operator: Steve D
Comment: FCC Test Guidelines for UNII Devices under 15.407 – OET 4/8/2013
- G) Peak Excursion
Limit:[15.407(a)(6)]: 13 dB
RBW = 1 MHz VBW = 3 MHz
Detector = Peak / RMS Trace = Max Hold / AVG
Sweep Time = Auto Sweep counts = 200
Output power setting: 30 dBm
Channel 0:

30 MHz channel Bandwidth:

Peak Excursion		30 MHz channel Bandwidth				
	dB	QPSK	16QAM	64QAM	256QAM	1024Q
FCC limit = 13dB	*FCC limit:*	13	13	13	13	13
HCH = 5709 MHz	PK	1.52	0.89	1.56	0.87	2.27
	AVG	-10.46	-10.04	-9.75	-9.5	-9.69
	Excursion	**11.98**	**10.93**	**11.31**	**10.37**	**11.96**
	Margin	1.02	2.07	1.69	2.63	1.04
MCH = 5575 MHz	PK	0.85	0.59	0.85	0.97	0.53
	AVG	-10.2	-10.3	-10.14	-10.47	-10.17
	Excursion	**11.05**	**10.89**	**10.99**	**11.44**	**10.7**
	Margin	1.95	2.11	2.01	1.56	2.30
LCH = 5486 MHz	PK	-0.82	2.58	1.15	1.15	1.57
	AVG	-9.53	-9.76	-9.88	-9.46	-9.83
	Excursion	**8.71**	**12.34**	**11.03**	**10.61**	**11.4**
	Margin	4.29	0.66	1.97	2.39	1.60

Appendix B – Measurement Data

B7.0 Unwanted Emission Levels – Radiated Operating Band-Edge
Radiated with antenna connected

Rule Section: Sections 15.407(b)(3) and 15.407(b)(5)

Test Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r03 – *Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E*

Section H – Unwanted emission levels
Section H(2) – Unwanted emissions that fall outside of the restricted bands
Section H(3) – General Requirements for Unwanted Emissions Measurements
Section H(3)(d)(ii) – Band edge measurements, Integration method
Section H(5) – Procedure for Peak Unwanted Emissions Measurements Above 1 GHz

Description: Measure the band-edge emission level using the following settings

Integration method:
RBW = 100 kHz
VBW ≥ 3 x RBW
Use the band power integration function of the spectrum analyzer to integrate the power across the 1 MHz bandwidth at the operating band edge

Limit: -27 dBm/MHz

Results: Passed

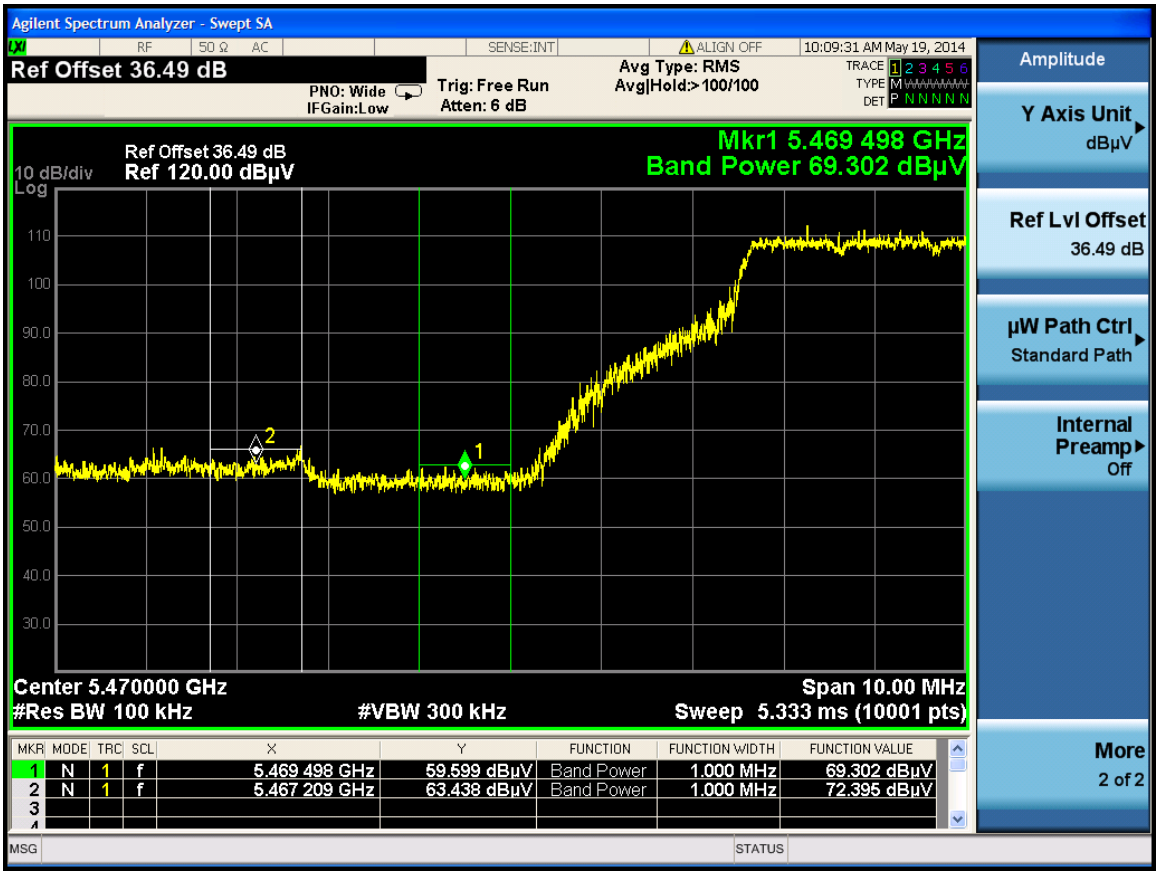
Notes: Measurements were taken for QPSK, 16QAM, 64QAM, 256QAM and 1024QAM modulations at the lowest and highest channels of operation. EUT was set to transmit continuously.

Both transmit chains active. Output power was set to 30 dBm eirp using special test software.
Test distance was 1 meter.

Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Lower Operating Band-Edge Compliance - Radiated
(FCC 15.407(b)(3))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
Low Channel: Frequency – 5486 MHz
Modulation: QPSK
Horizontal
Operating Band-Edge Frequency: 5470 MHz
Band-Edge Limit: -27 dBm/MHz
Test method: Integration
Offset on analyzer includes horn antenna and cable loss correction factors
Limit: -27 dBm/MHz

Measurement 1: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 69.302 dBµV/m + 20 log(1 meter) - 104.77
= **-35.46 dBm/MHz**

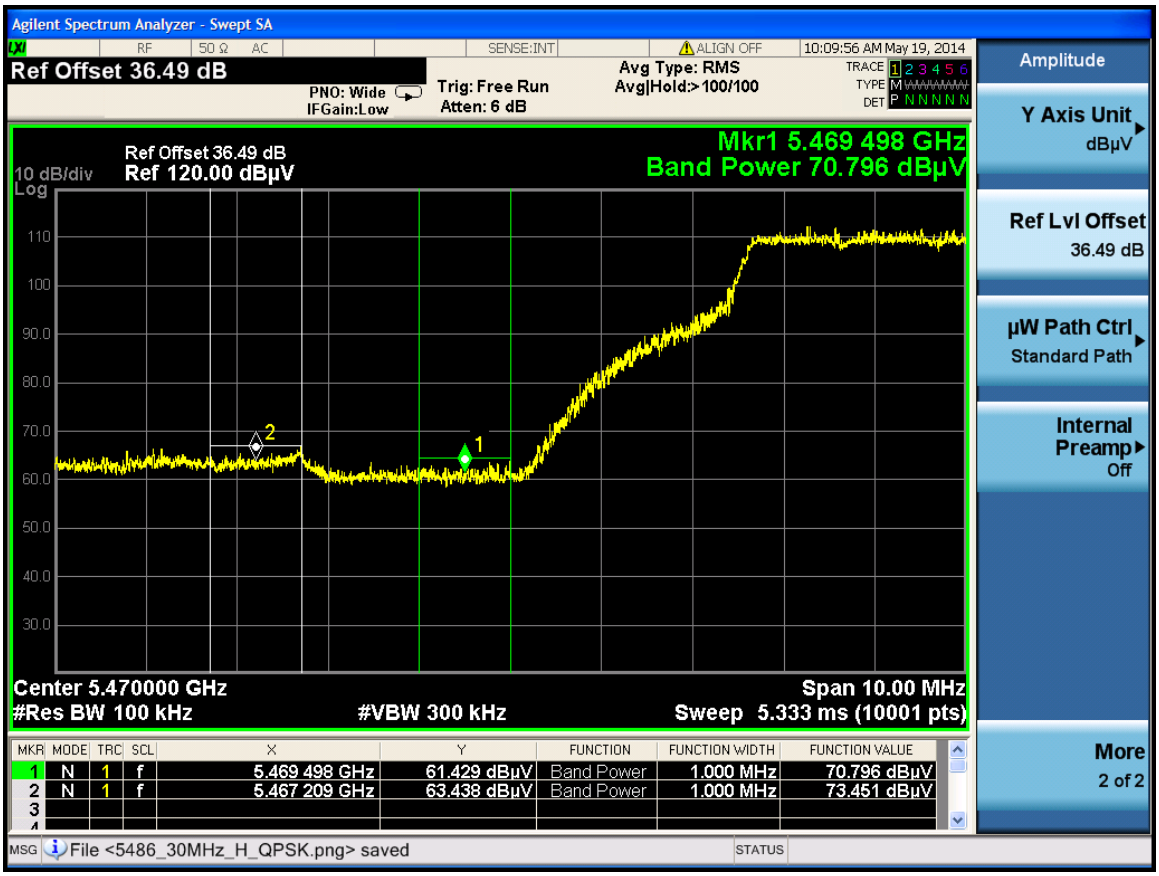
Measurement 2: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 72.395 dBµV/m + 20 log(1 meter) - 104.77
= **-32.37 dBm/MHz**



Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Lower Operating Band-Edge Compliance - Radiated
(FCC 15.407(b)(3))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
Low Channel: Frequency – 5486 MHz
Modulation: 16QAM
Horizontal
Operating Band-Edge Frequency: 5470 MHz
Band-Edge Limit: -27 dBm/MHz
Test method: Integration
Offset on analyzer includes horn antenna and cable loss correction factors
Limit: -27 dBm/MHz

Measurement 1: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 70.796 dBµV/m + 20 log(1 meter) - 104.77
= **-33.97 dBm/MHz**

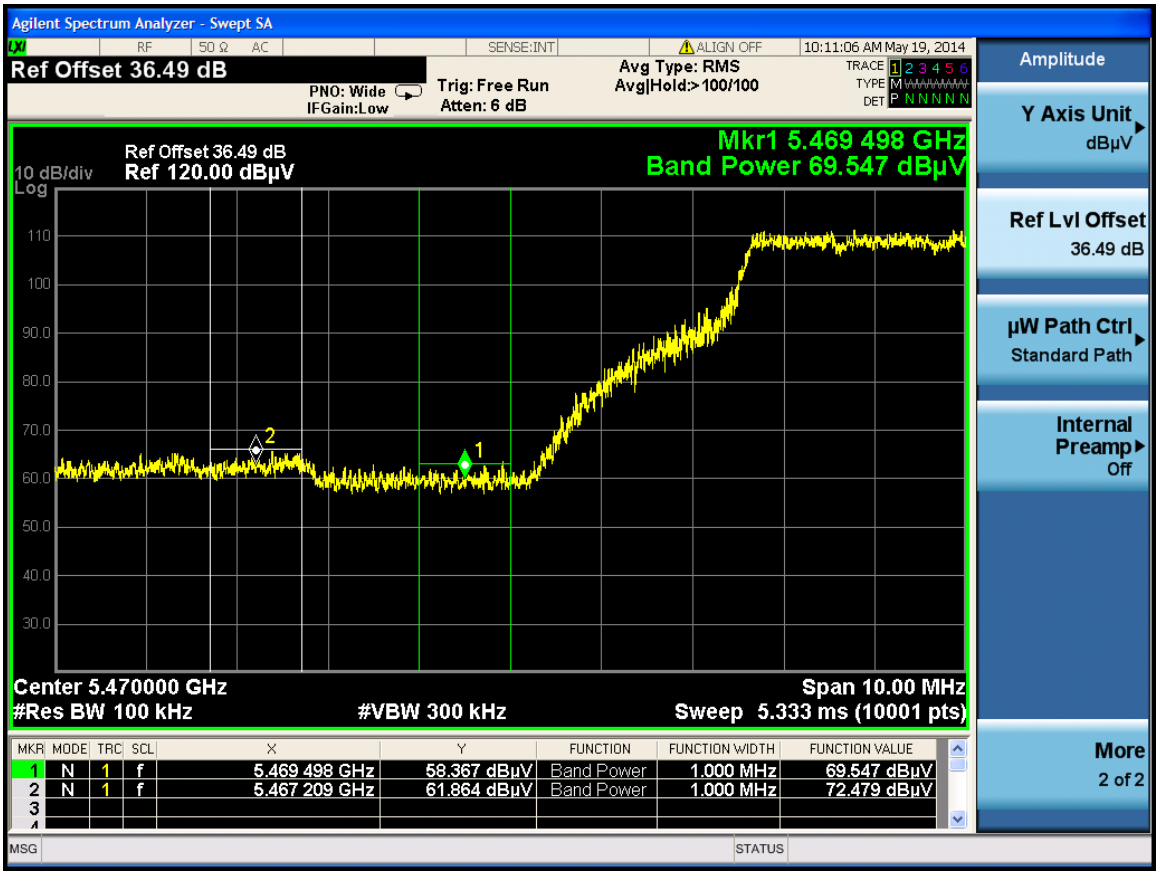
Measurement 2: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 73.451 dBµV/m + 20 log(1 meter) - 104.77
= **-31.31 dBm/MHz**



Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Lower Operating Band-Edge Compliance - Radiated
(FCC 15.407(b)(3))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
Low Channel: Frequency – 5486 MHz
Modulation: 64QAM
Horizontal
Operating Band-Edge Frequency: 5470 MHz
Band-Edge Limit: -27 dBm/MHz
Test method: Integration
Offset on analyzer includes horn antenna and cable loss correction factors
Limit: -27 dBm/MHz

Measurement 1: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 69.547 dBµV/m + 20 log(1 meter) - 104.77
= **-35.22 dBm/MHz**

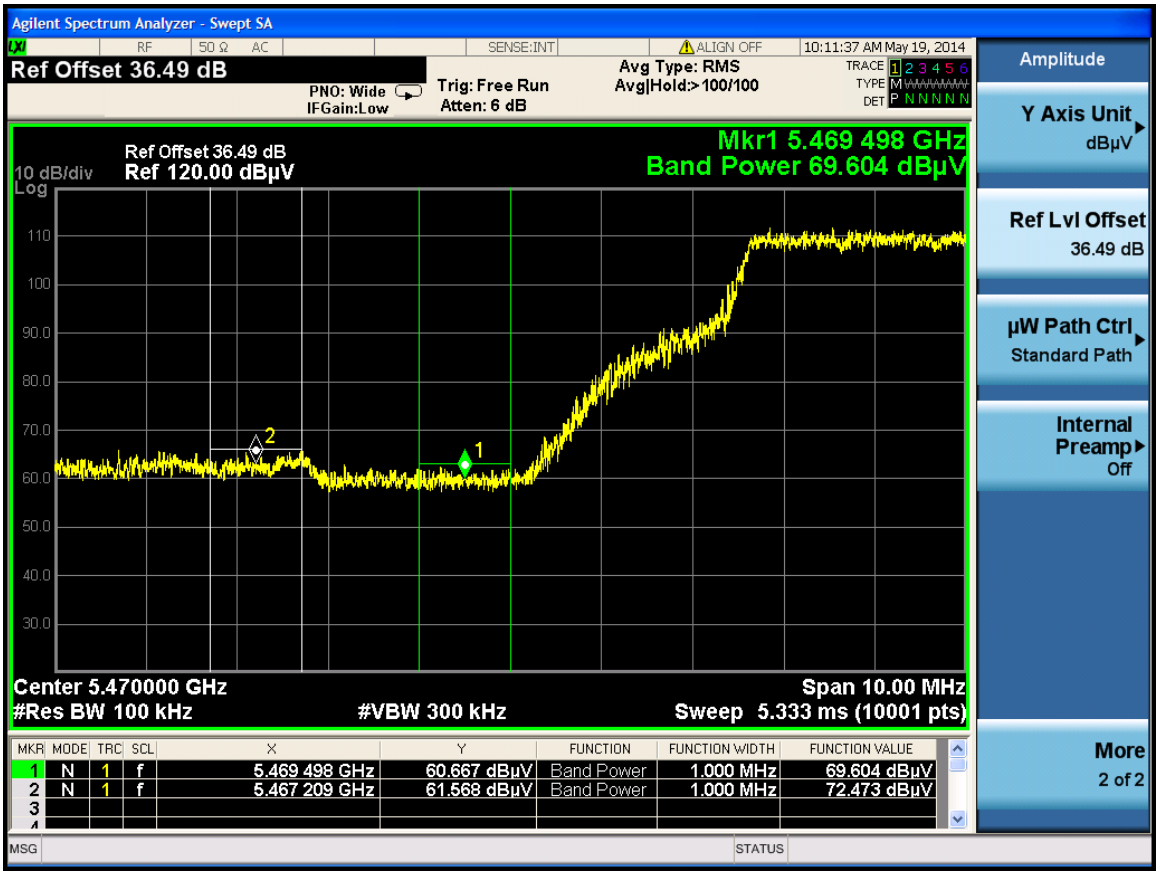
Measurement 2: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 72.479 dBµV/m + 20 log(1 meter) - 104.77
= **-32.29 dBm/MHz**



Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Lower Operating Band-Edge Compliance - Radiated
(FCC 15.407(b)(3))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
Low Channel: Frequency – 5486 MHz
Modulation: 256QAM
Horizontal
Operating Band-Edge Frequency: 5470 MHz
Band-Edge Limit: -27 dBm/MHz
Test method: Integration
Offset on analyzer includes horn antenna and cable loss correction factors
Limit: -27 dBm/MHz

Measurement 1: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 69.604 dBµV/m + 20 log(1 meter) - 104.77
= **-35.16 dBm/MHz**

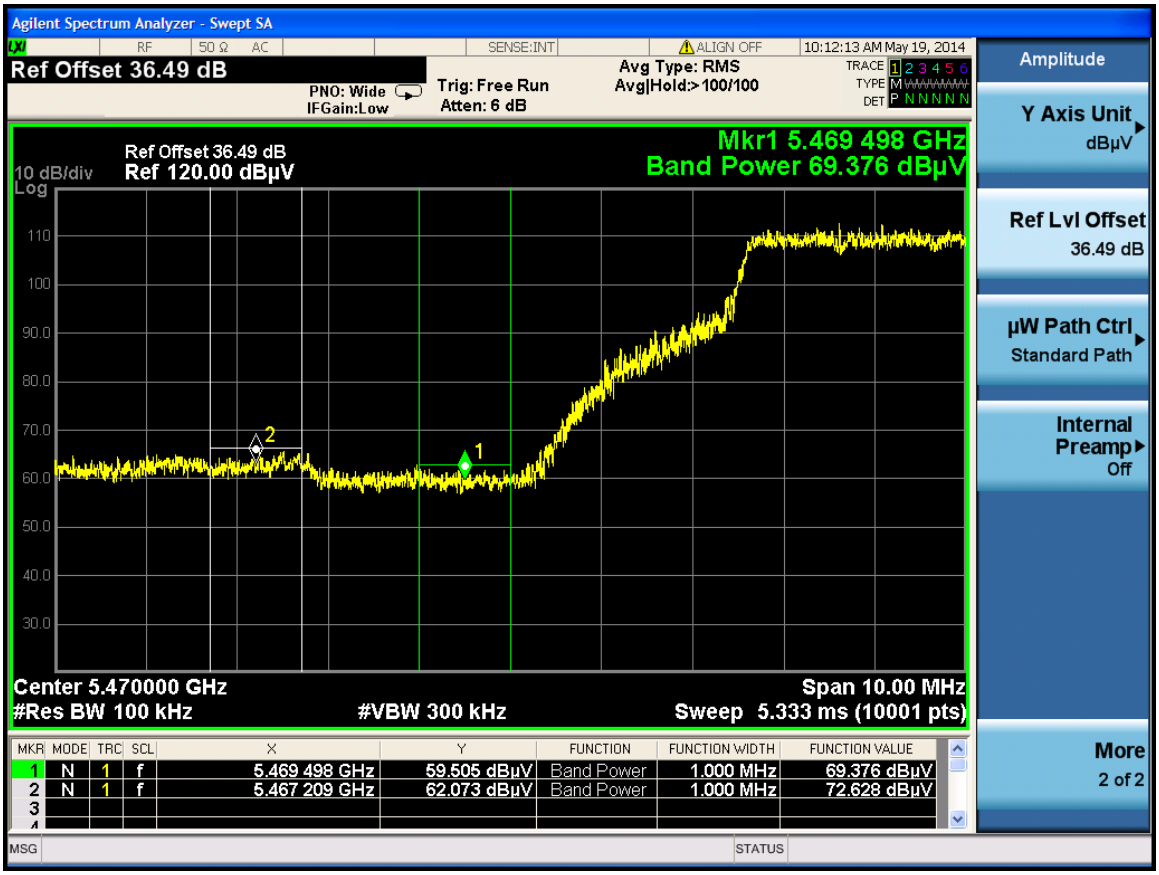
Measurement 2: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 72.473 dBµV/m + 20 log(1 meter) - 104.77
= **-32.29 dBm/MHz**



Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Lower Operating Band-Edge Compliance - Radiated
(FCC 15.407(b)(3))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
Low Channel: Frequency – 5486 MHz
Modulation: 1024QAM
Horizontal
Operating Band-Edge Frequency: 5470 MHz
Band-Edge Limit: -27 dBm/MHz
Test method: Integration
Offset on analyzer includes horn antenna and cable loss correction factors
Limit: -27 dBm/MHz

Measurement 1: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 69.376 dBµV/m + 20 log(1 meter) - 104.77
= **-35.39 dBm/MHz**

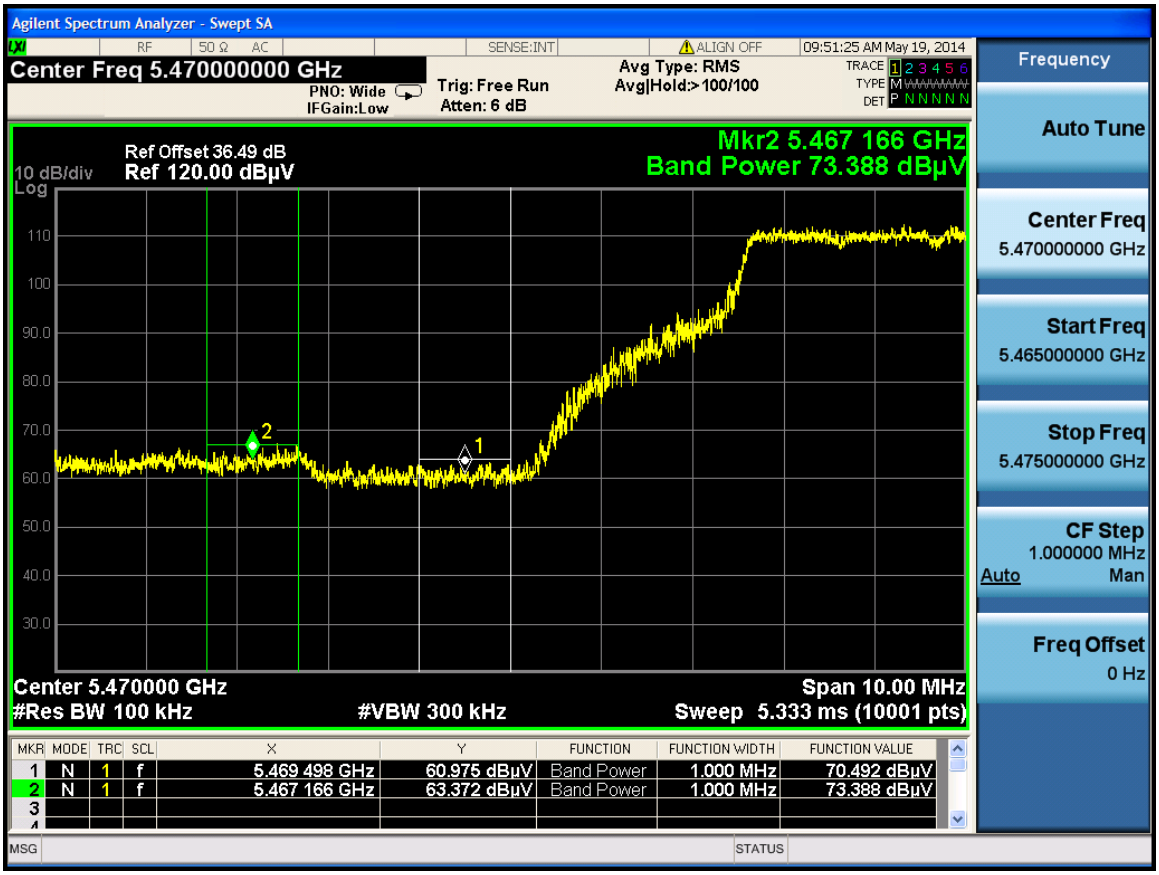
Measurement 2: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 72.628 dBµV/m + 20 log(1 meter) - 104.77
= **-32.14 dBm/MHz**



Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Lower Operating Band-Edge Compliance - Radiated
(FCC 15.407(b)(3))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
Low Channel: Frequency – 5486 MHz
Modulation: QPSK
Vertical
Operating Band-Edge Frequency: 5470 MHz
Band-Edge Limit: -27 dBm/MHz
Test method: Integration
Offset on analyzer includes horn antenna and cable loss correction factors
Limit: -27 dBm/MHz

Measurement 1: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 70.492 dBµV/m + 20 log(1 meter) - 104.77
= **-34.27 dBm/MHz**

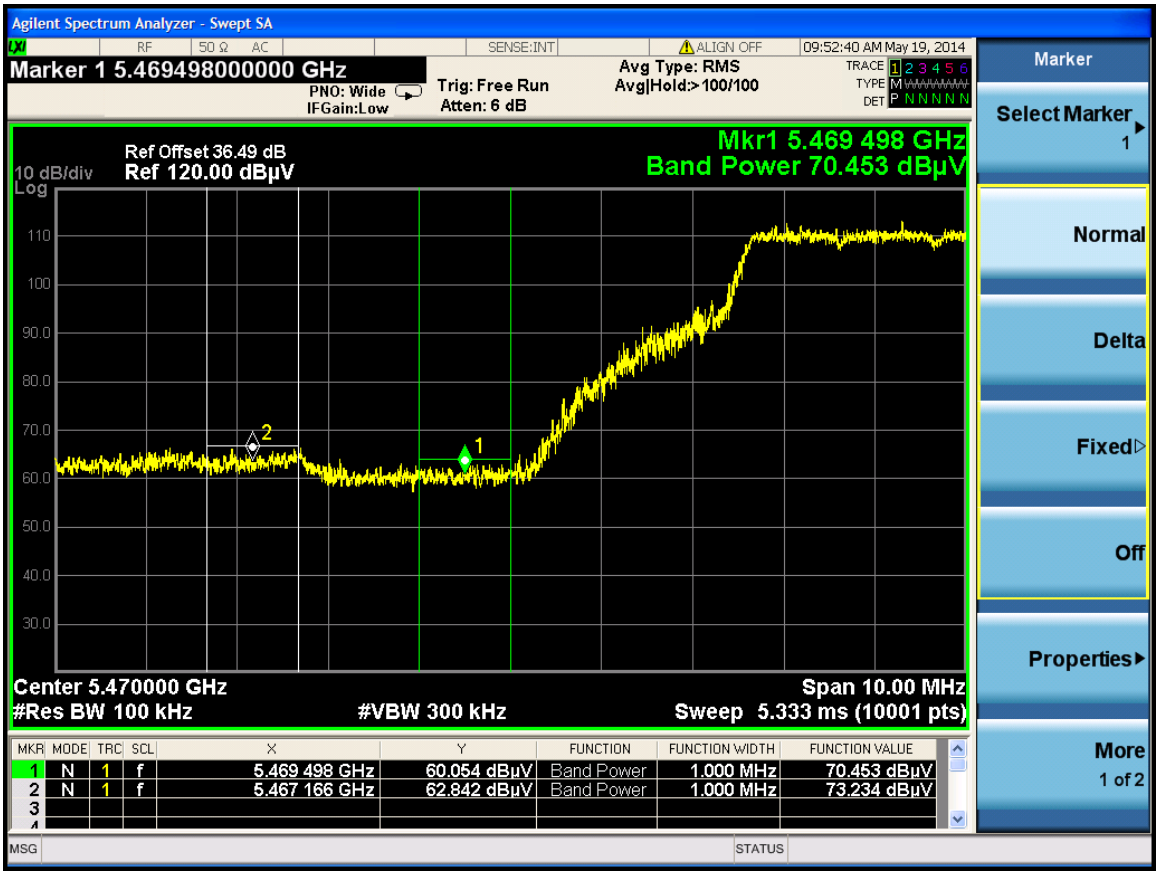
Measurement 2: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 73.388 dBµV/m + 20 log(1 meter) - 104.77
= **-31.38 dBm/MHz**



Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Lower Operating Band-Edge Compliance - Radiated
(FCC 15.407(b)(3))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
Low Channel: Frequency – 5486 MHz
Modulation: 16QAM
Vertical
Operating Band-Edge Frequency: 5470 MHz
Band-Edge Limit: -27 dBm/MHz
Test method: Integration
Offset on analyzer includes horn antenna and cable loss correction factors
Limit: -27 dBm/MHz

Measurement 1: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 70.453 dBµV/m + 20 log(1 meter) - 104.77
= **-34.31 dBm/MHz**

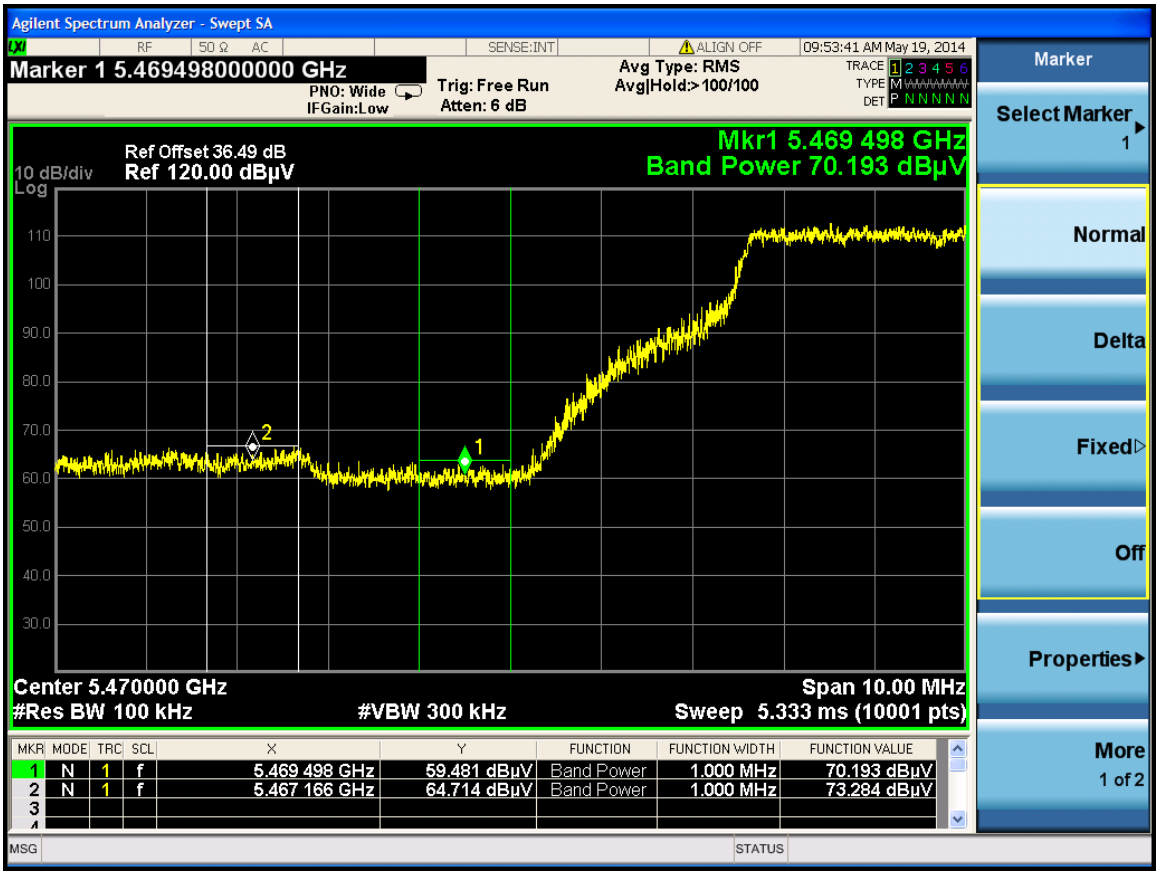
Measurement 2: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 73.234 dBµV/m + 20 log(1 meter) - 104.77
= **-31.53 dBm/MHz**



Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Lower Operating Band-Edge Compliance - Radiated
(FCC 15.407(b)(3))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
Low Channel: Frequency – 5486 MHz
Modulation: 64QAM
Vertical
Operating Band-Edge Frequency: 5470 MHz
Band-Edge Limit: -27 dBm/MHz
Test method: Integration
Offset on analyzer includes horn antenna and cable loss correction factors
Limit: -27 dBm/MHz

Measurement 1: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 70.193 dBµV/m + 20 log(1 meter) - 104.77
= **-34.57 dBm/MHz**

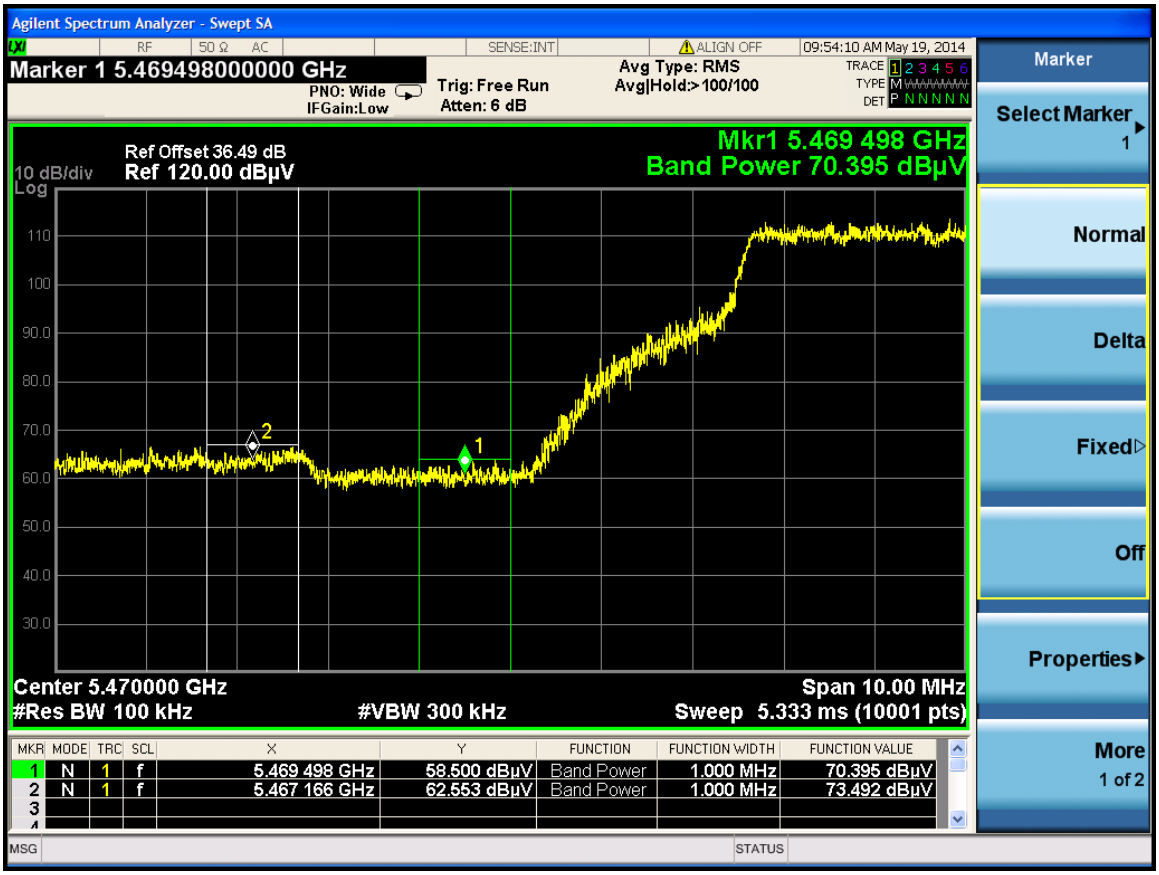
Measurement 2: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 73.284 dBµV/m + 20 log(1 meter) - 104.77
= **-31.48 dBm/MHz**



Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Lower Operating Band-Edge Compliance - Radiated
(FCC 15.407(b)(3))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
Low Channel: Frequency – 5486 MHz
Modulation: 256QAM
Vertical
Operating Band-Edge Frequency: 5470 MHz
Band-Edge Limit: -27 dBm/MHz
Test method: Integration
Offset on analyzer includes horn antenna and cable loss correction factors
Limit: -27 dBm/MHz

Measurement 1: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 70.395 dBµV/m + 20 log(1 meter) - 104.77
= **-34.37 dBm/MHz**

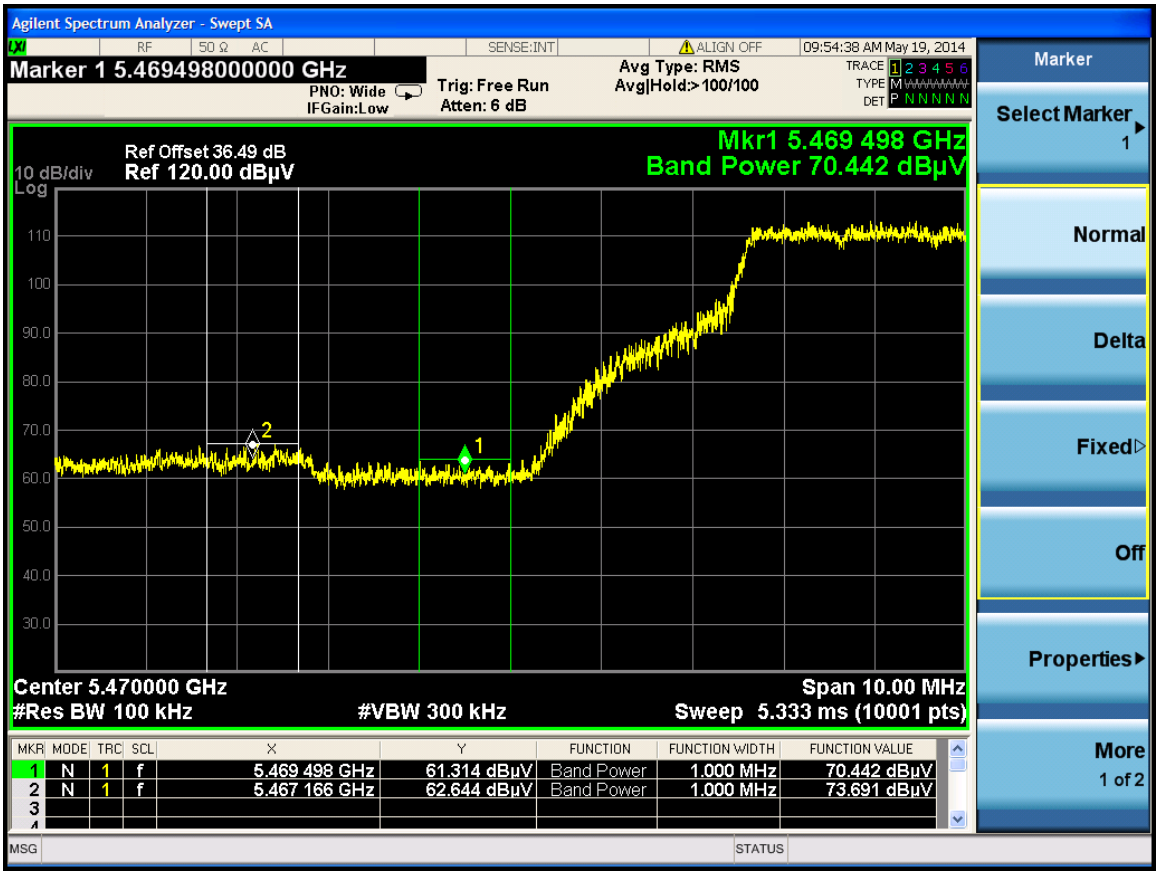
Measurement 2: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 73.492 dBµV/m + 20 log(1 meter) - 104.77
= **-31.27 dBm/MHz**



Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Lower Operating Band-Edge Compliance - Radiated
(FCC 15.407(b)(3))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
Low Channel: Frequency – 5486 MHz
Modulation: 1024QAM
Vertical
Operating Band-Edge Frequency: 5470 MHz
Band-Edge Limit: -27 dBm/MHz
Test method: Integration
Offset on analyzer includes horn antenna and cable loss correction factors
Limit: -27 dBm/MHz

Measurement 1: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 70.442 dBµV/m + 20 log(1 meter) - 104.77
= **-34.32 dBm/MHz**

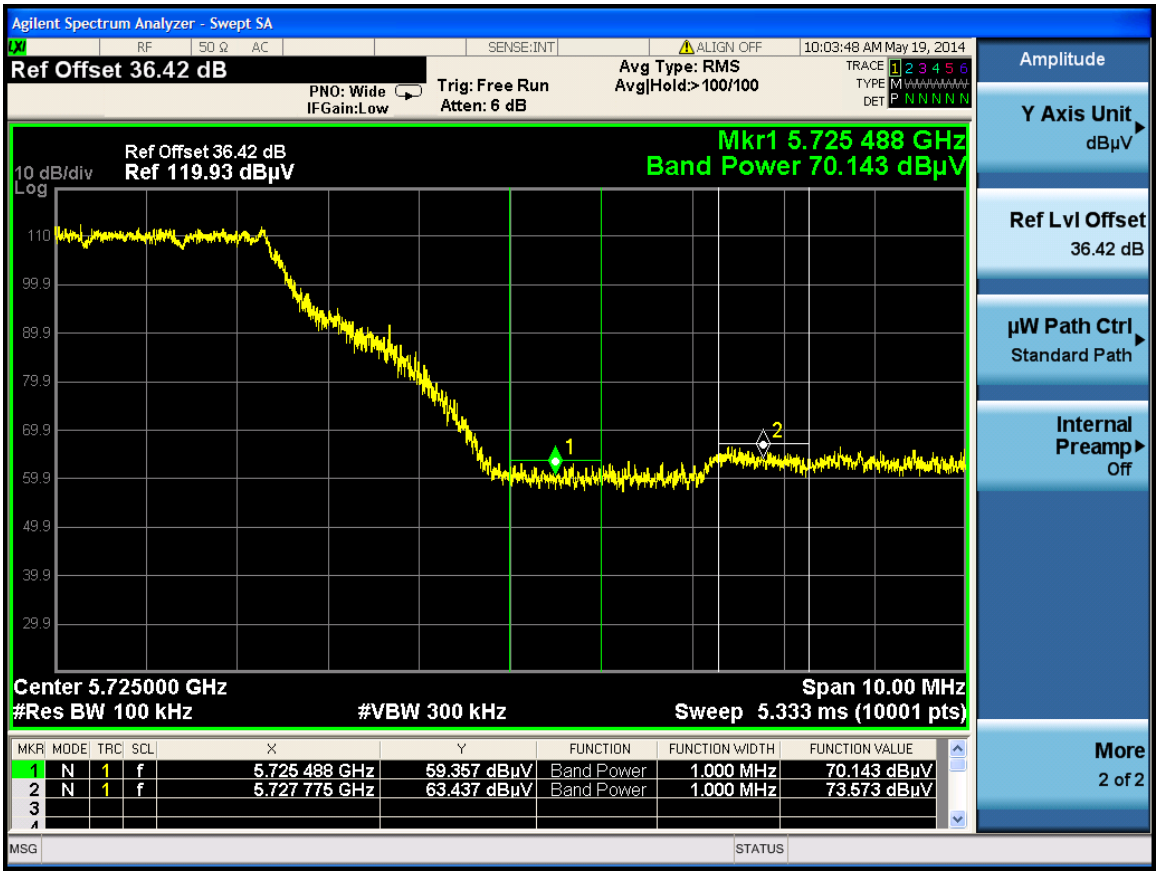
Measurement 2: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 73.691 dBµV/m + 20 log(1 meter) - 104.77
= **-31.07 dBm/MHz**



Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Upper Operating Band-Edge Compliance - Radiated
(FCC 15.407(b)(3))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
High Channel: Frequency – 5709 MHz
Modulation: QPSK
Horizontal
Operating Band-Edge Frequency: 5725 MHz
Band-Edge Limit: -27 dBm/MHz
Test method: Integration
Offset on analyzer includes horn antenna and cable loss correction factors
Limit: -27 dBm/MHz

Measurement 1: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 70.143 dBµV/m + 20 log(1 meter) - 104.77
= **-34.62 dBm/MHz**

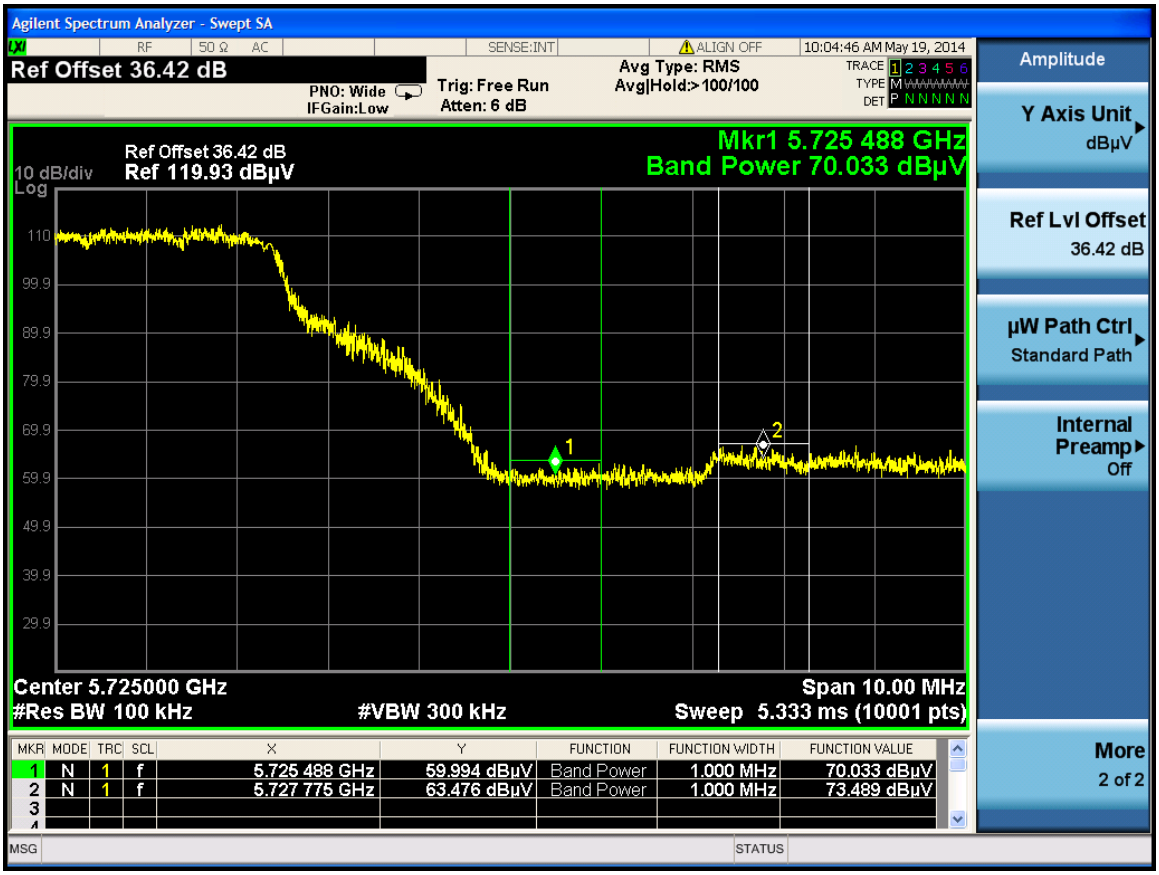
Measurement 2: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 73.573 dBµV/m + 20 log(1 meter) - 104.77
= **-31.19 dBm/MHz**



Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Upper Operating Band-Edge Compliance - Radiated
(FCC 15.407(b)(3))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
High Channel: Frequency – 5709 MHz
Modulation: 16QAM
Horizontal
Operating Band-Edge Frequency: 5725 MHz
Band-Edge Limit: -27 dBm/MHz
Test method: Integration
Offset on analyzer includes horn antenna and cable loss correction factors
Limit: -27 dBm/MHz

Measurement 1: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 70.033 dBµV/m + 20 log(1 meter) - 104.77
= **-34.73 dBm/MHz**

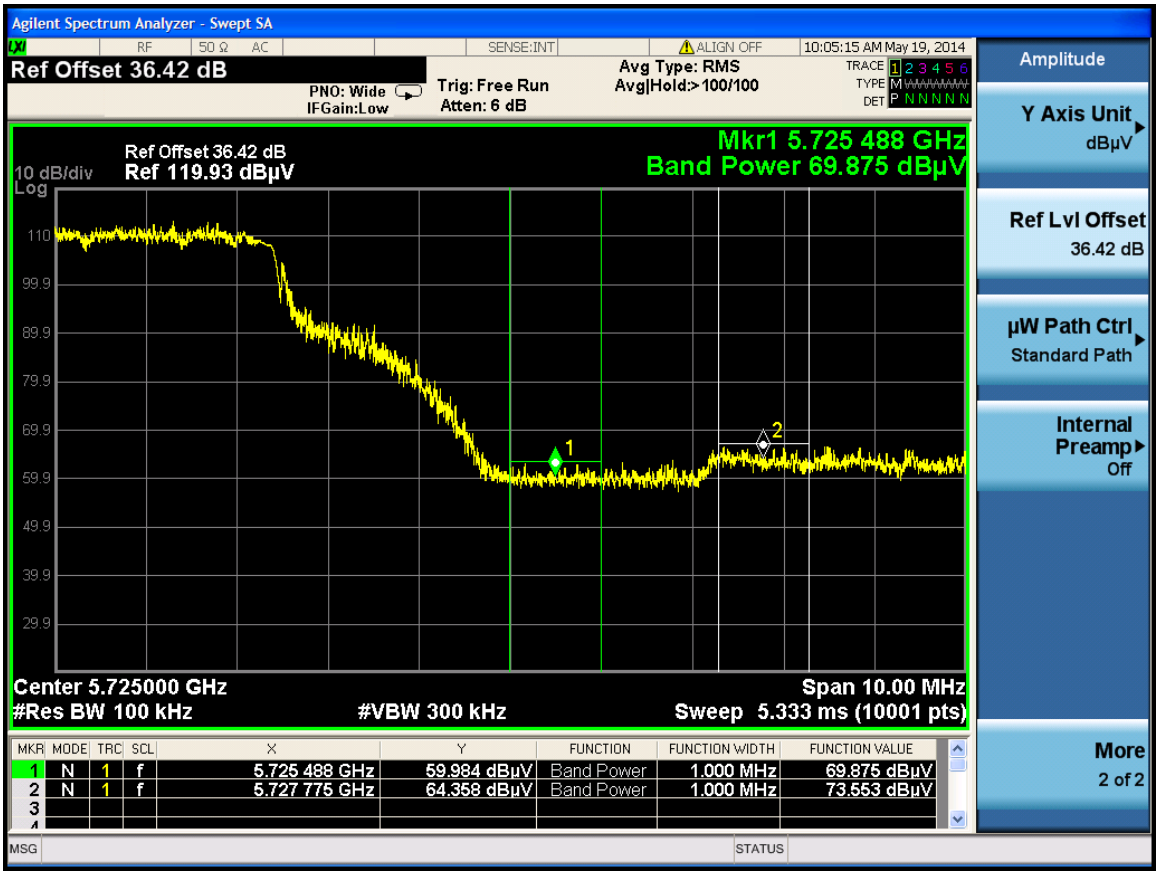
Measurement 2: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 73.489 dBµV/m + 20 log(1 meter) - 104.77
= **-31.28 dBm/MHz**



Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Upper Operating Band-Edge Compliance - Radiated
(FCC 15.407(b)(3))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
High Channel: Frequency – 5709 MHz
Modulation: 64QAM
Horizontal
Operating Band-Edge Frequency: 5725 MHz
Band-Edge Limit: -27 dBm/MHz
Test method: Integration
Offset on analyzer includes horn antenna and cable loss correction factors
Limit: -27 dBm/MHz

Measurement 1: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 69.875 dBµV/m + 20 log(1 meter) - 104.77
= **-34.89 dBm/MHz**

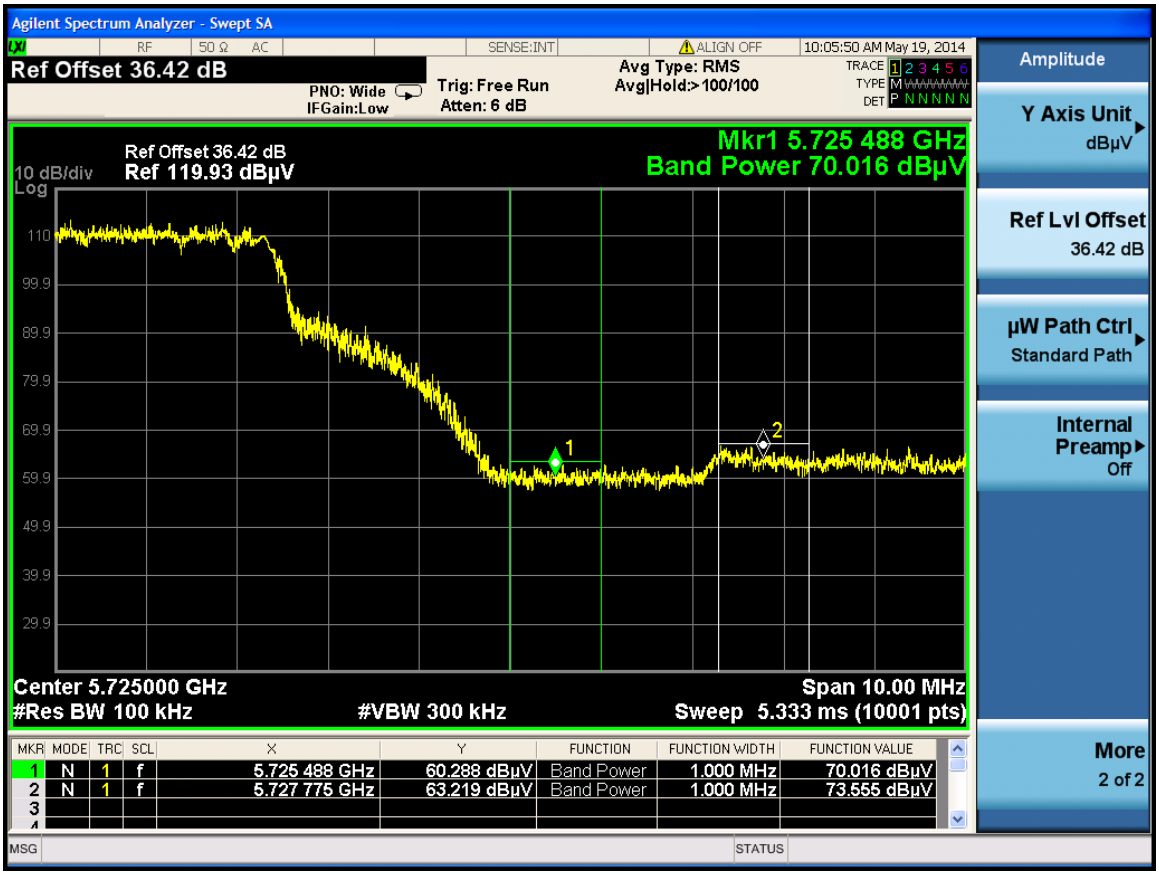
Measurement 2: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 73.553 dBµV/m + 20 log(1 meter) - 104.77
= **-31.21 dBm/MHz**



Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Upper Operating Band-Edge Compliance - Radiated
(FCC 15.407(b)(3))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
High Channel: Frequency – 5709 MHz
Modulation: 256QAM
Horizontal
Operating Band-Edge Frequency: 5725 MHz
Band-Edge Limit: -27 dBm/MHz
Test method: Integration
Offset on analyzer includes horn antenna and cable loss correction factors
Limit: -27 dBm/MHz

Measurement 1: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 70.016 dBµV/m + 20 log(1 meter) - 104.77
= **-34.75 dBm/MHz**

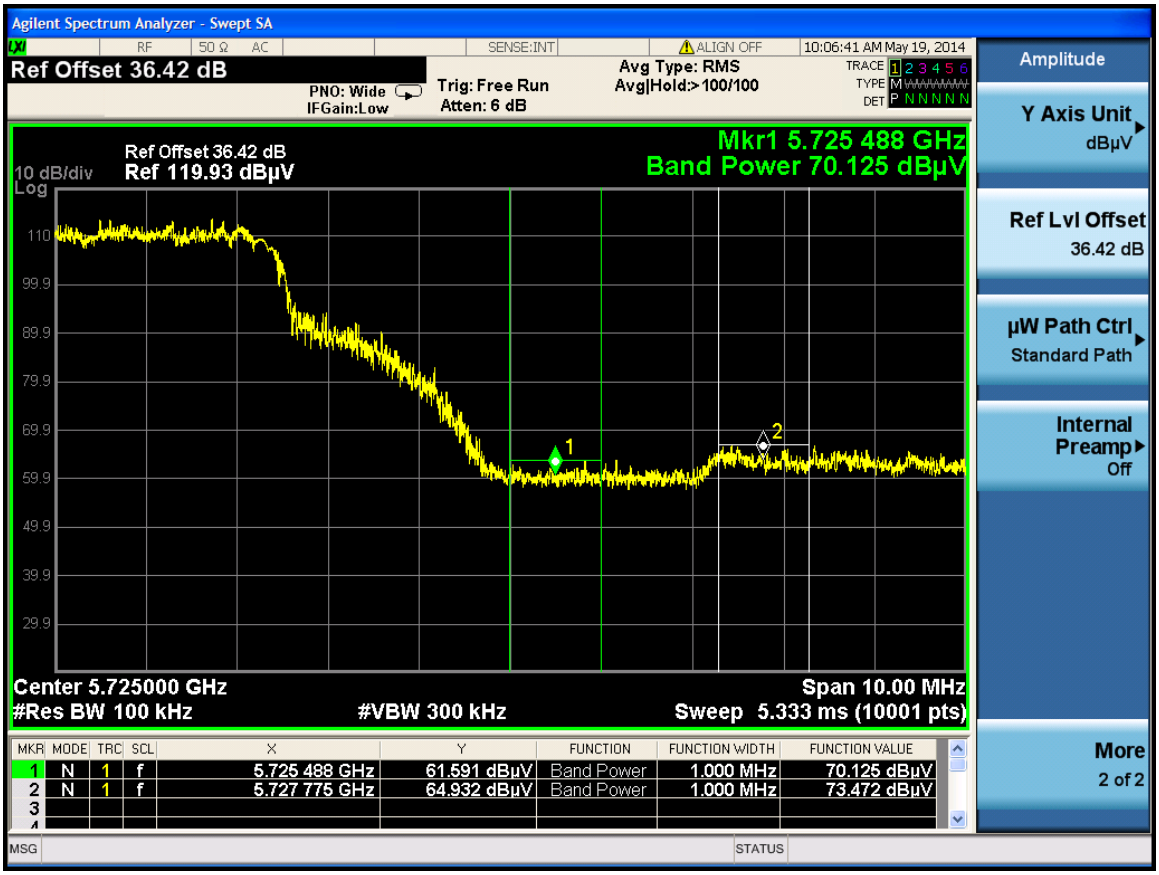
Measurement 2: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 73.555 dBµV/m + 20 log(1 meter) - 104.77
= **-31.21 dBm/MHz**



Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Upper Operating Band-Edge Compliance - Radiated
(FCC 15.407(b)(3))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
High Channel: Frequency – 5709 MHz
Modulation: 1024QAM
Horizontal
Operating Band-Edge Frequency: 5725 MHz
Band-Edge Limit: -27 dBm/MHz
Test method: Integration
Offset on analyzer includes horn antenna and cable loss correction factors
Limit: -27 dBm/MHz

Measurement 1: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 70.125 dBµV/m + 20 log(1 meter) - 104.77
= **-34.64 dBm/MHz**

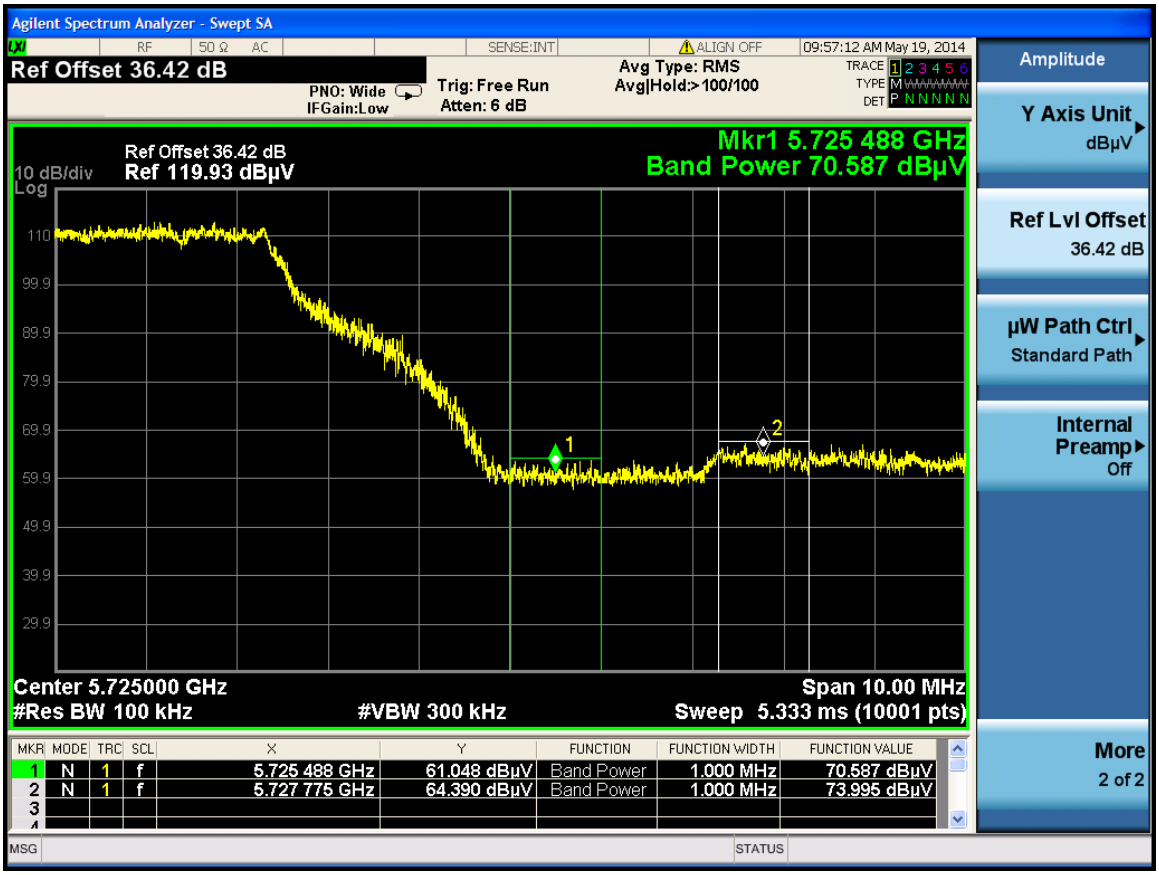
Measurement 2: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 73.472 dBµV/m + 20 log(1 meter) - 104.77
= **-31.29 dBm/MHz**



Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Upper Operating Band-Edge Compliance - Radiated
(FCC 15.407(b)(3))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
High Channel: Frequency – 5709 MHz
Modulation: QPSK
Vertical
Operating Band-Edge Frequency: 5725 MHz
Band-Edge Limit: -27 dBm/MHz
Test method: Integration
Offset on analyzer includes horn antenna and cable loss correction factors
Limit: -27 dBm/MHz

Measurement 1: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 70.587 dBµV/m + 20 log(1 meter) - 104.77
= **-34.18 dBm/MHz**

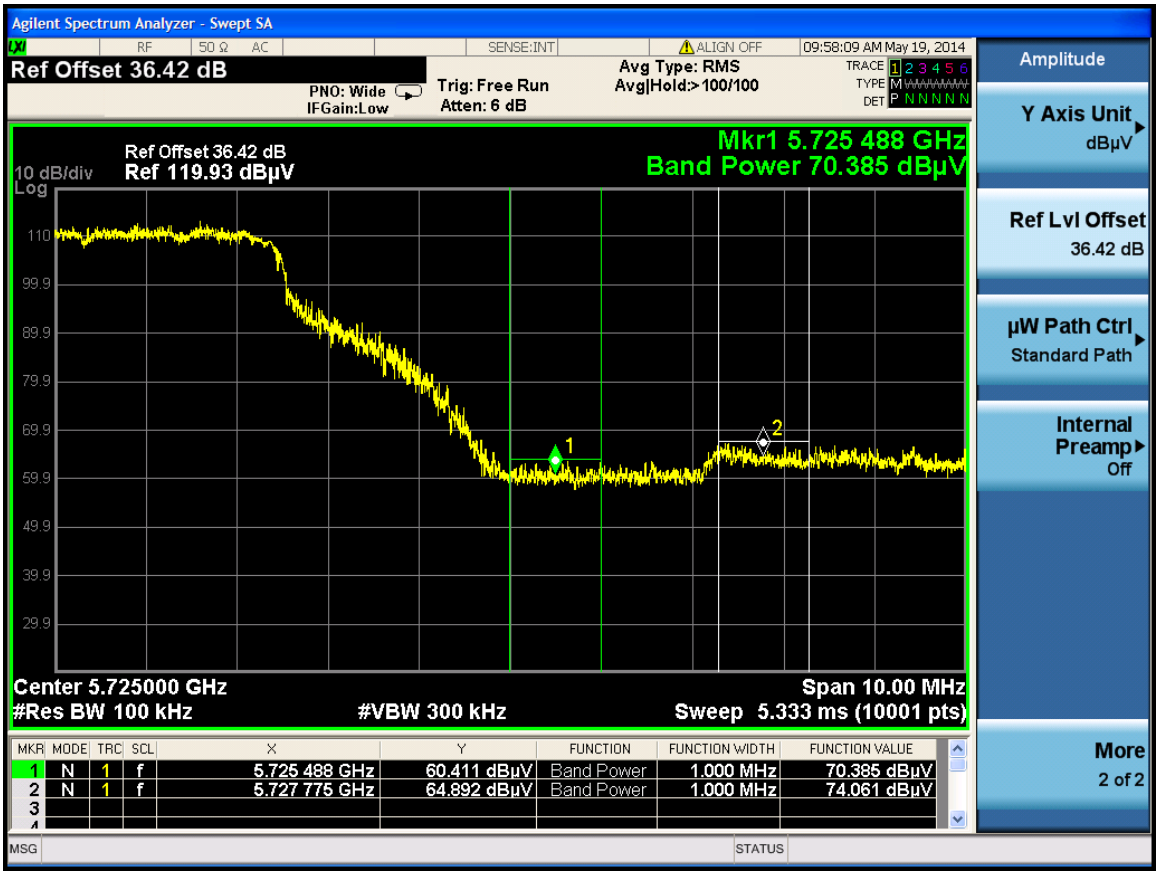
Measurement 2: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 73.995 dBµV/m + 20 log(1 meter) - 104.77
= **-30.77 dBm/MHz**



Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Upper Operating Band-Edge Compliance - Radiated
(FCC 15.407(b)(3))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
High Channel: Frequency – 5709 MHz
Modulation: 16QAM
Vertical
Operating Band-Edge Frequency: 5725 MHz
Band-Edge Limit: -27 dBm/MHz
Test method: Integration
Offset on analyzer includes horn antenna and cable loss correction factors
Limit: -27 dBm/MHz

Measurement 1: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 70.385 dBµV/m + 20 log(1 meter) - 104.77
= **-34.38 dBm/MHz**

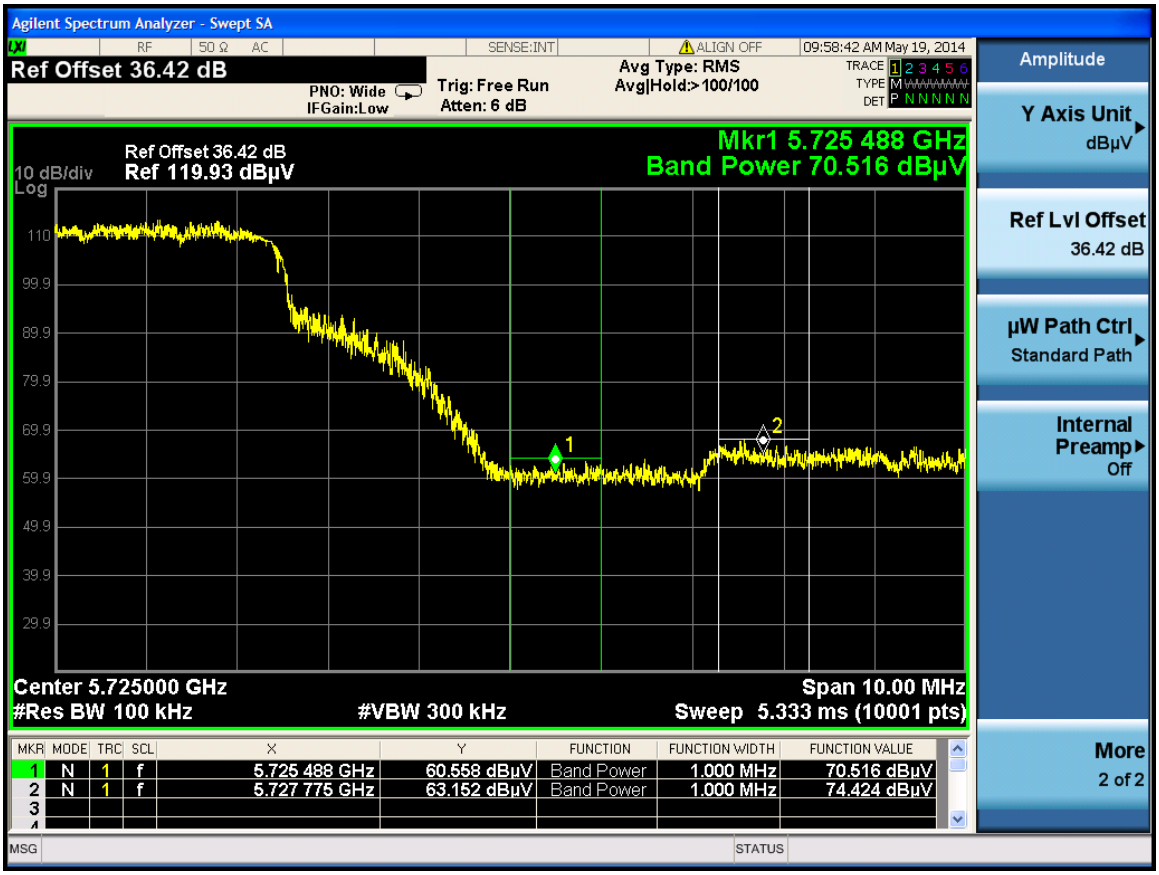
Measurement 2: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 74.061 dBµV/m + 20 log(1 meter) - 104.77
= **-30.70 dBm/MHz**



Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Upper Operating Band-Edge Compliance - Radiated
(FCC 15.407(b)(3))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
High Channel: Frequency – 5709 MHz
Modulation: 64QAM
Vertical
Operating Band-Edge Frequency: 5725 MHz
Band-Edge Limit: -27 dBm/MHz
Test method: Integration
Offset on analyzer includes horn antenna and cable loss correction factors
Limit: -27 dBm/MHz

Measurement 1: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 70.516 dBµV/m + 20 log(1 meter) - 104.77
= **-34.25 dBm/MHz**

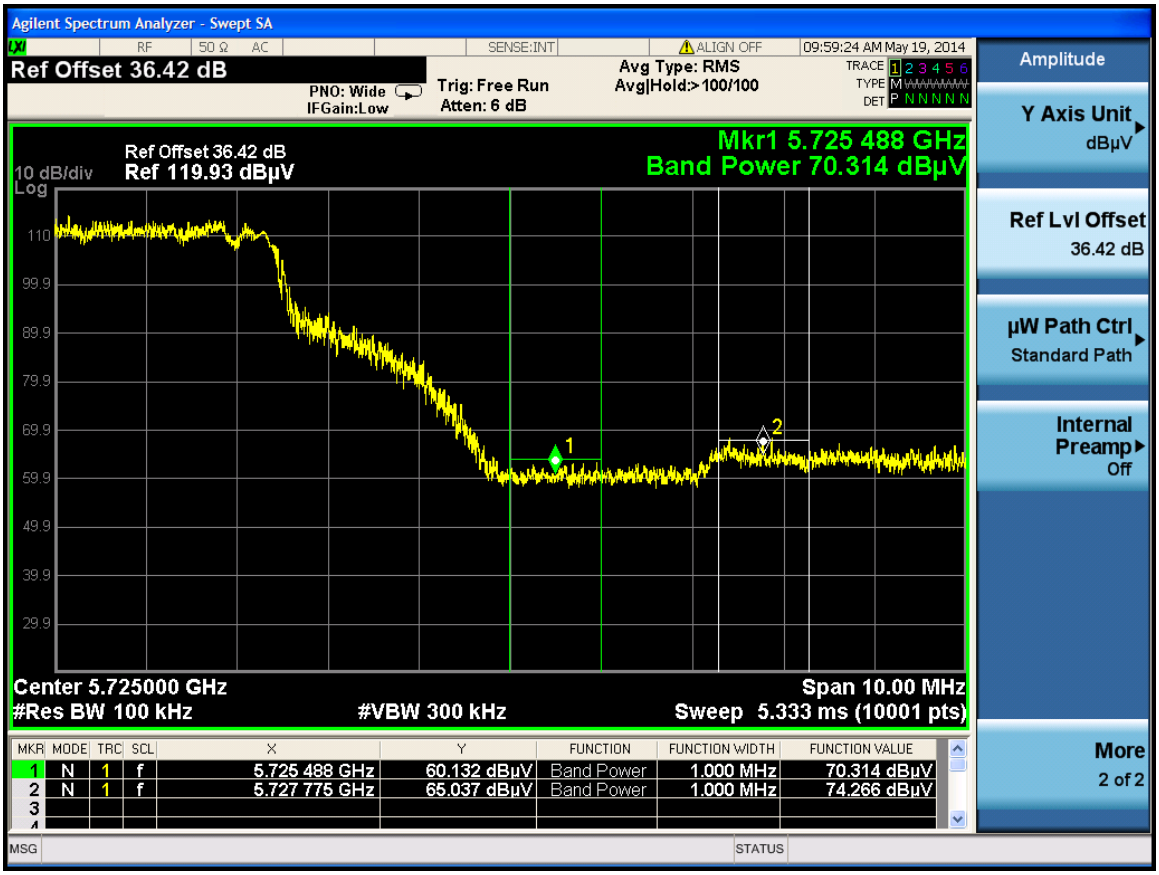
Measurement 2: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 74.424 dBµV/m + 20 log(1 meter) - 104.77
= **-30.34 dBm/MHz**



Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Upper Operating Band-Edge Compliance - Radiated
(FCC 15.407(b)(3))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
High Channel: Frequency – 5709 MHz
Modulation: 256QAM
Vertical
Operating Band-Edge Frequency: 5725 MHz
Band-Edge Limit: -27 dBm/MHz
Test method: Integration
Offset on analyzer includes horn antenna and cable loss correction factors
Limit: -27 dBm/MHz

Measurement 1: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 70.314 dBµV/m + 20 log(1 meter) - 104.77
= **-34.45 dBm/MHz**

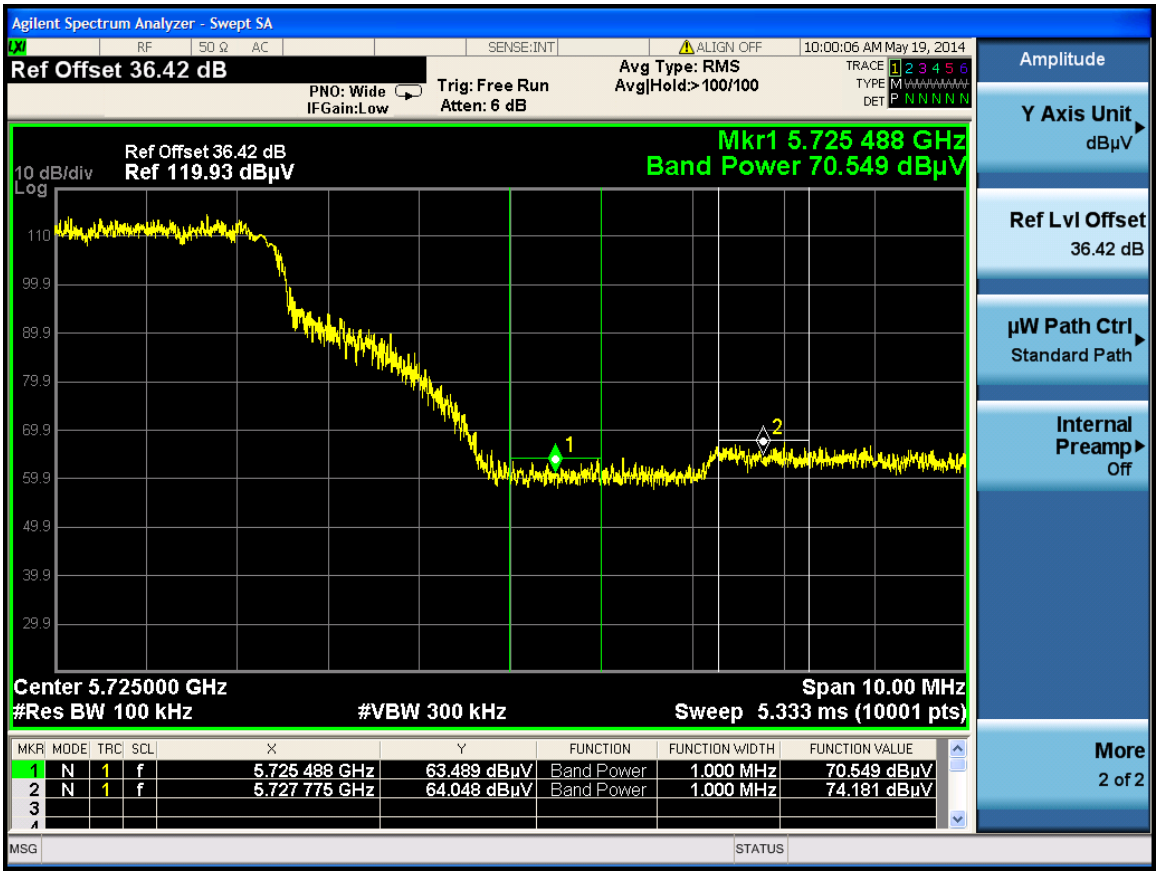
Measurement 2: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 74.266 dBµV/m + 20 log(1 meter) - 104.77
= **-30.50 dBm/MHz**



Test Date: 5-19-2014
Company: Ubiquiti Networks
EUT: AF5
Test: Upper Operating Band-Edge Compliance - Radiated
(FCC 15.407(b)(3))
Operator: Steve D
Comment: 30 MHz channel Bandwidth
High Channel: Frequency – 5709 MHz
Modulation: 1024QAM
Vertical
Operating Band-Edge Frequency: 5725 MHz
Band-Edge Limit: -27 dBm/MHz
Test method: Integration
Offset on analyzer includes horn antenna and cable loss correction factors
Limit: -27 dBm/MHz

Measurement 1: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 70.549 dBµV/m + 20 log(1 meter) - 104.77
= **-34.22 dBm/MHz**

Measurement 2: EIRP[dBm] = E[dBµV/m] + 20 log(d[meters]) - 104.77
= 74.181 dBµV/m + 20 log(1 meter) - 104.77
= **-30.58 dBm/MHz**



Appendix B – Measurement Data

B8.0 Unwanted Emission Levels – Radiated with integral antenna

Rule Section: Sections 15.407(b)(3) and 15.407(b)(6)

Test Procedure: FCC KDB 789033 D01 General UNII Test Procedures v01r03 – *Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E*

Section H(1) – Unwanted emissions in the restricted bands
Section H(2) – Unwanted emissions that fall outside of the restricted bands
Section H(3) – General Requirements for Unwanted Emissions Measurements

Radiated emissions measured with tuned receiver.
Measurements were taken with Peak and Average detectors.

Limits: Outside restricted bands: Peak EIRP shall not exceed -27 dBm/MHz
Inside restricted bands: Peak and Average limits of FCC Part 15.209

Per Section H(2)(c)(i): "an out-of-band emission that complies with both the average and peak limits of 15.209 is not required to satisfy the -27 dBm/MHz or -17 dBm/MHz peak emission limit."

Results: Passed; All unwanted emissions comply with the average and peak limits of 15.209.

Notes: Both transmit chains active. Output power was set to 30 dBm eirp using special test software. Measurements were taken for QPSK modulation (worst case) at the lowest, middle, and highest channels of operation. EUT was set to transmit continuously.

FCC Part 15.209

Electric Field Strength

EUT: AF5 - 5.4 GHz radio
Manufacturer: Ubiquiti Networks, Inc.
Operating Condition: 73 deg. F; 58% R.H.
Test Site: DLS O.F. Site 2
Operator: Steve / Craig B
Test Specification: Tx spurious emissions; QPSK modulation
Comment: 30 MHz ch BW; High Channel; power set to 30 dBm eirp
Date: 05-19-2014

TEXT: "Horz 3 meters"

Short Description: Test Set-up

Test Set-up: EUT Measured at 3 Meters with HORIZONTAL Antenna Polarization

Equations: Total Level(dBµV/m) = Level(dBµV) + System Loss(dB) + Antenna Factor(dBµV/m)

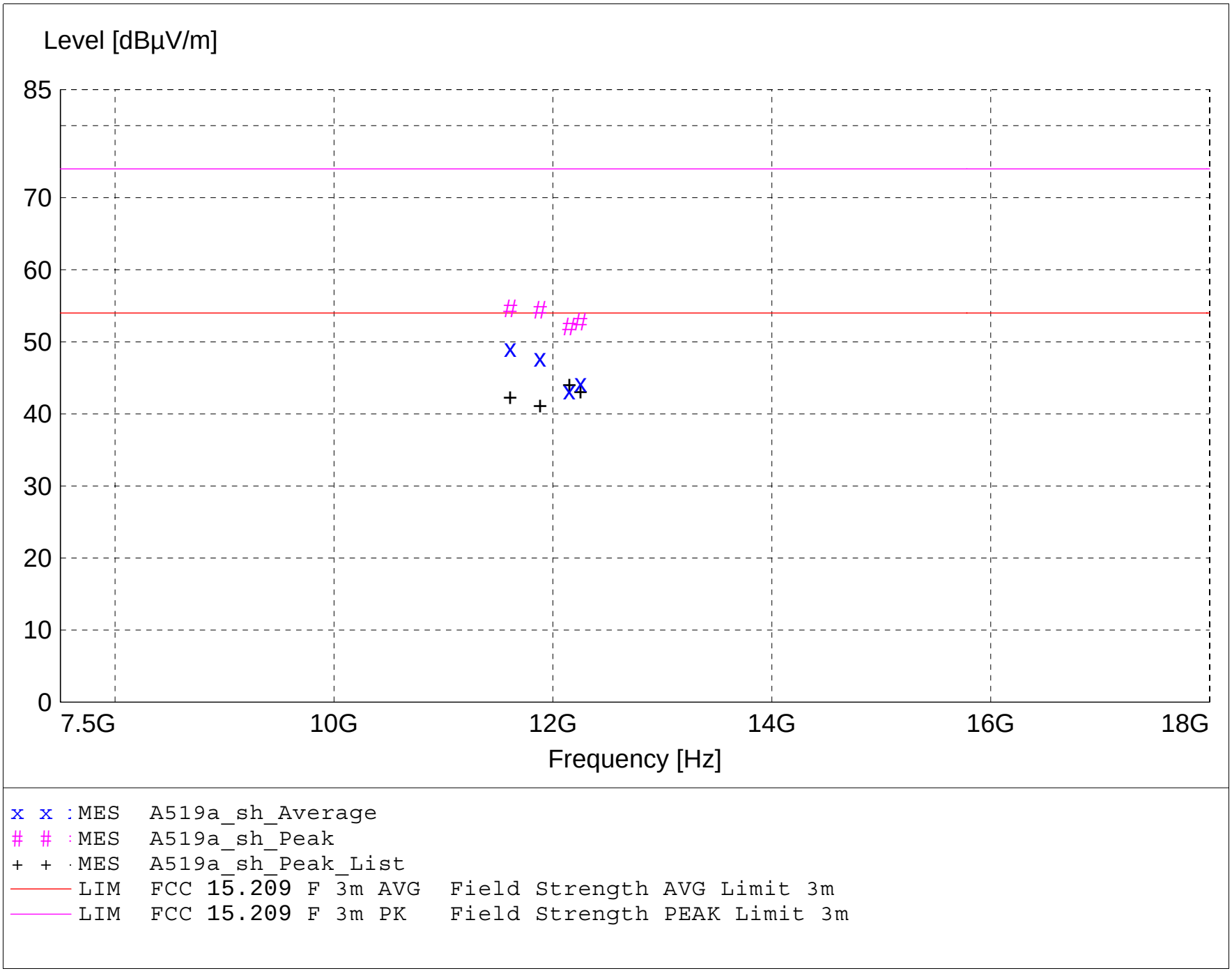
Margin(dB) = Limit(dBµV/m) - Total Level(dBµV/m)

Graph Markers: + Frequency marker (Level of marker not related to final level)

| Final maximized level using Quasi-Peak detector

X Final maximized level using Average dector

Final maximized level using Peak detector



x x : MES A519a_sh_Average
: MES A519a_sh_Peak
+ + : MES A519a_sh_Peak_List
——— LIM FCC 15.209 F 3m AVG Field Strength AVG Limit 3m
——— LIM FCC 15.209 F 3m PK Field Strength PEAK Limit 3m

MEASUREMENT RESULT: "A519a_sh_Final"

5/19/2014 3:53PM

Frequency	Level	Antenna Factor	System Loss	Total Level	Limit	Margin	Height Ant.	EuT Angle	Final Detector	Comment
MHz	dBµV	dBµV/m	dB	dBµV/m	dBµV/m	dB	m	deg		
11610.000000	61.71	39.17	-51.7	49.1	54.0	4.9	1.40	0	AVERAGE	None
11883.000000	60.52	39.21	-51.9	47.8	54.0	6.2	1.40	0	AVERAGE	None
12252.000000	57.88	38.97	-52.5	44.3	54.0	9.7	1.40	0	AVERAGE	None
12150.200000	56.41	39.04	-52.2	43.2	54.0	10.8	1.30	0	AVERAGE	None
11610.000000	67.23	39.17	-51.7	54.7	74.0	19.3	1.40	0	MAX PEAK	None
11883.000000	67.11	39.21	-51.9	54.4	74.0	19.6	1.40	0	MAX PEAK	None
12252.000000	66.36	38.97	-52.5	52.8	74.0	21.2	1.40	0	MAX PEAK	None
12150.200000	65.34	39.04	-52.2	52.1	74.0	21.9	1.30	0	MAX PEAK	None

FCC Part 15.209

Electric Field Strength

EUT: AF5 - 5.4 GHz radio
Manufacturer: Ubiquiti Networks, Inc.
Operating Condition: 73 deg. F; 58% R.H.
Test Site: DLS O.F. Site 2
Operator: Steve / Craig B
Test Specification: Tx spurious emissions; QPSK modulation
Comment: 30 MHz ch BW; High Channel; power set to 30 dBm eirp
Date: 05-19-2014

TEXT: "Vert 3 meters"

Short Description: Test Set-up

Test Set-up: EUT Measured at 3 Meters with VERTICAL Antenna Polarization

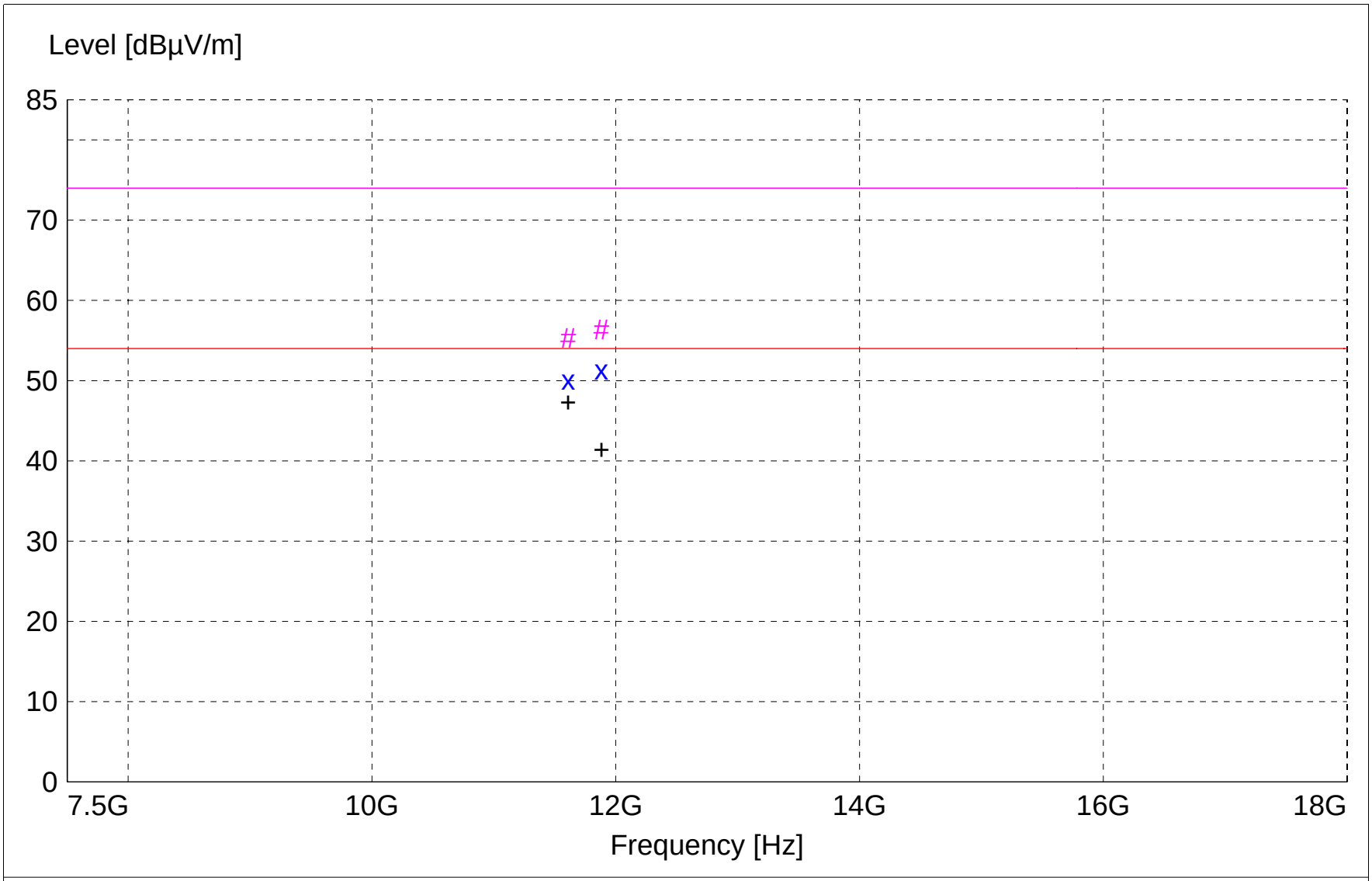
Sample Equations:

Total Level(dBµV/m)	= Level(dBµV)	+ System Loss(dB)	+ Antenna Factor(dBµV/m)
24.6	= 35.51	+ (-22.1)	+ 11.20

Margin(dB)	= Limit(dBµV/m)	- Total Level(dBµV/m)
15.4	= 40	- 24.6

Graph Markers:

+	Frequency marker (Level of marker not related to final level)
|	Final maximized level using Quasi-Peak detector
X	Final maximized level using Average dector
#	Final maximized level using Peak detector



x x :MES A519a_sv_Average
:MES A519a_sv_Peak
+ + :MES A519a_sv_Peak_List
——— LIM 15.209 F 3m AVG Field Strength AVG Limit 3m
——— LIM 15.209 F 3m PK Field Strength PEAK Limit 3m

MEASUREMENT RESULT: "A519a_sv_Final"

5/20/2014 8:40AM

Frequency	Level	Antenna Factor	System Loss	Total Level	Limit	Margin	Height Ant.	EuT Angle	Final Detector	Comment
MHz	dBµV	dBµV/m	dB	dBµV/m	dBµV/m	dB	m	deg		
11883.000000	64.07	39.21	-51.9	51.3	54.0	2.7	1.40	0	AVERAGE	None
11610.000000	62.64	39.17	-51.7	50.1	54.0	3.9	1.50	0	AVERAGE	None
11883.000000	69.08	39.21	-51.9	56.4	74.0	17.6	1.40	0	MAX PEAK	None
11610.000000	67.85	39.17	-51.7	55.3	74.0	18.7	1.50	0	MAX PEAK	None

FCC Part 15.209

Electric Field Strength

EUT: AF5 5.4 GHz radio
Manufacturer: Ubiquiti Networks
Operating Condition: 72 deg. F; 58% R.H.
Test Site: DLS Site 2
Operator: Steve D
Test Specification: Tx spurious emissions; QPSK modulation
Comment: 30 MHz ch BW; High Channel; power set to 30 dBm eirp
Date: 05-20-2014

TEXT: "Horz 1 meters"

Short Description: Test Set-up

Test Set-up: EUT Measured at 1 Meters with HORIZONTAL Antenna Polarization

Equations: Total Level(dBµV/m) = Level(dBµV) + System Loss(dB) + Antenna Factor(dBµV/m)

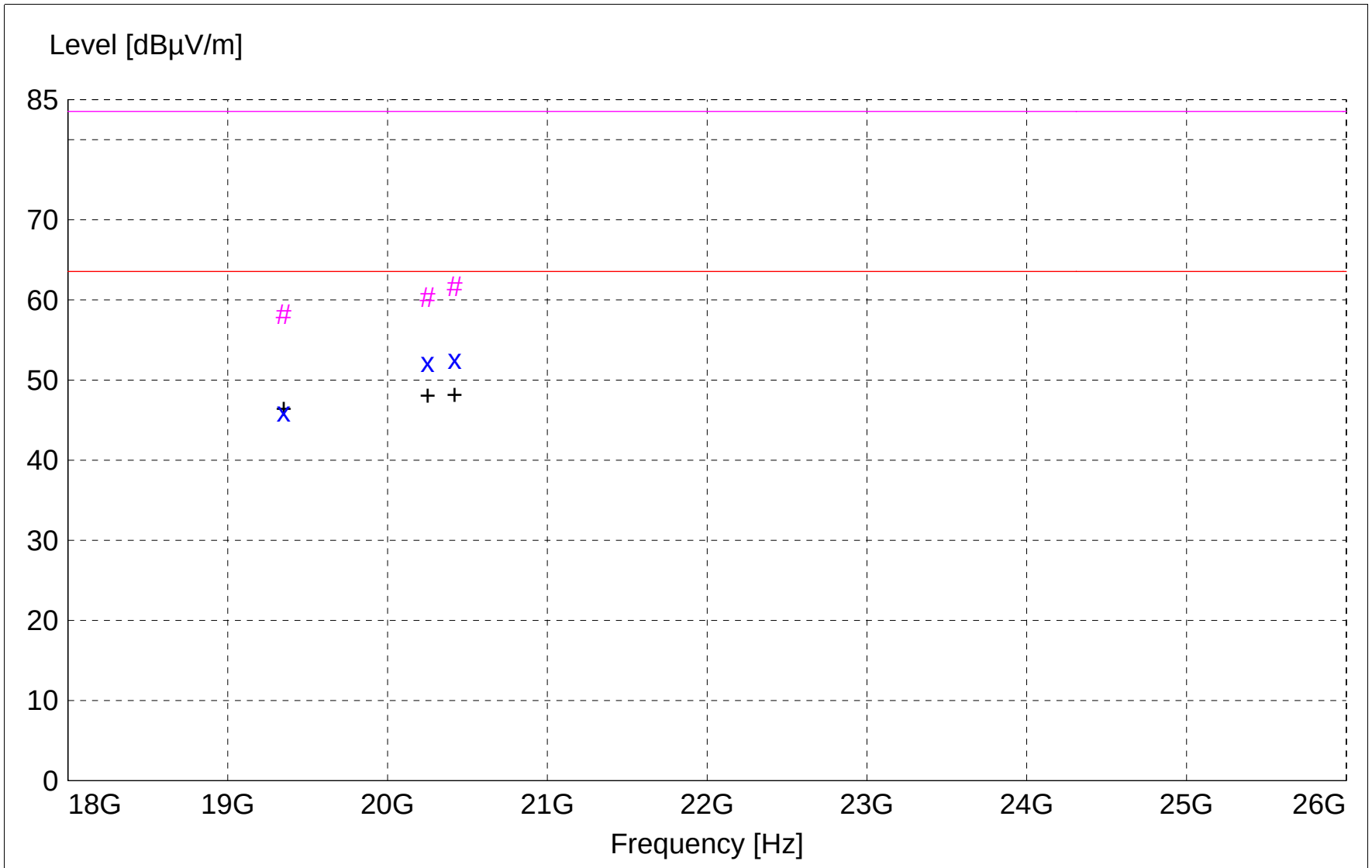
Margin(dB) = Limit(dBµV/m) - Total Level(dBµV/m)

Graph Markers: + Frequency marker (Level of marker not related to final level)

| Final maximized level using Quasi-Peak detector

X Final maximized level using Average dector

Final maximized level using Peak detector



x x xMES A520d_sh_Average
#MES A520d_sh_Peak
+ + +MES A520d_sh_Peak_List
——— LIM 15.209 F 1m AVG Field Strength AVG Limit 1m
——— LIM 15.209 F 1m PK Field Strength PEAK Limit 1m

MEASUREMENT RESULT: "A520d_sh_Final"

5/20/2014 2:16PM

Frequency	Level	Antenna Factor	System Loss	Total Level	Limit	Margin	Height Ant.	EuT Angle	Final Detector	Comment
MHz	dBµV	dBµV/m	dB	dBµV/m	dBµV/m	dB	m	deg		
20420.200000	42.29	47.78	-37.5	52.6	63.5	11.0	1.50	210	AVERAGE	None
20250.000000	41.93	47.84	-37.5	52.2	63.5	11.3	1.70	200	AVERAGE	None
19350.000000	38.46	47.48	-39.9	46.1	63.5	17.5	1.40	200	AVERAGE	None
20420.200000	51.40	47.78	-37.5	61.7	83.5	21.8	1.50	210	MAX PEAK	None
20250.000000	50.08	47.84	-37.5	60.4	83.5	23.1	1.70	200	MAX PEAK	None
19350.000000	50.60	47.48	-39.9	58.2	83.5	25.3	1.40	200	MAX PEAK	None

FCC Part 15.209

Electric Field Strength

EUT: AF5 5.4 GHz radio
Manufacturer: Ubiquiti Networks
Operating Condition: 72 deg. F; 58% R.H.
Test Site: DLS Site 2
Operator: Steve D
Test Specification: Tx spurious emissions; QPSK modulation
Comment: 30 MHz ch BW; High Channel; power set to 30 dBm eirp
Date: 05-20-2014

TEXT: "Horz 1 meters"

Short Description: Test Set-up

Test Set-up: EUT Measured at 1 Meters with HORIZONTAL Antenna Polarization

Equations: Total Level(dBµV/m) = Level(dBµV) + System Loss(dB) + Antenna Factor(dBµV/m)

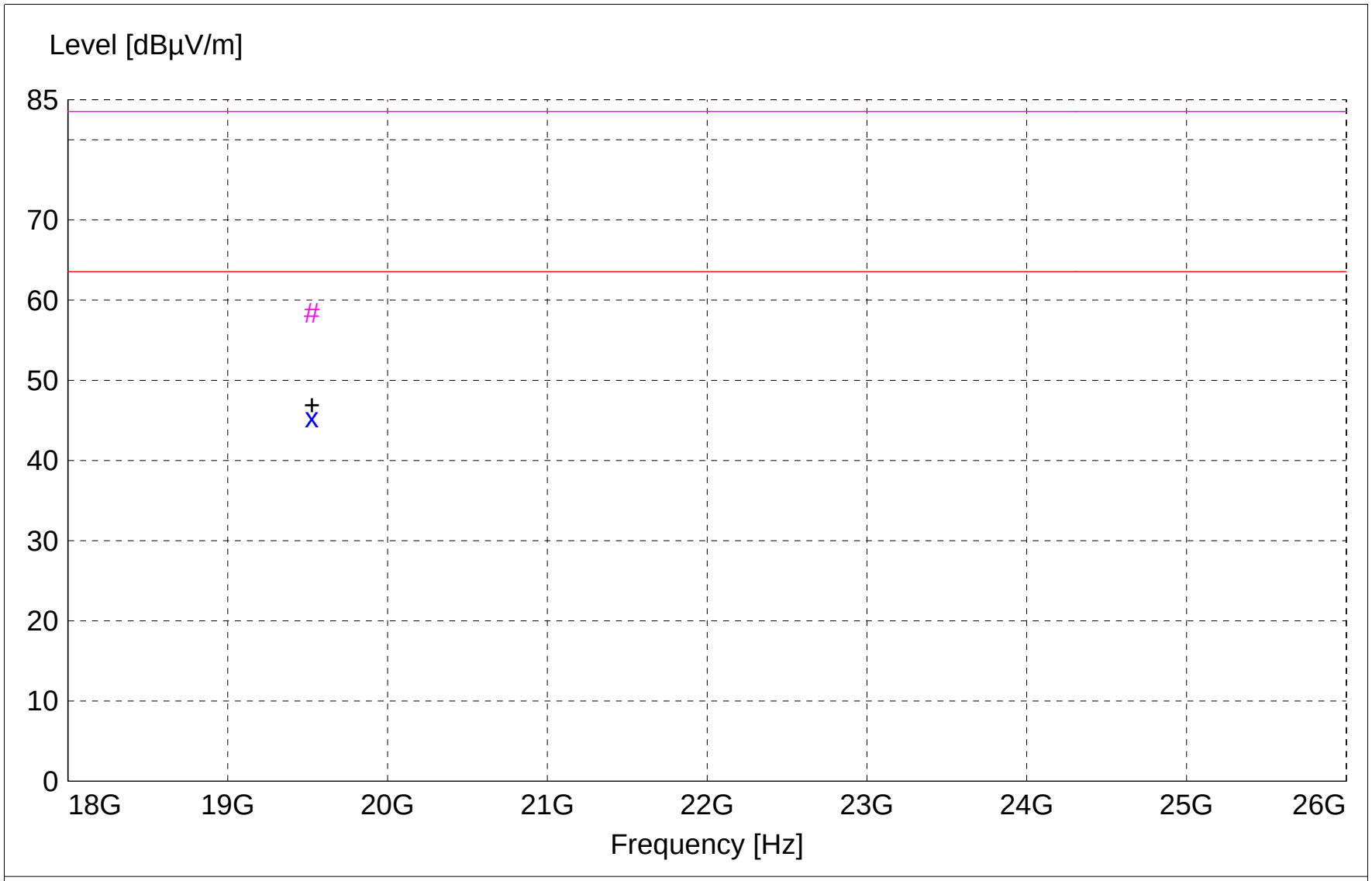
Margin(dB) = Limit(dBµV/m) - Total Level(dBµV/m)

Graph Markers: + Frequency marker (Level of marker not related to final level)

| Final maximized level using Quasi-Peak detector

X Final maximized level using Average dector

Final maximized level using Peak detector



x x xMES A520d_sh_Average
#MES A520d_sh_Peak
+ + +MES A520d_sh_Peak_List
——— LIM **15.209** F 1m AVG Field Strength AVG Limit **1**m
——— LIM **15.209** F 1m PK Field Strength PEAK Limit **1**m

MEASUREMENT RESULT: "A520d_sh_Final"

5/20/2014 1:47PM

Frequency	Level	Antenna Factor	System Loss	Total Level	Limit	Margin	Height Ant.	EuT Angle	Final Detector	Comment
MHz	dBµV	dBµV/m	dB	dBµV/m	dBµV/m	dB	m	deg		
19526.000000	36.65	47.90	-39.2	45.4	63.5	18.2	1.00	0	AVERAGE	None
19526.000000	49.68	47.90	-39.2	58.4	83.5	25.1	1.00	0	MAX PEAK	None

FCC Part 15.209

Electric Field Strength

EUT: AF5 5.4 GHz radio
Manufacturer: Ubiquiti Networks
Operating Condition: 72 deg. F; 58% R.H.
Test Site: DLS Site 2
Operator: Steve D
Test Specification: Tx spurious emissions; QPSK modulation
Comment: 30 MHz ch BW; High Channel; power set to 30 dBm eirp
Date: 05-20-2014

TEXT: "Horz 1 meters"

Short Description: Test Set-up

Test Set-up: EUT Measured at 1 Meters with HORIZONTAL Antenna Polarization

Equations: Total Level(dBµV/m) = Level(dBµV) + System Loss(dB) + Antenna Factor(dBµV/m)

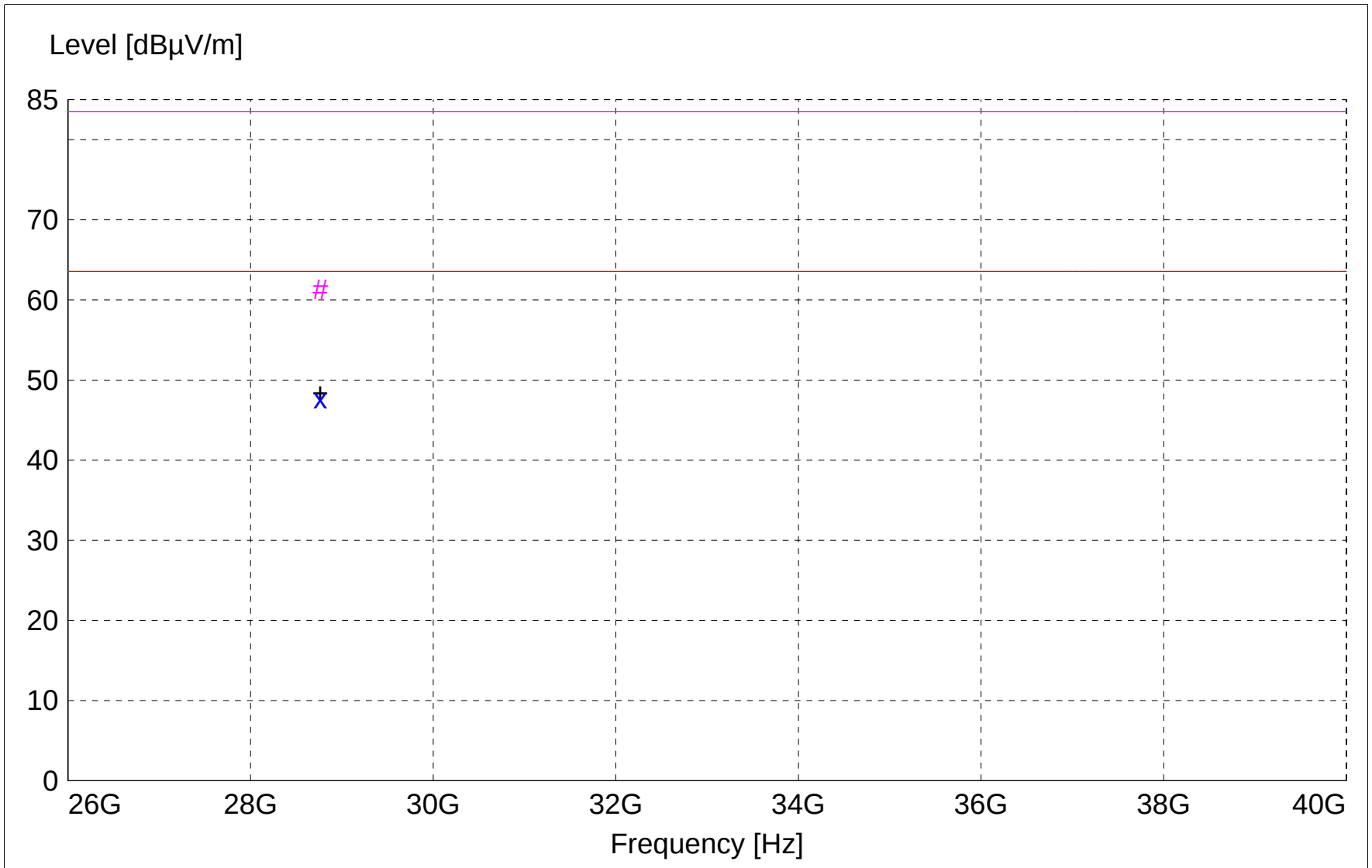
Margin(dB) = Limit(dBµV/m) - Total Level(dBµV/m)

Graph Markers: + Frequency marker (Level of marker not related to final level)

| Final maximized level using Quasi-Peak detector

X Final maximized level using Average dector

Final maximized level using Peak detector



x x xMES A520c_sh_Average
#MES A520c_sh_Peak
+ + +MES A520c_sh_Peak_List
——— LIM 15.209 F 1m AVG Field Strength AVG Limit 1m
——— LIM 15.209 F 1m PK Field Strength PEAK Limit 1m

MEASUREMENT RESULT: "A520c_sh_Final"

5/20/2014 12:53PM

Frequency	Level	Antenna Factor	System Loss	Total Level	Limit	Margin	Height Ant.	EuT Angle	Final Detector	Comment
MHz	dBµV	dBµV/m	dB	dBµV/m	dBµV/m	dB	m	deg		
28763.400000	48.52	48.36	-49.2	47.6	63.5	15.9	1.00	0	AVERAGE	None
28763.400000	62.17	48.36	-49.2	61.3	83.5	22.3	1.00	0	MAX PEAK	None

FCC Part 15.209

Electric Field Strength

EUT: AF5 5.4 GHz radio
Manufacturer: Ubiquiti Networks
Operating Condition: 72 deg. F; 58% R.H.
Test Site: DLS Site 2
Operator: Steve D
Test Specification: Tx spurious emissions; QPSK modulation
Comment: 30 MHz ch BW; High Channel; power set to 30 dBm eirp
Date: 05-20-2014

TEXT: "Vert 1 meters"

Short Description: Test Set-up

Test Set-up: EUT Measured at 1 Meters with VERTICAL Antenna Polarization

Equations: Total Level(dBµV/m) = Level(dBµV) + System Loss(dB) + Antenna Factor(dBµV/m)

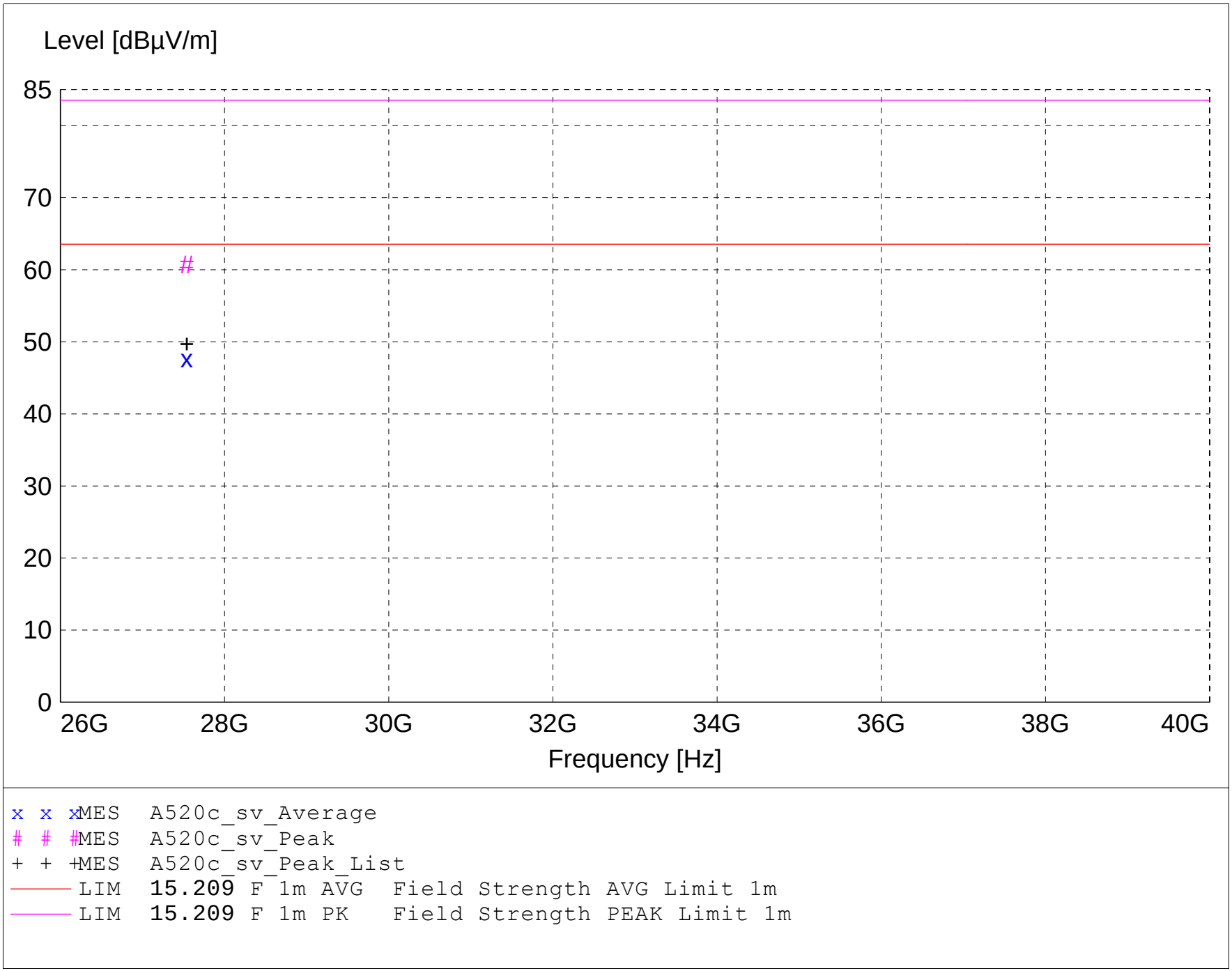
Margin(dB) = Limit(dBµV/m) - Total Level(dBµV/m)

Graph Markers: + Frequency marker (Level of marker not related to final level)

| Final maximized level using Quasi-Peak detector

X Final maximized level using Average dector

Final maximized level using Peak detector


Level [dBµV/m]
85
70
60
50
40
30
20
10
0
26G
28G
30G
32G
34G
36G
38G
40G
Frequency [Hz]
x x xMES A520c_sv_Average
#MES A520c_sv_Peak
+ + +MES A520c_sv_Peak_List
LIM 15.209 F 1m AVG Field Strength AVG Limit 1m
LIM 15.209 F 1m PK Field Strength PEAK Limit 1m

MEASUREMENT RESULT: "A520c_sv_Final"

5/20/2014 12:44PM

Frequency	Level	Antenna Factor	System Loss	Total Level	Limit	Margin	Height Ant.	EuT Angle	Final Detector	Comment
MHz	dBµV	dBµV/m	dB	dBµV/m	dBµV/m	dB	m	deg		
27540.200000	50.16	48.47	-51.0	47.7	63.5	15.9	1.20	90	AVERAGE	None
27540.200000	63.24	48.47	-51.0	60.7	83.5	22.8	1.20	90	MAX PEAK	None

END OF REPORT

Revision #	Date	Comments	By
1.0	05-28-2014	Preliminary Release	JS
1.1	05-29-2014	Typos on data corrected	JS
1.2	05-30-2014	Date typos - section 7.0 - corrected	JS