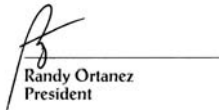
**MEASUREMENT REPORT**
FCC Part 15.247 WLAN 802.11b/g/n**Applicant Name:**
Device Solutions
3211 Moorefields Road
Hillsborough, NC 27278
United States**Date of Testing:**
12/22/2014 - 01/23/2015
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Test Report Serial No.:
0Y1412312386.OXW

FCC ID:	OXW-DS0028
APPLICANT:	Device Solutions

Application Type:	Certification
Model(s):	DS0028
EUT Type:	WiFi Gateway
FCC Classification:	Digital Transmission System (DTS)
FCC Rule Part(s):	Part 15.247
Test Procedure(s):	KDB 558074 v03r02

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in KDB 558074 v03r02. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.


Randy Ortanez
President





FCC ID: OXW-DS0028		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1412312386.OXW	Test Dates: 12/22/2014 - 01/23/2015	EUT Type: WiFi Gateway		Page 1 of 22

TABLE OF CONTENTS

FCC PART 15.247 MEASUREMENT REPORT	3
1.0 INTRODUCTION.....	4
1.1 SCOPE.....	4
1.2 PCTEST TEST LOCATION.....	4
2.0 PRODUCT INFORMATION	5
2.1 EQUIPMENT DESCRIPTION.....	5
2.2 DEVICE CAPABILITIES	5
2.3 TEST CONFIGURATION	5
2.4 EMI SUPPRESSION DEVICE(S)/MODIFICATIONS.....	5
3.0 DESCRIPTION OF TEST	6
3.1 EVALUATION PROCEDURE.....	6
3.2 AC LINE CONDUCTED EMISSIONS.....	6
3.3 RADIATED EMISSIONS	7
3.4 ENVIRONMENTAL CONDITIONS	7
4.0 ANTENNA REQUIREMENTS	8
5.0 TEST EQUIPMENT CALIBRATION DATA.....	9
6.0 TEST RESULTS	10
6.1 SUMMARY	10
6.2 RADIATED SPURIOUS EMISSION MEASUREMENTS.....	11
6.3 RADIATED RESTRICTED BAND EDGE MEASUREMENTS	16
6.4 LINE-CONDUCTED TEST DATA.....	20
7.0 CONCLUSION	22

FCC ID: OXW-DS0028		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1412312386.OXW	Test Dates: 12/22/2014 - 01/23/2015	EUT Type: WiFi Gateway		Page 2 of 22



MEASUREMENT REPORT

FCC Part 15.247



§ 2.1033 General Information

APPLICANT: Device Solutions

APPLICANT ADDRESS: 3211 Moorefields Road
Hillsborough, NC 27278, United States

TEST SITE: PCTEST ENGINEERING LABORATORY, INC.

TEST SITE ADDRESS: 7185 Oakland Mills Road, Columbia, MD 21046 USA

FCC RULE PART(S): Part 15.247

BASE MODEL: DS0028

FCC ID: OXW-DS0028

FCC CLASSIFICATION: Digital Transmission System (DTS)

Test Device Serial No.: FCC1, FCC2 ☐ Production ☒ Pre-Production ☐ Engineering

DATE(S) OF TEST: 12/22/2014 - 01/23/2015



TEST REPORT S/N: 0Y1412312386.OXW

Test Facility / Accreditations

Measurements were performed at PCTEST Engineering Lab located in Columbia, MD 21046, U.S.A.



- PCTEST facility is an FCC registered (PCTEST Reg. No. 159966) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules and Industry Canada (2451B-1).
- PCTEST Lab is accredited to ISO 17025 by U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP Lab code: 100431-0) in EMC, FCC and Telecommunications.
- PCTEST Lab is accredited to ISO 17025-2005 by the American Association for Laboratory Accreditation (A2LA) in Specific Absorption Rate (SAR) testing, Hearing Aid Compatibility (HAC) testing, CTIA Test Plans, and wireless testing for FCC and Industry Canada Rules.
- PCTEST Lab is a recognized U.S. Conformity Assessment Body (CAB) in EMC and R&TTE (n.b. 0982) under the U.S.-EU Mutual Recognition Agreement (MRA).
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC Guide 65 by the American National Standards Institute (ANSI) in all scopes of FCC Rules and Industry Canada Standards (RSS).
- PCTEST facility is an IC registered (2451B-1) test laboratory with the site description on file at Industry Canada.
- PCTEST is a CTIA Authorized Test Laboratory (CATL) for AMPS, CDMA, and EvDO wireless devices and for Over-the-Air (OTA) Antenna Performance testing for AMPS, CDMA, GSM, GPRS, EGPRS, UMTS (W-CDMA), CDMA 1xEVDO, and CDMA 1xRTT.

FCC ID: OXW-DS0028		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1412312386.OXW	Test Dates: 12/22/2014 - 01/23/2015	EUT Type: WiFi Gateway		Page 3 of 22

1.0 INTRODUCTION

1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

1.2 PCTEST Test Location

The map below shows the location of the PCTEST LABORATORY, its proximity to the FCC Laboratory, the Columbia vicinity, the Baltimore-Washington Intern'l (BWI) airport, the city of Baltimore and the Washington, DC area. (See Figure 1-1).

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility located at 7185 Oakland Mills Road, Columbia, MD 21046. The site coordinates are 39° 10'23" N latitude and 76° 49'50" W longitude. The facility is 0.4 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2009 on February 15, 2012.

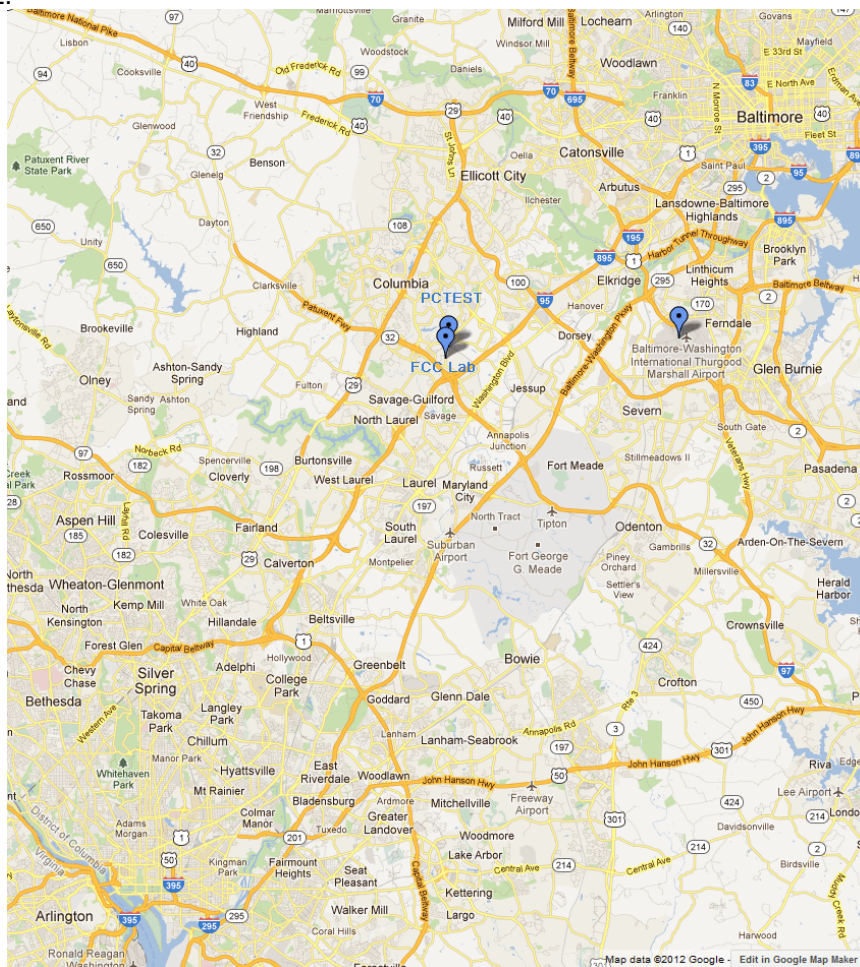


Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

FCC ID: OXW-DS0028	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CERTIFICATION)	DeviceSolutions Integration. Redefined.	Reviewed by: Quality Manager
Test Report S/N: 0Y1412312386.OXW	Test Dates: 12/22/2014 - 01/23/2015	EUT Type: WiFi Gateway		Page 4 of 22

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Device Solutions WiFi Gateway FCC ID: OXW-DS0028**. The test data contained in this report pertains only to the emissions due to the EUT's WLAN (DTS) transmitter. This device contains a previously certified module (FCC ID: O7P-362) whose conducted data is applied to this filing.

2.2 Device Capabilities

This device contains the following capabilities:

802.11b/g/n WLAN, 900MHz ISM

Note: The following duty cycle values were taken from measurements in the original filing:

Maximum Achievable Duty Cycles	
802.11 Mode/Band	Duty Cycle [%]
	ANT1
2.4GHz	4.32



Data Rates Supported: 1Mbps, 2Mbps, 5.5Mbps, 11Mbps (b)
6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps, 54Mbps (g)
6.5/7.2Mbps, 13/14.4Mbps, 19.5/21.7Mbps, 26/28.9Mbps, 39/43.3Mbps,
52/57.8Mbps, 58.5/65Mbps, 65/72.2Mbps (n – 20MHz)

2.3 Test Configuration

The EUT (Model: DS0028) is a WiFi Gateway containing two previously certified modules: a Sensor Board Module (FCC ID: OXW-PA0002) and an 802.11 WiFi Module (FCC ID: O7P-362). The Device Solutions WiFi Gateway was tested per the guidance of KDB 558074 v03r02. ANSI C63.10-2009 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing. See Sections 3.2 for AC line conducted emissions test setups and 3.3 for radiated emissions test setups.

2.4 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

FCC ID: OXW-DS0028		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1412312386.OXW	Test Dates: 12/22/2014 - 01/23/2015	EUT Type: WiFi Gateway		Page 5 of 22

3.0 DESCRIPTION OF TEST

3.1 Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2009), and the guidance provided in KDB 558074 v03r02 were used in the measurement of the **Device Solutions WiFi Gateway FCC ID: OXW-DS0028**.

Deviation from measurement procedure.....None



3.2 AC Line Conducted Emissions

The line-conducted facility is located inside a 10'x16'x9' shielded enclosure. The shielded enclosure is manufactured by ETS Lindgren RF Enclosures. The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-5. A 1m x 1.5m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50μH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. The external power line filter is an ETS Lindgren Model LPRX-4X30 (100dB Attenuation, 14kHz-18GHz) and the two EMI/RFI filters are ETS Lindgren Model LRW-2030-S1 (100dB Minimum Insertion Loss, 14kHz – 10GHz). These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference groundplane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The spectrum was scanned from 150kHz to 30MHz with a spectrum analyzer. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 10kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or resolution, clock or data exchange speed, scrolling H pattern to the EUT and/or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions is used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

Line conducted emissions test results are shown in Section 6.3. Automated test software was used to perform the AC line conducted emissions testing. The EMI Receiver mode of the Agilent MXE was used to perform ACLC emissions testing.

FCC ID: OXW-DS0028		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1412312386.OXW	Test Dates: 12/22/2014 - 01/23/2015	EUT Type: WiFi Gateway		Page 6 of 22

3.3 Radiated Emissions



The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Clause 5, Figure 5.7 of ANSI C63.4-2009. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. An ETS Lindgren Model 2188 raised turntable is used for radiated measurement. It is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. A 78cm high PVC support structure is placed on top of the turntable. A ¾" (~1.9cm) sheet of high density polyethylene is used as the table top and is placed on top of the PVC supports to bring the total height of the table to 80cm.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up was placed on top of the 0.8 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions.

3.4 Environmental Conditions

The temperature is controlled within range of 15°C to 35°C. The relative humidity is controlled within range of 10% to 75%. The atmospheric pressure is monitored within the range 86-106kPa (860-1060mbar).

FCC ID: OXW-DS0028		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1412312386.OXW	Test Dates: 12/22/2014 - 01/23/2015	EUT Type: WiFi Gateway		Page 7 of 22

4.0 ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.”



- The antennas of the WiFi Gateway are **permanently attached**.
- There are no provisions for connections to an external antenna.

Conclusion:

The **Device Solutions WiFi Gateway FCC ID: OXW-DS0028** unit complies with the requirement of §15.203.

Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437		

Table 4-1. Frequency/ Channel Operations



FCC ID: OXW-DS0028		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1412312386.OXW	Test Dates: 12/22/2014 - 01/23/2015	EUT Type: WiFi Gateway		Page 8 of 22

5.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST).

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	10/24/2014	Annual	10/24/2015	N/A
Agilent	8447D	Broadband Amplifier	5/30/2014	Annual	5/30/2015	2443A01900
Agilent	N9020A	MXA Signal Analyzer	10/27/2014	Annual	10/27/2015	US46470561
Agilent	N9038A	MXE EMI Receiver	3/3/2014	Annual	3/3/2015	MY51210133
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	6/26/2013	Biennial	6/26/2015	121034
Emco	3115	Horn Antenna (1-18GHz)	1/30/2014	Biennial	1/30/2016	9704-5182
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	4/8/2014	Biennial	4/8/2016	125518
ETS Lindgren	3160-09	18-26.5 GHz Standard Gain Horn	6/17/2014	Biennial	6/17/2016	135427
K & L	11SH10-3075/U18000	High Pass Filter	12/1/2014	Annual	12/1/2015	2
Pasternack	NMLC-1	Line Conducted Emissions Cable (NM)	10/17/2014	Annual	10/17/2015	N/A
Rhode & Schwarz	TS-PR18	Pre-Amplifier	6/12/2014	Annual	6/12/2015	101622
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	1/27/2014	Annual	1/27/2015	100342
Rohde & Schwarz	TS-PR18	1-18 GHz Pre-Amplifier	3/5/2014	Annual	3/5/2015	100071
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	3/12/2014	Annual	3/12/2015	100040
Seekonk	NC-100	Torque Wrench 5/16", 8" lbs	3/18/2014	Biennial	3/18/2016	N/A
Solar Electronics	8012-50-R-24-BNC	Line Impedance Stabilization Network	6/20/2013	Biennial	6/20/2015	310233
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	1/28/2014	Biennial	1/28/2016	A051107
VWR	62344-734	Thermometer with Clock	2/20/2014	Biennial	2/20/2016	140140336

Table 5-1. Annual Test Equipment Calibration Schedule

FCC ID: OXW-DS0028		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1412312386.OXW	Test Dates: 12/22/2014 - 01/23/2015	EUT Type: WiFi Gateway		Page 9 of 22

6.0 TEST RESULTS

6.1 Summary



Company Name: Device Solutions
 FCC ID: OXW-DS0028
 FCC Classification: Digital Transmission System (DTS)

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
TRANSMITTER MODE (TX)					
15.205 15.209 15.247(d)	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209	RADIATED	PASS	Sections 6.2, 6.3
15.207	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 limits	LINE CONDUCTED	PASS	Section 6.4

Table 6-1. Summary of Test Results

Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.

FCC ID: OXW-DS0028		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1412312386.OXW	Test Dates: 12/22/2014 - 01/23/2015	EUT Type: WiFi Gateway	Page 10 of 22	

6.2 Radiated Spurious Emission Measurements

§15.247(d) §15.205 & §15.209

Test Overview and Limit

All out of band radiated spurious emissions are measured with a spectrum analyzer connected to a receive antenna while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates and modes were investigated for radiated spurious emissions. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table 6-2 per Section 15.209.

Frequency	Field Strength [$\mu\text{V/m}$]	Measured Distance [Meters]
0.009 – 0.490 MHz	2400/F (kHz)	300
0.490 – 1.705 MHz	24000/F (kHz)	30
1.705 – 30.00 MHz	30	30
30.00 – 88.00 MHz	100	3
88.00 – 216.0 MHz	150	3
216.0 – 960.0 MHz	200	3
Above 960.0 MHz	500	3

Table 6-2. Radiated Limits



Test Procedures Used

KDB 558074 v03r02 – Section 12.1, 12.2.7

Test Settings

Average Field Strength Measurements per Section 12.2.5.1 of KDB 558074 v03r02

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = power average (RMS)
5. Number of measurement points = 1001 (Number of points must be $\geq 2 \times \text{span/RBW}$)
6. Sweep time = auto
7. Trace (RMS) averaging was performed over at least 100 traces

FCC ID: OXW-DS0028		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1412312386.OXW	Test Dates: 12/22/2014 - 01/23/2015	EUT Type: WiFi Gateway		Page 11 of 22

Peak Field Strength Measurements per Section 12.2.4 of KDB 558074 v03r02

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

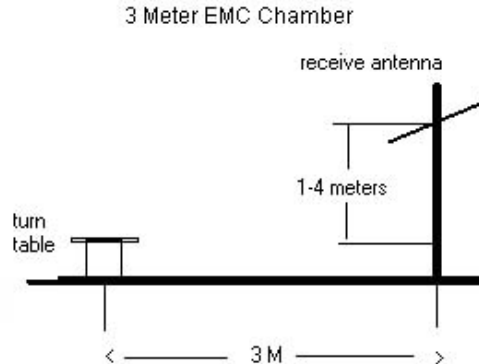


Figure 6-1. Test Instrument & Measurement Setup

FCC ID: OXW-DS0028	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CERTIFICATION)	DeviceSolutions Integration. Redefined.	Reviewed by: Quality Manager
Test Report S/N: 0Y1412312386.OXW	Test Dates: 12/22/2014 - 01/23/2015	EUT Type: WiFi Gateway		Page 12 of 22

Test Notes

1. The optional test procedures for antenna port conducted measurements of unwanted emissions per the guidance of KDB 558074 v03r02 were not used to evaluate this device for compliance to radiated limits. All radiated spurious emissions levels were measured in a radiated test setup.
2. All emissions lying in restricted bands specified in §15.205 are below the limit shown in Table 6-10.
3. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
4. This unit was tested while powered by an AC power source.
5. The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. Above 1 GHz, average and peak measurements were taken using linearly polarized horn antennas. The worst-case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
6. Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.

Sample Calculations

Determining Spurious Emissions Levels

- Field Strength Level $_{[dB\mu V/m]} = \text{Analyzer Level }_{[dBm]} + 107 + \text{AFCL }_{[dB/m]}$
- $\text{AFCL }_{[dB/m]} = \text{Antenna Factor }_{[dB/m]} + \text{Cable Loss }_{[dB]}$
- $\text{Margin }_{[dB]} = \text{Field Strength Level }_{[dB\mu V/m]} - \text{Limit }_{[dB\mu V/m]}$



Radiated Band Edge Measurement Offset

- The amplitude offset shown in the radiated restricted band edge plots in Section 6.8 was calculated using the formula:

$$\text{Offset (dB)} = (\text{Antenna Factor} + \text{Cable Loss} + 10 \text{ dB Attenuator}) - \text{Preamplifier Gain}$$

Duty Cycle Correction Factor Calculation

- Pulse Repetition Interval = 60ms (PRI)
- Pulse Width = 2.16ms
- In the worst case 100ms window, there will be 2 pulse widths, based on a PRI of 60ms
- Worst Case Dwell Time = 2.16ms x 2 = 4.32ms
- Duty Cycle Correction = $20\log(\text{Worst Case Dwell Time}/100\text{ms})_{[dB]} = -27.29\text{dB}$

FCC ID: OXW-DS0028		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1412312386.OXW	Test Dates: 12/22/2014 - 01/23/2015	EUT Type: WiFi Gateway		Page 13 of 22

Radiated Spurious Emission Measurements

§15.247(d) §15.205 & §15.209

Worst Case Mode: 802.11b
Worst Case Transfer Rate: 1 Mbps
Distance of Measurements: 3 Meters
Operating Frequency: 2412MHz
Channel: 01



Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	AFCL [dB/m]	Duty Cycle Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
4824.00	-84.27	Avg	V	40.56	-27.29	36.00	53.98	-17.98
4824.00	-75.78	Peak	V	40.56	0.00	71.78	73.98	-2.20
12060.00	-112.79	Avg	V	46.44	-27.29	13.36	53.98	-40.62
12060.00	-102.39	Peak	V	46.44	0.00	51.05	73.98	-22.93

Table 6-3. Radiated Measurements

Worst Case Mode: 802.11b
Worst Case Transfer Rate: 1 Mbps
Distance of Measurements: 3 Meters
Operating Frequency: 2442MHz
Channel: 07

Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
4884.00	-83.61	Avg	V	40.57	-27.29	36.67	53.98	-17.31
4884.00	-74.49	Peak	V	40.57	0.00	73.08	73.98	-0.90
7326.00	-94.92	Avg	V	42.91	-27.29	27.70	53.98	-26.28
7326.00	-84.29	Peak	V	42.91	0.00	65.62	73.98	-8.36
12210.00	-109.95	Avg	V	46.58	-27.29	16.33	53.98	-37.65
12210.00	-99.22	Peak	V	46.58	0.00	54.35	73.98	-19.63

Table 6-4. Radiated Measurements

FCC ID: OXW-DS0028		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1412312386.OXW	Test Dates: 12/22/2014 - 01/23/2015	EUT Type: WiFi Gateway		Page 14 of 22

Worst Case Mode: 802.11b
 Worst Case Transfer Rate: 1 Mbps
 Distance of Measurements: 3 Meters
 Operating Frequency: 2462MHz
 Channel: 11

Frequency [MHz]	Analyzer Level [dBm]	Detector	Ant. Pol. [H/V]	AFCL [dB/m]	Distance Correction Factor [dB]	Field Strength [dBμV/m]	Limit [dBμV/m]	Margin [dB]
4924.00	-83.35	Avg	V	40.56	-27.29	36.92	53.98	-17.06
4924.00	-74.14	Peak	V	40.56	0.00	73.42	73.98	-0.56
7386.00	-98.09	Avg	V	42.98	-27.29	24.60	53.98	-29.38
7386.00	-87.97	Peak	V	42.98	0.00	62.01	73.98	-11.97
12310.00	-114.80	Avg	V	46.72	-27.29	11.63	53.98	-42.35
12310.00	-103.55	Peak	V	46.72	0.00	50.17	73.98	-23.81

Table 6-5. Radiated Measurements

6.3 Radiated Restricted Band Edge Measurements

\$15.205 \$15.209

The radiated restricted band edge measurements are measured with an EMI test receiver connected to the receive antenna while the EUT is transmitting.

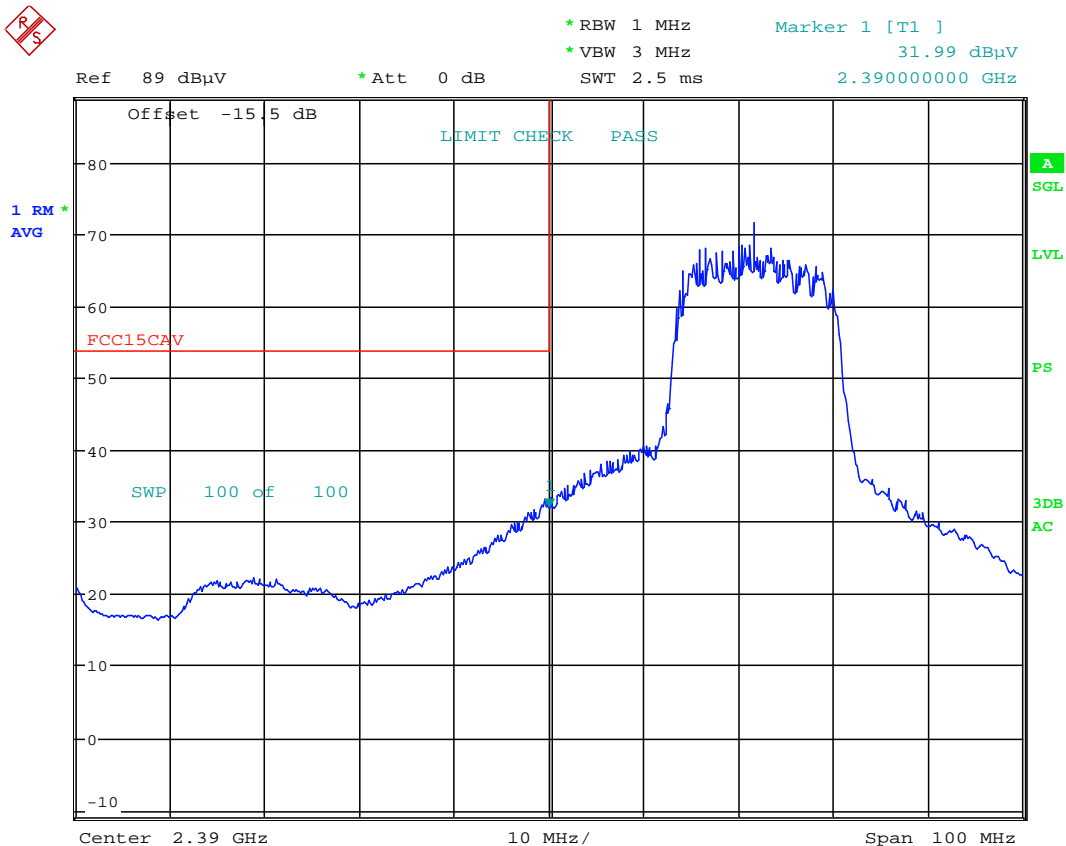
Worst Case Mode: 802.11g

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 2412MHz

Channel: 1



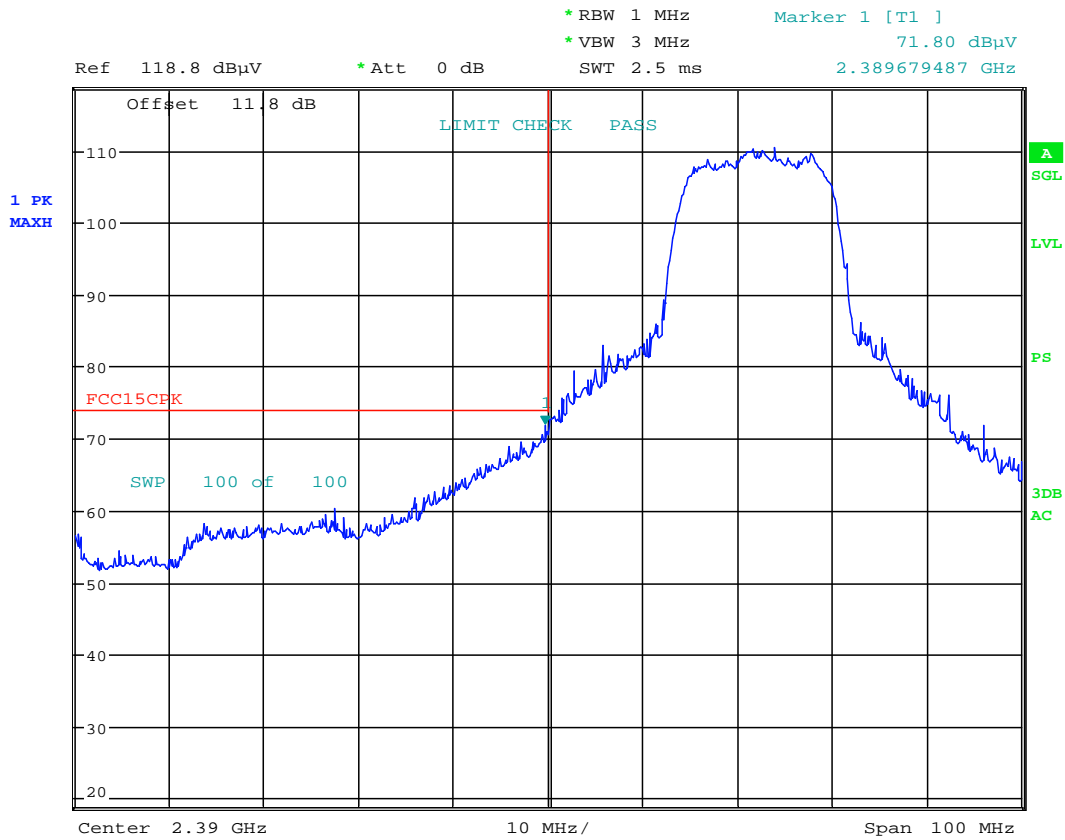
Date: 7.JAN.2015 19:12:31

Plot 6-1. Radiated Restricted Lower Band Edge Measurement (Average)

FCC ID: OXW-DS0028	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CERTIFICATION)	DeviceSolutions Integration. Redefined.	Reviewed by: Quality Manager
Test Report S/N: 0Y1412312386.OXW	Test Dates: 12/22/2014 - 01/23/2015	EUT Type: WiFi Gateway		Page 16 of 22

Radiated Restricted Band Edge Measurements

\$15.205 \$15.209



Date: 5.JAN.2015 19:37:09

Plot 6-2. Radiated Restricted Lower Band Edge Measurement (Peak)

FCC ID: OXW-DS0028	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CERTIFICATION)	DS DeviceSolutions Innovation. Redefined.	Reviewed by: Quality Manager
Test Report S/N: 0Y1412312386.OXW	Test Dates: 12/22/2014 - 01/23/2015	EUT Type: WiFi Gateway		Page 17 of 22

Radiated Restricted Band Edge Measurements

§15.205 §15.209

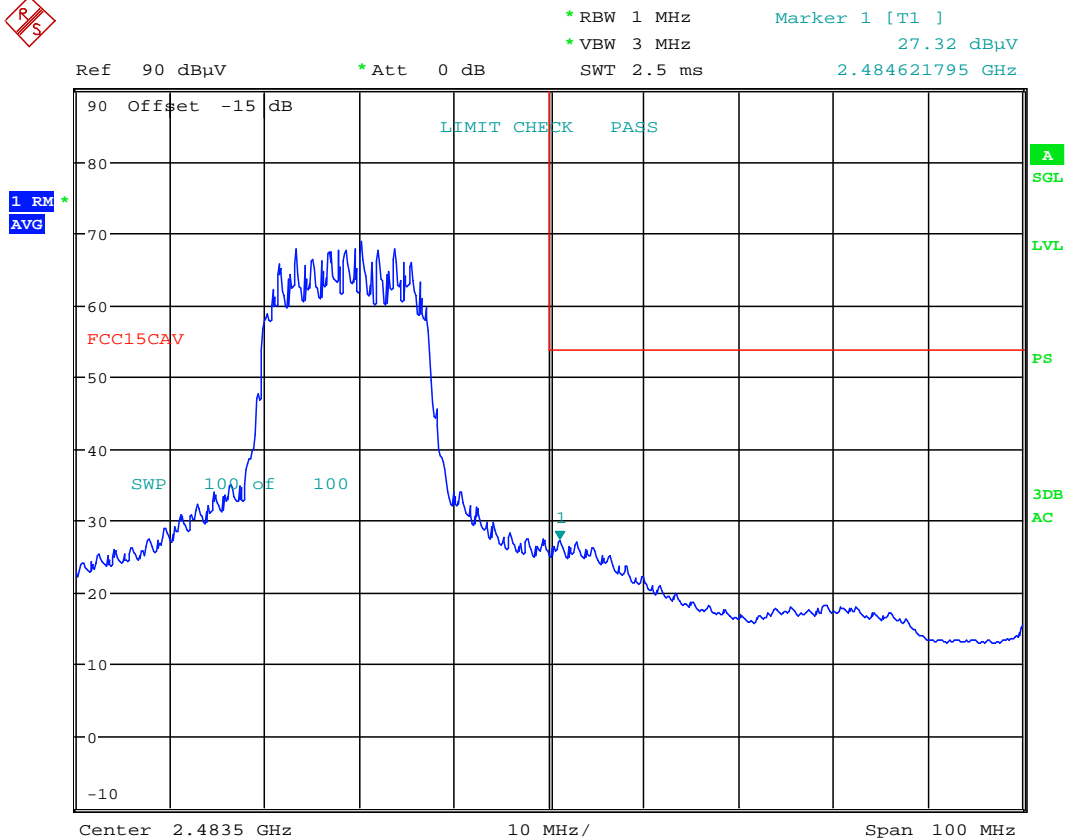
Worst Case Mode: 802.11g

Worst Case Transfer Rate: 6 Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 2462MHz

Channel: 11



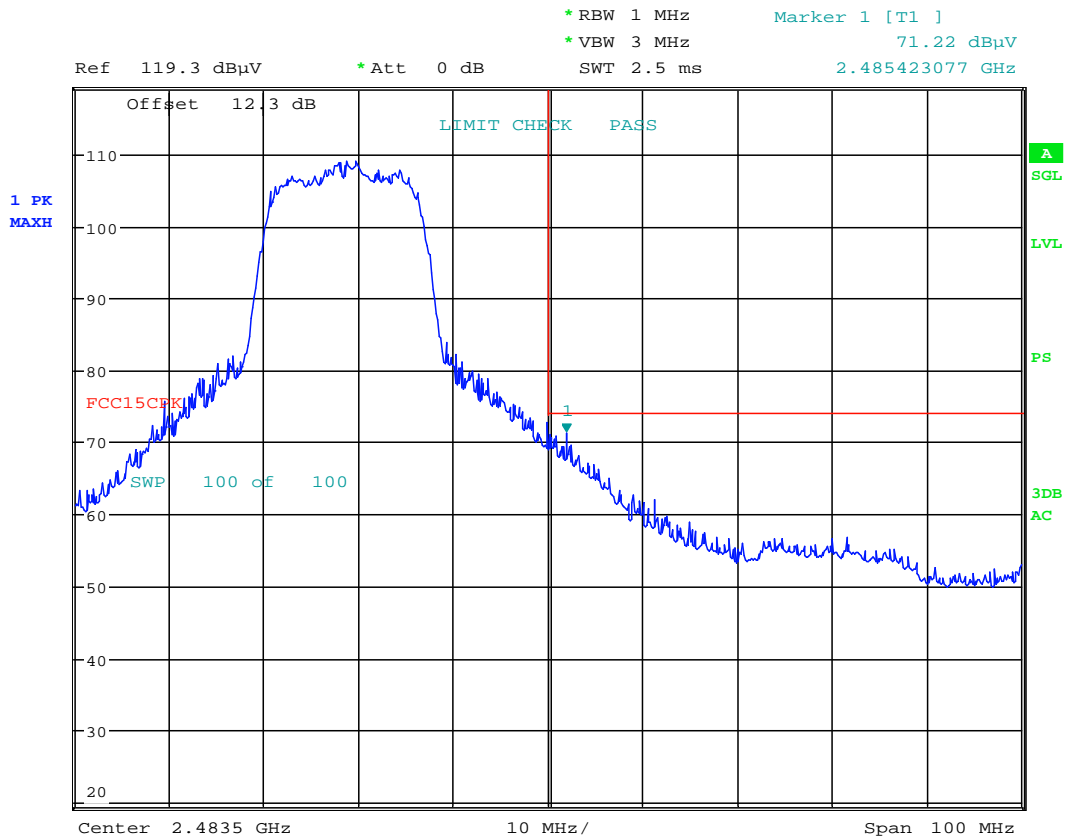
Date: 7.JAN.2015 19:38:08

Plot 6-3. Radiated Restricted Upper Band Edge Measurement (Average)

FCC ID: OXW-DS0028	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CERTIFICATION)	DeviceSolutions Integration. Redefined.	Reviewed by: Quality Manager
Test Report S/N: 0Y1412312386.OXW	Test Dates: 12/22/2014 - 01/23/2015	EUT Type: WiFi Gateway		Page 18 of 22

Radiated Restricted Band Edge Measurements

§15.205 §15.209



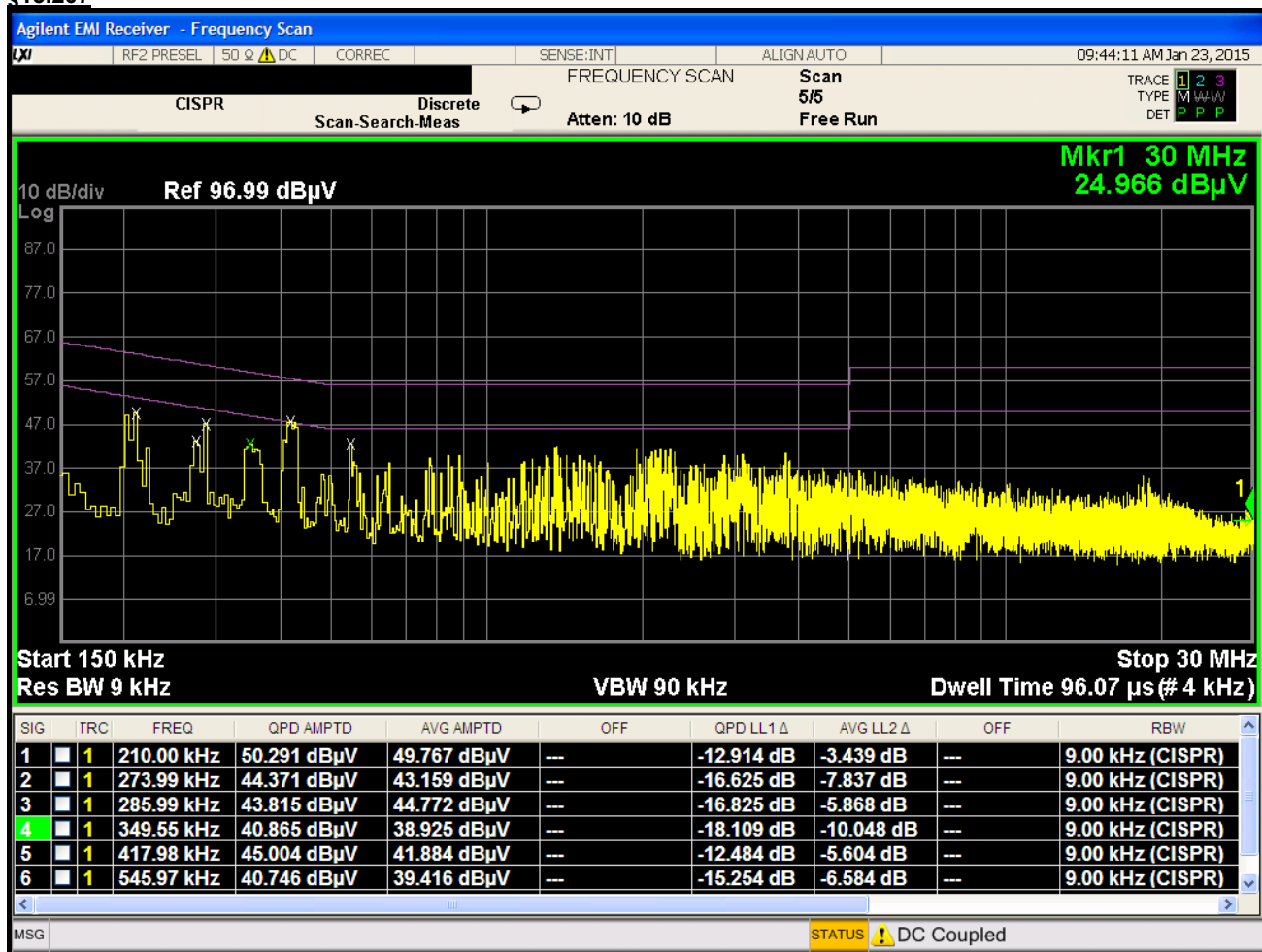
Date: 5.JAN.2015 19:29:57

Plot 6-4. Radiated Restricted Upper Band Edge Measurement (Peak)

FCC ID: OXW-DS0028	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CERTIFICATION)	DS DeviceSolutions Integration. Redefined.	Reviewed by: Quality Manager
Test Report S/N: 0Y1412312386.OXW	Test Dates: 12/22/2014 - 01/23/2015	EUT Type: WiFi Gateway		Page 19 of 22

6.4 Line-Conducted Test Data

\$15.207



Plot 6-5. Line Conducted Plot with 802.11b (L1)

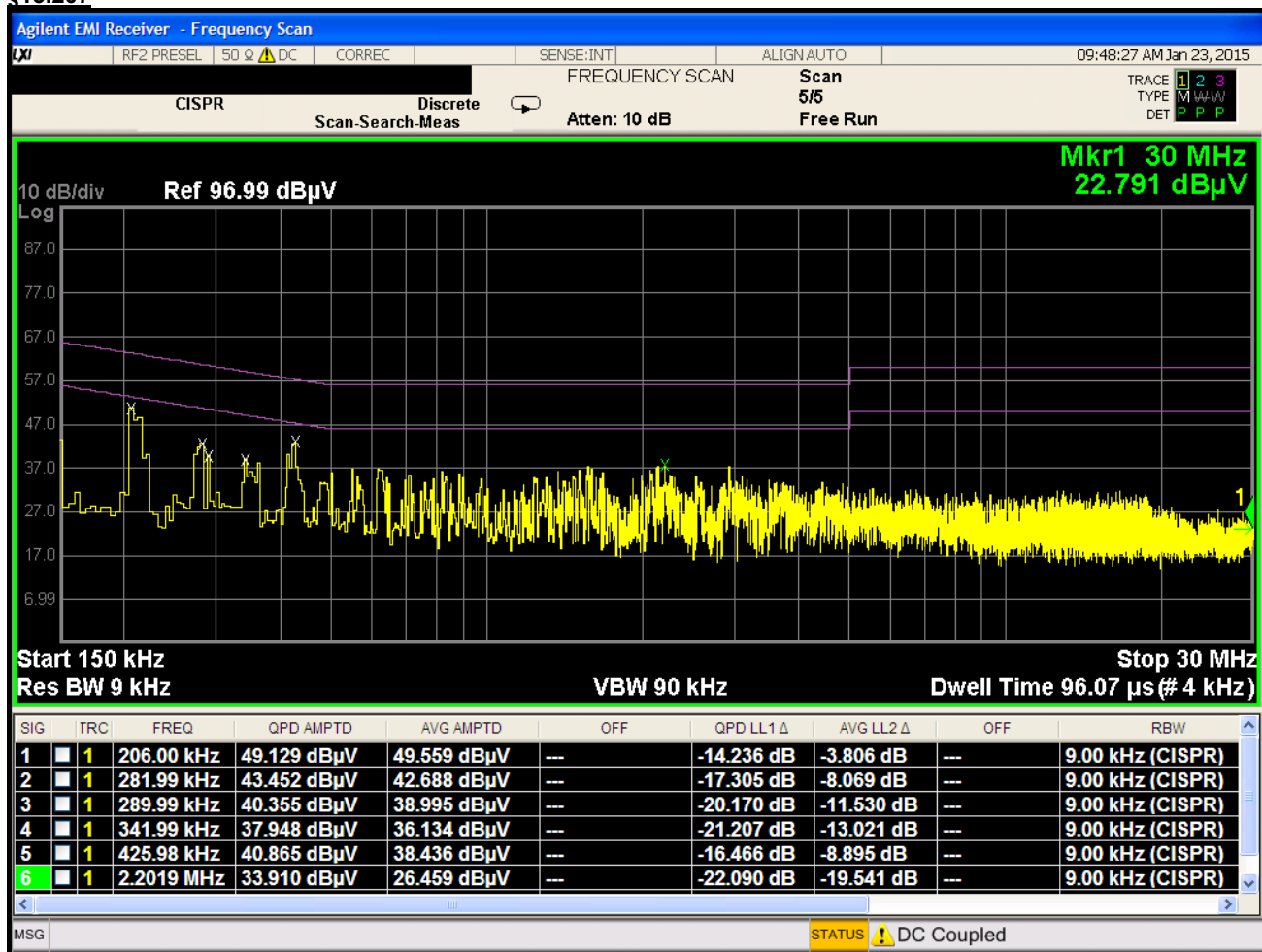
Notes:

1. All modes of operation, data rates, and test channels were investigated and the worst-case emissions are reported in 802.11b mode using 1Mbps on Channel 7. The emissions found were not affected by the choice of channel used during testing.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. Factor (dB) = Cable loss (dB) + LISN insertion factor (dB)
4. QP/AV Level (dBμV) = QP/AV Analyzer/Receiver Level (dBμV) + Factor (dB)
5. Margin (dB) = QP/AV Limit (dBμV) – QP/AV Level (dBμV)
6. Traces shown in plot are made using a peak detector.
7. Deviations to the Specifications: None.

FCC ID: OXW-DS0028	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CERTIFICATION)	DeviceSolutions Integration. Redefined.	Reviewed by: Quality Manager
Test Report S/N: 0Y1412312386.OXW	Test Dates: 12/22/2014 - 01/23/2015	EUT Type: WiFi Gateway		Page 20 of 22

Line-Conducted Test Data

\$15.207



Plot 6-6. Line Conducted Plot with 802.11b (N)



Notes:

1. All modes of operation, data rates, and test channels were investigated and the worst-case emissions are reported in 802.11b mode using 1Mbps on Channel 7. The emissions found were not affected by the choice of channel used during testing.
2. The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
3. Factor (dB) = Cable loss (dB) + LISN insertion factor (dB)
4. QP/AV Level (dBμV) = QP/AV Analyzer/Receiver Level (dBμV) + Factor (dB)
5. Margin (dB) = QP/AV Limit (dBμV) – QP/AV Level (dBμV)
6. Traces shown in plot are made using a peak detector.
7. Deviations to the Specifications: None.

FCC ID: OXW-DS0028	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CERTIFICATION)	DeviceSolutions Integration. Redefined.	Reviewed by: Quality Manager
Test Report S/N: 0Y1412312386.OXW	Test Dates: 12/22/2014 - 01/23/2015	EUT Type: WiFi Gateway		Page 21 of 22

7.0 CONCLUSION

The data collected relate only the item(s) tested and show that the **Device Solutions WiFi Gateway** **FCC ID: OXW-DS0028** is in compliance with Part 15C of the FCC Rules.

FCC ID: OXW-DS0028		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1412312386.OXW	Test Dates: 12/22/2014 - 01/23/2015	EUT Type: WiFi Gateway		Page 22 of 22