



# PCTEST ENGINEERING LABORATORY, INC.

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## MEASUREMENT REPORT FCC PART 15.247 WLAN 802.11b/g/n

**Applicant Name:**  
Panasonic Corporation of North America  
Two Riverfront Plaza, 9th Floor  
Newark, NJ 07102-5490  
United States


**Date of Testing:**  
1/13/2014  
**Test Site/Location:**  
PCTEST Lab, Columbia, MD, USA  
**Test Report Serial No.:**  
0Y1312312556.ACJ

<b>FCC ID:</b>	<b>ACJ9TGWL11E</b>
<b>APPLICANT:</b>	<b>Panasonic Corporation of North America</b>



**Application Type:** Class II Permissive Change  
**Model(s):** WL11E  
**EUT Type:** Module in Portable Tablet  
**FCC Classification:** Digital Transmission System (DTS)  
**FCC Rule Part(s):** Part 15.247  
**Test Procedure(s):** KDB 558074 v03r01  
**Class II Permissive Change:** Wireless Module FCC ID: ACJ9TGWL11E integrated into host tablet FZ-G1  
**Original Grant Date:** 08/24/2011

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 v03r01. 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



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<b>Test Report S/N:</b> 0Y1312312556.ACJ	<b>Test Dates:</b> 1/13/2014	<b>EUT Type:</b> Module in Portable Tablet	Page 1 of 41	

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# MEASUREMENT REPORT

## FCC Part 15.247



### § 2.1033 General Information

**APPLICANT:** Panasonic Corporation of North America

**APPLICANT ADDRESS:** Two Riverfront Plaza, 9th Floor  
Newark, NJ 07102-5490, 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

**IC SPECIFICATION(S):** RSS-210 Issue 8

**MODEL NAME:** WL11E

**FCC ID:** ACJ9TGWL11E

**Test Device Serial No.:** AABAXLM       Production     Pre-Production     Engineering

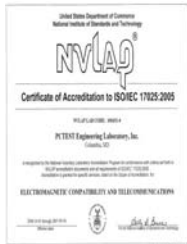
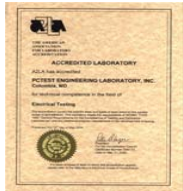
**FCC CLASSIFICATION:** Digital Transmission System (DTS)

**DATE(S) OF TEST:** 1/13/2014



**TEST REPORT S/N:** 0Y1312312556.ACJ

### 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.

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# 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't'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**

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## 2.0 PRODUCT INFORMATION

### 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Panasonic Module in Portable Tablet FCC ID: ACJ9TGWL11E**. The test data contained in this report pertains only to the emissions due to the EUT's 2.4GHz WLAN (DTS) transmitter. The purpose of the C2PC application is to determine the continued compliance of the certified module (FCC ID: ACJ9TGWL11E) as integrated into the FZ-G1 portable tablet. Evaluations of radiated spurious emissions and AC line conducted tests were performed for this evaluation.

### 2.2 Device Capabilities

This device contains the following capabilities:

802.11b/g/n WLAN

#### Notes:

- 1) This device supports 20MHz and 40MHz bandwidths in 802.11n mode.
- 2) The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz, and detector = peak per the guidance of Section 6.0 b) of KDB 558074 v03r01. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:
  - 802.11b – 99.53%
  - 802.11g/n 20MHz Bandwidth – 99.1%
- 3) This device supports 2x2 MIMO operation in 802.11n mode.

### 2.3 Test Configuration

The Panasonic Module in Portable Tablet FCC ID: ACJ9TGWL11E was tested per the guidance of KDB 558074 v03r01. 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, 3.3, and 6.1 of this test report for a description of the AC line conducted emissions and radiated emissions test setups, respectively.



### 2.4 EMI Suppression Device(s)/Modifications

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

### 2.5 Labeling Requirements

Per 15.19; Docket 95-19



The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the trade name and FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

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## 2.6 Nominal and Maximum Output Power Specifications

This device operates using the following maximum and nominal output power specifications. EMC measurements were performed while the unit was operating using the maximum output power level settings shown in the table below.

Mode/Bnd		CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11
frequency		2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
IEEE 802.11b	Maximum	18	20	21						20	18	
	Nominal	17	19	20						19	17	
	Data Rate											
IEEE 802.11g	6-24	Maximum	15	17	19	21			19	17	15	
		Nominal	14	16	18	20			18	16	14	
	36	Maximum	15	17	19	20			19	17	15	
		Nominal	14	16	18	19			18	16	14	
	48	Maximum	15	17	19	19			19	17	15	
		Nominal	14	16	18	18			18	16	14	
	54	Maximum	15	16	16	16			16	16	15	
		Nominal	14	15	15	15			15	15	14	
IEEE 802.11n	HT20 MCS0	Maximum	11	14	16.5	17			16.5	14	11	
		Nominal	10	13	15.5	16			15.5	13	10	
	HT20 MCS1-7	Maximum	11	14	15	15			15	14	11	
		Nominal	10	13	14	14			14	13	10	
	HT40 MCS0	Maximum	-	-	9	12	15		12	9	-	-
		Nominal	-	-	8	11	14		11	8	-	-
	HT40 MCS1-7	Maximum	-	-	9	12	13		12	9	-	-
		Nominal	-	-	8	11	12		11	8	-	-

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## 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 v03r01 were used in the measurement of the **Panasonic Module in Portable Tablet FCC ID: ACJ9TGWL11E**.

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 6.4. Automated test software was used to perform the AC line conducted emissions testing. Automated measurement software utilized is Rohde & Schwarz EMC32, Version 8.51.0.


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### 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. 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. For the EUT positioning, "H" is defined with the EUT lying flat on the test surface, "H2" is defined with the EUT standing up on its side, and "V" is defined with the EUT standing upright.

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## 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 Module in Portable Tablet are **permanently attached**.
- There are no provisions for connection to an external antenna.

**Conclusion:**

The **Panasonic Module in Portable Tablet FCC ID: ACJ9TGWL11E** unit complies with the requirement of §15.203.

Ch.	BW (MHz)	Frequency (MHz)	Ch.	BW (MHz)	Frequency (MHz)
1	20	2412	7	20/40	2442
2	20	2417	8	20/40	2447
3	20/40	2422	9	20/40	2452
4	20/40	2427	10	20	2457
5	20/40	2432	11	20	2462
6	20/40	2437			

**Table 4-1. Frequency/ Channel Operations**



FCC ID: ACJ9TGWL11E		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
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## 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)	3/29/2013	Annual	3/29/2014	N/A
-	RE2	Radiated Emissions Cable Set (VHF/UHF)	3/29/2013	Annual	3/29/2014	N/A
Agilent	8447D	Broadband Amplifier	5/31/2013	Annual	5/31/2014	2443A01900
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	6/26/2013	Annual	6/26/2014	121034
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	7/24/2013	Biennial	7/24/2015	125518
ETS Lindgren	3160-09	18-26.5 GHz Standard Gain Horn	5/30/2012	Biennial	5/30/2014	135427
Mini-Circuits	VHF-3100+	High Pass Filter	1/17/2013	Annual	1/17/2014	30841
Rohde & Schwarz	TS-PR18	1-18 GHz Pre-Amplifier	5/31/2013	Annual	5/31/2014	100071
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	5/31/2013	Annual	5/31/2014	100040
Rohde & Schwarz	ESU26	EMI Test Receiver	2/25/2013	Annual	2/25/2014	100342
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)	1/26/2012	Biennial	1/26/2014	A051107

**Table 5-1. Annual Test Equipment Calibration Schedule**

<b>FCC ID:</b> ACJ9TGWL11E		<b>FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)</b>		<b>Reviewed by:</b> Quality Manager
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## 6.0 TEST RESULTS

### 6.1 Summary



Company Name: Panasonic Corporation of North America  
 FCC ID: ACJ9TGWL11E  
 FCC Classification: Digital Transmission System (DTS)  
 Data Rate(s) Tested: 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)

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
<b>TRANSMITTER MODE (TX)</b>						
15.205 15.209	RSS-210 [A8.5]	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	RSS-Gen [7.2.2]	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 limits	LINE CONDUCTED	PASS	Section 6.4

**Table 6-1. Summary of Test Results**

**Notes:**

All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.

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## 6.2 Radiated Spurious Emission Measurements

§15.247(d) / §15.205 & §15.209; RSS-210 [A8.5]

### 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 (>98%), 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 v03r01 – Section 12.2.5 (average power measurements)

KDB 558074 v03r01 – Section 12.2.4 (peak power measurements)

### Test Settings

#### Average Field Strength Measurements per Section 12.2.5.1 of KDB 558074 v03r01

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

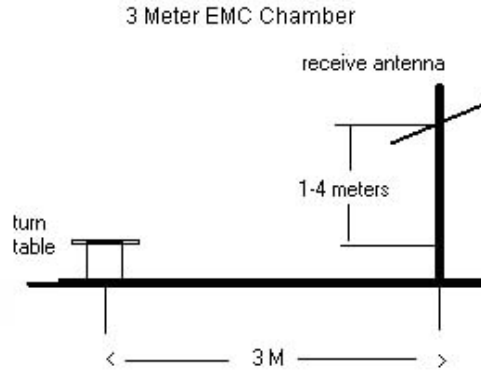
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**Peak Field Strength Measurements per Section 12.2.4 of KDB 558074 v03r01**



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**

<b>FCC ID:</b> ACJ9TGWL11E		<b>FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)</b>		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0Y1312312556.ACJ	<b>Test Dates:</b> 1/13/2014	<b>EUT Type:</b> Module in Portable Tablet	Page 13 of 41	

## Test Notes

1. The optional test procedures for antenna port conducted measurements of unwanted emissions per the guidance of KDB 558074 v03r01 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 6-2.
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 with its standard battery.
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.
7. The power level settings for this device were reduced at the outer channels in order to achieve radiated band edge compliance. The radiated band edge levels of all of the outer channels were measured until a particular channel was able to comply with the band edge requirements while operating at the maximum stated power (e.g. the power used on the center channel). At no time was the power level set to a level lower than the maximum power level settings specified in the table shown in Section 2.6.

## 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:

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

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## Radiated Spurious Emission Measurements (Cont'd)

§15.247(d) / §15.205 & §15.209; RSS-210 [A8.5]

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	Pol. [H/V]	AFCL [dB/m]	Field Strength [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]
4824.00	-100.30	Avg	H	40.64	47.34	53.98	-6.64
4824.00	-95.92	Peak	H	40.64	51.72	73.98	-22.26
12060.00	-135.00	Avg	H	50.62	22.62	53.98	-31.36
12060.00	-125.00	Peak	H	50.62	32.62	73.98	-41.36

**Table 6-3. Radiated Measurements**

Worst Case Mode: 802.11b  
 Worst Case Transfer Rate: 1 Mbps  
 Distance of Measurements: 3 Meters  
 Operating Frequency: 2437MHz  
 Channel: 06

Frequency [MHz]	Analyzer Level [dBm]	Detector	Pol. [H/V]	AFCL [dB/m]	Field Strength [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]
4874.00	-112.35	Avg	H	40.70	35.35	53.98	-18.63
4874.00	-100.20	Peak	H	40.70	47.50	73.98	-26.48
7311.00	-135.00	Avg	H	44.11	16.11	53.98	-37.87
7311.00	-125.00	Peak	H	44.11	26.11	73.98	-47.87
12185.00	-135.00	Avg	H	51.00	23.00	53.98	-30.98
12185.00	-125.00	Peak	H	51.00	33.00	73.98	-40.98

**Table 6-4. Radiated Measurements**



FCC ID: ACJ9TGWL11E		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1312312556.ACJ	Test Dates: 1/13/2014	EUT Type: Module in Portable Tablet	Page 15 of 41	

**Radiated Spurious Emission Measurements (Cont'd)**  
**§15.247(d) / §15.205 & §15.209; RSS-210 [A8.5]**

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	Pol. [H/V]	AFCL [dB/m]	Field Strength [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]
4924.00	-101.52	Avg	H	40.73	46.21	53.98	-7.77
4924.00	-96.56	Peak	H	40.73	51.17	73.98	-22.81
7386.00	-135.00	Avg	H	44.12	16.12	53.98	-37.86
7386.00	-125.00	Peak	H	44.12	26.12	73.98	-47.86
12310.00	-135.00	Avg	H	51.00	23.00	53.98	-30.98
12310.00	-125.00	Peak	H	51.00	33.00	73.98	-40.98

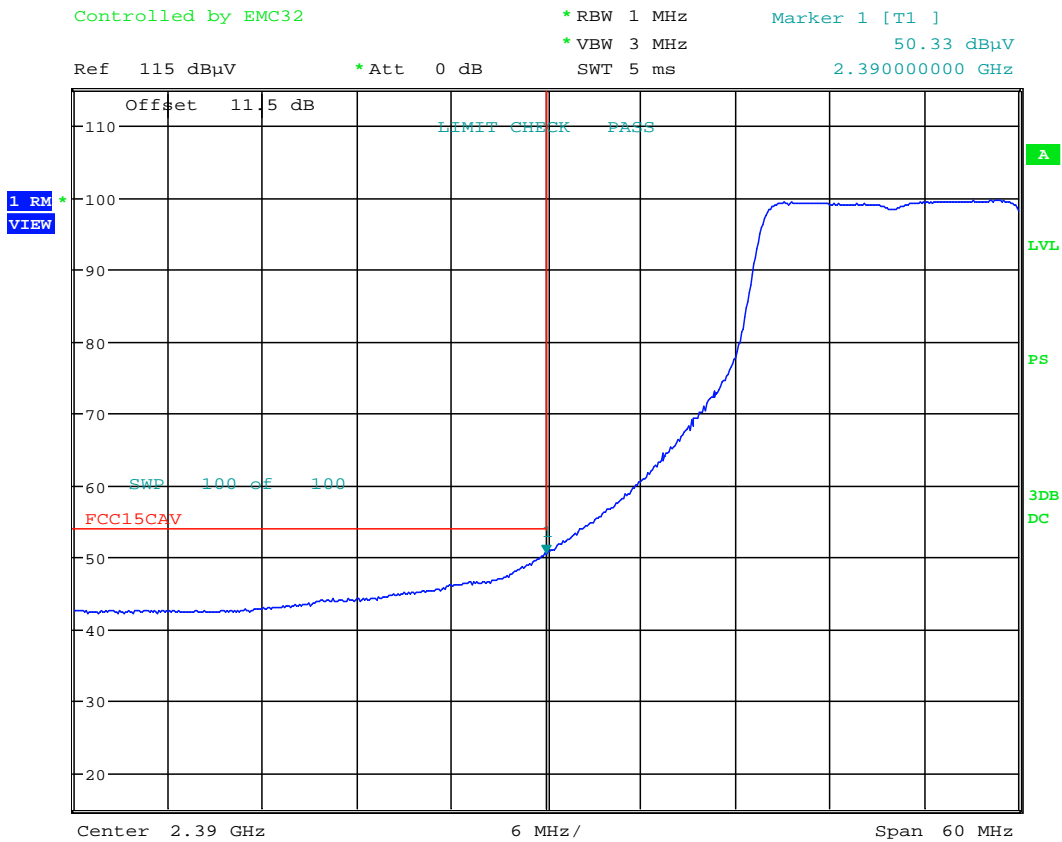
**Table 6-5. Radiated Measurements**

FCC ID: ACJ9TGWL11E		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1312312556.ACJ	Test Dates: 1/13/2014	EUT Type: Module in Portable Tablet	Page 16 of 41	

### 6.3 Radiated Restricted Band Edge Measurements §15.205 / §15.209; RSS-210 [A8.5]

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: 6Mbps  
 Distance of Measurements: 3 Meters  
 Operating Frequency: 2412MHz  
 Channel: 1  
 Power Level Setting: 15



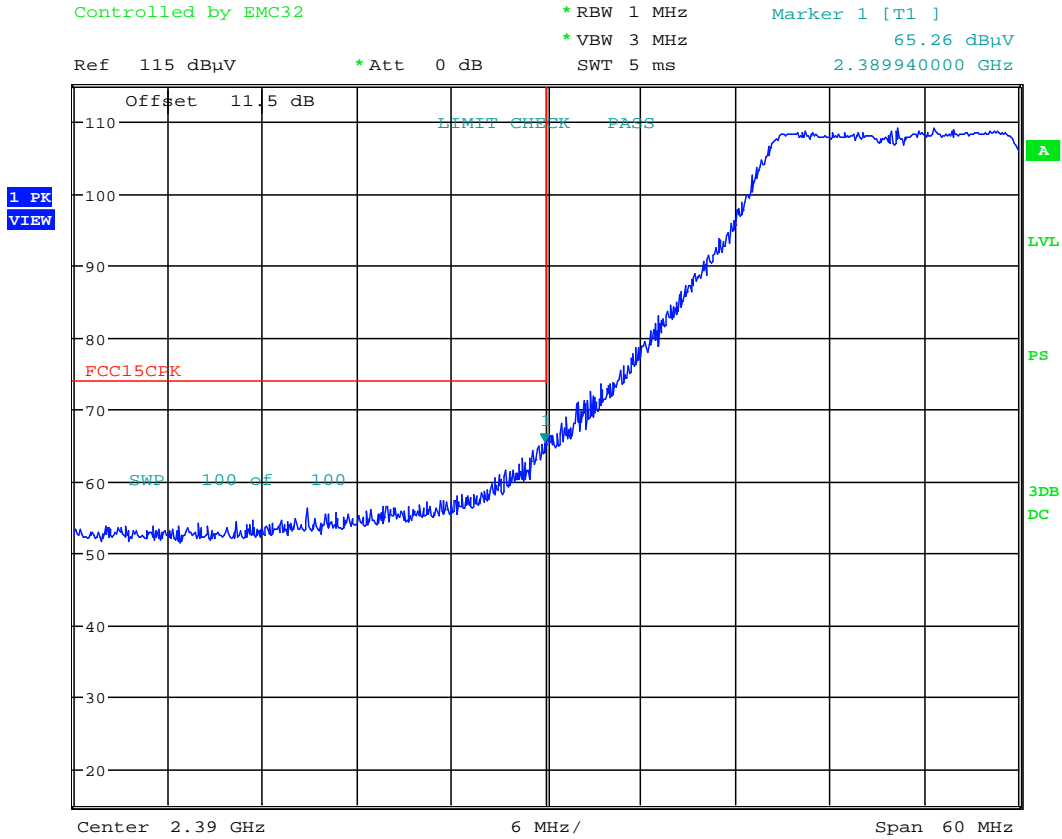
Date: 6.JAN.2014 08:29:45

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

FCC ID: ACJ9TGWL11E		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1312312556.ACJ	Test Dates: 1/13/2014	EUT Type: Module in Portable Tablet	Page 17 of 41	

# Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 / §15.209; RSS-210 [A8.5]



Date: 6.JAN.2014 08:30:18

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

FCC ID: ACJ9TGWL11E		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1312312556.ACJ	Test Dates: 1/13/2014	EUT Type: Module in Portable Tablet	Page 18 of 41	

## Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 / §15.209; RSS-210 [A8.5]

Worst Case Mode: 802.11g

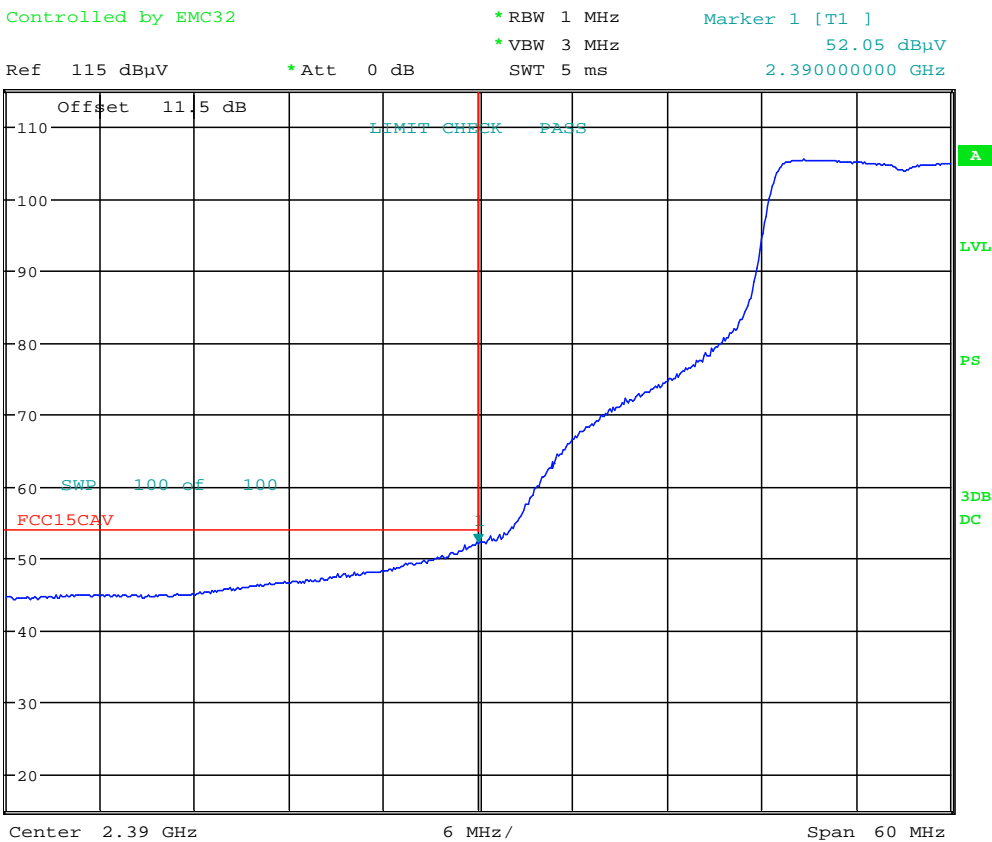
Worst Case Transfer Rate: 6Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 2417MHz

Channel: 2

Power Level Setting: 21



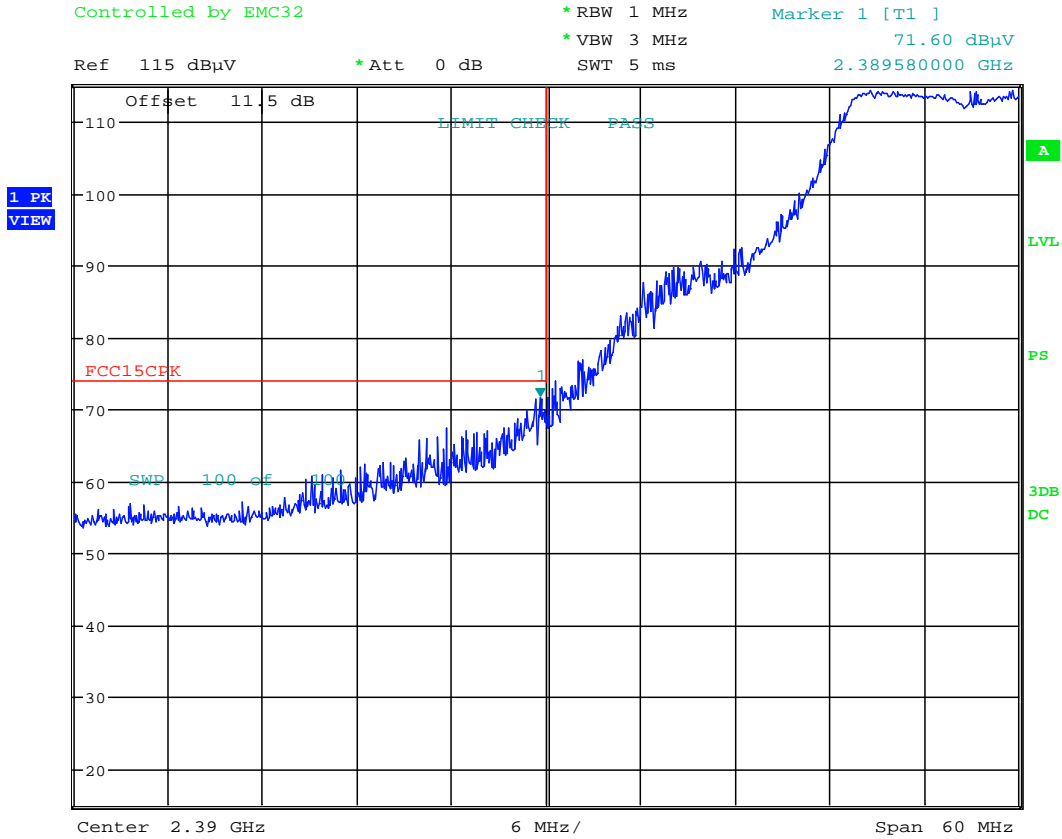
Date: 6.JAN.2014 08:37:53

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

FCC ID: ACJ9TGWL11E		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1312312556.ACJ	Test Dates: 1/13/2014	EUT Type: Module in Portable Tablet	Page 19 of 41	

# Radiated Restricted Band Edge Measurements (Cont'd)

## §15.205 / §15.209; RSS-210 [A8.5]



Date: 6.JAN.2014 08:38:42

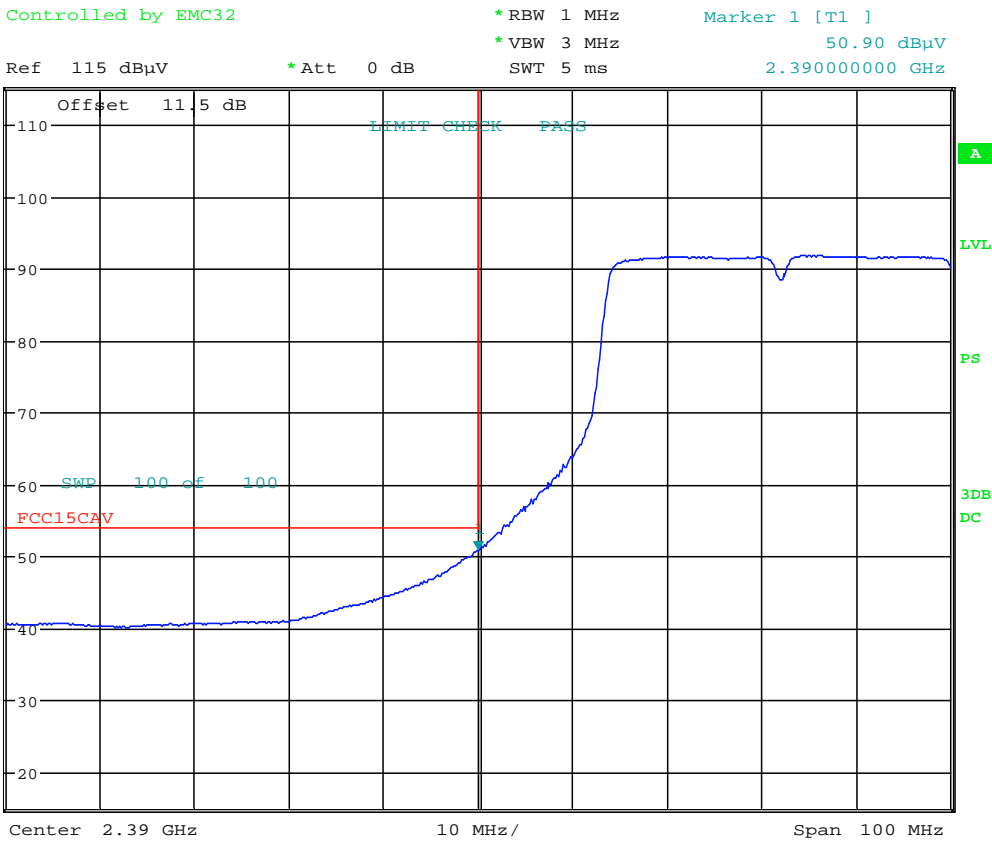
**Plot 6-4. Radiated Restricted Lower Band Edge Measurement (Peak)**

FCC ID: ACJ9TGWL11E		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1312312556.ACJ	Test Dates: 1/13/2014	EUT Type: Module in Portable Tablet	Page 20 of 41	

## Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 / §15.209; RSS-210 [A8.5]

Worst Case Mode: 802.11n (40MHz BW)  
 Worst Case Transfer Rate: MCS8 (MIMO)  
 Distance of Measurements: 3 Meters  
 Operating Frequency: 2422MHz  
 Channel: 3  
 Power Level Setting: 9



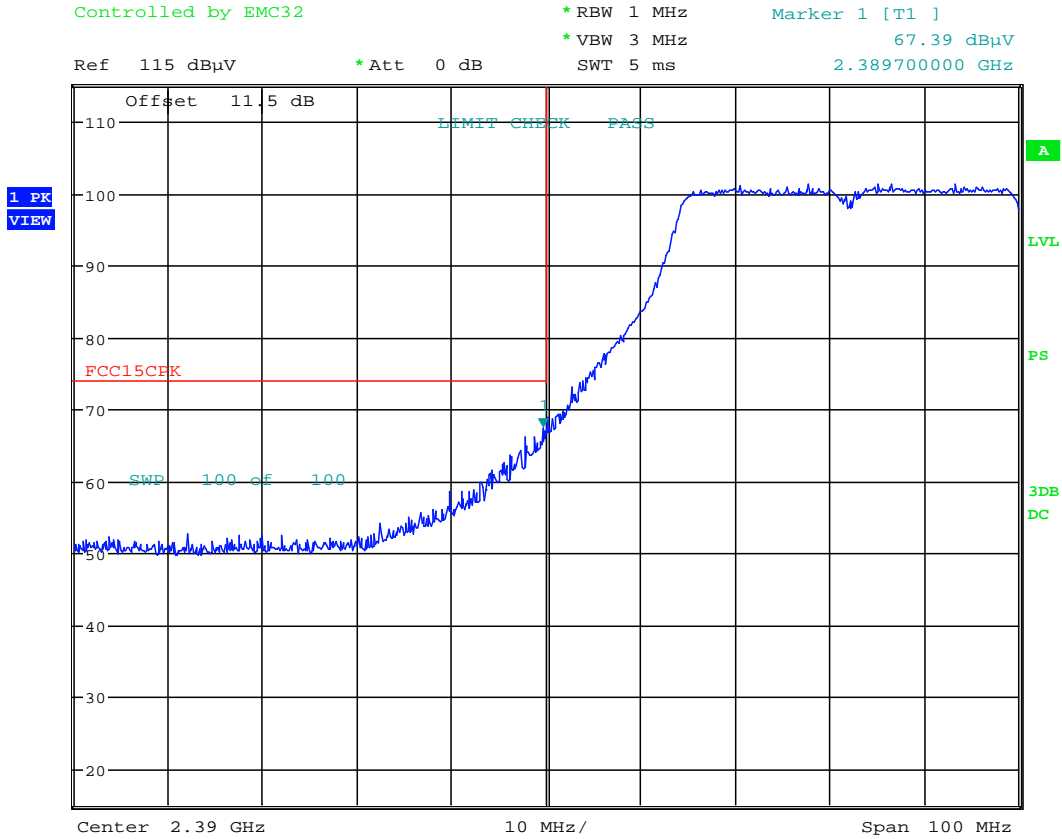
Date: 6.JAN.2014 08:55:31

**Plot 6-5. Radiated Restricted Lower Band Edge Measurement (Average)**

FCC ID: ACJ9TGWL11E		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1312312556.ACJ	Test Dates: 1/13/2014	EUT Type: Module in Portable Tablet	Page 21 of 41	

# Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 / §15.209; RSS-210 [A8.5]



Date: 6.JAN.2014 08:56:11

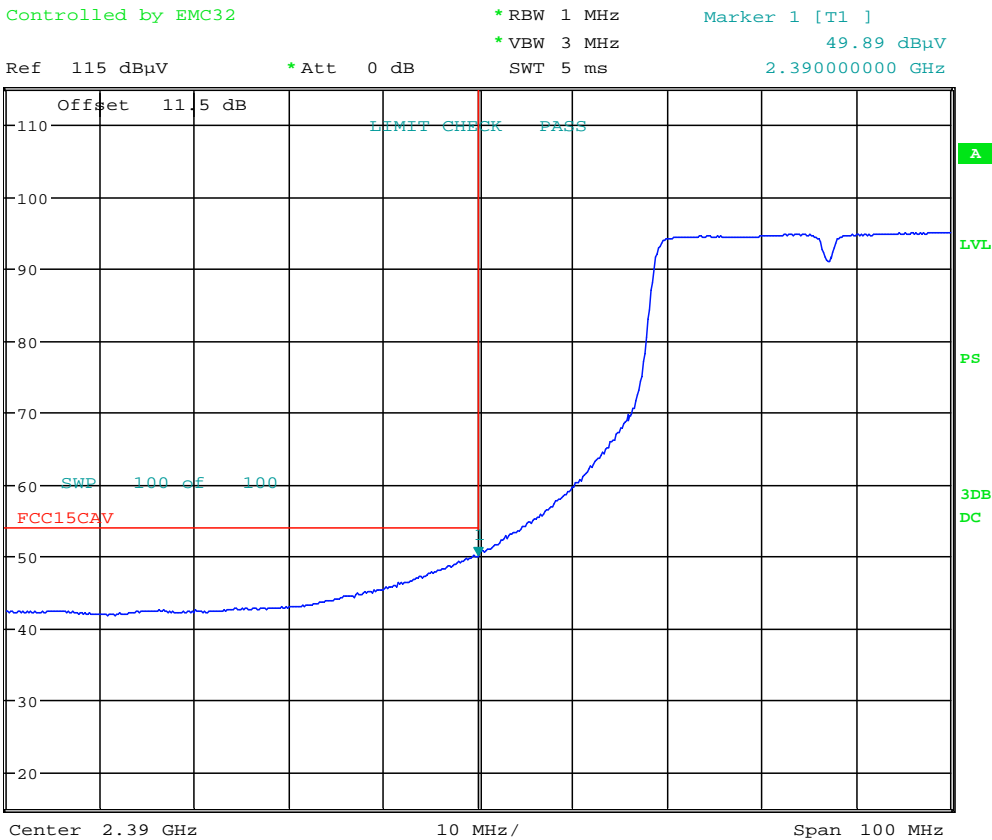
**Plot 6-6. Radiated Restricted Lower Band Edge Measurement (Peak)**

FCC ID: ACJ9TGWL11E		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1312312556.ACJ	Test Dates: 1/13/2014	EUT Type: Module in Portable Tablet	Page 22 of 41	

## Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 / §15.209; RSS-210 [A8.5]

Worst Case Mode: 802.11n (40MHz BW)  
 Worst Case Transfer Rate: MCS8 (MIMO)  
 Distance of Measurements: 3 Meters  
 Operating Frequency: 2427MHz  
 Channel: 4  
 Power Level Setting: 12



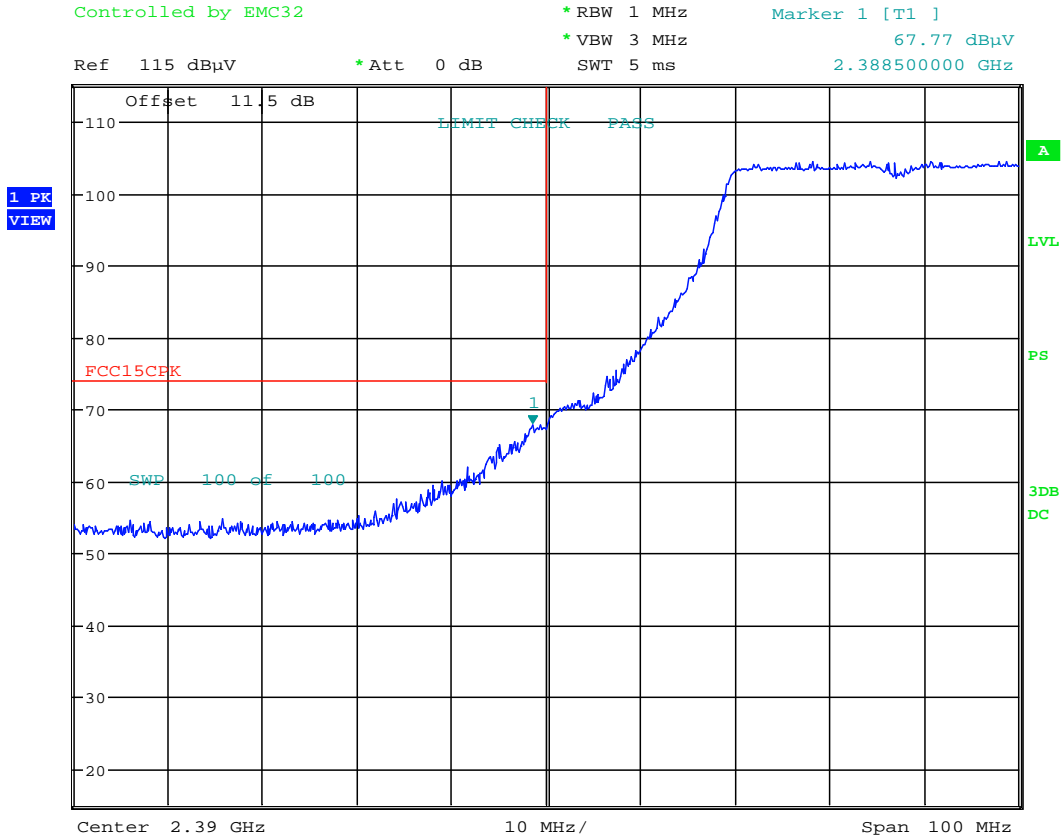
Date: 6.JAN.2014 09:04:33

**Plot 6-7. Radiated Restricted Lower Band Edge Measurement (Average)**

FCC ID: ACJ9TGWL11E		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1312312556.ACJ	Test Dates: 1/13/2014	EUT Type: Module in Portable Tablet	Page 23 of 41	

# Radiated Restricted Band Edge Measurements (Cont'd)

## §15.205 / §15.209; RSS-210 [A8.5]



Date: 6.JAN.2014 09:05:43

**Plot 6-8. Radiated Restricted Lower Band Edge Measurement (Peak)**

FCC ID: ACJ9TGWL11E		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1312312556.ACJ	Test Dates: 1/13/2014	EUT Type: Module in Portable Tablet	Page 24 of 41	

## Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 / §15.209; RSS-210 [A8.5]

Worst Case Mode: 802.11n (40MHz BW)

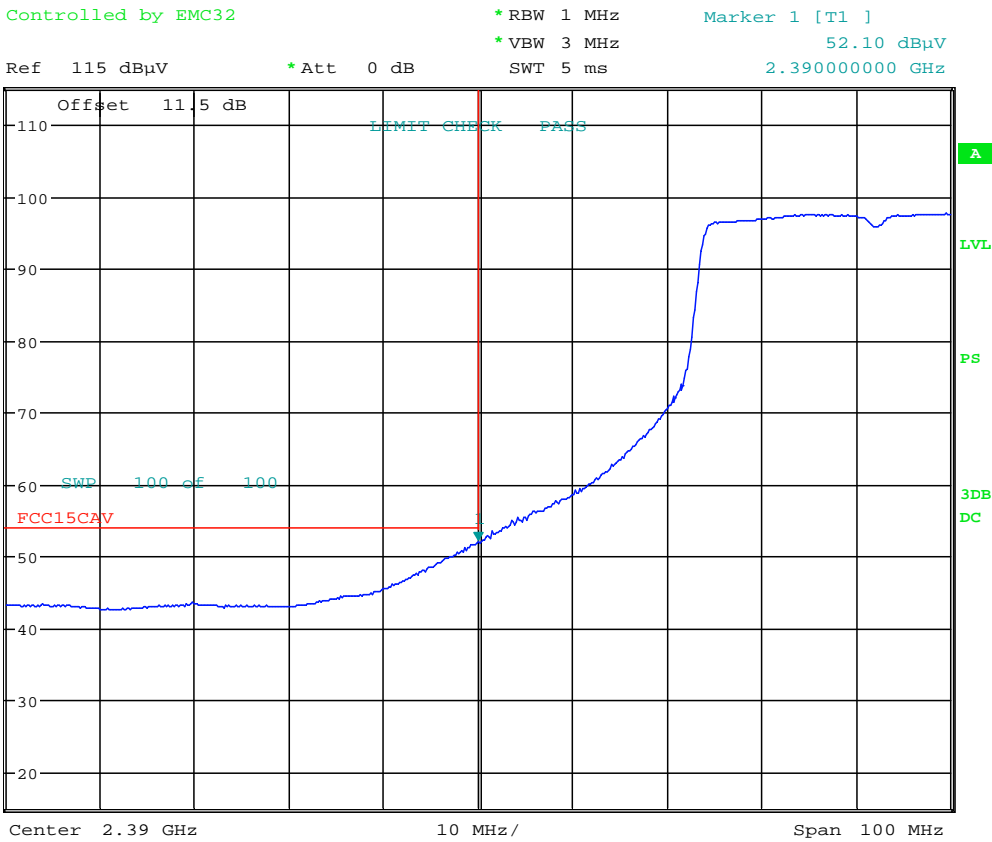
Worst Case Transfer Rate: MCS8 (MIMO)

Distance of Measurements: 3 Meters

Operating Frequency: 2432MHz

Channel: 5

Power Level Setting: 15



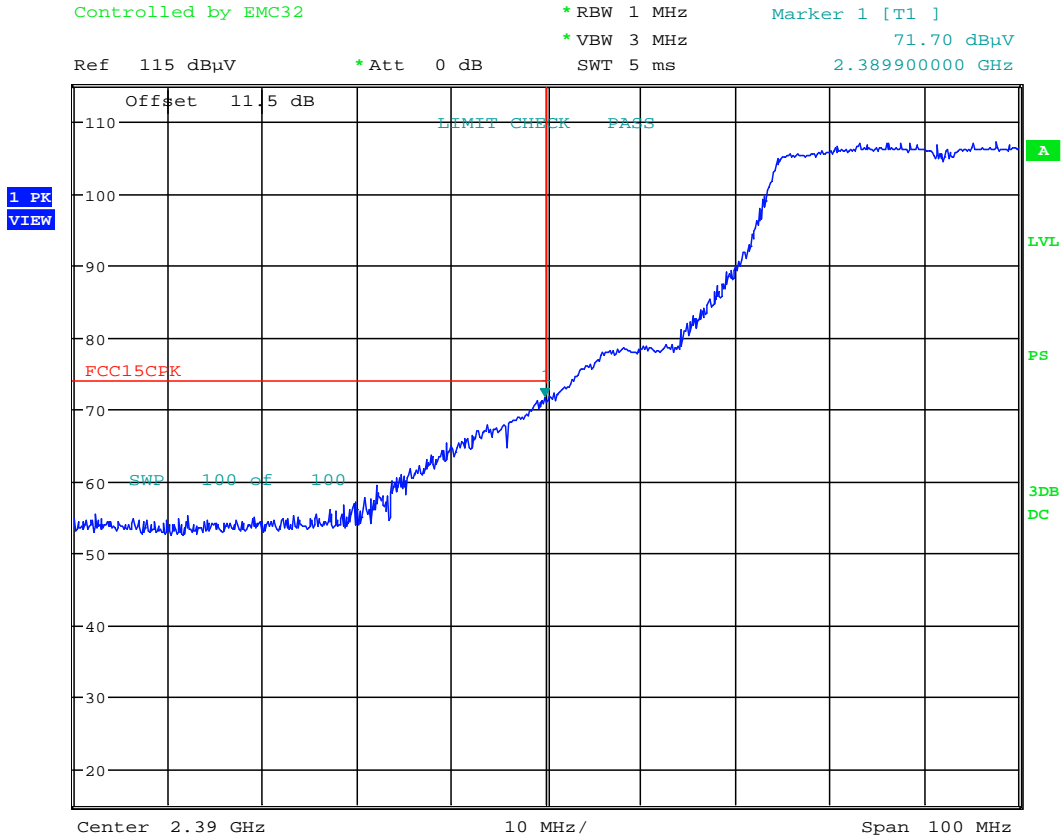
Date: 6.JAN.2014 09:12:38

**Plot 6-9. Radiated Restricted Lower Band Edge Measurement (Average)**

FCC ID: ACJ9TGWL11E		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1312312556.ACJ	Test Dates: 1/13/2014	EUT Type: Module in Portable Tablet	Page 25 of 41	

# Radiated Restricted Band Edge Measurements (Cont'd)

## §15.205 / §15.209; RSS-210 [A8.5]



Date: 6.JAN.2014 09:14:14

**Plot 6-10. Radiated Restricted Lower Band Edge Measurement (Peak)**

FCC ID: ACJ9TGWL11E		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1312312556.ACJ	Test Dates: 1/13/2014	EUT Type: Module in Portable Tablet	Page 26 of 41	

## Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 / §15.209; RSS-210 [A8.5]

Worst Case Mode: 802.11n (40MHz BW)

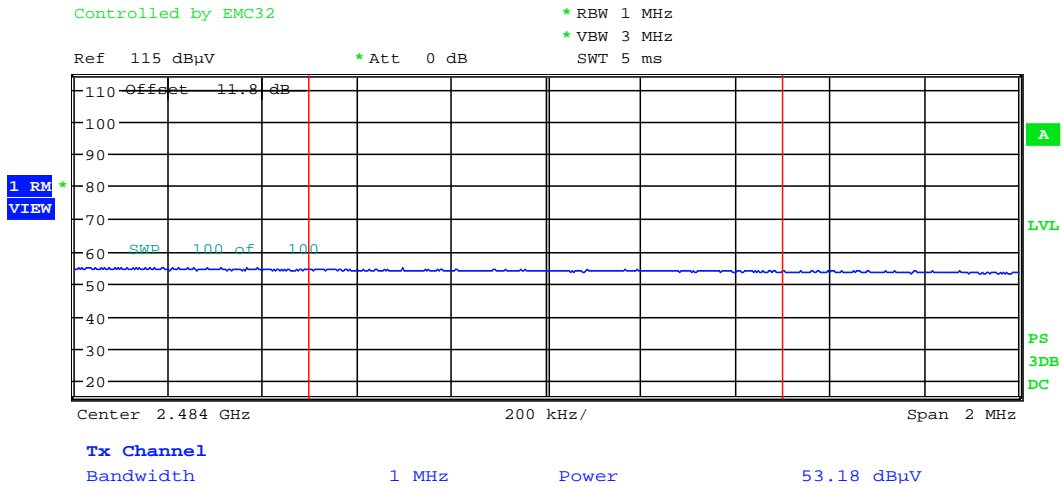
Worst Case Transfer Rate: MCS8 (MIMO)

Distance of Measurements: 3 Meters

Operating Frequency: 2442MHz

Channel: 7

Power Level Setting: 15



Date: 6.JAN.2014 11:48:05

**Plot 6-11. Radiated Restricted Upper Band Edge Measurement (Average)**

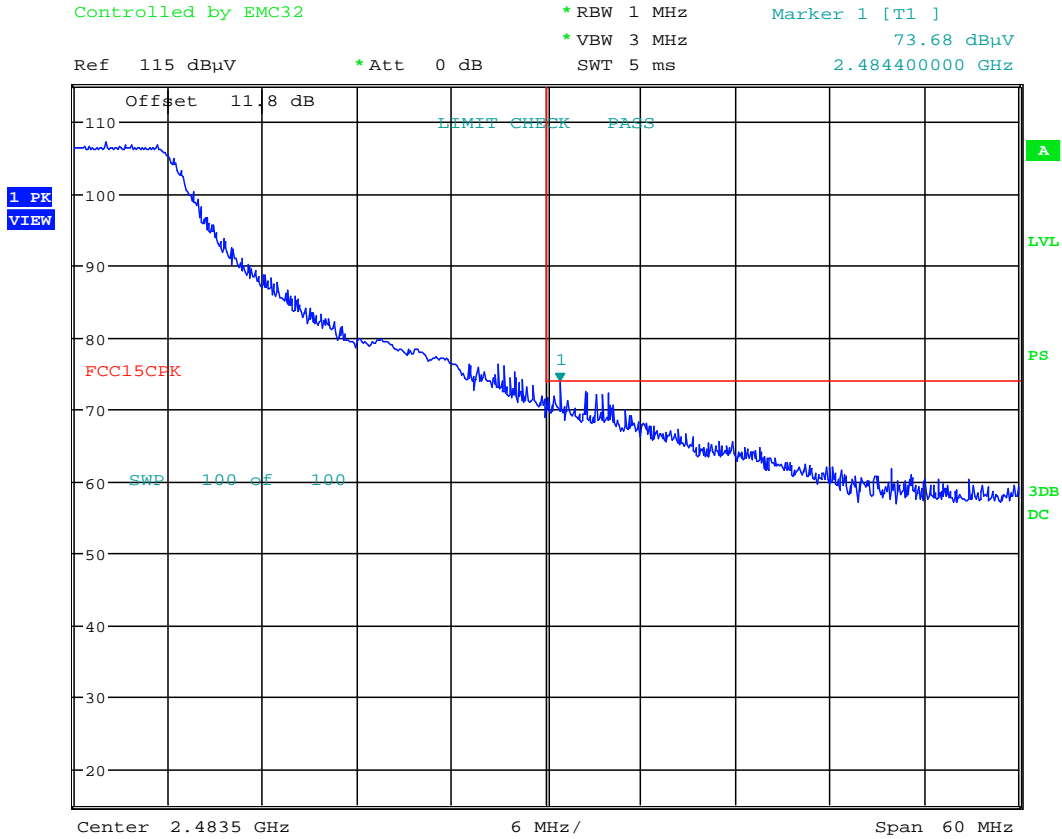
**Note**

The band edge measurement shown in the plot above was performed using the integration method guidance from Section 13.3.2 of KDB 558074.

FCC ID: ACJ9TGWL11E		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1312312556.ACJ	Test Dates: 1/13/2014	EUT Type: Module in Portable Tablet	Page 27 of 41	

# Radiated Restricted Band Edge Measurements (Cont'd)

## §15.205 / §15.209; RSS-210 [A8.5]



Date: 6.JAN.2014 11:49:42

**Plot 6-12. Radiated Restricted Upper Band Edge Measurement (Peak)**

FCC ID: ACJ9TGWL11E		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1312312556.ACJ	Test Dates: 1/13/2014	EUT Type: Module in Portable Tablet	Page 28 of 41	

## Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 / §15.209; RSS-210 [A8.5]

Worst Case Mode: 802.11n (40MHz BW)

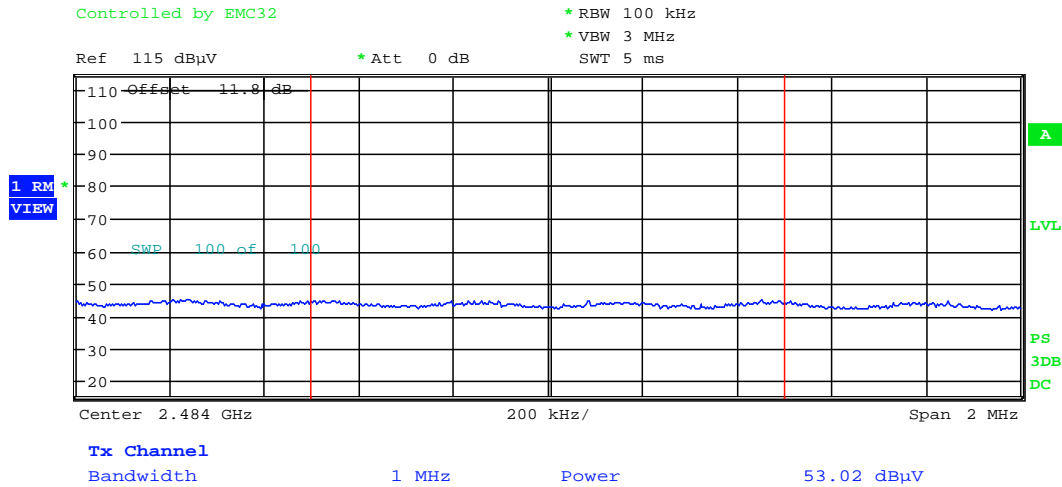
Worst Case Transfer Rate: MCS8 (MIMO)

Distance of Measurements: 3 Meters

Operating Frequency: 2447MHz

Channel: 8

Power Level Setting: 12



Date: 6.JAN.2014 11:42:03

**Plot 6-13. Radiated Restricted Upper Band Edge Measurement (Average)**

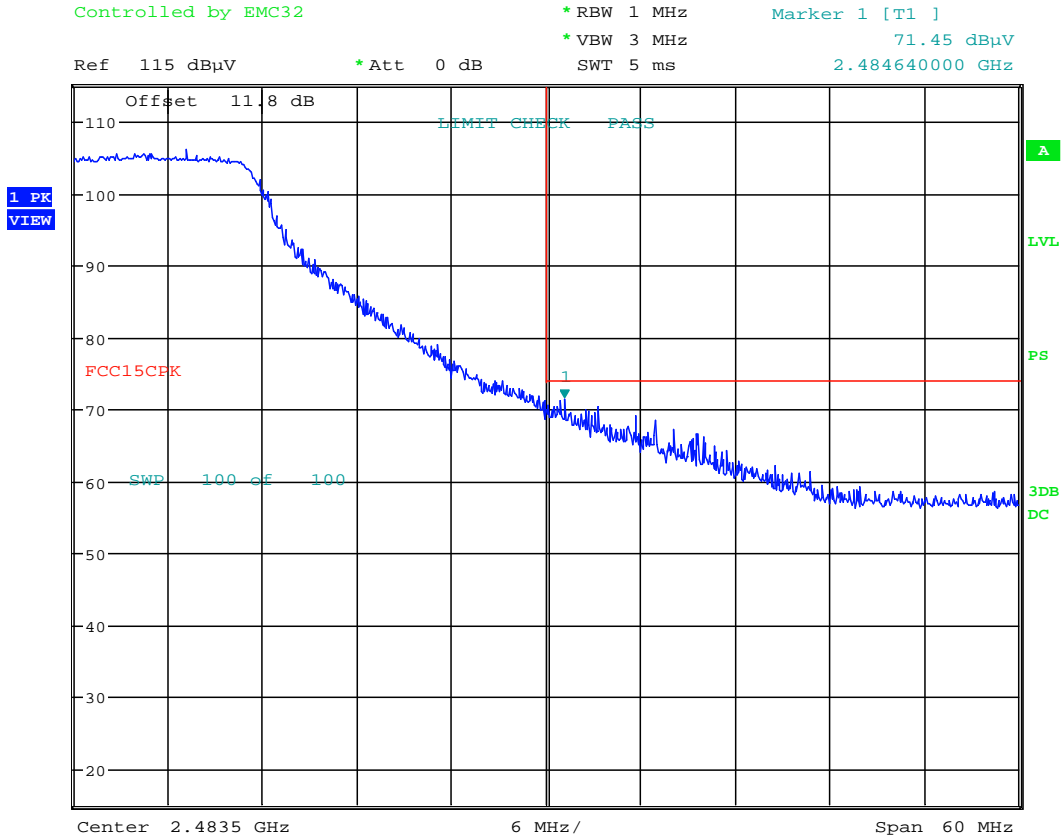
### Note

The band edge measurement shown in the plot above was performed using the integration method guidance from Section 13.3.2 of KDB 558074.

FCC ID: ACJ9TGWL11E		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1312312556.ACJ	Test Dates: 1/13/2014	EUT Type: Module in Portable Tablet	Page 29 of 41	

# Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 / §15.209; RSS-210 [A8.5]



Date: 6.JAN.2014 11:44:04

**Plot 6-14. Radiated Restricted Upper Band Edge Measurement (Peak)**

FCC ID: ACJ9TGWL11E		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1312312556.ACJ	Test Dates: 1/13/2014	EUT Type: Module in Portable Tablet	Page 30 of 41	

## Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 / §15.209; RSS-210 [A8.5]

Worst Case Mode: 802.11n (40MHz BW)

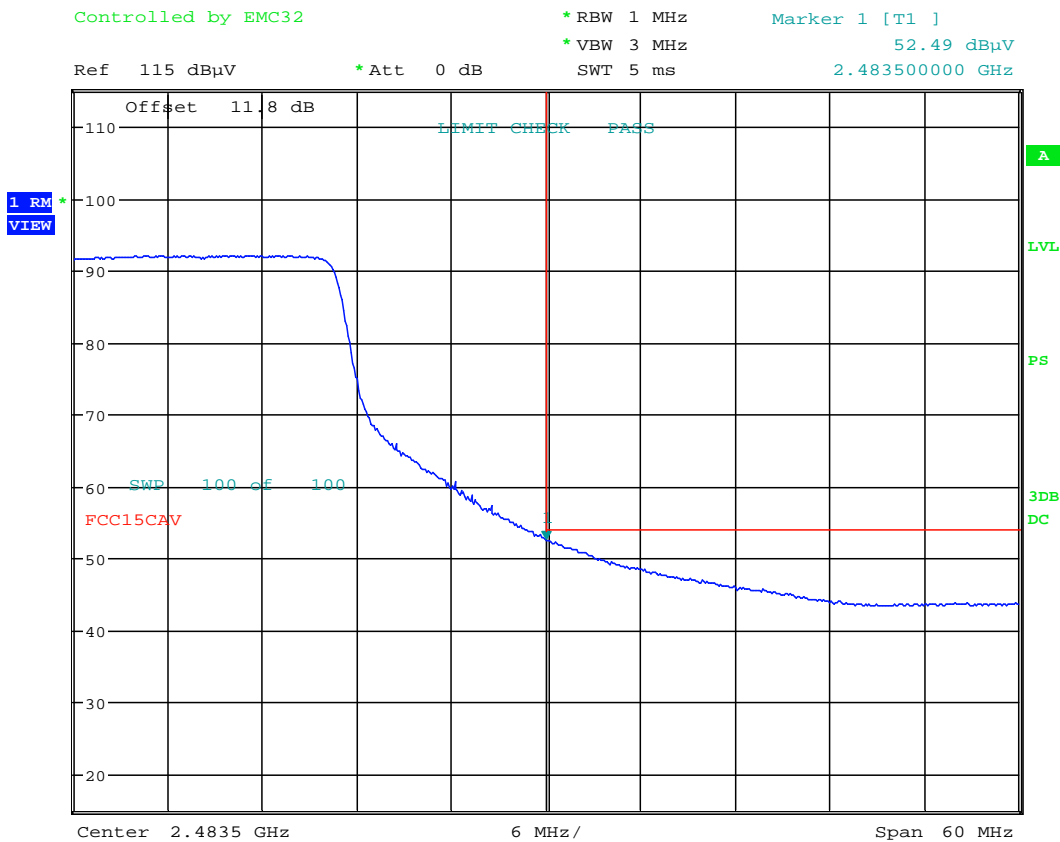
Worst Case Transfer Rate: MCS8 (MIMO)

Distance of Measurements: 3 Meters

Operating Frequency: 2452MHz

Channel: 9

Power Level Setting: 9



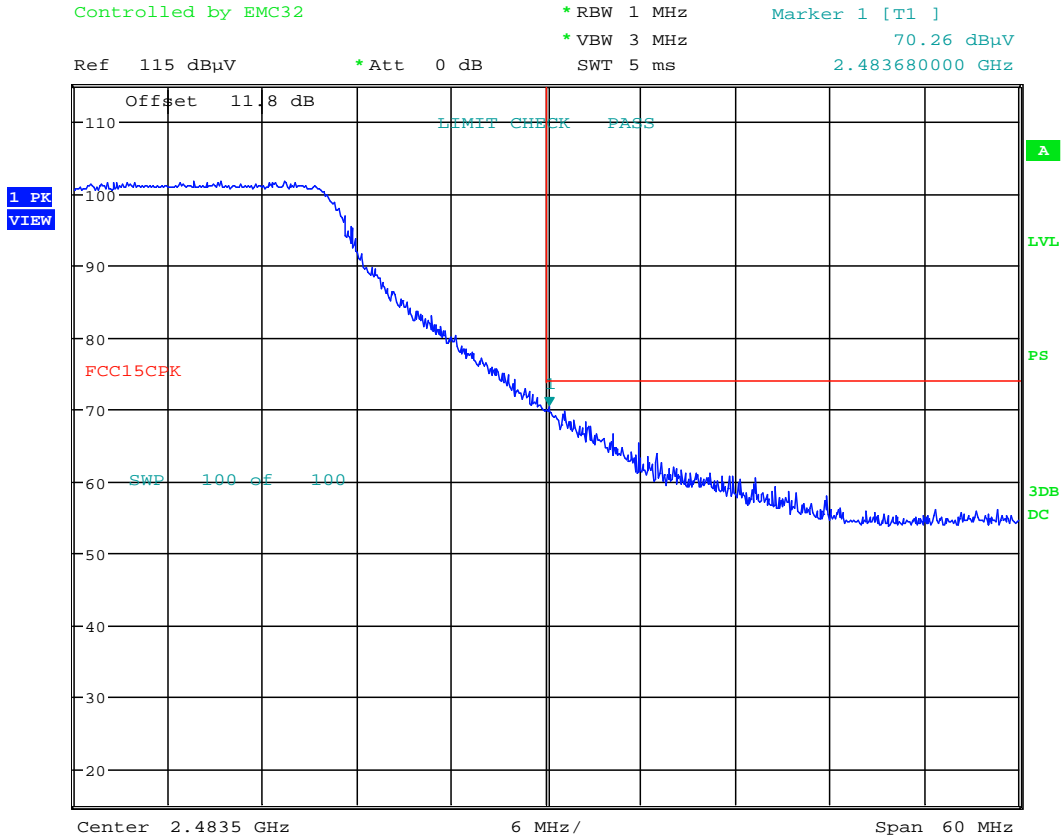
Date: 6.JAN.2014 11:35:47

Plot 6-15. Radiated Restricted Upper Band Edge Measurement (Average)

FCC ID: ACJ9TGWL11E		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1312312556.ACJ	Test Dates: 1/13/2014	EUT Type: Module in Portable Tablet	Page 31 of 41	

# Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 / §15.209; RSS-210 [A8.5]



Date: 6.JAN.2014 11:37:45

**Plot 6-16. Radiated Restricted Upper Band Edge Measurement (Peak)**

FCC ID: ACJ9TGWL11E		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1312312556.ACJ	Test Dates: 1/13/2014	EUT Type: Module in Portable Tablet	Page 32 of 41	

## Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 / §15.209; RSS-210 [A8.5]

Worst Case Mode: 802.11g

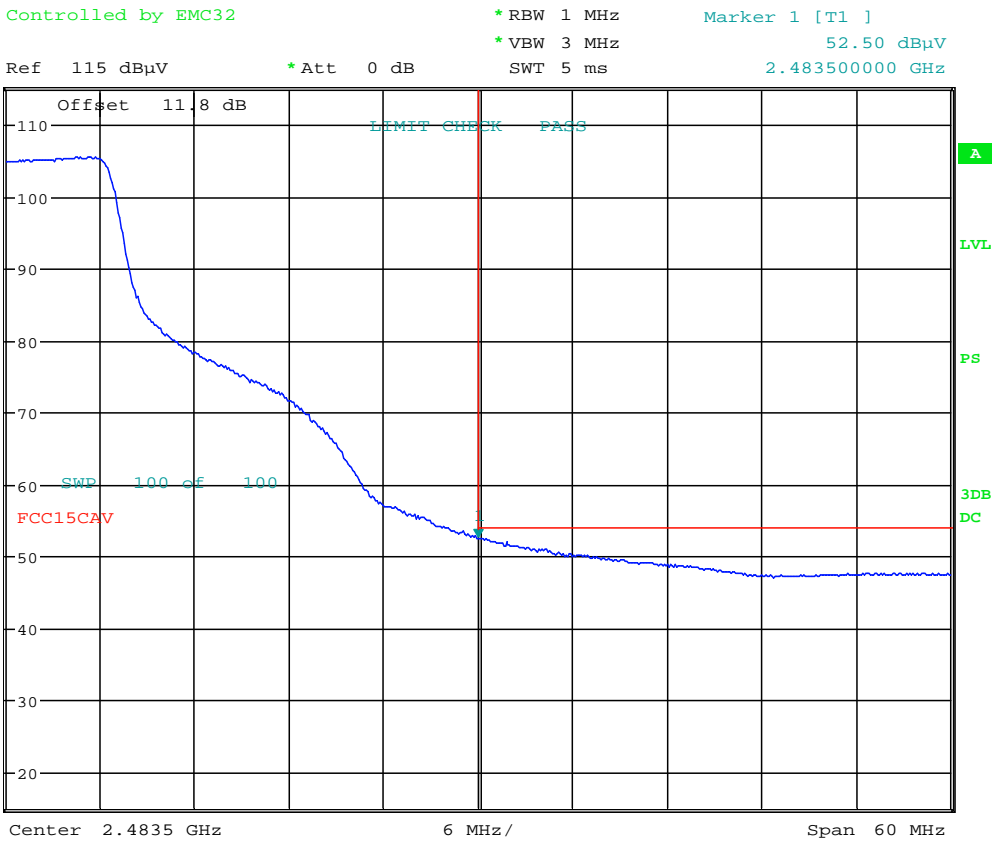
Worst Case Transfer Rate: 6Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 2452MHz

Channel: 9

Power Level Setting: 21



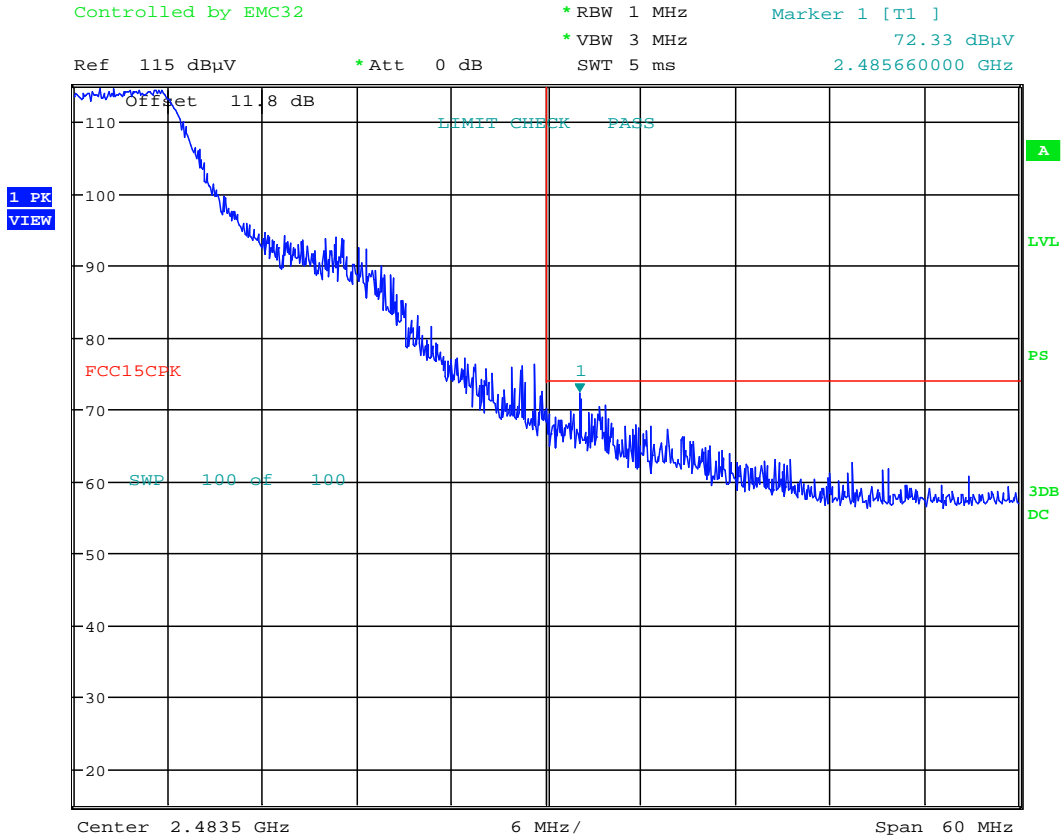
Date: 6.JAN.2014 11:26:11

**Plot 6-17. Radiated Restricted Upper Band Edge Measurement (Average)**

FCC ID: ACJ9TGWL11E		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1312312556.ACJ	Test Dates: 1/13/2014	EUT Type: Module in Portable Tablet	Page 33 of 41	

# Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 / §15.209; RSS-210 [A8.5]



Date: 6.JAN.2014 11:27:52

**Plot 6-18. Radiated Restricted Upper Band Edge Measurement (Peak)**

FCC ID: ACJ9TGWL11E		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1312312556.ACJ	Test Dates: 1/13/2014	EUT Type: Module in Portable Tablet	Page 34 of 41	

## Radiated Restricted Band Edge Measurements (Cont'd)

### §15.205 / §15.209; RSS-210 [A8.5]

Worst Case Mode: 802.11g

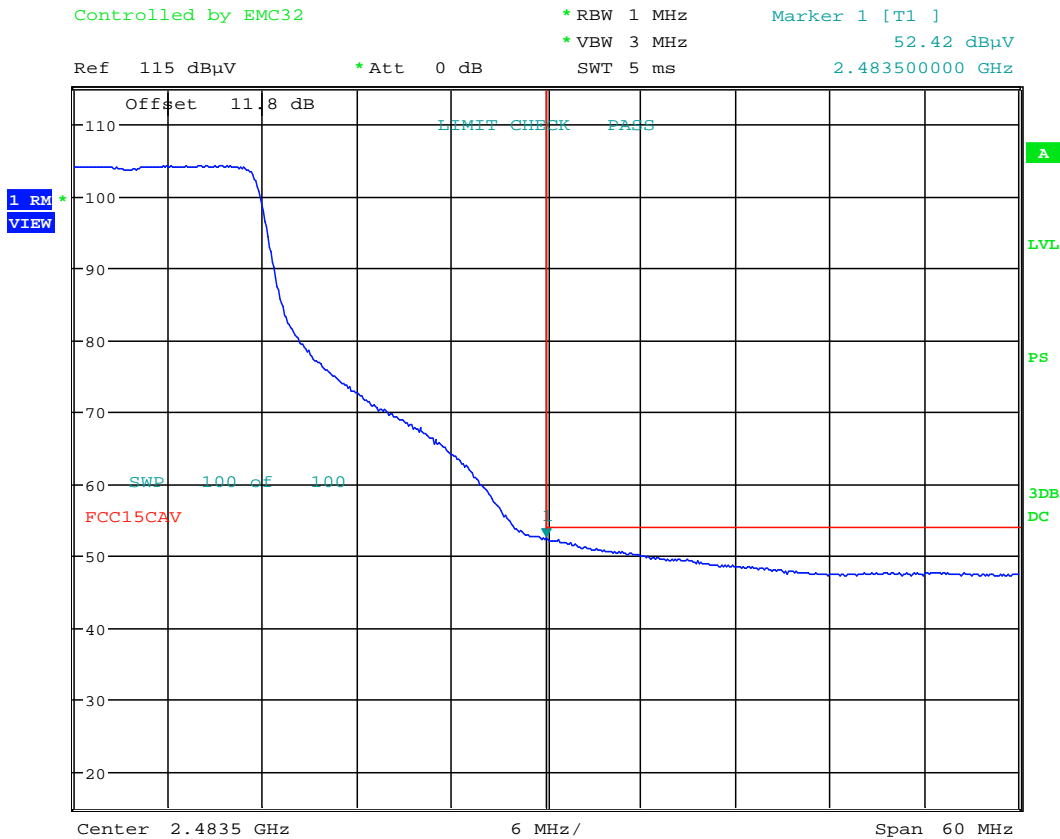
Worst Case Transfer Rate: 6Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 2457MHz

Channel: 10

Power Level Setting: 19

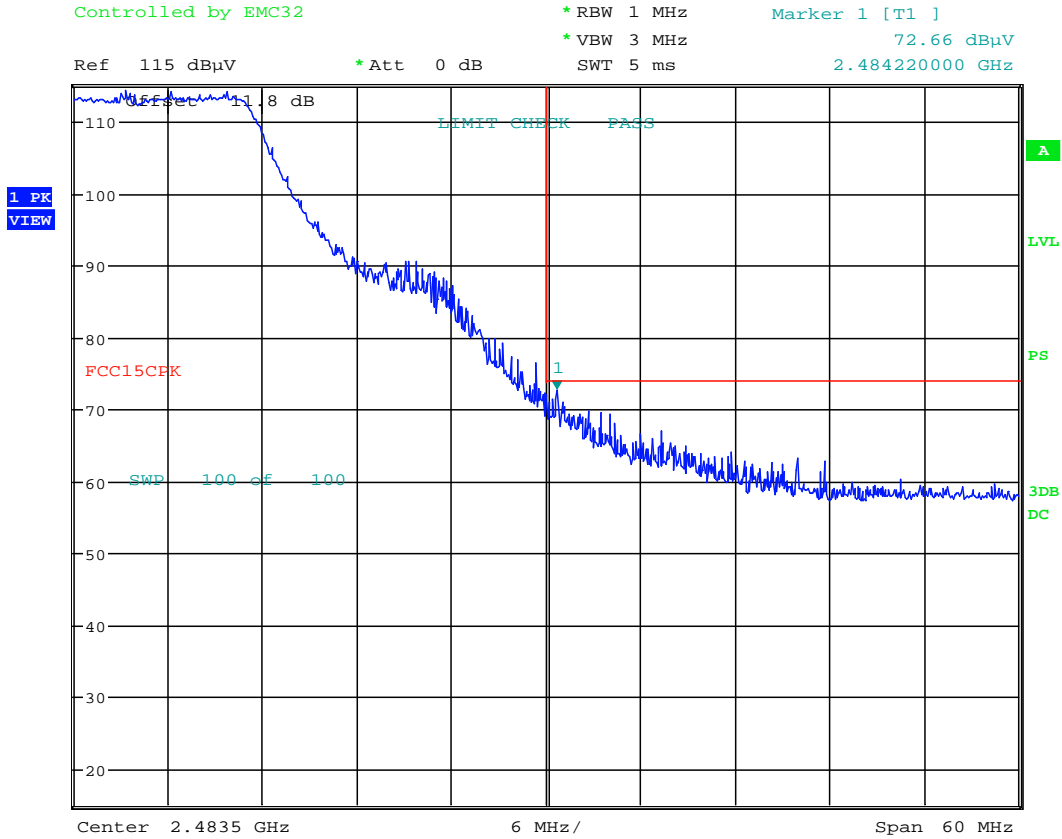


Date: 6.JAN.2014 11:20:55

**Plot 6-19. Radiated Restricted Upper Band Edge Measurement (Average)**


FCC ID: ACJ9TGWL11E		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1312312556.ACJ	Test Dates: 1/13/2014	EUT Type: Module in Portable Tablet	Page 35 of 41	

**Radiated Restricted Band Edge Measurements (Cont'd)**  
**§15.205 / §15.209; RSS-210 [A8.5]**



Date: 6.JAN.2014 11:22:13

**Plot 6-20. Radiated Restricted Upper Band Edge Measurement (Peak)**

FCC ID: ACJ9TGWL11E		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1312312556.ACJ	Test Dates: 1/13/2014	EUT Type: Module in Portable Tablet	Page 36 of 41	

## Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 / §15.209; RSS-210 [A8.5]

Worst Case Mode: 802.11g

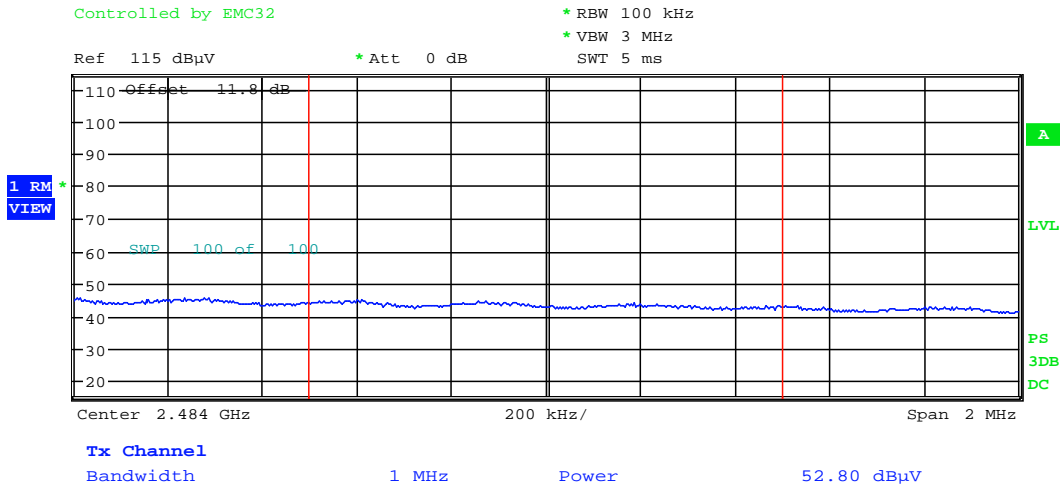
Worst Case Transfer Rate: 6Mbps

Distance of Measurements: 3 Meters

Operating Frequency: 2462MHz

Channel: 11

Power Level Setting: 15



Date: 6.JAN.2014 11:13:20

**Plot 6-21. Radiated Restricted Upper Band Edge Measurement (Average)**

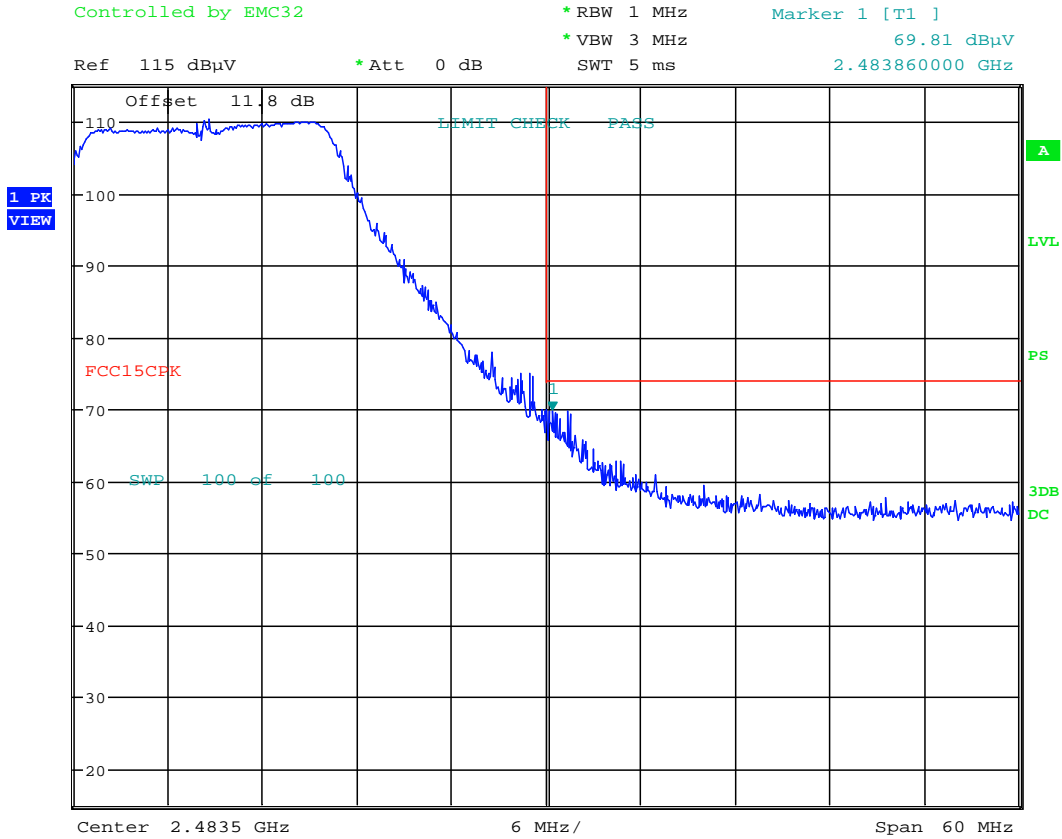
**Note**

The band edge measurement shown in the plot above was performed using the integration method guidance from Section 13.3.2 of KDB 558074.

FCC ID: ACJ9TGWL11E		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1312312556.ACJ	Test Dates: 1/13/2014	EUT Type: Module in Portable Tablet	Page 37 of 41	

# Radiated Restricted Band Edge Measurements (Cont'd)

§15.205 / §15.209; RSS-210 [A8.5]



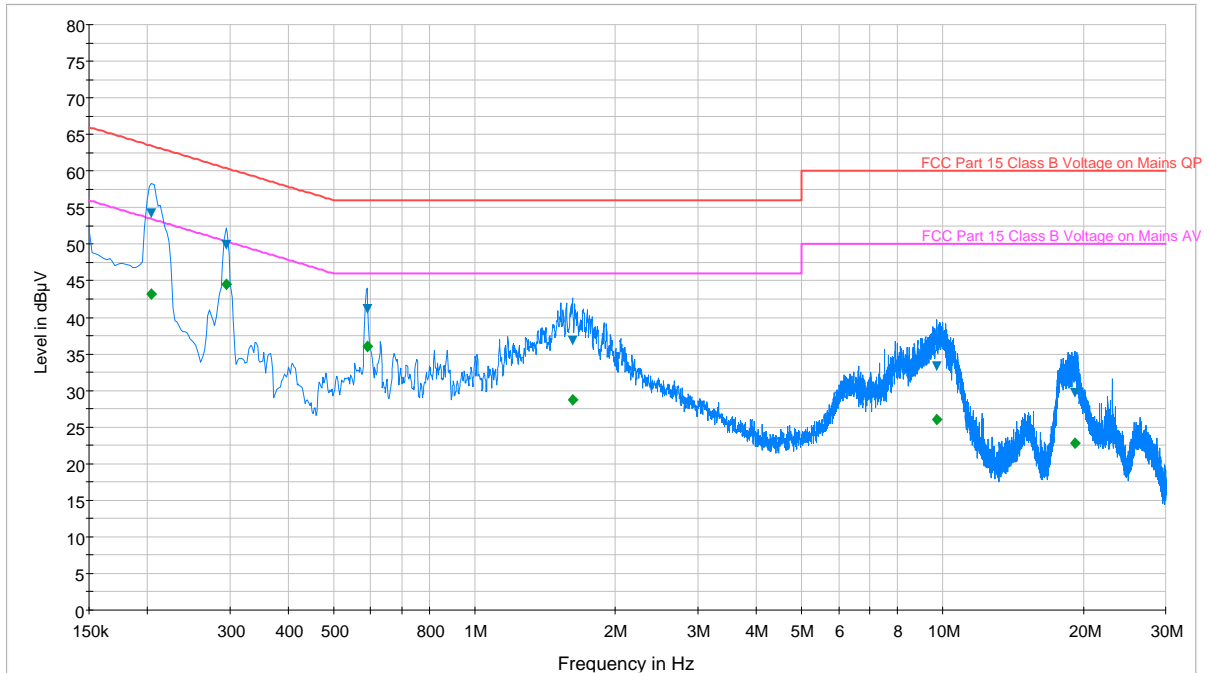
Date: 6.JAN.2014 11:15:20

**Plot 6-22. Radiated Restricted Upper Band Edge Measurement (Peak)**

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## 6.4 Line-Conducted Test Data

### §15.207; RSS-Gen [7.2.2]



— FCC Part 15 Class B Voltage on Mains QP.LimitLine  
— FCC Part 15 Class B Voltage on Mains AV.LimitLine  
— Preview Result 1-PK+ Final Result 1-QPK  
◆ Final Result 2-AVG

**Plot 6-23. Line Conducted Plot with 802.11b (L1)**

Frequency MHz	Line	Corr. dB	QuasiPeak dBµV	Limit dBµV	Margin dB	Average dBµV	Limit dBµV	Margin dB
0.204	L1	0.0	54.20	63.40	9.20	43.10	53.40	10.30
0.294	L1	0.1	49.90	60.40	10.50	44.50	50.40	5.90
0.589	L1	0.0	41.20	56.00	14.80	36.00	46.00	10.00
1.617	L1	0.2	36.80	56.00	19.20	28.70	46.00	17.30
9.733	L1	0.6	33.30	60.00	26.70	26.10	50.00	23.90
19.217	L1	1.2	29.70	60.00	30.30	22.80	50.00	27.20

**Table 6-6. Line Conducted Data with 802.11b (L1)**

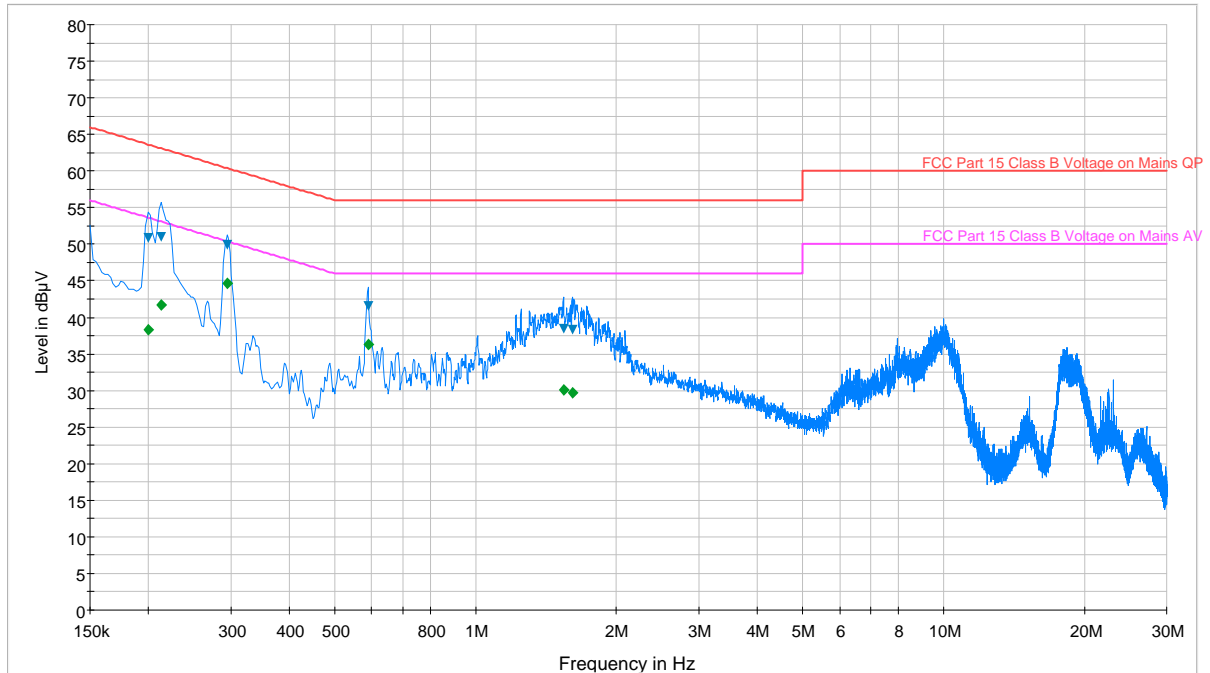
**Notes:**

- 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 6. The emissions found were not affected by the choice of channel used during testing.
- The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
- Factor (dB) = Cable loss (dB) + LISN insertion factor (dB)
- QP/AV Level (dBµV) = QP/AV Analyzer/Receiver Level (dBµV) + Factor (dB)
- Margin (dB) = QP/AV Limit (dBµV) – QP/AV Level (dBµV)
- Traces shown in plot are made using a peak detector.
- Deviations to the Specifications: None.

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# Line-Conducted Test Data (Cont'd)

## §15.207; RSS-Gen [7.2.2]



— FCC Part 15 Class B Voltage on Mains QP.LimitLine — FCC Part 15 Class B Voltage on Mains AV.LimitLine — Preview Result 1-PK+  
▼ Final Result 1-QPK ◆ Final Result 2-AVG

**Plot 6-24. Line Conducted Plot with 802.11b (N)**

Frequency MHz	Line	Corr. dB	QuasiPeak dBµV	Limit dBµV	Margin dB	Average dBµV	Limit dBµV	Margin dB
0.200	N	0.0	50.90	63.60	12.70	38.30	53.60	15.30
0.213	N	0.1	51.00	63.10	12.10	41.70	53.10	11.40
0.294	N	0.1	49.90	60.40	10.50	44.70	50.40	5.70
0.589	N	0.1	41.60	56.00	14.40	36.30	46.00	9.70
1.541	N	0.2	38.50	56.00	17.50	30.10	46.00	15.90
1.610	N	0.2	38.30	56.00	17.70	29.70	46.00	16.30

**Table 6-7. Line Conducted Data with 802.11b (N)**



**Notes:**

- 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 6. The emissions found were not affected by the choice of channel used during testing.
- The limit for Class B device(s) from 150kHz to 30MHz are specified in Section 15.207 of the Title 47 CFR.
- Factor (dB) = Cable loss (dB) + LISN insertion factor (dB)
- QP/AV Level (dBµV) = QP/AV Analyzer/Receiver Level (dBµV) + Factor (dB)
- Margin (dB) = QP/AV Limit (dBµV) – QP/AV Level (dBµV)
- Traces shown in plot are made using a peak detector.
- Deviations to the Specifications: None.

FCC ID: ACJ9TGWL11E		FCC Pt. 15.247 802.11b/g/n MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
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## 7.0 CONCLUSION

The data collected relate only the item(s) tested and show that the **Panasonic Module in Portable Tablet** **FCC ID: ACJ9TGWL11E** is in compliance with Part 15C of the FCC Rules.

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<b>Test Report S/N:</b> 0Y1312312556.ACJ	<b>Test Dates:</b> 1/13/2014	<b>EUT Type:</b> Module in Portable Tablet	Page 41 of 41	