

# FCC 47 CFR PART 15 SUBPART C INDUSTRY CANADA RSS-210 ISSUE 8

**CERTIFICATION TEST REPORT** 

FOR

**APPLE WATCH** 

# **MODEL NUMBER: A1553**

FCC ID: BCG-E2870 IC: 579C-E2870

# REPORT NUMBER: 14U19383-E3, REVISION C

ISSUE DATE: MARCH 03, 2015

Prepared for APPLE, INC 1 INFINITE LOOP CUPERTINO, CA 95014, U.S.A.

Prepared by UL VERIFICATION SERVICES INC. 47173 BENICIA STREET FREMONT, CA 94538, U.S.A. TEL: (510) 771-1000 FAX: (510) 661-0888

NVLAP LAB CODE 200065-0

# **Revision History**

Rev.	Date	Revisions	Revised By
	02/20/15	Initial Issue	M. Mekuria
A	02/25/15	Change EUT name	M. Mekuria
В	02/27/15	Revised report to address TCB's questions	T. Chu
С	03/03/15	Revised report to address TCB's questions	T. Chu

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8. 9. c	DU AN 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9.2 9.2 9.2 9.2 9.2 9.2 9.2 9.2	TY CYCLE	<b>15</b> <b>18</b> <i>18</i> <i>18</i> <i>22</i> <i>26</i> <i>27</i> <i>28</i> <i>32</i> <i>38</i> <i>42</i> <i>46</i> <i>47</i> <i>48</i> <i>53</i> <i>61</i>
<b>8.</b> 9. ς	DU AN 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9.2 9.2 9.2 9.2 9.2 9.2 9.2 9.2	TY CYCLE	<b>15</b> <b>18</b> 18 18 22 26 27 28 32 38 42 46 47 48 53 61 61
8. 9. ç	DU AN 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9.2 9.2 9.2 9.2 9.2 9.2 9.2 9.2	TY CYCLE	<b>15</b> <b>18</b> 18 22 26 27 28 32 38 32 46 47 48 53 <i>61</i> 61 65
8. 9. ç	DU AN 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9.2 9.2 9.2 9.2 9.2 9.2 9.2 9.2 9.2 9.2	TY CYCLE	<b>15</b> <b>18</b> 18 226 27 28 32 38 42 467 453 61 65 69
8. 9. 3	DU AN 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9.2 9.2 9.2 9.2 9.2 9.2 9.2 9.2	TY CYCLE	<b>15</b> <b>18</b> <i>18</i> <i>226</i> <i>27</i> <i>28</i> <i>38</i> <i>38</i> <i>42</i> <i>46</i> <i>47</i> <i>48</i> <i>53</i> <i>61</i> <i>65</i> <i>69</i> <i>70</i>
8. 9. 2	DU AN 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9.2 9.2 9.2 9.2 9.2 9.2 9.2 9.2	TY CYCLE	<b>15</b> <b>18</b> 18 226 27 28 32 38 32 46 47 48 53 <i>6</i> 1 65 69 70 71

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# **1. ATTESTATION OF TEST RESULTS**

COMPANY NAME:	IY NAME: APPLE 1 INFINITE LOOP CUPERTINO, CA 95014, U.S.A.		
EUT DESCRIPTION:	APPLE WATCH		
MODEL:	MODEL: A1553		
SERIAL NUMBER:	227LGA-SiP (CONDUCTED), FH7P3054G9HN (ANTENNA 1 RADIATED), FH7P20CSG9HM (ANTENNA 2 RADIATED)		
DATE TESTED:	NOVEMBER 24, 2014 - FEBRUARY 09	, 2015	
	APPLICABLE STANDARDS		
ST/	ANDARD	TEST RESULTS	
CFR 47 Pa	art 15 Subpart C	Pass	
INDUSTRY CANADA	RSS-210 Issue 8 Annex 8	Pass	
INDUSTRY CAN	ADA RSS-GEN Issue 4	Pass	

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For UL Verification Services Inc. By:

MENGISTU MEKURIA SENIOR ENGINEER UL Verification Services Inc. Tested By:

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Francisco Guarnero EMC ENGINEER UL Verification Services Inc.

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# 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.4-2009, RSS-GEN Issue 4, and RSS-210 Issue 8.

# 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA. The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street
Chamber A	🛛 Chamber D
Chamber B	Chamber E
Chamber C	Chamber F
	Chamber G
	Chamber H

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers A through H are covered under Industry Canada company address code 2324B with site numbers 2324B-1 through 2324B-8, respectively

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <u>http://ts.nist.gov/standards/scopes/2000650.htm</u>.

# 4. CALIBRATION AND UNCERTAINTY

# 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

# 4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB) 36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

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# 4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	± 3.52 dB
Radiated Disturbance, 30 to 1000 MHz	± 4.94 dB
Radiated Disturbance, 1 to 6 GHz	± 3.86 dB
Radiated Disturbance, 6 to 18 GHz	± 4.23 dB
Radiated Disturbance, 18 to 26 GHz	± 5.30 dB
Radiated Disturbance, 26 to 40 GHz	± 5.23 dB

Uncertainty figures are valid to a confidence level of 95%.

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# 5. EQUIPMENT UNDER TEST

# 5.1. DESCRIPTION OF EUT

The EUT is an Apple Watch with WLAN, Bluetooth and NFC support.

# 5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

Frequency Range	Mode	Output Power	Output Power
(MHz)		(dBm)	(mW)
2412 - 2472	802.11b, 1TX	21.56	143.22
2412 - 2472	802.11g, 1TX	26.44	440.55
2412 - 2472	802.11n, HT20 1TX	26.41	437.52

# 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a Planar Inverted-F Antenna (PIFA) with a maximum gain as below table:

Frequency Band (GHz)	Antenna 1 Gain (dBi)	Antenna 2 Gain (dBi)
2.4	-12.1	-12.1

The EUT has one WiFi/BT antenna port. The antenna used in any given unit can be either antenna 1 or antenna 2.

# 5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was 6.25.178.20

The test utility software used during testing was r503465 WLTEST

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# 5.5. WORST-CASE CONFIGURATION AND MODE

EUT has 3 types of enclosures and various kinds of metallic and non-metallic wristbands. There are 2 types of metallic bands; Metal Links, and Metal Mesh. Worst case configuration was investigated; and it was found that the stainless steel enclosure and metal mesh wristband was the worst case. All testing are performed on the worst case.

The following configurations were investigated and EUT powered by AC/DC adapter was the worstcase scenario. AC power line and below 1G radiated tests were conducted on configuration 1.

Configuration	Descriptions
1	EUT powered by AC/DC adapter via USB cable with wireless charger
2	EUT powered by host PC via USB cable with wireless charger

Radiated emission, 30-1000MHz and 18-26GHz, and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

All testing was performed with the EUT in three orthogonal orientations X-orientation (flatbed), Y-orientation (landscape), and Z-orientation (portrait). It was found that Y-orientation (landscape) was the worst-case.

Worst-case data rates as provided by the client were:

802.11b mode: 1 Mbps 802.11g mode: 6 Mbps 802.11n HT20 mode: MCS0

The EUT has one WiFi/BT antenna port. The antenna used in any given unit can be either antenna 1 or antenna 2. Therefore, all radiated tests were performed on both antennas.

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# 5.6. DESCRIPTION OF TEST SETUP

## SUPPORT EQUIPMENT

Support Equipment List							
Description	Manufacturer	Model	Serial Number	FCC ID			
Laptop AC/DC adapter	Apple	A1343	N/A	N/A			
Laptop	Apple	A1278	C02HJ0A7DTY4	NA			
Wireless Charger	Apple	A1570	DLC451508N5FTPG3K	BCGA1570			
AC/DC adapter	Apple	A1265	1X3276SZZ08QZ	N/A			

## I/O CABLES (CONDUCTED TEST)

I/O Cable List							
Cable	Cable Port # of identical Connector Type Cable Type Cable Remarks						
No		ports			Length (m)		
1	Antenna	1	SMA	Un-Shielded	0.2	To spectrum Analyzer	
2	USB	1	USB to mini USB	Shielded	1	To laptop and fixture	

# I/O CABLES (BELOW 1G RADIATED AND AC POWERLINE CONDUCTED TEST)

I/O Cable List							
Cable	Cable Port # of identical Connector Cable Type Cable Remarks						
No		ports	Туре		Length (m)		
1	USB	1	USB	Un-Shielded	2	To AC/DC adapter	

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# TEST SETUP- CONDUCTED PORT

The EUT was tested connected to a host Laptop via USB cable adapter and spectrum analyzer to antenna port. Test software exercised the EUT.

#### SETUP DIAGRAM



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# TEST SETUP- RADIATED-ABOVE 1 GHZ

The EUT was tested battery powered. Test software exercised the EUT.

### SETUP DIAGRAM



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## **TEST SETUP- BELOW 1GHZ & AC LINE CONDUCTED TESTS**

The EUT was powered by wireless charger. Test software exercised the EUT.

### SETUP DIAGRAM



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# 6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List						
Description	Manufacturer	Model	T Numbe	Cal Due		
PXA Signal Analyzer	Agilent	N9030A	T342	06/25/15		
Power Meter	Agilent	N1911A	T382	04/09/15		
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T119	01/15/16		
Antenna, Hybrid 30MHz to 2GHz	Sunol Sciences	JB3	T407	05/05/15		
PXA Signal Analyzer 3Hz to 44GHz	Agilent	N9030A	T340	03/11/15		
Amplifier, 10KHz to 1GHz	Sonoma	310N	T286	04/23/15		
Amplifier, 1 to 18GHz	Miteq	AFS42-00101	T740	01/26/16		
EMI Test Receiver, 9 kHz-7 GHz	R & S	ESCI7	T284	09/16/15		
LISN, 30 MHz	FCC	LISN-50/250-25-2	T24	01/16/16		
Amplifier, 1 to 26.5 Ghz	Agilent	8449B	T404	03/25/15		
Antenna, Horn 18 to 26.5GHz	ARA	SWH-28	T125	05/09/15		
Spectrum Analyzer	Agilent	8564E	T106	08/06/15		

# 7. MEASUREMENT METHODS

6 dB BW: KDB 558074 D01 v03r02, Section 8.1.

Output Power: KDB 558074 D01 v03r02, Section 9.2.3.1

Power Spectral Density: KDB 558074 D01 v03r02, Section 10.3.

Out-of-band emissions in non-restricted bands: KDB 558074 D01 v03r02, Section 11.0.

Out-of-band emissions in restricted bands: KDB 558074 D01 v03r02, Section 12.0

Band-edge: KDB 558074 D01 v03r02, Section 13.3.2.

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# 8. DUTY CYCLE

# LIMITS

None; for reporting purposes only.

## PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

# ON TIME AND DUTY CYCLE RESULTS

Mode	<b>ON Time</b>	Period	<b>Duty Cycle</b>	Duty	Duty Cycle	1/B
	В		x	Cycle	<b>Correction Factor</b>	Minimum VBW
	(msec)	(msec)	(linear)	(%)	(dB)	(kHz)
2.4GHz Band						
802.11b 1TX	8.600	8.800	0.977	97.73%	0.10	0.116
802.11g 1TX	1.428	1.628	0.877	87.71%	0.57	0.700
802.11n HT20 1TX	1.336	1.536	0.870	86.98%	0.61	0.749

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# **DUTY CYCLE PLOTS**





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🐥 Agile	ent 17:22:09	Ncv 24, 2014					+		Freq/Channel
Ref 30 dE	3m	#Atten 30 d	3		0 0	∆ Mł	(r2 1.5) 0.0	36 ms 60 dB	Certer Freq 2.43700000 GHz
.og = 0 = 1B/ = Dfist =		2R			2				Start Freq 2.43700000 GHz
IB					-1100				Stop Freq 2.43700000 GHz
PAvg –									CF Step 8.0000000 MHz <u>Auto Ma</u>
Center 2.	437 000 GH	z					Spa	n O Hz	Frea Offset
Kes BW 8	5 MHz	Ture	#VBW 50 N	1Hz	Sw	eep 4 n	ns (1001	pts)	0.00000000 Hz
1R 1∆ 2R 2∆	(1) (1) (1) (1)	Time Time Time Time Time	A 1. 1. 1. 1.	AXIS 172 ms 336 ms 172 ms 536 ms			20.57 dE -0.23 dl 20.57 dE 0.60 d	ide Im B Im B	Signal Track <sup>On <u>C</u>it</sup>

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# 9. ANTENNA PORT TEST RESULTS

# 9.1. 802.11b 1Tx MODE IN THE 2.4 GHz BAND

# 9.1.1. 6 dB BANDWIDTH

## <u>LIMITS</u>

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

# **RESULTS**

Channel	Frequency	6 dB Bandwidth	Minimum Limit
	(MHz)	(MHz)	(MHz)
1	2412	8.076	0.5
6	2437	8.076	0.5
11	2462	8.076	0.5
12	2467	8.064	0.5
13	2472	8.088	0.5

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#### 6 dB BANDWIDTH





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# 9.1.2. 99% BANDWIDTH

## <u>LIMITS</u>

None; for reporting purposes only.

## <u>RESULTS</u>

Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
1	2412	12.3461
6	2437	12.3641
11	2462	12.3813
12	2467	12.3702
13	2472	12.3893

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#### 99% BANDWIDTH





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Agilent 18:27:05 Ncv 24, 2014         R T	Freq/Channel
Ch Freq 2.472 GHz Trig Free Occupied Bandwidth Averages: 100	Certer Freq 2.47200000 GHz
Ref 20 dBm #Atten 20 dB	Start Freq 2.45700000 GHz
#Samp Log 10 →	Stop Freq 2.48700000 GHz
01/st 10.7 dB	3.0000000 MHz Auto Man
Center 2.472 00 GHz Span 30 MHz #Res BW 200 kHz #VBW 620 kHz #Sweep 20 ms (1001 pts)	0.00000000 Hz
Occupied Bandwidth         Occ BW % Pwr         99.00 %           12.3893 MHz         x dB         -26.00 dB	On <u>Cif</u>
Transmit Freq Error     34.132 kHz       x dB Bandwidth     14.998 MHz*       Copyright 2000-2011 Agilent Technologies	

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# 9.1.3. AVERAGE POWER

### <u>LIMITS</u>

None; for reporting purposes only.

# **RESULTS**

Channel	Frequency	Power
	(MHz)	(dBm)
Low	2412	19.30
Mid	2437	19.41
High	2462	19.31
High	2467	19.10
High	2472	18.96

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# 9.1.4. OUTPUT POWER

### LIMITS

FCC §15.247

IC RSS-210 A8.4

For systems using digital modulation in the 2400–2483.5 MHz, based on the use of antennas with directional gains that do not exceed 6dBi. If transmitting antennas of directional gain greater than 6dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

#### **DIRECTIONAL ANTENNA GAIN**

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

#### <u>RESULTS</u>

# Limits

Channel	Frequency	Directional	FCC	IC	IC	Max
		Gain	Power	Power	EIRP	Power
			Limit	Limit	Limit	
	(MHz)	(dBi)	(dBm)	(dBm)	(dBm)	(dBm)
Low	2412	-12.10	30.00	30	36	30.00
Mid	2437	-12.10	30.00	30	36	30.00
High	2462	-12.10	30.00	30	36	30.00
High	2467	-12.10	30.00	30	36	30.00
High	2472	-12.10	30.00	30	36	30.00

#### Results

Channel	Frequency	Meas	Total	Power	Margin
		Power	Corr'd	Limit	
			Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Low	2412	21.42	21.42	30.00	-8.58
Mid	2437	21.56	21.56	30.00	-8.44
High	2462	21.47	21.47	30.00	-8.53
High	2467	21.20	21.20	30.00	-8.80
High	2472	21.26	21.26	30.00	-8.74

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9.1.5. PSD

## **LIMITS**

FCC §15.247

IC RSS-210 A8.2

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

# **RESULTS**

Channel	Frequency	Meas	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
1	2412	-1.55	8.0	-9.6
6	2437	-2.96	8.0	-11.0
11	2462	-3.02	8.0	-11.0
12	2467	-2.76	8.0	-10.8
13	2472	-2.60	8.0	-10.6

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PSD





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# 9.1.6. OUT-OF-BAND EMISSIONS

# **LIMITS**

FCC §15.247 (d)

IC RSS-210 A8.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

**RESULTS** 

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## **IN-BAND REFERENCE LEVEL**



### LOW CHANNEL BANDEDGE



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### HIGH CHANNEL BANDEDGE





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# **OUT-OF-BAND EMISSIONS**



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# 9.2. 802.11g 1Tx MODE IN THE 2.4 GHz BAND

# 9.2.1. 6 dB BANDWIDTH

#### **LIMITS**

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

#### **RESULTS**

Channel	Frequency	6 dB Bandwidth	Minimum Limit
	(MHz)	(MHz)	(MHz)
1	2412	16.450	0.5
6	2437	16.500	0.5
11	2462	16.475	0.5
12	2467	16.500	0.5
13	2472	16.450	0.5

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#### 6 dB BANDWIDTH





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## 9.2.2. 99% BANDWIDTH

#### <u>LIMITS</u>

None; for reporting purposes only.

## **RESULTS**

Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
1	2412	16.4841
6	2437	16.5177
11	2462	16.5157
12	2467	16.4994
13	2472	16.5195

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#### 99% BANDWIDTH





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## 9.2.3. AVERAGE POWER

#### LIMITS

None; for reporting purposes only.

## <u>RESULTS</u>

Channel	Frequency	Power
	(MHz)	(dBm)
Low, Ch 1	2412	17.72
Low, Ch 2	2417	19.36
Mid, Ch 6	2437	19.42
High <i>,</i> Ch 10	2457	19.32
High, Ch 11	2462	17.80
High, Ch 12	2467	16.46
High, Ch 13	2472	5.89

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## 9.2.4. OUTPUT POWER

#### LIMITS

FCC §15.247

IC RSS-210 A8.4

For systems using digital modulation in the 2400–2483.5 MHz, based on the use of antennas with directional gains that do not exceed 6dBi. If transmitting antennas of directional gain greater than 6dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

#### **DIRECTIONAL ANTENNA GAIN**

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

#### **RESULTS**

#### Limits

Channel	Frequency	Directional	FCC	IC	IC	Max
		Gain	Power	Power	EIRP	Power
			Limit	Limit	Limit	
	(MHz)	(dBi)	(dBm)	(dBm)	(dBm)	(dBm)
Low	2412	-12.10	30.00	30	36	30.00
Low	2417	-12.10	30.00	30	36	30.00
Mid	2437	-12.10	30.00	30	36	30.00
High	2457	-12.10	30.00	30	36	30.00
High	2462	-12.10	30.00	30	36	30.00
High	2467	-12.10	30.00	30	36	30.00
High	2472	-12.10	30.00	30	36	30.00

#### Results

Channel	Frequency	Meas	Total	Power	Margin
		Power	Corr'd	Limit	
			Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Low	2412	25.10	25.10	30.00	-4.90
Low	2417	26.37	26.37	30.00	-3.63
Mid	2437	26.44	26.44	30.00	-3.56
High	2457	26.27	26.27	30.00	-3.73
High	2462	25.00	25.00	30.00	-5.00
High	2467	23.78	23.78	30.00	-6.22
High	2472	13.16	13.16	30.00	-16.84

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9.2.5. PSD

#### LIMITS

FCC §15.247

IC RSS-210 A8.2

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

#### RESULTS

Channel	Frequency	Meas	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
1	2412	-8.12	8.0	-16.1
2	2417	-6.94	8.0	-14.9
6	2437	-6.64	8.0	-14.6
10	2457	-7.02	8.0	-15.0
11	2462	-7.10	8.0	-15.1
12	2467	-8.76	8.0	-16.8
13	2472	-17.76	8.0	-25.76

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#### PSD





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## 9.2.6. OUT-OF-BAND EMISSIONS

## **LIMITS**

FCC §15.247 (d)

IC RSS-210 A8.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

RESULTS

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#### **IN-BAND REFERENCE LEVEL**



#### LOW CHANNEL BANDEDGE



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#### **HIGH CHANNEL BANDEDGE**



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#### **OUT-OF-BAND EMISSIONS**



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RL	RF 50 Ω DC	PNO: Fast	SENSE:INT	ALIGNAUTO #Avg Type: RMS	12:07:47 PM Feb 10, 2015 TRACE 1 2 3 4 5 6 TYPE MWWWWW	Frequency
0 dB/div	Ref Offset 10.7 dB Ref 15.00 dBm	IFGair:Low	Atten: 16 dB	N	4kr2 5.068 GHz -59.09 dBm	Auto Tune
5.00 5.00 15.0					-12.10 dBn	Center Fred 13.015000000 GHz
25.0						Start Free 30.000000 MH:
55.0 35.0 75.0	I L'a	yn e medwy	and the section of th	and water and the second spectrum and	an all an	Stop Free 26.00000000 GH;
tart 30 M Res BW	Hz 100 kHz	#VB\	V 300 kHz	Sweep	Stop 26.00 GHz 2.48 s (2001 pts)	CF Step 2.597000000 GH Auto Mar
1 N 1 2 N 1 3 4 5 6 7 8 9	f	3.705 GHz 5.068 GHz	-58.42 dBm -59.09 dBm			Freq Offse 0 Hz



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gilent RL	Spec	trum	Analyzer RF 5	Swept SA		1	SEM	E:INT	#Avg Typ	ALIGNAUTO pe: RMS	12:09:40 P	MFeb 10, 2015	Frequency
					PNO: I IFGain:	ast G	Atten: 16	Run dB			DE	PNNNNN	12 10 M 12 10 10
0 dB	div	F	tef Offset Ref 15.0	10.7 dB 0 dBm						N	lkr2 4.7 -60.0	44 GHz 08 dBm	Auto Tun
5.00			1										Center Free
.00		_										-12.10 dBm	13.015000000 GH
5.0													
5.0			-	-					-				Start Free 30.000000 MH
5.0			01	A2									
5.0		-	Inte	Inne	ma	م <del>جندہ رس</del> ر	money	مسلمي		equermenters.	in the second		Stop Free
5.0			-							-			26.000000000 GH
tart Res	30 BV	MH / 10	z I0 kHz			#VBV	/ 300 kHz			Sweep	Stop 2 2.48 s (	6.00 GHz 2001 pts)	CF Ster 2.597000000 GH
	IDDE I	TRC		×	3 796 G	17	-58.47 dB	FU M	INCTION FU	INCTION WIDTH	FUNCTIO	N VALUE	<u>Auto</u> Mar
2 3 4 5	N	1	i		4.744 G	łz	-60.08 dB	m					Freq Offse 0 H
6 7 8 9													
0													



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# 9.3. 802.11n HT20 1Tx MODE IN THE 2.4 GHz BAND

# 9.3.1. 6 dB BANDWIDTH

## **LIMITS**

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

#### **RESULTS**

Channel	Frequency	6 dB Bandwidth	Minimum Limit
	(MHz)	(MHz)	(MHz)
1	2412	17.712	0.5
6	2437	17.739	0.5
11	2462	17.658	0.5
12	2467	17.685	0.5
13	2472	17.685	0.5

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#### 6 dB BANDWIDTH





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## 9.3.2. 99% BANDWIDTH

#### <u>LIMITS</u>

None; for reporting purposes only

## **RESULTS**

Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
1	2412	17.6973
6	2437	17.7088
11	2462	17.6851
12	2467	17.6789
13	2472	17.7030

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#### 99% BANDWIDTH





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## 9.3.3. AVERAGE POWER

#### <u>LIMITS</u>

None; for reporting purposes only

## **RESULTS**

Channel	Frequency	Power
	(MHz)	(dBm)
Low	2412	17.82
Low	2417	19.24
Mid	2437	19.42
High	2457	19.31
High	2462	17.89
High	2467	16.33
High	2472	5.91

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## 9.3.4. OUTPUT POWER

#### LIMITS

FCC §15.247

IC RSS-210 A8.4

For systems using digital modulation in the 2400–2483.5 MHz, based on the use of antennas with directional gains that do not exceed 6dBi. If transmitting antennas of directional gain greater than 6dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

#### **DIRECTIONAL ANTENNA GAIN**

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

#### **RESULTS**

#### Limits

Channel	Frequency	Directional	FCC	IC	IC	Max
		Gain	Power	Power	EIRP	Power
			Limit	Limit	Limit	
	(MHz)	(dBi)	(dBm)	(dBm)	(dBm)	(dBm)
Low	2412	-12.10	30.00	30	36	30.00
Low	2417	-12.10	30.00	30	36	30.00
Mid	2437	-12.10	30.00	30	36	30.00
High	2457	-12.10	30.00	30	36	30.00
High	2462	-12.10	30.00	30	36	30.00
High	2467	-12.10	30.00	30	36	30.00
High	2472	-12.10	30.00	30	36	30.00

#### Results

Channel	Frequency	Meas	Total	Power	Margin
		Power	Corr'd	Limit	
			Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Low	2412	25.14	25.14	30.00	-4.86
Low	2417	26.10	26.10	30.00	-3.90
Mid	2437	26.41	27.14	30.00	-2.86
High	2457	26.30	26.30	30.00	-3.70
High	2462	25.01	25.01	30.00	-4.99
High	2467	24.96	24.96	30.00	-5.04
High	2472	16.04	13.97	30.00	-16.03

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9.3.5. PSD

#### **LIMITS**

FCC §15.247

IC RSS-210 A8.2

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

## **RESULTS**

Channel	Frequency	Meas	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
1	2412	-14.15	8.00	-22.15
2	2417	-6.53	8.00	-14.53
6	2437	-6.24	8.00	-14.24
10	2457	-6.33	8.00	-14.33
11	2462	-6.81	8.00	-14.81
12	2467	-8.91	8.00	-16.91
13	2472	-18.62	8.00	-26.62

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<u>PSD</u>





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## 9.3.6. OUT-OF-BAND EMISSIONS

#### **LIMITS**

FCC §15.247 (d)

IC RSS-210 A8.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

RESULTS

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#### **IN-BAND REFERENCE LEVEL**



#### LOW CHANNEL BANDEDGE



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#### **HIGH CHANNEL BANDEDGE**



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#### **OUT-OF-BAND EMISSIONS**



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R	L	1	RF	50 \$	2 DC			SEN	SE:INT	#Avg	ALIG Type: R	NAUTO MS	12:01:32 TRA	PMFeb 10, 2015 CE 1 2 3 4 5 6	Frequency
	_	_	_			PNC IFGa	Fast G	Trig: Free Atten: 16	Run dB				TY	ET P NNNNN	
0 di	B/div	,	Ref ( Ref	)ffset 10 15.00	0.7 dB dBm							М	kr2 5.8 -60.	399 GHz 27 dBm	Auto Tun
bg			1												Contor From
00			+		-							-		-12.00 dBm	13.015000000 GH
5.0			t												
5.0	$\vdash$		╋		-	-					-				Start Free 30.000000 MH
5.0 5.0			1	$\Diamond^1$	<b>△</b> <sup>2</sup>										
5.0	entre		Nor	~~	ne	and	m	and the second	- stranger		angeorer .	مرد مردمه مردم مردمه مردمه مرد	الصوال محمدة ومطلعها		Stop Free 26.00000000 GH
tar	t 30	MH	1z				41/01						Stop 2	26.00 GHz	CF Ste
Re	S B	W 1	OO K	HZ	X		#VBV	7 300 KHZ	E	NCTION	EUNCTIO	sweep	2.48 \$	(2001 pts)	2.597000000 GH Auto Mar
1	NN	1	f			3.770 5.899	GHz GHz	-59.03 dB -60.27 dB	m m						
34															Freq Offse
67															
9															
0															



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spec	Full A	F 50	wept SA Ω DC		1	SEN	SE:INT	#Avg Ty	ALIGNAUTO	12:03:19 F	MFeb 10, 2015 CE 1 2 3 4 5 6	Frequency
				PNO: I IFGain:	ast G	Atten: 16	Run dB		526 - J. & Profile 1	D	ET P NNNNN	
div	Re	f Offset	10.7 dB 0 dBm						N	1kr2 5.1 -59.	07 GHz 51 dBm	Auto Tun
	1											Center Free
	_		-								-12.00 dBm	13.015000000 GH
												Start Free
	-	.1	2						_			30.000000 MH
	J	hi	2°	man	in	the man in	-	-				Stop Free
منعنم												26.00000000 GH
30	MHz	1447		_	#\/B\	( 300 kHz			Swaar	Stop 2	26.00 GHz	CF Step
			×	_	#101	7 300 KH2	FL	INCTION FI	UNCTION WIDTH	FUNCTION	IN WALUE	2.597000000 GH Auto Mar
N N				3.666 G	Hz Hz	-59.57 dB -59.51 dB	m m	1				
												Freq Offse
	Jdiv 30 I BW	30 MHz BW 100	Ref Offset   /div Ref 15.00   /div Ref 15.00   30 MHz Ref 15.00   8 M 100 KHz Ref 15.00   9 Mz Ref 15.00	Ref Offset 10.7 dB Ref Offset 10.7 dB Ref 15.00 dBm All All All All All All All All All All	IF 50.0 DC   PNO F IFGain:   Ref Offset 10.7 dB   /div Ref 15.00 dBm   January January   30 MHz   BW 100 kHz   State   January   January	PNO. Fast Constrained of the second s	PNO. Fast FG Offset 10.7 dB Ref Offset 10.7 dB Atten: 16 Atten: 16 Atten: 16 30 MHz BW 100 kHz #VBW 300 kHz #VBW 300 kHz	PNO. Fast Trig: Free Run IFGais:Low   Ref Offset 10.7 dB Trig: Free Run Atten: 16 dB   /div Ref 15.00 dBm   30 MHz #VBW 300 kHz   BW 100 kHz #VBW 300 kHz   1 f   3.0 Get 10.7 GHz \$59.57 dBm	Box Solo DC SENSE.BIT   PNO. Fast Trig: Free Run Atten: 16 dB Free Run Atten: 16 dB   /div Ref Offset 10.7 dB Image: Comparison of the sense of the se	Image: solution of the soluti	Box ALIGNADO 12:03:191   PNO: Fast Trig: Free Run IFGais:Low Trig: Free Run Atten: 16 dB TMA   Ref Offset 10.7 dB Mkr2 5.1 -59.   Idiv Ref 15.00 dBm -59.   30 MHz #VBW 300 kHz Stop 2   BW 100 kHz #VBW 300 kHz Stop 2   1 1 5.107 GHz -59.51 dBm	Box ALIONAUTO 12:03:19 PM Feb 10, 2015   PNO: Fast IFGain:Low Trig: Free Run Atten: 16 dB Mkr2 5, 107 GHz -59,51 dBm   Ref Offset 10.7 dB Mkr2 5, 107 GHz -59,51 dBm -59,51 dBm   12:00 dPm -59,51 dBm -59,51 dBm   30 MHz #VBW 300 kHz Stop 26.00 GHz Sweep 2,48 s (2001 pts)   30 MHz 3.666 GHz 59,57 dBm   1 1 5.107 GHz



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# **10. RADIATED TEST RESULTS**

## 10.1. LIMITS AND PROCEDURE

## <u>LIMITS</u>

FCC §15.205 and §15.209

IC RSS-GEN, Section 8.9 and 8.10. IC RSS-GEN, Section 7 (Receiver)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m				
30 - 88	100	40				
88 - 216	150	43.5				
216 - 960	200	46				
Above 960	500	54				

## TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and as applicable for average measurements.

The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

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## 10.2. TX ABOVE 1 GHz ANTENNA 1

## 10.2.1. 802.11b 1Tx MODE IN THE 2.4 GHz BAND

#### **RESTRICTED BANDEDGE (LOW CHANNEL)**





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## AUTHORIZED BANDEDGE (HIGH CHANNEL, CH 11)





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## AUTHORIZED BANDEDGE (HIGH CHANNEL, CH 12)





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## AUTHORIZED BANDEDGE (HIGH CHANNEL, CH 13)





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#### HARMONICS AND SPURIOUS EMISSIONS, CH 1





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## <u>DATA</u>

Marker	Frequency (GHz)	Meter Reading	Det	AF T344 (dB/m)	Amp/Cbl/ Fltr/Pad	DC Corr (dB)	Corrected Reading	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
		(dBuV)			(dB)		(dBuV/m)			(dBuV/m)				
1	* 3.63	38.98	PK2	33.4	-28.7	0	43.68	-	-	74	-30.32	122	203	Н
	* 3.631	27.02	MAv1	33.4	-28.7	.1	31.82	54	-22.18	-	-	122	203	Н
2	* 5.047	38.2	PK2	34.3	-26.3	0	46.2	-	-	74	-27.8	282	203	Н
	* 5.048	25.93	MAv1	34.3	-26.3	.1	34.03	54	-19.97	-	-	282	203	н
3	* 8.13	35.86	PK2	35.7	-23.4	0	48.16	-	-	74	-25.84	19	101	н
	* 8.13	23.6	MAv1	35.7	-23.4	.1	36	54	-18	-	-	19	101	н
4	* 4.739	39.07	PK2	34.1	-27	0	46.17	-	-	74	-27.83	36	101	V
	* 4.739	26.67	MAv1	34.1	-27	.1	33.87	54	-20.13	-	-	36	101	V
5	5.761	37.61	PK2	34.8	-27	0	45.41	-	-	-	-	15	203	V
6	10.172	33.89	PK2	37.2	-20.1	0	50.99	-	-	-	-	24	203	V

\* - indicates frequency in CFR15.205/IC8.10 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

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#### HARMONICS AND SPURIOUS EMISSIONS, CH 6





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## <u>DATA</u>

Marker	Frequency	Meter	Det	AF T344	Amp/Cbl/	DC Corr	Corrected	Avg Limit	Margin	Peak	PK Margin	Azimuth	Height	Polarity
	(GH2)	(dBuV)		(ub/iii)	(dB)	(ub)	(dBuV/m)	(ubuv/iii)	(UB)	(dBuV/m)	(06)	(Degs)	(cm)	
1	* 3.896	38.23	PK2	33.5	-28.2	0	43.53	-	-	74	-30.47	223	304	Н
	* 3.896	27.74	MAv1	33.5	-28.2	.1	33.14	54	-20.86	-	-	223	304	Н
2	* 5.051	37.68	PK2	34.3	-26.4	0	45.58	-	-	74	-28.42	223	309	Н
	* 5.054	26.75	MAv1	34.3	-26.4	.1	34.75	54	-19.25	-	-	223	309	Н
3	* 8.06	35.6	PK2	35.8	-24	0	47.4	-	-	74	-26.6	227	312	Н
	* 8.059	24.85	MAv1	35.8	-24	.1	36.75	54	-17.25	-	-	227	312	Н
4	1.869	42.1	PK2	30.5	-21.2	0	51.4	-	-	-	-	294	367	V
5	* 5.042	37.49	PK2	34.3	-26.2	0	45.59	-	-	74	-28.41	227	101	V
	* 5.045	26.47	MAv1	34.3	-26.3	.1	34.57	54	-19.43	-	-	227	101	V
6	* 11.574	34.17	PK2	38.2	-20.9	0	51.47	-	-	74	-22.53	292	202	V
	* 11.573	22.98	MAv1	38.2	-20.9	.1	40.38	54	-13.62	-	-	292	202	V

\* - indicates frequency in CFR15.205/IC8.10 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

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#### HARMONICS AND SPURIOUS EMISSIONS, CH 11





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## <u>DATA</u>

Marker	Frequency	Meter	Det	AF T344	Amp/Cbl/	DC Corr	Corrected	Avg Limit	Margin	Peak	PK Margin	Azimuth	Height	Polarity
	(GHz)	Reading		(dB/m)	Fltr/Pad	(dB)	Reading	(dBuV/m)	(dB)	Limit	(dB)	(Degs)	(cm)	
		(dBuV)			(dB)		(dBuV/m)			(dBuV/m)				
1	* 3.78	38.86	PK2	33.4	-28.4	0	43.86	-	-	74	-30.14	168	304	Н
	* 3.782	27.46	MAv1	33.4	-28.3	.1	32.66	54	-21.34	-	-	168	304	н
2	* 7.493	36.05	PK2	35.6	-24.8	0	46.85	-	-	74	-27.15	34	301	Н
	* 7.491	24.61	MAv1	35.6	-24.8	.1	35.51	54	-18.49	-	-	34	301	Н
3	* 11.024	33.36	PK2	38.1	-20.3	0	51.16	-	-	74	-22.84	325	390	Н
	* 11.023	22.37	MAv1	38.1	-20.3	.1	40.27	54	-13.73	-	-	325	390	Н
4	2.092	41.31	PK2	31.4	-20.9	0	51.81	-	-	-	-	15	348	V
5	3.071	39.42	PK2	32.8	-28.6	0	43.62	-	-	-	-	258	375	V
6	* 3.803	38.03	PK2	33.4	-28.1	0	43.33	-	-	74	-30.67	265	368	V
	* 3.804	27.45	MAv1	33.4	-28.1	.1	32.85	54	-21.15	-	-	265	368	V

\* - indicates frequency in CFR15.205/IC8.10 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

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#### HARMONICS AND SPURIOUS EMISSIONS, CH 12





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## <u>DATA</u>

Marker	Frequency	Meter	Det	AF T344	Amp/Cbl/	DC Corr	Corrected	Avg Limit	Margin	Peak	PK Margin	Azimuth	Height	Polarity
	(GHz)	Reading		(dB/m)	Fltr/Pad	(dB)	Reading	(dBuV/m)	(dB)	Limit	(dB)	(Degs)	(cm)	
		(dBuV)			(dB)		(dBuV/m)			(dBuV/m)				
1	* 4.045	38.81	PK2	33.4	-28.5	0	43.71	-	-	74	-30.29	223	302	Н
	* 4.047	27.43	MAv1	33.4	-28.5	.1	32.43	54	-21.57	-	-	223	302	н
2	* 4.812	38.61	PK2	34.2	-26.9	0	45.91	-	-	74	-28.09	227	302	Н
	* 4.813	26.91	MAv1	34.2	-26.9	.1	34.31	54	-19.69	-	-	227	302	Н
3	7.142	37.51	PK2	35.7	-25.1	0	48.11	-	-	-	-	227	302	Н
4	3.291	38.85	PK2	32.7	-28.1	0	43.45	-	-	-	-	296	371	V
5	* 4.586	38.59	PK2	34.1	-28.1	0	44.59	-	-	74	-29.41	290	376	V
	* 4.586	27.58	MAv1	34.1	-28.1	.1	33.68	54	-20.32	-	-	290	376	V
6	* 8.344	35.86	PK2	35.8	-23.5	0	48.16	-	-	74	-25.84	294	371	V
	* 8.345	24.57	MAv1	35.8	-23.5	.1	36.97	54	-17.03	-	-	294	371	V

\* - indicates frequency in CFR15.205/IC8.10 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

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#### HARMONICS AND SPURIOUS EMISSIONS, CH 13





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## <u>DATA</u>

Marker	Frequency	Meter	Det	AF T344	Amp/Cbl/	DC Corr	Corrected	Avg Limit	Margin	Peak	PK Margin	Azimuth	Height	Polarity
	(GHz)	Reading		(dB/m)	Fltr/Pad	(dB)	Reading	(dBuV/m)	(dB)	Limit	(dB)	(Degs)	(cm)	
		(dBuV)			(dB)		(dBuV/m)			(dBuV/m)				
1	* 3.839	39.10	PK2	33.4	-28.3	0	44.20	-	-	74	-29.8	209	301	н
	* 3.839	27.83	MAv1	33.4	-28.3	.1	33.03	54	-20.97	-	-	209	301	Н
2	* 4.862	38.26	PK2	34.2	-27.7	0	44.76	-	-	74	-29.24	209	301	Н
	* 4.861	26.73	MAv1	34.2	-27.7	.1	33.33	54	-20.67	-	-	209	301	н
3	* 8.453	35.79	PK2	35.8	-23.5	0	48.09	-	-	74	-25.91	209	301	Н
	* 8.453	24.37	MAv1	35.8	-23.5	.1	36.77	54	-17.23	-	-	209	301	Н
4	* 3.700	38.62	PK2	33.2	-28.7	0	43.12	-	-	74	-30.88	293	349	V
	* 3.700	27.52	MAv1	33.2	-28.7	.1	32.12	54	-21.88	-	-	293	349	V
5	* 4.606	39.18	PK2	34.1	-28.2	0	45.08	-	-	74	-28.92	293	349	V
	* 4.607	27.52	MAv1	34.1	-28.2	.1	33.52	54	-20.48	-	-	293	349	V
6	* 8.149	35.85	PK2	35.8	-23.4	0	48.25	-	-	74	-25.75	293	349	V
	* 8.148	24.23	MAv1	35.8	-23.4	.1	36.73	54	-17.27	-	-	293	349	V

\* - indicates frequency in CFR15.205/IC8.10 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

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## 10.2.2. 802.11g 1Tx MODE IN THE 2.4 GHz BAND

#### **RESTRICTED BANDEDGE (LOW CHANNEL, Channel 1)**

LOW CHANNEL RESTRICTED, PEAK, HORIZ Dec 03, 2014 Frequency #Avg Type: RMS Trig: Free Run #Atten: 10 dB DET P P NNN PNO: Fast IFGain Low Auto Tune Mkr1 2.389 84 GHz Ref Offset 11.5 dB Ref 110.00 dBµV 68.80 dBµV dD (d) Center Freq 2.35000000 GHz Start Freq 2.310000000 GHz 74.00 d Stop Free 2.39000000 GHz what Hay martilithe CF Step 8.000000 MHz Mar Auto Freq Offset 0 Hz Stop 2.39000 GHz Sweep 1.00 ms (1001 pts) Start 2.31000 GHz #VBW 3.0 MHz #Res BW 1.0 MHz STATUS



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#### **RESTRICTED BANDEDGE (LOW CHANNEL, Channel 2)**





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#### **RESTRICTED BANDEDGE (HIGH CHANNEL, Channel 10)**





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### AUTHORIZED BANDEDGE (HIGH CHANNEL, Channel 11)





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### AUTHORIZED BANDEDGE (HIGH CHANNEL, Channel 12)

FCC ID: BCG-E2870





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### AUTHORIZED BANDEDGE (HIGH CHANNEL, Channel 13)





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Marker	Frequency	Meter	Det	AF T344	Amp/Cbl/	DC Corr	Corrected	Avg Limit	Margin	Peak	PK Margin	Azimuth	Height	Polarity
	(GHz)	Reading		(dB/m)	Fltr/Pad	(dB)	Reading	(dBuV/m)	(dB)	Limit	(dB)	(Degs)	(cm)	
		(dBuV)			(dB)		(dBuV/m)			(dBuV/m)				
1	* 3.727	39.25	PK2	33.3	-28.7	0	43.85	-	-	74	-30.15	212	305	Н
	* 3.728	27.61	MAv1	33.3	-28.7	.57	32.78	54	-21.22	-	-	212	305	Н
2	* 4.75	38.28	PK2	34.1	-26.9	0	45.48	-	-	74	-28.52	211	300	н
	* 4.749	27.07	MAv1	34.1	-26.9	.57	34.84	54	-19.16	-	-	211	300	н
3	* 9.020	34.60	PK2	36.2	-21.7	0	49.10	-	-	74	-24.9	210	308	Н
	* 9.019	23.52	MAv1	36.2	-21.8	.57	38.49	54	-15.51	-	-	210	308	Н
4	3.050	39.19	PK2	32.8	-28.3	0	43.69	-	-	-	-	284	234	V
5	* 5.055	38.38	PK2	34.3	-26.4	0	46.28	-	-	74	-27.72	292	347	V
	* 5.055	26.05	MAv1	34.3	-26.4	.57	34.52	54	-19.48	-	-	292	347	V
6	* 11.022	33.69	PK2	38.1	-20.3	0	51.49	-	-	74	-22.51	190	253	V
	* 11.025	22.49	MAv1	38.1	-20.3	.57	40.86	54	-13.14	-	-	190	253	V

\* - indicates frequency in CFR15.205/IC8.10 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

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Marker	Frequency	Meter	Det	AF T344	Amp/Cbl/	DC Corr	Corrected	Avg Limit	Margin	Peak	PK Margin	Azimuth	Height	Polarity
	(GHz)	Reading		(dB/m)	Fltr/Pad	(dB)	Reading	(dBuV/m)	(dB)	Limit	(dB)	(Degs)	(cm)	
		(dBuV)			(dB)		(dBuV/m)			(dBuV/m)				
1	* 3.831	38.43	PK2	33.4	-28.3	0	43.53	-	-	74	-30.47	224	312	н
	* 3.833	28.04	MAv1	33.4	-28.3	.57	33.71	54	-20.29	-	-	224	312	Н
2	* 5.056	37.87	PK2	34.3	-26.4	0	45.77	-	-	74	-28.23	220	300	н
	* 5.057	26.5	MAv1	34.3	-26.5	.57	34.87	54	-19.13	-	-	220	300	н
3	* 7.525	35.79	PK2	35.7	-24.7	0	46.79	-	-	74	-27.21	224	306	н
	* 7.525	24.73	MAv1	35.7	-24.7	.57	36.30	54	-17.70	-	-	224	306	н
4	* 3.654	39.24	PK2	33.4	-28.9	0	43.74	-	-	74	-30.26	300	369	V
	* 3.656	27.6	MAv1	33.3	-28.9	.57	32.57	54	-21.43	-	-	300	369	V
5	* 4.646	39.06	PK2	34.1	-28.1	0	45.06	-	-	74	-28.94	295	362	V
	* 4.644	27.28	MAv1	34.1	-28.1	.57	33.85	54	-20.15	-	-	295	362	V
6	6.373	36.92	PK2	35.6	-26.2	0	46.32	-	-	-	-	290	366	V

\* - indicates frequency in CFR15.205/IC8.10 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

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Marker	Frequency	Meter	Det	AF T344	Amp/Cbl/	DC Corr	Corrected	Avg Limit	Margin	Peak	PK Margin	Azimuth	Height	Polarity
	(GHz)	Reading		(dB/m)	Fltr/Pad	(dB)	Reading	(dBuV/m)	(dB)	Limit	(dB)	(Degs)	(cm)	
		(dBuV)			(dB)		(dBuV/m)			(dBuV/m)				
1	* 3.786	39.06	PK2	33.4	-28.3	0	44.16	-	-	74	-29.84	211	302	н
	* 3.785	27.53	MAv1	33.4	-28.3	.57	33.2	54	-20.80	-	-	211	302	Н
2	* 5.014	38.02	PK2	34.2	-26.4	0	45.82	-	-	74	-28.18	205	317	Н
	* 5.016	26.11	MAv1	34.2	-26.4	.57	34.48	54	-19.52	-	-	205	317	Н
3	5.877	37.98	PK2	35.0	-26.8	0	46.18	-	-	-	-	209	317	Н
4	* 3.877	38.88	PK2	33.5	-28.2	0	44.18	-	-	74	-29.82	288	361	V
	* 3.877	27.62	MAv1	33.5	-28.2	.57	33.49	54	-20.51	-	-	288	361	V
5	* 5.04	36.87	PK2	34.3	-26.2	0	44.97	-	-	74	-29.03	295	361	V
	* 5.04	26.25	MAv1	34.3	-26.2	.57	34.92	54	-19.08	-	-	295	361	V
6	7.100	36.27	PK2	35.6	-25.3	0	46.57	-	-	-	-	357	122	V

\* - indicates frequency in CFR15.205/IC8.10 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

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Marker	Frequency	Meter	Det	AF T344	Amp/Cbl/	DC Corr	Corrected	Avg Limit	Margin	Peak	PK Margin	Azimuth	Height	Polarity
	(GHz)	Reading		(dB/m)	Fltr/Pad	(dB)	Reading	(dBuV/m)	(dB)	Limit	(dB)	(Degs)	(cm)	
		(dBuV)			(dB)		(dBuV/m)			(dBuV/m)				
1	2.614	42.37	PK2	32.3	-20.3	0	54.37	-	-	-	-	227	311	Н
2	* 3.747	38.79	PK2	33.3	-28.4	0	43.69	-	-	74	-30.31	213	296	Н
	* 3.747	27.38	MAv1	33.3	-28.4	.57	32.85	54	-21.15	-	-	213	296	Н
3	* 5.036	37.54	PK2	34.2	-26.2	0	45.54	-	-	74	-28.46	213	296	Н
	* 5.036	26.51	MAv1	34.2	-26.2	.57	35.08	54	-18.92	-	-	213	296	Н
4	1.913	41.55	PK2	30.9	-21.2	0	51.25	-	-	-	-	291	356	V
5	* 4.774	37.37	PK2	34.2	-26.9	0	44.67	-	-	74	-29.33	292	373	V
	* 4.777	27.09	MAv1	34.2	-26.9	.57	34.96	54	-19.04	-	-	292	373	V
6	* 8.155	35.85	PK2	35.8	-23.4	0	48.25	-	-	74	-25.75	292	373	V
	* 8.156	24.28	MAv1	35.8	-23.4	.57	37.25	54	-16.75	-	-	292	373	V

\* - indicates frequency in CFR15.205/IC8.10 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

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Marker	Frequency	Meter	Det	AF T344	Amp/Cbl/	DC Corr	Corrected	Avg Limit	Margin	Peak	PK Margin	Azimuth	Height	Polarity
	(GHz)	Reading		(dB/m)	Fltr/Pad	(dB)	Reading	(dBuV/m)	(dB)	Limit	(dB)	(Degs)	(cm)	
		(dBuV)			(dB)		(dBuV/m)			(dBuV/m)				
1	1.882	41.75	PK2	30.7	-21.2	0	51.25	-	-	-	-	204	326	Н
2	* 4.746	39.19	PK2	34.1	-26.9	0	46.39	-	-	74	-27.61	201	305	Н
	* 4.747	27.11	MAv1	34.1	-26.9	.57	34.88	54	-19.12	-	-	201	305	Н
3	* 7.725	36.56	PK2	35.8	-24.6	0	47.76	-	-	74	-26.24	201	305	н
	* 7.725	25.01	MAv1	35.8	-24.6	.57	36.78	54	-17.22	-	-	201	305	Н
4	* 2.881	41.17	PK2	32.6	-20.0	0	53.77	-	-	74	-20.23	297	378	V
	* 2.883	29.96	MAv1	32.6	-20.0	.57	43.13	54	-10.87	-	-	297	378	V
5	3.017	38.57	PK2	32.7	-28.1	0	43.17	-	-	-	-	295	362	V
6	9.593	33.96	PK2	36.7	-20.9	0	49.76	-	-	-	-	295	362	V

\* - indicates frequency in CFR15.205/IC8.10 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

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# 10.2.3. 802.11n HT20 1Tx MODE IN THE 2.4 GHz BAND

#### **RESTRICTED BANDEDGE (LOW CHANNEL, Channel 1)**





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## **RESTRICTED BANDEDGE (LOW CHANNEL, Channel 2)**





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### **RESTRICTED BANDEDGE (HIGH CHANNEL, Channel 10)**





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