

FCC CFR47 PART 15 SUBPART C INDUSTRY CANADA RSS-210 ISSUE 8

**CERTIFICATION TEST REPORT** 

FOR

WIRELESS CONTROLLER

**MODEL NUMBER: 1537** 

FCC ID: C3K1537 IC: 3048A-1537

**REPORT NUMBER: 13U14963** 

ISSUE DATE: 2013-05-21

Prepared for MICROSOFT 1 MICROSOFT WAY REDMOND WA, 98052, USA

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NVLAP LAB CODE 100255-0

#### **Revision History**

Rev.	lssue Date	Revisions	Revised By
	5/21/13	Initial Issue	M. Antola

Page 2 of 119

# TABLE OF CONTENTS

1.	ATT	<b>TESTA</b>	TION OF TEST RESULTS	5
2.	TES	ST ME	THODOLOGY	6
3.	FAC	CILITIE	ES AND ACCREDITATION	6
4.	CAI	LIBRA	TION AND UNCERTAINTY	6
4	4.1.	MEAS	SURING INSTRUMENT CALIBRATION	6
4	4.2.	SAM	PLE CALCULATION	6
4	4.3.	MEAS	SUREMENT UNCERTAINTY	6
5.	EQ	UIPME	INT UNDER TEST	7
5	5.1.	DESC	CRIPTION OF EUT	7
5	5.2.	MAXI	MUM OUTPUT POWER	7
5	5.3.	DESC	CRIPTION OF AVAILABLE ANTENNAS	7
5	5.4.	SOFT	TWARE AND FIRMWARE	7
5	5.5.	WOR	ST-CASE CONFIGURATION AND MODE	8
5	5.6.	DESC	CRIPTION OF TEST SETUP	9
6.	TES	ST ANI	D MEASUREMENT EQUIPMENT1	1
7.	ON	TIME,	DUTY CYCLE AND MEASUREMENT METHODS1	3
7.	7.1.	1. C	ON TIME AND DUTY CYCLE RESULTS1	3
7.		1. C 2. N		3 3
7. 8.	7.1. 7.1. 7.1.	1. C 2. N 3. E	ON TIME AND DUTY CYCLE RESULTS1 //EASUREMENT METHOD1	3 3 4
8.	7.1. 7.1. 7.1.	1. C 2. N 3. C	DN TIME AND DUTY CYCLE RESULTS	3 3 4 <b>6</b>
8.	7.1. 7.1. 7.1. 8.1.	1. C 2. N 3. C FENN 802.1 1. 6	DN TIME AND DUTY CYCLE RESULTS.       1         MEASUREMENT METHOD.       1         DUTY CYCLE PLOTS       1         A PORT TEST RESULTS       1         1g MODE IN THE 2.4 GHz BAND.       1         3 dB BANDWIDTH.       1	3 4 6 6
8.	7.1. 7.1. 7.1. <b>AN</b> 8.1. 8.1. 8.1.	1. C 2. N 3. E FENN/ 802.1 1. 6 2. 9	DN TIME AND DUTY CYCLE RESULTS.       1         MEASUREMENT METHOD.       1         DUTY CYCLE PLOTS       1         A PORT TEST RESULTS       1         1g MODE IN THE 2.4 GHz BAND.       1         3 dB BANDWIDTH.       1         99% BANDWIDTH.       1	3 3 4 6 6 9
8.	7.1. 7.1. 7.1. <b>AN</b> 8.1. 8.1. 8.1. 8.1. 8.1.	1. C 2. M 3. E FENN/ 802.1 1. 6 2. 9 3. A 4. C	DN TIME AND DUTY CYCLE RESULTS. 1   MEASUREMENT METHOD. 1   DUTY CYCLE PLOTS 1   A PORT TEST RESULTS 1   1 1 g MODE IN THE 2.4 GHz BAND. 1   3 dB BANDWIDTH. 1   99% BANDWIDTH. 1   AVERAGE POWER 2   DUTPUT POWER 2	3 3 4 6 6 9 2 3
8.	7.1. 7.1. 7.1. 8.1. 8.1. 8.1. 8.1. 8.1.	1. C 2. M 3. E FENNA 802.1 1. 6 2. 9 3. A 4. C 5. F	DN TIME AND DUTY CYCLE RESULTS. 1   MEASUREMENT METHOD. 1   DUTY CYCLE PLOTS 1   A PORT TEST RESULTS 1   1 1 g MODE IN THE 2.4 GHz BAND. 1   3 dB BANDWIDTH. 1   99% BANDWIDTH. 1   AVERAGE POWER 2   DUTPUT POWER 2   2 SD 2	334 669237
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<b>8.</b> ε	7.1. 7.1. 7.1. 8.1. 8.1. 8.1. 8.1. 8.1.	1. C 2. M 3. E <b>FENN/</b> 802.1 1. 6 2. 9 3. A 4. C 5. F 6. C 802.1 1. 6	DN TIME AND DUTY CYCLE RESULTS. 1   MEASUREMENT METHOD. 1   DUTY CYCLE PLOTS 1   A PORT TEST RESULTS. 1   1 g MODE IN THE 2.4 GHz BAND. 1   2 dB BANDWIDTH. 1   9% BANDWIDTH. 1   AVERAGE POWER. 2   DUTPUT POWER 2   PSD. 2   DUT-OF-BAND EMISSIONS 3   1 n HT20 MODE IN THE 2.4 GHz BAND 3   3 dB BANDWIDTH. 3	334 <b>6</b> 6692370 55
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Page 3 of 119

8. 8. 8. 8. 8. 8. 8. 8. 8. 8. 8. 8.	3.2. 3.3. 3.4. 3.5. 3.6. 802 4.1. 4.2. 4.3. 4.4. 4.5. 4.6.	99% BANDWIDTH. AVERAGE POWER OUTPUT POWER PSD. OUT-OF-BAND EMISSIONS 	
9. R	ADIAT	ED TEST RESULTS	92
9.1.	LIM	ITS AND PROCEDURE	
9.2.	TRA	ANSMITTER ABOVE 1 GHz	93
9.3.	TX	ABOVE 1 GHz 802.11g MODE IN THE 2.4 GHz BAND	
9.4.	TX	ABOVE 1 GHz 802.11n HT20 MODE IN THE 2.4 GHz BAND	
9.5.	TX	ABOVE 1 GHz 802.11a MODE IN THE 5.8 GHz BAND	
9.6.	TX	ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.8 GHz BAND	
9.7.	WO	RST-CASE BELOW 1 GHz	
10.	AC PO	OWER LINE CONDUCTED EMISSIONS	105
11.	SETU	P PHOTOS	112

## **1. ATTESTATION OF TEST RESULTS**

COMPANY NAME: MICROSOFT 1 MICROSOFT WAY REDMOND, WA, 98052, USA				
EUT DESCRIPTION: WIRELESS CONTROLLER				
<b>MODEL:</b> 1537				
SERIAL NUMBER: NON-SERIALIZED PRODUCTION UNITS				
DATE TESTED:	<b>TE TESTED:</b> 2013-04-08 to 2013-05-09			
	APPLICABLE STANDARDS			
STANDARD TEST RESULTS				
CFR 47 Part 15 Subpart C Pass				
INDUSTRY CANADA RSS-210 Issue 8 Annex 8 Pa				
INDUSTRY CAN	ADA RSS-GEN Issue 3	Pass		

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards, using test results reported in the test report documents referenced below and/or documentation furnished by the applicant. All indications of Pass/Fail in this report are opinions expressed by UL LLC based on interpretations of these calculations. The results show that the equipment 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 by the referenced documents. This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC 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 By:

Tested By:

Bob Deat

Bob DeLisi WiSE Principal Engineer UL LLC

Mirtal At

Mike Antola WiSE Project Lead UL LLC

Page 5 of 119

# 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 3, and RSS-210 Issue 8.

# 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 1285 Walt Whitman Rd. Melville, NY 11747, USA.

UL Melville is accredited by NVLAP, Laboratory Code 100255-0. The full scope of accreditation can be viewed at <u>http://ts.nist.gov/standards/scopes/1002550.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

# 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	± 3.3 dB
Radiated Disturbance, 30 to 1000 MHz	± 4.00 dB
Radiated Emissions, 1-26GHz (worst case, Ground Plane)	± 5.7dB

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

Page 6 of 119

# 5. EQUIPMENT UNDER TEST

## 5.1. DESCRIPTION OF EUT

The EUT is an 802.11a/g/n transceiver, Model: 1537.

## 5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum average conducted output power as follows:

Frequency Range	quency Range Mode O		Output Power
(MHz)		(dBm)	(mW)
2412 - 2462	802.11g	9.09	8.11
2412 - 2462	802.11n HT20	9.28	8.47
5745 - 5825	802.11a	6.00	3.98
5745 - 5825	802.11n HT20	6.19	4.16

## 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an integral antenna, with a maximum gain of 1 dBi.

## 5.4. SOFTWARE AND FIRMWARE

The EUT uses network adapter Atheros AR6006 USB ART\_MDK.

The EUT driver software installed during testing was Atheros, ver. 1.0.1.1019.

The test utility software used during testing was Atheros Radio Test 2 (ART2-GUI), ver. 2.3.

Page 7 of 119

## 5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

Worst-case data rates as measured during preliminary testing:

802.11g mode: 6 Mbps 802.11a mode: 6 Mbps 802.11n HT20mode: MCS0

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Page 8 of 119

## 5.6. DESCRIPTION OF TEST SETUP

#### SUPPORT EQUIPMENT

Support Equipment List						
Description Manufacturer Model FCC ID						
Laptop Dell Latitude D830 DoC						

#### I/O CABLES

	I/O Cable List						
Cable	Cable Port #of identical Connector Cable Type Cable Remarks						
No		ports	Туре		Length (m)		
1	USB	1	USB	Shielded	<3M	None	
2	DC	1	Mains	Unshielded	<3M	None	
3	AC	1	Mains	Unshielded	<3M	None	

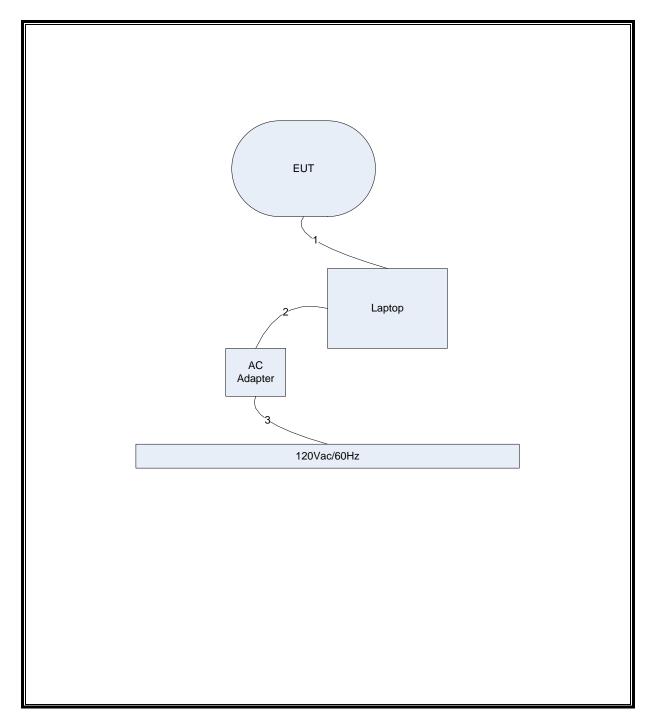
#### TEST SETUP

The EUT is a wireless controller used as a stand-alone device. Test software exercised the radio module.

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Page 9 of 119

#### SETUP DIAGRAM FOR TESTS



Page 10 of 119

# 6. TEST AND MEASUREMENT EQUIPMENT

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

Radiated Emissions							
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date		
30-1000MHz							
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081	2013-01-29	2014-01-31		
Log-P Antenna	Schaffner	UPA6109	44068	2013-04-03	2014-04-03		
Bicon Antenna	Schaffner	VBA6106A	54	2013-04-03	2014-04-03		
Switch Driver	HP	11713A	ME7A-627	N/A	N/A		
System Controller	Sunol Sciences	SC99V	44396	N/A	N/A		
Camera Controller	Panasonic	WV-CU254	44395	N/A	N/A		
RF Switch Box	UL	1	44398	N/A	N/A		
Measurement Software	UL	Version 9.5	44740	N/A	N/A		
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268	2012-12-22			
Multimeter	Fluke	83111	ME5B-305	2013-01-28	2014-01-31		
Above 1GHz (Band Optimized Sy							
EMI Receiver	Rohde & Schwarz	ESIB40	34968	2013-01-30			
Horn Antenna (1-2 GHz)	ETS	3161-01 (26°)**	51442	2008-03-28			
Horn Antenna (2-4 GHz)	ETS	3161-02 (22°)**	48107	2007-09-27	See * below		
Horn Antenna (4-8 GHz)	ETS	3161-03 (22°)**	48106	2007-09-27	See * below		
Horn Antenna (8-12 GHz)	ETS	3160-07 (26°)**	8933	2008-11-24	See * below		
Horn Antenna (12-18 GHz)	ETS	3160-08 (26°)**	8932	2007-09-27	See * below		
Horn Antenna (18-26.5 GHz)	ETS	3160-09 (27°)**	8947	2007-09-26	See * below		
Horn Antenna (26.5-40 GHz)	ETS	3160-10 (27°)**	73004	2007-09-26	See * below		
Signal Path Controller	HP	11713A	50250	N/A	N/A		
Gain Controller	HP	11713A	50251	N/A	N/A		
RF Switch / Preamp Fixture	UL	BOMS1	50249	N/A	N/A		
System Controller	UL	BOMS2	50252	N/A	N/A		
Measurement Software	UL	Version 9.5	44740	N/A	N/A		
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268	2012-12-22	2014-12-22		
Multimeter	Fluke	83111	ME5B-305	2013-01-28	2014-01-31		

Radiated Emissions								
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date			
one-time calibration. Only if physic Gain standard horn antennas (standard horn antennas) beyond that which is provided by the or they are used at a distance close	<ul> <li>* - Note: As allowed by the calibration standard ANSI C63.4 Section 4.4.2, standard gain horns need only a one-time calibration. Only if physical damage occurs will the horn antenna require re-calibration. Gain standard horn antennas (sometimes called standard gain horn antennas) need not be calibrated beyond that which is provided by the manufacturer unless they are damaged or deterioration is suspected, or they are used at a distance closer than 2D<sup>2</sup>/λ. Gain standard horn antennas have gains that are fixed by their dimensions and dimensional tolerances.</li> </ul>							

Conducted Emissions							
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date		
Conducted Emissions – GP 1	·						
	Rohde &						
EMI Receiver	Schwarz	ESCI 7	75141	2013-01-30	2014-01-31		
LISN	Solar	9252-50-R-24-BNC	ME5A-636	2013-01-31	2014-01-31		
Switch Driver	HP	11713A	44397	N/A	N/A		
RF Switch Box	UL	4	44404	N/A	N/A		
Measurement Software	UL	Version 9.5	44736	N/A	N/A		
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	43734	2012-03-13	2014-03-13		
Multimeter	Fluke	87V	79648	2013-01-29	2014-01-31		

Bench Tests						
Description Manufacturer Model Identifier Cal Date Cal Du						
RF Room 2						
Spectrum Analyzer	Agilent	E4446A	72822	2013-01-29	2014-01-31	
Power Sensor	Rohde & Schwarz	NRP-Z81	75345	2013-01-30	2014-01-31	
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268	2012-12-22	2014-12-22	

Page 12 of 119

# 7. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

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

None; for reporting purposes only.

#### PROCEDURE

KDB 558074 D01 Zero-Span Spectrum Analyzer Method.

7.1.1. ON	TIME AND DUTY CYCLE RES	ULTS

Mode	<b>ON Time</b>	Period	Duty Cycle	Duty	Duty Cycle	1/B	
	В		x	Cycle	<b>Correction Factor</b>	Minimum VBW	
	(msec)	(msec)	(linear)	(%)	(dB)	(Hz)	
802.11a	2020.00	2110	0.957	95.7%	0.19	0.495	
802.11g	2025.00	2258	0.897	89.7%	0.47	0.494	
802.11n HT20	1892.00	2067	0.915	91.5%	0.38	0.529	

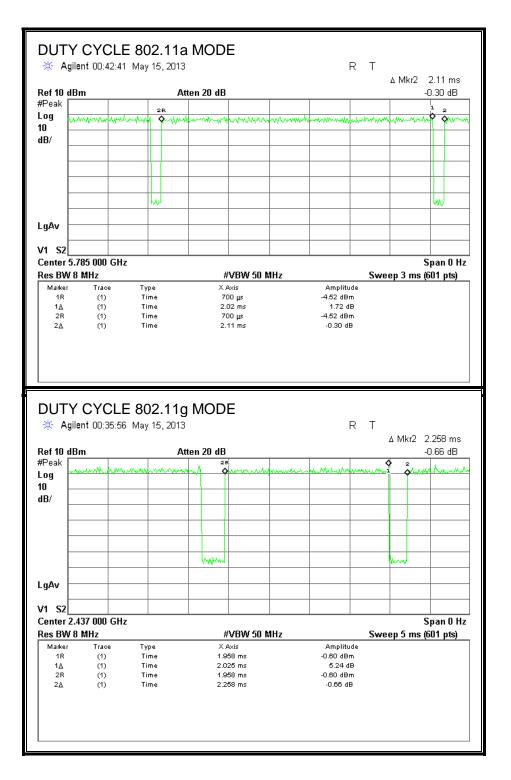
### 7.1.2. MEASUREMENT METHOD

KDB 558074 D01 DTS Measurement Guidance v03 was referenced during testing. Maximum Peak Conducted Power was measured using the method of section 9.1.2, thus method PKPSD is used for power spectral density.

Unwanted emissions within Restricted Bands are measured using traditional radiated procedures.

Page 13 of 119

## 7.1.3. DUTY CYCLE PLOTS



Page 14 of 119

			HT20 MOD	Ε			
🔆 🔆 Agilent (	00:38:30 N	/lay 15, 2013			R	Т	
						∆ Mkr2	2.067 ms
Ref 10 dBm		Att	en 20 dB				-1.34 dB
#Peak	marin		and and a second and a second	Ambarran		and an all and a	un a de la de la de
LUG	and the second	2R	- 1997 - 1997 - 1997 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996 - 1996		Y Y		
10							
dB/							
		- Wu			hund		
					- Parkalo		
LgAv							
-974							
W1 S2							
Center 2.437 (	00 GHz						Span 0 Hz
Res BW 8 MH	z		#VBW 50	MHz		Sweep 5 ms	
Marker	Ггасе	Туре	X Axis		Amplitude		· · · ·
1R	(1)	Time Ti	1.35 ms		1.15 dBm		
1∆ 2R	(1) (1)	Time Time	1.892 ms 1.35 ms		-1.54 dB 1.15 dBm		
2Δ	(1)	Time			1.15 dBm -1.34 dB		

Page 15 of 119

# 8. ANTENNA PORT TEST RESULTS

## 8.1. 802.11g MODE IN THE 2.4 GHz BAND

## 8.1.1.6 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.

### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer with the RBW set to 100 kHz, the VBW  $>= 3 \times RBW$ , peak detector and max hold.

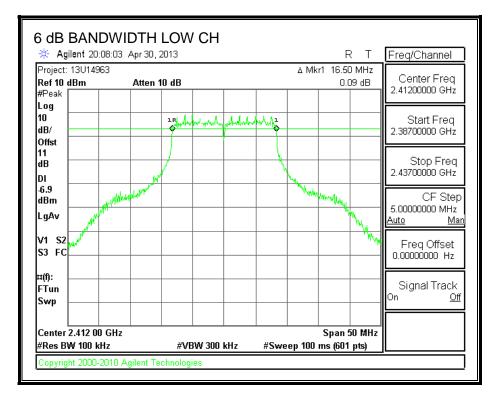
### **RESULTS**

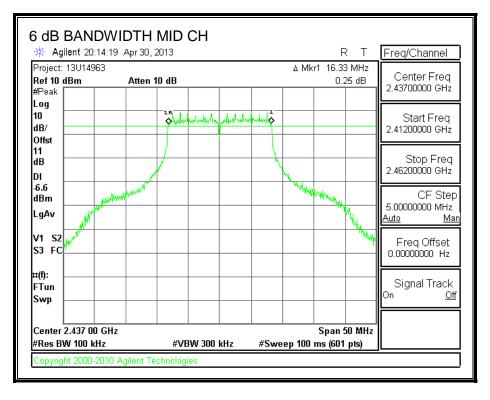
Channel	Frequency	6 dB Bandwidth	Minimum Limit
	(MHz)	(MHz)	(MHz)
Low	2412	16.500	0.5
Mid	2437	16.330	0.5
High	2462	16.330	0.5

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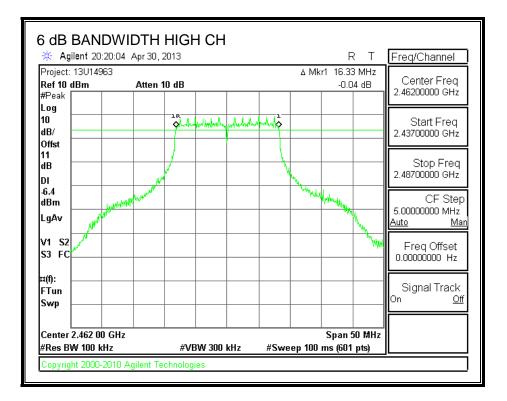
Page 16 of 119

#### 6 dB BANDWIDTH





Page 17 of 119



Page 18 of 119

### 8.1.2. 99% BANDWIDTH

#### LIMITS

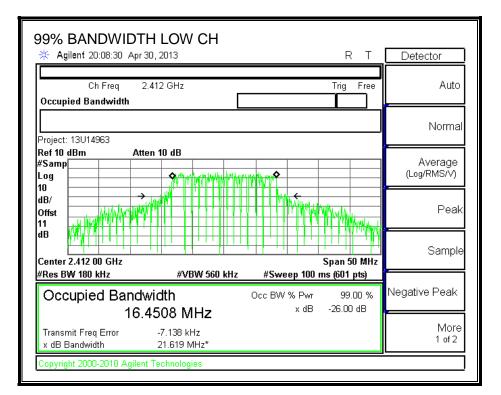
None; for reporting purposes only.

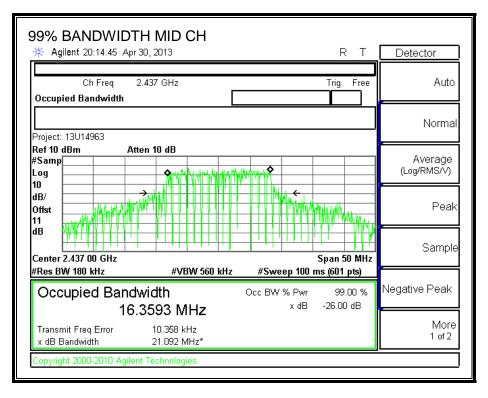
#### <u>RESULTS</u>

Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Low	2412	16.4500
Mid	2437	16.3600
High	2462	16.4200

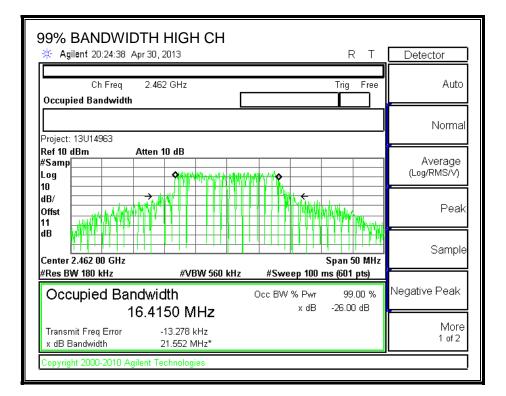
Page 19 of 119

#### 99% BANDWIDTH





Page 20 of 119



Page 21 of 119

### 8.1.3. AVERAGE POWER

#### **LIMITS**

None; for reporting purposes only.

#### TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

#### RESULTS

Channel	Frequency	Power
	(MHz)	(dBm)
Low	2412	8.87
Mid	2437	8.94
High	2462	9.09

Page 22 of 119

### 8.1.4. OUTPUT POWER

LIMITS

FCC §15.247

IC RSS-210 A8.4

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi 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 6 dBi.

#### **DIRECTIONAL ANTENNA GAIN**

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

Page 23 of 119

#### **RESULTS**

#### Limits

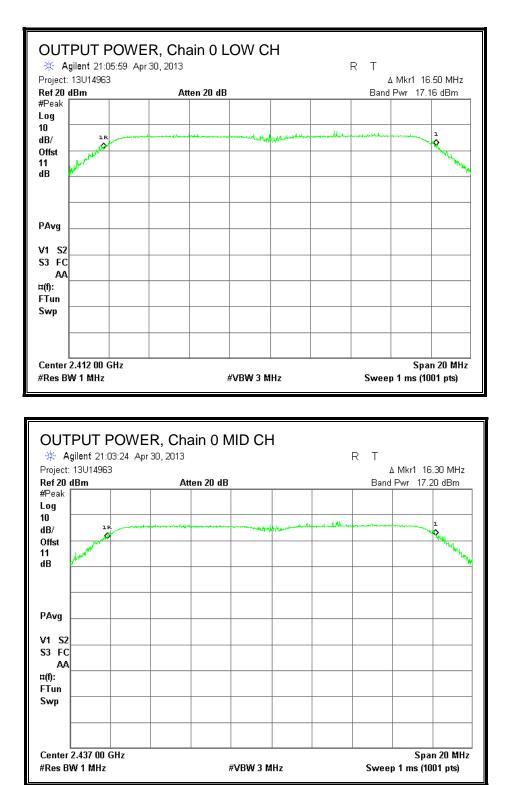
Channel	Frequency	Directional	FCC	IC	IC	Max
		Gain	Power	Power	EIRP	Power
			Limit	Limit	Limit	
	(MHz)	(dBi)	(dBm)	(dBm)	(dBm)	(dBm)
Low	2412	1.00	30.00	30	36	30.00
Mid	2437	1.00	30.00	30	36	30.00
High	2462	1.00	30.00	30	36	30.00

#### Results

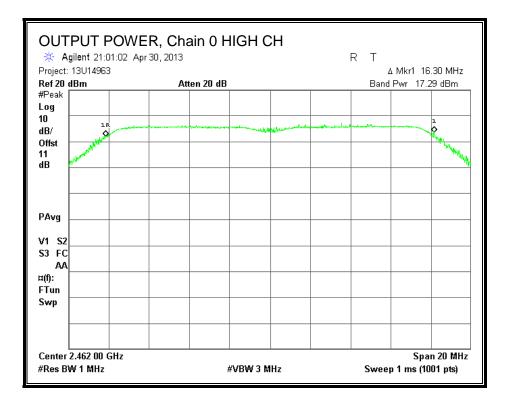
Channel	Frequency	Chain 0	Total	Power	Margin
		Meas	Corr'd	Limit	
		Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Low	2412	17.16	17.16	30.00	-12.84
Mid	2437	17.20	17.20	30.00	-12.80
High	2462	17.29	17.29	30.00	-12.71

Page 24 of 119

#### OUTPUT POWER, Chain 0



Page 25 of 119



Page 26 of 119

### 8.1.5. PSD

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

FCC §15.247

IC RSS-210 A8.2

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

#### **RESULTS**

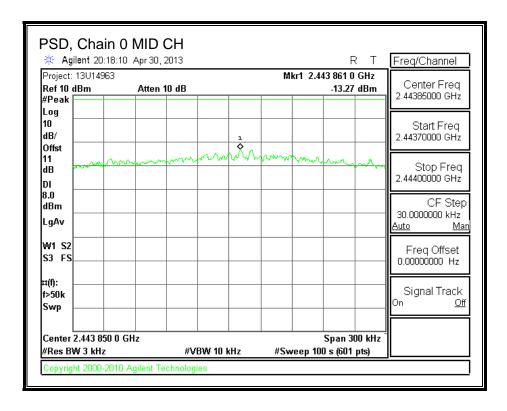
#### **PSD** Results

Channel	Frequency	Chain 0	Limit	Margin
		Meas		
	(MHz)	(dBm)	(dBm)	(dB)
Low	2412	-13.65	8.0	-21.7
Mid	2437	-13.27	8.0	-21.3
High	2462	-14.49	8.0	-22.5

Page 27 of 119

#### PSD, Chain 0

Agilent 20:11	0 LOW CH 20 Apr 30, 2013		R	T Freq/Channel
Project: 13U14963 Ref 10 dBm #Peak	Atten 10 dB		Mkr1 2.412 587 4 G -13.65 d	Contor From
Log 10 dB/ Offst		1		Start Freq 2.41245000 GHz
dB	Among and the second second		man	Stop Freq 2.41275000 GHz
8.0 dBm LgAv				CF Step 30.0000000 kHz <u>Auto Man</u>
W1 S2 S3 FS				Freq Offset 0.00000000 Hz
¤(f): f>50k Swp				Signal Track On <u>Off</u>
Center 2.412 600 ( #Res BW 3 kHz		BW 10 kHz	Span 300 #Sweep 100 s (601 pt	



Page 28 of 119

· •		8 Apr 30, 3	2015					F		Freq/Channel
Project: 13 Ref 10 dB #Peak		Atten '	10 dB			MI	kr1 2.46	65 740 5 -14.49		Center Freq 2.46575000 GHz
Log 10 dB/ Offst				1						Start Freq 2.46560000 GHz
dB	mm	m	m	mph	~~~~	ww.	~~~	<u>~~</u>	∞៹៱∆	Stop Freq 2.46590000 GHz
8.0 dBm										CF Step 30.0000000 kHz
W1 S2 S3 FS										Auto Mar Freq Offset 0.00000000 Hz
¤(f): f>50k Swp										Signal Track On <u>Off</u>
Center 2.4 #Res BW 3		GHz	#\	BW 10 F	(H7	#514	eep 10(	Span 30 1 s <i>(</i> 601		

Page 29 of 119

### 8.1.6. 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.

#### TEST PROCEDURE

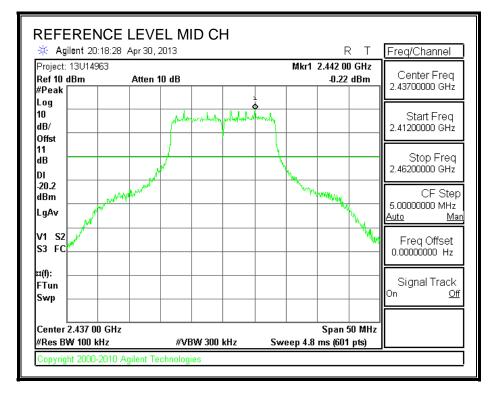
The transmitter output is connected to a spectrum analyzer with RBW = 100 kHz, VBW = 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the inband reference level, bandedge (where measurements to the general radiated limits will not be made) and out-of-band emissions.

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Page 30 of 119

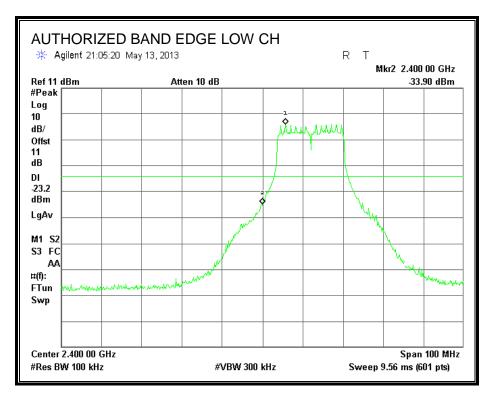
#### **RESULTS**

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

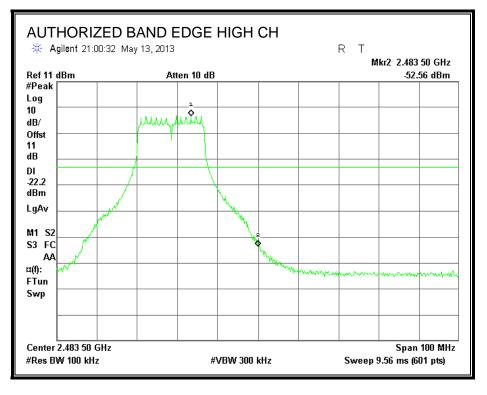


Page 31 of 119

#### LOW CHANNEL BANDEDGE

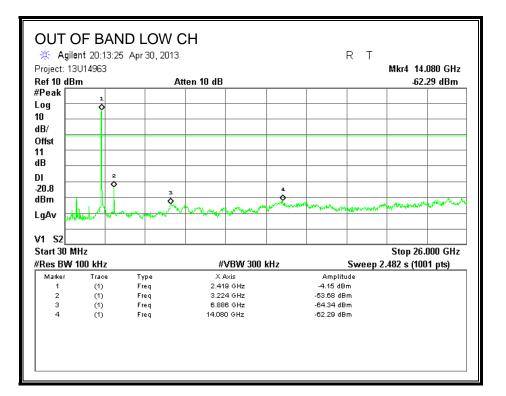


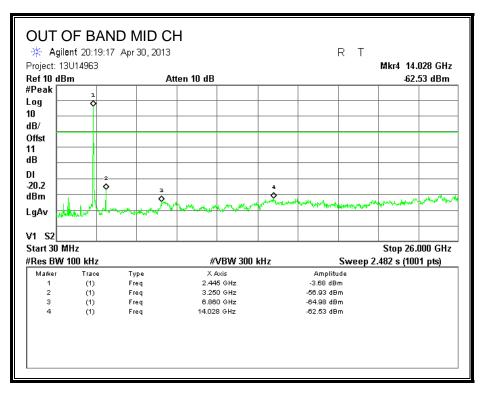
#### **HIGH CHANNEL BANDEDGE**



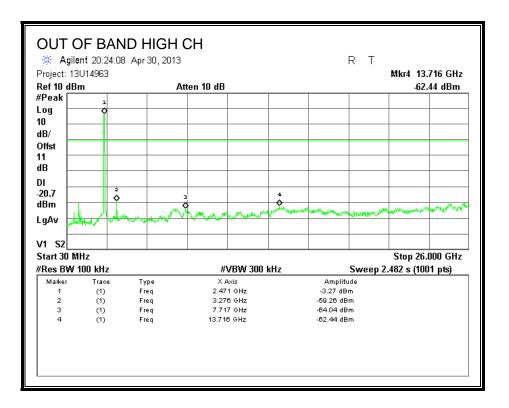
#### Page 32 of 119

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





Page 33 of 119



Page 34 of 119

### 8.2. 802.11n HT20 MODE IN THE 2.4 GHz BAND

### 8.2.1. 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.

#### TEST PROCEDURE

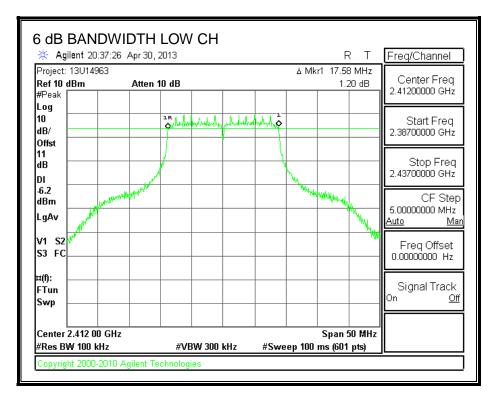
The transmitter output is connected to a spectrum analyzer with the RBW set to 100 kHz, the VBW  $>= 3 \times RBW$ , peak detector and max hold.

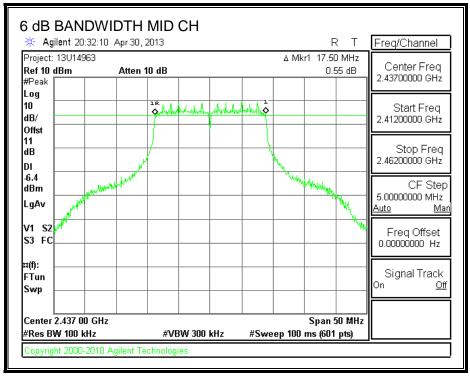
#### **RESULTS**

Channel	Frequency	6 dB Bandwidth	Minimum Limit
	(MHz)	(MHz)	(MHz)
Low	2412	17.580	0.5
Mid	2437	17.500	0.5
High	2462	17.580	0.5

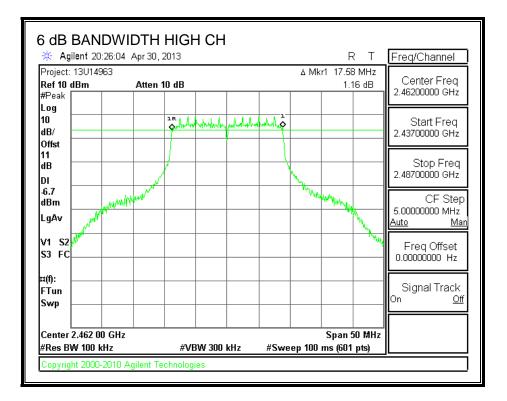
Page 35 of 119

#### 6 dB BANDWIDTH





Page 36 of 119



Page 37 of 119

# 8.2.2. 99% BANDWIDTH

# LIMITS

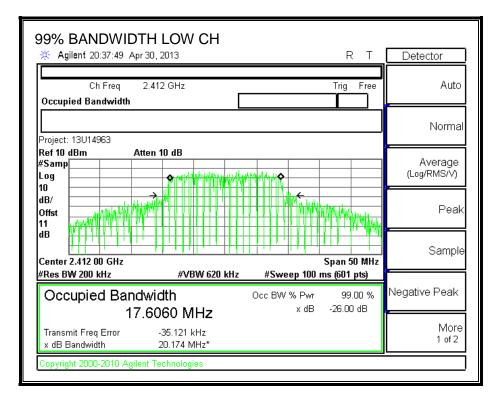
None; for reporting purposes only.

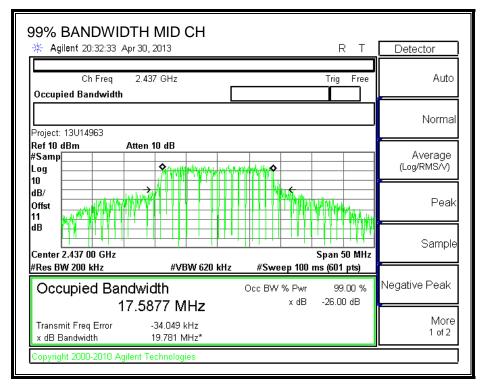
# <u>RESULTS</u>

Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Low	2412	17.6100
Mid	2437	17.5900
High	2462	17.6600

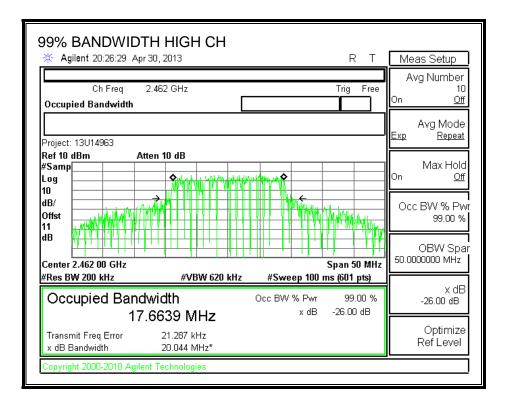
Page 38 of 119

#### 99% BANDWIDTH





Page 39 of 119



Page 40 of 119

# 8.2.3. AVERAGE POWER

## **LIMITS**

None; for reporting purposes only.

## TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

#### **RESULTS**

Channel	Frequency	Power
	(MHz)	(dBm)
Low	2412	9.28
Mid	2437	8.85
High	2462	9.01

Page 41 of 119

# 8.2.4. OUTPUT POWER

**LIMITS** 

FCC §15.247

IC RSS-210 A8.4

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi 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 6 dBi.

#### **DIRECTIONAL ANTENNA GAIN**

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

Page 42 of 119

# **RESULTS**

#### Limits

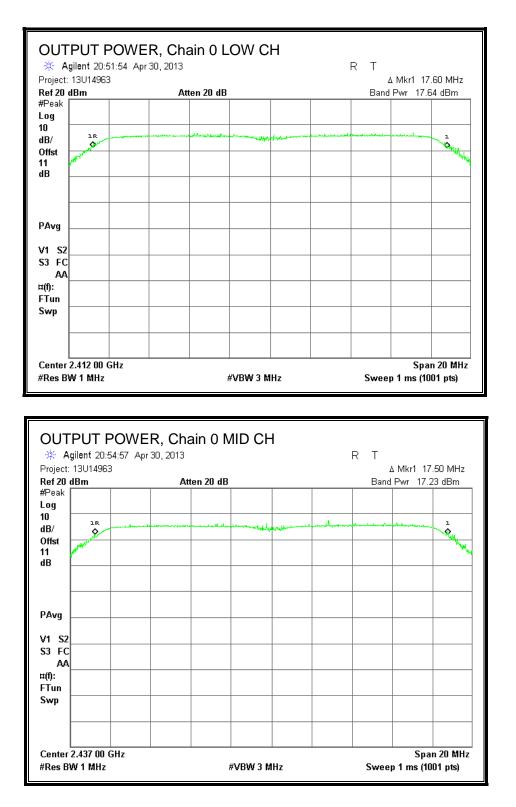
Channel	Frequency	Directional	FCC	IC	IC	Max
		Gain	Power	Power	EIRP	Power
			Limit	Limit	Limit	
	(MHz)	(dBi)	(dBm)	(dBm)	(dBm)	(dBm)
Low	2412	1.00	30.00	30	36	30.00
Mid	2437	1.00	30.00	30	36	30.00
High	2462	1.00	30.00	30	36	30.00

#### Results

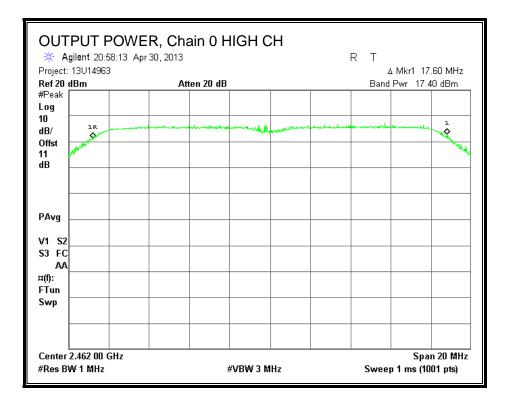
Channel	Frequency	Chain 0	Total	Power	Margin
		Meas	Corr'd	Limit	
		Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Low	2412	17.64	17.64	30.00	-12.36
Mid	2437	17.23	17.23	30.00	-12.77
High	2462	17.40	17.40	30.00	-12.60

Page 43 of 119

## OUTPUT POWER, Chain 0



Page 44 of 119



Page 45 of 119

# 8.2.5. PSD

# <u>LIMITS</u>

FCC §15.247

IC RSS-210 A8.2

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

## **RESULTS**

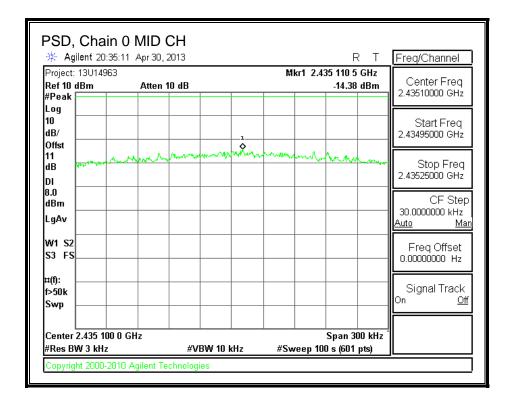
## **PSD** Results

Channel	Frequency	Chain 0	Limit	Margin
		Meas		
	(MHz)	(dBm)	(dBm)	(dB)
Low	2412	-13.78	8.0	-21.8
Mid	2437	-14.38	8.0	-22.4
High	2462	-14.59	8.0	-22.6

Page 46 of 119

# PSD, Chain 0

DI       2.41650000 GHz         B.0       dBm         LgAv       CF Stel         W1 S2       S3 FS         S3 FS       Signal Track         Center 2.416 350 0 GHz       Span 300 kHz	PSD, 🔆 Agi			L <b>OW</b> Apr 30, 2						F	? Т	Freq/Channel
10       dB/	Ref 10 ( #Peak		63	Atten 1	0 dB			M	kr1 2.41			Center Freq
11 dB DI 8.0 dBm dBm       Stop Freq 2.41650000 GHz         12 Stop Freq 2.41650000 GHz         10 CF Stel 30,0000000 Hz         11 Stop Freq 2.41650000 GHz         11 Stop Freq 2.41650000 Hz	10 dB/ Offert						1					
dBm         CF Stej           LgAv         Auto           W1 S2         S3 FS           S3 FS         Freq Offset           u(1):         Signal Track           Swp         Signal Track           Center 2.416 350 0 GHz         Span 300 kHz	11 dB DI	ada yaqda	un ann	- Anne	Moralla	~~~~+	man	harm	10	~~~~	n Mrn	Stop Freq 2.41650000 GHz
S3 FS         Image: S3 FS         Image: S3 FS         Image: S1 FS	dBm											
f>50k Swp Center 2.416 350 0 GHz Span 300 kHz												
	f>50k											Signal Track On <u>Off</u>
#Res BW 3 kHz #VBW 10 kHz #Sweep 100 s (601 pts)				lz	#V	BW 10 F	(Hz	#Sw		•		



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Page 47 of 119

🔆 Agilent :		Apr 30, 2	2013						t T	Freq/Channel
Project: 13U1 Ref 10 dBm #Peak	4963	Atten 1	0 dB			MI	kr1 2.45	7 565 8 -14.59		Center Freq 2.45760000 GHz
Log 10 dB/			1.							Start Freq 2.45745000 GHz
Offst 11 dB DI	an providence of	n anna an	an a	round	www.y	-s-m	mh	mutu		Stop Freq 2.45775000 GHz
8.0 dBm										CF Step 30.0000000 kHz
LgAv W1 S2										<u>Auto Mar</u> Freq Offset
S3 FS										0.00000000 Hz
f>50k Swp										Signal Track On <u>Off</u>
Center 2.457 #Res BW 3 k		Hz	#\/I	BW 10 I	(H <sub>7</sub>	#5	reep 100	Span 30 1 s (601		

Page 48 of 119

# 8.2.6. OUT-OF-BAND EMISSIONS

# <u>LIMITS</u>

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.

# TEST PROCEDURE

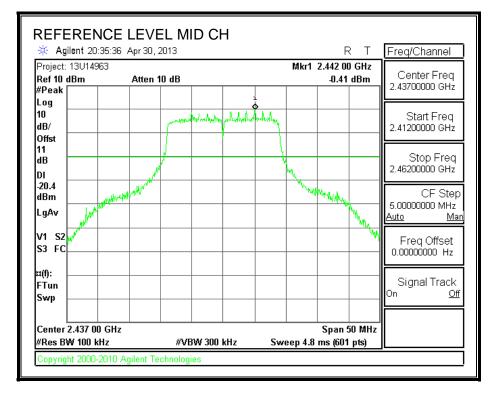
The transmitter output is connected to a spectrum analyzer with RBW = 100 kHz, VBW = 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the inband reference level, bandedge (where measurements to the general radiated limits will not be made) and out-of-band emissions.

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Page 49 of 119

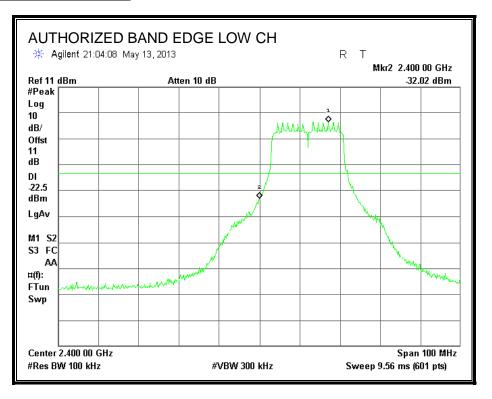
# **RESULTS**

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

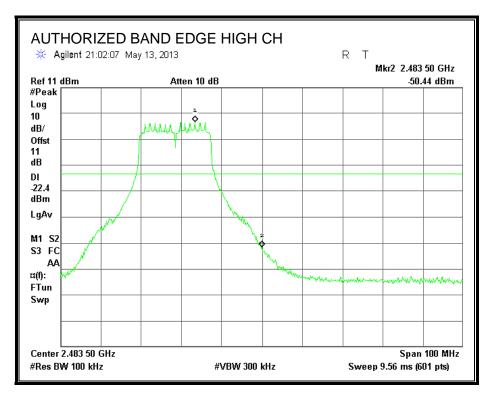


Page 50 of 119

#### LOW CHANNEL BANDEDGE

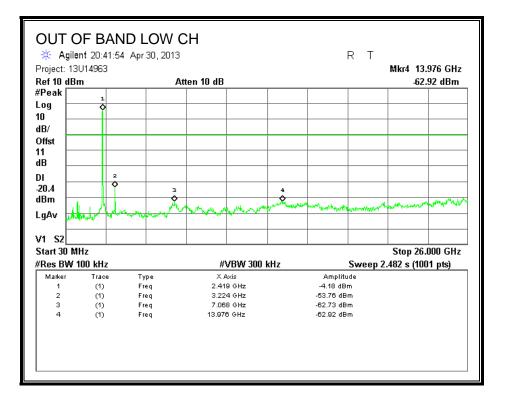


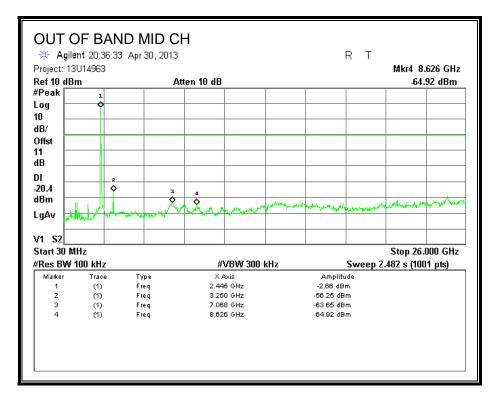
### **HIGH CHANNEL BANDEDGE**



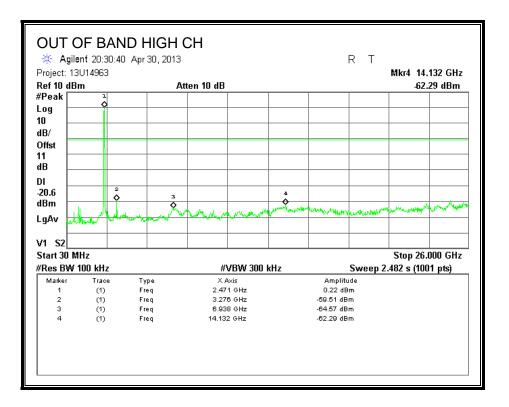
#### Page 51 of 119

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





#### Page 52 of 119



Page 53 of 119

# 8.3. 802.11a MODE IN THE 5.8 GHz BAND

# 8.3.1. 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.

## TEST PROCEDURE

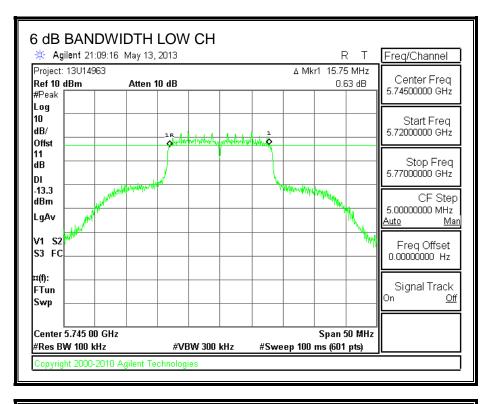
The transmitter output is connected to a spectrum analyzer with the RBW set to 100 kHz, the VBW  $>= 3 \times RBW$ , peak detector and max hold.

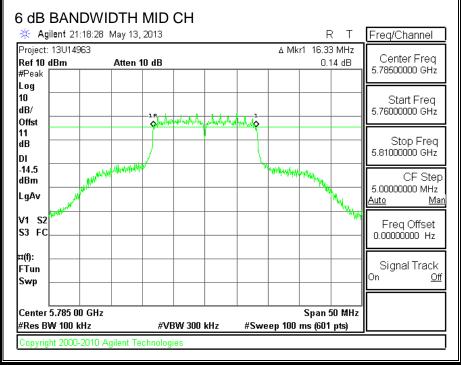
# <u>RESULTS</u>

Channel	Frequency	6 dB Bandwidth	Minimum Limit
	(MHz)	(MHz)	(MHz)
Low	5745	15.750	0.5
Mid	5785	16.330	0.5
High	5825	16.000	0.5

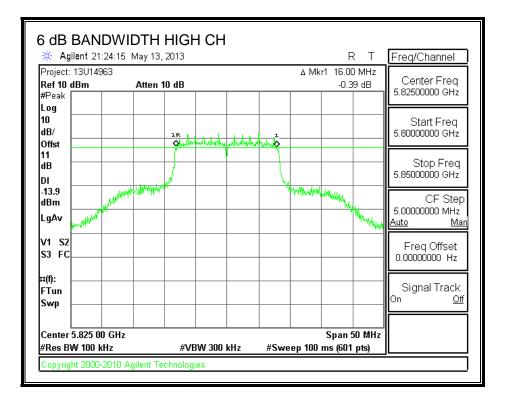
Page 54 of 119

# 6 dB BANDWIDTH





Page 55 of 119



Page 56 of 119

# 8.3.2. 99% BANDWIDTH

# LIMITS

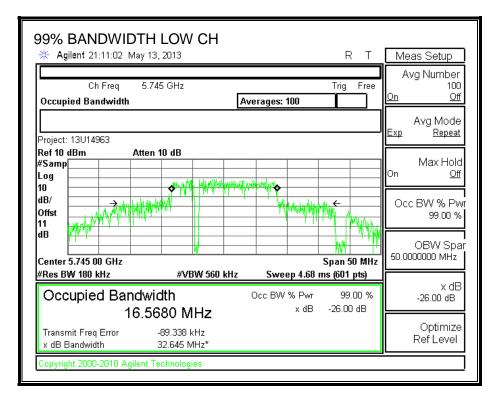
None; for reporting purposes only.

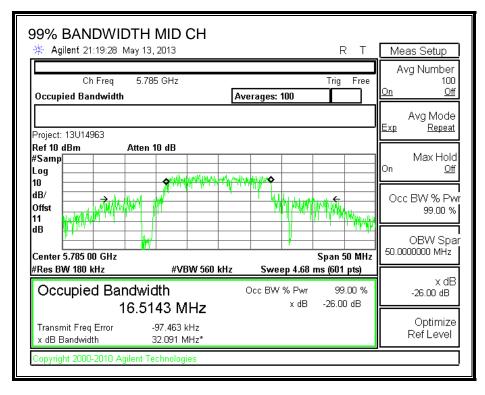
# **RESULTS**

Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Low	5745	16.5700
Mid	5785	16.5100
High	5825	16.6100

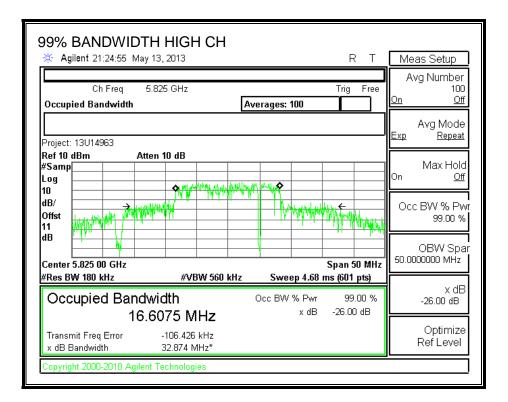
Page 57 of 119

#### 99% BANDWIDTH





Page 58 of 119



Page 59 of 119

# 8.3.3. AVERAGE POWER

## **LIMITS**

None; for reporting purposes only.

## TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

#### **RESULTS**

Channel	Frequency	Power
	(MHz)	(dBm)
Low	5745	6.00
Mid	5785	5.96
High	5825	5.99

Page 60 of 119

# 8.3.4. OUTPUT POWER

<u>LIMITS</u>

FCC §15.247

IC RSS-210 A8.4

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi 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 6 dBi.

#### DIRECTIONAL ANTENNA GAIN

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

Page 61 of 119

# **RESULTS**

#### Limits

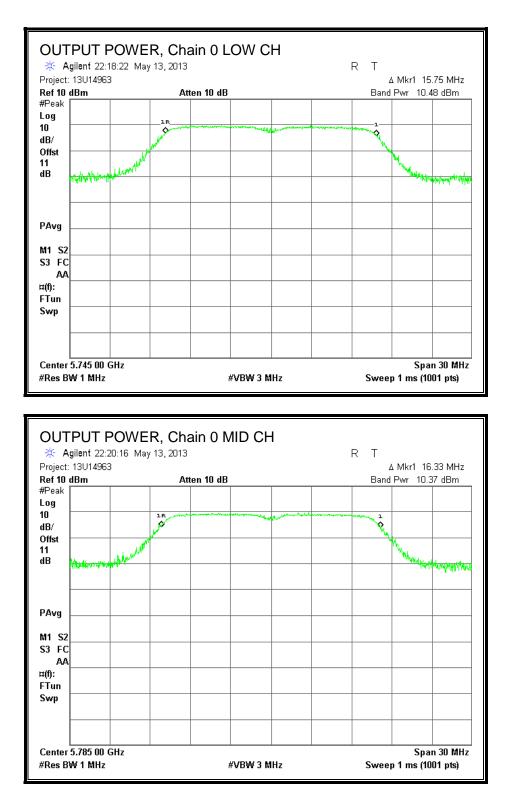
Channel	Frequency	Directional	FCC	IC	IC	Max
		Gain	Power	Power	EIRP	Power
			Limit	Limit	Limit	
	(MHz)	(dBi)	(dBm)	(dBm)	(dBm)	(dBm)
Low	5745	1.00	30.00	30	36	30.00
Mid	5785	1.00	30.00	30	36	30.00
High	5825	1.00	30.00	30	36	30.00

#### Results

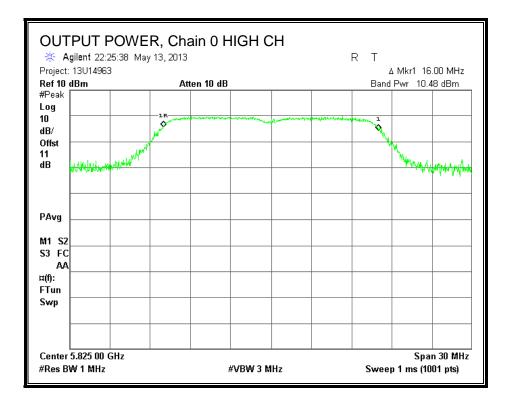
Channel	Frequency	Chain 0	Total	Power	Margin
		Meas	Corr'd	Limit	
		Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Low	5745	10.48	10.48	30.00	-19.52
Mid	5785	10.37	10.37	30.00	-19.63
High	5825	10.48	10.48	30.00	-19.52

Page 62 of 119

## OUTPUT POWER, Chain 0



Page 63 of 119



Page 64 of 119

# 8.3.5. PSD

# <u>LIMITS</u>

FCC §15.247

IC RSS-210 A8.2

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

## **RESULTS**

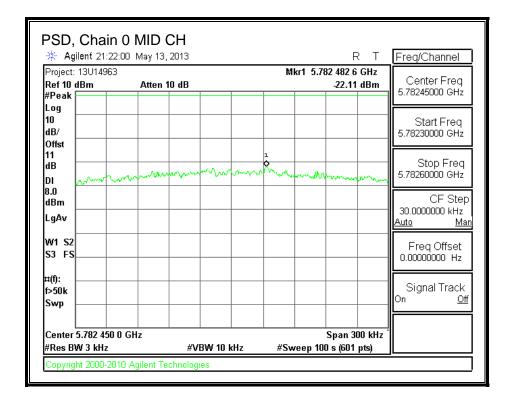
## PSD Results

Channel	Frequency	Chain 0	Limit	Margin
		Meas		
	(MHz)	(dBm)	(dBm)	(dB)
Low	5745	-20.45	8.0	-28.5
Mid	5785	-22.11	8.0	-30.1
High	5825	-22.23	8.0	-30.2

Page 65 of 119

## PSD, Chain 0

PSD, Chain 🔆 Agilent 21:13			R	T Freq/Channel
Project: 13U14963 Ref 10 dBm #Peak	Atten 10 dB		Mkr1 5.749 957 5 -20.45	GHz Contor From
Log 10 dB/ Offst				Start Freq 5.74980000 GHz
11 dB	mmmmmm	n n n n n n n n n n n n n n n n n n n	Munnman	Stop Freq 5.75010000 GHz
8.0 dBm LgAv				CF Step 30.0000000 kHz Auto Man
W1 S2 S3 FS				Freq Offset 0.00000000 Hz
¤(f): f>50k Swp				Signal Track
Center 5.749 950 #Res BW 3 kHz		W 10 kHz #	Span 30 Sweep 100 s (601 p	



Page 66 of 119

	Chain 0   ent 21:40:13						F	? Т	Freq/Channel
Project: 1 Ref 10 dl #Peak	13U14963 Bm	Atten 10 d	B		MI	kr1 5.82	3 092 5 -22.23		Center Freq 5.82310000 GHz
Log 10 dB/ Offst									Start Freq 5.82295000 GHz
11 dB DI	roman -	m	1 	maria ma	war		m	·····	Stop Freq 5.82325000 GHz
8.0 dBm LgAv									CF Step 30.0000000 kHz <u>Auto Man</u>
W1 S2 S3 FS									Freq Offset 0.00000000 Hz
¤(f): f>50k Swp –									Signal Track On <u>Off</u>
Center 5 #Res BW	.823 100 0 GH / 3 kHz	z	#VBW 10 F	(Hz	#Sw		Span 3( ) s (601		
Copyright	t 2000-2010 A	gilent Techn	ologies			-			

Page 67 of 119

# 8.3.6. OUT-OF-BAND EMISSIONS

# <u>LIMITS</u>

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.

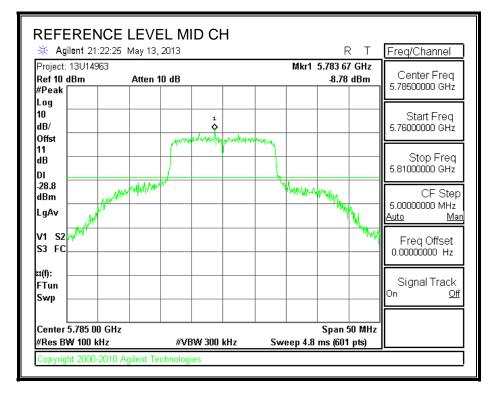
# TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer with RBW = 100 kHz, VBW = 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the inband reference level, bandedge (where measurements to the general radiated limits will not be made) and out-of-band emissions.

Page 68 of 119

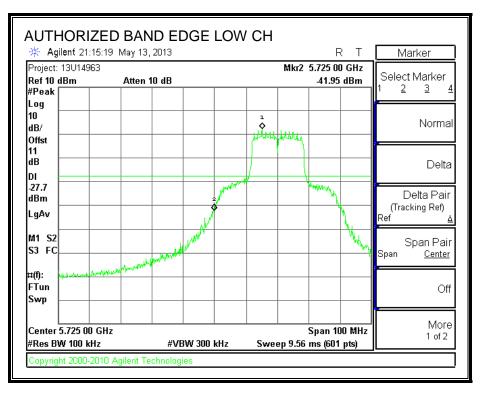
## **RESULTS**

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

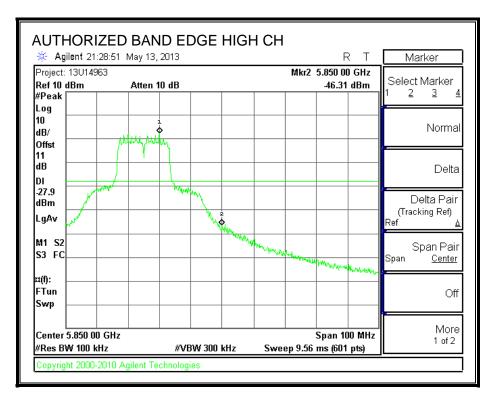


Page 69 of 119

# LOW CHANNEL BANDEDGE

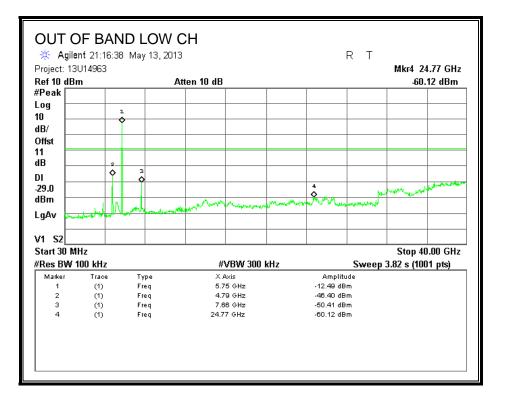


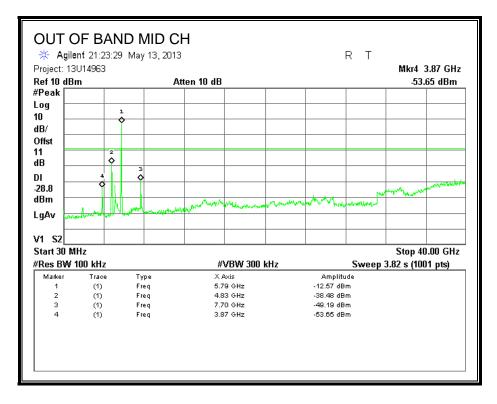
# HIGH CHANNEL BANDEDGE



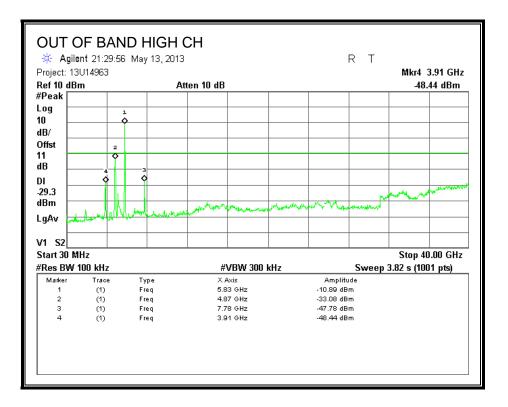
Page 70 of 119

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





#### Page 71 of 119



Page 72 of 119

# 8.4. 802.11n HT20 MODE IN THE 5.8 GHz BAND

## 8.4.1.6 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.

## TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer with the RBW set between 1% and 5% of the EBW, the VBW  $>= 3 \times RBW$ , peak detector and max hold.

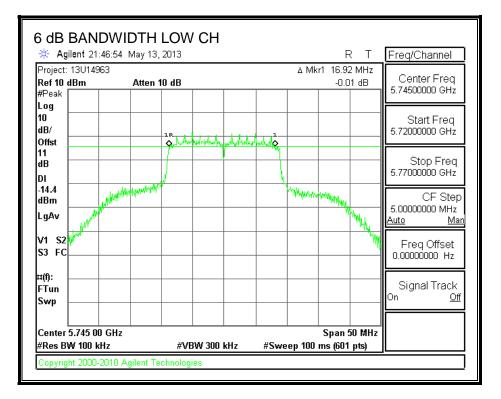
## **RESULTS**

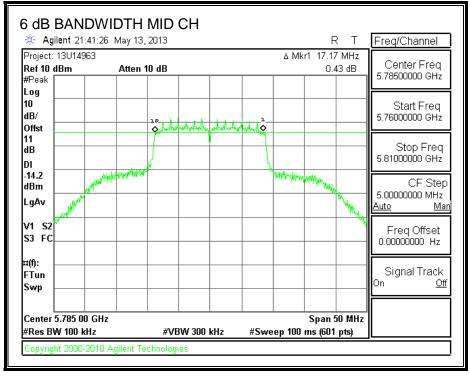
Channel	Frequency	6 dB Bandwidth	Minimum Limit
	(MHz)	(MHz)	(MHz)
Low	5745	16.920	0.5
Mid	5785	17.170	0.5
High	5825	16.670	0.5

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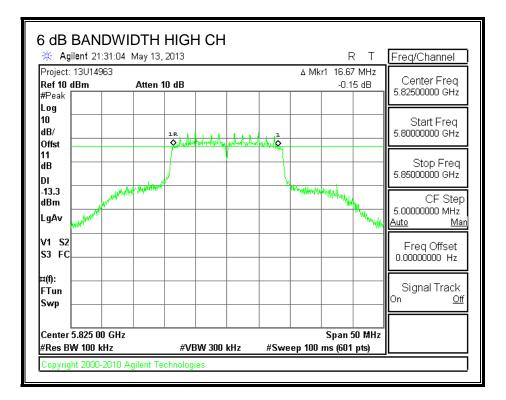
Page 73 of 119

### 6 dB BANDWIDTH





Page 74 of 119



Page 75 of 119

# 8.4.2. 99% BANDWIDTH

### LIMITS

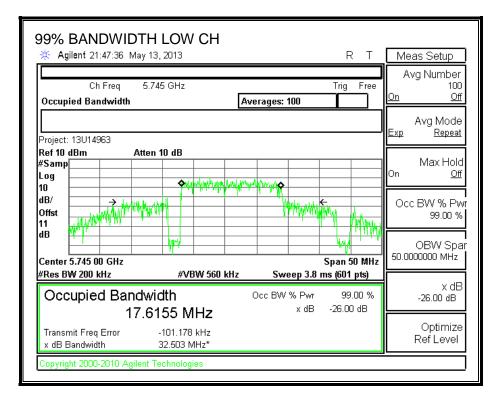
None; for reporting purposes only.

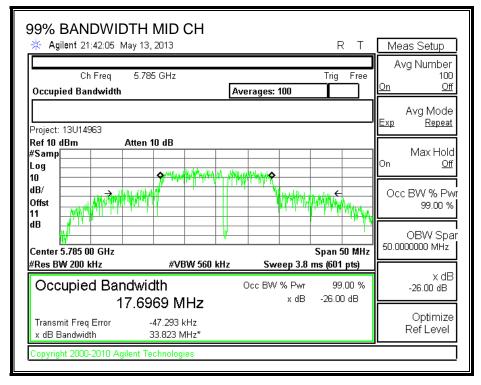
### **RESULTS**

Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Low	5745	17.6200
Mid	5785	17.6900
High	5825	17.7500

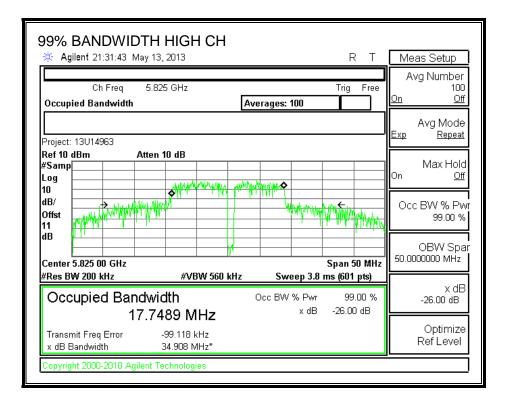
Page 76 of 119

### 99% BANDWIDTH





Page 77 of 119



Page 78 of 119

# 8.4.3. AVERAGE POWER

### **LIMITS**

None; for reporting purposes only.

### TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

### RESULTS

Channel	Frequency	Power
	(MHz)	(dBm)
Low	5745	5.96
Mid	5785	6.16
High	5825	6.19

Page 79 of 119

## 8.4.4. OUTPUT POWER

<u>LIMITS</u>

FCC §15.247

IC RSS-210 A8.4

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi 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 6 dBi.

### **DIRECTIONAL ANTENNA GAIN**

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

Page 80 of 119

### **RESULTS**

#### Limits

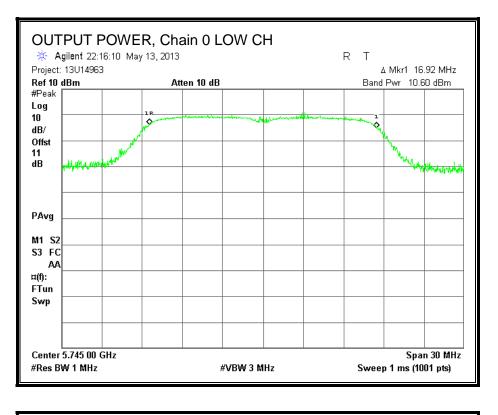
Channel	Frequency	Directional	FCC	IC	IC	Max
		Gain	Power	Power	EIRP	Power
			Limit	Limit	Limit	
	(MHz)	(dBi)	(dBm)	(dBm)	(dBm)	(dBm)
Low	5745	1.00	30.00	30	36	30.00
Mid	5785	1.00	30.00	30	36	30.00
High	5825	1.00	30.00	30	36	30.00

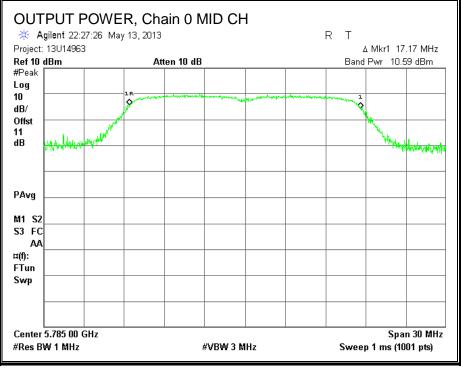
#### Results

Channel	Frequency	Chain 0	Total	Power	Margin
		Meas	Corr'd	Limit	
		Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Low	5745	10.60	10.60	30.00	-19.40
Mid	5785	10.59	10.59	30.00	-19.41
High	5825	10.79	10.79	30.00	-19.21

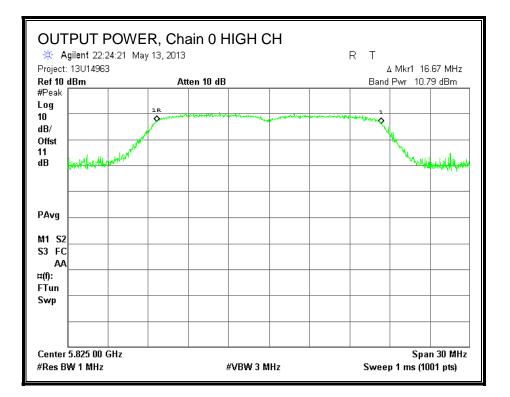
Page 81 of 119

### OUTPUT POWER, Chain 0





Page 82 of 119



Page 83 of 119

## 8.4.5. PSD

## <u>LIMITS</u>

FCC §15.247

IC RSS-210 A8.2

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

### **RESULTS**

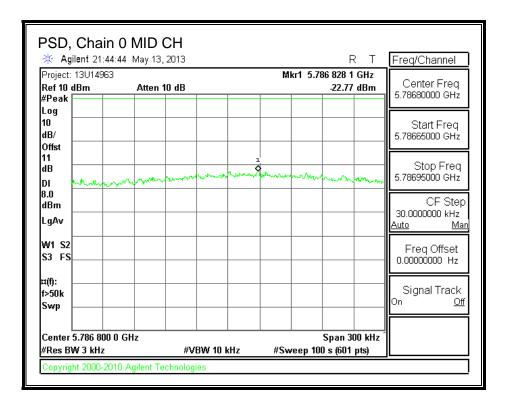
### PSD Results

Channel	Frequency	Chain 0	Limit	Margin
		Meas		
	(MHz)	(dBm)	(dBm)	(dB)
Low	5745	-22.59	8.0	-30.6
Mid	5785	-22.77	8.0	-30.8
High	5825	-22.53	8.0	-30.5

Page 84 of 119

### PSD, Chain 0

•	0 LOW CH			RТ	Freq/Channel
Project: 13U14963 Ref 10 dBm #Peak	-		Mkr1 5.74	10 542 4 GHz -22.59 dBm	Center Freq 5.74055500 GHz
Log 10 dB/ Offst					Start Freq 5.74040500 GHz
11 dB DI	man and a second	1 All Anno	······································	monthout	Stop Freq 5.74070500 GHz
8.0 dBm LgAv					CF Step 30.000000 kHz <u>Auto Man</u>
W1 S2 S3 FS					Freq Offset 0.00000000 Hz
¤(f): f>50k Swp					Signal Track <sup>On <u>Off</u></sup>
Center 5.740 555 #Res BW 3 kHz		BW 10 kHz	#Sweep 10	Span 300 kHz <sup>°</sup> ) s (601 pts)	
Copyright 2000-20	010 Agilent Technolog	ies			



Page 85 of 119

	:37 May 13, 2013		MI4 54	R T	Freq/Channel
Project: 13U14963 Ref 10 dBm #Peak	Atten 10 dB		MKr1 5.4	827 478 9 GHz -22.53 dBm	Center Freq 5.82750000 GHz
Log 10 dB/ Offst					Start Freq 5.82735000 GHz
11 dB DI 8.0		1 W. 1. 14 mar 1	the way was a second	. Marine	Stop Freq 5.82765000 GHz
dBm LgAv					CF Step 30.000000 kHz <u>Auto Mar</u>
W1 S2 S3 FS					Freq Offset 0.00000000 Hz
¤(f): f>50k Swp					Signal Track On <u>Off</u>
Center 5.827 500 #Res BW 3 kHz		BW 10 kHz	#Swoon 1	Span 300 kHz 00 s (601 pts)	ļ

Page 86 of 119

# 8.4.6. OUT-OF-BAND EMISSIONS

<u>LIMITS</u>

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.

## TEST PROCEDURE

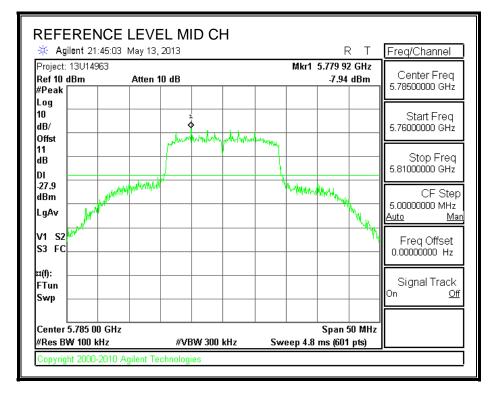
The transmitter output is connected to a spectrum analyzer with RBW = 100 kHz, VBW = 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the inband reference level, bandedge (where measurements to the general radiated limits will not be made) and out-of-band emissions.

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Page 87 of 119

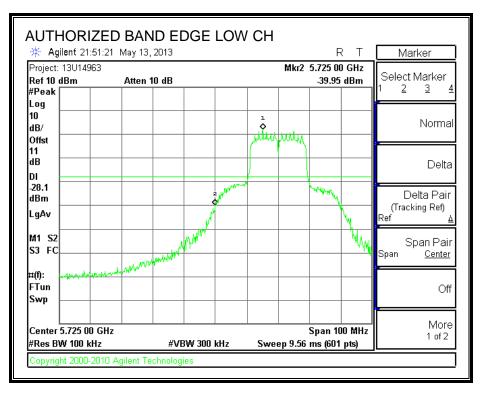
### **RESULTS**

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

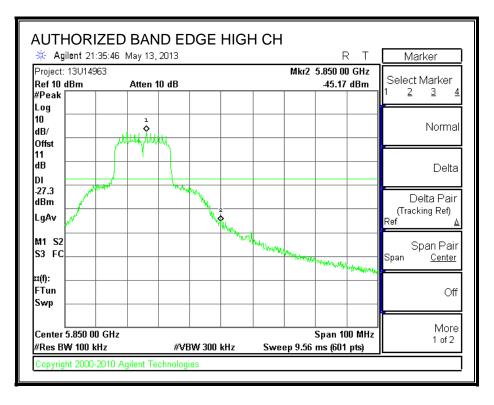


Page 88 of 119

### LOW CHANNEL BANDEDGE

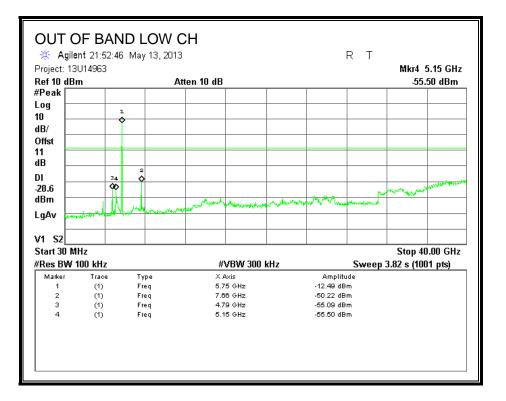


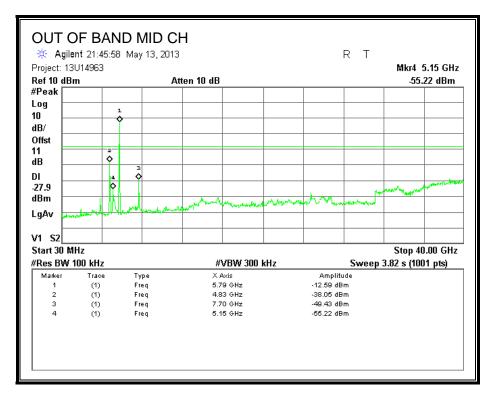
### HIGH CHANNEL BANDEDGE



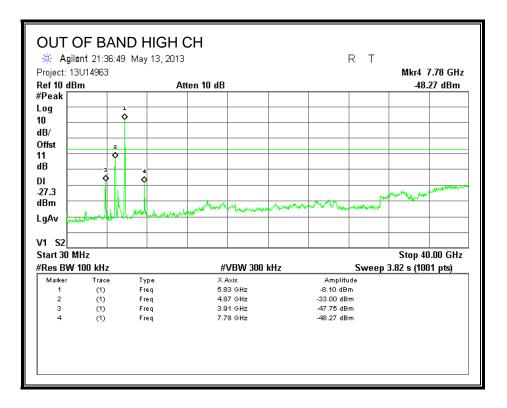
Page 89 of 119

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





#### Page 90 of 119



Page 91 of 119

# 9. RADIATED TEST RESULTS

# 9.1. LIMITS AND PROCEDURE

## <u>LIMITS</u>

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (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 1 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.

Based on the measured duty cycle of the EUT, the VBW was set to 1 kHz for all final measurements.

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Page 92 of 119

# 9.2. TRANSMITTER ABOVE 1 GHz

# 9.3. TX ABOVE 1 GHz 802.11g MODE IN THE 2.4 GHz BAND

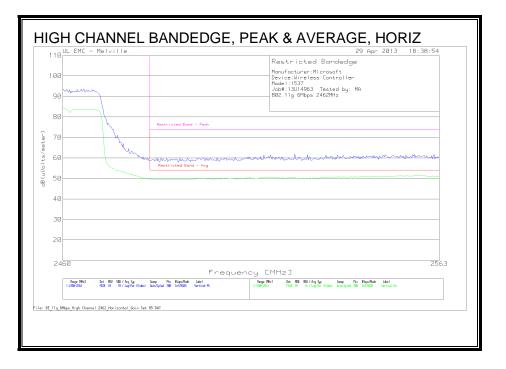
## **RESTRICTED BANDEDGE (LOW CHANNEL)**

	29 Apr 2013 18:09:13 Restricted Bandedge
aa	Monufacturer:Microsoft Device:Wireless Controller Model:1537
e	Job#:13U14963 Tested by: MA 802.11g 6Mbps 2412MHz
Restricted Band - Peak	
70	
50 Kestr loted Band - Avg	man - man
50	
40	
30	
20	
2310	241
	Frequency [MHz]
	Label Range DHtz1 Det FE4 UB4 / Avg Typ Sweep Pits #Supp/Node Label
Remot Effect         Det.         RSU         RSU         Light         Seesp         Pils         Esgen/Robel           1/2218-2415         FESK         IN         14         Lagrier (Educa)         Elsacc         568         Lef/NoRE	Harizandal-PA 2.238-205 PEAR IN No / Log-For Oldano .85ake 580 Enf/1088 Harizandal-94

	MC - Melville	Restricted Bandedge	19 Apr 2013 18:13:21
00		Manufacturer:Microsoft Device:Wireless Controller Model:1537 Job#:13U14963 Tested by: M	۵
90		802.11g 6Mbps 2412MHz	minin
80			
70	tricted Band - Peak		J. J.
60			man
	and a stand and a stage of the	www.hall.	
50			
40			
30			
20			
2310	Frequency [	- MUL - 7	241
	(Mitr] Det 1934 USE / Sun Tun Suren Pita Kiura-Node Label Pance I	Hrl Det Bill (Ava Jun Sween Pis	15ips/fide Latel
Rang	15 PEak IN 1N / Lag-Par (Uldao) .B5acc 508 Inf/M001 Vertical-Pk 2:2305201	PEAK IN IK/Log-Far (Noice) .85ac 588	Inf/NOH Vertical-Av
Rong 1:2318-			

Page 93 of 119

### AUTHORIZED BANDEDGE (HIGH CHANNEL)



10UL EMC - Melv	ville	29 Apr 2013 18:43:46
98		Restricted Bandedge Monufacturer:Nicrosoft Device:Nicreless Controller Model:1537 JobW:13U14963 Tested by: MA 802.11g 6Mbps 2462MHz
80		
\	Restricted Bond - Peak	
70	h.	
60	Mannananan	month and the second se
	Restricted Bond - Avg	
50		
40		
30		
20		
2460		25
Range [Mitz] Det 1984		equency EMHz]   Renge 1941] Det 1954 UBJ / Ang Tup Seep Pis 195ps/Node Latel
1:2468-2563 PEAK IN	9/ USE / Ang Tup Sweep Pits #Sweep/Node Label 1 18 / Lag-Pier (Uldaco) Auto/Tpiled 508 Inf/MADH Vertical-Pik	Ronge DHull Det 1958 UBL/Ang 1go Seeng Pits Fispe/Nede Lakel 2:24587-2533 PE34 IN 16 /Lag-file Ubland Auto/Galad 398 Enr/19681 Ularitani-An
1g 6Mbps High Channel 2462 Ve	ertical_Gain Set 85.DAT	

Page 94 of 119

### HARMONICS AND SPURIOUS EMISSIONS

Device:Wireless Co Model:1537 Job#:13U14963 Te: 11g 6Mbps Mode Low Channel - 2412												
Job#:13U14963 Tes 11g 6Mbps Mode	ested by	er										
11g 6Mbps Mode	ested by											
11g 6Mbps Mode		: MA/RM										
Low Channel - 2412												
	2MHz											
Me	leter		AF-48106	BOMS		FCC Part 15		FCC Part 15		Azimuth	Height	
Test Frequency Re	eading	Detector	[dB/m]	Factor [dB]	dB(uVolts/meter)	Subpart C 15.209	Margin (dB)	Subpart C Peak	Margin (dB)			Polarity
4825.7034	-		27.1									Horz
4824.8517			27.1	-53.54	47.05	-	-	74	-26.95	336	381	Vert
4825.7034			27.1				-25.13				340	
4824.8517			27.1						-	336	381	Vert
Mid Channel - 2437	7MHz											
Me	eter		AF-48106	BOMS		FCC Part 15		FCC Part 15		Azimuth	Height	
		Detector			dB(uVolts/meter)	Subpart C 15.209	Margin (dB)		Margin (dB)		-	Polarity
4875.022	_		27.2									Vert
4875.3527			27.2					74			252	
4875.022			27.2				-22.51				384	
4875.3527			27.2				-22.51			77		Horz
40/3.332/	33.40	LINAV	21.2	-35.20	23.42	54	-24.30	-	-		232	HUIZ
High Channel - 2462	2MHz											
			AF-48106			FCC Part 15		FCC Part 15		Azimuth		
	leter				10/14/14/14/14/14							
4924.7816	-					Subpart C 15.209						Vert
4924.7816			27.2				-				392	
			27.2					74				
4924.7816			27.2				-22.54		-		400	
4924.4509	55.41	LnAv	27.2	-53.34	29.27	54	-24.73	-	-	173	392	Horz
PK - Peak detector												
LnAv - Linear Averag	age dete	ector										
NOTE: No other em	nissions	detected	above the	system nois	e floor.							

Page 95 of 119

# 9.4. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 2.4 GHz BAND

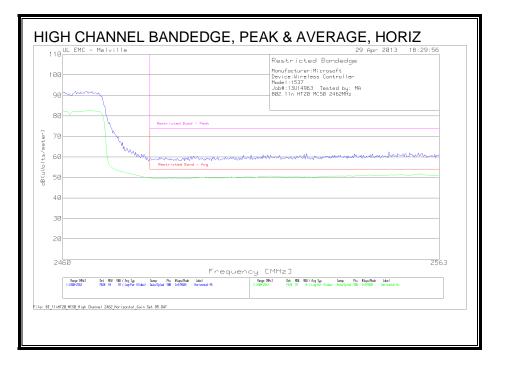
### **RESTRICTED BANDEDGE (LOW CHANNEL)**

10 UL EMC - Melville	29 Apr 2013 18:24:50 Restricted Bandedge Monufacturer:Hicrosoft Device:Wireless Controller Model:1537 Job8:130/1963 Tested by: MA 882:110.HT28 MC58 2412MHz
30 Restricted Bord - Peak	
70 Restricted Band - Reg	where the second s
10	
20	
2310	Frequency [MHz]
Page (1952) Det 1959 1988 / Ang 1ge Seep Pis Kieje/Rode Label 1/2016/2413 PDK IN 14 / Lag-Fer (Tubac) "Esse 398 Inf/1988 Himman	Desp. (Hz)         Dit         HB         MB / Apg Sp         Seep         Pits         Spc/Mail         Latel           2.2287-N15         F16         N         /Log We filded         Race 508         Sc/Mail         Retracted or

110	UL EMC - Melville	29 Apr 2013 18:18:48 Restricted Bandedge
100 90		Nonufacturer:Hiprosoft Device:Wireless Controller Node (132) Jobel : J301/433 Tested by: MA 682:11n 41/28 4/58 2412/Hz
80	Restricted Bond - Peak	
76		
66	Restricted Sond - Ava	
50	]	
46	]	
30	]	
20	]	
2	310 Frequency	
		e DHu] Det 1954 USH / Ava Tua Sweep Pits 15kos/Node Label
	T20 MCS0 Low Channel 2412 Vertical Gain Set 88.DAT	

Page 96 of 119

### AUTHORIZED BANDEDGE (HIGH CHANNEL)



10 UL EMC - Me	lville			29 Apr	2013 18:34:07
				stricted Bandedge	
80			Dev	nufacturer:Microsoft vice:Wineless Controller Hel:1537	
mm			Job	del:1537 o#:13U14963 Tested by: MA 2.11n HT20 MC50 2462MHz	
90	1		002	2.116 6120 6030 2462862	
80					
		Restricted Bond - Peak			
70					
	1 miles				
60	1 1140	Restricted Band - Avg	Mannaharan	And and a second and a second	
50					
40					
30					
20					
2460		Foo	quency EMH		256
Ronge [#ftz] Der	L REU VEU / Ang Typ X IH 111 / Lag-Flar (Video)		Renoe DHz	Det 1934 URI ( Ave Tun Saren Pis Hans/Node	Lakel
1:2468-2563 PE	¥ IH 1H / Lag-Pŵr (Uidao)	ato/Tpled 508 Inf/MADH Vertical-Pk	2:2486-2563	PEAK IM Ik / Log-For (lidee) Acto/Epicel 588 Enf/MOR	Vertical-Av
L					
InHT28 MCS8 High Channel	2462_Vertical_Gain Set	85.DAT			

Page 97 of 119

### HARMONICS AND SPURIOUS EMISSIONS

Device:Wireless ( Model:1537 Job#:13U14963 T 11n HT20 MCS0 M												
Job#:13U14963 T	Controlle	er										
11n HT20 MCS0 M	Tested by	: MA/RM										
	lode											
Low Channel - 241	12MHz											
	Meter	_	AF-48106			FCC Part 15		FCC Part 15		Azimuth	-	
	-					Subpart C 15.209	Margin (dB)					
4825.2625			27.1				-	74				Vert
4824.992			27.1					/ 1			150	
4825.2625			27.1				-23.07		-		338	
4824.992	55.57	LnAv	27.1	-53.55	29.12	54	-24.88	-	-	216	150	Horz
Mid Channel - 243	37MHz											
	Meter Reading	Detector	AF-48106 [dB/m]		dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	FCC Part 15 Subpart C Peak	Margin (dB)	Azimuth [Degs]	-	Polarity
4875.0421			27.2				-					Vert
4874.1804			27.2			-		74			301	Horz
4875.0421			27.2			54	-22.71	-	-	188	390	Vert
4874.1804	56.61	LnAv	27.2	-53.25	30.56	54	-23.44	-	-	74	301	Horz
High Channel - 24	62MHz											
	Meter	Detertor	AF-48106			FCC Part 15 Subpart C 15.209	Manaia (dD)	FCC Part 15	Massia (dB)	Azimuth	-	Palacity
4924.4208	-		27.2				Margin (db)					Vert
4923.8998			27.2				-	74			336	
4924.4208				-53.33			-21.94			173		Vert
4923.8998			27.2						-	175		Horz
1525.0550	22.2	210.00	27.2		25.0	5.	2			1.15		
PK - Peak detecto	or											
LnAv - Linear Aver	rage dete	ector										
NOTE: No other er	missions	detected	above the	system nois	e floor.							

Page 98 of 119

# 9.5. TX ABOVE 1 GHz 802.11a MODE IN THE 5.8 GHz BAND

#### HARMONICS AND SPURIOUS EMISSIONS

Device:Wireles	Aicrosoft											
	s Controll	er										
Model:1537												
Job#:13U14963	Tested	By: RM/DC										
11a 6Mbps												
Low Channel - 5	745MHz											
	Meter		AF-8933	BOMS		FCC Part 15		FCC Part 15		Azimuth	-	
Test Frequency	-					Subpart C 15.209	Margin (dB)					Polarity
11490.18			33.4		54.52	-	-			142		Horz
11489.619	67.17	PK	33.4	-49.04	51.53	-	-	74	-22.47	213	244	Vert
11490.18	61.29	LnAv	33.4	-49.05	45.84	54	-8.16	-	-	142	400	Horz
11489.619	60.4	LnAv	33.4	-49.04	44.96	54	-9.04	-	-	213	244	Vert
Test Frequency	Meter Re	Detector	AF-8947 [dB/m]		dB(uVolts/mater)	FCC Part 15 Subpart C 15.209	Margin (dB)	FCC Part 15 Subpart C Peak	Margin (dB)	Azimuth	-	Polarity
22979.884			40.6		44.63			74		324		Vert
22979.884			40.6		39.76		-	74	-29.57			Horz
22979.884			40.6					/4	-54.24	324		Vert
22979.884			40.6					-	-	199		Horz
223/3.004	50.66	LINAV	40.6	-55.25	50.55	54	-15.61	-	-	199	570	HOLZ
Mid Channel - 5	785MHz											
	Meter		AF-8933	BOMS		FCC Part 15		FCC Part 15		Azimuth	-	
Test Frequency						Subpart C 15.209	Margin (dB)					Polarity
11570.441			33.5		64.53		-	74	-9.47	2		Vert
11570.621			33.5					74	-20.41			Horz
11570.441			33.5		52.08				-	2		Vert
11570.621	61.36	LnAv	33.5	-49.66	45.4	54	-8.6	-	-	307	381	Horz
High Channel - 5	825MHz											
Test Frequency	Meter	Detector	AF-8933 [dB/m]		dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	FCC Part 15 Subpart C Peak	Margin (dB)	Azimuth	-	Polarity
11650.822	-		33.6		64.73			74	-9.27	315		Horz
11650.822			33.6				-	74				Vert
11650.822			33.6		52.44							Horz
11650.822			33.6		52.44				-	312		Vert
												-
		ector										
PK - Peak detect LnAv - Linear Av	erage det											

Page 99 of 119

# 9.6. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.8 GHz BAND

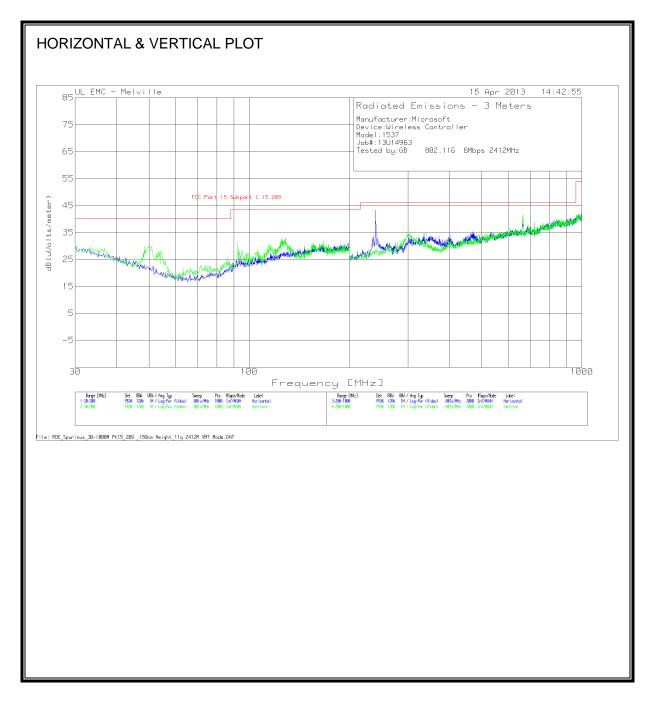
### HARMONICS AND SPURIOUS EMISSIONS

	Nicrosoft											
Device:Wireles	s Controll	er										
Model:1537												
Job#:13U14963	Tested	By: RM/DC										
11n HT20 MCS0												
Low Channel - 5	745MHz											
Test Frequency	Meter	Datastas	AF-8933		d P(v) (alta (mataa)	FCC Part 15 Subpart C 15.209	Margin (dB)	FCC Part 15	Marcia (dB)	Azimuth		Polarity
	_		33.4		62.47		Margin (ub)	500part C Peak 74		[Degs] 310	[cm]	Horz
11491.062							-					
11489.78			33.4						-18.42			Vert
11491.062			33.4						-	310		Horz
11489.78	61.75	LnAv	33.4	-49.04	46.31	54	-7.69	-	-	307	322	Vert
T F	Manag	D	AF-8947			FCC Part 15	Manaia (dD)	FCC Part 15	Manaia (dD)	Azimuth	-	Delecito
Test Frequency 22979.739			(dB/m) 40.6			Subpart C 15.209				[Degs] 351	• •	Polarity Vert
22979.739			40.6							90		Horz
22979.739			40.6						-	351		Vert
22979.739	51.56	LnAv	40.6	-53.3	39.06	54	-14.94	-	-	90	296	Horz
Mid Channel - 5	785MHz											
	Meter		AF-8933	BOMS		FCC Part 15		FCC Part 15		Azimuth	Height	
Test Frequency	Reading	Detector	[dB/m]			Subpart C 15.209	Margin (dB)	Subpart C Peak	Margin (dB)	[Degs]	[cm]	Polarity
11568.357	77.94	PK	33.5	-49.51	61.93		-	74	-12.07	19	350	Vert
11569.78	67.6	PK	33.5	-49.64	51.46	-	-	74	-22.54	60	358	Horz
11568.357	61.66	LnAv	33.5	-49.51	45.85	54	-8.15	-	-	19	350	Vert
11569.78	60.68	LnAv	33.5	-49.64	44.74	54	-9.26	-	-	60	358	Horz
High Channel - 5	825MHz											
Test Frequency	Meter Reading	Detector	AF-8933 [dB/m]	BOMS Factor [dB]	dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	FCC Part 15 Subpart C Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
11650.701	-		33.6							309		Horz
11650.42	74.4	PK	33.6	-49.79	58.21	-	-	74	-15.79	312	397	Vert
11050.42			33.6					-		309		Horz
11650.701			33.6						-	312		Vert
	00.40											
11650.701 11650.42												
11650.701	tor	ector										

Page 100 of 119

# 9.7. WORST-CASE BELOW 1 GHz

## SPURIOUS EMISSIONS 30 TO 1000 MHz (2.4GHZ WORST-CASE CONFIGURATION)

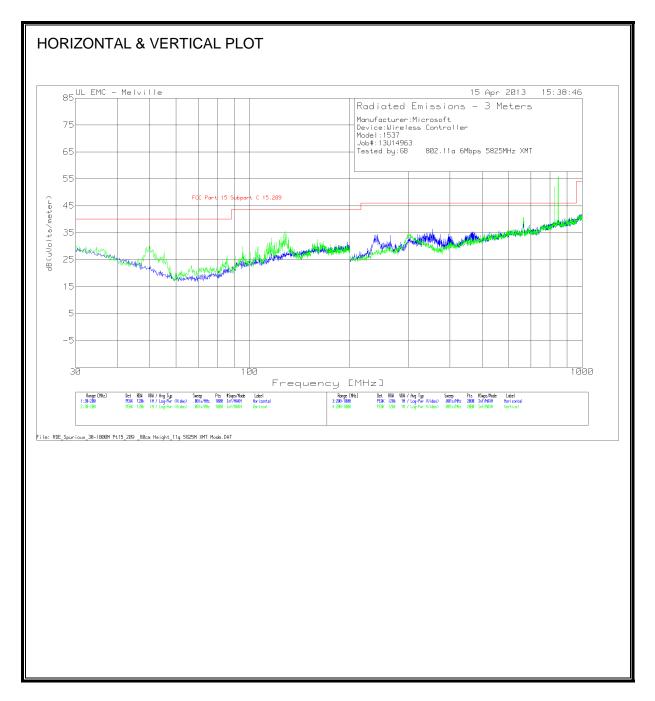


Page 101 of 119

manalactorer.	licrosoft									
Device:Wireles										
Model:1537										
Job#:13U14963										
Tested by:GB	02.11G 6Mbps 2	412MHz								
Vertical 30 - 20	OMHz									
			AF-43441	GL-3M		FCC Part 15	Margin	Azimuth	Height	
Test Frequency	Meter Reading	Detector	[dB/m]	[dB]		Subpart C 15.209	(dB)	[Degs]	[cm]	Polarity
49.8281			10.2				-13.44			Vert
92.45			9.8				-22.14			Vert
128.7	13.98	QP	13.8	0.5	28.28	43.5	-15.22	136	117	Vert
Horizontal 200	- 1000MHz			~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~						
<b>T F</b>	Marker Baradian		AF-44067				-	Azimuth	-	Deletis
240.015	Meter Reading 17.18		[dB/m] 11.2	[dB] 0.8	dB(uVolts/meter) 29.18		-16.82	[Degs] 128	[cm]	Polarity Horz
664.5499			20.1				-16.82			Horz
004.5455	12.03	ų,	20.1	1.0	54.75		-11.27	212	105	1012
Vertical 200 - 10	DOOMHz									
			AF-44067	GL-3M		FCC Part 15	Margin	Azimuth	Height	
Test Frequency	Meter Reading	Detector	[dB/m]	[dB]	dB(uVolts/meter)	Subpart C 15.209	-	[Degs]	[cm]	Polarity
664.6561	17.04	QP	20.1	1.9	39.04	46	-6.96	343	102	Vert
QP - Quasi-Peak	detector									

Page 102 of 119

## SPURIOUS EMISSIONS 30 TO 1000 MHz (5.8GHZ WORST-CASE CONFIGURATION)



Page 103 of 119

Non-state of the second	Device:Wireless C Model:1537 Job#:13U14963										
Model:1537         Image: Model:1537 <th< td=""><td>Model:1537 Job#:13U14963</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>	Model:1537 Job#:13U14963										
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Job#:13U14963										
Vertical $30 - 200$ Hz         AF-43441         GL-3M         dB(uVolts/meter)         FCC Part 15         Margin         Azimuth         Height         Pola           S0.0801         20.32         PK         10.1         0.1         30.52         40         -9.48         229         100         Vert           128.1882         21.28         PK         10.1         0.1         30.52         40.5         -9.48         229         100         Vert           128.1882         21.28         PK         13.8         0.5         35.58         43.5         7.92         126         100         Vert           40rizontal 200-1000MHz         F         F         F         FCC Part 15         Margin         Azimuth         Height         F           1665.1303         13.5         QP         20.1         1.9         35.5         466         10.5         62         162         Horz           Vertical 200-1000Hz         F         QP         20.1         1.9         35.5         466         10.5         62         162         Horz           Vertical 200-1000Hz         F         QP         20.1         1.9         35.9         466         10.5         62											
Vertical $30 - 200$ Hz         AF-43441         GL-3M         dB(uVolts/meter)         FCC Part 15         Margin         Azimuth         Height         Pola           S0.0801         20.32         PK         10.1         0.1         30.52         40         -9.48         229         100         Vert           128.1882         21.28         PK         10.1         0.1         30.52         40.5         -9.48         229         100         Vert           128.1882         21.28         PK         13.8         0.5         35.58         43.5         7.92         126         100         Vert           40rizontal 200-1000MHz         F         F         F         FCC Part 15         Margin         Azimuth         Height         F           1665.1303         13.5         QP         20.1         1.9         35.5         466         10.5         62         162         Horz           Vertical 200-1000Hz         F         QP         20.1         1.9         35.5         466         10.5         62         162         Horz           Vertical 200-1000Hz         F         QP         20.1         1.9         35.9         466         10.5         62	Tested by:GB 802	2.11a 6Mbps 5	825MHz XN	IT							
Test Frequency         Meter Reading         Detector         AF-43441 [dB/m]         GL-3M [dB]         dB(uVolts/meter)         FCC Part 15         Margin (dB)         Azimuth [Degs]         Height [cm]         Pola           50.0801         20.32         PK         10.1         0.1         30.52         40         -9.48         229         100         Vert           128.1882         21.28         PK         13.8         0.5         35.58         43.5         -7.92         126         100         Vert           Horizontal 200-1000MHz         FCC Part 15         Margin (dB)         Azimuth (dB/m]         Af-4067         GL-3M         AB(uVolts/meter)         Subpart C 15.209         Margin (dB)         Azimuth (Degs]         Height (cm]         Pola           Fest Frequency         Meter Reading         Detector         [dB/m]         [dB]         AB(uVolts/meter)         Subpart C 15.209         (dB)         Zimuth (Degs]         [cm]         Pola           665.1303         13.5         QP         20.1         1.9         35.5         46         -10.5         62         162         Horz           Vertical 200 - 1UOMHz         Imagin         Azimuth         Aright         Af-4067         GL-3M         Subpart C 15.209         (dB) <td></td>											
Test Frequency         Meter Reading         Detector         [dB/m]         [dB]         dB(uVolts/meter)         Subpart C 15.209         (dB)         [Degs]         [cm]         Pola           50.0801         20.32         PK         10.1         0.1         30.52         40         -9.48         229         100         Vert           128.1882         21.28         PK         13.8         0.5         35.58         43.5         -7.92         126         100         Vert           Horizontal 200 - 1000MHz         FCC Part 15         Margin         Azimuth         Height         FCC Part 15         Margin         Azimuth         Height         Folgen         Folgen         FCC Part 15         Margin         Azimuth         Height         Folgen	Vertical 30 - 200M	1Hz									
50.0801         20.32         PK         10.1         0.1         30.52         40         -9.48         229         100         Vert           128.1882         21.28         PK         13.8         0.5         35.58         43.5         -7.92         126         100         Vert           Horizontal 200 - 1000MHz         AF-44067         GL-3M         dB(uVolts/meter)         FCC Part 15         Margin         Azimuth         Height         Pola           665.1303         13.5         QP         20.1         1.9         35.5         46         -10.5         62         162         Horizontal 200 - 1000MHz           //ertical 200 - 1000MHz         AF-44067         GL-3M         dB(uVolts/meter)         Subpart C15.209         (dB)         IDetest Frequency         Margin         Azimuth         Height         Pola           //ertical 200 - 1000MHz         AF-44067         GL-3M         dB(uVolts/meter)         Subpart C15.209         (dB)         IDetest         [cm]         Pola           845.9         9.04         QP         22.8         2.1         33.94         46         -12.06         343         154         Vert           8247.         8.94         QP         22.4         2.1				AF-43441	GL-3M		FCC Part 15	Margin	Azimuth	Height	
128.1882       21.28       PK       13.8       0.5       35.58       43.5       -7.92       126       100       Vert         Horizontal 200 - 1000MHz       I	Test Frequency M	Aeter Reading	Detector	[dB/m]	[dB]	dB(uVolts/meter)	Subpart C 15.209	(dB)	[Degs]	[cm]	Polarity
Arrow Meter Reading         Detector         AF-44067 [dB/m]         GL-3M [dB]         dB(uVolts/meter)         FCC Part 15 Subpart C 15.209         Margin (dB)         Azimuth (dB)         Height (cm]         Pola           665.1303         13.5         QP         20.1         1.9         35.5         46         -10.5         62         162         Horz           //ertical 200 - 100000000000000000000000000000000	50.0801	20.32	PK	10.1	0.1	30.52	40	-9.48	229		
AF-44067         GL-3M         dB(uVolts/meter)         FCC Part 15         Margin         Azimuth         Height         Cm         Pola           665.1303         13.5         QP         20.1         1.9         35.5         46         -10.5         62         162         Horz           //ertical 200 - 1000         Vertical 2000 - 10000         Vertical 2000 - 10000         <	128.1882	21.28	PK	13.8	0.5	35.58	43.5	-7.92	126	100	Vert
AF-44067         GL-3M         dB(uVolts/meter)         FCC Part 15         Margin         Azimuth         Height         Cm         Pola           665.1303         13.5         QP         20.1         1.9         35.5         46         -10.5         62         162         Horz           //ertical 200 - 1000         Vertical 2000 - 10000         Vertical 2000 - 10000         <											
Test Frequency         Meter Reading         Detector         [dB/m]         [dB]         dB(uVolts/meter)         Subpart C 15.209         (dB)         [Degs]         [cm]         Pola           665.1303         13.5         QP         20.1         1.9         35.5         46         -10.5         62         162         Horz           //ertical 200-1UUUMHz         AF-44067         GL-3M         FCC Part 15         Margin         Azimuth         Height         Pola           Rest Frequency         Meter Reading         Detector         [dB/m]         [dB]         dB(uVolts/meter)         Subpart C 15.209         (dB)         Margin         Azimuth         Height         Pola           845.9         9.04         QP         22.8         2.1         33.94         46         -12.06         343         154         Vert           824.7         8.94         QP         22.4         2.1         33.44         446         -12.56         251         132         Vert           664.99         15.39         QP         20.1         1.9         37.39         46         -8.61         2222         131         Vert	Horizontal 200 - 10	000MHz									
665.1303       13.5       QP       20.1       1.9       35.5       46       -10.5       62       162       Horz         //ertical 200-1       OMHz       Image: Constraint of the state of the								-			
Vertical 200 - 1000MHz         AF-44067         GL-3M         dB(uVolts/meter)         FCC Part 15         Margin         Azimuth         Height         Pola           Rest Frequency         Meter Reading         Detector         [dB/m]         [dB]         dB(uVolts/meter)         Subpart C 15.209         (dB)         [Degs]         [cm]         Pola           845.9         9.04         QP         22.8         2.1         33.94         446         -12.06         343         154         Vert           824.7         8.94         QP         22.4         2.1         33.44         446         -12.56         251         132         Vert           664.99         15.39         QP         20.1         1.9         37.39         46         -8.61         222         131         Vert		-									Polarity
Fest Frequency         Meter Reading         Detector         AF-44067         GL-3M         dB(uVolts/meter)         FCC Part 15         Margin         Azimuth         Height         Pola           845.9         9.04         QP         22.8         2.1         33.94         46         -12.05         343         154         Vert           824.7         8.94         QP         22.4         2.1         33.44         446         -12.05         251         132         Vert           664.99         15.39         QP         20.1         1.9         37.39         46         -8.61         222         131         Vert           664.99         15.39         QP         20.1         1.9         37.39         46         -8.61         222         131         Vert	665.1303	13.5	QP	20.1	1.9	35.5	46	-10.5	62	162	Horz
Fest Frequency         Meter Reading         Detector         AF-44067         GL-3M         dB(uVolts/meter)         FCC Part 15         Margin         Azimuth         Height         Pola           845.9         9.04         QP         22.8         2.1         33.94         46         -12.05         343         154         Vert           824.7         8.94         QP         22.4         2.1         33.44         446         -12.05         251         132         Vert           664.99         15.39         QP         20.1         1.9         37.39         46         -8.61         222         131         Vert           664.99         15.39         QP         20.1         1.9         37.39         46         -8.61         222         131         Vert											
Fest Frequency         Meter Reading         Detector         [dB/m]         [dB]         dB(uVolts/meter)         Subpart C 15.209         (dB)         [Degs]         [cm]         Pola           845.9         9.04         QP         22.8         2.1         33.94         46         -12.06         343         154         Vert           824.7         8.94         QP         22.4         2.1         33.44         46         -12.56         251         132         Vert           664.99         15.39         QP         20.1         1.9         37.39         46         -8.61         222         131         Vert           1000000000000000000000000000000000000	Vertical 200 - 1000	OMHz		15 44057			500 D				
845.9         9.04         QP         22.8         2.1         33.94         46         -12.06         343         154         Vert           824.7         8.94         QP         22.4         2.1         33.44         46         -12.56         251         132         Vert           664.99         15.39         QP         20.1         1.9         37.39         46         -8.61         222         131         Vert						10(1)(1)(1)(1)(1)		-		_	
824.7         8.94         QP         22.4         2.1         33.44         46         -12.56         251         132         Vert           664.99         15.39         QP         20.1         1.9         37.39         46         -8.61         222         131         Vert		-									
664.99 15.39 QP 20.1 1.9 37.39 46 -8.61 222 131 Vert			•								
PK - Peak detector	004.33	15.55	ųr	20.1	1.9	57.55	40	-0.01	222	151	vert
PK - Peak detector											
	PK - Peak detector	r									
QP - Quasi-Peak detector											
		elector									

Page 104 of 119

# **10. AC POWER LINE CONDUCTED EMISSIONS**

## LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

Frequency of Emission (MHz)	Conducted L	.imit (dBuV)
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

\* Decreases with the logarithm of the frequency.

## TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

Page 105 of 119

### RESULTS – 2.4GHz BAND

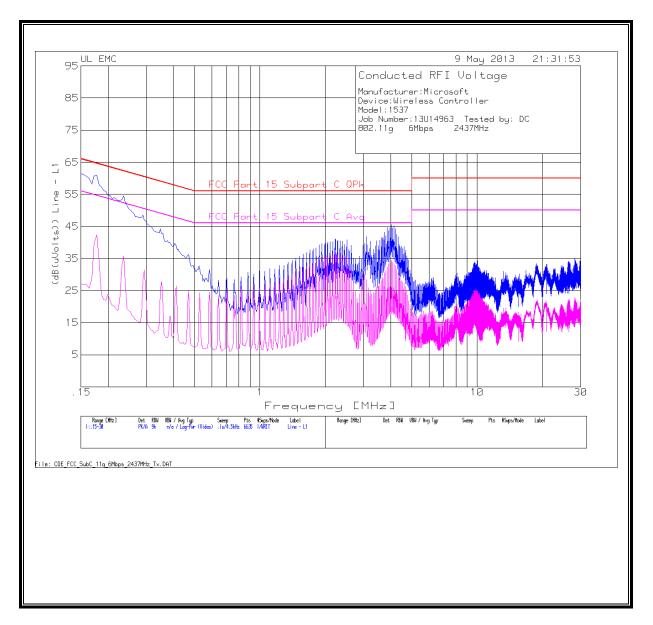
### **<u>6 WORST EMISSIONS</u>**

	Aicrosoft							
Device:Wireles								
Model:1537	scontroner							
	U14963 Tested I	by: DC						
802.11g 6Mbp		Jy. DC						
SU2.11g Bivibp:	5 2457MHZ							
Line - L1 .15 - 30	MHZ							
_			5A636 L1		FCC Part 15		FCC Part 15	
	Meter Reading				Subpart C QPk			
0.15	51.48		10	61.48	66	-4.52	56	5.48
0.15	17.15		10	27.15	66	-38.85	56	-28.85
0.177	50.81	PK	10	60.81	64.63	-3.82	54.63	6.18
0.177	32.34	Av	10	42.34	64.63	-22.29	54.63	-12.29
0.2355	44.4	PK	10	54.4	62.25	-7.85	52.25	2.15
0.2355	25.63	Av	10	35.63	62.25	-26.62	52.25	-16.62
0.2895	38.43	PK	10	48.43	60.54	-12.11	50.54	-2.11
0.2895	18.27	Av	10	28.27	60.54	-32.27	50.54	-22.27
0.348	34.28	PK	10	44.28	59.01	-14.73	49.01	-4.73
0.348	14.69	Av	10	24.69	59.01	-34.32	49.01	-24.32
4.029	35.25	PK	10.2	45.45	56	-10.55	46	-0.55
4.029	24.05	Av	10.2	34.25	56	-21.75	46	-11.75
0.159	39.66	QP	10	49.66	65.52	-15.86	55.52	-5.86
0.1536	40.92	QP	10	50.92	65.8	-14.88	55.8	-4.88
0.1734	40.5	QP	10	50.5	64.8	-14.3	54.8	-4.3
0.2328	33.05		10	43.05	62.35	-19.3	52.35	-9.3
0.2859	25.27		10	35.27	60.64	-25.37	50.64	-15.37
0.3453	23.06		10	33.06	59.07	-26.01	49.07	-16.01
4.0308	22.74		10.2	32.94	55.67	-23.06	45.07	-13.06
4.0500	22.14	~	10.2	52.54	50	-25.00	40	-15.00
Neutral .15 - 30	MH-							
Neutral 15-50	141112		5A636					
			DADDD					
			1.41		500 B-++ 45		500 B 45	
<b>-</b>			L4Neut	(10(1)(1))	FCC Part 15	Marchine (4172)	FCC Part 15	Manaria (40)
	Meter Reading		[dB]		Subpart C QPk		Subpart C Avg	
0.15	50.84	PK	[dB] 10.1	60.94	Subpart C QPk 66	-5.06	Subpart C Avg 56	4.94
0.15	50.84 16.64	PK Av	[dB] 10.1 10.1	60.94 26.74	Subpart C QPk 66 66	-5.06 -39.26	Subpart C Avg 56 56	4.94
0.15 0.15 0.1815	50.84 16.64 47.19	PK Av PK	[dB] 10.1 10.1 10	60.94 26.74 57.19	Subpart C QPk 66 66 64.42	-5.06 -39.26 -7.23	Subpart C Avg 56 56 54.42	4.94 -29.26 2.77
0.15 0.15 0.1815 0.1815	50.84 16.64 47.19 15.75	PK Av PK Av	[dB] 10.1 10.1 10 10	60.94 26.74 57.19 25.75	Subpart C QPk 66 66 64.42 64.42	-5.06 -39.26 -7.23 -38.67	Subpart C Avg 56 56 54.42 54.42	4.94 -29.26 2.77 -28.67
0.15 0.15 0.1815 0.1815 0.231	50.84 16.64 47.19 15.75 42.85	PK Av PK Av PK	[dB] 10.1 10.1 10 10 10	60.94 26.74 57.19 25.75 52.85	Subpart C QPk 66 64.42 64.42 64.42	-5.06 -39.26 -7.23 -38.67 -9.56	Subpart C Avg 56 56 54.42 54.42 52.41	4.94 -29.26 2.77 -28.67 0.44
0.15 0.1815 0.1815 0.231 0.231	50.84 16.64 47.19 15.75 42.85 22.86	PK Av PK Av PK Av	[dB] 10.1 10.1 10 10 10 10	60.94 26.74 57.19 25.75 52.85 32.86	Subpart C QPk 66 64.42 64.42 62.41 62.41	-5.06 -39.26 -7.23 -38.67 -9.56 -29.55	Subpart C Avg 56 54.42 54.42 52.41 52.41	4.94 -29.26 2.77 -28.67 0.44 -19.55
0.15 0.1815 0.1815 0.1815 0.231 0.231 0.285	50.84 16.64 47.19 15.75 42.85 22.86 37.33	PK Av PK Av PK Av PK	[dB] 10.1 10.1 10 10 10	60.94 26.74 57.19 25.75 52.85 32.86 47.33	Subpart C QPk 66 64.42 64.42 62.41 62.41 60.67	-5.06 -39.26 -7.23 -38.67 -9.56	Subpart C Avg 56 54.42 54.42 52.41 52.41 50.67	4.94 -29.26 2.77 -28.67 0.44 -19.55 -3.34
0.15 0.1815 0.1815 0.231 0.231	50.84 16.64 47.19 15.75 42.85 22.86	PK Av PK Av PK Av PK	[dB] 10.1 10.1 10 10 10 10	60.94 26.74 57.19 25.75 52.85 32.86	Subpart C QPk 66 64.42 64.42 62.41 62.41	-5.06 -39.26 -7.23 -38.67 -9.56 -29.55	Subpart C Avg 56 54.42 54.42 52.41 52.41	4.94 -29.26 2.77 -28.67 0.44 -19.55 -3.34
0.15 0.1815 0.1815 0.1815 0.231 0.231 0.285	50.84 16.64 47.19 15.75 42.85 22.86 37.33	PK Av PK Av PK Av PK Av	[dB] 10.1 10.1 10 10 10 10 10	60.94 26.74 57.19 25.75 52.85 32.86 47.33	Subpart C QPk 66 64.42 64.42 62.41 62.41 60.67	-5.06 -39.26 -7.23 -38.67 -9.56 -29.55 -13.34	Subpart C Avg 56 54.42 54.42 52.41 52.41 50.67	4.94 -29.26 2.77 -28.67 0.44 -19.55 -3.34 -23.62
0.15 0.1815 0.1815 0.231 0.231 0.285 0.285	50.84 16.64 47.19 15.75 42.85 22.86 37.33 17.05	PK Av PK Av PK Av PK Av PK	[dB] 10.1 10.1 10 10 10 10 10 10	60.94 26.74 57.19 25.75 52.85 32.86 47.33 27.05	Subpart C QPk 66 64.42 64.42 62.41 62.41 60.67 60.67	-5.06 -39.26 -7.23 -38.67 -9.56 -29.55 -13.34 -33.62	Subpart C Avg 56 54.42 54.42 52.41 52.41 50.67 50.67	4.94 -29.26 2.77 -28.67 0.44 -19.55 -3.34 -23.62 -5.71
0.15 0.1815 0.1815 0.231 0.231 0.285 0.285 0.285 0.3435	50.84 16.64 47.19 15.75 42.85 22.86 37.33 17.05 33.41 19.2	PK Av PK Av PK Av PK Av PK Av	[dB] 10.1 10.1 10 10 10 10 10 10 10	60.94 26.74 57.19 25.75 52.85 32.86 47.33 27.05 43.41 29.2	Subpart C QPk 66 64.42 64.42 62.41 62.41 60.67 60.67 59.12 59.12	-5.06 -39.26 -7.23 -38.67 -9.56 -29.55 -13.34 -33.62 -15.71 -29.92	Subpart C Avg 56 54.42 52.41 52.41 52.41 50.67 50.67 49.12 49.12	4.94 -29.26 2.77 -28.67 0.44 -19.55 -3.34 -23.62 -5.71 -19.92
0.15 0.1815 0.1815 0.231 0.231 0.285 0.285 0.285 0.3435 0.3435	50.84 16.64 47.19 15.75 42.85 22.86 37.33 17.05 33.41 19.2 36.6	PK Av PK Av PK Av PK Av PK Av PK	[dB] 10.1 10.1 10 10 10 10 10 10 10 10 10	60.94 26.74 57.19 25.75 52.85 32.86 47.33 27.05 43.41 29.2 46.8	Subpart C QPk 66 64.42 64.42 62.41 62.41 60.67 60.67 59.12 59.12 59.2 56	-5.06 -39.26 -7.23 -38.67 -9.56 -29.55 -13.34 -33.62 -15.71 -29.92 -9.2	Subpart C Avg 56 54.42 52.41 52.41 52.41 50.67 50.67 49.12 49.12 46	4.94 -29.26 2.77 -28.67 0.44 -19.55 -3.34 -23.62 -5.71 -19.92 0.8
0.15 0.1815 0.1815 0.231 0.231 0.285 0.285 0.285 0.3435 0.3435 3.921	50.84 16.64 47.19 15.75 42.85 22.86 37.33 17.05 33.41 19.2 36.6 24.68	PK Av PK Av PK Av PK Av PK Av PK Av	[dB] 10.1 10.1 10 10 10 10 10 10 10 10 10 20.2	60.94 26.74 57.19 25.75 52.85 32.86 47.33 27.05 43.41 29.2 46.8 34.88	Subpart C QPk 66 64.42 64.42 62.41 62.41 60.67 60.67 59.12 59.12 59.12 56 56	-5.06 -39.26 -7.23 -38.67 -9.56 -29.55 -13.34 -33.62 -15.71 -29.92 -9.2 -21.12	Subpart C Avg 56 54.42 52.41 52.41 52.41 50.67 50.67 49.12 49.12 46 46	4.94 -29.26 2.77 -28.67 0.44 -19.55 -3.34 -23.62 -5.71 -19.92 0.8 -11.12
0.15 0.1815 0.1815 0.231 0.231 0.285 0.285 0.285 0.3435 0.3435 3.921 3.921	50.84 16.64 47.19 15.75 42.85 22.86 37.33 17.05 33.41 19.2 36.6 24.68 38.01	PK Av PK Av PK Av PK Av PK Av PK Av QP	[dB] 10.1 10.1 10 10 10 10 10 10 10 10 102 10.2	60.94 26.74 57.19 25.75 52.85 32.86 47.33 27.05 43.41 29.2 46.8 34.88	Subpart C QPk 66 64.42 64.42 62.41 62.41 60.67 60.67 59.12 59.12 59.12 56 56 65.8	-5.06 -39.26 -7.23 -38.67 -9.56 -29.55 -13.34 -33.62 -15.71 -29.92 -9.2 -9.2 -21.12 -17.69	Subpart C Avg 56 54.42 52.41 52.41 50.67 50.67 49.12 49.12 46 46 55.8	4.94 -29.26 2.77 -28.67 0.44 -19.55 -3.34 -23.62 -5.71 -19.92 0.8 -11.12 -7.69
0.15 0.1815 0.1815 0.231 0.231 0.285 0.285 0.3435 0.3435 3.921 3.921 0.1536	50.84 16.64 47.19 15.75 42.85 22.86 37.33 17.05 33.41 19.2 36.6 24.68 38.01 40.98	PK Av PK Av PK Av PK Av PK Av PK Av QP QP	[dB] 10.1 10.1 10 10 10 10 10 10 10 10 10 1	60.94 26.74 57.19 25.75 52.85 32.86 47.33 27.05 43.41 29.2 46.8 34.88 48.11 51.08	Subpart C QPk 66 64.42 64.42 62.41 62.41 60.67 60.67 59.12 59.12 59.12 59.58 65.8 65.8	-5.06 -39.26 -7.23 -38.67 -9.56 -29.55 -13.34 -33.62 -15.71 -29.92 -9.2 -9.2 -21.12 -17.69 -14.82	Subpart C Avg 56 54.42 52.41 52.41 50.67 50.67 49.12 49.12 46 46 55.8 55.9	4.94 -29.26 2.77 -28.67 0.44 -19.55 -3.34 -23.62 -5.71 -19.92 0.8 -11.12 -7.69 -4.82
0.15 0.1815 0.1815 0.231 0.231 0.285 0.285 0.3435 0.3435 3.921 3.921 0.1536 0.1518	50.84 16.64 47.19 15.75 42.85 22.86 37.33 17.05 33.41 19.2 36.6 24.68 38.01 40.98 37.94	PK Av PK Av PK Av PK Av PK Av QP QP QP	[dB] 10.1 10.1 10 10 10 10 10 10 10 10 10 1	60.94 26.74 57.19 25.75 52.85 32.86 47.33 27.05 43.41 29.2 46.8 34.88 48.11 51.08 47.94	Subpart C QPk 66 64.42 64.42 62.41 60.67 60.67 59.12 59.12 59.12 56 65.8 65.9 64.63	-5.06 -39.26 -7.23 -38.67 -9.56 -29.55 -13.34 -33.62 -15.71 -29.92 -9.2 -9.2 -21.12 -17.69 -14.82 -16.69	Subpart C Avg 56 54.42 52.41 52.41 50.67 50.67 49.12 49.12 46 46 55.8 55.9 54.63	4.94 -29.26 2.77 -28.67 0.44 -19.55 -3.34 -23.62 -5.71 -19.92 0.8 -11.12 -7.69 -4.82 -6.69
0.15 0.1815 0.1815 0.231 0.231 0.285 0.285 0.3435 0.3435 3.921 3.921 0.1536 0.1518 0.177 0.2265	50.84 16.64 47.19 15.75 42.85 22.86 37.33 17.05 33.41 19.2 36.6 24.68 38.01 40.98 37.94 29.42	PK           Av           PK           Av           PK           Av           PK           Av           PK           Av           PK           QP           QP           QP           QP           QP           QP	[dB] 10.1 10.1 10 10 10 10 10 10 10 10 10 1	60.94 26.74 57.19 25.75 52.85 32.86 47.33 27.05 43.41 29.2 46.8 34.88 48.11 51.08 47.94 39.42	Subpart C QPk 66 64.42 64.42 62.41 60.67 60.67 59.12 59.12 59.12 56 65.8 65.9 64.63 62.58	-5.06 -39.26 -7.23 -38.67 -9.56 -29.55 -13.34 -33.62 -15.71 -29.92 -9.2 -21.12 -17.69 -14.82 -16.69 -23.16	Subpart C Avg 56 54.42 52.41 52.41 50.67 50.67 49.12 49.12 49.12 46 55.8 55.9 54.63 52.58	4.94 -29.26 2.77 -28.67 0.44 -19.55 -3.34 -23.62 -5.71 -19.92 0.8 -11.12 -7.69 -4.82 -6.69 -13.16
0.15 0.1815 0.1815 0.231 0.231 0.285 0.285 0.3435 0.3435 3.921 3.921 0.1536 0.1518 0.177 0.2265 0.2868	50.84 16.64 47.19 15.75 42.85 22.86 37.33 17.05 33.41 19.2 36.6 24.68 38.01 40.98 37.94 29.42 26.85	PK           Av           QP           QP	[dB] 10.1 10.1 10 10 10 10 10 10 10 10 10 1	60.94 26.74 57.19 25.75 52.85 32.86 47.33 27.05 43.41 29.2 46.8 34.88 48.11 51.08 47.94 39.42 36.85	Subpart C QPk 66 64.42 64.42 62.41 60.67 60.67 59.12 59.12 59.12 56 65.8 65.9 64.63 62.58 60.62	-5.06 -39.26 -7.23 -38.67 -9.56 -29.55 -13.34 -33.62 -15.71 -29.92 -9.2 -21.12 -17.69 -14.82 -16.69 -23.16 -23.77	Subpart C Avg 56 54.42 52.41 52.41 50.67 50.67 49.12 49.12 46 55.8 55.9 54.63 52.58 50.62	4.94 -29.26 2.77 -28.67 0.44 -19.55 -3.34 -23.62 -5.71 -19.92 0.8 -11.12 -7.69 -4.82 -6.69 -13.16 -13.77
0.15 0.1815 0.1815 0.231 0.231 0.285 0.285 0.285 0.3435 0.3435 0.3435 3.921 0.1536 0.1518 0.177 0.2265 0.2868 0.3471	50.84 16.64 47.19 15.75 42.85 22.86 37.33 17.05 33.41 19.2 36.6 24.68 38.01 40.98 37.94 29.42 26.85 23.08	PK           Av           PK           Av           PK           Av           PK           Av           PK           Av           PK           Av           QP           QP	[dB] 10.1 10.1 10 10 10 10 10 10 10 10 10 1	60.94 26.74 57.19 25.75 52.85 32.86 47.33 27.05 43.41 29.2 46.8 34.88 48.11 51.08 47.94 39.42 36.85 33.08	Subpart C QPk 66 64.42 64.42 62.41 60.67 60.67 59.12 59.12 59.12 56 65.8 65.9 64.63 62.58 60.62 59.03	-5.06 -39.26 -7.23 -9.56 -29.55 -13.34 -33.62 -15.71 -29.92 -9.2 -21.12 -17.69 -14.82 -16.69 -23.16 -23.77 -25.95	Subpart C Avg 56 54.42 52.41 52.41 50.67 50.67 49.12 49.12 46 55.8 55.9 54.63 52.58 50.62 49.03	4.94 -29.26 2.77 -28.67 0.44 -19.55 -3.34 -23.62 -5.71 -19.92 0.8 -11.12 -7.69 -4.82 -6.69 -13.16 -13.77 -15.95
0.15 0.1815 0.1815 0.231 0.231 0.285 0.285 0.3435 0.3435 3.921 3.921 0.1536 0.1518 0.177 0.2265 0.2868	50.84 16.64 47.19 15.75 42.85 22.86 37.33 17.05 33.41 19.2 36.6 24.68 38.01 40.98 37.94 29.42 26.85	PK           Av           PK           Av           PK           Av           PK           Av           PK           Av           PK           Av           QP           QP	[dB] 10.1 10.1 10 10 10 10 10 10 10 10 10 1	60.94 26.74 57.19 25.75 52.85 32.86 47.33 27.05 43.41 29.2 46.8 34.88 48.11 51.08 47.94 39.42 36.85	Subpart C QPk 66 64.42 64.42 62.41 60.67 60.67 59.12 59.12 59.12 56 65.8 65.9 64.63 62.58 60.62 59.03	-5.06 -39.26 -7.23 -9.56 -29.55 -13.34 -33.62 -15.71 -29.92 -9.2 -21.12 -17.69 -14.82 -16.69 -23.16 -23.77 -25.95	Subpart C Avg 56 54.42 52.41 52.41 50.67 50.67 49.12 49.12 46 55.8 55.9 54.63 52.58 50.62	4.94 -29.26 2.77 -28.67 0.44 -19.55 -3.34 -23.62 -5.71 -19.92 0.8 -11.12 -7.69 -4.82 -6.69 -13.16 -13.77 -15.95
0.15 0.1815 0.1815 0.231 0.231 0.285 0.285 0.285 0.3435 0.3435 0.3435 3.921 0.1536 0.1518 0.177 0.2265 0.2868 0.3471 3.9192	50.84 16.64 47.19 15.75 42.85 22.86 37.33 17.05 33.41 19.2 36.6 24.68 38.01 40.98 37.94 29.42 26.85 23.08 27.48	PK           Av           PK           Av           PK           Av           PK           Av           PK           Av           PK           Av           QP           QP	[dB] 10.1 10.1 10 10 10 10 10 10 10 10 10 1	60.94 26.74 57.19 25.75 52.85 32.86 47.33 27.05 43.41 29.2 46.8 34.88 48.11 51.08 47.94 39.42 36.85 33.08	Subpart C QPk 66 64.42 64.42 62.41 60.67 60.67 59.12 59.12 59.12 56 65.8 65.9 64.63 62.58 60.62 59.03	-5.06 -39.26 -7.23 -9.56 -29.55 -13.34 -33.62 -15.71 -29.92 -9.2 -21.12 -17.69 -14.82 -16.69 -23.16 -23.77 -25.95	Subpart C Avg 56 54.42 52.41 52.41 50.67 50.67 49.12 49.12 46 55.8 55.9 54.63 52.58 50.62 49.03	4.94 -29.26 2.77 -28.67 0.44 -19.55 -3.34 -23.62 -5.71 -19.92 0.8 -11.12 -7.69 -4.82 -6.69 -13.16 -13.77 -15.95
0.15 0.1815 0.1815 0.231 0.231 0.285 0.285 0.285 0.3435 0.3435 0.3435 3.921 0.1536 0.1518 0.177 0.2265 0.2868 0.3471	50.84 16.64 47.19 15.75 42.85 22.86 37.33 17.05 33.41 19.2 36.6 24.68 38.01 40.98 37.94 29.42 26.85 23.08 27.48 tor	PK           Av           PK           Av           PK           Av           PK           Av           PK           Av           PK           Av           QP           QP	[dB] 10.1 10.1 10 10 10 10 10 10 10 10 10 1	60.94 26.74 57.19 25.75 52.85 32.86 47.33 27.05 43.41 29.2 46.8 34.88 48.11 51.08 47.94 39.42 36.85 33.08	Subpart C QPk 66 64.42 64.42 62.41 60.67 60.67 59.12 59.12 59.12 56 65.8 65.9 64.63 62.58 60.62 59.03	-5.06 -39.26 -7.23 -9.56 -29.55 -13.34 -33.62 -15.71 -29.92 -9.2 -21.12 -17.69 -14.82 -16.69 -23.16 -23.77 -25.95	Subpart C Avg 56 54.42 52.41 52.41 50.67 50.67 49.12 49.12 46 55.8 55.9 54.63 52.58 50.62 49.03	4.94 -29.26 2.77 -28.67 0.44 -19.55 -3.34 -23.62 -5.71 -19.92 0.8 -11.12 -7.69 -4.82 -6.69

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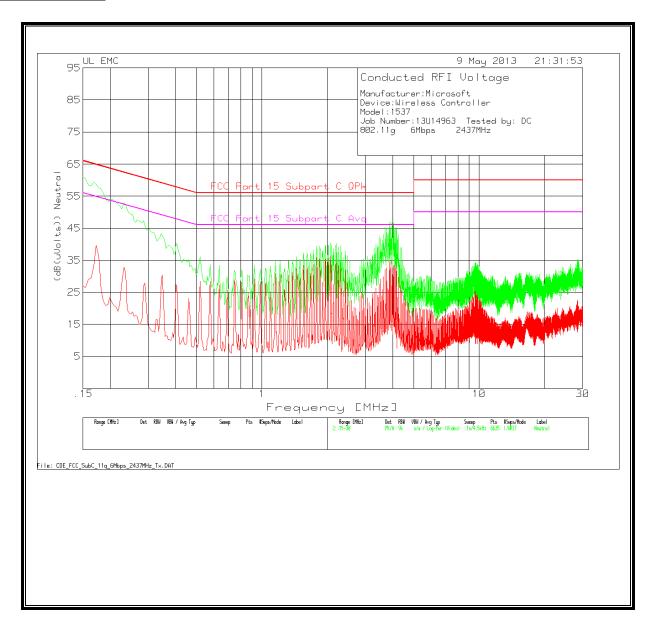
Page 106 of 119

### LINE 1 RESULTS



Page 107 of 119

### LINE 2 RESULTS



Page 108 of 119

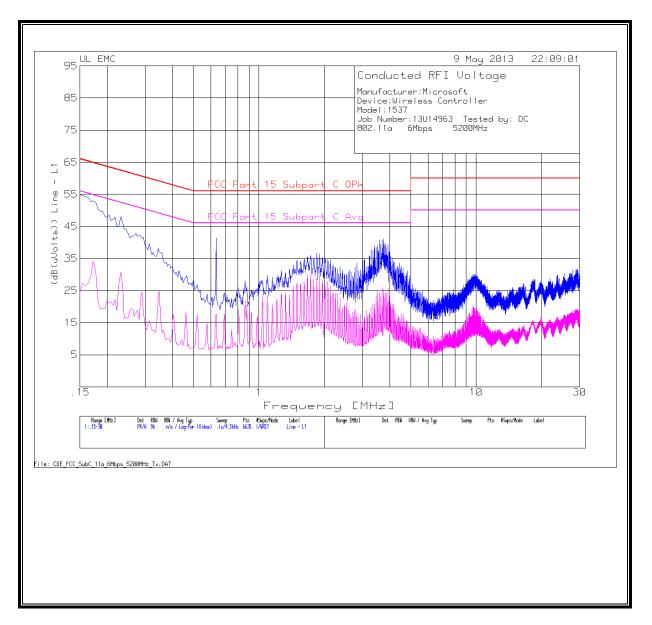
### **RESULTS – 5GHz BAND**

#### **<u>6 WORST EMISSIONS</u>**

Device:Wireless Controller         Image: Controler <th>Margin (dB) -1.08 -31.52</th>	Margin (dB) -1.08 -31.52
Job Number:13U14963 Tested by: DC         A         A         A           802.11a 6Mbps 5200MHz         A         A         A           Line - L1 .15 - 30 MHz         A         A         A           Test Frequency         Meter Reading         Detector         [dB]         (dB(uVolts))         Subpart C QPk         Margin (dB)         Subpart C Avg         M           0.15         44.92         PK         10         54.92         66         -11.08         56	-1.08
802.11a         6Mbps         5200MHz         Image: Constraint of the state of the s	-1.08
802.11a         6Mbps         5200MHz         Image: Constraint of the state of the s	-1.08
Line-L1.15-30MHz 5A636L1 Test Frequency Meter Reading Detector [dB] (dB(uVolts)) Subpart C QPk Margin (dB) Subpart C Avg M 0.15 44.92 PK 10 54.92 66 -11.08 56	-1.08
Test Frequency     Meter Reading     Detector     5A636 L1 [dB]     FCC Part 15 (dB(uVolts))     FCC Part 15 Subpart C QPk     FCC Part 15 Margin (dB)     FCC Part 15 Subpart C Avg     M       0.15     44.92     PK     10     54.92     66     -11.08     56	-1.08
Test Frequency     Meter Reading     Detector     5A636 L1 [dB]     FCC Part 15 (dB(uVolts))     FCC Part 15 Subpart C QPk     FCC Part 15 Margin (dB)     FCC Part 15 Subpart C Avg     M       0.15     44.92     PK     10     54.92     66     -11.08     56	-1.08
0.15 44.92 PK 10 54.92 66 -11.08 56	-1.08
0.15 14.48 Av 10 24.48 55 41.52 55	-31 52
0.15 14.40 AV 10 24.40 00 -41.52 50	
0.1725 42.89 PK 10 52.89 64.84 -11.95 54.84	-1.95
0.1725 24.24 Av 10 34.24 64.84 -30.6 54.84	-20.6
0.231 38.05 PK 10 48.05 62.41 -14.36 52.41	-4.36
0.231 20.87 Av 10 30.87 62.41 -31.54 52.41	-21.54
0.636 31.33 PK 10 41.33 56 -14.67 46	-4.67
0.636 7.64 Av 10 17.64 56 -38.36 46	-28.36
1.8465 26.59 PK 10.1 36.69 56 -19.31 46	-9.31
1.8465 18.77 Av 10.1 28.87 56 -27.13 46	-17.13
3.75 30.93 PK 10.1 41.03 56 -14.97 46	-4.97
3.75 15.23 Av 10.1 25.33 56 -30.67 46	-20.67
Neutral .15 - 30MHz	
5A636	
L4Neut FCC Part 15 FCC Part 15	
Test Frequency Meter Reading Detector [dB] (dB(uVolts)) Subpart C QPk Margin (dB) Subpart C Avg M	/largin (dB)
0.1635 45.05 PK 10 55.05 65.28 -10.23 55.28	-0.23
0.1635 17.57 Av 10 27.57 65.28 -37.71 55.28	-27.71
0.2085 39.25 PK 10 49.25 63.26 -14.01 53.26	-4.01
0.2085 11.01 Av 10 21.01 63.26 -42.25 53.26	-32.25
0.33 31.67 PK 10 41.67 59.45 -17.78 49.45	-7.78
0.33 4.01 Av 10 14.01 59.45 -45.44 49.45	-35.44
0.5775 21.6 PK 10.1 31.7 56 -24.3 46	-14.3
0.5775 15.99 Av 10.1 26.09 56 -29.91 46	-19.91
1.734 26.06 PK 10.1 36.16 56 -19.84 46	-9.84
1.734 17.03 Av 10.1 27.13 56 -28.87 46	-18.87
3.7005 33.02 PK 10.2 43.22 56 -12.78 46	-2.78
3.7005 14.46 Av 10.2 24.66 56 -31.34 46	-21.34
PK - Peak detector	
Av - Average detector	

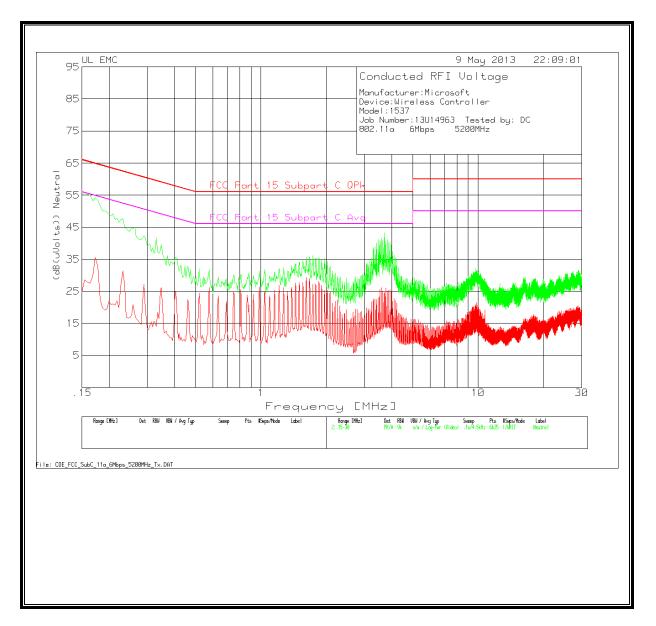
Page 109 of 119

### LINE 1 RESULTS



Page 110 of 119

### LINE 2 RESULTS



Page 111 of 119