

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

**CERTIFICATION TEST REPORT** 

FOR

## QUAD-BAND RADIO WITH WLAN AND BT RADIO

**MODEL NUMBER: A1529** 

FCC ID: BCG-E2694A IC: 579C-E2694A

REPORT NUMBER: 13U15037-13

ISSUE DATE: JULY 22, 2013

Prepared for

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

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

(R)

NVLAP LAB CODE 200065-0

### **Revision History**

Rev.	Issue Date	Revisions	Revised By
	07/22/13	Initial Issue	T. Chan

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	TION SERVICES INC. FORM NO: CCSUP470 A STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-08	
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## **1. ATTESTATION OF TEST RESULTS**

**INDUSTRY CANADA RSS-GEN Issue 3** 

DATE TESTED:	DATE TESTED: JUNE 17 to JUNE 25, 2013 (RF) and JULY 16, 2013 (DFS)				
DATE TESTED	C7JKT0UEFLW7 (DFS)				
SERIAL NUMBER:	C7JKV03GFLW6 (DVT-9GW10C-2099) (RF) and				
MODEL:	MODEL: A1529				
EUT DESCRIPTION:	EUT DESCRIPTION: QUAD-BAND RADIO WITH WLAN AND BT RADIO				
COMPANY NAME: APPLE, INC. 1 INFINITE LOOP CUPERTINO, CA 95014, U.S.A.					

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

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

Approved & Released For UL Verification Services Inc. By:

Thu Chan WiSE Operations Manager UL Verification Services Inc.

Tested By:

HA H

Francisco Guarnero WiSE Lab Technician UL Verification Services Inc.

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# 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, FCC 06-96, FCC KDB 789033, ANSI C63.10-2009, 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 47173 Benicia Street, Fremont, California, USA.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <u>http://www.ccsemc.com</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	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

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

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# 5. EQUIPMENT UNDER TEST

## 5.1. DESCRIPTION OF EUT

Model A1529 is a mobile phone with multimedia functions (music, application support, and video), cellular GSM/GPRS/EGPRS/WCDMA/HSPA+/DC-HSDPA/LTE radio, IEEE 802.11a/b/g/n, Bluetooth and GPS radio. The rechargeable battery is not user accessible.

## 5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5180 - 5240	802.11a	14.161	26.07
5180 - 5240	802.11n HT20	14.110	25.76
5190 - 5230	802.11n HT40	16.286	42.52
5260 - 5320	802.11a	15.973	39.56
5260 - 5320	802.11n HT20	16.183	41.52
5270 - 5310	802.11n HT40	16.120	40.93
5500 - 5700	802.11a	14.106	25.74
5500 - 5700	802.11n HT20	14.138	25.93
5510 - 5670	802.11n HT40	14.096	25.68

## 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PiFA antenna, with a maximum gain as below table.

FREQUENCY (MHZ)	ANTENNA GAIN ( dBi)
2400 - 2483.5	0.21
5150 - 5250	-0.73
5250 - 5350	-0.37
5500 - 5700	1.31
5725 - 5850	1.59

## 5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was WL Tool FW 6.10.56.166

## 5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel for RF radiated emissions below 1GHz tests is channel with highest RF output power.

Based on the investigation results, the highest peak power and enhanced data rate is the worstcase scenario for all measurements.

For the fundamental investigation, the EUT is investigated for vertical and horizontal antenna orientations and the worst case was determined to be at X-position.

Based on the manufacturer's attestation that the nominal output power is reduced as the data rate increases, the data rates tested represent the highest power and worst-case with respect to EMC performance.

Worst-case data rates were used:

802.11b mode: 1 Mbps 802.11g mode: 6 Mbps 802.11a mode: 6 Mbps 802.11n HT20mode: MCS0 802.11n HT40mode: MCS0

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### 5.1. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List						
Description	Manufacturer	Model	Serial Number			
AC adapter	Apple	A1385	D292365D11QDHLHCA			
Earphone	Apple	NA	NA			

### I/O CABLES (Conducted Setup)

I/O Cable List							
Cable Port		# of identical	Connector	Cable Type	Cable	Remarks	
No		ports	Туре		Length (m)		
1	Antenna	1	SMA	Shielded	0.1m	To Spectrum Analyzer	

### I/O CABLES

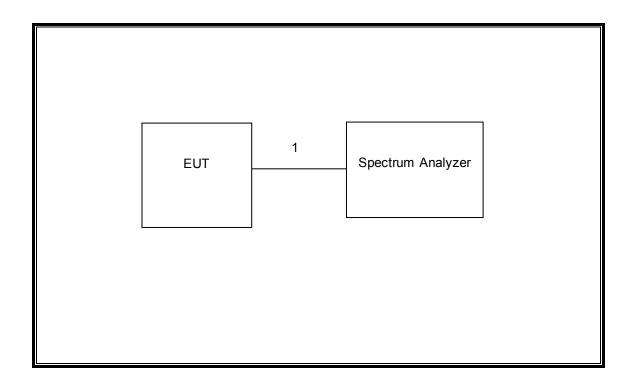
I/O Cable List						
Cable	Port	# of identical	Connector	Cable Type	Cable	Remarks
No		ports	Туре		Length (m)	
1	Jack	1	Earphone	Unshielded	0.5m	N/A

### TEST SETUP

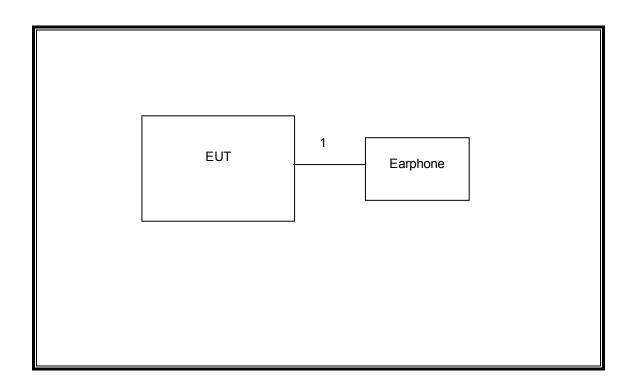
The EUT is a stand-alone device.

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### SETUP DIAGRAM FOR TESTS

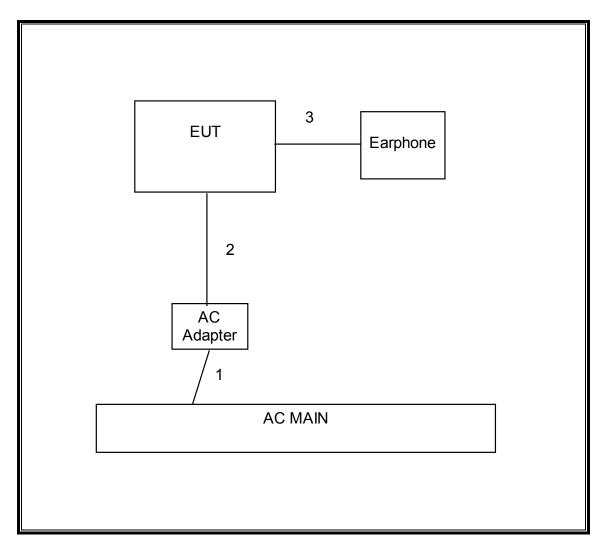


### SETUP DIAGRAM FOR RADIATED TESTS



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### SETUP DIAGRAM FOR AC POWER CONDUCTED TESTS



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# 6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment List							
Description	Manufacturer	Model	Asset	Cal Due			
Horn Antenna 1-18GHz	ETS Lindgren	3117	F00133	02/19/14			
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	01/28/14			
Antenna, Horn, 26.5 GHz	ARA	SWH-28	C01015	05/06/14			
Antenna, Biconolog, 30MHz-1 GHz	Sunol Sciences	JB3	F00215	03/07/14			
Peak / Average Power Sensor	Agilent / HP	E9323A	F00026	07/27/13			
P-Series single channel Power Meter	Agilent / HP	N1911A	F00153	07/26/13			
Spectrum Analyzer, 3Hz-44GHz	Agilent	N9030A	F00127	02/22/14			
PreApmplifier, 1-26.5GHz	Agilent	8449B	C01052	10/22/13			
LISN, 30 MHz	FCC	LISN-50/250-	N02625	04/17/14			
		25-2					
Antenna, Horn, 40 GHz	ARA	MWH-2640/B	C00981	06/14/14			
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	08/08/13			
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	08/02/13			

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## 7. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

### LIMITS

None; for reporting purposes only.

### PROCEDURE

KDB 789033 Zero-Span Spectrum Analyzer Method.

### 7.1.1. ON TIME AND DUTY CYCLE RESULTS

Mode	<b>ON</b> Time	Period	Period Duty Cycle		Duty Cycle Duty Duty Cycle	
	В		x	Cycle	<b>Correction Factor</b>	Minimum VBW
	(msec)	(msec)	(linear)	(%)	(dB)	(kHz)
802.11a 20 MHz	2.03	2.07	0.980	98.0%	0.09	0.493
802.11n HT20	1.91	1.94	0.985	98.5%	0.07	0.524
802.11n HT40	0.94	0.97	0.963	96.3%	0.16	1.070

### 7.1.2. MEASUREMENT METHOD FOR POWER AND PPSD

The Duty Cycle is greater than or equal to 98% therefore KDB 789033 Method SA-1 is used.

The Duty Cycle is less than 98% and consistent therefore KDB 789033 Method SA-2 is used.

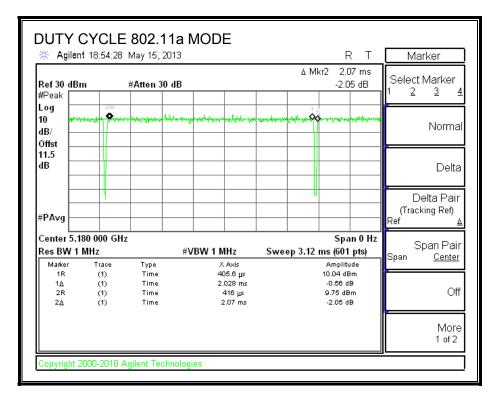
### 7.1.3. MEASUREMENT METHOD FOR AVERAGE SPURIOUS EMISSIONS ABOVE 1 GHz

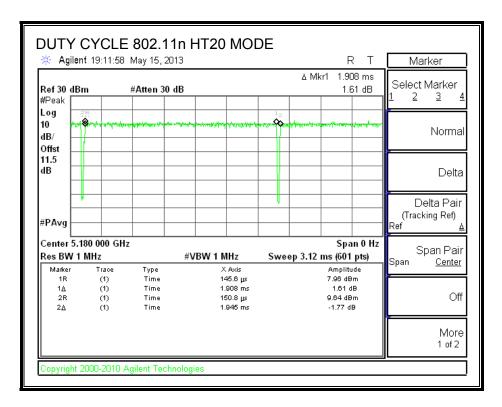
The Duty Cycle is greater than or equal to 98%, KDB 789033 Method AD with Power RMS Averaging is used.

The Duty Cycle is less than 98% and consistent, KDB 789033 Method AD with Power RMS Averaging and duty cycle correction is used.

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### 7.1.4. DUTY CYCLE PLOTS





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🔆 Agilent 16:	32:19 May 14	2013	0 MOD		F	×Τ	Marker
Ref 30 dBm #Peak	#Atten			۸ M ال ال	-0.4	8 µs 3 dB	Select Marker 1 <u>2 3 4</u>
Log Waynyma 10 dB/ Offst	adurtzie Aleriatete	and and a second se	www.manakal	when you to do		,	Normal
11.5 dB							Delta
#PAvg							Delta Pair (Tracking Ref) Ref <u>∆</u>
Center 5.190 00 Res BW 8 MHz	0 GHz	#VBW 50	MHz	Span 0 Hz Sweep 1.76 ms (601 pts)			Span Pair <sub>Span <u>Center</u></sub>
	ace Type		X Axis		Amplitu	opan <u>center</u>	
1∆ ( 2R (	1) Time 1) Time 1) Time 1) Time		352 µs 935.7 µs 352 µs 968 µs	13.03 dBm 3.92 dB 13.03 dBm -0.43 dB		B	Off
							More 1 of 2

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## 8. ANTENNA PORT TEST RESULTS

## 8.1. 802.11a MODE IN THE 5.2 GHz BAND

### 8.1.1. 26 dB BANDWIDTH

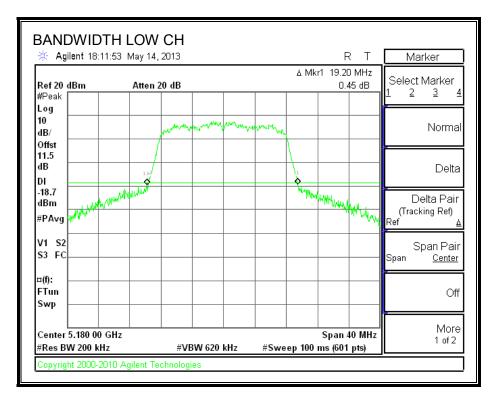
### **LIMITS**

None; for reporting purposes only.

### **RESULTS**

Channel	Frequency	26 dB Bandwidth
	(MHz)	(MHz)
Low	5180	19.20
Mid	5200	19.20
High	5240	19.07

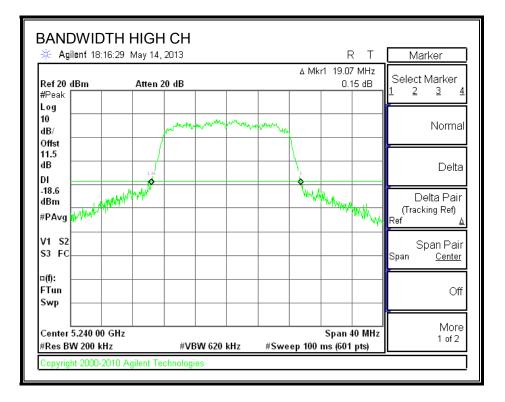
### 26 dB BANDWIDTH



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🔆 Agilent 18:14:	45 May 14, 2013				R		Marker
Ref 20 dBm /Peak	Atten 20 dB			∆ Mkr	1 19.20 0.3	MHz 7 dB	Select Marker 1 2 3 :
.og  0  B/ Dffst		www.mongum	man and a second				Norma
1.5 IB							Delta
)  18.6  Bm  PAvg	where where we are a construction of the const			VI. MA	halphar	how when	Delta Pair (Tracking Ref) Ref
/1 S2 53 FC							Span Pai <sub>Span <u>Center</u></sub>
(f): Tun Swp							Of
Center 5.200 00 G Res BW 200 kHz		/BW 620 kH;	7 #Swe	ep 100 n	Span 4 ns <i>(</i> 601		More 1 of 2



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### 8.1.2. 99% BANDWIDTH

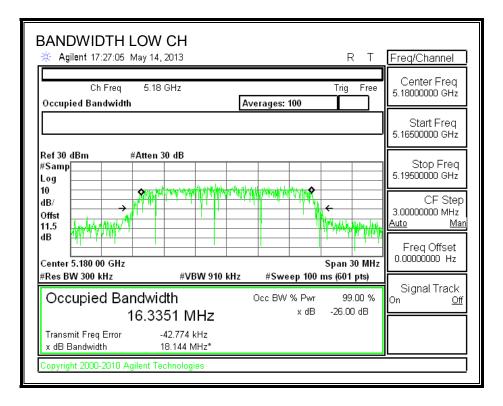
#### LIMITS

None; for reporting purposes only.

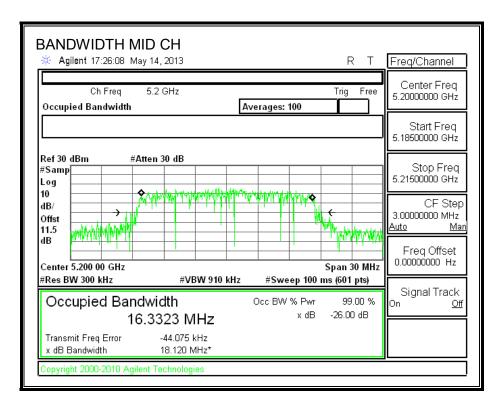
### <u>RESULTS</u>

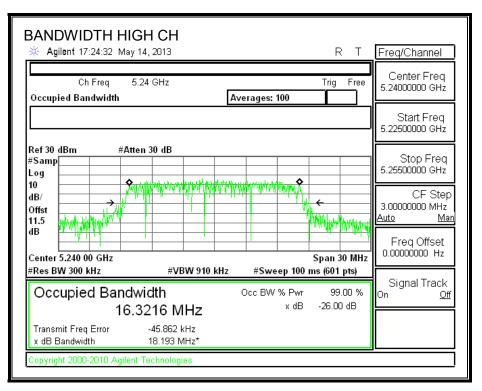
Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Low	5180	16.3351
Mid	5200	16.3323
High	5240	16.3216

#### 99% BANDWIDTH



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### 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 11.5 dB (including 10 dB pad and 1.5 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	5180	13.98
Mid	5200	13.81
High	5240	14.03

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### 8.1.4. OUTPUT POWER AND PSD

### LIMITS

FCC §15.407 (a) (1)

For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-210 A9.2 (1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

#### DIRECTIONAL ANTENNA GAIN

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

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### **RESULTS**

#### Bandwidth and Antenna Gain

Channel	Frequency	Min	Min	Directional
		26 dB	99%	Gain
		BW	BW	
	(MHz)	(MHz)	(MHz)	(dBi)
Low	5180.00	19.20	16.3351	-6.00
Mid	5200.00	19.20	16.3323	-6.00
High	5240.00	19.07	16.3216	-6.00

#### Limits

Channel	Frequency	FCC	IC	Max	Power	FCC	IC	PPSD
		Power	EIRP	IC	Limit	PPSD	eirp	Limit
		Limit	Limit	Power		Limit	PSD	
							Limit	
	(MHz)	(dBm)						
Low	5180	16.83	22.13	28.13	16.83	4.00	10.00	4.00
Mid	5200	16.83	22.13	28.13	16.83	4.00	10.00	4.00
High	5240	16.80	22.13	28.13	16.80	4.00	10.00	4.00

Duty Cycle CF (dB) 0.09

Included in Calculations of Corr'd Power & PPSD

### **Output Power Results**

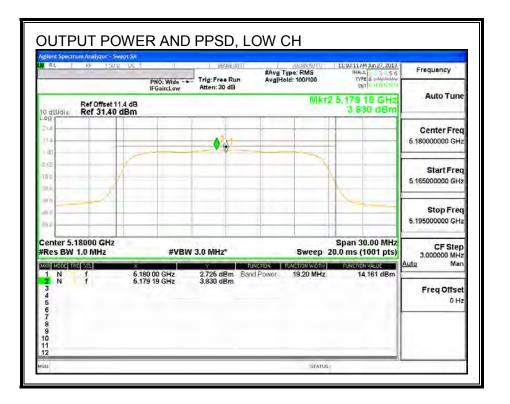
Channel	Frequency	Meas	Total	Power	Power
		Power	Corr'd	Limit	Margin
			Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Low	5180	14.161	14.25	16.83	-2.58
Mid	5200	14.025	14.12	16.83	-2.72
High	5240	14.060	14.15	16.80	-2.65

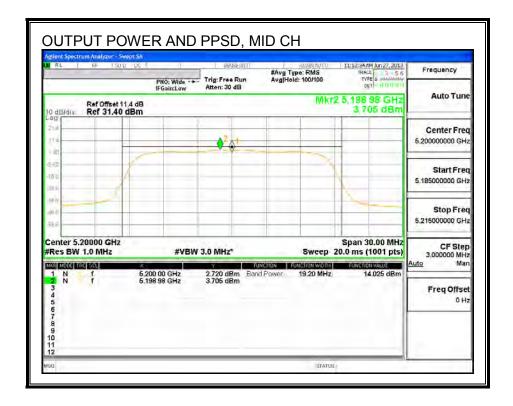
### **PPSD Results**

Channel	Frequency	Meas	Total	PPSD	PPSD
		PPSD	Corr'd	Limit	Margin
			PPSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Low	5180	3.830	3.92	4.00	-0.08
Mid	5200	3.705	3.80	4.00	-0.20
High	5240	3.728	3.82	4.00	-0.18

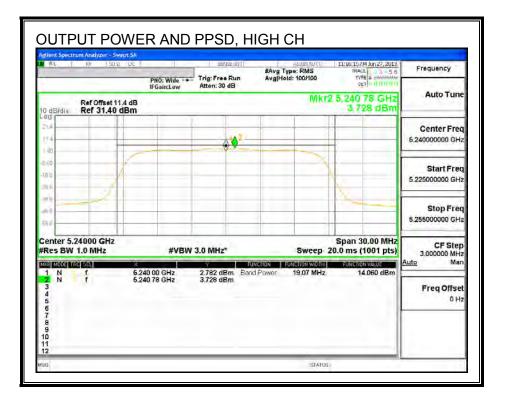
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### OUTPUT POWER AND PSD





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### 8.1.5. PEAK EXCURSION

### LIMITS

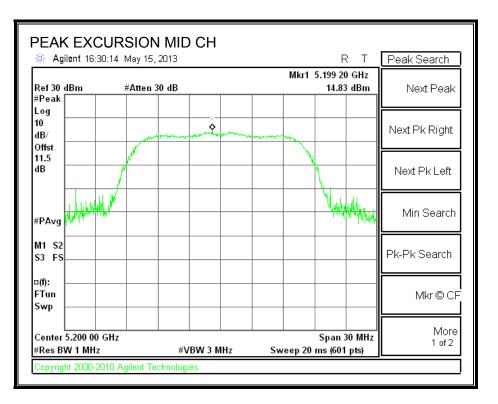
FCC §15.407 (a) (6)

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

### RESULTS

Channel	Frequency	PK Level	PSD	DCCF	Peak Excursion	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)	(dB)	(dB)	(dB)
Mid	5200	14.83	3.705	0.09	11.04	13	-1.97

### PEAK EXCURSION



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## 8.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND

### 8.2.1. 26 dB BANDWIDTH

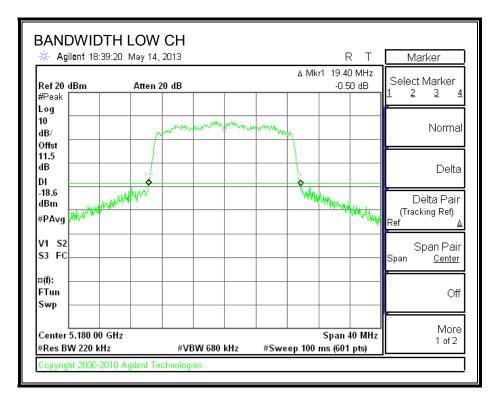
### **LIMITS**

None; for reporting purposes only.

### **RESULTS**

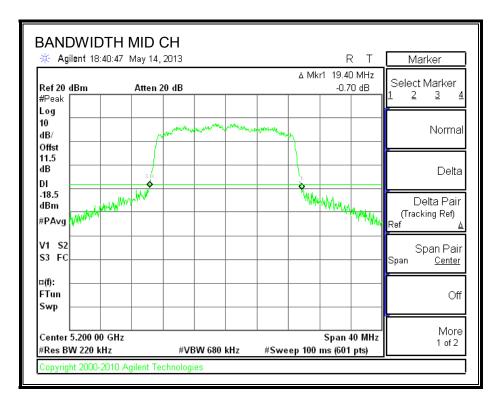
Channel	Frequency	26 dB Bandwidth
	(MHz)	(MHz)
Low	5180	19.40
Mid	5200	19.40
High	5240	19.47

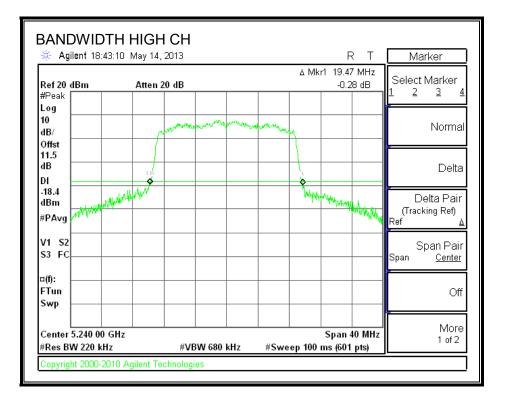
### 26 dB BANDWIDTH



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### 8.2.2. 99% BANDWIDTH

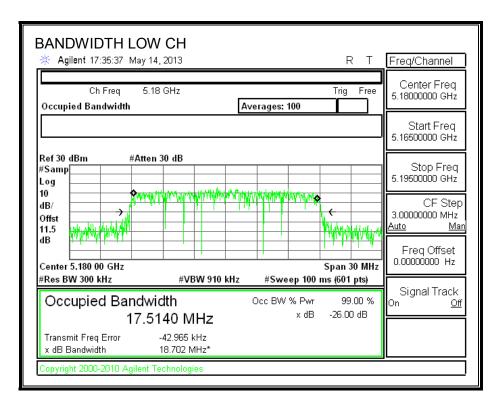
### **LIMITS**

None; for reporting purposes only.

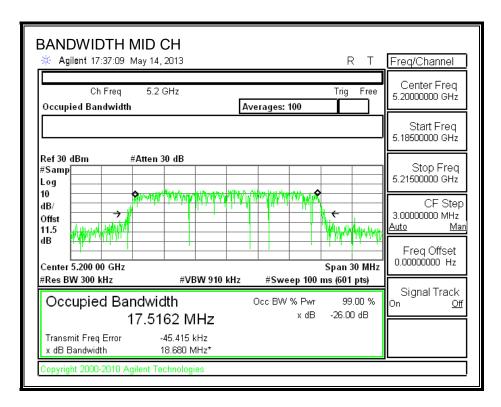
#### **RESULTS**

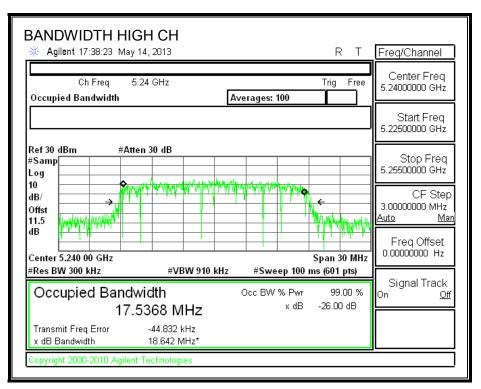
Channel	Frequency	99% Bandwidth		
	(MHz)	(MHz)		
Low	5180	17.5140		
Mid	5200	17.5162		
High	5240	17.5368		

#### 99% BANDWIDTH



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### 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 11.5 dB (including 10 dB pad and 1.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

### **RESULTS**

Channel	Frequency	Power
	(MHz)	
Low	5180	14.05
Mid	5200	14.01
High	5240	14.04

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### 8.2.4. OUTPUT POWER AND PSD

### LIMITS

FCC §15.407 (a) (1)

For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-210 A9.2 (1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

#### DIRECTIONAL ANTENNA GAIN

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

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### **RESULTS**

#### Bandwidth and Antenna Gain

Channel	Frequency	Min	Min	Directional	
		26 dB	<b>99%</b>	Gain	
	BW		BW		
	(MHz)	(MHz)	(MHz)	(dBi)	
Low	5180.00	19.40	17.5140	-6.00	
Mid	5200.00	19.40	17.5162	-6.00	
High	5240.00	19.47	17.5368	-6.00	

#### Limits

Channel	Frequency	FCC	IC	Max	Power	FCC	IC	PPSD
		Power	EIRP	IC	Limit	PPSD	eirp	Limit
		Limit	Limit	Power		Limit	PSD	
							Limit	
	(MHz)	(dBm)						
Low	5180	16.88	22.43	28.43	16.88	4.00	10.00	4.00
Mid	5200	16.88	22.43	28.43	16.88	4.00	10.00	4.00
High	5240	16.89	22.44	28.44	16.89	4.00	10.00	4.00

### Duty Cycle CF (dB) 0.07

Included in Calculations of Corr'd Power & PPSD

### **Output Power Results**

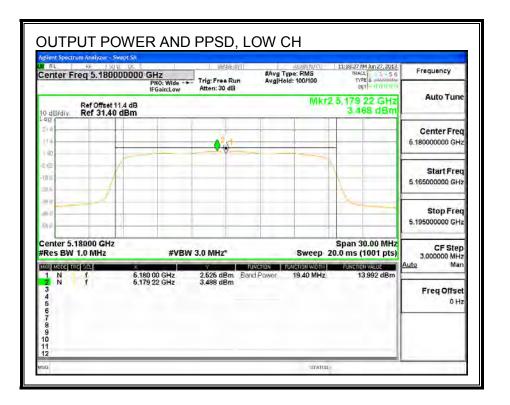
Channel	Frequency	Frequency Meas		Power	Power
		Power	Corr'd	Limit	Margin
			Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Low	5180	13.992	14.06	16.88	-2.82
Mid	5200	14.110	14.18	16.88	-2.70
High	5240	14.011	14.08	16.89	-2.81

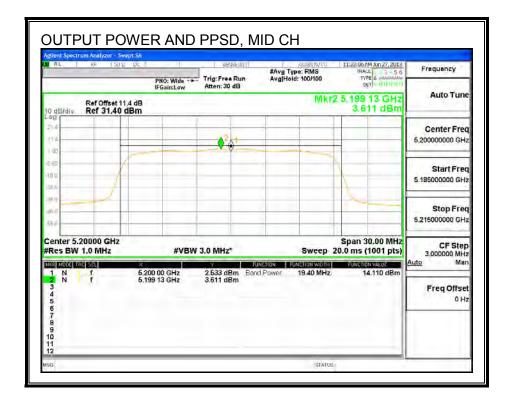
### **PPSD Results**

Channel	Frequency	requency Meas		Frequency Meas Total			PPSD	
		PPSD	Corr'd	Limit	Margin			
		PPSD						
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)			
Low	5180	3.488	3.56	4.00	-0.44			
Mid	5200	3.611	3.68	4.00	-0.32			
High	5240	3.497	3.57	4.00	-0.43			

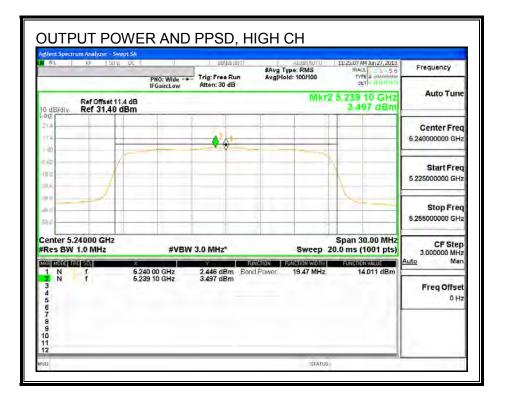
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### OUTPUT POWER AND PSD





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### 8.2.5. PEAK EXCURSION

### LIMITS

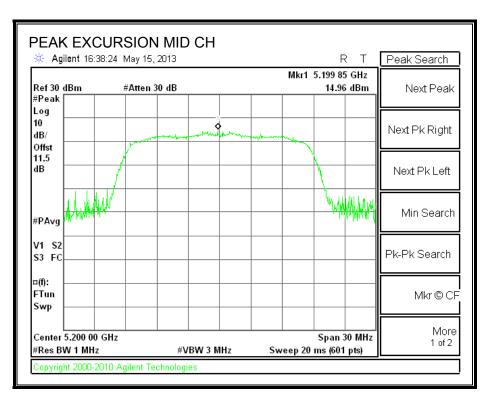
FCC §15.407 (a) (6)

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

### RESULTS

Channel	Frequency	PK Level	PSD	DCCF	Peak Excursion	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)	(dB)	(dB)	(dB)
Mid	5200	14.96	3.488	0.07	11.40	13	-1.60

### PEAK EXCURSION



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# 8.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND

## 8.3.1. 26 dB BANDWIDTH

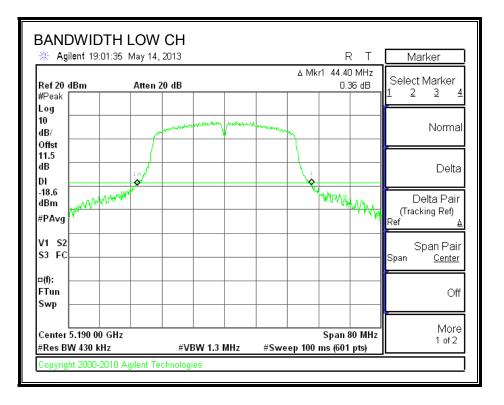
#### **LIMITS**

None; for reporting purposes only.

#### **RESULTS**

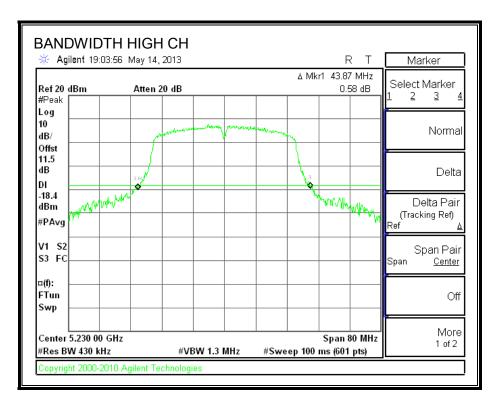
Channel	Frequency	26 dB Bandwidth
	(MHz)	(MHz)
Low	5190	44.40
5230	5230	43.87

#### 26 dB BANDWIDTH



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## 8.3.2. 99% BANDWIDTH

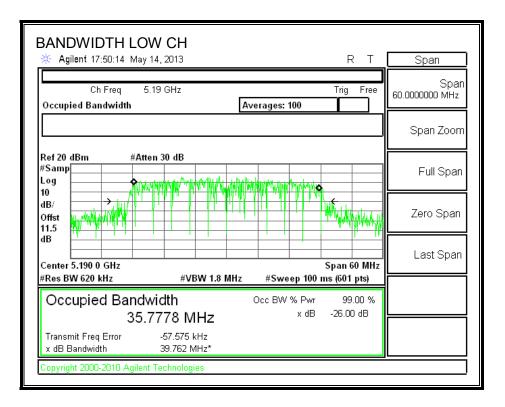
#### **LIMITS**

None; for reporting purposes only.

### **RESULTS**

Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Low	5190	35.7778
High	5230	35.7688

#### 99% BANDWIDTH



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BANDWIDTH HIGH C		RТ	Freq/Channel
Ch Freq 5.23 GH Occupied Bandwidth	z Averages: 100	Trig Free	Center Freq 5.23000000 GHz
			Start Freq 5.20000000 GHz
Ref 20 dBm #Atten 30 d #Samp Log 10		<b>•</b>	Stop Freq 5.2600000 GHz
dB/ Offst			CF Step 6.0000000 MHz <u>Auto Man</u>
dB		Span 60 MHz	Freq Offset 0.00000000 Hz
#Res BW 620 kHz Occupied Bandwidth		99.00 %	Signal Track On <u>Off</u>
	3 MHZ * <sup>100</sup> 984 kHz '40 MHz*	-28.00 00	
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## 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 11.4 dB (including 10 dB pad and 1.4 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

#### **RESULTS**

Channel	Frequency	Power
	(MHz)	(dBm)
Mid	5190	16.20
High	5230	16.00

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## 8.3.4. OUTPUT POWER AND PPSD

## LIMITS

FCC §15.407 (a) (1)

For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-210 A9.2 (1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

#### DIRECTIONAL ANTENNA GAIN

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

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#### **RESULTS**

## Bandwidth and Antenna Gain

Channel	Frequency	Min	Min	Directional
		26 dB	99%	Gain
		BW	BW	
	(MHz)	(MHz)	(MHz)	(dBi)
Low	5190	44.40	35.7778	-6.00
High	5230	43.87	35.7688	-6.00

#### Limits

Channel	Frequency	FCC	IC	Max	Power	FCC	IC	PPSD
		Power	EIRP	IC	Limit	PPSD	eirp	Limit
		Limit	Limit	Power		Limit	PSD	
							Limit	
	(MHz)	(dBm)						
Low	5190	17.00	23.00	29.00	17.00	4.00	10.00	4.00
High	5230	17.00	23.00	29.00	17.00	4.00	10.00	4.00

Duty Cycle CF (dB)0.16Included in Calculations of Corr'd Power & PPSD

## Output Power Results

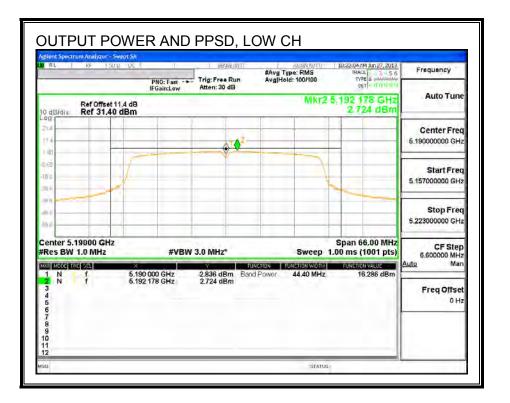
Channel	Frequency	Meas	Total	Power	Power
		Power	Corr'd	Limit	Margin
			Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
	(	()	()	N - 7	()
Low	5190	16.286	16.45	17.00	-0.55

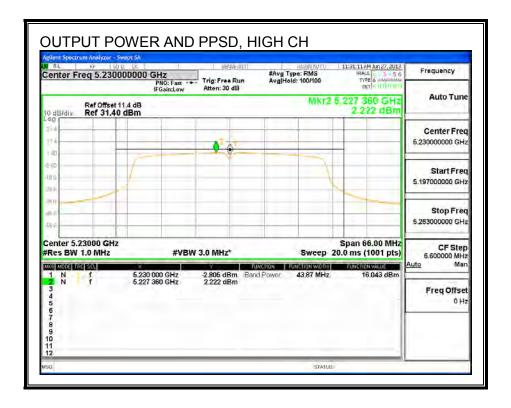
#### **PPSD Results**

Channel	Frequency	Meas	Total	PPSD	PPSD
		PPSD	Corr'd	Limit	Margin
			PPSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Low	<b>(MHz)</b> 5190	(dBm) 2.724	(dBm) 2.88	(dBm) 4.00	(dB) -1.12

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## OUTPUT POWER AND PPSD





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## 8.3.5. PEAK EXCURSION Fixed

## <u>LIMITS</u>

FCC §15.407 (a) (6)

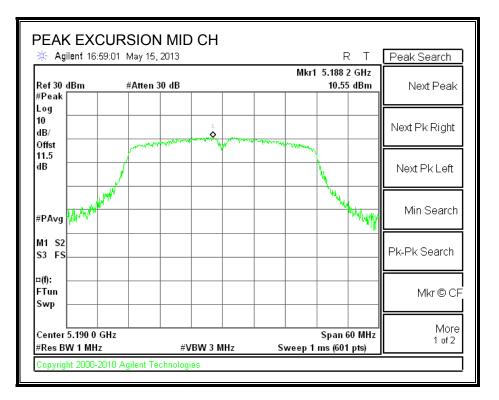
The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

## RESULTS

Refer to the results of 802.11n HT20 mode in the 5.2 GHz band.

Channel	Frequency	PK Level	PSD	DCCF	Peak Excursion	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)	(dB)	(dB)	(dB)
Mid	5190	10.55	2.222	0.16	8.17	13	-4.83

## PEAK EXCURSION



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# 8.4. 802.11a MODE IN THE 5.3 GHz BAND

## 8.4.1. 26 dB BANDWIDTH

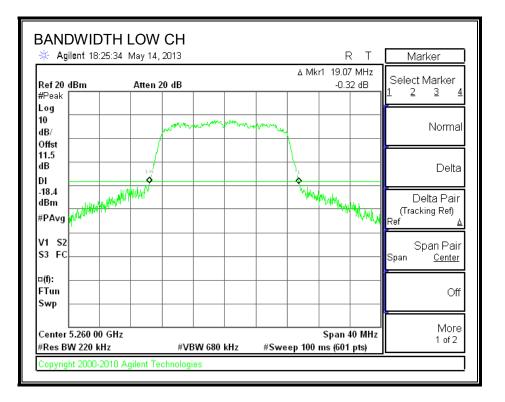
#### **LIMITS**

None; for reporting purposes only.

## **RESULTS**

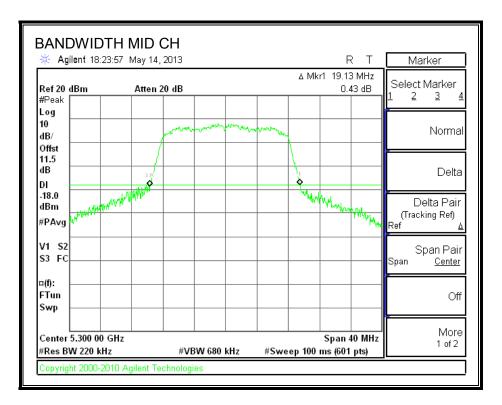
Channel	Frequency	26 dB Bandwidth
	(MHz)	(MHz)
Low	5260	19.07
Mid	5300	19.13
High	5320	19.27

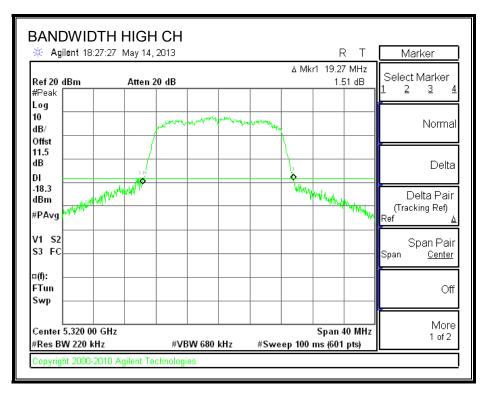
#### 26 dB BANDWIDTH



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## 8.4.2. 99% BANDWIDTH

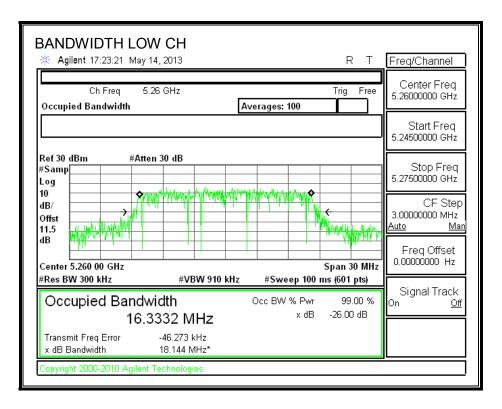
### **LIMITS**

None; for reporting purposes only.

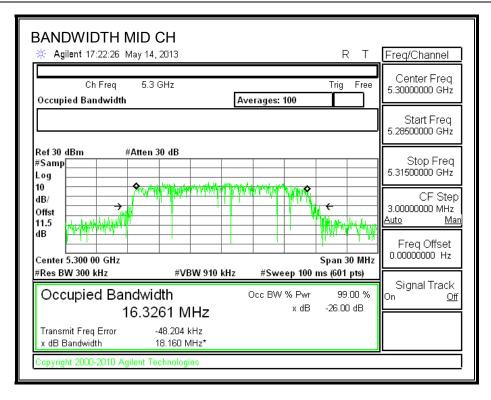
### **RESULTS**

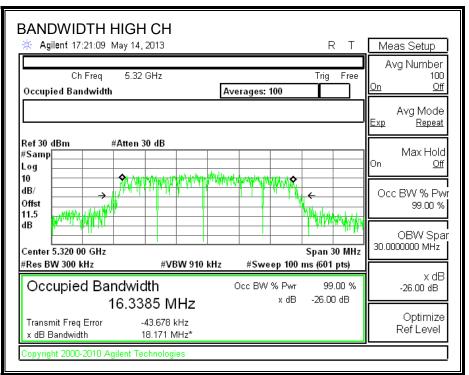
Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Low	5260	16.3332
Mid	5300	16.3261
High	5320	16.3385

#### 99% BANDWIDTH



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## 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 11.4 dB (including 10 dB pad and 1.4 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	5260	15.90
Mid	5300	15.91
High	5320	15.95

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## 8.4.4. OUTPUT POWER AND PPSD

## LIMITS

FCC §15.407 (a) (1)

For the band 5.25–5.35 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-210 A9.2 (1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

#### DIRECTIONAL ANTENNA GAIN

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

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#### **RESULTS**

## Bandwidth and Antenna Gain

Channel	Frequency	Min	Min	Directional
		26 dB	99%	Gain
		BW	BW	
	(MHz)	(MHz)	(MHz)	(dBi)
Low	5260	19.07	16.3332	-6.00
Mid	5300	19.13	16.3261	-6.00
High	5320	19.27	16.3385	-6.00

#### Limits

Channel	Frequency	FCC	IC	IC	Power	FCC	IC	PPSD
		Power	Power	EIRP	Limit	PPSD	PSD	Limit
		Limit	Limit	Limit		Limit	Limit	
	(MHz)	(dBm)						
Low	5260	23.80	23.13	29.13	23.13	11.00	11.00	11.00
Mid	5300	23.82	23.13	29.13	23.13	11.00	11.00	11.00
High	5320	23.85	23.13	29.13	23.13	11.00	11.00	11.00

Duty Cycle CF (dB)	0.07	Included in Calculations of Corr'd Power & PPSD
--------------------	------	---

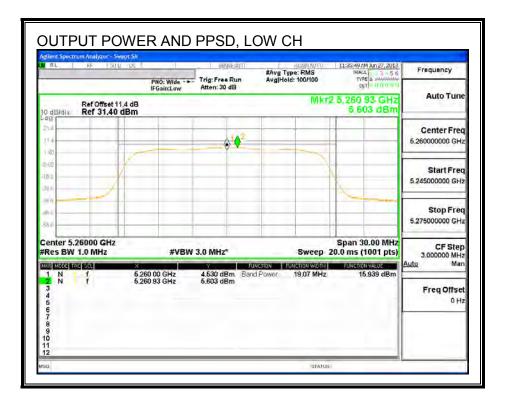
#### **Output Power Results**

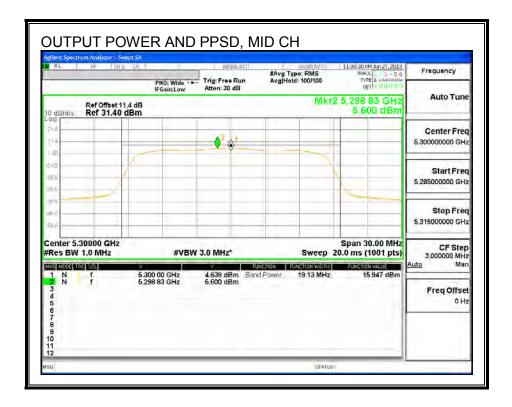
Channel	Frequency	Meas	Total	Power	Power
		Power	Corr'd	Limit	Margin
			Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Low	5260	15.939	16.01	23.13	-7.12
Mid	5300	15.947	16.02	23.13	-7.11
High	5320	15.973	16.04	23.13	-7.09

#### **PPSD Results**

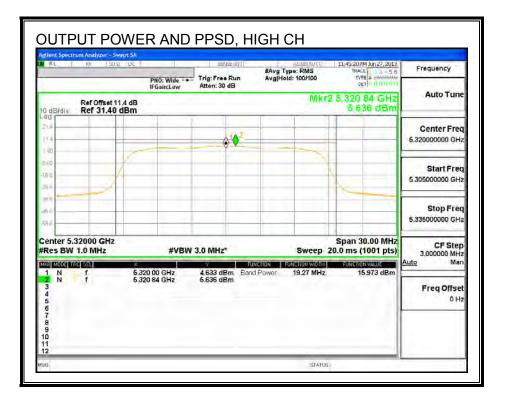
Channel	Frequency	Meas	Total	PPSD	PPSD
		PPSD	Corr'd	Limit	Margin
			PPSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Low	5260	5.603	5.67	11.00	-5.33
Mid	5300	5.600	5.67	11.00	-5.33
High	5320	5.636	5.71	11.00	-5.29

## OUTPUT POWER AND PPSD





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## 8.4.5. PEAK EXCURSION

### LIMITS

FCC §15.407 (a) (6)

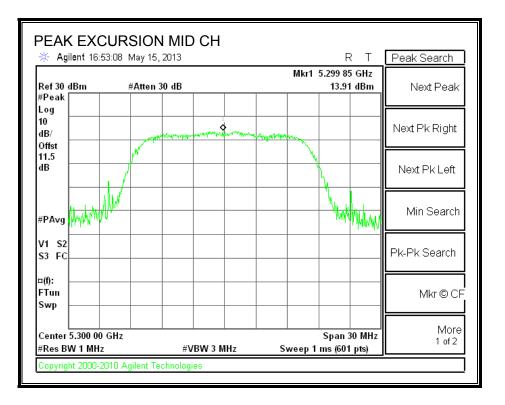
The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

## **RESULTS**

Refer to the results of 802.11n HT20 mode in the 5.2 GHz band.

Channe	el Frequency	PK Level	PSD	DCCF	Peak Excursion	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)	(dB)	(dB)	(dB)
Mid	5300	13.91	5.600	0.07	8.24	13	-4.76

## PEAK EXCURSION



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# 8.5. 802.11n HT20 MODE IN THE 5.3 GHz BAND

## 8.5.1. 26 dB BANDWIDTH

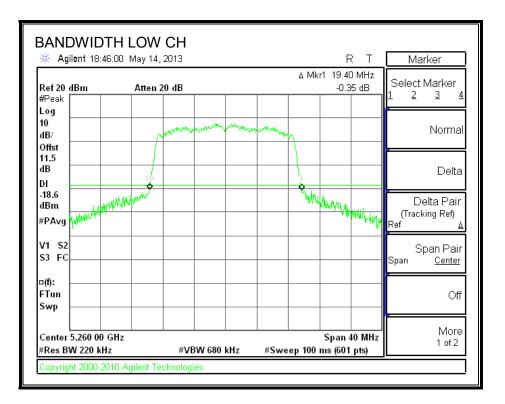
#### <u>LIMITS</u>

None; for reporting purposes only.

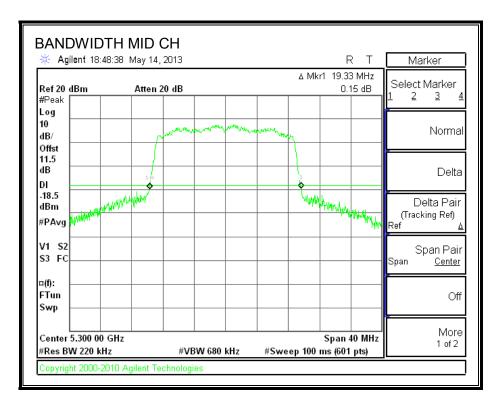
#### RESULTS

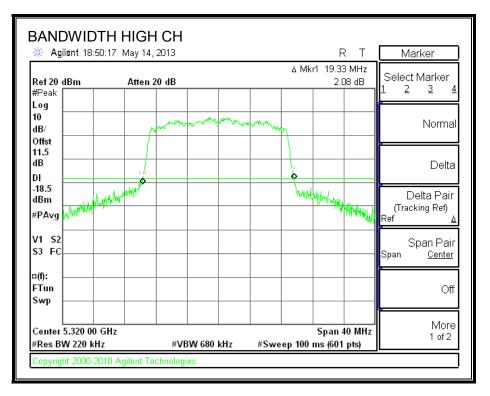
Channel	Frequency	26 dB Bandwidth
	(MHz)	(MHz)
Low	5260	19.40
Mid	5300	19.33
High	5320	19.33

#### 26 dB BANDWIDTH



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## 8.5.2. 99% BANDWIDTH

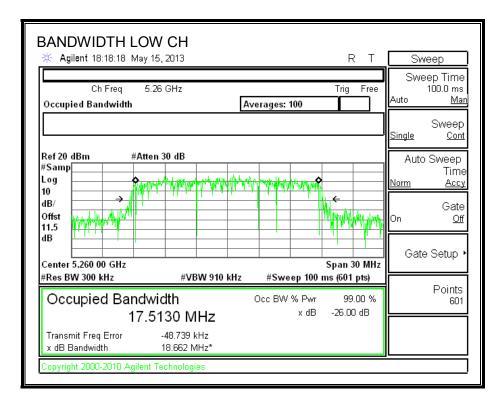
#### **LIMITS**

None; for reporting purposes only.

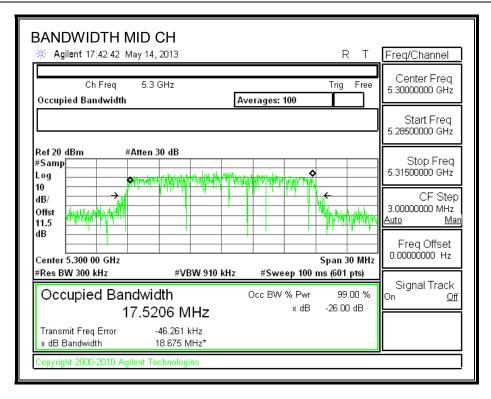
#### **RESULTS**

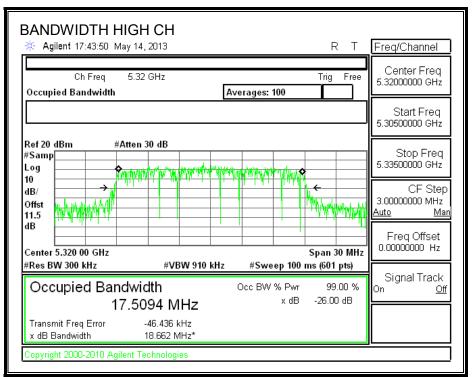
Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Low	5260	17.5130
Mid	5300	17.5206
High	5320	17.5094

#### 99% BANDWIDTH



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## 8.5.3. 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 11.4 dB (including 10 dB pad and 1.4 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	5260	16.04
Mid	5300	16.00
High	5320	16.00

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## 8.5.4. OUTPUT POWER AND PPSD

### LIMITS

FCC §15.407 (a) (1)

For the band 5.25–5.35 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-210 A9.2 (1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

#### DIRECTIONAL ANTENNA GAIN

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

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#### **RESULTS**

## Bandwidth and Antenna Gain

Channel	Frequency	Min	Min	Directional
		26 dB	99%	Gain
		BW	BW	
	(MHz)	(MHz)	(MHz)	(dBi)
Low	5260	19.40	17.5130	-6.00
Mid	5300	19.33	17.5206	-6.00
High	5320	19.33	17.5094	-6.00

#### Limits

Channel	Frequency	FCC	IC	IC	Power	FCC	IC	PPSD
		Power	Power	EIRP	Limit	PPSD	PSD	Limit
		Limit	Limit	Limit		Limit	Limit	
	(MHz)	(dBm)						
Low	5260	23.88	23.43	29.43	23.43	11.00	11.00	11.00
Mid	5300	23.86	23.44	29.44	23.44	11.00	11.00	11.00
High	5320	23.86	23.43	29.43	23.43	11.00	11.00	11.00

Duty Cycle CF (dB)	0.07	Included in Calculations of Corr'd Power & PPSD
--------------------	------	---

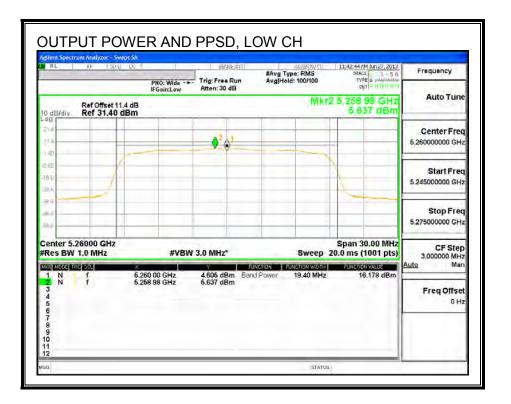
#### **Output Power Results**

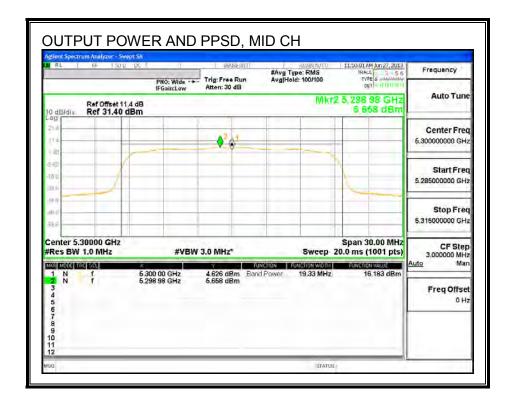
Channel	Frequency	Meas	Total	Power	Power
		Power	Corr'd	Limit	Margin
			Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Low	5260	16.178	16.25	23.43	-7.19
Mid	5300	16.183	16.25	23.44	-7.18
High	5320	16.048	16.12	23.43	-7.31

#### **PPSD Results**

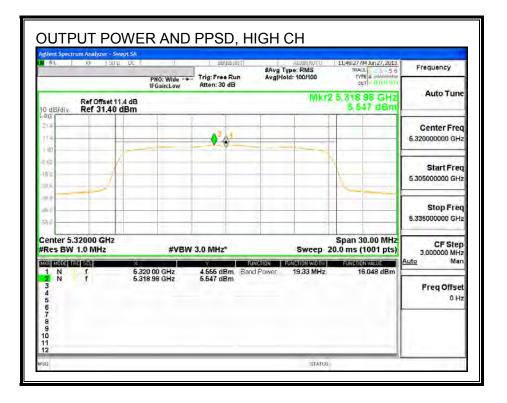
Channel	Frequency	Meas	Total	PPSD	PPSD
		PPSD	Corr'd	Limit	Margin
			PPSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Low	5260	5.637	5.71	11.00	-5.29
Mid	5300	5.658	5.73	11.00	-5.27
High	5320	5.547	5.62	11.00	-5.38

## **OUTPUT POWER AND PPSD**





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## 8.5.5. PEAK EXCURSION

### LIMITS

FCC §15.407 (a) (6)

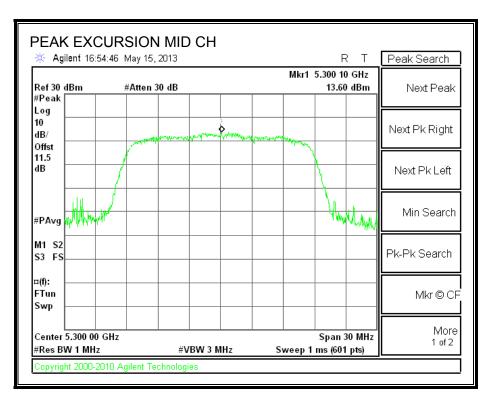
The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

## **RESULTS**

Refer to the results of 802.11n HT20 mode in the 5.2 GHz band.

Channel	Frequency	PK Level	PSD	DCCF	Peak Excursion	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)	(dB)	(dB)	(dB)
Mid	5300	13.60	5.547	0.07	7.98	13	-5.02

#### PEAK EXCURSION



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# 8.6. 802.11n HT40 MODE IN THE 5.3 GHz BAND

## 8.6.1. 26 dB BANDWIDTH

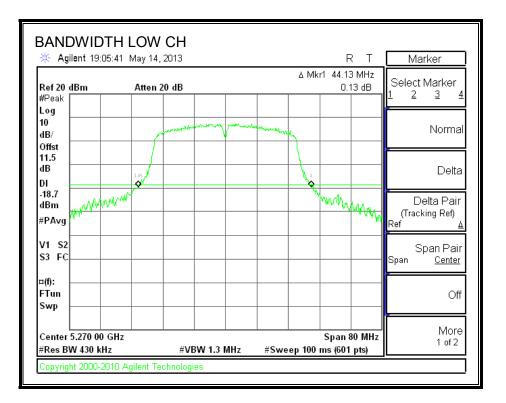
## LIMITS

None; for reporting purposes only.

#### RESULTS

Channel	Frequency	26 dB Bandwidth
	(MHz)	(MHz)
Low	5270	44.13
High	5310	44.00

#### 26 dB BANDWIDTH



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🔆 Agilent 19:07:	32 May 14, 2013			RT	Marker
Ref 20 dBm #Peak	Atten 20 dB		∆ Mkr	1 44.00 MHz 0.68 dB	Select Marker 1 <u>2</u> <u>3</u> 4
Log 10 dB/		and the second	al remain and any		Normal
Offst 11.5 dB DI	1.R				Delta
-18.6 dBm #PAvg	prod Market			how the advertised	Delta Pair (Tracking Ref) Ref ∆
V1 S2 S3 FC					Span Pair Span <u>Center</u>
⊐(f): FTun Swp					Off
Center 5.310 00 G #Res BW 430 kHz		BW 1.3 MHz	#Sweep 100 n	Span 80 MHz ns (601 pts)	More 1 of 2

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## 8.6.2. 99% BANDWIDTH

#### **LIMITS**

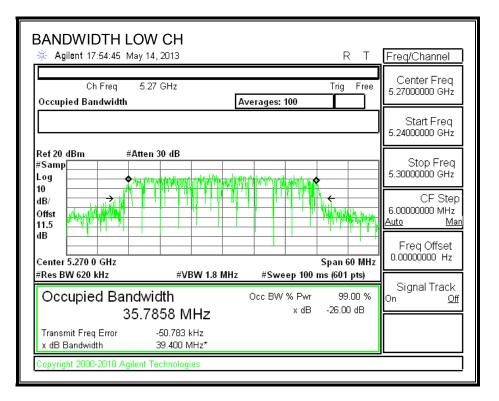
None; for reporting purposes only.

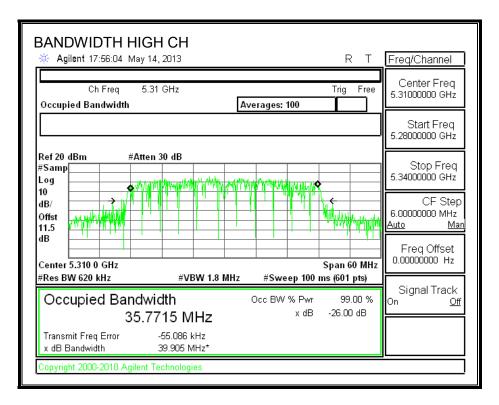
## <u>RESULTS</u>

Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Low	5270	35.7858
High	5310	35.7715

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## 99% BANDWIDTH





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## 8.6.3. 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 11.5 dB (including 10 dB pad and 1.5 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	5270	15.99
High	5310	15.94

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## 8.6.4. OUTPUT POWER AND PPSD

### LIMITS

FCC §15.407 (a) (1)

For the band 5.25–5.35 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-210 A9.2 (1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

#### DIRECTIONAL ANTENNA GAIN

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

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### **RESULTS**

#### Bandwidth and Antenna Gain

Channel	Frequency	Min	Min	Directional
		26 dB	99%	Gain
		BW	BW	
	(MHz)	(MHz)	(MHz)	(dBi)
Low	5270	44.13	35.7858	-6.00
High	5310	44.00	35.7715	-6.00

#### Limits

Channel	Frequency	FCC	IC	IC	Power	FCC	IC	PPSD
		Power	Power	EIRP	Limit	PPSD	PSD	Limit
		Limit	Limit	Limit		Limit	Limit	
	(MHz)	(dBm)						
Low	5270	24.00	24.00	30.00	24.00	11.00	11.00	11.00
High	5310	24.00	24.00	30.00	24.00	11.00	11.00	11.00

Duty Cycle CF (dB) 0.16 Included in Calculations of Corr'd Power & PPSD

#### **Output Power Results**

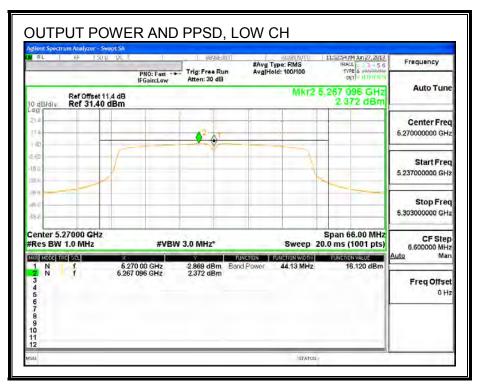
Channel	Frequency	Meas	Total	Power	Power
		Power	Corr'd	Limit	Margin
			Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Low	5270	16.120	16.28	24.00	-7.72
High	5310	15.900	16.06	24.00	-7.94

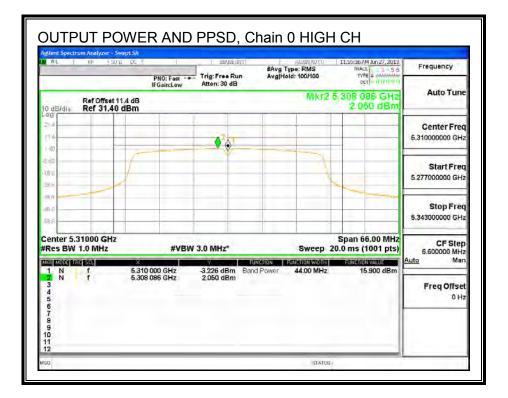
#### **PPSD Results**

Channel	Frequency	Meas	Total	PPSD	PPSD
		PPSD	Corr'd	Limit	Margin
			PPSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Low	<b>(MHz)</b> 5270	(dBm) 2.372	(dBm) 2.53	(dBm) 11.00	(dB) -8.47

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## **OUTPUT POWER AND PPSD,**





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## 8.6.5. PEAK EXCURSION

## LIMITS

FCC §15.407 (a) (6)

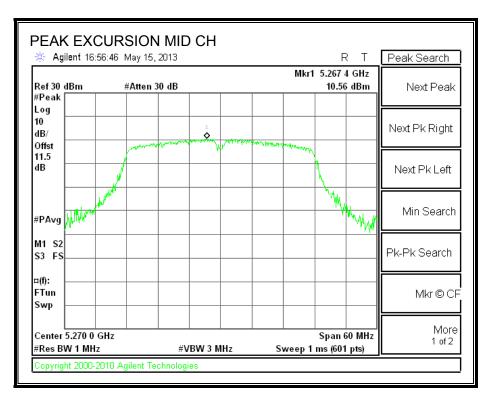
The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

## RESULTS

Refer to the results of 802.11n HT20 mode in the 5.2 GHz band.

Channel	Frequency	PK Level	PSD	DCCF	Peak Excursion	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)	(dB)	(dB)	(dB)
Mid	5270	10.56	2.050	0.16	8.35	13	-4.65

## PEAK EXCURSION



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# 8.7. 802.11a MODE IN THE 5.6 GHz BAND

## 8.7.1. 26 dB BANDWIDTH

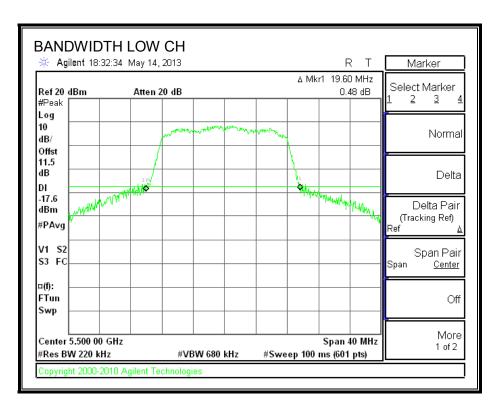
## **LIMITS**

None; for reporting purposes only.

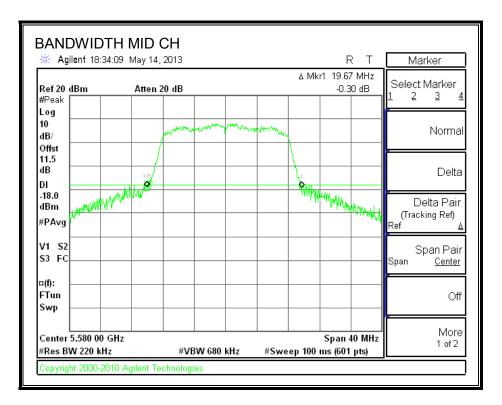
## RESULTS

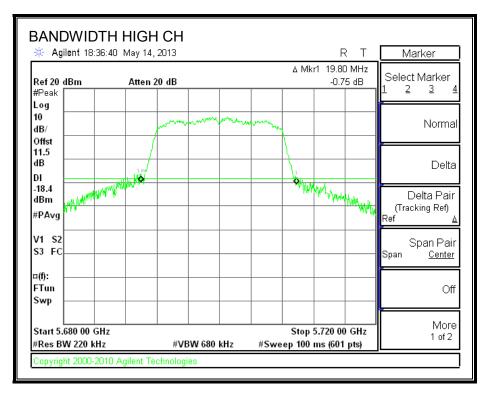
Channel Frequency		26 dB Bandwidth
	(MHz)	(MHz)
Low	5500	19.60
Mid	5580	19.67
High	5700	19.80

## 26 dB BANDWIDTH



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## 8.7.2. 99% BANDWIDTH

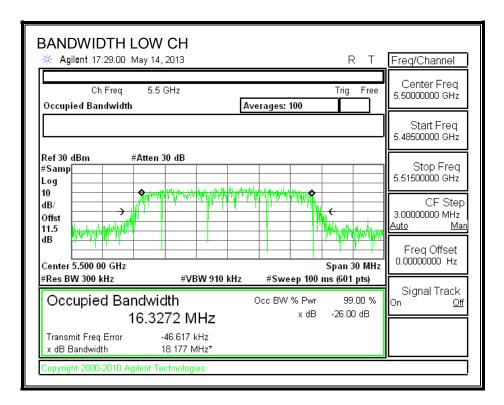
#### **LIMITS**

None; for reporting purposes only.

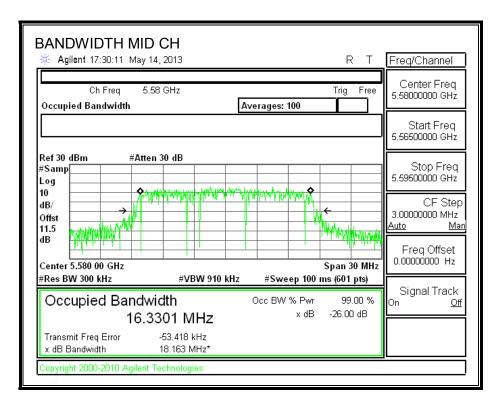
## **RESULTS**

Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Low	5500	16.3272
Mid	5580	16.3301
High	5700	16.3314

## 99% BANDWIDTH



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## 8.7.3. 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 11.5 dB (including 10 dB pad and 1.5 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	5500	14.00
Mid	5580	13.95
High	5700	13.92

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## 8.7.4. OUTPUT POWER AND PPSD

## LIMITS

FCC §15.407 (a) (1)

For the band 5.5–5.7 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-210 A9.2 (1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

## DIRECTIONAL ANTENNA GAIN

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

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## **RESULTS**

## Bandwidth and Antenna Gain

Channel	Frequency	Min	Min	Directional
		26 dB	99%	Gain
		BW	BW	
	(MHz)	(MHz)	(MHz)	(dBi)
Low	5500	19.60	16.3272	-5.50
Mid	5580	19.67	16.3301	-5.50
High	5700	19.80	16.3314	-5.50

#### Limits

Channel	Frequency	FCC	IC	IC	Power	FCC	IC	PPSD
		Power	Power	EIRP	Limit	PPSD	PSD	Limit
		Limit	Limit	Limit		Limit	Limit	
	(MHz)	(dBm)						
Low	5500	23.92	23.13	29.13	23.13	11.00	11.00	11.00
Mid	5580	23.94	23.13	29.13	23.13	11.00	11.00	11.00
High	5700	23.97	23.13	29.13	23.13	11.00	11.00	11.00

Duty Cycle CF (dB) 0.07 Included in Calculations of Corr'd Power & PPSD

## **Output Power Results**

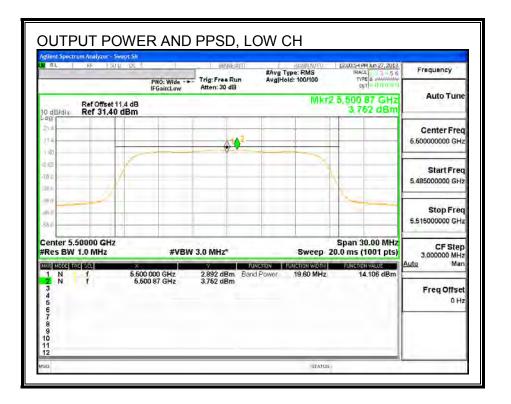
Channel	Frequency	Meas	Total	Power	Power
		Power	Corr'd	Limit	Margin
			Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Low	5500	14.106	14.18	23.13	-8.95
Mid	5580	13.989	14.06	23.13	-9.07
High	5700	13.948	14.02	23.13	-9.11

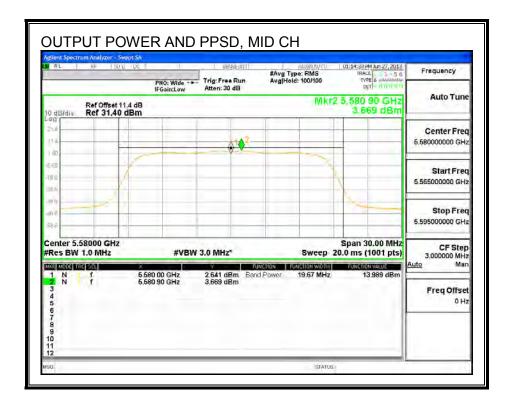
## **PPSD Results**

Channel	Frequency	Meas	Total	PPSD	PPSD
		PPSD	Corr'd	Limit	Margin
			PPSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Low	5500	3.752	3.82	11.00	-7.18
Mid	5580	3.669	3.74	11.00	-7.26
High	5700	3.626	3.70	11.00	-7.30

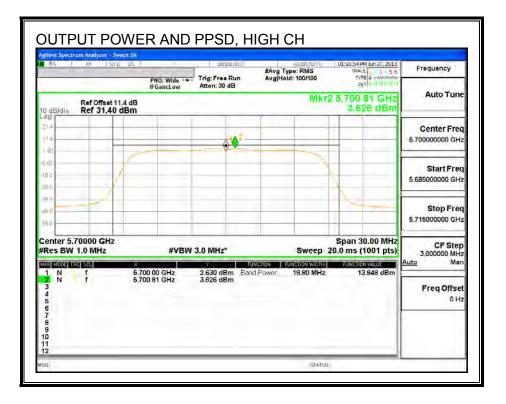
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## OUTPUT POWER AND PPSD





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## 8.7.5. PEAK EXCURSION

## LIMITS

FCC §15.407 (a) (6)

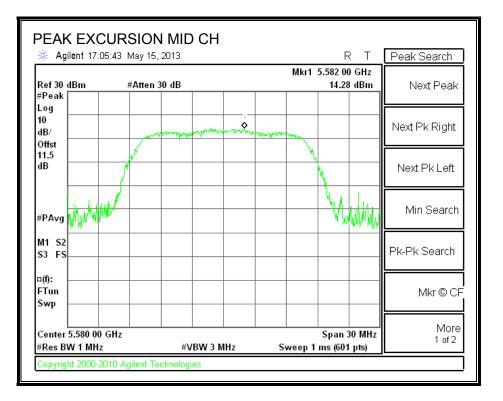
The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

## **RESULTS**

Refer to the results of 802.11n HT20 mode in the 5.2 GHz band.

Channel	Frequency	PK Level	PSD	DCCF	Peak Excursion	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)	(dB)	(dB)	(dB)
Mid	5580	14.28	3.626	0.07	10.58	13	-2.42

## PEAK EXCURSION



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# 8.8. 802.11n HT20 MODE IN THE 5.6 GHz BAND

## 8.8.1. 26 dB BANDWIDTH

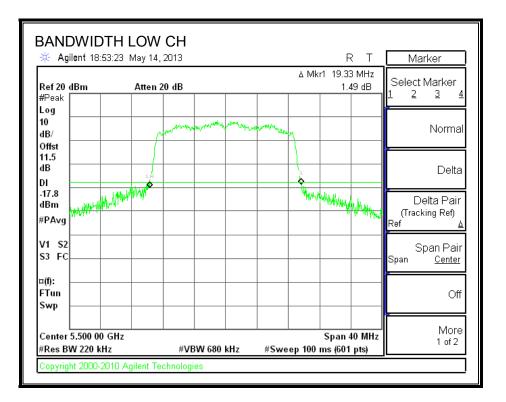
## <u>LIMITS</u>

None; for reporting purposes only.

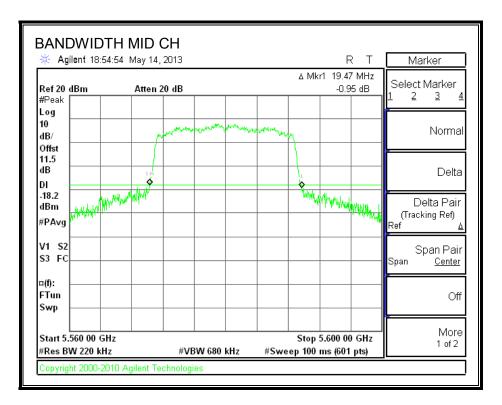
#### RESULTS

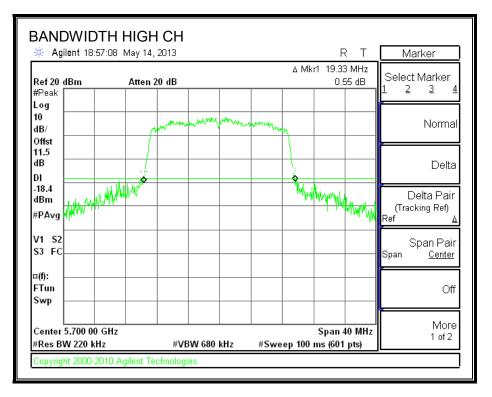
Channel	Frequency	26 dB Bandwidth
	(MHz)	(MHz)
Low	5500	19.33
Mid	5580	19.47
High	5700	19.33

#### 26 dB BANDWIDTH



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## 8.8.2. 99% BANDWIDTH

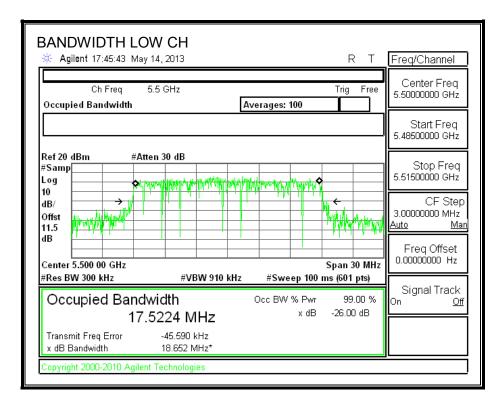
#### **LIMITS**

None; for reporting purposes only.

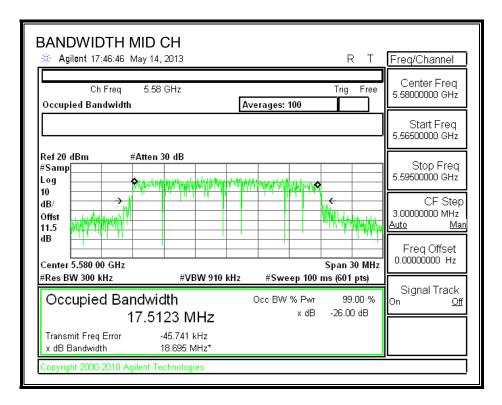
## **RESULTS**

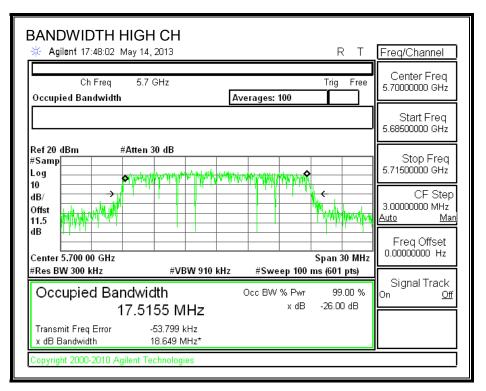
Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Low	5500	17.5224
Mid	5580	17.5123
High	5700	17.5155

## 99% BANDWIDTH



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## 8.8.3. 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 11.5 dB (including 10 dB pad and 1.5 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	5500	13.95
Mid	5580	14.00
High	5700	14.00

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## 8.8.4. OUTPUT POWER AND PPSD

## LIMITS

FCC §15.407 (a) (1)

For the band 5.5–5.7 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-210 A9.2 (1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

## DIRECTIONAL ANTENNA GAIN

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

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## **RESULTS**

## Bandwidth and Antenna Gain

Channel	Frequency	Min	Min	Directional
		26 dB	99%	Gain
		BW	BW	
	(MHz)	(MHz)	(MHz)	(dBi)
Low	5500	19.33	17.5224	-5.50
Mid	5580	19.47	17.5123	-5.50
High	5700	19.33	17.5155	-5.50

#### Limits

Channel	Frequency	FCC	IC	IC	Power	FCC	IC	PPSD
		Power	Power	EIRP	Limit	PPSD	PSD	Limit
		Limit	Limit	Limit		Limit	Limit	
	(MHz)	(dBm)						
Low	5500	23.86	23.44	29.44	23.44	11.00	11.00	11.00
Mid	5580	23.89	23.43	29.43	23.43	11.00	11.00	11.00
High	5700	23.86	23.43	29.43	23.43	11.00	11.00	11.00

Duty Cycle CF (dB)	0.09	Included in Calculations of Corr'd Power & PPSD
--------------------	------	---

## **Output Power Results**

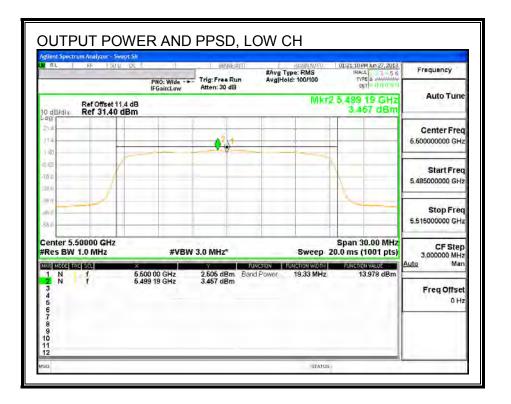
Channel	Frequency	Meas	Total	Power	Power
		Power	Corr'd	Limit	Margin
			Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Low	5500	13.978	14.07	23.44	-9.37
Mid	5580	14.138	14.23	23.43	-9.21
High	5700	14.116	14.21	23.43	-9.23

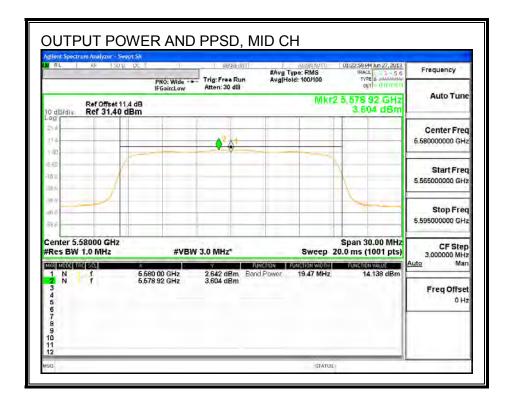
#### **PPSD Results**

Channel	Frequency	Meas	Total	PPSD	PPSD
		PPSD	Corr'd	Limit	Margin
			PPSD		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Low	5500	3.457	3.55	11.00	-7.45
Mid	5580	3.604	3.69	11.00	-7.31
High	5700	3.593	3.68	11.00	-7.32

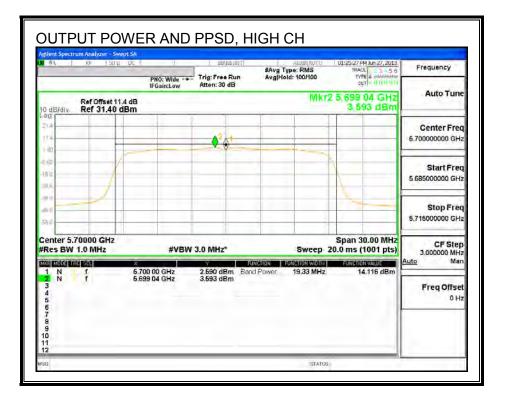
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## **OUTPUT POWER AND PPSD**





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## 8.8.5. PEAK EXCURSION

## LIMITS

FCC §15.407 (a) (6)

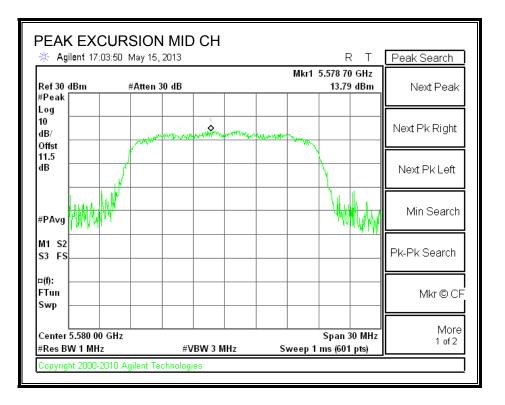
The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

## **RESULTS**

Refer to the results of 802.11n HT20 mode in the 5.2 GHz band.

Channel	Frequency	PK Level	PSD	DCCF	Peak Excursion	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)	(dB)	(dB)	(dB)
Mid	5580	13.79	3.457	0.09	10.24	13	-2.76

## PEAK EXCURSION



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# 8.9. 802.11n HT40 MODE IN THE 5.6 GHz BAND

## 8.9.1. 26 dB BANDWIDTH

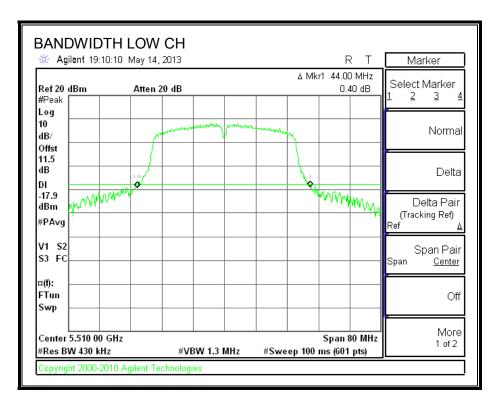
#### <u>LIMITS</u>

None; for reporting purposes only.

#### RESULTS

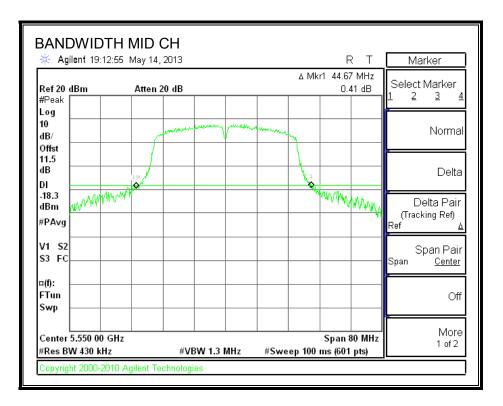
Channel	Frequency	26 dB Bandwidth
	(MHz)	(MHz)
Low	5510	44.00
Mid	5550	44.67
High	5670	44.80

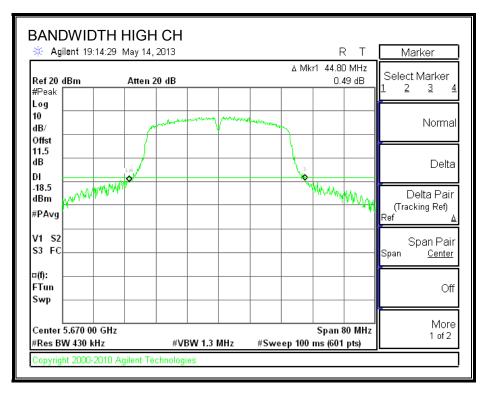
#### 26 dB BANDWIDTH



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## 8.9.2. 99% BANDWIDTH

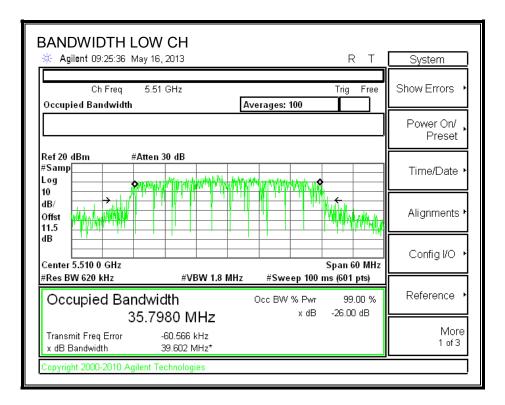
#### **LIMITS**

None; for reporting purposes only.

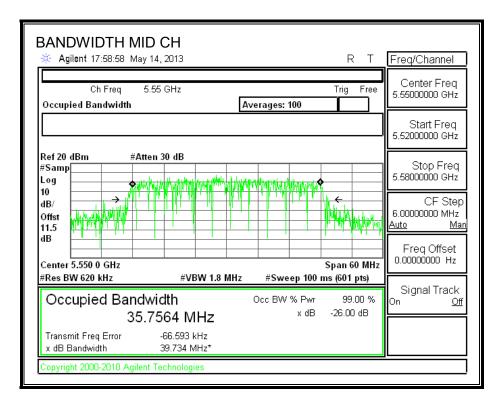
## **RESULTS**

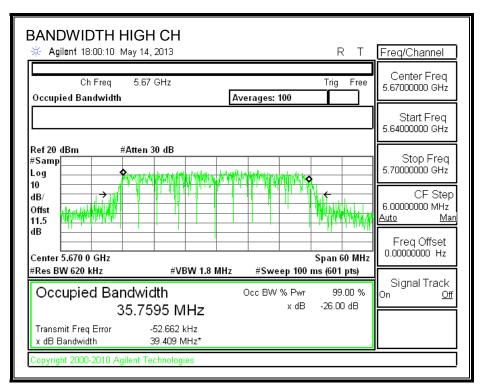
Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Low	5510	35.7980
Mid	5550	35.7564
High	5670	35.7595

## 99% BANDWIDTH



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## 8.9.3. 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 11.5 dB (including 10 dB pad and 11.5 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	5510	14.02
Mid	5550	13.95
High	5670	14.08

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## 8.9.4. OUTPUT POWER AND PPSD

## LIMITS

FCC §15.407 (a) (1)

For the band 5.5–5.7 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-210 A9.2 (1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

## DIRECTIONAL ANTENNA GAIN

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

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## **RESULTS**

## Bandwidth and Antenna Gain

Channel	Frequency	Min	Min	Directional
		26 dB	99%	Gain
		BW	BW	
	(MHz)	(MHz)	(MHz)	(dBi)
Low	5510	44.00	35.7980	-5.50
Mid	5550	44.67	35.7564	-5.50
High	5670	44.80	35.7595	-5.50

#### Limits

Channel	Frequency	FCC	IC	IC	Power	FCC	IC	PPSD
		Power	Power	EIRP	Limit	PPSD	PSD	Limit
		Limit	Limit	Limit		Limit	Limit	
	(MHz)	(dBm)						
Low	5510	24.00	24.00	30.00	24.00	11.00	11.00	11.00
Mid	5550	24.00	24.00	30.00	24.00	11.00	11.00	11.00
High	5670	24.00	24.00	30.00	24.00	11.00	11.00	11.00

Duty Cycle CF (dB)	0.16	Included in Calculations of Corr'd Power & PPSD
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## **Output Power Results**

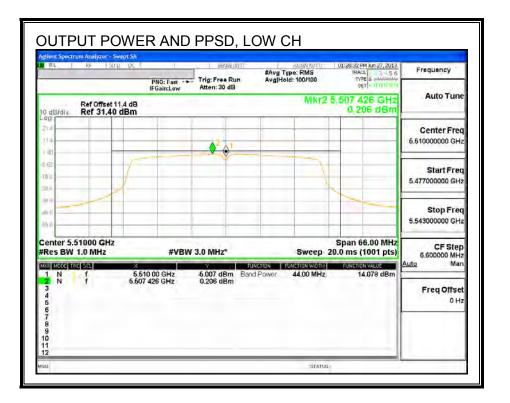
Channel	Frequency	Meas Total		Power	Power
		Power	Corr'd	Limit	Margin
			Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Low	5510	14.078	14.24	24.00	-9.76
Mid	5550	14.096	14.26	24.00	-9.74
High	5670	14.077	14.24	24.00	-9.76

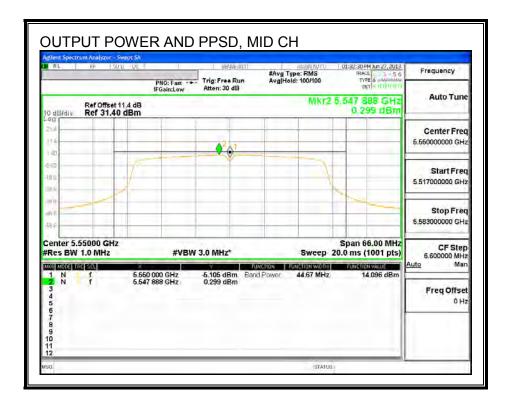
#### **PPSD Results**

Channel	Frequency	Meas	Total	PPSD	PPSD	
		PPSD	Corr'd	Limit	Margin	
			PPSD			
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)	
Low	5510	0.206	0.37	11.00	-10.63	
Mid	5550	0.299	0.46	11.00	-10.54	
High	5670	0.264	0.42	11.00	-10.58	

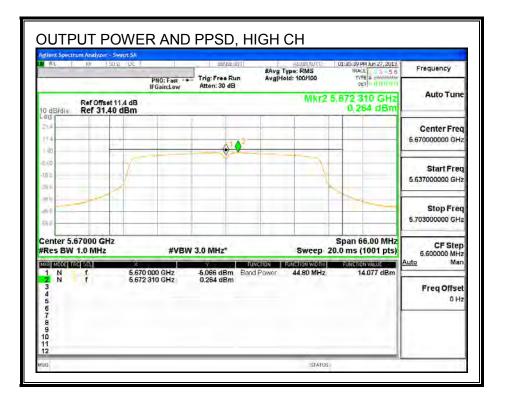
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## **OUTPUT POWER AND PPSD**





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## 8.9.5. PEAK EXCURSION

## LIMITS

FCC §15.407 (a) (6)

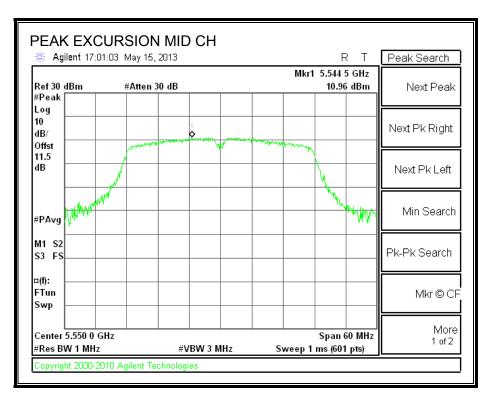
The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

## RESULTS

Refer to the results of 802.11n HT20 mode in the 5.2 GHz band.

Channel	Frequency	PK Level	PSD	DCCF	Peak Excursion	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)	(dB)	(dB)	(dB)
Mid	5550	10.96	0.206	0.16	10.59	13	-2.41

## PEAK EXCURSION



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# 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.

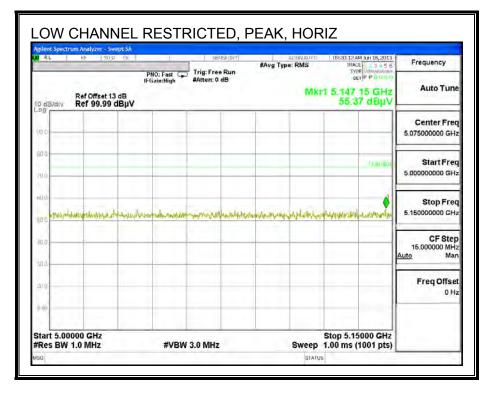
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

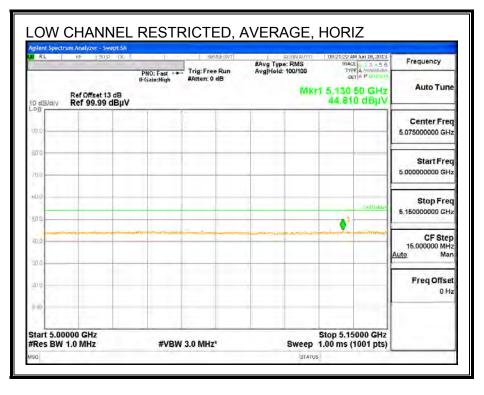
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# 9.2. TRANSMITTER ABOVE 1 GHz

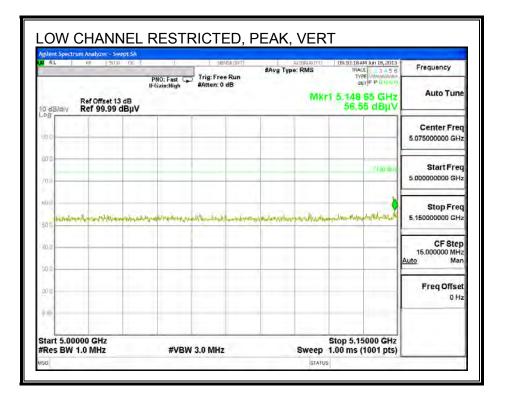
## 9.2.1. TX ABOVE 1 GHz 802.11a MODE IN THE 5.2 GHz BAND

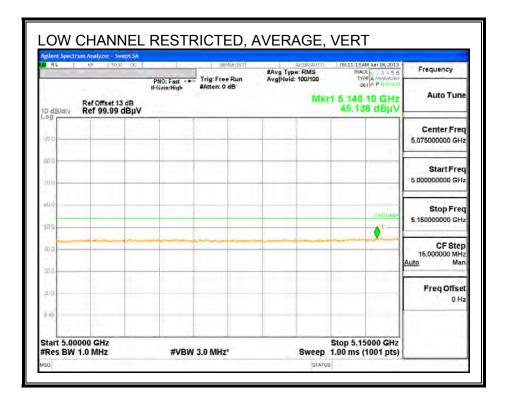
## **RESTRICTED BANDEDGE (LOW CHANNEL)**





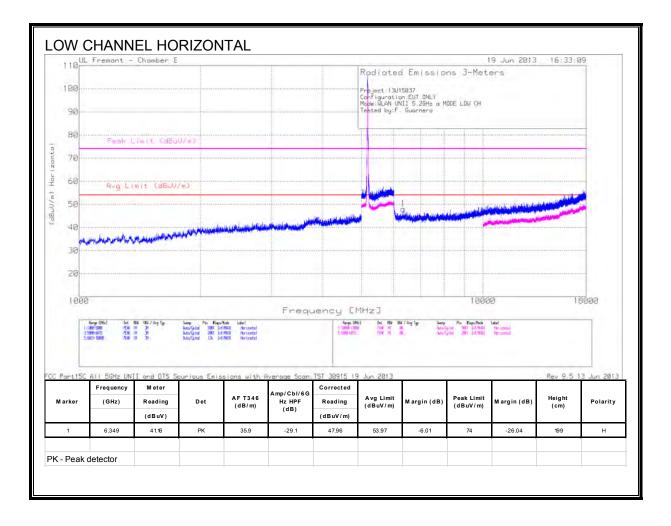
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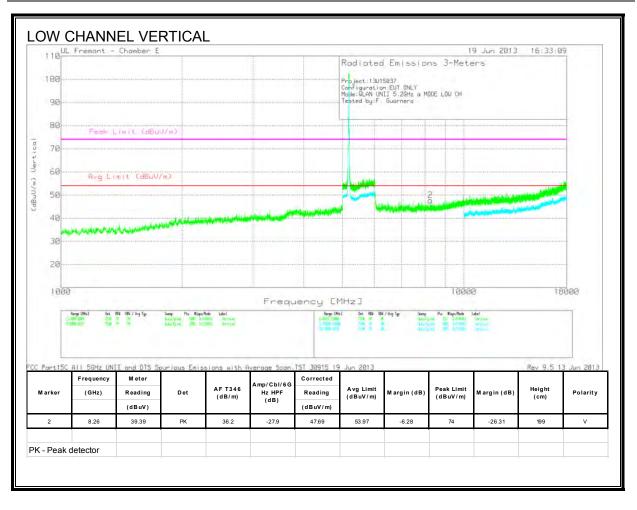
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## HARMONICS AND SPURIOUS EMISSIONS

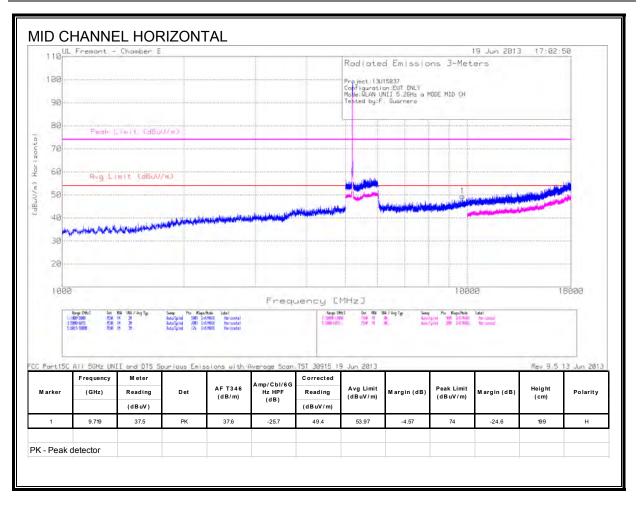


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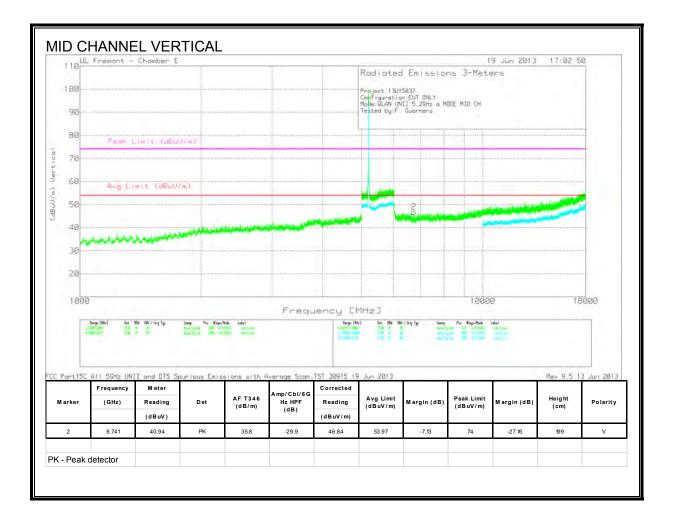
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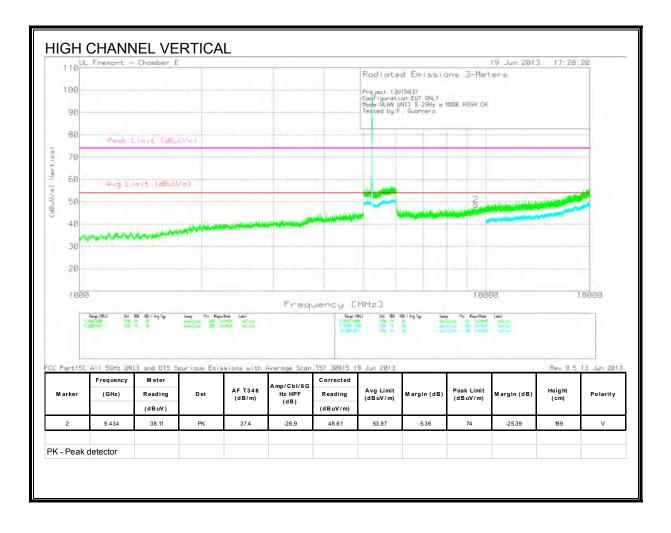
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Deals	detector												
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A arker	(GHz)	Reading	Det	AF T346 (dB/m)	Amp/Cbl/6G Hz HPF (dB)	Reading	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarit	
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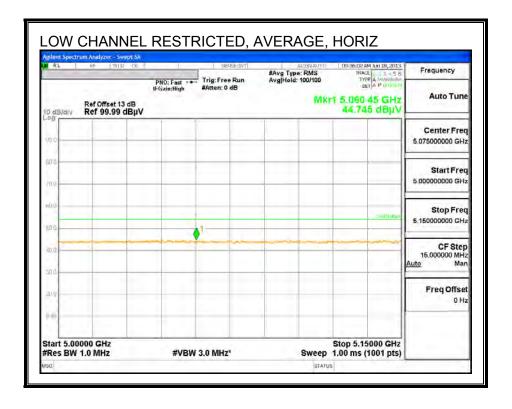


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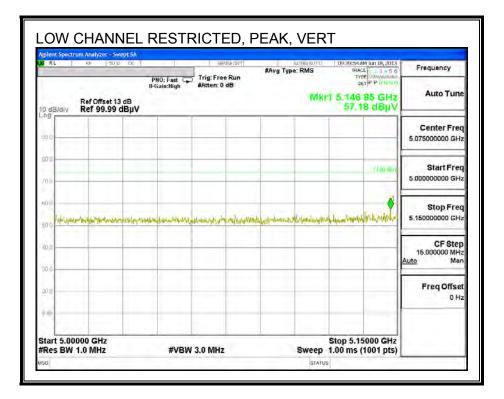
# 9.2.2. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.2 GHz BAND

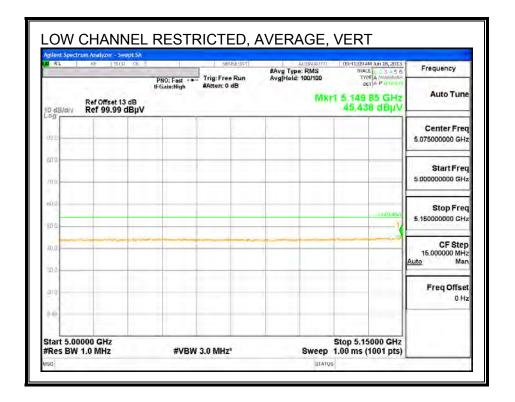
#### **RESTRICTED BANDEDGE (LOW CHANNEL)**

LOW CHANNEL RESTRICTED, PEAK, HORIZ 09/33:53 AM Jun 18, 2013 Frequency #Avg Type: RMS TYPE MMMM DET P P U Trig: Free Run #Atten: 0 dB PNO: Fast 😱 Auto Tune Mkr1 5.148 65 GHz 56.739 dBµV Ref Offset 13 dB Ref 99.99 dBµV 10 dB/div Center Freq 5.075000000 GHz Start Freq 11 00 1 5.000000000 GHz Stop Freq will rolling 5.150000000 GHz welling and the state of the st and the set of the state of the state astral atura Made-CF Step 15.000000 MHz Mar uto Freq Offset 0 Hz Stop 5.15000 GHz Start 5.00000 GHz #Res BW 1.0 MHz #VBW 3.0 MHz Sweep 1.00 ms (1001 pts) STATUS



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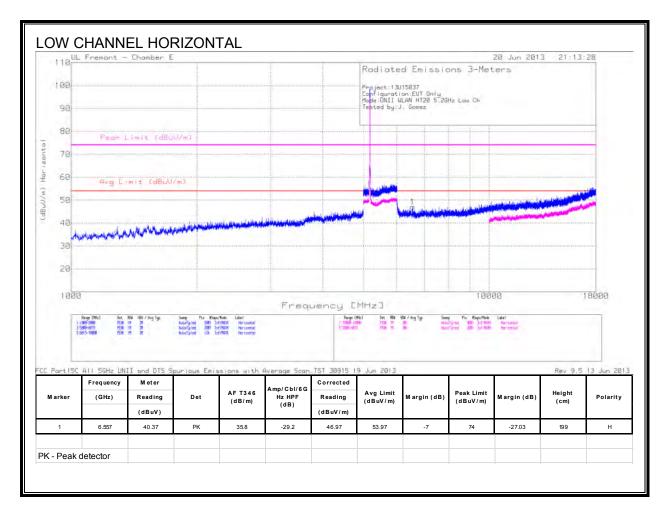




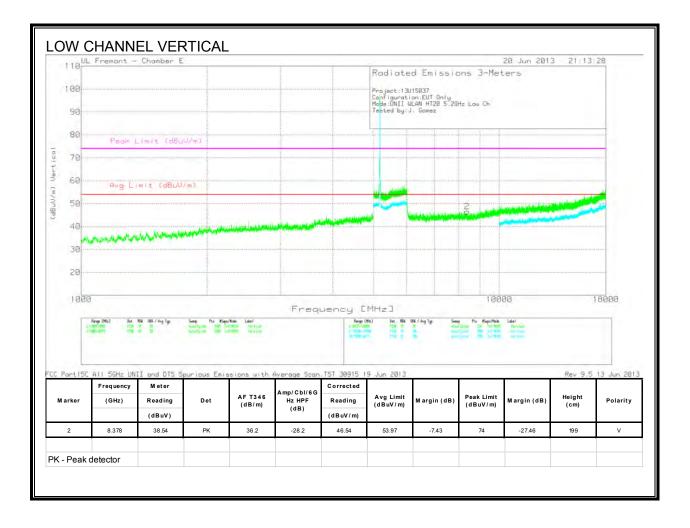
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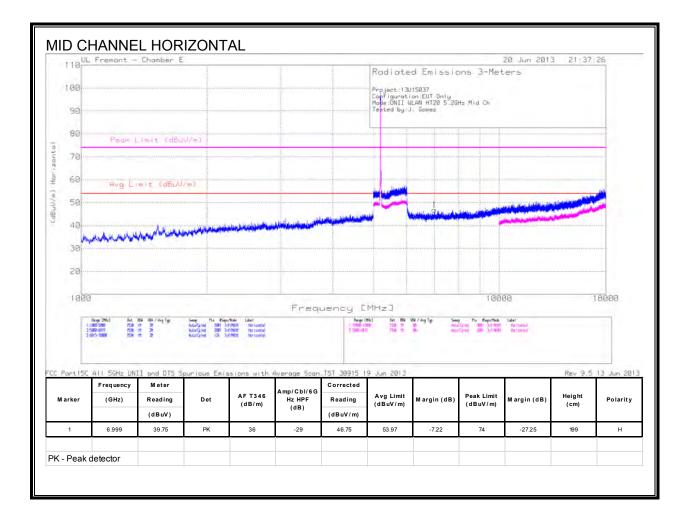
### HARMONICS AND SPURIOUS EMISSIONS



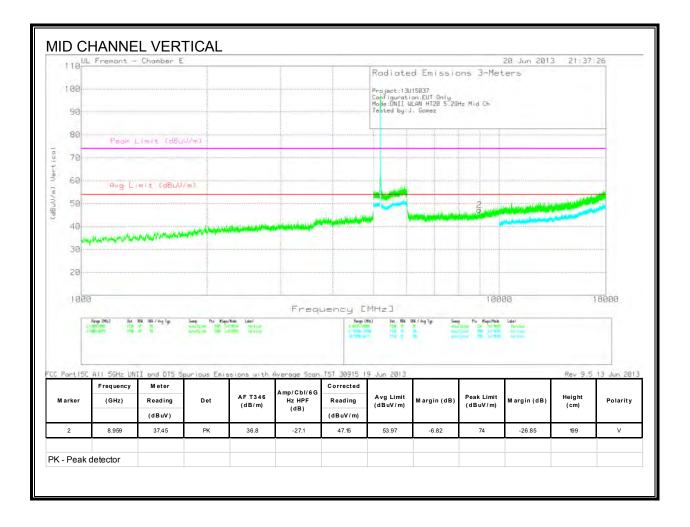
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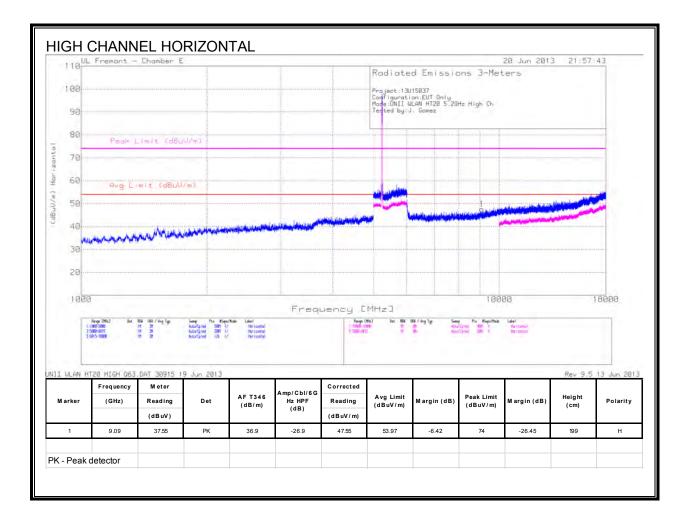
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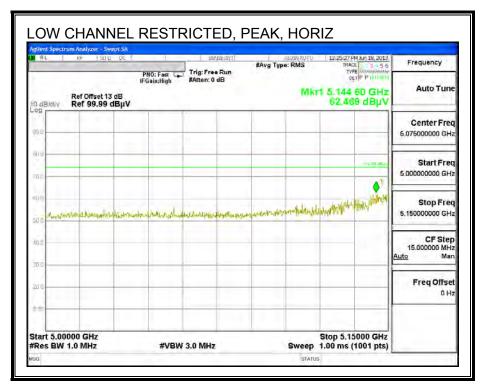
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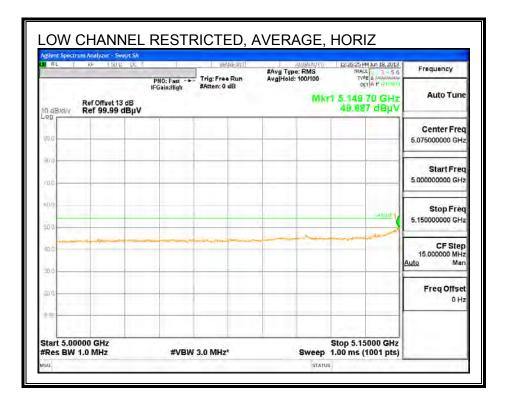
Marker	(GHz)	Reading	Det	AF T346 (dB/m)	Amp/Cbl/6G Hz HPF	Reading	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity	
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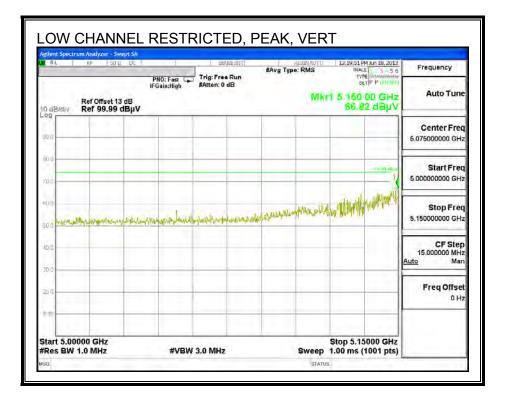
# 9.2.3. TX ABOVE 1 GHz 802.11n HT40 MODE IN THE 5.2 GHz BAND

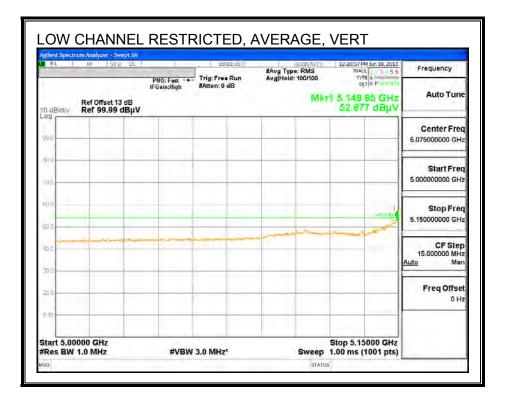
### **RESTRICTED BANDEDGE (LOW CHANNEL)**





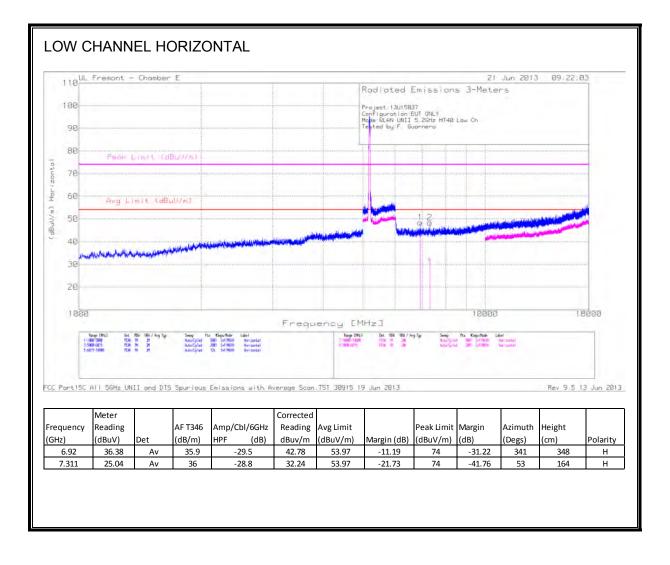
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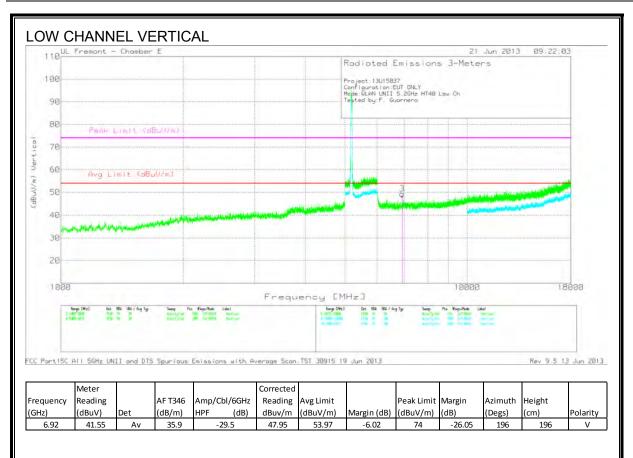


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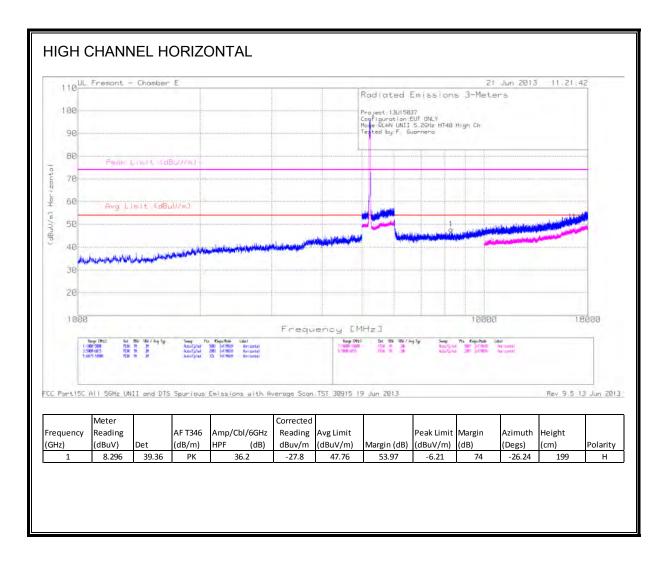
## HARMONICS AND SPURIOUS EMISSIONS



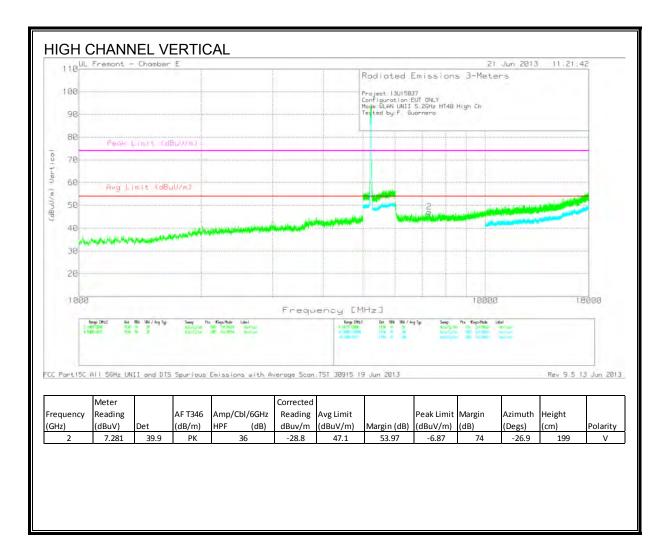
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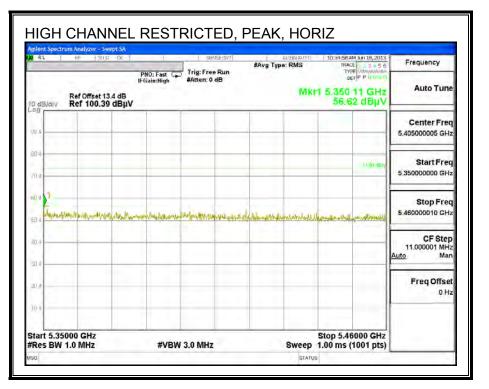
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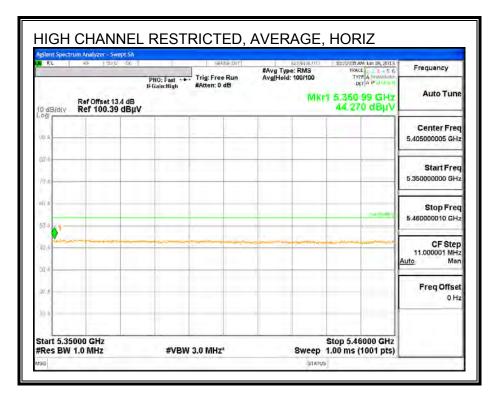


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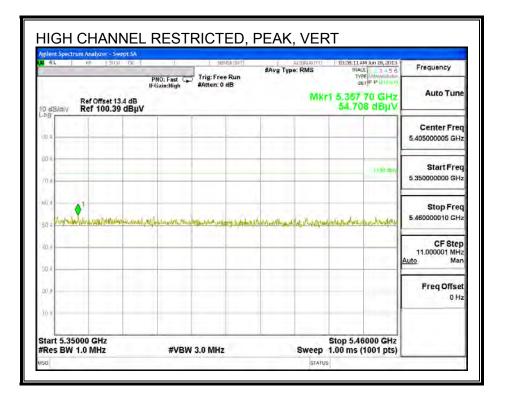
# 9.2.4. TX ABOVE 1 GHz 802.11a MODE IN THE 5.3 GHz BAND

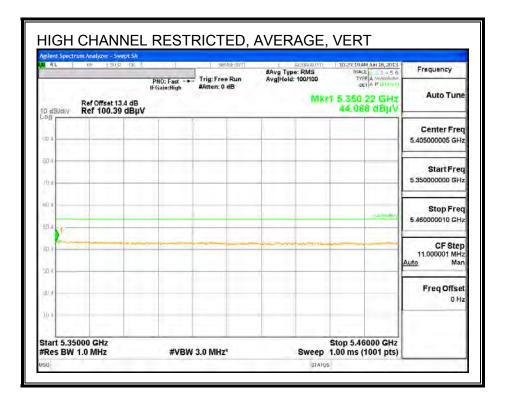
### **RESTRICTED BANDEDGE (HIGH CHANNEL)**





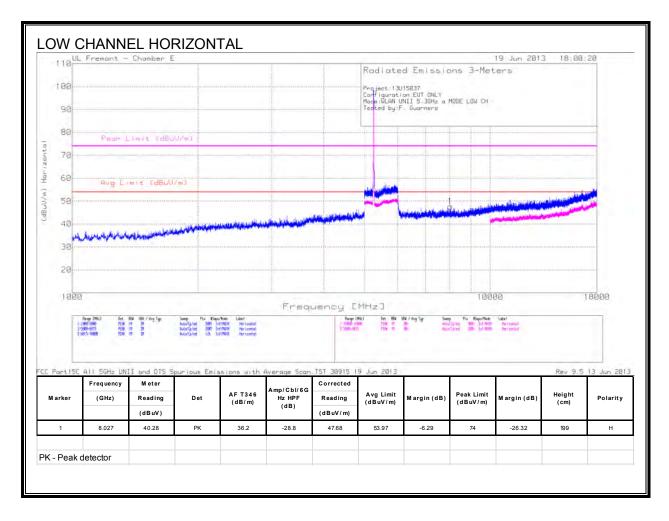
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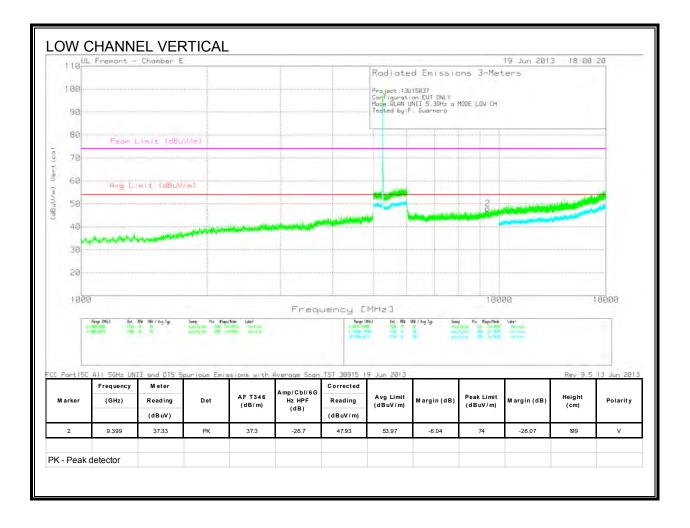


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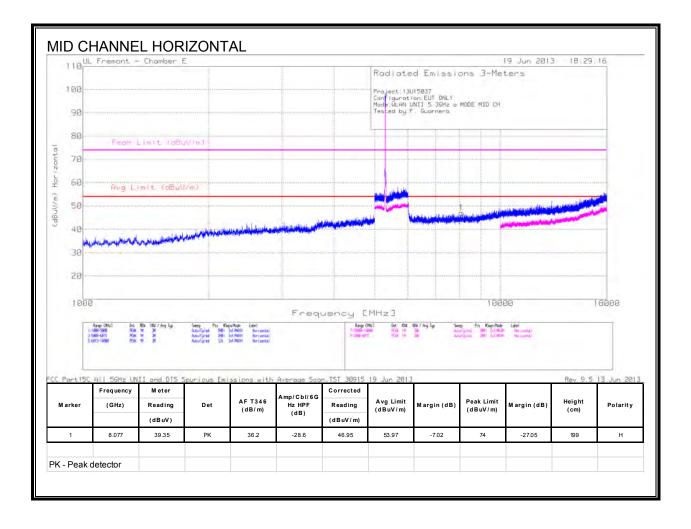
### HARMONICS AND SPURIOUS EMISSIONS



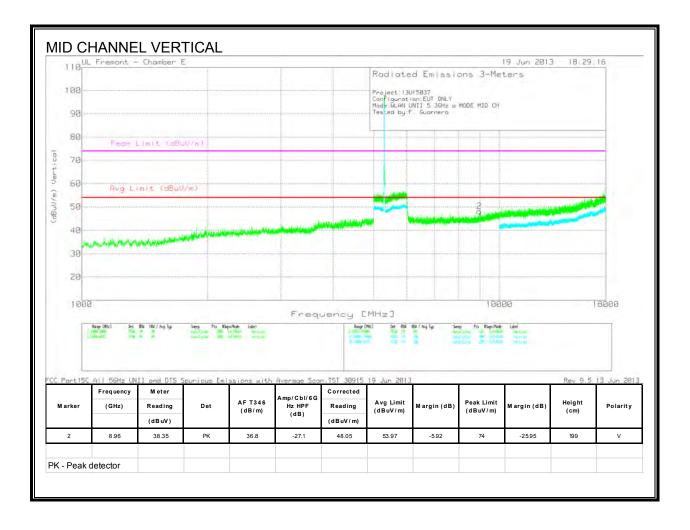
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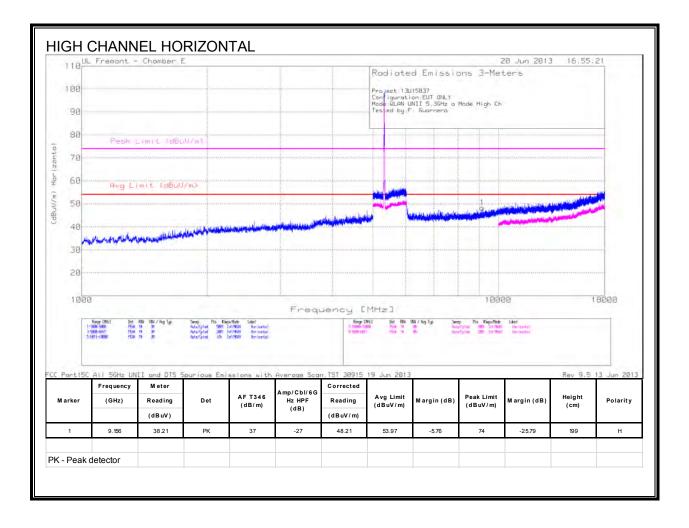
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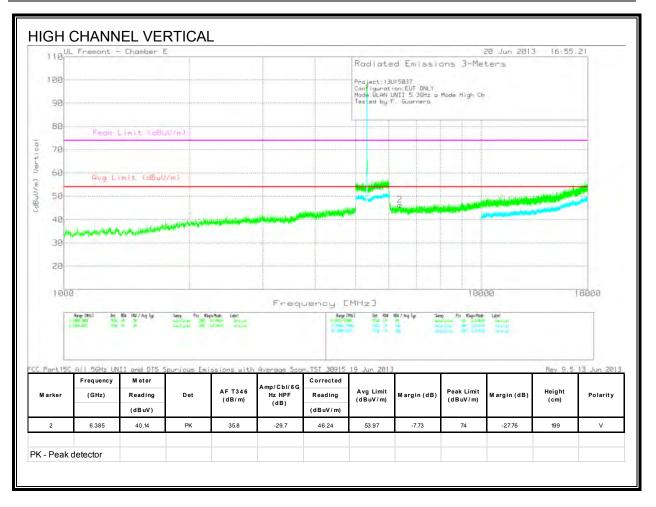
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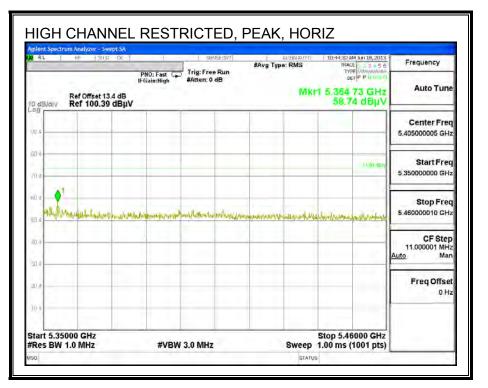
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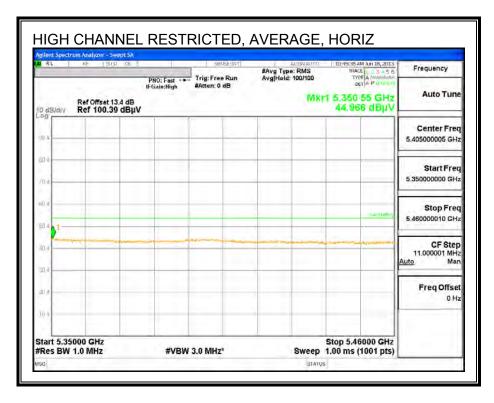


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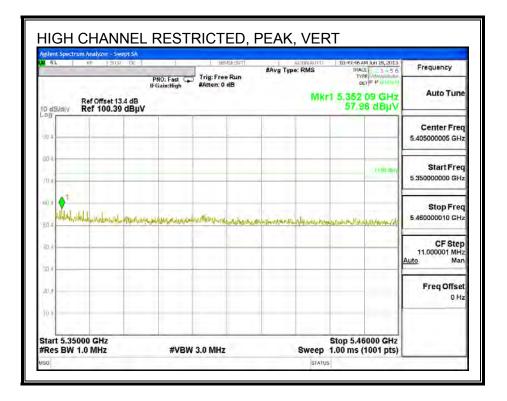
# 9.2.5. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.3 GHz BAND

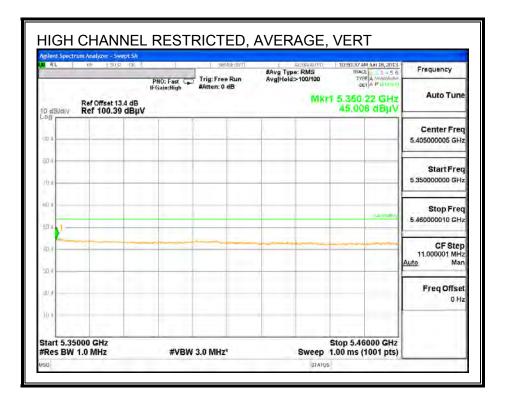
## **RESTRICTED BANDEDGE (HIGH CHANNEL)**





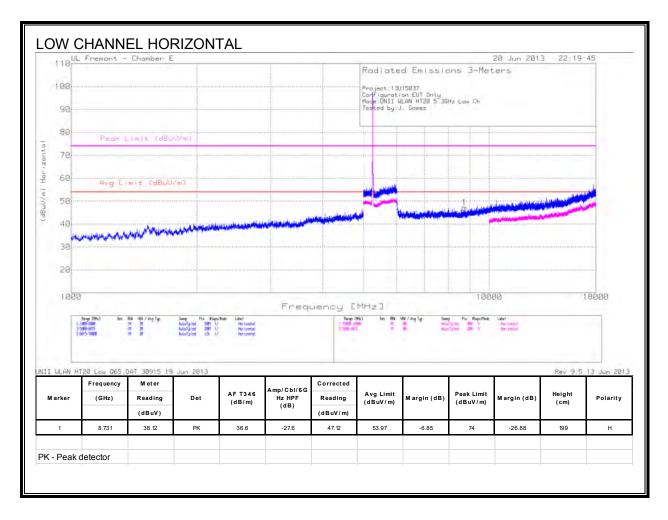
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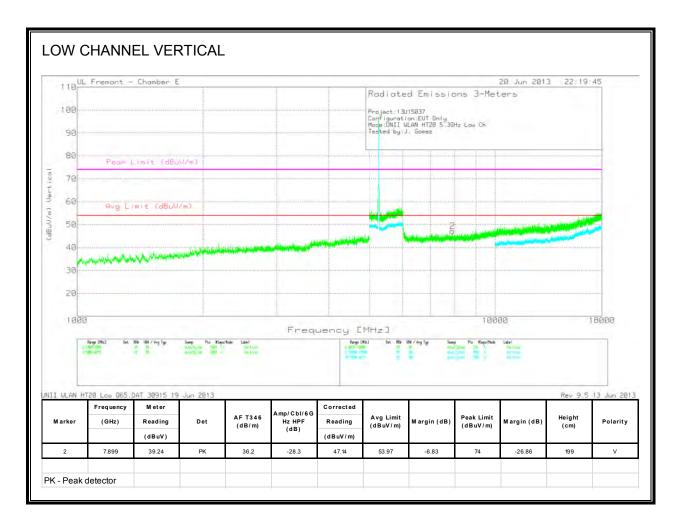


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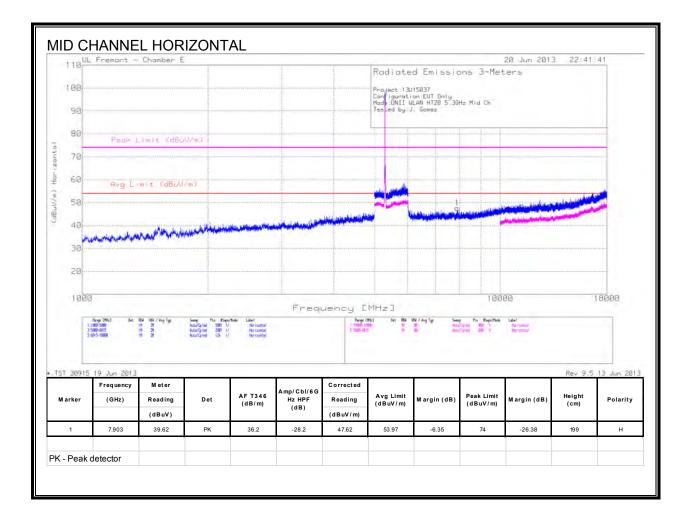
### HARMONICS AND SPURIOUS EMISSIONS



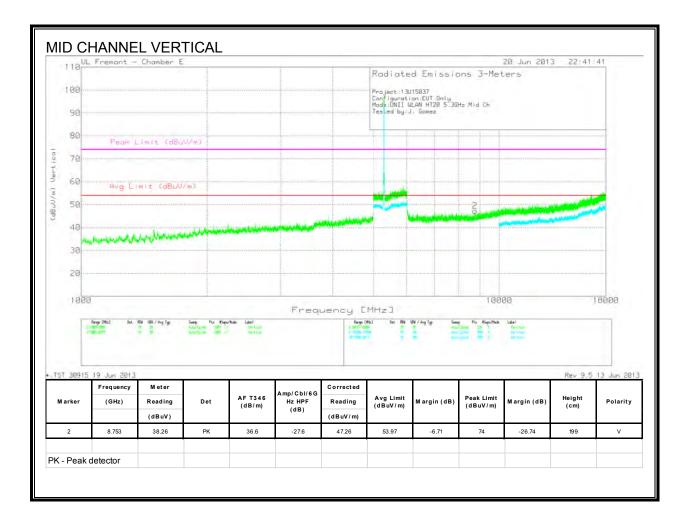
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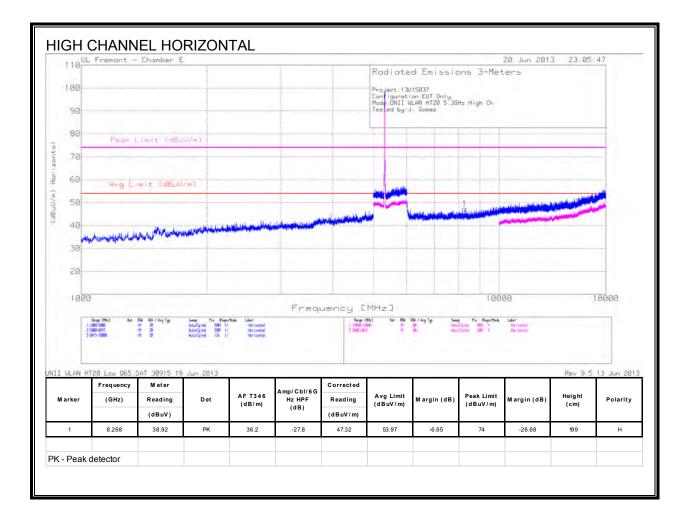
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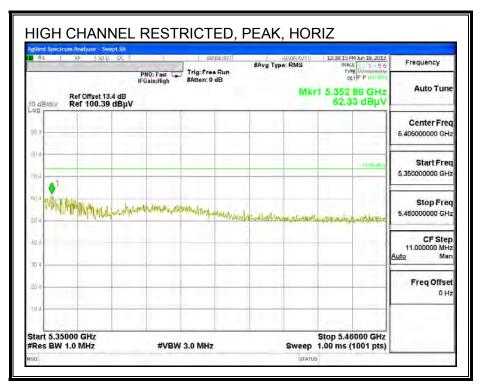
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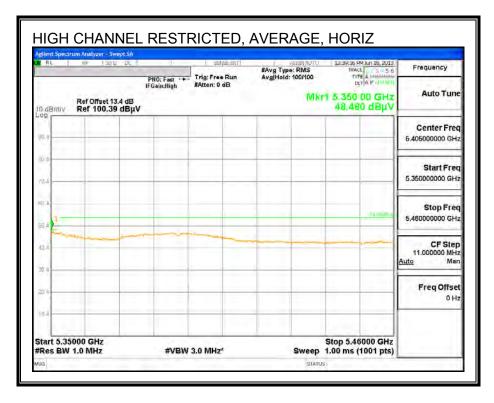
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					Frequ	uency [	MHz]					
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	1000	the set / the far.	N/Collama Sett	Act Manufacture		Range C	(#b) Det #84	WW / Ang Type State	p Pis Espaitiale	United I		
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WLAN H	1720 Low 065.0	OAT 30915 19	Jun 2013								Rev 9.5	13 Jun 21
	Frequency	Meter				Corrected						
	r requency	weter		1.	Amp/Cbl/6G	Corrected	I	1	L	1 1		1
/larker	(GHz)	Reading	Det	AF T346	Amp/Cbl/6G Hz HPF	Reading	Avg Limit	Margin (dB)	Peak Limit	Margin (dB)	Height	Polarit
ıarKer	(GHZ)	Reading	Det	(dB/m)		Reading	(dBuV/m)	wargin (dB)	(dBuV/m)	wiargin (dB)	(cm)	Polarit
		(dBuV)		,,	(dB)	(dBuV/m)	1	1		1 1		
	1	(ubuv)		1		(ubuv/m)	I	+	ļ			Ļ
2	7.272	40.16	PK	36	-28.9	47.26	53.97	-6.71	74	-26.74	199	V
4	1.212	4U. ID	۳K	30	-20.9	41.20	53.97	-0./1	/4	-20.14	89	v
						<b></b>						
	detector				-		-		1			-

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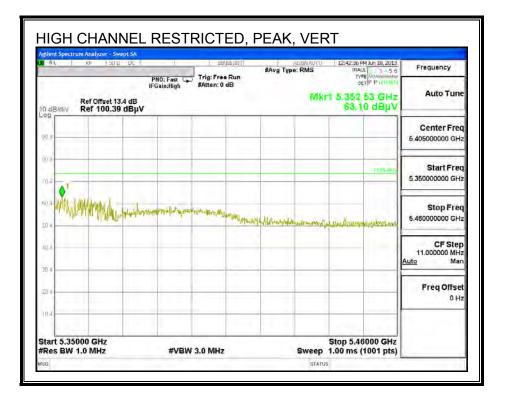
# 9.2.6. TX ABOVE 1 GHz 802.11n HT40 MODE IN THE 5.3 GHz BAND

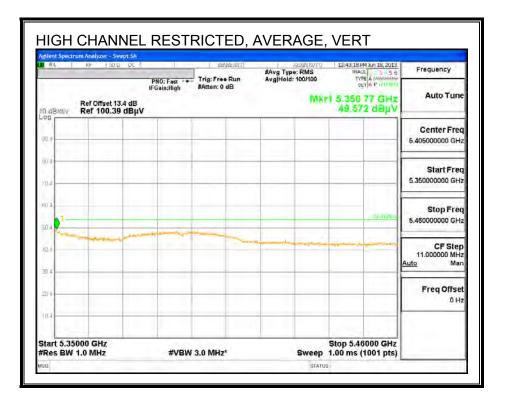
## **RESTRICTED BANDEDGE (HIGH CHANNEL)**





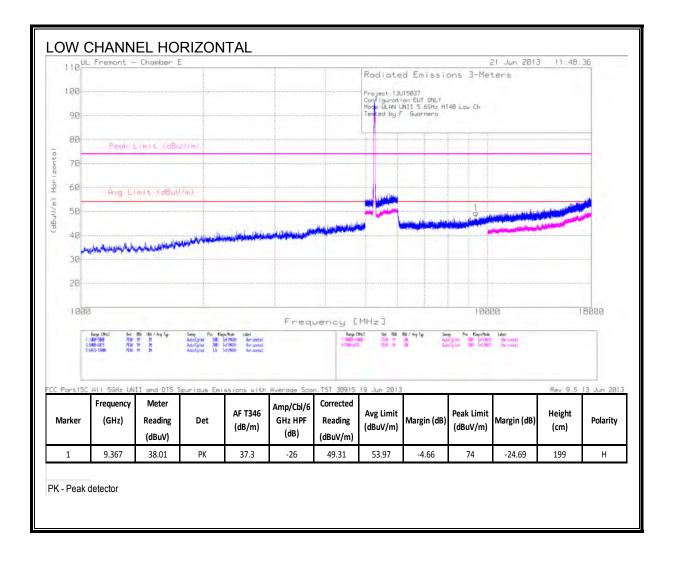
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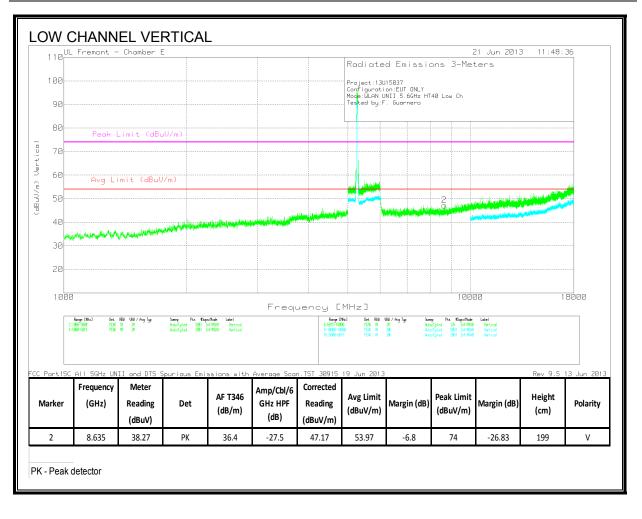
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### HARMONICS AND SPURIOUS EMISSIONS

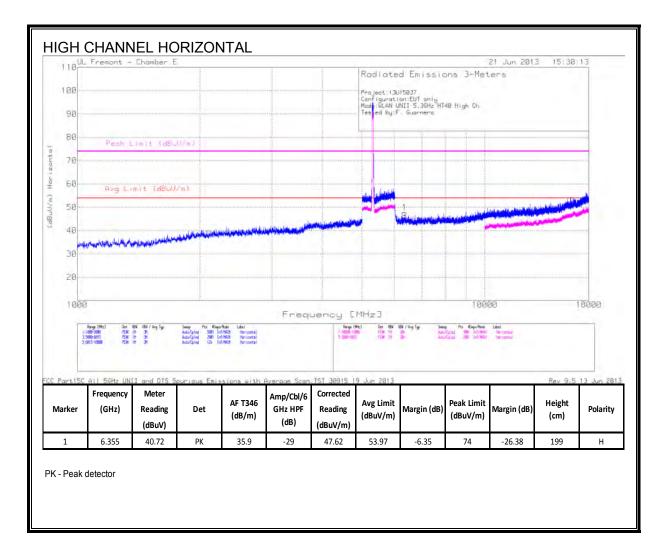


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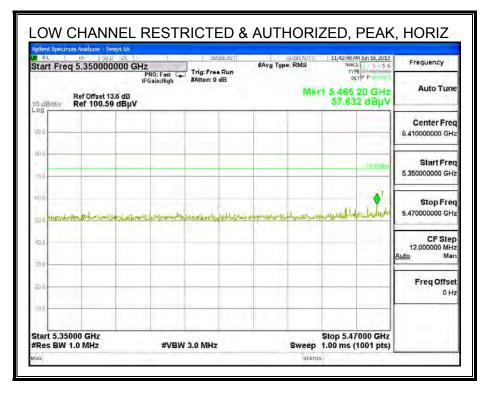
110 🗆	L Fremont -	Chamber B					D I · ·	1		21 Jun 2013	8 15:30	:13
								d Emissi	ons j-Met	lens		
100							Project:13L Configurat	J15037 ion:EUT only JNII 5.3GHz H1	10.11.1.01			
90							. Tested by:F	5. Guarnero	40 High Uh			
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60	Avg Li	mit (dBuV	۲m۵				المتصعفان أسروه					
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	بالماليه ومعرفا المالية	المناجعة والمعاولة والمناج	والمعادية المحامدة المحددة الم	adagay katalogi katal	and a state of the second s							
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100	0				Frequ	uency E	MHz]		100	20		10000
	Renge D148-2 № 1 2:1888-5888 FENK 1:5889-6815 FENK	14 34	Sweep Pts HSw Nuto/Gold 5081 Nuto/Gold 2081	nt/MKKE Versicel nt/MKKE Versicel		Range I 6:0015-100 8:10002-10 10:5002-00	8 PEAK IM 80 PEAK IM 5 PEAK IM	38k Aut	ep Pts 4Seporthole of Died 128 Inf/Web Of Died 2881 Inf/Web of Died 2881 Inf/Web	Lebel Vertical Vertical	Rev 9 5	13 Jun 20
- Fartist	Frequency	Meter	purious cmi	SSIDNS WITH	Amp/Cbl/6	Corrected	9 JUN 2013				NEV 9.5	15 Jun 26
Marker	(GHz)	Reading	Det	AF T346	GHz HPF	Reading	Avg Limit	Margin (dB)	Peak Limit	Margin (dB)	Height	Polarit
		(dBuV)		(dB/m)	(dB)	(dBuV/m)	(dBuV/m)		(dBuV/m)		(cm)	
	6.902	40.8	РК	35.9	-29.8	46.9	53.97	-7.07	74	-27.1	199	V
2												

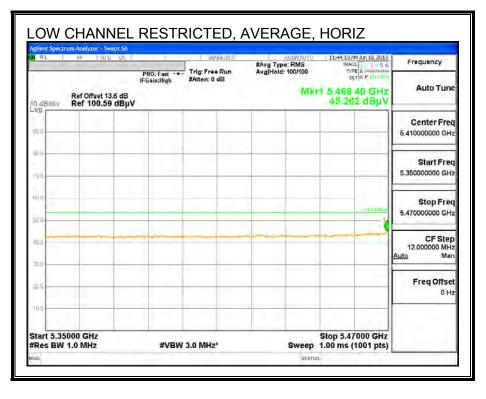
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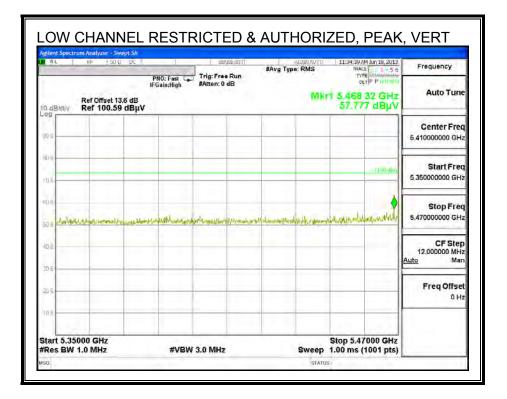
# 9.2.7. TX ABOVE 1 GHz 802.11a MODE IN THE 5.6 GHz BAND

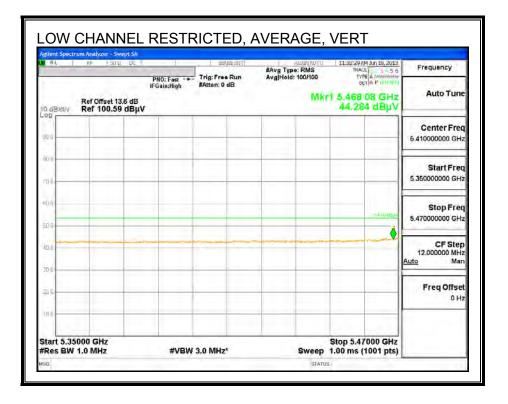
### **RESTRICTED & AUTHORIZED BANDEDGE (LOW CHANNEL)**





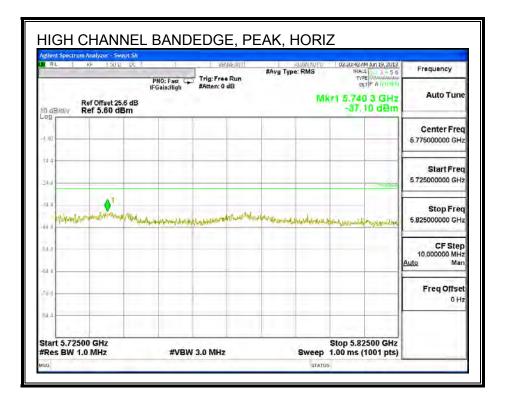
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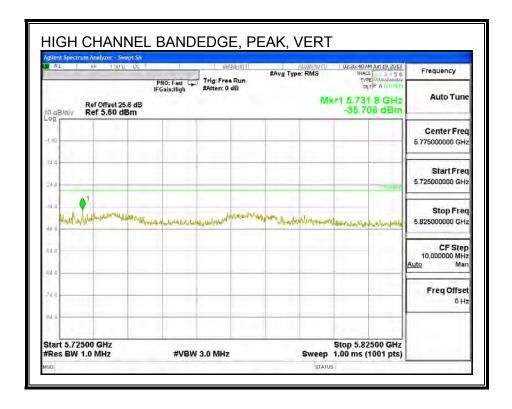




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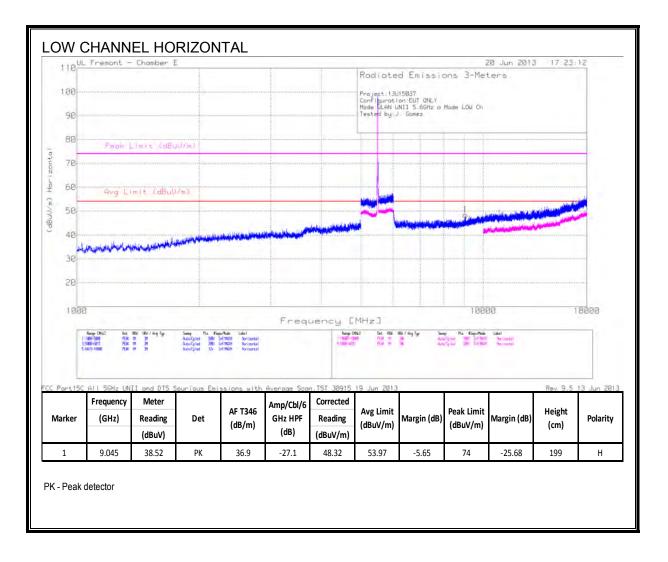
# **AUTHORIZED BANDEDGE (HIGH CHANNEL)**





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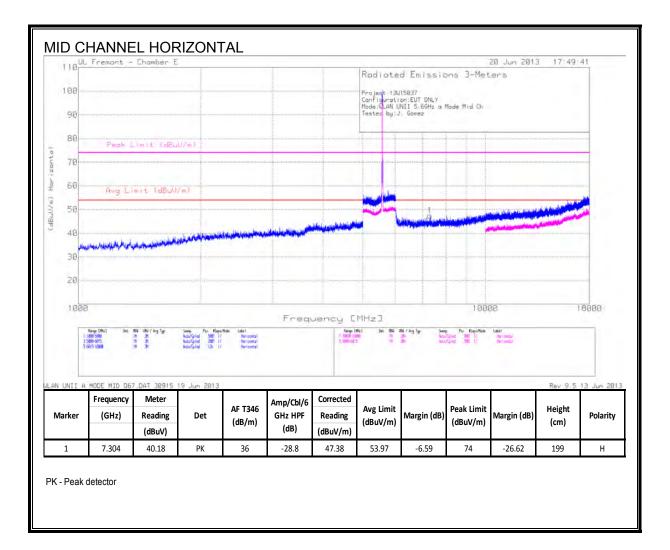
# HARMONICS AND SPURIOUS EMISSIONS



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2	6.304	(dBuV) 40.58	PK	(dB/m) 35.9	(dB)	(dBuV/m)	(dBuV/m)	-6.89	(dBuV/m)	-26.92	(cm)	V
Marker	Frequency (GHz)	Meter Reading	Det	AF T346	Amp/Cbl/6 GHz HPF	Corrected Reading	Avg Limit	Margin (dB)	Peak Limit	Margin (dB)	Height	Polarity
Part 150	AII 56Hz UN	II and DTS S	iour ious Em	issions with	Avenage Scar	1. TST 30915	19 Jun 2013				Rev 9.5	13 Jun 281
1	Range (MHz) Det	Reu ∪eu/a-g typ	Samp Pas B	eps/Rode Label	Frequ	lency [		1864 / áng Tgo Sam	ep Pla Kapa/Pab	Label Orefland		
188	0	_							1000	Ø		18000
20		****										
30	withink	مرجنة المرجنة ا مرجنة المرجنة ال										
40-								â <sub>ler</sub> ad			~	
70 60 50	Avg Li	mit (dBuU	/m3					9			- a second second	
70 60												
80	Peok I	imit (dB)	µU∕m)	0+1+++0+1+++0+1+++0+						1.)	)	*****
90			(+   1   1   1   1   1   1   1   1   1				Tested by:	J. Gomez	hode cos ch			
100-							Project 13L Configurat	J15837 Ion EUT ONLY JNII 5.66Hz o	Made I DU Ch			
	_ Fremont -						Radiate	d Emissio		18 Jun 2013 Lens	17:23	12

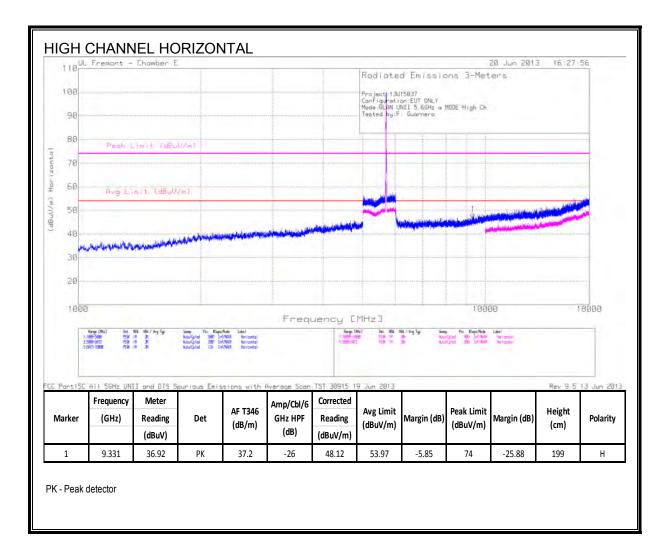
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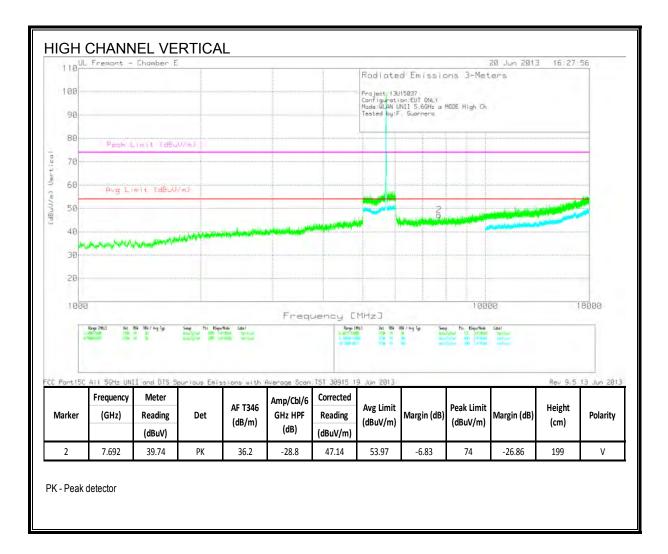
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AN UNII A	MODE MID D67	DAT 30915	19 Jun 2013	21							Rev 9.5	13 Jun 201		
		1		land land										
( BBR		ew ⊎av/AngTyp	Samp Pits King	s/finde Label	Frequ	uency C		®a/AngTyp Swee	p Fts. Kieps/Note	label		0000		
1000									1000	20		8000		
30							0.4			00				
40	www.www.wanpartick.com													
70									2	der en der en der				
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80	Paul	imit (dE).	117-5											
98							Project:13U Confidurati Mode:CLAN U Testec by:J	N5037 on:EUT DNLY NII 5.66Hz a /. Gowez	Mode Mid Ch					
100-	Fremarit -						10000	d Emissio		ers				

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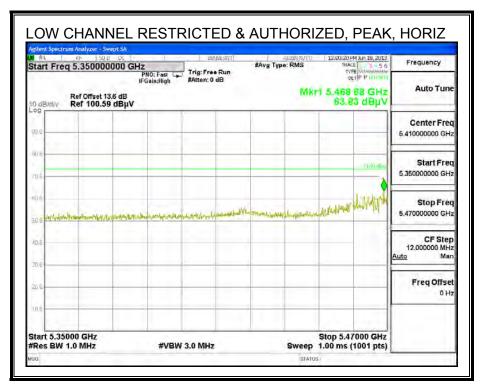
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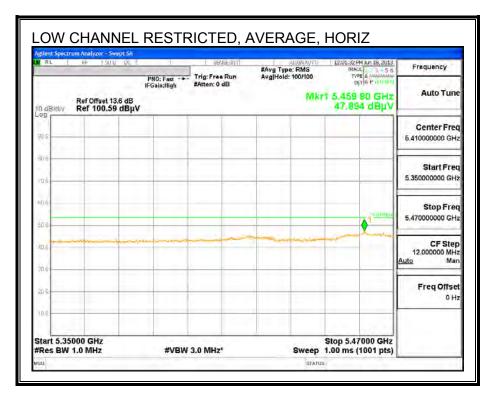


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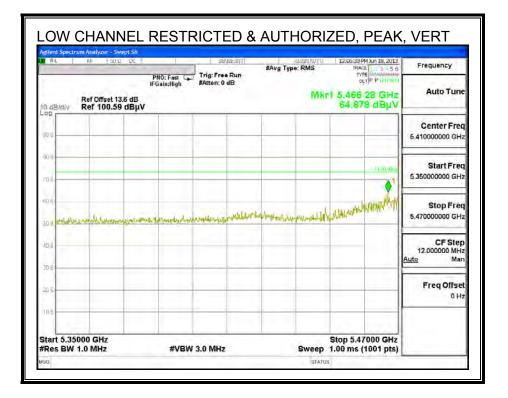
# 9.2.8. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.6 GHz BAND

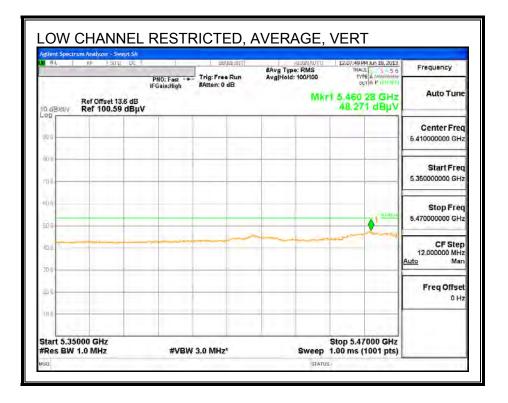
# **RESTRICTED & AUTHORIZED BANDEDGE (LOW CHANNEL)**





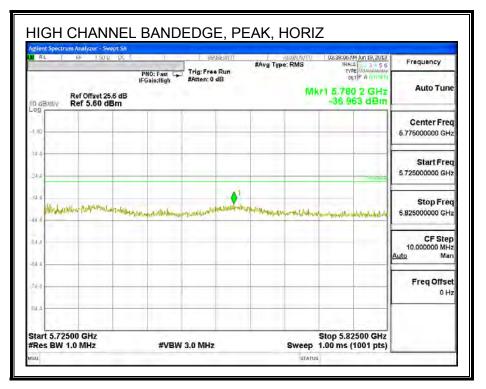
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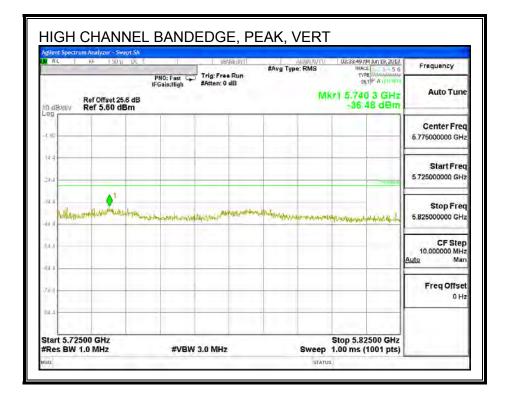




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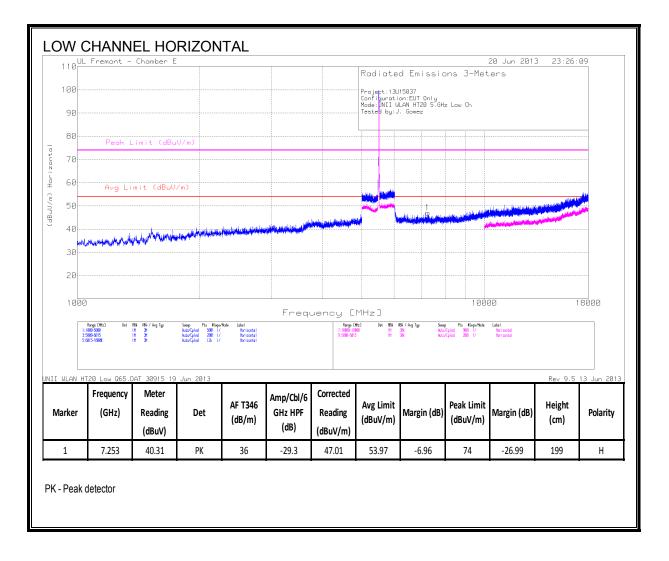
# **AUTHORIZED BANDEDGE (HIGH CHANNEL)**



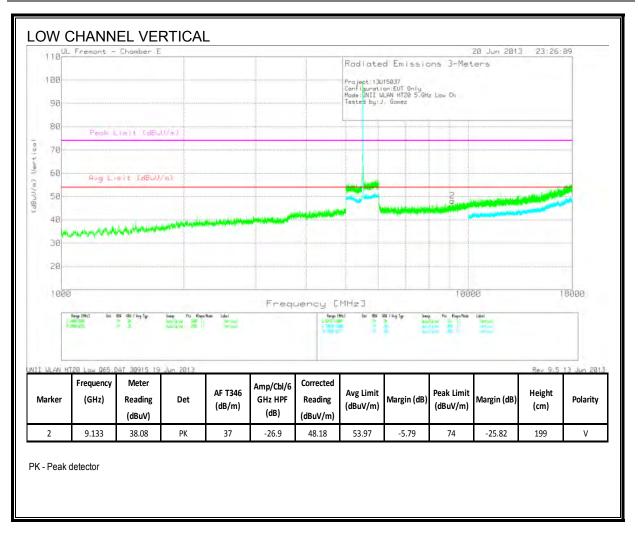


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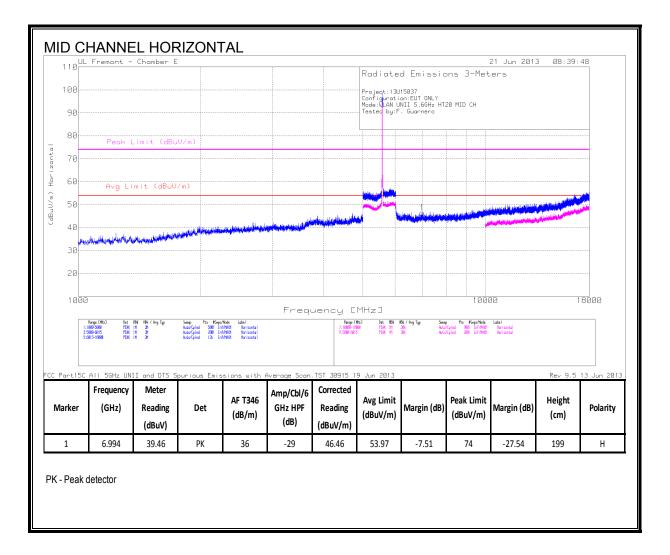
# HARMONICS AND SPURIOUS EMISSIONS



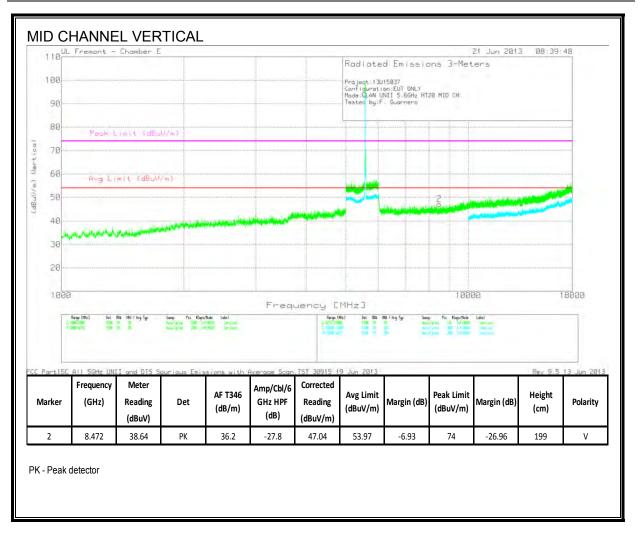
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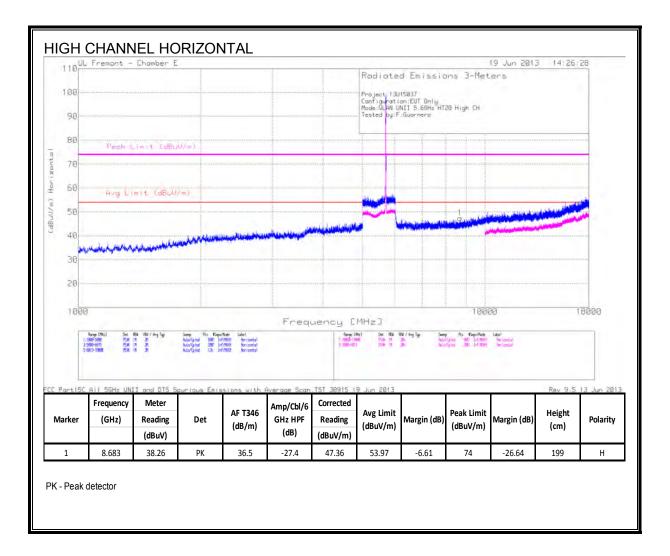
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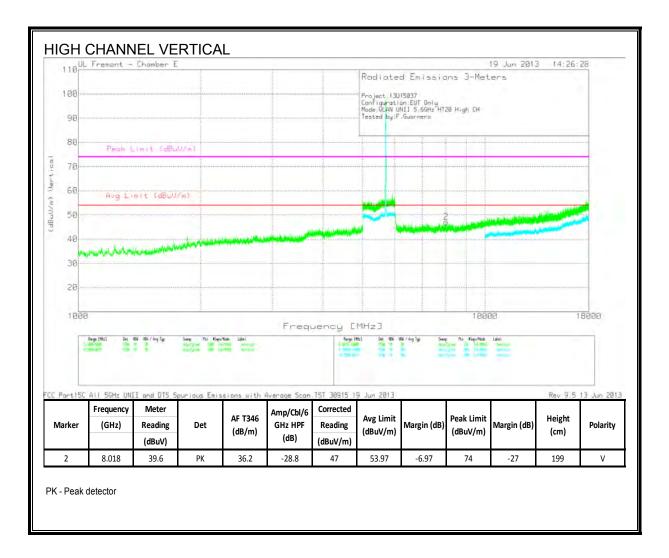
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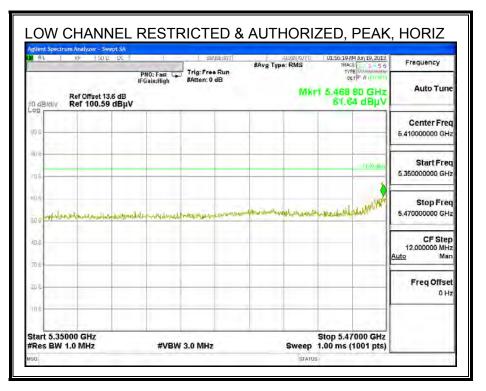
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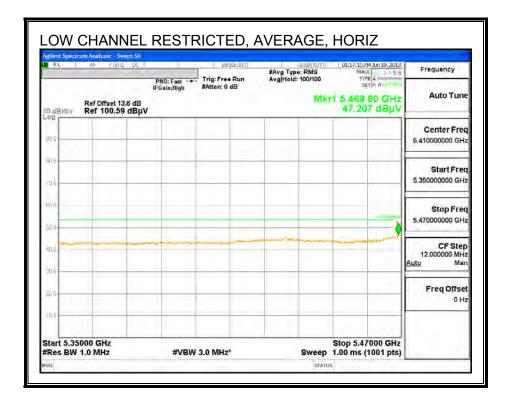


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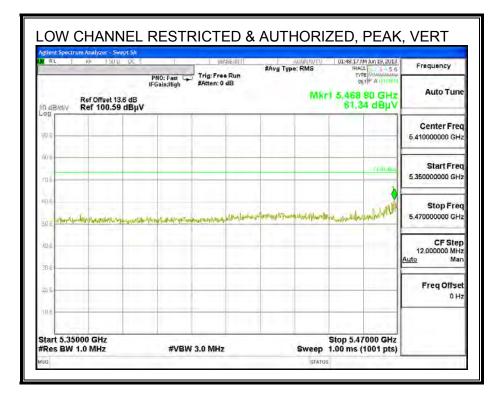
# 9.2.9. TX ABOVE 1 GHz 802.11n HT40 MODE IN THE 5.6 GHz BAND

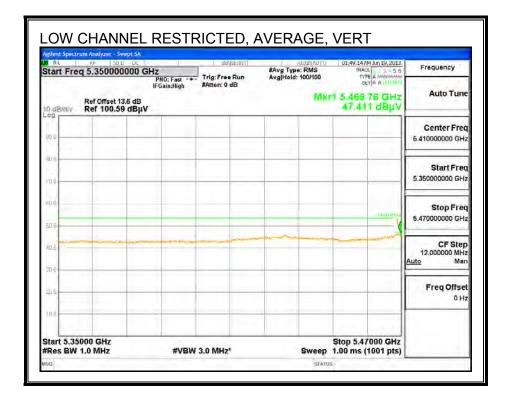
# **RESTRICTED & AUTHORIZED BANDEDGE (LOW CHANNEL)**





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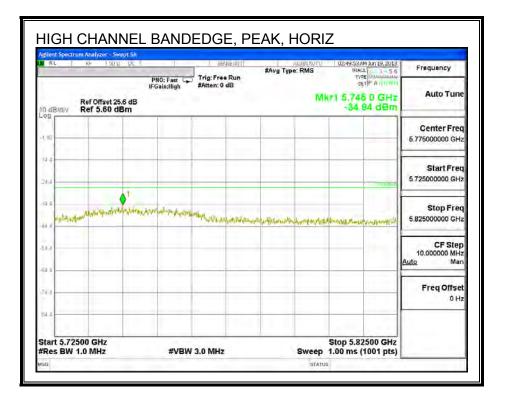


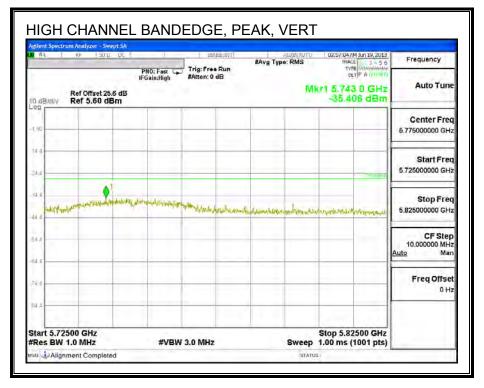


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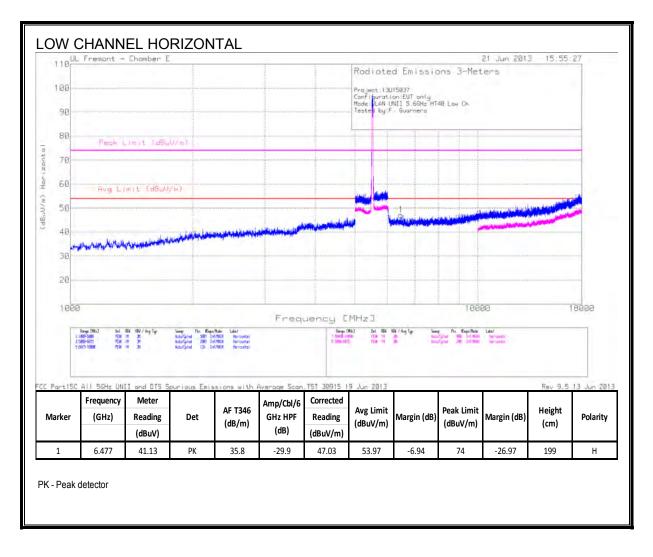
# AUTHORIZED BANDEDGE (HIGH CHANNEL)



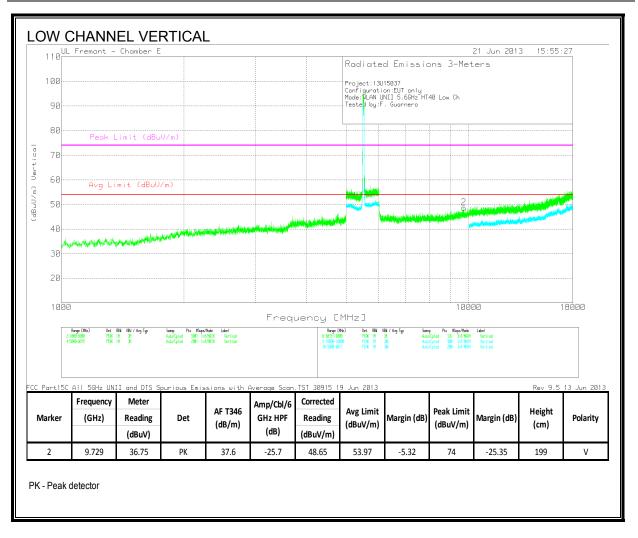


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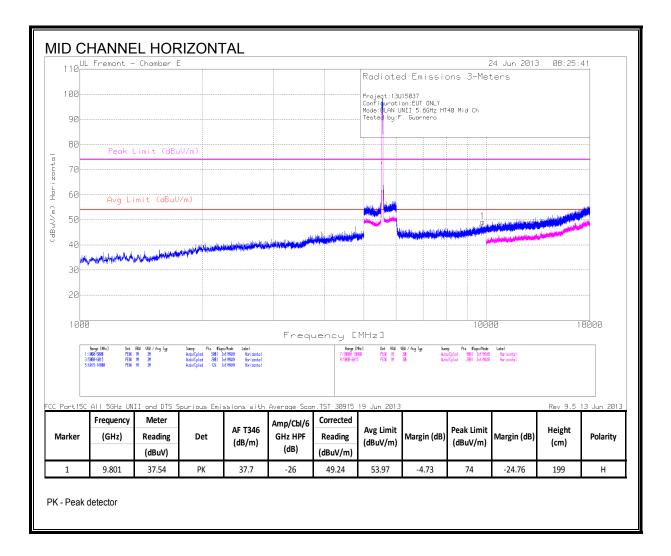
### HARMONICS AND SPURIOUS EMISSIONS



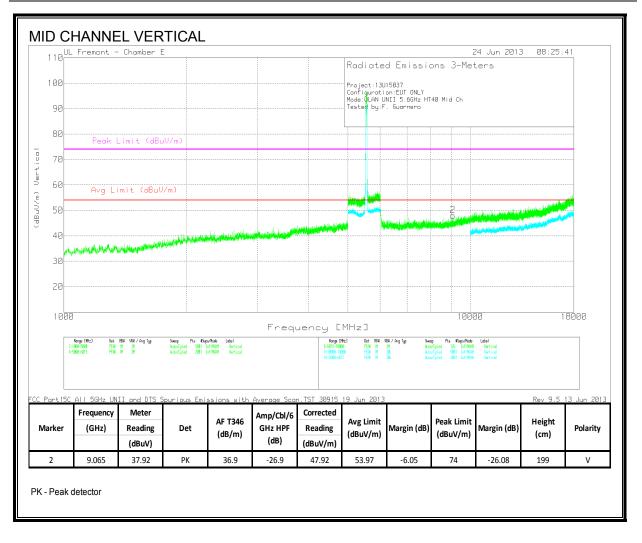
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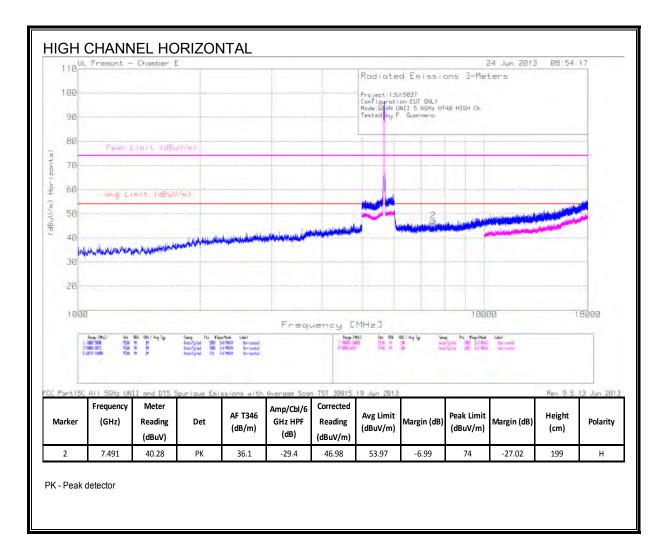
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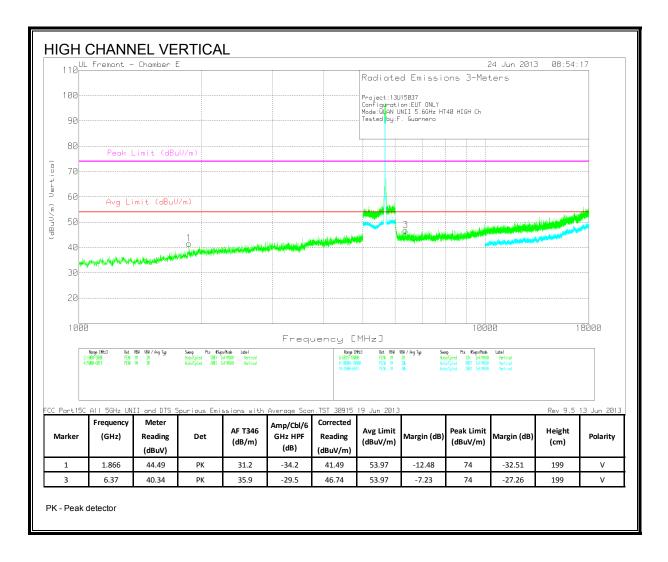
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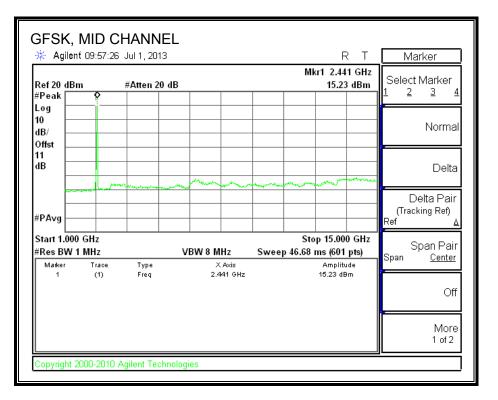
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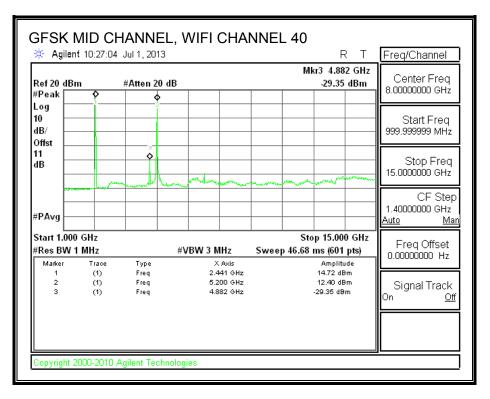
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# 9.2.10. 2.4GHz and 5GHz Band Co-Location

#### **BLUETOOTH ON**



#### **BLUETOOTH AND WIFI ON**



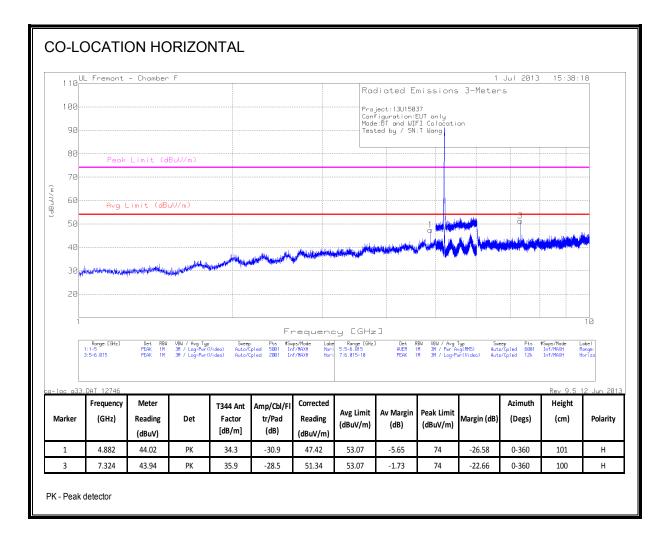
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# **BLUETOOTH OFF WIFI ON**

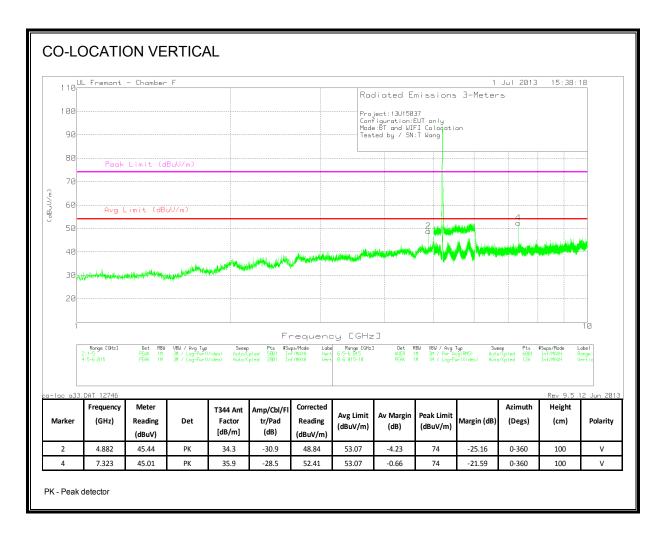
🔆 Agilen	f 10:16:30	Jul 1, 2013					F	X T	В	W/Avg
Ref 20 dBi #Peak	m	#Atten 20 d	В			Mk	ar1 5.20 12.14	0 GHz dBm	Auto	Res BW 1.0 MHz <u>Man</u>
Log 10 dB/ Offst									Auto	Video BW 1.0 MHz <u>Man</u>
11 dB							and the second		<u>Auto</u>	VBW/RBV 10.00000 <u>Man</u>
#PAvg									On	Average 100 <u>Off</u>
Start 1.000 #Res BW 1	1 MHz		#VBW 1 M		Swee	Sto p 46.68 i	,	pts)		/BW Type Pwr (RMS) ►
Marker 1	Trace (1)	Type Freq		K Axis 200 GHz			Amplitu 12.14 dB		Auto	Man
									Auto	Span/RBW 106 <u>Man</u>

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# HARMONICS AND SPURIOUS EMISSIONS



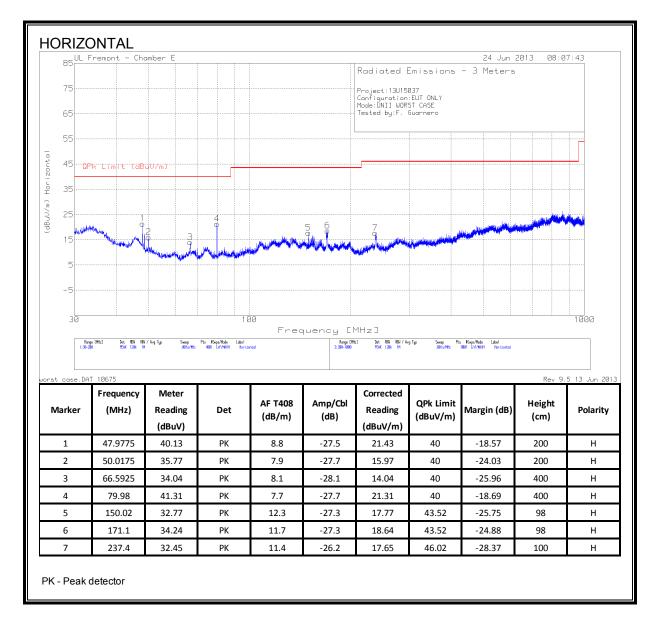
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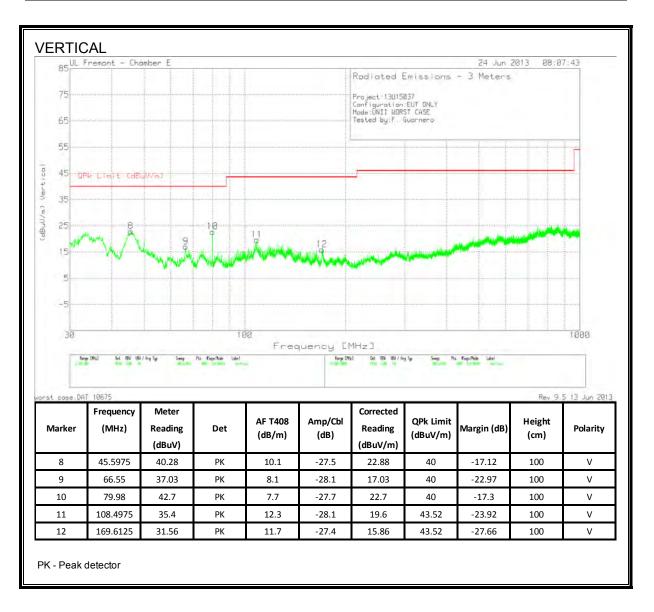
# 9.3. WORST-CASE BELOW 1 GHz

#### SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



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# SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)



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# 9.4. RECEIVER ABOVE 1 GHz

Note: No emissions were detected above the system noise floor.

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

## LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

Frequency of Emission (MHz)	Conducted I	.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.

**RESULTS** 

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## **6 WORST EMISSIONS**

Line-L1.15		,		1				1	
						CISPR			
						11/22		CISPR	
			T24 IL	LC Cables		Class B		11/22	
Test	Meter		L1.TXT	1&3.TXT		Quasi-		Class B	
Frequency	Reading	Detector	(dB)	(dB)	dB(uVolts)	peak	Margin	Average	Margin
0.159	54.38	QP	0.1	0	54.48	65.52	-11.04	-	-
0.159	48.7	Av	0.1	0	48.8	-	-	55.5	-6.7
0.8295	48.8	РК	0.1	0	48.9	56	-7.1	-	-
0.8295	30.76	Av	0.1	0	30.86	-	-	46	-15.14
7.278	39.71	РК	0.1	0.1	39.91	60	-20.09	-	-
7.278	25.72	Av	0.1	0.1	25.92	-	-	50	-24.08
16.854	45.42	РК	0.2	0.2	45.82	60	-14.18	-	-
10.004	4J.4Z	FN	0.2	0.2	45.02	00	1110		
16.854	28.85	Av	0.2	0.2	29.25	-	-	50	-20.75
16.854	28.85		-	-		CISPR	-		-20.75
	28.85		0.2	0.2		- CISPR 11/22	-	CISPR	-20.75
16.854 Line-L2 .15	28.85		0.2 T24 IL	0.2		CISPR 11/22 Class B	-	CISPR 11/22	-20.75
16.854 Line-L2 .15	28.85 - 30MHz Meter	Av	0.2 T24 IL L2.TXT	0.2 LC Cables 2&3.TXT	29.25	CISPR 11/22 Class B Quasi-	-	CISPR 11/22 Class B	
16.854 Line-L2 .15	28.85 - 30MHz Meter		0.2 T24 IL	0.2		CISPR 11/22 Class B	Margin	CISPR 11/22	-20.75 Margin
16.854 Line-L2 .15	28.85 - 30MHz Meter	Av	0.2 T24 IL L2.TXT	0.2 LC Cables 2&3.TXT	29.25	CISPR 11/22 Class B Quasi-	-	CISPR 11/22 Class B	
16.854 Line-L2 .15 Test Frequency	28.85 - 30MHz Meter Reading	Av Detector	0.2 T24 IL L2.TXT (dB)	0.2 LC Cables 2&3.TXT (dB)	29.25 dB(uVolts)	CISPR 11/22 Class B Quasi- peak	Margin	CISPR 11/22 Class B	
16.854 Line-L2 .15 Test Frequency 0.1545	28.85 - 30MHz - Meter Reading 54.75	Av Detector PK	0.2 T24 IL L2.TXT (dB) 0.1	0.2 LC Cables 2&3.TXT (dB) 0	29.25 dB(uVolts) 54.85	CISPR 11/22 Class B Quasi- peak	Margin	CISPR 11/22 Class B Average	Margin -
16.854 Line-L2 .15 - Test Frequency 0.1545 0.1545	28.85 30MHz Meter Reading 54.75 40.25	Av Detector PK Av	0.2 T24 IL L2.TXT (dB) 0.1 0.1	0.2 LC Cables 2&3.TXT (dB) 0 0	29.25 <b>dB(uVolts)</b> 54.85 40.35	CISPR 11/22 Class B Quasi- peak 65.8	- Margin -10.95 -	CISPR 11/22 Class B Average	Margin -
16.854 Line-L2 .15 Test Frequency 0.1545 0.1545 0.78	28.85 - 30MHz Meter Reading 54.75 40.25 42.3	Av Detector PK Av PK	0.2 T24 IL L2.TXT (dB) 0.1 0.1 0.1	0.2 LC Cables 2&3.TXT (dB) 0 0 0	29.25 <b>dB(uVolts)</b> 54.85 40.35 42.4	- CISPR 11/22 Class B Quasi- peak 65.8 - 56	- Margin -10.95 -	CISPR 11/22 Class B Average - 55.8 -	<b>Margin</b> - -15.45 -
16.854 Line-L2 .15 Test Frequency 0.1545 0.1545 0.78 0.78	28.85 30MHz Meter Reading 54.75 40.25 42.3 24.89	Av Detector PK Av PK Av	0.2 T24 IL L2.TXT (dB) 0.1 0.1 0.1 0.1	0.2 LC Cables 2&3.TXT (dB) 0 0 0 0	29.25 <b>dB(uVolts)</b> 54.85 40.35 42.4 24.99	- CISPR 11/22 Class B Quasi- peak 65.8 - 56 -	- Margin -10.95 - -13.6 -	CISPR 11/22 Class B Average - 55.8 - 46	<b>Margin</b> - -15.45 -
16.854 Line-L2 .15 Test Frequency 0.1545 0.1545 0.78 0.78 0.78 2.4585	28.85 30MHz Meter Reading 54.75 40.25 42.3 24.89 35.55	Av Detector PK Av PK Av PK	0.2 T24 IL L2.TXT (dB) 0.1 0.1 0.1 0.1 0.1 0.1	0.2 LC Cables 2&3.TXT (dB) 0 0 0 0 0 0 0	29.25 <b>dB(uVolts)</b> 54.85 40.35 42.4 24.99 35.75	- CISPR 11/22 Class B Quasi- peak 65.8 - 56 -	- Margin -10.95 - -13.6 -	CISPR 11/22 Class B Average - 55.8 - 46 -	Margin - -15.45 - -21.01 -

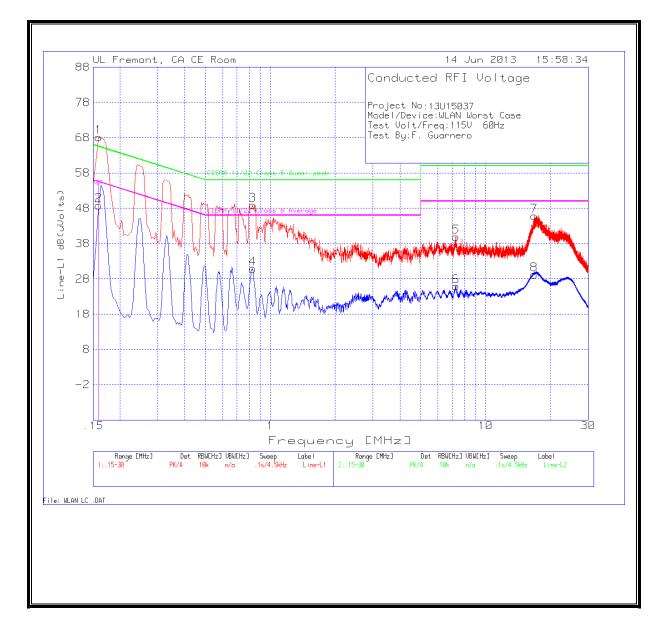
PK - Peak detector

QP - Quasi-Peak detector

Av - Average detector

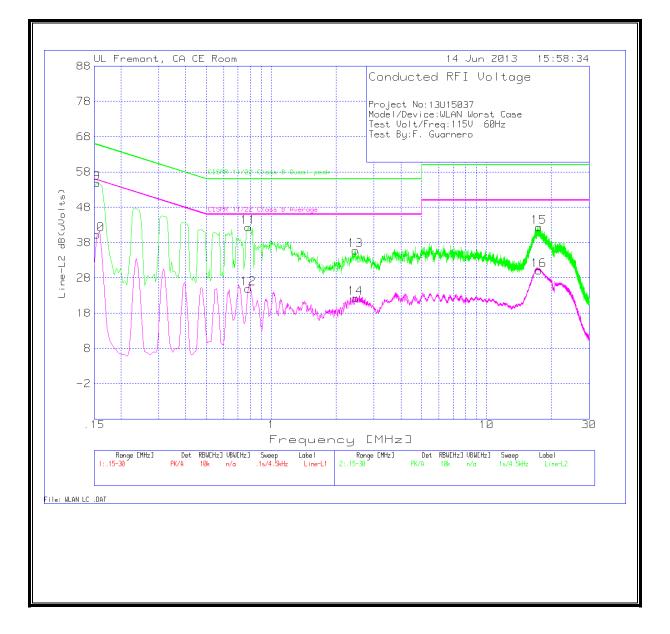
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# LINE 1 RESULTS



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# LINE 2 RESULTS



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# 11. DYNAMIC FREQUENCY SELECTION

# 11.1. OVERVIEW

# 11.1.1. LIMITS

## INDUSTRY CANADA

IC RSS-210 is closely harmonized with FCC Part 15 DFS rules. The deviations are as follows:

RSS-210 Issue 7 A9.4 (b) (ii) Channel Availability Check Time: ...

Additional requirements for the band 5600-5650 MHz: Until further notice, devices subject to this Section shall not be capable of transmitting in the band 5600-5650 MHz, so that Environment Canada weather radars operating in this band are protected.

RSS-210 Issue 7 A9.4 (b) (iv) **Channel closing time:** the maximum channel closing time is 260 ms.

# FCC

§15.407 (h) and FCC 06-96 APPENDIX "COMPLIANCE MEASUREMENT PROCEDURES FOR UNLICENSED-NATIONAL INFORMATION INFRASTRUCTURE DEVCIES OPERATING IN THE 5250-5350 MHz AND 5470-5725 MHz BANDS INCORPORATING DYNAMIC FREQUENCY SELECTION".

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## Table 1: Applicability of DFS requirements prior to use of a channel

Requirement	Operational Mode				
	Master	Client (without radar detection)	Client (with radar detection)		
Non-Occupancy Period	Yes	Not required	Yes		
DFS Detection Threshold	Yes	Not required	Yes		
Channel Availability Check Time	Yes	Not required	Not required		
Uniform Spreading	Yes	Not required	Not required		

# Table 2: Applicability of DFS requirements during normal operation

Requirement	Operational M	Operational Mode			
	Master	Master Client Client			
		(without DFS)	(with DFS)		
DFS Detection Threshold	Yes	Not required	Yes		
Channel Closing Transmission Time	Yes	Yes	Yes		
Channel Move Time	Yes	Yes	Yes		

# Table 3: Interference Threshold values, Master or Client incorporating In-ServiceMonitoring

Maximum Transmit Power	Value				
	(see note)				
≥ 200 milliwatt	-64 dBm				
< 200 milliwatt	-62 dBm				
Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude					
of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.					

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# Table 4: DFS Response requirement values

Parameter	Value
Non-occupancy period	30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds
Channel Closing Transmission Time	200 milliseconds +
	approx. 60 milliseconds
	over remaining 10 second
	period

The instant that the Channel Move Time and the Channel Closing Transmission Time begins is as follows:

For the Short pulse radar Test Signals this instant is the end of the *Burst*.

For the Frequency Hopping radar Test Signal, this instant is the end of the last radar burst generated.

For the Long Pulse radar Test Signal this instant is the end of the 12 second period defining the radar transmission.

The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate channel changes (an aggregate of approximately 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.

# Table 5 – Short Pulse Radar Test Waveforms

Radar	Pulse Width	PRI	Pulses	Minimum	Minimum
Туре	(Microseconds)	(Microseconds)		Percentage of	Trials
-				Successful	
				Detection	
1	1	1428	18	60%	30
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (I	120				

## Table 6 – Long Pulse Radar Test Signal

	<u> </u>		<u> </u>				
Radar Waveform	Bursts	Pulses per Burst	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µsec)	Minimum Percentage of Successful Detection	Minimum Trials
5	8-20	1-3	50-100	5-20	1000- 2000	80%	30

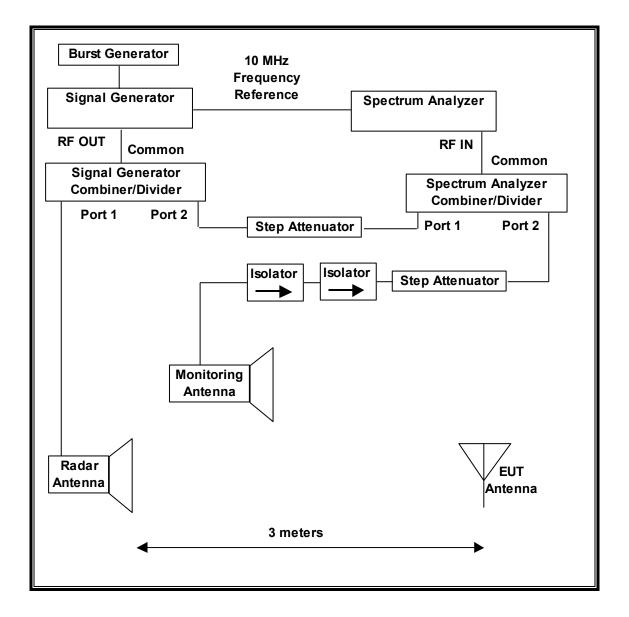
# Table 7 – Frequency Hopping Radar Test Signal

Radar Waveform	Pulse Width (µsec)	PRI (µsec)	Burst Length (ms)	Pulses per Hop	Hopping Rate (kHz)	Minimum Percentage of Successful Detection	Minimum Trials
6	1	333	300	9	.333	70%	30

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# 11.1.2. TEST AND MEASUREMENT SYSTEM

## RADIATED METHOD SYSTEM BLOCK DIAGRAM



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## SYSTEM OVERVIEW

The short pulse and long pulse signal generating system utilizes the NTIA software. The Vector Signal Generator has been validated by the NTIA. The hopping signal generating system utilizes the CCS simulated hopping method and system, which has been validated by the DoD, FCC and NTIA. The software selects waveform parameters from within the bounds of the signal type on a random basis using uniform distribution.

The short pulse types 2, 3 and 4, and the long pulse type 5 parameters are randomized at runtime.

The hopping type 6 pulse parameters are fixed while the hopping sequence is based on the August 2005 NTIA Hopping Frequency List. The initial starting point randomized at run-time and each subsequent starting point is incremented by 475. Each frequency in the 100-length segment is compared to the boundaries of the EUT Detection Bandwidth and the software creates a hopping burst pattern in accordance with Section 7.4.1.3 Method #2 Simulated Frequency Hopping Radar Waveform Generating Subsystem of FCC 06-96 APPENDIX. The frequency of the signal generator is incremented in 1 MHz steps from  $F_L$  to  $F_H$  for each successive trial. This incremental sequence is repeated as required to generate a minimum of 30 total trials and to maintain a uniform frequency distribution over the entire Detection Bandwidth.

The signal monitoring equipment consists of a spectrum analyzer. The aggregate ON time is calculated by multiplying the number of bins above a threshold during a particular observation period by the dwell time per bin, with the analyzer set to peak detection and max hold.

## SYSTEM CALIBRATION

A 50-ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected to a horn antenna via a coaxial cable, with the reference level offset set to (horn antenna gain – coaxial cable loss). The signal generator is set to CW mode. The amplitude of the signal generator is adjusted to yield a level of –64 dBm as measured on the spectrum analyzer.

Without changing any of the instrument settings, the spectrum analyzer is reconnected to the Common port of the Spectrum Analyzer Combiner/Divider. The Reference Level Offset of the spectrum analyzer is adjusted so that the displayed amplitude of the signal is –64 dBm.

The spectrum analyzer displays the level of the signal generator as received at the antenna ports of the Master Device. The interference detection threshold may be varied from the calibrated value of –64 dBm and the spectrum analyzer will still indicate the level as received by the Master Device.

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#### ADJUSTMENT OF DISPLAYED TRAFFIC LEVEL

A link is established between the Master and Slave and the distance between the units is adjusted as needed to provide a suitable received level at the Master and Slave devices. The video test file is streamed to generate WLAN traffic. The monitoring antenna is adjusted so that the WLAN traffic level, as displayed on the spectrum analyzer, is at lower amplitude than the radar detection threshold.

#### TEST AND MEASUREMENT EQUIPMENT

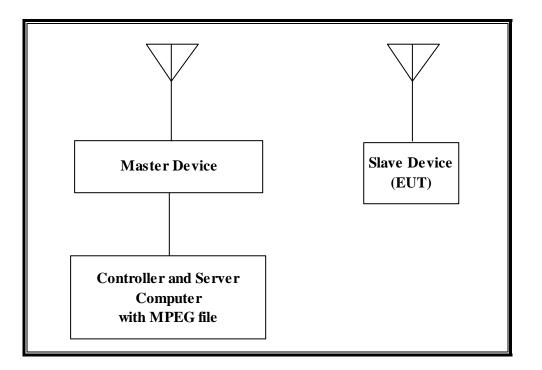
The following test and measurement equipment was utilized for the DFS tests documented in this report:

TEST EQUIPMENT LIST							
Description Manufacturer Model Asset Number Cal Due							
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01178	08/18/13			
Vector Signal Generator, 20GHz	Agilent / HP	E8267C	C01066	11/20/13			

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# 11.1.3. SETUP OF EUT (CLIENT MODE)

## RADIATED METHOD EUT TEST SETUP



## SUPPORT EQUIPMENT

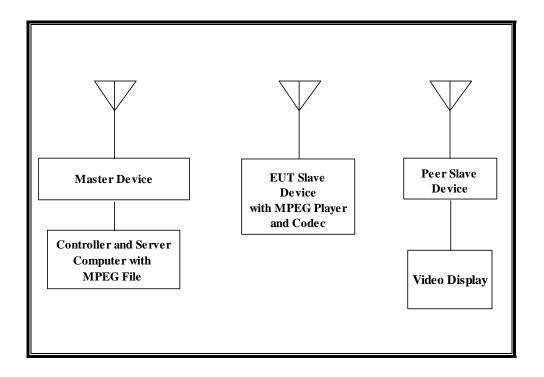
The following support equipment was utilized for the DFS tests documented in this report:

PERIPHERAL SUPPORT EQUIPMENT LIST									
Description	Manufacturer	Model	Serial Number	FCC ID					
Wireless Access Point	Cisco	AIR-AP1252AG-A-	FTX130390D9	LDK102061					
(Master Device)		K9							
AC Adapter (AP)	Delta Electronics	EADP-45BB B	DTH1049902N	DoC					
Notebook PC	Apple	MacBook Pro A1150	AOU257941	DoC					
(Controller/Server)									
AC Adapter	Delta Electronics	A1330	MV952157KAGKA	DoC					
(Controller/Server PC)									

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# 11.1.4. SETUP OF EUT (CLIENT-TO-CLIENT COMMUNICATIONS MODE)

# RADIATED METHOD EUT TEST SETUP



## SUPPORT EQUIPMENT

The following support equipment was utilized for the DFS tests documented in this report:

PERIPHERAL SUPPORT EQUIPMENT LIST								
Description	Manufacturer	Model	Serial Number	FCC ID				
Wireless Access Point (Master Device)	Cisco	AIR-AP1252AG-A- K9	FTX130390D9	LDK102061				
AC Adapter (AP)	Delta Electronics	EADP-45BB B	DTH1049902N	DoC				
Notebook PC (Controller/Server)	Apple	MacBook Pro A1150	AOU257941	DoC				
AC Adapter (Controller/Server PC)	Delta Electronics	A1330	MV952157KAGKA	DoC				
Apple TV (Peer Slave	Apple	A1469	V07JV1Z7FF54	BCGA1469				
Video Display	Dell	U2410f	CN-0FJ525N- 72872-1B5-AGAL	DoC				

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# 11.1.5. DESCRIPTION OF EUT

The EUT operates over the 5250-5350 MHz and 5470-5725 MHz ranges.

The EUT is a Slave Device without Radar Detection.

The highest power level within these bands is 15.81 dBm EIRP in the 5250-5350 MHz band and 15.45 dBm EIRP in the 5470-5725 MHz band.

The only antenna assembly utilized with the EUT has a gain of –0.37dBi in the 5250-5350 MHz band and 1.31dBi in the 5470-5725 MHz band.

The rated output power of the Master unit is > 23dBm (EIRP). Therefore the required interference threshold level is -64 dBm. After correction for procedural adjustments, the required radiated threshold at the antenna port is -64 + 1 = -63 dBm.

The calibrated radiated DFS Detection Threshold level is set to –64 dBm. The tested level is lower than the required level hence it provides margin to the limit.

The EUT uses one transmitter/receiver chain connected to an antenna to perform radiated tests.

WLAN traffic is generated by streaming the video file TestFile.mp2 "6 ½ Magic Hours" from the Master to the Slave in full motion video mode using Safari web browser.

TPC is not required since the maximum EIRP is less than 500 mW (27 dBm).

The EUT utilizes the 802.11a/n architecture. Two nominal channel bandwidths of 20 MHz and 40 MHz are implemented.

The software installed in the EUT is 11A5400f.

## UNIFORM CHANNEL SPREADING

This requirement is not applicable to Slave radio devices.

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#### **OVERVIEW OF MASTER DEVICE WITH RESPECT TO §15.407 (h) REQUIREMENTS**

The Master Device is a Cisco Access Point, FCC ID: LDK102061. The minimum antenna gain for the Master Device is 3.5 dBi.

The rated output power of the Master unit is > 23dBm (EIRP). Therefore the required interference threshold level is -64 dBm. After correction for procedural adjustments, the required radiated threshold at the antenna port is -64 + 1 = -63 dBm.

The calibrated radiated DFS Detection Threshold level is set to –64 dBm. The tested level is lower than the required level hence it provides margin to the limit.

The software installed in the access point is 12.4(25d)JA1.

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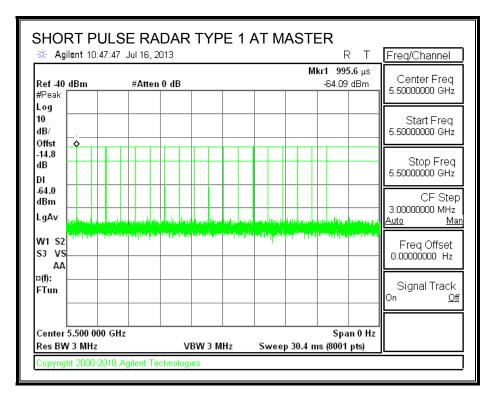
# 11.2. CLIENT MODE RESULTS FOR 20 MHz BANDWIDTH

# 11.2.1. TEST CHANNEL

All tests were performed at a channel center frequency of 5500 MHz.

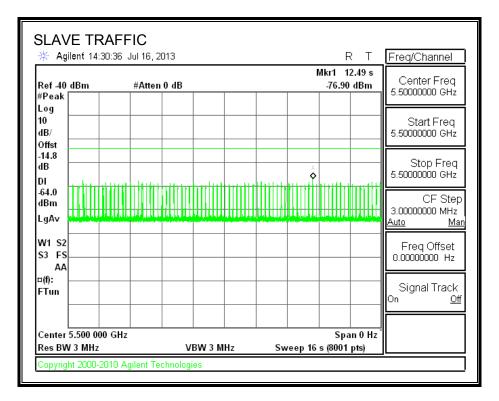
# 11.2.2. RADAR WAVEFORM AND TRAFFIC

## RADAR WAVEFORM



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#### TRAFFIC



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# 11.2.3. OVERLAPPING CHANNEL TESTS

## RESULTS

These tests are not applicable.

# 11.2.4. MOVE AND CLOSING TIME

## **REPORTING NOTES**

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

```
Aggregate Transmission Time = (Number of analyzer bins showing transmission) * (dwell time per bin)
```

The observation period over which the FCC aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

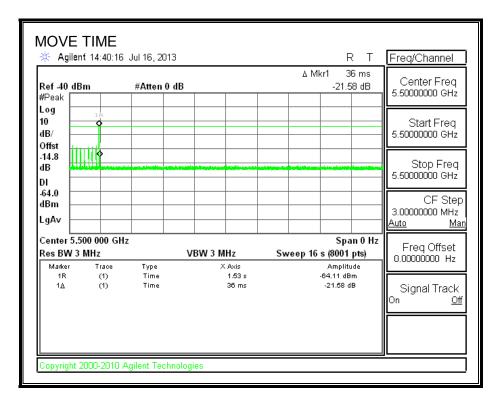
## RESULTS

Agency	Channel Move Time	Limit
	(sec)	(sec)
FCC / IC	0.036	10

Agency	Aggregate Channel Closing Transmission Time	Limit
	(msec)	(msec)
FCC	0.0	60
IC	2.0	260

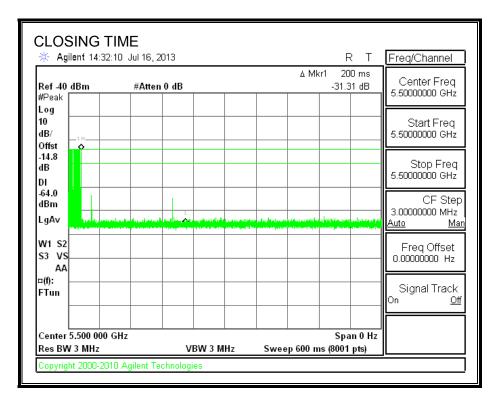
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#### MOVE TIME



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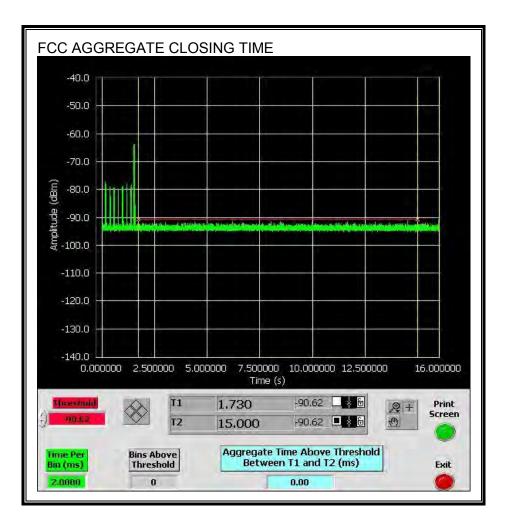
## **CHANNEL CLOSING TIME**



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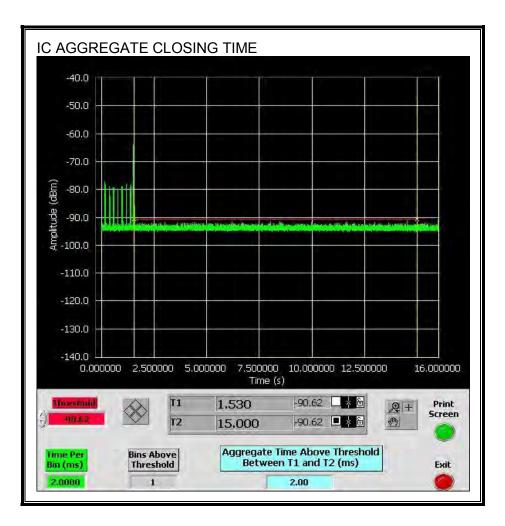
#### AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

No transmissions are observed during the FCC aggregate monitoring period.



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Only intermittent transmissions are observed during the IC aggregate monitoring period.



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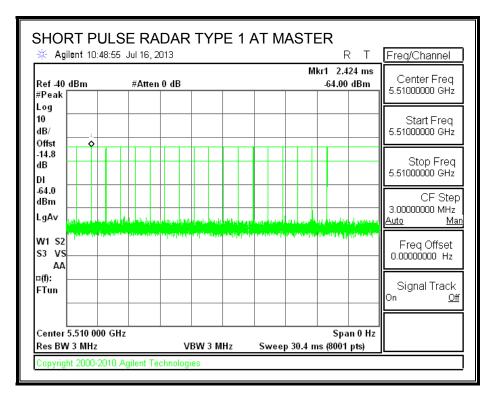
# 11.3. CLIENT MODE RESULTS FOR 40 MHz BANDWIDTH

# 11.3.1. TEST CHANNEL

All tests were performed at a channel center frequency of 5510 MHz.

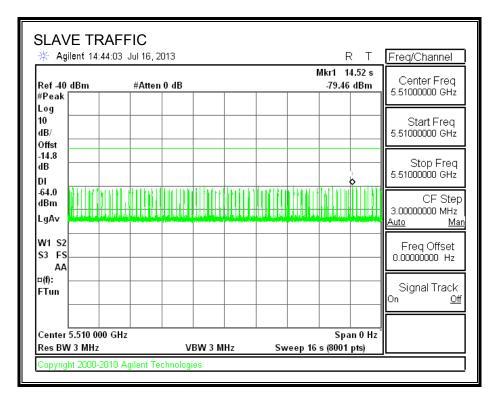
# 11.3.2. RADAR WAVEFORM AND TRAFFIC

## RADAR WAVEFORM



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#### TRAFFIC



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# 11.3.3. OVERLAPPING CHANNEL TESTS

## RESULTS

These tests are not applicable.

# 11.3.4. MOVE AND CLOSING TIME

## **REPORTING NOTES**

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

```
Aggregate Transmission Time = (Number of analyzer bins showing transmission) * (dwell time per bin)
```

The observation period over which the FCC aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

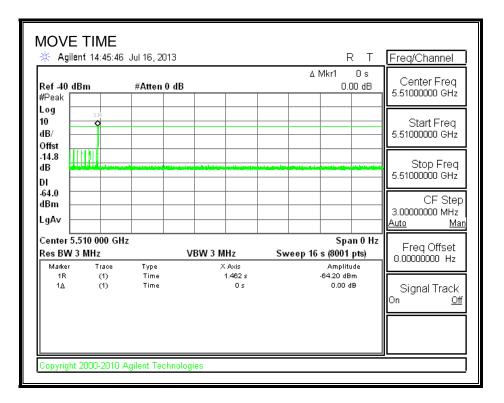
## RESULTS

Agency	Channel Move Time	Limit
	(sec)	(sec)
FCC / IC	0.000	10

Agency	Aggregate Channel Closing Transmission Time	Limit
	(msec)	(msec)
FCC	0.0	60
IC	0.0	260

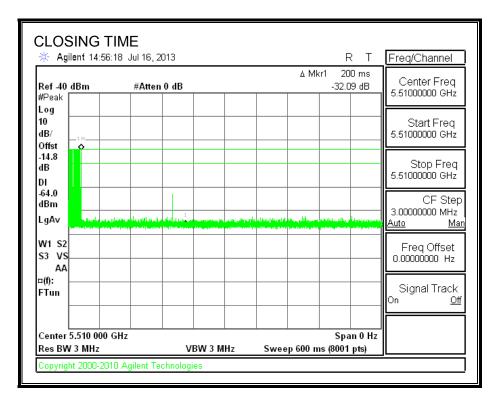
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#### MOVE TIME



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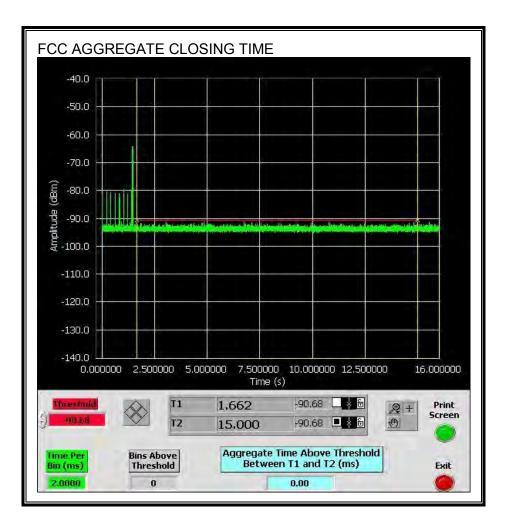
## **CHANNEL CLOSING TIME**



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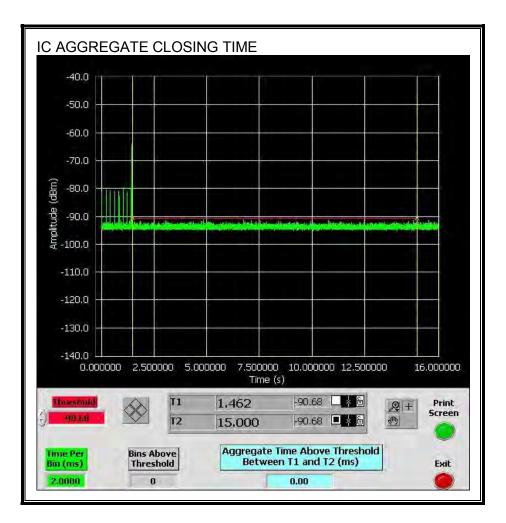
#### AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

No transmissions are observed during the FCC aggregate monitoring period.



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No transmissions are observed during the IC aggregate monitoring period.



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# 11.3.5. NON-OCCUPANCY PERIOD

## **RESULTS**

No EUT transmissions were observed on the test channel during the 30-minute observation time.

Center 5.510 000 Les BW 3 MHz	GHz VBW 3 MH	Span 0 Hz Iz Sweep 2 ks (8001 pts)	*
dB 64.0 dBm LgAv W1 S2 S3 FS AA =(f): FTun Center 5 510 000 0			5.51000000 GHz CF Step 3.00000000 MHz <u>Auto Ma</u> Freq Offset 0.00000000 Hz Signal Track On <u>Off</u>
Log 10 dB/ 			Start Freq 5.51000000 GHz
Ref 40 dBm #Peak	#Atten 0 dB	∆ Mkr1 1.8 ks -27.66 dB	Center Freq 5.51000000 GHz
Agilent 15:32:	PANCY PERIOD 19 Jul 16, 2013	RT	Freq/Channel

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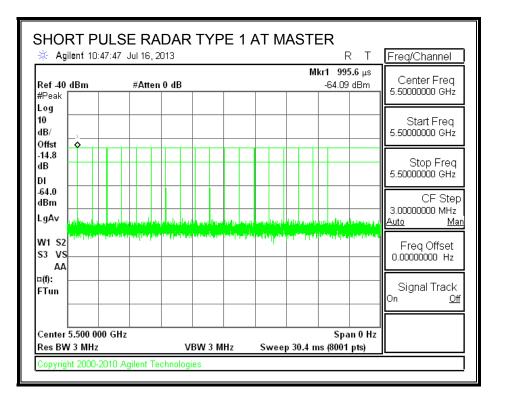
# 11.4. CLIENT-TO-CLIENT COMMUNICATIONS MODE RESULTS FOR 20 MHz BANDWIDTH

# 11.4.1. TEST CHANNEL

All tests were performed at a channel center frequency of 5500 MHz.

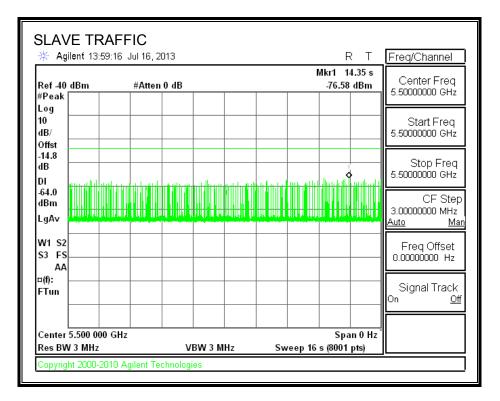
# 11.4.2. RADAR WAVEFORM AND TRAFFIC

## RADAR WAVEFORM



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#### TRAFFIC



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# 11.4.3. OVERLAPPING CHANNEL TESTS

## RESULTS

These tests are not applicable.

# 11.4.4. MOVE AND CLOSING TIME

## **REPORTING NOTES**

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

```
Aggregate Transmission Time = (Number of analyzer bins showing transmission) * (dwell time per bin)
```

The observation period over which the FCC aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

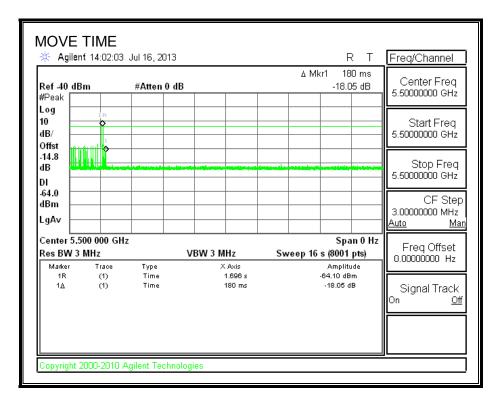
## RESULTS

Agency	Channel Move Time	Limit
	(sec)	(sec)
FCC / IC	0.180	10

Agency	Aggregate Channel Closing Transmission Time	Limit
	(msec)	(msec)
FCC	0.0	60
IC	10.0	260

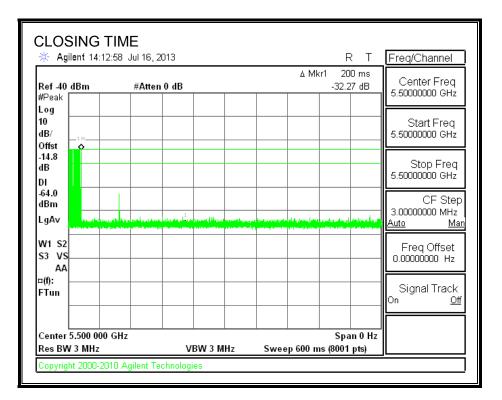
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#### MOVE TIME



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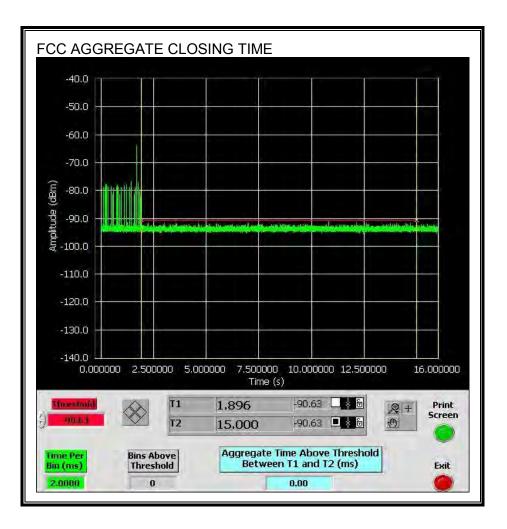
## **CHANNEL CLOSING TIME**



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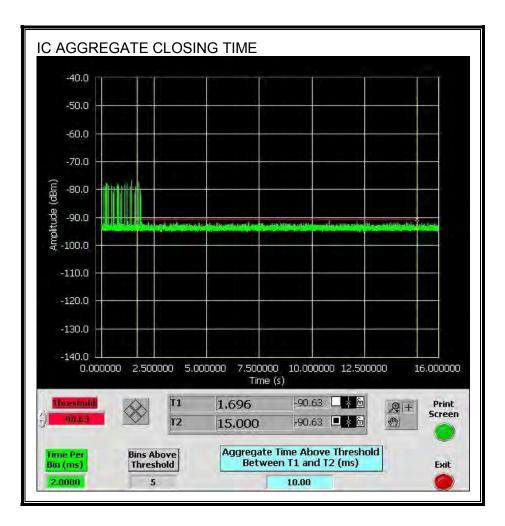
#### AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

No transmissions are observed during the FCC aggregate monitoring period.



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Only intermittent transmissions are observed during the IC aggregate monitoring period.



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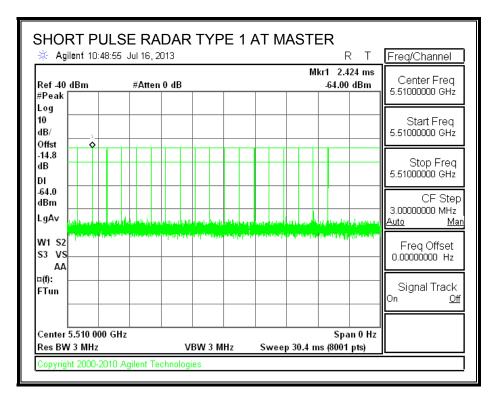
# 11.5. CLIENT-TO-CLIENT COMMUNICATIONS MODE RESULTS FOR 40 MHz BANDWIDTH

# 11.5.1. TEST CHANNEL

All tests were performed at a channel center frequency of 5510 MHz.

# 11.5.2. RADAR WAVEFORM AND TRAFFIC

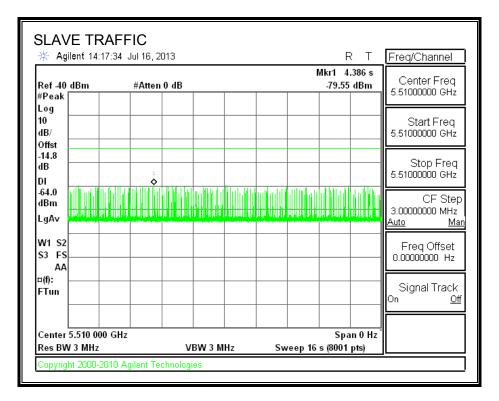
## RADAR WAVEFORM



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#### TRAFFIC



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# 11.5.3. OVERLAPPING CHANNEL TESTS

## RESULTS

These tests are not applicable.

# 11.5.4. MOVE AND CLOSING TIME

## REPORTING NOTES

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

```
Aggregate Transmission Time = (Number of analyzer bins showing transmission) * (dwell time per bin)
```

The observation period over which the FCC aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

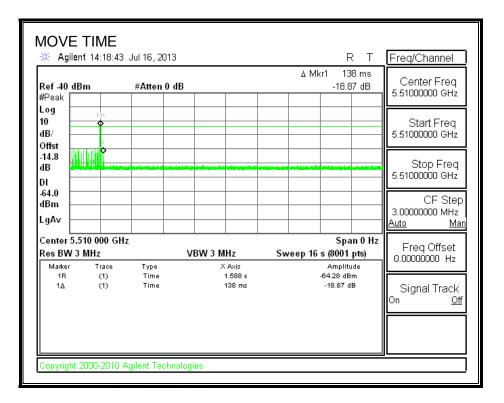
## <u>RESULTS</u>

Agency	Channel Move Time	Limit
	(sec)	(sec)
FCC / IC	0.138	10

Agency	Aggregate Channel Closing Transmission Time	Limit
	(msec)	(msec)
FCC	0.0	60
IC	4.0	260

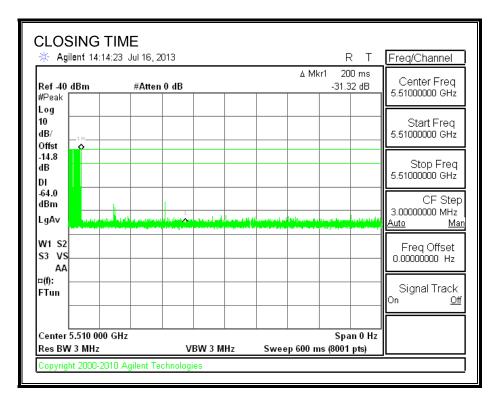
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#### MOVE TIME



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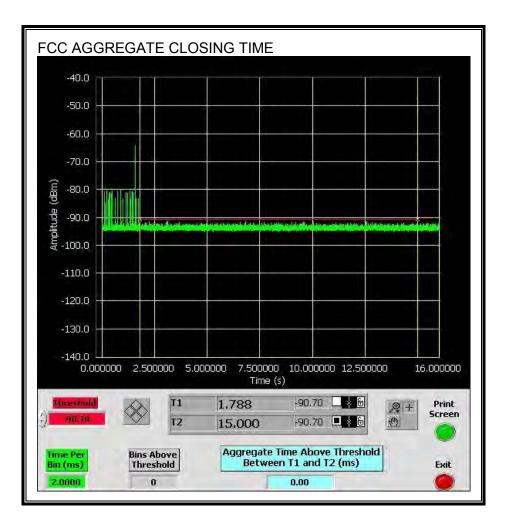
## **CHANNEL CLOSING TIME**



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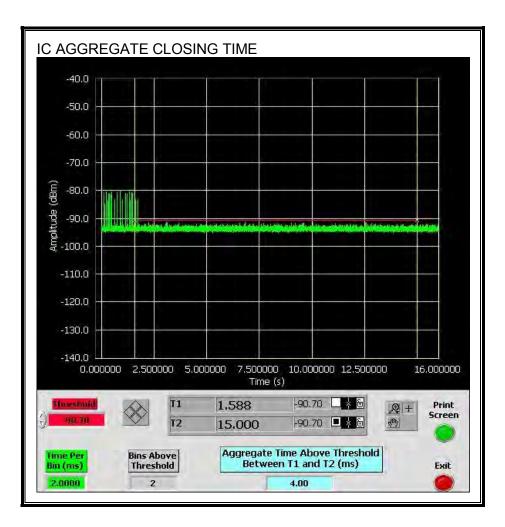
#### AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

No transmissions are observed during the FCC aggregate monitoring period.



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Only intermittent transmissions are observed during the IC aggregate monitoring period.



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