FCC 47 CFR PART 15 SUBPART E

CERTIFICATION TEST REPORT

FOR

GSM/WCDMA/LTE Phone + Bluetooth &
WLAN (2.4GHz & 5GHz) and NFC

MODEL NUMBER: SM-C105S

FCC ID: A3LSMC105S

REPORT NUMBER: 13U15830-4 REVISION A

ISSUE DATE: SEP 6, 2013

Prepared for
SAMSUNG ELECTRONICS CO., LTD.
416, MAETAN 3-DONG, YEONGTONG-GU
SUWON-CITY, GYEONGGI-DO 443-742, SOUTH KOREA

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Revision History

Rev.	Issue Date	Revisions	Revised By
	08/29/13	Initial Issue	P.Kim
A	9/6/13	Updated statement	P.Kim

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	SAMSUNG ELECTRONICS CO., LTD. 416, MAETAN 3-DONG, YEONGTONG-GU SUWON-CITY, GYEONGGI-DO 443-742, South Korea
EUT DESCRIPTION:	GSM/WCDMA + LTE Phone Bluetooth, WLAN (2.4GHz & 5GHz) and NFC
MODEL:	SM-C105S
SERIAL NUMBER:	1693679-VS
DATE TESTED:	AUGEST 14-26, 2013

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart E	Pass

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

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

Approved & Released For
UL Verification Services Inc. By:

PHILIP KIM
WiSE PROGRAM MANAGER
UL Verification Services Inc.

Tested By:

STEVEN TRAN
WiSE LAB TECHNICIAN
UL Verification Services Inc.

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, FCC KDB 644545 D01.

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 http://www.ccsemc.com.

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%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11 A/B/G/N 1X1 HT20, HT40 + BT4.0 (LE) + GSM/ WCDMA / LTE BAR PHONE.

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)
5170-5250	802.11a	12.1	16.22
5170-5250	802.11n HT20	12	15.85
5170-5250	802.11n HT40	12.1	16.22
5250-5330	802.11a	12.2	16.60
5250-5330	802.11n HT20	11.9	15.49
5250-5330	802.11n HT40	12.1	16.22
5490-5730	802.11a	12.3	16.98
5490-5730	802.11n HT20	12.3	16.98
5490-5730	802.11n HT40	12.2	16.60

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antenna, with a maximum gain of -0.57dBi.

5.4. SOFTWARE AND FIRMWARE

Software version was SMC105S.001

The firmware used was Android 4.2.2.

5.5. WORST-CASE CONFIGURATION AND MODE

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

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

Based on the baseline scan, the worst-case data rates were:

802.11a mode: 6 Mbps
802.11n HT20mode: MCS0
802.11n HT40mode: MCS0

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
AC Adapter	Samsung	ETA0U18KWK	RT2D704IS/A	N/A
Earphone	Samsung	SHV-E470S	FK-236-B	N/A

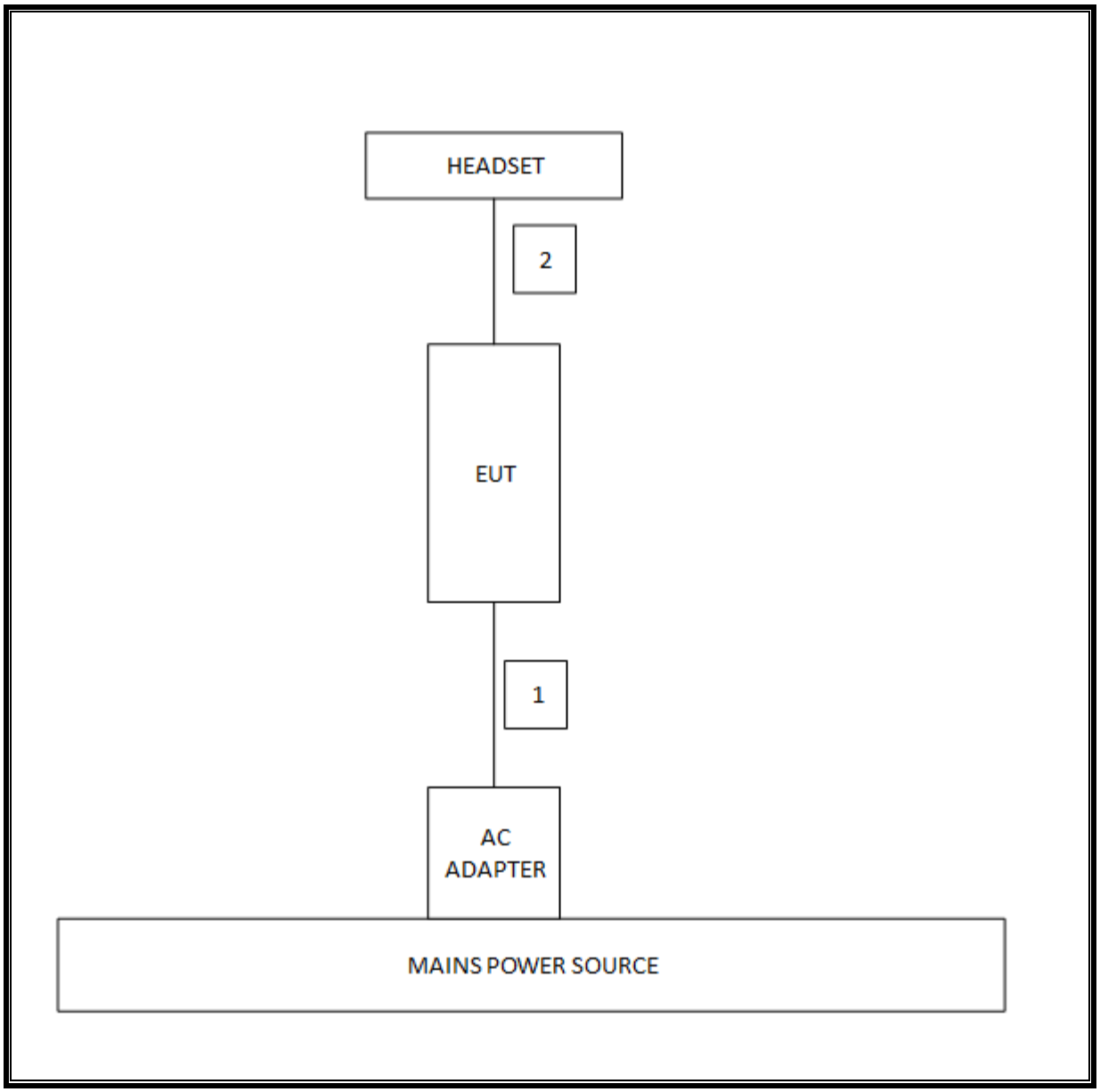
I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	DC Power	1	Mini-USB	Shielded	1.2m	N/A
2	Audio	1	Mini-Jack	Unshielded	1.0m	N/A

TEST SETUP

The EUT is setup as a stand-alone device.

SETUP DIAGRAM FOR TESTS



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**
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00986	4/1/2014
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01179	2/26/2014
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	8/8/2014
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	1/28/2014
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	10/22/2013
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	8/2/2014
Antenna, Bilog, 30MHz-1 GHz	Sunol Sciences	JB1	N/A	3/6/2014
Antenna, Horn, 18 GHz	ETS	3117	C01022	2/21/2014
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00589	12/17/2013
Peak Power Meter	Agilent / HP	E4416A	C00963	12/13/2013
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/13/2013
LISN, 30 MHz	FCC	50/250-25-2	C00626	01/14/14
Reject Filter, 5.725-5.825 GHz	Micro-Tronics	BRC13192	N02676	CNR

7. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

LIMITS

None; for reporting purposes only.

PROCEDURE

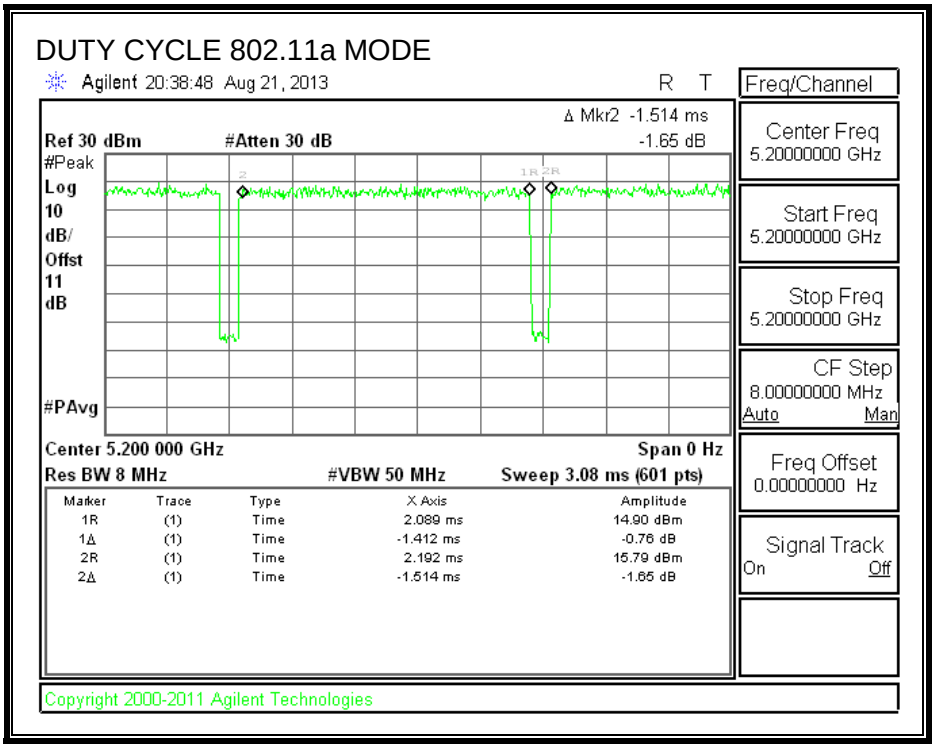
KDB 789033 Zero-Span Spectrum Analyzer Method.

7.1. ON TIME AND DUTY CYCLE RESULTS

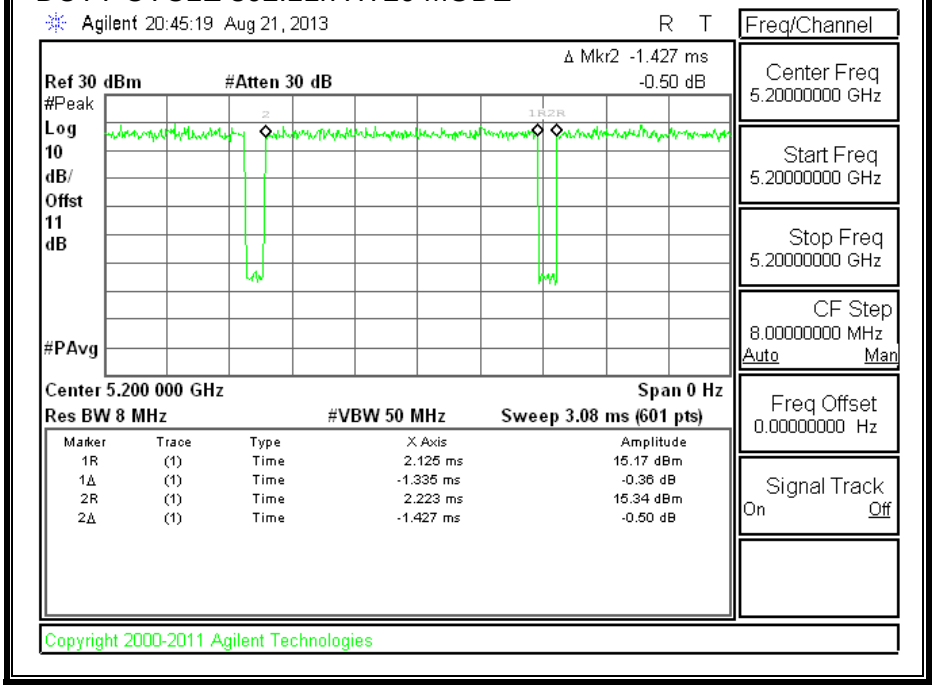
Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/T Minimum VBW (kHz)
802.11a	1.41	1.51	0.933	93.3%	0.30	0.708
802.11n HT20	1.34	1.43	0.936	93.6%	0.29	0.749
802.11n HT40	0.67	0.77	0.872	87.2%	0.60	1.499

7.2. DUTY CYCLE PLOTS

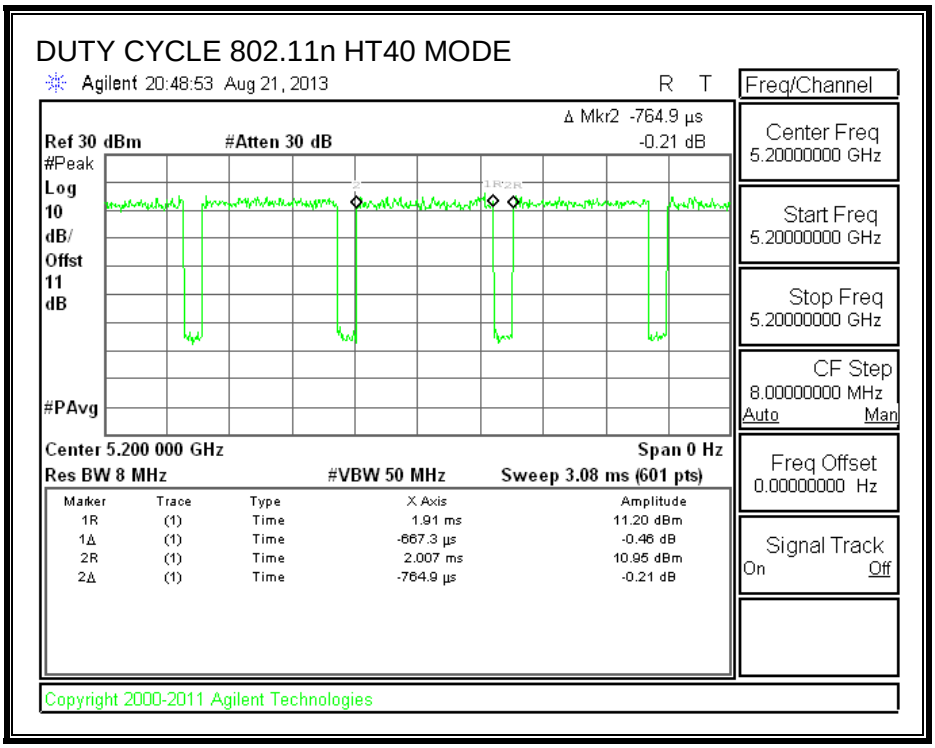
DUTY CYCLE 802.11a MODE



DUTY CYCLE 802.11n HT20 MODE



DUTY CYCLE 802.11n HT40 MODE



8. MEASUREMENT METHOD

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

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

9. ANTENNA PORT TEST RESULTS

9.1. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

9.1.1. 802.11a MODE IN THE 5.2 GHz BAND

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5180	19.00
Mid	5200	18.96
High	5240	18.88
Worst		19.00

9.1.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5180	19.38
Mid	5200	19.25
High	5240	19.25
Worst		19.38

9.1.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5190	50.510
Mid	5230	50.050
Worst		50.510

9.1.1. 802.11a MODE IN THE 5.3 GHz BAND

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5260	18.90
Mid	5300	19.00
High	5320	19.00
Worst		19.00

9.1.1. 802.11n HT20 MODE IN THE 5.3 GHz BAND

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5260	19.25
Mid	5300	19.35
High	5320	19.25
Worst		19.35

9.1.2. 802.11n HT40 MODE IN THE 5.3 GHz BAND

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5270	50.7
High	5310	50.3
Worst		50.7

9.1.3. 802.11a MODE IN THE 5.5 GHz BAND

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5500	19.000
Mid	5580	18.950
High	5700	18.950
Worst		19.000

9.1.4. 802.11n HT20 MODE IN THE 5.5 GHz BAND

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5500	19.350
Mid	5580	19.250
High	5700	19.150
Worst		19.350

9.1.5. 802.11n HT40 MODE IN THE 5.5 GHz BAND

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5510	50.3
Mid	5550	50.2
High	5670	50.7
Worst		50.7

9.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

9.2.1. 802.11a MODE IN THE 5.2 GHz BAND

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5180	16.30
Mid	5200	16.29
High	5240	16.29
Worst		16.30

9.2.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5180	17.45
Mid	5200	17.45
High	5240	17.45
Worst		17.45

9.2.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND

	(MHz)	(MHz)
Low	5190	36.490
Mid	5230	36.400
Worst		36.490

9.2.4. 802.11a MODE IN THE 5.3 GHz BAND

	(MHz)	(MHz)
Low	5260	16.29
Mid	5300	16.34
High	5320	16.36
Worst		16.36

9.2.5. 802.11n HT20 MODE IN THE 5.3 GHz BAND

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5260	17.42
Mid	5300	17.45
High	5320	17.46
Worst		17.46

9.2.6. 802.11n HT40 MODE IN THE 5.3 GHz BAND

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5270	36.6
High	5310	36.6
Worst		36.6

9.2.7. 802.11a MODE IN THE 5.5 GHz BAND

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5500	16.393
Mid	5580	16.436
High	5700	16.441
Worst		16.441

9.2.8. 802.11n HT20 MODE IN THE 5.5 GHz BAND

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5500	17.469
Mid	5580	17.491
High	5700	17.466
Worst		17.491

9.2.9. 802.11n HT40 MODE IN THE 5.5 GHz BAND

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5510	37.5
Mid	5550	37.3
High	5670	37.0
Worst		37.5

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

RESULTS

9.3.1. 802.11a MODE IN THE 5.2 GHz BAND

Channel	Frequency (MHz)	Avg Power (dBm)
Low	5180	12.10
Mid	5200	12.10
High	5240	12.10
Worst		12.10

9.3.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND

Channel	Frequency (MHz)	Avg Power (dBm)
Low	5180	11.90
Mid	5200	12.00
High	5240	11.90
Worst		12.00

9.3.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND

Channel	Frequency (MHz)	Avg Power (dBm)
Low	5190	12.100
Mid	5230	12.100
Worst		12.100

9.3.4. 802.11a MODE IN THE 5.3 GHz BAND

Channel	Frequency (MHz)	Avg Power (dBm)
Low	5260	12.20
Mid	5300	11.40
High	5320	11.70
Worst		12.20

9.3.5. 802.11n HT20 MODE IN THE 5.3 GHz BAND

Channel	Frequency (MHz)	Avg Power (dBm)
Low	5260	11.90
Mid	5300	11.90
High	5320	11.80
Worst		11.90

9.3.6. 802.11n HT40 MODE IN THE 5.3 GHz BAND

Channel	Frequency (MHz)	Avg Power (dBm)
Low	5270	12.1
High	5310	12.1
Worst		12.1

9.3.7. 802.11a MODE IN THE 5.5 GHz BAND

Channel	Frequency (MHz)	Avg Power (dBm)
Low	5500	12.000
Mid	5580	12.300
High	5700	12.100
Worst		12.300

9.3.8. 802.11n HT20 MODE IN THE 5.5 GHz BAND

Channel	Frequency (MHz)	Avg Power (dBm)
Low	5500	12.100
Mid	5580	12.100
High	5700	12.300
Worst		12.300

9.3.9. 802.11n HT40 MODE IN THE 5.5 GHz BAND

Channel	Frequency (MHz)	Avg Power (dBm)
Low	5510	12.2
Mid	5550	12.2
High	5670	11.5
Worst		12.2

9.4. 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 logB, 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.

Test Methodology

Note: The power is based on 4 dBm + 10 log B for FCC; 10 + 10 log B. All the following calculation is using the minimum 26dB bandwidth which will show the lowest limit. This will represent the Unit compliance with the lowest power limit. For example, the low, mid, high channel will use the minimum 26dB bandwidth among them for the power limit calculation.

RESULTS

9.4.1. 802.11a MODE IN THE 5.2 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain (dBi)
Low	5180	18.880	16.290	-1.06
Mid	5200	18.880	16.290	-1.06
High	5240	18.880	16.290	-1.06

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC EIRP Limit (dBm)	Max IC Power (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC eirp PSD Limit (dBm)	PPSD Limit (dBm)
Low	5180	16.76	22.12	23.18	16.76	4.00	10.00	4.00
Mid	5200	16.76	22.12	23.18	16.76	4.00	10.00	4.00
High	5240	16.76	22.12	23.18	16.76	4.00	10.00	4.00

Duty Cycle CF (dB)	0.30	Included in Calculations of Corr'd Power & PPSD

Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5180	12.383	12.68	16.76	-4.08
Mid	5200	12.571	12.87	16.76	-3.89
High	5240	12.353	12.65	16.76	-4.11

PPSD Results

Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5180	2.020	2.32	4.00	-1.68
Mid	5200	2.380	2.68	4.00	-1.32
High	5240	2.000	2.30	4.00	-1.70

9.4.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain (dBi)
Low	5180	19.250	17.452	-1.06
Mid	5200	19.250	17.452	-1.06
High	5240	19.250	17.452	-1.06

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC EIRP Limit (dBm)	Max IC Power (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC eirp PSD Limit (dBm)	PPSD Limit (dBm)
Low	5180	16.84	22.42	23.48	16.84	4.00	10.00	4.00
Mid	5200	16.84	22.42	23.48	16.84	4.00	10.00	4.00
High	5240	16.84	22.42	23.48	16.84	4.00	10.00	4.00

Duty Cycle CF (dB)	0.29	Included in Calculations of Corr'd Power & PPSD

Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5180	11.888	12.18	16.84	-4.67
Mid	5200	11.830	12.12	16.84	-4.72
High	5240	11.769	12.06	16.84	-4.79

PPSD Results

Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5180	1.000	1.29	4.00	-2.71
Mid	5200	1.630	1.92	4.00	-2.08
High	5240	0.450	0.74	4.00	-3.26

9.4.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain (dBi)
Low	5190	50.05	36.400	-1.06
Mid	5230	50.05	36.400	-1.06

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC EIRP Limit (dBm)	Max IC Power (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC eirp PSD Limit (dBm)	PPSD Limit (dBm)
Low	5190	17.00	23.00	24.06	17.00	4.00	10.00	4.00
Mid	5230	17.00	23.00	24.06	17.00	4.00	10.00	4.00
Duty Cycle CF (dB)		0.59	Included in Calculations of Corr'd Power & PPSD					

Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5190	11.735	12.33	17.00	-4.68
Mid	5230	11.758	12.35	17.00	-4.65

PPSD Results

Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5190	-3.420	-2.83	4.00	-6.83
Mid	5230	-3.660	-3.07	4.00	-7.07

9.4.4. 802.11a MODE IN THE 5.3 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain (dBi)
Low	5260	18.90	16.285	-1.89
Mid	5300	18.90	16.285	-1.89
High	5320	18.90	16.285	-1.89

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC PSD Limit (dBm)	PPSD Limit (dBm)
Low	5260	23.76	23.12	29.12	23.12	11.00	11.00	11.00
Mid	5300	23.76	23.12	29.12	23.12	11.00	11.00	11.00
High	5320	23.76	23.12	29.12	23.12	11.00	11.00	11.00

Duty Cycle CF (dB)	0.30	Included in Calculations of Corr'd Power & PPSD

Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5260	13.371	13.67	23.12	-9.45
Mid	5300	12.421	12.72	23.12	-10.40
High	5320	12.399	12.70	23.12	-10.42

PPSD Results

Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5260	2.540	2.84	11.00	-8.16
Mid	5300	1.990	2.29	11.00	-8.71
High	5320	0.970	1.27	11.00	-9.73

9.4.5. 802.11n HT20 MODE IN THE 5.3 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain (dBi)
Low	5260	19.25	17.417	-1.89
Mid	5300	19.25	17.417	-1.89
High	5320	19.25	17.417	-1.89

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC PSD Limit (dBm)	PPSD Limit (dBm)
Low	5260	23.84	23.41	29.41	23.41	11.00	11.00	11.00
Mid	5300	23.84	23.41	29.41	23.41	11.00	11.00	11.00
High	5320	23.84	23.41	29.41	23.41	11.00	11.00	11.00

Duty Cycle CF (dB)	0.29	Included in Calculations of Corr'd Power & PPSD

Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5260	12.358	12.65	23.41	-10.76
Mid	5300	12.340	12.63	23.41	-10.78
High	5320	12.242	12.53	23.41	-10.88

PPSD Results

Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5260	1.560	1.85	11.00	-9.15
Mid	5300	1.870	2.16	11.00	-8.84
High	5320	1.850	2.14	11.00	-8.86

9.4.6. 802.11n HT40 MODE IN THE 5.3 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain (dBi)
Low	5270	50.3	36.577	-1.89
High	5310	50.3	36.577	-1.89

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC EIRP Limit (dBm)	Max IC Power (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC eirp PSD Limit (dBm)	PPSD Limit (dBm)
Low	5270	17.00	23.00	24.89	17.00	4.00	10.00	4.00
High	5310	17.00	23.00	24.89	17.00	4.00	10.00	4.00
Duty Cycle CF (dB)		0.59	Included in Calculations of Corr'd Power & PPSD					

Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5270	12.200	12.79	17.00	-4.21
High	5310	12.121	12.71	17.00	-4.29

PPSD Results

Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5270	-3.140	-2.55	4.00	-6.55
High	5310	-3.440	-2.85	4.00	-6.85

9.4.7. 802.11a MODE IN THE 5.5 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain (dBi)
Low	5500	18.95	16.393	-0.57
Mid	5580	18.95	16.393	-0.57
High	5700	18.95	16.393	-0.57

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC PSD Limit (dBm)	PPSD Limit (dBm)
Low	5500	23.78	23.15	29.15	23.15	11.00	11.00	11.00
Mid	5580	23.78	23.15	29.15	23.15	11.00	11.00	11.00
High	5700	23.78	23.15	29.15	23.15	11.00	11.00	11.00

Duty Cycle CF (dB)	0.30	Included in Calculations of Corr'd Power & PPSD

Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5500	16.850	17.15	23.15	-6.00
Mid	5580	17.150	17.45	23.15	-5.70
High	5700	16.980	17.28	23.15	-5.87

PPSD Results

Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5500	-11.820	-11.52	11.00	-22.52
Mid	5580	-12.540	-12.24	11.00	-23.24
High	5700	-9.370	-9.07	11.00	-20.07

9.4.8. 802.11n HT20 MODE IN THE 5.5 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain (dBi)
Low	5500	19.15	17.466	-0.57
Mid	5580	19.15	17.466	-0.57
High	5700	19.15	17.466	-0.57

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC PSD Limit (dBm)	PPSD Limit (dBm)
Low	5500	23.82	23.42	29.42	23.42	11.00	11.00	11.00
Mid	5580	23.82	23.42	29.42	23.42	11.00	11.00	11.00
High	5700	23.82	23.42	29.42	23.42	11.00	11.00	11.00

Duty Cycle CF (dB)	0.29	Included in Calculations of Corr'd Power & PPSD

Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5500	17.040	17.33	23.42	-6.09
Mid	5580	17.010	17.30	23.42	-6.12
High	5700	16.600	16.89	23.42	-6.53

PPSD Results

Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5500	-8.120	-7.83	11.00	-18.83
Mid	5580	-8.840	-8.55	11.00	-19.55
High	5700	-8.410	-8.12	11.00	-19.12

9.4.9. 802.11n HT40 MODE IN THE 5.5 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain (dBi)
Low	5510	50.2	36.999	-0.57
Mid	5550	50.2	36.999	-0.57
High	5670	50.2	36.999	-0.57

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC PSD Limit (dBm)	PPSD Limit (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)	0.59	Included in Calculations of Corr'd Power & PPSD

Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5510	17.070	17.66	24.00	-6.34
Mid	5550	17.030	17.62	24.00	-6.38
High	5670	16.400	16.99	24.00	-7.01

PPSD Results

Channel	Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5510	-22.430	-21.84	11.00	-32.84
Mid	5550	-24.610	-24.02	11.00	-35.02
High	5670	-25.280	-24.69	11.00	-35.69

9.4.10. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

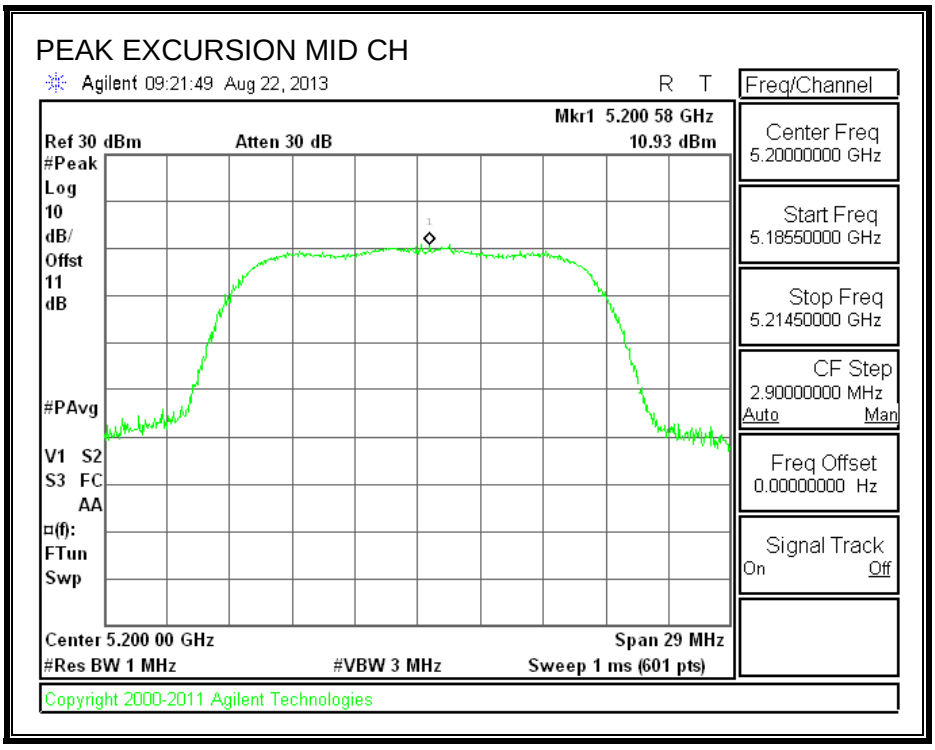
The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

RESULTS

9.4.11. 802.11a MODE IN THE 5.2 GHz BAND

Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Mid	5200	10.930	2.68	0.30	7.95	13	-5.05

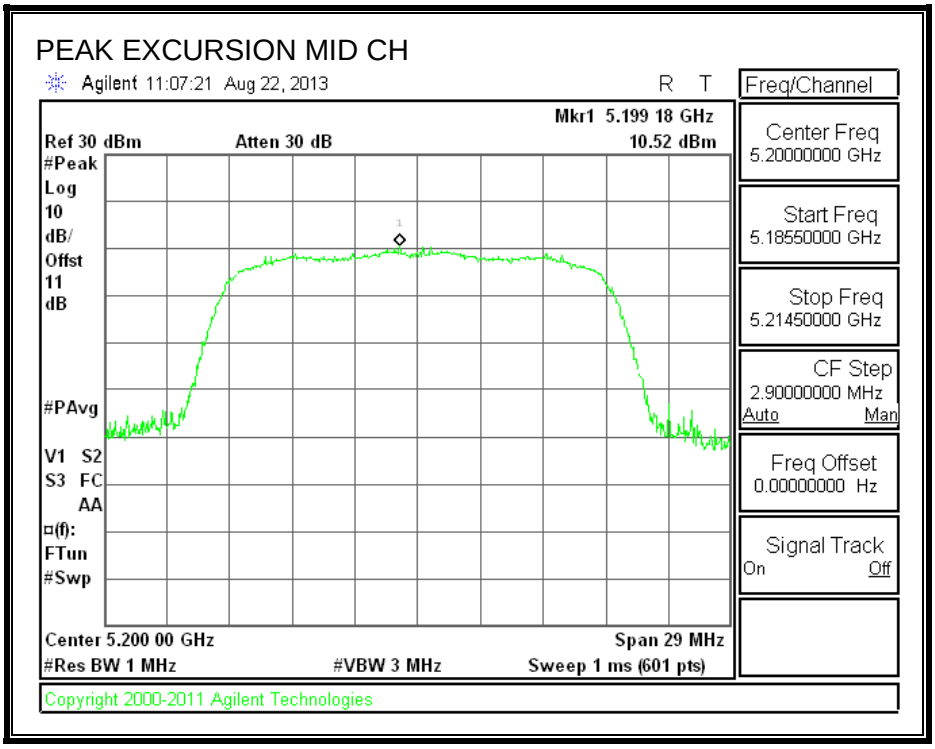
PEAK EXCURSION



9.4.1. 802.11n HT20 MODE IN THE 5.2 GHz BAND

Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Mid	5200	10.520	1.63	0.29	8.60	13	-4.40

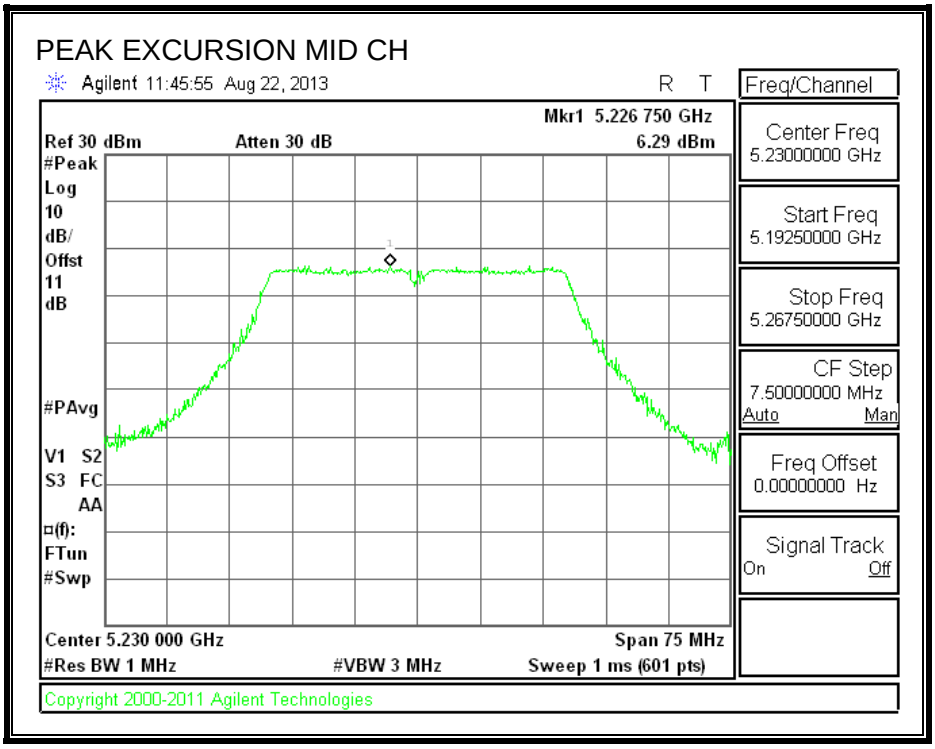
PEAK EXCURSION



9.4.1. 802.11n HT40 MODE IN THE 5.2 GHz BAND

Channel	Frequency (MHz)	PK Level (dBm)	PSD (dBm)	DCCF (dB)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Mid	5230	6.290	-3.66	0.59	9.36	13	-3.64

PEAK EXCURSION



10. TRANSMITTER ABOVE 1 GHz

10.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

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.

Reference to KDB 789033 UNII part H) 6) d) Method VB:
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and add duty cycle factor to the reading offset 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.

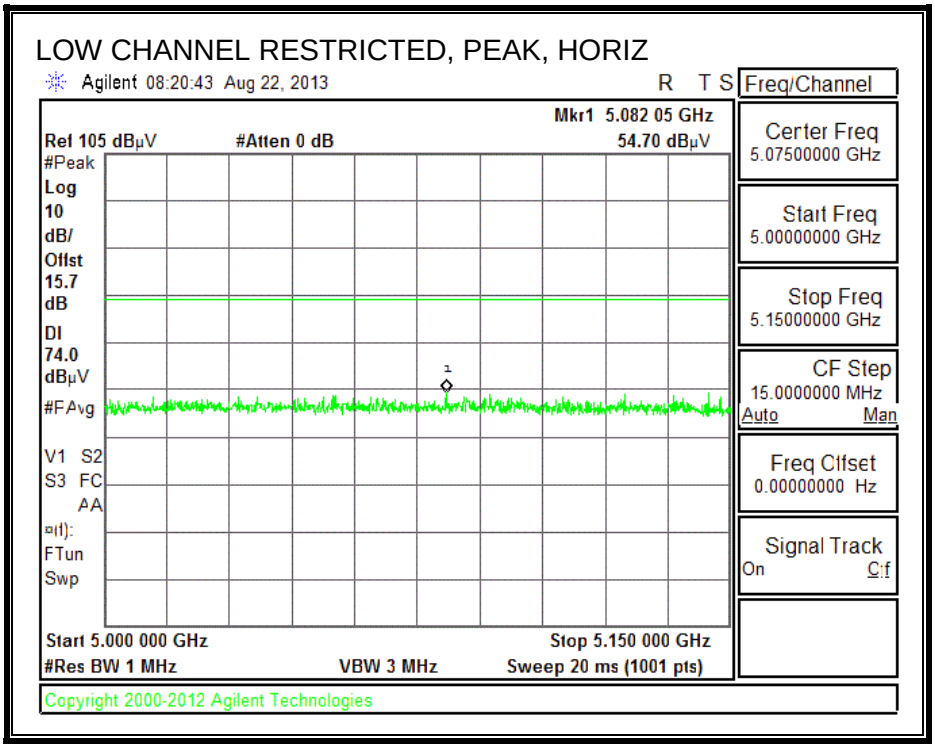
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

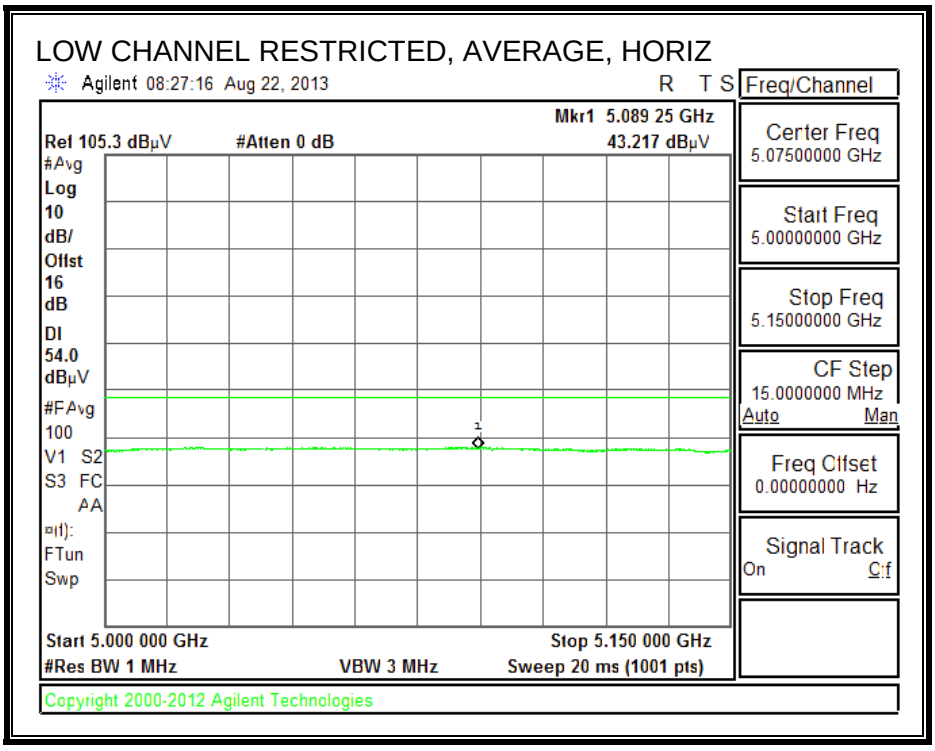
10.2. 5.2 GHz

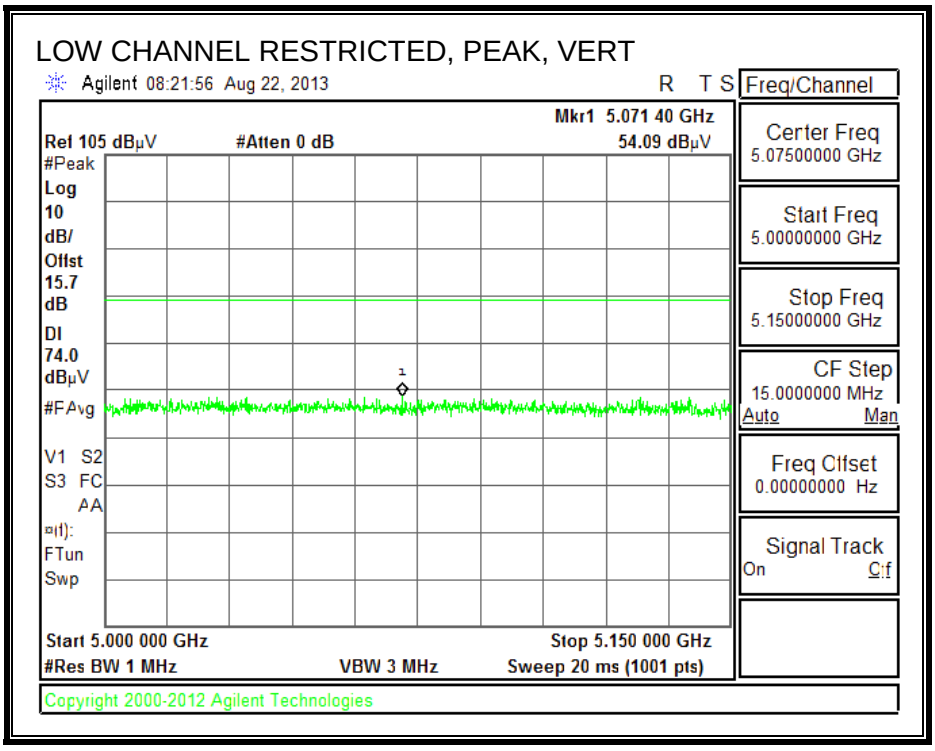
10.2.1. TX ABOVE 1 GHz 802.11a MODE IN THE 5.2 GHz BAND

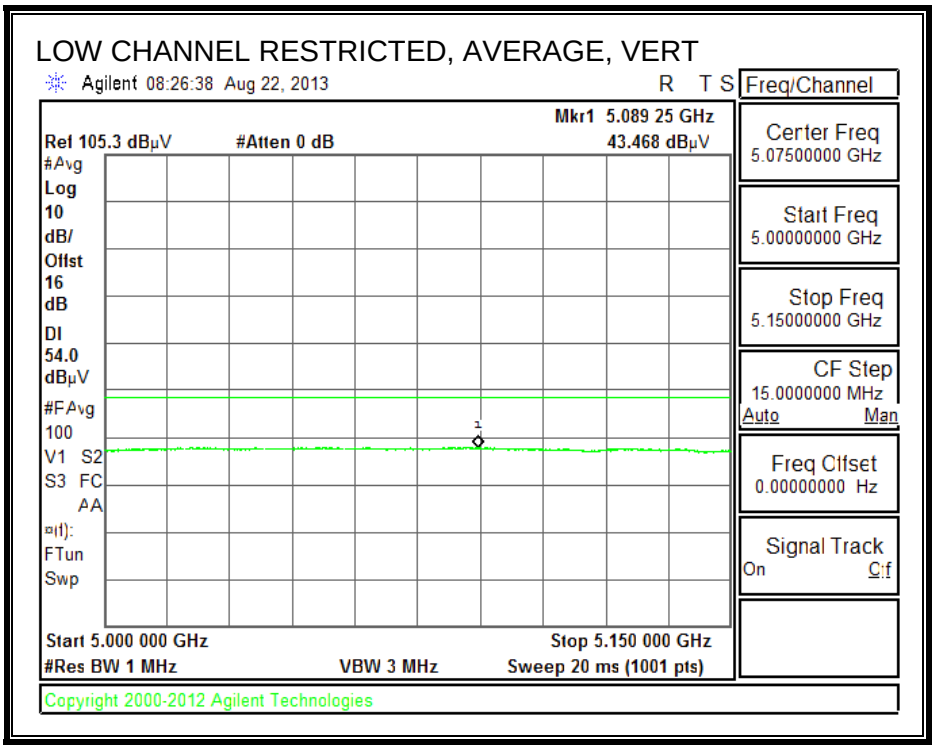
Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

RESTRICTED BANDEDGE (LOW CHANNEL)



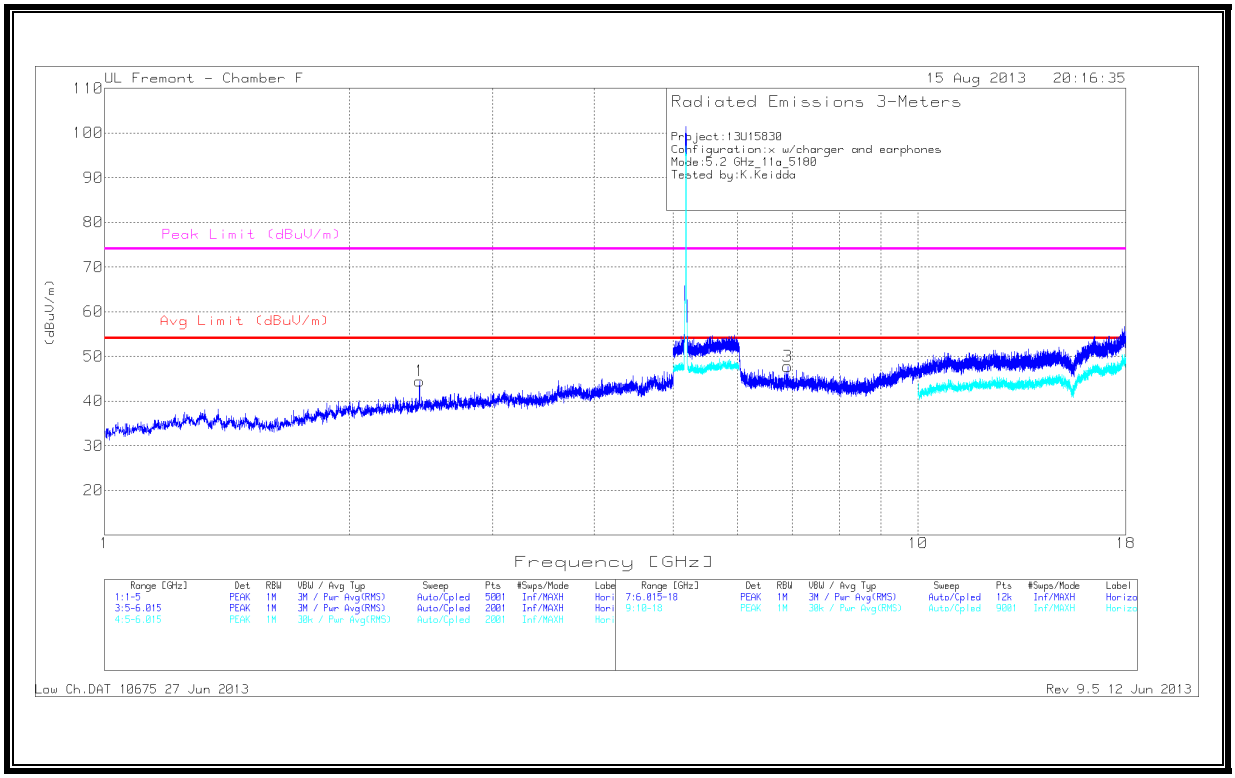




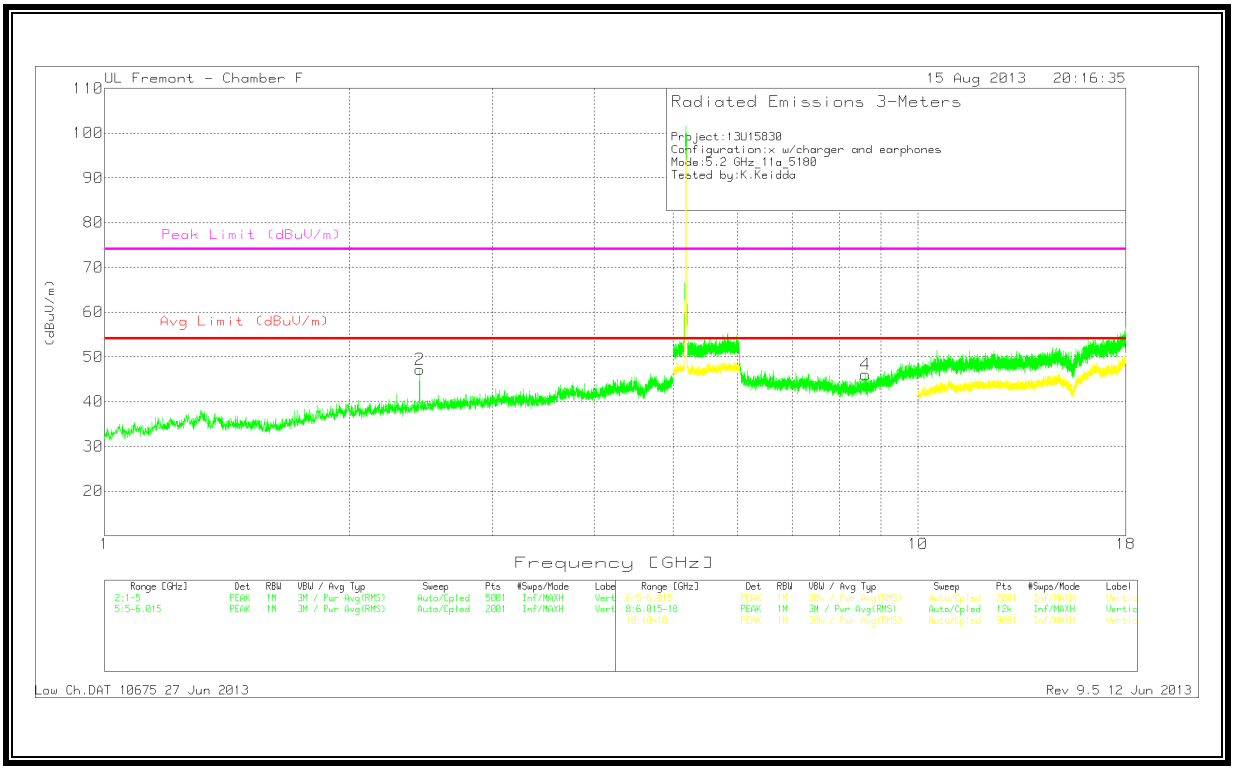


HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL
HORIZONTAL



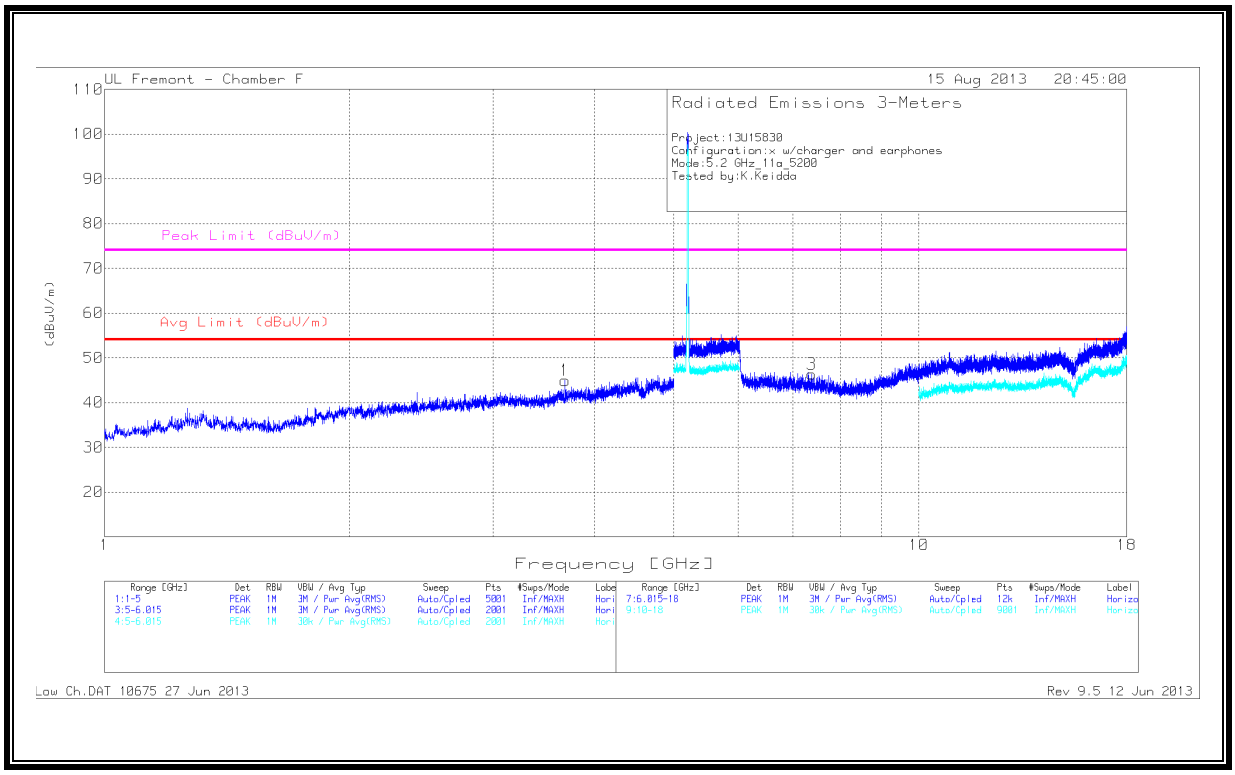
VERTICAL



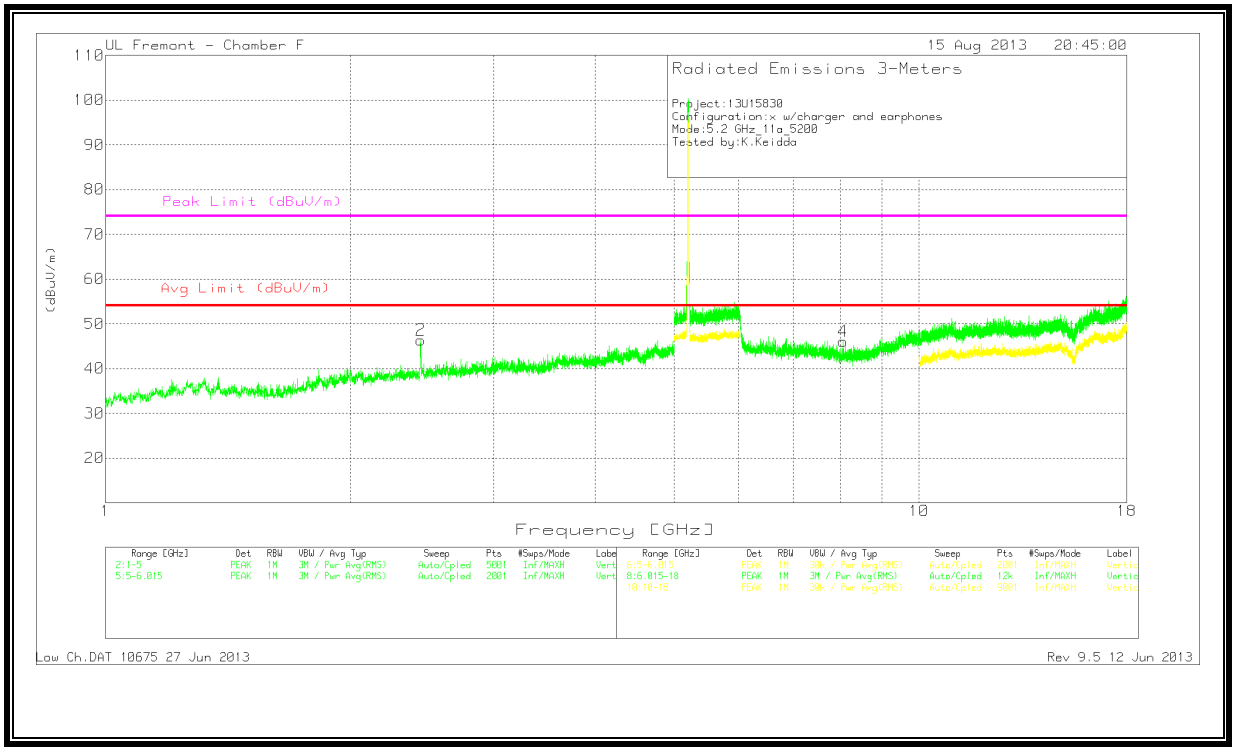
LOW CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.439	43.19	PK	32.3	-31	44.49	53.97	-9.48	74	-29.51	0-360	199	H
2	2.44	45.85	PK	32.3	-31	47.15	53.97	-6.82	74	-26.85	0-360	200	V
3	6.914	39.48	PK	35.7	-27.4	47.78	53.97	-6.19	74	-26.22	0-360	199	H
4	8.613	36.33	PK	36.1	-26.4	46.03	53.97	-7.94	74	-27.97	0-360	101	V

MID CHANNEL
HORIZONTAL



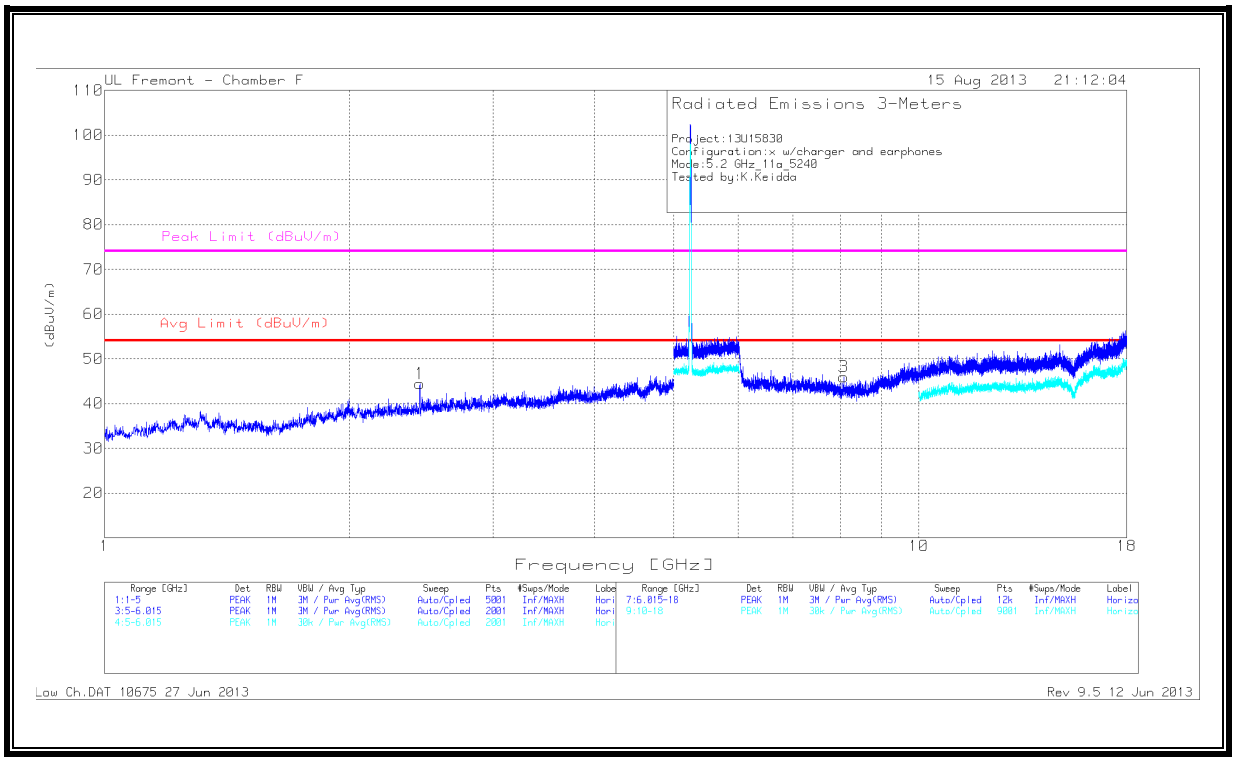
VERTICAL



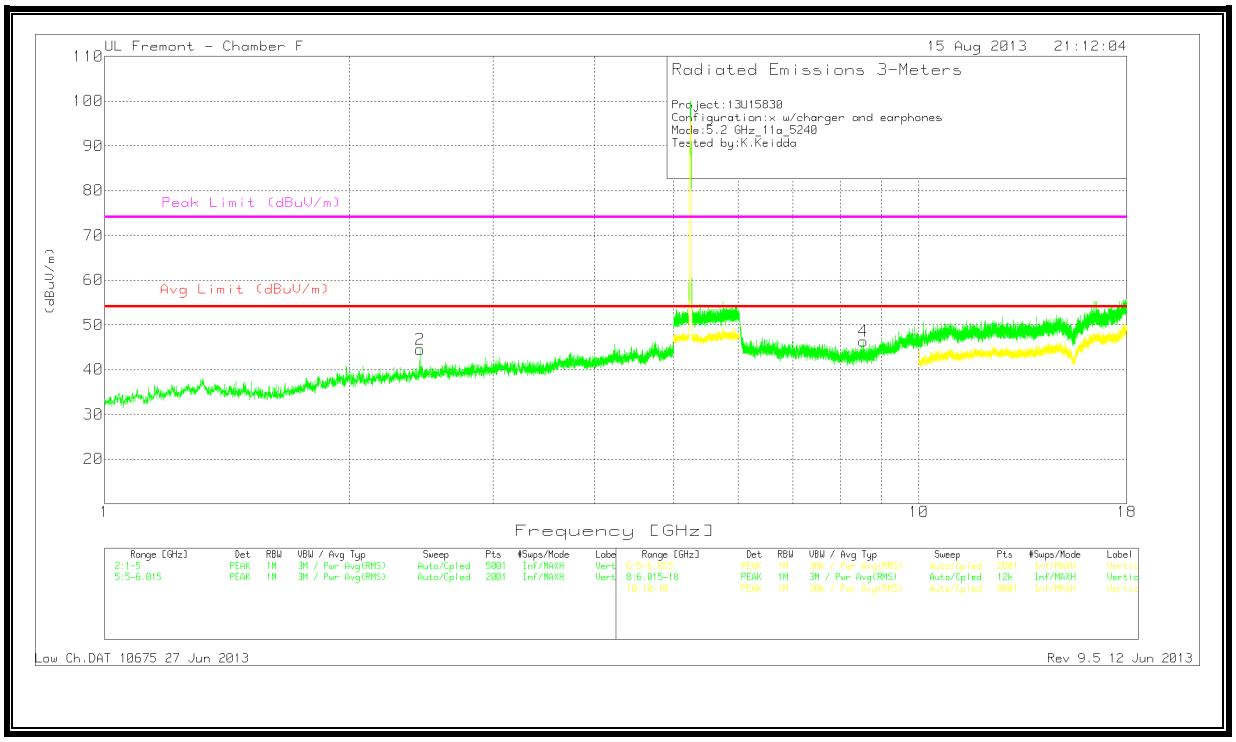
MID CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	3.677	40.85	PK	33.6	-29.5	44.95	53.97	-9.02	74	-29.05	0-360	100	H
2	2.441	45.07	PK	32.3	-31	46.37	53.97	-7.6	74	-27.63	0-360	200	V
3	7.384	38.25	PK	35.7	-27.6	46.35	53.97	-7.62	74	-27.65	0-360	199	H
4	8.065	37.26	PK	36	-27.2	46.06	53.97	-7.91	74	-27.94	0-360	101	V

HIGH CHANNEL
HORIZONTAL



VERTICAL



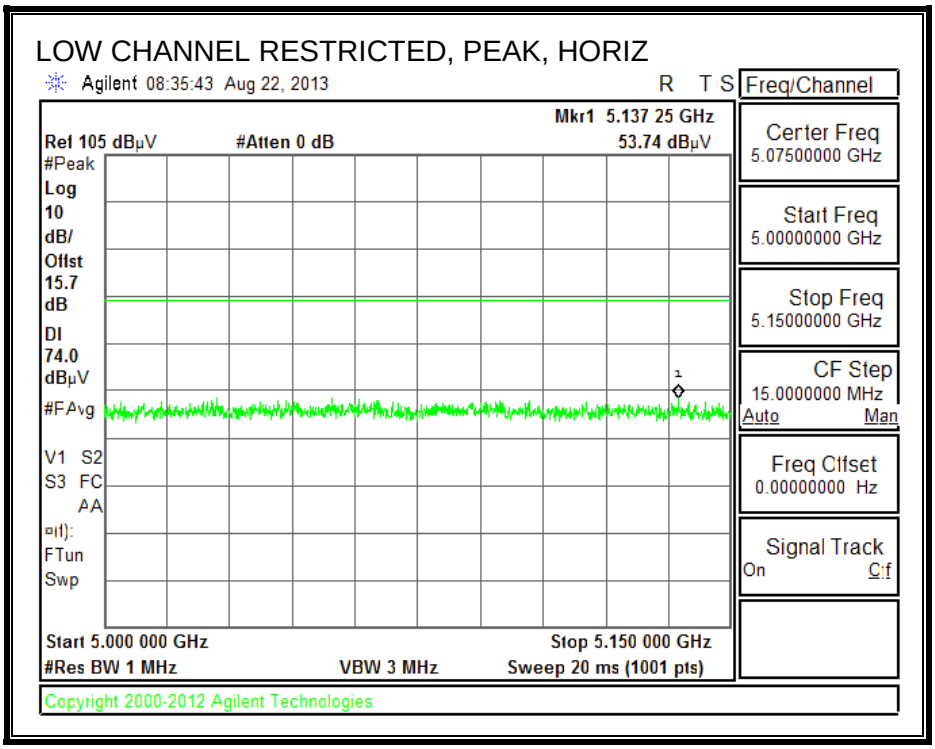
HIGH CHANNEL DATA

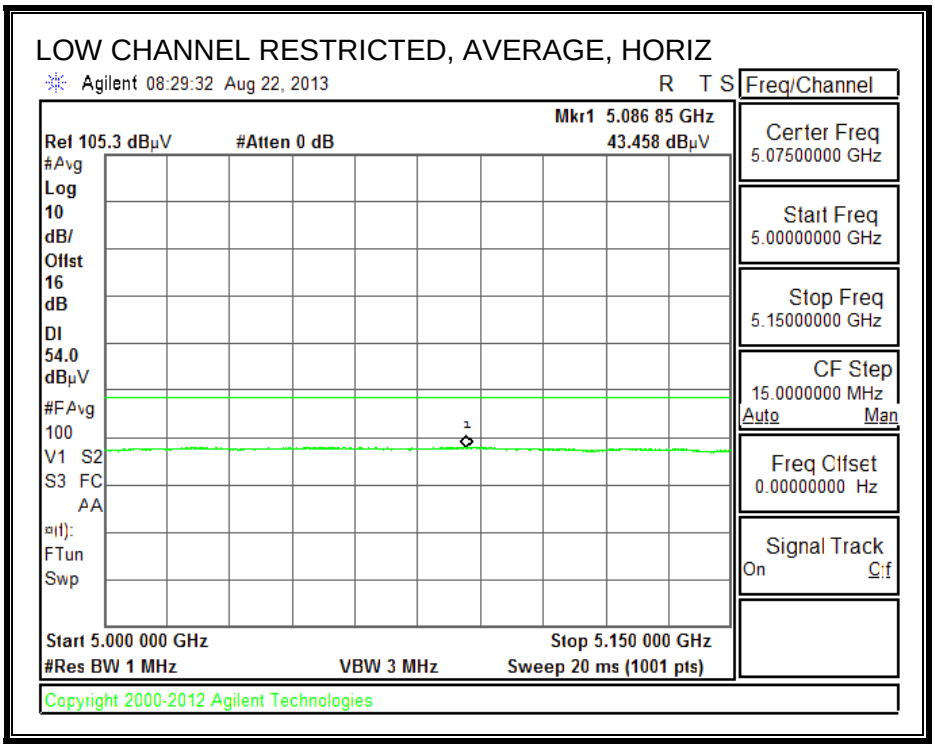
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.439	43.15	PK	32.3	-31	44.45	53.97	-9.52	74	-29.55	0-360	199	H
2	2.441	43.22	PK	32.3	-31	44.52	53.97	-9.45	74	-29.48	0-360	201	V
3	8.083	37.09	PK	36	-27.1	45.99	53.97	-7.98	74	-28.01	0-360	100	H
4	8.548	37.54	PK	36	-27.2	46.34	53.97	-7.63	74	-27.66	0-360	201	V

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

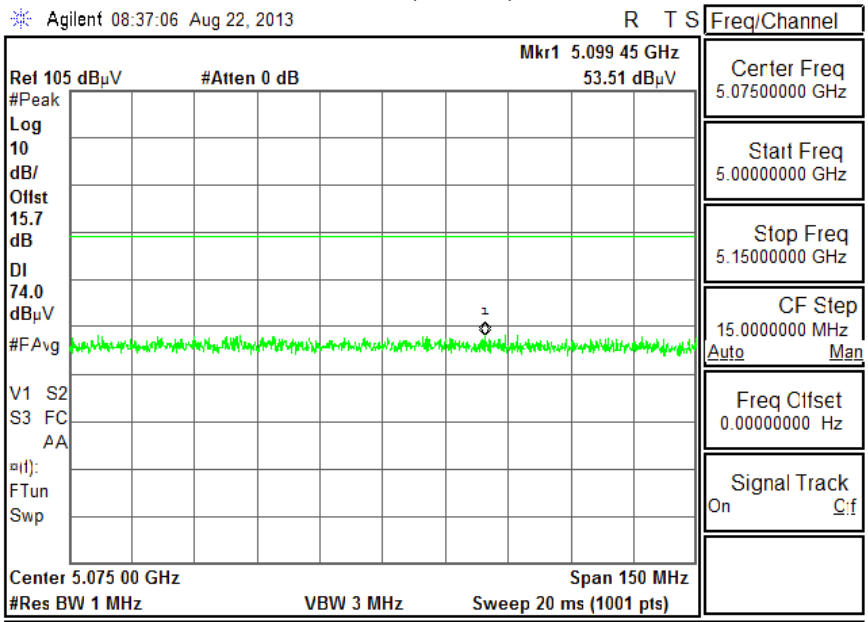
Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

RESTRICTED BANDEDGE (LOW CHANNEL)

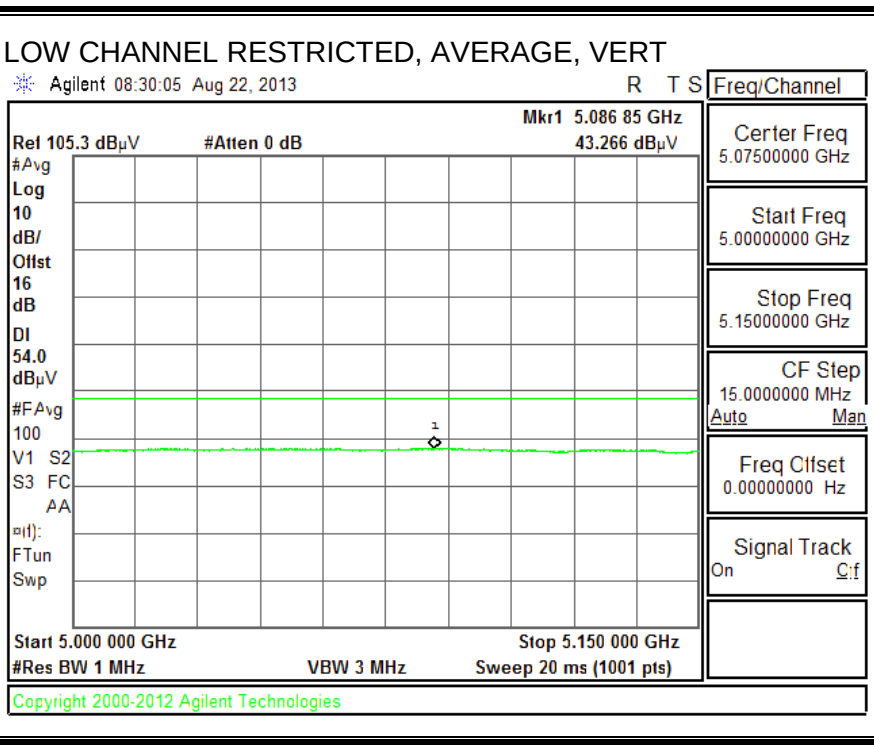




LOW CHANNEL RESTRICTED, PEAK, VERT

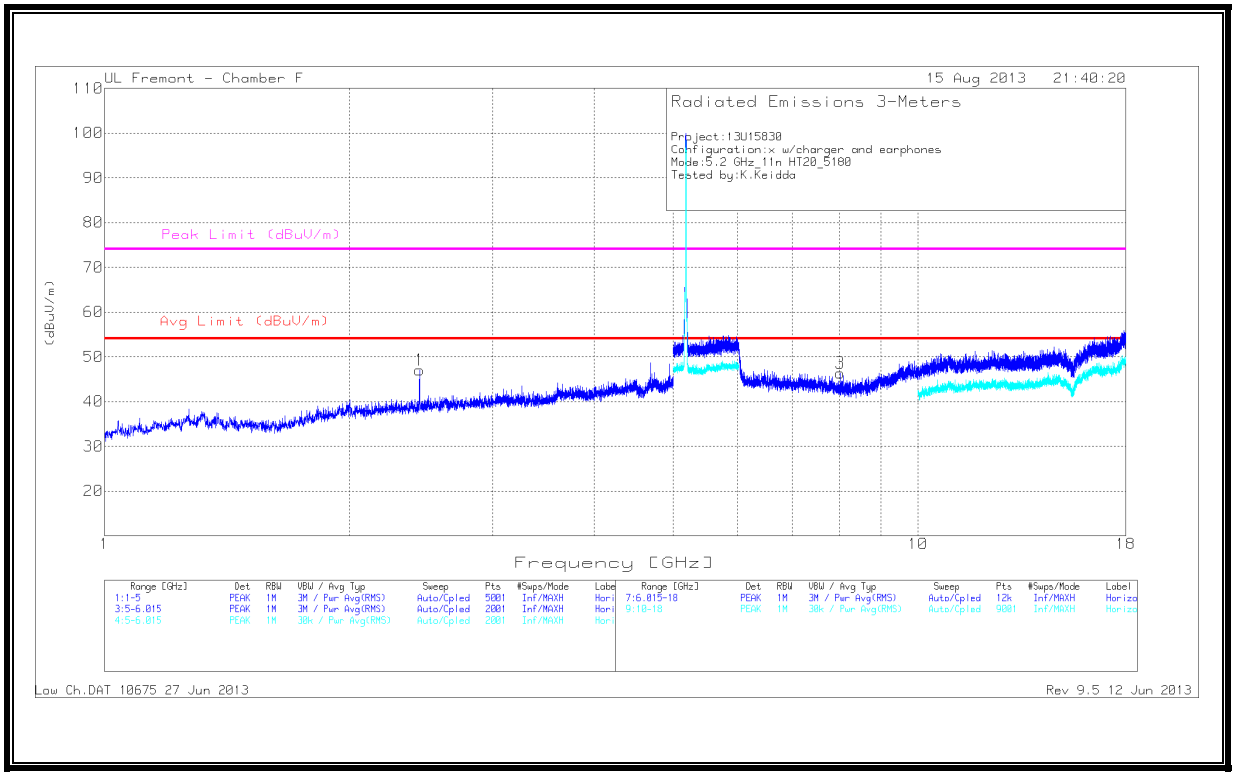


LOW CHANNEL RESTRICTED, AVERAGE, VERT

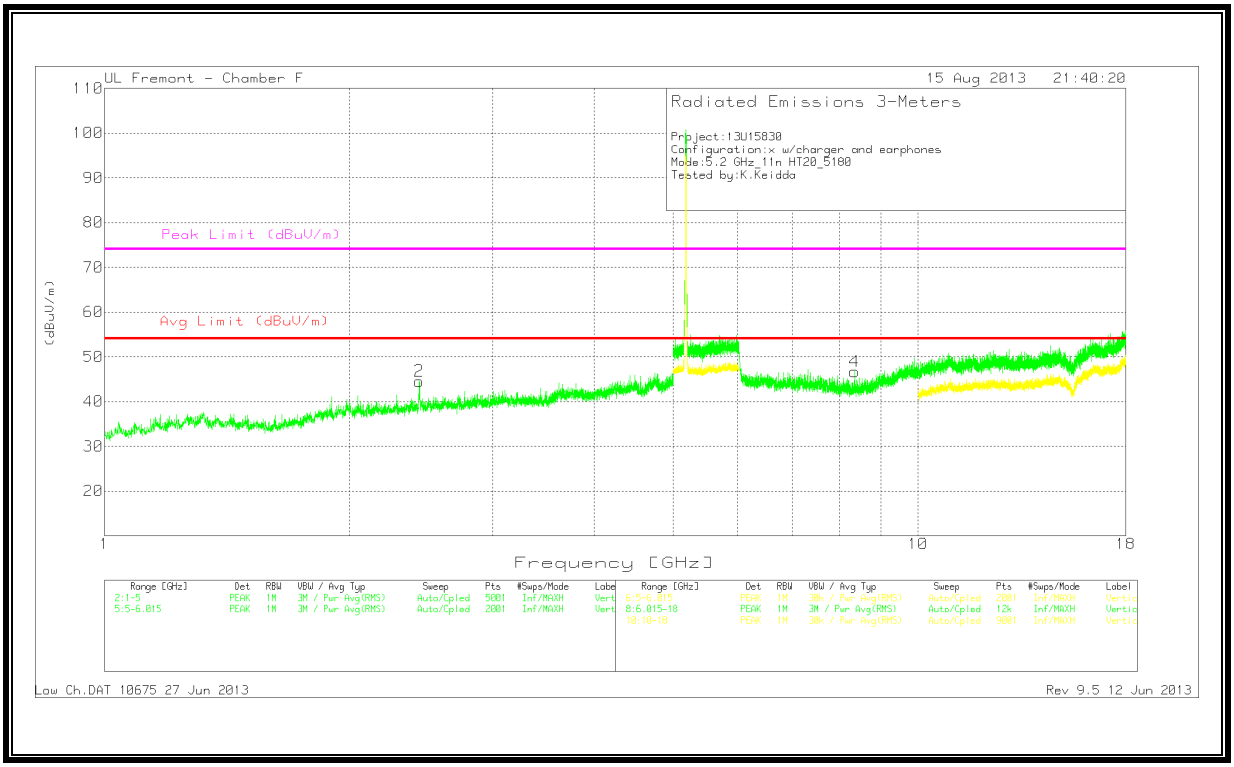


HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL
HORIZONTAL



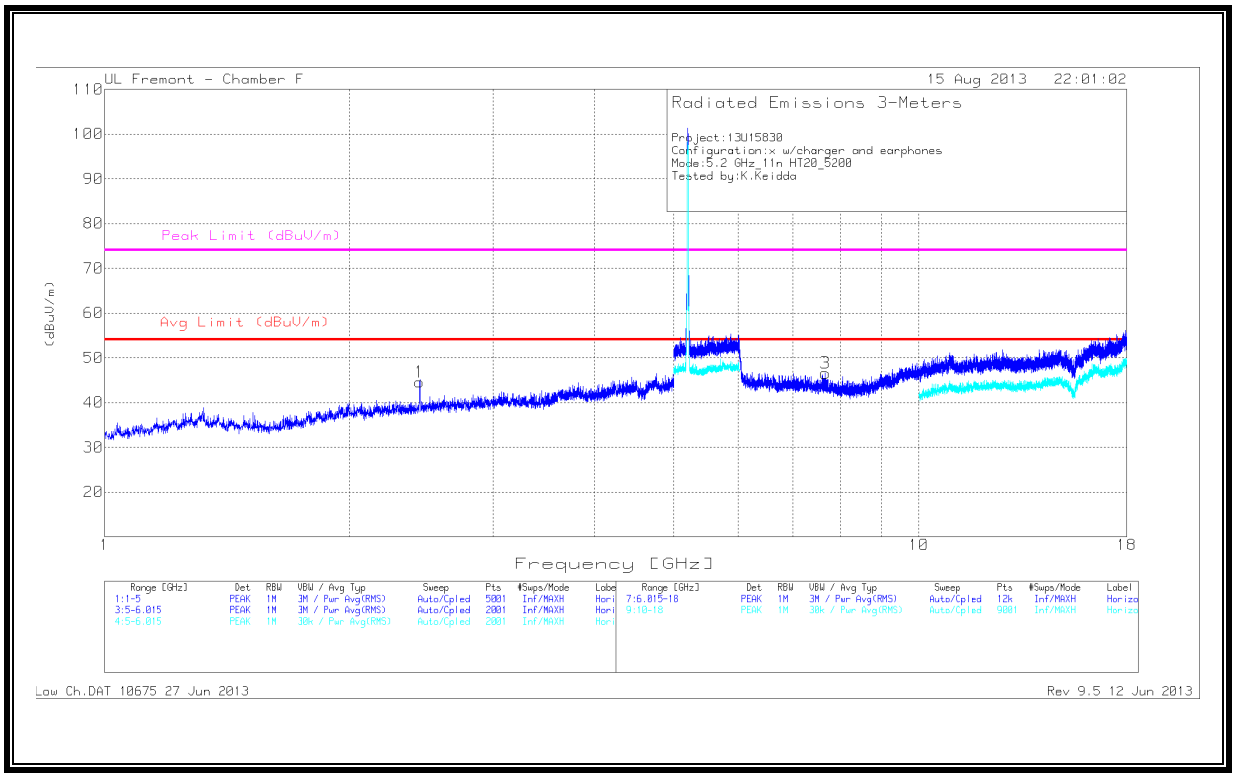
VERTICAL



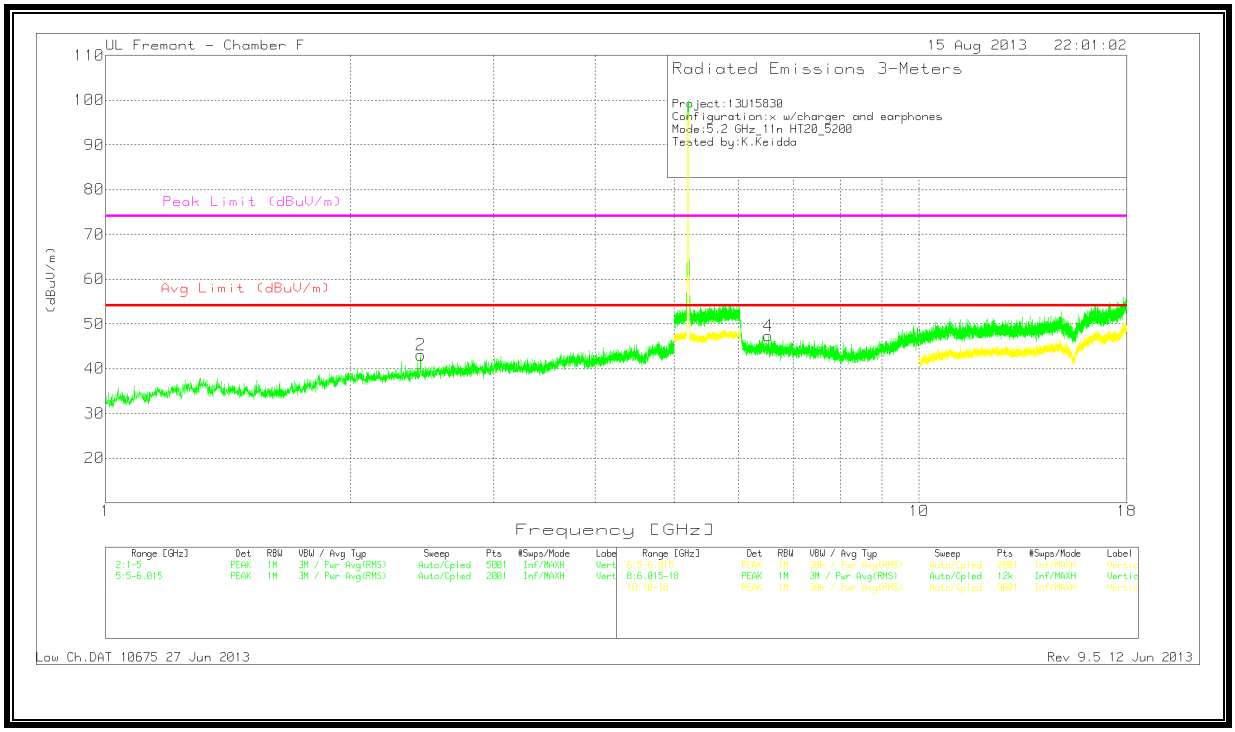
LOW CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.439	45.76	PK	32.3	-31	47.06	53.97	-6.91	74	-26.94	0-360	200	H
2	2.438	43.35	PK	32.3	-31.1	44.55	53.97	-9.42	74	-29.45	0-360	199	V
3	8.022	38.08	PK	36	-27.7	46.38	53.97	-7.59	74	-27.62	0-360	200	H
4	8.355	37.6	PK	36	-26.9	46.7	53.97	-7.27	74	-27.3	0-360	199	V

MID CHANNEL
HORIZONTAL



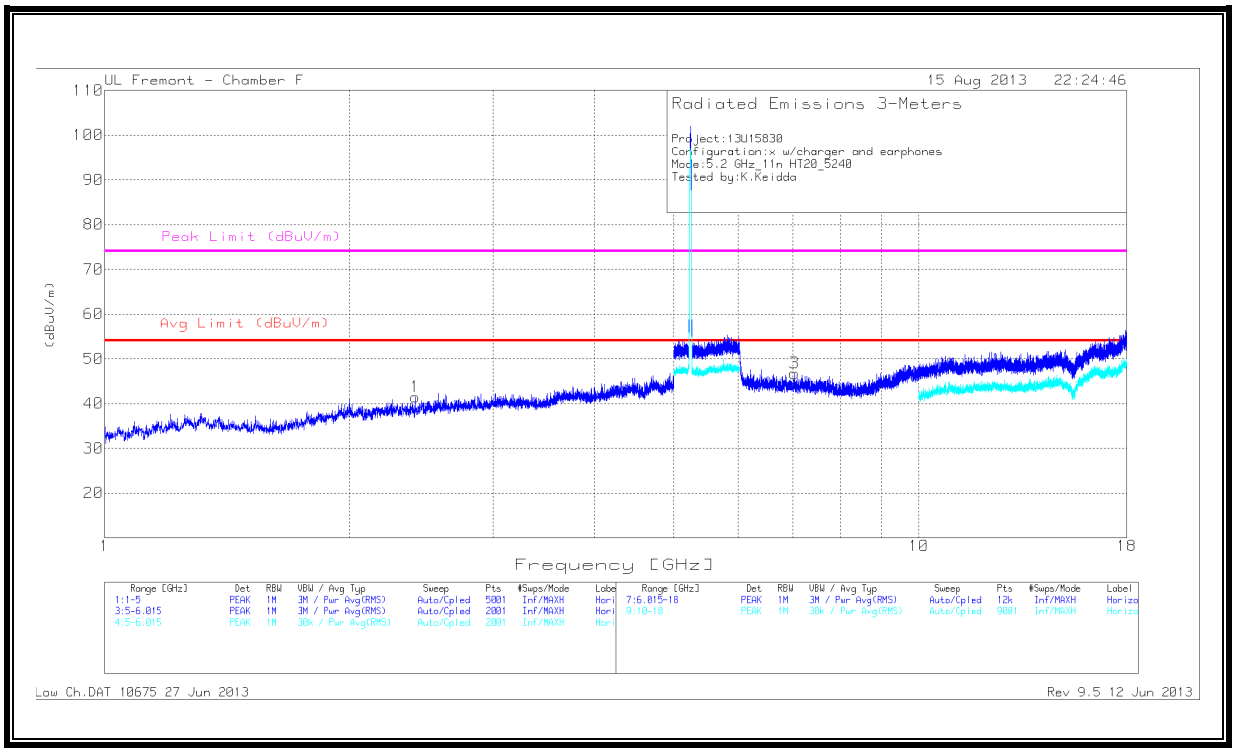
VERTICAL



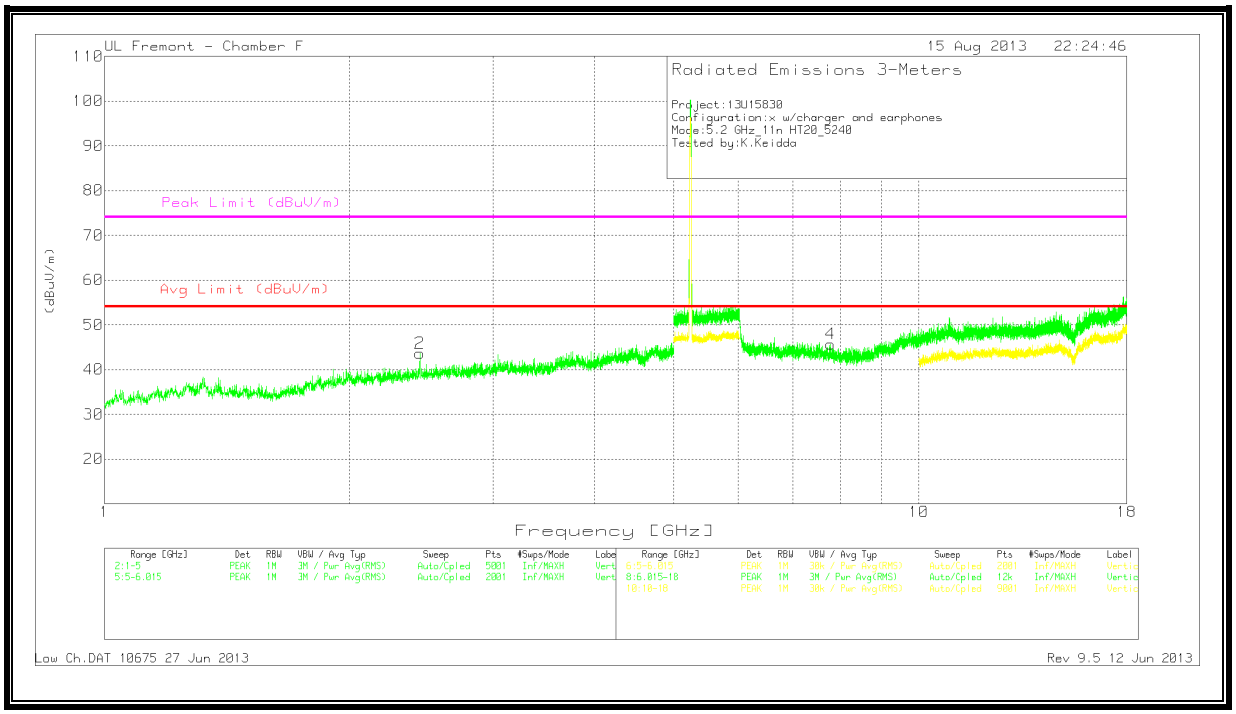
MID CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.437	43.41	PK	32.3	-31.1	44.61	53.97	-9.36	74	-29.39	0-360	199	H
2	2.44	41.76	PK	32.3	-31	43.06	53.97	-10.91	74	-30.94	0-360	100	V
3	7.675	37.78	PK	35.9	-27.1	46.58	53.97	-7.39	74	-27.42	0-360	199	H
4	6.528	38.39	PK	35.8	-26.9	47.29	53.97	-6.68	74	-26.71	0-360	100	V

HIGH CHANNEL
HORIZONTAL



VERTICAL



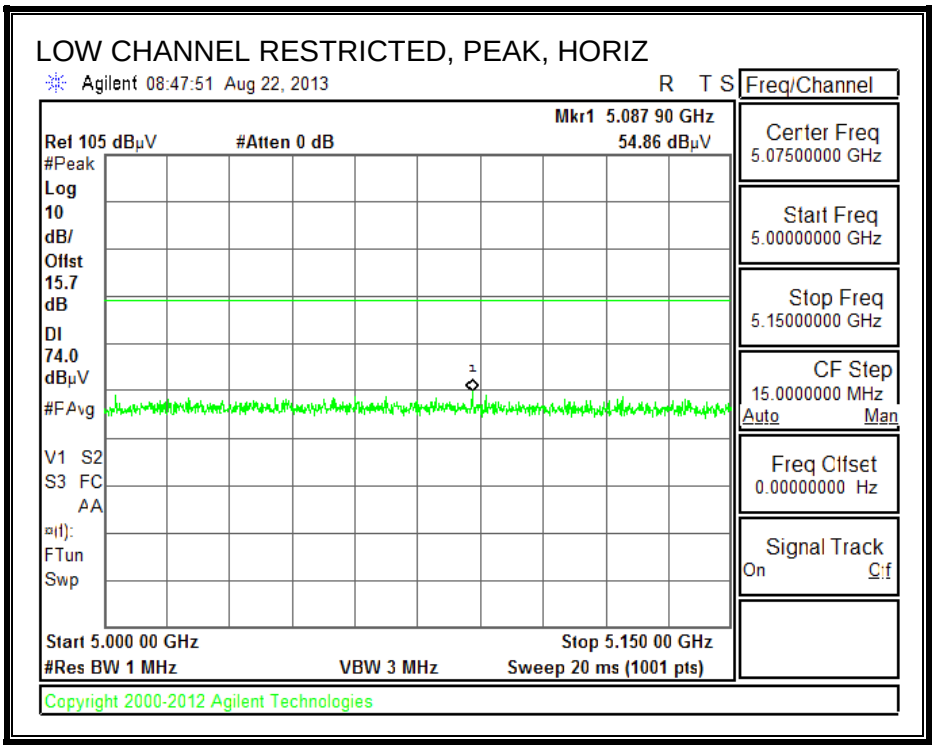
HIGH CHANNEL DATA

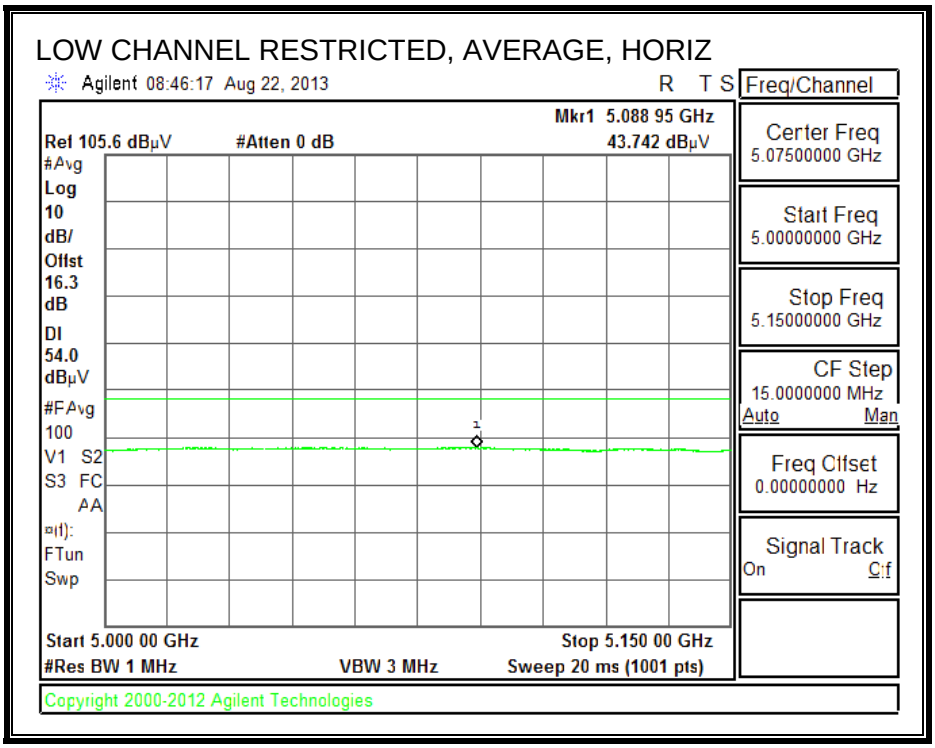
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.408	40.1	PK	32.2	-30.8	41.5	53.97	-12.47	74	-32.5	0-360	199	H
2	2.439	42.36	PK	32.3	-31	43.66	53.97	-10.31	74	-30.34	0-360	101	V
3	7.034	37.92	PK	35.7	-26.8	46.82	53.97	-7.15	74	-27.18	0-360	100	H
4	7.789	36.62	PK	35.9	-26.8	45.72	53.97	-8.25	74	-28.28	0-360	100	V

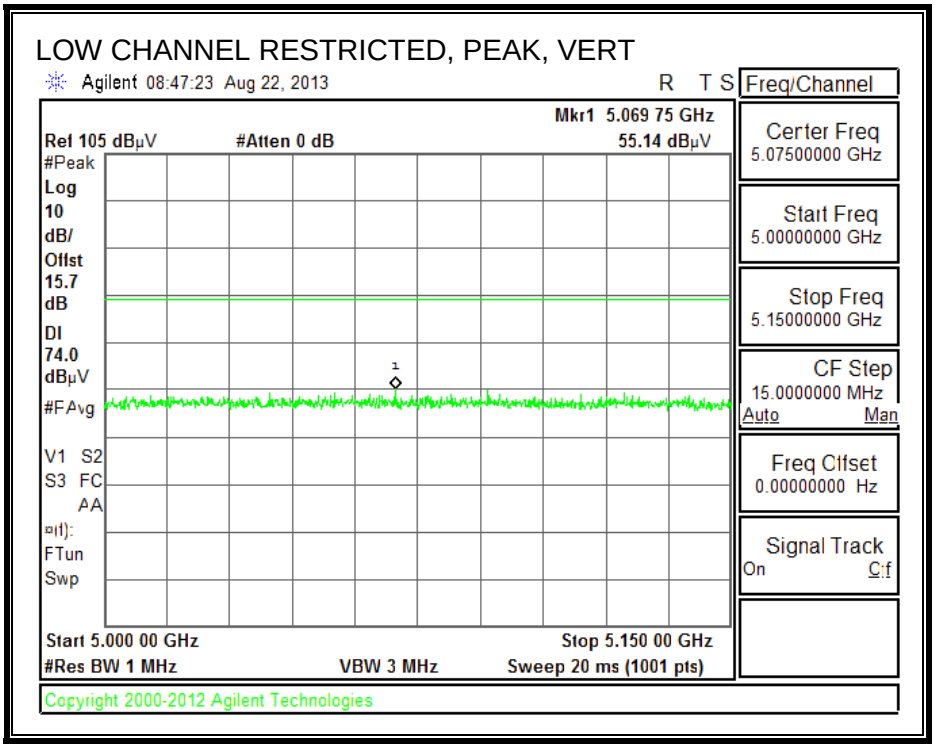
10.2.3. TX ABOVE 1 GHz 802.11n HT40 MODE IN THE 5.2 GHz BAND

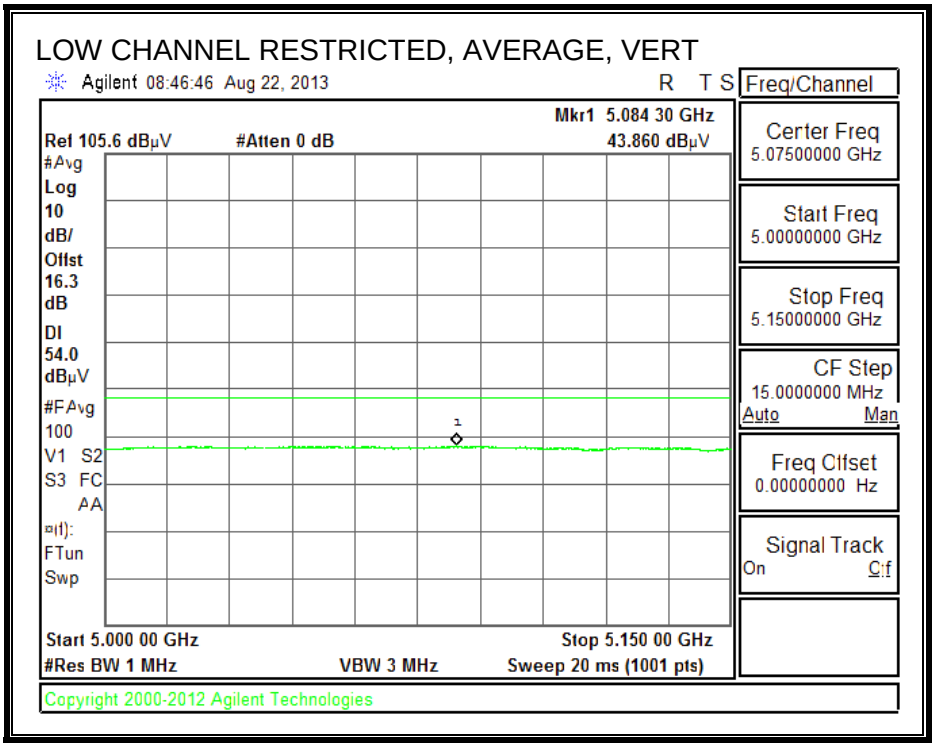
Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

RESTRICTED BANDEDGE (LOW CHANNEL)



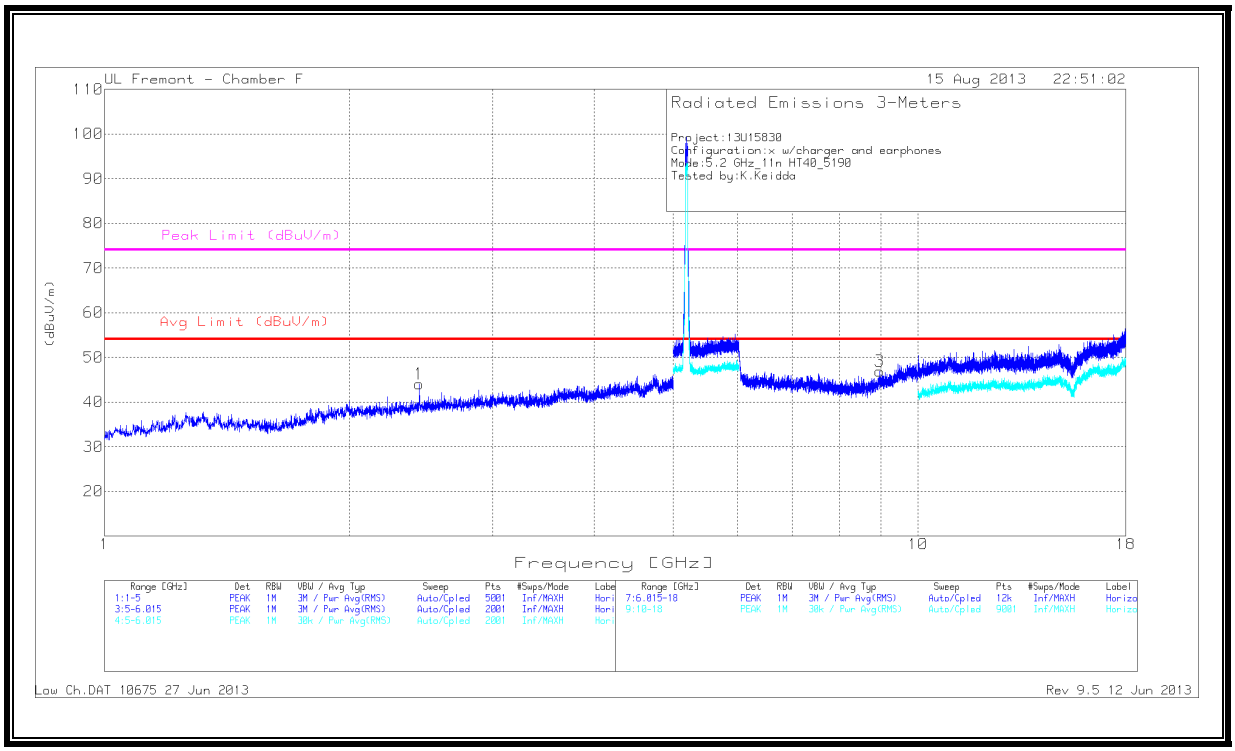




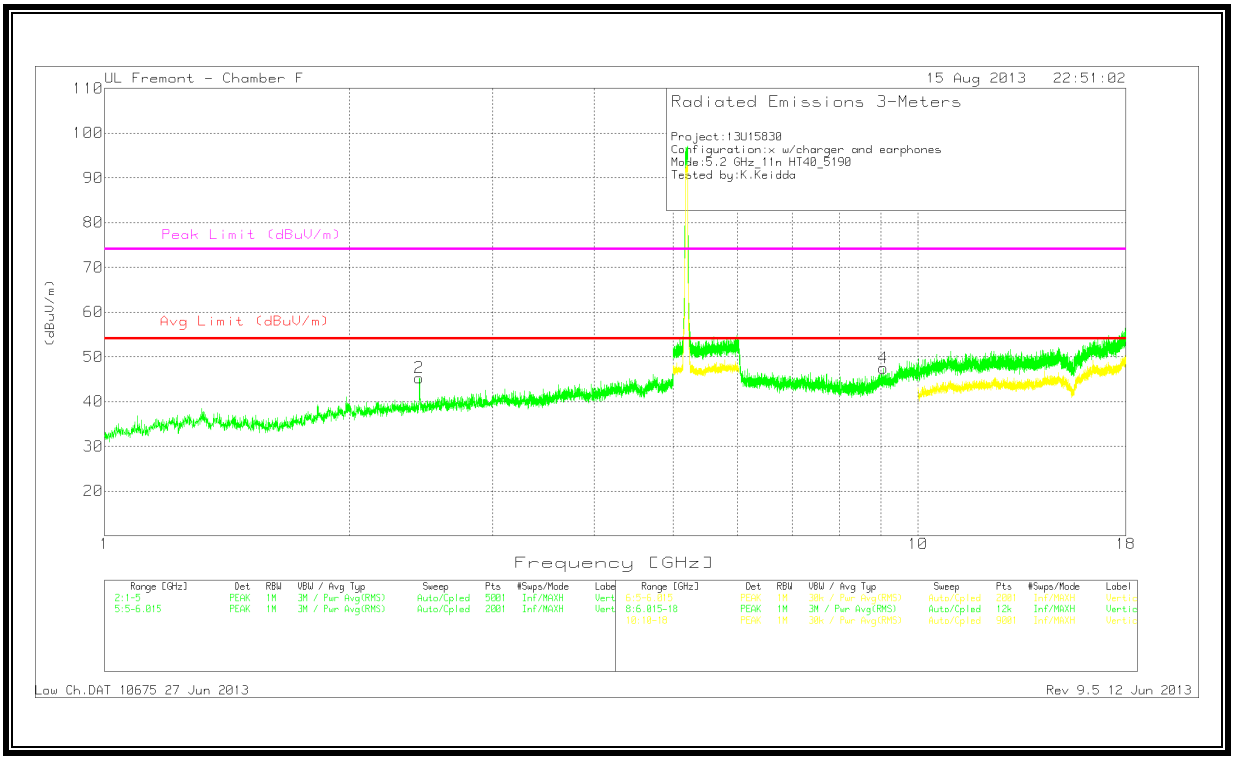


HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL
HORIZONTAL



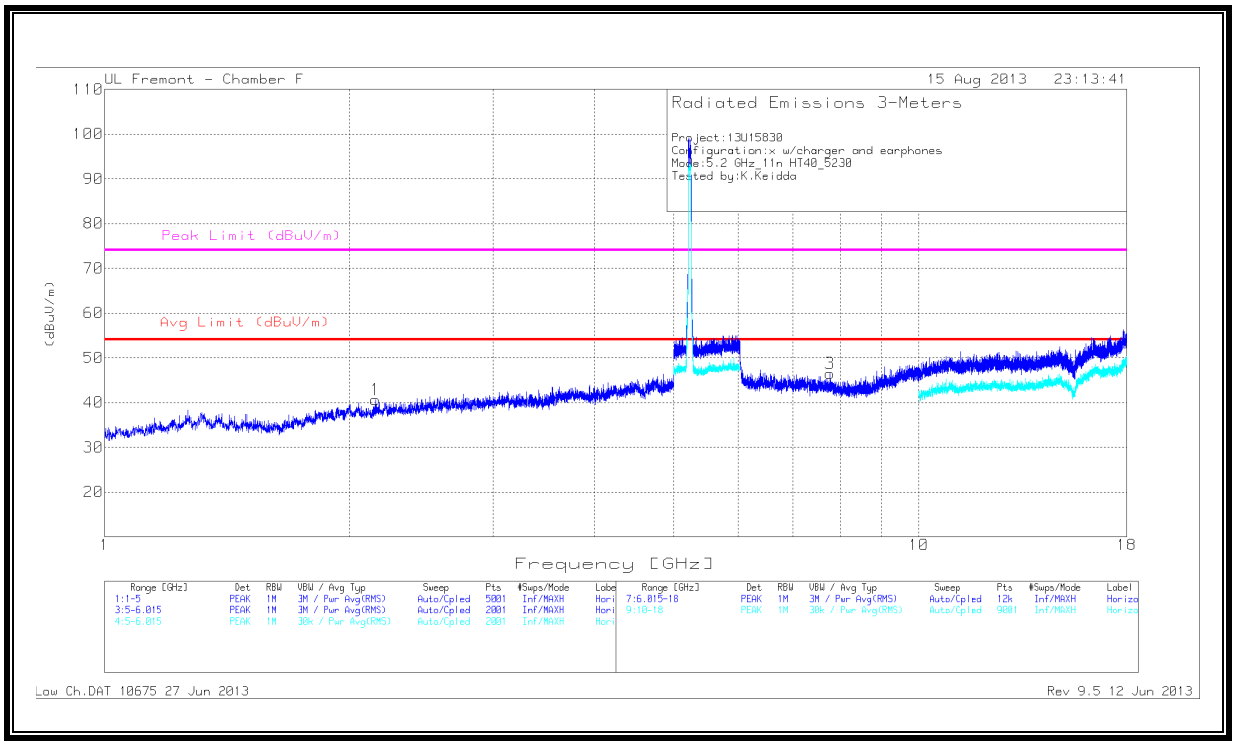
VERTICAL



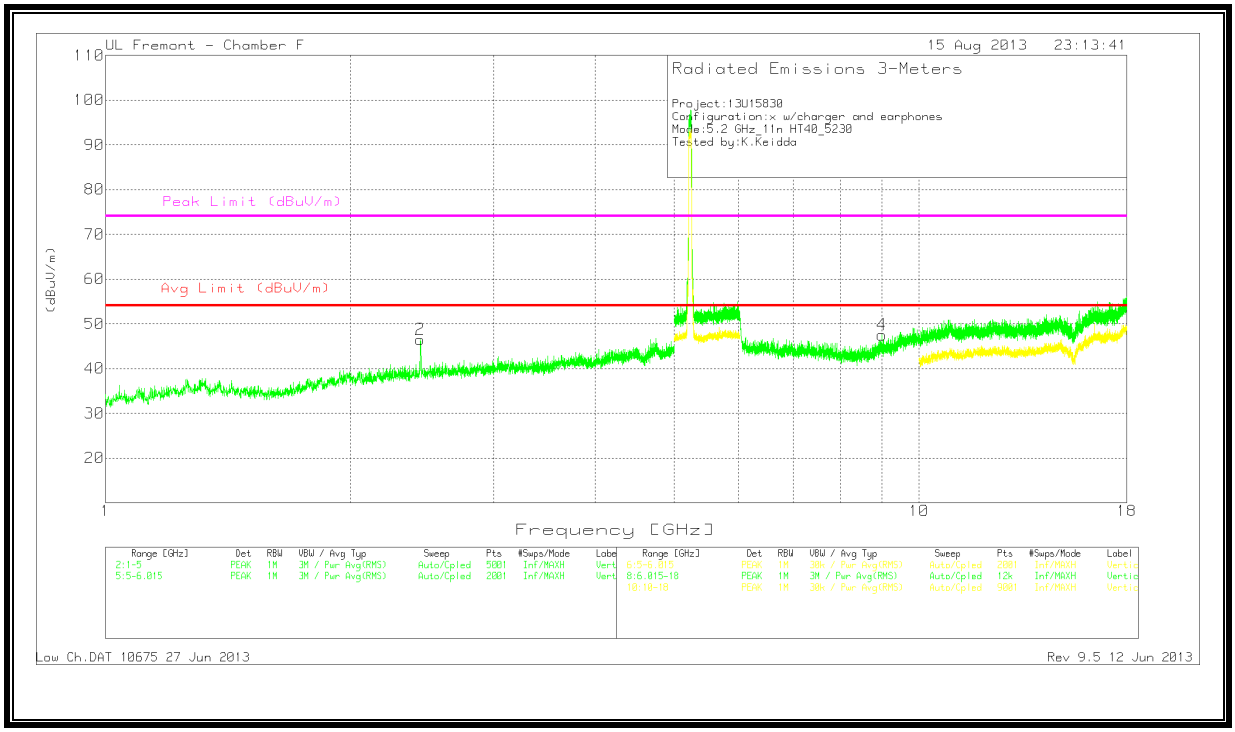
LOW CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.437	42.84	PK	32.3	-31.1	44.04	53.97	-9.93	74	-29.96	0-360	199	H
2	2.438	44.12	PK	32.3	-31.1	45.32	53.97	-8.65	74	-28.68	0-360	201	V
3	8.968	35.33	PK	36.3	-24.7	46.93	53.97	-7.04	74	-27.07	0-360	199	H
4	9.067	36.61	PK	36.4	-25.5	47.51	53.97	-6.46	74	-26.49	0-360	101	V

MID CHANNEL
HORIZONTAL



VERTICAL



MID CHANNEL DATA

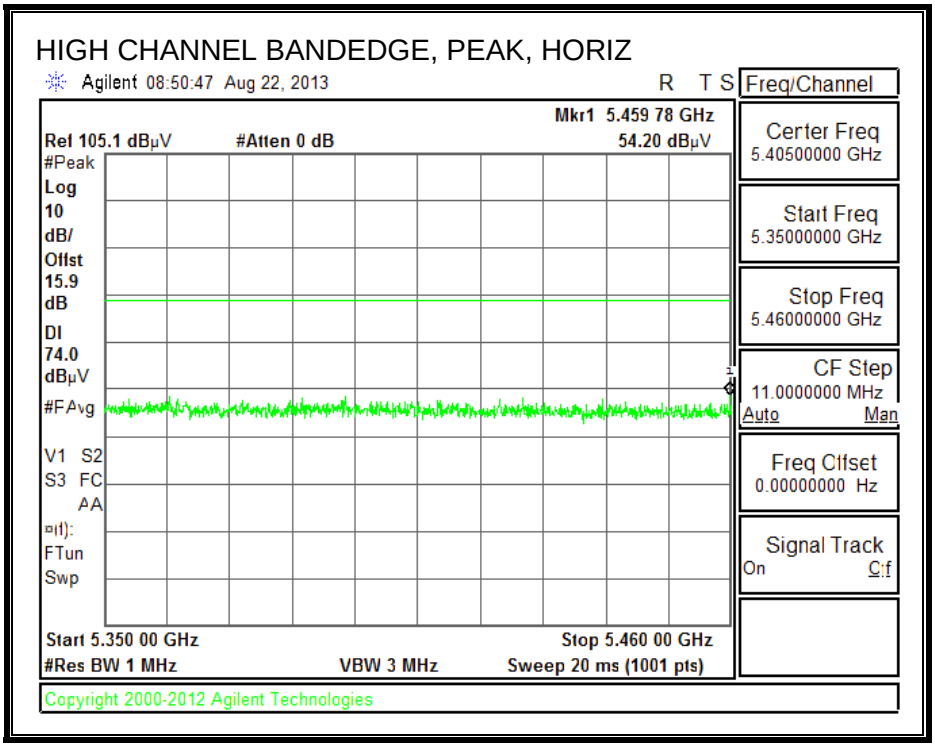
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.151	40.07	PK	31.7	-31.1	40.67	53.97	-13.3	74	-33.33	0-360	199	H
2	2.437	45.3	PK	32.3	-31.1	46.5	53.97	-7.47	74	-27.5	0-360	201	V
3	7.775	37.59	PK	35.9	-27	46.49	53.97	-7.48	74	-27.51	0-360	199	H
4	9.002	36.34	PK	36.3	-25.1	47.54	53.97	-6.43	74	-26.46	0-360	201	V

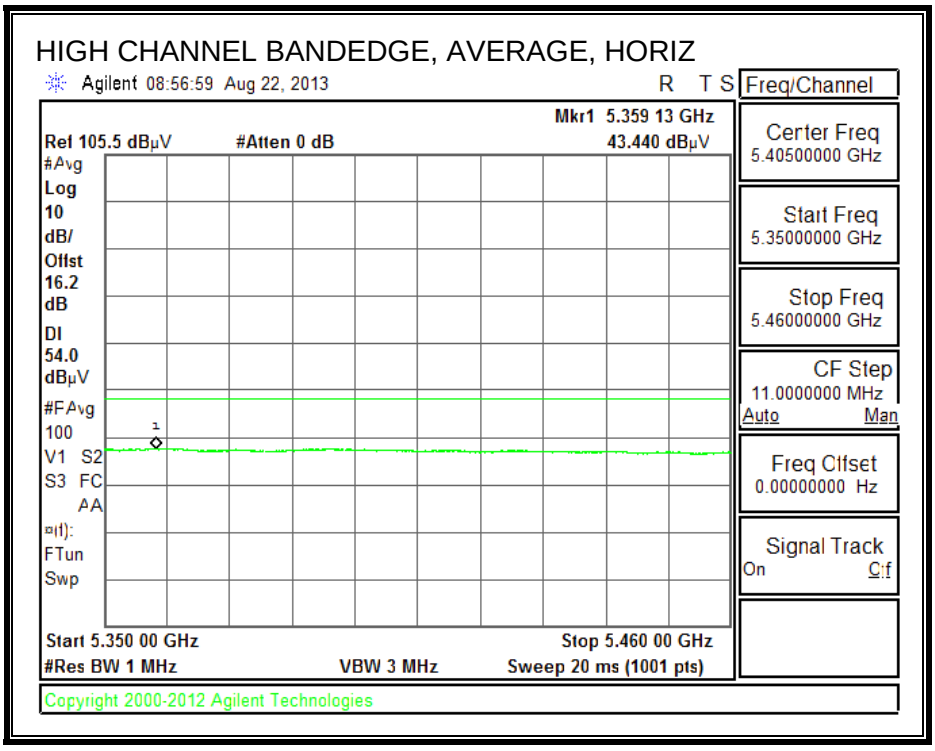
10.3. 5.3 GHz

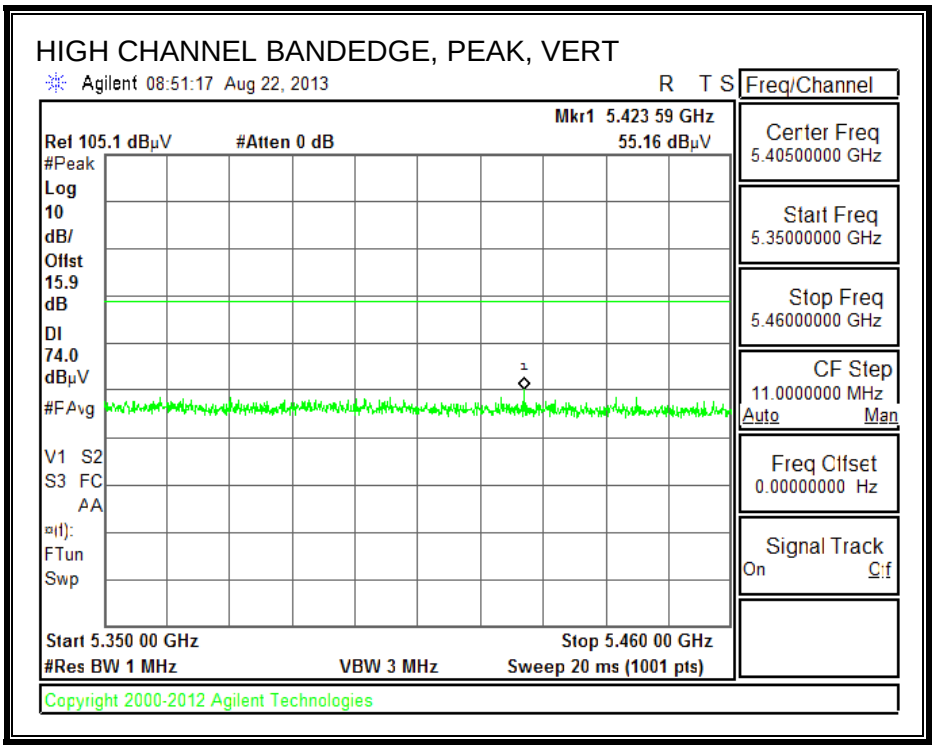
10.3.1. TX ABOVE 1 GHz 802.11a MODE IN THE 5.3 GHz BAND

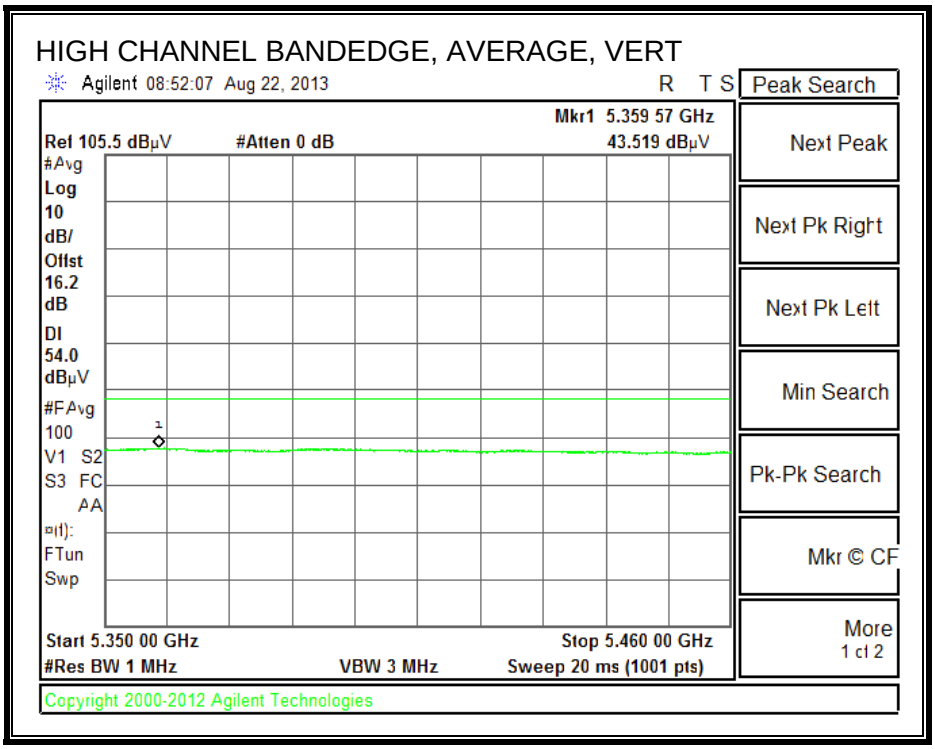
Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

AUTHORIZED BANDEDGE (HIGH CHANNEL)



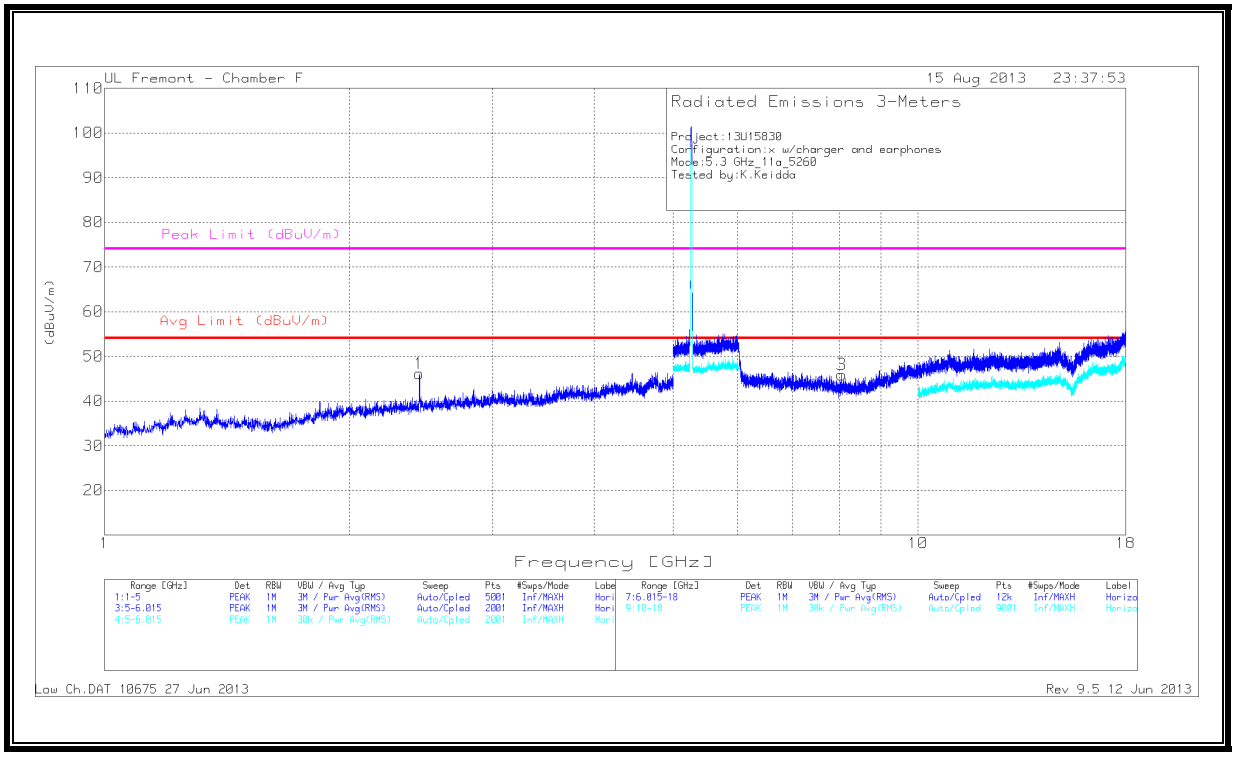




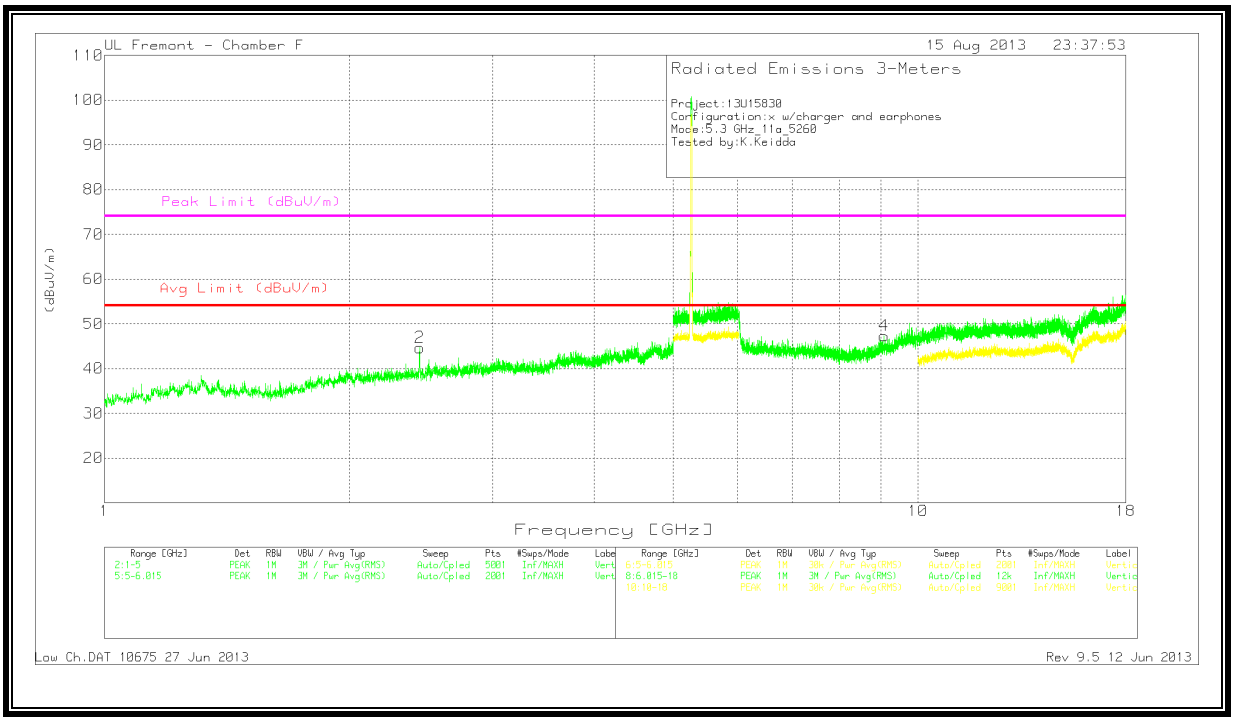


HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL
HORIZONTAL



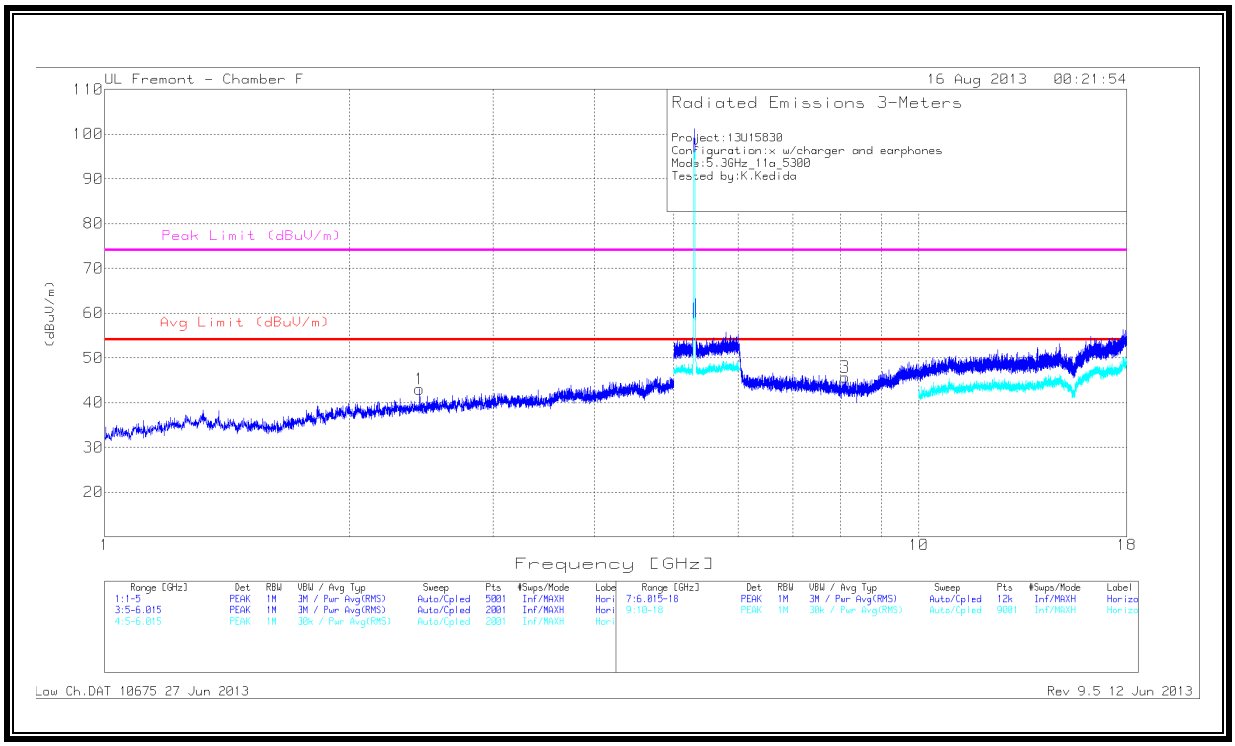
VERTICAL



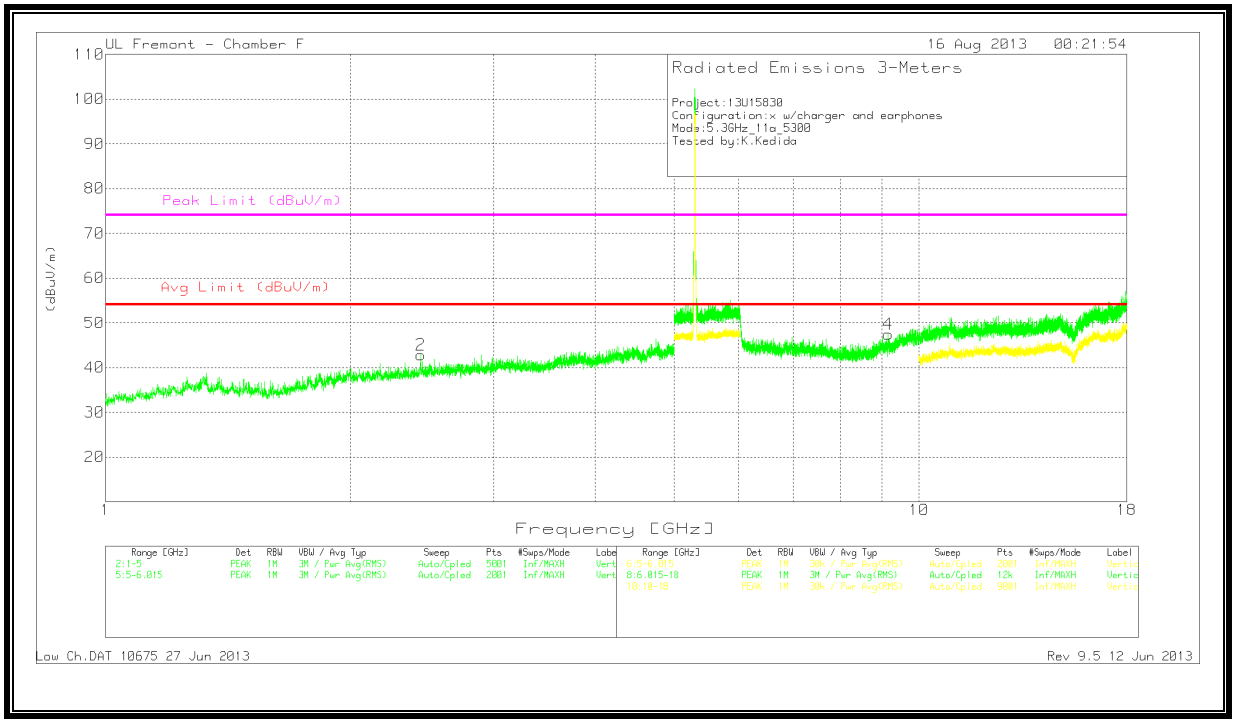
LOW CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.438	44.95	PK	32.3	-31.1	46.15	53.97	-7.82	74	-27.85	0-360	199	H
2	2.441	43.37	PK	32.3	-31	44.67	53.97	-9.3	74	-29.33	0-360	201	V
3	8.053	37.12	PK	36	-27.2	45.92	53.97	-8.05	74	-28.08	0-360	199	H
4	9.083	36.35	PK	36.4	-25.4	47.35	53.97	-6.62	74	-26.65	0-360	201	V

MID CHANNEL
HORIZONTAL



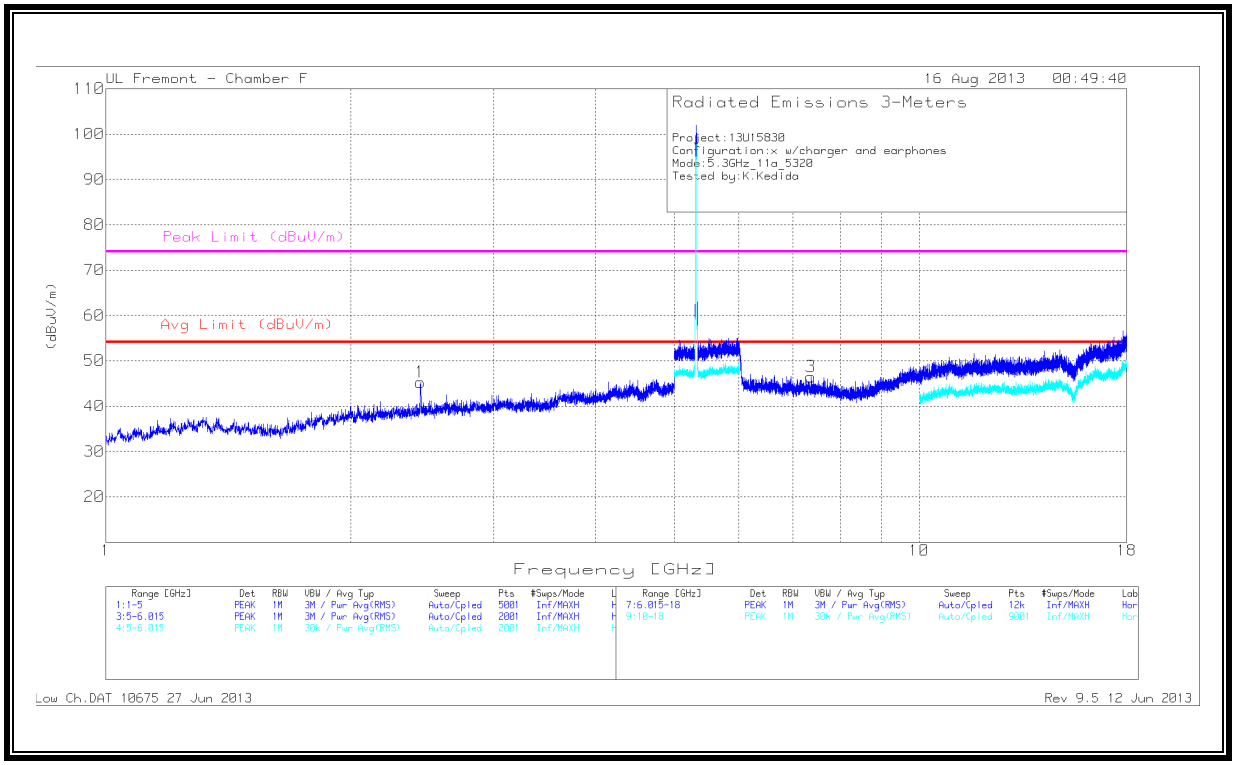
VERTICAL



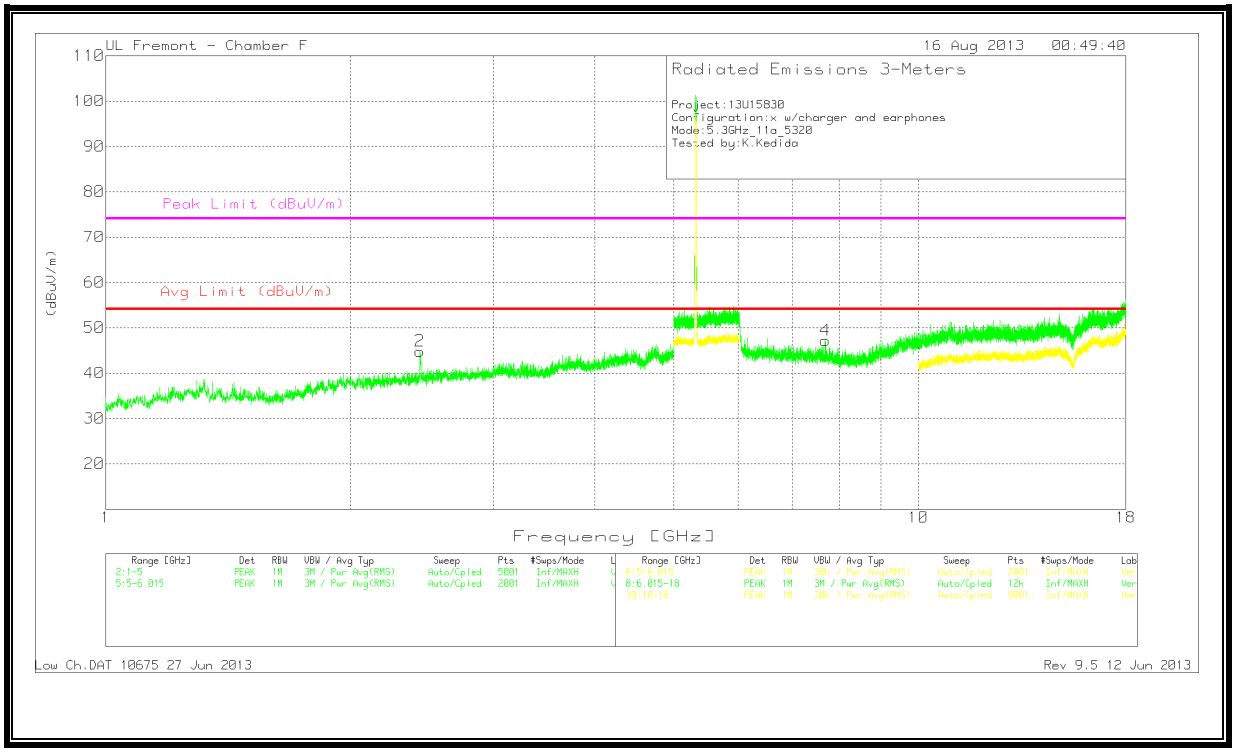
MID CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.438	41.83	PK	32.3	-31.1	43.03	53.97	-10.94	74	-30.97	0-360	199	H
2	2.441	41.5	PK	32.3	-31	42.8	53.97	-11.17	74	-31.2	0-360	101	V
3	8.122	36.96	PK	36	-27.3	45.66	53.97	-8.31	74	-28.34	0-360	199	H
4	9.162	35.85	PK	36.5	-24.9	47.45	53.97	-6.52	74	-26.55	0-360	200	V

HIGH CHANNEL
HORIZONTAL



VERTICAL



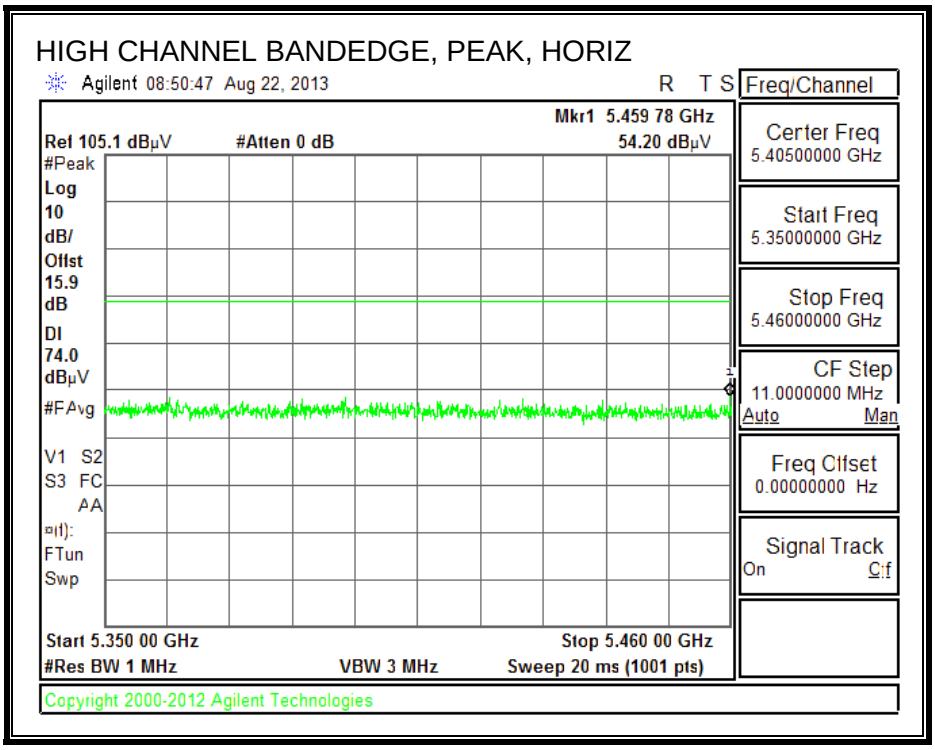
HIGH CHANNEL DATA

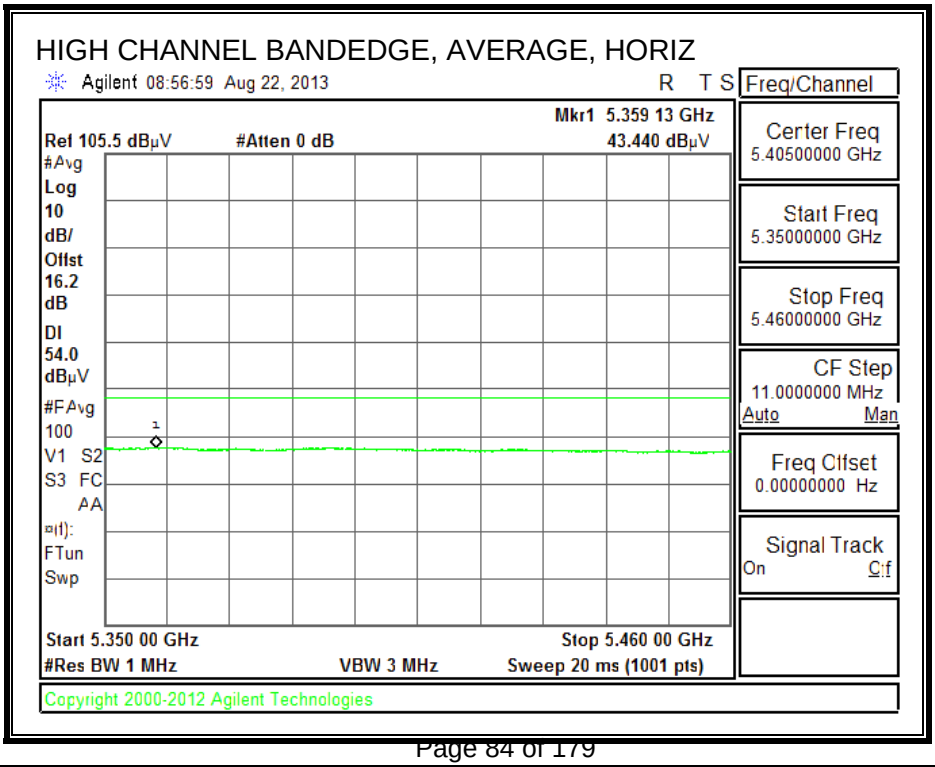
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.438	44.04	PK	32.3	-31.1	45.24	53.97	-8.73	74	-28.76	0-360	199	H
2	2.436	43.62	PK	32.3	-31.1	44.82	53.97	-9.15	74	-29.18	0-360	101	V
3	7.364	38.07	PK	35.7	-27.3	46.47	53.97	-7.5	74	-27.53	0-360	199	H
4	7.684	38.4	PK	35.9	-27.1	47.2	53.97	-6.77	74	-26.8	0-360	200	V

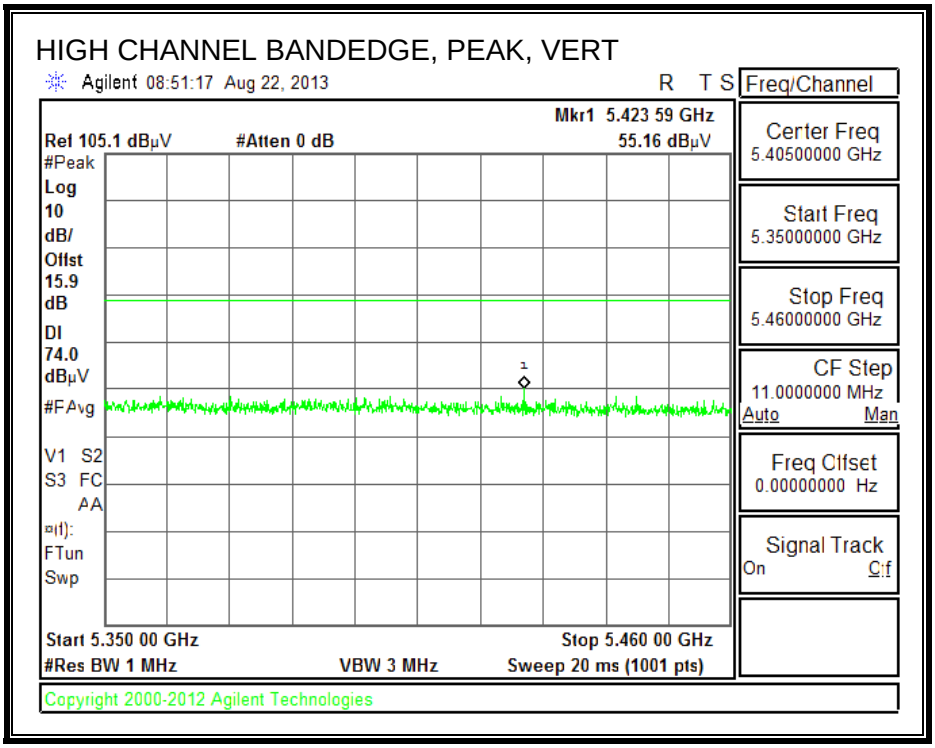
10.3.3. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.3 GHz BAND

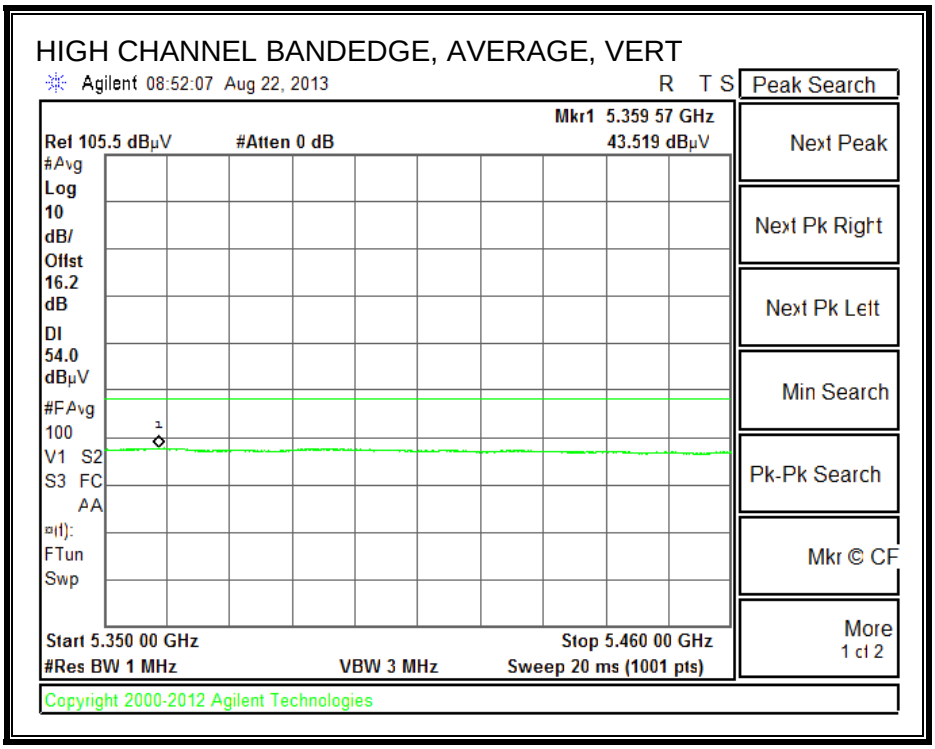
Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

AUTHORIZED BANDEDGE (HIGH CHANNEL)



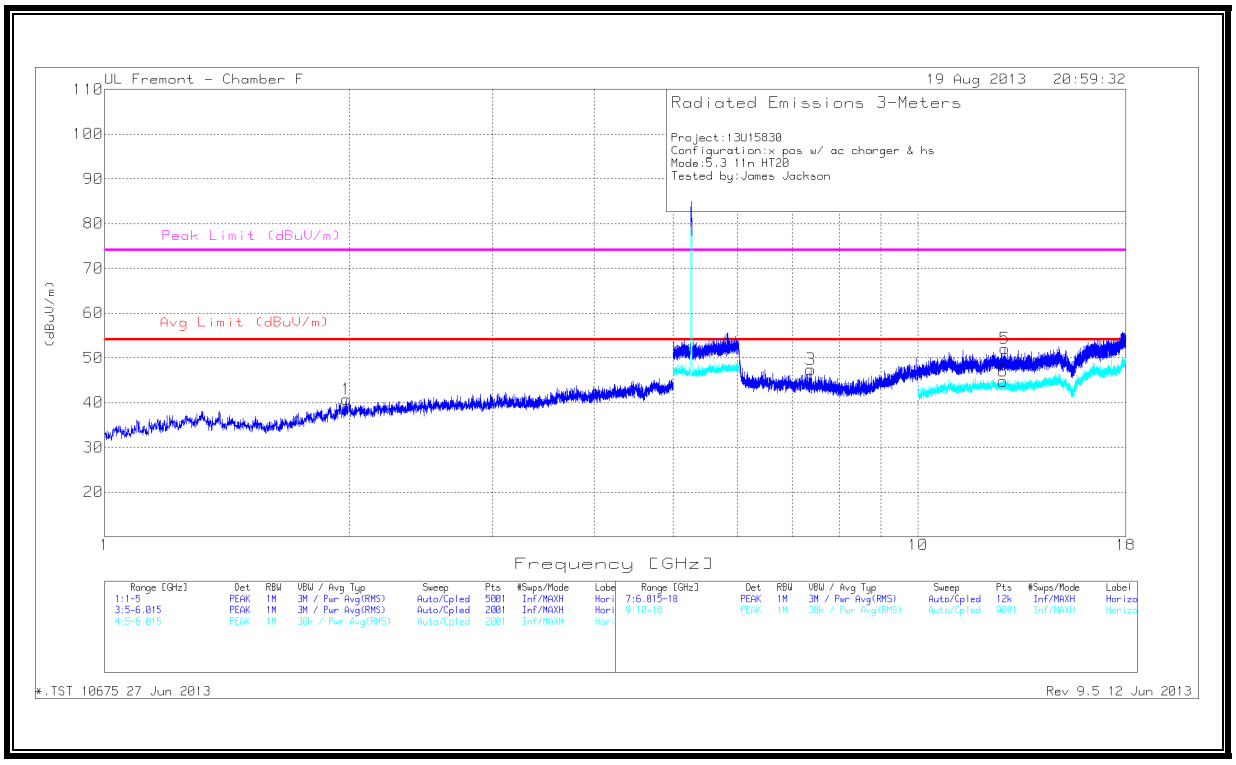




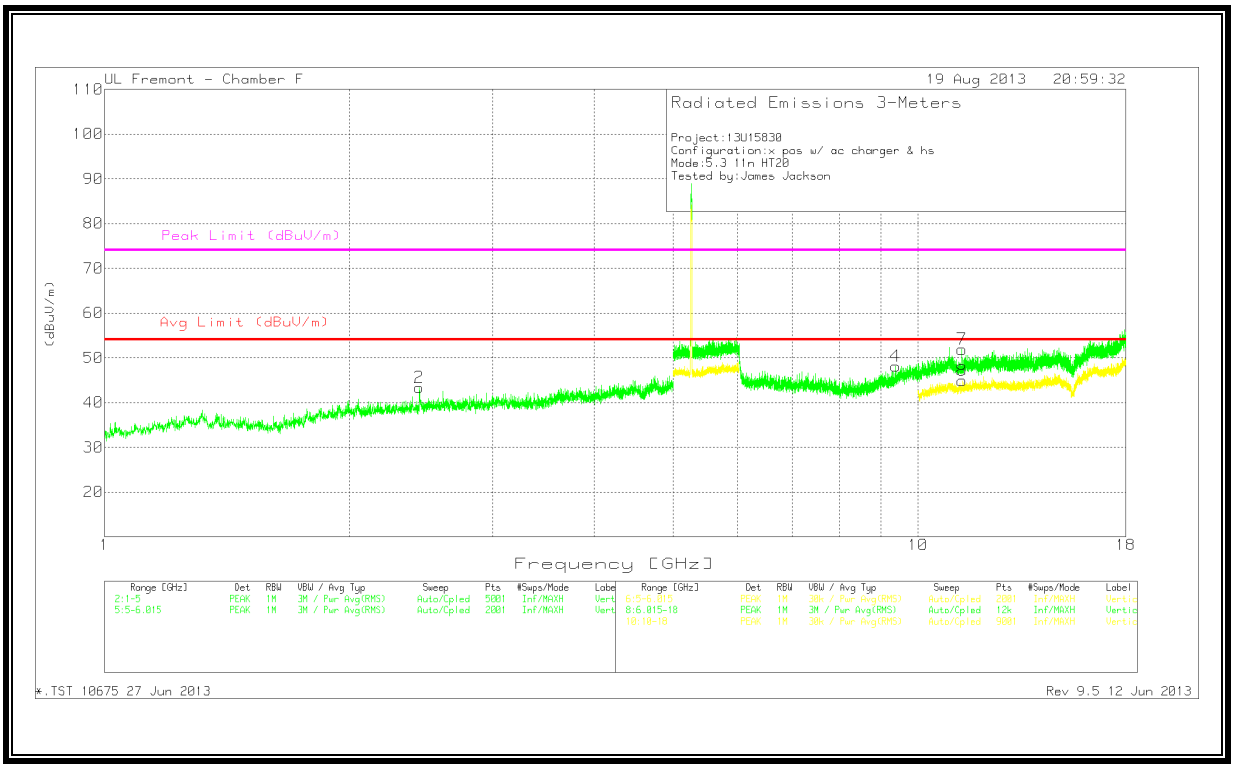


HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL
HORIZONTAL



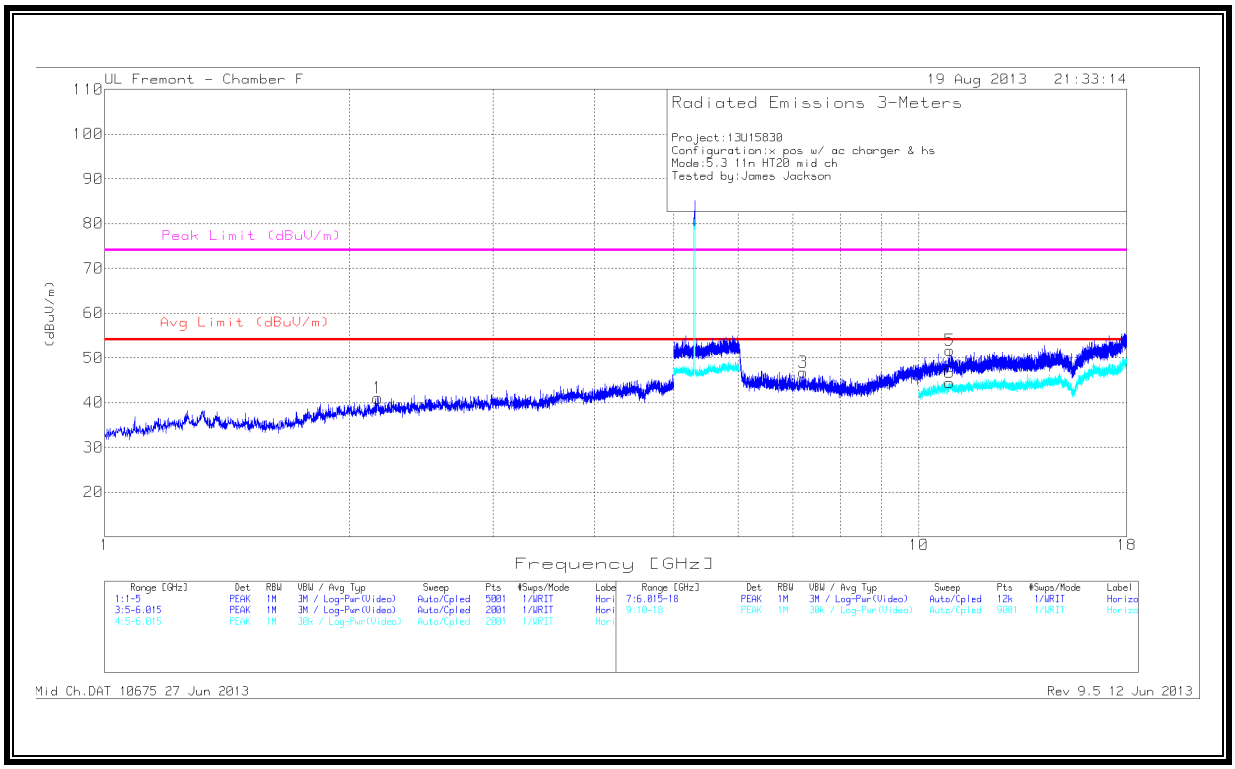
VERTICAL



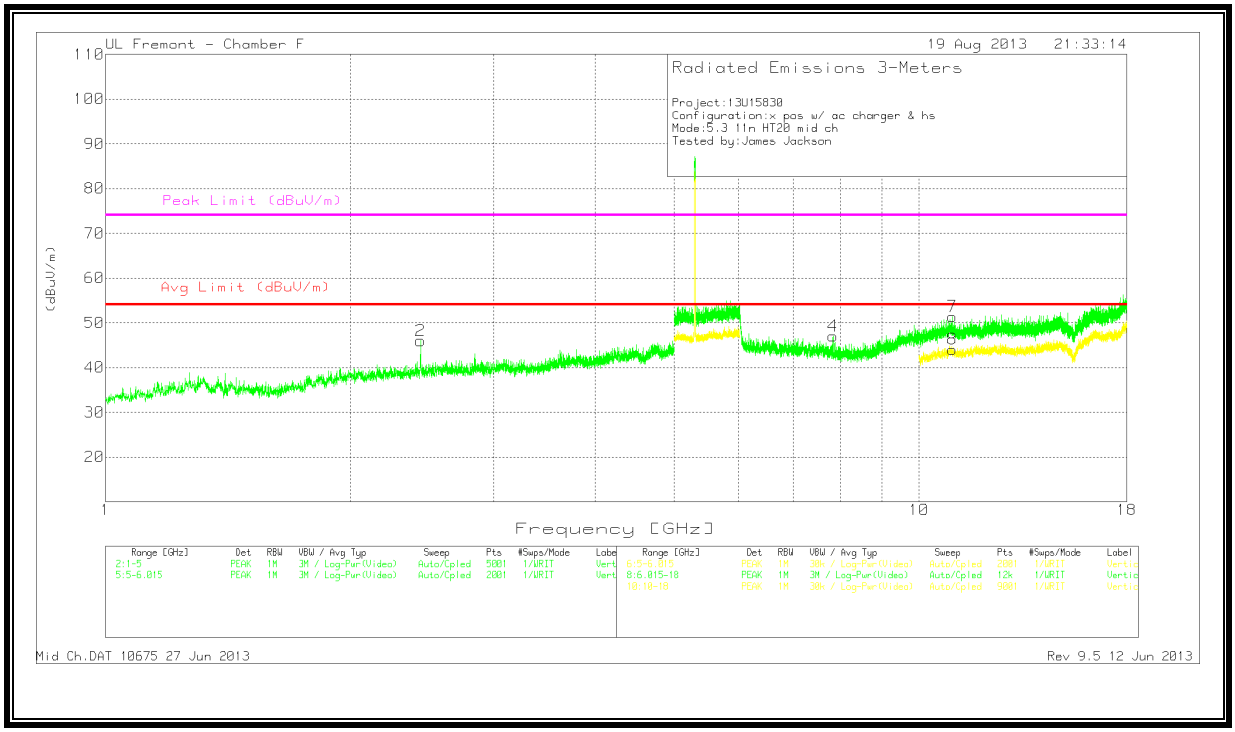
LOW CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.983	40.33	PK	31.6	-31.2	40.73	53.97	-13.24	74	-33.27	0-360	98	H
2	2.438	42.18	PK	32.3	-31.1	43.38	53.97	-10.59	74	-30.62	0-360	100	V
3	7.381	39.29	PK	35.7	-27.6	47.39	53.97	-6.58	74	-26.61	0-360	100	H
5	12.785	36.79	PK	39.5	-24.2	52.09	53.97	-1.88	74	-21.91	0-360	199	H
4	9.386	35.62	PK	36.9	-24.4	48.12	53.97	-5.85	74	-25.88	0-360	101	V
7	11.321	35.98	PK	38.7	-22.8	51.88	53.97	-2.09	74	-22.12	0-360	200	V
6	12.712	29.53	PK	39.5	-24.2	44.83	53.97	-9.14	74	-29.17	0-360	199	H
8	11.326	28.83	PK	38.7	-22.6	44.93	53.97	-9.04	74	-29.07	0-360	200	V

MID CHANNEL
HORIZONTAL



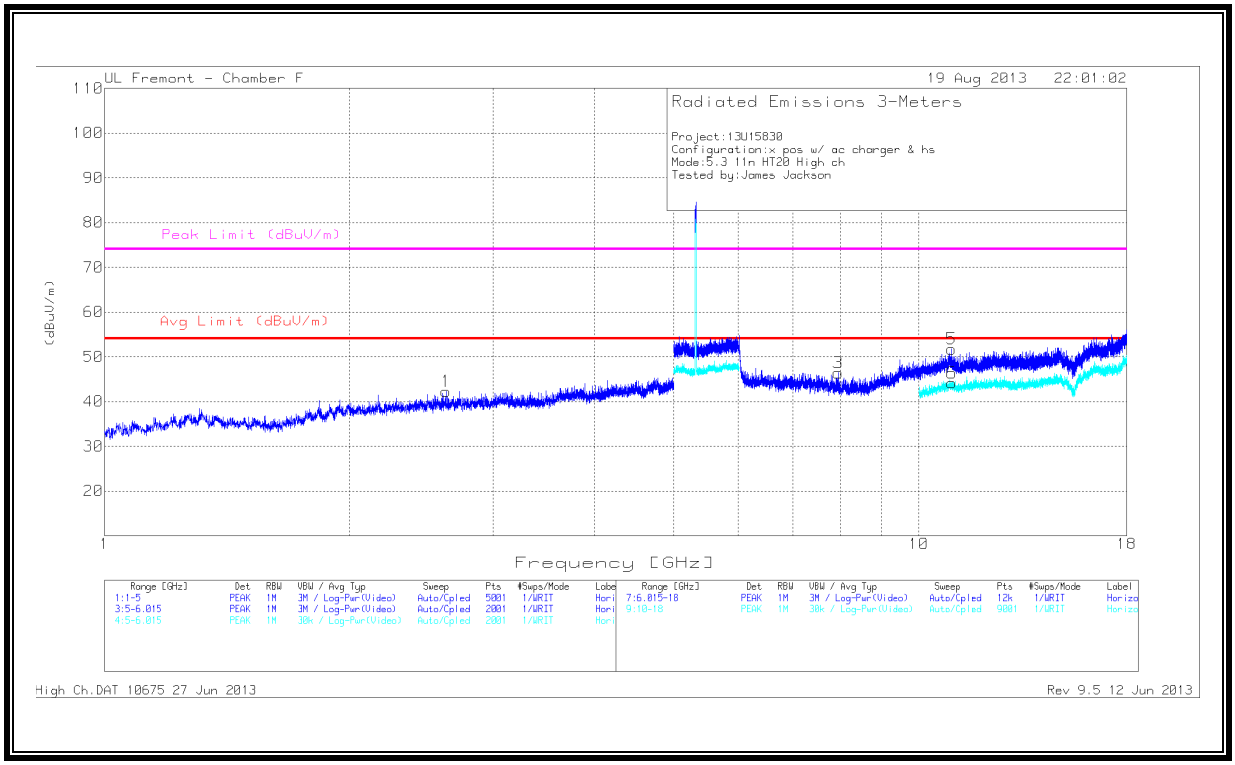
VERTICAL



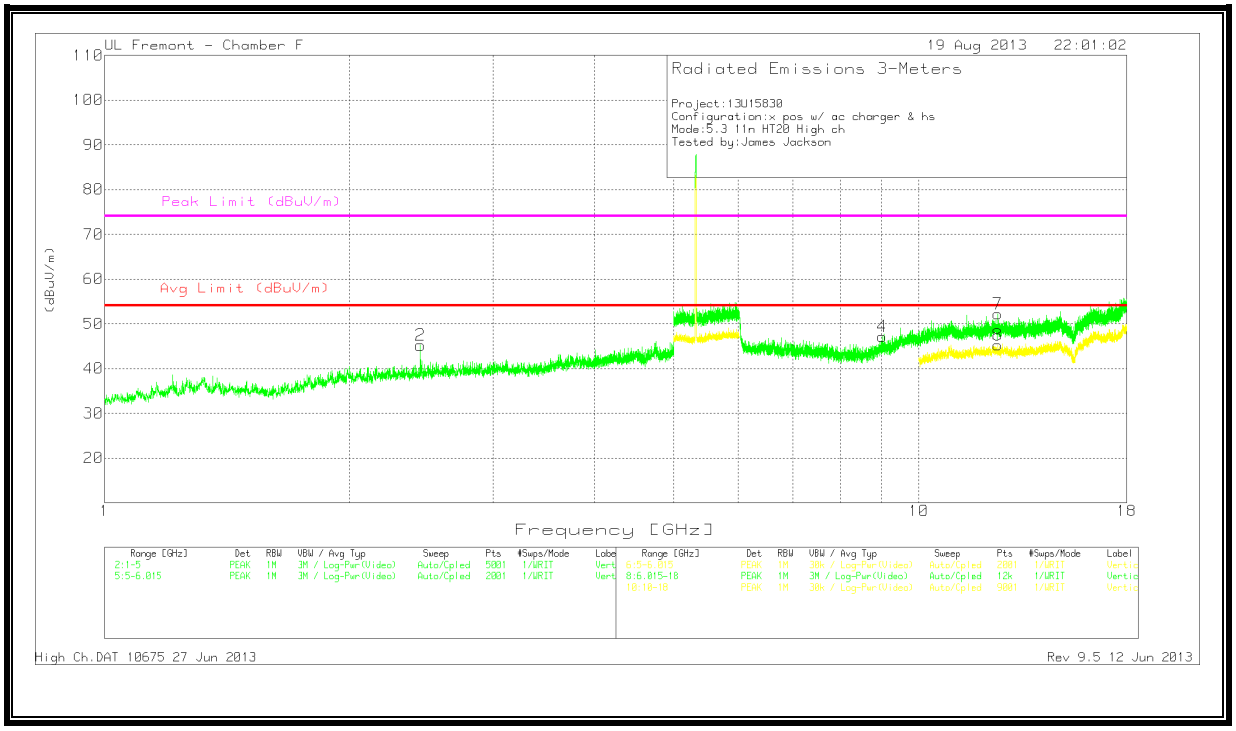
MID CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.166	40.31	PK	31.7	-31	41.01	53.97	-12.96	74	-32.99	0-360	199	H
2	2.439	44.72	PK	32.3	-31	46.02	53.97	-7.95	74	-27.98	0-360	101	V
3	7.207	37.49	PK	35.7	-26.4	46.79	53.97	-7.18	74	-27.21	0-360	100	H
5	10.907	35.29	PK	38.7	-22.3	51.69	53.97	-2.28	74	-22.31	0-360	199	H
4	7.837	37.72	PK	35.9	-26.6	47.02	53.97	-6.95	74	-26.98	0-360	201	V
7	10.987	35.57	PK	38.7	-22.9	51.37	53.97	-2.6	74	-22.63	0-360	201	V
6	10.901	28.2	PK	38.7	-22.4	44.5	53.97	-9.47	74	-29.5	0-360	199	H
8	10.983	28.1	PK	38.7	-22.7	44.1	53.97	-9.87	74	-29.9	0-360	101	V

HIGH CHANNEL
HORIZONTAL



VERTICAL



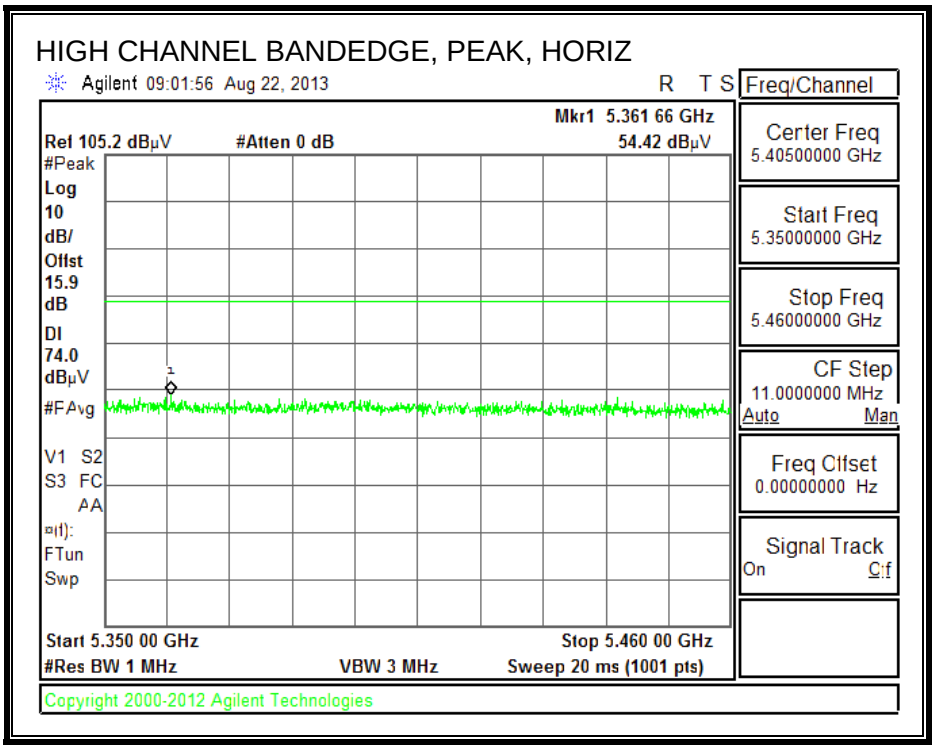
HIGH CHANNEL DATA

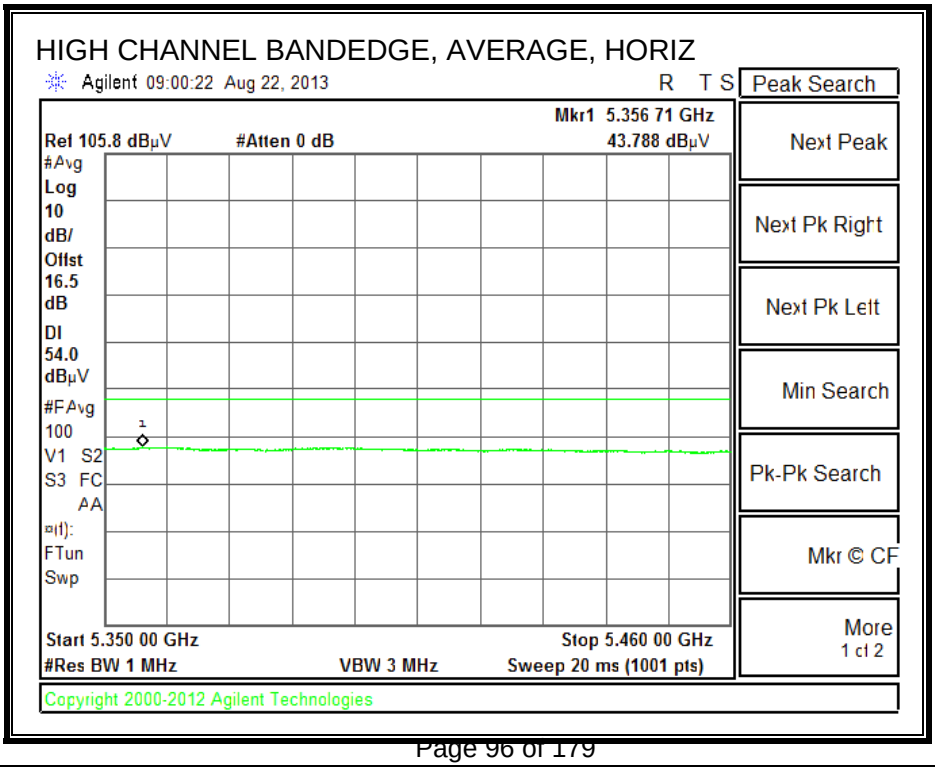
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.626	39.88	PK	32.6	-30.2	42.28	53.97	-11.69	74	-31.72	0-360	199	H
2	2.442	43.91	PK	32.3	-31	45.21	53.97	-8.76	74	-28.79	0-360	200	V
3	7.959	37.93	PK	35.9	-27.4	46.43	53.97	-7.54	74	-27.57	0-360	100	H
5	10.97	35.74	PK	38.7	-22.7	51.74	53.97	-2.23	74	-22.26	0-360	199	H
4	9.014	35.96	PK	36.4	-25.2	47.16	53.97	-6.81	74	-26.84	0-360	101	V
7	12.495	36.5	PK	39.4	-23.7	52.2	53.97	-1.77	74	-21.8	0-360	101	V
6	10.978	27.97	PK	38.7	-22.5	44.17	53.97	-9.8	74	-29.83	0-360	199	H
8	12.501	29.55	PK	39.4	-23.7	45.25	53.97	-8.72	74	-28.75	0-360	201	V

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

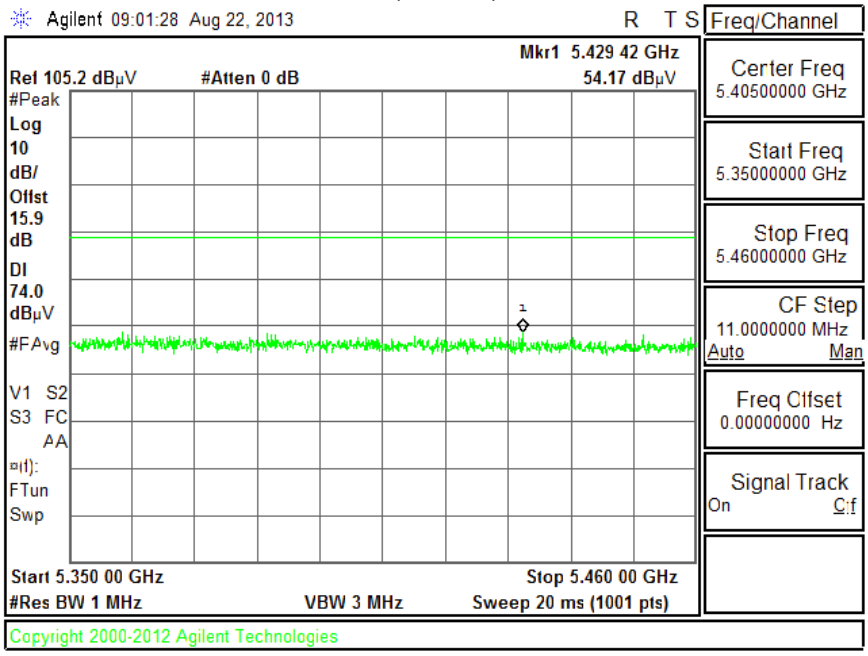
Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

AUTHORIZED BANDEDGE (HIGH CHANNEL)

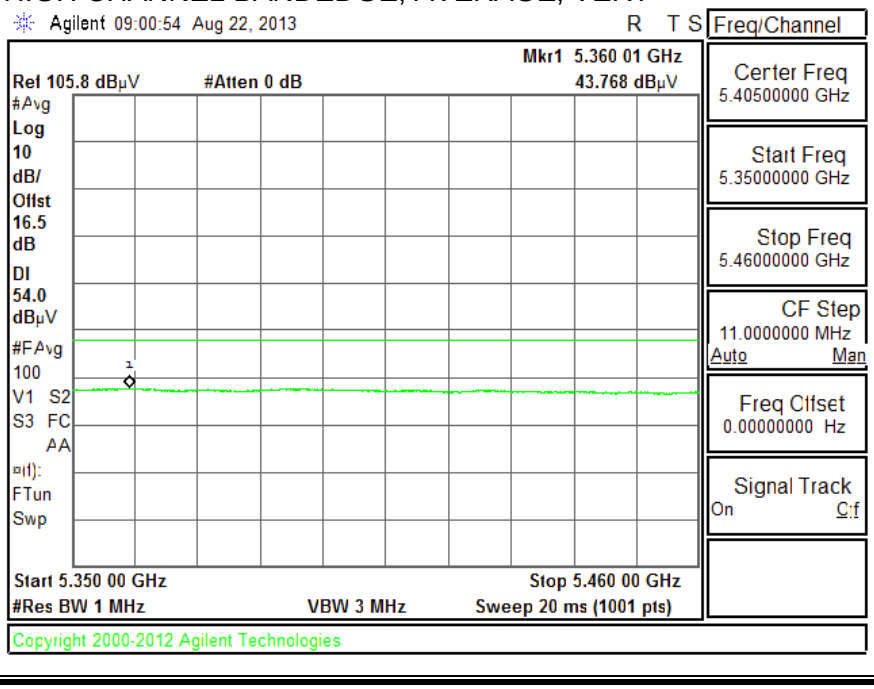




HIGH CHANNEL BANDEDGE, PEAK, VERT

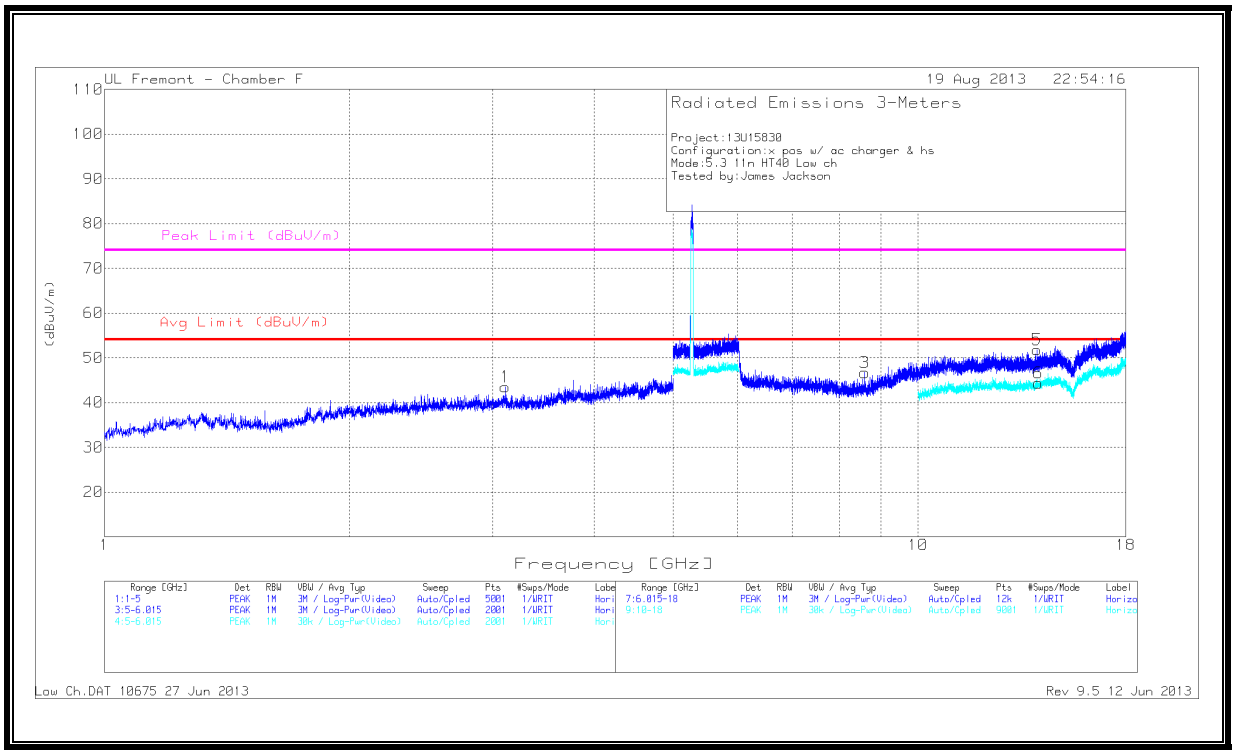


HIGH CHANNEL BANDEDGE, AVERAGE, VERT

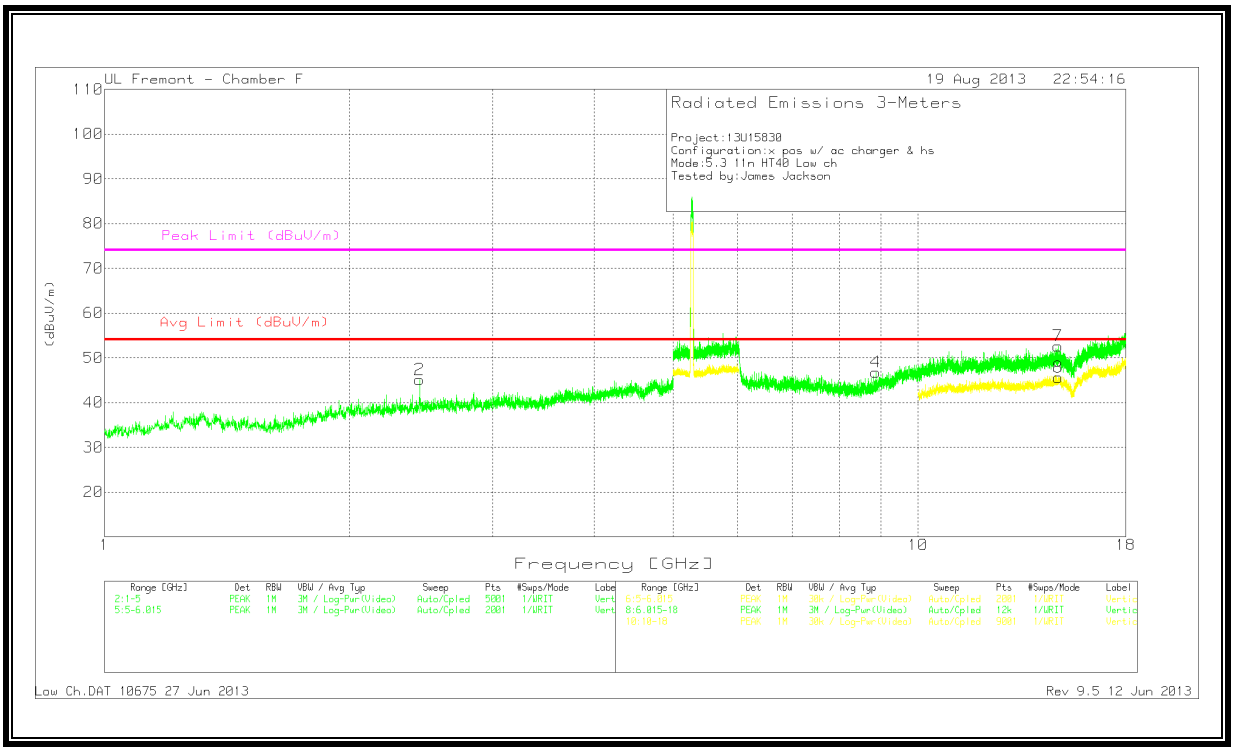


HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL
HORIZONTAL



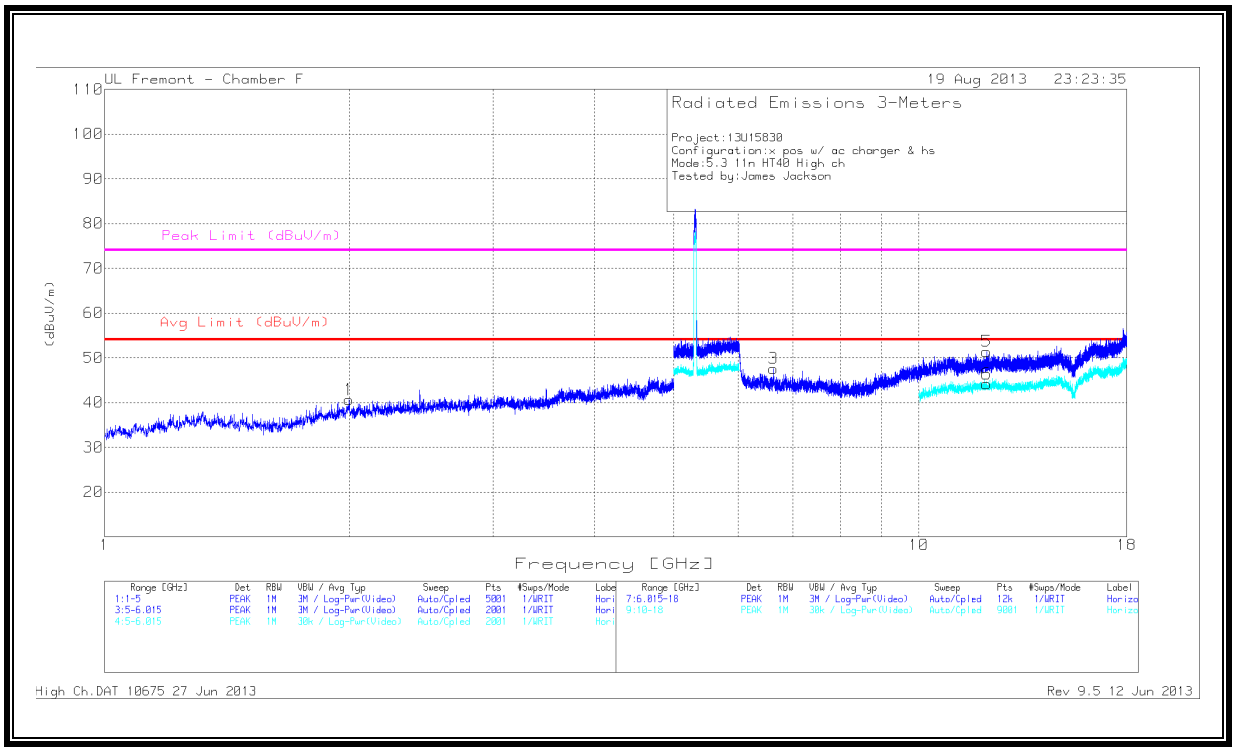
VERTICAL



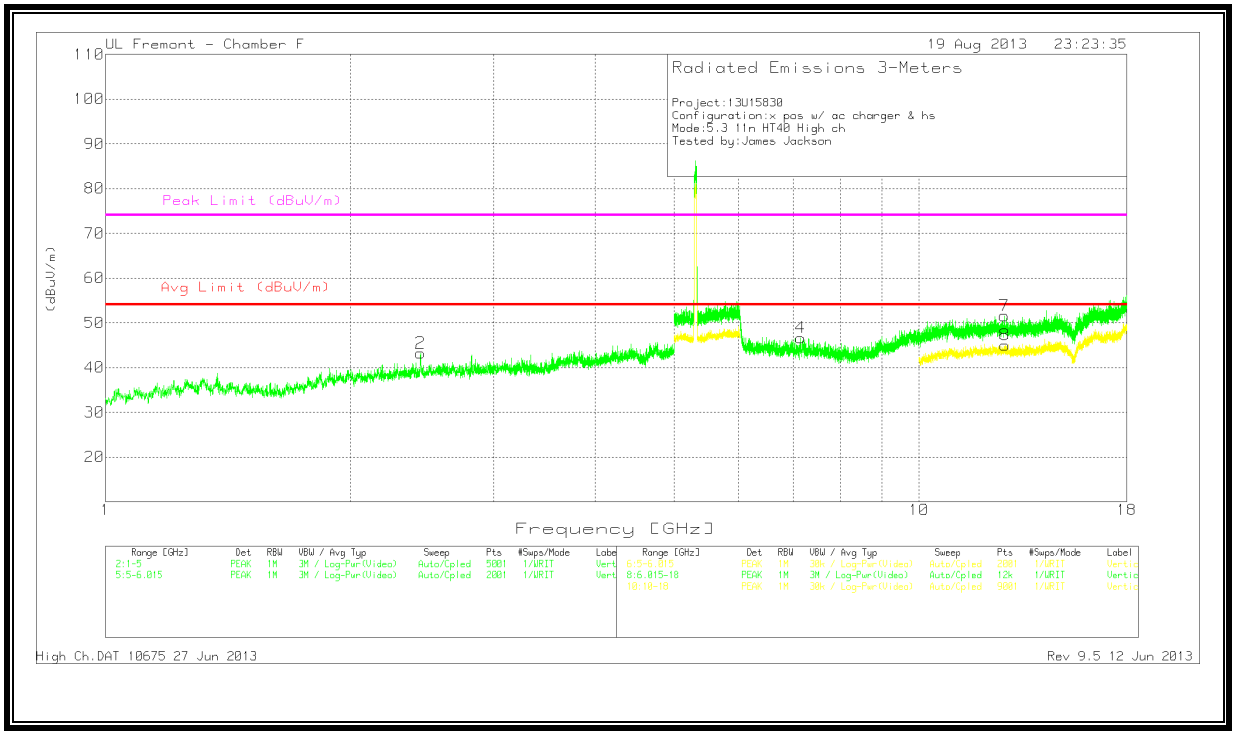
LOW CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	3.109	39.9	PK	33.3	-29.7	43.5	53.97	-10.47	74	-30.5	0-360	100	H
2	2.439	43.84	PK	32.3	-31	45.14	53.97	-8.83	74	-28.86	0-360	101	V
3	8.598	37.4	PK	36	-26.7	46.7	53.97	-7.27	74	-27.3	0-360	199	H
5	14	37.22	PK	39.2	-24.6	51.82	53.97	-2.15	74	-22.18	0-360	199	H
4	8.87	36.4	PK	36.3	-25.9	46.8	53.97	-7.17	74	-27.2	0-360	200	V
7	14.858	37.57	PK	40	-24.9	52.67	53.97	-1.3	74	-21.33	0-360	200	V
6	14.046	30.08	PK	39.3	-25	44.38	53.97	-9.59	74	-29.62	0-360	100	H
8	14.873	30.12	PK	40	-24.5	45.62	53.97	-8.35	74	-28.38	0-360	201	V

MID CHANNEL
HORIZONTAL



VERTICAL



MID CHANNEL DATA

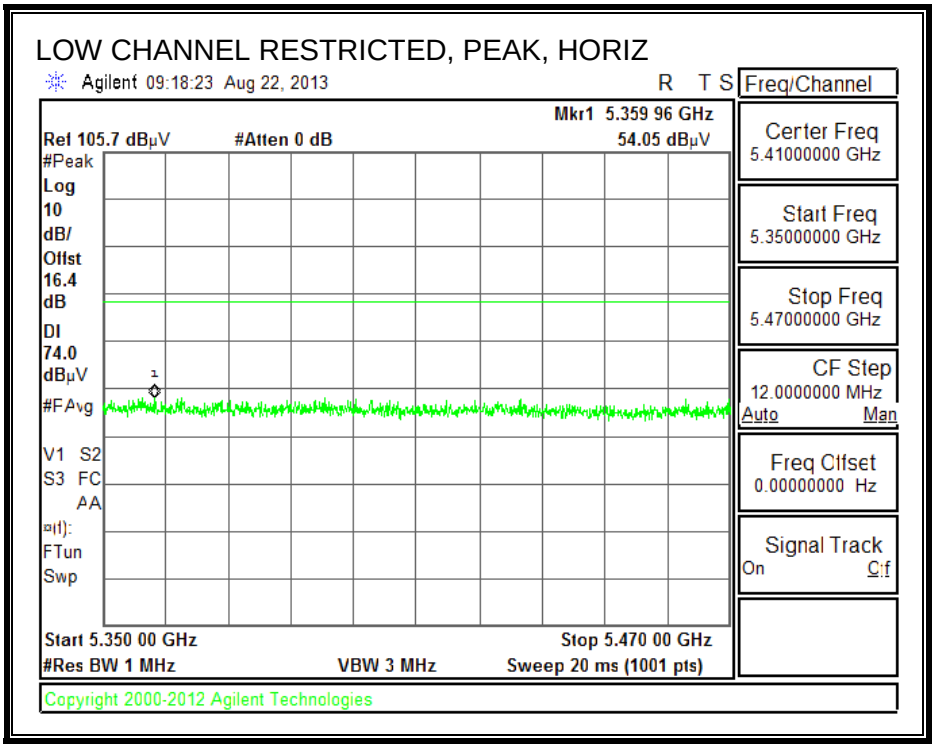
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.996	40.26	PK	31.6	-31.2	40.66	53.97	-13.31	74	-33.34	0-360	199	H
2	2.438	41.93	PK	32.3	-31	43.23	53.97	-10.74	74	-30.77	0-360	101	V
3	6.628	37.72	PK	35.8	-25.9	47.62	53.97	-6.35	74	-26.38	0-360	199	H
5	12.108	35.75	PK	39.3	-23.6	51.45	53.97	-2.52	74	-22.55	0-360	100	H
4	7.152	38.38	PK	35.7	-27.4	46.68	53.97	-7.29	74	-27.32	0-360	200	V
7	12.729	35.89	PK	39.5	-23.8	51.59	53.97	-2.38	74	-22.41	0-360	101	V
6	12.111	28.41	PK	39.3	-23.5	44.21	53.97	-9.76	74	-29.79	0-360	199	H
8	12.748	29.54	PK	39.5	-24	45.04	53.97	-8.93	74	-28.96	0-360	101	V

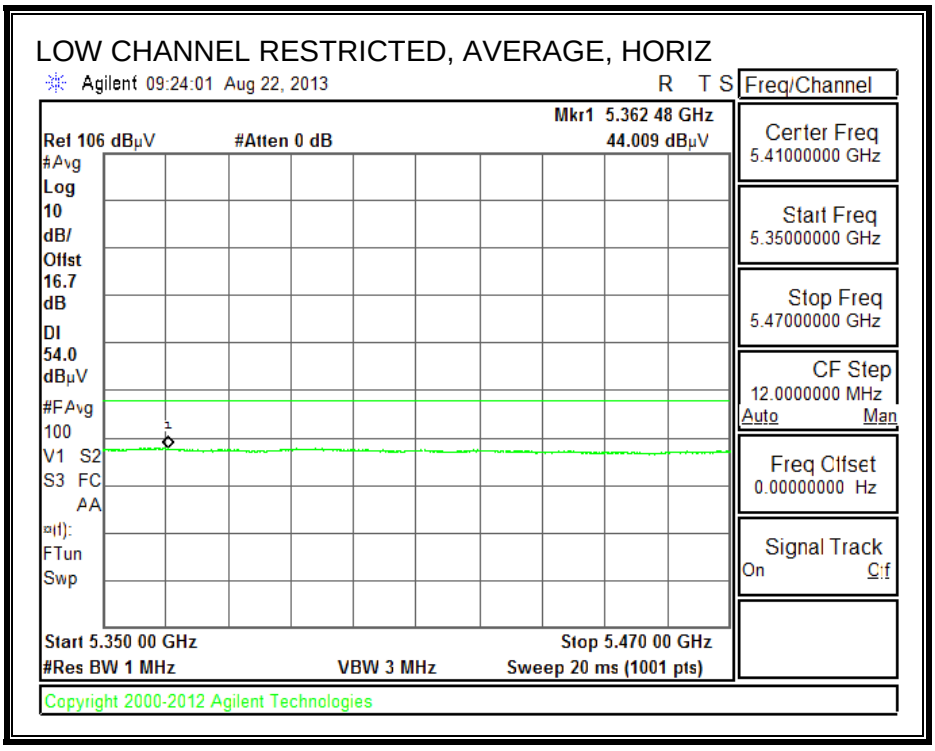
10.4. 5.5-5.6 GHz

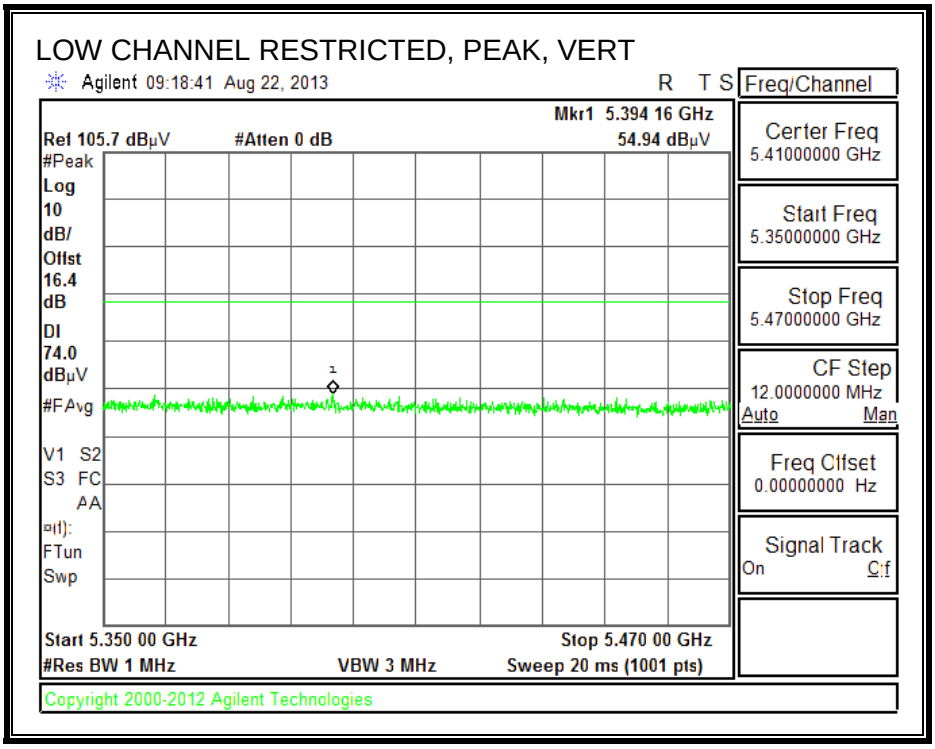
10.4.1. TX ABOVE 1 GHz 802.11a MODE IN THE 5.5 GHz BAND

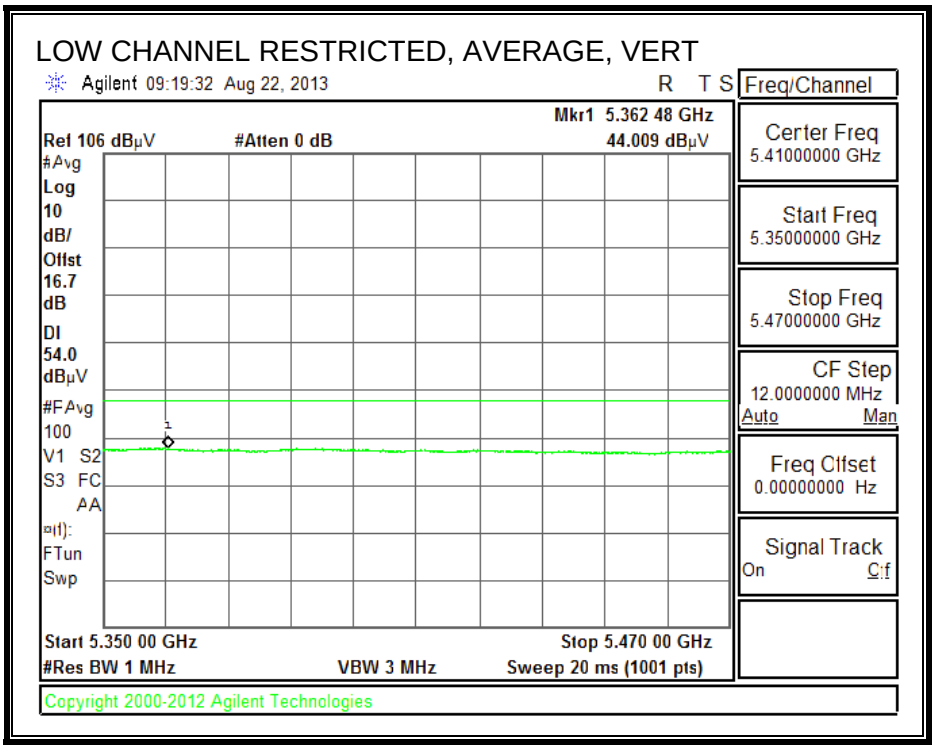
Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

RESTRICTED BANDEDGE (LOW CHANNEL)

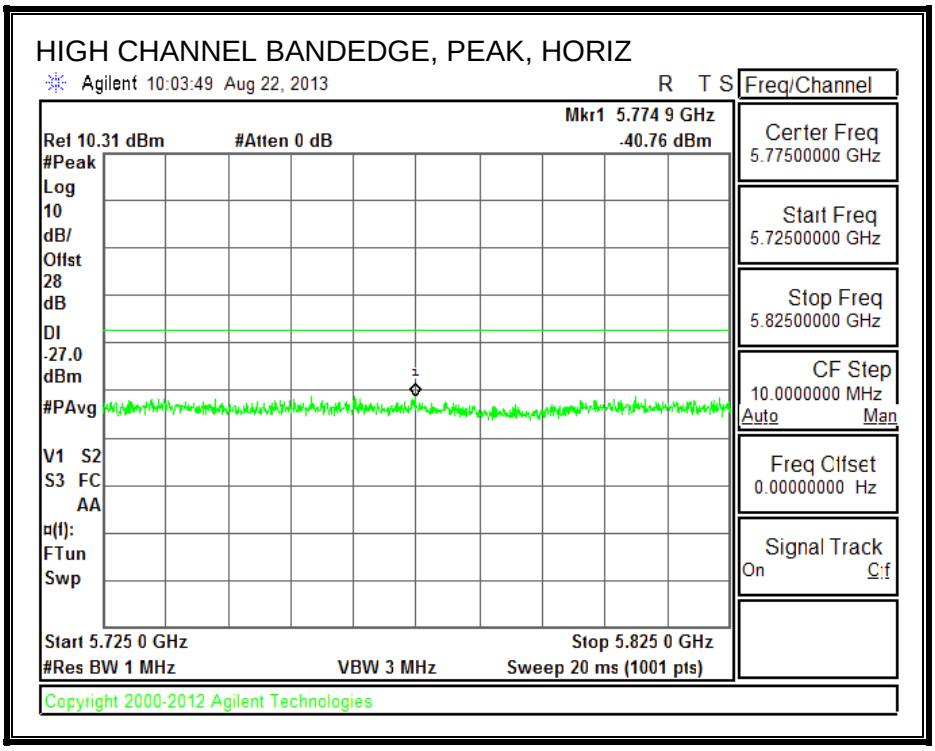


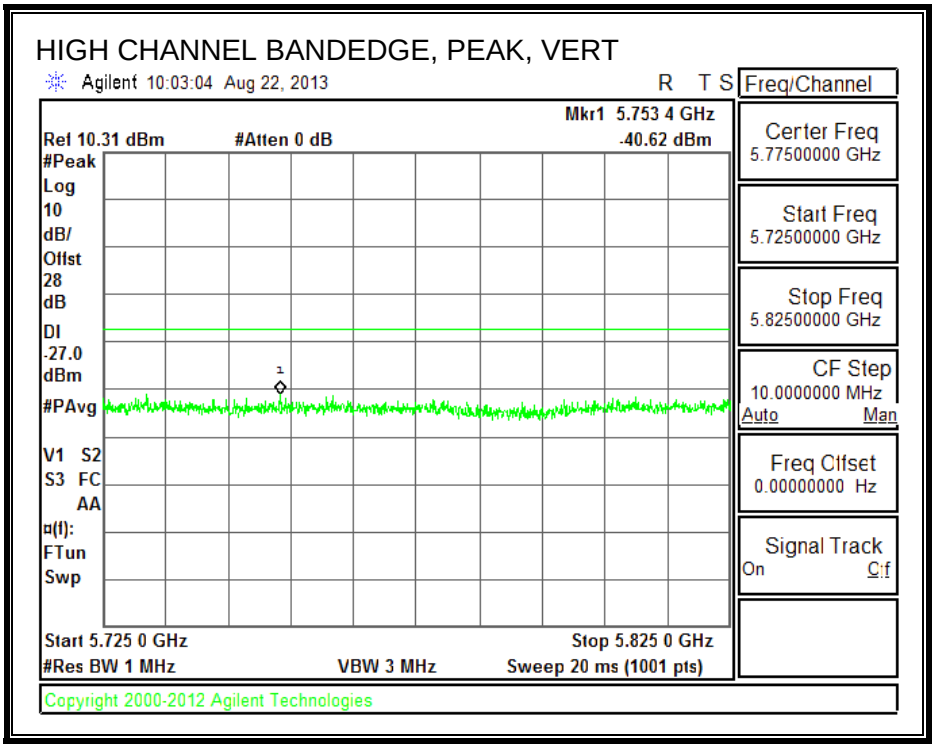






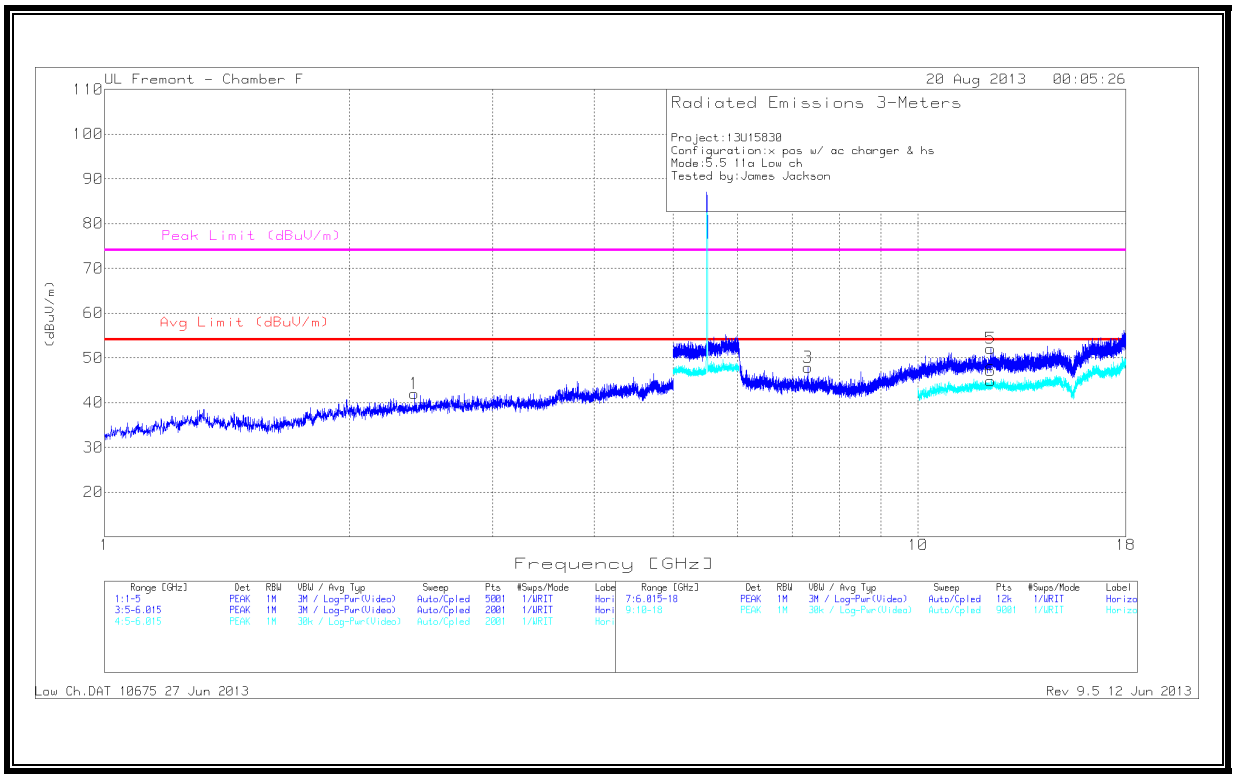
AUTHORIZED BANDEDGE (HIGH CHANNEL)



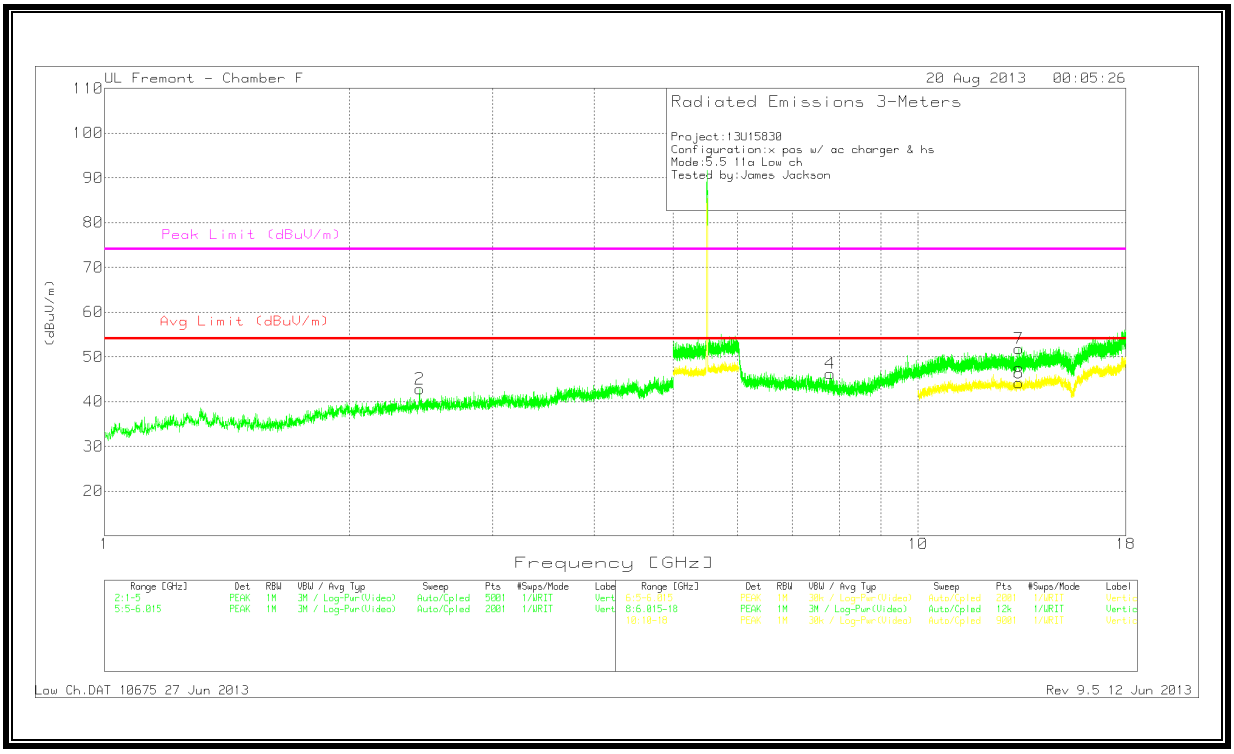


HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL
HORIZONTAL



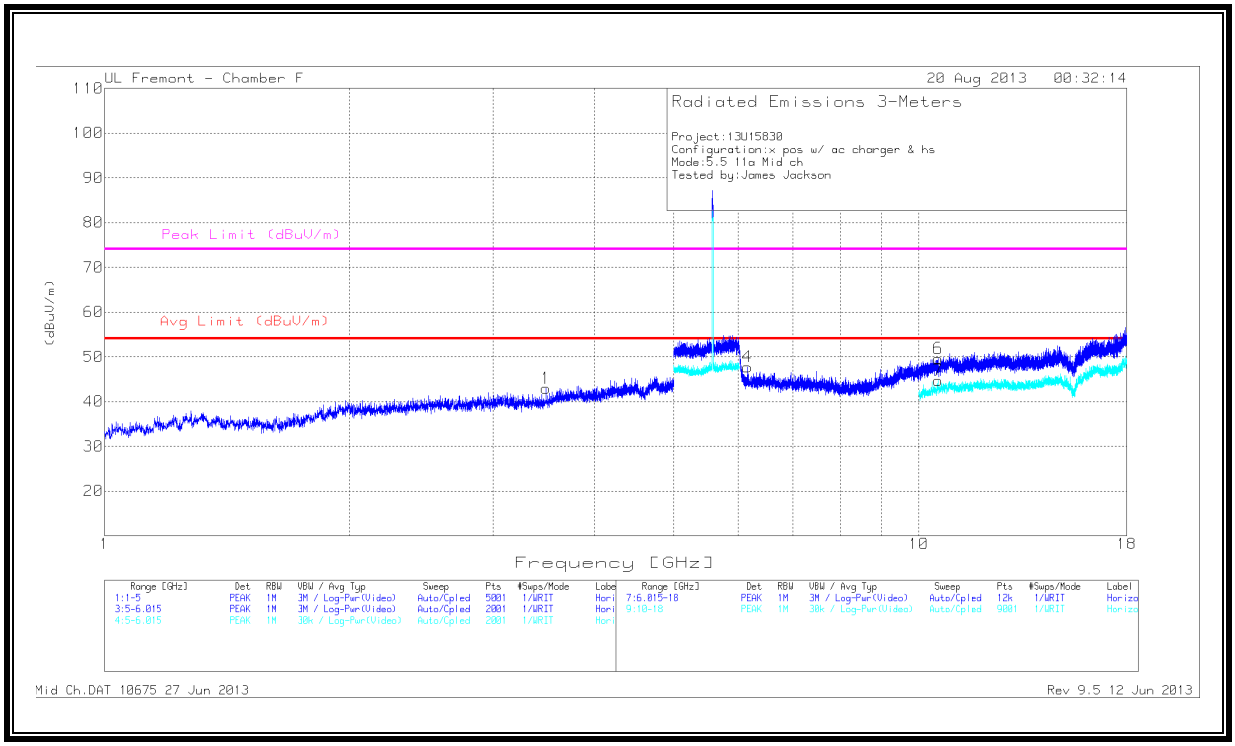
VERTICAL



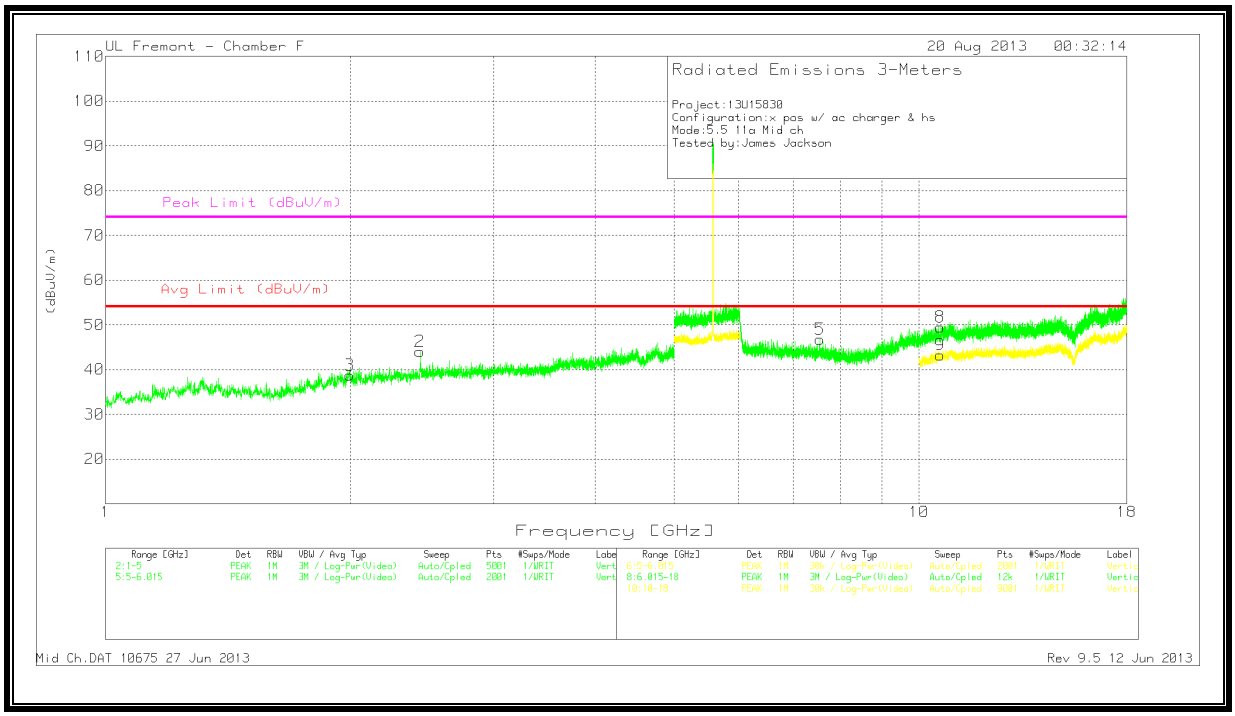
LOW CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.403	40.69	PK	32.1	-30.8	41.99	53.97	-11.98	74	-32.01	0-360	100	H
2	2.441	41.54	PK	32.3	-31	42.84	53.97	-11.13	74	-31.16	0-360	201	V
3	7.324	38.48	PK	35.7	-26.3	47.88	53.97	-6.09	74	-26.12	0-360	199	H
5	12.276	36.81	PK	39.2	-23.9	52.11	53.97	-1.86	74	-21.89	0-360	199	H
4	7.798	37.07	PK	35.9	-26.7	46.27	53.97	-7.7	74	-27.73	0-360	100	V
7	13.301	36.86	PK	39.3	-24.3	51.86	53.97	-2.11	74	-22.14	0-360	100	V
6	12.275	29.61	PK	39.2	-23.9	44.91	53.97	-9.06	74	-29.09	0-360	199	H
8	13.304	29.07	PK	39.3	-24.2	44.17	53.97	-9.8	74	-29.83	0-360	101	V

MID CHANNEL
HORIZONTAL



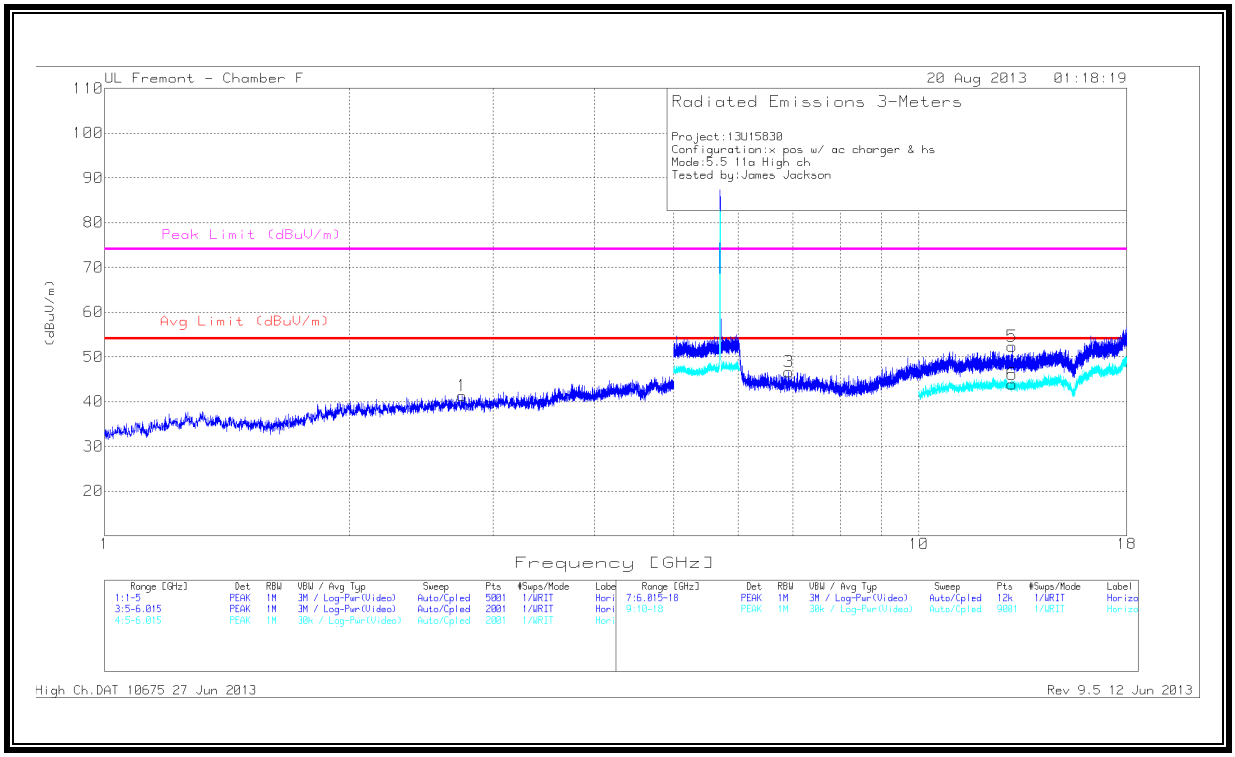
VERTICAL



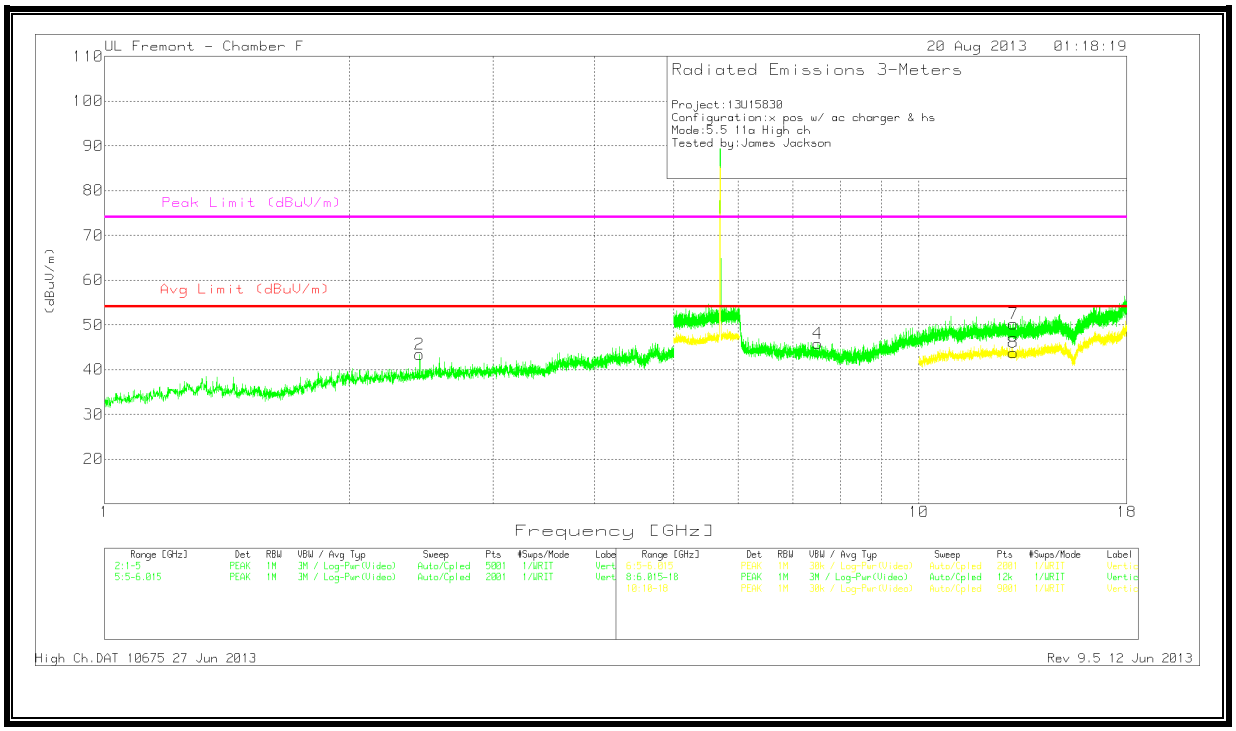
MID CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	3.483	39.56	PK	33.1	-29.7	42.96	53.97	-11.01	74	-31.04	0-360	100	H
2	2.435	42.83	PK	32.3	-31.1	44.03	53.97	-9.94	74	-29.97	0-360	201	V
3	1.995	38.34	PK	31.6	-31.2	38.74	53.97	-15.23	74	-35.26	0-360	101	V
4	6.159	38.95	PK	35.4	-26.6	47.75	53.97	-6.22	74	-26.25	0-360	100	H
6	10.564	33.64	PK	38.5	-22.5	49.64	53.97	-4.33	74	-24.36	0-360	199	H
5	7.55	37.07	PK	35.8	-26.1	46.77	53.97	-7.2	74	-27.23	0-360	101	V
8	10.616	34.01	PK	38.6	-23.1	49.51	53.97	-4.46	74	-24.49	0-360	101	V
7	10.564	28.72	PK	38.5	-22.5	44.72	53.97	-9.25	74	-29.28	0-360	100	H
9	10.612	27.76	PK	38.6	-23.1	43.26	53.97	-10.71	74	-30.74	0-360	101	V

HIGH CHANNEL
HORIZONTAL



VERTICAL



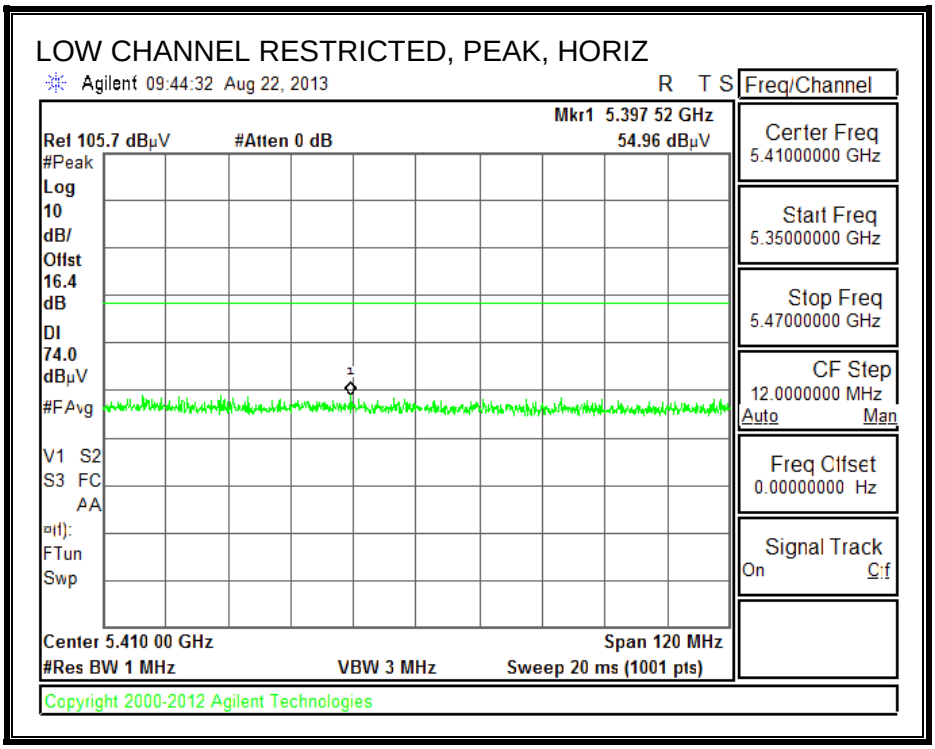
HIGH CHANNEL DATA

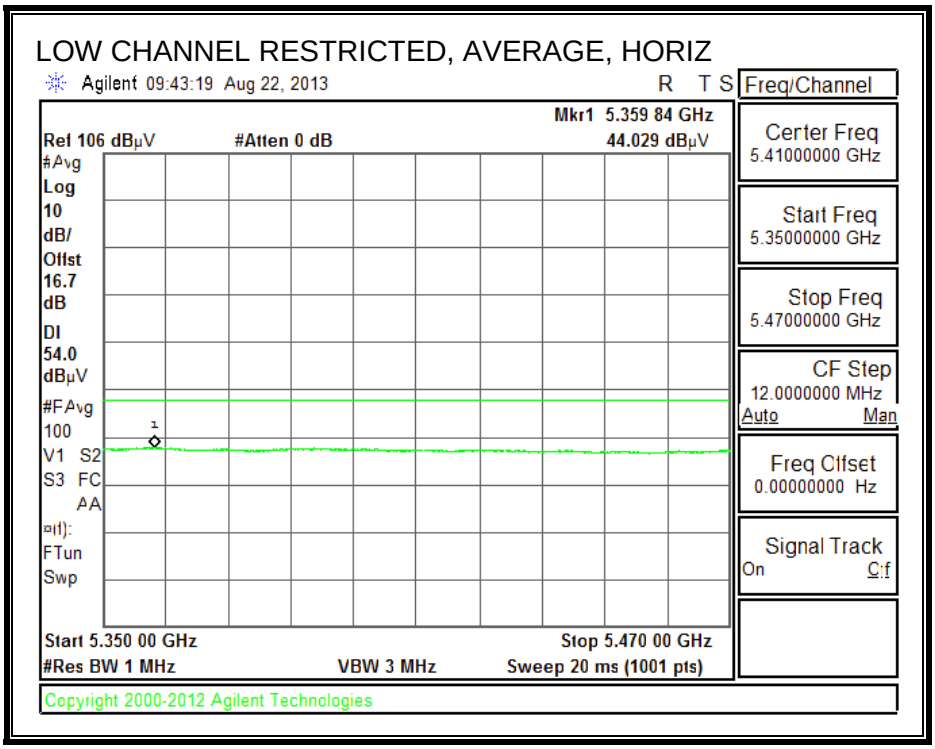
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.748	39.25	PK	32.7	-30.6	41.35	53.97	-12.62	74	-32.65	0-360	199	H
2	2.438	42.23	PK	32.3	-31.1	43.43	53.97	-10.54	74	-30.57	0-360	199	V
3	6.924	38.16	PK	35.7	-27.2	46.66	53.97	-7.31	74	-27.34	0-360	100	H
5	13.015	37.52	PK	39.2	-24.4	52.32	53.97	-1.65	74	-21.68	0-360	100	H
4	7.517	36.64	PK	35.8	-26.6	45.84	53.97	-8.13	74	-28.16	0-360	101	V
7	13.074	35.64	PK	39.1	-24.5	50.24	53.97	-3.73	74	-23.76	0-360	101	V
6	13.013	29.09	PK	39.2	-24.4	43.89	53.97	-10.08	74	-30.11	0-360	100	H
8	13.064	28.92	PK	39.2	-24.3	43.82	53.97	-10.15	74	-30.18	0-360	101	V

10.4.3. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.5 GHz BAND

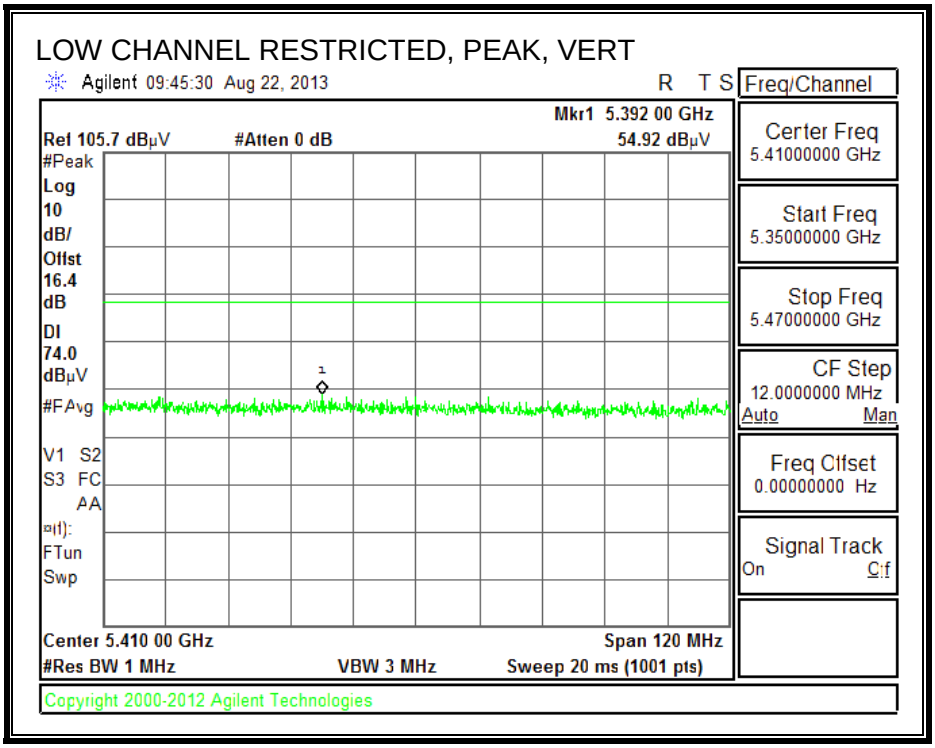
Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

RESTRICTED BANDEDGE (LOW CHANNEL)

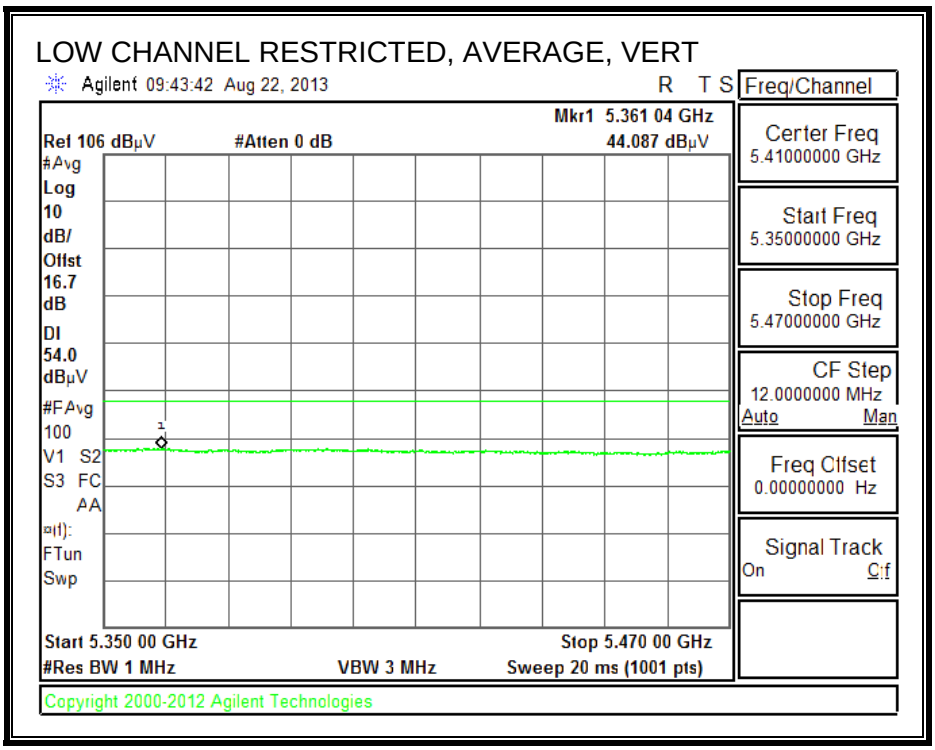




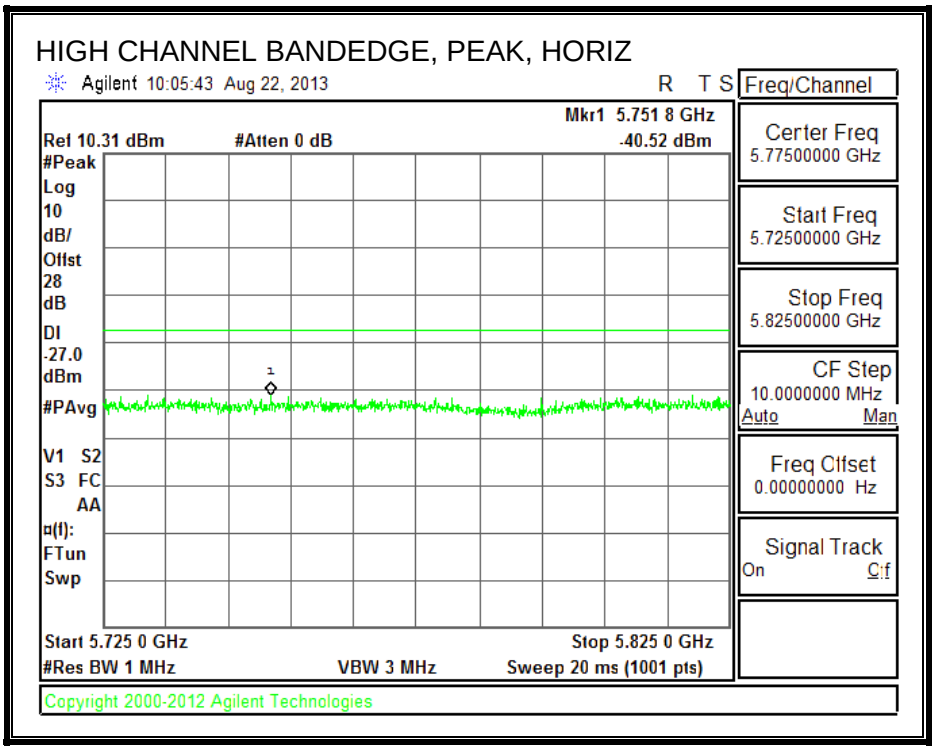
LOW CHANNEL RESTRICTED, PEAK, VERT

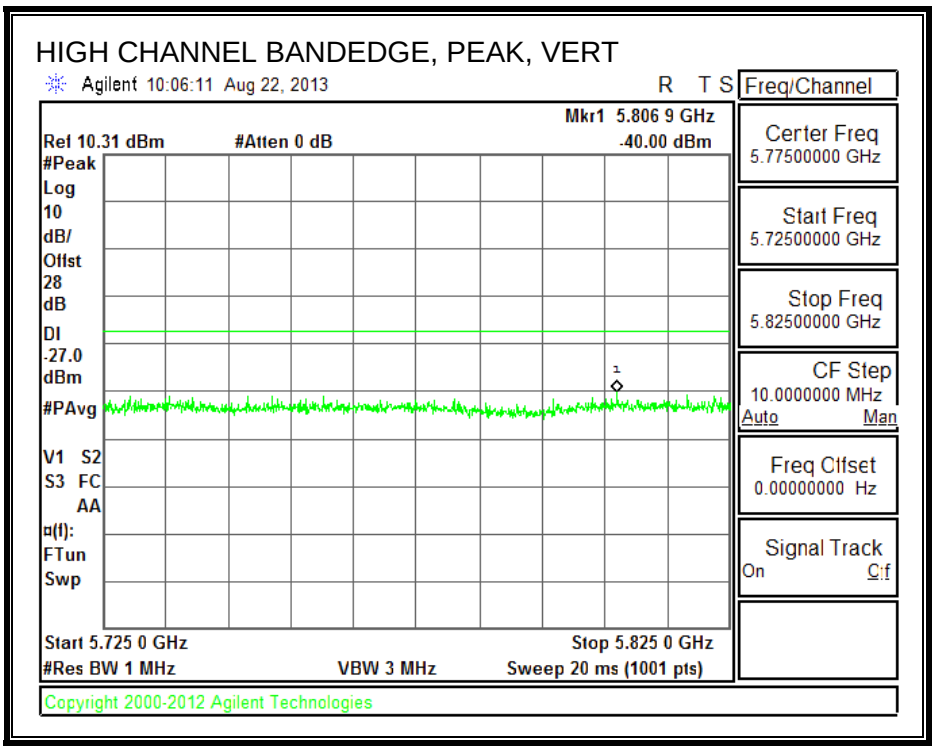


LOW CHANNEL RESTRICTED, AVERAGE, VERT



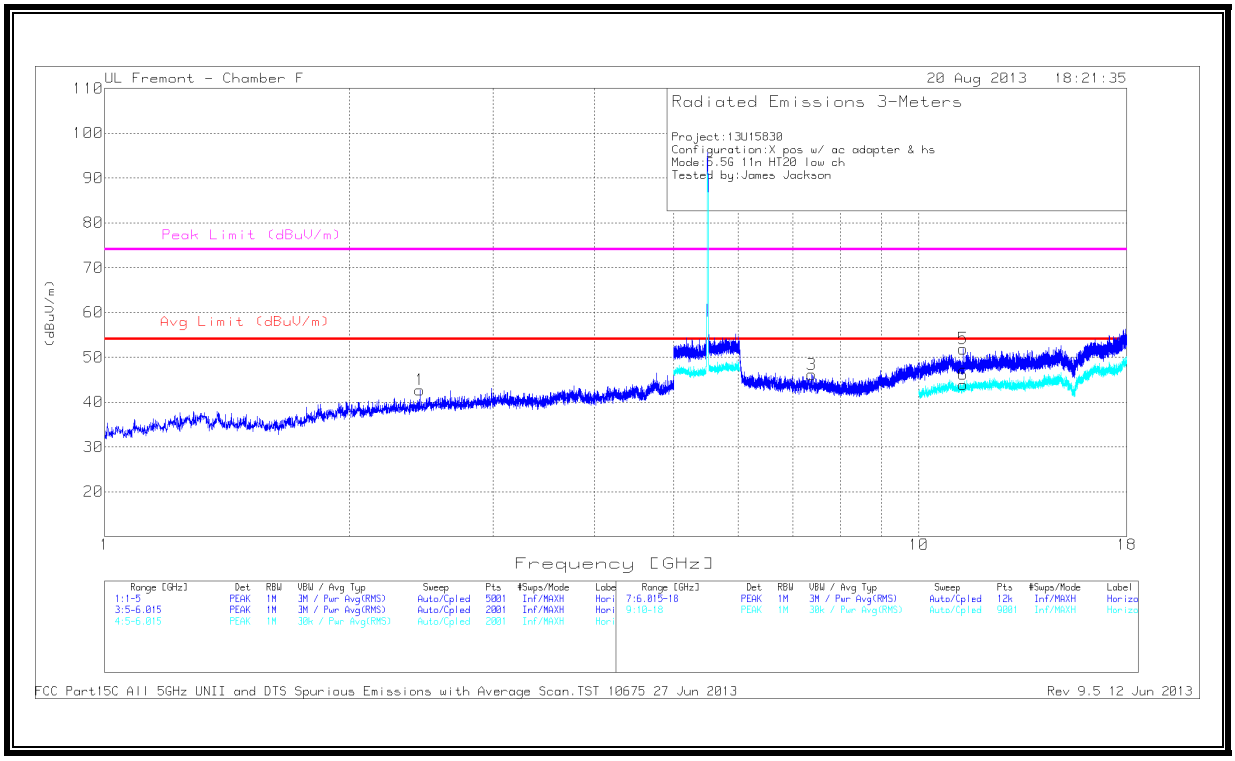
AUTHORIZED BANDEDGE (HIGH CHANNEL)



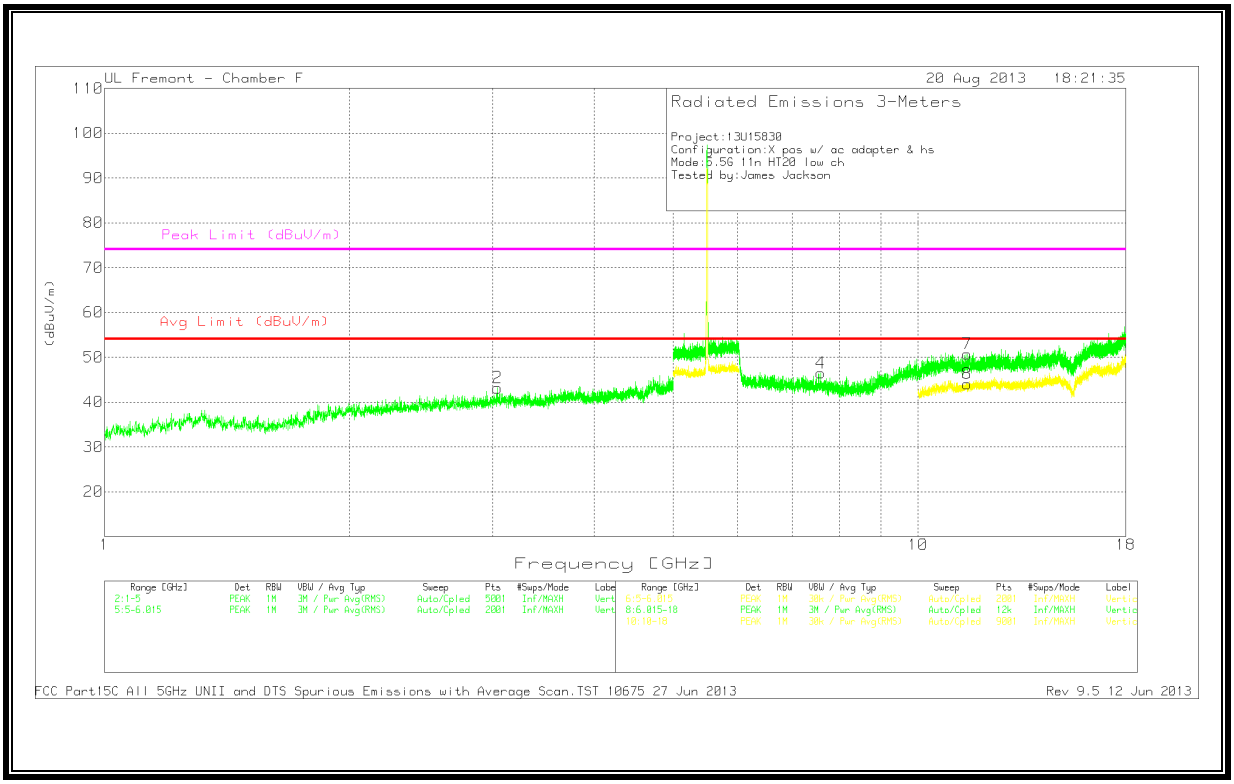


HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL
HORIZONTAL



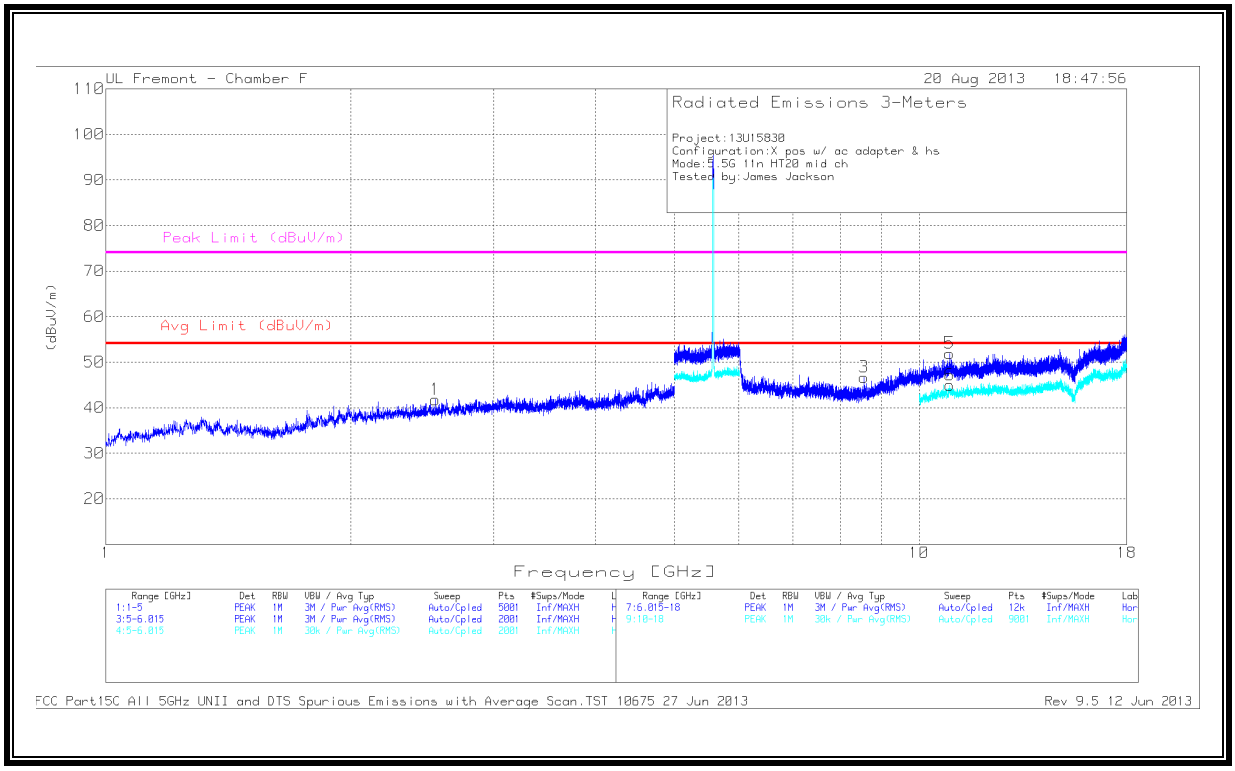
VERTICAL



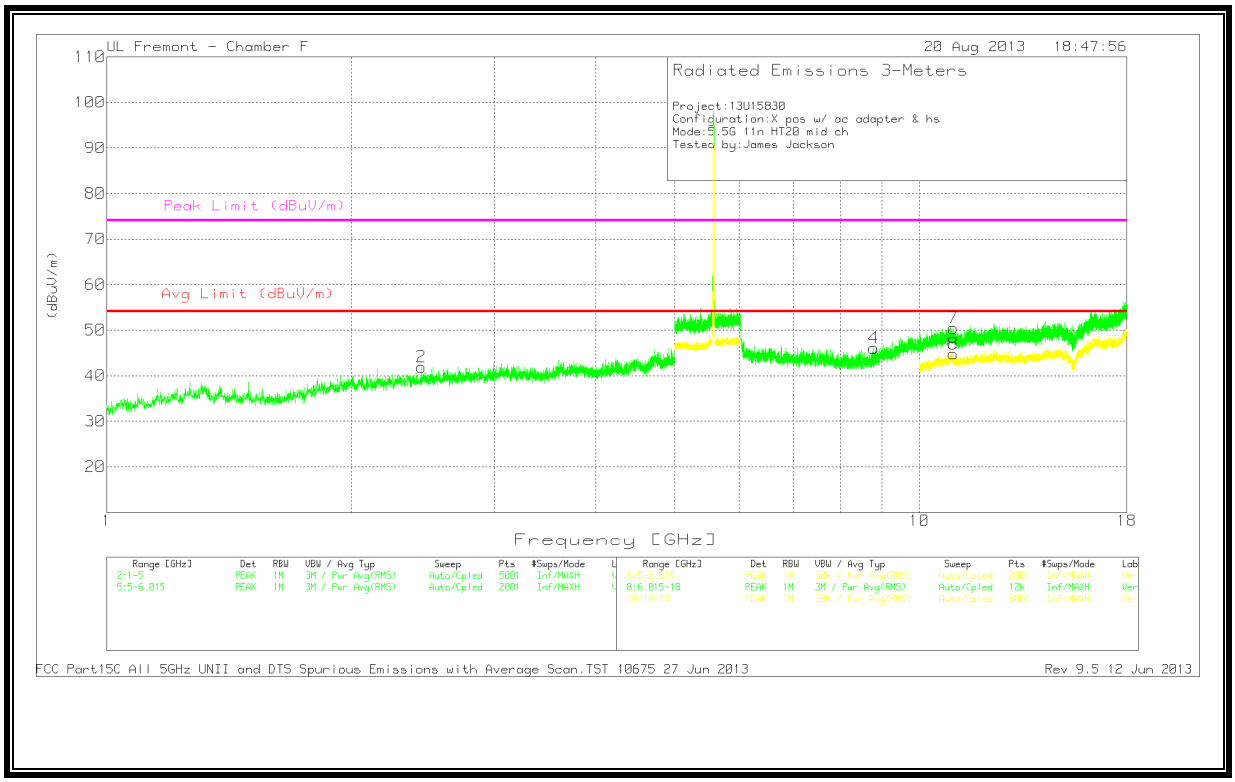
LOW CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.439	41.44	PK	32.3	-31	42.74	53.97	-11.23	74	-31.26	0-360	199	H
2	3.041	39.99	PK	33.2	-30	43.19	53.97	-10.78	74	-30.81	0-360	200	V
3	7.384	38.06	PK	35.7	-27.6	46.16	53.97	-7.81	74	-27.84	0-360	199	H
5	11.335	36.11	PK	38.7	-22.9	51.91	53.97	-2.06	74	-22.09	0-360	199	H
4	7.592	36.98	PK	35.9	-26.4	46.48	53.97	-7.49	74	-27.52	0-360	101	V
7	11.486	35.16	PK	38.8	-23.2	50.76	53.97	-3.21	74	-23.24	0-360	200	V
6	11.336	28.25	PK	38.7	-23	43.95	53.97	-10.02	74	-30.05	0-360	199	H
8	11.489	28.58	PK	38.8	-23.3	44.08	53.97	-9.89	74	-29.92	0-360	101	V

MID CHANNEL
HORIZONTAL



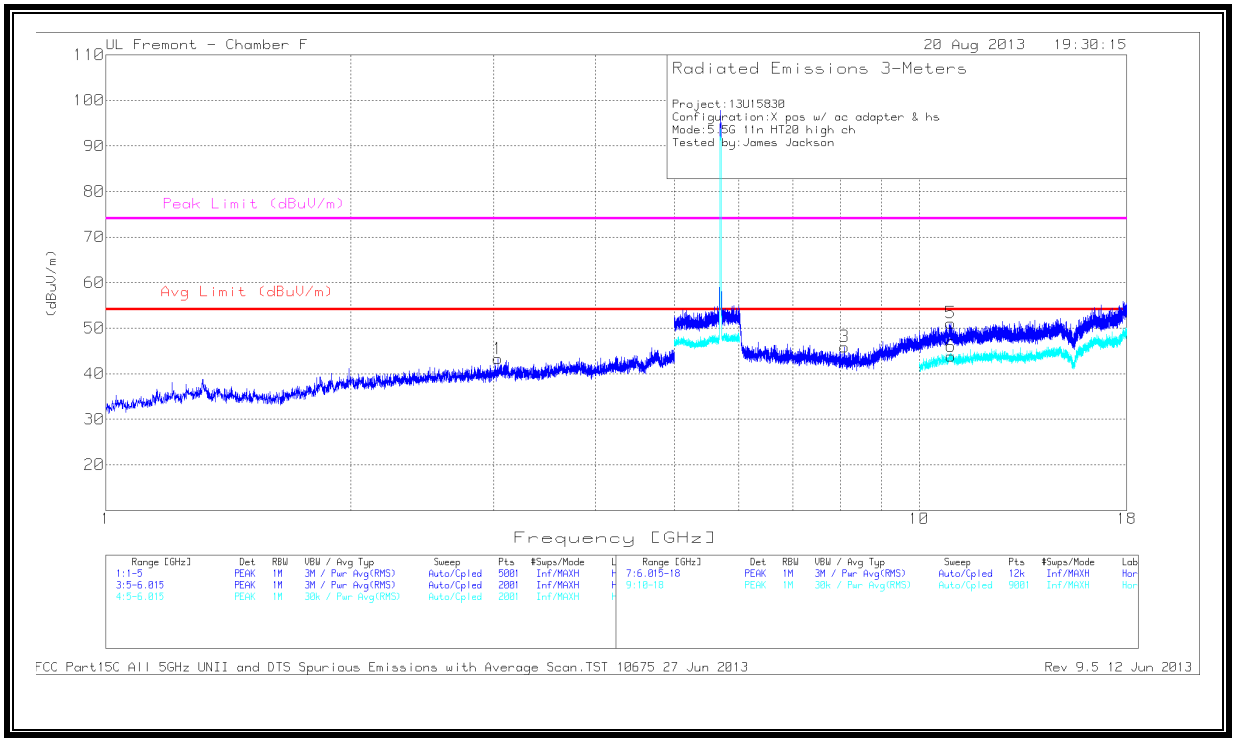
VERTICAL



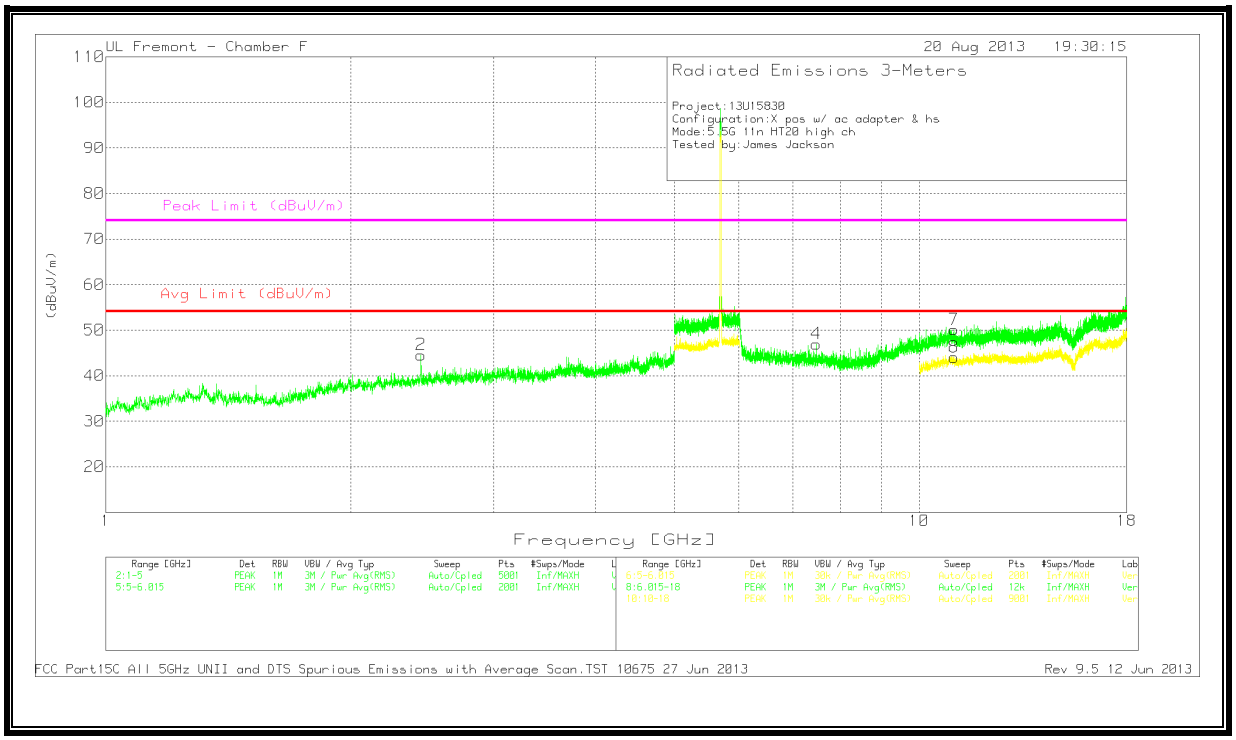
MID CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.542	40.07	PK	32.5	-30.8	41.77	53.97	-12.2	74	-32.23	0-360	100	H
2	2.44	40.63	PK	32.3	-31	41.93	53.97	-12.04	74	-32.07	0-360	201	V
3	8.56	37.49	PK	36	-26.8	46.69	53.97	-7.28	74	-27.31	0-360	199	H
5	10.902	35.52	PK	38.7	-22.3	51.92	53.97	-2.05	74	-22.08	0-360	100	H
4	8.786	36.46	PK	36.2	-26.6	46.06	53.97	-7.91	74	-27.94	0-360	201	V
7	11.011	35.02	PK	38.6	-23.1	50.52	53.97	-3.45	74	-23.48	0-360	201	V
6	10.907	28.57	PK	38.7	-22.3	44.97	53.97	-9	74	-29.03	0-360	100	H
8	11.012	29.27	PK	38.6	-23.1	44.77	53.97	-9.2	74	-29.23	0-360	200	V

HIGH CHANNEL
HORIZONTAL



VERTICAL



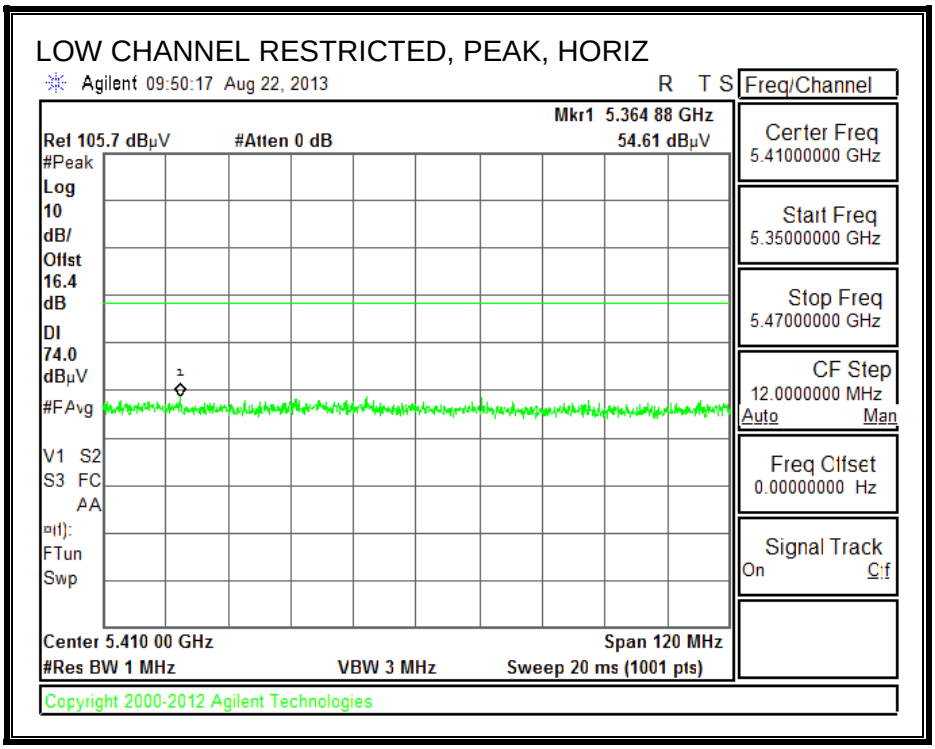
HIGH CHANNEL DATA

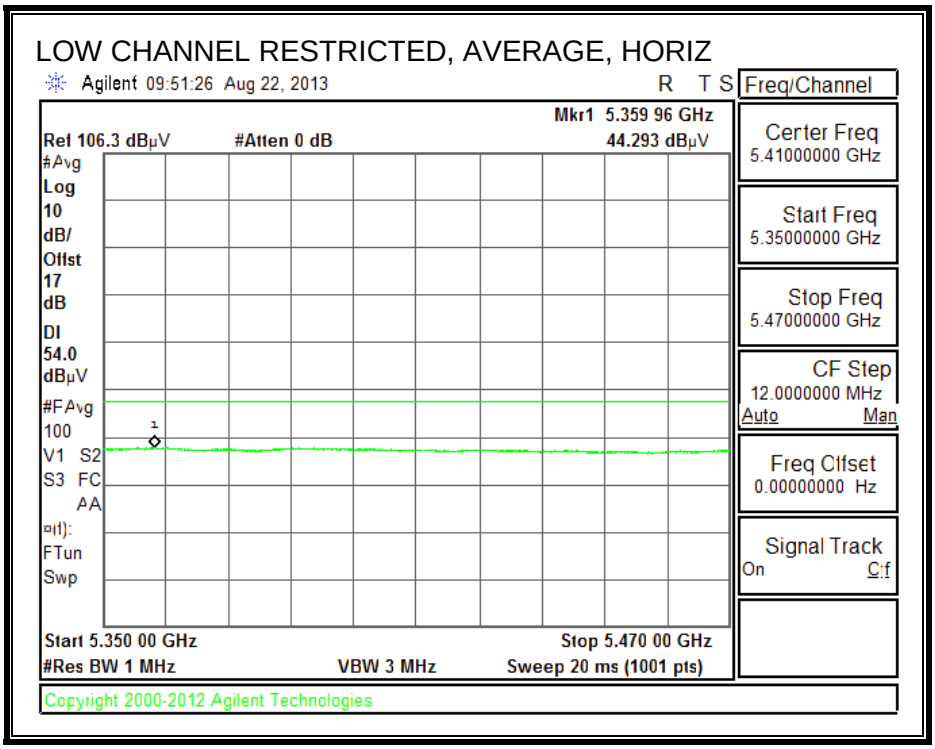
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	3.037	40.1	PK	33.2	-30	43.3	53.97	-10.67	74	-30.7	0-360	100	H
2	2.441	43.26	PK	32.3	-31	44.56	53.97	-9.41	74	-29.44	0-360	100	V
3	8.099	36.99	PK	36	-27.1	45.89	53.97	-8.08	74	-28.11	0-360	100	H
5	10.94	35	PK	38.7	-22.6	51.1	53.97	-2.87	74	-22.9	0-360	100	H
4	7.477	38.07	PK	35.8	-26.9	46.97	53.97	-7	74	-27.03	0-360	101	V
7	11.039	34.53	PK	38.6	-23	50.13	53.97	-3.84	74	-23.87	0-360	101	V
6	10.944	27.85	PK	38.7	-22.7	43.85	53.97	-10.12	74	-30.15	0-360	100	H
8	11.042	28.48	PK	38.6	-23	44.08	53.97	-9.89	74	-29.92	0-360	100	V

10.4.5. TX ABOVE 1 GHz 802.11n HT40 MODE IN THE 5.5 GHz BAND

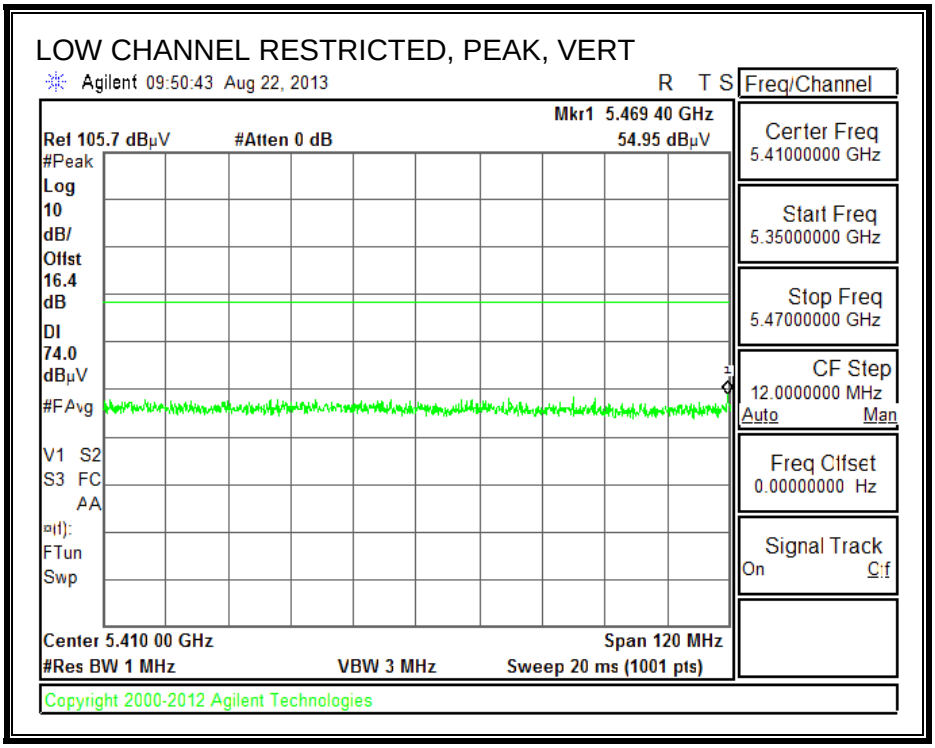
Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

RESTRICTED BANDEDGE (LOW CHANNEL)

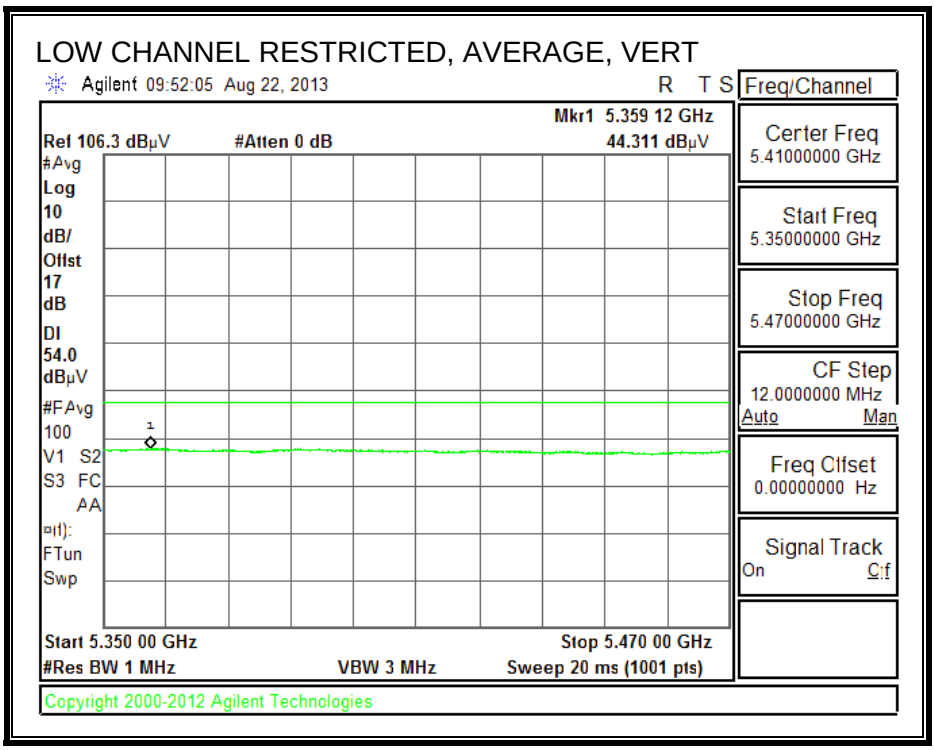




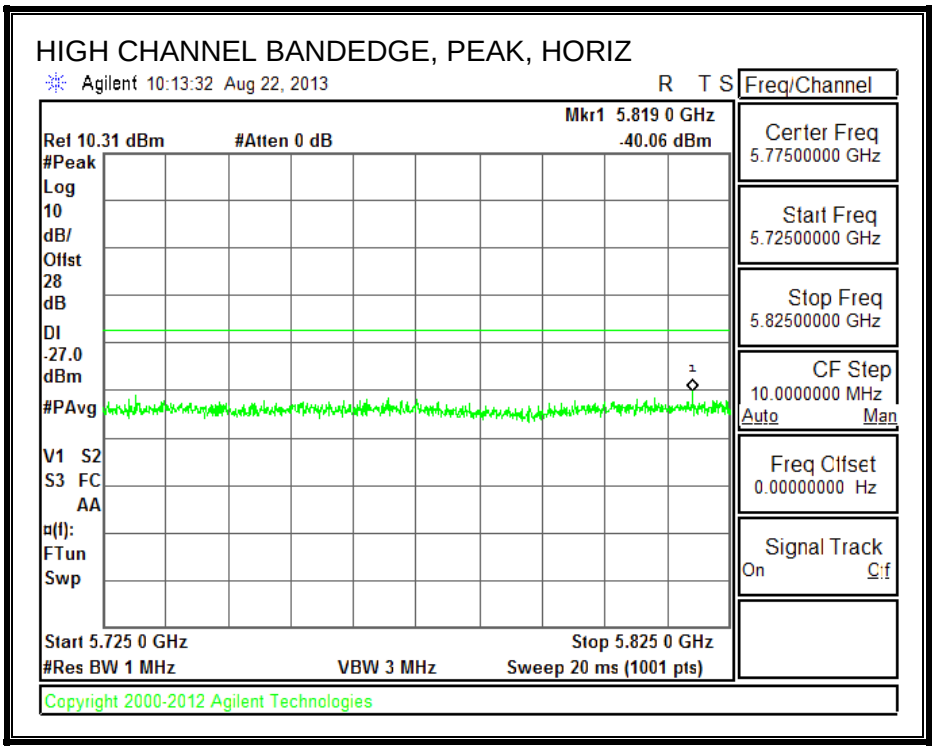
LOW CHANNEL RESTRICTED, PEAK, VERT

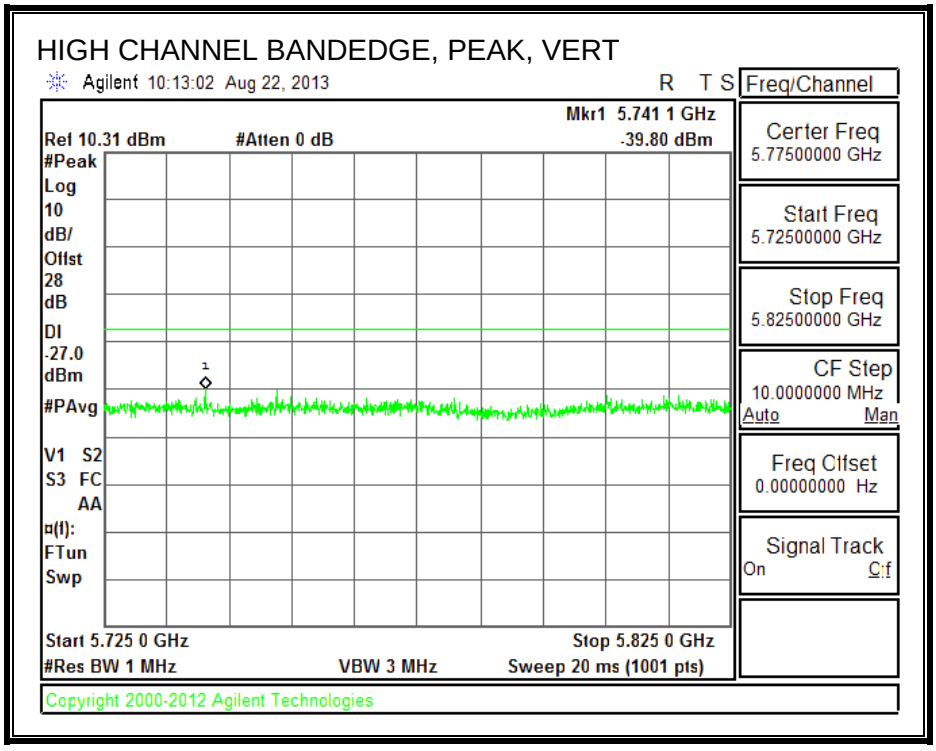


LOW CHANNEL RESTRICTED, AVERAGE, VERT



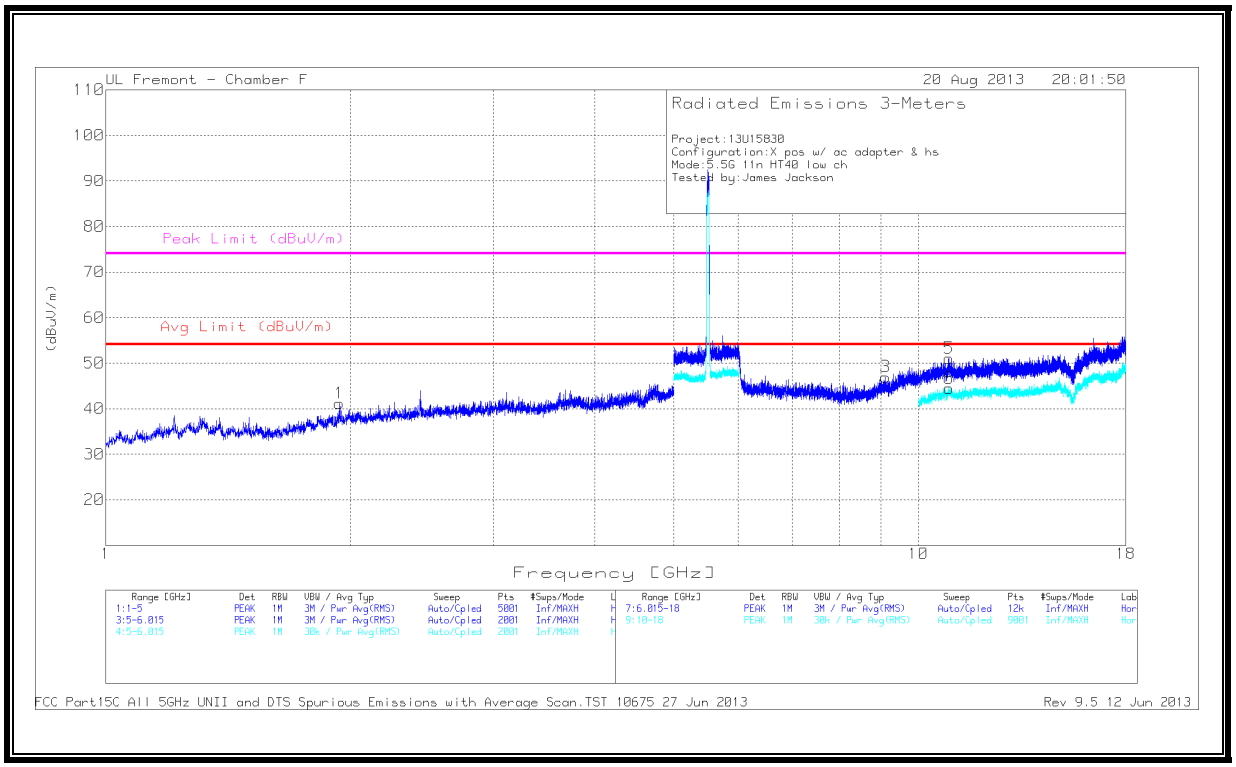
AUTHORIZED BANDEDGE (HIGH CHANNEL)



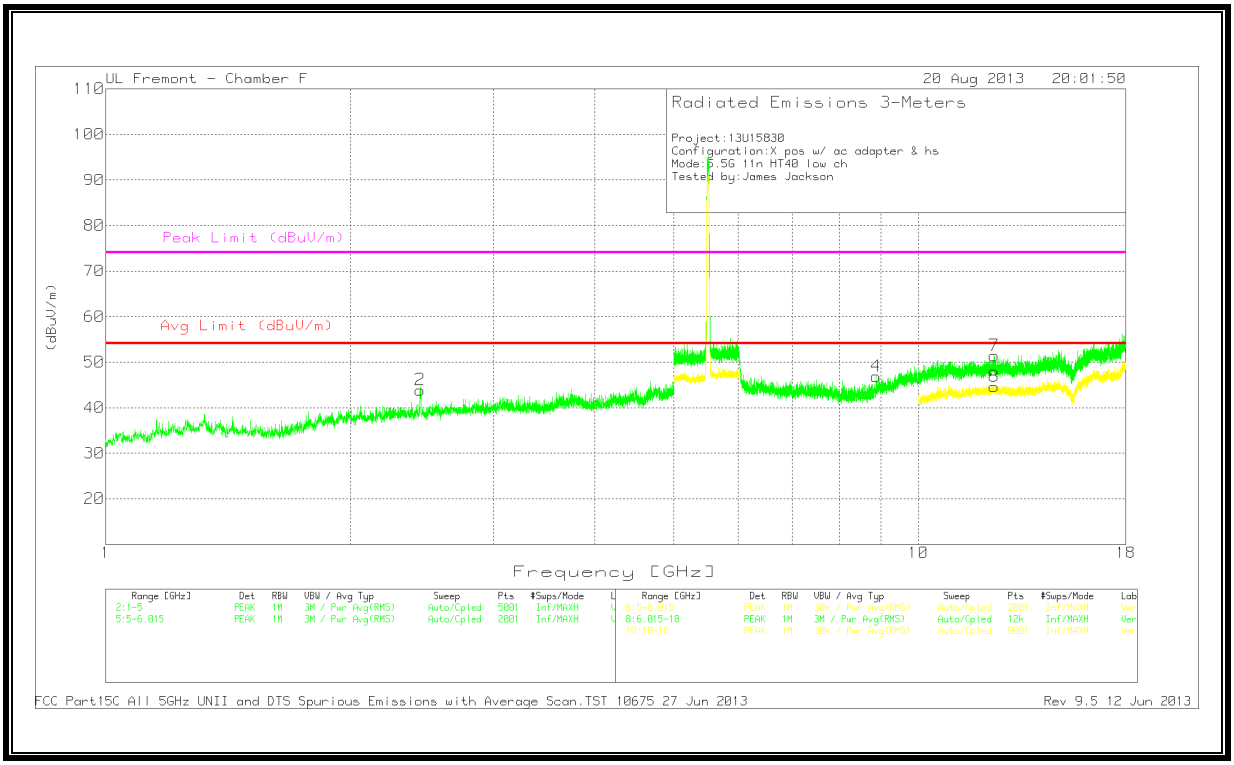


HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL
HORIZONTAL



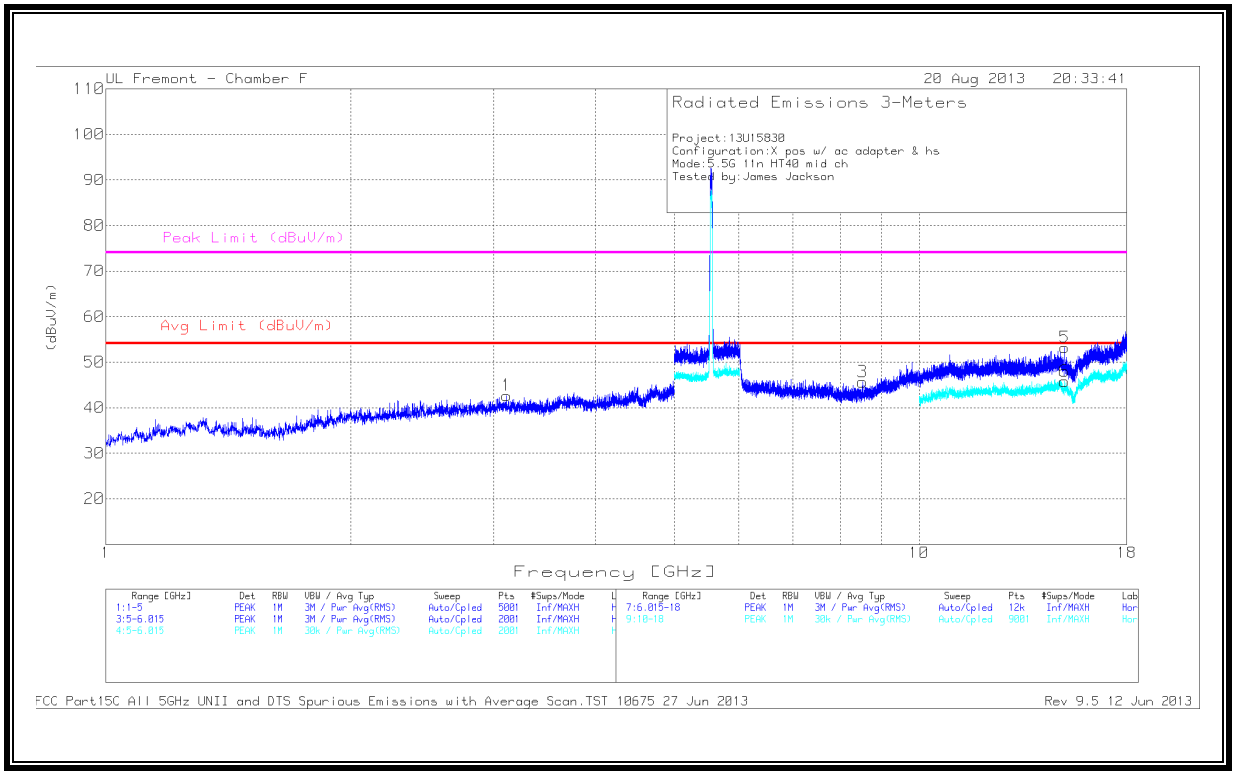
VERTICAL



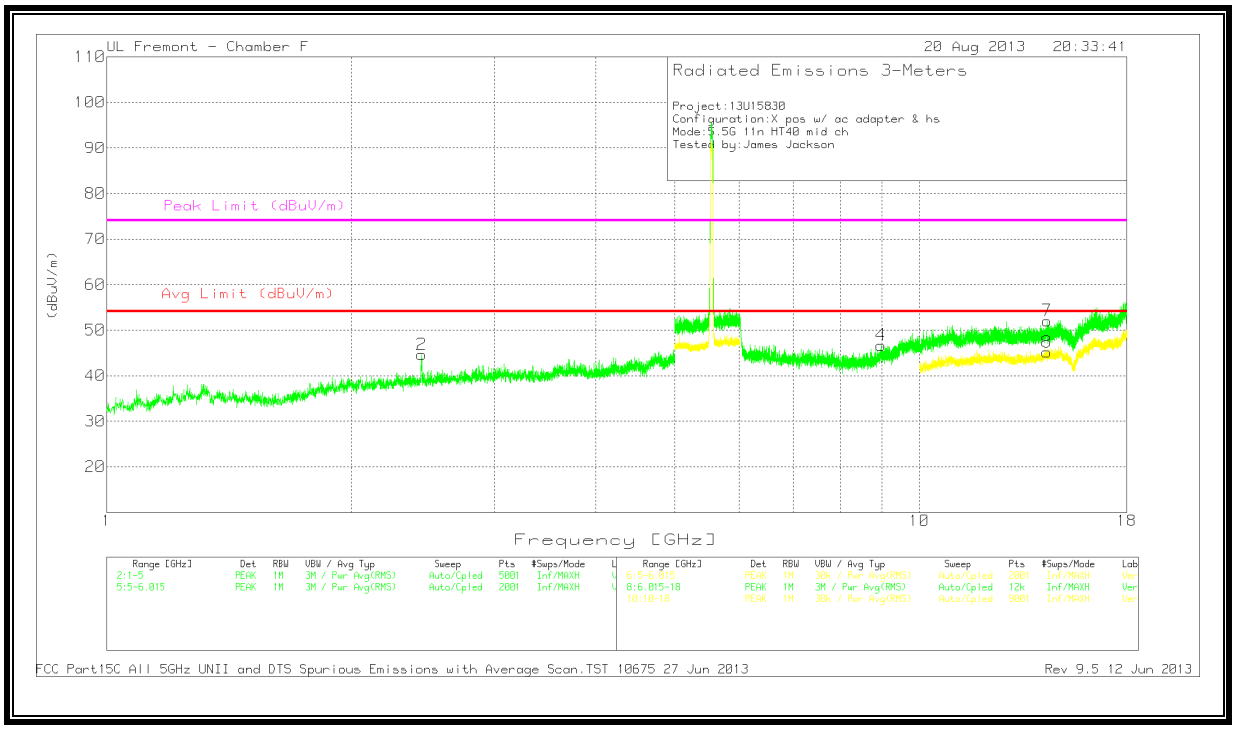
LOW CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.939	41.18	PK	31.3	-31.3	41.18	53.97	-12.79	74	-32.82	0-360	100	H
2	2.438	42.68	PK	32.3	-31.1	43.88	53.97	-10.09	74	-30.12	0-360	200	V
3	9.107	35.57	PK	36.4	-25	46.97	53.97	-7	74	-27.03	0-360	199	H
5	10.91	34.53	PK	38.7	-22.2	51.03	53.97	-2.94	74	-22.97	0-360	100	H
4	8.874	36.51	PK	36.3	-25.9	46.91	53.97	-7.06	74	-27.09	0-360	101	V
7	12.396	35.35	PK	39.3	-23.2	51.45	53.97	-2.52	74	-22.55	0-360	201	V
6	10.909	27.98	PK	38.7	-22.2	44.48	53.97	-9.49	74	-29.52	0-360	100	H
8	12.394	28.65	PK	39.3	-23.3	44.65	53.97	-9.32	74	-29.35	0-360	201	V

MID CHANNEL
HORIZONTAL



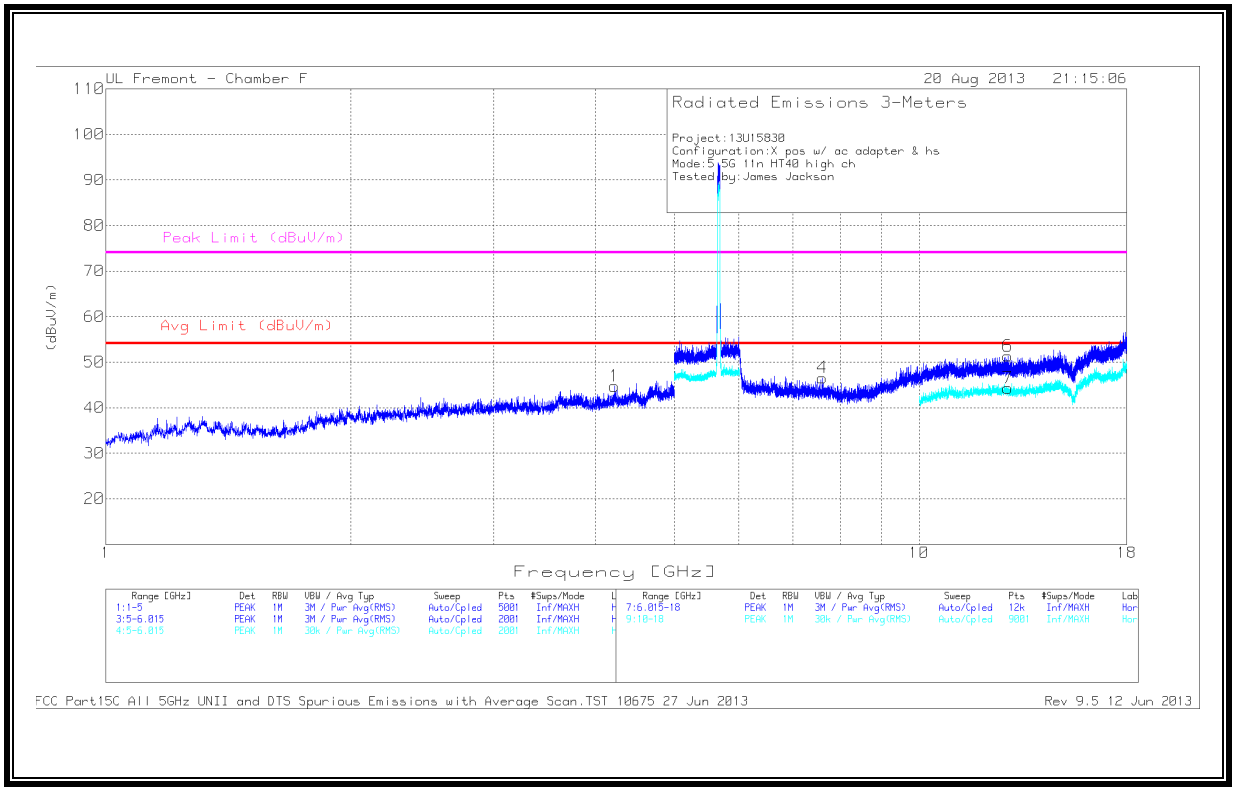
VERTICAL



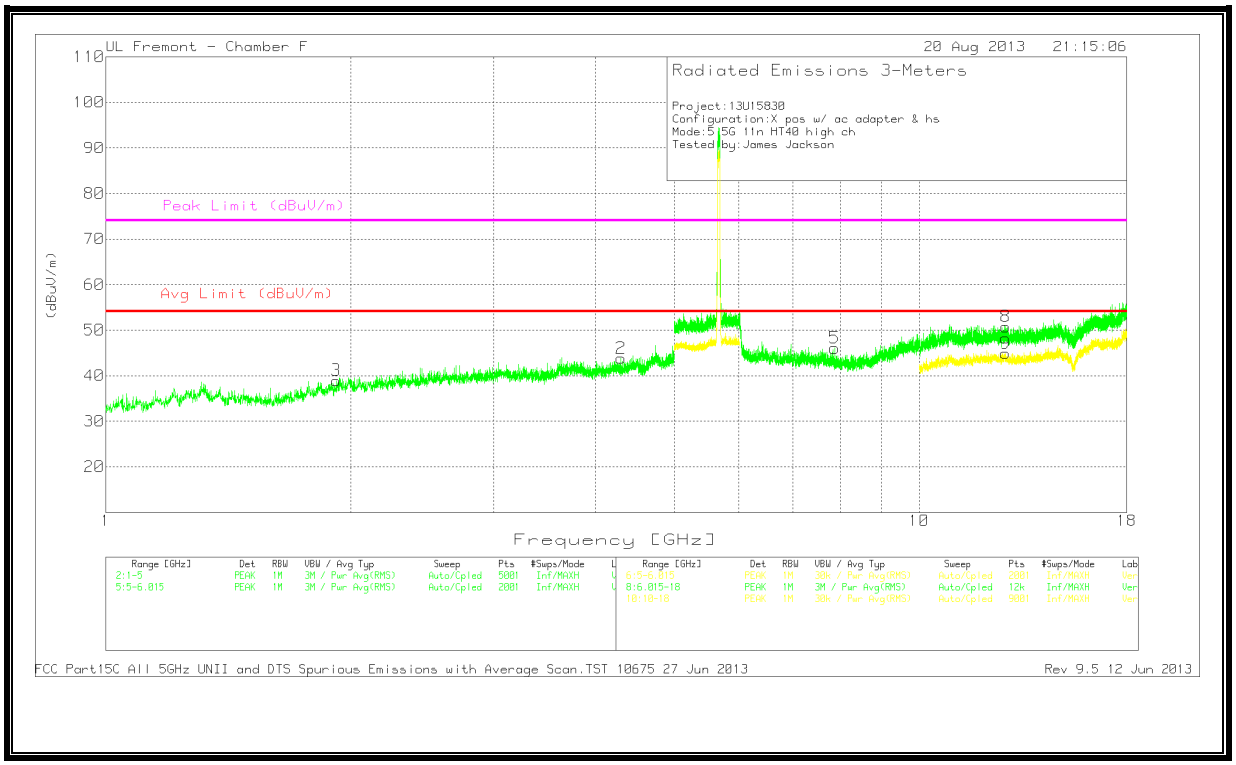
MID CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	3.111	39.08	PK	33.3	-29.7	42.68	53.97	-11.29	74	-31.32	0-360	100	H
2	2.442	43.34	PK	32.3	-31	44.64	53.97	-9.33	74	-29.36	0-360	200	V
3	8.522	36.96	PK	36	-27.3	45.66	53.97	-8.31	74	-28.34	0-360	199	H
5	15.097	37.53	PK	40.2	-24.5	53.23	53.97	-.74	74	-20.77	0-360	100	H
4	8.972	35.3	PK	36.3	-24.9	46.7	53.97	-7.27	74	-27.3	0-360	101	V
7	14.369	37.05	PK	39.8	-24.8	52.05	53.97	-1.92	74	-21.95	0-360	101	V
6	15.095	30.2	PK	40.2	-24.6	45.8	53.97	-8.17	74	-28.2	0-360	199	H
8	14.357	30.69	PK	39.8	-25.3	45.19	53.97	-8.78	74	-28.81	0-360	201	V

HIGH CHANNEL
HORIZONTAL



VERTICAL



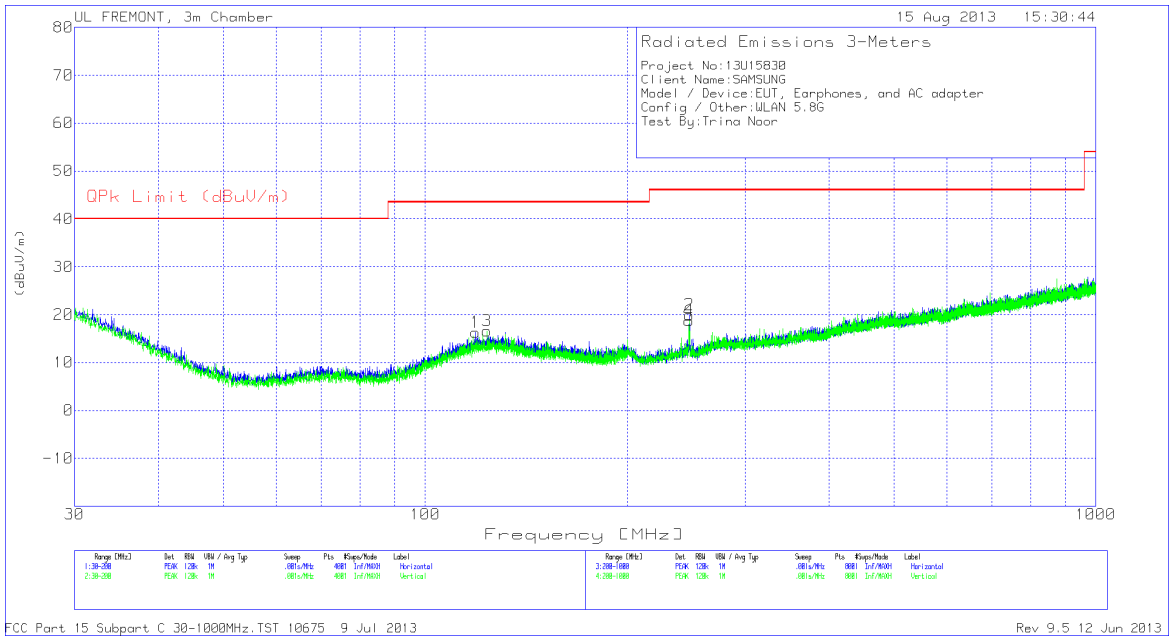
HIGH CHANNEL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	4.222	39.06	PK	33.4	-27.7	44.76	53.97	-9.21	74	-29.24	0-360	100	H
2	4.3	38.64	PK	33.5	-28.3	43.84	53.97	-10.13	74	-30.16	0-360	201	V
3	1.921	39.32	PK	31.2	-31.6	38.92	53.97	-15.05	74	-35.08	0-360	100	V
4	7.608	37.14	PK	35.9	-26.5	46.54	53.97	-7.43	74	-27.46	0-360	100	H
6	12.855	35.94	PK	39.4	-24	51.34	53.97	-2.63	74	-22.66	0-360	100	H
5	7.873	37.48	PK	35.9	-27.3	46.08	53.97	-7.89	74	-27.92	0-360	100	V
8	12.777	35.45	PK	39.5	-24.2	50.75	53.97	-3.22	74	-23.25	0-360	100	V
7	12.863	28.95	PK	39.4	-24	44.35	53.97	-9.62	74	-29.65	0-360	100	H
9	12.773	29.62	PK	39.5	-24.2	44.92	53.97	-9.05	74	-29.08	0-360	101	V

11. WORST-CASE BELOW 1 GHz (in the 5.3 GHz Band)

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

HORIZONTAL PLOT



Worst Case Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)
1	118.7825	29.04	PK	13.9	-26.6	16.34	43.52	-27.18
3	123.585	29.13	PK	14.1	-26.6	16.63	43.52	-26.89
2	247.8	33.85	PK	11.5	-25.4	19.95	46.02	-26.07
4	247.5	32.51	PK	11.6	-25.4	18.71	46.02	-27.31

12. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

Frequency of Emission (MHz)	Conducted Limit (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

6 WORST EMISSIONS

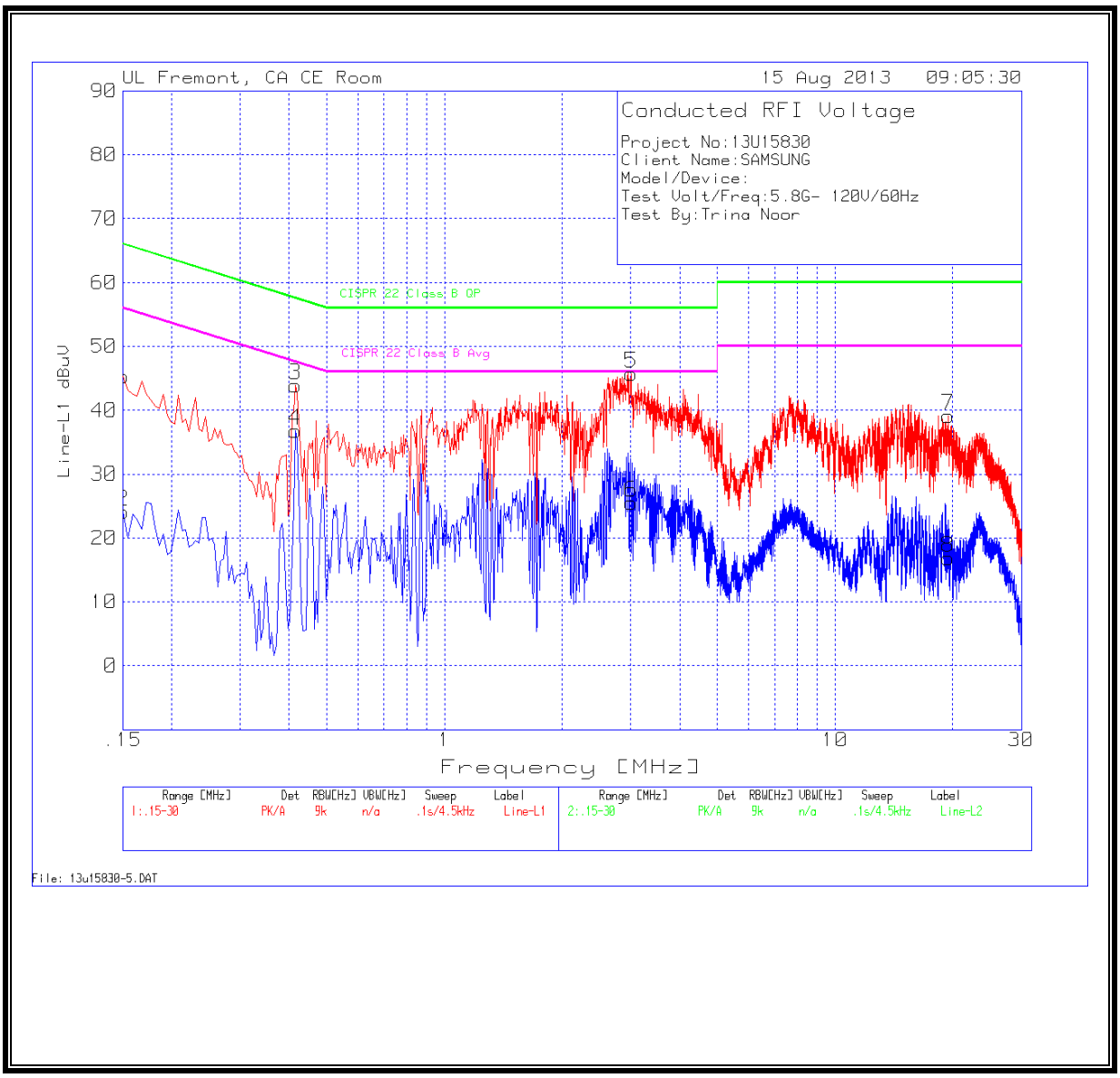
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1 (dB)	LC Cables 1&3 (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin to Limit (dB)	CISPR 22 Class B Avg	Margin t Limit (dI
1	.15	45.19	PK	.1	0	45.29	66	-20.71	-	-
2	.15	24.07	Av	.1	0	24.17	-	-	56	-31.83
3	.4155	43.84	PK	.1	0	43.94	57.5	-13.56	-	-
4	.4155	36.66	Av	.1	0	36.76	-	-	47.5	-10.74
5	3.003	45.58	PK	.1	.1	45.78	56	-10.22	-	-
6	3.003	25.32	Av	.1	.1	25.52	-	-	46	-20.48
7	19.446	38.74	PK	.2	.2	39.14	60	-20.86	-	-
8	19.446	16.45	Av	.2	.2	16.85	-	-	50	-33.15

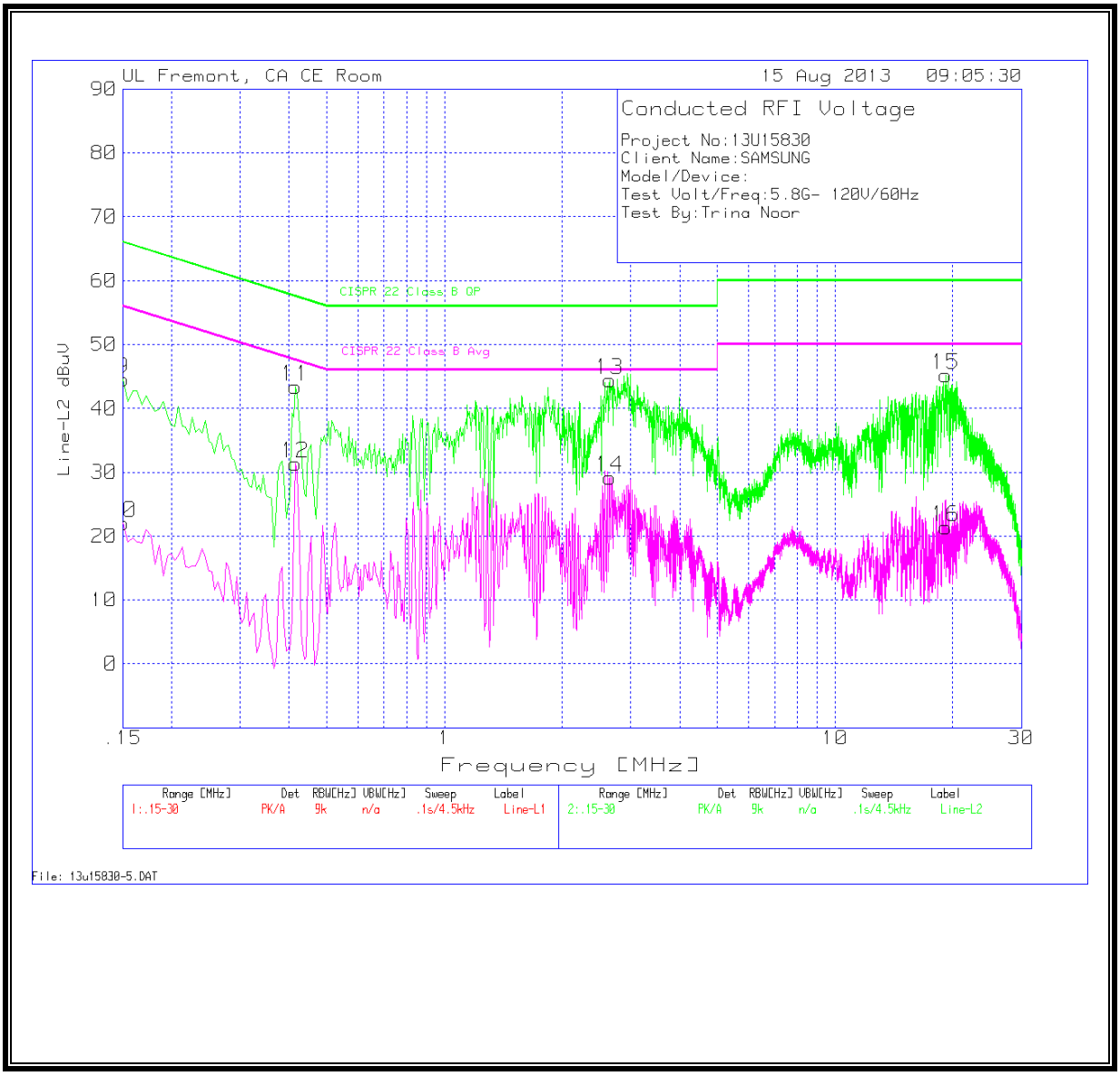
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2 (dB)	LC Cables 2&3 (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin to Limit (dB)	CISPR 22 Class B Avg	Margin t Limit (dB
9	.15	44.51	PK	.1	0	44.61	66	-21.39	-	-
10	.15	21.91	Av	.1	0	22.01	-	-	56	-33.99
11	.4155	43.27	PK	.1	0	43.37	57.5	-14.13	-	-
12	.4155	31.22	Av	.1	0	31.32	-	-	47.5	-16.18
13	2.6475	44.25	PK	.1	.1	44.45	56	-11.55	-	-
14	2.6475	29.02	Av	.1	.1	29.22	-	-	46	-16.78
15	19.1895	44.73	PK	.3	.2	45.23	60	-14.77	-	-
16	19.1895	20.88	Av	.3	.2	21.38	-	-	50	-28.62

LINE 1 RESULTS



LINE 2 RESULTS



13. DYNAMIC FREQUENCY SELECTION

13.1. OVERVIEW

13.1.1. 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”.

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 Mode		
	Master	Client **(without DFS)**	Client **(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-Service Monitoring

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.		

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 Type	Pulse Width (Microseconds)	PRI (Microseconds)	Pulses	Minimum Percentage of Successful Detection	Minimum Trials
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 (Radar Types 1-4)				80%	120

Table 6 – Long Pulse Radar Test Signal

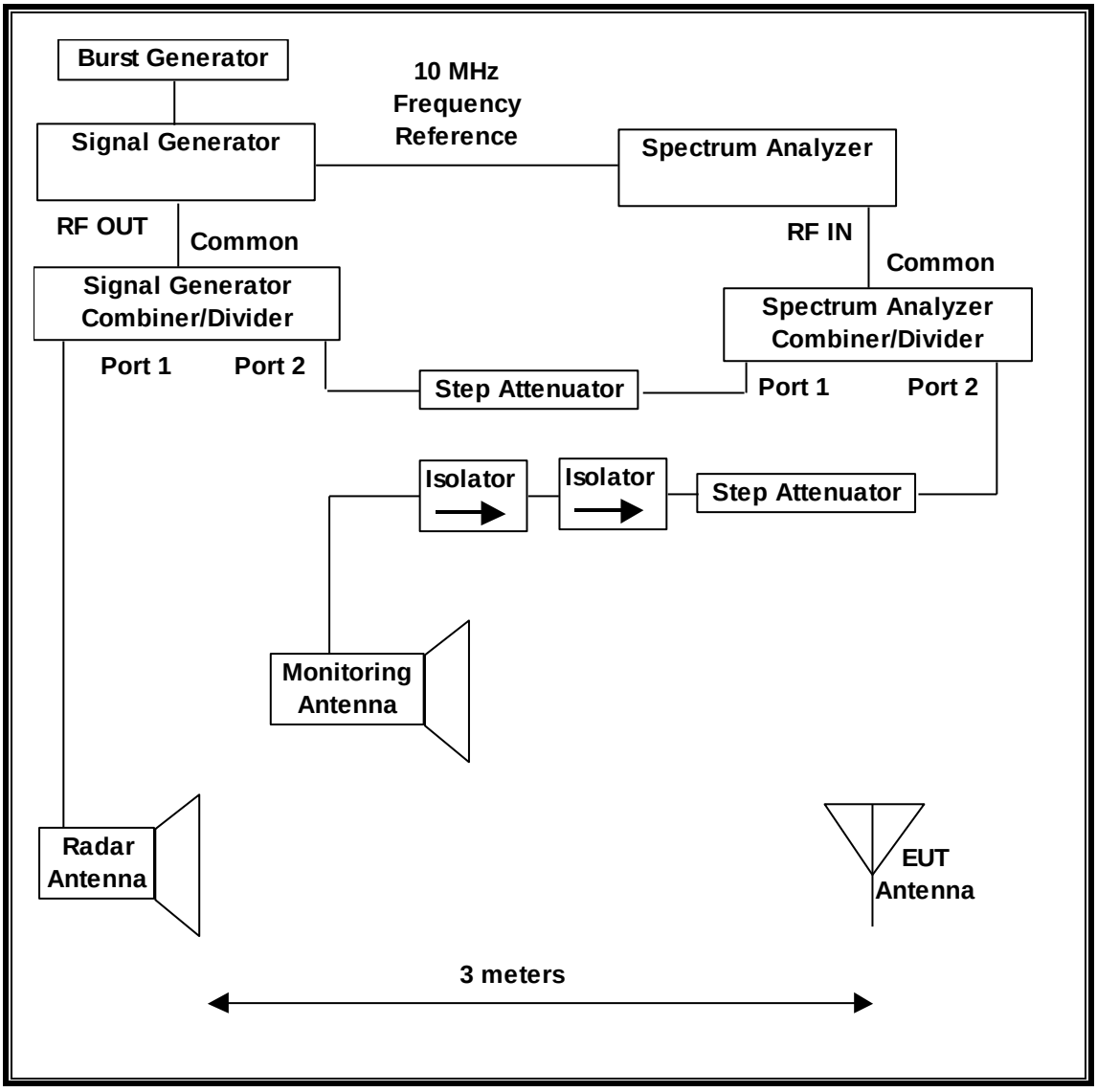
Radar Waveform	Bursts	Pulses per Burst	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µsec)	Minimum Percentage of Successful Detection	Minimum Trials
5	8-20	1-3	50-100	5-20	1000-2000	80%	30

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

13.1.2. TEST AND MEASUREMENT SYSTEM

RADIATED METHOD SYSTEM BLOCK DIAGRAM



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 run-time.

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 Freqeuncy 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.

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.

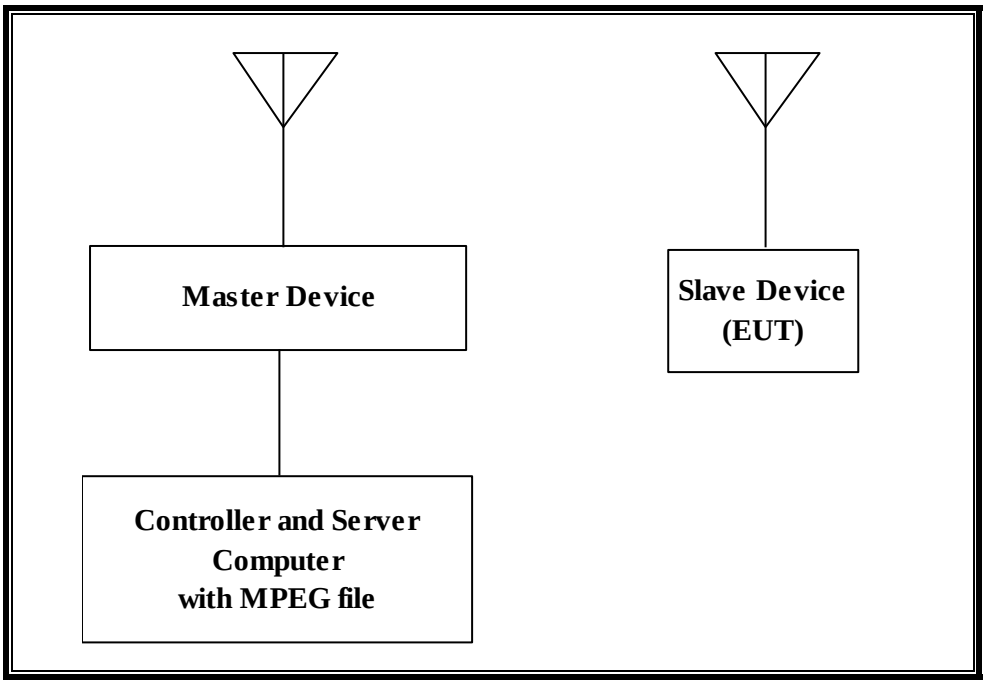
TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial 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

13.1.3. SETUP OF EUT

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-K9	FTX120690N2	LDK102061
AC Adapter (AP)	Delta Electronics	EADP-45BB B	DTH112490BD	DoC
Notebook PC (Controller/Server)	Dell	PP18L	10657517725	DoC
AC Adapter (Controller/Server PC)	Dell	LA65SN0-00	CN-ODF263-71615-6AU-1019	DoC

13.1.4. 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 is 6.84 dBm EIRP in the 5470-5725 MHz band.

The only antenna assembly utilized with the EUT has a gain of -0.28 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 EUT uses one transmitter/receiver chain 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 the MX media player.

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

The EUT utilizes the 802.11a/n architecture. One nominal channel bandwidth, 20 MHz, is implemented.

The software installed in the access point is C105S revision 001.

UNIFORM CHANNEL SPREADING

This requirement is not applicable to Slave radio devices.

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.

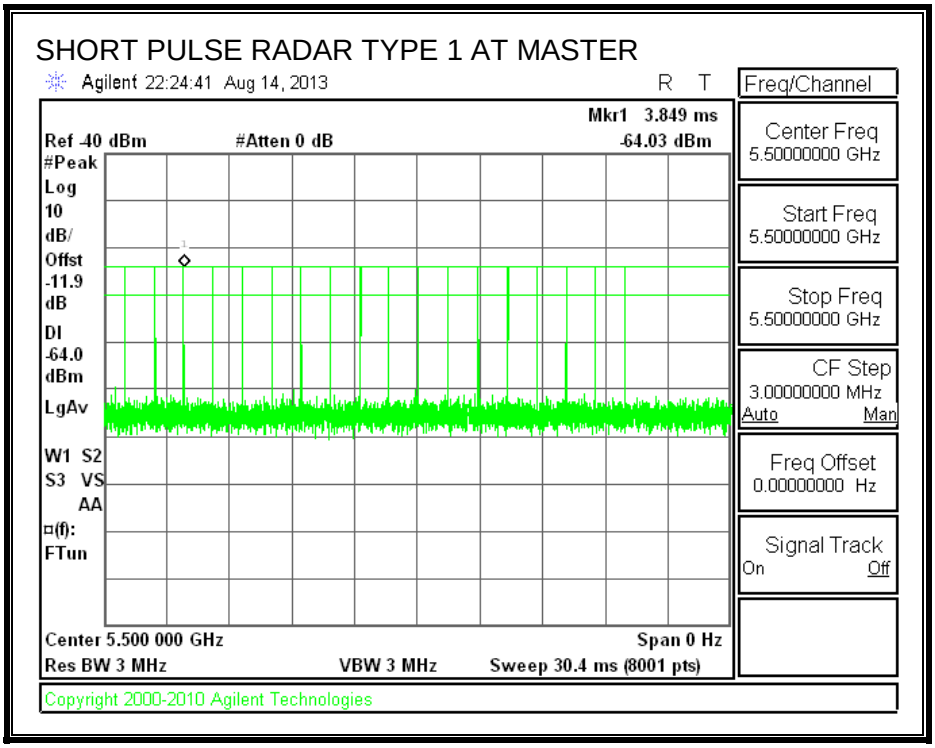
13.2. RESULTS FOR 20 MHz BANDWIDTH

13.2.1. TEST CHANNEL

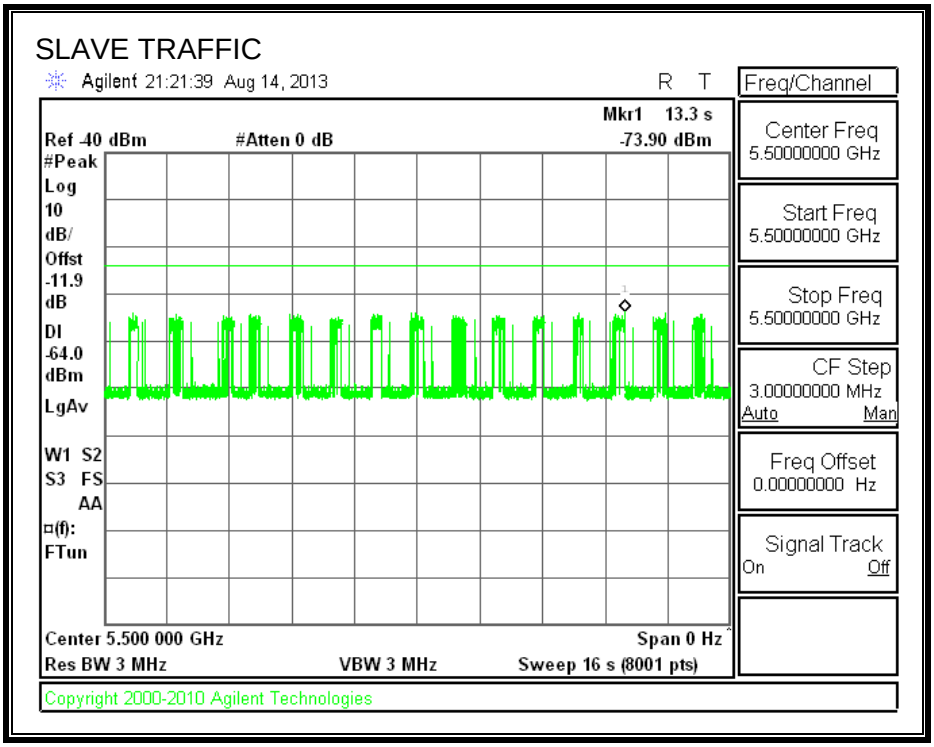
All tests were performed at a channel center frequency of 5500 MHz.

13.2.2. RADAR WAVEFORM AND TRAFFIC

RADAR WAVEFORM



TRAFFIC



13.2.3. OVERLAPPING CHANNEL TESTS

RESULTS

These tests are not applicable.

13.2.4. 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).

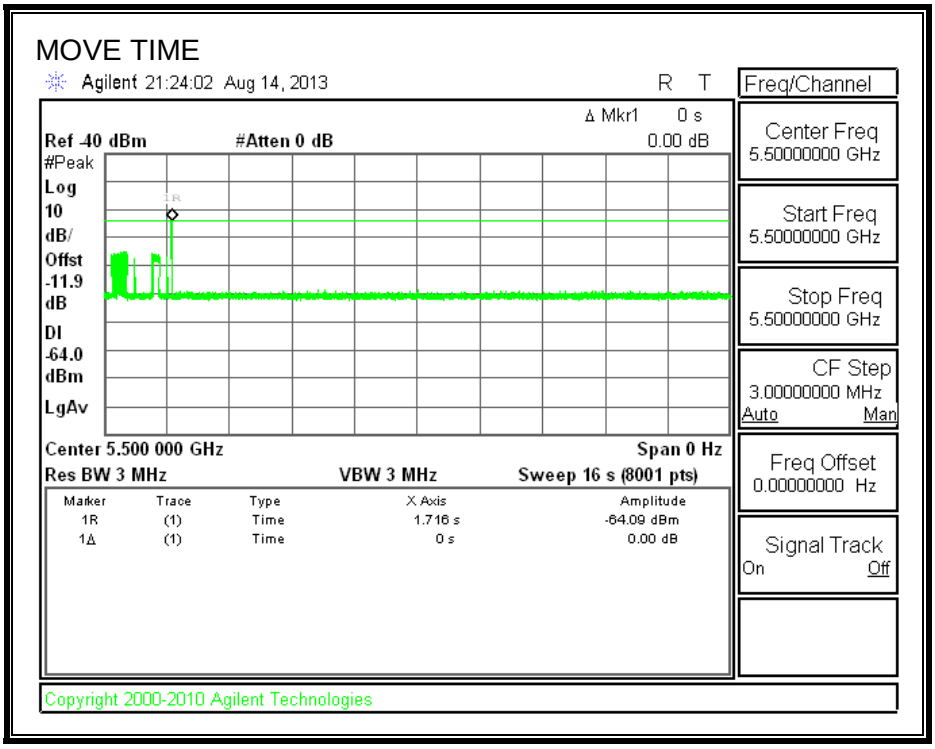
The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

RESULTS

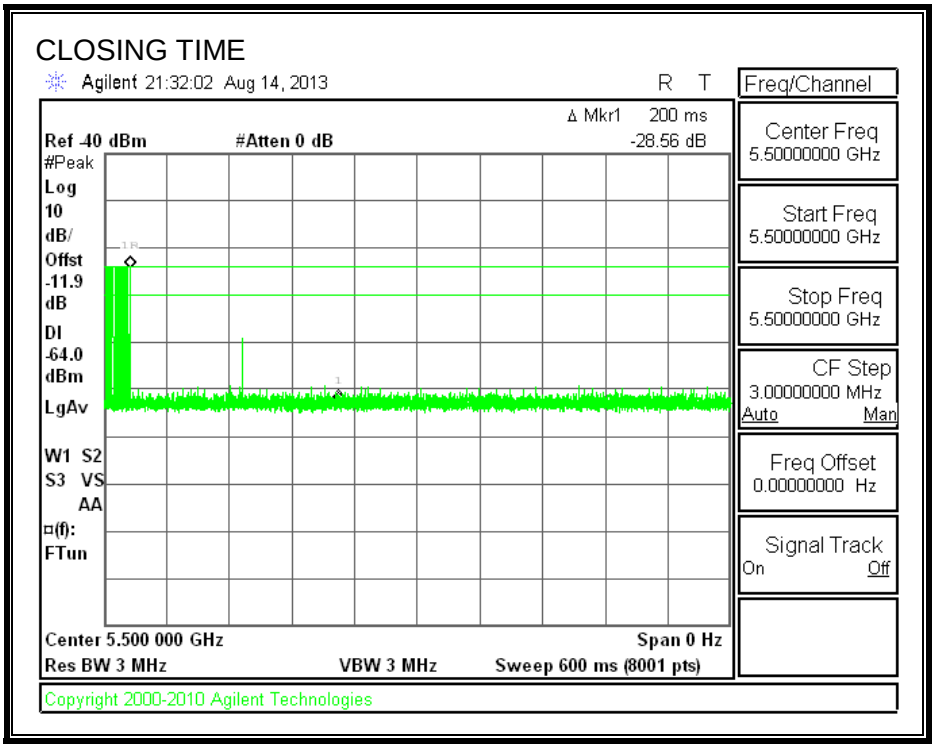
Agency	Channel Move Time (sec)	Limit (sec)
FCC / IC	0.000	10

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

MOVE TIME



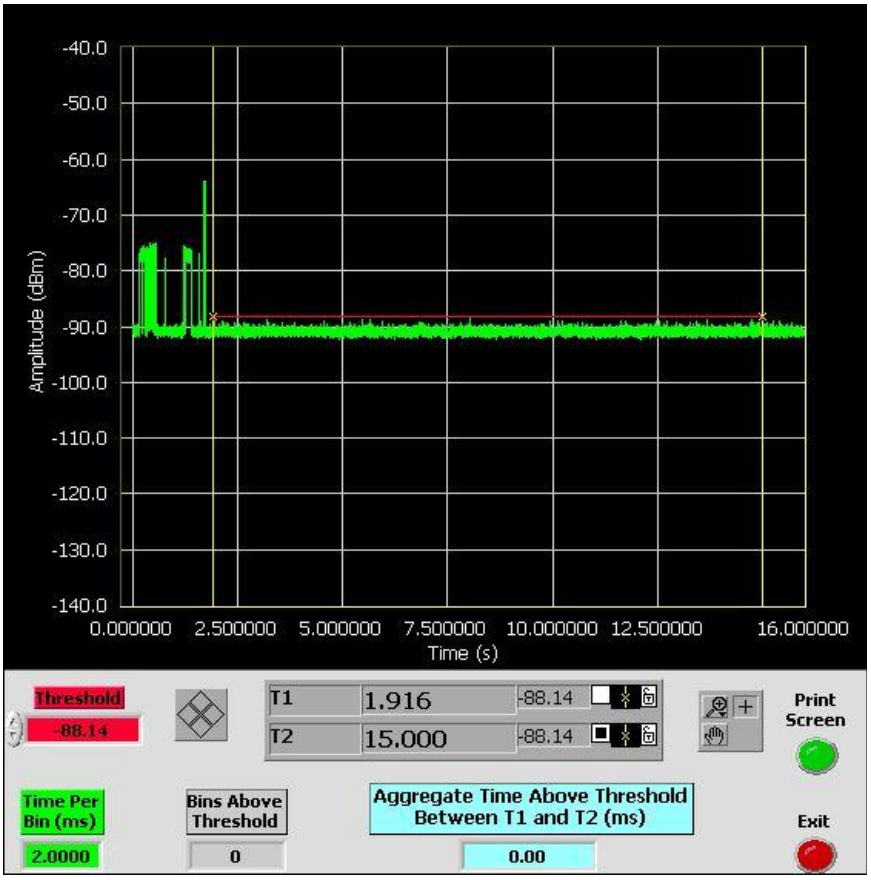
CHANNEL CLOSING TIME



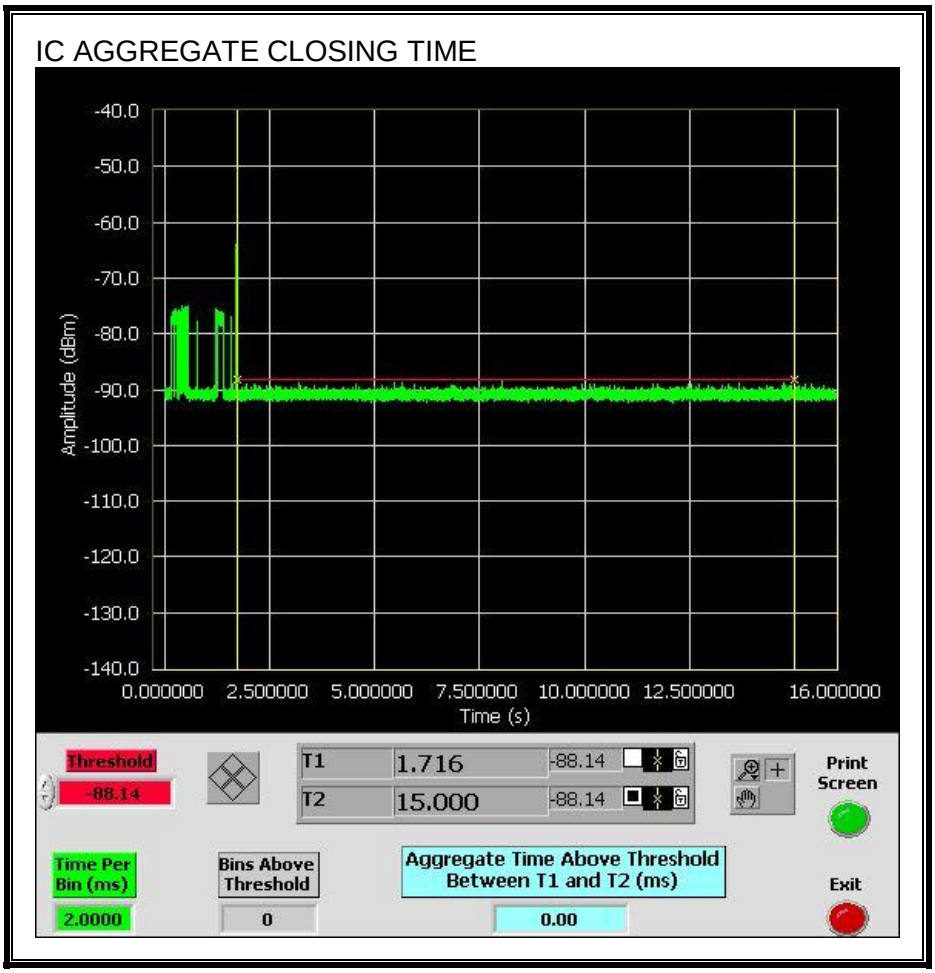
AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

No transmissions are observed during the FCC aggregate monitoring period.

FCC AGGREGATE CLOSING TIME



No transmissions are observed during the IC aggregate monitoring period.



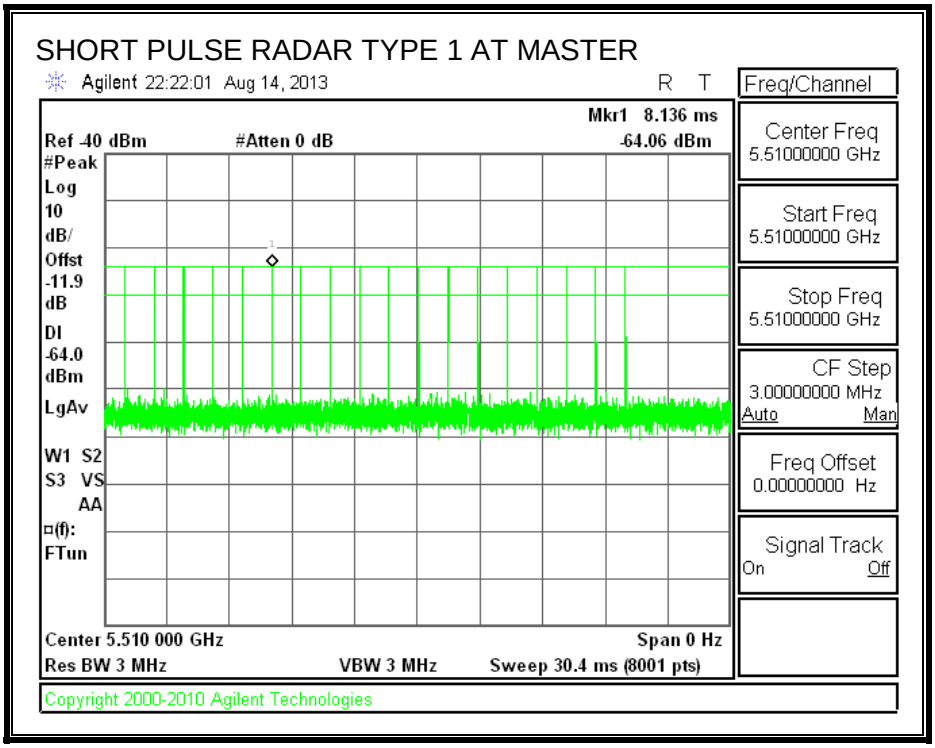
13.3. RESULTS FOR 40 MHz BANDWIDTH

13.3.1. TEST CHANNEL

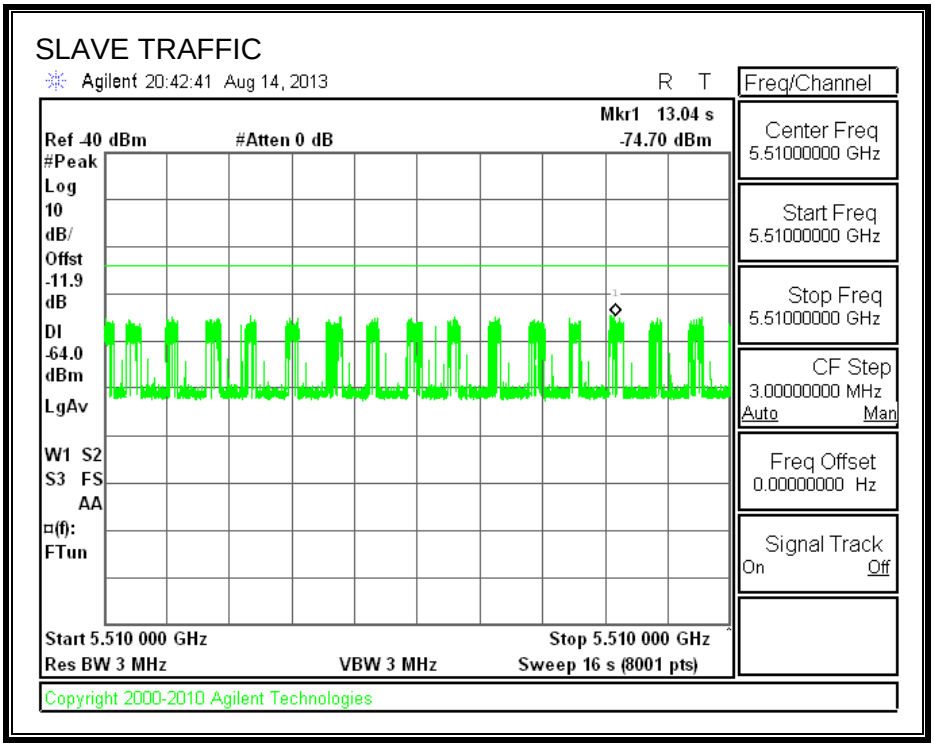
All tests were performed at a channel center frequency of 5510 MHz.

13.3.2. RADAR WAVEFORM AND TRAFFIC

RADAR WAVEFORM



TRAFFIC



13.3.3. OVERLAPPING CHANNEL TESTS

RESULTS

These tests are not applicable.

13.3.4. 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).

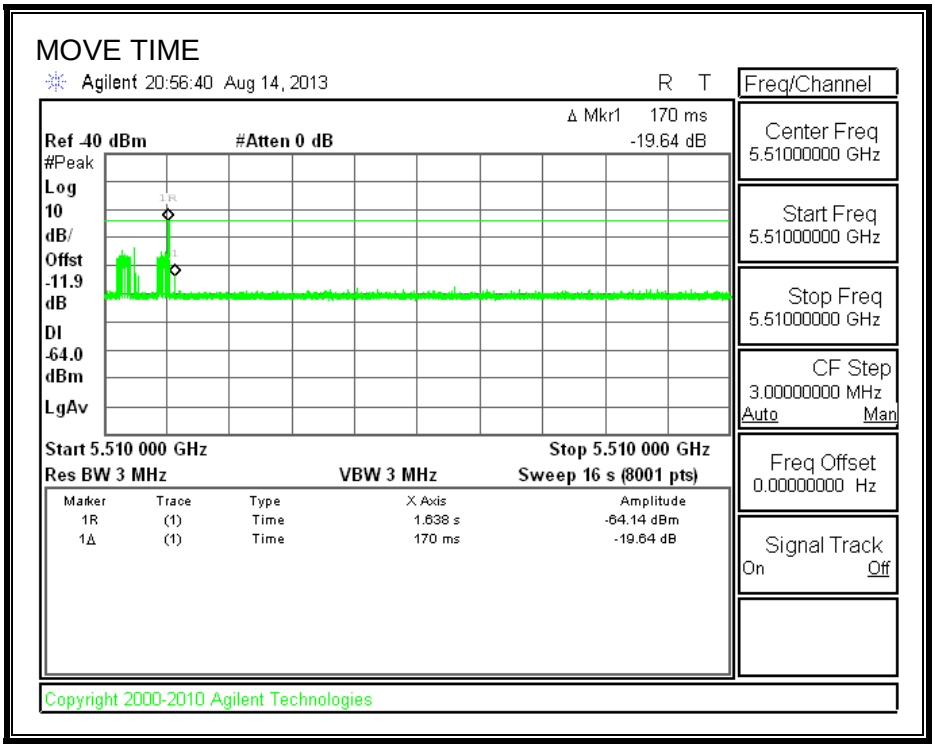
The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

RESULTS

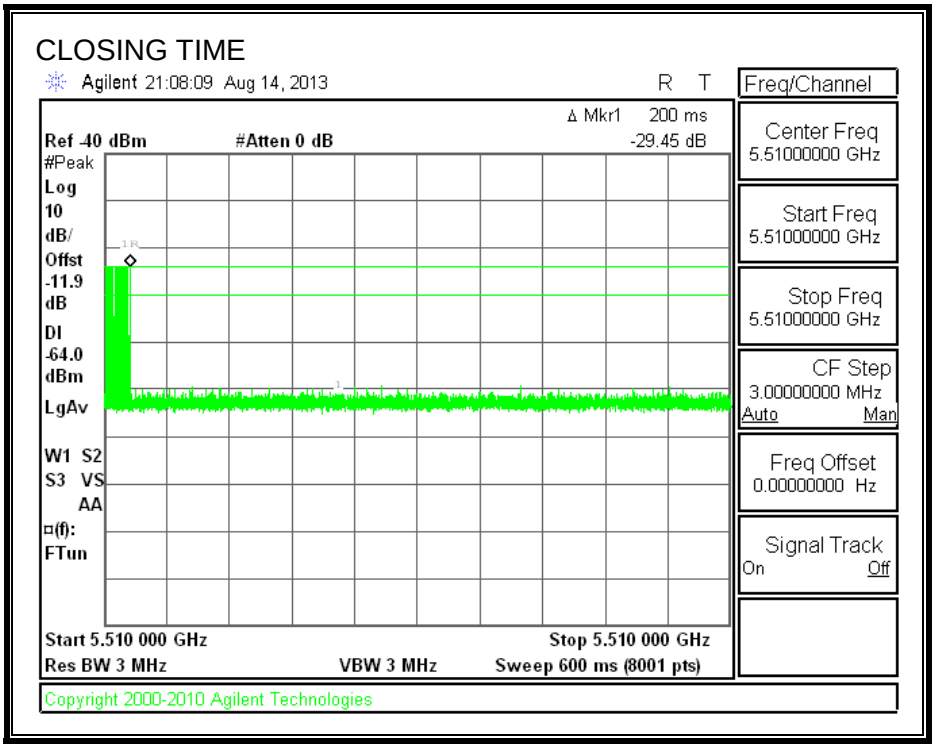
Agency	Channel Move Time (sec)	Limit (sec)
FCC / IC	0.170	10

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

MOVE TIME



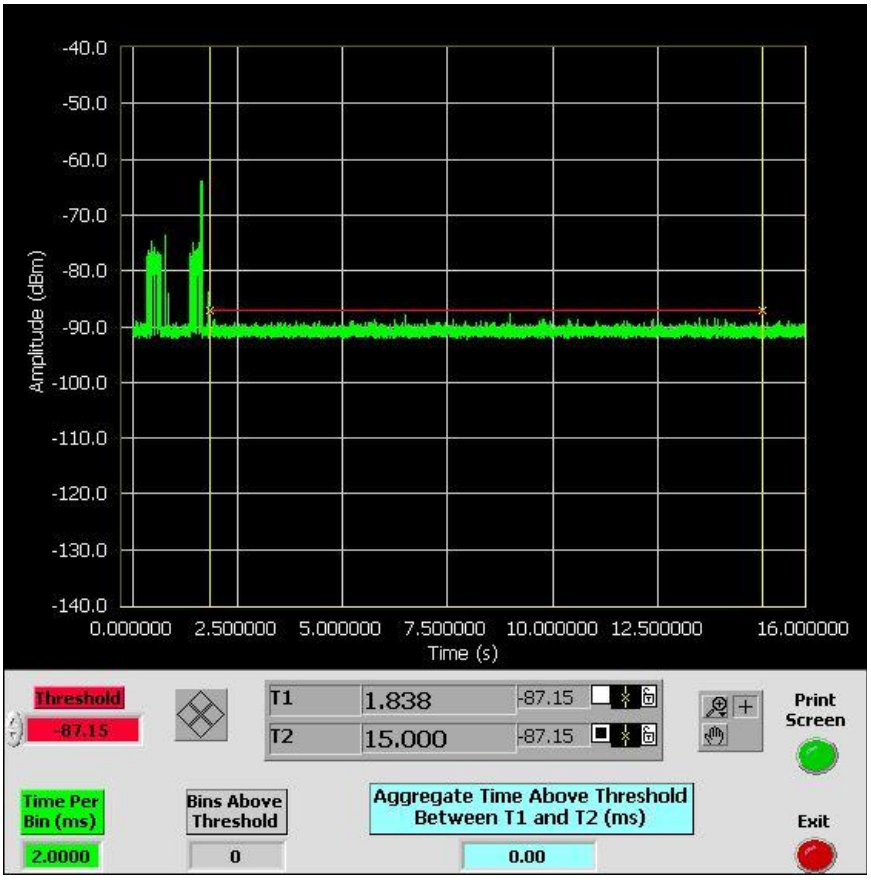
CHANNEL CLOSING TIME



AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

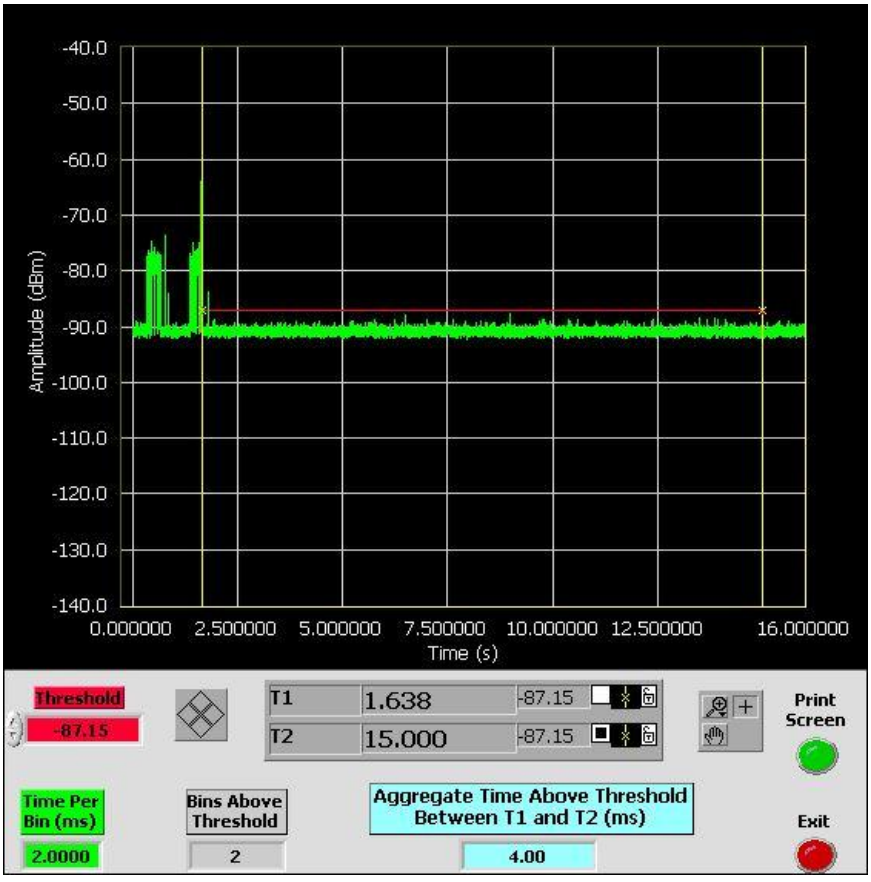
No transmissions are observed during the FCC aggregate monitoring period.

FCC AGGREGATE CLOSING TIME



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

IC AGGREGATE CLOSING TIME



13.3.5. NON-OCCUPANCY PERIOD

RESULTS

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