FCC 47 CFR PART 15 SUBPART E

CERTIFICATION TEST REPORT
CLASS II PERMISSIVE CHANGE

FOR

QUAD-BAND RADIO WITH WLAN AND BT RADIO

MODEL NUMBER: MODEL NUMBER: A1456, A1532

FCC ID: BCG-E2644A

REPORT NUMBER: 15U21850-E1V2

ISSUE DATE: NOVEMBER 23, 2015

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

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

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	11/16/2015	Initial Issue	C. Pang
V2	11/23/2015	Revised report to address TCB's questions	T. Chu

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: QUAD-BAND RADIO WITH WLAN AND BT RADIO

MODEL: A1456, A1532

SERIAL NUMBER: C7JK50SEFFYS (Conducted), C7JKP0D1FLTM (Radiated)

DATE TESTED: SEPTEMBER 23, 2015 -- SEPTEMBER 25, 2015

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:

CHIN PANG
SENIOR ENGINEER
UL VERIFICATION SERVICES INC.

Tested By:

ERIC YU
EMC LAB ENGINEER
UL VERIFICATION SERVICES INC.

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, FCC 14-30, FCC KDB 789033 D02 v01, ANSI C63.10-2013.

3. FACILITIES AND ACCREDITATION

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

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

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

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

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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
Radiated Disturbance, 1 to 6 GHz	± 3.86 dB
Radiated Disturbance, 6 to 18 GHz	± 4.23 dB
Radiated Disturbance, 18 to 26 GHz	± 5.30 dB
Radiated Disturbance, 26 to 40 GHz	± 5.23 dB

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

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

Model A1456/A1532 is a mobile phone with multimedia functions (music, application support, and video), cellular GSM/GPRS/EGPRS/WCDMA/HSPA+/DC-HSDPA/CDMA/EVDO/LTE radio, IEEE 802.11a/b/g/n, Bluetooth and GPS radio. The rechargeable battery is not user accessible.

5.2. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

Upgrade 5.8GHz band to new rule per KDB 789033 D02 v01

5.3. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

5.8GHz Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5745 - 5825	802.11a	13.49	22.34
5745 - 5825	802.11n HT20 SISO	13.50	22.39
5755 - 5795	802.11n HT40 SISO	13.50	22.39

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

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

FREQUENCY (MHz)	ANTENNA GAIN (dBi)
5725 - 5850	1.59

5.5. SOFTWARE AND FIRMWARE

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

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5.6. WORST-CASE CONFIGURATION AND MODE

For Radiated Emissions below 1 GHz and Power line Conducted Emissions, the channel with the highest conducted output power was selected.

Worst-case data rates as provided by the manufacturer are:

802.11a mode: 6 Mbps
802.11n HT20 mode: MCS0
802.11n HT40 mode: MCS0

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

Since EUT passed radiated with antenna, no conducted spurious was performed.

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5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Apple	A1502	C02LRLKYFH00	QDS-BRCM1061
Laptop AC/DC adapter	Apple	A1435	D39346606VMF2Y1AJ	N/A
Earphone	Apple	NA	NA	N/A
EUT AC/DC adapter	Apple	A1357	W010A051	N/A

I/O CABLES (CONDUCTED TEST)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Antenna	1	SMA	Un-Shielded	0.2	To spectrum Analyzer
2	USB	1	USB	Shielded	1	N/A
3	AC	1	AC	Un-shielded	3	N/A

I/O CABLES (RADIATED ABOVE 1 GHZ)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
None Used						

I/O CABLES (RADAITED BELOW 1 GHZ)

I/O Cable List						
Cable No	Port	# of identical	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Headphones Jack	1	3.5mm Audio	Shielded	0.9	N/A
2	AC	1	AC	Un-shielded	3	N/A

I/O CABLES (AC LINE CONDUCTED: AC/DC ADAPTER)

I/O Cable List						
Cable No	Port	# of identical	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Headphones Jack	1	3.5mm Audio	Shielded	0.9	N/A
2	AC	1	AC	Un-shielded	3	N/A

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I/O CABLES (AC LINE CONDUCTED: LAPTOP CONFIGUARTION)

I/O Cable List						
Cable No	Port	# of identical	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Headphones Jack	1	3.5mm Audio	Shielded	0.9	N/A
2	USB	1	USB	Shielded	1	N/A
3	AC	1	AC	Un-shielded	3	N/A

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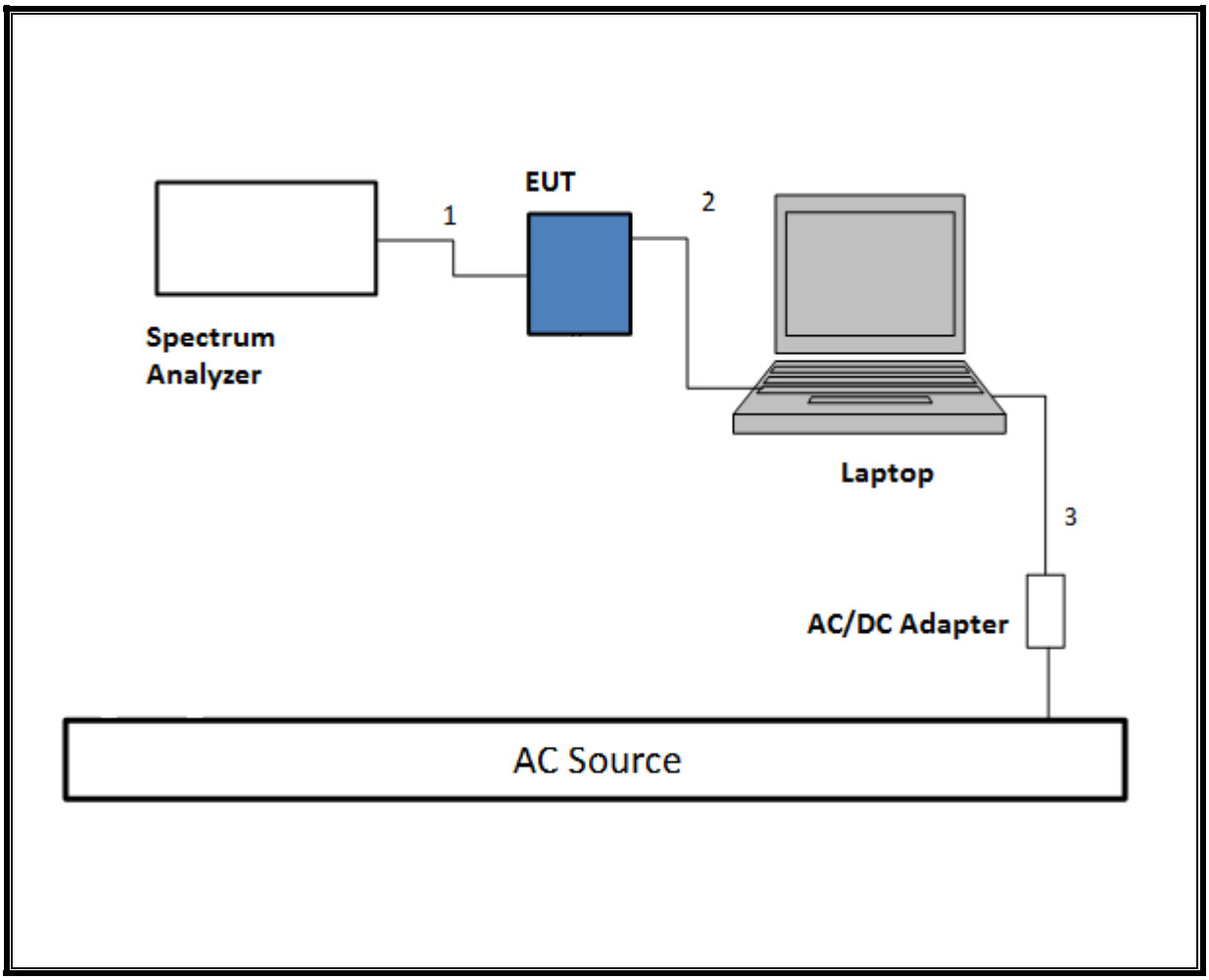
TEST SETUP - CONDUCTED TESTS

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

SETUP DIAGRAM



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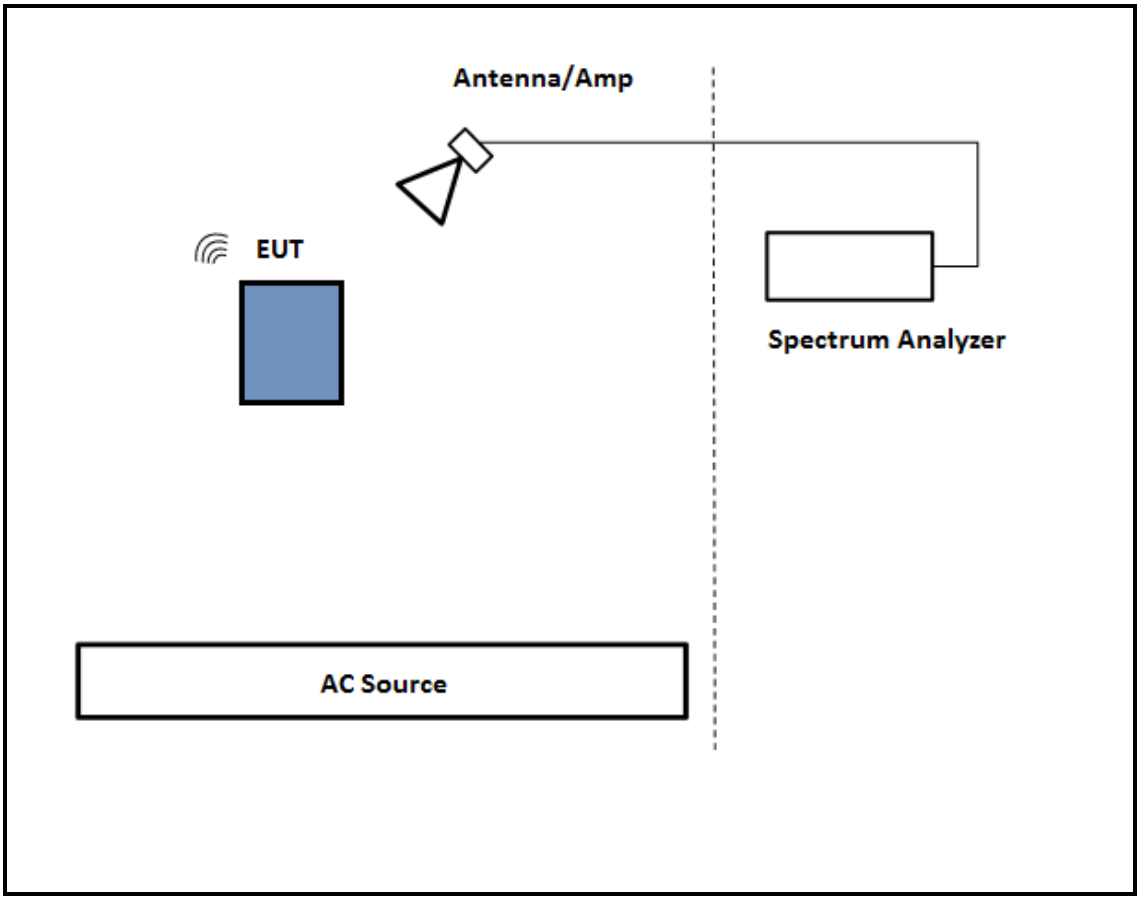
TEST SETUP- RADIATED-ABOVE 1 GHZ

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

SETUP DIAGRAM



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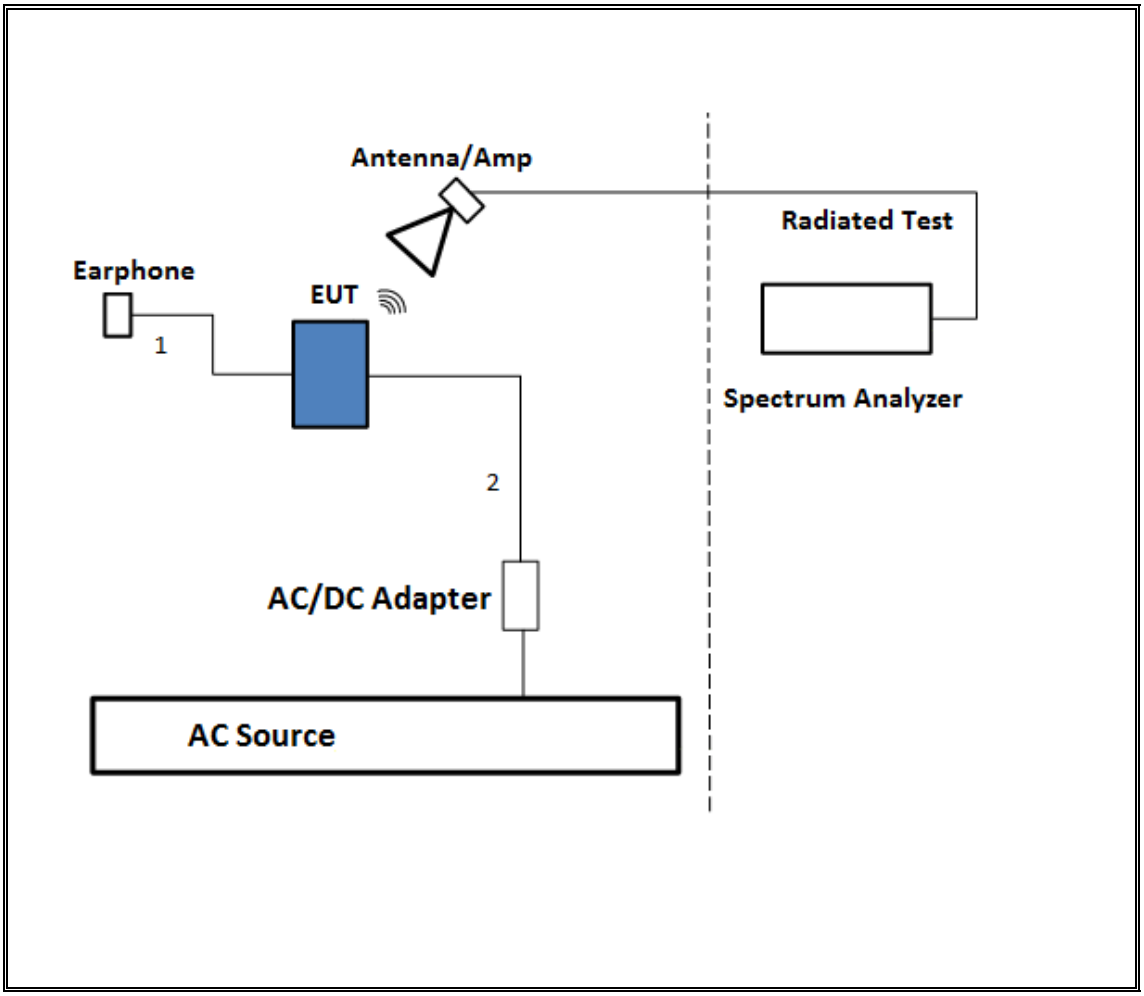
TEST SETUP- BELOW 1GHz

The EUT was tested with earphone connected and powered by AC adapter. Test software exercised the EUT.

SETUP DIAGRAM



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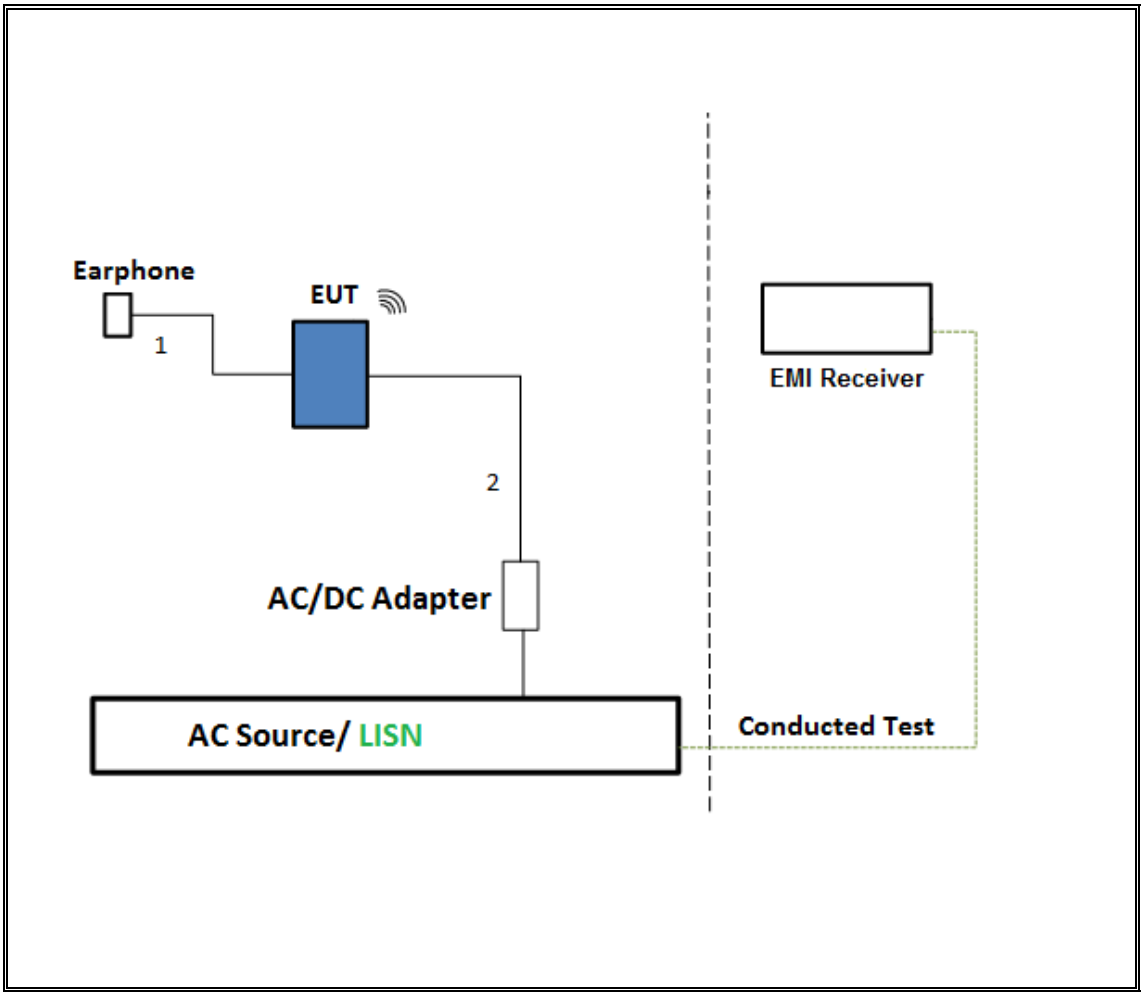
TEST SETUP- AC LINE CONDUCTED: AC/DC ADAPTER

The EUT was tested with earphone connected and powered by AC/DC adapter via USB cable. Test software exercised the EUT.

SETUP DIAGRAM



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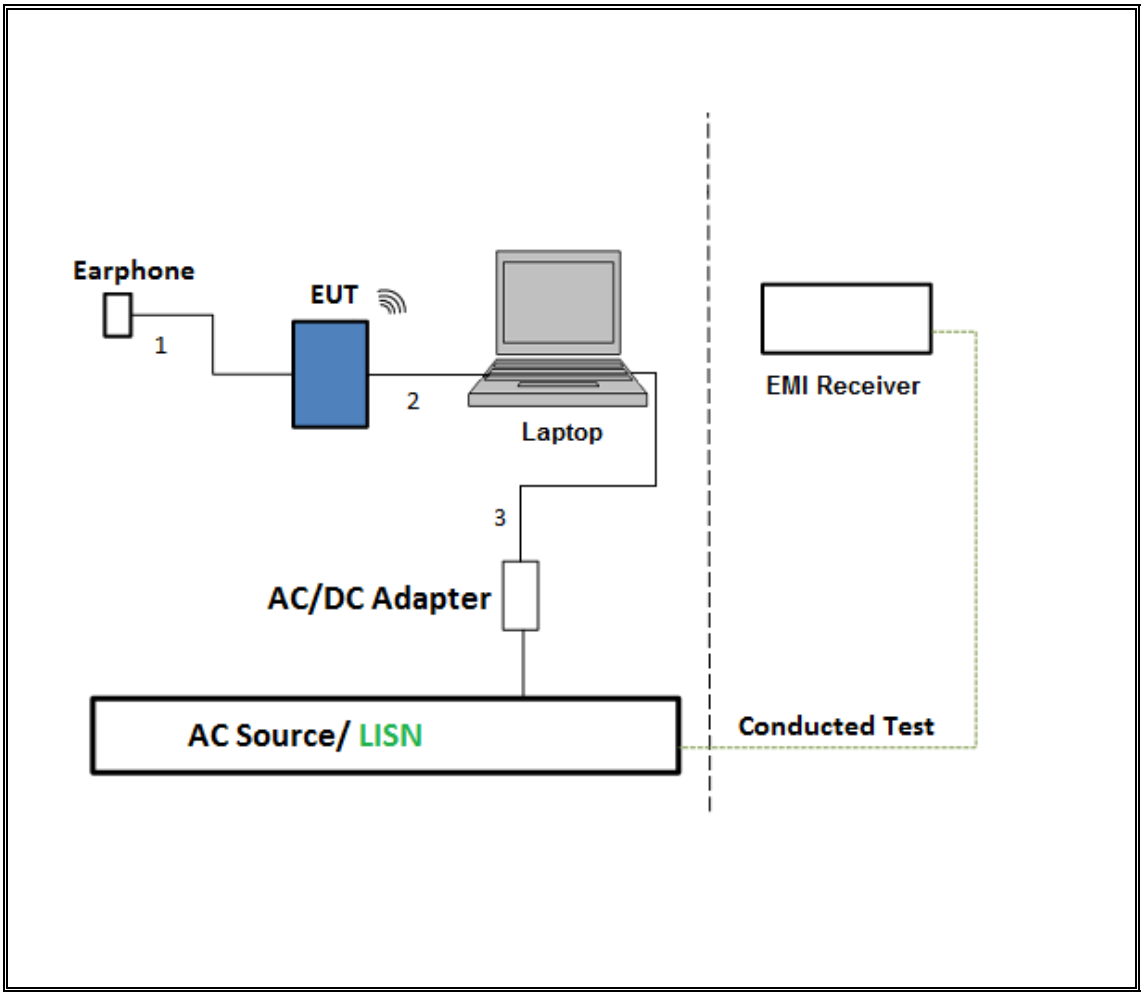
TEST SETUP- AC LINE CONDUCTED: LAPTOP CONFIGURATION

The EUT was tested with earphone connected and powered by host PC via USB cable. Test software exercised the EUT.

SETUP DIAGRAM



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6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment List				
Description	**Manufacturer**	**Model**	**Asset**	**Cal Due**
Antenna, Horn 1-18GHz	ETS Lindgren	3117	00143448	02/10/16
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	A022813-1	01/14/16
Amplifier, 1 - 18GHz	Miteq	AFS42-00101800-25-S-42	1782158	01/26/16
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	323561	06/08/16
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	325117	06/09/16
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A-544	US51160264	12/23/15
Power Meter, P-series single channel	Agilent	N1911A	GB45100212	10/09/15
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Agilent	N1921A	MY53260010	07/12/16
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826	1049	12/17/15
Horn Antenna, 40GHz	ARA	MWH-2640/B	1029	07/15/16
Spectrum Analyzer, 40 GHz	Agilent	8564E	3943A01643	08/06/16
Amplifier, 1 to 26.5GHz, 23.5dB Gain minimum	Agilent	8449B	3008A01114	10/04/15
Amplifier, 26 to 40GHz	Miteq	NSP4000-SP2	1029	04/07/16
AC Line Conducted				
EMI Test Receiver 9Khz-7GHz	Rohde & Schwarz	ESCI7	100935	08/07/16
LISN for Conducted Emissions CISPR-16	FCC	50/250-25-2	114	01/16/16
Power Cable, Line Conducted Emissions ANSI 63.4	UL	PG1	N/A	07/28/16
UL SOFTWARE				
*Radiated Software	UL	UL EMC	Ver 9.5, July 22, 2014	
*Conducted Software	UL	UL EMC	Ver 2.2, March 31, 2015	
*AC Line Conducted Software	UL	UL EMC	Ver 9.5, April 3, 2015	

Note: * indicates automation software version used in the compliance certification testing

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7. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

7.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 789033 Zero-Span Spectrum Analyzer Method.

RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
802.11a	2.061	2.091	0.986	98.57%	0.00	0.010
802.11n HT20	1.920	1.950	0.985	98.46%	0.00	0.010
802.11n HT40	0.942	0.972	0.969	96.91%	0.14	1.062

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DUTY CYCLE PLOTS

DUTY CYCLE 802.11a MODE

DUTY CYCLE 802.11n HT20 MODE

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DUTY CYCLE 802.11n HT40 MODE

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47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
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7.2. MEASUREMENT METHODS

26 dB Emission BW & 6 dB Emission BW: KDB 789033 D02 v01, Section C.

99% Occupied BW: KDB 789033 D02 v01, Section D.

Conducted Output Power: KDB 789033 D02 v01, Section E.3.b (Method PM-G).

Power Spectral Density: KDB 789033 D02 v01, Section F.

Unwanted emissions in restricted bands: KDB 789033 D02 v01, Sections G.3, G.4, G.5, and G.6.

Unwanted emissions in non-restricted bands: KDB 789033 D02 v01, Sections G.3, G.4, and G.5.

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8. ANTENNA PORT TEST RESULTS

8.1. 802.11a MODE IN THE 5.8 GHz BAND

8.1.1. 6 dB BANDWIDTH

LIMITS

FCC §15.407 (e)

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

RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	5745	15.10	0.5
Mid	5785	15.05	0.5
High	5825	15.13	0.5

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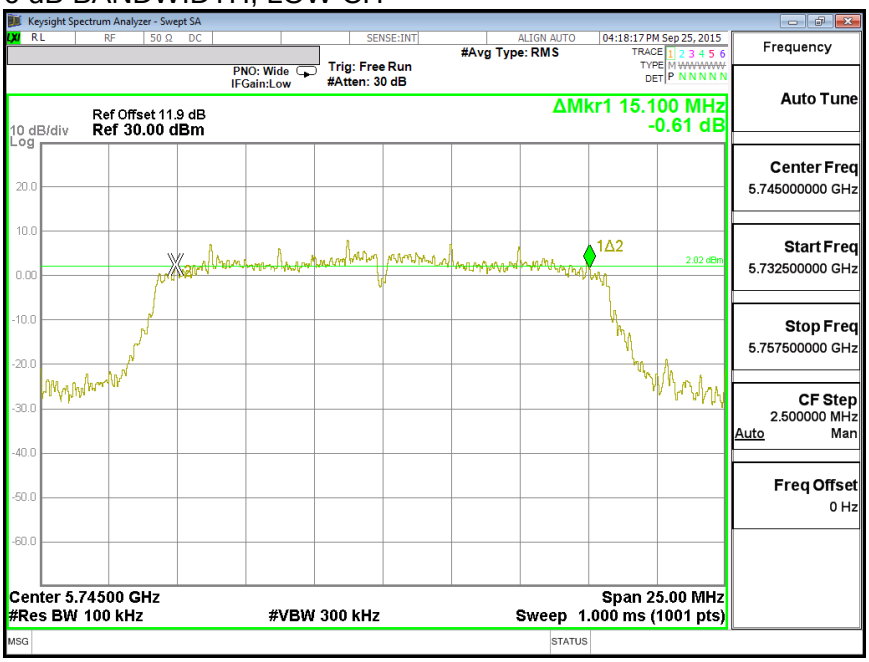
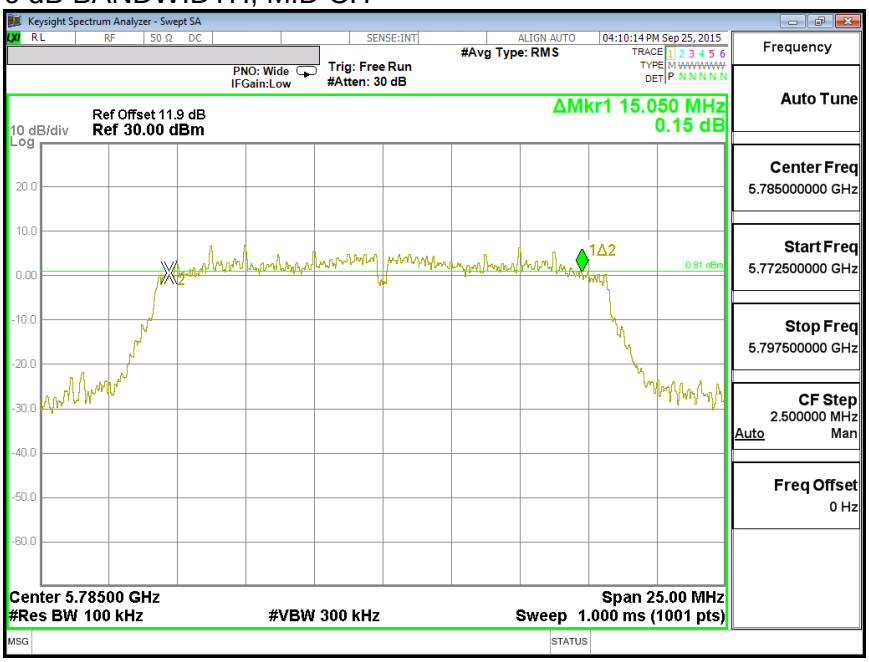
6 dB BANDWIDTH

6 dB BANDWIDTH, LOW CH



6 dB BANDWIDTH, MID CH



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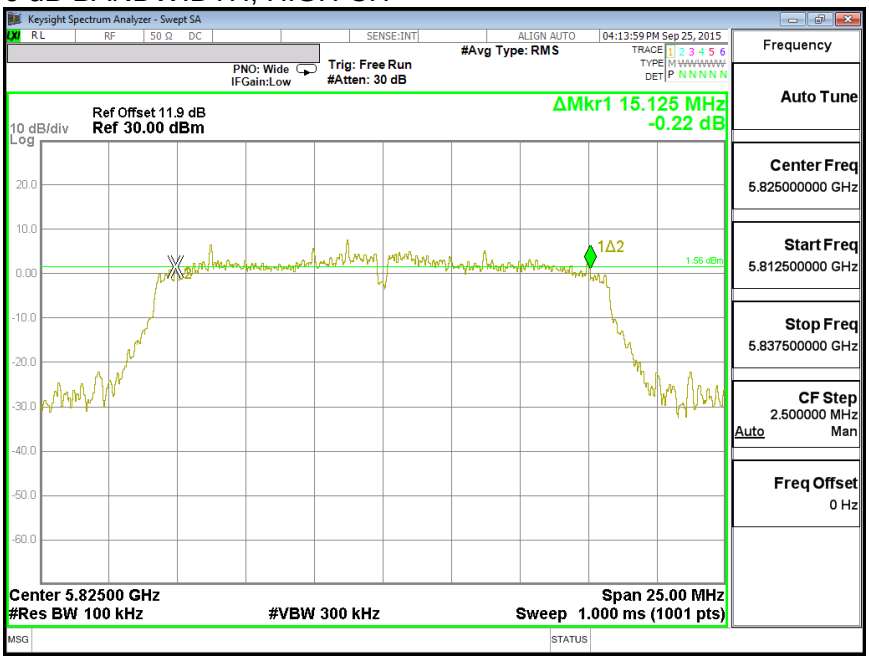
6 dB BANDWIDTH, HIGH CH



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8.1.2. 26 dB BANDWIDTH

LIMITS

None, for reporting purposes only

RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5745	18.800
Mid	5785	18.825
High	5825	18.925

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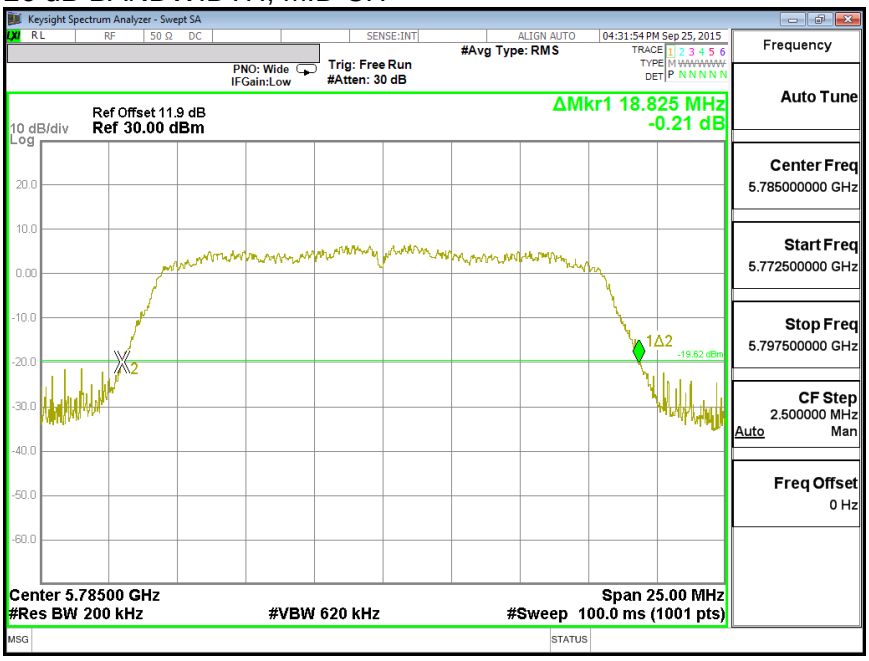
26 dB BANDWIDTH

26 dB BANDWIDTH, LOW CH

26 dB BANDWIDTH, MID CH



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26 dB BANDWIDTH, HIGH CH

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8.1.3. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Frequency (MHz)	99% Bandwidth (MHz)
5745	16.394
5785	16.318
5825	16.344

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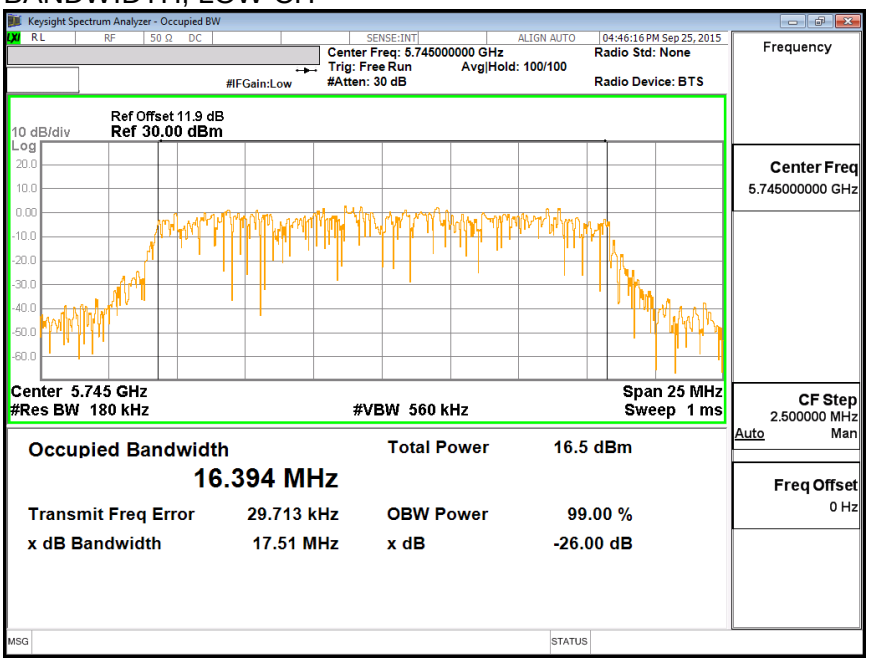
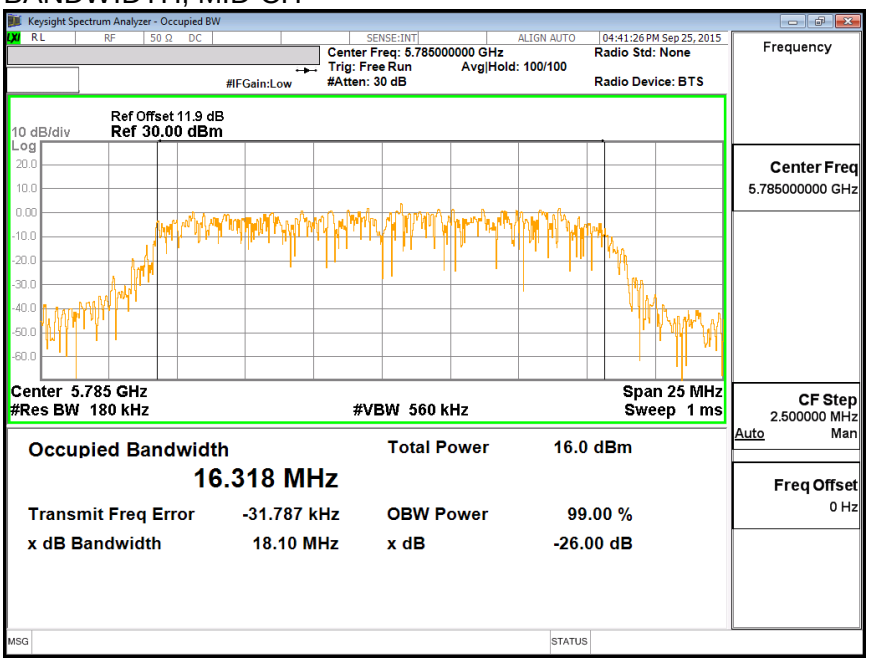
99% BANDWIDTH

BANDWIDTH, LOW CH



BANDWIDTH, MID CH



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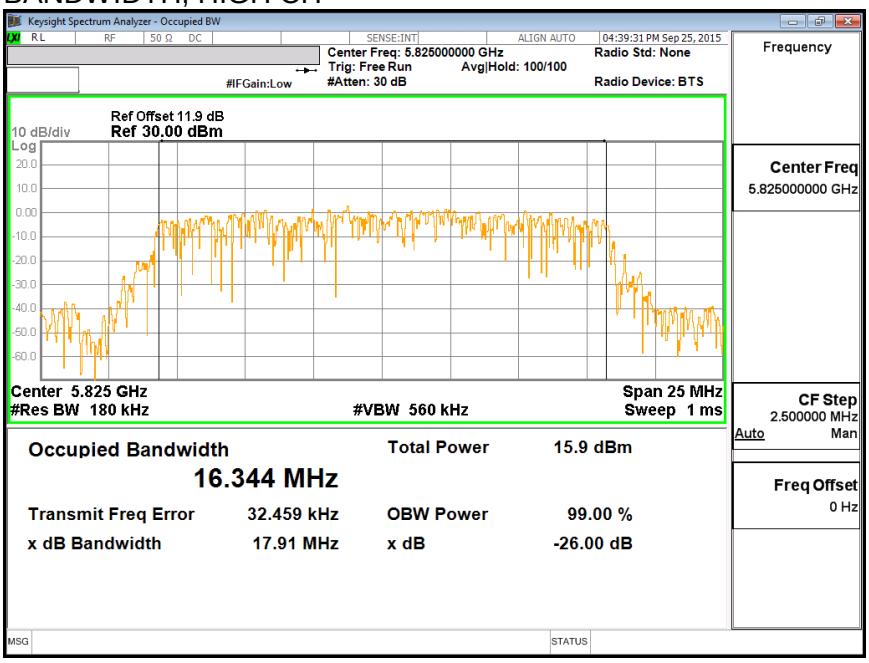
BANDWIDTH, HIGH CH



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8.1.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.

RESULTS

Channel	Frequency (MHz)	Power (dBm)
Low	5745	13.49
Mid	5785	13.47
High	5825	13.40

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8.1.5. OUTPUT POWER

LIMITS

FCC §15.407 (a) (3)

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

DIRECTIONAL ANTENNA GAIN

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

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RESULTS

Antenna Gain and Limit

Channel	Frequency (MHz)	Gain (dBi)	Power Limit (dBm)
Low	5745	1.59	30.00
Mid	5785	1.59	30.00
High	5825	1.59	30.00

Output Power Results

Channel	Frequency (MHz)	Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5745	13.49	13.49	30.00	-16.51
Mid	5785	13.47	13.47	30.00	-16.53
High	5825	13.40	13.40	30.00	-16.60

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8.1.6. PSD

LIMITS

FCC §15.407 (a) (3)

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

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

RESULTS

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	PSD Limit (dBm)
Low	5745	1.59	30.00
Mid	5785	1.59	30.00
High	5825	1.59	30.00

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD

PSD Results

Channel	Frequency (MHz)	Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5745	1.54	1.54	30.00	-28.47
Mid	5785	1.45	1.45	30.00	-28.55
High	5825	1.33	1.33	30.00	-28.67

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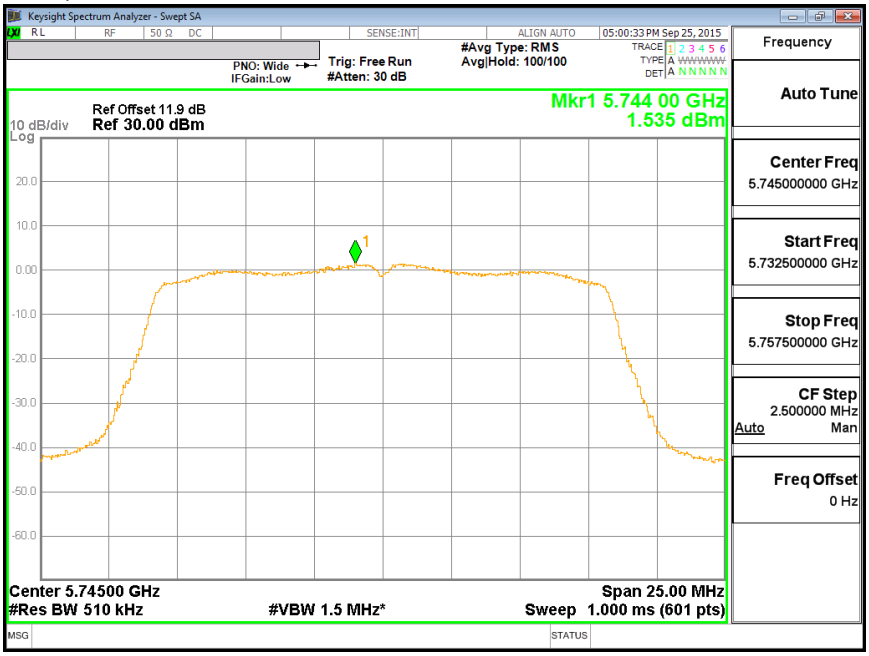
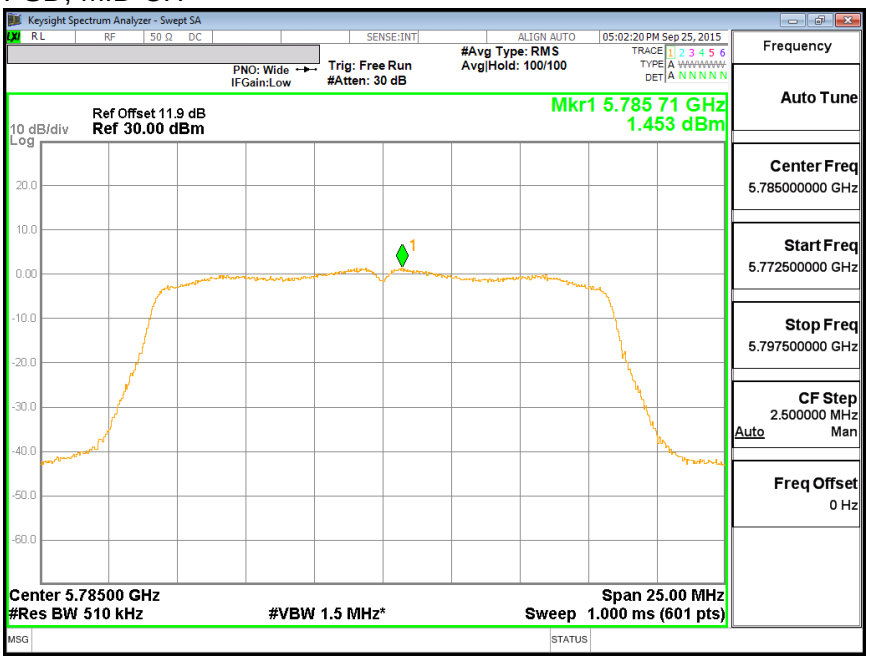
PSD,

PSD, LOW CH



PSD, MID CH



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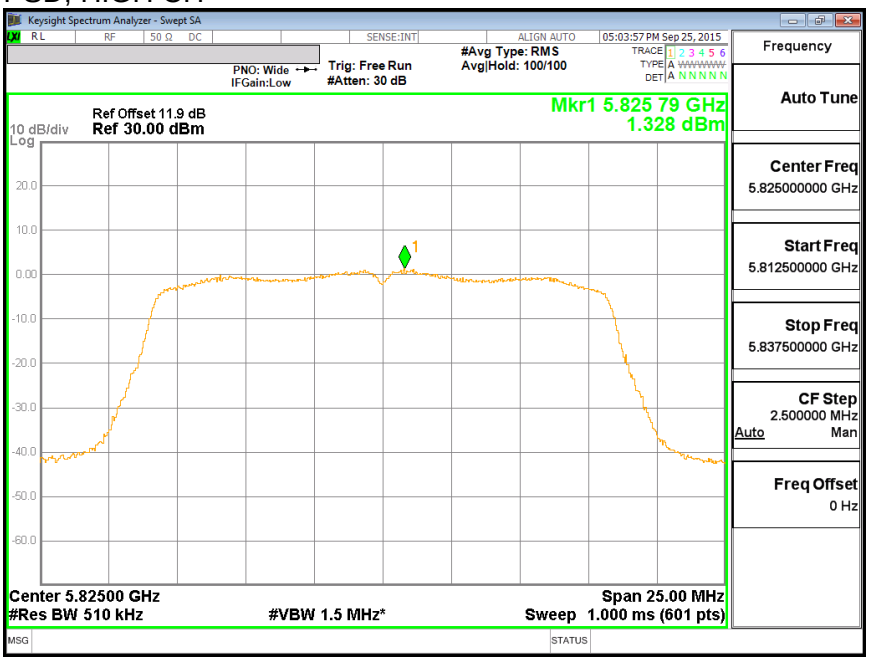
PSD, HIGH CH



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8.2. 802.11n HT20 MODE IN THE 5.8 GHz BAND

8.2.1. 6 dB BANDWIDTH

LIMITS

FCC §15.407 (e)

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

RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	5745	15.79	0.5
Mid	5785	15.67	0.5
High	5825	16.08	0.5

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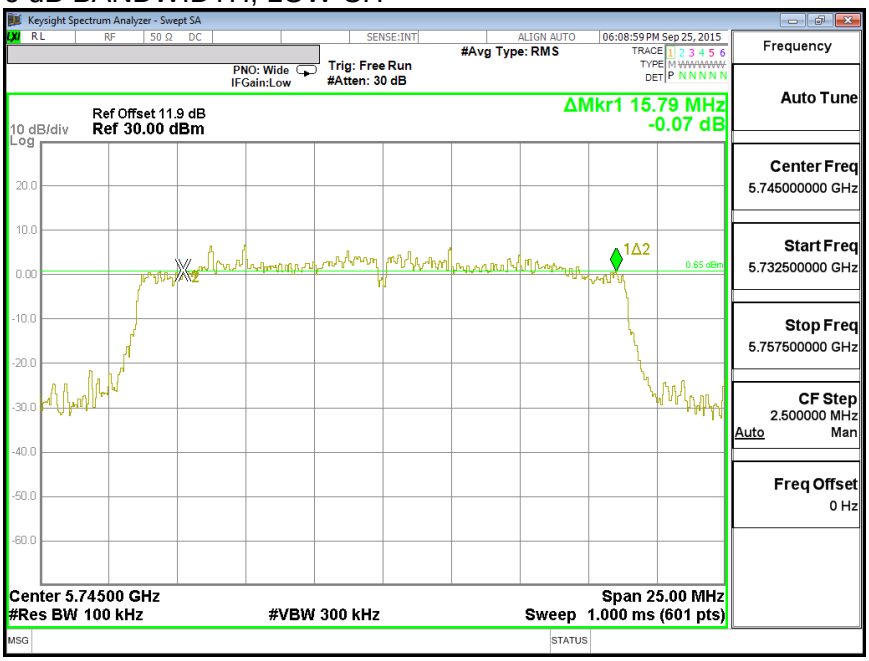
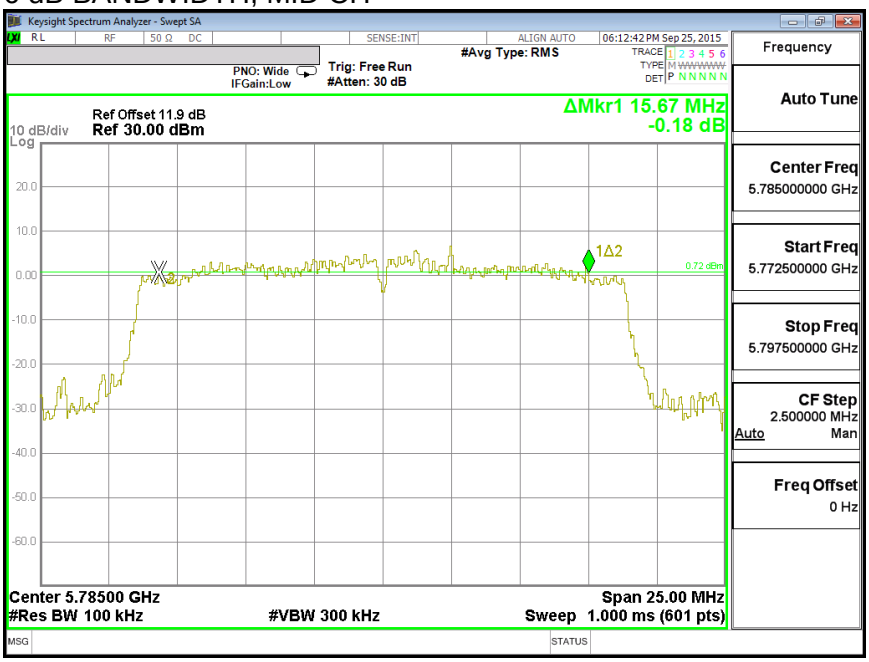
6 dB BANDWIDTH

6 dB BANDWIDTH, LOW CH



6 dB BANDWIDTH, MID CH



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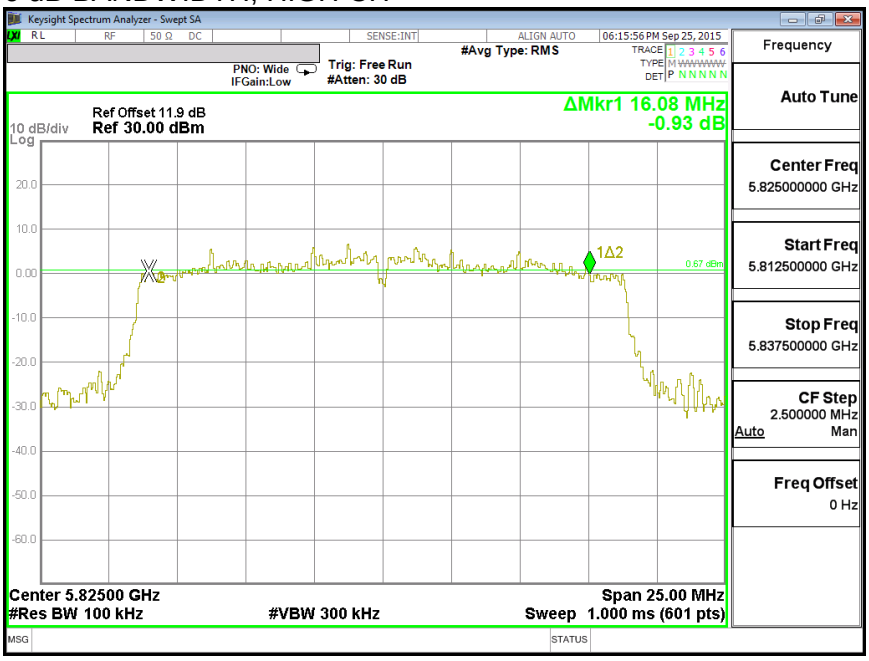
6 dB BANDWIDTH, HIGH CH



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8.2.2. 26 dB BANDWIDTH

LIMITS

None, for reporting purposes only

RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5745	18.734
Mid	5785	18.734
High	5825	18.879

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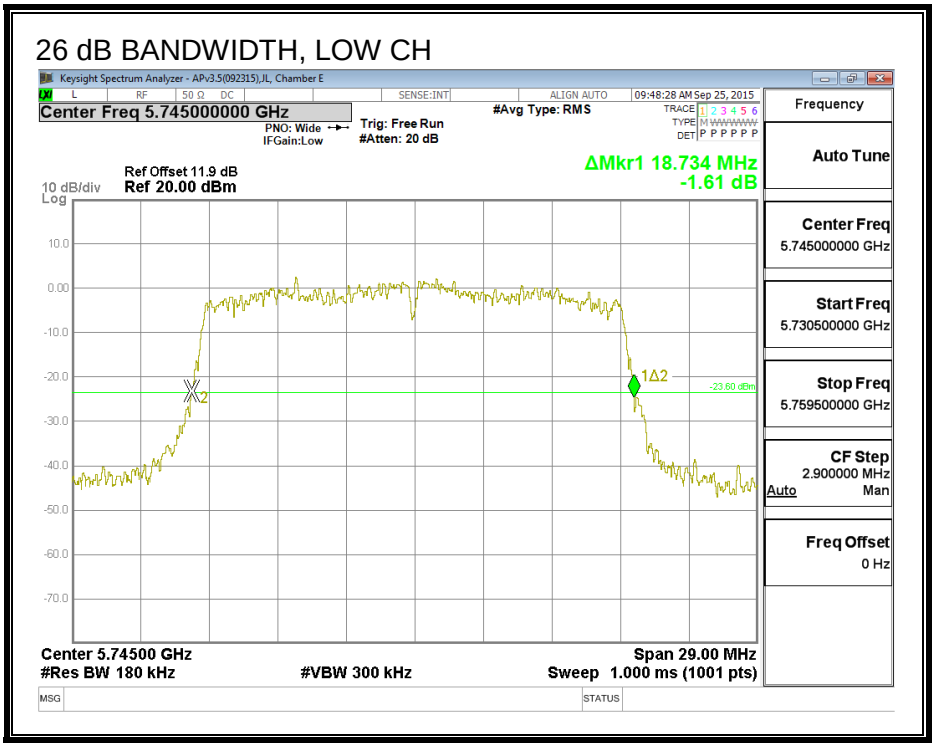
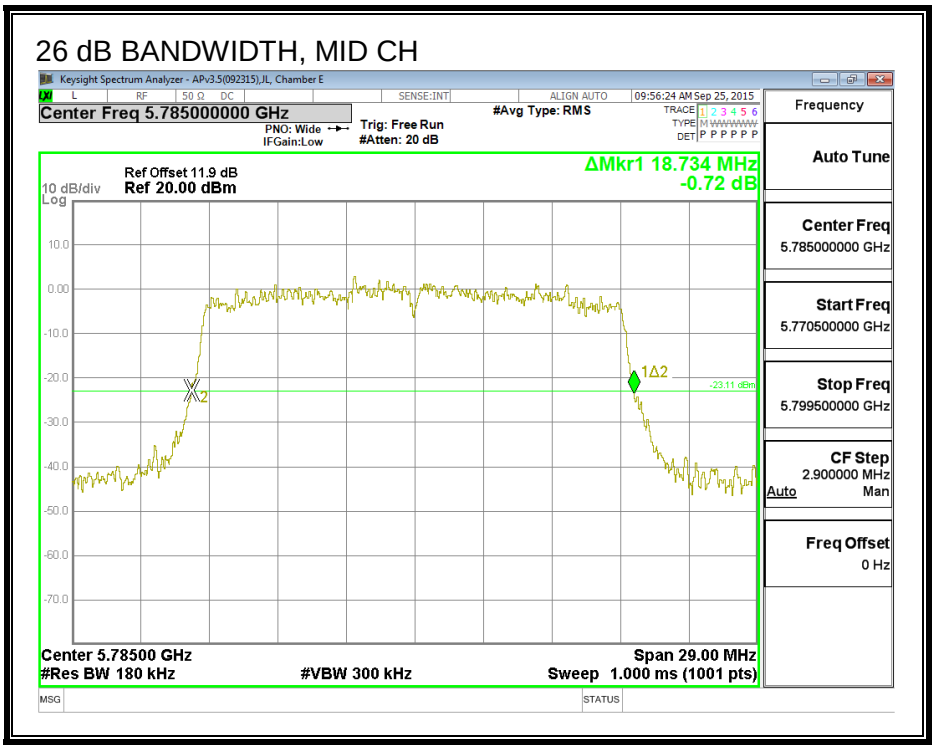
26 dB BANDWIDTH





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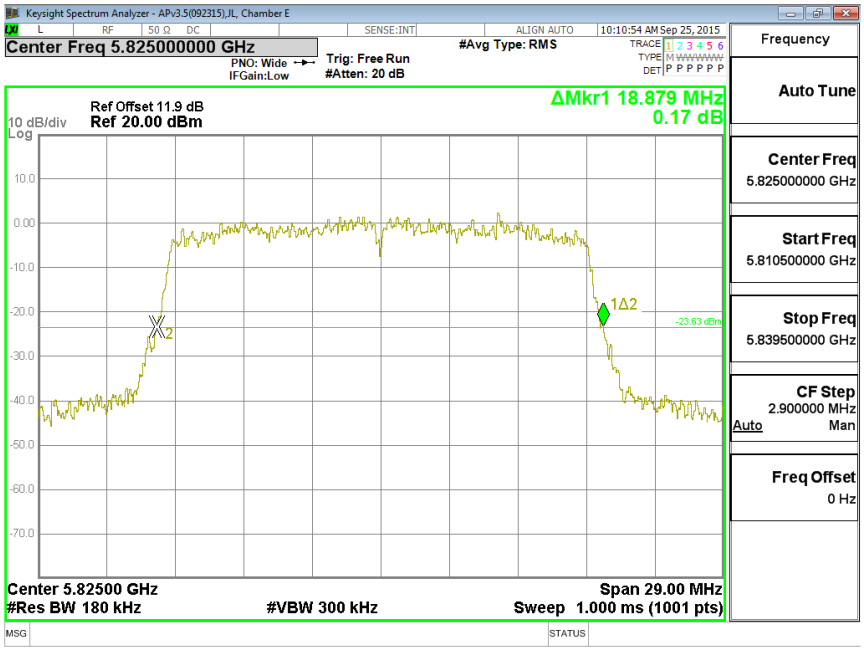
26 dB BANDWIDTH, HIGH CH



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8.2.3. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5745	17.572
Mid	5785	17.499
High	5825	17.566

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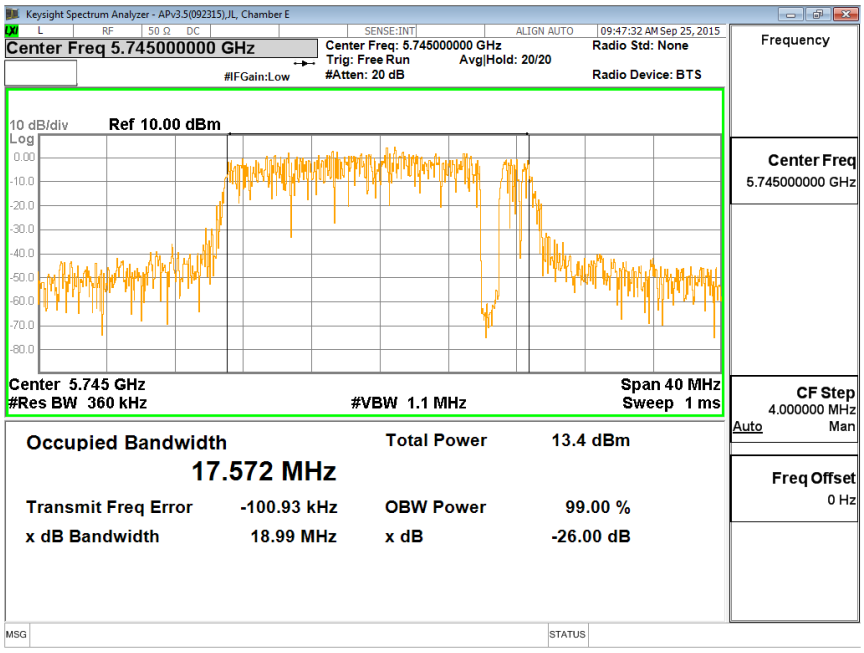
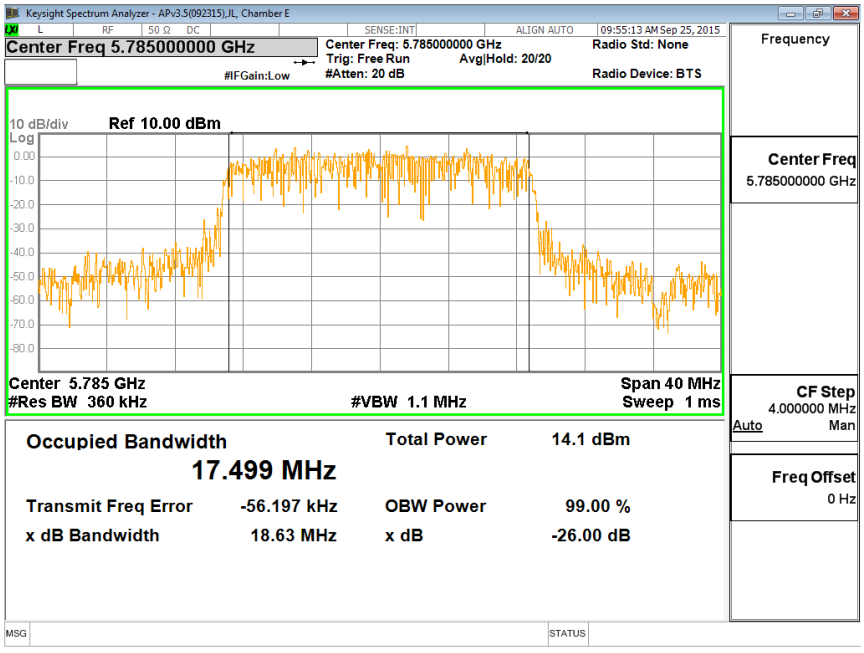
99% BANDWIDTH

BANDWIDTH, LOW CH



BANDWIDTH, MID CH



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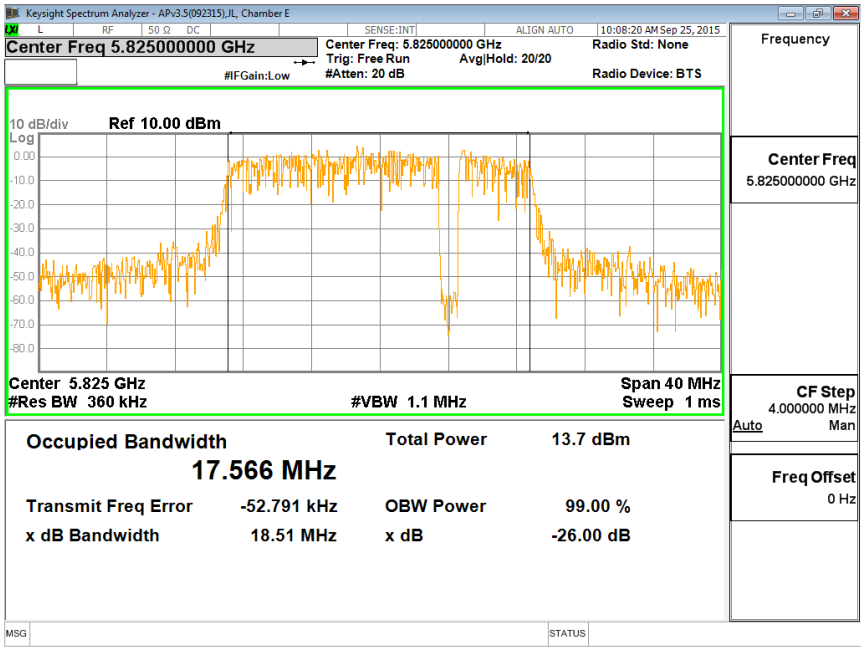
BANDWIDTH, HIGH CH



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8.2.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.

RESULTS

Channel	Frequency (MHz)	Power (dBm)
Low	5745	13.48
Mid	5785	13.50
High	5825	13.49

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8.2.5. OUTPUT POWER

LIMITS

FCC §15.407 (a) (3)

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

DIRECTIONAL ANTENNA GAIN

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

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RESULTS

Antenna Gain and Limit

Channel	Frequency (MHz)	Gain (dBi)	Power Limit (dBm)
Low	5745	1.59	30.00
Mid	5785	1.59	30.00
High	5825	1.59	30.00

Output Power Results

Channel	Frequency (MHz)	Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5745	13.48	13.48	30.00	-16.52
Mid	5785	13.50	13.50	30.00	-16.50
High	5825	13.49	13.49	30.00	-16.51

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8.2.6. PSD

LIMITS

FCC §15.407 (a) (3)

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

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

RESULTS

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	PSD Limit (dBm)
Low	5745	1.59	30.00
Mid	5785	1.59	30.00
High	5825	1.59	30.00

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD

PSD Results

Channel	Frequency (MHz)	Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5745	0.50	0.50	30.00	-29.50
Mid	5785	0.90	0.90	30.00	-29.10
High	5825	0.80	0.80	30.00	-29.20

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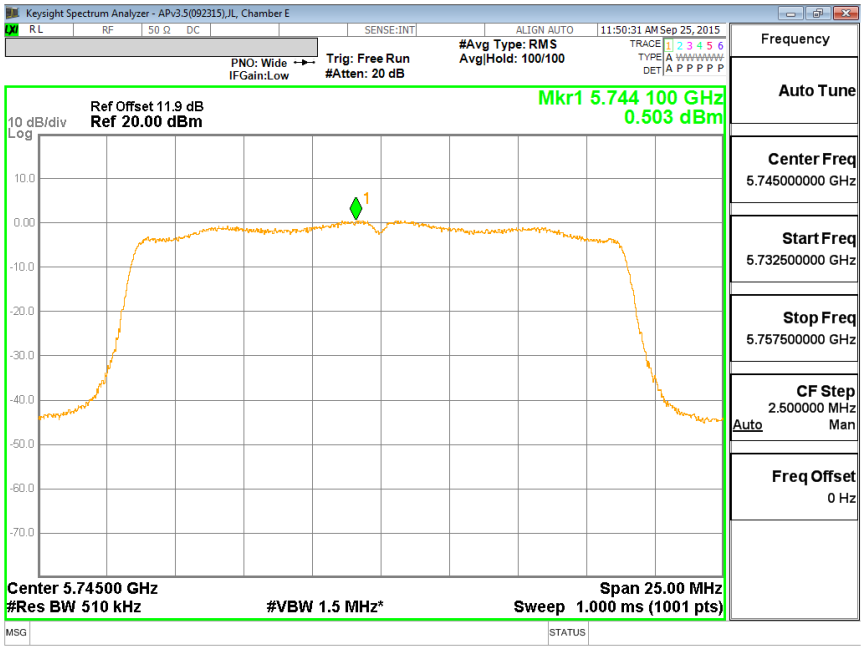
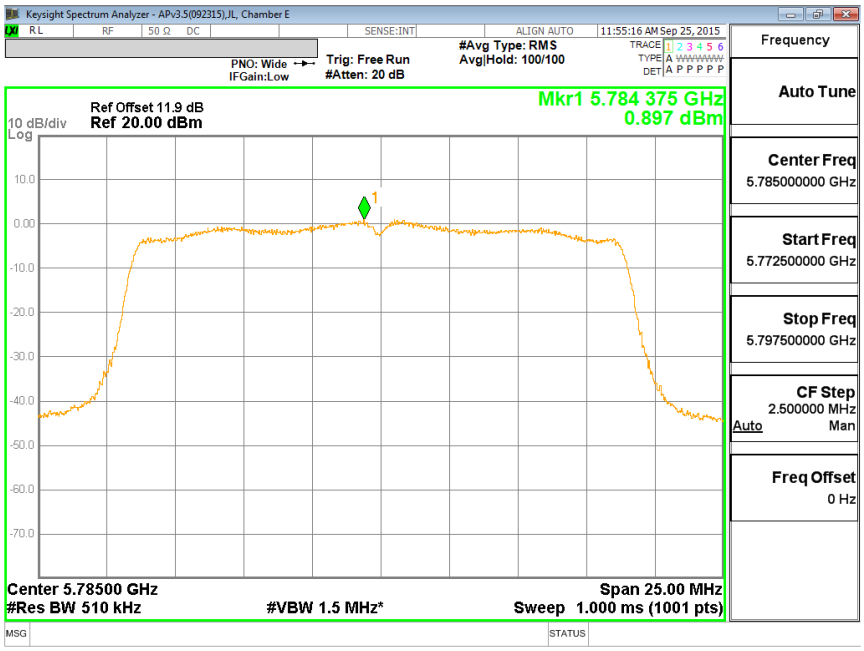
PSD,

PSD, LOW CH



PSD, MID CH



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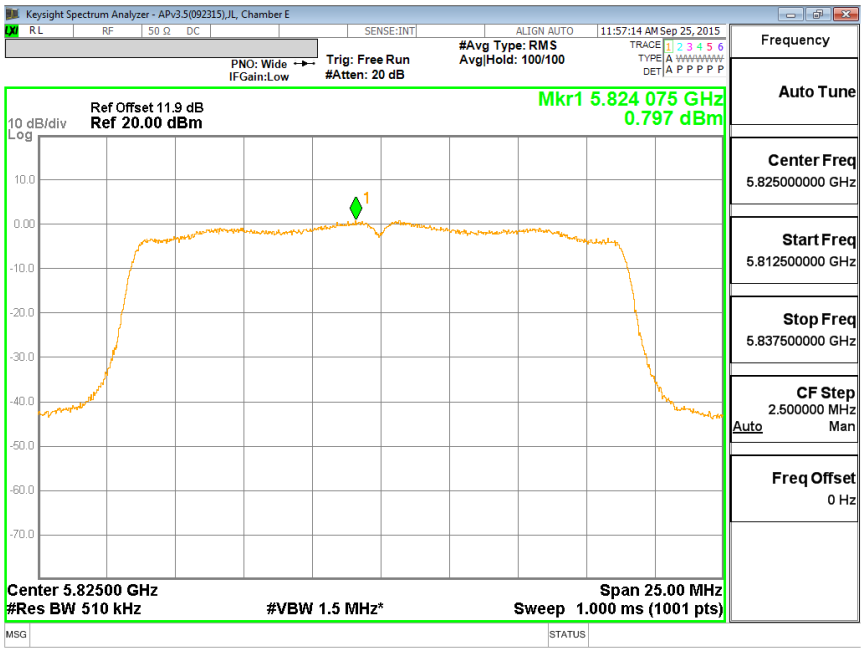
PSD, HIGH CH



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8.3. 802.11n HT40 MODE IN THE 5.8 GHz BAND

8.3.1. 6 dB BANDWIDTH

LIMITS

FCC §15.407 (e)

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

RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	5755	30.331	0.5
High	5795	33.660	0.5

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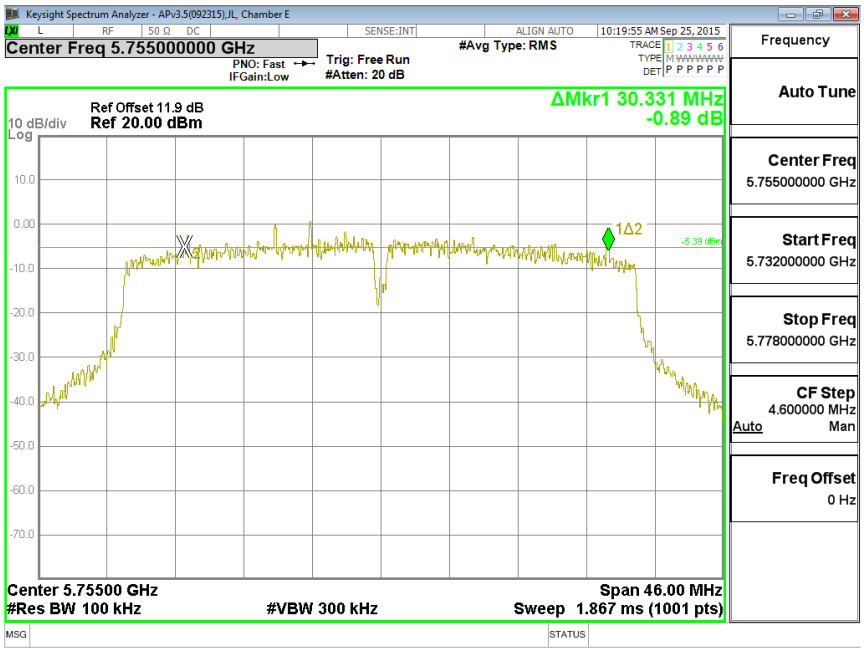
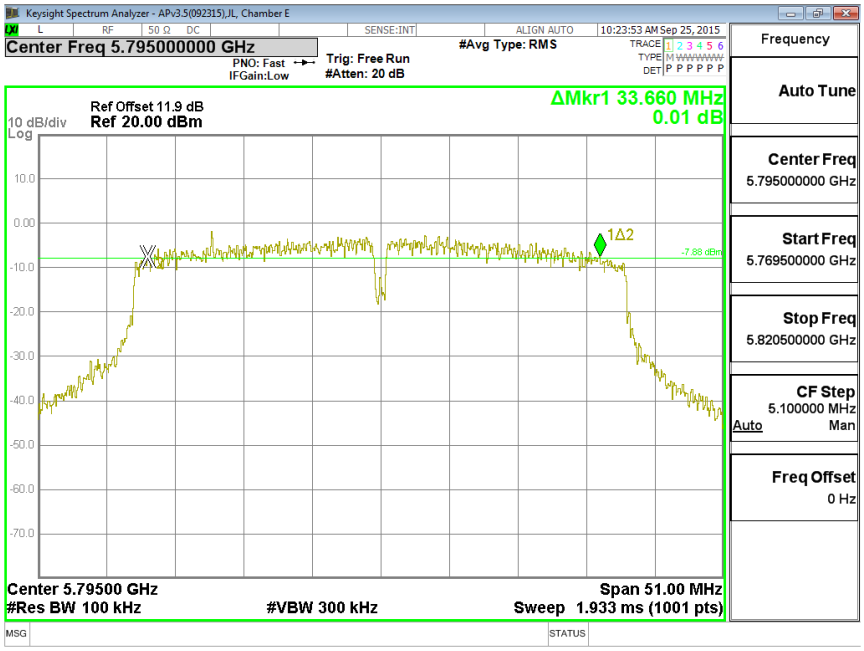
6 dB BANDWIDTH

6 dB BANDWIDTH, LOW CH



6 dB BANDWIDTH, HIGH CH



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8.3.2. 26 dB BANDWIDTH

LIMITS

None, for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5755	42.098
High	5795	41.391

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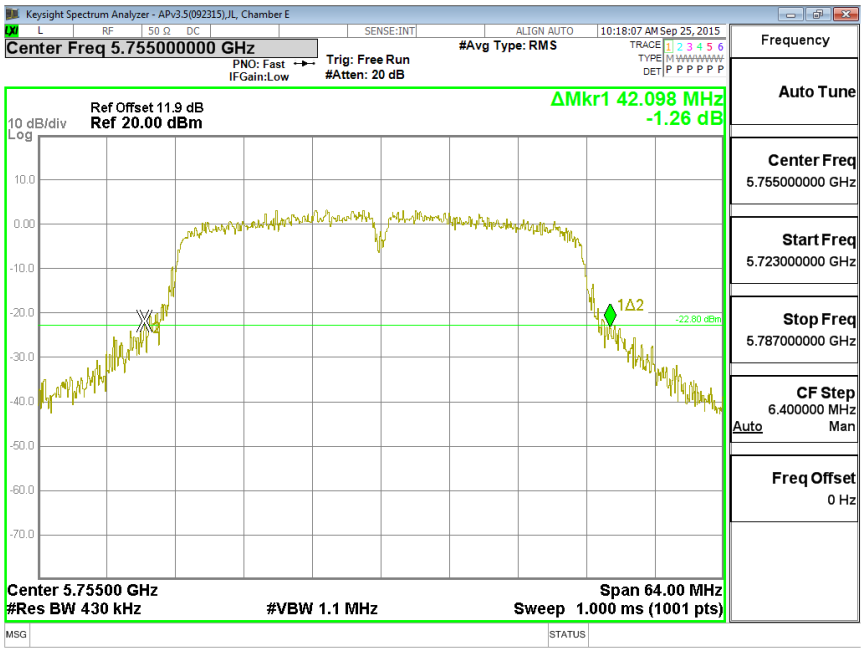
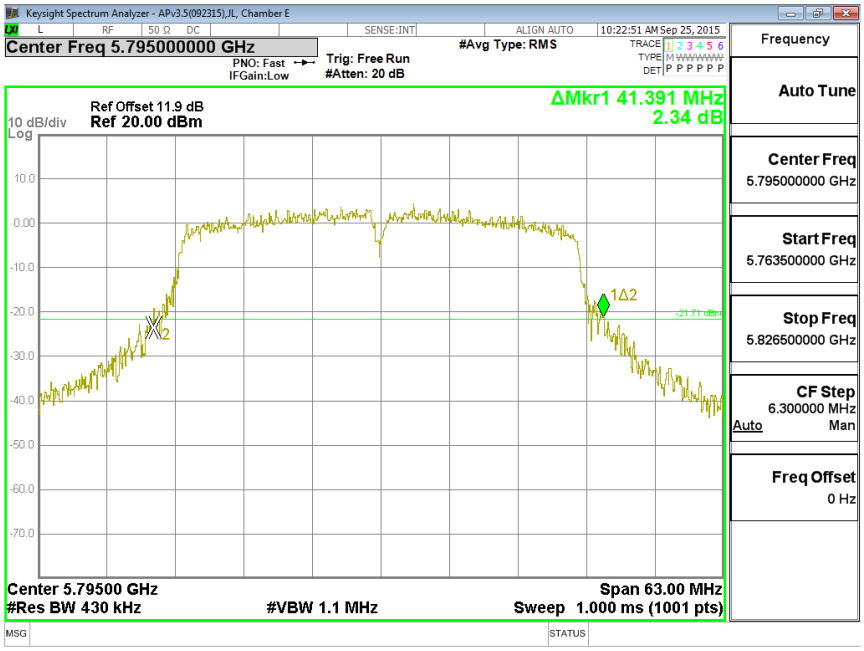
26 dB BANDWIDTH

26 dB BANDWIDTH, LOW CH



26 dB BANDWIDTH, HIGH CH



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8.3.3. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5755	35.955
High	5795	36.126

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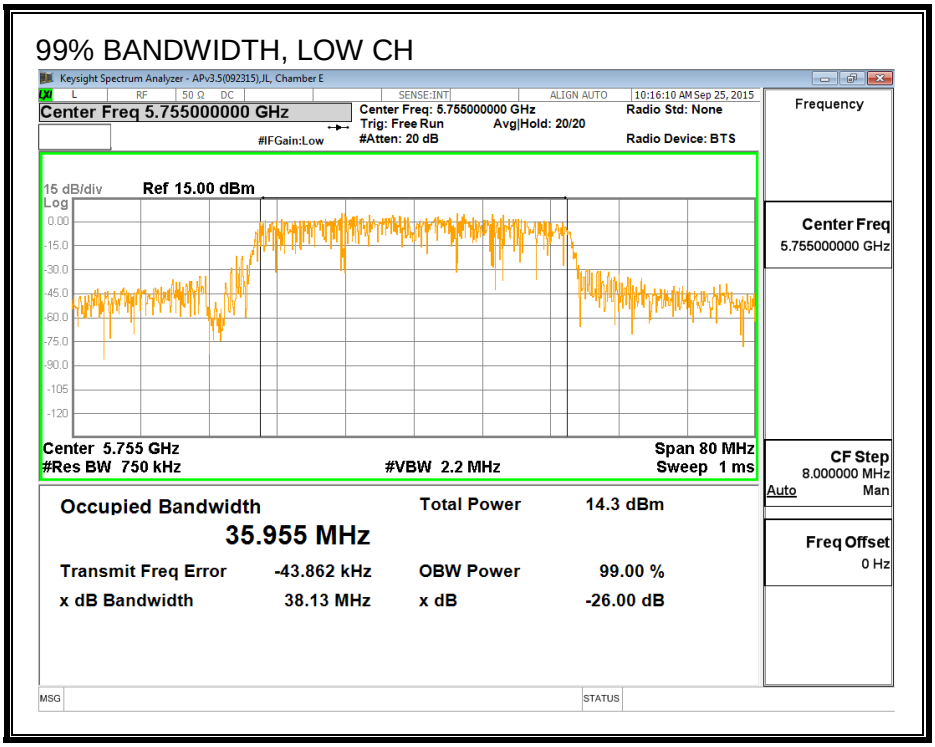
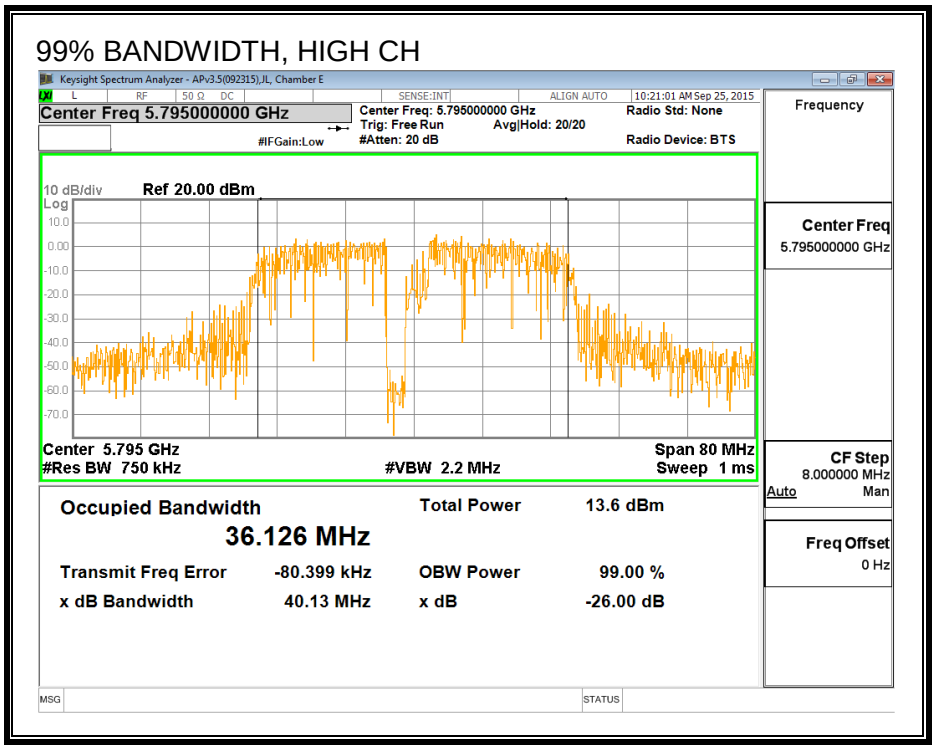
99% BANDWIDTH





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8.3.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.

RESULTS

Channel	Frequency (MHz)	Power (dBm)
Low	5755	13.49
High	5795	13.50

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8.3.5. OUTPUT POWER

LIMITS

FCC §15.407 (a) (3)

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

DIRECTIONAL ANTENNA GAIN

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

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RESULTS

Antenna Gain and Limit

Channel	Frequency (MHz)	Gain (dBi)	Power Limit (dBm)
Low	5755	1.59	30.00
High	5795	1.59	30.00

Output Power Results

Channel	Frequency (MHz)	Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5755	13.49	13.49	30.00	-16.51
High	5795	13.50	13.50	30.00	-16.50

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8.3.6. PSD

LIMITS

FCC §15.407 (a) (3)

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

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

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RESULTS

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	PSD Limit (dBm)
Low	5755	1.59	30.00
High	5795	1.59	30.00

Duty Cycle CF (dB)	0.14	**Included in Calculations of Corr'd PSD**

PSD Results

Channel	Frequency (MHz)	Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5755	-2.21	-2.07	30.00	-32.07
High	5795	-2.17	-2.03	30.00	-32.03

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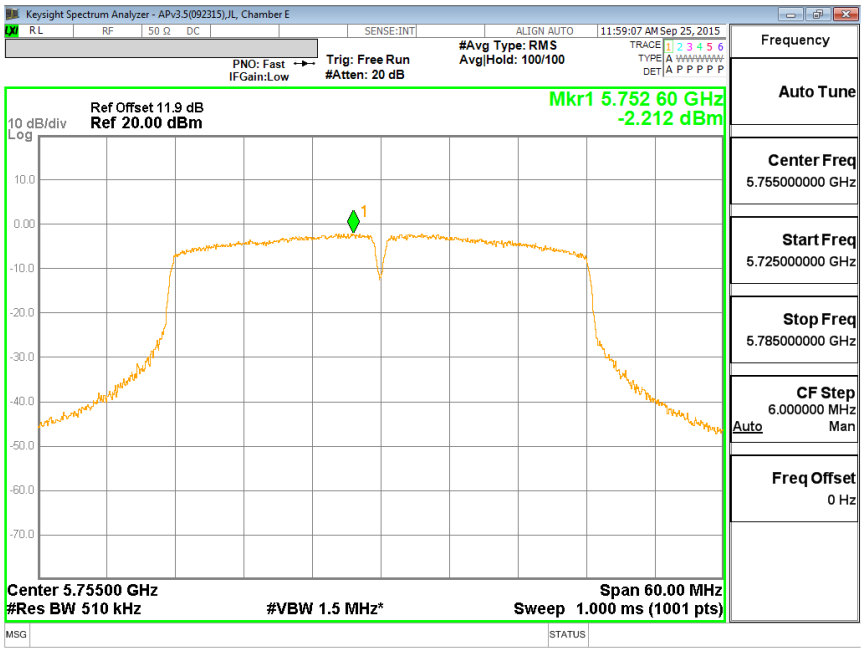
PSD,

PSD, LOW CH



PSD, HIGH CH

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9. RADIATED TEST RESULTS

9.1. 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 for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

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

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

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

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

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

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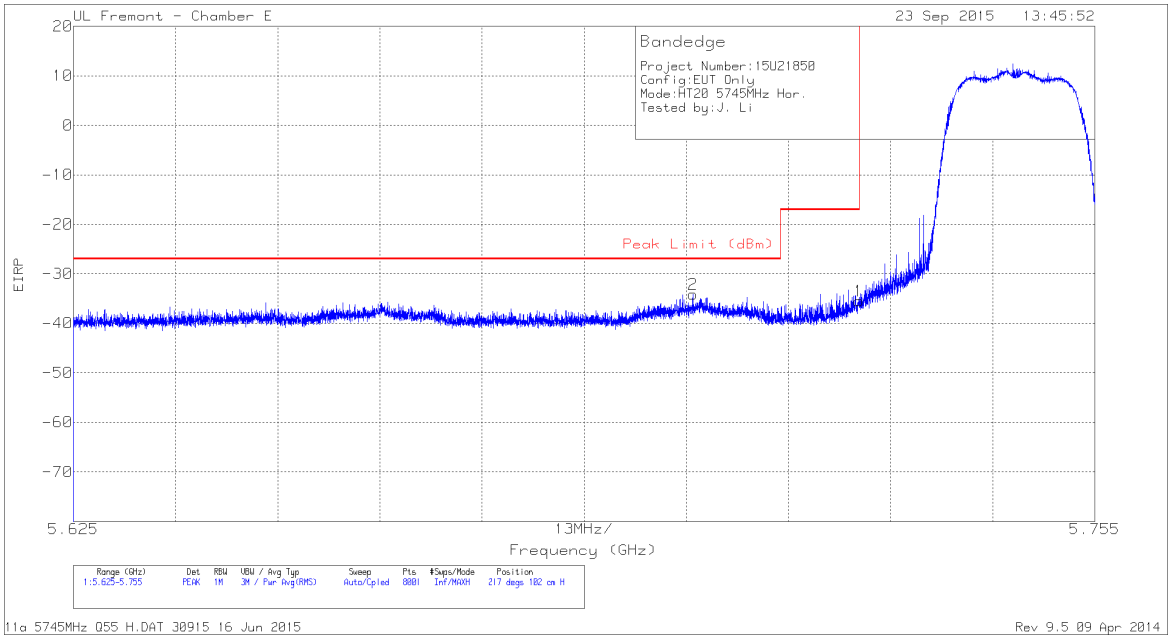
9.2. 802.11a MODE IN THE 5.8 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL)

LOW CHANNEL HORIZONTAL PLOT



DATA

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	5.704	-60.55	PK	34.7	-20.1	11.8	-34.15	-27	-7.15	217	102	H
1	5.725	-61.85	PK	34.7	-20.1	11.8	-35.45	-17	-18.45	217	102	H

PK - Peak detector

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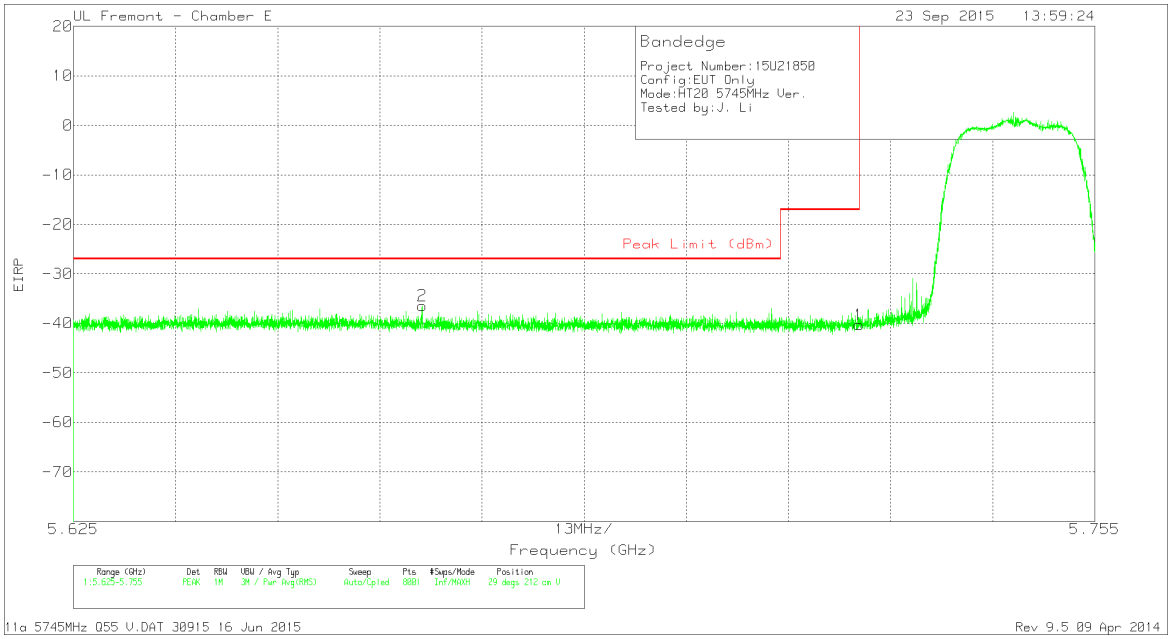
LOW CHANNEL VERTICAL PLOT



DATA

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	5.669	-62.7	PK	34.6	-20.1	11.8	-36.4	-27	-9.4	29	212	V
1	5.725	-66.7	PK	34.7	-20.1	11.8	-40.3	-17	-23.3	29	212	V

PK - Peak detector

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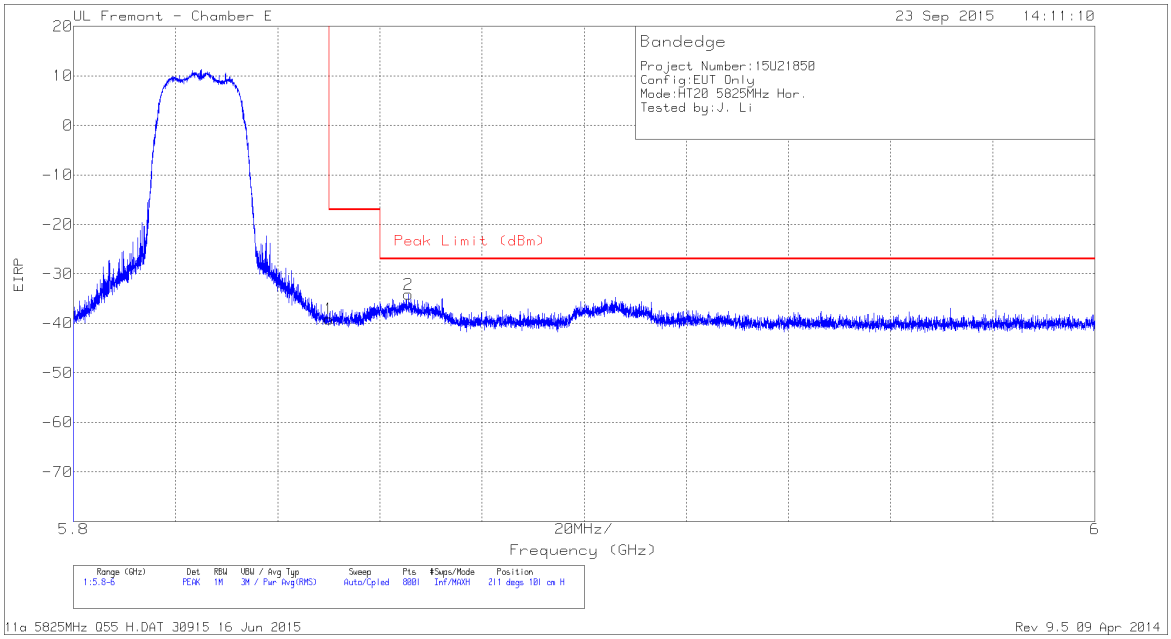
RESTRICTED BANDEDGE (HIGH CHANNEL)

HIGH CHANNEL HORIZONTAL PLOT



DATA

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T346 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85	-65.5	PK	34.9	-20.3	11.8	-39.1	-17	-22.1	211	101	H
2	5.866	-60.39	PK	34.9	-20.4	11.8	-34.09	-27	-7.09	211	101	H

PK - Peak detector

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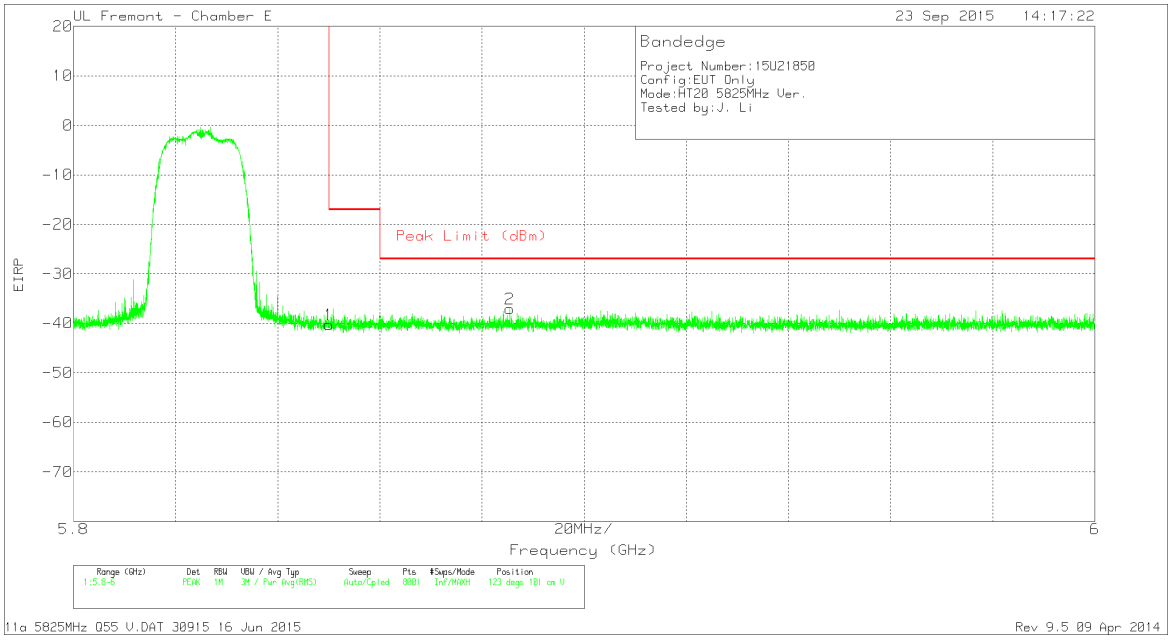
HIGH CHANNEL VERTICAL PLOT



DATA

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85	-66.67	PK	34.9	-20.3	11.8	-40.27	-17	-23.27	123	101	V
2	5.885	-63.44	PK	34.9	-20.3	11.8	-37.04	-27	-10.04	123	101	V

PK - Peak detector

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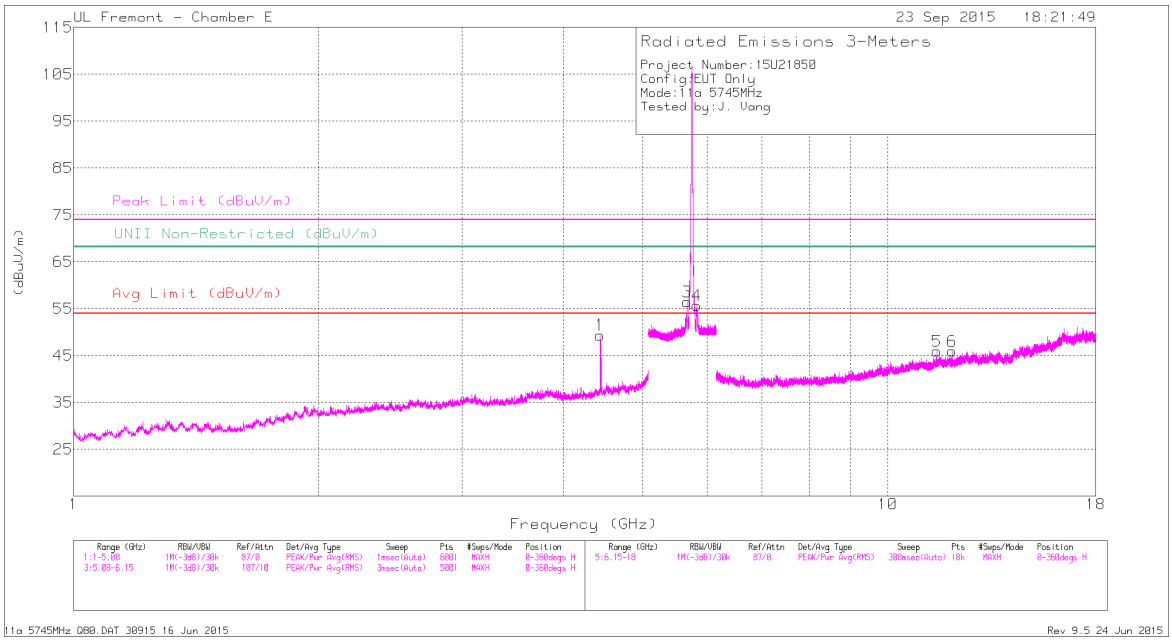
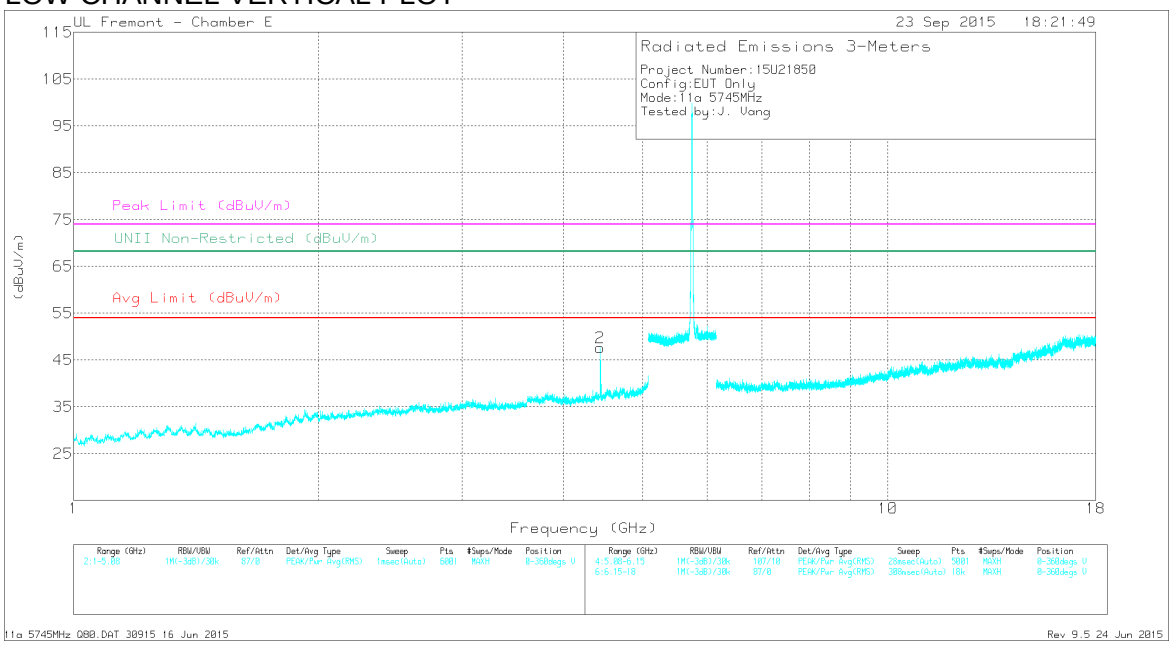
LOW CHANNEL HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL PLOT



LOW CHANNEL VERTICAL PLOT



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DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
5	*11.493	41.41	PK-U	38.1	-24.2	55.31	-	-	74	-18.69	-	-	51	173	H
	*11.49	29.17	ADR	38.1	-24.2	43.07	54	-10.93	-	-	-	-	51	173	H
6	*12	36.9	PK-U	38.6	-24.1	51.4	-	-	74	-22.6	-	-	54	371	H
	*11.996	25.45	ADR	38.6	-24.1	39.95	54	-14.05	-	-	-	-	54	371	H
2	4.435	47.77	PK-U	33.8	-30.1	51.47	-	-	-	-	68.2	-16.73	117	245	V
1	4.437	57.22	PK-U	33.8	-30.2	60.82	-	-	-	-	68.2	-7.38	88	112	H
3	5.664	50.99	PK-U	34.6	-20.1	65.49	-	-	-	-	68.2	-2.71	89	102	H
4	5.826	50.02	PK-U	34.9	-20.2	64.72	-	-	-	-	68.2	-3.48	84	149	H

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

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

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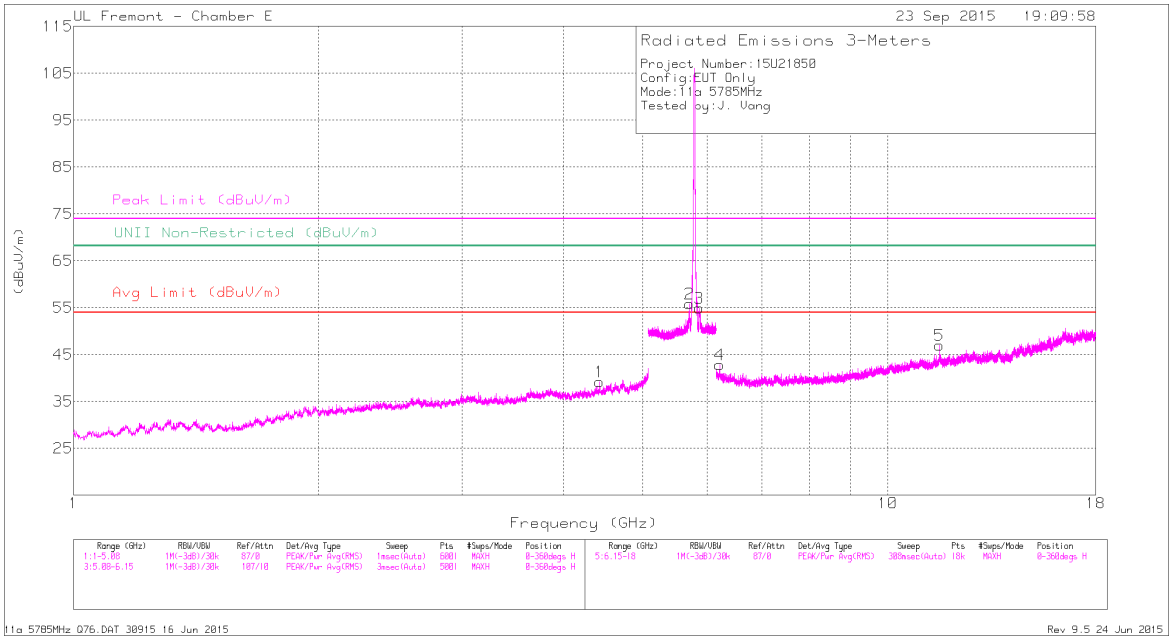
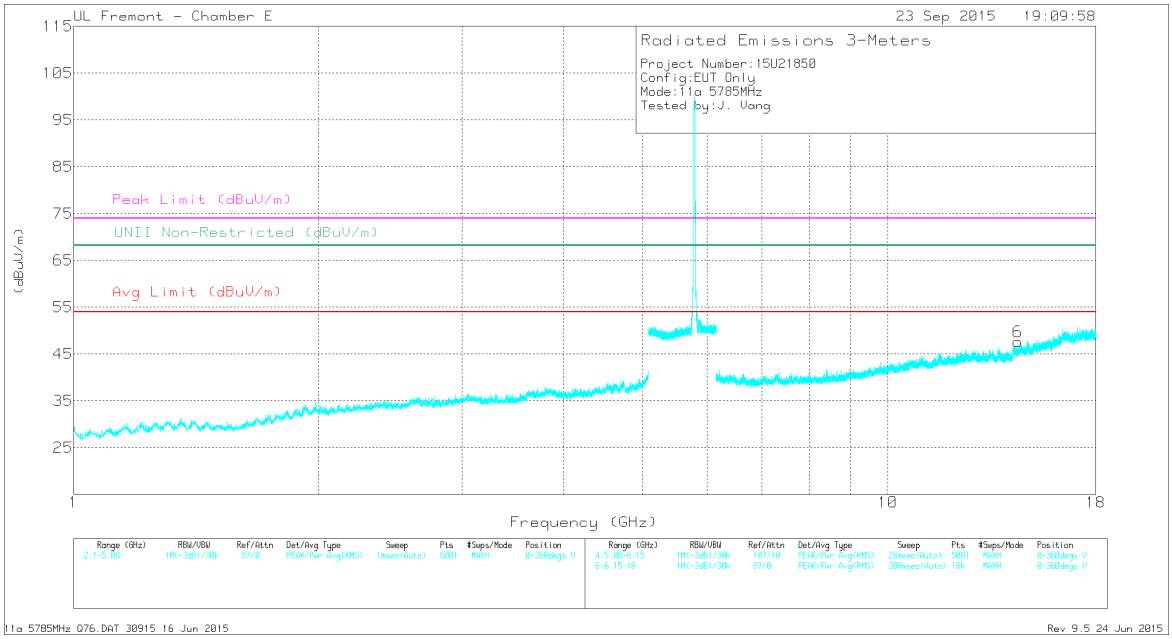
MID CHANNEL HARMONICS AND SPURIOUS EMISSIONS

MID CHANNEL HORIZONTAL PLOT



MID CHANNEL VERTICAL PLOT



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DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
5	*11.571	41.01	PK-U	38.1	-22.2	56.91	-	-	74	-17.09	-	-	56	183	H
	*11.57	27.95	ADR	38.1	-22.2	43.85	54	-10.15	-	-	-	-	56	183	H
1	4.426	41.75	PK-U	33.8	-29.9	45.65	-	-	-	-	68.2	-22.55	207	101	H
2	5.704	48.94	PK-U	34.7	-20.1	63.54	-	-	-	-	68.2	-4.66	76	127	H
3	5.866	48.79	PK-U	34.9	-20.4	63.29	-	-	-	-	68.2	-4.91	72	101	H
4	6.213	41.54	PK-U	35.4	-28	48.94	-	-	-	-	68.2	-19.26	74	165	H
6	14.429	37.84	PK-U	39.2	-23.7	53.34	-	-	-	-	68.2	-14.86	66	200	V

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

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

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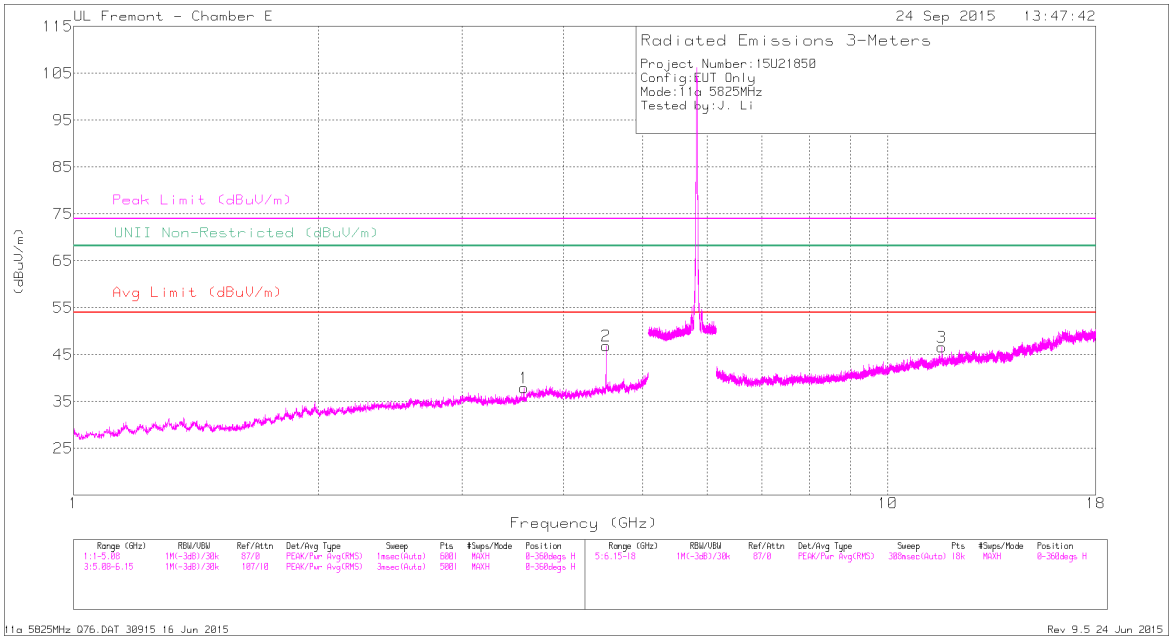
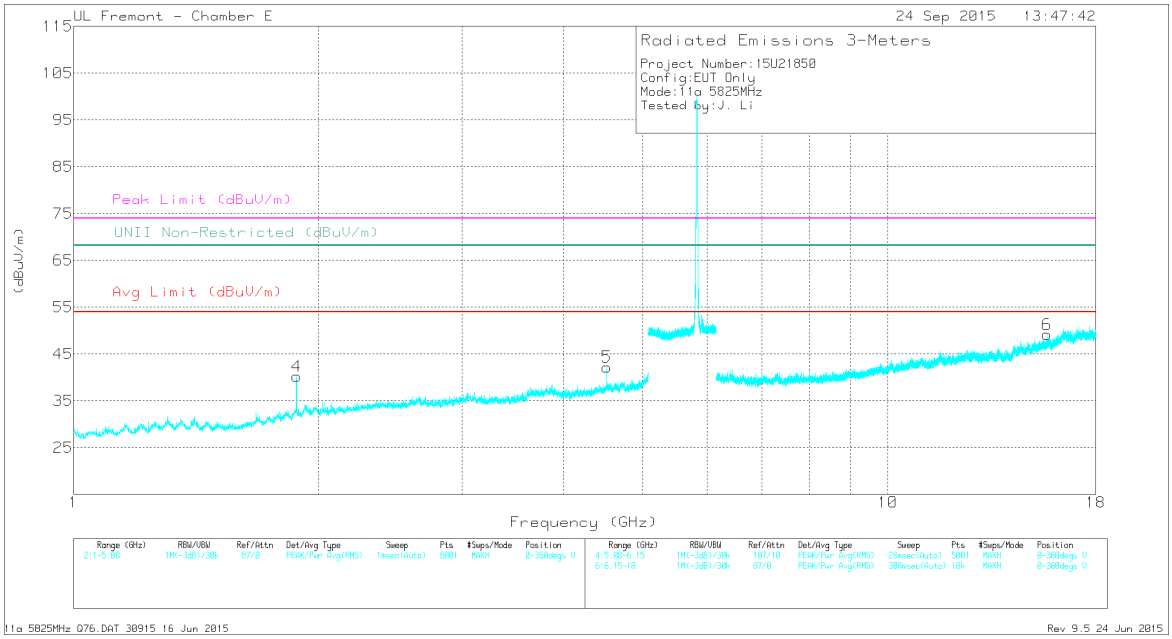
HIGH CHANNEL HARMONICS AND SPURIOUS EMISSIONS

HIGH CHANNEL HORIZONTAL PLOT



HIGH CHANNEL VERTICAL PLOT



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DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*3.575	41.02	PK-U	33	-30.5	43.52	-	-	74	-30.48	-	-	360	200	H
	*3.573	29.55	ADR	33	-30.5	32.05	54	-21.95	-	-	-	-	360	200	H
2	*4.511	55.5	PK-U	34	-29.8	59.7	-	-	74	-14.3	-	-	310	333	H
	*4.51	30.09	ADR	34	-29.9	34.19	54	-19.81	-	-	-	-	310	333	H
5	*4.513	50.27	PK-U	34	-29.8	54.47	-	-	74	-19.53	-	-	169	201	V
	*4.514	30.05	ADR	34	-29.8	34.25	54	-19.75	-	-	-	-	169	201	V
3	*11.653	42.78	PK-U	38.2	-24.2	56.78	-	-	74	-17.22	-	-	332	107	H
	*11.65	28.92	ADR	38.2	-24.1	43.02	54	-10.98	-	-	-	-	332	107	H
6	*15.691	35.8	PK-U	40.4	-22.1	54.1	-	-	74	-19.9	-	-	332	200	V
	*15.69	25.28	ADR	40.4	-22.1	43.58	54	-10.42	-	-	-	-	332	200	V
4	1.87	43.9	PK-U	30.7	-33.8	40.8	-	-	-	-	68.2	-27.4	317	325	V

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

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

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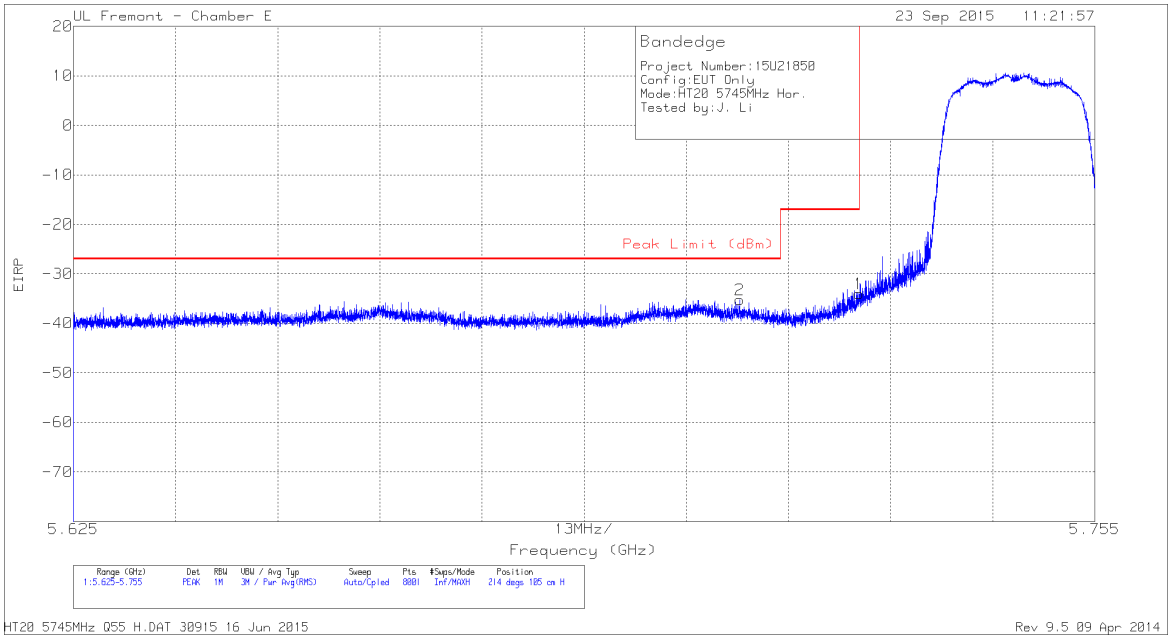
9.3. 802.11n HT20 MODE IN THE 5.8 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL)

LOW CHANNEL HORIZONTAL PLOT



DATA

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T346 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	5.71	-61.63	PK	34.7	-20.1	11.8	-35.23	-27	-8.23	214	105	H
1	5.725	-60.36	PK	34.7	-20.1	11.8	-33.96	-17	-16.96	214	105	H

PK - Peak detector

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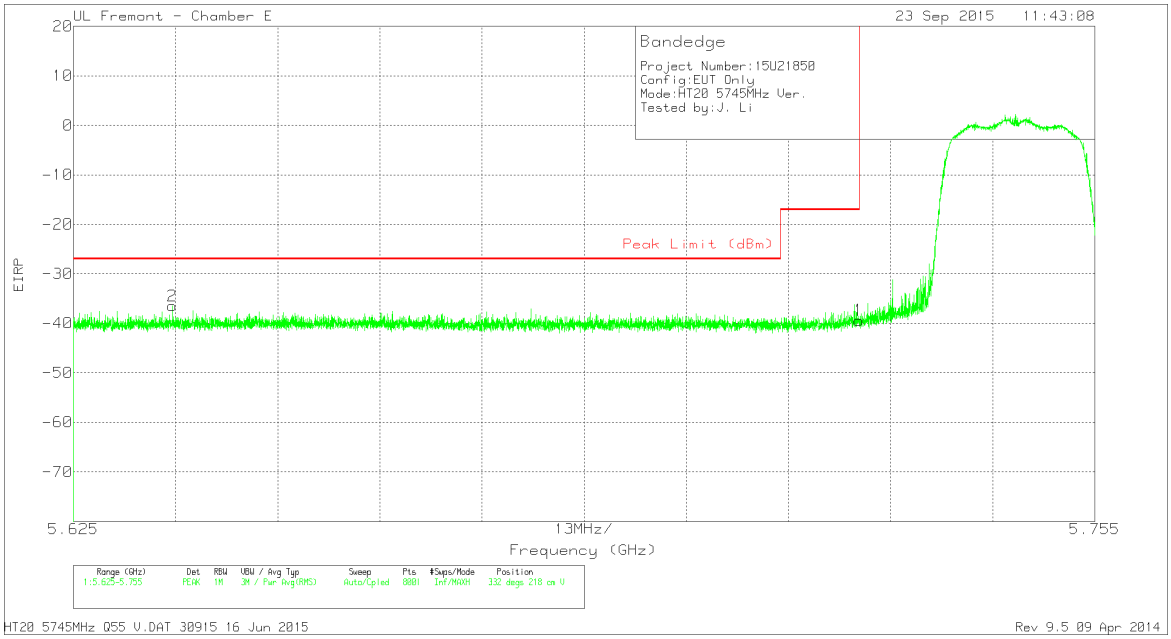
LOW CHANNEL VERTICAL PLOT



DATA

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	5.638	-62.81	PK	34.6	-20	11.8	-36.41	-27	-9.41	332	218	V
1	5.725	-65.75	PK	34.7	-20.1	11.8	-39.35	-17	-22.35	332	218	V

PK - Peak detector

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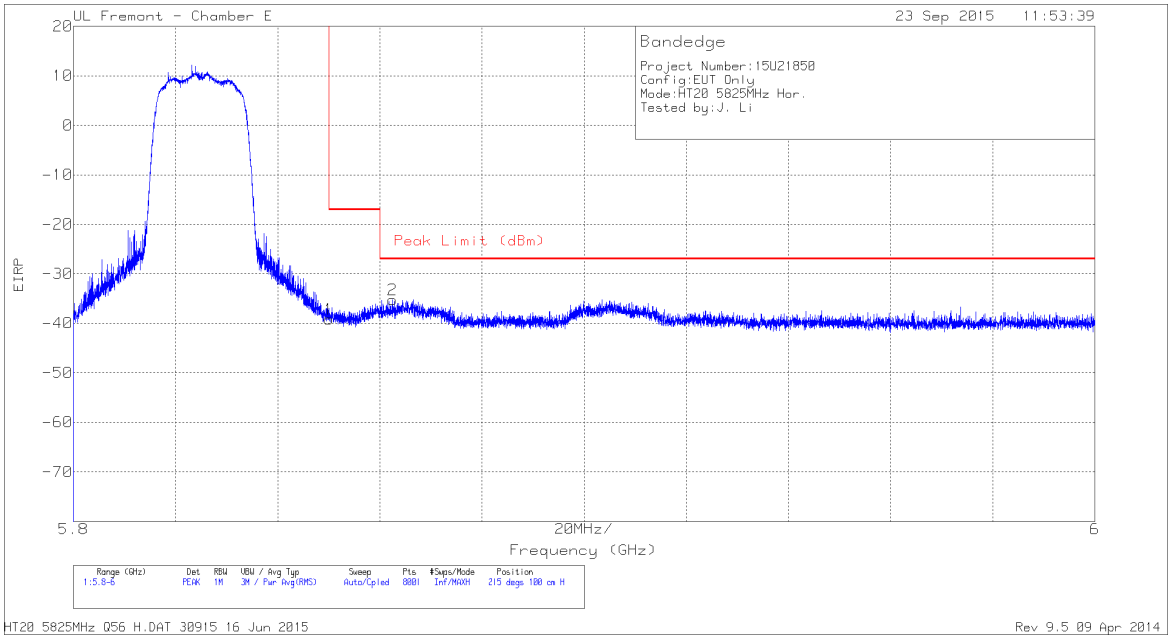
RESTRICTED BANDEDGE (HIGH CHANNEL)

HIGH CHANNEL HORIZONTAL PLOT



DATA

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85	-65.55	PK	34.9	-20.3	11.8	-39.15	-17	-22.15	215	100	H
2	5.862	-61.48	PK	34.9	-20.4	11.8	-35.18	-27	-8.18	215	100	H

PK - Peak detector

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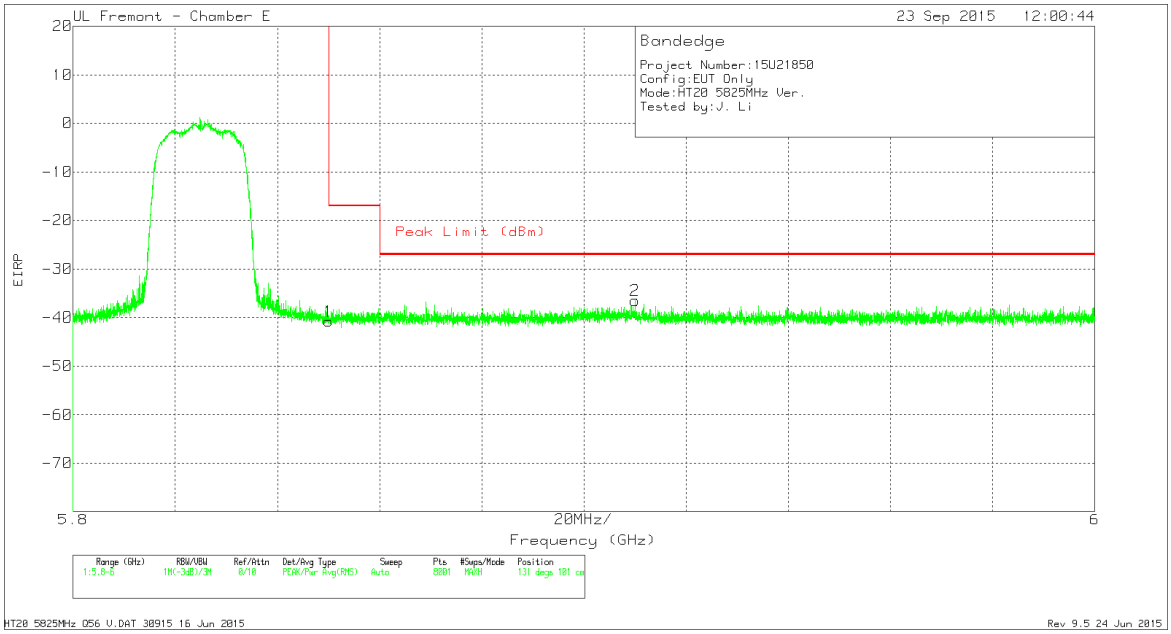
HIGH CHANNEL VERTICAL PLOT



DATA

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85	-67.15	Pk	34.9	-20.3	11.8	-40.75	-17	-23.75	131	101	V
2	5.91	-62.9	Pk	34.9	-20.3	11.8	-36.5	-27	-9.5	131	101	V

Pk - Peak detector

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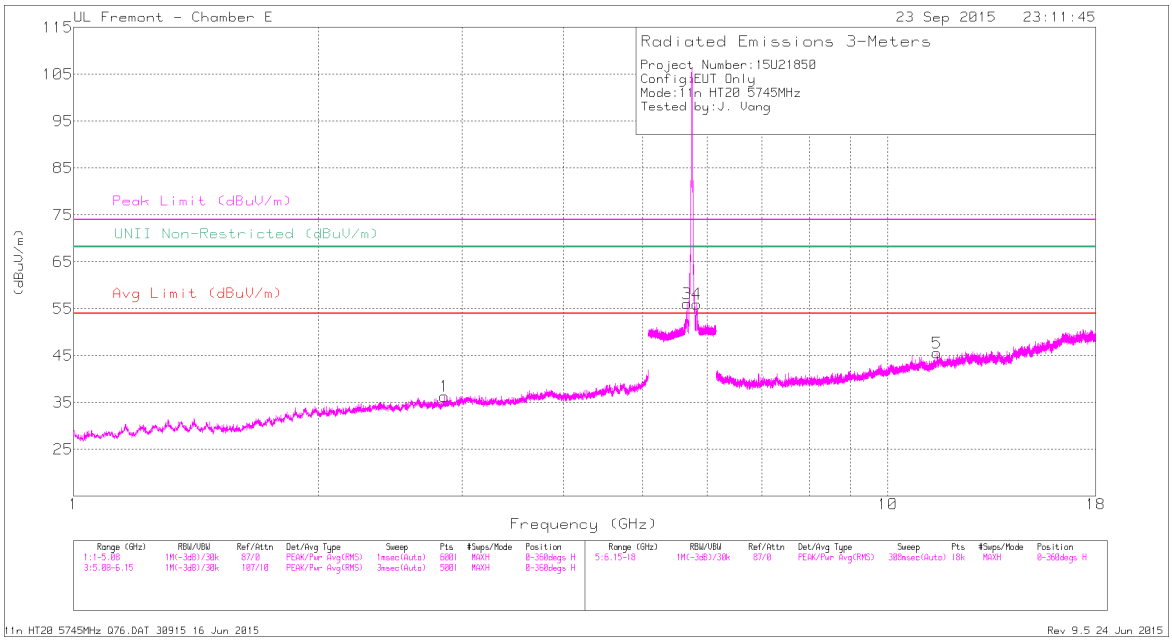
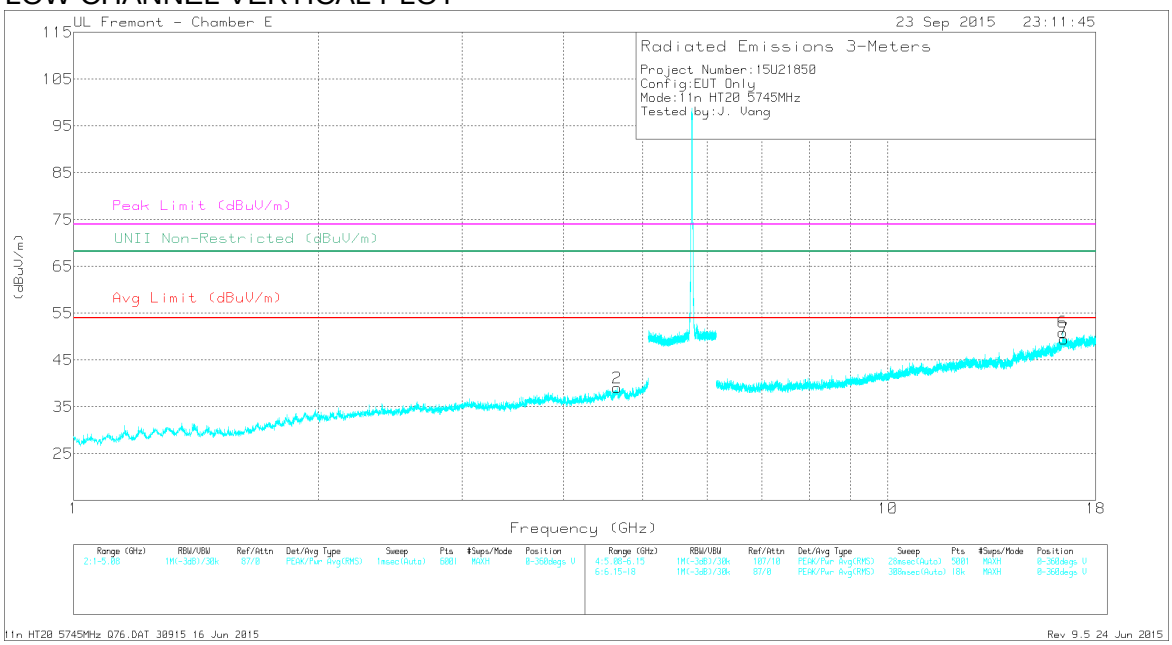
LOW CHANNEL HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL PLOT



LOW CHANNEL VERTICAL PLOT



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DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*2.853	42.34	PK-U	32.4	-31.8	42.94	-	-	74	-31.06	-	-	314	151	H
	*2.853	30.07	ADR	32.4	-31.8	30.67	54	-23.33	-	-	-	-	314	151	H
2	*4.65	41.89	PK-U	34.1	-30	45.99	-	-	74	-28.01	-	-	296	358	V
	*4.65	30.38	ADR	34.1	-30	34.48	54	-19.52	-	-	-	-	296	358	V
5	*11.489	41.52	PK-U	38.1	-24.1	55.52	-	-	74	-18.48	-	-	58	175	H
	*11.49	28.68	ADR	38.1	-24.2	42.58	54	-11.42	-	-	-	-	58	175	H
3	5.664	49.45	PK-U	34.6	-20.1	63.95	-	-	-	-	68.2	-4.25	82	125	H
4	5.826	49.57	PK-U	34.9	-20.2	64.27	-	-	-	-	68.2	-3.93	85	211	H
6	16.415	37.38	PK-U	41.1	-21.3	57.18	-	-	-	-	68.2	-11.02	64	346	V
7	16.461	37.01	PK-U	41.2	-21.2	57.01	-	-	-	-	68.2	-11.19	232	100	V

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

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

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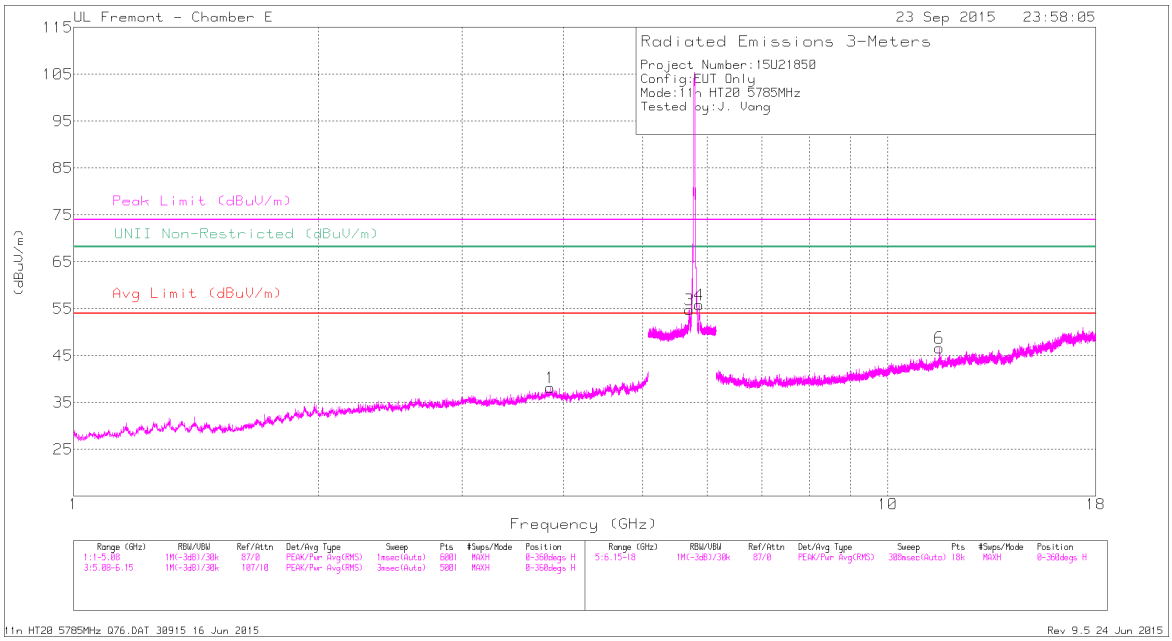
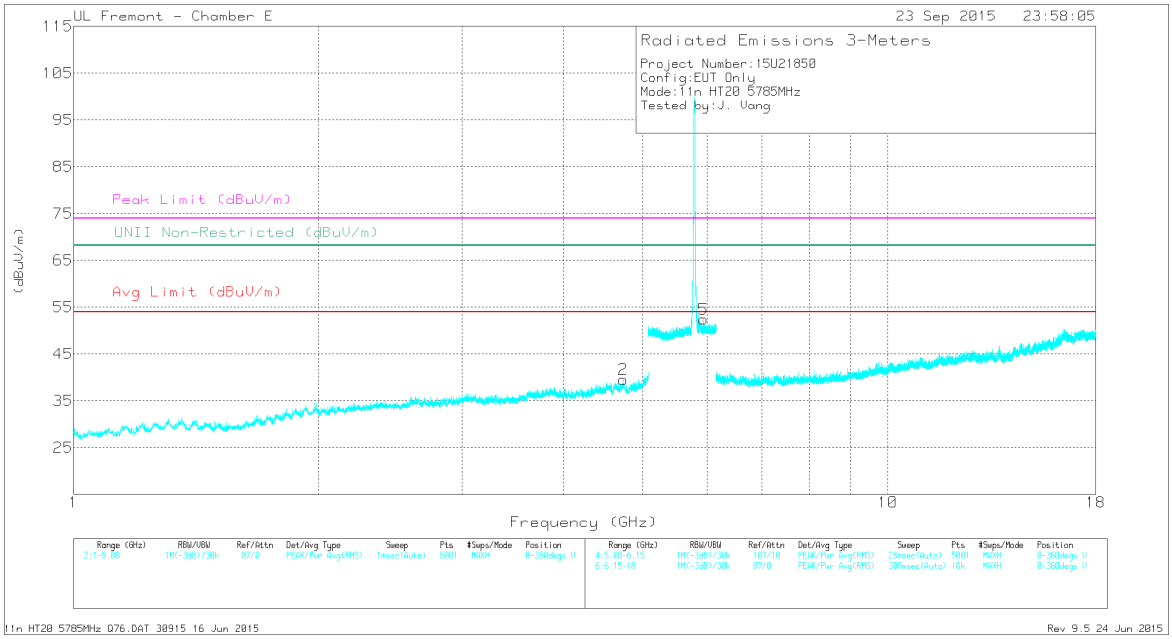
MID CHANNEL HARMONICS AND SPURIOUS EMISSIONS

MID CHANNEL HORIZONTAL PLOT



MID CHANNEL VERTICAL PLOT



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DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*3.845	41.23	PK-U	33.5	-29.9	44.83	-	-	74	-29.17	-	-	49	386	H
	*3.848	29.66	ADR	33.5	-29.8	33.36	54	-20.64	-	-	-	-	49	386	H
2	*4.732	40.77	PK-U	34.2	-28.9	46.07	-	-	74	-27.93	-	-	165	273	V
	*4.729	29.12	ADR	34.2	-28.8	34.52	54	-19.48	-	-	-	-	165	273	V
6	*11.568	40.54	PK-U	38.1	-22.3	56.34	-	-	74	-17.66	-	-	57	200	H
	*11.57	27.6	ADR	38.1	-22.3	43.4	54	-10.6	-	-	-	-	57	200	H
3	5.705	47.9	PK-U	34.7	-20.1	62.5	-	-	-	-	68.2	-5.7	65	106	H
4	5.866	48.68	PK-U	34.9	-20.4	63.18	-	-	-	-	68.2	-5.02	81	200	H
5	5.934	43.87	PK-U	35	-20.3	58.57	-	-	-	-	68.2	-9.63	173	101	V

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

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

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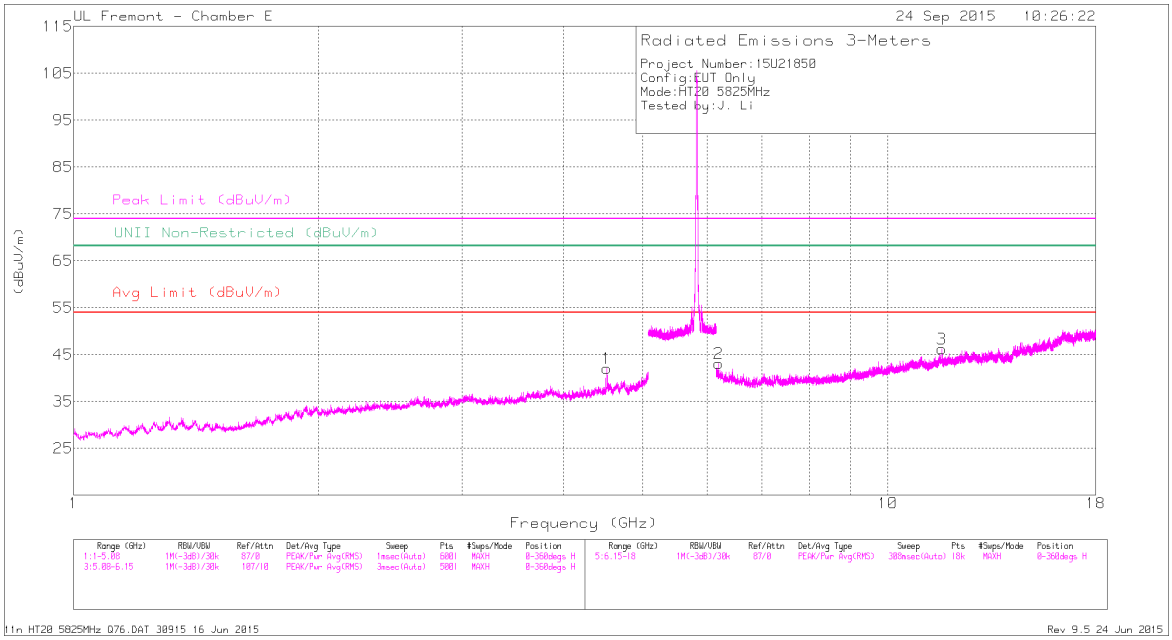
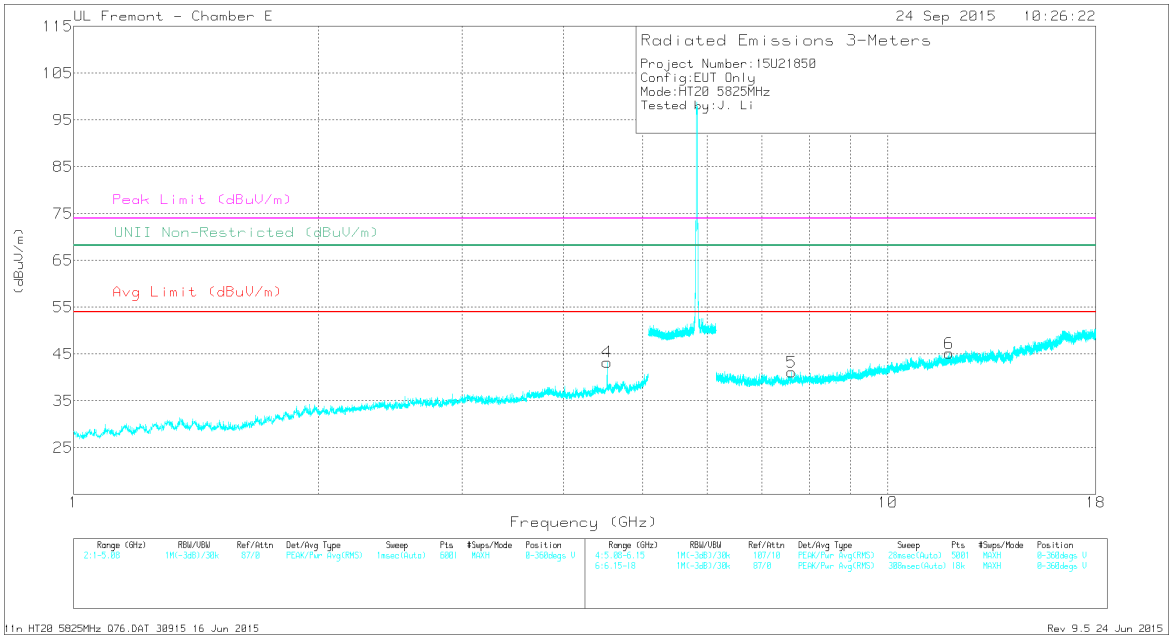
HIGH CHANNEL HARMONICS AND SPURIOUS EMISSIONS

HIGH CHANNEL HORIZONTAL PLOT



HIGH CHANNEL VERTICAL PLOT



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DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*4.521	47.51	PK-U	34	-29.7	51.81	-	-	74	-22.19	-	-	149	305	H
	*4.518	29.87	ADR	34	-29.7	34.17	54	-19.83	-	-	-	-	149	305	H
4	*4.518	42.99	PK-U	34	-29.7	47.29	-	-	74	-26.71	-	-	306	165	V
	*4.521	29.84	ADR	34	-29.7	34.14	54	-19.86	-	-	-	-	306	165	V
3	* 1.65	39.18	PK-U	38.2	-24.1	53.28	-	-	74	-20.72	-	-	266	101	H
	*11.648	27.79	ADR	38.2	-24	41.99	54	-12.01	-	-	-	-	266	101	H
5	*7.622	39.08	PK-U	35.7	-27.1	47.68	-	-	74	-26.32	-	-	198	215	V
	*7.622	27.58	ADR	35.7	-27.1	36.18	54	-17.82	-	-	-	-	198	215	V
6	*11.896	36.43	PK-U	38.4	-23.4	51.43	-	-	74	-22.57	-	-	238	179	V
	*11.895	25.64	ADR	38.4	-23.3	40.74	54	-13.26	-	-	-	-	238	179	V
2	6.196	39.95	PK-U	35.4	-28.2	47.15	-	-	-	-	68.2	-21.05	312	192	H

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

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

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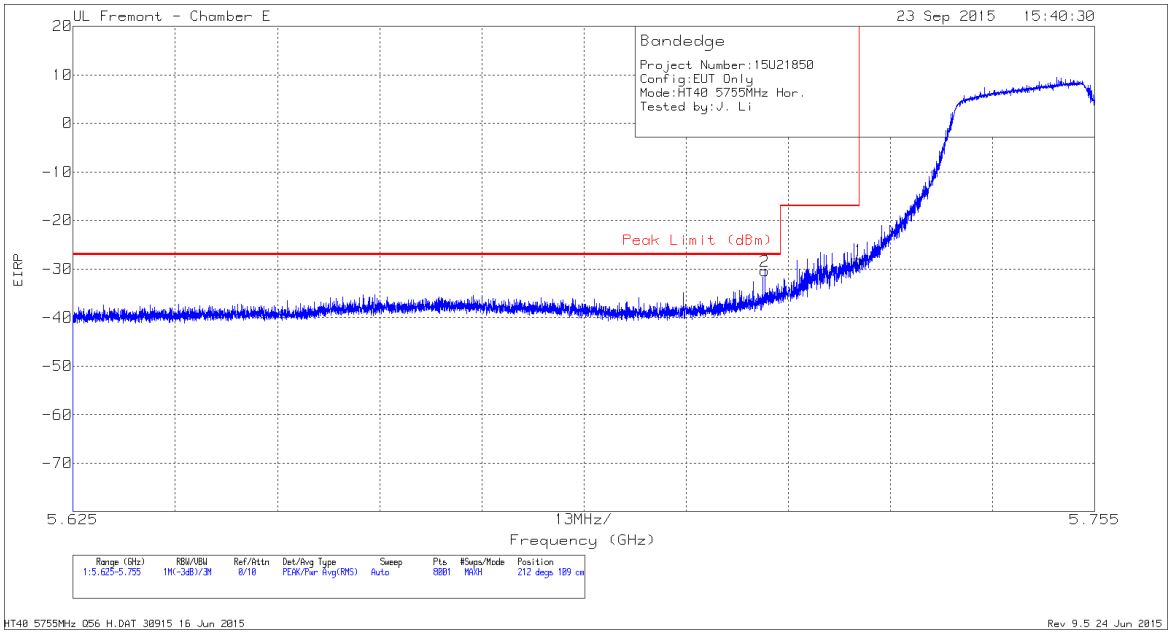
9.4. 802.11n HT40 MODE IN THE 5.8 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL)

LOW CHANNEL HORIZONTAL PLOT



DATA

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T346 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Conversion Factor (dB)	DC Corr (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	5.713	-56.81	Pk	34.7	-20.1	11.8	0	-30.41	-27	-3.41	212	109	H
1	5.725	-54.55	Pk	34.7	-20.1	11.8	0	-28.15	-17	-11.15	212	109	H

Pk - Peak detector

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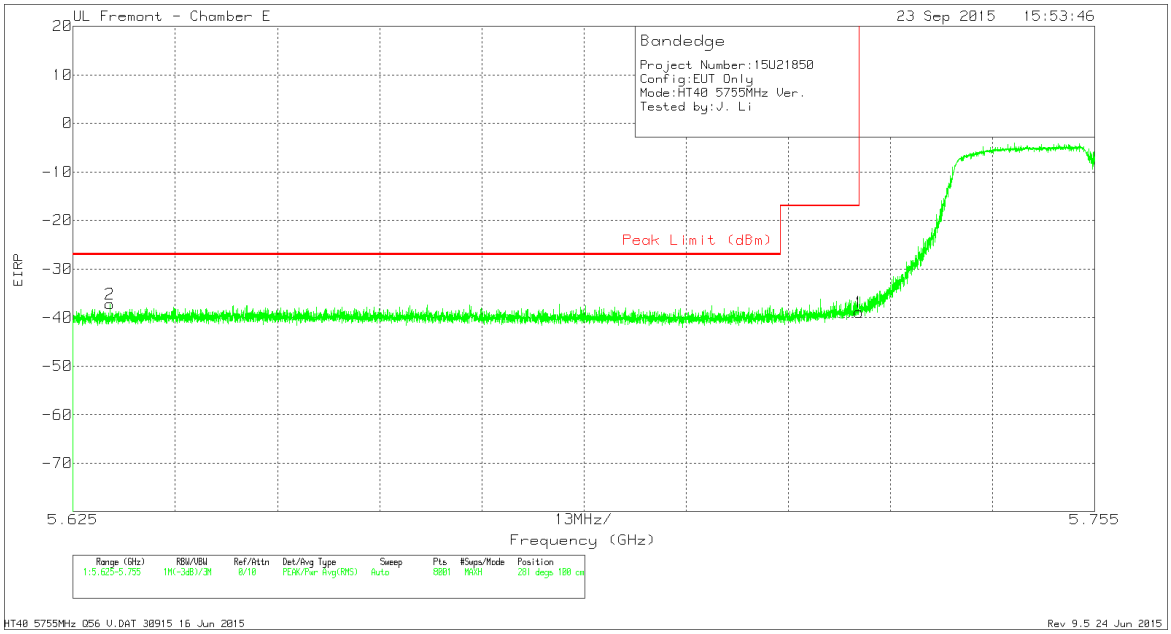
LOW CHANNEL VERTICAL PLOT



DATA

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T346 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Conversion Factor (dB)	DC Corr (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	5.63	-63.6	Pk	34.6	-20	11.8	0	-37.2	-27	-10.2	281	100	V
1	5.725	-65.29	Pk	34.7	-20.1	11.8	0	-38.89	-17	-21.89	281	100	V

Pk - Peak detector

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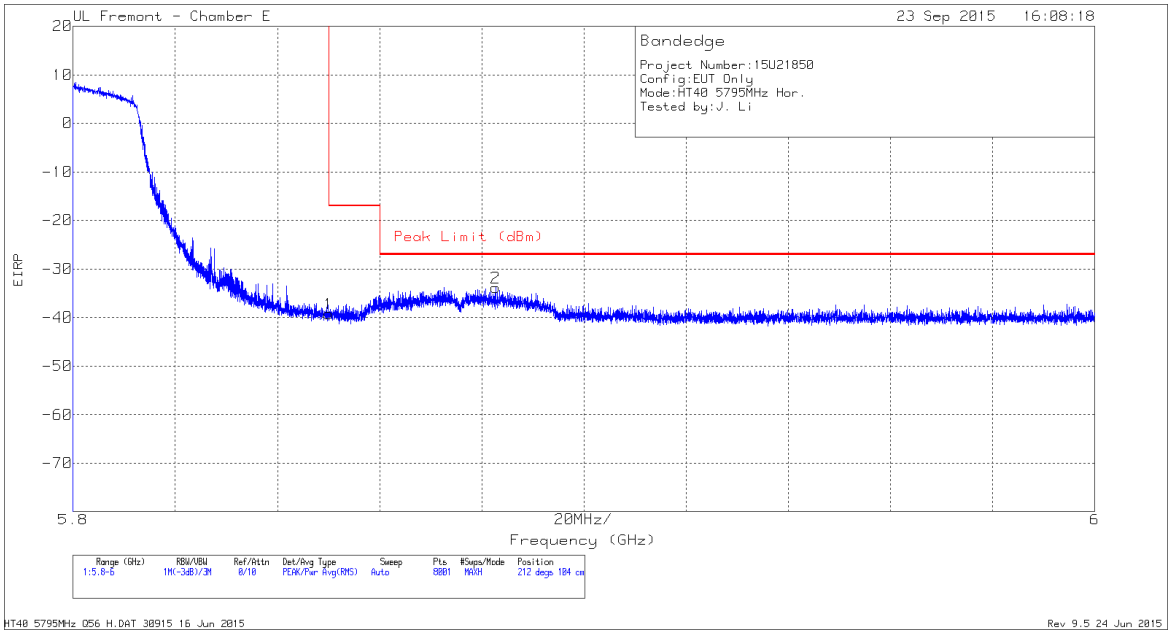
RESTRICTED BANDEDGE (HIGH CHANNEL)

HIGH CHANNEL HORIZONTAL PLOT



DATA

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T346 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Conversion Factor (dB)	DC Corr (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85	-65.62	Pk	34.9	-20.3	11.8	0	-39.22	-17	-22.22	212	104	H
2	5.883	-60.24	Pk	34.9	-20.3	11.8	0	-33.84	-27	-6.84	212	104	H

Pk - Peak detector

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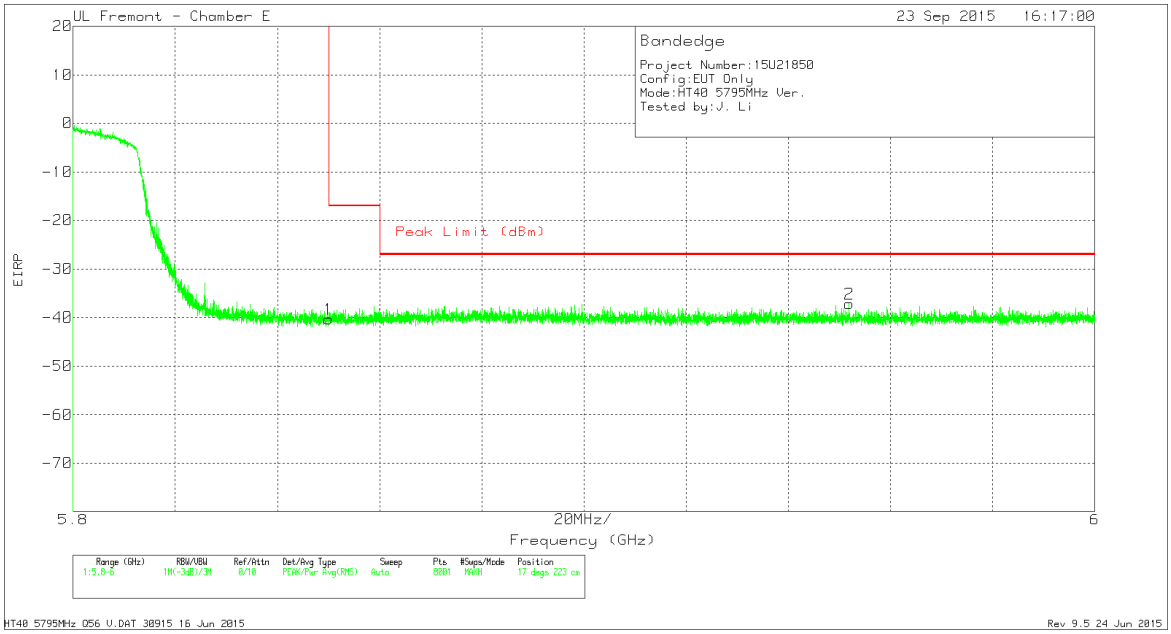
HIGH CHANNEL VERTICAL PLOT



DATA

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T346 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Conversion Factor (dB)	DC Corr (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85	-66.71	Pk	34.9	-20.3	11.8	0	-40.31	-17	-23.31	17	223	V
2	5.952	-63.73	Pk	35	-20.2	11.8	0	-37.13	-27	-10.13	17	223	V

Pk - Peak detector

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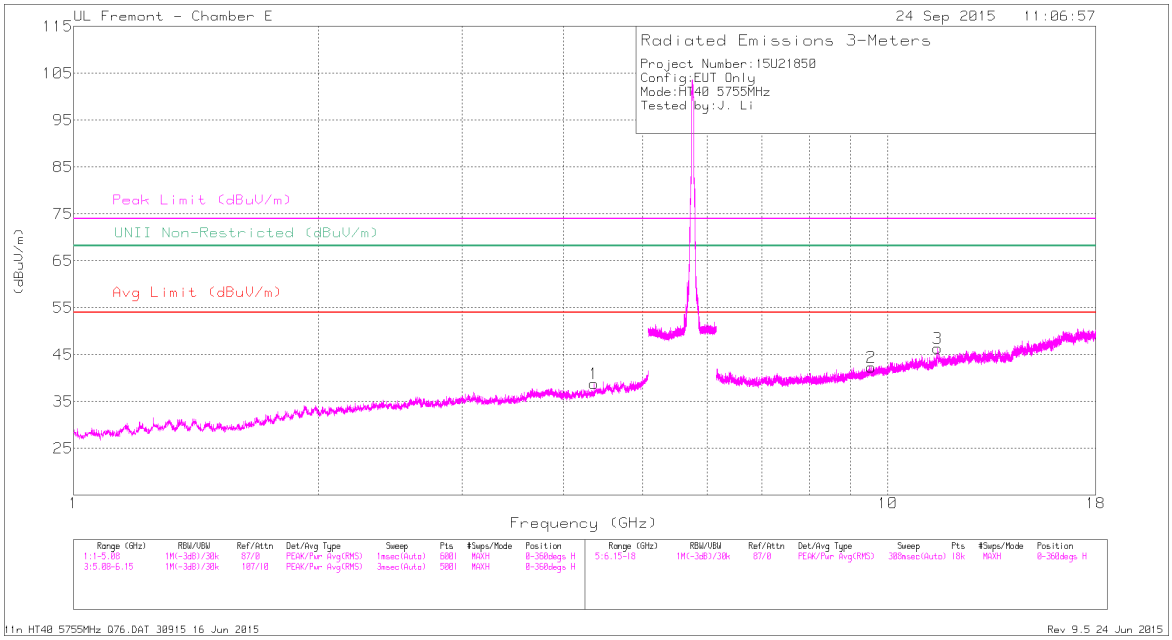
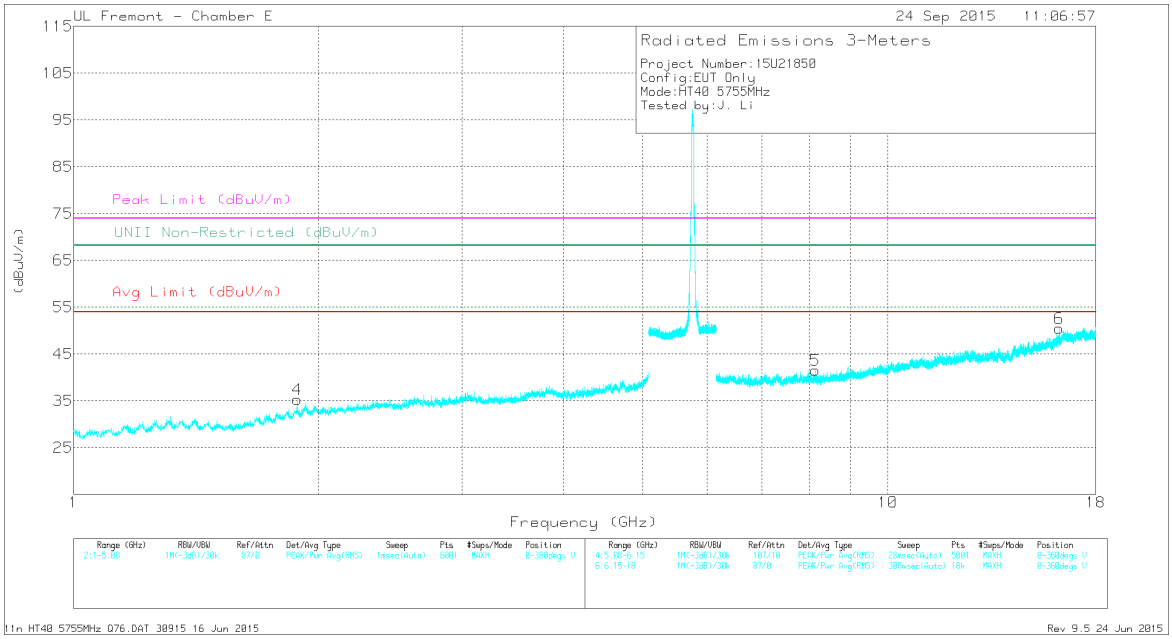
LOW CHANNEL HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL PLOT



LOW CHANNEL VERTICAL PLOT



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DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*4.355	41.75	PK-U	33.6	-30.2	0	45.15	-	-	74	-28.85	-	-	360	200	H
	*4.355	30.11	ADR	33.6	-30.2	.14	33.73	54	-20.27	-	-	-	-	360	200	H
3	*11.509	40.96	PK-U	38.1	-24	0	55.06	-	-	74	-18.94	-	-	144	112	H
	*11.51	28.64	ADR	38.1	-23.9	.14	43.06	54	-10.94	-	-	-	-	144	112	H
5	*8.148	38.95	PK-U	35.7	-26.5	0	48.15	-	-	74	-25.85	-	-	183	152	V
	*8.145	27.11	ADR	35.7	-26.5	.14	36.53	54	-17.47	-	-	-	-	183	152	V
4	1.88	43.67	PK-U	30.7	-33.6	0	40.77	-	-	-	-	68.2	-27.43	275	368	V
2	9.535	37.8	PK-U	36.8	-25.1	0	49.5	-	-	-	-	68.2	-18.7	265	200	H
6	16.219	36.64	PK-U	40.9	-21.6	0	55.94	-	-	-	-	68.2	-12.26	265	200	V

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

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

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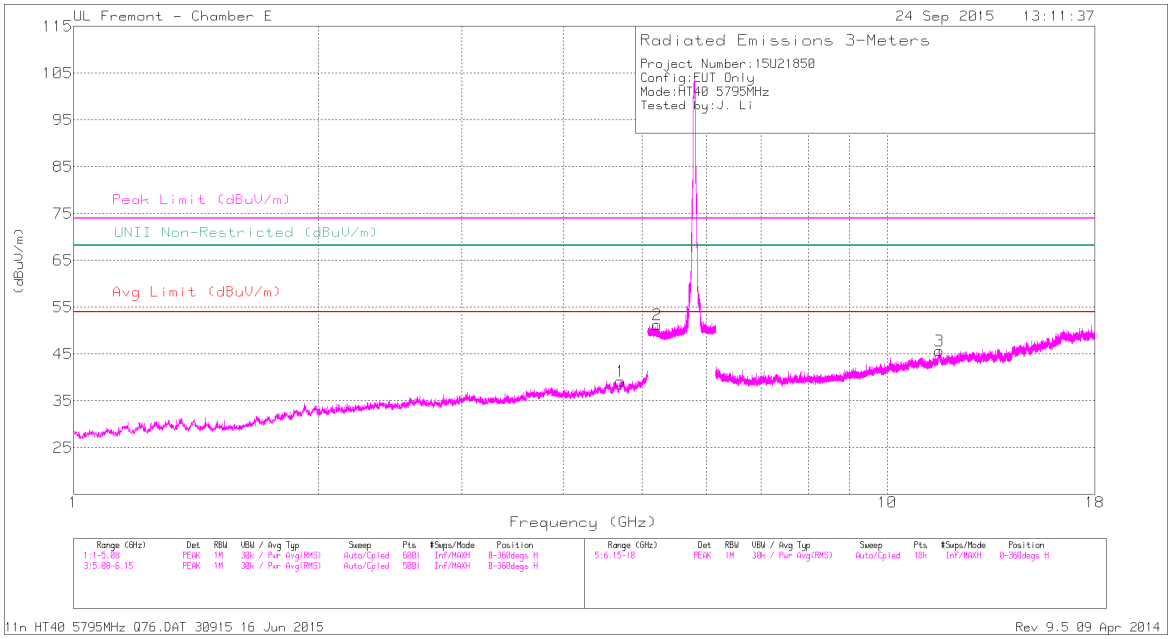
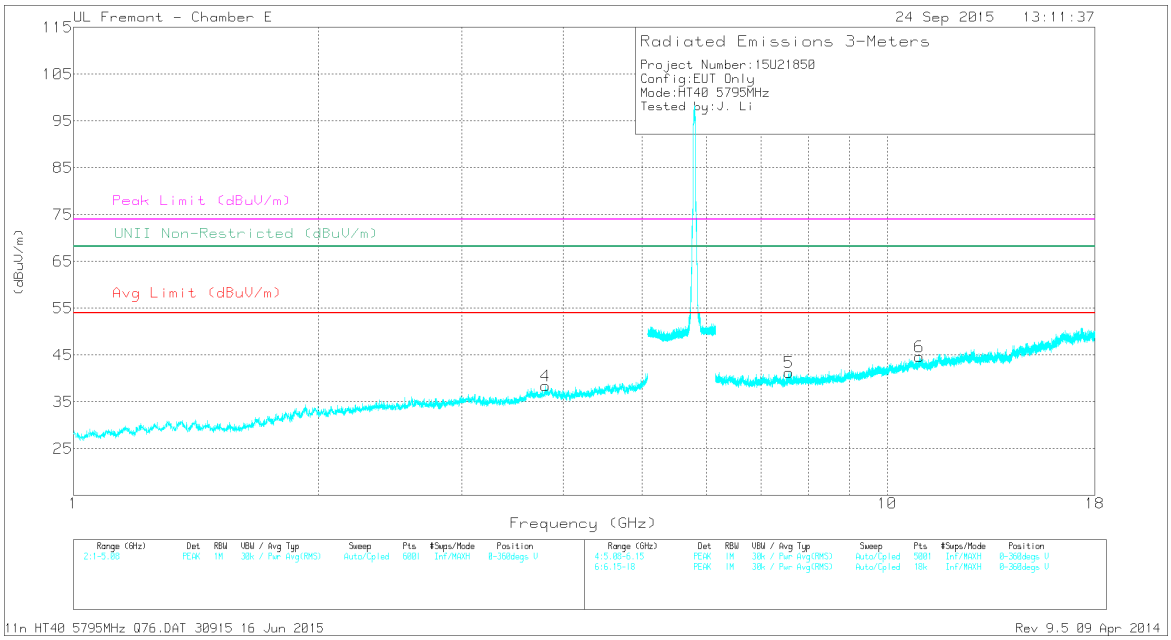
HIGH CHANNEL HARMONICS AND SPURIOUS EMISSIONS

HIGH CHANNEL HORIZONTAL PLOT



HIGH CHANNEL VERTICAL PLOT



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DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*4.701	41.15	PK-U	34.2	-29.4	0	45.95	-	-	74	-28.05	-	-	261	179	H
	*4.702	30.03	ADR	34.2	-29.4	.14	35.05	54	-18.95	-	-	-	-	261	179	H
4	*3.802	41.82	PK-U	33.5	-30.2	0	45.12	-	-	74	-28.88	-	-	239	200	V
	*3.804	30.22	ADR	33.5	-30.1	.14	33.84	54	-20.16	-	-	-	-	139	200	V
3	*11.587	36.34	PK-U	38.1	-22.4	0	52.04	-	-	74	-21.96	-	-	228	214	H
	*11.59	25.2	ADR	38.1	-22.5	.14	41.02	54	-12.98	-	-	-	-	228	214	H
5	*7.576	37.58	PK-U	35.7	-26.4	0	46.88	-	-	74	-27.12	-	-	95	186	V
	*7.578	26.79	ADR	35.7	-26.4	.14	36.31	54	-17.69	-	-	-	-	95	186	V
6	*10.951	36.62	PK-U	37.9	-23.5	0	51.02	-	-	74	-22.98	-	-	227	233	V
	*10.952	25.4	ADR	37.9	-23.5	.14	40.02	54	-13.98	-	-	-	-	227	233	V
2	5.216	43.6	PK-U	34.4	-20.3	0	57.7	-	-	-	-	68.2	-10.5	149	191	H

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

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

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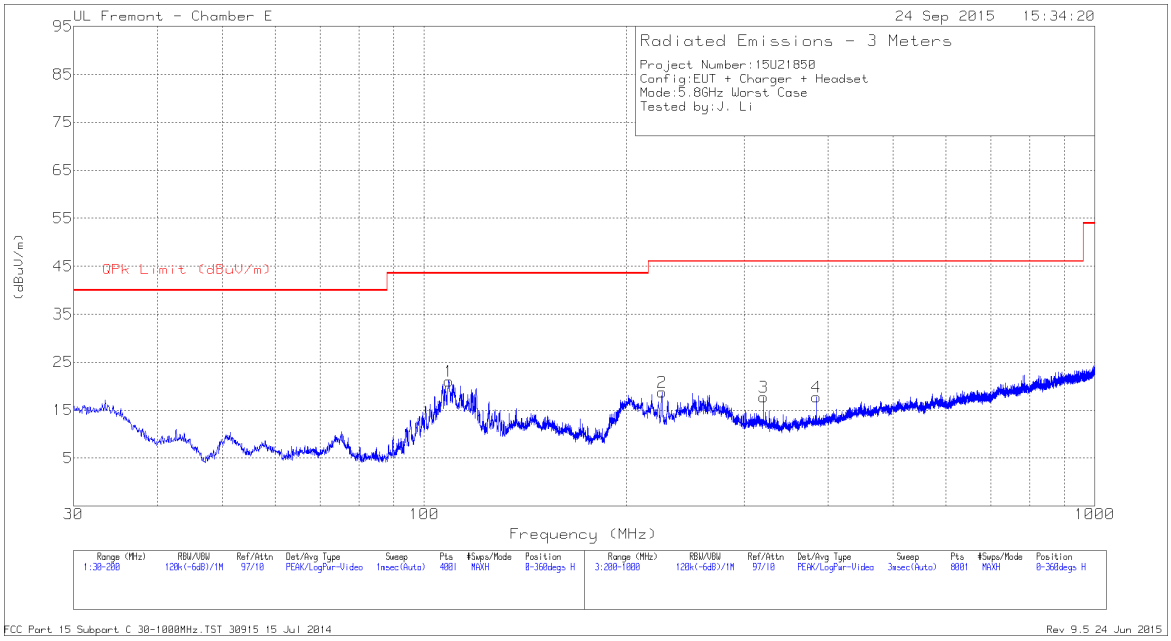
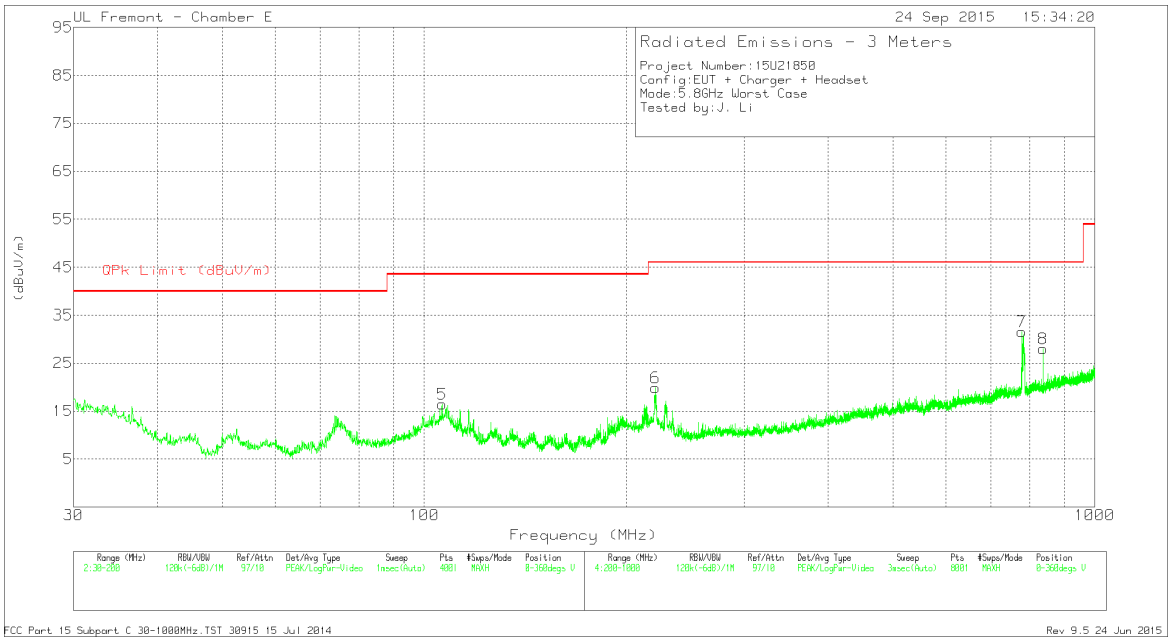
9.5. WORST-CASE BELOW 1 GHz

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

HORIZONTAL PLOT



VERTICAL PLOT



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HORIZONTAL AND VERTICAL DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T408 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 108.965	40.24	Pk	12.1	-31.3	21.04	43.52	-22.48	0-360	201	H
5	106.33	36.07	Pk	11.6	-31.2	16.47	43.52	-27.05	0-360	100	V
6	221.2	39.96	Pk	10.6	-30.7	19.86	46.02	-26.16	0-360	99	V
2	226.2	38.63	Pk	10.8	-30.7	18.73	46.02	-27.29	0-360	100	H
3	320.6	34.16	Pk	13.7	-30.1	17.76	46.02	-28.26	0-360	100	H
4	384.7	32.53	Pk	15.1	-29.9	17.73	46.02	-28.29	0-360	100	H
7	777.6	39.66	Pk	20.8	-28.9	31.56	46.02	-14.46	0-360	201	V
8	836.6	35.59	Pk	21	-28.6	27.99	46.02	-18.03	0-360	99	V

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

Pk - Peak detector

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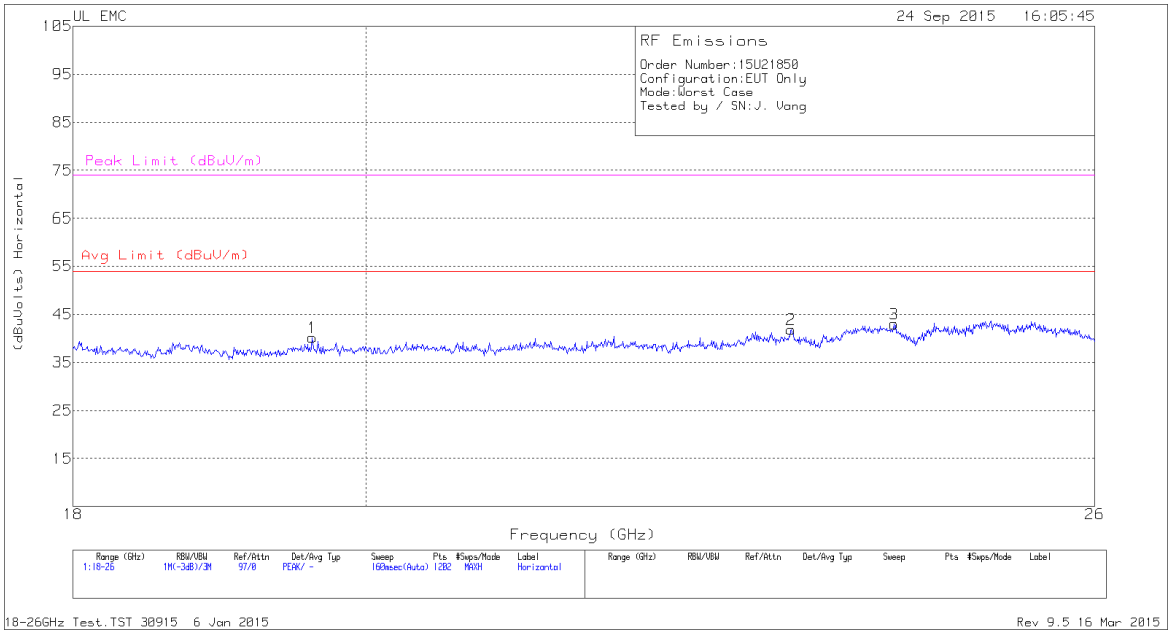
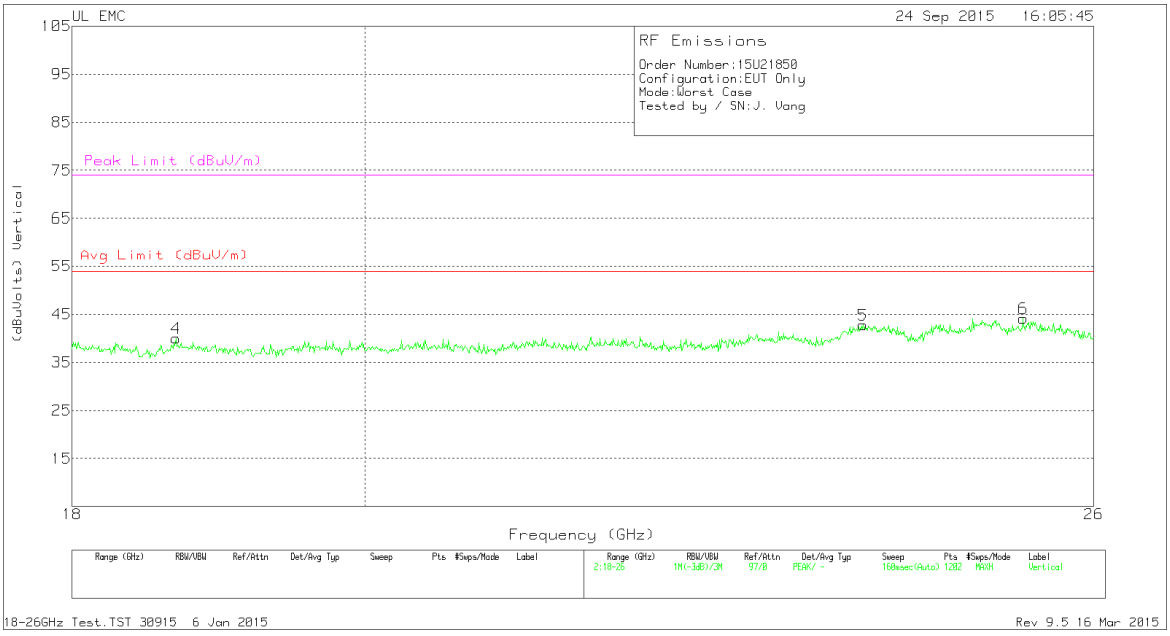
9.6. WORST-CASE ABOVE 18 GHz

SPURIOUS EMISSIONS 18000 TO 26000 MHz (WORST-CASE CONFIGURATION)

HORIZONTAL PLOT



VERTICAL PLOT



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HORIZONTAL AND VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T89 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	19.619	42.07	Pk	32.5	-24.9	-9.5	40.16	54	-13.83	74	-33.83
2	23.309	42.33	Pk	33.5	-24.5	-9.5	41.83	54	-12.16	74	-32.16
3	24.188	43.1	Pk	33.5	-24.1	-9.5	43	54	-11	74	-31
4	18.686	41.4	Pk	32.5	-24.4	-9.5	40	54	-14	74	-34
5	23.928	42.93	Pk	33.4	-24	-9.5	42.83	54	-11.16	74	-31.16
6	25.347	44.87	Pk	33.7	-24.9	-9.5	44.16	54	-9.83	74	-29.83

Pk - Peak detector

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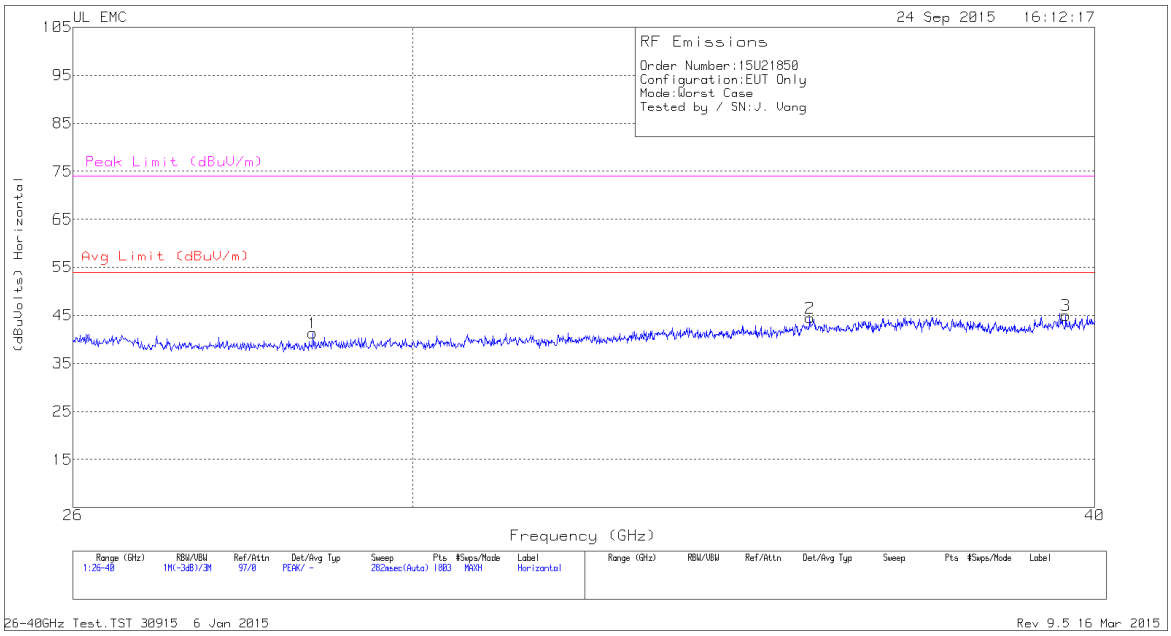
SPURIOUS EMISSIONS 26000 TO 40000 MHz (WORST-CASE CONFIGURATION)

HORIZONTAL PLOT



VERTICAL PLOT

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HORIZONTAL AND VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T90 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	28.766	46.93	Pk	35.7	-31.8	-9.5	41.33	54	-12.66	74	-32.66
2	35.471	49.6	Pk	37.9	-33.5	-9.5	44.5	54	-9.5	74	-29.5
3	39.511	49	Pk	37.3	-31.8	-9.5	45	54	-9	74	-29
4	26.606	45.57	Pk	35.4	-30.3	-9.5	41.16	54	-12.83	74	-32.83
5	37.312	50.47	Pk	37.3	-33.1	-9.5	45.16	54	-8.83	74	-28.83
6	39.417	49.27	Pk	37.7	-31.8	-9.5	45.66	54	-8.33	74	-28.33

Pk - Peak detector

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10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	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 C63.10.

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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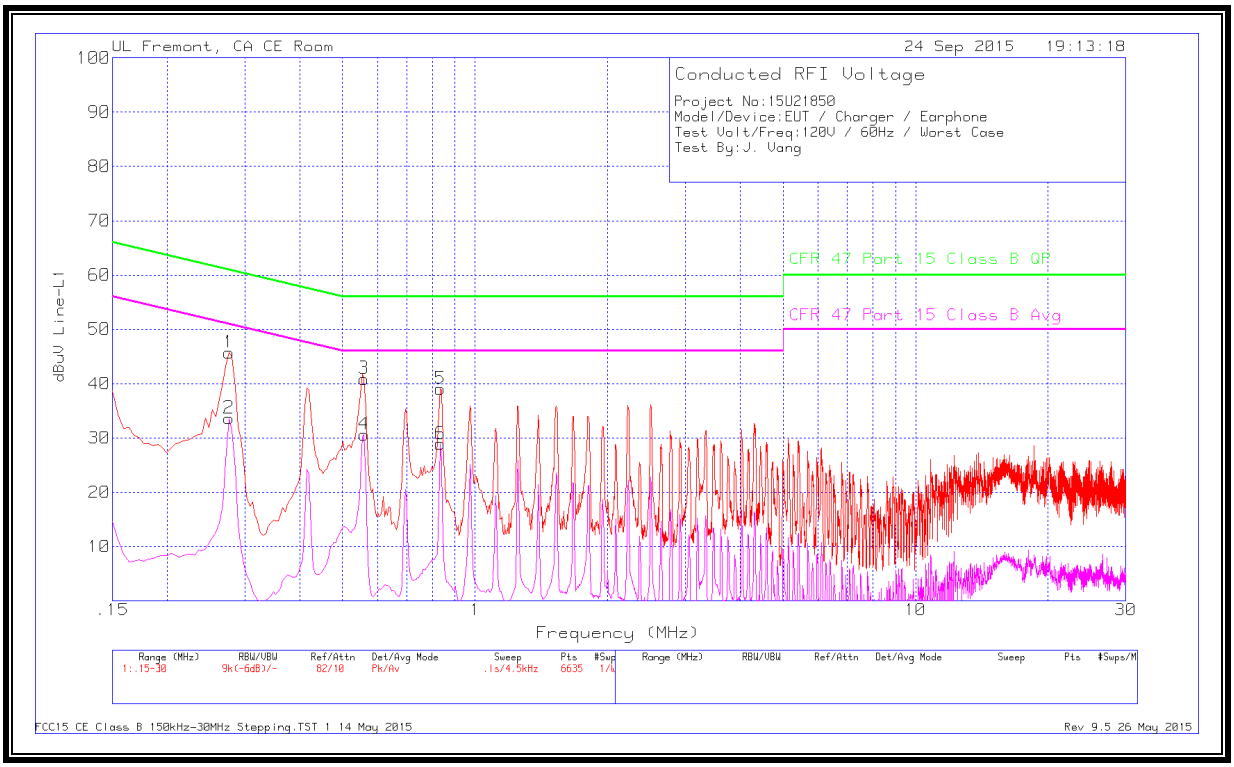
10.1. EUT POWERED BY AC ADAPTER

LINE 1 RESULTS



WORST EMISSIONS

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1	LC Cables 1&3	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	Margin (dB)	CFR 47 Part 15 Class B Avg	Margin (dB)
1	.276	45.1	Pk	.6	0	45.7	60.94	-15.24	-	-
2	.276	33.03	Av	.6	0	33.63	-	-	50.94	-17.31
3	.5595	40.6	Pk	.3	0	40.9	56	-15.1	-	-
4	.5595	30.34	Av	.3	0	30.64	-	-	46	-15.36
5	.834	38.75	Pk	.3	0	39.05	56	-16.95	-	-
6	.834	28.62	Av	.3	0	28.92	-	-	46	-17.08

Pk - Peak detector

Av - Average detection

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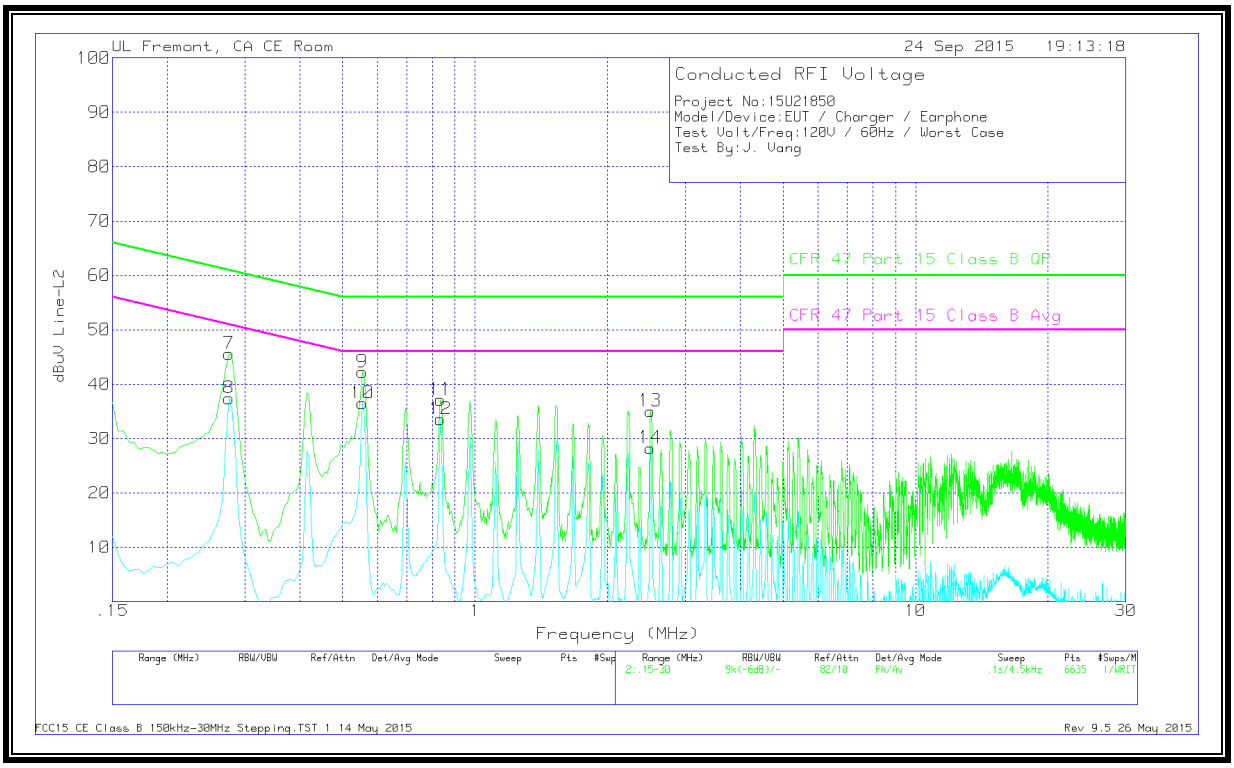
LINE 2 RESULTS



WORST EMISSIONS

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2	LC Cables 2&3	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	Margin (dB)	CFR 47 Part 15 Class B Avg	Margin (dB)
7	.276	44.88	Pk	.7	0	45.58	60.94	-15.36	-	-
8	.276	36.69	Av	.7	0	37.39	-	-	50.94	-13.55
9	.555	41.93	Pk	.3	0	42.23	56	-13.77	-	-
10	.555	36.18	Av	.3	0	36.48	-	-	46	-9.52
11	.834	36.8	Pk	.3	0	37.1	56	-18.9	-	-
12	.834	33.25	Av	.3	0	33.55	-	-	46	-12.45
13	2.499	34.74	Pk	.2	.1	35.04	56	-20.96	-	-
14	2.499	27.93	Av	.2	.1	28.23	-	-	46	-17.77

Pk - Peak detector

Av - Average detection

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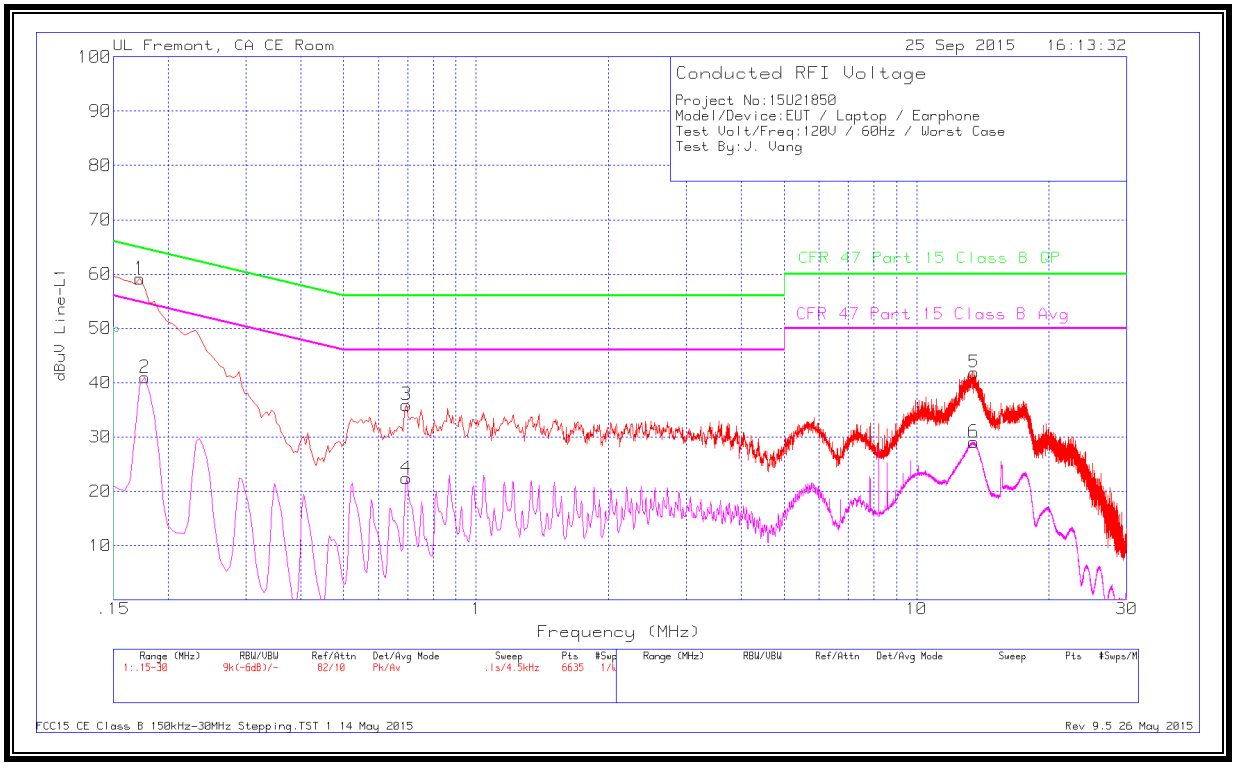
10.2. EUT POWERED BY HOST PC VIA USB CABLE

LINE 1 RESULTS



WORST EMISSIONS

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1	LC Cables 1&3	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	Margin (dB)	CFR 47 Part 15 Class B Avg	Margin (dB)
1	.1725	58.04	Pk	1.1	0	59.14	64.84	-5.7	-	-
2	.177	39.84	Av	1.1	0	40.94	-	-	54.63	-13.69
3	.6945	35.61	Pk	.3	0	35.91	56	-20.09	-	-
4	.6945	22.14	Av	.3	0	22.44	-	-	46	-23.56
5	13.515	41.49	Pk	.2	.2	41.89	60	-18.11	-	-
6	13.479	28.64	Av	.2	.2	29.04	-	-	50	-20.96

Pk - Peak detector

Av - Average detection

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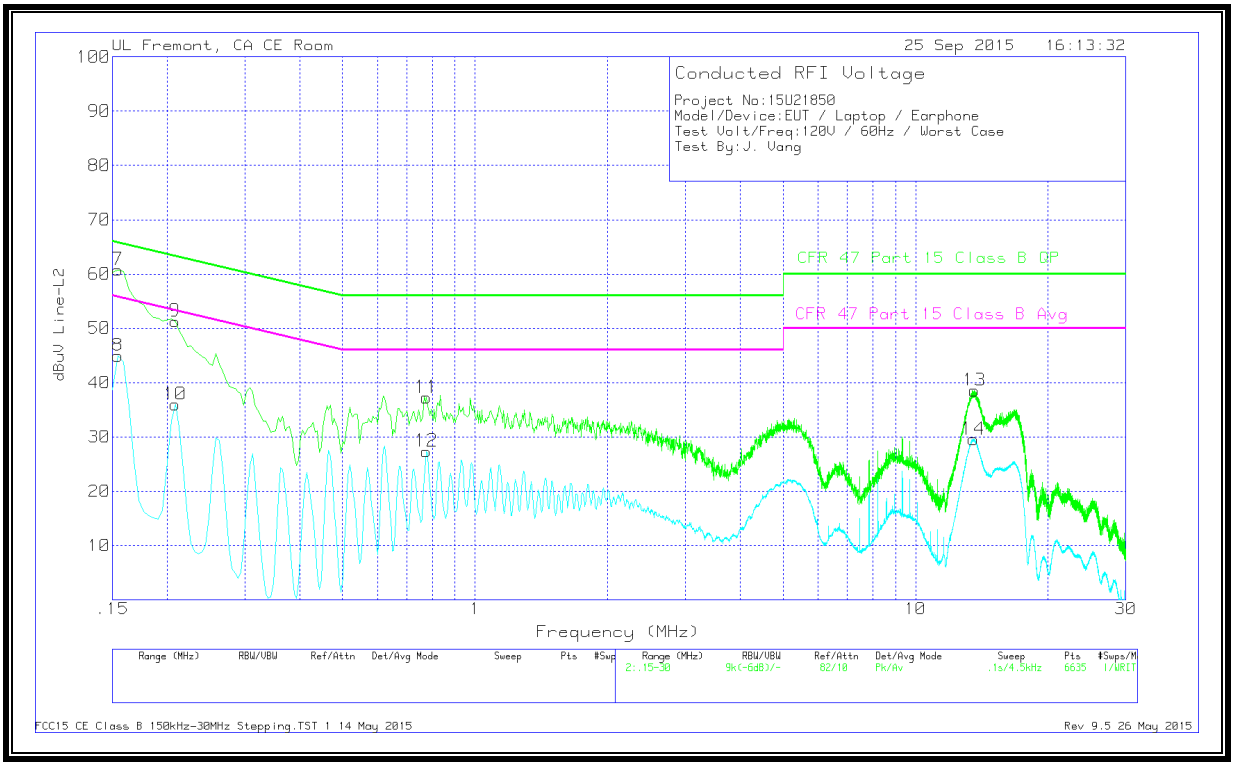
LINE 2 RESULTS



WORST EMISSIONS

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2	LC Cables 2&3	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	Margin (dB)	CFR 47 Part 15 Class B Avg	Margin (dB)
7	.1545	59.38	Pk	1.4	0	60.78	65.75	-4.97	-	-
	.15	47.44	Qp	1.4	0	48.84	66	-17.16		
8	.1545	43.58	Av	1.4	0	44.98	-	-	55.75	-10.77
9	.2085	50.29	Pk	1	0	51.29	63.26	-11.97	-	-
10	.2085	34.97	Av	1	0	35.97	-	-	53.26	-17.29
11	.7755	36.94	Pk	.3	0	37.24	56	-18.76	-	-
12	.7755	27.05	Av	.3	0	27.35	-	-	46	-18.65
13	13.605	38.13	Pk	.2	.2	38.53	60	-21.47	-	-
14	13.5375	29.15	Av	.2	.2	29.55	-	-	50	-20.45

Pk - Peak detector

Av - Average detection

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