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: A1453 / A1533

FCC ID: BCG-E2642A

REPORT NUMBER: 15U21850-E17V1

ISSUE DATE: NOVEMBER 16, 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	M. Mekuria

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

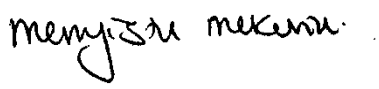
COMPANY NAME:	APPLE, INC. 1 INFINITE LOOP CUPERTINO, CA 95014, U.S.A.
EUT DESCRIPTION:	QUAD-BAND RADIO WITH WLAN AND BT RADIO
MODEL:	A1453 / A1533
SERIAL NUMBER:	C39KP004FL57(Conducted); C39JF3LRF8HR (Radiated)
DATE TESTED:	NOVEMBER 05, 2015 – NOVEMBER 06, 2015

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:



MENGISTU MEKURIA
SENIOR ENGINEER
UL VERIFICATION SERVICES INC.

Tested By:

TINA CHU
EMC LAB ENGINEER
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 14-30, FCC KDB 789033 D02 v01, FCC, 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.

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

4.1. 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%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

Model A1453/A1533 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 EUT to 5.8GHz band new rule per FCC 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 SISO	16.08	40.55
5745 - 5825	802.11n HT20 SISO	16.04	40.18
5755 - 5795	802.11n HT40 SISO	16.09	40.64

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Band (MHz)	Antenna Gain (dBi)
5745 - 5850	-4.21

5.5. SOFTWARE AND FIRMWARE

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

5.6. WORST-CASE CONFIGURATION AND MODE

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

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.

Worst-case data rates were used:

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

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

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Dell	Latitude D630	N/A	N/A
AC/DC adapter	Dell	PA-1900-02D	N/A	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

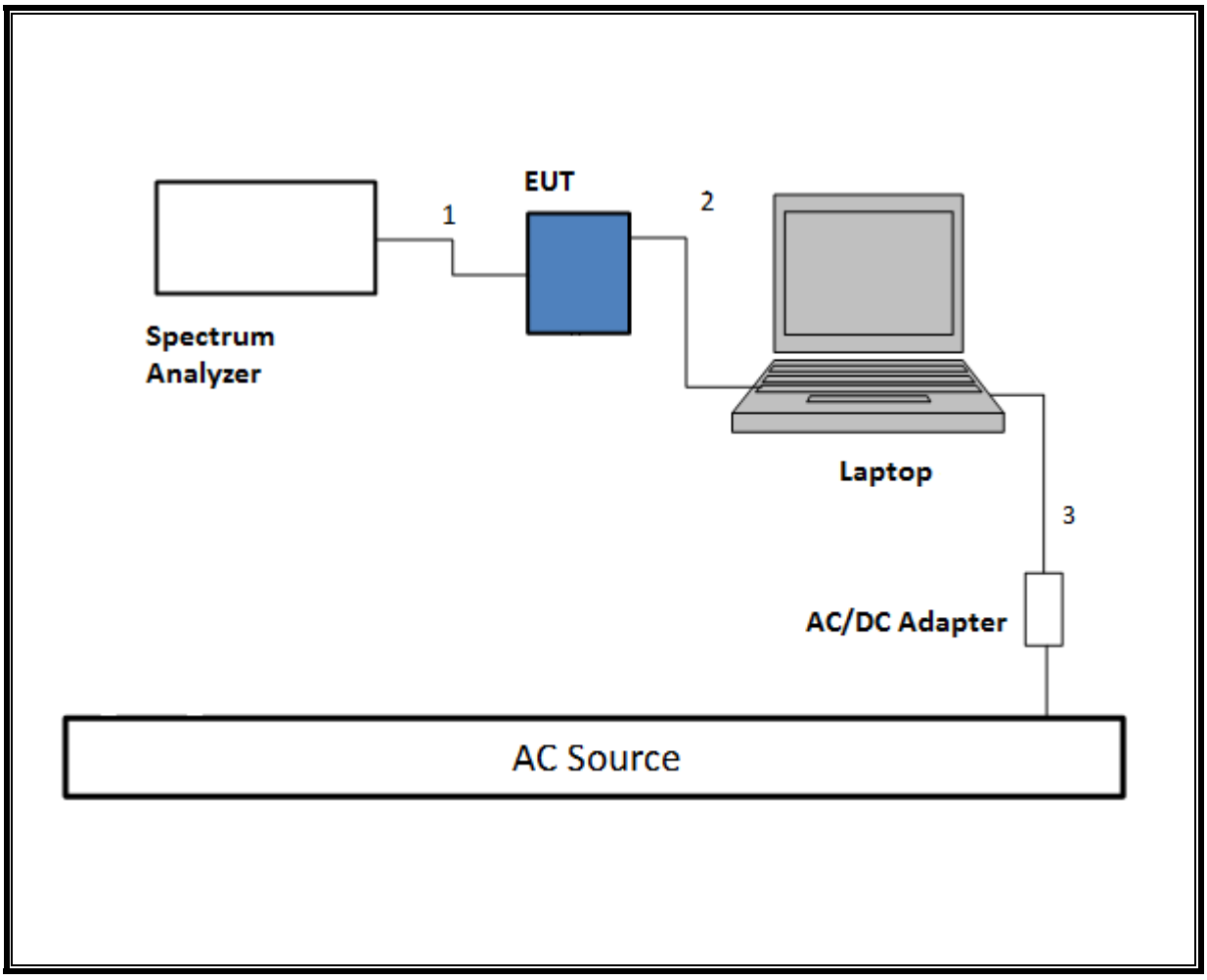
I/O CABLES (AC LINE CONDUCTED: LAPTOP CONFIGUARTION)

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

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.

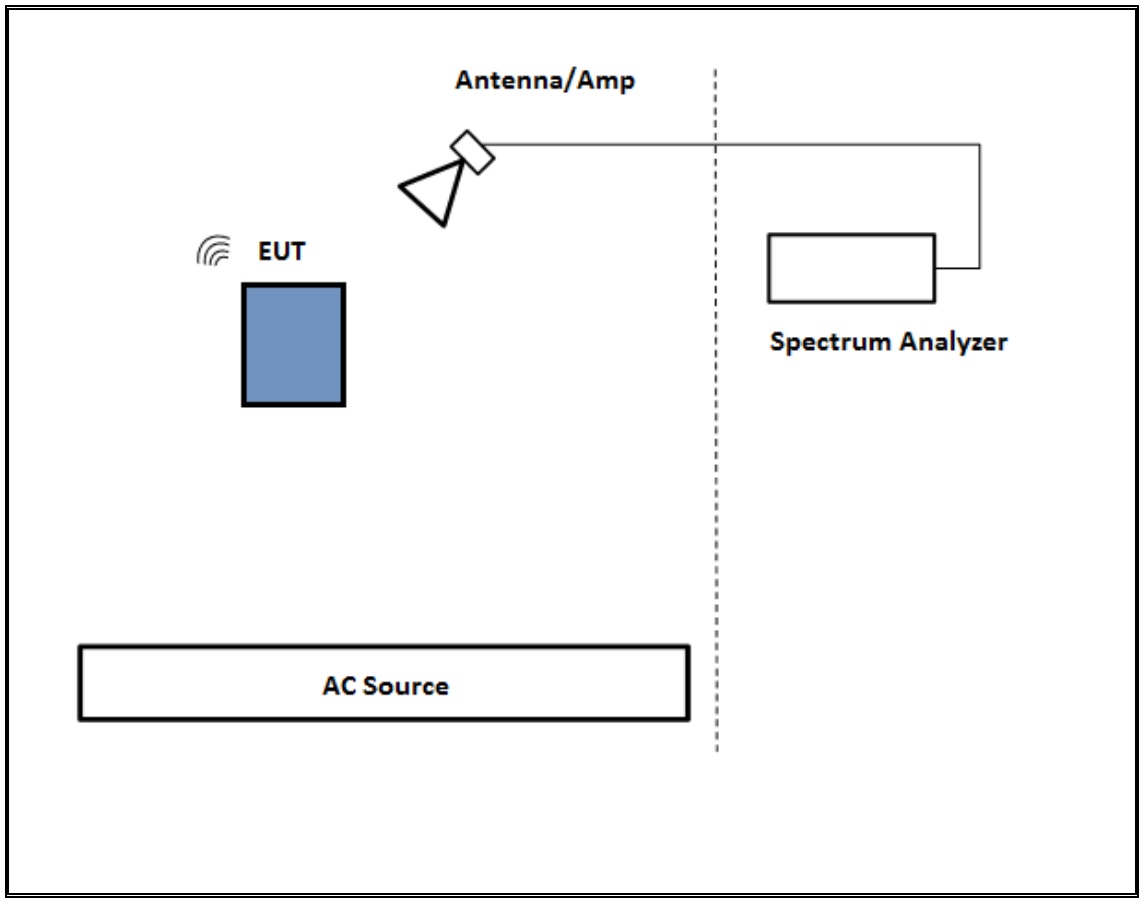
SETUP DIAGRAM



TEST SETUP- RADIATED-ABOVE 1 GHZ

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

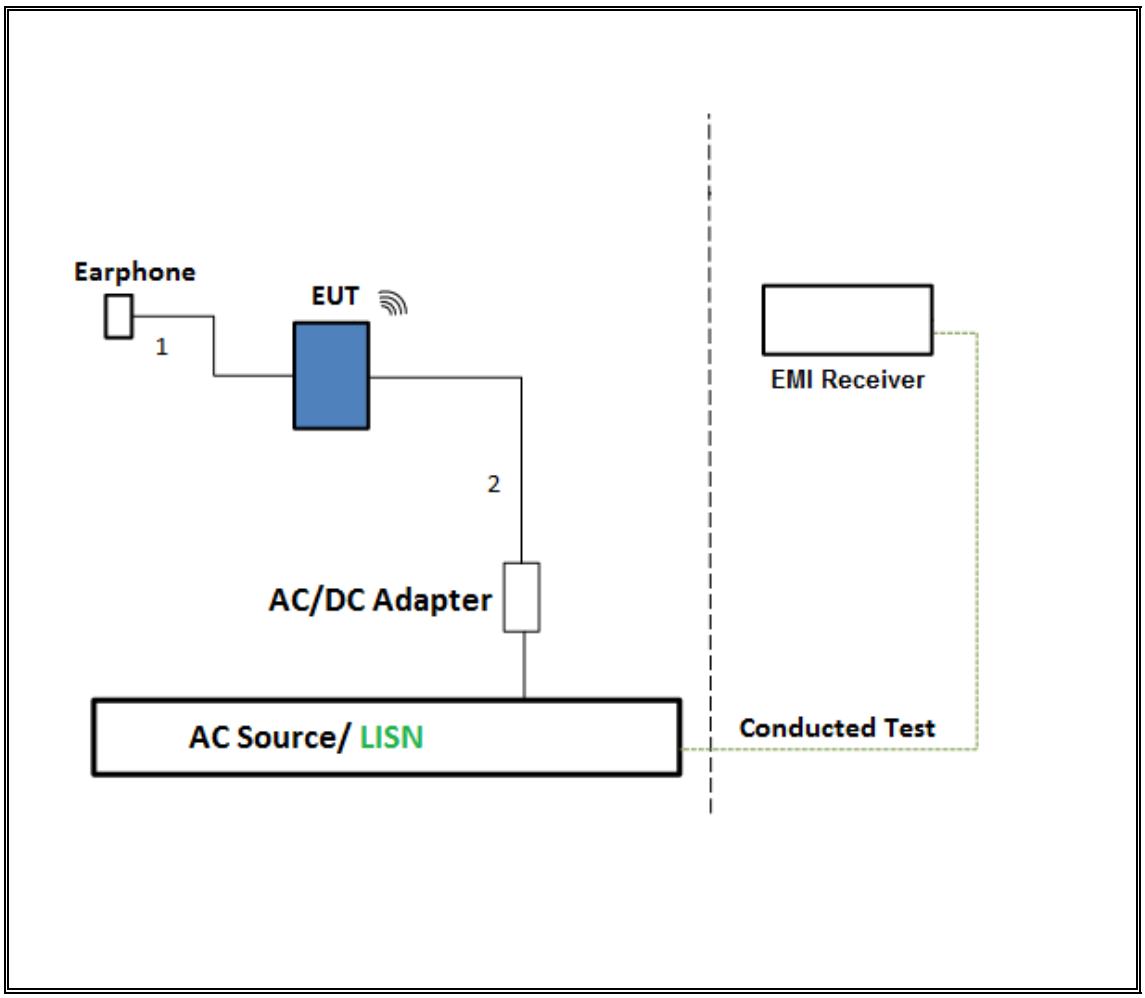
SETUP DIAGRAM



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.

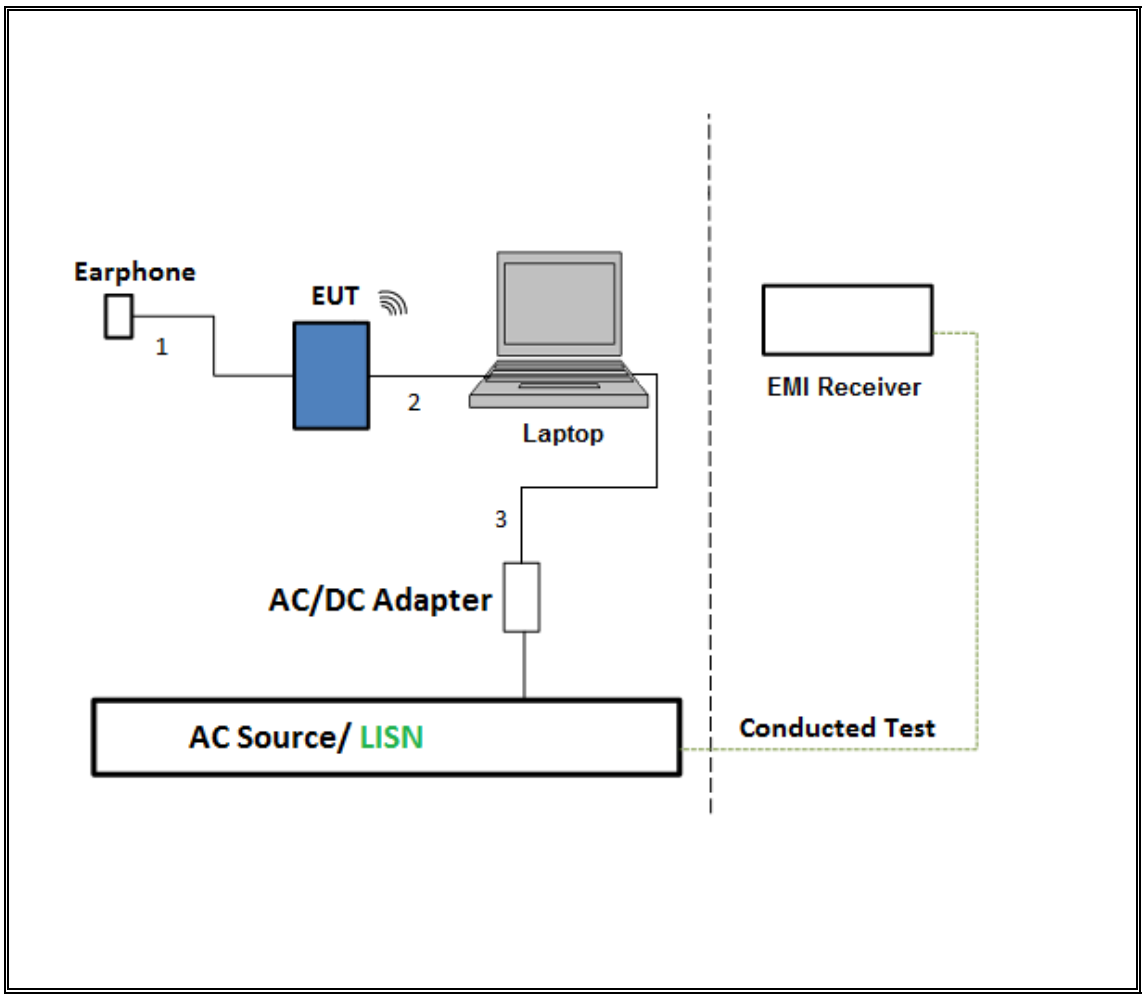
SETUP DIAGRAM



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



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, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB1	A012712	9/25/2016
Amplifier, 1 - 18GHz	Miteq	AFS42-00101800-25-S-42	1908958	8/12/2016
Antenna, Horn 1-18GHz	ETS Lindgren	3117	00143449	2/10/2016
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	323561	6/8/2016
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight	N9030A	MY53310972	3/31/2016
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight	N9030A-544	MY52350176	5/22/2016
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight	N1921A	MY55200002	3/6/2016
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight	N1921A	MY55200004	5/6/2016
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826	1049	12/17/2015
Horn Antenna, 40GHz	ARA	MWH-2640/B	1029	7/28/2016
Spectrum Analyzer, 40 GHz	Agilent	8564E	3943A01643	8/6/2016
Amplifier, 1 to 26.5GHz, 23.5dB Gain minimum	Keysight	8449B	3008A04710	6/29/2016
Amplifier, 26 - 40GHz	Miteq	NSP4000-SP2	924343	4/7/2016
AC Line Conducted				
EMI Test Receiver 9Khz-7GHz	Rohde & Schwarz	ESCI7	100773	8/7/2016
LISN for Conducted Emissions CISPR-16	FCC	50/250-25-2	114	1/16/2016
Power Cable, Line Conducted Emissions ANSI 63.4	UL	PG1	N/A	7/28/2016
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

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

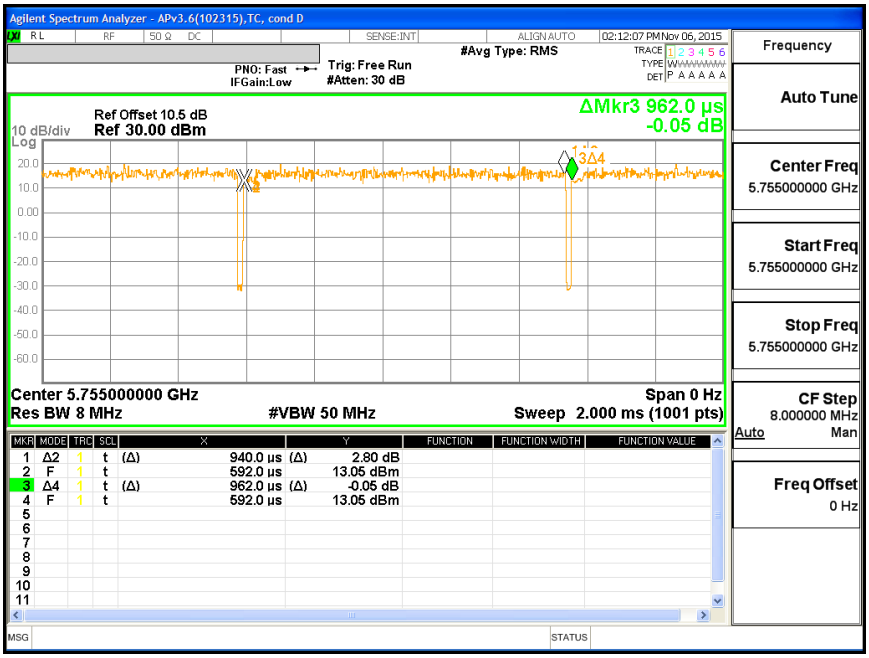
Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
802.11a 1TX	2.064	2.094	0.986	98.57%	0.00	0.010
802.11n HT20 1TX	1.920	1.950	0.985	98.46%	0.00	0.010
802.11n HT40 1TX	0.940	0.962	0.977	97.71%	0.10	1.064

DUTY CYCLE PLOTS

DUTY CYCLE 802.11a1TX MODE

DUTY CYCLE 802.11n HT20 1TX MODE

DUTY CYCLE 802.11n HT40 1TX MODE



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.

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)

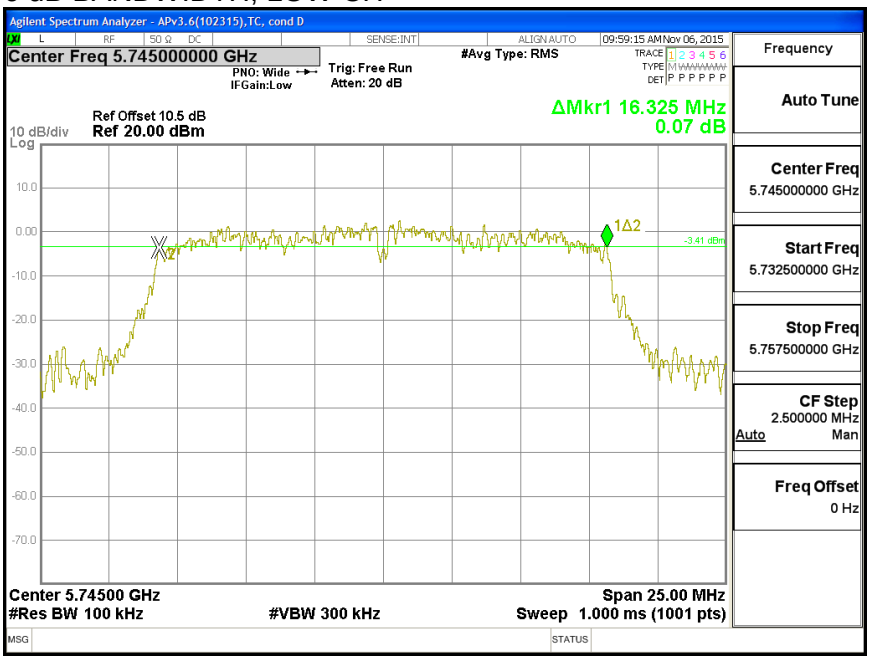
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

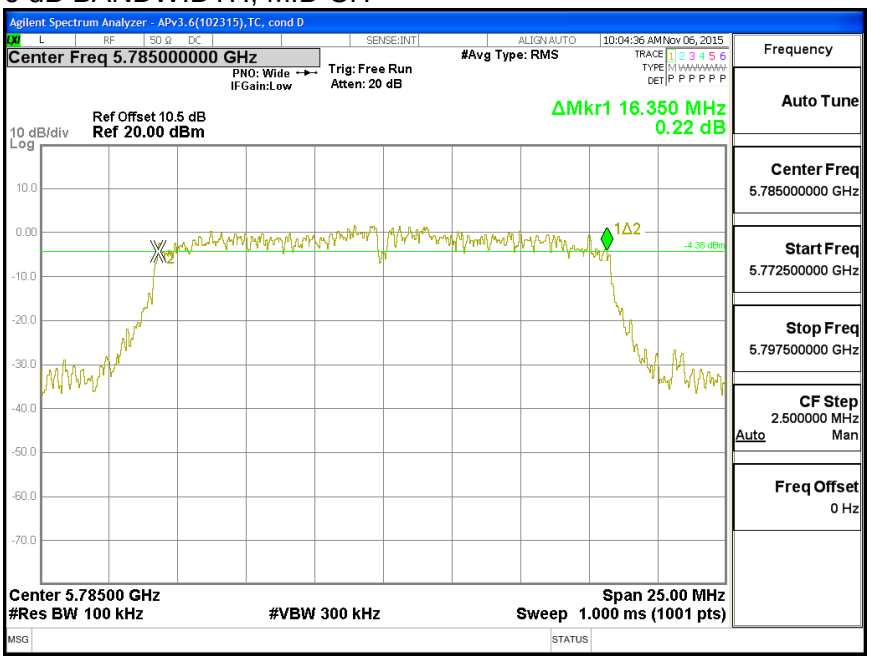
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	5745	16.325	0.5
Mid	5785	16.350	0.5
High	5825	16.325	0.5

6 dB BANDWIDTH

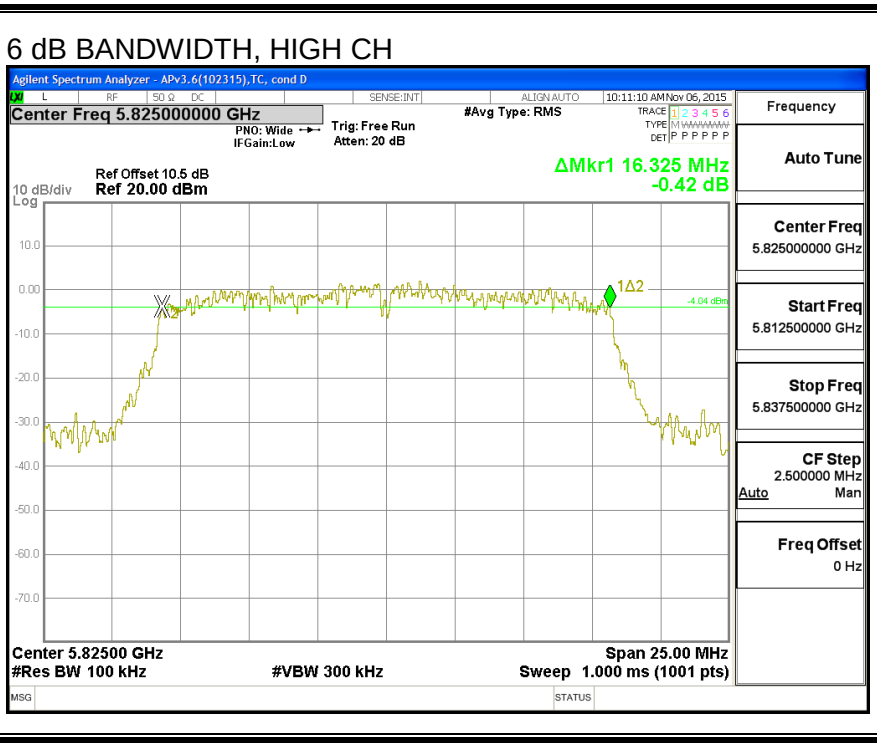
6 dB BANDWIDTH, LOW CH



6 dB BANDWIDTH, MID CH



6 dB BANDWIDTH, HIGH CH



8.1.2. 26 dB BANDWIDTH

LIMITS

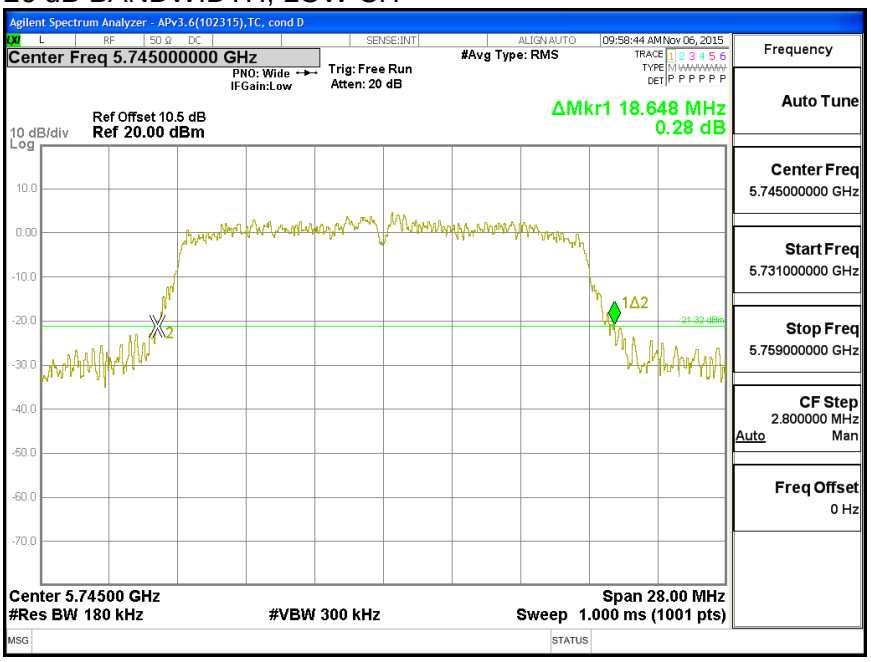
None, for reporting purposes only

RESULTS

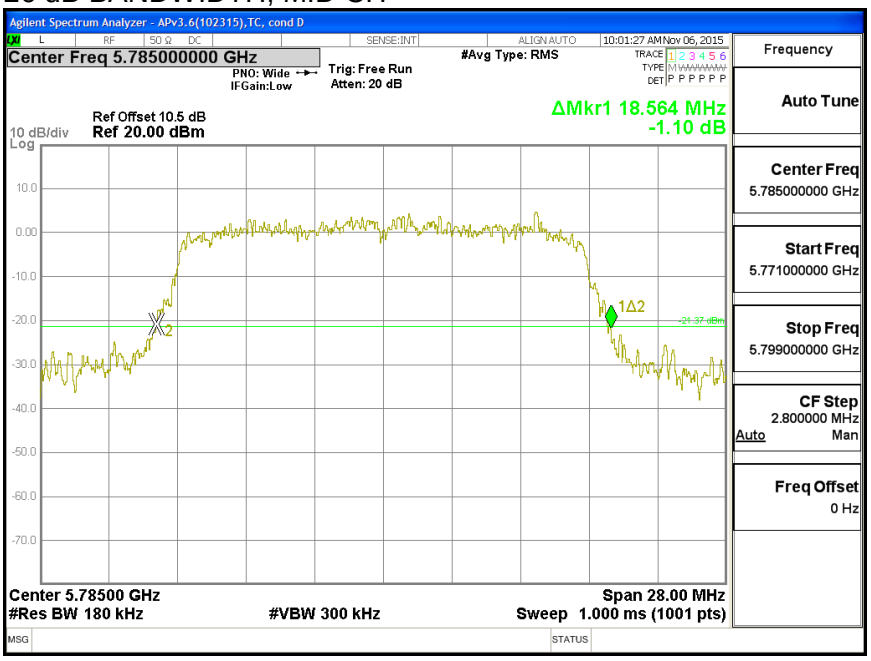
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5745	18.648
Mid	5785	18.564
High	5825	18.424

26 dB BANDWIDTH

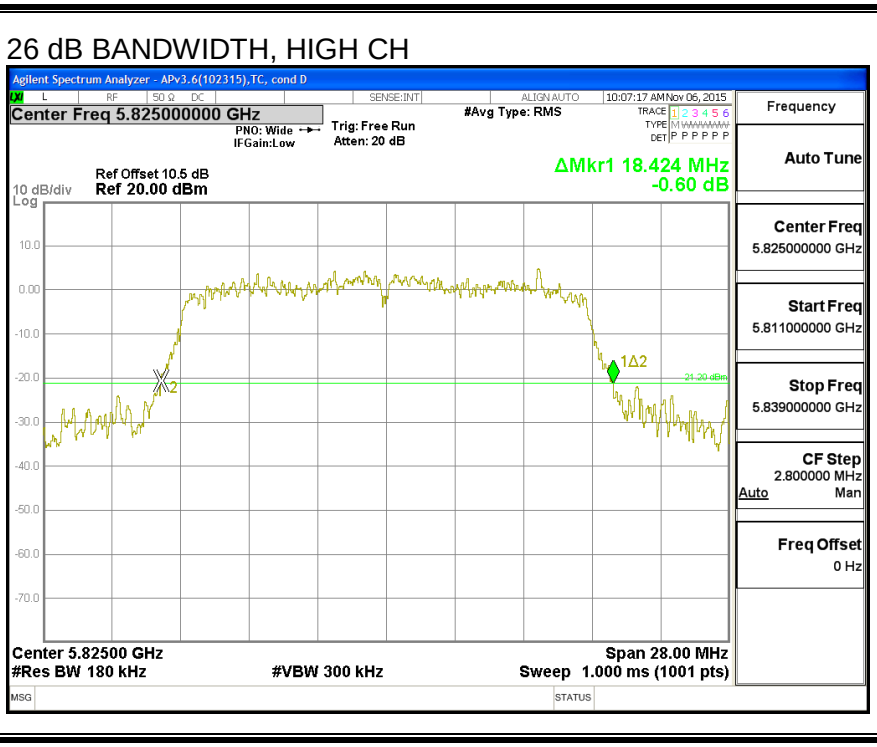
26 dB BANDWIDTH, LOW CH



26 dB BANDWIDTH, MID CH



26 dB BANDWIDTH, HIGH CH



8.1.3. 99% BANDWIDTH

LIMITS

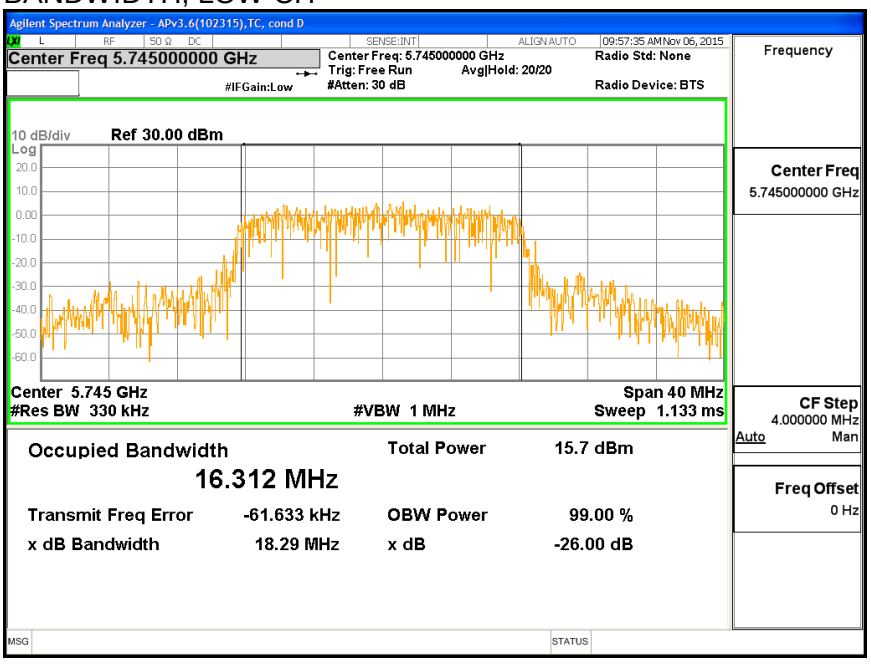
None; for reporting purposes only.

RESULTS

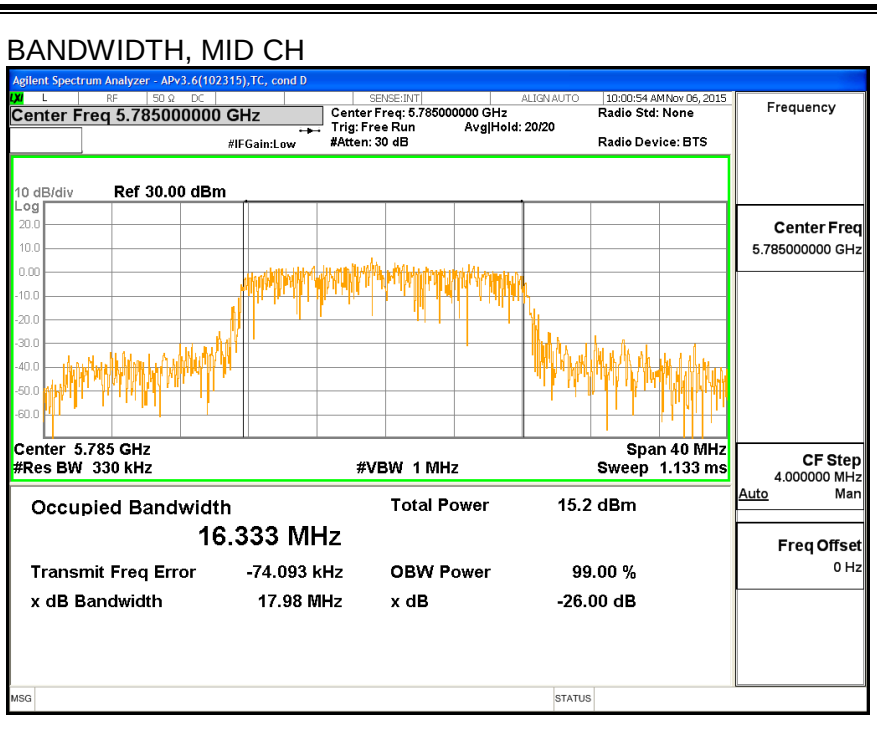
Frequency (MHz)	99% Bandwidth (MHz)
5745	16.312
5785	16.333
5825	16.333

99% BANDWIDTH

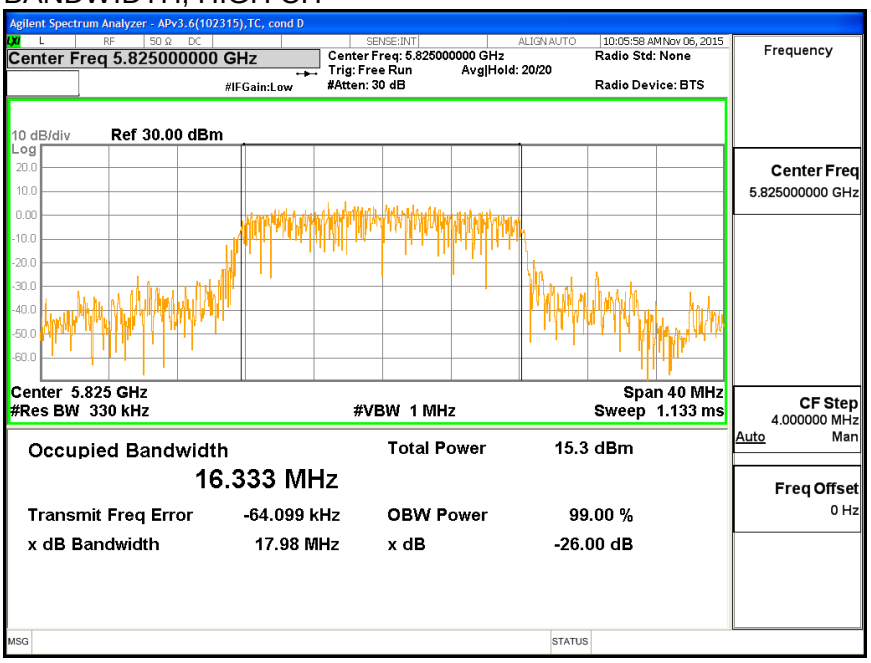
BANDWIDTH, LOW CH



BANDWIDTH, MID CH



BANDWIDTH, HIGH CH



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	15.93
Mid	5785	16.01
High	5825	16.08

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.

RESULTS

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Power Limit (dBm)
Low	5745	-4.21	30.00
Mid	5785	-4.21	30.00
High	5825	-4.21	30.00

Output Power Results

Channel	Frequency (MHz)	Meas Power (dBm)	Total Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5745	15.93	15.93	30.00	-14.07
Mid	5785	16.01	16.01	30.00	-13.99
High	5825	16.08	16.08	30.00	-13.92

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	-4.21	30.00
Mid	5785	-4.21	30.00
High	5825	-4.21	30.00

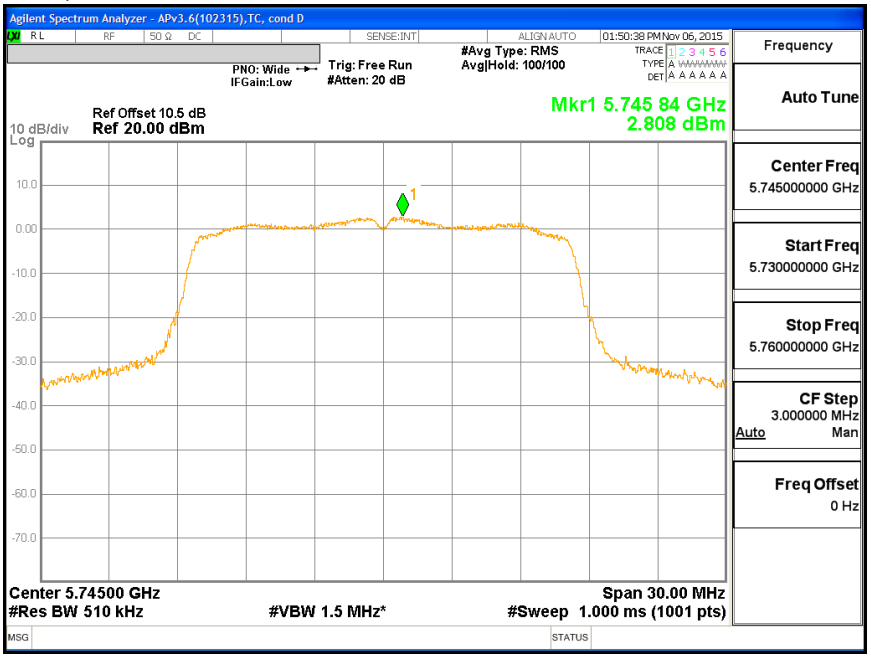
Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD

PSD Results

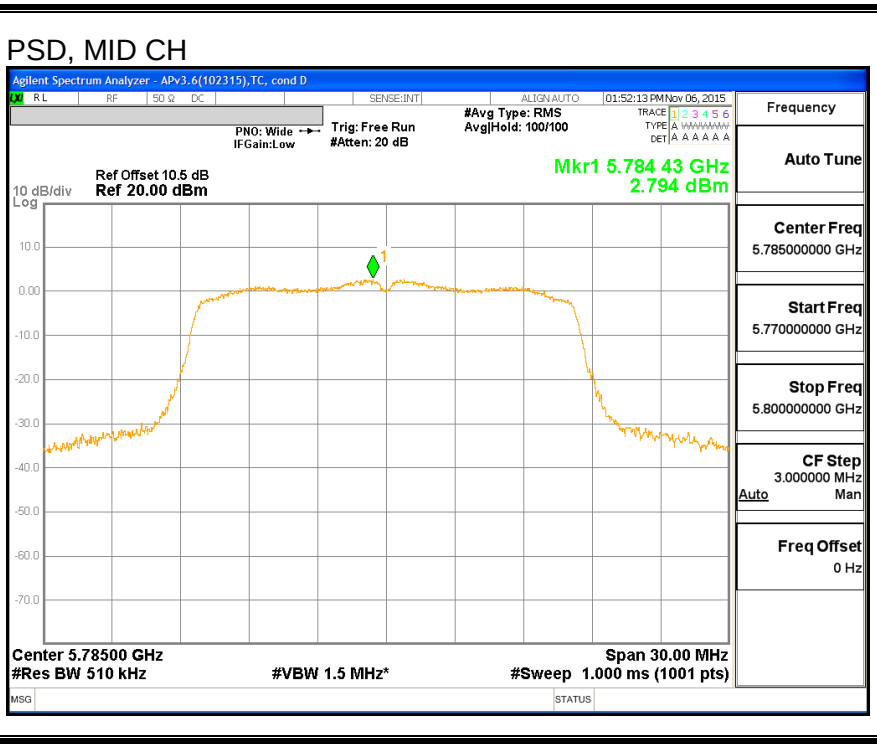
Channel	Frequency (MHz)	PSD Meas (dBm)	Total PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5745	2.81	2.81	30.00	-27.19
Mid	5785	2.79	2.79	30.00	-27.21
High	5825	2.84	2.84	30.00	-27.16

PSD

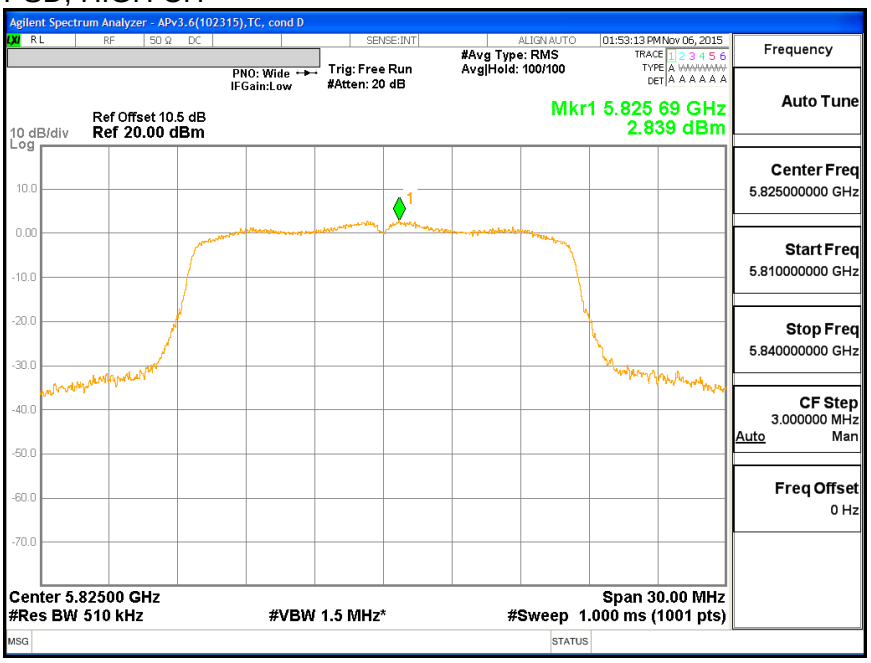
PSD, LOW CH



PSD, MID CH



PSD, HIGH CH



8.2.802.11n HT20 IN THE 5.8 GHz BAND

8.2.1. 6 dB BANDWIDTH

LIMITS

FCC §15.407 (e)

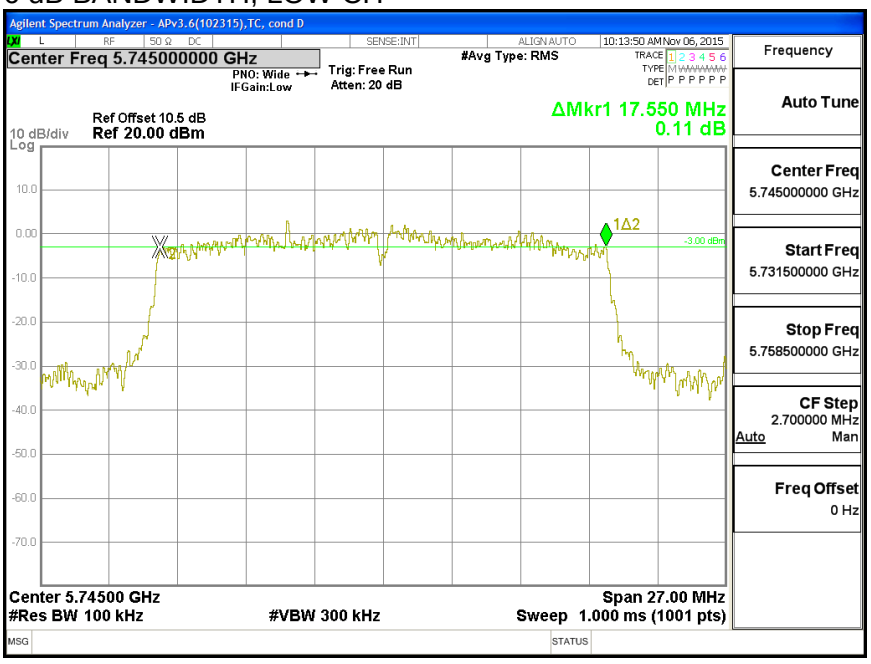
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

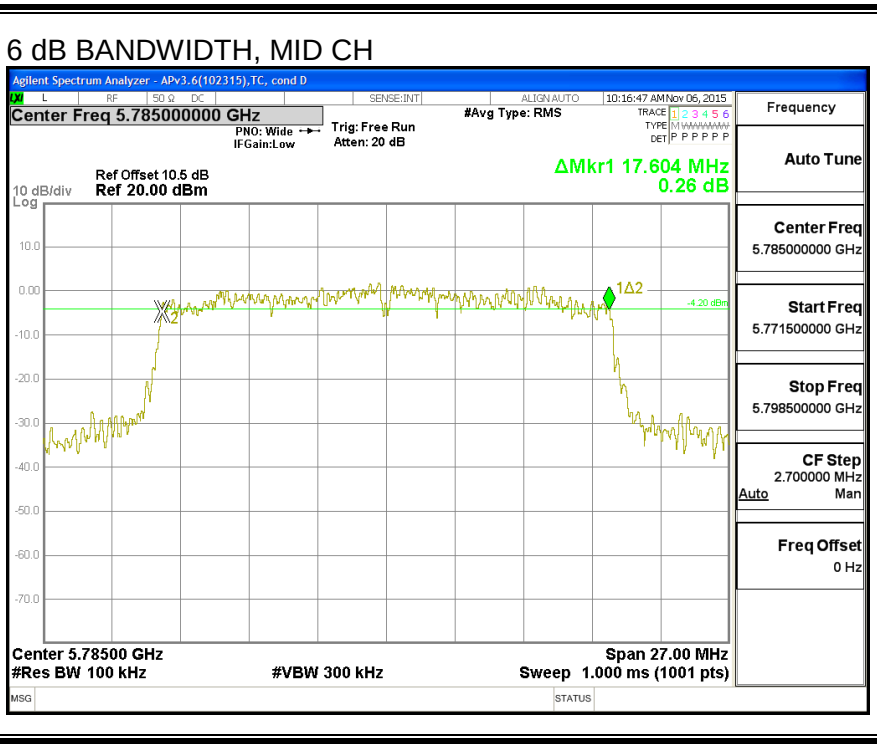
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	5745	17.550	0.5
Mid	5785	17.604	0.5
High	5825	17.604	0.5

6 dB BANDWIDTH

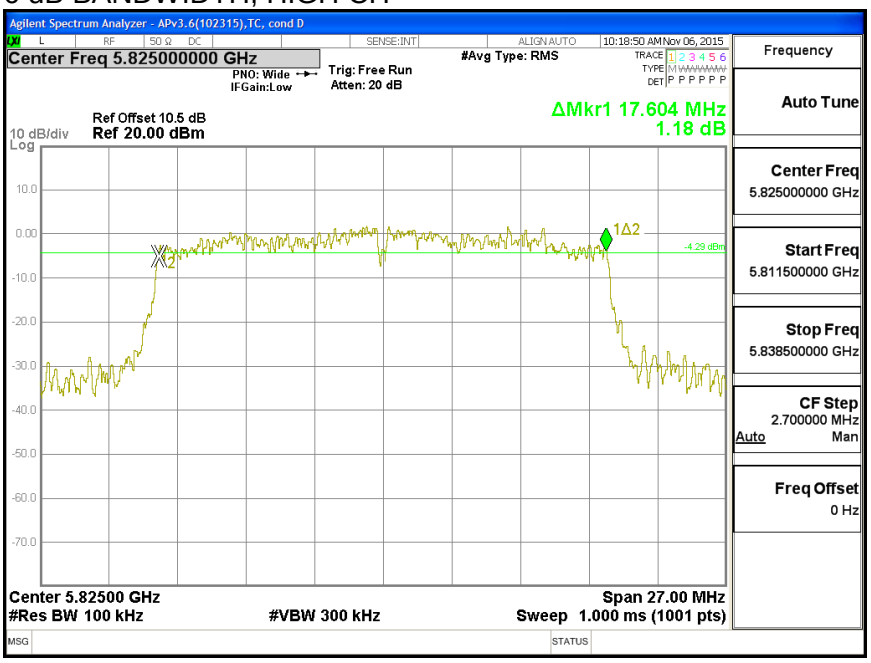
6 dB BANDWIDTH, LOW CH



6 dB BANDWIDTH, MID CH



6 dB BANDWIDTH, HIGH CH



8.2.2. 26 dB BANDWIDTH

LIMITS

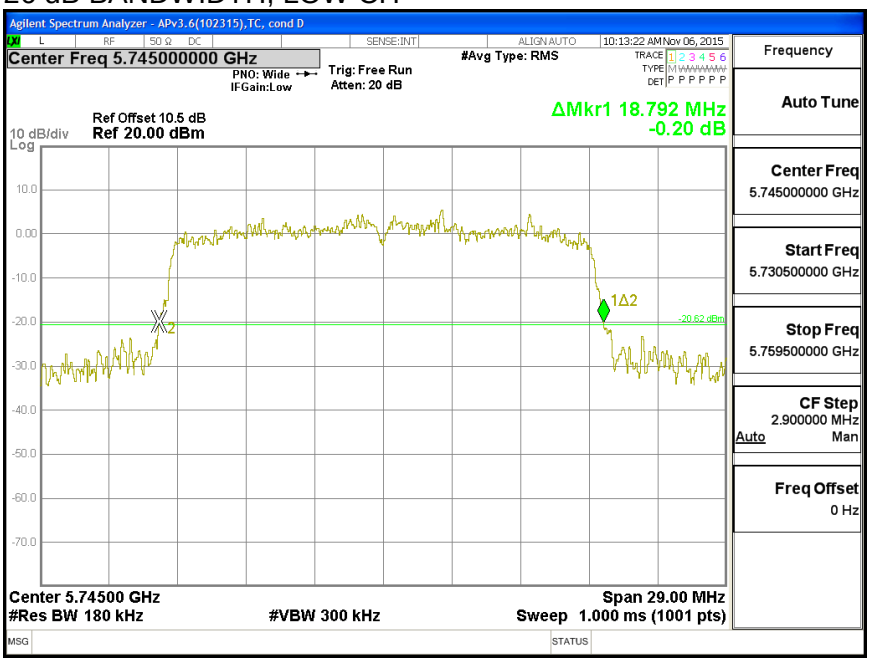
None, for reporting purposes only

RESULTS

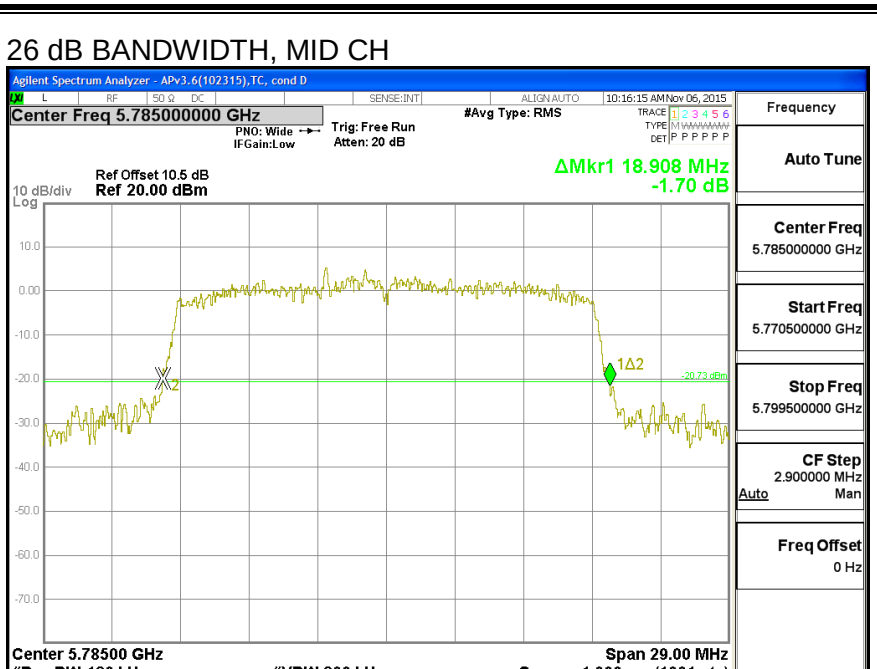
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5745	18.792
Mid	5785	18.908
High	5825	18.734

26 dB BANDWIDTH

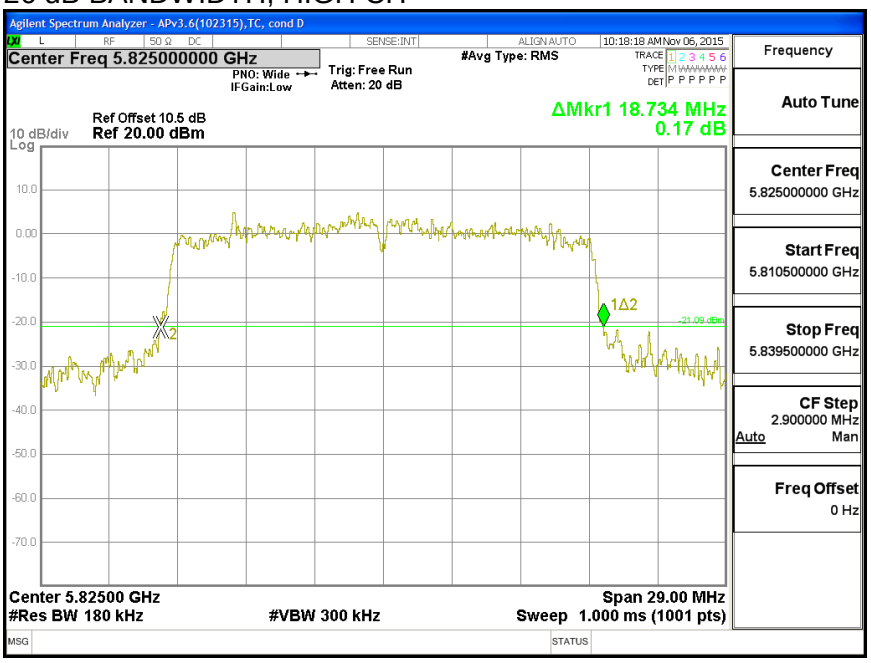
26 dB BANDWIDTH, LOW CH



26 dB BANDWIDTH, MID CH



26 dB BANDWIDTH, HIGH CH



8.2.3. 99% BANDWIDTH

LIMITS

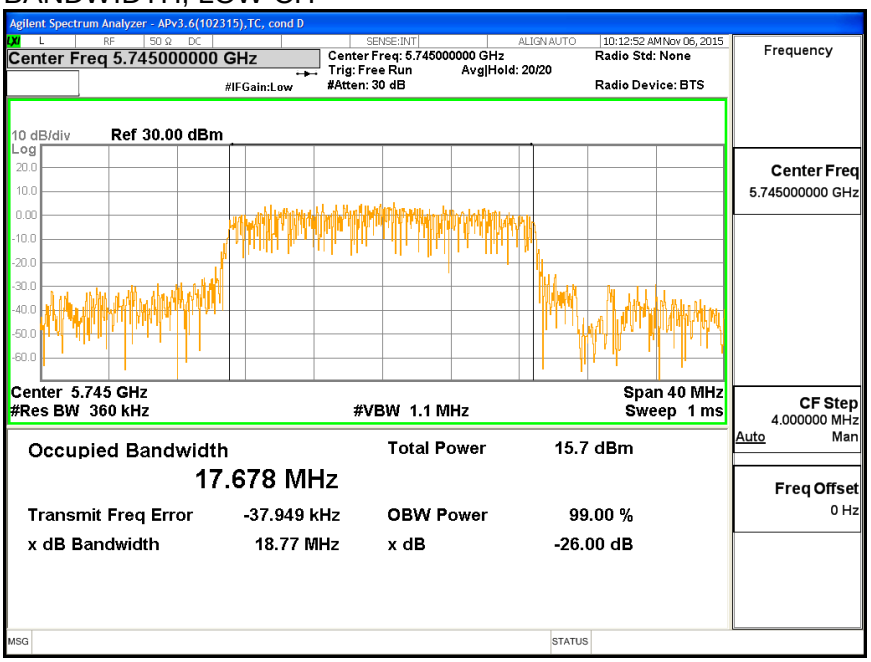
None; for reporting purposes only.

RESULTS

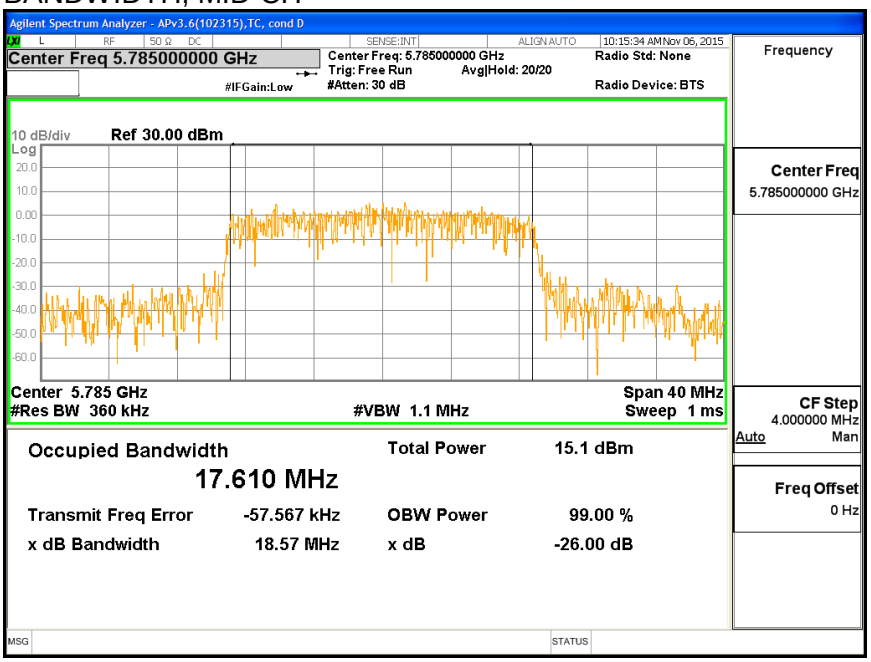
Frequency (MHz)	99% Bandwidth (MHz)
5745	17.678
5785	17.610
5825	17.661

99% BANDWIDTH

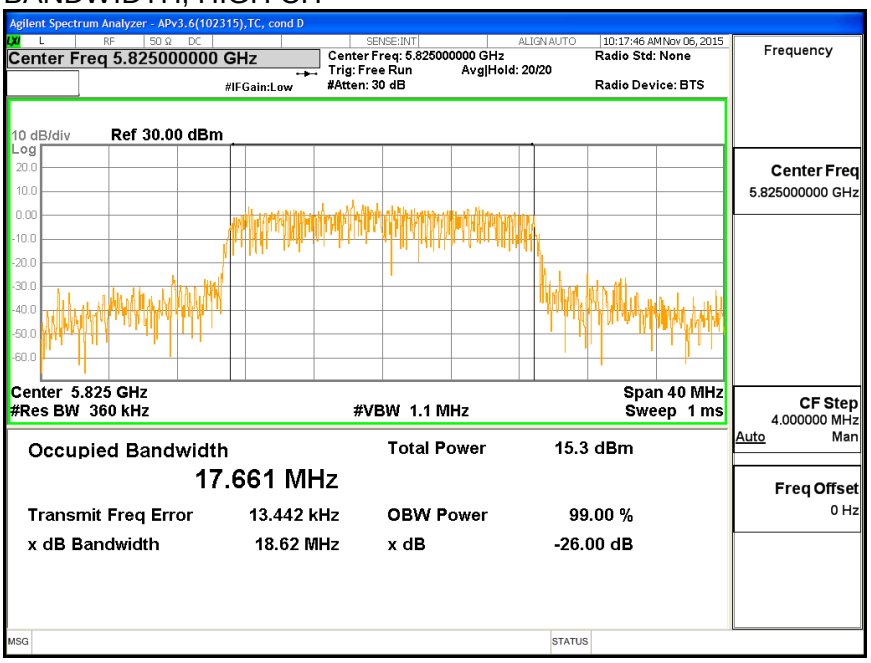
BANDWIDTH, LOW CH



BANDWIDTH, MID CH



BANDWIDTH, HIGH CH



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	16.04
Mid	5785	15.96
High	5825	16.00

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.

RESULTS

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Power Limit (dBm)
Low	5745	-4.21	30.00
Mid	5785	-4.21	30.00
High	5825	-4.21	30.00

Output Power Results

Channel	Frequency (MHz)	Power Meas (dBm)	Total Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5745	16.04	16.04	30.00	-13.96
Mid	5785	15.96	15.96	30.00	-14.04
High	5825	16.00	16.00	30.00	-14.00

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	-4.21	30.00
Mid	5785	-4.21	30.00
High	5825	-4.21	30.00

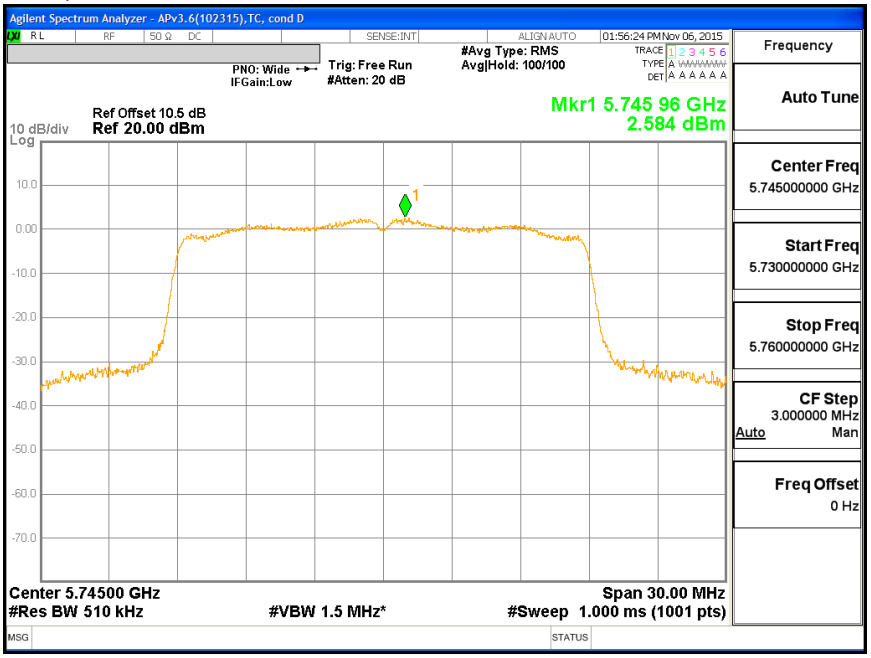
Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD

PSD Results

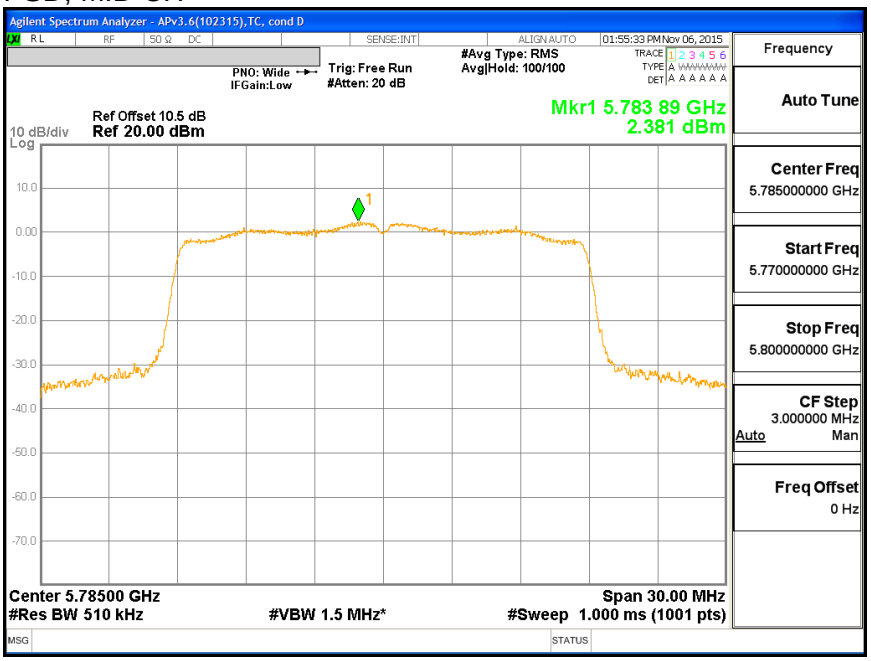
Channel	Frequency (MHz)	Meas PSD (dBm)	Total PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5745	2.58	2.58	30.00	-27.42
Mid	5785	2.38	2.38	30.00	-27.62
High	5825	2.44	2.44	30.00	-27.56

PSD

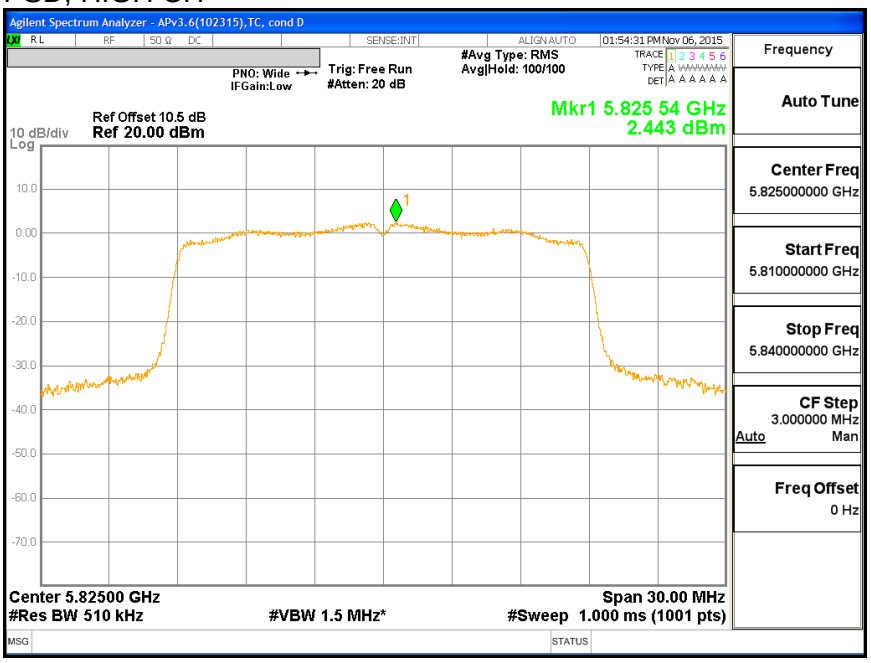
PSD, LOW CH



PSD, MID CH



PSD, HIGH CH



8.3.802.11n HT40 MODE IN THE 5.8 GHz BAND

8.3.1. 6 dB BANDWIDTH

LIMITS

FCC §15.407 (e)

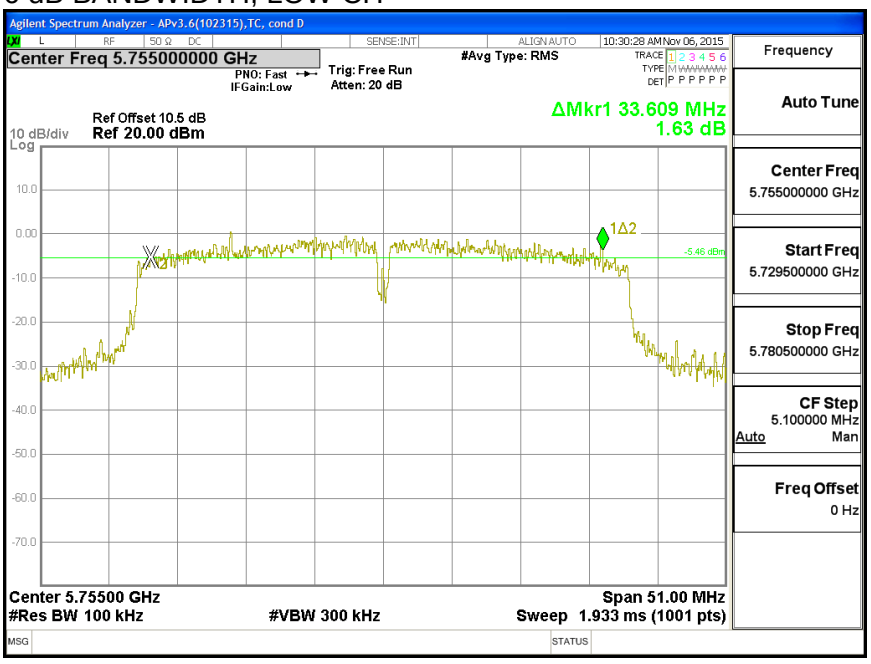
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

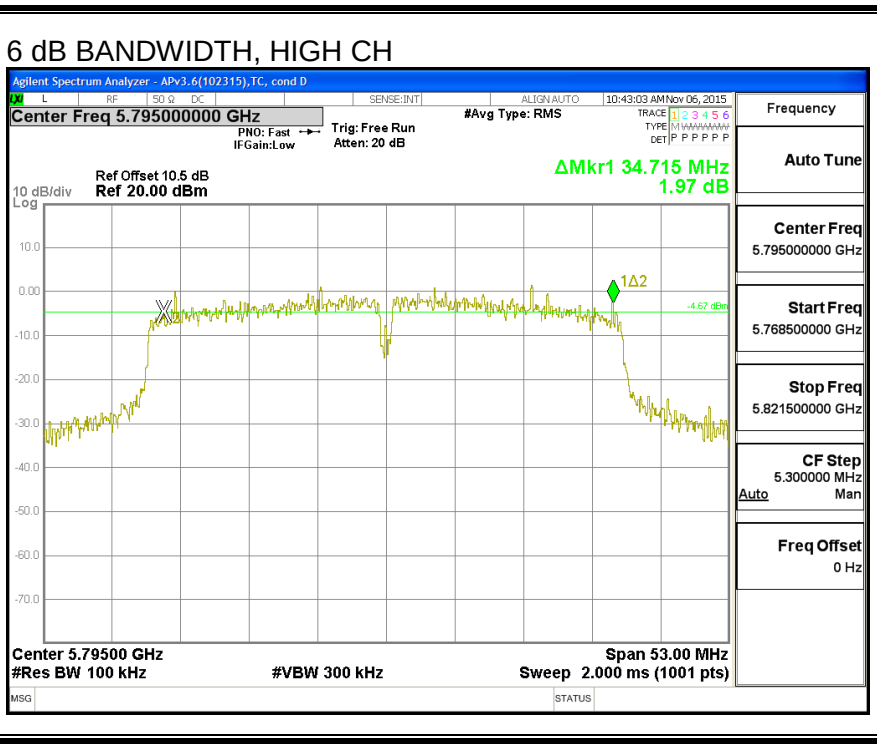
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	5755	33.609	0.5
High	5795	34.715	0.5

6 dB BANDWIDTH

6 dB BANDWIDTH, LOW CH



6 dB BANDWIDTH, HIGH CH



8.3.2. 26 dB BANDWIDTH

LIMITS

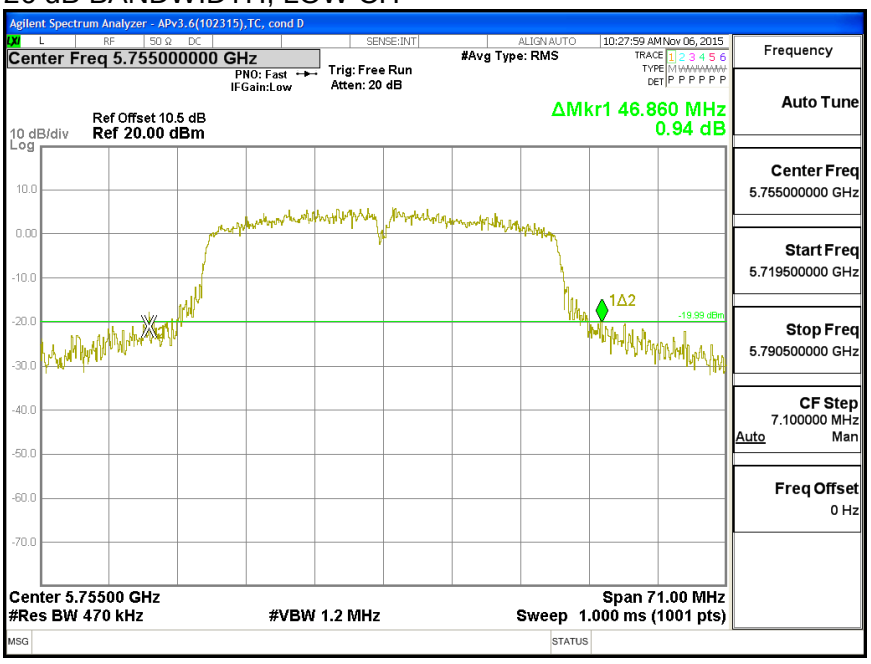
None, for reporting purposes only.

RESULTS

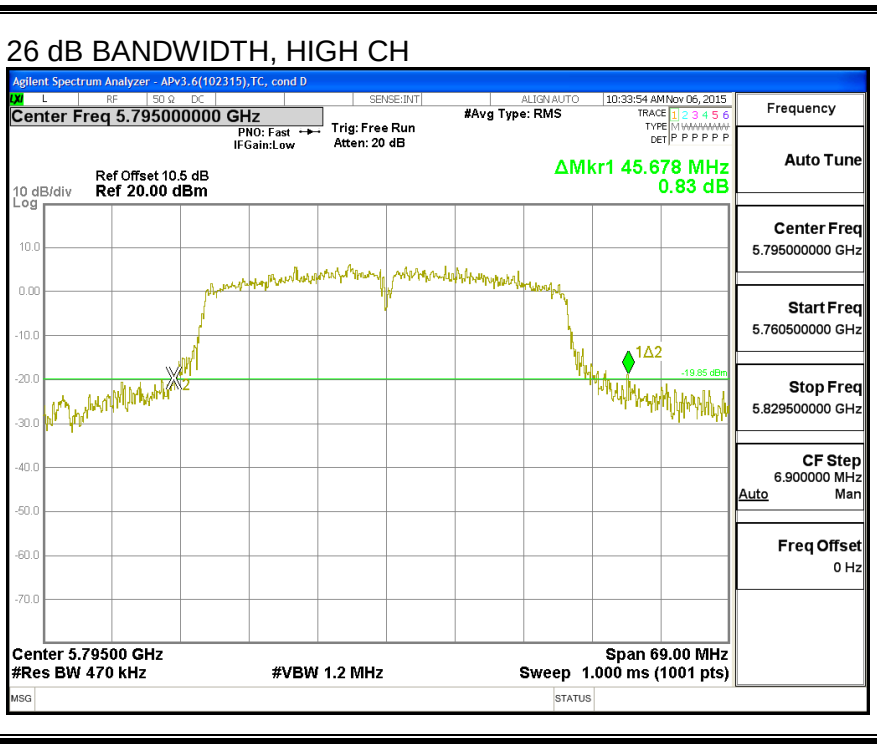
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5755	46.860
High	5795	45.678

26 dB BANDWIDTH

26 dB BANDWIDTH, LOW CH



26 dB BANDWIDTH, HIGH CH



8.3.3. 99% BANDWIDTH

LIMITS

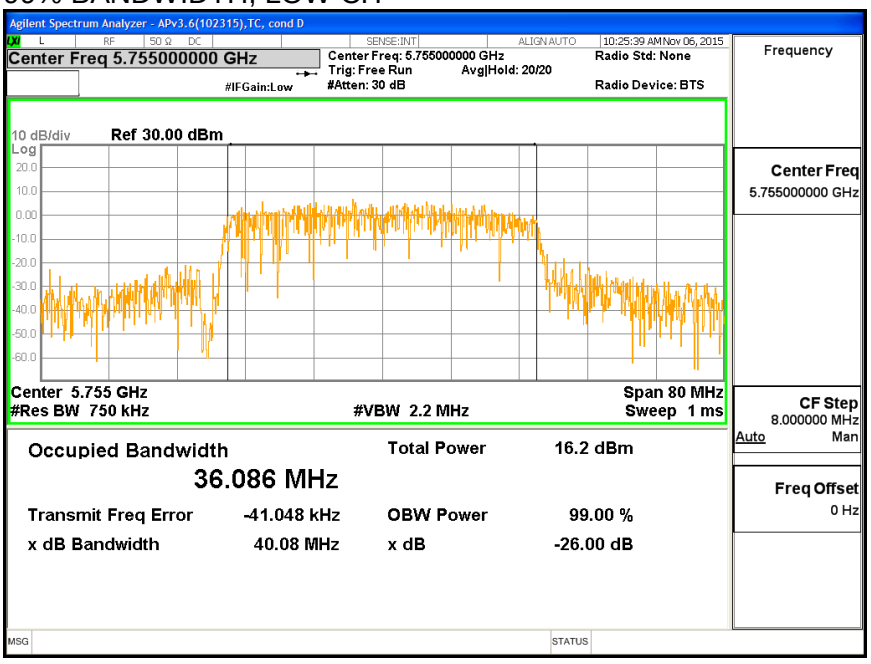
None; for reporting purposes only.

RESULTS

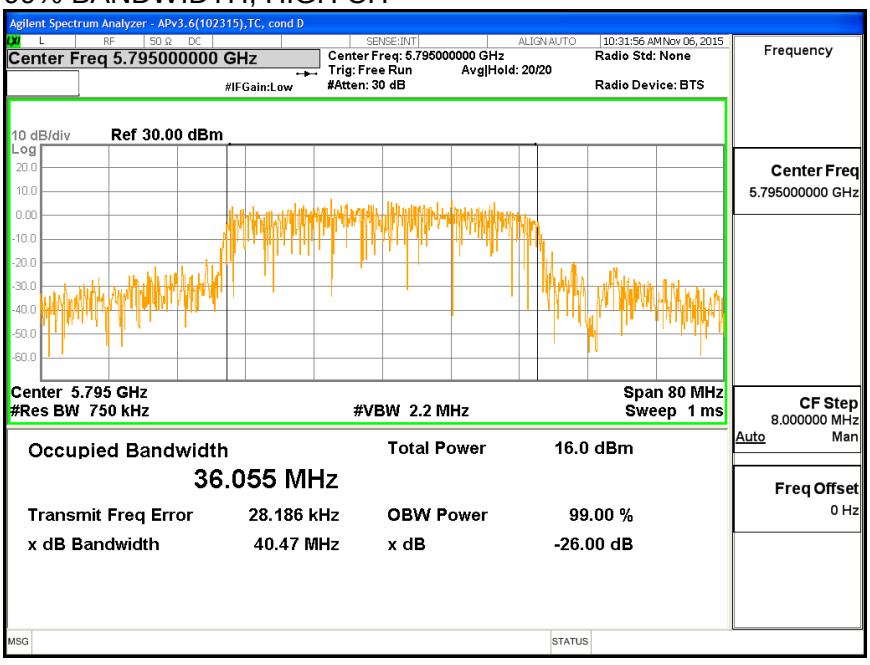
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5755	36.086
High	5795	36.055

99% BANDWIDTH

99% BANDWIDTH, LOW CH



99% BANDWIDTH, HIGH CH



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	16.09
High	5795	15.91

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.

RESULTS

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain (dBi)	Power Limit (dBm)
Low	5755	-4.21	30.00
High	5795	-4.21	30.00

Output Power Results

Channel	Frequency (MHz)	Meas Power (dBm)	Total Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5755	16.09	16.09	30.00	-13.91
High	5795	15.91	15.91	30.00	-14.09

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.

RESULTS

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	PSD Limit (dBm)
Low	5755	-4.21	30.00
High	5795	-4.21	30.00

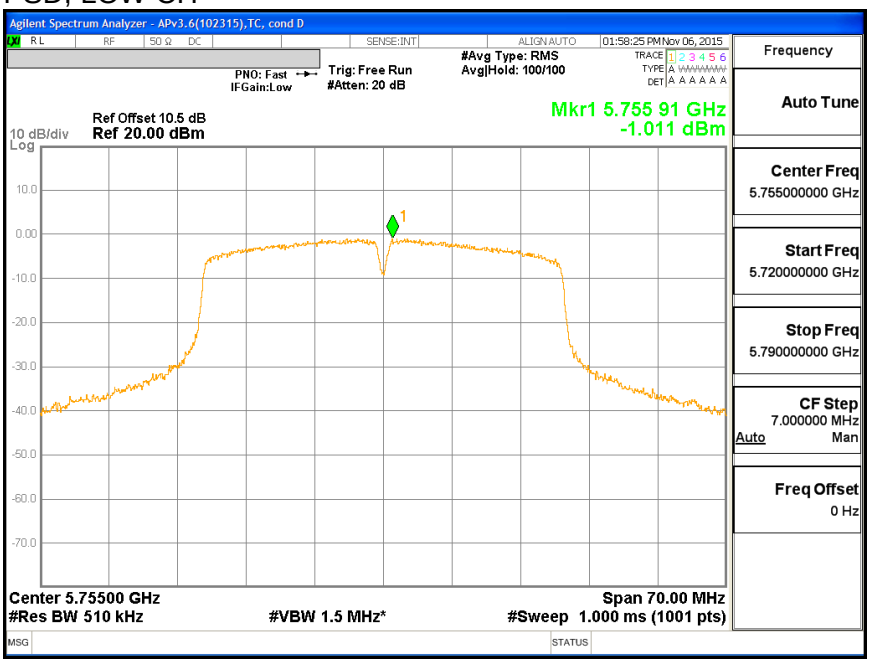
Duty Cycle CF (dB)	0.10	Included in Calculations of Corr'd PSD

PSD Results

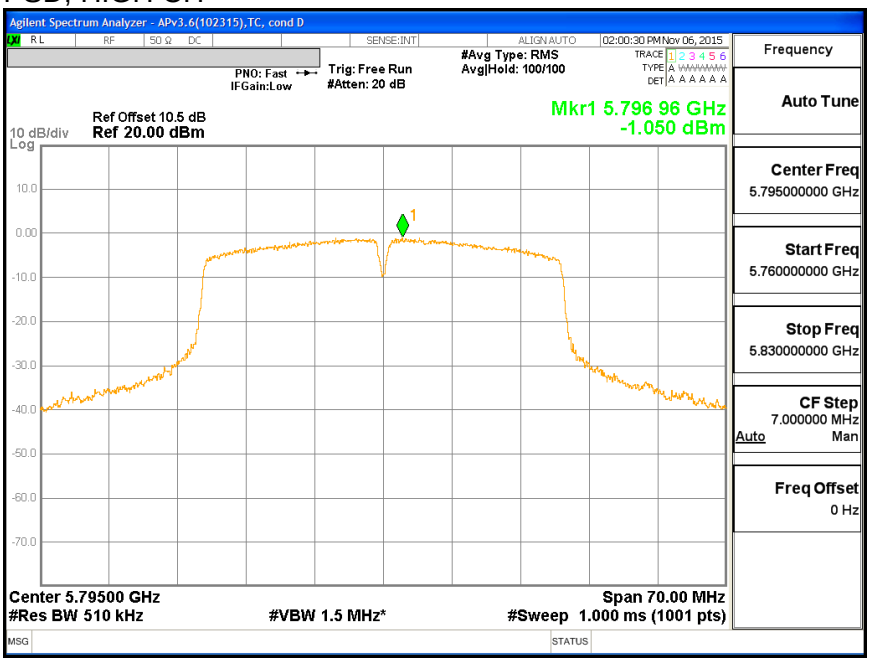
Channel	Frequency (MHz)	Meas PSD (dBm)	Total PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5755	-1.01	-0.91	30.00	-30.91
High	5795	-1.05	-0.95	30.00	-30.95

PSD,

PSD, LOW CH



PSD, HIGH CH



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.

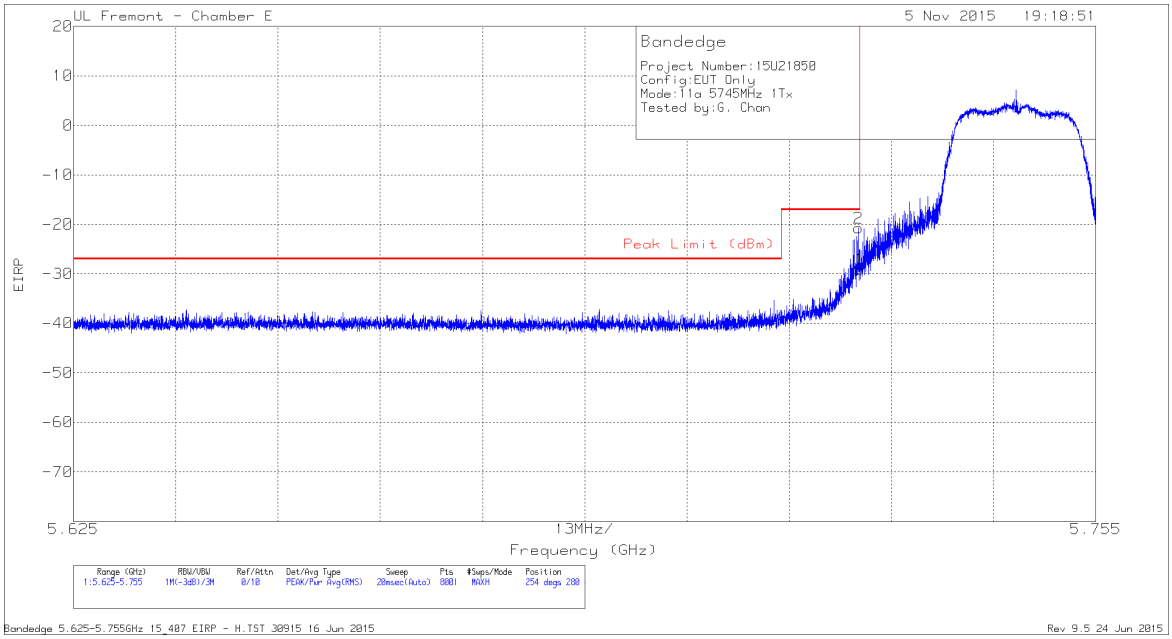
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

9.2.802.11a MODE IN THE 5.8 GHz BAND

RESTRICTED BANDEDGE, (LOW CHANNEL)

LOW CHANNEL HORIZONTAL PLOT

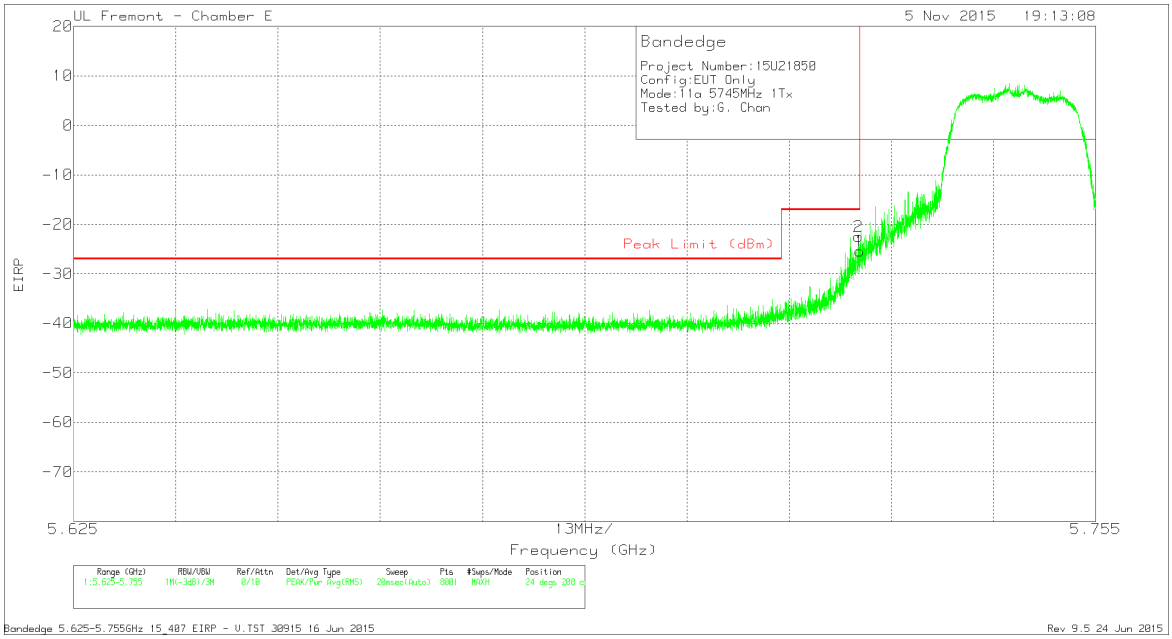


DATA

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
1	5.725	-55.52	Pk	34.7	-20.1	11.8	-29.12	-17	-12.12	254	280	H
2	5.725	-47.13	Pk	34.7	-20.1	11.8	-20.73	-17	-3.73	254	280	H

Pk - Peak detector

LOW CHANNEL VERTICAL PLOT



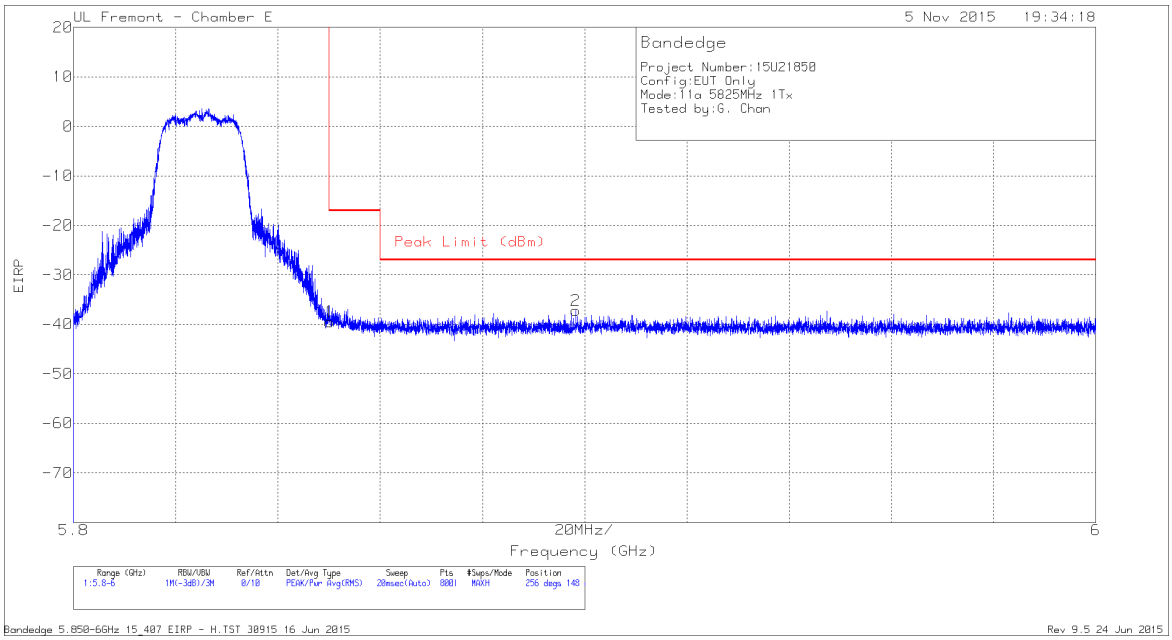
DATA

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
1	5.725	-51.78	Pk	34.7	-20.1	11.8	-25.38	-17	-8.38	24	208	V
2	5.725	-48.81	Pk	34.7	-20.1	11.8	-22.41	-17	-5.41	24	208	V

Pk - Peak detector

RESTRICTED BANDEDGE, (HIGH CHANNEL)

HIGH CHANNEL HORIZONTAL PLOT

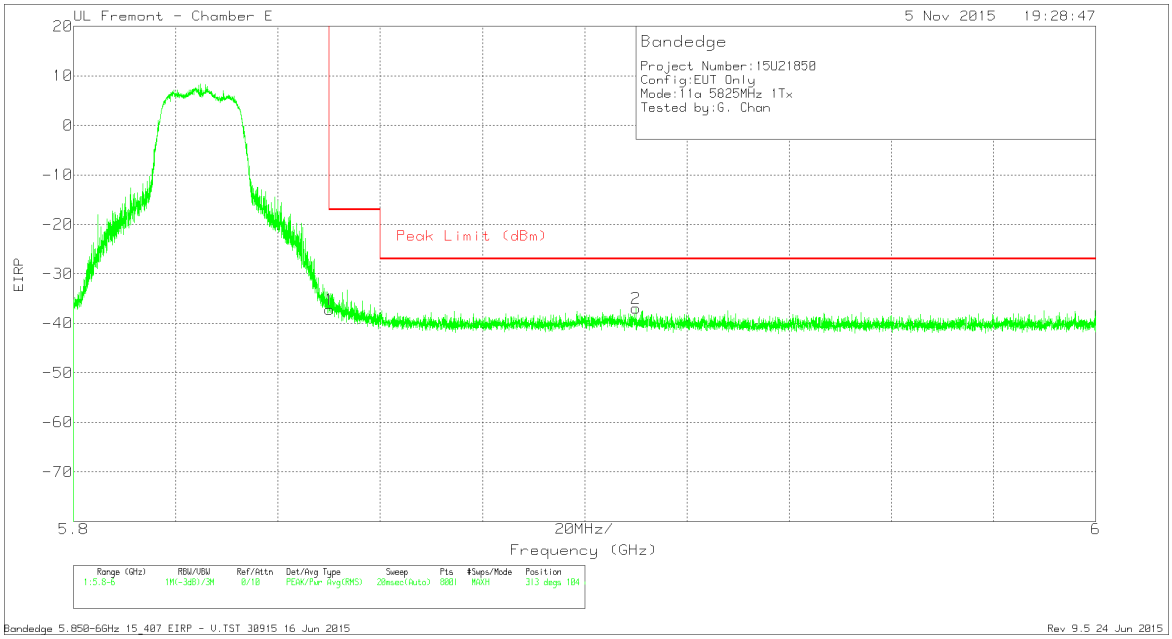


DATA

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	-65.87	Pk	34.9	-20.3	11.8	-39.47	-17	-22.47	256	148	H
2	5.898	-63.62	Pk	34.9	-20.3	11.8	-37.22	-27	-10.22	256	148	H

Pk - Peak detector

HIGH CHANNEL VERTICAL PLOT



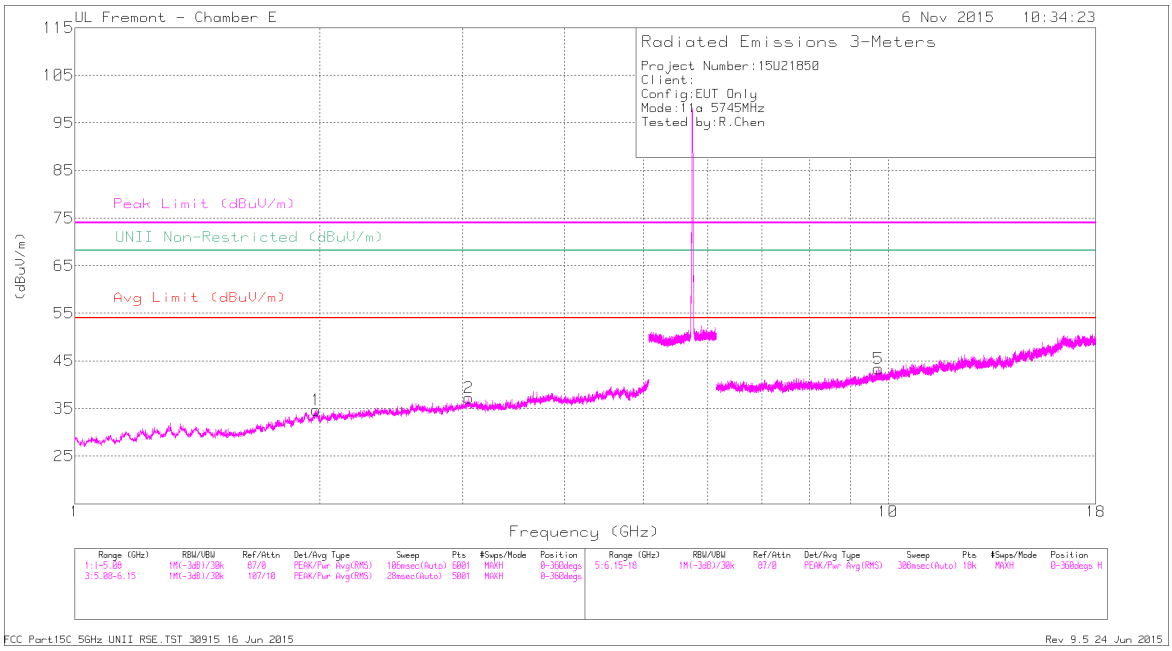
DATA

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	-63.62	Pk	34.9	-20.3	11.8	-37.22	-17	-20.22	313	104	V
2	5.91	-63.36	Pk	34.9	-20.3	11.8	-36.96	-27	-9.96	313	104	V

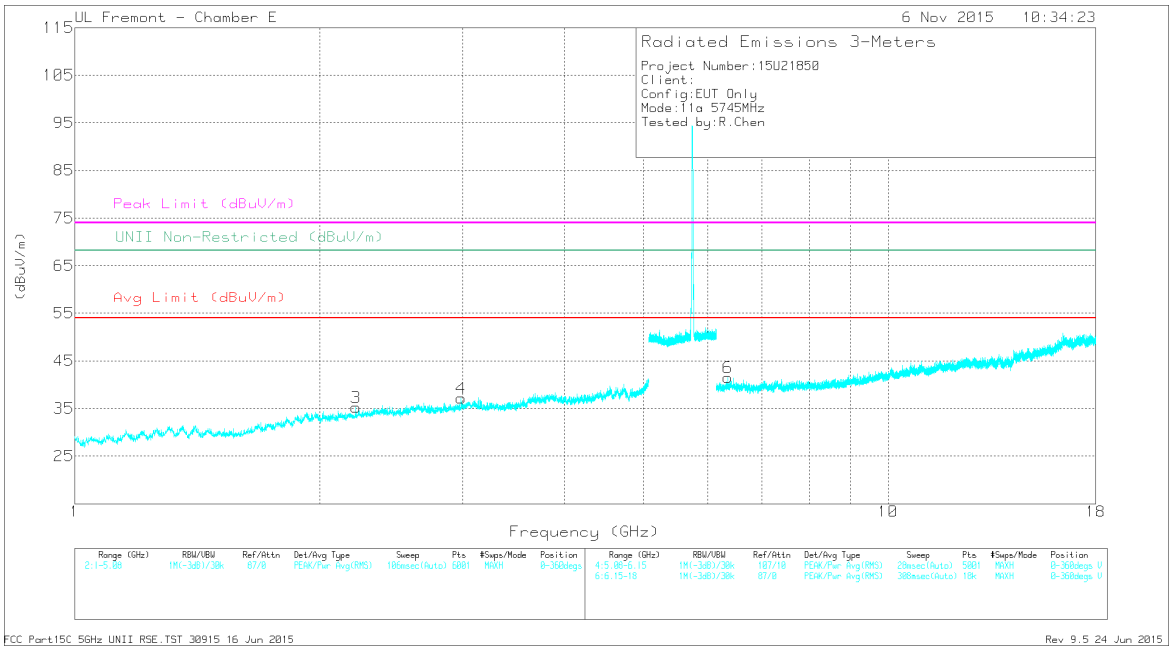
Pk - Peak detector

LOW CHANNEL HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL PLOT



LOW CHANNEL VERTICAL PLOT



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
3	* 2.216	42.72	PK-U	31.4	-32.5	41.62	-	-	74	-32.38	-	-	212	250	V
	* 2.217	30.56	ADR	31.4	-32.5	29.46	54	-24.54	-	-	-	-	212	250	V
1	1.98	43.6	PK-U	31.2	-33.1	41.7	-	-	-	-	68.2	-26.5	73	144	H
4	2.988	43.32	PK-U	32.9	-32.2	44.02	-	-	-	-	68.2	-24.18	178	155	V
2	3.053	41.55	PK-U	32.9	-30.7	43.75	-	-	-	-	68.2	-24.45	38	178	H
6	6.355	41.55	PK-U	35.5	-28.7	48.35	-	-	-	-	68.2	-19.85	107	227	V
5	9.727	38.01	PK-U	37	-25.7	49.31	-	-	-	-	68.2	-18.89	150	380	H

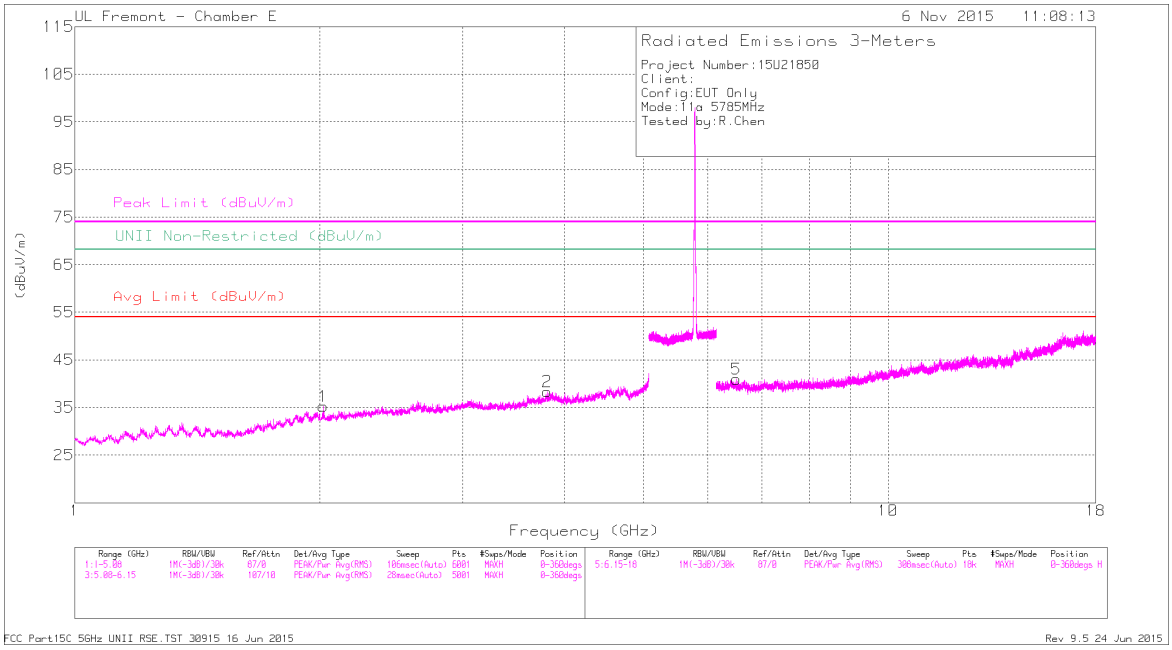
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK-U - U-NII: Maximum Peak

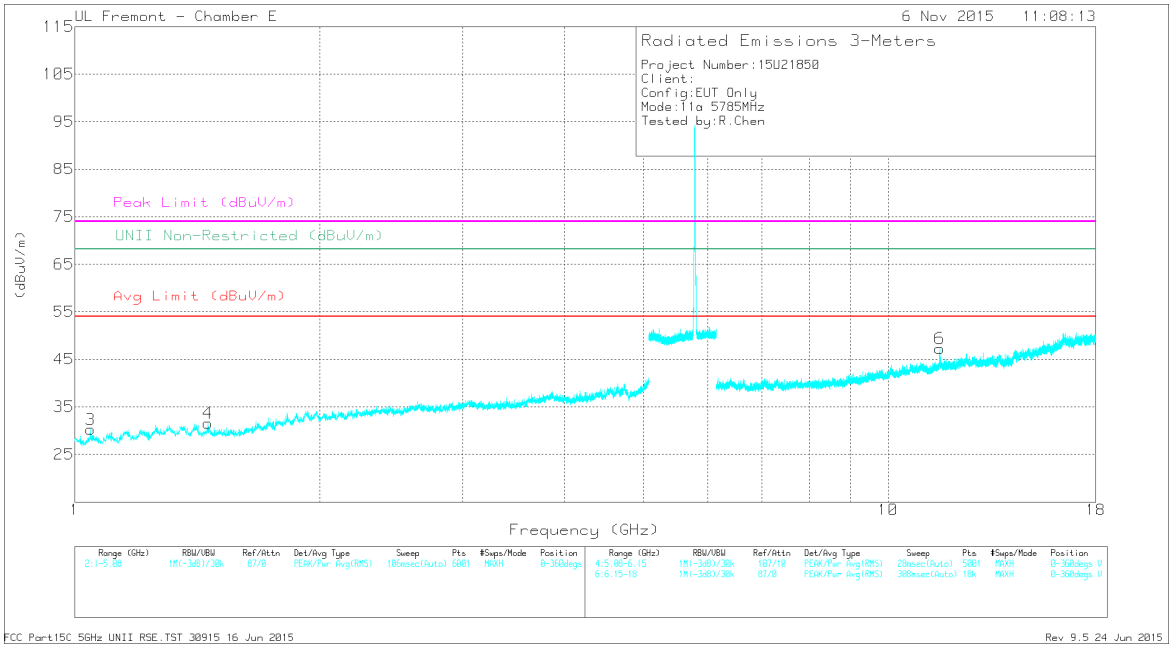
ADR - U-NII AD primary method, RMS average

MID CHANNEL HARMONICS AND SPURIOUS EMISSIONS

MID CHANNEL HORIZONTAL PLOT



MID CHANNEL VERTICAL PLOT



DATA

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
* 3.809	42.06	PK-U	33.5	-30.1	45.46	-	-	74	-28.54	-	-	169	165	H
* 3.809	30.58	ADR	33.5	-30.1	33.98	54	-20.02	-	-	-	-	169	165	H
* 1.047	46.17	PK-U	27	-36.1	37.07	-	-	74	-36.93	-	-	151	146	V
* 1.045	33.96	ADR	27	-36.1	24.86	54	-29.14	-	-	-	-	151	146	V
* 1.459	45.65	PK-U	28.3	-34.9	39.05	-	-	74	-34.95	-	-	193	200	V
* 1.458	33.25	ADR	28.3	-34.8	26.75	54	-27.25	-	-	-	-	193	200	V
* 11.577	39.45	PK-U	38.1	-22.2	55.35	-	-	74	-18.65	-	-	343	204	V
* 11.573	26.09	ADR	38.1	-22.2	41.99	54	-12.01	-	-	-	-	343	204	V
2.021	43.28	PK-U	31.3	-33.8	40.78	-	-	-	-	68.2	-27.42	254	183	H
6.506	40.53	PK-U	35.6	-28.8	47.33	-	-	-	-	68.2	-20.87	222	212	H

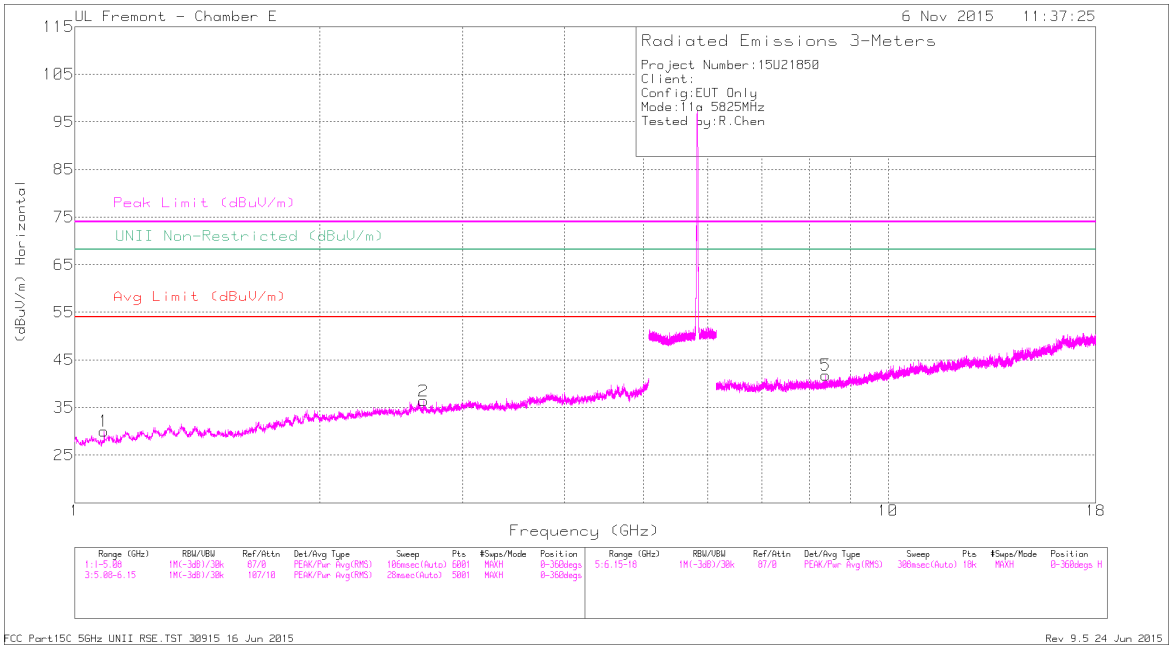
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK-U - U-NII: Maximum Peak

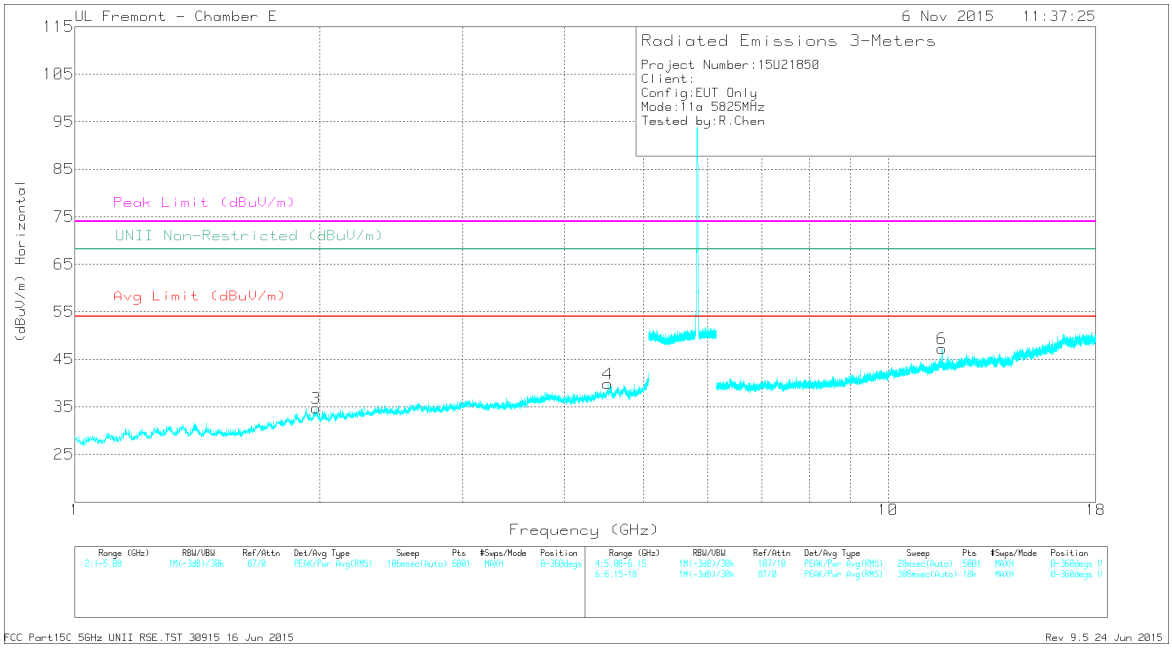
ADR - U-NII AD primary method, RMS average

HIGH CHANNEL HARMONICS AND SPURIOUS EMISSIONS

HIGH CHANNEL HORIZONTAL PLOT



HIGH CHANNEL VERTICAL PLOT



DATA

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
* 1.087	45.01	PK-U	27.1	-35.8	36.31	-	-	74	-37.69	-	-	280	133	H
* 1.088	33.27	ADR	27.1	-35.8	24.57	54	-29.43	-	-	-	-	280	133	H
* 2.685	42.96	PK-U	32.4	-32.2	43.16	-	-	74	-30.84	-	-	217	110	H
* 2.683	30.85	ADR	32.4	-32.1	31.15	54	-22.85	-	-	-	-	217	110	H
* 4.521	41.75	PK-U	34	-29.7	46.05	-	-	74	-27.95	-	-	167	149	V
* 4.522	30.36	ADR	34	-29.7	34.66	54	-19.34	-	-	-	-	167	149	V
* 8.382	38.14	PK-U	35.8	-26.7	47.24	-	-	74	-26.76	-	-	278	126	H
* 8.382	27.23	ADR	35.8	-26.7	36.33	54	-17.67	-	-	-	-	278	126	H
* 11.65	41.39	PK-U	38.2	-24.1	55.49	-	-	74	-18.51	-	-	304	111	V
* 11.65	28.41	ADR	38.2	-24.1	42.51	54	-11.49	-	-	-	-	304	111	V
1.981	43.25	PK-U	31.2	-33.1	41.35	-	-	-	-	68.2	-26.85	360	200	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

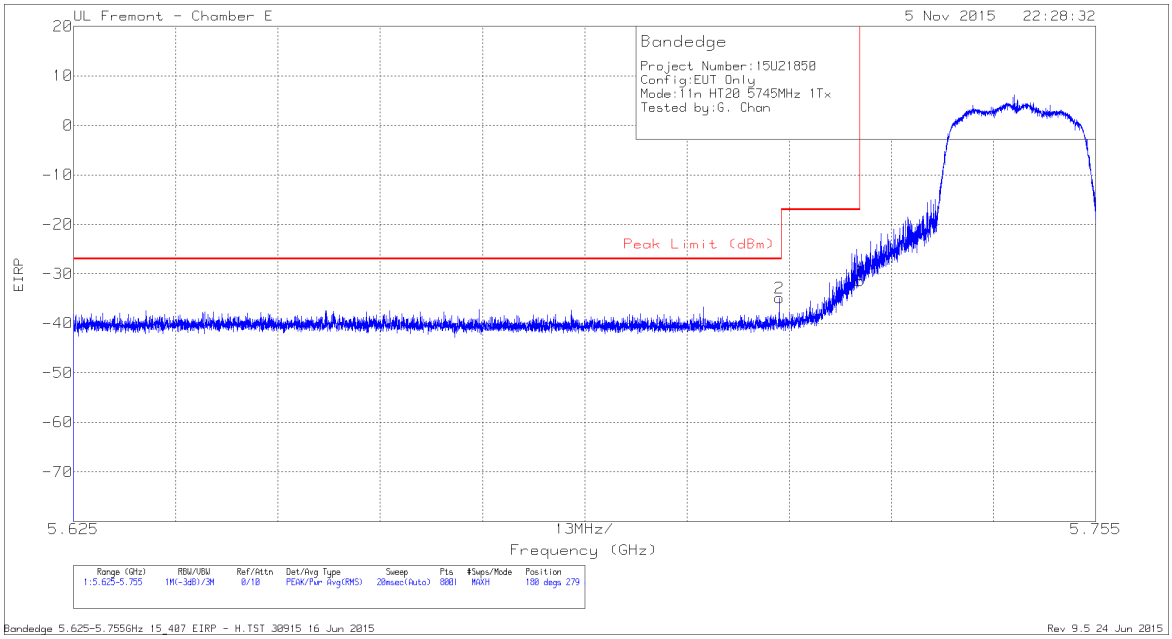
PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

9.3.802.11n HT20 MODE IN THE 5.8 GHz BAND

RESTRICTED BANDEDGE, (LOW CHANNEL)

LOW CHANNEL HORIZONTAL PLOT

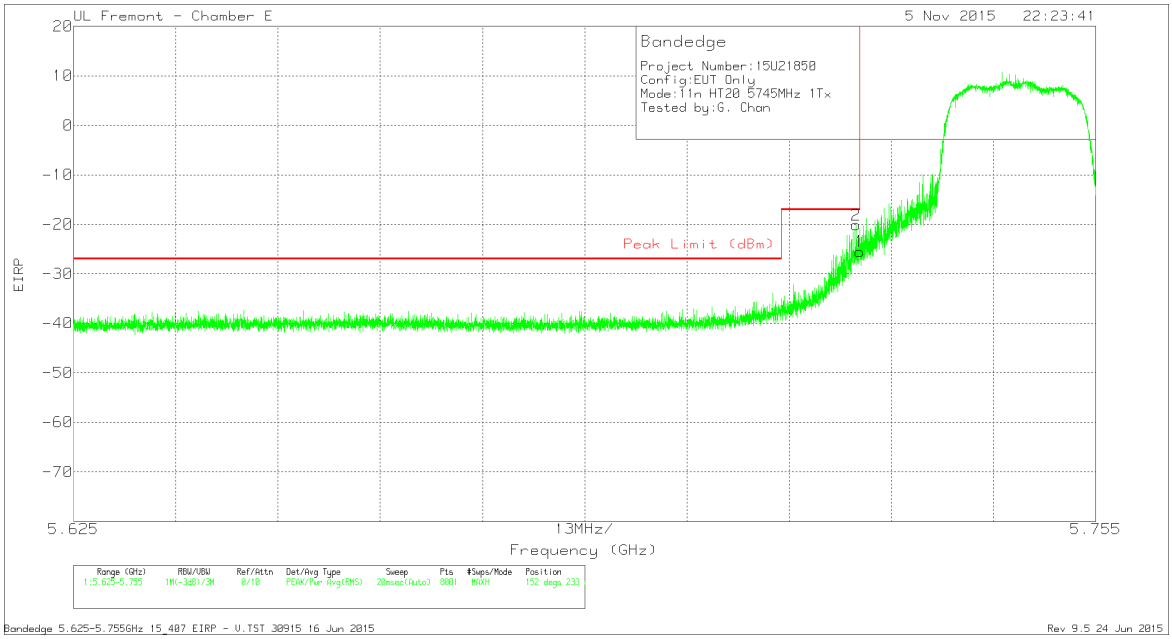


DATA

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	5.715	-61.29	Pk	34.7	-20.1	11.8	-34.89	-27	-7.89	180	279	H
1	5.725	-57.83	Pk	34.7	-20.1	11.8	-31.43	-17	-14.43	180	279	H

Pk - Peak detector

LOW CHANNEL VERTICAL PLOT



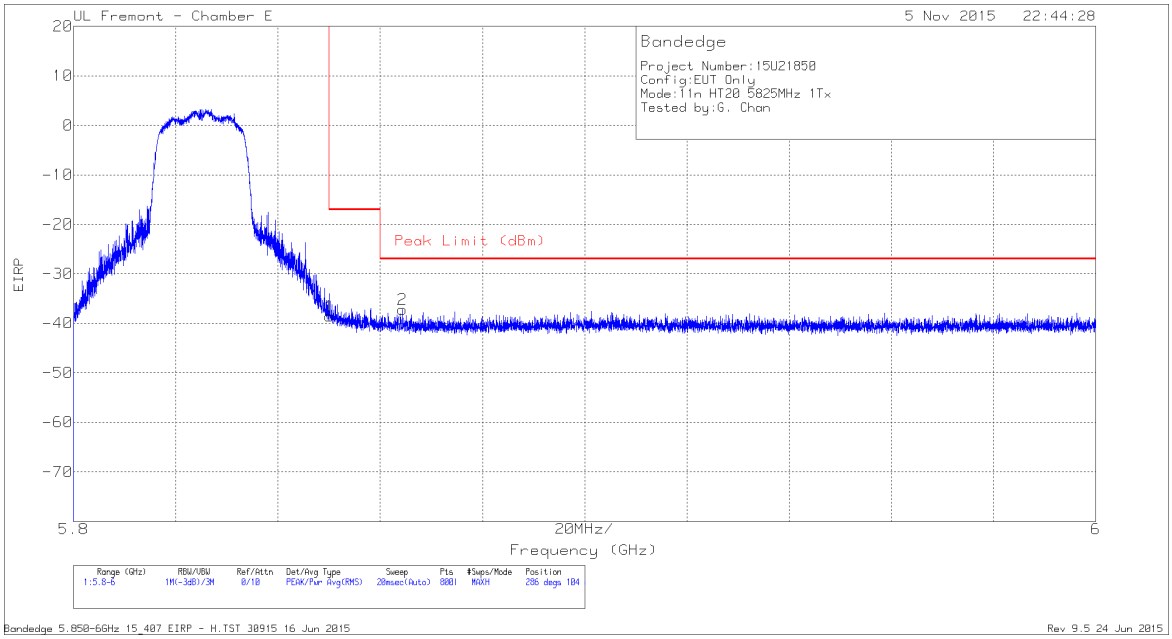
DATA

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
1	5.725	-51.87	Pk	34.7	-20.1	11.8	-25.47	-17	-8.47	152	233	V
2	5.725	-46.53	Pk	34.7	-20.1	11.8	-20.13	-17	-3.13	152	233	V

Pk - Peak detector

RESTRICTED BANDEDGE, (HIGH CHANNEL)

HIGH CHANNEL HORIZONTAL PLOT

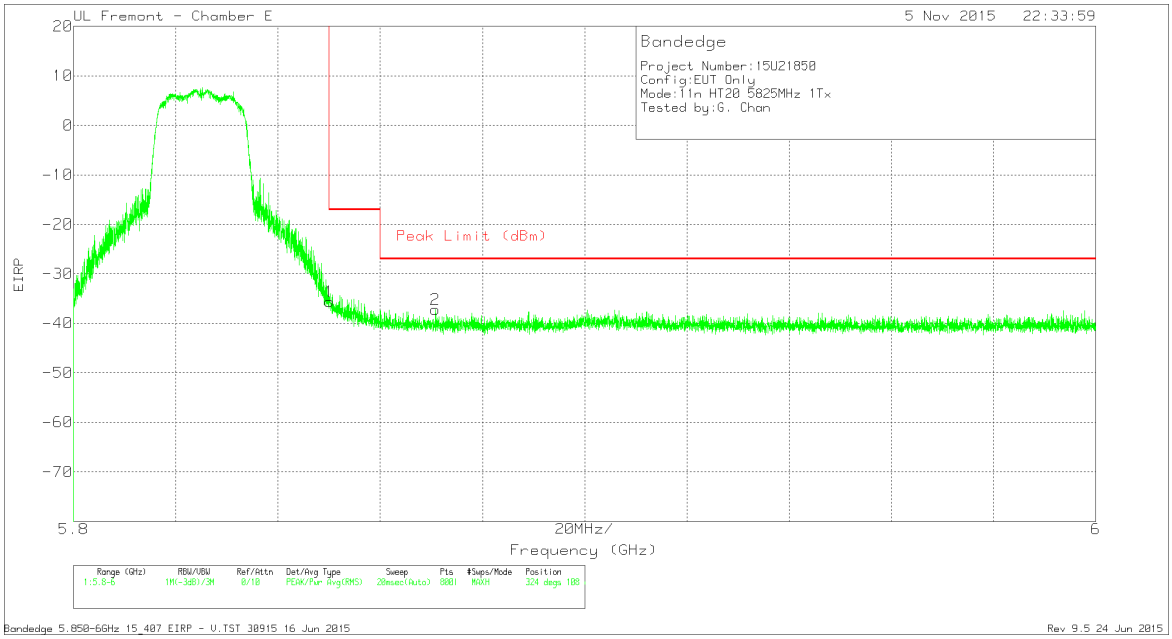


DATA

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	-64.91	Pk	34.9	-20.3	11.8	-38.51	-17	-21.51	286	104	H
2	5.864	-63.51	Pk	34.9	-20.4	11.8	-37.21	-27	-10.21	286	104	H

Pk - Peak detector

HIGH CHANNEL VERTICAL PLOT



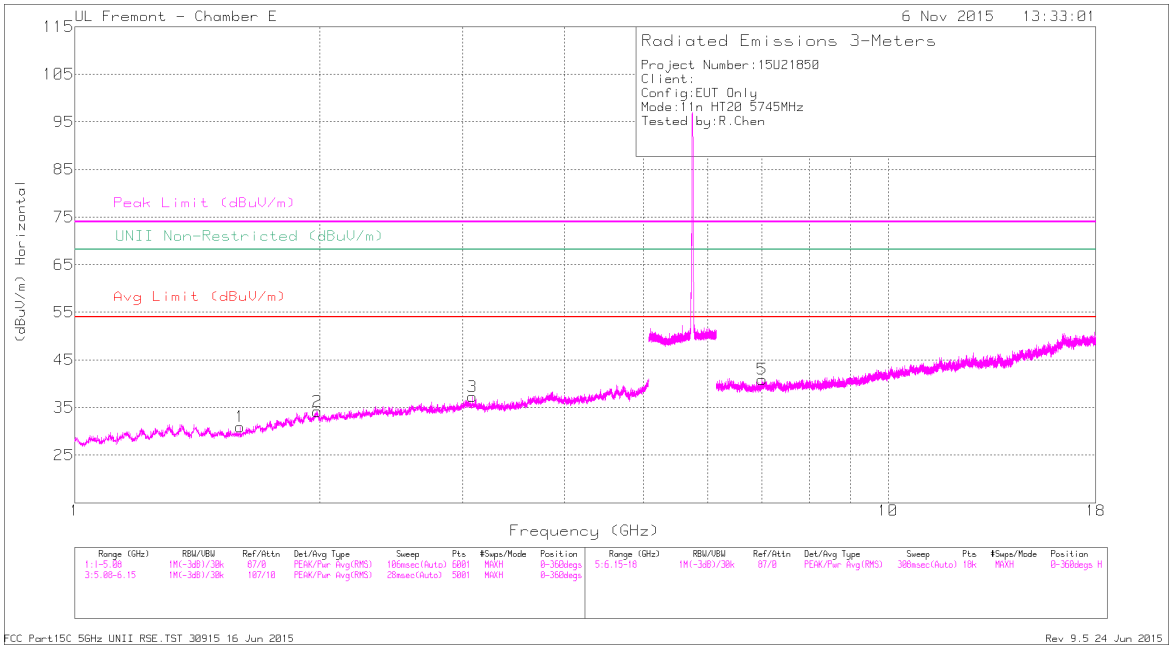
DATA

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	-61.97	Pk	34.9	-20.3	11.8	-35.57	-17	-18.57	324	108	V
2	5.871	-63.54	Pk	34.9	-20.4	11.8	-37.24	-27	-10.24	324	108	V

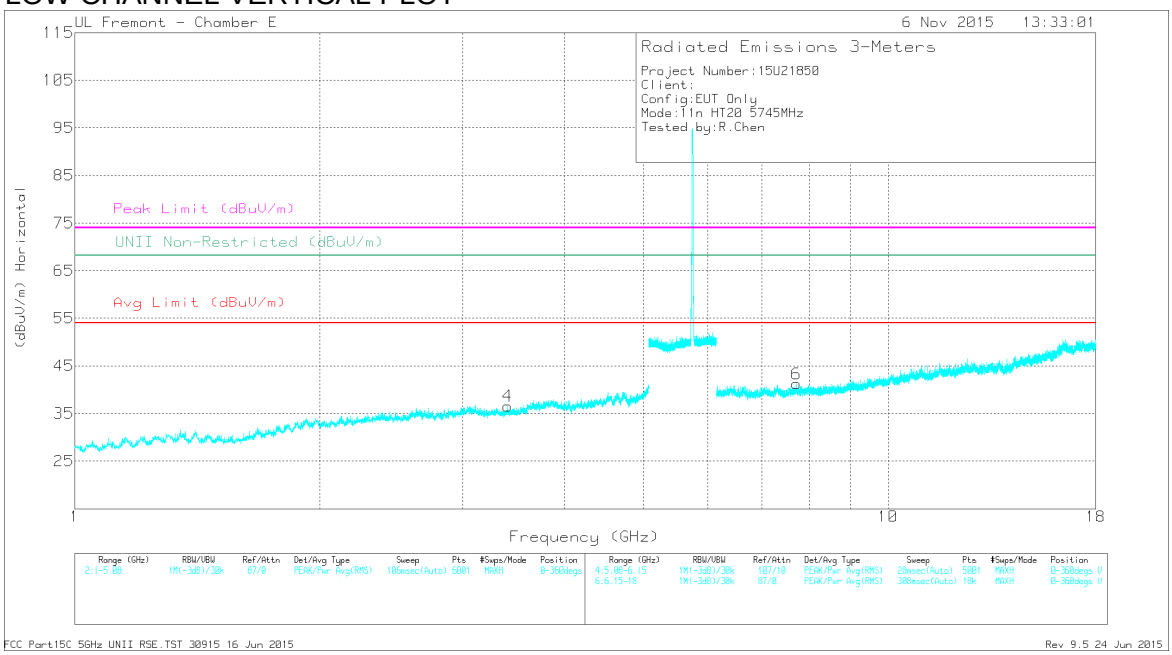
Pk - Peak detector

LOW CHANNEL HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL PLOT



LOW CHANNEL VERTICAL PLOT



DATA

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
* 1.597	43.98	PK-U	27.9	-34.7	37.18	-	-	74	-36.82	-	-	266	156	H
* 1.596	32.81	ADR	27.9	-34.7	26.01	54	-27.99	-	-	-	-	266	156	H
* 7.72	39.2	PK-U	35.8	-26.9	48.1	-	-	74	-25.9	-	-	189	262	V
* 7.719	27.68	ADR	35.8	-26.9	36.58	54	-17.42	-	-	-	-	189	262	V
1.99	43.73	PK-U	31.2	-33.2	41.73	-	-	-	-	68.2	-26.47	161	183	H
3.082	41.3	PK-U	32.9	-30.7	43.5	-	-	-	-	68.2	-24.7	254	138	H
3.406	41.51	PK-U	32.7	-30.8	43.41	-	-	-	-	68.2	-24.79	140	127	V
7.002	38.98	PK-U	35.6	-27.1	47.48	-	-	-	-	68.2	-20.72	174	168	H

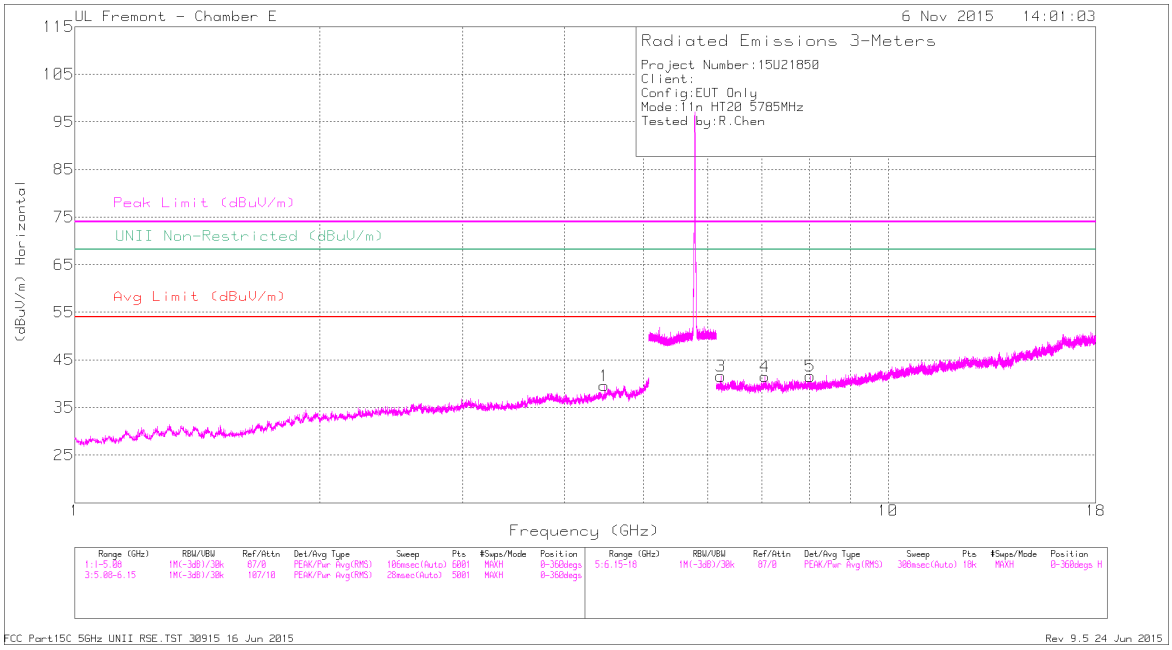
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK-U - U-NII: Maximum Peak

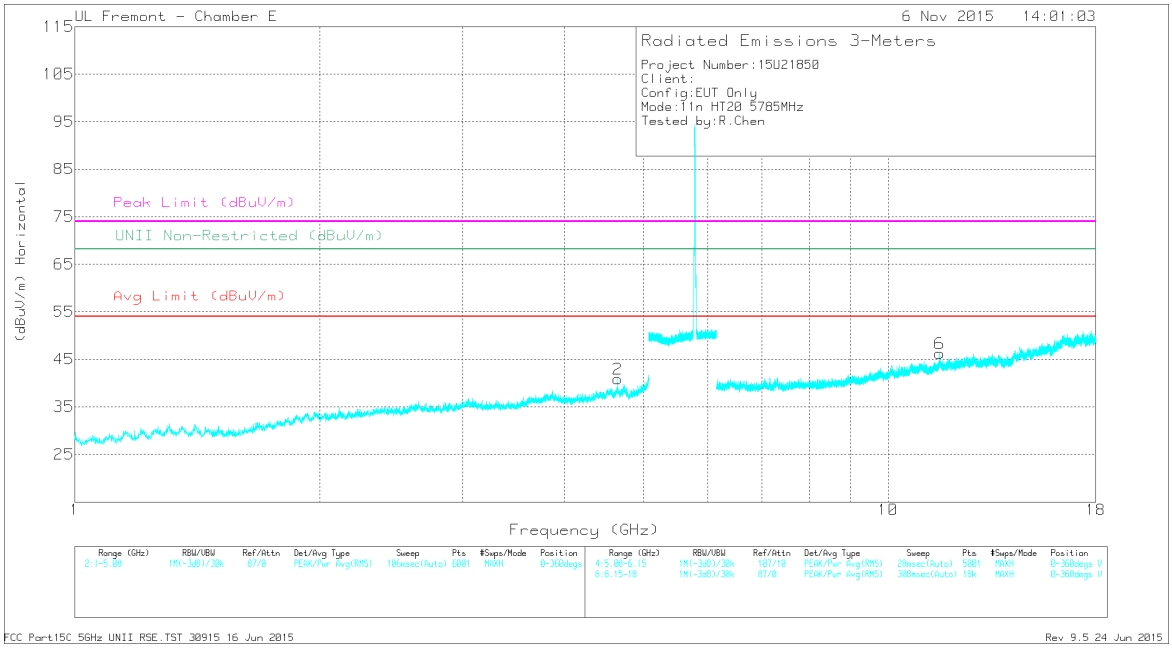
ADR - U-NII AD primary method, RMS average

MID CHANNEL HARMONICS AND SPURIOUS EMISSIONS

MID CHANNEL HORIZONTAL PLOT



MID CHANNEL VERTICAL PLOT



DATA

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
* 4.654	41.85	PK-U	34.1	-30	45.95	-	-	74	-28.05	-	-	213	285	V
* 4.654	30.48	ADR	34.1	-30	34.58	54	-19.42	-	-	-	-	213	285	V
* 4.656	42.15	PK-U	34.1	-30.1	46.15	-	-	74	-27.85	-	-	226	103	V
* 11.572	38.45	PK-U	38.1	-22.2	54.35	-	-	74	-19.65	-	-	114	128	V
* 11.57	25.66	ADR	38.1	-22.3	41.46	54	-12.54	-	-	-	-	114	128	V
4.475	42.04	PK-U	33.9	-30.6	45.34	-	-	-	-	68.2	-22.86	235	101	H
6.228	39.96	PK-U	35.4	-28.1	47.26	-	-	-	-	68.2	-20.94	346	121	H
7.06	39.06	PK-U	35.6	-27.3	47.36	-	-	-	-	68.2	-20.84	282	100	H
8.023	38.19	PK-U	35.8	-26.7	47.29	-	-	-	-	68.2	-20.91	246	383	H

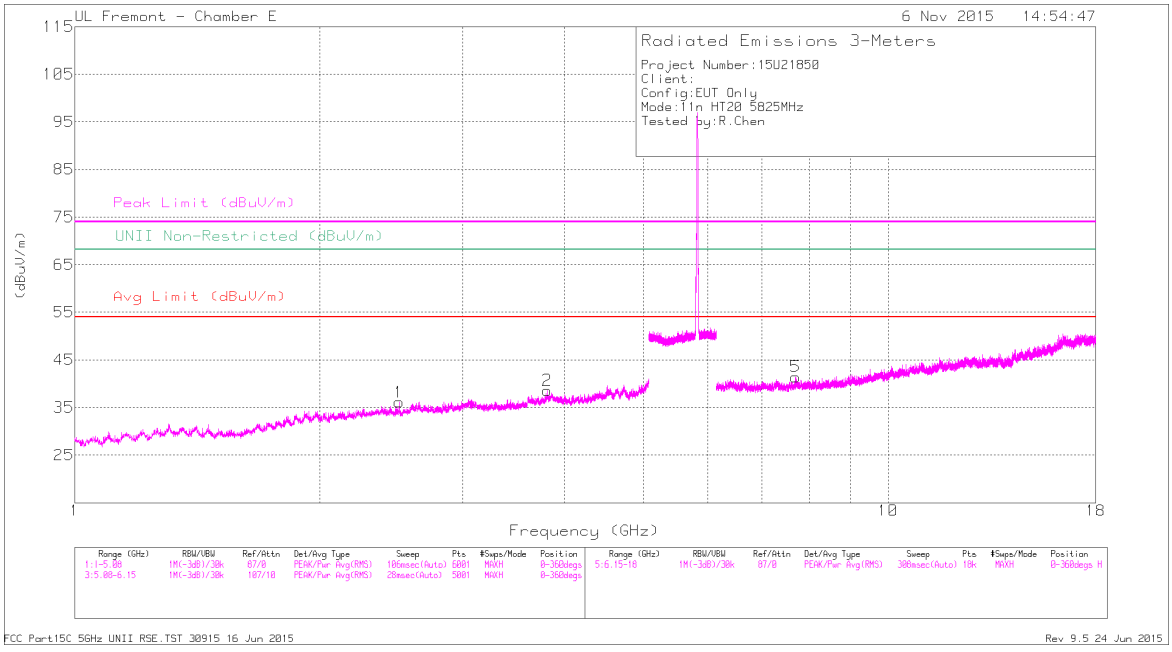
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK-U - U-NII: Maximum Peak

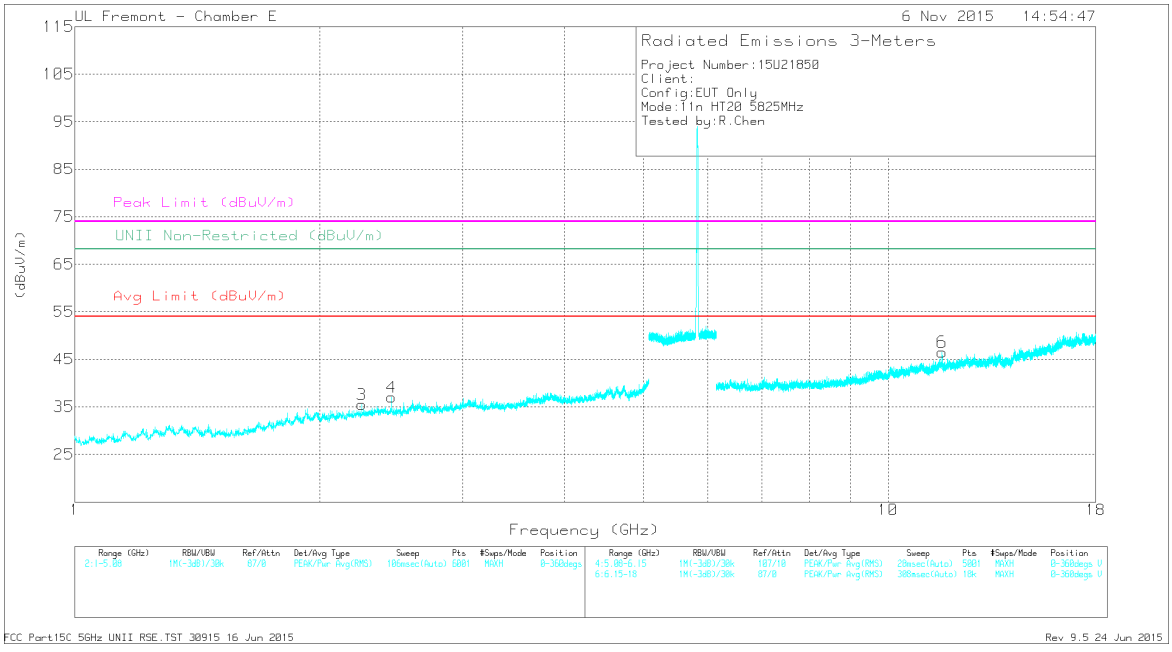
ADR - U-NII AD primary method, RMS average

HIGH CHANNEL HARMONICS AND SPURIOUS EMISSIONS

HIGH CHANNEL HORIZONTAL PLOT



HIGH CHANNEL VERTICAL PLOT



DATA

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
* 3.809	41.66	PK-U	33.5	-30.1	45.06	-	-	74	-28.94	-	-	228	191	H
* 3.811	30.47	ADR	33.5	-30	33.97	54	-20.03	-	-	-	-	228	191	H
* 2.255	42.89	PK-U	31.6	-33	41.49	-	-	74	-32.51	-	-	85	203	V
* 2.252	30.77	ADR	31.6	-33	29.37	54	-24.63	-	-	-	-	85	203	V
* 7.696	38.67	PK-U	35.8	-27.2	47.27	-	-	74	-26.73	-	-	354	323	H
* 7.695	27.07	ADR	35.8	-27.2	35.67	54	-18.33	-	-	-	-	354	323	H
* 11.649	40.45	PK-U	38.2	-24	54.65	-	-	74	-19.35	-	-	200	102	V
* 11.651	27.63	ADR	38.2	-24.1	41.73	54	-12.27	-	-	-	-	200	102	V
2.454	43.41	PK-U	32.1	-32.8	42.71	-	-	-	-	68.2	-25.49	207	245	V
2.507	42.76	PK-U	32.2	-33	41.96	-	-	-	-	68.2	-26.24	303	135	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

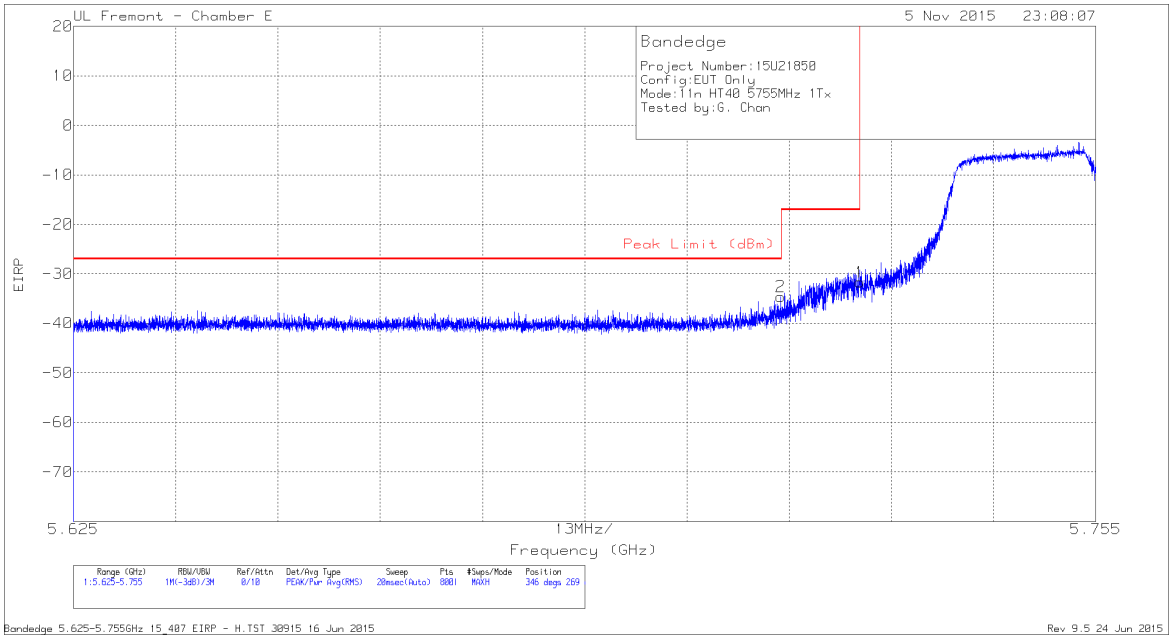
PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

9.4.802.11n HT40 1Tx MODE IN THE 5.8 GHz BAND

RESTRICTED BANDEDGE, (LOW CHANNEL)

LOW CHANNEL HORIZONTAL PLOT

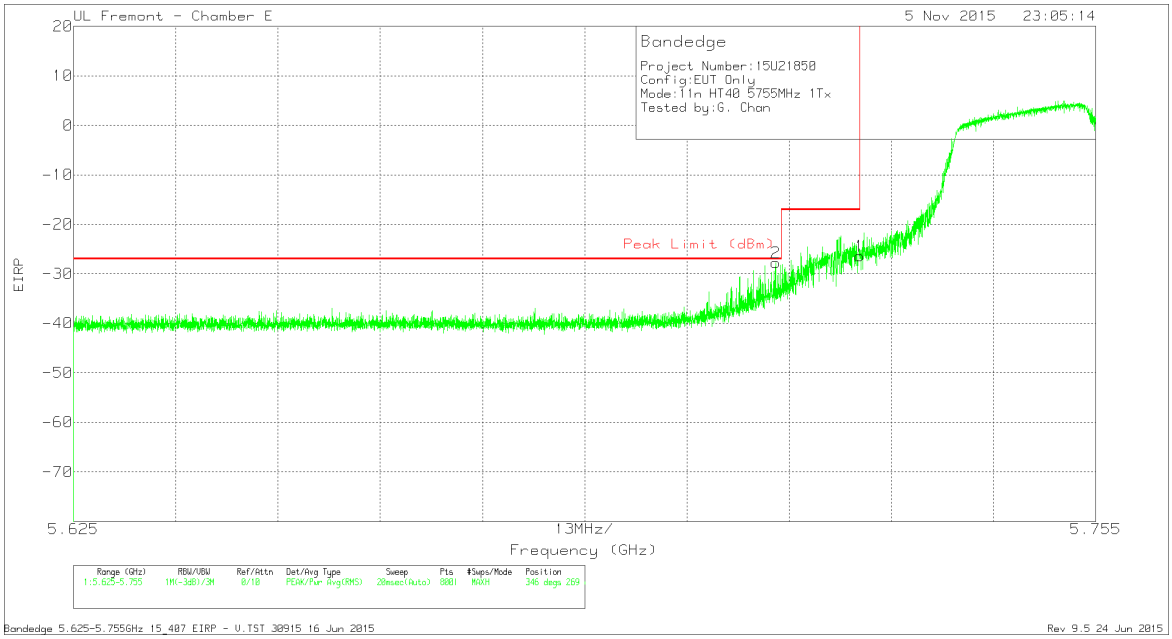


DATA

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	5.715	-60.96	Pk	34.7	-20.1	11.8	-34.56	-27	-7.56	346	269	H
1	5.725	-58.11	Pk	34.7	-20.1	11.8	-31.71	-17	-14.71	346	269	H

Pk - Peak detector

LOW CHANNEL VERTICAL PLOT

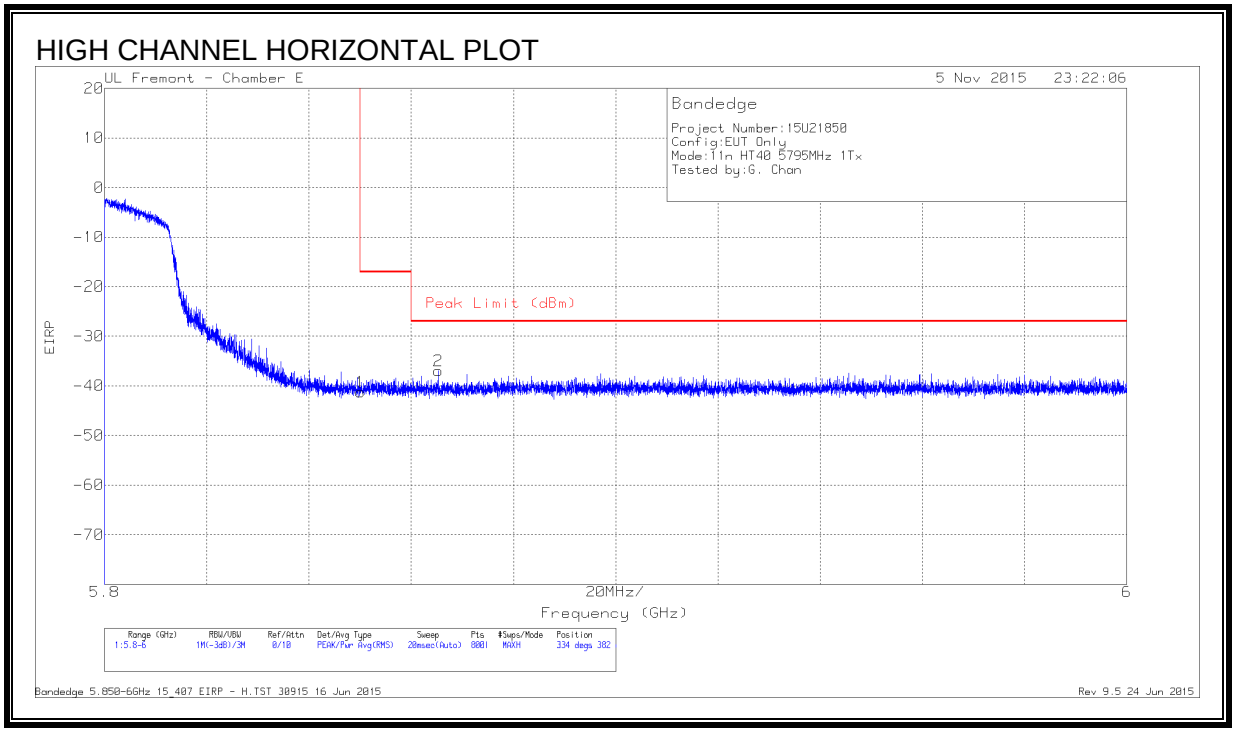


DATA

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	5.714	-54.15	Pk	34.7	-20.1	11.8	-27.75	-27	-.75	346	269	V
1	5.725	-52.83	Pk	34.7	-20.1	11.8	-26.43	-17	-9.43	346	269	V

Pk - Peak detector

RESTRICTED BANDEDGE, (HIGH CHANNEL)

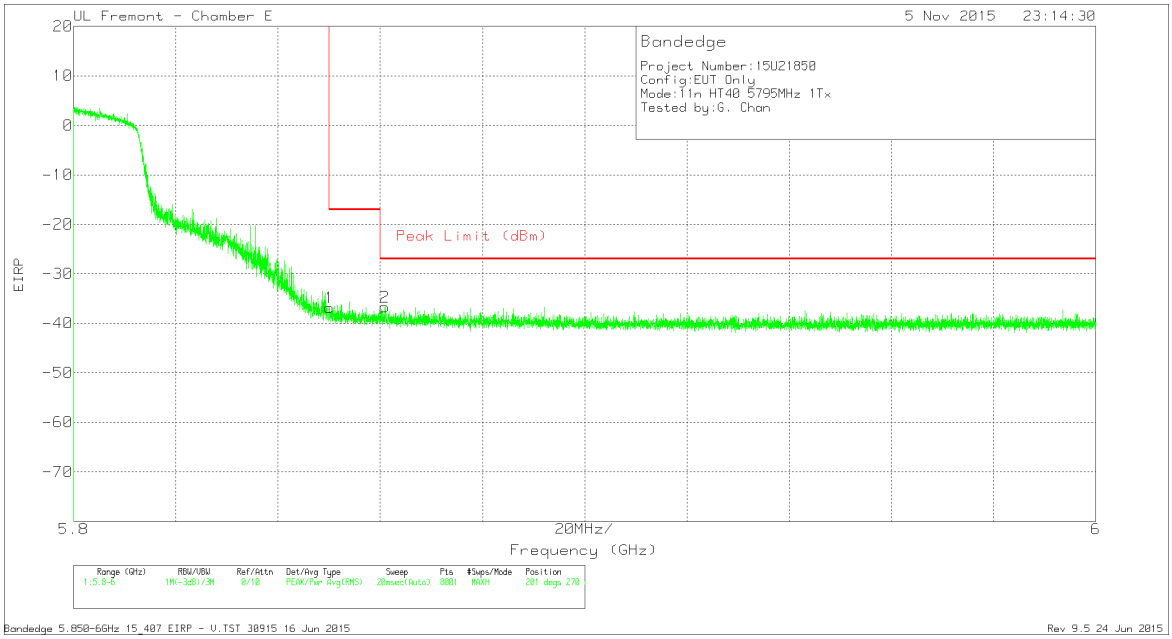


DATA

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	-67.6	Pk	34.9	-20.3	11.8	-41.2	-17	-24.2	334	382	H
2	5.865	-63.26	Pk	34.9	-20.4	11.8	-36.96	-27	-9.96	334	382	H

Pk - Peak detector

HIGH CHANNEL VERTICAL PLOT



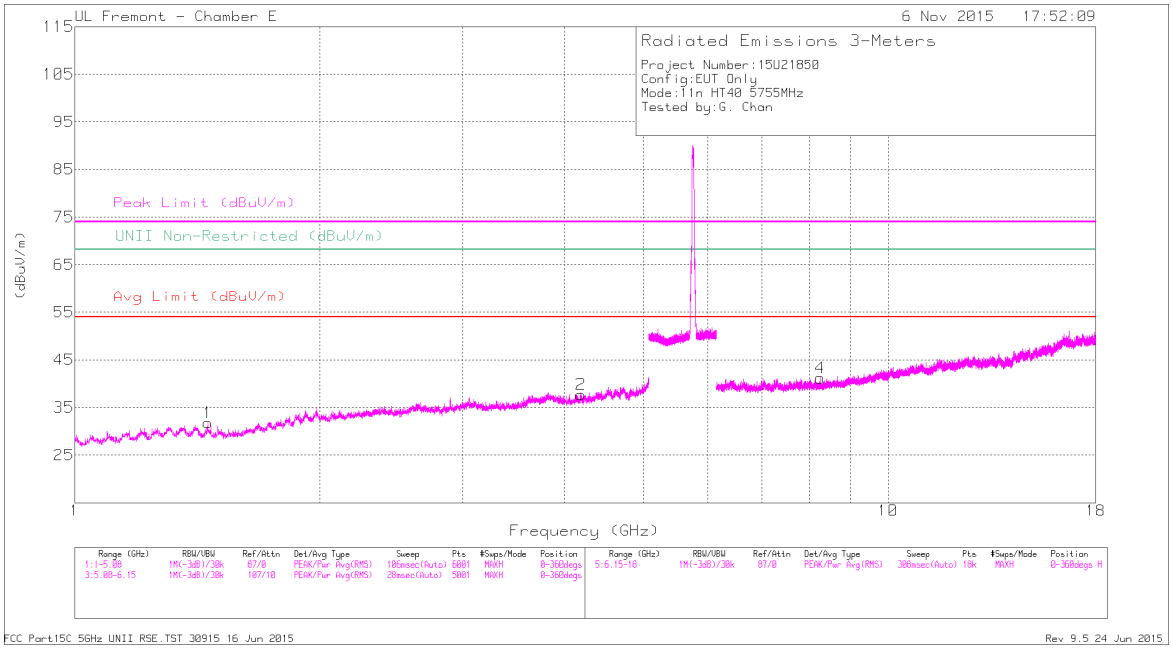
DATA

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	-63.23	Pk	34.9	-20.3	11.8	-36.83	-17	-19.83	201	270	V
2	5.861	-62.99	Pk	34.9	-20.4	11.8	-36.69	-27	-9.69	201	270	V

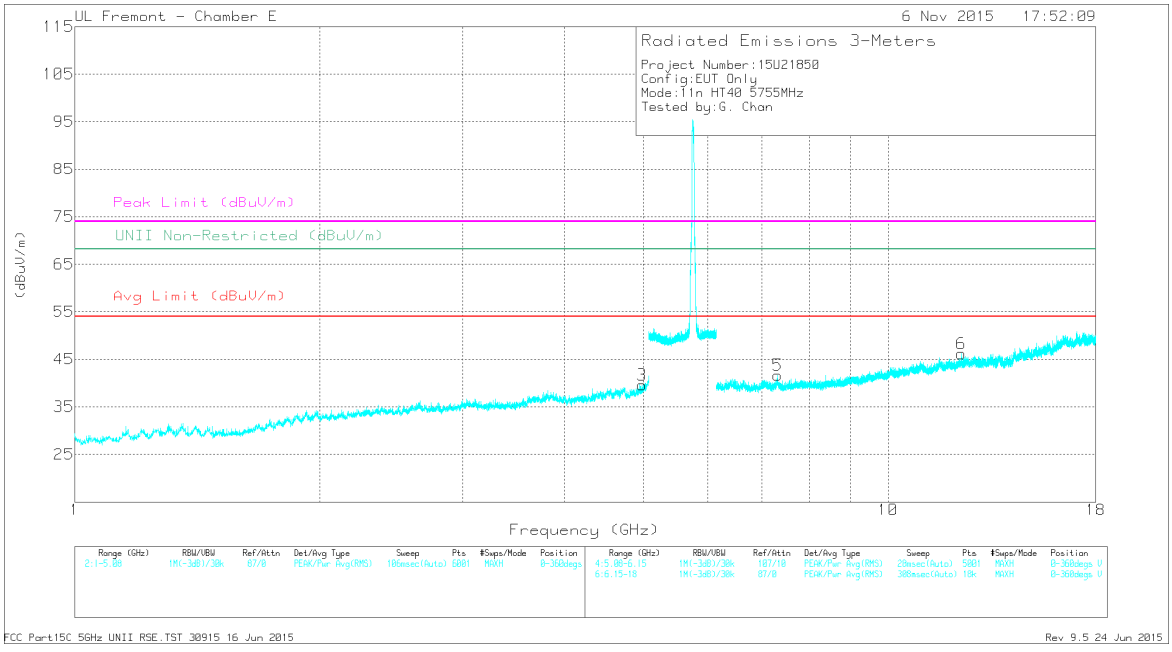
Pk - Peak detector

LOW CHANNEL HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL PLOT



LOW CHANNEL VERTICAL PLOT



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	* 1.459	45.31	PK-U	28.3	-34.9	38.71	-	-	74	-35.29	-	-	149	247	H
	* 1.459	32.77	ADR	28.3	-34.9	26.17	54	-27.83	-	-	-	-	149	247	H
2	* 4.193	41.42	PK-U	33.5	-30.3	44.62	-	-	74	-29.38	-	-	157	318	H
	* 4.193	29.83	ADR	33.5	-30.3	33.03	54	-20.97	-	-	-	-	157	318	H
3	* 4.984	41.71	PK-U	34.2	-29.3	46.61	-	-	74	-27.39	-	-	233	359	V
	* 4.982	29.77	ADR	34.2	-29.4	34.57	54	-19.43	-	-	-	-	233	359	V
4	* 8.253	38.55	PK-U	35.7	-26.9	47.35	-	-	74	-26.65	-	-	62	311	H
	* 8.252	26.63	ADR	35.7	-26.9	35.43	54	-18.57	-	-	-	-	62	311	H
5	* 7.312	38.14	PK-U	35.5	-26.1	47.54	-	-	74	-26.46	-	-	343	313	V
	* 7.309	26.52	ADR	35.5	-26.1	35.92	54	-18.08	-	-	-	-	343	313	V
6	* 12.306	37.8	PK-U	38.8	-24.2	52.4	-	-	74	-21.6	-	-	200	104	V
	* 12.308	25.79	ADR	38.8	-24.2	40.39	54	-13.61	-	-	-	-	200	104	V

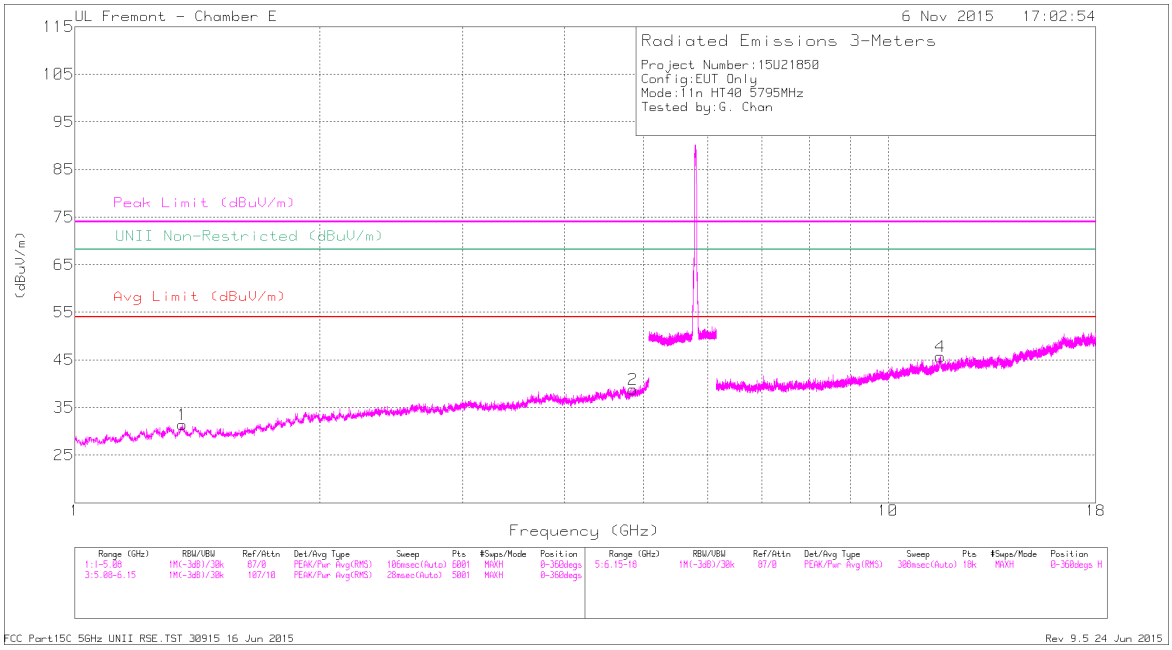
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK-U - U-NII: Maximum Peak

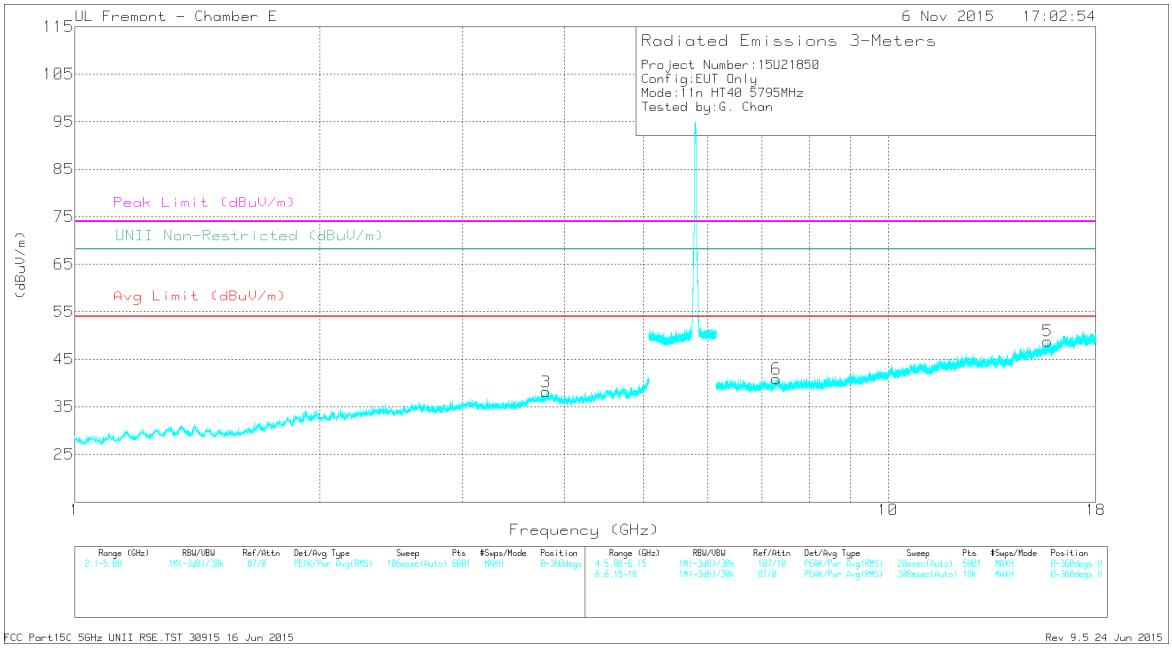
ADR - U-NII AD primary method, RMS average

HIGH CHANNEL HARMONICS AND SPURIOUS EMISSIONS

HIGH CHANNEL HORIZONTAL PLOT



HIGH CHANNEL VERTICAL PLOT



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	* 1.356	45.54	PK-U	28.7	-35	39.24	-	-	74	-34.76	-	-	214	132	H
	* 1.357	32.95	ADR	28.7	-34.9	26.75	54	-27.25	-	-	-	-	214	132	H
2	* 4.857	40.41	PK-U	34.1	-29.2	45.31	-	-	74	-28.69	-	-	67	326	H
	* 4.86	28.58	ADR	34.1	-29.2	33.48	54	-20.52	-	-	-	-	67	326	H
3	* 3.798	41.85	PK-U	33.5	-30.3	45.05	-	-	74	-28.95	-	-	48	156	V
	* 3.799	30.18	ADR	33.5	-30.2	33.48	54	-20.52	-	-	-	-	48	156	V
4	* 11.594	37.72	PK-U	38.1	-22.6	53.22	-	-	74	-20.78	-	-	354	130	H
	* 11.592	25.42	ADR	38.1	-22.6	40.92	54	-13.08	-	-	-	-	354	130	H
5	* 15.711	36.85	PK-U	40.4	-21.9	55.35	-	-	74	-18.65	-	-	261	252	V
	* 15.714	24.96	ADR	40.4	-21.9	43.46	54	-10.54	-	-	-	-	261	252	V
6	* 7.295	37.93	PK-U	35.5	-26.3	47.13	-	-	74	-26.87	-	-	206	198	V
	* 7.293	26.69	ADR	35.5	-26.3	35.89	54	-18.11	-	-	-	-	206	198	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

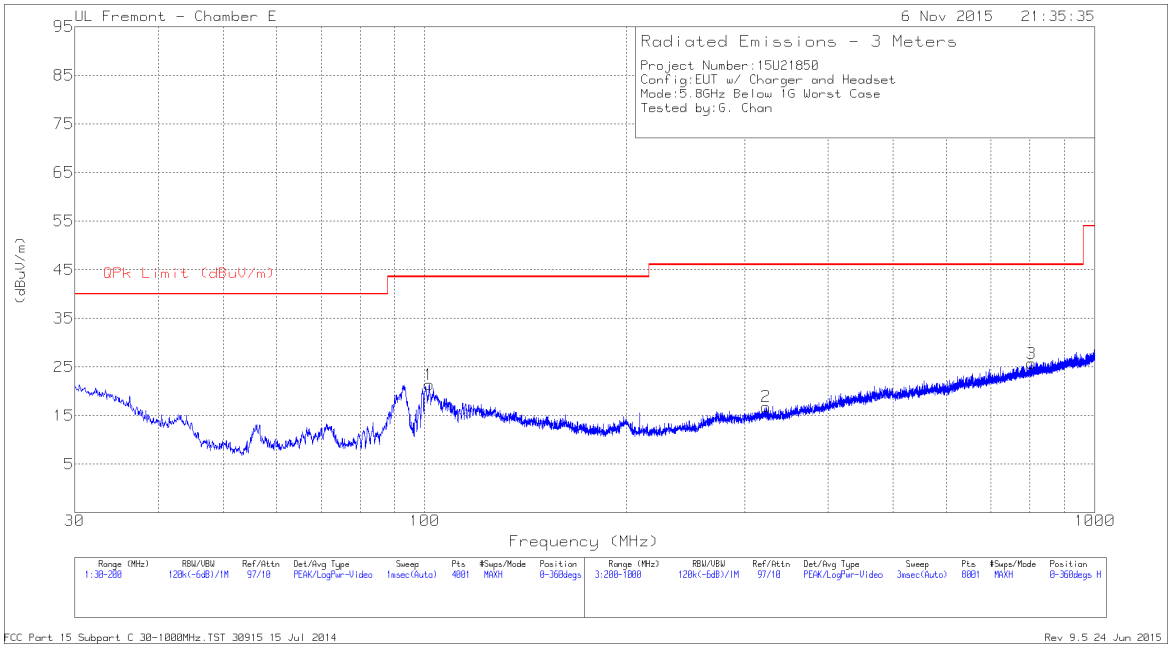
PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

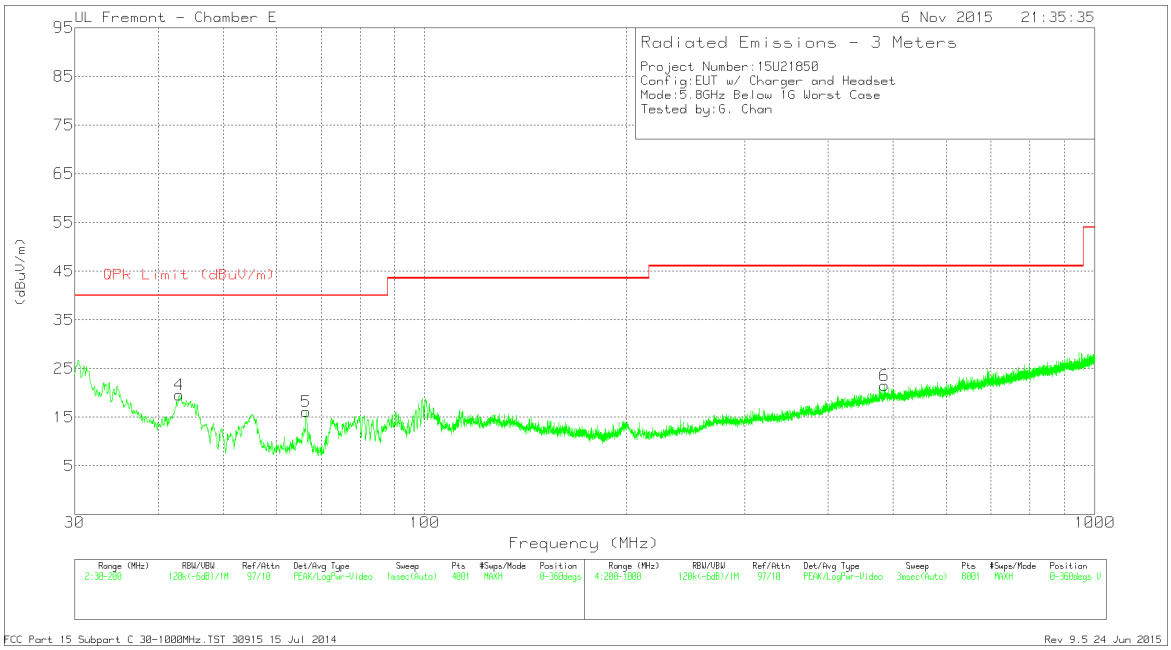
9.5. WORST-CASE BELOW 1 GHz

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

HORIZONTAL PLOT



VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 323	29.15	Pk	17.9	-30.2	16.85	46.02	-29.17	0-360	100	H
4	42.9625	35.7	Pk	15.6	-31.7	19.6	40	-20.4	0-360	100	V
5	66.5075	35.73	Pk	11.9	-31.5	16.13	40	-23.87	0-360	100	V
1	101.485	38.1	Pk	14.6	-31.3	21.4	43.52	-22.12	0-360	301	H
6	485.5	29.44	Pk	21.7	-29.6	21.54	46.02	-24.48	0-360	201	V
3	805.1	29.04	Pk	25.4	-28.7	25.74	46.02	-20.28	0-360	202	H

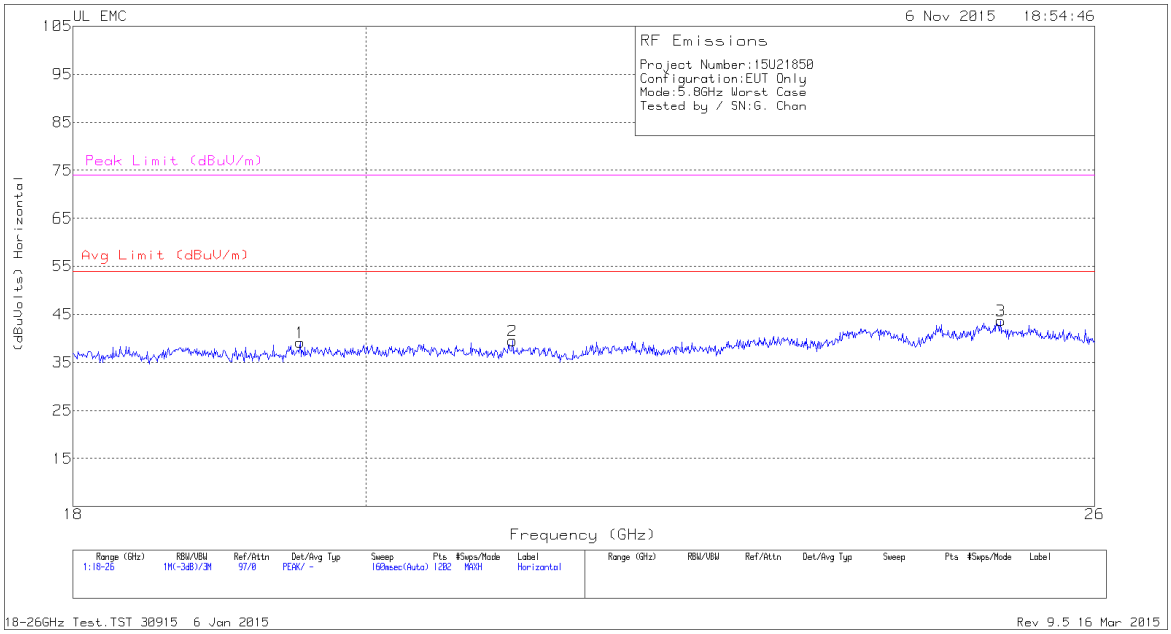
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

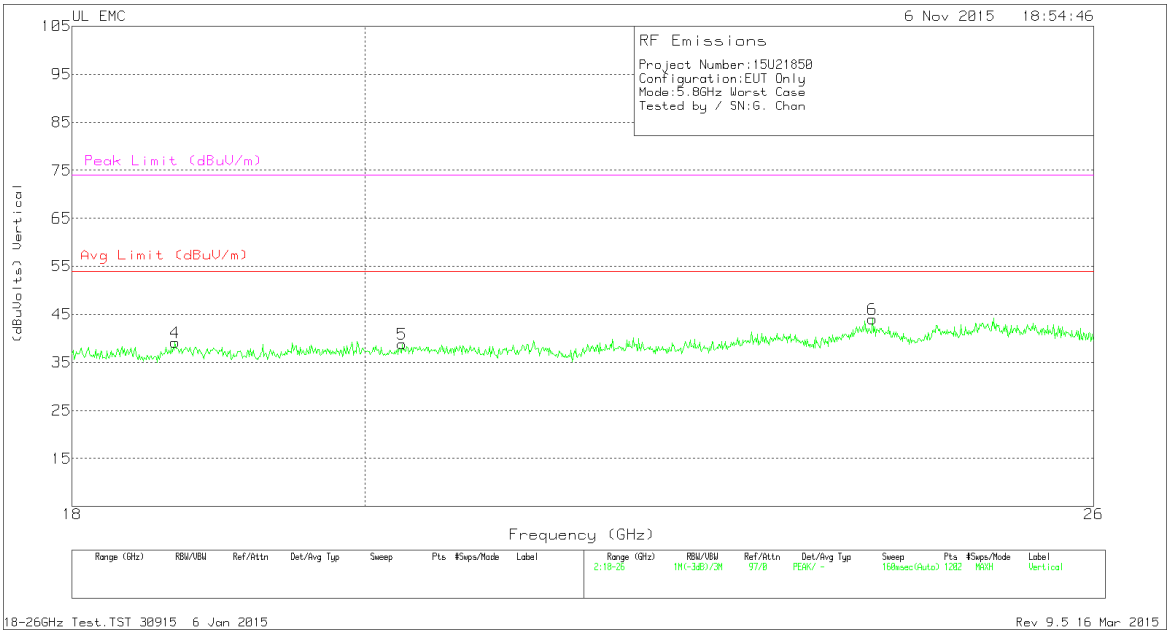
9.6. WORST-CASE ABOVE 18 GHz

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

HORIZONTAL PLOT



VERTICAL PLOT



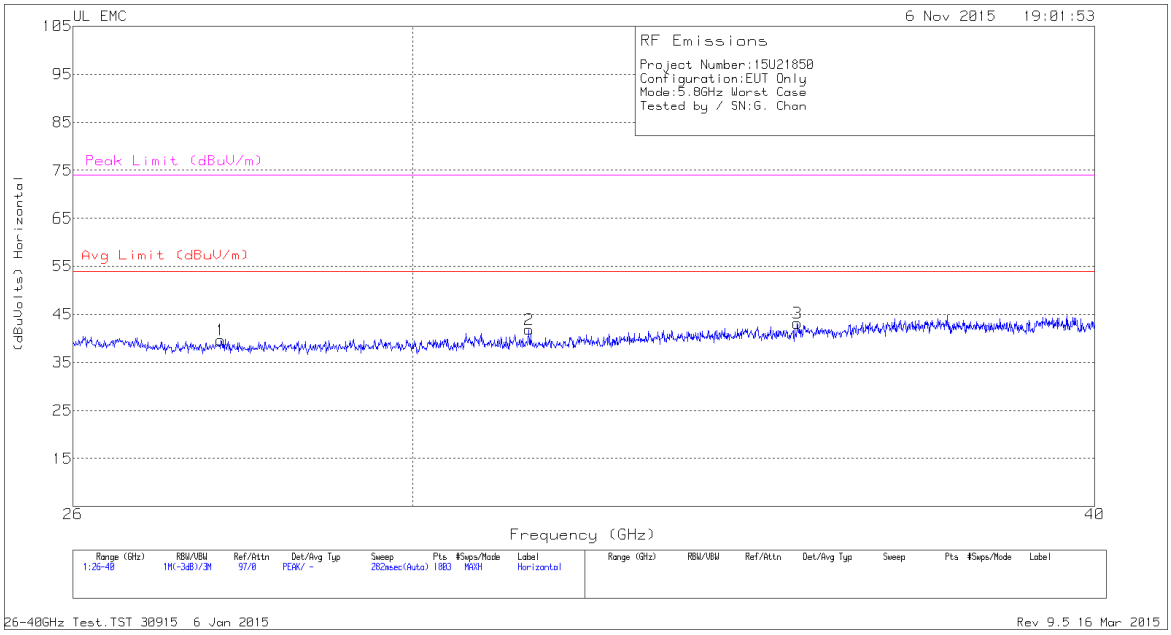
HORIZONTAL AND VERTICAL DATA

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	19.532	41.37	Pk	32.5	-25.2	-9.5	39.17	54	-14.83	74	-34.83
2	21.084	41.5	Pk	32.7	-25.2	-9.5	39.5	54	-14.5	74	-34.5
3	25.134	44.07	Pk	33.8	-24.7	-9.5	43.67	54	-10.33	74	-30.33
4	18.679	40.77	Pk	32.5	-24.6	-9.5	39.17	54	-14.83	74	-34.83
5	20.271	41.03	Pk	32.5	-25.2	-9.5	38.83	54	-15.17	74	-35.17
6	24.008	44.7	Pk	33.2	-24.4	-9.5	44	54	-10	74	-30

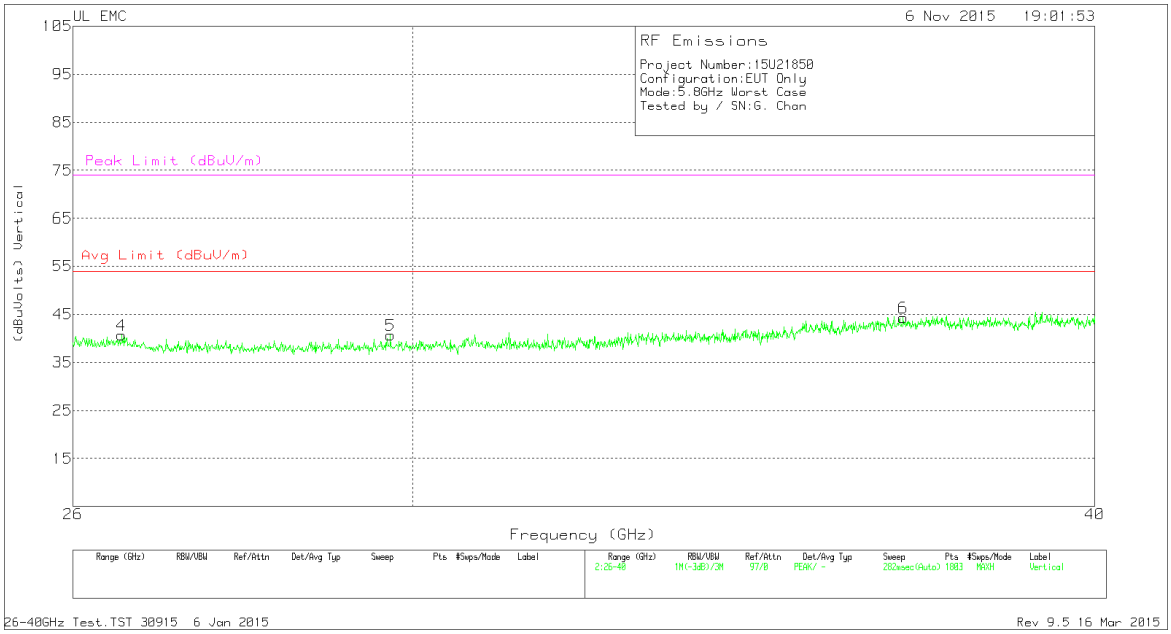
Pk - Peak detector

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

HORIZONTAL PLOT



VERTICAL PLOT



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	27.67	44.67	Pk	35.8	-31.3	-9.5	39.67	54	-14.33	74	-34.33
2	31.508	48.13	Pk	36.2	-33	-9.5	41.83	54	-12.17	74	-32.17
3	35.284	48.27	Pk	37.7	-33.3	-9.5	43.17	54	-10.83	74	-30.83
4	26.536	44.87	Pk	35.5	-30.2	-9.5	40.67	54	-13.33	74	-33.33
5	29.721	46.57	Pk	36.1	-32.5	-9.5	40.67	54	-13.33	74	-33.33
6	36.892	49.63	Pk	37.2	-33	-9.5	44.33	54	-9.67	74	-29.67

Pk - Peak detector

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.

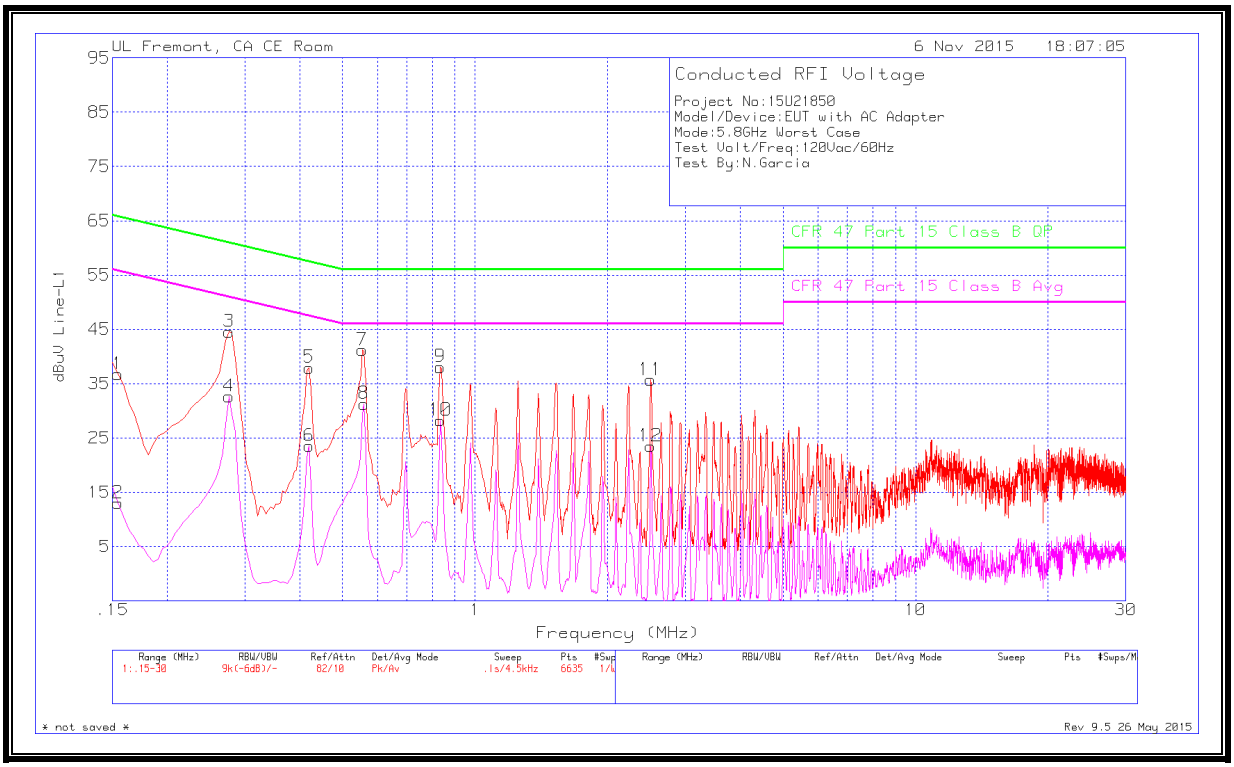
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

RESULTS

10.1. EUT POWERED BY AC/DC ADAPTER

LINE 1 RESULTS



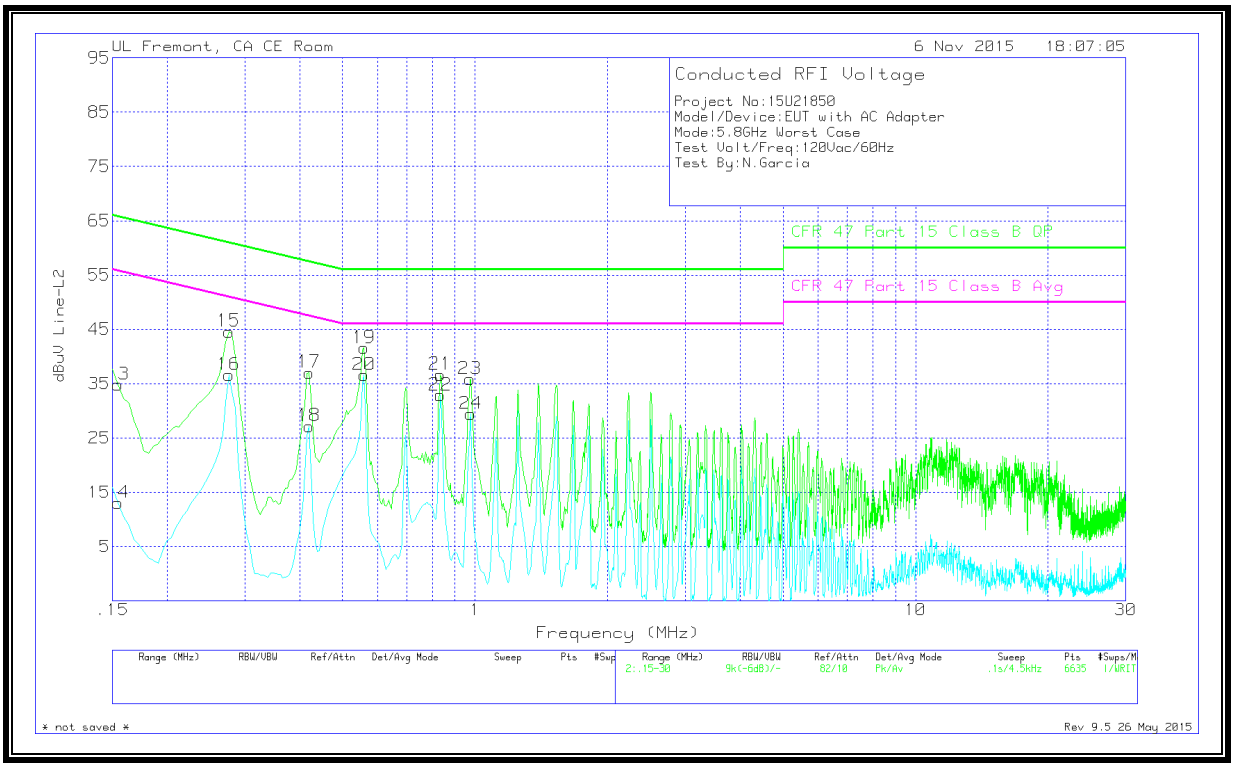
WORST EMISSIONS

Range 1: Line-L1 .15 - 30MHz

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	.1545	35.46	Pk	1.3	0	36.76	65.75	-28.99	-	-
2	.1545	11.71	Av	1.3	0	13.01	-	-	55.75	-42.74
3	.276	44	Pk	.6	0	44.6	60.94	-16.34	-	-
4	.276	32.05	Av	.6	0	32.65	-	-	50.94	-18.29
5	.42	37.55	Pk	.4	0	37.95	57.45	-19.5	-	-
6	.42	23.14	Av	.4	0	23.54	-	-	47.45	-23.91
7	.555	40.89	Pk	.3	0	41.19	56	-14.81	-	-
8	.5595	30.99	Av	.3	0	31.29	-	-	46	-14.71
9	.834	37.78	Pk	.3	0	38.08	56	-17.92	-	-
10	.834	27.93	Av	.3	0	28.23	-	-	46	-17.77
11	2.5035	35.4	Pk	.2	.1	35.7	56	-20.3	-	-
12	2.5035	23.2	Av	.2	.1	23.5	-	-	46	-22.5

Pk - Peak detector
Av - Average detection

LINE 2 RESULTS



WORST EMISSIONS

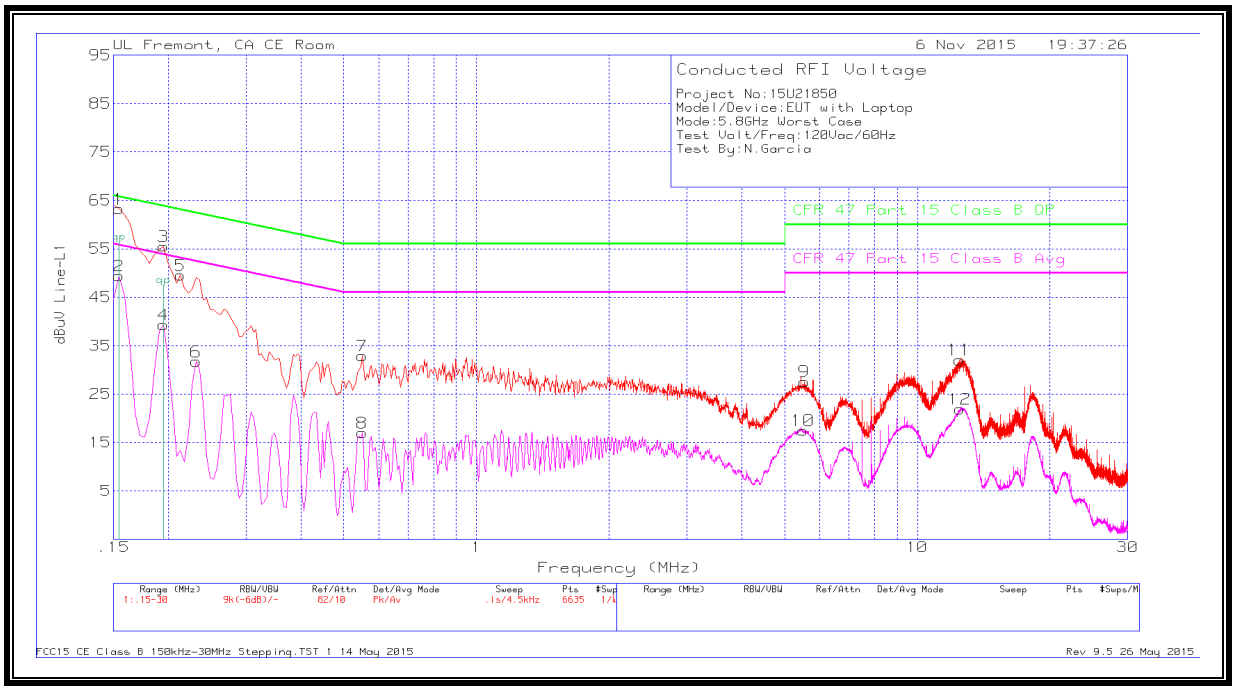
Range 2: Line-L2 .15 - 30MHz

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)
13	.1545	33.45	Pk	1.4	0	34.85	65.75	-30.9	-	-
14	.1545	11.64	Av	1.4	0	13.04	-	-	55.75	-42.71
15	.276	43.91	Pk	.7	0	44.61	60.94	-16.33	-	-
16	.276	35.95	Av	.7	0	36.65	-	-	50.94	-14.29
17	.42	36.65	Pk	.4	0	37.05	57.45	-20.4	-	-
18	.42	26.79	Av	.4	0	27.19	-	-	47.45	-20.26
19	.5595	41.29	Pk	.3	0	41.59	56	-14.41	-	-
20	.5595	36.3	Av	.3	0	36.6	-	-	46	-9.4
21	.834	36.37	Pk	.3	0	36.67	56	-19.33	-	-
22	.834	32.58	Av	.3	0	32.88	-	-	46	-13.12
23	.9735	35.45	Pk	.3	.1	35.85	56	-20.15	-	-
24	.978	29.06	Av	.3	.1	29.46	-	-	46	-16.54

Pk - Peak detector
Av - Average detection

10.2. EUT POWERED BY HOST PC VIA USB CABLE

LINE 1 RESULTS



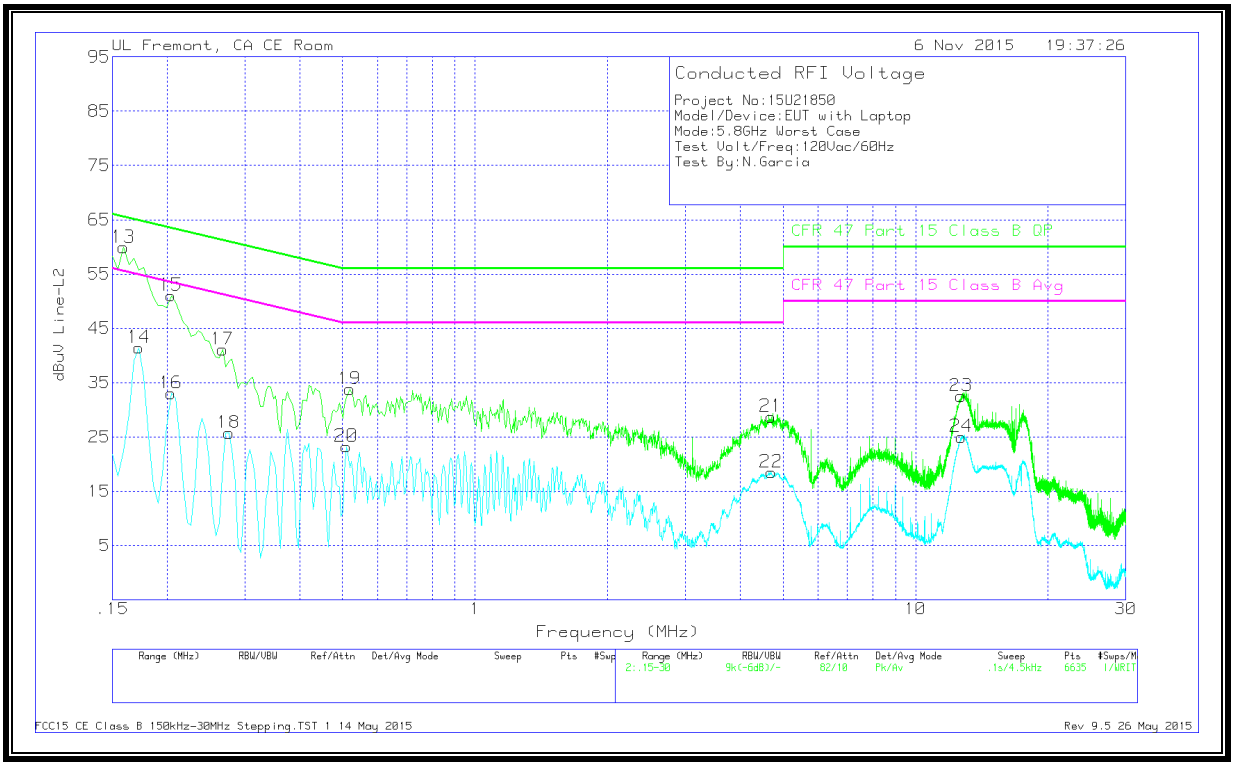
WORST EMISSIONS

Range 1: Line-L1 .15 - 30MHz

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	.1545	61.93	Pk	1.3	0	63.23	65.75	-2.52	-	-
	.1545	55.09	Qp	1.3	0	56.39	65.75	-9.36	-	-
2	.1545	48.11	Av	1.3	0	49.41	-	-	55.75	-6.34
3	.195	54.51	Pk	1	0	55.51	63.82	-8.31	-	-
4	.195	38.31	Av	1	0	39.31	-	-	53.82	-14.51
5	.213	48.62	Pk	.9	0	49.52	63.09	-13.57	-	-
6	.231	30.93	Av	.8	0	31.73	-	-	52.41	-20.68
7	.5505	32.59	Pk	.3	0	32.89	56	-23.11	-	-
8	.5505	16.69	Av	.3	0	16.99	-	-	46	-29.01
9	5.5365	27.27	Pk	.2	.1	27.57	60	-32.43	-	-
10	5.5005	17.19	Av	.2	.1	17.49	-	-	50	-32.51
11	12.444	31.66	Pk	.2	.2	32.06	60	-27.94	-	-
12	12.48	21.53	Av	.2	.2	21.93	-	-	50	-28.07

Pk - Peak detector
Av - Average detection
Qp - Quasi-Peak detector

LINE 2 RESULTS



WORST EMISSIONS

Range 2: Line-L2 .15 - 30MHz

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)
13	.159	58.5	Pk	1.4	0	59.9	65.52	-5.62	-	-
14	.1725	40.22	Av	1.2	0	41.42	-	-	54.84	-13.42
15	.204	50.03	Pk	1	0	51.03	63.45	-12.42	-	-
16	.204	32.04	Av	1	0	33.04	-	-	53.45	-20.41
17	.267	40.43	Pk	.7	0	41.13	61.21	-20.08	-	-
18	.276	25.06	Av	.7	0	25.76	-	-	50.94	-25.18
19	.519	33.41	Pk	.4	0	33.81	56	-22.19	-	-
20	.51	22.85	Av	.4	0	23.25	-	-	46	-22.75
21	4.6995	28.43	Pk	.2	.1	28.73	56	-27.27	-	-
22	4.704	18.2	Av	.2	.1	18.5	-	-	46	-27.5
23	12.6915	32.15	Pk	.2	.2	32.55	60	-27.45	-	-
24	12.705	24.61	Av	.2	.2	25.01	-	-	50	-24.99

Pk - Peak detector
Av - Average detection