FCC 47 CFR PART 15 SUBPART E

CLASS II PERMISSIVE CHANGE

FOR

802.11a/b/g/n/ac WLAN + BLUETOOTH PCI-E MINI CARD

MODEL NUMBER: BCM94352Z

FCC ID: QDS-BRCM1076

REPORT NUMBER: 15U22567–E1V3

ISSUE DATE: JANUARY 20, 2016

Prepared for
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	1/7/16	Initial Issue	H. Mustapha
V2	1/19/16	Updated section 6 with equipment list from original report Added Note 2 to sections 8.2.1 and 8.3.1 Updated section 9.1 with the test procedure	H. Mustapha
V3	1/20/16	Updated section 5.7 with justification statement regarding antenna port tests	H. Mustapha

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: BROADCOM CORPORATION
190 MATHILDA PLACE
SUNNYVALE, CA 94086, U.S.A.

EUT DESCRIPTION: 802.11a/b/g/n/ac WLAN + Bluetooth PCI-E Mini Card

MODEL: BCM94352Z

SERIAL NUMBER: SN145

DATE TESTED: January 5 ~ 7, 2016
May 22 ~ 31, 2013

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

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

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

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PROGRAM MANAGER
UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, FCC 06-96, FCC KDB 789033 D02 v01, KDB 662911 D01 v02r01 and 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

4.3. 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%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11 a/b/g/n/ac WLAN + Bluetooth PCI-E Mini Card.

The radio module is manufactured by Broadcom.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

Frequency Range (MHz)	Mode	Power, Chain 0 (dBm)	Power, Chain 1 (dBm)	Output Power (dBm)	Output Power (mW)
5.8 GHz band, 1TX					
5745-5825	802.11a Legacy	20.15	N/A	20.15	103.51
5745-5825	802.11n HT20	20.22	N/A	20.22	105.20
5755-5795	802.11n HT40	20.03	N/A	20.03	100.69
5775	802.11ac VHT80	15.13	N/A	15.13	32.58
5.8 GHz band, 2TX					
5745-5825	802.11n HT20 CDD	19.98	19.87	22.94	196.59
5755-5795	802.11n HT40 CDD	18.77	18.33	21.57	143.41
5775	802.11ac VHT80 CDD	13.65	13.51	16.59	45.61

5.3. LIST OF TEST REDUCTION AND MODES COVERING OTHER MODES

List of test reduction (Non Beam-Forming modes)

Antenna Port Testing		
Band	**Mode**	**Covered by**
5 GHz bands	802.11a Legacy 1TX	802.11n HT20 CDD 2TX
5 GHz bands	802.11a CDD 2TX	802.11n HT20 CDD 2TX
5 GHz bands	802.11n HT20 CDD 1TX	802.11n HT20 CDD 2TX
5 GHz bands	802.11n HT40 1TX	802.11n HT40 CDD 2TX
5 GHz bands	802.11ac VHT80 1TX	802.11ac VHT80 CDD 2TX

Radiated Testing		
Band	**Mode**	**Covered by**
5 GHz bands	802.11a Legacy 1TX (Harmonics)	802.11n HT20 CDD 2TX (Harmonics)
5 GHz bands	802.11a CDD 2TX	802.11n HT20 CDD 2TX
5 GHz bands	802.11n HT20 CDD 1TX (Harmonics)	802.11n HT20 CDD 2TX (Harmonics)
5 GHz bands	802.11n HT40 1TX (Harmonics)	802.11n HT40 CDD 2TX (Harmonics)
5 GHz bands	802.11ac VHT80 1TX (Harmonics)	802.11ac VHT80 CDD 2TX (Harmonics)

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

Set No.	Antenna Manufacturer	Antenna Type	Model	Peak gain (2400 - 2462 MHz) @2462MHz	Peak gain (5150-5250MHz) @5180MHz	Peak gain (5250-5350MHz) @5320MHz	Peak gain (5470-5725MHz) @5580	Peak gain (5725-5850MHz) @5745MHz
1	Ethertronics	802.11bgn WLAN Antenna	1000802	3.8	N/a	N/a	N/a	N/a
1	Ethertronics	802.11bgn WLAN Antenna	1000802	3.8	N/a	N/a	N/a	N/a
2	Ethertronics	802.11 5 GHz WLAN antenna	1000615a	N/a	4.2	4.5	6.6	5.4
2	Ethertronics	802.11 5 GHz WLAN antenna	1000615a	N/a	4.2	4.5	6.6	5.4

Note:

This table includes two sets of antennas, first set is identified by number (1) in the first column, and the second set is identified by number (2) in the first column.

5.5. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Broadcom, rev. 6.30.223.98.

The test utility software used during testing was BCM Internal, rev. 6.30.RC223.98.

5.6. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

The purpose of this C2PC is to upgrade the device described under section 5.1 of this report to the new rules per KDB 789033 D02 v01.

All data in this report is for operation in the UNII-3 band.

For UNII-1, UNII-2 and UNII-2C bands, we have reviewed the original test report for (report no. 13U15029-2B) and are hereby attesting that all the current technical requirements are still met and all applicable test procedures remain the same. Therefore, the original test report is still applicable and no additional testing is done.

5.7. WORST-CASE CONFIGURATION AND MODE

The EUT was tested as an external module installed in a test jig board connected to a host Laptop PC.

Worst-Case data rates, as provided by the client, were as follows:

For 5.8 GHz Band:
802.11a: 6 Mb/s.
802.11n 20MHz: MCS0.
802.11n 40MHz: MCS0.
802.11ac VHT80MHz: MCS0.

Worst-case mode and channel used for 30-1000 MHz radiated and power line conducted emissions was the mode and channel with the highest output power.

For Radiated Band Edge measurements, preliminary testing showed that the worst case was horizontal polarization, so final measurements were performed with horizontal polarization only.

For all modes with single chain, chain 0 (connector J0, Main port) was selected per the software provided by the client.

For antenna port testing, 2TX modes were considered worst case, where testing was performed at power levels, per transmit chain, greater than or equal to the maximum power in any 1TX mode.

5.8. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Lenovo	G560	CB06427441	DoC
AC Adapter	Lenovo	PA-1650-56LC	11S36001651ZZ40008KCMA	DoC
Adapter Board	Broadcom	BCM9NGFF2EC_1	1822863	N/A

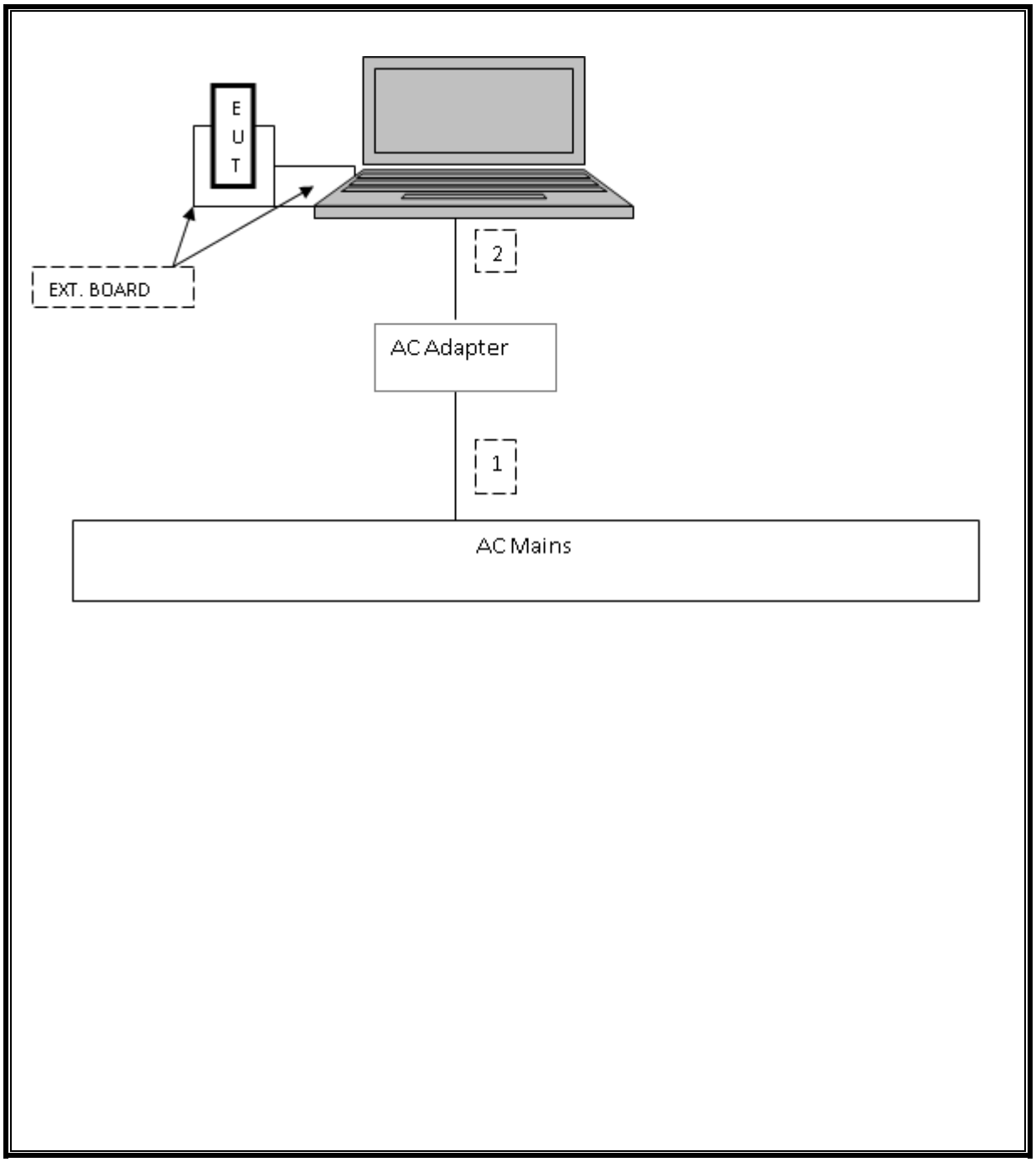
I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC	2	US 115V	Unshielded	1	NA
2	DC	2	DC	Unshielded	1.8	Ferrite at laptop's end

TEST SETUP

The EUT is attached to a jig board which is installed in the PCI-E slot of a host laptop computer during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment List					
Description	Manufacturer	Model	T No.	Cal Date	Cal Due
Radiated Software	UL	UL EMC	Ver 9.5, June 6, 2015		
Conducted Software	UL	UL EMC	Ver 9.5, May 17 2012		
Horn Antenna 1-18GHz	ETS	3117	136	01/15/15	01/15/16
Horn Antenna 18-26GHz	ARA	MWH-1826	447	05/12/15	05/12/16
Horn Antenna 26.5- 40GHz	ARA	MWH-2640/B	90	07/28/15	07/28/16
Preamp 10kHz-1000MHz	HP	8447D	10	01/16/15	01/16/16
Preamp 1-8GHz	Miteq	AMF-4D-01000800-30-29P	782	10/22/15	10/22/16
Preamp 1-26.5GHz	Agilent	8449B	404	04/13/15	04/13/16
Amplifier, 26-40GHz	Miteq	NSP4000-SP2	88	04/07/15	04/07/16
Spectrum Analyzer 3kHz - 44GHz	Agilent	N9030A	907	05/15/15	05/15/16
3GHz HPF	Micro-Tronics	HPM17543	485	01/16/15	01/16/16
5GHz LPF	Micro-Tronics	LPS17541	482	01/16/15	01/16/16
6GHz HPF	Micro-Tronics	HPS17542	483	01/16/15	01/16/16
EMI Test Receiver	Rohde & Schwarz	ECSI 7	1124	09/30/15	09/30/16
Power Meter	Agilent	N1911A	T1268	06/07/15	06/07/16
Power Sensor	Agilent	N1921A	1223	06/07/15	02/06/16
LISN for Conducted Emission	FCC	50/250-25-2	24	01/16/15	01/16/16

Equipment list from original report 13U15029-2B

Test Equipment List					
Description	Manufacturer	Model	Asset	Cal Date	Cal Due
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	12/13/11	12/13/13
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00986	04/01/13	04/01/14
EMI Test Receiver, 9 kHz-7 GHz	R & S	ESCI 7	1000741	07/13/12	07/06/13
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	08/08/12	08/08/13
Peak Power Meter	Agilent / HP	E4416A	C00963	12/13/11	12/13/13
Peak / Average Power Sensor	Agilent / HP	E9327A	C00964	12/13/11	12/13/13
Antenna, Horn, 18 GHz	ETS	3117	C01022	02/21/13	02/21/14
Antenna, Horn, 26.5 GHz	ARA	MWH-1826/B	C00946	11/12/12	11/12/13
Antenna, Horn, 40 GHz *	ARA	MWH-2640/B	C00981	06/14/12	06/14/13
Antenna, Horn, 40GHz	ARA	MWH-2640/B	F00194	05/14/13	05/14/14
Antenna, Bilog, 30MHz-1 GHz	Sunol Sciences	JB1	C00885	08/14/12	08/14/13
Preamplifier, 1300 MHz	Agilent / HP	8447D	C01016	01/16/13	01/16/14
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	10/22/12	10/22/13
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	08/02/11	08/02/13
LISN, 30 MHz	FCC	50/250-25-2	N02396	08/08/12	08/08/13
Reject Filter, 5.15-5.35 GHz	Micro-Tronics	BRC13190	N02680	CNR	CNR
Reject Filter, 5.47-5.725 GHz	Micro-Tronics	BRC13191	N02678	CNR	CNR
Reject Filter, 5.725-5.825 GHz	Micro-Tronics	BRC13192	N02676	CNR	CNR

* Equipment not used after 6/14/2013

7. MEASUREMENT METHODS

On Time and Duty Cycle: KDB 789033 D02 v01, Section B.

6 dB Emission BW: KDB 789033 D02 v01, Section C.2.

Conducted Output Power: KDB 789033 D02 v01, Section E.3.b (Method PM-G), and KDB 662911 D01 v02r01.

Power Spectral Density: KDB 789033 D02 v01, Section F, and KDB 662911 D01 v02r01.

Unwanted emissions in restricted bands: KDB 789033 D02 v01, Sections G.2, G.3, G.4, G.5, and G.6.

Unwanted emissions in non-restricted bands: KDB 789033 D02 v01, Sections G.2, G.3, G.4, and G.5.

AC Power-line conducted emissions: ANSI C63.10-2013, Section 6.2.

8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
5GHz Band						
802.11a 1TX	2.064	2.082	0.991	99.14%	0.00	0.010
802.11n HT20 CDD 2TX	1.920	1.938	0.991	99.07%	0.00	0.010
802.11n HT40 CDD 2TX	0.942	0.960	0.981	98.13%	0.00	0.010
802.11ac VHT80 CDD 2TX	0.460	0.477	0.964	96.44%	0.16	2.174

DUTY CYCLE PLOTS

DUTY CYCLE 802.11a MODE

DUTY CYCLE 802.11n HT20 CDD MODE

DUTY CYCLE 802.11n HT40 CDD MODE

DUTY CYCLE 802.11ac HT80 CDD MODE

8.2. 802.11a SISO MODE IN THE 5.8 GHz BAND

8.2.1. 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.

DIRECTIONAL ANTENNA GAIN

This is SISO mode, AG is the highest (worst-case) = 5.4 dBi

RESULTS

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Power Limit (dBm)
Low	5745	5.40	30.00
153	5765	5.40	30.00
High	5825	5.40	30.00

Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5745	19.03	19.03	30.00	-10.97
153	5765	20.11	20.11	30.00	-9.89
High	5825	20.15	20.15	30.00	-9.85

Note 1: the power readings above were measured with gated method, and the measurement was taken only during the ON time. No duty cycle correction was necessary.

Note 2: Mid channel was not tested as it was considered covered by testing 11n HT20 2Tx (CDD).

8.3. 802.11n HT20 CDD SISO MODE IN THE 5.8 GHz BAND

8.3.1. 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.

DIRECTIONAL ANTENNA GAIN

This is SISO mode, AG is the highest (worst-case) = 5.4 dBi

RESULTS

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Power Limit (dBm)
Low	5745	5.40	30.00
High	5825	5.40	30.00

Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5745	17.53	17.53	30.00	-12.47
High	5825	20.22	20.22	30.00	-9.78

Note 1: the power readings above were measured with gated method, and the measurement was taken only during the ON time. No duty cycle correction was necessary.

Note 2: Mid channel was not tested as it was considered covered by testing 11n HT20 2Tx (CDD).

8.4. 802.11n HT20 CDD 2Tx MODE IN THE 5.8 GHz BAND

8.4.1. 6 dB BANDWIDTH

LIMITS

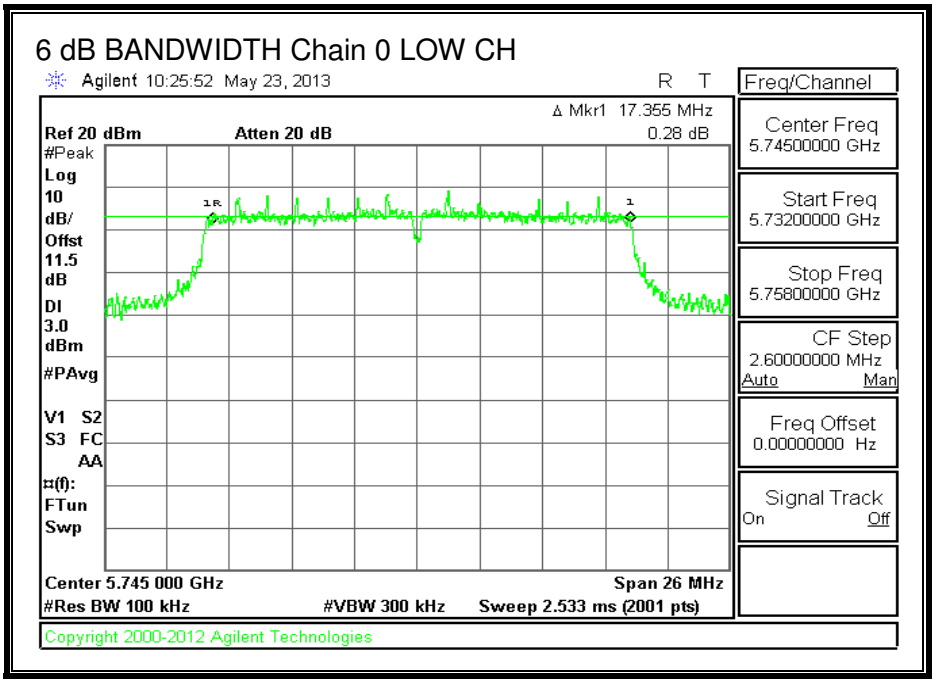
FCC §15.247 (a) (2)

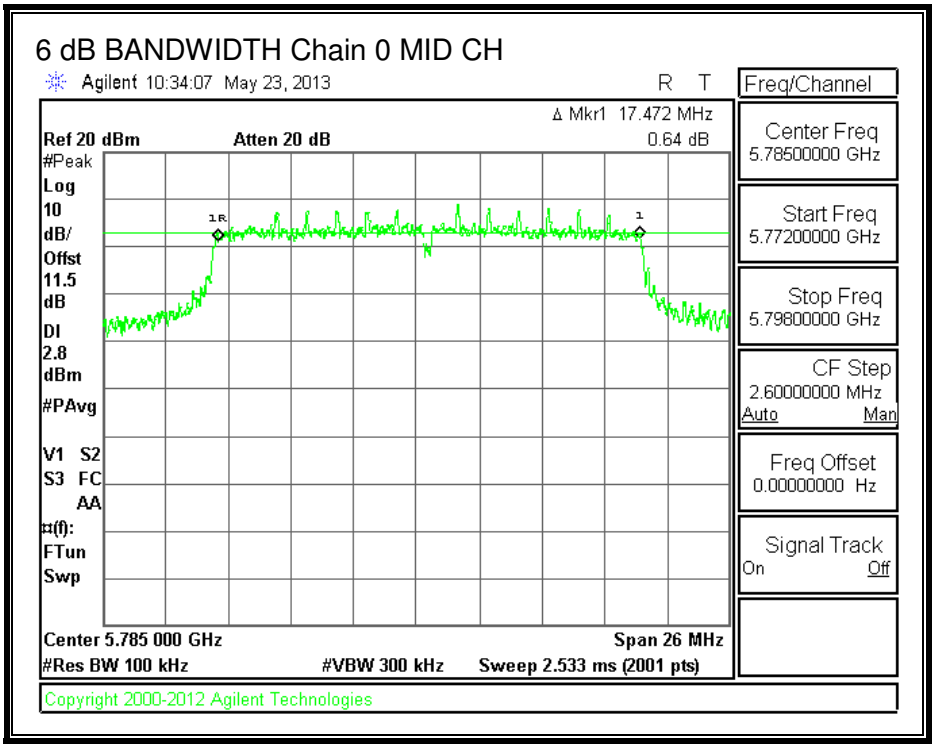
The minimum 6 dB bandwidth shall be at least 500 kHz.

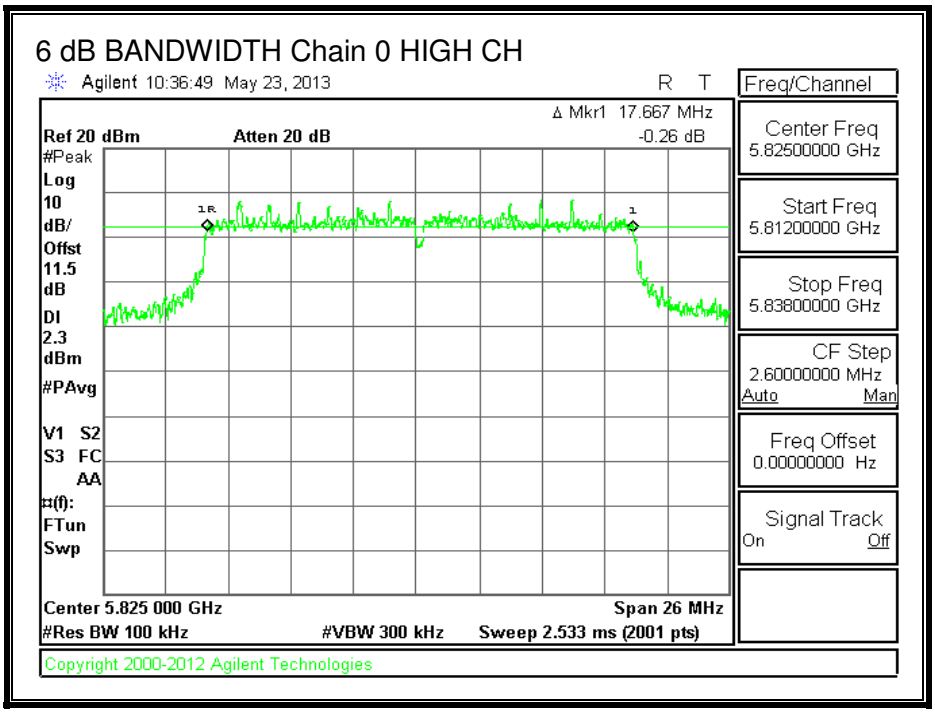
RESULTS

Channel	Frequency (MHz)	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	Minimum Limit (MHz)
Low	5745	17.355	17.628	0.5
Mid	5785	17.472	17.615	0.5
High	5825	17.667	17.381	0.5

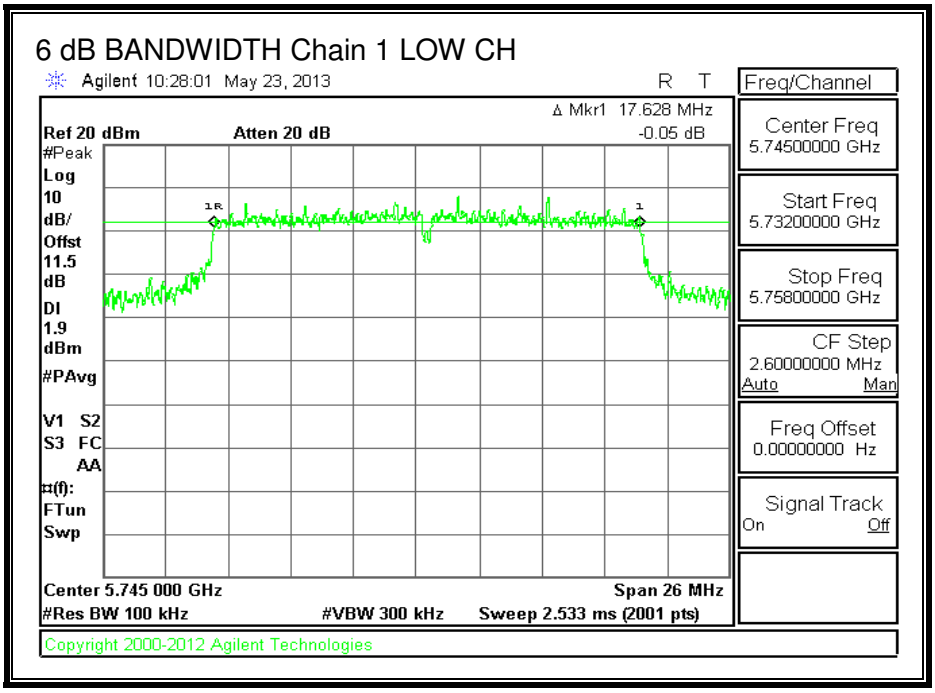
6 dB BANDWIDTH, Chain 0

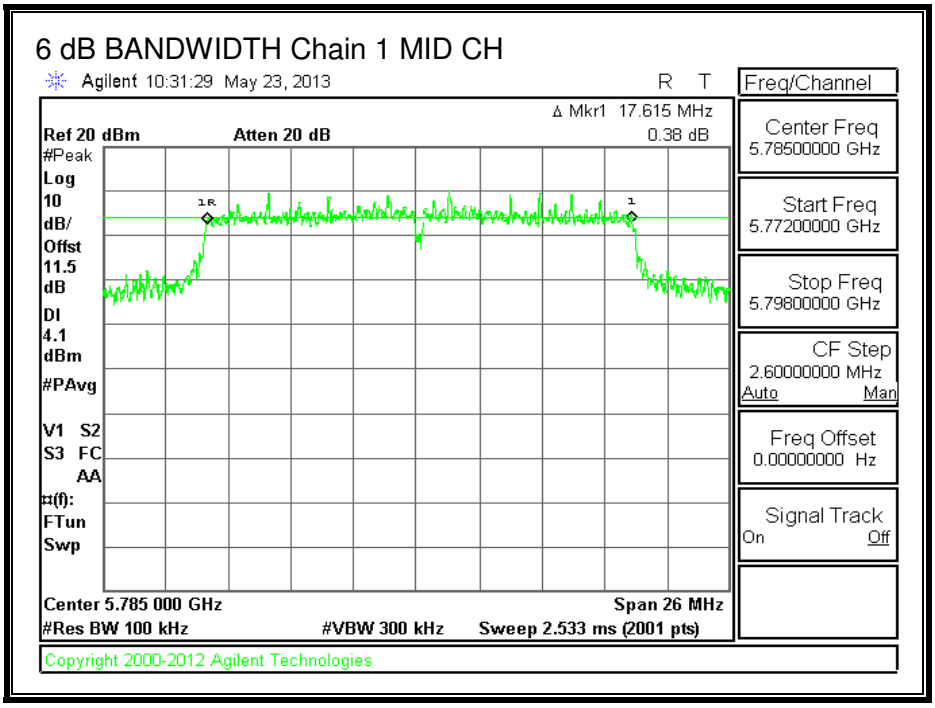


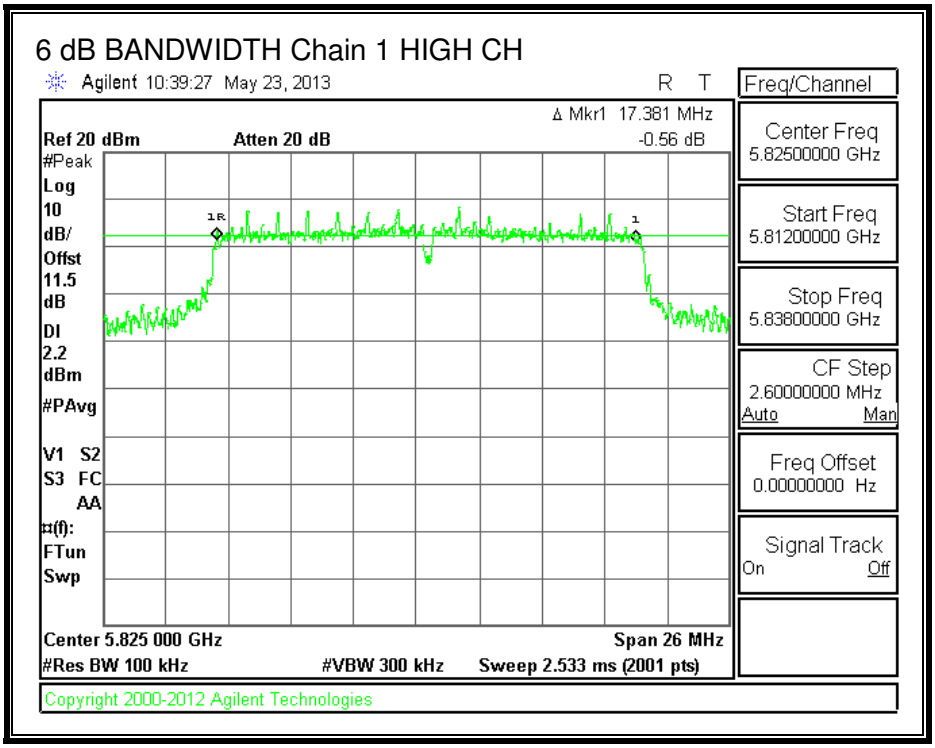




6 dB BANDWIDTH, Chain 1







8.4.2. 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.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is the same for each chain. The directional gain is equal to the antenna gain, 5.4 dBi

RESULTS

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Power Limit (dBm)
Low	5745	5.40	30.00
153	5765	5.40	30.00
Mid	5785	5.40	30.00
High	5825	5.40	30.00

Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5745	15.62	15.74	18.69	30.00	-11.31
153	5765	19.83	19.86	22.86	30.00	-7.14
Mid	5785	19.98	19.87	22.94	30.00	-7.06
High	5825	19.02	18.66	21.85	30.00	-8.15

Note: the power readings above were measured with gated method, and the measurement was taken only during the ON time. No duty cycle correction was necessary.

8.4.3. Maximum Power Spectral Density (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

The TX chains are correlated and the antenna gain is the same for each chain. The directional gain is:

Antenna Gain (dBi)	10 * Log (2 chains) (dB)	Correlated Chains Directional Gain (dBi)
5.40	3.01	8.41

RESULTS

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	PSD Limit (dBm)
Low	5745	8.41	27.59
Mid	5785	8.41	27.59
High	5825	8.41	27.59

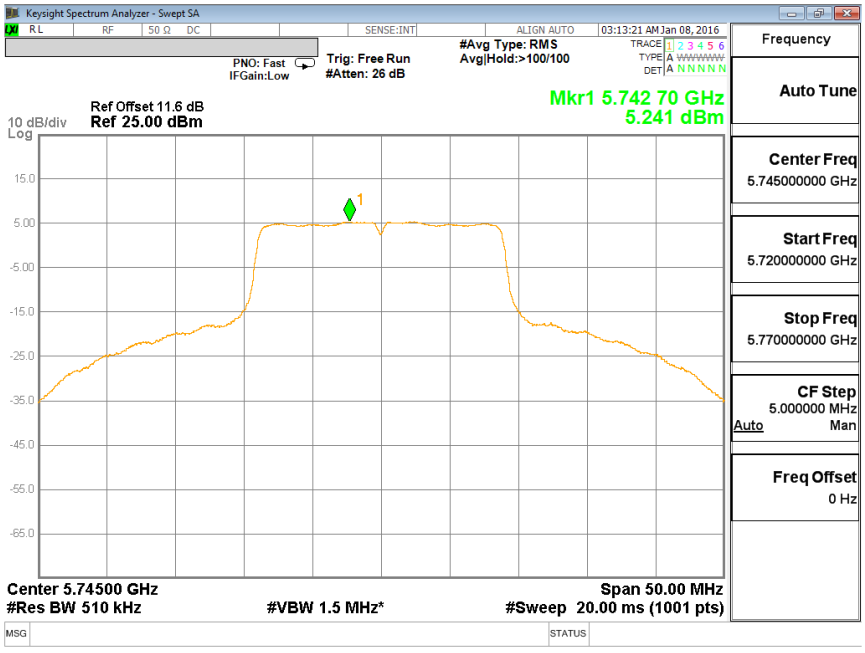
Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD

PSD Results

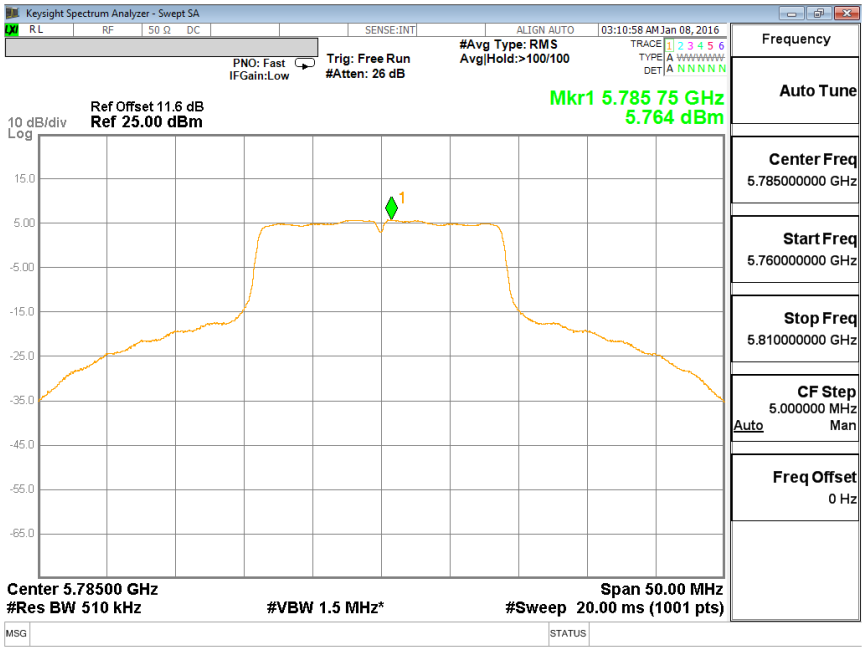
Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5745	5.241	5.134	8.198	27.59	-19.39
Mid	5785	5.764	5.374	8.584	27.59	-19.01
High	5825	5.791	5.396	8.608	27.59	-18.98

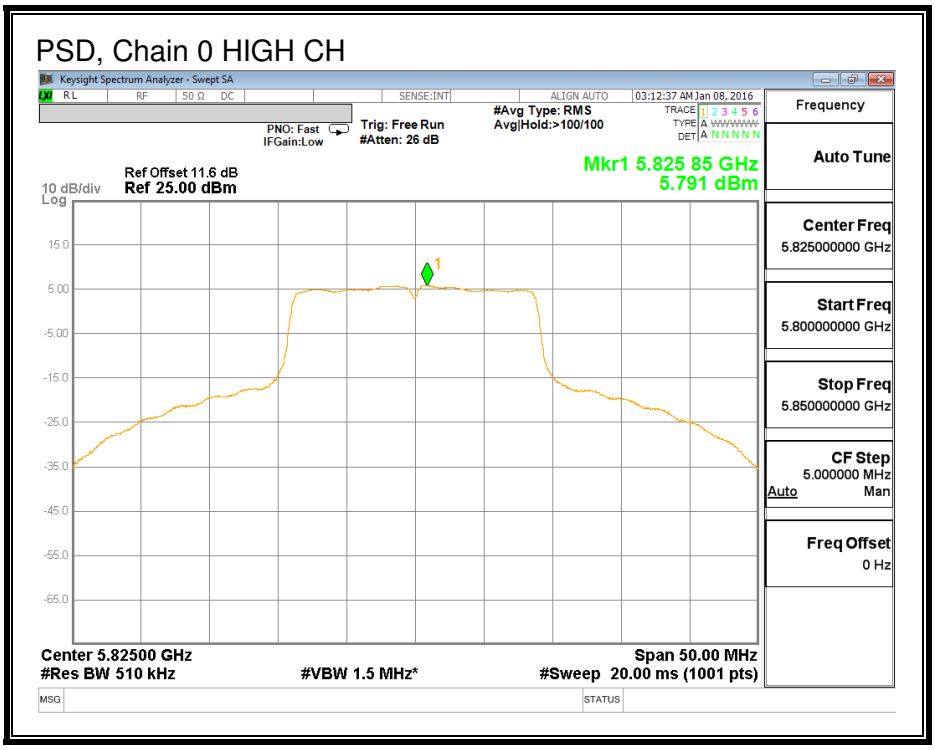
PSD, Chain 0

PSD, Chain 0 LOW CH

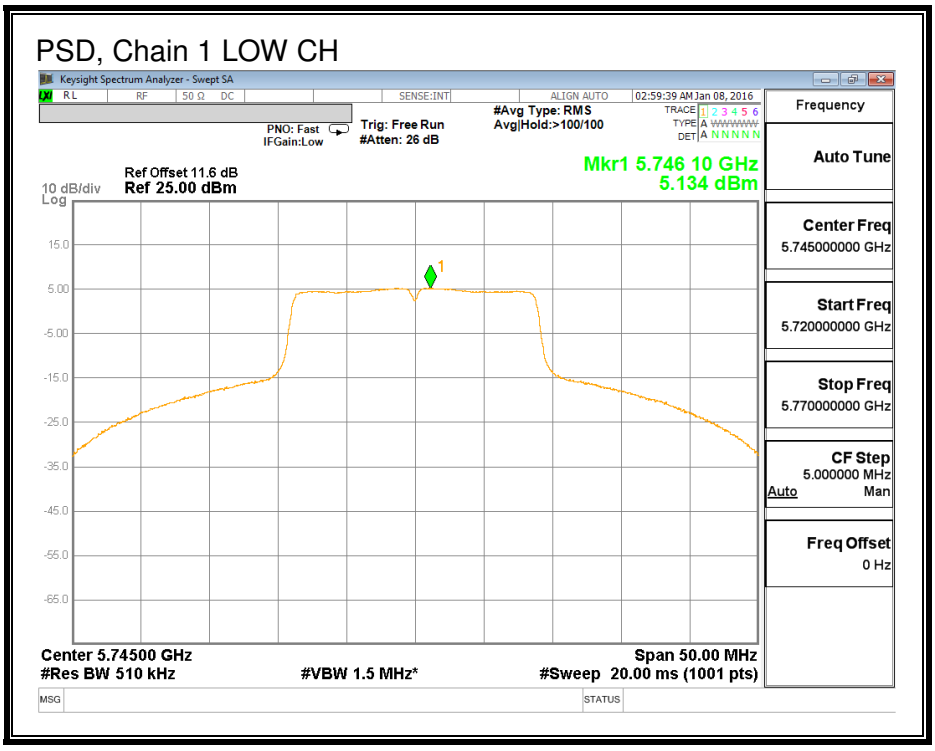


PSD, Chain 0 MID CH

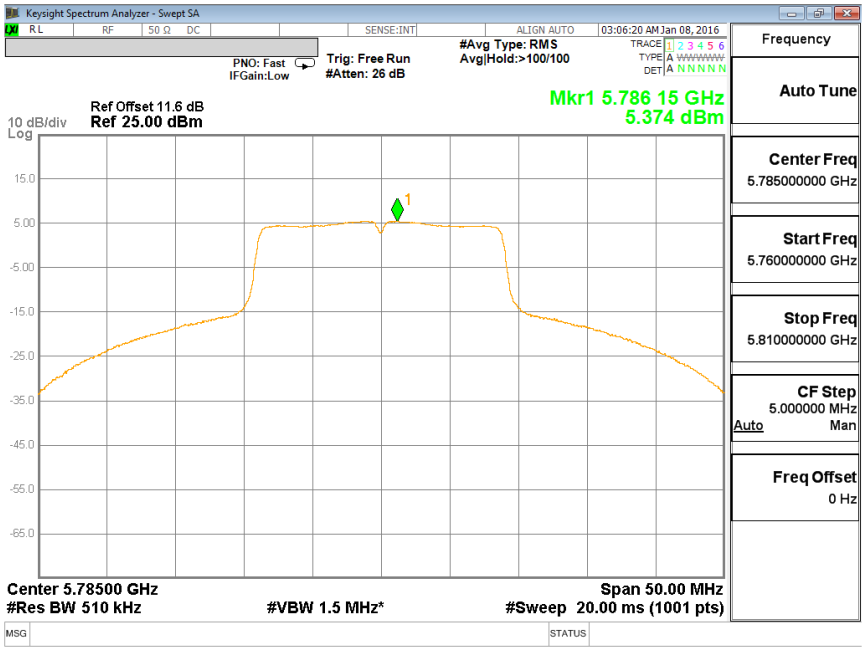




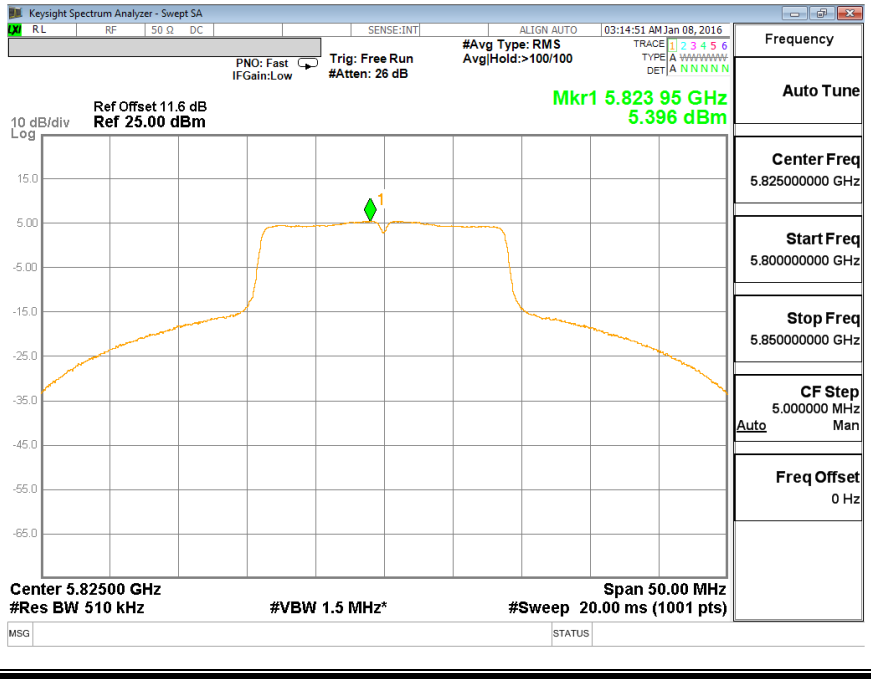
PSD, Chain 1



PSD, Chain 1 MID CH



PSD, Chain 1 HIGH CH



8.5. 802.11n HT40 SISO MODE IN THE 5.8 GHz BAND

8.5.1. 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.

DIRECTIONAL ANTENNA GAIN

This is SISO mode, AG is the highest (worst-case) = 5.4 dBi

RESULTS

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain (dBi)	Power Limit (dBm)
Low	5755	5.40	30.00
High	5795	5.40	30.00

Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5755	16.35	16.35	30.00	-13.65
High	5795	20.03	20.03	30.00	-9.97

Note: the power readings above were measured with gated method, and the measurement was taken only during the ON time. No duty cycle correction was necessary.

8.6. 802.11n HT40 CDD 2Tx MODE IN THE 5.8 GHz BAND

8.6.1. 6 dB BANDWIDTH

LIMITS

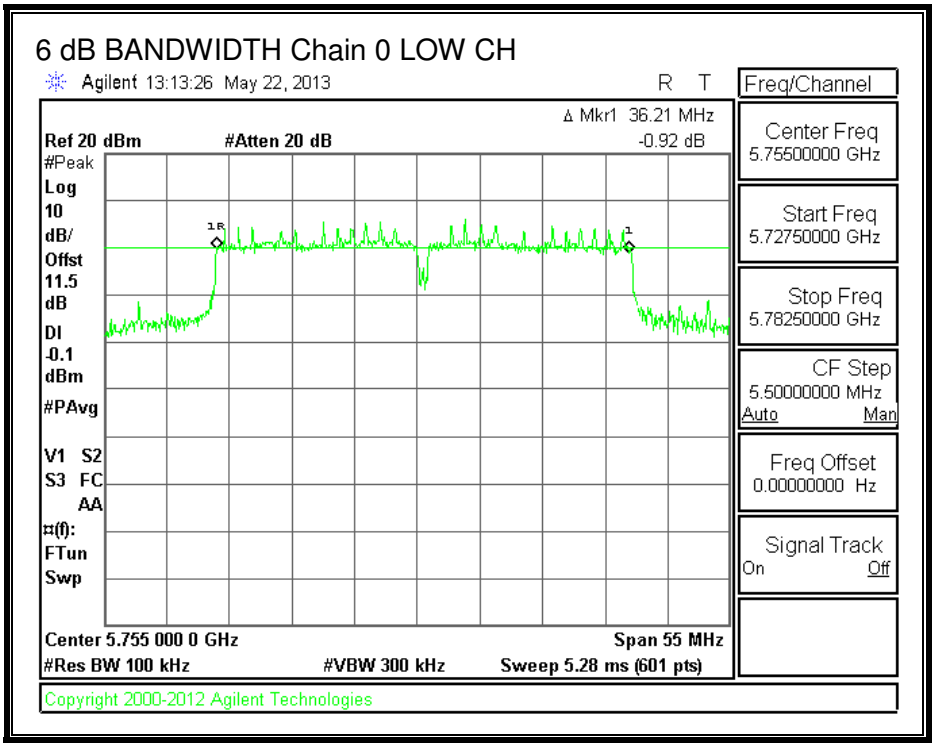
FCC §15.247 (a) (2)

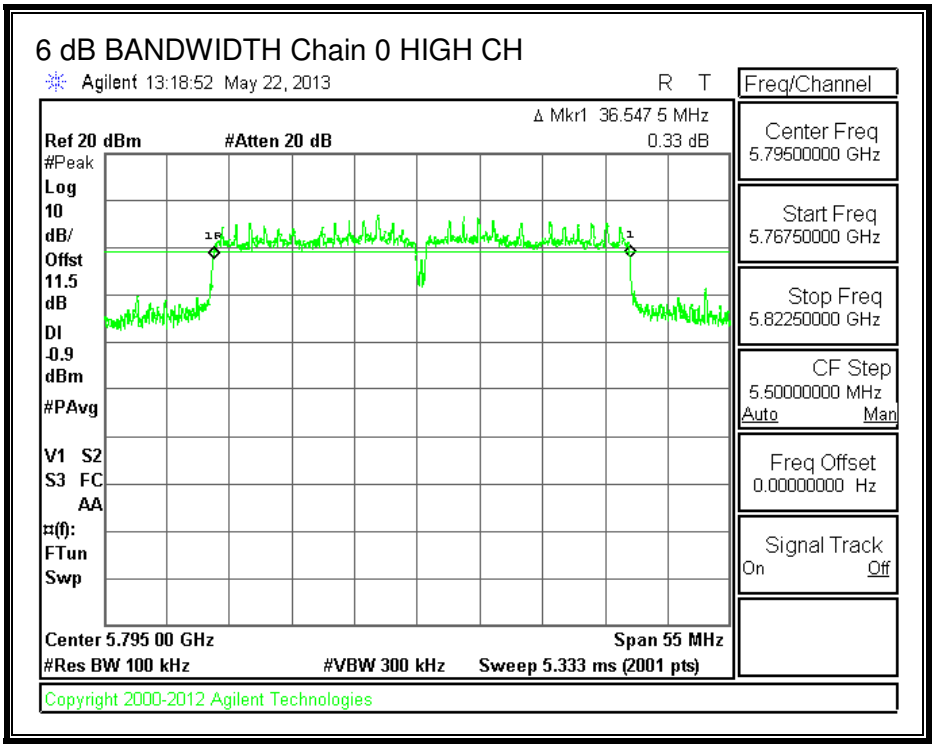
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

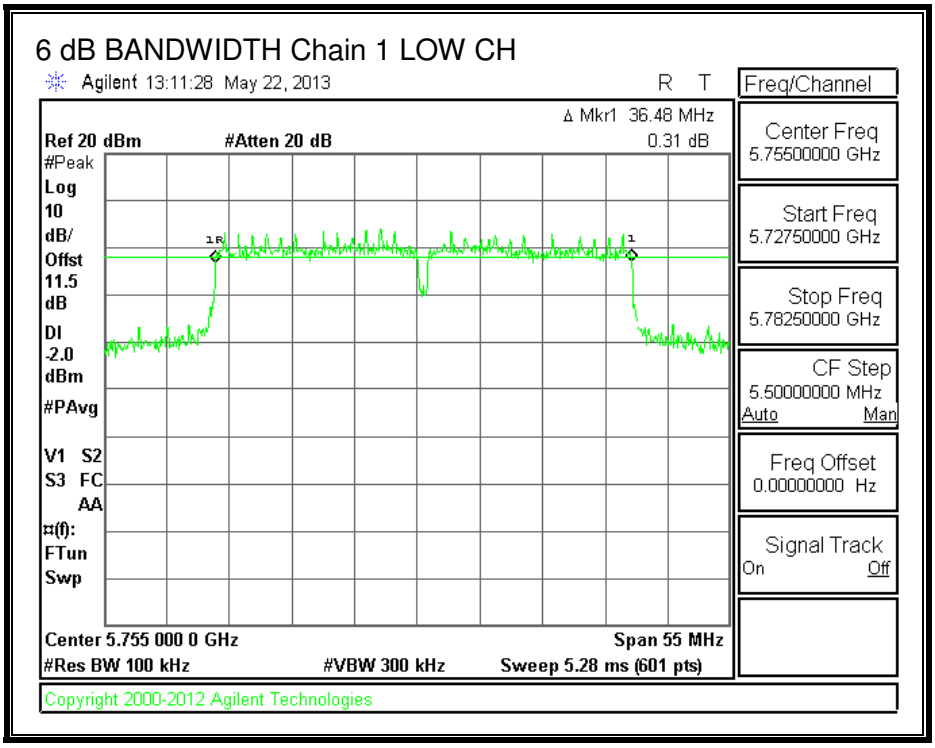
Channel	Frequency (MHz)	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	Minimum Limit (MHz)
Low	5755	36.210	36.480	0.5
High	5795	36.547	36.245	0.5

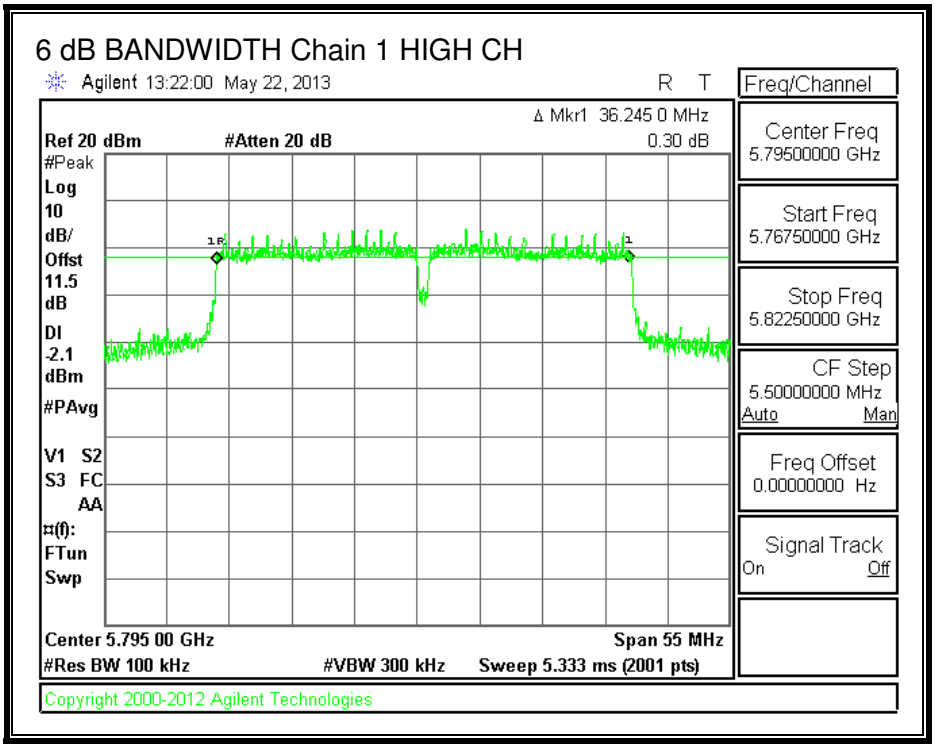
6 dB BANDWIDTH, Chain 0





6 dB BANDWIDTH, Chain 1





8.6.2. 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.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is the same for each chain. The directional gain is equal to the antenna gain, 5.4 dBi

RESULTS

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain (dBi)	Power Limit (dBm)
Low	5755	5.40	30.00
High	5795	5.40	30.00

Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5755	14.39	14.18	17.30	30.00	-12.70
High	5795	18.77	18.33	21.57	30.00	-8.43

Note: the power readings above were measured with gated method, and the measurement was taken only during the ON time. No duty cycle correction was necessary.

8.6.3. Maximum Power Spectral Density (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

The TX chains are correlated and the antenna gain is the same for each chain. The directional gain is:

Antenna Gain (dBi)	10 * Log (2 chains) (dB)	Correlated Chains Directional Gain (dBi)
5.40	3.01	8.41

RESULTS

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain (dBi)	PSD Limit (dBm)
Low	5755	8.41	27.59
High	5795	8.41	27.59

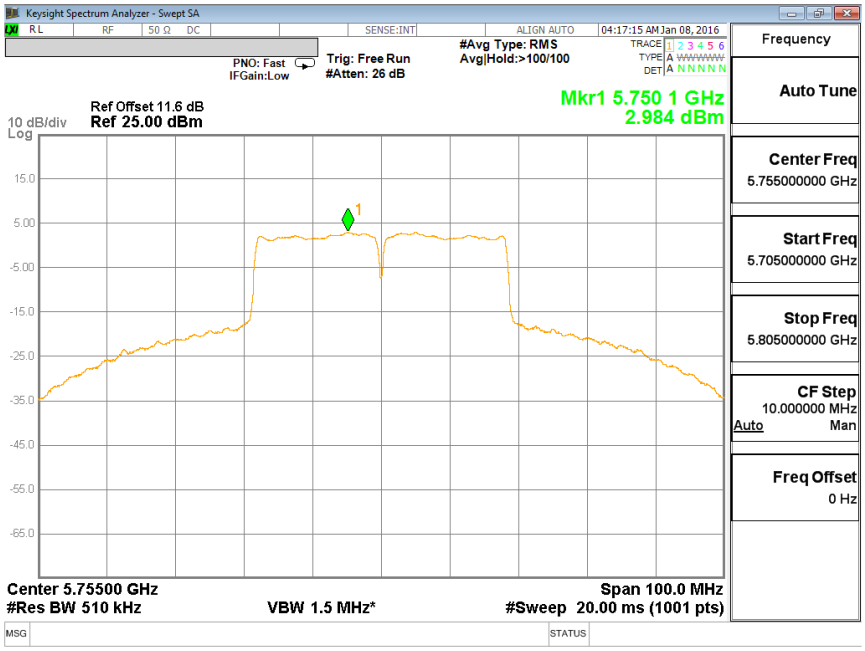
Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD

PSD Results

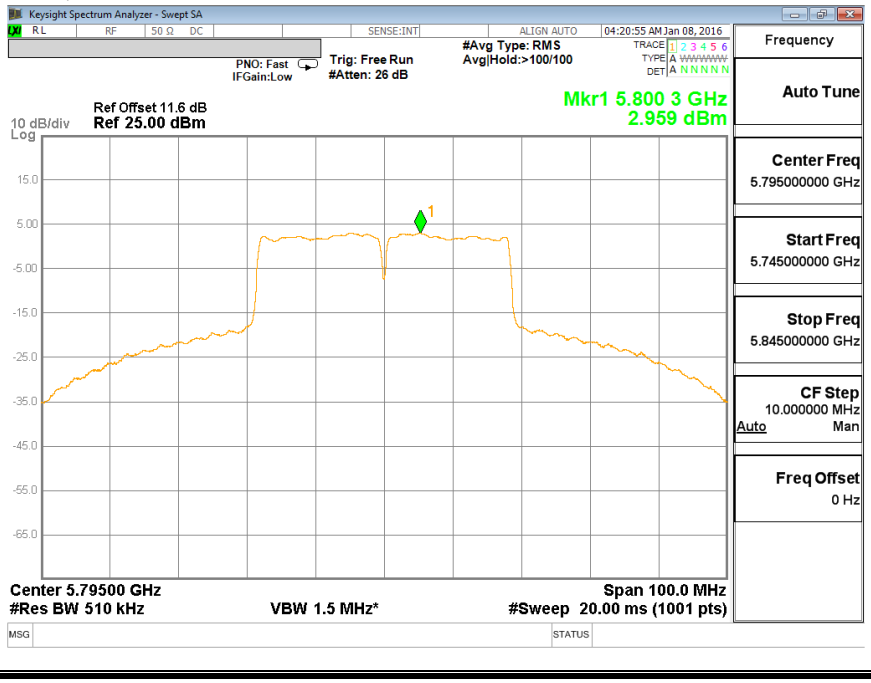
Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5755	2.984	2.743	5.875	27.59	-21.71
High	5795	2.959	3.194	6.088	27.59	-21.50

PSD, Chain 0

PSD, Chain 0 LOW CH

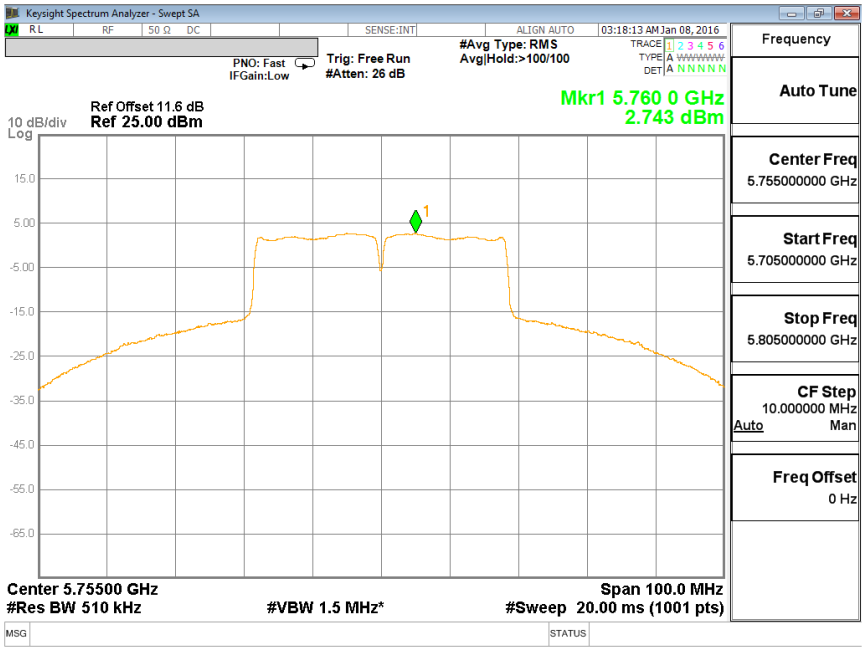


PSD, Chain 0 HIGH CH

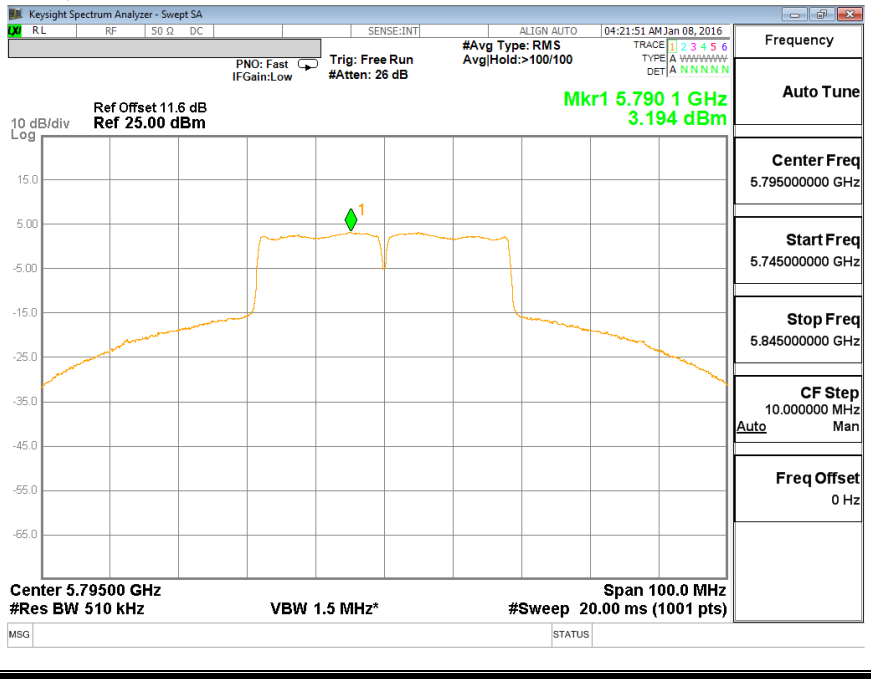


PSD, Chain 1

PSD, Chain 1 LOW CH



PSD, Chain 1 HIGH CH



8.7. 802.11ac HT80 SISO MODE IN THE 5.8 GHz BAND

8.7.1. 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.

DIRECTIONAL ANTENNA GAIN

This is SISO mode, AG is the highest (worst-case) = 5.4 dBi

RESULTS

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain (dBi)	Power Limit (dBm)
Mid	5775	5.40	30.00

Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Mid	5775	15.13	15.13	30.00	-14.87

Note: the power readings above were measured with gated method, and the measurement was taken only during the ON time. No duty cycle correction was necessary.

8.8. 802.11n HT80 CDD 2Tx MODE IN THE 5.8 GHz BAND

8.8.1. 6 dB BANDWIDTH

LIMITS

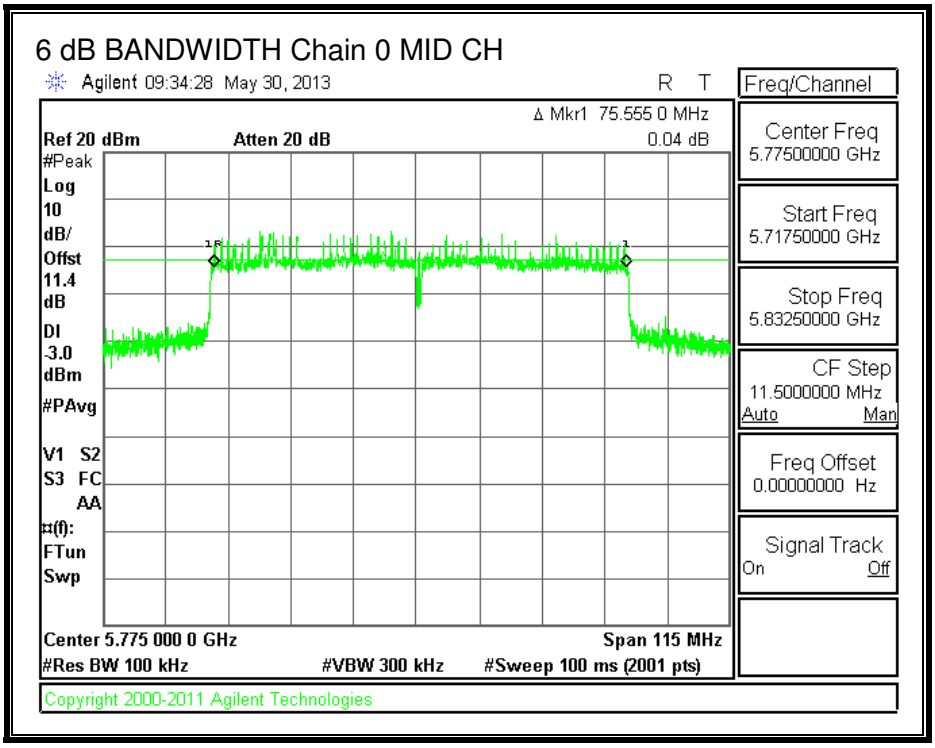
FCC §15.247 (a) (2)

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

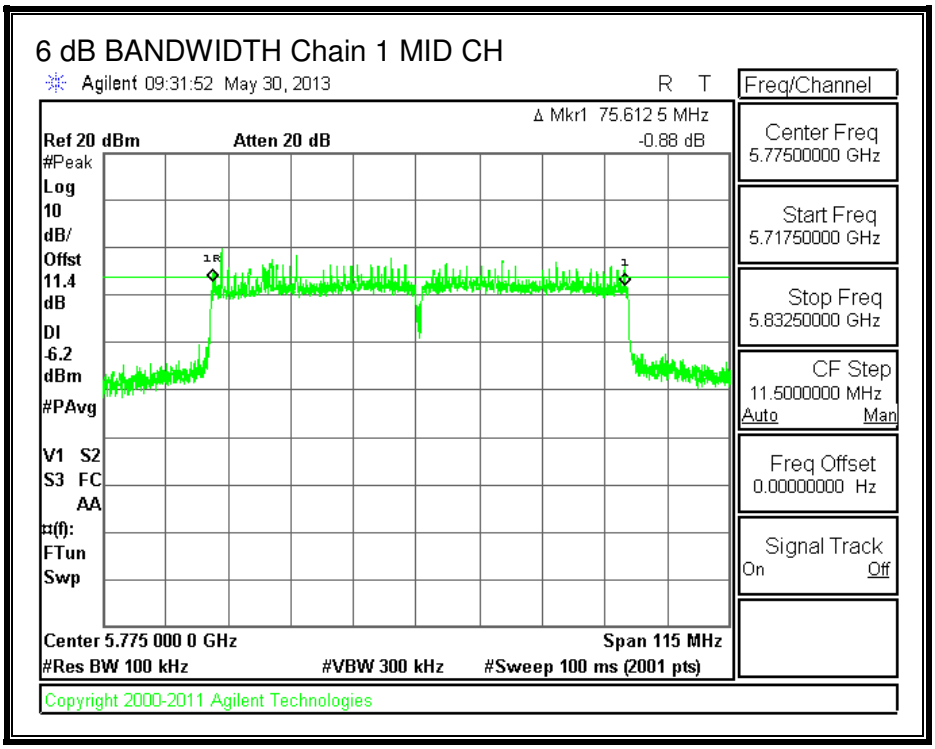
RESULTS

Channel	Frequency (MHz)	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	Minimum Limit (MHz)
Mid	5775	75.555	75.613	0.5

6 dB BANDWIDTH, Chain 0



6 dB BANDWIDTH, Chain 1



8.8.2. 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.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is the same for each chain. The directional gain is equal to the antenna gain, 5.4 dBi

RESULTS

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain (dBi)	Power Limit (dBm)
Low	5775	5.40	30.00

Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5775	13.65	13.51	16.59	30.00	-13.41

Note: the power readings above were measured with gated method, and the measurement was taken only during the ON time. No duty cycle correction was necessary.

8.8.3. Maximum Power Spectral Density (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

The TX chains are correlated and the antenna gain is the same for each chain. The directional gain is:

Antenna Gain (dBi)	10 * Log (2 chains) (dB)	Correlated Chains Directional Gain (dBi)
5.40	3.01	8.41

RESULTS

Antenna Gain and Limit

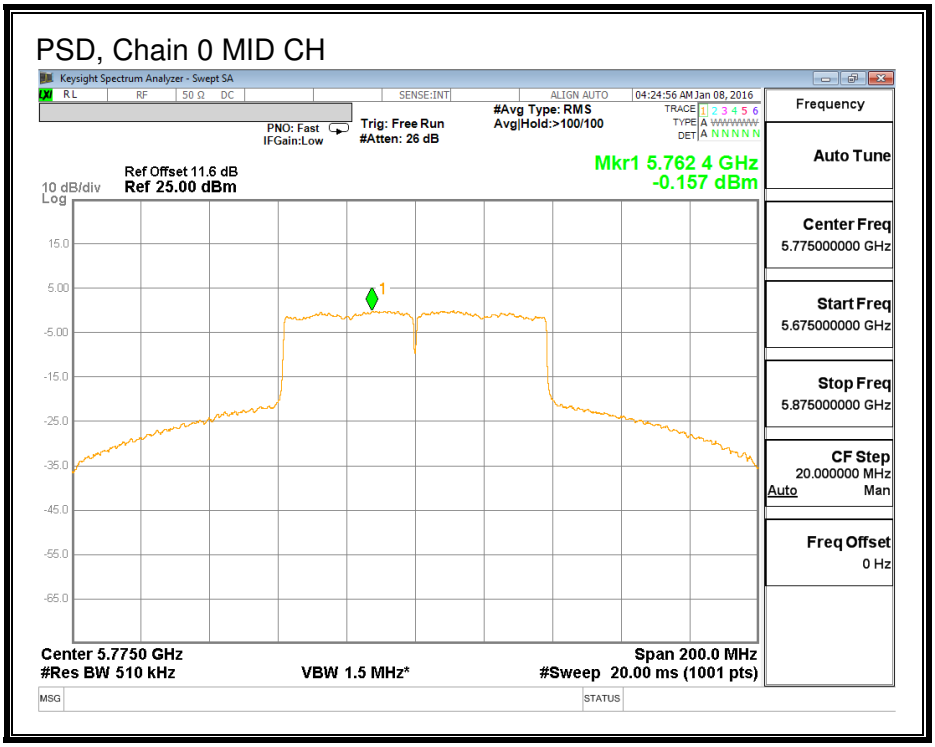
Channel	Frequency (MHz)	Directional Gain (dBi)	PSD Limit (dBm)
Mid	5755	8.41	27.59

Duty Cycle CF (dB)	0.16	Included in Calculations of Corr'd PSD

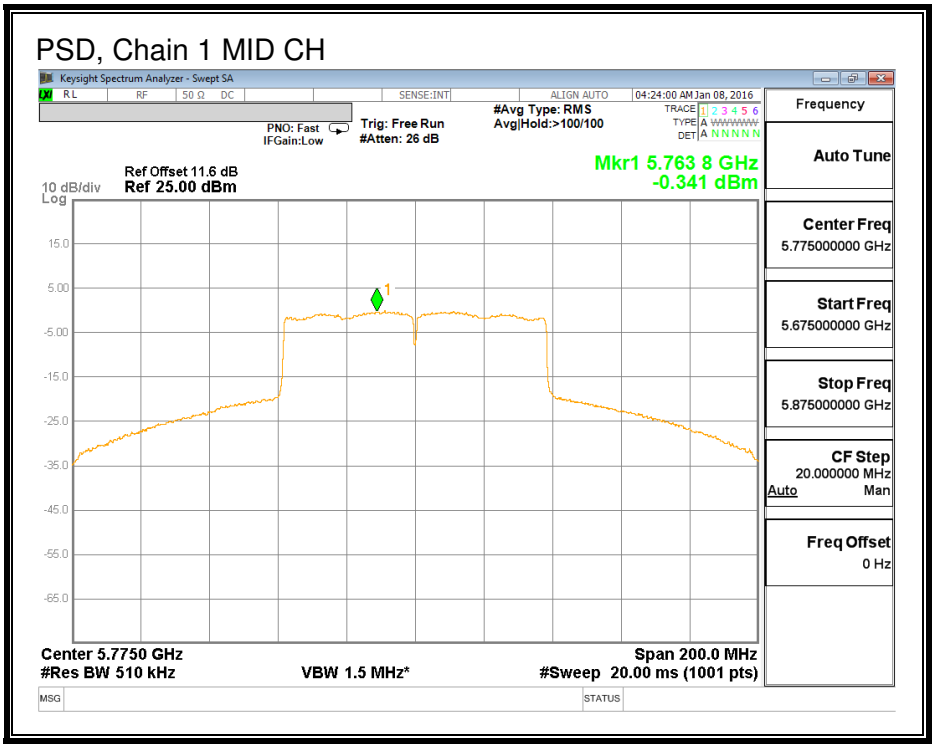
PSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Mid	5755	-0.157	-0.341	2.922	27.59	-24.67

PSD, Chain 0



PSD, Chain 1



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 below 1GHz and 150 cm for above 1GHz. The antenna to EUT distance is 3 meters.

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

Reference to KDB 789033 UNII part G) 6) c) Method AD:

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and add duty cycle factor to the reading offset for average measurements.

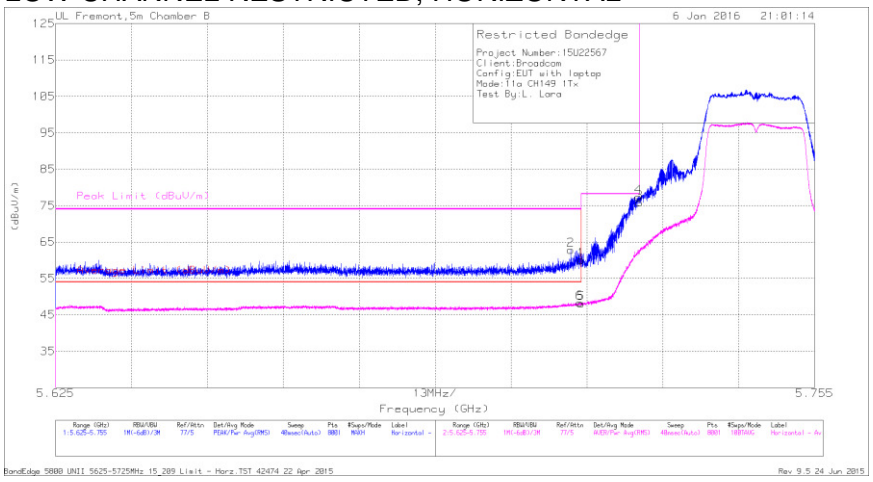
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

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

9.2. TX ABOVE 1 GHz 802.11a MODE SISO IN THE 5.8 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL)

LOW CHANNEL RESTRICTED, HORIZONTAL



Trace Markers

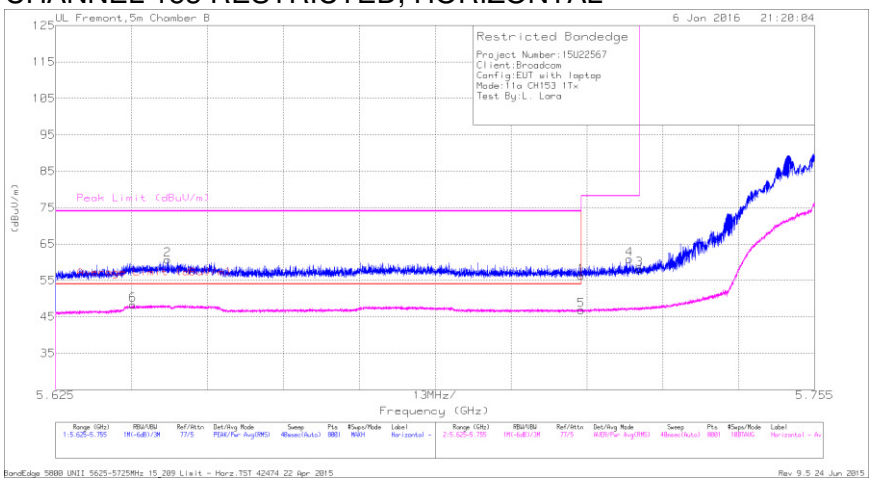
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Bypass (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	5.713	20.55	Pk	35	7.3	0	62.85	-	-	74	-11.15	290	133	H
1	5.715	17.77	Pk	35	7.3	0	60.07	-	-	74	-13.93	290	133	H
5	5.715	5.82	RMS	35	7.3	0	48.12	54	-5.88	-	-	290	133	H
6	5.715	5.95	RMS	35	7.3	0	48.25	54	-5.75	-	-	290	133	H
3	5.725	33.51	Pk	35	7.4	0	75.91	-	-	78.2	-2.29	290	133	H
4	5.725	35.01	Pk	35	7.4	0	77.41	-	-	78.2	-.79	290	133	H

Pk - Peak detector

RMS - RMS detection

RESTRICTED BANDEDGE (CHANNEL 153)

CHANNEL 153 RESTRICTED, HORIZONTAL



Trace Markers

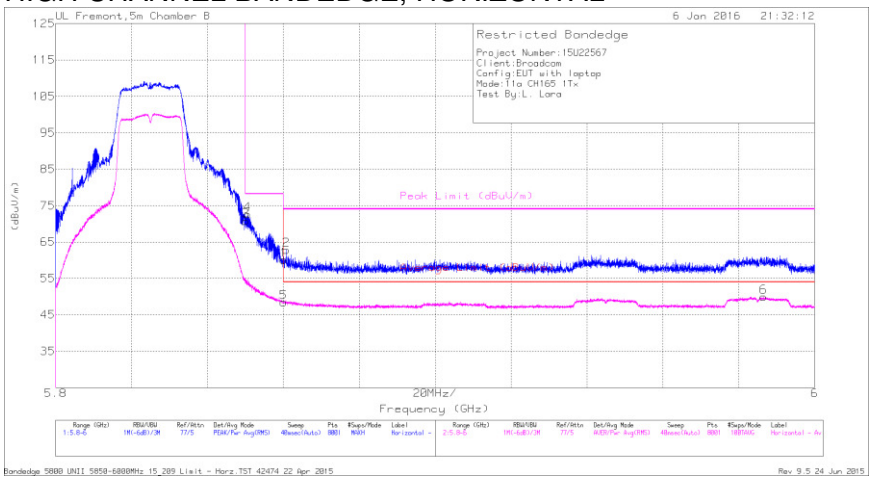
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Bypass (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
6	5.638	6.19	RMS	34.8	7.3	0	48.29	54	-5.71	-	-	293	127	H
2	5.644	18.62	Pk	34.8	7.3	0	60.72	-	-	74	-13.28	293	127	H
1	5.715	13.91	Pk	35	7.3	0	56.21	-	-	74	-17.79	293	127	H
5	5.715	4.53	RMS	35	7.3	0	46.83	54	-7.17	-	-	293	127	H
4	5.723	18.39	Pk	35	7.4	0	60.79	-	-	78.2	-17.41	293	127	H
3	5.725	15.7	Pk	35	7.4	0	58.1	-	-	78.2	-20.1	293	127	H

Pk - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HIGH CHANNEL BANDEDGE, HORIZONTAL



Trace Markers

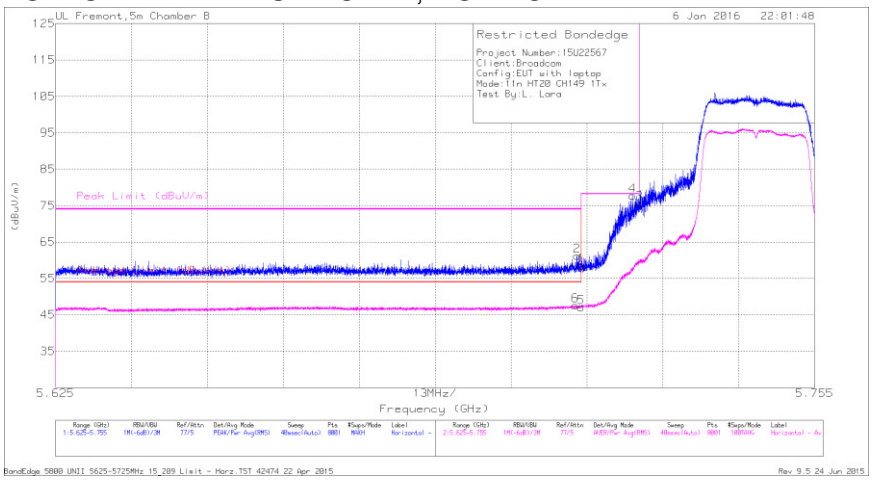
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Bypass (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	5.85	27.94	Pk	35.4	7.5	0	70.84	-	-	78.2	-7.36	271	187	H
4	5.851	29.79	Pk	35.4	7.5	0	72.69	-	-	78.2	-5.51	271	187	H
1	5.86	17.18	Pk	35.4	7.5	0	60.08	-	-	74	-13.92	271	187	H
5	5.86	5.52	RMS	35.4	7.5	0	48.42	54	-5.58	-	-	271	187	H
2	5.861	19.96	Pk	35.4	7.5	0	62.86	-	-	74	-11.14	271	187	H
6	5.987	6.8	RMS	35.6	7.5	0	49.9	54	-4.1	-	-	271	187	H

Pk - Peak detector

9.3. TX ABOVE 1 GHz 802.11n HT20 MODE 1Tx IN THE 5.8 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL)

LOW CHANNEL RESTRICTED, HORIZONTAL



Trace Markers

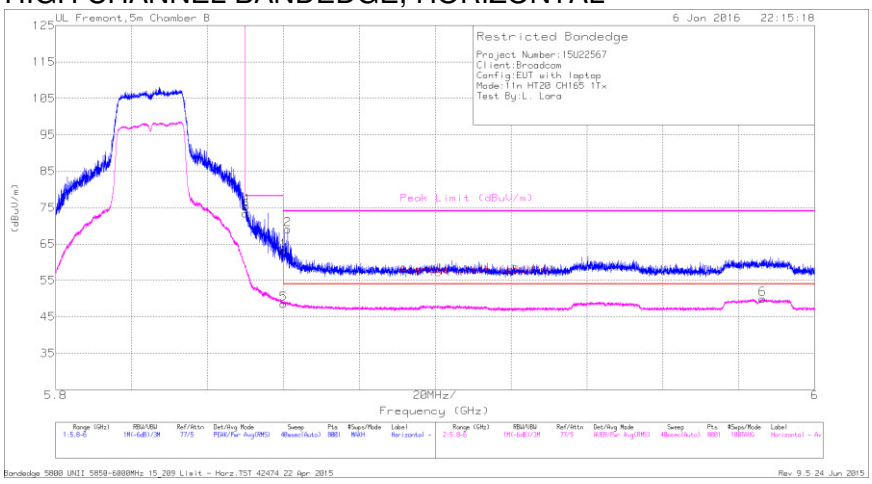
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Bypass (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	5.714	18.93	Pk	35	7.3	0	61.23	-	-	74	-12.77	290	131	H
6	5.714	5.26	RMS	35	7.3	0	47.56	54	-6.44	-	-	290	131	H
1	5.715	16.19	Pk	35	7.3	0	58.49	-	-	74	-15.51	290	131	H
5	5.715	4.81	RMS	35	7.3	0	47.11	54	-6.89	-	-	290	131	H
4	5.724	35.34	Pk	35	7.4	0	77.74	-	-	78.2	-.46	290	131	H
3	5.725	33.17	Pk	35	7.4	0	75.57	-	-	78.2	-2.63	290	131	H

Pk - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HIGH CHANNEL BANDEDGE, HORIZONTAL



Trace Markers

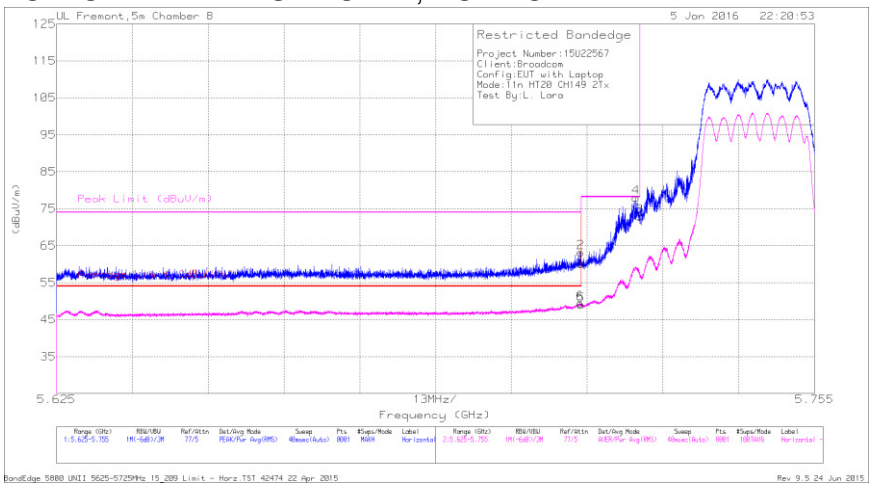
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Bypass (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	5.85	30.44	Pk	35.4	7.5	0	73.34	-	-	78.2	-4.86	281	212	H
4	5.85	32.64	Pk	35.4	7.5	0	75.54	-	-	78.2	-2.66	281	212	H
1	5.86	20.23	Pk	35.4	7.5	0	63.13	-	-	74	-10.87	281	212	H
5	5.86	5.68	RMS	35.4	7.5	0	48.58	54	-5.42	-	-	281	212	H
2	5.861	26.16	Pk	35.4	7.5	0	69.06	-	-	74	-4.94	281	212	H
6	5.986	6.83	RMS	35.6	7.5	0	49.93	54	-4.07	-	-	281	212	H

Pk - Peak detector

9.4. TX ABOVE 1 GHz 802.11n HT20 MODE 2Tx IN THE 5.8 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL)

LOW CHANNEL RESTRICTED, HORIZONTAL



Trace Markers

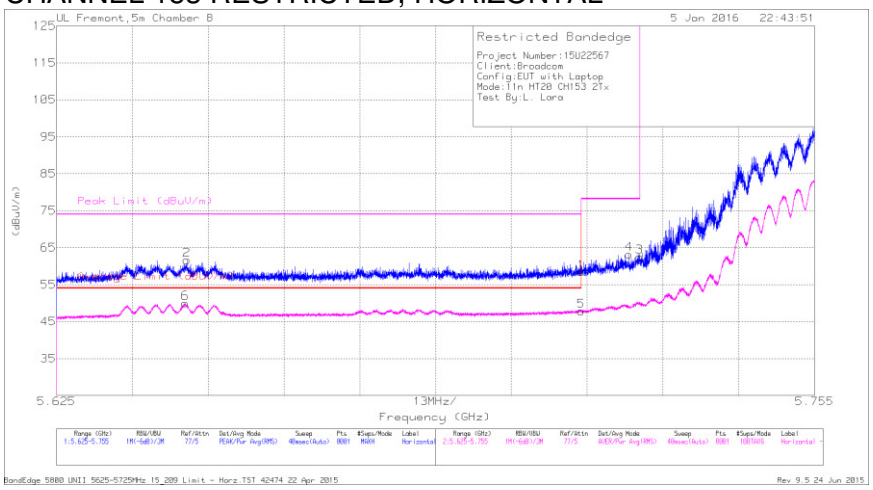
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Bypass (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.715	17.86	Pk	35	7.3	0	60.16	-	-	74	-13.84	107	196	H
2	5.715	20.9	Pk	35	7.3	0	63.2	-	-	74	-10.8	107	196	H
5	5.715	6.69	RMS	35	7.3	0	48.99	54	-5.01	-	-	107	196	H
6	5.715	7.08	RMS	35	7.3	0	49.38	54	-4.62	-	-	107	196	H
4	5.724	35.59	Pk	35	7.4	0	77.99	-	-	78.2	-.21	107	196	H
3	5.725	30.52	Pk	35	7.4	0	72.92	-	-	78.2	-5.28	107	196	H

Pk - Peak detector

RMS - RMS detection

RESTRICTED BANDEDGE (CHANNEL 153)

CHANNEL 153 RESTRICTED, HORIZONTAL



Trace Markers

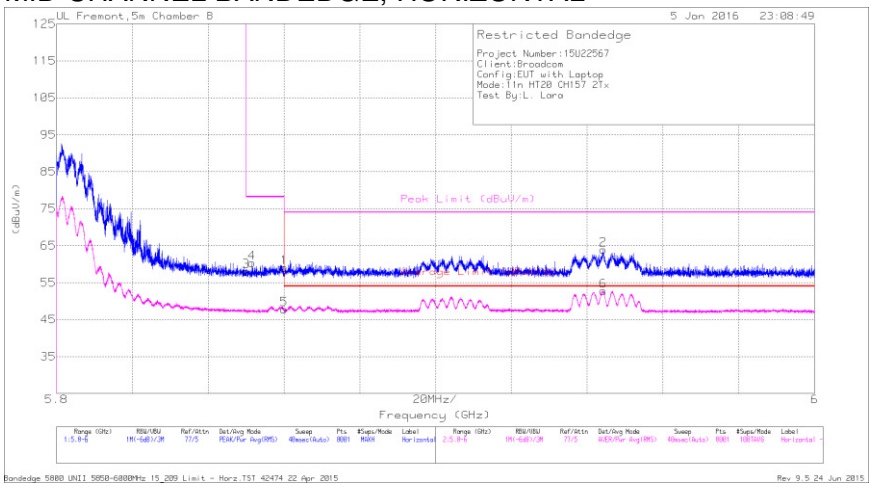
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Bypass (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	5.647	19.55	Pk	34.8	7.3	0	61.65	-	-	74	-12.35	112	190	H
6	5.647	7.9	RMS	34.8	7.3	0	50	54	-4	-	-	112	190	H
1	5.715	16.08	Pk	35	7.3	0	58.38	-	-	74	-15.62	112	190	H
5	5.715	5.53	RMS	35	7.3	0	47.83	54	-6.17	-	-	112	190	H
4	5.723	20.82	Pk	35	7.4	0	63.22	-	-	78.2	-14.98	112	190	H
3	5.725	20.13	Pk	35	7.4	0	62.53	-	-	78.2	-15.67	112	190	H

Pk - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (MID CHANNEL)

MID CHANNEL BANDEDGE, HORIZONTAL



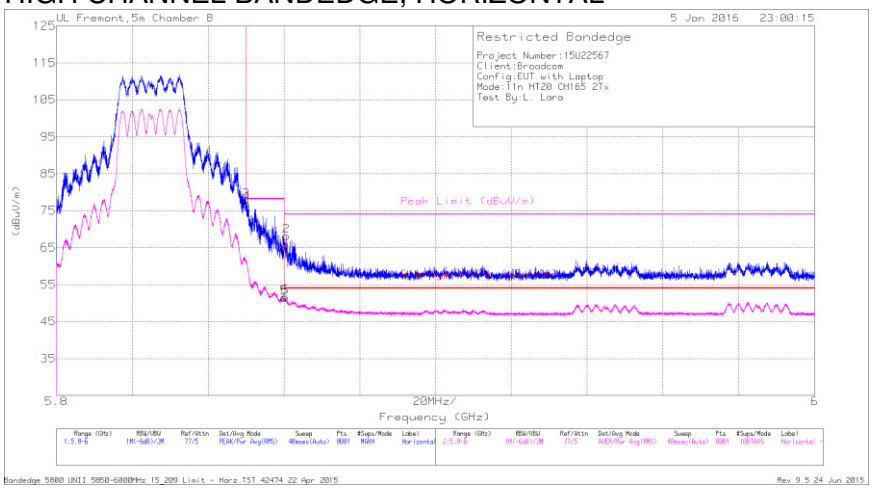
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Bypass (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	5.85	15.14	Pk	35.4	7.5	0	58.04	-	-	78.2	-20.16	103	221	H
4	5.852	17.41	Pk	35.4	7.5	0	60.31	-	-	78.2	-17.89	103	221	H
1	5.86	16.18	Pk	35.4	7.5	0	59.08	-	-	74	-14.92	103	221	H
5	5.86	4.9	RMS	35.4	7.5	0	47.8	54	-6.2	-	-	103	221	H
2	5.944	20.83	Pk	35.6	7.5	0	63.93	-	-	74	-10.07	103	221	H
6	5.944	9.66	RMS	35.6	7.5	0	52.76	54	-1.24	-	-	103	221	H

Pk - Peak detector

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HIGH CHANNEL BANDEDGE, HORIZONTAL



Trace Markers

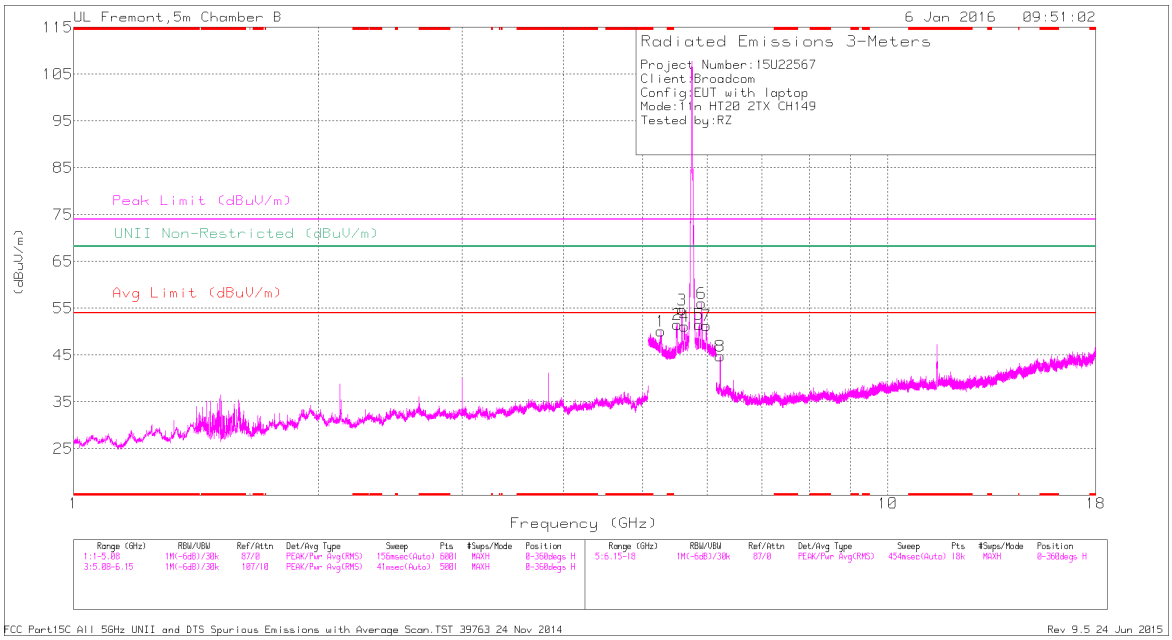
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Bypass (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	5.85	34.78	Pk	35.4	7.5	0	77.68	-	-	78.2	-.52	77	103	H
4	5.85	34.03	Pk	35.4	7.5	0	76.93	-	-	78.2	-1.27	77	103	H
1	5.86	22.01	Pk	35.4	7.5	0	64.91	-	-	74	-9.09	77	103	H
5	5.86	8.57	RMS	35.4	7.5	0	51.47	54	-2.53	-	-	77	103	H
6	5.86	8.76	RMS	35.4	7.5	0	51.66	54	-2.34	-	-	77	103	H
2	5.861	25.23	Pk	35.4	7.5	0	68.13	-	-	74	-5.87	77	103	H

Pk - Peak detector

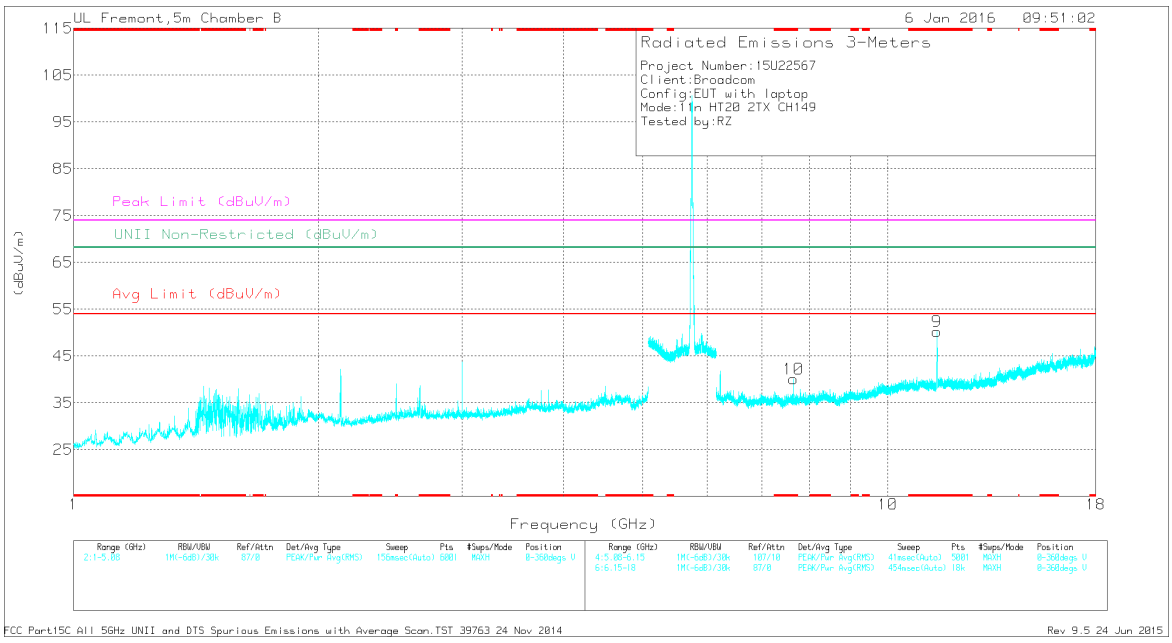
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL

LOW CHANNEL HORIZONTAL PLOT



LOW CHANNEL VERTICAL PLOT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (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
9	* 11.492	44.83	PK-U	38.3	-25.4	57.73	-	-	74	-16.27	-	-	351	182	V
	* 11.49	30.71	ADR	38.3	-25.4	43.61	54	-10.39	-	-	-	-	351	182	V
10	* 7.66	41.74	PK-U	35.5	-29.9	47.34	-	-	74	-26.66	-	-	235	208	V
	* 7.66	33.02	ADR	35.5	-29.9	38.62	54	-15.38	-	-	-	-	235	208	V
1	5.265	44.38	PK-U	34.3	-19.5	59.18	-	-	-	-	68.2	-9.02	227	246	H
2	5.508	46.89	PK-U	34.5	-20.7	60.69	-	-	-	-	68.2	-7.51	229	214	H
3	5.586	49.08	PK-U	34.7	-20.7	63.08	-	-	-	-	68.2	-5.12	233	244	H
4	5.628	46.04	PK-U	34.8	-20.6	60.24	-	-	-	-	68.2	-7.96	230	246	H
5	5.864	45.6	PK-U	35.4	-20.7	60.3	-	-	-	-	68.2	-7.9	5	198	H
6	5.906	49.67	PK-U	35.5	-20.7	64.47	-	-	-	-	68.2	-3.73	227	218	H
7	5.983	44.44	PK-U	35.6	-21	59.04	-	-	-	-	68.2	-9.16	218	250	H
8	6.223	48.26	PK-U	35.5	-31.4	52.36	-	-	-	-	68.2	-15.84	11	335	H

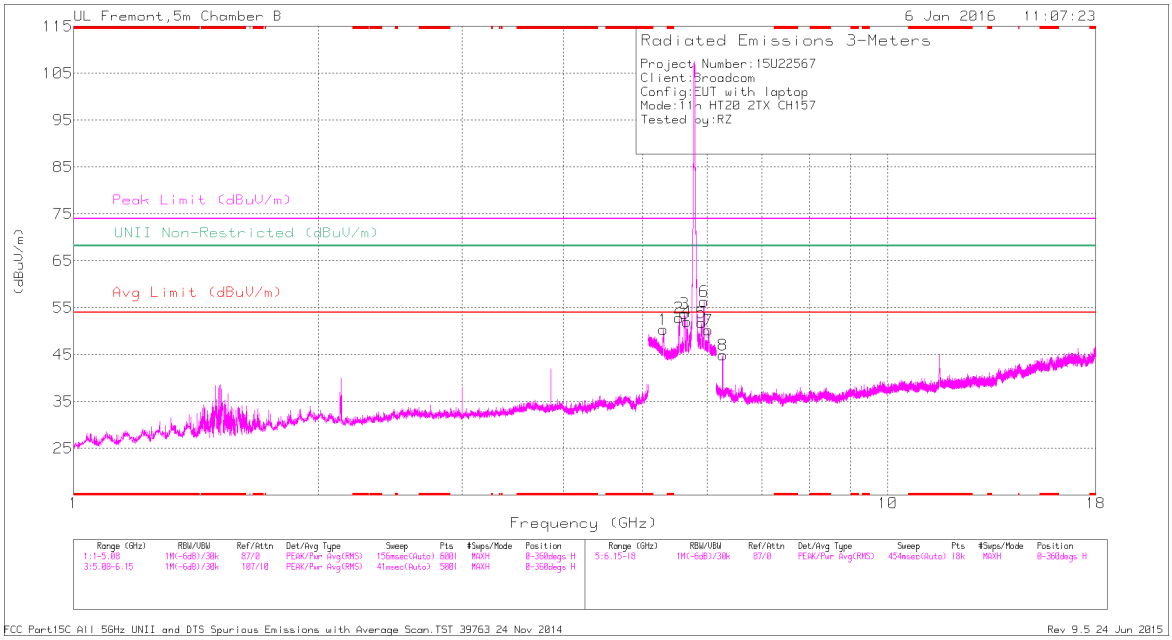
* - indicates frequency in CFR15.205 Restricted Band

PK-U - U-NII: Maximum Peak

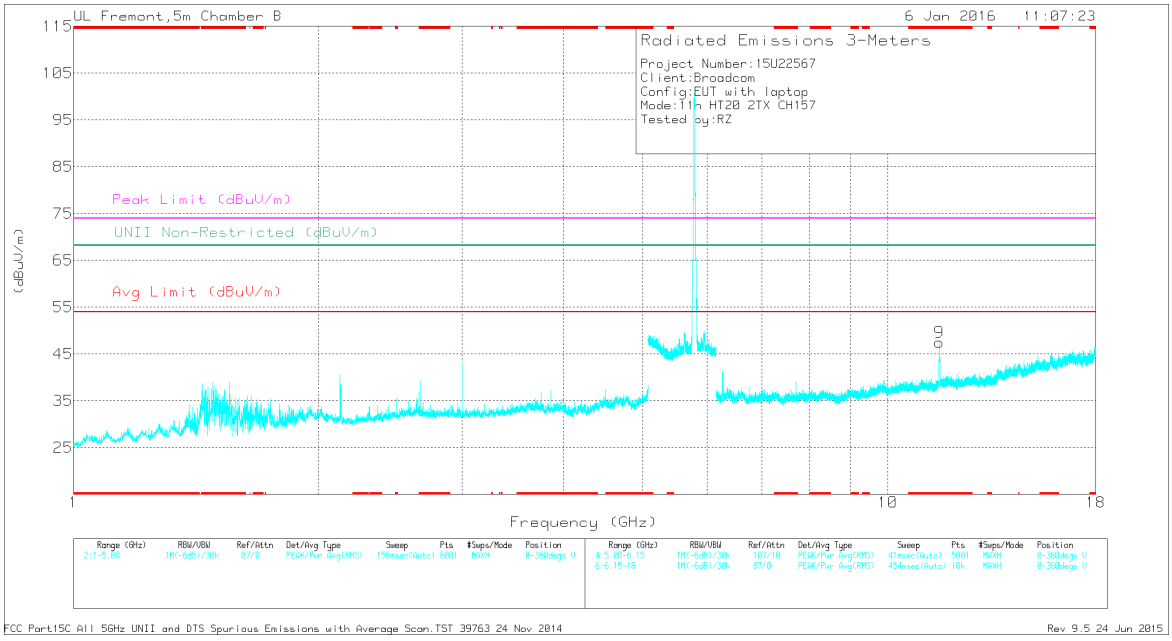
ADR - U-NII AD primary method, RMS average

MID CHANNEL

MID CHANNEL HORIZONTAL PLOT



MID CHANNEL VERTICAL PLOT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (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
9	* 11.57	44.21	PK-U	38.4	-24.6	58.01	-	-	74	-15.99	-	-	224	230	V
	* 11.569	31.11	ADR	38.4	-24.6	44.91	54	-9.09	-	-	-	-	224	230	V
1	5.303	43.38	PK-U	34.4	-19.5	58.28	-	-	-	-	68.2	-9.92	223	199	H
2	5.544	46.35	PK-U	34.6	-20.4	60.55	-	-	-	-	68.2	-7.65	201	231	H
3	5.627	49.04	PK-U	34.8	-20.8	63.04	-	-	-	-	68.2	-5.16	204	241	H
4	5.667	45.1	PK-U	34.9	-21	59	-	-	-	-	68.2	-9.2	4	236	H
5	5.907	46.12	PK-U	35.5	-20.8	60.82	-	-	-	-	68.2	-7.38	233	238	H
6	5.944	48.81	PK-U	35.6	-20.7	63.71	-	-	-	-	68.2	-4.49	226	234	H
7	6.019	42.63	PK-U	35.6	-20.8	57.43	-	-	-	-	68.2	-10.77	221	268	H
8	6.267	50.86	PK-U	35.5	-31.6	54.76	-	-	-	-	68.2	-13.44	14	119	H

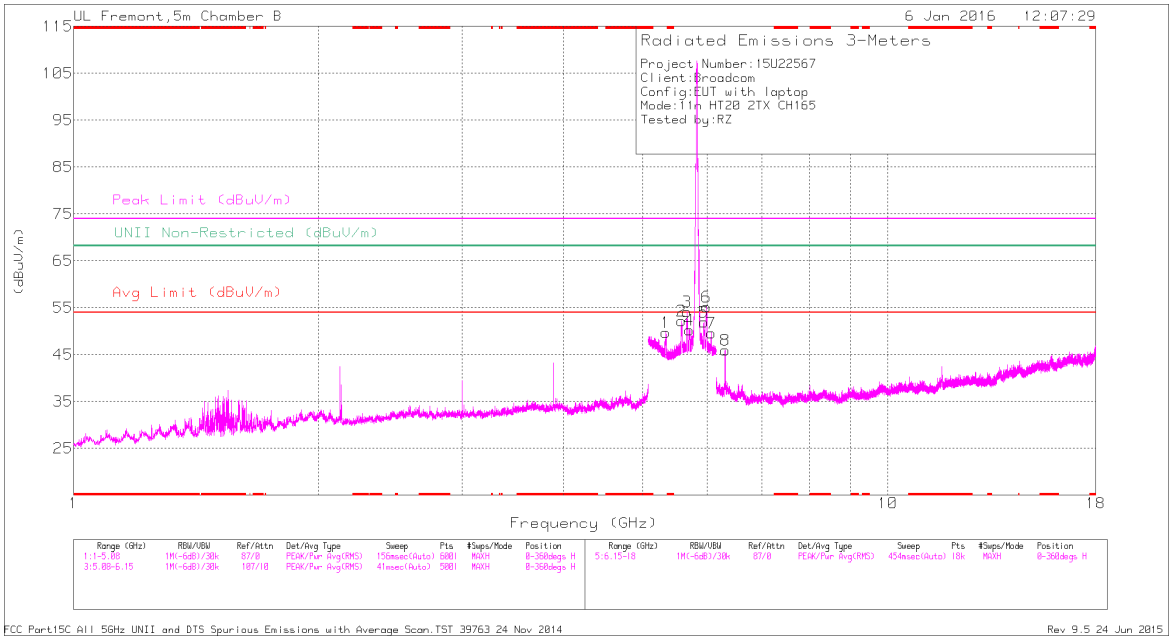
* - indicates frequency in CFR15.205 Restricted Band

PK-U - U-NII: Maximum Peak

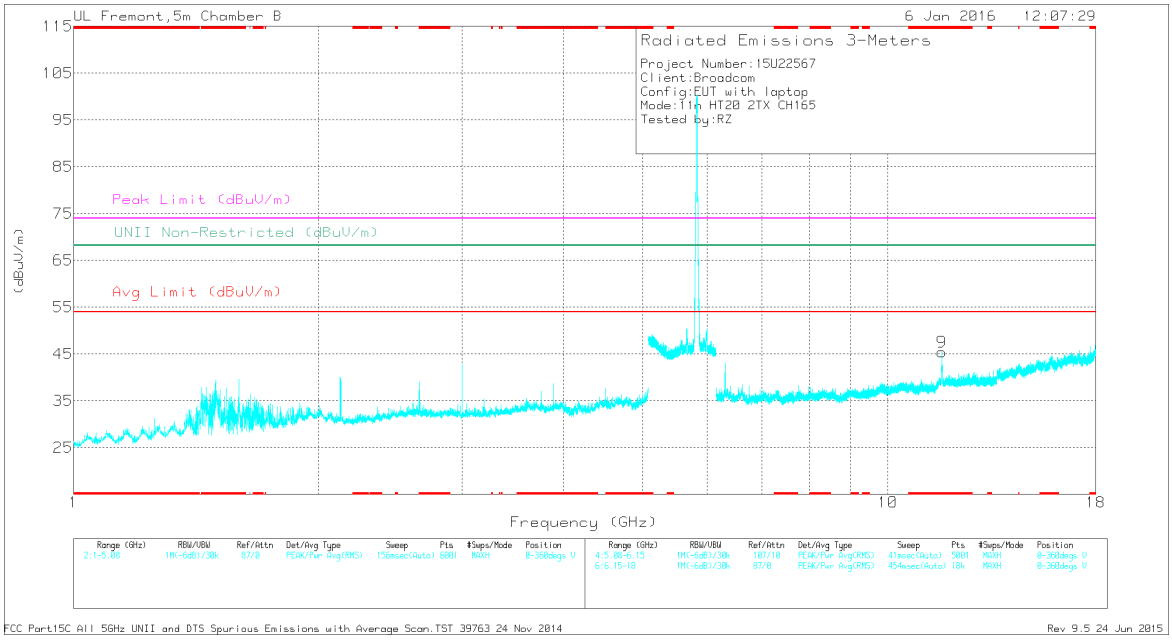
ADR - U-NII AD primary method, RMS average

HIGH CHANNEL

HIGH CHANNEL HORIZONTAL PLOT



HIGH CHANNEL VERTICAL PLOT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (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
9	* 11.65	42.29	PK-U	38.5	-24.8	55.99	-	-	74	-18.01	-	-	13	248	V
	* 11.65	29.25	ADR	38.5	-24.8	42.95	54	-11.05	-	-	-	-	13	248	V
1	5.338	44.17	PK-U	34.4	-19.8	58.77	-	-	-	-	68.2	-9.43	226	215	H
2	5.579	47.08	PK-U	34.7	-20.8	60.98	-	-	-	-	68.2	-7.22	230	245	H
3	5.668	45.83	PK-U	34.9	-21.1	59.63	-	-	-	-	68.2	-8.57	357	140	H
4	5.707	44.9	PK-U	35	-21	58.9	-	-	-	-	68.2	-9.3	229	198	H
5	5.946	46.08	PK-U	35.6	-20.9	60.78	-	-	-	-	68.2	-7.42	226	251	H
6	5.984	49.56	PK-U	35.6	-20.9	64.26	-	-	-	-	68.2	-3.94	228	229	H
7	6.067	43.82	PK-U	35.5	-20.6	58.72	-	-	-	-	68.2	-9.48	14	359	H
8	6.311	53.15	PK-U	35.6	-31.3	57.45	-	-	-	-	68.2	-10.75	235	233	H

* - indicates frequency in CFR15.205 Restricted Band

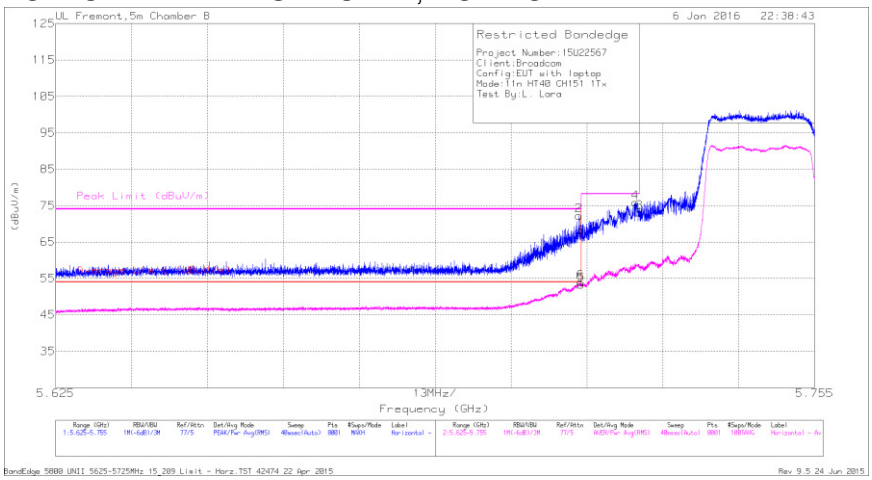
PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

9.5. TX ABOVE 1 GHz 802.11n HT40 MODE 1Tx IN THE 5.8 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL)

LOW CHANNEL RESTRICTED, HORIZONTAL



Trace Markers

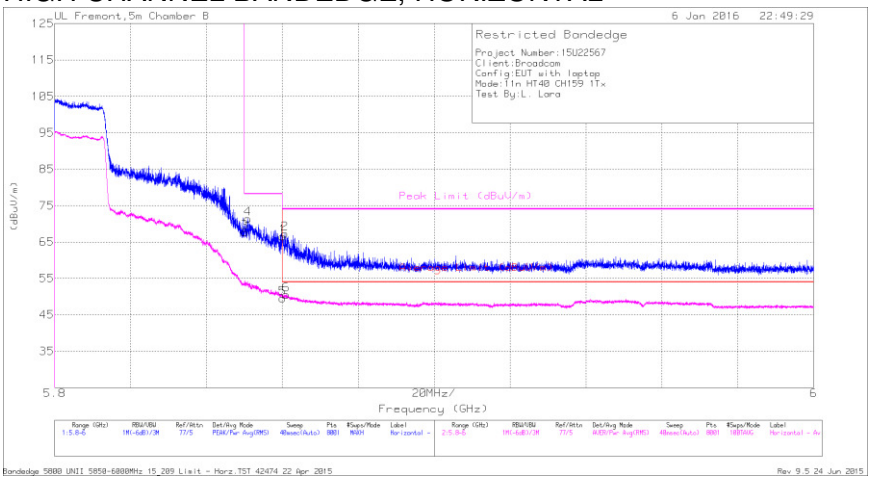
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Bypass (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.715	26.03	Pk	35	7.3	0	68.33	-	-	74	-5.67	290	135	H
2	5.715	29.92	Pk	35	7.3	0	72.22	-	-	74	-1.78	290	135	H
5	5.715	10.92	RMS	35	7.3	0	53.22	54	-.78	-	-	290	135	H
6	5.715	11.65	RMS	35	7.3	0	53.95	54	-.05	-	-	290	135	H
4	5.724	33.43	Pk	35	7.4	0	75.83	-	-	78.2	-2.37	290	135	H
3	5.725	30.7	Pk	35	7.4	0	73.1	-	-	78.2	-5.1	290	135	H

Pk - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HIGH CHANNEL BANDEDGE, HORIZONTAL



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Bypass (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	5.85	24.81	Pk	35.4	7.5	0	67.71	-	-	78.2	-10.49	282	213	H
4	5.851	28.54	Pk	35.4	7.5	0	71.44	-	-	78.2	-6.76	282	213	H
1	5.86	23.6	Pk	35.4	7.5	0	66.5	-	-	74	-7.5	282	213	H
5	5.86	6.7	RMS	35.4	7.5	0	49.6	54	-4.4	-	-	282	213	H
2	5.861	24.41	Pk	35.4	7.5	0	67.31	-	-	74	-6.69	282	213	H
6	5.861	7.69	RMS	35.4	7.5	0	50.59	54	-3.41	-	-	282	213	H

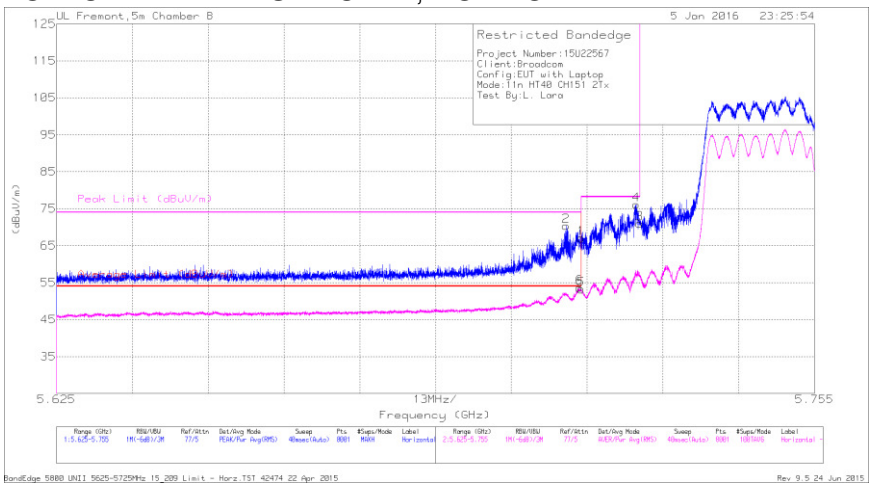
Pk - Peak detector

RMS - RMS detection

9.6. TX ABOVE 1 GHz 802.11n HT40 MODE 2Tx IN THE 5.8 GHz BAND

RESTRICTED BANDEDGE (LOW CHANNEL)

LOW CHANNEL RESTRICTED, HORIZONTAL



Trace Markers

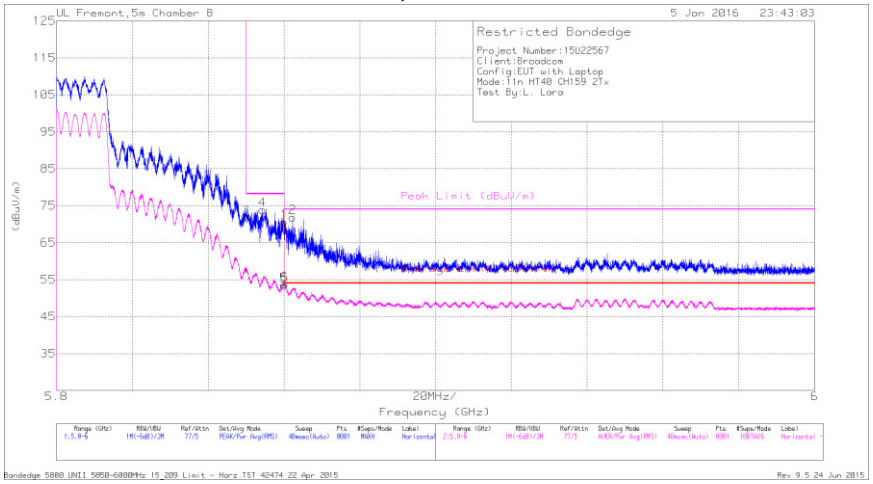
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Bypass (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	5.712	28.03	Pk	35	7.3	0	70.33	-	-	74	-3.67	77	123	H
1	5.715	24.72	Pk	35	7.3	0	67.02	-	-	74	-6.98	77	123	H
5	5.715	10.92	RMS	35	7.3	0	53.22	54	-.78	-	-	77	123	H
6	5.715	11.34	RMS	35	7.3	0	53.64	54	-.36	-	-	77	123	H
4	5.724	33.71	Pk	35	7.4	0	76.11	-	-	78.2	-2.09	77	123	H
3	5.725	28.6	Pk	35	7.4	0	71	-	-	78.2	-7.2	77	123	H

Pk - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HIGH CHANNEL BANDEDGE, HORIZONTAL



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Bypass (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	5.85	28.94	Pk	35.4	7.5	0	71.84	-	-	78.2	-6.36	77	107	H
4	5.854	31.09	Pk	35.4	7.4	0	73.89	-	-	78.2	-4.31	77	107	H
1	5.86	27.76	Pk	35.4	7.5	0	70.66	-	-	74	-3.34	77	107	H
5	5.86	10.52	RMS	35.4	7.5	0	53.42	54	-.58	-	-	77	107	H
6	5.86	10.88	RMS	35.4	7.5	0	53.78	54	-.22	-	-	77	107	H
2	5.862	28.98	Pk	35.4	7.5	0	71.88	-	-	74	-2.12	77	107	H

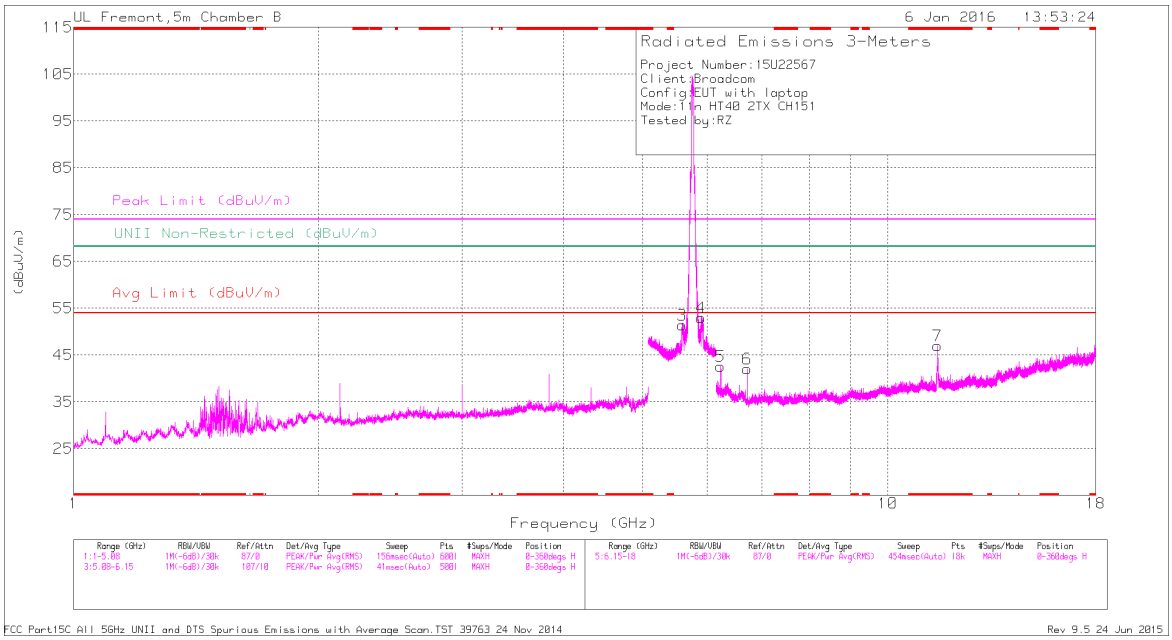
Pk - Peak detector

RMS - RMS detection

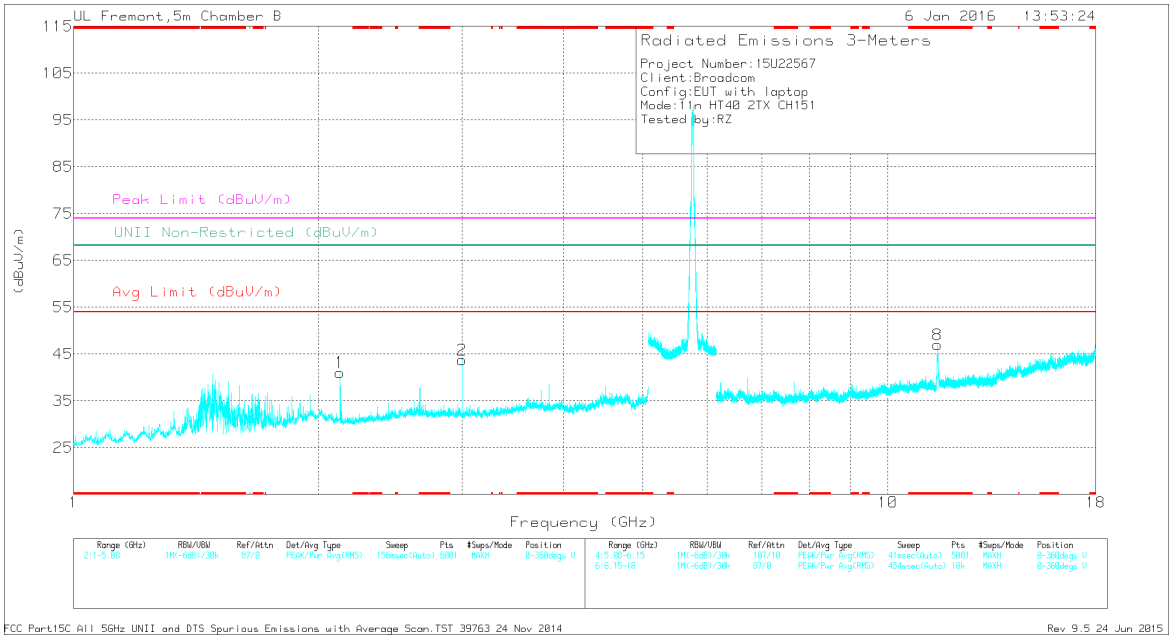
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL

LOW CHANNEL HORIZONTAL PLOT



LOW CHANNEL VERTICAL PLOT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (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
7	* 11.512	38.45	PK-U	38.3	-25.2	51.55	-	-	74	-22.45	-	-	35	361	H
	* 11.51	26.58	ADR	38.3	-25.3	39.58	54	-14.42	-	-	-	-	35	361	H
8	* 11.51	43.71	PK-U	38.3	-25.3	56.71	-	-	74	-17.29	-	-	223	207	V
	* 11.51	30.87	ADR	38.3	-25.3	43.87	54	-10.13	-	-	-	-	223	207	V
1	2.124	50.75	PK-U	31.6	-35	47.35	-	-	-	-	68.2	-20.85	155	113	V
2	3	49.5	PK-U	32.5	-33.6	48.4	-	-	-	-	68.2	-19.8	285	222	V
3	5.591	48.51	PK-U	34.7	-20.5	62.71	-	-	-	-	68.2	-5.49	235	243	H
4	5.899	45.53	PK-U	35.5	-20.8	60.23	-	-	-	-	68.2	-7.97	360	297	H
5	6.235	43.2	PK-U	35.5	-31.6	47.1	-	-	-	-	68.2	-21.1	225	207	H
6	6.714	43.59	PK-U	35.9	-31	48.49	-	-	-	-	68.2	-19.71	235	202	H

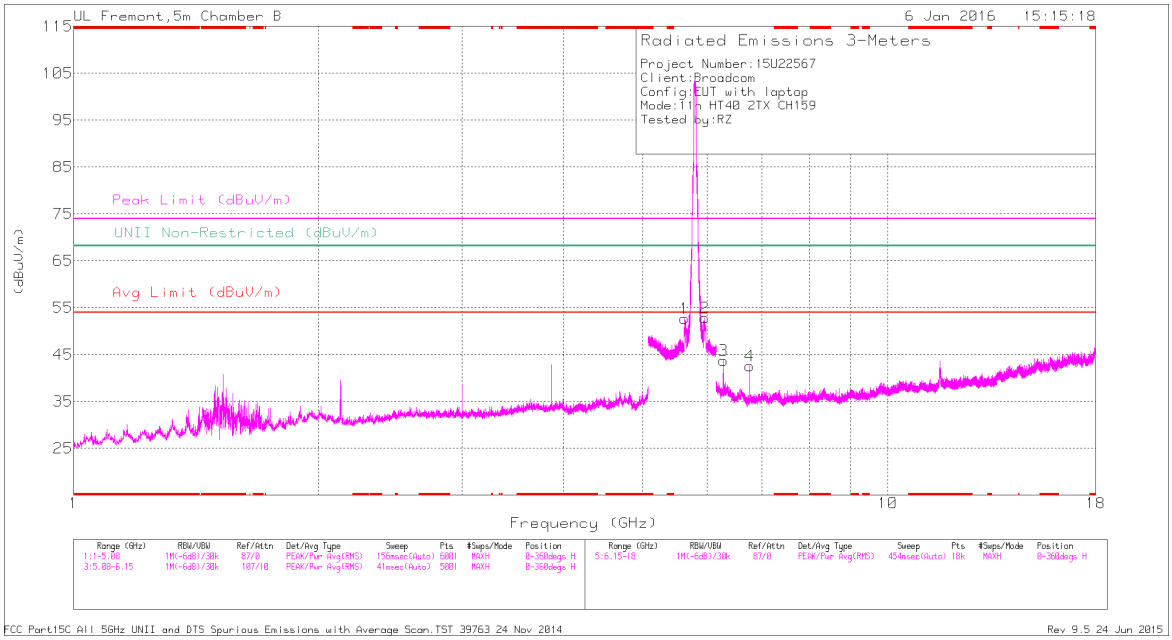
* - indicates frequency in CFR15.205 Restricted Band

PK-U - U-NII: Maximum Peak

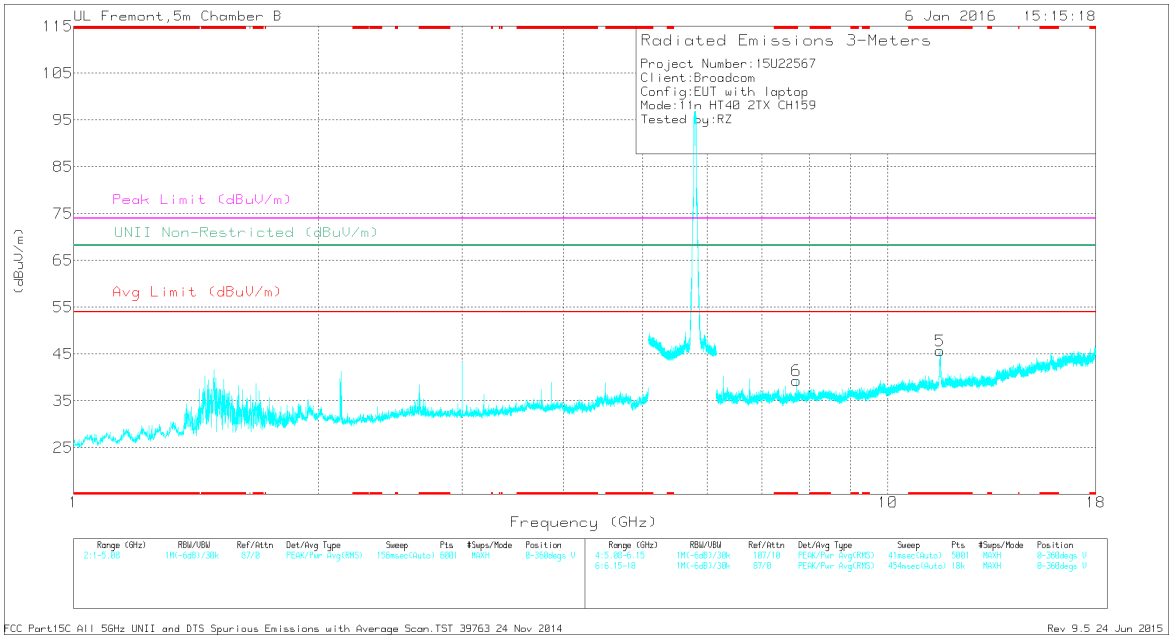
ADR - U-NII AD primary method, RMS average

HIGH CHANNEL

HIGH CHANNEL HORIZONTAL PLOT



HIGH CHANNEL VERTICAL PLOT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (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	* 11.59	40.95	PK-U	38.4	-24.7	54.65	-	-	74	-19.35	-	-	357	265	V
	* 11.59	28.28	ADR	38.4	-24.7	41.98	54	-12.02	-	-	-	-	357	265	V
6	* 7.727	39.46	PK-U	35.5	-29.3	45.66	-	-	74	-28.34	-	-	347	113	V
	* 7.727	29.7	ADR	35.5	-29.3	35.9	54	-18.1	-	-	-	-	347	113	V
1	5.633	48.79	PK-U	34.8	-20.7	62.89	-	-	-	-	68.2	-5.31	206	228	H
2	5.952	45.88	PK-U	35.6	-20.8	60.68	-	-	-	-	68.2	-7.52	0	252	H
3	6.278	46.56	PK-U	35.5	-31.6	50.46	-	-	-	-	68.2	-17.74	15	190	H
4	6.761	43.48	PK-U	35.9	-30.9	48.48	-	-	-	-	68.2	-19.72	236	207	H

* - indicates frequency in CFR15.205 Restricted Band

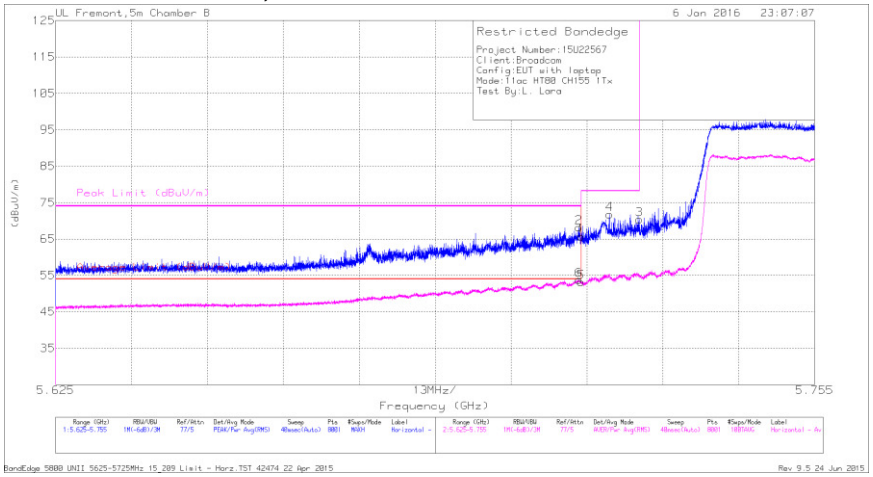
PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

9.7. TX ABOVE 1 GHz 802.11ac HT80 MODE 1Tx IN THE 5.8 GHz BAND

RESTRICTED BANDEDGE (LOW EDGE)

CH155 LOW EDGE, HORIZONTAL



Trace Markers

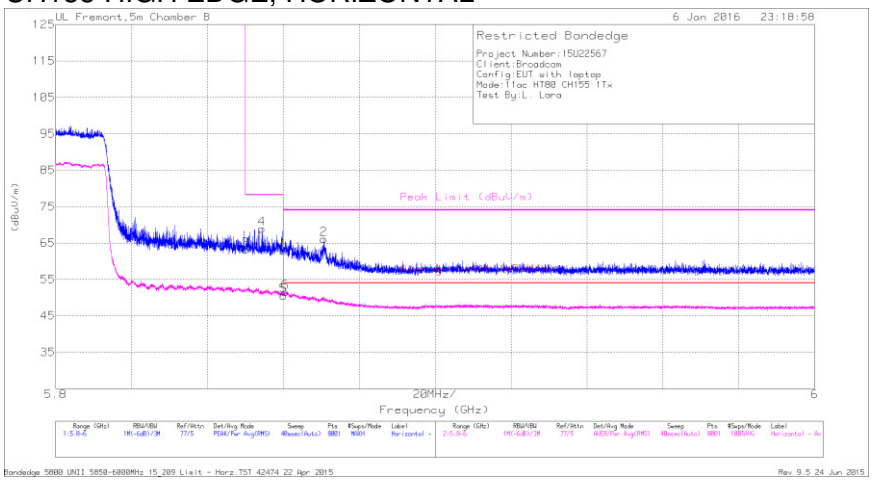
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Bypass (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.715	23.45	Pk	35	7.3	0	65.75	-	-	74	-8.25	271	209	H
2	5.715	25.82	Pk	35	7.3	0	68.12	-	-	74	-5.88	271	209	H
5	5.715	10.65	RMS	35	7.3	.16	53.11	54	-.89	-	-	271	209	H
6	5.715	11.36	RMS	35	7.3	.16	53.82	54	-.18	-	-	271	209	H
4	5.72	29.43	Pk	35	7.4	0	71.83	-	-	78.2	-6.37	271	209	H
3	5.725	28.04	Pk	35	7.4	0	70.44	-	-	78.2	-7.76	271	209	H

Pk - Peak detector

RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH EDGE)

CH155 HIGH EDGE, HORIZONTAL



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Bypass (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	5.85	20.26	Pk	35.4	7.5	0	63.16	-	-	78.2	-15.04	269	330	H
4	5.854	26.16	Pk	35.4	7.4	0	68.96	-	-	78.2	-9.24	269	330	H
1	5.86	19.94	Pk	35.4	7.5	0	62.84	-	-	74	-11.16	269	330	H
5	5.86	7.48	RMS	35.4	7.5	.16	50.54	54	-3.46	-	-	269	330	H
6	5.861	8.53	RMS	35.4	7.5	.16	51.59	54	-2.41	-	-	269	330	H
2	5.871	23.11	Pk	35.4	7.5	0	66.01	-	-	74	-7.99	269	330	H

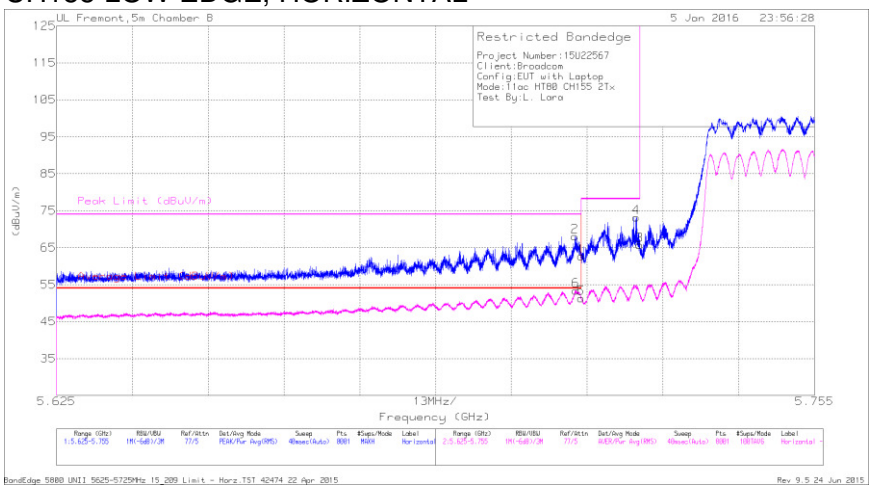
Pk - Peak detector

RMS - RMS detection

9.8. TX ABOVE 1 GHz 802.11ac HT80 MODE 2Tx IN THE 5.8 GHz BAND

RESTRICTED BANDEDGE (LOW EDGE)

CH155 LOW EDGE, HORIZONTAL



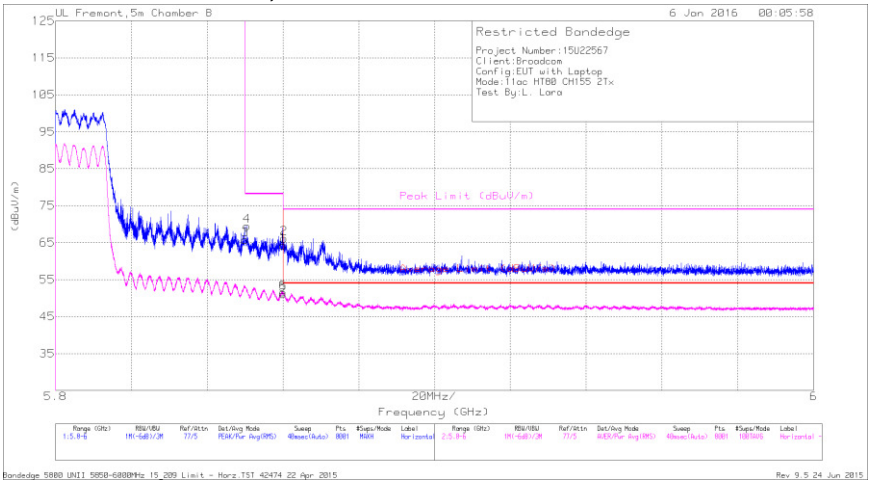
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Bypass (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	5.714	25.79	Pk	35	7.3	0	68.09	-	-	74	-5.91	109	205	H
6	5.714	10.97	RMS	35	7.3	.16	53.43	54	-.57	-	-	109	205	H
1	5.715	20.37	Pk	35	7.3	0	62.67	-	-	74	-11.33	109	205	H
5	5.715	8.86	RMS	35	7.3	.16	51.32	54	-2.68	-	-	109	205	H
4	5.724	30.79	Pk	35	7.4	0	73.19	-	-	78.2	-5.01	109	205	H
3	5.725	23.34	Pk	35	7.4	0	65.74	-	-	78.2	-12.46	109	205	H

Pk - Peak detector
RMS - RMS detection

AUTHORIZED BANDEDGE (HIGH EDGE)

CH155 HIGH EDGE, HORIZONTAL



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Bypass (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	5.85	22.89	Pk	35.4	7.5	0	65.79	-	-	78.2	-12.41	77	103	H
4	5.851	26.59	Pk	35.4	7.5	0	69.49	-	-	78.2	-8.71	77	103	H
1	5.86	21.38	Pk	35.4	7.5	0	64.28	-	-	74	-9.72	77	103	H
2	5.86	23.27	Pk	35.4	7.5	0	66.17	-	-	74	-7.83	77	103	H
5	5.86	7.97	RMS	35.4	7.5	.16	51.03	54	-2.97	-	-	77	103	H
6	5.86	8.46	RMS	35.4	7.5	.16	51.52	54	-2.48	-	-	77	103	H

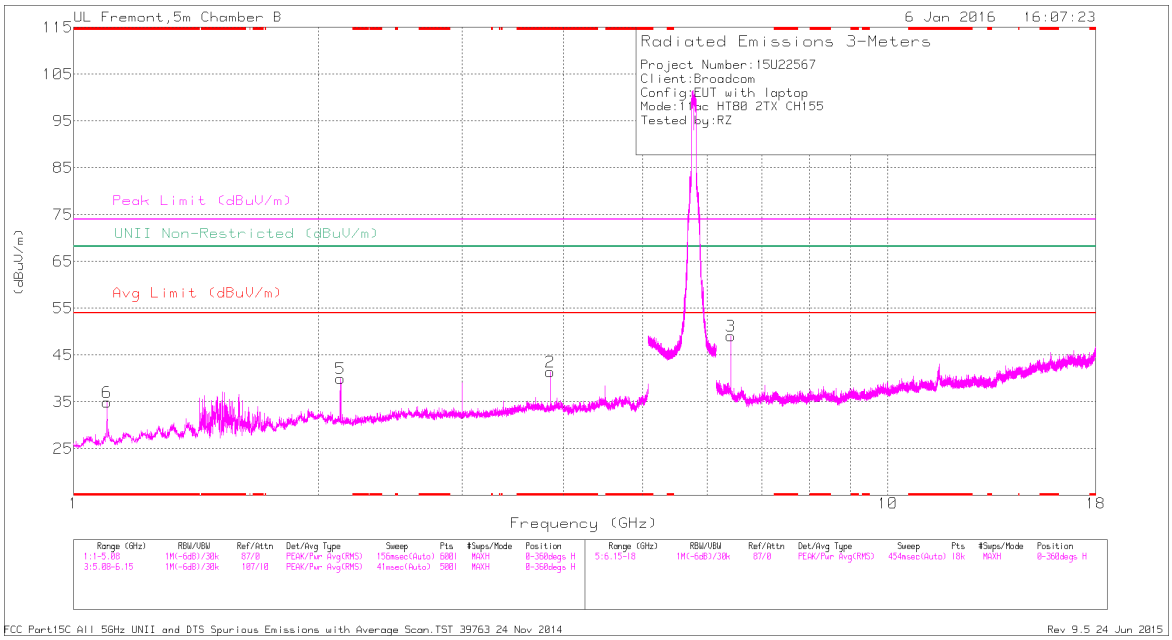
Pk - Peak detector

RMS - RMS detection

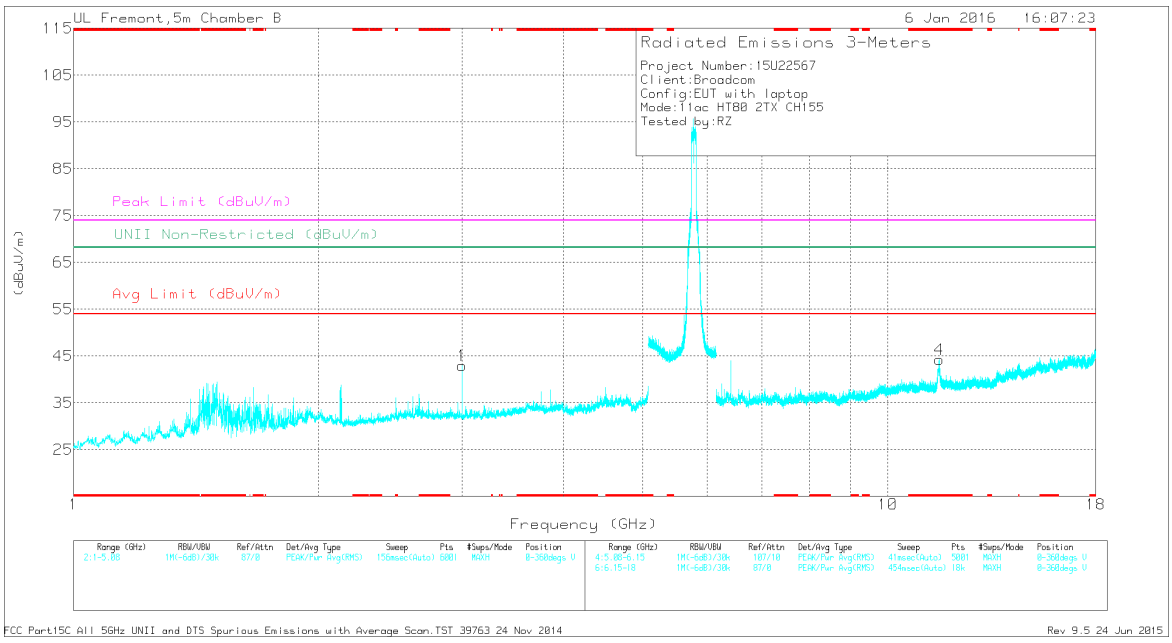
HARMONICS AND SPURIOUS EMISSIONS

CH155

CH155 HORIZONTAL PLOT



CH155 VERTICAL PLOT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (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
2	* 3.85	46.9	PK-U	33.4	-33	0	47.3	-	-	74	-26.7	-	-	18	141	H
	* 3.85	41.09	ADR	33.4	-33	.16	41.65	54	-12.35	-	-	-	-	18	141	H
6	* 1.097	48.07	PK-U	27.6	-35.6	0	40.07	-	-	74	-33.93	-	-	259	374	H
	* 1.099	32.92	ADR	27.6	-35.5	.16	25.18	54	-28.82	-	-	-	-	259	374	H
4	* 11.563	37.61	PK-U	38.4	-24.6	0	51.41	-	-	74	-22.59	-	-	358	172	V
	* 11.561	25.3	ADR	38.4	-24.6	.16	39.26	54	-	-	-	-	-	358	172	V
5	2.125	54.42	PK-U	31.6	-35	0	51.02	-	-14.74	-	-	68.2	-17.18	248	134	H
1	3	49.84	PK-U	32.5	-33.6	0	48.74	-	-	-	-	68.2	-19.46	287	229	V
3	6.417	49.35	PK-U	35.7	-29.9	0	55.15	-	-	-	-	68.2	-13.05	5	316	H

* - indicates frequency in CFR15.205 Restricted Band

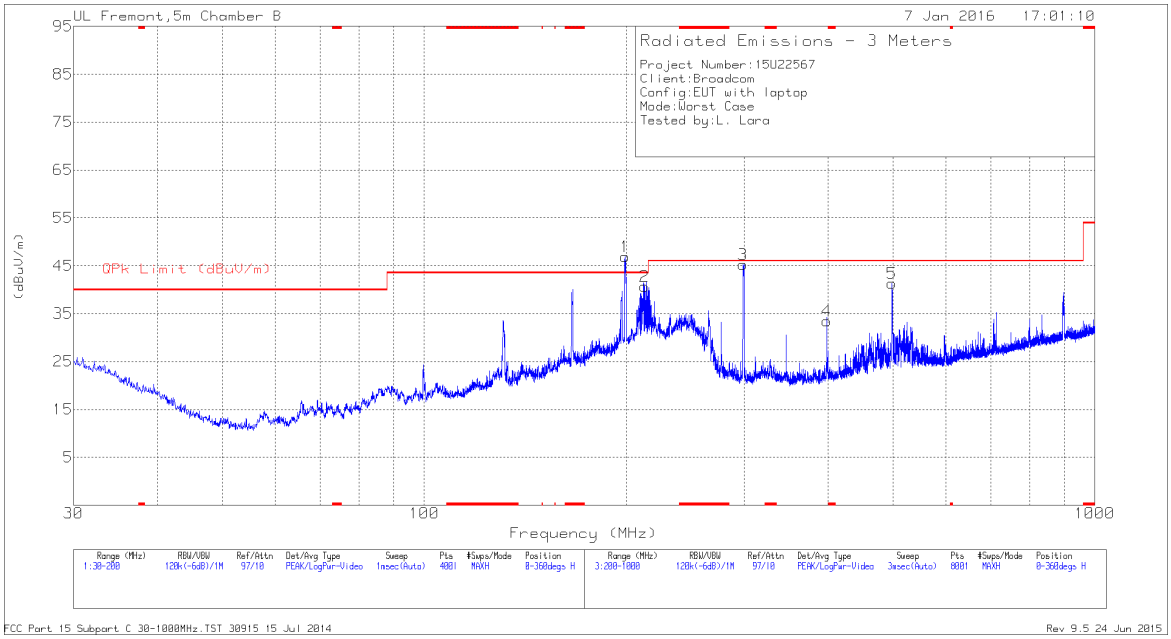
PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

9.9. WORST-CASE BELOW 1 GHz

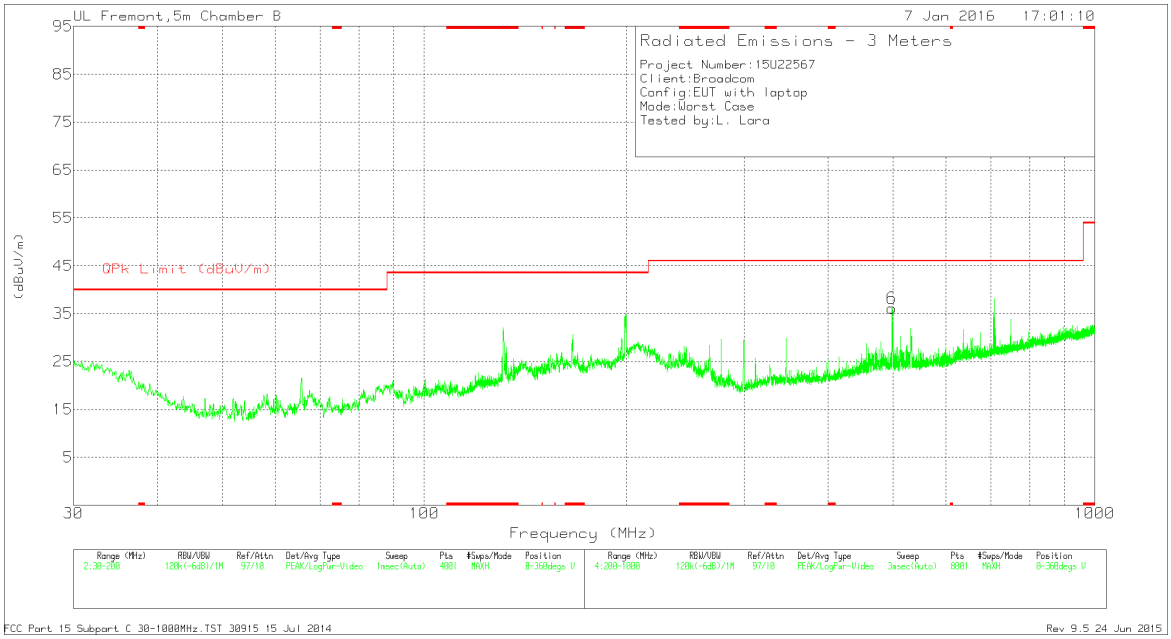
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



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

VERTICAL PLOT



DATA

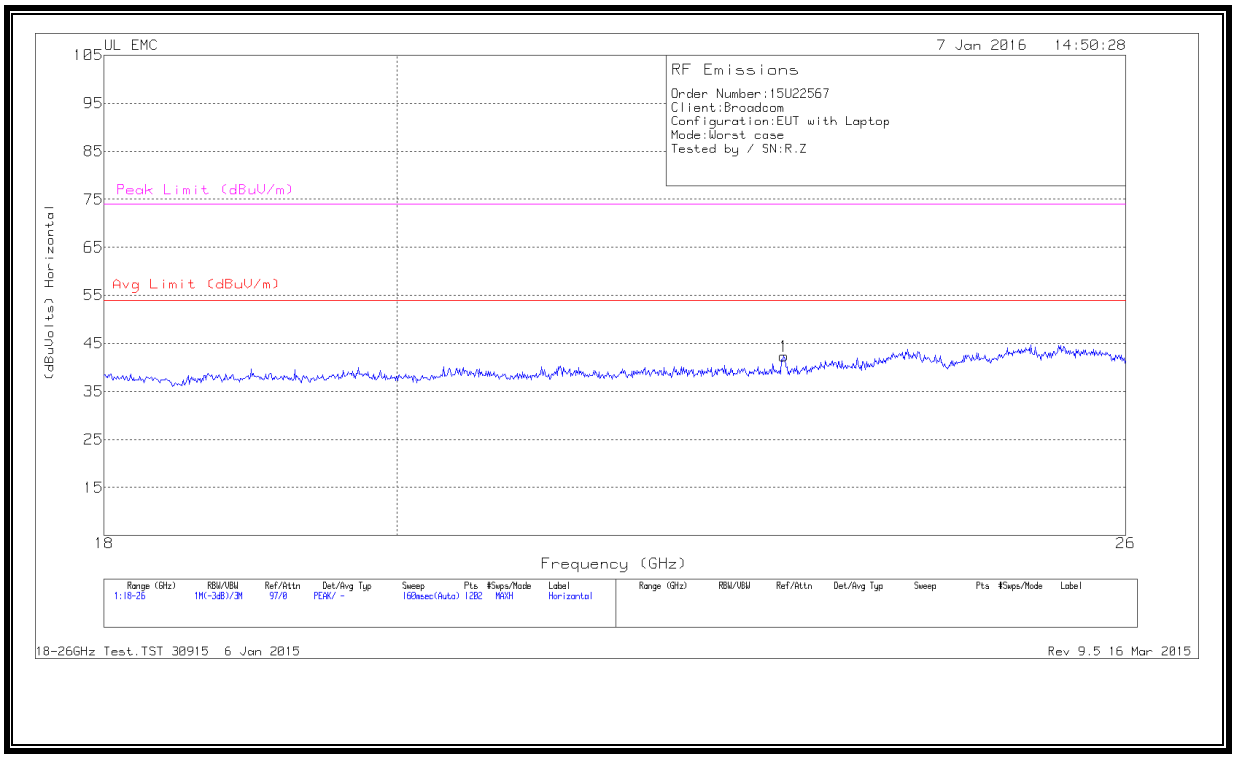
Trace Markers

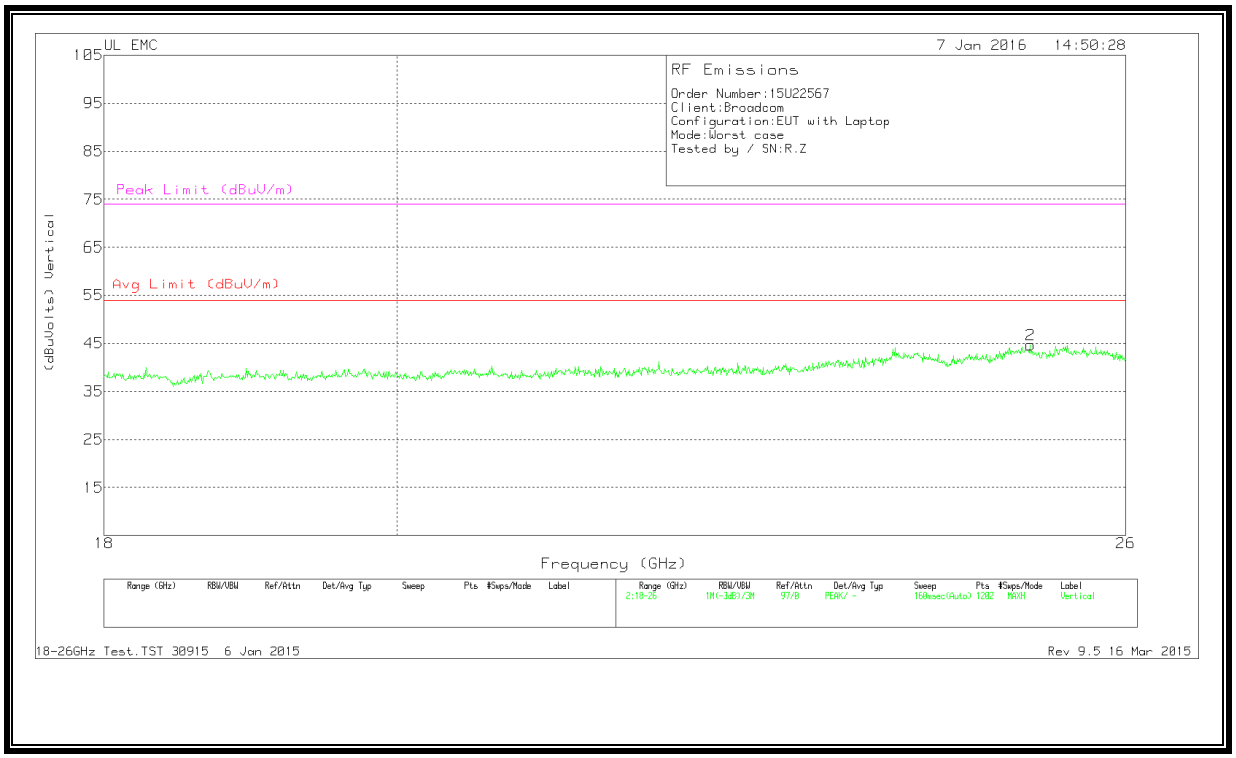
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T130 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	199.1623	53.09	Qp	16.5	-27	42.59	43.52	-.93	198	182	H
2	214.3866	41.62	Qp	14.5	-26.9	29.22	43.52	-14.3	194	166	H
3	299.754	47.23	Qp	17.3	-26.2	38.33	46.02	-7.69	219	106	H
4	398.2	40.34	Pk	19.4	-26.3	33.44	46.02	-12.58	0-360	101	H
5	497.82	35.6	Qp	21.7	-26.3	31	46.02	-15.02	38	207	H
6	498.3	40.7	Pk	21.7	-26.2	36.2	46.02	-9.82	0-360	199	V

Pk - Peak detector
Qp - Quasi-Peak detector

9.10. WORST-CASE ABOVE 18GHz

SPURIOUS EMISSIONS 18 – 26GHz



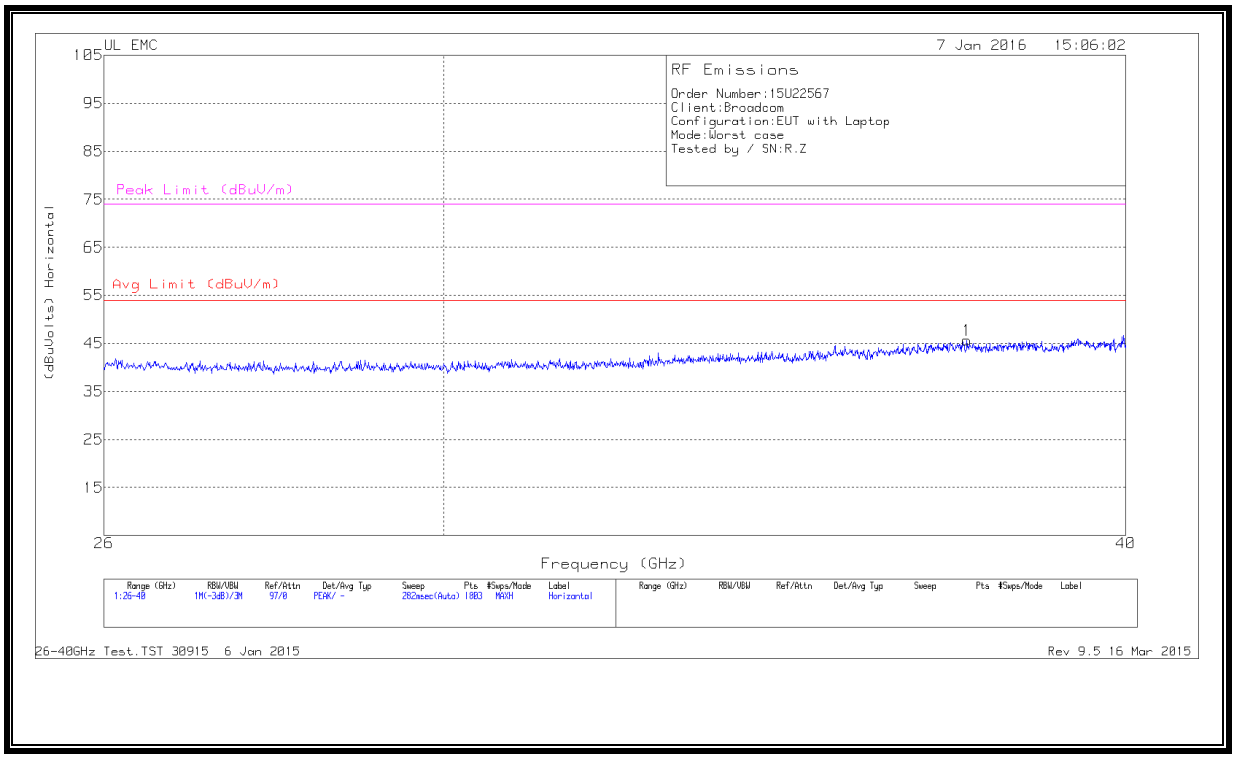


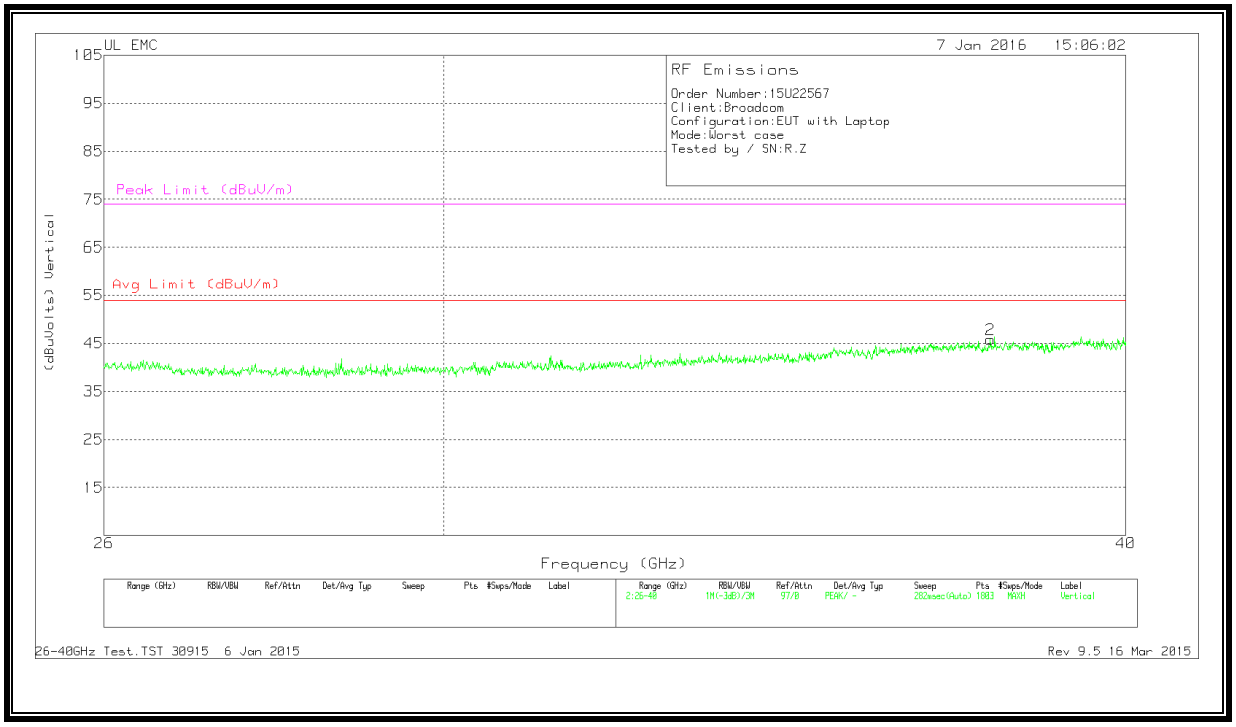
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T477 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	22.989	43.63	Pk	33.1	-24.9	-9.5	42.33	54	-11.67	74	-31.67
2	25.121	44.57	Pk	34.2	-24.6	-9.5	44.67	54	-9.33	74	-29.33

Pk - Peak detector

SPURIOUS EMISSIONS 26 – 40GHz





Trace Markers

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	37.405	50.97	Pk	37.3	-33.1	-9.5	45.67	54	-8.33	74	-28.333
2	37.778	50.93	Pk	37	-32.6	-9.5	45.83	54	-8.17	74	-28.17

Pk - Peak detector

10. AC POWER LINE CONDUCTED EMISSIONS

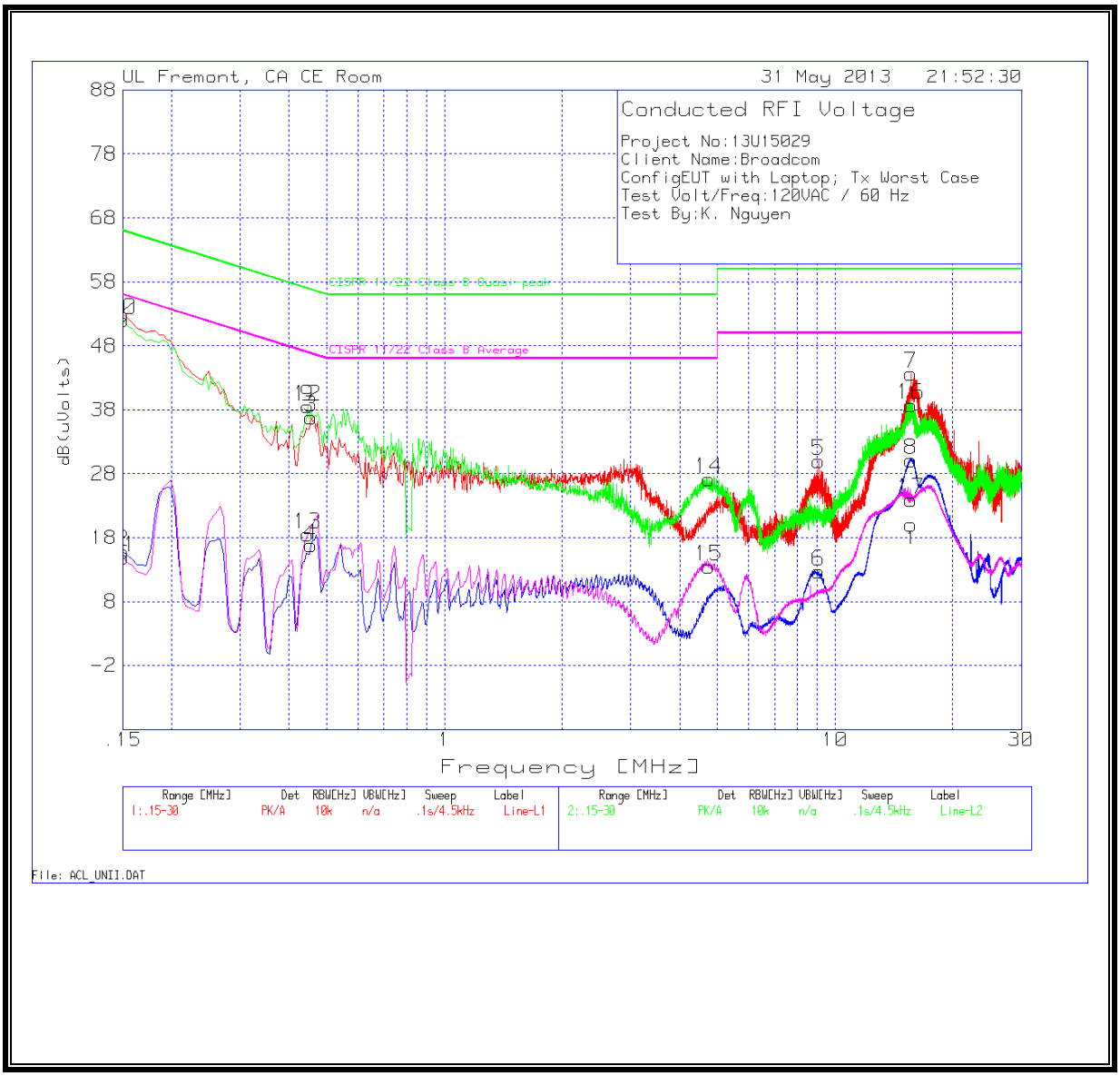
LIMITS

FCC §15.207 (a)

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

* Decreases with the logarithm of the frequency.

LINE 1 & LINE 2 RESULTS



6 WORST EMISSIONS

Project No:	**13U15029**
Client Name:	**Broadcom**
Config:	**EUT with Laptop; Tx Worst Case**
Test Volt/Freq:	**120VAC / 60 Hz**
Test By:	**K. Nguyen**

Line-L1 .15 - 30MHz

Test Frequency (MHz)	Meter Reading (dBuV)	Detector	T24 IL L1(dB)	LC Cables(dB)	dB(uVolts)	CISPR 11/22 Class B Quasi-peak	Peak Margin	CISPR 11/22 Class B Average	Average Margin
0.15	52.79	PK	0.1	0	52.89	66	-13.11	-	-
0.15	15.7	Av	0.1	0	15.8	-	-	56	-40.2
0.456	36.67	PK	0.1	0	36.77	56.8	-20.03	-	-
0.456	16.75	Av	0.1	0	16.85	-	-	46.8	-29.95
9.06	29.76	PK	0.1	0.1	29.96	60	-30.04	-	-
9.06	12.52	Av	0.1	0.1	12.72	-	-	50	-37.28
15.675	43.28	PK	0.2	0.2	43.68	60	-16.32	-	-
15.675	29.68	Av	0.2	0.2	30.08	-	-	50	-19.92

Line-L2 .15 - 30MHz

Test Frequency	Meter Reading	Detector	T24 IL L2 (dB)	LC Cables (dB)	dB(uVolts)	CISPR 11/22 Class B Quasi-peak	Peak Margin	CISPR 11/22 Class B Average	Average Margin
0.15	51.88	PK	0.1	0	51.98	66	-14.02	-	-
0.15	14.84	Av	0.1	0	14.94	-	-	56	-41.06
0.447	38.45	PK	0.1	0	38.55	56.9	-18.35	-	-
0.447	18.42	Av	0.1	0	18.52	-	-	46.9	-28.38
4.749	26.99	PK	0.1	0.1	27.19	56	-28.81	-	-
4.749	13.29	Av	0.1	0.1	13.49	-	-	46	-32.51
15.675	38.39	PK	0.2	0.2	38.79	60	-21.21	-	-
15.675	23.57	Av	0.2	0.2	23.97	-	-	50	-26.03

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear Average detector
LgAv - Log Average detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection