

EMC Test Report

Project Number: 4185288

Report Number: 4185288EMC01

Revision Level: 0

Client: ADTRAN, Inc.

Equipment Under Test: Indoor Wireless Access Point

Model Number: BSAP-3045

FCC ID: HDCBSAP304X

Applicable Standards: FCC Part 15 Subpart C, § 15.407

ANSI C63.10: 2013

Report issued on: 03 October 2017

Test Result: Compliant

Tested by:



Jeremy Pickens, Senior EMC Engineer

Reviewed by:



David Schramm, Operations Manager

Remarks: This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This document is issued by the Company under its General Conditions of Service accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

Table of Contents

1	SUMMARY OF TEST RESULTS	3
1.1	MODIFICATIONS REQUIRED FOR COMPLIANCE	3
2	GENERAL INFORMATION	4
2.1	CLIENT INFORMATION	4
2.2	TEST LABORATORY	4
2.3	GENERAL INFORMATION OF EUT	4
2.4	OPERATING MODES AND CONDITIONS	4
2.5	EUT CONNECTION BLOCK DIAGRAM.....	5
2.6	SYSTEM CONFIGURATIONS	5
3	UNDESIRABLE EMISSIONS	6
3.1	TEST RESULT.....	6
3.2	TEST METHOD.....	6
3.3	TEST SITE	6
3.4	TEST EQUIPMENT	7
3.5	TEST DATA - UNII BAND 1 – RADIATED BAND EDGE	8
3.6	TEST DATA - UNII BAND 3 – RADIATED BAND EDGE	11
3.7	TEST DATA – (1-6GHZ).....	14
3.8	TEST DATA – (6-18GHZ).....	20
3.9	TEST DATA – (18-40GHZ).....	26
4	REVISION HISTORY	32
	APPENDIX A: POWER ADJUSTMENT REQUIREMENTS	33

1 Summary of Test Results

Test Description	Test Specification	Test Result
Occupied Bandwidth	15.407	NS(1)
Spectral Density	15.407(5)	NS(1)(2)
Peak Power Output	15.407(4)	NS(1)(2)
Peak Excursion	15.407(6)	NS(1)
Radiated Spurious Emissions	15.407(b)	Compliant

(1) This evaluation is to support a Class II Permissive Change. Refer to original filing for results.

(2) In order to maintain compliance when using the higher gain antenna, the power must be reduced. These calculations are included in Appendix A.

1.1 Modifications Required for Compliance

None

2 General Information

2.1 Client Information

Name: ADTRAN, Inc.
Address: 901 Explorer Blvd.
City, State, Zip, Country: Huntsville, AL 35806

2.2 Test Laboratory

Name: SGS North America, Inc.
Address: 620 Old Peachtree Road NW, Suite 100
City, State, Zip, Country: Suwanee, GA 30024, USA

Accrediting Body: A2LA
Type of lab: Testing Laboratory
Certificate Number: 3212.01

2.3 General Information of EUT

Type of Product: Indoor Wireless Access Point
Model: BSAP-3045
Serial Number: 30454316050013

Frequency Range: 5150 to 5250 MHz and 5725 to 5825MHz
Data Modes: 802.11a, 802.11n (HT20), 802.11n (HT40), 802.11ac (VHT20), 802.11ac (VHT40), 802.11ac (VHT80)
Antenna: Ventev, 2.4/5 GHz, 12/13 dBi Directional Antenna (P/N: M6012013O3D36820)

Rated Voltage: 48Vdc (PoE)

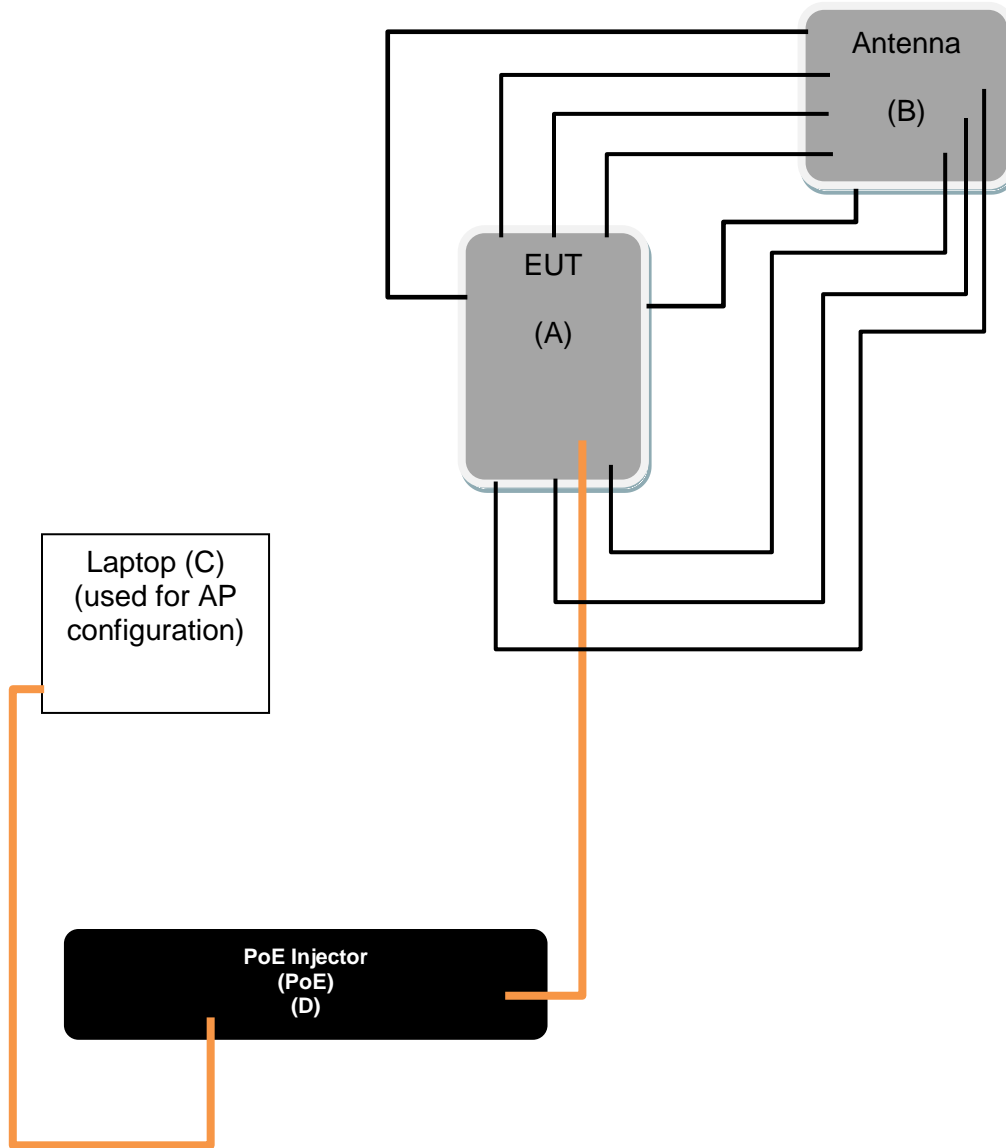
Sample Received Date: 1 August 2017
Dates of testing: 08 – 16 August 2017

2.4 Operating Modes and Conditions

For spurious emissions measurements, only the worst-case mode with respect to peak power from the original filing was investigated: 802.11a, 6Mbps.

Continuous traffic was generated using test commands which allowed a >98% duty-cycle transmission.

2.5 EUT Connection Block Diagram



2.6 System Configurations

Device reference	Manufacturer	Description	Model Number	Serial Number
A	ADTRAN, Inc.	Indoor Access Point	BSAP-3045	30454316050013
B	Ventev	Dual Band MIMO Patch	M6012013O3D36820	Not Labeled
C	Lenovo	Laptop	ThinkPad E560	PF-0HGUH7 16/12
D	EnGenius	PoE Adapter	EPA5006GAT-B	173287527

3 Undesirable Emissions

3.1 Test Result

Test Description	Test Specification	Test Result
Spurious Emissions	15.407(b) ANSI C63.10: 2013	Compliant

3.2 Test Method

Testing was performed using the radiated and conducted methods defined in ANSI C63.10: 2013 clause 12.7 and KDB 789033 D02 General UNII Test Procedures New Rules v01r04. In lieu of the marker-delta or integration methods, band edge compliance was shown using a peak detector and a 1MHz resolution bandwidth.

Lowest, middle, and highest channels were investigated for each band. Only the modulation providing the worst-case power was reported except at the band edges where all modulations and bandwidths were measured. The frequency range examined was 1GHz to 40GHz.

Limit:

For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

3.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 24.1 °C
Relative Humidity: 42.6 %

3.4 Test Equipment

Test End Date: 29-Aug-2017

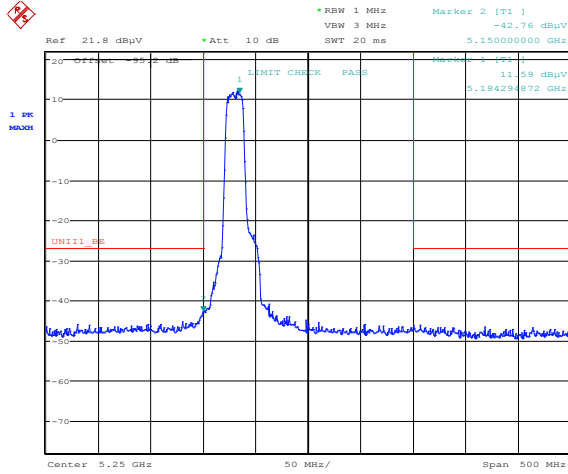
Tester: JOP

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	25-Apr-2018
ANTENNA, DRG HORN (MEDIUM)	3117	ETS LINDGREN	B079699	16-May-2018
RF CABLE	HPA190	RF LOGIC	17014	24-Jul-2018
RF CABLE	SF106	HUBER & SUHNER	B079713	24-Jul-2018
RF CABLE	SF106	HUBER & SUHNER	B079659	25-Jul-2018
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	B094463	22-Feb-2018
FILTER, BAND REJECT (2450MHZ)	BRM50709	MICRO-TRONICS	B079790	27-Jul-2018
ANTENNA, DRG HORN (SMALL)	3116B	ETS LINDGREN	B079697	21-Mar-2018
RF CABLE	SF102	HUBER & SUHNER	B079822	27-Jul-2018
RF CABLE	SF102	HUBER & SUHNER	B079823	26-Jul-2018
LOW NOISE AMPLIFIER	NSP1840-HG	MITEQ	B087572	28-Jul-2018

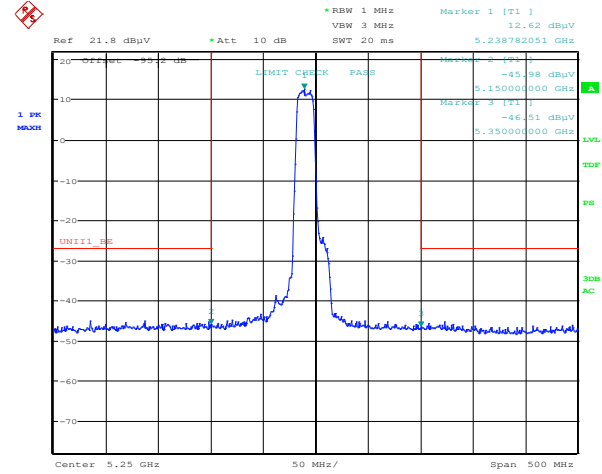
Note: The equipment calibration period is 1 year.

3.5 Test Data - UNII Band 1 – Radiated Band Edge

802.11a Channels 36 and 48

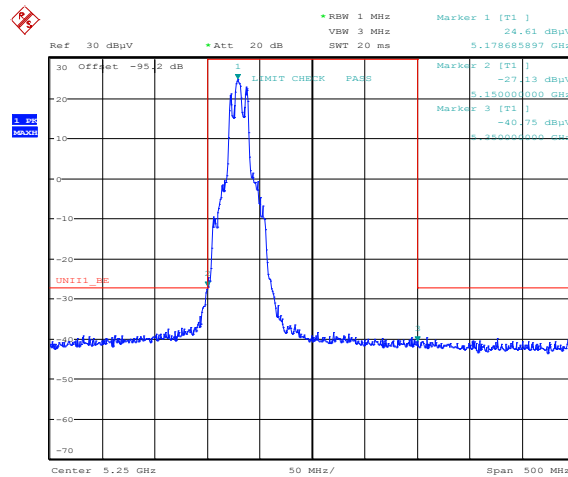


Date: 29.AUG.2017 06:43:36

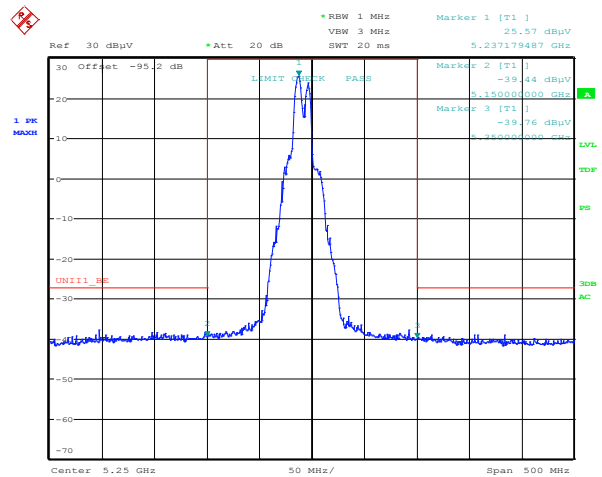


Date: 29.AUG.2017 07:16:05

802.11n (HT20) Channels 36 and 48

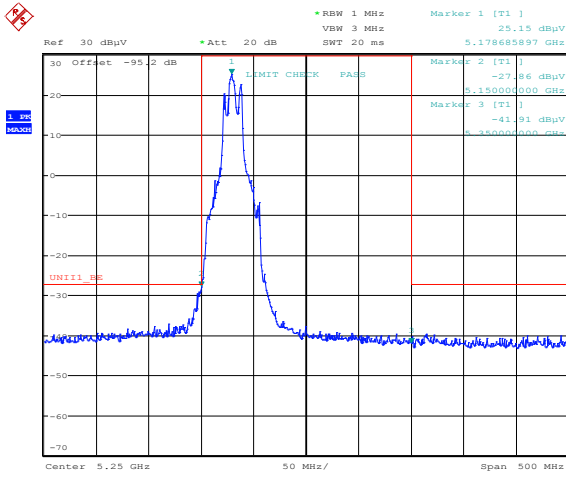


Date: 29.AUG.2017 07:34:50

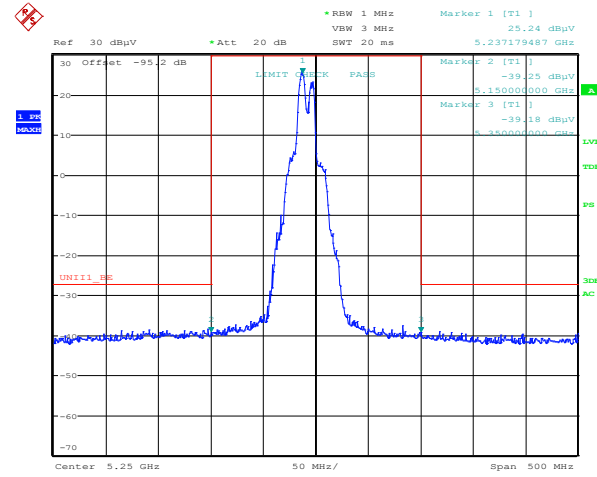


Date: 29.AUG.2017 07:32:52

802.11ac (VHT20) Channels 36 and 48

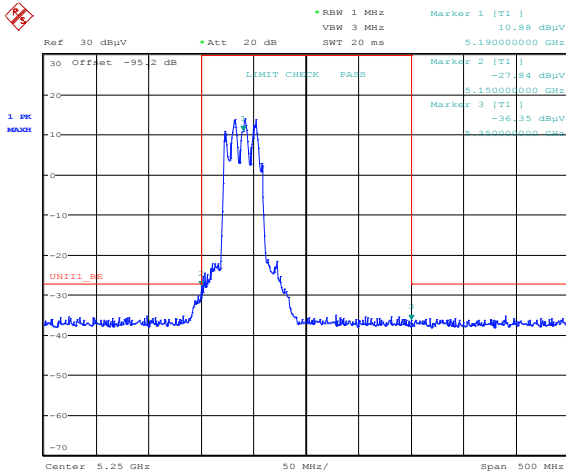


Date: 29.AUG.2017 07:40:28

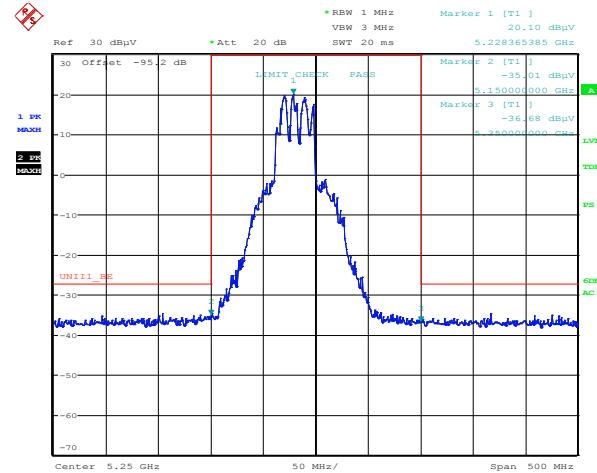


Date: 29.AUG.2017 07:41:29

802.11n (HT40) Channels 38 and 46

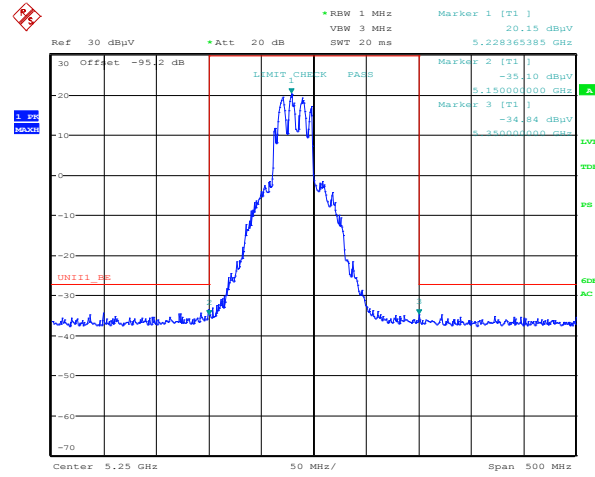
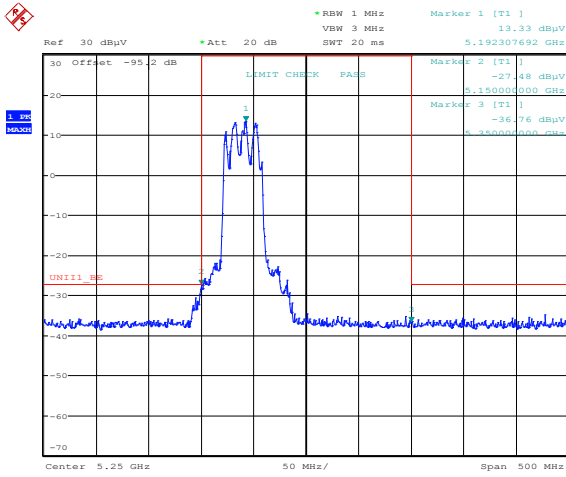


Date: 29.AUG.2017 07:46:15



Date: 29.AUG.2017 07:48:42

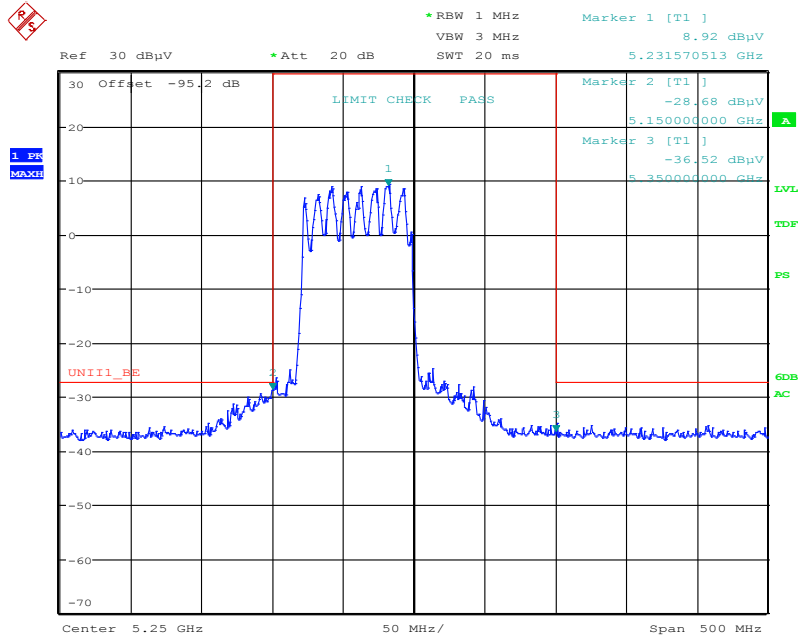
802.11ac (VHT40) Channels 38 and 46



Date: 29.AUG.2017 07:51:48

Date: 29.AUG.2017 07:50:52

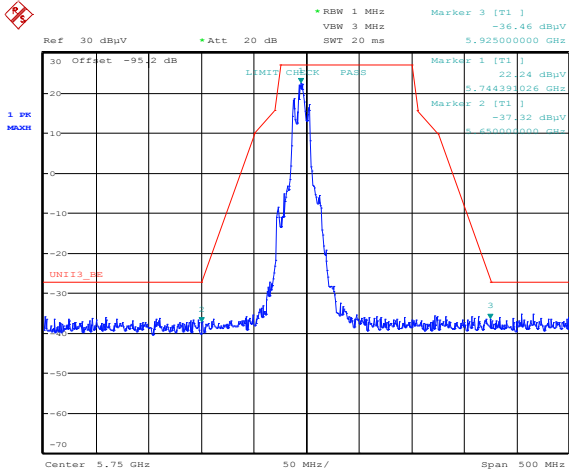
Ch 38 Target 8dBm 802.11ac (VHT80) Channel 42



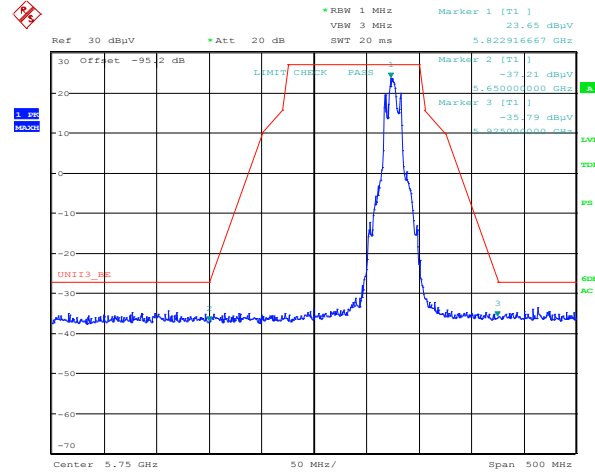
Date: 29.AUG.2017 07:53:31

3.6 Test Data - UNII Band 3 – Radiated Band Edge

802.11a Channels 149 and 165

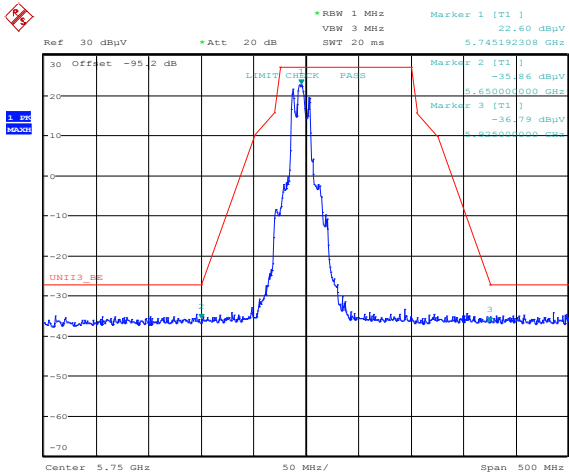


Date: 29.AUG.2017 08:30:37

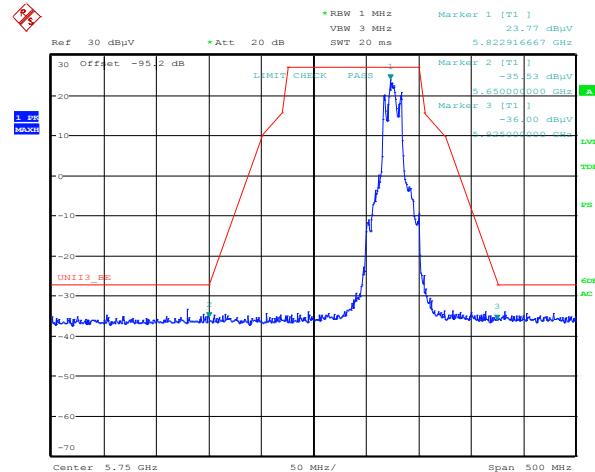


Date: 29.AUG.2017 08:32:19

802.11n (HT20) Channels 149 and 165

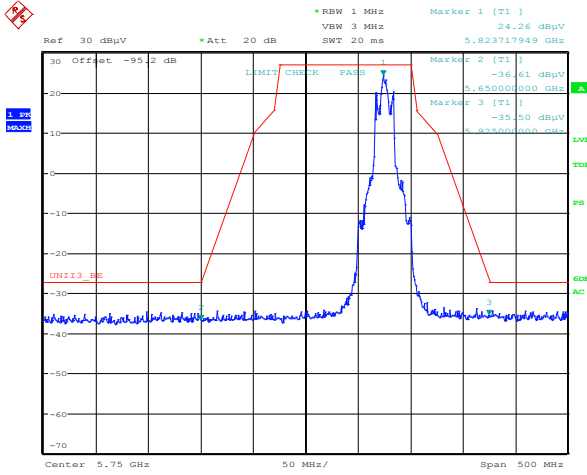
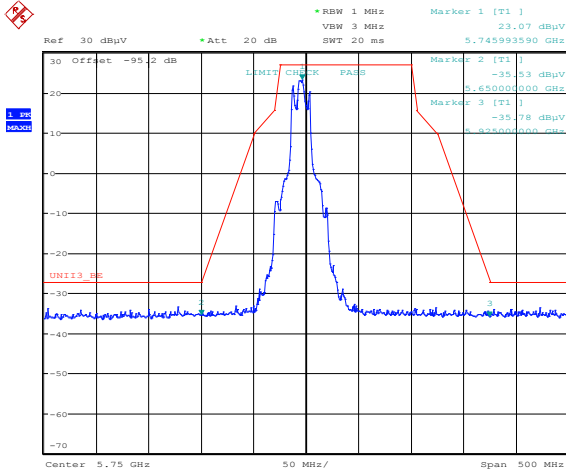


Date: 29.AUG.2017 08:34:27



Date: 29.AUG.2017 08:33:31

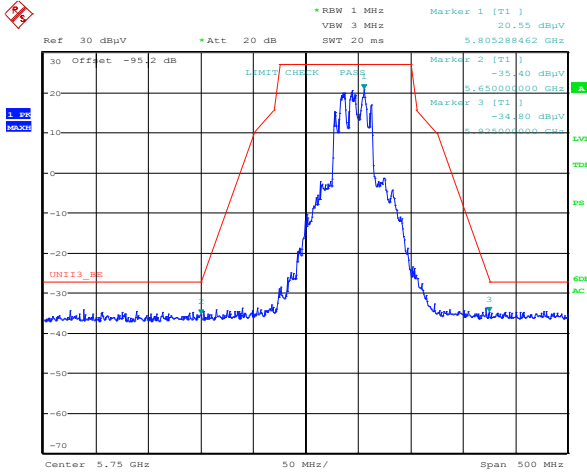
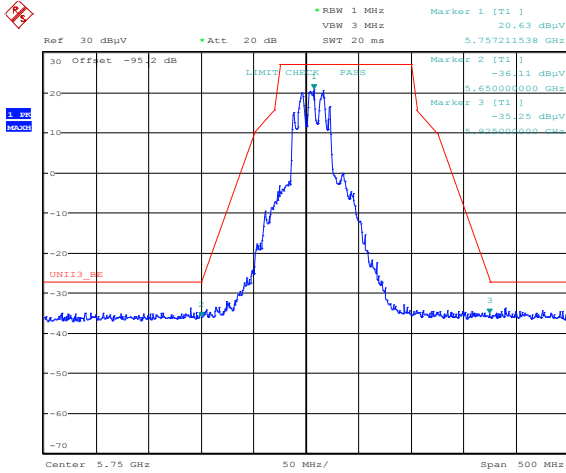
802.11ac (VHT20) Channels 149 and 165



Date: 29.AUG.2017 08:37:42

Date: 29.AUG.2017 08:38:33

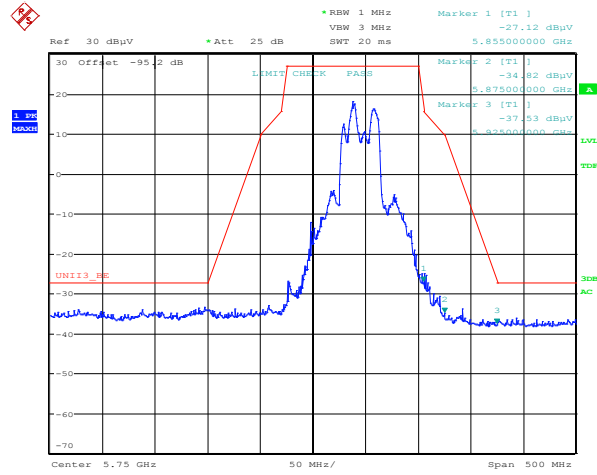
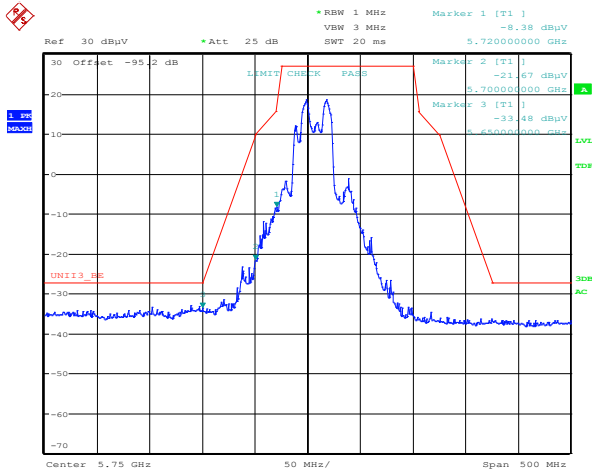
802.11n (HT40) Channels 151 and 159



Date: 29.AUG.2017 08:39:59

Date: 29.AUG.2017 08:41:23

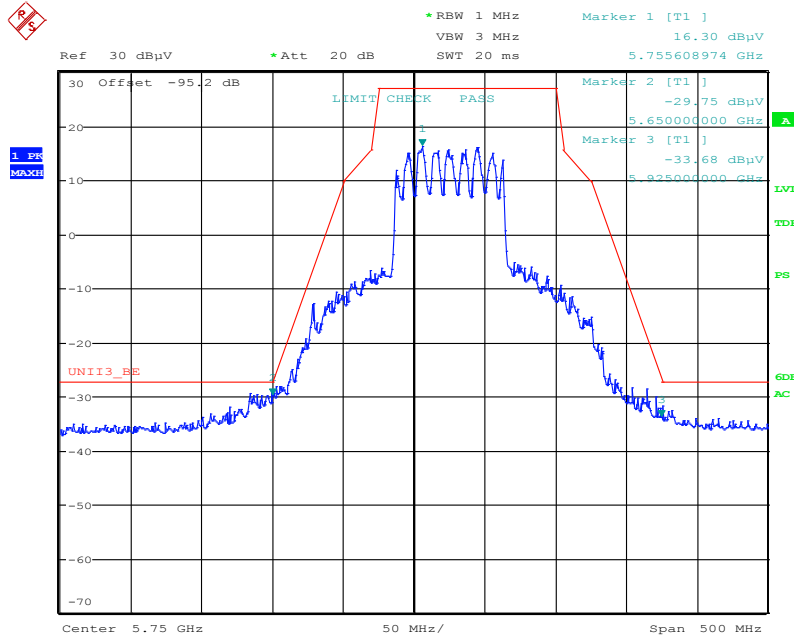
802.11ac (VHT40) Channels 151 and 159



Date: 22 JUN.2017 13:24:13

Date: 22 JUN.2017 13:44:40

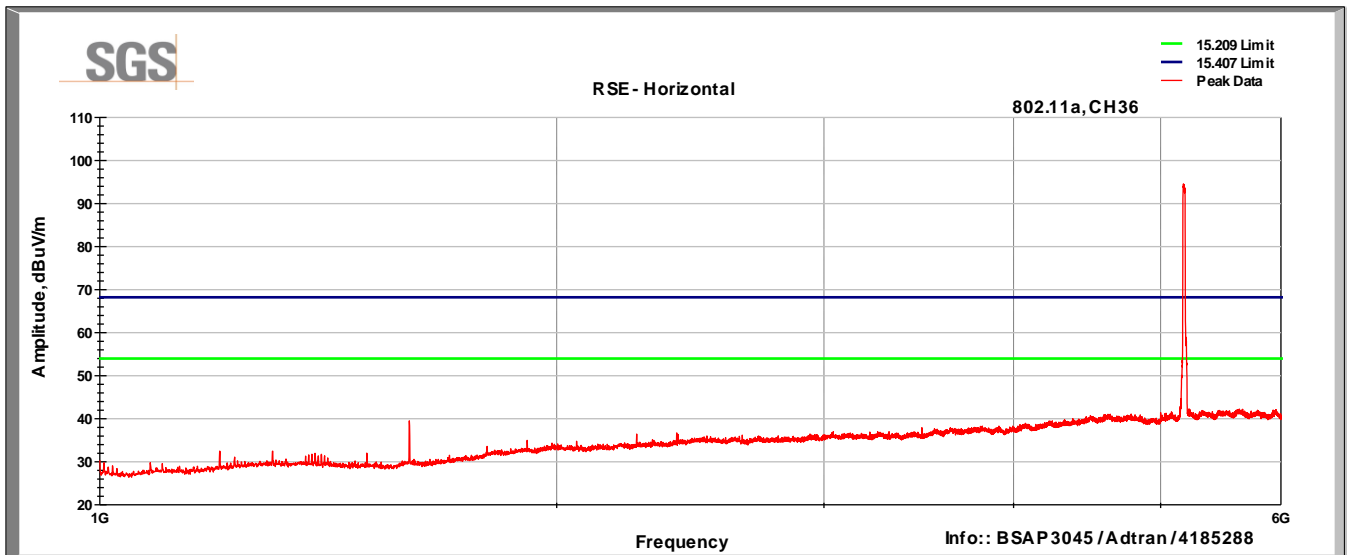
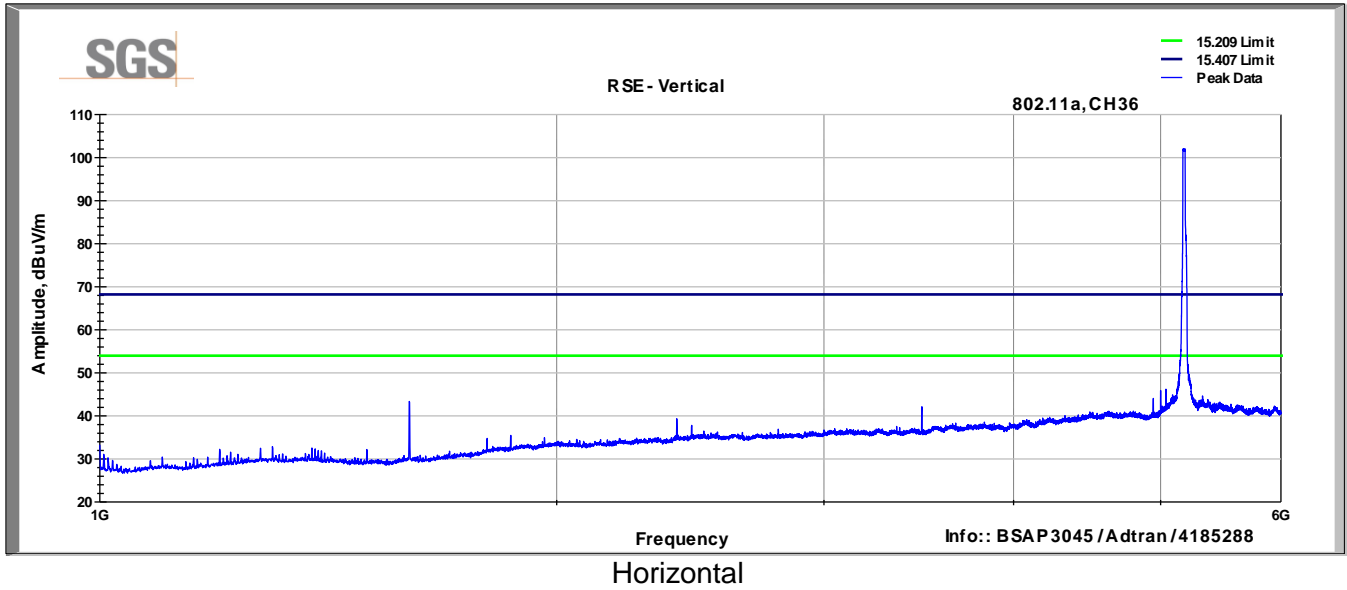
802.11ac (VHT80) Channel 155



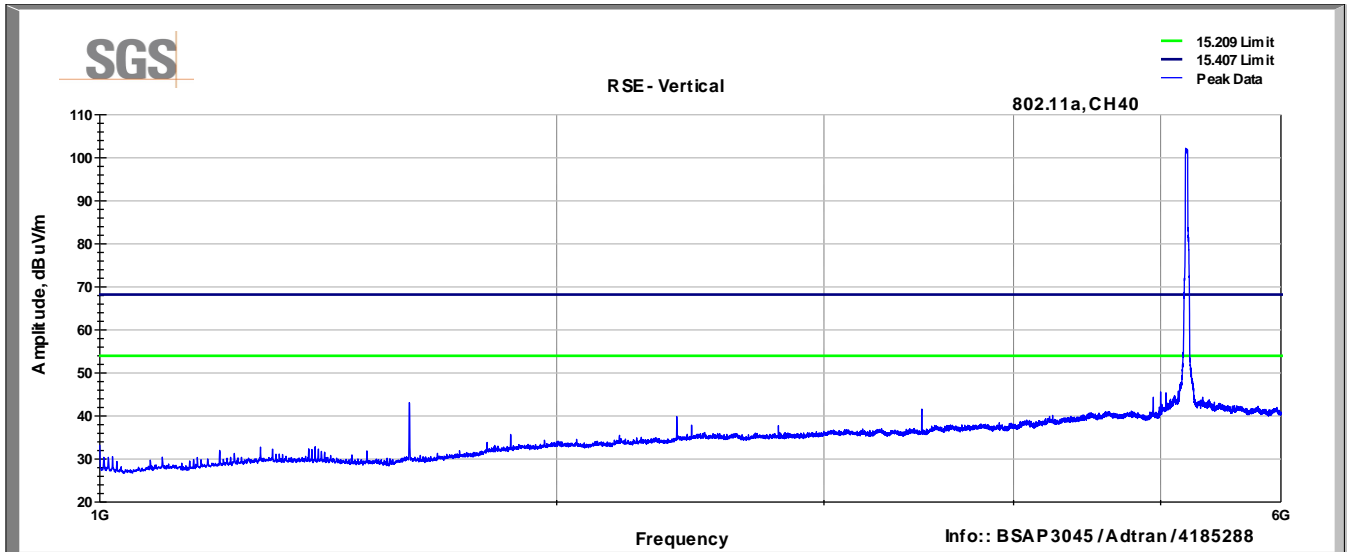
Date: 29.AUG.2017 08:44:23

3.7 Test Data – (1-6GHz)

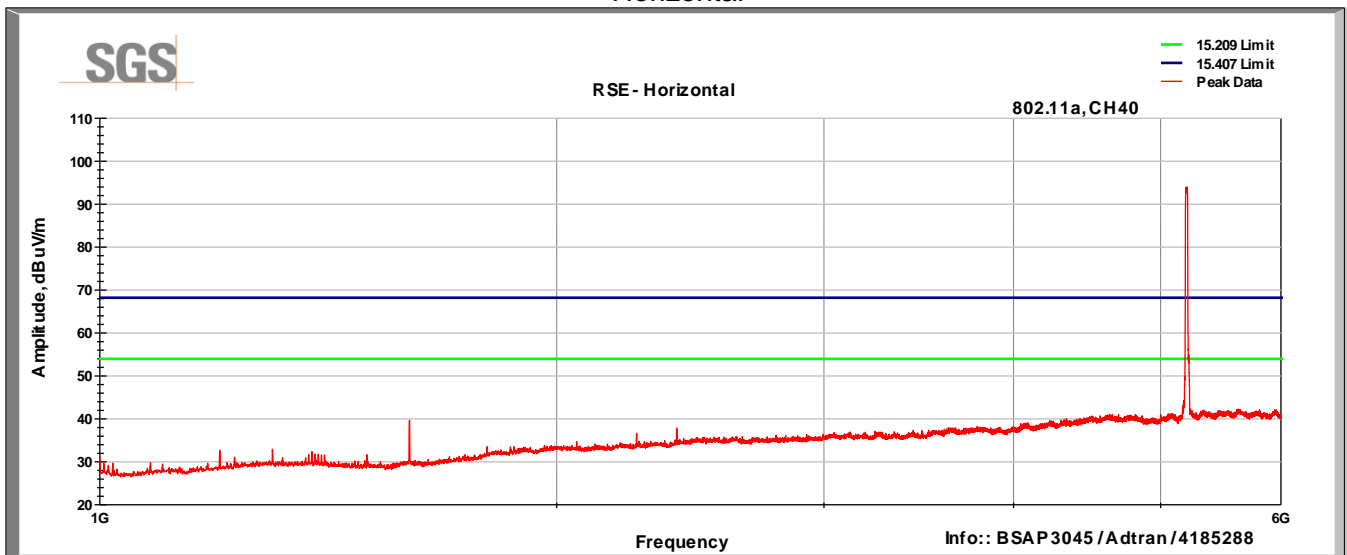
CH 36 6MB/s
Vertical



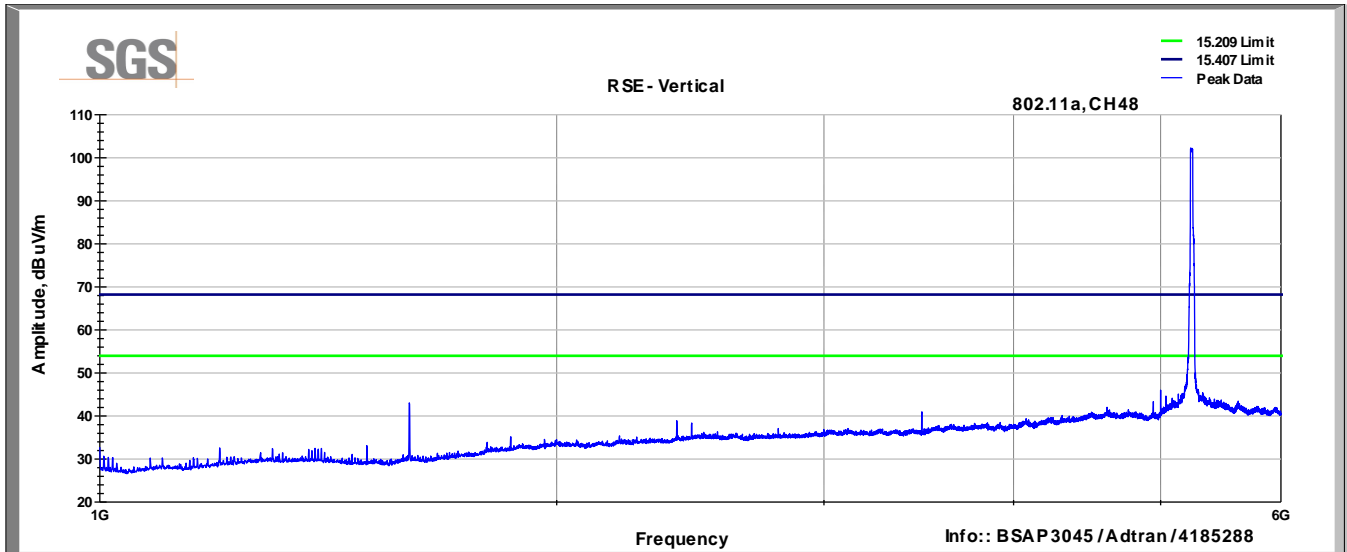
CH 40 6MB/s
Vertical



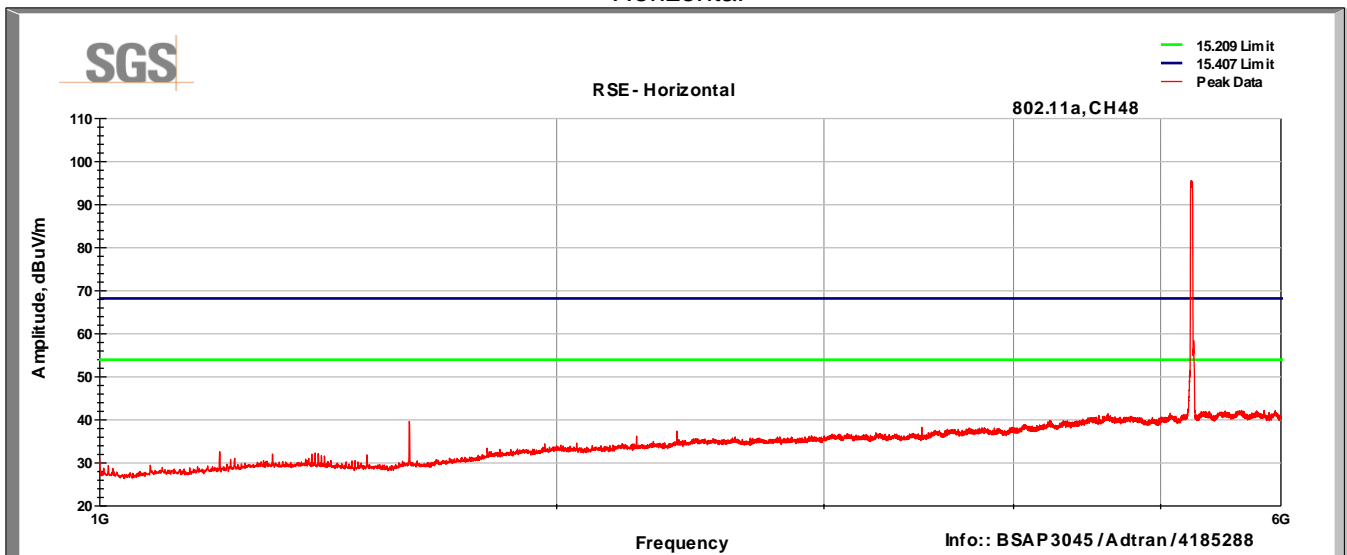
Horizontal



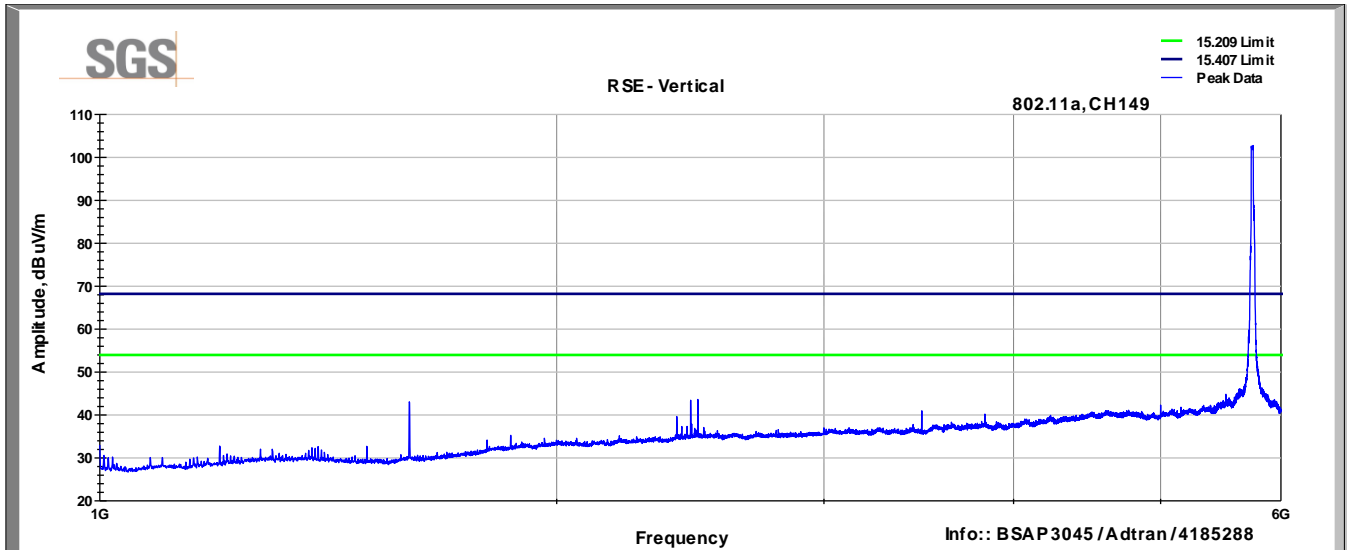
CH 48 6MB/s
Vertical



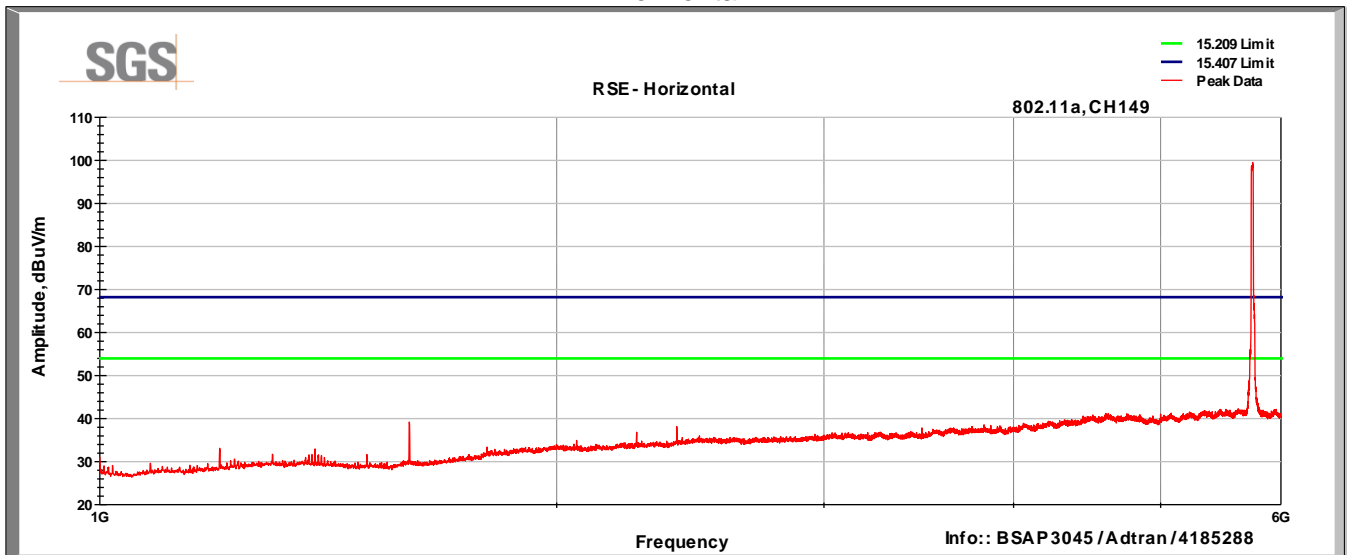
Horizontal



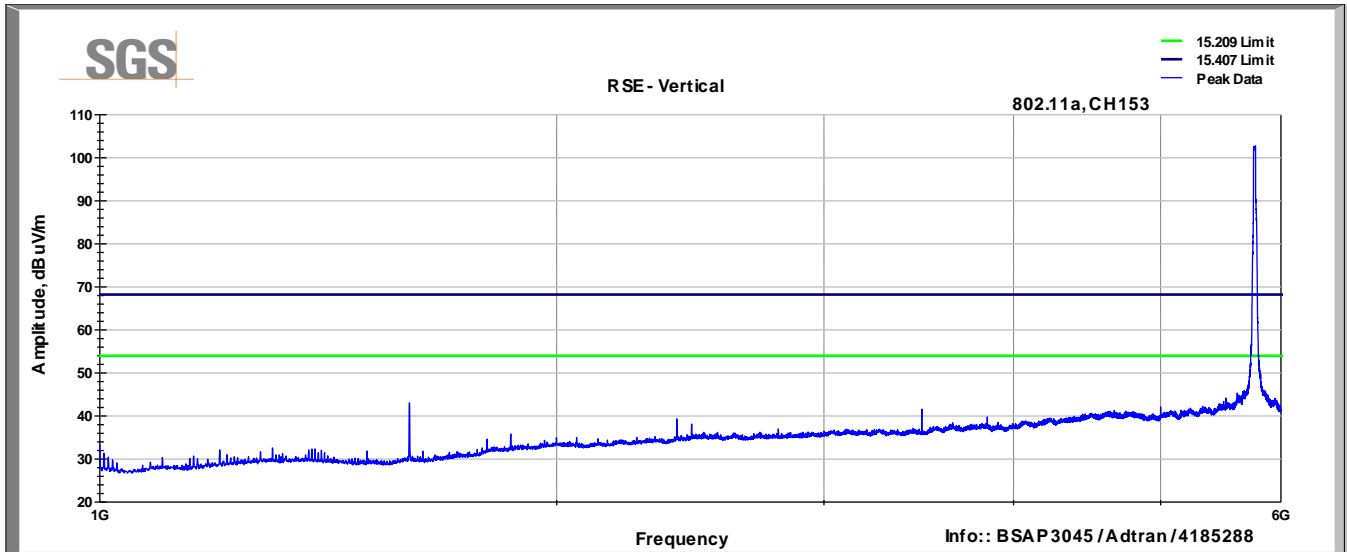
CH 149 6MB/s
Vertical



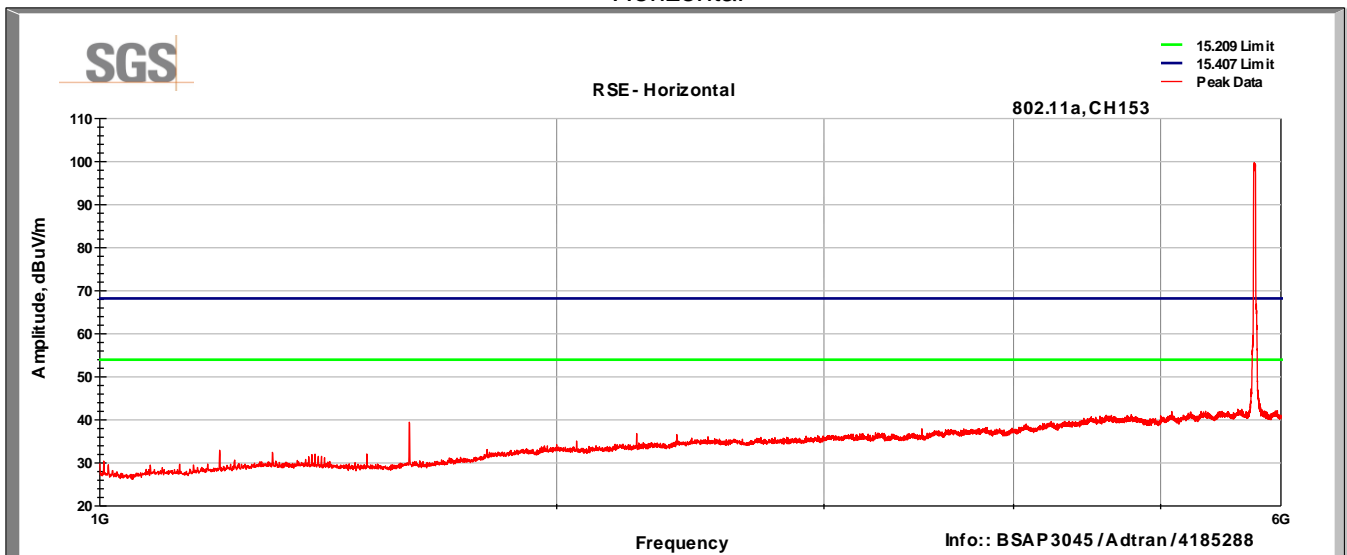
Horizontal



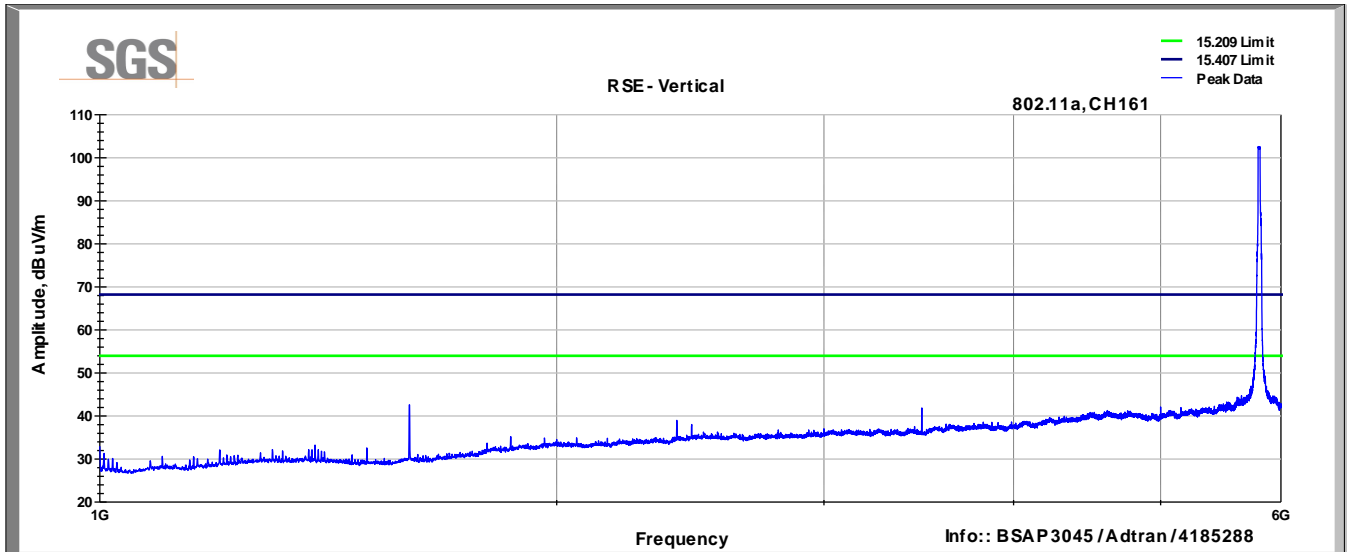
CH 153 6MB/s
Vertical



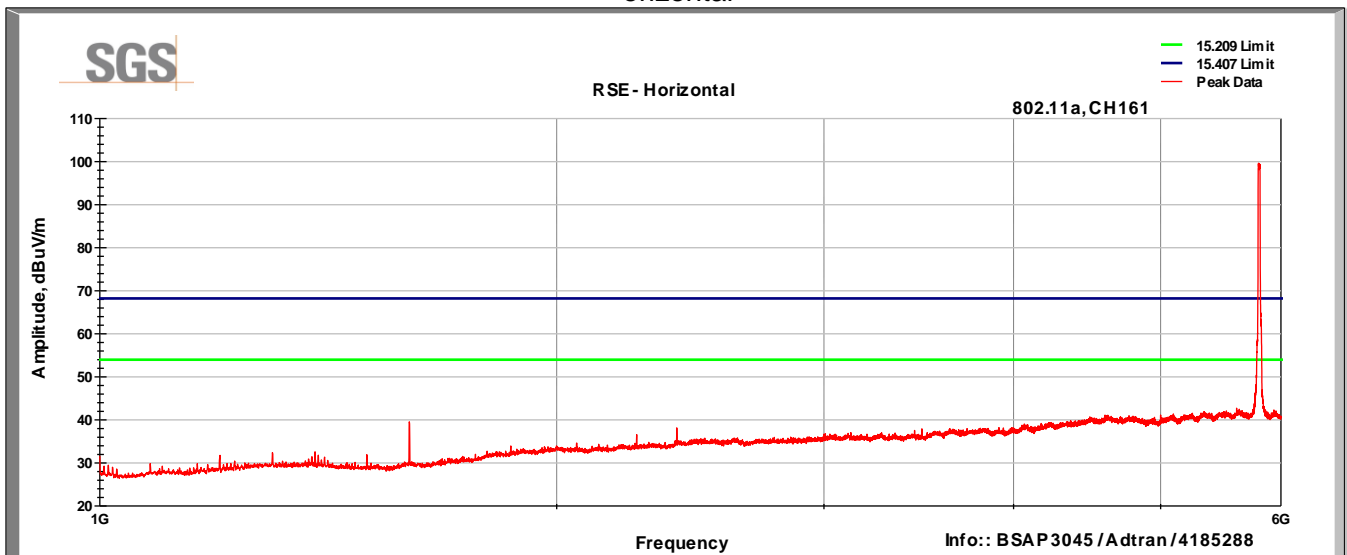
Horizontal



CH 161 6MB/s
Vertical

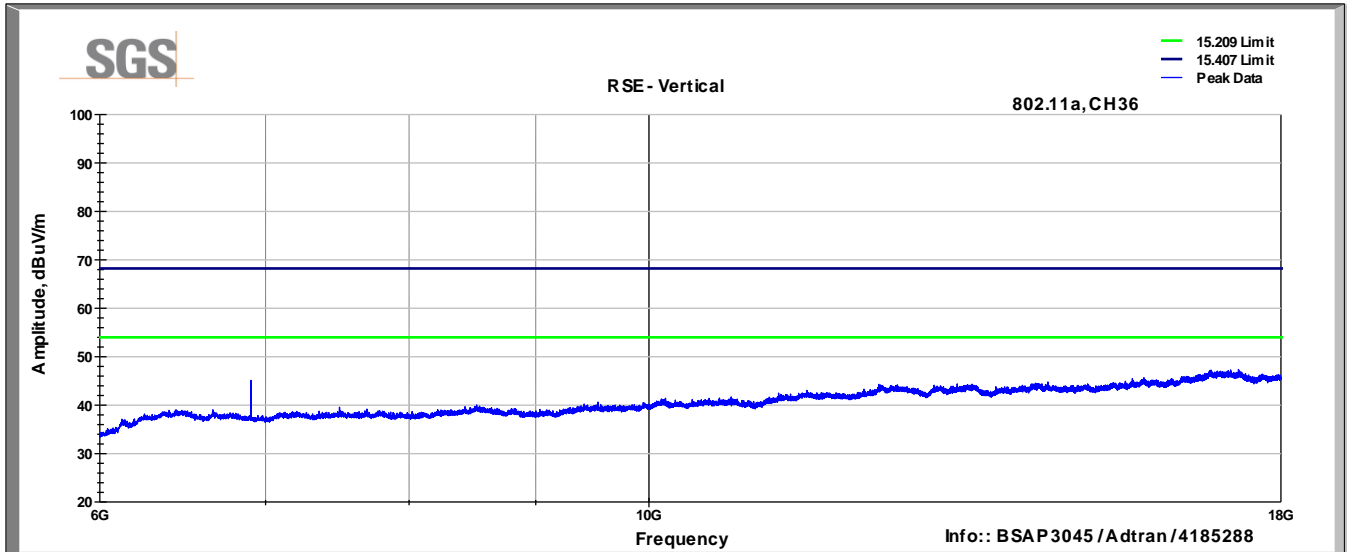


orizental

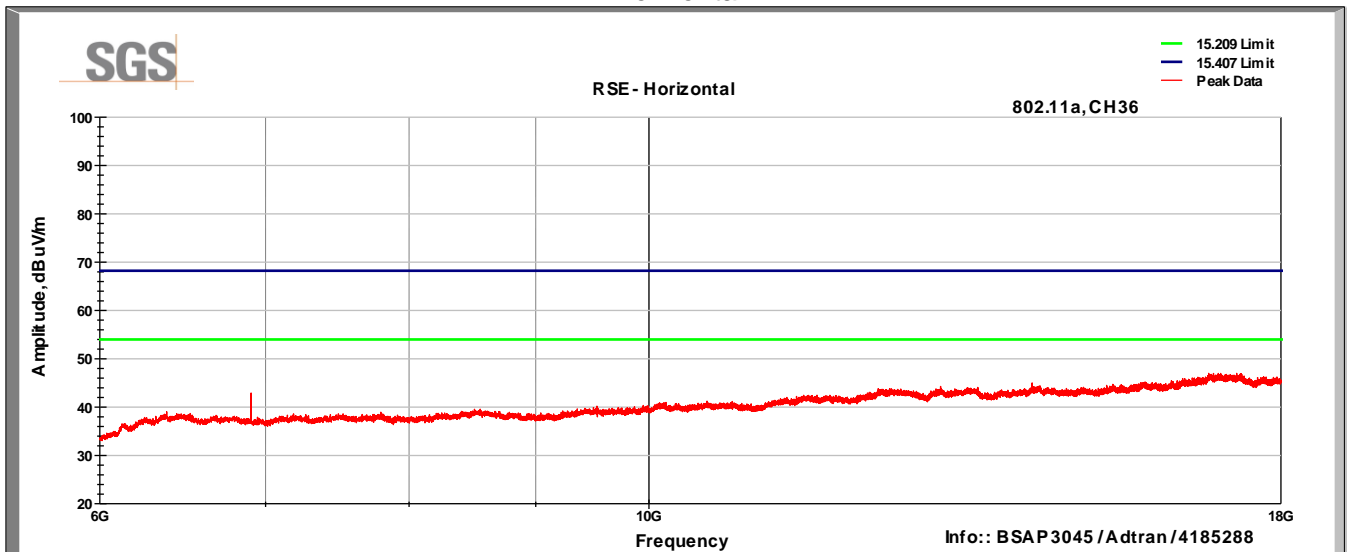


3.8 Test Data – (6-18GHz)

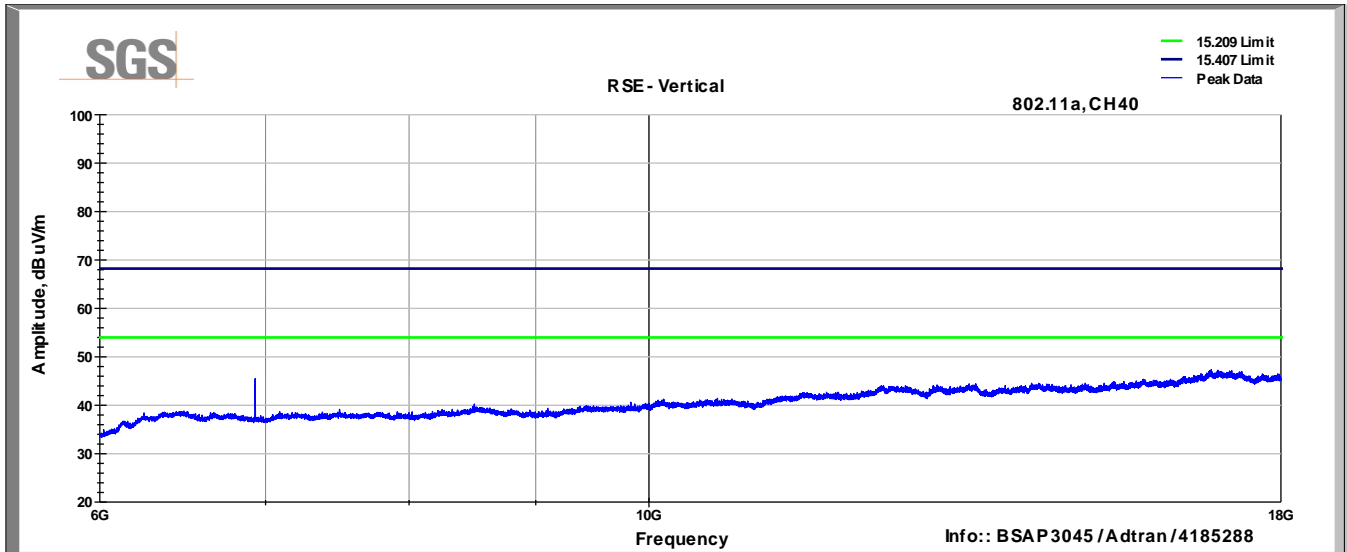
CH 36 6MB/s
Vertical



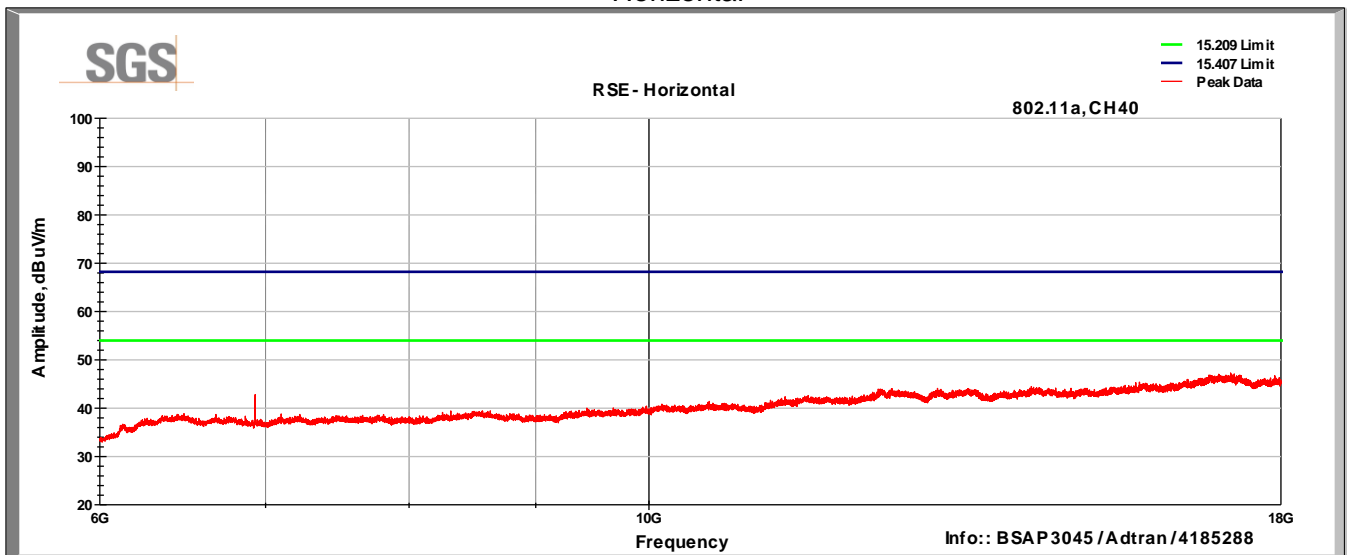
Horizontal



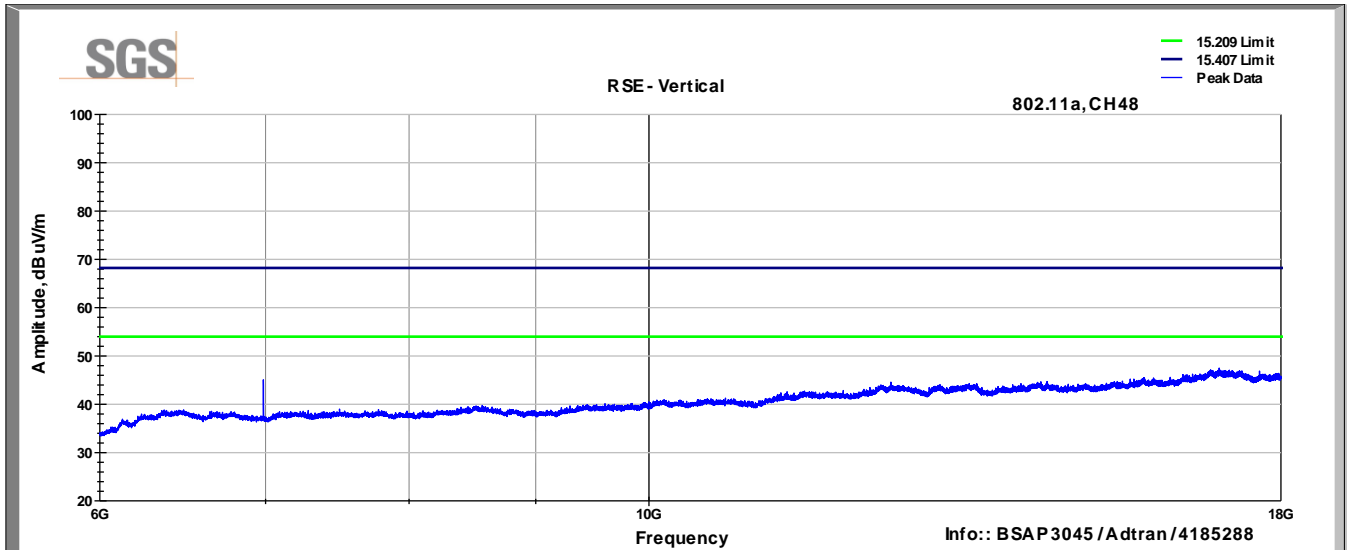
CH 40 6MB/s
Vertical



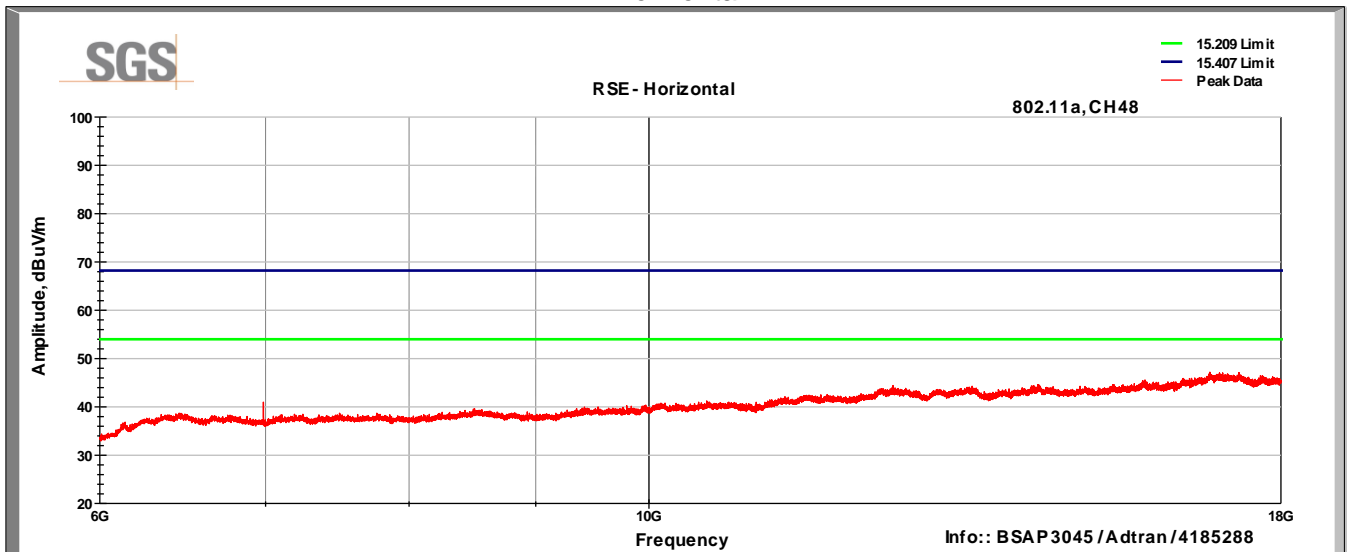
Horizontal



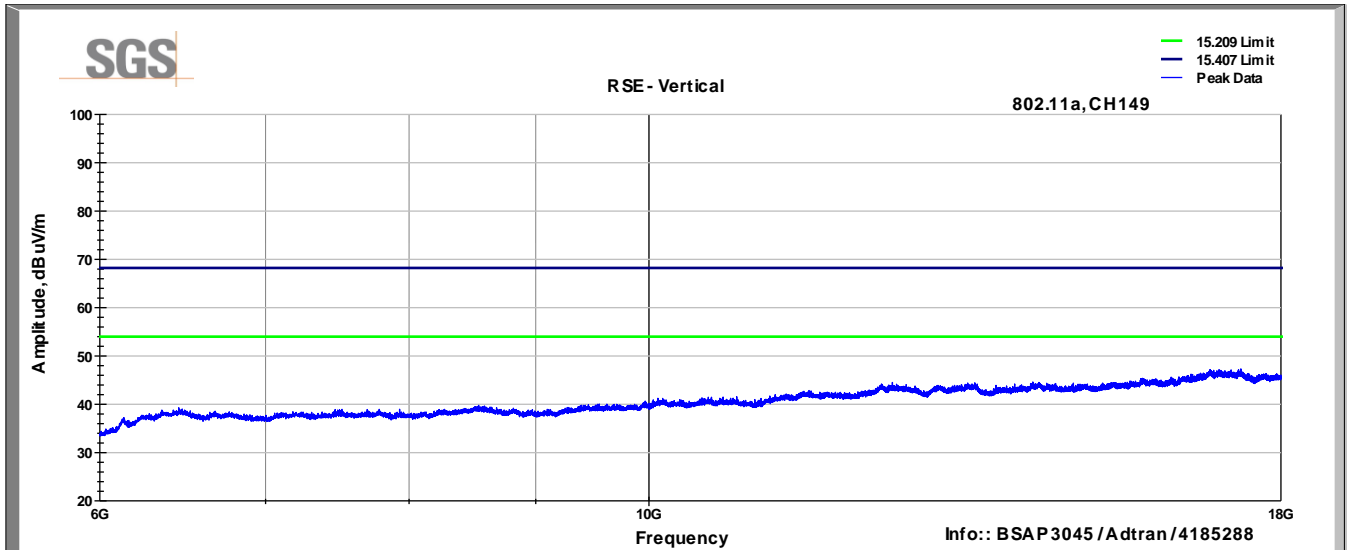
CH 48 6MB/s
Vertical



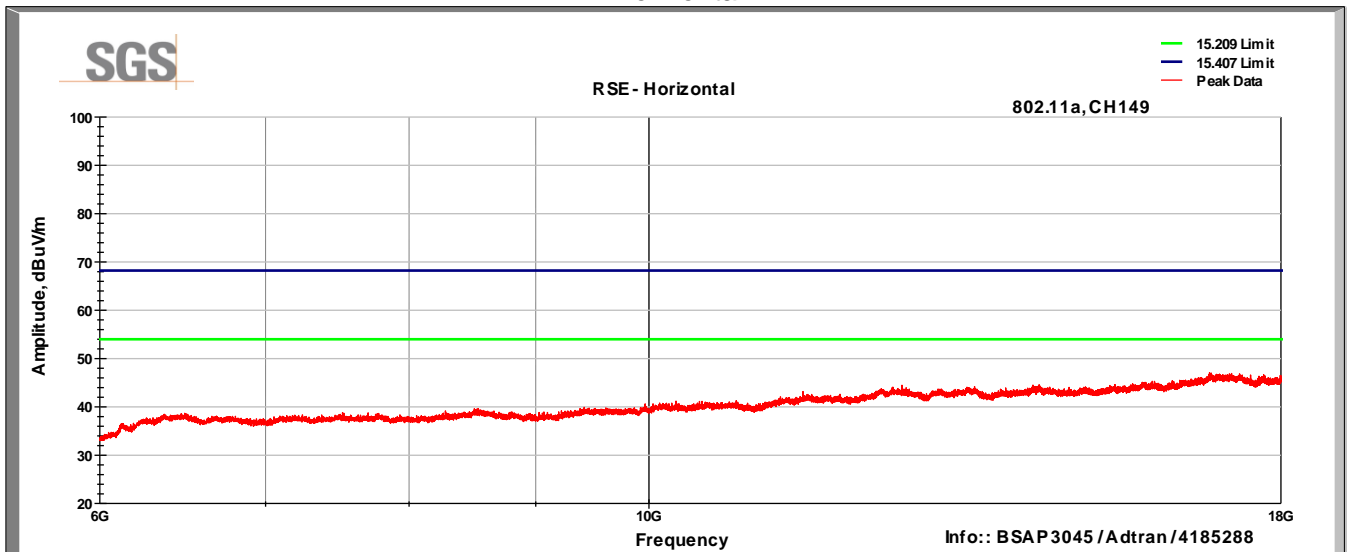
Horizontal



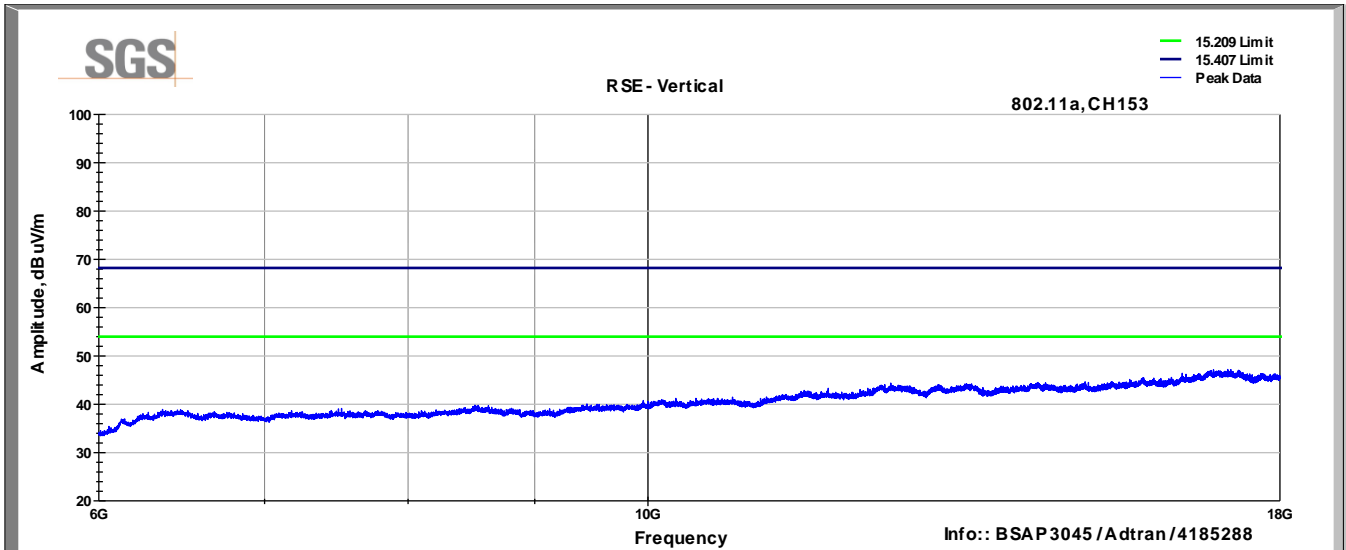
CH 149 6MB/s
Vertical



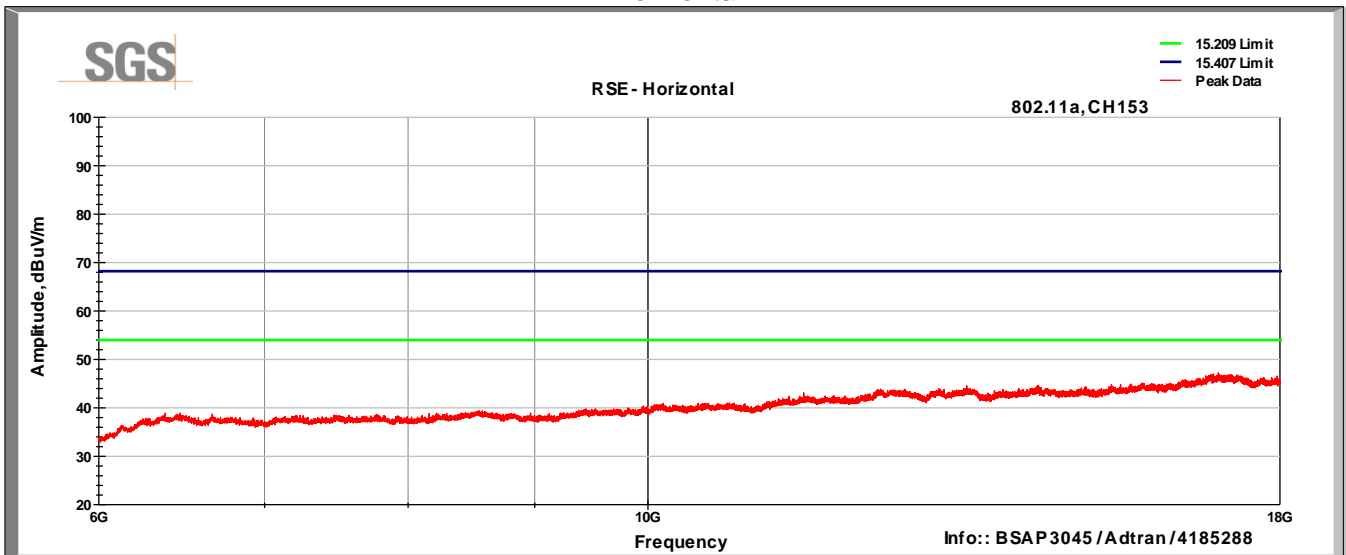
Horizontal



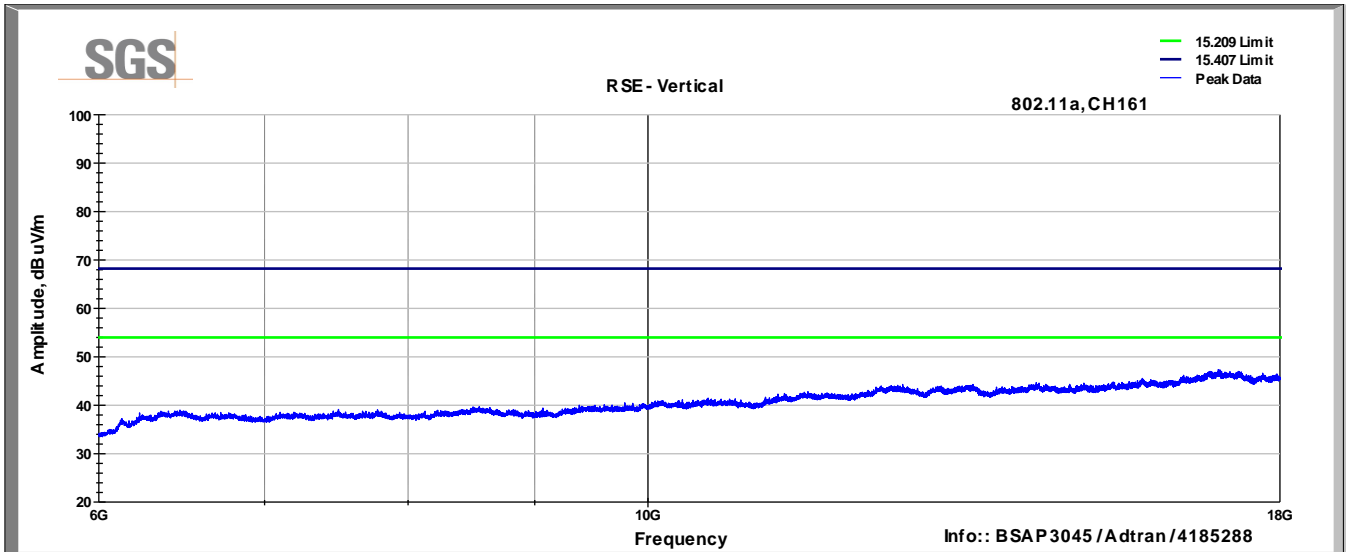
CH 153 6MB/s
Vertical



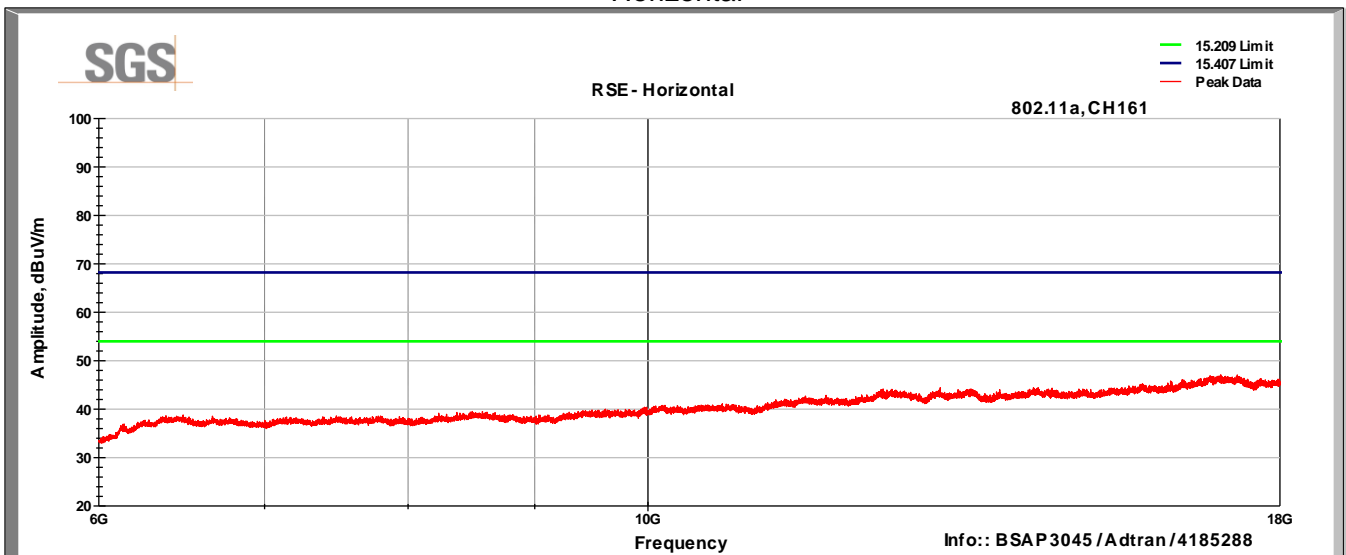
Horizontal



CH 161 6MB/s
Vertical

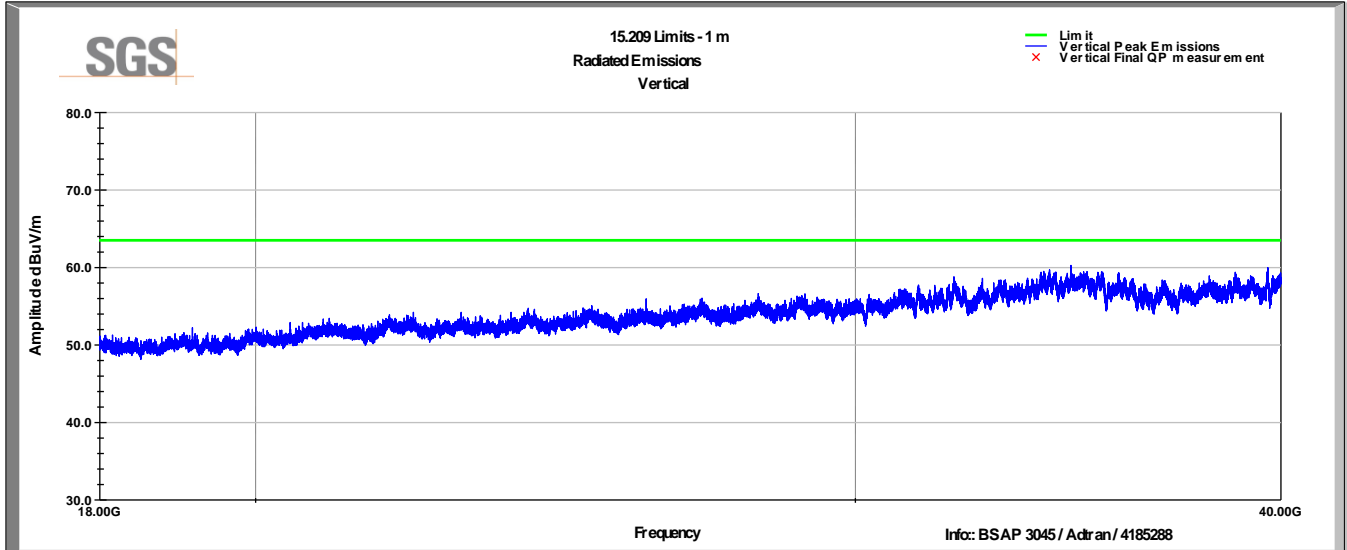


Horizontal

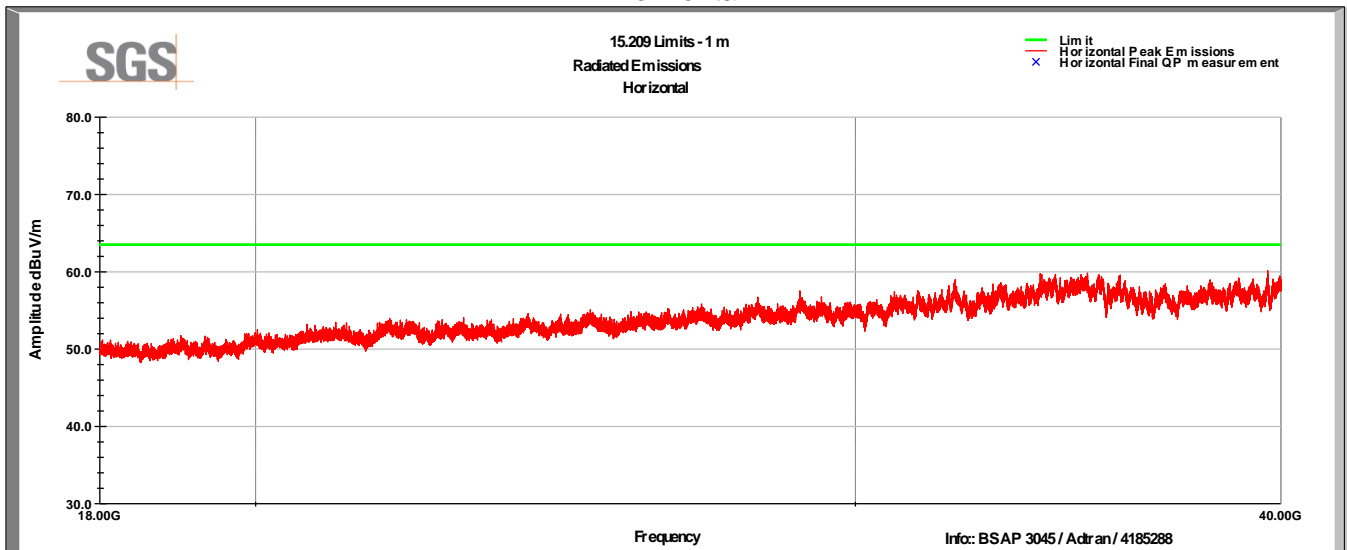


3.9 Test Data – (18-40GHz)

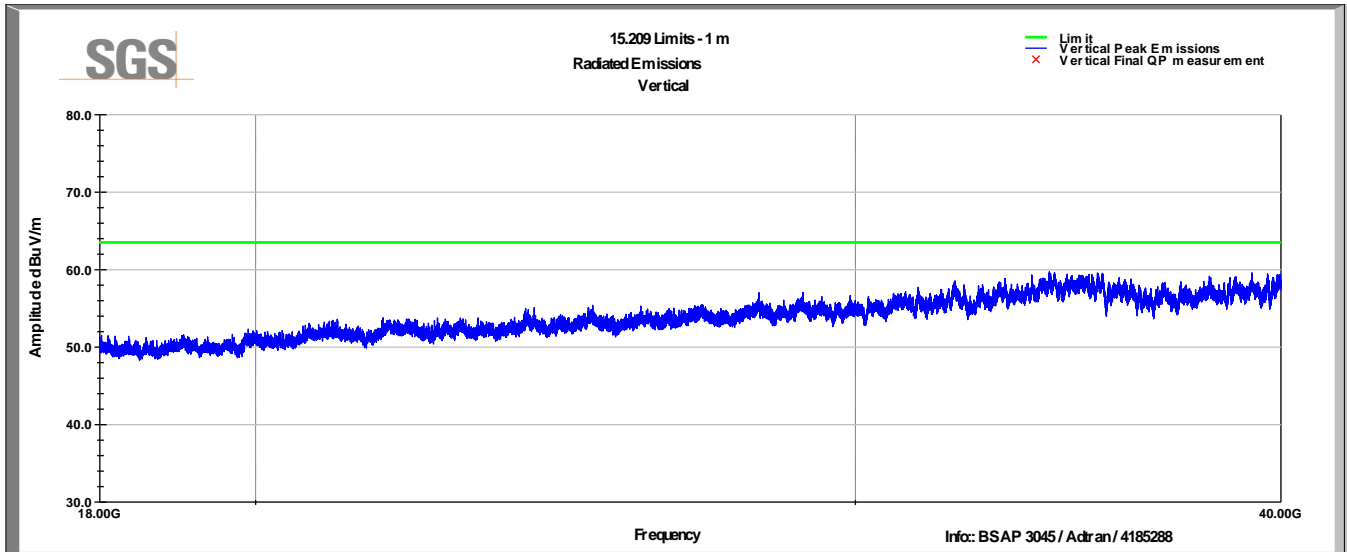
CH 36 6MB/s
Vertical



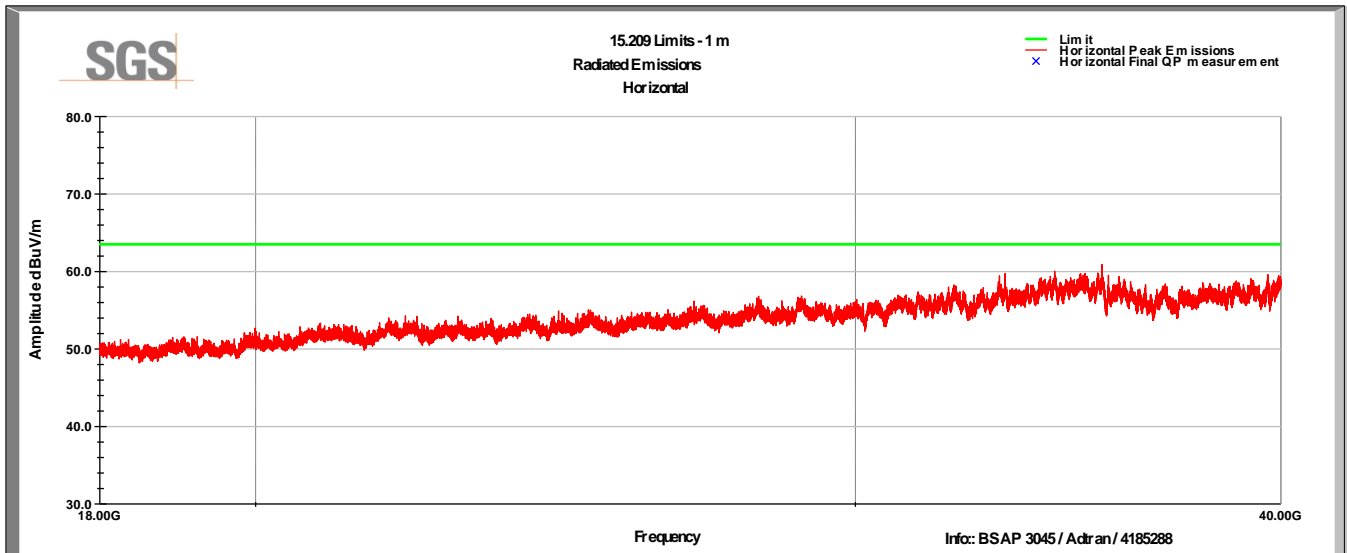
Horizontal



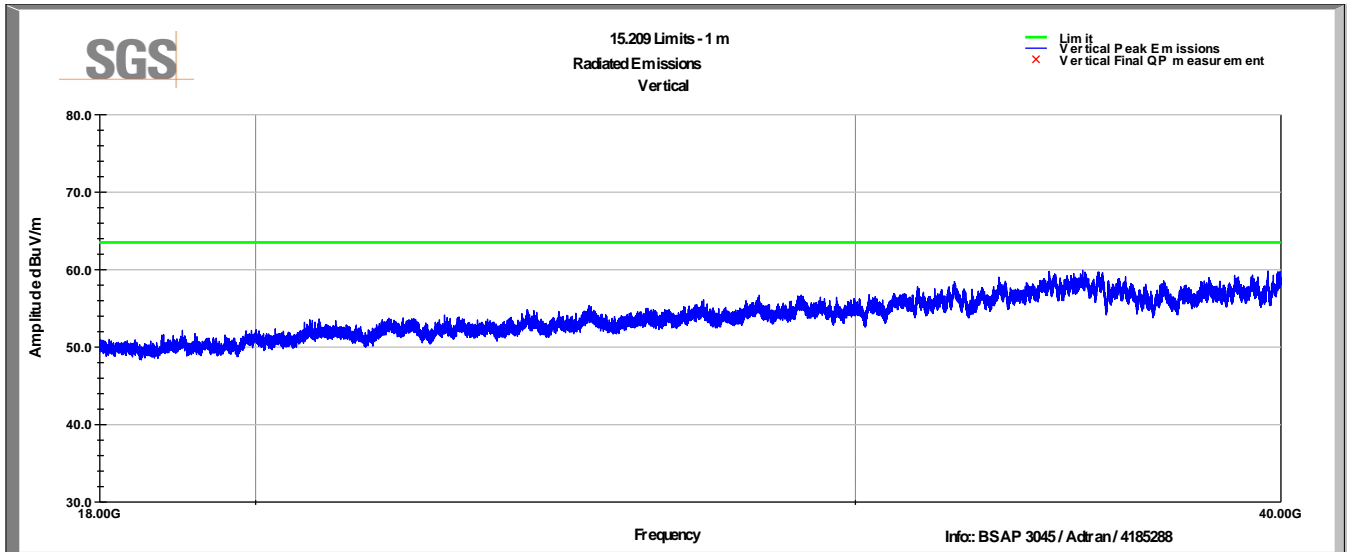
CH 40 6MB/s
Vertical



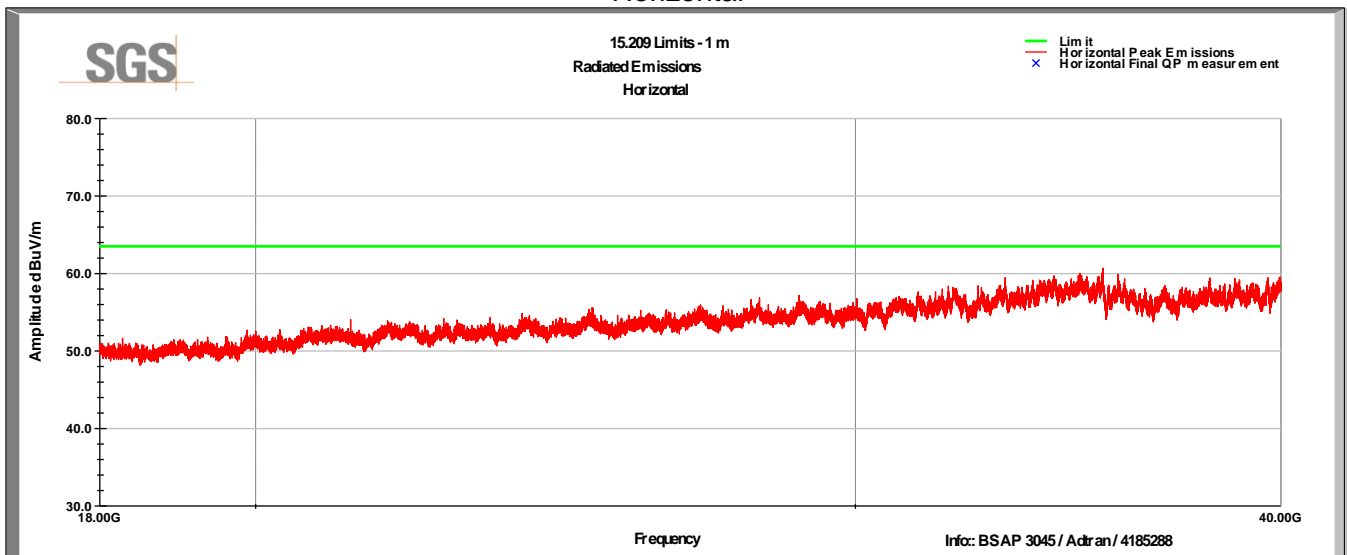
Horizontal



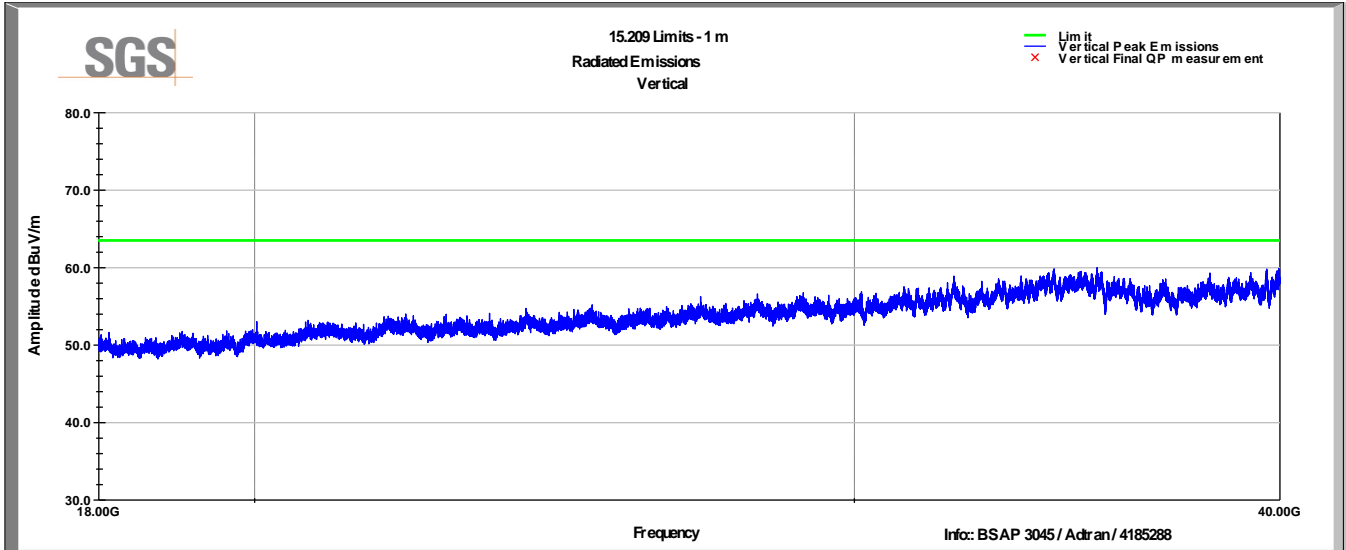
CH 48 6MB/s
Vertical



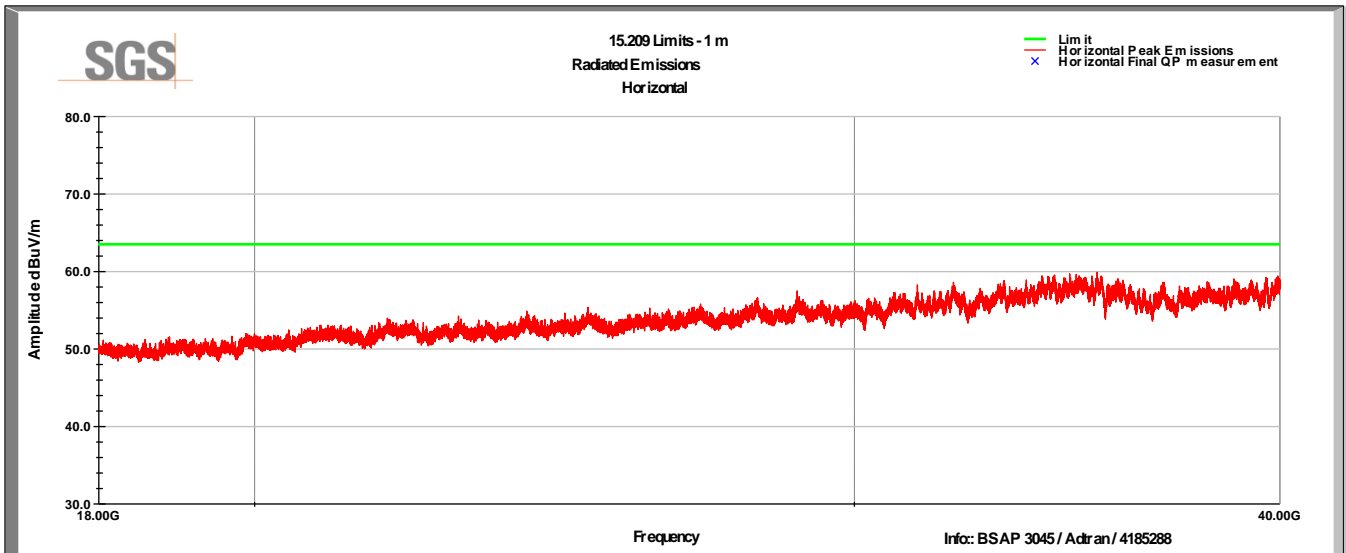
Horizontal



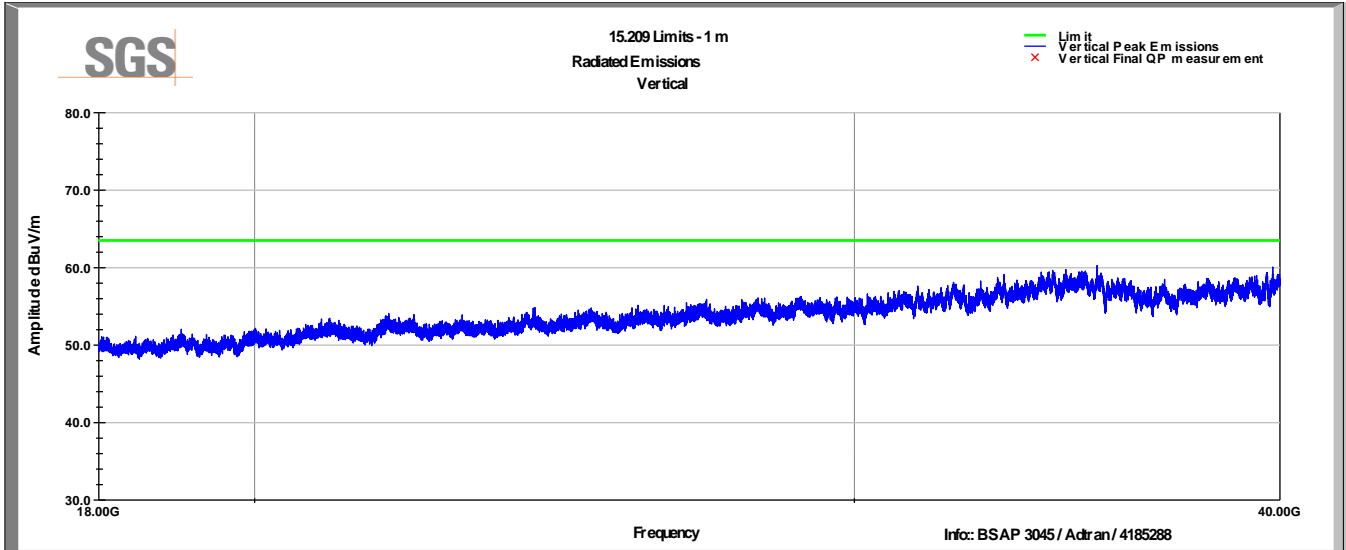
CH 149 6MB/s
Vertical



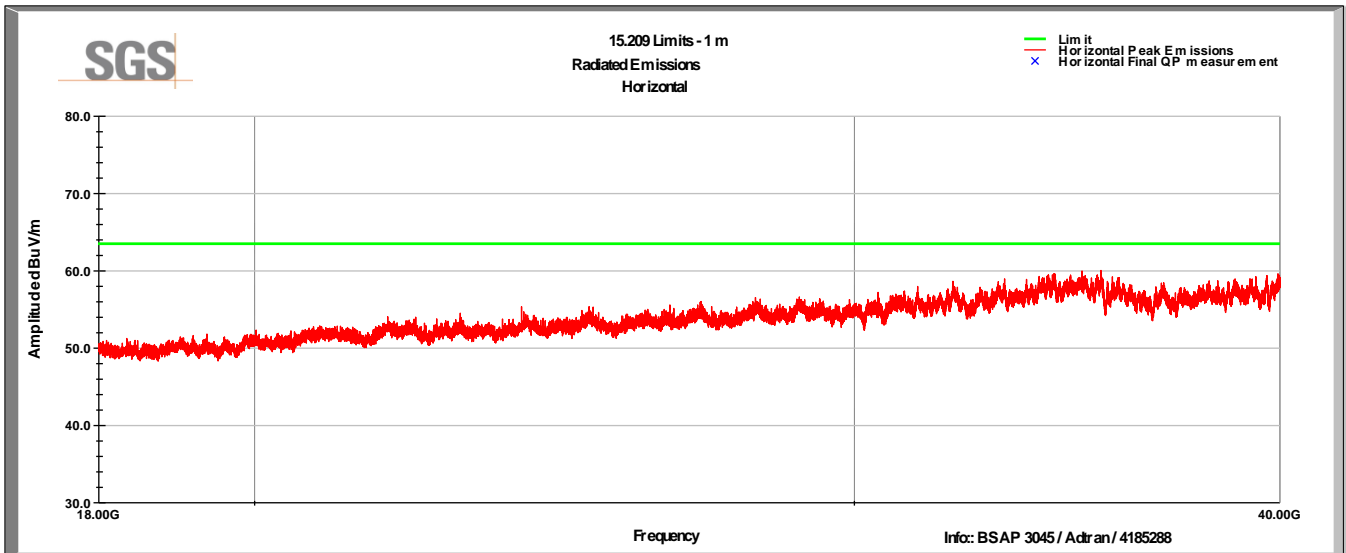
Horizontal



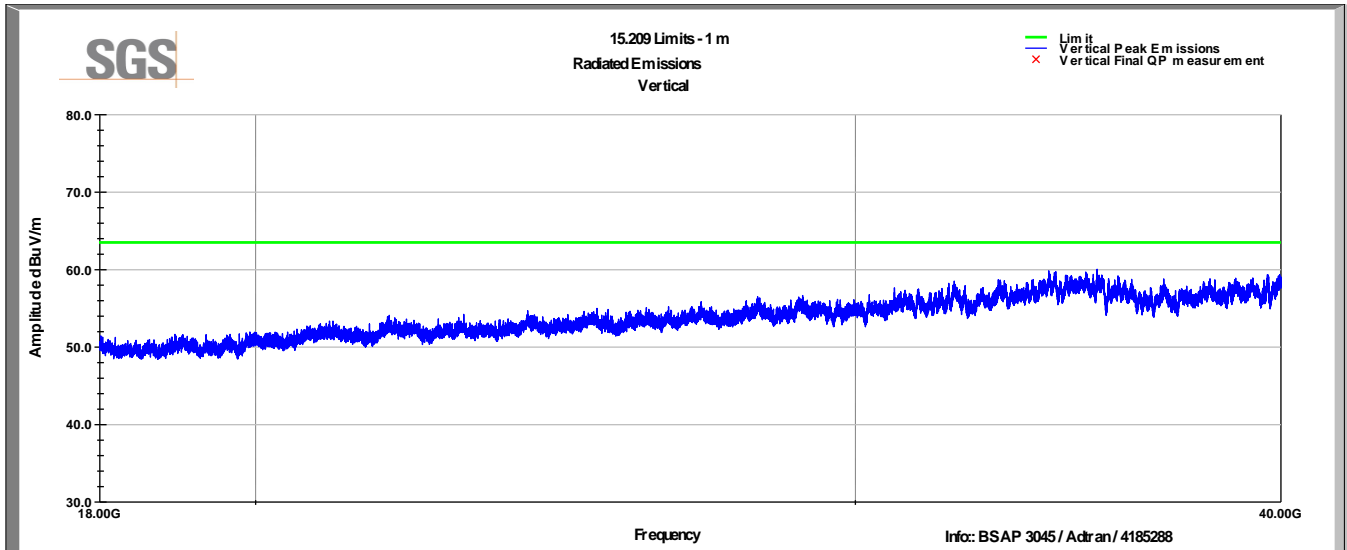
CH 153 6MB/s
Vertical



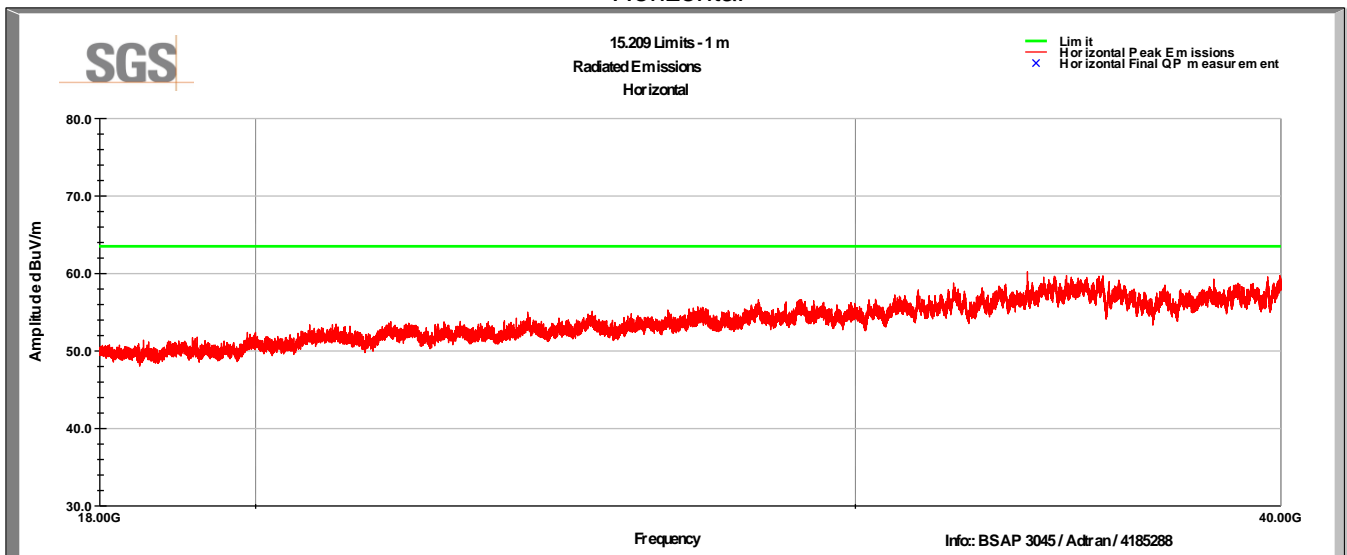
Horizontal



CH 161 6MB/s
Vertical



Horizontal



4 Revision History

Revision Level	Description of changes	Revision Date
0	Initial release	03 October 2017

Appendix A: Power Adjustment Requirements

To maintain compliance with the power and PSD limits defined in Section 15.407(a)(1)(ii), the following guidance will be used for reducing the power settings relative to the original certification measurements.

Note: Because the directional gain of the antenna was > 6dB, the limits were adjusted by the following equation:

Limit-(Gain-6)

So, for the 13dBi gain antenna, the limits were reduced by 7dB

CDD Mode 802.11a Conducted Power

Channel	Freq (MHz)	Total Power (dBm)	Limit (dBm)	Required Reduction (dB)
36	5180	21.67	23	0
40	5200	23.62	23	0.62
48	5240	22.39	23	0
149	5745	25.20	23	2.20
157	5785	25.46	23	2.46
165	5825	24.36	23	1.36

CDD Mode 802.11n (HT20) Conducted Power

Channel	Freq (MHz)	Total Power (dBm)	Limit (dBm)	Required Reduction (dB)
36	5180	22.77	23	0
40	5200	24.11	23	1.11
48	5240	23.31	23	1.31
149	5745	25.46	23	2.46
157	5785	25.42	23	2.42
165	5825	23.87	23	0.87

CDD Mode 802.11n (HT40) Conducted Power

Channel	Freq (MHz)	Total Power (dBm)	Limit (dBm)	Required Reduction (dB)
38	5190	18.85	23	0
46	5230	24.28	23	1.28
151	5755	24.19	23	1.19
159	5795	25.42	23	2.42

CDD Mode 802.11ac (VHT80)
Conducted Power

Channel	Freq (MHz)	Total Power (dBm)	Limit (dBm)	Required Reduction (dB)
42	5210	16.02	23	0
155	5775	22.02	23	0

CDD Mode 802.11ac (VHT80+VHT80)
Conducted Power

Channel	Freq (MHz)	Total Power (dBm)	Limit (dBm)	Required Reduction (dB)
42	5210	13.65	23	0
155	5775	13.54	23	0

Beamforming Mode 802.11n (HT20)
Conducted Power

Channel	Freq (MHz)	Total Power (dBm)	Limit (dBm)	Required Reduction (dB)
36	5180	16.75	23	0
40	5200	18.09	23	0
48	5240	17.29	23	0
149	5745	19.44	23	0
157	5785	19.40	23	0
165	5825	17.85	23	0

Beamforming Mode 802.11n (HT40)
Conducted Power

Channel	Freq (MHz)	Total Power (dBm)	Limit (dBm)	Required Reduction (dB)
38	5190	12.83	23	0
46	5230	18.26	23	0
151	5755	18.17	23	0
159	5795	19.40	23	0

Beamforming Mode 802.11ac (VHT80)
Conducted Power

Channel	Freq (MHz)	Total Power (dBm)	Limit (dBm)	Required Reduction (dB)
42	5210	10.00	23	0
155	5775	16.00	23	0

**Beamforming Mode 802.11ac (VHT80+VHT80)
Conducted Power**

Channel	Freq (MHz)	Total Power (dBm)	Limit (dBm)	Required Reduction (dB)
42	5210	7.63	23	0
155	5775	7.52	23	0

**CDD Mode 802.11a
PSD – UNII-1**

Channel	Freq (MHz)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Required Reduction (dB)
36	5180	8.13	10	0
40	5200	10.80	10	0.8
48	5240	9.75	10	0

**CDD Mode 802.11n (HT20)
PSD – UNII-1**

Channel	Freq (MHz)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Required Reduction (dB)
36	5180	8.84	10	0
40	5200	10.97	10	0.97
48	5240	10.38	10	0.38

**CDD Mode 802.11n (HT40)
PSD – UNII-1**

Channel	Freq (MHz)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Required Reduction (dB)
38	5190	2.46	10	0
46	5230	8.36	10	0

**CDD Mode 802.11ac (VHT80)
PSD – UNII-1**

Channel	Freq (MHz)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Required Reduction (dB)
42	5210	-3.56	10	0

**CDD Mode 802.11ac (VHT80+VHT80)
PSD – UNII-1**

Channel	Freq (MHz)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Required Reduction (dB)
42	5210	-5.25	10	0

**CDD Mode 802.11a
Power Spectral Density – UNII-3**

Chain	Channel	Freq (MHz)	Total PSD (dBm/500kHz)	Limit* (dBm/500kHz)	Required Reduction (dB)
0	149	5745	5.86	23	0
	157	5785	5.96	23	0
	165	5825	4.84	23	0
1	149	5745	5.48	23	0
	157	5785	5.78	23	0
	165	5825	4.74	23	0
2	149	5745	5.45	23	0
	157	5785	5.54	23	0
	165	5825	4.36	23	0
3	149	5745	5.50	23	0
	157	5785	5.50	23	0
	165	5825	4.47	23	0

**CDD Mode 802.11n (HT20)
Power Spectral Density – UNII-3**

Chain	Channel	Freq (MHz)	Total PSD (dBm/500kHz)	Limit* (dBm/500kHz)	Required Reduction (dB)
0	149	5745	5.43	23	0
	157	5785	5.56	23	0
	165	5825	4.10	23	0
1	149	5745	5.38	23	0
	157	5785	5.38	23	0
	165	5825	4.00	23	0
2	149	5745	5.38	23	0
	157	5785	5.35	23	0
	165	5825	3.71	23	0
3	149	5745	5.66	23	0
	157	5785	5.66	23	0
	165	5825	4.30	23	0

**CDD Mode 802.11n (HT40)
Power Spectral Density – UNII-3**

Chain	Channel	Freq (MHz)	Total PSD (dBm/500kHz)	Limit* (dBm/500kHz)	Required Reduction (dB)
0	151	5755	1.43	23	0
	159	5795	2.37	23	0
1	151	5755	0.99	23	0
	159	5795	2.21	23	0
2	151	5755	1.14	23	0
	159	5795	2.13	23	0
3	151	5755	1.37	23	0
	159	5795	2.31	23	0

**CDD Mode 802.11ac (VHT80)
Power Spectral Density – UNII-3**

Chain	Channel	Freq (MHz)	Total PSD (dBm/500kHz)	Limit* (dBm/500kHz)	Required Reduction (dB)
0	155	5775	-4.03	23	0
1	155	5775	-4.61	23	0
2	155	5775	-4.59	23	0
3	155	5775	-4.25	23	0

**CDD Mode 802.11ac (VHT80+VHT80)
Power Spectral Density – UNII-3**

Chain	Channel	Freq (MHz)	Total PSD (dBm/500kHz)	Limit* (dBm/500kHz)	Required Reduction (dB)
2	155	5775	-8.70	23	0
3	155	5775	-8.81	23	0