



TEST REPORT

Report Number: 13259319-E5V2 & E6V2

Applicant : APPLE INC.
1 APPLE PARK WAY
CUPERTINO, CA 95014, U.S.A

Model : A2407, A2408, A2409

FCC ID : BCG-E3547A

IC : 579C-E3547A

Test Standard(s) : FCC 47 CFR PART 15 SUBPART E
ISED RSS-247 ISSUE 2
ISED RSS-GEN ISSUE

Date of Issue:
September 23, 2020

Prepared by:
UL Verification Services Inc.
47173 Benicia Street
Fremont, CA 94538 U.S.A.
TEL: (510) 319-4000
FAX: (510) 661-0888

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	9/21/2020	Initial Issue	Chin Pang
V2	9/23/2020	Updated TCB comments	Vien Tran

TABLE OF CONTENTS

REPORT REVISION HISTORY	2
TABLE OF CONTENTS	3
1. ATTESTATION OF TEST RESULTS	5
2. TEST RESULT SUMMARY	6
3. TEST METHODOLOGY	6
4. FACILITIES AND ACCREDITATION	6
5. DECISION RULES AND MEASUREMENT UNCERTAINTY	7
5.1. METROLOGICAL TRACEABILITY	7
5.2. DECISION RULES.....	7
5.3. MEASUREMENT UNCERTAINTY.....	7
6. RADIATED TEST RESULTS.....	8
7. INTRODUCTION OF TEST DATA REUSE.....	9
7.1. EUT DESCRIPTION	9
7.2. INTRODUCTION	9
7.3. DIFFERENCE IN MODEL NUMBER.....	9
7.4. SPOT CHECK VERIFICATION RESULTS SUMMARY	9
7.4.1. TX ABOVE 1 GHz 802.11ax HE20 MODE IN THE 5.2 GHz BAND.....	10
7.4.2. TX ABOVE 1 GHz 802.11ax HE20 MODE IN THE 5.3 GHz BAND.....	14
7.4.3. TX ABOVE 1 GHz 802.11ax HE20 MODE IN THE 5.6 GHz BAND.....	18
7.4.4. TX ABOVE 1 GHz 802.11ax HE20 MODE IN THE 5.8 GHz BAND.....	22
7.5. REFERENCE DETAIL	26
7.6. DESCRIPTION OF AVAILABLE ANTENNAS	26
7.7. SOFTWARE AND FIRMWARE.....	26
7.8. WORST-CASE CONFIGURATION AND MODE.....	26
7.9. DESCRIPTION OF TEST SETUP.....	27
8. MEASUREMENT METHOD.....	28
9. TEST AND MEASUREMENT EQUIPMENT	28
10. SETUP PHOTOS.....	28
Appendix A - Conducted Data for FCC Part 15 E.....	29
Appendix B - Conducted Data for ISED RSS 247.....	30

Appendix C - Radiated Data (13259315-E5 & E6).....	31
---	-----------

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: APPLE INC.
1 APPLE PARK WAY
CUPERTINO, CA 95014, U.S.A

EUT DESCRIPTION: SMARTPHONE

MODEL: A2407, A2408, A2409

SERIAL NUMBER: (Original): G6TCP01UQ5R9, G6TCM020Q5T6
(Spot Check): G6TCN00GQ5W0, G6TCN00KQ5W0

DATE TESTED: JULY 23, 2020 – AUGUST 11, 2020

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart E	Complies
ISED RSS-247 Issue 2	Complies
ISED RSS-GEN Issue 5	Complies

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

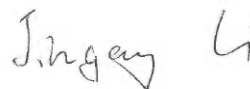
This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This 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 the U.S. government.

Approved & Released For
UL Verification Services Inc. By:



Chin Panf
Senior Engineer
Consumer Technology Division
UL Verification Services Inc.

Prepared By:



Francisco Guarnero
Test Engineer
Consumer Technology Division
UL Verification Services Inc.

2. TEST RESULT SUMMARY

FCC Clause	ISED Clause	Requirement	Result	Comment
15.209, 15.205, 15.407 (b)	RSS-GEN 8.9, 8.10, RSS-247 6.2	Radiated Emissions	Complies	None.

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, FCC 14-30, FCC KDB 662911 D01 v02r01, FCC KDB 905462 D02 v02/D03 v01r02/D06 v02, FCC KDB 789033 D02 v02r01, ANSI C63.10-2013, FCC 06-96, RSS-GEN Issue 5, and RSS-247 Issue 2.

4. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, and 47658 Kato Road, 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	47658 Kato Rd.
☐ Chamber A (IC:2324B-1)	☐ Chamber D (IC:22541-1)	☒ Chamber I (IC: 2324A-5)
☐ Chamber B (IC:2324B-2)	☐ Chamber E (IC:22541-2)	☐ Chamber J (IC: 2324A-6)
☐ Chamber C (IC:2324B-3)	☐ Chamber F (IC:22541-3)	☐ Chamber K (IC: 2324A-1)
	☐ Chamber G (IC:22541-4)	☒ Chamber L (IC: 2324A-3)
	☐ Chamber H (IC:22541-5)	☐ Chamber M (IC: 2324A-2)

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers above are covered under Industry Canada company address and respective code.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0

5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

5.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	U _{Lab}
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.39 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.07 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.52 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	4.88 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.24 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.37 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.17 dB

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

6. RADIATED TEST RESULTS

LIMITS

FCC §15.205 and §15.209 -Restricted bands

FCC §15.407(b)(1-3) -Un-Restricted bands

RSS 247 Issue 2 Sections

6.2.1.2 (for 5150-5250 MHz band)

6.2.2.2 (for 5250-5350 MHz band)

6.2.3.2 (for 5470-5600 MHz and 5650-5725 MHz bands)

6.2.4.2 (for 5725-5850 MHz band)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

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

The 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.

KDB 414788 Open Field Site(OFS) and Chamber Correlation Justification

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

7. INTRODUCTION OF TEST DATA REUSE

7.1. EUT DESCRIPTION

The Apple iPhone is a smartphone with multimedia functions (music, application support, and video), cellular GSM, GPRS, EGPRS, UMTS, LTE, TD-SCDMA, CDMA, IEEE 802.11a/b/g/n/ac/ax, Bluetooth, Ultra-Wide band, GPS and NFC. All models support at least one UICC based SIM. The second SIM, if present, is either UICC based pSIM (physical SIM) or e-SIM (electronic SIM). The device has a built-in inductive charging receiver. The rechargeable battery is also not user accessible.

7.2. INTRODUCTION

This application for certification is leveraging the data reuse procedures from KDB 484596 D01 based on reference FCC ID: BCG-E3545A, IC: 579C-E3545A to cover variant model BCG-E3547A, 579C-E3547A. The major difference between the parent/reference model and the variant model is the depopulation in the variant model of the mmWave transmitter. All other circuitry and features are identical. The data reuse test plan was approved via manufacturer KDB inquiry.

7.3. DIFFERENCE IN MODEL NUMBER

Models A2407, A2408, and A2409 are electrically identical and the model numbers are allocated for marketing and logistic purposes only. Model A2407 was used for the spot check testing described in this report.

7.4. SPOT CHECK VERIFICATION RESULTS SUMMARY

Spot check verification has been done on device model A2407, FCC ID: BCG-E3547A, IC: 579C-E3547A for radiated spurious and radiated band-edge in accordance with the Test Plan that was approved via KDB inquiry.

RBE inquiry:

BCG-E3547A, 579C-E3547A SPOT CHECK RESULTS										
Technology	Mode	Test Item	Channel	Measured	Original model		Spot check model		Delta (dB)	
					BCG-E3545A 579C-E3545A		BCG-E3547A 579C-E3547A			
					A2341		A2407, A2408, A2409			
				Frequency (MHz)	Peak (dBuV)	Ave (dBuV)	Peak (dBuV)	Ave (dBuV)	Peak (dBuV)	Ave (dBuV)
WiFi (5GHz)	11ax HE20	RBE	Low	5150	59.78	50.66	64.68	50.54	4.90	-0.12
			High	5350	62.57	50.37	66.47	50.41	3.90	-0.04
			Low	5460	63.78	N/A	63.49	N/A	-0.29	N/A
			High	5927	-31.48 (dBm)	N/A	-37.10 (dBm)	N/A	-5.62	N/A
		RSE	60	5300	49.85	39.80	48.25	38.34	-1.60	-1.46
			116	5580	52.77	41.90	48.96	38.57	-3.81	-3.33
			157	5785	55.14	N/A	59.98	N/A	-2.81	N/A

Comparison of the models, upper deviation is within 3dB for the worst case measurements relative to the limit (note some peak values are more than 3dB higher but the corresponding average value, which has less margin relative to the average limit for emissions, is within 3dB of the reference model) and all measurements are under FCC/IC Technical Limits.

Note: The output powers were verified on model A2407 to match with model A2341 before radiated emissions spot check was performed.

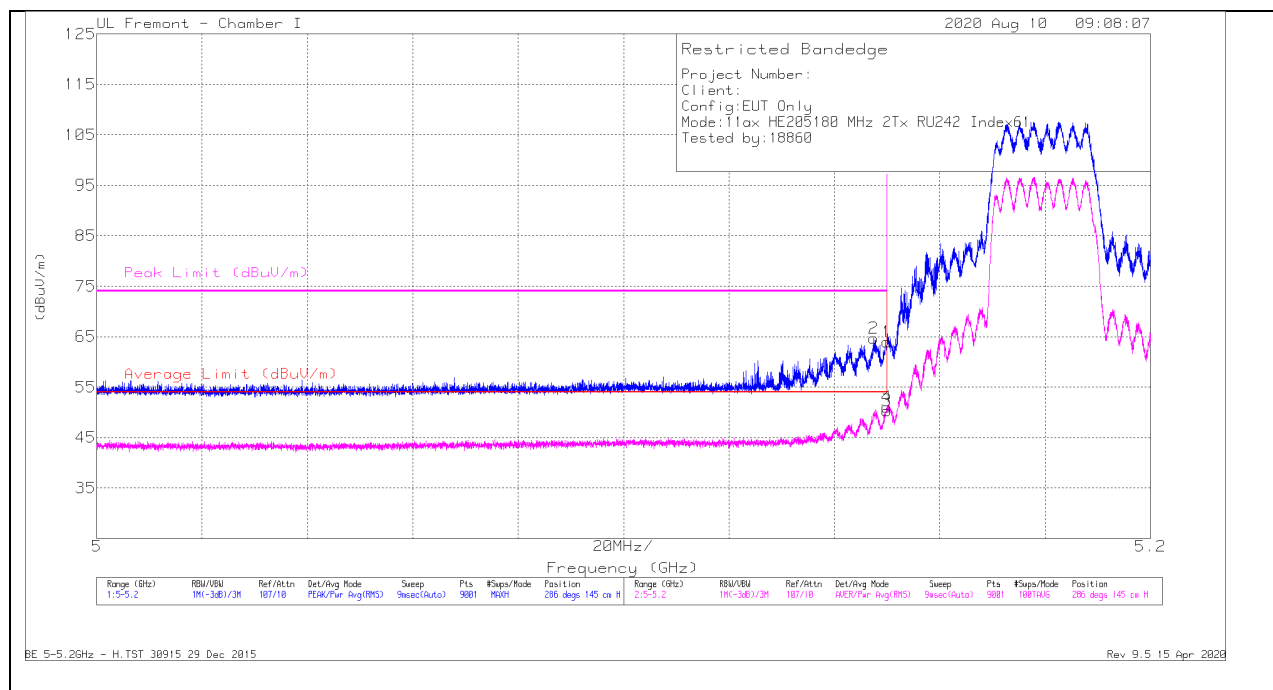
SPOT CHECK

7.4.1. TX ABOVE 1 GHz 802.11ax HE20 MODE IN THE 5.2 GHz BAND

2TX Antenna 5 + Antenna 6 OFDMA MODE 242 Tones, RU Index 61

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



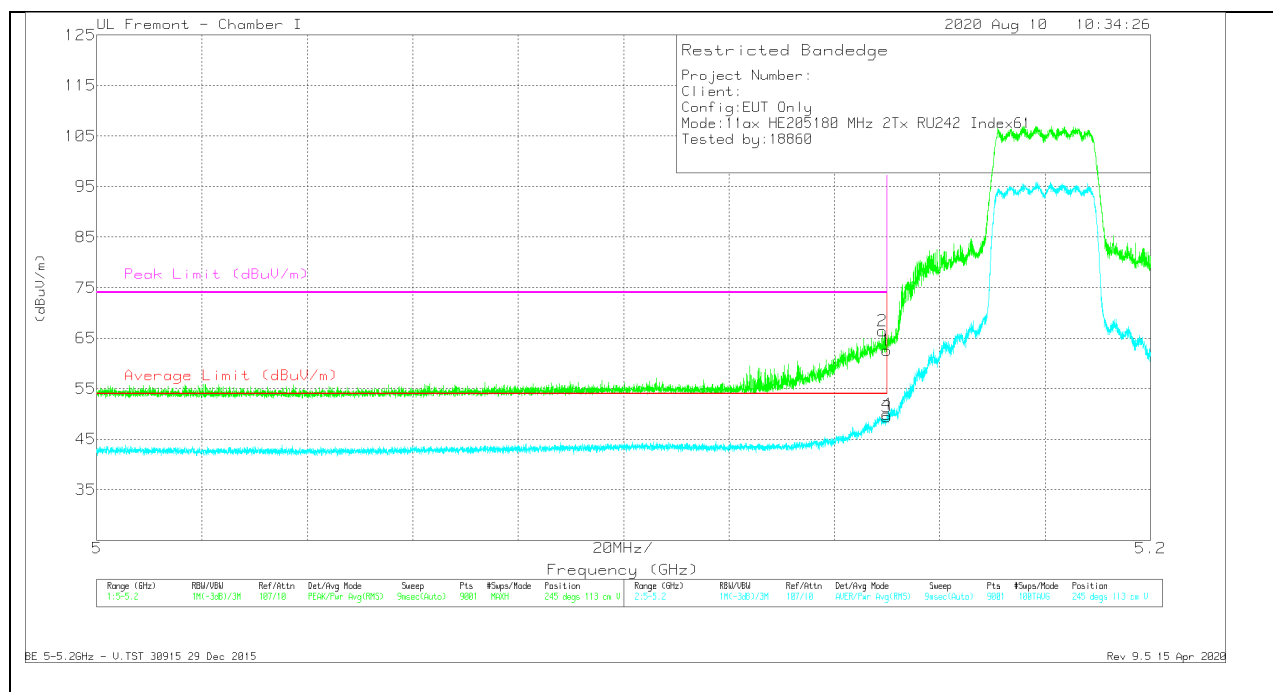
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Ftr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 5.15	44.49	Pk	34.3	-14.8	63.99	-	-	74	-10.01	286	145	H
2	* 5.14751	45.28	Pk	34.2	-14.8	64.68	-	-	74	-9.32	286	145	H
3	* 5.15	30.35	RMS	34.3	-14.8	49.85	54	-4.15	-	-	286	145	H
4	* 5.14995	31.04	RMS	34.3	-14.8	50.54	54	-3.46	-	-	286	145	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 5.15	43.13	Pk	34.3	-14.8	62.63	-	-	74	-11.37	245	113	V
2	* 5.14915	47.04	Pk	34.2	-14.8	66.44	-	-	74	-7.56	245	113	V
3	* 5.15	29.97	RMS	34.3	-14.8	49.47	54	-4.53	-	-	245	113	V
4	* 5.14998	30.47	RMS	34.3	-14.8	49.97	54	-4.03	-	-	245	113	V

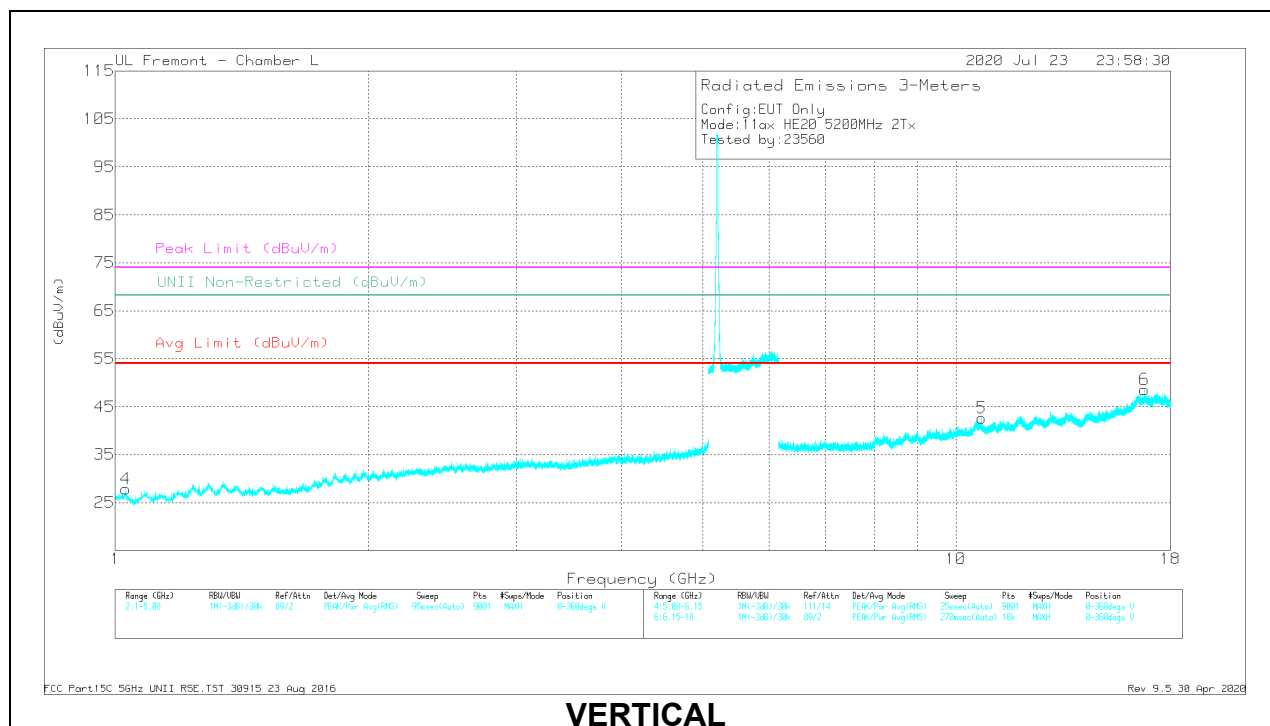
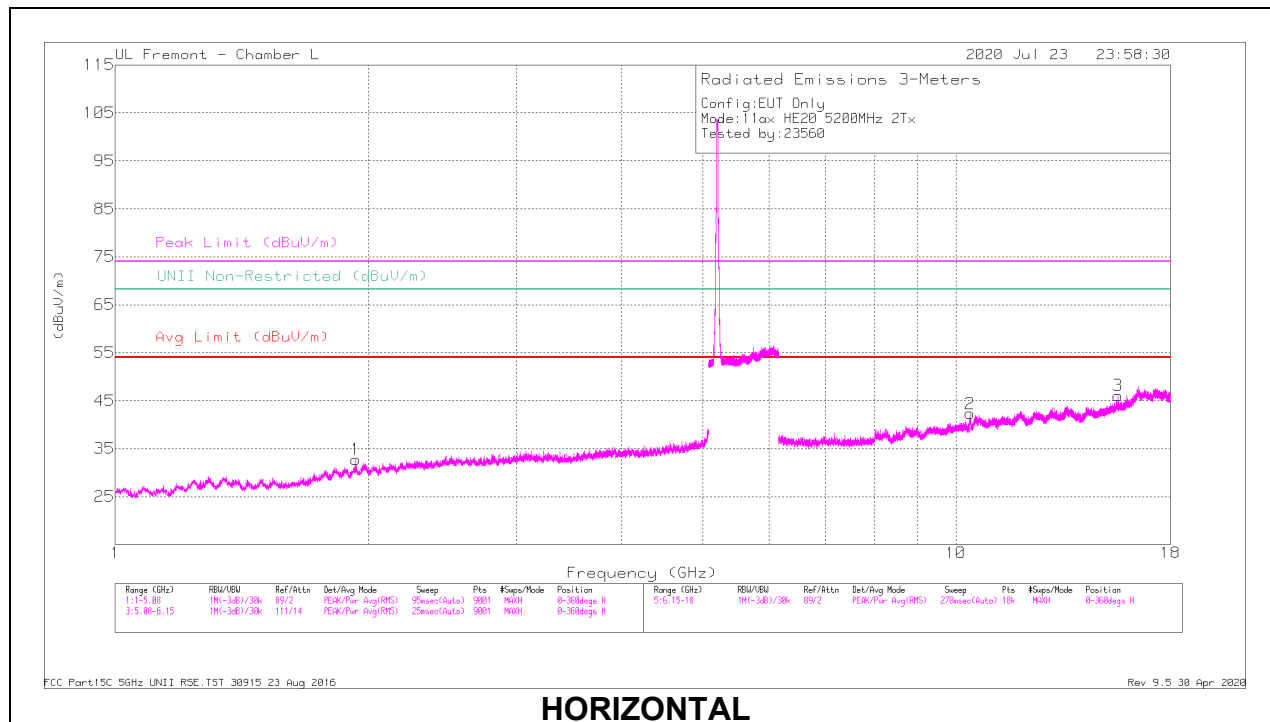
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

MID CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 344 (dBm)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.93142	41.66	PK-U	30.6	-32	40.26	-	-	-	-	68.2	-27.94	52	214	H
4	* 1.02891	41.51	PK-U	27.2	-34.3	34.41	-	-	74	-39.59	-	-	80	251	V
	* 1.025	31.23	ADR	27.2	-34.3	24.13	54	-29.87	-	-	-	-	80	251	V
2	10.39243	29.65	PK-U	37.5	-19.7	47.45	-	-	-	-	68.2	-20.75	116	296	H
3	* 15.58495	29.42	PK-U	41	-18.9	51.52	-	-	74	-22.48	-	-	162	141	H
	* 15.58585	19.96	ADR	41	-18.9	42.06	54	-11.94	-	-	-	-	162	141	H
5	* 10.73593	29.23	PK-U	38	-19.5	47.73	-	-	74	-26.27	-	-	338	334	V
	* 10.73497	19.74	ADR	38	-19.5	38.24	54	-15.76	-	-	-	-	338	334	V
6	16.76991	30.71	PK-U	42.3	-17.7	55.31	-	-	-	-	68.2	-12.89	230	106	V

* - Indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK-U - U-NII: Maximum Peak

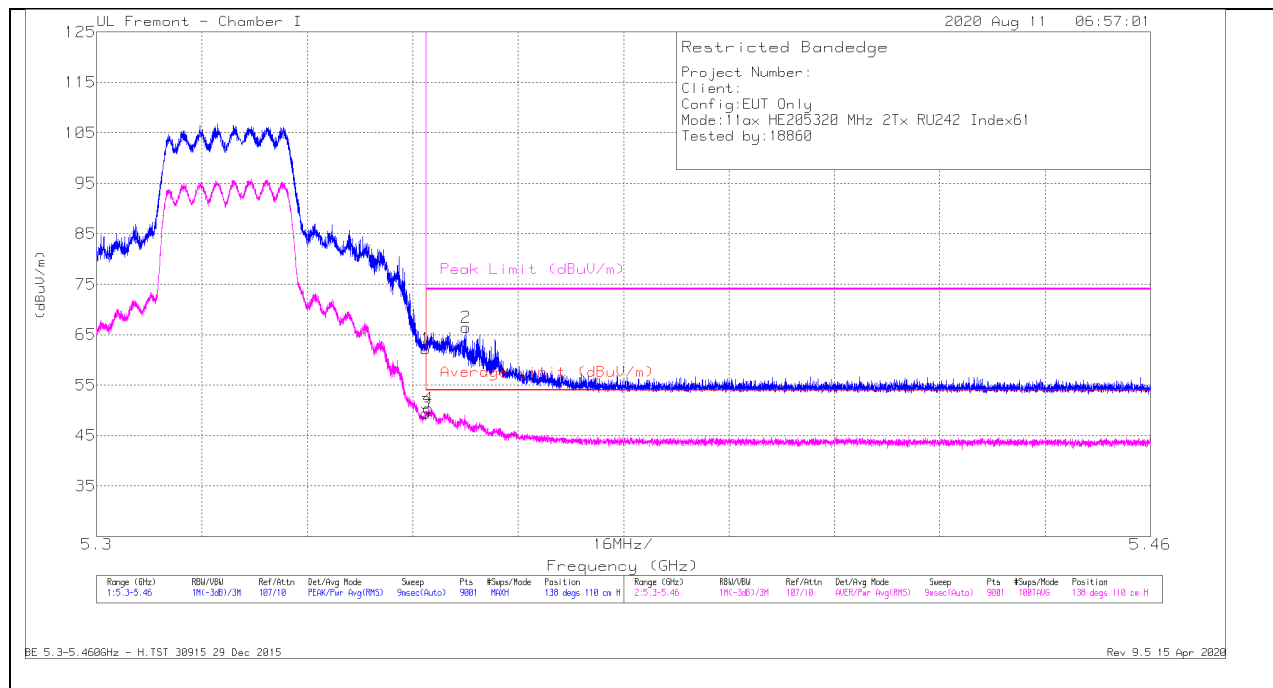
ADR - U-NII AD primary method, RMS average

7.4.2. TX ABOVE 1 GHz 802.11ax HE20 MODE IN THE 5.3 GHz BAND

2TX Antenna 5 + Antenna 6 OFDMA MODE 242 Tones, RU Index 61

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



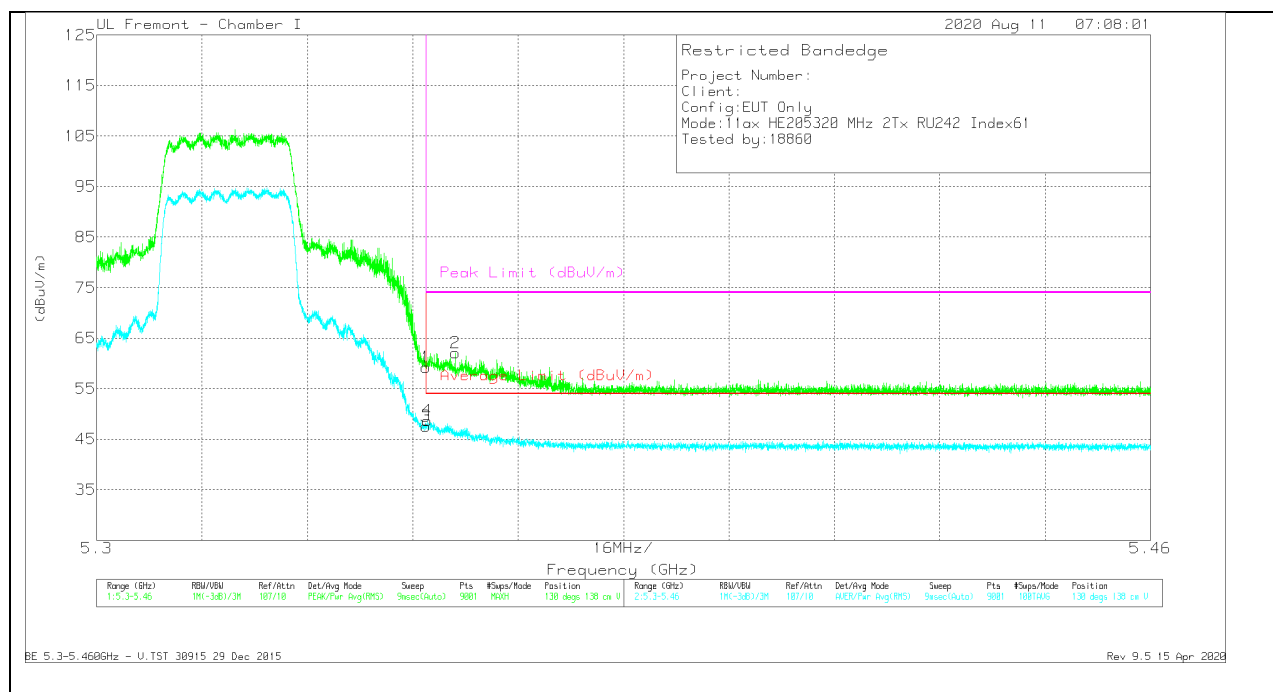
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Fitr/Pa d (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 5.35001	41.46	Pk	34.7	-14	62.16	-	-	74	-11.84	138	110	H
2	* 5.35605	45.77	Pk	34.7	-14	66.47	-	-	74	-7.53	138	110	H
3	* 5.35001	28.78	RMS	34.7	-14	49.48	54	-4.52	-	-	138	110	H
4	* 5.35037	29.71	RMS	34.7	-14	50.41	54	-3.59	-	-	138	110	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT

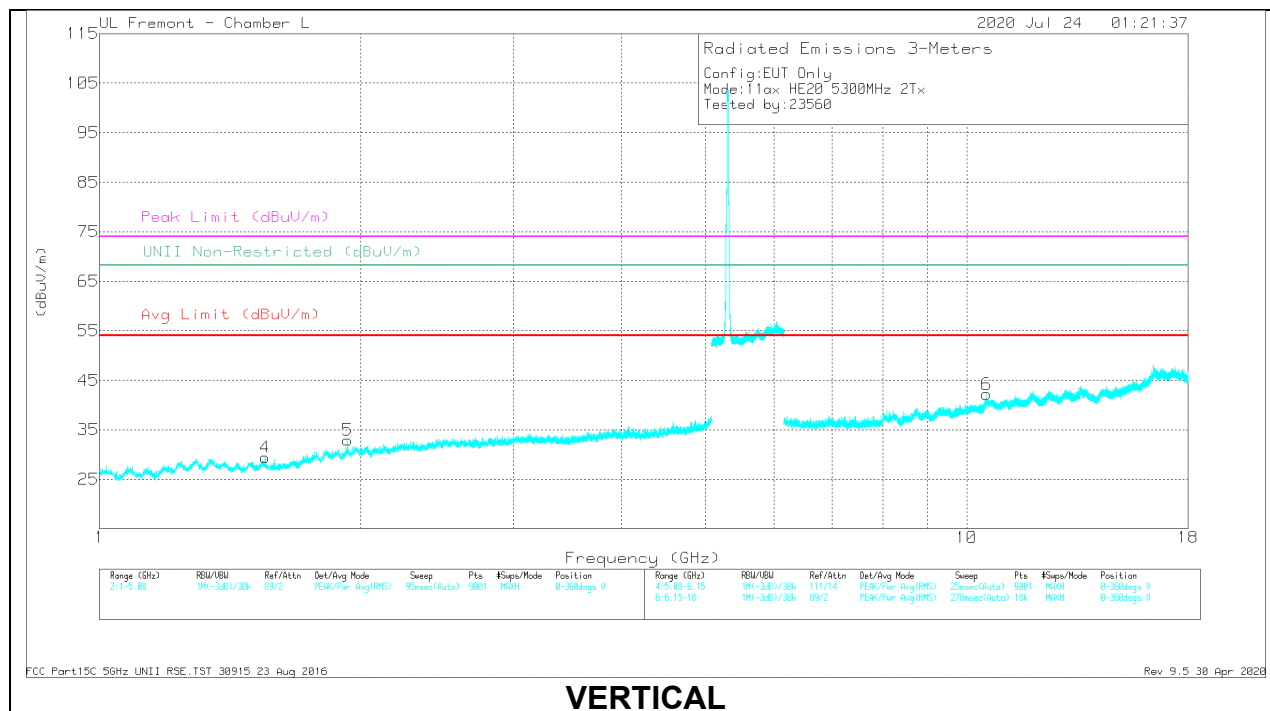
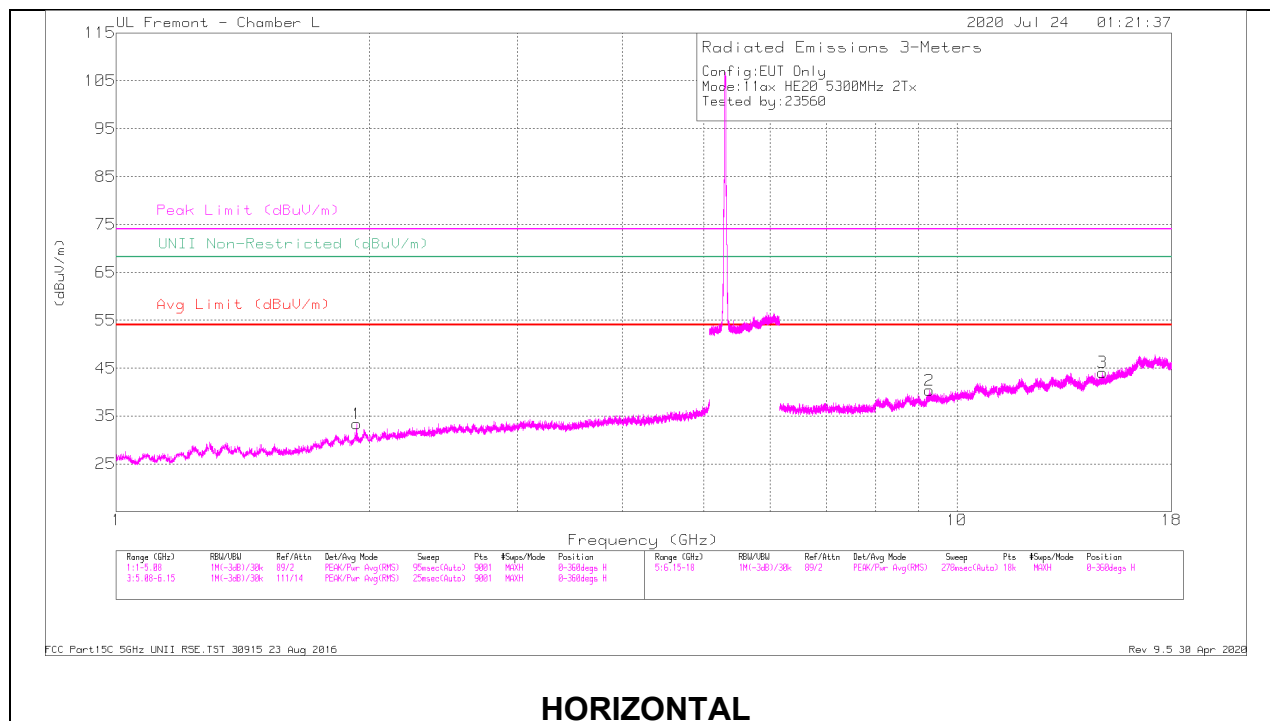


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Filt/Pa d (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 5.35001	38.53	Pk	34.7	-14	59.23	-	-	74	-14.77	130	138	V
2	* 5.35449	41.36	Pk	34.7	-14	62.06	-	-	74	-11.94	130	138	V
3	* 5.35001	26.9	RMS	34.7	-14	47.6	54	-6.4	-	-	130	138	V
4	* 5.35019	27.94	RMS	34.7	-14	48.64	54	-5.36	-	-	130	138	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

MID CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 344 (dB/m)	Amp/Cb I/Filtr/Pa d (dB)	Correct ed Reading (dBuV/ m)	Avg Limit (dBuV/ m)	Margin (dB)	Peak Limit (dBuV/ m)	PK Margin (dB)	UNII Non-Restrict ed (dBuV/ m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.93283	42.65	PK-U	30.6	-32	41.25	-	-	-	-	68.2	-26.95	68	186	H
4	* 1.55373	40.29	PK-U	28.1	-32.2	36.19	-	-	74	-37.81	-	-	135	259	V
	* 1.55299	29.88	ADR	28.1	-32.2	25.78	54	-28.22	-	-	-	-	135	259	V
5	1.93291	41.81	PK-U	30.6	-32	40.41	-	-	-	-	68.2	-27.79	100	130	V
2	9.28095	30.21	PK-U	36.4	-20.4	46.21	-	-	-	-	68.2	-21.99	179	232	H
3	14.90529	29.9	PK-U	39.9	-19	50.8	-	-	-	-	68.2	-17.4	311	137	H
6	* 10.6065	29.85	PK-U	37.9	-19.5	48.25	-	-	74	-25.75	-	-	178	156	V
	* 10.6064	19.94	ADR	37.9	-19.5	38.34	54	-15.66	-	-	-	-	178	156	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK-U - U-NII: Maximum Peak
ADR - U-NII AD primary method, RMS average

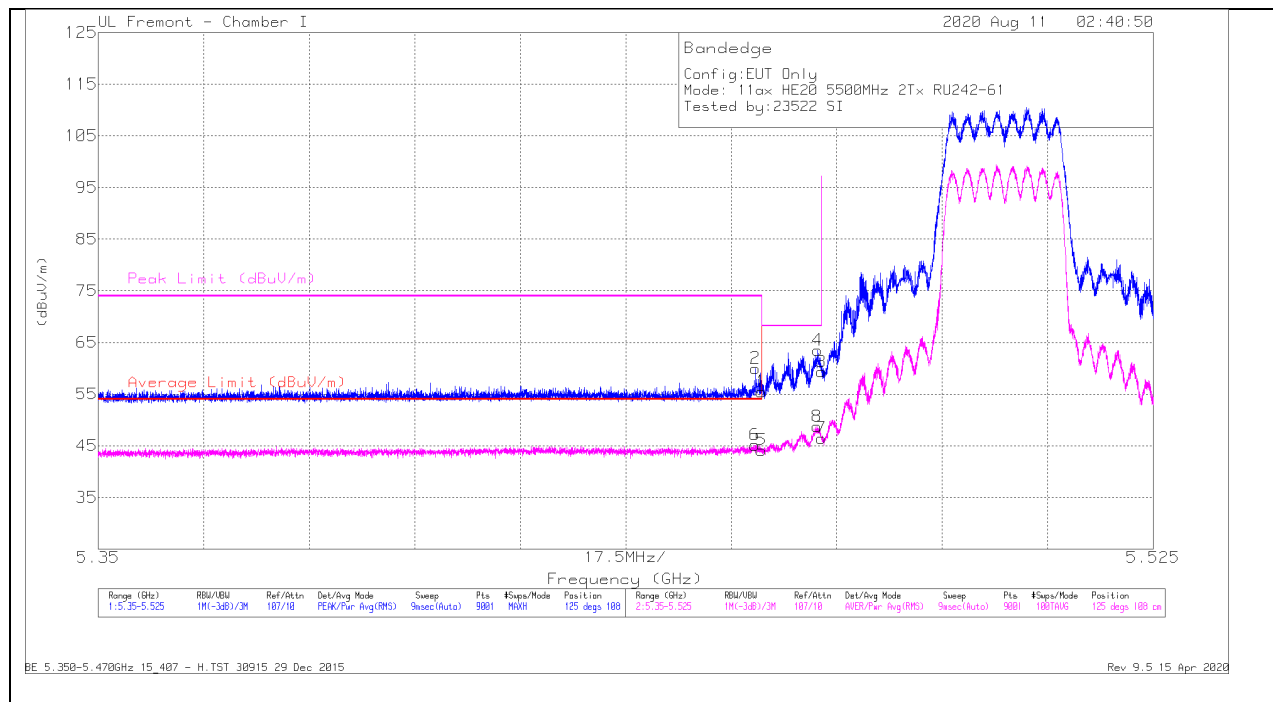
FCC Part15C 5GHz UNII RSE.TST 30915 23 Aug 2016
Rev 9.5 30 Apr 2020

7.4.3. TX ABOVE 1 GHz 802.11ax HE20 MODE IN THE 5.6 GHz BAND

2TX Antenna 5 + Antenna 6 OFDMA MODE 242 Tones, RU Index 61

BANDEDGE (LOW CHANNEL)

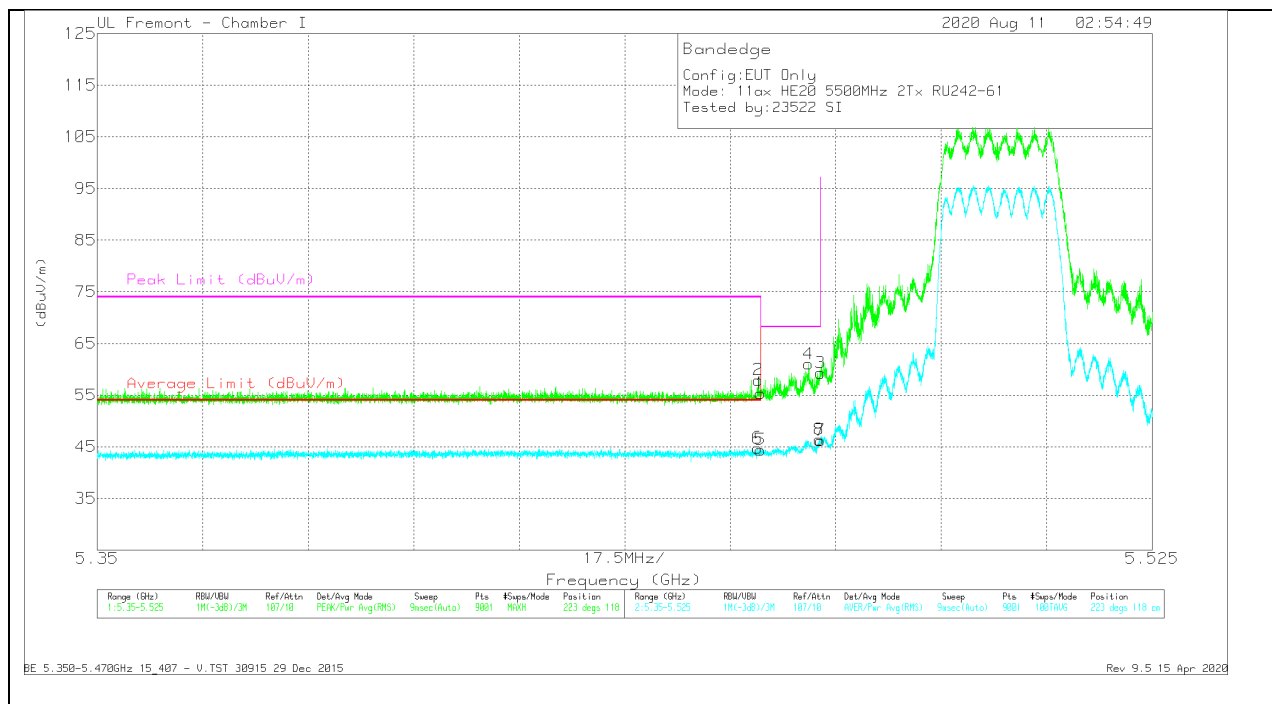
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/FitriPa d (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 5.45999	34.65	Pk	34.6	-13.8	55.45	-	-	74	-18.55	125	108	H
2	* 5.45902	39.08	Pk	34.7	-13.8	59.98	-	-	74	-14.02	125	108	H
3	5.46999	38.41	Pk	34.7	-13.8	59.31	-	-	68.2	-8.89	125	108	H
4	5.46933	42.69	Pk	34.6	-13.8	63.49	-	-	68.2	-4.71	125	108	H
5	* 5.45999	23.37	RMS	34.6	-13.8	44.17	54	-9.83	-	-	125	108	H
6	* 5.45891	24.25	RMS	34.7	-13.8	45.15	54	-8.85	-	-	125	108	H
7	5.46999	25.58	RMS	34.7	-13.8	46.48	-	-	-	-	125	108	H
8	5.46923	27.91	RMS	34.6	-13.8	48.71	-	-	-	-	125	108	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 5.45999	34.52	Pk	34.6	-13.8	55.32	-	-	74	-18.68	223	118	V
2	* 5.45961	37.03	Pk	34.7	-13.8	57.93	-	-	74	-16.07	223	118	V
3	5.46999	38.4	Pk	34.7	-13.8	59.3	-	-	68.2	-8.9	223	118	V
4	5.46795	40.23	Pk	34.6	-13.8	61.03	-	-	68.2	-7.17	223	118	V
5	* 5.45999	23.6	RMS	34.6	-13.8	44.4	54	-9.6	-	-	223	118	V
6	* 5.45953	23.83	RMS	34.7	-13.8	44.73	54	-9.27	-	-	223	118	V
7	5.46999	25.29	RMS	34.7	-13.8	46.19	-	-	-	-	223	118	V
8	5.46978	25.48	RMS	34.7	-13.8	46.38	-	-	-	-	223	118	V

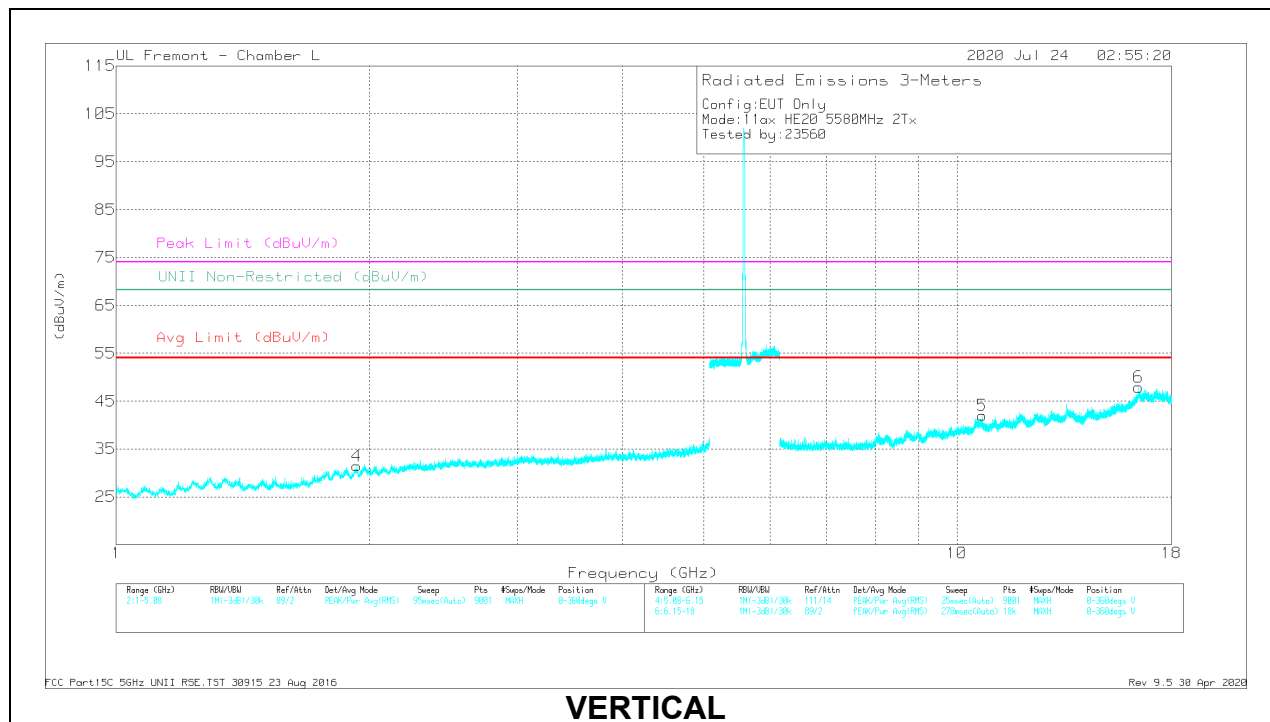
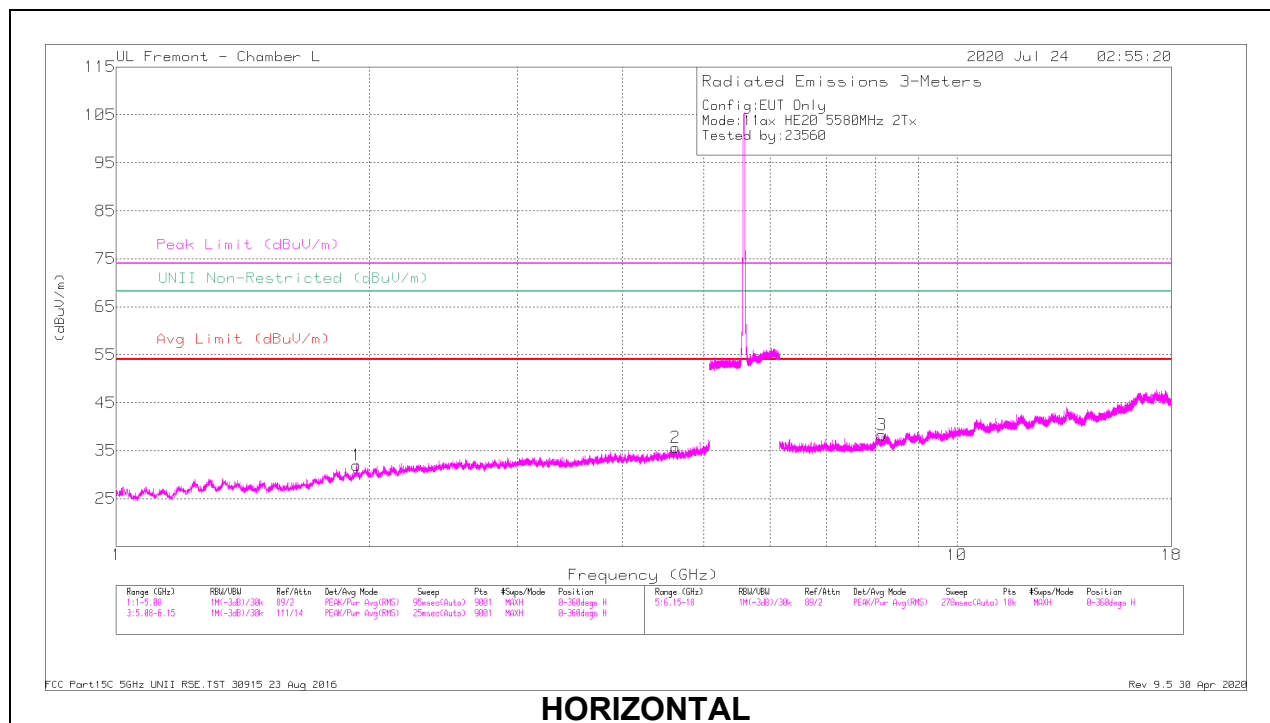
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

MID CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 344 (dB/m)	Amp/Cb I/Fitr/Pa d (dB)	Correct ed Reading (dBuV/ m)	Avg Limit (dBuV/ m)	Margin (dB)	Peak Limit (dBuV/ m)	PK Margin (dB)	UNII Non-Restrict ed (dBuV/ m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.9326	42.47	PK-U	30.6	-32	41.07	-	-	-	-	68.2	-27.13	323	202	H
2	* 4.6266	35.99	PK-U	34.1	-27.2	42.89	-	-	74	-31.11	-	-	256	333	H
	* 4.62648	26.17	ADR	34.1	-27.2	33.07	54	-20.93	-	-	-	-	256	333	H
4	1.93179	43.58	PK-U	30.6	-32	42.18	-	-	-	-	68.2	-26.02	20	139	V
3	* 8.14145	32.78	PK-U	35.7	-23.1	45.38	-	-	74	-28.62	-	-	71	119	H
	* 8.14335	22.77	ADR	35.7	-23.1	35.37	54	-18.63	-	-	-	-	71	119	H
5	* 10.7154	30.46	PK-U	38	-19.5	48.96	-	-	74	-25.04	-	-	285	109	V
	* 10.71894	19.97	ADR	38	-19.4	38.57	54	-15.43	-	-	-	-	285	109	V
6	16.43726	31.07	PK-U	41.9	-18.6	54.37	-	-	-	-	68.2	-13.83	199	132	V

* - Indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK-U - U-NII: Maximum Peak

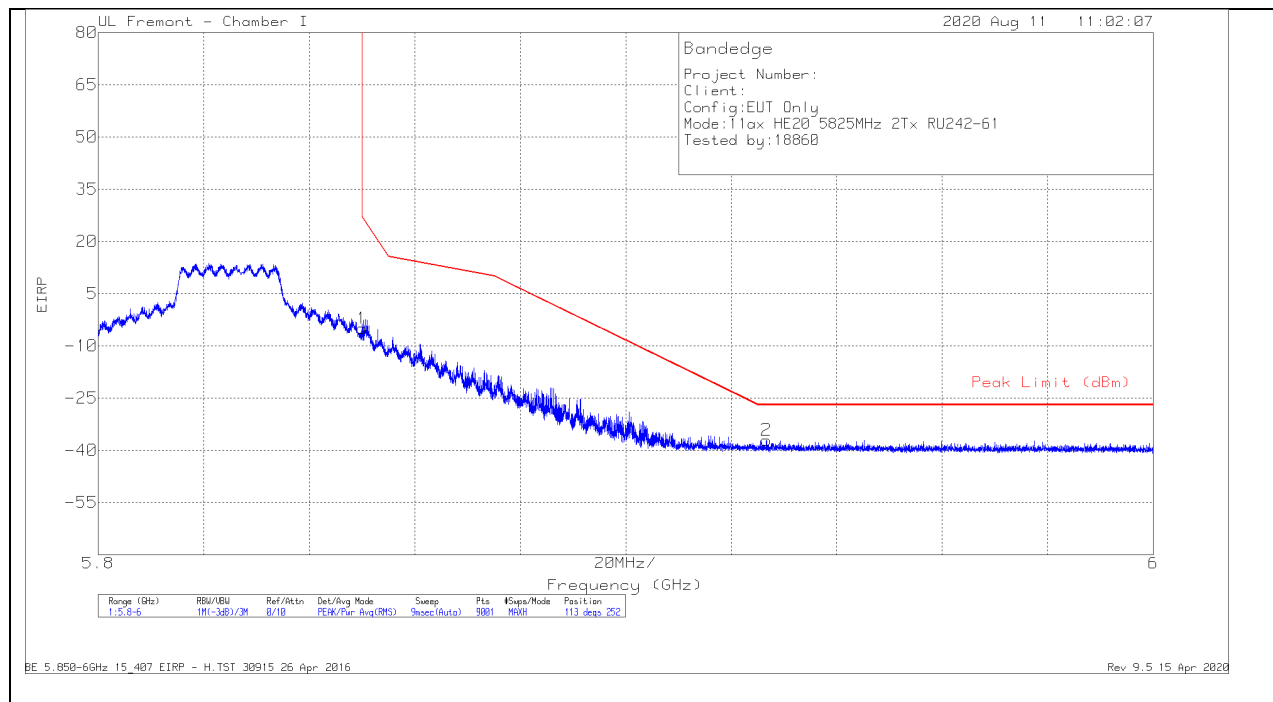
ADR - U-NII AD primary method, RMS average

7.4.4. TX ABOVE 1 GHz 802.11ax HE20 MODE IN THE 5.8 GHz BAND

2TX Antenna 5 + Antenna 6 OFDMA MODE 242 Tones, RU Index 61

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT

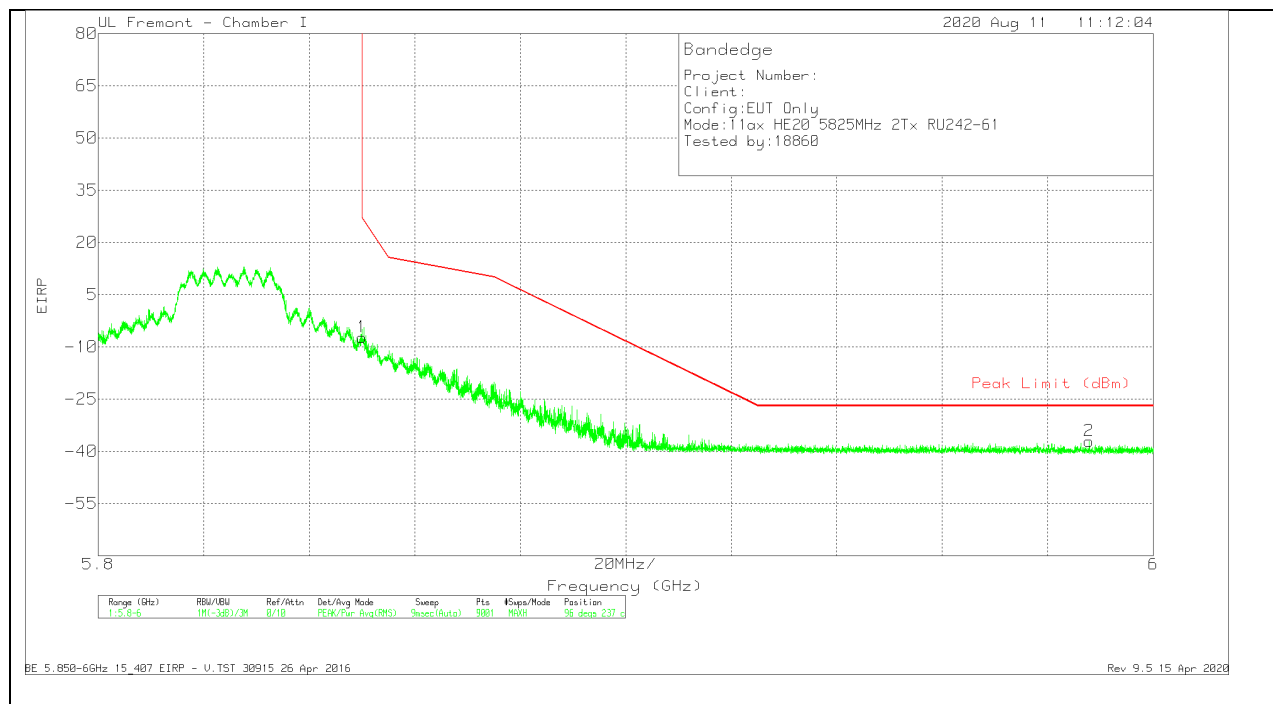


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T346 (dB/m)	Amp/Cbl/Filtr/Pa d (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85002	-38.2	Pk	35	-13.6	11.8	-5	26.95	-31.95	113	252	H
2	5.92667	-70.6	Pk	35.1	-13.4	11.8	-37.1	-27	-10.1	113	252	H

Pk - Peak detector

VERTICAL RESULT

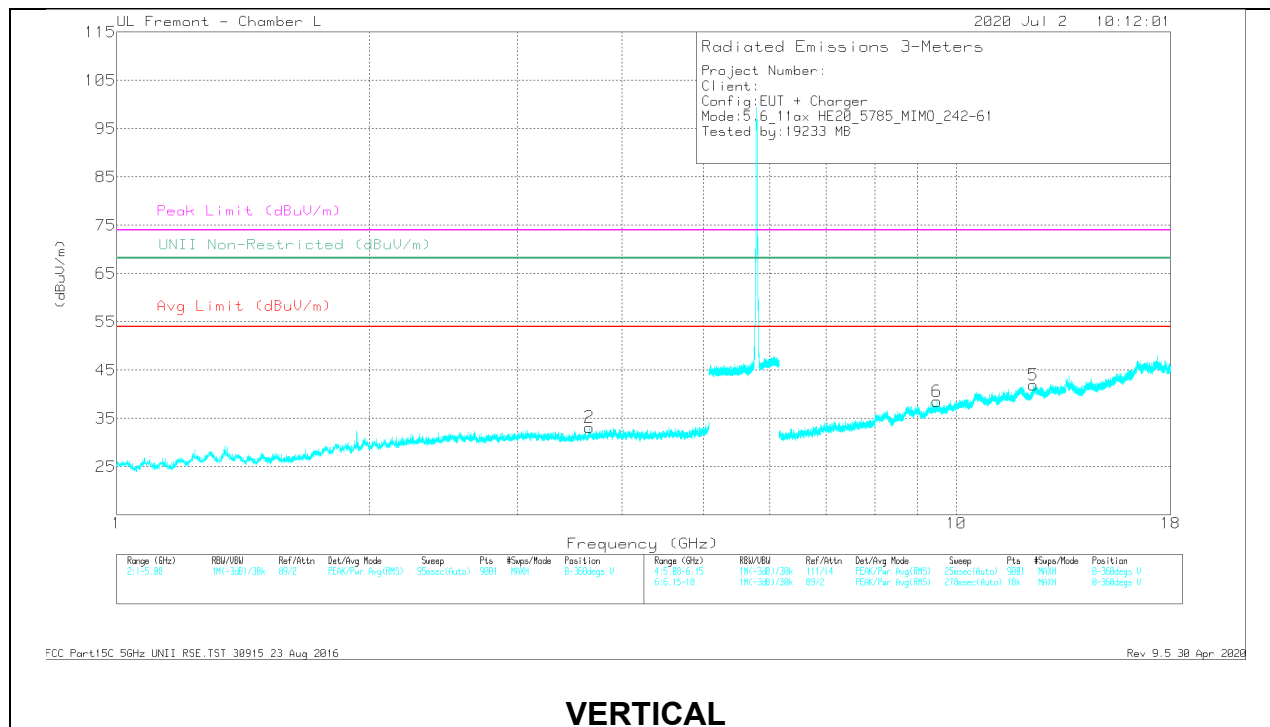
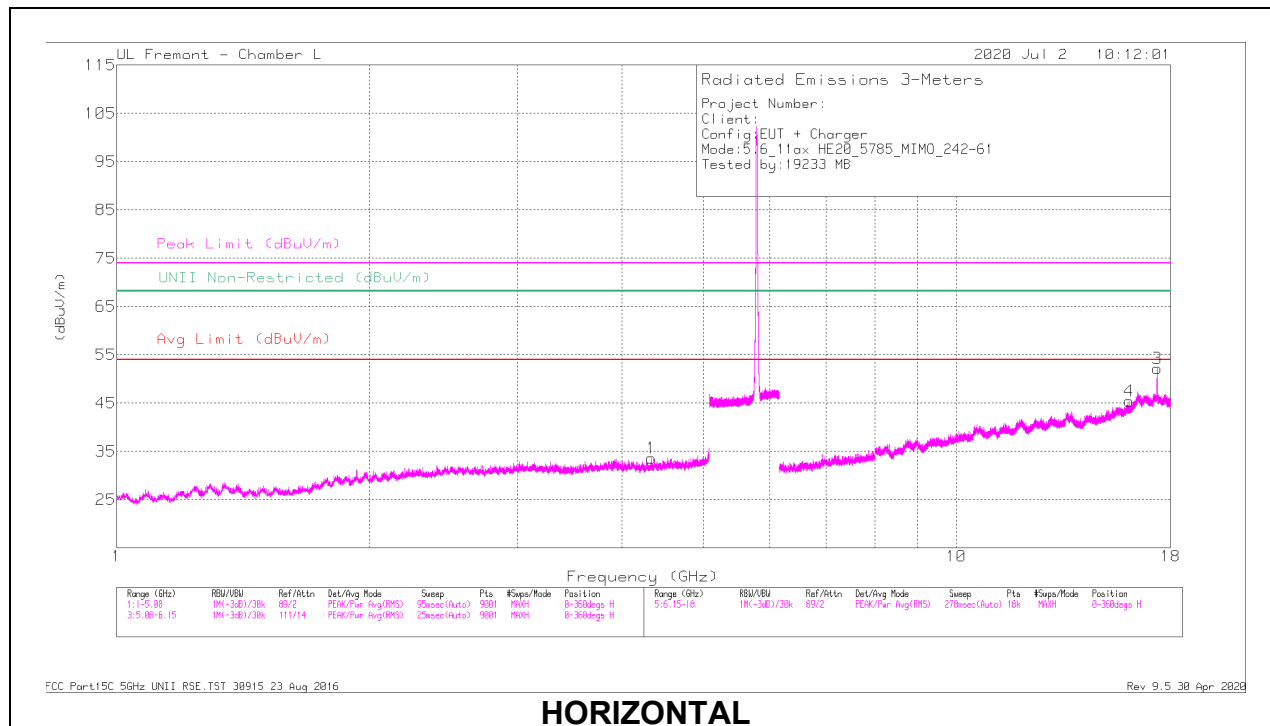


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T346 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85002	-40.44	Pk	35	-13.6	11.8	-7.24	26.95	-34.19	96	237	V
2	5.98786	-70.56	Pk	35.3	-13.6	11.8	-37.06	-27	-10.06	96	237	V

Pk - Peak detector

HARMONICS AND SPURIOUS EMISSIONS

MID CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 344 (dB/m)	Amp/Cb I/Fitr/Pa d (dB)	Correct ed Reading (dBuV/ m)	Avg Limit (dBuV/ m)	Margin (dB)	Peak Limit (dBuV/ m)	PK Margin (dB)	UNII Non-Restrict ed (dBuV/ m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.33865	36.18	PK-U	33.7	-27.8	42.08	-	-	74	-31.92	-	-	155	349	H
	* 4.33692	26.12	ADR	33.6	-27.8	31.92	54	-22.08	-	-	-	-	155	349	H
2	* 3.65189	36.43	PK-U	33	-27.9	41.53	-	-	74	-32.47	-	-	31	351	V
	* 3.65356	26.24	ADR	33	-27.9	31.34	54	-22.66	-	-	-	-	31	351	V
3	17.35526	35.98	PK-U	41.6	-17.6	59.98	-	-	-	-	68.2	-8.22	0	181	H
	17.35489	25.17	ADR	41.6	-17.6	49.17	-	-	-	-	-	-	0	181	H
4	* 16.07938	28.63	PK-U	41.4	-18.4	51.63	-	-	74	-22.37	-	-	11	358	H
	* 16.08018	18.45	ADR	41.4	-18.4	41.45	54	-12.55	-	-	-	-	11	358	H
5	* 12.36136	30.76	PK-U	38.9	-19.7	49.96	-	-	74	-24.04	-	-	170	341	V
	* 12.36411	19.85	ADR	38.9	-19.7	39.05	54	-14.95	-	-	-	-	170	341	V
6	* 9.47997	31.34	PK-U	36.6	-20.6	47.34	-	-	74	-26.66	-	-	348	340	V
	* 9.48317	20.08	ADR	36.6	-20.5	36.18	54	-17.82	-	-	-	-	348	340	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

7.5. REFERENCE DETAIL

Reference application that contains the reused reference data which is attached to this report in the Appendixes.

Equipment Class	Reference FCC ID & IC	Reference Report	Report Title/Section
NII	BCG-E3545A 579C-E3545A	13259315-E5 (FCC) 13259315-E6 (IC) 13259315-E5 & E6	FCC IC_UNII Report / All sections

*-E5 report is conducted measurements for FCC, -E6 is conducted for Canada, -E5 & E6 contains radiated emissions data.

7.6. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Range (GHz)	ANT 6 (dBi)	ANT 5 (dBi)
5150-5250	0.3	-2.6
5250-5350	1.4	-1.2
5500-5700	0.6	-0.2
5725-5825	-0.6	-1.7

7.7. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was 20_10_619_14

7.8. WORST-CASE CONFIGURATION AND MODE

For radiated bandedge and spurious 1-18GHz L/M/H channels were performed with the EUT set at the 2TX CDD mode based on model A2341 with power setting equal or higher than SISO modes as worst-case scenario.

There are two vendors of the WiFi/Bluetooth radio modules: variant 1 and variant 2. The Wi-Fi/Bluetooth radio modules have the same mechanical outline (e.g., the same package dimension and pin-out layout), use the same on-board antenna matching circuit, have an identical antenna structure, and are built and tested to conform to the same specifications and to operate within the same tolerances.

7.9. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Apple	A1989	C02YL3ZMJHC8	BCGA1989
Laptop 61W USBC-C AC/DC adapter	Liteon Technology	A1718	C4N711404U3GN8RAW	NA
EUT AC Adapter	Apple	A2305	D292365CDYADHLHC3	NA

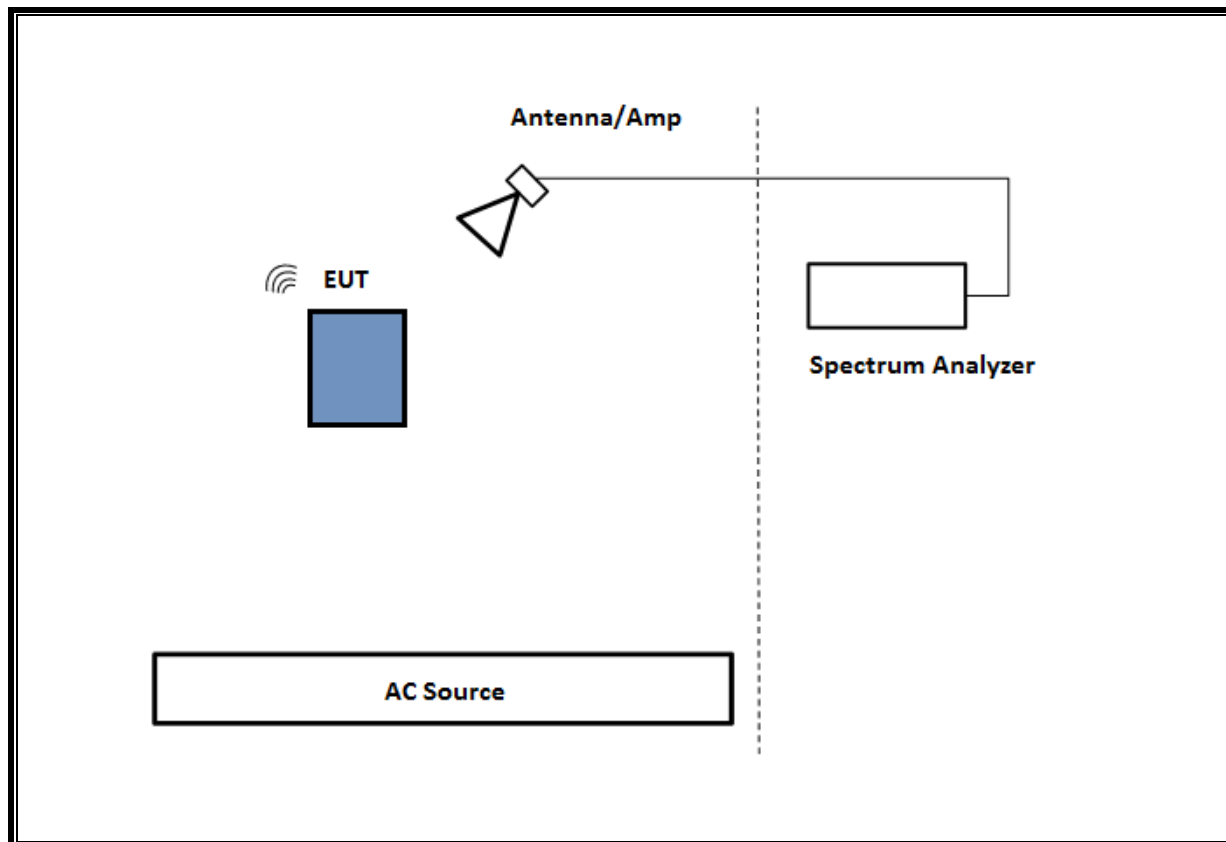
I/O CABLES (RADIATED ABOVE 1 GHZ)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
NA						

TEST SETUP

The EUT is connected to a test laptop during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR RADIATED TESTS Above 1GHz



8. MEASUREMENT METHOD

Test Item	Test Method
Unwanted emissions in restricted bands:	KDB 789033 D02 v02r01, Sections G.3, G.4, G.5, and G.6.
Unwanted emissions in non-restricted bands	KDB 789033 D02 v02r01, Sections G.3, G.4, and G.5.
Band-edge	ANSI C63.10-2013, Section 6.10.

9. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST					
Description	Manufacturer	Model	ID Num	Cal Due	Last Cal
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T346	07/20/2021	07/20/2020
Amplifier, 1 to 18GHz	Miteq	AFS42-00101800-25-S-42	T931	05/11/2021	05/11/2020
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0179522	02/20/2021	02/20/2020
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0179376	04/03/2021	04/03/2020
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T344	05/26/2021	05/26/2020
Amplifier, 1 to 18GHz, 35dB	Ampical	AFS42-00101800-25-S-42	T1568	04/14/2021	04/14/2020
Power Meter, P-series single channel	Keysight	N1911A	PRE0177682	01/21/2021	01/21/2020
Power Sensor	Keysight	N1921A	T1226	02/13/2021	02/13/2020

UL AUTOMATION SOFTWARE			
Radiated Software	UL	UL EMC	Ver 9.5, Mar 6, 2020

10. SETUP PHOTOS

Please refer to 13259315-EP1 for setup photos

END OF TEST REPORT

Appendix A - Conducted Data for FCC Part 15 E

Attached is the test report (13259315-E5) containing the reference data from the parent model as detailed in section 7.5. This data will only be included in the report submitted for FCC filing

Appendix B - Conducted Data for ISED RSS 247

This data will only be included in the report (13259315-E6) submitted for ISED filing.

Appendix C - Radiated Data (13259315-E5 & E6)