



CERTIFICATION TEST REPORT

Report Number: 13190901-E5V1 & E6V1

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

Model : A2398

FCC ID : BCG-E3540A
IC : 579C-E3540A

EUT Description : SMARTPHONE

Test Standard(s) : FCC 47 CFR PART 15 SUBPART E
ISED RSS-247 ISSUE 2
ISED RSS-GEN ISSUE 5

Date of Issue:
September 21, 2020

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REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	09/21/2020	Initial Issue	Vien Tran

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: SMARTPHONE

MODEL: A2398

SERIAL NUMBER: Original: C7CD603Z08HK, C7CCT014Q90Y
Spot Check: C7CD602408GF, C7CCT01HQ91K

DATE TESTED: July 16 to September 08, 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
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Consumer Technology Division
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2. TEST 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 KDB 662911 D01 v02r01, FCC KDB 789033 D02 v02r01, ANSI C63.10-2013, 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
<input type="checkbox"/> Chamber A (ISED:2324B-1)	<input type="checkbox"/> Chamber D (ISED:22541-1)	<input type="checkbox"/> Chamber I (ISED:2324A-5)
<input type="checkbox"/> Chamber B (ISED:2324B-2)	<input type="checkbox"/> Chamber E (ISED:22541-2)	<input type="checkbox"/> Chamber J (ISED:2324A-6)
<input type="checkbox"/> Chamber C (ISED:2324B-3)	<input type="checkbox"/> Chamber F (ISED:22541-3)	<input type="checkbox"/> Chamber K (ISED:2324A-1)
	<input type="checkbox"/> Chamber G (ISED:22541-4)	<input checked="" type="checkbox"/> Chamber L (ISED:2324A-3)
	<input checked="" type="checkbox"/> Chamber H (ISED:22541-5)	

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

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.

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, 5G, CDMA, IEEE 802.11a/b/g/n/ac/ax, Bluetooth, Ultra-Wideband, GPS, NFC and WPT. All models support at least one UICC based SIM. The second SIM is either an UICC based p-SIM (physical SIM) or e-SIM (electronic SIM). The device supports a built-in inductive charging transmitter and receiver. The rechargeable battery is 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-E3539A, IC: 579C-E3539A to cover variant model BCG-E3540A, 579C-E3540A. 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. SPOT CHECK VERIFICATION RESULTS SUMMARY

Spot check verification has been done on device model A2398, FCC ID: BCG-E3540A, IC: 579C-E3540A for radiated spurious and radiated band-edge in accordance with the Test Plan that was approved via KDB inquiry.

BCG-E3540A / 579C-E3540A SPOT CHECK RESULTS										
Technology	Mode	Test Item	Channel	Measured	Original model	Spot check model	Delta (dB)			
					A2176	A2398				
					BCG-E3539A	BCG-E3540A				
					579C-E3539A	579C-E3540A				
WiFi (5GHz)	ax, HE20 5.2 & 5.3GHz	RBE	Low, 36	5150	62.88	50.40	62.34	51.19	-0.54	0.79
			High, 64	5350	62.48	50.90	67.14	50.69	4.66	-0.21
	ax, HE20 5.6GHz	RBE	Low, 100	5460	58.06	48.13	62.11	45.22	4.05	-2.91
	ax, HE20 5.8GHz	RBE	High, 165	5825	-38.49 (EIRP)		-36.73 (EIRP)		-1.76	
	ax, HE20 5.3/5.6/5.8GHz	RSE	Mid, 60	15.51583	52.87	41.89	53.74	42.91	0.87	1.02
			Mid, 116	5.48226-H	57.99	46.70	57.01	45.18	-0.98	-1.52
			Mid, 157	11.31766	51.28	40.49	47.95	36.45	-3.33	-4.40

Comparison with parent model data for spurious emissions shows a delta of less than 3dB, and the parent model's data is considered representative of this model. The variant's band edge emissions, although slightly higher than 3dB above the parent model, are more than 10dB below the limit. The data for band edge emissions is taken in the worst operating mode with respect to band-edge emissions, and therefore no additional testing for band edge is required.

Note: The output powers were verified on model A2398 to match with model A2176 before radiated emissions spot check was performed.

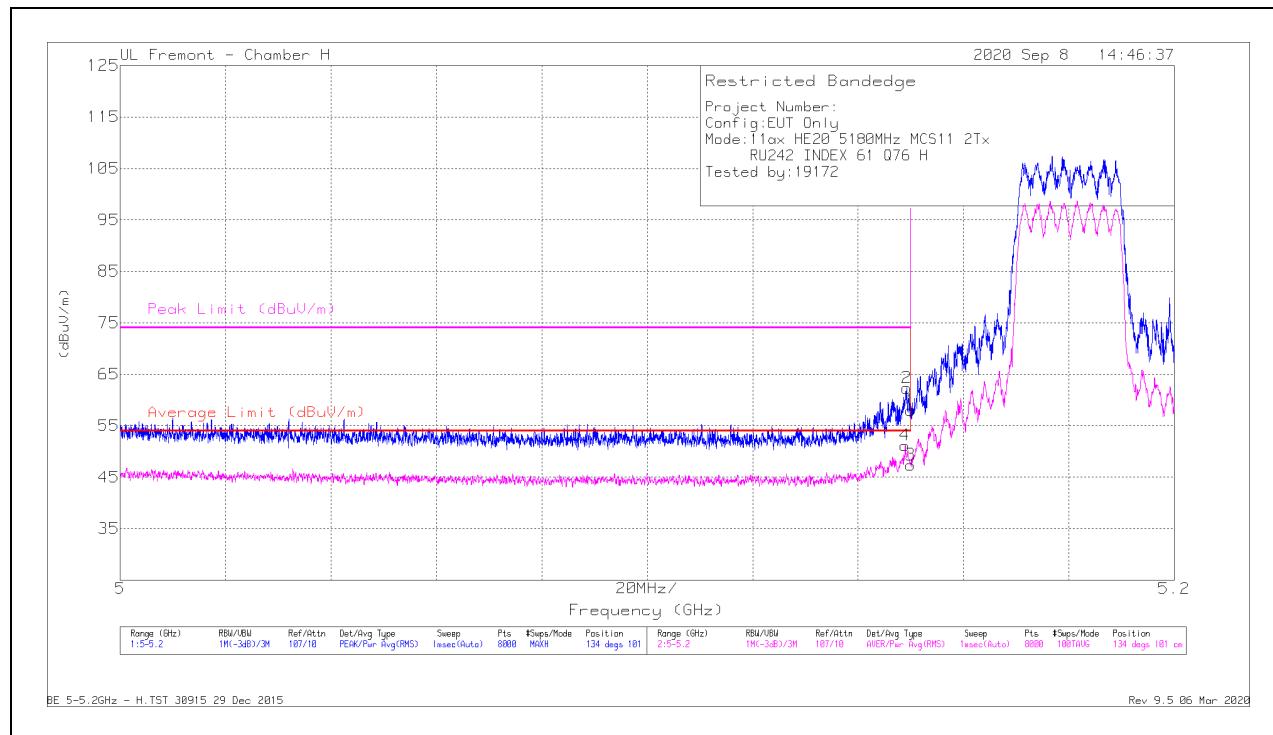
SPOT CHECK DATA

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

5.2GHz Band, Ax, HE 20 RU 61, 242 Tone

BANDEDGE (LOW CHANNEL), 5180MHz

HORIZONTAL RESULT



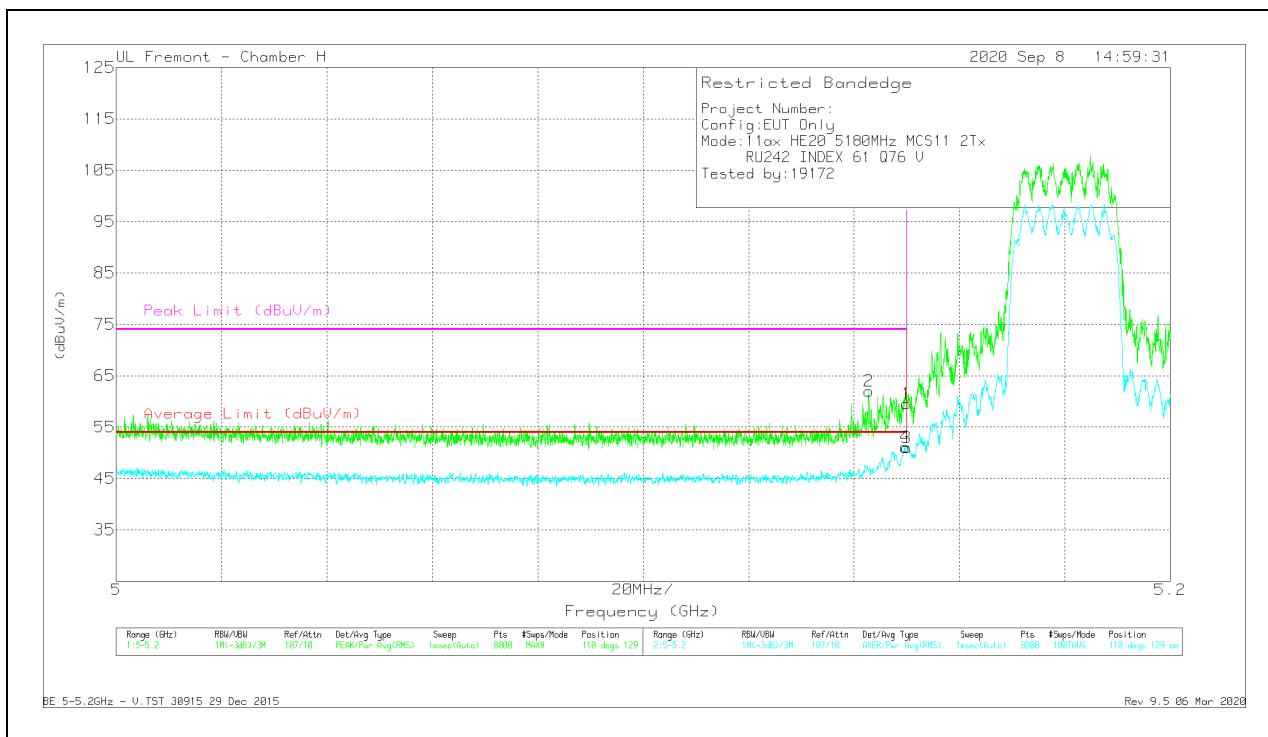
Marker	Frequency (GHz)	Meter Reading (dBuV/m)	Det	AF T862 (dB/m)	Amp/Cbl/Filt/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 5.14999	45	Pk	34.3	-21.3	58	-	-	74	-16	134	101	H
2	* 5.14922	49.34	Pk	34.3	-21.3	62.34	-	-	74	-11.66	134	101	H
3	* 5.14999	34.38	RMS	34.3	-21.3	47.38	54	-6.62	-	-	134	101	H
4	* 5.14892	38.19	RMS	34.3	-21.3	51.19	54	-2.81	-	-	134	101	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 T862 (dB/m)	Amp/Cbl/Fltr/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	* 5.14999	46.55	Pk	34.3	-21.3	59.55	-	-	74	-14.45	110	129	V
2	* 5.14279	49.01	Pk	34.3	-21.3	62.01	-	-	74	-11.99	110	129	V
3	* 5.14999	37.99	RMS	34.3	-21.3	50.99	54	-3.01	-	-	110	129	V
4	* 5.14974	38.16	RMS	34.3	-21.3	51.16	54	-2.84	-	-	110	129	V

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

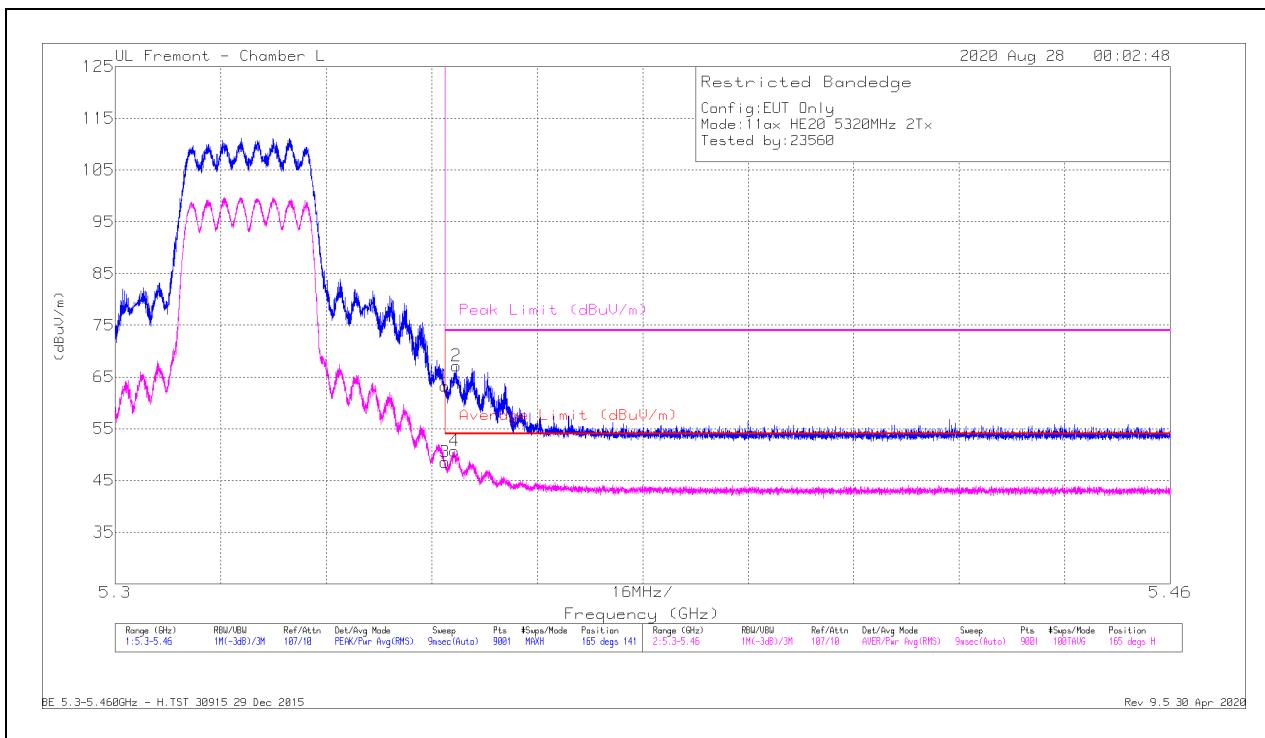
PK - Peak detector

RMS - RMS detection

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

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



Trace Markers

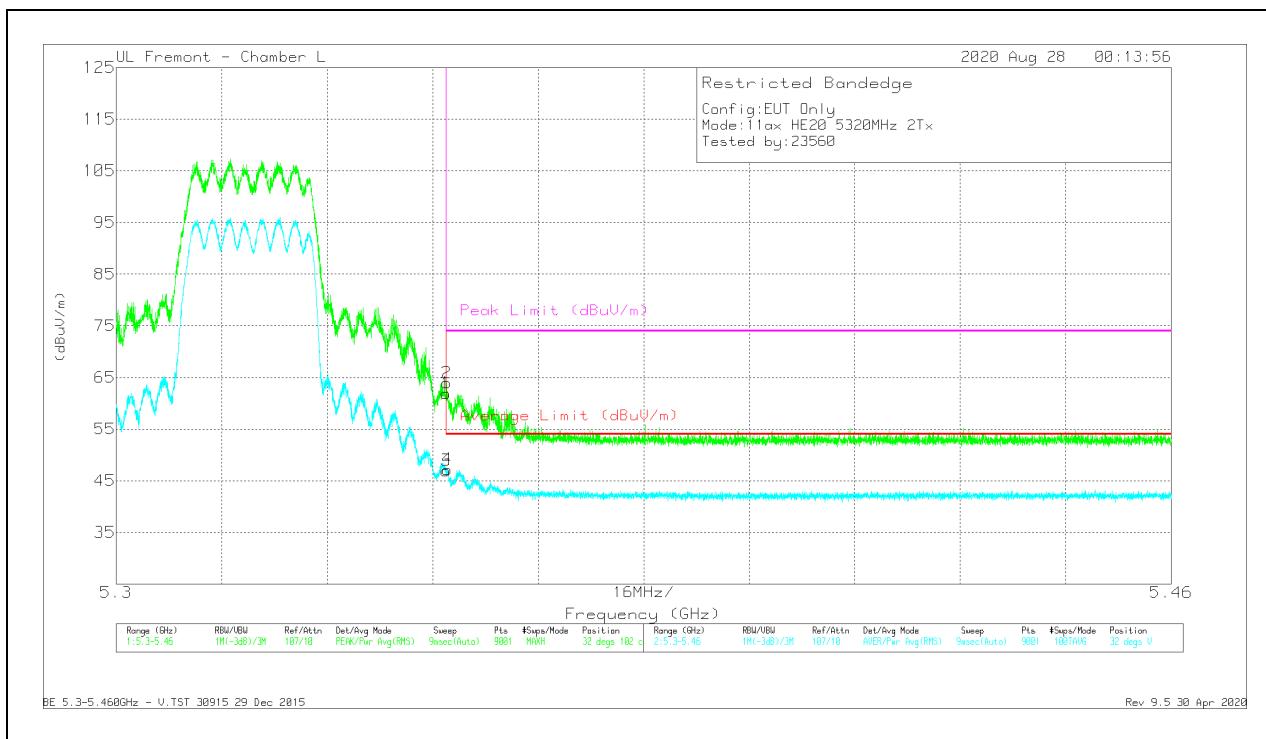
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 344 (dB/m)	Amp/Cбл/Fit/Fpa d (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 5.35001	45.85	Pk	34.5	-17.1	63.25	-	-	74	-10.75	165	141	H
2	* 5.35175	49.74	Pk	34.5	-17.1	67.14	-	-	74	-6.86	165	141	H
3	* 5.35001	31.17	RMS	34.5	-17.1	48.57	54	-5.43	-	-	165	141	H
4	* 5.35145	33.29	RMS	34.5	-17.1	50.69	54	-3.31	-	-	165	141	H

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

PK - Peak detector

RMS - RMS detection

VERTICAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 344 (dB/m)	Amp/Cbl/Filt/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	* 5.35001	44.51	Pk	34.5	-17.1	61.91	-	-	74	-12.09	32	102	V
2	* 5.3501	46.55	Pk	34.5	-17.1	63.95	-	-	74	-10.05	32	102	V
3	* 5.35001	29.57	RMS	34.5	-17.1	46.97	54	-7.03	-	-	32	102	V
4	* 5.35024	29.79	RMS	34.5	-17.1	47.19	54	-6.81	-	-	32	102	V

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

Pk - Peak detector

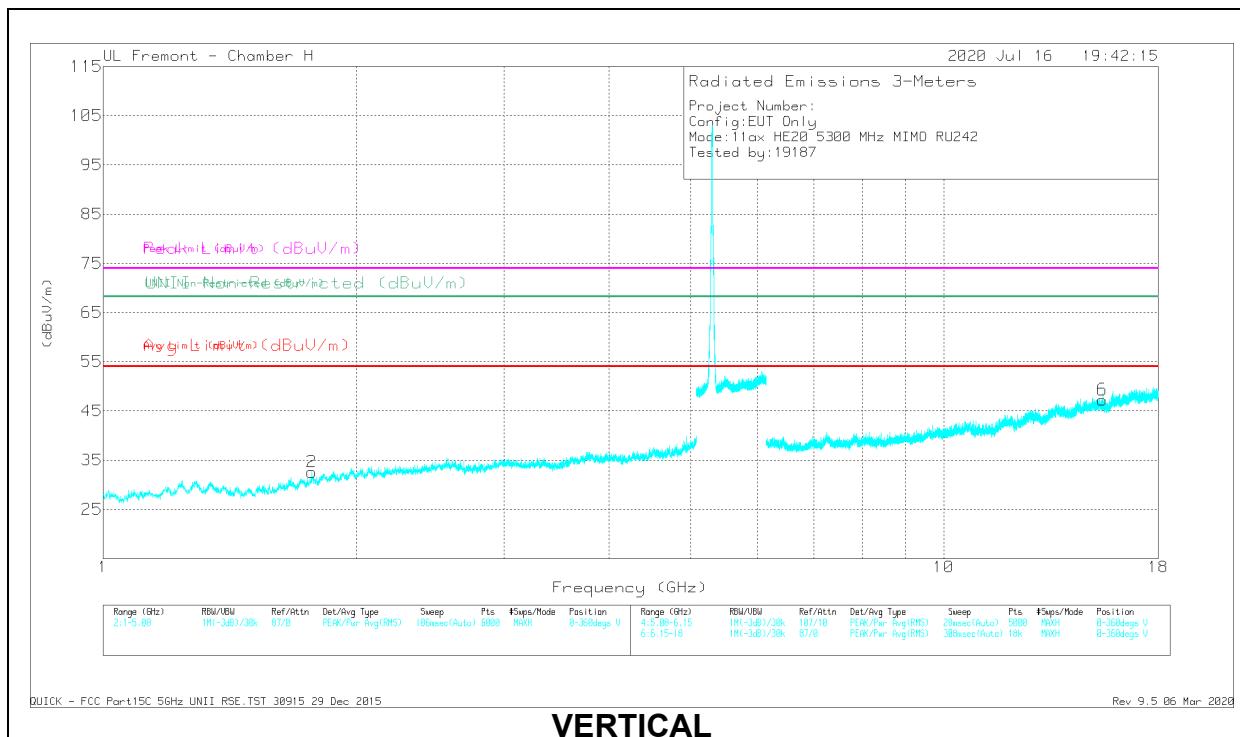
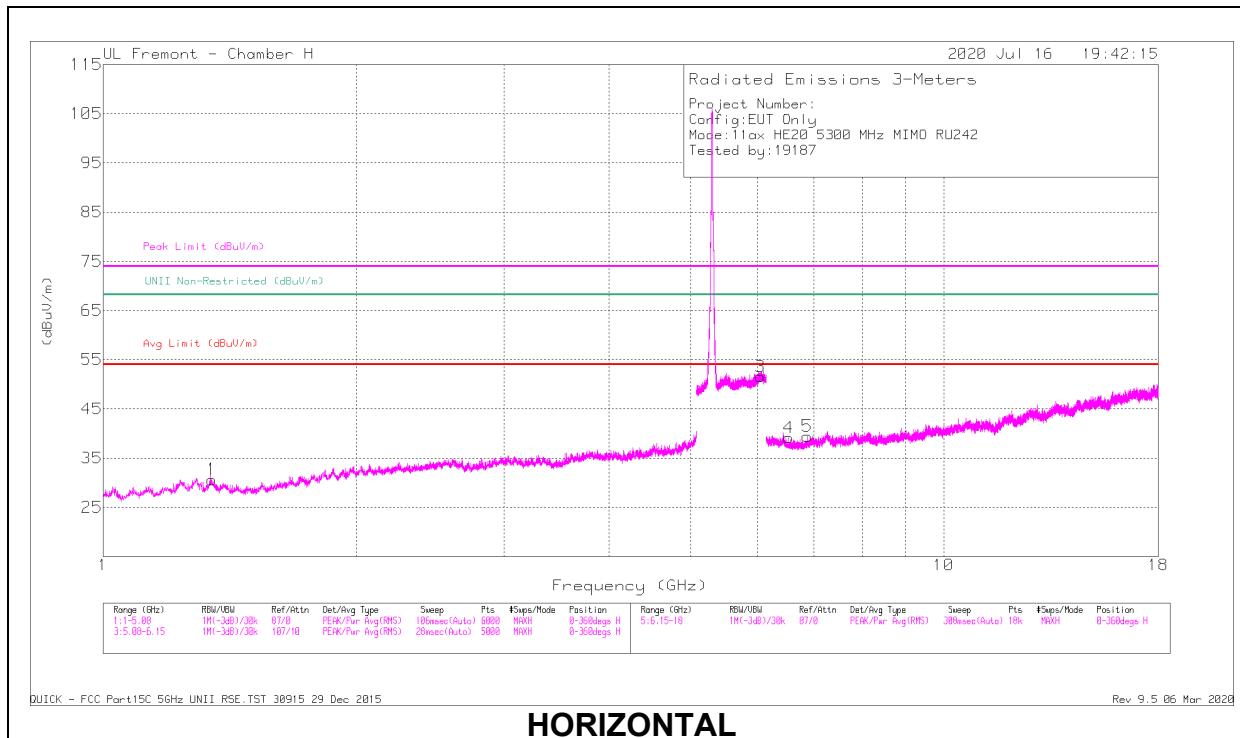
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

2TX Antenna 5 + Antenna 6 OFDMA MODE

5.3GHz Band, 5300MHz

MID CHANNEL RESULTS



RADIATED EMISSIONS

Markers	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cb I/Fitr/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	* 1.34705	44.55	PK-U	29	-35.2	38.35	-	74	-35.65	-	-	360	101	H	
	* 1.34589	32.99	ADR	29	-35.2	26.79	54	-27.21	-	-	-	360	101	H	
6	* 15.43429	36.04	PK-U	41	-23.3	53.74	-	-	74	-20.26	-	-	360	101	V
	* 15.43144	25.31	ADR	41	-23.4	42.91	54	-11.09	-	-	-	360	101	V	
2	1.76862	43.96	PK-U	29.9	-34.5	39.36	-	-	-	-	68.2	-28.84	360	101	V
	1.7723	32.34	ADR	30	-34.4	27.94	-	-	-	-	-	360	101	V	
3	6.05146	32.96	ADR	35.5	-20.2	48.26	-	-	-	-	-	360	101	H	
	6.05377	44.92	PK-U	35.6	-20.2	60.32	-	-	-	-	68.2	-7.88	360	101	H
4	6.53562	28.81	ADR	35.6	-29.6	34.81	-	-	-	-	-	360	101	H	
	6.53671	39.74	PK-U	35.6	-29.6	45.74	-	-	-	-	68.2	-22.46	360	101	H
5	6.88162	28.13	ADR	35.7	-28.7	35.13	-	-	-	-	-	360	101	H	
	6.88341	39.35	PK-U	35.7	-28.7	46.35	-	-	-	-	68.2	-21.85	360	101	H

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

PK-U - U-NII: Maximum Peak

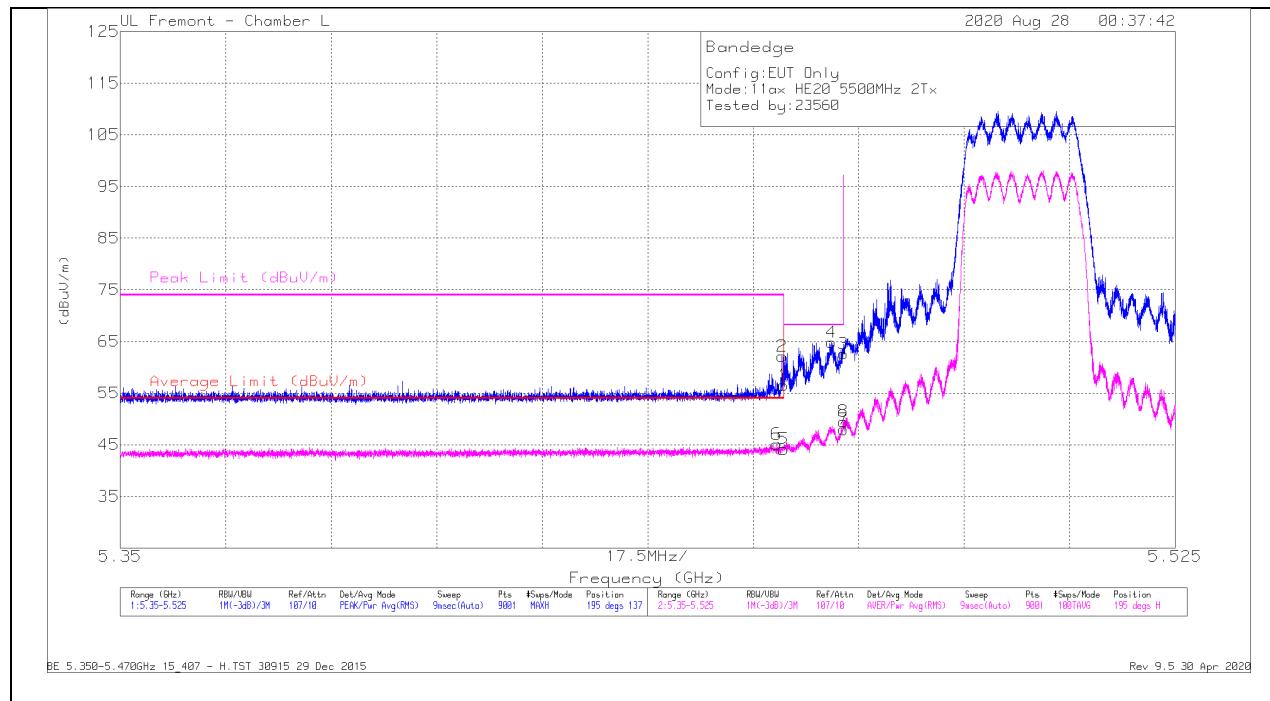
ADR - U-NII AD primary method, RMS average

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

5.6GHz Band, Ax, HE 20 242 Tone

BANDEDGE (LOW CHANNEL), 5500MHz

HORIZONTAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 344 (dB/m)	Amp/Cbl/Fltr/ 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	38.84	Pk	34.6	-16.9	56.54	-	-	74	-17.46	195	137	H
2	* 5.45978	44.41	Pk	34.6	-16.9	62.11	-	-	74	-11.89	195	137	H
3	5.46999	44.9	Pk	34.6	-16.9	62.6	-	-	68.2	-5.6	195	137	H
4	5.46799	47.09	Pk	34.6	-16.9	64.79	-	-	68.2	-3.41	195	137	H
5	* 5.45999	26.48	RMS	34.6	-16.9	44.18	54	-9.82	-	-	195	137	H
6	* 5.45887	27.4	RMS	34.6	-16.9	45.1	54	-8.9	-	-	195	137	H
7	5.46999	30.27	RMS	34.6	-16.9	47.97	-	-	-	-	195	137	H
8	5.46993	31.8	RMS	34.6	-16.9	49.5	-	-	-	-	195	137	H

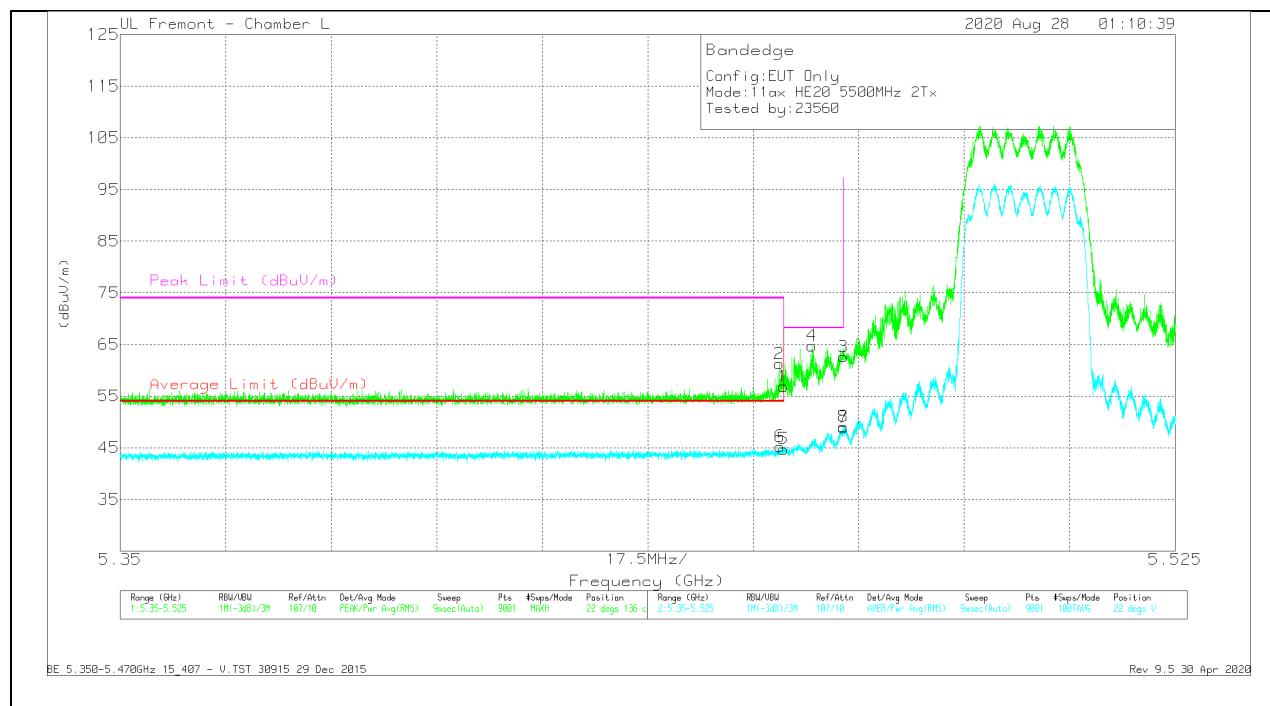
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

BANDEDGE (LOW CHANNEL)

VERTICAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 344 (dB/m)	Amp/Cbl/Filt/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	39.2	Pk	34.6	-16.9	56.9	-	-	74	-17.1	22	136	V
2	* 5.45929	43.57	Pk	34.6	-16.9	61.27	-	-	74	-12.73	22	136	V
3	5.46999	44.9	Pk	34.6	-16.9	62.6	-	-	68.2	-5.6	22	136	V
4	5.46472	47.13	Pk	34.5	-16.9	64.73	-	-	68.2	-3.47	22	136	V
5	* 5.45999	27.08	RMS	34.6	-16.9	44.78	54	-9.22	-	-	22	136	V
6	* 5.45941	27.52	RMS	34.6	-16.9	45.22	54	-8.78	-	-	22	136	V
7	5.46999	31.18	RMS	34.6	-16.9	48.88	-	-	-	-	22	136	V
8	5.46993	31.4	RMS	34.6	-16.9	49.1	-	-	-	-	22	136	V

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

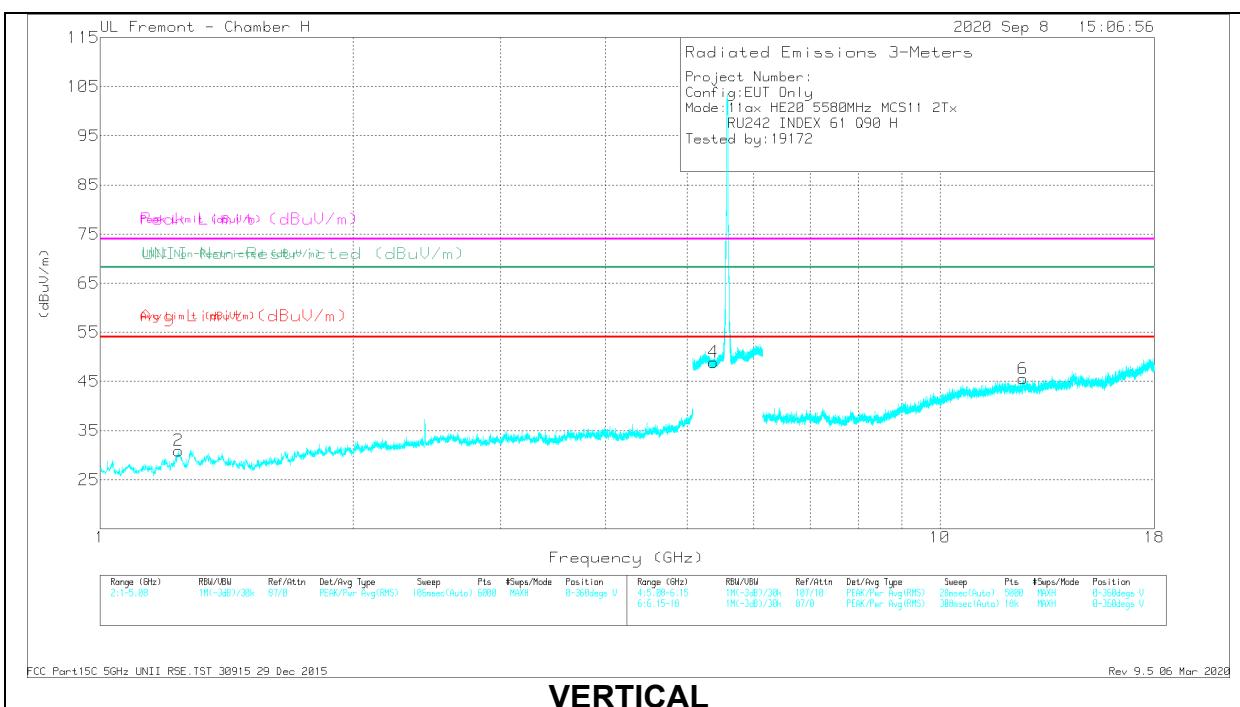
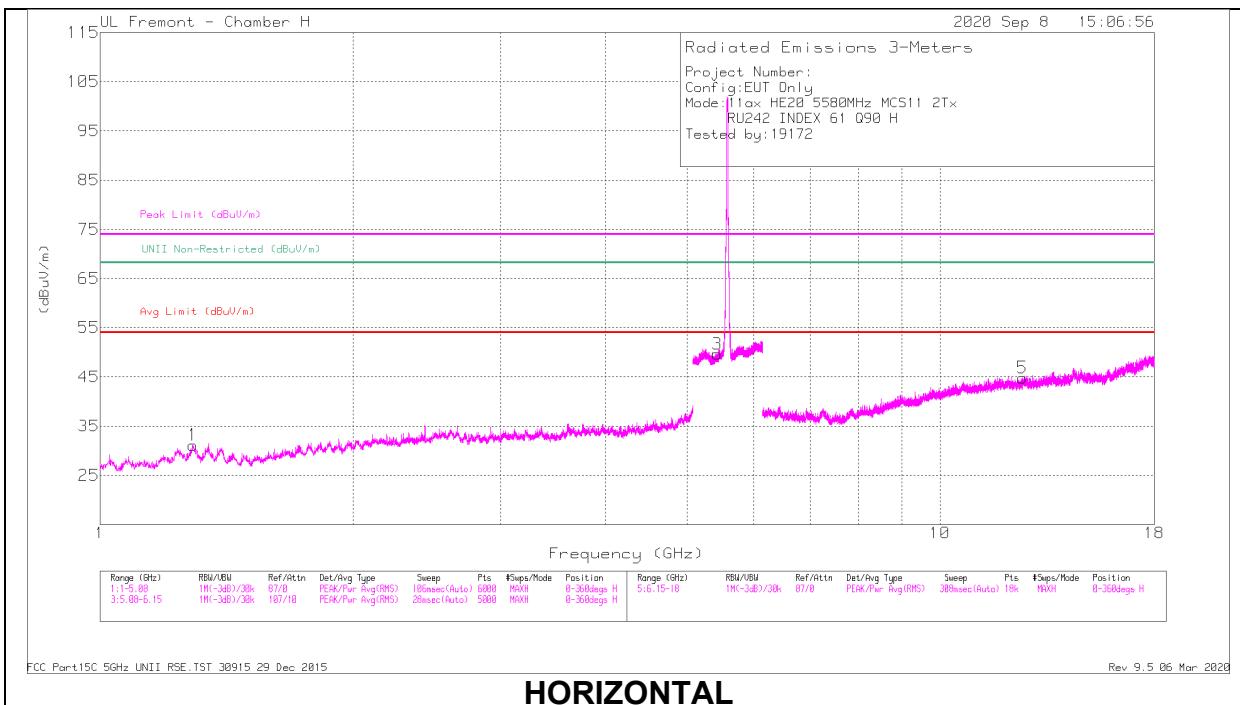
Pk - Peak detector

RMS - RMS detection

2Tx Antenna 5 + Antenna 6 OFDMA MODE

5.6GHz Band, 5580MHz

MID CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cb I/Ftr/Pa d (dB)	Correct ed Readin g (dBuV/ m)	Avg Limit (dBuV/ m)	Margin (dB)	Peak Limit (dBuV/ m)	PK Margin (dB)	Azimut h (Degs)	Height (cm)	Polarity
1	* 1.29699	43.39	PK-U	29.4	-35.1	37.69	-	74	-36.31	85	220	H	
	* 1.29679	31.1	ADR	29.4	-35.1	25.4	54	-28.6	-	-	85	220	H
2	* 1.2432	45.11	PK-U	29	-35.4	38.71	-	74	-35.29	39	375	V	
	* 1.2409	32.97	ADR	28.9	-35.4	26.47	54	-27.53	-	-	39	375	V
3	* 5.43308	43.21	PK-U	34.6	-20.8	57.01	-	74	-16.99	5	371	H	
	* 5.43824	31.48	ADR	34.6	-20.9	45.18	54	-8.82	-	-	5	371	H
4	* 5.36955	42.79	PK-U	34.5	-20.9	56.39	-	74	-17.61	136	333	V	
	* 5.38565	31.11	ADR	34.5	-20.9	44.71	54	-9.29	-	-	136	333	V
5	* 12.54966	35.63	PK-U	39.3	-23.6	51.33	-	74	-22.67	270	225	H	
	* 12.5483	24.12	ADR	39.3	-23.6	39.82	54	-14.18	-	-	270	225	H
6	* 12.55031	35.42	PK-U	39.3	-23.6	51.12	-	74	-22.88	170	161	V	
	* 12.55821	23.99	ADR	39.4	-23.4	39.99	54	-14.01	-	-	170	161	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

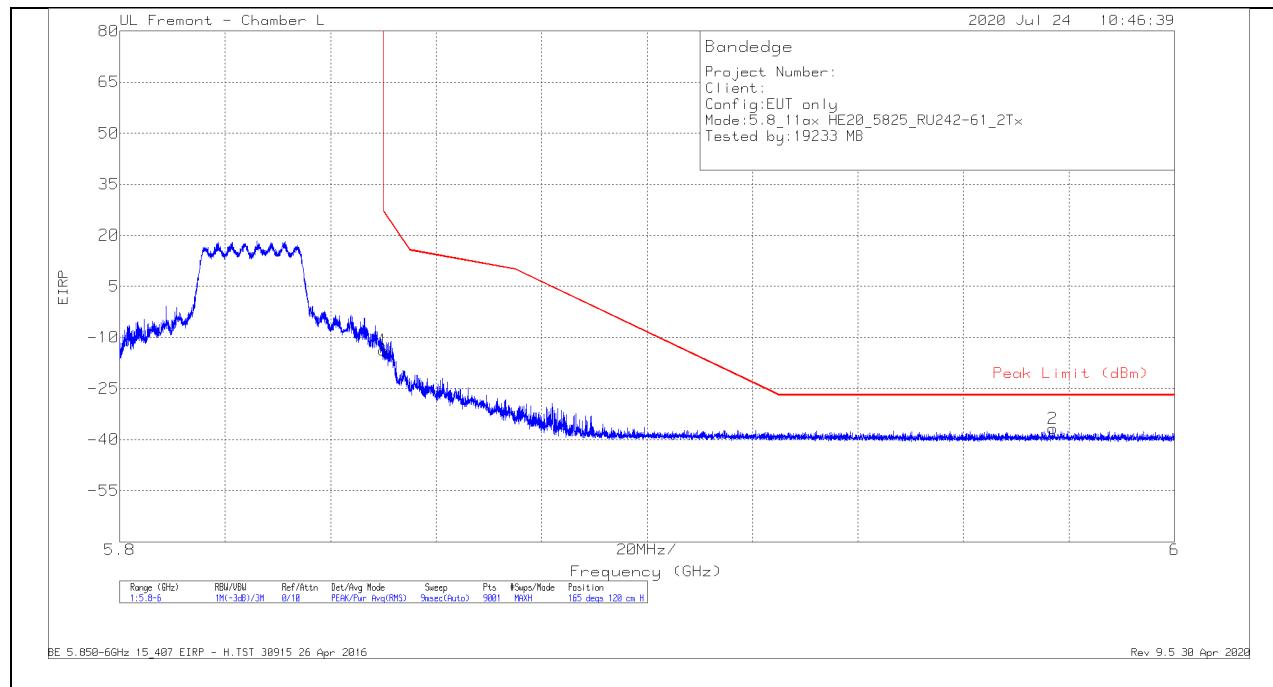
7.3.4. TX ABOVE 1 GHz 802.11ax HE20 MODE IN THE 5.8 GHz BAND

5.8GHz Band, Ax, HE 20 242 Tone

5825MHz

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



Trace Markers

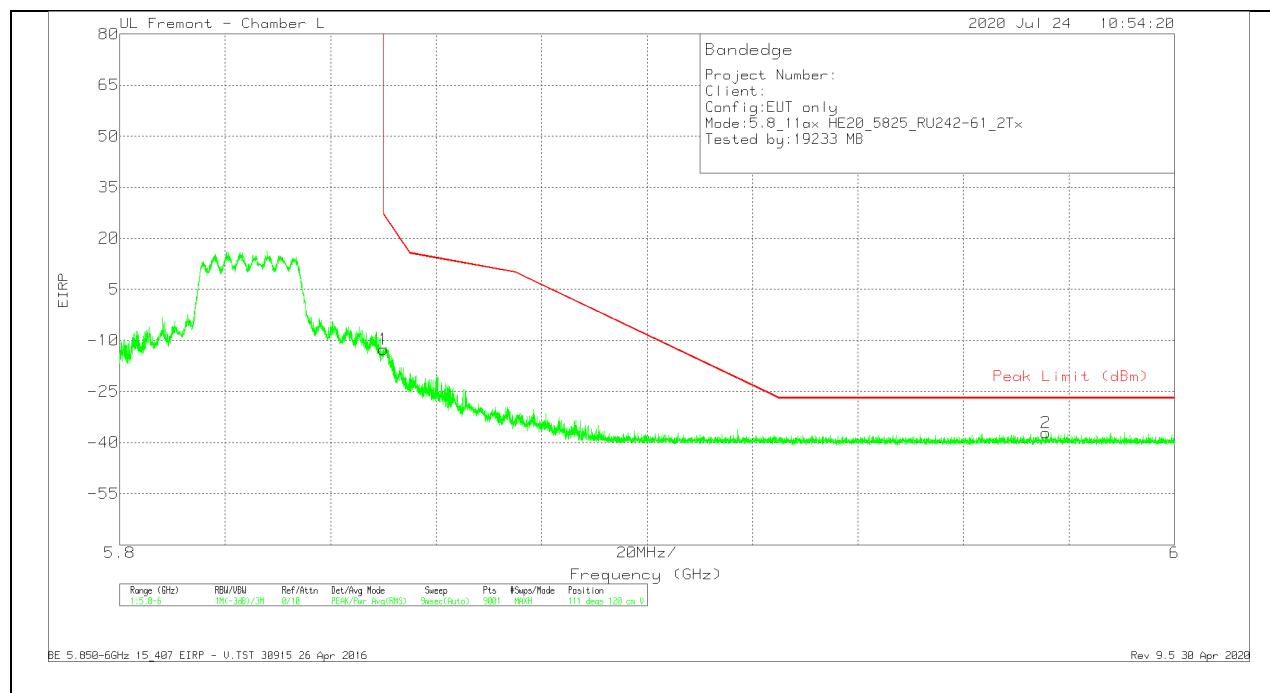
Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF 344 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85002	-43.89	Pk	35	-16.7	11.8	-13.79	26.95	-40.74	165	120	H
2	5.97693	-67.83	Pk	35.3	-16	11.8	-36.73	-27	-9.73	165	120	H

Pk - Peak detector

BE 5.850-6GHz 15_407 EIRP - H.TST 30915 26 Apr 2016
 Rev 9.5 15 Apr 2020

BANDEDGE (HIGH CHANNEL)

VERTICAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF 344 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85002	-42.68	Pk	35	-16.7	11.8	-12.58	26.95	-39.53	111	120	V
2	5.97569	-68.13	Pk	35.3	-16	11.8	-37.03	-27	-10.03	111	120	V

Pk - Peak detector

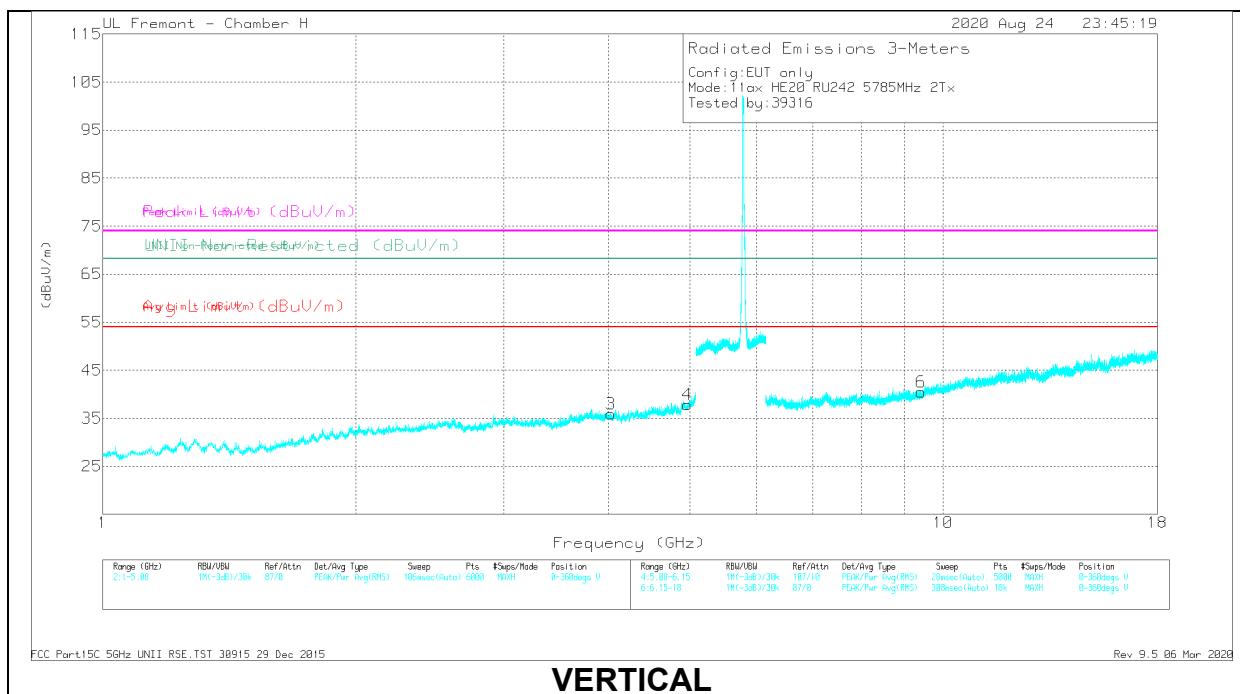
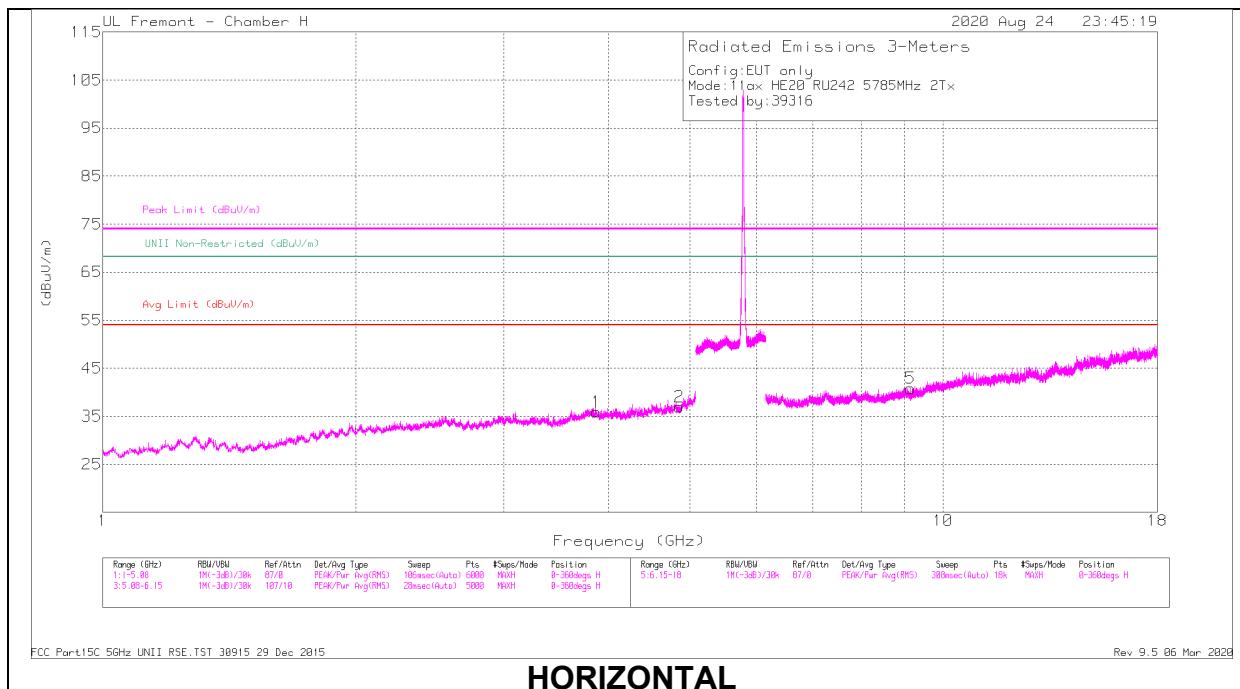
BE 5.850-6GHz 15_407 EIRP - V.TST 30915 26 Apr 2016
 Rev 9.5 15 Apr 2020

HARMONICS AND SPURIOUS EMISSIONS

2TX Antenna 5 + Antenna 6 OFDMA MODE

5.8GHz Band, 5785MHz

MID CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cb I/Ftr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 3.8713	42.62	PK-U	33.4	-31.8	44.22	-	-	74	-29.78	-	-	0	200	H
	* 3.87089	31.08	ADR	33.4	-31.8	32.68	54	-21.32	-	-	-	-	0	200	H
2	* 4.85805	40.95	PK-U	34.3	-31.2	44.05	-	-	74	-29.95	-	-	0	200	H
	* 4.85608	30.09	ADR	34.3	-31.2	33.19	54	-20.81	-	-	-	-	0	200	H
3	* 4.02144	42.34	PK-U	33.4	-32	43.74	-	-	74	-30.26	-	-	0	200	V
	* 4.02239	31.54	ADR	33.4	-32	32.94	54	-21.06	-	-	-	-	0	200	V
4	* 4.96542	40.96	PK-U	34.2	-29.9	45.26	-	-	74	-28.74	-	-	0	200	V
	* 4.96647	29.9	ADR	34.2	-29.9	34.2	54	-19.8	-	-	-	-	0	200	V
5	* 9.14917	37.02	PK-U	36.3	-26.2	47.12	-	-	74	-26.88	-	-	0	200	H
	* 9.14972	26.11	ADR	36.3	-26.2	36.21	54	-17.79	-	-	-	-	0	200	H
6	* 9.41476	36.95	PK-U	36.5	-25.6	47.85	-	-	74	-26.15	-	-	0	200	V
	* 9.41726	25.65	ADR	36.5	-25.7	36.45	54	-17.55	-	-	-	-	0	200	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. REFERENCE DETAIL

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

Equipment Class	Reference FCC ID & IC	Reference Report	Report Title/Section
NII	BCG-E3539A 579C-E3539A	13179110-E5 (FCC) 13179110-E6 (IC) 13179110-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.

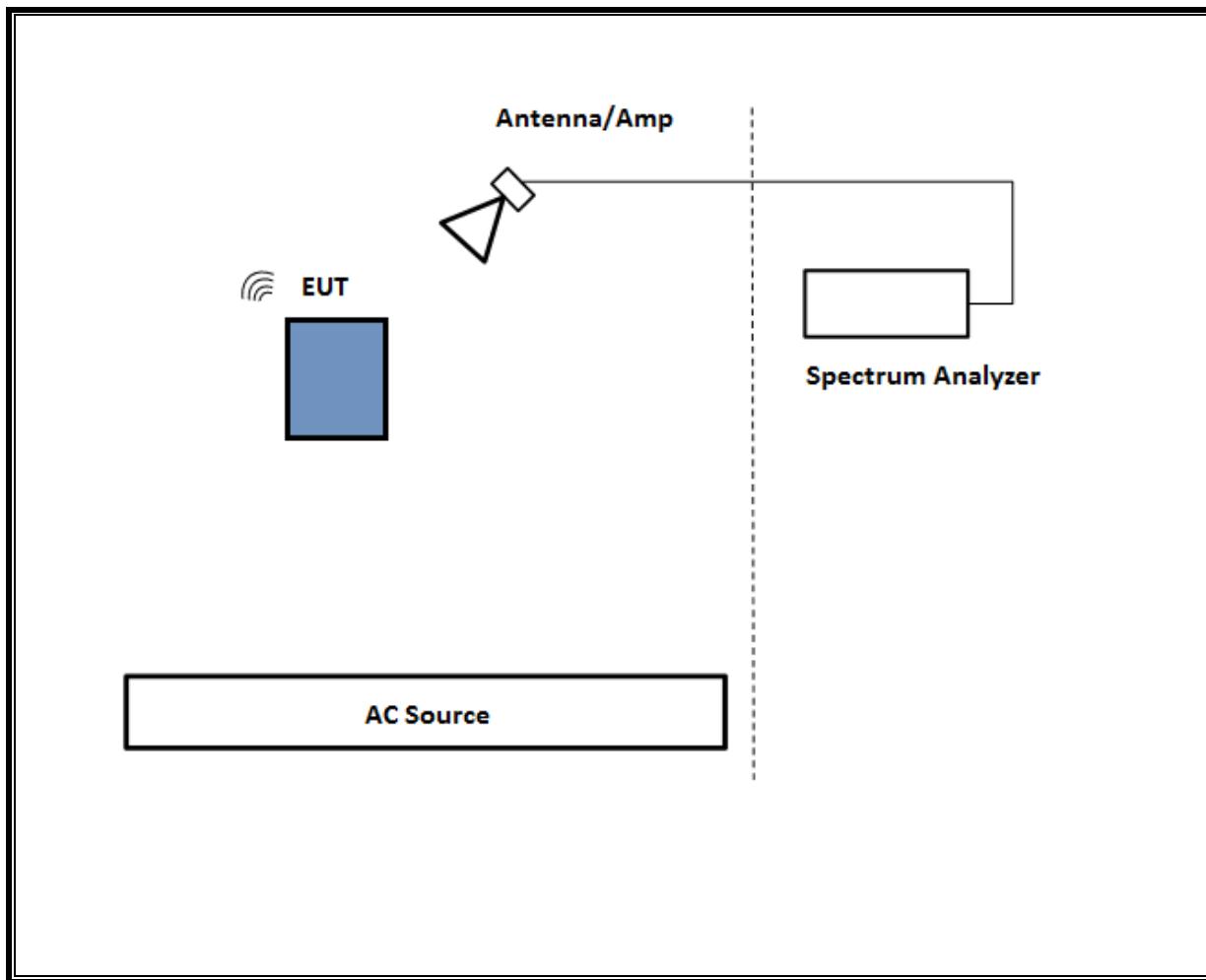
7.5. DESCRIPTION OF TEST SETUP

SUPPORT TEST EQUIPMENT					
Description		Manufacturer	Model	Serial Number	FCC ID/ DoC
Laptop		Apple	A1398	C02PM012G3QD	DQS-BRCM1069
Laptop AC/DC adapter		Liteon Technology	PA-1450-BA1	B123	N/A
EUT AC/DC adapter		Apple	A1385	D29325SM03XDHLHC9	N/A
I/O CABLES (RF RADIATED TEST)					
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)
1	AC	1	AC	Un-shielded	2
2	USB	1	USB	Un-shielded	1

TEST SETUP

The EUT setup is shown as below. Test software exercised the radio card.

SETUP DIAGRAM FOR RADIATED TESTS Above 1GHz



7.6. WORST-CASE CONFIGURATION AND MODE

For radiated harmonics spurious 1-18GHz L/M/H channels were performed with the EUT set at the 2TX CDD mode based on model A2176 with power setting equal or higher than SISO modes as worst-case scenario.

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 Due
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight Technologies Inc	N9030A-544	T1210	01/21/2021	01/21/2020
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T862	08/19/2021	08/19/2020
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T863	08/31/2021	08/31/2020
Amplifier, 1 to 18GHz, 35dB	Amplical	AFS42-00101800-25-S-42	T1567	01/24/2021	01/24/2020
RF Filter Box, 1-18GHz	FREMONT	N/A	PRE0178741	01/24/2021	01/24/2020
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0179367	02/26/2021	02/26/2020
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T344	05/26/2021	05/26/2020
Amplifier, 1 - 18GHz	MITEQ	AFS42-00101800-25-S-42	T1568	04/14/2021	04/14/2020
RF Filter Box, 1-18GHz	FREMONT	SAC-L1	PRE0180571	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	Rev 9.5, 30 Apr, 2020

10. SETUP PHOTOS

Please refer to 13179110-EP1 for setup photos.