TEST REPORT

Report Number: 13146732-E5V1 & E6V1

Applicant	:	APPLE, INC. 1 APPLE PARK WAY CUPERTINO, CA 95014, U.S.A.
Model	:	A2399, A2400, A2401
FCC ID	:	BCG-E3541A
IC	:	579C-E3541A
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

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

NVLAP Lab code: 200065-0

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	9/21/2020	Initial Revision	Chin Pang

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UL VERIFICATION SERVICES INC.
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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: A2399, A2400, A2401

SERIAL NUMBER: (Original): C7CCW023Q91T, C7CCT01RQ920
(Spot Check): C7CCT01RQ920, C7CCT010Q920

DATE TESTED: JULY 17 – AUGUST 27, 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 Pang
Senior Engineer
Consumer Technology Division
UL Verification Services Inc.

Prepared By:

Tony Li
Test Engineer
Consumer Technology Division
UL Verification Services Inc.

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
☐ Chamber A (ISED:2324B-1)	☐ Chamber D (ISED:22541-1)	☒ Chamber I (ISED:2324A-5)
☐ Chamber B (ISED:2324B-2)	☒ Chamber E (ISED:22541-2)	☐ Chamber J (ISED:2324A-6)
☐ Chamber C (ISED:2324B-3)	☐ Chamber F (ISED:22541-3)	☐ Chamber K (ISED:2324A-1)
	☐ Chamber G (ISED:22541-4)	☒ Chamber L (ISED:2324A-3)
	☐ 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: 2324A.

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

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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%.

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6. RADIATED TEST RESULTS

LIMITS

FCC §15.205 and §15.209 -Restriced bands

FCC §15.407(b)(1-3) -Un-Restriced 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 measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For pre-scans above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 KHz for peak measurements.

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 spectrum from 30 MHz to 1GHz and 18GHz to 40 GHz is investigated with the transmitter set to transmit at the channel with highest output power as worst-case scenario. 1GHz to 18GHz was set to the lowest, middle, and highest channels in the 5 GHz bands.

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.

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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.

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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-E3541A, 579C-E3541A. 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 A2399, A2400, and A2401 are electrically identical and the model numbers are allocated for marketing and logistic purposes only. Model A2399 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 A2399, FCC ID: BCG-E3541A, IC: 579C-E3541A for radiated spurious and radiated band-edge in accordance with the Test Plan that was approved via KDB inquiry.

BCG-E3541A, 579C-E3541A SPOT CHECK RESULTS										
Technology	Mode	Test Item	Channel	Measured	Original model		Spot check model		Delta (dB)	
					A2176		A2399, A2400, A2401			
					BCG-E3539A 579C-E3539A		BCG-E3541A 579C-E3541A			
				Frequency (GHz)	Peak (dBuV)	Ave (dBuV)	Peak	Ave	Peak	Ave
WiFi (5GHz)	ax, HE20 5.2 & 5.3GHz	RBE	Low, 36	5150	62.88	50.4	68.06	52.36	5.18	1.96
			High, 64	5350	62.48	50.9	67.59	51.27	5.11	0.37
	ax, HE20 5.6GHz	RBE	Low, 100	5451	58.06	48.13	63.03	46.67	4.97	-1.46
	ax, HE20 5.8GHz	RBE	High,165	5850	-17.68 (EIRP)		-14.35 (EIRP)		3.33	
	ax, HE20 5.3/5.6/5.8GHz	RSE	Mid, 60	12.416	48.28	37.91	51.06	40.18	2.78	2.27
			Mid,116	11.490	52.67	41.82	49.24	39.13	-3.43	-2.69
			Mid,157	12.521	50.66	40.22	51.19	40.27	0.53	0.05

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 A2399 to match with model A2176 before radiated emissions spot check was performed.

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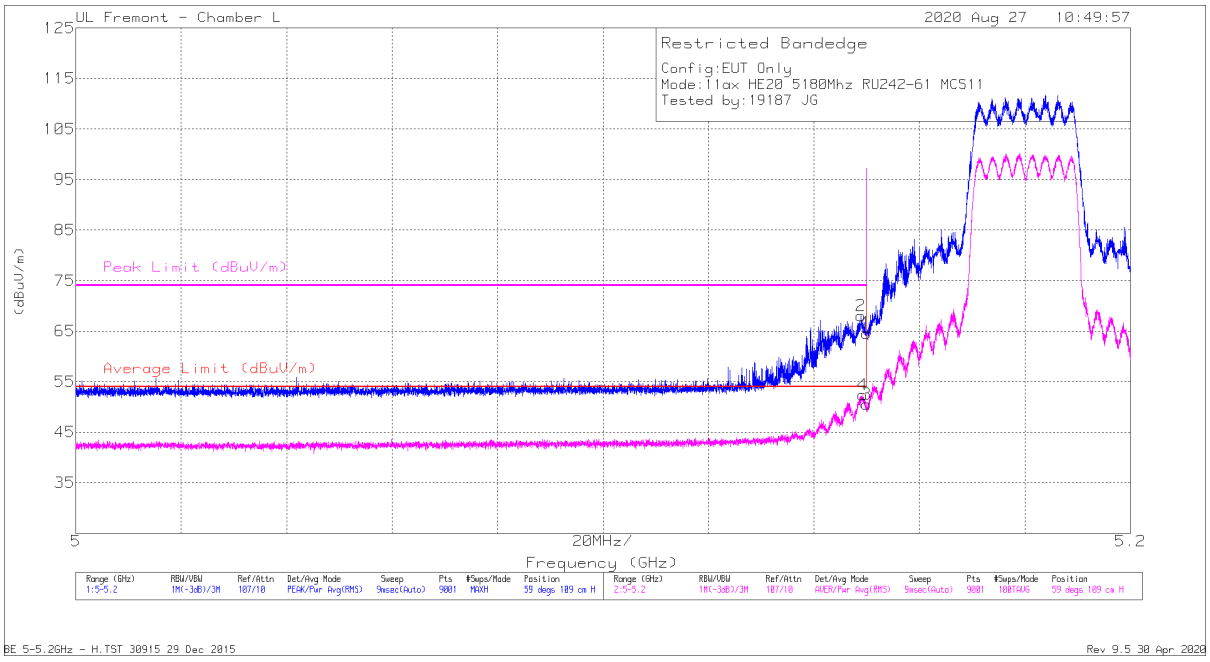
SPOT CHECK

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 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	* 5.15	47.83	Pk	34.3	-17.5	64.63	-	-	74	-9.37	59	109	H
2	* 5.14893	51.26	Pk	34.3	-17.5	68.06	-	-	74	-5.94	59	109	H
3	* 5.15	33.74	RMS	34.3	-17.5	50.54	54	-3.46	-	-	59	109	H
4	* 5.14922	35.56	RMS	34.3	-17.5	52.36	54	-1.64	-	-	59	109	H

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

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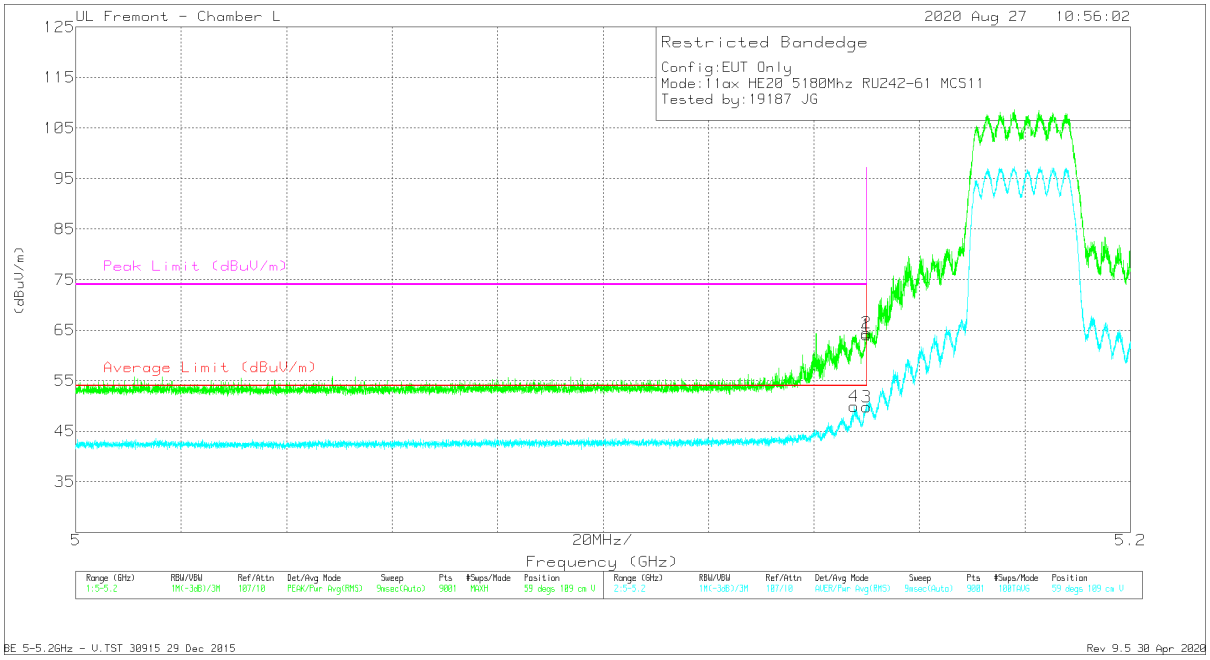
VERTICAL RESULT



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	* 5.15	47.29	Pk	34.3	-17.5	64.09	-	-	74	-9.91	59	109	V
2	* 5.14998	47.63	Pk	34.3	-17.5	64.43	-	-	74	-9.57	59	109	V
3	* 5.15	33.01	RMS	34.3	-17.5	49.81	54	-4.19	-	-	59	109	V
4	* 5.14762	33.08	RMS	34.3	-17.5	49.88	54	-4.12	-	-	59	109	V

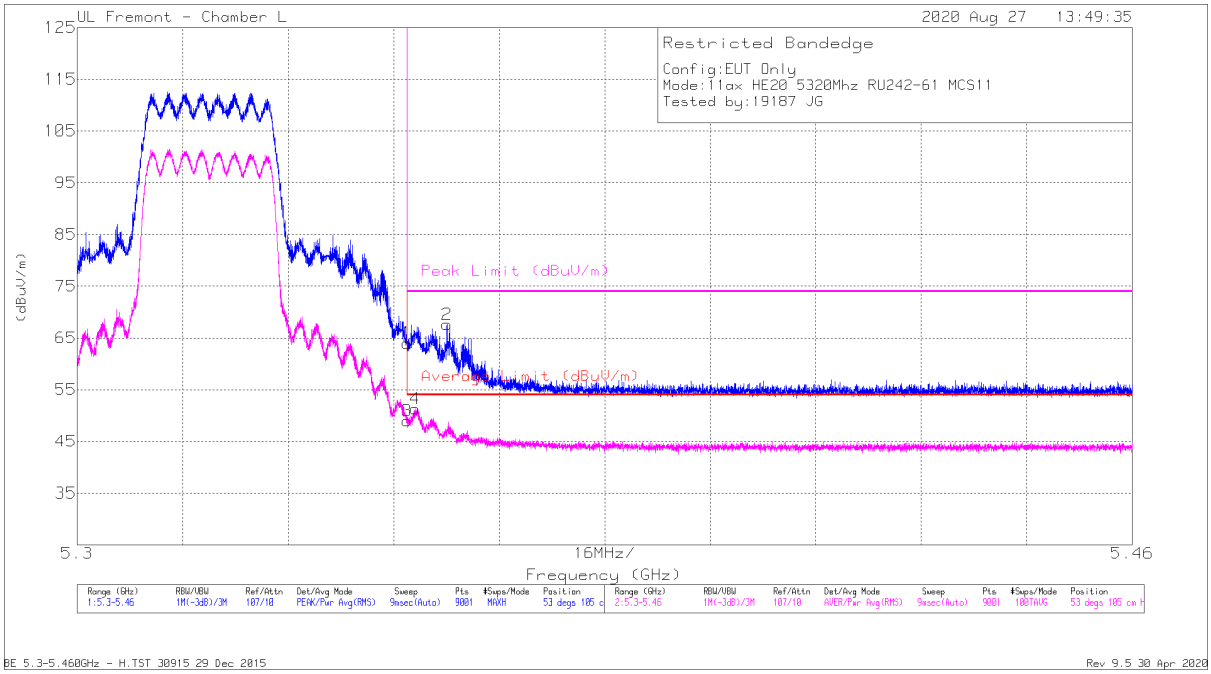
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

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)

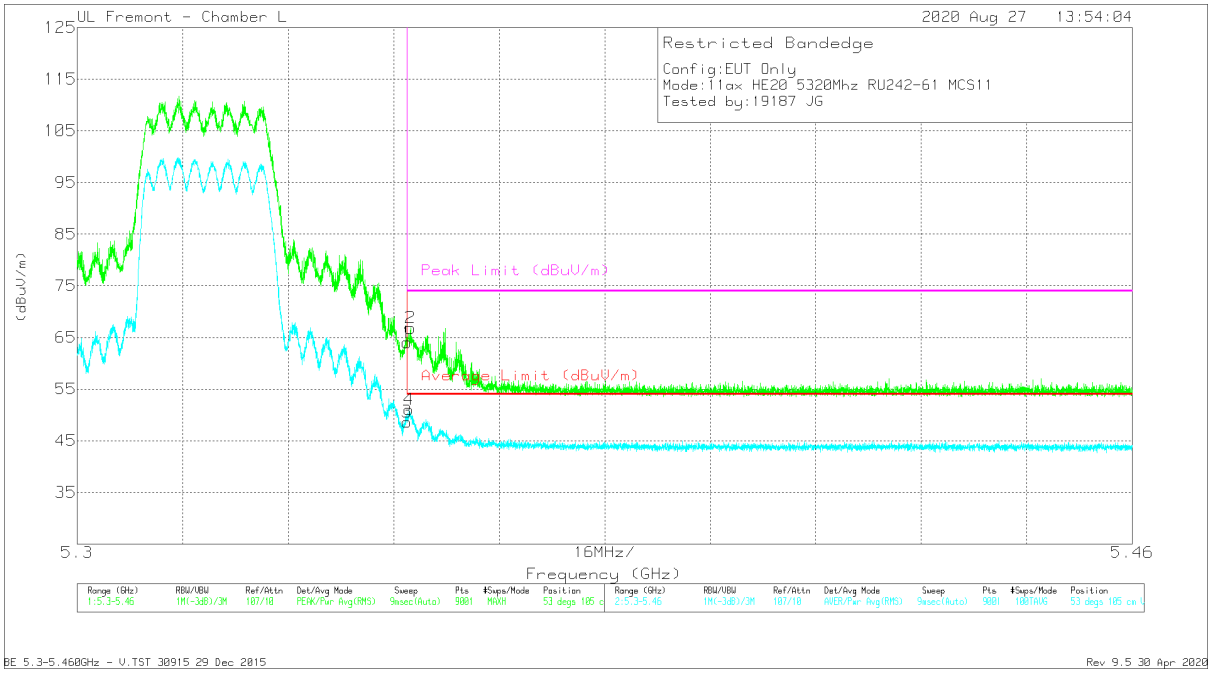
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 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	* 5.35001	46.61	Pk	34.5	-17.1	64.01	-	-	74	-9.99	53	105	H
2	* 5.35607	50.19	Pk	34.5	-17.1	67.59	-	-	74	-6.41	53	105	H
3	* 5.35001	31.57	RMS	34.5	-17.1	48.97	54	-5.03	-	-	53	105	H
4	* 5.35124	33.87	RMS	34.5	-17.1	51.27	54	-2.73	-	-	53	105	H

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

VERTICAL RESULT

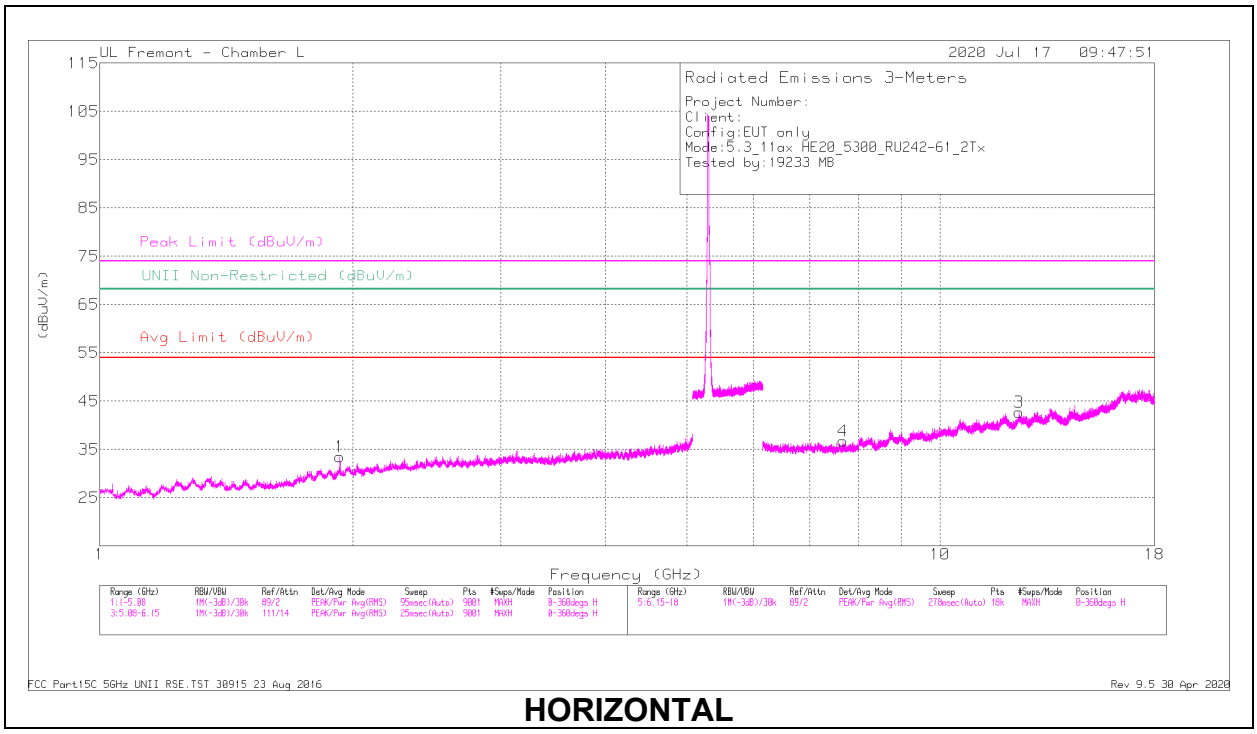


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 344 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 5.35001	46.64	Pk	34.5	-17.1	64.04	-	-	74	-9.96	53	105	V
2	* 5.35054	49.44	Pk	34.5	-17.1	66.84	-	-	74	-7.16	53	105	V
3	* 5.35001	31.25	RMS	34.5	-17.1	48.65	54	-5.35	-	-	53	105	V
4	* 5.35031	33.63	RMS	34.5	-17.1	51.03	54	-2.97	-	-	53	105	V

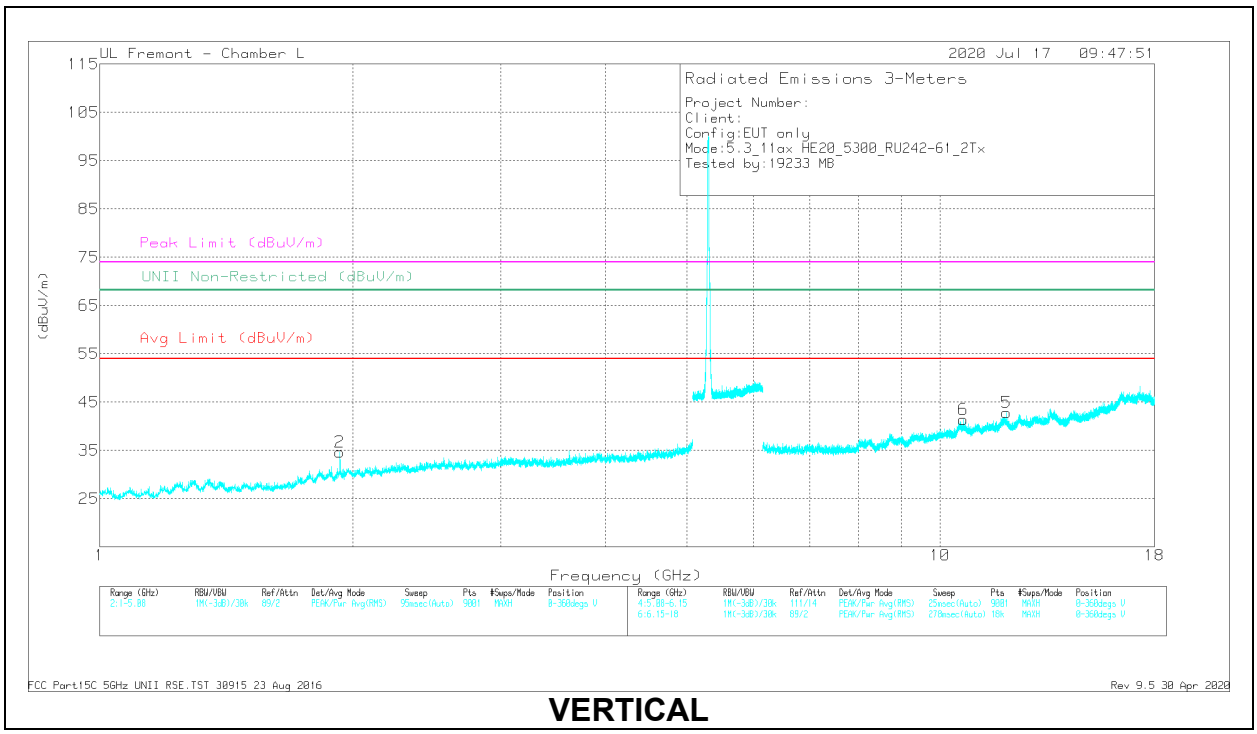
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 344 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.93119	42.87	PK-U	30.6	-32	41.47	-	-	-	-	68.2	-26.73	115	209	H
3	* 12.41685	31.56	PK-U	39	-19.5	51.06	-	-	74	-22.94	-	-	234	383	H
	* 12.41421	20.68	ADR	39	-19.5	40.18	54	-13.82	-	-	-	-	234	383	H
4	* 7.66411	33.84	PK-U	35.7	-23.4	46.14	-	-	74	-27.86	-	-	142	394	H
	* 7.66124	22.45	ADR	35.7	-23.4	34.75	54	-19.25	-	-	-	-	142	394	H
2	1.93139	44.86	PK-U	30.6	-32	43.46	-	-	-	-	68.2	-24.74	285	186	V
5	* 11.99435	30.67	PK-U	38.7	-19.7	49.67	-	-	74	-24.33	-	-	101	381	V
	* 11.99381	21.33	ADR	38.7	-19.7	40.33	54	-13.67	-	-	-	-	101	381	V
6	* 10.66748	30.67	PK-U	37.9	-19.5	49.07	-	-	74	-24.93	-	-	201	397	V
	* 10.66653	20.64	ADR	37.9	-19.5	39.04	54	-14.96	-	-	-	-	201	397	V

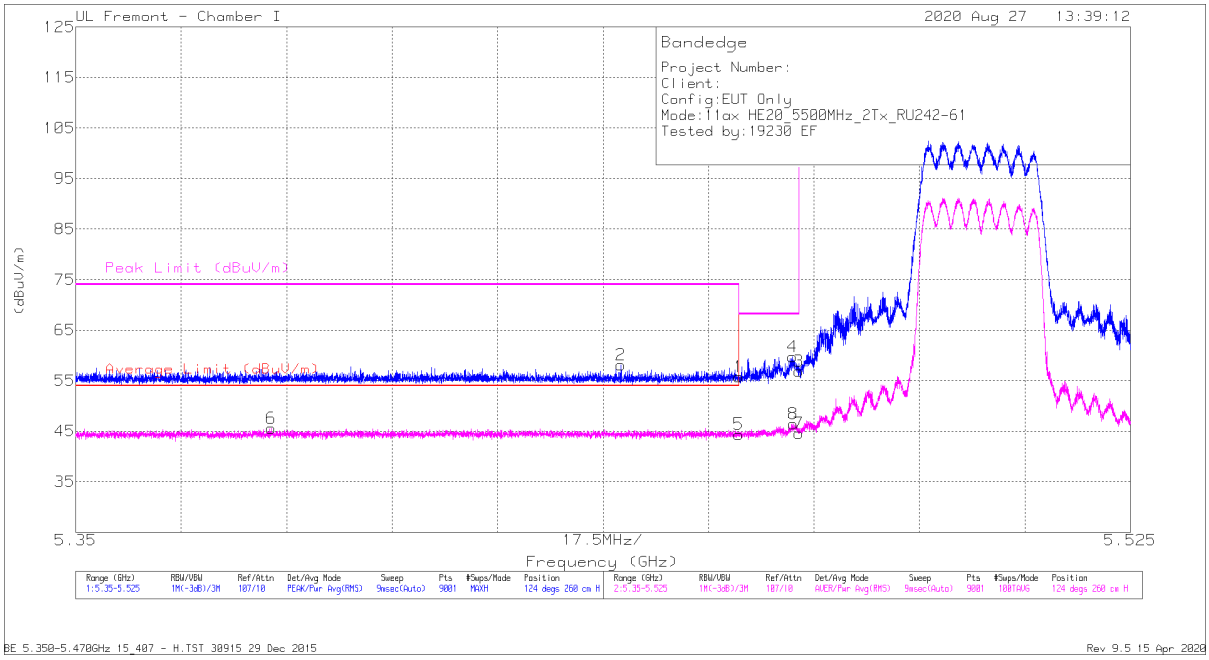
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK-U - U-NII: Maximum Peak
ADR - U-NII AD primary method, RMS average

7.4.3. 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

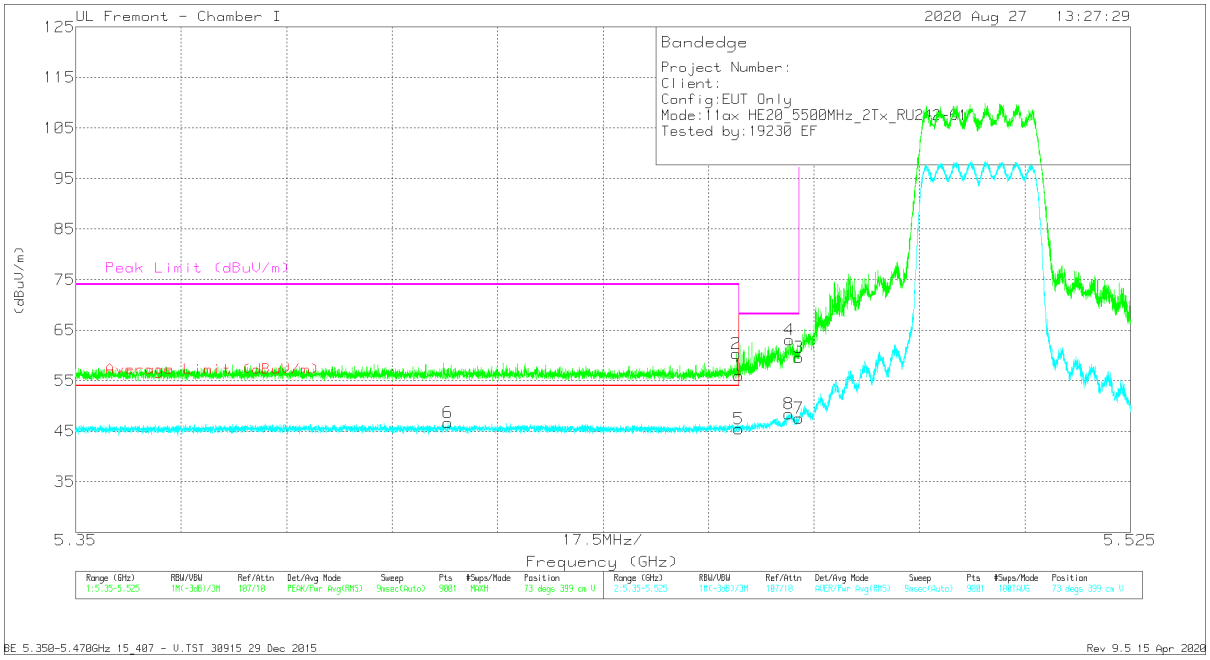


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 5.45999	34.95	Pk	34.6	-13.8	0	55.75	-	-	74	-18.25	124	260	H
2	* 5.44047	37.19	Pk	34.7	-13.8	0	58.09	-	-	74	-15.91	124	260	H
3	5.46999	35.92	Pk	34.7	-13.8	0	56.82	-	-	68.2	-11.38	124	260	H
4	5.46894	38.93	Pk	34.6	-13.8	0	59.73	-	-	68.2	-8.47	124	260	H
5	* 5.45999	23.59	RMS	34.6	-13.8	0	44.39	54	-9.61	-	-	124	260	H
6	* 5.38239	24.73	RMS	34.7	-13.8	0	45.63	54	-8.37	-	-	124	260	H
7	5.46999	23.71	RMS	34.7	-13.8	0	44.61	-	-	-	-	124	260	H
8	5.46904	25.69	RMS	34.6	-13.8	0	46.49	-	-	-	-	124	260	H

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

BANDEDGE (LOW CHANNEL)

VERTICAL RESULT

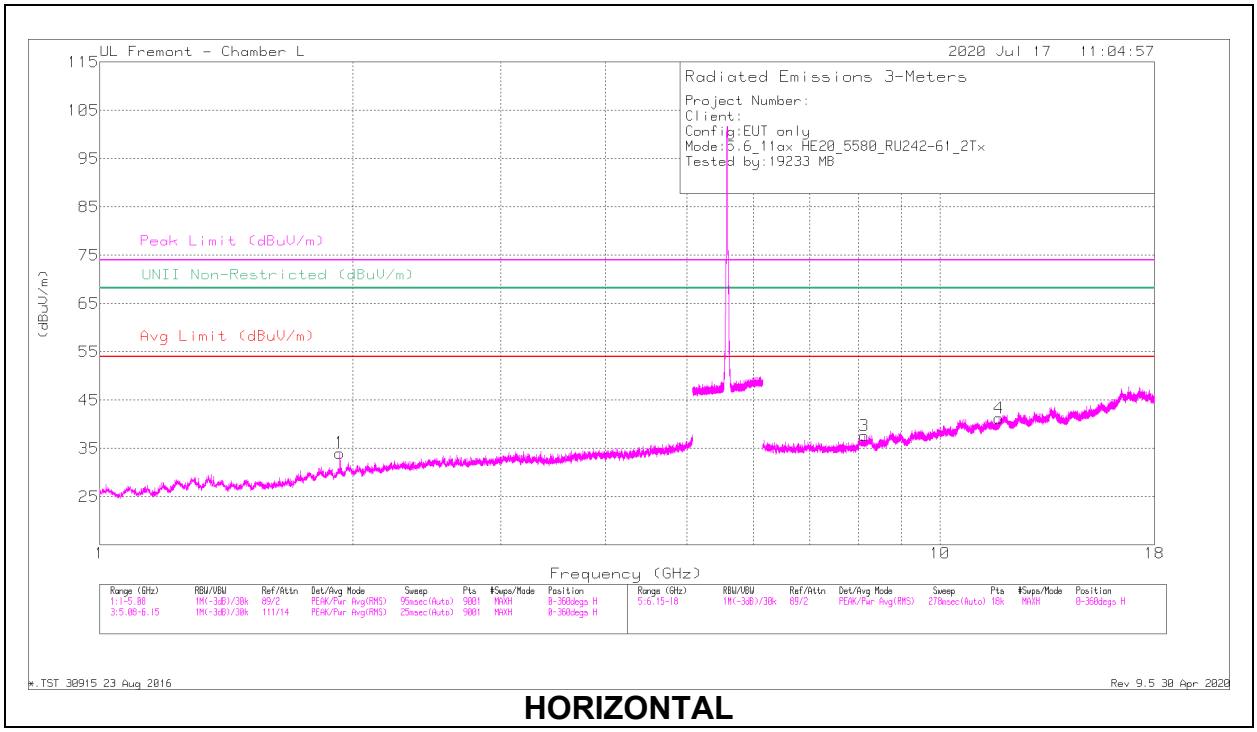


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 5.45999	35.22	Pk	34.6	-13.8	0	56.02	-	-	74	-17.98	73	399	V
2	* 5.45957	39.49	Pk	34.7	-13.8	0	60.39	-	-	74	-13.61	73	399	V
3	5.46999	38.68	Pk	34.7	-13.8	0	59.58	-	-	68.2	-8.62	73	399	V
4	5.46847	42.23	Pk	34.6	-13.8	0	63.03	-	-	68.2	-5.17	73	399	V
5	* 5.45999	24.6	RMS	34.6	-13.8	0	45.4	54	-8.6	-	-	73	399	V
6	* 5.41172	25.77	RMS	34.7	-13.8	0	46.67	54	-7.33	-	-	73	399	V
7	5.46999	26.63	RMS	34.7	-13.8	0	47.53	-	-	-	-	73	399	V
8	5.46828	27.62	RMS	34.6	-13.8	0	48.42	-	-	-	-	73	399	V

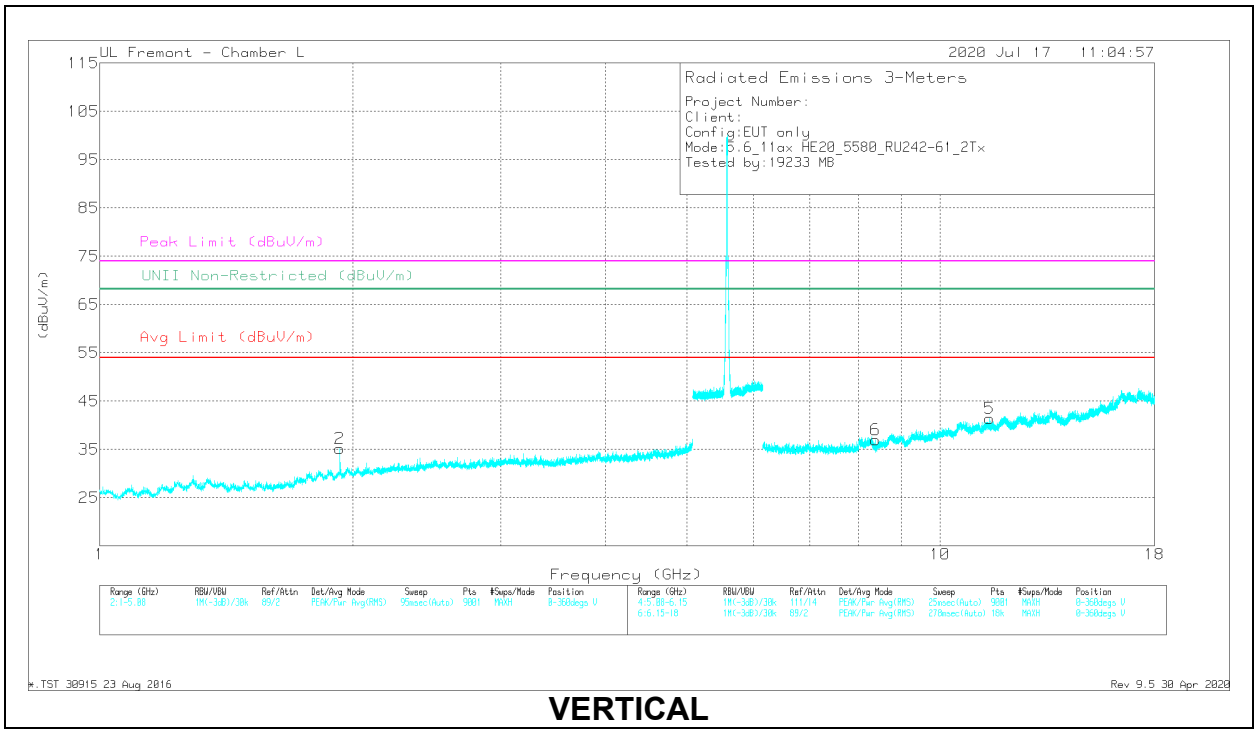
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 344 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.93126	42.14	PK-U	30.6	-32	40.74	-	-	-	-	68.2	-27.46	228	241	H
3	* 8.12258	33.87	PK-U	35.7	-23.1	46.47	-	-	74	-27.53	-	-	309	395	H
	* 8.1236	23.47	ADR	35.7	-23.1	36.07	54	-17.93	-	-	-	-	309	395	H
4	* 11.75789	30.61	PK-U	38.4	-19.8	49.21	-	-	74	-24.79	-	-	228	382	H
	* 11.76135	20.13	ADR	38.4	-19.8	38.73	54	-15.27	-	-	-	-	228	382	H
2	1.93175	43.17	PK-U	30.6	-32	41.77	-	-	-	-	68.2	-26.43	283	198	V
5	* 11.45905	31.04	PK-U	38.1	-19.9	49.24	-	-	74	-24.76	-	-	42	392	V
	* 11.4559	20.93	ADR	38.1	-19.9	39.13	54	-14.87	-	-	-	-	42	392	V
6	* 8.38405	32.74	PK-U	35.7	-22.8	45.64	-	-	74	-28.36	-	-	244	390	V
	* 8.3843	22.3	ADR	35.7	-22.8	35.2	54	-18.8	-	-	-	-	244	390	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

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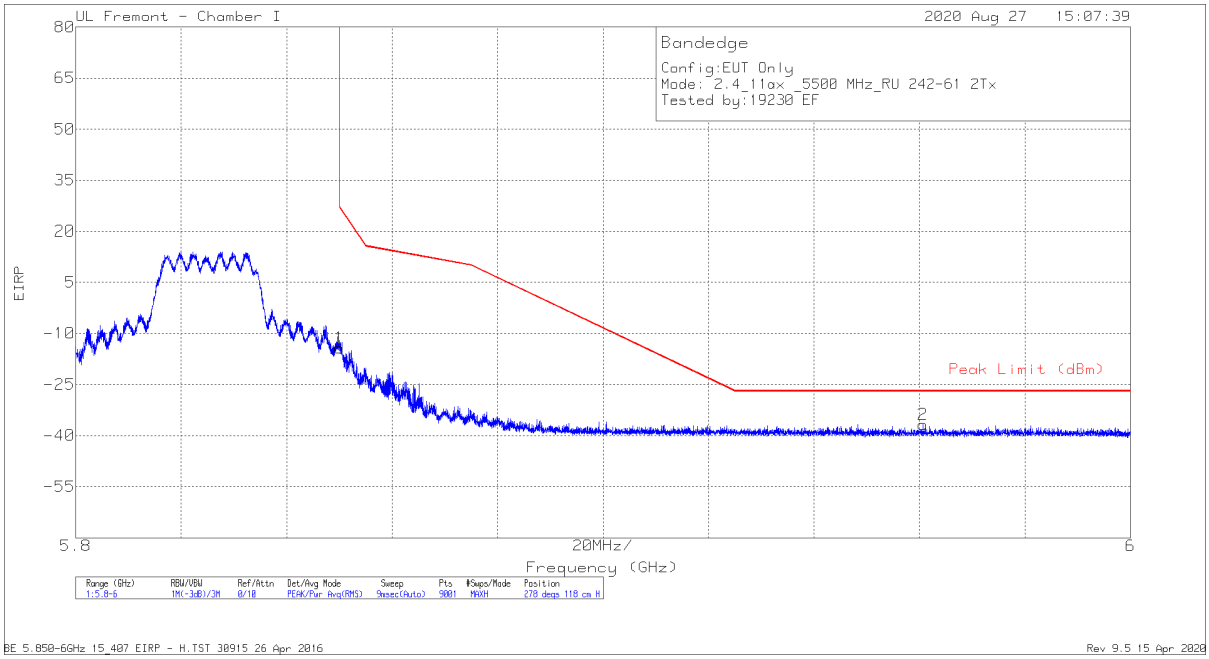
7.4.4. TX ABOVE 1 GHz 802.11ax HE20 MODE IN THE 5.8 GHz BAND

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

BANDEDGE (HIGH CHANNEL)

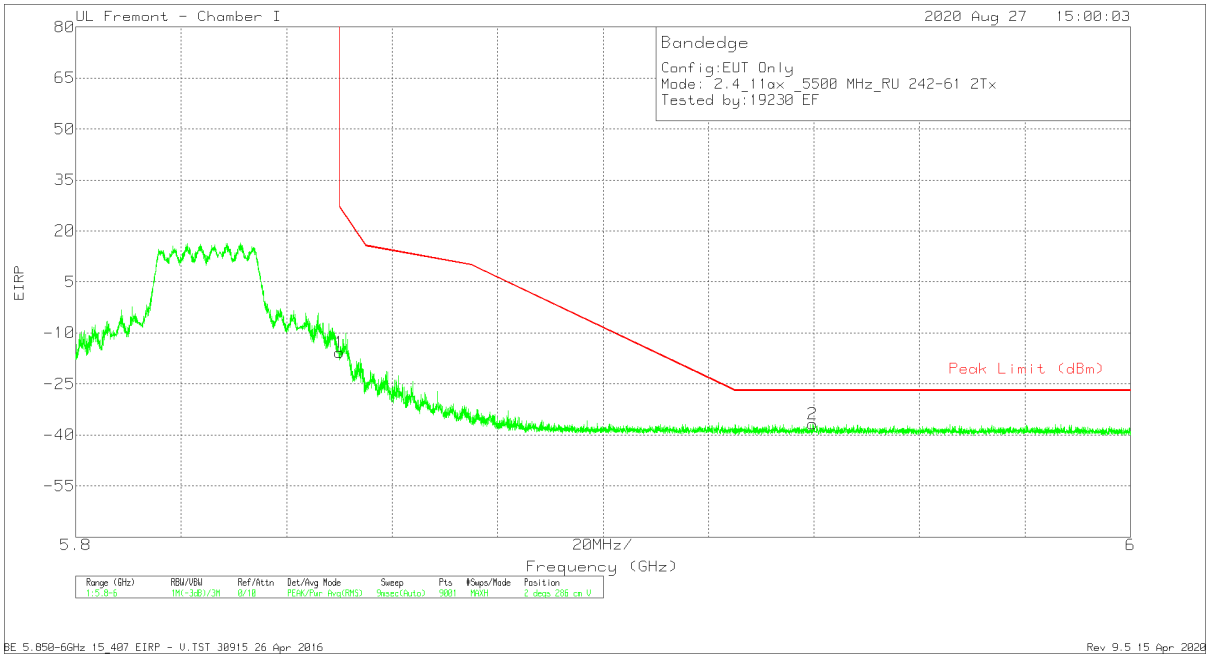
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	DC Corr (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85002	-47.55	Pk	35	-13.6	11.8	0	-14.35	26.95	-41.3	278	118	H
2	5.96067	-70.19	Pk	35.2	-13.5	11.8	0	-36.69	-27	-9.69	278	118	H

Pk - Peak detector

VERTICAL RESULT

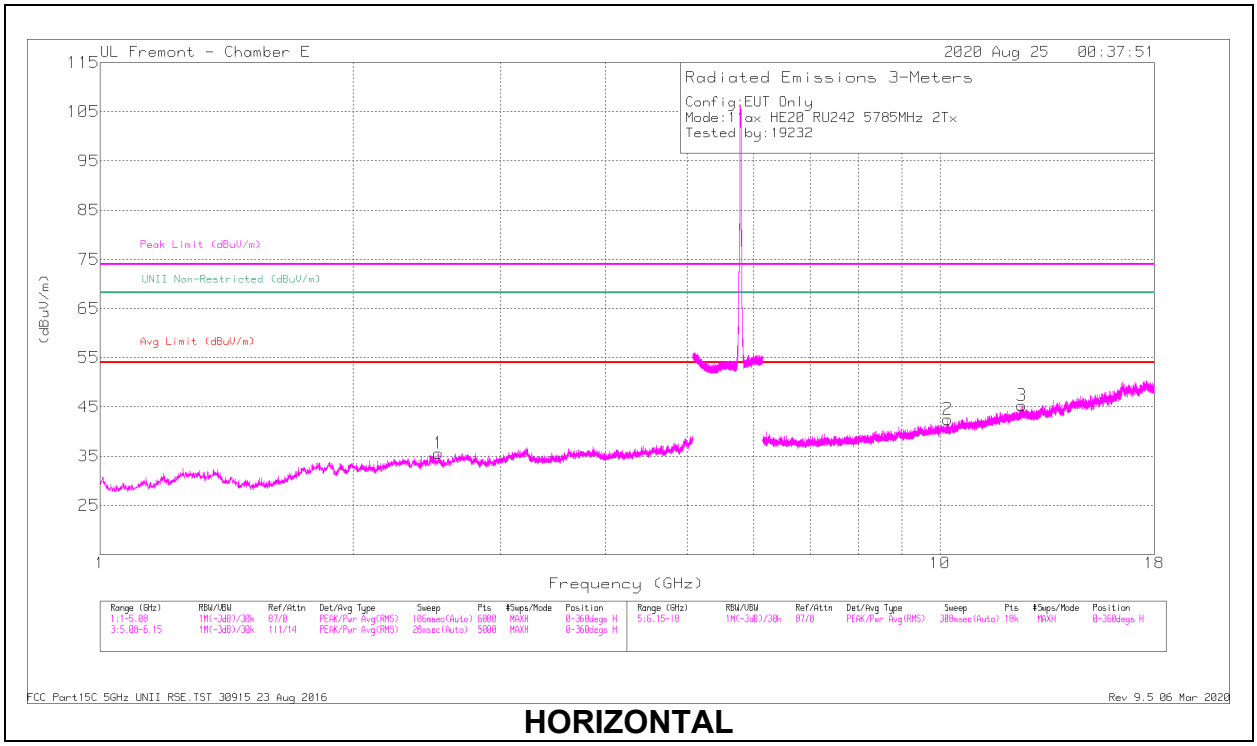


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Conversion Factor (dB)	DC Corr (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85002	-49.01	Pk	35	-13.6	11.8	0	-15.81	26.95	-42.76	2	286	V
2	5.93971	-70.3	Pk	35.1	-13.4	11.8	0	-36.8	-27	-9.8	2	286	V

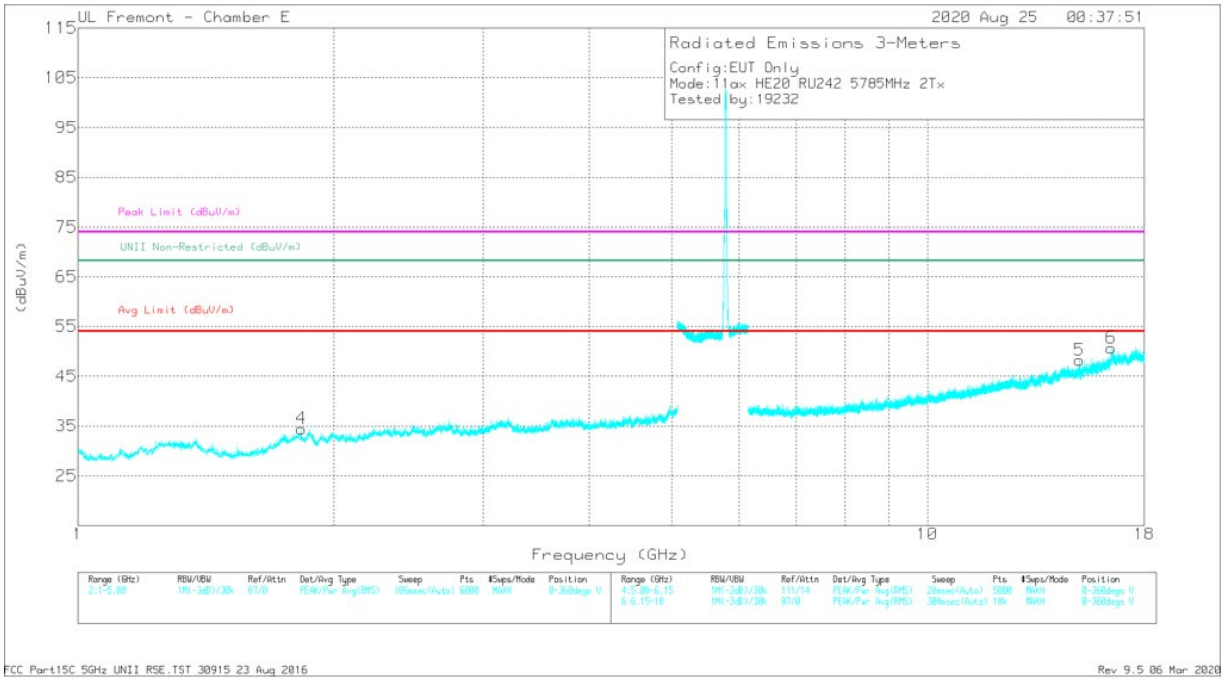
Pk - Peak detector

HARMONICS AND SPURIOUS EMISSIONS

MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 12.52124	34.99	PK-U	39	-22.8	51.19	-	-	74	-22.81	-	-	0	101	H
	* 12.52042	24.07	ADR	39	-22.8	40.27	54	-13.73	-	-	-	-	0	101	H
1	2.52972	45.55	PK-U	32.7	-36.2	42.05	-	-	-	-	68.2	-26.15	0	101	H
2	10.21543	37.97	PK-U	37.1	-26.5	48.57	-	-	-	-	68.2	-19.63	0	101	H
4	1.83125	45.52	PK-U	30.9	-35.2	41.22	-	-	-	-	68.2	-26.98	0	199	V
5	15.10757	34.98	PK-U	39.7	-20.3	54.38	-	-	-	-	68.2	-13.82	0	101	V
6	16.46016	34.76	PK-U	41.3	-18.9	57.16	-	-	-	-	68.2	-11.04	0	198	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

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7.5. 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.

7.6. DESCRIPTION OF TEST SETUP

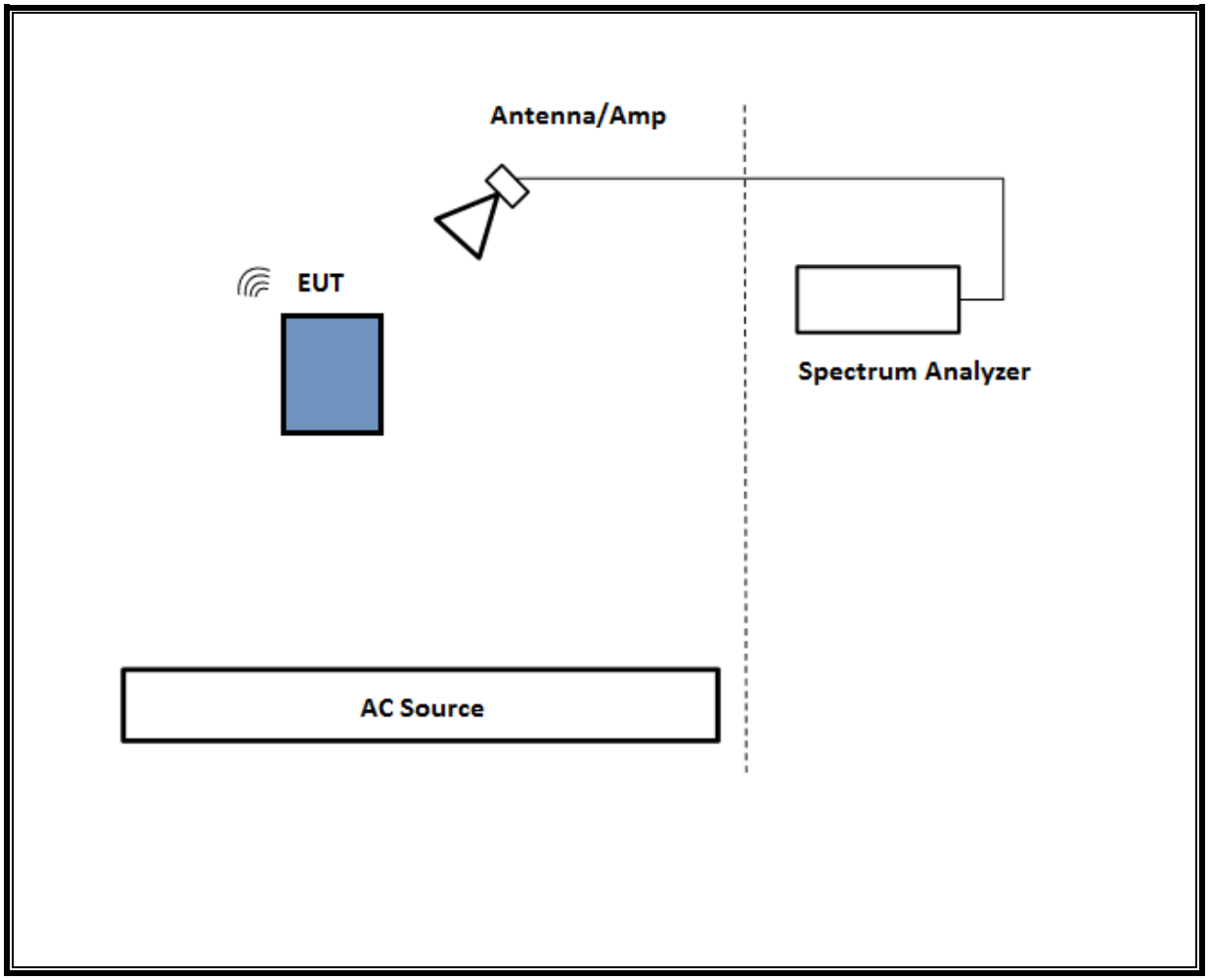
SUPPORT EQUIPMENT

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						

SETUP DIAGRAM FOR RADIATED TESTS Above 1GHz



7.7. 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.

Investigated worst-case data rates as listed below were:

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	T712	03/09/2021	03/09/2020
Amplifier, 1 to 8GHz, 35dB	MITEQ	AMF-4D-01000800-30-29P	T1169	03/03/2021	03/03/2020
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight Technologies Inc	N9030A	T1466	01/23/2021	01/23/2020
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T346	07/20/2021	07/20/2020
RF Amplifier, 1-18GHz	MITEQ	AFS42-00101800-25-S-42	PRE0181078	05/06/2021	05/06/2020
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0179522	02/20/2021	02/20/2020
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
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0180917	02/26/2021	02/26/2020
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

Appendix A – Conducted Data for FCC Part 15 E

Attached is the test report (13179110-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

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Appendix B - Conducted Data for ISED RSS 247

This data will only be included in the report (13179110-E6) submitted for ISED filing.

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Appendix C - Radiated Data (13179110-E5 & E6)

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END OF TEST REPORT

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