FCC CFR47 PART 15 SUBPART C
ISED CANADA RSS-210 ISSUE 10

CLASS 2 PERMISSIVE CHANGE REPORT

FOR

WIRELESS KEYBOARD

MODEL NUMBER: 6160RF-3

FCC ID: CFS8DL6160RF-3
IC: 573F-6160RF3

REPORT NUMBER: R13251005-E1

ISSUE DATE: 2020-03-06

Prepared for
RESIDEO
2 CORPORATE CENTER DRIVE
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Prepared by
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NVLAP LAB CODE 200246-0

REVISION HISTORY

Ver.	Issue Date	Revisions	Revised By
1	2020-03-05	Initial Issue	Brian T. Kiewra
2	2020-03-06	Revised C2PC testing statement in Section 5.1	Brian T. Kiewra

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Resideo
2 Corporate Center Drive
Melville, NY 11749, USA

EUT DESCRIPTION: Wireless Keypad

MODEL: 6160RF3

SERIAL NUMBER: MEL-932 and MEL933

DATE TESTED: 2020-02-26 to 2020-02-28

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART C	Complies
ISED CANADA RSS-210 Issue 10, Annex A.1	Complies
ISED CANADA RSS-GEN Issue 5	Complies

UL LLC 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 LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC 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, or any agency of the U.S. government.

Approved & Released
For UL LLC By:

Jeffrey Moser
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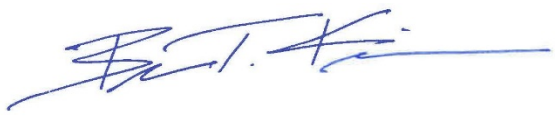
Consumer Technology Division
UL LLC

Prepared By:



Brian T. Kiewra
Project Engineer
Consumer Technology Division
UL LLC

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 5, and RSS-210 Issue 10.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 12 Laboratory Drive, Research Triangle Park, NC 27709, USA and 2800 Perimeter Park Dr., Suite B, Morrisville, NC 27560, USA. 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.

12 Laboratory Dr.	2800 Perimeter Park Dr.
Site Code: 2180C	
☐ Chamber A	☐ Chamber North
☐ Chamber C	☒ Chamber South

The above test sites and facilities are covered under FCC Test Firm Registration # 703469. Chambers above are covered under Industry Canada company address and respective code.

UL LLC (RTP) is accredited by NVLAP, Laboratory Code 200246-0.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.

36.5 dBuV + 0 dB +10.1 dB+ 0 dB = 46.6 dBuV

4.3. MEASUREMENT UNCERTAINTY

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.)

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

PARAMETER	UNCERTAINTY
Radio Frequency (Spectrum Analyzer)	141.2 Hz
Occupied Channel Bandwidth	2.00%
All emissions, radiated	5.36 dB
Temperature	2.26°C
Humidity	6.79%
DC Supply voltages	1.70%
Time	3.39%

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

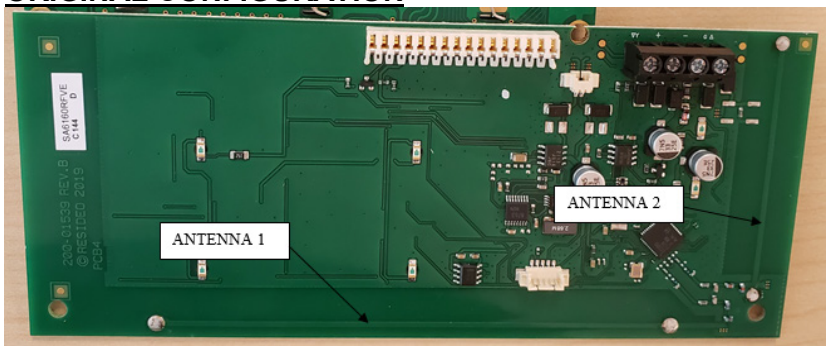
5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

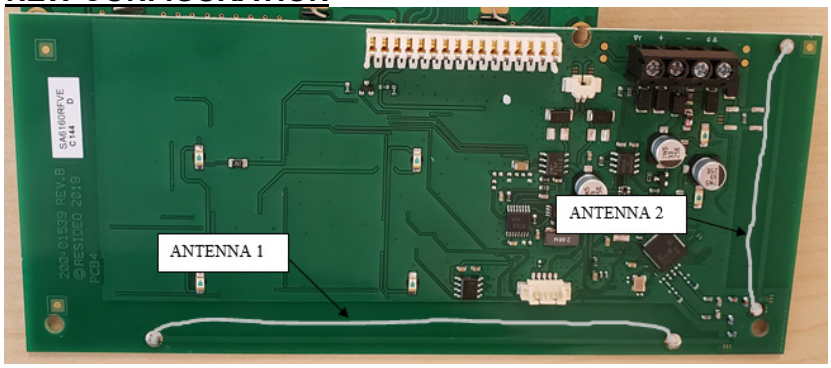
The EUT is a wireless keypad with a 344.94MHz periodic operating transmitter. This report is to support a class 2 permissive change on a previously certified device. The change to the device involves changing from PCB trace antennas to wire antennas. See photo mock-ups below.

Due to the changes under this C2PC, only OBW, AC Mains Line Conducted, and Radiated Emissions were performed.

ORIGINAL CONFIGURATION



NEW CONFIGURATION



5.2. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes 2 wire antenna for each antenna.

5.3. SOFTWARE AND FIRMWARE

The software used during testing was SFTWR,0 Part Number: ESQ312.

5.4. WORST-CASE CONFIGURATION AND MODE

The EUT is intended to be installed in one orientation. Therefore all radiated testing performed with the EUT in its intended orientation.

5.5. DESCRIPTION OF TEST SETUP

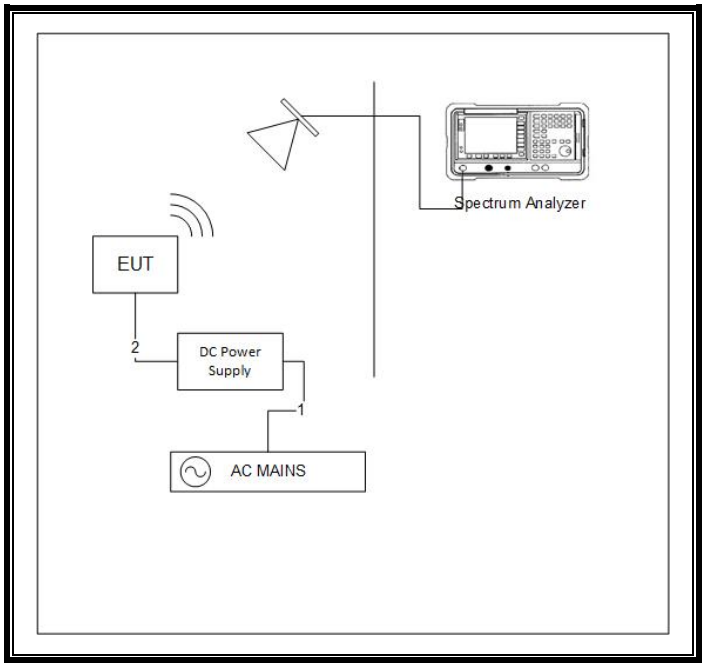
SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
AC/DC Adaptor	MG Electronics	MGT12500RTS	N/A	N/A

I/O CABLES

I/O Cable List						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC	1	2-blade plug	N/A	N/A	Wall-wart AC/DC adaptor.
2	DC	1	2-wire terminal	Unshielded 24AWG	1.2	Screw terminals on AC/DC adaptor; Screw terminals on EUT.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville - South Chamber)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
AT0079	Active Loop Antenna	ETS-Lindgren	6502	2019-08-08	2020-08-08
AT0074	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2019-07-16	2020-07-16
AT0072	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2019-04-22	2020-04-22
S-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2019-05-02	2020-05-02
S-SAC02	Gain-loss string: 25-1000MHz	Various	Various	2019-05-02	2020-05-02
S-SAC03	Gain-loss string: 1-18GHz	Various	Various	2019-03-13	2020-03-13
SA0025	Spectrum Analyzer	Agilent	N9030A	2019-02-28	2020-02-28
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
s/n 181474409	Environmental Meter	Fisher Scientific	15-077-963	2018-07-27	2020-07-27
ATA176 (in S-SAC)	10dB, DC-18GHz, 5W	Mini-Circuits	BW-N10W5	2019-03-07	2020-03-07
HPF012	1GHz high-pass filter, 2W, F_{high} =18GHz	Micro-Tronics	HPM18129	2019-06-14	2020-06-14

Test Equipment Used - Line-Conducted Emissions – Voltage (Morrisville – Conducted 1)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
CBL087	Coax cable, RG223, N-male to BNC-male, 20-ft.	Pasternack	PE3W06143-240	2019-05-29	2020-05-29
s/n 181562858	Environmental Meter	Fisher Scientific	14-650-118	2018-09-04	2020-09-04
LISN003	LISN, 50-ohm/50-uH, 2-conductor, 25A	Fischer Custom Com.	FCC-LISN-50-25-2-01-550V	2019-08-19	2020-08-19
75141 (PRE0101521)	EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESCI 7	2019-08-20	2020-08-20
TL001	Transient Limiter, 0.009-30MHz	Com-Power	LIT-930A	2019-05-29	2020-05-29
PS215	AC Power Source	Elgar	CW2501M (s/n 1523A02397)	NA	NA
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
CDECABLE001	ANSI C63.4 1m extension cable.	UL	Per Annex B of ANSI C63.4	2019-07-10	2020-07-10

7. 20 dB AND 99% BW

LIMITS

FCC §15.231 (c)
The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

RSS-210 A1.3
The 99% bandwidth of momentarily operated devices shall be less or equal to 0.25% of the centre frequency for devices operating between 70 MHz and 900 MHz. For devices operating above 900 MHz, the 99% bandwidth shall be less or equal to 0.5% of the center frequency.

TEST PROCEDURE

99% BW: Per ANSI C63.10, Section 6.9.3

The transmitter output is coupled to the spectrum analyzer via an antenna connected to the spectrum analyzer.

The RBW is set to 1% to 5% of the 99 % bandwidth. The VBW is set to approximately 3 times the RBW. The sweep time is coupled. The detection mode is set to peak and the trace mode to max hold as allowed by the RSS-Gen standard for devices that do not transmit continuously. The spectrum analyzer's internal 99% bandwidth function is utilized.

20dB BW: Per ANSI C63.10, Section 6.9.2

The transmitter output is coupled to the spectrum analyzer via an antenna connected to the spectrum analyzer.

The RBW is set to 1% to 5% of the 20dB bandwidth. The VBW is set to approximately 3 times the RBW. The sweep time is coupled. The detection mode is set to peak and the trace mode to max hold. The spectrum analyzer's internal 20dB bandwidth function is utilized.

7.1. RESULTS – ANTENNA 1

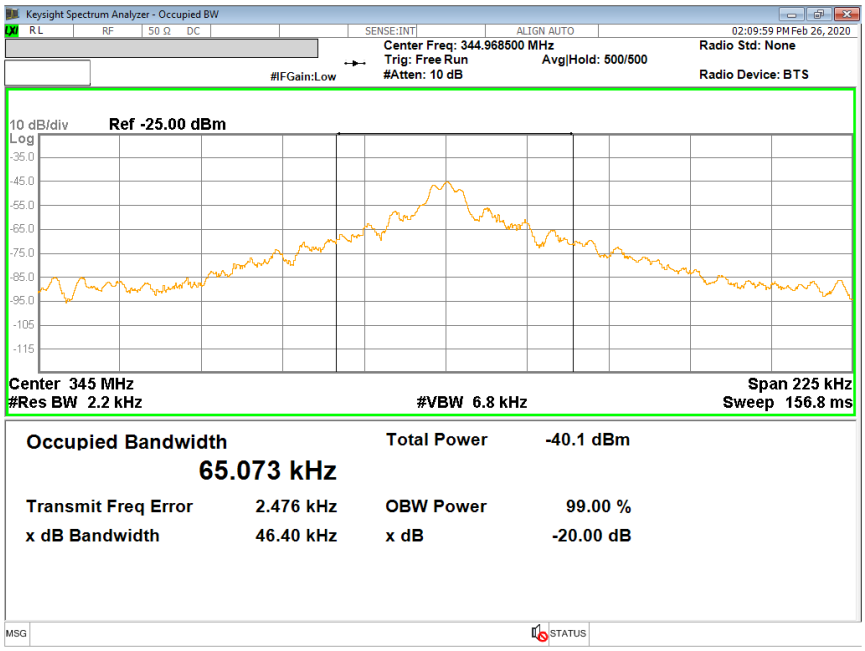
20dB Bandwidth

Frequency (MHz)	20dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
345	46.40	862.5	-816.1

99% Bandwidth

Frequency (MHz)	99% Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
345	65.073	862.5	-797.427

20dB BANDWIDTH



Tested by: 17051

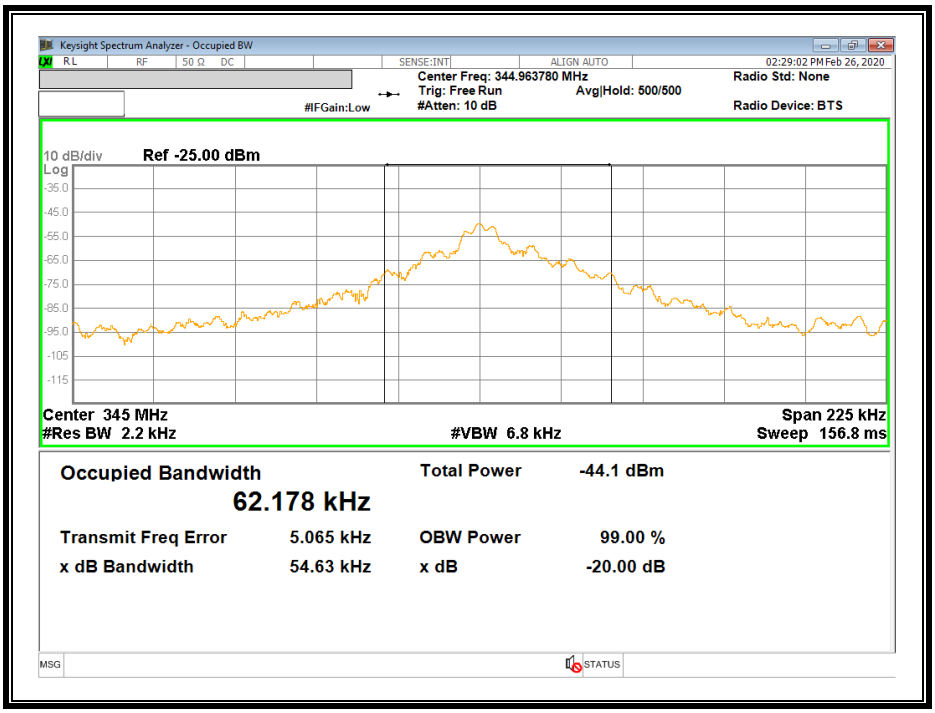
7.2. RESULTS – ANTENNA 2

20dB Bandwidth

Frequency (MHz)	20dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
345	54.63	862.5	-807.87

99% Bandwidth

Frequency (MHz)	99% Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
345	62.178	862.5	-800.322



Tested by: 17051

8. RADIATED EMISSION TEST RESULTS

8.1. TX RADIATED SPURIOUS EMISSION

LIMITS

FCC §15.231 (b)
RSS-210 A1.2
In addition to the provisions of § 15.205, the field strength of emissions from Intentional radiators operated under this section shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental Frequency (microvolts/meter)	Field Strength of Spurious Emissions (microvolts/meter)
40.66 - 40.70	2,250	225
70 - 130	1,250	125
130 - 174	1,250 to 3,750 [1]	125 to 375[1]
174 - 260	3,750	375
260 - 470	3,750 to 12,500[1]	375 to 1,250[1]
Above 470	12,500	1,250

[1] Linear interpolation

§15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	([2])
13.36 – 13.41	322 - 335.4		

1 Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
2 Above 38.6

§15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 88	100 **	3
88 216	150 **	3
216 960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 72 MHz, 76 88 MHz, 174 216 MHz or 470 806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz measurements and 1.5 meters above the ground plane for above 1 GHz measurements. The antenna to EUT distance is 3 meters.

For measurements below 1 GHz the resolution bandwidth is set to 120 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements for the 30-1000 MHz range, 9 kHz for peak detection measurements or 9 kHz for quasi-peak detection measurements for the 0.15-30 MHz range and 200 Hz for peak detection measurements or 200 Hz for quasi-peak detection measurements for the 9 to 150 kHz range. Peak detection is used unless otherwise noted as quasi-peak.

For peak measurements above 1 GHz, the resolution bandwidth is set to 1 MHz and the video bandwidth is set to 3 MHz. For average measurements above 1GHz, the resolution bandwidth and video bandwidth are set as described in ANSI C63.10:2013 for the applicable measurement. For this test program, Average measurements of the fundamental and its associated harmonics were performed using a Peak detector and duty cycle correction by 20log(x) where 'x' is the duty cycle of 10%, as real world duty cycle declared by manufacturer. This results in a duty cycle correction factor of -20. For all other spurious emissions, voltage averaging was used.

The spectrum from 9 kHz to 4.5 GHz was investigated with the transmitter on. The EUT only transmits on one frequency, therefore all testing performed on only this frequency.

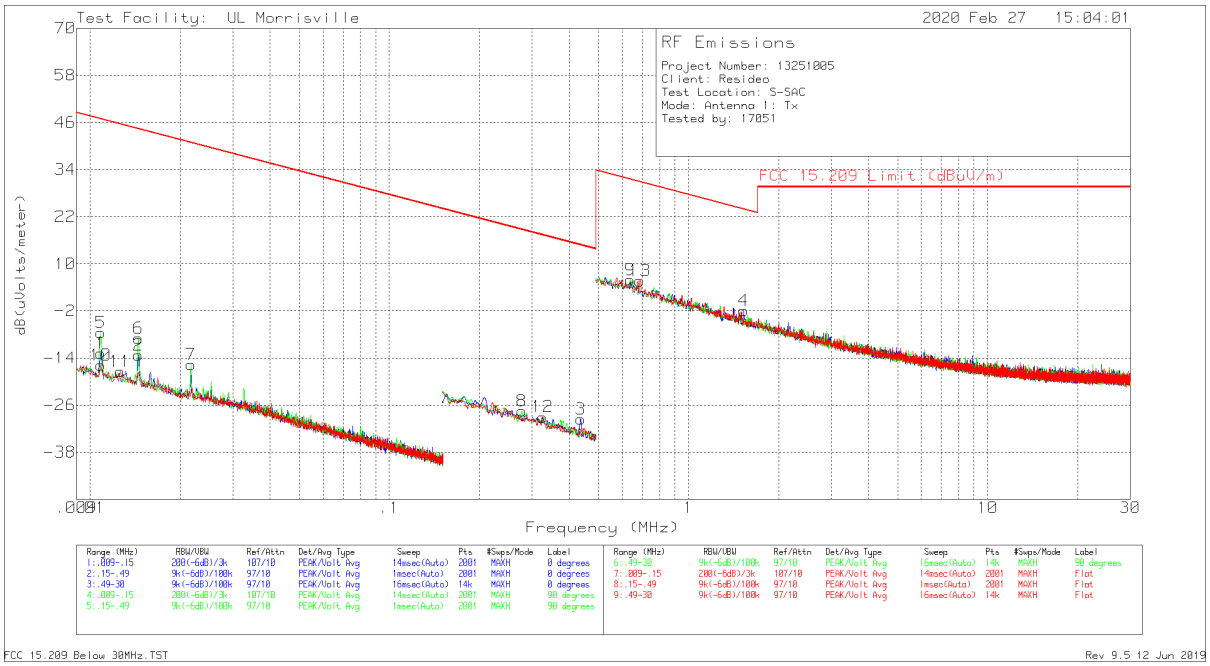
The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

8.1.1. RESULTS – ANT 1

TX SPURIOUS EMISSIONS (0.009-30MHz)

Note: All measurements were made at a test distance of 3 m. The tabular data was extrapolated from the measurement distance to the specification distance (300 m from 9-490 kHz and 30 m from 490 kHz – 30 MHz) to clearly show the relative levels of fundamental and spurious emissions and demonstrate compliance with the requirement that the level of any spurious emissions be below the level of the intentionally transmitted signal. The extrapolation factor for the data was 40*Log (test distance/specification distance).

Although these tests were performed at a test site other than an open area test site, adequate comparison measurements were confirmed against an open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

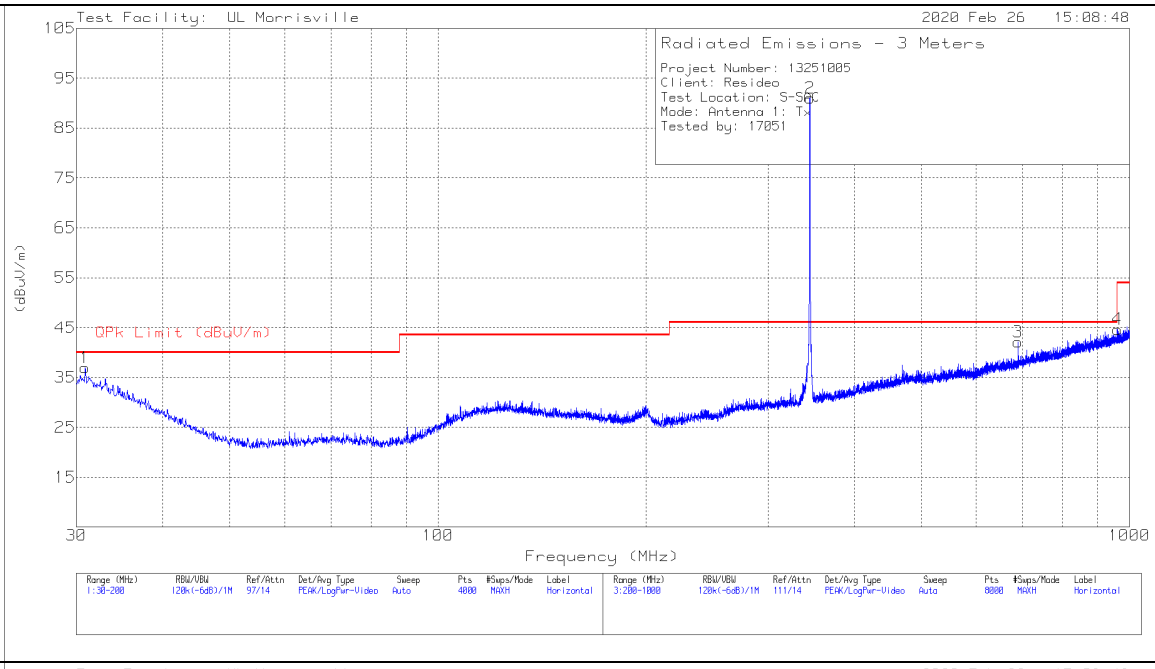


Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 AF (dB/m)	Cbl (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.209 QP/AV Limit (dBuV/m)	FCC 15.209 PK Limit (dBuV/m)	Worst-Case Margin (dB)	Azimuth (Degs)
1	.01085	49.28	Pk	17.8	.1	-80	-12.82	46.9	66.9	-59.72	0-360
2	.01447	50.28	Pk	16.3	.1	-80	-13.32	44.4	64.4	-57.72	0-360
3	.43569	39.33	Pk	11	.1	-80	-29.57	14.82	34.82	-44.39	0-360
4	1.5303	26.73	Pk	11.1	.2	-40	-1.97	23.91	-	-25.88	0-360
5	.01085	54.56	Pk	17.8	.1	-80	-7.54	46.9	66.9	-54.44	0-360
6	.01447	54.66	Pk	16.3	.1	-80	-8.94	44.4	64.4	-53.34	0-360
7	.02171	50.44	Pk	13.8	.1	-80	-15.66	40.87	60.87	-56.53	0-360
8	.27742	41.43	Pk	11	.1	-80	-27.47	18.74	38.74	-46.21	0-360
9	.63861	34.79	Pk	11	.1	-40	5.89	31.5	-	-25.61	0-360
10	.01085	46.21	Pk	17.8	.1	-80	-15.89	46.9	66.9	-62.79	0-360
11	.01262	45.37	Pk	17.1	.1	-80	-17.43	45.58	65.58	-63.01	0-360
12	.32553	39.89	Pk	11	.1	-80	-29.01	17.35	37.35	-46.36	0-360
13	.68815	34.57	Pk	11	.1	-40	5.67	30.85	-	-25.18	0-360

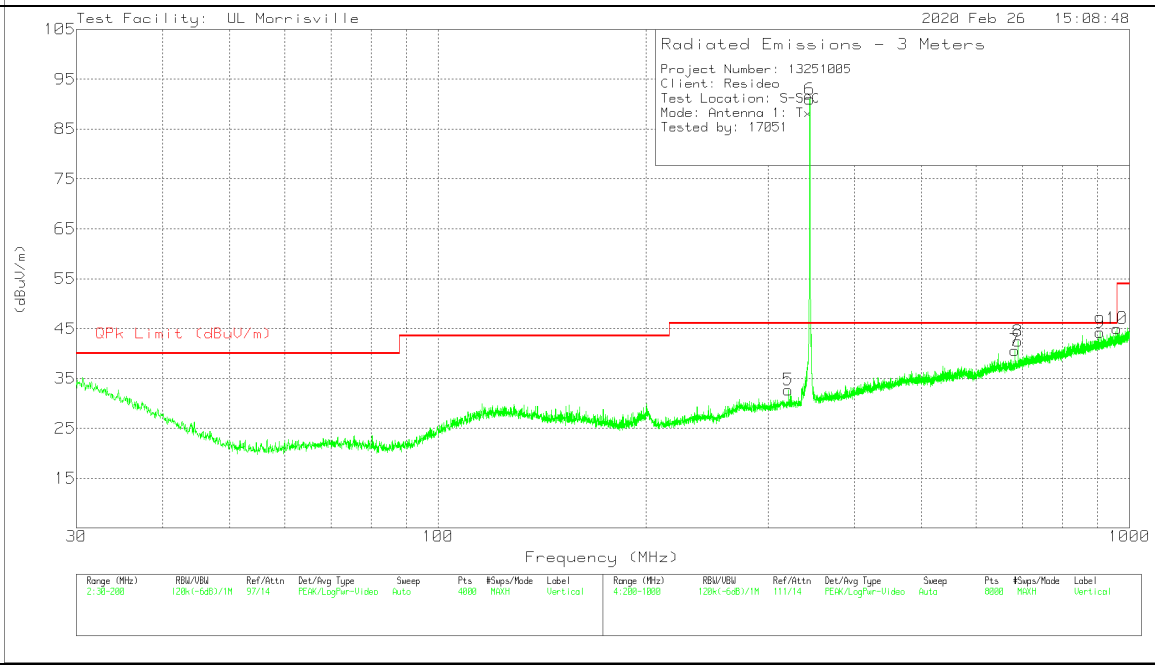
Pk - Peak detector

FUNDAMENTAL AND HARMONICS AND SPURIOUS EMISSIONS (30-1000MHz)

Horizontal



Vertical



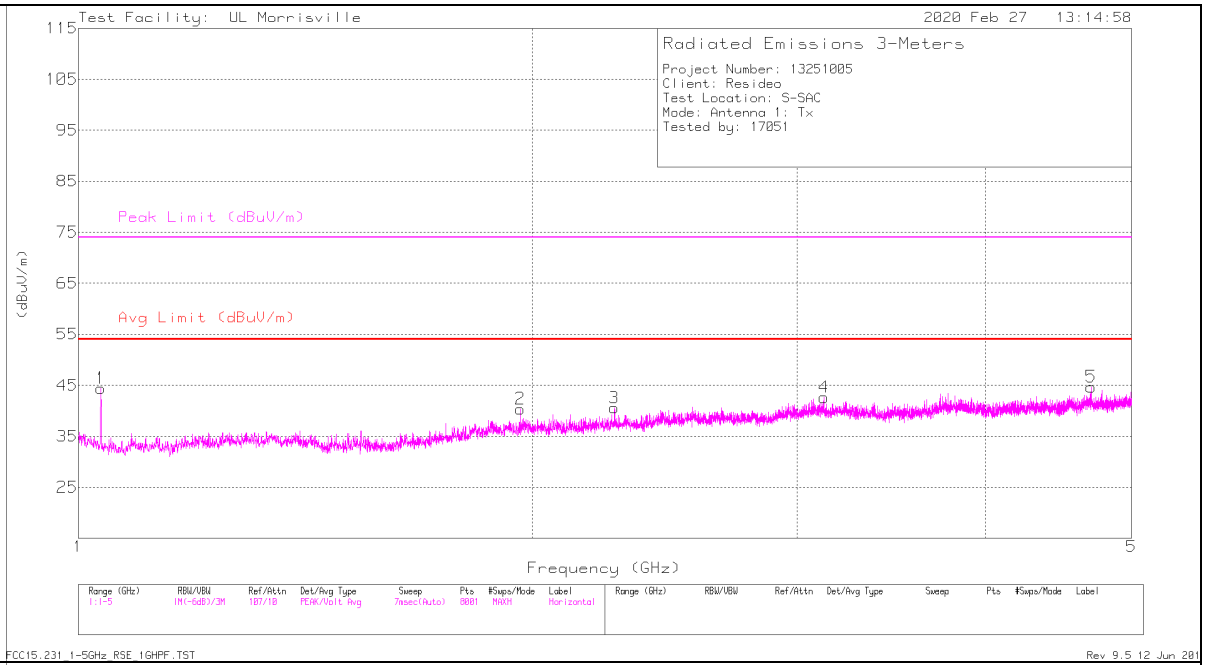
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0074 AF (dB/m)	Cbl/Amp	Pad (dB)	DCCF (dB)	Corrected Reading (dBuV/m)	Pk Limit (dBuV/m)	Margin (dB)	AVG/QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	30.8927	25.42	Qp	26.4	-31.8	9.9	0	29.92	-	-	40	-10.08	286	272	H
2 (Fc)	344.9691	90.66	Pk	20.2	-29.5	10	0	91.36	97.25	-5.89	-	-	321	100	H
	344.9691	90.66	Pk	20.2	-29.5	10	-20	71.36	-	-	77.25	-5.89	321	100	H
3	689.9382	37.42	Pk	26	-28.5	10.1	0	45.02	77.25	-32.23	-	-	302	100	H
	689.9382	37.42	Pk	26	-28.5	10.1	-20	25.02	-	-	57.25	-32.23	302	100	H
4	* 960.3988	24.55	Qp	29	-26.3	10.1	0	37.35	-	-	53.97	-16.62	271	198	H
5	320.9671	28.07	Qp	20	-29.5	10	0	28.57	-	-	46.02	-17.45	11	180	V
6 (Fc)	344.9691	92.35	Pk	20.2	-29.5	10	0	93.05	97.25	-4.2	-	-	14	155	V
	344.9691	92.35	Pk	20.2	-29.5	10	-20	73.05	-	-	77.25	-4.2	14	155	V
7	683.3628	24.93	Qp	25.9	-28.3	10.1	0	32.63	-	-	46.02	-13.39	337	122	V
8	689.9382	38.1	Pk	26	-28.5	10.1	0	45.7	77.25	-31.55	-	-	24	150	V
	689.9382	38.1	Pk	26	-28.5	10.1	-20	25.7	-	-	57.25	-31.55	24	150	V
9	906.1918	25.09	Qp	28.4	-27	10.1	0	36.59	-	-	46.02	-9.43	41	196	V
10	958.8986	24.53	Qp	29.1	-26.3	10.1	0	37.43	-	-	46.02	-8.59	198	165	V

Note: Markers 2 and 6 are fundamental.

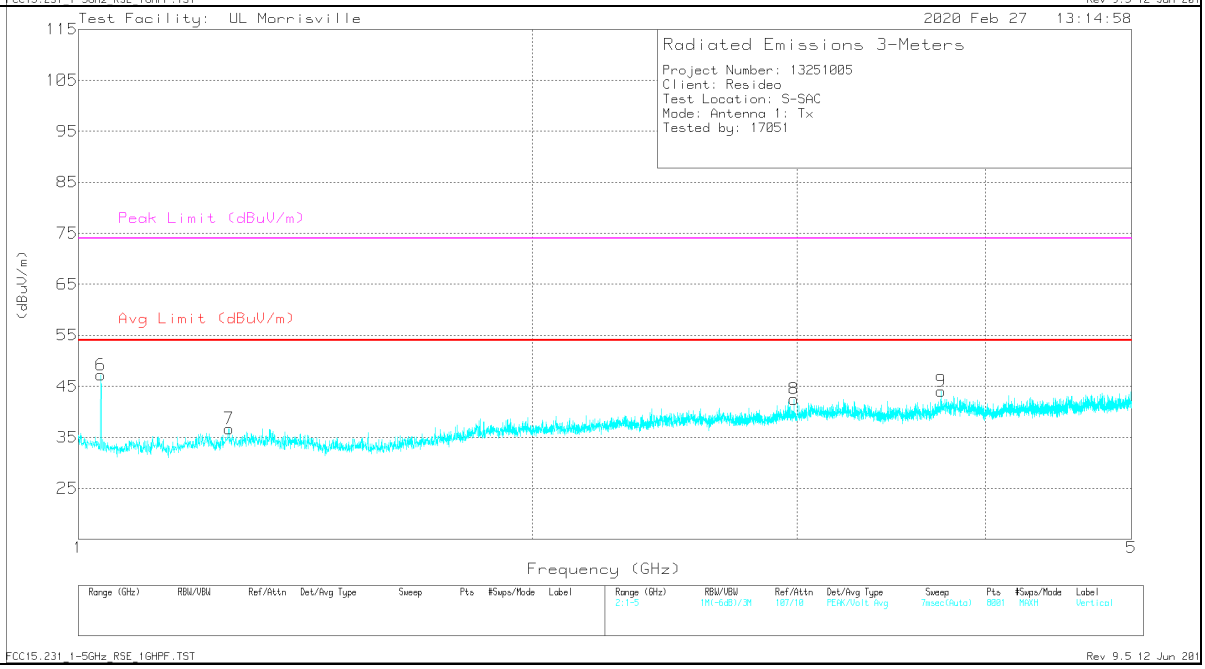
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
Qp - Quasi-Peak detector

HARMONICS AND TX SPURIOUS EMISSIONS ABOVE 1GHz

Horizontal



Vertical



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Filter (dB)	DCCF (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.03496	53.67	Pk	27.1	-35.5	1.7	0	46.97	-	-	74	-27.03	188	329	H
	* 1.03496	53.67	Pk	27.1	-35.5	1.7	-20	26.97	54	-27.03	-	-	188	329	H
2	1.9645	43.29	Pk	31.3	-34.6	.4	0	40.39	-	-	74	-33.61	0-360	100	H
	1.9645	43.29	Pk	31.3	-34.6	.4	-20	20.39	54	-33.61	-	-	0-360	100	H
3	* 2.269	42.59	Pk	31.8	-34.2	.4	0	40.59	-	-	74	-33.41	0-360	399	H
	* 2.269	42.59	Pk	31.8	-34.2	.4	-20	20.59	54	-33.41	-	-	0-360	399	H
4	3.1245	42.43	Pk	33.2	-33.6	.6	0	42.63	-	-	74	-31.37	0-360	199	H
	3.1245	42.43	Pk	33.2	-33.6	.6	-20	22.63	54	-31.37	-	-	0-360	199	H
5	* 4.701	42.1	Pk	34	-31.8	.4	0	44.7	-	-	74	-29.3	0-360	299	H
	* 4.701	42.1	Pk	34	-31.8	.4	-20	24.7	54	-29.3	-	-	0-360	299	H
6	* 1.03492	56.12	Pk	27.1	-35.5	1.7	0	49.42	-	-	74	-24.58	120	106	V
	* 1.03492	56.12	Pk	27.1	-35.5	1.7	-20	29.42	54	-24.58	-	-	120	106	V
7	* 1.259	41.79	Pk	29	-35.1	1	0	36.69	-	-	74	-37.31	0-360	101	V
	* 1.259	41.79	Pk	29	-35.1	1	-20	16.69	54	-37.31	-	-	0-360	101	V
8	2.9855	42.7	Pk	33	-33.7	.5	0	42.5	-	-	74	-31.50	0-360	101	V
	2.9855	42.7	Pk	33	-33.7	.5	-20	22.5	54	-31.50	-	-	0-360	101	V
9	* 3.739	43.48	Pk	33.2	-33	.4	0	44.08	-	-	74	-29.92	0-360	301	V
	* 3.739	43.48	Pk	33.2	-33	.4	-20	24.08	54	-29.92	-	-	0-360	301	V

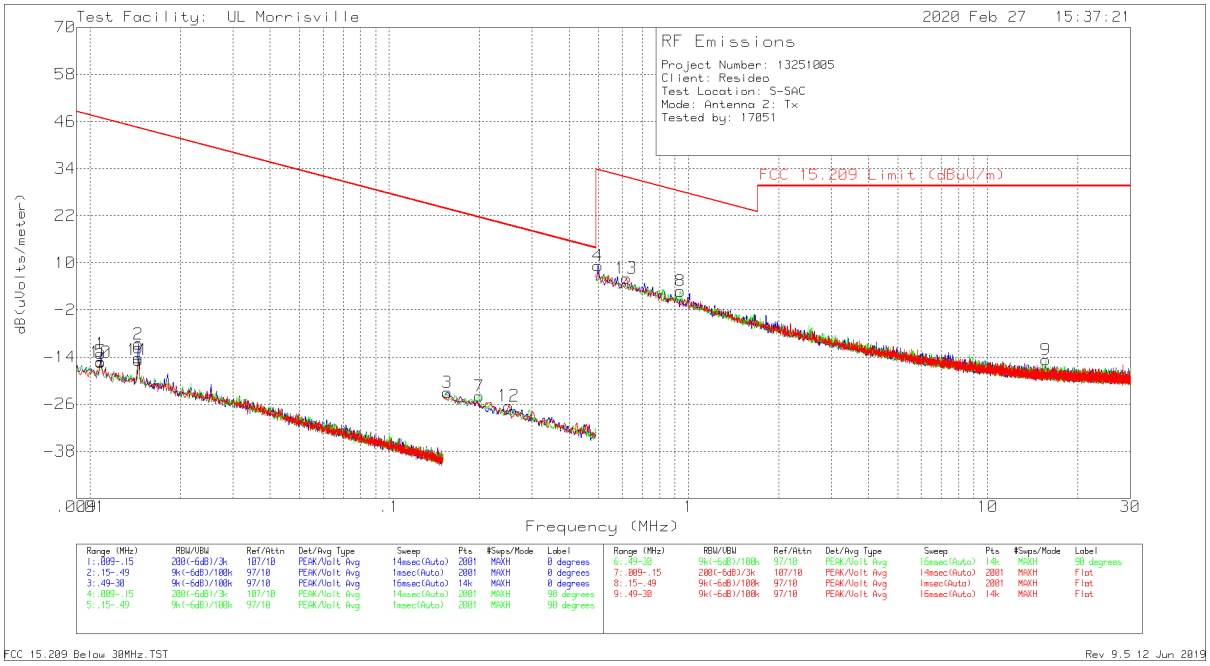
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector

8.1.2. RESULTS – ANT 2

TX SPURIOUS EMISSIONS (0.009-30MHz)

Note: All measurements were made at a test distance of 3 m. The tabular data was extrapolated from the measurement distance to the specification distance (300 m from 9-490 kHz and 30 m from 490 kHz – 30 MHz) to clearly show the relative levels of fundamental and spurious emissions and demonstrate compliance with the requirement that the level of any spurious emissions be below the level of the intentionally transmitted signal. The extrapolation factor for the data was 40*Log (test distance/specification distance).

Although these tests were performed at a test site other than an open area test site, adequate comparison measurements were confirmed against an open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

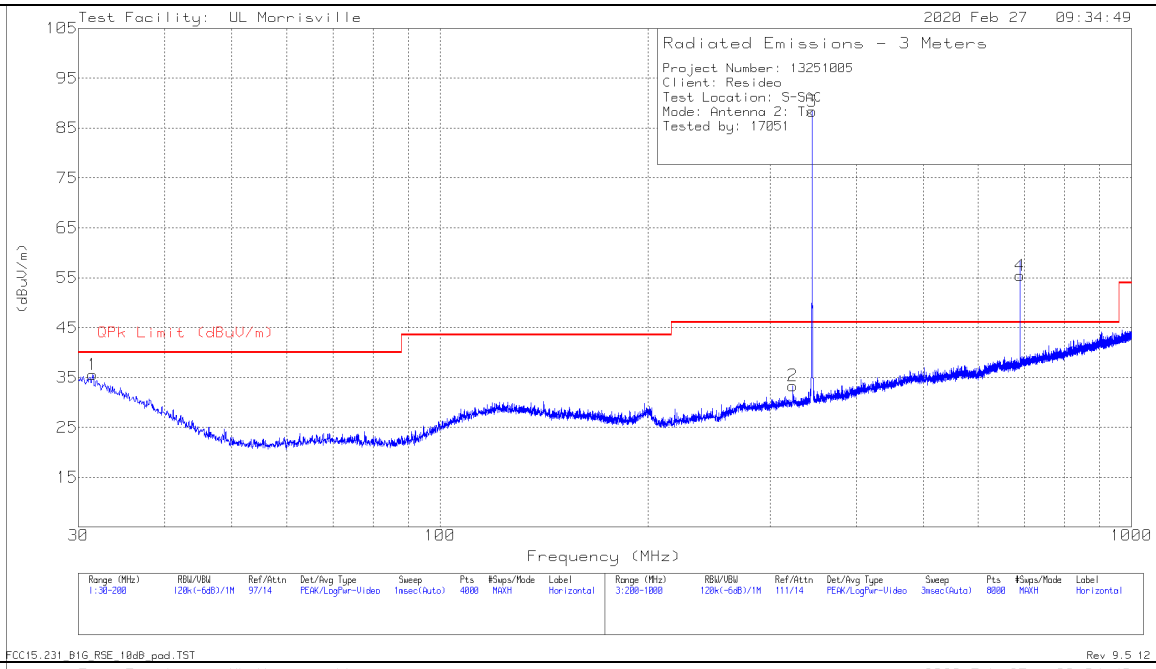


Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 AF (dB/m)	Cbl (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.209 QP/AV Limit (dBuV/m)	FCC 15.209 PK Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.01085	49.01	Pk	17.8	.1	-80	-13.09	46.9	66.9	-59.99	0-360
2	.01447	52.86	Pk	16.3	.1	-80	-10.74	44.4	64.4	-55.14	0-360
3	.15621	45.9	Pk	11	.1	-80	-23	23.73	43.73	-46.73	0-360
4	.49843	38.12	Pk	11	.1	-40	9.22	33.65	-	-24.43	0-360
5	.01085	46.97	Pk	17.8	.1	-80	-15.13	46.9	66.9	-62.03	0-360
6	.01447	49.4	Pk	16.3	.1	-80	-14.2	44.4	64.4	-58.6	0-360
7	.19947	44.9	Pk	11	.1	-80	-24	21.61	41.61	-45.61	0-360
8	.939	31.68	Pk	11	.1	-40	2.78	28.15	-	-25.37	0-360
9	15.6676	14.88	Pk	9.8	.6	-40	-14.72	29.54	-	-44.26	0-360
10	.01085	46.78	Pk	17.8	.1	-80	-15.32	46.9	66.9	-62.22	0-360
11	.01447	48.8	Pk	16.3	.1	-80	-14.8	44.4	64.4	-59.2	0-360
12	.25107	42.43	Pk	11	.1	-80	-26.47	19.61	39.61	-46.08	0-360
13	.61964	34.99	Pk	11	.1	-40	6.09	31.76	-	-25.67	0-360

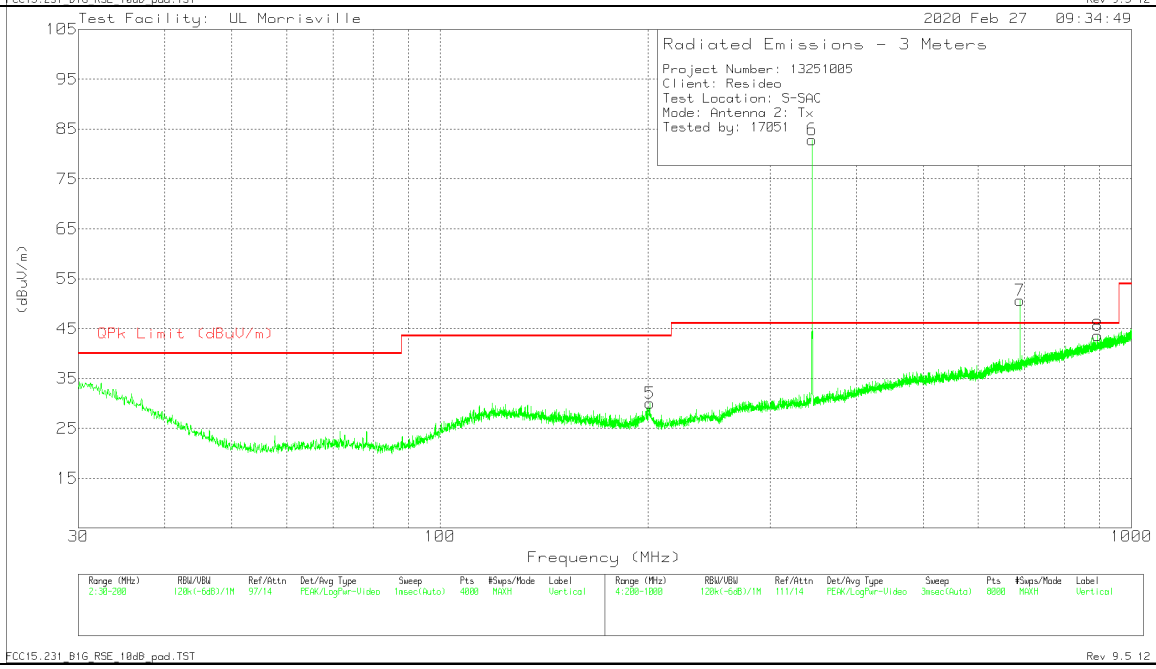
Pk - Peak detector

FUNDAMENTAL AND HARMONICS AND SPURIOUS EMISSIONS (30-1000MHz)

Horizontal



Vertical



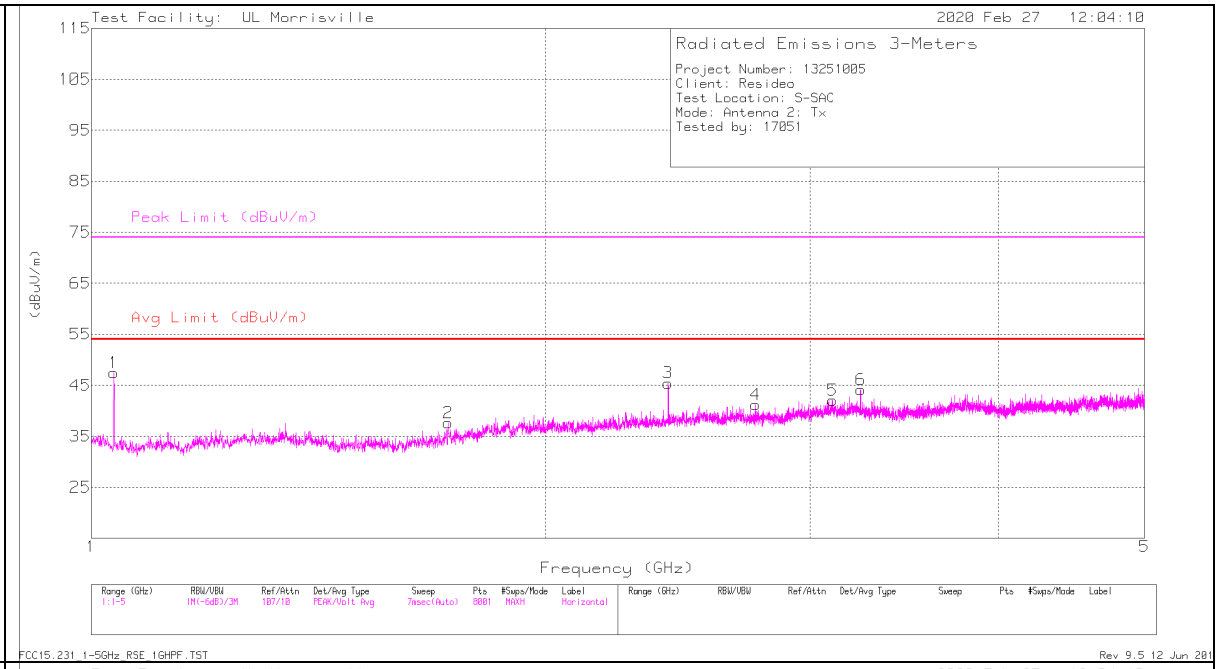
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0074 AF (dB/m)	Cbl/Amp	Pad (dB)	DCCF (dB)	Corrected Reading (dBuV/m)	Pk Limit (dBuV/m)	Margin (dB)	AVG/QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	31.4879	25.42	Qp	26.1	-31.8	9.9	0	29.62	-	-	40	-10.38	252	185	H
2	* 323.4032	31.45	Qp	20	-29.4	10	0	32.05	-	-	46.02	-13.97	318	100	H
3 (Fc)	344.9637	87.57	Pk	20.2	-29.5	10	0	88.27	97.25	-8.98	-	-	121	100	H
	344.9637	87.57	Pk	20.2	-29.5	10	-20	68.27	-	-	77.25	-8.98	121	100	H
4	689.9274	52.88	Pk	26	-28.5	10.1	0	60.48	77.25	-16.77	-	-	133	120	H
	689.9274	52.88	Pk	26	-28.5	10.1	-20	40.48	-	-	57.25	-16.77	133	120	H
5	201.0501	24.94	Qp	18.7	-30.2	10	0	23.44	-	-	43.52	-20.80	278	259	V
6 (Fc)	344.9637	84.3	Pk	20.2	-29.5	10	0	85	97.25	-12.25	-	-	214	136	V
	344.9637	84.3	Pk	20.2	-29.5	10	-20	65	-	-	77.25	-12.25	214	136	V
7	689.9274	44.3	Pk	26	-28.5	10.1	0	51.9	77.25	-25.35	-	-	213	232	V
	689.9274	44.3	Pk	26	-28.5	10.1	-20	31.9	-	-	57.25	-25.35	213	232	V
8	893.4901	25.18	Qp	28.3	-27.1	10.1	0	36.48	-	-	46.02	-9.54	247	288	V

Note: Markers 2 and 6 are fundamental.

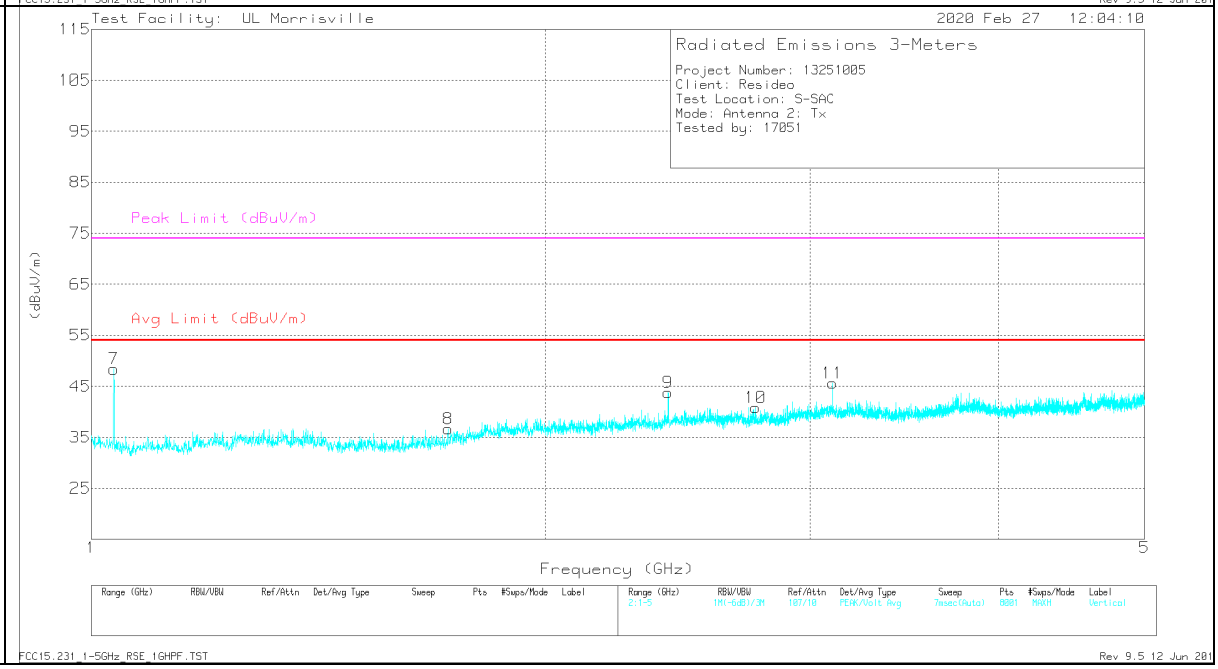
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
Qp - Quasi-Peak detector

HARMONICS AND TX SPURIOUS EMISSIONS ABOVE 1GHz

Horizontal



Vertical



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Filter (dB)	DCCF (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.03488	55.38	Pk	27.1	-35.5	1.7	0	48.68	-	-	74	-25.32	61	289	H
	* 1.03488	55.38	Pk	27.1	-35.5	1.7	-20	28.68	54	-25.32	-	-	61	289	H
2	1.7245	42.73	Pk	29.2	-34.7	.4	0	37.63	-	-	77.25	-39.62	0-360	100	H
	1.7245	42.73	Pk	29.2	-34.7	.4	-20	17.63	57.25	-39.62	-	-	0-360	100	H
3	2.4145	47.24	Pk	32	-34.2	.4	0	45.44	-	-	77.25	-31.81	0-360	199	H
	2.4145	47.24	Pk	32	-34.2	.4	-20	25.44	57.25	-31.81	-	-	0-360	199	H
4	* 2.7595	42.2	Pk	32.3	-33.8	.5	0	41.2	-	-	74	-32.8	0-360	399	H
	* 2.7595	42.2	Pk	32.3	-33.8	.5	-20	21.2	54	-32.8	-	-	0-360	399	H
5	3.105	41.84	Pk	33.3	-33.6	.5	0	42.04	-	-	77.25	-35.21	0-360	299	H
	3.105	41.84	Pk	33.3	-33.6	.5	-20	22.04	57.25	-35.21	-	-	0-360	299	H
6	3.24	43.98	Pk	33.1	-33.4	.5	0	44.18	-	-	74	-29.82	0-360	299	H
	3.24	43.98	Pk	33.1	-33.4	.5	-20	24.18	54	-29.82	-	-	0-360	299	H
7	* 1.03484	57	Pk	27.1	-35.5	1.7	0	50.3	-	-	74	-23.7	116	111	V
	* 1.03484	57	Pk	27.1	-35.5	1.7	-20	30.3	54	-23.7	-	-	116	111	V
8	1.725	41.78	Pk	29.2	-34.7	.4	0	36.68	-	-	77.25	-40.57	0-360	399	V
	1.725	41.78	Pk	29.2	-34.7	.4	-20	16.68	57.25	-40.57	-	-	0-360	399	V
9	2.4145	45.55	Pk	32	-34.2	.4	0	43.75	-	-	77.25	-33.5	0-360	399	V
	2.4145	45.55	Pk	32	-34.2	.4	-20	23.75	57.25	-33.5	-	-	0-360	399	V
10	* 2.76	41.85	Pk	32.3	-33.8	.5	0	40.85	-	-	74	-33.15	0-360	101	V
	* 2.76	41.85	Pk	32.3	-33.8	.5	-20	20.85	54	-33.15	-	-	0-360	101	V
11	3.1045	45.42	Pk	33.3	-33.6	.5	0	45.62	-	-	77.25	-31.63	0-360	201	V
	3.1045	45.42	Pk	33.3	-33.6	.5	-20	25.62	57.25	-31.63	-	-	0-360	201	V

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

9. AC MAINS LINE CONDUCTED EMISSIONS

LIMITS

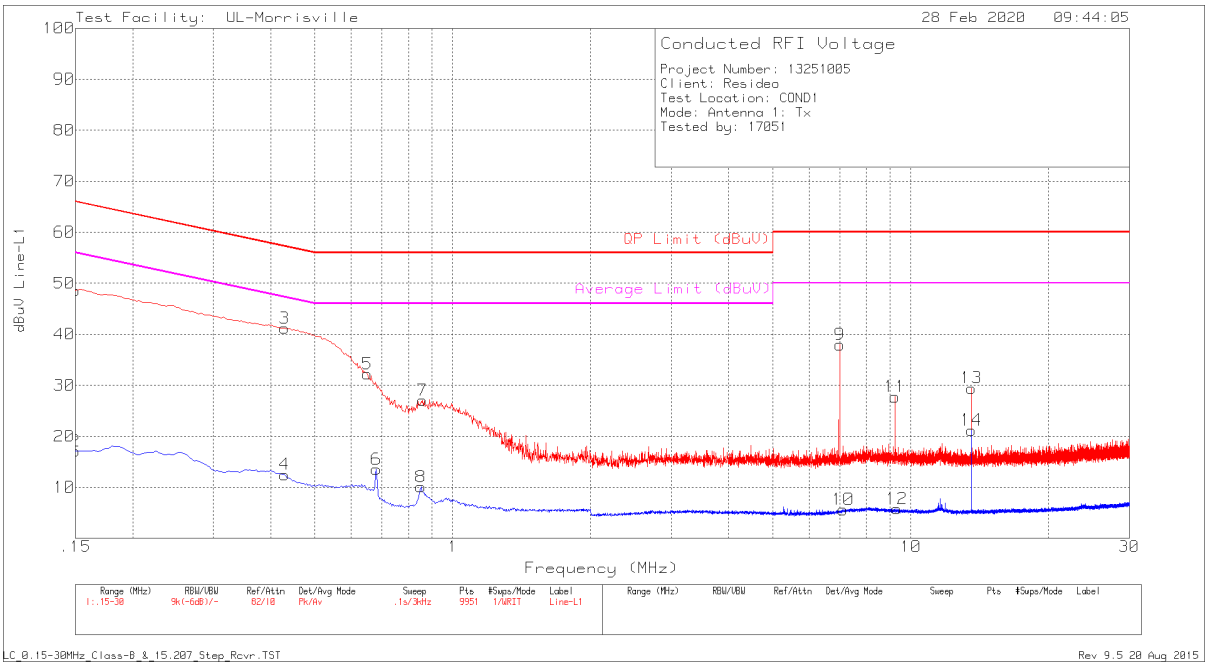
§15.207 (a)
RSS-GEN, Section 8.8

Frequency of emission	Conducted Limit (dBµV)	
(MHz)	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50
* Decreases with the logarithm of the frequency.		

TEST PROCEDURE

ANSI C63.10

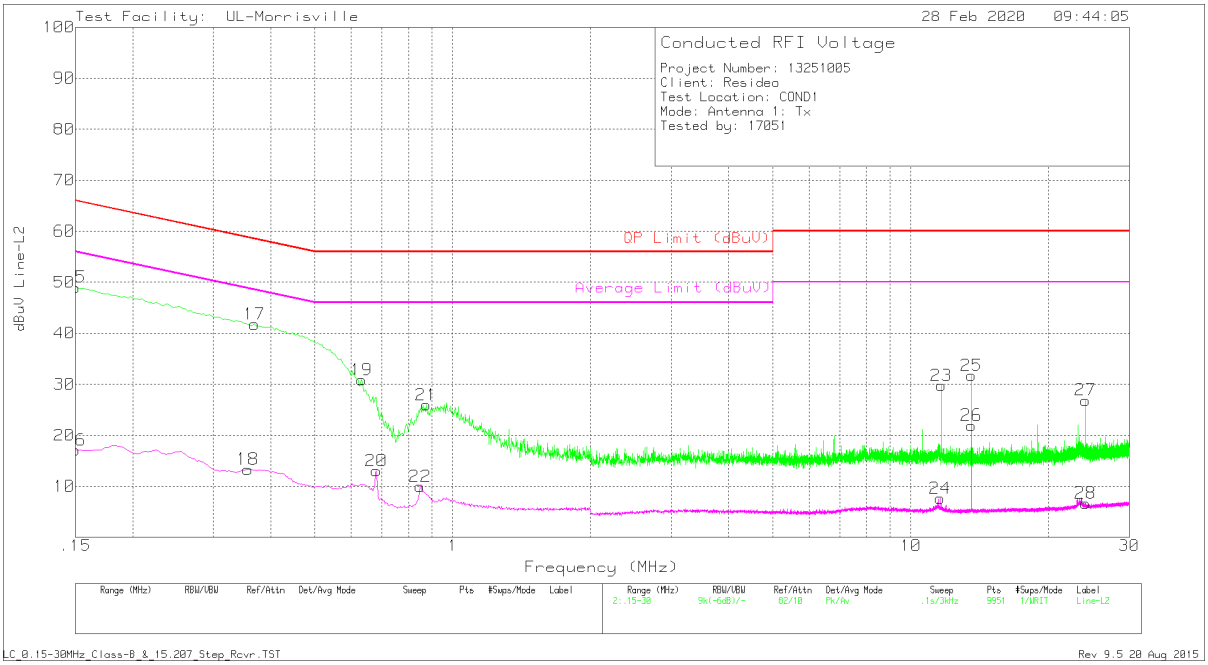
LINE 1 RESULTS – ANTENNA 1



Line-L1: 0.15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
1	.15	38.43	Pk	.2	10	48.63	66	-17.37	-	-
2	.15	6.91	Av	.2	10	17.11	-	-	56	-38.89
3	.429	31.11	Pk	.1	10	41.21	57.27	-16.06	-	-
4	.429	2.4	Av	.1	10	12.5	-	-	47.27	-34.77
5	.651	22.12	Pk	.1	10	32.22	56	-23.78	-	-
6	.681	3.44	Av	.1	10	13.54	-	-	46	-32.46
7	.858	17.06	Pk	0	10	27.06	56	-28.94	-	-
8	.852	.08	Av	0	10	10.08	-	-	46	-35.92
9	7.005	27.65	Pk	.1	10.2	37.95	60	-22.05	-	-
10	7.119	-4.67	Av	.1	10.2	5.63	-	-	50	-44.37
11	9.231	17.35	Pk	.1	10.3	27.75	60	-32.25	-	-
12	9.321	-4.58	Av	.1	10.3	5.82	-	-	50	-44.18
13	13.56	18.96	Pk	.1	10.4	29.46	60	-30.54	-	-
14	13.56	10.71	Av	.1	10.4	21.21	-	-	50	-28.79

Pk - Peak detector
Av - Average detection

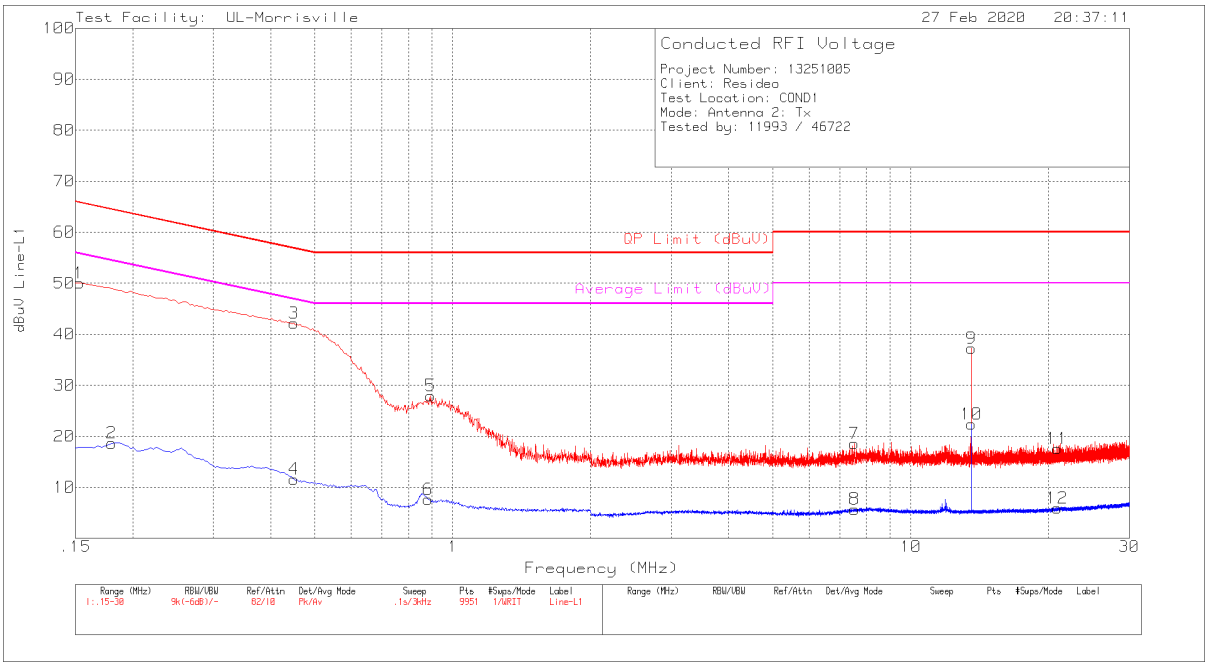
LINE 2 RESULTS – ANTENNA 1



Line-L2: 0.15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
15	.15	38.8	Pk	.2	10	49	66	-17	-	-
16	.15	6.91	Av	.2	10	17.11	-	-	56	-38.89
17	.369	31.66	Pk	.1	10	41.76	58.52	-16.76	-	-
18	.357	3.24	Av	.1	10	13.34	-	-	48.8	-35.46
19	.633	20.86	Pk	0	10	30.86	56	-25.14	-	-
20	.681	3.08	Av	0	10	13.08	-	-	46	-32.92
21	.876	15.92	Pk	0	10	25.92	56	-30.08	-	-
22	.849	-.03	Av	0	10	9.97	-	-	46	-36.03
23	11.667	19.28	Pk	.1	10.4	29.78	60	-30.22	-	-
24	11.589	-2.89	Av	.1	10.4	7.61	-	-	50	-42.39
25	13.56	21.25	Pk	.1	10.4	31.75	60	-28.25	-	-
26	13.56	11.44	Av	.1	10.4	21.94	-	-	50	-28.06
27	24.069	16.08	Pk	.2	10.6	26.88	60	-33.12	-	-
28	24.045	-4.1	Av	.2	10.6	6.7	-	-	50	-43.3

Pk - Peak detector
Av - Average detection

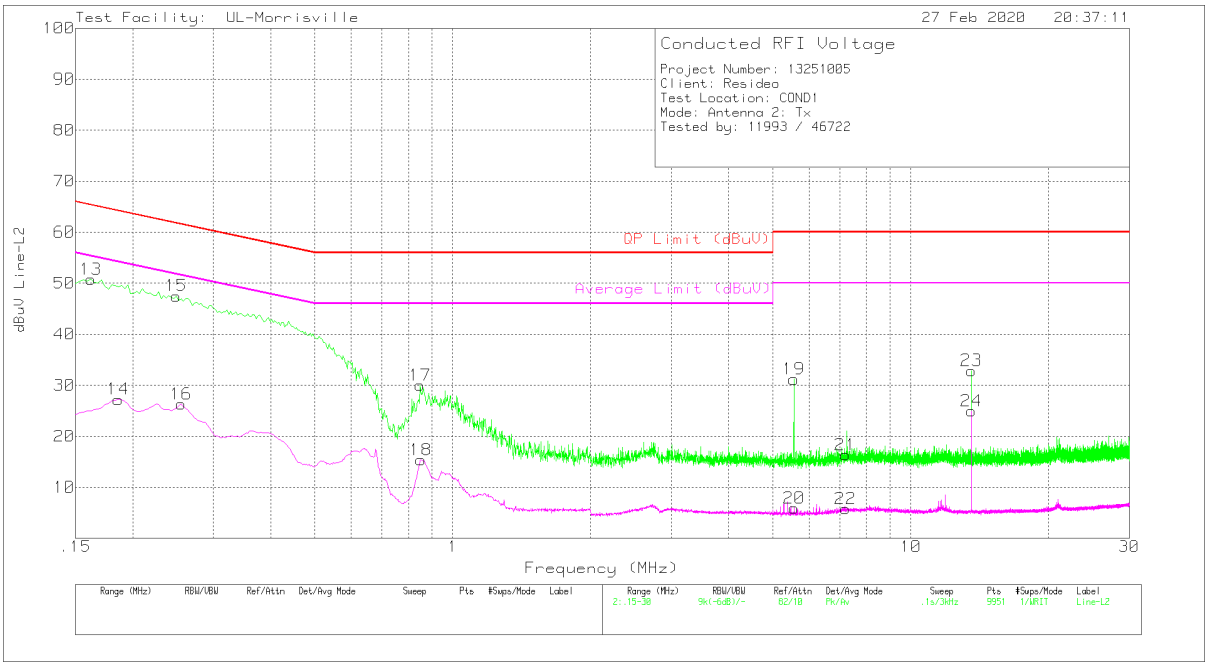
LINE 1 RESULTS – ANTENNA 2



Line-L1: 0.15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
1	.153	39.86	Pk	.2	10	50.06	65.84	-15.78	-	-
2	.18	8.45	Av	.2	10	18.65	-	-	54.49	-35.84
3	.45	32.06	Pk	.1	10	42.16	56.88	-14.72	-	-
4	.45	1.52	Av	.1	10	11.62	-	-	46.88	-35.26
5	.894	17.96	Pk	0	10	27.96	56	-28.04	-	-
6	.8835	-2.35	Av	0	10	7.65	-	-	46	-38.35
7	7.521	8.19	Pk	.1	10.3	18.59	60	-41.41	-	-
8	7.536	-4.67	Av	.1	10.3	5.73	-	-	50	-44.27
9	13.56	26.73	Pk	.1	10.4	37.23	60	-22.77	-	-
10	13.56	11.9	Av	.1	10.4	22.4	-	-	50	-27.6
11	20.898	6.82	Pk	.2	10.6	17.62	60	-42.38	-	-
12	20.898	-4.85	Av	.2	10.6	5.95	-	-	50	-44.05

Pk - Peak detector
Av - Average detection

LINE 2 RESULTS – ANTENNA 2



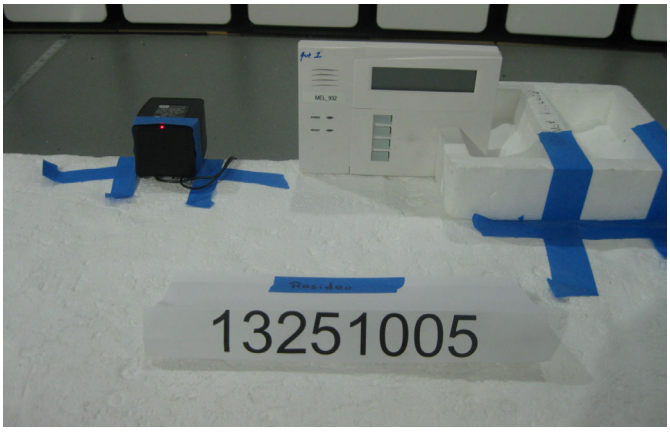
Line-L2: 0.15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VCF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
13	.162	40.55	Pk	.2	10	50.75	65.36	-14.61	-	-
14	.186	17.05	Av	.2	10	27.25	-	-	54.21	-26.96
15	.249	37.43	Pk	.1	10	47.53	61.79	-14.26	-	-
16	.255	16.23	Av	.1	10	26.33	-	-	51.59	-25.26
17	.849	20.03	Pk	0	10	30.03	56	-25.97	-	-
18	.852	5.37	Av	0	10	15.37	-	-	46	-30.63
19	5.553	20.89	Pk	.1	10.2	31.19	60	-28.81	-	-
20	5.559	-4.38	Av	.1	10.2	5.92	-	-	50	-44.08
21	7.203	6.07	Pk	.1	10.2	16.37	60	-43.63	-	-
22	7.194	-4.51	Av	.1	10.2	5.79	-	-	50	-44.21
23	13.563	22.39	Pk	.1	10.4	32.89	60	-27.11	-	-
24	13.56	14.47	Av	.1	10.4	24.97	-	-	50	-25.03

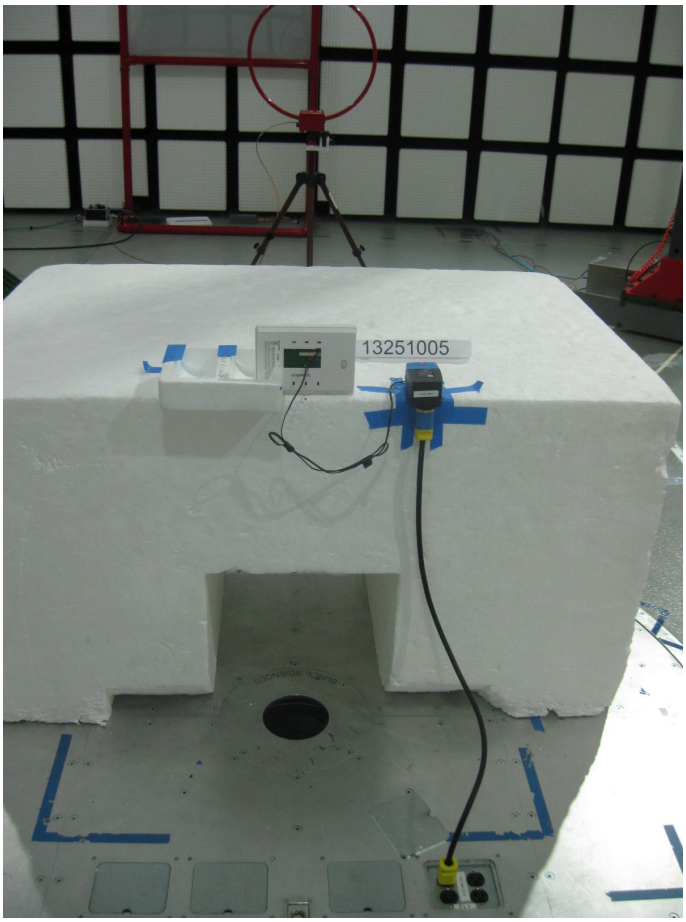
Pk - Peak detector
Av - Average detection

10. SETUP PHOTOS

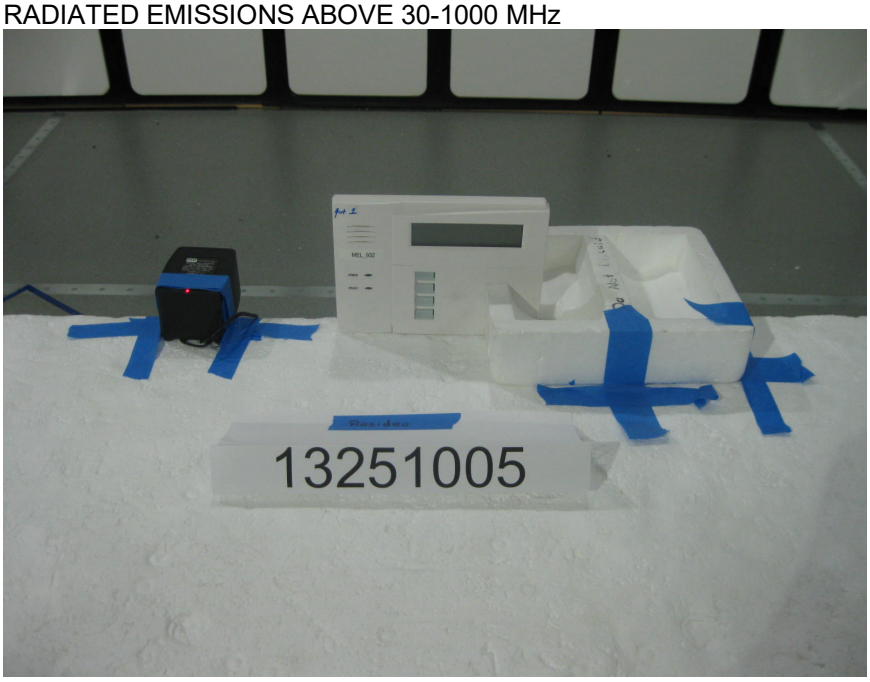
RADIATED EMISSIONS SETUP

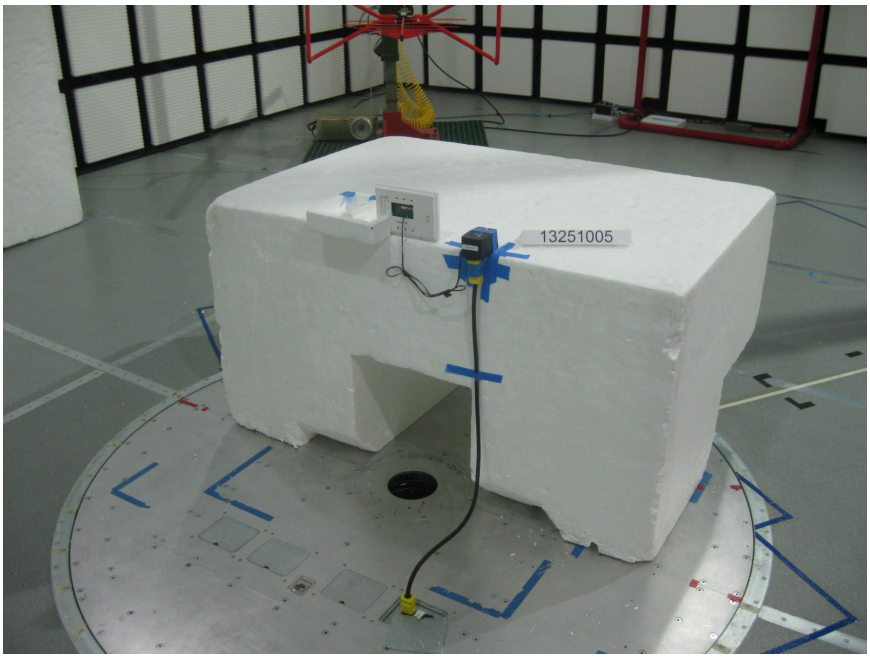
RADIATED EMISSIONS BELOW 30MHz





RADIATED EMISSIONS ABOVE 30-1000 MHz

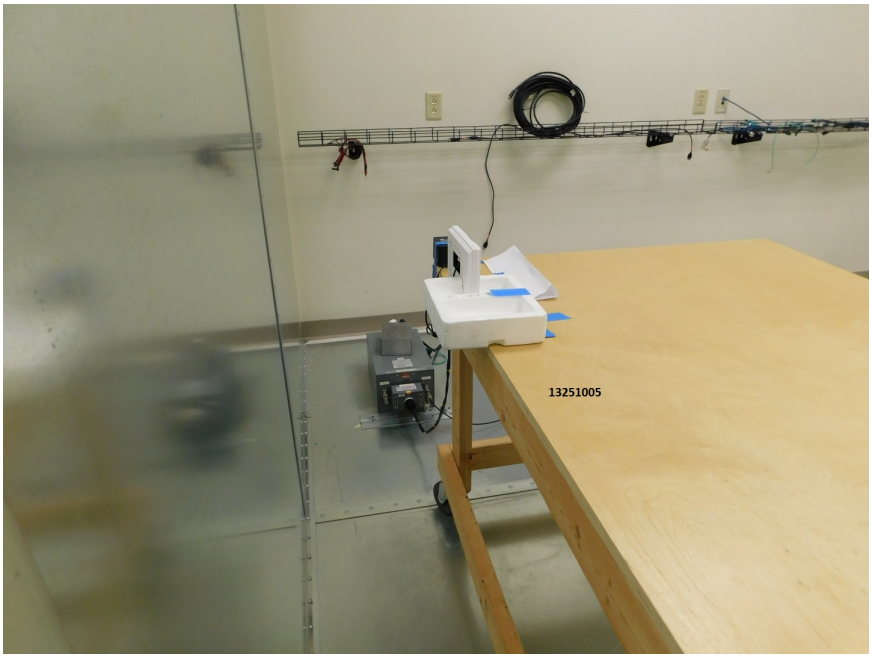




RADIATED EMISSIONS ABOVE 1GHz

AC MAINS LINE CONDUCTED EMISSION

LINE CONDUCTED EMISSION



END OF TEST REPORT