



# **CERTIFICATION TEST REPORT**

**Report Number. :** 13939155-E1V2

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

**Model :** A2548

**FCC ID :** BCGA2548

**IC :** 579C-A2548

**EUT Description :** MAGNETIC CHARGER

**Test Standard(s) :** FCC 47 CFR PART 15 SUBPART C  
ISED RSS-216 ISSUE 2  
ISED RSS-GEN ISSUE 5 + A1 + A2

**Date Of Issue:**  
August 21, 2021

**Prepared by:**  
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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	08/19/2021	Initial Issue	Chin Pang
V2	08/21/2021	Address TCB's Questions on FCC ID, Section 5.2, 5.4 & 5.5 page 11, 18, 21, 25, 31 & 38	Chin Pang

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### 1. ATTESTATION OF TEST RESULTS

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

**EUT DESCRIPTION:** MAGNETIC CHARGER

**MODEL:** A2548

**BRAND:** APPLE

**SERIAL NUMBER:** DLC128400291HN12C

**SAMPLE RECEIPT DATE:** JULY 26, 2021

**DATE TESTED:** July 26- 31, 2021

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART C	Complies
ISED RSS-216 Issue 2, Annex B	Complies
ISED RSS-GEN Issue 5 + A1 + A2	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 A2LA, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released For  
UL Verification Services Inc. By:



Prepared By:



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Senior Engineer  
Consumer Technology Division  
UL Verification Services Inc.

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Test Engineer  
Consumer Technology Division  
UL Verification Services Inc.

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with:

- FCC CFR 47 Part 2
- FCC CFR 47 Part 15
- ANSI C63.10-2013
- KDB 414788 D01 Radiated Test Site v01r01
- RSS-GEN Issue 5 + A1 + A2
- RSS-216 Issue 2

## 3. FACILITIES AND ACCREDITATION

UL Verification Services Inc. is accredited by A2LA, certification #0751.05, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
<input type="checkbox"/>	Building 1: 47173 Benicia Street, Fremont, CA 94538	US0104	2324A	208313
<input checked="" type="checkbox"/>	Building 2: 47266 Benicia Street, Fremont, CA 94538	US0104	22541	208313
<input checked="" type="checkbox"/>	Building 4: 47658 Kato Rd, Fremont, CA 94538	US0104	2324B	208313

## 4. CALIBRATION AND UNCERTAINTY

### 4.1. 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.

### 4.2. 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).

### 4.3. 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)  
 $36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$

#### **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.  
 $36.5 \text{ dBuV} + 0 \text{ dB} + 10.1 \text{ dB} + 0 \text{ dB} = 46.6 \text{ dBuV}$

### 4.4. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.78 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.40 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.87 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	6.01 dB

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

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

The EUT is an inductive magnetic charger designed to charge wireless charging devices. The charging function operates at 127.7 kHz and 360 kHz. The charger supports charging at 15W (Phone) and 1W (AirPods) power.

### 5.2. MAXIMUM OUTPUT POWER

The transmitter has maximum peak radiated electric and magnetic field strength as follows:

<b>Fundamental Frequency (KHz)</b>	<b>Mode</b>	<b>E field (300m distance) FCC (dBuV/m)</b>	<b>H field (3m distance) IC (dBuA/m)</b>
127.7	Operating (Config 2)	-10.48	21.02
360	Operating (Config 3)	-18.72	4.02

### 5.3. SOFTWARE AND FIRMWARE

The firmware version installed in the EUT during testing was v252.



## 5.4. WORST-CASE CONFIGURATION AND MODE

For the entire radiated emissions test, the EUT was investigated on the following configuration during the test at its natural orientation at max coupling.

Config	Mode	Descriptions
1	Standby	EUT Alone powered by AC/DC adapter
2	Operating	EUT Operating 127.7kHz with Load powered by AC/DC adapter
3	Operating	EUT Operating 360kHz with Load and case powered by AC/DC adapter

For below 30MHz & 1GHz tests EUT was connected to AC power adapter. For operating frequency of 127.7kHz the EUT was tested with a WPT accessory (load) at max coupling. For operating frequency of 360kHz, the EUT was tested with two different orientations. 1) EUT was tested with WPT accessory (load) at max coupling. 2) EUT was tested with WPT accessory (load) and silicon case at max coupling. The worst case was determined to be number 2 for operating at 360kHz which is EUT was tested with WPT accessory (load) and silicon case at max coupling.

For below 30MHz testing, investigation was done on three antenna orientations: RX antenna Face-on, Face-off and horizontal (parallel to ground). The worst-case configurations were determined on RX antenna Face-on and Face-off; therefore, all final tests were performed using these two orientations.

Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 300 m 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 D01.

## 5.5. DESCRIPTION OF TEST SETUP

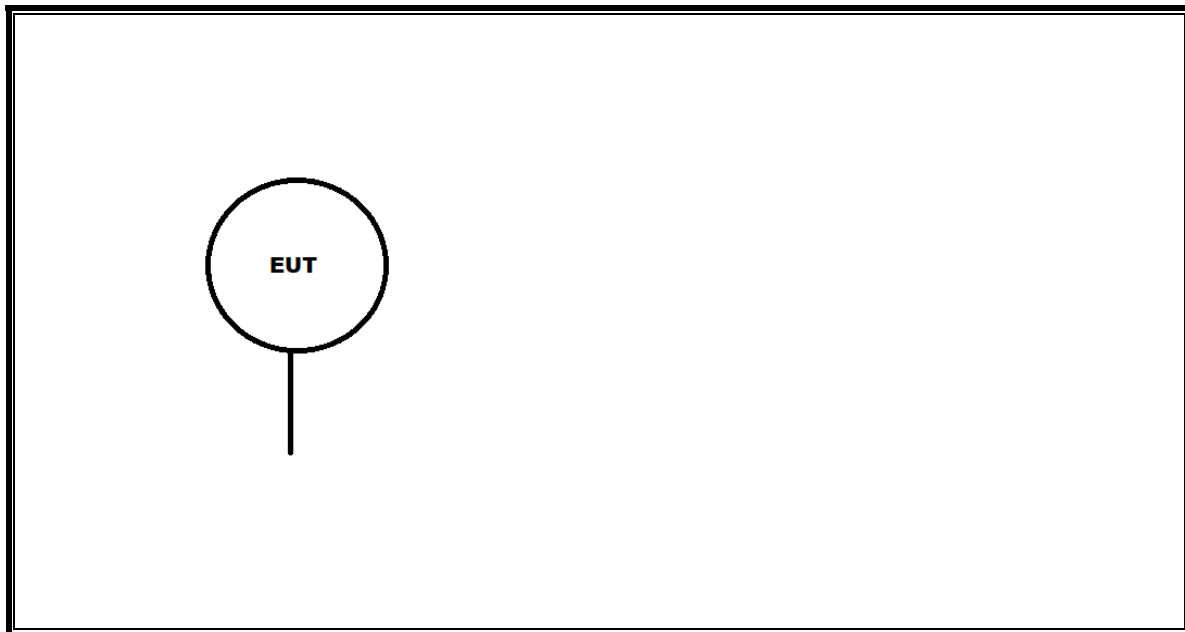
### SUPPORT EQUIPMENT & PERIPHERALS

SUPPORT EQUIPMENT & PERIPHERALS LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
AC/DC adapter	Apple	A2305	C4H01050096PF4FAH	DoC
AC/DC adapter	Apple	A1882	FNT84460MNQJV3FA6	DoC
Silicon Case	Apple	N/A	C07080ET0MACAHV0142	DoC
WPT Load	Apple	A2342	G6TD909B0G81	BCG-E3548A
WPT Load	Apple	N/A	H6VFQ0801059	N/A

### TEST SETUP

Please see the following configurations for the test setups. Configurations 1, 2, and 3 indicate that the EUT is directly connected to an AC/DC adapter via USB cable.

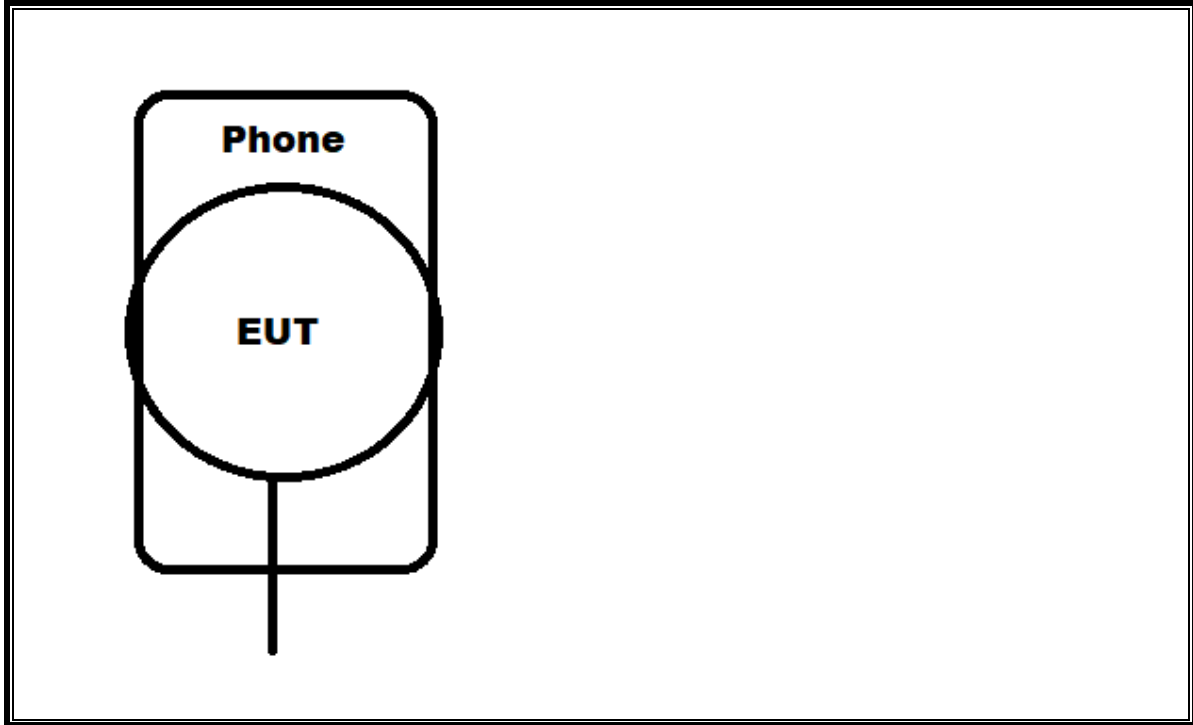
### CONFIGURATION 1: STANDBY MODE



**CONFIGURATION 2: OPERATING MODE at 127.7kHz with Load**



**CONFIGURATION 3: OPERATING MODE at 360kHz with Load**



## 6. 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, Active Loop 9KHz to 30MHz	ETS-Lindgren	6502	T757	11/12/2021	11/12/2020
Antenna, Active Loop 9KHz to 30MHz	ETS-Lindgren	6502	T1616	12/02/2021	12/02/2020
*Antenna, Broadband Hybrid, 30MHz to 2000MHz w/4dB	Sunol Sciences Crop.	JB1	T130	08/04/2021	08/04/2020
Amplifier, 9kHz to 1GHz, 32dB	Sonoma Instrument	310N	84489	07/20/2022	07/20/2021
Sniffer Probes	Electro Metrics	EM-6992	N/A	N/A	N/A
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A-544	T1210	01/26/2022	01/26/2021

AC Line Conducted					
Description	Manufacturer	Model	ID Num	Cal Due	Last Cal
EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESR	T1436	02/19/2022	02/19/2021
Power Cable, Line Conducted Emissions	UL	PR1	T861	10/27/2021	10/27/2020
LISN for Conducted Emissions	FISCHER CUSTOM COMMUNICATIONS	FCC-LISN-50/250-25-2-01	PRE0186446	01/20/2022	01/20/2021
UL AUTOMATION SOFTWARE					
Radiated Software	UL	UL EMC	Ver 9.5, April 14, 2021		
Conducted Software	UL	UL EMC	2021.4.21		

Note: \*Testing is completed before equipment expiration date

## 7. OCCUPIED BANDWIDTH

### TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 300Hz. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

Note: Because the measured signal is CW-like, adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW.

Note that when the EUT was in standby mode there is no signal. On the other hand, when the EUT was in operational mode there were two signals. One of the intentional charging signal of 127.7kHz and the other intentional charging signal of 360kHz.

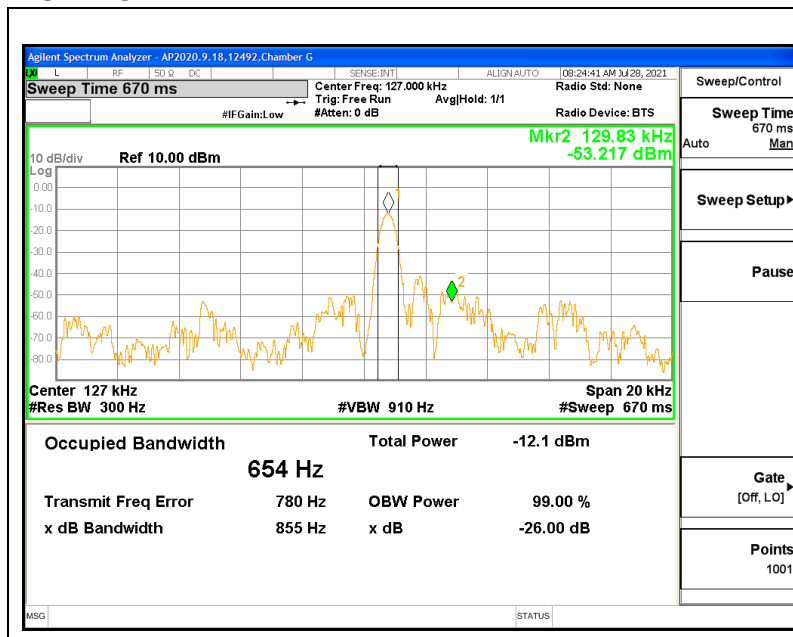
### EUT SETUP

Configuration 1: Charger operating at 127.7kHz with load

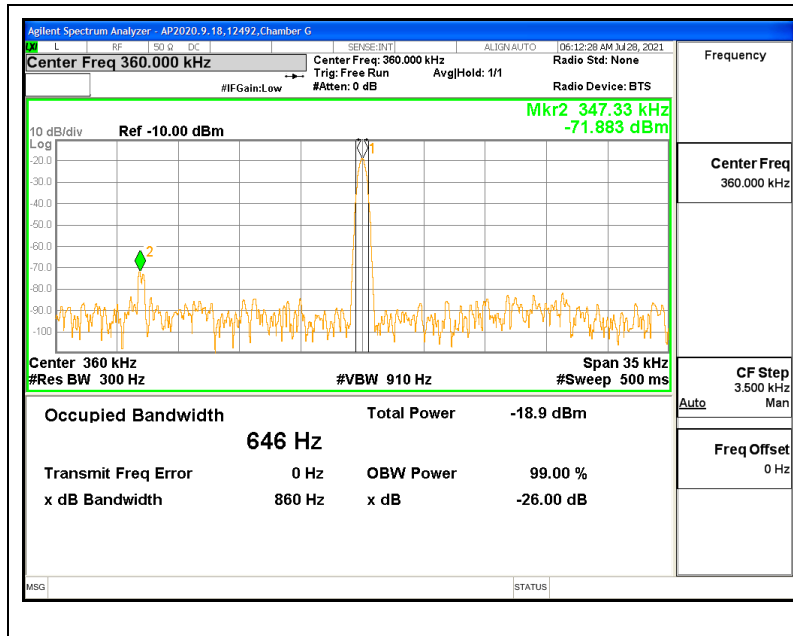
Configuration 2: Charger operating at 360kHz with load

### RESULTS

#### 7.1.1. CONFIG 1



### 7.1.2. CONFIG 2



## 8. RADIATED EMISSION TEST RESULTS

### 8.1. LIMITS AND PROCEDURE

#### LIMITS

FCC §15.209 (a)

ICES-001 Section 6.2, IC RSS-216 6.2.2, and IC RSS-GEN Sections 8.9 and 8.10.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (m)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/F(kHz)	30
1.705–30.0	30	30
30–88	100	3
88 to 216	150	3
216 to 960	200	3
Above 960 MHz	500	3

Note: The lower limit shall apply at the transition frequency.

ICES-001 Issue 5 Table 2 & Table 4:

**Table 2: Magnetic field strength radiated emission limits for induction cooking appliances**

Frequency range (MHz)	Quasi-peak, at 3 m distance (dBµA/m)
0.009 – 0.07	69
0.07 – 0.15	69 to 39 *
0.15 – 30	39 to 7 *

\* The limit level in dBµA/m decreases linearly with the logarithm of frequency.

**Table 4: Electric field strength radiated emission limits for induction cooking appliances**

Frequency range (MHz)	OATS or SAC *	OATS or SAC *	FAR *
	10 m measurement distance Quasi-peak (dBµV/m)	3 m measurement distance Quasi-peak (dBµV/m)	3 m measurement distance Quasi-peak (dBµV/m)
30 – 230	30	40	42 to 35**
230 – 1000	37	47	42

**Note:** The more stringent limit applies at the transition frequency.  
 \* OATS = open-area test site, SAC = semi-anechoic chamber, FAR = fully-anechoic room (see CSA CISPR 11:19).  
 \*\* The limit level in dBµV/m decreases linearly with the logarithm of frequency.

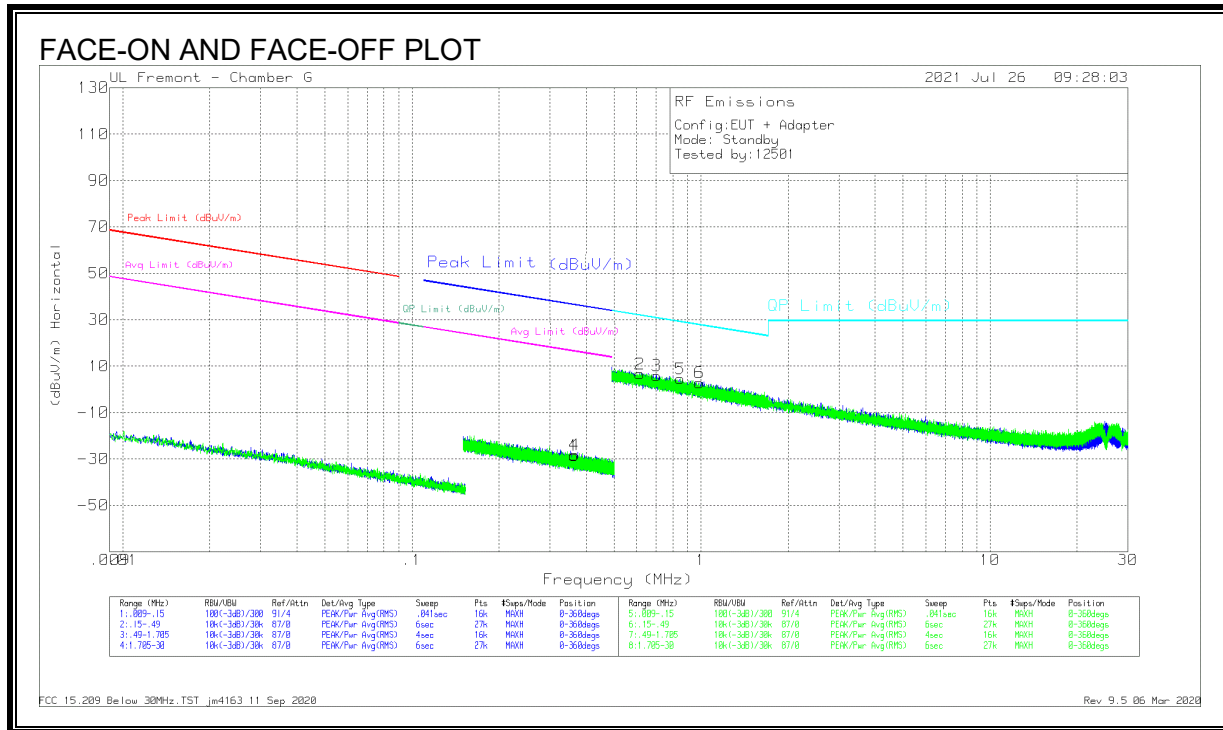
#### RESULTS



## 8.2. Radiated Emissions

### 8.2.1. FCC TX FUNDAMENTAL AND SPURIOUS EMISSIONS FROM 9 kHz TO 30 MHz

#### STANDBY CONFIGURATION



#### DATA

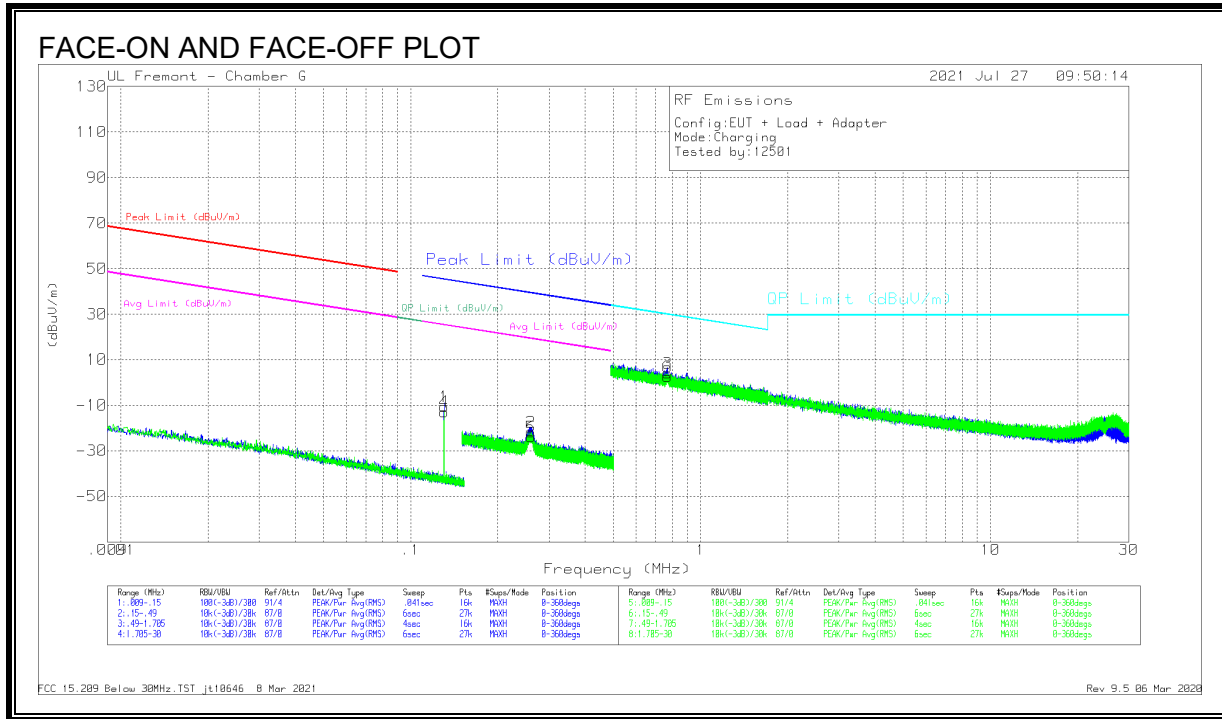
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables (dB)	Dist Corr 300m	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Antenna Orientation
1	.36394	39.58	Pk	11.8	.1	-80	-28.52	36.39	-64.91	16.39	-44.91	0-360	Face On
4	.36514	39.85	Pk	11.8	.1	-80	-28.25	36.36	-64.61	16.36	-44.61	0-360	Face Off

Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables (dB)	Dist Corr 30m	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Antenna Orientation
2	.61479	34.92	Pk	11.6	.1	-40	6.62	31.83	-25.21	0-360	Face On
3	.70143	34.28	Pk	11.6	.1	-40	5.98	30.69	-24.71	0-360	Face On
5	.84697	32.85	Pk	11.6	.1	-40	4.55	29.06	-24.51	0-360	Face Off
6	.98742	31.18	Pk	11.6	.1	-40	2.88	27.73	-24.85	0-360	Face Off

Pk - Peak detector

**OPERATING WITH LOAD at 127.7kHz**



**DATA**

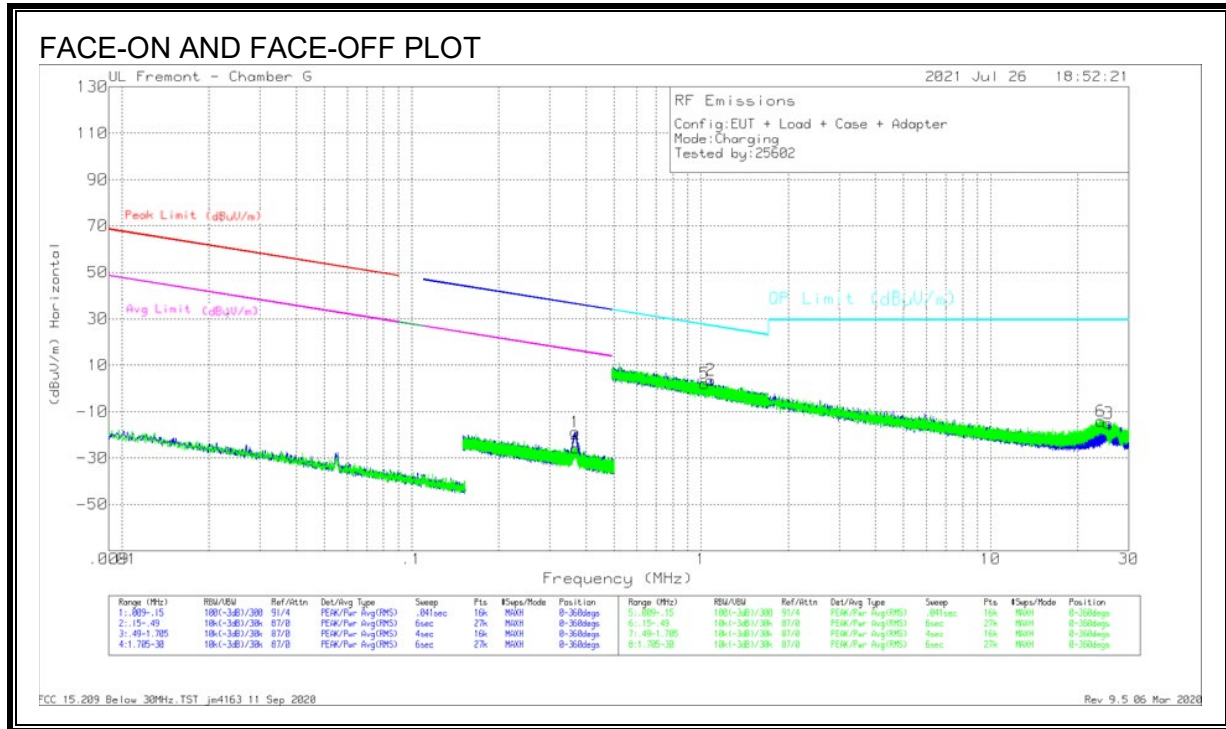
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dBm)	Cables (dB)	Dist Corr 300m	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Antenna Orientation
4	.1278	55.77	Pk	11.3	.1	-80	-12.83	-	-	0-360	Face Off
1	.1278	58.12	Pk	11.3	.1	-80	-10.48	-	-	0-360	Face On
5	.25971	44.88	Pk	11	.1	-80	-24.02	39.32	-63.34	0-360	Face Off
2	.25976	47.05	Pk	11	.1	-80	-21.85	39.32	-61.17	0-360	Face On

Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dBm)	Cables (dB)	Dist Corr 30m	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Antenna Orientation
3	.76786	33.2	Pk	10.8	.1	-40	4.1	29.91	-25.81	0-360	Face On
6	.76801	31.71	Pk	10.8	.1	-40	2.61	29.91	-27.3	0-360	Face Off

Pk - Peak detector

**OPERATING WITH LOAD at 360kHz**



**DATA**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables (dB)	Dist Corr 300m	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Antenna Orientation
1	.361	49.38	Pk	11.8	.1	-80	-18.72	36.3	-55.02	16.3	-35.02	0-360	Face On
4	.362	42.46	PK	11.8	.1	-80	-25.64	36.27	-61.91	16.27	-41.91	0-360	Face Off

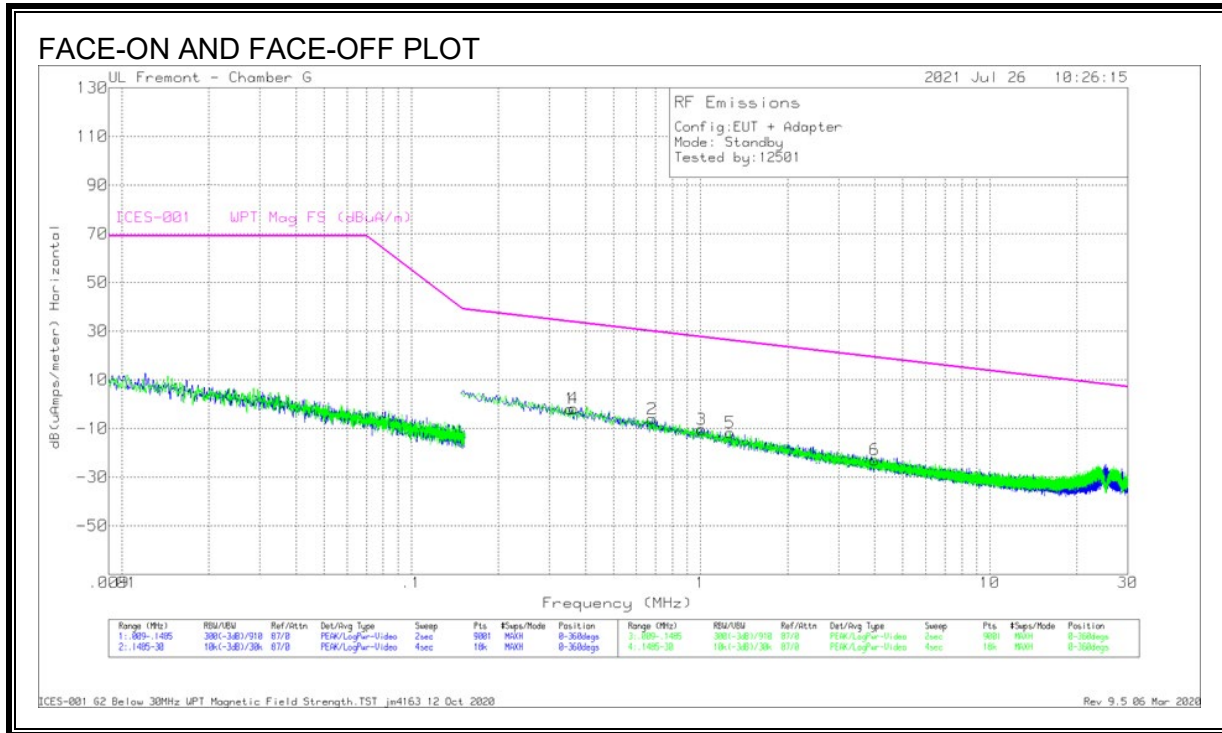
Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables (dB)	Dist Corr 30m	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Antenna Orientation
5	1.02983	30.43	Pk	11.6	.1	-40	2.13	27.37	-25.24	0-360	Face Off
2	1.07847	31.83	Pk	11.6	.2	-40	3.63	26.97	-23.34	0-360	Face On
6	23.99177	16.1	Pk	9	.8	-40	-14.1	29.5	-43.6	0-360	Face Off
3	25.51766	15.53	Pk	8.7	.8	-40	-14.97	29.5	-44.47	0-360	Face On

Pk - Peak detector

## 8.2.2. IC / ICES-001 TX FUNDAMENTAL AND SPURIOUS EMISSIONS FROM 9 kHz TO 30 MHz

### STANDBY CONFIGURATION

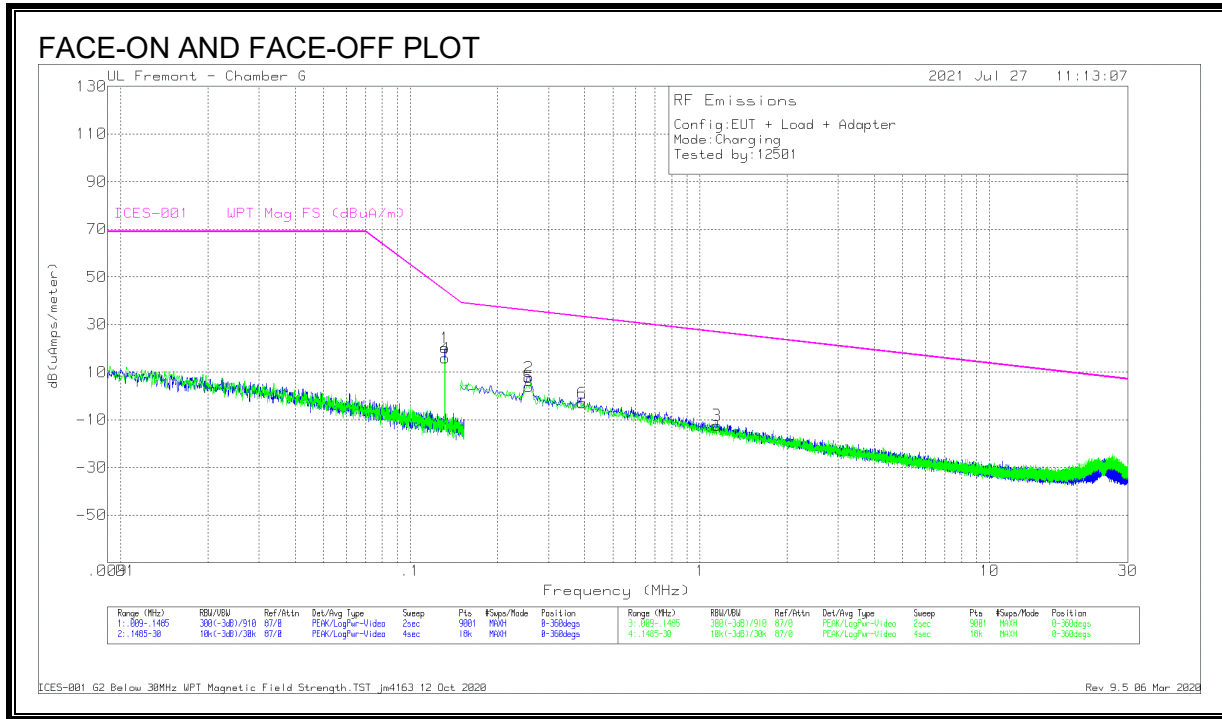


### DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables (dB)	Corrected Reading dB(uAmps/meter)	ICES-001 G2 WPT Mag FS (dBuA/m)	Margin (dB)	Azimuth (Degs)	Antenna Orientation
4	.35471	33.53	Qp	-40.3	.1	-6.67	33.8	-40.47	212	Face Off
1	.3684	33.33	Qp	-40.3	.1	-6.87	33.57	-40.44	94	Face On
2	.69249	27.74	Qp	-40.1	.1	-12.26	29.76	-42.02	196	Face On
3	1.00126	24.13	Qp	-40	.1	-15.77	27.53	-43.3	265	Face On
5	1.26142	21.88	Qp	-40	.2	-17.92	26.14	-44.06	263	Face Off
6	3.98719	11.62	Qp	-40	.3	-28.08	19.19	-47.27	107	Face Off

Qp - Quasi-Peak detector

**OPERATING WITH LOAD at 127.7kHz**

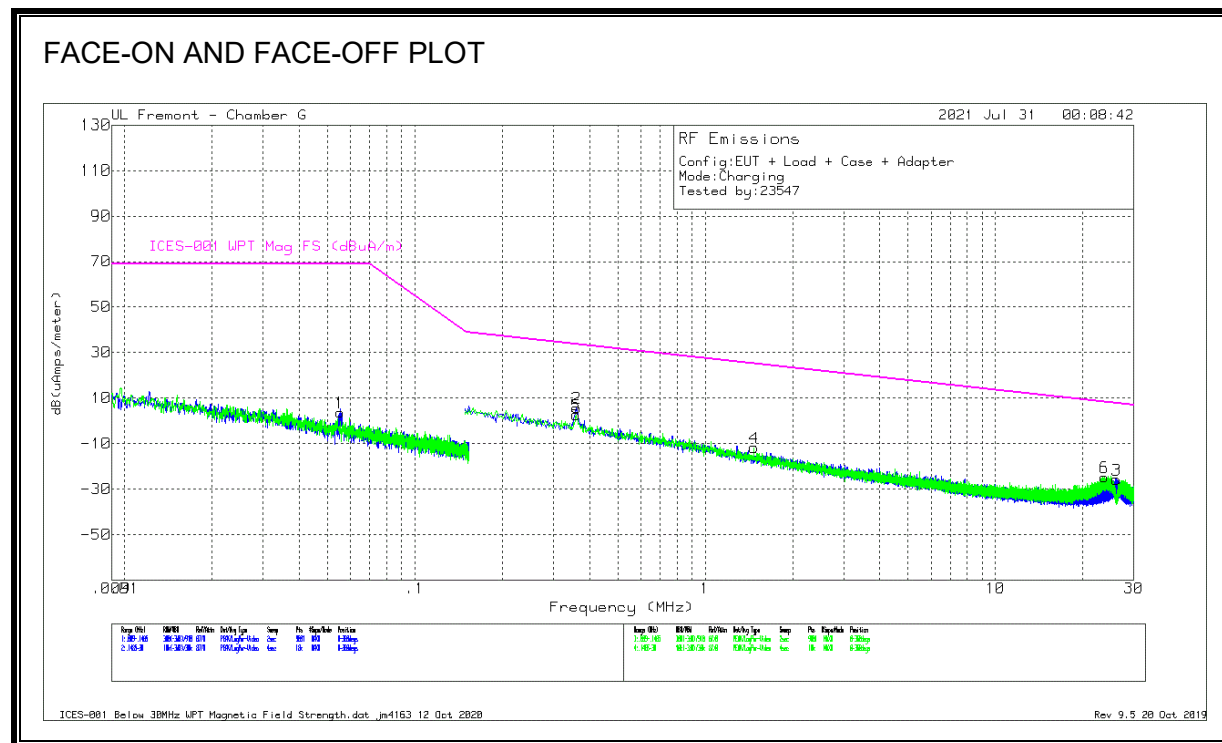


**DATA**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables (dB)	Corrected Reading dB(uAmps/meter)	ICES-001 WPT Mag FS (dBuA/m)	Margin (dB)	Azimuth (Degs)	Antenna Orientation
4	.12774	56.7	Qp	-39.8	.1	17	45.45	-28.45	139	Face Off
1	.12772	60.72	Qp	-39.8	.1	21.02	45.39	-24.37	238	Face On
5	.25575	44.44	Qp	-40.2	.1	4.34	35.78	-31.44	335	Face Off
2	.25643	48.06	Qp	-40.2	.1	7.96	35.76	-27.8	249	Face On
6	.38381	34.45	Qp	-40.3	.1	-5.75	33.33	-39.08	151	Face Off
3	1.14904	25.84	Qp	-40	.2	-13.96	26.7	-40.66	72	Face On

Qp - Quasi-Peak detector

**OPERATING WITH LOAD at 360kHz**

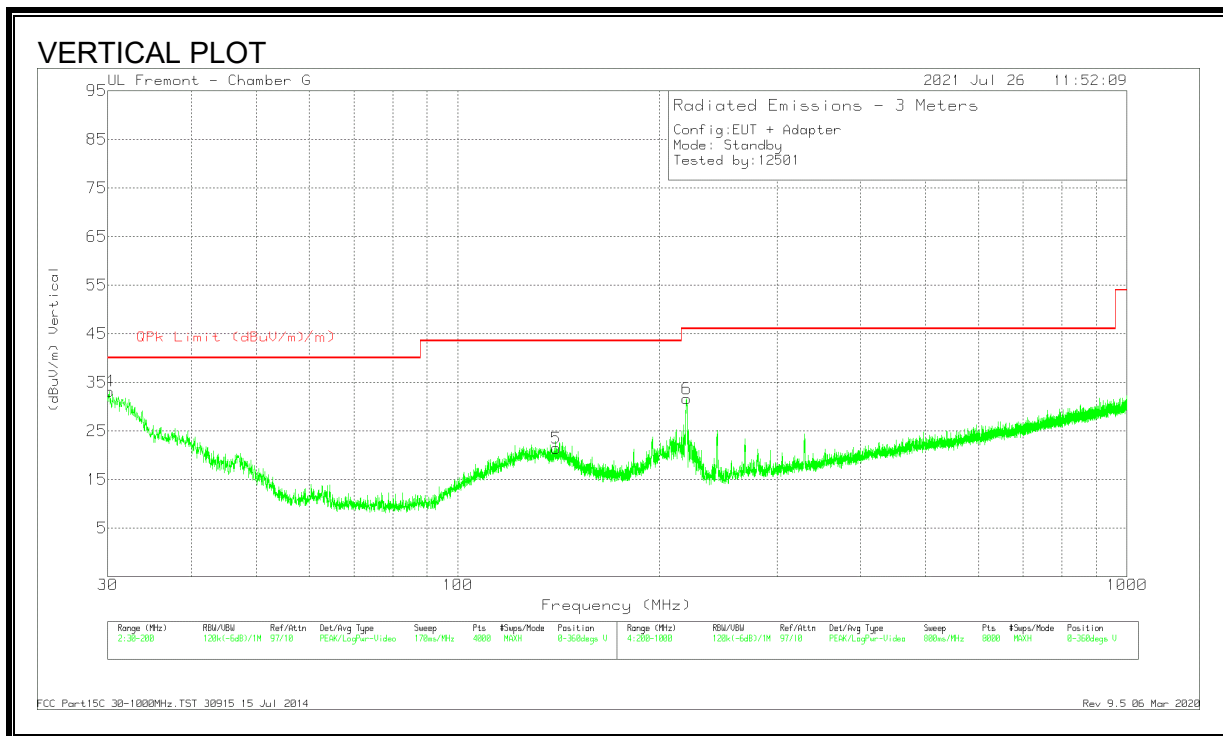
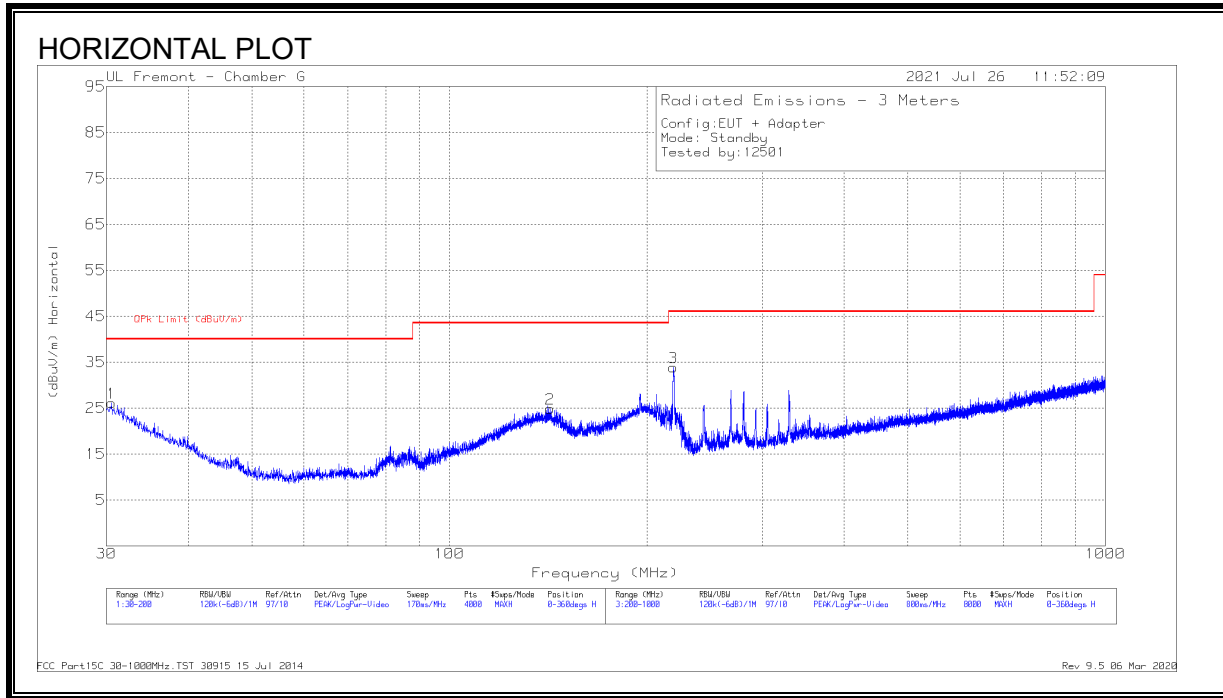


Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables (dB)	Corrected Reading dB(uAmps/meter)	ICES-001 WPT Mag FS (dBuA/m)	Margin (dB)	Azimuth (Degs)	Antenna Orientation
1	.0523	35.52	Qp	-38.7	.1	-3.08	69	-72.08	338	Face On
2	.36056	44.22	Qp	-40.3	.1	4.02	33.7	-29.68	154	Face On
3	26.1057	11.83	Qp	-42.3	.8	-29.67	7.84	-37.51	308	Face On
4	1.4838	20.6	Qp	-40	.2	-19.2	25.16	-44.36	121	Face Off
5	.36153	40.34	Qp	-40.3	.1	.14	33.69	-33.55	255	Face Off
6	24.5967	11.65	Qp	-42	.8	-29.55	8.2	-37.75	14	Face Off

Qp - Quasi-Peak detector

### 8.2.3. FCC TX SPURIOUS EMISSION 30 TO 1000 MHz

#### STANDBY CONFIGURATION



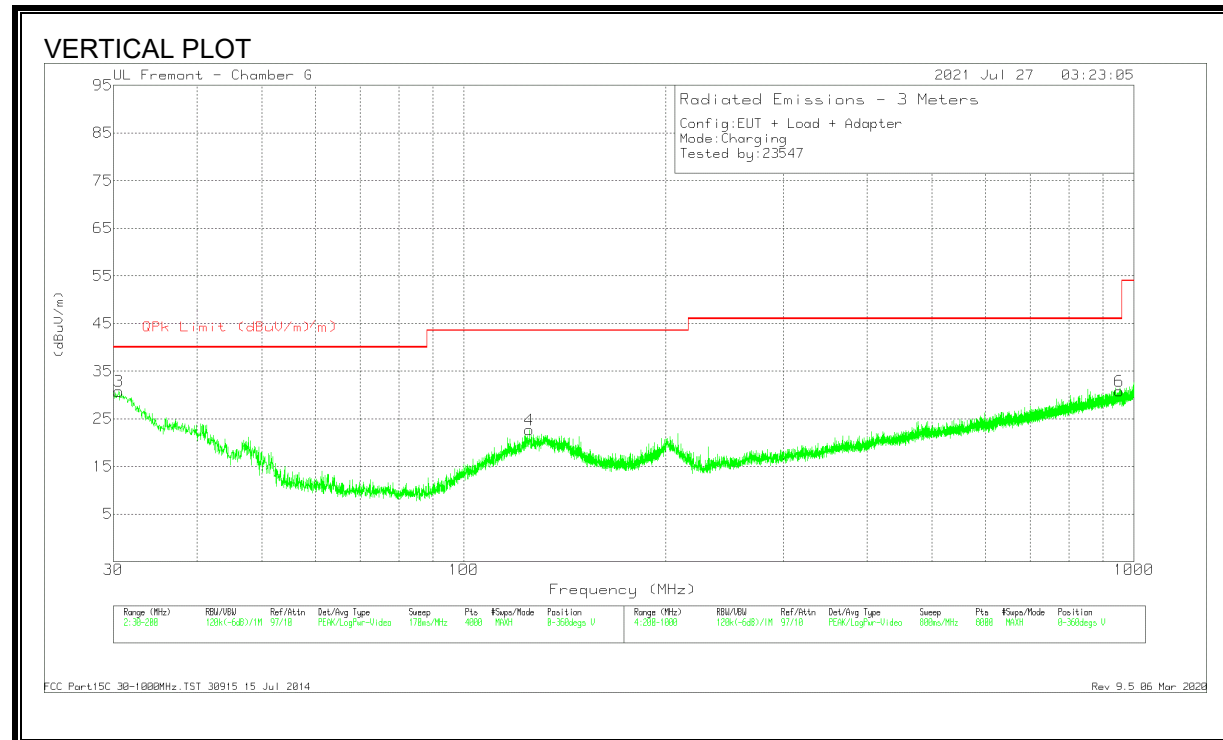
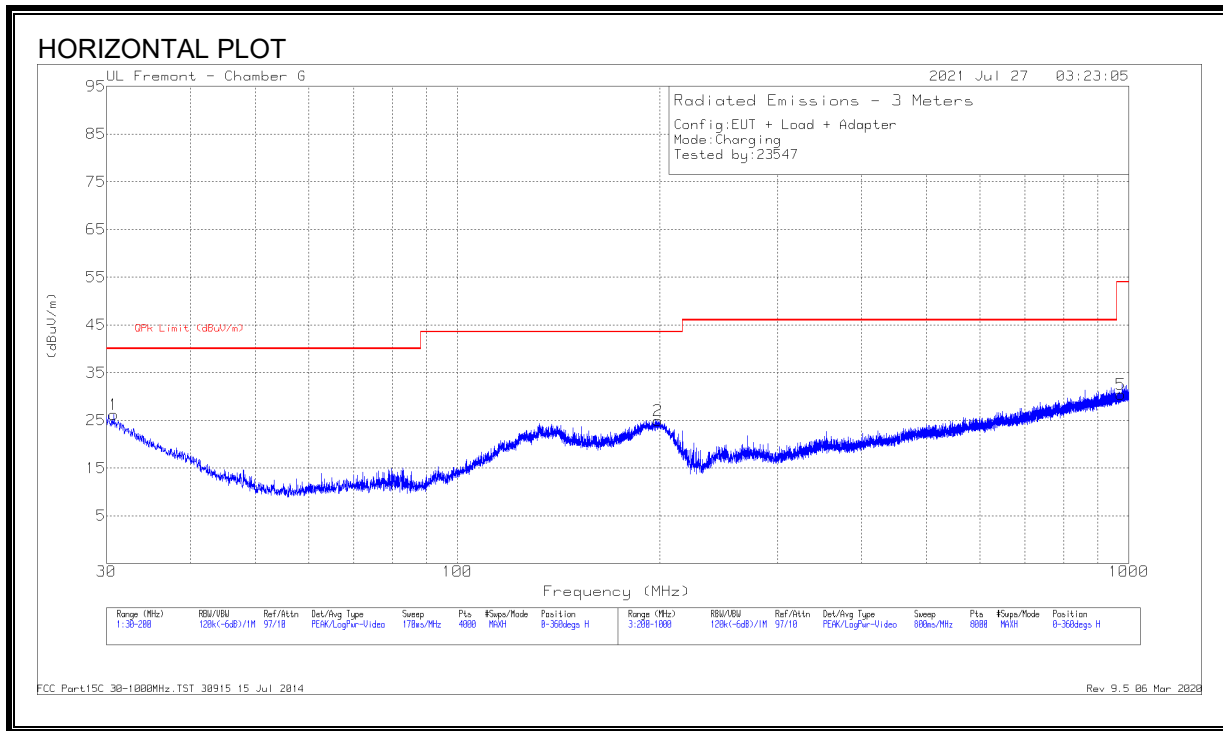
**DATA**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AFT130 (dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	31.362	32.65	Qp	26.8	-31.3	28.15	40	-11.85	9	103	V
1	31.452	25.41	Qp	26.8	-31.3	20.91	40	-19.09	318	370	H
5	141.6836	28.03	Qp	19.2	-30.2	17.03	43.52	-26.49	328	116	V
2	144.2966	30.21	Qp	19	-30.2	19.01	43.52	-24.51	349	291	H
3	219.3875	41.83	Qp	17.2	-29.7	29.33	46.02	-16.69	58	220	H
6	219.4726	42.95	Qp	17.2	-29.7	30.45	46.02	-15.57	24	178	V

Qp - Quasi-Peak detector



**OPERATING WITH LOAD at 127.7kHz**

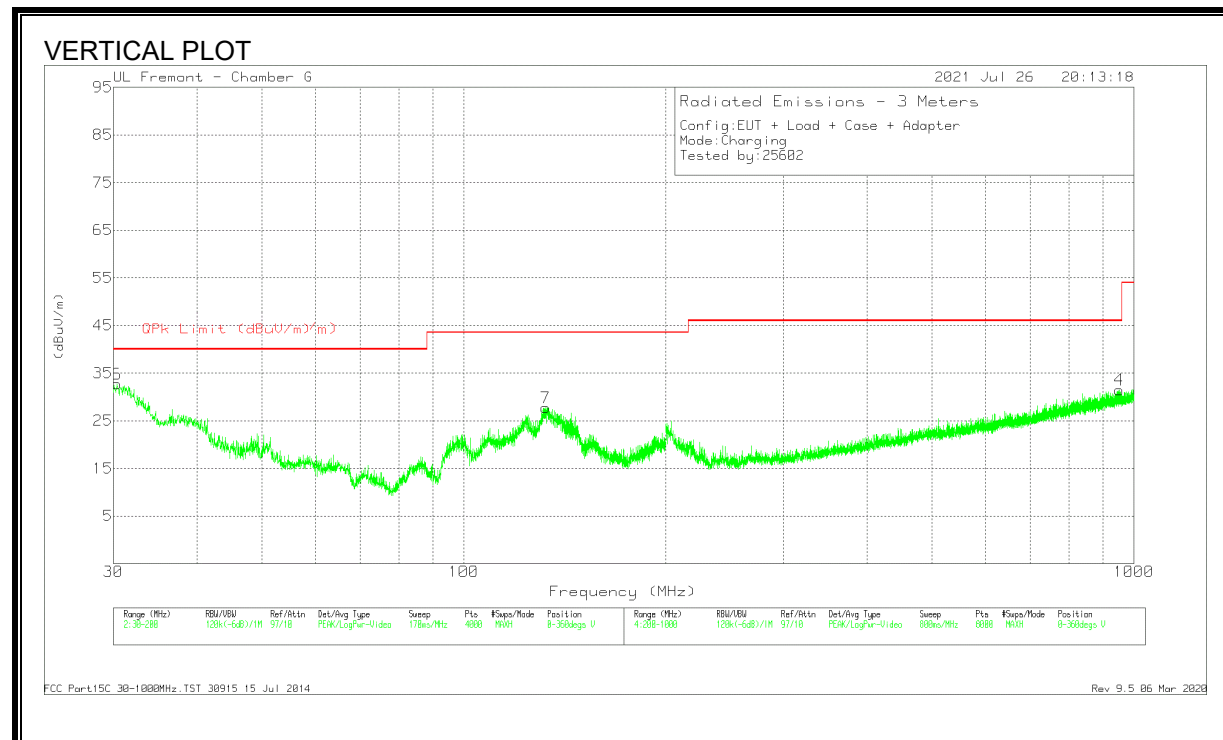
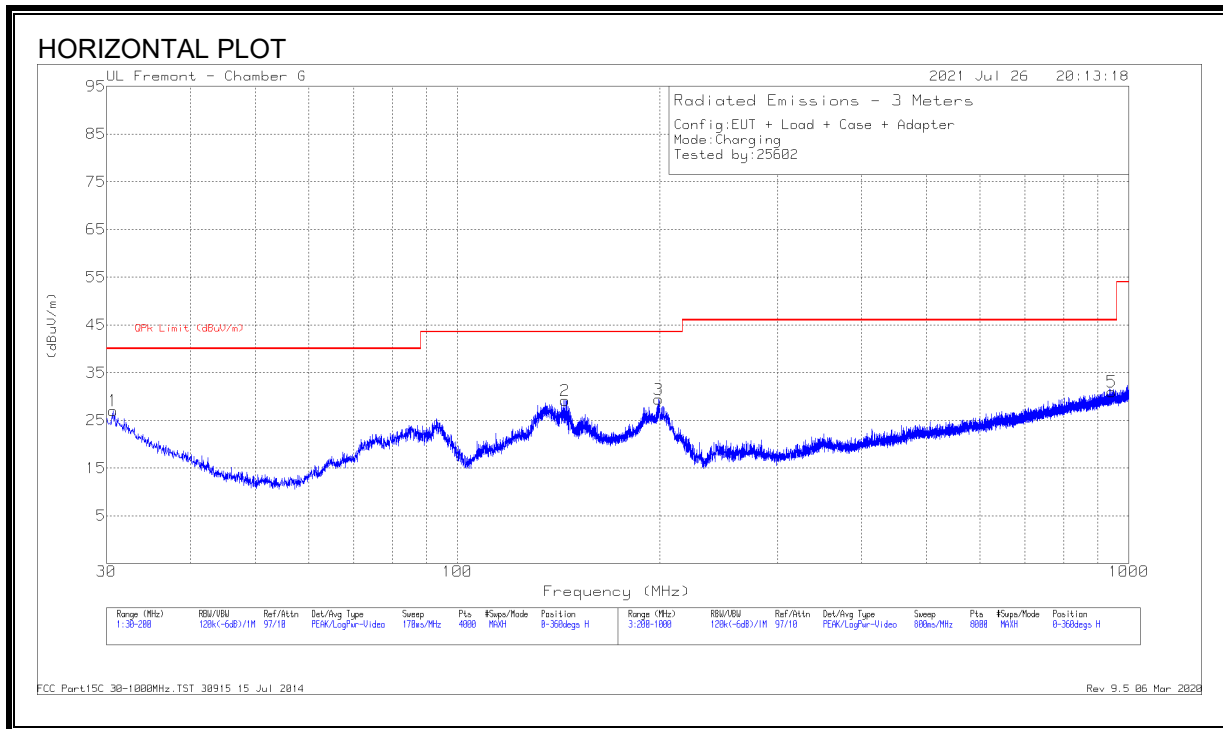


**DATA**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AFT130 (dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 124.5761	27.39	Qp	20.3	-30.4	17.29	43.52	-26.23	330	115	V
5	* 973.3605	21.86	Qp	29.4	-25.7	25.56	53.97	-28.41	223	299	H
3	30.2381	30.68	Qp	27.7	-31.3	27.08	40	-12.92	182	100	V
1	30.5436	25.01	Qp	27.5	-31.3	21.21	40	-18.79	295	215	H
2	198.6166	32.2	Qp	19.2	-29.8	21.6	43.52	-21.92	360	163	H
6	951.8736	21.88	Qp	29.4	-25.9	25.38	46.02	-20.64	28	162	V

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

**OPERATING WITH LOAD at 360kHz**



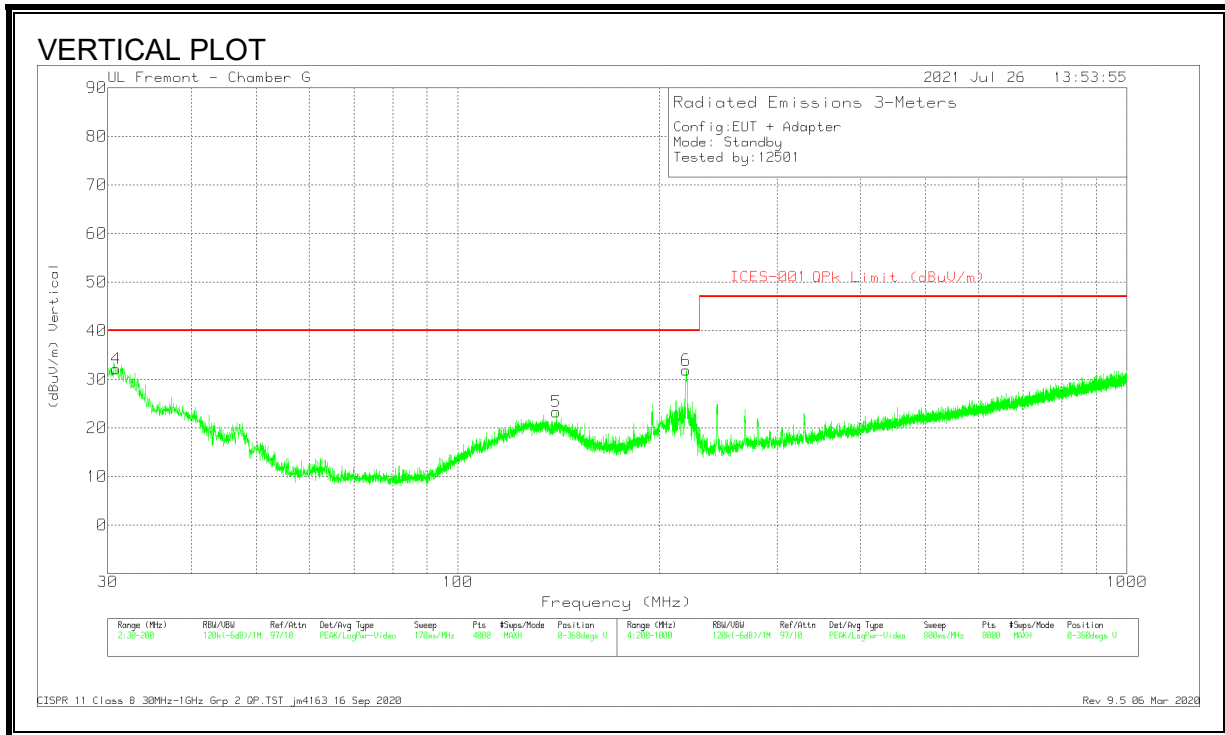
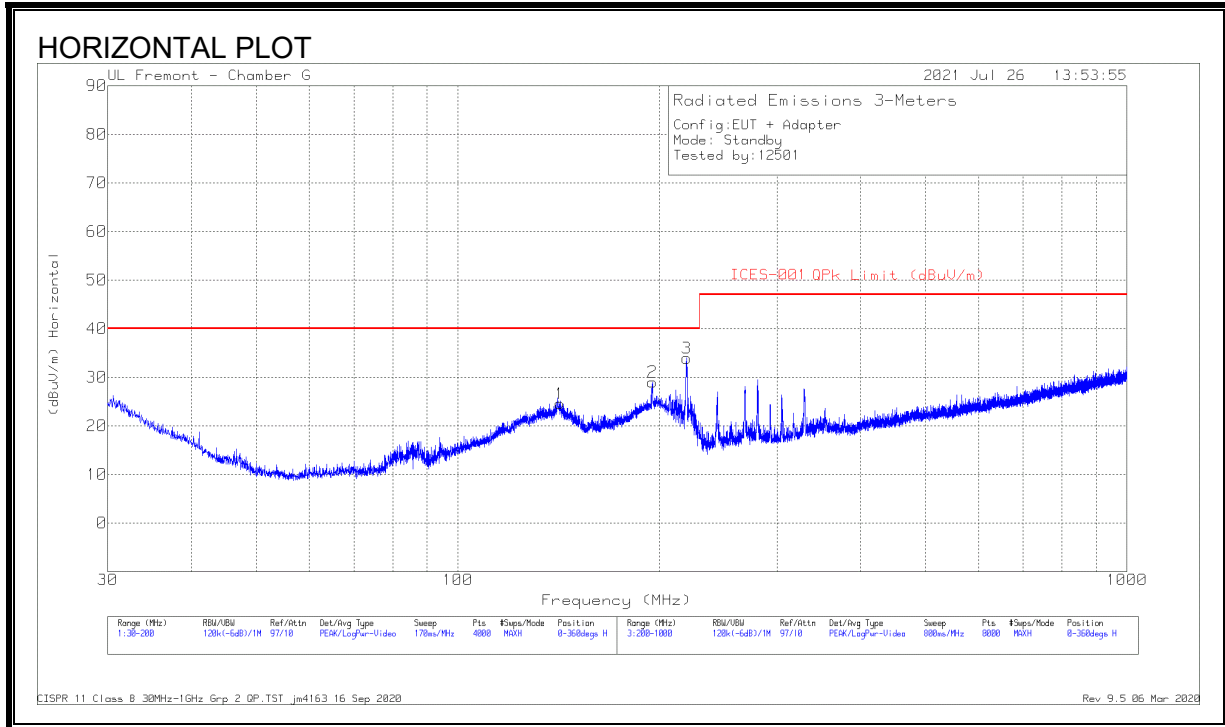
**DATA**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AFT130 (dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
7	* 133.474	36.25	Qp	20	-30.3	25.95	43.52	-17.57	315	106	V
1	30.552	24.14	Qp	27.5	-31.3	20.34	40	-19.66	120	317	H
6	31.4501	32.68	Qp	26.8	-31.3	28.18	40	-11.82	275	109	V
2	144.6359	36.04	Qp	18.9	-30.2	24.74	43.52	-18.78	72	101	H
3	198.5074	33.77	Qp	19.2	-29.8	23.17	43.52	-20.35	246	111	H
5	942.4905	21.99	Qp	29.2	-26	25.19	46.02	-20.83	193	281	H
4	951.3337	21.9	Qp	29.4	-25.9	25.4	46.02	-20.62	232	157	V

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

### 8.2.4. IC / ICES-001 TX SPURIOUS EMISSION 30 TO 1000 MHz

#### STANDBY CONFIGURATION

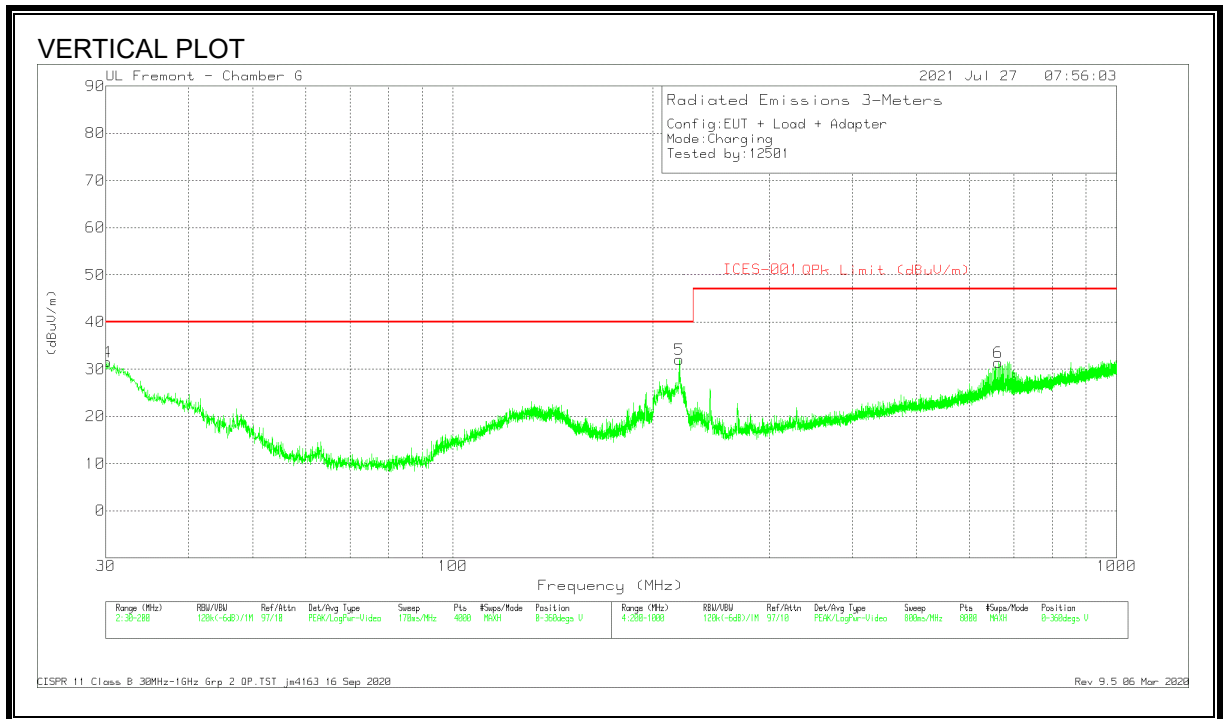
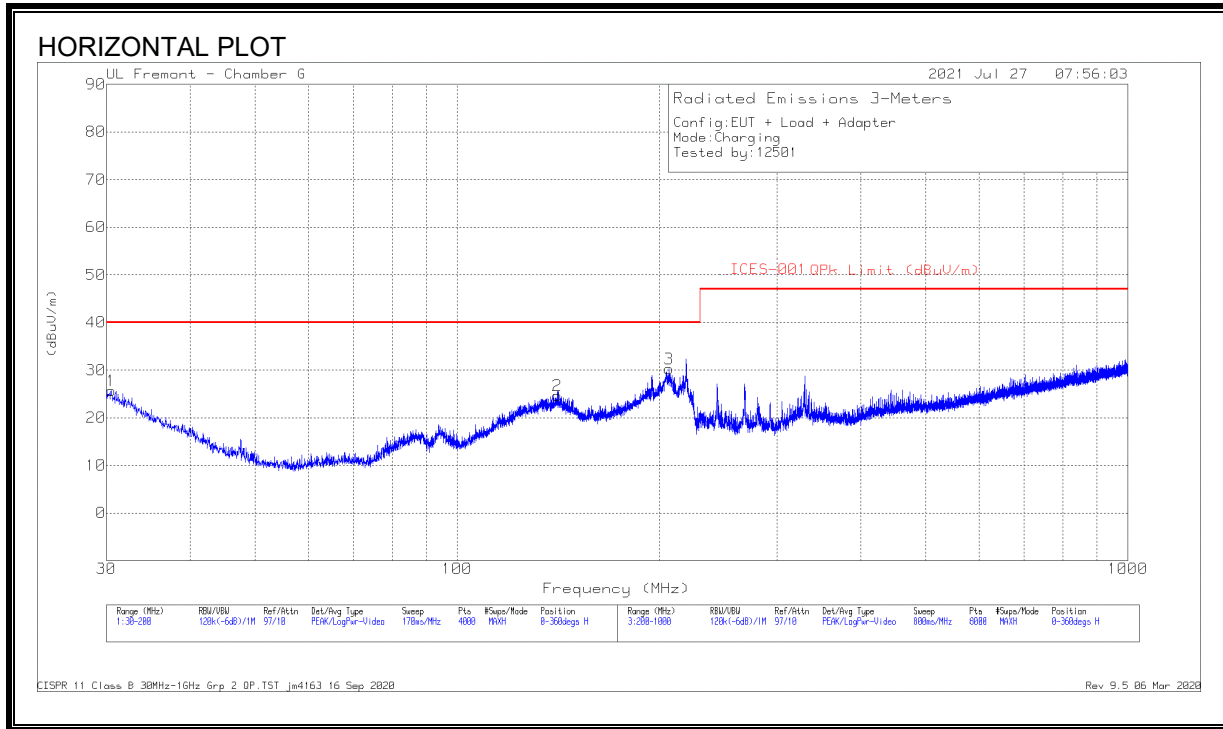


**DATA**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AFT130 (dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	ClassB Grp2 QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	31.338	31.87	Qp	26.9	-31.3	27.47	40	-12.53	287	121	V
1	142.579	31.07	Qp	19.1	-30.2	19.97	40	-20.03	337	100	H
5	142.7635	27.82	Qp	19.1	-30.2	16.72	40	-23.28	126	120	V
2	195.2286	36.97	Qp	18.4	-29.8	25.57	40	-14.43	233	149	H
3	219.4626	45.01	Qp	17.2	-29.7	32.51	40	-7.49	61	143	H
6	219.9225	42.93	Qp	17.3	-29.7	30.53	40	-9.47	34	177	V

Qp - Quasi-Peak detector

**OPERATING WITH LOAD at 127.7kHz**



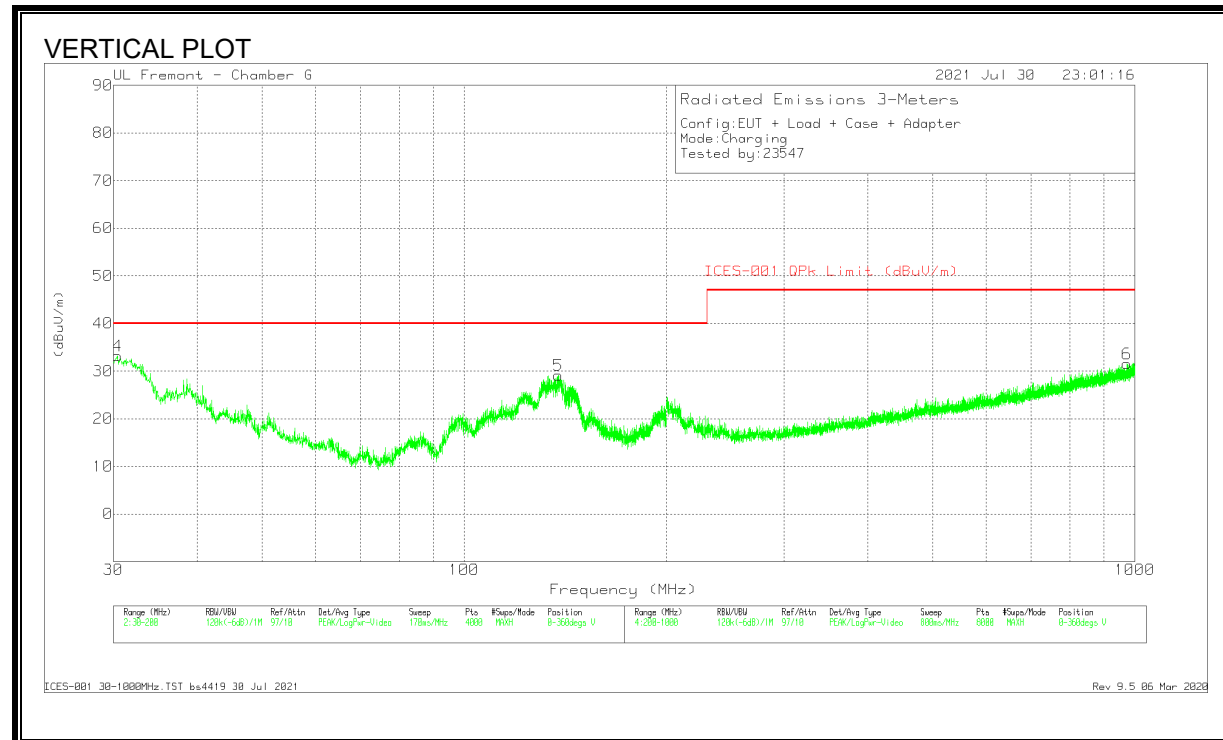
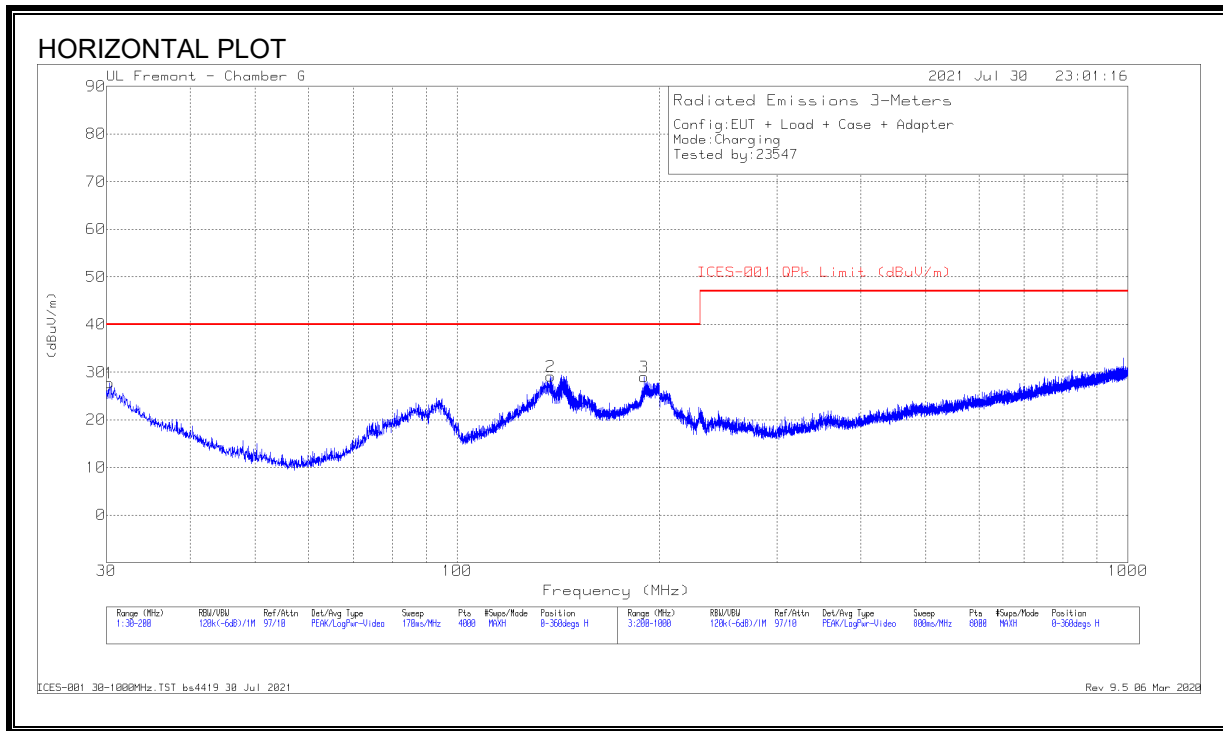
**DATA**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AFT130 (dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	ClassB Grp2 QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	30.1802	31.01	Qp	27.8	-31.3	27.51	40	-12.49	266	100	V
1	31.596	25.19	Qp	26.7	-31.3	20.59	40	-19.41	311	287	H
2	140.7321	28.33	Qp	19.3	-30.2	17.43	40	-22.57	266	202	H
3	207.0731	38.79	Qp	17.1	-29.7	26.19	40	-13.81	253	169	H
5	219.3497	40.28	Qp	17.2	-29.7	27.78	40	-12.22	33	129	V
6	663.3576	31.15	Qp	26.1	-27.7	29.55	47	-17.45	46	101	V

Qp - Quasi-Peak detector



**OPERATING WITH LOAD at 360kHz**



**DATA**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AFT130 (dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	ICES-001 QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	30.3142	33.35	Qp	27.6	-31.3	29.65	40	-10.35	223	100	V
1	31.2716	25.11	Qp	26.9	-31.3	20.71	40	-19.29	307	133	H
2	136.3674	37.88	Qp	19.7	-30.3	27.28	40	-12.72	84	245	H
5	138.4725	35.86	Qp	19.5	-30.2	25.16	40	-14.84	56	101	V
3	191.4219	35.49	Qp	17.9	-29.9	23.49	40	-16.51	63	161	H
6	972.4825	21.89	Qp	29.4	-25.7	25.59	47	-21.41	196	112	V

Qp - Quasi-Peak detector

## 9. AC POWER LINE CONDUCTED EMISSIONS

### LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

\*Decreases with the logarithm of the frequency.

ICES-001 Issue 5 Table 1:

**Table 1: Conducted emission limits for induction cooking appliances (AC mains terminals)**

Frequency range (MHz)	Appliances rated 100 V, without an earth connection Quasi-peak (dBµV)	Appliances rated 100 V, without an earth connection Average (dBµV)	All other appliances Quasi-peak (dBµV)	All other appliances Average (dBµV)
0.009 – 0.05	122	—	110	—
0.05 – 0.15	102 to 92 *	—	90 to 80 *	—
0.15 – 0.5	72 to 62 *	62 to 52 *	66 to 56 *	56 to 46 *
0.5 – 5	56	46	56	46
5 – 30	60	50	60	50

**Note:** The more stringent limit applies at transition frequencies.  
 \* The limit level in dBµV decreases linearly with the logarithm of frequency.

### TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

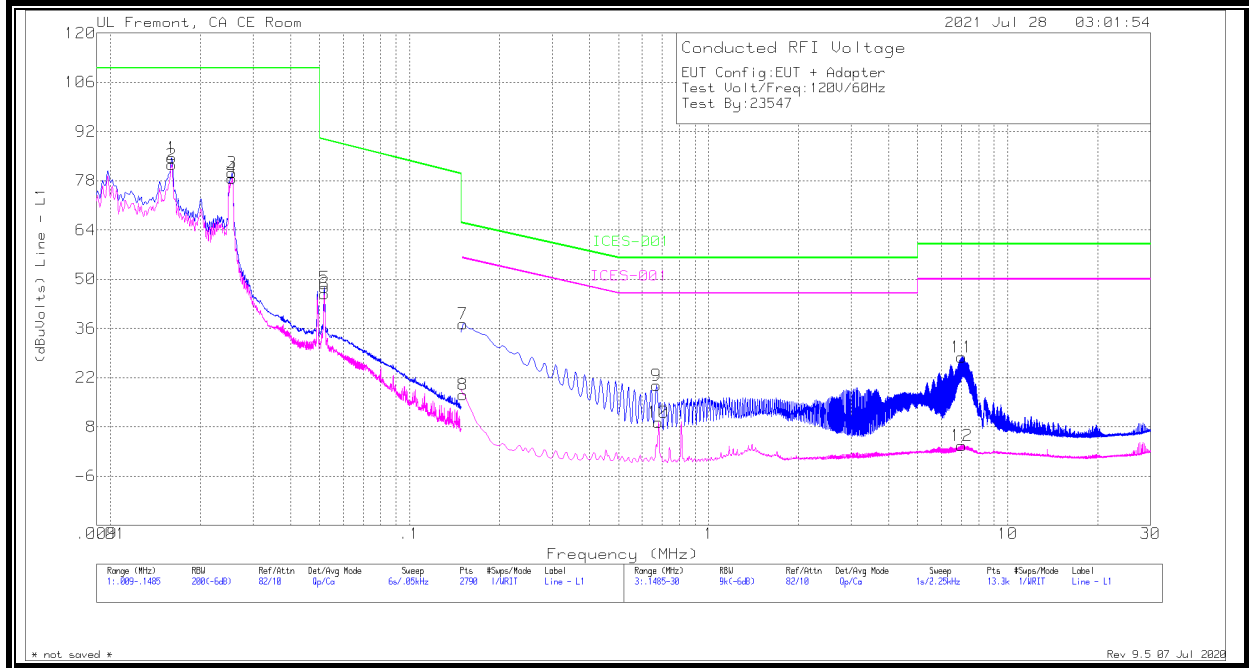
Line conducted data is recorded for both NEUTRAL and HOT lines.

### RESULTS

## 9.1. Conducted Emissions Data

### 9.1.1. STANDBY MODE POWERED BY AC/DC ADAPTER

#### LINE 1 RESULTS



#### WORST EMISSIONS

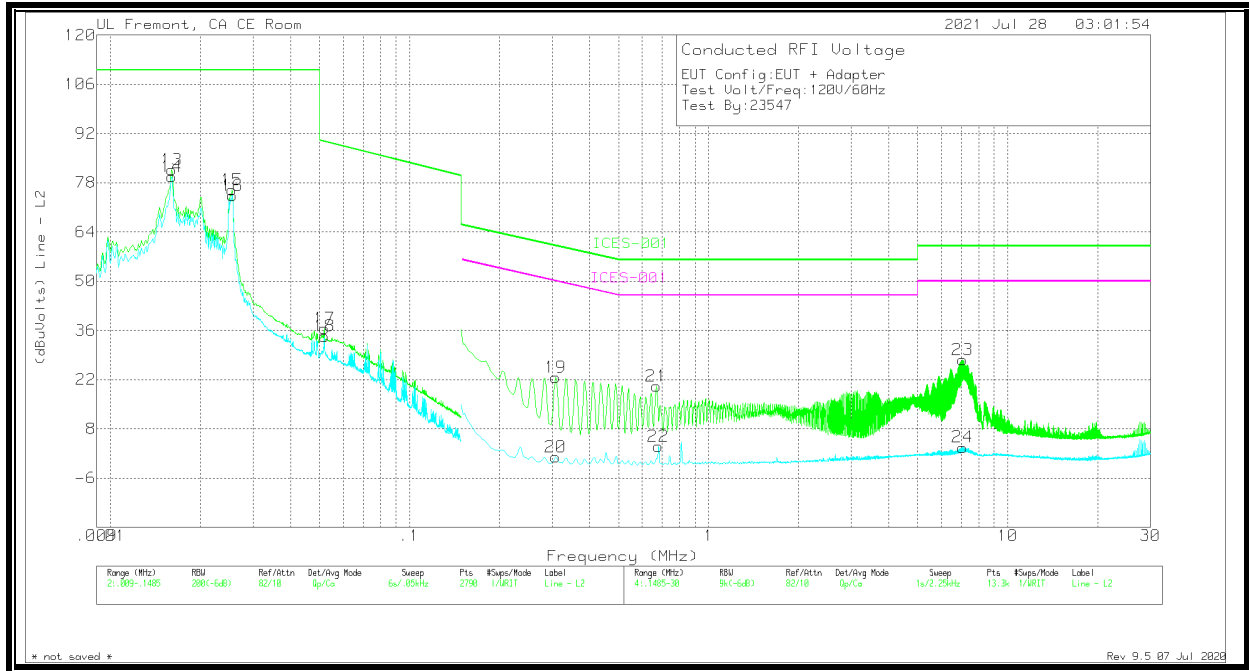
Range 1: Line - L1 .009 - .1485MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE0186446 LISN09(IL L1) r	LC Cables C1&C3 dB	TekBox Limiter TBFL1 Model 207	Corrected Reading (dBuVolts)	ICES-001 Class QP	Margin (dB)	ICES-001 Class B Avg	Margin (dB)
2	.01605	67.92	Ca	2.3	0	12.3	82.52	-	-	-	-
4	.0255	65.51	Ca	1.1	0	12	78.61	-	-	-	-
6	.052	34.39	Ca	.3	0	11.2	45.89	-	-	-	-
1	.01605	69.91	Qp	2.3	0	12.3	84.51	110	-25.49	-	-
3	.0255	67.19	Qp	1.1	0	12	80.29	110	-29.71	-	-
5	.05195	36.06	Qp	.3	0	11.2	47.56	89.65	-42.09	-	-

Range 3: Line - L1 .1485 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE0186446 LISN09(IL L1) r	LC Cables C1&C3 dB	TekBox Limiter TBFL1 Model 207	Corrected Reading (dBuVolts)	ICES-001 Class QP	Margin (dB)	ICES-001 Class B Avg	Margin (dB)
8	.15075	7.67	Ca	.1	0	9.4	17.17	-	-	55.96	-38.79
10	.6795	.01	Ca	0	0	9.3	9.31	-	-	46	-36.69
12	7.01325	-6.69	Ca	0	.1	9.3	2.71	-	-	50	-47.29
7	.15075	27.77	Qp	.1	0	9.4	37.27	65.88	-28.61	-	-
9	.6705	10.55	Qp	0	0	9.3	19.85	56	-36.15	-	-
11	7.01325	18.41	Qp	0	.1	9.3	27.81	60	-32.19	-	-

Qp - Quasi-Peak detector  
 Ca - CISPR average detection

**LINE 2 RESULTS**



**WORST EMISSIONS**

Range 2: Line - L2 .009 - .1485MHz												
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE0186446 LISN10(IL L2) r	LC Cables C2&C3 dB	TekBox Limiter TBFL1 Model 207	Corrected Reading (dBuVolts)	ICES-001 Class QP	Margin (dB)	ICES-001 Class B Avg	Margin (dB)	
14	.01605	65.21	Ca	2.3	0	12.3	79.81	-	-	-	-	
16	.02555	61.3	Ca	1.1	0	12	74.4	-	-	-	-	
18	.052	22.83	Ca	.3	0	11.2	34.33	-	-	-	-	
13	.01605	67.05	Qp	2.3	0	12.3	81.65	110	-28.35	-	-	
15	.0255	62.9	Qp	1.1	0	12	76	110	-34	-	-	
17	.05195	25.06	Qp	.3	0	11.2	36.56	89.65	-53.09	-	-	

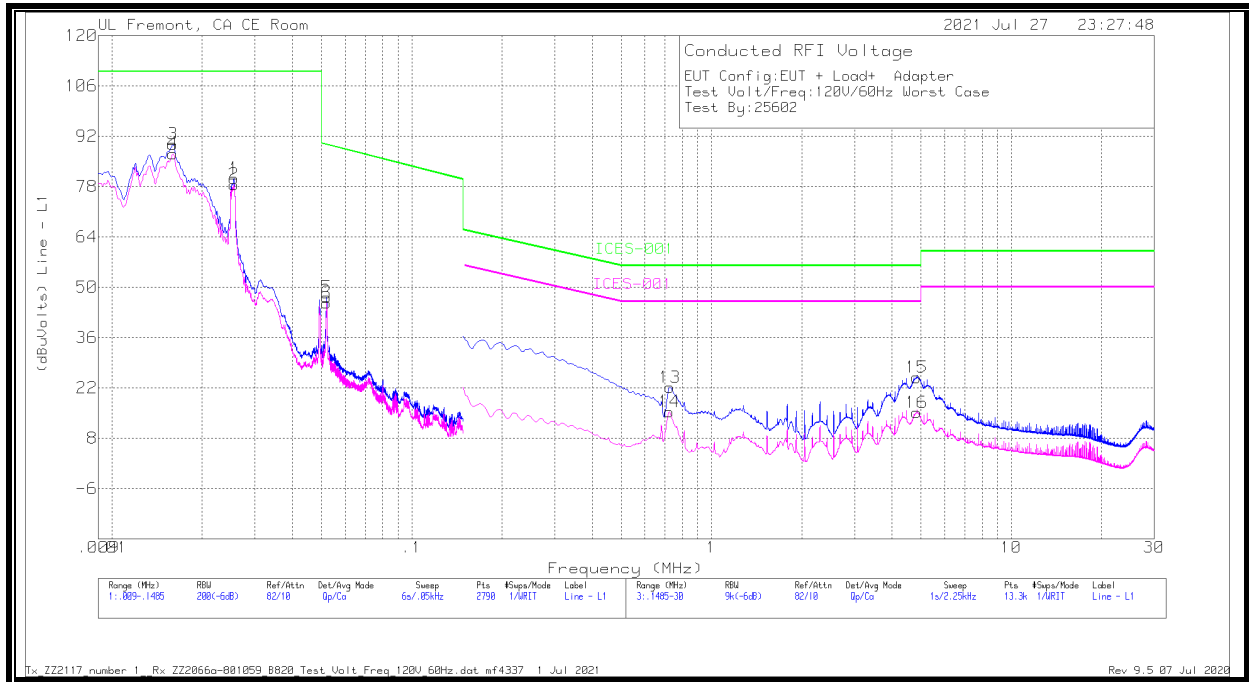
  

Range 4: Line - L2 .1485 - 30MHz												
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE0186446 LISN10(IL L2) r	LC Cables C2&C3 dB	TekBox Limiter TBFL1 Model 207	Corrected Reading (dBuVolts)	ICES-001 Class QP	Margin (dB)	ICES-001 Class B Avg	Margin (dB)	
20	.30825	-9.38	Ca	0	0	9.3	-0.8	-	-	50.02	-50.1	
22	.6795	-6.22	Ca	0	0	9.3	3.08	-	-	46	-42.92	
24	7.065	-6.65	Ca	0	.1	9.3	2.75	-	-	50	-47.25	
19	.30825	13.27	Qp	0	0	9.3	22.57	59.98	-37.41	-	-	
21	.6705	10.85	Qp	0	0	9.3	20.15	56	-35.85	-	-	
23	7.065	18.3	Qp	0	.1	9.3	27.7	60	-32.3	-	-	

Qp - Quasi-Peak detector  
 Ca - CISPR average detection

### 9.1.2. OPERATING MODE at 127.7kHz with Load POWERED BY AC/DC ADAPTER

#### LINE 1 RESULTS

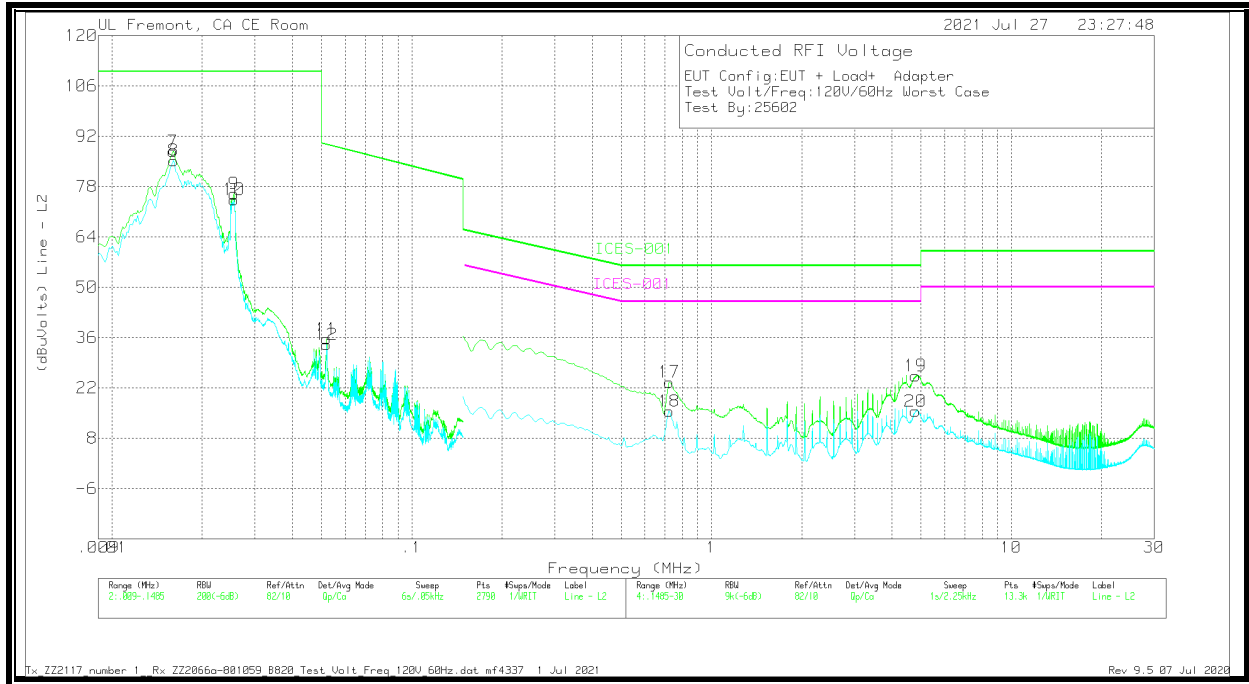


#### WORST EMISSIONS

Range 1: Line - L1 .009 - .1485MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE0186446 LISN09(IL L1) r	LC Cables C1&C3 dB	TekBox Limiter TBFL1 Model 207	Corrected Reading (dBuVolts)	ICES-001 Class QP	Margin (dB)	ICES-001 Class B Avg	Margin (dB)
2	.02555	65.48	Ca	1.1	0	12	78.58	-	-	-	-
4	.01595	72.46	Ca	2.4	0	12.3	87.16	-	-	-	-
6	.052	34.13	Ca	.3	0	11.2	45.63	-	-	-	-
1	.0255	67.17	Qp	1.1	0	12	80.27	110	-29.73	-	-
3	.01595	75.09	Qp	2.4	0	12.3	89.79	110	-20.21	-	-
5	.052	35.75	Qp	.3	0	11.2	47.25	89.64	-42.39	-	-
Range 3: Line - L1 .1485 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE0186446 LISN09(IL L1) r	LC Cables C1&C3 dB	TekBox Limiter TBFL1 Model 207	Corrected Reading (dBuVolts)	ICES-001 Class QP	Margin (dB)	ICES-001 Class B Avg	Margin (dB)
14	.72225	6.04	Ca	0	0	9.3	15.34	-	-	46	-30.66
16	4.8375	5.75	Ca	0	.1	9.3	15.15	-	-	46	-30.85
13	.72675	12.82	Qp	0	0	9.3	22.12	56	-33.88	-	-
15	4.833	15.5	Qp	0	.1	9.3	24.9	56	-31.1	-	-

Qp - Quasi-Peak detector  
 Ca - CISPR average detection

**LINE 2 RESULTS**



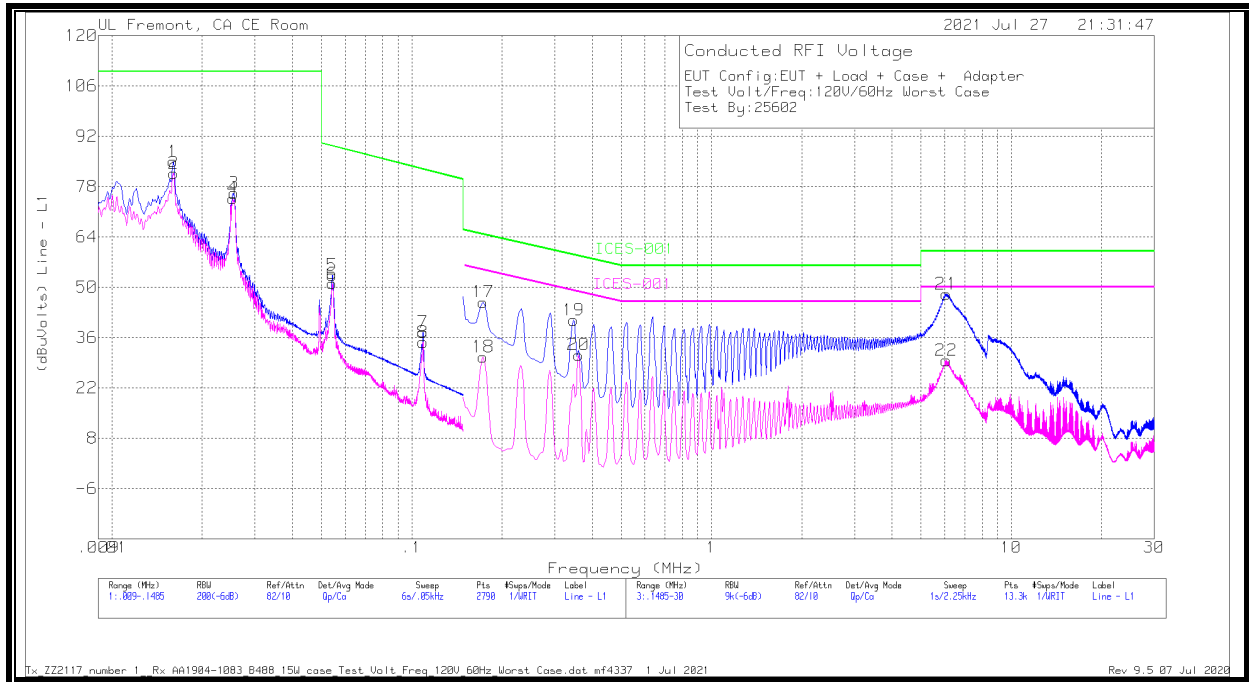
**WORST EMISSIONS**

Range 2: Line - L2 .009 - .1485MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE0186446 LISN10(IL L2) r	LC Cables C2&C3 dB	TekBox Limiter TBFL1 Model 207	Corrected Reading (dBuVolts)	ICES-001 Class QP	Margin (dB)	ICES-001 Class B Avg	Margin (dB)
8	.01605	70.64	Ca	2.3	0	12.3	85.24	-	-	-	-
10	.02555	61.26	Ca	1.1	0	12	74.36	-	-	-	-
12	.052	22.51	Ca	.3	0	11.2	34.01	-	-	-	-
7	.016	73.07	Qp	2.4	0	12.3	87.77	110	-22.23	-	-
9	.0255	62.89	Qp	1.1	0	12	75.99	110	-34.01	-	-
11	.052	24.1	Qp	.3	0	11.2	35.6	89.64	-54.04	-	-
Range 4: Line - L2 .1485 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE0186446 LISN10(IL L2) r	LC Cables C2&C3 dB	TekBox Limiter TBFL1 Model 207	Corrected Reading (dBuVolts)	CISPR 11 Class QP	Margin (dB)	CISPR 11 Class B Avg	Margin (dB)
18	.72225	6.2	Ca	0	0	9.3	15.5	-	-	46	-30.5
20	4.79475	6.09	Ca	0	.1	9.3	15.49	-	-	46	-30.51
17	.72225	14.26	Qp	0	0	9.3	23.56	56	-32.44	-	-
19	4.79475	15.92	Qp	0	.1	9.3	25.32	56	-30.68	-	-

Qp - Quasi-Peak detector  
 Ca - CISPR average detection

### 9.1.3. OPERATING MODE at 360kHz with Load POWERED BY AC/DC ADAPTER

#### LINE 1 RESULTS



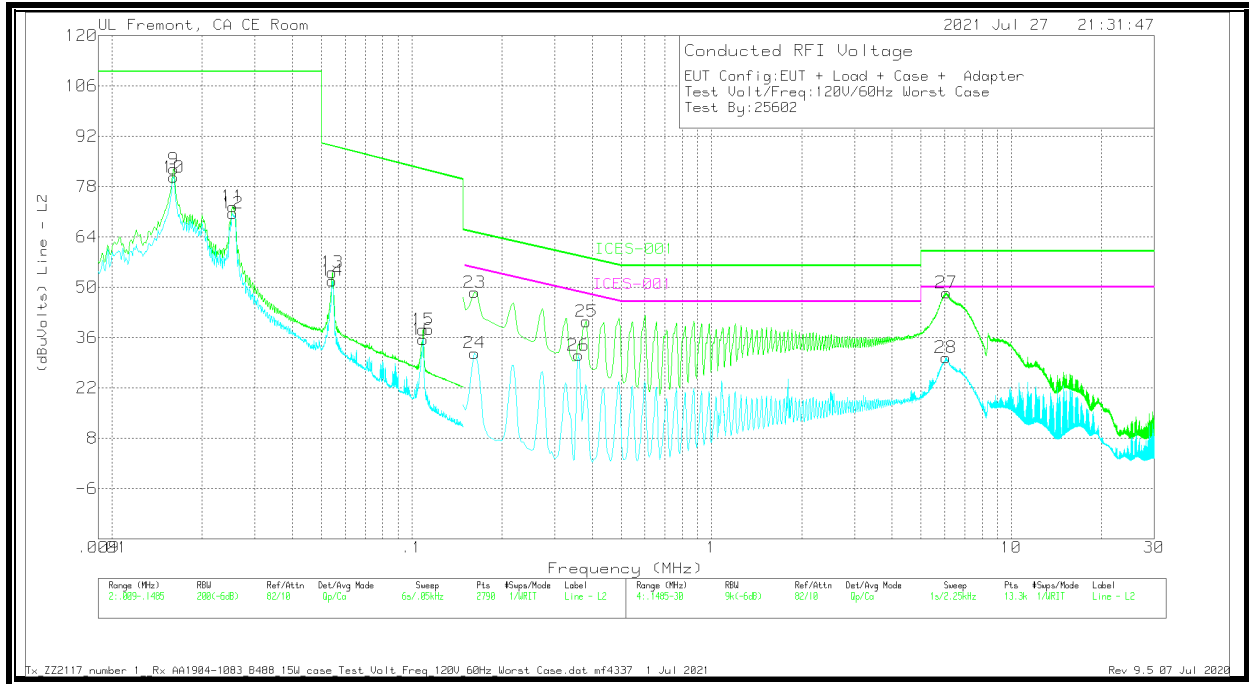
#### WORST EMISSIONS

Range 1: Line - L1 .009 - .1485MHz												
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE0186446 LISN09(IL L1) r	LC Cables C1&C3 dB	TekBox Limiter TBFL1 Model 207	Corrected Reading (dBuVolts)	ICES-001 Class QP	Margin (dB)	ICES-001 Class B Avg	Margin (dB)	
2	.01605	67.12	Ca	2.3	0	12.3	81.72	-	-	-	-	
4	.0253	61.62	Ca	1.1	0	12	74.72	-	-	-	-	
6	.05435	39.59	Ca	.3	0	11.1	50.99	-	-	-	-	
8	.10905	25.2	Ca	.1	0	9.4	34.7	-	-	-	-	
1	.016	70.26	Qp	2.4	0	12.3	84.96	110	-25.04	-	-	
3	.0255	63.08	Qp	1.1	0	12	76.18	110	-33.82	-	-	
5	.05435	41.91	Qp	.3	0	11.1	53.31	89.23	-35.92	-	-	
7	.10905	27.89	Qp	.1	0	9.4	37.39	82.84	-45.45	-	-	
Range 3: Line - L1 .1485 - 30MHz												
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE0186446 LISN09(IL L1) r	LC Cables C1&C3 dB	TekBox Limiter TBFL1 Model 207	Corrected Reading (dBuVolts)	ICES-001 Class QP	Margin (dB)	ICES-001 Class B Avg	Margin (dB)	
18	.17325	21.18	Ca	0	0	9.4	30.58	-	-	54.8	-24.22	
20	.36	21.85	Ca	0	0	9.3	31.15	-	-	48.73	-17.58	
22	6.075	20.21	Ca	0	.1	9.3	29.61	-	-	50	-20.39	
17	.17325	36.45	Qp	0	0	9.4	45.85	64.73	-18.88	-	-	
19	.3465	31.53	Qp	0	0	9.3	40.83	59.02	-18.19	-	-	
21	6.075	38.68	Qp	0	.1	9.3	48.08	60	-11.92	-	-	

Qp - Quasi-Peak detector  
 Ca - CISPR average detection



**LINE 2 RESULTS**



**WORST EMISSIONS**

Range 2: Line - L2 .009 - .1485MHz												
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE0186446 LISN10(IL L2) r	LC Cables C2&C3 dB	TekBox Limiter TBFL1 Model 207	Corrected Reading (dBuVolts)	ICES-001 Class QP	Margin (dB)	ICES-001 Class B Avg	Margin (dB)	
10	.01605	65.99	Ca	2.3	0	12.3	80.59	-	-	-	-	
12	.0253	57.47	Ca	1.1	0	12	70.57	-	-	-	-	
14	.05435	40.4	Ca	.3	0	11.1	51.8	-	-	-	-	
16	.1091	25.98	Ca	.1	0	9.4	35.48	-	-	-	-	
9	.01605	68.26	Qp	2.3	0	12.3	82.86	110	-27.14	-	-	
11	.02525	59.37	Qp	1.1	0	12	72.47	110	-37.53	-	-	
13	.05435	42.7	Qp	.3	0	11.1	54.1	89.23	-35.13	-	-	
15	.1091	28.68	Qp	.1	0	9.4	38.18	82.83	-44.65	-	-	
Range 4: Line - L2 .1485 - 30MHz												
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE0186446 LISN10(IL L2) r	LC Cables C2&C3 dB	TekBox Limiter TBFL1 Model 207	Corrected Reading (dBuVolts)	ICES-001 Class QP	Margin (dB)	ICES-001 Class B Avg	Margin (dB)	
24	.162	22.28	Ca	0	0	9.4	31.68	-	-	55.36	-23.68	
26	.36	21.77	Ca	0	0	9.3	31.07	-	-	48.73	-17.66	
28	6.0525	21.01	Ca	0	.1	9.3	30.41	-	-	50	-19.59	
23	.162	39.16	Qp	0	0	9.4	48.56	65.28	-16.72	-	-	
25	.3825	31.18	Qp	0	0	9.3	40.48	58.21	-17.73	-	-	
27	6.0795	39.02	Qp	0	.1	9.3	48.42	60	-11.58	-	-	

Qp - Quasi-Peak detector  
 Ca - CISPR average detection

## 10. SETUP PHOTO

Please refer to 13939155-EP1V1 for setup photos

**END OF TEST REPORT**