CERTIFICATION TEST REPORT

Report Number. : 12938050-E1V2

Applicant	:	APPLE, INC. ONE APPLE PARK WAY CUPERTINO, CA 95014, U.S.A.
Model	:	A2256
FCC ID	:	BCGA2256
IC	:	579C-A2256
EUT Description	:	MAGNETIC CHARGING CABLE
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C ISED RSS-216 ISSUE 2

Date Of Issue:
August 23, 2019

Prepared by:
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NVLAP Lab code: 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	8/21/2019	Initial Issue	Chin Pang
V2	8/23/2019	Address TCB's Questions	Chin Pang

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
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UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
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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 CHARGING CABLE

MODEL: A2256

SERIAL NUMBER: DLC9223008HLNWL46

DATE TESTED: JULY 3, 2019 TO JULY 17, 2019

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART C	Complies
ISED RSS-216 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:

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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 ANSI C63.10-2013, FCC CFR 47 Part 2, and FCC CFR 47 Part 15, RSS-GEN Issue 5 and RSS-216 Issue 2 January 2016.

3. 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 ISED Site Code:	47266 Benicia Street ISED Site Code:	47658 Kato Rd ISED Site Code:
☐ Chamber A (IC:2324B-1)	☐ Chamber D (IC:22541-1)	☐ Chamber I (IC: 2324A-5)
☐ Chamber B (IC:2324B-2)	☐ Chamber E (IC:22541-2)	☐ Chamber J (IC: 2324A-6)
☐ Chamber C (IC:2324B-3)	☐ Chamber F (IC:22541-3)	☐ Chamber K (IC: 2324A-1)
	☒ Chamber G (IC:22541-4)	☐ Chamber L (IC: 2324A-3)
	☐ Chamber H (IC:22541-5)	

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

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

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

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	3.84 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.65 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%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a magnetic charging device, with plastic housing, which has a single inductive charging coil to charge Apple Watch. The charging frequency is 326.5 kHz, and the maximum power consumption is 5W in charging status.

5.2. MAXIMUM OUTPUT POWER

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

Fundamental Frequency (KHz)	Mode	E field (300m distance) FCC (dBuV/m)	H field (3m distance) IC (dBuA/m)
326.5	Standby (Config 1)	-18.79	10.02
326.5	Operating (Config 2)	-21.83	6.45

5.3. SOFTWARE AND FIRMWARE

The firmware version installed in the EUT during testing was 9.3.0

5.4. WORST-CASE CONFIGURATION AND MODE

The EUT is a single frequency magnetic charger enclosed in a plastic case For the entire radiated emissions test, the EUT was investigated on the following configuration during the test at its natural orientation.

Config	Mode	Descriptions
1	Standby	EUT Alone powered by AC/DC adapter
2	Operating	EUT and Watch powered by AC/DC adapter

An AC Power Line conducted Emissions were also investigated on the following configurations.

Config	Mode	Descriptions
1	Standby	EUT Alone powered by AC/DC adapter
2	Operating	EUT and Watch powered by AC/DC adapter
3	Standby	EUT Alone powered by laptop
4	Operating	EUT and Watch powered by laptop

For below 30MHz & 1GHz tests EUT was connected to AC power adapter as the worst case, the worst-case configuration reported was tested with EUT only. For AC line conducted emission, test was investigated with AC power adapter and with laptop.

The EUT was tested as standby and operation modes. During operational mode, EUT was tested with two different sizes of watches, small and big of having similar mechanical structure.

For all radiated emissions tests, both small and big watches were investigated and no significant different in reading was found between both watches; the big watch was chosen to test as the worst case condition since it has max load overall, hence all final data for operational mode represents EUT with the big watch. During the charging process, the watch actively indicates the status of the charging process. Device being charged was at a state of 20 – 50% charged.

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	A1385	N/A	N/A
Watch	Apple	A2095	D92YT005MWC4	BCG-A2095
Laptop	Apple	MacBook Pro	C02SG8l0G8WP	FCC DoC
Laptop Adapter	Apple	A1435	C046042GFYFG6HKAY	N/A
Charging Base	Apple	N/A	920-00855-01	N/A

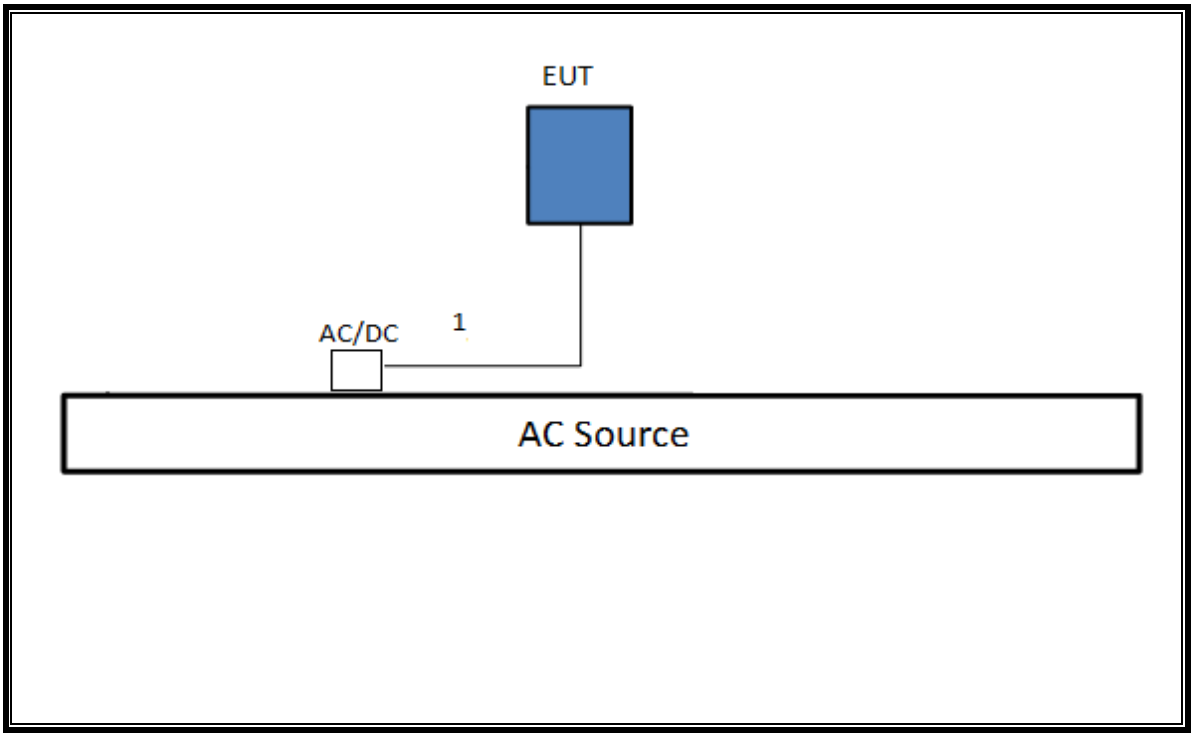
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	DC	1	USB	Un-shielded	2	5W Power Supply
2	DC	1	Magnetic 5 pin	Un-shielded	2	60W Power Supply

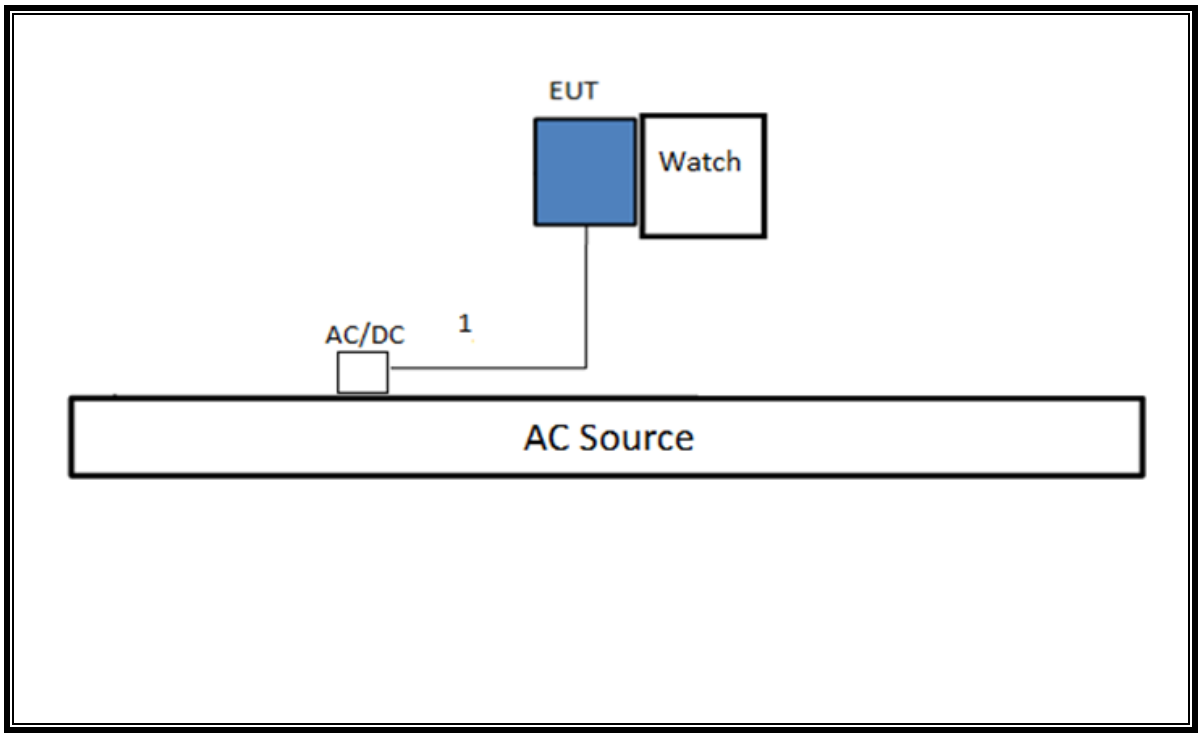
TEST SETUP

Please see the following configurations for the test setups. Configurations 1 and 2 indicate that the EUT is directly connected to an AC/DC adapter via USB cable. Configurations 3 and 4 indicate that the EUT is directly connected to a Host PC via USB cable.

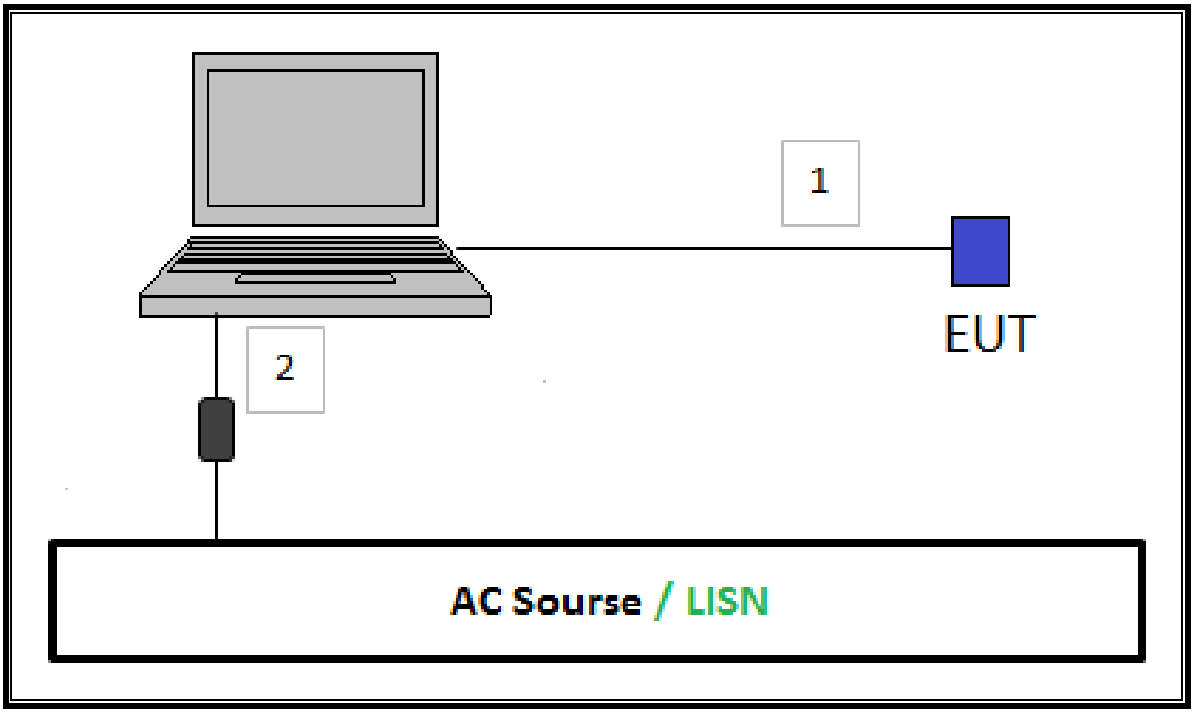
CONFIGURATION 1: STANDBY MODE



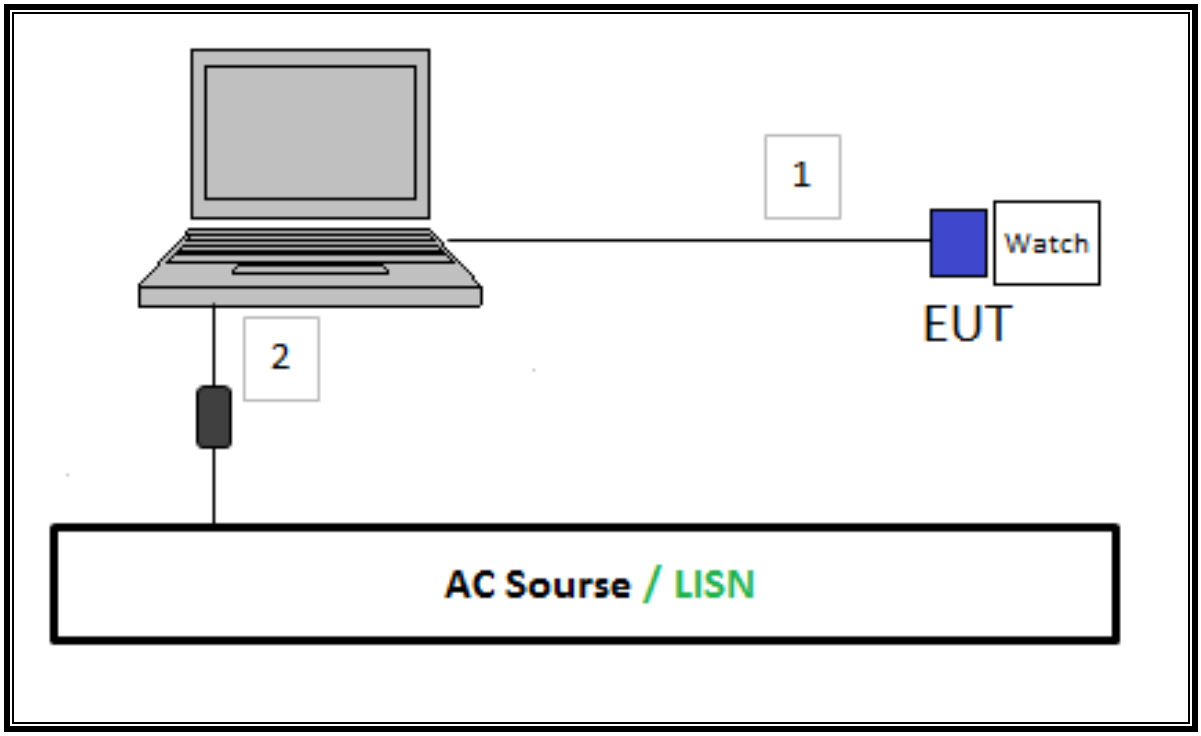
CONFIGURATION 2: OPERATING MODE WITH WATCH



CONFIGURATION 3: STANDBY MODE BY HOST PC VIA USB CABLE



CONFIGURATION 4: OPERATING MODE WITH WATCH BY HOST PC VIA USB CABLE



6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**ID Num**	**Cal Due**
Antenna, Active Loop 9KHz to 30MHz	ETS-Lindgren	6502	T1616	10/18/2019
Antenna, Broadband Hybrid, 30MHz to 2000MHz w/4dB	Sunol Sciences Crop.	JB3	T477	7/24/19
Amplifier, 10kHz to 1GHz, 32dB	Sonoma Instrument	310N	T834	6/01/2020
Sniffer Probes	Electro Metrics	EM-6992	N/A	N/A
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A-544	T1113	01/22/2020

AC Line Conducted				
EMI Test Receiver 9Khz-7GHz	Rohde & Schwarz	ESCI7	T1436	02/14/2020
Power Cable, Line Conducted Emissions	UL	PG1	T861	08/31/2019
LISN for Conducted Emissions CISPR-16	Fischer	50/250-25-2-01	T1310	01/24/2020
UL AUTOMATION SOFTWARE				
Radiated Software	UL	UL EMC	Ver 9.5, April 26, 2016	
Conducted Software	UL	UL EMC	Ver 5.4, October 13, 2016	
AC Line Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2015	

7. OCCUPIED BANDWIDTH

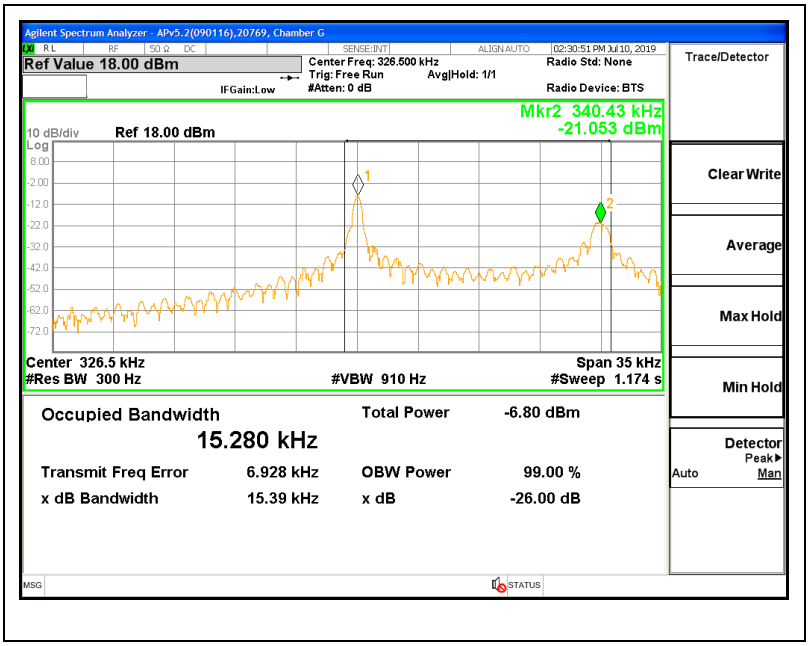
TEST PROCEDURE

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 the only signal that comes out from the EUT was the intentional charging signal of 326.5kHz. On the other hand, when the EUT was in operational mode there were two signals. One of the intentional charging signal of 326.5kHz and the other one the control signal of 340kHz that controls the communication/charging status between EUT and the client device-the watch.

7.1.1. CONFIG 2



EUT SETUP

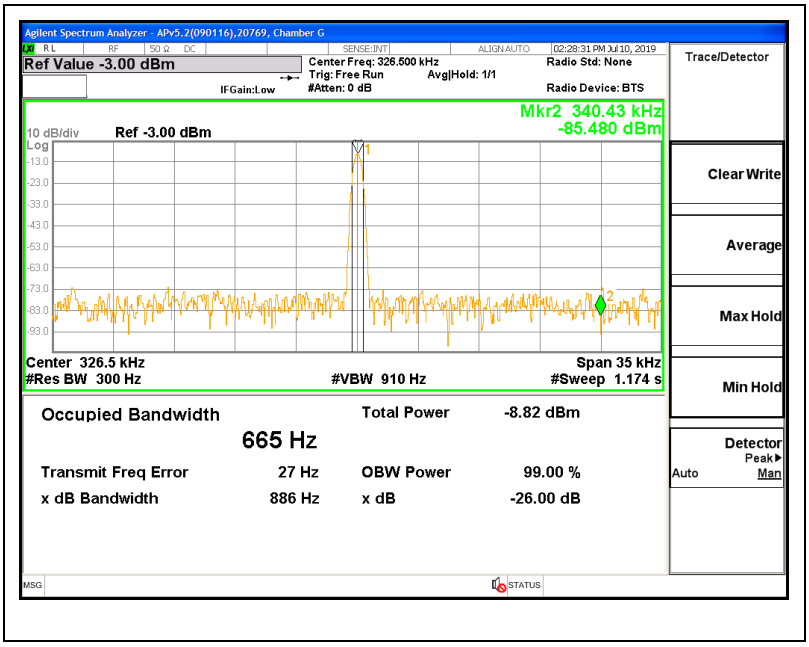
Configuration 1: Charger in standby mode, transmitting low duty cycle CW signal at 326.5kHz test.

Configuration 2: Charger in pairing mode with FSK modulation (-0/+15 kHz) which occurs over a very short period of time as soon as the watch is placed on the charger.

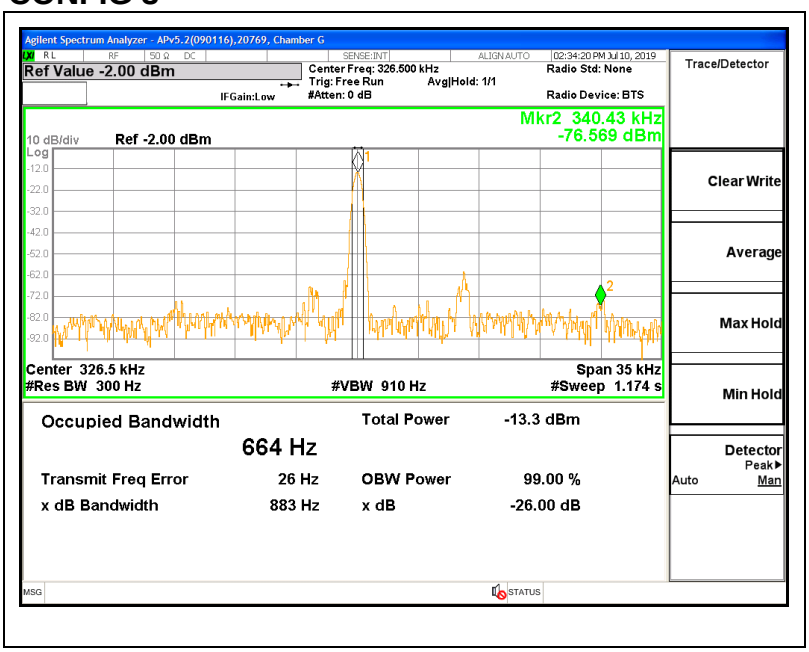
Configuration 3: Charger in charging mode with CW signal and duty cycle varied to control charge level via load modulation from watch.

RESULTS

7.1.2. CONFIG 1



7.1.3. CONFIG 3



8. RADIATED EMISSION TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMIT

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.		

CISPR 11:04

Electromagnetic radiation disturbance limits for class B group 2 equipment measured on a test site

Frequency Range (MHz)	Magnetic Field Strength Limit Class B Group 2 @ 3m Distance (dBuA/m)
	Quasi-peak
0.009 - 0.070	69
0.070 - 0.1485	69 Decreasing Linearly with Logarithm of Frequency to 39
0.1485 - 4.0	39 Decreasing Linearly with Logarithm of Frequency to 3
4.0 - 30	3
The limits of this table apply to induction cooking appliances intended for commercial use and those for domestic use with a diagonal diameter of more than 1.6m. The measurements are performed at 3m distance with a 0.6 m loop antenna as described in 4.2.1 of CISPR 16-1-4. The antenna should be vertically installed, with the lower edge of the loop at 1m height above the floor.	

Frequency Range (MHz)	Electric Field Strength Limit Class B Group 2 @ 3m Distance (dBuV/m)	
	Quasi-peak	Average
30 – 80,872	40	35
80,872 – 81,848	60	55
81,848 – 134,786	40	35
134,786 – 136,414	60	55
136,414 – 230	40	35
230 – 1 000	47	42

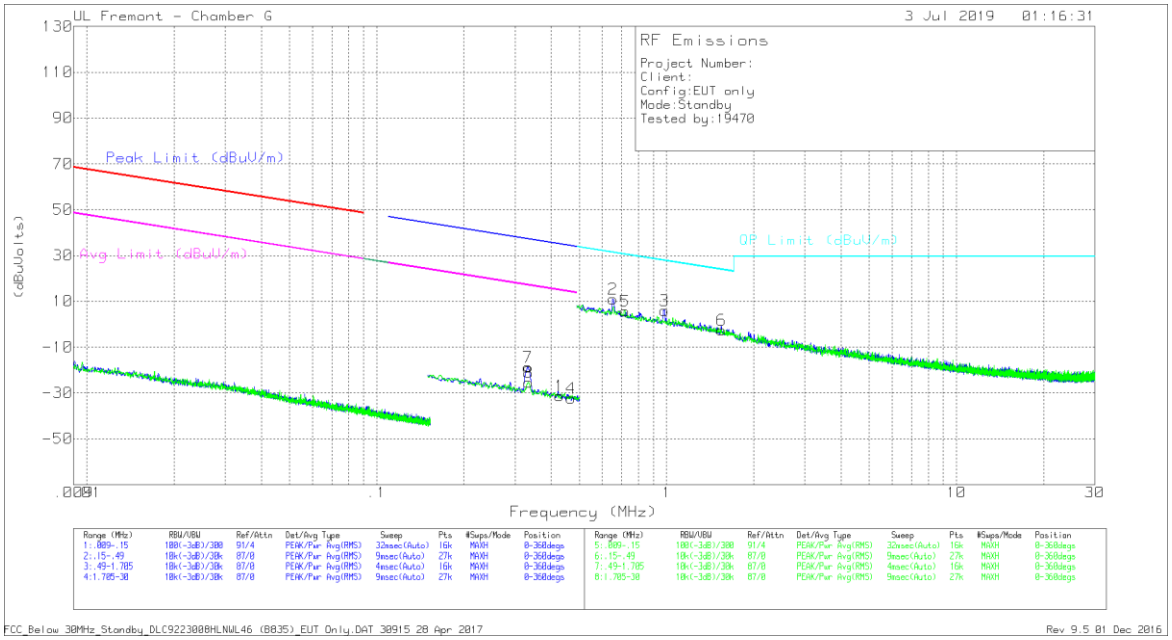
RESULTS

8.2. PLASTIC HOUSING WITH 1m CABLE

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

STANDBY CONFIGURATION

FACE-ON AND FACE-OFF PLOT



DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dBm)	Cables (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
7	.33289	50.21	Pk	10.9	.1	-80	-18.79	37.16	-55.95	17.16	-35.95	0-360
8	.3335	43.55	Pk	10.9	.1	-80	-25.45	37.15	-62.6	17.15	-42.6	0-360
1	.42741	37.77	Pk	11	.1	-80	-31.13	34.99	-66.12	14.99	-46.12	0-360
4	.46826	36.6	Pk	11	.1	-80	-32.3	34.19	-66.49	14.19	-46.49	0-360

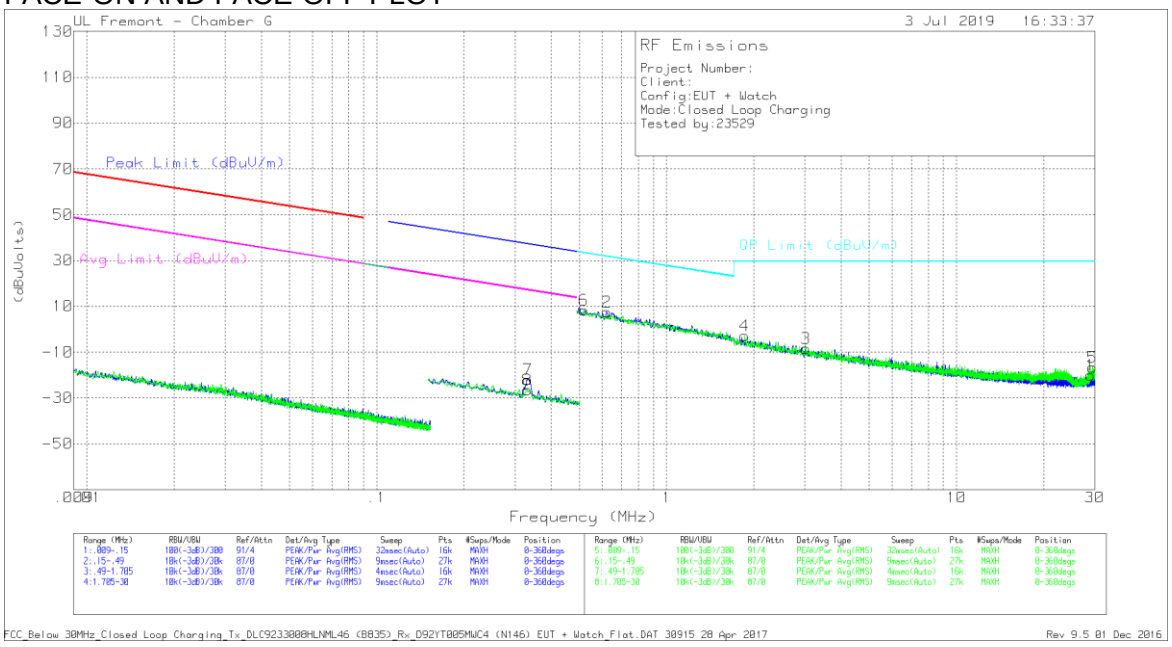
Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dBm)	Cables (dB)	Dist Corr 30m	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
2	.65298	39.99	Pk	11	.1	-40	11.09	31.31	-20.22	0-360
5	.71914	34.49	Pk	11	.1	-40	5.59	30.48	-24.89	0-360
3	.98347	34.65	Pk	11.3	.1	-40	6.05	27.77	-21.72	0-360
6	1.54553	26.17	Pk	11.3	.1	-40	-2.43	23.85	-26.28	0-360

Pk - Peak detector

OPERATING WITH WATCH

FACE-ON AND FACE-OFF PLOT



DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dBm)	Cables (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
8	.33062	42.65	Pk	10.9	.1	-80	-26.35	37.22	-63.57	17.22	-43.57	0-360
7	.3329	47.17	Pk	10.9	.1	-80	-21.83	37.16	-58.99	17.16	-38.99	0-360

Pk - Peak detector

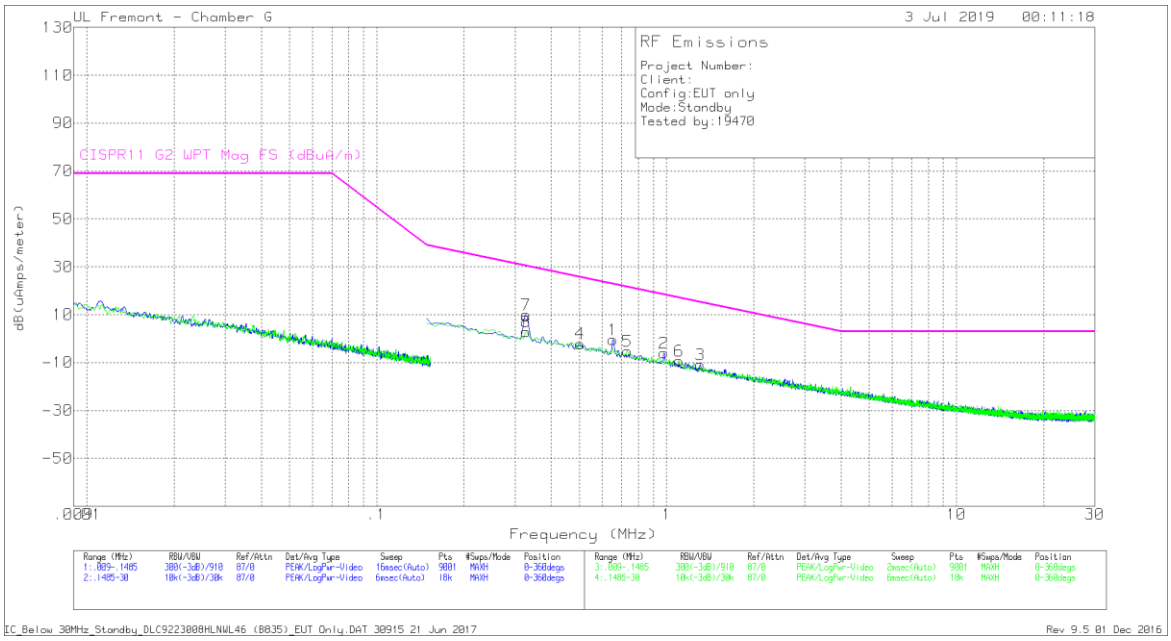
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dBm)	Cables (dB)	Dist Corr 30m	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
6	.51858	37.13	Pk	11.1	.1	-40	8.33	33.31	-24.98	0-360
2	.62201	36.38	Pk	11	.1	-40	7.48	31.73	-24.25	0-360
4	1.8601	25.76	Pk	11.3	.2	-40	-2.74	29.5	-32.24	0-360
3	3.01762	20.04	Pk	11.3	.2	-40	-8.46	29.5	-37.96	0-360
1	29.04522	10.83	Pk	8.4	.6	-40	-20.17	29.5	-49.67	0-360
5	29.38058	14.43	Pk	8.3	.6	-40	-16.67	29.5	-46.17	0-360

Pk - Peak detector

8.2.2. IC / CISPR 11 TX FUNDAMENTAL AND SPURIOUS EMISSIONS FROM 9 kHz TO 30 MHz

STANDBY CONFIGURATION

FACE-ON AND FACE-OFF PLOT



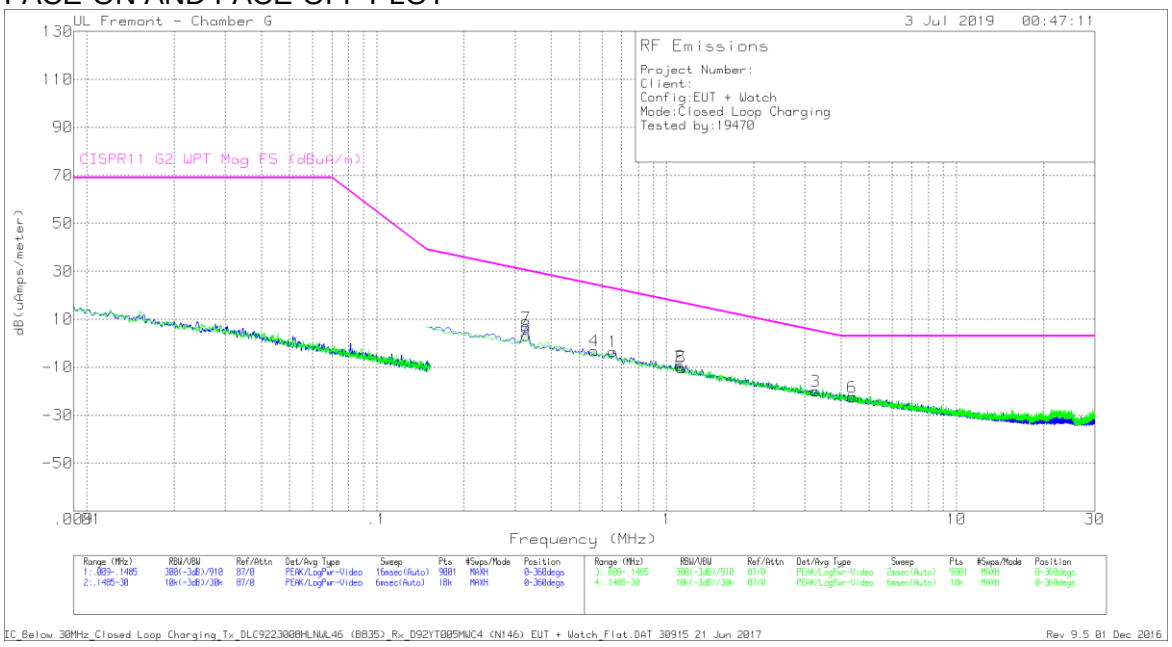
DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables (dB)	Corrected Reading dB(uAmps/meter)	CISPR11 G2 WPT Mag FS (dBuA/m)	Margin (dB)	Azimuth (Degs)
4	* .50331	38.23	Pk	-40.4	.1	-2.07	25.66	-27.73	0-360
7	.32756	50.42	Pk	-40.5	.1	10.02	30.35	-20.33	0-360
8	.32756	43.32	Pk	-40.5	.1	2.92	30.35	-27.43	0-360
1	.65419	39.93	Pk	-40.4	.1	-.37	22.79	-23.16	0-360
5	.73212	34.99	Pk	-40.4	.1	-5.31	21.56	-26.87	0-360
2	.97916	34.03	Pk	-40.2	.1	-6.07	18.38	-24.45	0-360
6	1.10268	30.76	Pk	-40.2	.1	-9.34	17.08	-26.42	0-360
3	1.30744	29.24	Pk	-40.2	.1	-10.86	15.22	-26.08	0-360

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

OPERATING WITH WATCH

FACE-ON AND FACE-OFF PLOT



DATA

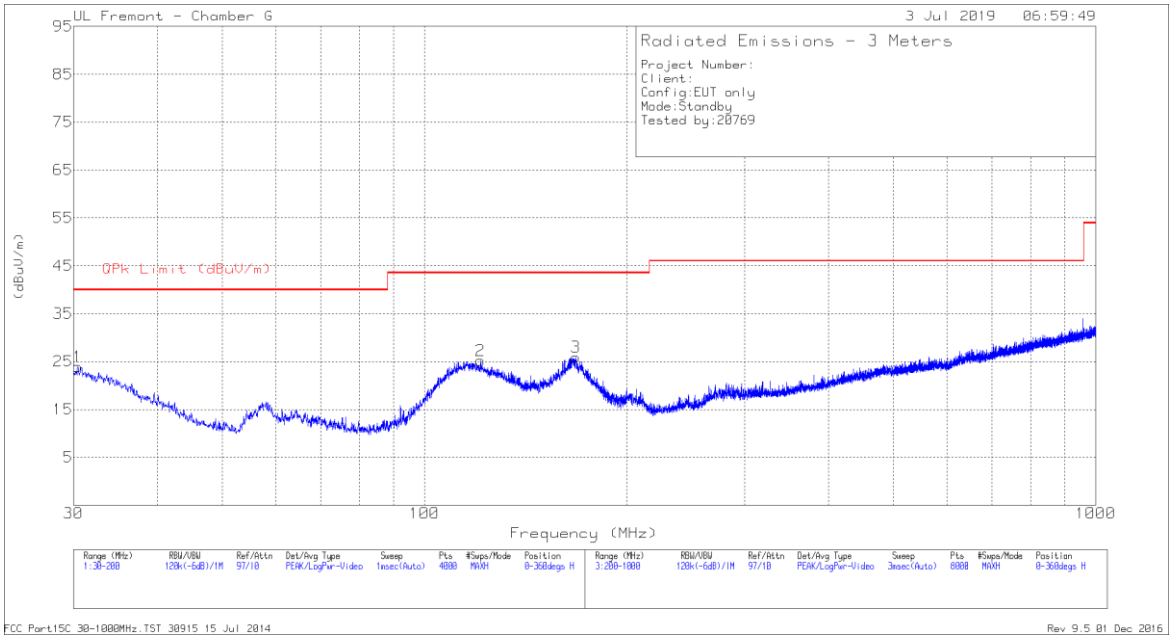
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables (dB)	Corrected Reading dB(uAmps/meter)	CISPR11 G2 WPT Mag FS (dBuA/m)	Margin (dB)	Azimuth (Degs)
7	.32756	46.85	Pk	-40.5	.1	6.45	30.35	-23.9	0-360
8	.32756	43.5	Pk	-40.5	.1	3.1	30.35	-27.25	0-360
4	.563	37.06	Pk	-40.4	.1	-3.24	24.43	-27.67	0-360
1	.65419	36.75	Pk	-40.4	.1	-3.55	22.79	-26.34	0-360
2	1.11346	30.59	Pk	-40.2	.1	-9.51	16.98	-26.49	0-360
5	1.12838	29.9	Pk	-40.2	.1	-10.2	16.83	-27.03	0-360
3	3.26388	19.96	Pk	-40.1	.2	-19.94	5.22	-25.16	0-360
6	4.36811	17.3	Pk	-40.1	.2	-22.6	3	-25.6	0-360

Pk - Peak detector

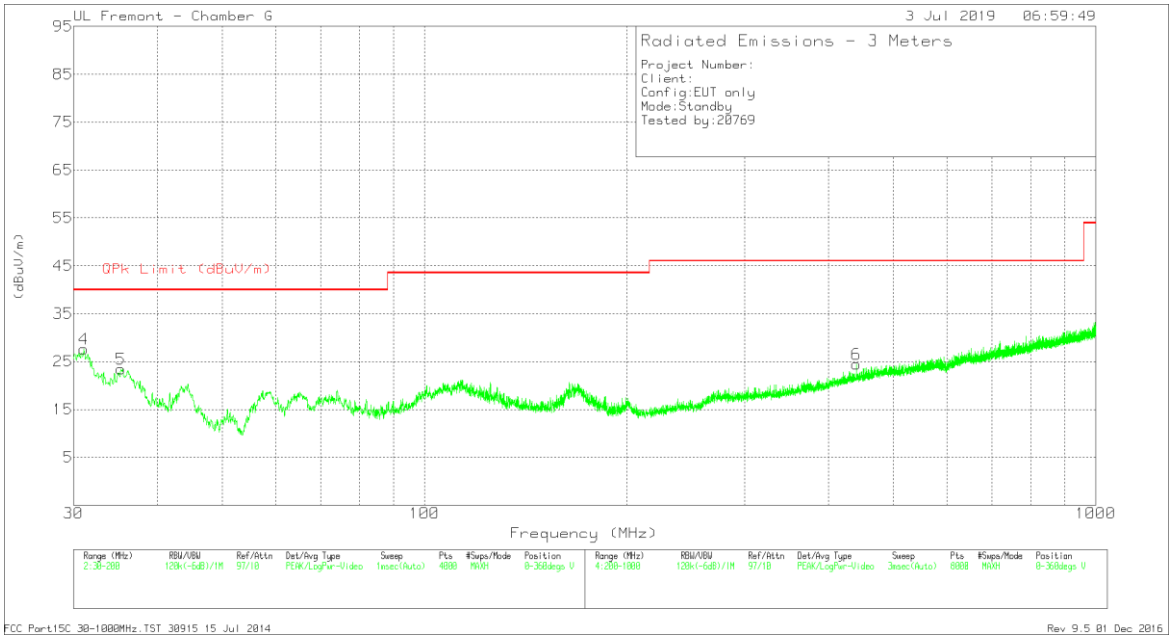
8.2.3. FCC TX SPURIOUS EMISSION 30 TO 1000 MHz

STANDBY CONFIGURATION

HORIZONTAL PLOT



VERTICAL PLOT

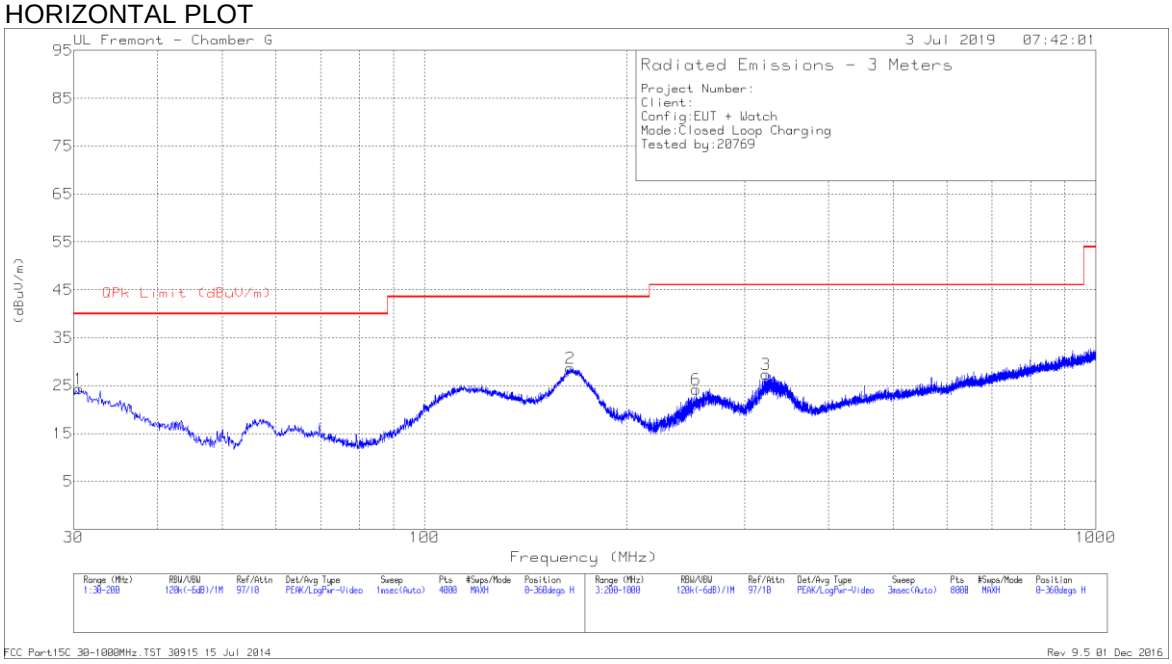


DATA

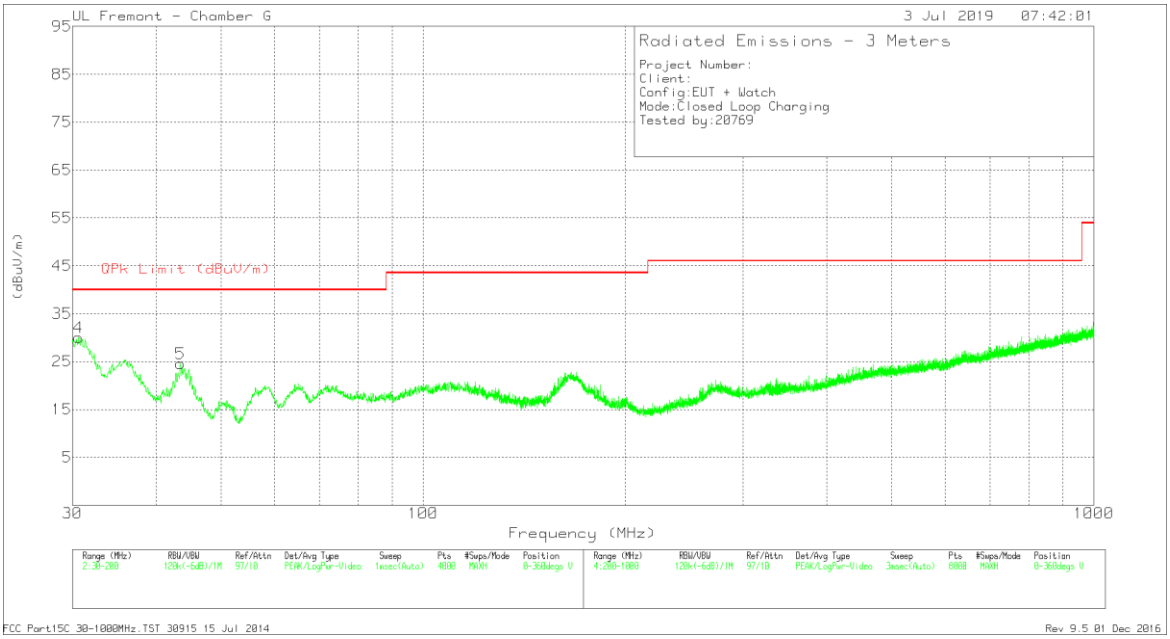
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T477 (dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 119.8561	31.01	Qp	19.6	-30.2	20.41	43.52	-23.11	153	197	H
3	* 168.0525	32.97	Qp	17.7	-29.8	20.87	43.52	-22.65	88	160	H
1	30.5086	22.94	Qp	26.4	-31.2	18.14	40	-21.86	23	282	H
4	31.2959	26.28	Qp	26	-31.2	21.08	40	-18.92	54	109	V
5	35.3681	26.01	Qp	22.9	-31.1	17.81	40	-22.19	285	111	V
6	440.0859	22.25	Qp	22.5	-28.1	16.65	46.02	-29.37	149	126	V

OPERATING WITH WATCH

HORIZONTAL PLOT



VERTICAL PLOT



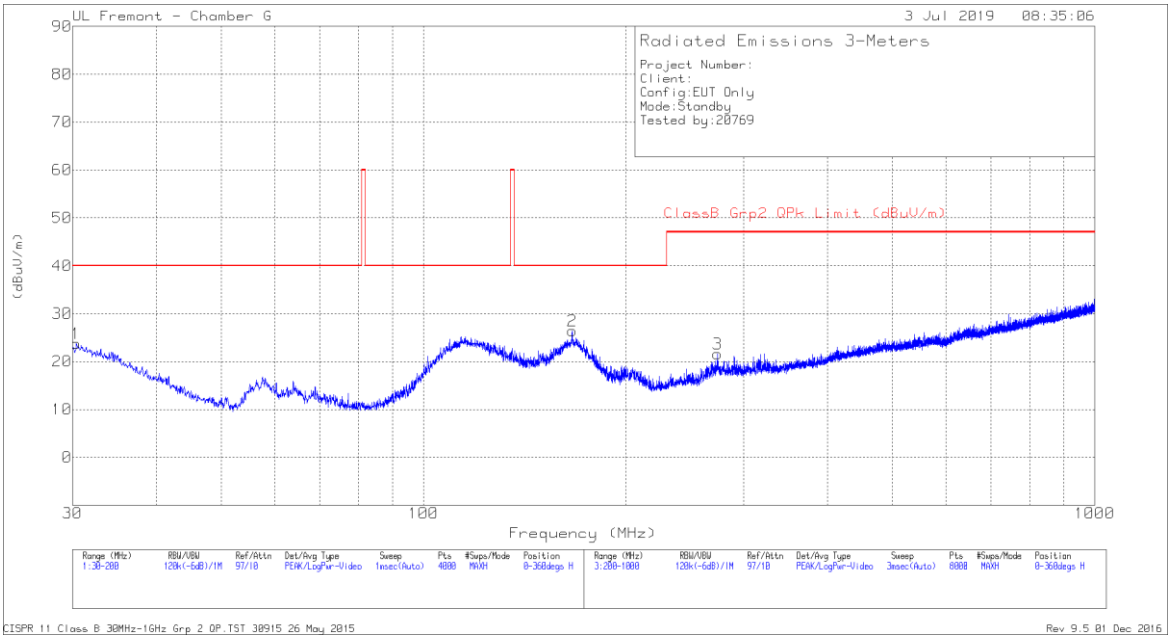
DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T477 (dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 166.7134	36.53	Qp	17.8	-29.8	24.53	43.52	-18.99	86	180	H
6	* 256.335	30.92	Qp	17.5	-29.2	19.22	46.02	-26.8	114	114	H
1	30.6727	28.31	Qp	26.4	-31.2	23.51	40	-16.49	217	102	V
4	30.7158	24.09	Qp	26.4	-31.2	19.29	40	-20.71	36	221	H
5	43.589	33.65	Qp	17	-31	19.65	40	-20.35	115	103	V
3	321.9599	32.62	Qp	19.8	-28.8	23.62	46.02	-22.4	120	107	H

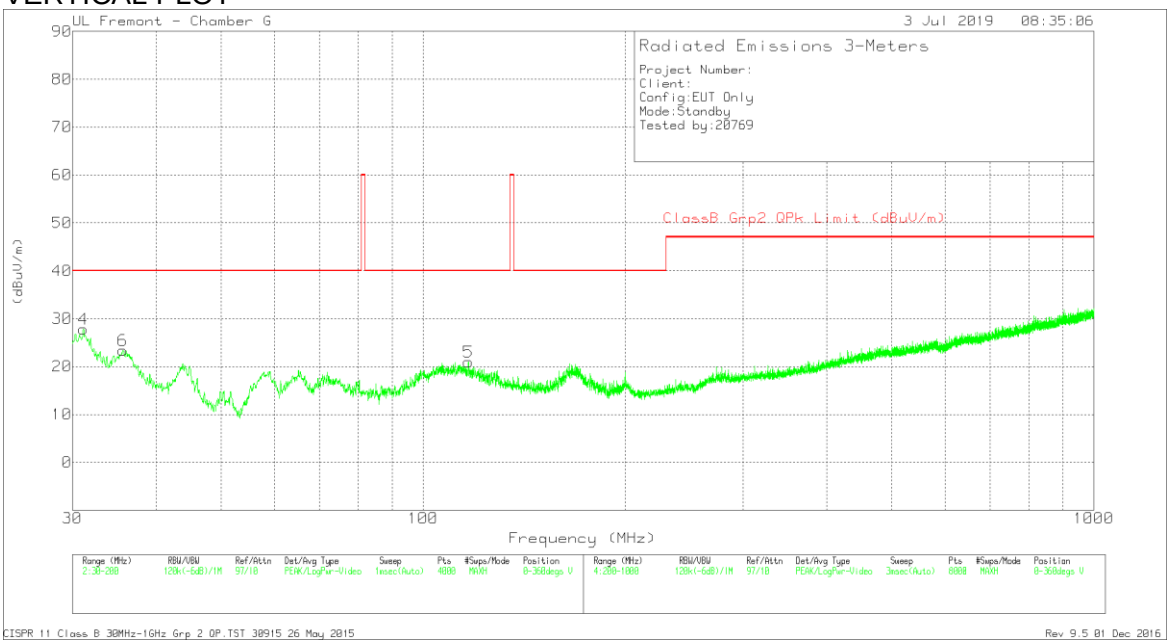
8.2.4. IC / CISPR 11 TX SPURIOUS EMISSION 30 TO 1000 MHz

STANDBY CONFIGURATION

HORIZONTAL PLOT



VERTICAL PLOT

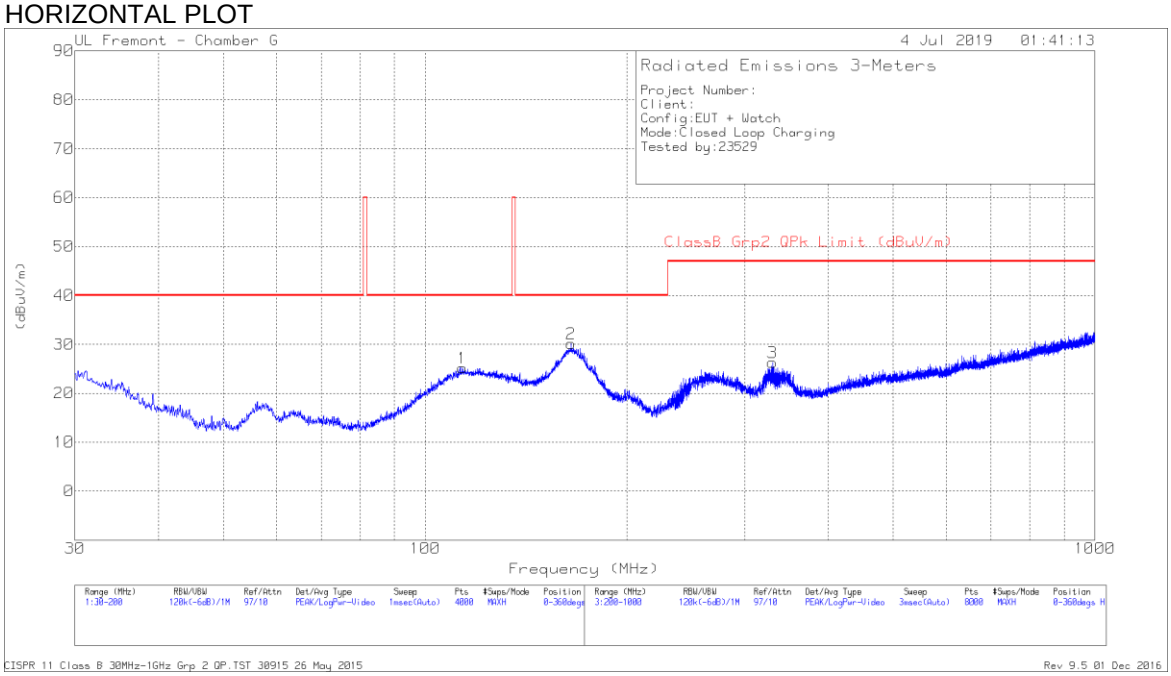


DATA

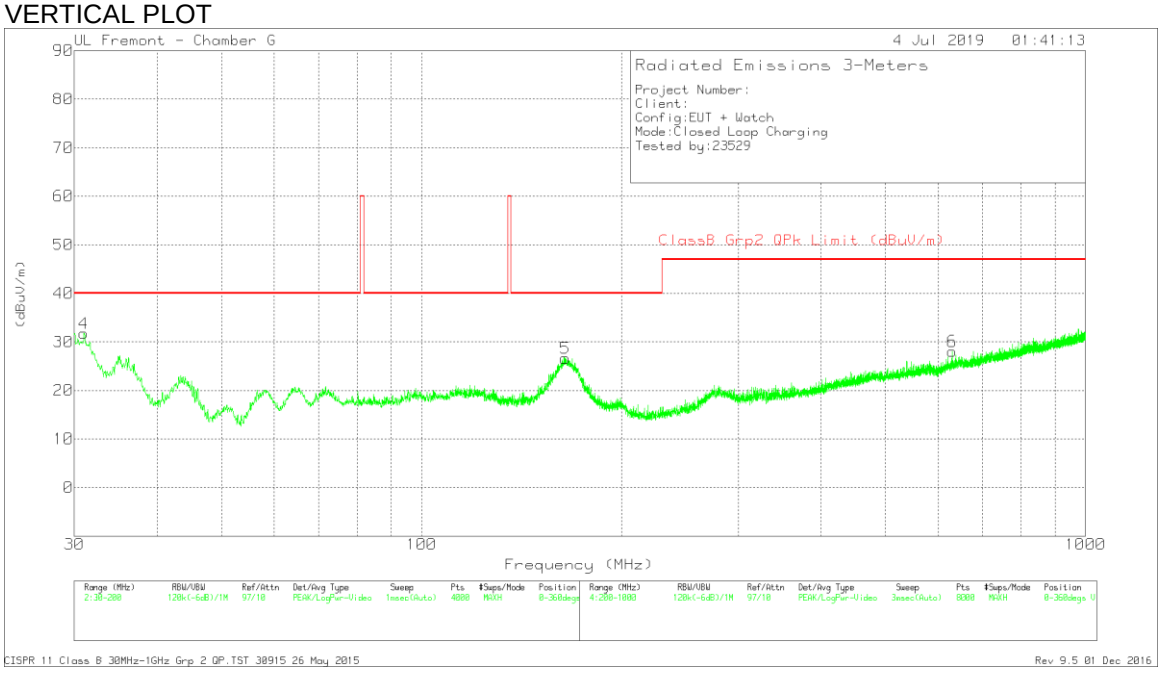
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T477 (dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	ClassB Grp2 QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	30.5122	22.84	Qp	26.4	-31.2	18.04	40	-21.96	304	248	H
4	30.9553	25.84	Qp	26.4	-31.2	21.04	40	-18.96	186	109	V
6	35.6156	25.05	Qp	22.8	-31.1	16.75	40	-23.25	10	139	V
5	113.2875	27.28	Qp	19	-30.3	15.98	40	-24.02	26	101	V
2	166.3228	32.76	Qp	17.8	-29.8	20.76	40	-19.24	80	157	H
3	281.0157	24.42	Qp	19.2	-29	14.62	47	-32.38	308	133	H

OPERATING WITH WATCH

HORIZONTAL PLOT



VERTICAL PLOT



DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T477 (dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	ClassB Grp2 QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	31.0361	28.88	Qp	26.4	-31.2	24.08	40	-15.92	309	130	V
1	113.7952	32.46	Qp	19.1	-30.3	21.26	40	-18.74	334	300	H
5	164.8682	35.86	Qp	17.9	-29.9	23.86	40	-16.14	140	101	V
2	165.1411	36.54	Qp	17.9	-29.9	24.54	40	-15.46	88	181	H
3	330.1217	30.42	Qp	19.8	-28.8	21.42	47	-25.58	27	108	H
6	630.0066	22.34	Qp	25.4	-27.4	20.34	47	-26.66	171	180	V

9. AC MAINS 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.

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.

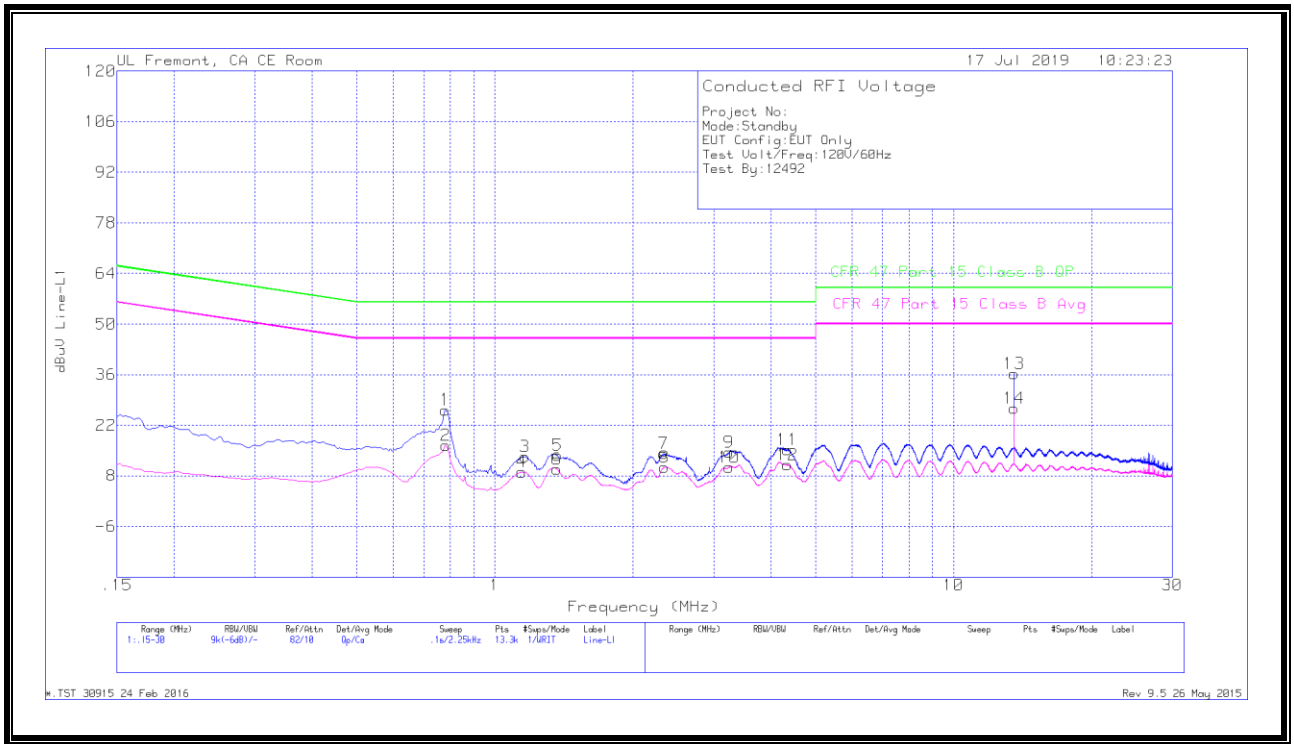
Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

9.1. PLASTIC HOUSING WITH 1m CABLE

9.1.1. STANDBY MODE POWERED BY AC/DC ADAPTER

LINE 1 RESULTS



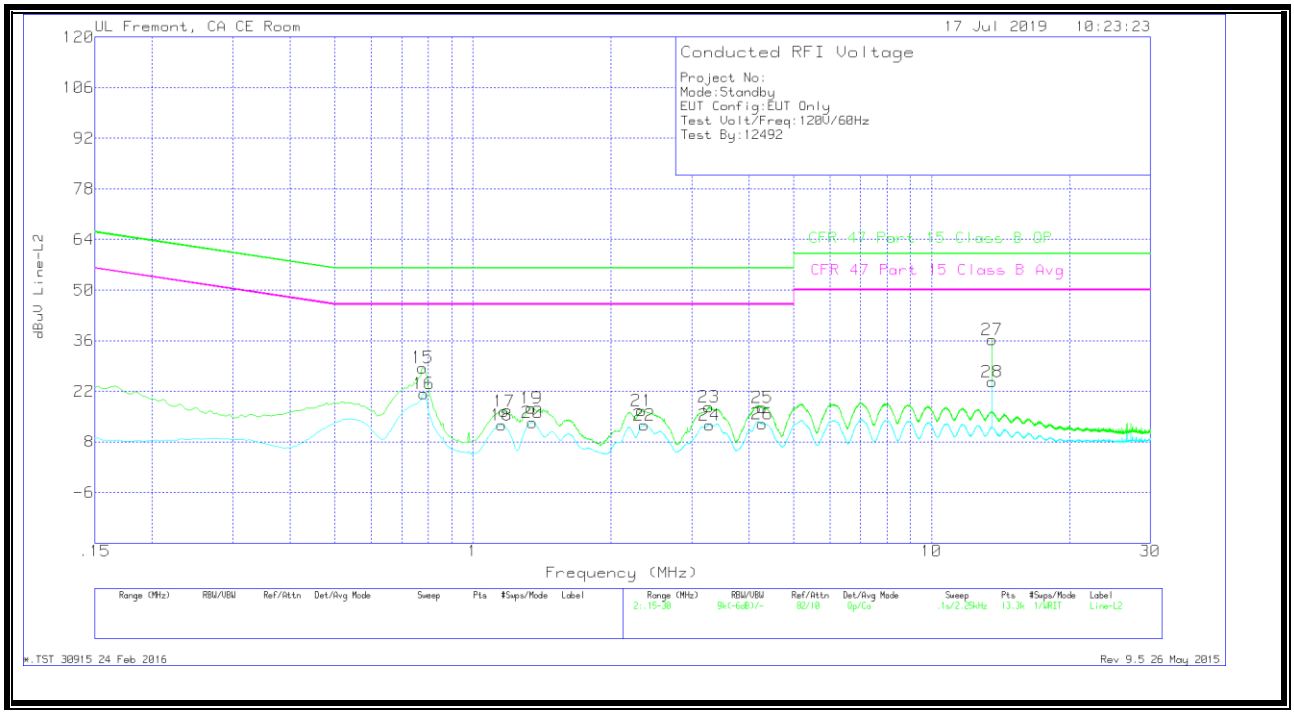
WORST EMISSIONS

Range 1: Line-L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
1	.78	16.17	Qp	0	0	10.1	26.27	56	-29.73	-	-
2	.78225	6.34	Ca	0	0	10.1	16.44	-	-	46	-29.56
3	1.16363	3.11	Qp	0	.1	10.1	13.31	56	-42.69	-	-
4	1.1445	-1.13	Ca	0	.1	10.1	9.07	-	-	46	-36.93
5	1.3695	3.48	Qp	0	.1	10.1	13.68	56	-42.32	-	-
6	1.36725	-.36	Ca	0	.1	10.1	9.84	-	-	46	-36.16
7	2.337	3.92	Qp	0	.1	10.1	14.12	56	-41.88	-	-
8	2.33925	.16	Ca	0	.1	10.1	10.36	-	-	46	-35.64
9	3.2415	4.33	Qp	0	.1	10.1	14.53	56	-41.47	-	-
10	3.2415	.24	Ca	0	.1	10.1	10.44	-	-	46	-35.56
11	4.34625	5.11	Qp	0	.1	10.1	15.31	56	-40.69	-	-
12	4.3395	.83	Ca	0	.1	10.1	11.03	-	-	46	-34.97
13	13.56	25.76	Qp	.1	.2	10.2	36.26	60	-23.74	-	-
14	13.56	16.19	Ca	.1	.2	10.2	26.69	-	-	50	-23.31

Qp - Quasi-Peak detector
Ca - CISPR average detection
*Indicates UL RFID signal. Not from device.

LINE 2 RESULTS



WORST EMISSIONS

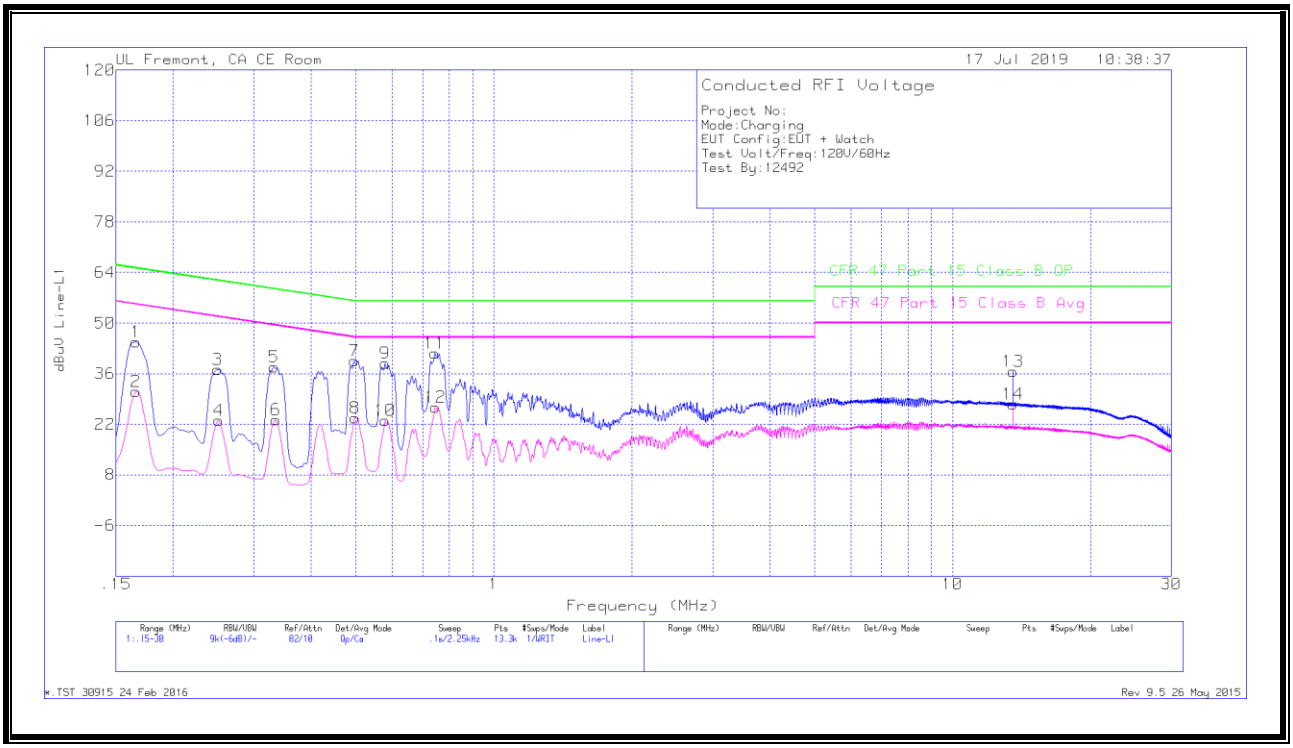
Range 2: Line-L2 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
15	.77775	18.43	Qp	0	0	10.1	28.53	56	-27.47	-	-
16	.78225	11.28	Ca	0	0	10.1	21.38	-	-	46	-24.62
17	1.1715	6.23	Qp	0	.1	10.1	16.43	56	-39.57	-	-
18	1.15688	2.35	Ca	0	.1	10.1	12.55	-	-	46	-33.45
19	1.3425	7.09	Qp	0	.1	10.1	17.29	56	-38.71	-	-
20	1.34925	3.07	Ca	0	.1	10.1	13.27	-	-	46	-32.73
21	2.33475	6.5	Qp	0	.1	10.1	16.7	56	-39.3	-	-
22	2.364	2.35	Ca	0	.1	10.1	12.55	-	-	46	-33.45
23	3.26625	7.42	Qp	0	.1	10.1	17.62	56	-38.38	-	-
24	3.27863	2.45	Ca	0	.1	10.1	12.65	-	-	46	-33.35
25	4.27875	7.27	Qp	0	.1	10.1	17.47	56	-38.53	-	-
26	4.27875	2.82	Ca	0	.1	10.1	13.02	-	-	46	-32.98
27	13.56	25.71	Qp	.1	.2	10.2	36.21	60	-23.79	-	-
28	13.56	14.12	Ca	.1	.2	10.2	24.62	-	-	50	-25.38

Qp - Quasi-Peak detector
Ca - CISPR average detection
*Indicates UL RFID signal. Not from device.

9.1.2. OPERATING MODE WITH WATCH POWERED BY AC/DC ADAPTER

LINE 1 RESULTS



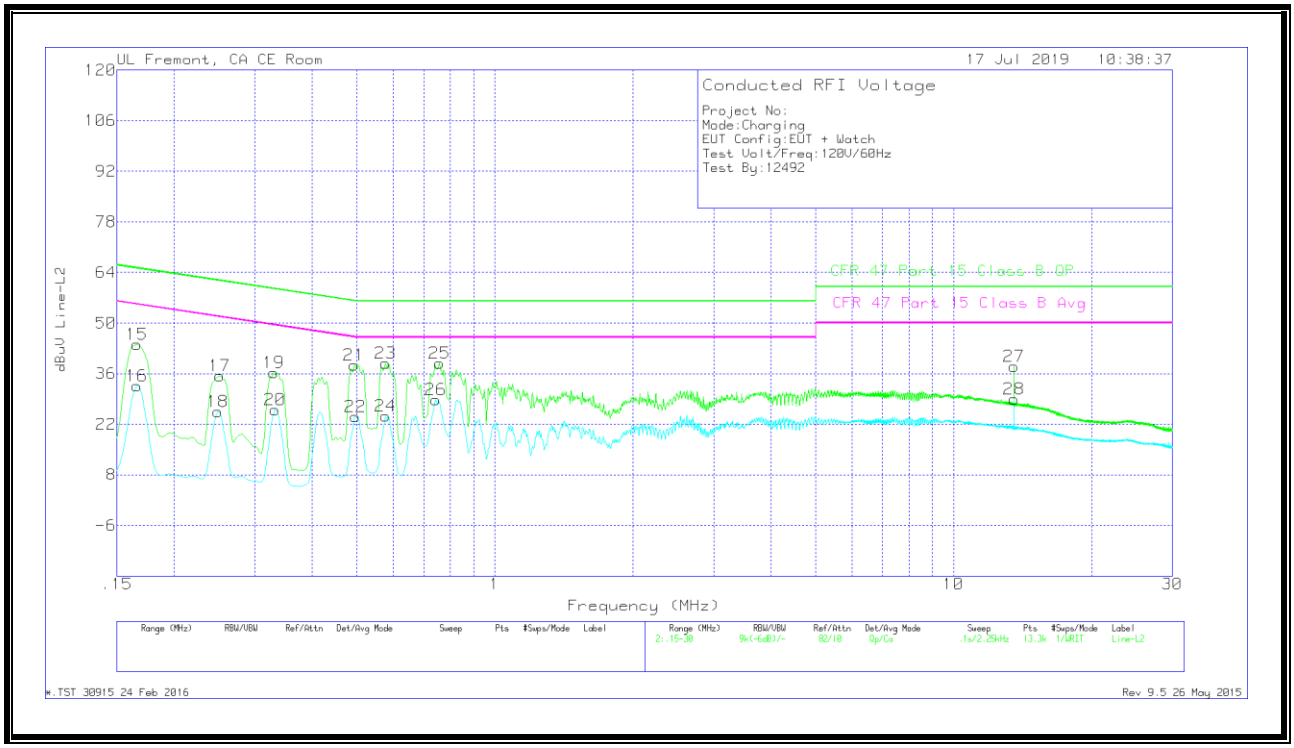
WORST EMISSIONS

Range 1: Line-L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
1	.16575	34.53	Qp	.1	0	10.1	44.73	65.17	-20.44	-	-
2	.16575	20.8	Ca	.1	0	10.1	31	-	-	55.17	-24.17
3	.25013	27.08	Qp	0	0	10.1	37.18	61.75	-24.57	-	-
4	.25125	12.94	Ca	0	0	10.1	23.04	-	-	51.72	-28.68
5	.33225	27.67	Qp	0	0	10.1	37.77	59.39	-21.62	-	-
6	.3345	13.07	Ca	0	0	10.1	23.17	-	-	49.34	-26.17
7	.4965	29.47	Qp	0	0	10.1	39.57	56.06	-16.49	-	-
8	.49875	13.72	Ca	0	0	10.1	23.82	-	-	46.02	-22.2
9	.57975	28.76	Qp	0	0	10.1	38.86	56	-17.14	-	-
10	.57975	12.91	Ca	0	0	10.1	23.01	-	-	46	-22.99
11	.744	31.58	Qp	0	0	10.1	41.68	56	-14.32	-	-
12	.74625	16.62	Ca	0	0	10.1	26.72	-	-	46	-19.28
*13	13.56	26.07	Qp	.1	.2	10.2	36.57	60	-23.43	-	-
*14	13.56	17.01	Ca	.1	.2	10.2	27.51	-	-	50	-22.49

Qp - Quasi-Peak detector
Ca - CISPR average detection
*Indicates UL RFID signal. Not from device

LINE 2 RESULTS



WORST EMISSIONS

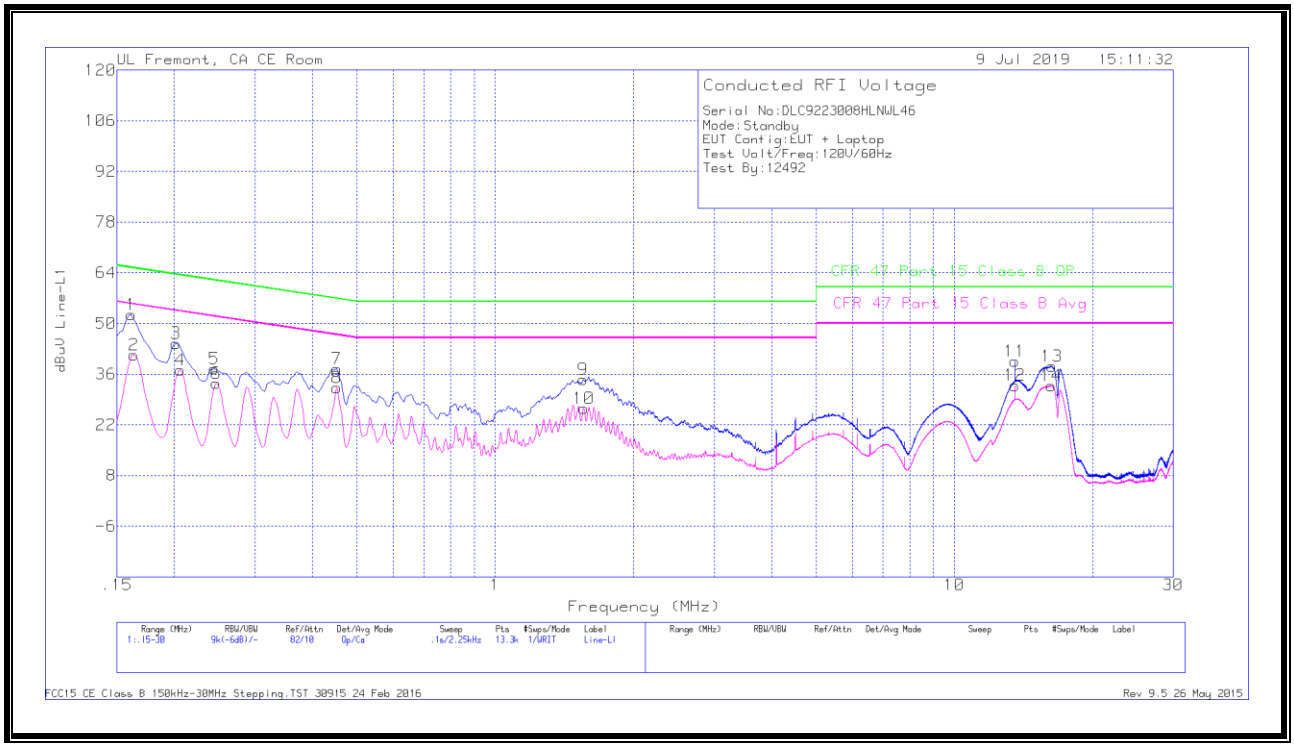
Range 2: Line-L2 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
15	.16575	33.81	Qp	.1	0	10.1	44.01	65.17	-21.16	-	-
16	.16575	22.46	Ca	.1	0	10.1	32.66	-	-	55.17	-22.51
17	.25125	25.32	Qp	0	0	10.1	35.42	61.72	-26.3	-	-
18	.249	15.4	Ca	0	0	10.1	25.5	-	-	51.79	-26.29
19	.33	26.17	Qp	0	0	10.1	36.27	59.45	-23.18	-	-
20	.33225	15.9	Ca	0	0	10.1	26	-	-	49.39	-23.39
21	.49425	28.32	Qp	0	0	10.1	38.42	56.1	-17.68	-	-
22	.4965	14.07	Ca	0	0	10.1	24.17	-	-	46.06	-21.89
23	.5775	28.82	Qp	0	0	10.1	38.92	56	-17.08	-	-
24	.5775	14.1	Ca	0	0	10.1	24.2	-	-	46	-21.8
25	.7575	28.74	Qp	0	0	10.1	38.84	56	-17.16	-	-
26	.744	18.72	Ca	0	0	10.1	28.82	-	-	46	-17.18
*27	13.56	27.46	Qp	.1	.2	10.2	37.96	60	-22.04	-	-
*28	13.56	18.41	Ca	.1	.2	10.2	28.91	-	-	50	-21.09

Qp - Quasi-Peak detector
Ca - CISPR average detection
*Indicates UL RFID signal. Not from device
.

9.1.3. STANDBY MODE POWERED BY HOST PC VIA USB CABLE

LINE 1 RESULTS



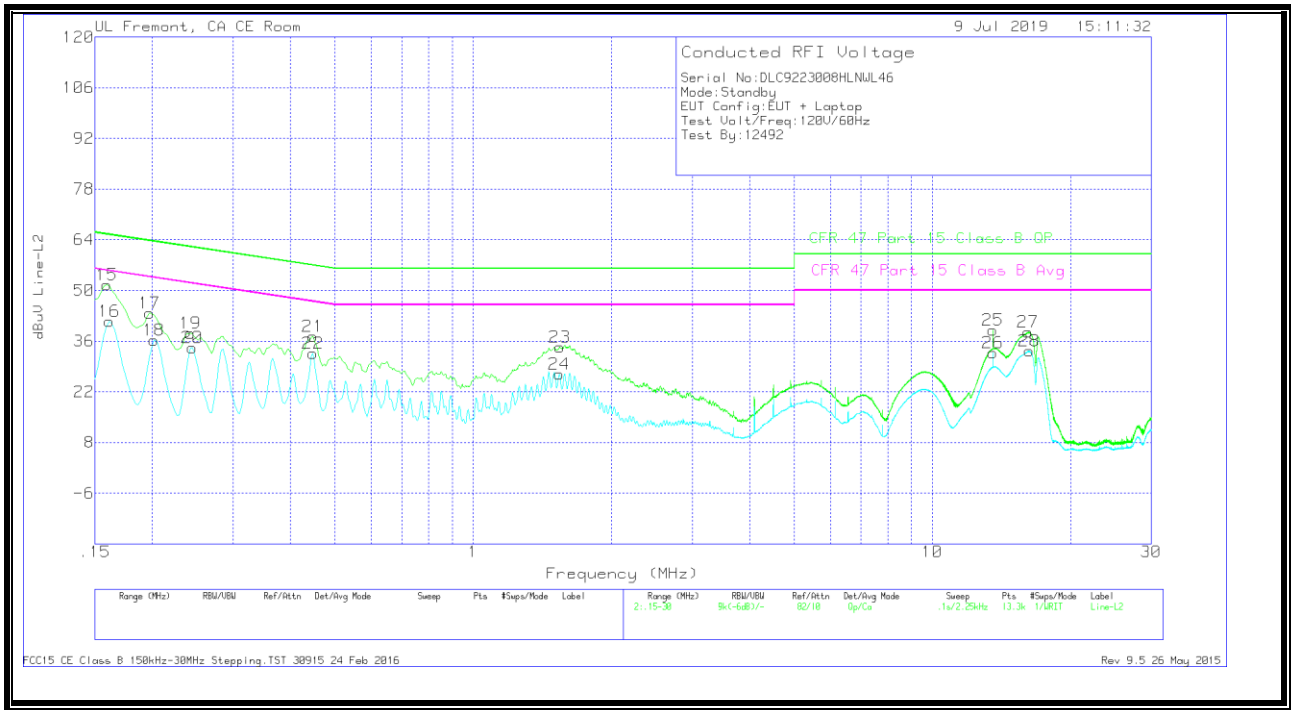
WORST EMISSIONS

Range 1: Line-L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
1	.16125	42.17	Qp	.1	0	10.1	52.37	65.4	-13.03	-	-
2	.1635	31.1	Ca	.1	0	10.1	41.3	-	-	55.28	-13.98
3	.20175	34.42	Qp	0	0	10.1	44.52	63.54	-19.02	-	-
4	.20625	27.1	Ca	0	0	10.1	37.2	-	-	53.35	-16.15
5	.2445	27.31	Qp	0	0	10.1	37.41	61.94	-24.53	-	-
6	.24675	23.42	Ca	0	0	10.1	33.52	-	-	51.87	-18.35
7	.4515	27.32	Qp	0	0	10.1	37.42	56.85	-19.43	-	-
8	.4515	22.11	Ca	0	0	10.1	32.21	-	-	46.85	-14.64
9	1.55625	24.32	Qp	0	.1	10.1	34.52	56	-21.48	-	-
10	1.5585	16.34	Ca	0	.1	10.1	26.54	-	-	46	-19.46
*11	13.56	29.08	Qp	.1	.2	10.2	39.58	60	-20.42	-	-
*12	13.56	22.38	Ca	.1	.2	10.2	32.88	-	-	50	-17.12
13	16.30725	27.44	Qp	.1	.3	10.3	38.14	60	-21.86	-	-
14	16.2645	22.15	Ca	.1	.3	10.3	32.85	-	-	50	-17.15

Qp - Quasi-Peak detector
Ca - CISPR average detection
*Indicates UL RFID signal. Not from device.

LINE 2 RESULTS



WORST EMISSIONS

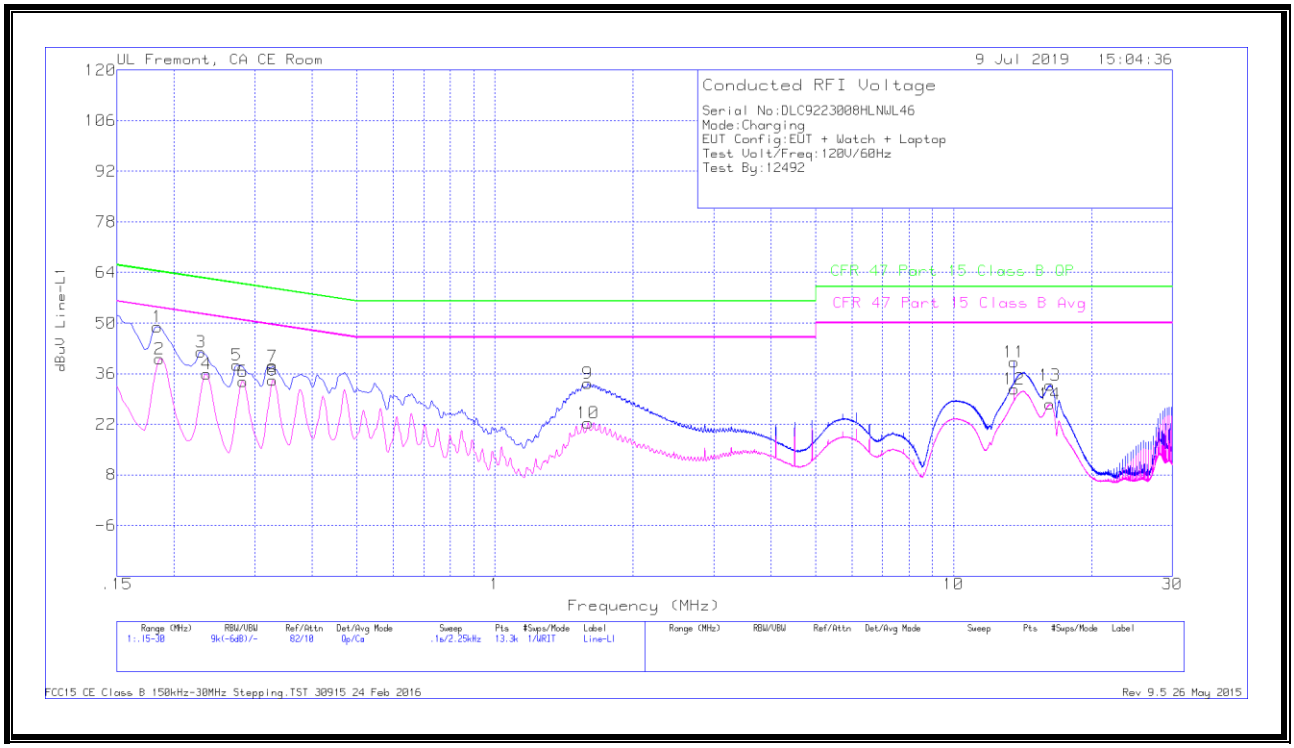
Range 2: Line-L2 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
15	.159	41.41	Qp	.1	0	10.1	51.61	65.52	-13.91	-	-
16	.16125	31.27	Ca	.1	0	10.1	41.47	-	-	55.4	-13.93
17	.19725	33.67	Qp	0	0	10.1	43.77	63.73	-19.96	-	-
18	.20175	26.17	Ca	0	0	10.1	36.27	-	-	53.54	-17.27
19	.24225	28.13	Qp	0	0	10.1	38.23	62.02	-23.79	-	-
20	.2445	24.13	Ca	0	0	10.1	34.23	-	-	51.94	-17.71
21	.447	27.15	Qp	0	0	10.1	37.25	56.93	-19.68	-	-
22	.447	22.56	Ca	0	0	10.1	32.66	-	-	46.93	-14.27
23	1.54275	24.17	Qp	0	.1	10.1	34.37	56	-21.63	-	-
24	1.5405	16.66	Ca	0	.1	10.1	26.86	-	-	46	-19.14
*25	13.56	28.48	Qp	.1	.2	10.2	38.98	60	-21.02	-	-
*26	13.56	22.3	Ca	.1	.2	10.2	32.8	-	-	50	-17.2
27	16.1835	27.84	Qp	.1	.3	10.3	38.54	60	-21.46	-	-
28	16.26675	22.61	Ca	.1	.3	10.3	33.31	-	-	50	-16.69

Qp - Quasi-Peak detector
Ca - CISPR average detection
*Indicates UL RFID signal. Not from device.

9.1.4. OPERATING MODE WITH WATCH POWERED BY HOST PC VIA USB CABLE

LINE 1 RESULTS



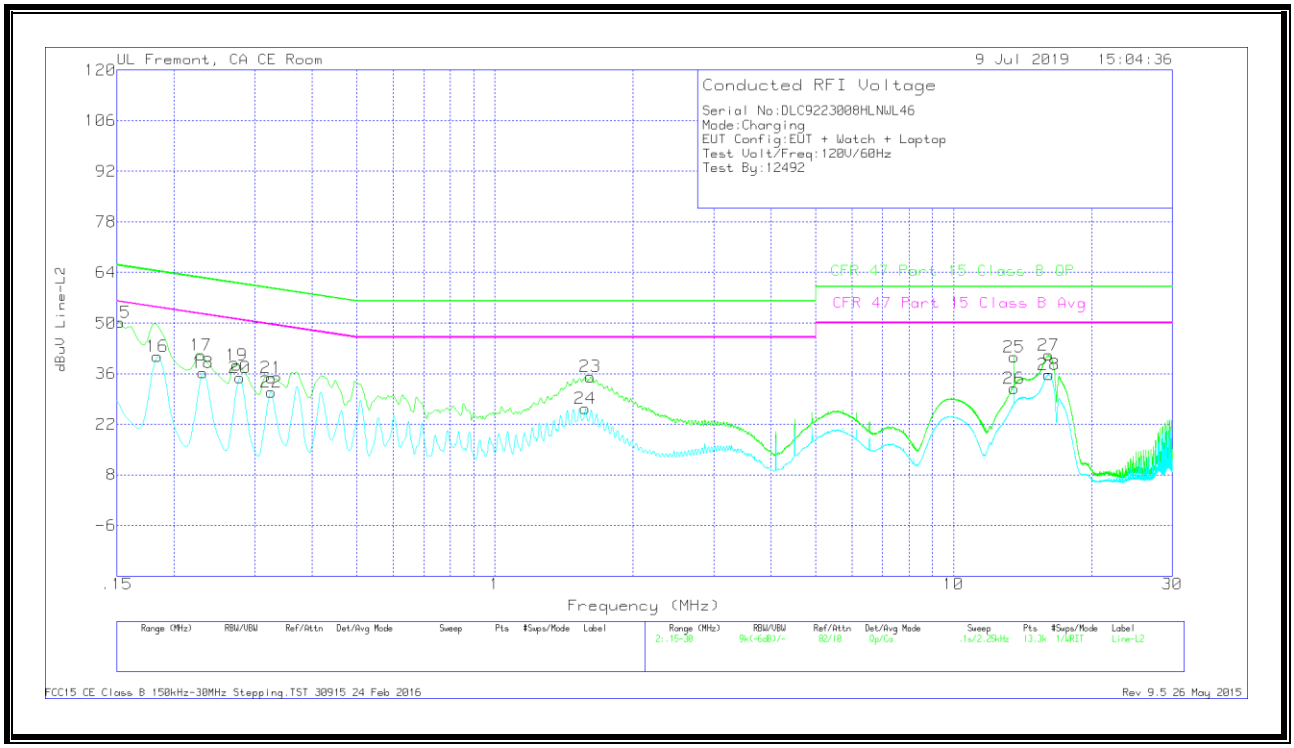
WORST EMISSIONS

Range 1: Line-L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
1	.18375	38.89	Qp	0	0	10.1	48.99	64.31	-15.32	-	-
2	.186	30.02	Ca	0	0	10.1	40.12	-	-	54.21	-14.09
3	.22875	31.94	Qp	0	0	10.1	42.04	62.49	-20.45	-	-
4	.2355	25.77	Ca	0	0	10.1	35.87	-	-	52.25	-16.38
5	.27375	28.28	Qp	0	0	10.1	38.38	61	-22.62	-	-
6	.28275	23.81	Ca	0	0	10.1	33.91	-	-	50.73	-16.82
7	.32775	27.87	Qp	0	0	10.1	37.97	59.51	-21.54	-	-
8	.32775	24.12	Ca	0	0	10.1	34.22	-	-	49.51	-15.29
9	1.5945	23.05	Qp	0	.1	10.1	33.25	56	-22.75	-	-
10	1.59675	12.23	Ca	0	.1	10.1	22.43	-	-	46	-23.57
*11	13.56	28.75	Qp	.1	.2	10.2	39.25	60	-20.75	-	-
*12	13.56225	21.31	Ca	.1	.2	10.2	31.81	-	-	50	-18.19
13	16.22175	22.05	Qp	.1	.3	10.3	32.75	60	-27.25	-	-
14	16.22963	16.88	Ca	.1	.3	10.3	27.58	-	-	50	-22.42

Qp - Quasi-Peak detector
Ca - CISPR average detection
*Indicates UL RFID signal. Not from device.

LINE 2 RESULTS



WORST EMISSIONS

Range 2: Line-L2 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
15	.15225	40.02	Qp	.1	0	10.1	50.22	65.88	-15.66	-	-
16	.18375	30.63	Ca	0	0	10.1	40.73	-	-	54.31	-13.58
17	.22875	30.98	Qp	0	0	10.1	41.08	62.49	-21.41	-	-
18	.231	26.09	Ca	0	0	10.1	36.19	-	-	52.41	-16.22
19	.27375	28.32	Qp	0	0	10.1	38.42	61	-22.58	-	-
20	.27825	24.75	Ca	0	0	10.1	34.85	-	-	50.87	-16.02
21	.3255	24.71	Qp	0	0	10.1	34.81	59.57	-24.76	-	-
22	.3255	20.83	Ca	0	0	10.1	30.93	-	-	49.57	-18.64
23	1.61475	24.94	Qp	0	.1	10.1	35.14	56	-20.86	-	-
24	1.5765	16.11	Ca	0	.1	10.1	26.31	-	-	46	-19.69
*25	13.56	30.08	Qp	.1	.2	10.2	40.58	60	-19.42	-	-
*26	13.56	21.45	Ca	.1	.2	10.2	31.95	-	-	50	-18.05
27	16.1385	30.37	Qp	.1	.3	10.3	41.07	60	-18.93	-	-
28	16.14075	25	Ca	.1	.3	10.3	35.7	-	-	50	-14.3

Qp - Quasi-Peak detector
Ca - CISPR average detection
*Indicates UL RFID signal. Not from device.

10. SETUP PHOTOS

Please refer to 12938050-EP1V1 for setup photos

END OF TEST REPORT