



CERTIFICATION TEST REPORT

Report Number. : 14499781-E1V3

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

Model : A2929

FCC ID : BCGA2929

IC : 579C-A2929

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:
October 13, 2022

Prepared by:
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Revision History

Rev.	Issue Date	Revisions	Revised By
V1	9/15/2022	Initial Issue	Chin Pang
V2	9/21/2022	Address TCB's questions	Chin Pang
V3	10/13/2022	Added ferrite comment to I/O section	Tri Pham

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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: A2929

BRAND: APPLE

SERIAL NUMBER: DLC2317003124GH1C

SAMPLE RECEIPT DATE: AUGUST 30, 2022

DATE TESTED: AUGUST 30 -SEPTEMBER 13, 2022

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:



Chin Pang
Senior Lab Engineer
Consumer Technology Division
UL Verification Services Inc.

Prepared By:



Gabe Nunez
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	550739
<input checked="" type="checkbox"/>	Building 2: 47266 Benicia Street, Fremont, CA 94538	US0104	22541	550739
<input type="checkbox"/>	Building 4: 47658 Kato Rd, Fremont, CA 94538	US0104	2324B	550739

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 (dB_{UV}/m) = Measured Voltage (dB_{UV}) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

$$36.5 \text{ dB}_{\text{UV}} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dB}_{\text{UV}/\text{m}}$$

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

Final Voltage (dB_{UV}) = Measured Voltage (dB_{UV}) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.

$$36.5 \text{ dB}_{\text{UV}} + 0 \text{ dB} + 10.1 \text{ dB} + 0 \text{ dB} = 46.6 \text{ dB}_{\text{UV}}$$

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	3.78 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 a magnetic charger which has a single inductive charging coil to charge Apple Watch. The charging frequencies are 1.778MHz and 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)	-21.13	10.18
326.5	Operating (Config 2)	-32.05	-2.28

Fundamental Frequency (KHz)	Mode	E field (30m distance) FCC (dBuV/m)	H field (3m distance) IC (dBuA/m)
1778	Operating (Config 3)	4.9	-4.3

5.3. SOFTWARE AND FIRMWARE

The firmware version installed in the EUT during testing was v. 190.

5.4. WORST-CASE CONFIGURATION AND MODE

The EUT is a dual frequency a magnetic charger which has a single inductive charging coil to charge Apple Watch. 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 operating at 326.5kHz powered by AC/DC adapter
3	Operating	EUT and Watch operating at 1.778MHz powered by AC/DC adapter

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 operating at 1.778MHz powered by AC/DC adapter
3	Operating	EUT and Watch operating at 326.5KHz powered by AC/DC adapter

For below 30MHz & 1GHz tests EUT was connected to AC power adapter as the worst case, For AC line conducted emission, test was investigated with AC power adapter.

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 result 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
AC/DC adapter	Apple	A2305	C4H01050096PF4FAH
Watch	Apple	A2622	N73KY02M96
Watch	Apple	A2723	C9T7597F69

I/O CABLES

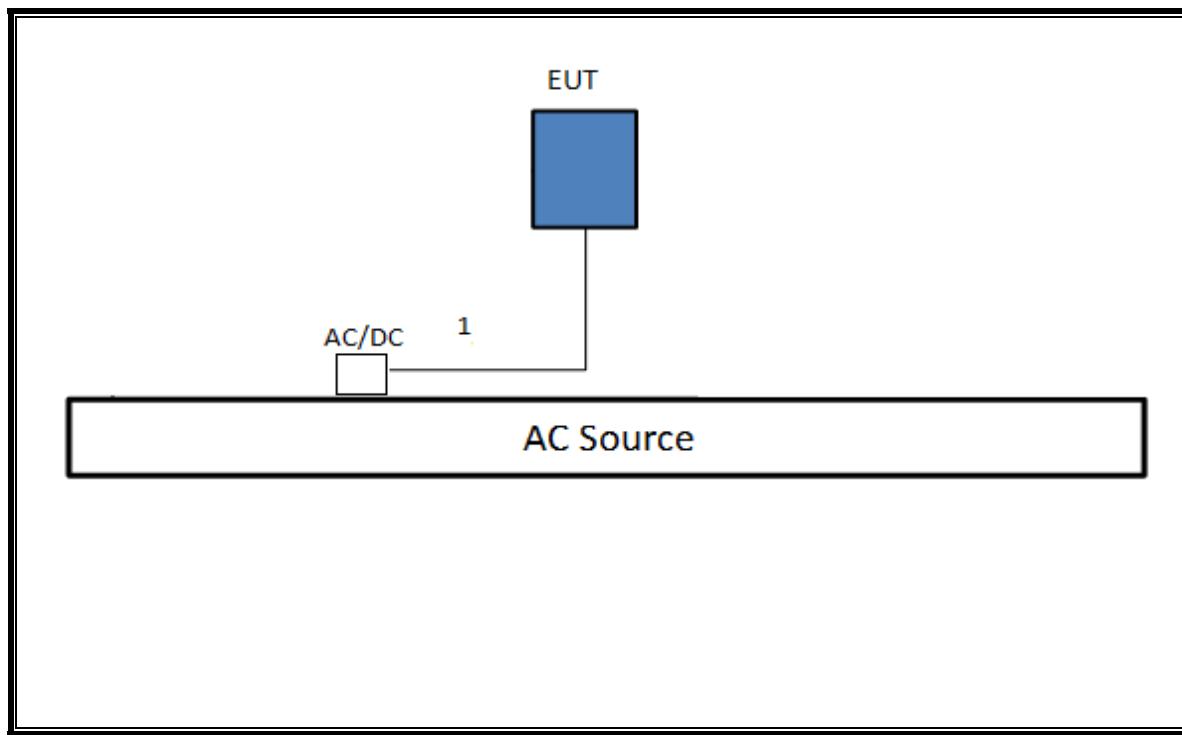
I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC	1	*USB-C	Un-shielded	2	30W Power Supply

TEST SETUP

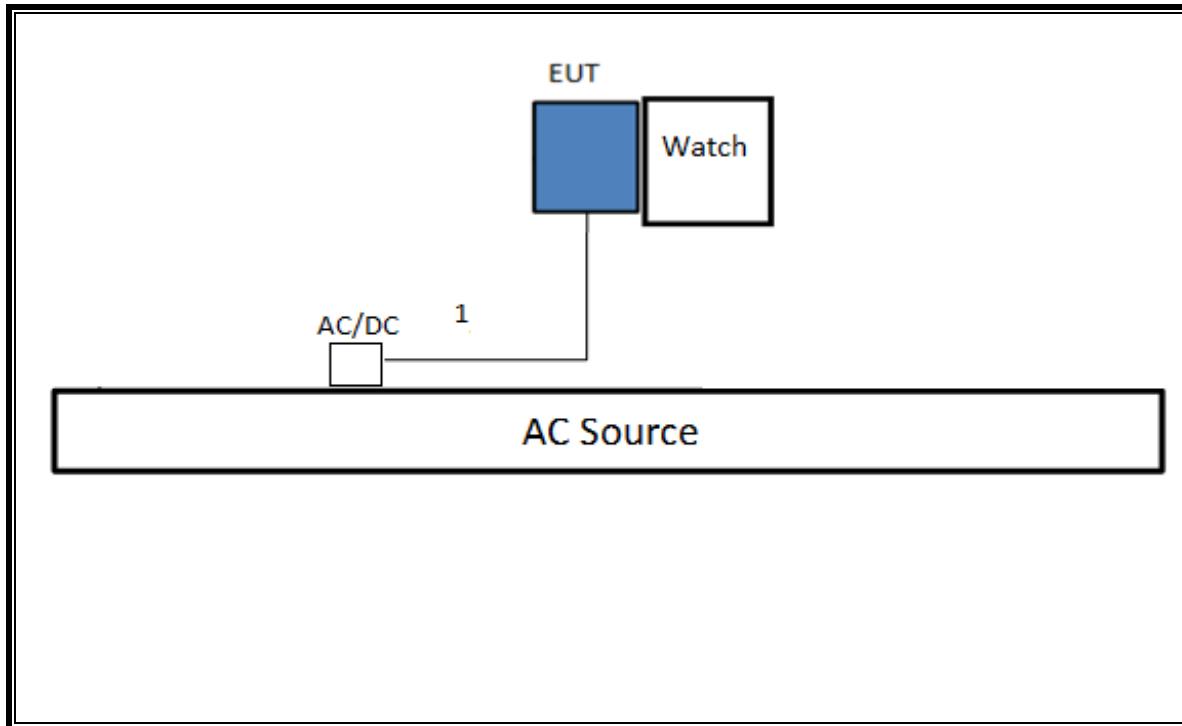
Please see the following configurations for the test setups. Configurations 1, 2 and 3 indicate that the EUT is directly connected to an AC/DC adapter via USB cable.

*Preliminary measurements were taken with the ferrite installed between the USB-C connector and the overmold at different locations. It was determined that the worst case position was with the ferrite placed nearest to the USB-C connector, therefore, all of the tests were performed with the ferrite at this position.

CONFIGURATION 1: STANDBY MODE



CONFIGURATION 2/3: OPERATING MODE WITH WATCH



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	Last Cal
Antenna, Passive Loop 30Hz to 1MHz	Electro-Metrics	EM-6871	219908	05/10/2023	05/10/2022
Antenna, Passive Loop 100KHz to 30MHz	Electro-Metrics	EM-6872	219910	05/10/2023	05/10/2022
Antenna, Broadband Hybrid, 30MHz to 2000MHz w/4dB	Sunol Sciences Crop.	JB3	204045	03/21/2023	03/21/2022
Amplifier, 9kHz to 1GHz, 32dB	Sonoma Instrument	310	222362	08/15/2023	08/15/2022
Sniffer Probes	Electro Metrics	EM-6992	N/A	N/A	N/A
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A-544	85313	01/30/2023	01/30/2022

AC Line Conducted					
Description	Manufacturer	Model	ID Num	Cal Due	Last Cal
EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESR	93091	02/21/2023	02/21/2022
Power Cable, Line Conducted Emissions	UL	PR1	T861	10/27/2022	10/27/2021
LISN for Conducted Emissions	FISCHER CUSTOM COMMUNICATIONS	FCC-LISN-50/250-25-2-01	175765	01/26/2023	01/26/2022
UL AUTOMATION SOFTWARE					
Radiated Software	UL	UL EMC	Ver 9.5, 21 Jan 2022		
Conducted Software	UL	UL EMC	Ver 9.5, 21 Jan 2022		

7. OCCUPIED BANDWIDTH

TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 300Hz at 326.5kHz signal and 5.1kHz at 1.778MHz signal. 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 intentional charging signal is 1.778MHz.

EUT SETUP

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

Configuration 2: Low Frequency Charger in pairing mode with FSK modulation which occurs over a very short period of time as soon as the watch is placed on the charger.

Configuration 3: Low Frequency Charger in charging mode with signal transmitting at 326.5kHz.

Configuration 4: High Frequency Charger in pairing mode with FSK modulation which occurs over a very short period of time as soon as the watch is placed on the charger.

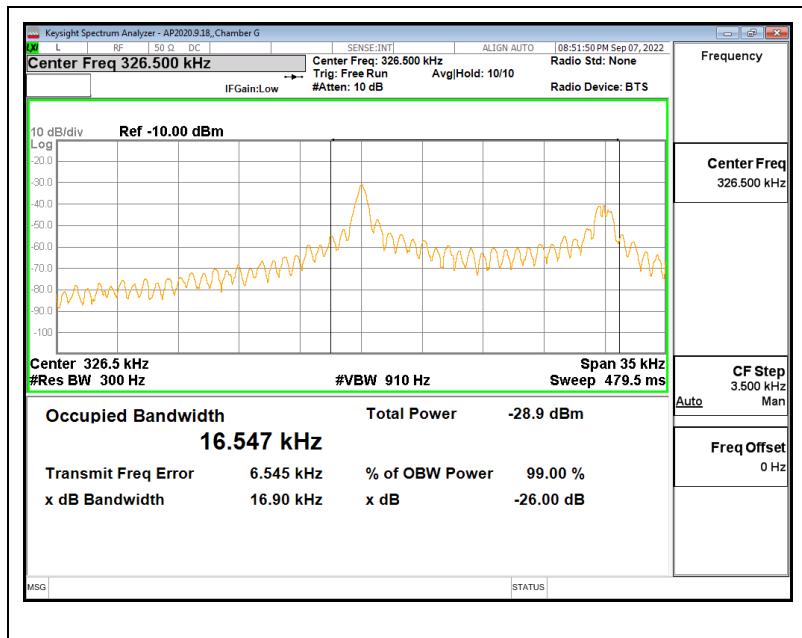
Configuration 5: High Frequency Charger in charging mode with signal transmitting at 1.778MHz.

RESULTS

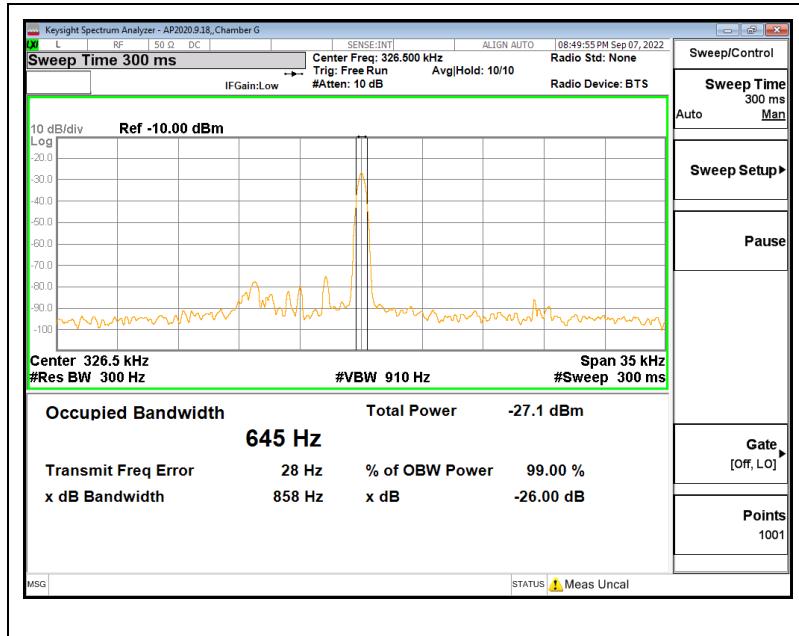
7.1.1. CONFIG 1



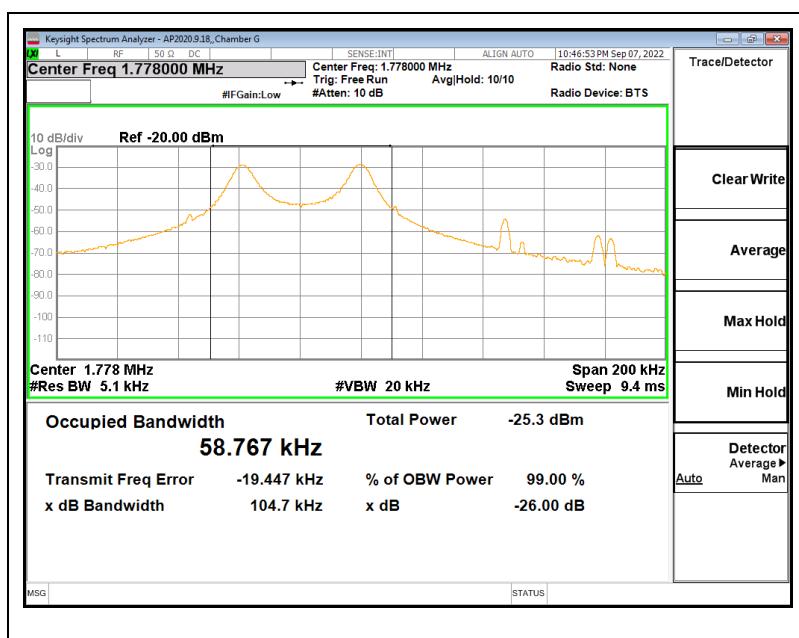
7.1.2. CONFIG 2



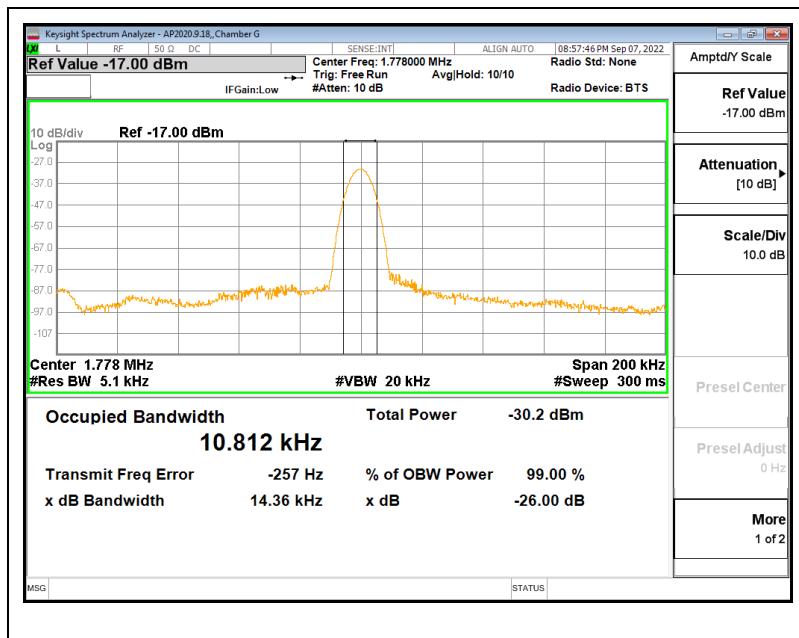
7.1.3. CONFIG 3



7.1.4. CONFIG 4



7.1.5. CONFIG 5



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 (dB μ A/m)
0.009 – 0.07	69
0.07 – 0.15	69 to 39 *
0.15 – 30	39 to 7 *

* The limit level in dB μ A/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 * 10 m measurement distance Quasi-peak (dB μ V/m)	OATS or SAC * 3 m measurement distance Quasi-peak (dB μ V/m)	FAR * 3 m measurement distance Quasi-peak (dB μ V/m)
	30 – 230	30	40
230 – 1000	37	47	42

Note: The more stringent limit applies at the transition frequency.

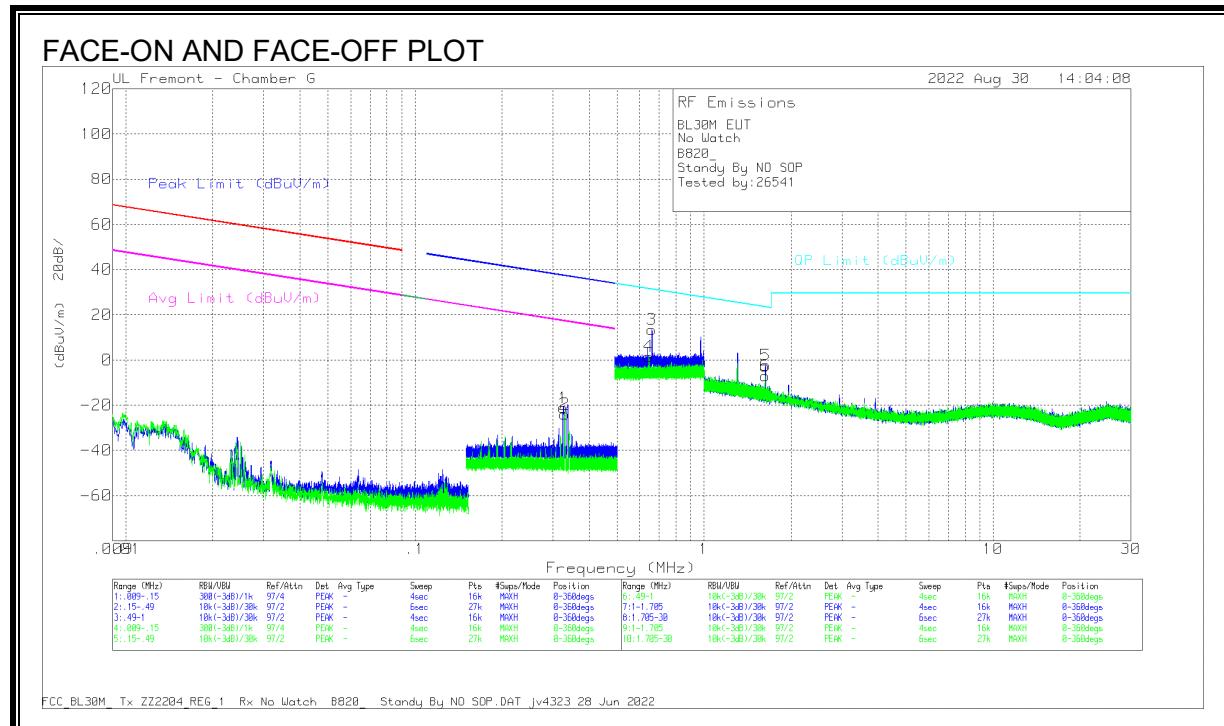
* OATS = open-area test site, SAC = semi-anechoic chamber, FAR = fully-anechoic room (see CSA CISPR 11:19).

** The limit level in dB μ V/m decreases linearly with the logarithm of frequency.

RESULTS

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

STANDBY CONFIGURATION (326.5kHz Frequency)



DATA

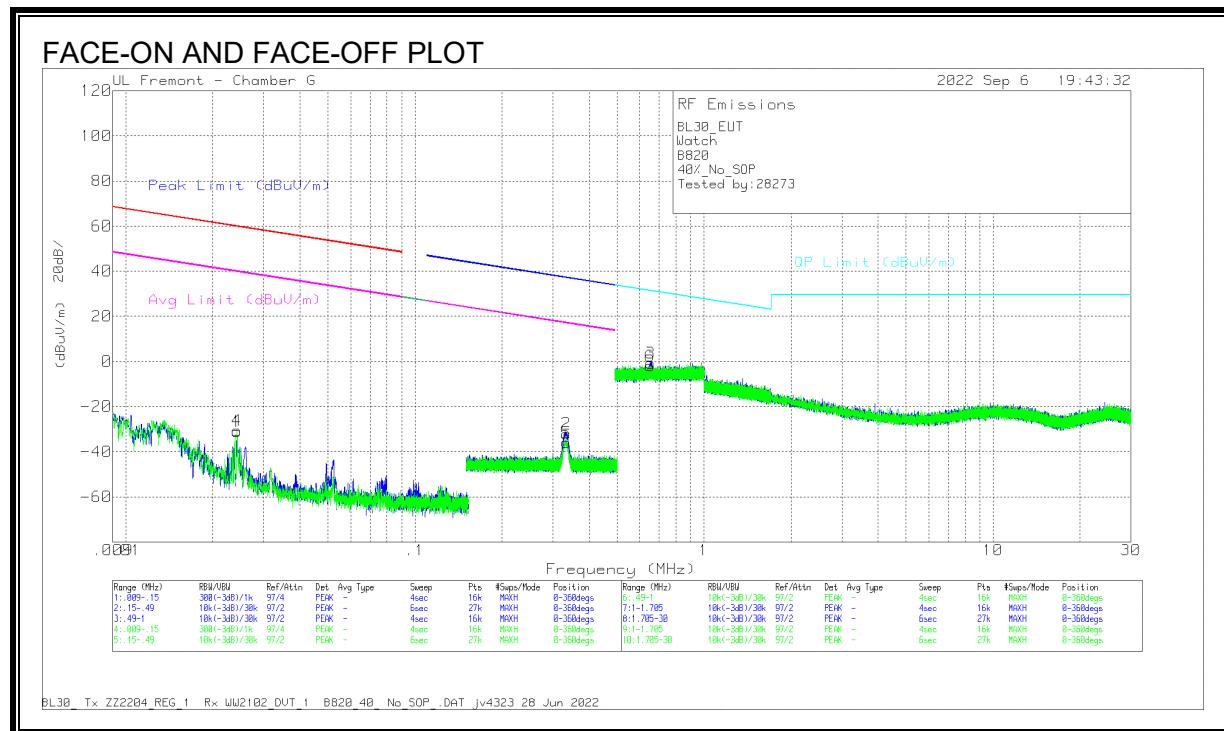
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables w/T834 (dB)	Dist Corr 300m (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity
1	.3259	34.67	Pk	56.2	-32	-80	-21.13	37.35	-58.48	17.35	-38.48	0-360	Face-On
2	.3297	31.87	Pk	56.2	-32	-80	-23.93	37.25	-61.18	17.25	-41.18	0-360	Face-Off

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables w/T834 (dB)	Dist Corr 30m (dB)	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity
4	.645	17.33	Pk	56.3	-32	-40	1.63	31.42	-29.79	0-360	Face-Off
3	.6606	29.11	Pk	56.4	-32	-40	13.51	31.21	-17.7	0-360	Face-On
6	1.6276	21.47	Pk	43.4	-31.9	-40	-7.03	23.4	-30.43	0-360	Face-Off
5	1.6328	26.16	Pk	43.4	-31.9	-40	-2.34	23.37	-25.71	0-360	Face-On

Pk - Peak detector

Note: no power transmission on 326.5KHz during the standby mode

OPERATING WITH WATCH at 326.5kHz Frequency



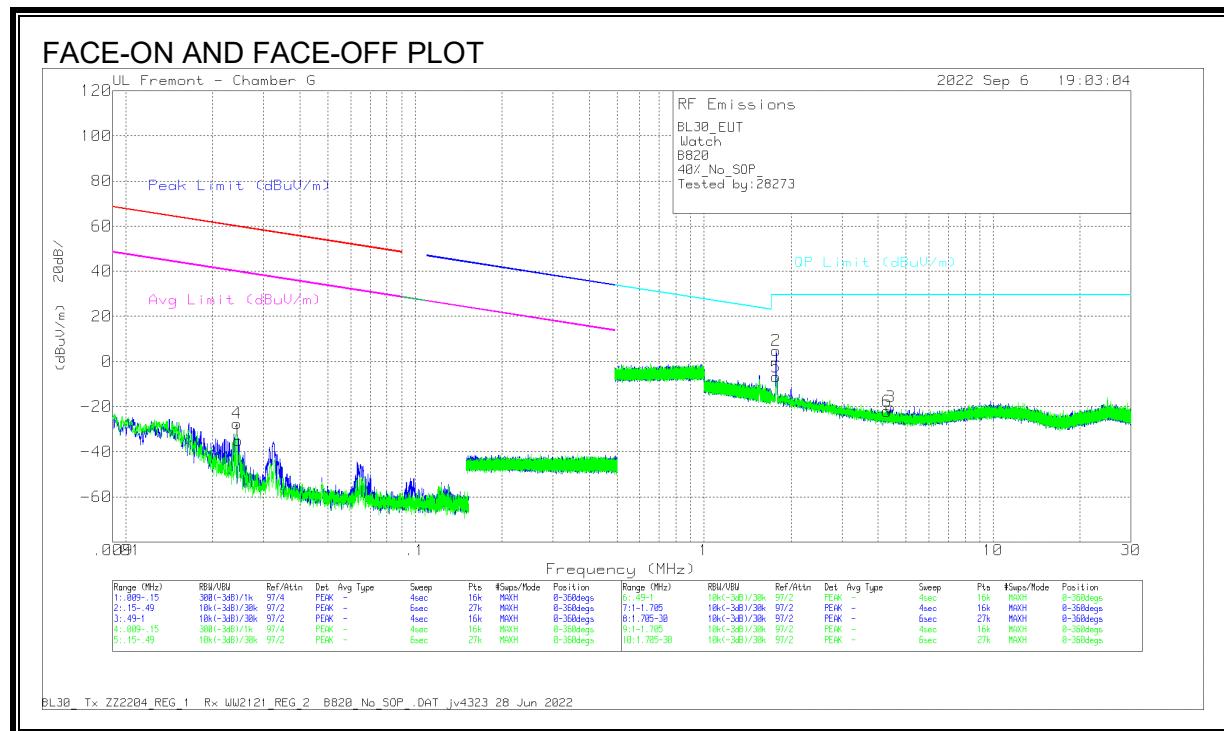
DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables w/T834 (dB)	Dist Corr 300m (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity
1	.0242	22.08	Pk	58.6	-31.7	-80	-31.02	59.91	-90.93	39.91	-70.93	0-360	Face-Off
4	.0242	22.51	Pk	58.6	-31.7	-80	-30.59	59.9	-90.49	39.9	-70.49	0-360	Face-On
2	.3342	23.75	Pk	56.2	-32	-80	-32.05	37.13	-69.18	17.13	-49.18	0-360	Face-On
5	.3342	19.87	Pk	56.2	-32	-80	-35.93	37.13	-73.06	17.13	-53.06	0-360	Face-Off

Pk - Peak detector

Note: Emissions from Markers 1 & 4 is not from the EUT. After further investigation, it was confirmed they were emitted from the AC/DC adapter which is not a part of the EUT.

OPERATING WITH WATCH at 1.778MHz Frequency



DATA

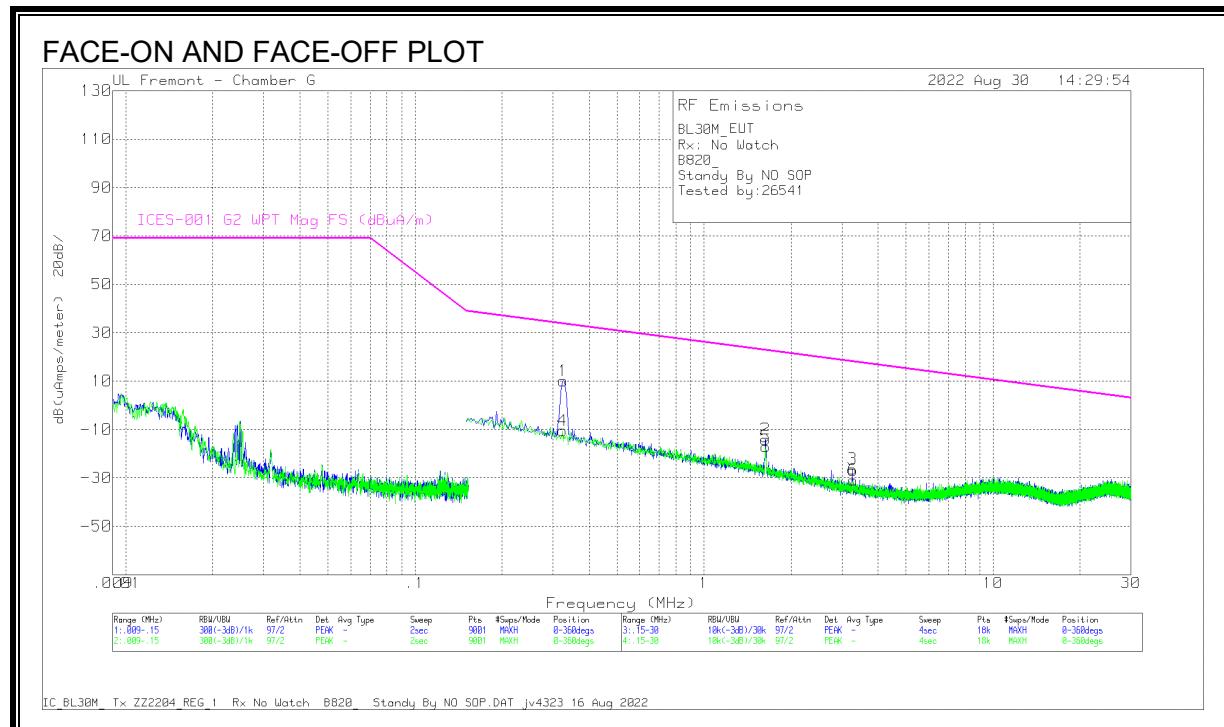
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables w/T834 (dB)	Dist Corr 300m (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity
4	.0242	25.71	Pk	58.6	-31.7	-80	-27.39	59.9	-87.29	39.9	-67.29	0-360	Face-On
1	.0245	18.08	Pk	58.6	-31.7	-80	-35.02	59.82	-94.84	39.82	-74.84	0-360	Face-Off

Pk - Peak detector

Note: Emissions from Markers 1 and 4 are not from the EUT. After further investigation, it was confirmed they were emitted from the AC/DC adapter which is not a part of the EUT.

8.1.2. IC / CISPR11 TX FUNDAMENTAL AND SPURIOUS EMISSIONS FROM 9 kHz TO 30 MHz

STANDBY CONFIGURATION at 326.5kHz Frequency

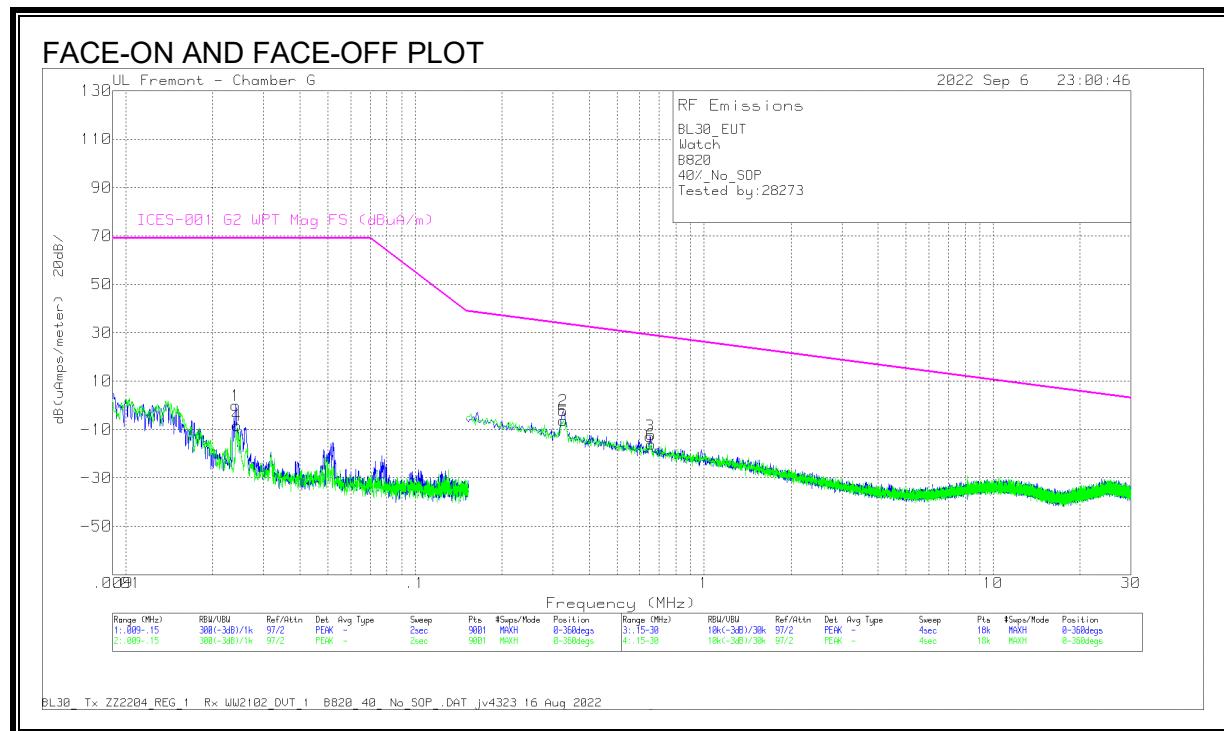


DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables w/T834 (dB)	Corrected Reading (dBuA/m)	ICES-001 G2 WPT Mag FS (dBuA/m)	Margin (dB)	Azimuth (Degs)	Polarity
4	.3241	17.27	Pk	4.3	-32	-10.43	33.77	-44.2	0-360	Face-Off
1	.3258	37.88	Pk	4.3	-32	10.18	33.73	-23.55	0-360	Face-On
2	1.6323	25.93	Pk	-8	-31.9	-13.97	22.78	-36.75	0-360	Face-On
5	1.6356	22.86	Pk	-8	-31.9	-17.04	22.77	-39.81	0-360	Face-Off
3	3.2654	18.81	Pk	-13.2	-31.9	-26.29	18.07	-44.36	0-360	Face-On
6	3.2836	14.22	Pk	-13.2	-31.9	-30.88	18.03	-48.91	0-360	Face-Off

Pk - Peak detector

OPERATING WITH WATCH at 326.5kHz Frequency



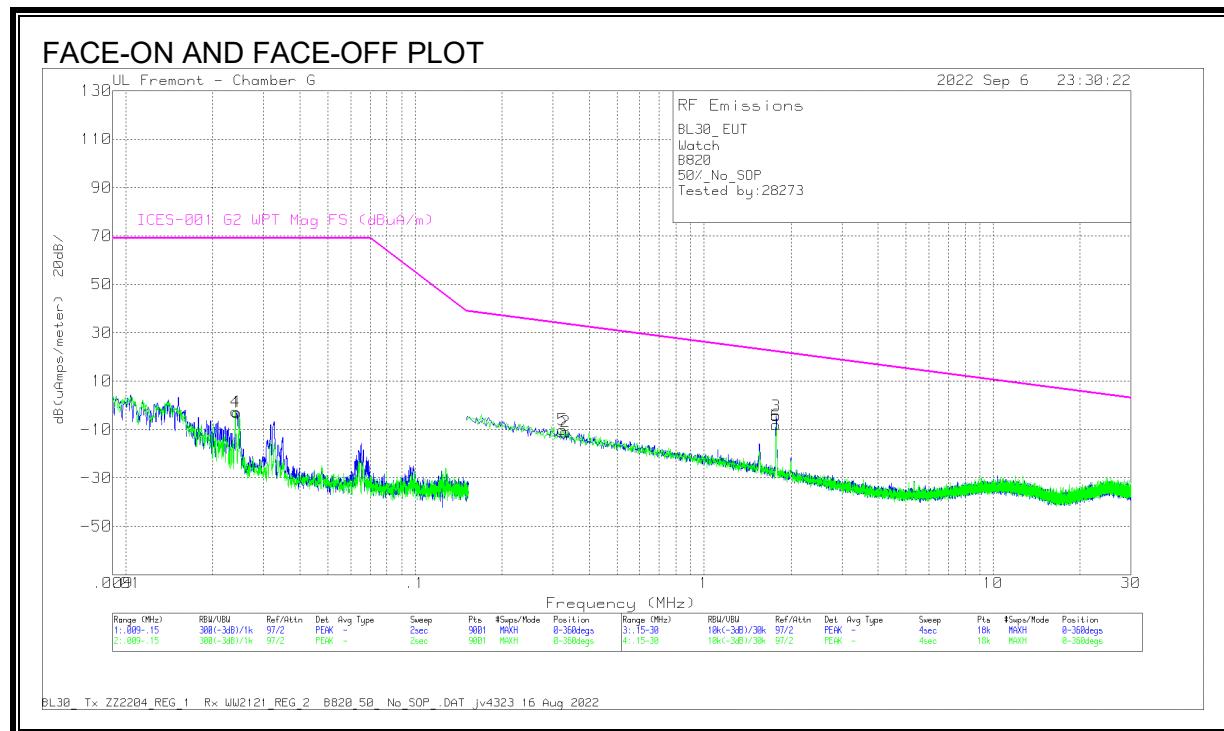
DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables w/T834 (dB)	Corrected Reading dB(uAmps/meter)	ICES-001 G2 WPT Mag FS (dBuA/m)	Margin (dB)	Azimuth (Degs)	Polarity
1	.024	24.37	Pk	7.3	-31.7	-.03	69	-69.03	0-360	Face-On
4	.0242	16.26	Pk	7.2	-31.7	-8.24	69	-77.24	0-360	Face-Off
2	.3258	25.42	Pk	4.3	-32	-2.28	33.73	-36.01	0-360	Face-On
5	.3258	21.35	Pk	4.3	-32	-6.35	33.73	-40.08	0-360	Face-Off
3	.6507	20.7	Pk	-1.4	-32	-12.7	29.03	-41.73	0-360	Face-On
6	.6574	17.29	Pk	-1.4	-32	-16.11	28.96	-45.07	0-360	Face-Off

Pk - Peak detector

Note: Emissions from Markers 1, 4 are not from the EUT. After further investigation, it was confirmed they were emitted from the AC/DC adapter which is not a part of the EUT.

OPERATING WITH WATCH at 1.778MHz Frequency



DATA

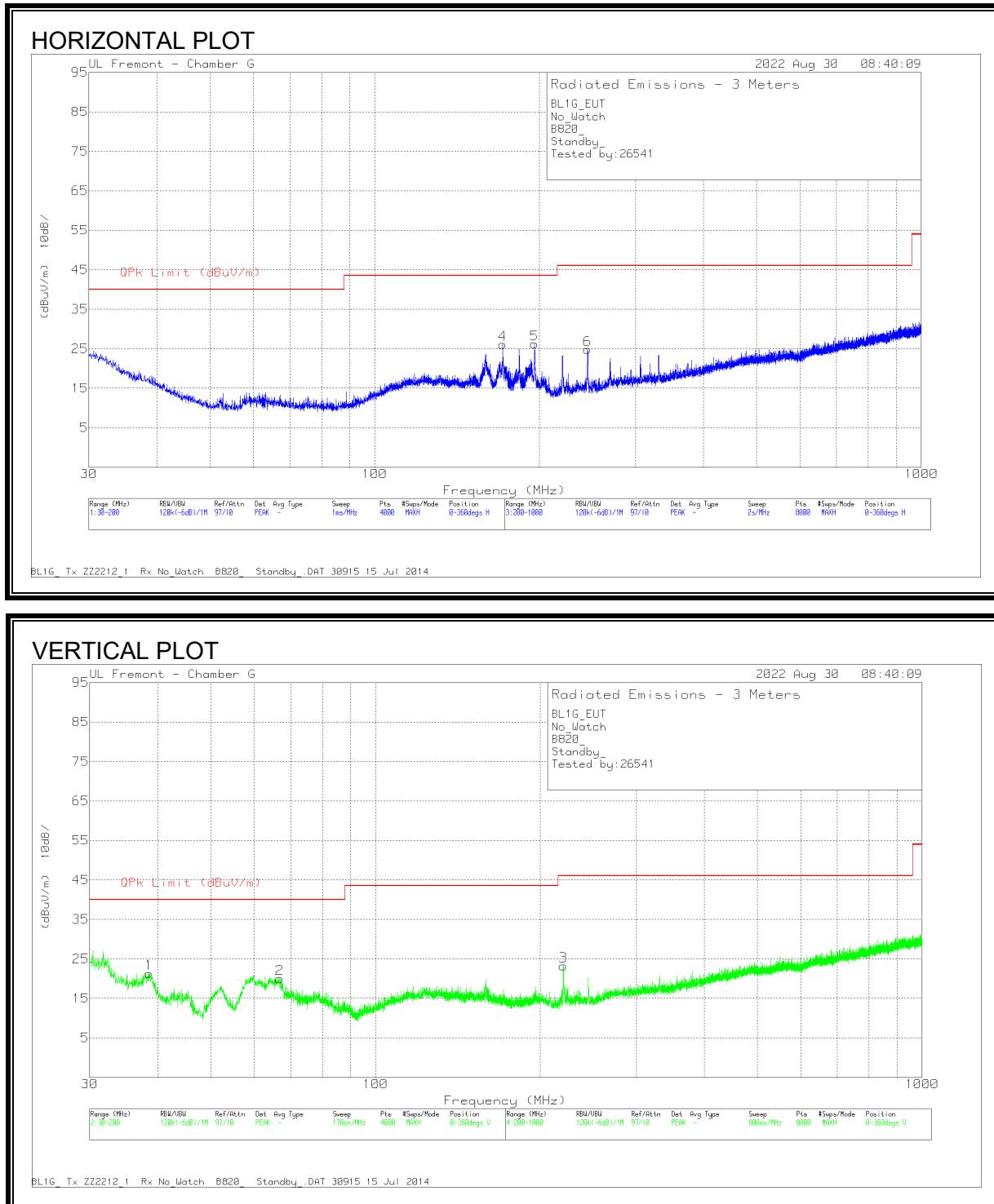
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables w/T834 (dB)	Corrected Reading dB(uAmps/meter)	ICES-001 G2 WPT Mag FS (dBuA/m)	Margin (dB)	Azimuth (Degs)	Polarity
4	.0239	21.81	Pk	7.3	-31.7	-2.59	69	-71.59	0-360	Face-Off
1	.0242	21.56	Pk	7.2	-31.7	-2.94	69	-71.94	0-360	Face-On
5	.3241	17.67	Pk	4.3	-32	-10.03	33.77	-43.8	0-360	Face-On
2	.3324	17	Pk	4.1	-32	-10.9	33.59	-44.49	0-360	Face-Off
3	1.7782	36.3	Pk	-8.7	-31.9	-4.3	22.2	-26.5	0-360	Face-On
6	1.7782	32.5	Pk	-8.7	-31.9	-8.1	22.2	-30.3	0-360	Face-Off

Pk - Peak detector

Note: Emissions from Markers 1, 4 are not from the EUT. After further investigation, it was confirmed they were emitted from the AC/DC adapter which is not a part of the EUT.

8.1.3. FCC TX SPURIOUS EMISSION 30 TO 1000 MHz

STANDBY CONFIGURATION at 326.5kHz Frequency

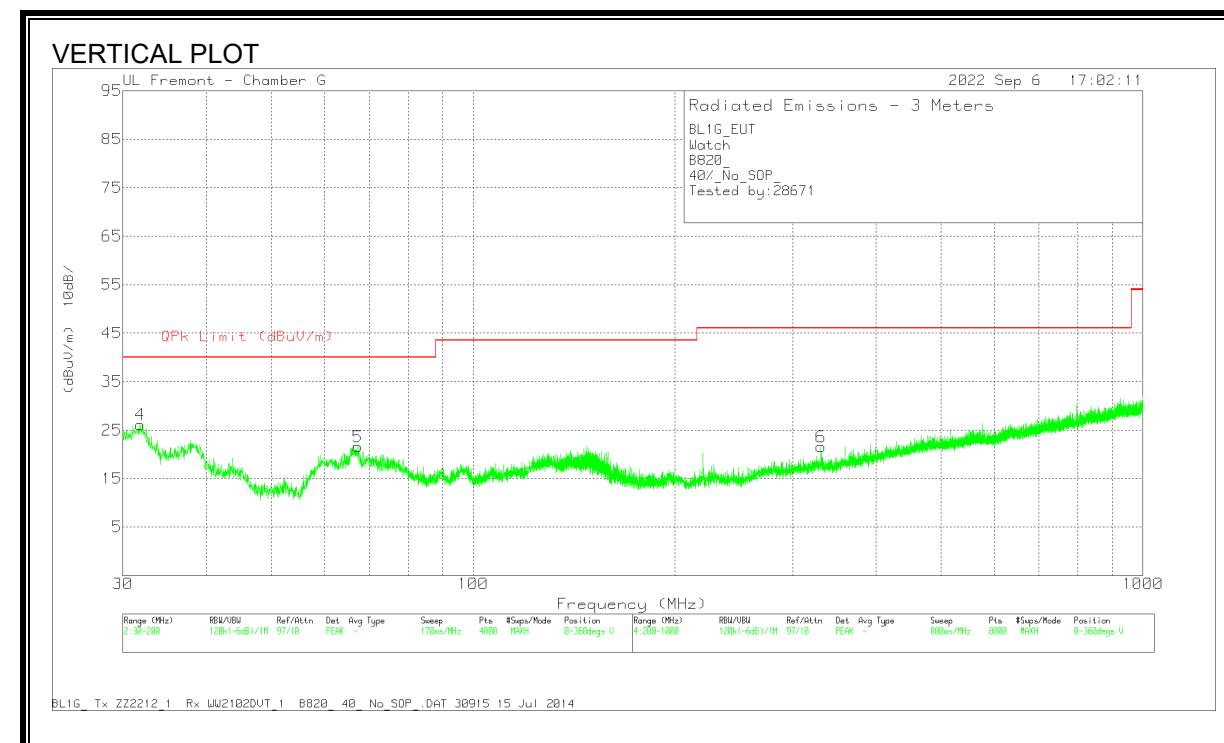
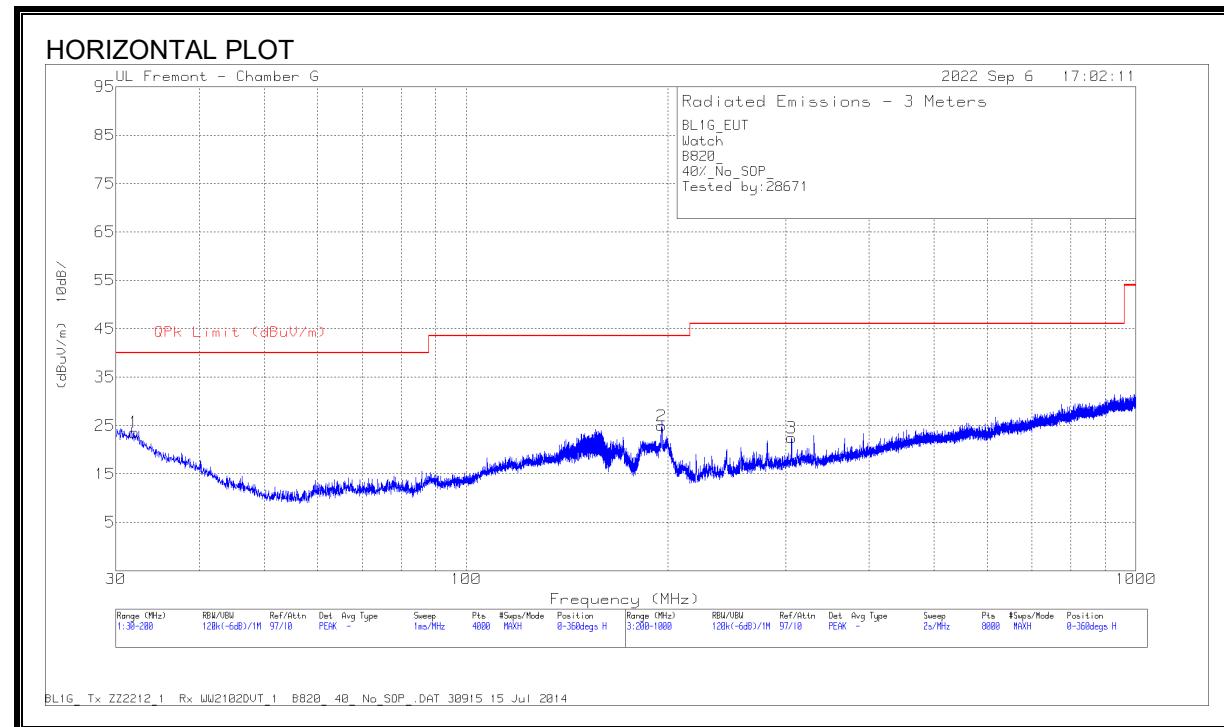


DATA

Marker	Frequenc y (MHz)	Meter Reading (dBuV)	Det	Hybrid Antenna 204045 AF(dB/m)	Amp Cbl (dB)	Correcte d Reading (dBuV/m)	QPK Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 171.604	38.52	Pk	17.6	-30	26.12	43.52	-17.4	0-360	101	H
6	* 245.206	36.83	Pk	17.4	-29.4	24.83	46.02	-21.19	0-360	99	H
1	38.5447	32.05	Pk	20.5	-31.2	21.35	40	-18.65	0-360	100	V
2	66.8145	37	Pk	13.9	-30.9	20	40	-20	0-360	100	V
5	196.133	37.82	Pk	18.2	-29.8	26.22	43.52	-17.3	0-360	199	H
	196.15	35.86	Qp	18.2	-29.8	24.26	43.52	-19.26	2	174	H
3	220.603	36.24	Pk	16.7	-29.7	23.24	46.02	-22.78	0-360	199	V

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

OPERATING WITH WATCH at 326.5kHz Frequency



DATA

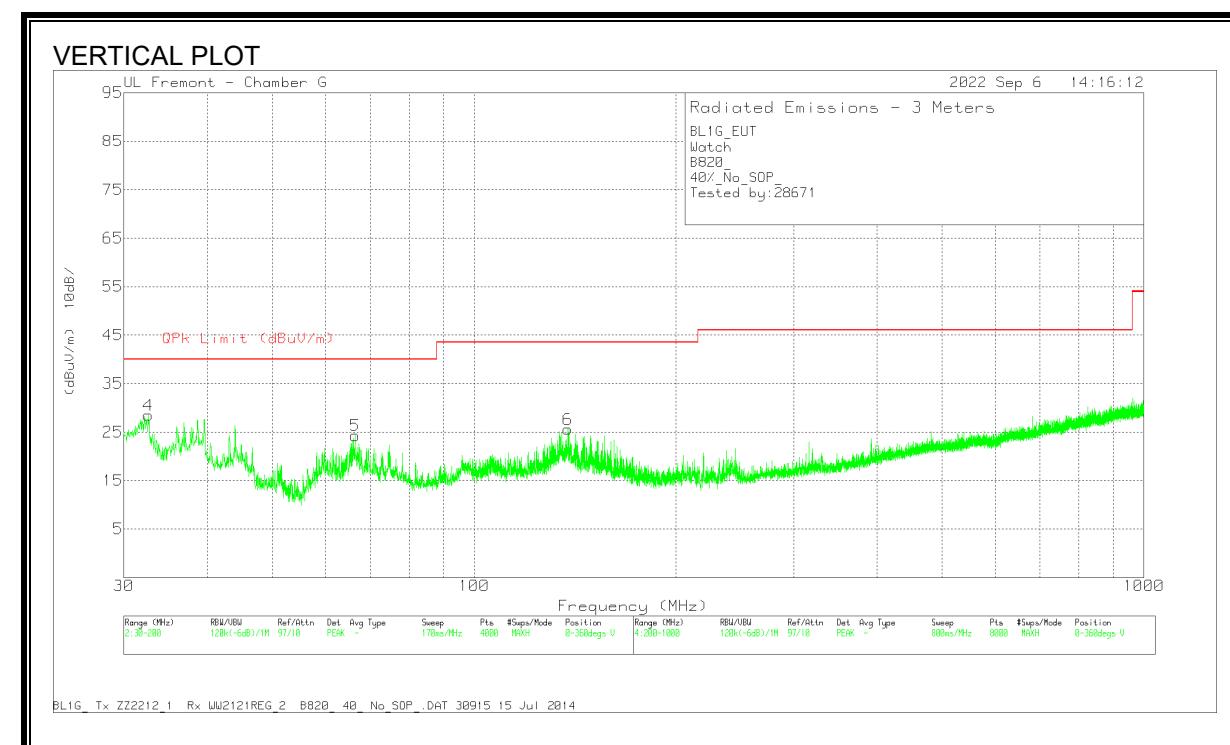
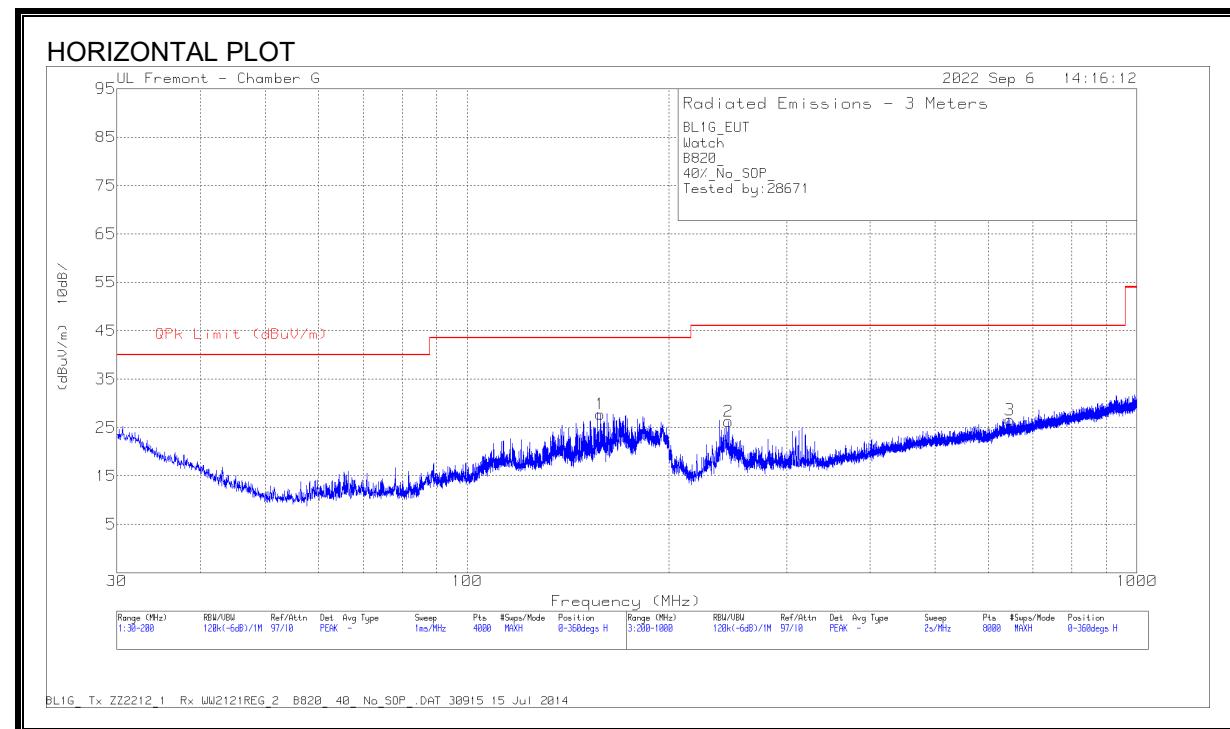
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Hybrid Antenna 204045 AF(dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
6	* 330.817	30.67	Pk	19.9	-29	21.57	46.02	-24.45	0-360	100	V
4	31.8705	31.33	Pk	26.1	-31.3	26.13	40	-13.87	0-360	100	V
	31.9905	26.83	Qp	26	-31.3	21.53	40	-18.47	154	162	V
1	31.9555	28.9	Pk	26	-31.3	23.6	40	-16.4	0-360	101	H
5	67.2822	38.58	Pk	13.9	-30.9	21.58	40	-18.42	0-360	100	V
2	195.878	36.55	Pk	18.2	-29.8	24.95	43.52	-18.57	0-360	199	H
3	306.214	32.08	Pk	19.6	-29.2	22.48	46.02	-23.54	0-360	100	H

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

Pk - Peak detector

Qp - Quasi-Peak detector

OPERATING WITH WATCH at 1.778MHz Frequency



DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Hybrid Antenna 204045 AF(dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
6	* 137.978	36.56	Pk	19.2	-30.2	25.56	43.52	-17.96	0-360	100	V
2	* 245.506	38.39	Pk	17.4	-29.5	26.29	46.02	-19.73	0-360	99	H
4	32.6357	34.66	Pk	25.1	-31.3	28.46	40	-11.54	0-360	100	V
	32.0867	24.66	Qp	25.9	-31.3	19.26	40	-20.74	173	361	V
5	66.4744	41.29	Pk	13.9	-30.9	24.29	40	-15.71	0-360	100	V
1	158.213	39.48	Pk	18.4	-30.1	27.78	43.52	-15.74	0-360	199	H
3	645.758	28.71	Pk	25.7	-27.8	26.61	46.02	-19.41	0-360	299	H

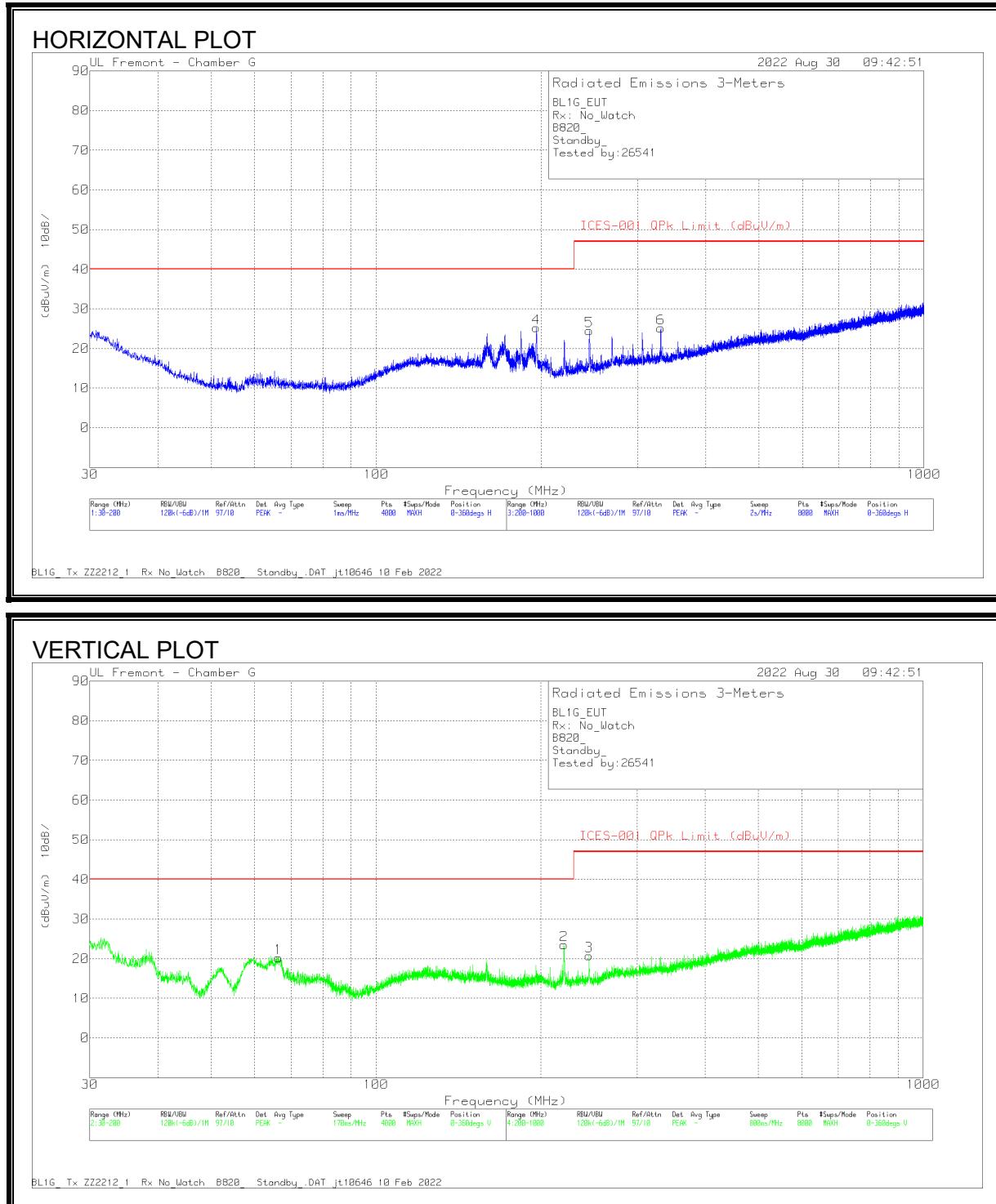
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK – Peak Detector

Qp - Quasi-Peak detector

8.1.4. IC / CISPR11 TX SPURIOUS EMISSION 30 TO 1000 MHz

STANDBY CONFIGURATION at 326.5kHz Frequency



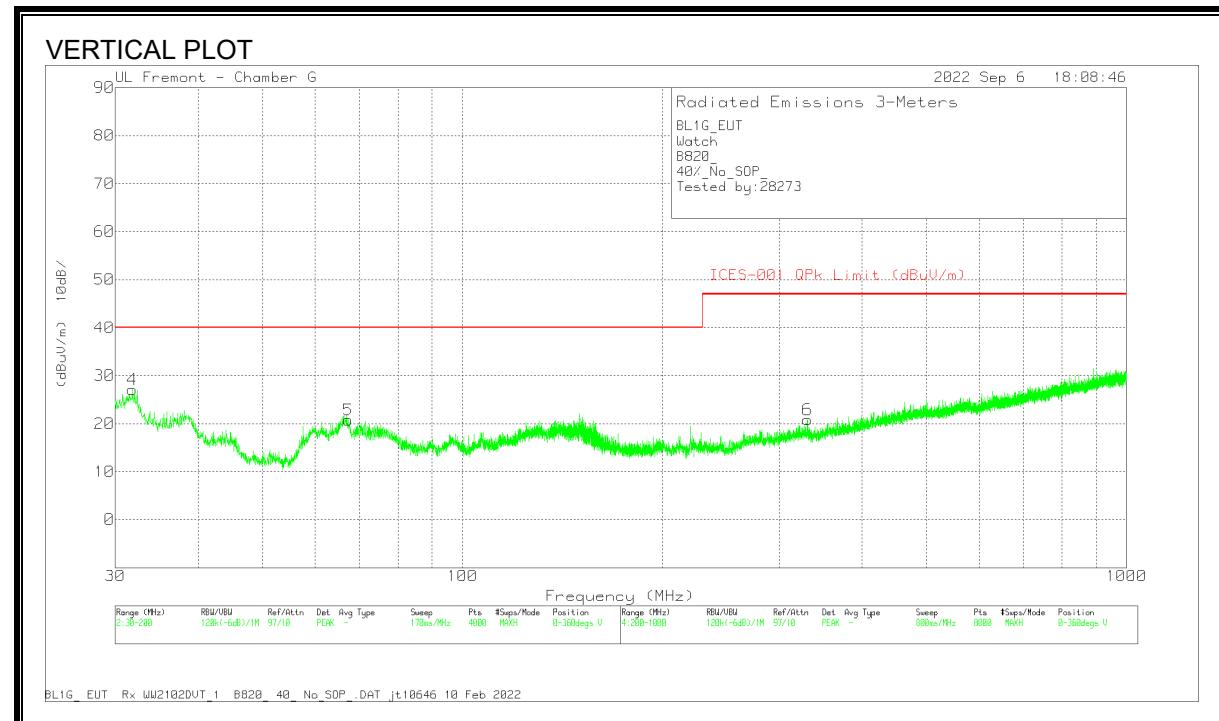
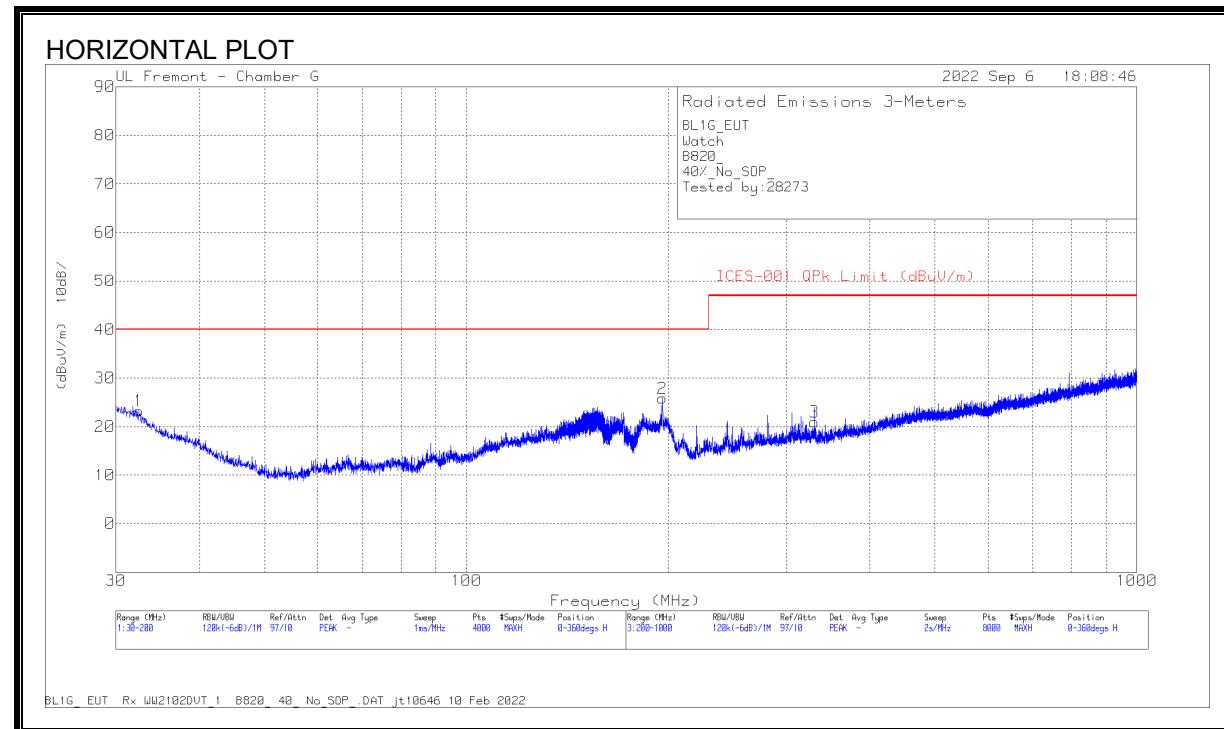
DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Hybrid Antenna 204045 AF(dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	ICES-001 QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	66.3894	37.26	Pk	13.9	-30.9	20.26	40	-19.74	0-360	100	V
4	196.005	36.82	Pk	18.2	-29.8	25.22	40	-14.78	0-360	200	H
	196.127	33.54	Qp	18.2	-29.8	21.94	40	-18.06	331	196	H
2	220.603	36.53	Pk	16.7	-29.7	23.53	40	-16.47	0-360	199	V
5	244.906	36.51	Pk	17.4	-29.4	24.51	47	-22.49	0-360	100	H
3	245.106	32.75	Pk	17.4	-29.4	20.75	47	-26.25	0-360	199	V
6	330.917	34.28	Pk	19.9	-29	25.18	47	-21.82	0-360	100	H

PK – Peak Detector

Qp - Quasi-Peak detector

OPERATING WITH WATCH at 326.5kHz Frequency



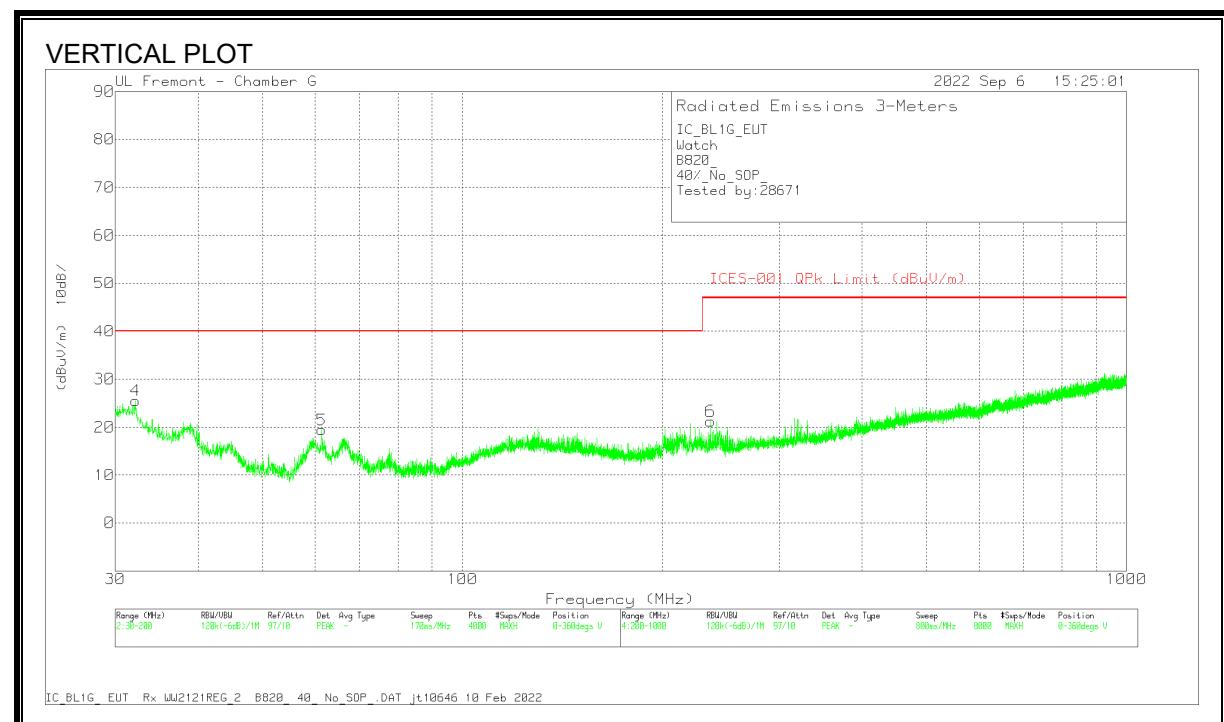
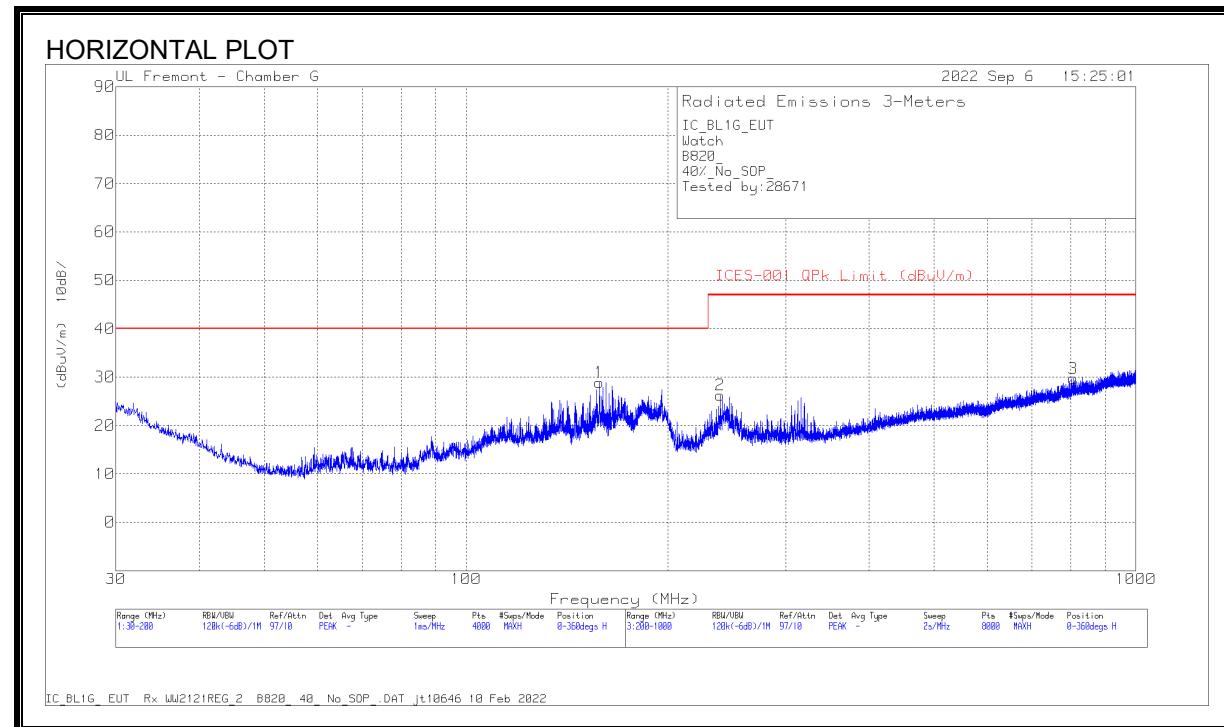
DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Hybrid Antenna 204045 AF(dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	ICES-001 QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	31.828	32.33	Pk	26.1	-31.3	27.13	40	-12.87	0-360	100	V
	31.849	27.66	Qp	26.1	-31.3	22.46	40	-17.54	184	103	V
1	32.4656	29.25	Pk	25.3	-31.3	23.25	40	-16.75	0-360	86	H
5	67.2822	37.8	Pk	13.9	-30.9	20.8	40	-19.2	0-360	100	V
2	196.005	37.43	Pk	18.2	-29.8	25.83	40	-14.17	0-360	199	H
3	330.717	30.09	Pk	19.9	-29	20.99	47	-26.01	0-360	99	H
6	330.917	29.98	Pk	19.9	-29	20.88	47	-26.12	0-360	100	V

Pk - Peak detector

Qp - Quasi-Peak detector

OPERATING WITH WATCH at 1.778MHz Frequency



DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Hybrid Antenna 204045 AF(dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	ICES-001 QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	32.2106	31.15	Pk	25.7	-31.3	25.55	40	-14.45	0-360	100	V
5	61.4156	36.96	Pk	13.5	-31	19.46	40	-20.54	0-360	100	V
1	158.213	40.59	Pk	18.4	-30.1	28.89	40	-11.11	0-360	199	H
	158.210	27.84	Qp	18.6	-30.1	16.34	40	-23.66	7	186	H
6	236.405	33.46	Pk	17.3	-29.5	21.26	47	-25.74	0-360	199	V
2	239.505	38.5	Pk	17.4	-29.6	26.3	47	-20.7	0-360	99	H
3	806.179	29.51	Pk	27.4	-27.2	29.71	47	-17.29	0-360	99	H

Pk - Peak detector

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 (dB μ V)	
	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	Appliances rated 100 V, without an earth connection	All other appliances Quasi-peak (dB μ V)	All other appliances Average (dB μ V)
	Quasi-peak (dB μ V)	Average (dB μ V)		
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 dB μ V 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.

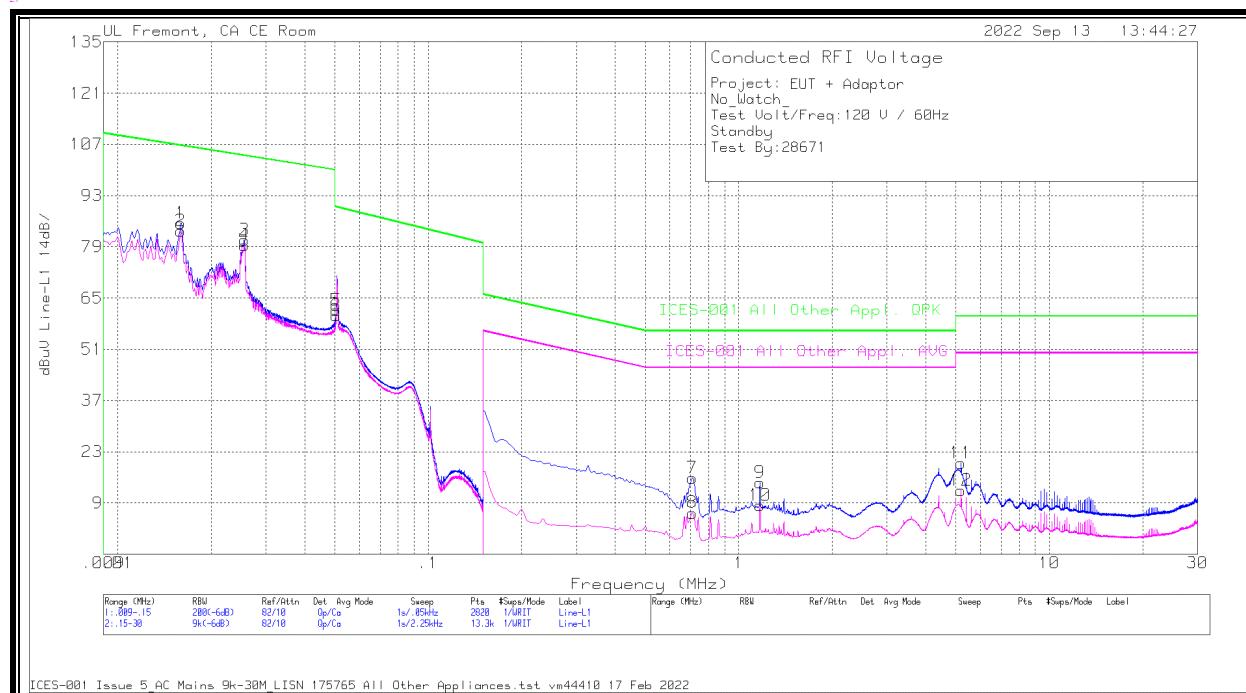
Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

Testing range from 9kHz to 30MHz using ICES-001 Issue Table 1 “All other appliances” limit to cover both FCC and ISED frequency range.

9.1.1. STANDBY MODE POWERED BY AC/DC ADAPTER

LINE 1 RESULTS



WORST EMISSIONS

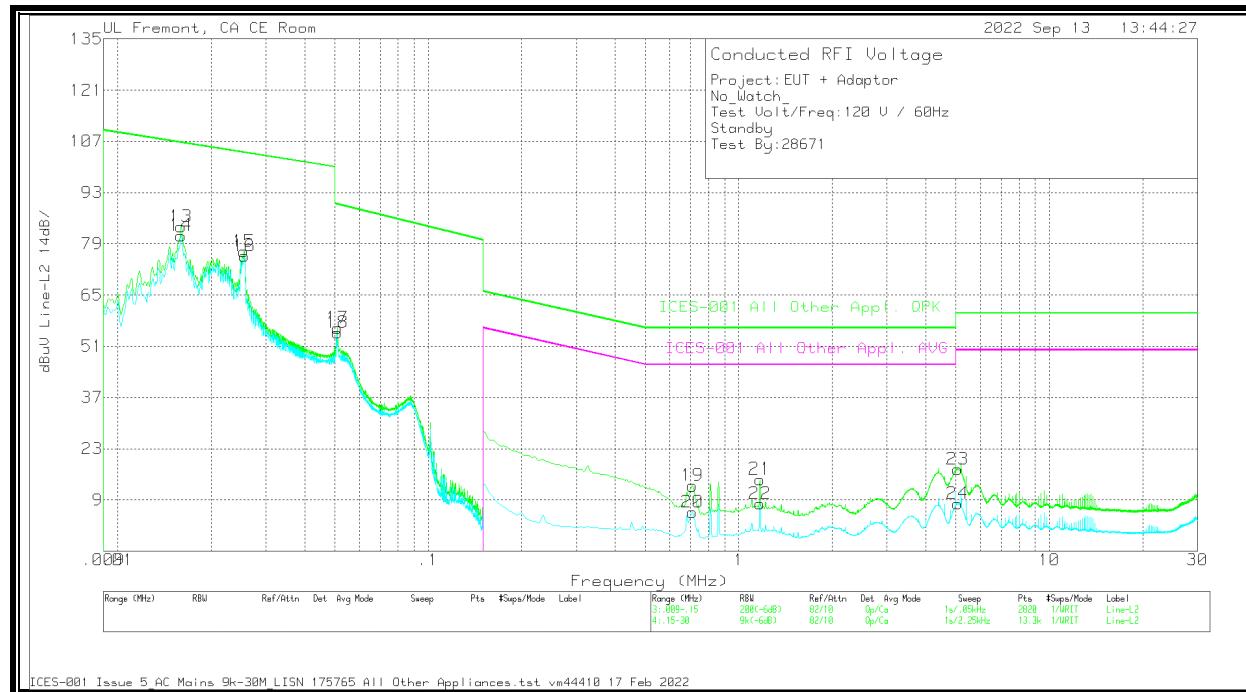
Range 1: Line-L1 .009 - .15MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	175765 LISN L1 (dB)	C1&C3 cable path loss (dB)	207996 Limiter with short cable (dB)	Corrected Reading dBuV	ICES-001 All Other Appl. QPK dBuV	Margin (dB)	ICES-001 All Other Appl. AVG dBuV	Margin (dB)
2	.016	69.62	Ca	2.8	0	10.9	83.32	-	-	-	-
4	.0256	67.19	Ca	1.5	0	10.8	79.49	-	-	-	-
6	.0506	49.9	Ca	.4	0	9.9	60.2	-	-	-	-
1	.016	71.83	Qp	2.8	0	10.9	85.53	106.66	-21.13	-	-
3	.0256	68.56	Qp	1.5	0	10.8	80.86	103.92	-23.06	-	-
5	.0506	51.39	Qp	.4	0	9.9	61.69	89.9	-28.21	-	-

Range 2: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	175765 LISN L1 (dB)	C1&C3 cable path loss (dB)	207996 Limiter with short cable (dB)	Corrected Reading dBuV	ICES-001 All Other Appl. QPK dBuV	Margin (dB)	ICES-001 All Other Appl. AVG dBuV	Margin (dB)
8	.708	-3.1	Ca	0	.1	9.3	6.3	-	-	46	-39.7
10	1.1693	-.98	Ca	0	.1	9.3	8.42	-	-	46	-37.58
12	5.199	3.11	Ca	0	.1	9.3	12.51	-	-	50	-37.49
7	.7103	6.44	Qp	0	.1	9.3	15.84	56	-40.16	-	-
9	1.1693	5.11	Qp	0	.1	9.3	14.51	56	-41.49	-	-
11	5.199	10.42	Qp	0	.1	9.3	19.82	60	-40.18	-	-

Qp - Quasi-Peak detector

Ca - CISPR average detection

LINE 2 RESULTS



WORST EMISSIONS

Range 3: Line-L2 .009 - .15MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	175765 LISN L2 (dB)	C2&C3 cable path loss (dB)	207996 Limiter with short cable (dB)	Corrected Reading dBuV	ICES-001 All Other Appl. QPK dBuV	Margin (dB)	ICES-001 All Other Appl. AVG dBuV	Margin (dB)
14	.016	67.89	Ca	2.5	0	10.9	81.29	-	-	-	-
16	.0256	63.52	Ca	1.4	0	10.8	75.72	-	-	-	-
18	.0509	44.53	Ca	.3	0	9.9	54.73	-	-	-	-
13	.016	70.27	Qp	2.5	0	10.9	83.67	106.64	-22.97	-	-
15	.0255	64.79	Qp	1.4	0	10.8	76.99	103.93	-26.94	-	-
17	.051	45.76	Qp	.3	0	9.9	55.96	89.83	-33.87	-	-

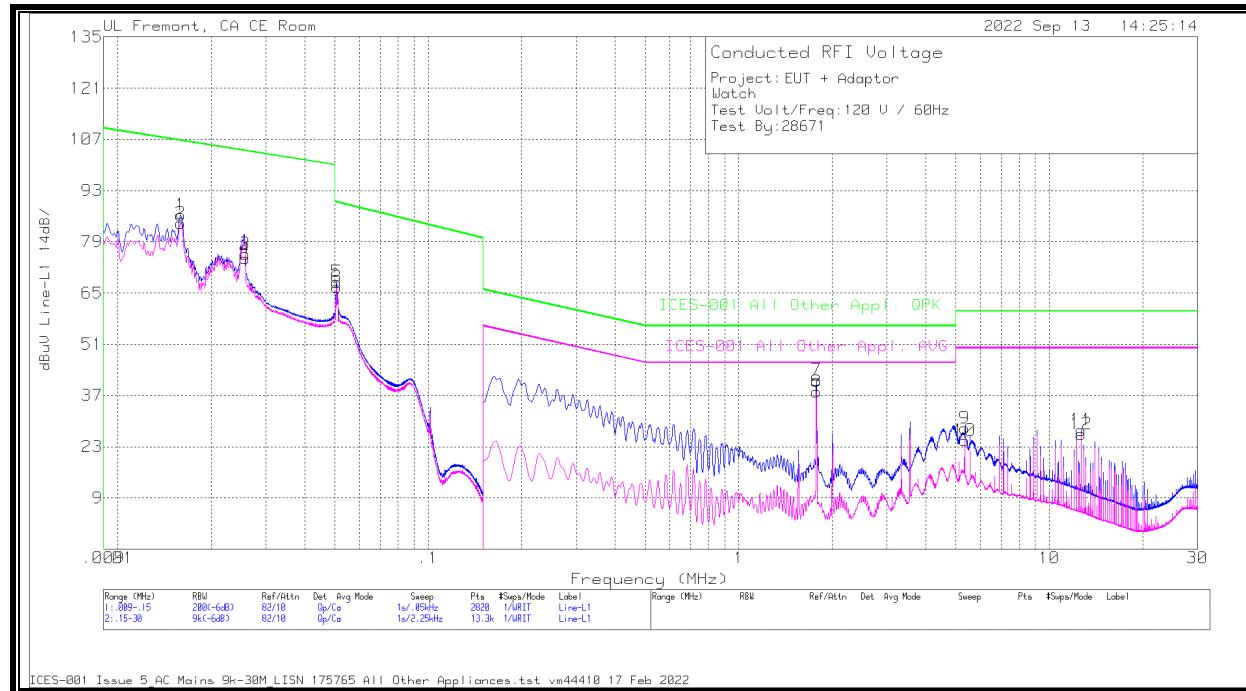
Range 4: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	175765 LISN L2 (dB)	C2&C3 cable path loss (dB)	207996 Limiter with short cable (dB)	Corrected Reading dBuV	ICES-001 All Other Appl. QPK dBuV	Margin (dB)	ICES-001 All Other Appl. AVG dBuV	Margin (dB)
20	.708	-3.77	Ca	0	.1	9.3	5.63	-	-	46	-40.37
22	1.1693	-1.38	Ca	0	.1	9.3	8.02	-	-	46	-37.98
24	5.0595	-1.39	Ca	0	.1	9.3	8.01	-	-	50	-41.99
19	.708	3.48	Qp	0	.1	9.3	12.88	56	-43.12	-	-
21	1.1693	5.25	Qp	0	.1	9.3	14.65	56	-41.35	-	-
23	5.0573	8.02	Qp	0	.1	9.3	17.42	60	-42.58	-	-

Qp - Quasi-Peak detector

Ca - CISPR average detection

9.1.2. OPERATING MODE (1.778MHz) WITH WATCH POWERED BY AC/DC ADAPTER

LINE 1 RESULTS



WORST EMISSIONS

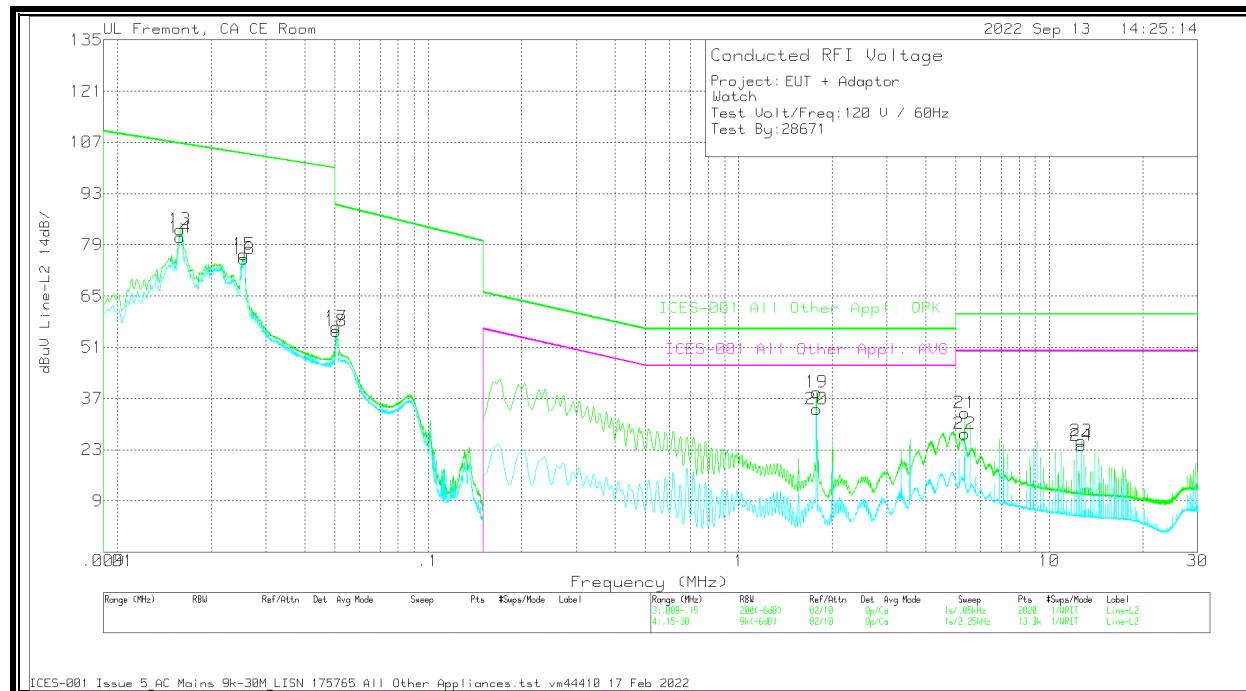
Range 1: Line-L1 .009 - .15MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	175765 LISN L1 (dB)	C1&C3 cable path loss (dB)	207996 Limiter with short cable (dB)	Corrected Reading dBuV	ICES-001 All Other Appl. QPK dBuV	Margin (dB)	ICES-001 All Other Appl. AVG dBuV	Margin (dB)
2	.016	70.33	Ca	2.8	0	10.9	84.03	-	-	-	-
4	.0258	62.16	Ca	1.5	0	10.8	74.46	-	-	-	-
6	.0507	56.39	Ca	.4	0	9.9	66.69	-	-	-	-
1	.016	72.7	Qp	2.8	0	10.9	86.4	106.66	-20.26	-	-
3	.0258	63.43	Qp	1.5	0	10.8	75.73	103.87	-28.14	-	-
5	.0507	57.67	Qp	.4	0	9.9	67.97	89.88	-21.91	-	-

Range 2: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	175765 LISN L1 (dB)	C1&C3 cable path loss (dB)	207996 Limiter with short cable (dB)	Corrected Reading dBuV	ICES-001 All Other Appl. QPK dBuV	Margin (dB)	ICES-001 All Other Appl. AVG dBuV	Margin (dB)
8	1.7768	28.62	Ca	0	.1	9.3	38.02	-	-	46	-7.98
10	5.334	15.27	Ca	0	.1	9.3	24.67	-	-	50	-25.33
12	12.6668	16.93	Ca	.1	.2	9.3	26.53	-	-	50	-23.47
7	1.7768	31.83	Qp	0	.1	9.3	41.23	56	-14.77	-	-
9	5.334	18.68	Qp	0	.1	9.3	28.08	60	-31.92	-	-
11	12.6668	17.98	Qp	.1	.2	9.3	27.58	60	-32.42	-	-

Qp - Quasi-Peak detector

Ca - CISPR average detection

LINE 2 RESULTS



WORST EMISSIONS

Range 3: Line-L2 .009 - .15MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	175765 LISN L2 (dB)	C2&C3 cable path loss (dB)	207996 Limiter with short cable (dB)	Corrected Reading dBuV	ICES-001 All Other Appl. QPK dBuV	Margin (dB)	ICES-001 All Other Appl. AVG dBuV	Margin (dB)
14	.0159	67.58	Ca	2.5	0	10.9	80.98	-	-	-	-
16	.0255	63	Ca	1.4	0	10.8	75.2	-	-	-	-
18	.0506	45.25	Ca	.3	0	9.9	55.45	-	-	-	-
13	.0159	69.71	Qp	2.5	0	10.9	83.11	106.68	-23.57	-	-
15	.0255	64.27	Qp	1.4	0	10.8	76.47	103.93	-27.46	-	-
17	.0506	46.38	Qp	.3	0	9.9	56.58	89.9	-33.32	-	-

Range 4: Line-L2 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	175765 LISN L2 (dB)	C2&C3 cable path loss (dB)	207996 Limiter with short cable (dB)	Corrected Reading dBuV	ICES-001 All Other Appl. QPK dBuV	Margin (dB)	ICES-001 All Other Appl. AVG dBuV	Margin (dB)
20	1.7768	24.65	Ca	0	.1	9.3	34.05	-	-	46	-11.95
22	5.334	17.89	Ca	0	.1	9.3	27.29	-	-	50	-22.71
24	12.6668	14.59	Ca	.1	.2	9.3	24.19	-	-	50	-25.81
19	1.7768	29.36	Qp	0	.1	9.3	38.76	56	-17.24	-	-
21	5.334	23.62	Qp	0	.1	9.3	33.02	60	-26.98	-	-
23	12.6668	15.84	Qp	.1	.2	9.3	25.44	60	-34.56	-	-

Qp - Quasi-Peak detector

Ca - CISPR average detection

9.1.3. OPERATING MODE (326.5kHz) WITH WATCH POWERED BY AC/DC ADAPTER

LINE 1 RESULTS



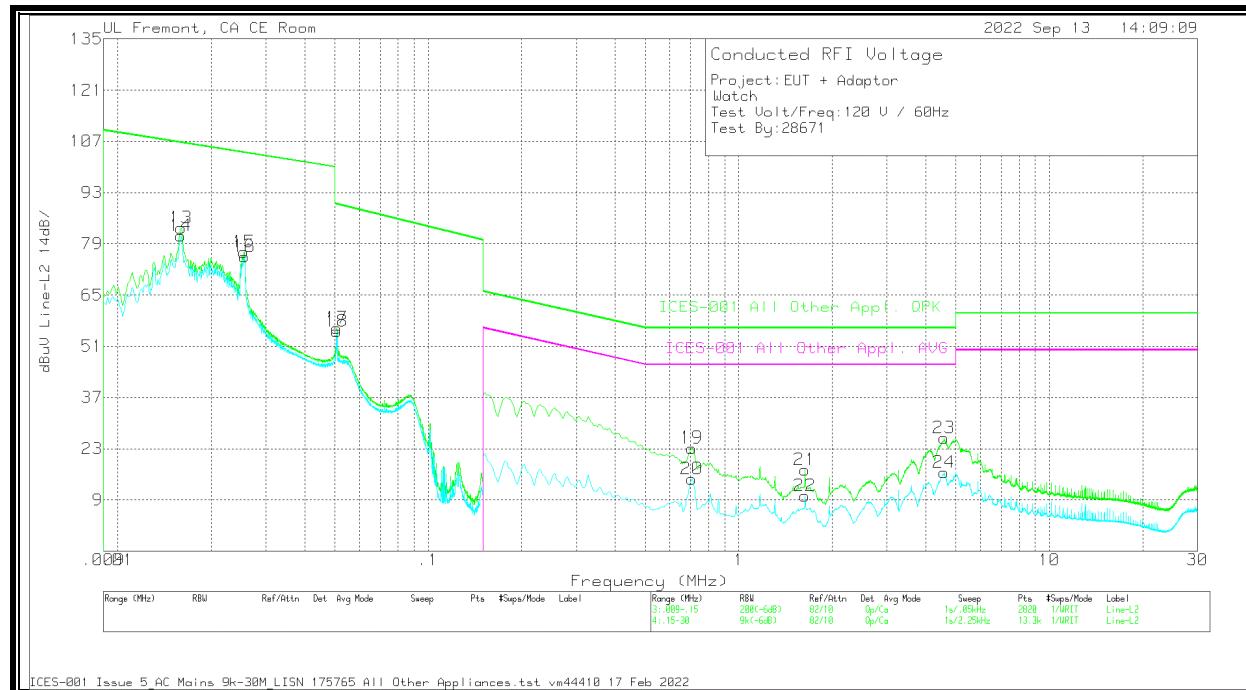
WORST EMISSIONS

Range 1: Line-L1 0.009 - .15MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	175765 LISN L1 (dB)	C1&C3 cable path loss (dB)	207996 Limiter with short cable (dB)	Corrected Reading dBuV	ICES-001 All Other Appl. QPK dBuV	Margin (dB)	ICES-001 All Other Appl. AVG dBuV	Margin (dB)
2	.0161	69.01	Ca	2.7	0	10.9	82.61	-	-	-	-
4	.0255	67.07	Ca	1.5	0	10.8	79.37	-	-	-	-
6	.0509	57.44	Ca	.3	0	9.9	67.64	-	-	-	-
1	.0161	71.55	Qp	2.7	0	10.9	85.15	106.61	-21.46	-	-
3	.0256	68.42	Qp	1.5	0	10.8	80.72	103.92	-23.2	-	-
5	.0508	58.23	Qp	.4	0	9.9	68.53	89.86	-21.33	-	-

Range 2: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	175765 LISN L1 (dB)	C1&C3 cable path loss (dB)	207996 Limiter with short cable (dB)	Corrected Reading dBuV	ICES-001 All Other Appl. QPK dBuV	Margin (dB)	ICES-001 All Other Appl. AVG dBuV	Margin (dB)
8	.6945	2.14	Ca	0	.1	9.3	11.54	-	-	46	-34.46
10	1.6328	2.1	Ca	0	.1	9.3	11.5	-	-	46	-34.5
12	4.5713	8.31	Ca	0	.1	9.3	17.71	-	-	46	-28.29
7	.6923	12.83	Qp	0	.1	9.3	22.23	56	-33.77	-	-
9	1.6328	6.94	Qp	0	.1	9.3	16.34	56	-39.66	-	-
11	4.5713	16.5	Qp	0	.1	9.3	25.9	56	-30.1	-	-

Qp - Quasi-Peak detector
Ca - CISPR average detection

LINE 2 RESULTS



WORST EMISSIONS

Range 3: Line-L2 .009 - .15MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	175765 LISN L2 (dB)	C2&C3 cable path loss (dB)	207996 Limiter with short cable (dB)	Corrected Reading dBuV	ICES-001 All Other Appl. QPK dBuV	Margin (dB)	ICES-001 All Other Appl. AVG dBuV	Margin (dB)
14	.016	67.73	Ca	2.5	0	10.9	81.13	-	-	-	-
16	.0256	63.4	Ca	1.4	0	10.8	75.6	-	-	-	-
18	.0509	44.81	Ca	.3	0	9.9	55.01	-	-	-	-
13	.016	70	Qp	2.5	0	10.9	83.4	106.64	-23.24	-	-
15	.0255	64.56	Qp	1.4	0	10.8	76.76	103.93	-27.17	-	-
17	.0509	45.69	Qp	.3	0	9.9	55.89	89.85	-33.96	-	-

Range 4: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	175765 LISN L2 (dB)	C2&C3 cable path loss (dB)	207996 Limiter with short cable (dB)	Corrected Reading dBuV	ICES-001 All Other Appl. QPK dBuV	Margin (dB)	ICES-001 All Other Appl. AVG dBuV	Margin (dB)
20	.7069	5.31	Ca	0	.1	9.3	14.71	-	-	46	-31.29
22	1.6328	.64	Ca	0	.1	9.3	10.04	-	-	46	-35.96
24	4.5713	7.1	Ca	0	.1	9.3	16.5	-	-	46	-29.5
19	.7058	13.78	Qp	0	.1	9.3	23.18	56	-32.82	-	-
21	1.6328	7.85	Qp	0	.1	9.3	17.25	56	-38.75	-	-
23	4.5713	16.48	Qp	0	.1	9.3	25.88	56	-30.12	-	-

Qp - Quasi-Peak detector

Ca - CISPR average detection

10. SETUP PHOTO

Please refer to 14499781-EP1V1 for setup photos

END OF TEST REPORT