CERTIFICATION TEST REPORT

Report Number. : 13371062-E2V3

Applicant	:	APPLE INC. 1 APPLE PARK WAY CUPERTINO, CA 95014, U.S.A
Model	:	A2458
FCC ID	:	BCGA2458
IC	:	579C-A2458
EUT Description	:	TWO COIL CHARGER
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C ISED RSS-216 ISSUE 2

Date Of Issue:
October 22, 2020

Prepared by:
UL Verification Services Inc.
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Fremont, CA 94538 U.S.A.
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NVLAP TESTING

NVLAP Lab code: 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	10/14/2020	Initial Issue	Chin Pang
V2	10/19/2020	Address TCB's Questions	Chin Pang
V3	10/22/2020	Address TCB's Questions	Chin Pang

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: TWO COIL CHARGER

MODEL: A2458

SERIAL NUMBER: DLCCM0CCQ4G2

DATE TESTED: SEPTEMBER 09, 2020 – OCTOBER 12, 2020

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
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Prepared By:

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, 414788 D01 Radiated Test Site v01r01, 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 were measured at 47658 Kato RD address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street	47658 Kato Rd.
☐ Chamber A (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)	☐ Chamber M (IC: 2324A-2)

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

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4. DECISION RULES AND MEASUREMENT 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. MEASUREMENT UNCERTAINTY

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

PARAMETER	U_{Lab}
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.39 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.07 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.52 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	4.88 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.24 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.37 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.17 dB

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

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5. EQUIPMENT UNDER TEST – Notes: watches operates at 326kHz

5.1. DESCRIPTION OF EUT

The EUT is a magnetic charger with two-coil charging mat designed to be capable of inductively charging up to two client devices at once. One coil is used for charging an iPhone or an AirPods Case while another coil is used for charging an Apple Watch. The charging function operates at 326.5kHz, 127.7kHz (Qi), and 360kHz. It supports charging at 5W, 7.5W, and 15W power operation. There is no internal battery.

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	1	30W Power Supply
2	DC	1	Magnetic 5 pin	Un-shielded	3	60W Power Supply
3	USB	1	Lightening	Un-shielded	1	Communication

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5.2. MAXIMUM E-FIELD AND H-FIELD STRENGTH

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

Fundamental Frequency (kHz)	Mode	E field (300m distance) FCC (dBuV/m)	H field (3m distance) IC (dBuA/m)
326	Standby mode	-26.78	2.91
360	Operating mode (New iPhone)	-14.87	14.47
127.7	Operating mode (Legacy iPhone)	-4.32	24.59
127.7	Operating mode (Airpods Charging Case)	3.14	16.65
326	Operating mode (iWatch)	-23.04	4.32
360	Operating Mode (360kHz iPhone/326kHz iWatch)	-15.14	13.57
127.7	Operating Mode (127kHz iPhone/326kHz iWatch)	-0.7	24.33

5.3. WORST-CASE CONFIGURATION

The EUT is a dual frequencies magnetic charger enclosed in a plastic case. The EUT + one and two loads configurations with both Flat and Folded positions were investigated, and the results for the worst case were EUT + one load and two loads with New phone +iWatch and AirPods + iWatch configurations at Flat position. For the entire radiated emissions test, the EUT was testing at flat position on the following configurations.

Config	Mode	Descriptions
1	Standby mode, Flat (EUT w/ 326kHz Fund & 360kHz/127.7kHz RSE)	EUT powered by AC/DC adapter via USB-C cable
2	Operating mode @ Flat (EUT w/360kHz Fund @15W)	EUT powered by AC/DC adapter via USB-C cable with iPhone (15W) at charging mode
3	Operating mode, Flat (EUT w/127.7kHz Fund @7.5W)	EUT powered by AC/DC adapter via USB-C cable with Legacy Phones (7.5W) at charging mode
4	Operating mode, Flat (EUT w/127.7kHz Fund @1W)	EUT powered by AC/DC adapter via USB-C cable airpods charging case (1W) at charging mode
5	Operating mode, Flat (EUT w/326kHz Fund @1W)	EUT powered by AC/DC adapter via USB-C cable with iWatch (1W) at charging mode
6	Operating mode, Flat (EUT w/360kHz iPhone @15W & 326kHz iWatch, @1W Fund)	EUT powered by AC/DC adapter via USB-C cable with iPhone (15W) & iWatch (1W) at charging mode
7	Operating mode ,Flat (EUT w/326kHz iWatch @1W & 127.7KHz Airpods @1W Fund)	EUT powered by AC/DC adapter via USB-C cable with AirPods (1W) & iWatch (1W) at charging mode

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EUT was tested as standby and operation modes. For worst case operational mode, EUT was tested with iPhones, with iPhone at 15W has a magnetic alignment and iPhones at 7.5W without magnetic alignment. Device being charged was at a state of <20 – 50% charged.

For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel); parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only.

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.

5.4. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
AC/DC adapter	Apple	A1882	C4H748200RXH80MAY	DoC
Phone	Apple	A2402	G6TD300804HV	BCG-E3542A
Legacy Phone	Apple	A2160	G39Z400JNGHV	BCG-E3305A
Airpods	Apple	A2190	DLCZ415LLKKT	BCG-A2084
Watch	Apple	A2292	GY6D302D03HW	BCG-A2292
Legacy Watch	Apple	A2095	FHLZ30VFMLF1	BCG-A2095

TEST SETUP

The EUT is directly connected to an AC/DC adapter via USB-C cable and magnetic connect to host phone on top of EUT.

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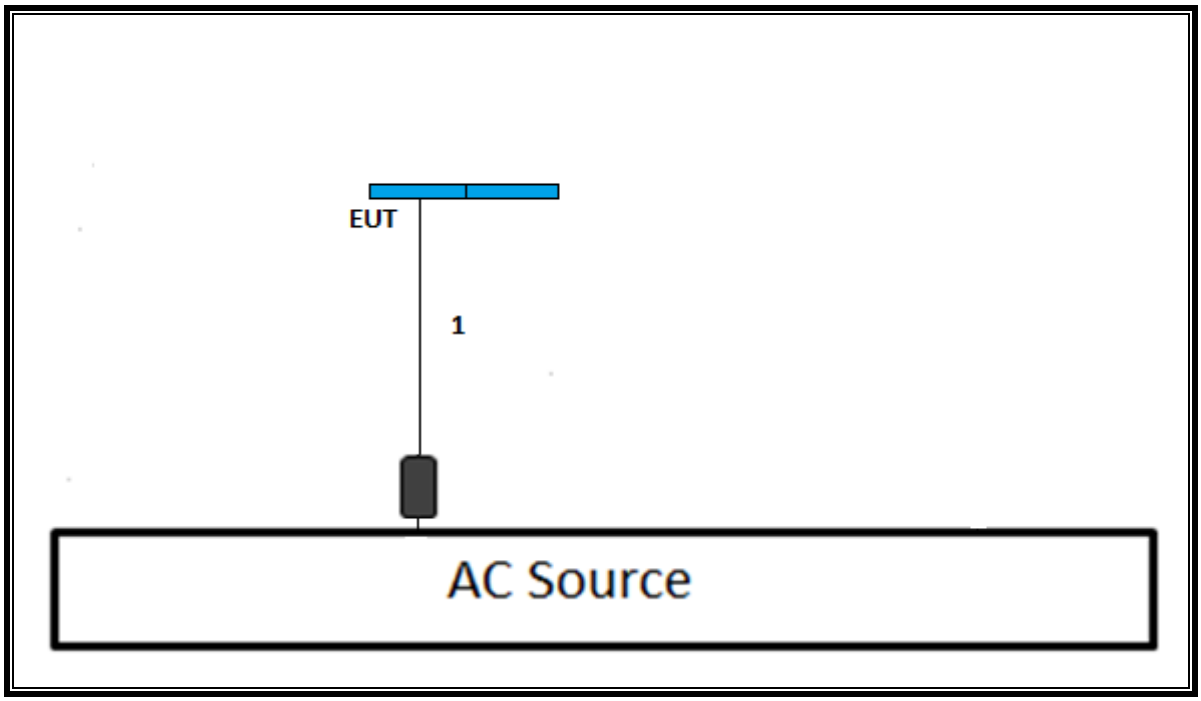
CONFIGURATION 1: STANDBY MODE



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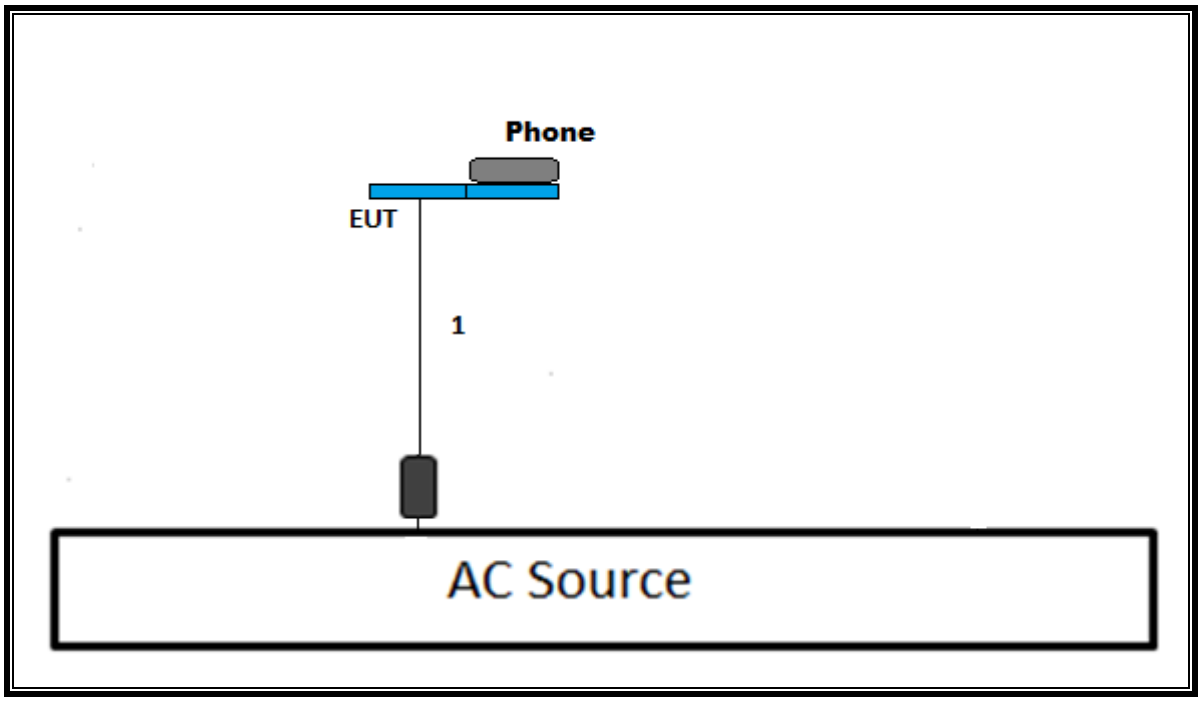
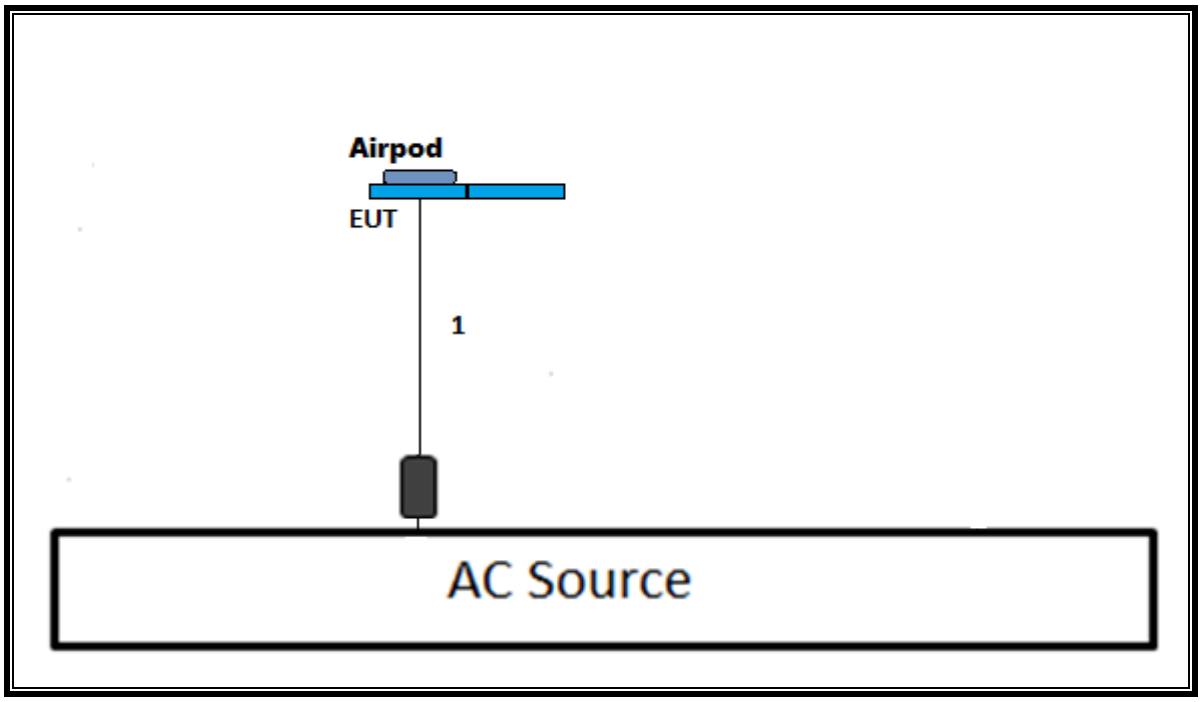
CONFIGURATION 2 & 3: OPERATING MODE WITH iPhone & Legacy Phone



CONFIGURATION 4: OPERATING MODE WITH Airpods



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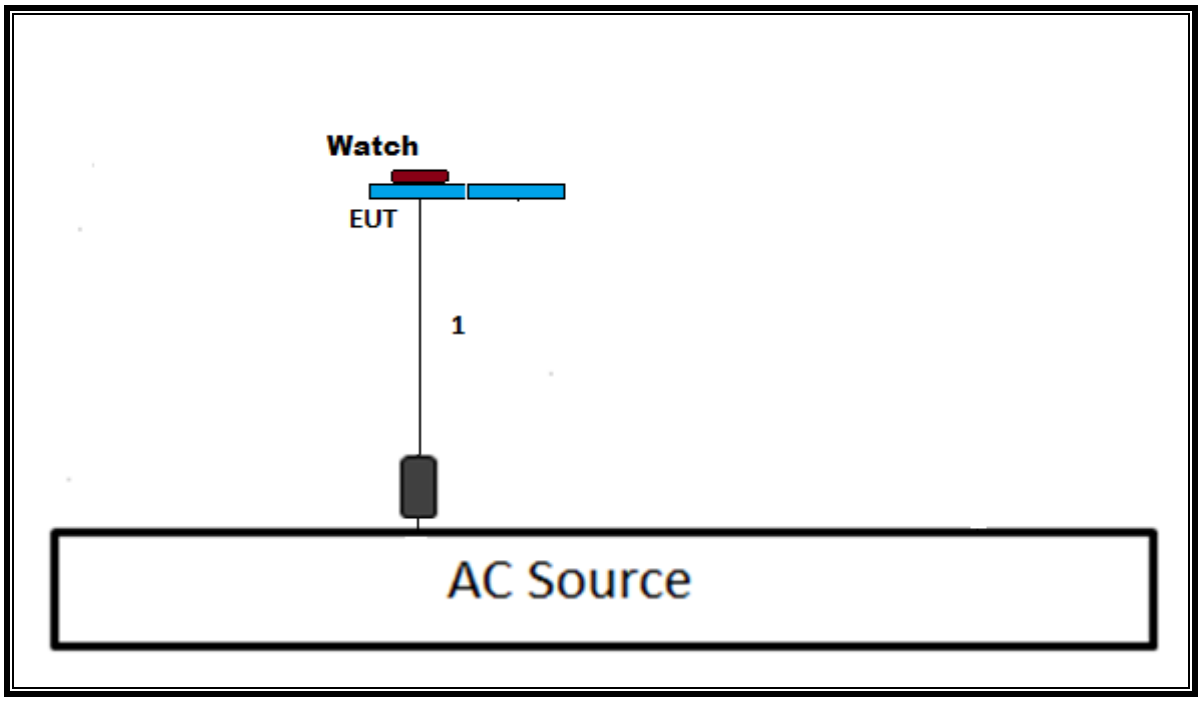
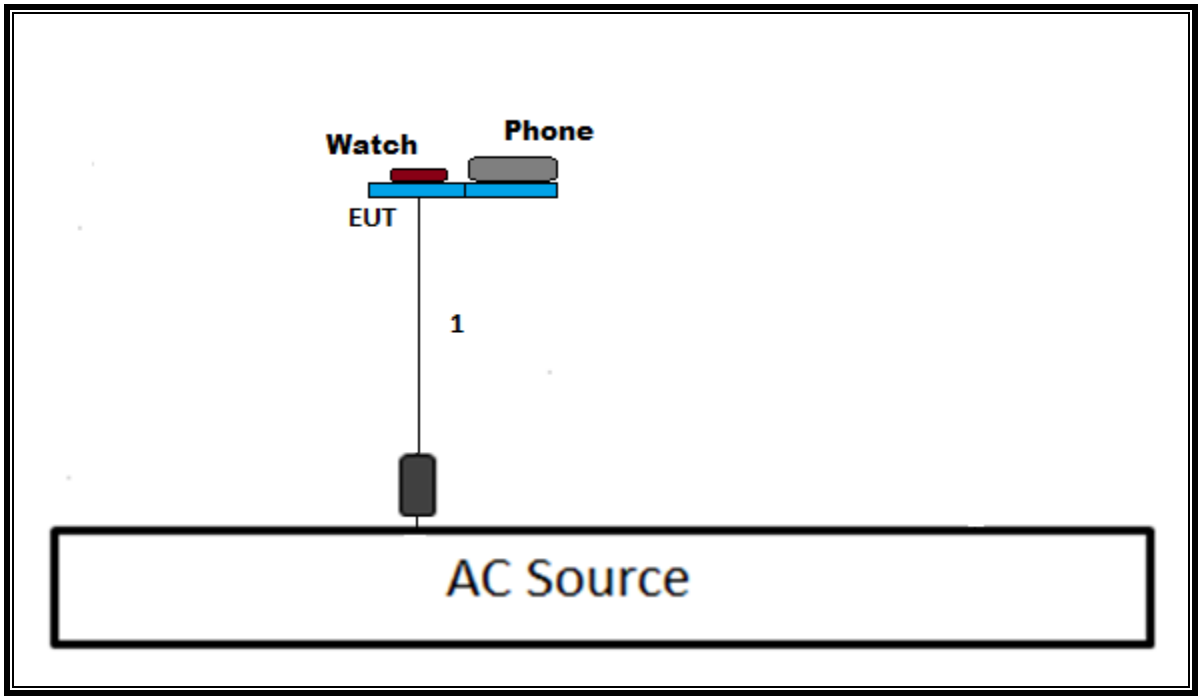
CONFIGURATION 5: OPERATING MODE WITH iWatch



CONFIGURATION 6: OPERATING MODE WITH iWatch & iPhone



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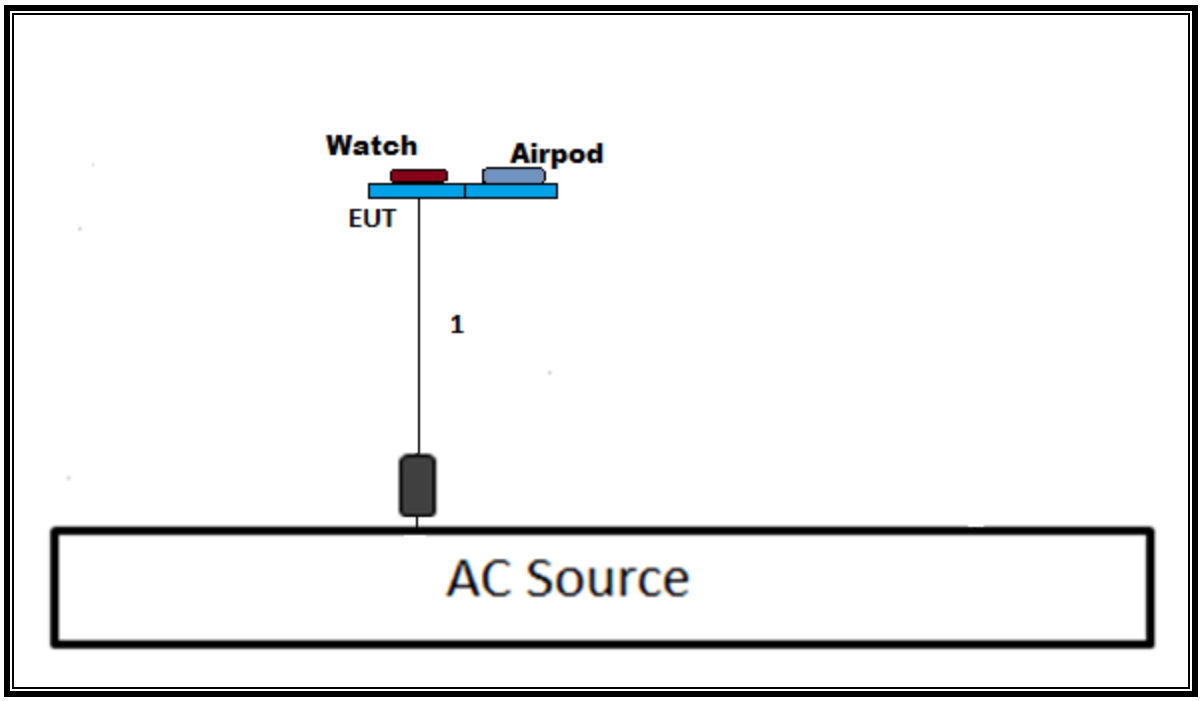
CONFIGURATION 7: OPERATING MODE WITH iWatch & Airpods



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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, Active Loop 9KHz to 30MHz	ETS-Lindgren	6502	T1616	10/28/2020	10/28/2019
Antenna, Broadband Hybrid, 30MHz to 2000MHz w/4dB	Sunol Sciences Crop.	JB1	T130	08/04/2021	08/04/2020
Amplifier, 10kHz to 1GHz, 32dB	Sonoma Instrument	310N	T834	07/14/2021	07/14/2020
Sniffer Probes	Electro Metrics	EM-6992	N/A	N/A	N/A
Environmental Chamber	Cincinnati Sub-Zero	ZPHS-8-3.5-SCT/WC	T754	12/22/2020	12/22/2019
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A-544	T917	01/28/2021	01/28/2020

AC Line Conducted					
Description	**Manufacturer**	**Model**	**ID Num**	**Cal Due**	**Last Cal**
EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESR	T1436	02/20/2021	02/20/2020
Power Cable, Line Conducted Emissions	UL	PR1	T861	10/27/2020	10/27/2019
LISN for Conducted Emissions CISPR-16	FISCHER CUSTOM COMMUNICATIONS	FCC-LISN-50/250-25-2-01	PRE0186446	01/23/2021	01/23/2020
UL AUTOMATION SOFTWARE					
Radiated Software	UL	UL EMC	Ver 9.5, Mar 6, 2020		
Conducted Software	UL	UL EMC	2020.2.26		
AC Line Conducted Software	UL	UL EMC	Ver 9.5, February 21, 2020		

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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.

EUT SETUP

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

Configuration 2: Charger with New iPhone in operating mode, transmitting at 360kHz test.

Configuration 3: Charger with Legacy Phone in operating mode, transmitting at 127.7kHz test.

Configuration 4: Charger with Airpod in operating mode, transmitting at 127.7kHz test

Configuration 5: 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 6: Charger in charging mode with CW signal and duty cycle varied to control charge level via load modulation from watch.

RESULTS

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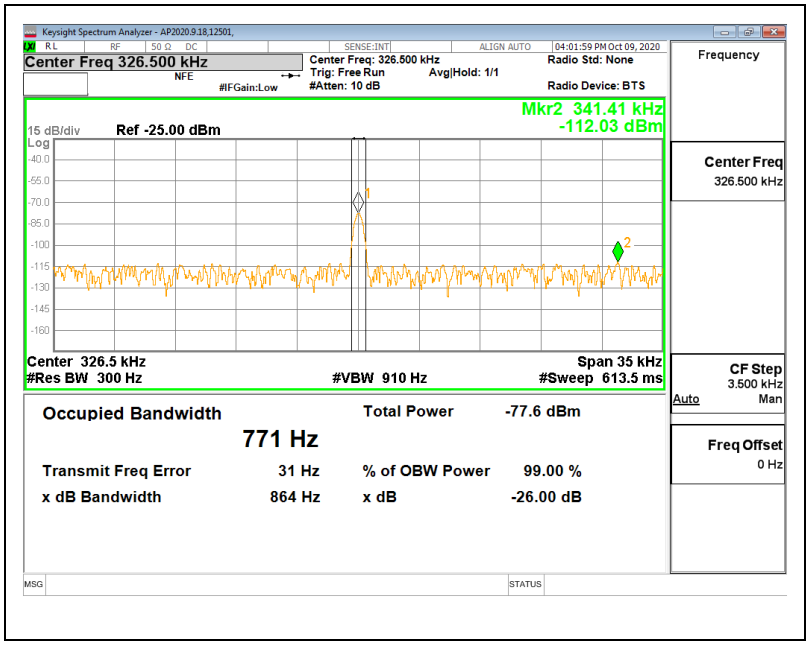
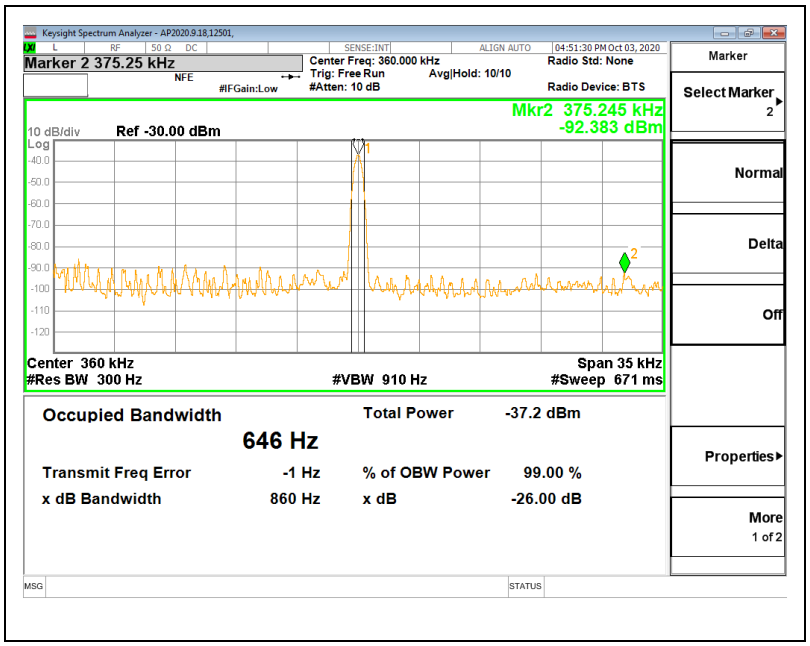
CONFIG 1



CONFIG, 2



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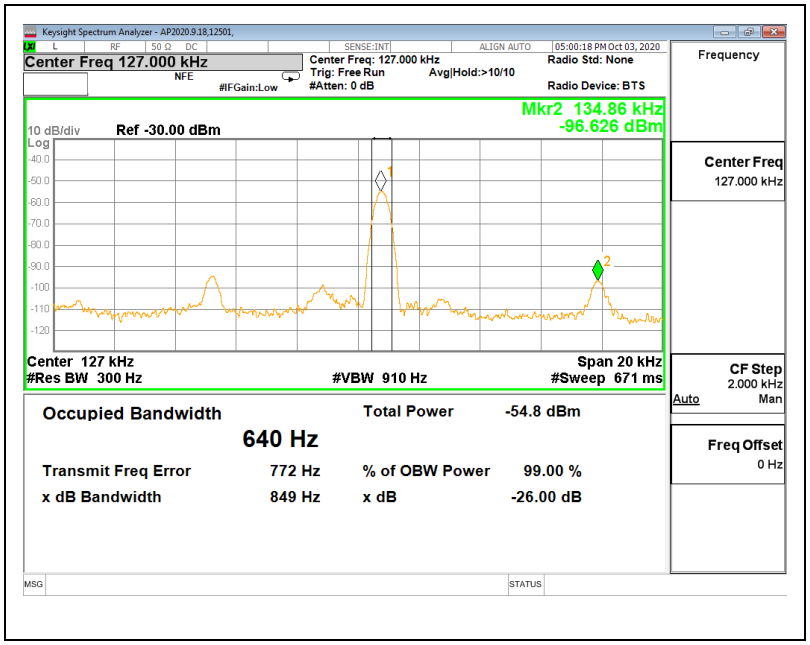
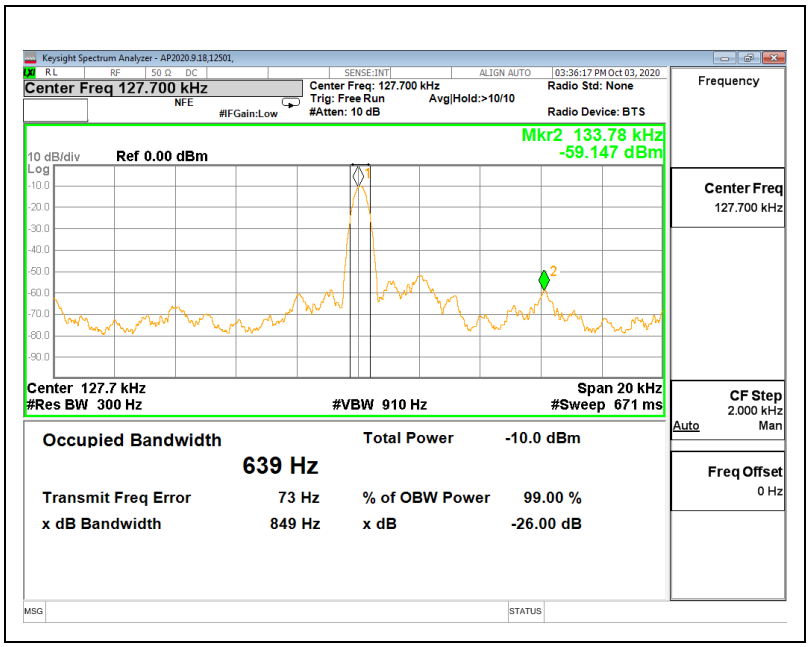
CONFIG 3



CONFIG 4



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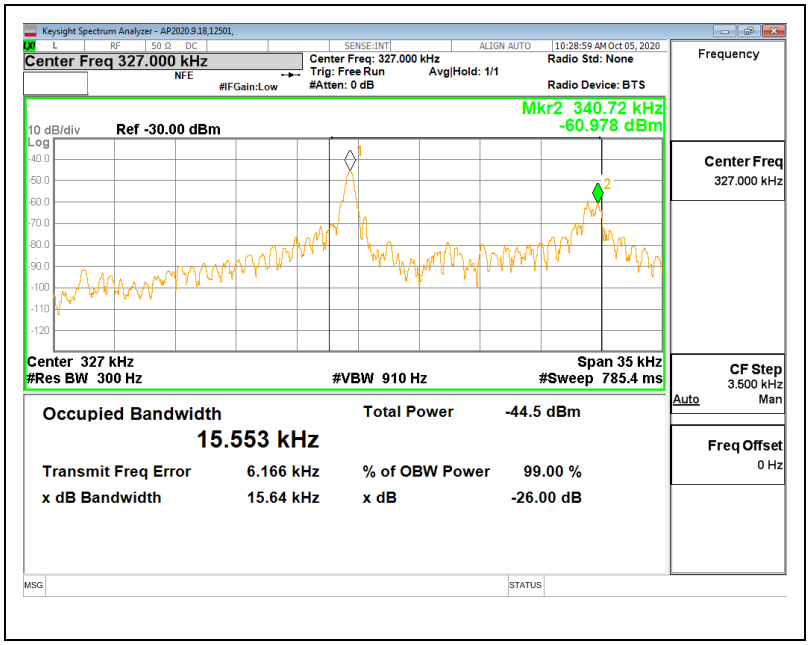
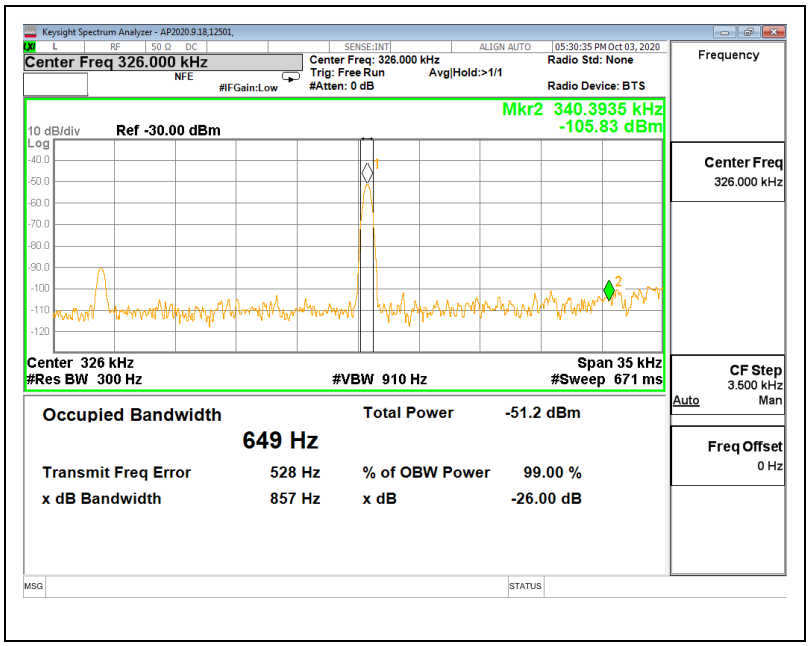
CONFIG 5



CONFIG 6



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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.		

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 * 10 m measurement distance Quasi-peak (dBµV/m)	OATS or SAC * 3 m measurement distance Quasi-peak (dBµV/m)	FAR * 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

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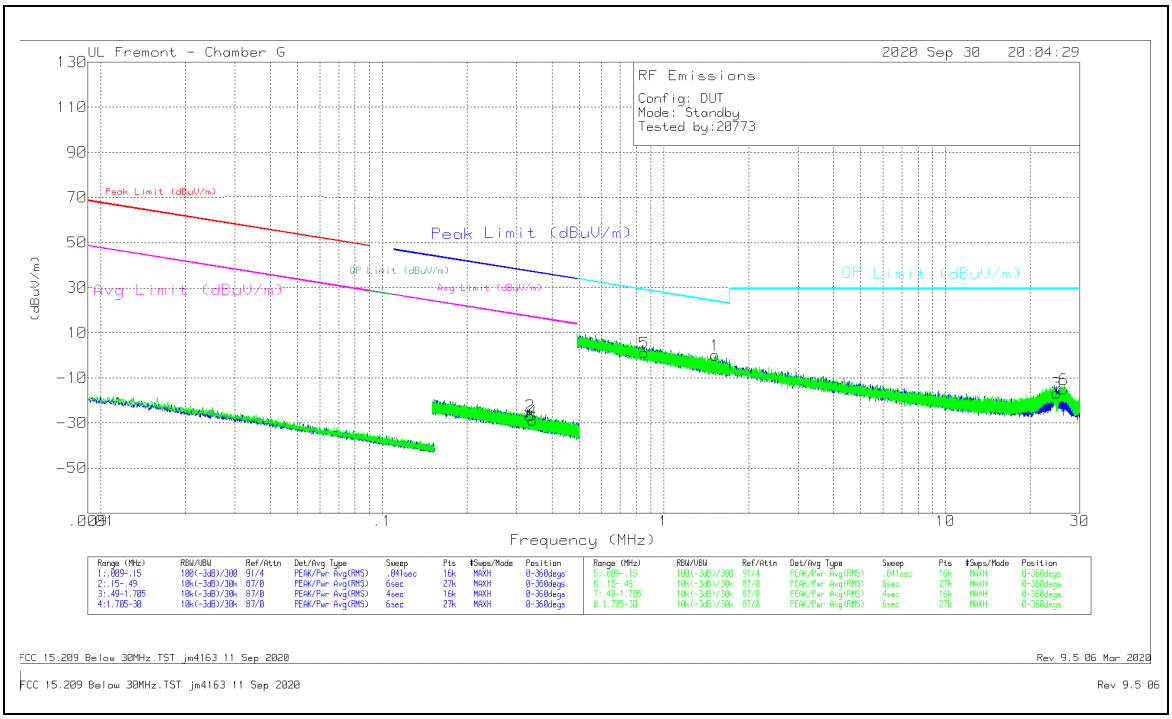
8.2. FCC TX FUNDAMENTAL AND SPURIOUS EMISSIONS FROM 9 kHz TO 30 MHz

8.2.1. Config 1, STANDBY CONFIGURATION (FLAT POSITION)



DATA

Radiated Emissions

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)
2	.3347	42.02	Pk	11.1	.1	-80	-26.78	37.12	-63.9	17.12	-43.9	0-360
4	.34187	39.82	Pk	11.1	.1	-80	-28.98	36.93	-65.91	16.93	-45.91	0-360

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)
1	1.51385	25.23	Pk	10.8	.2	-40	-3.77	24.03	-27.8	0-360
5	.85199	30.27	Pk	10.8	.1	-40	1.17	29.01	-27.84	0-360
3	24.83436	13.69	Pk	8.8	.8	-40	-16.71	29.5	-46.21	0-360
6	26.31833	15.6	Pk	8.5	.8	-40	-15.1	29.5	-44.6	0-360

Pk - Peak detector

Qp - Quasi-Peak detector

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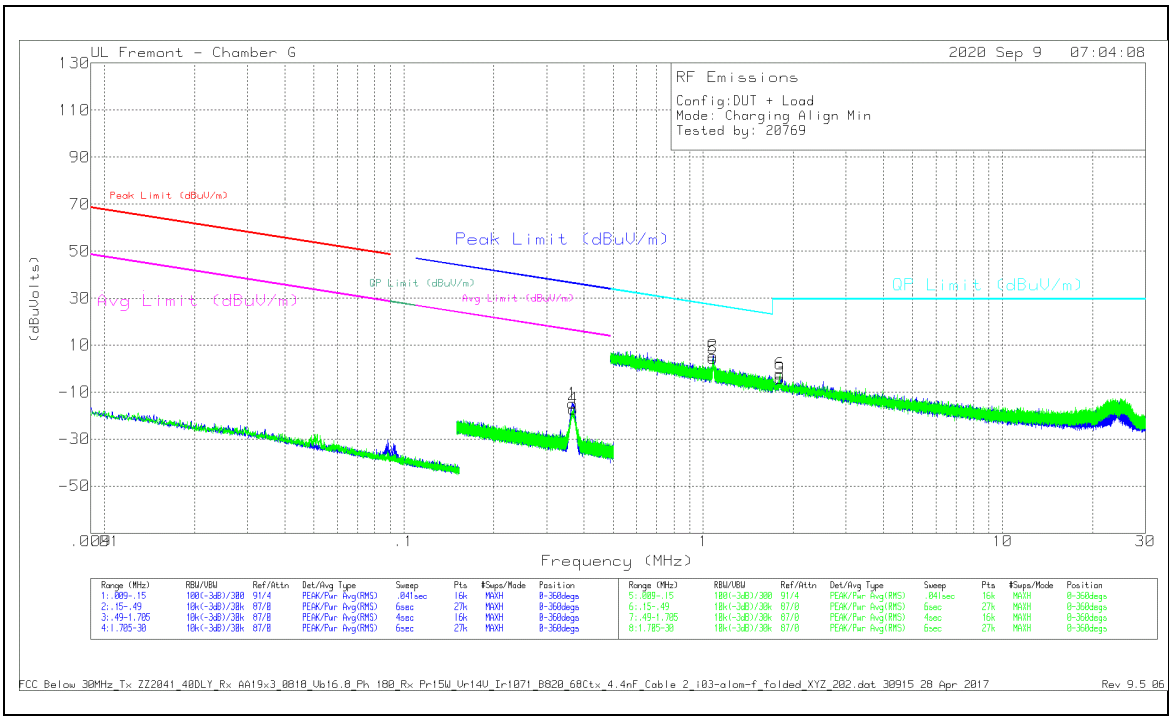
8.2.2. Config 2, OPERATING 360kHz (FLAT POSITION) –iPhone



DATA

Radiated Emissions

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)
1	.36701	54.23	Pk	10.8	.1	-80	-14.87	36.31	-51.18	16.31	-31.18	0-360
4	.3678	52.01	Pk	10.8	.1	-80	-17.09	36.3	-53.39	16.3	-33.39	0-360

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	1.07725	34.12	Pk	11.2	.1	-40	5.42	26.98	-21.56	0-360
5	1.08022	33.21	Pk	11.2	.1	-40	4.51	26.95	-22.44	0-360
3	1.80351	24.36	Pk	11.3	.2	-40	-4.14	29.5	-33.64	0-360
6	1.80456	26.19	Pk	11.3	.2	-40	-2.31	29.5	-31.81	0-360

Pk - Peak detector

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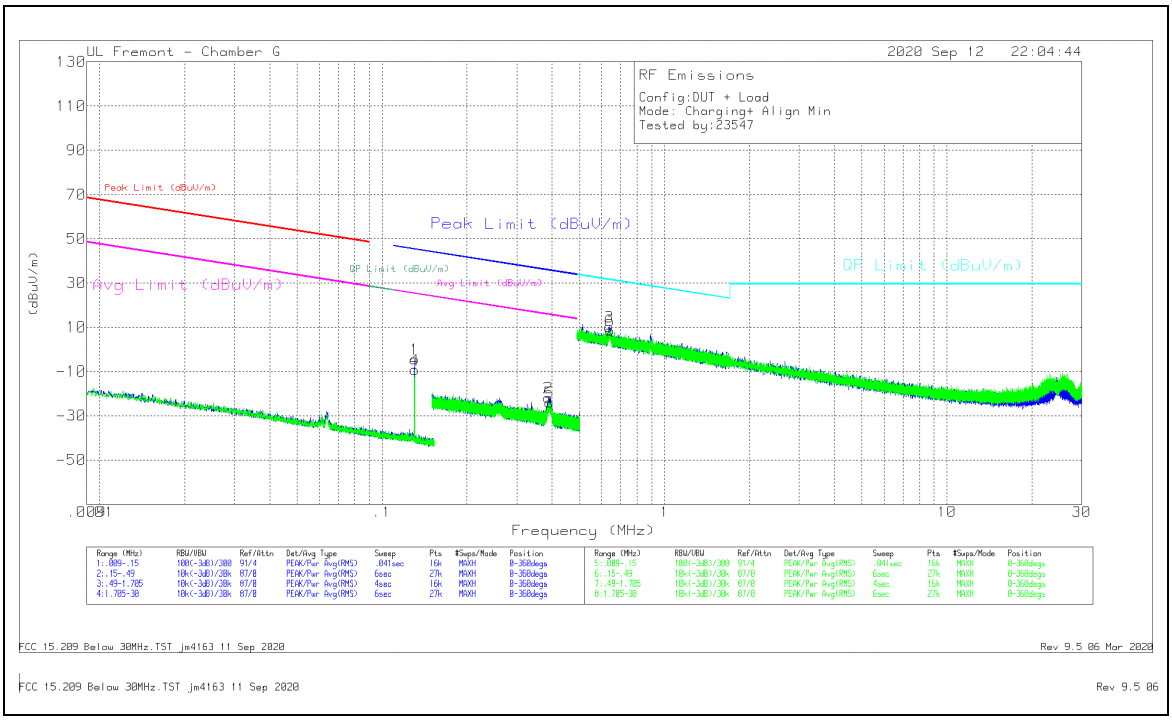
8.2.3. Config 3, OPERATING 127.7kHz (FLAT POSITION) -Legacy phone



DATA

Radiated Emissions

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables (dB)	Dist Corr 300 m	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.13029	64.48	Pk	11.1	.1	-80	-4.32	45.33	-49.65	25.33	-29.65	0-360
4	.13029	59.69	Pk	11.1	.1	-80	-9.11	45.33	-54.44	25.33	-34.44	0-360
2	.38882	47.4	Pk	10.8	.1	-80	-21.7	35.81	-57.51	15.81	-37.51	0-360
5	.39101	45.3	Pk	10.8	.1	-80	-23.8	35.76	-59.56	15.76	-39.56	0-360

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)
3	.63714	39.29	Pk	10.8	.1	-40	10.19	31.53	-21.34	0-360
6	.63957	37.87	Pk	10.8	.1	-40	8.77	31.49	-22.72	0-360

Pk - Peak detector

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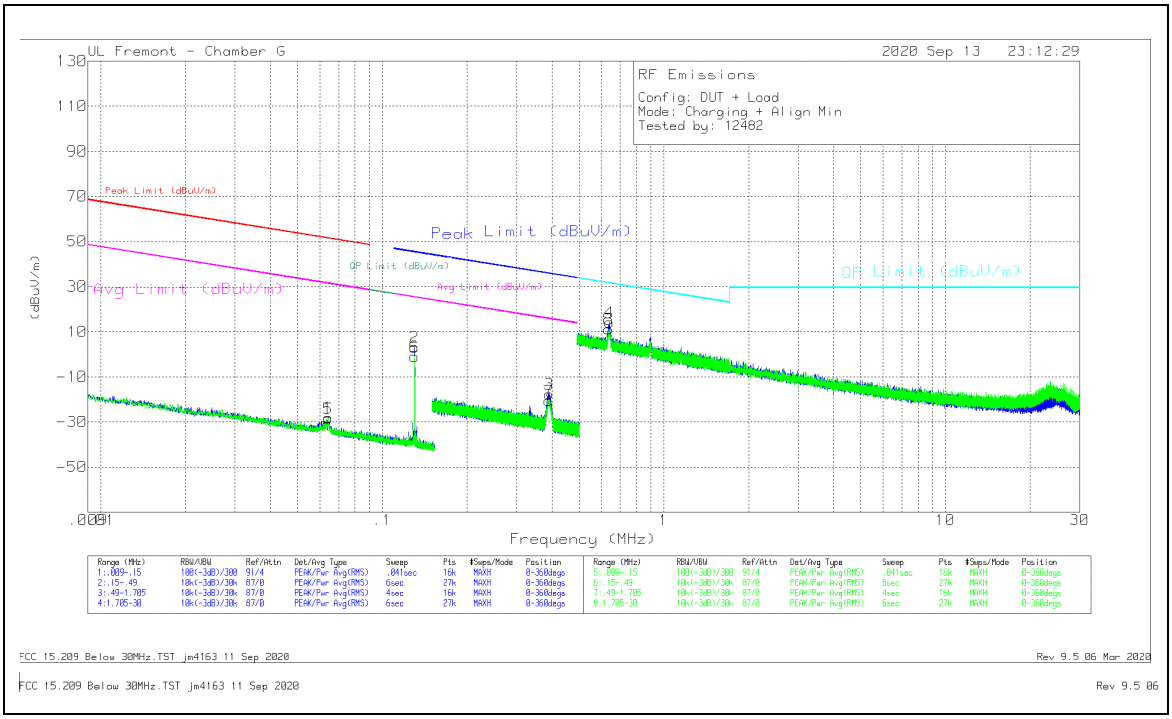
8.2.4. Config 4, OPERATING 127.7kHz (FLAT POSITION)- Airpods with Charging Case



DATA

Radiated Emissions

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)
5	.06415	38.99	Pk	12.5	.1	-80	-28.41	51.44	-79.85	31.44	-59.85	0-360
1	.06427	39.32	Pk	12.5	.1	-80	-28.08	51.42	-79.5	31.42	-59.5	0-360
2	.13029	71.24	Pk	11.8	.1	-80	3.14	45.33	-42.19	25.33	-22.19	0-360
6	.13029	67.09	Pk	11.8	.1	-80	-1.01	45.33	-46.34	25.33	-26.34	0-360
7	.38972	48.33	Pk	11	.1	-80	-20.57	35.79	-56.36	15.79	-36.36	0-360
3	.39122	51.32	Pk	11	.1	-80	-17.58	35.76	-53.34	15.76	-33.34	0-360

Pk - Peak detector

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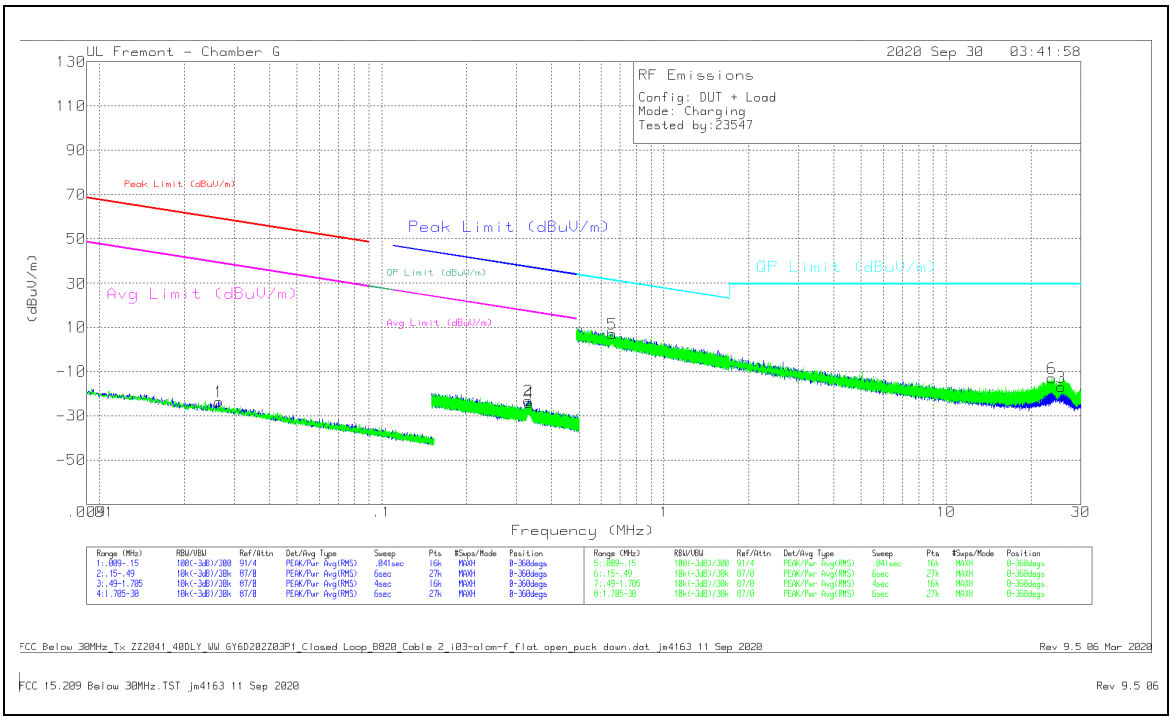
8.2.5. Config 5, OPERATING 326kHz (FLAT POSITION), iWATCH



DATA

Radiated Emissions

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)	Azimuth (Degs)
1	.02642	41.79	Pk	14.6	.1	-80	-23.51	59.14	-82.65	0-360
2	.33112	45.76	Pk	11.1	.1	-80	-23.04	37.21	-60.25	0-360
4	.3326	44.63	Pk	11.1	.1	-80	-24.17	37.17	-61.34	0-360

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)
5	.65371	31.44	Qp	10.8	.1	-40	2.34	31.3	-28.96	228
6	23.7263	11.25	Qp	9	.7	-40	-19.05	29.5	-48.55	81
3	25.5651	7.48	Qp	8.7	.8	-40	-23.02	29.5	-52.52	4

Pk - Peak detector
Qp - Quasi-Peak detector

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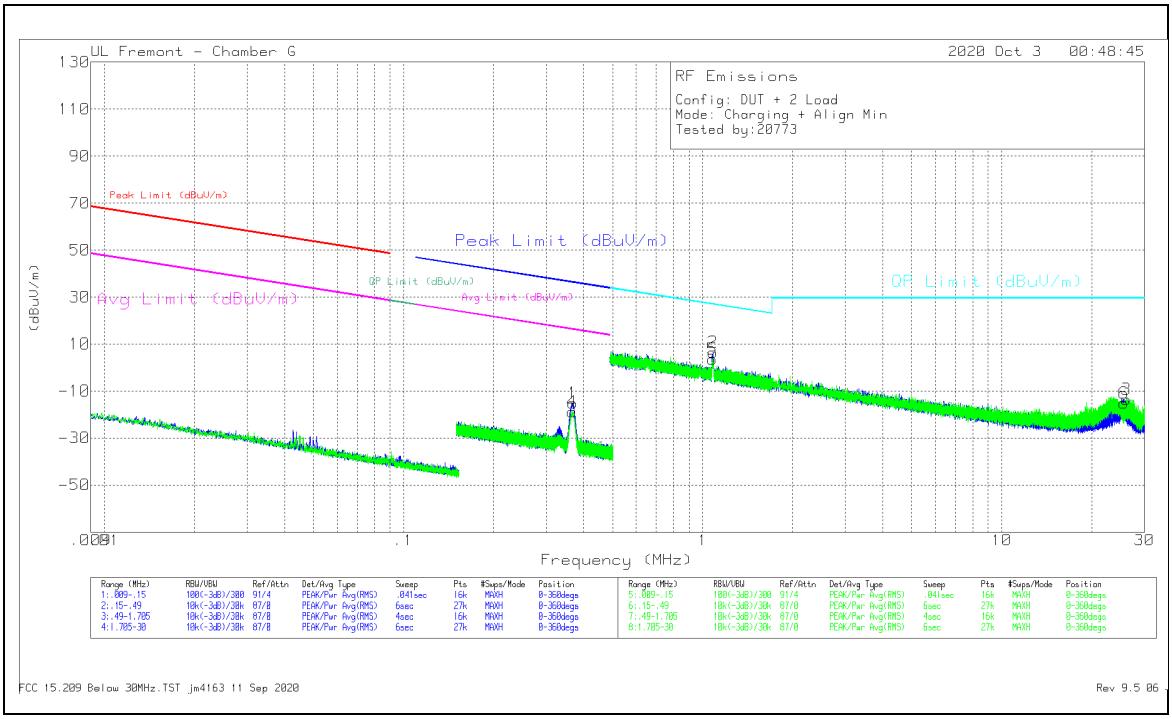
8.2.6. Config 6, OPERATING 360kHz iPhone + 326KHz iWatch (FLAT POSITION)



DATA

Radiated Emissions

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)	Azimuth (Degs)
4	.36291	50.14	Pk	10.9	.1	-80	-18.86	36.3	-55.16	0-360
1	.36253	53.86	Pk	10.9	.1	-80	-15.14	36.3	-51.44	0-360

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)
5	1.07908	32.57	Pk	10.9	.1	-40	3.57	26.96	-23.39	0-360
2	1.08105	35.63	Pk	10.9	.1	-40	6.63	26.95	-20.32	0-360
6	25.6015	14.9	Pk	9.1	.8	-40	-15.2	29.5	-44.7	0-360
3	26.05004	16.68	Pk	9.1	.8	-40	-13.42	29.5	-42.92	0-360

Pk - Peak detector

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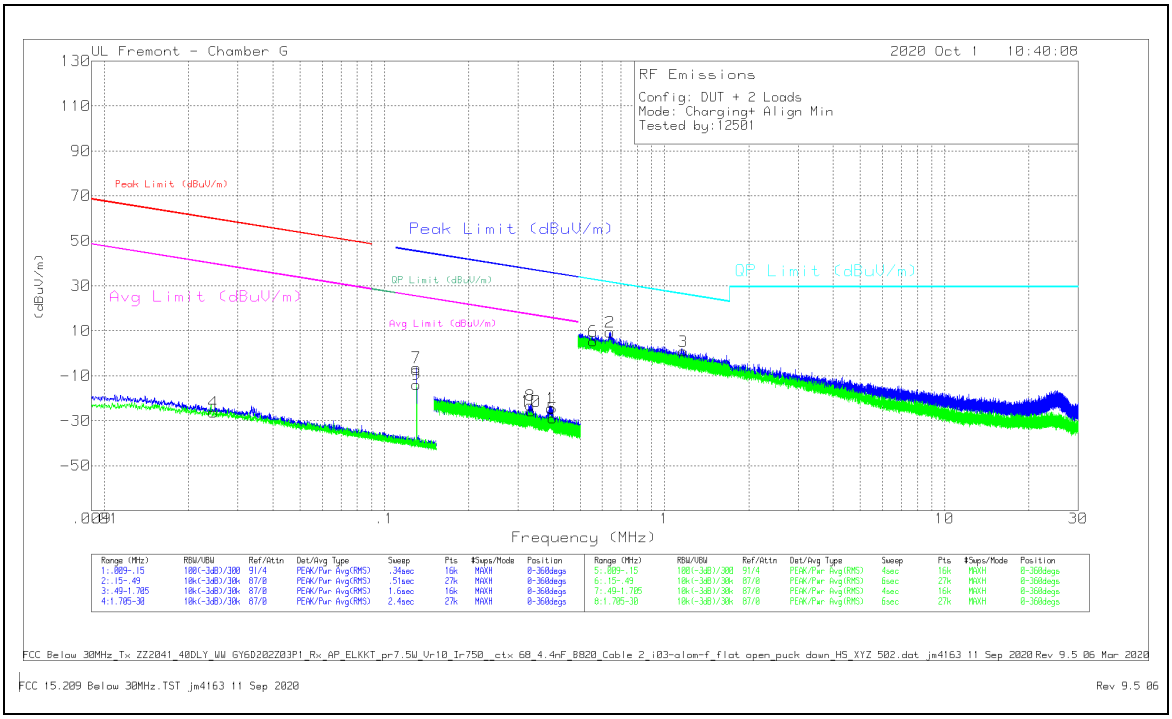
8.2.7. Config 7, OPERATING 127.7kHz Airpods With Charging Case + 326kHz iWatch (FLAT POSITION)



DATA

Radiated Emissions

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)
4	.0245	38.94	Pk	14.7	.1	-80	-26.26	59.8	-86.06	39.8	-66.06	0-360
7	.13029	61.77	Pk	11.8	.1	-80	-6.33	45.33	-51.66	25.33 -	-31.66	0-360
9	.13029	54.22	Pk	11.8	.1	-80	-13.88	45.33	-59.21	25.33	-39.21	0-360
8	.33252	45.65	Pk	11.1	.1	-80	-23.15	37.17	-60.32	17.17	-40.32	0-360
10	.33382	43.1	Pk	11.1	.1	-80	-25.7	37.14	-62.84	17.14	-42.84	0-360
1	.39297	44.48	Pk	11	.1	-80	-24.42	35.72	-60.14	15.72	-40.14	0-360
5	.3989	40.02	Pk	11	.1	-80	-28.88	35.59	-64.47	15.59	-44.47	0-360

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)
6	.55604	34.39	Pk	10.9	.1	-40	5.39	32.7	-27.31	0-360
2	.63942	38.56	Pk	10.8	.1	-40	9.46	31.49	-22.03	0-360
3	1.168	29.88	Pk	10.8	.2	-40	.88	26.28	-25.4	0-360

Pk - Peak detector

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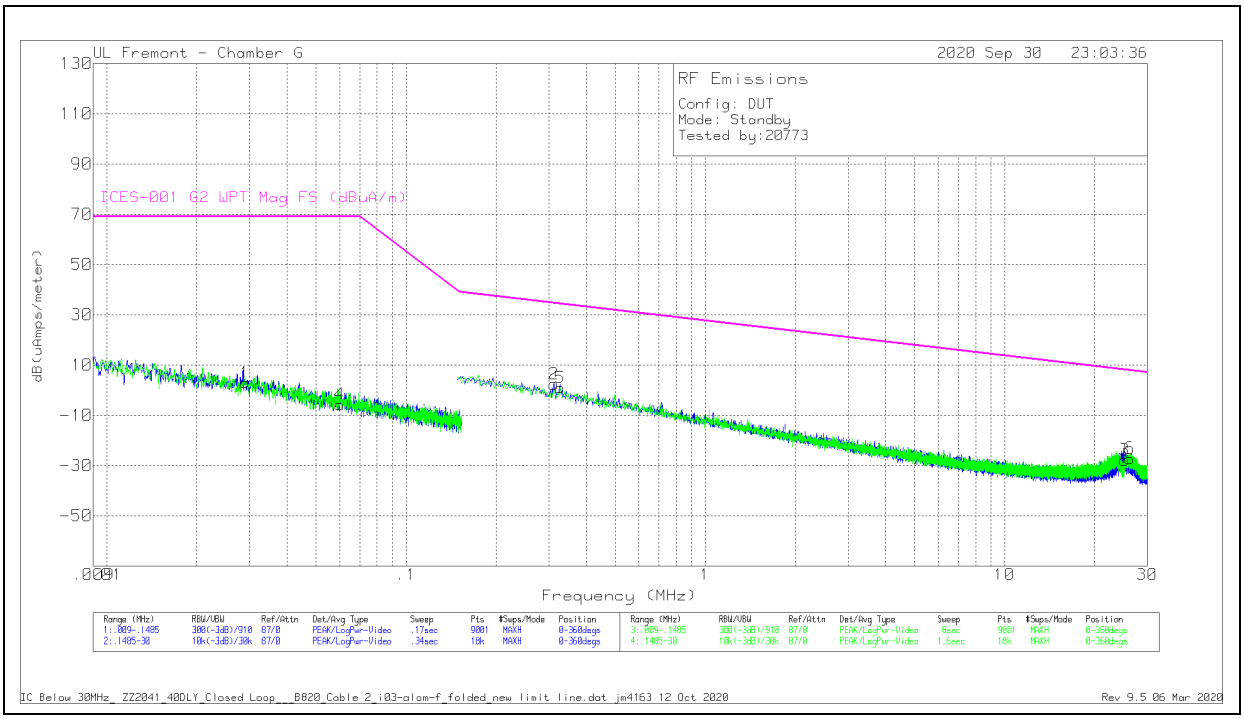
8.3. IC / CISPR 11 TX FUNDAMENTAL AND SPURIOUS EMISSIONS FROM 9 kHz TO 30 MHz

8.3.1. Config 1, STANDBY CONFIGURATION (FLAT POSITION)



DATA

Radiated Emissions

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)
*1	.02897	39.61	Pk	-36.8	.1	2.91	69	-66.09	0-360
4	.06007	33.34	Pk	-39.1	.1	-5.66	69	-74.66	0-360
2	.31181	42.88	Pk	-40.6	.1	2.38	34.58	-32.2	0-360
5	.32756	41.41	Pk	-40.6	.1	.91	34.28	-33.37	0-360
3	25.19591	13.52	Pk	-42.2	.8	-27.88	8.05	-35.93	0-360
6	26.18573	14.38	Pk	-42.4	.8	-27.22	7.82	-35.04	0-360

Pk - Peak detector

*Noise Floor.

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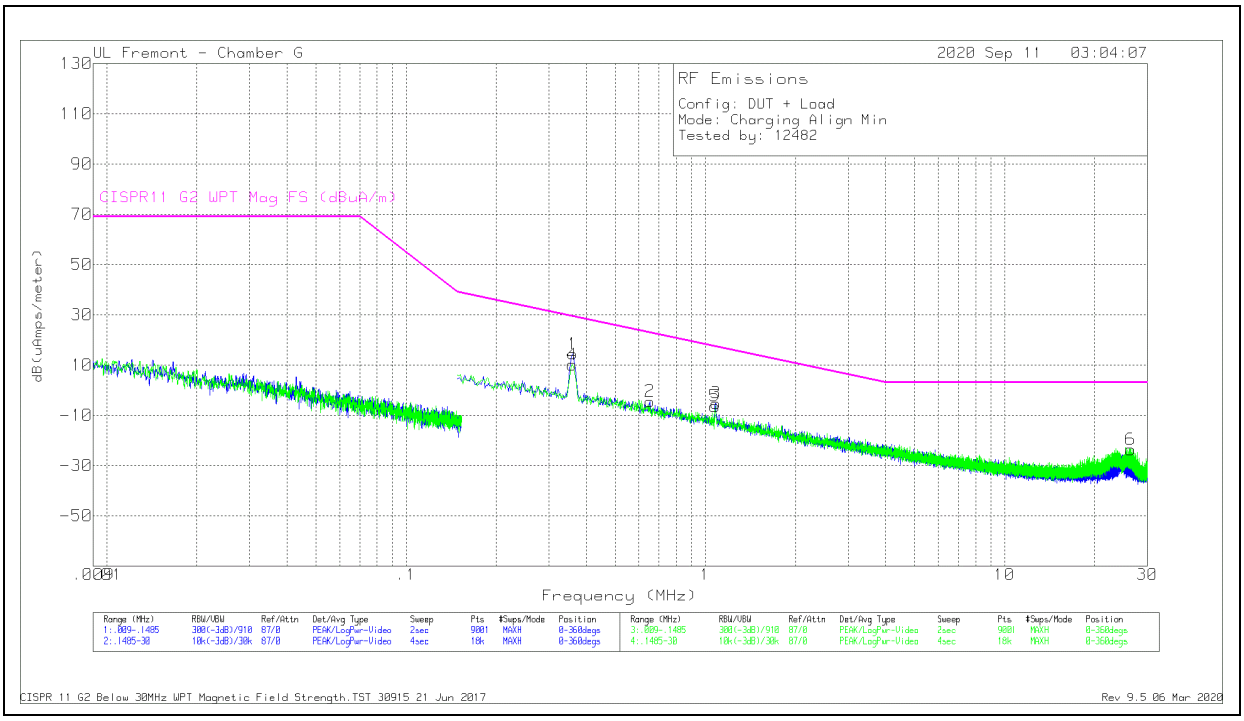
8.3.2. Config 2, OPERATING 360kHz (FLAT POSITION) – iPhone



DATA

Radiated Emissions

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	.35907	50.65	Pk	-40.6	.1	10.15	29.35	-19.2	0-360
1	.36072	54.97	Pk	-40.6	.1	14.47	29.3	-14.83	0-360
2	.65253	35.94	Pk	-40.5	.1	-4.46	22.82	-27.28	0-360
5	1.07698	33.71	Pk	-40.2	.1	-6.39	17.34	-23.73	0-360
3	1.08361	34.92	Pk	-40.2	.1	-5.18	17.28	-22.46	0-360
6	26.36977	18.07	Pk	-42.5	.8	-23.63	3	-26.63	0-360

Pk - Peak detector

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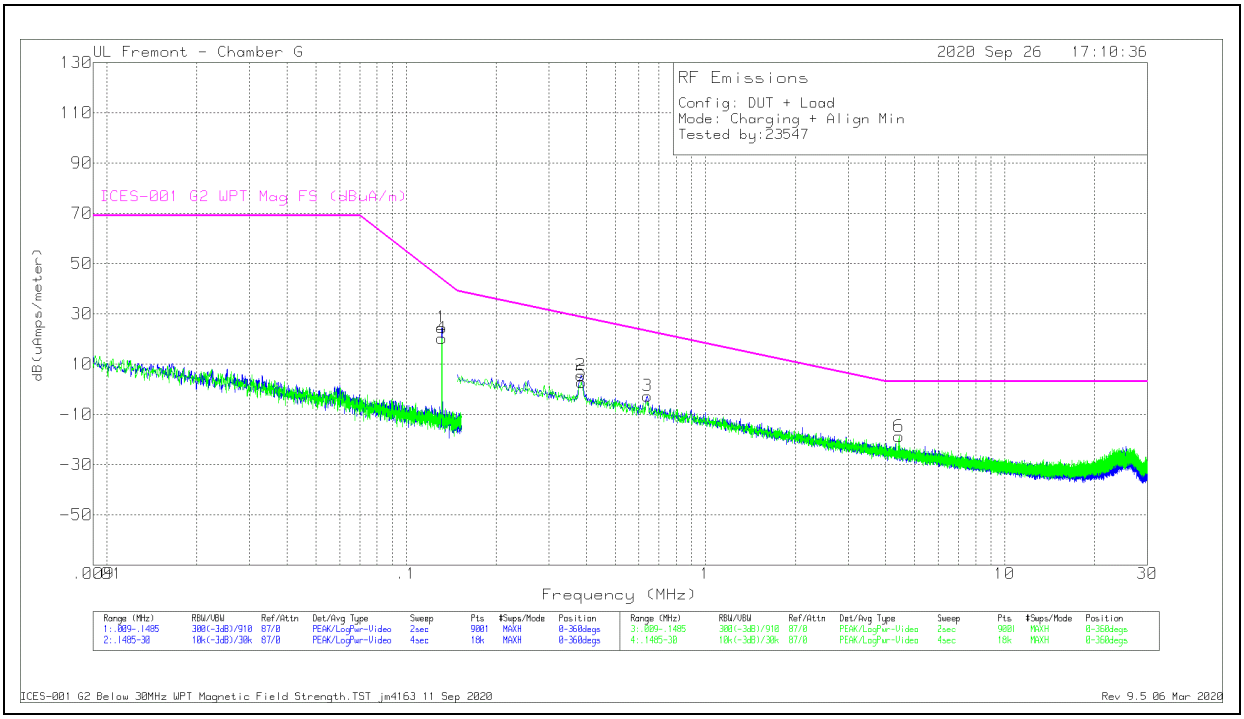
8.3.3. Config 3, OPERATING 127.7kHz (FLAT POSITION) – Legacy phones



DATA

Radiated Emissions

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)
4	.13159	60.37	Pk	-40.2	.1	20.27	43.82	-23.55	0-360
1	.1316	64.69	Pk	-40.2	.1	24.59	43.82	-19.23	0-360
2	.38394	46.07	Pk	-40.6	.1	5.57	28.62	-23.05	0-360
5	.38559	43.27	Pk	-40.6	.1	2.77	28.57	-25.8	0-360
3	.64093	37.74	Pk	-40.5	.1	-2.66	23.02	-25.68	0-360
6	4.43775	21.07	Pk	-40.1	.3	-18.73	3	-21.73	0-360

Pk - Peak detector

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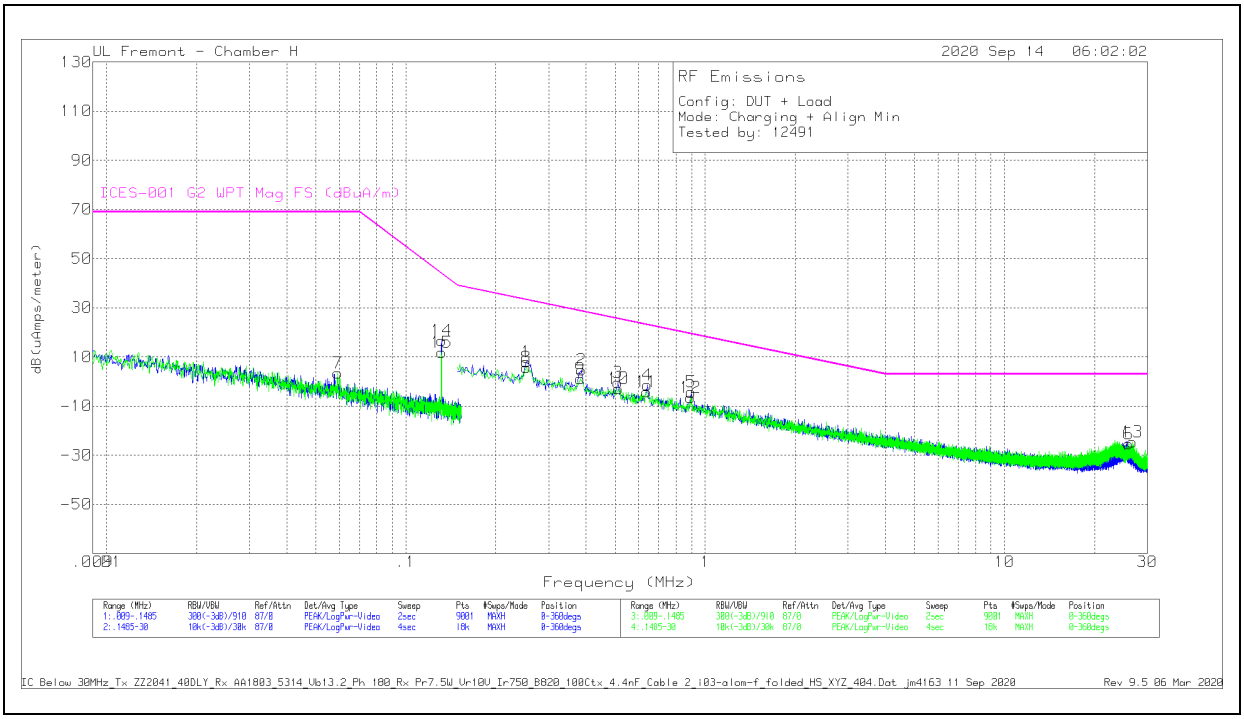
8.3.4. Config 4, OPERATING 127.7kHz (FLAT POSITION) – Airpods with Charging Case



DATA

Radiated Emissions

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)
7	.05914	42.39	Pk	-39.1	.1	3.39	69	-65.61	0-360
14	.1316	56.75	Pk	-40.2	.1	16.65	43.82	-27.17	0-360
15	.1316	52.02	Pk	-40.2	.1	11.92	43.82	-31.9	0-360
1	.25295	48.37	Pk	-40.5	.1	7.97	33.18	-25.21	0-360
8	.25295	46.08	Pk	-40.5	.1	5.68	33.18	-27.5	0-360
9	.38228	41.58	Pk	-40.6	.1	1.08	28.66	-27.58	0-360
2	.38559	45.23	Pk	-40.6	.1	4.73	28.57	-23.84	0-360
3	.5116	39.89	Pk	-40.4	.1	-.41	25.48	-25.89	0-360
10	.51326	37.45	Pk	-40.4	.1	-2.85	25.44	-28.29	0-360
11	.63761	36.13	Pk	-40.5	.1	-4.27	23.07	-27.34	0-360
4	.64093	38.87	Pk	-40.5	.1	-1.53	23.02	-24.55	0-360
12	.8946	33.74	Pk	-40.4	.1	-6.56	19.37	-25.93	0-360
5	.89626	35.94	Pk	-40.4	.1	-4.36	19.35	-23.71	0-360
6	25.92874	16.19	Pk	-42.4	.8	-25.41	3	-28.41	0-360
13	26.6964	17.17	Pk	-42.5	.8	-24.53	3	-27.53	0-360

Pk - Peak detector

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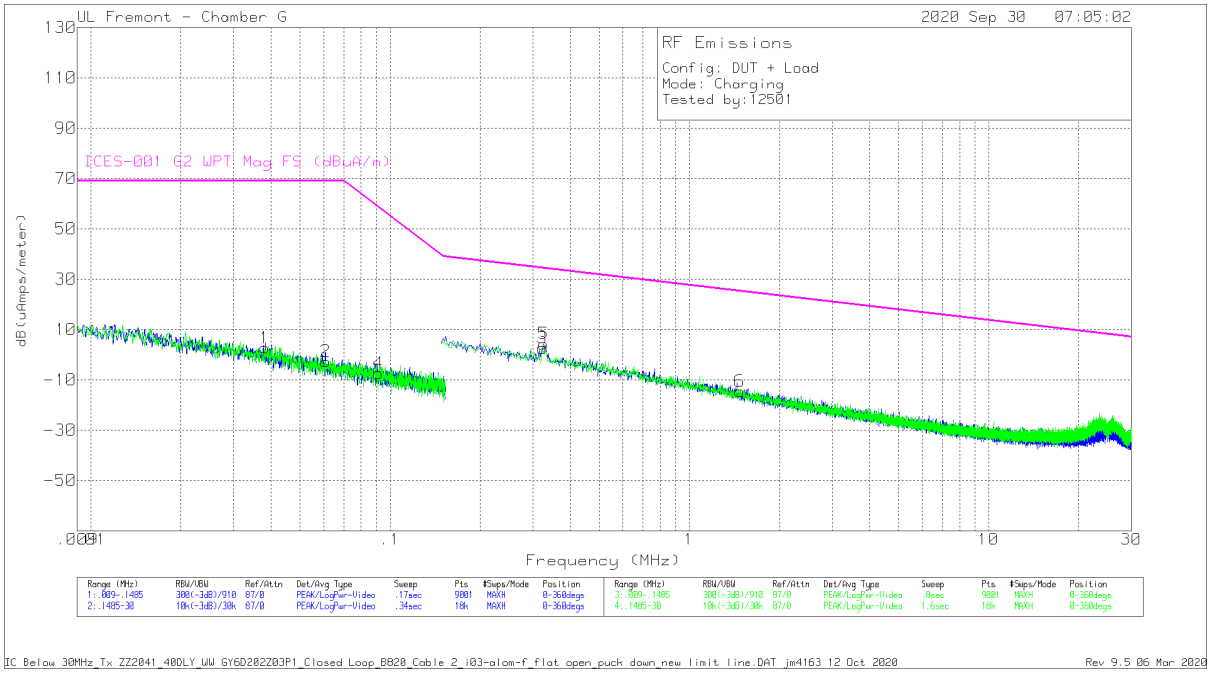
8.3.5. Config 5, OPERATING 326kHz (FLAT POSITION)-iWatch



DATA

Radiated Emissions

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)
4	* .09134	32.2	Pk	-39.7	.1	-7.4	58.53	-65.93	0-360
1	.03813	40.46	Pk	-37.9	.1	2.66	69	-66.34	0-360
2	.06101	36.27	Pk	-39.1	.1	-2.73	69	-71.73	0-360
3	.32259	43.12	Pk	-40.6	.1	2.62	34.38	-31.76	0-360
5	.32591	44.82	Pk	-40.6	.1	4.32	34.31	-29.99	0-360
6	1.4749	25.51	Pk	-40.2	.2	-14.49	25.2	-39.69	0-360

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

Pk - Peak detector

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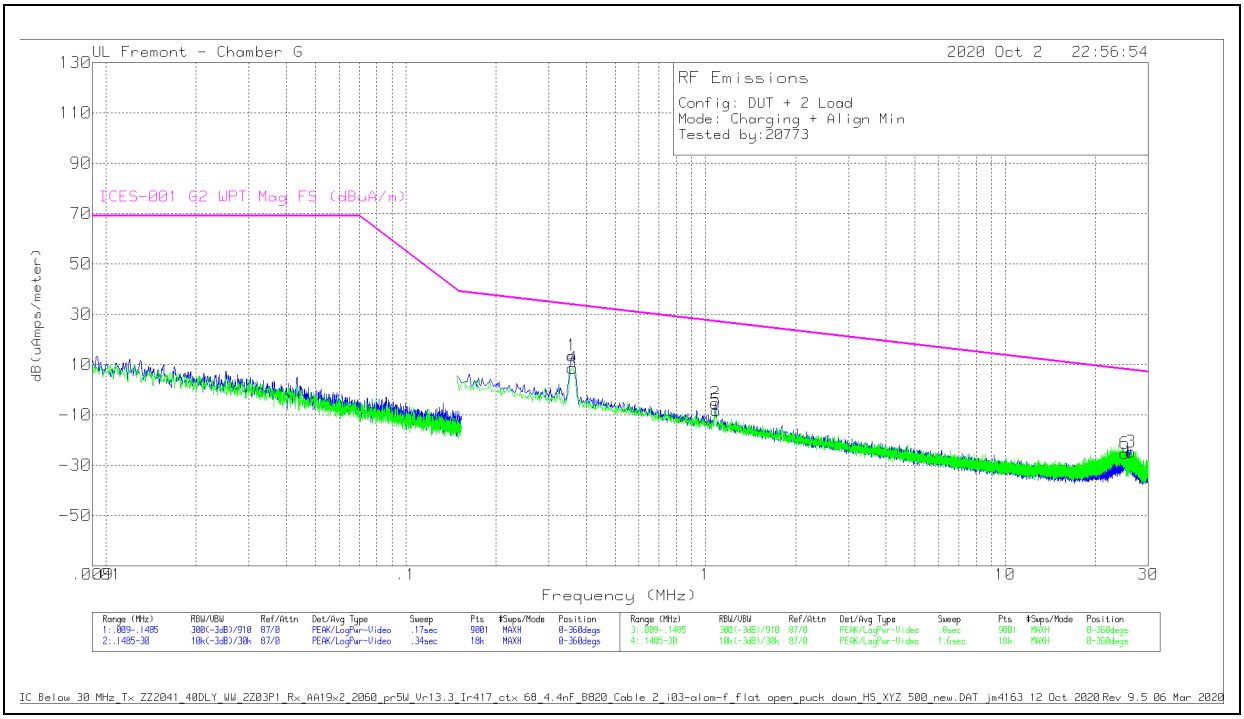
8.3.6. Config 6, OPERATING 360kHz iPhone + 326KHz iWatch (FLAT POSITION)



DATA

Radiated Emissions

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)
1	.35907	54.07	Pk	-40.6	.1	13.57	33.73	-20.16	0-360
4	.3599	49.11	Pk	-40.6	.1	8.61	33.71	-25.1	0-360
2	1.07864	34.73	Pk	-40.2	.1	-5.37	27.08	-32.45	0-360
5	1.08527	31.87	Pk	-40.2	.1	-8.23	27.05	-35.28	0-360
6	25.10803	16.2	Pk	-42.2	.8	-25.2	8.08	-33.28	0-360
3	26.31837	16.98	Pk	-42.5	.8	-24.72	7.79	-32.51	0-360

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

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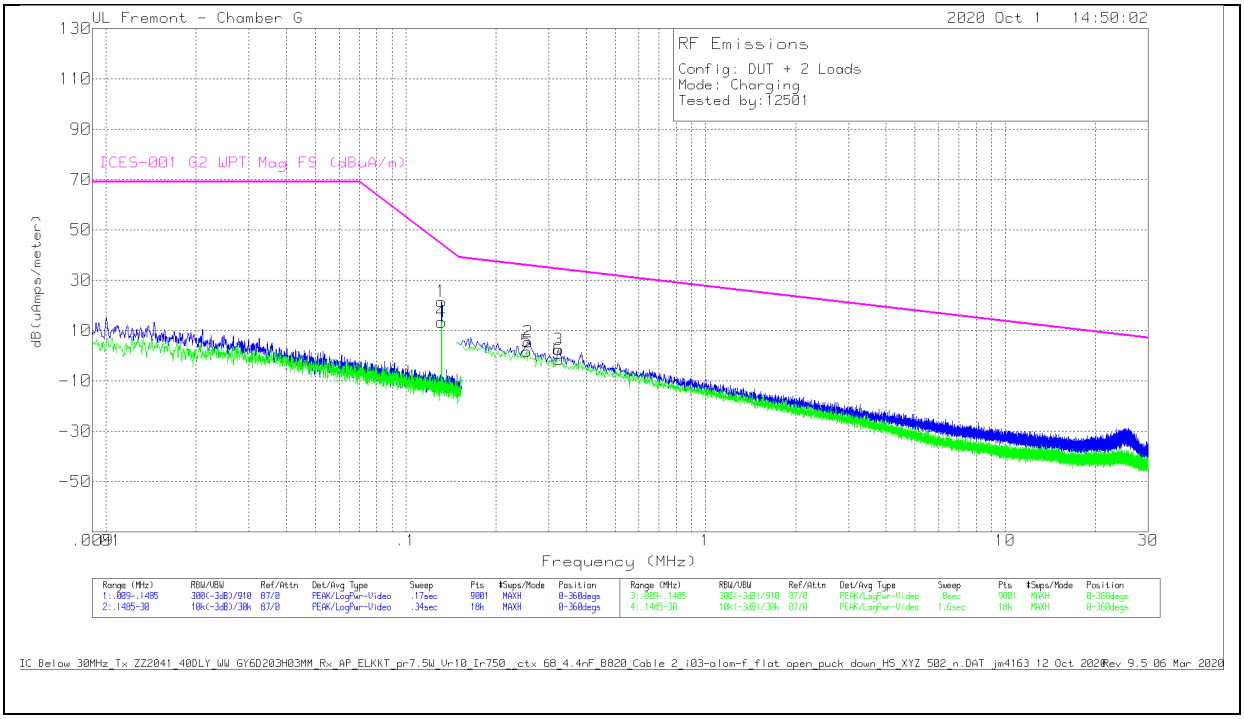
8.3.7. Config 7, OPERATING 127.7kHz Airpods with Charging Case + 326kHz iWatch (FLAT POSITION)



DATA

Radiated Emissions

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)
4	.1316	53.5	Pk	-40.2	.1	13.4	44.15	-30.75	0-360
1	.13161	61.65	Pk	-40.2	.1	21.55	44.15	-22.6	0-360
5	.25295	42.19	Pk	-40.5	.1	1.79	35.84	-34.05	0-360
2	.25627	45.82	Pk	-40.5	.1	5.42	35.77	-30.35	0-360
3	.32259	42.94	Pk	-40.6	.1	2.44	34.38	-31.94	0-360
6	.32425	39.01	Pk	-40.6	.1	-1.49	34.34	-35.83	0-360

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

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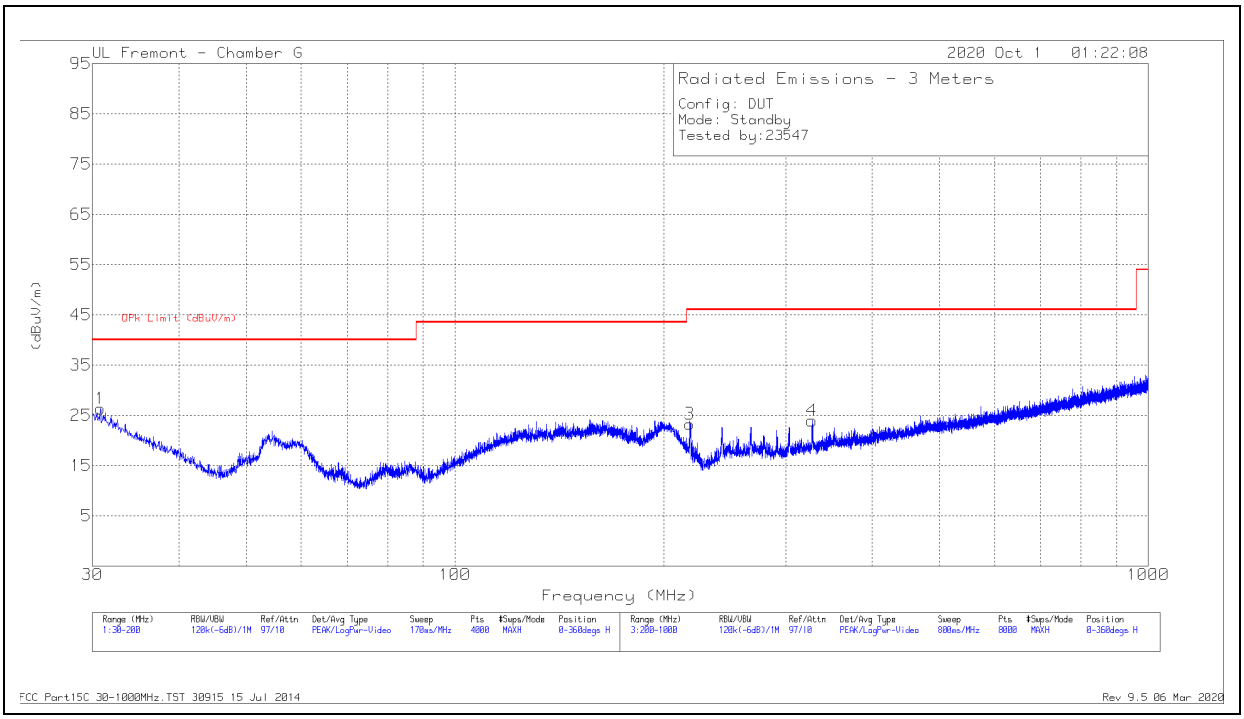
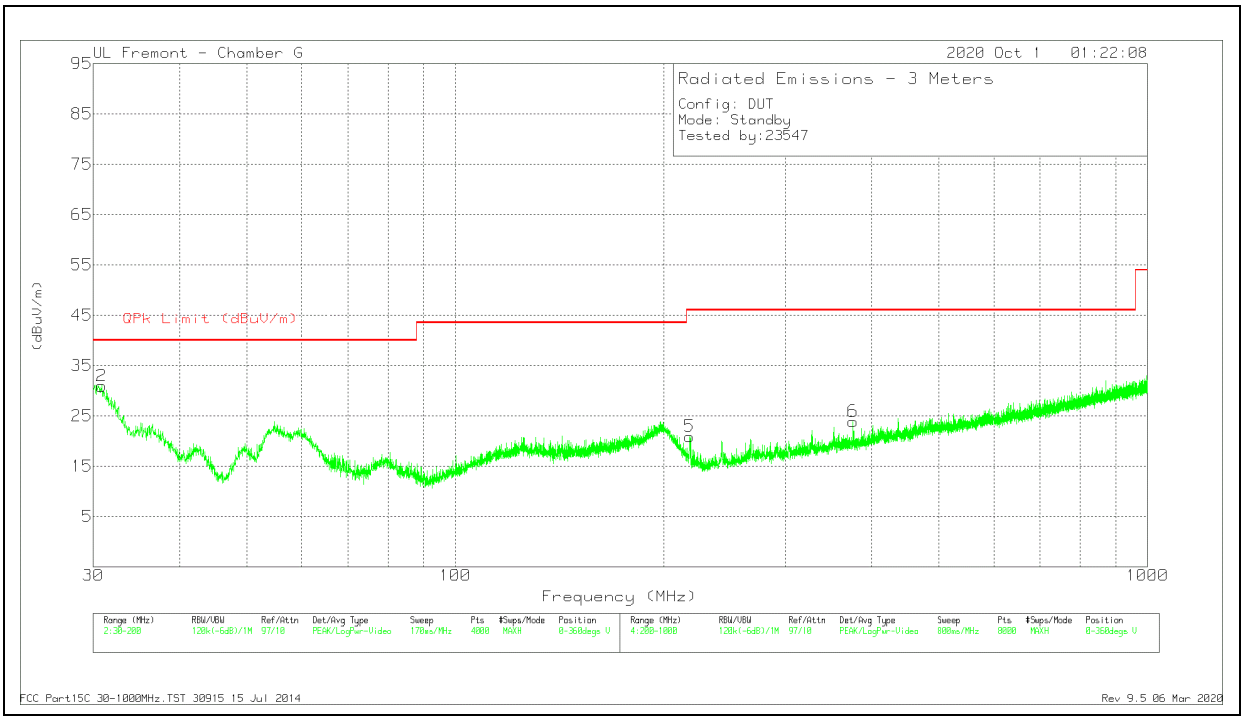
8.4. FCC TX SPURIOUS EMISSION 30 TO 1000 MHz

8.4.1. Config 1, STANDBY CONFIGURATION (FLAT POSITION)

HORIZONTAL PLOT



VERTICAL PLOT



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DATA

Radiated Emissions

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
1	31.0035	22.53	Qp	27.1	-31	18.63	40	-21.37	357	231	H
2	30.891	28.7	Qp	27.2	-31	24.9	40	-15.1	269	117	V
3	218.2768	34.57	Qp	17.2	-29.4	22.37	46.02	-23.65	32	164	H
4	* 327.5016	28.78	Qp	20.5	-28.6	20.68	46.02	-25.34	273	100	H
5	218.2235	29.68	Qp	17.2	-29.4	17.48	46.02	-28.54	260	190	V
6	375.9009	24.31	Qp	21.5	-28.5	17.31	46.02	-28.71	119	112	V

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

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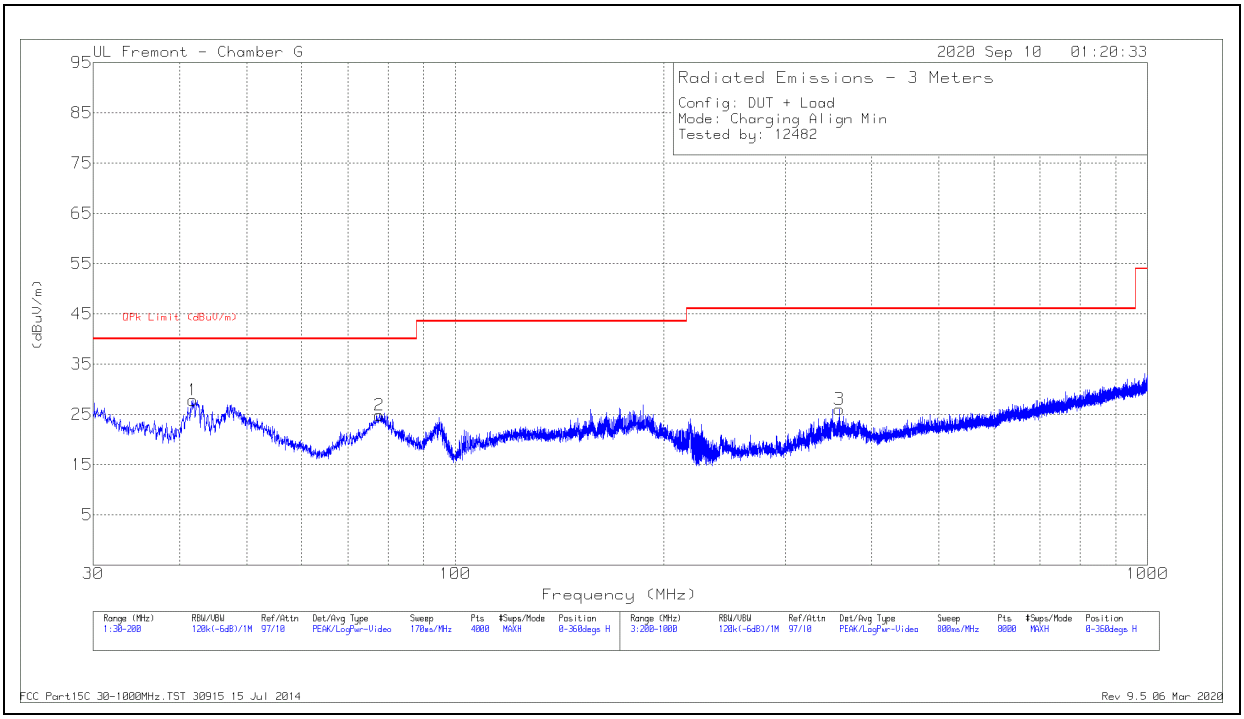
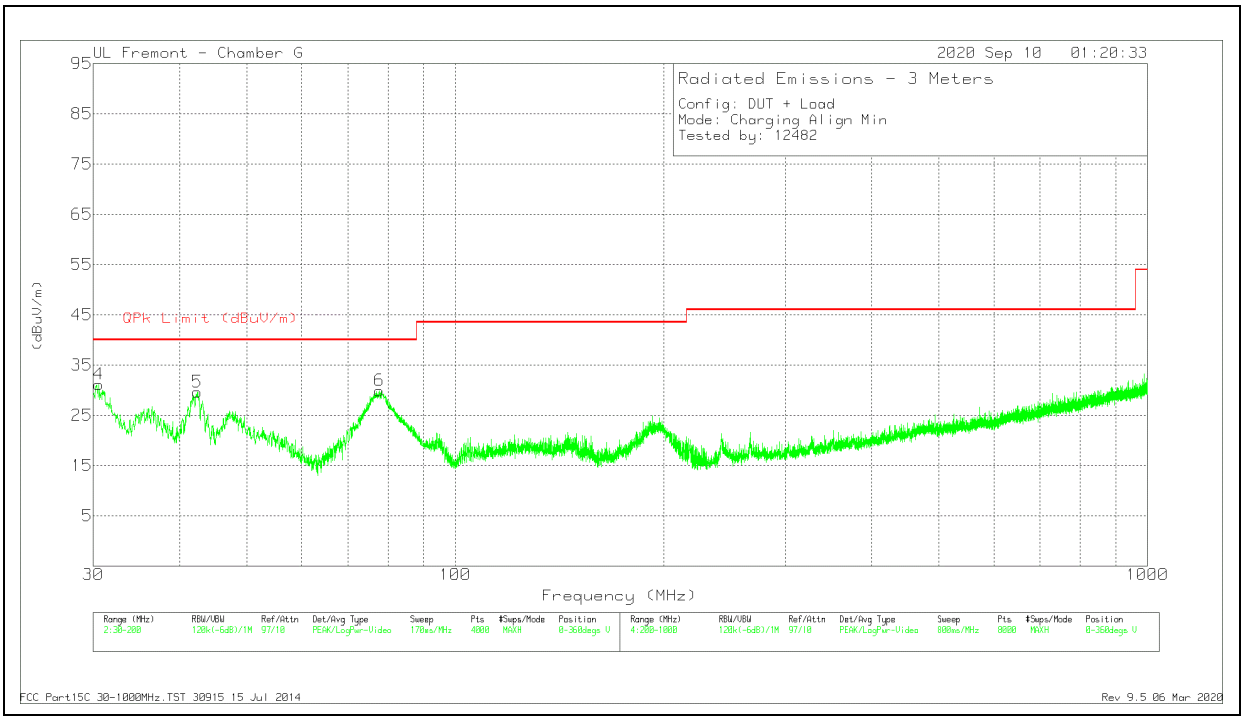
8.4.2. Config 2, OPERATING 360kHz (FLAT POSITION)-iphone

HORIZONTAL PLOT



VERTICAL PLOT



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DATA

Radiated Emissions

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
4	30.5526	35.17	Pk	27	-31	31.17	40	-8.83	0-360	100	V
1	41.8181	40.31	Pk	18.4	-30.9	27.81	40	-12.19	0-360	401	H
5	42.4132	42.53	Pk	18	-30.9	29.63	40	-10.37	0-360	100	V
2	77.6973	41.51	Pk	13.8	-30.5	24.81	40	-15.19	0-360	201	H
6	77.7824	46.61	Pk	13.8	-30.5	29.91	40	-10.09	0-360	100	V
3	358.9207	33.92	Pk	20.7	-28.6	26.02	46.02	-20	0-360	99	H

Pk - Peak detector

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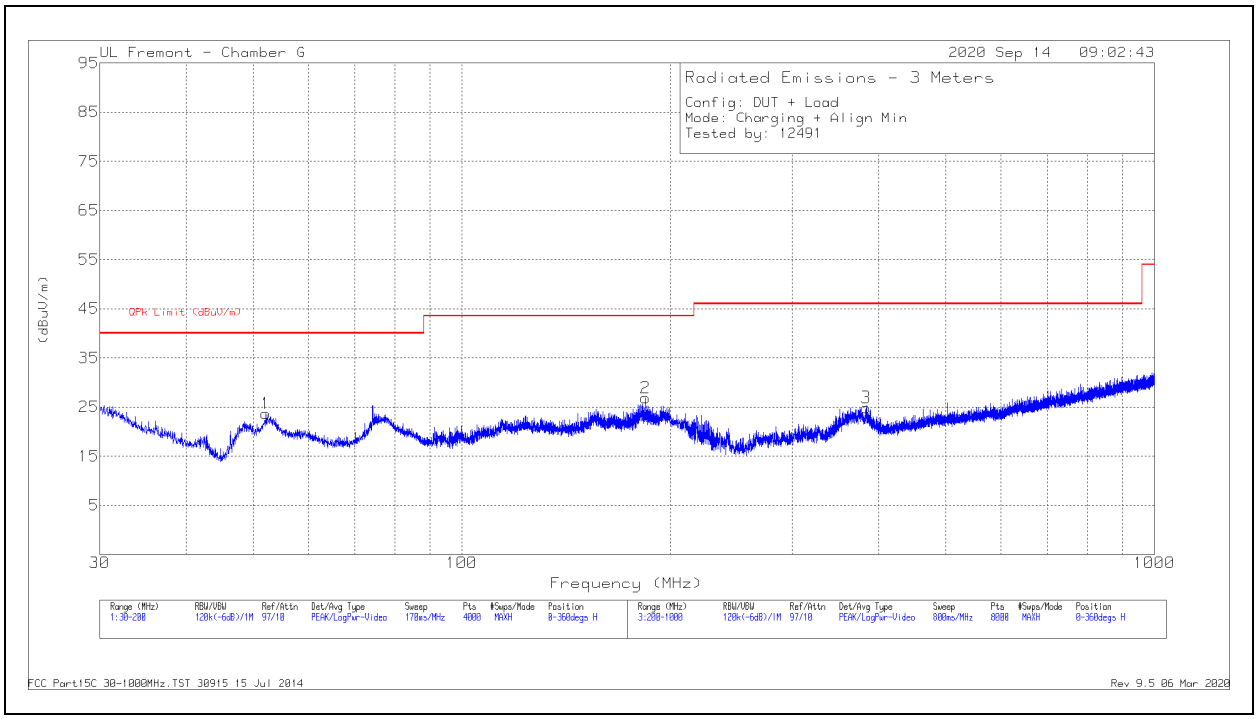
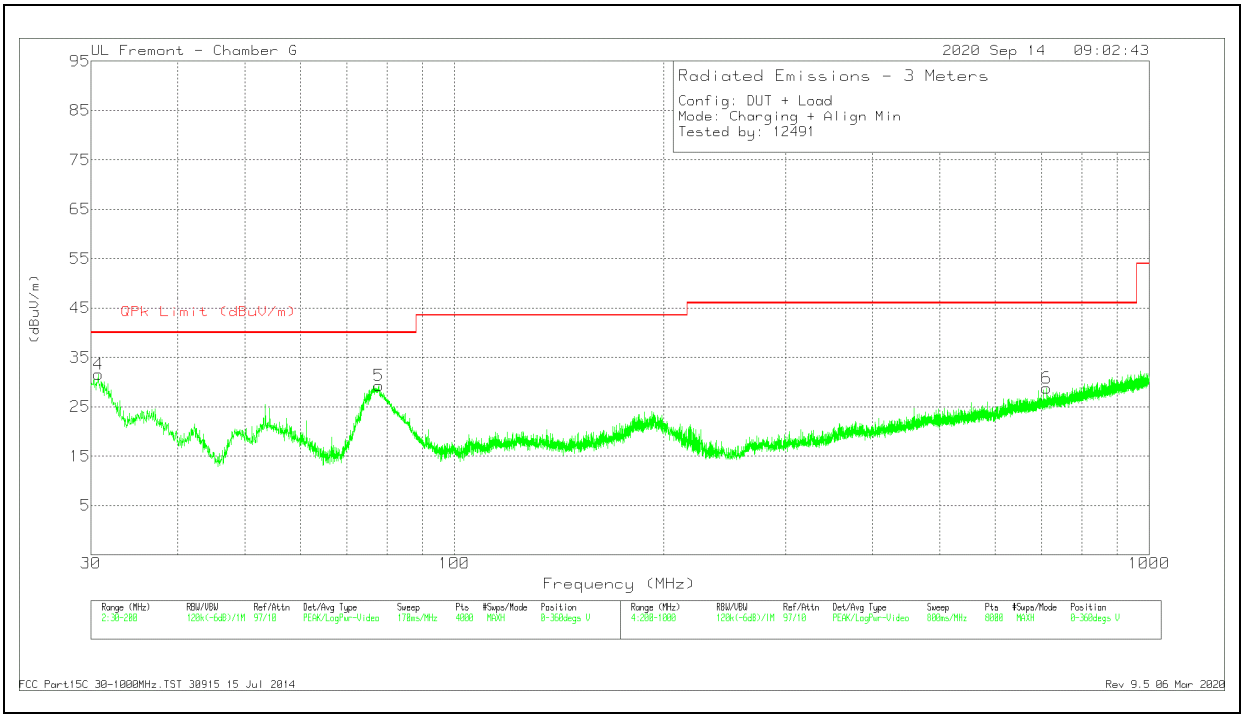
8.4.3. Config 3, OPERATING 127.7kHz (FLAT POSITION) – Legacy iPhone

HORIZONTAL PLOT



VERTICAL PLOT



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DATA

Radiated Emissions

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
4	30.7227	35.64	Pk	26.9	-31	31.54	40	-8.46	0-360	100	V
1	52.1482	41.07	Pk	13.4	-30.8	23.67	40	-16.33	0-360	401	H
5	77.8674	45.93	Pk	13.8	-30.5	29.23	40	-10.77	0-360	100	V
2	184.0599	39.28	Pk	17.2	-29.6	26.88	43.52	-16.64	0-360	201	H
3	383.8239	32.28	Pk	21.1	-28.5	24.88	46.02	-21.14	0-360	100	H
6	712.3666	29.48	Pk	26.5	-27.2	28.78	46.02	-17.24	0-360	201	V

Pk - Peak detector

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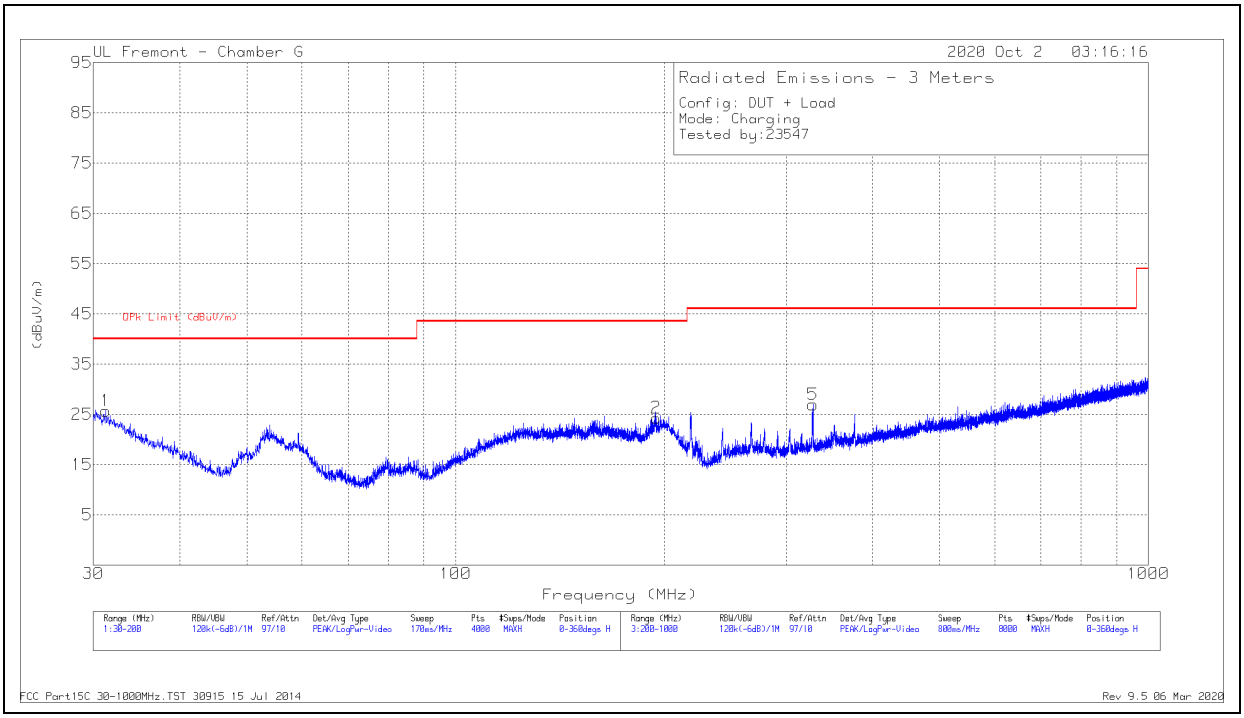
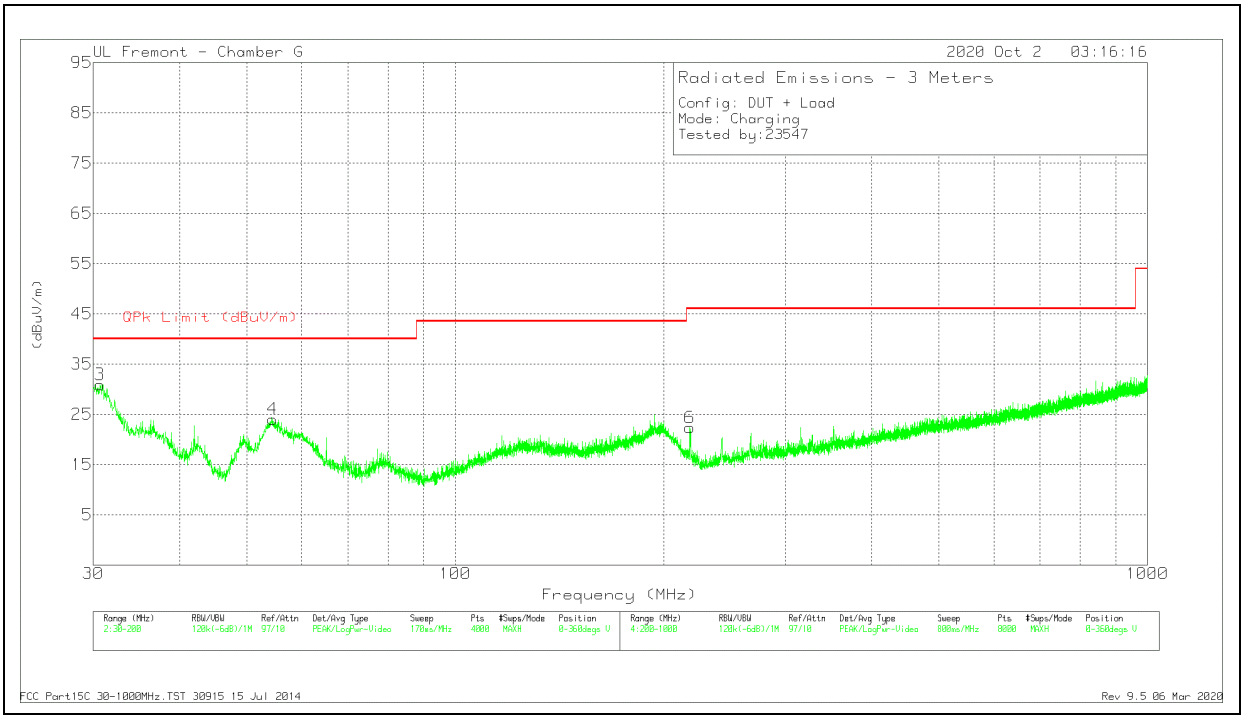
8.4.4. Config 4, OPERATING 127.7kHz (FLAT POSITION) – AirPods With Charging case

HORIZONTAL PLOT



VERTICAL PLOT



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DATA

Radiated Emissions

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
5	* 328.1167	35.04	Pk	20.5	-28.6	26.94	46.02	-19.08	0-360	99	H
3	30.6802	34.49	Pk	27.4	-31	30.89	40	-9.11	0-360	100	V
1	31.2753	29.78	Pk	26.9	-31	25.68	40	-14.32	0-360	301	H
4	54.5288	41.22	Pk	13.5	-30.7	24.02	40	-15.98	0-360	100	V
2	194.7301	35.47	Pk	18.3	-29.5	24.27	43.52	-19.25	0-360	201	H
6	218.3024	34.56	Pk	17.2	-29.4	22.36	46.02	-23.66	0-360	99	V

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

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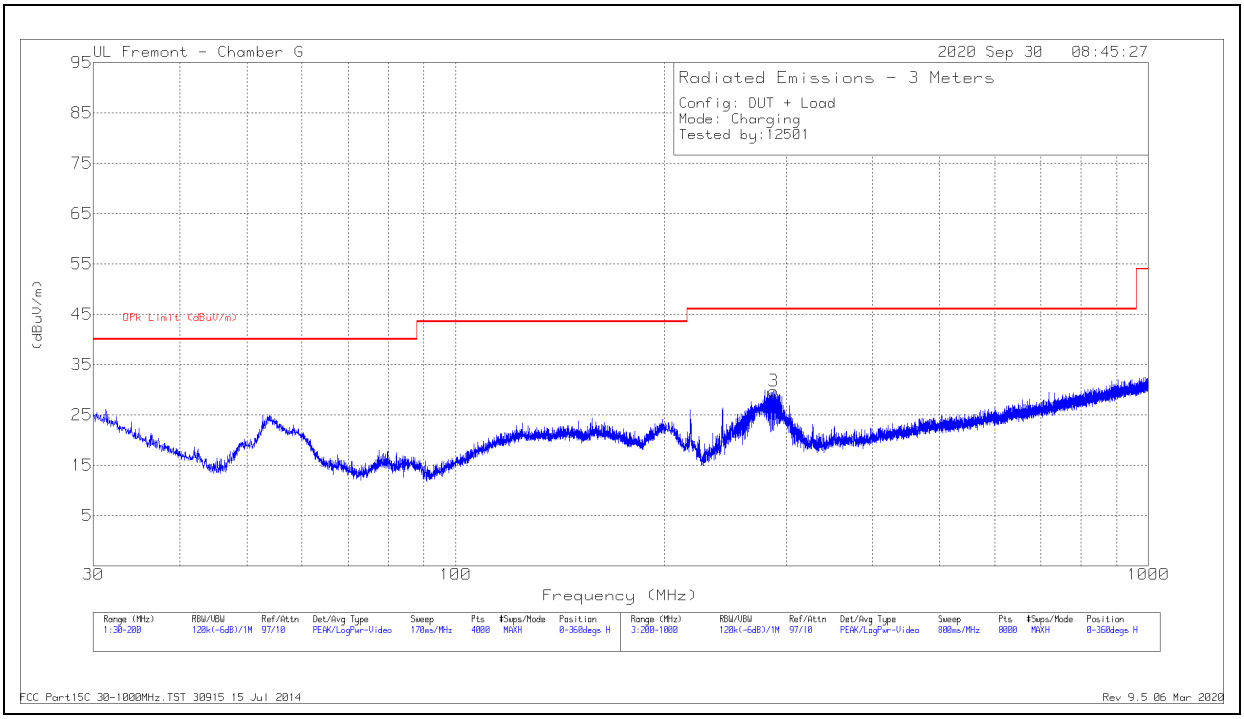
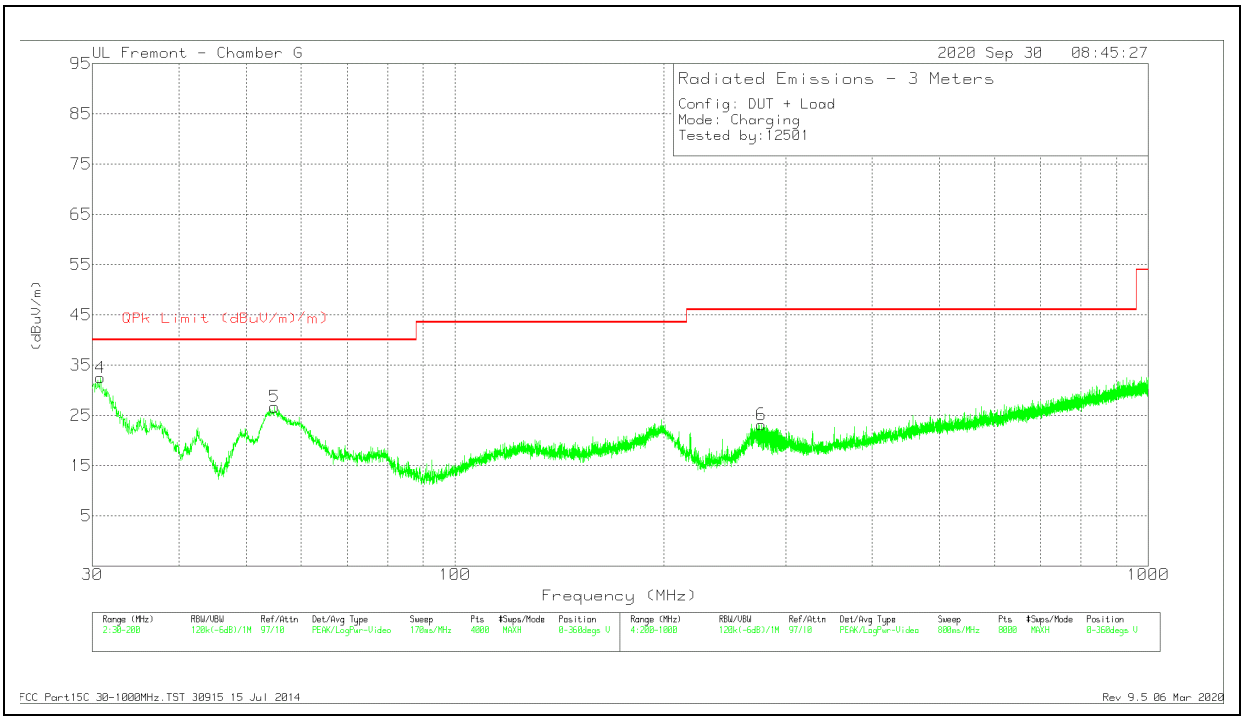
8.4.5. Config 5, OPERATING 326kHz (FLAT POSITION) - iWatch

HORIZONTAL PLOT



VERTICAL PLOT



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Radiated Emissions

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
6	* 276.61	32.63	Pk	19.6	-29.1	23.13	46.02	-22.89	0-360	99	V
4	30.8077	36.18	Pk	27.3	-31	32.48	40	-7.52	0-360	101	V
1	31.2753	30.19	Qp	26.9	-31	26.09	40	-13.91	0-360	201	H
2	53.7636	42.34	Qp	13.5	-30.8	25.04	40	-14.96	0-360	401	H
5	54.954	43.89	Pk	13.5	-30.7	26.69	40	-13.31	0-360	101	V
3	288.0114	39.14	Pk	19.6	-29	29.74	46.02	-16.28	0-360	101	H

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

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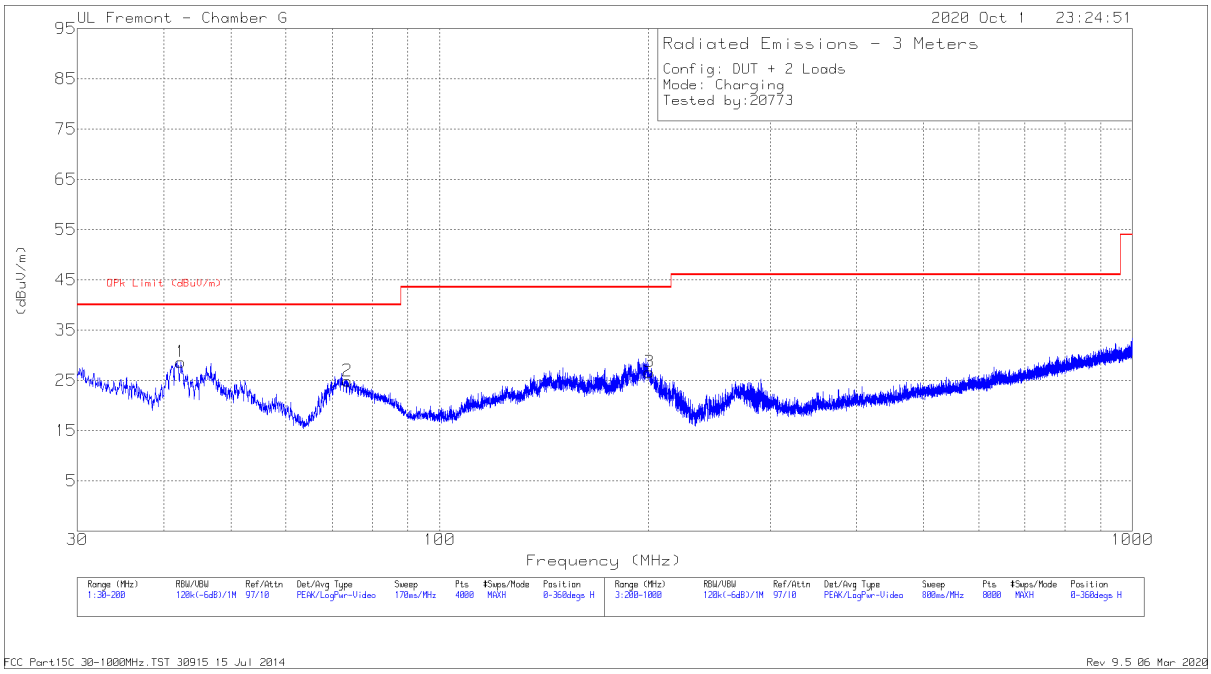
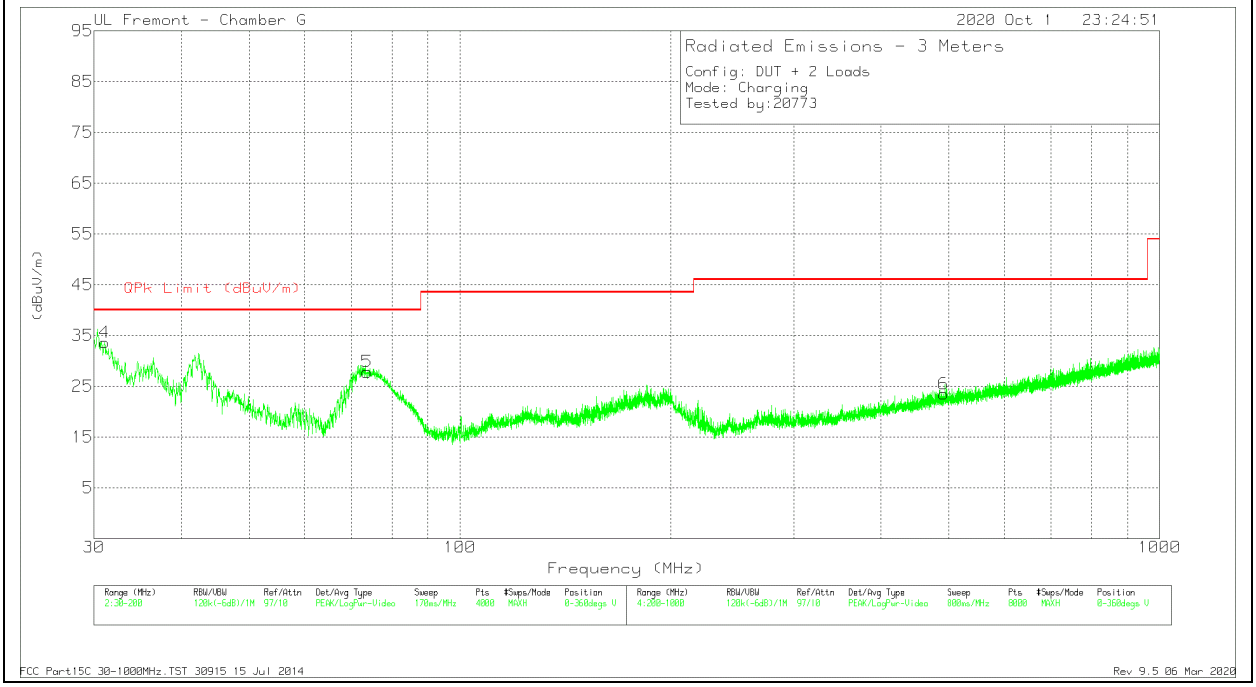
8.4.6. Config 6, OPERATING 360kHz iPhone + 326KHz iWatch (FLAT POSITION)

HORIZONTAL PLOT



VERTICAL PLOT



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DATA

Radiated Emissions

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
2	* 73.6588	41.39	Pk	14.1	-30.6	24.89	40	-15.11	0-360	201	H
5	* 73.7013	44.3	Pk	14.1	-30.6	27.8	40	-12.2	0-360	100	V
4	31.0628	37.5	Pk	27.1	-31	33.6	40	-6.4	0-360	100	V
4	31.0369	33.19	Qp	27.1	-31	29.29	40	-10.71	260	110	V
1	42.3282	41.27	Pk	18.3	-30.9	28.67	40	-11.33	0-360	401	H
3	200.8001	37.06	Pk	19.1	-29.5	26.66	43.52	-16.86	0-360	201	H
6	491.4379	27.46	Pk	24	-28	23.46	46.02	-22.56	0-360	97	V

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

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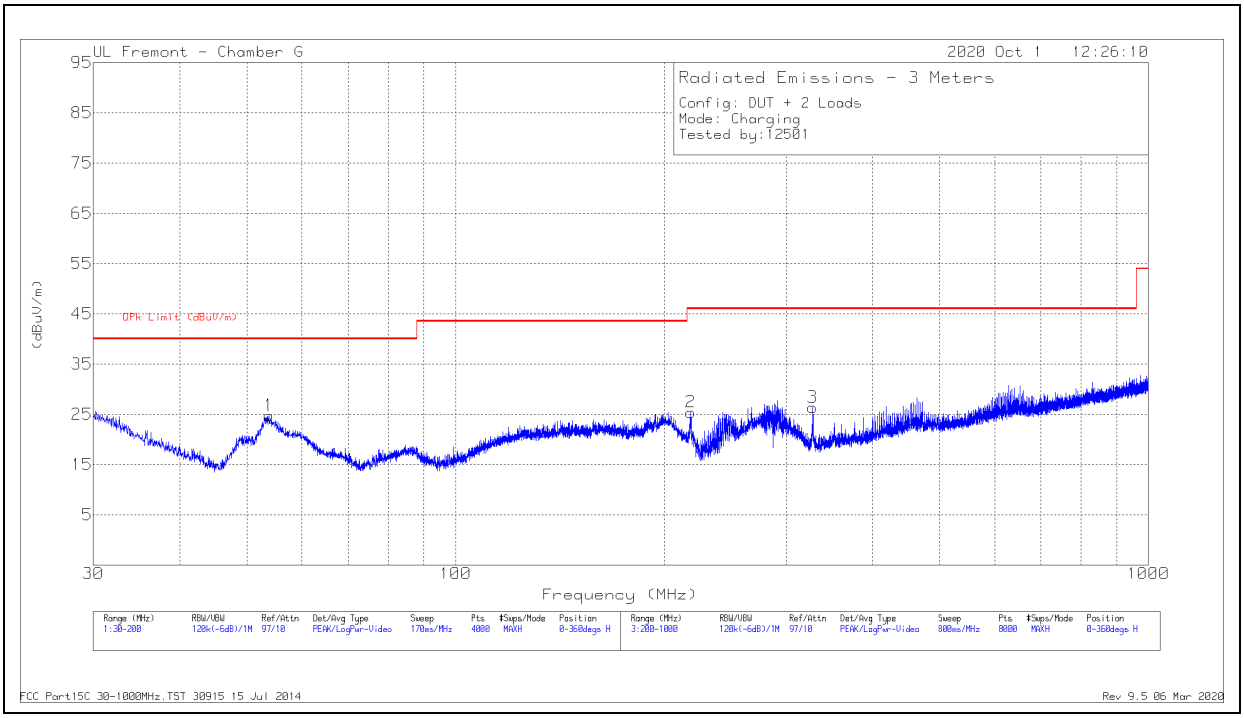
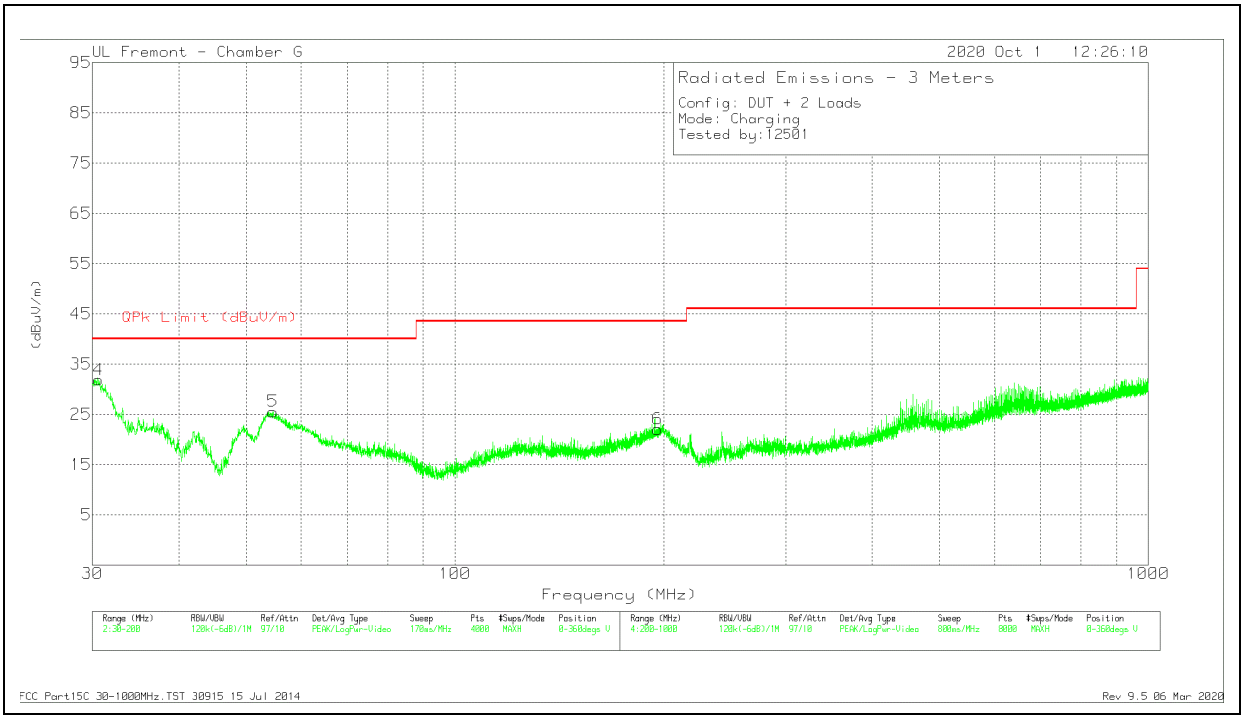
8.4.7. Config 7, OPERATING 127.7kHz Airpods With Charging Case + 326kHz iWatch (FLAT POSITION)

HORIZONTAL PLOT



VERTICAL PLOT



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DATA

Radiated Emissions

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
3	* 327.5166	34.5	Pk	20.5	-28.6	26.4	46.02	-19.62	0-360	99	H
4	30.6377	35.44	Pk	27.4	-31	31.84	40	-8.16	0-360	100	V
1	53.8062	42.06	Pk	13.5	-30.8	24.76	40	-15.24	0-360	401	H
5	54.6564	42.74	Pk	13.5	-30.7	25.54	40	-14.46	0-360	100	V
6	196.1755	32.95	Pk	18.6	-29.5	22.05	43.52	-21.47	0-360	100	V
2	218.4024	37.62	Pk	17.2	-29.4	25.42	46.02	-20.6	0-360	99	H

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

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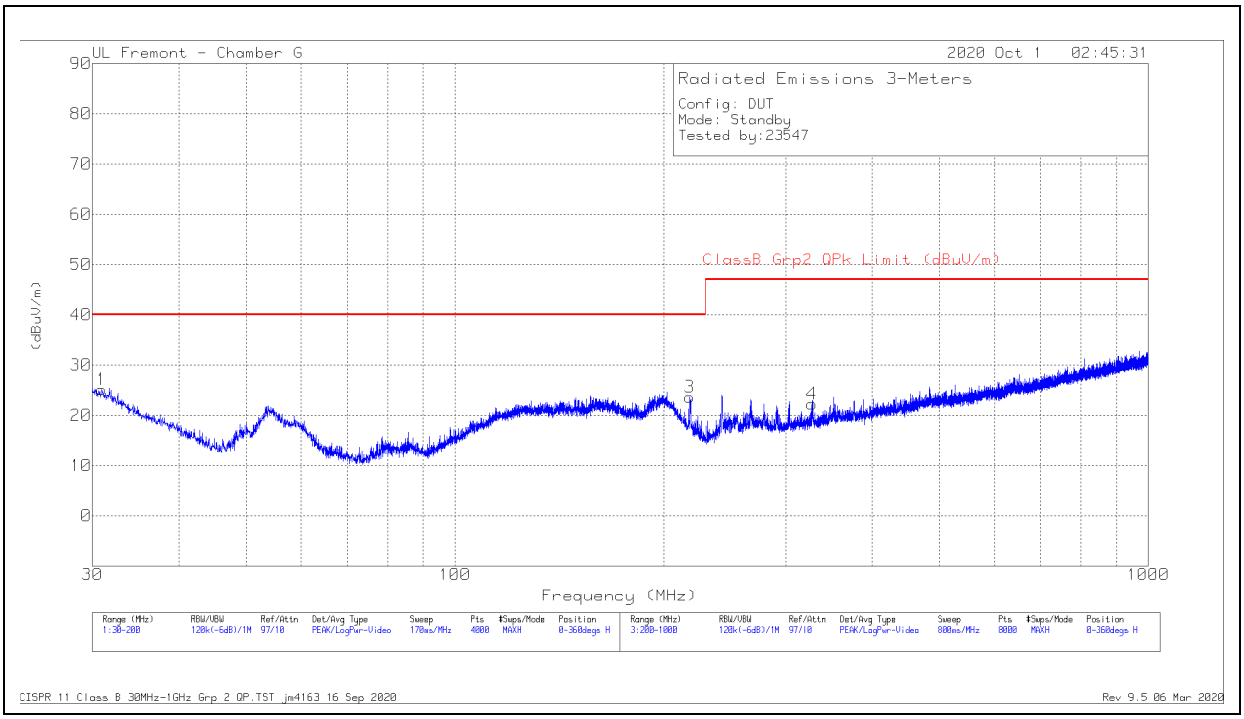
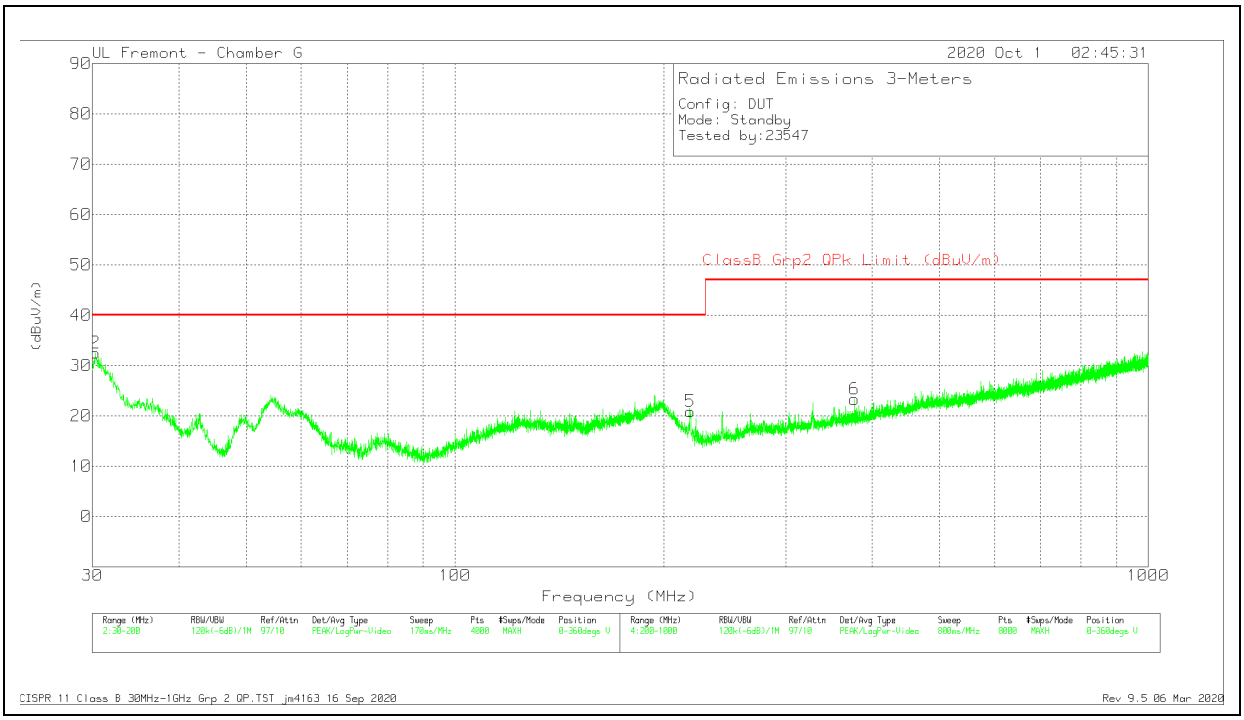
8.5. IC / CISPR 11 TX SPURIOUS EMISSION 30 TO 1000 MHz

8.5.1. Config 1, STANDBY CONFIGURATION (FLAT POSITION)

HORIZONTAL PLOT



VERTICAL PLOT



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DATA

Radiated Emissions

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
2	30.2976	35.83	Pk	27.7	-31	32.53	40	-7.47	0-360	100	V
	30.3936	29.09	Qp	27.6	-31	25.69	40	-14.31	258	109	V
1	30.9352	28.92	Pk	27.2	-31	25.12	40	-14.88	0-360	99	H
3	218.2024	35.83	Pk	17.2	-29.4	23.63	40	-16.37	0-360	201	H
5	218.7024	33.07	Pk	17.2	-29.4	20.87	40	-19.13	0-360	99	V
4	327.4166	30.36	Pk	20.5	-28.6	22.26	47	-24.74	0-360	99	H
6	377.023	30.31	Pk	21.5	-28.5	23.31	47	-23.69	0-360	99	V

Pk - Peak detector

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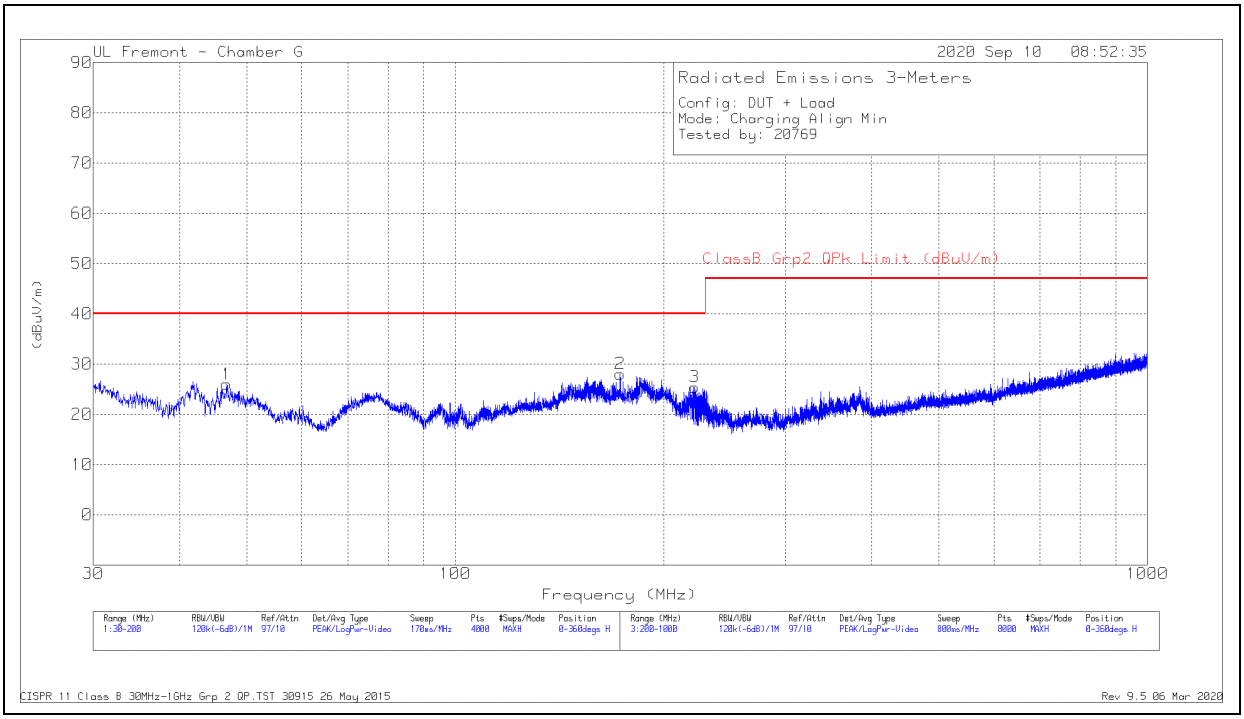
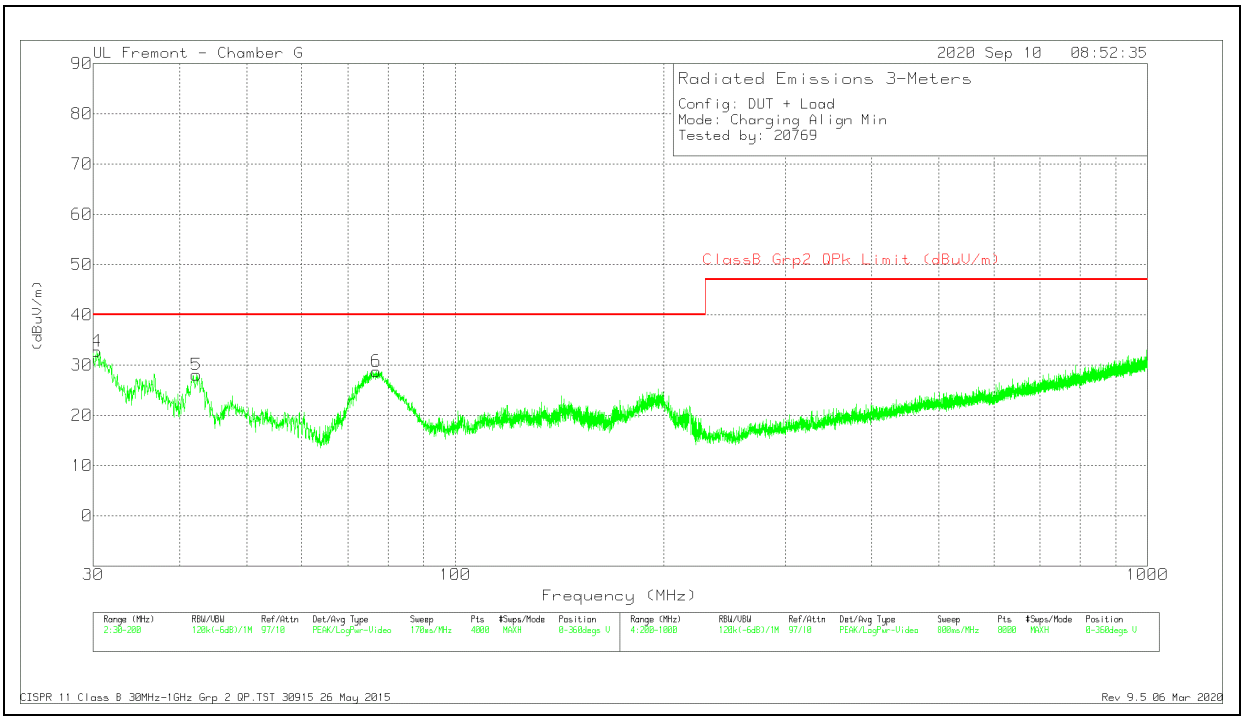
8.5.2. Config 2, OPERATING 360kHz (FLAT POSITION) – iPhone

HORIZONTAL PLOT



VERTICAL PLOT



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DATA

Radiated Emissions

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	30.3826	36.66	Pk	27.1	-31	32.76	40	-7.24	0-360	101	V
5	42.2857	40.87	Pk	18.1	-30.9	28.07	40	-11.93	0-360	101	V
1	46.7493	41.58	Pk	15.2	-30.8	25.98	40	-14.02	0-360	401	H
6	76.9747	45.38	Pk	13.9	-30.5	28.78	40	-11.22	0-360	101	V
2	173.1345	40.04	Pk	17.7	-29.7	28.04	40	-11.96	0-360	201	H
3	221.7028	38.02	Pk	16.8	-29.4	25.42	40	-14.58	0-360	101	H

Pk - Peak detector

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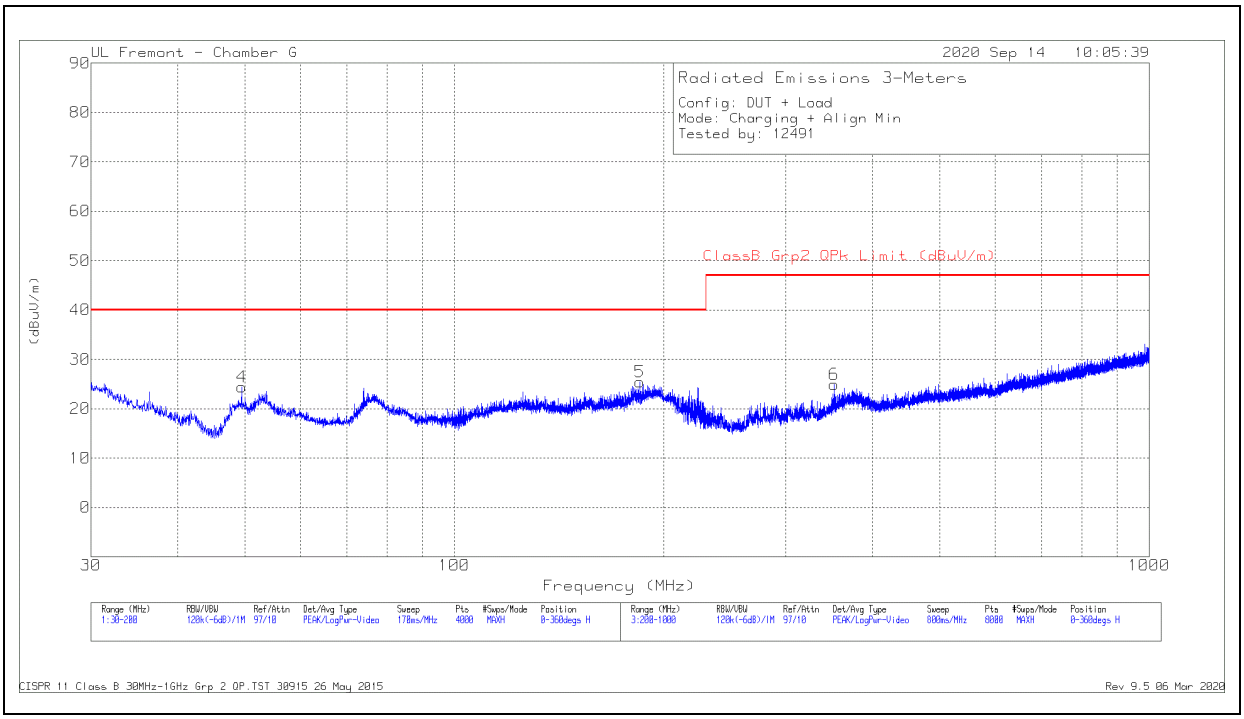
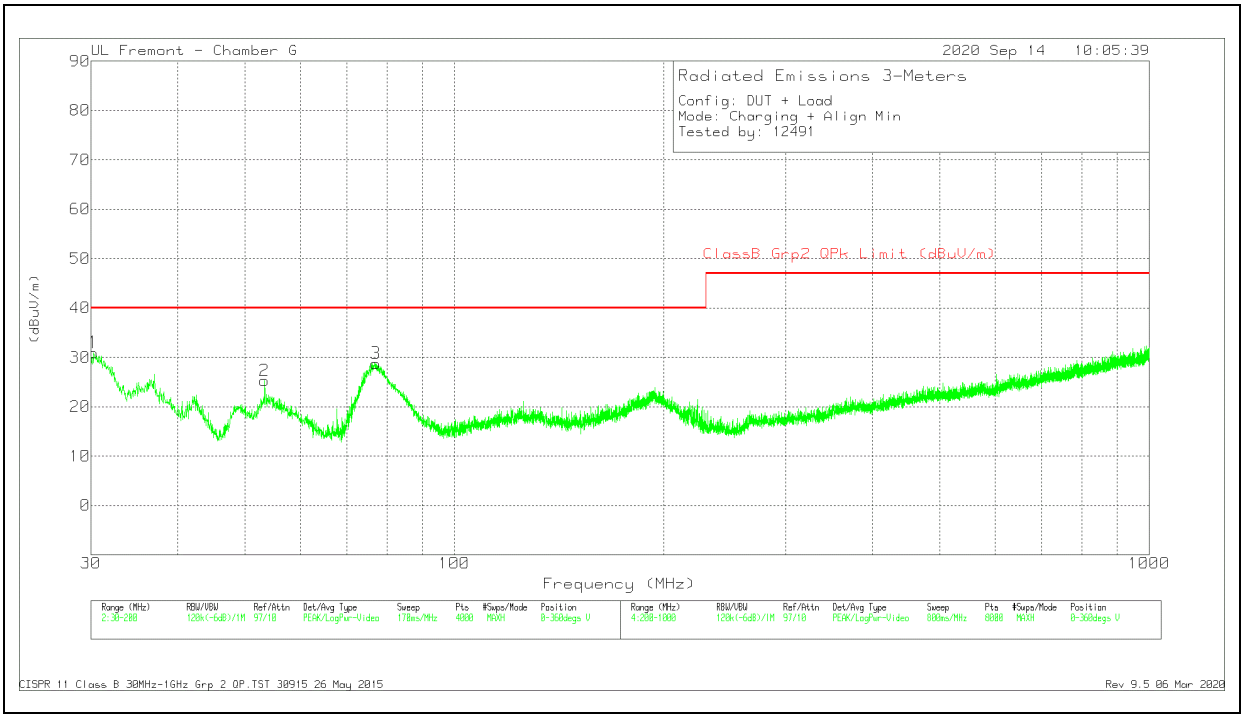
8.5.3. Config 3, OPERATING 127.7kHz (FLAT POSITION) – Legacy iPhone

HORIZONTAL PLOT



VERTICAL PLOT



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DATA

Radiated Emissions

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	30.2551	34.87	Pk	27.1	-31	30.97	40	-9.03	0-360	100	V
4	49.4275	41.15	Pk	14	-30.8	24.35	40	-15.65	0-360	401	H
2	53.3385	42.82	Pk	13.3	-30.8	25.32	40	-14.68	0-360	100	V
3	77.0172	45.4	Pk	13.9	-30.5	28.8	40	-11.2	0-360	100	V
5	184.9101	37.84	Pk	17.2	-29.6	25.44	40	-14.56	0-360	201	H
6	352.3198	32.96	Pk	20.5	-28.6	24.86	47	-22.14	0-360	99	H

Pk - Peak detector

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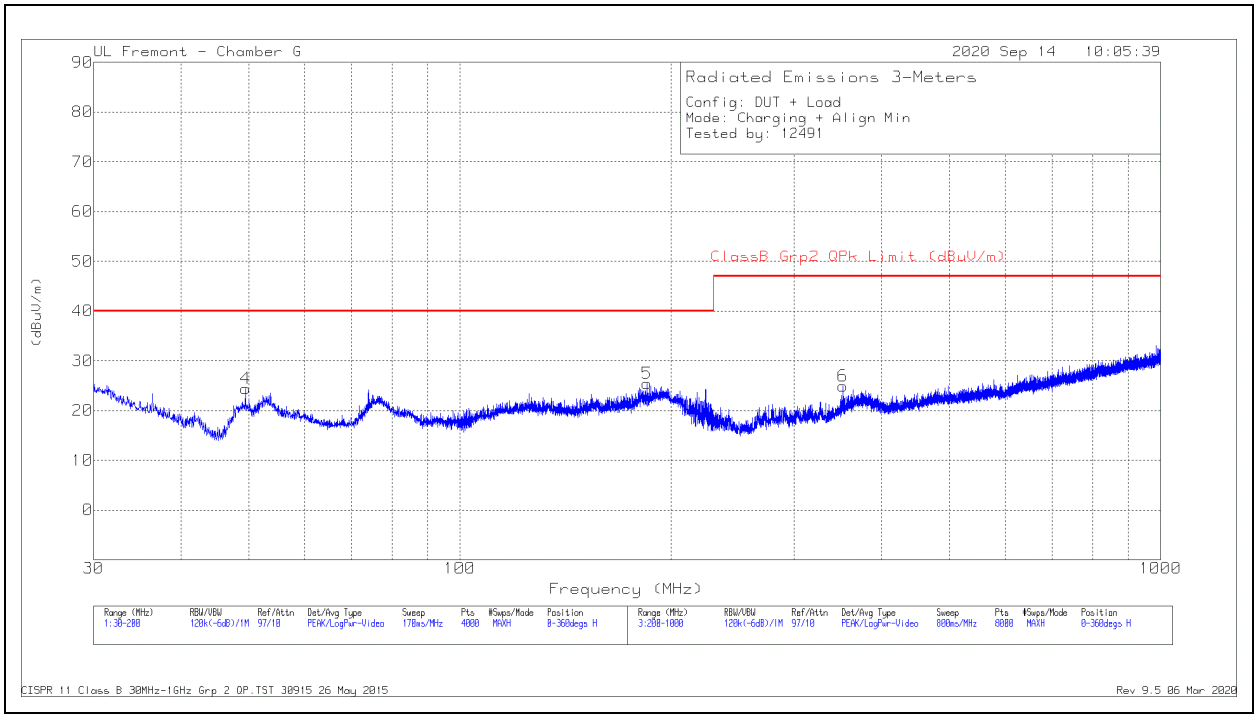
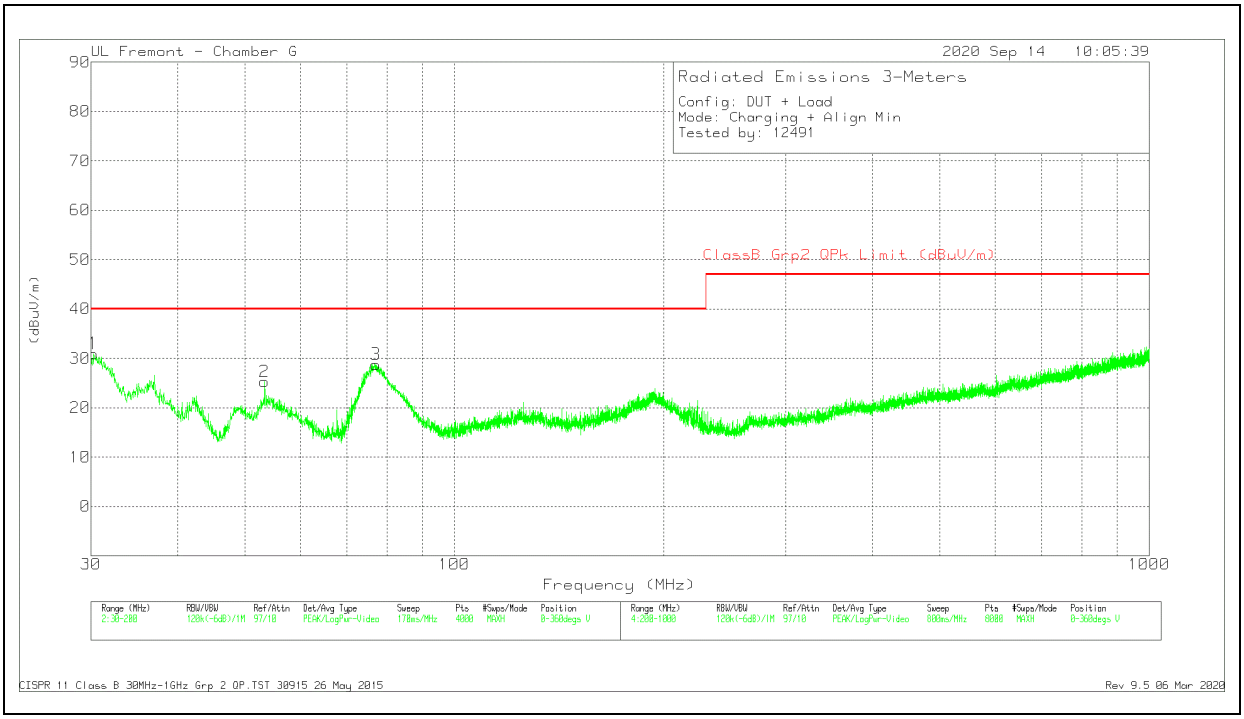
8.5.4. Config 4, OPERATING 127.7kHz (FLAT POSITION) – Airpods With Charging Case

HORIZONTAL PLOT



VERTICAL PLOT



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DATA

Radiated Emissions

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	30.2551	34.87	Pk	27.1	-31	30.97	40	-9.03	0-360	100	V
4	49.4275	41.15	Pk	14	-30.8	24.35	40	-15.65	0-360	401	H
2	53.3385	42.82	Pk	13.3	-30.8	25.32	40	-14.68	0-360	100	V
3	77.0172	45.4	Pk	13.9	-30.5	28.8	40	-11.2	0-360	100	V
5	184.9101	37.84	Pk	17.2	-29.6	25.44	40	-14.56	0-360	201	H
6	352.3198	32.96	Pk	20.5	-28.6	24.86	47	-22.14	0-360	99	H

Pk - Peak detector

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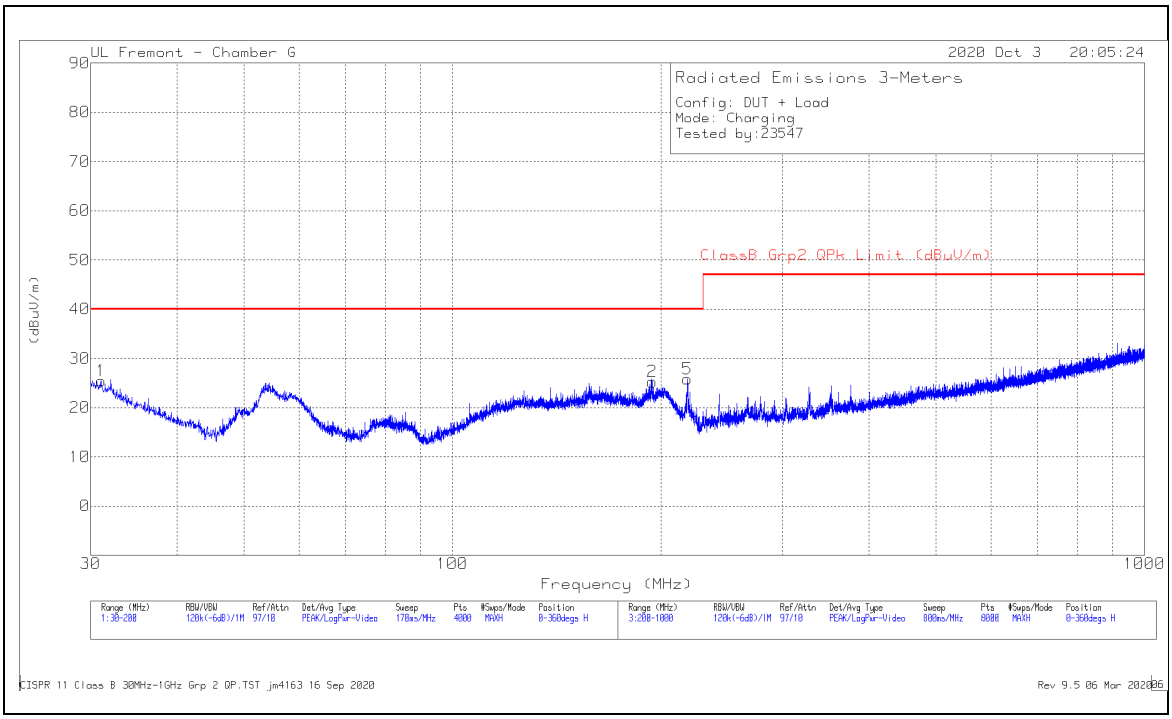
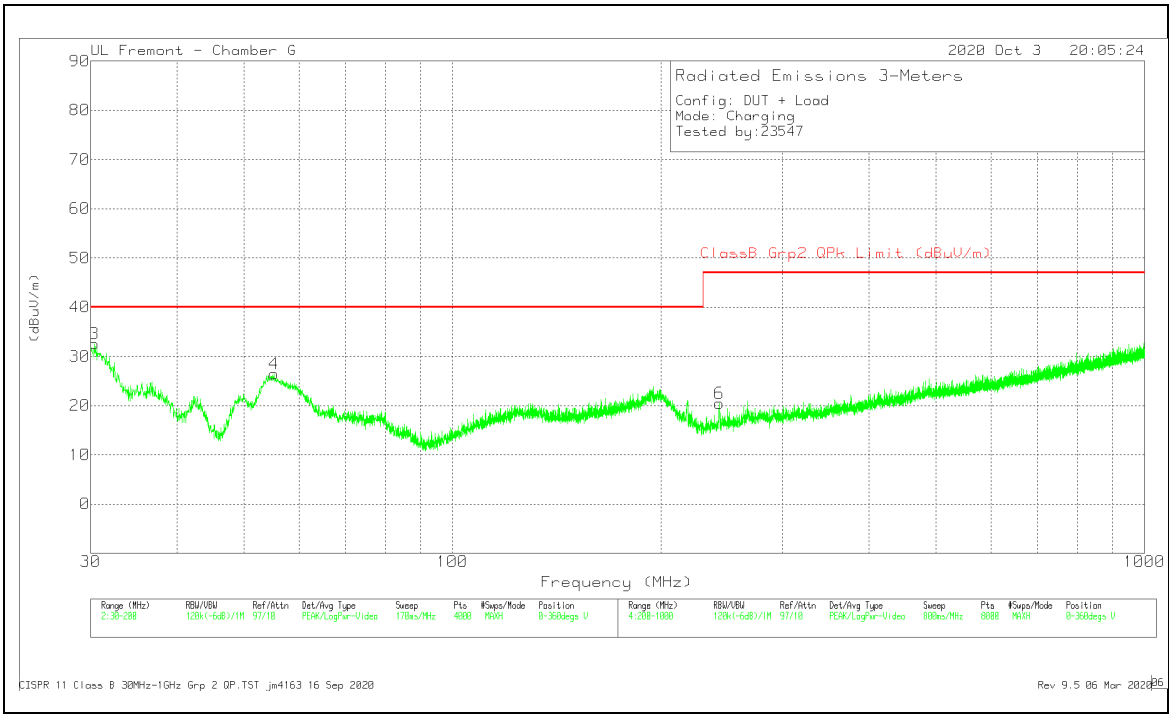
8.5.5. Config 5, OPERATING 326KHz (FLAT POSITION) with iWatch

HORIZONTAL PLOT



VERTICAL PLOT



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DATA

Radiated Emissions

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
3	30.3401	35.95	Pk	27.6	-31	32.55	40	-7.45	0-360	101	V
	30.3545	29.59	Qp	27.6	-31	26.19	40	-13.81	291	115	V
1	31.0628	29.3	Pk	27.1	-31	25.4	40	-14.6	0-360	100	H
4	55.209	43.7	Pk	13.5	-30.7	26.5	40	-13.5	0-360	101	V
2	194.4325	36.44	Pk	18.3	-29.5	25.24	40	-14.76	0-360	100	H
5	218.4024	37.96	Pk	17.2	-29.4	25.76	40	-14.24	0-360	101	H
6	243.0056	31.7	Pk	18	-29.2	20.5	47	-26.5	0-360	97	V

Pk - Peak detector

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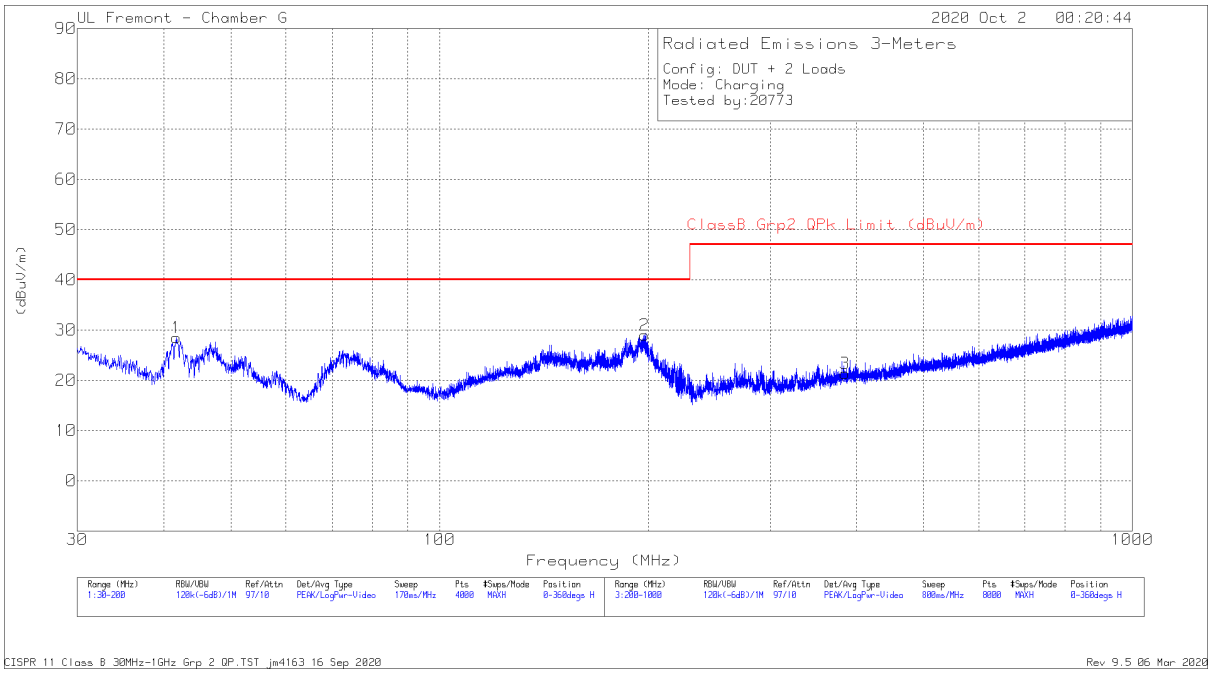
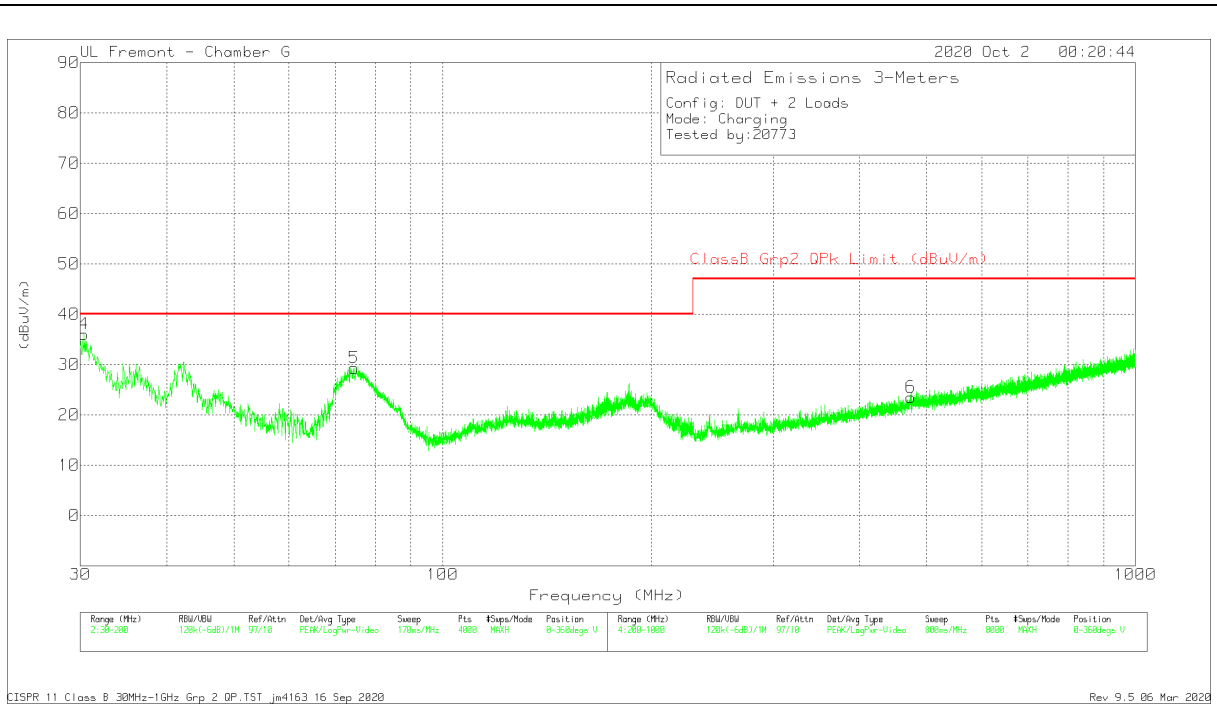
8.5.6. Config 6, OPERATING 360kHz iPhone + 326KHz iWatch (FLAT POSITION)

HORIZONTAL PLOT



VERTICAL PLOT



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DATA

Radiated Emissions

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	30.3826	39.44	Pk	27.6	-31	36.04	40	-3.96	0-360	101	V
	30.3231	33.44	Qp	27.6	-31	30.04	40	-9.96	264	125	V
1	41.733	40.67	Pk	18.7	-30.9	28.47	40	-11.53	0-360	401	H
5	74.509	45.92	Pk	14	-30.6	29.32	40	-10.68	0-360	101	V
2	197.6634	39.46	Pk	19	-29.5	28.96	40	-11.04	0-360	201	H
3	385.0241	28.13	Pk	21.6	-28.4	21.33	47	-25.67	0-360	101	H
6	474.1356	27.83	Pk	23.7	-28	23.53	47	-23.47	0-360	301	V

Pk - Peak detector
Qp - Quasi-Peak detector

CISPR 11 Class B 30MHz-1GHz Grp 2 QP.TST jm4163 16 Sep 2020
Rev 9.5 06 Mar 2020

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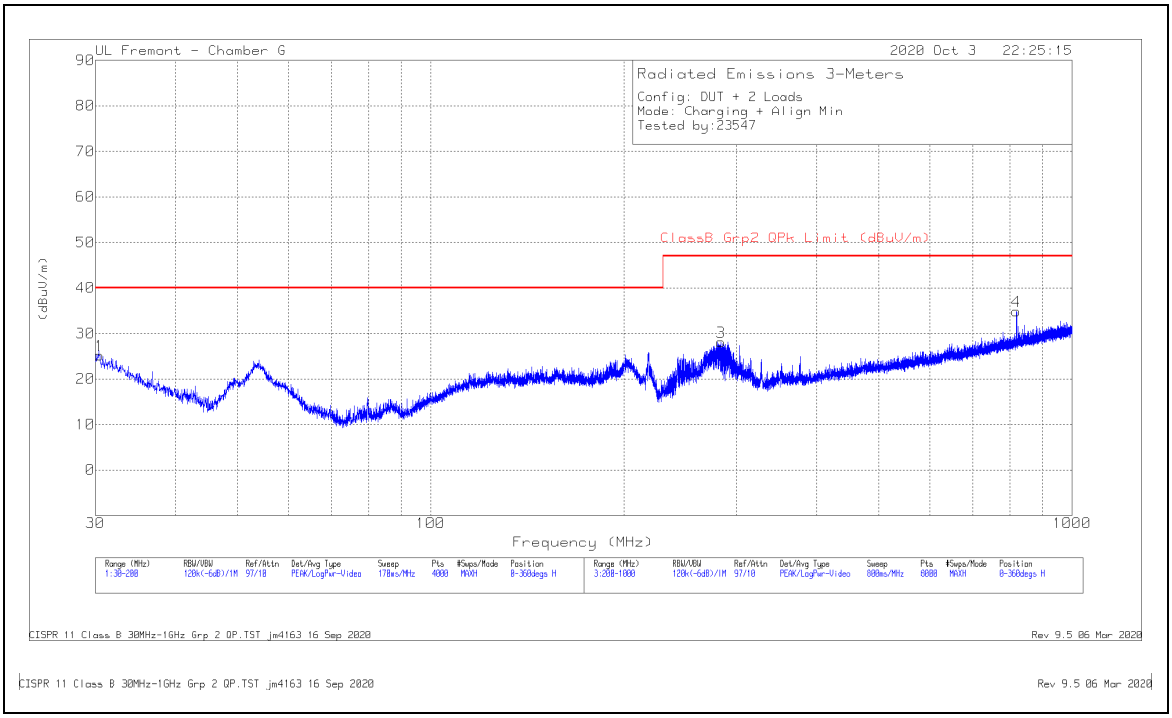
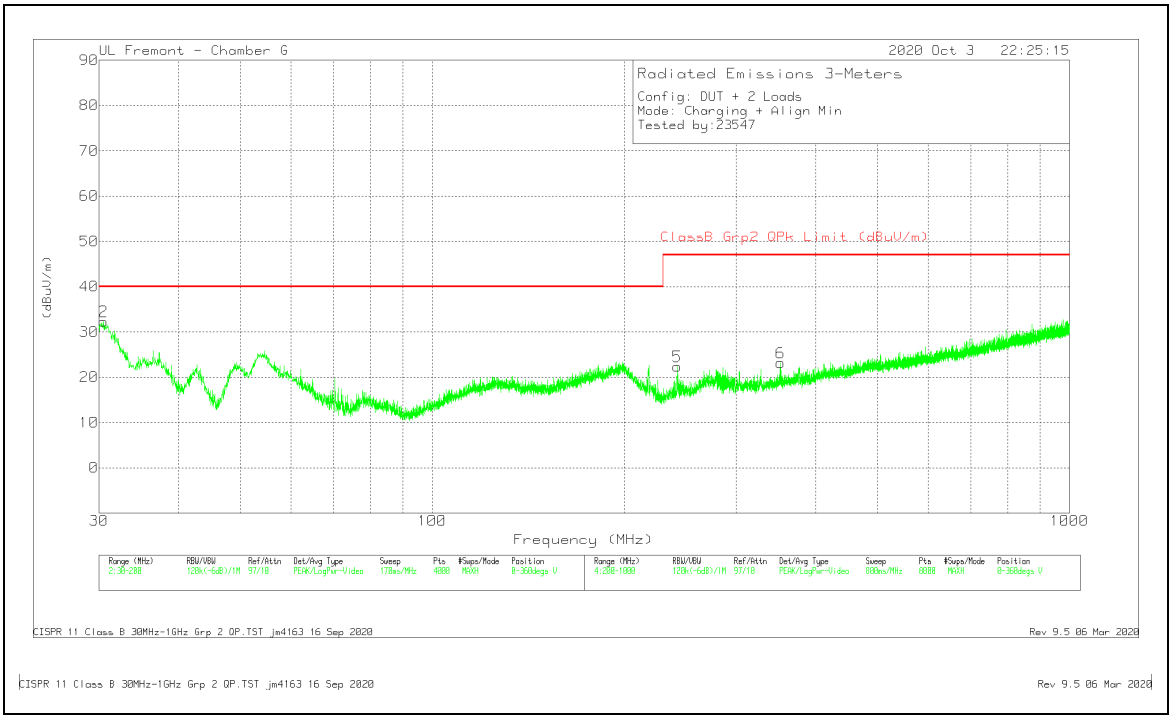
8.5.7. Config 7, OPERATING 127.7kHz Airpods With Charging Case + 326kHz iWatch (FLAT POSITION)

HORIZONTAL PLOT



VERTICAL PLOT



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DATA

Radiated Emissions

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
1	30.4251	28.61	Pk	27.6	-31	25.21	40	-14.79	0-360	301	H
2	30.5101	35.87	Pk	27.5	-31	32.37	40	-7.63	0-360	100	V
5	242.5055	33.73	Pk	18	-29.3	22.43	47	-24.57	0-360	99	V
3	283.4108	37.39	Pk	19.7	-29	28.09	47	-18.91	0-360	100	H
6	352.3198	30.7	Pk	21.1	-28.6	23.2	47	-23.8	0-360	99	V
4	819.3805	33.47	Pk	28.1	-26.7	34.87	47	-12.13	0-360	201	H

Pk - Peak detector

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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.

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

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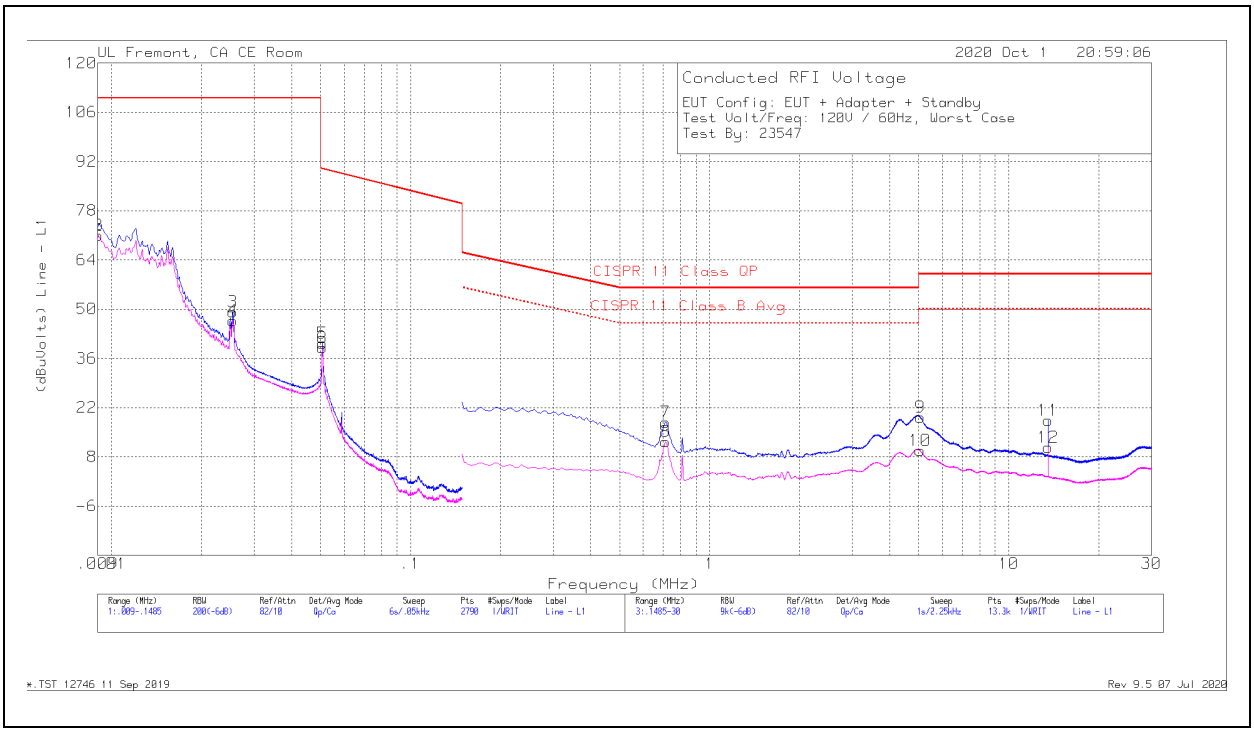
9.1.1. STANDBY MODE – FLAT POSITION

LINE 1 RESULTS



WORST EMISSIONS

Trace Markers

Range 1: Line - L1 .009 - .1485MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE0186446 LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading (dBuVolts)	CISPR 11 Class QP	Margin (dB)	CISPR 11 Class B Avg	Margin (dB)
1	.0091	63.16	Qp	.1	0	10.8	74.06	110	-35.94	-	-
2	.00905	60.1	Ca	.1	0	10.8	71	-	-	-	-
3	.02545	38.82	Qp	.1	0	10.3	49.22	110	-60.78	-	-
4	.02545	36.39	Ca	.1	0	10.3	46.79	-	-	-	-
5	.0508	29.97	Qp	.1	0	10.2	40.27	89.85	-49.58	-	-
6	.05075	28.83	Ca	.1	0	10.2	39.13	-	-	-	-

Range 3: Line - L1 .1485 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE0186446 LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading (dBuVolts)	CISPR 11 Class QP	Margin (dB)	CISPR 11 Class B Avg	Margin (dB)
7	.71325	7.79	Qp	0	0	10.1	17.89	56	-38.11	-	-
8	.71325	2.2	Ca	0	0	10.1	12.3	-	-	46	-33.7
9	5.05688	8.99	Qp	0	.1	10.2	19.29	60	-40.71	-	-
10	5.0535	-.53	Ca	0	.1	10.2	9.77	-	-	50	-40.23
11	13.56075	7.91	Qp	.1	.2	10.2	18.41	60	-41.59	-	-
12	13.56075	.13	Ca	.1	.2	10.2	10.63	-	-	50	-39.37

Qp - Quasi-Peak detector
Ca - CISPR average detection

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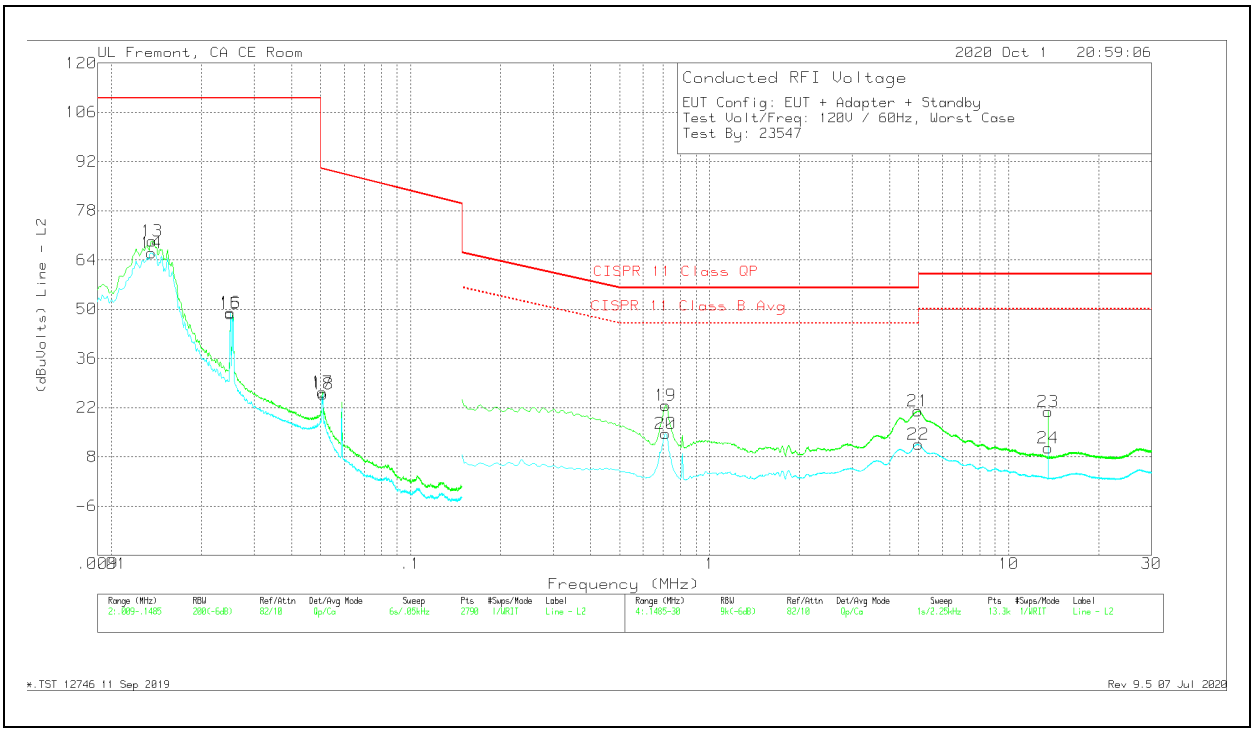
LINE 2 RESULTS



WORST EMISSIONS

Trace Markers

Range 2: Line - L2 .009 - .1485MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE0186446 LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading (dBuVolts)	CISPR 11 Class QP	Margin (dB)	CISPR 11 Class B Avg	Margin (dB)
13	.01368	58.75	Qp	.1	0	10.6	69.45	110	-40.55	-	-
14	.01363	55.28	Ca	.1	0	10.6	65.98	-	-	-	-
15	.025	38.26	Qp	.1	0	10.3	48.66	110	-61.34	-	-
16	.025	38.61	Ca	.1	0	10.3	49.01	-	-	-	-
17	.05085	16.13	Qp	.1	0	10.2	26.43	89.85	-63.42	-	-
18	.0509	15.53	Ca	.1	0	10.2	25.83	-	-	-	-

Range 4: Line - L2 .1485 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE0186446 LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading (dBuVolts)	CISPR 11 Class QP	Margin (dB)	CISPR 11 Class B Avg	Margin (dB)
19	.71325	12.51	Qp	0	0	10.1	22.61	56	-33.39	-	-
20	.71325	4.51	Ca	0	0	10.1	14.61	-	-	46	-31.39
21	4.96575	10.74	Qp	0	.1	10.2	21.04	56	-34.96	-	-
22	4.9815	1.3	Ca	0	.1	10.2	11.6	-	-	46	-34.4
23	13.56075	10.38	Qp	.1	.2	10.2	20.88	60	-39.12	-	-
24	13.56075	-.04	Ca	.1	.2	10.2	10.46	-	-	50	-39.54

Qp - Quasi-Peak detector
Ca - CISPR average detection

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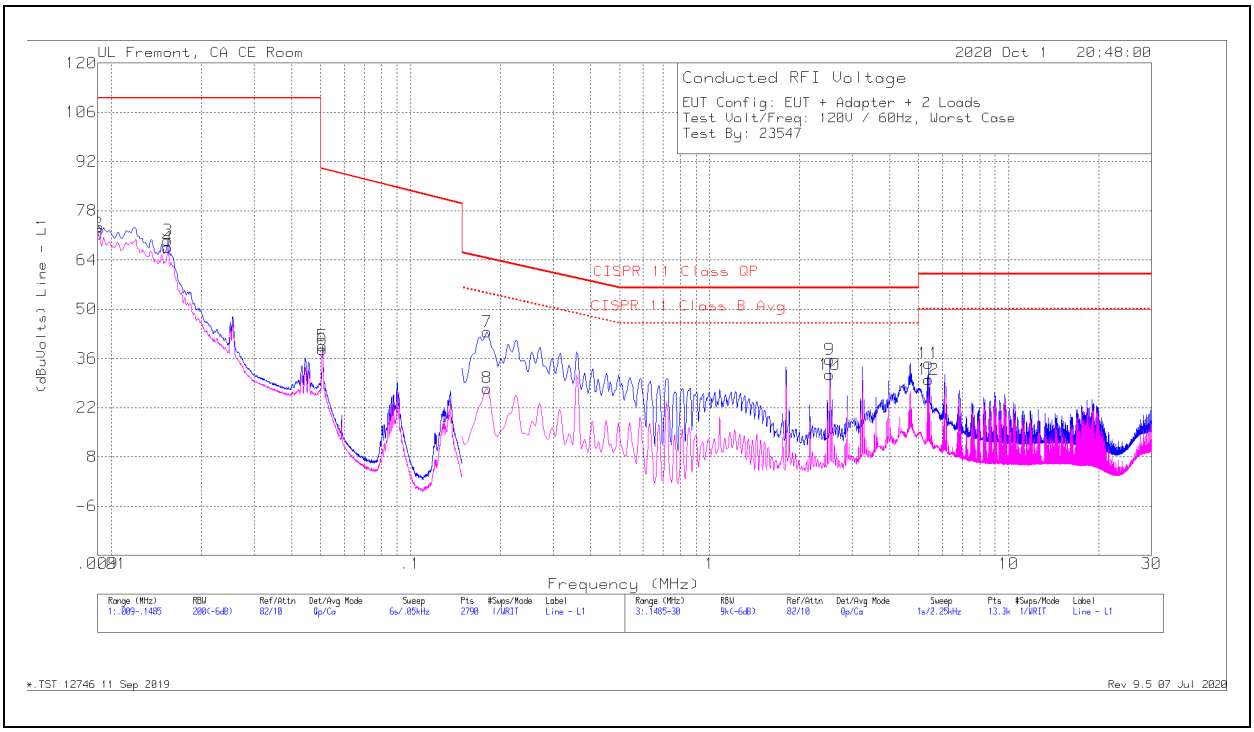
9.1.2. OPERATING MODE – FLAT with New iPhone + iWatch

LINE 1 RESULTS



WORST EMISSIONS

Range 1: Line - L1 .009 - .1485MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE0186446 LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading (dBuVolts)	CISPR 11 Class QP	Margin (dB)	CISPR 11 Class B Avg	Margin (dB)
1	.0091	62.66	Qp	.1	0	10.8	73.56	110	-36.44	-	-
2	.00905	60.54	Ca	.1	0	10.8	71.44	-	-	-	-
3	.01545	58.93	Qp	.1	0	10.5	69.53	110	-40.47	-	-
4	.01545	57.01	Ca	.1	0	10.5	67.61	-	-	-	-
5	.0508	29.28	Qp	.1	0	10.2	39.58	89.85	-50.27	-	-
6	.05075	28.21	Ca	.1	0	10.2	38.51	-	-	-	-

Range 3: Line - L1 .1485 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE0186446 LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading (dBuVolts)	CISPR 11 Class QP	Margin (dB)	CISPR 11 Class B Avg	Margin (dB)
7	.18	33.43	Qp	0	0	10.1	43.53	64.42	-20.89	-	-
8	.18	17.45	Ca	0	0	10.1	27.55	-	-	54.49	-26.94
9	2.52	25.53	Qp	0	.1	10.1	35.73	56	-20.27	-	-
10	2.52	21.22	Ca	0	.1	10.1	31.42	-	-	46	-14.58
11	5.4	24.25	Qp	0	.1	10.2	34.55	60	-25.45	-	-
12	5.4	19.72	Ca	0	.1	10.2	30.02	-	-	50	-19.98

Qp - Quasi-Peak detector
Ca - CISPR average detection

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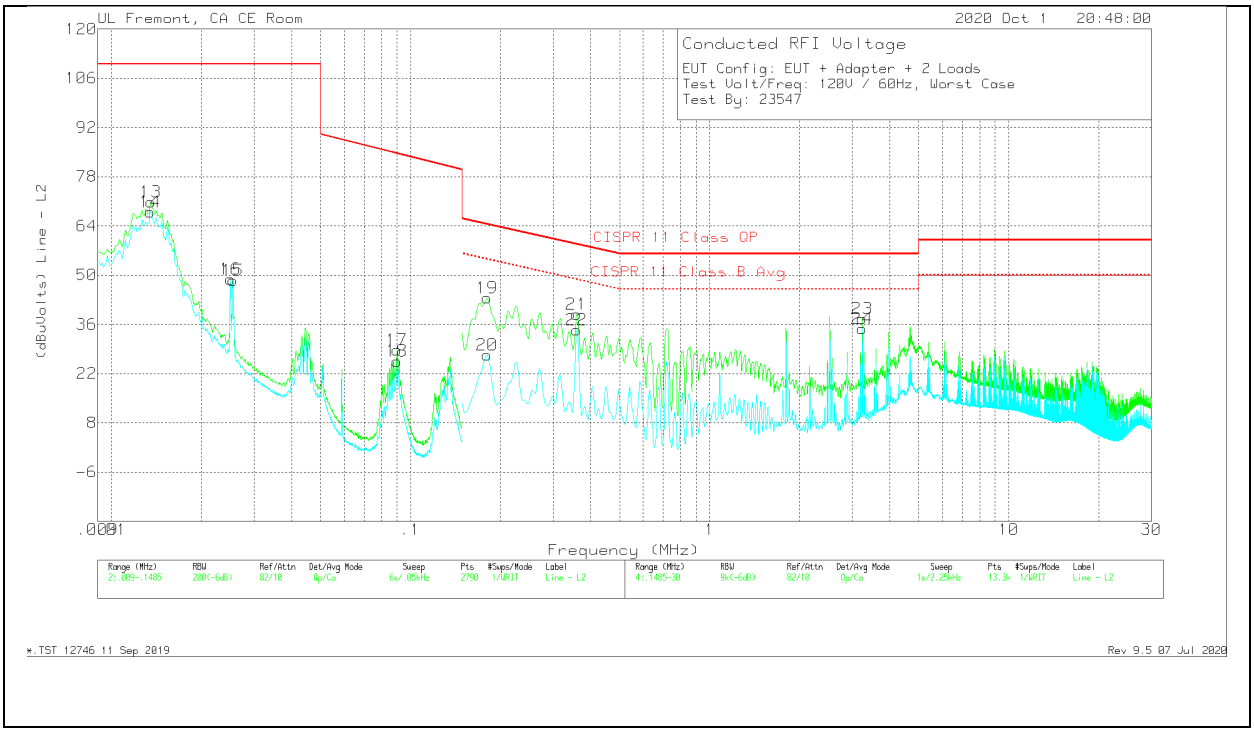
LINE 2 RESULTS



WORST EMISSIONS

Range 2: Line - L2 .009 - .1485MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE0186446 LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading (dBuVolts)	CISPR 11 Class QP	Margin (dB)	CISPR 11 Class B Avg	Margin (dB)
13	.01355	60.11	Qp	.1	0	10.6	70.81	110	-39.19	-	-
14	.0135	57.29	Ca	.1	0	10.6	67.99	-	-	-	-
15	.02545	38.11	Qp	.1	0	10.3	48.51	110	-61.49	-	-
16	.025	38.45	Ca	.1	0	10.3	48.85	-	-	-	-
17	.09015	18.39	Qp	.1	0	10.2	28.69	84.59	-55.9	-	-
18	.0902	15.28	Ca	.1	0	10.2	25.58	-	-	-	-

Range 4: Line - L2 .1485 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE0186446 LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading (dBuVolts)	CISPR 11 Class QP	Margin (dB)	CISPR 11 Class B Avg	Margin (dB)
19	.18	33.46	Qp	0	0	10.1	43.56	64.42	-20.86	-	-
20	.18	17.24	Ca	0	0	10.1	27.34	-	-	54.49	-27.15
21	.36	28.79	Qp	0	0	10.1	38.89	58.71	-19.82	-	-
22	.36	24.27	Ca	0	0	10.1	34.37	-	-	48.73	-14.36
23	3.24	27.39	Qp	0	.1	10.2	37.69	56	-18.31	-	-
24	3.24	24.44	Ca	0	.1	10.2	34.74	-	-	46	-11.26

Qp - Quasi-Peak detector
Ca - CISPR average detection

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10. SETUP PHOTOS

Please refer to 13371062-EP1V1 for setup photos

END OF TEST REPORT

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