



**FCC Part 1 Subpart I
FCC Part 2 Subpart J**

CERTIFICATION TEST REPORT

FOR

MAGNETIC CHARGING DOCK

MODEL NO: A2086

FCC ID: BCGA2086

REPORT NUMBER: 12529284-E2V3

ISSUE DATE: 10/26/2018

Prepared for
APPLE INC.
1 APPLE PARK WAY
CUPERTINO, CA 95014, U.S.A.

Prepared by
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Revision History

Rev.	Issue Date	Revisions	Revised By
V1	10/23/2018	Initial Issue	Chin Pang
V2	10/25/2018	Update RF exposure Table with corrected Flatbed Configuration 1 & 2 and Tilt Configuration 3 & 4	Chin Pang
V3	10/26/2018	Update Section 7.2.1 formula and replaced the correct Flatbed RF exposure table	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: MAGNETIC CHARGING DOCK

MODEL NUMBER: A2086

SERIAL NUMBER: DLC8405000FK18N1Y

DATE TESTED: OCTOBER 11-12, 2018

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 1 SUBPART I & PART 2 SUBPART J	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.

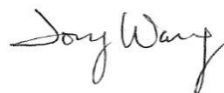
This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This 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.

Reviewed By:



Chin Pang
Senior Engineer
UL Verification Service Inc.

Prepared By:



Tony Wang
Test Engineer
UL Verification Services Inc.

2. TEST METHODOLOGY

All calculations were made in accordance with FCC OET Bulletin 65 Edition 97-01.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, and 47658 Kato Road, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street	47658 Kato Rd
<input type="checkbox"/> Chamber A (ISED:2324B-1)	<input type="checkbox"/> Chamber D (ISED:22541-1)	<input type="checkbox"/> Chamber I (ISED:2324A-5)
<input type="checkbox"/> Chamber B (ISED:2324B-2)	<input type="checkbox"/> Chamber E (ISED:22541-2)	<input type="checkbox"/> Chamber J (ISED:2324A-6)
<input type="checkbox"/> Chamber C (ISED:2324B-3)	<input type="checkbox"/> Chamber F (ISED:22541-3)	<input type="checkbox"/> Chamber K (ISED:2324A-1)
	<input type="checkbox"/> Chamber G (ISED:22541-4)	<input type="checkbox"/> Chamber L (ISED:2324A-3)
	<input type="checkbox"/> Chamber H (ISED:22541-5)	
	<input checked="" type="checkbox"/> Temperature B Room	

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

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

4. EQUIPMENT UNDER TEST

4.1. DESCRIPTION OF EUT

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

4.2. WORST-CASE CONFIGURATION AND MODE

The EUT is a single frequency magnetic charger enclosed in a plastic case, with flatbed and tilt two position charging configuration. For operation mode, it was tested with small and big watches to find the worst case. 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.

Config	Mode	Descriptions
1	Standby	EUT Alone powered by AC/DC adapter
2	Operating	EUT at Flatbed position with Watch (big) powered by AC/DC adapter
3	Operating	EUT at Tilt position with Watch (big) powered by AC/DC adapter

Note: EUT was tested as standby and operation modes.

4.3. KDB 680106 D01 v03 SECTION 5b EQUIPMENT APPROVAL CONSIDERATIONS

Requirement	Device
(1) Power transfer frequency is less than 1 MHz.	Yes. Operating Frequency is 326.5KHz.
(2) Output power from each primary coil is less than or equal to 15 watts.	Yes. The maximum power is 5 Watts.
(3) The transfer system includes only single primary and secondary coils. This includes charging systems that may have multiple primary coils and clients that are able to detect and allow coupling only between individual pairs of coils.	Yes. The system includes one single primary and secondary coil and the device is designed to charge a single client.
(4) Client device is placed directly in contact with the transmitter.	Yes. The client device is placed directly in contact with the transmitter.
(5) Mobile exposure conditions only (portable exposure conditions are not covered by this exclusion).	Yes. Mobile exposure condition apply.
(6) The aggregate H-field strengths at 15 cm surrounding the device and 20 cm above the top surface from all simultaneous transmitting coils are demonstrated to be less than 50% of the MPE limit.	Yes. The aggregate fields at 15 cm from the device are 1.47% and 1.66% of the FCC H field limit on flatbed and tilt position respectively.

4.4. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

SUPPORT EQUIPMENT & PERIPHERALS LIST				
Description	Housing/Watch Band	Manufacturer	Model	Serial Number
Watch (big)	Stainless Steel/Milanese Loop	Apple	A1976	D92WV001K47J
Watch (small)	Stainless Steel/Milanese Loop	Apple	A1975	D92X2006KNWV
AC/DC Adapter	N/A	Apple	A1385	N/A
USB-A to Lightning Cable 1m	N/A	Apple	A1480	N/A

I/O CABLES

N/A

TEST SETUP

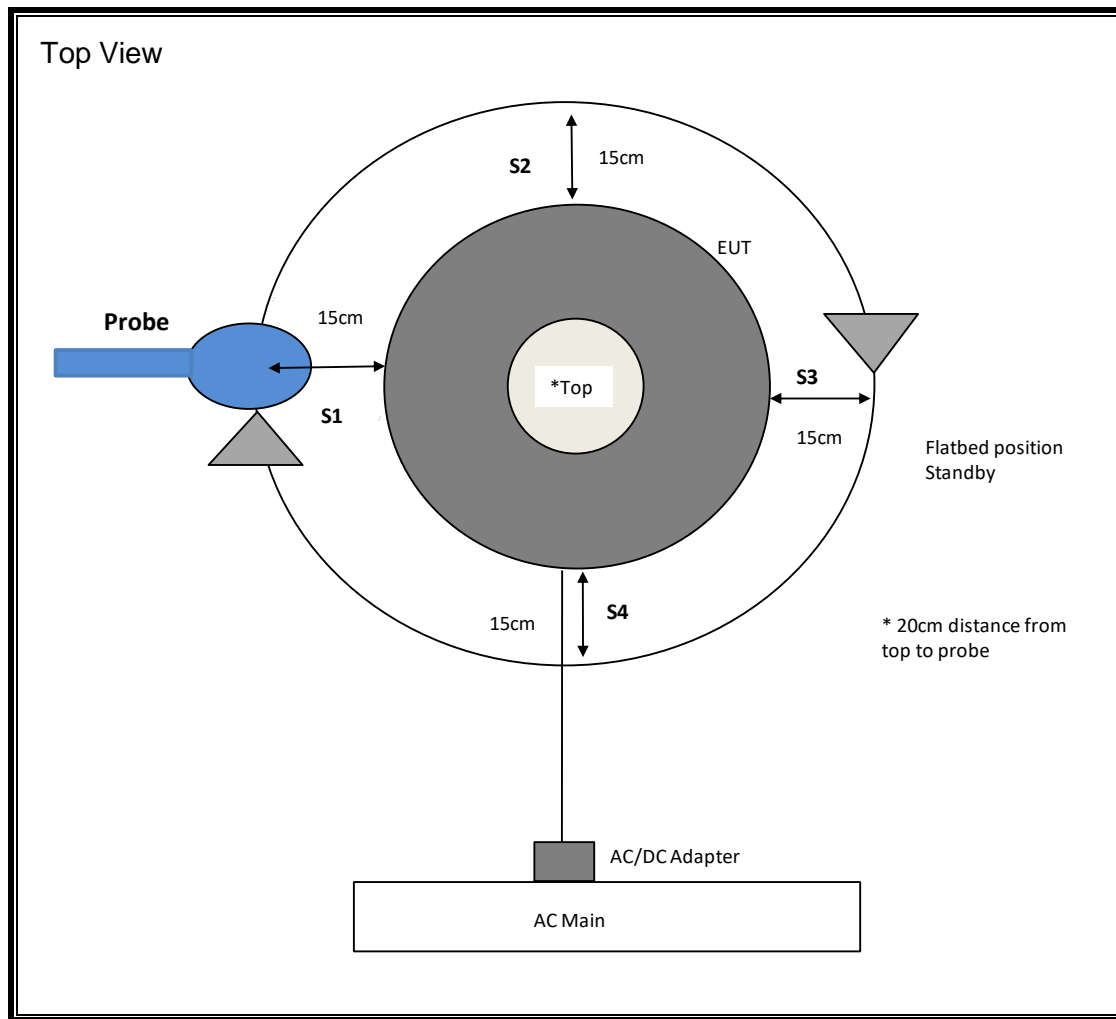
The following two configurations are tested:

Configuration	EUT Position	Mode	Descriptions
1 & 3	Flatbed/Tilt	Standby	EUT Alone powered by AC/DC adapter
2 & 4	Flatbed/Tilt	Operating (Watch, ~10% Power Charging)	EUT and Watch powered by AC/DC adapter
		Operating (Watch, ~50% Power Charging) <u>Note:</u> For the configuration 2 & 4 operating with Watch, battery level of the Watch was at a state of 20 – 50%.	EUT and Watch powered by AC/DC adapter
		Operating (Watch, >90% Power Charging)	EUT and Watch powered by AC/DC adapter

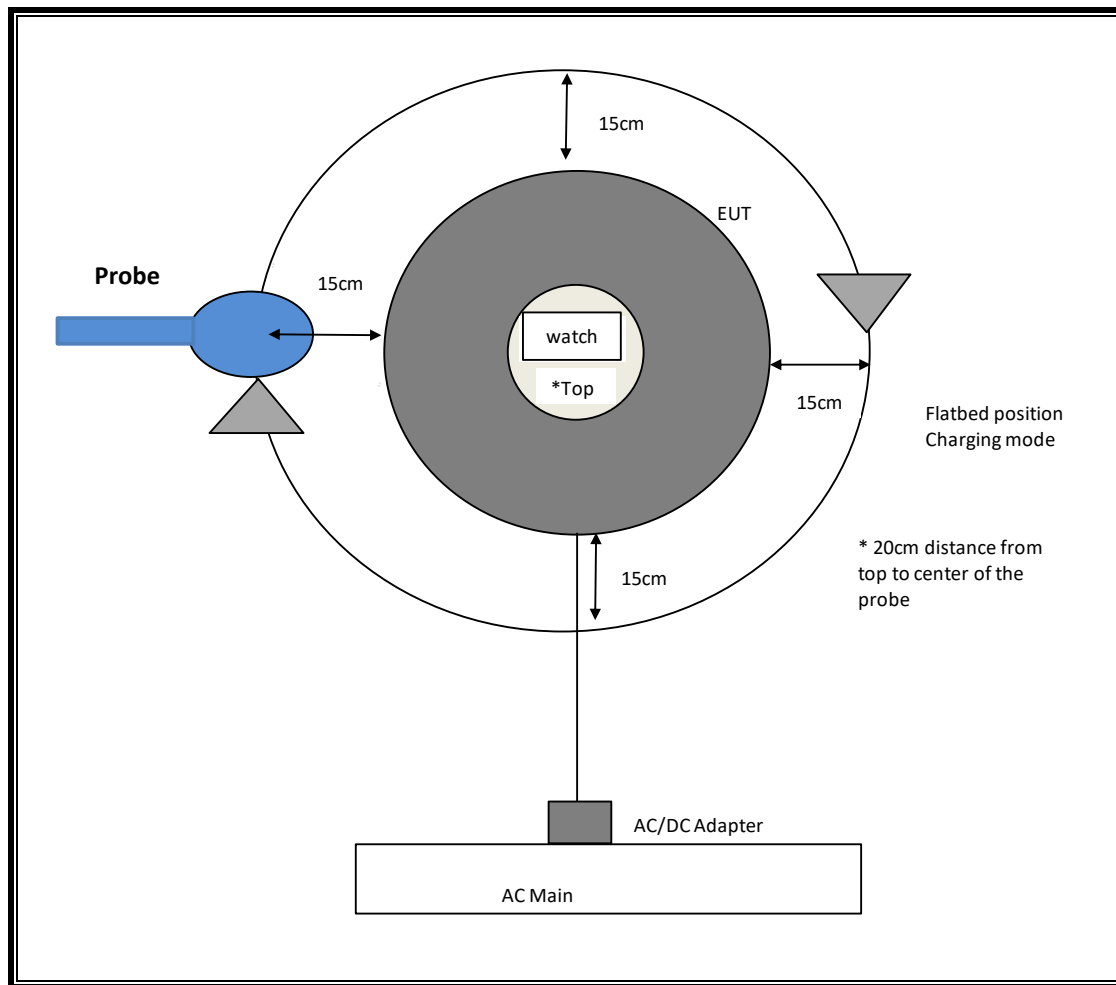
MEASUREMENT SETUP

The measurement was taken using a probe placed 15 cm surrounding the device and 20 cm above the top surface of the EUT. Measurements were taken from the top and all sides of the EUT per KDB680106 D01 v03.

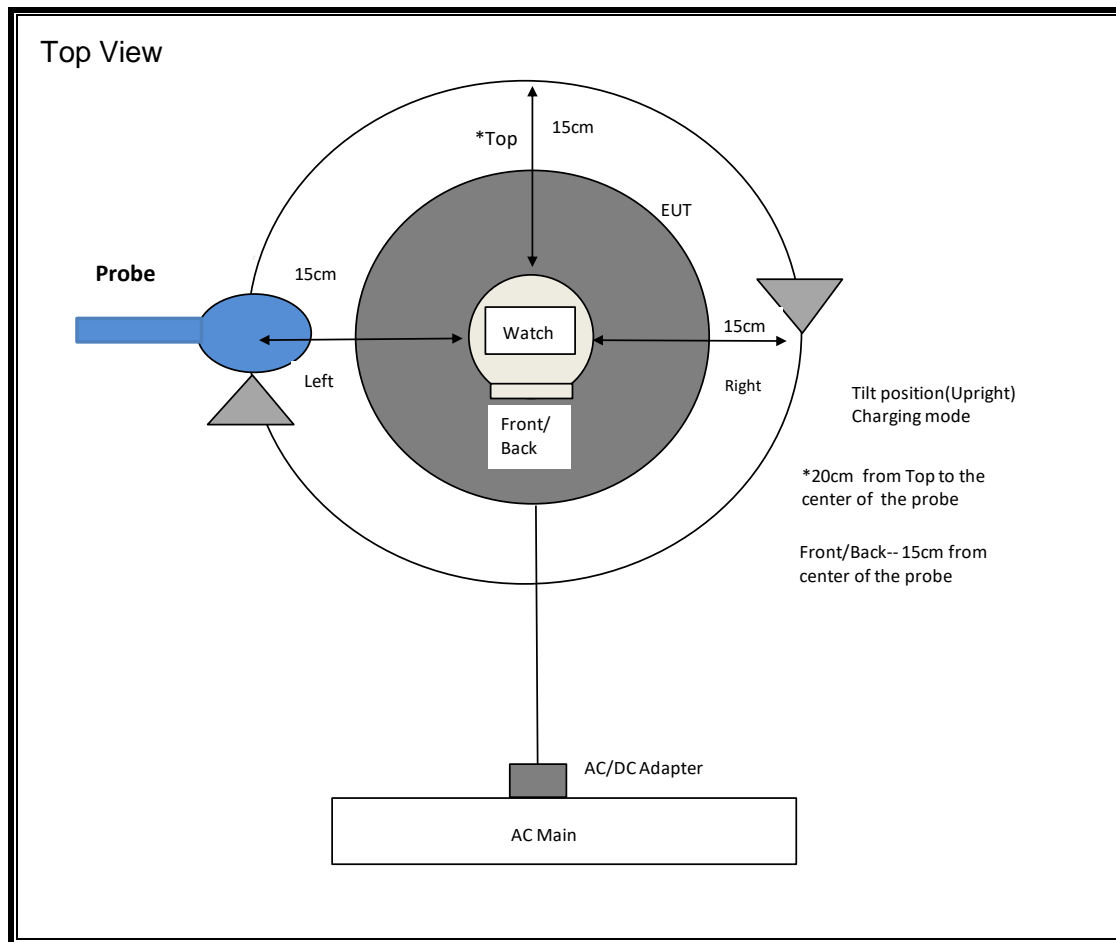
CONFIGURATION 1, FLATBED, STANDBY POSITION



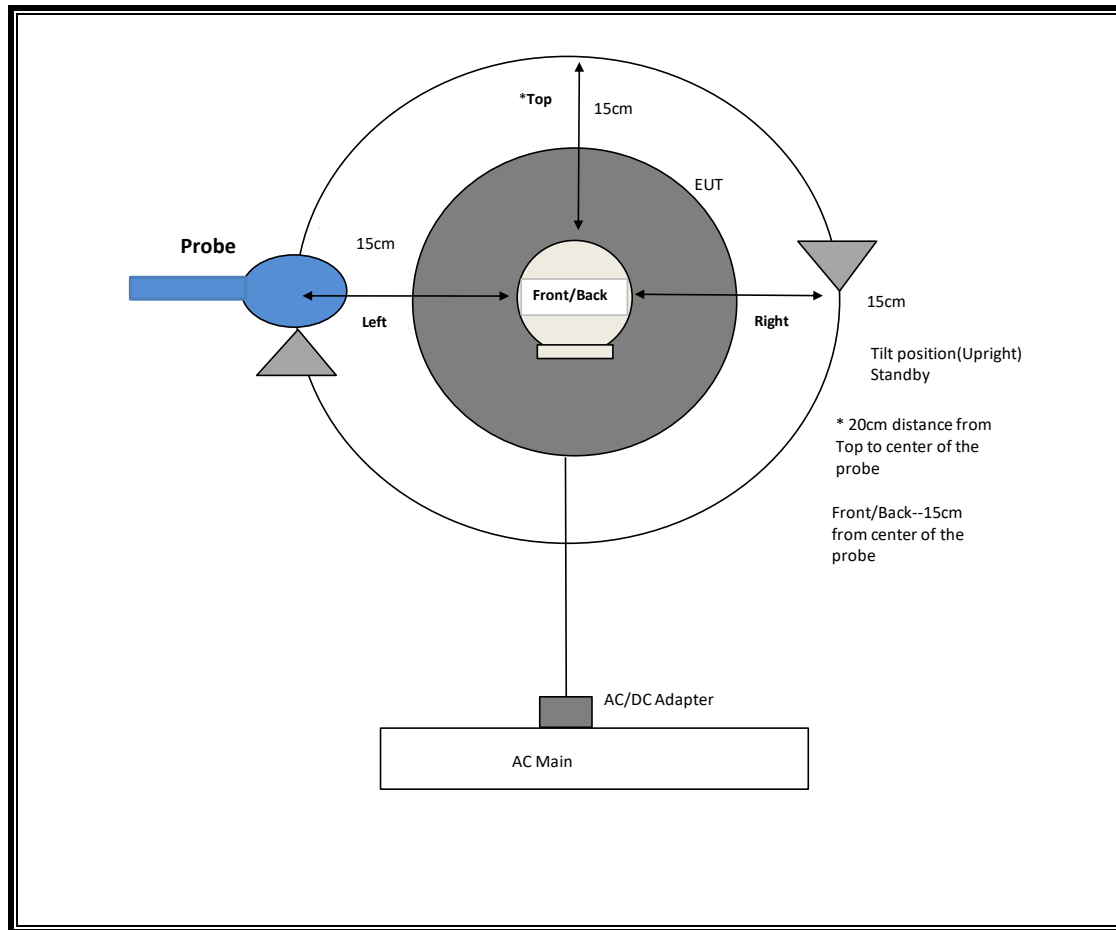
CONFIGURATION 2 , FLATBED, CHARGING MODE



CONFIGURATION 3, TILT POSITION, STANDBY POSITION



CONFIGURATION 4 , TILT POSITION, CHARGING MODE



5. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment List					
Description	Manufacturer	Model	S/N	Cal Date	Cal Due
Electric and Magnetic Field Probe	Narda	EHP-200A	170WX80318	04/06/2018	04/06/19

6. DUTY CYCLE

LIMITS

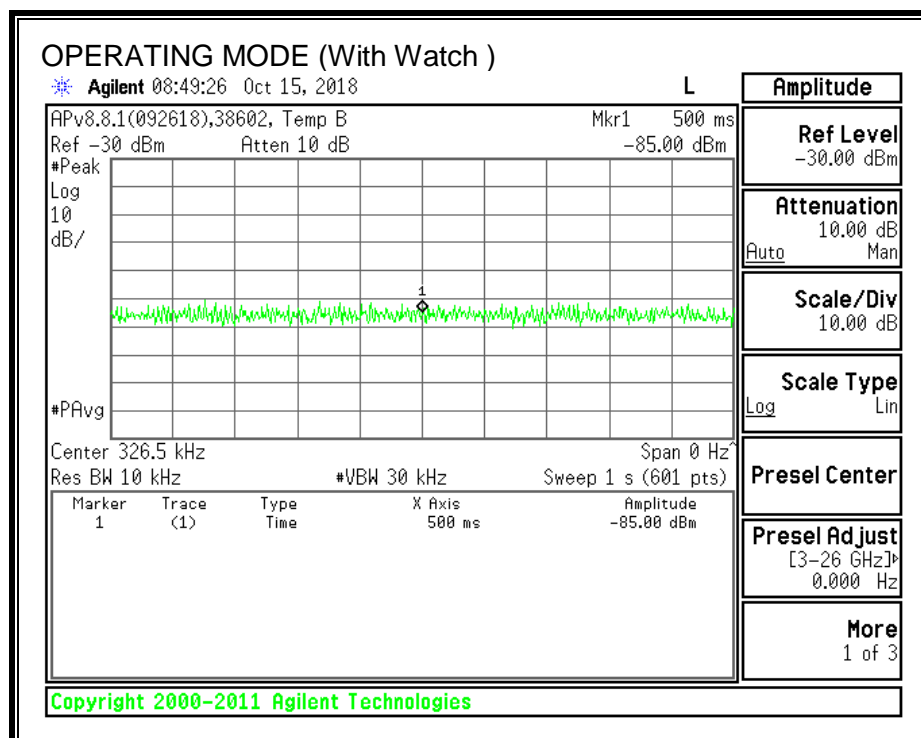
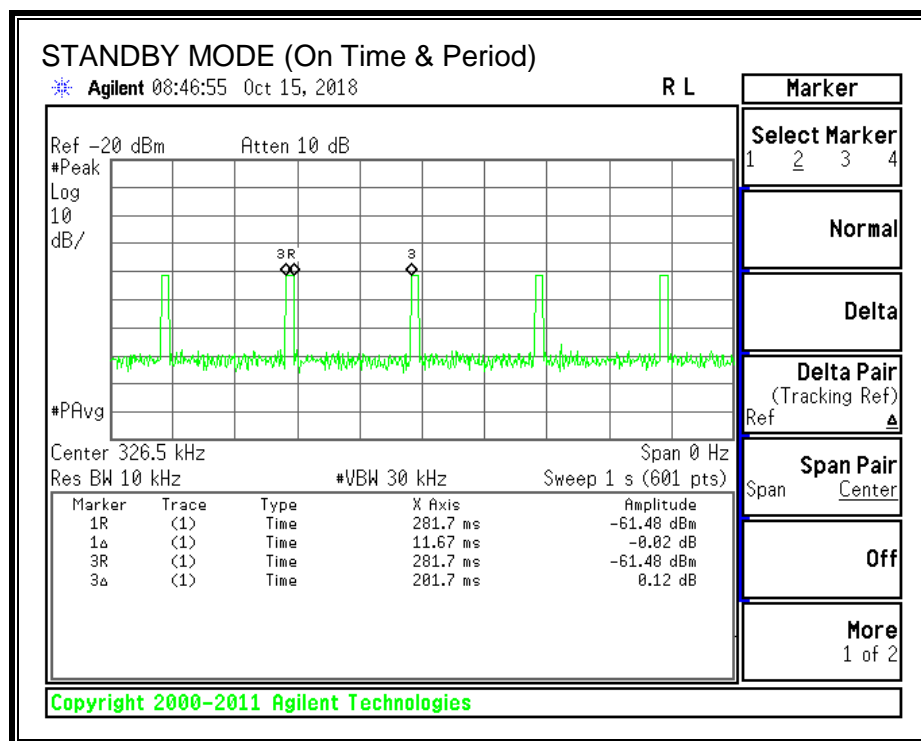
None; for reporting purposes only.

PROCEDURE

Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

	B (msec)	(msec)	x (linear)	Cycle (%)	Correction Factor (dB)
Standby (Config 1)	11.67	201.70	0.06	5.79%	12.38
Operating(Config 2)	100.00	100.00	1.00	100.00%	0.00



7. MAXIMUM PERMISSIBLE RF EXPOSURE

7.1. FCC LIMITS AND SUMMARY

7.1.1. FCC LIMITS

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f ²)	6
30–300	61.4	0.163	1.0	6
300–1500 .....	.....	.....	f/300	6
1500–100,000 .....	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500 .....	.....	.....	f/1500	30
1500–100,000 .....	.....	.....	1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

7.1.2. FCC SUMMARY OF RESULTS

RESULTS

ID:	38602	Date:	10/12/18
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FCC RF Exposure Summary of Results

Flatbed Position, A2086, A1385, Stainless Steel and Model A1976 WATCH

Electric Field Limit			Magnetic Field Limit		
FCC RF Exposure Limit	Maximum Average (V/m)	Percentage (%)	FCC RF Exposure	Maximum Average (A/m)	Percentage (%)
614	0.252	0.04%	1.63	0.024	1.47%

Tilt Position, A2086, A1385, Stainless Steel and Model A1976 WATCH

Electric Field Limit			Magnetic Field Limit		
FCC RF Exposure Limit	Maximum Average (V/m)	Percentage (%)	FCC RF Exposure	Maximum Average (A/m)	Percentage (%)
614	0.260	0.04%	1.63	0.027	1.66%

7.2. TEST RESULTS

7.2.1. FCC RF EXPOSURE

E- FIELD AND H- FIELD MEASUREMENTS

Note: Peak measurements were performed. RMS values were calculated from the peak measurement. Please refer to the formula for calculating the RMS values: [Field Strength x $\sqrt{\text{Duty Cycle}}$].

FLATBED: RF EXPOSURE LIMIT

Configuration	Test Mode	Measuring Distance (cm)	Electric Field Limit	Electric Field Reading				Magnetic Field Limit	Magnetic Field Reading			
			(V/m)	(V/m)				(A/m)	(A/m)			
			FCC	Location	Peak	Duty Cycle %	FCC Average	FCC	Location	Peak	Duty Cycle %	FCC Average
1	Standby	15 cm surrounding the device (S1 - S4) and 20 cm above the top surface of the EUT	614	S1	0.236	5.79	0.057	1.63	S1	0.036	5.79	0.009
				S2	0.229		0.055		S2	0.034		0.008
				S3	0.235		0.057		S3	0.033		0.008
				S4	0.235		0.057		S4	0.030		0.007
				Top	0.235		0.057		Top	0.035		0.008
				Max	0.242		0.058		Max	0.049		0.012
2	Operating Real Product (Power <10% Charging)			S1	0.233	100	0.233		S1	0.010	100	0.010
				S2	0.228		0.228		S2	0.012		0.012
				S3	0.228		0.228		S3	0.012		0.012
				S4	0.226		0.226		S4	0.015		0.015
				Top	0.226		0.226		Top	0.017		0.017
				Max	0.235		0.235		Max	0.021		0.021
	Operating Real Product (Power ~ 20% - 50% Charging)			S1	0.235	100	0.235		S1	0.010	100	0.010
				S2	0.240		0.240		S2	0.014		0.014
				S3	0.242		0.242		S3	0.014		0.014
				S4	0.242		0.242		S4	0.015		0.015
				Top	0.245		0.245		Top	0.015		0.015
				Max	0.252		0.252		Max	0.024		0.024
	Operating Real Product (Power >90% Charging)			S1	0.209	100	0.209		S1	0.014	100	0.014
				S2	0.209		0.209		S2	0.015		0.015
				S3	0.218		0.218		S3	0.015		0.015
				S4	0.230		0.230		S4	0.018		0.018
				Top	0.235		0.235		Top	0.018		0.018
				Max	0.240		0.240		Max	0.023		0.023

TILT: RF EXPOSURE LIMIT

Configuration	Test Mode	Measuring Distance (cm)	Electric Field Limit	Electric Field Reading				Magnetic Field Limit	Magnetic Field Reading			
			(V/m)	(V/m)				(A/m)	(A/m)			
			FCC	Location	Peak	Duty Cycle %	FCC Average	FCC	Location	Peak	Duty Cycle %	FCC Average
3	Standby	15 cm surrounding the device (S1 - S4) and 20 cm above the top surface of the EUT	614	Front	0.236	5.79	0.057	1.63	Front	0.036	5.79	0.009
				Back	0.229		0.055		Back	0.034		0.008
				Left	0.235		0.057		Left	0.033		0.008
				Right	0.235		0.057		Right	0.030		0.007
				Top	0.235		0.057		Top	0.035		0.008
				Max	0.242		0.058		Max	0.049		0.012
4	Operating Real Product (Power <10% Charging)			Front	0.209	100	0.209		Front	0.015	100	0.015
				Back	0.217		0.217		Back	0.016		0.016
				Left	0.218		0.218		Left	0.016		0.016
				Right	0.218		0.218		Right	0.018		0.018
				Top	0.218		0.218		Top	0.020		0.020
				Max	0.240		0.240		Max	0.025		0.025
	Operating Real Product (Power ~ 20% - 50% Charging)			Front	0.235	100	0.235		Front	0.016	100	0.016
				Back	0.226		0.226		Back	0.016		0.016
				Left	0.235		0.235		Left	0.018		0.018
				Right	0.225		0.225		Right	0.018		0.018
				Top	0.245		0.245		Top	0.025		0.025
				Max	0.260		0.260		Max	0.027		0.027
	Operating Real Product (Power >90% Charging)			Front	0.235	100	0.235		Front	0.020	100	0.020
				Back	0.235		0.235		Back	0.018		0.018
				Left	0.234		0.234		Left	0.017		0.017
				Right	0.235		0.235		Right	0.016		0.016
				Top	0.236		0.236		Top	0.019		0.019
				Max	0.240		0.240		Max	0.022		0.022