



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*  
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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

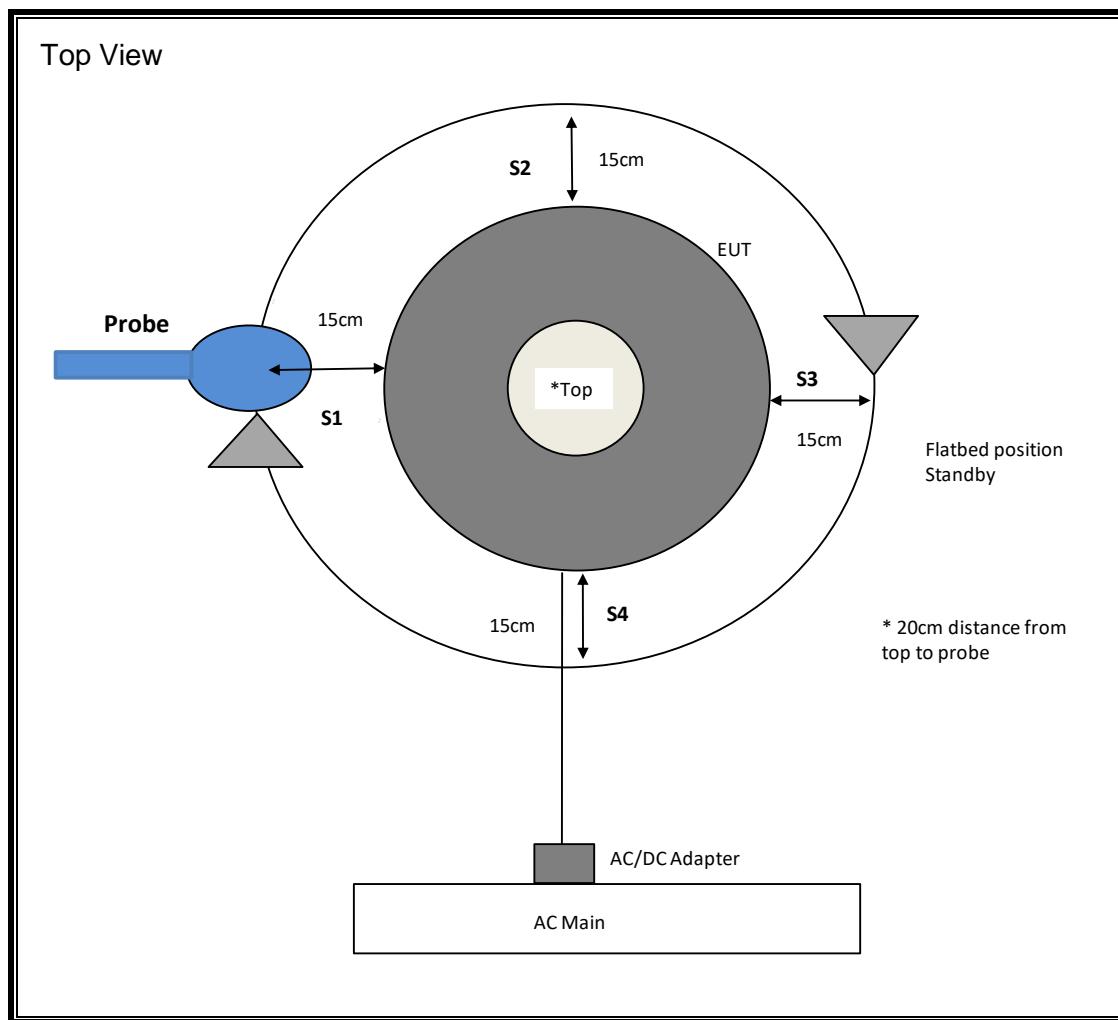
The following two configurations are tested:

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

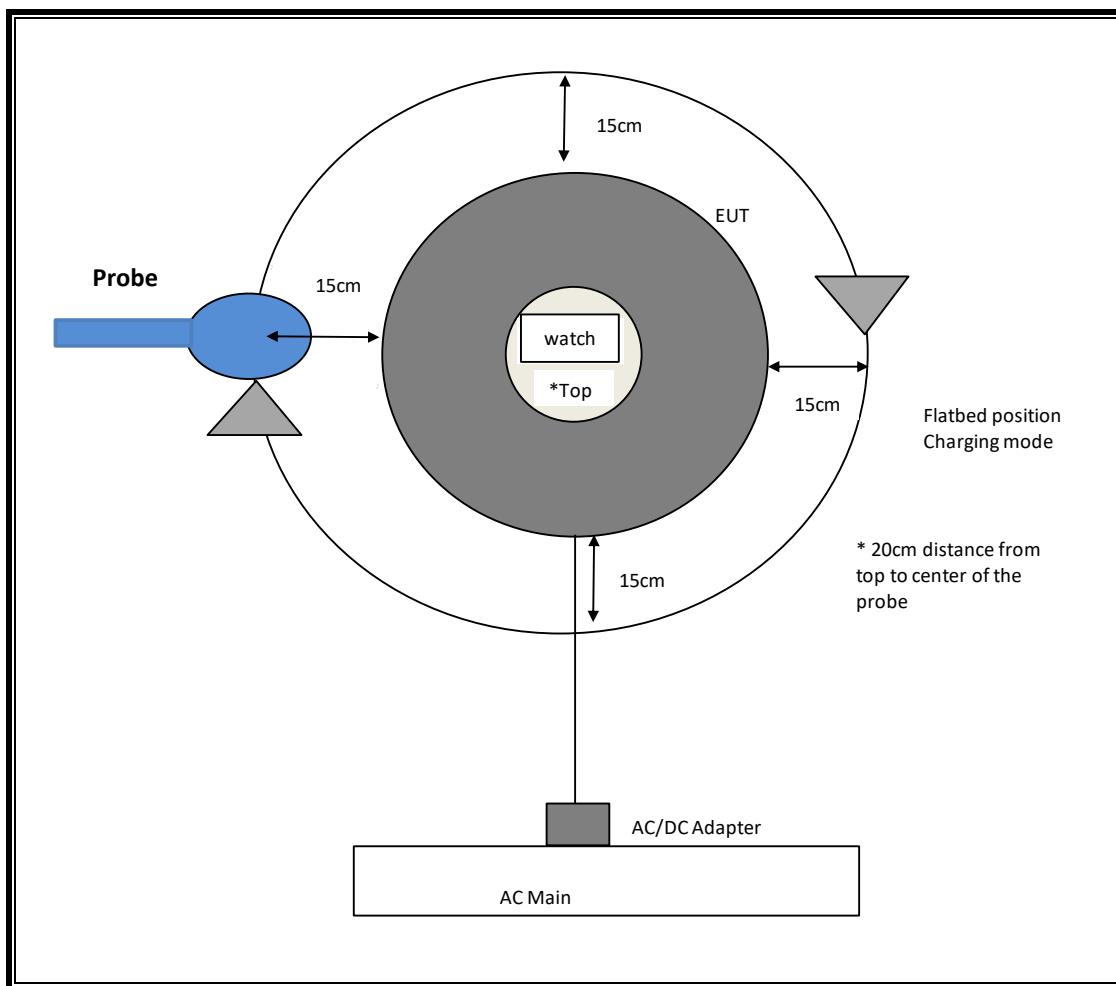
##### MEASUREMENT SETUP

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.

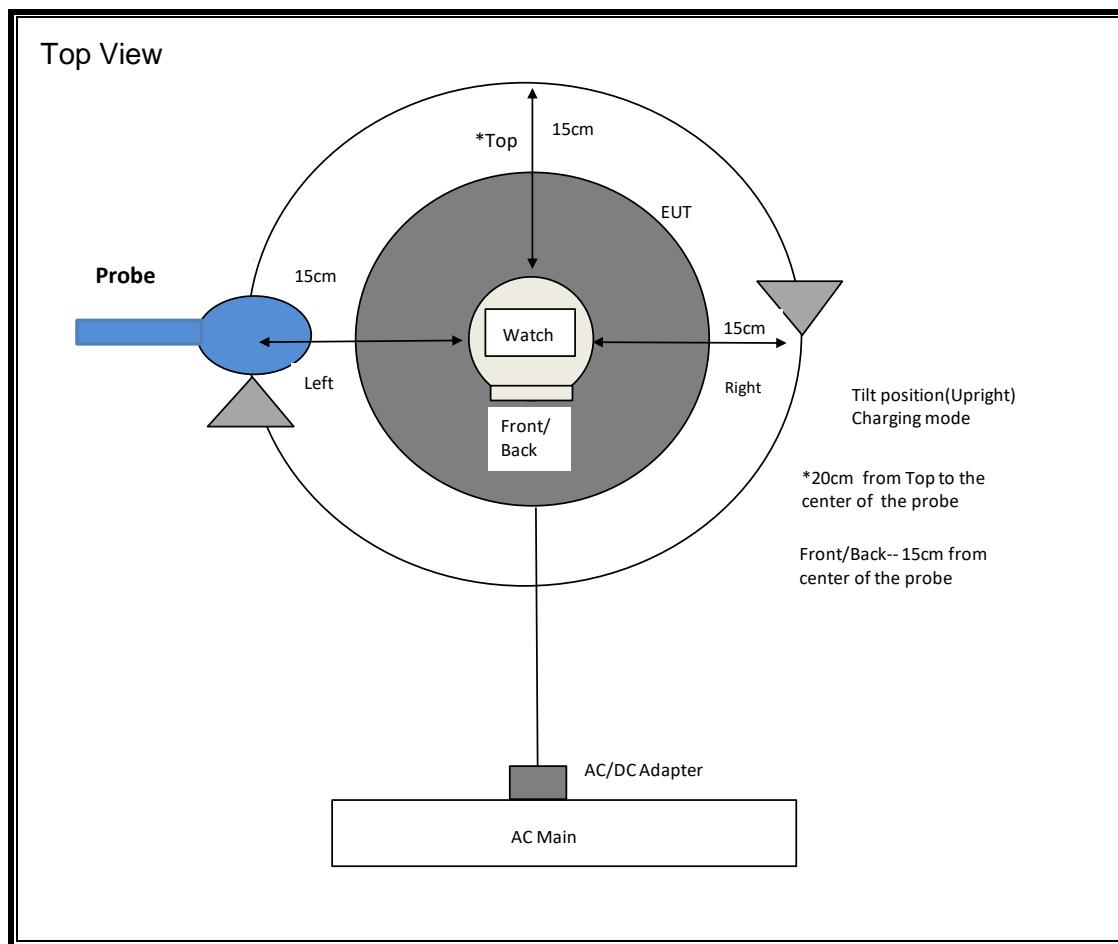
**CONFIGURATION 1, FLATBED, STANDBY POSITION**



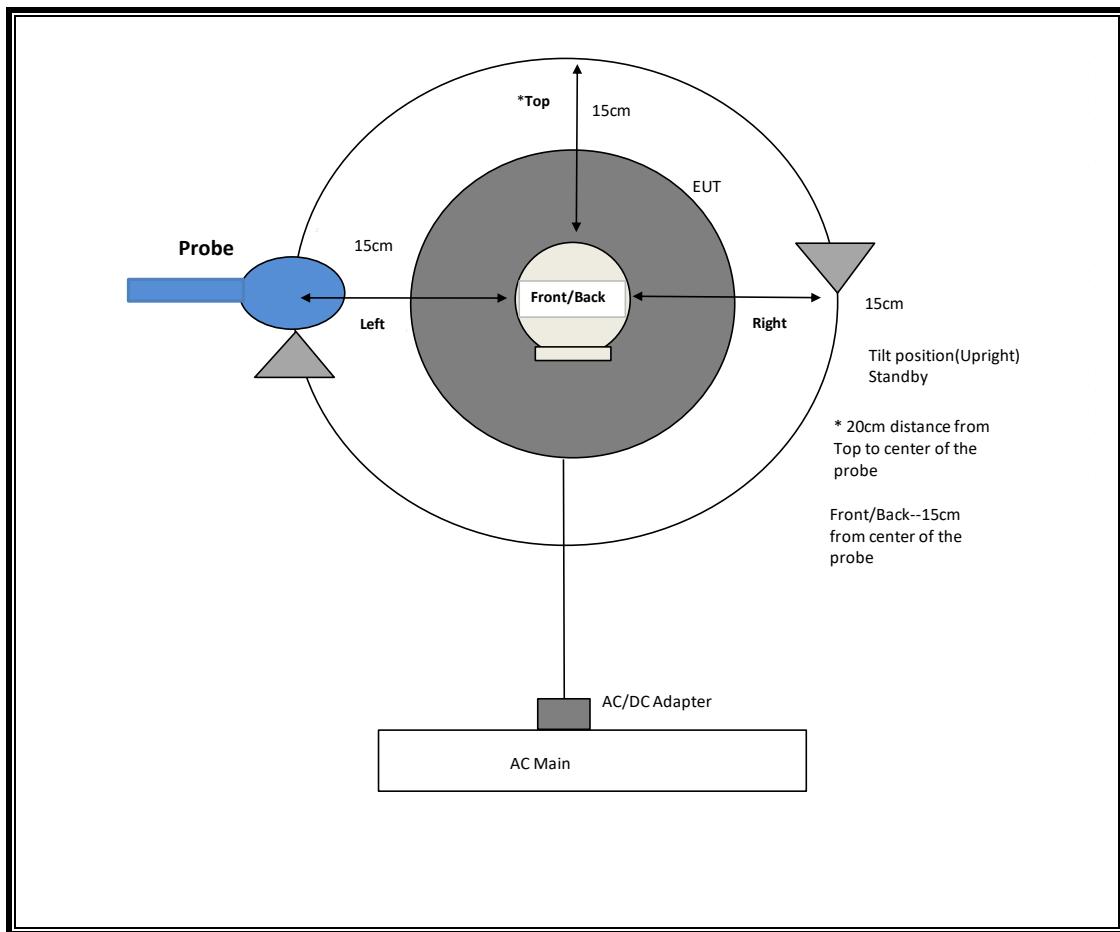
**CONFIGURATION 2 , FLATBED, CHARGING MODE**



**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

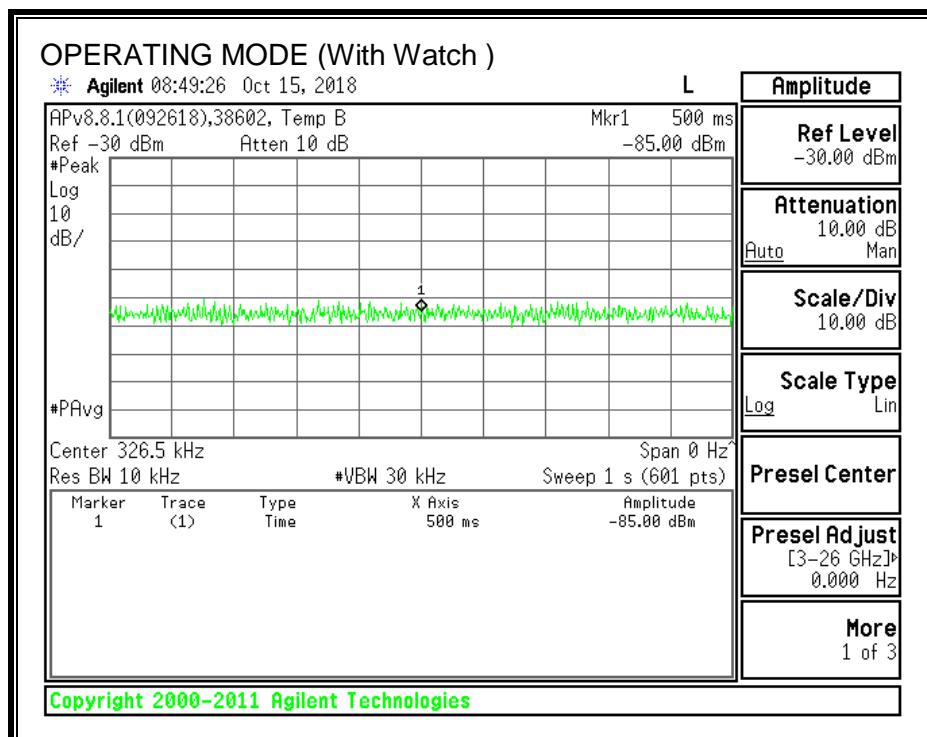
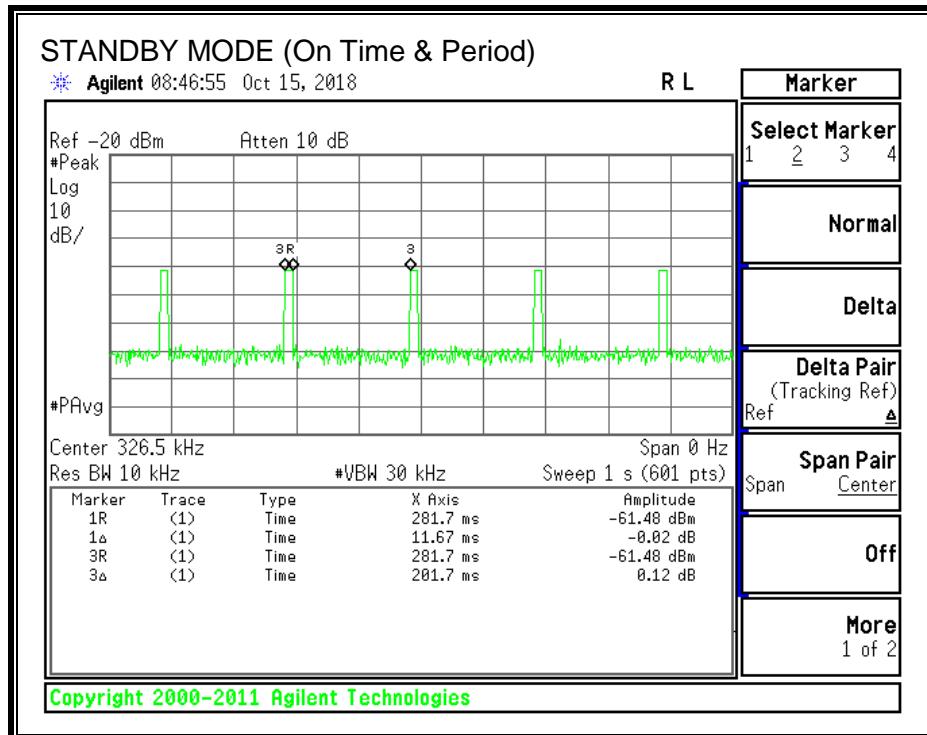
None; for reporting purposes only.

### 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 <sup>2</sup> )	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 <sup>2</sup> )	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 <sup>2</sup> )	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 <sup>2</sup> )	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 (V/m)	Electric Field Reading (V/m)				Magnetic Field Limit (A/m)	Magnetic Field Reading (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			0.057	1.63	S1	0.036		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		
	Operating Real Product (Power <10% Charging)			Max	0.242			0.058		Max	0.049		0.012		
				S1	0.233			0.233		S1	0.010		0.010		
				S2	0.228			0.228		S2	0.012		0.012		
				S3	0.228		100	0.228		S3	0.012		0.012		
				S4	0.226			0.226		S4	0.015		0.015		
2	Operating Real Product (Power ~ 20% - 50% Charging)			Top	0.226			0.226		Top	0.017		0.017		
				Max	0.235			0.235		Max	0.021		0.021		
				S1	0.235			0.235		S1	0.010		0.010		
				S2	0.240			0.240		S2	0.014		0.014		
				S3	0.242		100	0.242		S3	0.014		0.014		
	Operating Real Product (Power >90% Charging)			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		
				S1	0.209		100	0.209		S1	0.014		0.014		
				S2	0.209			0.209		S2	0.015		0.015		

#### TIILT: RF EXPOSURE LIMIT

Configuration	Test Mode	Measuring Distance (cm)	Electric Field Limit (V/m)	Electric Field Reading (V/m)				Magnetic Field Limit (A/m)	Magnetic Field Reading (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			0.057	1.63	Front	0.036		0.009		
				Back	0.229			0.055		Back	0.034		0.008		
				Left	0.235		5.79	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		
	Operating Real Product (Power <10% Charging)			Max	0.242			0.058		Max	0.049		0.012		
				Front	0.209			0.209		Front	0.015		0.015		
				Back	0.217			0.217		Back	0.016		0.016		
				Left	0.218		100	0.218		Left	0.016		0.016		
				Right	0.218			0.218		Right	0.018		0.018		
4	Operating Real Product (Power ~ 20% - 50% Charging)	15 cm surrounding the device (S1 - S4) and 20 cm above the top surface of the EUT	614	Top	0.218			0.218		Top	0.020		0.020		
				Max	0.240			0.240		Max	0.025		0.025		
				Front	0.235			0.235		Front	0.016		0.016		
				Back	0.226			0.226		Back	0.016		0.016		
				Left	0.235			0.235		Left	0.018		0.018		
				Right	0.235		100	0.235		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			0.235		Front	0.020		0.020		
				Back	0.235			0.235		Back	0.018		0.018		