FCC Part 1 Subpart I
FCC Part 2 Subpart J

CERTIFICATION TEST REPORT

FOR

MAGNETIC CHARGING CABLE

MODEL NO: A2255

FCC ID: BCGA2255

REPORT NUMBER: 12936083-E2V2

ISSUE DATE: AUGUST 29, 2019

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

Prepared by
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	08/16/2019	Initial Issue	Chin Pang
V2	08/29/2019	Correction on report number typo	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 CABLE

MODEL NUMBER: A2255

SERIAL NUMBER: DLC9226006WMF564M, DLC9223005MLNWK4C, DLC923300E5MF554P

DATE TESTED: JULY 17–22, 2019

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

UL Verification Services Inc. calculated the RF Exposure of the above equipment in accordance with the requirements set forth in the above standards, using test results reported in the test report documents referenced below and/or documentation furnished by the applicant. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations of these calculations. The results show that the equipment is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. 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 any 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, 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.
☐ 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)
☒ Temperature B Room	☐ Chamber G (IC:22541-4)	☐ Chamber L (IC: 2324A-3)
	☐ Chamber H (IC:22541-5)	

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

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

4. KDB 680106 D01 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 worst case aggregate fields at 15cm from the device is 1.96% of the FCC H field limit.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

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

5.2. WORST-CASE CONFIGURATION AND MODE

The EUT is a single frequency magnetic charger enclosed in stainless steel case with different cable length USB -A type. For operation mode, it was tested with model A2095, a big watch. A2095 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 and Watch (big) powered by AC/DC adapter

Note that the EUT was tested as standby and operation modes.

5.3. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

SUPPORT EQUIPMENT & PERIPHERALS LIST				
Description	**Housing/Watch Band**	**Manufacturer**	**Model**	**Serial Number**
Watch	Stainless Steel	Apple	A2095	D92YT00GMW95
AC/DC Adapter	N/A	Apple	A1385	N/A

I/O CABLES

N/A

TEST SETUP

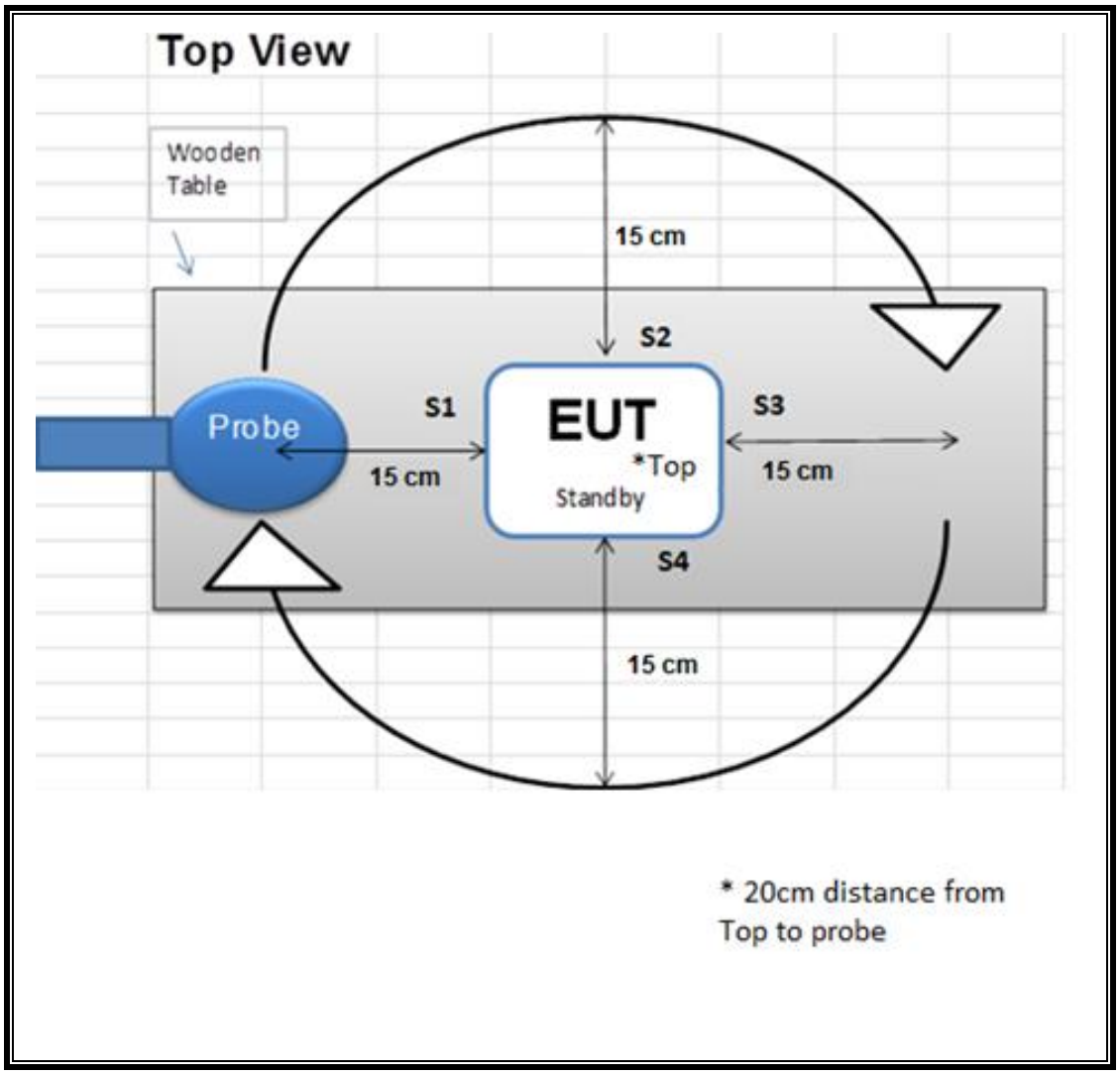
The following two configurations are tested:

Configuration	Mode	Descriptions
1	Standby	EUT Alone powered by AC/DC adapter
2	Operating (Watch, ~10% Power Charging)	EUT and Watch powered by AC/DC adapter
	Operating (Watch, ~50% Power Charging) Note: For the configuration 2 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

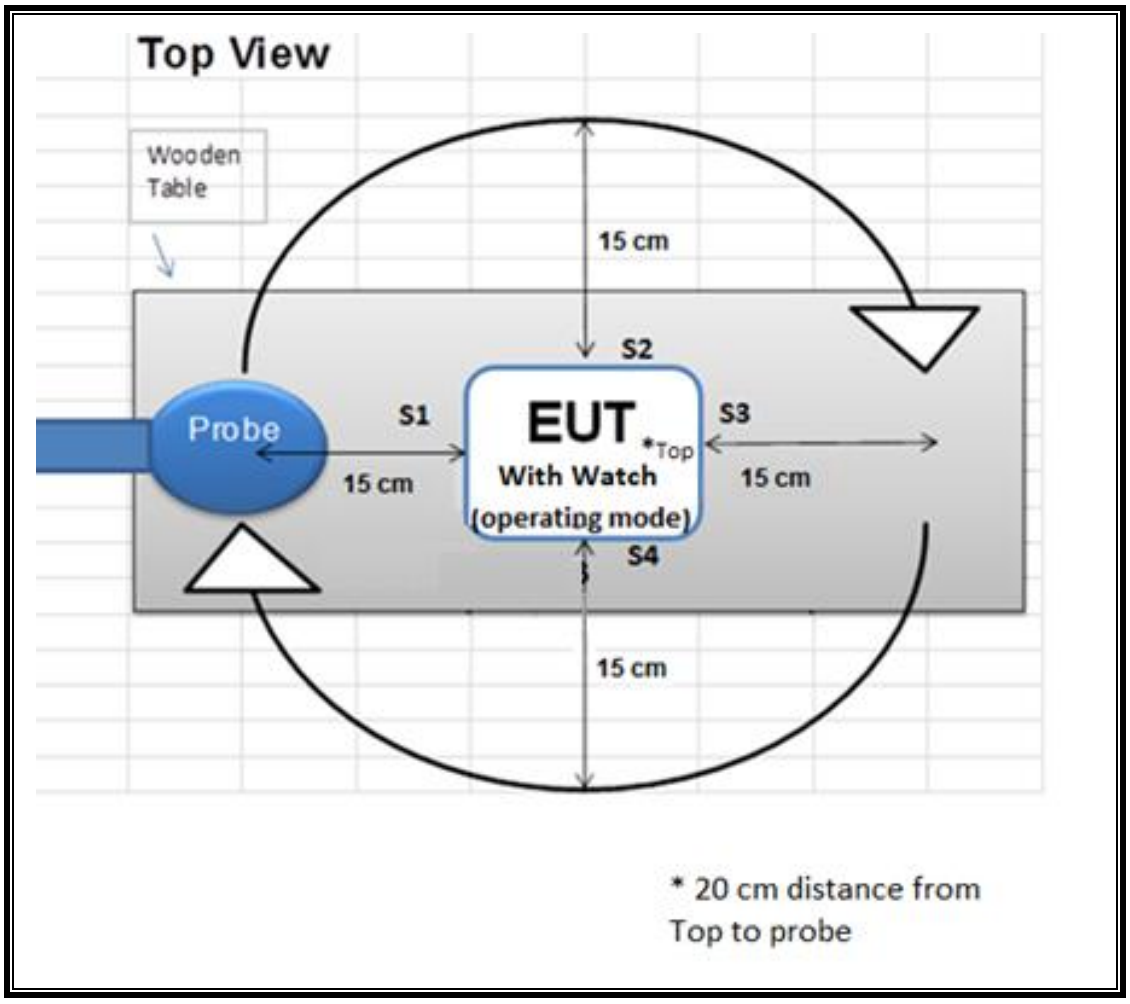
MEASUREMENT SETUP

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



CONFIGURATION 2



6. 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**	**Label ID**	**Cal Date**	**Cal Due**
Electric and Magnetic Field Probe	Narda	EHP-200A	160WX41008	T1085	10/24/2018	10/24/2019

7. DUTY CYCLE

LIMITS

None; for reporting purposes only.

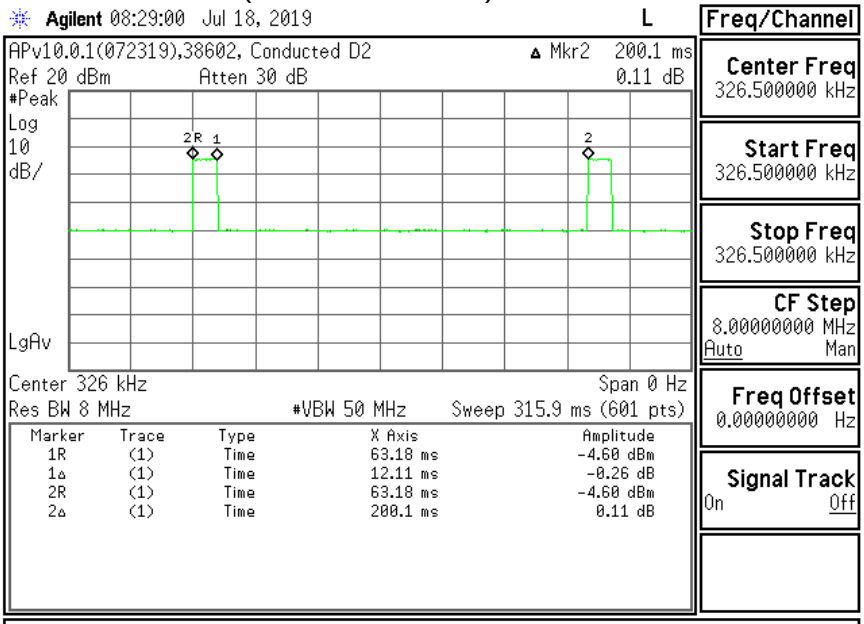
PROCEDURE

Zero-Span Spectrum Analyzer Method.

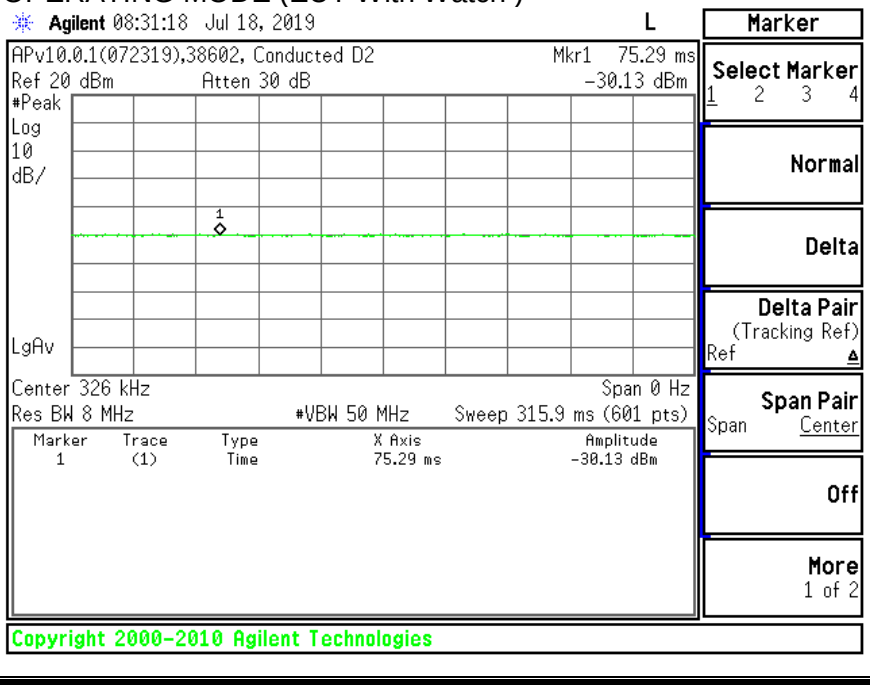
ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
Standby (Config 1)	12.11	200.10	0.06	6.05%	12.18
Operating(Config 2)	100.00	100.00	1.00	100.00%	0.00

STANDBY MODE (On Time & Period)



OPERATING MODE (EUT With Watch)



8. MAXIMUM PERMISSIBLE RF EXPOSURE

8.1. FCC LIMITS AND SUMMARY

8.1.1. 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.

8.1.2. FCC SUMMARY OF RESULTS

RESULTS

ID:	38602	Date:	7/19/19

FCC RF Exposure Summary of Results

A2255/A1385/0.3M CABLE/USB-A/A2095

Electric Field Limit			Magnetic Field Limit		
FCC RF Exposure Limit	Maximum Average (V/m)	Percentage (%)	FCC RF Exposure	Maximum Average (A/m)	Percentage (%)
614	0.232	0.04%	1.63	0.032	1.96%

A2255/A1385/1.0M CABLE/USB-A/A2095

Electric Field Limit			Magnetic Field Limit		
FCC RF Exposure Limit	Maximum Average (V/m)	Percentage (%)	FCC RF Exposure	Maximum Average (A/m)	Percentage (%)
614	0.137	0.02%	1.63	0.026	1.60%

A2255/A1385/2.0M CABLE/USB-A/A2095

Electric Field Limit			Magnetic Field Limit		
FCC RF Exposure Limit	Maximum Average (V/m)	Percentage (%)	FCC RF Exposure	Maximum Average (A/m)	Percentage (%)
614	0.129	0.02%	1.63	0.014	0.86%

8.2. TEST RESULTS

8.2.1. 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 √Duty Cycle].

A2255 WITH A1385, 0.3M CABLE USB-A AND MODEL A2095 WATCH

FCC 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	0.120	6.05	0.030	1.63	S1	0.020	6.05	0.005
				S2	0.120		0.030		S2	0.019		0.005
				S3	0.119		0.029		S3	0.025		0.006
				S4	0.120		0.030		S4	0.019		0.005
				Top	0.120		0.030		Top	0.027		0.007
				Max	0.126		0.031		Max	0.029		0.007
2	Operating Real Product (Power <10% Charging)			S1	0.118	100	0.118		S1	0.031	6.05	0.031
				S2	0.120		0.120		S2	0.017		0.017
				S3	0.121		0.121		S3	0.030		0.030
				S4	0.171		0.171		S4	0.020		0.020
				Top	0.111		0.111		Top	0.017		0.017
				Max	0.213		0.213		Max	0.032		**0.032**
	Operating Real Product (Power ~ 20% - 50% Charging)			S1	0.127	100	0.127		S1	0.029	100	0.029
				S2	0.115		0.115		S2	0.019		0.019
				S3	0.121		0.121		S3	0.021		0.021
				S4	0.225		0.225		S4	0.018		0.018
				Top	0.111		0.111		Top	0.019		0.019
				Max	0.232		**0.232**		Max	0.029		0.029
	Operating Real Product (Power >90% Charging)			S1	0.120	100	0.120		S1	0.020	100	0.020
				S2	0.118		0.118		S2	0.019		0.019
				S3	0.120		0.120		S3	0.019		0.019
				S4	0.160		0.160		S4	0.026		0.026
				Top	0.120		0.120		Top	0.018		0.018
				Max	0.221		0.221		Max	0.031		0.031

A2255 WITH A1385, 1.0M CABLE USB-A AND MODEL A2095 WATCH

FCC 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	0.120	6.05	0.030	1.63	S1	0.017	6.05	0.004
				S2	0.120		0.030		S2	0.019		0.005
				S3	0.120		0.030		S3	0.025		0.006
				S4	0.141		0.035		S4	0.018		0.004
				Top	0.120		0.030		Top	0.021		0.005
				Max	0.144		0.035		Max	0.025		0.006
2	Operating Real Product (Power <10% Charging)			S1	0.120	100	0.120		S1	0.025	100	0.025
				S2	0.118		0.118		S2	0.018		0.018
				S3	0.115		0.115		S3	0.019		0.019
				S4	0.120		0.120		S4	0.019		0.019
				Top	0.120		0.120		Top	0.017		0.017
				Max	0.120		0.120		Max	0.026		**0.026**
	Operating Real Product (Power ~ 20% - 50% Charging)			S1	0.115	100	0.115		S1	0.019	100	0.019
				S2	0.118		0.118		S2	0.017		0.017
				S3	0.111		0.111		S3	0.019		0.019
				S4	0.120		0.120		S4	0.020		0.020
				Top	0.111		0.111		Top	0.017		0.017
				Max	0.120		0.120		Max	0.021		0.021
	Operating Real Product (Power >90% Charging)			S1	0.111	100	0.111		S1	0.019	100	0.019
				S2	0.120		0.120		S2	0.016		0.016
				S3	0.118		0.118		S3	0.018		0.018
				S4	0.137		**0.137**		S4	0.024		0.024
				Top	0.122		0.122		Top	0.019		0.019
				Max	0.137		0.137		Max	0.024		0.024

A2255 WITH A1385, 2.0M CABLE USB-A AND MODEL A2095 WATCH

FCC 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	0.120	6.05	0.030	1.63	S1	0.019	6.05	0.005
				S2	0.118		0.029		S2	0.019		0.005
				S3	0.118		0.029		S3	0.025		0.006
				S4	0.120		0.030		S4	0.019		0.005
				Top	0.120		0.030		Top	0.027		0.007
				Max	0.120		0.030		Max	0.027		0.007
2	Operating Real Product (Power <10% Charging)			S1	**0.129**	100	**0.129**		S1	0.005	100	0.005
				S2	0.120		0.120		S2	0.013		0.013
				S3	0.111		0.111		S3	0.007		0.007
				S4	0.120		0.120		S4	0.011		0.011
				Top	0.105		0.105		Top	0.003		0.003
				Max	0.129		**0.129**		Max	0.013		0.013
	Operating Real Product (Power ~ 20% - 50% Charging)			S1	0.096	100	0.096		S1	0.004	100	0.004
				S2	0.100		0.100		S2	**0.014**		**0.014**
				S3	0.094		0.094		S3	0.006		0.006
				S4	**0.111**		0.111		S4	0.012		0.012
				Top	0.105		0.105		Top	0.003		0.003
				Max	0.111		0.111		Max	0.014		**0.014**
	Operating Real Product (Power >90% Charging)			S1	**0.105**	100	0.105		S1	0.003	100	0.003
				S2	0.090		0.090		S2	**0.010**		0.010
				S3	0.101		0.101		S3	0.004		0.004
				S4	0.100		0.100		S4	0.010		0.010
				Top	0.100		0.100		Top	0.003		0.003
				Max	0.105		0.105		Max	0.010		0.010

END OF REPORT

9. SETUP PHOTO

Please see setup photo report 12936083-EP1V1