



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

**CERTIFICATION TEST REPORT**

**FOR**

**MAGNETIC CHARGING CABLE**

**MODEL NO: A2515**

**FCC ID: BCGA2515**

**REPORT NUMBER: 13573888-E2V2**

**ISSUE DATE: AUGUST 17, 2021**

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

*Prepared by*  
**UL VERIFICATION SERVICES INC.**  
**47173 BENICIA STREET**  
**FREMONT, CA 94538, U.S.A.**  
**TEL: (510) 771-1000**  
**FAX: (510) 661-0888**



Revision History

Rev.	Issue Date	Revisions	Revised By
V1	8/6/2021	Initial Issue	Chin Pang
V2	8/17/2021	Address TCB's Question on Section1 & 6.2	Chin Pang

---

**TABLE OF CONTENTS**

<b>1. ATTESTATION OF TEST RESULTS .....</b>	<b>4</b>
<b>2. TEST METHODOLOGY .....</b>	<b>6</b>
<b>3. FACILITIES AND ACCREDITATION .....</b>	<b>6</b>
<b>4. DECISION RULES AND MEASUREMENT UNCERTAINTY .....</b>	<b>6</b>
4.1. METROLOGICAL TRACEABILITY .....	6
4.2. DECISION RULES.....	6
4.3. MEASUREMENT UNCERTAINTY.....	6
<b>5. KDB 680106 D01 SECTION 5b EQUIPMENT APPROVAL CONSIDERATIONS .....</b>	<b>7</b>
<b>6. EQUIPMENT UNDER TEST .....</b>	<b>8</b>
6.1. DESCRIPTION OF EUT .....	8
6.2. WORST-CASE CONFIGURATION AND MODE.....	8
6.3. DESCRIPTION OF TEST SETUP.....	9
<b>7. TEST AND MEASUREMENT EQUIPMENT .....</b>	<b>12</b>
<b>8. DUTY CYCLE.....</b>	<b>13</b>
<b>9. MAXIMUM PERMISSIBLE RF EXPOSURE .....</b>	<b>15</b>
9.1. FCC LIMITS AND SUMMARY .....	15
9.1.1. FCC RF Exposure Summary of Results.....	16
<b>10. SETUP PHOTO.....</b>	<b>22</b>

**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:** A2515

**BRAND:** APPLE

**SERIAL NUMBER:** DLC1224000G0KWT1H

**SAMPLE RECEIPT DATE** AUGUST 04, 2021

**DATE TESTED:** AUGUST 04-06, 2021

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.

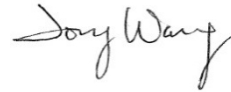
This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by A2LA, 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 measurements made in accordance with KDB 680106.

## 3. FACILITIES AND ACCREDITATION

UL LLC is accredited by A2LA, certification #0751.05, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
<input type="checkbox"/>	Building 1: 47173 Benicia Street, Fremont, CA 94538	US0104	2324A	208313
<input checked="" type="checkbox"/>	Building 2: 47266 Benicia Street, Fremont, CA 94538	US0104	22541	208313
<input type="checkbox"/>	Building 4: 47658 Kato Rd, Fremont, CA 94538	US0104	2324B	208313

## 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 <sub>Lab</sub>
Magnetic Field Reading (A/m)	+/-0.04284 (A/m)
Electric Field Reading (V/m)	+/-0.03682 (V/m)

Uncertainty figures are valid to a confidence level of 95.45%.

## 5. KDB 680106 D01 SECTION 5b EQUIPMENT APPROVAL CONSIDERATIONS

Requirement	Device
(1) Power transfer frequency is less than 1 MHz.	No. Operating Frequency are 326.5kHz and 1.778MHz
(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. It is a mobile device.
(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.	The worst case leakage @1.778MHz is 0.92% @326.5kHz is 1.53%

## 6. EQUIPMENT UNDER TEST

### 6.1. DESCRIPTION OF EUT

The EUT is a magnetic charging cable which has a single inductive charging coil to charge Apple Watch. The charging frequencies are 1.778MHz and 326.5 kHz, and the maximum power consumption is 5W in charging status.

### 6.2. WORST-CASE CONFIGURATION AND MODE

The EUT is a single frequency magnetic charger enclosed in an aluminum case. For the entire radiated emissions test, the EUT was investigated on the following configuration during the test at its natural orientation.

Config	Mode	Descriptions
1	Standby @ 326.5KHz	Standby-EUT Alone powered by AC/DC adapter
2	Operating @1.778MHz. (~10%, 20~60%, and >90% of Watch battery status)	Full test on direct contact during charging between the EUT & Watch #1 , and the EUT is powered by AC/DC adapter
3	Operating @1.778MHz. (20~60% of Watch battery status)	Spot check on direct contact during charging between the EUT & Watch #2 , and the EUT is powered by AC/DC adapter
4	Operating @326.5KHz. (~10%, 20~60%, and >90% of Watch battery status)	Full test on direct contact during charging between the EUT & Watch #3 , and the EUT is powered by AC/DC adapter
5	Operating @326.5kHz. (20~60% of Watch battery status)	Spot check on direct contact during charging between the EUT & Watch #4 , and the EUT is powered by AC/DC adapter



**6.3. DESCRIPTION OF TEST SETUP****SUPPORT EQUIPMENT**

<b>SUPPORT EQUIPMENT &amp; PERIPHERALS LIST</b>				
<b>Description</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Serial Number</b>	<b>Notes</b>
Watch #1	Apple	A2475	WG35WJ77QX	New Watch, 1.778MHz
Watch #2	Apple	A2474	H3GWY4P12T	New Watch, 1.778MHz
Watch #3	Apple	A2293	GY6CQ05JQ603	Legacy Watch, 326.5KHz
Watch #4	Apple	A2354	G99D305UQ128	Legacy Watch, 326.5KHz

**I/O CABLES**

The EUT with lightning to USB-C cable powered by AC/DC Adapter.

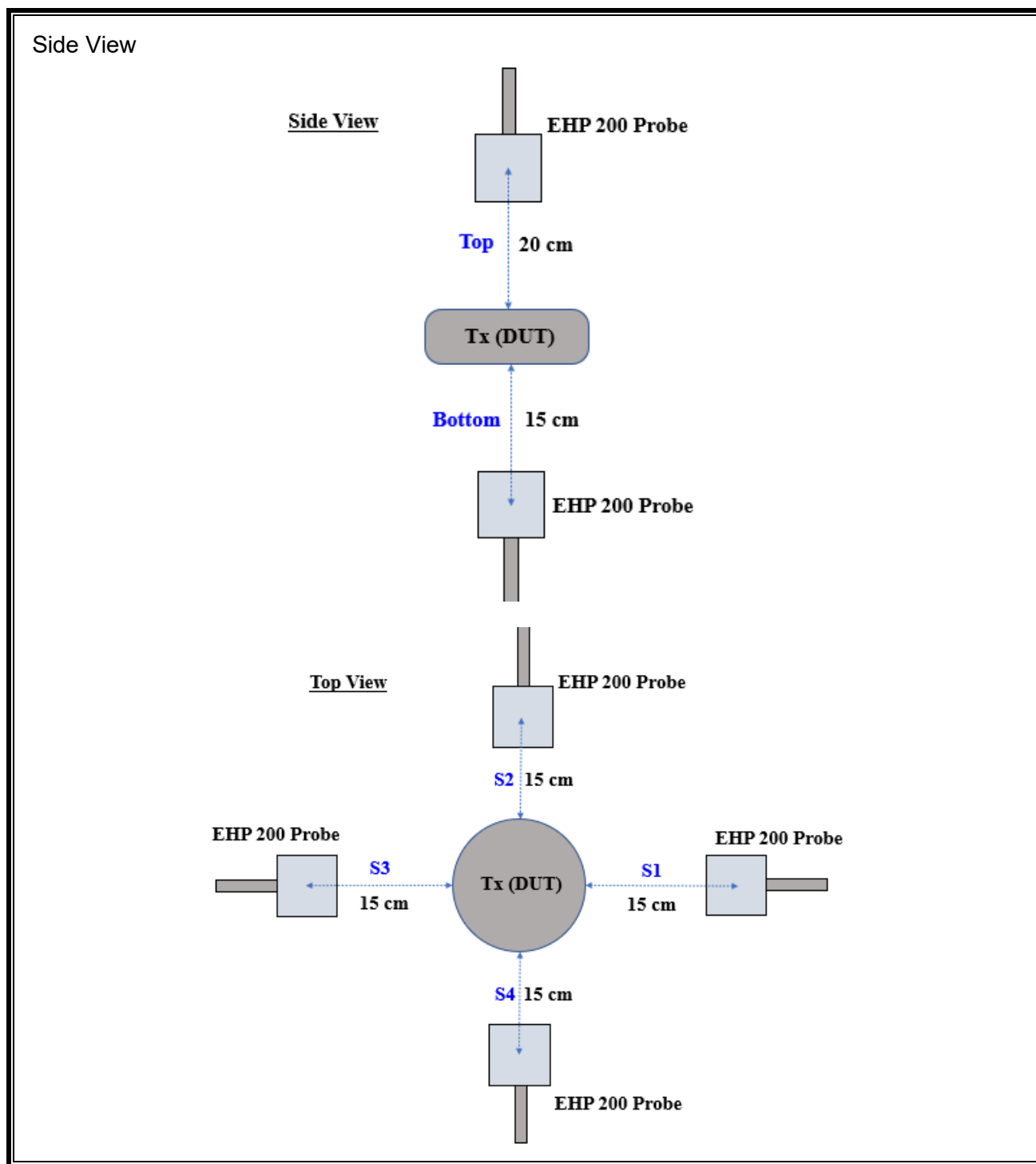
**TEST SETUP**

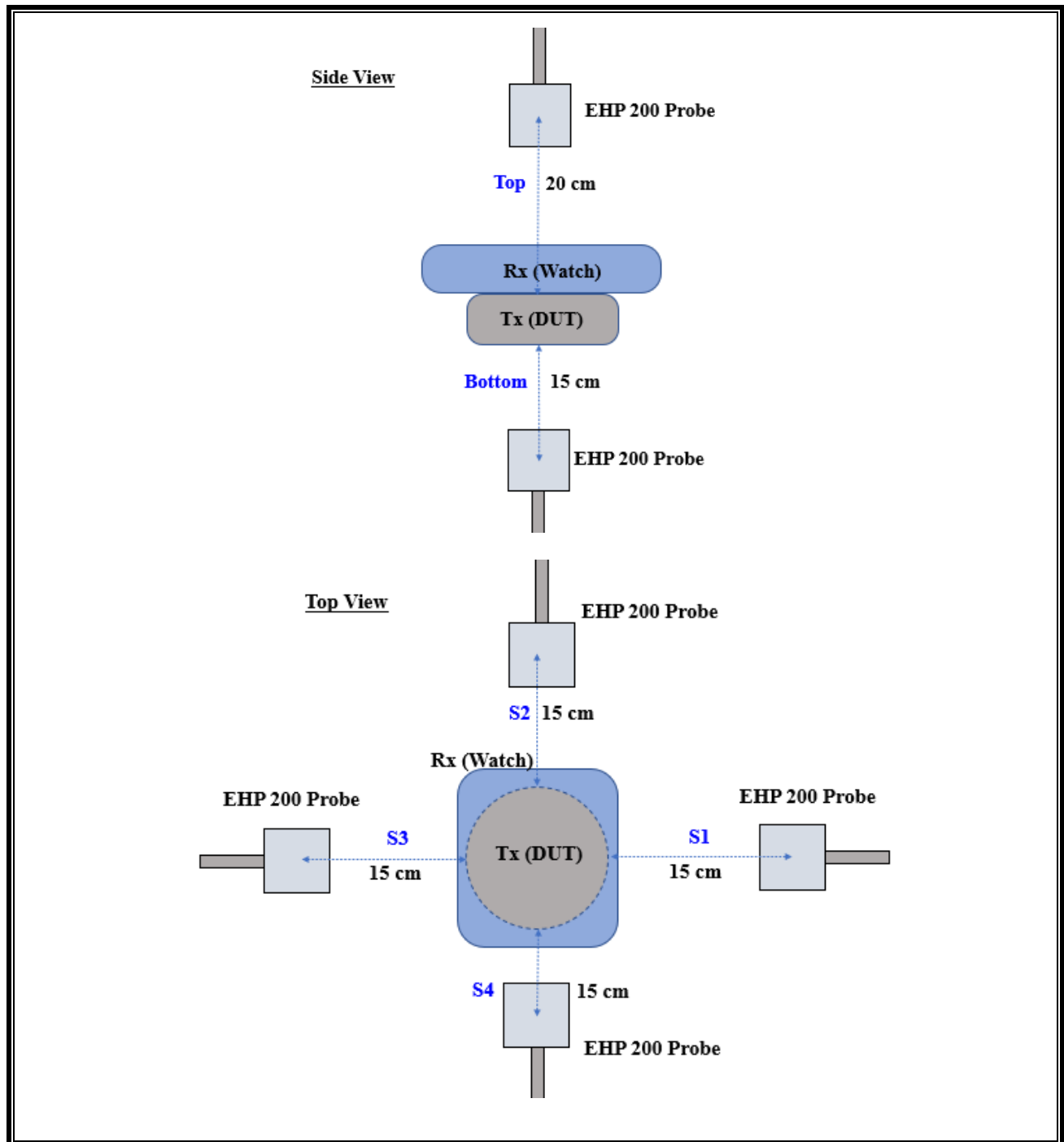
The following configurations are tested:

<b>Configuration</b>	<b>Mode</b>	<b>Descriptions</b>
1 (Standby)	EUT standalone	EUT with lightning to USB-C cable powered by AC/DC Adapter
2 & 4 (Operating-Full Test)	(~10% of Watch battery status)	EUT with lightning to USB-C cable powered by AC/DC Adapter & Wireless Charging to Watch #1 & 3
	(25%~60% of Watch battery status)	
	(Client >90% of Watch battery status)	
3 & 5 (Operating-Spot Check)	(20~60% of Watch battery status)	EUT with lightning to USB-C cable powered by AC/DC Adapter & Wireless Charging to Watch #2 and #4

**MEASUREMENT SETUP**

Measurements were taken from the top and all sides of the EUT per KDB680106 D01 v03.

**CONFIGURATION 1: STANDBY MODE**

**CONFIGURATION 2, 3, 4 & 5: EUT WITH NEW and Legacy WATCH**

## 7. 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 Due	Cal Date
Electric and Magnetic Field Probe	Narda	EHP-200A	160WX41008	T1085	03/16/2022	03/16/2021
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A-544	MY52350176	T1210	01/22/2022	01/22/2021

## 8. DUTY CYCLE

### LIMITS

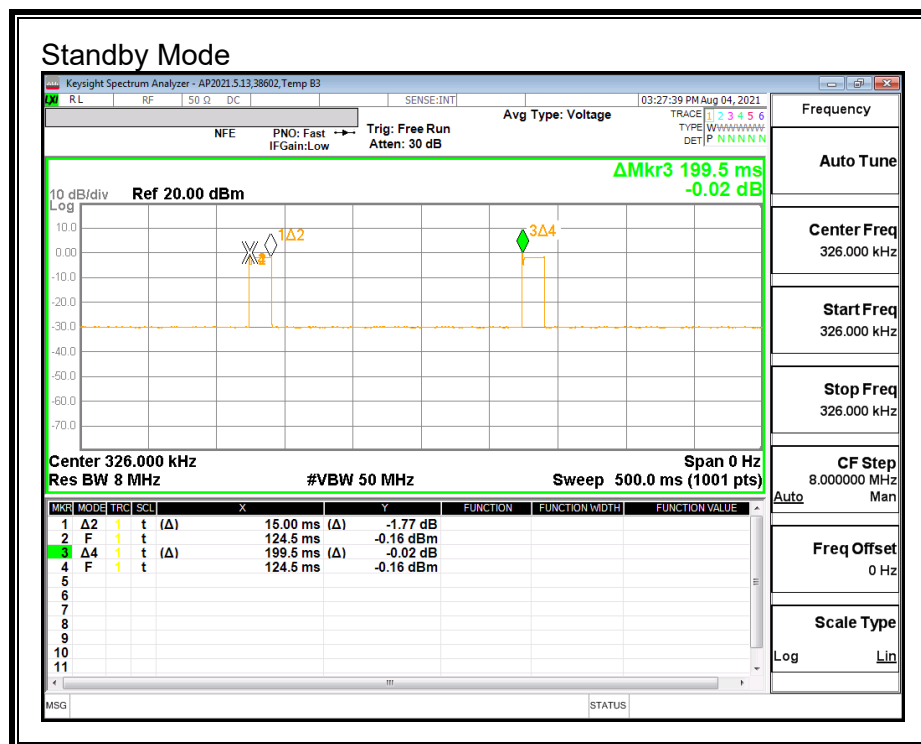
None; for reporting purposes only.

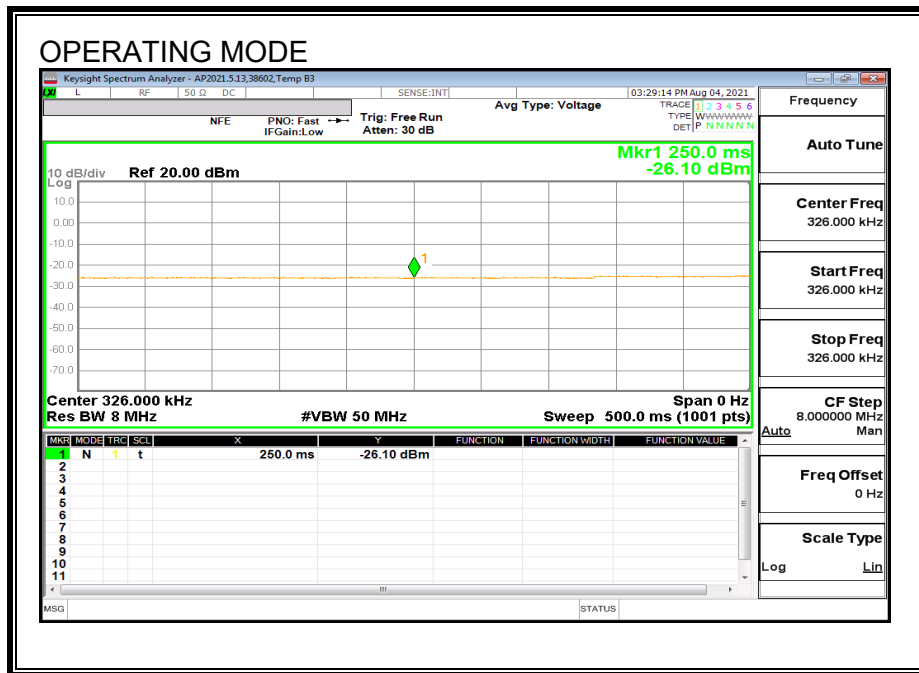
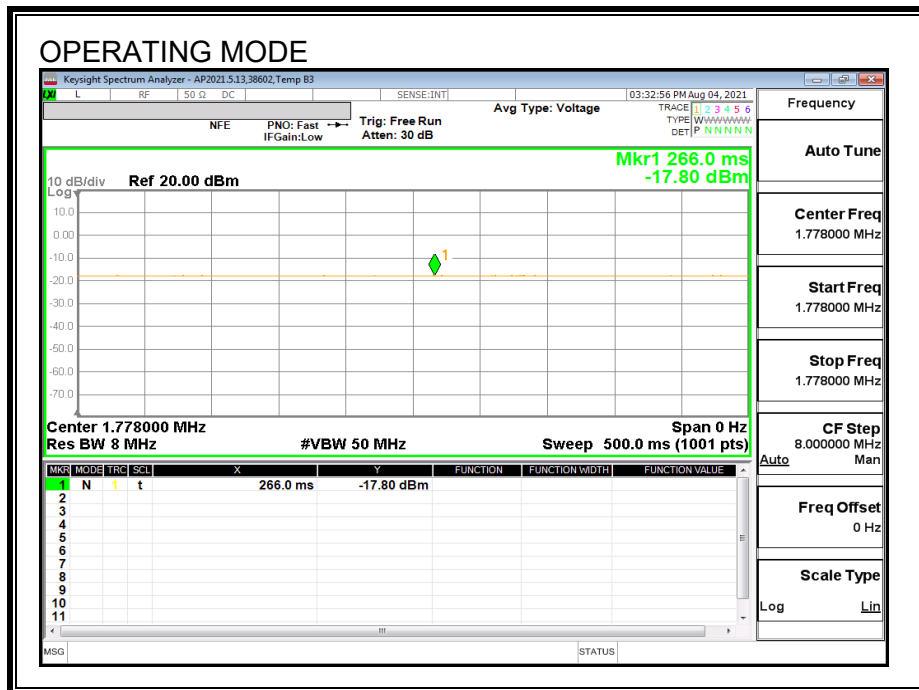
### PROCEDURE

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)	15.00	199.50	0.08	7.52%	11.24
Operating(Config 2)	100.00	100.00	1.00	100.00%	0.00



**326.5KHz****1.78MHz**

## 9. MAXIMUM PERMISSIBLE RF EXPOSURE

### 9.1. FCC LIMITS AND SUMMARY

§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.

**9.1.1. FCC RF Exposure Summary of Results**

ID	38602	Date:	08/06/2021
----	-------	-------	------------

**FCC RF Exposure Summary of Results****Configuration #1: STANDBY MODE**

Electric Field Limit			Magnetic Field Limit		
FCC RF Exposure Limit	Maximum Average (V/m)	Percentage (%)	FCC RF Exposure	Maximum Average (A/m)	Percentage (%)
614	0.047	0.01%	1.63	0.014	0.86%

**Configuration #2: OPERATING MODE EUT WITH NEW WATCH #1**

Electric Field Limit			Magnetic Field Limit		
FCC RF Exposure Limit	Maximum Average (V/m)	Percentage (%)	FCC RF Exposure	Maximum Average (A/m)	Percentage (%)
614	0.122	0.02%	1.63	0.015	0.92%

**Configuration #3: OPERATING MODE EUT WITH NEW WATCH #2**

Electric Field Limit			Magnetic Field Limit		
FCC RF Exposure Limit	Maximum Average (V/m)	Percentage (%)	FCC RF Exposure	Maximum Average (A/m)	Percentage (%)
614	0.122	0.02%	1.63	0.015	0.92%

**Configuration #4: OPERATING MODE EUT WITH LEGACY WATCH #3**

Electric Field Limit			Magnetic Field Limit		
FCC RF Exposure Limit	Maximum Average (V/m)	Percentage (%)	FCC RF Exposure	Maximum Average (A/m)	Percentage (%)
614	0.179	0.03%	1.63	0.025	1.53%

**Configuration #5: OPERATING MODE EUT WITH LEGACYWATCH #4**

Electric Field Limit			Magnetic Field Limit		
FCC RF Exposure Limit	Maximum Average (V/m)	Percentage (%)	FCC RF Exposure	Maximum Average (A/m)	Percentage (%)
614	0.173	0.03%	1.63	0.022	1.35%



**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  $\sqrt{\text{Duty Cycle}}$ ].

**Configuration #1: STANDBY MODE**

FCC 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,Bottom) and 20 cm above the top surface of the EUT	614	S1	0.156	7.52	0.043	1.63	S1	0.022	7.52	0.006
				S2	0.156		0.043		S2	0.028		0.008
				S3	0.173		0.047		S3	0.030		0.008
				S4	0.164		0.045		S4	0.023		0.006
				Bottom	0.162		0.044		Bottom	0.052		0.014
				Top	0.156		0.043		Top	0.040		0.011
				Max	0.173		0.047		Max	0.052		0.014

**Configuration #2: EUT With New Watch #1 @ 1.778MHz Operating Frequency( Full Test)**

FCC 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
2	Operating Real Product (Power <10% Charging)	15 cm surrounding the device (S1 - S4,Bottom) and 20 cm above the top surface of the EUT	614	S1	0.094	100	0.094	1.63	S1	0.015	100	0.015
				S2	0.094		0.094		S2	0.015		0.015
				S3	0.100		0.100		S3	0.013		0.013
				S4	0.094		0.094		S4	0.015		0.015
				Bottom	0.084		0.084		Bottom	0.014		0.014
				Top	0.094		0.094		Top	0.014		0.014
				Max	0.100		0.100		Max	0.015		0.015
				S1	0.109		100		0.109	S1		0.015
	S2			0.100	0.100	S2			0.015	0.015		
	S3			0.100	0.100	S3			0.015	0.015		
	S4			0.122	0.122	S4			0.015	0.015		
	Bottom			0.094	0.094	Bottom			0.015	0.015		
	Top			0.096	0.096	Top			0.015	0.015		
	Max			0.122	0.122	Max			0.015	0.015		
	S1			0.104	100	0.104			S1	0.014	100	0.014
	S2			0.111		0.111	S2		0.014	0.014		
	S3			0.096		0.096	S3		0.015	0.015		
	S4			0.100		0.100	S4		0.015	0.015		
	Bottom			0.094		0.094	Bottom		0.015	0.015		
	Top			0.096		0.096	Top		0.014	0.014		
	Max			0.111		0.111	Max		0.015	0.015		

**Configuration #3: EUT With New Watch #2 @1.778MHz Operating Frequency ( Spot Check)**

FCC 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	Operating Real Product (Power ~ 20% - 60% Charging)	15 cm surrounding the device (S1 - S4,Bottom) and 20 cm above the top surface of the EUT	614	S1	0.109	100	0.109	1.63	S1	0.013	100	0.013
				S2	0.122		0.122		S2	0.014		0.014
				S3	0.104		0.104		S3	0.015		0.015
				S4	0.122		0.122		S4	0.014		0.014
				Bottom	0.091		0.091		Bottom	0.015		0.015
				Top	0.109		0.109		Top	0.014		0.014
				Max	0.122		0.122		Max	0.015		0.015

**Configuration #4: EUT With Watch #3 @ 326KHz Operating Frequency( Full Test)**

FCC 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
4	Operating Real Product (Power <10% Charging)	15 cm surrounding the device (S1 - S4,Bottom) and 20 cm above the top surface of the EUT	614	S1	0.156	100	0.156	1.63	S1	0.022	100	0.022
				S2	0.156		0.156		S2	0.022		0.022
				S3	0.164		0.164		S3	0.022		0.022
				S4	0.156		0.156		S4	0.022		0.022
				Bottom	0.156		0.156		Bottom	0.020		0.020
				Top	0.156		0.156		Top	0.020		0.020
				Max	0.164		0.164		Max	0.022		0.022
				S1	0.156		100		0.156	S1		0.022
	S2		0.164	0.164	S2	0.025		0.025				
	S3		0.179	0.179	S3	0.022		0.022				
	S4		0.156	0.156	S4	0.024		0.024				
	Bottom		0.156	0.156	Bottom	0.022		0.022				
	Top		0.164	0.164	Top	0.022		0.022				
	Max		0.179	0.179	Max	0.025		0.025				
	Operating Real Product (Power ~ 20% - 60% Charging)		614	S1	0.016	100		0.016	1.63	S1	0.022	100
				S2	0.164		0.164	S2		0.022	0.022	
				S3	0.164		0.164	S3		0.020	0.020	
				S4	0.156		0.156	S4		0.022	0.022	
				Bottom	0.156		0.156	Bottom		0.020	0.020	
				Top	0.156		0.156	Top		0.020	0.020	
				Max	0.164		0.164	Max		0.022	0.022	
Operating Real Product (Power >90% Charging)		614		S1	0.016		100	0.016		1.63	S1	
	S2		0.164	0.164	S2	0.022		0.022				
	S3		0.164	0.164	S3	0.020		0.020				
	S4		0.156	0.156	S4	0.022		0.022				
	Bottom		0.156	0.156	Bottom	0.020		0.020				
Top	0.156	0.156	Top	0.020	0.020							
Max	0.164	0.164	Max	0.022	0.022							

**Configuration #5: EUT With Legacy Watch #4 @ 326KHz Operating Frequency( Spot Check)**

FCC 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
5	Operating Real Product (Power ~ 20% - 60% Charging)	15 cm surrounding the device (S1 - S4,Bottom) and 20 cm above the top surface of the EUT	614	S1	0.144	100	0.144	1.63	S1	0.020	100	0.020
				S2	0.173		0.173		S2	0.022		0.022
				S3	0.157		0.157		S3	0.020		0.020
				S4	0.156		0.156		S4	0.021		0.021
				Bottom	0.145		0.145		Bottom	0.020		0.020
				Top	0.137		0.137		Top	0.019		0.019
				Max	0.173		0.173		Max	0.022		0.022

## **10. SETUP PHOTO**

Please see setup photo report 13573888-EP1V1

**END OF REPORT**