



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

CERTIFICATION TEST REPORT

FOR

MAGNETIC CHARGER

MODEL NO: A2675

FCC ID: BCGA2675

REPORT NUMBER: 13573888-E4V2

ISSUE DATE: AUGUST 23, 2021

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	8/22/2021	Initial Issue	Chin Pang
V2	8/23/2021	Address TCB'S questions in Section 6.1, 6.2, 6.3, page 10-11 & 20	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 CHARGER

MODEL: A2675

BRAND: APPLE

SERIAL NUMBER: DLC127700B419G22F

SAMPLE RECEIPT DATE AUGUST 06, 2021

DATE TESTED: AUGUST 6 & 22, 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.

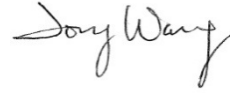
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Reviewed By:



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 _{Lab}
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 326.5 kHz 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 3.62% @326.5kHz is 3.13%

6. EQUIPMENT UNDER TEST

6.1. DESCRIPTION OF EUT

The EUT is a magnetic charger 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 dual frequency magnetic charger enclosed in a aluminum case testing on a Stand for display purpose. For the entire radiated emissions test, the EUT was investigated on the following configuration.

Config	Mode	Descriptions
1	Standby @ 326KHz	Standby-EUT Alone powered by MTI Stand
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 MTI Stand
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 MTI Stand
4	Operating @326KHz. (~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 MTI Stand
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 MTI Stand

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

SUPPORT EQUIPMENT & PERIPHERALS LIST				
Description	Manufacturer	Model	Serial Number	Notes
Watch #1	Apple	A2473	T57WV360XL	New Watch, 1.778MHz, Operating 326KHz Standby mode
Watch #2	Apple	A2478	FP4T9VJLQP	New Watch, 1.778MHz
Watch #3	Apple	A2355	G99D300EQ127	Legacy Watch, 326KHz
Watch #4	Apple	A2354	G99D308AQ128	Legacy Watch, 326KHz
MTI Stand	Mobile Technology Inc.	N/A	N/A	None

I/O CABLES

The EUT powered by MTI Stand

TEST SETUP

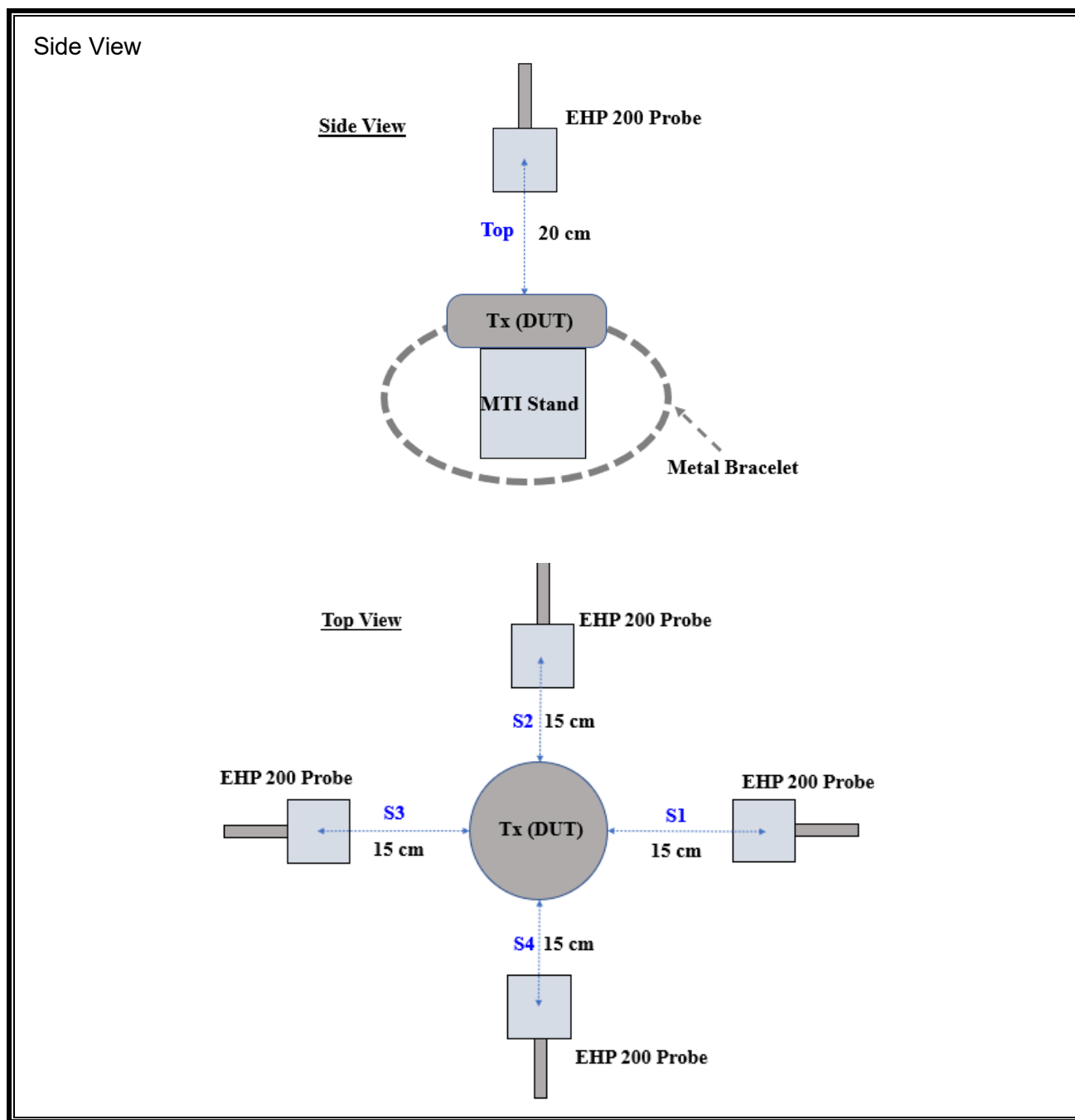
The following configurations are tested:

Configuration	Mode	Descriptions
1 (Standby)	EUT standalone	EUT Powered by MTI Stand
2 & 4 (Operating- Full Test)	(~10% of Watch battery status)	EUT Powered by MTI Stand & Wireless Charging to Watch #1 & 3
	(20%~60% of Watch battery status)	
	(>90% of Watch battery status)	
3 & 5 (Operating- Spot Check)	(20~60% of Watch battery status)	EUT Powered by MTI Stand & Wireless Charging to Watch #2 and #4

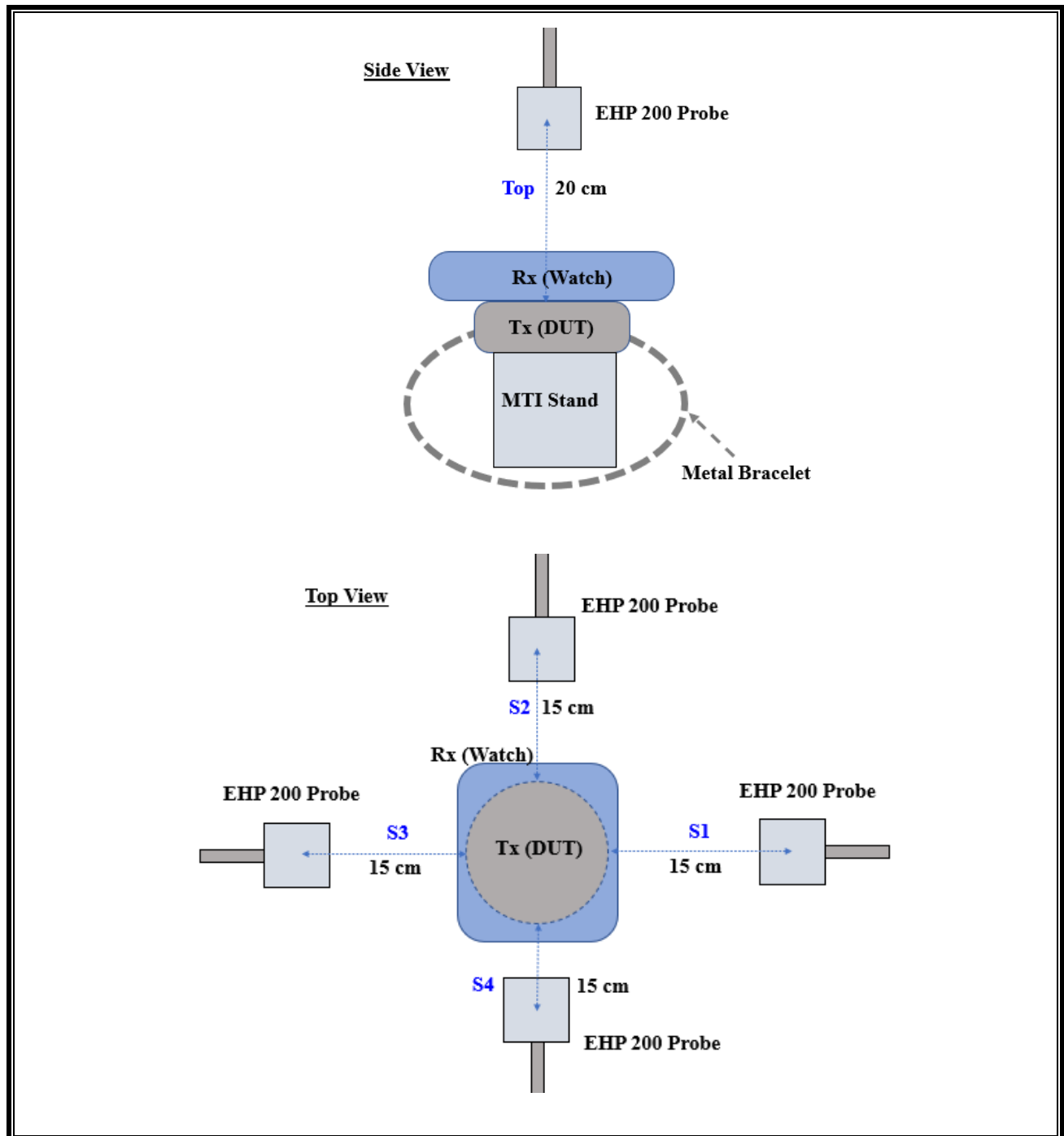
MEASUREMENT SETUP

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

MTI Stand delivers power to the EUT.

CONFIGURATION 1: STANDBY MODE

Note: MTI Stand is placed in a box that contains hardware and electrical power that is used to power the stand. Bottom was not tested side because is not accessible during charging and it is going to be displayed only in Apple stores.

CONFIGURATION 2, 3, 4 AND 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

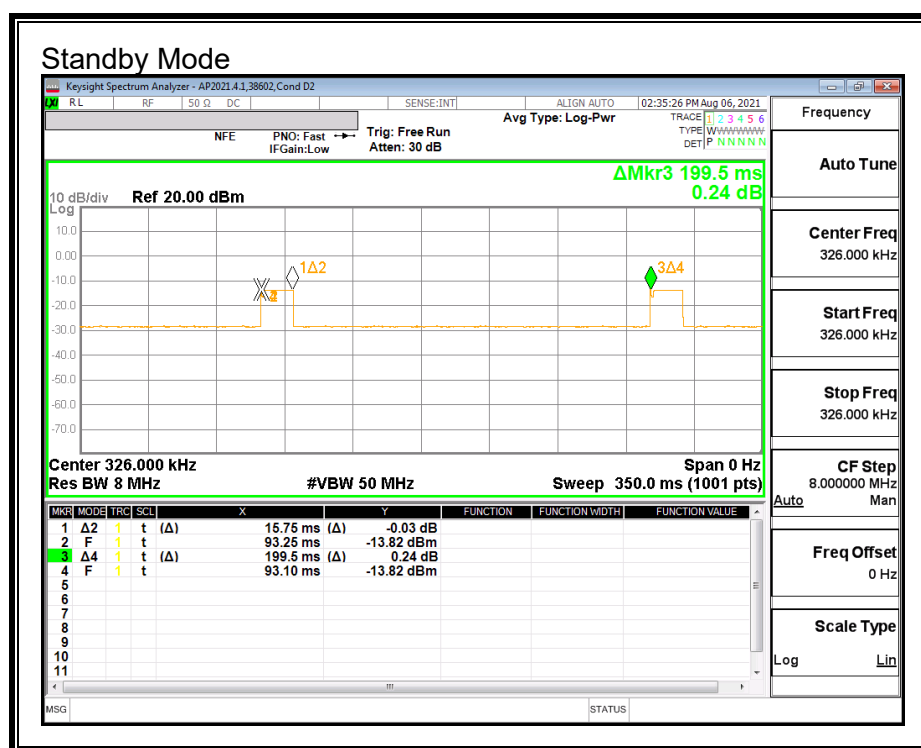
None; for reporting purposes only.

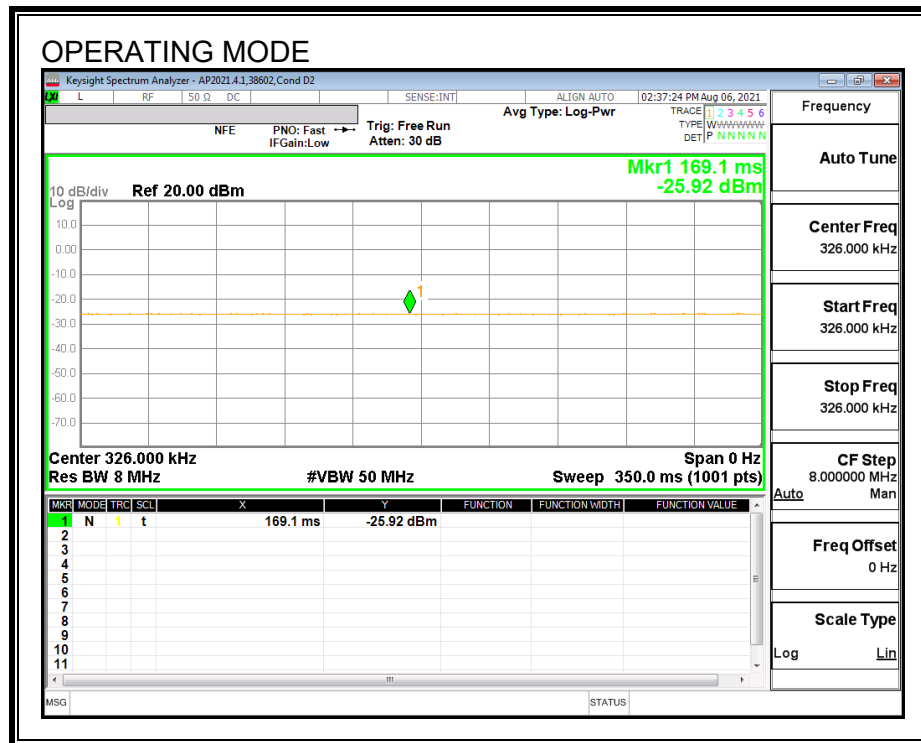
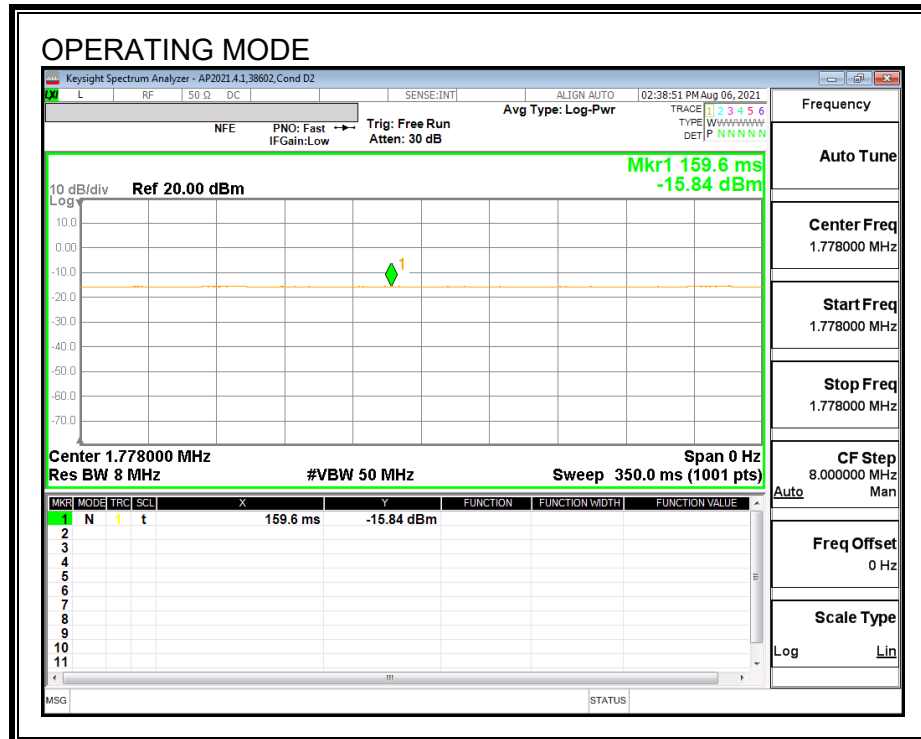
PROCEDURE

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)	15.75	199.50	0.08	7.89%	11.03
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 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.

9.1.1. FCC RF Exposure Summary of Results

ID	38602	Date:	08/21/2021
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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	0.130	0.02%	1.63	0.014	0.86%

Configuration #2 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	0.417	0.07%	1.63	0.059	3.62%

Configuration #3: 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	0.406	0.07%	1.63	0.054	3.31%

Configuration #4: 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	0.534	0.09%	1.63	0.051	3.13%

Configuration #5: EUT WITH LEGACY WATCH #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	0.400	0.07%	1.63	0.050	3.07%

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	0.398	7.89	0.112	1.63	S1	0.049	7.89	0.014
				S2	0.462		0.130		S2	0.049		0.014
				S3	0.394		0.111		S3	0.049		0.014
				S4	0.380		0.107		S4	0.049		0.014
				Top	0.388		0.109		Top	0.050		0.014
				Max	0.462		0.130		Max	0.050		0.014

Configuration #2: EUT With New Watch #1 @ 1.778MHz

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	0.398	100	0.398	1.63	S1	0.053	100	0.053
				S2	0.398		0.398		S2	0.053		0.053
				S3	0.391		0.391		S3	0.054		0.054
				S4	0.380		0.380		S4	0.052		0.052
				Top	0.398		0.398		Top	0.053		0.053
				Max	0.398		0.398		Max	0.054		0.054
	Operating Real Product (Power ~ 20% - 60% Charging)			S1	0.417	2100	0.417		S1	0.059	100	0.059
				S2	0.389		0.389		S2	0.054		0.054
				S3	0.386		0.386		S3	0.054		0.054
				S4	0.398		0.398		S4	0.055		0.055
				Top	0.398		0.398		Top	0.055		0.055
				Max	0.417		0.417		Max	0.059		0.059
	Operating Real Product (Power >90% Charging)			S1	0.398	100	0.398		S1	0.054	100	0.054
				S2	0.389		0.389		S2	0.054		0.054
				S3	0.389		0.389		S3	0.054		0.054
				S4	0.389		0.389		S4	0.053		0.053
				Top	0.389		0.389		Top	0.054		0.054
				Max	0.398		0.398		Max	0.054		0.054

Configuration #3: EUT With New Watch #2 @ 1.778MHz

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	0.406	100	0.406	1.63	S1	0.054	100	0.054
				S2	0.388		0.388		S2	0.053		0.053
				S3	0.398		0.398		S3	0.053		0.053
				S4	0.389		0.389		S4	0.054		0.054
				Top	0.388		0.388		Top	0.054		0.054
				Max	0.406		0.406		Max	0.054		0.054

Configuration #4: EUT With Legacy Watch #3 @ 326.5KHz

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	0.534	100	0.534	163	S1	0.051	100	0.051
				S2	0.407		0.407		S2	0.049		0.049
				S3	0.383		0.383		S3	0.048		0.048
				S4	0.483		0.483		S4	0.049		0.049
				Top	0.380		0.380		Top	0.047		0.047
				Max	0.534		0.534		Max	0.051		0.051
	Operating Real Product (Power ~20% - 60% Charging)			S1	0.534	100	0.534		S1	0.051	100	0.051
				S2	0.391		0.391		S2	0.047		0.047
				S3	0.463		0.463		S3	0.047		0.047
				S4	0.534		0.534		S4	0.049		0.049
				Top	0.398		0.398		Top	0.045		0.045
				Max	0.534		0.534		Max	0.051		0.051
	Operating Real Product (Power >30% Charging)			S1	0.510	100	0.510		S1	0.049	100	0.049
				S2	0.388		0.388		S2	0.049		0.049
				S3	0.389		0.389		S3	0.049		0.049
				S4	0.499		0.499		S4	0.048		0.048
				Top	0.388		0.388		Top	0.049		0.049
				Max	0.510		0.510		Max	0.049		0.049

Configuration #5: EUT With Legacy Watch #4 @ 326.5KHz

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	0.400	100	0.400	1.63	S1	0.049	100	0.049
				S2	0.391		0.391		S2	0.048		0.048
				S3	0.389		0.389		S3	0.050		0.050
				S4	0.388		0.388		S4	0.049		0.049
				Top	0.380		0.380		Top	0.047		0.047
				Max	0.400		0.400		Max	0.050		0.050

10. SETUP PHOTO

Please see setup photo report 13573888-EP2V1

END OF REPORT