

FCC Part 1 Subpart I
FCC Part 2 Subpart J

CERTIFICATION TEST REPORT

FOR

Wireless Charger

MODEL NO: A2844

FCC ID: BCGA2844

REPORT NUMBER: 15412975-E3V1

ISSUE DATE: 2024/07/31

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	2024/07/25	Initial Issue	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: Wireless Charger

MODEL: A2844

BRAND: APPLE

FCC ID: BCGA2844

SERIAL NUMBER: QTL02D7L9C
KJYLV6V59X

SAMPLE RECEIPT DATE 2024/07/09

DATE TESTED: 2024/07/09 – 2024/07/29

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 Lab Engineer
UL Verification Services Inc.

Prepared By:



Carlos D. Caudana
Test Engineer
UL Verification Services Inc.

2. TEST METHODOLOGY

All measurements made in accordance with KDB 680106 and manufacturer KDB inquiry.

3. FACILITIES AND ACCREDITATION

UL Verification Services Inc. 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, USA	US0104	2324A	550739
<input checked="" type="checkbox"/>	Building 2: 47266 Benicia Street, Fremont, CA 94538, USA			
<input type="checkbox"/>	Building 3: 843 Auburn Court, Fremont, CA 94538 USA			
<input type="checkbox"/>	Building 4: 47658 Kato Rd, Fremont, CA 94538 USA			
<input type="checkbox"/>	Building 5: 47670 Kato Rd, Fremont, CA 94538 USA			

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}
Spectrum Analyzer	141.16 Hz
EMF Exposure	1.960 dB
Magnetic Field Reading (A/m)	+/-0.3 dB
Electric Field Reading (V/m)	+/-0.3 dB

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 & 1.778 MHz.
(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 20 cm surrounding device surface from all simultaneous transmitting coils are demonstrated to be less than 50% of the MPE limit.	The worst-case leakage @ 1.778 is 0.32% and @326.5KHz is 0.61%

6. EQUIPMENT UNDER TEST

6.1. DESCRIPTION OF EUT

The magnetic charging cable inductively charges apple watch. There is an apple custom made connector between charging puck and USB-C boot. The custom connector cannot be combined with any other off the shelf connector.

6.2. WORST-CASE CONFIGURATION AND MODE

The EUT is a dual frequency magnetic charger attached to a metal shaft for holding purpose. For the entire RF exposure test EUT was investigated under following configuration:

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

6.3. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Description	Manufacturer	Load SN	Operating Frequency
Load 1	Apple	G3XHP0QRQY	326.5KHz
Load 2	Apple	KVOJ3369WT5	326.5KHz
Load 3	Apple	F2G7R962H9	1.778MHz
Load 4	Apple	FNXY2NYXYR	1.778MHz
AC Adapter	Apple	NA	N/A

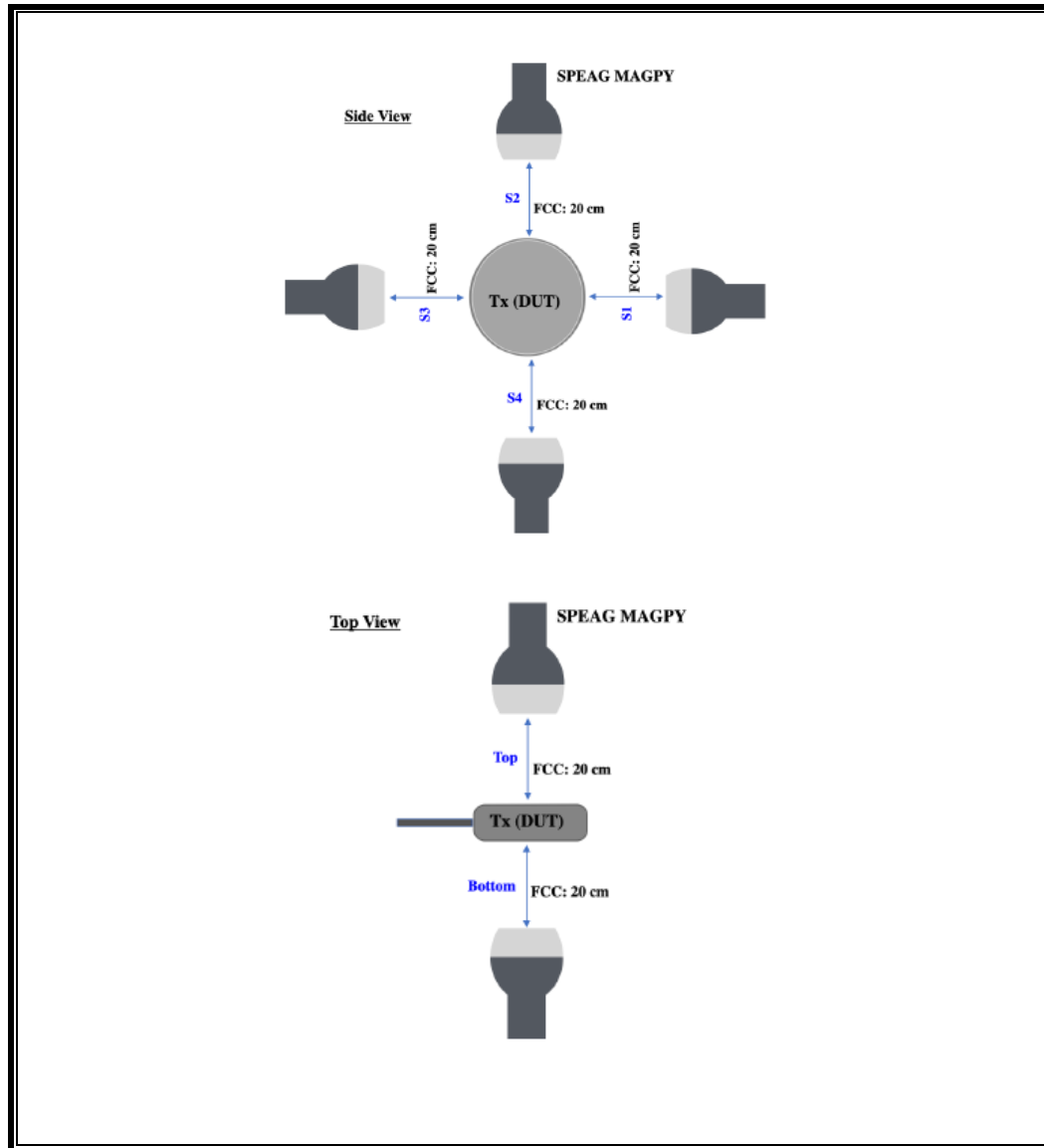
TEST SETUP

The following configurations are tested:

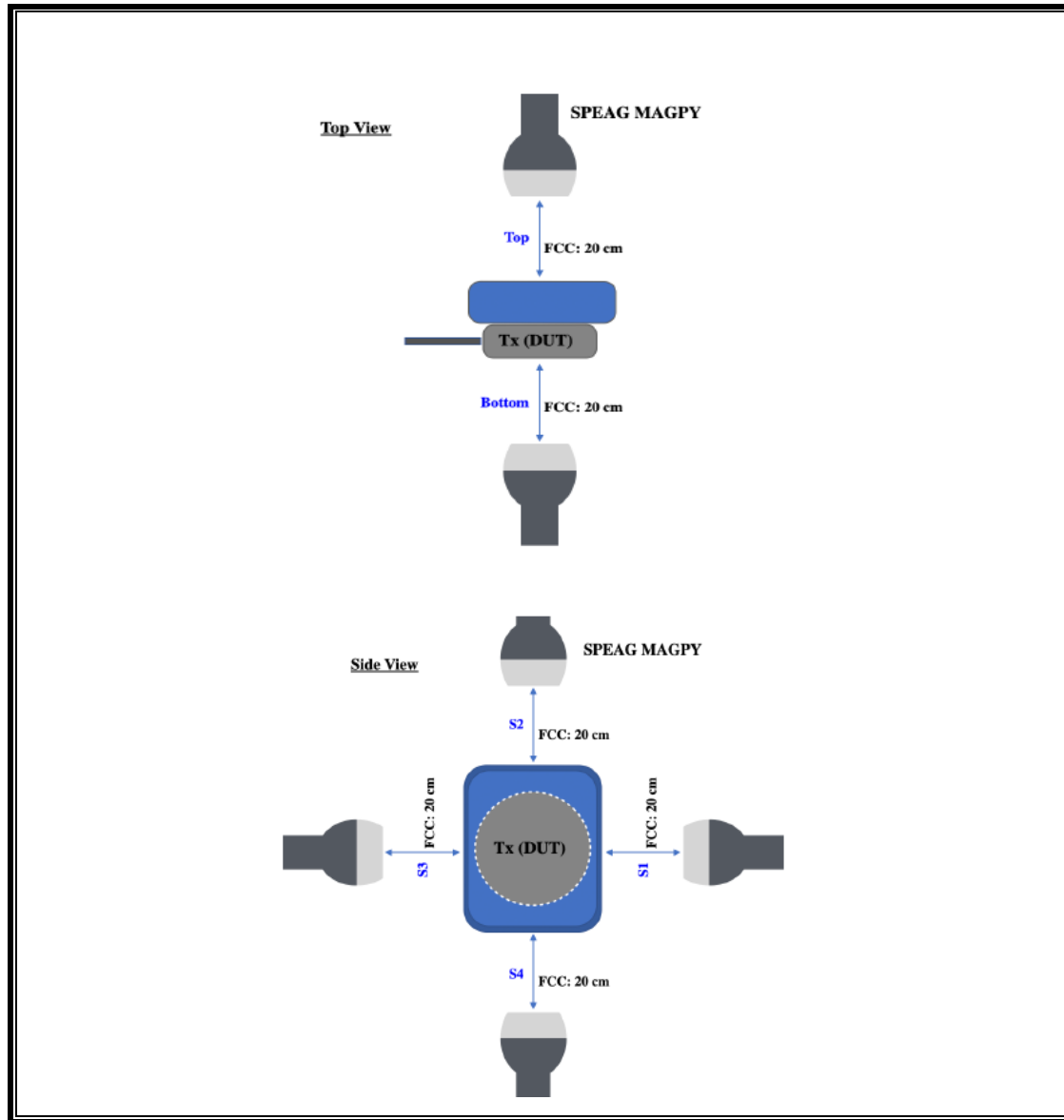
Configuration	Mode	Descriptions
1 (Standby)	EUT Standalone	EUT Alone powered by AC/DC Adapter
2 & 3 (Operating)	<10% Load battery status	EUT is powered by AC/DC adapter & Wireless Charging to Load 3 & 4 at 1.778MHz
	20-60% Load battery status	
	>90% of Load battery status	
4 & 5 (Operating)	<10% Load battery status	EUT is powered by AC/DC adapter & Wireless Charging to Load 1 & 2 at 326.5MHz
	20-60% Load battery status	
	>90% of Load battery status	

MEASUREMENT SETUP

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

Standby Config 1

Operating Configs 2 - 5



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	Speag	MAGPy V2	3056	235867	2024/08/31	2023/08/11
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight Technologies Inc	N9030A	MY52350675	80397	2025/01/31	2024/01/29

8. DUTY CYCLE

LIMITS

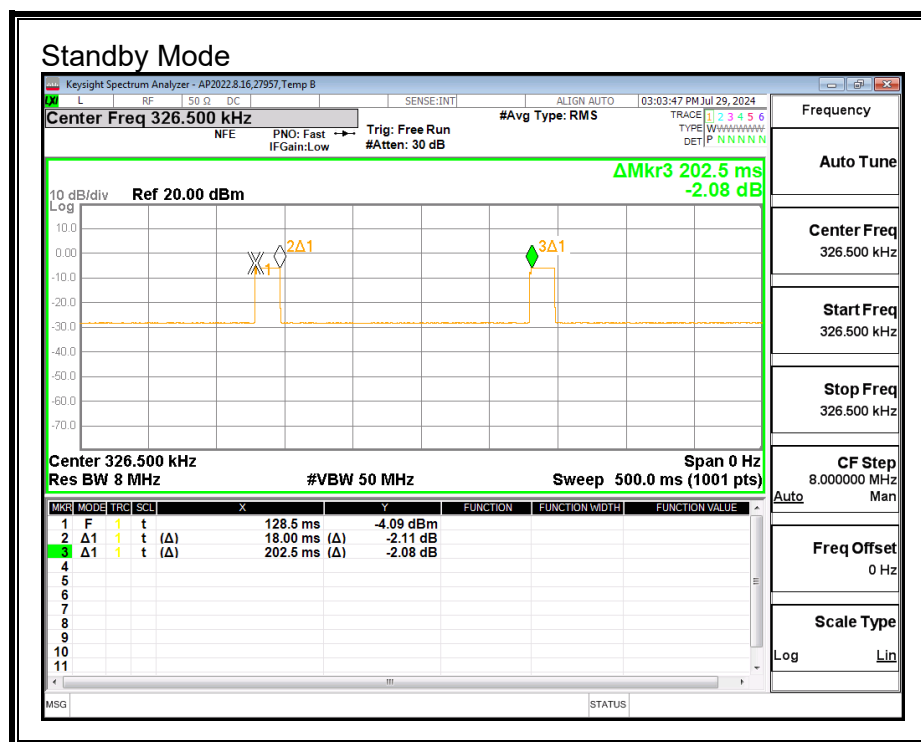
None; for reporting purposes only.

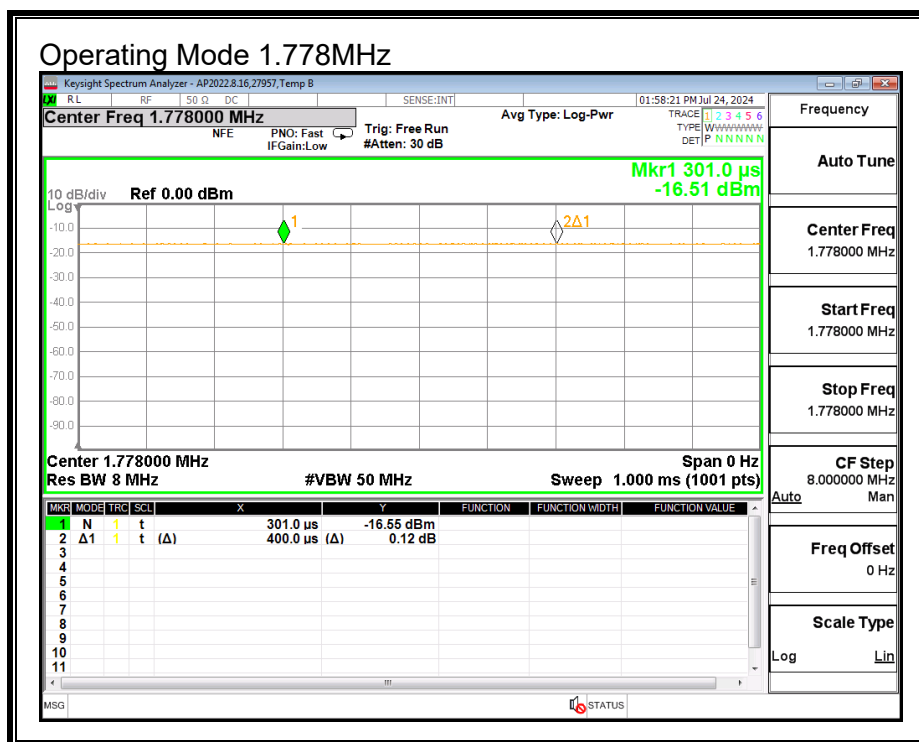
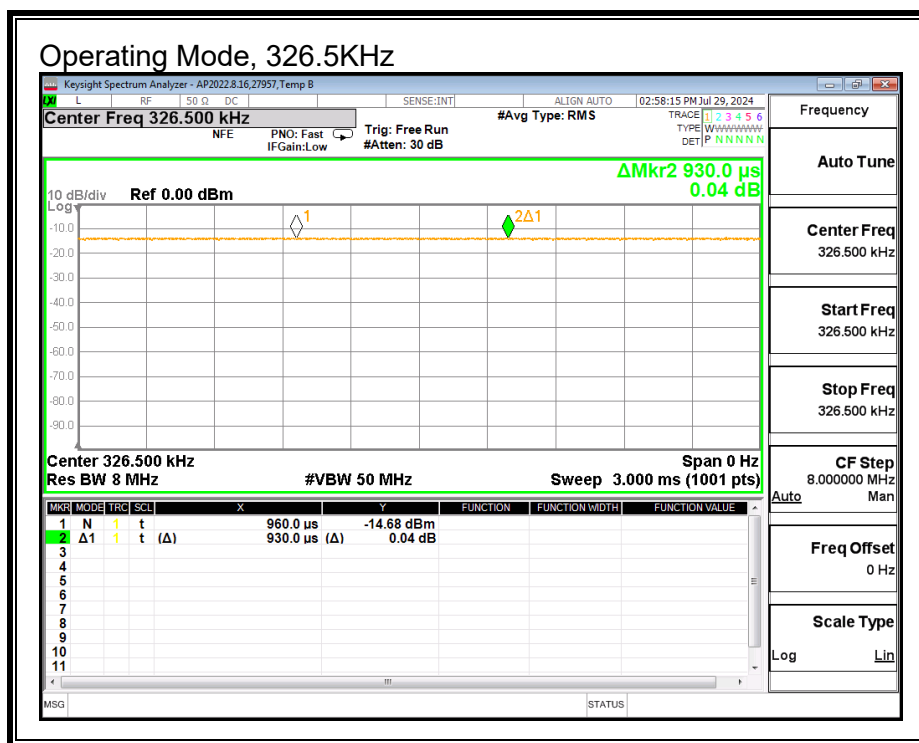
PROCEDURE

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	18.00	202.50	0.09	8.89%	10.51
Operating 326.5KHz	100.00	100.00	1.00	100.00%	0.00
Operating 1.778MHz	100.00	100.00	1.00	100.00%	0.00





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.

Results:

ID:	27957	Date:	2024/07/09 - 2024/07/18
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9.1.1. FCC RF exposure summary of results

Standby Config 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	0.516	0.08%	1.63	0.006	0.37%

Operating Config 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	0.250	0.04%	1.63	0.005	0.32%

Operating Config 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	0.300	0.05%	1.63	0.005	0.30%

Operating Config 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	1.860	0.30%	1.63	0.010	0.61%

Operating Config 5:

Electric Field Limit			Magnetic Field Limit		
FCC RF Exposure Limit	Maximum Average (V/m)	Percentage (%)	FCC RF Exposure	Maximum Average (A/m)	Percentage (%)
614	1.930	0.31%	1.63	0.007	0.40%

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

Standby Config 1

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	20 cm	614	S1	1.170	8.89	0.349	1.63	S1	0.003	8.89	0.001
				S2	0.630		0.188		S2	0.010		0.003
				S3	0.360		0.107		S3	0.005		0.001
				S4	1.730		0.516		S4	0.005		0.002
				Bottom	0.780		0.233		Bottom	0.020		0.006
				Top	1.460		0.435		Top	0.005		0.002
				Max	1.730		0.516		Max	0.020		0.006
				S1	0.200	100	0.200		S1	0.004	100	0.004
				S2	0.250		0.250		S2	0.004		0.004
				S3	0.080		0.080		S3	0.002		0.002
				S4	0.200		0.200		S4	0.004		0.004
				Bottom	0.220		0.220		Bottom	0.002		0.002
				Top	0.090		0.090		Top	0.005		0.005
				Max	0.250		0.250		Max	0.005		0.005
				S1	0.180		0.180		S1	0.004		0.004
				S2	0.200		0.200		S2	0.003		0.003
				S3	0.200		0.200		S3	0.005		0.005
				S4	0.110		0.110		S4	0.002		0.002
				Bottom	0.130		0.130		Bottom	0.003		0.003
				Top	0.230		0.230		Top	0.004		0.004
				Max	0.230		0.230		Max	0.005		0.005
				S1	0.140	100	0.140		S1	0.004	100	0.004
				S2	0.110		0.110		S2	0.003		0.003
				S3	0.180		0.180		S3	0.004		0.004
				S4	0.170		0.170		S4	0.004		0.004
				Bottom	0.100		0.100		Bottom	0.003		0.003
				Top	0.210		0.210		Top	0.003		0.003
				Max	0.210		0.210		Max	0.004		0.004

Operating Config 2

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)	20 cm	614	S1	0.200	100	0.200	1.63	S1	0.004	100	0.004
				S2	0.250		0.250		S2	0.004		0.004
				S3	0.080		0.080		S3	0.002		0.002
				S4	0.200		0.200		S4	0.004		0.004
				Bottom	0.220		0.220		Bottom	0.002		0.002
				Top	0.090		0.090		Top	0.005		0.005
				Max	0.250		0.250		Max	0.005		0.005
	Operating Real Product (Power ~ 20% - 60% Charging)			S1	0.180	100	0.180		S1	0.004	100	0.004
				S2	0.200		0.200		S2	0.003		0.003
				S3	0.200		0.200		S3	0.005		0.005
				S4	0.110		0.110		S4	0.002		0.002
				Bottom	0.130		0.130		Bottom	0.003		0.003
				Top	0.230		0.230		Top	0.004		0.004
				Max	0.230		0.230		Max	0.005		0.005
	Operating Real Product (Power >90% Charging)			S1	0.140	100	0.140		S1	0.004	100	0.004
				S2	0.110		0.110		S2	0.003		0.003
				S3	0.180		0.180		S3	0.004		0.004
				S4	0.170		0.170		S4	0.004		0.004
				Bottom	0.100		0.100		Bottom	0.003		0.003
				Top	0.210		0.210		Top	0.003		0.003
				Max	0.210		0.210		Max	0.004		0.004

Operating Config 3

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 <10% Charging)	20 cm	614	S1	0.130	100	0.130	1.63	S1	0.002	100	0.002
				S2	0.140		0.140		S2	0.003		0.003
				S3	0.150		0.150		S3	0.002		0.002
				S4	0.080		0.080		S4	0.003		0.003
				Bottom	0.090		0.090		Bottom	0.003		0.003
				Top	0.120		0.120		Top	0.003		0.003
				Max	0.150		0.150		Max	0.003		0.003
				S1	0.140		100		0.140	S1		0.003
	S2			0.130	0.130	S2			0.004	0.004		
	S3			0.300	0.300	S3			0.005	0.005		
	S4			0.170	0.170	S4			0.003	0.003		
	Bottom			0.110	0.110	Bottom			0.002	0.002		
	Top			0.190	0.190	Top			0.003	0.003		
	Max			0.300	0.300	Max			0.005	0.005		
	S1			0.110	100	0.110			S1	0.002	100	0.002
	S2			0.090		0.090	S2		0.003	0.003		
	S3			0.090		0.090	S3		0.002	0.002		
	S4			0.230		0.230	S4		0.005	0.005		
	Bottom			0.240		0.240	Bottom		0.003	0.003		
	Top			0.120		0.120	Top		0.003	0.003		
	Max			0.240		0.240	Max		0.005	0.005		

Operating Config 4

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)	20 cm	614	S1	0.500	100	0.500	1.63	S1	0.005	100	0.005
				S2	0.230		0.230		S2	0.005		0.005
				S3	0.340		0.340		S3	0.003		0.003
				S4	0.750		0.750		S4	0.010		0.010
				Bottom	0.270		0.270		Bottom	0.004		0.004
				Top	0.670		0.670		Top	0.007		0.007
				Max	0.750		0.750		Max	0.010		0.010
	Operating Real Product (Power ~ 20% ~ 60% Charging)			S1	0.610	100	0.610		S1	0.005	100	0.005
				S2	0.910		0.910		S2	0.007		0.007
				S3	0.230		0.230		S3	0.005		0.005
				S4	1.860		1.860		S4	0.006		0.006
				Bottom	0.250		0.250		Bottom	0.003		0.003
				Top	1.330		1.330		Top	0.006		0.006
				Max	1.860		1.860		Max	0.007		0.007
	Operating Real Product (Power >90% Charging)			S1	0.400	100	0.400		S1	0.007	100	0.007
				S2	0.250		0.250		S2	0.002		0.002
				S3	0.340		0.340		S3	0.006		0.006
				S4	0.420		0.420		S4	0.006		0.006
				Bottom	0.250		0.250		Bottom	0.004		0.004
				Top	0.560		0.560		Top	0.007		0.007
				Max	0.560		0.560		Max	0.007		0.007

Operating Config 5

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 <10% Charging)	20 cm	614	S1	0.800	100	0.800	1.63	S1	0.004	100	0.004
				S2	0.210		0.210		S2	0.004		0.004
				S3	1.450		1.450		S3	0.005		0.005
				S4	0.890		0.890		S4	0.005		0.005
				Bottom	1.900		1.900		Bottom	0.005		0.005
				Top	0.580		0.580		Top	0.006		0.006
				Max	1.900		1.900		Max	0.006		0.006
				S1	0.400		100		0.400	S1		0.005
	S2			1.020	1.020	S2			0.006	0.006		
	S3			0.130	0.130	S3			0.004	0.004		
	S4			0.570	0.570	S4			0.004	0.004		
	Bottom			0.220	0.220	Bottom			0.005	0.005		
	Top			0.090	0.090	Top			0.004	0.004		
	Max			1.020	1.020	Max			0.006	0.006		
	S1			0.320	100	0.320			S1	0.007	100	0.007
	S2			0.310		0.310	S2		0.005	0.005		
	S3			0.300		0.300	S3		0.005	0.005		
	S4			0.500		0.500	S4		0.005	0.005		
	Bottom			1.010		1.010	Bottom		0.007	0.007		
	Top			1.930		1.930	Top		0.004	0.004		
	Max			1.930		1.930	Max		0.007	0.007		

10. SETUP PHOTO

Please see setup photo report 15412975-EP1V1

END OF REPORT