



FCC PART 15C

TEST REPORT

For

SDI Technologies Inc.

1299 Main St. Rahway, NJ 07065, United States

FCC ID: EMOIWW33A

Report Type: Original Report	Product Type: Compact Clock with Dual-Wireless Charging and Apple Watch Charger
Report Number:	SZKA210618-24117E-RF-00
Report Date:	2021-08-05
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TABLE OF CONTENTS

GENERAL INFORMATION.....3

 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)3

 OBJECTIVE3

 TEST METHODOLOGY3

 MEASUREMENT UNCERTAINTY4

 TEST FACILITY4

SYSTEM TEST CONFIGURATION.....5

 JUSTIFICATION5

 EUT EXERCISE SOFTWARE5

 SUPPORT EQUIPMENT LIST AND DETAILS5

 EXTERNAL I/O CABLE.....5

 BLOCK DIAGRAM OF TEST SETUP6

SUMMARY OF TEST RESULTS7

TEST EQUIPMENT LIST8

FCC §1.1310, §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)9

 APPLICABLE STANDARD9

 BLOCK DIAGRAM OF TEST SETUP10

 TEST DATA10

FCC§15.203 – ANTENNA REQUIREMENT12

 APPLICABLE STANDARD12

 ANTENNA CONNECTED CONSTRUCTION12

FCC §15.207 – AC LINE CONDUCTED EMISSION13

 APPLICABLE STANDARD13

 EUT SETUP13

 EMI TEST RECEIVER SETUP.....14

 TEST PROCEDURE14

 CORRECTED FACTOR & MARGIN CALCULATION14

 TEST DATA14

FCC §15.205 & §15.209 - RADIATED EMISSIONS TEST17

 APPLICABLE STANDARD17

 EUT SETUP17

 EMI TEST RECEIVER SETUP.....18

 CORRECTED AMPLITUDE & MARGIN CALCULATION18

 TEST DATA18

GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

Product	Compact Clock with Dual-Wireless Charging and Apple Watch Charger
Tested Model	iWW33
Multiple Models	iWW33BG, iWW33X (X could be single or multiple digits by any alphabets denote different cabinet color)
Models Differences	Refer to the DoS letter
Frequency Range	110.5-205kHz(Coil 1) 127.7kHz±6Hz(Coil 2) 392.5kHz±6Hz(Coil 3)
Antenna Type	Coil
Voltage Range	DC15.0V from adapter
Date of Test	2021-07-01 to 2021-08-05
Sample serial number	SZKA210618-24117E-RF-S1/1 (Assigned by BACL, Shenzhen)
Received date	2021-06-18
Sample/EUT Status	Good condition
Adapter information	Model: BQ36B-1502400-U Input: AC100-240V, 50/60Hz Max, 1000mA Output: DC 15.0V, 2400mA

Objective

This test report is in accordance with Part 2, Subpart J, and Part 15, Subparts A and C of the Federal Communications Commission's rules.

The objective is to determine the compliance of EUT with FCC rules, section 15.203, 15.205, 15.207 and 15.209.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Each test item follows test standards and with no deviation.

Measurement Uncertainty

Item		Uncertainty
AC Power Line Conducted Emissions		±1.95 dB
Radiated emission	9 kHz~30MHz	±4.52 dB
	30MHz~1 GHz	±5.81 dB
Occupied Bandwidth		±0.5 kHz
Temperature		±3.0 °C
Humidity		±6 %

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 5F(B-West), 6F, 7F, the 3rd Phase of Wan Li Industrial Building D, Shihua Rd, FuTian Free Trade Zone, Shenzhen, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 342867, the FCC Designation No.: CN1221.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062B.

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing in a test mode

EUT Exercise Software

No software used in test.

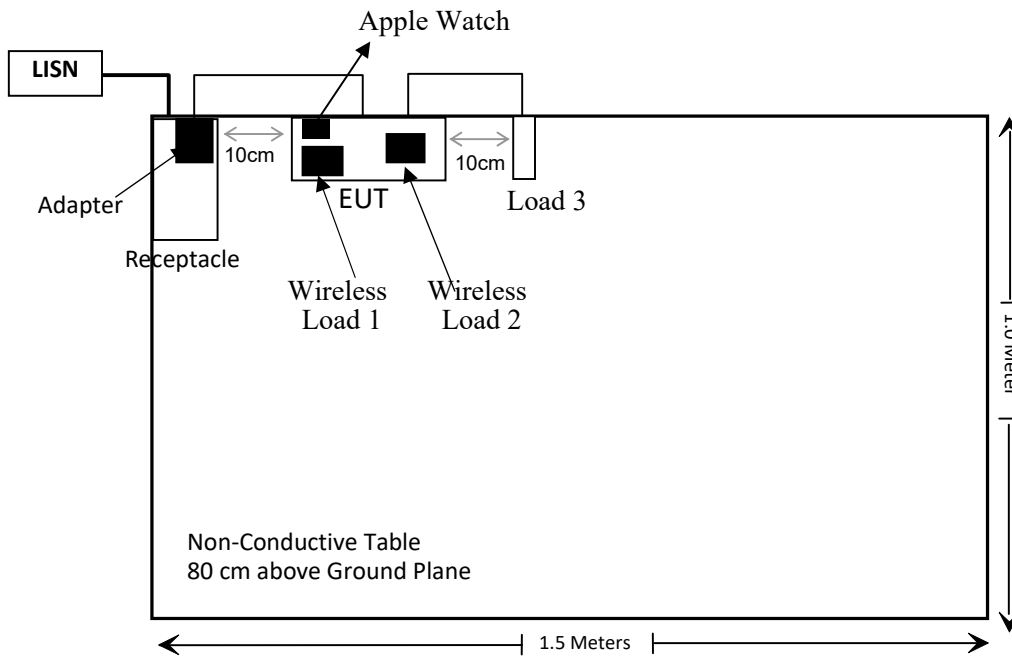
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Unknown	Load 3	Bacload 3	Bacload 3
Unknown	Wireless Load 1	Bacload 1	Bacload 1
Unknown	Wireless Load 2	Bacload 2	Bacload 2
Apple	Apple Watch	Apple Watch 3	FH7TF0X0HDX7

External I/O Cable

Cable Description	Length (m)	From Port	To
Un-shielded Un-Detachable DC Cable	0.8	Adapter	EUT

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC§1.1310 & §2.1091	Maximum Permissible Exposure(MPE)	Compliant
FCC§15.203	Antenna Requirement	Compliant
FCC§15.207	AC Line Conducted Emission	Compliant
§15.209 §15.205	Radiated Emission Test	Compliant

Note: EUT can support different charging power output, such as 5.0W, 7.5W, 9W and 15W.
Pre-scan with all of them, the worst case is 15W which was recorded in the report.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
MPE					
Narda	Exposure Level Tester	ELT-400	N-0229	2019/11/19	2021/11/18
Narda	B Field Probe	ELT Probe 100cm ²	M-0666	2019/11/19	2021/11/18
ETS-Lindgreen	Isotropic Field Probe	HI-6005	69461	2018/09/28	2021/09/27
Conducted Emissions Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2020/08/04	2021/08/03
Rohde & Schwarz	LISN	ENV216	101613	2020/08/04	2021/08/03
Rohde & Schwarz	Transient Limitor	ESH3Z2	DE25985	2020/11/29	2021/11/28
Unknown	CE Cable	CE Cable	UF A210B-1-0720-504504	2020/11/29	2021/11/28
Rohde & Schwarz	CE Test software	EMC 32	V8.53.0	NCR	NCR
RF Radiated test					
R&S	EMI Test Receiver	ESR3	102455	2021/07/06	2022/07/05
Sonoma instrument	Pre-amplifier	310 N	186238	2020/08/04	2021/08/03
Sonoma instrument	Pre-amplifier	310 N	186238	2021/08/03	2022/08/02
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2020/12/22	2023/12/21
ETS	Passive Loop Antenna	6512	29604	2019/07/14	2022/07/13
COM-POWER	Dipole Antenna	AD-100	721027	NCR	NCR
Unknown	Cable 2	RF Cable 2	F-03-EM197	2020/11/29	2021/11/28
Unknown	Cable	Chamber Cable 1	F-03-EM236	2020/11/29	2021/11/28
Unknown	Cable	Chamber Cable 4	EC-007	2020/11/29	2021/11/28
Rohde & Schwarz	Auto test software	EMC 32	V9.10.00	NCR	NCR

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §1.1310, §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission’s guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm²)	Averaging Time (minutes)
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30
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;

According with KDB 680106 D01 RF Exposure Wireless Charging Apps v03r01 clause 3 c)

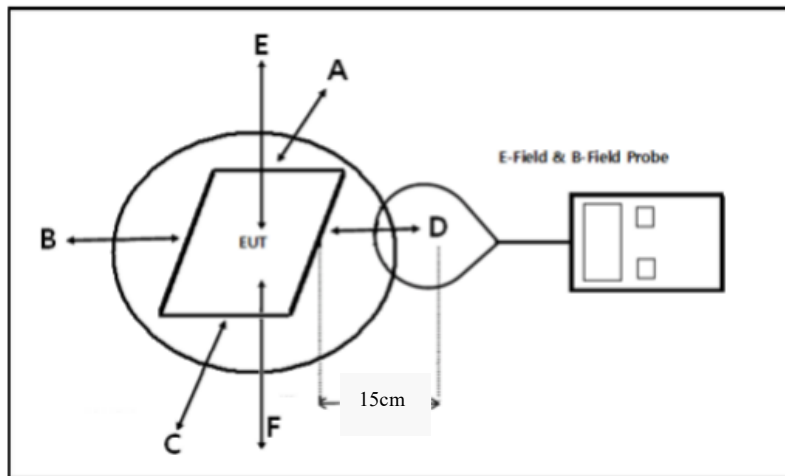
- c) For devices designed for typical desktop applications, such a wireless charging pads, RF exposure evaluation should be conducted assuming a user separation distance of 15 cm. E and H field strength measurements or numerical modeling may be used to demonstrate compliance. Measurements should be made from all sides and the top of the primary/client pair, with the 15 cm measured from the center of the probe(s) to the edge of the device. Emissions between 100 kHz to 300 kHz should be assessed versus the limits at 300 kHz in Table 1 of Section 1.1310: 614 V/m and 1.63 A/m. Below 100 kHz, applicable reference levels for maximum instantaneous exposure field strengths are defined in clause 3.a).(2).

According to KDB 680106 D01 RF Exposure Wireless Charging App v03r01 clause 5 b)

- b) Inductive wireless power transfer applications with supporting field strength results and meeting all of the following requirements are not required to submit a KDB inquiry for devices approved using SDoC² or a PAG³ for equipment approved using certification to address RF exposure compliance. However, the responsible party is required to keep a copy of the test report in accordance with KDB 865664 D02. A copy of the test report is to be submitted with the application if the device is approved using certification.

- (1) Power transfer frequency is less than 1 MHz
- (2) Output power from each primary coil is less than or equal to 15 watts.
- (3) The system may consist of more than one source primary coils, charging one or more clients. If more than one primary coil is present, the coil pairs may be powered on at the same time.
- (4) Client device is placed directly in contact with the transmitter.
- (5) Mobile exposure conditions only (portable exposure conditions are not covered by this exclusion).
- (6) The aggregate H-field strengths anywhere at or beyond 15 cm surrounding the device, and 20 cm away from the surface from all coils that by design can simultaneously transmit, and while those coils are simultaneously energized, are demonstrated to be less than 50% of the applicable MPE limit.

Block Diagram of Test Setup



Note: 20 cm for Top test.

Test Data

Environmental Conditions

Temperature:	26°C
Relative Humidity:	54 %
ATM Pressure:	101.0 kPa

The testing was performed by Black Chen on 2021-07-08.

Test mode: Wireless Charging with full load

H-Field Strength

Frequency Range (kHz)	Position A (A/m)	Position B (A/m)	Position C (A/m)	Position D (A/m)	Position E (A/m)	50% Limit (A/m)	Limit (A/m)
110.5-392.5	0.131	0.186	0.145	0.130	0.163	0.815	1.63

E-Field Strength

Frequency Range (kHz)	Position A (V/m)	Position B (V/m)	Position C (V/m)	Position D (V/m)	Position E (V/m)	50% Limit (V/m)	Limit (V/m)
110.5-392.5	0.556	0.585	0.536	0.642	0.715	307	614

Result: Pass

Considerations of compliance 680106 D01 RF Exposure Wireless Charging App v03r01 clause 5 b:

(1) Power transfer frequency is less than 1 MHz.

Yes, the operation frequency is 110.5-392.5 kHz.

(2) Output power from each primary coil is less than or equal to 15 watts.

Yes, the maximum output power of primary coil is 15Watts.

(3) The system may consist of more than one source primary coils, charging one or more clients. If more than one primary coil is present, the coil pairs may be powered on at the same time.

The transfer system includes three primary coils, the coil pairs can be powered on at the same time.

(4) Client device is placed directly in contact with the transmitter.

Yes, 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 conditions only

(6) The aggregate H-field strengths anywhere at or beyond 15 cm surrounding the device, and 20 cm away from the surface from all coils that by design can simultaneously transmit, and while those coils are simultaneously energized, are demonstrated to be less than 50% of the applicable MPE limit.

Yes, the test result for H and E-Field strength less than 50% of the MPE limit.

FCC§15.203 – ANTENNA REQUIREMENT

Applicable Standard

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

Antenna Connected Construction

The EUT has three coil antennas arrangement which were permanently attached, fulfill the requirement of this section. Please refer to the EUT photos.

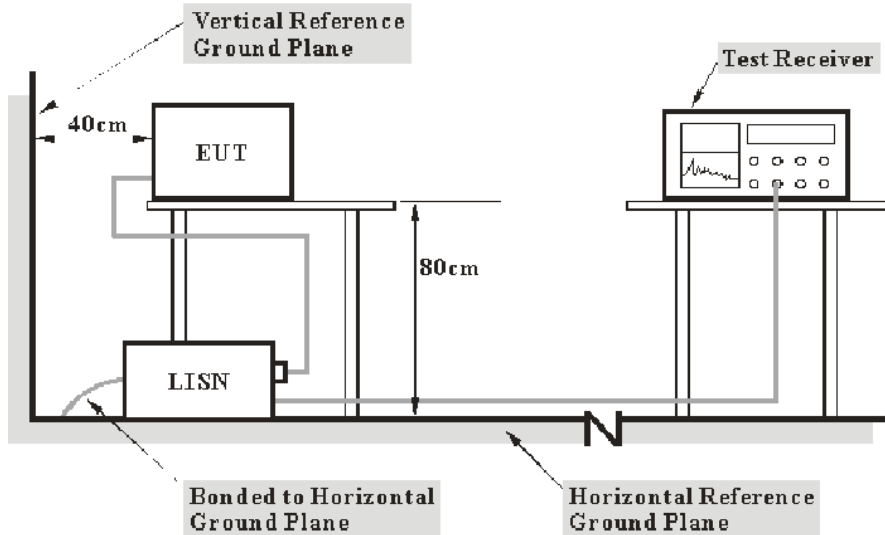
Result: Pass

FCC §15.207 – AC LINE CONDUCTED EMISSION

Applicable Standard

FCC§15.207

EUT Setup



- Note: 1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle. The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All final data was recorded in the Quasi-peak and average detection mode.

Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

$$\text{Correction Factor} = \text{LISN VDF} + \text{Cable Loss} + \text{Transient Limiter Attenuation}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Data

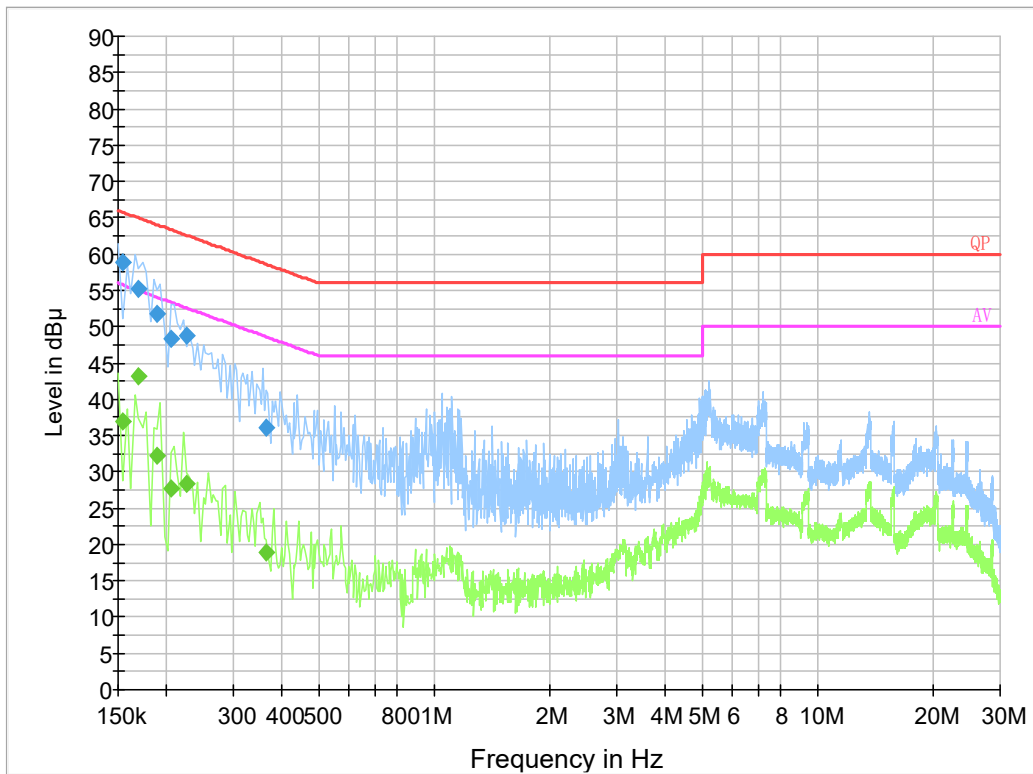
Environmental Conditions

Temperature:	25°C
Relative Humidity:	70 %
ATM Pressure:	101.0 kPa

The testing was performed by Haiguo Li on 2021-07-01.

Test mode: Wireless Charging with full load

AC 120 V/60 Hz, Line:



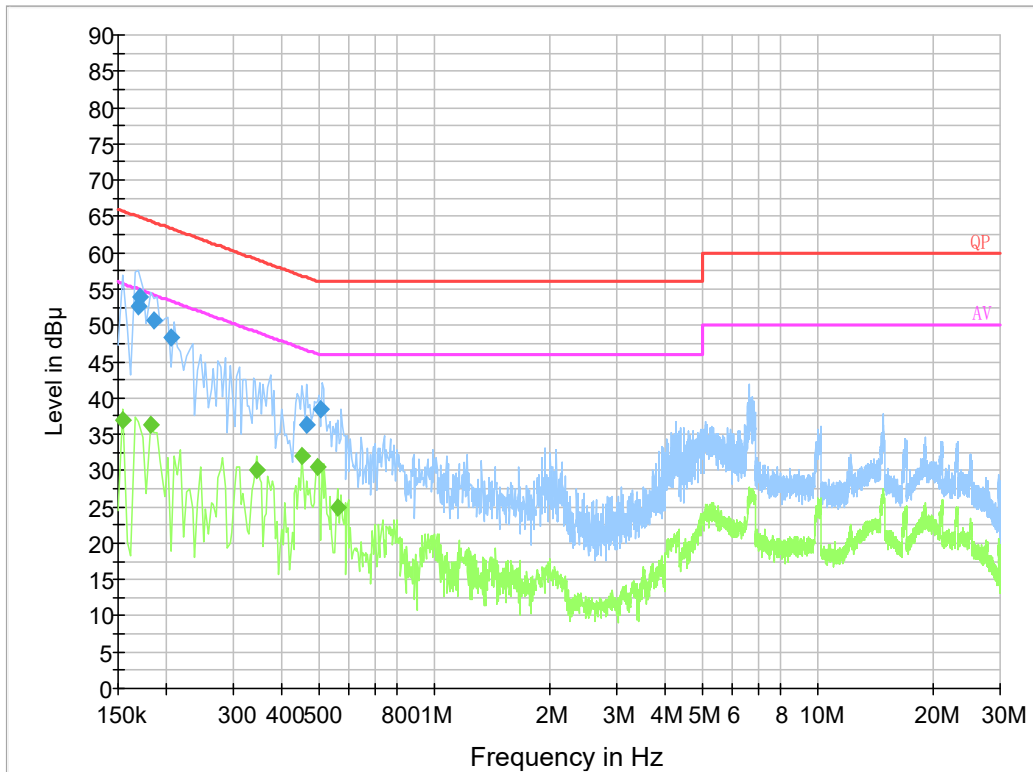
Final Result 1

Frequency (MHz)	QuasiPeak (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.154000	58.9	9.000	L1	19.8	6.9	65.8
0.169500	55.2	9.000	L1	19.9	9.8	65.0
0.189500	51.8	9.000	L1	19.8	12.2	64.1
0.205500	48.4	9.000	L1	19.8	15.0	63.4
0.225500	48.8	9.000	L1	19.8	13.8	62.6
0.363370	36.1	9.000	L1	19.9	22.6	58.7

Final Result 2

Frequency (MHz)	Average (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.154000	37.0	9.000	L1	19.8	18.8	55.8
0.169500	43.2	9.000	L1	19.9	11.8	55.0
0.189500	32.2	9.000	L1	19.8	21.8	54.1
0.205500	27.7	9.000	L1	19.8	25.7	53.4
0.225500	28.4	9.000	L1	19.8	24.2	52.6
0.363370	19.0	9.000	L1	19.9	29.7	48.7

AC 120V/ 60 Hz, Neutral:



Final Result 1

Frequency (MHz)	QuasiPeak (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.169500	52.7	9.000	N	19.8	12.3	65.0
0.170501	53.9	9.000	N	19.8	11.0	64.9
0.185500	50.8	9.000	N	19.8	13.4	64.2
0.205500	48.3	9.000	N	19.8	15.1	63.4
0.467010	36.3	9.000	N	19.8	20.3	56.6
0.506350	38.4	9.000	N	19.8	17.6	56.0

Final Result 2

Frequency (MHz)	Average (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.154000	37.0	9.000	N	19.8	18.8	55.8
0.182000	36.2	9.000	N	19.8	18.2	54.4
0.346000	30.0	9.000	N	19.8	19.0	49.1
0.454000	32.0	9.000	N	19.8	14.8	46.8
0.498000	30.4	9.000	N	19.8	15.6	46.0
0.562000	25.0	9.000	N	19.8	21.0	46.0

FCC §15.205 & §15.209 - RADIATED EMISSIONS TEST

Applicable Standard

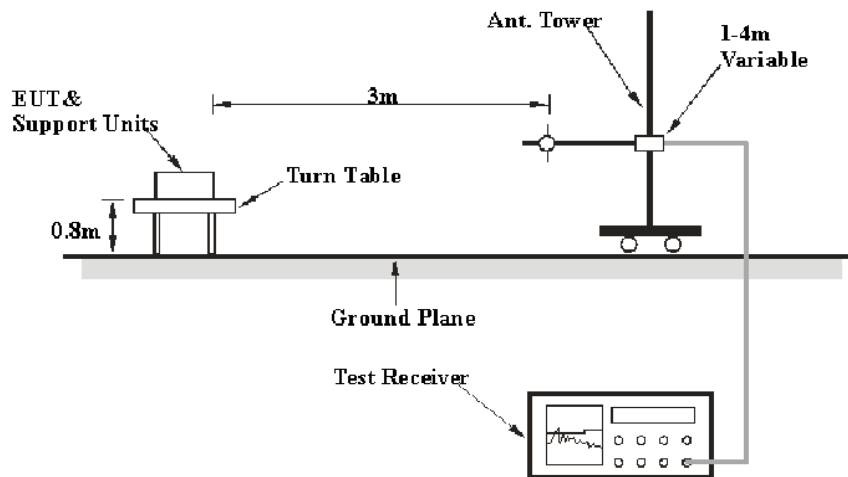
As per FCC Part 15.209

(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§15.231 and 15.241.

EUT Setup



The radiated emission tests were performed in the 3-meter chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC Part Subpart C limits.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

During the radiated emission test, the EMI test Receiver was set with the following configurations:

Frequency Range	RBW	Video B/W	Measurement
9 kHz – 150 kHz	300 Hz	1 kHz	PK
150 kHz – 30 MHz	10 kHz	30 kHz	PK
30 MHz – 1000 MHz	120 kHz	300 kHz	QP

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

If the maximized peak measured value complies with the limit, then it is unnecessary to perform an QP/Average measurement

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corr. Ampl.}$$

Test Data

Environmental Conditions

Temperature:	29~ 30°C
Relative Humidity:	55~ 56 %
ATM Pressure:	101.0 kPa

The testing was performed by Cloud Qiu on 2021-07-24 and Willia Wang on 2021-08-05.

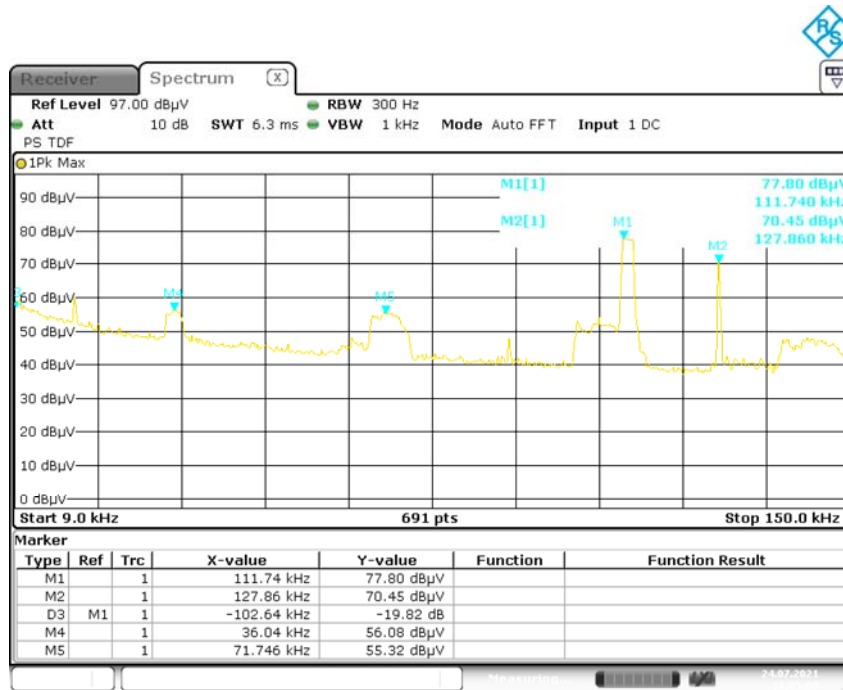
Test mode: Wireless Charging with full load

1) 9 kHz~30MHz:

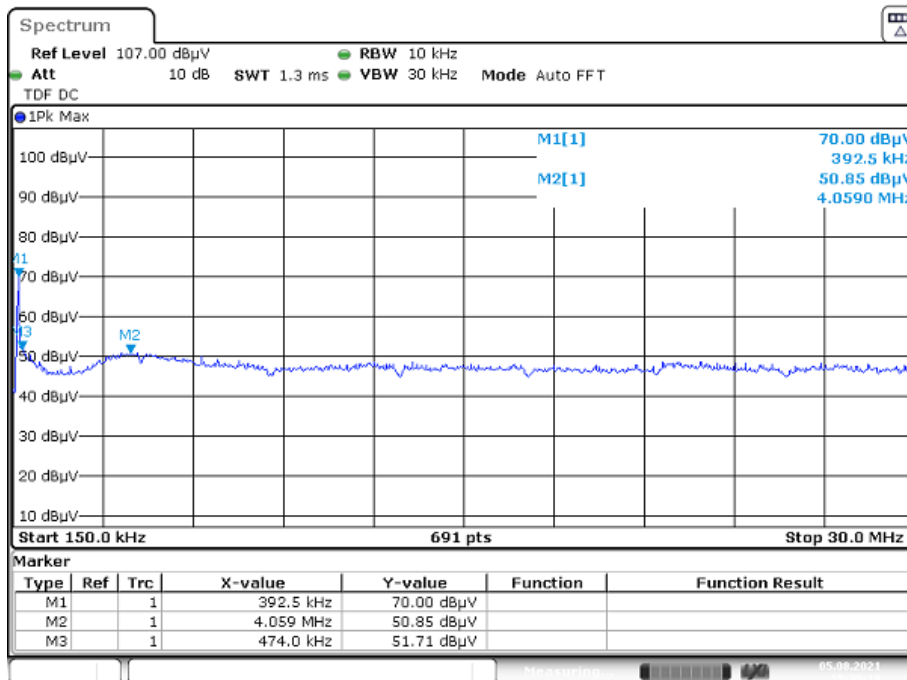
Frequency (MHz)	Corrected Amplitude (dB μ V/m)	PK/QP/Ave.	Turntable Degree	RX Antenna Height (m)	FCC Part 15.205&15.209		Remark
					Limit (dB μ V/m)	Margin (dB)	
0.03604	56.08	PK	89	1.0	116.47	60.39	Spurious Emission
0.07175	55.32	PK	256	1.0	110.49	55.17	
4.059	50.85	PK	315	1.0	69.54	18.69	
0.39250	70.00	PK	254	1.0	95.73	25.73	Fundamental
0.11174	77.80	PK	192	1.0	106.64	28.84	
0.12786	70.45	PK	231	1.0	105.47	35.02	

Note: PK detector data Compliant with average and QP detector limit.

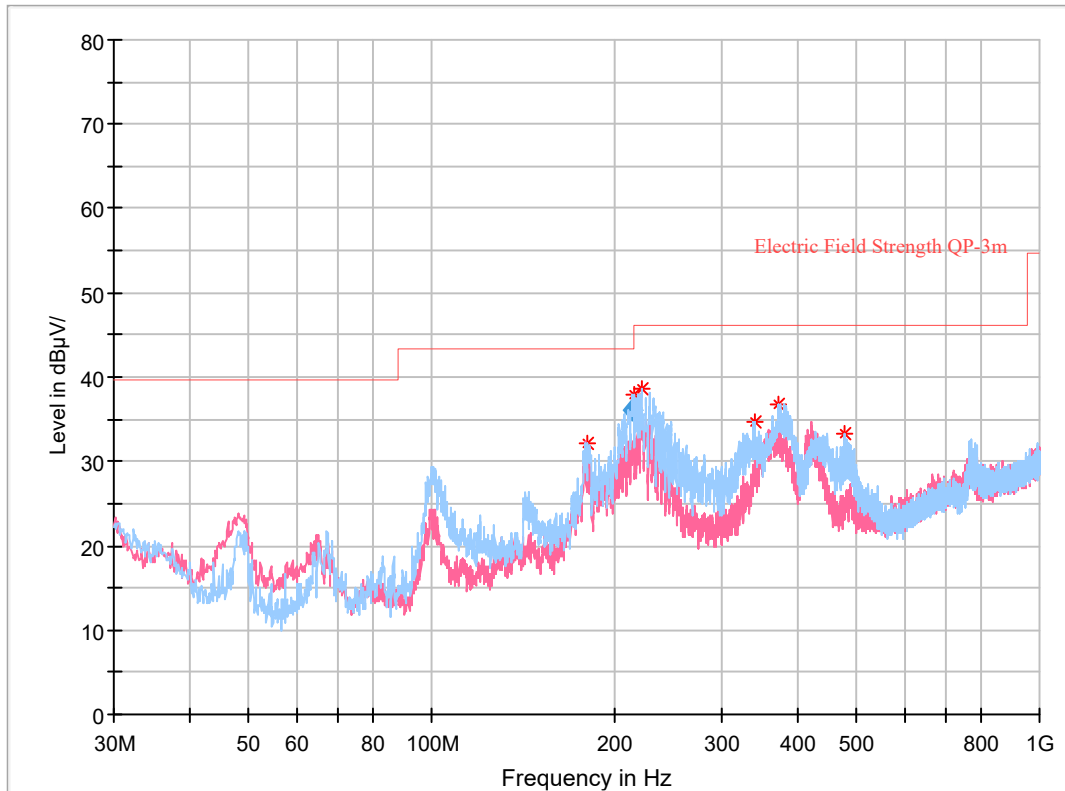
9 kHz-150 kHz



150 kHz-30 MHz



2) 30 MHz ~ 1 GHz



Comment

Final Result

Frequency (MHz)	QuasiPeak (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
214.368875	36.17	43.50	7.33	184.0	H	324.0	-11.3

Critical Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
180.835000	32.23	43.50	11.27	200.0	H	5.0	-12.2
221.211250	38.50	46.00	7.50	200.0	H	315.0	-11.4
340.642500	34.75	46.00	11.25	100.0	H	120.0	-9.0
372.288750	36.85	46.00	9.15	100.0	H	45.0	-8.2
479.473750	33.21	46.00	12.79	100.0	H	69.0	-5.3

******* END OF REPORT *******