




FCC PART 15C TEST REPORT

For

Snap-on Incorporated

2801 80th St, Kenosha, Wisconsin United States 53143

FCC ID: 2ACXBECFLPRA0

Report Type: Original Report	Product Name: Wireless Charge Base
Report Number:	RXM190708052-00
Report Date:	2019-08-30
Reviewed By:	Ivan Cao Assistant Manager 
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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

EUT Name:		Wireless Charge Base
EUT Model:		ECFLPRA0
Operation Frequency:		110-205kHz
Rated Input Voltage:		DC 5V from Adapter
Adapter Information	Model:	IVP0500-3500W
	Input:	100-240Vac
	Output:	DC 5V 3.5A
External Dimension:		168mm(L)*96.5 mm(W)*13.2 mm(H)
Serial Number:		190708052
EUT Received Date:		2019/7/12

Objective

This Type approval report is prepared on behalf of *Snap-on Incorporated* 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 the EUT with FCC rules, 15.203, 15.205, 15.207, 15.209.

Related Submittal(s)/Grant(s)

No related submittal(s)/grant(s).

Test Methodology

All measurements detailed in this Test Report were performed in accordance with ANSI C63.10-2013 "American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices".

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

Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
radiated Emissions	9kHz~30MHz: 4.12dB 30M~200MHz: 4.58 dB for Horizontal, 4.59 dB for Vertical 200M~1GHz: 4.83 dB for Horizontal, 5.85 dB for Vertical
Temperature	±1 °C
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
AC Power Lines Conducted Emission	3.12 dB (150 kHz to 30 MHz)

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218, the FCC Designation No. : CN1220.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0022.

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing in a test mode

The device is a wireless charger operation on frequency 110 kHz - 205 kHz.

EUT Exercise Software

No software used in test.

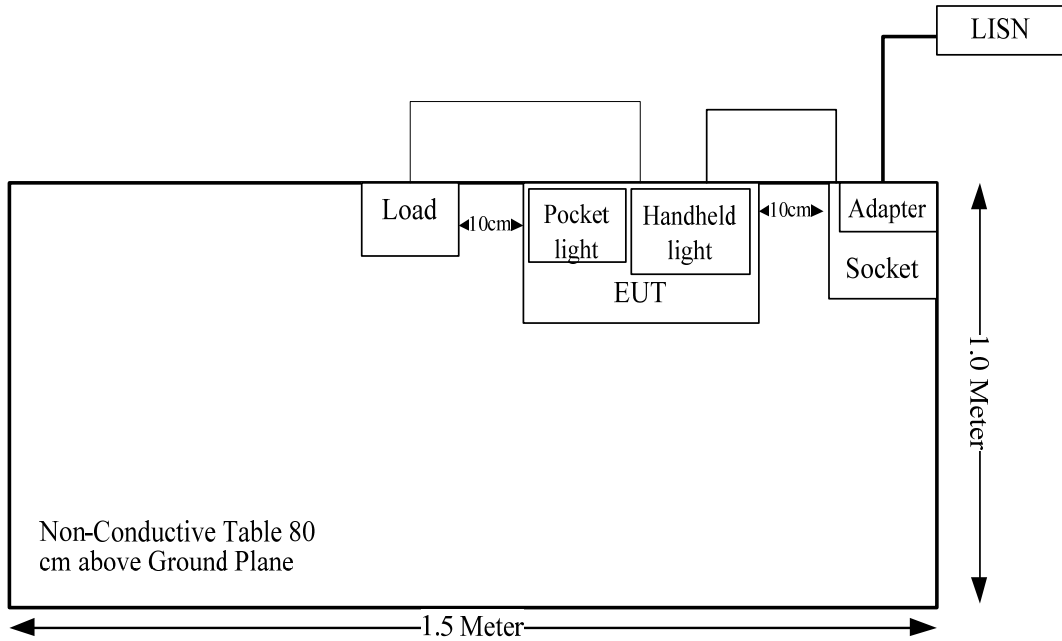
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Un-known	Ceramic resistor	Un-known	0087
Snap-on Incorporated	Pocket light	ECPRC050	190708052-3
Snap-on Incorporated	Handheld light	ECFLD030	190708052-4

Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From	To
Power Cable	No	No	1.25	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)	Compliance
FCC§15.203	Antenna Requirement	Compliance
FCC§15.207	AC Line Conducted Emission	Compliance
§15.209 §15.205	Radiated Emission Test	Compliance

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;

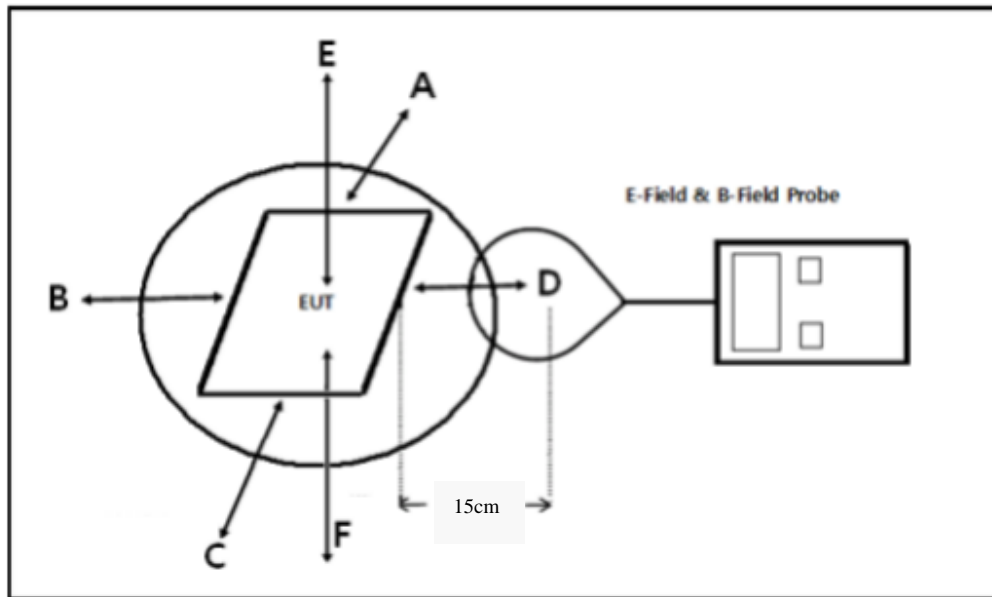
According with KDB 680106 D01 RF Exposure Wireless Charging Apps v03 clause 3 c)

- 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. A KDB inquiry is required to determine the applicable exposure limits below 100 kHz.

According to 680106 D01 RF Exposure Wireless Charging App v03 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 SDoC or a PAG 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 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.
 - (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 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.

Block Diagram of Test Setup



Note: 20 cm for Top test.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Narda	Exposure Level Tester	ELT-400	N-0229	2017-11-15	2019-11-15
Narda	B Field Probe	ELT Probe 100cm2	M-0666	2017-11-15	2019-11-15
Amplifier Research	Isotropic Field Probe	FP5000	301825	2018-11-22	2021-11-22

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

Test Data

Environmental Conditions

Temperature:	27.9 °C
Relative Humidity:	60 %
ATM Pressure:	100.5kPa
Test Engineer:	Miller Zhao
Test Date:	2019-08-26

Test mode: Transmitting

H-field Strength

Frequency Range (kHz)	Right Side (A) (A/m)	Back Side (B) (A/m)	Left Side (C) (A/m)	Front Side (D) (A/m)	Top Side (E) (A/m)	50% Limit (A/m)	Limit Test (A/m)
110-205	0.046	0.088	0.066	0.069	0.064	0.815	1.63

Note: Test with 15cm distance from the center of the probe(s) to the edge of the device, 20 cm for top test.

E-field Strength

Frequency Range (kHz)	Right Side (A) (V/m)	Back Side (B) (V/m)	Left Side (C) (V/m)	Front Side (D) (V/m)	Top Side (E) (V/m)	50% Limit (V/m)	Limit Test (V/m)
110-205	0.669	1.406	1.367	1.361	1.679	307	614

Note: Test with 15cm distance from the center of the probe(s) to the edge of the device, 20 cm for top test.

Result: Compliance

Considerations of compliance 680106 D01 RF Exposure Wireless Charging App v03 clause 5 b:

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

Yes, the operation frequency is 110-205 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 **10 Watts**, less than 15 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.

The transfer system includes only single primary coils to detect and allow coupling only between individual pairs of coils.

(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 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 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.

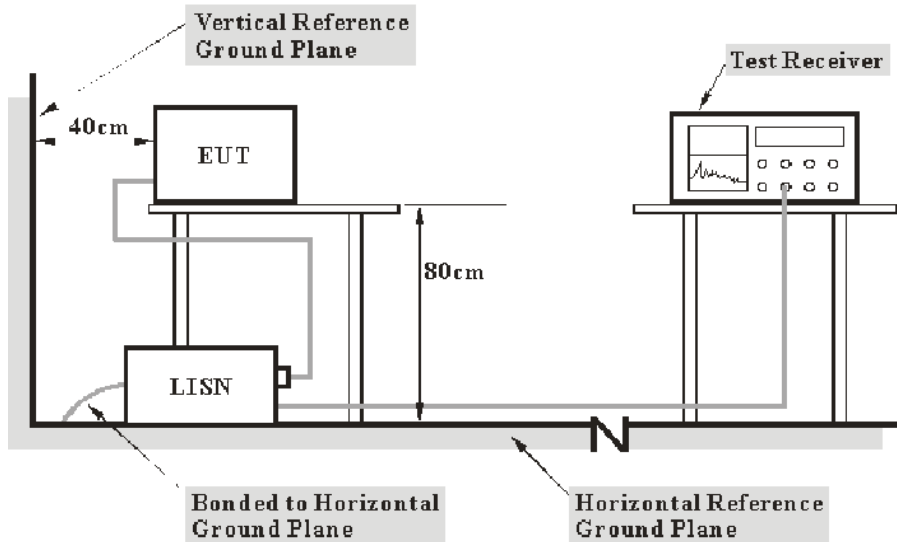
Antenna Connected Construction

The EUT has an integral antenna arrangement, which was permanently attached and fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliance.

FCC §15.207 – AC LINE CONDUCTED EMISSION

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.

The adapter was connected to the main LISN with an AC 120V/60Hz power source.

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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESPI	100120	2019-05-09	2020-05-09
R&S	Two-line V-network	ENV 216	101614	2018-12-10	2019-12-10
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-01	2018-09-05	2019-09-05

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

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

According FCC publication number 174176, for a device with a permanent antenna operating at or below 30 MHz, the measurements done with a suitable dummy load, in lieu of the permanent antenna under the following conditions: (1) perform the AC line conducted tests with the permanent antenna to determine compliance with the Section 15.207 limits outside the transmitter's fundamental emission band; (2) retest with a dummy load in lieu of the permanent antenna to determine compliance with the Section 15.207 limits within the transmitter's fundamental emission band.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$$V_C = V_R + A_C + VDF$$

Herein,

V_C : corrected voltage amplitude

V_R : reading voltage amplitude

A_C : attenuation caused by cable loss

VDF : voltage division factor of AMN or ISN

The "**Margin**" column of the following data tables indicates the degree of compliance within 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:

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

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207.

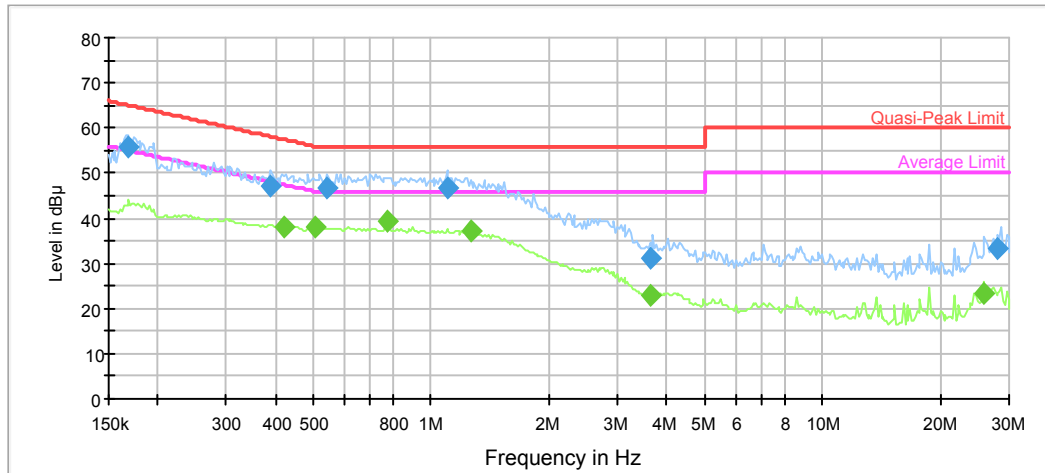
Test Data

Environmental Conditions

Temperature:	30 °C
Relative Humidity:	54 %
ATM Pressure:	100.5 kPa
Test Engineer:	Lily Xie
Test Date	2019-07-18

Test Mode: Charging

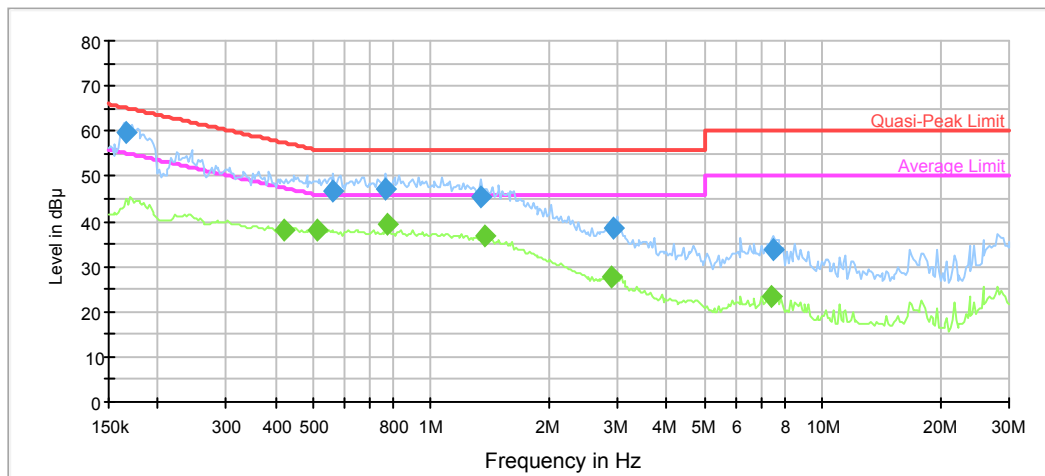
AC 120V, 60 Hz, Line:



Frequency (MHz)	Quasi Peak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.169024	55.7	9.000	L1	10.9	9.3	65.0	Compliance
0.389891	47.2	9.000	L1	10.0	10.9	58.1	Compliance
0.541438	46.9	9.000	L1	9.9	9.1	56.0	Compliance
1.097403	46.5	9.000	L1	9.8	9.5	56.0	Compliance
3.621856	31.2	9.000	L1	9.8	24.8	56.0	Compliance
28.127584	33.3	9.000	L1	9.8	26.7	60.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.422196	38.1	9.000	L1	9.9	9.3	47.4	Compliance
0.505009	38.2	9.000	L1	9.9	7.8	46.0	Compliance
0.774673	39.5	9.000	L1	9.8	6.5	46.0	Compliance
1.261437	37.1	9.000	L1	9.8	8.9	46.0	Compliance
3.621856	22.9	9.000	L1	9.8	23.1	46.0	Compliance
25.794247	23.2	9.000	L1	9.8	26.8	50.0	Compliance

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	Quasi Peak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.165693	59.5	9.000	N	10.9	5.7	65.2	Compliance
0.563423	46.7	9.000	N	9.8	9.3	56.0	Compliance
0.767003	47.1	9.000	N	9.8	8.9	56.0	Compliance
1.339041	45.4	9.000	N	9.8	10.6	56.0	Compliance
2.938548	38.3	9.000	N	9.8	17.7	56.0	Compliance
7.488247	33.9	9.000	N	9.8	26.1	60.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.422196	38.1	9.000	N	9.9	9.3	47.4	Compliance
0.510059	38.2	9.000	N	9.9	7.8	46.0	Compliance
0.774673	39.5	9.000	N	9.8	6.5	46.0	Compliance
1.365955	36.8	9.000	N	9.8	9.2	46.0	Compliance
2.884424	27.9	9.000	N	9.8	18.1	46.0	Compliance
7.414288	23.1	9.000	N	9.8	26.9	50.0	Compliance

FCC §15.205 & §15.209 - RADIATED EMISSIONS TEST

Applicable Standard

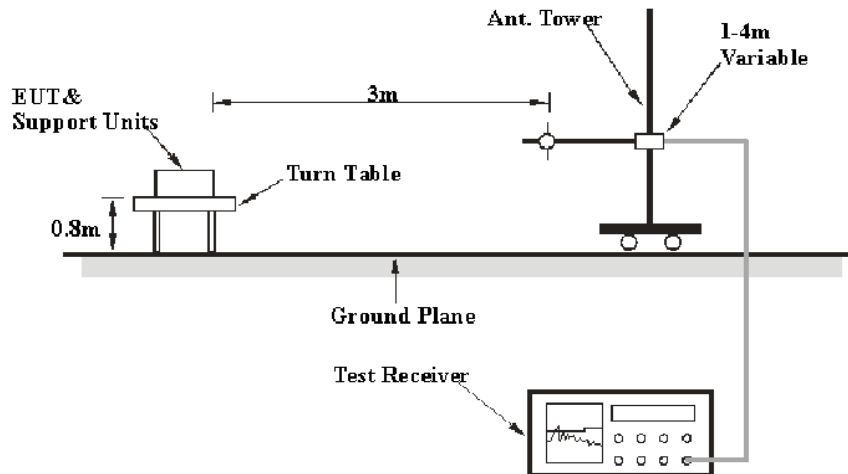
As per FCC Part 15.209

(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

The system was investigated from 9 kHz to 1 GHz.

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	200 Hz	1 kHz	QP/Average
150 kHz – 30 MHz	9 kHz	30 kHz	QP/Average
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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESR3	102453	2019-06-26	2020-06-26
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
EMCO	Passive Loop	6512	9706-1206	2017-03-05	2020-03-04
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1400-01	2019-05-06	2020-05-06
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
HP	Amplifier	8447D	2727A05902	2018-09-05	2019-09-05

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

Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.209&15.205.

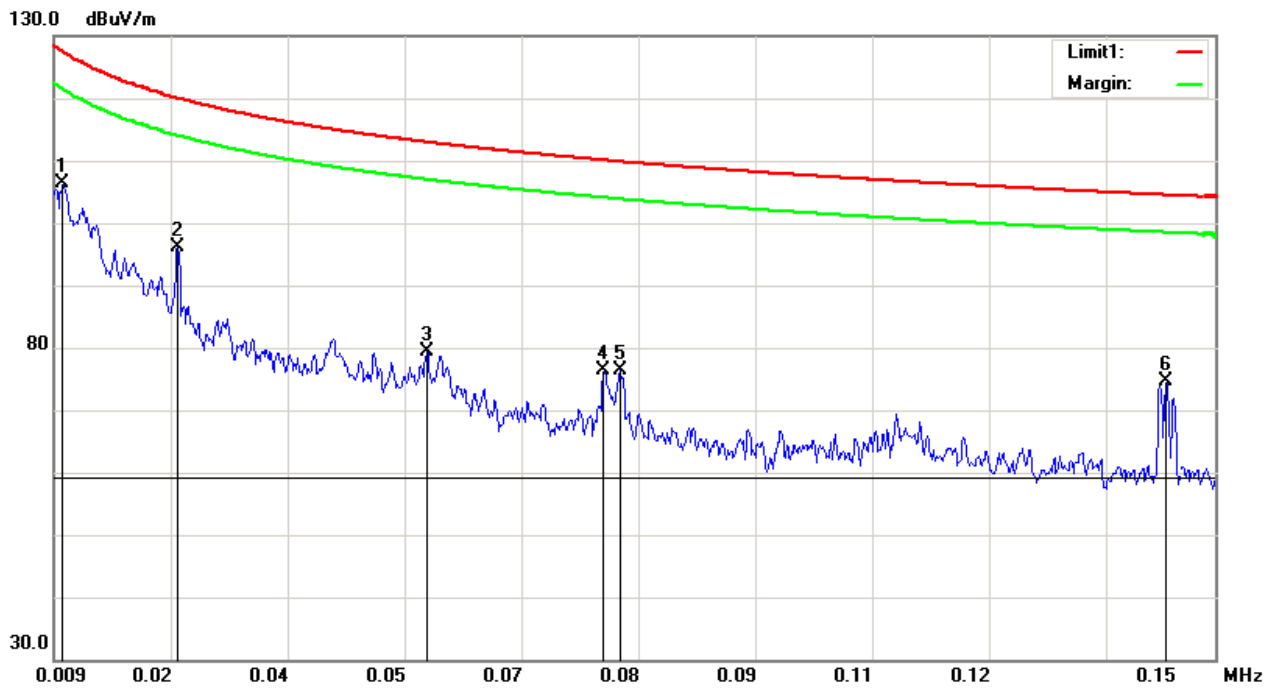
Test Data

Environmental Conditions

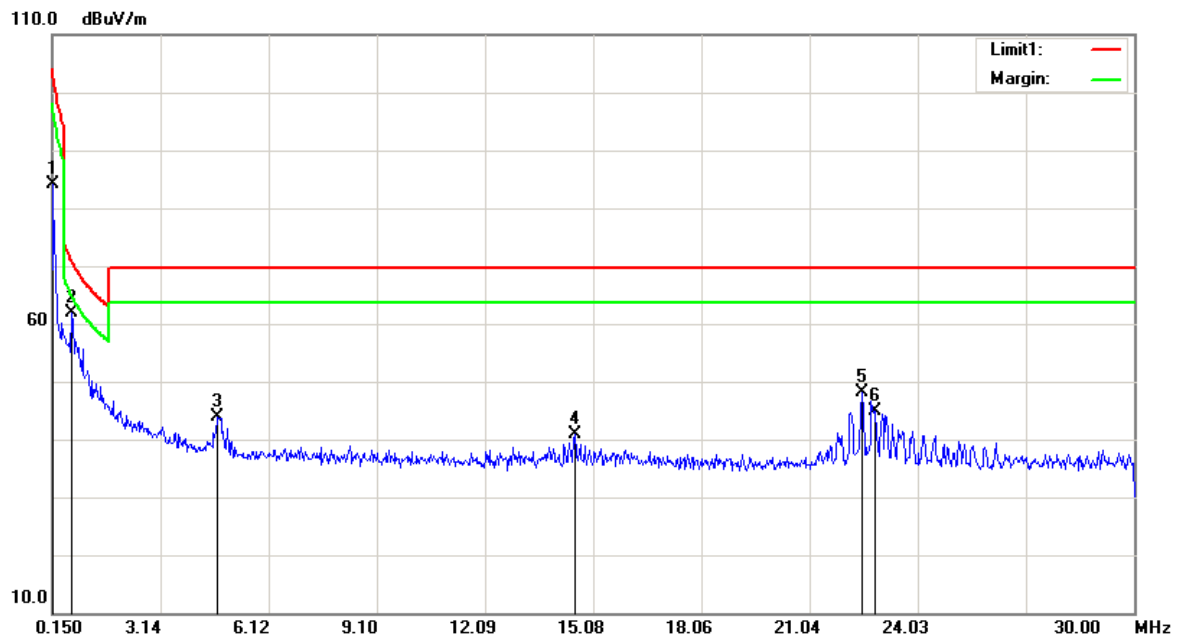
Temperature:	27.9°C
Relative Humidity:	60 %
ATM Pressure:	100.5 kPa
Test Engineer:	Miller Zhao
Test date:	2019-08-26

Test mode: Charging

1) 9 kHz~30MHz:



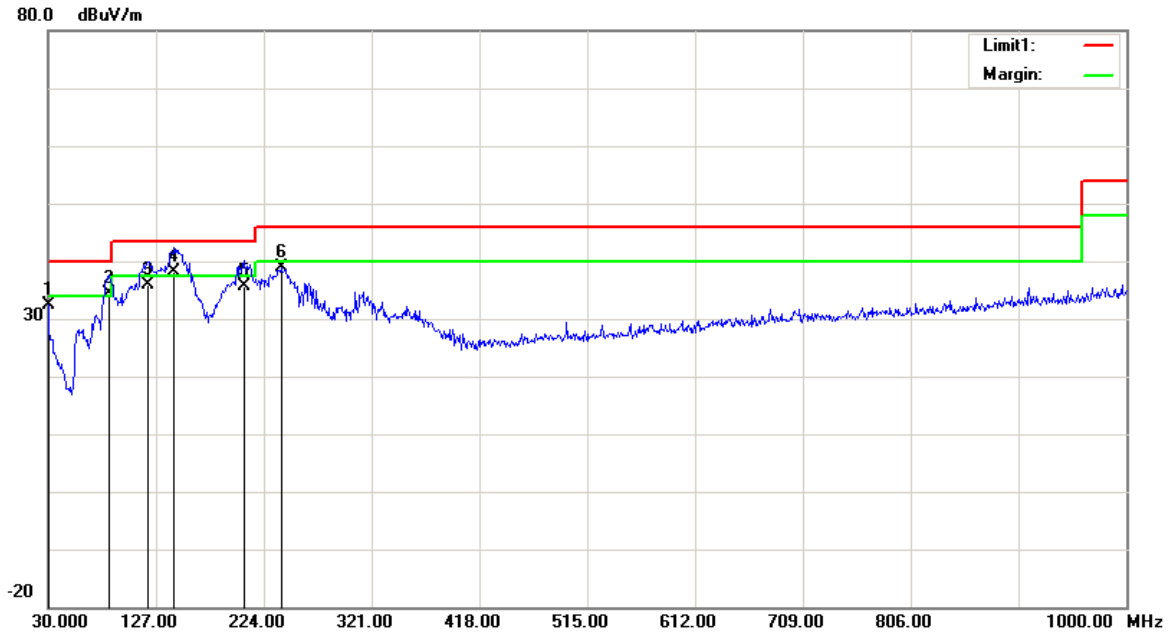
Frequency (MHz)	Receiver Reading (dB μ V)	Detector	Correction Factor (dB/m)	Cord. Amp. (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
0.0100	17.65	peak	88.67	106.32	127.60	21.28
0.0240	17.13	peak	79.02	96.15	120.00	23.85
0.0540	6.40	peak	72.91	79.31	112.96	33.65
0.0753	7.23	peak	69.21	76.44	110.07	33.63
0.0772	7.26	peak	69.00	76.26	109.85	33.59
0.1431	10.19	peak	64.35	74.54	104.49	29.95



Frequency (MHz)	Receiver Reading (dB μ V)	Detector	Correction Factor (dB/m)	Cord. Amp. (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
0.1500	20.17	peak	63.96	84.13	104.08	19.95
0.6873	10.63	peak	51.33	61.96	70.86	8.90
4.7171	6.25	peak	37.51	43.76	69.54	25.78
14.5676	5.04	peak	35.79	40.83	69.54	28.71
22.5076	12.66	peak	35.49	48.15	69.54	21.39
22.8658	9.40	peak	35.49	44.89	69.54	24.65

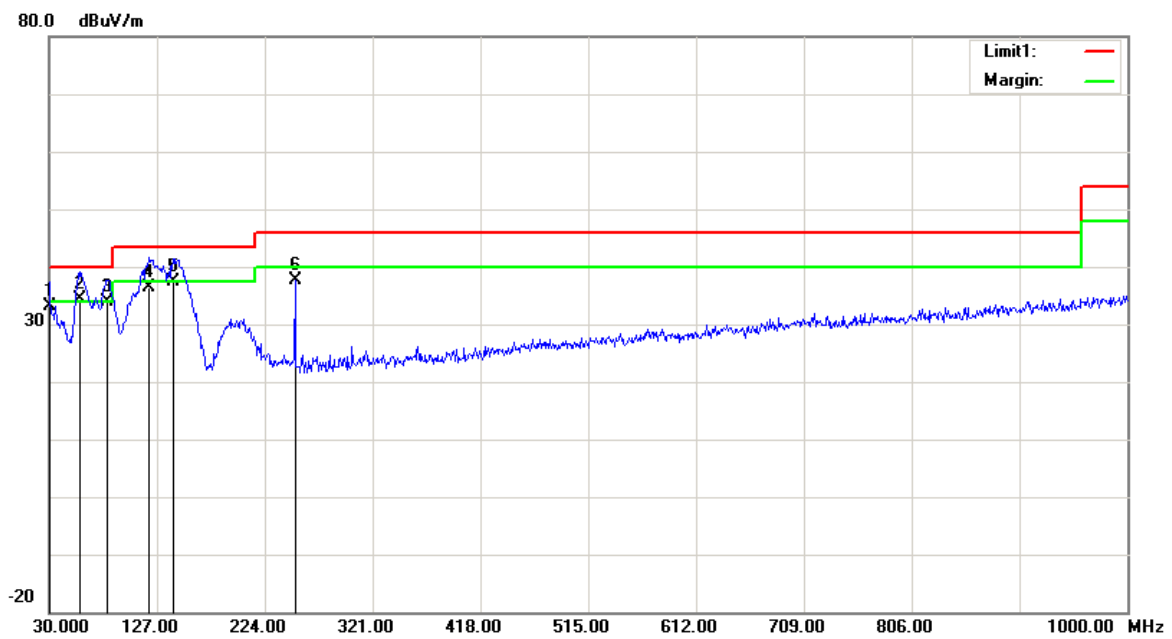
2) 30 MHz-1GHz

Horizontal



Frequency (MHz)	Receiver Reading (dBµV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
30.0000	30.59	peak	1.72	32.31	40.00	7.69
84.3200	45.70	QP	-11.38	34.32	40.00	5.68
119.2400	40.61	QP	-4.84	35.77	43.50	7.73
143.4900	44.10	QP	-5.95	38.15	43.50	5.35
206.5400	42.80	QP	-7.10	35.70	43.50	7.80
239.5200	44.97	peak	-6.02	38.95	46.00	7.05

Vertical



Frequency (MHz)	Receiver Reading (dBμV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
30.0000	31.34	QP	1.72	33.06	40.00	6.94
57.1600	46.50	QP	-12.21	34.29	40.00	5.71
82.3800	45.10	QP	-11.27	33.83	40.00	6.17
120.2100	41.30	QP	-4.83	36.47	43.50	7.03
141.5500	43.21	QP	-5.85	37.36	43.50	6.14
251.1600	43.57	peak	-6.02	37.55	46.00	8.45

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