



TESTING LABORATORY  
CERTIFICATE #4820.01



## FCC PART 15C

## TEST REPORT

For

**SHEN ZHEN EVOWERA TECHNOLOGY CO.,LTD**

ROOM 301C BUILDING 2C, SOFTWARE INDUSTRY BASE, NANSHAN, SHEN ZHEN,  
GUANGDONG 518000 China

**FCC ID: 2AV42-PLANCK01**

<b>Report Type:</b> Original Report	<b>Product Type:</b> planck O1 Adaptive Control Sonic Electric Toothbrush
<b>Report Number:</b>	<u>RDG200518031-00B</u>
<b>Report Date:</b>	<u>2020-06-15</u>
<b>Reviewed By:</b>	Ivan Cao Assistant Manager 
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## GENERAL INFORMATION

### Product Description for Equipment Under Test (EUT)

<b>EUT Name:</b>	planck O1 Adaptive Control Sonic Electric Toothbrush
<b>EUT Model:</b>	planck O1
<b>Operation Frequency:</b>	13.56 MHz
<b>Modulation Type:</b>	ASK
<b>Rated Input Voltage:</b>	DC 7.4V from battery or charged from wireless charger
<b>Serial Number:</b>	RDG200518031-RF-S1
<b>EUT Received Date:</b>	2020.05.22
<b>EUT Received Status:</b>	Good

### Objective

This type approval report is prepared on behalf of **SHEN ZHEN EVOWERA TECHNOLOGY CO.,LTD** 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, sec 15.203, 15.205, 15.207, 15.209 and 15.225.

### Related Submittal(s)/Grant(s)

15C DTS Submittal with FCC ID: 2AV42-PLANCKO1  
Part of system submittal with FCC ID: 2AV42-E2152

### 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	$\pm 5\%$
radiated Emissions	9kHz~30MHz: 4.12dB, 30M~200MHz: 4.55 dB, 200M~1GHz: 5.92 dB
Temperature	$\pm 1^\circ\text{C}$
Humidity	$\pm 5\%$
DC and low frequency voltages	$\pm 0.4\%$
Duty Cycle	1%
AC Power Lines Conducted Emission	3.12 dB (150 kHz to 30 MHz)

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

## 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.

## Declarations

BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol “ $\triangle$ ”. Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

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## **SYSTEM TEST CONFIGURATION**

### **Justification**

The system was configured for testing in a test mode.

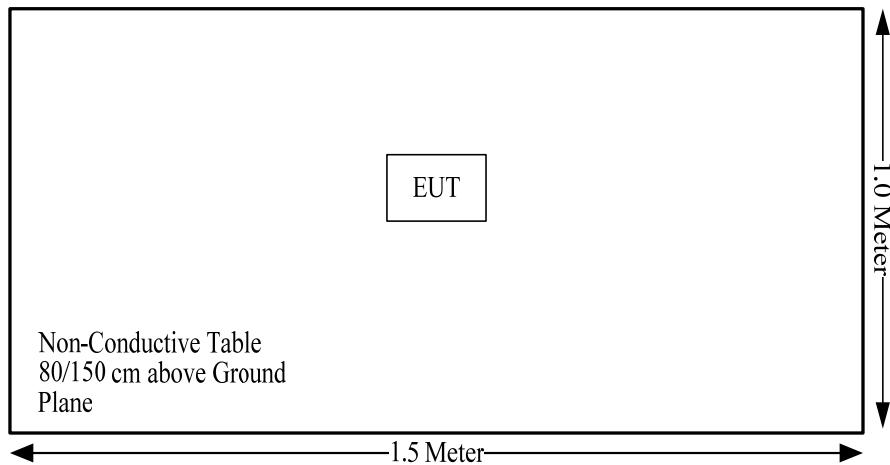
### **EUT Exercise Software**

No software used in test.

### **Equipment Modifications**

No modification was made to the EUT.

### **Block Diagram of Test Setup**



## SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC§15.203	Antenna Requirement	Compliance
FCC§15.207 (a)	AC Line Conducted Emissions	Not Applicable
§15.225 §15.209 §15.205	Radiated Emission Test	Compliance
§15.225(e)	Frequency Stability	Compliance
§15.215(c)	20 dB Bandwidth	Compliance

Not Applicable: the device was powered by battery when operating.

## **FCC §15.203- ANTENNA REQUIREMENT**

### **Applicable Standard**

According to FCC § 15.203, 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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

### **Antenna Connected Construction**

The EUT has one FPC antenna arrangement for NFC, fulfill the requirement of this section. Please refer to below information and the EUT photos:

**Result:** Compliance.

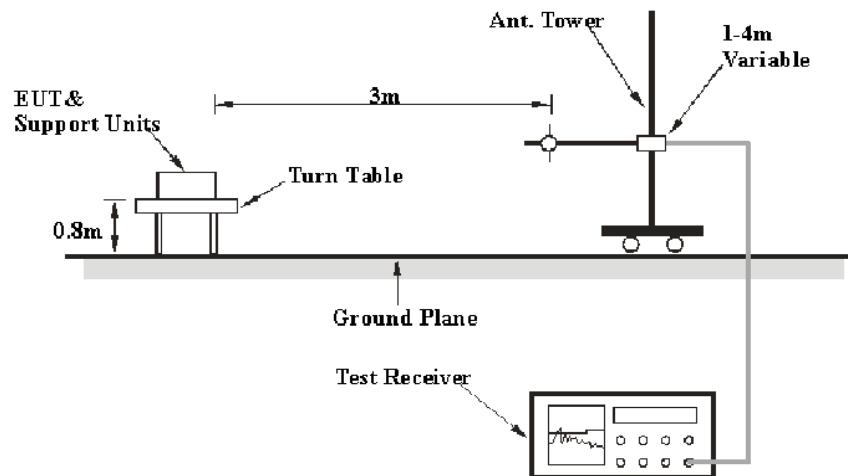
## FCC§15.225, §15.205 & §15.209- RADIATED EMISSIONS

### Applicable Standard

As per FCC Part 15.225

- (a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
- (b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
- (c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.
- (d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

### 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 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	Detector
9 kHz – 150 kHz	200 Hz	1 kHz	QP
150 kHz – 30 MHz	9 kHz	30 kHz	QP
30 MHz – 1000 MHz	120 kHz	300 kHz	QP

If the maximized peak measured value complies with the limit, then it is unnecessary to perform an QP 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	2019-09-12	2020-09-12
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
EMCO	Passive Loop	6512	9706-1206	2020-03-05	2023-03-04
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1400-01	2020-05-06	2021-05-06
HP	Amplifier	8447D	2727A05902	2019-09-05	2020-09-05

\* **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).

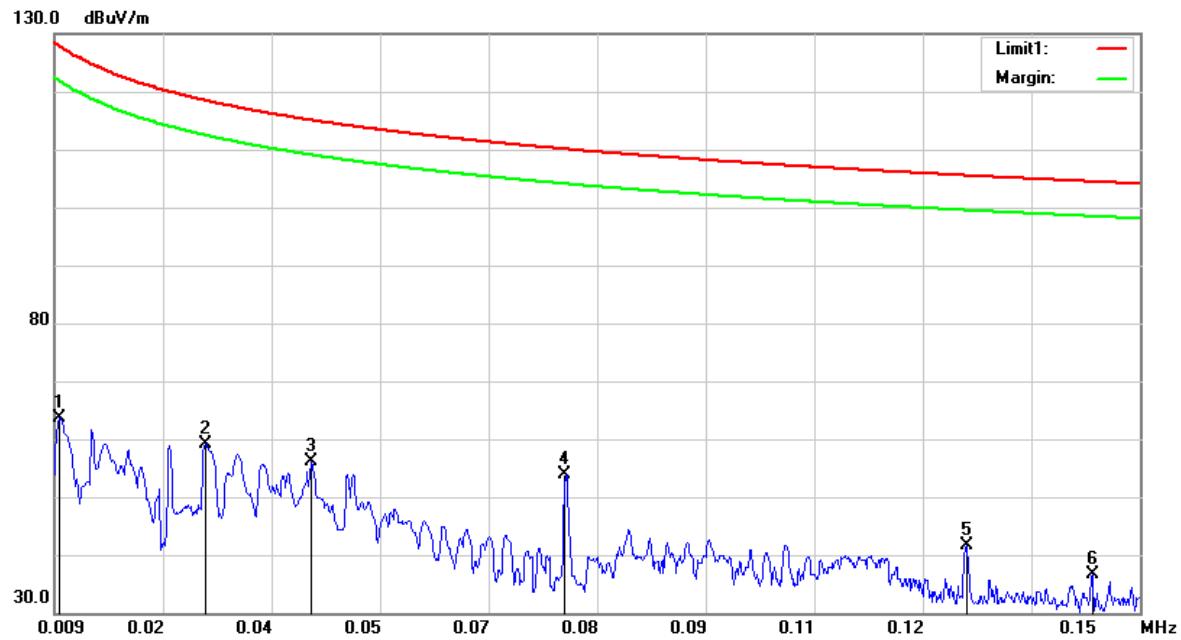
### Test Data

#### Environmental Conditions

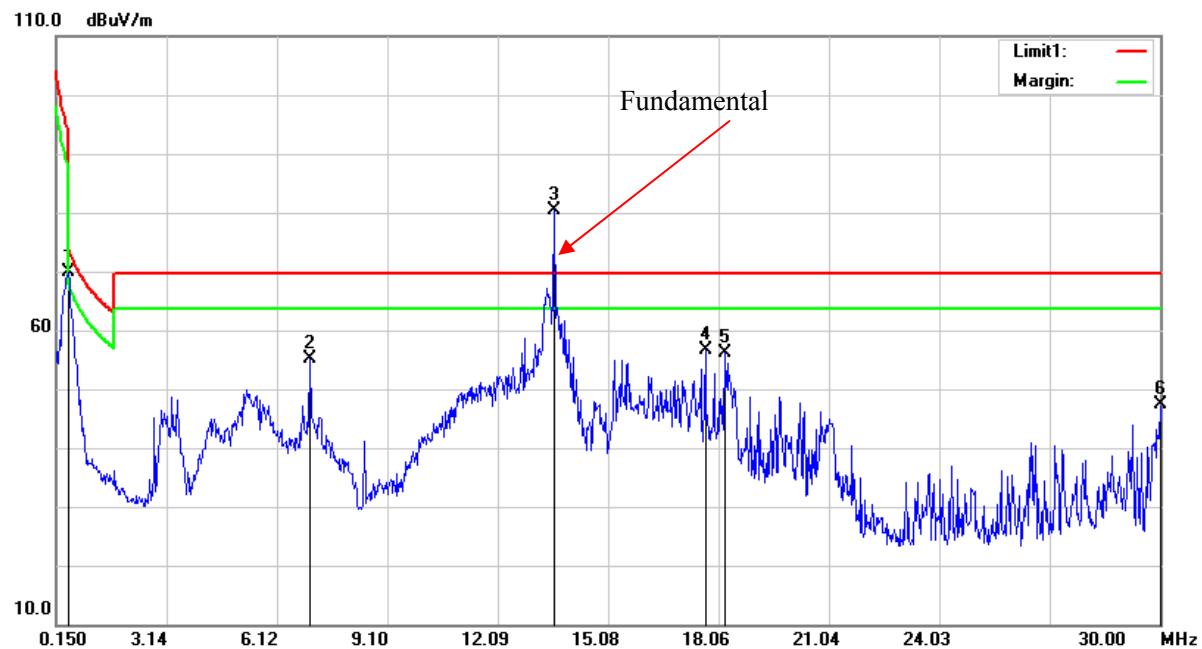
<b>Test Items</b>	Radiation Below 1GHz
<b>Temperature:</b>	25.6°C
<b>Relative Humidity:</b>	53%
<b>ATM Pressure:</b>	100.9 kPa
<b>Tester:</b>	James Chen
<b>Test Date:</b>	2020-06-04

*Test mode: Transmitting*

1) 9 kHz~30 MHz:

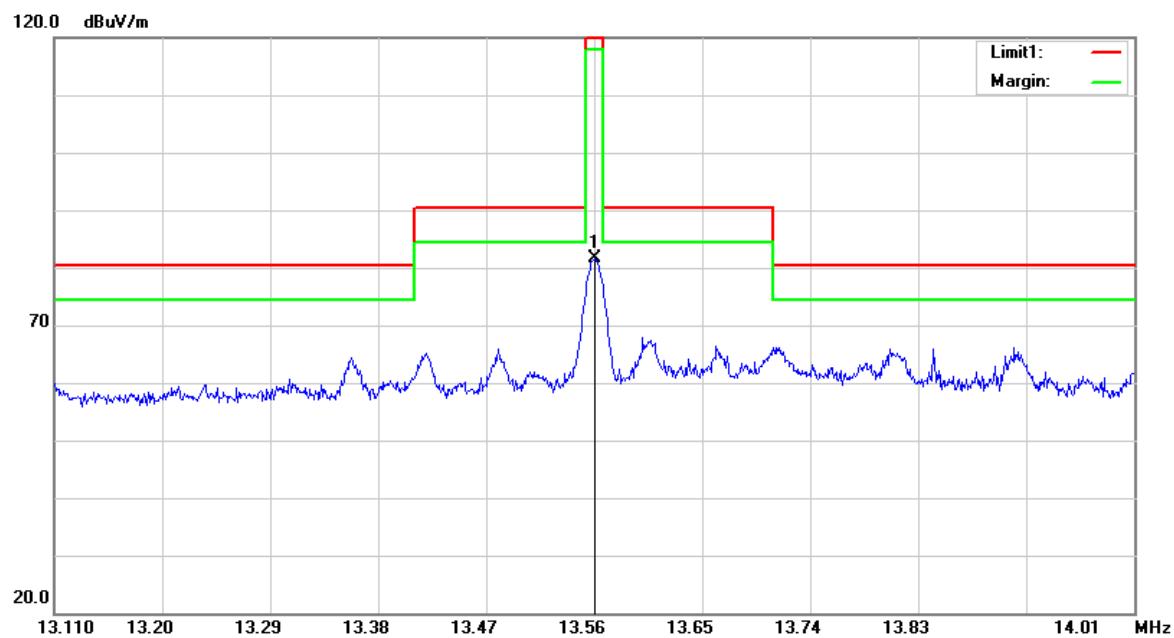


Frequency (MHz)	Receiver Reading (dB $\mu$ V)	Detector	Correction Factor (dB)	Cord. Amp. (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
0.0097	-24.94	peak	88.67	63.73	127.87	64.14
0.0286	-18.35	peak	77.46	59.11	118.48	59.37
0.0424	-18.63	peak	74.78	56.15	115.06	58.91
0.0752	-15.36	peak	69.22	53.86	110.08	56.22
0.1274	-23.65	peak	65.25	41.60	105.50	63.90
0.1438	-27.69	peak	64.31	36.62	104.45	67.83



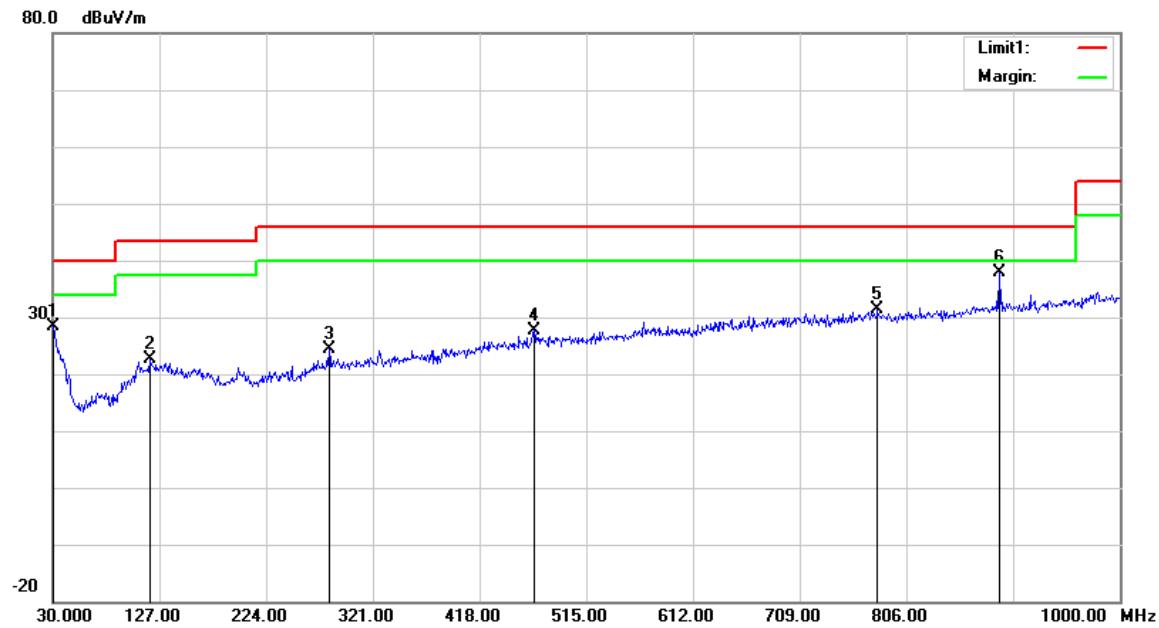
Frequency (MHz)	Receiver Reading (dB $\mu$ V)	Detector	Correction Factor (dB)	Cord. Amp. (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
0.4783	42.17	peak	27.79	69.96	94.01	24.05
7.0155	44.89	peak	10.25	55.14	69.54	14.40
17.7017	47.41	peak	9.19	56.60	69.54	12.94
18.2391	47.00	peak	9.17	56.17	69.54	13.37
30.0000	32.67	peak	14.82	47.49	69.54	22.05

Fundamental:

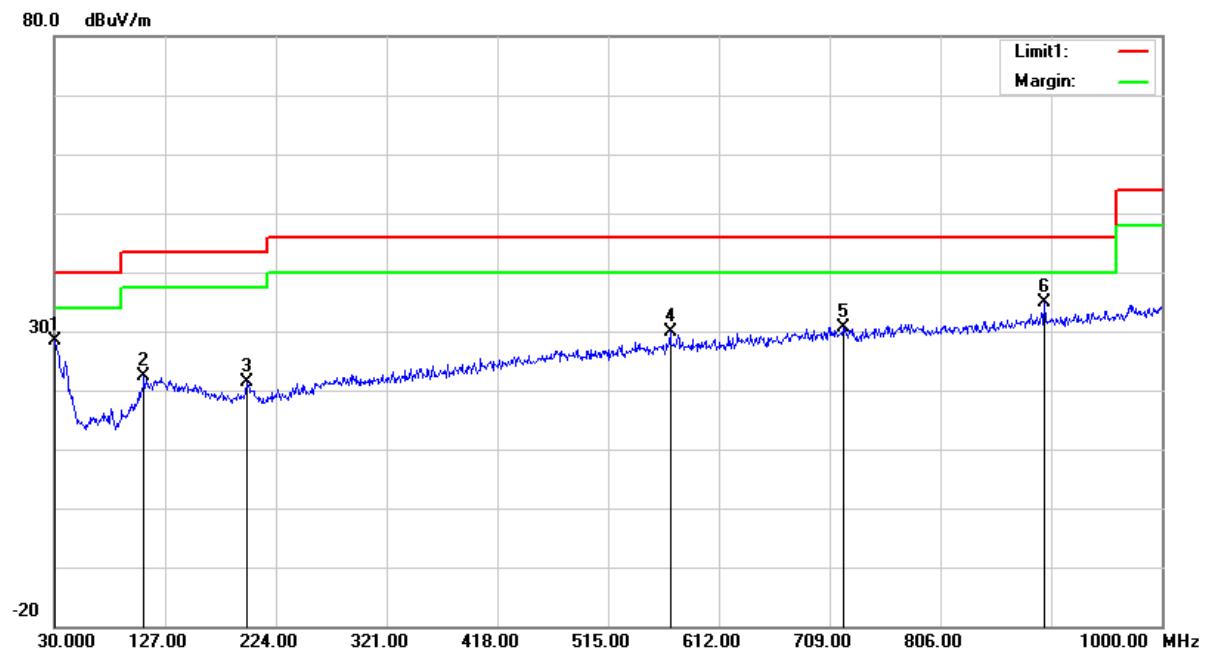


Frequency (MHz)	Receiver Reading (dB $\mu$ V)	Detector	Correction Factor (dB)	Cord. Amp. (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
13.5610	72.16	peak	9.36	81.52	124.00	42.48

30MHz-1GHz

**Horizontal**

Frequency (MHz)	Receiver Reading (dB $\mu$ V)	Detector	Correction Factor (dB)	Cord. Amp. (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
30.9700	27.46	peak	0.91	28.37	40.00	11.63
118.2700	27.41	peak	-4.82	22.59	43.50	20.91
281.2300	28.42	peak	-4.12	24.30	46.00	21.70
467.4700	28.22	peak	-0.47	27.75	46.00	18.25
779.8100	26.89	peak	4.37	31.26	46.00	14.74
890.3900	37.99	peak	-0.20	37.79	46.00	8.21

**Vertical**

Frequency (MHz)	Receiver Reading (dB $\mu$ V)	Detector	Correction Factor (dB)	Cord. Amp. (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
30.0000	26.74	peak	1.72	28.46	40.00	11.54
108.5700	28.95	peak	-6.69	22.26	43.50	21.24
198.7800	27.50	peak	-6.08	21.42	43.50	22.08
569.3200	28.82	peak	0.99	29.81	46.00	16.19
720.6400	27.43	peak	3.27	30.70	46.00	15.30
897.1800	34.83	peak	0.04	34.87	46.00	11.13

## FCC§15.225(e) - FREQUENCY STABILITY

### Applicable Standard

As per FCC Part 15.225:

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency over a temperature variation of  $-20$  degrees to  $+50$  degrees C at normal supply voltage, and for a variation in the primary supply voltage from  $85\%$  to  $115\%$  of the rated supply voltage at a temperature of  $20$  degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

### Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power.

The EUT was placed inside the temperature chamber.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the Spectrum Analyzer.

Frequency Stability vs. Voltage: An external variable DC power supply Source. The voltage was set to the end point of the battery. The output frequency was recorded for each voltage.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
EMCO	Passive Loop	6512	9706-1206	2020-03-05	2023-03-04
R&S	EMI Test Receiver	ESR3	102453	2019-09-12	2020-09-12
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2019-09-05	2020-09-05
HP	Amplifier	8447D	2727A05902	2019-09-05	2020-09-05
ESPEC	Constant temperature and humidity Tester	ESX-4CA	018 463	2020-03-26	2021-03-26
UNI-T	Multimeter	UT39A	M130199938	2019-07-23	2020-07-23
Pro instrument	DC Power Supply	pps3300	3300012	N/A	N/A

**\* 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**

<b>Temperature:</b>	25.6°C
<b>Relative Humidity:</b>	53%
<b>ATM Pressure:</b>	100.9 kPa
<b>Tester:</b>	James Chen
<b>Test Date:</b>	2020-06-04

*Test Mode: Transmitting*

Test Result: Pass

$f_0 = 13.56 \text{ MHz}$				
<b>Temperature</b>	<b>Voltage</b>	<b>Measured frequency</b>	<b>Frequency Error</b>	<b>Limit</b>
°C	V <sub>DC</sub>	MHz	Hz	Hz
-20	7.4	13.560478	478	±1356
-10		13.560451	451	±1356
0		13.560395	395	±1356
10		13.561970	970	±1356
20		13.560431	431	±1356
25		13.560444	444	±1356
30		13.560300	300	±1356
40		13.560526	526	±1356
50		13.560790	790	±1356
60		13.560592	592	±1356
25	6.0	13.560691	691	±1356
25	8.4	13.560586	586	±1356

## FCC §15.215(c)– 20 dB BANDWIDTH

### Applicable Standard

Per FCC §15.215 (c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §15.217 through § 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

### Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on the test table without connection to measurement instrument. Turn on the EUT. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
EMCO	Passive Loop	6512	9706-1206	2020-03-05	2023-03-04
R&S	EMI Test Receiver	ESR3	102453	2019-09-12	2020-09-12
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2019-09-05	2020-09-05
HP	Amplifier	8447D	2727A05902	2019-09-05	2020-09-05

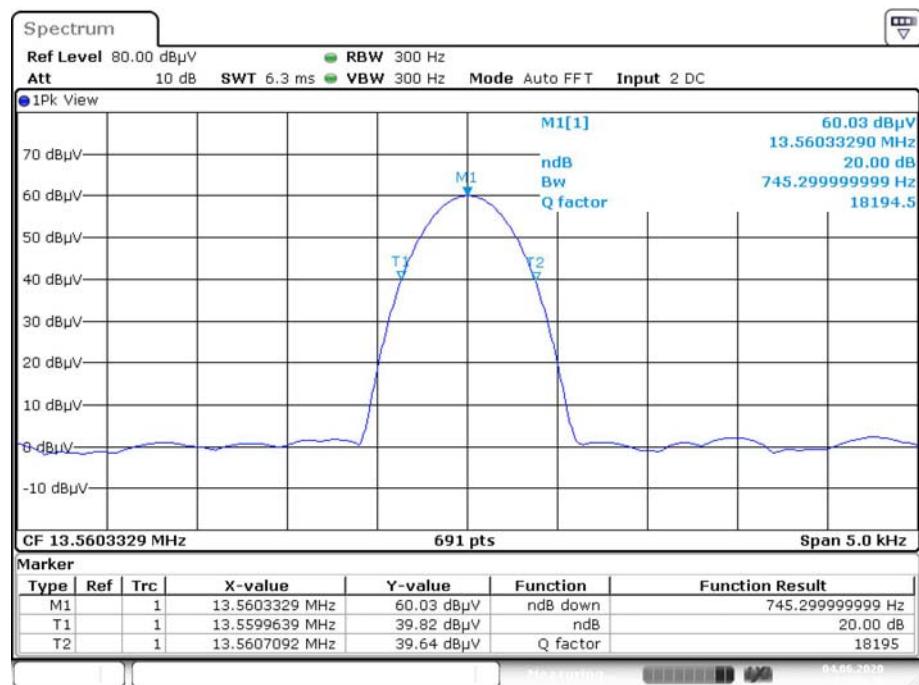
**\* Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

**Test Data****Environmental Conditions**

<b>Temperature:</b>	25.6°C
<b>Relative Humidity:</b>	53%
<b>ATM Pressure:</b>	100.9 kPa
<b>Tester:</b>	James Chen
<b>Test Date:</b>	2020-06-04

*Test Mode: Transmitting*

Frequency (MHz)	20 dB Bandwidth (kHz)
13.56	0.745

**20 dB Bandwidth****\*\*\*\*\* END OF REPORT \*\*\*\*\***