

FCC PART 15.249

TEST REPORT

For

TianJin HuaLai Technology Co.,Ltd.

No.10 JinPing Road,Ya An Street,Nankai District,Tianjin,China

FCC ID: 2ANJHWDBC1

Report Type: Original Report	Product Type: Wyze Chime
Report Number: RBJ200510050-00	
Report Date: 2020-07-10	
Reviewed By:	Ivan Cao Assistant Manager 
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Type:	Wyze Chime
EUT Model:	WDBC1
Operation Frequency:	906.6-907MHz
Modulation Type:	GFSK
Rated Input Voltage:	AC 120V
Serial Number:	RBJ200510050-RF-S2
EUT Received Date:	2020/5/14
EUT Received Status:	Good

Objective

This type approval report is prepared on behalf of ***TianJin HuaLai Technology Co.,Ltd.*** in accordance with Part 2-Subpart J, and Part 15-Subparts A and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Rules Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.249 rules.

Related Submittal(s)/Grant(s)

Part of system submittal with FCC ID: 2ANJH-WHSB1;
Part of system submittal with FCC ID: 2ANJHWYZEC2;
Part of system submittal with FCC ID: 2ANJHWYZECP1.

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 and Bay Area Compliance Laboratories Corp. (Dongguan).

Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
Unwanted Emissions, radiated	30M~200MHz: 4.58 dB for Horizontal, 4.59 dB for Vertical 200M~1GHz: 4.83 dB for Horizontal, 5.85 dB for Vertical 1G~6GHz: 4.45 dB, 6G~26.5GHz: 5.23 dB
Temperature	±1℃
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)

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 “△”. 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 EUT was configured in operating mode for testing which was provided by the manufacturer.

The device employs total 3 channels as below for test:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	906.6	3	907
2	906.8	/	/

EUT Exercise Software

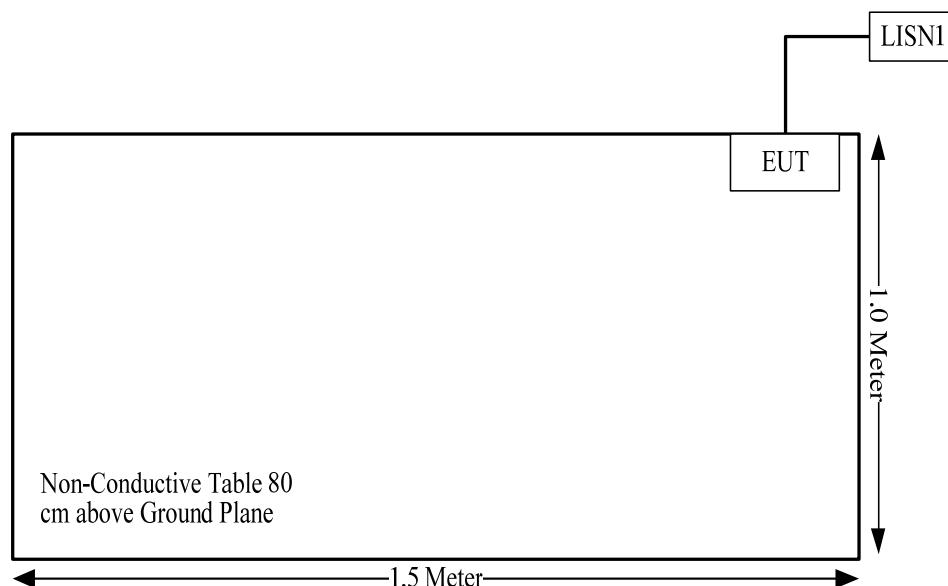
The software: 'Engineering mode ' was used during test, which was provided by manufacturer. The maximum power level was configured by the software as below table:

Channel	Frequency (MHz)	Power level Setting
Low	906.6	default
Middle	906.7	default
High	906.8	default

Equipment Modifications

No modifications were made to the EUT.

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207(a)	Conduction Emissions	Compliance
15.205, §15.209, §15.249	Radiated Emissions	Compliance
§15.215 (c)	20 dB Bandwidth	Compliance

FCC§15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to § 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 user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.
- c. Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

Antenna Connector Construction

The EUT has internal Antenna permanently attached to the unit, fulfill the requirement of this section. Please refer to the EUT photos.

Antenna Type	input impedance (Ohm)	Antenna Gain
FPC	50	1.5 dBi

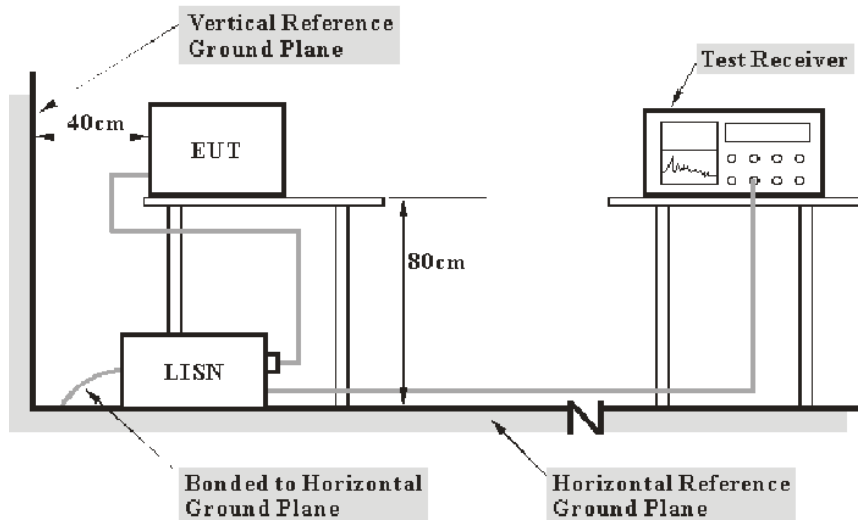
Result: Compliant.

FCC §15.207 (a)– AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207(a)

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.

The spacing between the peripherals was 10 cm.

The EUT was connected to the main LISN with a 120 V/60 Hz AC 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 Procedure

During the conducted emission test, the EUT was connected to the first 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.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$$V_C = V_R + A_C + VDF$$

$$C_f = A_C + VDF$$

Herein,

V_C (cord. Reading): corrected voltage amplitude

V_R : reading voltage amplitude

A_C : attenuation caused by cable loss

VDF: voltage division factor of AMN

C_f : Correction Factor

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:

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

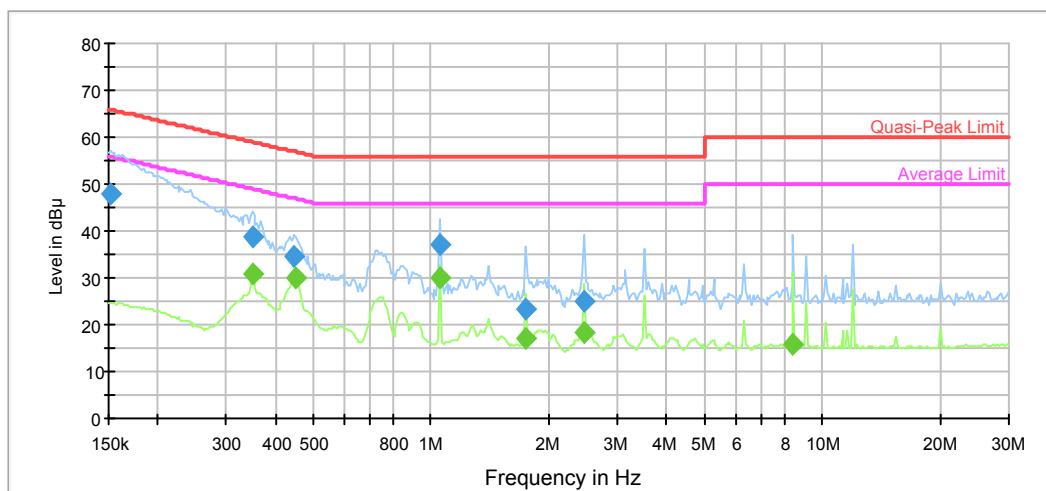
Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-01	2019-09-05	2020-09-05
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A
R&S	Two-line V-network	ENV 216	101614	2019-12-10	2020-12-10
R&S	EMI Test Receiver	ESPI	100120	2020-05-09	2021-05-09

* **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).

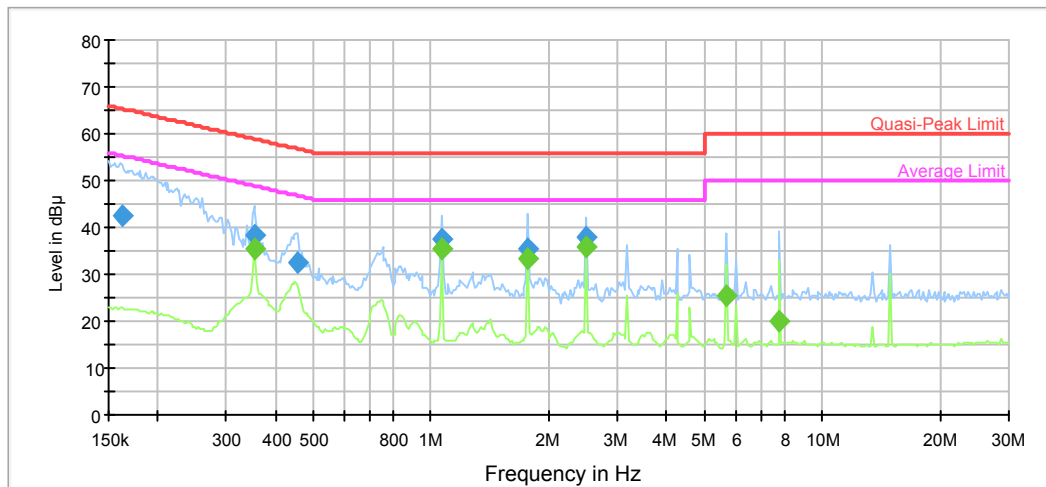
Test Data**Environmental Conditions**

Temperature:	26.2°C
Relative Humidity:	64%
ATM Pressure:	100.3kPa
Tester:	Barry
Test Date:	2020-05-27

Test Mode: *Transmitting***AC120V, 60 Hz, Line:**

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.151500	48.1	9.000	L1	9.7	17.8	65.9
0.349469	38.8	9.000	L1	9.7	20.2	59.0
0.448170	34.6	9.000	L1	9.7	22.3	56.9
1.054583	37.2	9.000	L1	9.7	18.8	56.0
1.751745	23.2	9.000	L1	9.8	32.8	56.0
2.456957	25.0	9.000	L1	9.8	31.0	56.0

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.349469	31.0	9.000	L1	9.7	17.9	49.0
0.452652	30.0	9.000	L1	9.7	16.8	46.8
1.054583	30.2	9.000	L1	9.7	15.8	46.0
1.751745	17.3	9.000	L1	9.8	28.7	46.0
2.456957	18.2	9.000	L1	9.8	27.8	46.0
8.438163	15.9	9.000	L1	9.9	34.1	50.0

AC120V, 60 Hz, Neutral:

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.162429	42.4	9.000	N	9.7	22.9	65.3
0.352963	38.3	9.000	N	9.6	20.6	58.9
0.457178	32.4	9.000	N	9.6	24.3	56.7
1.065129	37.6	9.000	N	9.6	18.4	56.0
1.769262	35.4	9.000	N	9.6	20.6	56.0
2.481527	38.1	9.000	N	9.6	17.9	56.0

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.352963	35.4	9.000	N	9.6	13.5	48.9
1.065129	35.3	9.000	N	9.6	10.7	46.0
1.769262	33.1	9.000	N	9.6	12.9	46.0
2.481527	35.9	9.000	N	9.6	10.1	46.0
5.667519	25.6	9.000	N	9.7	24.4	50.0
7.792502	19.9	9.000	N	9.7	30.1	50.0

FCC§15.205, §15.209&§15.249- RADIATED EMISSIONS**Applicable Standard**

As per FCC§15.249 (a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

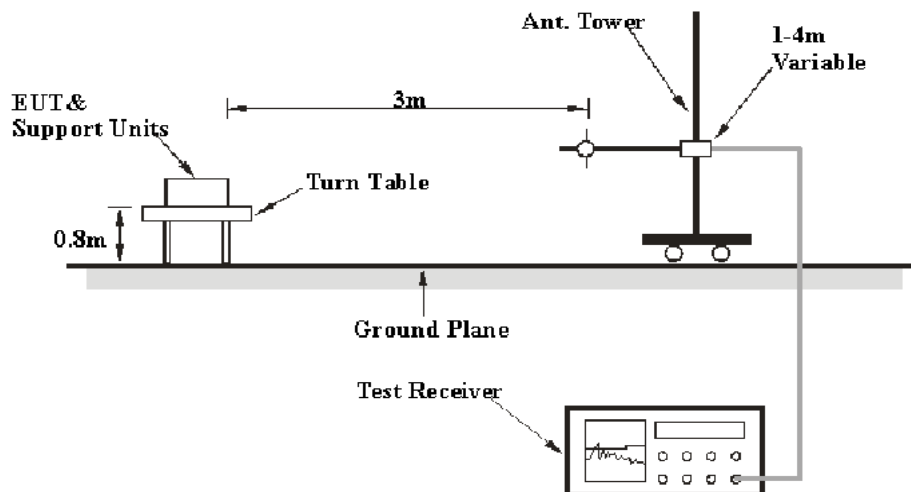
Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

As per FCC§15.249 (c), Field strength limits are specified at a distance of 3 meters.

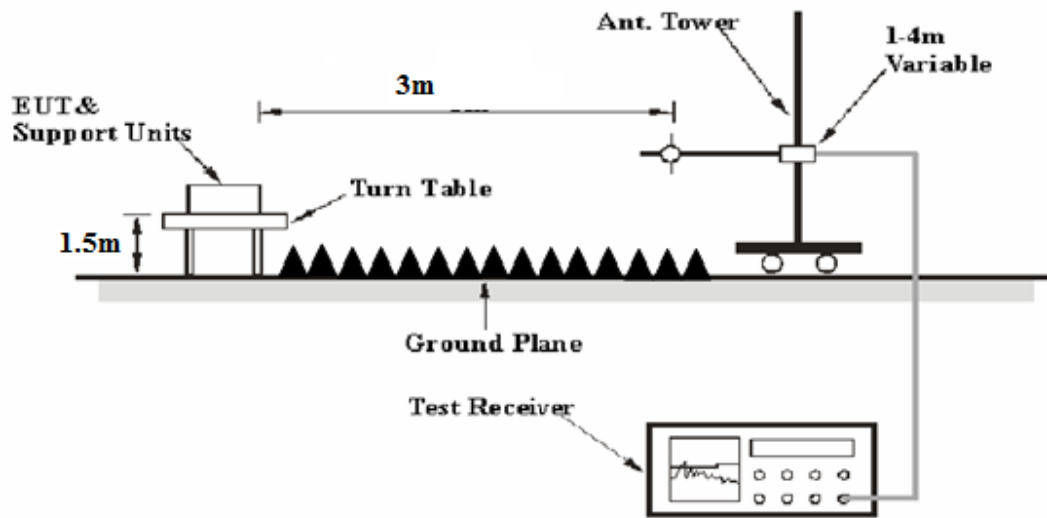
(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

EUT Setup

Below 1 GHz:



Above 1 GHz:



The radiated emission below 1GHz tests were performed in the 3 meters chamber test site A, above 1GHz tests were performed in the 3 meters chamber test site B, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.249 limits.

Test Equipment Setup

The system was investigated from 30 MHz to 10 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	AV

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the Quasi-peak detection mode from 30 MHz to 1GHz, peak and average detection mode above 1 GHz.

Corrected Amplitude & Margin Calculation

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

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

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:

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

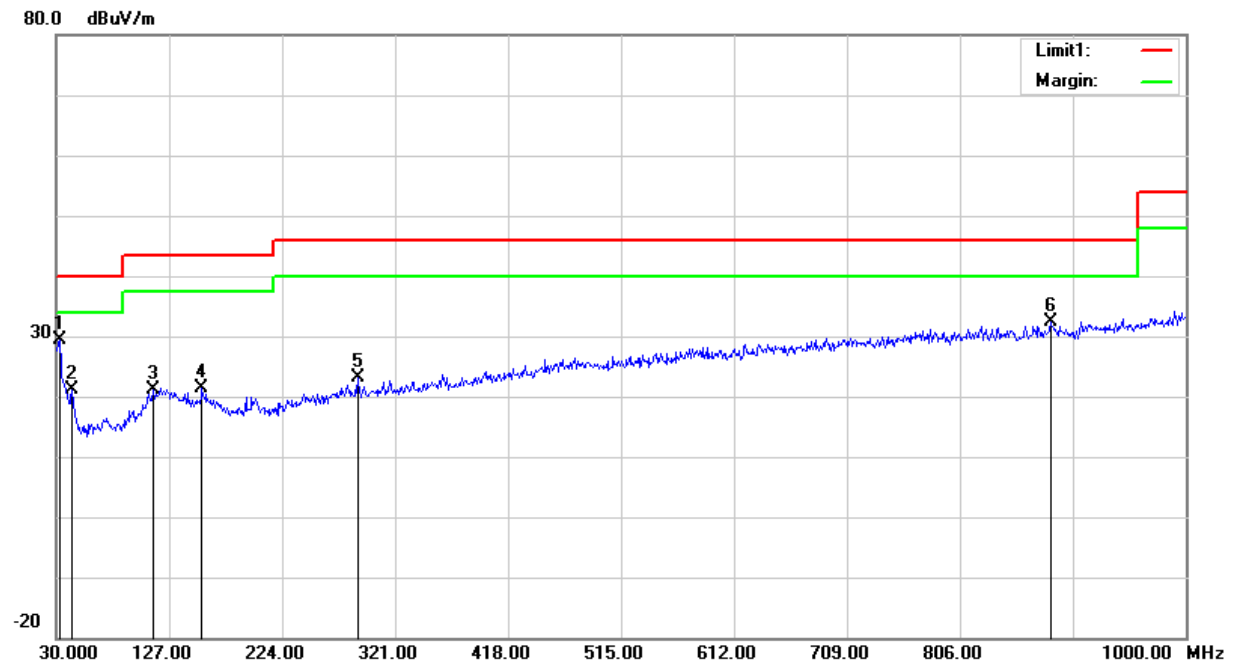
Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2019-12-10	2020-12-10
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
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
Agilent	Spectrum Analyzer	E4440A	SG43360054	2020-01-04	2021-01-04
ETS-Lindgren	Horn Antenna	3115	000 527 35	2018-10-12	2021-10-12
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2019-09-05	2020-09-05
E-Microwave	Band Rejector Filters	OBSF-900-928-S	OE01601744	2019-06-16	2020-06-16
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	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).

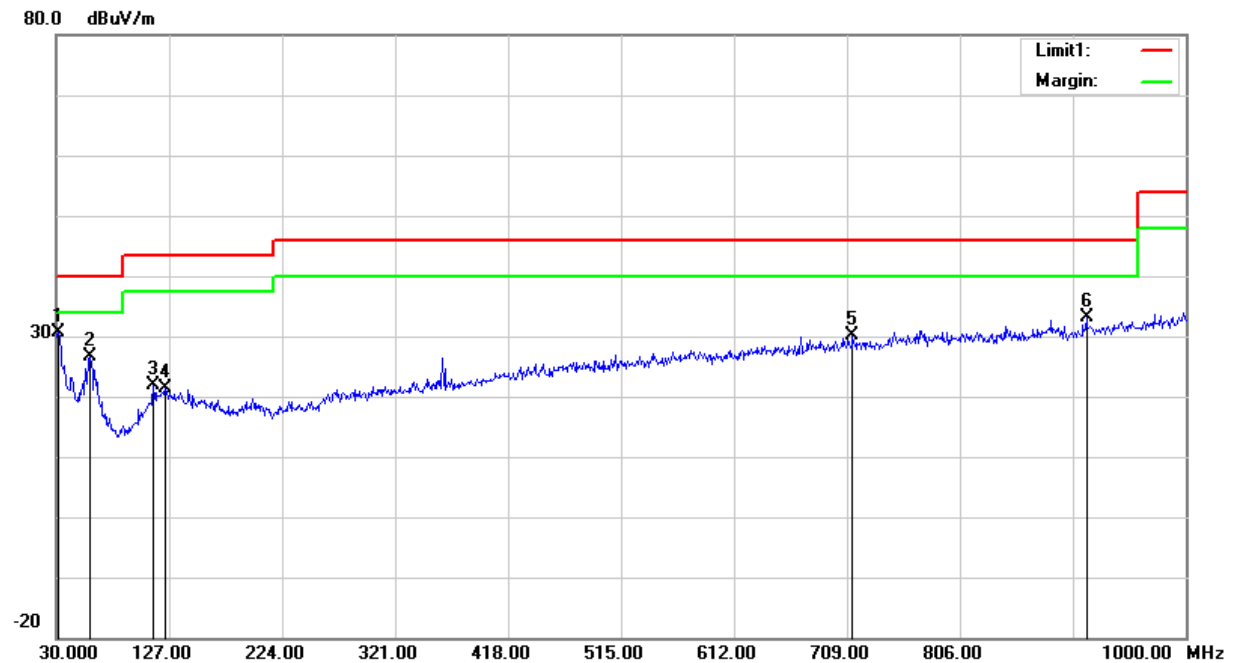
Test Data**Environmental Conditions**

Test Items	Radiation Below 1GHz	Radiation Above 1GHz
Temperature:	22.5 °C	22.5 °C
Relative Humidity:	58%	58%
ATM Pressure:	99.7 kPa	99.7 kPa
Tester:	Leo Long	Jalon Liu
Test Date:	2020-05-20	2020-05-20

*Test Mode: Transmitting***1) 30MHz-1GHz****906.8MHz:****Horizontal:**

Frequency (MHz)	Receiver Reading (dBuV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
32.9100	29.97	peak	-0.56	29.41	40.00	10.59
43.5800	29.42	peak	-8.38	21.04	40.00	18.96
113.4200	26.74	peak	-5.55	21.19	43.50	22.31
155.1300	27.28	peak	-5.87	21.41	43.50	22.09
288.9900	27.00	peak	-3.98	23.02	46.00	22.98
883.6000	32.66	peak	-0.30	32.36	46.00	13.64

Note: test with Band Rejector Filter.

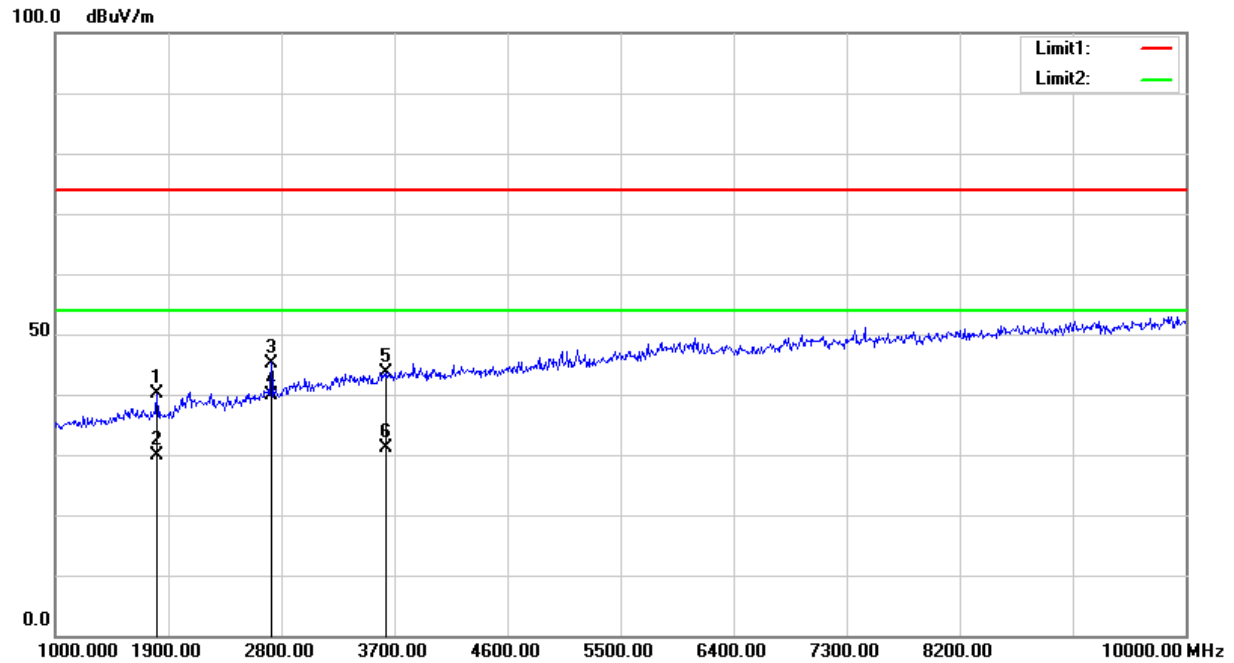
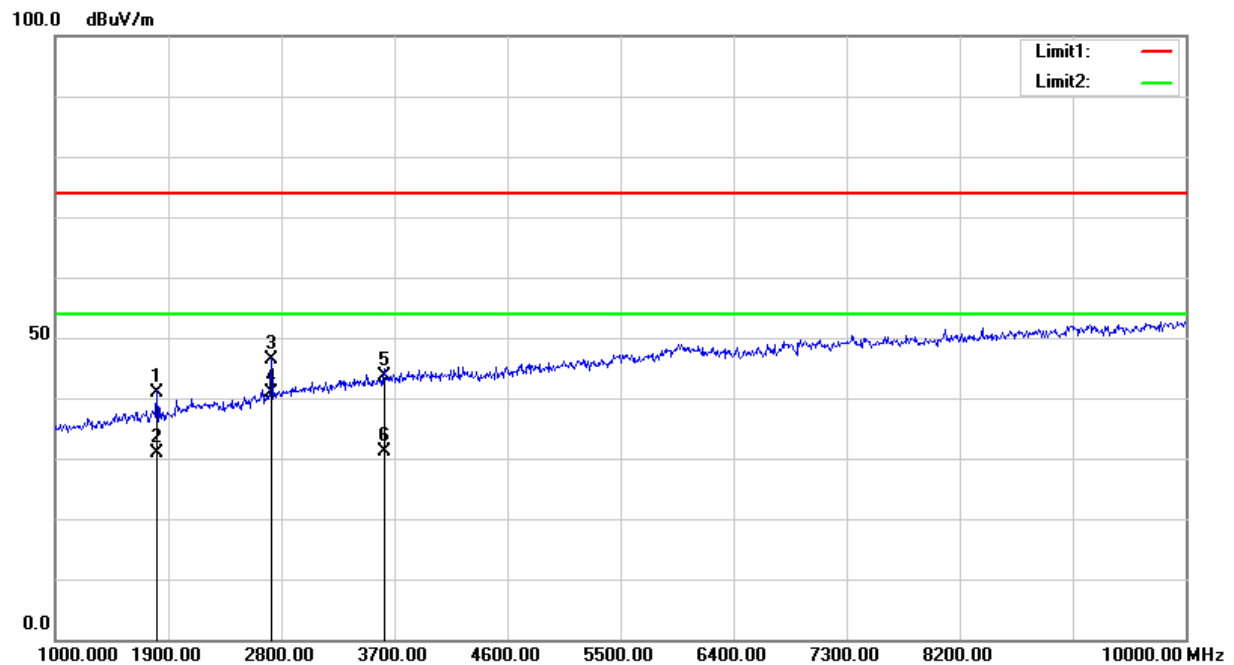
Vertical:

Frequency (MHz)	Receiver Reading (dBuV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
31.9400	30.39	peak	0.19	30.58	40.00	9.42
59.1000	38.76	peak	-12.18	26.58	40.00	13.42
113.4200	27.49	peak	-5.55	21.94	43.50	21.56
123.1200	25.97	peak	-4.57	21.40	43.50	22.10
713.8500	26.84	peak	3.22	30.06	46.00	15.94
914.6400	32.93	peak	0.19	33.12	46.00	12.88

Note: test with Band Rejector Filter.

2) Fundamental, Bandedge and 1GHz-10GHz:

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector	Polar (H/V)	Factor (dB/m)					
Low Channel: 906.60 MHz									
906.60	43.59	QP	H	22.40	4.25	0.00	70.24	93.98	23.74
906.60	48.60	QP	V	22.40	4.25	0.00	75.25	93.98	18.73
902.00	10.52	QP	V	22.34	4.29	0.00	37.15	46.00	8.85
1813.20	38.46	PK	V	26.52	1.66	25.84	40.80	74.00	33.20
1813.20	28.53	AV	V	26.52	1.66	25.84	30.87	54.00	23.13
2719.80	40.05	PK	V	29.09	1.89	26.11	44.92	74.00	29.08
2719.80	36.04	AV	V	29.09	1.89	26.11	40.91	54.00	13.09
3626.40	36.35	PK	V	31.58	2.44	25.94	44.43	74.00	29.57
3626.40	23.17	AV	V	31.58	2.44	25.94	31.25	54.00	22.75
Middle Channel: 906.80 MHz									
906.80	43.64	QP	H	22.40	4.25	0.00	70.29	93.98	23.69
906.80	48.72	QP	V	22.40	4.25	0.00	75.37	93.98	18.61
1813.60	38.62	PK	V	26.52	1.66	25.84	40.96	74.00	33.04
1813.60	28.63	AV	V	26.52	1.66	25.84	30.97	54.00	23.03
2720.40	41.50	PK	V	29.09	1.89	26.11	46.37	74.00	27.63
2720.40	36.31	AV	V	29.09	1.89	26.11	41.18	54.00	12.82
3627.20	35.63	PK	V	31.58	2.44	25.94	43.71	74.00	30.29
3627.20	23.12	AV	V	31.58	2.44	25.94	31.20	54.00	22.80
High Channel: 907.00 MHz									
907.00	43.18	QP	H	22.40	4.25	0.00	69.83	93.98	24.15
907.00	48.23	QP	V	22.40	4.25	0.00	74.88	93.98	19.10
928.00	10.33	QP	V	22.56	4.34	0.00	37.23	46.00	8.77
1814.00	38.02	PK	V	26.52	1.66	25.84	40.36	74.00	33.64
1814.00	26.10	AV	V	26.52	1.66	25.84	28.44	54.00	25.56
2721.00	41.42	PK	V	29.10	1.89	26.11	46.30	74.00	27.70
2721.00	36.25	AV	V	29.10	1.89	26.11	41.13	54.00	12.87
3628.00	35.66	PK	V	31.58	2.44	25.94	43.74	74.00	30.26
3628.00	23.15	AV	V	31.58	2.44	25.94	31.23	54.00	22.77

Test plots(Test channel: 906.8MHz)**Horizontal****Vertical:**

FCC §15.215(c) – 20 dB BANDWIDTH TESTING

Applicable Standard

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.

Test Procedure

1. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
2. Repeat above procedures until all frequencies measured were complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2019-12-10	2020-12-10
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
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

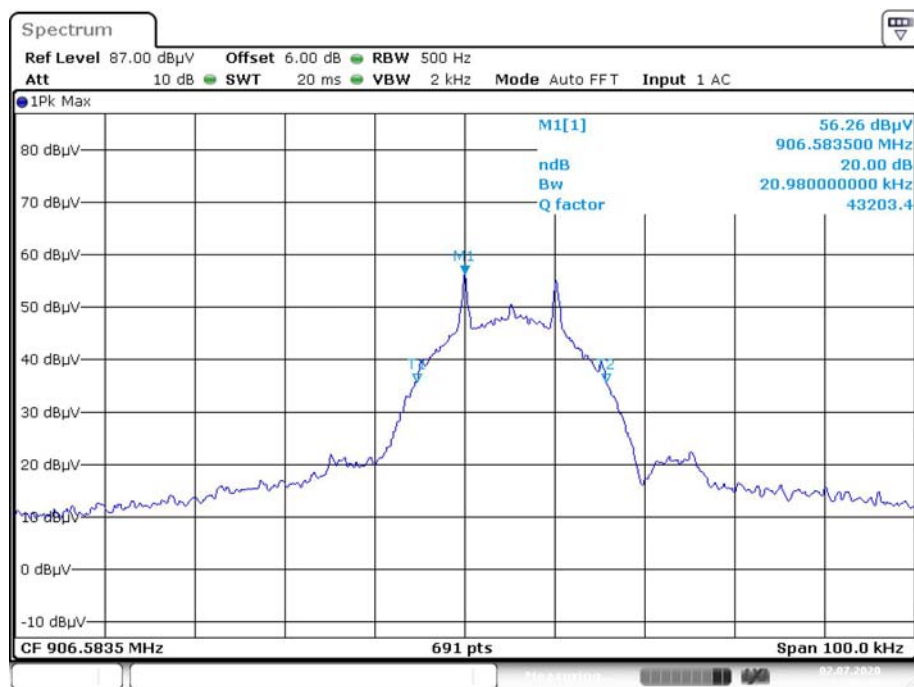
Temperature:	27.6 °C
Relative Humidity:	65%
ATM Pressure:	100.1 kPa
Tester:	Leo Long
Test Date:	2020-07-02

Test Result: Compliant.

Please refer to following tables and plots

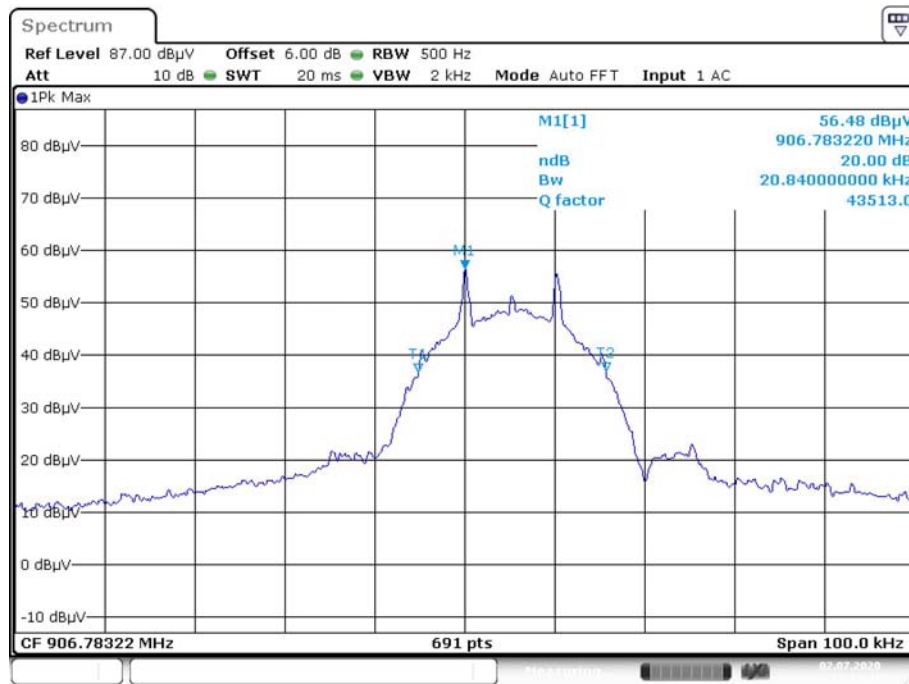
Test Mode: Transmitting

Channel	Frequency (MHz)	20 dB Emission Bandwidth (kHz)
Low	906.6	20.98
Middle	906.8	20.84
High	907	21.13

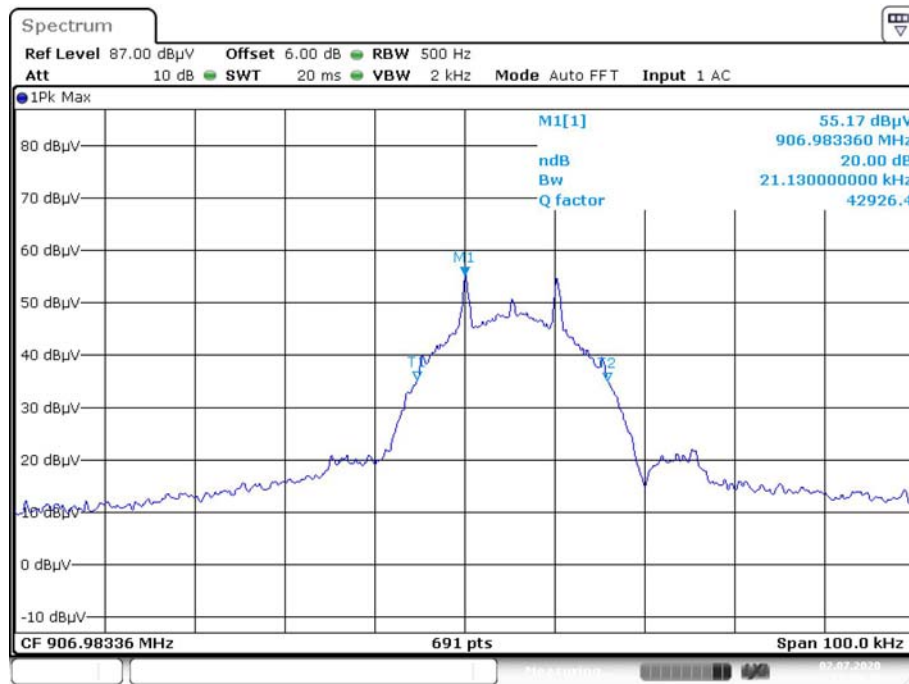
906.6MHz

Date: 2.JUL.2020 12:09:48

906.8MHz



907MHz



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