

FCC PART 95  
MEASUREMENT AND TEST REPORT

For

**RUIXUN LIMITED**

Vistra Corporate Services Centre, Wickhams Cay II, Road Town, Tortola, VG1110, British Virgin Islands.

**FCC ID:2A00QCBIA**

<b>Report Type:</b> Original Report	<b>Product Type:</b> Citizens Band Radio
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**Note:** This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan).

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## GENERAL INFORMATION

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

<b>EUT Name:</b>	Citizens Band Radio
<b>EUT Model:</b>	CB91
<b>Multiple Model:</b>	CB91 C, CB91 L
<b>FCC ID:</b>	2A00QCBIA
<b>Rated Input Voltage:</b>	DC 13.8V
<b>External Dimension:</b>	Length (205 mm)*Width (115 mm)*High (45 mm)
<b>Serial Number:</b>	171225004
<b>EUT Received Date:</b>	2017.12.25

*Note: The series product, models CB91, CB91 L, CB91 C are electrically identical, we selected CB91 for fully testing, The difference between them was explained in the attached declaration letter..*

### Objective

This report is prepared on behalf of **RUIXUN LIMITED** in accordance with Part 2 and Part 95, Subpart D of the Federal Communication Commissions rules.

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

No related submittal(s).

### Test Methodology

All tests and measurements indicated in this document were performed in accordance with Part 95 Subpart D of the Federal Communication Commissions rules with TIA-603-D, Land Mobile FM or PM-Communications Equipment-Measurement and Performance Standards.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan).

### Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.61dB
Unwanted Emissions, radiated	30MHz ~ 1GHz: 5.85 dB 1G~26.5GHz: 5.23 dB
Unwanted Emissions, conducted	±1.5 dB
Temperature	±1 °C
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%

### **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 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. : 897218,the FCC Designation No. : CN1220.

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

F I N A L

## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

The system was configured for testing in a typical fashion (as normally used by a typical user).

The device is a CBRS(CB Radio Service) uses AM modulation(A3E) and employs total 40 channels as below:

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	26.965	11	27.085	21	27.215	31	27.315
2	26.975	12	27.105	22	27.225	32	27.325
3	26.985	13	27.115	23	27.255	33	27.335
4	27.005	14	27.125	24	27.235	34	27.345
5	27.015	15	27.135	25	27.245	35	27.355
6	27.025	16	27.155	26	27.265	36	27.365
7	27.035	17	27.165	27	27.275	37	27.375
8	27.055	18	27.175	28	27.285	38	27.385
9	27.065	19	27.185	29	27.295	39	27.395
10	27.075	20	27.205	30	27.305	40	27.405

### Equipment Modifications

No modification was made to the EUT tested.

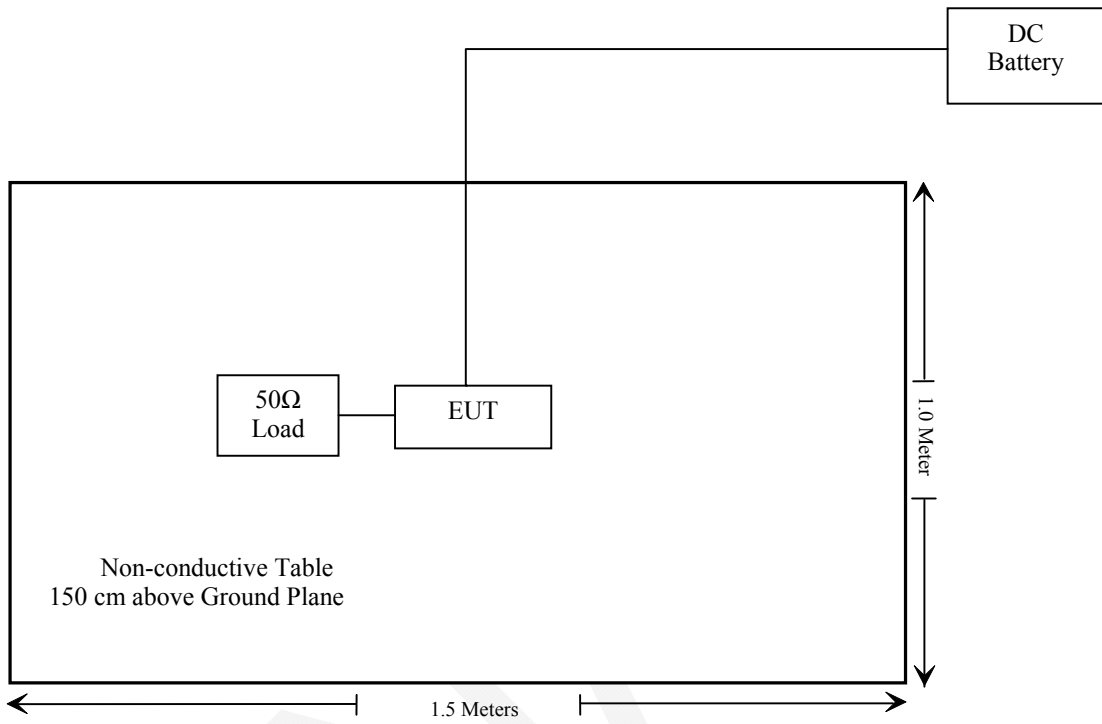
### Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Desai	Battery	12V	N/A
N/A	Terminal Load (50 Ω)	N/A	N/A

### Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
DC Cable	No	No	2.0	Battery	EUT

**Block Diagram of Test Setup**



**SUMMARY OF TEST RESULTS**

<b>FCC Rules</b>	<b>Description of Test</b>	<b>Results</b>
§1.1310, §2.1091	Maximum Permissible Exposure	Compliance
§2.1046, §95.967	RF Output Power	Compliance
§2.1047, §95.975	Modulation Characteristic	Compliance
§2.1049, §95.973, §95.979	Authorized Bandwidth & Emission Mask	Compliance
§2.1053, §95.979	Spurious Radiated Emissions	Compliance
§2.1055(d), §95.965	Frequency Stability	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>(B) Limits for General Population/Uncontrolled Exposure</b>				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minutes)
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f <sup>2</sup> )	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 to §1.1310 and §2.1091 RF exposure is calculated.

**Calculation Formula:**

Prediction of power density at the distance of the applicable MPE limit:

$S = PG/4\pi R^2$  = power density (in appropriate units, e.g. mW/cm<sup>2</sup>);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

**Calculated Data:**

Frequency (MHz)	Antenna Gain		Tune-up Power		Evaluation Distance (cm)	Power Density (mW/cm <sup>2</sup> )	MPE Limit (mW/cm <sup>2</sup> )
	(dBi)	(numeric)	(dBm)	(mW)			
26.965~27.405	0	1.00	36	3981.07	40.00	0.20	0.24

**Result: Compliance,** The device meets MPE requirement for Devices Used by the General Public (Uncontrolled Environment) at distance ≥40 cm.



**FCC §2.1046, §95.967 - RF OUTPUT POWER**

**Applicable Standard**

According to FCC §95.967

Each CBRS transmitter type must be designed such that the transmitter power can not exceed the following limits:

- (a) When transmitting amplitude modulated (AM) voice signals, the mean carrier power must not exceed 4 Watts.
- (b) When transmitting single sideband (SSB) voice signals, the peak envelope power must not exceed 12 Watts.

**Test Procedure**

Conducted RF Output Power:

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

Spectrum Analyzer Setting:

R B/W      Video B/W  
 100 kHz    300 kHz

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2017-08-31	2018-08-31
E-Microwave	Coaxial Attenuators	EMCA40-200SN-6	OE01201046	Each time	N/A
N/A	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
N/A	Coaxial Cable	C-SJ00-0010	C0010/02	Each time	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>	22.4 °C
<b>Relative Humidity:</b>	40 %
<b>ATM Pressure:</b>	102 kPa

*The testing was performed by Costa Dong on 2018-01-09.*

**Test Result:** Compliance.

*Test Mode: Transmitting*

<b>f<sub>c</sub> (MHz)</b>	<b>Reading (Watt)</b>	<b>Limit (Watt)</b>
26.965	3.61	4.0
27.185	3.62	4.0
27.405	3.80	4.0

FINAL

**FCC §2.1047 & §95.975 - MODULATION CHARACTERISTIC**

**Applicable Standard**

Per FCC §2.1047 and §95.975:

Each CBRS transmitter type must be designed such that the modulation characteristics are in compliance with the rules in this section.

(a) When emission type A3E is transmitted with voice modulation, the modulation percentage must be at least 85%, but not more than 100%.

(b) When emission type A3E is transmitted by a CBRS transmitter having a transmitter output power of more than 2.5 W, the transmitter must contain a circuit that automatically prevents the modulation percentage from exceeding 100%.

**Test Equipment List and Details**

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
HP	RF Communications Test Set	8920A	00 235	2017-07-11	2018-07-11
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2017-08-31	2018-08-31
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	Each Time	/
E-Microwave	RF Attenuator	20dB	20dB-1	Each Time	/
Unknown	Coaxial Cable	0.1m	C-1	Each Time	/

**\* 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**

Test Method: TIA/EIA-603-D

**Test Data**

**Environmental Conditions**

<b>Temperature:</b>	22.4 °C
<b>Relative Humidity:</b>	40 %
<b>ATM Pressure:</b>	102 kPa

The testing was performed by Costa Dong on 2018-01-09.

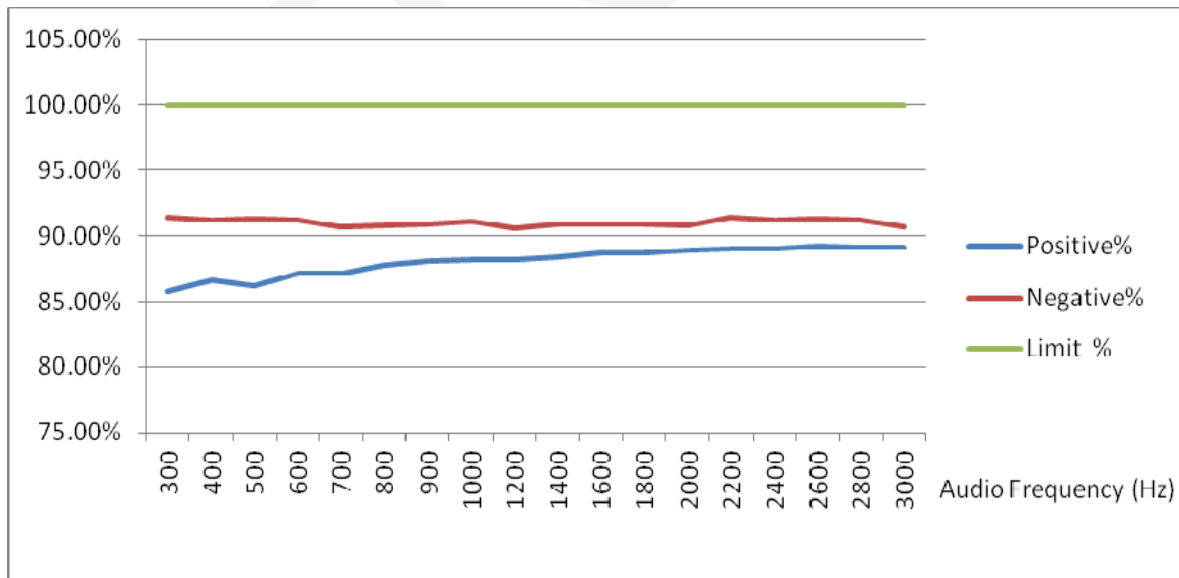
Please refer to the following tables and plots.

Test Mode: Transmitting

**Modulation Limit**

Audio Frequency (Hz)	Modulation Level[%]		Limit [%]
	Positive	Negative	
300	85.77	91.38	100
400	86.59	91.26	100
500	86.19	91.32	100
600	87.13	91.26	100
700	87.17	90.68	100
800	87.75	90.78	100
900	88.08	90.95	100
1000	88.16	91.07	100
1200	88.17	90.56	100
1400	88.43	90.93	100
1600	88.71	90.95	100
1800	88.73	90.86	100
2000	88.87	90.77	100
2200	88.99	91.38	100
2400	88.97	91.26	100
2600	89.19	91.32	100
2800	89.13	91.26	100
3000	89.17	90.68	100

Note: the input audio level is 107.5dBuV(40dB incrd for the maximum modulation level frequency 500Hz 50% modulation(67.5dBuV))



**Audio Frequency Response**

Carrier Frequency: 27.185 MHz

<b>Audio Frequency (Hz)</b>	<b>Response Attenuation (dB)</b>	<b>Limits (dB)</b>
100	-20.9	/
200	-4.99	/
300	-0.87	-14 ~ +2
400	-0.33	-14 ~ +2
500	0	-14 ~ +2
800	0	-14 ~ +2
1000	0	-14 ~ +2
1200	-0.87	-14 ~ +2
1400	-1.38	-14 ~ +2
1600	-2.1	-14 ~ +2
1800	-2.32	-14 ~ +2
2000	-2.76	-14 ~ +2
3000	-8.12	-14 ~ +2
4000	-12.64	/
6000	-20.68	/
8000	-26.86	/
10000	-32.58	/

**FCC §2.1049, §95.973, §95.979 - AUTHORIZED BANDWIDTH AND EMISSION MASK**

**Applicable Standard**

According to §95.973

Each CBRS transmitter type must be designed such that the occupied bandwidth does not exceed the authorized bandwidth for the emission type under test.

- (a) *AM*. The authorized bandwidth for emission type A3E is 8 kHz.
- (b) *SSB*. The authorized bandwidth for emission types J3E, R3E, and H3E is 4 kHz.

According to §95.979

Each CBRS transmitter type must be designed to comply with the applicable unwanted emissions limits in this section.

(a) *Attenuation requirements*. The power of unwanted emissions must be attenuated below the transmitter output power in Watts (P) as specified in the applicable paragraphs listed in the following table:

Emission type	Paragraph
A3E	(1), (3), (5), (6)
H3E, J3E, R3E	(2), (4), (5), (6)

- (1) 25 dB (decibels) in the frequency band 4 kHz to 8 kHz removed from the channel center frequency;
- (2) 25 dB in the frequency band 2 kHz to 6 kHz removed from the channel center frequency;
- (3) 35 dB in the frequency band 8 kHz to 20 kHz removed from the channel center frequency;
- (4) 35 dB in the frequency band 6 kHz to 10 kHz removed from the channel center frequency;
- (5)  $53 + 10 \log (P)$  dB in any frequency band removed from the channel center frequency by more than 250% of the authorized bandwidth.
- (6) 60 dB in any frequency band centered on a harmonic (*i.e.*, an integer multiple of two or more times) of the carrier frequency.

**Test Procedure**

TIA-603-D, section 2.2.11

**Test Equipment List and Details**

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2017-08-31	2018-08-31
E-Microwave	Coaxial Attenuators	EMCA40-200SN-6	OE01201046	Each time	N/A
N/A	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
N/A	Coaxial Cable	C-SJ00-0010	C0010/02	Each time	N/A
HP	RF Communications Test Set	8920A	00 235	2017-07-11	2018-07-11

**\* 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**

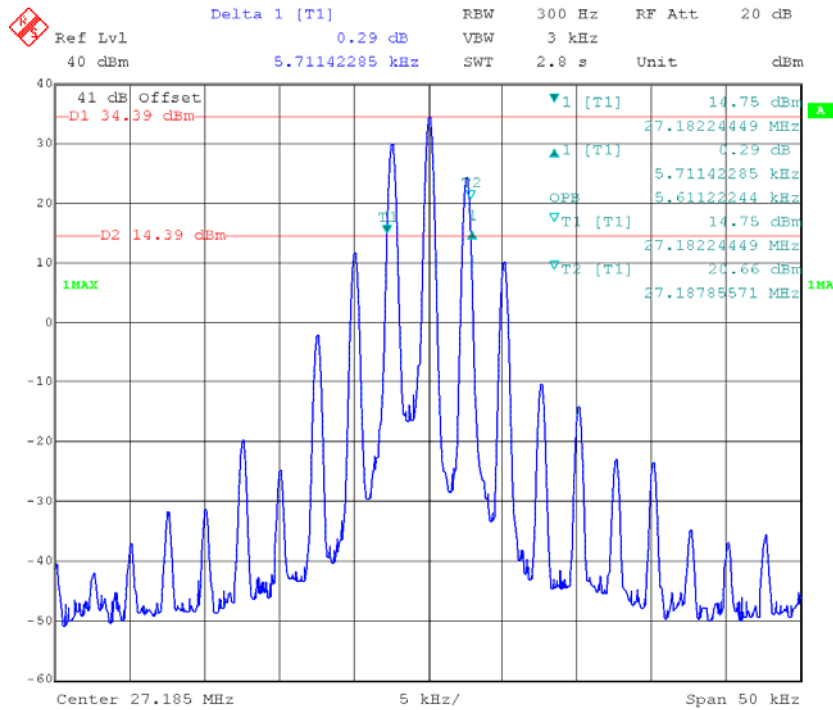
<b>Temperature:</b>	22.4 °C
<b>Relative Humidity:</b>	40 %
<b>ATM Pressure:</b>	102 kPa

*The testing was performed by Costa Dong on 2018-01-09.*

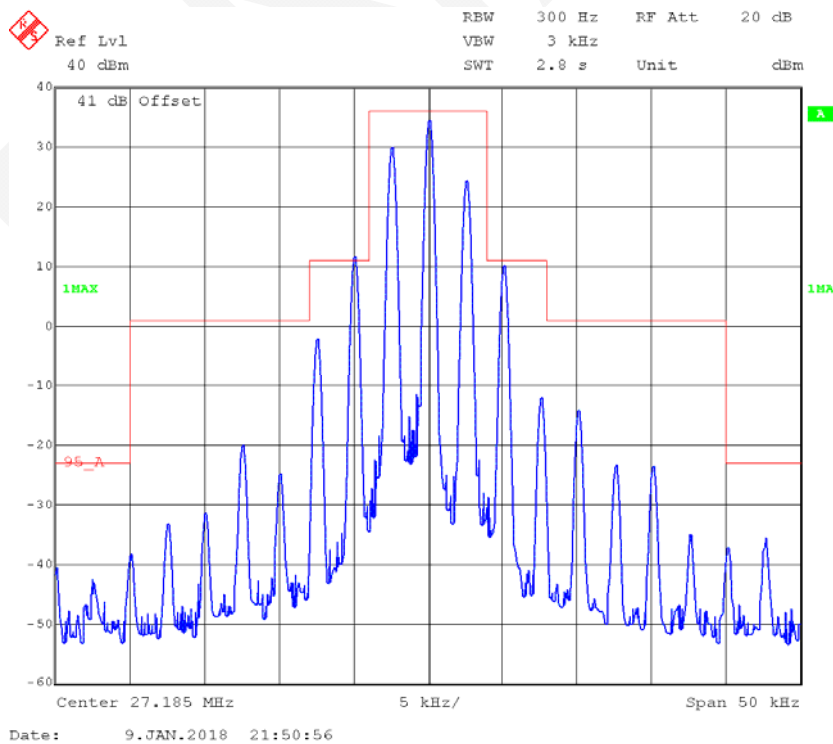
Test Mode: Transmitting

fc (MHz)	99% Occupied Bandwidth (kHz)	20 dB Bandwidth (kHz)	Limit (kHz)
27.185	5.611	5.711	8.0

*Bandwidth*



*Emission Mask*





**FCC §2.1053,§95.979 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS****Applicable Standard**

FCC §2.1053 and §95.979

**Test Procedure**

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100kHz for below 1GHz. Sufficient scans were taken to show any out of band emissions up to 10<sup>th</sup> harmonic.

**Test Equipment List and Details**

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2017-08-31	2018-08-31
E-Microwave	Coaxial Attenuators	EMCA40-200SN-6	OE01201046	Each time	N/A
N/A	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
N/A	Coaxial Cable	C-SJ00-0010	C0010/02	Each time	N/A
HP	RF Communications Test Set	8920A	00 235	2017-07-11	2018-07-11

\* **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**

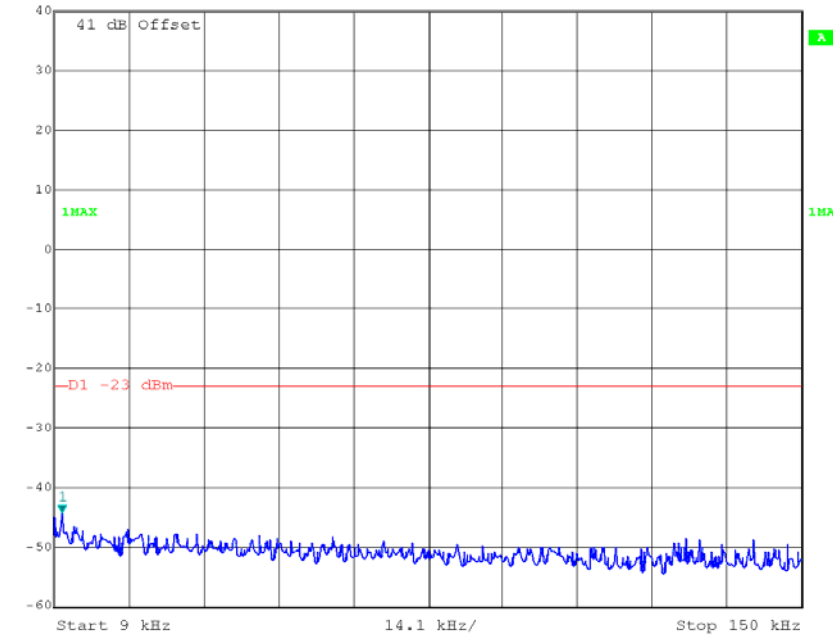
<b>Temperature:</b>	22.1~22.4 °C
<b>Relative Humidity:</b>	38.9~40 %
<b>ATM Pressure:</b>	101~102 kPa

*The testing was performed by Costa Dong on 2018-01-09&2018-02-06*

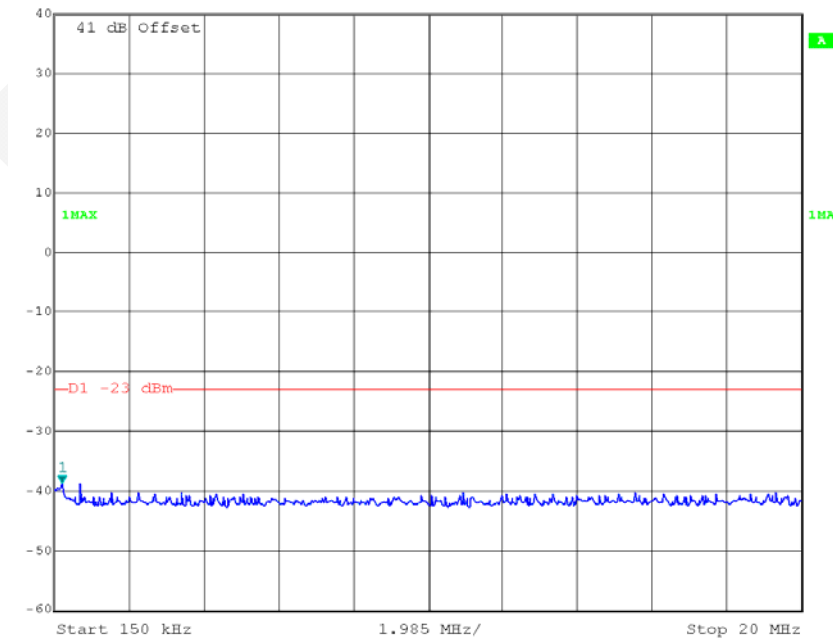
*Test Mode: Transmitting, all emissions under -24dBm, please refer to the following plots.*

Test Frequency: 27.185 MHz

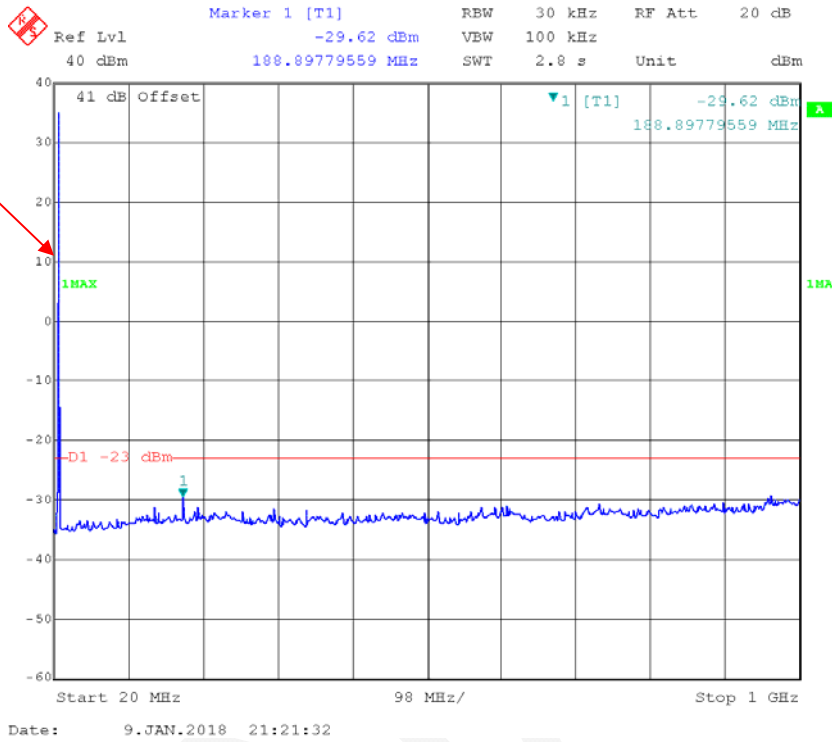
Marker 1 [T1] RBW 1 kHz RF Att 20 dB  
Ref Lvl -44.41 dBm VBW 3 kHz  
40 dBm 10.41282565 kHz SWT 360 ms Unit dBm



Marker 1 [T1] RBW 10 kHz RF Att 20 dB  
Ref Lvl -38.82 dBm VBW 30 kHz  
40 dBm 348.89779559 kHz SWT 500 ms Unit dBm



Fund.test



## FCC §2.1053 & §95.979 - RADIATED SPURIOUS EMISSION

### Applicable Standard

FCC §2.1053 and §95.979

### Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load, which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = 10 lg (TXpwr in Watts/0.001)-the absolute level

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Signal Generator	E8247C	MY43321350	2016-09-23	2017-09-22
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
HP	Amplifier	8447E	2434A02181	2017-09-01	2018-09-01
R&S	EMI Test Receiver	ESCI	100224	2017-09-01	2018-09-01
EMCO	Passive Loop	6512	9706-1206	2017-03-05	2020-03-05
Unknown	Coaxial Cable	Chamber A-1	4m	2017-09-05	2018-09-05
Unknown	Coaxial Cable	Chamber A-2	10m	2017-09-05	2018-09-05
N/A	Coaxial Cable	4m	N/A	2017-09-05	2018-09-05
N/A	Coaxial Cable	8m	N/A	2017-09-05	2018-09-05
HP	RF Communications Test Set	8920A	00 235	2017-07-11	2018-07-11

\* **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>	18.4 °C
<b>Relative Humidity:</b>	28 %
<b>ATM Pressure:</b>	102.1 kPa

The testing was performed by Eric Xiao on 2018-01-11.

Test Mode: Transmitting (Pre-scan with CB91 and CB91 L, worst case is CB91, the data as below)

Frequency (MHz)	Polar (H/V)	Receiver Reading (dB $\mu$ V)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
frequency:27.185MHz								
54.370	H	39.28	-17.1	-12.9	0.2	-30.2	-24.0	6.2
54.370	V	45.36	-13	-12.9	0.2	-26.1	-24.0	2.1
81.555	H	36.86	-46.5	0.0	0.4	-46.9	-24.0	22.9
81.555	V	42.14	-40.3	0.0	0.4	-40.7	-24.0	16.7
108.740	H	38.69	-48.4	0.0	0.3	-48.7	-24.0	24.7
108.740	V	36.14	-45.7	0.0	0.3	-46.0	-24.0	22
189.080	H	57.21	-29.6	0.0	0.5	-30.1	-24.0	6.1
189.080	V	46.38	-37.6	0.0	0.5	-38.1	-24.0	14.1

Note: No emission was detected in the range 9kHz~30MHz, the rated output power is 36dBm.

## **FCC§2.1055 (d), §95.965- FREQUENCY STABILITY**

### **Applicable Standard**

According to FCC §2.1055(a) (1),

The frequency stability shall be measured with variation of ambient temperature from  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$ , and according to FCC 2.1055(d) (2), the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point which is specified by the manufacturer.

According to FCC §95.965

Each CBRS transmitter type must be designed such that the transmit carrier frequency (or in the case of SSB transmissions, the reference frequency) remains within 50 parts-per-million of the channel center frequencies specified in §95.963 under all normal operating conditions.

### **Test Procedure**

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to a Frequency Counter via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the Frequency Counter.

Frequency Stability vs. Voltage:

1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

The output frequency was recorded for each voltage.

### **Test Equipment List and Details**

<b>Manufacturer</b>	<b>Description</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Calibration Date</b>	<b>Calibration Due Date</b>
Dongzhixu	High Temperature Test Chamber	DP1000	201105083-4	2017-09-10	2018-09-10
UNI-T	Multimeter	UT39A	M130199938	2017-04-10	2018-04-10
HP	RF Communications Test Set	8920A	00 235	2017-07-11	2018-07-11
E-Microwave	Coaxial Attenuators	EMCA40-200SN-6	OE01201046	Each time	N/A
N/A	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
N/A	Coaxial Cable	C-SJ00-0010	C0010/02	Each time	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>	22.4 °C
<b>Relative Humidity:</b>	40 %
<b>ATM Pressure:</b>	102 kPa

The testing was performed by Costa Dong on 2017-01-09.

Test Mode: Transmitting

Reference Frequency: 27.1850 MHz				
Temperature	Voltage	Reading	Frequency Error	Limit
°C	Vdc	MHz	ppm	ppm
-30	13.8	27.185053	1.95	50
-20		27.185053	1.95	
-10		27.185049	1.80	
0		27.185065	2.39	
10		27.185046	1.69	
20		27.185043	1.58	
30		27.185052	1.91	
40		27.185058	2.13	
50		27.185043	1.58	
25		11	27.185060	
25	15.6	27.185054	1.99	

Note: The extreme low voltage was declared by applicant.

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