NVLAP TESTING
NVLAP LAB CODE 600338-0

BACL Bay Area Compliance Labs Corp.

FCC PART 15.231

TEST REPORT

For

Ningbo Litesun Electronics Co.,Ltd

Simen Town, yuyao, Zhejiang, China

FCC ID: 2AMQ8-RC-04

Report Type:	**Product Name:**
Original Report	remote control

Report Number:	RKSA240119002-00B
Report Date:	2024-02-06
Reviewed By:	Jenny Yang
Approved By:	Kyle Xu
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road, Kunshan, Jiangsu province, China Tel: +86-512-86175000 Fax: +86-512-88934268 www.baclcorp.com.cn

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REPORT REVISION HISTORY

Number of Revisions	Report No.	Version	Issue Date	Description
0	RKSA240119002-00B	R1V1	2024-02-06	Initial Release

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant:	Ningbo Litesun Electronics Co.,Ltd
Product Name:	remote control
Tested Model:	LA-RC04
Power Supply:	DC 3V
RF Function:	SRD
Operating Band/Frequency:	433.92 MHz
Channel Number:	1
Modulation Type:	ASK
Antenna Type:	PCB Antenna
★Maximum Antenna Gain:	0 dBi

Note: The maximum antenna gain was provided by the applicant.

All measurement and test data in this report was gathered from production sample serial number: RKSA240119002-1 (Assigned by the BACL (Kunshan). The EUT supplied by the applicant was received on 2024-01-19.)

Objective

This test report is prepared for *Ningbo Litesun Electronics Co.,Ltd.* All the test measurements were performed according to the measurement procedure described in ANSI C63.10 - 2013.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, section 15.203, 15.205, 15.209, 15.35(c) and 15.231 rules.

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.

Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		3.19 dB
RF conducted test with spectrum		0.9 dB
Radiated emission	9 kHz~150 kHz	3.8 dB
	150 kHz~30 MHz	3.4 dB
	30 MHz~1 GHz	6.11 dB
	1 GHz~6 GHz	4.45 dB
	6 GHz~18 GHz	5.23 dB
Occupied Bandwidth		0.5 kHz
Temperature		1.0 ℃
Humidity		6%

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China.

Bay Area Compliance Laboratories Corp. (Kunshan) is accredited in accordance with ISO/IEC 17025:2017 by NVLAP (Lab code: 600338-0), and the lab has been recognized as the FCC accredited lab under the KDB 974614 D01, the FCC Designation No. : CN5055.

SYSTEM TEST CONFIGURATION

Justification

Channel List:

Channel	Frequency (MHz)
1	433.92

EUT Exercise Software

For radiated emission testing:
Engineering mode which can continue transmit.

Equipment Modifications

No modification was made to the EUT.

Support Equipment List and Details

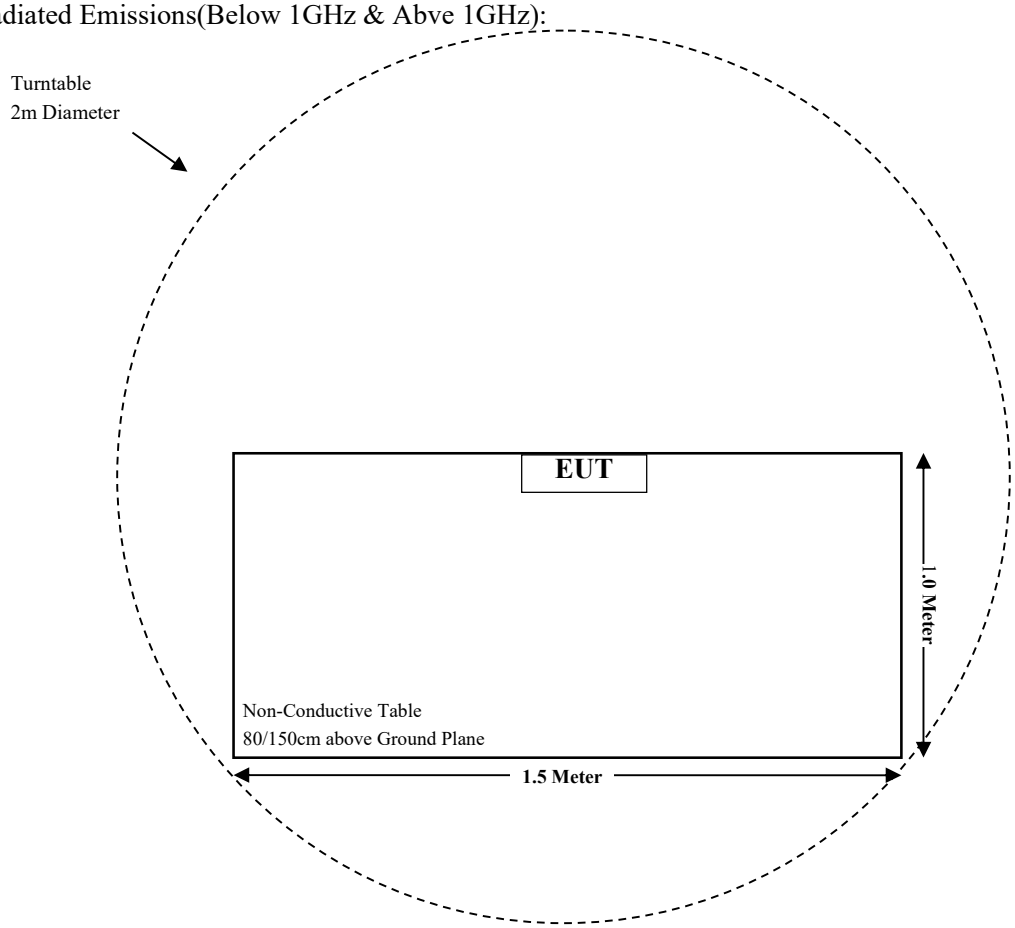
Manufacturer	Description	Model	Serial Number
/	/	/	/

External I/O Cable

Cable Description	Length (m)	From Port	To Port
/	/	/	/

Block Diagram of Test Setup

For Radiated Emissions(Below 1GHz & Abve 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliant
§15.207(a)	Conducted Emissions	Not Applicable (See Note)
§15.205, §15.209, §15.231(b)	Radiated Emissions	Compliant
§15.231 (a) (2)	Deactivation	Compliant
§15.231 (c)	20dB Emission Bandwidth	Compliant
§1.1307	RF Exposure Evaluation	Compliant

Note: The EUT is powered by battery.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test (Chamber 1#)					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2023-05-23	2024-05-22
Sunol Sciences	Hybrid Antenna	JB3	A090314-1	2023-11-11	2024-11-10
Narda	6dB Attenuator	773-6	10690812-2-1	2023-11-11	2024-11-10
Sonoma Instrunent	Amplifier	310N	171205	2023-05-23	2024-05-22
ETS-LINDGREN	Loop Antenna	6512	108100	2023-11-09	2024-11-08
Rohde & Schwarz	Signal Analyzer	FSV40	101116	2023-05-23	2024-05-22
MICRO-COAX	Coaxial Cable	Cable-8	008	2023-05-23	2024-05-22
MICRO-COAX	Coaxial Cable	Cable-9	009	2023-05-23	2024-05-22
MICRO-COAX	Coaxial Cable	Cable-10	010	2023-05-23	2024-05-22
Rohde & Schwarz	Test Software	EMC32	100361	N/A	N/A
Radiated Emission Test (Chamber 2#)					
Rohde & Schwarz	EMI Test Receiver	ESU40	100207/040	2023-05-19	2024-05-18
ETS-LINDGREN	Horn Antenna	3115	9311-4159	2023-12-02	2024-12-01
A.H.Systems,inc	Amplifier	PAM-0118P	512	2023-05-23	2024-05-22
MICRO-COAX	Coaxial Cable	Cable-11	011	2023-05-23	2024-05-22
MICRO-COAX	Coaxial Cable	Cable-12	012	2023-05-23	2024-05-22
MICRO-COAX	Coaxial Cable	Cable-13	013	2023-05-23	2024-05-22
Rohde & Schwarz	Test Software	EMC32	100361	N/A	N/A

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

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 a PCB antenna which were permanently attached and each antenna gain is 0 dBi; fulfill the requirement of this section. Please refer to EUT photos.

Result: Compliant.

FCC §15.205, §15.209, §15.231 (b) - RADIATED EMISSIONS

Applicable Standard

FCC §15.205, §15.209, §15.231 (b)

According to FCC §15.231(b), the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emission (microvolts/meter)
40.66-40.70	2250	225
70-130	1250	125
130-174	1250 to 3750 ★	125 to 375 ★
174-260	3750	375
260-470	3750 to 12500 ★	375 to 1250 ★
Above 470	12500	1250

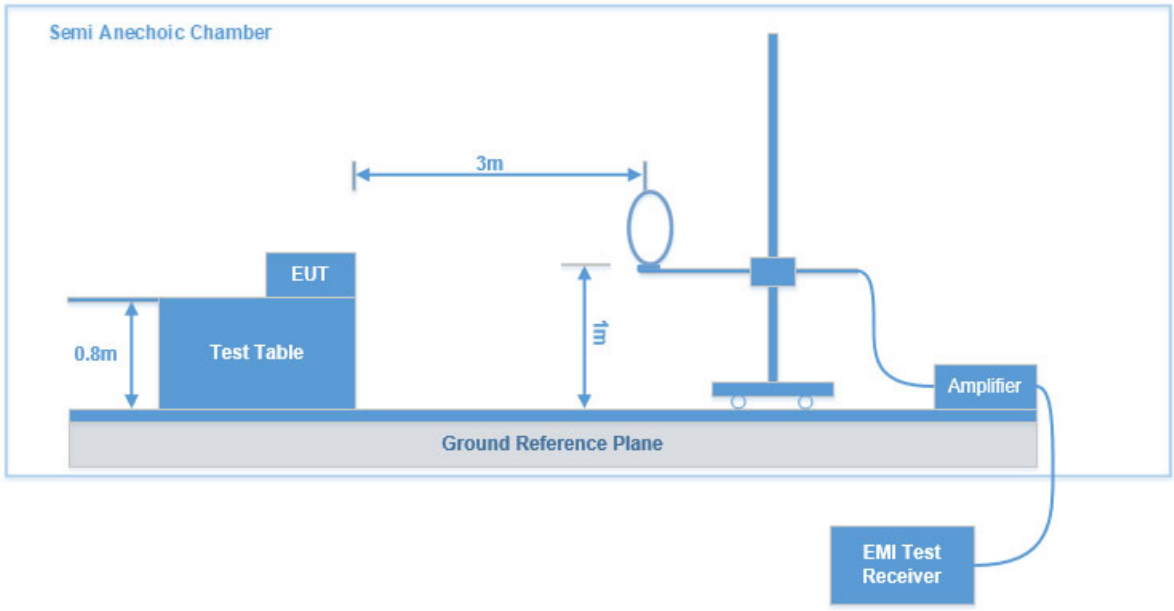
(1) The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.

(2) Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provisions in §15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.

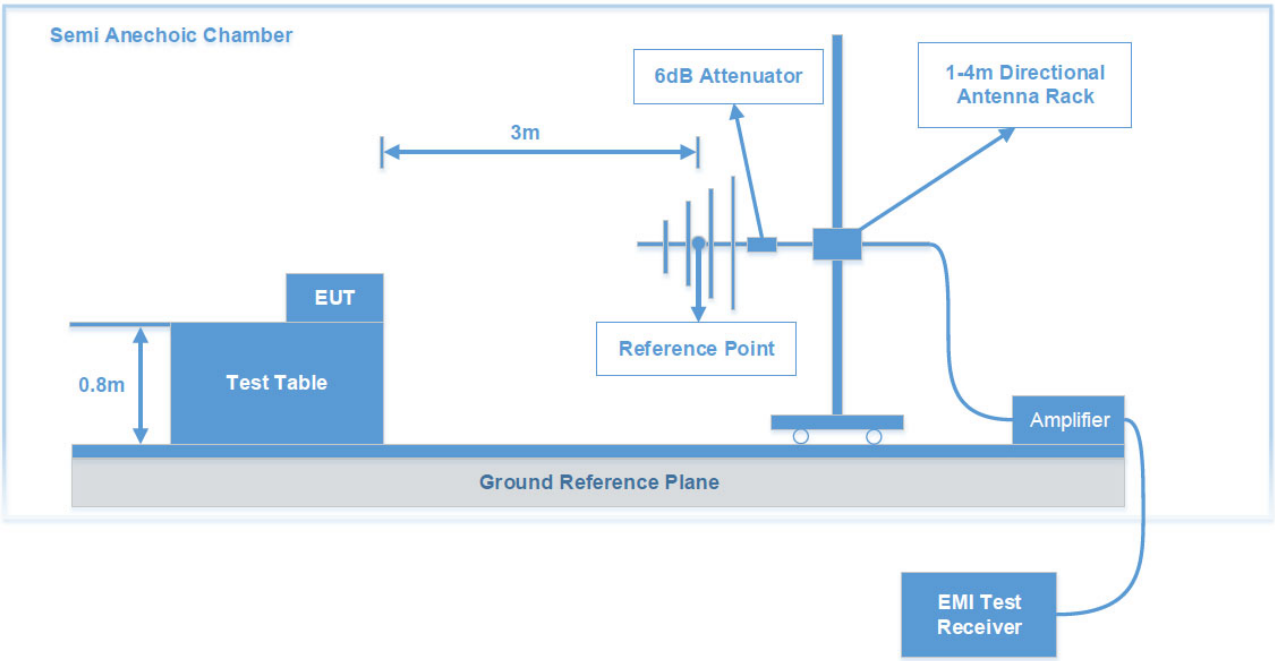
(3) The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

Test System Setup

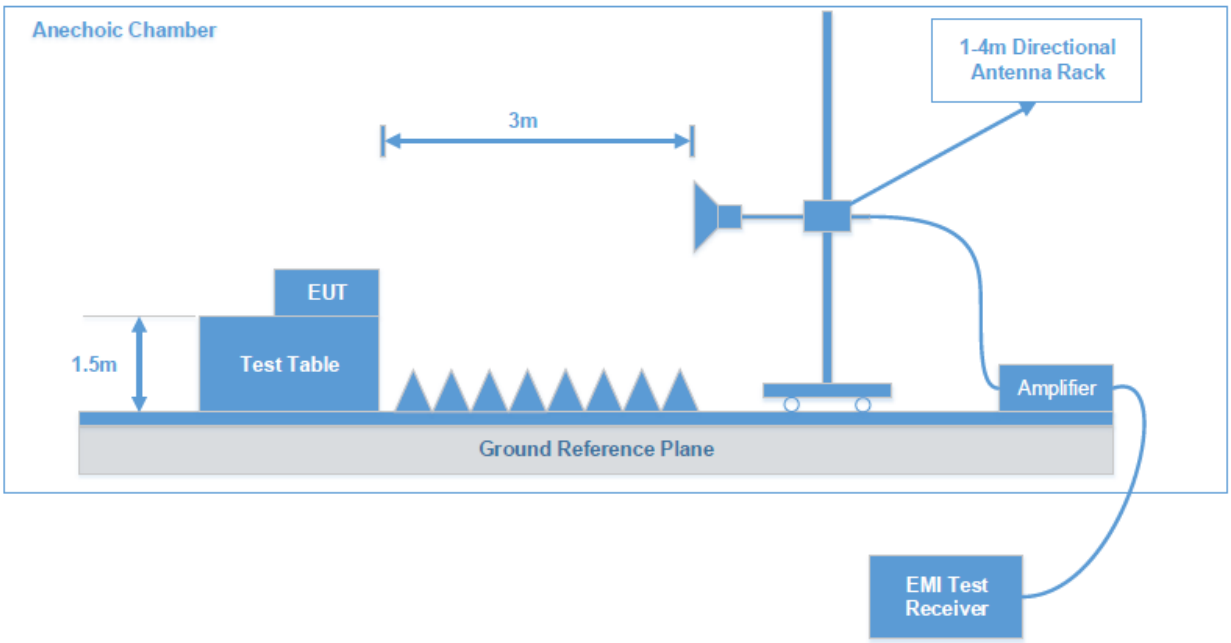
9 kHz~30MHz:



30MHz~1 GHz:



Above 1 GHz:



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10 - 2013. The specification used was the FCC 15 § 15.209, 15.205 and 15.231.

EMI Test Receiver Setup

The system was investigated from 9 kHz to 4.5 GHz.

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

Frequency Range	RBW	VBW	IF B/W	Measurement
9 kHz – 150 kHz	300 Hz	1 kHz	200 Hz	QP/AV
150 kHz – 30 MHz	10 kHz	30 kHz	9 kHz	QP/AV
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	PK
Above 1 GHz	1 MHz	3 MHz	/	PK

Test Procedure

Maximizing procedure was performed on at least six (6) highest emissions to ensure that the EUT complied with all installation combinations.

If the measured peak level of the emissions that the measuring receiver reading level plus corrected factor is at least 6 dB below the QP emission limit, there's no need to record the measured QP level of the emissions in the report.

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:

Corrected Amplitude (dBμV/m) = Meter Reading (dBμV) + Antenna Factor (dB/m) + Cable Loss (dB) - Amplifier Gain (dB)

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:

Margin (dB) = Limit (dBμV/m) – Corrected Amplitude (dBμV/m)

Test Results Summary

According to the data in the following table, the EUT complied with the FCC §15.205, §15.209, §15.231 (b).

Test Data

Environmental Conditions &Test Information

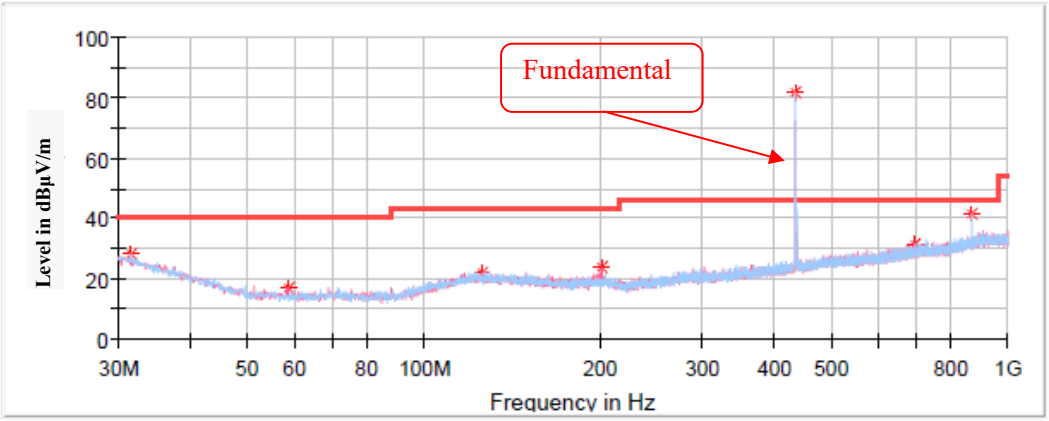
Frequency Range:	Below 1 GHz		Above 1 GHz
Temperature:	16.5 ℃	20.8 ℃	20.3 ℃
Relative Humidity:	46 %	42 %	52 %
ATM Pressure:	103 kPa	102.1 kPa	101.5 kPa
Test Date:	2024-02-06	2024-02-04	2024-02-01
Test Engineer:	Joe Zhang	Jenny Yang	Peter Wang

Test mode: Transmitting
After pre-scan in the X, Y and Z axes of orientation, the worst case is below:
For 9kHz-30MHz, the amplitude of spurious emissions attenuated more than 20 dB below the limit was not be recorded.

30 MHz-1 GHz:

Common Information

Project No:	RKSA240119002
EUT Model:	LA-RC04
Test Mode:	SRD
Standard:	FCC Part 15.205&FCC Part 15.209&FCC Part 15.231
Test Equipment:	ESCI、JB3、310N
Temperature:	16.5℃
Humidity:	46%
Barometric Pressure:	103.0kPa
Test Engineer:	Joe Zhang
Test Date:	2024/2/6



Critical_Freqs

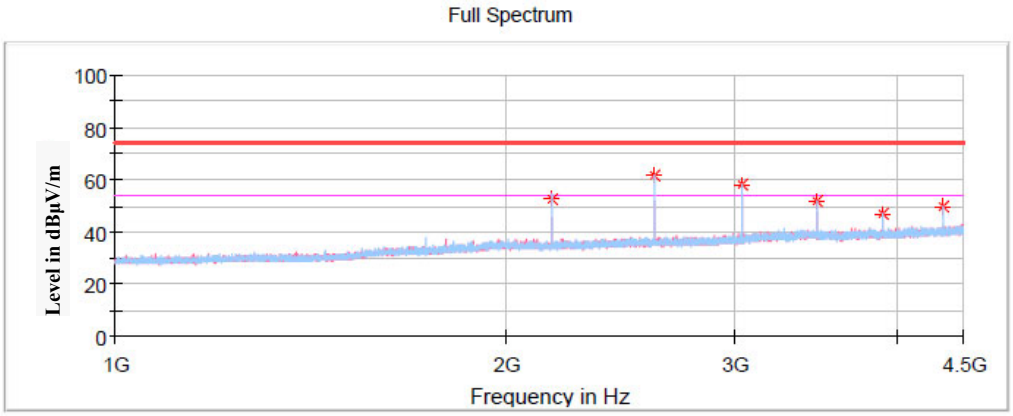
Frequency (MHz)	Corrected Amplitude Max Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
31.576250	28.04	60.83	32.79	H	-5.5
58.615000	16.94	60.83	43.89	V	-17.4
126.515000	22.19	43.50	21.31	V	-11.3
202.296250	23.60	60.83	37.23	V	-12.7
433.920000	81.78	100.83	19.05	H	-7.6
691.903750	31.45	60.83	29.38	H	-2.6
867.840000	41.81	80.83	39.02	H	0.5

Note: If the spurious emissions maximized peak measured value complies with the QP/Average limit, it is unnecessary to perform QP/Average measurement.

1 GHz-4.5 GHz:

Common Information

Project No.:	RKSA240119002
EUT Model:	LA-RC04
Test Mode:	Transmitting
Standard:	FCC Part 15.231 & FCC Part 15.205 & FCC 15.209
Test Equipment:	ESU40、3115、PAM-0118P
Temperature:	20.3°C
Humidity:	52%
Atmospheric pressure:	101.5KPa
Test Engineer:	Peter Wang
Test Date	2024/2/1



Critical_Freqs

Frequency (MHz)	Corrected Amplitude MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
2169.600000	52.61	---	80.83	28.22	H	-10.3
2603.520000	61.56	---	80.83	19.27	H	-9.4
3037.440000	58.23	---	80.83	22.6	H	-7.9
3471.360000	51.57	---	80.83	29.26	H	-6.2
3905.280000	46.69	---	74.00	27.31	H	-5.3
4339.200000	49.91	---	74.00	24.09	H	-4.2

Field Strength of Average Emission

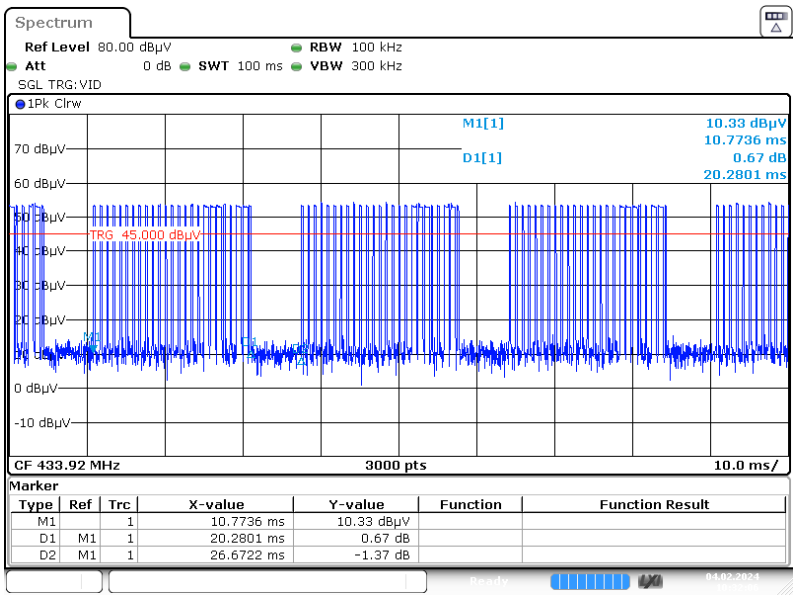
Frequency (MHz)	Peak Measurement@3m (dBµV/m)	Height (cm)	Polar (H/V)	Duty Cycle Corrected Factor (dB)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
433.9200000	81.78	100	H	-10.69	71.09	80.83	9.74
2169.600000	52.61	150	H	-10.69	41.92	60.83	18.91
2603.520000	61.56	150	H	-10.69	50.87	60.83	9.96
3037.440000	58.23	150	H	-10.69	47.54	60.83	13.29
3471.360000	51.57	150	H	-10.69	40.88	60.83	19.95
3905.280000	46.69	200	H	-10.69	36.00	54.00	18.00
4339.200000	49.91	200	H	-10.69	39.22	54.00	14.78

Note: All keys was pre-tested, the worst data (Button 1 OFF) was recorded.

Calculate Average value based on Duty Cycle correction factor:
Tp=26.753ms
Ton=0.228*20+0.65*5=7.81ms
Duty Cycle Corrected Factor =20*log (Ton/Tp) =20*log (7.81ms/26.753ms) =-10.69dB
Average value /Corrected Amplitude = Peak value + Duty Cycle Corrected Factor

This duty cycle is the worst case for the EUT

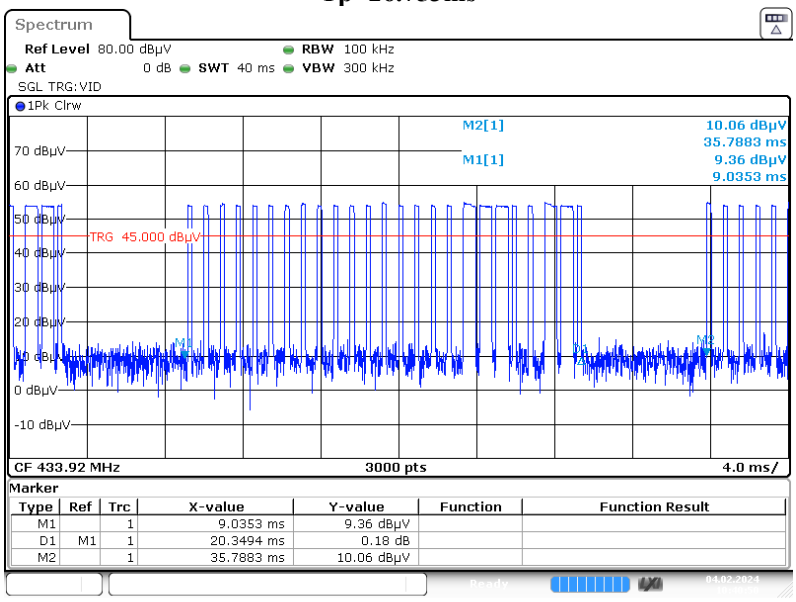
Duty Cycle



Project No. : RKSA240119002 Tester : Jenny Yang

Date: 4.FEB.2024 10:32:06

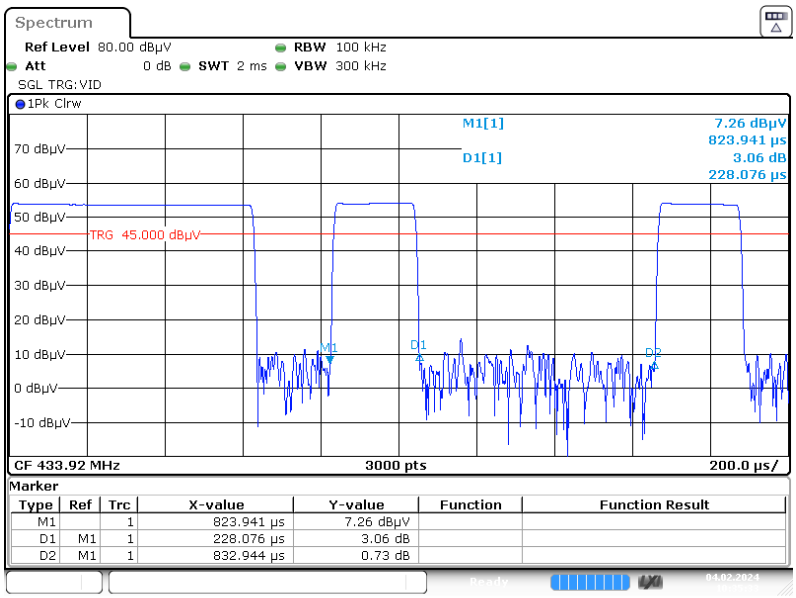
Zoom in Pulse Train
Tp=26.753ms



Project No. : RKSA240119002 Tester : Jenny Yang

Date: 4.FEB.2024 10:40:50

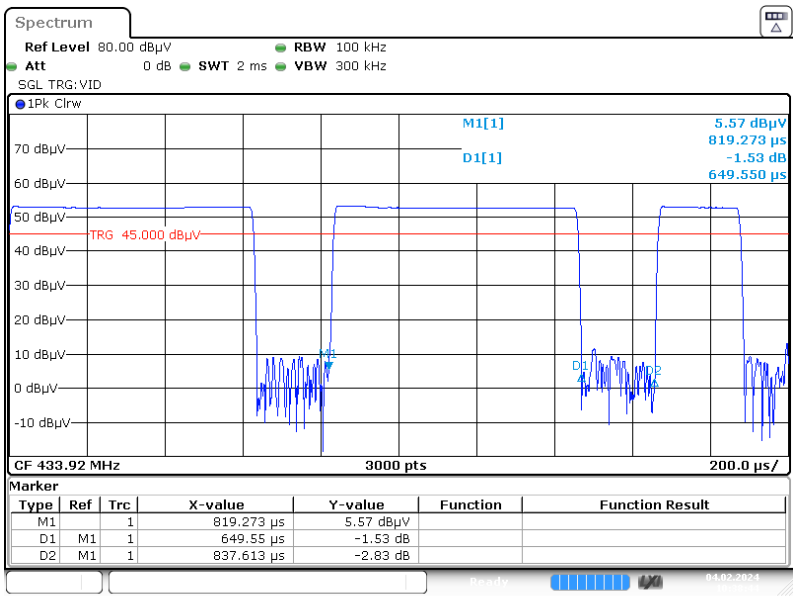
Burst 1 N=20



Project No. : RKSA240119002 Tester : Jenny Yang

Date: 4.FEB.2024 10:35:33

Burst 2 N=5



Project No. : RKSA240119002 Tester : Jenny Yang

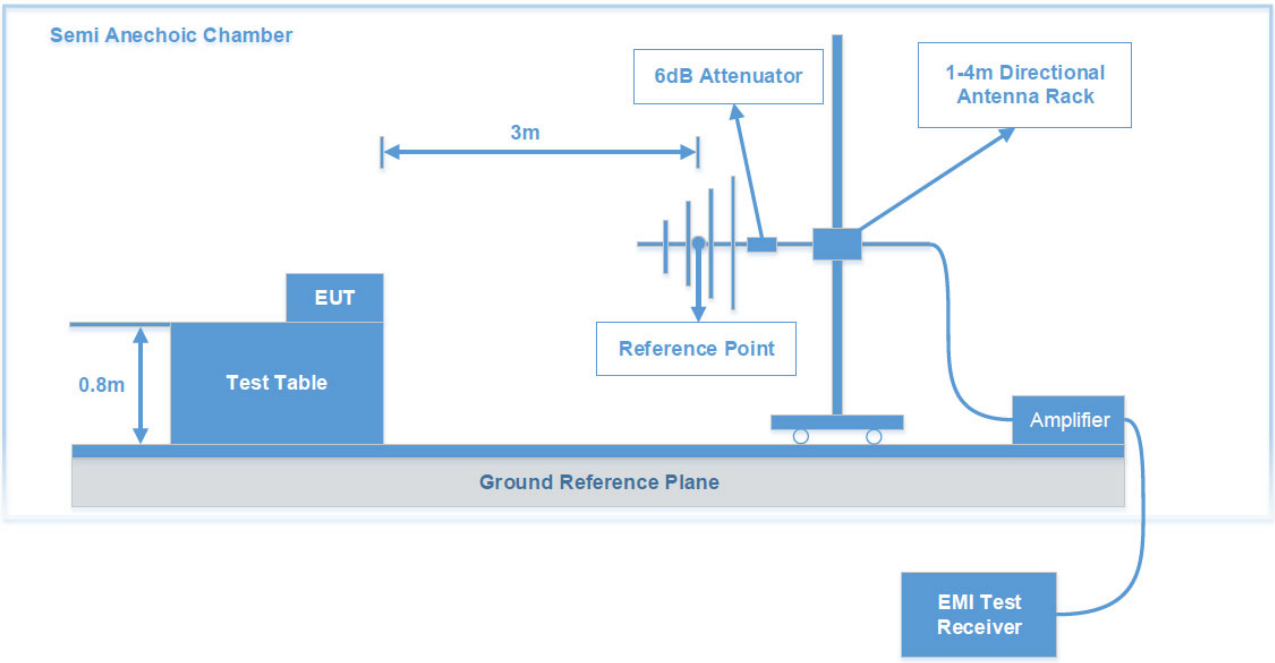
Date: 4.FEB.2024 10:38:45

FCC §15.231(a) (2) - DEACTIVATION TESTING

Applicable Standard

Per FCC §15.231(a), (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

Test System Setup



Test Procedure

1. With the EUT's antenna attached, the waveform was received by the test antenna which was connected to the spectrum analyzer.
2. Set center frequency of spectrum analyzer=operating frequency.
3. Set the spectrum analyzer as RBW=100k VBW=300k Span=0Hz.
4. Repeat above procedures until all frequency measured was complete.

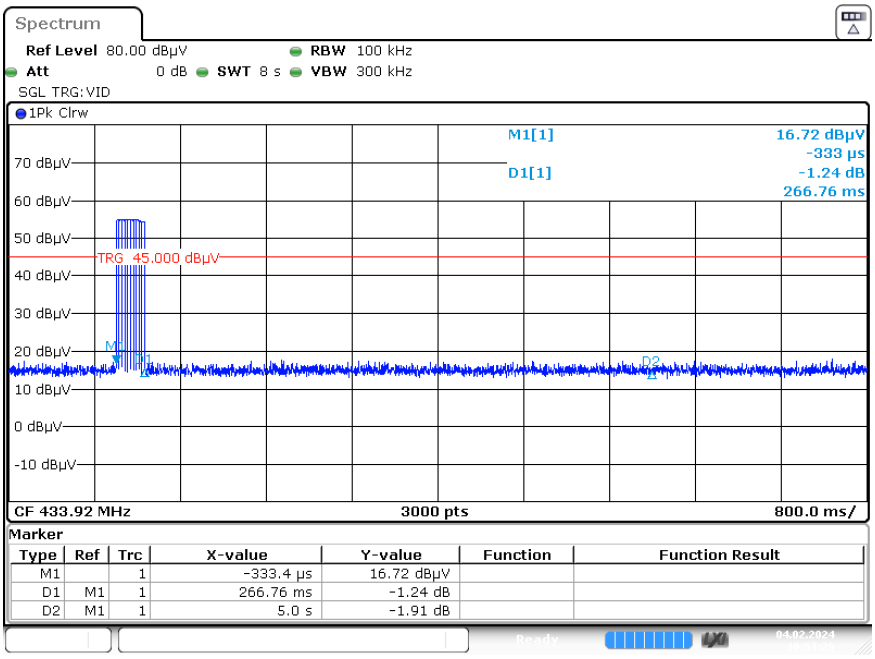
Test Data

Environmental Conditions & Test Information

Temperature:	21.2 ℃
Relative Humidity:	41 %
ATM Pressure:	102.1 kPa
Test Date:	2024-02-04
Test Engineer:	Jenny Yang

Test mode: Transmitting

Low Channel, T_{Stop}<5s



Project No. : RKSA240119002 Tester : Jenny Yang

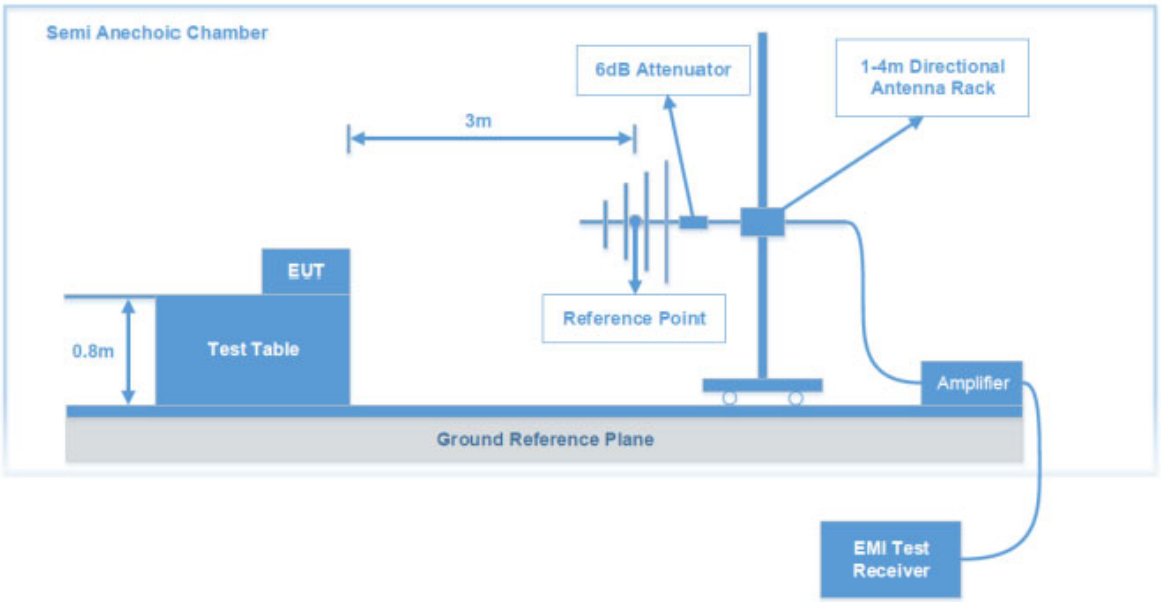
Date: 4.FEB.2024 10:51:27

FCC §15.231(c) - 20dB EMISSION BANDWIDTH TESTING

Applicable Standard

Per 15.231(c), The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Test System Setup



Test Procedure

With the EUT's antenna attached, the waveform was received by the test antenna which was connected to the spectrum analyzer, plot the 20 dB bandwidth.

Test Data

Environmental Conditions & Test Information

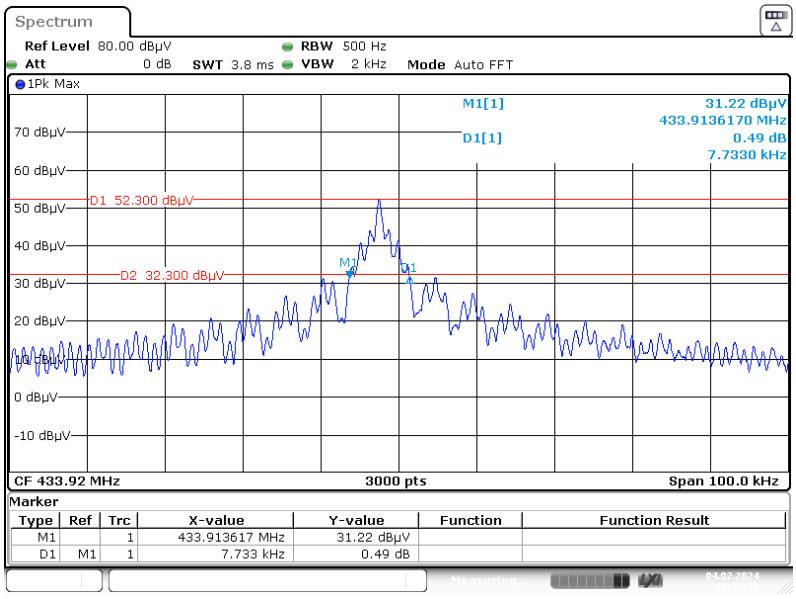
Temperature:	21.2 ℃
Relative Humidity:	41 %
ATM Pressure:	102.1 kPa
Test Date:	2024-02-04
Test Engineer:	Jenny Yang

Test Mode: Transmitting

Channel Frequency (MHz)	20dB Bandwidth (kHz)	Limit (kHz)	Result
433.92	7.733	1084.8	Pass

Note: Limit = 0.25% * Center Frequency = 0.25% * 433.92 MHz = 1084.8 kHz

Low Channel, 20 dB Emission Bandwidth



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Date: 4.FEB.2024 11:36:33

RF EXPOSURE EVALUATION

Applicable Standard

§1.1307(b)(3)(i) For single RF sources (*i.e.*, any single fixed RF source, mobile device, or portable device, as defined in paragraph (b)(2) of this section): A single RF source is exempt if:

(A) The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A).

Measurement Result

Frequency (MHz)	Maximum EIRP (dBm)	Maximum ERP		1-mW Test Exemption
		dBm	mW	
433.92	-13.42	-15.57	0.002667	Compliant

Note:
1. Chose the maximum power to do MPE analysis.
2. This device maximum E-Field level is 81.78 dBμV/m at 3m, so the ERP power is -13.42 dBm.
3. Pout EIRP (dBm)= Field Strength of Fundamental(dBμV/m)-95.2

Result: Compliant. RF Exposure is exemption.

EUT PHOTOGRAPHS

Please refer to the attachment EXHIBIT A_EUT EXTERNAL PHOTOGRAPHS and EXHIBIT B_EUT INTERNAL PHOTOGRAPHS.

TEST SETUP PHOTOGRAPHS

Please refer to the attachment EXHIBIT C_TEST SETUP PHOTOGRAPHS.

Declarations

1. Bay Area Compliance Laboratories Corp. (Kunshan) is not responsible for authenticity of any test data provided by the applicant. Test data from the applicant that may affect test results are marked with an asterisk "★". The model number, product name, address, trademark, etc. from the applicant are not considered as test data.

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

3. Unless required by the rule provided by the applicant or product regulations, then decision rule in this report did not consider the uncertainty.

4. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor k=2 with the 95.45% confidence interval.

5. This report cannot be reproduced except in full, without prior written approval of Bay Area Compliance Laboratories Corp. (Kunshan).

6. This report is valid only with a valid digital signature. The digital signature may be available only under the adobe software above version 7.0.

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