TEST REPORT

Application No.:	SZCR2403000906LM
Applicant:	JRL Corporation Inc.
Address of Applicant:	Floor 11, Zone 101, Building 1, Tiancheng Baowan Industrial Park, No. 668 Xiagang Road, Qiugang Community, Longxi Street, Boluo County, Huizhou City, Guangdong Province, China 516121
Manufacturer:	JRL Corporation Inc.
Address of Manufacturer:	Floor 11, Zone 101, Building 1, Tiancheng Baowan Industrial Park, No. 668 Xiagang Road, Qiugang Community, Longxi Street, Boluo County, Huizhou City, Guangdong Province, China 516121
Factory:	JRL Corporation Inc.
Address of Factory:	Floor 11, Zone 101, Building 1, Tiancheng Baowan Industrial Park, No. 668 Xiagang Road, Qiugang Community, Longxi Street, Boluo County, Huizhou City, Guangdong Province, China 516121
Equipment Under Test (EUT):	
EUT Name:	remote control
Model No.:	LED2024-RF
FCC ID:	2AZCF-LED2024
Standard(s) :	47 CFR Part 15, Subpart C 15.231
Date of Receipt:	2024-03-18
Date of Test:	2024-03-20 to 2024-04-15
Date of Issue:	2024-04-16
Test Result:	**Pass***

* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu
EMC Laboratory Manager

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Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		2024-04-16		Original

Authorized for issue by:				
		Martin Tang Martin Tang/Project Engineer		
		Eric Fu Eric Fu/Reviewer		

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2 Test Summary

Radio Spectrum Technical Requirement				
Item	**Standard**	**Method**	**Requirement**	**Result**
Antenna Requirement	47 CFR Part 15, Subpart C 15.231	N/A	47 CFR Part 15, Subpart C 15.203	Pass

Radio Spectrum Matter Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
20dB Bandwidth	47 CFR Part 15, Subpart C 15.231	ANSI C63.10 (2013) Section 6.9	47 CFR Part 15, Subpart C 15.231(c)	Pass
Dwell Time (15.231(a))		ANSI C63.10 (2013) Section 7.5	47 CFR Part 15, Subpart C 15.231(a)	Pass
Radiated Emissions		ANSI C63.10 (2013) Section 6.4&6.5&6.6	47 CFR Part 15C Section 15.231(b) and 15.209	Pass
Field Strength of the Fundamental Signal (15.231(b))		ANSI C63.10 (2013) Section 6.5	47 CFR Part 15, Subpart C 15.231(b)	Pass

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4 General Information

4.1 Details of E.U.T.

Power supply:	3V DC (1.5V x 2 "AAA" Size Batteries) for remote controller
Operation Frequency:	433.92MHz
Modulation Type:	ASK
Number of Channels:	1
Antenna Type:	PCB Antenna
Antenna Gain:	0dBi

Remark:The information in this section is provided by the applicant or manufacturer, SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
--	--	--	--
The EUT has been tested as an independent unit.			

4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
20dB Bandwidth	3%
Radiated Emissions below 1GHz	± 6.0dB
Dwell Time (15.231(a))	3%
Field Strength of the Fundamental Signal (15.231(b))	± 6.0dB
Radiated Emissions above 1GHz	± 4.6dB (1-18GHz);± 4.8dB (18-40GHz)

Remark:
The U_{lab} (lab Uncertainty) is less than $U_{cispr/ETSI}$ (CISPR/ETSI Uncertainty), so the test results
– compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
– non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

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4.4 Test Location

All tests were performed at:

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Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• VCCI (Member No. 1937)

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen EMC laboratory have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

• FCC –Designation Number: CN1336

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1336. Test Firm Registration Number: 787754.

• Innovation, Science and Economic Development Canada

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

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5 Equipment List

20dB Bandwidth					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
DC Power Supply	Chroma	62012P-80-60	SEM011-11	2023-10-19	2024-10-18
MXA Signal Analyzer	KEYSIGHT	N9020A	SEM004-19	2024-03-14	2025-03-13
Measurement Software	TST PASS	TST PASS V2.0	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-01	2023-07-07	2024-07-06
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	2023-03-31 2024-03-27	2024-03-30 2025-03-26
Programmable Temperature & Humidity Chamber	Votsch Industrietechnik GmbH	VT 4002	SEM002-15	2024-03-19	2025-03-18

Dwell Time (15.231(a))					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
DC Power Supply	Chroma	62012P-80-60	SEM011-11	2023-10-19	2024-10-18
MXA Signal Analyzer	KEYSIGHT	N9020A	SEM004-19	2024-03-14	2025-03-13
Measurement Software	TST PASS	TST PASS V2.0	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-01	2023-07-07	2024-07-06
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	2023-03-31 2024-03-27	2024-03-30 2025-03-26
Programmable Temperature & Humidity Chamber	Votsch Industrietechnik GmbH	VT 4002	SEM002-15	2024-03-19	2025-03-18

Field Strength of the Fundamental Signal (15.231(b))					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2023-06-19	2026-06-18
MXE EMI Receiver	Agilent Technologies	N9038A	SEM004-15	2023-10-19	2024-10-18
BiConiLog Antenna	ETS-LINDGREN	3142C	SEM003-01	2023-09-16	2025-09-15
Pre-Amplifier	Agilent Technologies	8447D	SEM005-01	2024-03-14	2025-03-13
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM025-01	2023-07-07	2024-07-06

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Radiated Emissions below 1GHz					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
Loop Antenna	ETS-Lindgren	6502	SEM003-08	2023-11-20	2025-11-19
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2023-06-19	2026-06-18
MXE EMI Receiver	Agilent Technologies	N9038A	SEM004-15	2023-10-19	2024-10-18
BiConiLog Antenna	ETS-LINDGREN	3142C	SEM003-01	2023-09-16	2025-09-15
Pre-Amplifier	Agilent Technologies	8447D	SEM005-01	2024-03-14	2025-03-13
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM025-01	2023-07-07	2024-07-06

Radiated Emissions above 1GHz					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
3m Fully-Anechoic Chamber	AUDIX	N/A	SEM001-02	2023-04-01	2026-03-31
Signal Analyzer	Rohde & Schwarz	FSV40	SEM008-04	2024-03-15	2025-03-14
Horn Antenna	Rohde&Schwarz	HF907	SEM003-07	2023-07-23	2025-07-22
Microwave system amplifier	Agilent	83017A	SEM005-25	2023-09-19	2024-09-18
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2023-07-07	2024-07-06

General used equipment					
Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal Date**	**Cal Due Date**
Humidity/ Temperature Indicator	deli	8838	SEM002-32	2023-07-28	2024-07-27
Humidity/ Temperature Indicator	deli	8838	SEM002-33	2023-07-28	2024-07-27
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2024-03-18	2025-03-17

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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203

6.1.2 Conclusion

15.203 requirement:

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, 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.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement.

Antenna location: Refer to Internal photos

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7 Radio Spectrum Matter Test Results

7.1 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.231(c)
Test Method: ANSI C63.10 (2013) Section 6.9

Limit:

Frequency range(MHz)	Limit
70-900	No wider than 0.25% of the center frequency
Above 900	No wider than 0.5% of the center frequency

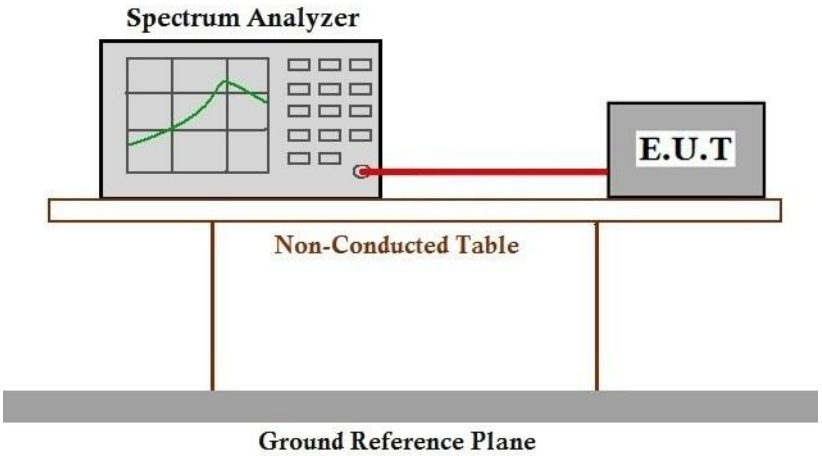
7.1.1 E.U.T. Operation

Operating Environment:
Temperature: 23.2 °C Humidity: 52.3 % RH Atmospheric Pressure: 1020 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in transmitting with modulation mode.

7.1.3 Test Setup Diagram



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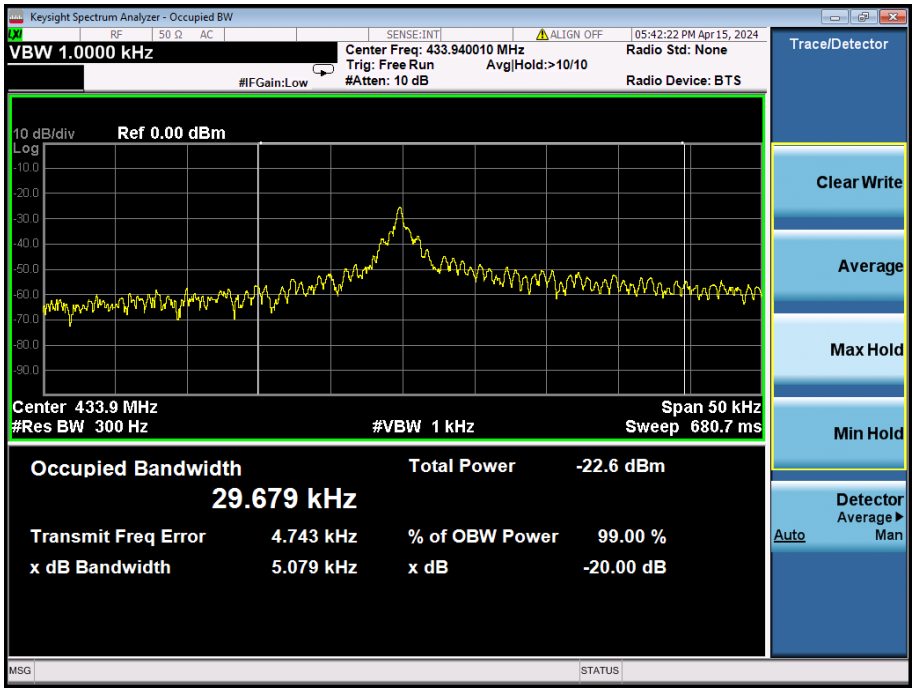
7.1.4 Measurement Procedure and Data

Test channel	20dB Bandwidth (KHz)	Limit (KHz)	Results
433.92MHz	5.079	1084.9	Pass



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7.2 Radiated Emissions

Test Requirement 47 CFR Part 15C Section 15.231(b) and 15.209
Test Method: ANSI C63.10 (2013) Section 6.4&6.5&6.6
Measurement Distance: 3m

Limit:

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
Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.		

7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 23.2 °C Humidity: 52.9 % RH Atmospheric Pressure: 1020 mbar

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in transmitting with modulation mode.

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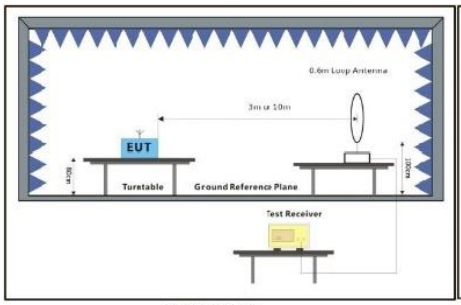
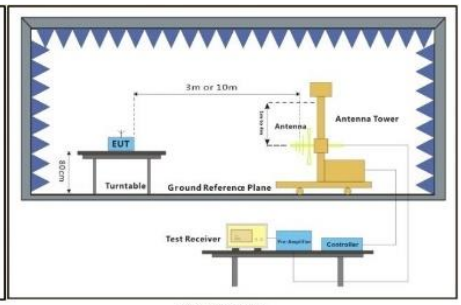
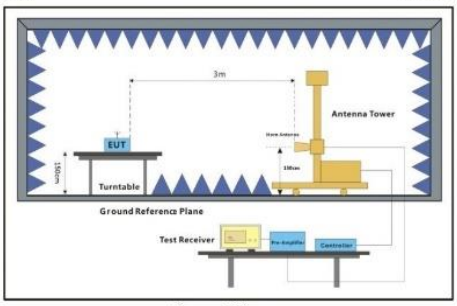
7.2.3 Test Setup Diagram



Below 30MHz



30MHz-1GHz



Above 1GHz

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7.2.4 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

Remark:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows: Final Test Level =Receiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor

2) Scan from 9kHz to 1GHz, the disturbance below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

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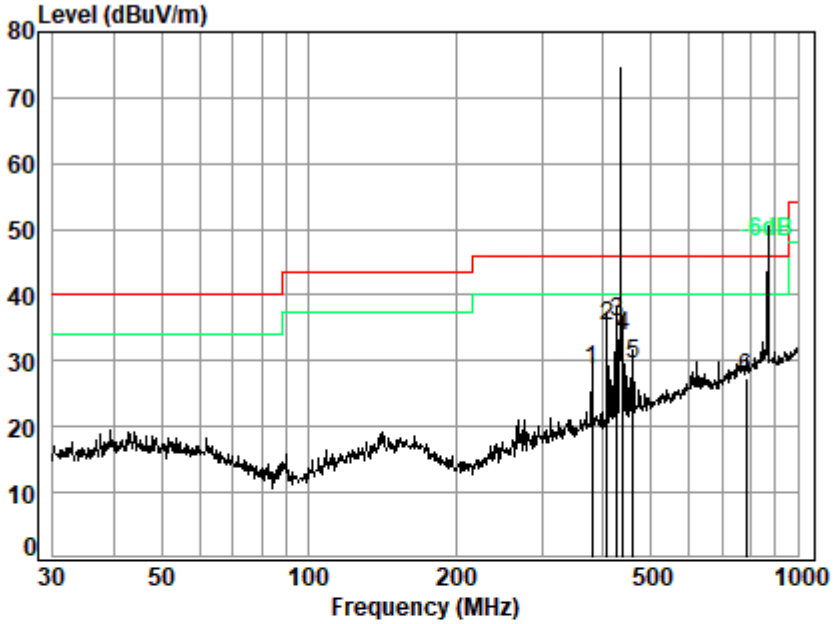
Below 1GHz

Test Mode: 00; Polarity: Horizontal



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00906LM
Mode : 00

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	379.91	1.59	19.41	25.68	33.19	28.51	46.00	-17.49	QP
2	407.51	1.62	19.84	25.82	39.50	35.14	46.00	-10.86	QP
3	426.52	1.57	20.44	25.91	39.85	35.95	46.00	-10.05	QP
4	440.20	1.53	20.91	25.97	37.19	33.66	46.00	-12.34	QP
5	460.73	1.49	21.29	26.07	32.83	29.54	46.00	-16.46	QP
6	782.35	2.47	26.21	26.42	25.09	27.35	46.00	-18.65	QP

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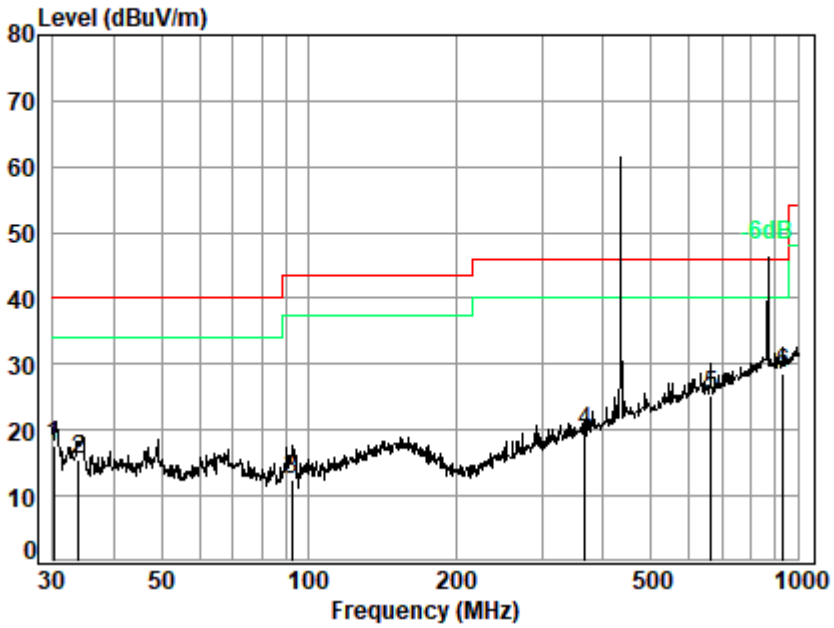
Test Mode: 00; Polarity: Vertical



Site : chamber
Condition: 3m VERTICAL
Job No : 00906LM
Mode : 00

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	30.11	0.20	16.64	25.90	26.64	17.58	40.00	-22.42	QP
2	33.92	0.22	17.13	25.89	24.04	15.50	40.00	-24.50	QP
3	92.46	0.69	12.04	25.81	25.60	12.52	43.50	-30.98	QP
4	366.82	1.56	19.00	25.61	24.73	19.68	46.00	-26.32	QP
5	663.47	2.04	24.43	26.53	25.31	25.25	46.00	-20.75	QP
6	935.55	2.24	27.64	25.77	24.52	28.63	46.00	-17.37	QP

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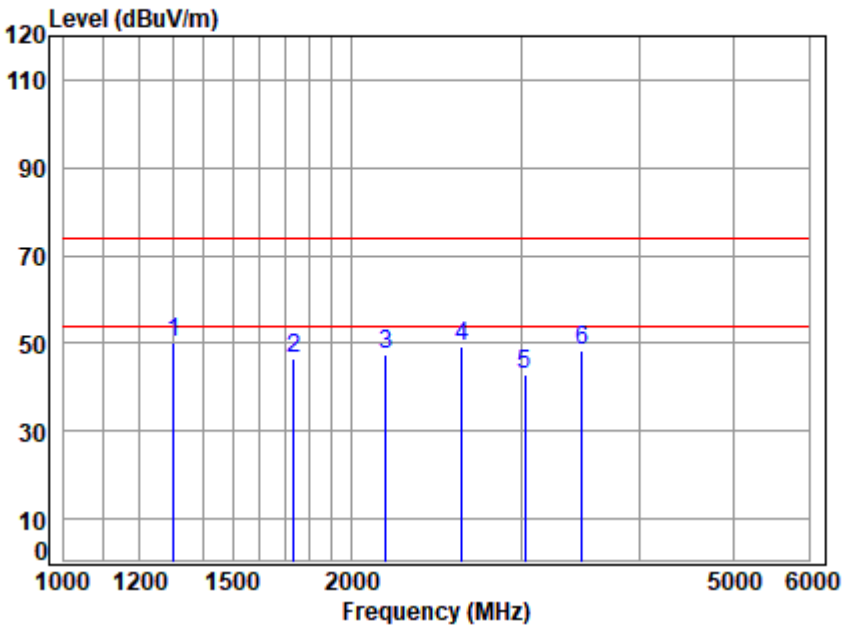
Above 1GHz:

Test Mode: 00; Polarity: Horizontal



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00906LM
Mode : 00
Note :

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1300.86	3.42	24.30	52.73	75.07	50.06	74.00	-23.94	Peak
2	1736.83	4.32	25.07	52.98	70.35	46.76	74.00	-27.24	Peak
3	2169.73	5.03	26.60	53.10	69.09	47.62	74.00	-26.38	Peak
4	2603.13	5.41	27.71	53.10	69.45	49.47	74.00	-24.53	Peak
5	3034.06	7.21	28.80	52.92	59.72	42.81	74.00	-31.19	Peak
6	3475.54	8.42	32.76	52.91	60.00	48.27	74.00	-25.73	Peak

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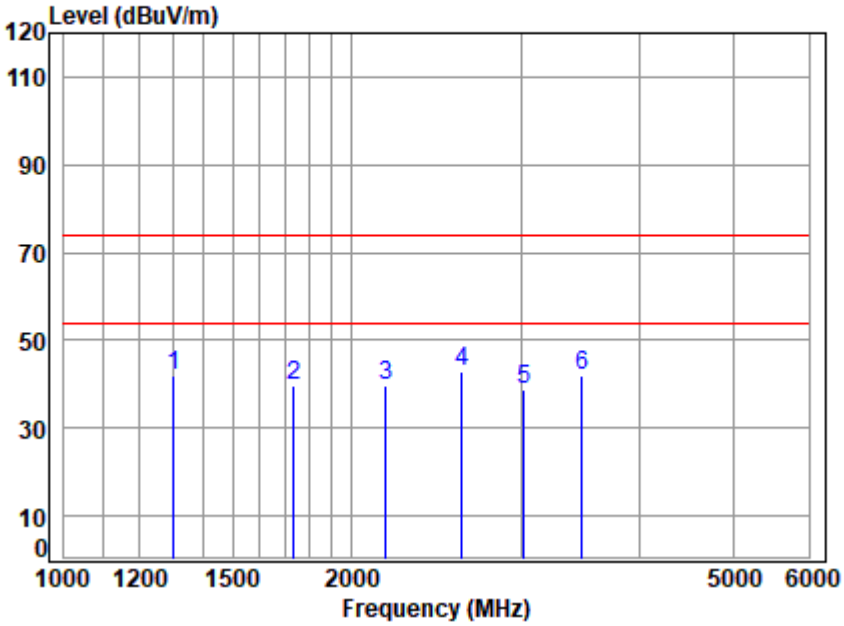
Test Mode: 00; Polarity: Vertical



Site : chamber
Condition: 3m VERTICAL
Job No : 00906LM
Mode : 00
Note :

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1300.86	3.42	24.30	52.73	66.89	41.88	74.00	-32.12	Peak
2	1736.83	4.31	25.07	52.98	63.15	39.55	74.00	-34.45	Peak
3	2169.77	5.03	26.60	53.10	61.25	39.78	74.00	-34.22	Peak
4	2603.13	5.41	27.71	53.10	62.73	42.75	74.00	-31.25	Peak
5	3025.31	7.93	29.50	52.81	54.23	38.85	74.00	-35.15	Peak
6	3475.54	8.36	32.89	52.90	53.76	42.11	74.00	-31.89	Peak

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7.3 Field Strength of the Fundamental Signal (15.231(b))

Test Requirement 47 CFR Part 15, Subpart C 15.231(b)
Test Method: ANSI C63.10 (2013) Section 6.5
Measurement Distance: 3m

Limit:

Fundamental frequency(MHz)	Field strength of fundamental(microvolts/meter)	Field strength of spurious emissions(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
Remark: the emission limit is based on measurement instrumentation employing an average detector at a distance of 3 meters. The frequencies above 1000MHz are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.		

7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 23.2 °C Humidity: 52.9 % RH Atmospheric Pressure: 1020 mbar

7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in transmitting with modulation mode.

Average value:	
Calculate Formula:	Average value=Peak value + PDCF
	PDCF=20 log(Duty cycle)= 20 log[42.40/100]=-7.45dB
	Duty cycle= T on time / T period
Test data:	Ton time =1.2*28+0.4*22=42.40ms
	T period =100ms

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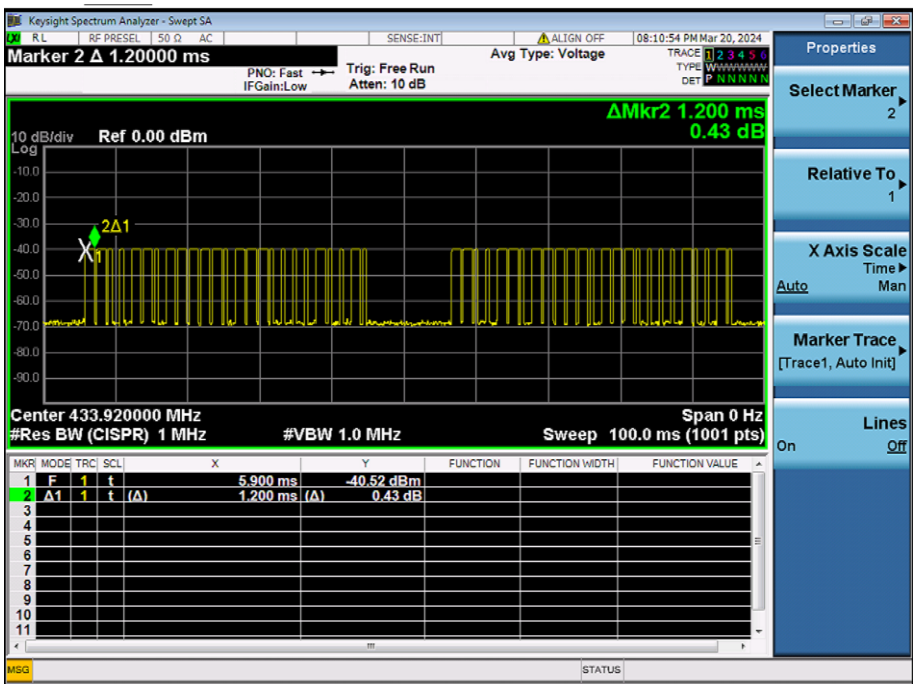

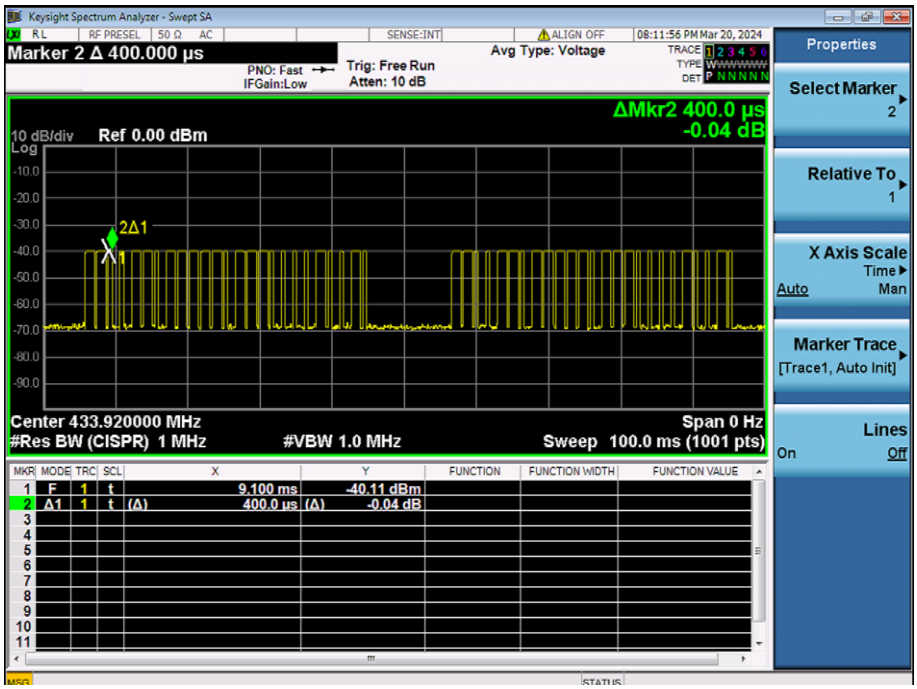

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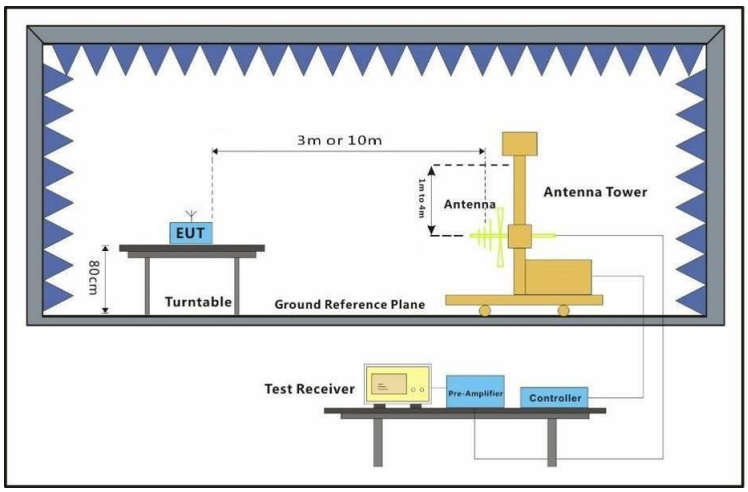
7.3.3 Test Setup Diagram



7.3.4 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

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Freq (MHz)	Cable_ Loss (dB)	Antenna_ Factor (dB/m)	Preamp_ Gain (dB)	Read_ Level (dBuV)	Level (dBuV/m)	Limit_Line (dBuV/m)	Over_ Limit (dB)	Remark	Pol/ Phase
433.92	1.55	20.74	25.95	78.12	74.46	100.83	-26.37	Peak	Horizontal
433.92	1.55	20.74	25.95	65.10	61.44	100.83	-39.39	Peak	Vertical

Freq (MHz)	PDCF(dB)	Average Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Remark
433.92	-7.45	62.63	80.83	-18.2	Horizontal	Average
433.92		50.01	80.83	-30.82	Vertical	Average

Freq (MHz)	Cable_ Loss (dB)	Antenna_ Factor (dB/m)	Preamp_ Gain (dB)	Read_ Level (dBuV)	Level (dBuV/m)	Limit_Line (dBuV/m)	Over_ Limit (dB)	Remark	Pol/ Phase
867.84	2.75	27.53	26.07	46.17	50.38	80.83	-30.45	Peak	Horizontal
867.84	2.75	27.53	26.07	41.90	46.11	80.83	-34.72	Peak	Vertical

Freq (MHz)	PDCF(dB)	Average Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	Remark
867.84	-7.45	42.93	60.83	-17.9	Horizontal	Average
867.84		38.66	60.83	-22.17	Vertical	Average

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8 Test Setup Photo

Refer to Appendix - Test Setup Photo for SZCR2403000906LM

9 EUT Constructional Details (EUT Photos)

Refer to Appendix - external and internal photos for SZCR2403000906LM

- End of the Report -

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