

TEST REPORT

Application No.: SZEM2007006722CR
Applicant: LINGSHENG TOYS FACTORY
Address of Applicant: Lianxia Town, Chenghai District, Shantou City, Guangdong Province, 515800, China
Manufacturer: LINGSHENG TOYS FACTORY
Address of Manufacturer: Lianxia Town, Chenghai District, Shantou City, Guangdong Province, 515800, China
Equipment Under Test (EUT):
EUT Name: REMOTE CONTROL CAR SERIES
Model No.: Please refer to section 2 ♣
 ♣ Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.
FCC ID: 2AT3ILS93589
Standard(s) : 47 CFR Part 15, Subpart C 15.235
Date of Receipt: 2020-07-20
Date of Test: 2020-07-21 to 2020-08-05
Date of Issue: 2020-08-10

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu

Keny Xu
EMC Laboratory Manager



Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2020-08-10		Original

Authorized for issue by:			
			
		<hr/> Peter Geng /Project Engineer	
			
		<hr/> Eric Fu /Reviewer	

2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.235	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 15.235	ANSI C63.10 (2013) Section 6.9	47 CFR Part 15, Subpart C 15.215	Pass
Field Strength of the Fundamental Signal (15.235(a))	47 CFR Part 15, Subpart C 15.235	ANSI C63.10 (2013) Section 6.4	47 CFR Part 15, Subpart C 15.235	Pass
Radiated Emissions (9kHz-30MHz)	47 CFR Part 15, Subpart C 15.235	ANSI C63.10 (2013) Section 6.4 & 6.5	47 CFR Part 15, Subpart C 15.235 & 15.209	Pass
Radiated Emissions (30MHz-1GHz)	47 CFR Part 15, Subpart C 15.235	ANSI C63.10 (2013) Section 6.4 & 6.5	47 CFR Part 15, Subpart C 15.235 & 15.209	Pass

Remark:

Model No.: 955-31, 955-32, 955-33, 955-35, 955-36, 955-38, 955-39, 955-50, 955-51, 955-52, 955-53, 955-55, 955-56, 955-58, 955-59, 955-60, 955-61, 955-62, 955-63, 955-65, 955-66, 955-68, 955-69, 955-80, 955-81, 955-82, 955-83, 955-85, 955-86, 955-88, 955-89, 955-90, 955-91, 955-92, 955-93, 955-95, 955-96, 955-98, 955-99, 955-100, 955-101, 955-102, 955-103, 955-105, 955-106, 955-108, 955-109, 955-110, 955-111, 955-112, 955-113, 955-115, 955-116, 955-118, 955-119, 955-120, 955-121, 955-122, 955-123, 955-125, 955-126, 955-128, 955-129, 955-130, 955-131, 955-132, 955-133, 955-135, 955-136, 955-138, 955-139, 955-150, 955-151, 955-152, 955-153, 955-155, 955-156

Only the model 955-89 was tested, since according to the declaration from the applicant, the electrical circuit design, layout, components used, internal wiring and functions were identical for all the above models, with only difference on color, appearance and packaging.



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4 General Information

4.1 Details of E.U.T.

Power Supply:	remote: DC 3V by 2x1.5V "AA" batteries
Operation Frequency:	49.86MHz
Antenna Type:	Integral antenna

4.2 Description of Support Units

The EUT has been tested as an independent unit.

4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 7.25 \times 10^{-8}$
2	Duty cycle	$\pm 0.37\%$
3	Occupied Bandwidth	$\pm 3\%$
4	Conduction emission	$\pm 3.0\text{dB}$ (150kHz to 30MHz)
5	RF conducted power	$\pm 0.75\text{dB}$
6	RF power density	$\pm 2.84\text{dB}$
7	Conducted Spurious emissions	$\pm 0.75\text{dB}$
8	RF Radiated power	$\pm 4.5\text{dB}$ (Below 1GHz)
		$\pm 4.8\text{dB}$ (Above 1GHz)
9	Radiated Spurious emission test	$\pm 4.5\text{dB}$ (Below 1GHz)
		$\pm 4.8\text{dB}$ (Above 1GHz)
10	Temperature test	$\pm 1^\circ\text{C}$
11	Humidity test	$\pm 3\%$
12	Supply voltages	$\pm 1\%$
13	Time	$\pm 3\%$

4.4 Test Location

All tests were performed at:

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No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

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**

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. 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: CN1178**

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

Designation Number: CN1178. Test Firm Registration Number: 406779.

- **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

Field Strength of the Fundamental Signal (15.235(a))					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2020-07-19	2023-07-18
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM025-01	2020-07-10	2021-07-09
MXE EMI receiver	KEYSIGHT	N9038A	SEM004-15	2019-12-16	2020-12-15
BiConiLog Antenna	ETS-LINDGREN	3142C	SEM003-02	2019-05-24	2022-05-23
Pre-amplifier	Agilent Technologies	8447D	SEM005-01	2020-04-01	2021-03-31

Radiated Emissions(30MHz-1GHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2020-07-19	2023-07-18
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM025-01	2020-07-10	2021-07-09
MXE EMI receiver	KEYSIGHT	N9038A	SEM004-15	2019-12-16	2020-12-15
BiConiLog Antenna	ETS-LINDGREN	3142C	SEM003-02	2019-05-24	2022-05-23
Pre-amplifier	Agilent Technologies	8447D	SEM005-01	2020-04-01	2021-03-31



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RF conducted test

Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (yyyy-mm-dd)	Cal. Due date (yyyy-mm-dd)
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2022-06-12
DC Power Supply	ZhaoXin	PS-3005D	SEM011-05	2019-09-24	2020-09-23
Spectrum Analyzer (20Hz-43GHz)	Rohde & Schwarz	FSU43	SEM004-08	2020-04-01	2021-03-31
Signal Generator (9kHz-40GHz)	KEYSIGHT	N5173B	SEM006-05	2019-09-28	2020-09-27
Measurement Software	JS Tonscend	JS1120-2 BT/WIFI V2.6	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-01	2020-07-10	2021-07-09
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	N/A	N/A
Programmable Temperature & Humidity Chamber	Votsch Industrietechnik GmbH	VT 4002	SEM002-15	2020-03-25	2021-03-24

General used equipment

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-03	2019-09-26	2020-09-25
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2019-09-26	2020-09-25
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2019-09-26	2020-09-25
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2020-04-07	2021-04-06



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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

Standard 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 antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit permanently attached antenna or of an 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.

7 Radio Spectrum Matter Test Results

7.1 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.215

Test Method: ANSI C63.10 (2013) Section 6.9

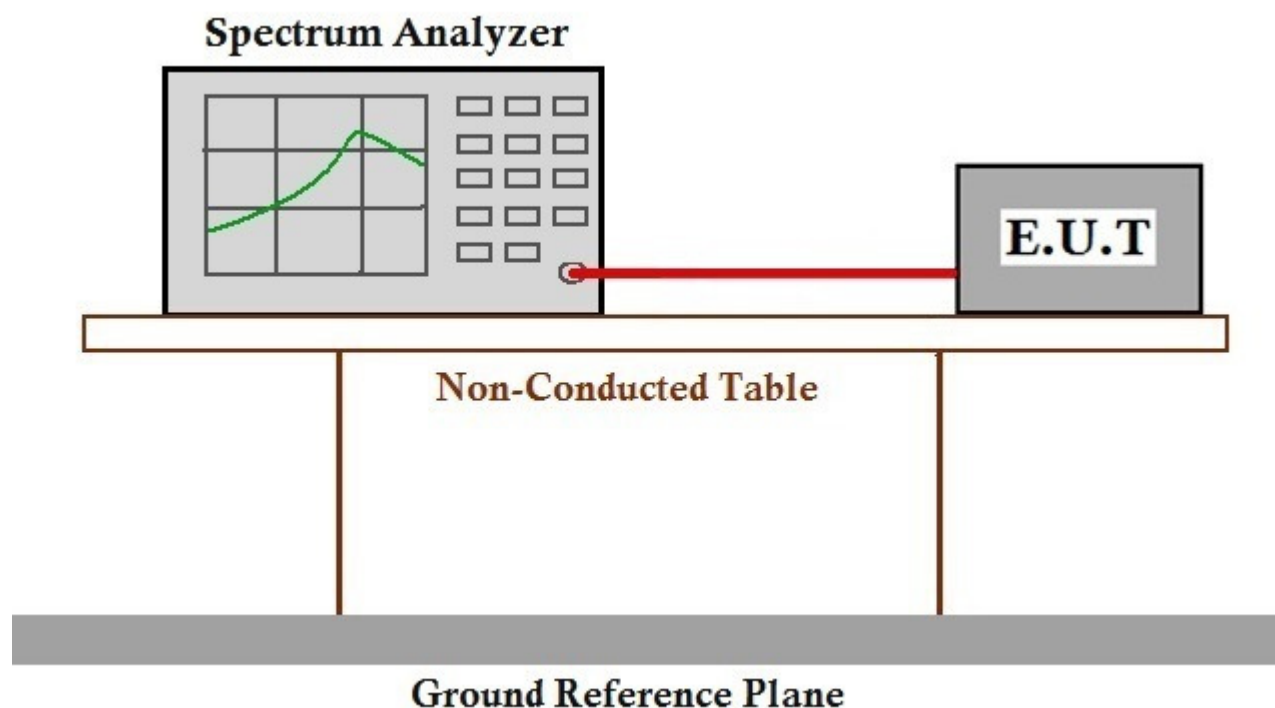
7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 25.9 °C Humidity: 53 % RH Atmospheric Pressure: 1010 mbar

Test mode b:TX mode_Keep the EUT in transmitting with modulation mode.

7.1.2 Test Setup Diagram



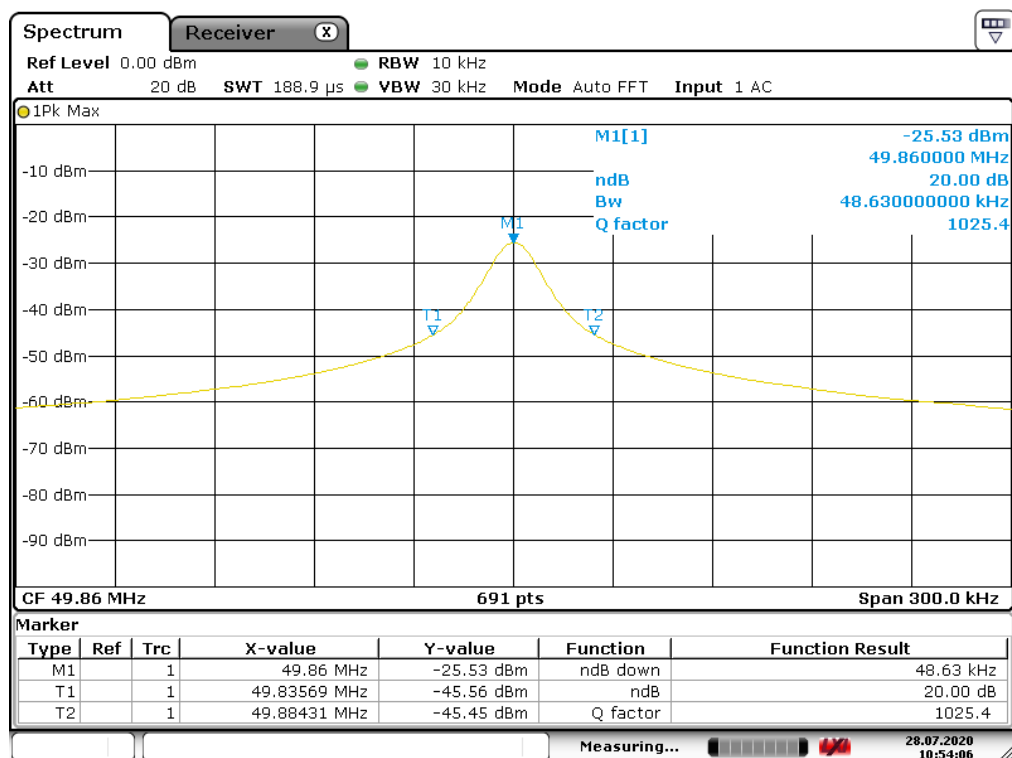
7.1.3 Measurement Procedure and Data



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Mode b:



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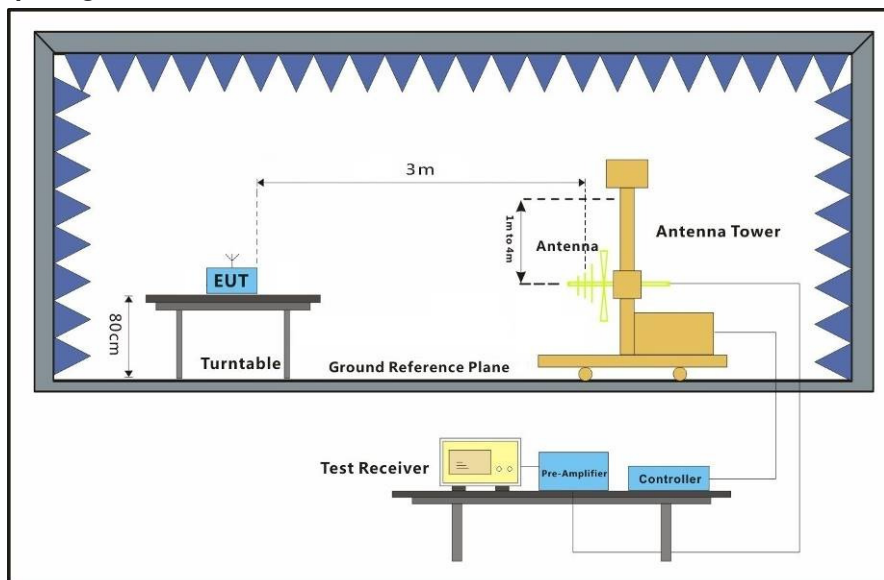
7.2 Field Strength of the Fundamental Signal (15.235(a))

Test Requirement 47 CFR Part 15, Subpart C 15.235
 Test Method: ANSI C63.10 (2013) Section 6.4
 Measurement Distance: 3m
 Limit: ≤ 10000 microvolts/meter at 3 meters, the emission limit is based on measurement instrumentation employing an average Detector. The provisions in § 15.35 for limiting peak emissions apply.

7.2.1 E.U.T. Operation

Operating Environment:
 Temperature: 25.9 °C Humidity: 53 % RH Atmospheric Pressure: 1010 mbar
 Test mode b:TX mode_Keep the EUT in transmitting with modulation mode.

7.2.2 Test Setup Diagram

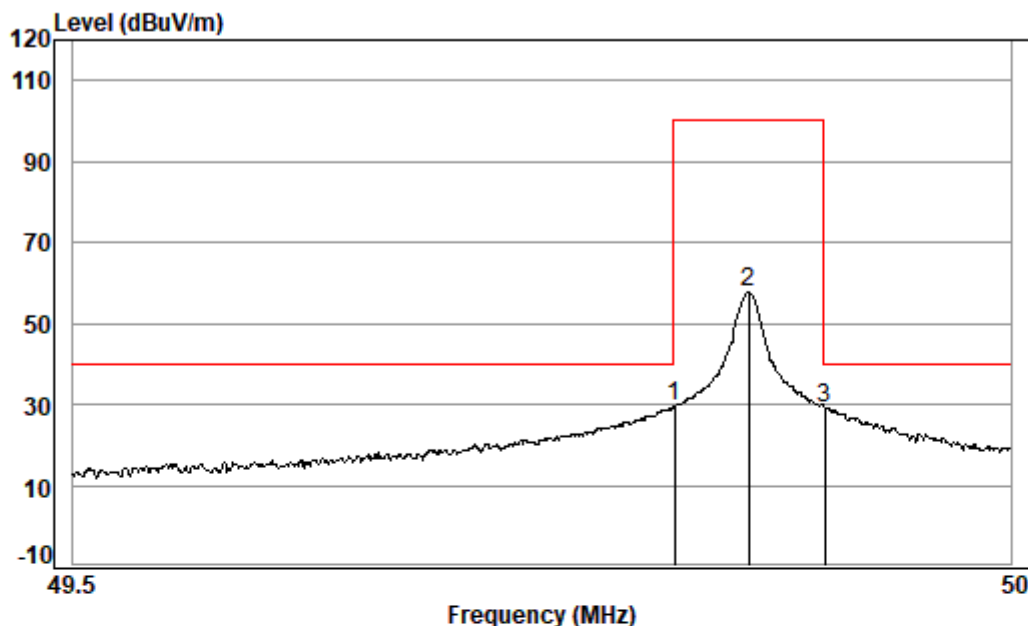


7.2.3 Measurement Procedure and Data

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground for below 1Ghz at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. 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.
- d. 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.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. 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.
- g. 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

Mode:b; Polarization:Horizontal



Condition: 3m HORIZONTAL

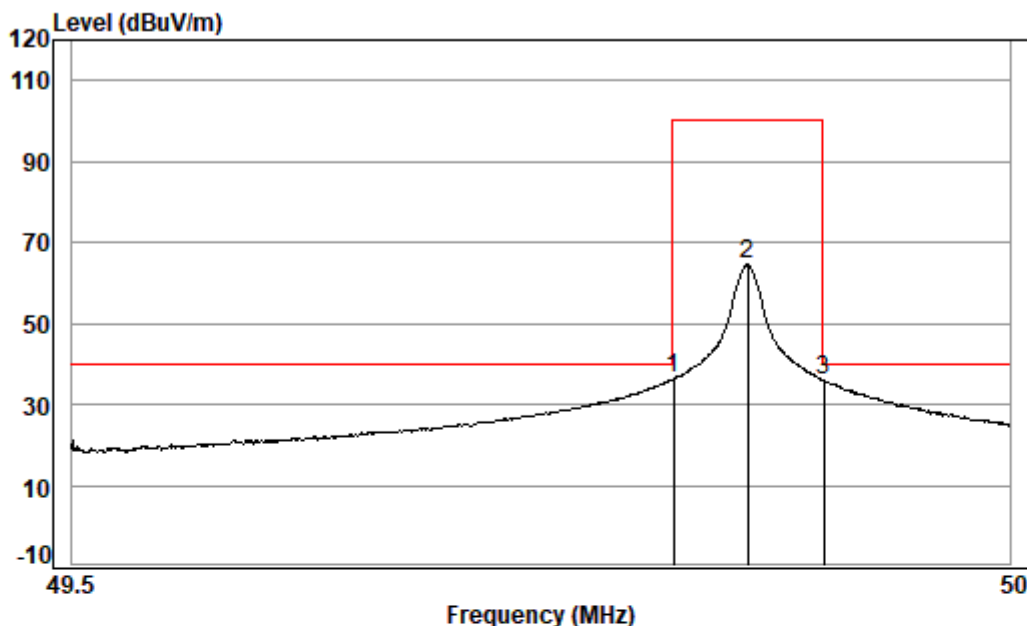
Job No. : 06722CR

Test mode: TX

		Cable	Ant	Preamp	Read	Limit	Over	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	49.82	0.80	14.25	27.69	42.04	29.40	100.00	-70.60
2	49.86	0.80	14.24	27.69	70.39	57.74	100.00	-42.26
3 pp	49.90	0.80	14.23	27.69	41.73	29.07	40.00	-10.93



Mode:b; Polarization:Vertical



Condition: 3m VERTICAL

Job No. : 06722CR

Test mode: TX

		Cable	Ant	Preamp	Read	Limit	Over	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	49.82	0.80	14.25	27.69	49.24	36.60	100.00	-63.40
2	49.86	0.80	14.24	27.69	77.15	64.50	100.00	-35.50
3 pp	49.90	0.80	14.23	27.69	48.80	36.14	40.00	-3.86



7.3 Radiated Emissions(9kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.235 & 15.209

Test Method: ANSI C63.10 (2013) Section 6.4 & 6.5

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
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 above 1000MHz. Radiated emission limits above 1000MHz is based on measurements employing an average detector.

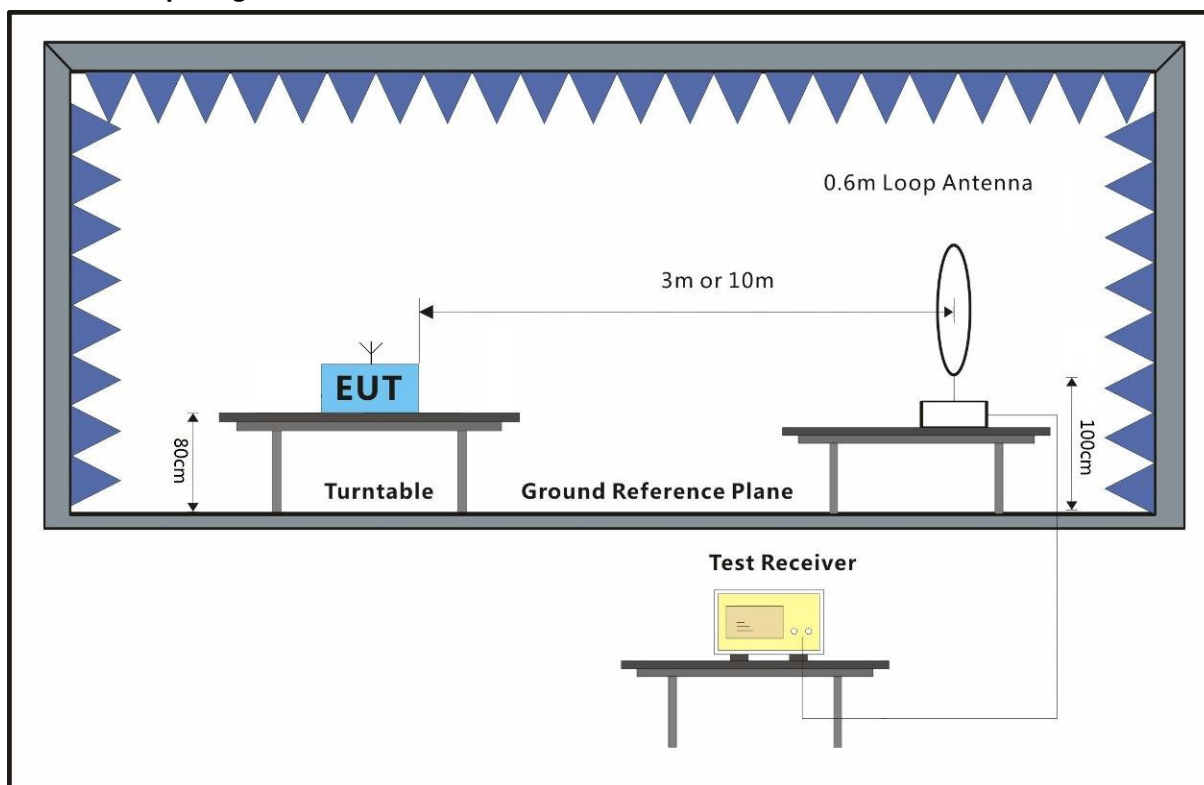
7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 25.9 °C Humidity: 53 % RH Atmospheric Pressure: 1010 mbar

Test mode b:TX mode_Keep the EUT in transmitting with modulation mode.

7.3.2 Test Setup Diagram



7.3.3 Measurement Procedure and Data

For testing performed with the loop antenna, the center of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane. All emissions has more than 10 dB margins, so it is deemed to comply with the requirement without submitting the test data



7.4 Radiated Emissions(30MHz-1GHz)

Test Requirement 47 CFR Part 15, Subpart C 15.235 & 15.209

Test Method: ANSI C63.10 (2013) Section 6.4 & 6.5

Measurement Distance: 3m

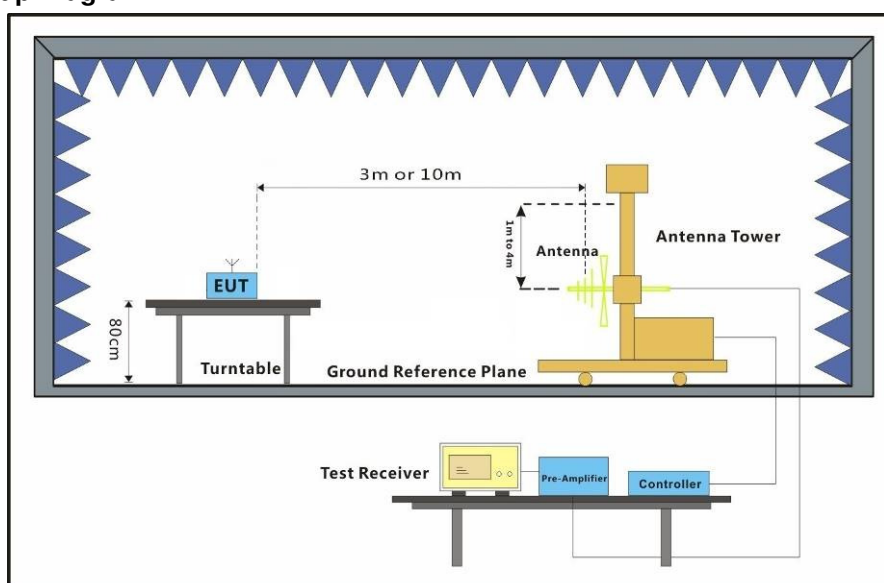
7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 25.9 °C Humidity: 53 % RH Atmospheric Pressure: 1010 mbar

Test mode b:TX mode_Keep the EUT in transmitting with modulation mode.

7.4.2 Test Setup Diagram

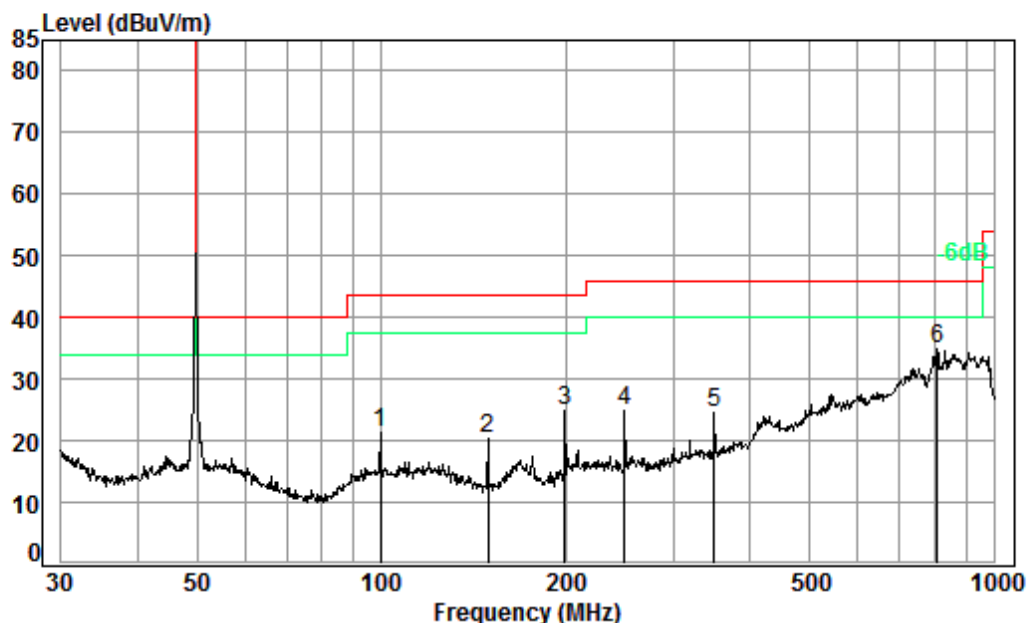


7.4.3 Measurement Procedure and Data

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground for below 1Ghz at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. 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.
- d. 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.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. 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.
- g. 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

Mode:b; Polarization:Horizontal



Condition: 3m HORIZONTAL

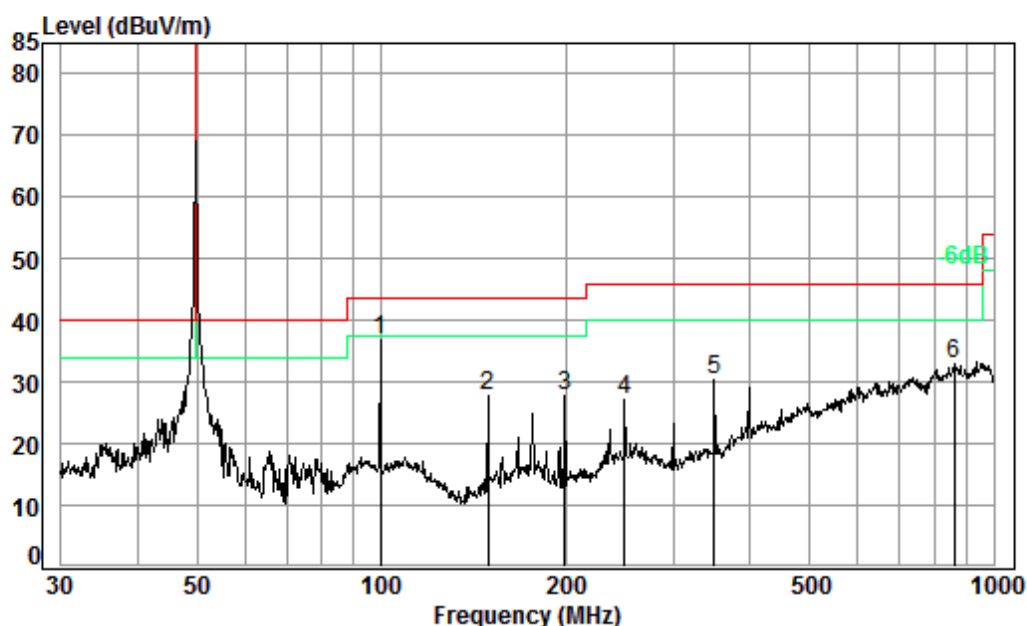
Job No. : 06722CR

Test mode: b

	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	99.53	1.19	13.96	27.51	33.60	21.24	43.50	-22.26	QP
2	149.49	1.32	14.58	27.52	31.91	20.29	43.50	-23.21	QP
3	199.29	1.40	16.48	27.53	34.51	24.86	43.50	-18.64	QP
4	249.43	1.67	18.94	27.53	31.78	24.86	46.00	-21.14	QP
5	349.25	2.06	21.08	27.64	28.91	24.41	46.00	-21.59	QP
6 pp	807.43	3.24	28.60	27.39	30.35	34.80	46.00	-11.20	QP



Mode:b; Polarization:Vertical



Condition: 3m VERTICAL

Job No. : 06722CR

Test mode: b

	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 pp	99.53	1.19	13.96	27.51	49.22	36.86	43.50	-6.64	QP
2	149.49	1.32	14.58	27.52	39.42	27.80	43.50	-15.70	QP
3	199.29	1.40	16.48	27.53	37.42	27.77	43.50	-15.73	QP
4	249.43	1.67	18.94	27.53	33.93	27.01	46.00	-18.99	QP
5	349.25	2.06	21.08	27.64	34.95	30.45	46.00	-15.55	QP
6	863.06	3.46	29.34	27.20	27.30	32.90	46.00	-13.10	QP



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8 Photographs

8.1 Test Setup

Please refer to setup photos.

8.2 EUT Constructional Details (EUT Photos)

Please Refer to external and internal photos for details.

- End of the Report -

