SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch

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Email: ee.shenzhen@sgs.com

TEST REPORT

Application No.:	SZEM1705004430CR (SGS SZ No.:T51710220015EM)
Applicant:	SHANTOU CITY CHENGHAI ZONE NEWQIDA TOYS FACTORY CO., LTD.
Address of Applicant:	YUTING ROAD, CHENGHUA, CHENGHAI ZONE, SHANTOU CITY, GUANGDONG, CHINA
Equipment Under Test (EUT):	
EUT Name:	R/C BOAT
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:	T9TAIY3Y820021
Standards:	47 CFR Part 15, Subpart C 15.227
Date of Receipt:	2017-05-11
Date of Test:	2017-05-16 to 2017-06-08
Date of Issue:	2017-06-09
Test Result :	**Pass**

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

Jack Zhang
EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.
If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

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Revision Record				
Version	***Chapter***	***Date***	***Modifier***	***Remark***
01		*2017-06-09*		*Original*

Authorized for issue by:				
		Leo Li **Leo Li /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 15.227	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 15.227	ANSI C63.10 (2013) Section 6.9	47 CFR Part 15, Subpart C 15.215	Pass
Field Strength of the Fundamental Signal (15.227(a))	47 CFR Part 15, Subpart C 15.227	ANSI C63.10 (2013) Section 6.4	47 CFR Part 15, Subpart C 15.227(a)	Pass
Radiated Emissions (9kHz-30MHz)	47 CFR Part 15, Subpart C 15.227	ANSI C63.10 (2013) Section 6.4&6.5	47 CFR Part 15, Subpart C 15.227(b) & C 15.209	Pass
Radiated Emissions (30MHz-1GHz)	47 CFR Part 15, Subpart C 15.227	ANSI C63.10 (2013) Section 6.4&6.5	47 CFR Part 15, Subpart C 15.227(b) & C 15.209	Pass

Declaration of EUT Family Grouping:

Model No.: Y820021, 757T-018, 757T-018C, 757T-022, 757T-022C, 757T-028, 757T-028C, 757T-065(2.4G), 757-059, 757T-4020(2.4G), 757T-4021A, 757T-4021B, 757T-4022, 757T-4023, 757T-6030(2.4G), 757T-6300(2.4G), 757T-6034(2.4G), 757T-6029, 757T-6031, 757T-6023, 757T-6024, 757T-6038, 757T-6011(2.4G), 757T-6012, 757T-6013, 757T-6016(2.4G), 757T-6018, 757T-6019, 757T-058, 757T-068,757T-600, 757T-048, 757T-049, 757T-4024, 757T-4011, 757T-4012, 757T-4013, 757T-4014, 757T-4015(2.4G), 757T-4016, M018, M019, M020, 757T-5018, 757T-5019, 757T-5020, 757T-5021, 757T-5022, 757T-5023, 757T-5024, 757T-5025, 757T-6032

Only the model Y820021 was tested, since the electrical circuit design, layout, components used, internal wiring and functions were identical for all the above models, with only difference on number.

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4 General Information

4.1 Details of E.U.T.

Product Name:	R/C BOAT
Model No.:	Y820021
Operation Frequency	27.145MHz
Modulation Type:	FM
Number of Channels:	1
Antenna Type:	Wire
Antenna Gain:	0dBi
Power supply:	DC 9.0V(9.0x1"6F22"Battery)
Test voltage	DC 9.0V

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	7.25 x 10-8
2	Duty cycle	0.37%
3	Occupied Bandwidth	3%
4	RF conducted power	0.75dB
5	RF power density	2.84dB
6	Conducted Spurious emissions	0.75dB
7	RF Radiated power	4.5dB (below 1GHz)
		4.8dB (above 1GHz)
8	Radiated Spurious emission test	4.5dB (30MHz-1GHz)
		4.8dB (1GHz-18GHz)
9	Temperature test	1℃
10	Humidity test	3%
11	Supply voltages	1.5%
12	Time	3%

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4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

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:

• **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• **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 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-823, R-4188, T-1153 and C-2383 respectively.

• **FCC – Registration No.: 556682**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 556682.

• **Industry Canada (IC)**

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

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5 Equipment List

RF connected test					
Test Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal. Date (yyyy-mm-dd)**	**Cal. Due date (yyyy-mm-dd)**
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2016-10-09	2017-10-09
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2016-10-09	2017-10-09
Signal Generator	Rohde & Schwarz	SML03	SEM006-02	2017-04-14	2018-04-14
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2016-10-09	2017-10-09

20dB Bandwidth					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2016-10-09	2017-10-09
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2016-10-09	2017-10-09

Field Strength of the Fundamental Signal (15.227(a))					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2017-05-10	2018-05-10
EMI Test Receiver	Agilent Technologies	N9038A	SEM004-05	2016-10-09	2017-10-09
BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEM003-01	2014-11-01	2017-11-01
Double-ridged horn (1-18GHz)	ETS-LINDGREN	3117	SEM003-11	2015-10-17	2018-10-17
Horn Antenna (18-26GHz)	ETS-LINDGREN	3160	SEM003-12	2014-11-24	2017-11-24

Radiated Emissions(9kHz-30MHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
10m Semi-Anechoic Chamber	SAEMC	FSAC1018	SEM001-03	2017-05-10	2018-05-10
EMI Test Receiver (9k-3GHz)	Rohde & Schwarz	ESCI	SEM004-01	2017-04-14	2018-04-14
Trilog-Broadband Antenna(30M-1GHz)	Schwarzbeck	VULB9168	SEM003-17	2016-01-26	2019-01-26
Pre-amplifier	Sonoma Instrument Co	310N	SEM005-03	2016-07-06	2017-07-06
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2015-08-14	2018-08-14

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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	2017-05-10	2018-05-10
EMI Test Receiver	Agilent Technologies	N9038A	SEM004-05	2016-10-09	2017-10-09
BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEM003-01	2014-11-01	2017-11-01
Double-ridged horn (1-18GHz)	ETS-LINDGREN	3117	SEM003-11	2015-10-17	2018-10-17
Horn Antenna (18-26GHz)	ETS-LINDGREN	3160	SEM003-12	2014-11-24	2017-11-24

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	2016-10-12	2017-10-12
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2016-10-12	2017-10-12
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2016-10-12	2017-10-12
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2017-04-18	2018-04-18

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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 Requirment:

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. The best case gain of the antenna is 0dBi.

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7 Radio Spectrum Matter Test Results

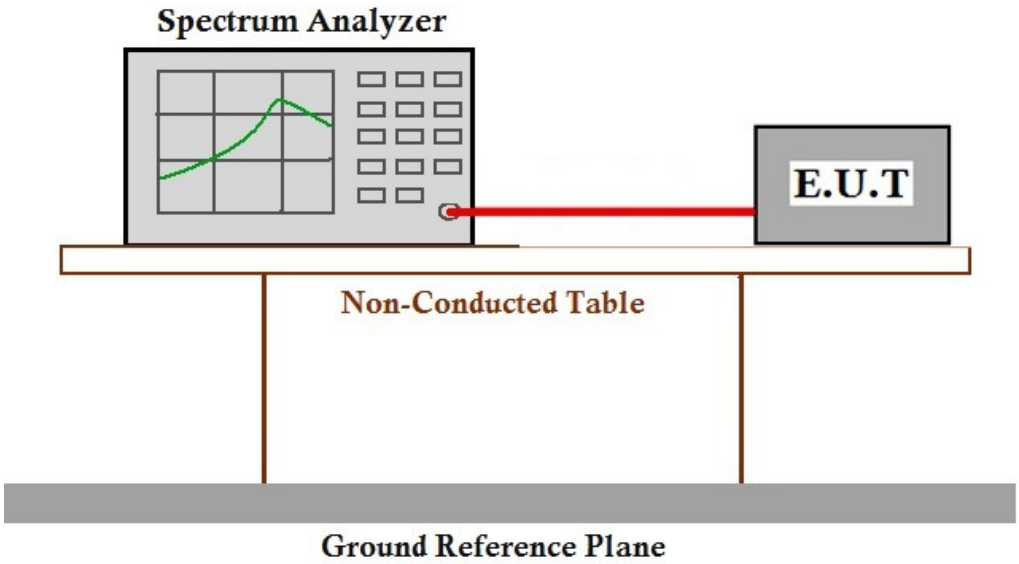
7.1 20dB Bandwidth

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 °C Humidity: 55 % 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

Mode	Frequency（MHz）	-20dB Bandwidth(KHz)	Limit	Conclusion
Tx	27.145	61.300	N/A	Pass

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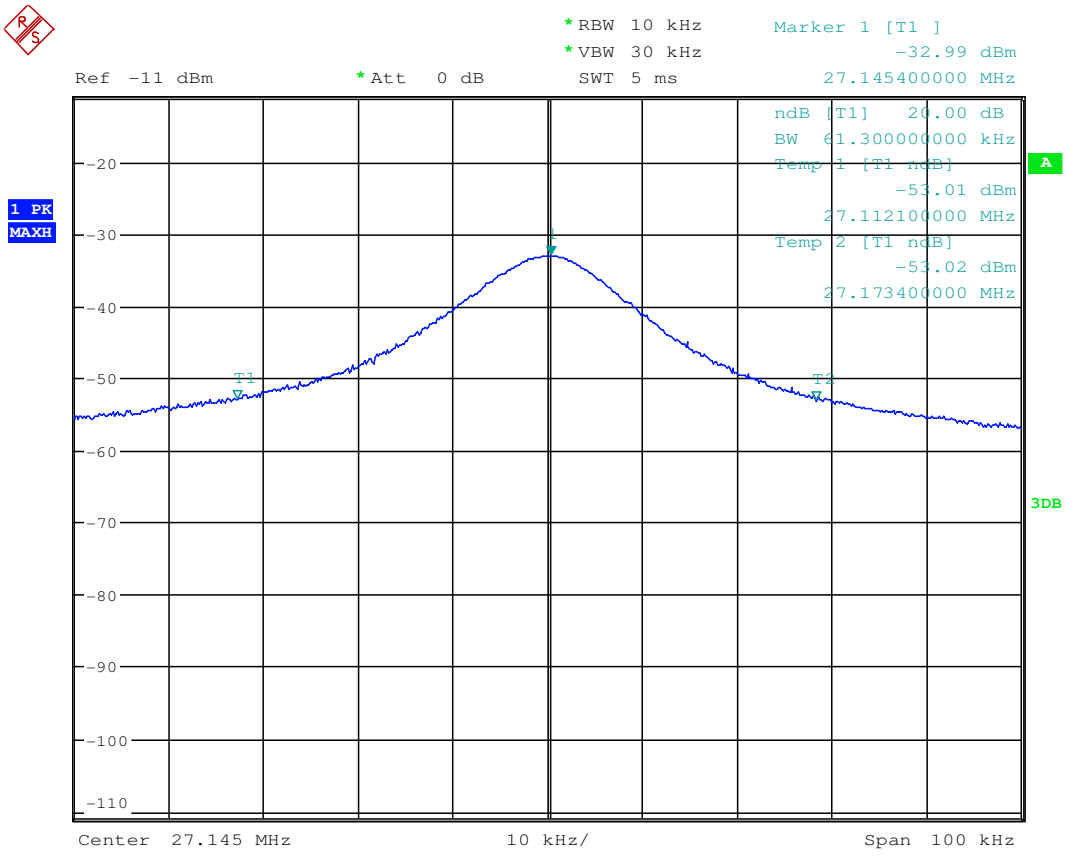
Mode:b



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7.2 Field Strength of the Fundamental Signal (15.227(a))

Test Requirement	47 CFR Part 15, Subpart C 15.227(a)
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.

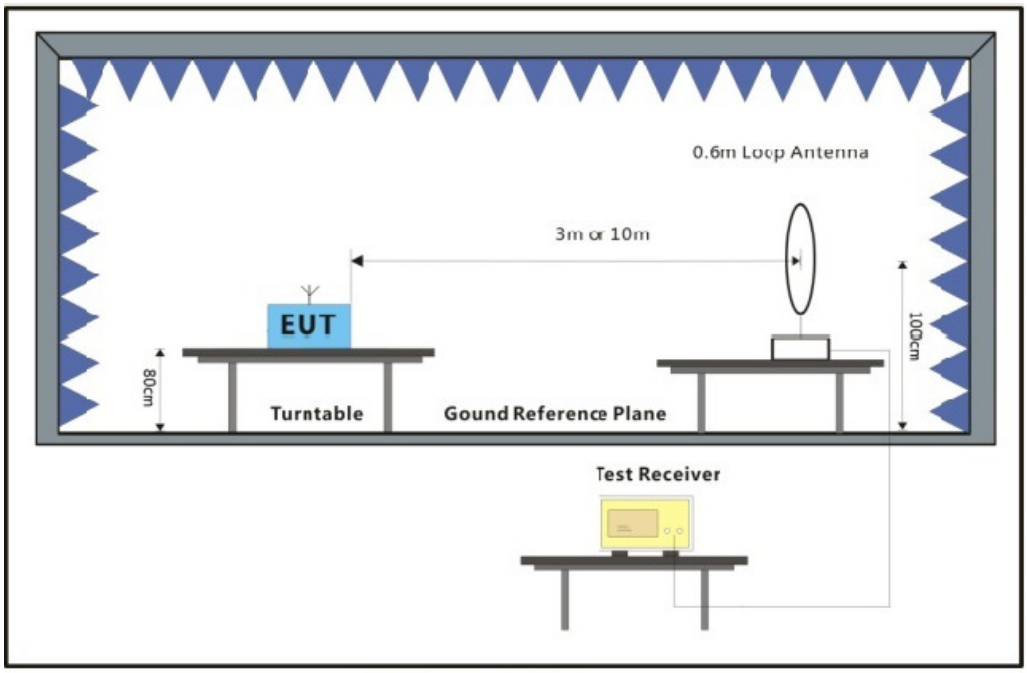
7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 55 % RH Atmospheric Pressure: 1015 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

For testing performed with the loop antenna, 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. Only the worst position of vertical was shown in the report.

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Horizontal

Frequency (MHz)	Cable _Loss (dB)	Antenna factors (dB/m)	Preamp Gain (dB)	Reading Level (dBμV)	Level (dBμV/m)	Limit (dBμV/m)	Over limit (dB)
26.966	0.6	20.67	27.37	72.51	66.41	100	-33.59

Vertical

Frequency (MHz)	Cable _Loss (dB)	Antenna factors (dB/m)	Preamp Gain (dB)	Reading Level (dBμV)	Level (dBμV/m)	Limit (dBμV/m)	Over limit (dB)
26.966	0.6	20.67	27.37	62.93	56.83	100	-43.17

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7.3 Radiated Emissions(9kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.227(b) & C 15.209
Test Method: ANSI C63.10 (2013) Section 6.4&6.5
Measurement Distance: 10m
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
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 and 110-490kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.		

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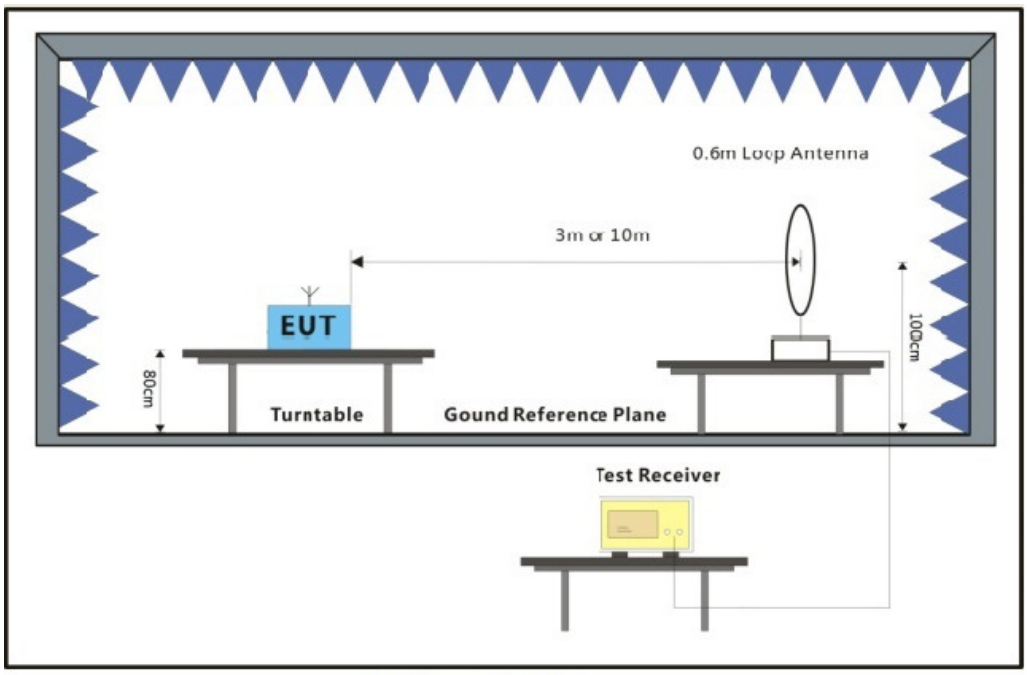
7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 24 °C Humidity: 54 % RH Atmospheric Pressure: 1015 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 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. Only the worst position of vertical was shown in the report.

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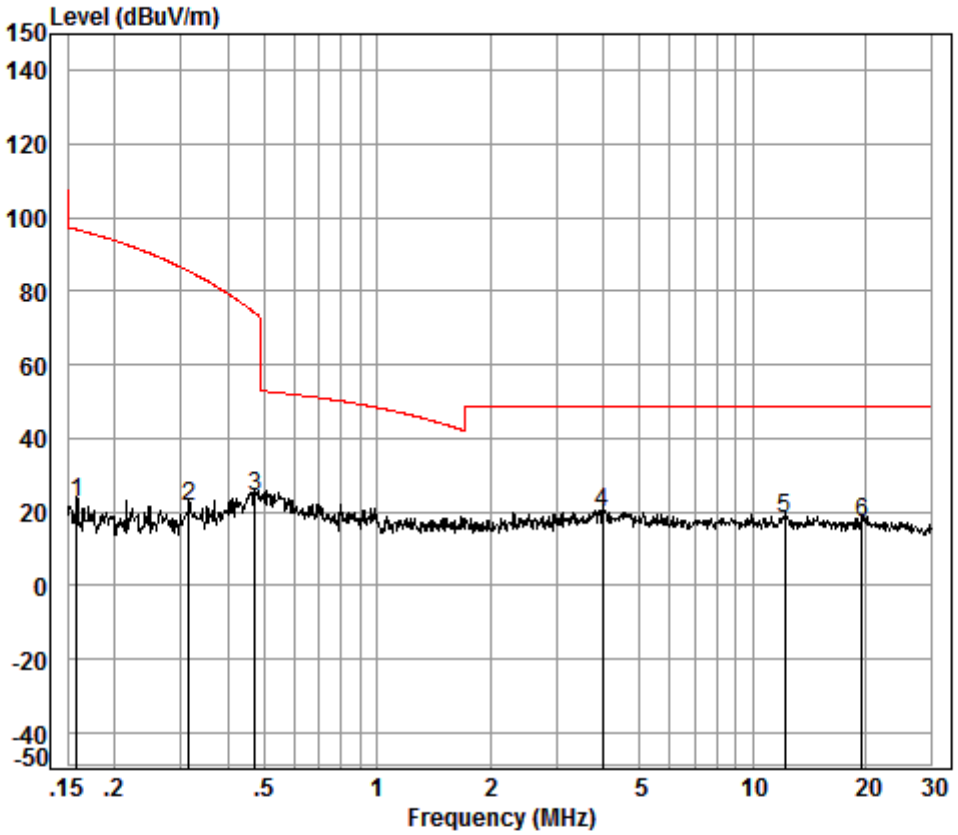
Mode:b; Polarization:Horizontal



Condition: 10m
Job No. : 04430CR
Test Mode: b

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	0.16	0.07	11.73	32.50	43.02	22.32	82.66	-60.34
2	0.31	0.09	11.90	32.52	41.78	21.25	76.73	-55.48
3	0.47	0.11	11.72	32.49	44.84	24.18	73.19	-49.01
4 pp	3.99	0.40	12.10	32.47	39.64	19.67	48.63	-28.96
5	12.12	0.54	10.56	32.50	39.40	18.00	48.63	-30.63
6	19.53	0.67	9.57	32.52	39.06	16.78	48.63	-31.85

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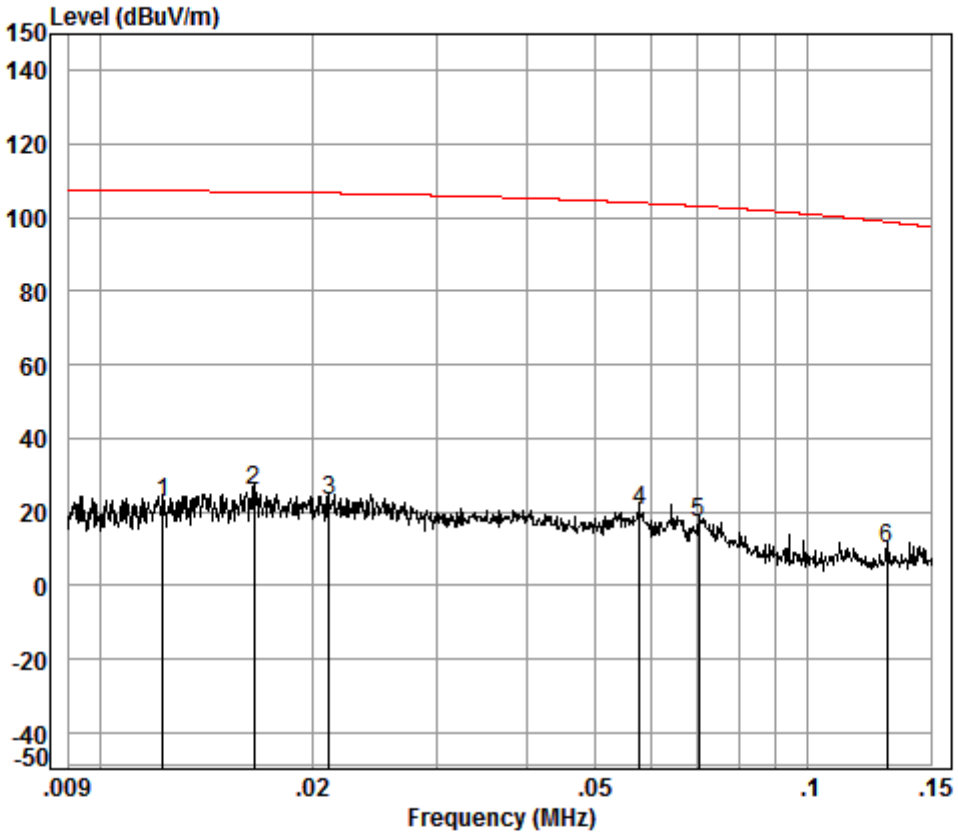
Mode:b; Polarization:Vertical



Condition: 10m
Job No. : 04430CR
Test Mode: b

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	0.01	0.27	18.03	32.48	36.78	22.60	104.91	-82.31
2	0.02	0.24	16.18	32.49	41.63	25.56	102.32	-76.76
3	0.02	0.21	14.85	32.49	40.37	22.94	100.22	-77.28
4 pp	0.06	0.11	12.29	32.51	40.51	20.40	91.45	-71.05
5	0.07	0.09	12.15	32.51	37.34	17.07	89.77	-72.70
6	0.13	0.06	11.81	32.51	30.36	9.72	84.44	-74.72

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7.4 Radiated Emissions(30MHz-1GHz)

Test Requirement 47 CFR Part 15, Subpart C 15.227(b) & C 15.209
Test Method: ANSI C63.10 (2013) Section 6.4&6.5
Measurement Distance: 3m
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.		

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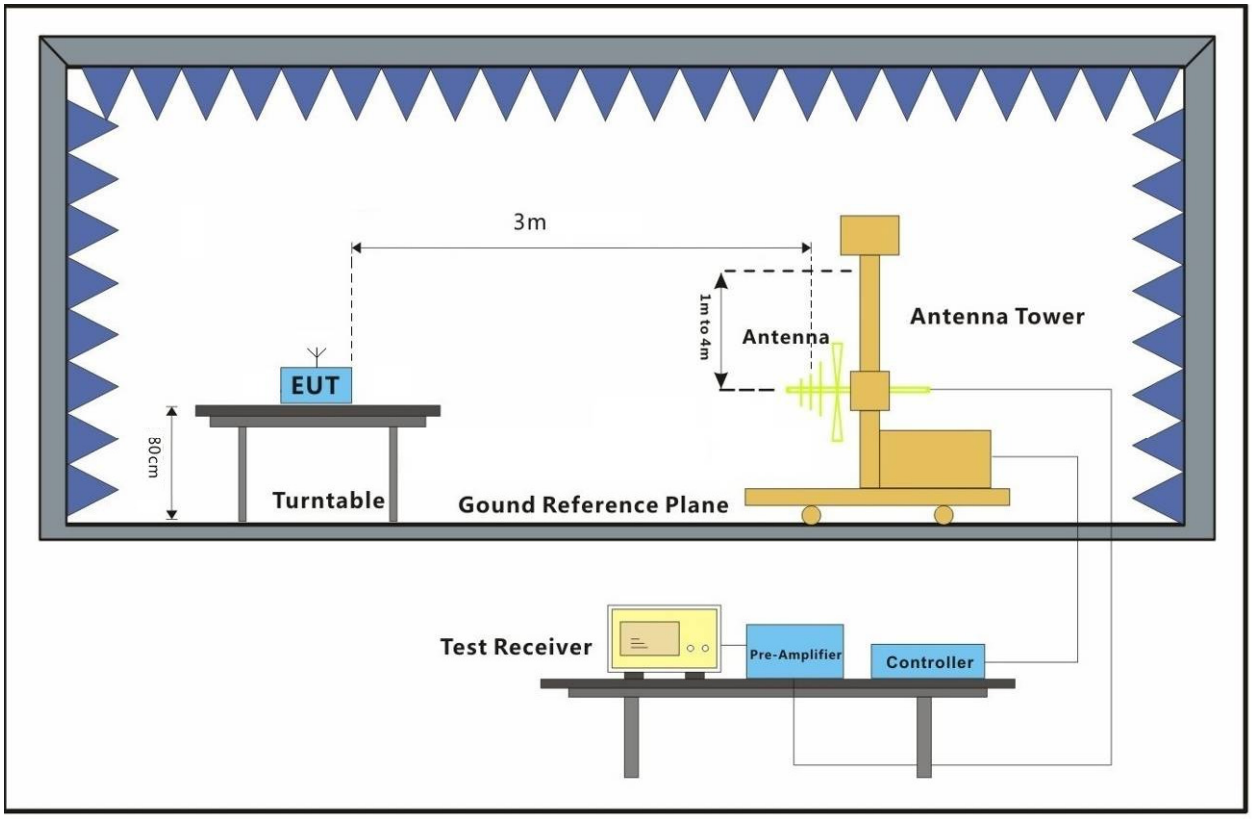
7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 55 % RH Atmospheric Pressure: 1015 mbar

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

7.4.2 Test Setup Diagram



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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.

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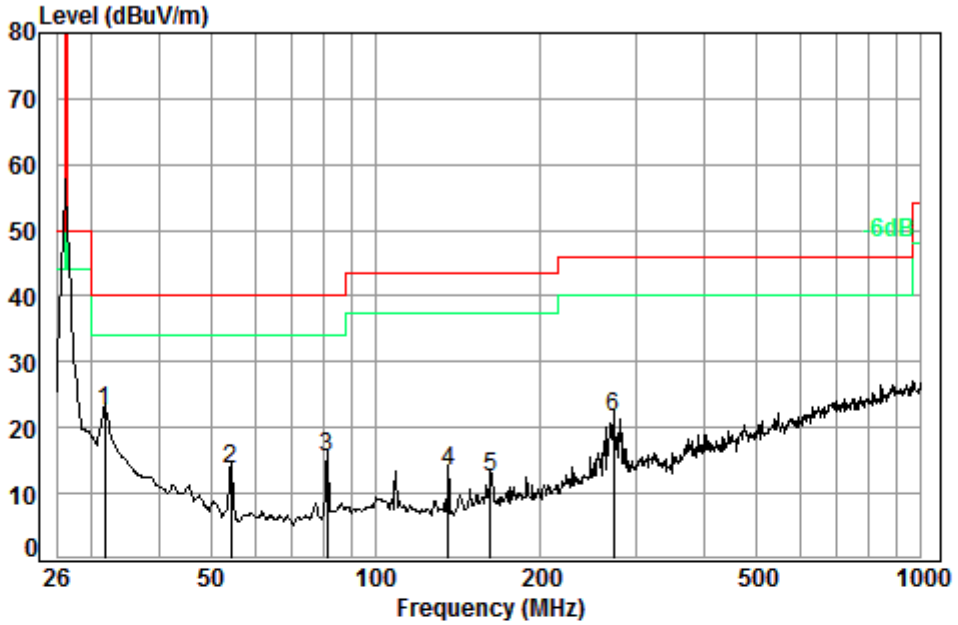
Mode:b; Polarization:Horizontal



Condition: 3m HORIZONTAL
Job No. : 04430CR
Test mode: b

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 pp	31.90	0.60	17.64	27.35	31.69	22.58	40.00	-17.42
2	54.34	0.80	8.05	27.28	32.19	13.76	40.00	-26.24
3	81.49	1.10	7.85	27.23	33.82	15.54	40.00	-24.46
4	135.83	1.29	7.93	26.98	31.10	13.34	43.50	-30.16
5	162.43	1.34	9.58	26.85	28.36	12.43	43.50	-31.07
6	272.73	1.78	12.75	26.47	33.69	21.75	46.00	-24.25

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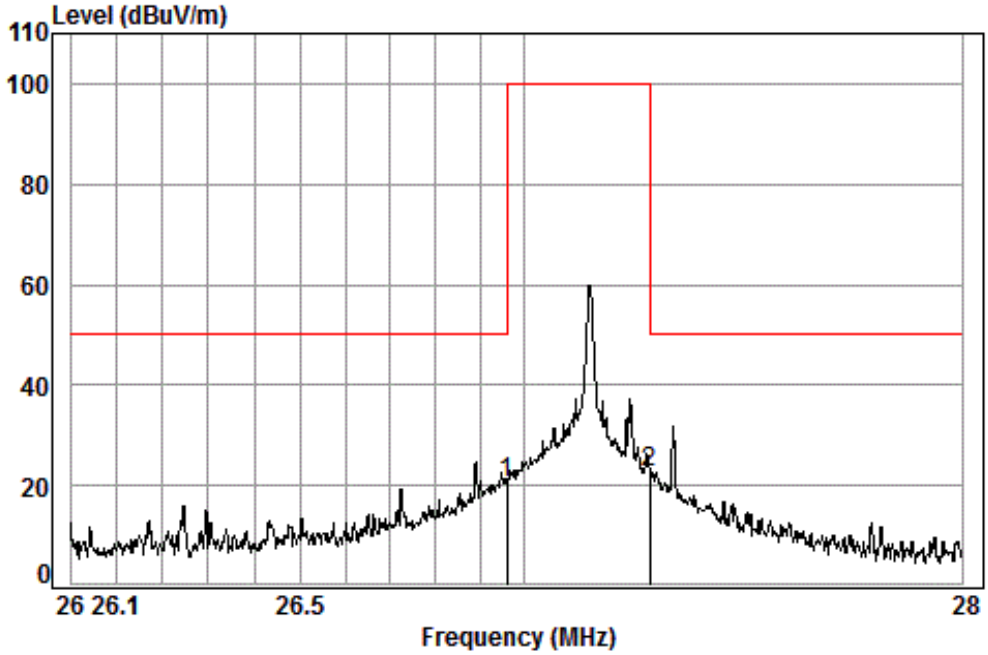

Condition: 3m HORIZONTAL
Job No. : 04430CR
Test mode: b

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 pp	26.96	0.60	20.68	27.37	26.62	20.53	50.00	-29.47
2	27.28	0.60	20.47	27.37	28.91	22.61	100.00	-77.39

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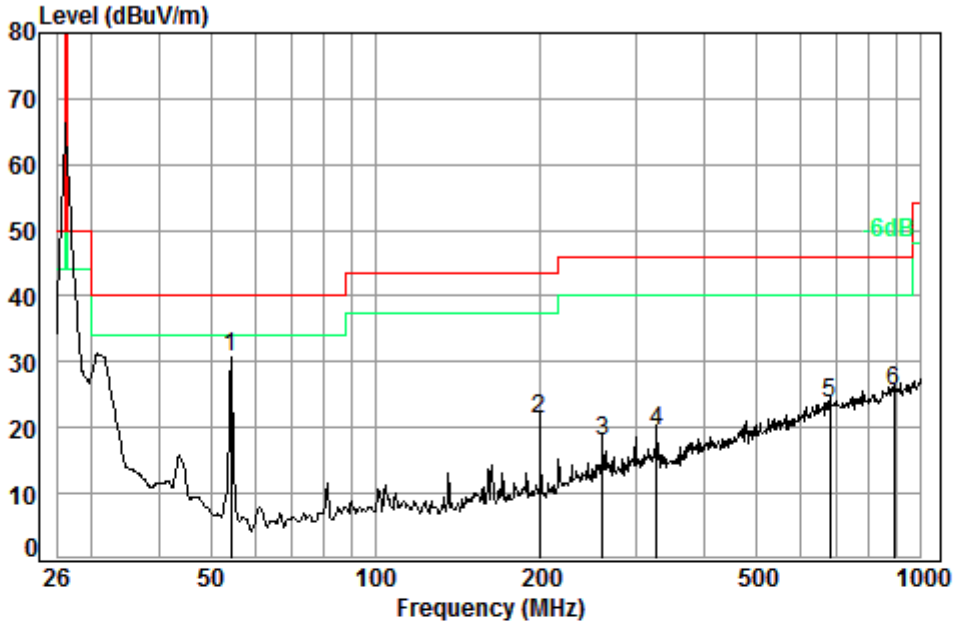
Mode:b; Polarization:Vertical



Condition: 3m VERTICAL
Job No. : 04430CR
Test mode: b

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 pp	54.34	0.80	8.05	27.28	49.26	30.83	40.00	-9.17
2	199.99	1.40	10.20	26.70	36.31	21.21	43.50	-22.29
3	260.09	1.72	12.50	26.51	30.22	17.93	46.00	-28.07
4	327.33	1.99	14.72	26.62	29.44	19.53	46.00	-26.47
5	679.18	2.86	21.43	27.44	26.85	23.70	46.00	-22.30
6	889.77	3.56	23.12	26.82	25.68	25.54	46.00	-20.46

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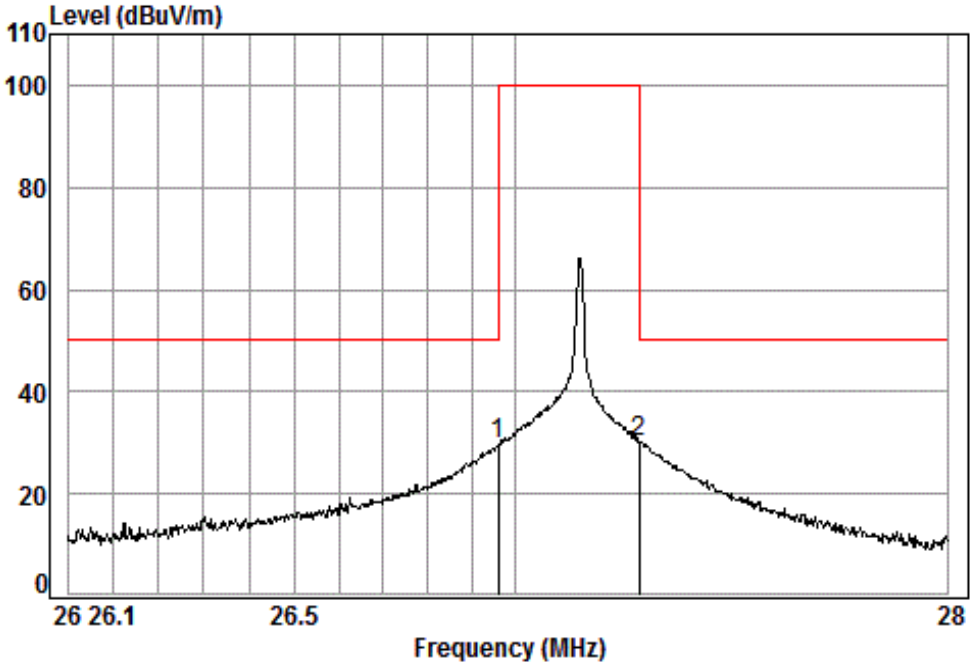

Condition: 3m VERTICAL
Job No. : 04430CR
Test mode: b

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 pp	26.96	0.60	20.68	27.37	35.59	29.50	50.00	-20.50
2	27.28	0.60	20.47	27.37	36.56	30.26	100.00	-69.74

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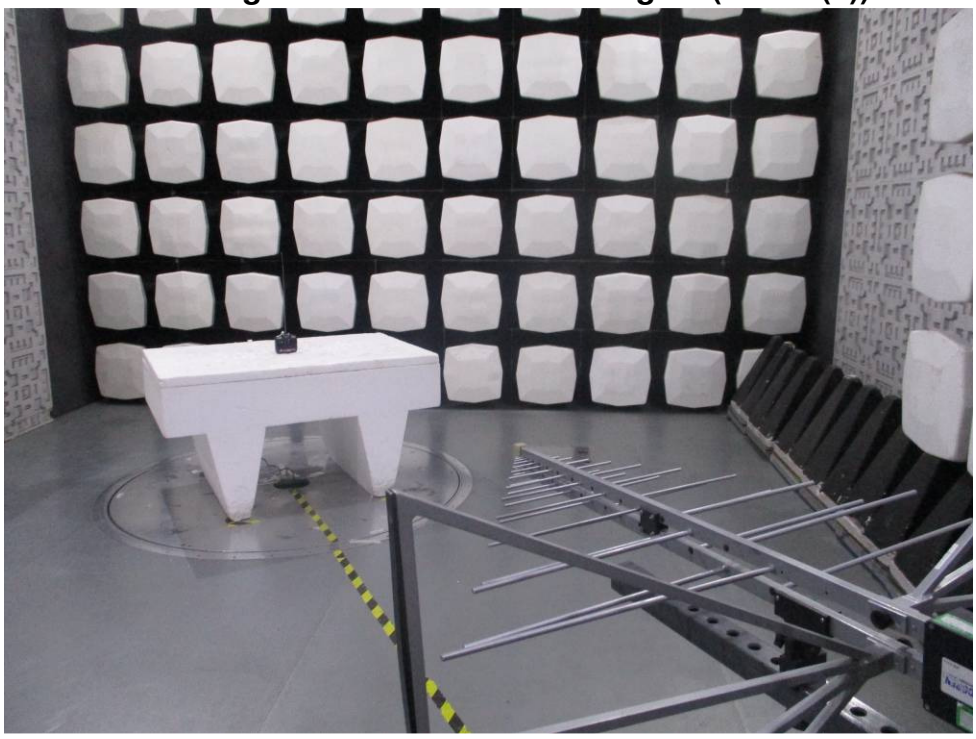
8 Photographs

8.1 Field Strength of the Fundamental Signal (15.227(a)) Test Setup



8.2 Radiated Emissions(9kHz-30MHz) Test Setup

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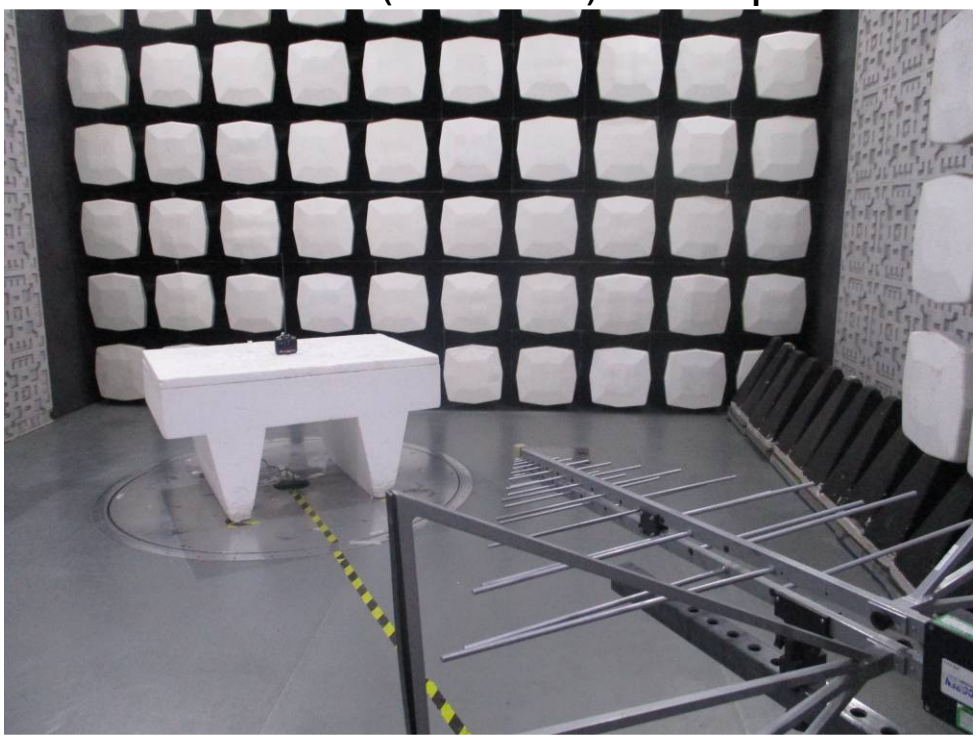
8.3 Radiated Emissions(30MHz-1GHz) Test Setup



8.4 EUT Constructional Details

Refer to Appendix A - Photographs of EUT Constructional Details for SZEM1705004430CR

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