TEST REPORT

.

Applicant:	FENGMA TOYS INDUSTRY CO.,LIMITED
Address of Applicant:	No.1,Lane1,Road 2 of Shangjiao Xingye Industrial Park,Chenghua Stree, Chenghai Area, Shantou City, Guangdong Province 515800, China
Manufacturer:	FENGMA TOYS INDUSTRY CO.,LIMITED
Address of Manufacturer:	No.1,Lane1,Road 2 of Shangjiao Xingye Industrial Park,Chenghua Stree, Chenghai Area, Shantou City, Guangdong Province 515800, China

Equipment Under Test (EUT)

Product Name:	Remote control car series
Model No.:	278, 277, 378, 478, 377, 477, 577, 578, 877, 878, 777, 778, 789, 677, 678, 689, 789A, 689B, 208051, 1828-10, AS-9800, AS-9783, AS-9782, 1828-1, 1828-7, 1827-1, 1827-4, 277-1, 278-1, 378-1, 478-1, 377-1, 477-1, 577-1, 578-1, 877-1, 878-1, 777-1, 778-1, 789-1, 677-1, 678-1, 689-1, 789B, 1828-4, 208052, AS-10061W, AS-10062, AS-10063, 9877, 1828-2, 1828-8, 1827-2, YF389, 277-2, 278-2, 378-2, 478-2, 377-2, 477-2, 577-2, 578-2, 877-2, 878-2, 777-2, 778-2, 789-2, 677-2, 678-2, 689-2, 689A, 789-6, AS-10061, AS-9659, AS-10064, AS-9781, 9877A, 1828-3, 1828-9, 1827-3
FCC ID:	2A5IE2016278
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.227
Date of sample receipt:	November 29, 2022
Date of Test:	November 30, 2022-January 12, 2023
Date of report issued:	January 13, 2023
Test Result :	PASS *

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

Authorized Signature:

Robinson Luo

Laboratory Manager

2 Version

Version No.	Date	Description
01	*January 13, 2023*	*Original*

Prepared By: ***Date:*** *January 13, 2023*

Project Engineer

Check By: ***Date:*** *January 13, 2023*

Reviewer

3 Contents

4 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	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

Remark:

Pass: The EUT complies with the essential requirements in the standard.

4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	30MHz-200MHz	3.8039dB	(1)
Radiated Emission	200MHz-1GHz	3.9679dB	(1)
Radiated Emission	1GHz-18GHz	4.29dB	(1)
Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.			

5 General Information

5.1 General Description of EUT

	Product Name:	Remote control car series
	Model No.:	278, 277, 378, 478, 377, 477, 577, 578, 877, 878, 777, 778, 789, 677, 678, 689, 789A, 689B, 208051, 1828-10, AS-9800, AS-9783, AS-9782, 1828-1, 1828-7, 1827-1, 1827-4, 277-1, 278-1, 378-1, 478-1, 377-1, 477-1, 577-1, 578-1, 877-1, 878-1, 777-1, 778-1, 789-1, 677-1, 678-1, 689-1, 789B, 1828-4, 208052, AS-10061W, AS-10062, AS-10063, 9877, 1828-2, 1828-8, 1827-2, YF389, 277-2, 278-2, 378-2, 478-2, 377-2, 477-2, 577-2, 578-2, 877-2, 878-2, 777-2, 778-2, 789-2, 677-2, 678-2, 689-2, 689A, 789-6, AS-10061, AS-9659, AS-10064, AS-9781, 9877A, 1828-3, 1828-9, 1827-3
	Test Model No:	278
	Remark: All above models are identical in the same PCB layout, interior structure and electrical circuits. The differences are appearance color and model name for commercial purpose.	
	Serial No.:	2016278
	Test sample(s) ID:	GTS202211000293-1
	Sample(s) Status:	Engineer sample
	Operation Frequency:	27.145MHz
	Channel Number:	1
	Modulation:	GFSK
	Antenna type:	Spring antenna
	Antenna gain:	3dBi(Declared by applicant)
	Power supply:	TX: DC 3.0V (1.5V x 2 "AA" Size Batteries)

Note: The report is for TX device only.

5.2 Test mode

Transmitter mode	Keep the EUT in transmitting with modulation mode.
Remark: New battery is used during all test.	

5.3 Description of Support Units

None.

5.4 Test Facility

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

● **FCC—Registration No.: 381383**

Designation Number: CN5029

Global United Technology 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 files.

● **IC —Registration No.: 9079A**

CAB identifier: CN0091

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

● **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP).

5.5 Test Location

All tests were performed at:
Global United Technology Services Co., Ltd. Address: No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102 Tel: 0755-27798480 Fax: 0755-27798960

6 Equipment List

Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July 02, 2020	July 01, 2025
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	April 22, 2022	April 21, 2023
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9168	GTS640	March 21, 2022	March 20, 2023
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June 12, 2022	June 11, 2023
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June 23, 2022	June 22, 2023
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	April 22, 2022	April 21, 2023
9	Coaxial Cable	GTS	N/A	GTS211	April 22, 2022	April 21, 2023
10	Coaxial cable	GTS	N/A	GTS210	April 22, 2022	April 21, 2023
11	Coaxial Cable	GTS	N/A	GTS212	April 22, 2022	April 21, 2023
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	April 22, 2022	April 21, 2023
13	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June 23, 2022	June 22, 2023
14	Band filter	Amindeon	82346	GTS219	June 23, 2022	June 22, 2023
15	Power Meter	Anritsu	ML2495A	GTS540	June 23, 2022	June 22, 2023
16	Power Sensor	Anritsu	MA2411B	GTS541	June 23, 2022	June 22, 2023
17	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	April 22, 2022	April 21, 2023
18	Splitter	Agilent	11636B	GTS237	June 23, 2022	June 22, 2023
19	Loop Antenna	ZHINAN	ZN30900A	GTS534	Nov. 29, 2022	Nov. 28, 2023
20	Broadband Preamplifier	SCHWARZBECK	BBV9718	GTS535	April 22, 2022	April 21, 2023
21	Breitband hornantenna	SCHWARZBECK	BBHA 9170	GTS579	Oct. 16, 2022	Oct. 15, 2023
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 16, 2022	Oct. 15, 2023
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 16, 2022	Oct. 15, 2023
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	June 23, 2022	June 22, 2023
25	Amplifier(1GHz-26.5GHz)	HP	8449B	GTS601	April 22, 2022	April 21, 2023

RF Conducted Test:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	April 22, 2022	April 21, 2023
2	EMI Test Receiver	R&S	ESCI 7	GTS552	April 22, 2022	April 21, 2023
3	Spectrum Analyzer	Agilent	E4440A	GTS536	April 22, 2022	April 21, 2023
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	April 22, 2022	April 21, 2023
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	April 22, 2022	April 21, 2023
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	April 22, 2022	April 21, 2023
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	April 22, 2022	April 21, 2023
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	April 22, 2022	April 21, 2023

General used equipment:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	April 25, 2022	April 24, 2023
2	Barometer	KUMAO	SF132	GTS647	July 26, 2022	July 25, 2023

7 Radio Spectrum Technical Requirement

7.1 Antenna Requirement

7.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203

7.1.2 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 spring antenna, reference to the appendix II for details.

8 Radio Spectrum Matter Test Results

8.1 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.215

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

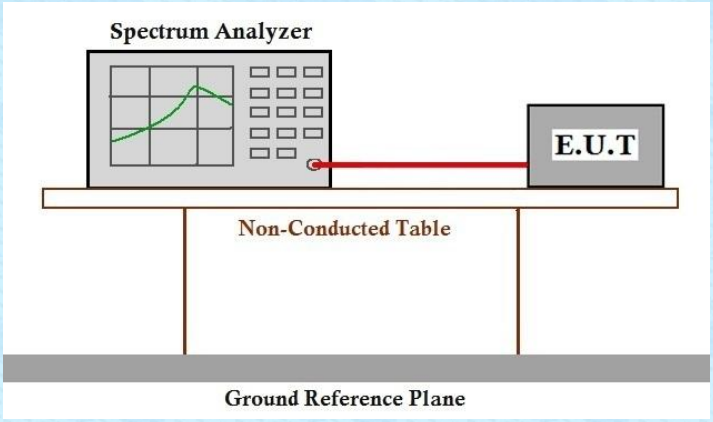
8.1.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 55 % RH Atmospheric Pressure: 1005 mbar

Test mode Transmitter mode: Keep the EUT in transmitting with modulation mode.

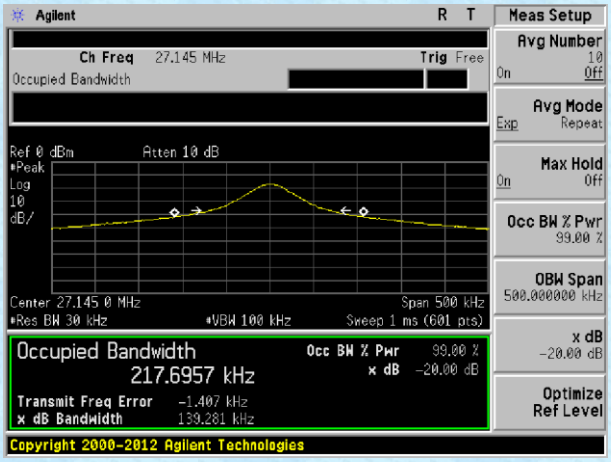
8.1.2 Test Setup Diagram



8.1.3 Measurement Procedure and Data

Mode	Frequency （MHz）	-20dB Bandwidth (kHz)	Limit	Conclusion
TX	27.145	139.281	N/A	Pass

Test plot as follows:



8.2 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.

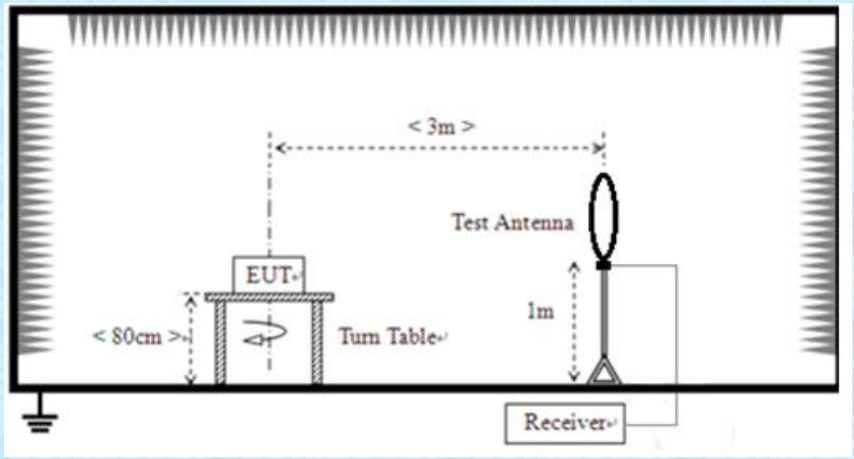
8.2.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 55 % RH Atmospheric Pressure: 1000 mbar

Test mode Transmitter mode: Keep the EUT in transmitting with modulation mode.

8.2.2 Test Setup Diagram



8.2.3 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 fixed at one meter

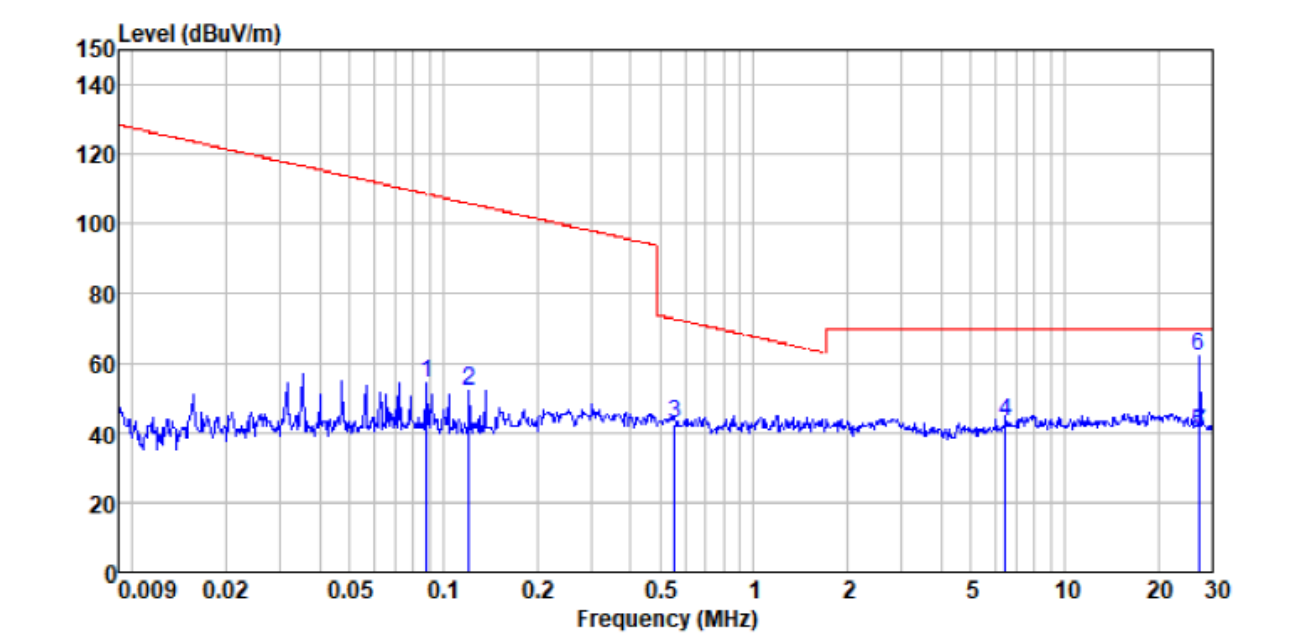
d. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

e. 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 Facto

Measurement data:



Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
0.089	33.70	20.61	0.16	0.00	54.47	108.65	-54.18	PK
0.121	31.95	20.13	0.18	0.00	52.26	105.97	-53.71	PK
0.554	22.20	20.41	0.28	0.00	42.89	72.73	-29.84	PK
6.476	21.78	20.79	0.45	0.00	43.02	69.54	-26.52	QP
26.960	18.94	20.59	0.55	0.00	40.08	69.54	-29.46	QP
27.145	40.79	20.57	0.55	0.00	61.91	100.00	-38.09	Peak
27.280	18.94	20.54	0.55	0.00	40.03	69.54	-29.51	QP

Remarks:

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) 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. So, only the above measurement data were shown in the report.

8.3 Radiated Emissions

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)
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.		
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.		

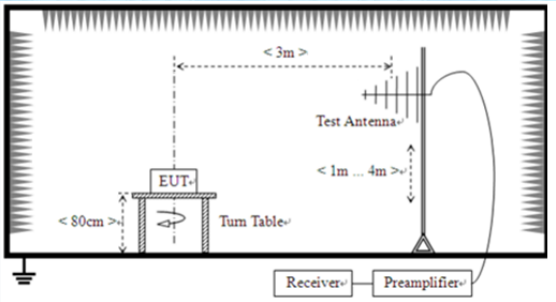
8.3.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 50 % RH Atmospheric Pressure: 1000 mbar

Test mode Transmitter mode: Keep the EUT in transmitting with modulation mode.

8.3.2 Test Setup Diagram



8.3.3 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.

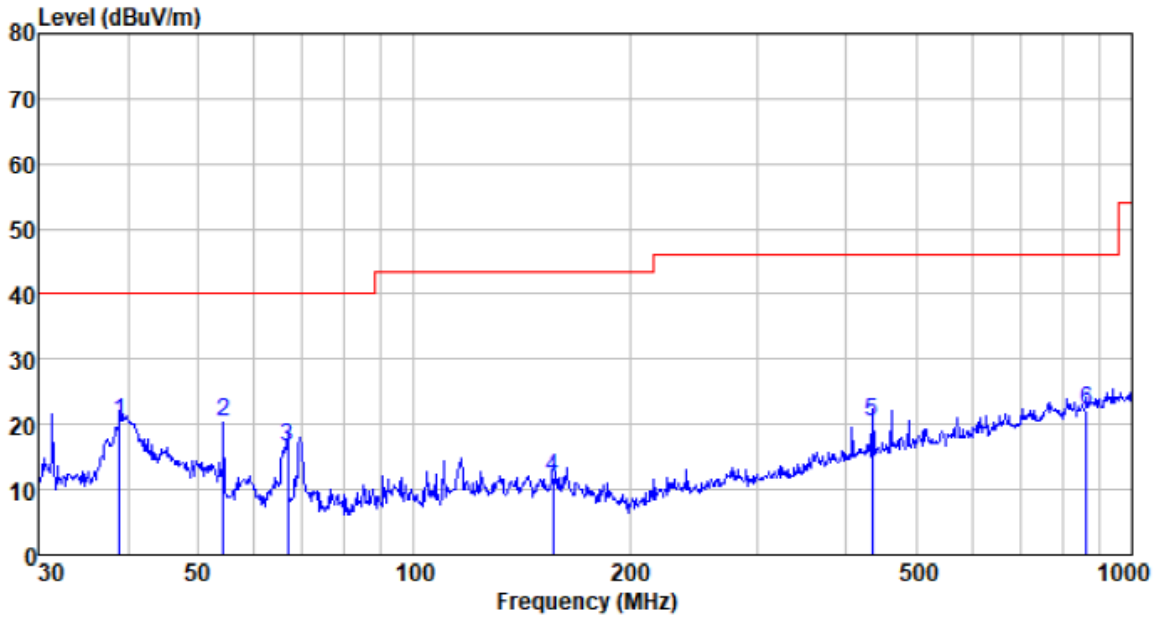
g. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

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

Measurement data:

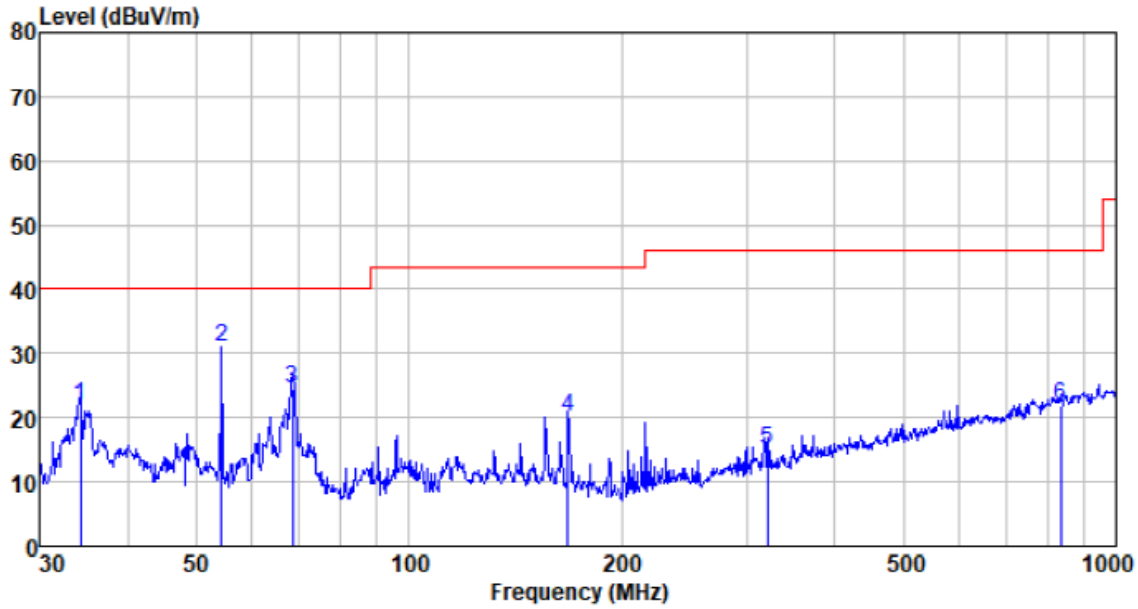
■ **30MHz~1GHz**

Mode:	**Transmitting mode**	**Polarization:**	**Horizontal**



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
38.888	36.29	13.33	0.65	30.00	20.27	40.00	-19.73	QP
54.261	36.68	12.93	0.81	30.00	20.42	40.00	-19.58	QP
66.733	34.48	11.15	0.91	30.00	16.54	40.00	-23.46	QP
156.458	27.56	12.57	1.61	30.00	11.74	43.50	-31.76	QP
434.065	31.00	16.40	3.02	30.00	20.42	46.00	-25.58	QP
863.056	23.88	23.47	4.71	30.00	22.06	46.00	-23.94	QP

Mode:	Transmitting mode	Polarization:	Vertical



Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
34.276	38.61	12.62	0.60	30.00	21.83	40.00	-18.17	QP
54.261	47.38	12.93	0.81	30.00	31.12	40.00	-8.88	QP
68.391	42.78	10.82	0.93	30.00	24.53	40.00	-15.47	QP
167.824	36.68	11.67	1.67	30.00	20.02	43.50	-23.48	QP
321.061	29.32	13.18	2.47	30.00	14.97	46.00	-31.03	QP
836.244	24.01	23.15	4.60	30.00	21.76	46.00	-24.24	QP

Remark:

1. Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor

9 Test Setup Photo

Reference to the **appendix I** for details.

10 EUT Constructional Details

Reference to the **appendix II** for details.

------End------