

TEST REPORT

Applicant: HUANG QI TOYS CO.,LTD

Address of Applicant: 13 New 1 Lane,Xinxiang Village,Guangyi Road, Chenghai Area, Shantou 515800, China

Manufacturer: HUANG QI TOYS CO.,LTD

Address of Manufacturer: 13 New 1 Lane,Xinxiang Village,Guangyi Road, Chenghai Area, Shantou 515800, China

Equipment Under Test (EUT)

Product Name: R/C CAR

Model No.: MT1224, RD313-1B, RD313-2B

FCC ID: 2ATZWHQMT1224

Applicable standards: FCC CFR Title 47 Part 15 Subpart C Section 15.227

Date of sample receipt: July 29, 2021

Date of Test: July 30, 2021-August 27, 2021

Date of report issued: August 27, 2021

Test Result : PASS *

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

Authorized Signature:



Robinson Luo

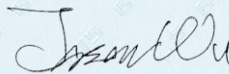
Laboratory Manager

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

2 Version

Version No.	Date	Description
01	August 27, 2021	Original

Prepared By:

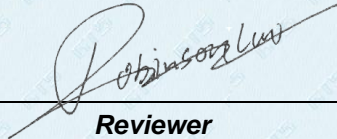


Date:

August 27, 2021

Project Engineer

Check By:



Date:

August 27, 2021

Reviewer

3 Contents

	Page
1 COVER PAGE	1
2 VERSION	2
3 CONTENTS	3
4 TEST SUMMARY	4
4.1 MEASUREMENT UNCERTAINTY	4
5 GENERAL INFORMATION	5
5.1 GENERAL DESCRIPTION OF EUT	5
5.2 TEST MODE	6
5.3 DESCRIPTION OF SUPPORT UNITS	6
5.4 TEST FACILITY	6
5.5 TEST LOCATION	6
6 EQUIPMENT LIST	7
7 RADIO SPECTRUM TECHNICAL REQUIREMENT	9
7.1 ANTENNA REQUIREMENT	9
7.1.1 Test Requirement:	9
7.1.2 Conclusion	9
8 RADIO SPECTRUM MATTER TEST RESULTS	10
8.1 20DB BANDWIDTH	10
8.1.1 E.U.T. Operation	10
8.1.2 Test Setup Diagram	10
8.1.3 Measurement Procedure and Data	10
8.2 FIELD STRENGTH OF THE FUNDAMENTAL SIGNAL (15.227(A))	11
8.2.1 E.U.T. Operation	11
8.2.2 Test Setup Diagram	11
8.2.3 Measurement Procedure and Data	11
8.3 RADIATED EMISSIONS	13
8.3.1 E.U.T. Operation	14
8.3.2 Test Setup Diagram	14
8.3.3 Measurement Procedure and Data	14
9 TEST SETUP PHOTO	17
10 EUT CONSTRUCTIONAL DETAILS	17

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:	R/C CAR
Model No.:	MT1224, RD313-1B, RD313-2B
Test Model No:	MT1224
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.:	CS-242T-T
Hardware Version:	YY-12J
Software Version:	1.0
Test sample(s) ID:	GTS202107000288-1
Sample(s) Status:	Engineer sample
Operation Frequency:	27.145MHz
Channel Number:	1
Modulation:	FSK
Antenna type:	Wire antenna
Antenna gain:	0dBi(Declared by applicant)
Power supply:	TX: DC 3.0V (1.5V x 2 "AA" Size Batteries) RX: DC 3.6/4.5V (1.2/1.5V x 3 "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

<p>The test facility is recognized, certified, or accredited by the following organizations:</p> <ul style="list-style-type: none">● 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	June. 24 2021	June. 23 2022
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 24 2021	June. 23 2022
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 24 2021	June. 23 2022
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 24 2021	June. 23 2022
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 24 2021	June. 23 2022
9	Coaxial Cable	GTS	N/A	GTS211	June. 24 2021	June. 23 2022
10	Coaxial cable	GTS	N/A	GTS210	June. 24 2021	June. 23 2022
11	Coaxial Cable	GTS	N/A	GTS212	June. 24 2021	June. 23 2022
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 24 2021	June. 23 2022
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 24 2021	June. 23 2022
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 24 2021	June. 23 2022
15	Band filter	Amindeon	82346	GTS219	June. 24 2021	June. 23 2022
16	Power Meter	Anritsu	ML2495A	GTS540	June. 24 2021	June. 23 2022
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 24 2021	June. 23 2022
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 24 2021	June. 23 2022
19	Splitter	Agilent	11636B	GTS237	June. 24 2021	June. 23 2022
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 24 2021	June. 23 2022
21	Breitband hornantenne	SCHWARZBECK	BBHA 9170	GTS579	Oct. 18 2020	Oct. 17 2021
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 18 2020	Oct. 17 2021
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 18 2020	Oct. 17 2021
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	June. 24 2021	June. 23 2022

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	June. 24 2021	June. 23 2022
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 24 2021	June. 23 2022
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June. 24 2021	June. 23 2022
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	June. 24 2021	June. 23 2022
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	June. 24 2021	June. 23 2022
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	June. 24 2021	June. 23 2022
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	June. 24 2021	June. 23 2022
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	June. 24 2021	June. 23 2022

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	June. 24 2021	June. 23 2022
2	Barometer	ChangChun	DYM3	GTS255	June. 24 2021	June. 23 2022

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 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 an 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 wire antenna, the best case gain of the antenna is 0dBi, 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

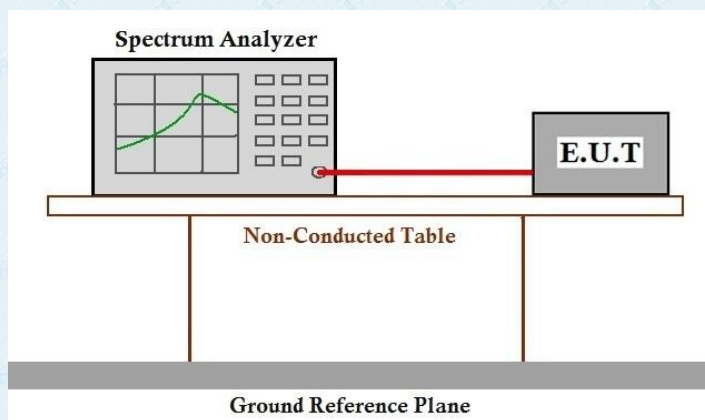
8.1.1 E.U.T. Operation

Operating Environment:

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

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

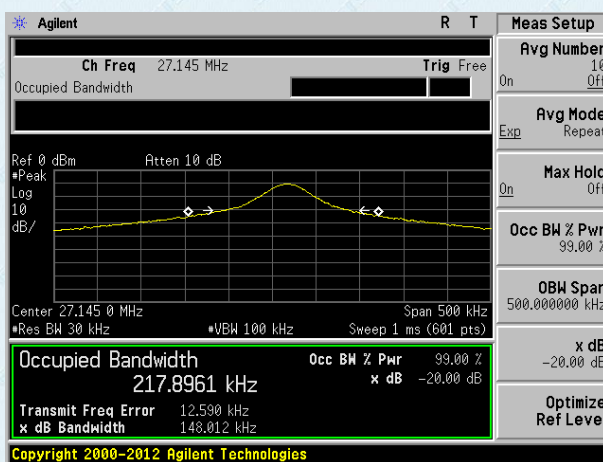
8.1.2 Test Setup Diagram



8.1.3 Measurement Procedure and Data

Mode	Frequency (MHz)	-20dB Bandwidth (kHz)	Limit	Conclusion
TX	27.145	148.012	N/A	Pass

Test plot as follows:



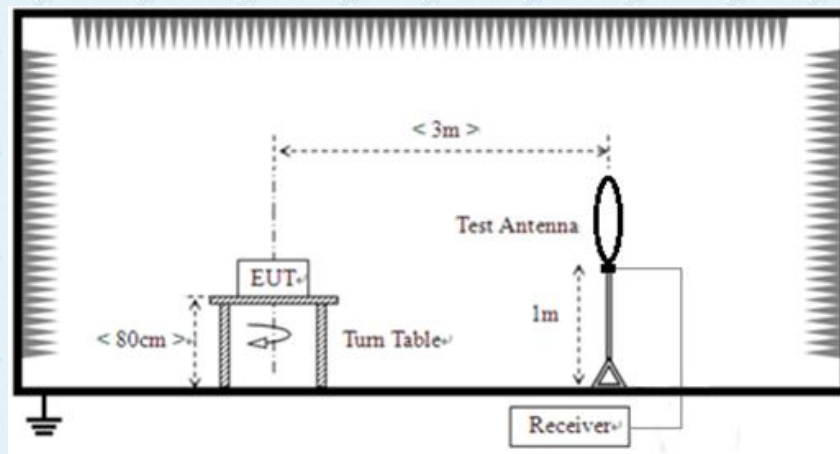
8.2 Field Strength of the Fundamental Signal (15.227(a))

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

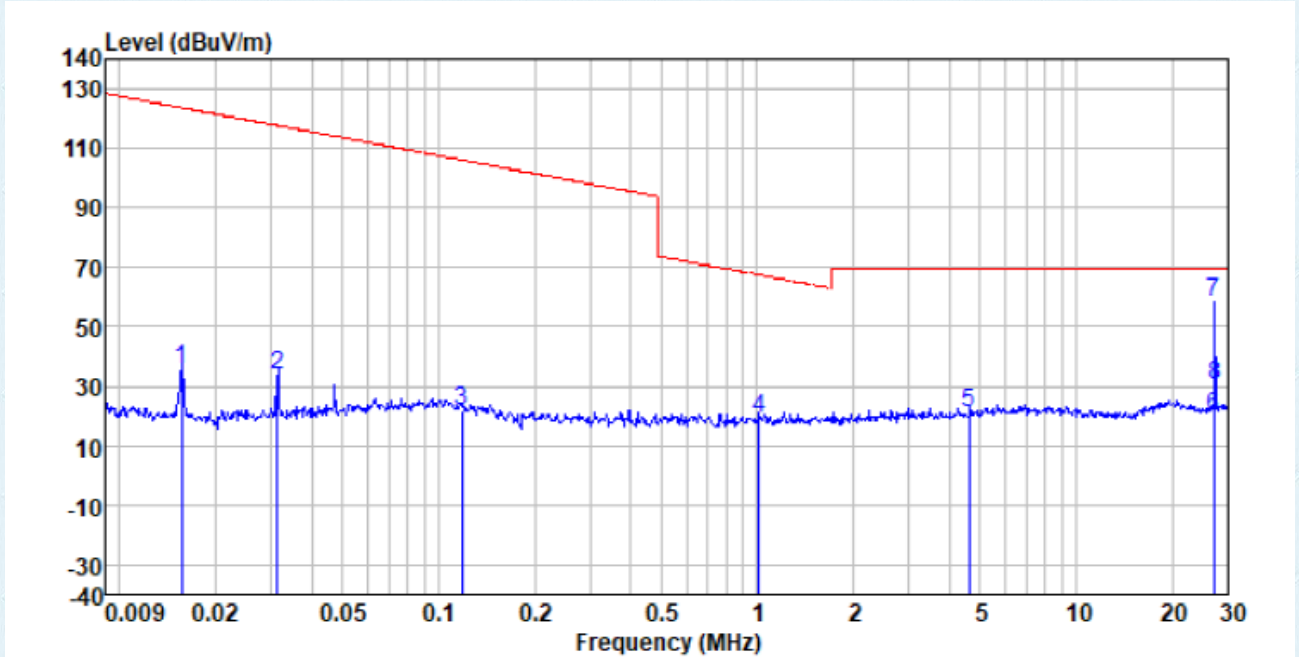


8.2.3 Measurement Procedure and Data

- 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.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is fixed at one meter
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 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.
- 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
0.016	15.56	20.04	0.04	0.00	35.64	123.73	-88.09	PK
0.031	13.29	20.07	0.09	0.00	33.45	117.72	-84.27	PK
0.119	-1.99	23.83	0.18	0.00	22.02	106.11	-84.09	PK
1.010	-2.14	21.00	0.33	0.00	19.19	67.52	-48.33	QP
4.622	-1.65	22.13	0.43	0.00	20.91	69.54	-48.63	QP
26.960	-7.66	27.12	0.55	0.00	20.01	69.54	-49.53	QP
27.145	30.74	27.24	0.55	0.00	58.53	100.00	-41.47	Peak
27.280	2.74	27.24	0.55	0.00	30.53	69.54	-39.01	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.

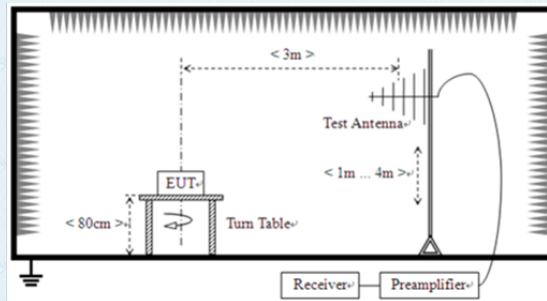
8.3.1 E.U.T. Operation

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

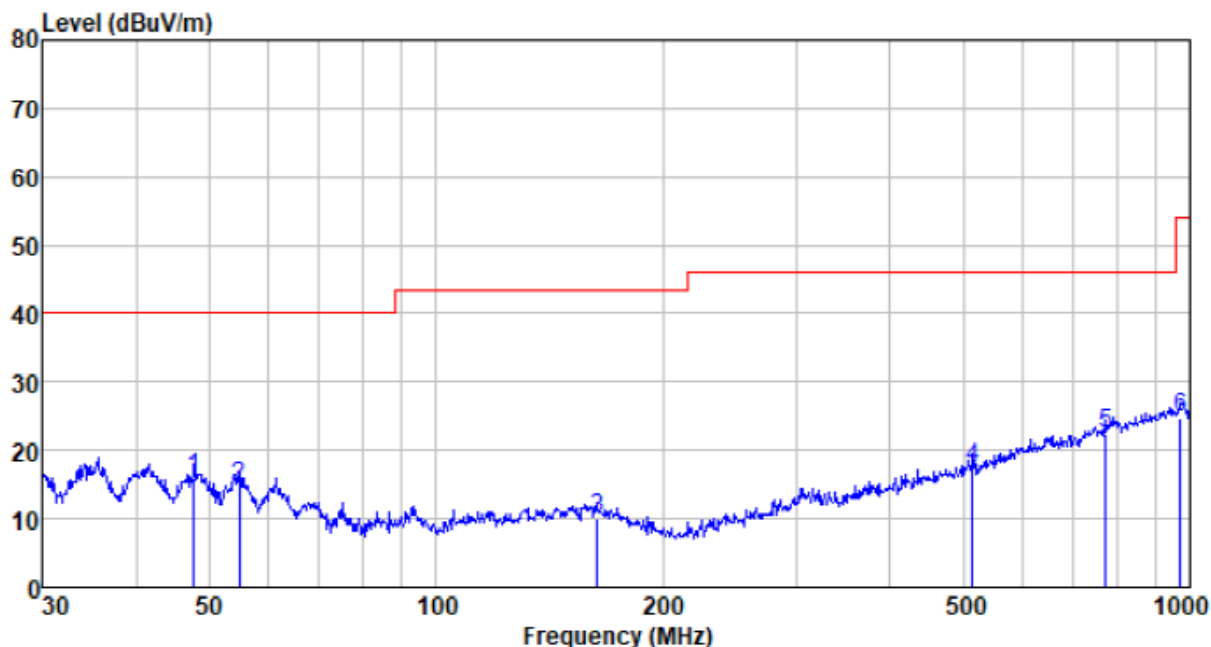
- The EUT was placed on the top of a rotating table 0.8 meters above the ground for below 1GHz at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 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.
- 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.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 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.
- 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: $\text{Level} = \text{Read Level} + \text{Cable Loss} + \text{Antenna Factor} - \text{Preamp Factor}$

Measurement data:

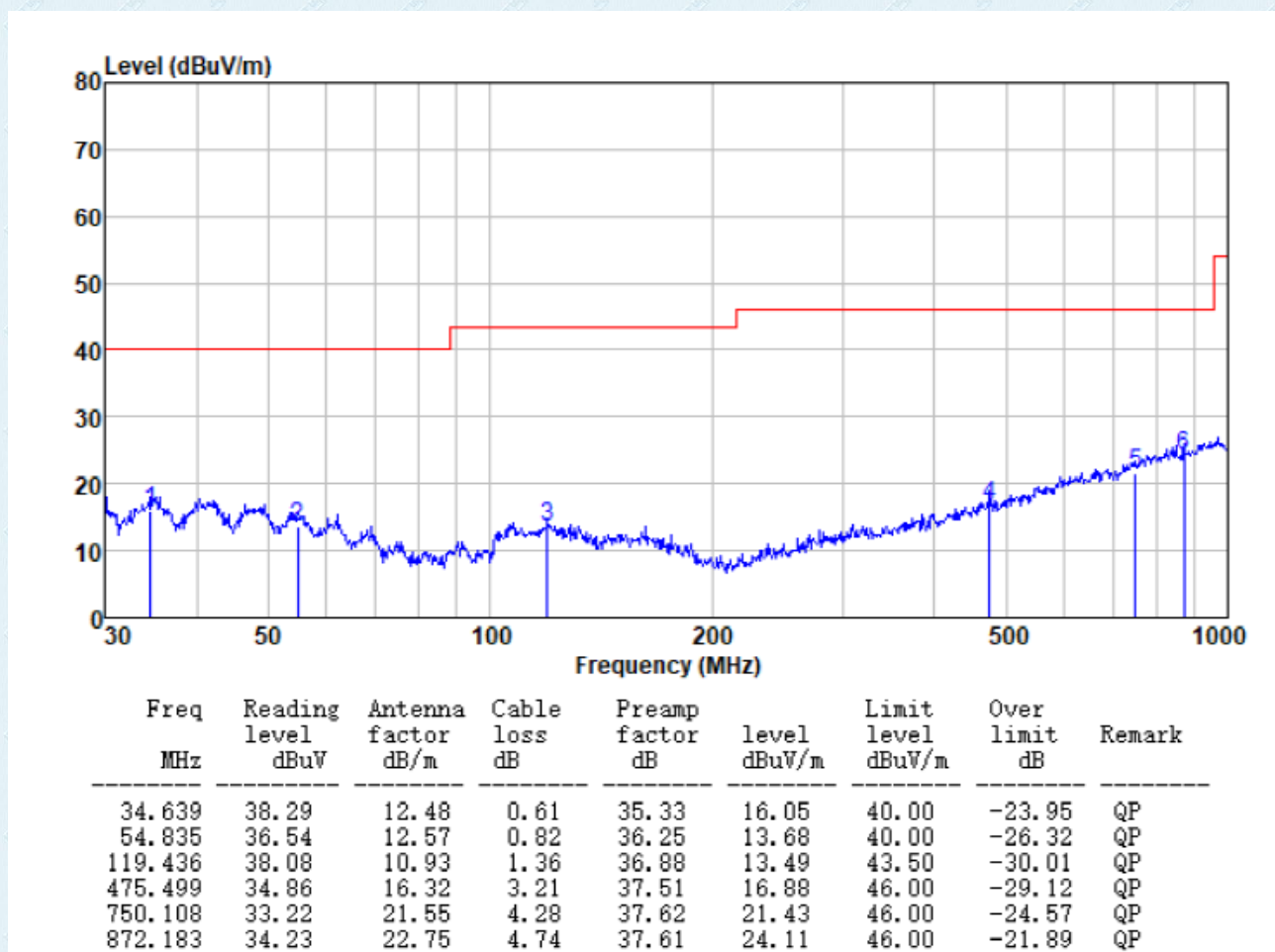
■ 30MHz~1GHz

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
47.659	38.35	13.00	0.75	36.07	16.03	40.00	-23.97	QP
54.835	37.60	12.57	0.82	36.25	14.74	40.00	-25.26	QP
163.755	32.92	12.64	1.65	37.15	10.06	43.50	-33.44	QP
515.437	34.60	16.98	3.37	37.52	17.43	46.00	-28.57	QP
774.158	33.75	21.88	4.36	37.62	22.37	46.00	-23.63	QP
972.337	33.28	23.99	5.12	37.53	24.86	54.00	-29.14	QP

Mode:	Transmitting mode	Polarization:	Vertical
--------------	--------------------------	----------------------	-----------------



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-----