FCC TEST REPORT

Client Name	:	DGL Group LTD.
Address	:	195 Raritan Center Parkway, Edison, New Jersey, United States 08837
Product Name	:	GENERIC RC STUNT CAR JAX -WITH REMOTE
Date	:	Apr. 26, 2020

Shenzhen Anbotek Compliance Laboratory Limited

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TEST REPORT

Applicant	:	DGL Group LTD.
Manufacturer	:	DGL Group LTD.
Product Name	:	GENERIC RC STUNT CAR JAX -WITH REMOTE
Model No.	:	WKM-33, AW-RC-JAX, AW-RC-JAX-XXX (X:A~Z)
Trade Mark	:	N.A.
Rating(s)	:	Input: DC 3V by "AA"*2 battery inside

Test Standard(s)	**:**	**FCC Part15 Subpart C, Section 15.227**
Test Method(s)	**:**	**ANSI C63.10: 2013**

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 15 Subpart C requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Receipt	Apr. 07, 2020
Date of Test	Apr. 07~16, 2020

Prepared by

(Engineer / Dolly Mo)

Reviewer

(Supervisor / Bibo Zhang)

Approved & Authorized Signer

(Manager / Tom Chen)

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1. General Information

1.1. Client Information

Applicant	:	DGL Group LTD.
Address	:	195 Raritan Center Parkway, Edison, New Jersey, United States 08837
Manufacturer	:	DGL Group LTD.
Address	:	195 Raritan Center Parkway, Edison, New Jersey, United States 08837
Factory	:	DGL Group LTD.
Address	:	195 Raritan Center Parkway, Edison, New Jersey, United States 08837

1.2. Description of Device (EUT)

Product Name	:	GENERIC RC STUNT CAR JAX -WITH REMOTE	
Model No.	:	WKM-33, AW-RC-JAX, AW-RC-JAX-XXX (X:A~Z) (Note: All samples are the same except the model appearance, so we prepare "WKM-33" for test only.)	
Trade Mark	:	N.A.	
Test Power Supply	:	DC 3V battery inside	
Test Sample No.	:	1-2-1(Normal Sample), 1-2-2(Engineering Sample)	
Product Description	:	Operation Frequency:	27.145MHz
		Number of Channel:	1 Channel
		Modulation Type:	ASK
		Antenna Type:	Spring Antenna
		Antenna Gain(Peak):	3 dBi
Remark: 1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.			

1.3. Auxiliary Equipment Used During Test

N/A		

1.4. Description of Test Modes

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	CH01

For Radiated Emission	
Final Test Mode	Description
Mode 1	CH01

Note:

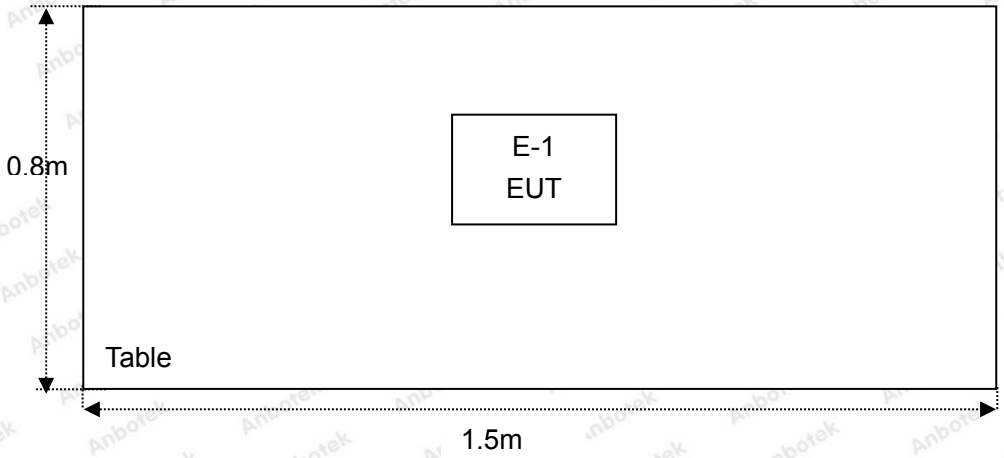
1. The engineering test program was provided and the EUT was programmed to be in continuously transmitting mode.

1.5. List of Channels

Channel	Freq.
	(MHz)
01	27.145

1.6. Description of Test Setup

RE



1.7. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	Rohde & Schwarz	ENV216	100055	Nov. 04, 2019	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESPI3	101604	Nov. 04, 2019	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Nov. 04, 2019	1 Year
4.	MAX Spectrum Analysis	Agilent	N9020A	MY51170037	Nov. 04, 2019	1 Year
5.	Preamplifier	SKET Electronic	BK1G18G30D	KD17503	Nov. 04, 2019	1 Year
6.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Nov. 01, 2019	1 Year
7.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Nov. 01, 2019	1 Year
8.	Loop Antenna	Schwarzbeck	FMZB1519B	00053	Nov. 01, 2019	1 Year
9.	Horn Antenna	A-INFO	LB-180400-KF	J211060628	Nov. 01, 2019	1 Year
10.	Pre-amplifier	SONOMA	310N	186860	Nov. 04, 2019	1 Year
11.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
12.	RF Test Control System	YIHENG	YH3000	2017430	Nov. 04, 2019	1 Year
13.	Power Sensor	DAER	RPR3006W	15I00041SN045	Nov. 04, 2019	1 Year
14.	Power Sensor	DAER	RPR3006W	15I00041SN046	Nov. 04, 2019	1 Year
15.	MXA Spectrum Analysis	Agilent	N9020A	MY51170037	Nov. 04, 2019	1 Year
16.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	Nov. 04, 2019	1 Year
17.	Signal Generator	Agilent	E4421B	MY41000743	Nov. 04, 2019	1 Year
18.	DC Power Supply	LW	TPR-6420D	374470	Nov. 04, 2019	1 Year
19.	Constant Temperature Humidity Chamber	ZHONGJIAN	ZJ-KHWS80B	N/A	Nov. 04, 2019	1 Year

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1.8. Measurement Uncertainty

Radiation Uncertainty	:	Ur = 3.9 dB (Horizontal)
		Ur = 3.8 dB (Vertical)
Conduction Uncertainty	:	Uc = 3.4 dB

1.9. Description of Test Facility

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

FCC-Registration No.: 184111

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registed 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. 184111, September 27, 2019.

ISED-Registration No.: 8058A

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A, March 07, 2019.

Test Location

Shenzhen Anbotek Compliance Laboratory Limited.
1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518102

2. Summary of Test Results

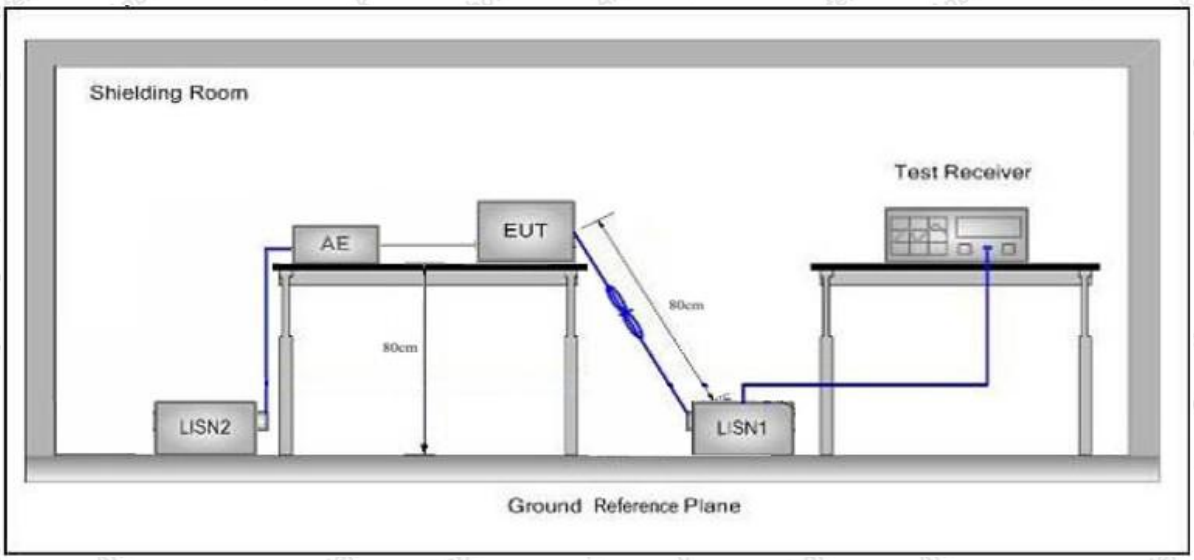
Standard Section	Test Item	Result
15.203	Antenna Requirement	PASS
15.207	Conducted Emission	N/A
15.205/15.209/15.227	Spurious Emission	PASS
15.215(c)	20dB Occupied Bandwidth	PASS
Remark: "N/A" is an abbreviation for Not Applicable.		

3. Conducted Emission Test

3.1. Test Standard and Limit

Test Standard	FCC Part15 Section 15.207		
Test Limit	Frequency	Maximum RF Line Voltage (dBuV)	
		Quasi-peak Level	Average Level
	150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
	500kHz~5MHz	56	46
	5MHz~30MHz	60	50
Remark: (1) *Decreasing linearly with logarithm of the frequency. (2) The lower limit shall apply at the transition frequency.			

3.2. Test Setup



3.3. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC ANSI C63.10-2013 on Conducted Emission Measurement.

The bandwidth of test receiver (ESCI) set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

3.4. Test Data

The EUT is powered by DC 3V battery inside, so there is no need to conduct this test.

4. Radiated Emission and Band Edge

4.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.209, 15.205 and 15.227(a)				
Test Limit	Frequency (MHz)	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009MHz~0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz~88MHz	100	40.0	Quasi-peak	3
	88MHz~216MHz	150	43.5	Quasi-peak	3
	216MHz~960MHz	200	46.0	Quasi-peak	3
	960MHz~1000MHz	500	54.0	Quasi-peak	3
	Above 1000MHz	500	54.0	Average	3
		-	74.0	Peak	3
Remark: (1)The lower limit shall apply at the transition frequency. (2) 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission					

According to §15.227(a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Emission Level (dBuV/m)=20log Emission Level(uV/m)

The field strength of emission limits have been calculated in below table:

Fundamental Frequency (MHz)	Field Strength of Fundamental (dBuV/m)@3m
26.96~27.28	80.0 (AVG)
26.96~27.28	100.0 (Peak)

NOTE:
1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average

detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.2. Test Setup

Figure 1. Below 30MHz

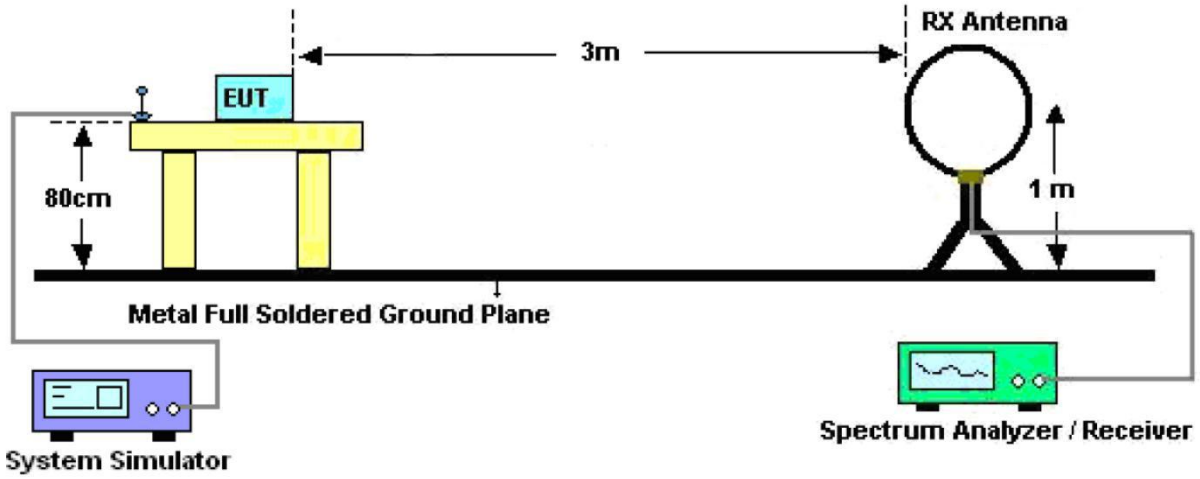


Figure 2. 30MHz to 1GHz

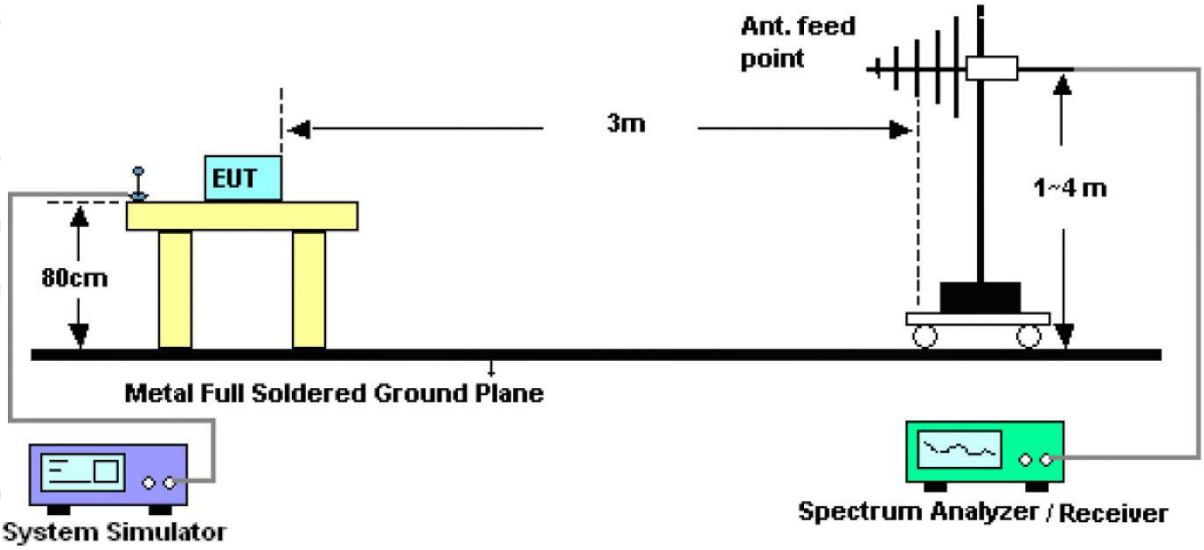
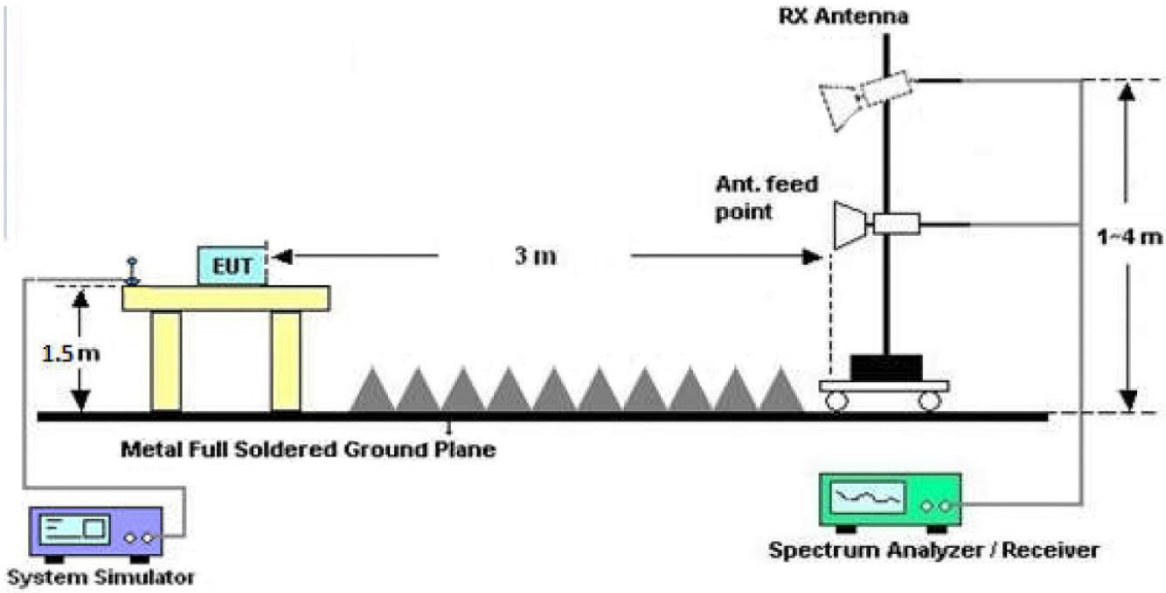


Figure 3. Above 1 GHz



4.3. Test Procedure

For below 1GHz: The EUT is placed on a turntable, which is 0.8m above the ground plane.
For above 1GHz: The EUT is placed on a turntable, which is 1.5m above the ground plane.
The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Rotated the EUT through three orthogonal axes to determine the maximum emissions, both horizontal and vertical polarization of the antenna are set on test. The EUT is tested in 9*6*6 Chamber. The device is evaluated in xyz orientation.

For 9kHz to 150kHz, Set the spectrum analyzer as:
RBW = 200Hz, VBW =1kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 150kHz to 30MHz, Set the spectrum analyzer as:
RBW = 9KHz, VBW =30kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 30MHz to 1000MHz, Set the spectrum analyzer as:
RBW = 100kHz, VBW =300kHz,Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.
For above 1GHz,Set the spectrum analyzer as:
RBW =1MHz, VBW =1MHz, Detector= Peak, Trace mode= Max hold, Sweep- auto couple.
RBW =1MHz, VBW =10Hz, Detector= Average, Trace mode= Max hold, Sweep- auto couple.

4.4. Test Data

PASS

During the test, Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the X-axis is the worst case.

The test results of 9kHz-30MHz was attenuated more than 20dB below the permissible limits, so the results don't record in the report, Only report the fundamental frequency results.

Test Results (Fundamental 27.145MHz)

Frequency	Antenna	Reading	Cable Loss	Ant Factor	Amplifier	Duty cycle Factor	Results	Limits	Det.
(MHz)	Pol.	(dBuV/m)	(dB)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	Mode
27.145	/	55.18	1.12	-16.70	0.00	--	39.60	100.00	PK
27.145	/	55.18	1.12	-16.70	0.00	-4.12	35.48	80.00	AV

Remark ：

1. Result = Reading + Cable Loss +Ant Factor –Amplifier + Duty cycle Factor

3. Duty Cycle Factor

Calculate Formula:

AV=PEAK +Duty Cycle Factor

Duty Cycle Factor=20log(Duty Cycle)

Duty Cycle= on time/ period

Test Data:

T on time=1.55ms*4+0.5ms*10=11.20ms

T period=18.0ms

Duty Cycle=62.22%

Duty Cycle Factor =20log(Duty Cycle)=-4.12

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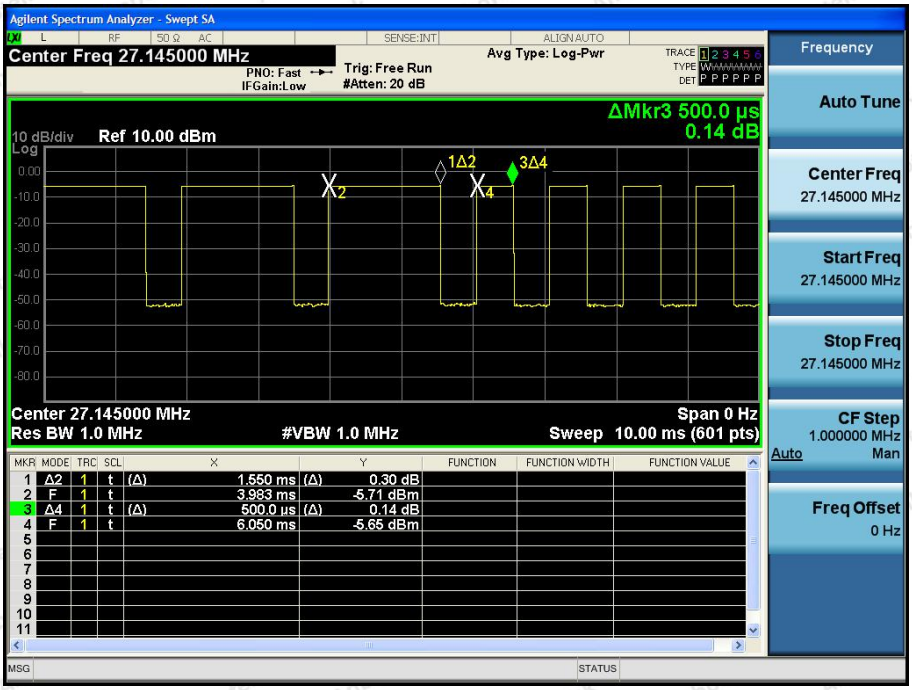
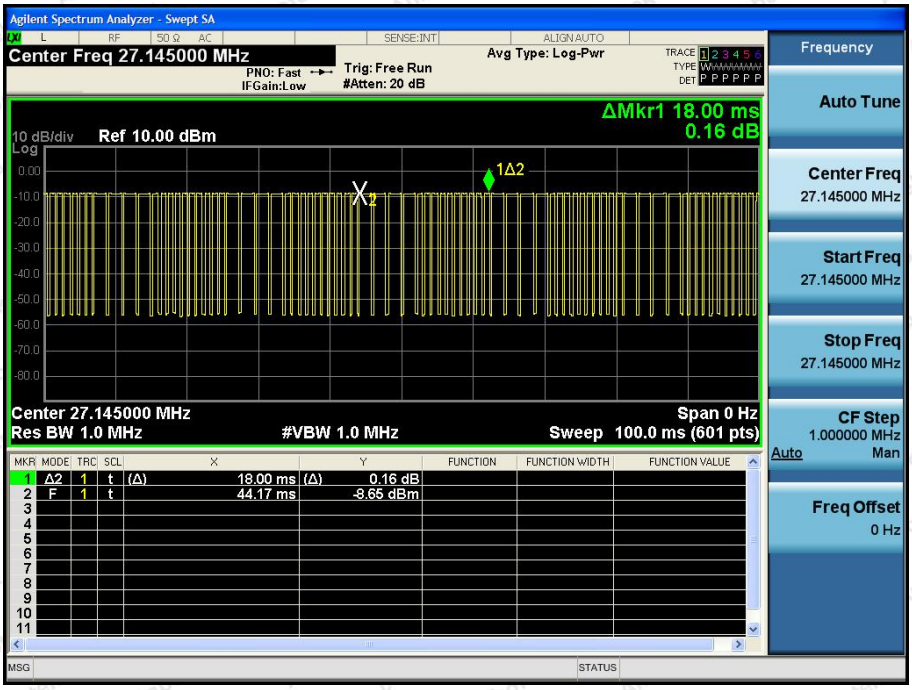
T on time slot

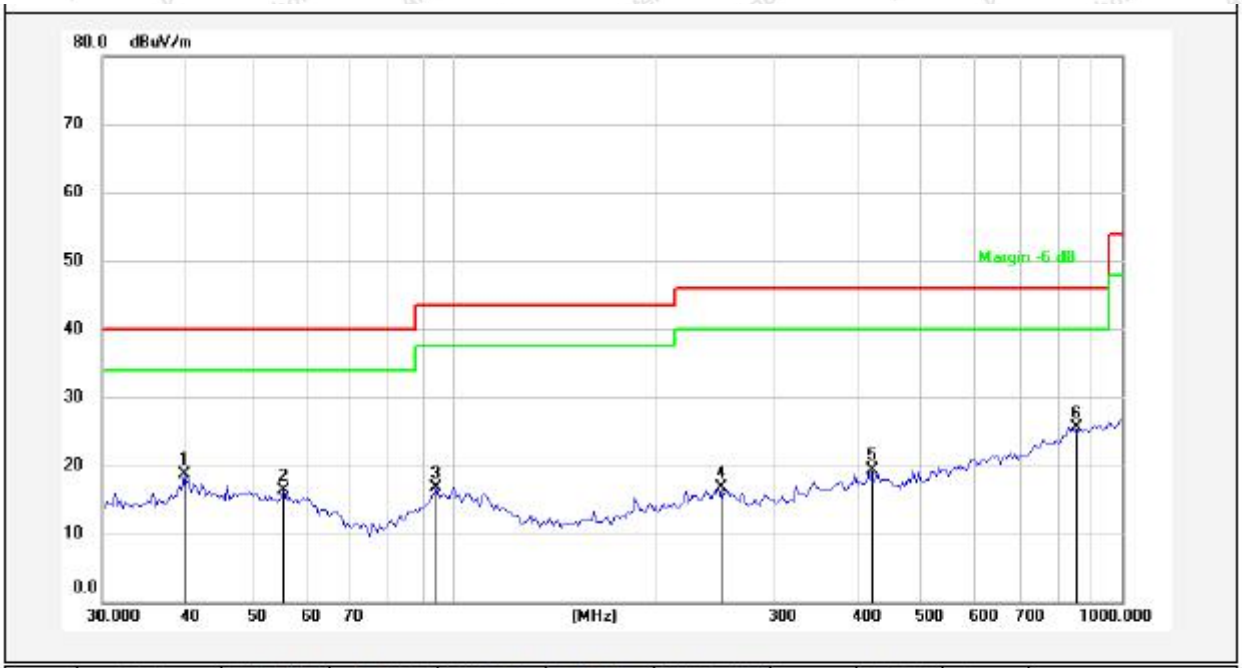


T period



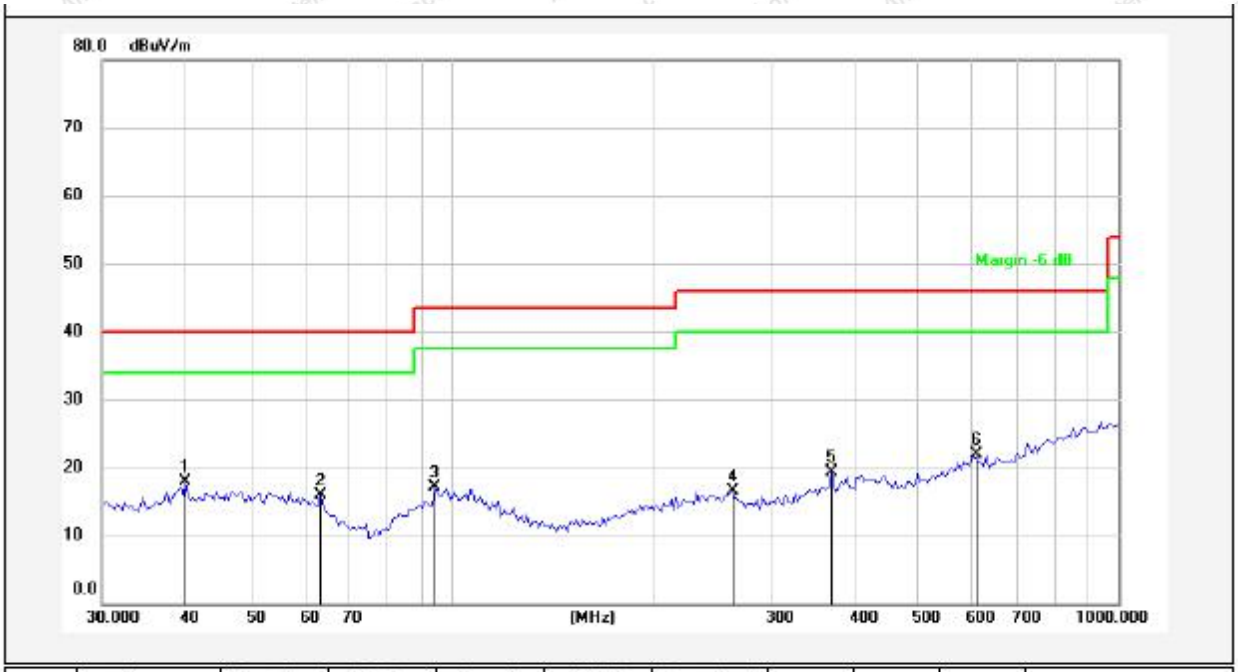
Test Results (Radiated Emission: 30M-1GHz)

Test Mode: CH01
Power Source: DC 3V Battery inside
Polarization: Vertical
Temp.(℃)/Hum.(%RH): 23.0℃/56%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor ()	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	39.7146	34.32	-15.64	18.68	40.00	-21.32	QP	100	360	
2	55.9026	32.53	-16.17	16.36	40.00	-23.64	QP	100	0	
3	94.5941	32.88	-16.21	16.67	43.50	-26.83	QP	100	360	
4	250.3012	32.93	-16.19	16.74	46.00	-29.26	QP	100	0	
5	419.8436	33.77	-14.42	19.35	46.00	-26.65	QP	100	360	
6	846.5708	33.88	-8.31	25.57	46.00	-20.43	QP	100	0	

Test Mode: CH01
Power Source: DC 3V Battery inside
Polarization: Horizontal
Temp.(℃)/Hum.(%RH): 23.0℃/56%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor ()	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	40.0644	33.38	-15.57	17.81	40.00	-22.19	QP	100	0	
2	63.7588	33.70	-17.88	15.82	40.00	-24.18	QP	100	360	
3	94.5941	33.39	-16.21	17.18	43.50	-26.32	QP	100	360	
4	261.5164	32.87	-16.28	16.59	46.00	-29.41	QP	100	0	
5	371.3528	34.61	-15.34	19.27	46.00	-26.73	QP	100	360	
6	606.7221	33.91	-12.07	21.84	46.00	-24.16	QP	100	0	

Remark:

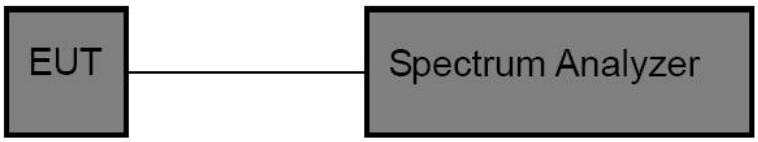
1. Results = Reading + Cable Loss +Ant Factor –Amplifier

5. 20dB Bandwidth Test

5.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.215
Test Limit	15.215(c), Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the 20 dB bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation. Operation within the band: 26. 96 – 27.28 MHz

5.2. Test Setup



5.3. Test Procedure

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as:

RBW = 30kHz, VBW≥3*RBW =100kHz,

Detector= Average

Trace mode= Max hold.

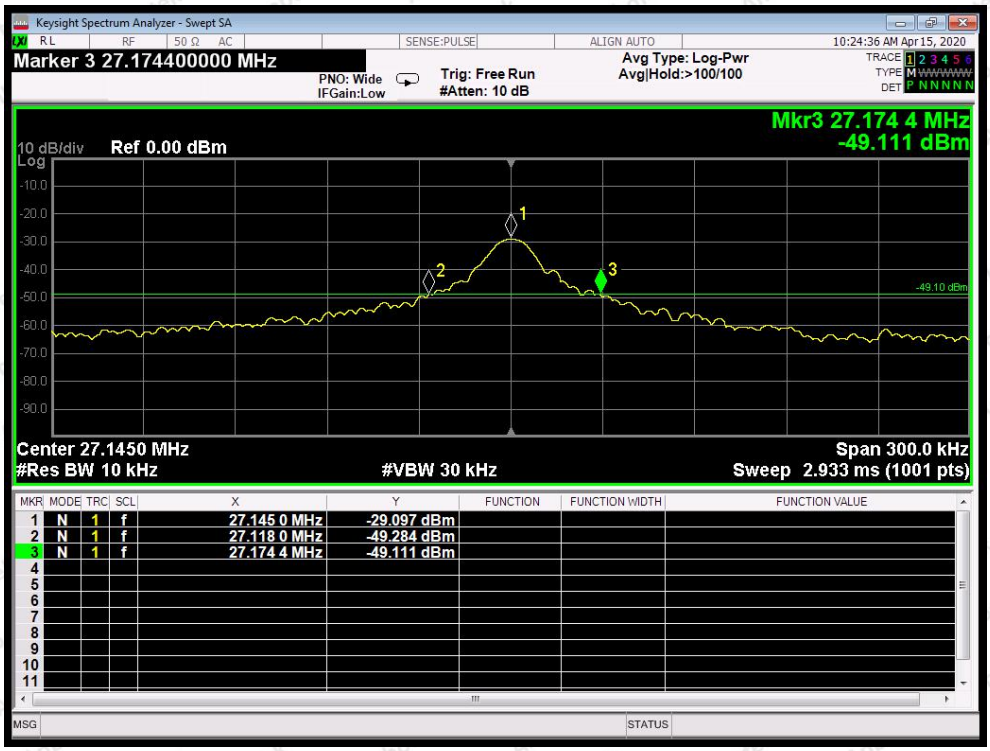
Sweep- auto couple.

4. Mark the peak frequency and –20dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

5.4. Test Data

Test Item	:	20dB Bandwidth	Test Mode	:	Mode 1
Test Voltage	:	DC 3V battery inside	Temperature	:	22.4℃
Test Result	:	PASS	Humidity	:	55%RH

Fl(MHz)	Fh(MHz)	Permitted frequency range(MHz)	Result
27.1180	27.1744	26.96-27.28	PASS



20 dB BW

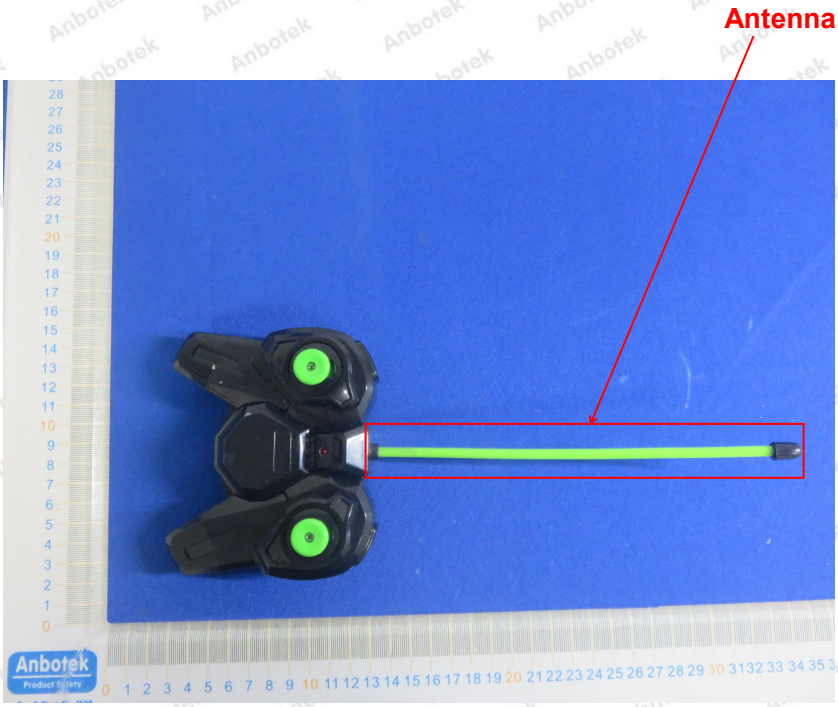
6. Antenna Requirement

6.1. Test Standard and Requirement

Test Standard	FCC Part15 Section 15.203
Requirement	1) 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.

6.2. Antenna Connected Construction

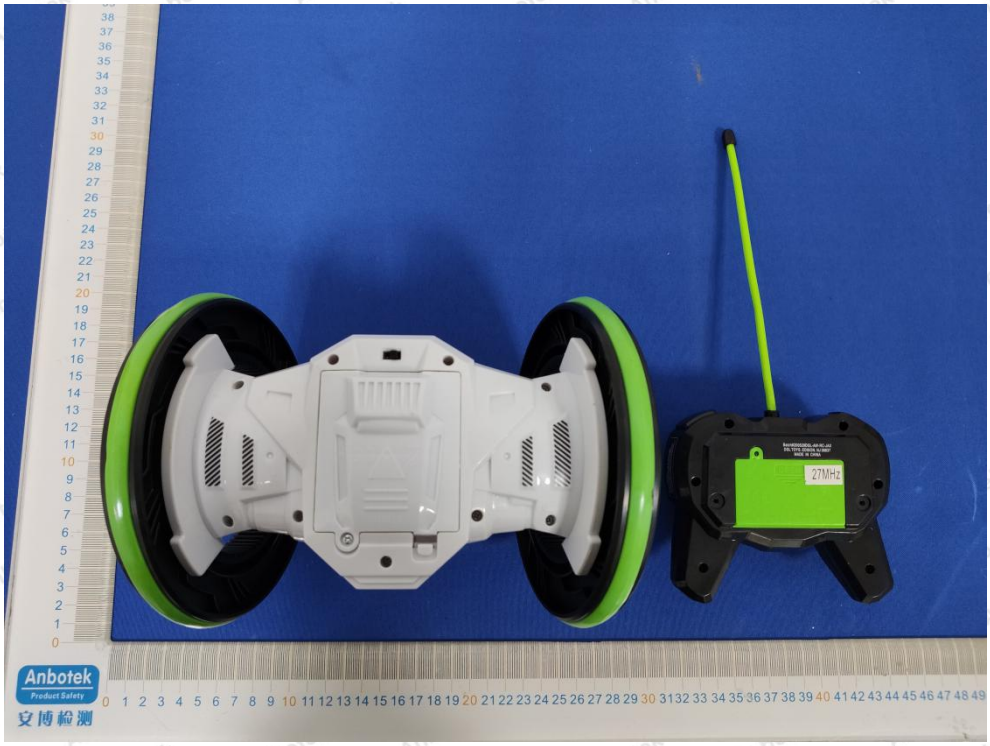
The antenna is a Spring Antenna which permanently attached, and the best case gain of the antenna is 3 dBi. It complies with the standard requirement.

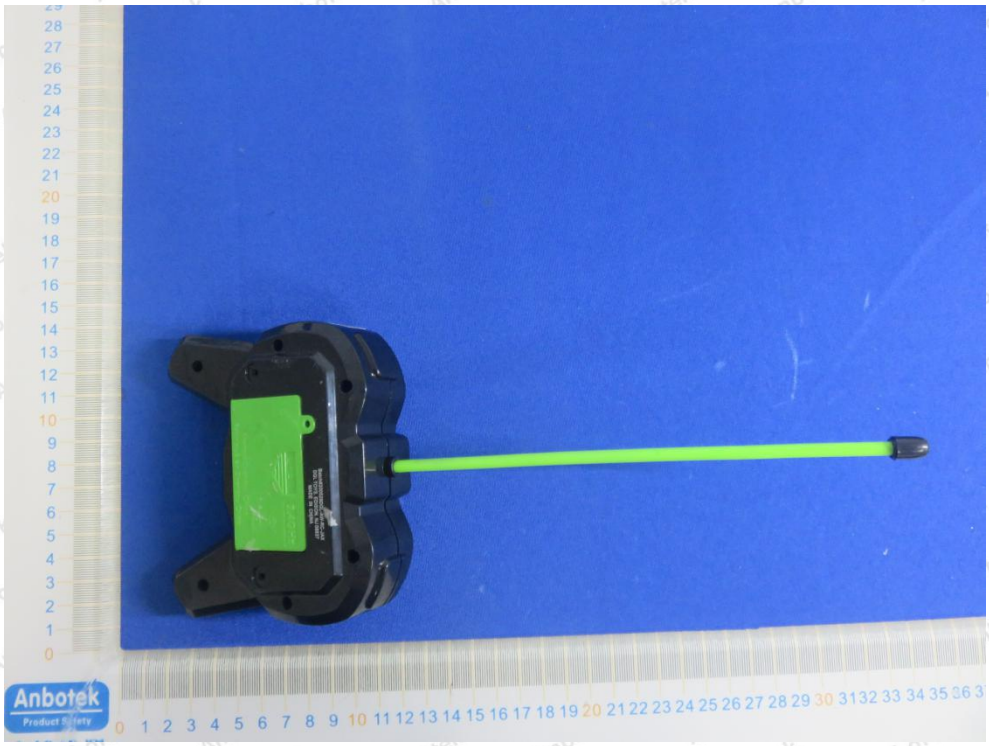


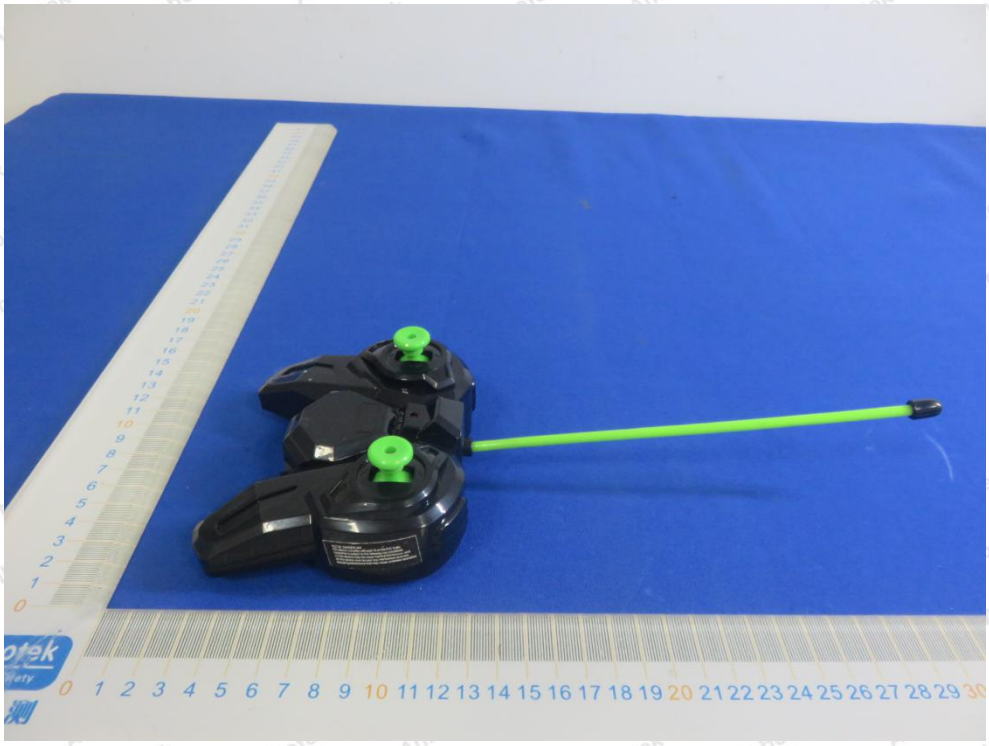
APPENDIX I -- TEST SETUP PHOTOGRAPH

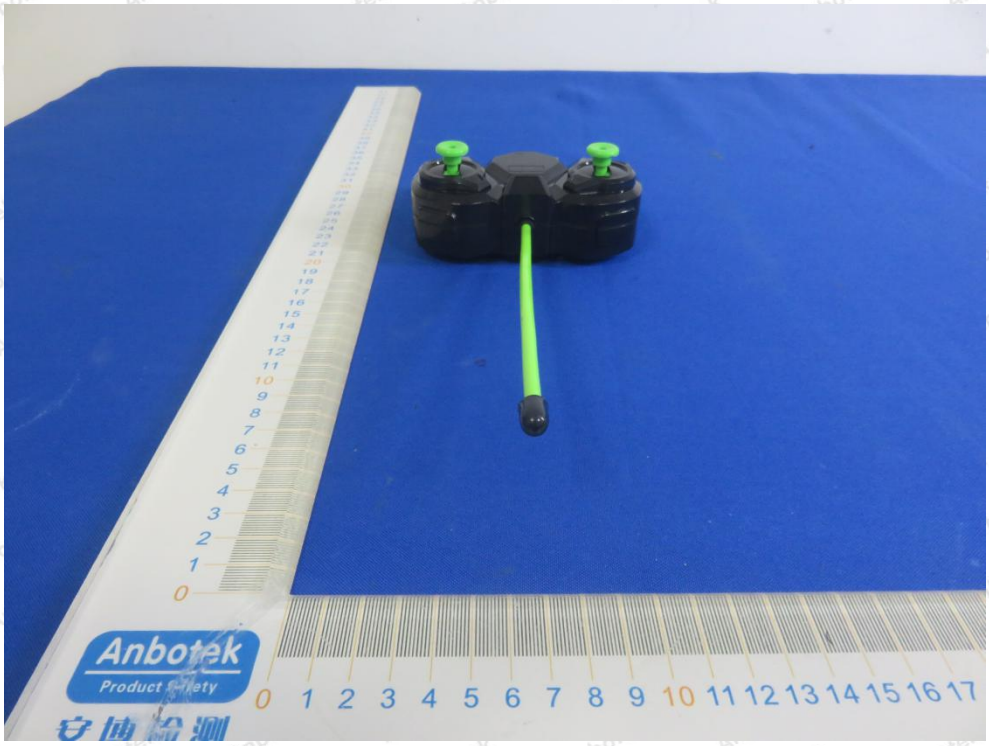
Photo of Radiation Emission Test

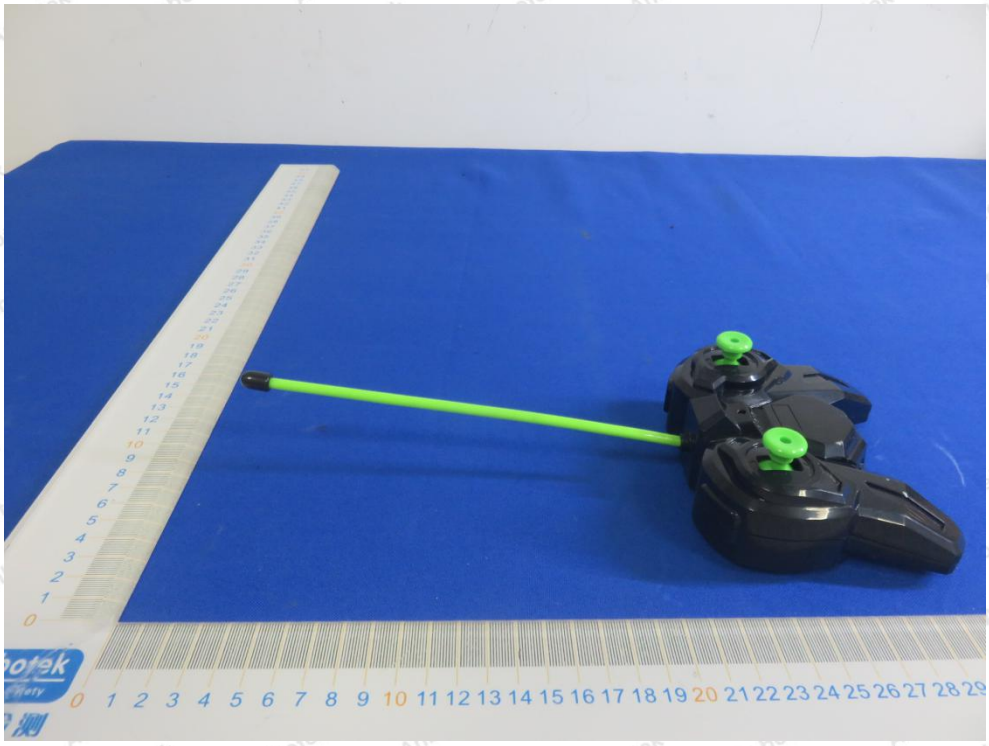
APPENDIX II -- EXTERNAL PHOTOGRAPH


27MHz

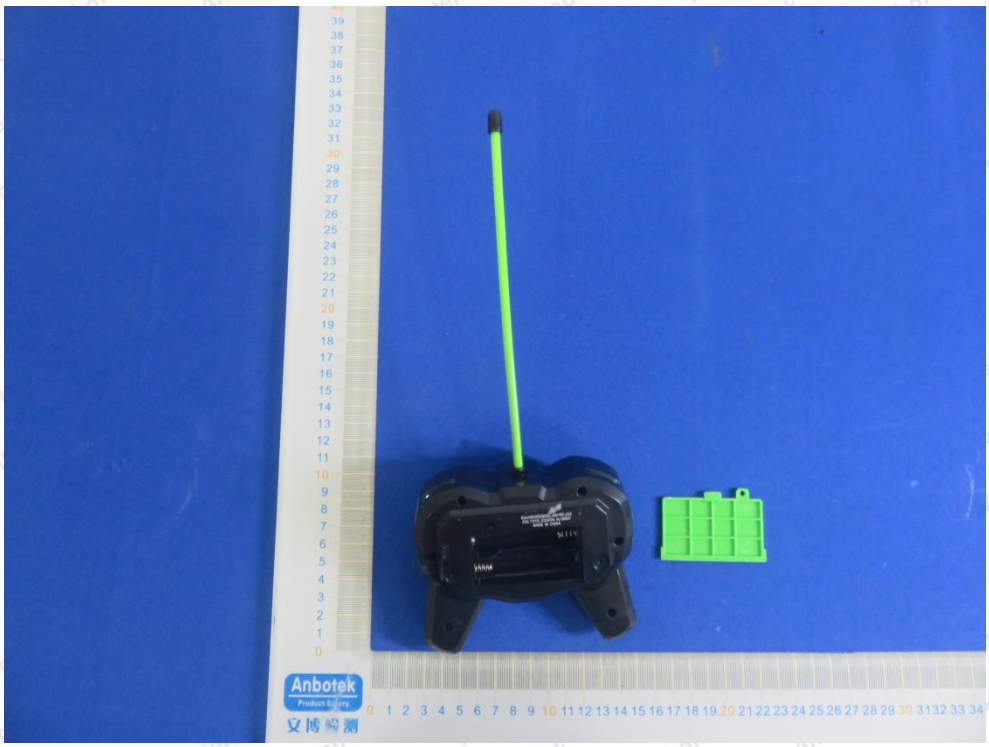


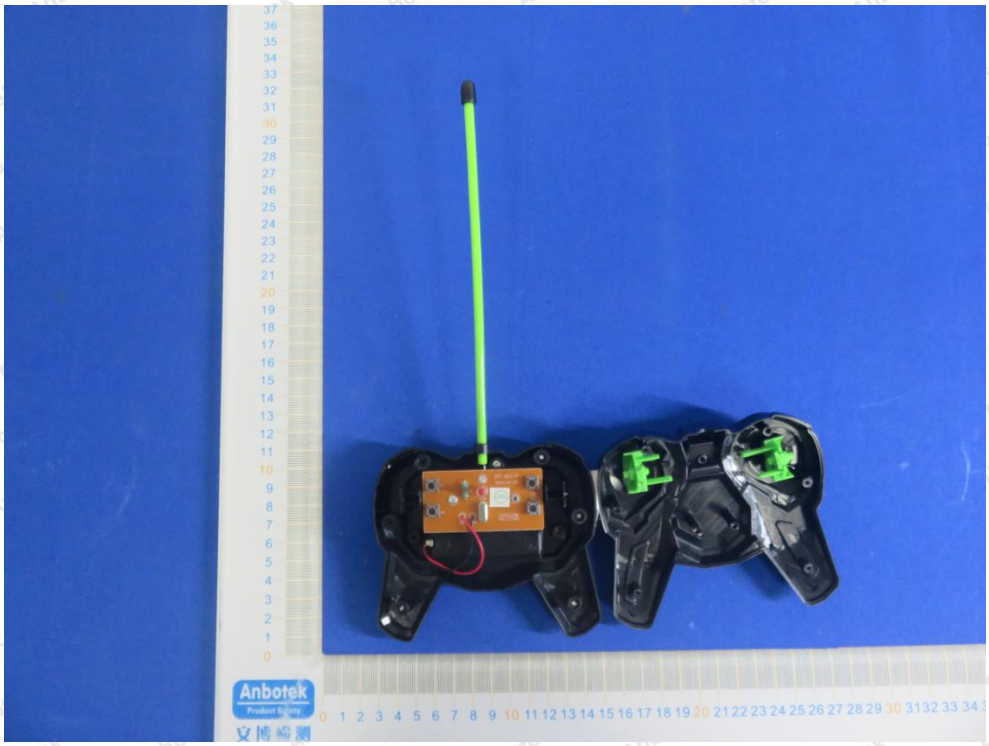


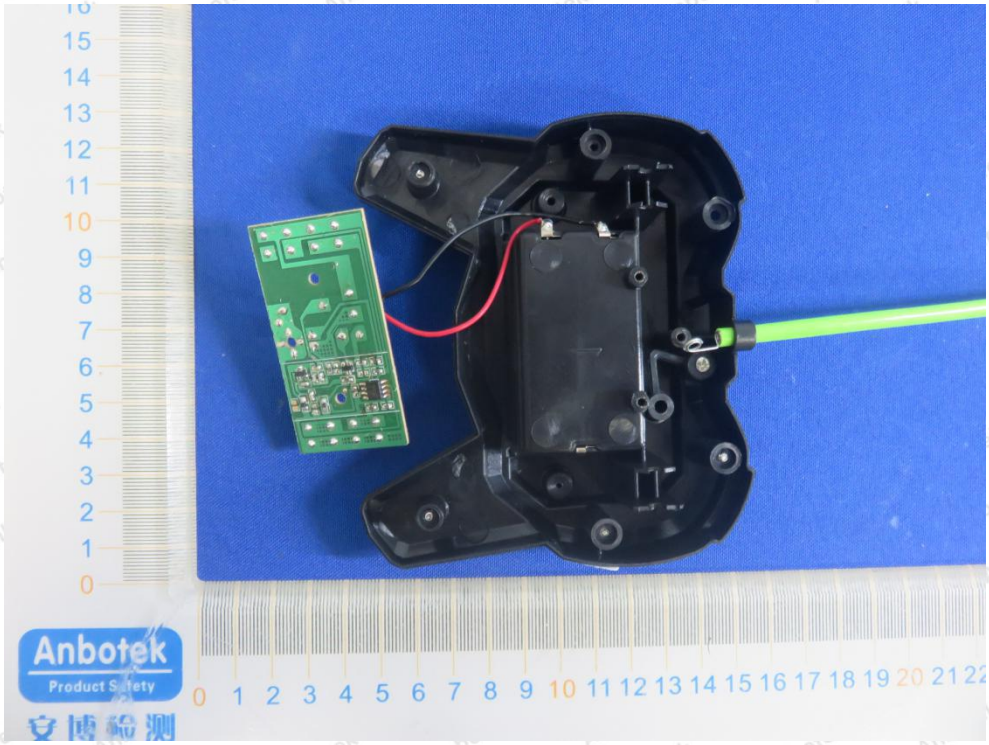


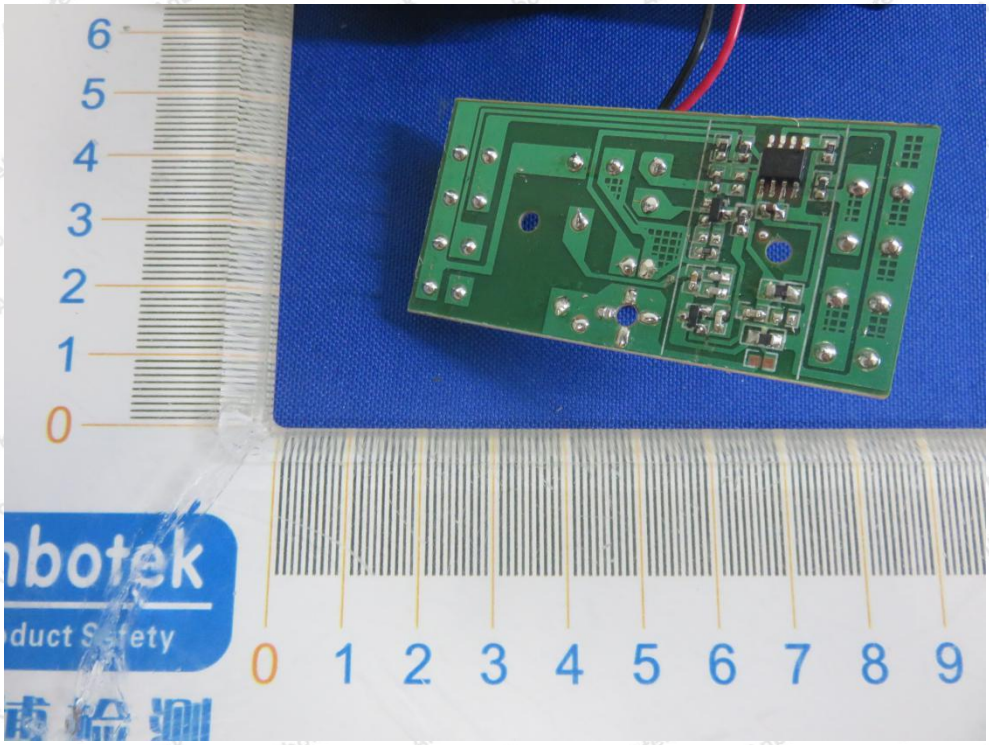


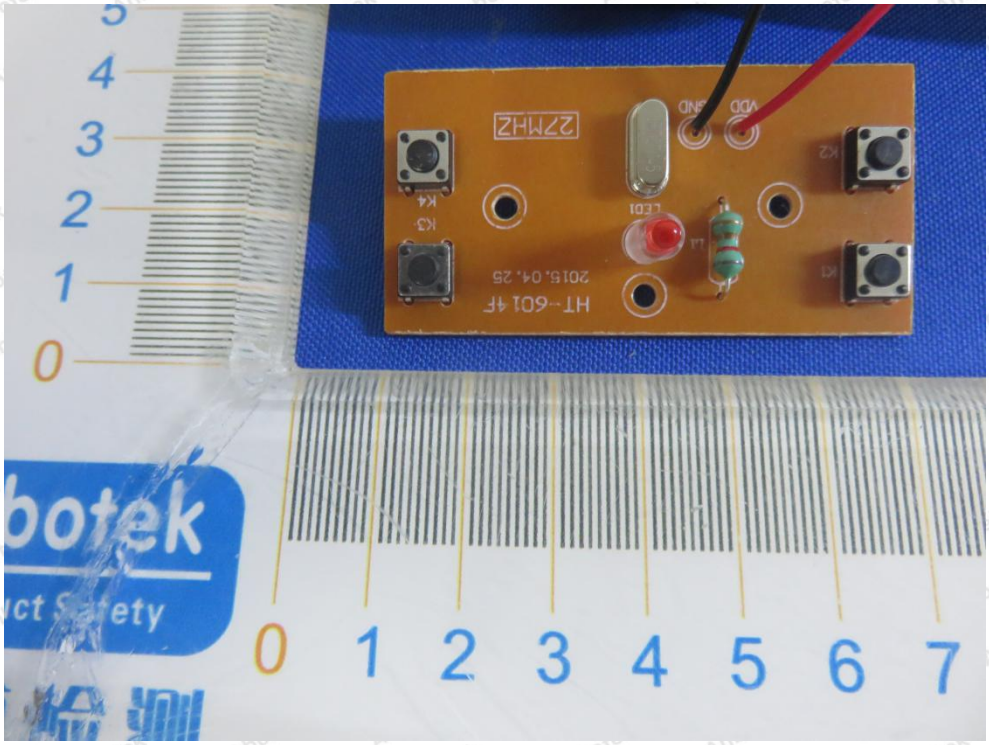
APPENDIX III -- INTERNAL PHOTOGRAPH







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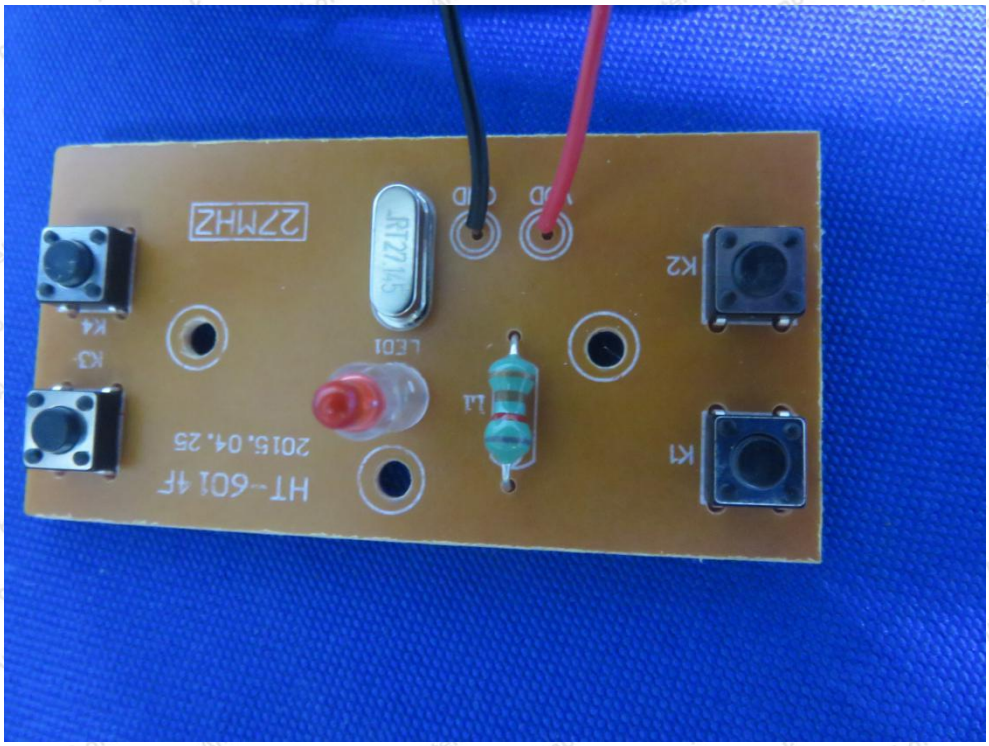
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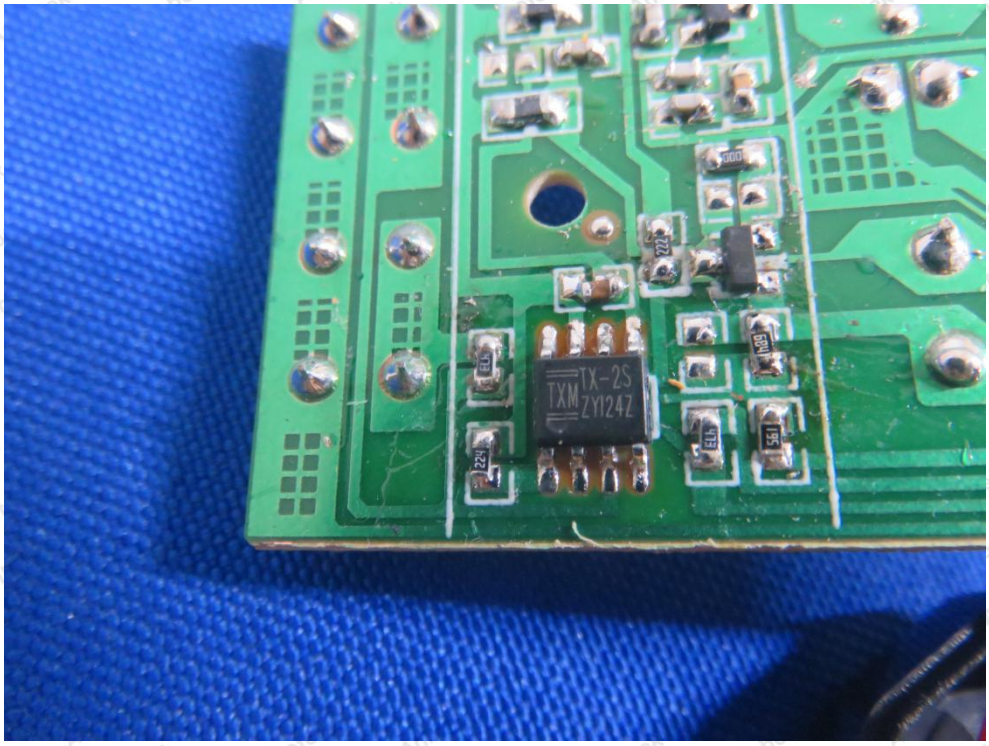

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