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Test Report No.:RF121207N005

Test Lab
Cert 2951.01

TEST REPORT

Applicant	MAXSPEED TOYS FACTORY
Address:	XINGYE EAST ROAD AND THE JUNCTION OF XIUSHUI ROAD LAIMEI INDUSTRIAL ESTATE, CHENGHAI, SHANTOU, GUANGDONG

Manufacturer or Supplier	MAXSPEED TOYS FACTORY
Address	XINGYE EAST ROAD AND THE JUNCTION OF XIUSHUI ROAD LAIMEI INDUSTRIAL ESTATE, CHENGHAI, SHANTOU, GUANGDONG
Product	REMOTE CONTROL CAR
Brand Name	N/A
Model	313
Additional Model & Model Difference:	311, 312, 314, 315, 316, 317, 318, 319, 320, 8545 ect. See item 3.1
Date of tests	Nov. 09 ~ Nov. 22, 2012

the tests have been carried out according to the requirements of the following standards:

 FCC Part 15, Subpart C (Section 15.227)**CONCLUSION: The submitted sample was found to COMPLY with the test requirement**

Tested by Glyn He Specialist / EMC Department	Approved by Sam Tung Manager / EMC Department
	 Date: Dec. 07, 2012

This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification



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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF121109N007	Original release	Nov. 22, 2012
RF121207N005	Based on RF121109N007 add model name.	Dec. 07, 2012



1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.227)			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
§15.207 (a)	Conducted Emission	N/A	N/A
§15.209 §15.227	Radiated Emission	PASS	Compliant
§15.35	Duty Cycle	PASS	Compliant
§15.215(c)	20dB Bandwidth Test	PASS	Compliant

2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.44dB
Radiated emissions	30MHz ~ 1GHz	3.64dB
	1GHz ~ 18GHz	2.26dB
	18GHz ~ 40GHz	1.94dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.



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3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	REMOTE CONTROL CAR
MODEL NO.	313
FCC ID	QUAMAXSPEEDTOYS96
NOMINAL VOLTAGE	TX: DC3V by Battery RX: DC7.5V by Battery
MODULATION TYPE	ASK
OPERATING FREQUENCY	27.145MHz
NUMBER OF CHANNEL	1
ANTENNA TYPE	Integral External Antenna
I/O PORTS	N/A
CABLE SUPPLIED	N/A

NOTE:

1. This report is issued based on the previous report with report number RF121109N007 add model name: 8545.
2. Additional models 311, 312, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 0998CH, 1699CH, 1778CH, 236CH, 1559CH, 1569CH, 1358CH, 1359CH, 0998CH-B10, 1358CH-B10, 1778CH-B10, 216, 217, 218, 219, 8545 are identical with the test model 313 except the color and model number for marketing purpose.
3. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
4. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

3.2 DESCRIPTION OF TEST MODES

The EUT was tested under the following mode.

FREQUENCY	TEST MODES
27.145MHz	Transmitting



3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (15.227)

ANSI C63.4-2003

ANSI C63.10-2009

All test items have been performed and recorded as per the above standards.

3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit without any other necessary accessories or support units.



4. TEST TYPES AND RESULTS

4.1 DUTY CYCLE TEST

4.1.1 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Signal Analyzer Rohde & Schwarz	FSV7	102331	Nov. 25, 11	Nov. 25, 12
Loop antenna Daze	ZN30900A	0708	Nov. 28,12	Nov. 28,13
10m Semi-anechoic Chamber ETS-LINDGREN	21.4m*12.1m*8.8m	NSEMC006	Mar. 24,12	Mar. 23,13
RF Cable IMRO	IMRO-400	10m Cable 1#10m	May 16,12	May 15,13
RF Cable IMRO	IMRO-400	10m Cable 2#3m	May 16,12	May 15,13
Signal Amplifier SONOMA	310N	186955	Mar. 14,12	Mar. 13,13
RF Cable DRAKA	M06/25-RG102	10m Cable 2#	May 16,12	May 15,13
Test software ADT	ADT_Radiated_V7. 6.15	N/A	N/A	N/A

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA and NIM/CHINA.

2. The test was performed in 10m Chamber.

4.1.2 TEST PROCEDURES

For below 30MHz, a loop antenna with its vertical plane is place 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1m above the ground.

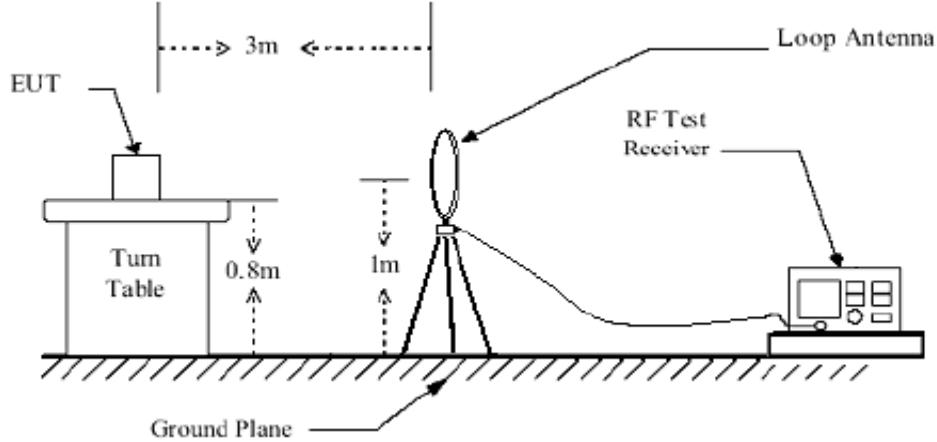
Set the center frequency to 27.145 MHz, than set the spectrum analyzer to Zero Span for the release time reading. During the testing, the switch was released then the EUT automatically deactivated.

4.1.3 DEVIATION FROM TEST STANDARD

No deviation



4.1.4 TEST SETUP



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.5 EUT OPERATING CONDITIONS

- Turn on the EUT.
- Hold down the button of the remote control, then the EUT was operating.
- Enable EUT under transmission condition continuously at specific channel frequency.

4.1.6 TEST RESULTS

$$T_p = 62.681\text{ms}$$

$$\begin{aligned} T_{on} &= T_{on1} * \text{Number} + T_{on2} * \text{Number} + T_{on3} * \text{Number} \\ &= 0.261 * 1 + 0.172 * 4 + 0.084 * 12 = 1.957\text{ms} \end{aligned}$$

$$\text{Duty Cycle} = T_{on} / T_p * 100\% = 1.957 / 62.681 = 3.122\%$$

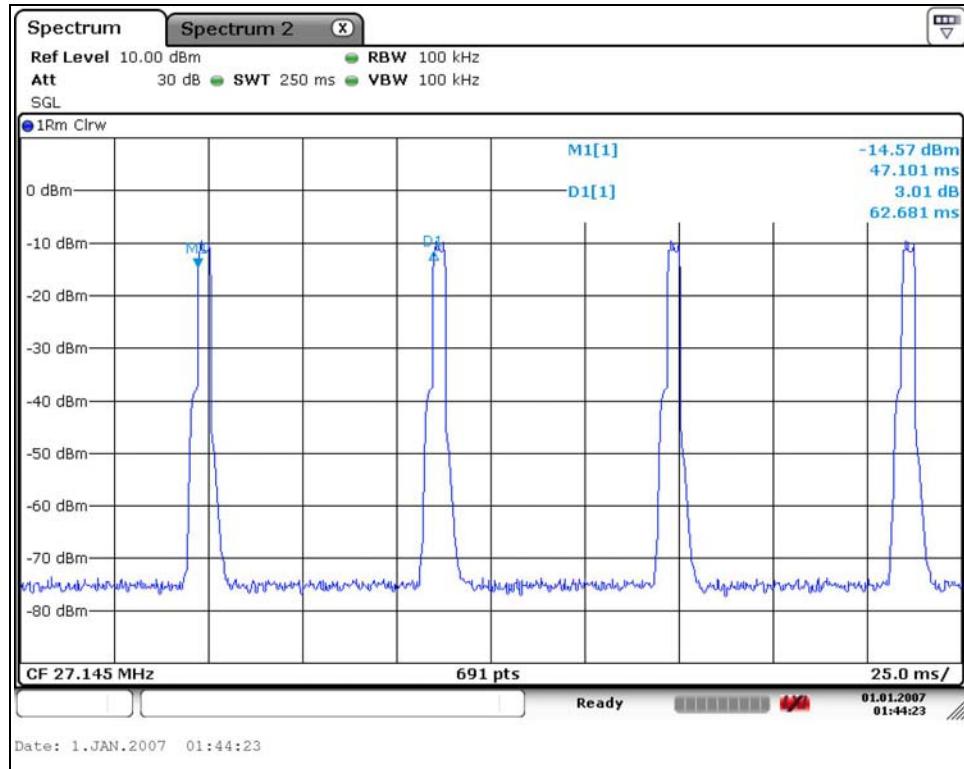
$$\text{Factor} = 20 * \text{Log} (3.122\%) = -30.1$$



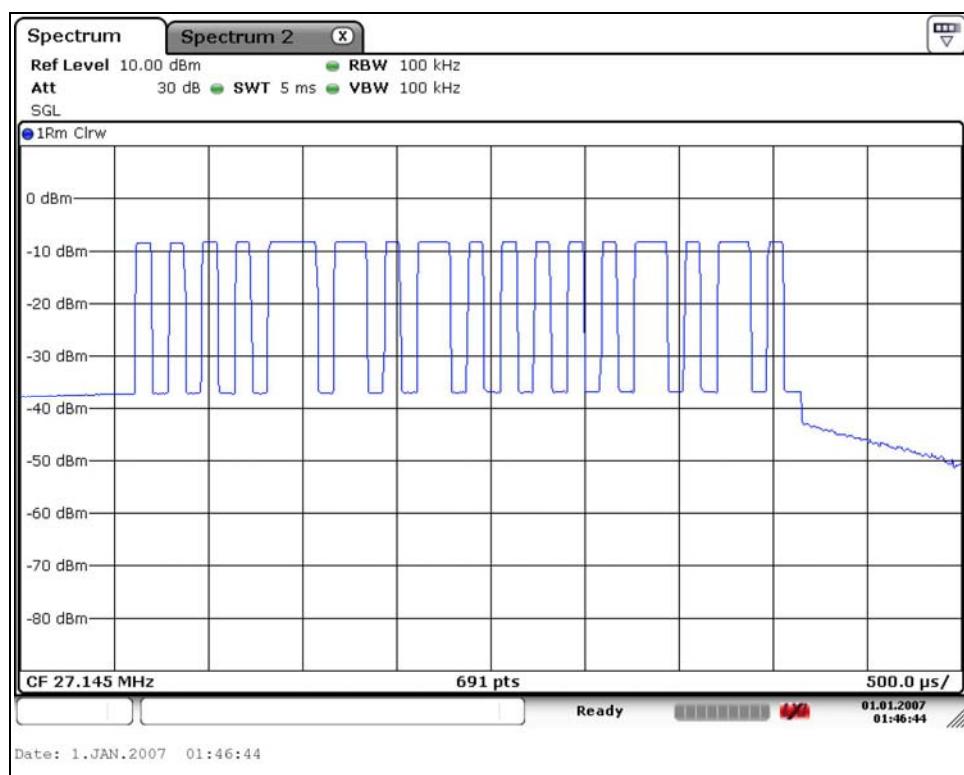
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$T_p=62.681\text{ms}$



$$\text{Ton} = \text{Ton1} * \text{Number} + \text{Ton2} * \text{Number} + \text{Ton3} * \text{Number} = 0.261 * 1 + 0.172 * 4 + 0.084 * 12 = 1.957\text{ms}$$

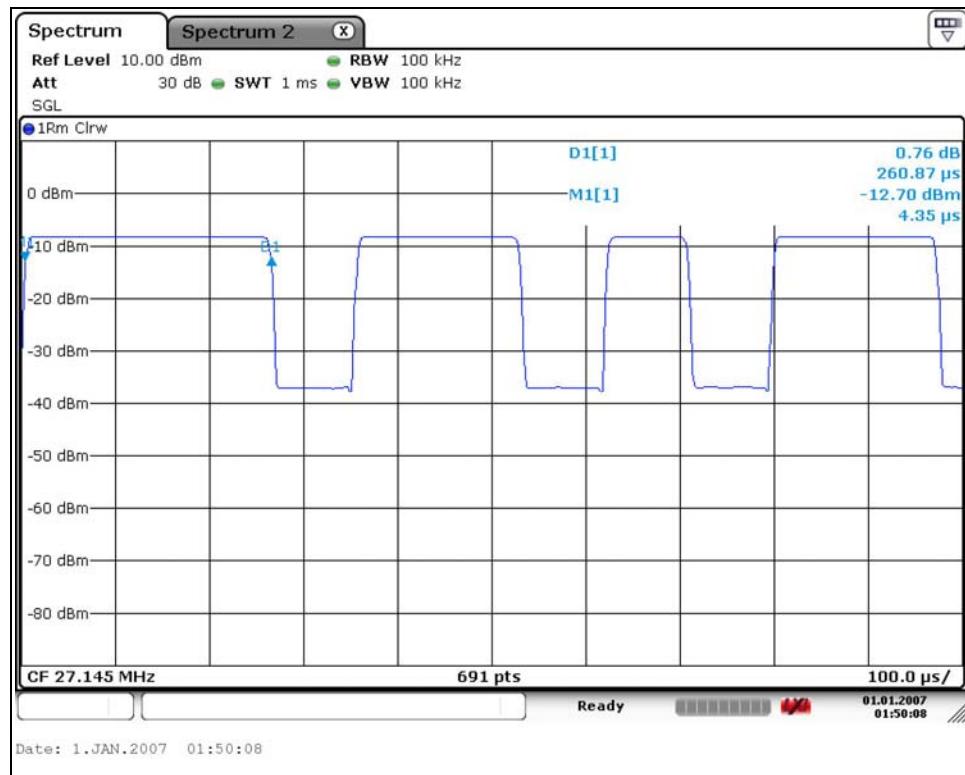




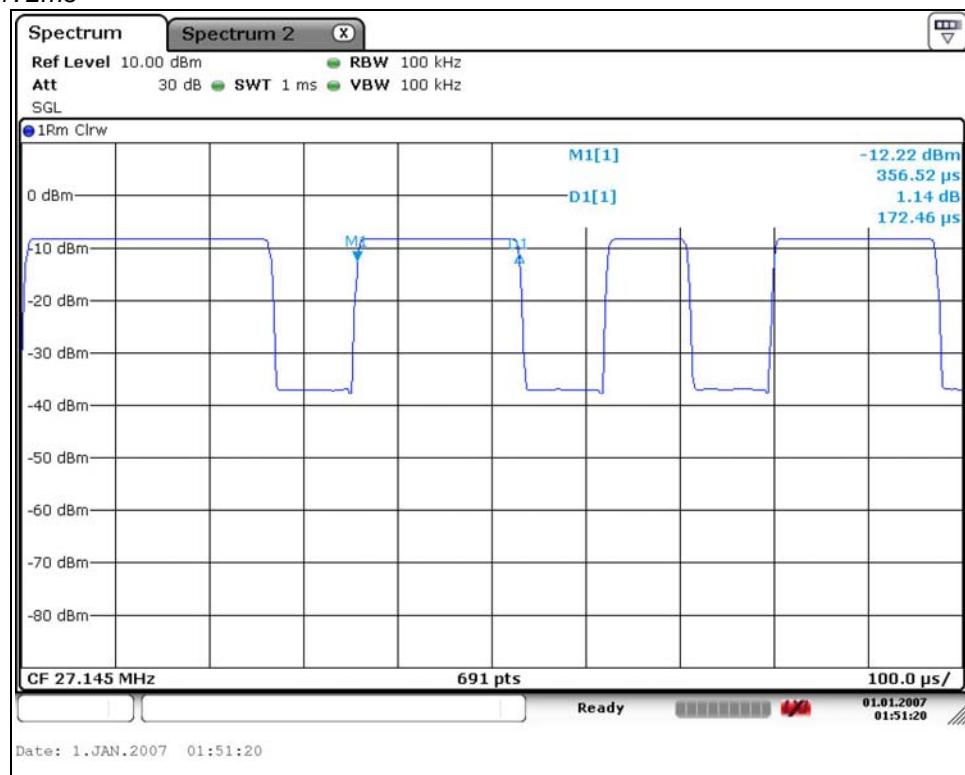
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Ton1=0.261ms



Ton2=0.172ms

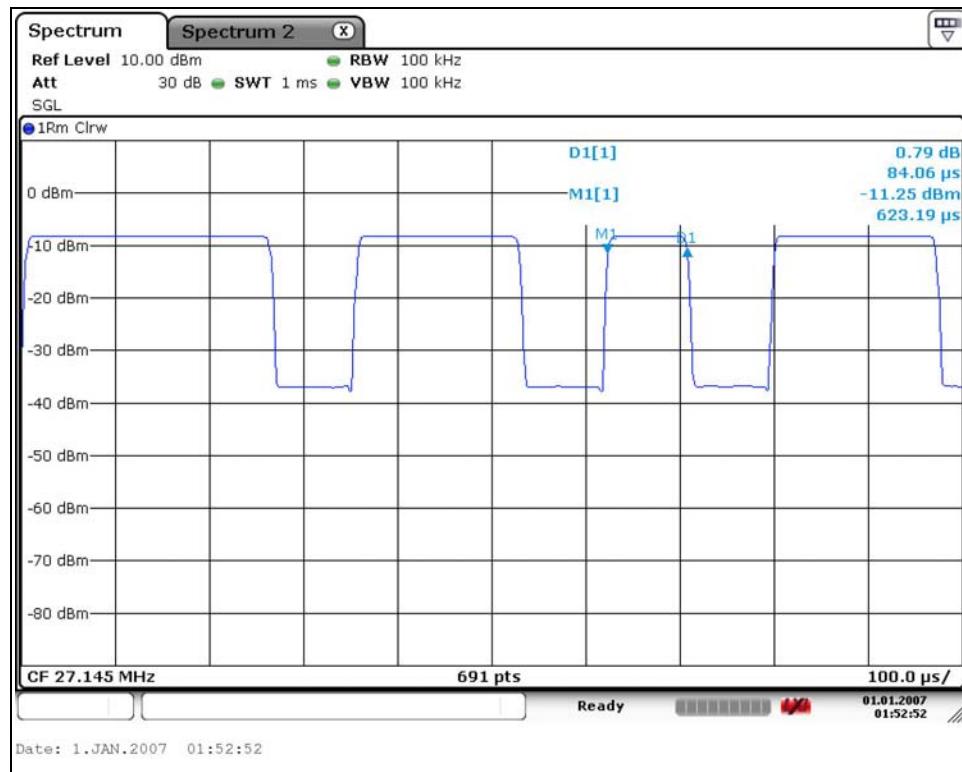




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Ton3=0.084ms





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4.2 RADIATED EMISSION MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

FREQUENCIES (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
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

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

Frequency Range of Fundamental [MHz]	Field Strength of Fundamental Emission [Peak] [μ V/m]	Field Strength of Fundamental Emission [Average] [μ V/m]
26.96 – 27.28	100,000 (100 dB μ V/m)	10,000 (80 dB μ V/m)

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dB μ V/m) = 20 log Emission level (μ V/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.



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4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Spectrum Analyzer ROHDE & SCHWARZ	E4446A	MY46180622	May 02, 12	May 01, 13
Test Receiver ROHDE & SCHWARZ	ESVD	847398/003	May 15,12	May 14,13
Bilog Antenna TESEQ	CBL 6111D	27089	July 16,12	July 15,13
Loop antenna Daze	ZN30900A	0708	Dec. 01,11	Nov. 30,12
Horn Antenna EMCO	3117	00062558	Oct.18,12	Oct.17,13
10m Semi-anechoic Chamber ETS-LINDGREN	21.4m*12.1m*8.8m	NSEMC006	Mar. 24,12	Mar. 23,13
RF Cable IMRO	IMRO-400	10m Cable 1#10m	May 16,12	May 15,13
RF Cable IMRO	IMRO-400	10m Cable 2#3m	May 16,12	May 15,13
Signal Amplifier SONOMA	310N	186955	Mar. 14,12	Mar. 13,13
Signal Amplifier HP	8449B	3008A00409	May 31,12	May 30,13
RF Cable DRAKA	M06/25-RG102	10m Cable 2#	May 16,12	May 15,13
Test software ADT	ADT_Radiated_V7. 6.15	N/A	N/A	N/A

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA and NIM/CHINA.
2. The test was performed in 10m Chamber.



4.2.3 TEST PROCEDURES

The basic test procedure was in accordance with ANSI C63.4 (section 12).

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meters Semi-anechoic chamber room. 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 height of antenna 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 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 quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, For battery operated equipment, the equipment tests shall be perform using new battery. The turntable was rotated to maximize the emission level.
- g. For below 30MHz, a loop antenna with its vertical plane is place 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1m above the ground.

NOTE:

1. The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
3. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
4. Margin value = Emission level – Limit value.
5. Fundamental AV value =PK Emission +duty cycle.

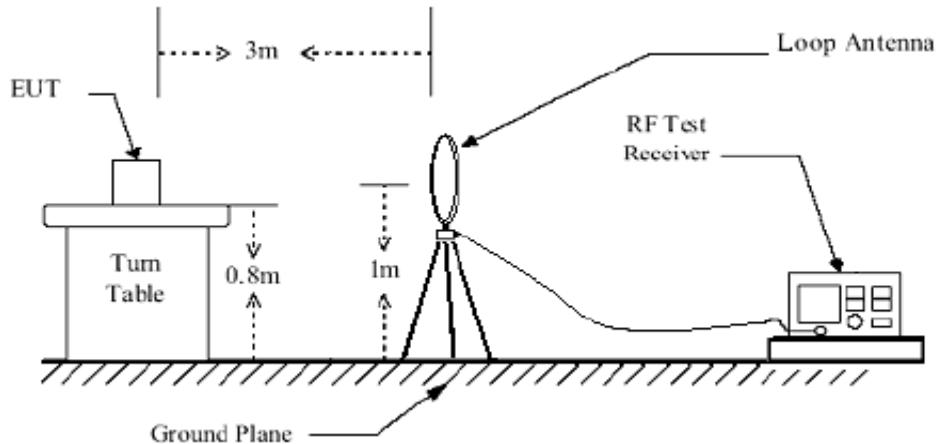
4.2.4 DEVIATION FROM TEST STANDARD

No deviation

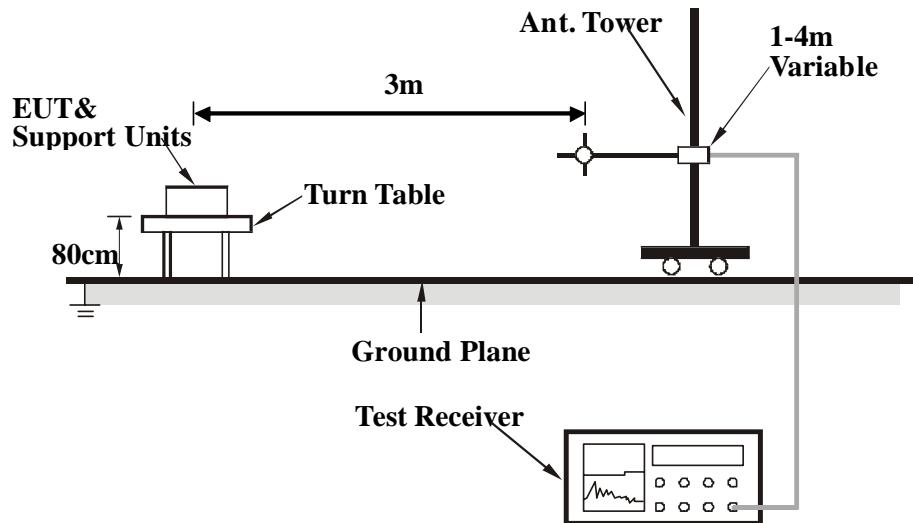


4.2.5 TEST SETUP

Below 30MHz



30MHz~1GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).



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4.2.6 EUT OPERATING CONDITIONS

Same as item 4.1.5

4.2.7 TEST RESULTS

FIELD STRENGTH OF FUNDAMENTAL

No.	Freq. (MHz)	Correction Factor (dB/m)	Raw Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*	27.145(PK)	21.56	63.94	85.5	100	-14.5
*	27.145(AV)	-		55.4	80	-24.6

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “*”: Fundamental frequency.
 6. Duty Cycle Correction = $20\log(0.03122) = -30.1\text{dB}$

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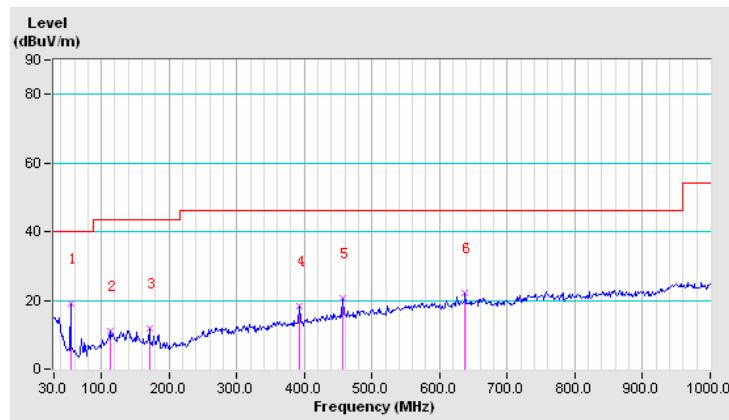
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FREQUENCY RANGE	30MHz ~ 1GHz	DETECTOR FUNCTION	Quasi-Peak (QP)
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ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	54.16	18.9 QP	40.0	-21.1	1.00 H	339	9.47	9.43
2	112.37	10.9 QP	43.5	-32.6	1.00 H	191	-1.30	12.19
3	170.58	12.0 QP	43.5	-31.6	1.00 H	264	0.97	10.98
4	392.11	18.4 QP	46.0	-27.6	1.00 H	284	0.86	17.53
5	456.79	20.5 QP	46.0	-25.5	1.00 H	302	1.26	19.27
6	637.89	22.1 QP	46.0	-23.9	1.00 H	319	-1.06	23.17

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.



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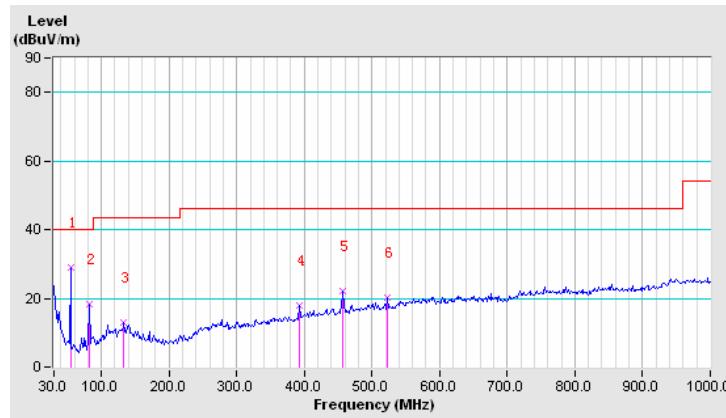
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FREQUENCY RANGE	30MHz ~ 1GHz	DETECTOR FUNCTION	Quasi-Peak (QP)
------------------------	--------------	--------------------------	-----------------

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	54.16	29.1 QP	40.0	-10.9	1.00 V	349	19.64	9.43
2	81.64	18.4 QP	40.0	-21.6	1.00 V	328	9.70	8.72
3	133.39	12.8 QP	43.5	-30.7	1.00 V	239	0.07	12.75
4	392.11	18.0 QP	46.0	-28.0	1.00 V	268	0.48	17.53
5	456.79	22.3 QP	46.0	-23.8	1.00 V	308	2.98	19.27
6	523.09	20.2 QP	46.0	-25.8	1.00 V	286	-0.35	20.58

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.





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4.3 20dB BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF 20dB BANDWIDTH MEASUREMENT

According to FCC 15.215(c), must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Spectrum Analyzer ROHDE & SCHWARZ	E4446A	MY46180622	May 02, 12	May 01, 13
Horn Antenna EMCO	3117	00062558	Oct.18,12	Oct.17,13
10m Semi-anechoic Chamber ETS-LINDGREN	21.4m*12.1m*8.8m	NSEMC006	Mar. 24,12	Mar. 23,13
RF Cable IMRO	IMRO-400	10m Cable 2#3m	May 16,12	May 15,13
Signal Amplifier EMCI	8447D	2944A10488	May 2,12	May 2,13
RF Cable DRAKA	M06/25-RG102	10m Cable 2#	May 16,12	May 15,13
Test software ADT	ADT_Radiated_V7.6.15	N/A	N/A	N/A

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA and NIM/CHINA
2. The test was performed in 10m Chamber.



4.3.3 TEST PROCEDURE

The EUT was placed on a turn table which was 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on a antenna tower. At the frequency band of 30MHz to 1GHz, The measuring antenna moved up and down to find out the maximum emission level. It moved from 1 to 4 m for horizontal and vertical polarizations.

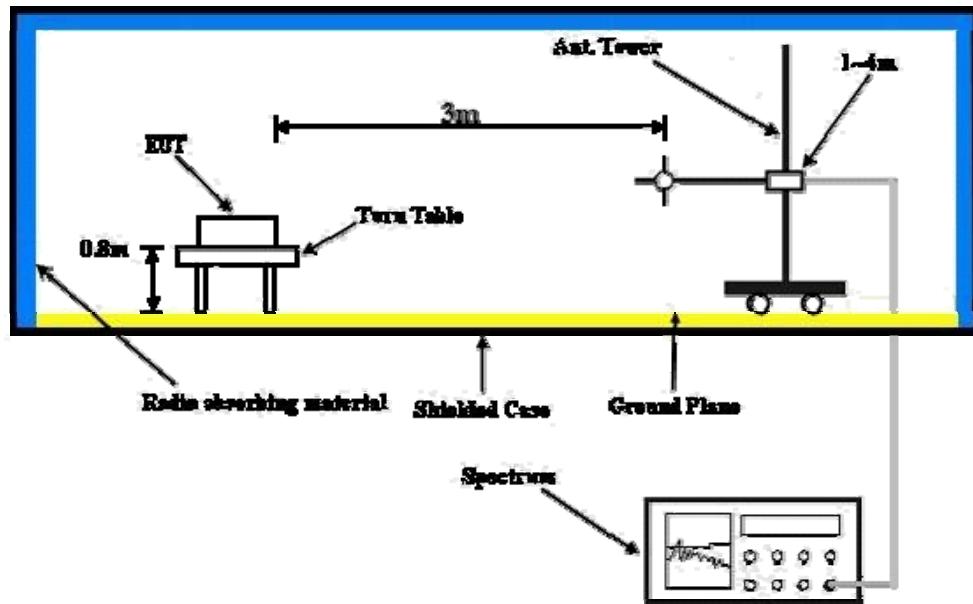
The spectrum analyzer was receiving the maximum emission level. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation.



4.3.5 TEST SETUP



4.3.6 EUT OPERATING CONDITIONS

Same as item 4.1.5



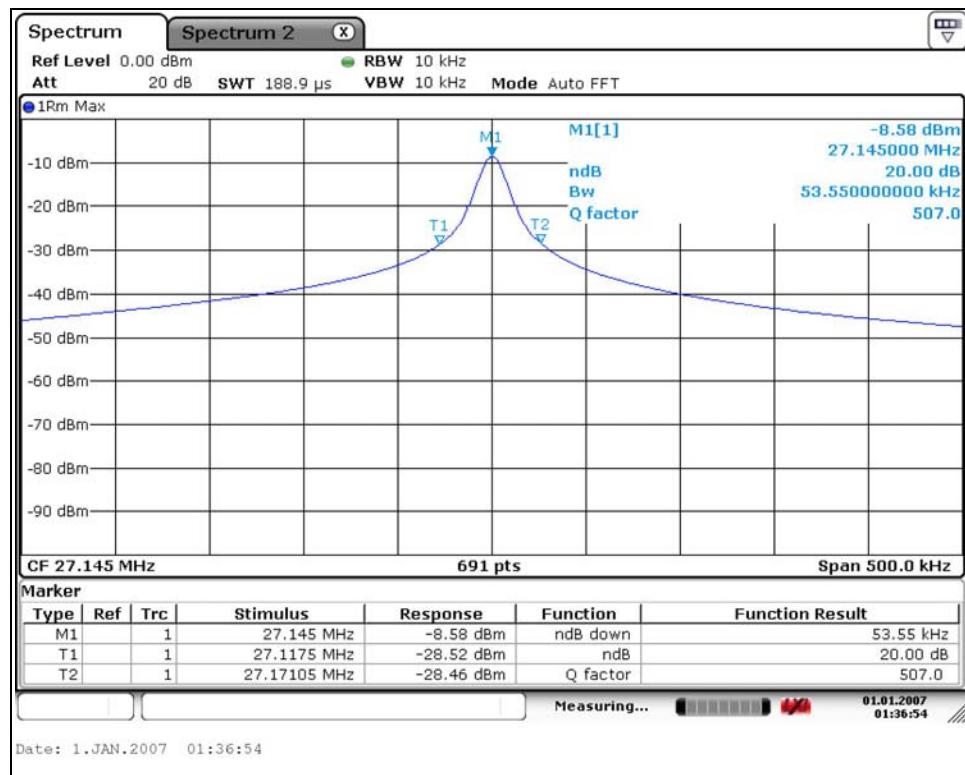
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4.3.7 TEST RESULTS

CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (KHz)
27.145	53.55

Test Data:





5 PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).



6 APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

---END---