

EMC TEST REPORT

No. JSH006080747-001

Applicant : Ningbo Mingjong Electric Industry Co., Ltd.
Yaqian Jiangnan Exports Process Trading Zone, Beilun
District, Ningbo City, Zhejiang Province, P.R.China

Manufacturer : Ningbo Mingjong Electric Industry Co., Ltd.
Yaqian Jiangnan Exports Process Trading Zone, Beilun
District, Ningbo City, Zhejiang Province, P.R.China

Equipment : Remote controller

Type/Model : RF1112 TX

Summary

The test report is to certify that the tested equipment properly complies with the requirements of:

FCC Rules and Regulations: 47CFR Part 15: Radio Frequency Devices: 2006
ANSIC63.4 (2003): American National Standard for Methods of Measurement of
Radio-Noise Emissions from Low-Voltage Electrical and Electronic
Equipment in the Range of 9 kHz to 40 GHz

Description

The appliances were tested by Intertek Testing Services Limited Shanghai and found compliance with relevant requirements described in FCC Part 15: Radio Frequency Devices.

Test results are contained in this test report and Intertek Testing Services Limited Shanghai is assumed full responsibility for the accuracy and completeness of these measurements.

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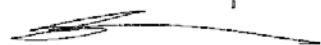
Date of issue: September 28, 2006

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Content

SUMMARY.....	1
DESCRIPTION	1
DESCRIPTION OF TEST FACILITY	2
CONTENT	3
1.APPLICANT INFORMATION.....	4
2.INFORMATION OF EQUIPMENT UNDER TEST (EUT)	4
2.1 Identification of the EUT	4
2.2 Technical specification	4
2.3 Mode of operation during the test / Test peripherals used.....	5
2.4 Related Grant and test Standard	5
2.5 Instrument list.....	5
3. TEST SUMMARY	6
4. CONDUCTED EMISSIONS TEST (NOT APPLICABLE IN THIS REPORT).....	7
4.1 Limits	7
4.2 Test Procedure:.....	7
4.3 Test SET-UP (Block Diagram of Configuration)	7
4.4 Test Result:.....	7
5. RADIATED EMISSION TEST.....	8
5.1 Limits	8
5.2 Test Procedure:.....	8
5.3 Test SET-UP (Block Diagram of Configuration)	9
5.4 Test result.....	10
6. EMISSION BANDWIDTH.....	12
6.1 Limits	12
6.2 Test Procedure	12
6.3 Test Configuration.....	12
6.4 Test Results	12
7. DUTY CYCLE MEASUREMENT.....	13
7.1 Measurement Procedure	13
7.2 Test SET-UP (Block Diagram of Configuration)	13
7.3 Test results.....	13

1. Applicant Information

Applicant : Ningbo Mingjong Electric Industry Co., Ltd.
Yaqian Jiangnan Exports Process Trading Zone, Beilun District,
Ningbo City, Zhejiang Province, P.R.China

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Manufacture : Ningbo Mingjong Electric Industry Co., Ltd.
Yaqian Jiangnan Exports Process Trading Zone, Beilun District,
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Country of origin : P.R. China

2. Information of Equipment Under Test (EUT)

2.1 Identification of the EUT

Equipment : Remote controller
Type/model : RF1112 TX
FCC ID : UNBRF111299
Date of sample receipt : September 10, 2006
Date of test : September 10 - 25, 2006

2.2 Technical specification

Operation Frequency : 315MHz
Modulation : Pulse Modulation(PM)
Antenna Designation : Inner antenna, Non-User Replaceable(Fixed)
Transmitting Time : A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
Rating : DC 12V, Battery Operated.
Description of EUT : none.

2.3 Mode of operation during the test / Test peripherals used

The compliance tests were performed under the following operation mode.
The EUT (Transmitter) was operated in the normal operating mode and it powered by a new battery.

2.4 Related Grant and test Standard

This product is complying with section 15.231 of FCC Part 15, Subpart C Rules. The composite system (receiver) is compliance with Subpart B is authorized under a DOC Procedure.

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4 (2003). Radiated testing was performed at an antenna to EUT distance 3 meters.

2.5 Instrument list

Equipment	Type	Manu.	Serials number	Cal. Date	Cal. Interval
Test receiver	ESCS 30	R&S	835418/003	2006-3-14	1 Year
Passive voltage probe	ESH2-Z3	R&S	100009	2006-3-14	2 Years
Artificial mains network	ESH3-Z5	R&S	835239/008	2006-3-14	1 Year
Oscilloscope	TDS430A	TEK	B061847	2005-11-20	1 Year
EMI test receiver	ESI 26	R&S	838687/011	2006-8-13	1 Year
Broadband antenna	HL562	R&S	100019	2005-10-10	1 Year
Horn antenna	HF906	R&S	100023	2006-6-24	1 Year
3m anechoic chamber	-	Albatross	-	2006-9-6	Half year

3. Test Summary

This report applies to tested sample only. This report shall not be reproduced in part without written approval of Intertek Testing Service Shanghai Limited.

TEST ITEM	RESULT	NOTE
Conducted Emission	NA	
Radiation Emission	Pass	
Emission Bandwidth	Pass	

Notes: 1: NA =Not Applicable

4. Conducted Emissions Test (Not applicable in this report)**4.1 Limits**

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

4.2 Test Procedure:

1. The EUT was placed on a table that is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT Compliance.
3. Repeat above procedures until all frequency measured was complete.

4.3 Test SET-UP (Block Diagram of Configuration)

N/A

4.4 Test Result:

N/A

5. Radiated Emission Test

Test result: Pass

5.1 Limits

According to 15.231(e), the field strength of emissions from Intentional Radiators operated under this section shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (microvolts/meter)	Field Strength of Spurious Emissions (microvolts/meter)
40.66 - 40.70	2,250	225
70 - 130	1,250	125
130 - 174	1,250 to 3,750 **	125 to 375 **
174 - 260	3,750	375
260 - 470	3,750 to 12,500 **	375 to 1,250 **
Above 470	12,500	1,250

** linear interpolations

Remark: 1. Emission level in dB μ V/m=20 log (uV/m)
 2. Measurement was performed at an antenna to the closed point of EUT distance of 3 meters.
 3. Field strength of fundamental(limit = $20\log(56.81818 \times (F) - 6136.3636)$;
 F: Fundamental Frequency (130-174MHz)
 4. Field strength of fundamental limit = $20\log(41.6667 \times (F) - 7083.3333)$;
 F: Fundamental Frequency (260-470MHz)
 5. Field strength of spurious emission limit = The Limit of Fundamental Frequency – 20dB
 6. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of § 15.205
 7. Emission spurious frequency which appearing within the Restricted Bands specified in provision of § 15.205, then the general radiated emission limits in § 15.209 apply.

5.2 Test Procedure:

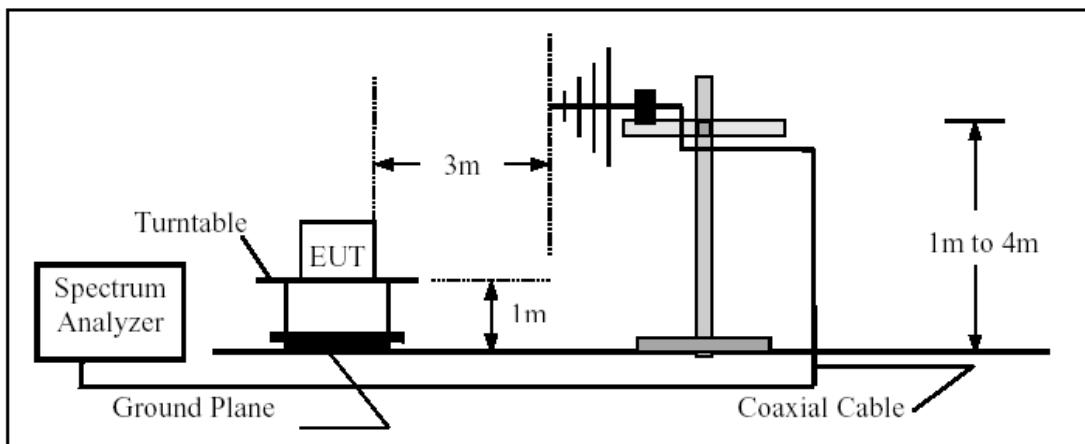
The EUT is placed on a turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in ANSI C63.4-2003.

The EUT was placed on a turntable which is 0.8m above ground plane. .
The turntable shall rotate 360 degrees to determine the position of maximum emission level.
EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

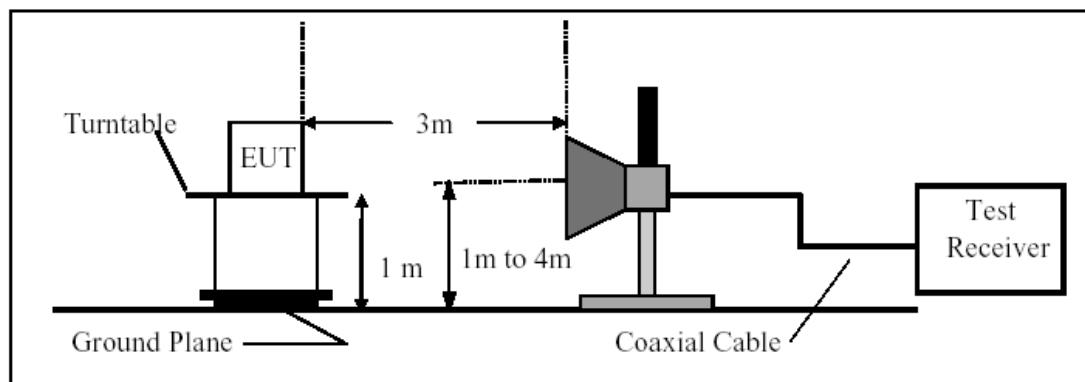
The frequency from 30MHz to 1000MHz was checked and the detector bandwidth of the test receiver was set to 120kHz; the frequency above 1GHz was checked and the detector bandwidth of the test receiver was set to 1MHz.

5.3 Test SET-UP (Block Diagram of Configuration)

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-UP Frequency Above 1 GHz



5.4 Test result.

Temperature: 22 °C
 Humidity: 40%

EUT Axis: X

Frequency (MHz)	Ant. Pol. (H/V)	Reading level (dB μ V)	Factor (dB)	Duty cycle (dB)	Emission Level (dB μ V/m)		Limit (dB μ V/m)		Margin (dB)	
					PK	AV	PK	AV	PK	AV
315.00	H	52.30	13.20	-8.27	65.50	57.23	95.62	75.62	30.12	18.39
630.00	H	14.73	19.80	-8.27	34.53	26.26	75.62	55.62	41.09	29.36
945.00	/	/	/	-8.27	/	/	75.62	55.62	/	/
1260.00	H	47.00	0.50	-8.27	47.50	39.23	75.62	55.62	28.12	16.39
*1575.00	V	48.00	1.00	-8.27	49.00	40.73	74.00	54.00	25.00	13.27
1890.00	H	43.60	3.70	-8.27	47.30	39.03	75.62	55.62	28.32	16.59
*2205.00	H	38.00	6.50	-8.27	44.50	36.23	74.00	54.00	29.50	17.77
2520.00	/	/	/	-8.27	/	/	75.62	55.62	/	/
*2835.00	/	/	/	-8.27	/	/	74.00	54.00	/	/
3150.00	/	/	/	-8.27	/	/	75.62	55.62	/	/

EUT Axis: Y

Frequency (MHz)	Ant. Pol. (H/V)	Reading level (dB μ V)	Factor (dB)	Duty cycle (dB)	Emission Level (dB μ V/m)		Limit (dB μ V/m)		Margin (dB)	
					PK	AV	PK	AV	PK	AV
315.00	H	48.90	13.20	-8.27	62.10	53.83	95.62	75.62	33.52	21.79
630.00	V	15.53	19.80	-8.27	35.33	27.06	75.62	55.62	40.29	28.56
945.00	/	/	/	-8.27	/	/	75.62	55.62	/	/
1260.00	V	45.60	0.50	-8.27	46.10	37.83	75.62	55.62	29.52	17.79
*1575.00	V	48.90	1.00	-8.27	49.90	41.63	74.00	54.00	24.10	12.37
1890.00	V	43.50	3.70	-8.27	47.20	38.93	75.62	55.62	28.42	16.69
*2205.00	H	37.70	6.50	-8.27	44.20	35.93	74.00	54.00	29.80	18.07
2520.00	/	/	/	-8.27	/	/	75.62	55.62	/	/
*2835.00	/	/	/	-8.27	/	/	74.00	54.00	/	/
3150.00	/	/	/	-8.27	/	/	75.62	55.62	/	/

EUT Axis: Z

Frequency (MHz)	Ant. Pol. (H/V)	Reading level (dB μ V)	Factor (dB)	Duty cycle (dB)	Emission Level (dB μ V/m)		Limit (dB μ V/m)		Margin (dB)	
					PK	AV	PK	AV	PK	AV
315.00	H	44.80	13.20	-8.27	58.00	49.73	95.62	75.62	37.62	25.89
630.00	V	17.80	19.80	-8.27	37.60	29.33	75.62	55.62	38.02	26.29
945.00	/	/	/	-8.27	/	/	75.62	55.62	/	/
1260.00	V	43.80	0.50	-8.27	44.30	36.03	75.62	55.62	31.32	19.59
*1575.00	V	50.60	1.00	-8.27	51.60	43.33	74.00	54.00	22.40	10.67
1890.00	V	48.50	3.70	-8.27	52.20	43.93	75.62	55.62	23.42	11.69
*2205.00	V	38.70	6.50	-8.27	45.20	36.93	74.00	54.00	28.80	17.07
2520.00	/	/	/	-8.27	/	/	75.62	55.62	/	/
*2835.00	/	/	/	-8.27	/	/	74.00	54.00	/	/
3150.00	/	/	/	-8.27	/	/	75.62	55.62	/	/

Note:

(1) Emission level PK (dB μ V/m) = Reading level (dB μ V) + Factor(dB)
Emission level AV (dB μ V/m)= Emission level PK (dB μ V/m) + Duty cycle (dB)

Example: 315.00MHz(Z axis)

Reading level = 44.80 dB μ V;

Factor= 13.20 dB;

Emission level PK(dB μ V/m) = 44.80 + 13.20 = 58.00 dB μ V/m

(2) Measuring frequencies from 30 MHz to the 10th harmonic of fundamental frequency of 315MHz.

(3) Margin (dB)= Limit - Emission level

(4) * Denotes spurious frequency which falls within the Restricted Bands specified in provision of ξ 15.205, then the general radiated emission limits in ξ 15.209 apply.

6. Emission Bandwidth

Test result: Pass

6.1 Limits

According to 15.231(c), The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

FREQUENCY (MHz)	BANDWIDTH LIMIT(kHz)
Above 70-900	$0.25\% \times \text{Center Frequency(MHz)}$
Above 900	$0.5\% \times \text{Center Frequency(MHz)}$

6.2 Test Procedure

The Occupied bandwidth is measured with a spectrum analyzer connected to the transmitter output while EUT is operating in transmit mode with modulation at the appropriate frequency. The spectrum analyzer was set to: RBW = 10 kHz, VBW = 10 kHz, span = 500 kHz

6.3 Test Configuration



Figure 3: Measurement setup for operating bandwidth test

1 Transmitter (EUT)	3 DC-block
2 Wooden table	4 Test cable
	5 Spectrum analyzer

6.4 Test Results

Ref Level (dBm)	Center Frequency (MHz)	20dB down Bandwidth (kHz)	Authorized Bandwidth (kHz)
-52.83	315.00	58.12	787.5

7. Duty Cycle Measurement

7.1 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set ETU normal operating mode.
3. Set SPA Center Frequency = fundamental frequency, RBW,VBW= 100KHz, Span =0 Hz. Adjacent sweep.
4. Set SPA View. Mark delta.

7.2 Test SET-UP (Block Diagram of Configuration)

Same as 5.3 Radiated Emission Measurements.

7.3 Test results

Total Time (ms)	Total on Time (ms)	Duty Cycle	Duty Cycle (%)	Duty cycle Fact (dB)
46.292	17.896	0.386	38.6%	-8.27

Note: 1. Total on Time (ms)= $1.042 \times 13 + 0.361 \times 12 = 17.896$ ms

2. Duty cycle= Total on Time/Total Time=0.386

3. Duty cycle (%)=Duty cycle $\times 100\% = 38.6\%$

4. Duty cycle factor=20 log (Duty cycle)= -8.27dB