# EMC TEST REPORT for Class II permissive Change
# No. SH09010075-002

| | | |
|---|---|---|
| Applicant | : | Shanghai Nine Eagles Electronic Technology Co., Ltd.<br>Room 1104, Huaxiang Building, No. 80 Moling Road,<br>Shanghai, 200070, China |
| Manufacturer | : | Shanghai Nine Eagles Electronic Technology Co., Ltd.<br>No. 28 Yulu road, Malu, Jiading District, Shanghai, China |
| Equipment | : | Radio Control Helicopter |
| Type/Model | : | NE-024G |

**This report is based on SH08030701-001 for Class II permissive change. Only the panel display of the modified EUT is changed from LED to LCD and adding a button for fine-tuning.**

## SUMMARY

The equipment complies with the requirements according to the following standard(s):

**47CFR Part 15 (2007):** Radio Frequency Devices

**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

**RSS-210 Issue 7 (June 2007):** Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

**RSS-Gen Issue 2 (June 2007):** General Requirements and Information for the Certification of Radiocommunication Equipment

Date of issue: Feb 5, 2009

Tested by:

Wakeyou Wang (*Project Engineer*)

Reviewed by:

Daniel Zhao (*Reviewer*)

# Description of Test Facility

Name: Intertek Testing Services Limited Shanghai
Address: Building No.86, 1198 Qinzhou Road(North), Shanghai 200233, P.R. China

FCC Registration Number: 236597
IC Assigned Code: 6201A

Name of contact: Steve Li
Tel: +86 21 64956565 ext. 214
Fax: +86 21 54262335 ext. 214

# Content

SUMMARY ..... 1
DESCRIPTION OF TEST FACILITY ..... 2
1. GENERAL INFORMATION ..... 4
1.1 Applicant Information ..... 4
1.2 Identification of the EUT ..... 4
1.3 Technical specification ..... 5
1.4 Mode of operation during the test / Test peripherals used ..... 5
2. TEST SPECIFICATION ..... 6
2.1 Instrument list ..... 6
2.2 Test Standard ..... 6
2.3 Radiated test description ..... 7
2.4 Test Summary ..... 9
3. SPURIOUS EMISSION OTHER THAN HARMONICS ..... 10
3.1 Test limit ..... 10
3.2 Test Configuration ..... 10
3.3 Test procedure and test setup ..... 10
3.4 Test protocol ..... 11
3.5 Measurement uncertainty ..... 11
4. FUNDAMENTAL & HARMONIC EMISSION ..... 12
4.1 Test limit ..... 12
4.2 Test Configuration ..... 12
4.3 Test procedure and test setup ..... 12
4.4 Test protocol ..... 13
4.5 Measurement uncertainty ..... 13

# 1. General Information

## 1.1 Applicant Information

| | | |
|---|---|---|
| Applicant: | | Shanghai Nine Eagles Electronic Technology Co., Ltd.<br>Room 1104, Huaxiang Building, No. 80 Moling Road, Shanghai, 200070, China |
| Name of contact: | | Mr. Huang Guochuan |
| Tel:<br>Fax: | | 86 21 69152688<br>86 21 69152687 |
| Manufacturer: | | Shanghai Nine Eagles Electronic Technology Co., Ltd.<br>No. 28 Yulu road, Malu, Jiading District, Shanghai, China |
| Sample received date | : | Dec 1, 2008 |
| Date of test | : | Dec 1, 2008 ~ Feb 5, 2009 |

## 1.2 Identification of the EUT

| | |
|---|---|
| Equipment: | Radio Control Helicopter |
| Type/model: | NE-024G |
| FCC ID: | U45-2400008001 |
| IC: | Not applied |

## 1.3 Technical specification

| | |
|---|---|
| Operation Frequency Band: | 2400-2483.5MHz |
| Modulation: | BPSK |
| Antenna Designation: | Internal antenna, non-user removable.<br>Although there is a component with antenna- like shape at the top of EUT, it is an adorning in fact and independent of electrical parts. |
| Gain of Antenna: | 1.20dBi max. |
| Rating: | Built-in Battery: DC 4*1.5V<br>Working frequency: 2410MHz |
| Description of EUT: | There is one model only.<br>The EUT is a transmitter to transmit wireless signal so as to control the flight of Helicopter.<br>There are two main joy sticks on the panel: one control forward & back; the other control left & right. |
| Channel Description: | There is one channel only and working at the central frequency of 2410MHz. |

## 1.4 Mode of operation during the test / Test peripherals used

Within this test report, EUT was tested with modulation and tested under its rating voltage and frequency.
The two joy sticks were operated in turn and the worst test result was recorded.
While for radiated test, as a portable device, 3 orthogonal axes of the EUT were observed and the worst data were recorded.

.

# 2. Test Specification

## 2.1 Instrument list

| Equipment | Type | Manu. | Internal no. | Cal. Date | Due date |
|---|---|---|---|---|---|
| Test Receiver | ESIB 26 | R&S | EC 3045 | 2008-6-1 | 2009-5-31 |
| Semi-anechoic chamber | - | Albatross project | EC 3048 | 2008-6-1 | 2009-5-31 |
| A.M.N. | ESH2-Z5 | R&S | EC 3119 | 2009-1-23 | 2010-1-22 |
| Test Receiver | ESCS 30 | R&S | EC 2107 | 2009-1-23 | 2010-1-22 |
| Ultra-broadband antenna | HL 562 | R&S | EC 3046-1 | 2008-6-30 | 2009-6-29 |
| Horn antenna | HF 906 | R&S | EC 3049 | 2008-6-30 | 2009-6-29 |
| Pre-amplifier | Pre-amp 18 | R&S | EC 3222 | 2008-6-30 | 2009-6-29 |
| Pre-amplifier | Pre-amp 40 | Beijing Radio 2 | - | 2008-3-4 | 2009-3-3 |
| Horn antenna | K638A | Beijing Radio 2 | - | 2008-3-4 | 2009-3-3 |
| Power meter | PM2002 | AR | EC3043-7 | 2009-1-23 | 2010-1-22 |
| Power sensor | PH2000 | AR | EC3043-8 | 2009-1-23 | 2010-1-22 |
| Signal generator | SMR 20 | R&S | EC 3044-1 | 2008-8-21 | 2009-8-20 |
| Spectrum Analyzer | E7402A | Agilent | EC2254 | 2008-9-17 | 2009-9-16 |

## 2.2 Test Standard

47CFR Part 15 (2007)
ANSI C63.4: 2003
RSS-210 Issue 7 (June 2007)
RSS-Gen Issue 2 (June 2007)

## 2.3 Radiated test description

Test site: Semi-anechoic chamber

Test distance: 3m

Antenna: Ultra-broadband antenna (30MHz ~ 1GHz);
Horn antenna (1GHz ~ 18GHz & 18Gz ~ 40GHz)

Typical Gain of Preamplifiers: 30dB (for 1GHz ~ 18GHz); 37dB (for 18Gz ~ 40GHz)

Test Receiver set: RBW = 100kHz, VBW = 300kHz, internal amplifier: ON; (30MHz~1GHz)
RBW = 1MHz, VBW = 3MHz, internal amplifier: OFF; (>1GHz for PK);
RBW = 1MHz, VBW = 10Hz, internal amplifier: OFF; (>1GHz for AV);

Floor noise reading of the radiated test system (consisting of test site, antenna, preamplifier and receiver):

1GHz ~ 18GHz

| Antenna | Frequency (MHz) | Uncorrected Reading (dBuV) | Correct Factor (dB/m) | Corrected Reading (dBuV/m) | Detector |
|---|---|---|---|---|---|
| H | 1000 | 33.80 | -0.60 | 33.20 | PK |
| H | 8650 | 34.30 | 5.10 | 39.40 | PK |
| H | 15000 | 34.80 | 5.50 | 40.30 | PK |
| V | 1000 | 33.80 | -0.60 | 33.20 | PK |
| V | 8650 | 34.20 | 5.10 | 39.30 | PK |
| V | 15000 | 34.70 | 5.50 | 40.20 | PK |
| H | 1000 | 17.10 | -0.60 | 16.50 | AV |
| H | 8650 | 17.30 | 5.10 | 22.40 | AV |
| H | 15000 | 18.80 | 5.50 | 24.30 | AV |
| V | 1000 | 17.00 | -0.60 | 16.40 | AV |
| V | 8650 | 17.10 | 5.10 | 22.20 | AV |
| V | 15000 | 18.60 | 5.50 | 24.10 | AV |

**Remark: 1.Correct Factor = Antenna Factor + Cable Loss - Gain of Preamplifier.**
Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB, Gain of Preamplifier = 32.00dB, then Correct Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m

**2. Corrected Reading = Uncorrected Reading + Correct Factor**
Example: Assuming Uncorrected Reading = 35.00dBuV, Correct Factor = 0.20dB/m, then Corrected Reading =35.00+0.20 = 35.20dBuV/m

18GHz ~ 25GHz

| Antenna | Frequency (MHz) | Uncorrected Reading (dBuV) | Correct Factor (dB/m) | Corrected Reading (dBuV/m) | Detector |
|---|---|---|---|---|---|
| H | 18000 | 35.30 | 5.70 | 41.00 | PK |
| H | 20000 | 36.20 | 5.10 | 41.30 | PK |
| H | 25000 | 37.20 | 6.60 | 43.80 | PK |
| V | 18000 | 35.20 | 5.70 | 40.90 | PK |
| V | 20000 | 36.20 | 5.10 | 41.30 | PK |
| V | 25000 | 37.20 | 6.60 | 43.80 | PK |
| H | 18000 | 18.50 | 5.70 | 24.20 | AV |
| H | 20000 | 20.20 | 5.10 | 25.30 | AV |
| H | 25000 | 20.80 | 6.60 | 27.40 | AV |
| V | 18000 | 18.50 | 5.70 | 24.20 | AV |
| V | 20000 | 20.20 | 5.10 | 25.30 | AV |
| V | 25000 | 20.80 | 6.60 | 27.40 | AV |

**Remark: 1.Correct Factor = Antenna Factor + Cable Loss - Gain of Preamplifier.**
Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB, Gain of Preamplifier = 32.00dB, then Correct Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m

**2. Corrected Reading = Uncorrected Reading + Correct Factor**
Example: Assuming Uncorrected Reading = 35.00dBuV, Correct Factor = 0.20dB/m, then Corrected Reading =35.00+0.20 = 35.20dBuV/m

## 2.4 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 | FCC REFERANCE | IC REFERANCE | RESULT |
|---|---|---|---|
| Spurious emission other than harmonics | 15.249(d) | RSS-210 Issue 7 Annex A2.9(b) | Pass |
| Power line conducted emission | 15.207 | RSS-Gen Issue 2 Clause 7.2.2 | NA |
| Fundamental & Harmonic emission | 15.249(a) | RSS-210 Issue 7 Annex A2.9(a) | Pass |
| Spurious emission for receiver | - | RSS-210 Issue 7 Clause 2.3 | NA |

# 3. Spurious Emission Other than Harmonics

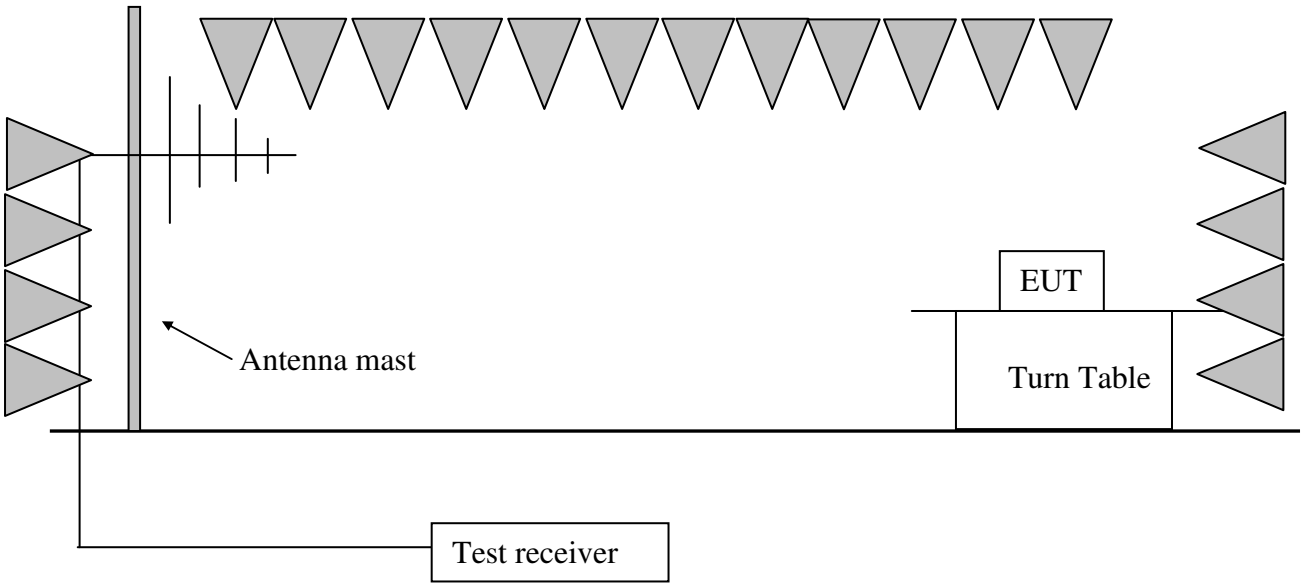
**Test result: PASS**

## 3.1 Test limit

The spurious emission shall test through the 10th harmonic or to 40GHz, whichever is lower. It must comply with the less stringent limits listed below:
☐50 dB below the level of the fundamental;
☒specified in §15.209(a) showed as below:

| Frequency (MHz) | Field Strength (dBuV/m) | Measurement Distance (m) |
|---|---|---|
| 30 - 88 | 40.0 | 3 |
| 88 - 216 | 43.5 | 3 |
| 216 - 960 | 46.0 | 3 |
| Above 960 | 54.0 | 3 |

## 3.2 Test Configuration




## 3.3 Test procedure and test setup

The measurement was applied in a semi-anechoic chamber. While testing for spurious emission higher than 1GHz, the pre-amplifier is equipped just at the output terminal of the antenna.
The EUT and simulators were placed on a 0.8m high wooden turntable above the horizontal metal ground plane. The turn table rotated 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 an antenna mast. The antenna moved up and down between from 1meter to 4 meters to find out the maximum emission level.

### 3.4 Test protocol

*Spurious emission for test below 1GHz, highest reading related to the limit*

| Antenna | Frequency (MHz) | Correct Factor (dB/m) | Corrected Reading (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|
| H | 148.58 | * | * | * | * | QP |
| H | 296.31 | * | * | * | * | QP |
| H | 372.12 | * | * | * | * | QP |
| H | 519.86 | * | * | * | * | QP |
| H | 593.73 | * | * | * | * | QP |
| H | 891.14 | * | * | * | * | QP |
| V | 41.66 | * | * | * | * | QP |
| V | 74.71 | * | * | * | * | QP |
| V | 148.58 | * | * | * | * | QP |
| V | 372.12 | * | * | * | * | QP |
| V | 519.86 | * | * | * | * | QP |
| V | 675.37 | * | * | * | * | QP |

Remark: 1.Correct Factor = Antenna Factor + Cable Loss
2. Corrected Reading = Original Receiver Reading + Correct Factor
3. Margin = limit - Corrected Reading
4. If the reading is submerged in the floor noise, it would be marked as *.
5. For more details, please refer to the test data.

*Spurious emissions above 1GHz other than harmonics:* all is submerged in the floor noise.

### 3.5 Measurement uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.
Measurement uncertainty of radiated emission is: ± 5.31dB
The measurement uncertainty is given with a confidence of 95%, k=2.
The measurement uncertainty is traceable to internal procedure TI-036.

# 4. Fundamental & Harmonic Emission

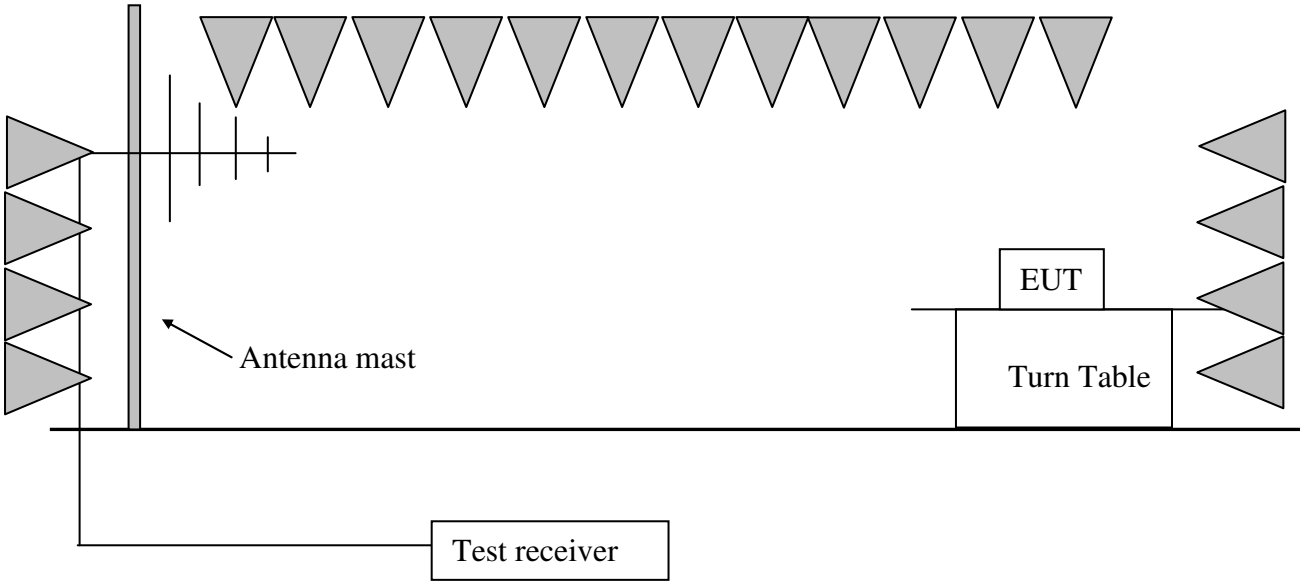
**Test result: PASS**

## 4.1 Test limit

The emission shall test through the 10th harmonic or to 40GHz, whichever is lower. It must comply with the limits below:

| Fundamental Frequency (MHz) | Fundamental limit (dBuV/m) | Harmonic limit (dBuV/m) |
|---|---|---|
| ☐ 902 - 928 | 94 | 54 |
| ☒ 2400 - 2483.5 | 94 | 54 |
| ☐ 5725 - 5875 | 94 | 54 |
| ☐ 24000 - 24250 | 108 | 68 |

## 4.2 Test Configuration




## 4.3 Test procedure and test setup

The measurement was applied in a semi-anechoic chamber. While testing for spurious emission higher than 1GHz, the pre-amplifier is equipped just at the output terminal of the antenna.
The EUT and simulators were placed on a 0.8m high wooden turntable above the horizontal metal ground plane. The turn table rotated 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 an antenna mast. The antenna moved up and down between from 1meter to 4 meters to find out the maximum emission level.

## 4.4 Test protocol

| Channel | Antenna | Frequency (MHz) | Uncorrected Reading (dBuV) | Correct Factor (dB/m) | Corrected Reading (dBuV/m) | Limit (dBuV/m) | Detector |
|---|---|---|---|---|---|---|---|
| 1 | H | 2410.10 | 82.54 | 2.20 | 84.74 | 114.00 | PK |
| 1 | H | 4820.22 | 52.76 | 4.80 | 57.56 | 74.00 | PK |
| 1 | V | 2410.10 | 82.75 | 2.20 | 84.95 | 114.00 | PK |
| 1 | V | 4820.22 | 53.19 | 4.80 | 57.99 | 74.00 | PK |
| 1 | H | 2410.10 | 32.32 | 2.20 | 34.52 | 94.00 | AV |
| 1 | H | 4820.22 | * | 4.80 | * | 54.00 | AV |
| 1 | V | 2410.10 | 34.41 | 2.20 | 36.61 | 94.00 | AV |
| 1 | V | 4820.22 | * | 4.80 | * | 54.00 | AV |

Remark: 1.Correct Factor = Antenna Factor + Cable Loss - Gain of Preamplifier
2. Uncorrected Reading is the original data which can be referred from “test data”.
3. Corrected Reading = Uncorrected Reading + Correct Factor
4. The shaded data is the fundamental reading.
5. If the reading is submerged in the floor noise, it would be marked as *.

## 4.5 Measurement uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.
Measurement uncertainty of radiated emission is: ± 5.31dB
The measurement uncertainty is given with a confidence of 95%, k=2.
The measurement uncertainty is traceable to internal procedure TI-036.