

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT
UNINTENTIONAL RADIATOR CERTIFICATION TO
FCC PART 95 SUBPART C REQUIREMENT**

For

Radio Control System

Model Number: N-6, N-2, N-3, N-4, N-5

FCC ID: V6KN-X

Trade Name: N/A

Report No.: SDEE080821471610

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Prepared for

**Guangzhou Chiyuan Electronic Co., Ltd
2/F., No.1 Bldg., Boyi Industrial Garden 4th Gongye Rd. Zhicun,
Dashi Street, Panyu Dis., Guangzhou, China
TEL: 86-20-3479 6226
FAX: 86-20-3479 6116**

Prepared by

**CENTRE TESTING INTERNATIONAL
Building C, Hongwei Industrial Zone, Baoan 70 District,
Shenzhen, Guangdong, China
TEL: 86-755-3368 3368
FAX: 86-755-3368 3365**

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1. GENERAL INFORMATION

Applicant: Guangzhou Chiyuan Electronic Co., Ltd
 2/F., No.1 Bldg., Boyi Industrial Garden 4th Gongye Rd.
 Zhicun, Dashi Street, Panyu Dis., Guangzhou, China

Manufacturer: Guangzhou Chiyuan Electronic Co., Ltd
 2/F., No.1 Bldg., Boyi Industrial Garden 4th Gongye Rd.
 Zhicun, Dashi Street, Panyu Dis., Guangzhou, China

Trade Name: N/A

Sample Description: Radio Control System

Model Number: N-6, N-2, N-3, N-4, N-5

Model Discrepancy: The difference among the models N-6, N-2, N-3, N-4, N-5 are only appearance and model indication. There are the same circuit and construction. The test was conducted on model N-6.

Serial Number : N/A

Date of Test: Aug. 24, 2008 to Nov. 01, 2008

Test Result:	PASS *
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*The test sample is just a radio control system, and this test report is only for Tx. (Tx : In this whole report Tx means Transmitter.)

The above equipment was tested by Centre Testing International (CTI), the test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2003) and the energy emitted by the sample EUT tested as described in this report is in compliance with FCC PART95C requirements.

The test results of this report relate only to the tested sample identified in this report.

Prepared by :

Christy Chen
Christy Chen

Reviewed by :

Daisy Wu
Daisy Wu

Approved by:

Jim Zhang
Jim Zhang
Manager



Date :

Nov. 01, 2008

2. FACILITIES AND ACCREDITATIONS

2.1 TEST FACILITY

All measurement facilities used to collect the measurement data are located at Building C, Hongwei Industrial Zone, Baoan 70 District, Shenzhen, Guangdong, China. The sites are constructed in conformance with the requirements of ANSI C63.4: 2003. The test site Registration Number is 614926.

2.2 TEST EQUIPMENT LIST

Instrumentation: The following list contains equipments used at CTI for testing. The calibrations of the measuring instruments, including any accessories that may effect such calibration, are checked frequently to assure their accuracy. Adjustments are made and correction factors applied in accordance with instructions contained in the manual for the measuring instrument.

Equipment used during the tests:

Equipment Type	Manufacturer	Model Number	Serial Number	Last Calibration
Receiver	R&S	ESCI	1004 35	01/28/2008
LISN	ETS	3850	00051952	09/08/2008
Spectrum Analyzer	Agilent	E4443A	MY46185649	01/29/2008
Biconilog Antenna	ETS	3142C	920250	01/30/2008
Multi device Controller	ETS	2090	00057230	01/07/2008
DC Power Supply	WIK	WYK-605	N/A	01/07/2008
Horn Antenna	ETS	3117	57410	01/07/2008
Receiver	R&S	ESCI	100435	01/28/2008
Attenuator	EM-Test	ATT6/75	0320837	06/07/2008

2.3 LABORATORY ACCREDITATIONS AND LISTINGS

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC/EN 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

3. SETUP OF EQUIPMENT UNDER TEST

3.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

3.2 SUPPORT EQUIPMENTS

No.	Device Type	Brand	Model	Series No.	Data Cable	Power Cord
1.	---	---	---	---	---	---
2.	---	---	---	---	---	---

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4. TECHNICAL DETAILS

4.1 PRODUCT DESCRIPTION

A major technical description of EUT is described as following:

- a. Operation Frequency: 75.43MHz
- b. Modulation: FM
- c. Antenna Designation: Non-User Replaceable (Fixed)
- d. Power Supply: DC 12 V by battery.

4.2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

Standards	Required Type	Results	Notes
FCC Part 15, Paragraph 15.207(a)	Conducted Emission Test	PASS	Compliant
FCC Part 95, Paragraph 95.623(c)	Frequency stability Test	PASS	Compliant
FCC Part 95, Paragraph 95.633(b)	Emission bandwidth Test	PASS	Compliant
FCC Part 95, Paragraph 95.635(b)	Unwanted Radiation Test	PASS	Compliant
FCC Part 95, Paragraph 95.639(b)	Transmitter power Test	PASS	Compliant
FCC Part 95, Paragraph 95.647	Transmitter antenna	PASS	Antenna shall be a dedicate type.
FCC Part 95, Paragraph 95.649	Power capability	PASS	Output power can't be change
FCC Part 95, Paragraph 95.651	Crystal control required	PASS	Compliant

4.2 TEST STANDARDS

FCC Part 95 Subpart C

4.3 EUT MODIFICATION

No modification by CENTRE TESTING INTERNATIONAL

5. CONDUCTION EMISSION TEST

5.1 CONDUCTED EMISSION LIMIT

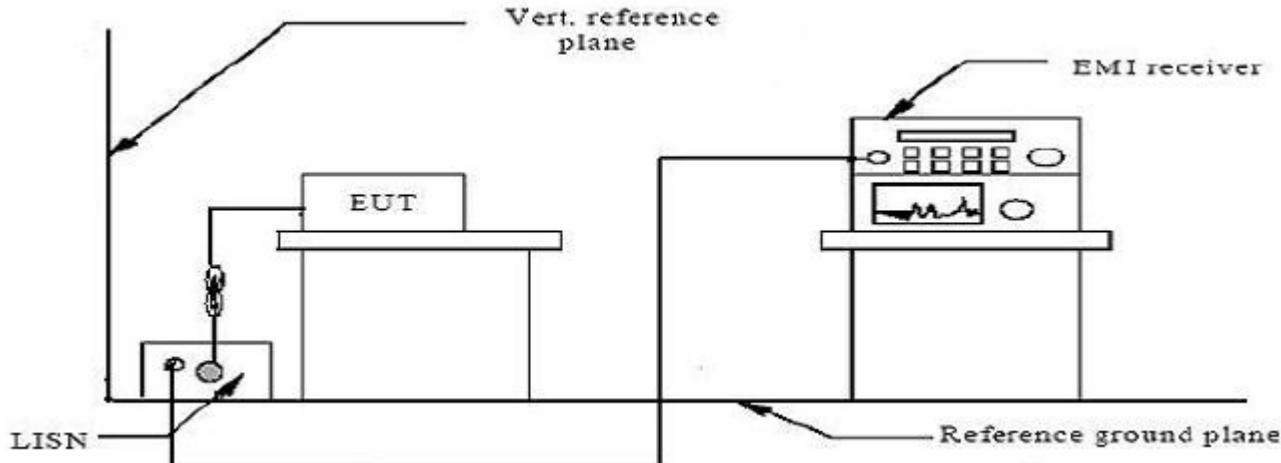
According to section 15.207(a) Conducted Emission Limits is as following:

Frequency range	Limits dB(uV)	
MHz	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Note

1. The lower limit shall apply at the transition frequencies
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.
3. The measure uncertainty is less than +/-2.53dB.

5.2 TEST CONFIGURATION



5.3 TEST PROCEDURE

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room and connected to the main through Line Impedance Stability Network (L.I.S.N). This provided a 50ohm coupling impedance for the tested equipments.
- b. The bandwidth of the field strength meter (R&S Test Receiver) was set at 9 kHz in 150kHz ~ 30MHz and 200Hz in 9 kHz ~150 kHz.

The frequency range from 150 kHz to 30MHz was investigated.

- c. The disturbance levels and the frequencies of at least six highest disturbances were recorded from each power line which comprises the EUT.

5.4 TEST RESULTS

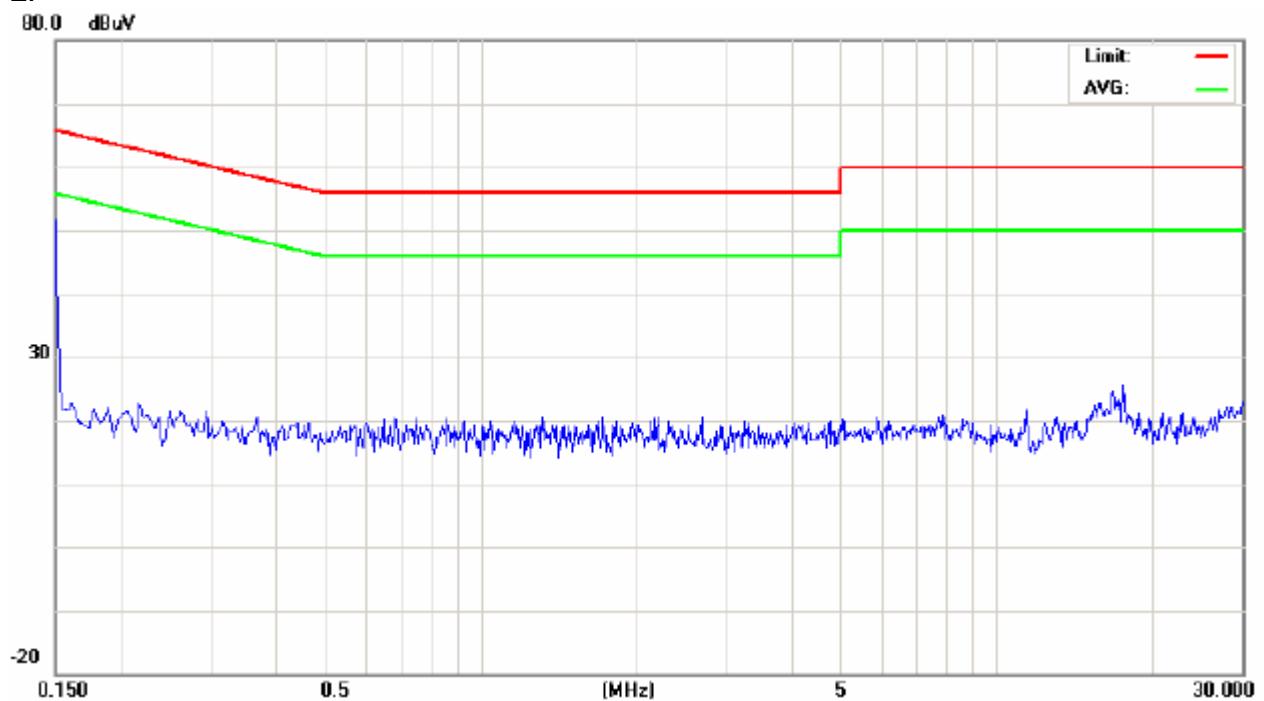
Pass.

5.5 TEST DATA

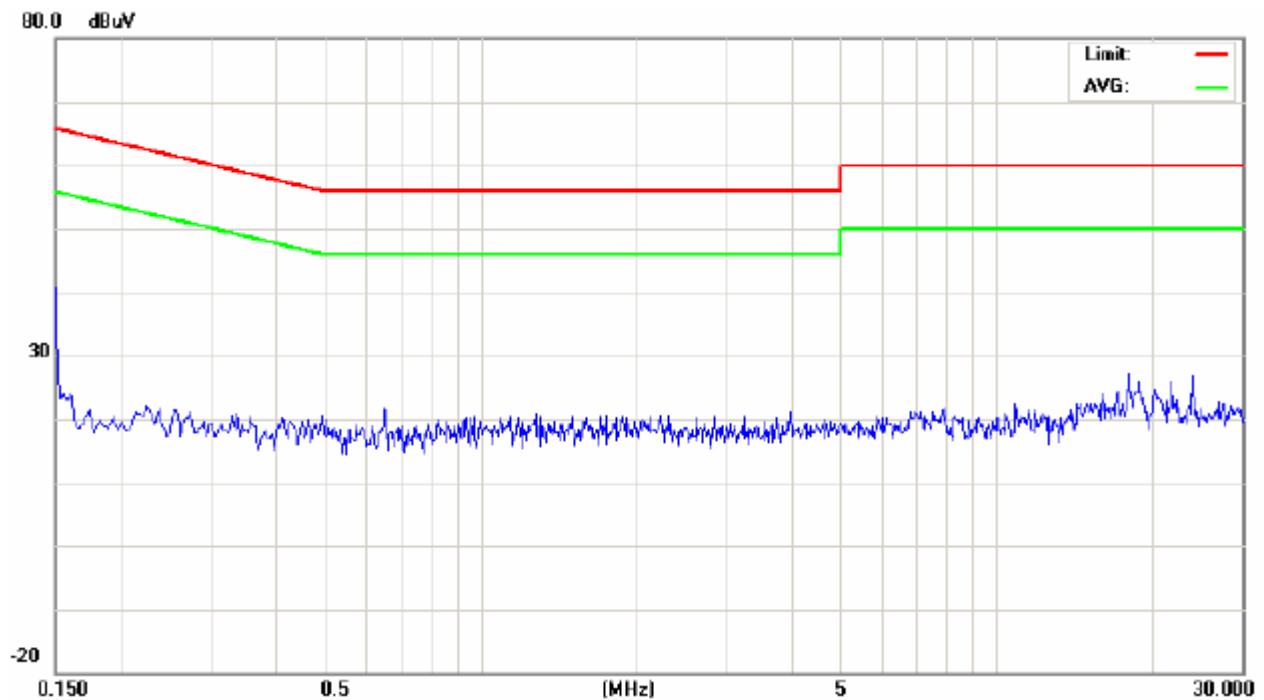
Limit : Conducted disturbance of Class B ITE Power : DC 12V input
M/N : N-6 Temperature : 24.2
Mode : charging Humidity : 56%

Graphs of Conducted Emission:

L:



N:



6. FREQUENCY STABILITY TEST

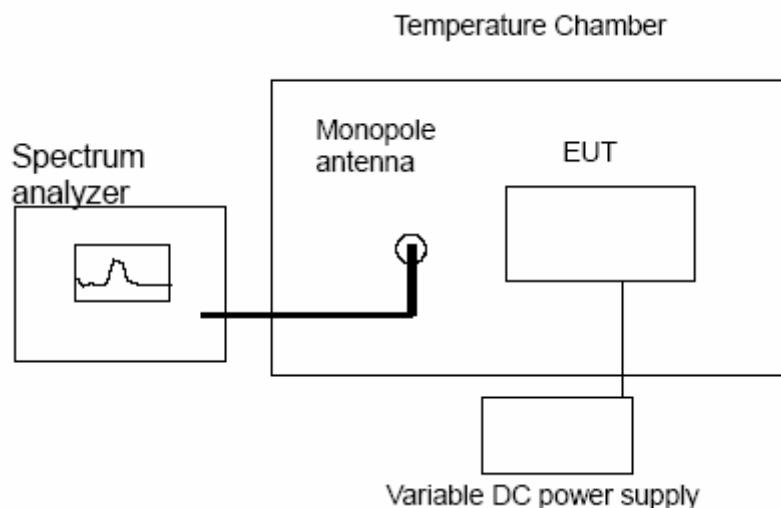
6.1 FREQUENCY STABILITY LIMITS

Please refer to §2 and §95.623(c)

6.2 TEST PROCEDURE

- a. The EUT was placed in an environmental chamber. All cables connecting to the EUT were routed through a port in the side of the chamber. The RC antenna output connector was connected to an attenuator, which was in turn connected to the input of a modulation analyzer located outside the chamber.
- b. The RC was then powered on and the frequency was selected. The Transmitter frequency was then measured to determine compliance with the 0.002% frequency tolerance.
- c. The procedure was repeated while varying the temperature from -30 to +50 degrees Celsius using 10 degree increments. At 25 degrees the input DC voltage was varied from 85% to 115% of nominal and the frequency measured.

6.3 BLOCK DIAGRAM



6.4 TEST RESULTS

Pass.

6.5 TEST DATA

In all cases shown below, the output frequency is well within the 0.002% tolerance required by FCC Part §2 and §95.623(c) for R/C transmitters.

Frequency stability Temperature Data

Temperature (°C)	Measured Frequency (MHz)	Delta (Hz)	Percent error (%)	Limit (%)
50	75.42976	240	0.0009	0.002
40	75.42854	460	0.0017	0.002
30	75.43013	130	0.0005	0.002
25	75.43000	0	0	0.002
20	75.43000	0	0	0.002
10	75.43015	150	0.0005	0.002
0	75.42993	70	0.00026	0.002
-10	75.42985	150	0.0006	0.002
-20	75.42996	40	0.0016	0.002
-30	75.42889	110	0.0004	0.002

Frequency stability Input Voltage Data

Power supply (V)	Temperature (°C)	Measured Frequency (MHz)	Delta (Hz)	Percent Error (%)	Limit (%)
10.2	25	75.42961	90	0.0003	0.002
13.8	25	75.43025	250	0.0009	0.002

7. EMISSION BANDWIDTH TEST

7.1 EMISSION BANDWIDTH LIMITS

According to FCC Part 95 Section 95.633 (b):

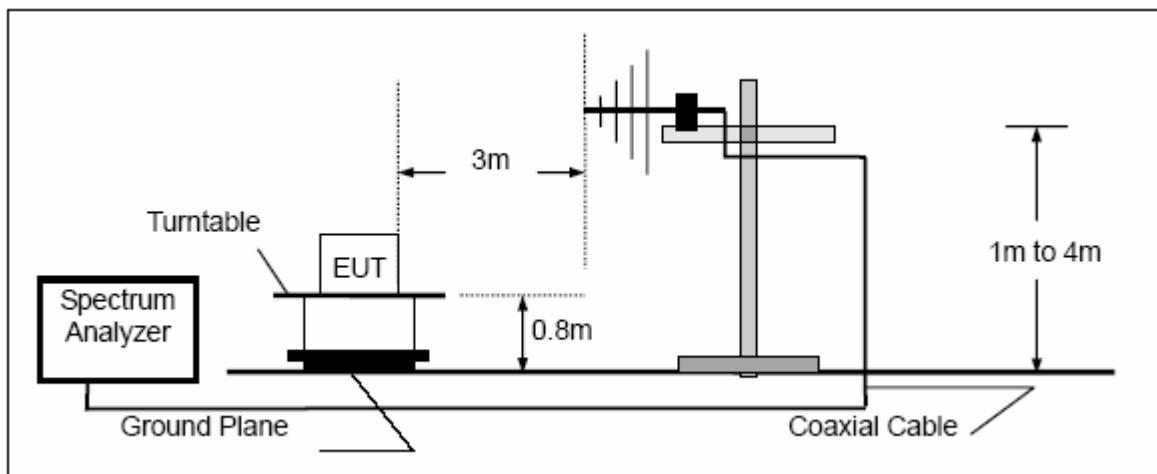
The authorized bandwidth for any emission type transmitted by an R/C transmitter is 8 KHz.

7.2 MEASUREMENT PROCEDURE

- a. The EUT was placed on a turn table which is 0.8m above ground plane.
- b. Set EUT as normal operation.
- c. Set SPA Center Frequency = fundamental frequency , RBW=1kHz,VBW= 1KHz, Span =50KHz.
- d. Set SPA Max hold. Mark peak, -26dB.

7.3 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

Radiated Emission Test Set-Up, Frequency below 1000MHz

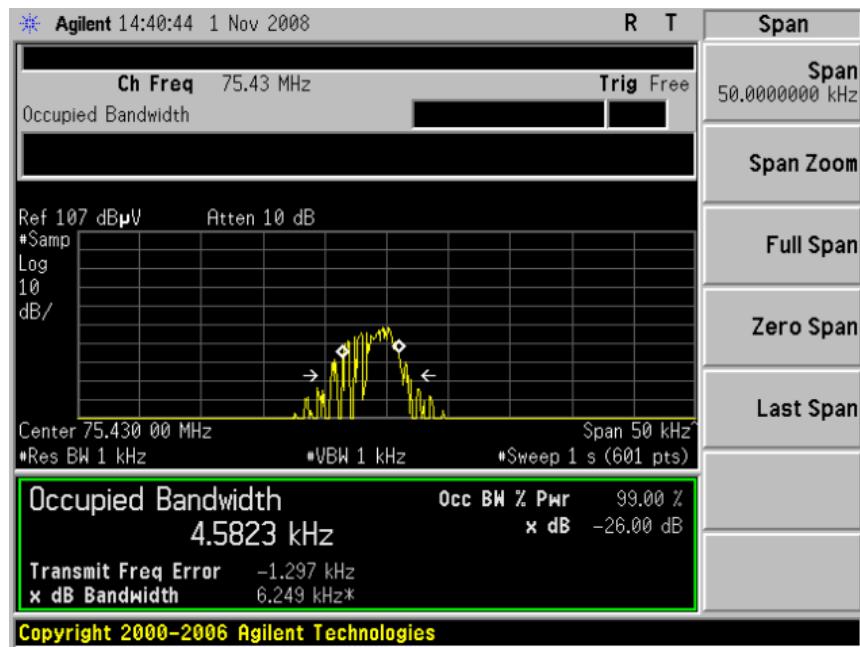


7.4 TEST DATA

For channel 75.43MHz, 26dB bandwidth = 4.5823 KHz;

Refer to attached data chart:

26 dB bandwidth test data



8. UNWANTED RADIATION TEST

8.1 UNWANTED RADIATION LIMITS

According to Section 95.635(b), the power of each unwanted emission shall be less than Transmitted Power as specified below:

- a. At least 25 db on any frequency removed from the center of the authorized bandwidth by more than 50% up to and including 100% of the authorized bandwidth.
- b. At least 45 db on any frequency removed from the center of the authorized bandwidth by more than 100% up to and including 125% of the authorized bandwidth.
- c. At least 55 db on any frequency removed from the center of the authorized bandwidth by more than 125% up to and including 250% of the authorized bandwidth.
- d. At least $56 + 10 \log_{10} (TP)$ db on any frequency removed from the center of the authorized bandwidth by more than 250%.

8.2 MEASUREMENT PROCEDURE

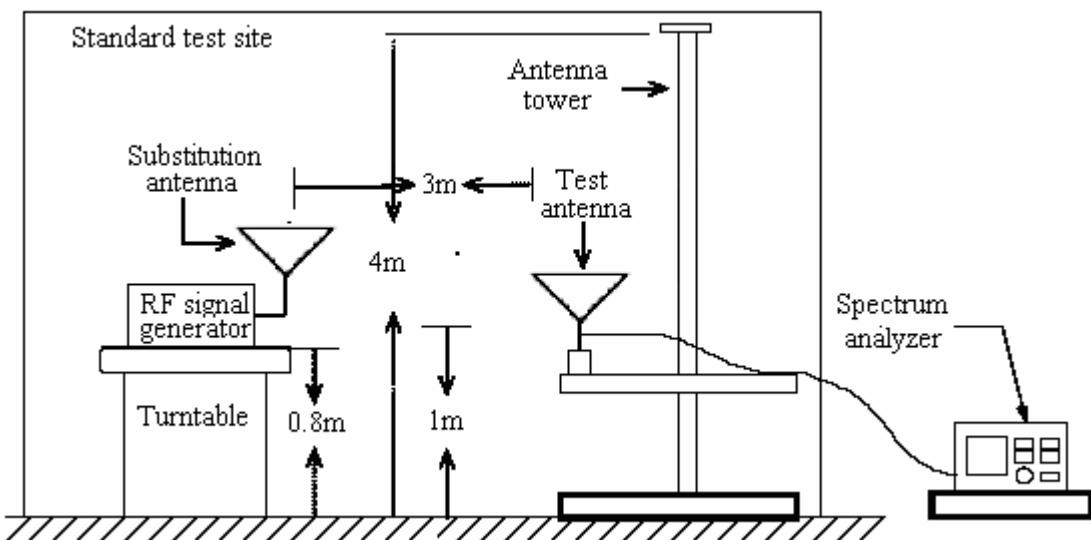
- a. On a test site, the EUT shall be placed on a turntable and in the position closest to the normal use as declared by the user.
- b. The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the transmitter.
- c. The output of the antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report.
The detector selection is based on how close the emission level was approaching the limit.
- d. The transmitter shall be switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.
- e. The test antenna shall be raised and lowered through the specified range of height until the measuring receiver detects a maximum signal level.
- f. The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- g. The test antenna shall be raised and lowered again through the specified range of height until the measuring receiver detects a maximum signal level.
- h. The maximum signal level detected by the measuring receiver shall be noted.
- i. The measurement shall be repeated with the test antenna set to horizontal polarization.
- j. Remove the transmitter and replace it with a substitution antenna (the antenna should be half-wavelength for each frequency involved). The center of the substitution antenna should be approximately at the same location as the center of the transmitter.
- k. The substitution antenna shall be oriented for vertical polarization and, if necessary, the length of the substitution antenna shall be adjusted to correspond to the frequency of transmitting.
- l. The substitution antenna shall be connected to a calibrated signal generator.
- m. If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
- n. The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
- o. The input signal to substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the

measuring receiver.

p. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.

q. The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

8.3 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) SUBSTITUTION METHOD: (Radiated Emissions)



8.4 TEST RESULTS

Ambient temperature: 25°C Relative humidity: 53%

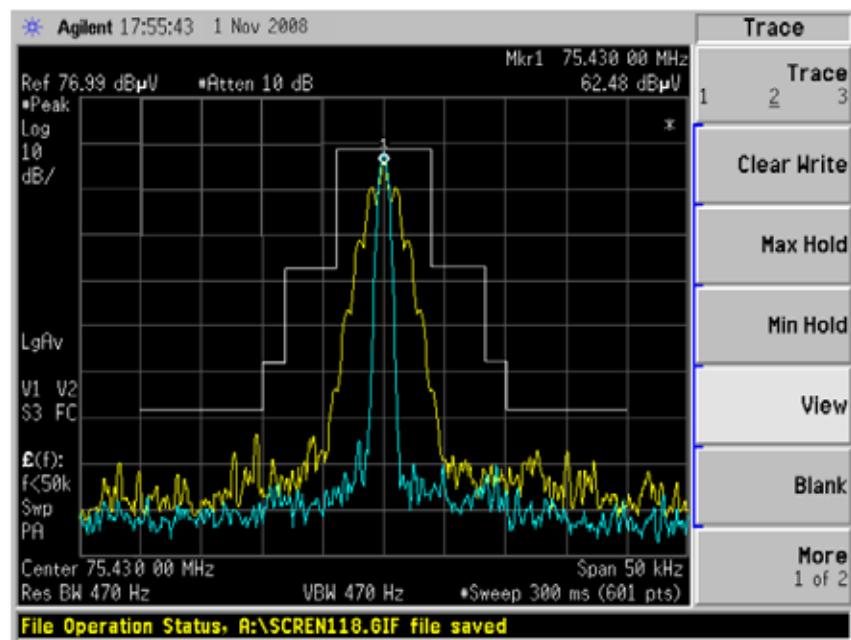
Frequency (MHZ)	Reading Level (dBm)	Antenna Polarity	Corrected Factor (dBm)	Result ERP (dBm)	Specified Limit (dBm)	Margin (dB)
150.23	-90.33	H	11.02	-79.31	-26	-53.31
230.11	-78.38	H	13.41	-64.97	-26	-38.97
309.68	-84.54	H	16.23	-68.31	-26	-42.31
351.47	-77.38	H	18.10	-59.28	-26	-33.28
*						
150.23	-80.29	V	11.02	-69.27	-26	-43.27
230.11	-76.88	V	13.41	-63.47	-26	-37.47
309.68	-80.88	V	16.23	-64.65	-26	-38.65
350.11	-76.18	V	18.02	-58.16	-26	-32.16
*						

Notes:

*means the output power of all the frequency is too low to test.

8.6 TRANSMITTER MASK TEST PLOT

Channel 75.43MHz test plot



9. MAXIMUM TRANSMITTER POWER TEST

9.1 MAXIMUM TRANSMITTER POWER LIMITS

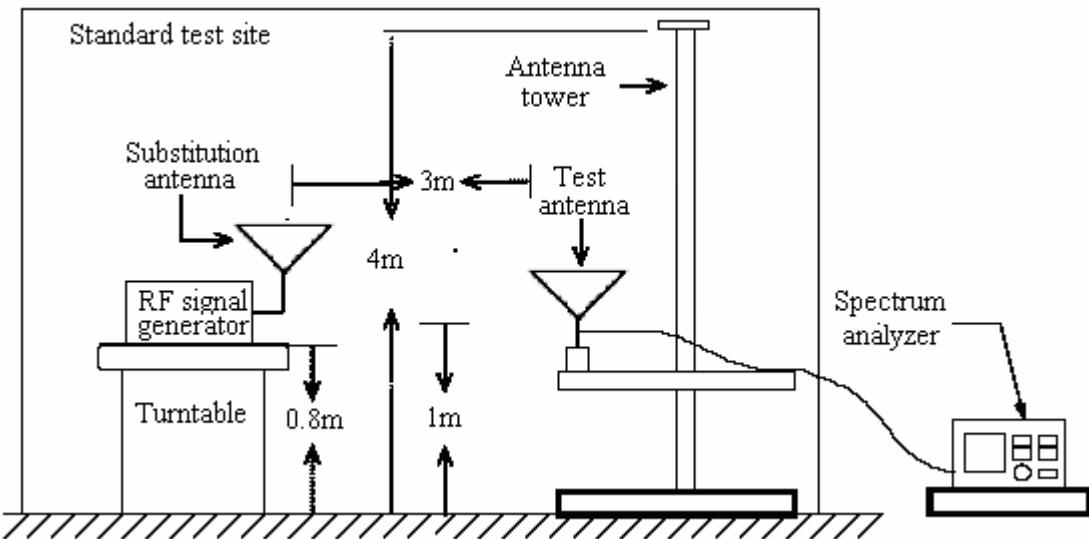
According to FCC Part 95 Section 95.639(b), under any condition of modulation, the R/C transmitters operate in the 72-76MHz frequency band shall not exceed a carrier power of 0.75W.

9.2 MEASUREMENT PROCEDURE

- a. On a test site, the EUT shall be placed on a turntable and in the position closest to the normal use as declared by the user.
- b. The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the transmitter.
- c. The output of the antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report.
The detector selection is based on how close the emission level was approaching the limit.
- d. The transmitter shall be switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.
- e. The test antenna shall be raised and lowered through the specified range of height until the measuring receiver detects a maximum signal level.
- f. The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- g. The test antenna shall be raised and lowered again through the specified range of height until the measuring receiver detects a maximum signal level.
- h. The maximum signal level detected by the measuring receiver shall be noted.
- i. The measurement shall be repeated with the test antenna set to horizontal polarization.
- j. Remove the transmitter and replace it with a substitution antenna (the antenna should be half-wavelength for each frequency involved). The center of the substitution antenna should be approximately at the same location as the center of the transmitter.
- k. The substitution antenna shall be oriented for vertical polarization and, if necessary, the length of the substitution antenna shall be adjusted to correspond to the frequency of transmitting.
- l. The substitution antenna shall be connected to a calibrated signal generator.
- m. If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
- n. The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
- o. The input signal to substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.
- p. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
- q. The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

9.3 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

SUBSTITUTION METHOD: (Radiated Emissions)



9.4 TEST RESULTS

Ambient temperature: 25°C Relative humidity: 53%

Measurement Frequency (MHZ)	Reading Level (dBm)	Correction Factor	Measurement Power(dBm)	Limit Power		Antenna Polarity
				(dBm)	(W)	
75.43	-35.34	8.09	-27.25	28.75	0.75	H
75.43	-37.41	8.09	-29.32	28.75	0.75	V

10. TRANSMITTER ANTENNA

10.1 PROVISIONS APPLICABLE

According to FCC Part 95 Section 95.647, the antenna of each R/C station transmitting in 72-76 MHz band must be an integral part of the transmitter. The antenna must have no gain and must be vertically polarized.

10.2 COMPLIANCE

The antenna is designed as a fixed, non-user replaceable with no gain and vertically polarized unit integrated to EUT.

11. POWER CAPABILITY

11.1 PROVISIONS APPLICABLE

According to FCC Part 95 Section 95.649, no R/C unit shall incorporate provisions for increasing its transmitter power to any level in excess of the limits specified in §95.639.

11.2 COMPLIANCE

All the components employed by EUT have the power capability less than 0.75W either being assembled or individual.

12. CRYSTAL CONTROL REQUIRED

12.1 PROVISIONS APPLICABLE

According to FCC Part 95 Section 95.651, all transmitters used in Personal Radio Services must be crystal controlled, except an R/C station that transmits in 26-27 MHz frequency band.

12.2 COMPLIANCE

The crystal is soldered on the main board, and not accessible to the user.

APPENDIX 1 PHOTOGRAPHS OF TEST SETUP

CONDUCTED EMISSION TEST



RADIATED EMISSION TEST



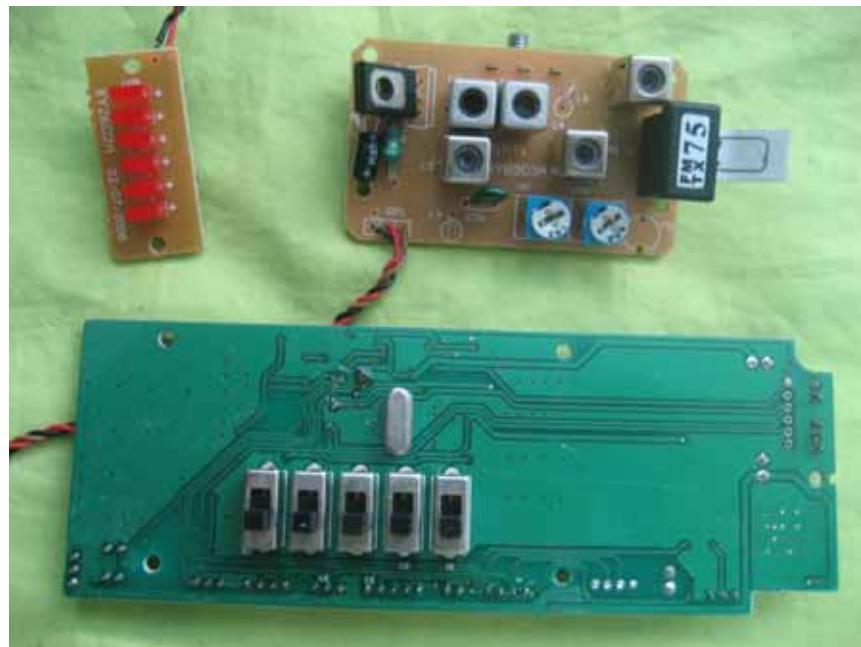
APPENDIX 2 PHOTOGRAPHS OF EUT



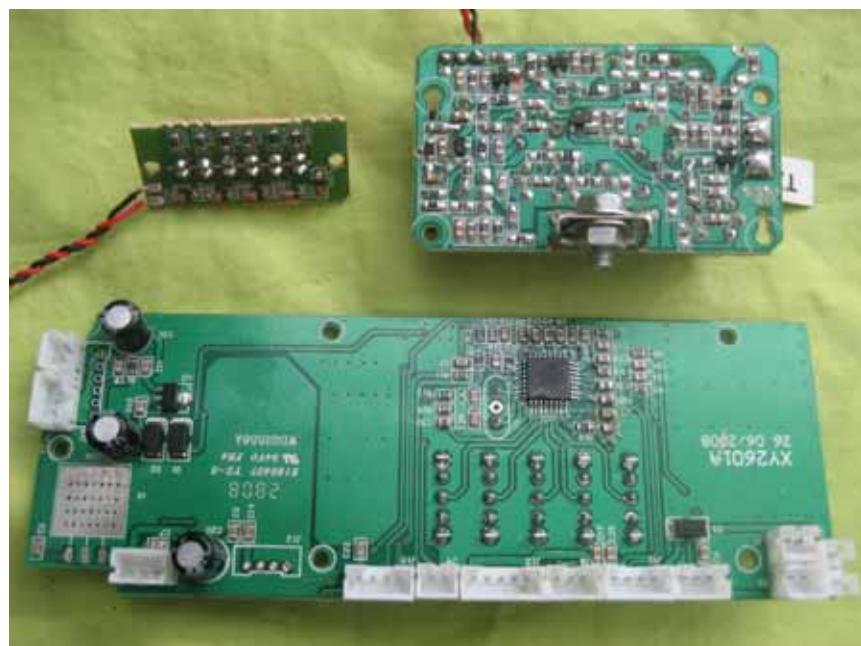
View of EUT-1



View of EUT-2



Internal photo of EUT-1



Internal photo of EUT-2



Internal photo of EUT-3



Internal photo of EUT-4

----End of the report----