

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

**OF**

**Radio Control System**

**MODEL NO.: N-4Q**

**BRAND NAME: N/A**

**FCC ID: U8JN-4Q**

**REPORT NO: GZEE07021320194**

**ISSUE DATE: Mar 28, 2007**

*Prepared for*

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## VERIFICATION OF COMPLIANCE

Applicant:	GUANGZHOU CHIYUAN ELECTRONIC CO., LTD. 2/F., NO.1 BLDG., BOYI INDUSTRIAL GARDEN, 4 <sup>th</sup> GONGYE RD.ZHICUN,DASHI STREET, PANYU, DIS., GUANGZHOU,CHINA
Product Description:	Radio Control System
Brand Name:	N/A
Model Number:	N-4Q
Serial Number:	N/A
File Number:	GZEE07021320194
Date of Test:	Mar 1,2007 ~ Mar 28, 2007

### We hereby certify that:

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 TIA/EIA 603 and the sample tested as described in this report is in compliance with the FCC Rules Part 95 Subpart C.

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

### *Approved By*

Jimmy.Zhang

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*Q.A. Manager*  
CENTRE TESTING INTERNATIONAL

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## **1. GENERAL INFORMATION**

### **1.1 Product Description**

The Guangzhou Chiyuan Electronic Co., Ltd. Model: N-4Q (referred to as the EUT in this report) The EUT is an short range, lower power, wireless Controller designed as an “ Output Device”. It is designed by way of utilizing the FM modulation achieves the system operating.

A major technical descriptions of EUT is described as following:

- A). Operation Frequency Range:72.01MHz-72.99 MHz
- B). Sample Tested Frequency:72.45MHz
- C). Modulation: FM
- D). Antenna Designation: Non-User Replaceable (Fixed)
- E). Power Supply: 12 Vdc by battery.

### **1.2 Related Submittal(s) / Grant (s)**

This submittal(s) (test report) is intended for FCC ID: U8JN-4Q filing to comply with the FCC Part 95, Subpart C Rules.

### **1.3 Test Methodology**

The radiated emission testing was performed according to the procedures in TIA/EIA 603 and FCC CFR 47 2.1033, 2.1046, 2.1047, 2.1049, 2.1053, 2.1055 and 2.1057

### **1.4 Test Facility**

The open area test site used to collect the radiated data is located on the address of Centre Testing International (CTI). No. 6, Jinao industrial park, No.35 Jukeng Road, Dashuikeng Village, Guanlan Town, Baoan District, Shenzhen, China. The Open Area Test Site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003 and CISPR 22/EN 55022 requirements. And the test firm: Compliance Engineering Service (China).

### **1.5 Special Accessories**

Not available for this EUT intended for grant.

### **1.6 Equipment Modifications**

Not available for this EUT intended for grant.

## 2. System Test Configuration

### 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### 2.2 EUT Exercise

The Transmitter was operated in the normal operating mode. the TX frequency was fixed which was for the purpose of the measurements.

## 2.3 GENERAL TECHNICAL REQUIREMENTS

- a). Section 95.207: Authorized operation channels: 72MHz-73MHz
- b). Section 95.623 (c) : Frequency Tolerance less than 0.002%
- c). Section 95.631 (b) : Transmit non-voice emission
- d). Section 95.633 (b) : Emission Bandwidth shall less than 8KHz
- e). Section 95.635: Unwanted radiation

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

- 1). 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.
- 2). 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.
- 3). 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.
- 4). At least  $56 + 10 \log_{10} (T)$  db on any frequency removed from the center of the authorized bandwidth by more than 250%.
- f). Section 95.637: Not applicable for this R/C device.
- g). Section 95.639: Maximum transmitter power less than 0.75W
- h). Section 95.647: Antenna shall be a dedicate type
- i). Section 95.649: Output power can't be change
- j). Section 95.651: Crystal control required

## 2.4 Configuration of Tested System

**Fig. 2-1 Configuration of Tested System**



Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Note
E-1	Radio Control System	Xinyi/TOPCARE	N-4Q	<b>EUT</b>

### 3. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§95.207	Authorized operation channels	Compliant
§95.623	Frequency tolerance	Compliant
§95.631	Emission type	Compliant
§95.633	Emission bandwidth	Compliant
§95.635	Unwanted radiation	Compliant
§95.637	Modulation standard	N/A
§95.639	Maximum transmitter power	Compliant
§95.647	Transmitter antenna	Compliant
§95.649	Power capability	Compliant
§95.651	Crystal control required	Compliant
&15.107	Conducted emission	Compliant

### 4. DESCRIPTION OF TEST MODES

1. The EUT (Radio Control System) has been tested under normal operating condition
2. The EUT stay in continuous transmitting mode. Three axes ( X,Y,Z ) are chosen for testing.

## **5. AUTHORIZED OPERATION CHANNELS**

### **5.1 PROVISIONS APPLICABLE**

According to FCC Part 95 Section 95.207, the authorized operation channels for model aircrafts are located on the frequencies from 72.01 to 72.99 with the interval of 20KHz,

### **5.2 COMPLIANCE**

The EUT designed as a model aircraft controller with the operation frequency on 72.45&72.71 MHz is absolutely in accordance with the requirement above.

## 6. FREQUENCY TOLERANCE

### 6.1 PROVISIONS APPLICABLE

- a). According to FCC Part 2 Section 2.1055(a)(1), the frequency stability shall be measured with variation of ambient temperature from  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  centigrade.
- b). According to FCC Part 2 Section 2.1055(d)(2), for hand carried battery powered equipment, the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point, which is specified by the manufacturer.
- c). According to FCC Part 95 Section 95.623(c), the frequency tolerance must be maintained within 0.002%.

### 6.2 MEASUREMENT PROCEDURE

#### 6.2.1 Frequency stability versus environmental temperature

1. Setup the configuration per figure 1 for frequencies measurement inside an environment chamber, Install new battery in the EUT.
2. Turn on EUT and set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 1KHz and Video Resolution Bandwidth to 1KHz and Frequency Span to 50KHz. Record this frequency as reference frequency.
3. Set the temperature of chamber to  $50^{\circ}\text{C}$ . Allow sufficient time(approximately 30 min) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the chamber, turn the EUT on and measure the EUT operating frequency.
4. Repeat step 2 with a  $10^{\circ}\text{C}$  decreased per stage until the lowest temperature  $-30^{\circ}\text{C}$  is measured, record all measured frequencies on each temperature step.

#### 6.2.2 Frequency stability versus input voltage

1. Setup the configuration per figure 1 for frequencies measured at temperature if it is within  $15^{\circ}\text{C}$  to  $25^{\circ}\text{C}$ . Otherwise, an environment chamber set for a temperature of  $20^{\circ}\text{C}$  shall be used. Install new battery in the EUT.
2. Set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 1KHz and Video Resolution Bandwidth to 1KHz. Record this frequency as reference frequency.
3. For battery operated only device, supply the EUT primary voltage at the operating end point which is specified by manufacturer and record the frequency.

### 6.3 TEST SETUP BLOCK DIAGRAM(block diagram of configuration)

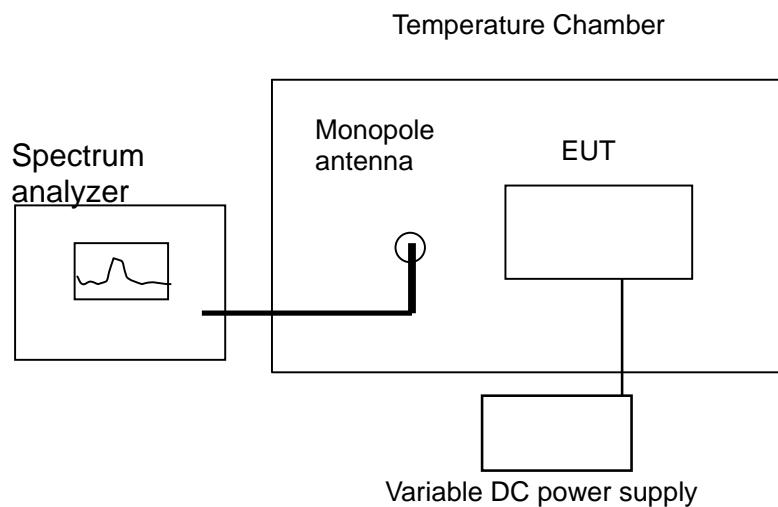


Figure 1

Test equipment used:

Equipment	Model No.	Serial No.	Cal. Due.
Advantest Spectrum Analyzer	R3132	120901472	02/09/2008
Shihin Temperature Chamber	BM50-CB	908	02/09/2008
DC Power Supply	WYK-605	N/A	02/09/2008
Huber + suhner low loss cable	N/A	N/A	02/09/2008
Monopole Antenna	N/A	N/A	N/A

## 6.4 TEST RESULT

a. Frequency stability versus input voltage (battery operation end point voltage is 10.3V)

Reference Frequency (MHz)	Frequency Measured at end point voltage	Frequency Deviation (%)	Limit (%)
72.45	72.44876	0.0017	0.002

b. Frequency stability versus ambient temperature

Reference Frequency:72.45 MHz		Limit: $\pm 0.002\%$	
Environment Temperature (°C)	Power Supply	Frequency deviation measured with time Elapse (10 minutes)	
		(MHz)	%
50	New Battery	72.44952	-0.0006625
30	New Battery	72.44961	-0.0005383
10	New Battery	72.45076	0.0010490
0	New Battery	72.45084	0.0011594
-10	New Battery	72.45081	0.0011180
-30	New Battery	72.45088	0.0012146

## **7. EMISSION TYPE**

### **7.1 PROVISIONS APPLICABLE**

According to FCC Part 95 Section 95.631(b) : An R/C transmitter may transmit any appropriate non-voice emission which meets the emission limitations of §95.633.

### **7.2 COMPLIANCE**

The EUT is solely used to control model aircraft without transmitting any voice emission and it has been tested to comply with the emission limitation of §95.633.

## 8. EMISSION BANDWIDTH

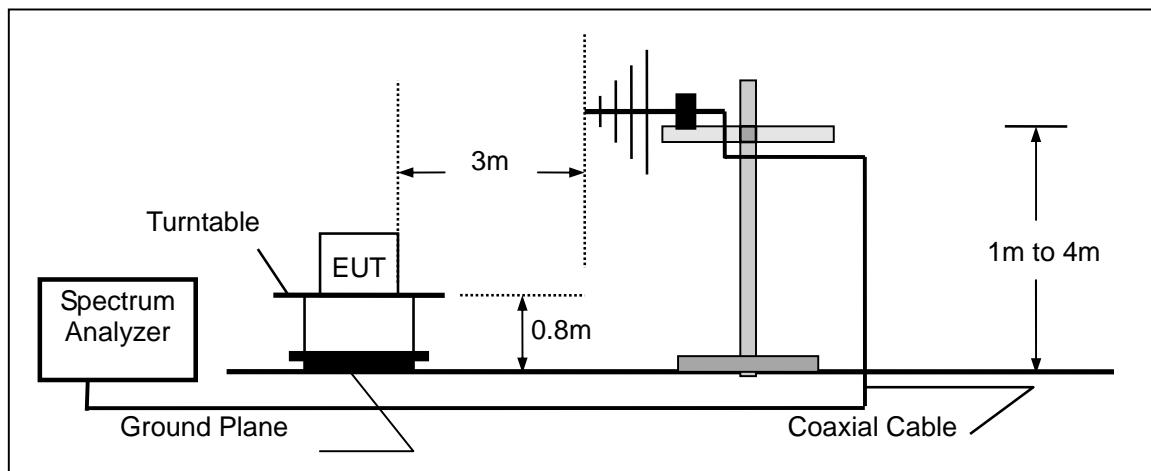
### 8.1 PROVISIONS APPLICABLE

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.

### 8.2 MEASUREMENT PROCEDURE

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

### 8.3 TEST SETUP BLOCK DIAGRAM (Block Diagram of Configuration)



### 8.4 MEASUREMENT EQUIPMENT USED:

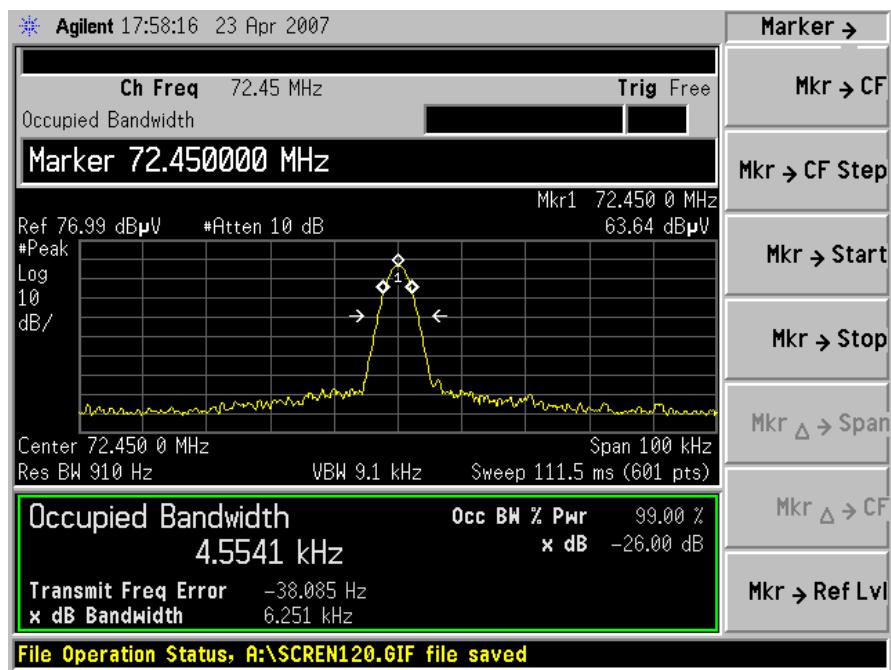
Open Area Test Site # 3					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	ADVANTEST	R3132	120901472	02/08/2007	02/09/2008
EMI Test Receiver	HP	8546A	3448A00232	02/08/2007	02/09/2008
Pre-Amplifier	HP	8447D	2944A07999	02/08/2007	02/09/2008
Bi-log Antenna	EMCO	3142	9910-1436	02/08/2007	02/09/2008

## 8.5 MEASUREMENT RESULT:

For channel 72.45MHz ,26dB bandwidth = 6.251 KHz;

Refer to attached data chart.

### 26 dB bandwidth test data



## 9. UNWANTED RADIATION

### 9.1 PROVISIONS APPLICABLE

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

- 1). 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.
- 2). 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.
- 3). 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.
- 4). At least  $56 + 10 \log_{10} (TP)$  db on any frequency removed from the center of the authorized bandwidth by more than 250%.

### 9.2 MEASUREMENT PROCEDURE

- 1). 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.
- 2). The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the transmitter.
- 3). 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.
- 4). 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.
- 5). The test antenna shall be raised and lowered through the specified range of height until the measuring receiver detects a maximum signal level.
- 6). The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- 7). The test antenna shall be raised and lowered again through the specified range of height until the measuring receiver detects a maximum signal level.
- 8). The maximum signal level detected by the measuring receiver shall be noted.
- 9). The measurement shall be repeated with the test antenna set to horizontal polarization.
- 10). Replace the antenna with a proper Antenna (substitution antenna).
- 11). 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.

12). The substitution antenna shall be connected to a calibrated signal generator.

13). If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.

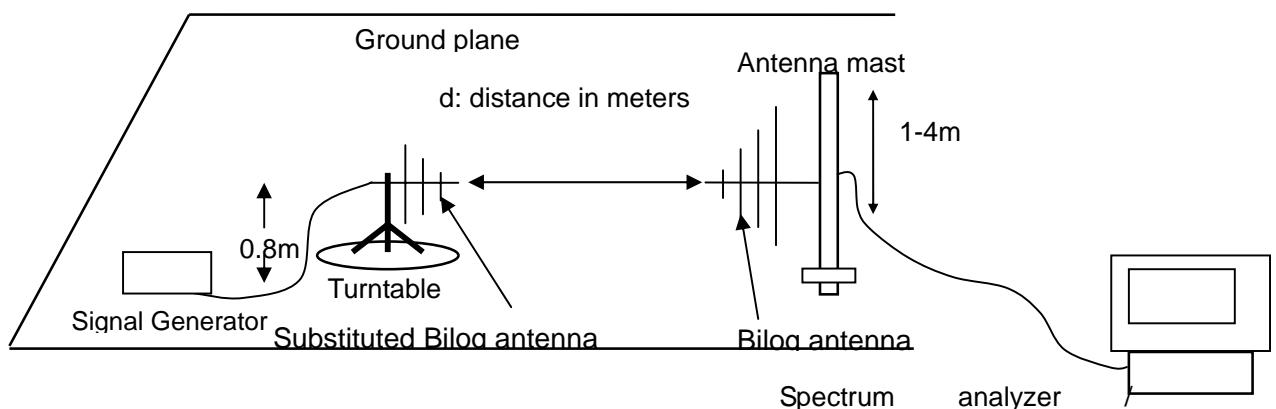
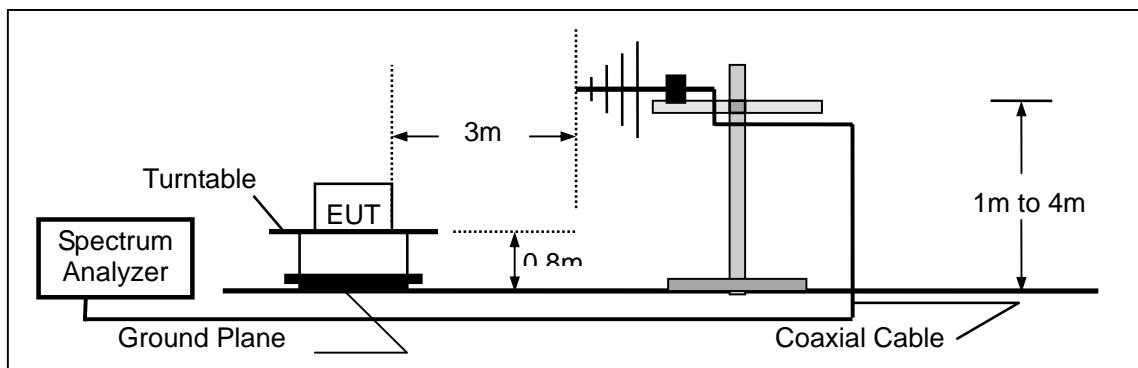
14). The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.

15). 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.

16). 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.

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

### 9.3 TEST SETUP BLOCK DIAGRAM (block diagram of configuration)



## 9.4 MEASUREMENT EQUIPMENT USED:

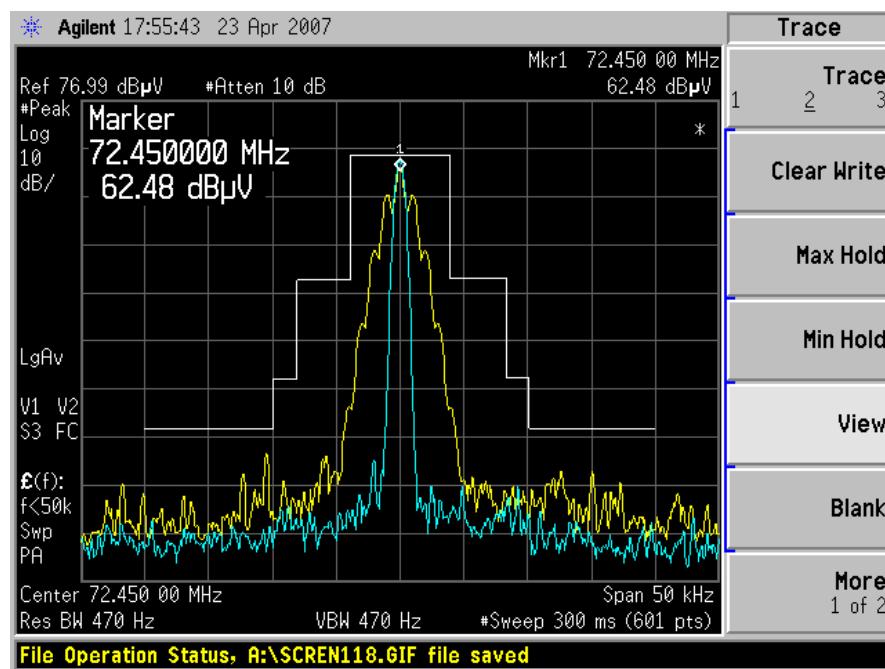
Open Area Test Site					
EQUIPMENT TYPE	MFR	MODEL NO.	SERIAL NO.	LAST CAL.	CAL DUE.
Spectrum Analyzer	ADVANTEST	R3132	N/A	02/08/2007	02/09/2008
EMI Test Receiver	HP	8546A	3448A00232	02/08/2007	02/09/2008
Pre-Amplifier	HP	8447D	2944A07999	02/08/2007	02/09/2008
Bi-Log Antenna	EMCO	3142	9910-1436	02/08/2007	02/09/2008
Bi-Log Antenna	SCHAFFNER	CBL6143	5082	02/08/2007	02/09/2008
CABLE	TIME MICROWAVE	LMR-400	N-TYPE04	02/08/2007	02/09/2008

## 9.5 MEASUREMENT RESULTS:

Frequency (MHz)	Reading level (dBuV)	Antenna Polarization	Total Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
72.41	71.57	V	8.18	-27.25	28.75	-56.00
144.78	15.66	V	10.09	-81.25	-26.00	-55.25
217.53	27.49	V	12.81	-66.70	-26.00	-40.70
309.68	20.19	V	16.23	-70.58	-26.00	-44.58
290.28	26.58	V	15.43	-64.99	-26.00	-38.99
72.41	54.49	H	8.18	-44.33	28.75	-73.08
144.78	25.89	H	10.09	-71.02	-26.00	-45.02
217.53	24.71	H	12.81	-69.48	-26.00	-43.48
309.68	23.77	H	15.43	-67.80	-26.00	-41.80
290.28	22.19	H	17.84	-66.97	-26.00	-40.97

## 9.6 TRANSMITTER MASK TEST PLOT:

Channel 72.45MHz test plot

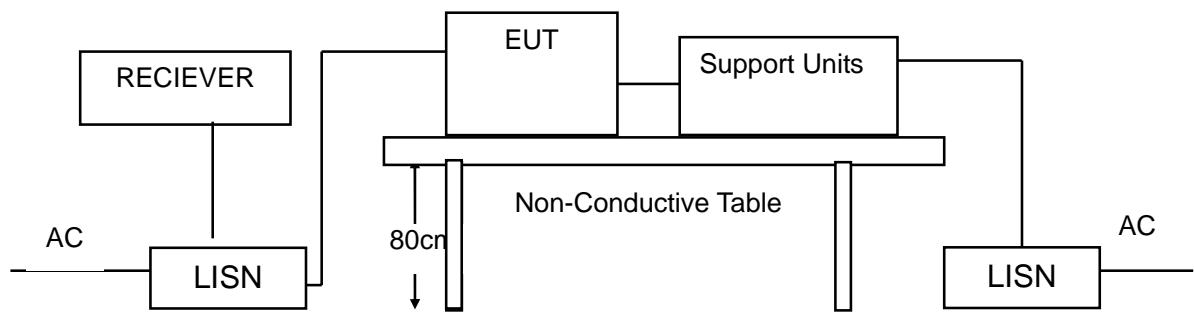


## 10. Conducted Emissions Test (Not applicable in this report)

### 10.1 Measurement Procedure

1. The EUT was placed on a table which 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 were complete.

### 10.2 Test SET-UP (Block Diagram of Configuration)



### 10.3 Measurement Equipment Used

Conducted Emission Test Site # 4					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	HP	8546A	3448A00232	02/08/2007	02/07/2008
Spectrum Analyzer	ADVANTEST	R3132	120901472	02/08/2007	02/07/2008
LISN	EMCO	3825/2	1371	02/08/2007	02/07/2008
LISN	EMCO	3825/2	8901-1459	02/08/2007	02/07/2008

## 10.4 Measurement Result

(The chart below shows the highest readings taken from the final data)

L1 = Line One (Hot side) / L2 = Line Two (Neutral side):

FREQ MHz	PEAK dBuV	Q.P. RAW dBuV	AVG RAW dBuV	Q.P. Limit dBuV	AVG Limit dBuV	Q.P. Margin dB	AVG Margin dB	NOTE
2.045	31.22			56.00	46.00	-24.78	-34.78	L1
3.523	31.53			56.00	46.00	-24.47	-34.47	L1
8.023	32.99			60.00	50.00	-27.01	-37.01	L1
11.441	31.26			60.00	50.00	-28.74	-38.74	L1
16.748	30.02			60.00	50.00	-29.98	-39.98	L1
26.573	31.42			60.00	50.00	-28.58	-38.58	L1
4.662	30.11			56.00	46.00	-25.89	-35.89	L2
7.351	32.19			60.00	50.00	-27.81	-37.81	L2
8.044	32.33			60.00	50.00	-27.67	-37.67	L2
10.992	28.66			60.00	50.00	-31.34	-41.34	L2
22.020	30.16			60.00	50.00	-29.84	-39.84	L2
25.271	20.89			60.00	50.00	-39.11	-49.11	L2

**\*\*NOTE:** “---” denotes the emission level was or more than 2dB below the Average limit,  
So no re-check anymore.

## **11. MODULATION STANDARDS**

The Modulation Standard is not applicable to this kind of R/C devices.

## **12. MAXIMUM TRANSMITTER POWER.**

### **12.1 PROVISIONS APPLICABLE**

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

### **12.2 MEASUREMENT PROCEDURE**

- 1). 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.
- 2). The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the transmitter.
- 3). 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.
- 4). 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.
- 5). The test antenna shall be raised and lowered through the specified range of height until the measuring receiver detects a maximum signal level.
- 6). The transmitter shall than be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- 7). The test antenna shall be raised and lowered again through the specified range of height until the measuring receiver detects a maximum signal level.
- 8). The maximum signal level detected by the measuring receiver shall be noted.
- 9). Replace the antenna with a proper Antenna (substitution antenna).
- 10). 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.
- 11). The substitution antenna shall be connected to a calibrated signal generator.
- 12). If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
- 13). The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.

14). 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.

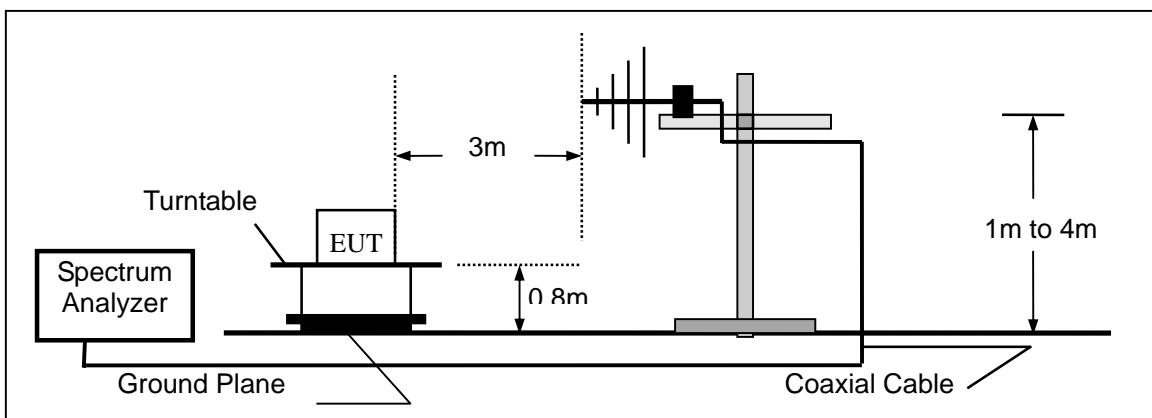
15). The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.

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

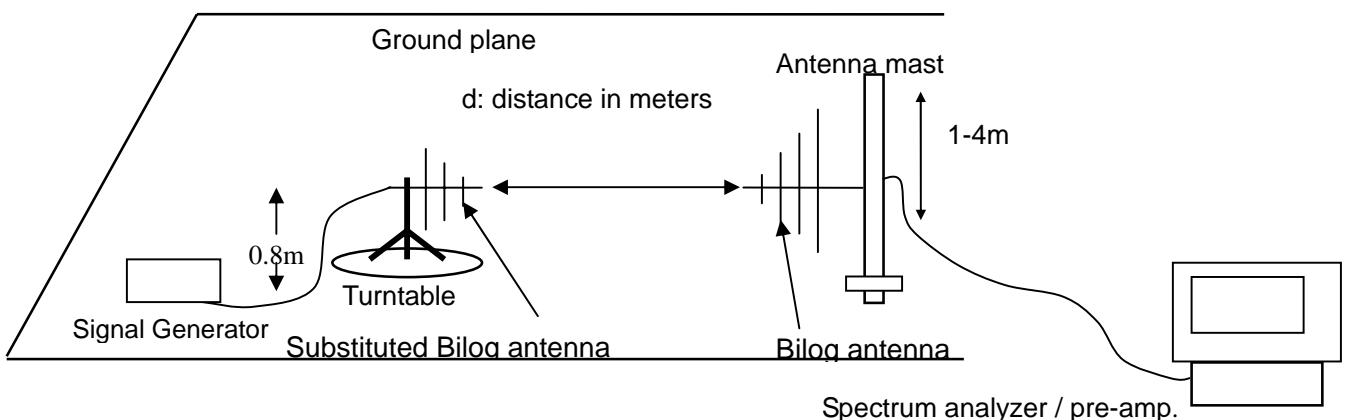
17). The measure of the effective radiated power is the larger of the two levels recorded, at the input to the substitution antenna, corrected for the gain of the substitution antenna if necessary.

### 12.3 TEST SETUP BLOCK DAIGRAM(setup block diagram of configuration)

#### TEST SETUP:



#### SUBSTITUTION METHOD:



## 12.4 MEASUREMENT EQUIPMENT USED:

Open Area Test Site					
EQUIPMENT TYPE	MFR	MODEL NO.	SERIAL NO.	LAST CAL.	CAL DUE.
Spectrum Analyzer	ADVANTEST	R3132	N/A	02/08/2007	02/09/2008
EMI Test Receiver	HP	8546A	3448A00232	02/08/2007	02/09/2008
Pre-Amplifier	HP	8447D	2944A07999	02/08/2007	02/09/2008
Bi-Log Antenna	EMCO	3142	9910-1436	02/08/2007	02/09/2008
Bi-Log Antenna	SCHAFFNER	CBL6143	5082	02/08/2007	02/09/2008
CABLE	TIME MICROWAVE	LMR-400	N-TYPE04	02/08/2007	02/09/2008

## 12.5 TEST RESULT

Freq (MHz)	Antenna Polarity	Reading (dBuV)	SGOP (dBm)	Ant. Gain (dB)	Dipole Gain (dBi)	Cable (dB)	Corrected Power		Limit (W)
							(dBm)	(mW)	
7245	V	85.77	-28.38	-0.5	0	0.64	-29.52	0.001117	0.75
7245	H	66.97	-45.32	-0.5	0	0.64	-46.46	0.000023	0.75

## **13. TRANSMITTER ANTENNA**

### **13.1 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.

### **13.2 COMPLIANCE**

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

## **14. POWER CAPABILITY**

### **14.1 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

### **14.2 COMPLIANCE**

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

## **15. CRYSTAL CONTROL REQUIRED**

### **15.1 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.

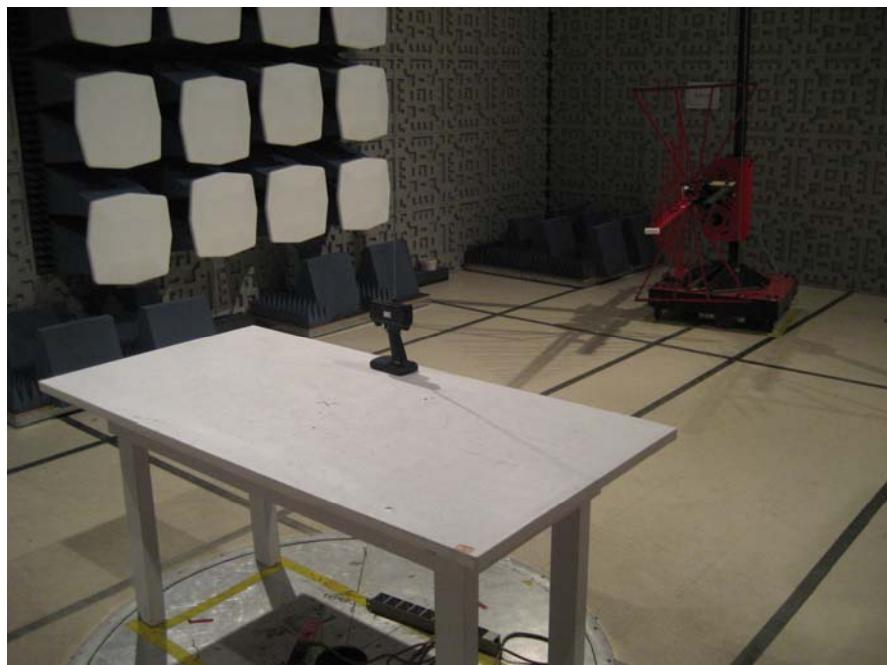
### **15.2 COMPLIANCE**

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

## **APPENDIX 1**

## **PHOTOGRAPHS OF SET UP**

## RADIATED EMISSION TEST SETUP



## CONDUCTED EMISSION TEST



## **APPENDIX 2**

## **PHOTOGRAPHS OF EUT**

FRONT VIEW OF EUT



BACK VIEW OF EUT



LEFT VIEW OF EUT



RIGHT VIEW OF EUT



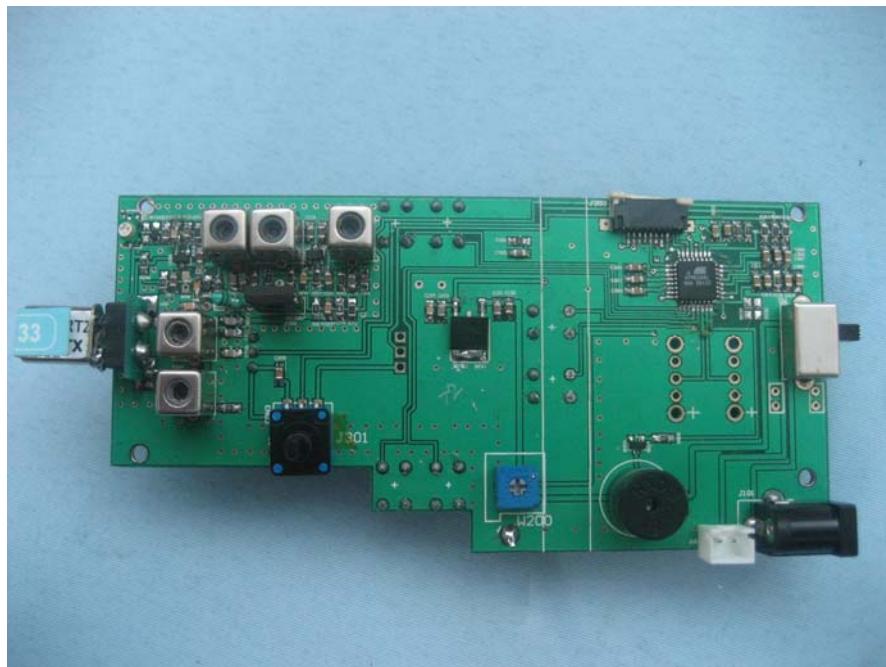
TOP VIEW OF EUT



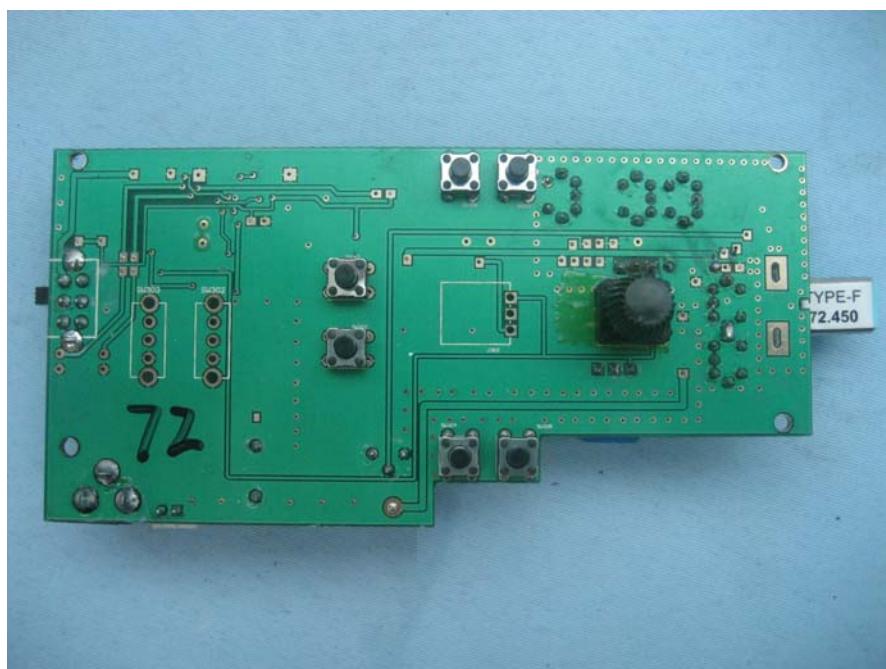
BOTTOM VIEW OF EUT



INTERANAL PHOTO OF TX - 1



INTERNAL PHOTO OF TX - 2



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