

EMC TEST REPORT

For

FM Proportional Radio Control System

Model Number: E-FLYTX100

FCC ID: SPWE-FLYTX100

Report Number : KSZ2004111601J

Test Laboratory : Shenzhen Academy of Metrology and
Quality Inspection EMC Laboratory

Site Location : Bldg. of Metrology & Quality Inspection,
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TABLE OF CONTENTS

Description	Page
Test Report Certification	
1. TEST RESULTS.....	4
2. GENERAL INFORMATION	4
2.1. Description of EUT.....	4
2.2. Test Facility	5
3. TEST EQUIPMENT	5
3.1. For Conducted Disturbance Test.....	5
3.2. For Radiated Disturbance Test	5
4. RADIATED EMISSION MEASUREMENT	6
4.1. Block Diagram of Test Setup.....	6
4.2. Test Procedure	7
4.3. Operating Condition of EUT.....	7
4.4. Test Data	7
5. FREQUENCY STABILITY.....	8
5.1. Block Diagram of Test Setup.....	8
5.2. Test Standard and Limit	9
5.3. Test Procedure	9
5.4. Test Data	10
6. BAND EDGES TESTING.....	11
6.1 Test Procedure	11
6.2 Test Equipment	11
6.3 Test Results	11
7. CRYSTAL ACCESS RESTRICTIONS.....	12

CERTIFICATION

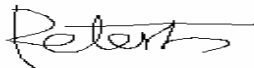
Applicant : Shenzhen ART-Tech Electronic Technology Co., Ltd.
Address : 2/F, No.2 Bai wang 2nd Industrial Park, baimang, Xili Town, Nanshan District, Shenzhen China.
Manufacturer : Same applicant .
Address : Same applicant .
EUT Description : FM Proportional Radio Control System
Model No : E-FLYTX100

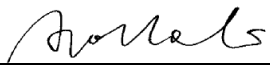
Test Standards:

FCC PART 95, SUBPART C & E : 2003
FCC PART 2, SUBPART J : 2003
ANSI C63.4 2001

The EUT described above is tested by Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory to determine the maximum emissions from the EUT. Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory is assumed full responsibility for the accuracy of the test results. Also, this report shows that the EUT technically complies with FCC requirements.

The test report is valid for above tested sample only and shall not be reproduced in part without written approval of the laboratory.

Tested by : 
(Peter Lin) Date : November 6,2004

Approved by : 
(Apollo Liu) Date : November 16,2004

1. TEST RESULTS

Table 1 Test Results

Test Items	Test Results
95.210(a) Transmitter Power Test	Pass
95.635 Unwanted Radiated Test	Pass
95.623(c) Frequency Stability Test	Pass
95.633(b) Emission Bandwidth Test	Pass
95.647 Transmitter antenna	Pass
95.651 Crystal Access Restrictions Test	Pass

2. GENERAL INFORMATION

2.1. Description of EUT

Description : FM Proportional Radio Control System

Model Number : E-FLYTX100

Applicant : Shenzhen ART-Tech Electronic Technology Co., Ltd

Manufacturer : Shenzhen ART-Tech Electronic Technology Co., Ltd

Transmitter:

Working Frequency : 72.1512MHz

Channel : 1

Emission Designator : 8K00F1D

Transmitting Power : -35dBm

Power Supply : DC12V

Adaptor: Input Power: N/A

Output Power: N/A

The system is FM proportional radio control system. 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.

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

2.2. Test Facility

Name of Facility : Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory

Site Location : Bldg. of Metrology & Quality Inspection, Longzhu Road, Shenzhen, Guangdong, China

Site Description : June 02, 2004 file on Federal Communications Commission Registration Number: 274801

Aug. 11, 2000 certificated by TUV Rheinland, Shenzhen.

3. TEST EQUIPMENT

3.1. For Conducted Disturbance Test

Table 2 Conducted Disturbance Test Equipment

No.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
SB2603	EMI Test Receiver	Rohde & Schwarz	ESCS30	Jan.31,2004	1 Year
SB3321	AMN	Rohde & Schwarz	ESH2-Z5	Jan.31,2004	1 Year
SB2589	L.I.S.N	KYROTISU	KNW-407	Jan.31,2004	1 Year

3.2. For Radiated Disturbance Test

Table 3 Radiated Disturbance Test Equipment

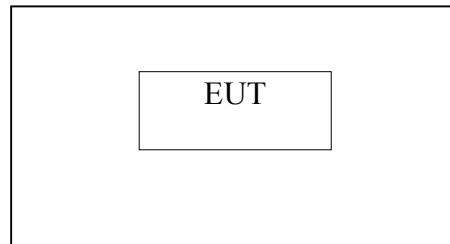
NO.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
SB3436	EMI Test Receiver	Rohde & Schwarz	ESI26	Jan.31,2004	1 Year
SB3440	Bilog Antenna	Chase	CBL6112B	Jan.31,2004	1 Year
	Horn antenna	Rohde & Schwarz	HF906	Jan.31,2004	1 Year

4. RADIATED EMISSION MEASUREMENT

4.1. Block Diagram of Test Setup

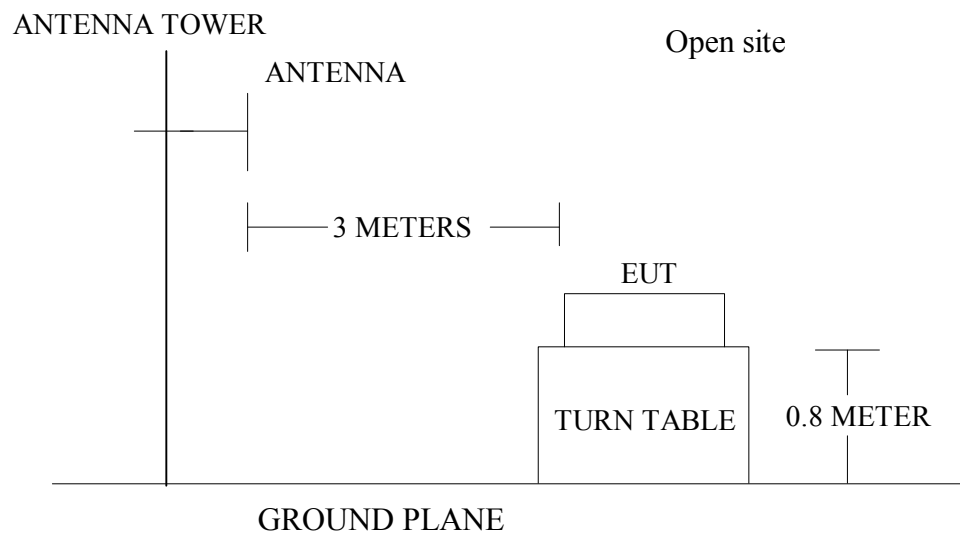
4.1.1. Block Diagram of the EUT

Figure 1 EUT



4.1.2. Test setup of Open Site Test

Figure 2 Test Setup(Open Site)



4.1.3. Test Standard

FCC Part 95:2003

4.1.4. Limits of Fundamental Frequency Measurement

The maximum transmitter output power is 0.75W.

4.1.5 Limits of Unwanted Radiated Emissions Measurement

The unwanted emissions should be less than the transmitter field strength by at least $56 + 10\log(TP)$ dB on any frequency removed from the center of the authorized bandwidth by more than 250%.

4.2. Test Procedure

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the receiving antenna, which was mounted on antenna tower and its position at 0.8 m above the ground.
- c. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading and recorded the value.
- d. The EUT is replaced by a proper antenna(substitution antenna) connected to a signal generator tuned to the frequency of emission.
- e. The signal generator level has to be adjusted to have the same emission nature.
- f. The radiated power can be calculated via the factor and antenna gain.
- g. Repeat step 1-6 for horizontal polarization.

4.3. Operating Condition of EUT

- 4.3.1. Setup the EUT as shown in section 4.1.
- 4.3.2. Turn on the power.
- 4.3.3 Let the Transmitter working in each channel.

Enable the EUT under transmission condition continuously at specific channel frequencies individually.

4.4. Test Data

The emissions don't show in below are too low against the limits.

Table 1 Radiated Disturbance Test Data

Date of Test	2004.11.6	Temperature	20 °C
EUT	FM Proportional Radio Control System	Humidity	58 %
Model Number	E-FLYTX100		

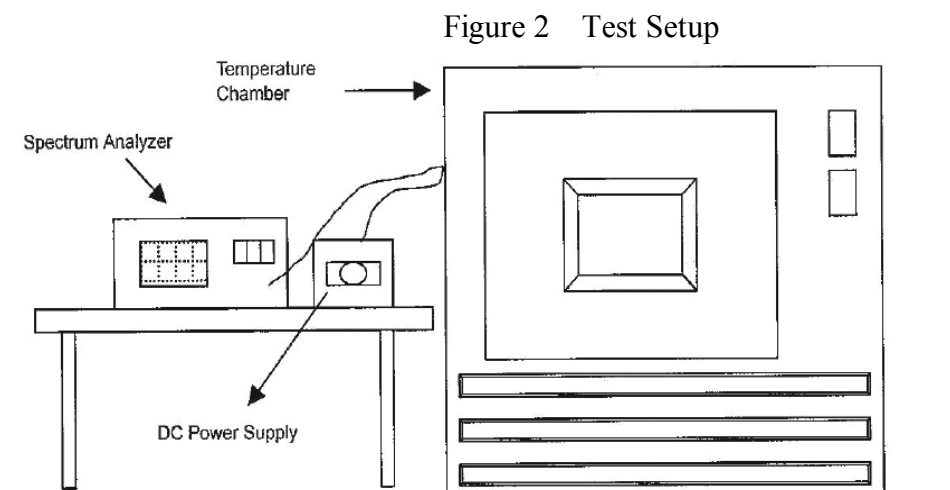
Frequency MHz	Readings(dBm) Peak	Polarization	Limits (dBm)
72.1512	-52.0	Horizontal	28.75
886.6730	-56.7	Horizontal	-26.00
72.1512	-35.0	Vertical	28.75
67.985	-67.0	Vertical	-26.00
144.188	-63.7	Vertical	-26.00

Note:

1. Unwanted emissions more than 20kHz from the channel center frequency shall be attenuated at least $56 + \log(\text{maximum output power}) = -35.0 - (56 + 10\log(0.000000316)) = -44\text{dBm}$
2. The other emission levels were very low against the limit.

5. FREQUENCY STABILITY

5.1. Block Diagram of Test Setup



5.2. Test Standard and Limit

5.2.1. Test Standard

FCC Part 95: 2003

5.2.2. Test Limit

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.002\%$ of the operating frequency over a temperature variation of -30 degrees to 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

5.3. Test Procedure

- a. The EUT was situated inside the environmental test chamber and supply the EUT with nominal DC voltage.
- b. Turn the EUT on and couple its output to a spectrum analyzer.
- c. Turn the EUT off and set the chamber to the highest temperature specified.
- d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 10 minutes.
- e. Repeat step b and c with the temperature chamber set to the lowest temperature.
- f. The test chamber was allowed to stabilize at $+20$ degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

5.4. Test Data

Operating Frequency: 72.1512MHz		Limit: +/- 0.002%	
Temp(℃)	DC (V)	10 minute	%
50	13.8	72.15133	0.00018
	12.0	72.1513	0.00014
	8.8	72.15133	0.00018
40	13.8	72.15131	0.00015
	12.0	72.15119	-0.00001
	8.8	72.15129	0.00012
30	13.8	72.1513	0.00014
	12.0	72.15127	0.00010
	8.8	72.15118	-0.00003
20	13.8	72.15129	0.00012
	12.0	72.1512	0.00000
	8.8	72.15123	0.00004
10	13.8	72.15119	-0.00001
	12.0	72.15128	0.00011
	8.8	72.1513	0.00014
0	13.8	72.15124	0.00006
	12.0	72.15118	-0.00003
	8.8	72.15128	0.00011
-10	13.8	72.15112	-0.00011
	12.0	72.15122	0.00003
	8.8	72.15123	0.00004
-20	13.8	72.15121	0.00001
	12.0	72.1512	0.00000
	8.8	72.15119	-0.00001

6. BAND EDGES TESTING

An R/C transmitter is allowed to transmit any appropriate non-voice emission, which meets the emission limitations for an R/C transmitter. The authorized bandwidth for any emission type transmitted by an R/C transmitter is 8kHz.

6.1 Test Procedure

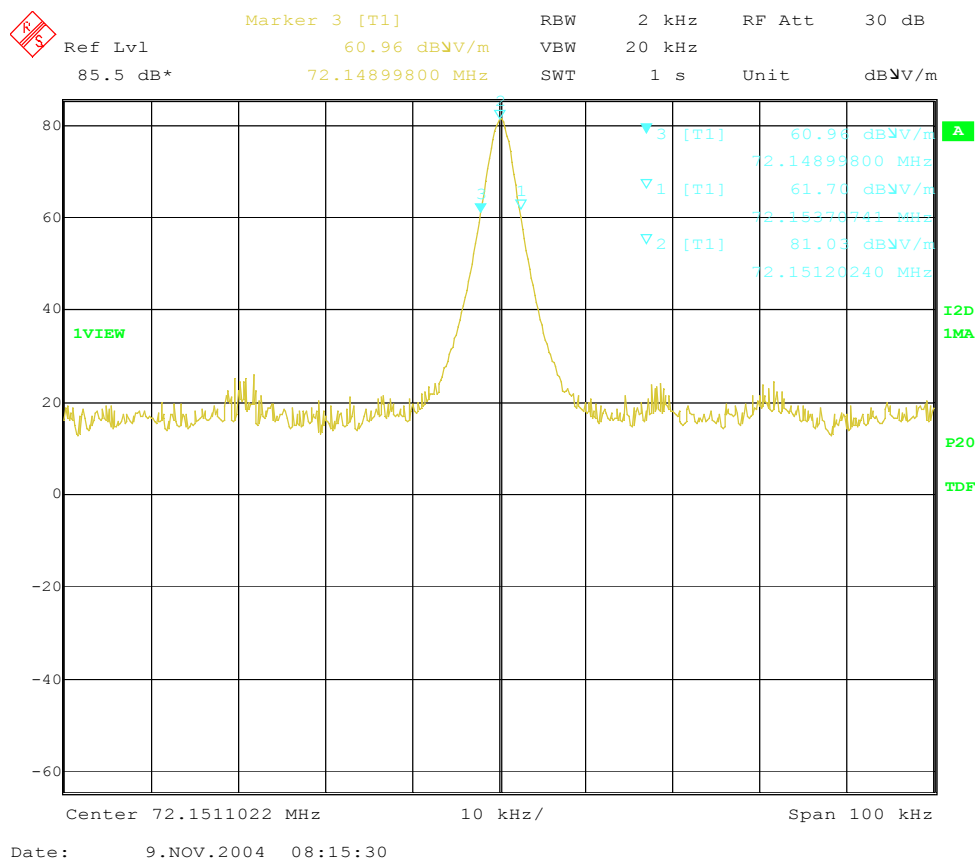
- The EUT was placed on the turning table.
- The signal was coupled to the spectrum analyzer through an antenna.
- Set the resolution bandwidth and video bandwidth to 20kHz and select Peak function to scan the channel frequency.
- The 26dB bandwidth was measured and recorded.

6.2 Test Equipment

RS ESI26 EMI Test Receiver
HP 930C printer

6.3 Test Results

The occupied bandwidth of the EUT complied with the emission bandwidth requirement. During testing, all control switches and buttons were investigated for the worse case modulated signal. The occupied bandwidth plot submitted was the worst case condition.



7. CRYSTAL ACCESS RESTRICTIONS

The crystal of transmitter has been glued on the PCB after it has been plugged in, so it is not accessible for the user. Adjustment for the crystal is also not possible in this device.