

FCC CERTIFICATION RADIO MEASUREMENT TECHNICAL REPORT

On Model Name: Toy R/C Plane

Model Number: FH-001A/FH-002A/FH-003A/FH-004A/
FH-005A/FH-006A/FH-007A/FH-008A/
FH-009A/FH-010A

Trademark: Flying Hobby

FCC ID: TS3-FHPRC-66666A

Prepared for Flying Hobby Co., Ltd.

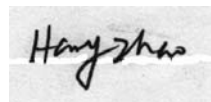
According to FCC Part 15 (2004), Subpart C

Test Report #: FLY-0511-0085SH-FCC

Prepared by: Chris Huang

QC Manager: Harry Zhao

Test Report Released by:



Harry Zhao

2005, Dec 20th

Date

Test Location

Tests performed at EMC Compliance Management Group (China) in a Certified ANSI Semi-Anechoic Chamber and Shielded Room performed testing.

Tests performed at EMC Compliance Management Group (China) in a Certified ANSI Semi-Anechoic Chamber and Shielded Room performed testing.

Test Site Location: *Jiangsu Electronic Products
Supervision & Inspection Institute
No 107 Ge lane ZhongQiao
WuXi JiangSu, China*

Tel: *86-510-5140037*

Fax: *86-510-5105579*

Registration Number: *399439*

Accreditation Bodies

EMC Compliance Management Group is a fully accredited Test Laboratory for ITE, ISM and Telecommunications Products.



In compliance with the site registration requirements of Section 2.948 of the FCC Rules to perform EMI measurements for the general public.



Accredited by the National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code # 200068-0.

Table of Contents

<i>DISCLAIMER NOTICE</i>	<i>1</i>
<i>REPRODUCTION CLAUSE</i>	<i>1</i>
<i>ADMINISTRATIVE DATA</i>	<i>2</i>
<i>EUT DESCRIPTION</i>	<i>2</i>
<i>TYPE OF DERIVER</i>	<i>3</i>
<i>TEST SUMMARY</i>	<i>4</i>
<i>TEST MODE JUSTIFICATION</i>	<i>5</i>
<i>EUT EXERCISE SOFTWARE</i>	<i>5</i>
<i>EQUIPMENT MODIFICATION</i>	<i>5</i>
<i>TEST SYSTEM DETAILS</i>	<i>6</i>
<i>CONFIGURATION OF TESTED SYSTEM</i>	<i>7</i>
<i>EUT SAMPLE PHOTOS</i>	<i>8</i>
<i>ATTACHMENT 1 - ANTENNA REQUIREMENT</i>	<i>15</i>
<i>ATTACHMENT 2 - RESTRICTED BAND OF OPERATION</i>	<i>18</i>
<i>ATTACHMENT 3 - FIELD STRENGTH WITHIN THE BAND</i>	<i>23</i>
<i>ATTACHMENT 4 - FIELD STRENGTH OUTSIDE OF THE BAND</i>	<i>28</i>

Disclaimer Notice

When government drawing, specification, or other data are used for any purpose other than in connection with a definitely related government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawing, specifications, or other data, is not to be regarded by implication or otherwise in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell patented invention that may in any way be related thereto. This report must not be used to claim product endorsement by NVLAP or any agency of the U.S. Government.

Reproduction Clause

Any reproduction of this document must be done in full. No single part of this document may be reproduced without permission from EMC Compliance Management Group, 670 National Ave., Mountain View, CA 94043.

Administrative Data

Test Sample : RF remote control handset

Model Number : FH-001A/FH-002A/FH-003A/FH-004A/
FH-005A/FH-006A/FH-007A/FH-008A/
FH-009A/FH-010A

Models Tested : FH-001A

Trade Mark : Flying Hobby

Date Tested : 2005, December 15th

Applicant : Flying Hobby Co., Ltd.
Da Miao Cun, Zhang Ze, Songjiang, Shanghai
201608

Telephone : 86-21-57888210

Fax : 86-21-57888163

Manufacturer : Flying Hobby. Co., Ltd.

EUT Description

Flying Hobby Co., Ltd. Model number FH-001A (referred to as the EUT in this test report) is a Toy R/C Plane.

Type of Deriver

Model numbers of FH-001A, FH-002A, FH-003A, FH004A, FH-005A, FH-006A, FH-007A, FH008A, FH-009A, FH-010A, are the identical except the appearance of the receiver, see the difference below.

<i>FH-001A</i>	<i>HIGH WING CESSNA 195 AIR PLANE</i>
<i>FH-002A</i>	<i>MICRO KITE PLANE</i>
<i>FH-003A</i>	<i>DORNIER 328 TWIN MOTOR PLANE</i>
<i>FH-004A</i>	<i>MICRO GLIDER (ALBATROSS)</i>
<i>FH-005A</i>	<i>DORNIER 27</i>
<i>FH-006A</i>	<i>MICRO PITTS</i>
<i>FH-007A</i>	<i>P-51</i>
<i>FH-008A</i>	<i>TYPHOON</i>
<i>FH-009A</i>	<i>P-38</i>
<i>FH-010A</i>	<i>MICRO INDOOR</i>

Test Summary

The Electromagnetic Compatibility requirements on FH-001A for this test are stated below. All results listed in this report relate exclusively to this above-mentioned model as the Equipment Under Test. This report confers no approval or endorsement upon any other component, host or subsystem used in the test set-up.

EMC Test Item			
<i>Reference FCC Part 15 (2004), Subpart C</i>			
Specification	Description	Test Results	Remark
<i>FCC Part 15.203</i>	<i>Antenna Requirement</i>	<i>Compliance</i>	<i>Attachment 1</i>
<i>FCC Part 15.205</i>	<i>Restricted Band of Operation</i>	<i>Compliance</i>	<i>Attachment 2</i>
<i>FCC Part 15.207</i>	<i>Conducted Limits</i>	<i>Test is not applicable, because EUT only employ battery power for operation.</i>	
<i>FCC Part 15.209</i>	<i>Radiated Emission Limits</i>	<i>Compliance</i>	<i>Refer to Attachment 4</i>
<i>FCC Part 15.227</i>	<i>Operation within the Band 26.96-27.28MHz</i>	<i>--</i>	<i>--</i>
<i>(a)</i>	<i>Field Strength within this band</i>	<i>Compliance</i>	<i>Attachment 3</i>
<i>(b)</i>	<i>Field Strength outside the band</i>	<i>Compliance</i>	<i>Attachment 4</i>

Test Mode Justification

The test mode transmitting was done for testing.

EUT Exercise Software

The device is not programmable and does not use software.

Equipment Modification

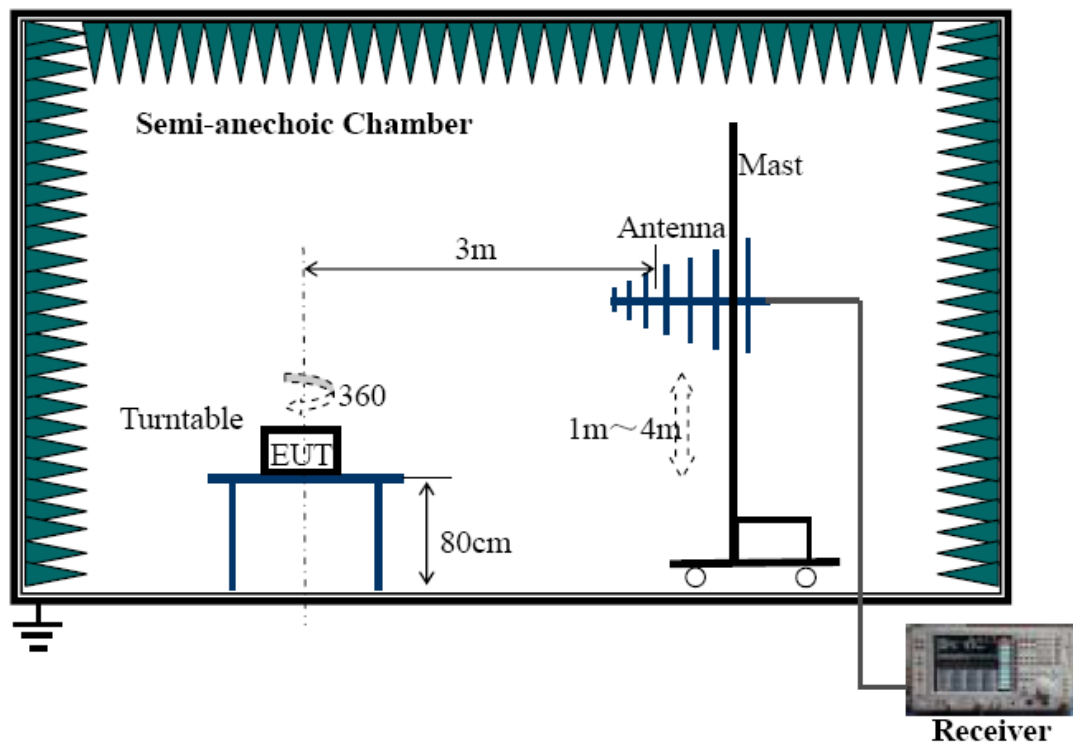
Any modifications installed previous to testing by Flying Hobby. Co., Ltd. will be incorporated in each production model sold or leased in United States.

There were no modifications installed by EMC Compliance Management Group (China) test personnel.

Test System Details

<i>EUT</i>	
<i>Model Number:</i>	<i>FH-001A/FH-002A/FH-003A/ FH-004A/FH-005A/ FH-006A/FH-007A/FH-008A /FH-009A/FH-010A</i>
<i>Model Tested:</i>	<i>FH-001A</i>
<i>Trademark::</i>	<i>Flying Hobby</i>
<i>Serial Number:</i>	<i>Engineer Sample</i>
<i>Input Voltage:</i>	<i>9.6V DC for transmitting device, 4.8V DC for receiving device</i>
<i>Description:</i>	<i>Toy R/C Plane</i>
<i>Support Equipment</i>	
<i>None</i>	
<i>Cable Description</i>	
<i>None</i>	

Configuration of Tested System



EUT Sample Photos



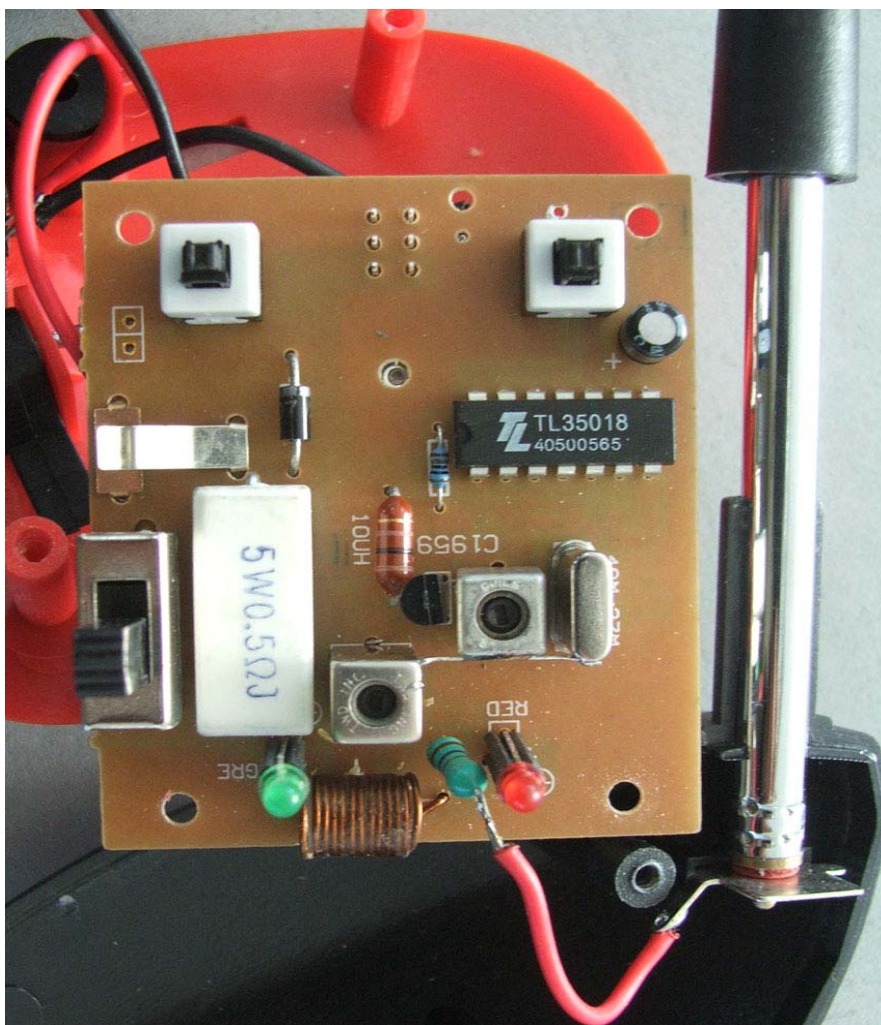
Transmitter and Receiver - General View



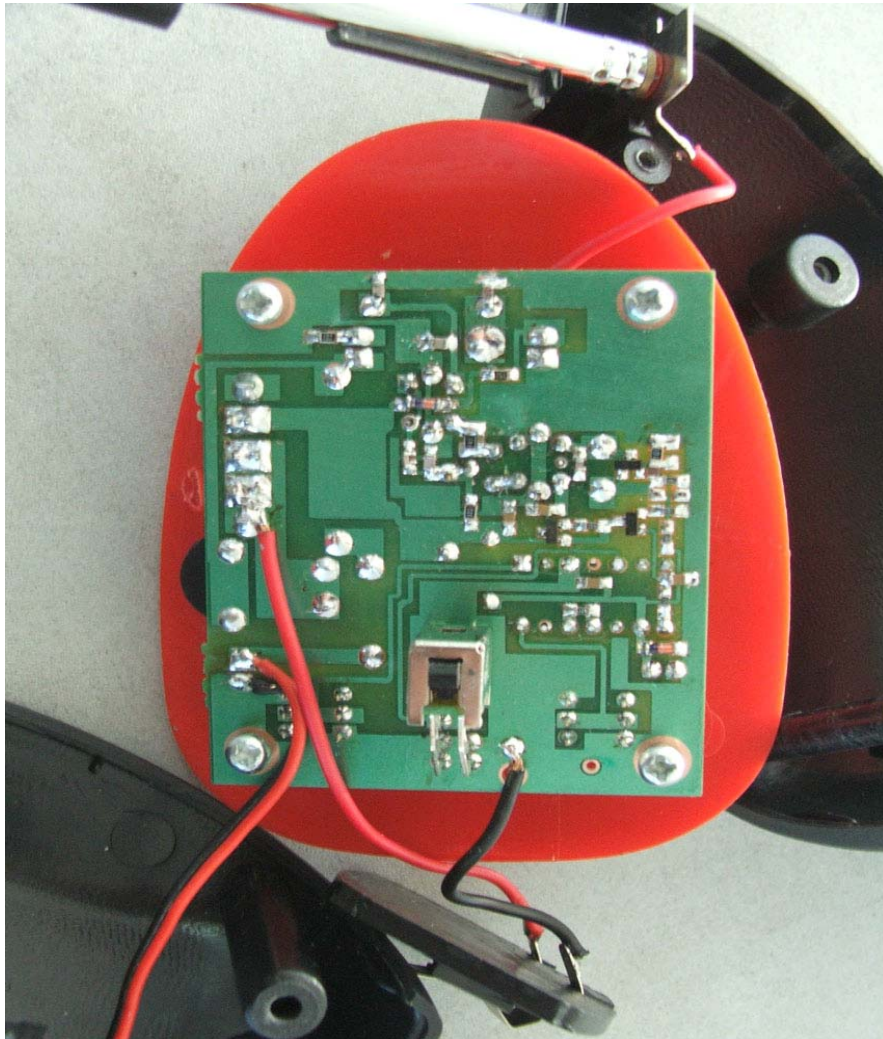
Transmitter - General View



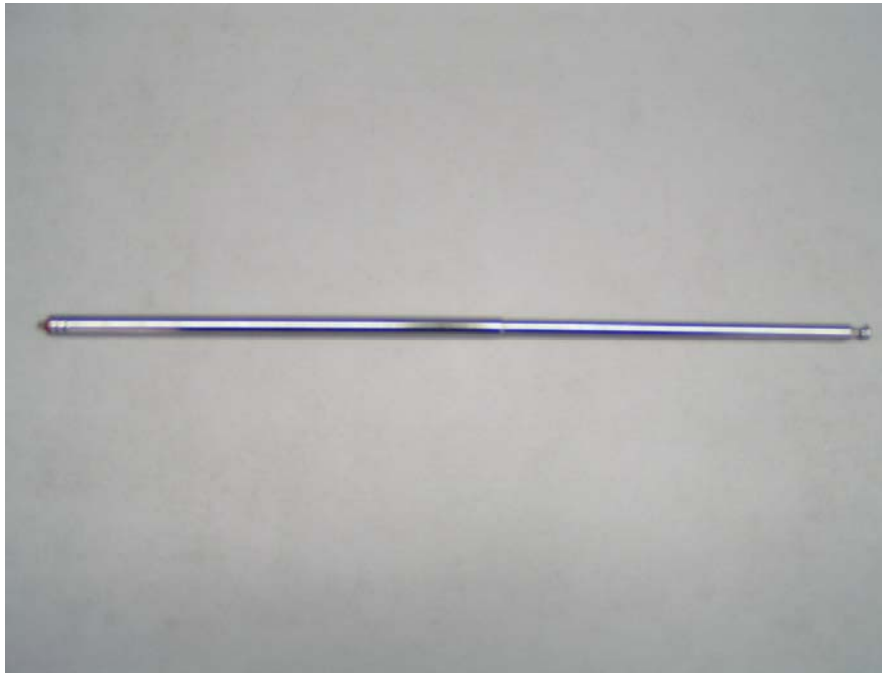
Transmitter - Uncovered



Transmitter - Main Board Component View



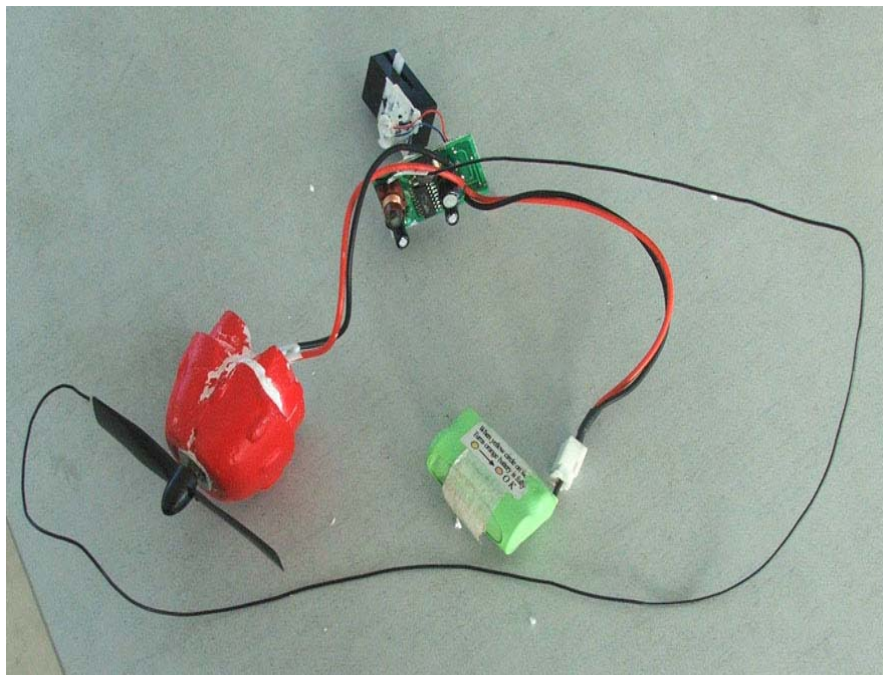
Transmitter - Main Board Soldered View



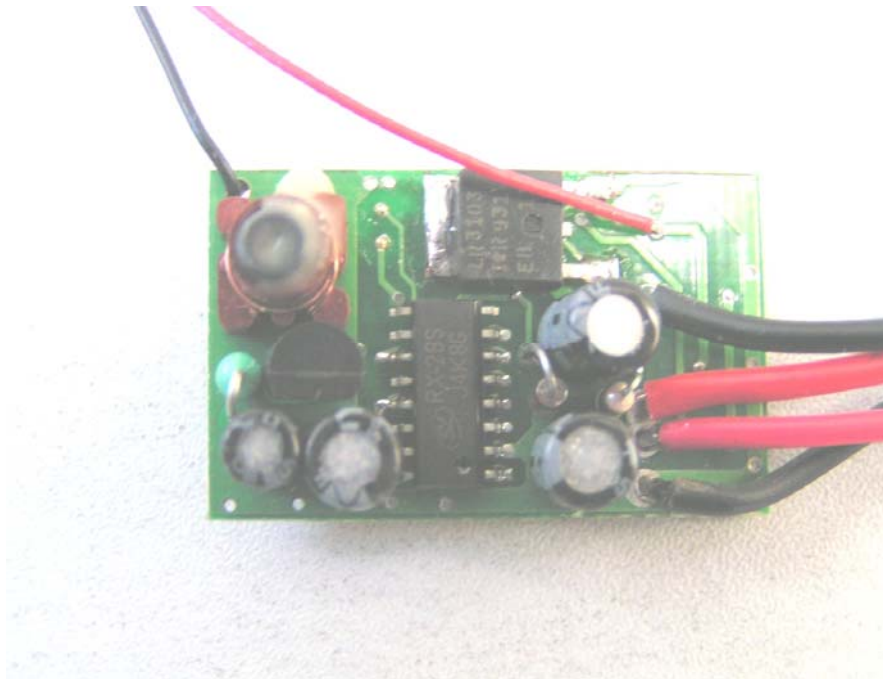
Dedicated Antenna



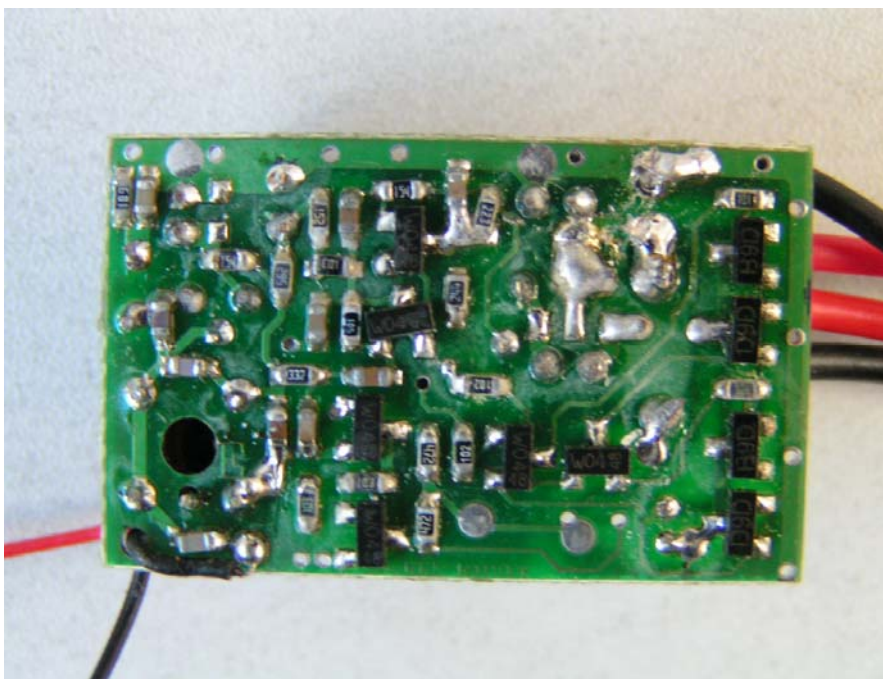
Receiver - Uncovered View



Receiver - Electrical Part View



Receiver - Main Board Component Side



Receiver - Main Board Soldered Side



Receiver – Motor

ATTACHMENT 1 - ANTENNA REQUIREMENT

CLIENT:	Flying Hobby. Co., Ltd.	TEST STANDARD:	FCC Part 15.203 (2004)
MODEL TESTED:	FH-001A	PRODUCT:	Toy R/C plane
SERIAL NO.:	Engineering Sample	EUT DESIGNATION:	RF Equipment
TEMPERATURE:	25 °C	HUMIDITY:	55%RH
ATM PRESSURE:	101.8 kPa	GROUNDING:	No Grounding
TESTED BY:	Shi Xiting	DATE OF TEST:	2005, Dec 15 th
SETUP METHOD:	N/A		
ANTENNA REQUIREMENT:	An intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.		
TEST VOLTAGE:	9.6V DC (8*1.2V Ni-H Batteries)		
TEST STATUS:	Normal Operation As Usual		
RESULTS:	The EUT meets the Antenna requirement. The test results relate only to the equipment under test provided by client.		
CHANGES OR MODIFICATIONS:	There were no modifications installed by EMC Compliance Management Group (China) test personnel.		
M. UNCERTAINTY:	N/A		

FCC Section	FCC Rules	Conclusion
15.203	<i>Described how the EUT complies with the requirement that either its antenna is permanently attached, or that it employs a unique antenna connector, for every antenna proposed for use with the EUT.</i> <i>The exception is in those cases where EUT must be professionally installed. In order to demonstrate that professional installation is required, the following 3 points must be addressed:</i> <i>● The application (or intended use) of the EUT</i> <i>● The installation requirements of the EUT</i> <i>● The method by which the EUT will be marketed</i>	<i>The RF Device used a dedicated antenna connected to device with a unique connector. The length of the antenna is adjustable and the maximum length is 1m.</i>



Dedicated Antenna

ATTACHMENT 2 – RESTRICTED BAND OF OPERATION

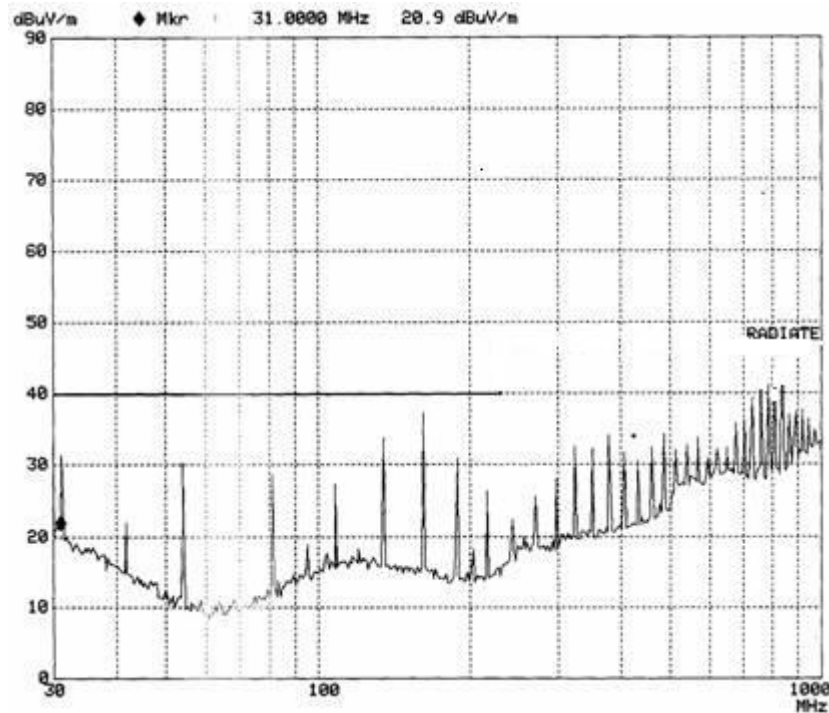
CLIENT:	Flying Hobby. Co., Ltd.	TEST STANDARD:	FCC Part 15.205 (2004)
MODEL TESTED:	FH-001A	PRODUCT:	Toy R/C Plane
SERIAL NO.:	Engineering Sample	EUT DESIGNATION:	RF Equipment
TEMPERATURE:	21°C	HUMIDITY:	53%RH
ATM PRESSURE:	101.6 kPa	GROUNDING:	No Grounding
TESTED BY:	Shi Xiting	DATE OF TEST:	2005, Dec 15 th
SETUP METHOD:	ANSI C63.4 - 2003		
RESTRICTED BANDS OF OPERATION REQUIREMENT:	The only spurious emissions are permitted in any of the frequency bands listed below table of next page.		
TESTED RANGE:	30MHz to 1000MHz		
TEST VOLTAGE:	9.6V DC (8*1.2V Ni-H Batteries)		
TEST STATUS:	Keep Tx in continuous transmission mode, modulated		
RESULTS:	The EUT meets the restricted bands of operation requirement. The test results relate only to the equipment under test provided by client.		
CHANGES OR MODIFICATIONS:	There were no modifications installed by EMC Compliance Management Group (China) test personnel.		
M. UNCERTAINTY:	Freq. $\pm 2 \times 10^{-7}$ x Center Freq., Amp ± 2.6 dB		

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)
13.36 - 13.41			

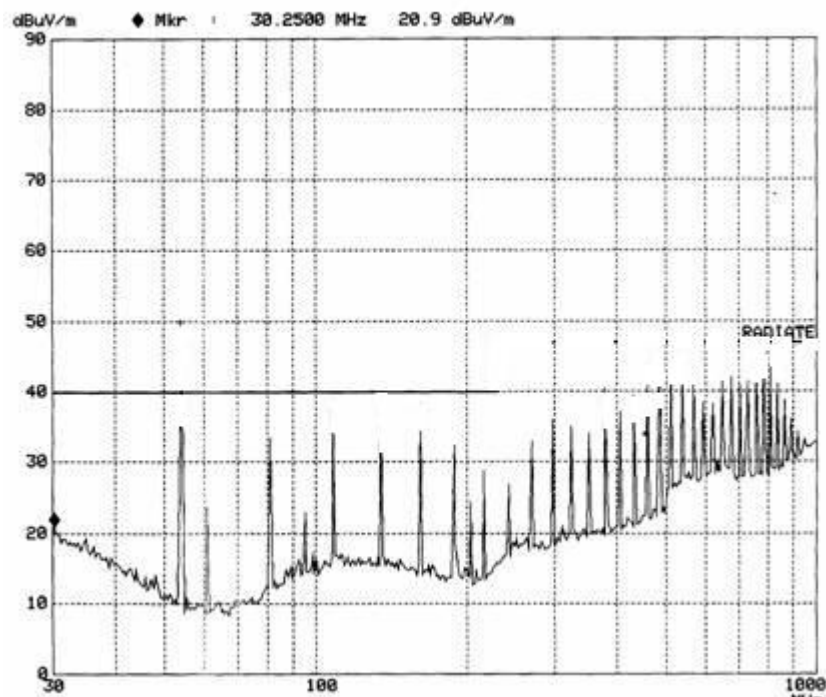
¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

Model: Tx of FH-001A



Horizontal Radiated Emission Plot (Transmitter)

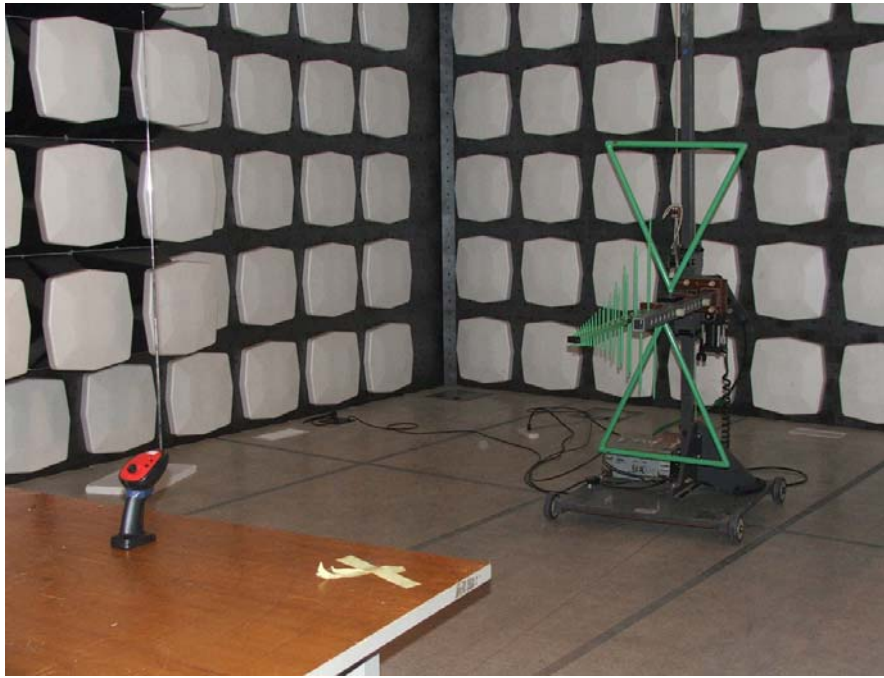


Vertical Radiated Emission Plot (Transmitter)

Test Equipment	Model	Serial No.	Manufacturer	Last Cal.	Cal. Due Date
EMI TEST RECEIVER	ESCI	1166.595003 100065	ROHDE&SCWARZ	11/23/05	11/22/06
BILOG ANTENNA	CBL6112	117.0800.20	CHASE	02/17/05	02/17/06
Anechoic Chamber	FACT-3	601	LINDGREN	01/10/05	01/10/06
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.					

SIGNED BY: Shi-xiting
ENGINEER

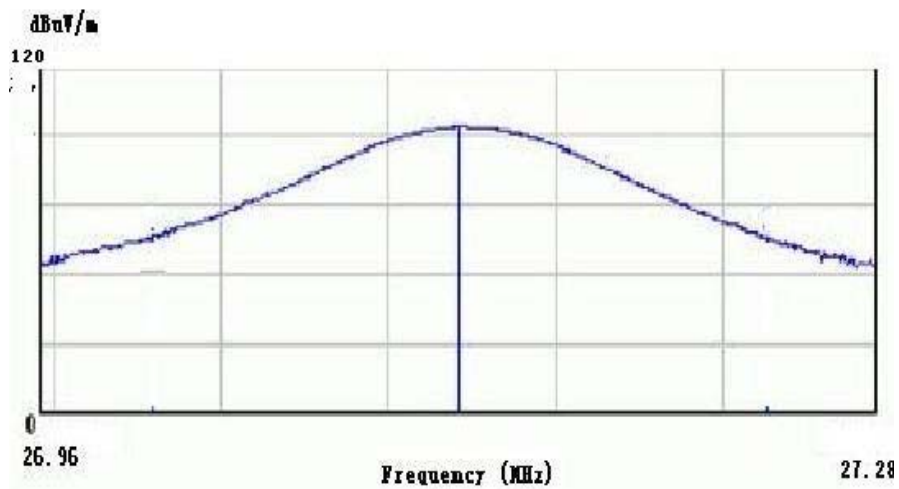
REVIEWED BY: Hanyzha
QC



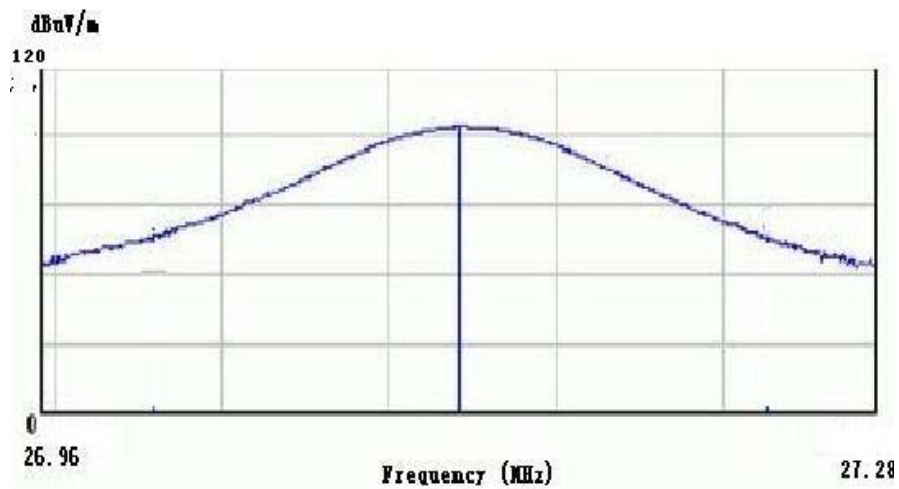
Radiated Emissions Test Set-up

ATTACHMENT 3 – Field Strength within the Band

CLIENT:	Flying Hobby Co., Ltd.	TEST STANDARD:	FCC Part 15.203 (2004)
MODEL TESTED:	FH-001A	PRODUCT:	Toy R/C Plane
SERIAL NO.:	Engineering Sample	EUT DESIGNATION:	RF Equipment
TEMPERATURE:	20°C	HUMIDITY:	55%RH
ATM PRESSURE:	101.7 kPa	GROUNDING:	No Grounding
TESTED BY:	Shi Xiting	DATE OF TEST:	2005, Dec 15 th
SETUP METHOD:	ANSI C63.4 - 2003		
FCC 15.227(A)	The Field strength of any emission within this band shall not exceed 1,000 microvolts/meter at 3 meters. The emission limit in this paragraph is based on measurement instrumentation employing an average detector.		
TEST PROCEDURE:	The EUT is set up according to the guidelines of ANSI C63.4 for radiated emissions. The length of the antenna was adjusted to the maximum output level. An EMI receiver employing average detector is used for the test. Peak scan was made at the frequency measurement range (pre-scan) in an Anechoic chamber, and then three significant points were investigated by peak detector and average detector. The frequency investigated is from 26.96MHz – 27.28MHz. The following data lists the significant emission frequencies, measured levels, and the corrected readings against the limits. Explanation of the Correction Factor is given as follows: FS= RA + AF + CF - AG Where: FS = Field Strength RA = Receiver Amplitude AF = Antenna Factor CF = Cable Attenuation Factor AG = Amplifier Gain		
TESTED RANGE:	26.96MHz – 27.28MHz		
TEST VOLTAGE:	For Tx of FH-001A: 8*1.2V Ni-H Batteries		
RESULTS:	Tx of FH-001A - The EUT meets the requirements of test reference for Radiated Emissions on vertical polarization by 2.88 dB for peak reading and 6.00 dB for average reading at 27.0014MHz. The test results relate only to the equipment under test provided by client.		
CHANGES OR MODIFICATIONS:	There were no modifications installed by EMC Compliance Management Group test personnel.		
M. UNCERTAINTY:	Freq. $\pm 2 \times 10^{-7}$ x Center Freq., Amp ± 2.6 dB		



Field Strength within the Band – Horizontal View



Field Strength within the Band – Vertical View

26.96MHZ – 27.28MHZ							
Horizontal (Transmitter of of FH-001A)							
Signal	Frequency (MHz)	Corrected PK Level dB(uV/m)	3 Meter PK Limits dB(uV/m)	Margin (dB)	Corrected AV Level dB(uV/m)	3 Meter AV Limits dB(uV/m)	Margin (dB)
1	26.9600	51.33	100	48.67	39.11	80	40.89
2	27.0014	96.51	100	3.49	73.55	80	6.45
3	27.2800	50.28	100	49.72	36.09	80	43.91
Vertical (Transmitter of of FH-001A)							
Signal	Frequency (MHz)	Corrected PK Level dB(uV/m)	3 Meter PK Limits dB(uV/m)	Margin (dB)	Corrected AV Level dB(uV/m)	3 Meter AV Limits dB(uV/m)	Margin (dB)
1	26.9600	51.47	100	48.53	37.05	80	42.95
2	27.0014	97.12	100	2.88	74.00	80	6.00
4	27.2800	51.99	100	48.01	35.24	80	44.76
Note: The readings are peak and average, using a QPA bandwidth of 120kHz, with a 30 ms sweep time. A video filter was not used.							

Test Equipment	Model	Serial No.	Manufacturer	Last Cal.	Cal. Due Date
EMI TEST RECEIVER	ESCI	1166.595003 100065	ROHDE&SC WARZ	11/23/05	11/22/06
BILOG ANTENNA	CBL6112	117.0800.20	CHASE	02/17/05	02/17/06
Anechoic Chamber	FACT-3	601	LINDGREN	01/10/05	01/10/06

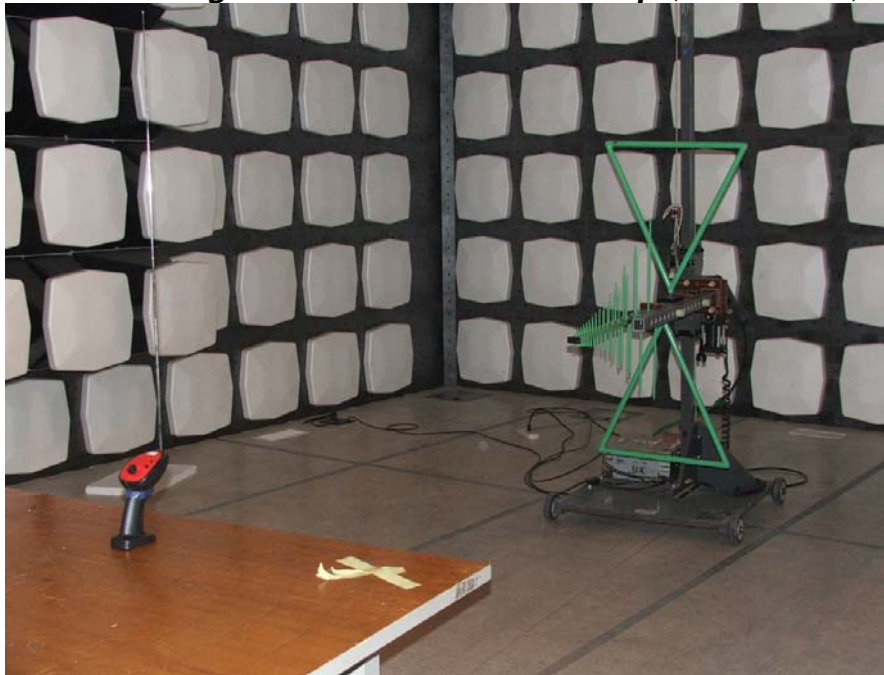
SIGNED BY: Shi-xiting
ENGINEER

REVIEWED BY: Hanyzhu
QC

EUT Model: Tx of FH-001A



Field Strength within Band Test Set-up (Horizontal)

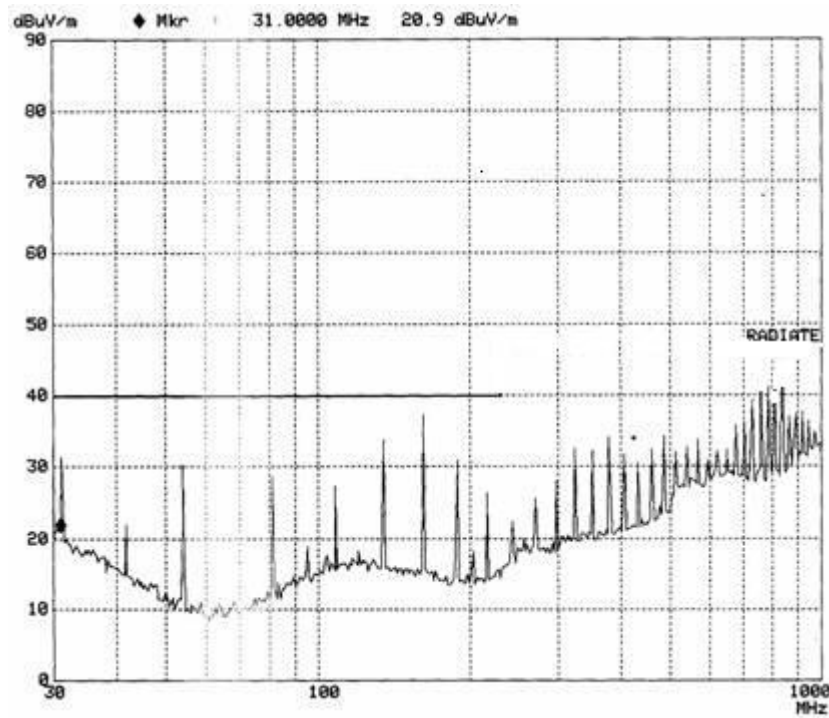


Field Strength within Band Test Set-up (Vertical)

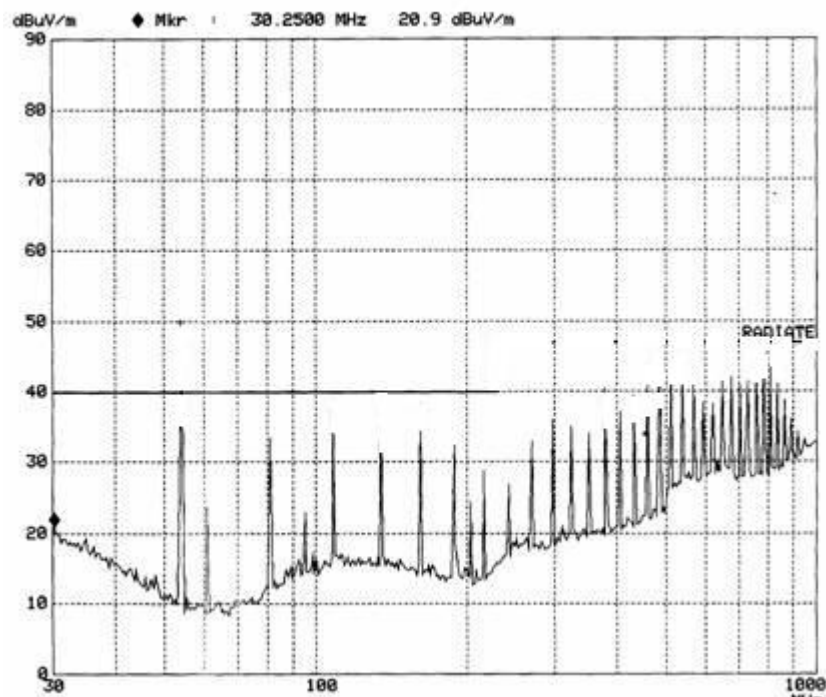
ATTACHMENT 4 – Field Strength outside of the Band

CLIENT:	Flying Hobby Co., Ltd.	TEST STANDARD:	FCC Part 15.203 (2004)
MODEL TESTED:	FH-001A	PRODUCT:	Toy R/C Plane
SERIAL NO.:	Engineering Sample	EUT DESIGNATION:	RF Equipment
TEMPERATURE:	20° C	HUMIDITY:	55%RH
ATM PRESSURE:	101.7 kPa	GROUNDING:	No Grounding
TESTED BY:	Shi Xiting	DATE OF TEST:	2005, Dec 15 th
SETUP METHOD:	ANSI C63.4 - 2003		
TEST PROCEDURE:	The EUT is set up according to the guidelines of ANSI C63.4 for radiated emissions. The length of the antenna was adjusted to the maximum output level. An EMI receiver peak scan is made at the frequency measurement range (pre-scan) in an Anechoic chamber. Signal discrimination is then performed and the significant peaks marked. These peaks are then quasi-peaked for final test at an Open Site Test area. The frequency investigated is from 30MHz to 1GHz. The following data lists the significant emission frequencies, measured levels, correction factors (including cable and antenna correction factors), and the corrected readings against the limits. Explanation of the Correction Factor is given as follows: FS= RA + AF + CF - AG Where: FS = Field Strength RA = Receiver Amplitude AF = Antenna Factor CF = Cable Attenuation Factor AG = Amplifier Gain		
TESTED RANGE:	30MHz to 1,000MHz		
TEST VOLTAGE:	For Tx of FH-001A: 8*1.2V Ni-H Batteries For Rx of FH-001A: 4* 1.2 Lithium Batteries		
RESULTS:	Tx of FH-001A - The EUT meets the requirements of test reference for Radiated Emissions on horizontal polarization by 6.40 dB at 172.6897 MHz. Rx of FH-001A - The EUT meets the requirements of test reference for Radiated Emissions on horizontal polarization by 3.81 dB at 210.8800 MHz. The test results relate only to the equipment under test provided by client.		
CHANGES OR MODIFICATIONS:	There were no modifications installed by EMC Compliance Management Group test personnel.		
M. UNCERTAINTY:	Freq. $\pm 2 \times 10^{-7}$ x Center Freq., Amp ± 2.6 dB		

Model: Tx of FH-001A

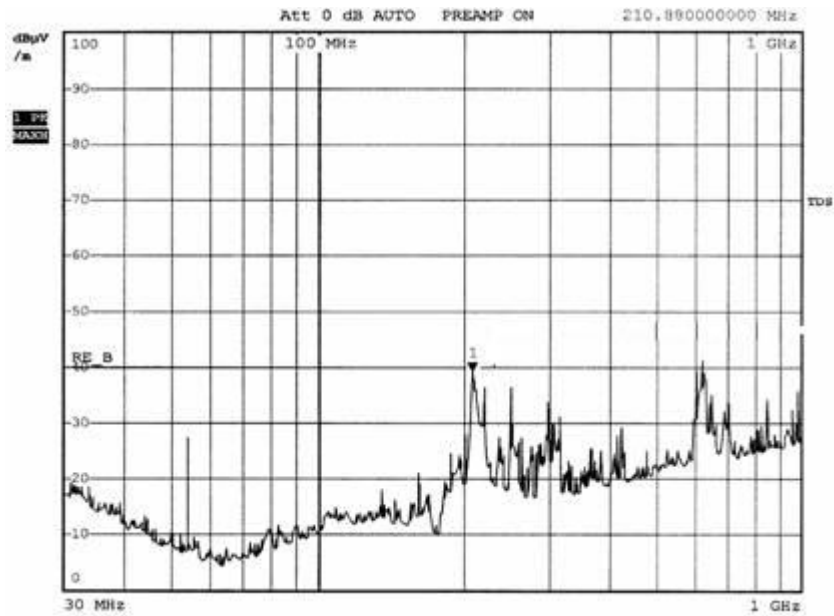


Horizontal Radiated Emission Plot (Transmitter)

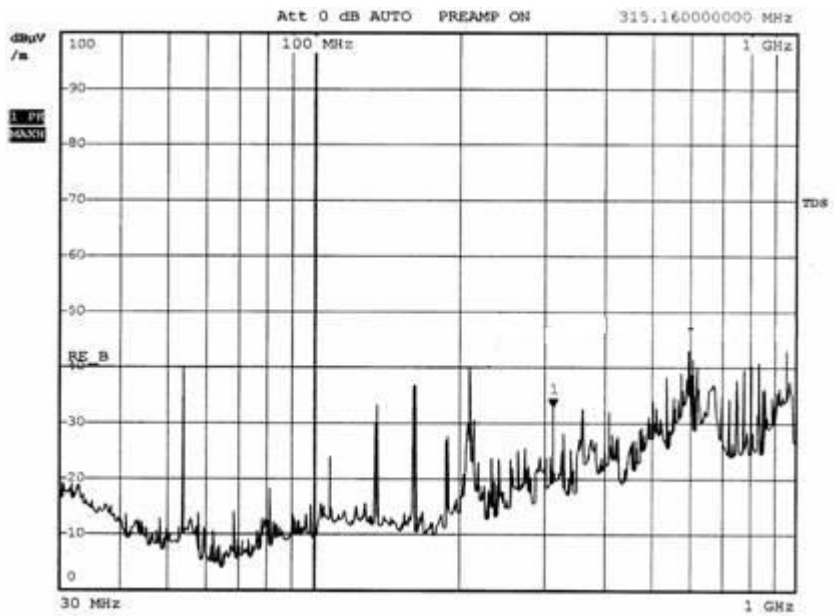


Vertical Radiated Emission Plot (Transmitter)

Model: Rx of FH-001A



Horizontal Radiated Emission Plot (Receiver)



Vertical Radiated Emission Plot (Receiver)

30MHZ - 1GHZ							
<i>Horizontal (Transmitter of FH-001A)</i>							
Signal	Frequency (MHz)	Factor (dB)	Corrected QP Level dB(uV/m)	3 Meter Limits dB(uV/m)	Margin (dB)	Angle of Turner (degree)	Height of Tower (cm)
1	31.1875	9.89	30.95	40	-9.05	21.8	166
2	172.6897	10.77	37.10	43.5	-6.40	354.9	101
3	810.1645	15.89	37.40	46	-8.60	10.0	100
<i>Vertical (Transmitter of FH-001A)</i>							
Signal	Frequency (MHz)	Factor (dB)	Corrected QP Level dB(uV/m)	3 Meter Limits dB(uV/m)	Margin (dB)	Angle of Turner (degree)	Height of Tower (cm)
1	53.9960	11.87	24.72	40	-15.28	8.0	149
2	172.5775	13.46	36.81	43.5	-6.69	342.5	100
3	810.6384	20.77	37.66	46	-8.34	25.5	172
Note: All readings are quasi-peak unless stated otherwise, using a QPA bandwidth of 120kHz, with a 30 ms sweep time. A video filter was not used.							

30MHZ - 1GHZ							
Horizontal (Receiver of of FH-001A)							
Signal	Frequency (MHz)	Factor (dB)	Corrected QP Level dB(uV/m)	3 Meter Limits dB(uV/m)	Margin (dB)	Angle of Turner (degree)	Height of Tower (cm)
1	210.8800	12.55	38.69	43.5	-3.81	196.9	124
2	349.2835	13.68	31.10	46	-14.90	176.9	187
3	629.9228	21.89	36.77	46	-9.23	204.8	169
Vertical (Receiver of of FH-001A)							
Signal	Frequency (MHz)	Factor (dB)	Corrected QP Level dB(uV/m)	3 Meter Limits dB(uV/m)	Margin (dB)	Angle of Turner (degree)	Height of Tower (cm)
1	32.1500	6.99	17.15	40	-22.85	15.4	110
2	229.2050	12.87	22.36	46	-23.64	347.3	145
4	608.5745	20.70	37.12	46	-8.88	173.6	270
Note: All readings are quasi-peak unless stated otherwise, using a QPA bandwidth of 120kHz, with a 30 ms sweep time. A video filter was not used.							

Test Equipment	Model	Serial No.	Manufacturer	Last Cal.	Cal. Due Date
EMI TEST RECEIVER	ESCI	1166.595003 100065	ROHDE&SC WARZ	11/23/05	11/22/06
BILOG ANTENNA	CBL6112	117.0800.20	CHASE	02/17/05	02/17/06
Anechoic Chamber	FACT-3	601	LINDGREN	01/10/05	01/10/06

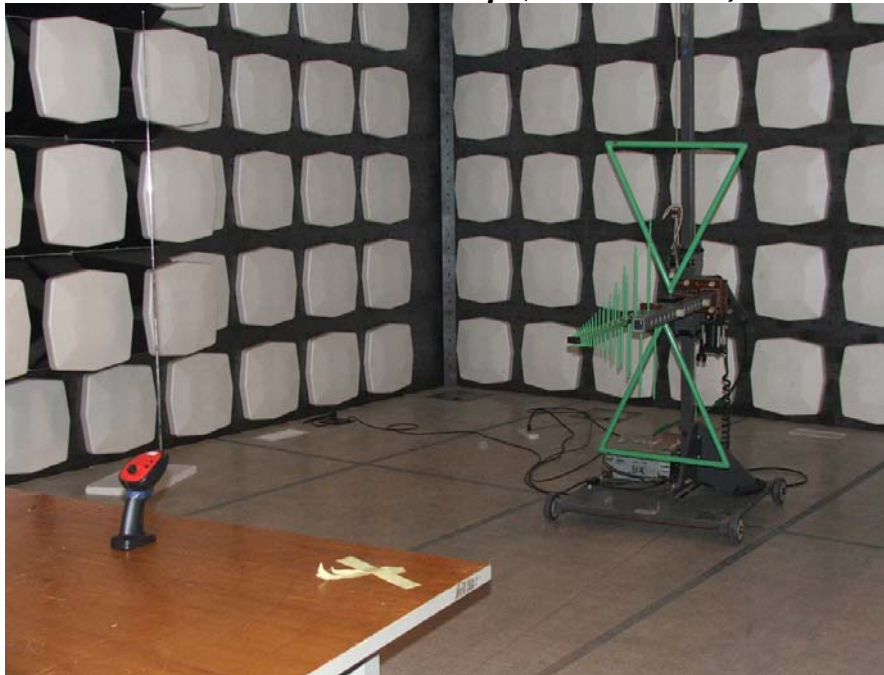
SIGNED BY: Shi-xiting
ENGINEER

REVIEWED BY: Hangzhou
QC

EUT Model: Tx of FH-001A

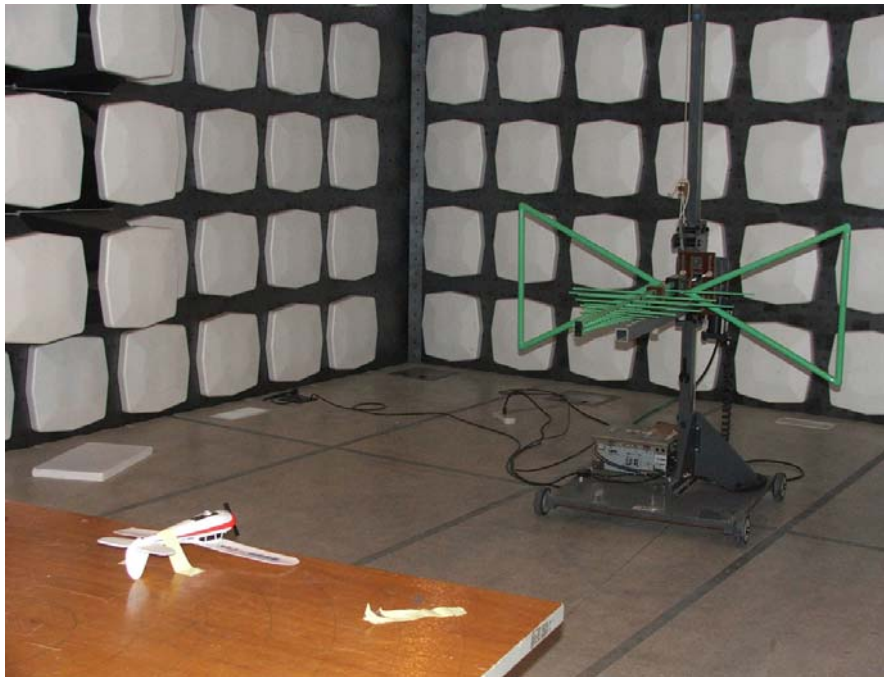


RADIATED EMISSION TEST Set-up (Transmitter, Horizontal)



RADIATED EMISSION TEST Set-up (Transmitter, Vertical)

EUT Model: Rx of FH-001A



RADIATED EMISSION TEST Set-up (Receiver, Horizontal)



RADIATED EMISSION TEST Set-up (Receiver, Vertical)