ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

FM Transmitter

FCC ID: RNII614188096T

MODEL No.: N-6141

BRAND NAME: N/A

REPORT NO: TRE06050001

ISSUE DATE: May 23, 2006

Prepared for

ESEL INTERNATIONAL CO.,LTD
RM 15-17, 5/F, CARDINAL IND,BLDG.NO.17 ON LOK MUN ST.,
FANLING,N.T. ,HONG KONG

Prepared by

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d.b.a.

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VERIFICATION OF COMPLIANCE

Applicant:	Esel International Co.,Ltd. Rm 15-17,5/F,Cardinal Ind,Bldg.No.17 On Lok Mun St.,Fanling,N.T., Hong Kong
Product Description:	FM Transmitter
Brand Name:	N/A
Model Number:	N-6141
Serial Number:	N/A
File Number:	TRE06050001
Date of Test:	May 15, 2006 ~ May 22,2006

We hereby certify that:

The above equipment was tested by SHENZHEN HUA TONG WEI INTERNATIONAL INSPECTION CO., LTD. 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 radiated emission limits of FCC Rules Part 15.227.

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

Approved By ***Reviewed By***

Jimmy Li / Q.A. Manager
SHENZHEN HUA TONG WEI INTERNATIONAL INSPECTION CO., LTD

Tracy Qi / Test Engineer
SHENZHEN HUA TONG WEI INTERNATIONAL INSPECTION CO., LTD

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1. GENERAL INFORMATION

1.1 Product Description

The EUT is a short range, lower power, wireless transmitter designed as an "audio sender.". 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: 88.1, 88.3, 88.5, 88.7 and 88.9 MHz, five channels.
B). Modulation: FM
C). Antenna Designation: Non-User Replaceable (Fixed)
D). Power Supply: Powered by iPod nano.

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **RNII614188096T** filing to comply with Section 15.239(b) of the FCC Part 15, Subpart C Rules. The composite system (receiver) is compliance with Subpart B is authorized under a verification procedure

1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (2003). Radiated testing was performed at an antenna to EUT distance 3 meters.

1.4 Test Facility

The fully anechoic chamber test site and conducted measurement facility used to collect the radiated data is located on the address of SHENZHEN HUA TONG WEI INTERNATIONAL INSPECTION CO., LTD Huatongwei Building, Keji Rd. 12 S., High-tech Park, Nanshan District, Shenzhen, Guangdong, P.R.China

The fully anechoic chamber Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003 and CISPR 22/EN 55022 requirements.

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 Test Procedure

2.3.1 Conducted Emissions (Not applicable in this report)

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4-2003.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode.

2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4-2003.

2.4 Limitation

(1) Conducted Emission (Not applicable in this report)

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

Frequency range MHz	Limits dB(uV)	
	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.

(2) Radiated Emission

a. The field strength of any emission within this band (section 15.227 frequency between 26.96MHz –27.28MHz) shall not exceed 10000 micro volts/meter at 3 meters. (80dBμV at 3m) The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in section 15.35 for limiting peak emissions apply.
b. The field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in section 15.209(Intentional Radiators general limit).as below.

Frequency (MHz)	Field strength μV/m	Distance(m)	Field strength at 3m dBμV/m
1.705-30	30	30	69.54
30-88	100	3	40
88-216	150	3	43.5
216-960	200	3	46
Above 960	500	3	54

Remark: 1. Emission level in dBμV/m=20 log (μV/m)
2. Measurement was performed at an antenna to the closed point of EUT distance o meters.
3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of ξ 15.205
4. Emission spurious frequency which appearing within the Restricted Bands specified in provision of ξ15.205, then the general radiated emission limits in ξ 15.209 apply.

2.5 Configuration of Tested System

Fig. 2-1 Configuration of Tested System

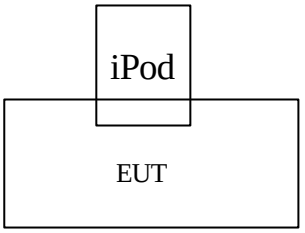


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
1	FM Transmitter	N/A	N-6141	RNII614188096T	N/A	***EUT***
2	iPod nano	N/A	A1137	N/A	YM536RNNSZC	

3. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§ 15.207	Conducted Emission	N/A
§ 15.239	Radiated Emission	Compliant
§ 15.239	Occupied Bandwidth	Compliant

4. DESCRIPTION OF TEST MODES

1. The EUT (FM Transmitter) 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. CONDUCTED EMISSIONS TEST (Not applicable in this report)

5.1 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.

5.2 Test SET-UP (Block Diagram of Configuration)

N/A

5.3 Measurement Equipment Used:

Conducted Emission Test Site # 3					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESCS30	100038	2005/11	2006/11
ARTIFICIAL MAINS	ROHDE & SCHWARZ	ESH2-Z5	100028	2005/11	2006/11
PULSE LIMITER	ROHDE & SCHWARZ	ESHSZ2	100044	2005/11	2006/11
EMI TEST SOFTWARE	ROHDE & SCHWARZ	ES-K1 V1.71	N/A	2005/11	2006/11

5.4 Measurement Result:

N/A

5.5 Conducted Measurement Photos:

N/A

6. RADIATED EMISSION TEST

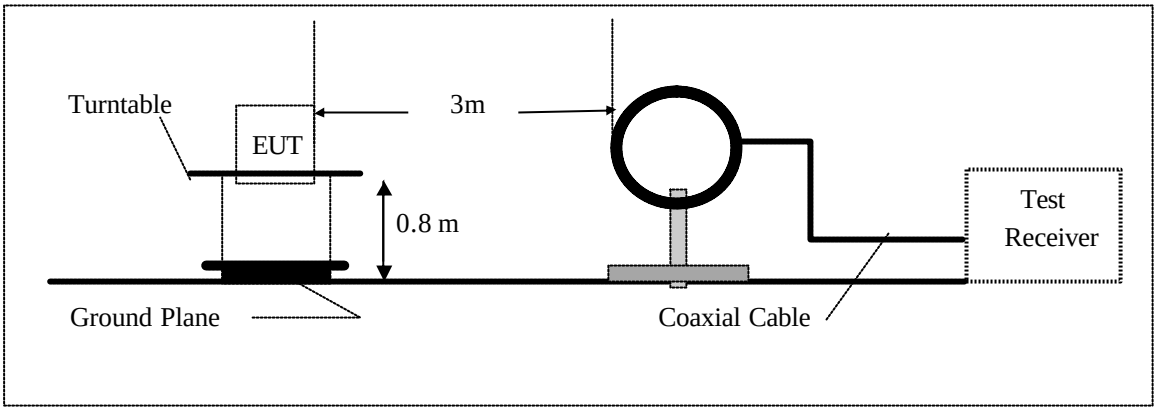
6.1 Measurement Procedure

1 The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on at least ten highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.

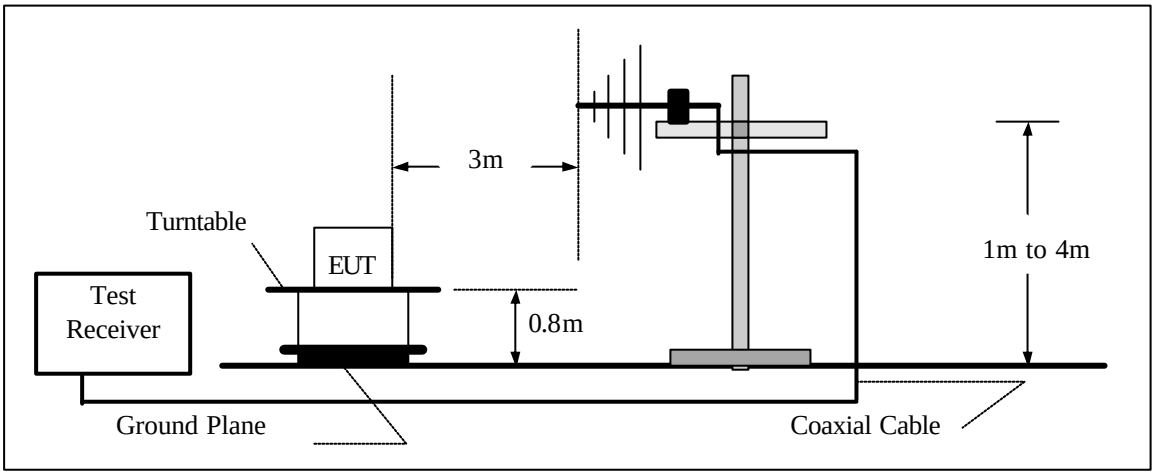
Note:
Three axes are chosen for pretest, the Z axis is the worst mode for final test.

6.2 Test SET-UP (Block Diagram of Configuration)

(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency Below 1000MHz



6.3 Measurement Equipment Used:

3/5 Anechoic ChamberRadiation Test Site # 4					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
ULTRA-BROADBAND ANTENNA	ROHDE & SCHWARZ	HL562	100015	2005/11	2006/11
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESI 26	100009	2005/11	2006/11
RF TEST PANEL	ROHDE & SCHWARZ	TS / RSP	335015/ 0017	N/A	N/A
TURNTABLE	ETS	2088	2149	N/A	N/A
ANTENNA MAST	ETS	2075	2346	N/A	N/A
EMI TEST SOFTWARE	ROHDE & SCHWARZ	ES-K1 V1.71	N/A	2005/11	2006/11

6.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

6.5 Measurement Result

Operation Mode: Transmitting Mode On Z Axis
Test Date : May 22,2006
Fundamental Frequency: 88.5 MHz
Test By: Tracy Qi
Rules Part No.: FCC Part 15.239
Temperature : 23℃
Humidity : 53 %
Requirements: Carrier frequency will not exceeds 48.0 dBuV/m at 3M.

TEST DATA

Frequency (MHz)	Value dBuv/m PK	Value dBuv/m AV	Polar	Ant Height m	Ant./CL Amp.CF(dB) dB	Result dBuv/m PK	Result dBuv/m AV	Limit dBuv/m PK	Limit dBuv/m AV	Margin dBuv/m PK	Margin dBuv/m AV
88.5	33.2	31.6	H	2.8	11.8	**56.8**	**41.7**	68	48	-11.2	-6.3
88.5	25.3	21.0	V	2.3	11.8	**63.3**	**42.4**	68	48	-4.7	-5.6

Remark：
(1) Measuring frequencies from 25 MHz to the 1GHz。
(2) The IF bandwidth of EMI Test Receiver between 25MHz to 1GHz was 120KHz.

TEST RESULTS: THE UNIT DOES MEET THE FCC REQUIREMENTS.

Operation Mode: Transmitting Mode On Z Axis
Test Date : May 22,2006
Fundamental Frequency: 88.5 MHz
Test By: Tracy Qi
Rules Part No.: FCC Part 15.239
Temperature : 23℃
Humidity : 53 %
Requirements: OUT-OF-BAND EMISSIONS SHALL NOT EXCEED:

30 - 88 MHz	40.0 dBuV/M MEASURED AT 3 METERS
88 - 216 MHz	43.5 dBuV/M
216 - 960 MHz	46.0 dBuV/M
ABOVE 960 MHz	54.0 dBuV/M

88.5 MHz

Frequency (MHz)	Result (dBuv/m)	Polar	Ant Height m	Ant./CL Amp.CF dB	Limit (dBuv/m)	Margin (dBuv/m)
177.00	36.6	H	2.0	10.8	43.5	-6.9
354.00	29.7	H	3.2	17.5	46.0	-16.3
442.50	36.4	H	2.0	20.2	46.0	-9.6
531.00	42.0	H	2.5	21.1	46.0	-4.0
619.50	41.0	H	2.9	23.6	46.0	-5.0
708.00	35.5	H	1.5	26.6	46.0	-10.5
796.50	40.8	H	1.6	23.7	46.0	-5.2

Frequency (MHz)	Result (dBuv/m)	Polar	Ant Height m	Ant./CL Amp.CF dB	Limit (dBuv/m)	Margin (dBuv/m)
177.00	32.9	V	2.0	10.8	43.5	-10.6
354.00	30.9	V	3.2	17.5	46.0	-15.1
442.50	38.1	V	2.0	20.2	46.0	-7.9
531.00	32.5	V	2.5	21.1	46.0	-13.5
796.50	34.2	V	1.6	23.7	46.0	-11.8

SAMPLE CALCULATION: FSdBuV/m = MR (dBuV) + ACFdB.

TEST PROCEDURE: The procedure used was ANSI STANDARD C63.4-2003.The spectrum was scanned from 30 MHz to 1000 MHz. When an emission was found, the table was rotated to produce the maximum signal strength. The antenna was placed in both the horizontal and vertical planes and the worse case emissions were reported. The UUT was tested in 3 orthogonal planes.

Remark：

(1) Measuring frequencies from 30 MHz to the 1GHz。

(2) Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.

(3) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.

(4) Data of measurement within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

(5) The IF bandwidth of SPA 30MHz to 1GHz was 100KHz.

TEST RESULTS: THE UNIT DOES MEET THE FCC REQUIREMENTS.

7. OCCUPIED BANDWIDTH

7.1 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. Based on FCC Part15 C Section 15.239(a):,RBW= 10KHz.,VBW= 30KHz,Span=200KHz.
4. The useful radiated emission from the EUT was detected by the spectrum analyser with peak detector.

7.2 Test SET-UP (Block Diagram of Configuration)

Same as 6.2 Radiated Emission Measurement.

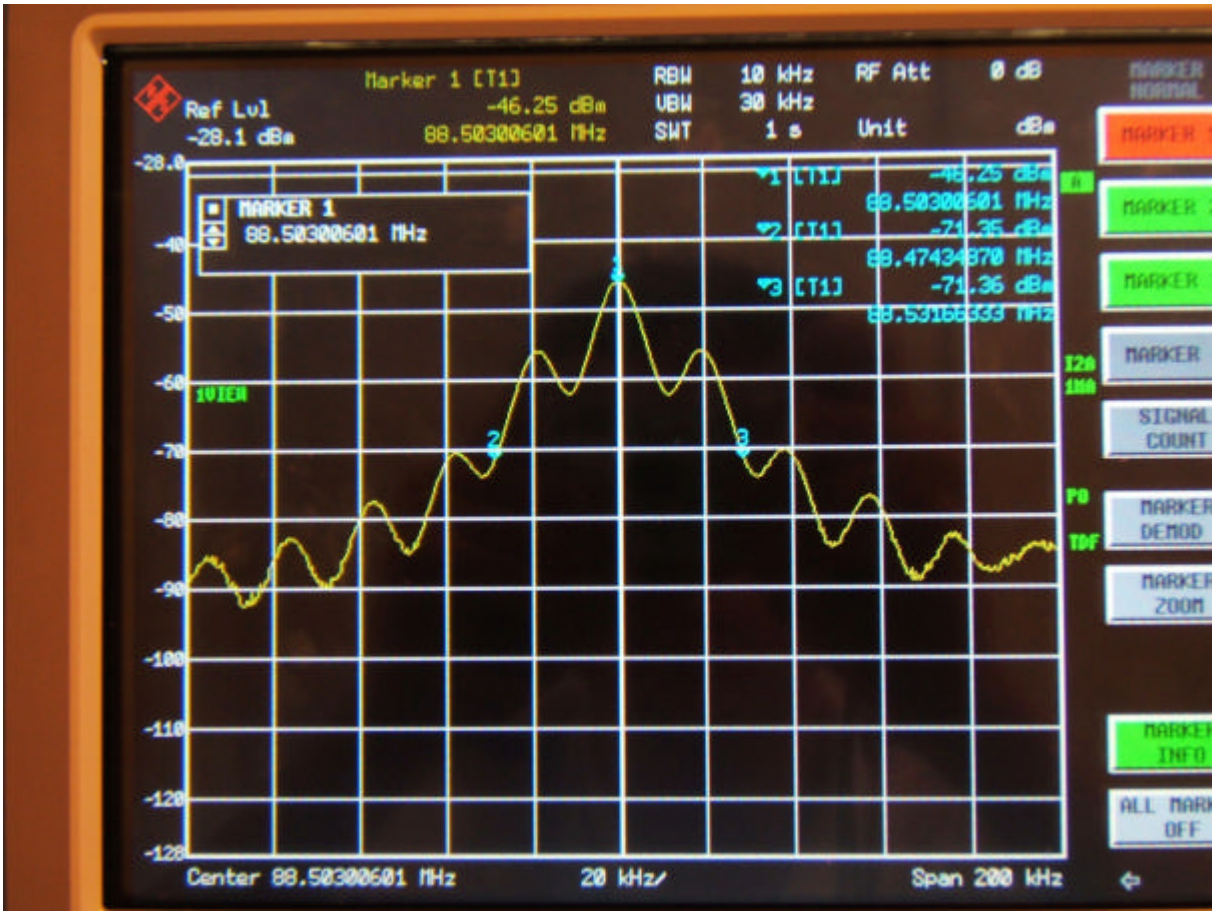
7.3 Measurement Equipment Used:

Same as 6.3 Radiated Emission Measurement.

7.4 Measurement Results:

The graph as below, represents the emissions take for this device.

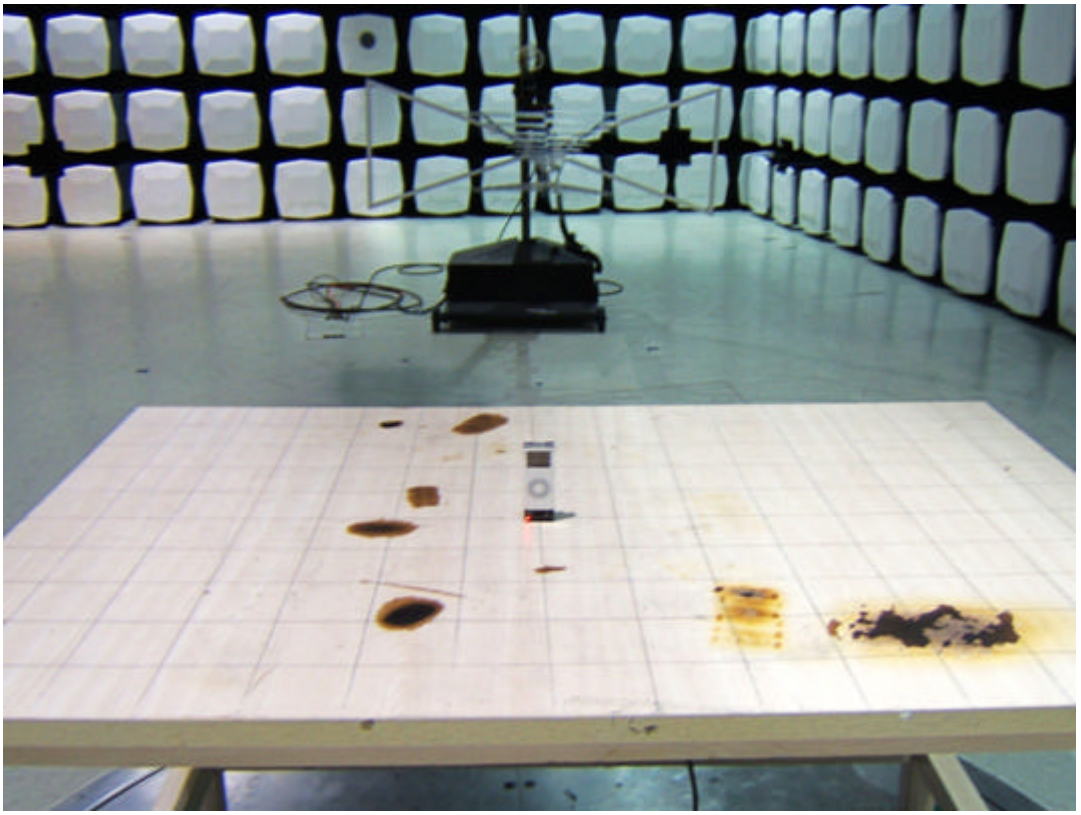
88.5MHz


Marker 1 [T1]
-46.25 dBm
88.50300601 MHz
RBW 10 kHz
VBW 30 kHz
SWT 1 s
RF Att 0 dB
Unit dBm
Ref Lvl
-28.1 dBm
MARKER 1
88.50300601 MHz
Center 88.50300601 MHz
20 kHz/
Span 200 kHz

APPENDIX 1

PHOTOGRAPHS OF SET UP

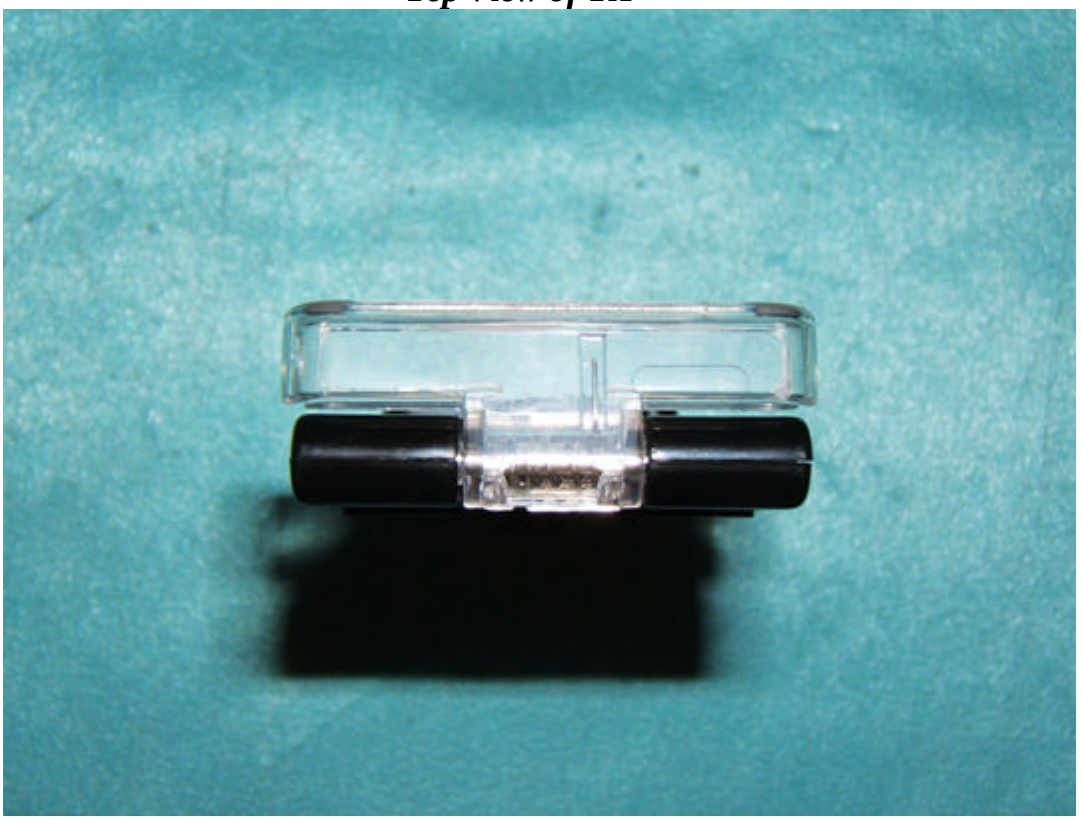
Radiated Emission Setup Photos



APPENDIX 2

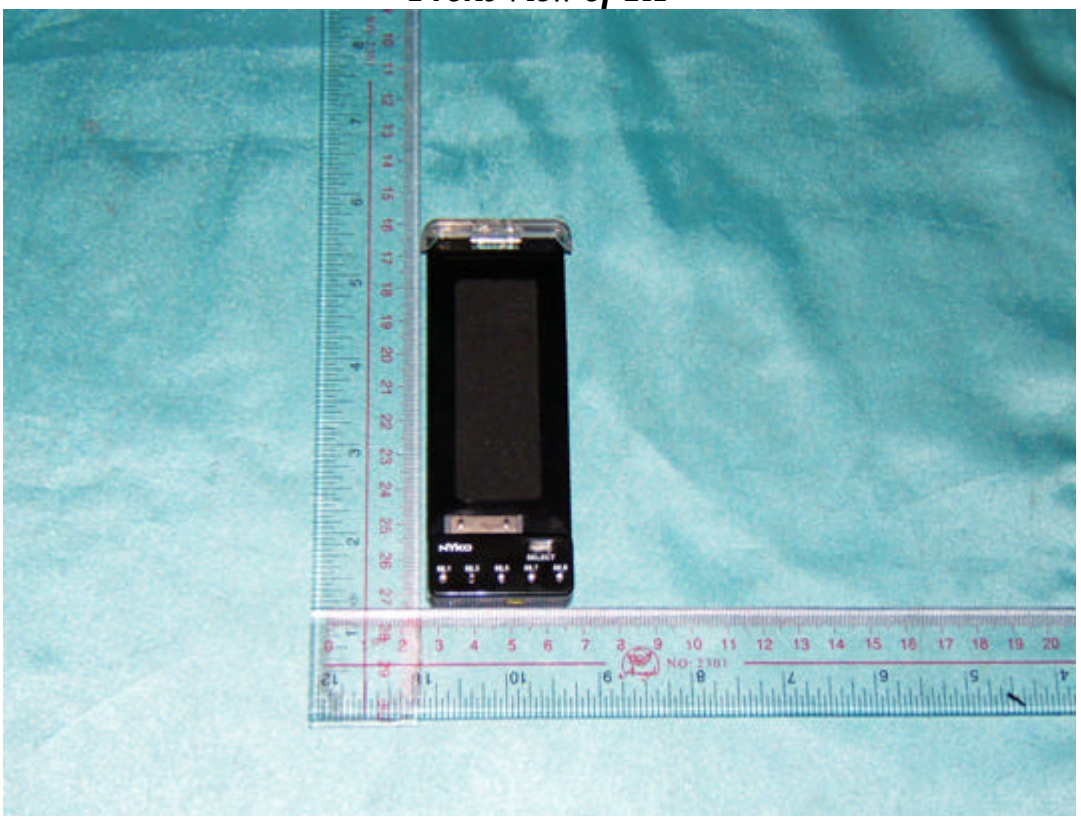
PHOTOGRAPHS OF EUT

Top View of TX



Bottom View of TX

Front View of TX

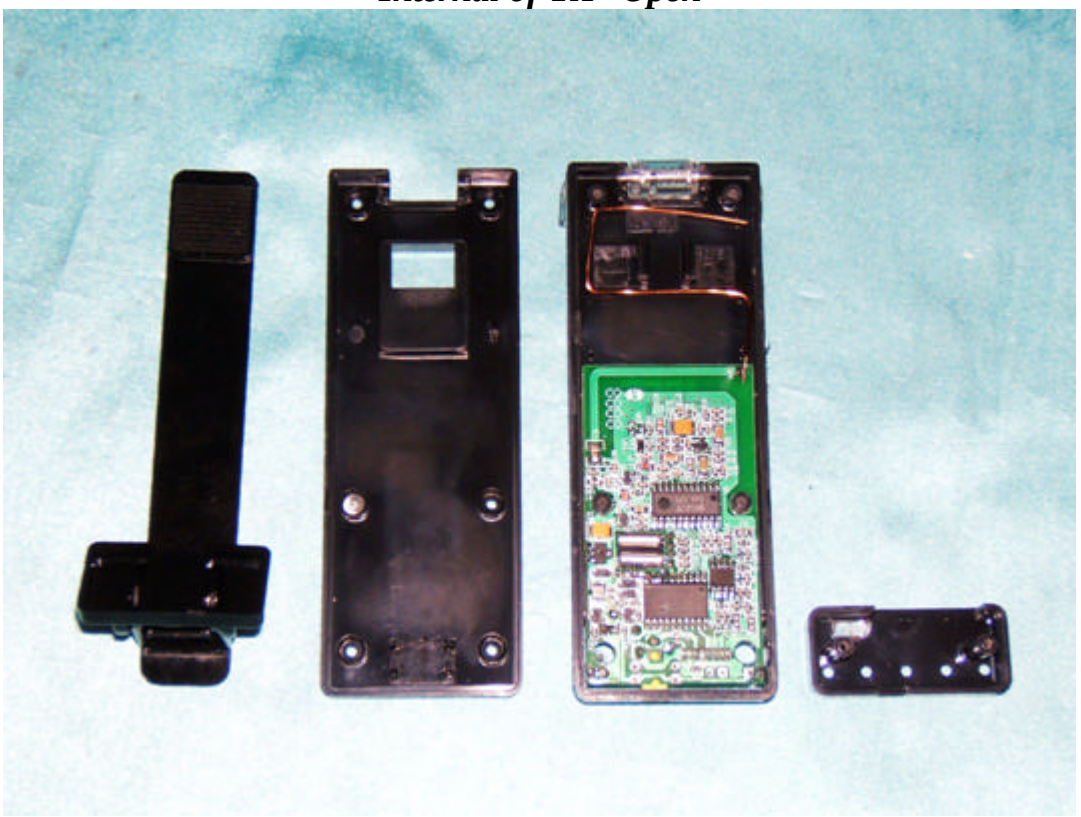


Back View of TX

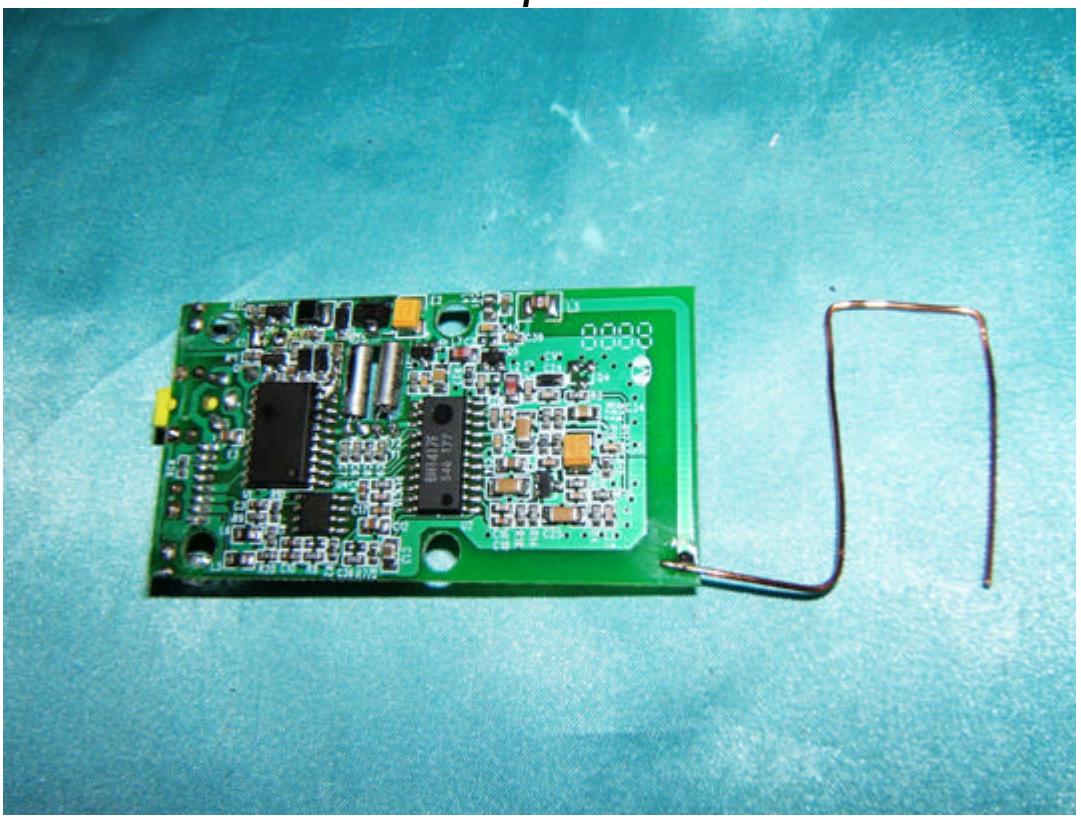
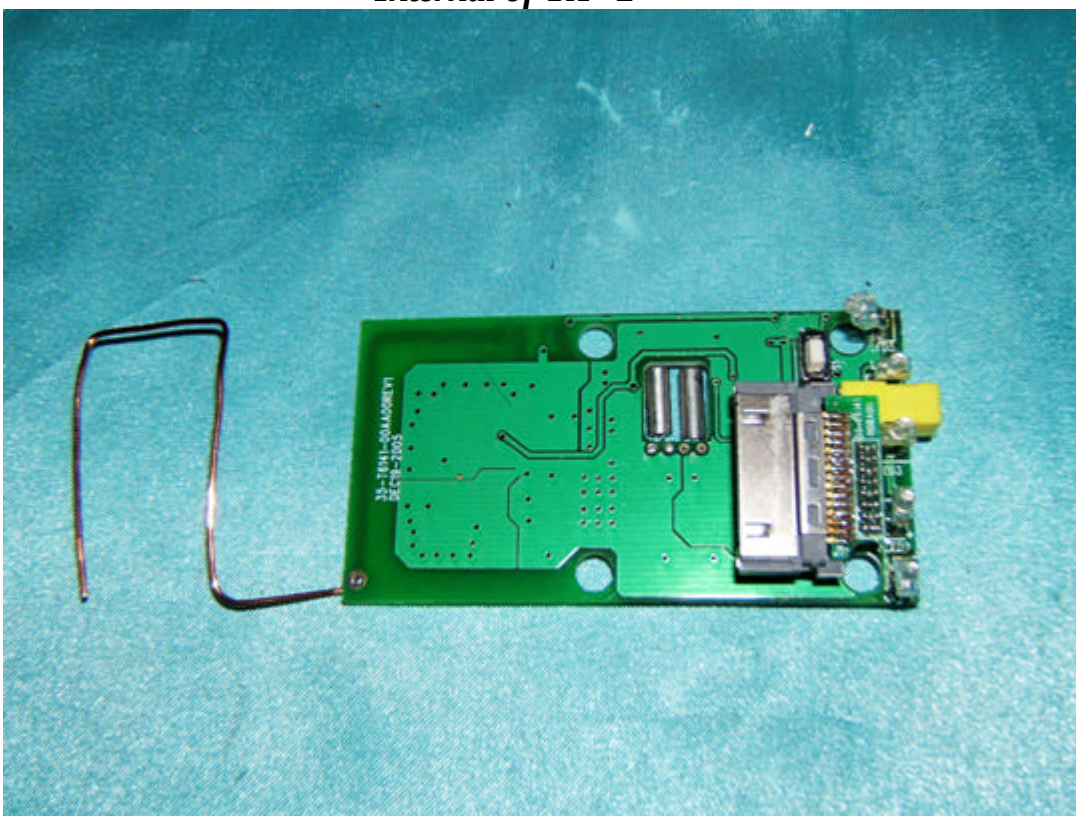
Left View of TX

Right View of TX

Internal of TX– Open



Internal of TX– 1



Internal of TX– 2