

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

OF

TPMS Tire Numen

FCC ID: T2FTH6100

MODEL No.: TH6100

BRAND NAME: N/A

REPORT NO.: TRE06020025

ISSUE DATE: Mar 01, 2006

Prepared for

**SHENZHEN SENSTAR TECHNOLOGY CO.,LTD.
ROOM 807,SOFTWARE PARK FUTIAN HI-TECH CENTER,
NO.6009 CAITIAN DISTRICT SHENZHEN
GUANGDONG, P.R. CHINA**

Prepared by

**SHENZHEN HUATONGWEI INTERNATIONAL
INSPECTION CO., LTD**

d.b.a.

**SHENZHEN HUATONGWEI INTERNATIONAL INSPECTION CO., LTD
HUATONGWEI BUILDING, KEJI RD. 12 S., HIGH-TECH PARK,
NANSAN DISTRICT, SHENZHEN,
GUANGDONG , P.R.CHINA**

**TEL: 86-755-26748099
FAX: 86-755-26748089**

VERIFICATION OF COMPLIANCE

Applicant:	Shenzhen Senstar Technology Co.,Ltd. Room 807,Software park Futian Hi-Tech Center,No.6009 Caitian District Shenzhen Guangdong P.R. China
Product Description:	TPMS Tire Numen
Brand Name:	N/A
Model Number:	TH6100
Serial Number:	N/A
File Number:	TRE06020025
Date of Test:	Feb 21, 2006 ~ Feb 25, 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 15.231.

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

Approved By


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

Reviewed By


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 an short range, lower power communication device transmitter. It is designed by way of utilizing the FSK modulation achieves the system operating.

A major technical descriptions of EUT is described as following:

- A). Operation Frequency: 433.92 MHz
- B). Modulation: FSK
- C). Antenna Designation: Non-User Replaceable (Fixed)
- D). Power Supply: DC 3.6V by battery

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: T2FTH6100 filing to comply with Section 15.231 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 apply in the 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. (80dB μ V 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.

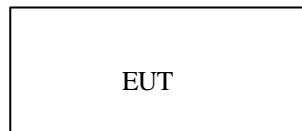
Frequency (MHz)	Field strength μ V/m	Distance(m)	Field strength at 3m dB μ V/m
1.705-30	30	30	69.54
30-88	100	3	40
88-216	150	3	43.5
216-960	200	3	46
Above 960	500	3	54

Remark: 1. Emission level in dB μ V/m=20 log (μ V/m)

2. Measurement was performed at an antenna to the closed point of EUT distance of 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 ξ 15.205, then the general radiated emission limits in ξ 15.209 apply.

2.5 Configuration of Tested System

Fig. 2-1 Configuration of Tested System



3. Summary Of Test Results

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

4. Description of test modes

1. The EUT (R/C Racer car) 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

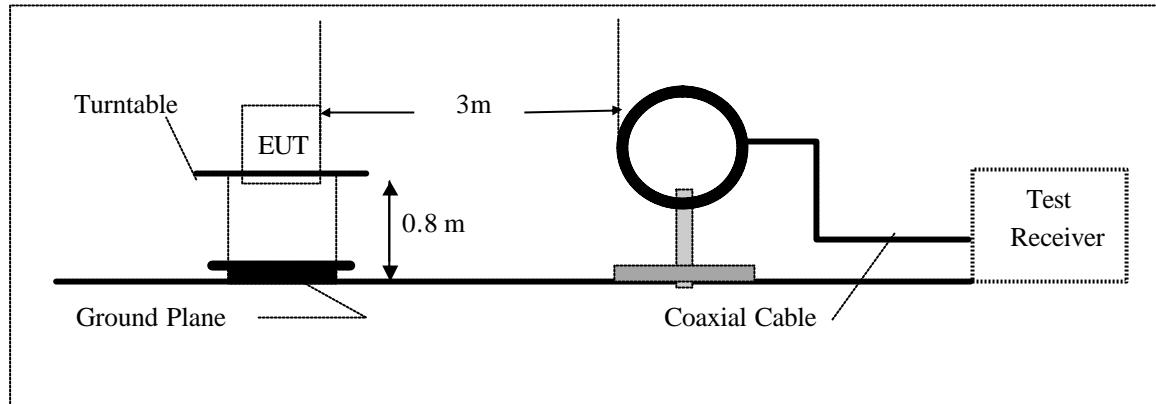
- 1 The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on at least ten highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat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

Note:

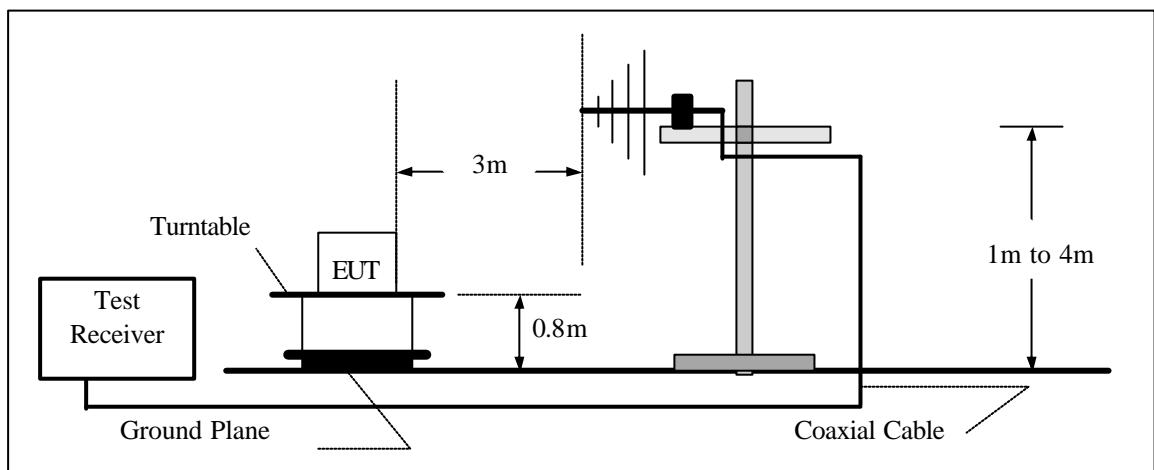
Three axes are chosen for pretest, the Z axis is the worst mode for final test.

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 Chamber Radiation 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 : Feb 25, 2006
 Fundamental Frequency: 433.9861 MHz Test By: Tracy Qi
 Temperature : 23 Pol: Vertical
 Humidity : 58 %
 Judgement : Passed by -4.82 dB at 867.972 MHz Ant.Pol. Ver.

Freq. (MHz)	Ant.Pol. H/V	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)	Note
433.986	V	Peak	38.10	21.20	79.56	80.82	-1.26	F
867.972	V	Peak	28.00	8.30	56.00	60.82	-4.82	H
1301.96	V	Peak	15.40	11.40	46.90	60.82	-13.92	H
1735.94	V	Peak	18.08	11.63	40.40	60.82	-20.42	H
2169.93	V	Peak	18.63	11.87	37.80	60.82	-23.02	H
Others								

Remark :

(1) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
 (2) RULES PART NO.: 15.231

REQUIREMENTS:

Fundamental Frequency MHz	Field Strength of Fundamental dBuV	Field Strength of Harmonics and Spurious Emissions (dBuV/m @ 3m)
40.66 to 40.70	67.04	47.04
70 to 130	61.94	41.94
130 to 174	61.94 to 71.48	41.94 to 51.48
174 to 260	71.48	51.48
260 to 470	71.48 to 81.94	51.48 to 61.94
470 and above	81.94	61.94

THE LIMIT FOR AVERAGE FIELD STRENGTH dBuV/m FOR THE FUNDAMENTAL FREQUENCY =80.82 dBuV/m. NO FUNDAMENTAL IS ALLOWED IN THE RESTRICTED BANDS.

THE LIMIT FOR AVERAGE FIELD STRENGTH dBuV/m FOR THE HARMONICS AND SPURIOUS FREQUENCIES = 60.82 dBuV/m. SPURIOUS IN THE RESTRICTED BANDS MUST BE LESS THAN 54 dBuV/m OR 15.209.

(3) 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.
 (4) The IF bandwidth of EMI Test Receiver between 25MHz to 1GHz was 120KHz, above 1GHz was 1MHz.

6.6 Measurement Result

Operation Mode: Transmitting Mode On Z Axis Test Date : Feb 25, 2005
 Fundamental Frequency: 433.9861 MHz Test By: Tracy Qi
 Temperature : 23 Pol: Horizontal
 Humidity: 58 %
 Judgement: Passed by -2.32 dB at 867.972 MHz Ant.Pol. Hor.

Freq. (MHz)	Ant.Pol. H/V	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)	Note
433.986	H	Peak	19.37	21.20	76.98	80.82	-3.84	F
867.972	H	Peak	11.13	22.90	58.50	60.82	-2.32	H
Others			-					

Remark :

(1) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
 (2) RULES PART NO.: 15.231

REQUIREMENTS:

Fundamental Frequency MHz	Field Strength of Fundamental dBuV	Field Strength of Harmonics and Spurious Emissions (dBuV/m @ 3m)
40.66 to 40.70	67.04	47.04
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174 to 260	71.48	51.48
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 (4) The IF bandwidth of EMI Test Receiver between 25MHz to 1GHz was 120KHz, above 1GHz was 1MHz.

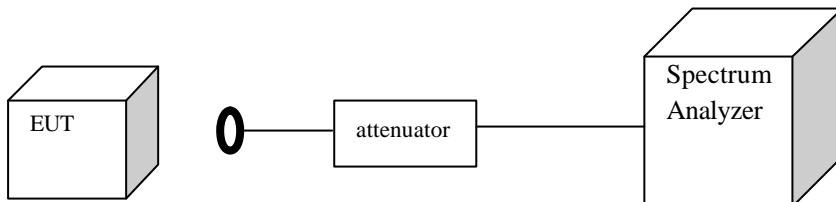
7. Dwell Time

7.1 Test Standards

FCC Rules and Regulations Part 15 Subpart C –Intentional Radiators

According to 15.231 (a), a manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

7.2 Diagram of Test Setup



Remark: the attenuator is the built-in part of spectrum analyzer.

7.3 Test Equipments Used

EQP. Description	Manufacturer	Model No.	Serial No.	Last Cal
SHIELDED ROOM	ETS.LINDGREN	RFD-100	2391	N/A
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESI 26	100009	2005/11

7.4 Test Description

7.4.1 Test Receiver Setting:

RBW (KHz)	VBW (KHz)	Detector	Comment
30	100	Peak	

7.4.2 Operating Condition of EUT

As stated in sec 2.4.3 of this report.

7.4.3 Test Procedure

The EUT was set up per the test configuration figured in Sec 7.2 of this test report to simulate the typical usage per the user's manual.

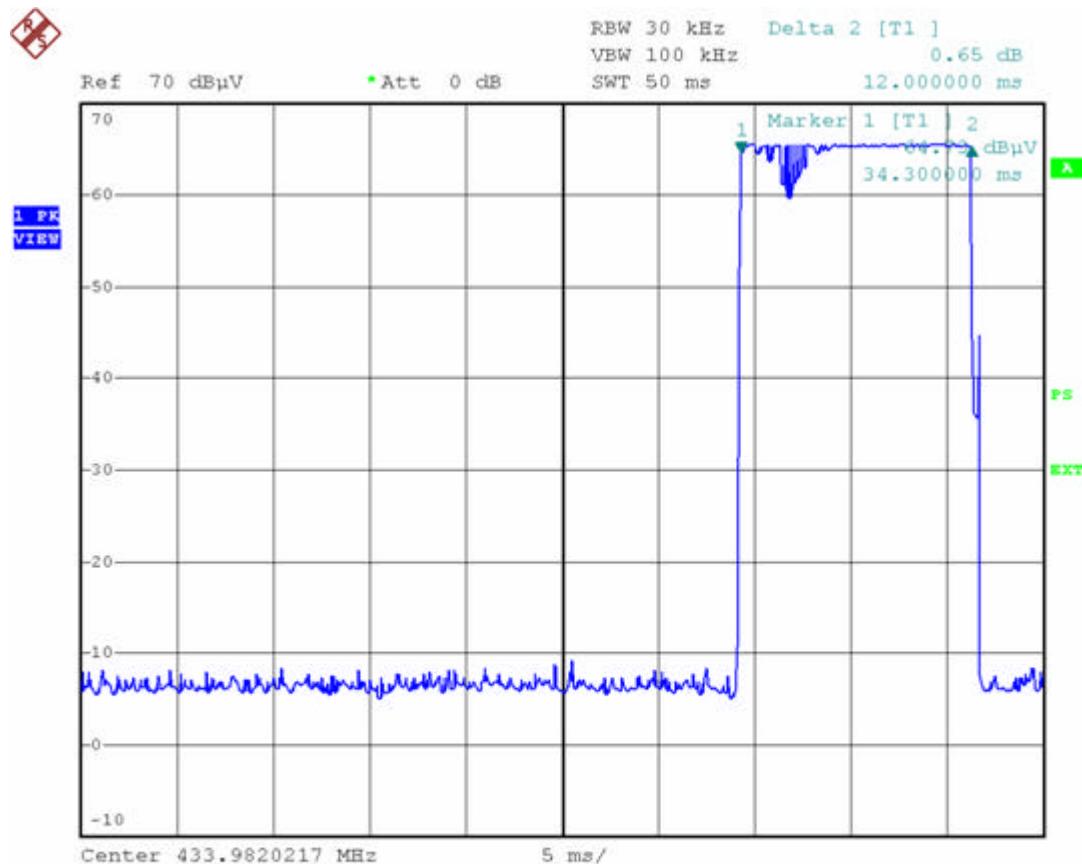
The transmitter output of EUT was connected to the spectrum analyzer through an attenuator.

Set the spectrum analyzer into zero span and perform the dwell time bandwidth measurement. Record the dwell time and compare with the required limit.

7.5 Test Results

Test Results : PASS

Test data see following graph:



Date: 23.FEB.2006 14:30:18

8. Occupied Bandwidth

8.1 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. According to 15.231 (c), the bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.
RBW=30KHz,VBW= 100KHz.
4. The useful radiated emission from the EUT was detected by the spectrum analyser with peak detector.

8.2 Test SET-UP (Block Diagram of Configuration)

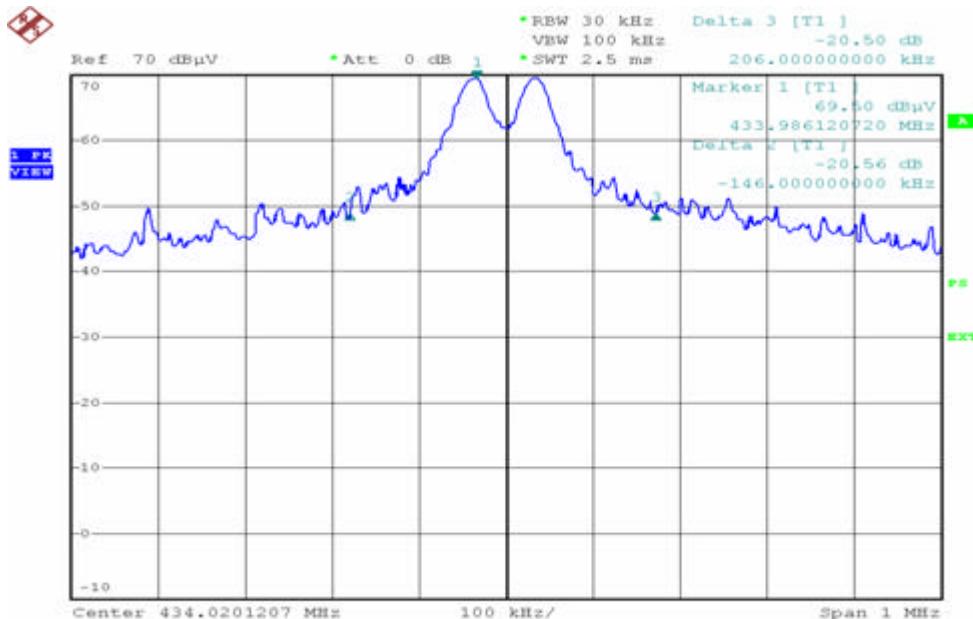
Same as 4.2 Radiated Emission Measurement.

8.3 Measurement Equipment Used:

Same as 4.2 Radiated Emission Measurement.

8.4 Measurement Results:

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

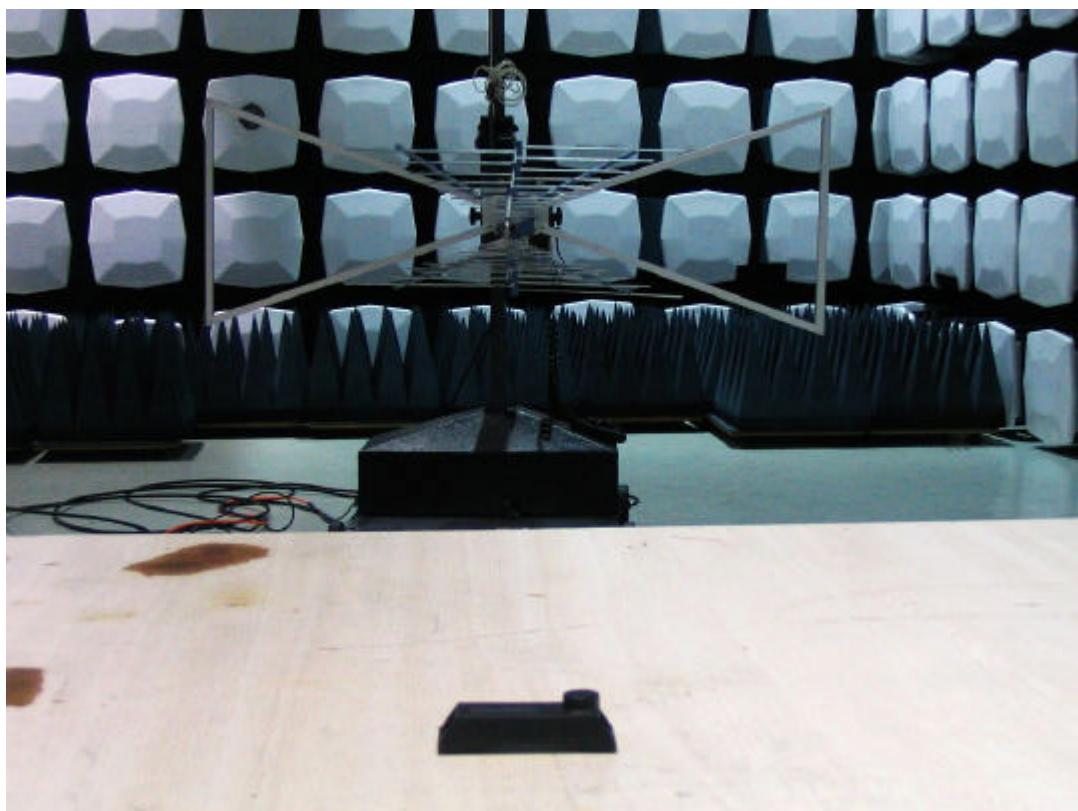


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APPENDIX 1

PHOTOGRAPHS OF SET UP

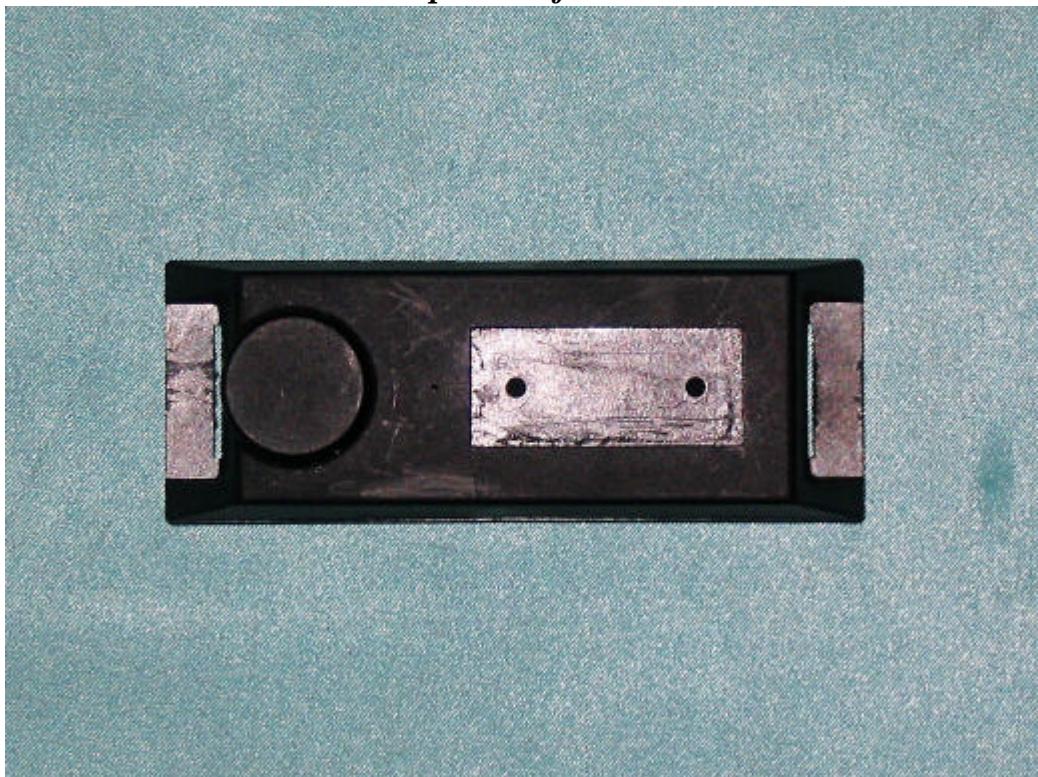
Radiated Emission Setup Photos



APPENDIX 2

PHOTOGRAPHS OF EUT

Top View of TX



Bottom View of TX



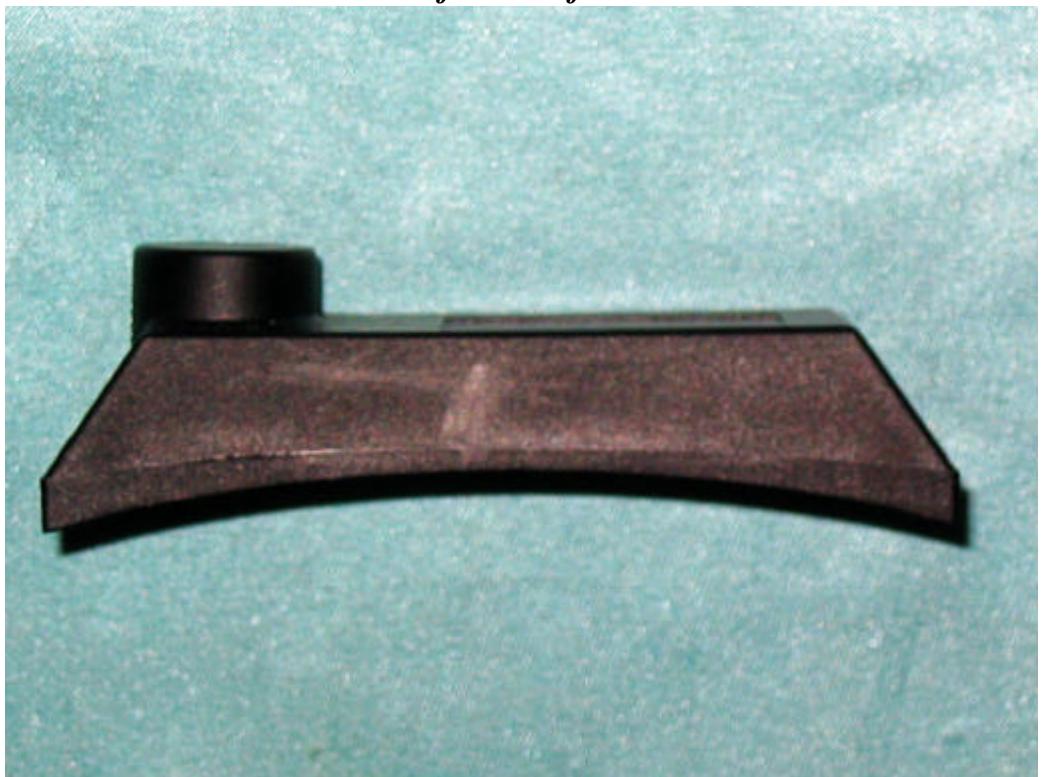
Front View of TX



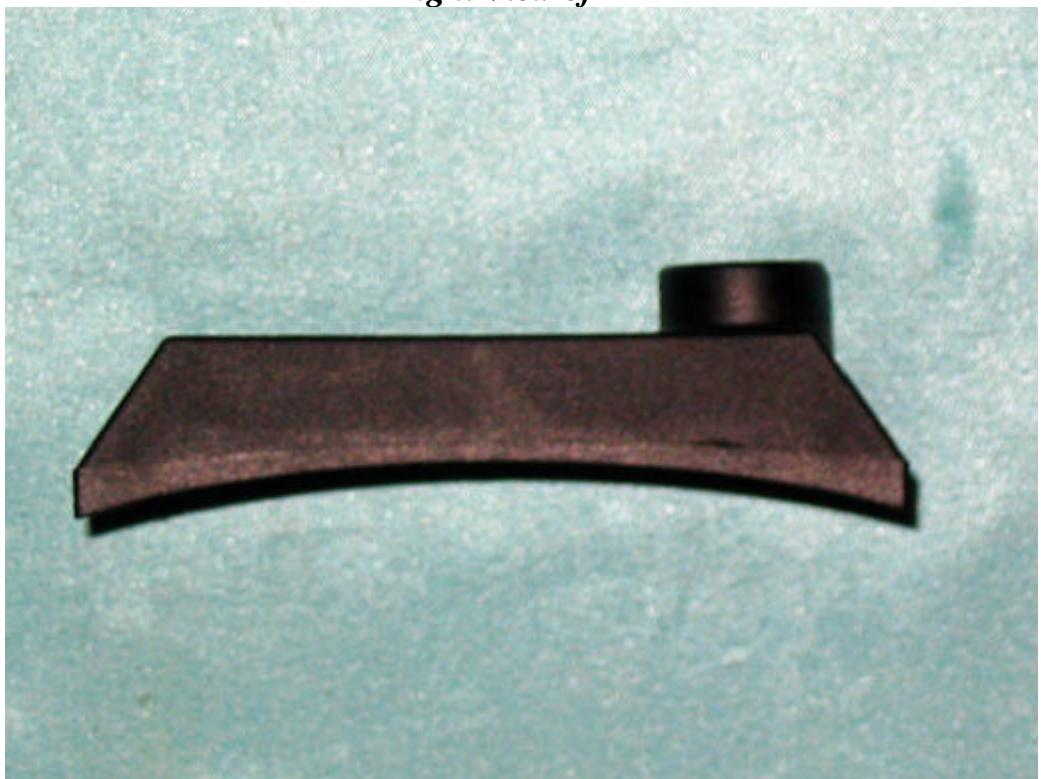
Back View of TX



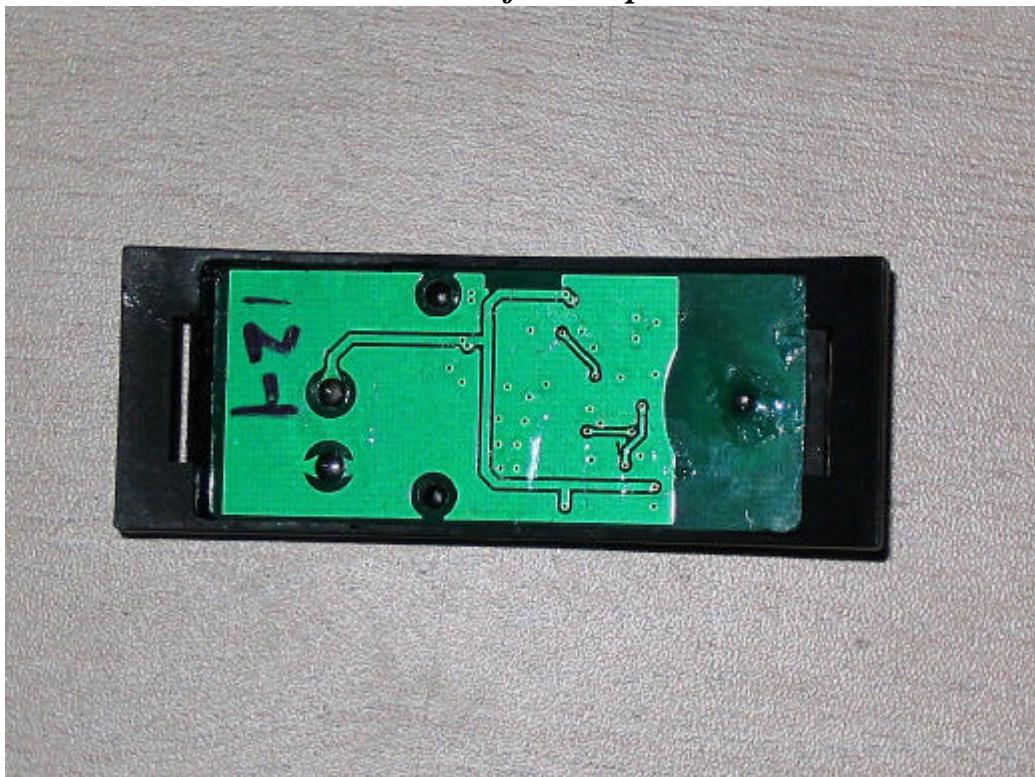
Left View of TX



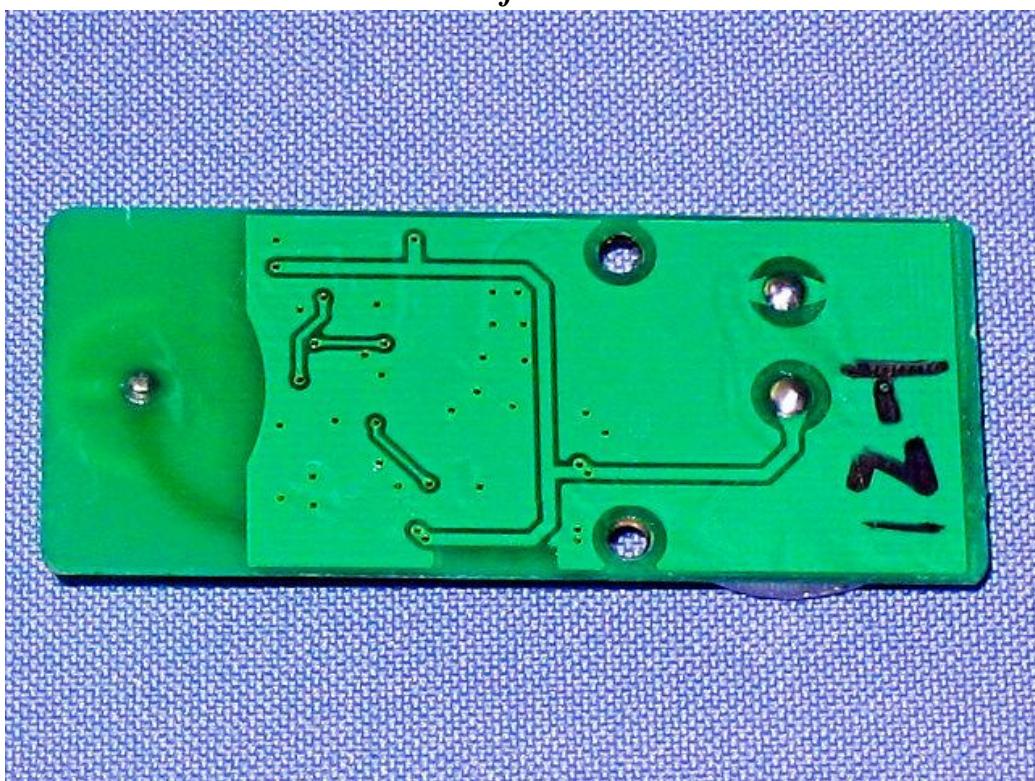
Right View of TX



Internal of TX- Open



Internal of TX- 1



Internal of TX- 2

