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

OF

2.4 GHz Wireless AV Sender

FCC ID: TKMZTVZT-750T

MODEL No.: ZT-750T

BRAND NAME: N/A

REPORT NO: TR05080052

ISSUE DATE: September 16, 2005

Prepared for

ZHONGWANG TECHNOLOGY CO., LTD
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Prepared by

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d.b.a.

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VERIFICATION OF COMPLIANCE

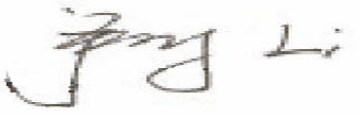
Applicant:	Zhongwang Technology CO., LTD West, 3rd Floor, FIYTA Building Southern Hi-tech Park, Nanshan, Shenzhen, P.R. China.
Product Description:	2.4 GHz Wireless AV Sender
Brand Name:	N/A
Model Number:	ZT-750T
Serial Number:	N/A
File Number:	SQE05080052
Date of Test:	August 25, 2005 ~ September 16, 2005

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



Jimmy Li / Q.A. Manager
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, 2.4 GHz Wireless AV Sender designed as an " Input 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: 2.414 GHz, 2.432 GHz, 2.450 GHz, 2.468 GHz
B). Modulation: FM
C). Antenna Designation: Non-User Replaceable (Integral without external RF Port)
D). Power Supply: 8 VDC Powered by AC/DC adapter.

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: TKMZTVZT-750T filing to comply with Section 15.249 of the FCC Part 15, Subpart C Rules. The composite system (receiver) is compliance with Subpart B is authorized under a Declaration of Conformity 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

The EUT is placed on support 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.

2.4 Limitation

(1) Conducted Emission

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 fundamental frequency within this band (section 15.249 frequency operating between 2.4 GHz –2.4835 GHz) shall not exceed 50 millivolts/meter at 3 meters. (93.98 dBμV/m at 3m) The field strength of harmonics shall not exceed 500 microvolts/meter at 3 meters.(53.98 dBμV/m 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 except harmonics shall be attenuated by at least 50 dB below the fundamental or 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 dBuV/m=20 log (uV/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
E-1	2.4 GHz Wireless AV Sender	Zhongwang	ZT-750T	TKMZTVZT-750T	N/A	***EUT***
	DVD	GVG	DV-3839	N/A	N/A	

3. Summary Of Test Results

FCC Rules	Description Of Test	Result
§ 15.207	Conducted Emission	Compliant
§ 15.249	Radiated Emission	Compliant
§ 15.249	26 dB Bandwidth	Compliant

4. Description of test modes

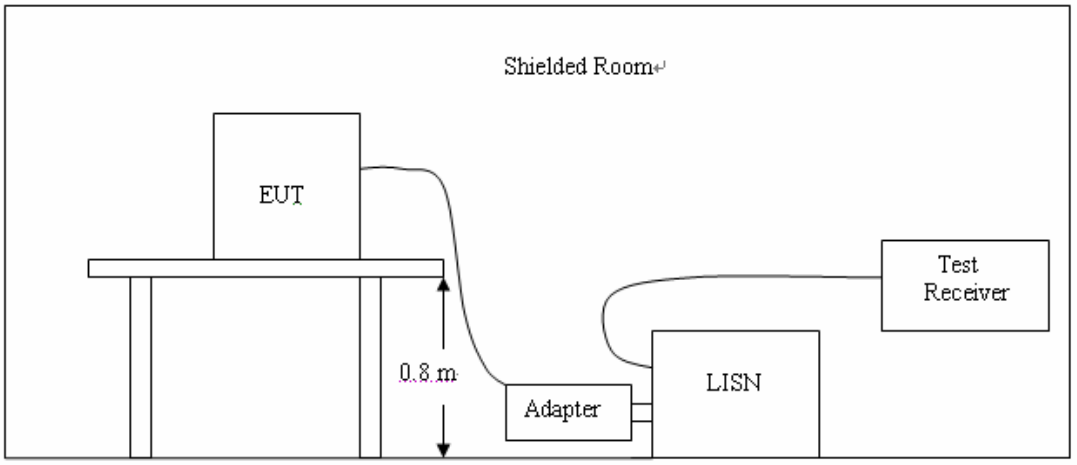
1. The EUT (2.4 GHz Wireless AV Sender) has been tested under normal operating condition.
2. The EUT stay in continuous transmitting mode. Three channels (The top, The middle, The bottom) are chosen for testing.

5. Conducted Emissions Test

5.1 Measurement Procedure:

1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4.
2 Support equipment, if needed, was placed as per ANSI C63.4.
3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
4 The EUT received DC8V power from the adapter, the adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5 All support equipments received AC power from a second LISN, if any.
6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8 During the above scans, the emissions were maximized by cable manipulation.

5.2 Test SET-UP (Block Diagram of Configuration)



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	2004/11	2005/11
ARTIFICIAL MAINS	ROHDE & SCHWARZ	ESH2-Z5	100028	2004/11	2005/11
PULSE LIMITER	ROHDE & SCHWARZ	ESHSZ2	100044	2004/11	2005/11
EMI TEST SOFTWARE	ROHDE & SCHWARZ	ESK1	N/A	N/A	N/A

5.4 Measurement Result:

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

FREQ MHz	PEAK RAW dBuV	Q.P. RAW dBuV	AVG RAW dBuV	Q.P. Limit dBuV	AVG Limit dBuV	Q.P. Margin dB	AVG Margin dB	NOTE
0.187	46.52	---	---	64.13	54.13	---	-7.61	L1
0.285	44.71	---	---	60.09	50.09	---	-5.38	L1
0.339	43.68	---	---	59.22	49.22	---	-5.54	L1
0.424	41.22	---	---	57.43	47.43	---	-6.21	L1
0.515	39.65	---	---	56.00	46.00	---	-6.35	L1
1.764	36.44	---	---	56.00	46.00	---	-9.56	L1
0.193	45.43	---	---	64.08	54.08	---	-8.65	L2
0.274	43.15	---	---	60.72	50.72	---	-7.57	L2
0.307	42.39	---	---	59.35	49.35	---	-6.96	L2
0.411	40.57	---	---	57.46	47.46	---	-6.89	L2
0.514	38.30	---	---	56.00	46.00	---	-7.70	L2
1.733	35.16	---	---	56.00	46.00	---	-10.84	L2

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

****NOTE:** "---" denotes the peak emission level was or more than 2dB below the Average limit, so no re-check anymore.

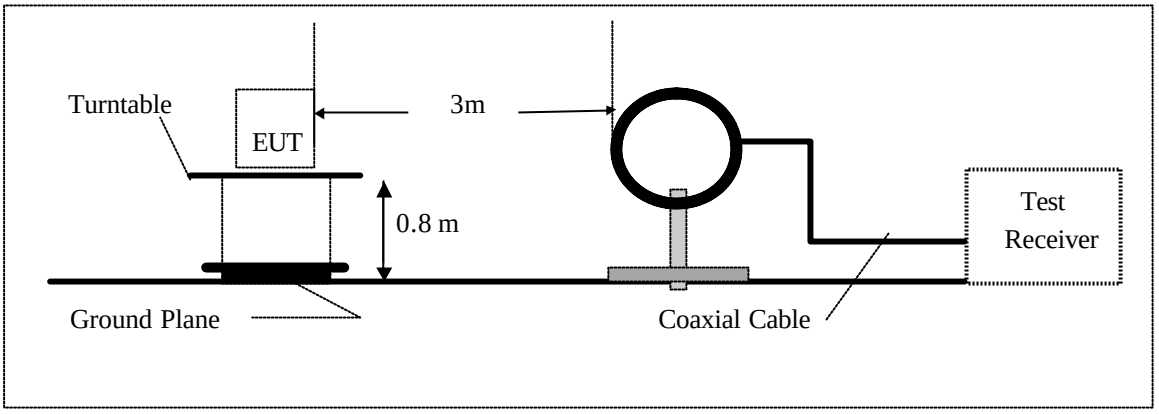
6. Radiated Emission Test

6.1 Measurement Procedure

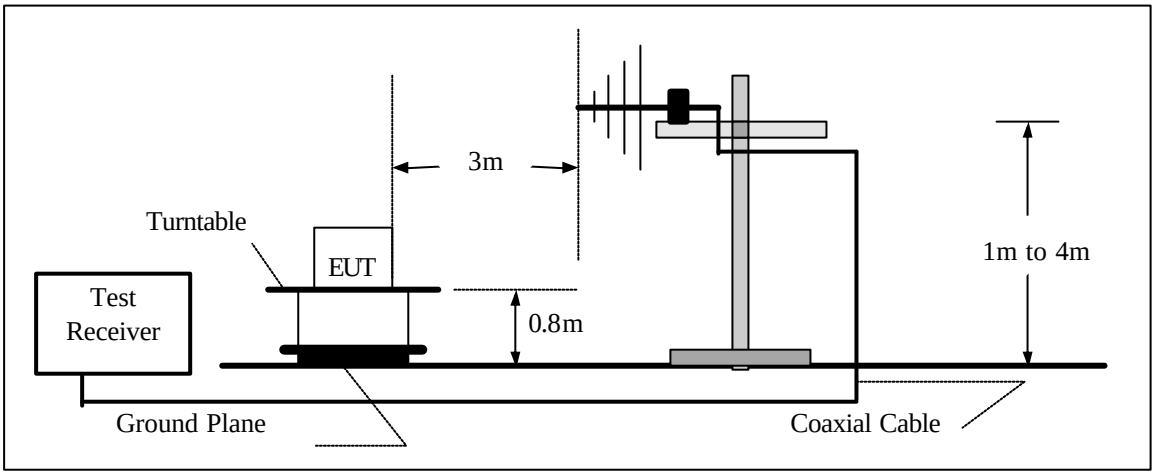
1 The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0°C to 360°C to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.

6.2 Test SET-UP (Block Diagram of Configuration)

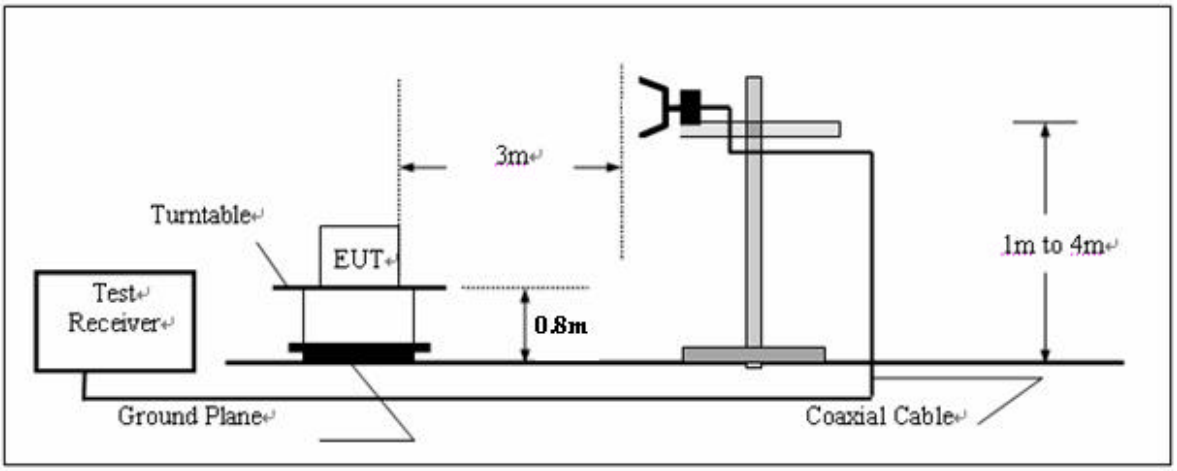
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



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



(C) Radiated Emission Test Set-Up, Frequency above 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	2004/11	2005/11
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESI 26	100009	2004/11	2005/11
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	ESK1	NA	N/A	N/A

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 Top Channel	Test Date :	August 28, 2005
Fundamental Frequency:	2468 MHz	Test By:	Jimmy Zhang
Temperature :	23 ℃	Humidity :	53 %

Judgement：Passed by -8.41 dB at 434.33 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
2468	V	Peak	74.64	-3.50	71.14	93.98	-22.84	F
2468	H	Peak	67.28	-3.50	63.78	93.98	-30.20	F
434.33	H	Peak	17.39	20.20	37.59	46.00	-8.41	
434.33	V	Peak	4.48	26.20	30.68	46.00	-15.32	
Others			---					

Remark：

(1) Measuring frequencies from 30 MHz to the 25 GHz。

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

(3) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.

(4) Datas 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 EMI Test Receiver was 120KHz for measuring from 30 MHz to 1 GHz and 1 MHz for measuring above 1 GHz

Operation Mode: Transmitting Mode On Middle Channel Test Date : August 28, 2005
Fundamental Frequency: 2432 MHz Test By: Jimmy Zhang
Temperature : 23 ℃ Humidity : 53 %
Judgement：Passed by -8.26 dB at 434.33 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
2432	V	Peak	74.80	-3.50	71.30	93.98	-22.68	F
2432	H	Peak	67.50	-3.50	64.00	93.98	-29.98	F
434.33	H	Peak	17.54	20.20	37.74	46.00	-8.26	
434.33	V	Peak	4.61	26.20	30.81	46.00	-15.19	
Others			---					

Remark：

(1) Measuring frequencies from 30 MHz to the 25 GHz。

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

(3) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.

(4) Datas 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 EMI Test Receiver was 120KHz for measuring from 30 MHz to 1 GHz and 1 MHz for measuring above 1 GHz

Operation Mode: Transmitting Mode On Bottom Channel Test Date : August 28, 2005
Fundamental Frequency: 2414 MHz Test By: Jimmy Zhang
Temperature : 23 ℃ Humidity : 53 %
Judgement：Passed by -8.10 dB at 434.33 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
2412	V	Peak	75.90	-3.50	72.40	93.98	-21.58	F
2412	H	Peak	69.00	-3.50	65.50	93.98	-28.48	F
434.33	H	Peak	17.70	20.20	37.90	46.00	-8.10	
434.33	V	Peak	4.90	26.20	31.10	46.00	-14.90	
Others			---					

Remark：

(1) Measuring frequencies from 30 MHz to the 25 GHz。

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

(3) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.

(4) Datum 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 EMI Test Receiver was 120KHz for measuring from 30 MHz to 1 GHz and 1 MHz for measuring above 1 GHz

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. Set SPA Center Frequency = fundamental frequency , RBW,VBW= 1KHz.
4. Set SPA Max hold. Mark peak, -26dB.

7.2 Test SET-UP (Block Diagram of Configuration)

Same as 4.2 Radiated Emission Measurement.

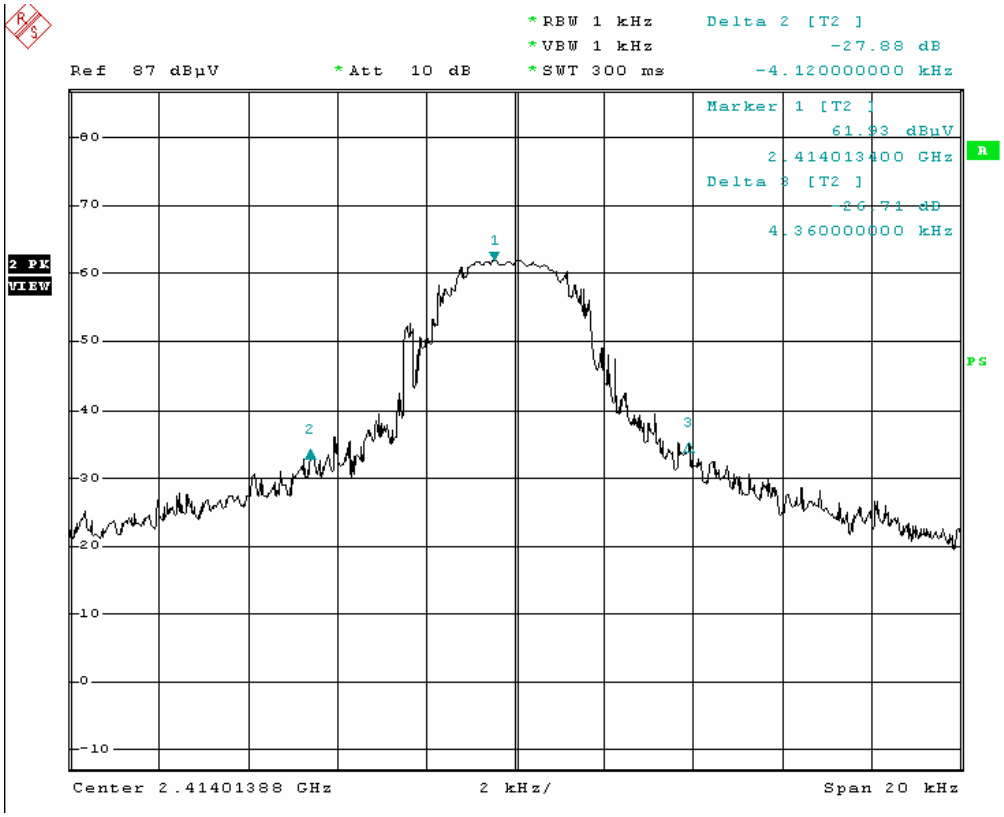
7.3 Measurement Equipment Used:

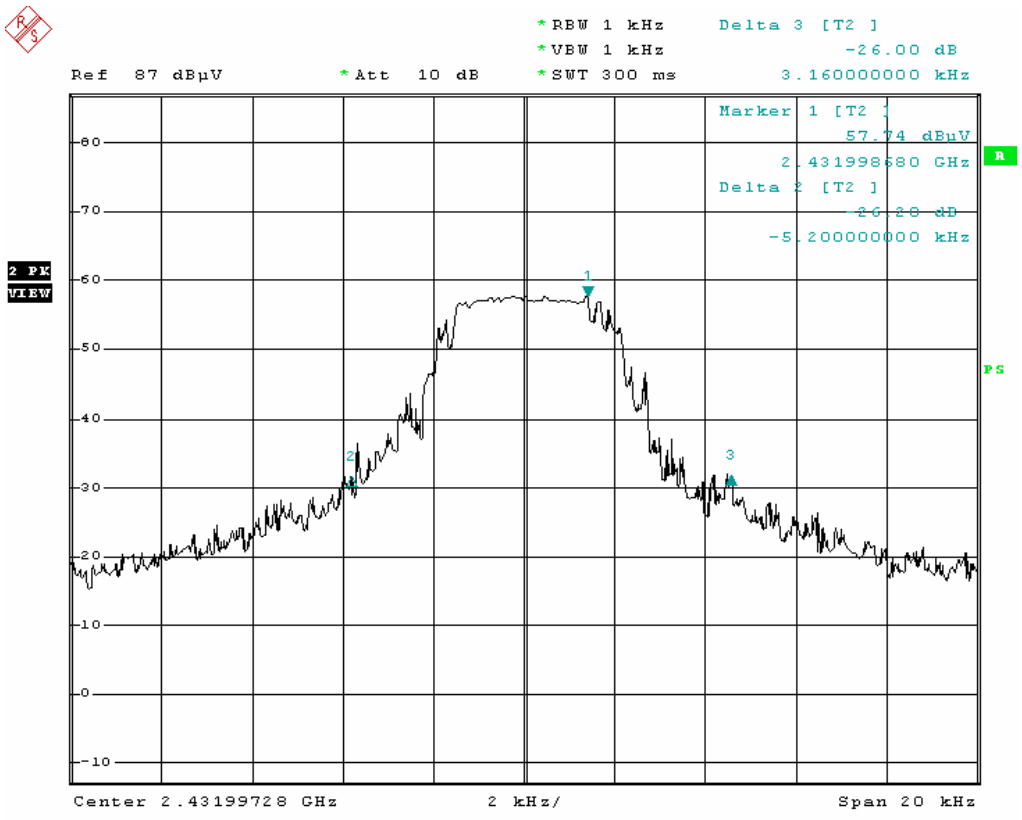
Same as 4.2 Radiated Emission Measurement.

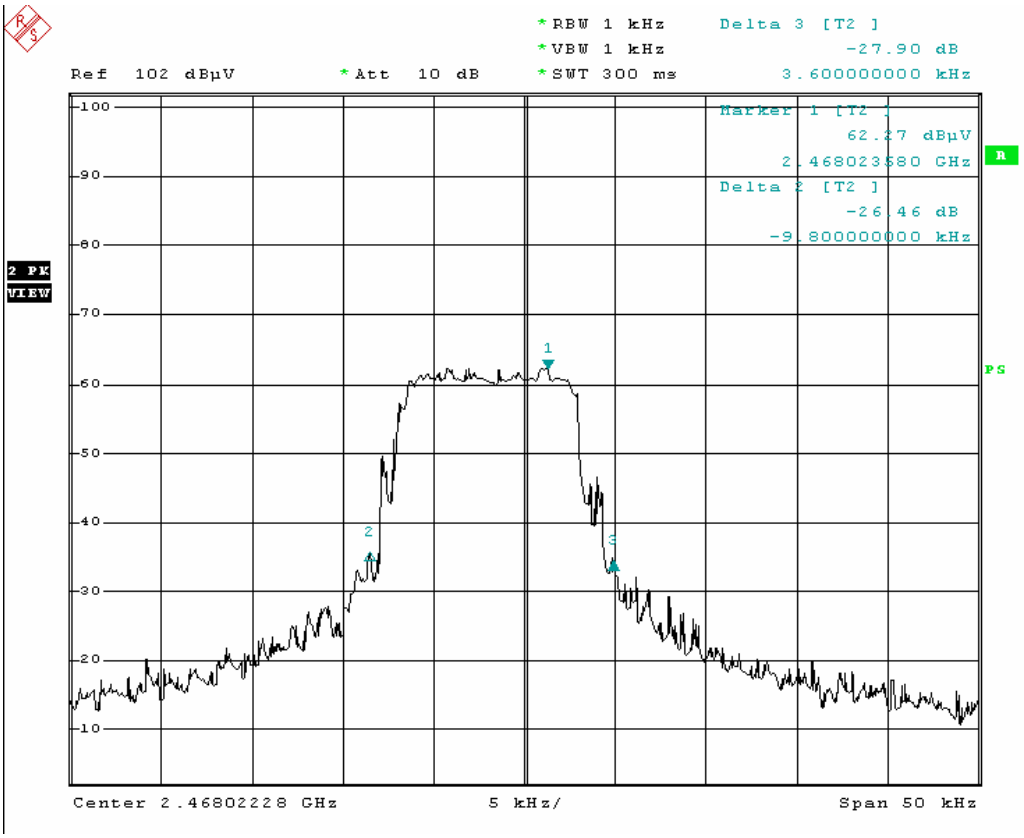
7.4 Measurement Results:

26dB bandwidth of the Top Channel= 13.4 KHz
26dB bandwidth of the Middle Channel= 8.36 KHz
26dB bandwidth of the Bottom Channel= 8.48 KHz

26 dB Bandwidth Test Plot :



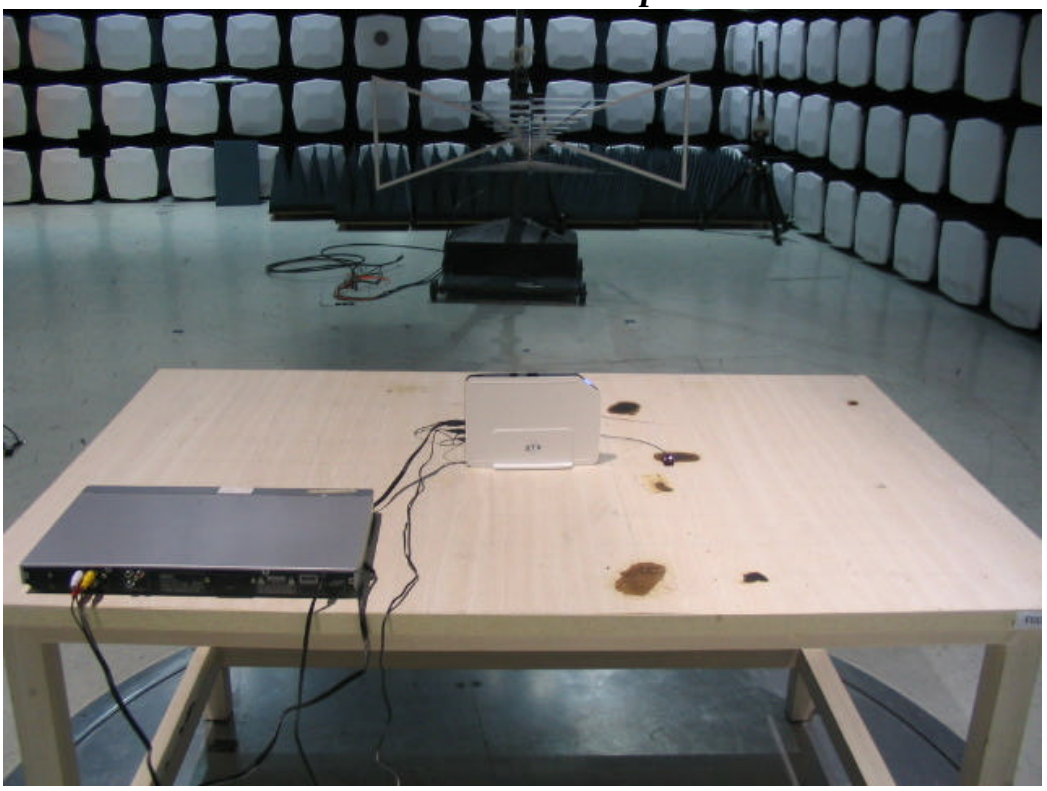

RBW 1 kHz
VBW 1 kHz
SWT 300 ms
Delta 3 [T2]
-26.00 dB
3.160000000 kHz
Ref 87 dBµV
Att 10 dB
Marker 1 [T2]
57.74 dBµV
2.431998680 GHz
Delta 2 [T2]
-26.20 dB
-5.200000000 kHz
2 PK VIEW
Center 2.43199728 GHz
2 kHz/
Span 20 kHz


RBW 1 kHz
VBW 1 kHz
SWT 300 ms
Delta 3 [T2]
-27.90 dB
3.600000000 kHz
Ref 102 dBµV
Att 10 dB
Marker 1 [T2]
62.27 dBµV
2.468023680 GHz
Delta 2 [T2]
-26.46 dB
-9.800000000 kHz
2 PK VIEW
Center 2.46802228 GHz
5 kHz/
Span 50 kHz

APPENDIX 1

PHOTOGRAPHS OF SET UP

Radiated Emission Setup Photo

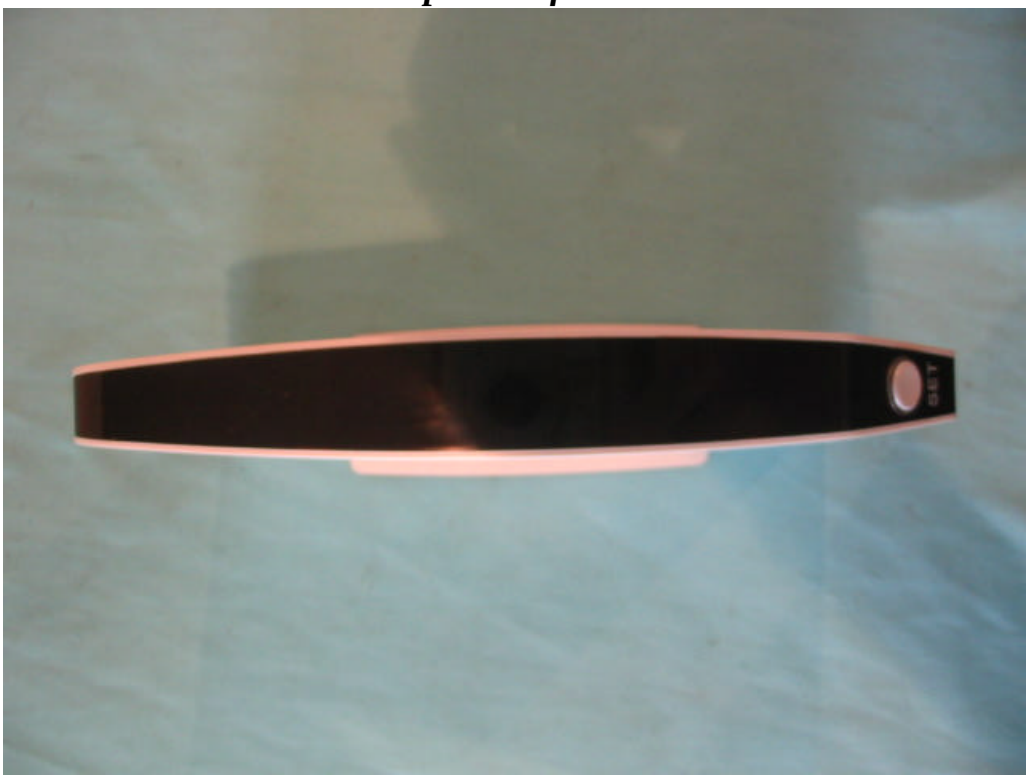


Conducted Emission Setup Photo

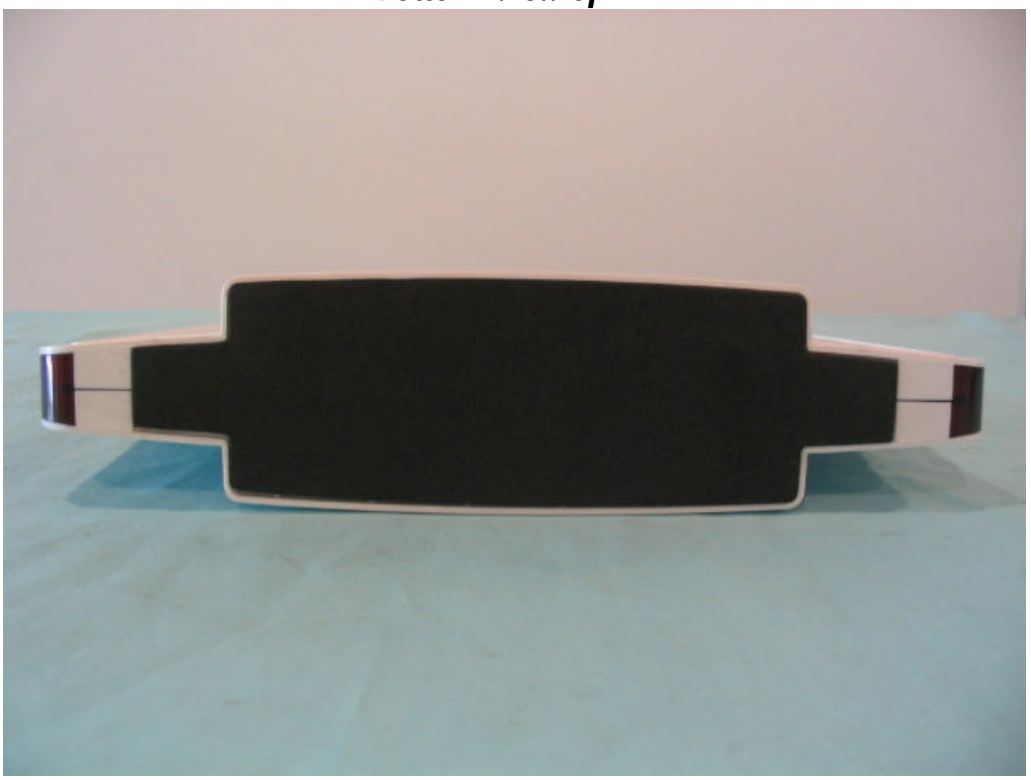
APPENDIX 2

PHOTOGRAPHS OF EUT

Top View of TX



Bottom View of TX



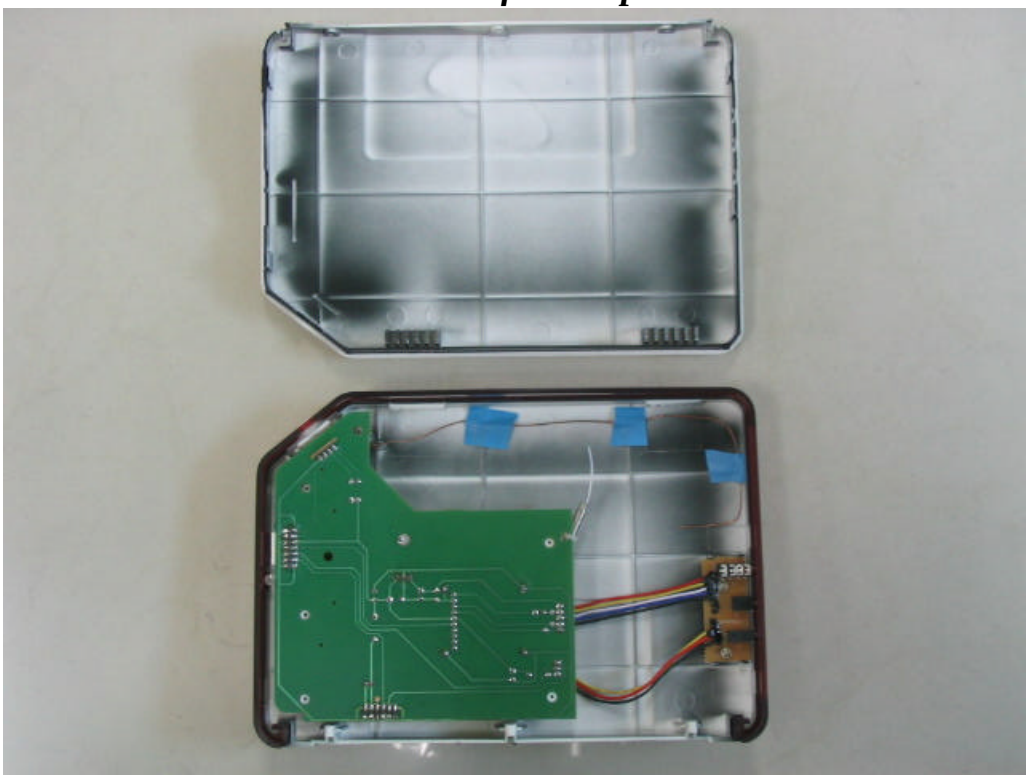
Front View of TX

Back View of TX

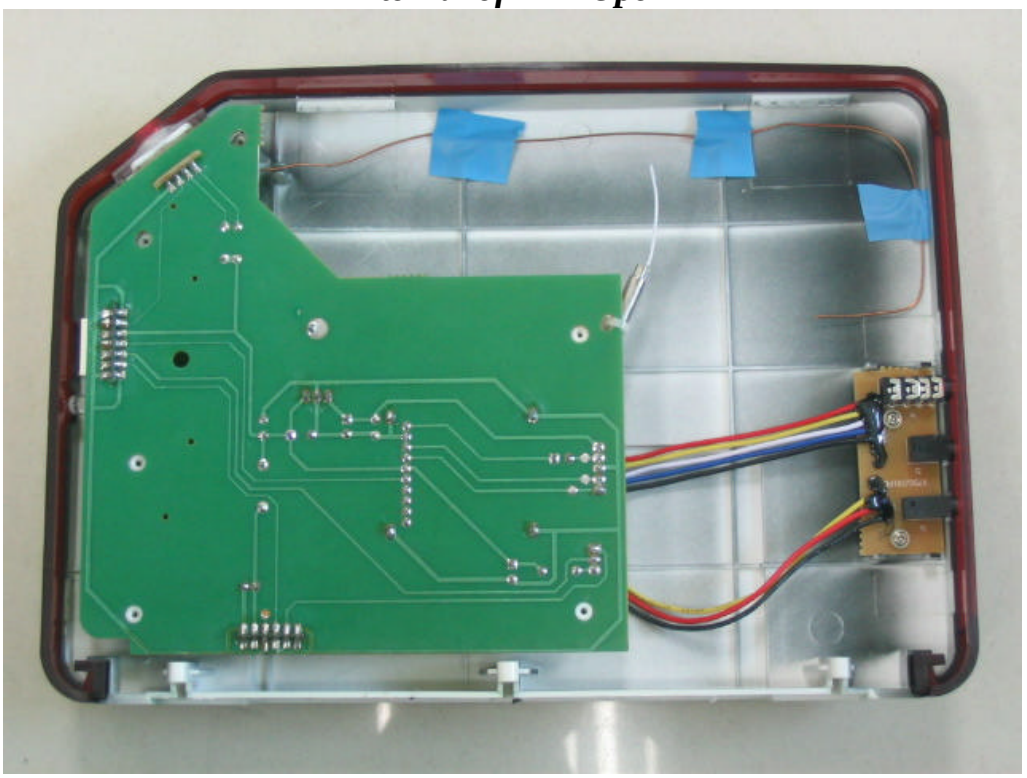
Left View of TX

Right View of TX

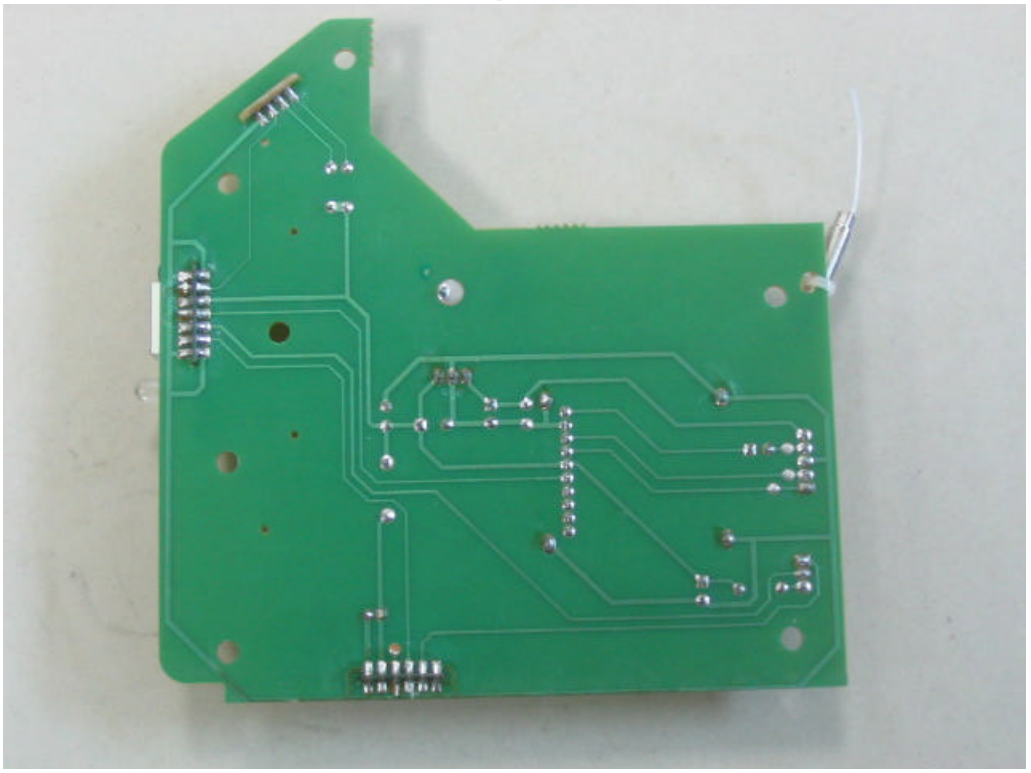
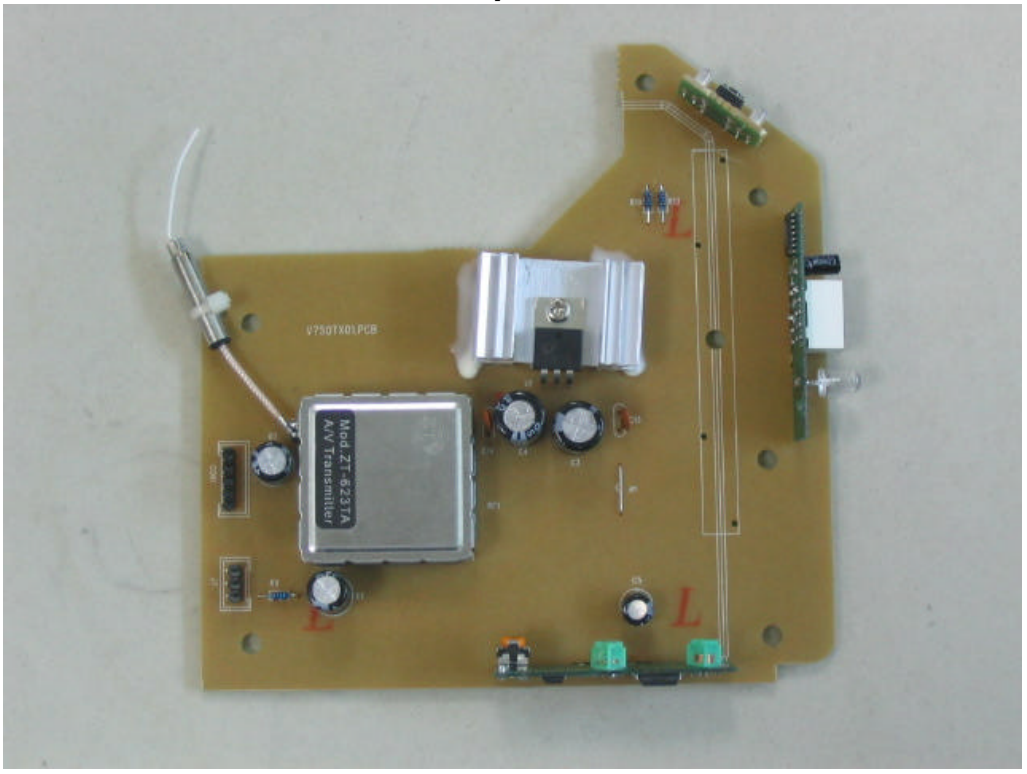
Internal of TX– Open



Internal of TX– Open



Internal of TX– 1



Internal of TX– 2