

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

OF

AUDIO FM TRANSMITTER

MODEL No.: AT400-2

Brand Name: K-mate

FCC ID: RLQAT400-2

REPORT NO: SZE06051710932R

ISSUE DATE: July 10, 2006

Prepared for

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VERIFICATION OF COMPLIANCE

Applicant:	Zhongshan K-mate General Elec. Co., Ltd. 3/F B1 Building Fuwan Ind. Zone Sun Wen East Road, Zhongshan, China
Manufacturer:	Zhongshan K-mate General Elec. Co., Ltd. 3/F B1 Building Fuwan Ind. Zone Sun Wen East Road, Zhongshan, China
Product Description:	FM Stereo Wireless Emitter
Brand Name:	K-mate
Model Number:	AT400-2
Serial Number:	N/A
File Number:	SZE06051710932R
Date of Test:	July 2, 2006 ~ July 10, 2006

We hereby certify that:

The EUT was assessed by Centre Testing International 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 conducted and radiated emission limits of FCC Rules Part 15.239.

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

Approved By



***Jimmy Zhang / Lab. Director
Centre Testing International (CTI)***

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1. GENERAL INFORMATION

1.1 Product Description

The Zhongshan K-mate General Elec. Co., Ltd., Model: AT400-2 (referred to as the EUT in this report) The EUT is an short range, lower power, Audio FM Transmitter designed as an “Output 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: 88.1 MHz ~ 107.9 MHz
- B). Modulation: FM
- C). Antenna Designation: Integral
- D). Power Supply: 12 Vdc by battery

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: RLQAT400-2 filing to comply with Section 15.239 of the FCC Part 15, Subpart C Rules.

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 open area test site and conducted measurement facility used to collect the radiated data is located on No. 6, Jinao industrial park, No.35 Jukeng Road, Dashuikeng Village, Guanlan Town, Baoan District, Shenzhen, China. The Open Area 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.

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 a turn table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4-2001. 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 placed on a 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.

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 any emission within this band (section 15.239 frequency between 88MHz –108MHz) shall not exceed 250 micro volts/meter at 3 meters. (47.96dB 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 (uV/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 Powered By Battery



Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
E-1	Audio FM Transmitter	K-mate	AT400-2	RLQAT400-2	N/A	EUT
E-2	Mp3	Apple	N/A	N/A	N/A	

Summary Of Test Results

FCC Rules	Description Of Test	Result
§ 15.207	Conducted Emission	N/A
§ 15.239	Radiated Emission	Compliant
§ 15.239	26 dB Bandwidth	Compliant

1. Description of test modes

1. The EUT (Wireless FM transmitter) has been tested under condition that powered either by battery or by adapter.
2. The EUT stay in continuous transmitting mode.

Conducted Emissions Test (Not Applicable)**5.1 Measurement Procedure:**

1. The EUT powered by adapter 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 # 4					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI 30	N/A	06/07/2006	06/06/2007
Spectrum Analyzer	ADVANTEST	R3132	120901472	06/07/2006	06/06/2007
LISN	EMCO	3825/2	1371	02/26/2006	02/25/2007
LISN	EMCO	3825/2	8901-1459	02/26/2006	02/25/2007

5.4 Measurement Result:

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

FREQ MHz	PEAK dBuV	Q.P. Raw dBuV	AVG Raw dBuV	Q.P. Limit dBuV	AVG Limit dBuV	Q.P. Margin dB	AVG Margin dB	NOTE
								L1
								L1
								L1
								L1
								L1
								L1
								L2
								L2
								L2
								L2
								L2

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

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

5.5 Conducted Measurement Photos:

N/A

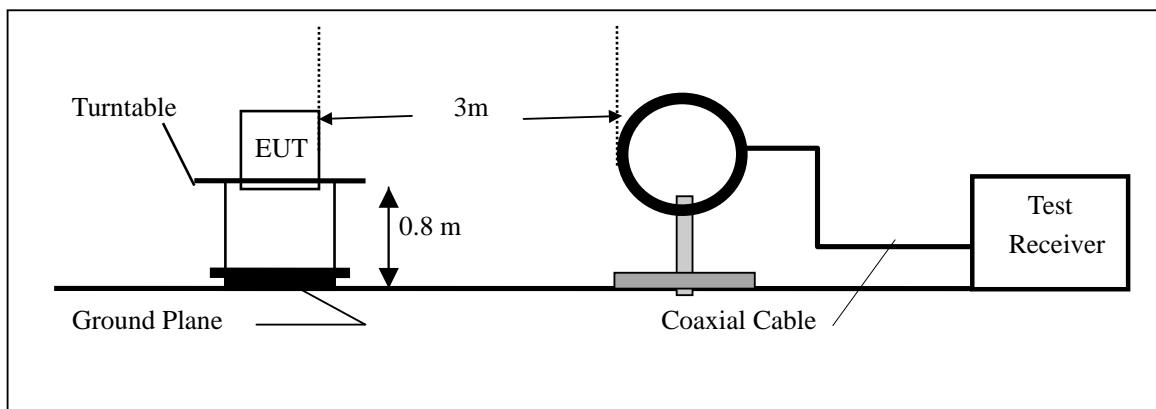
6. Radiated Emission Test

6.1 Measurement Procedure

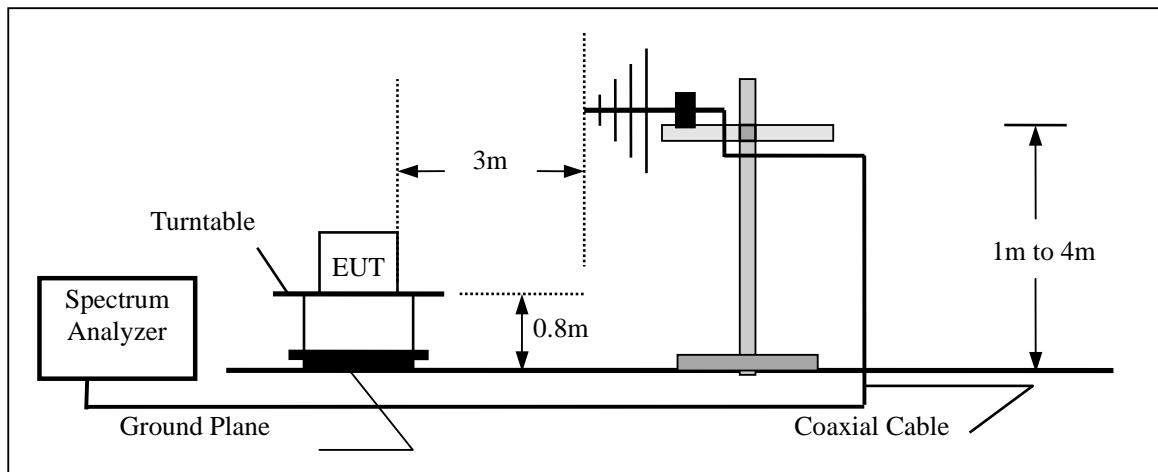
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on at least twelve highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat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



6.3 Measurement Equipment Used:

Open Area Test Site # 3					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	ADVANTEST	R3132	120901472	06/07/2006	06/06/2007
EMI Test Receiver	R&S	ESCI 30	N/A	06/07/2006	06/06/2007
Pre-Amplifier	HP	8447D	2944A07999	06/07/2006	06/06/2007
Bi-log Antenna	EMCO	3142	9910-1436	06/07/2006	06/06/2007

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:

$$\mathbf{FS = RA + AF - CL - AG}$$

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 Powered by Adapter Test Date : July 10, 2006
Fundamental Frequency: 88.1 MHz Test By: Jimmy
Temperature : 24 Pol: Ver & Hor
Humidity : 56 %
Judgement : Passed by -1.93 dB at 88.1 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
88.100	V	Peak	33.97	12.06	46.03	47.96	-1.93	F
88.100	H	Peak	30.15	12.06	42.21	47.96	-5.75	F
176.200	V	Peak	26.38	10.69	37.07	43.50	-6.43	H
176.200	H	Peak	22.47	10.69	33.16	43.50	-10.34	H
264.300	V	Peak	20.34	12.59	32.93	46.00	-13.07	H
264.300	H	Peak	17.96	12.59	30.55	46.00	-15.45	H
352.400	V	Peak	16.47	15.02	31.49	46.00	-14.51	H
352.400	H	Peak	14.32	15.02	29.34	46.00	-16.66	H

Remark :

- (1) Measuring frequencies from 25 MHz to the 1GHz.
- (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 between 30MHz to 1GHz was 120KHz.

Operation Mode: Transmitting Mode Powered by Adapter Test Date : July10, 2006
Fundamental Frequency: 98.0 MHz Test By: Jimmy
Temperature : 24 Pol: Ver & Hor
Humidity : 56 %
Judgement : Passed by -2.88 dB at 98.00 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
98.000	V	Peak	32.49	12.59	45.08	47.96	-2.88	F
98.000	H	Peak	29.83	12.59	42.42	47.96	-5.54	F
196.000	V	Peak	27.66	11.06	38.72	43.50	-4.78	H
196.000	H	Peak	24.57	11.06	35.63	43.50	-7.87	H
294.000	V	Peak	22.14	12.98	35.12	46.00	-10.88	H
294.000	H	Peak	19.82	12.98	32.80	46.00	-13.20	H
392.000	V	Peak	17.56	17.64	35.20	46.00	-10.80	H
392.000	H	Peak	14.18	17.64	31.82	46.00	-14.18	H

Remark :

- (1) Measuring frequencies from 25 MHz to the 1GHz.
- (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 between 30MHz to 1GHz was 120KHz.

Operation Mode: Transmitting Mode Power by Adapter Test Date : July 10, 2006
 Fundamental Frequency: 107.9 MHz Test By: Jimmy
 Temperature : 24 Pol: Ver & Hor
 Humidity: 56 %
 Judgement: Passed by -2.00 dB at 107.9 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
107.900	V	Peak	34.58	12.06	46.64	47.96	-1.32	F
107.900	H	Peak	32.25	12.06	44.31	47.96	-3.65	F
215.800	V	Peak	27.17	13.32	40.49	43.50	-3.01	H
215.800	H	Peak	23.96	13.32	37.28	43.50	-6.22	H
323.700	V	Peak	24.44	12.59	37.03	46.00	-8.97	H
323.700	H	Peak	21.05	12.63	33.68	46.00	-12.32	H
431.600	V	Peak	17.43	18.02	35.45	46.00	-10.55	H
431.600	H	Peak	13.11	18.02	31.13	46.00	-14.87	H

Remark :

- (1) Measuring frequencies from 25 MHz to the 1GHz.
- (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 between 30MHz to 1GHz was 120KHz.

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, Span =200KHz.
4. Set SPA Max hold. Mark peak, -26dB.

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:

Measurement Result for the Bottom Channel(88.1 MHz):

26 dB Bandwidth =135.7 KHz

The bottom frequency covered by the 26 dB bandwidth is 88.043 MHz

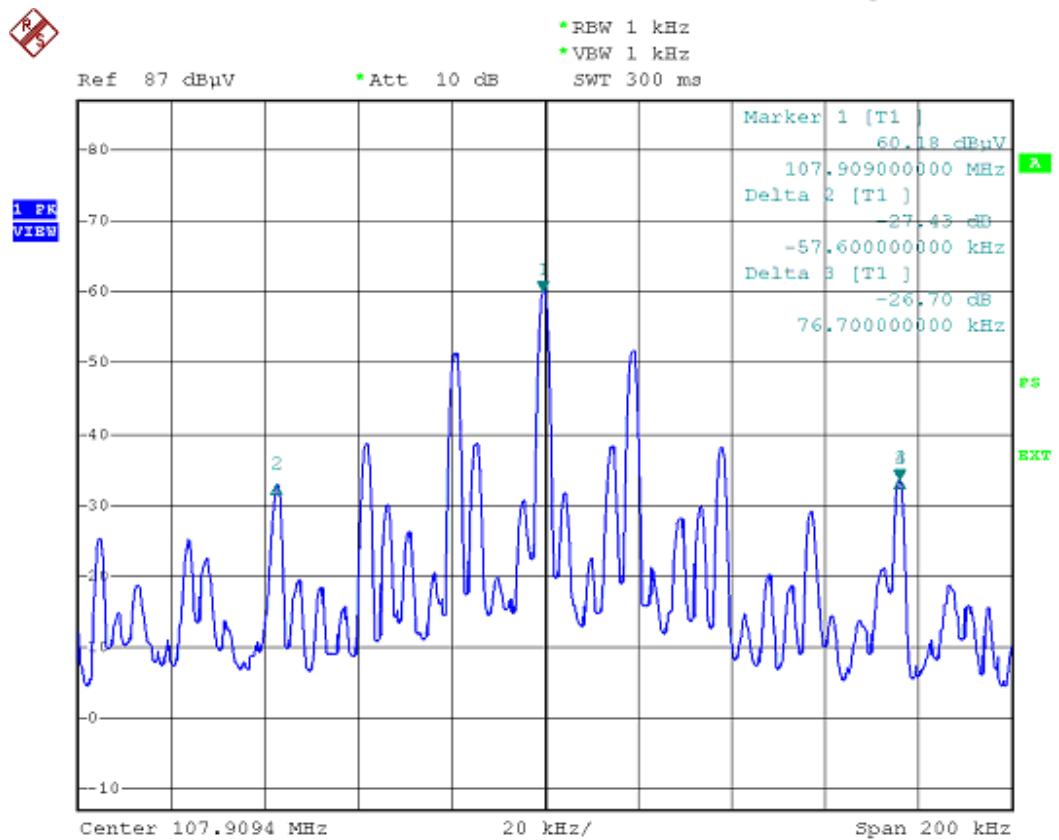
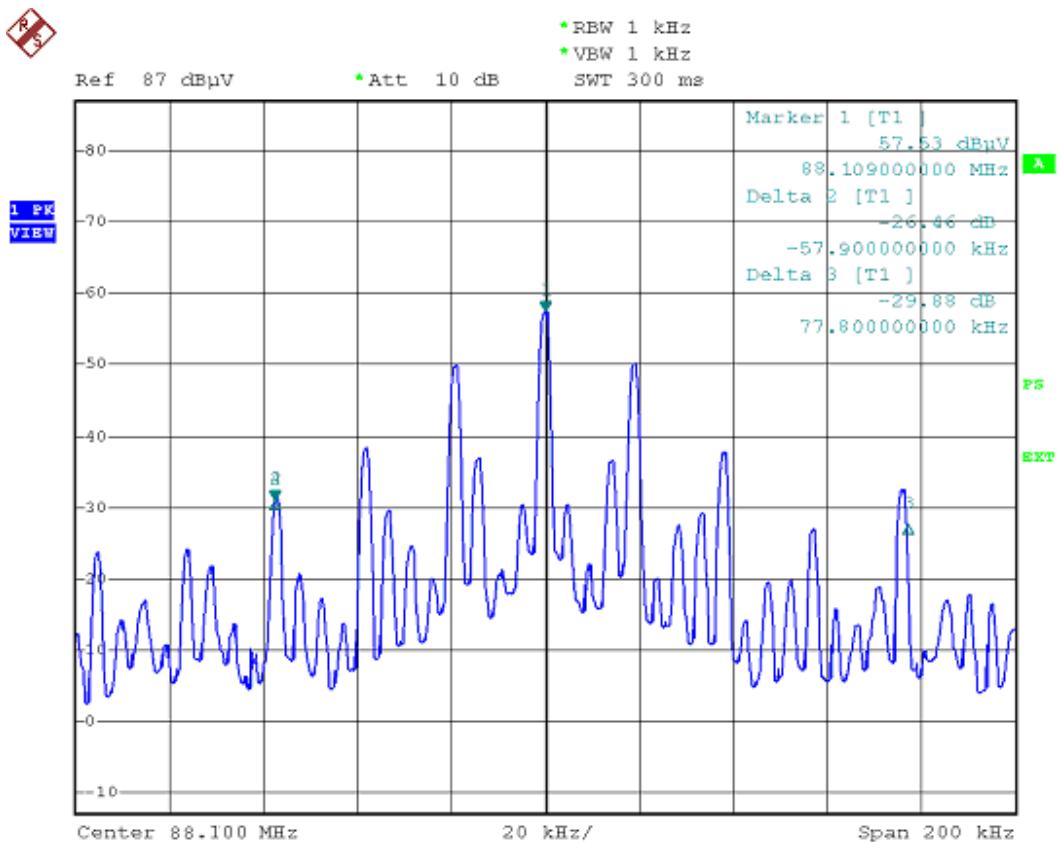
Measurement Result for the Top Channel (107.9 MHz):

26 dB Bandwidth =134.3 KHz

The top frequency covered by the 26 dB bandwidth is 107.9767 MHz

Refer to attached data chart.

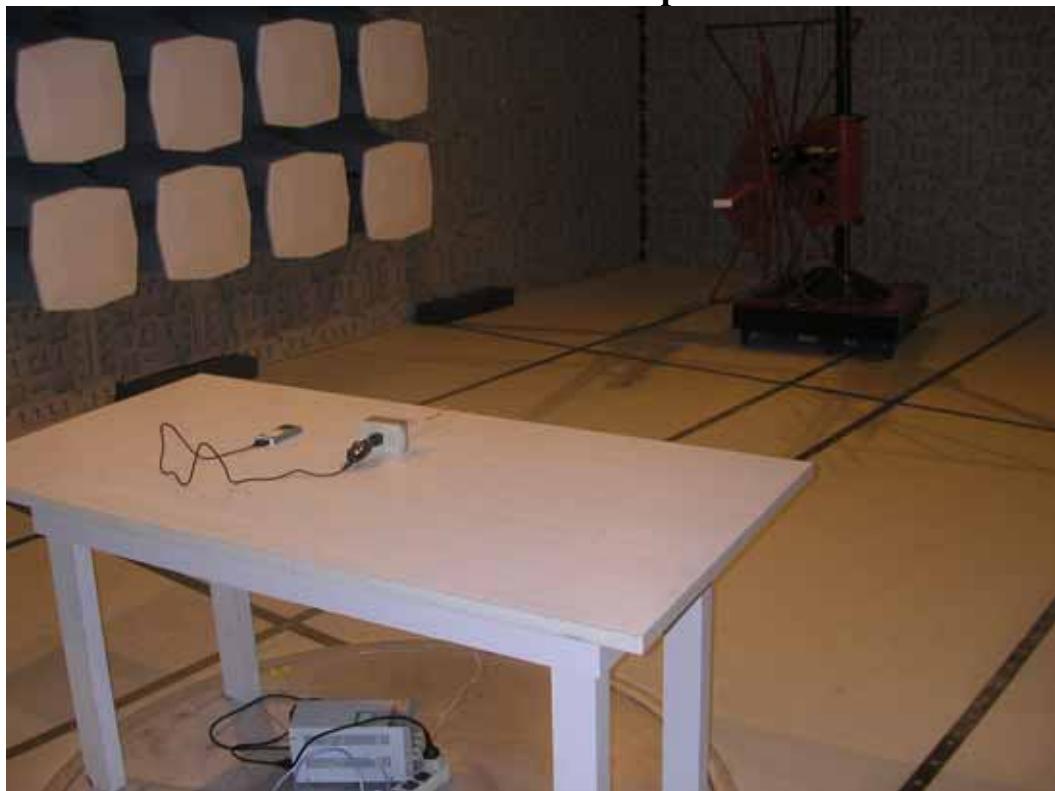
26dB Bandwidth Test Data :



APPENDIX 1

PHOTOGRAPHS OF SET UP

Radiated Emission Setup Photos



APPENDIX 2

PHOTOGRAPHS OF EUT

Front View of EUT



Back View of EUT



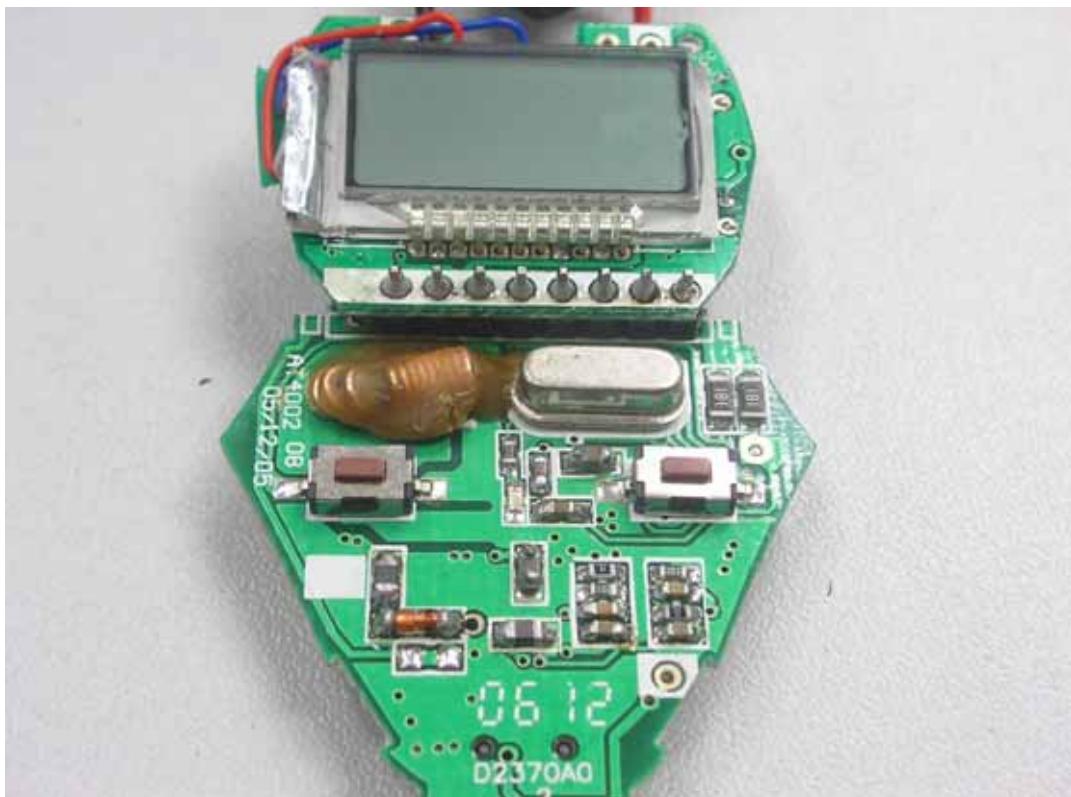
Left View of EUT



System View of EUT



Internal View of EUT-1



Internal View of EUT-2

