FCC Part 15 Subpart C

TEST REPORT

of

E.U.T. : FM Modular
FCC ID. : TI79295300
MODEL : Wireless FM Transmitter
Working Frequency : 88.1~107.9 MHz

for

APPLICANT : Rosen Entertainment Systems
ADDRESS : 1120 California Ave., Corona, CA 92881

Test Performed by

ELECTRONICS TESTING CENTER, TAIWAN

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Report Number : ET94R-08-060

TEST REPORT CERTIFICATION

Applicant : Rosen Entertainment Systems
1120 California Ave., Corona, CA 92881

Manufacture : Rosen Entertainment Systems
1120 California Ave., Corona, CA 92881

Description of EUT :

a) Type of EUT	: FM MODULAR
b) Trade Name	: ROSEN
c) Model No	: Wireless FM Transmitter
d) Working Frequency	: 88.1~107.9 MHz
e) Power Supply	: 5.0 V DC

Regulation Applied : FCC Rules and Regulations Part 15 Subpart C (2005)

I HEREBY CERTIFY THAT; The data shown in this report were made in accordance with the procedures given in ANSI C63.4 and the energy emitted by the device was founded to be within the limits applicable. I assume full responsibility for accuracy and completeness of these data.

Issued Date : Oct. 14, 2005

Test Engineer : Vincent Chang
(Vincent Chang)

Approve & Authorized Signer : Will Yauo
Will Yauo, Manager
EMC Dept. II of ELECTRONICS
TESTING CENTER, TAIWAN

Table of Contents Page

1. GENERAL INFORMATION 1

1.1 Product Description 1
1.2 Characteristics of Device: 1
1.3 Test Methodology 1
1.4 Test Facility 1

2. DEFINITION AND LIMITS 2

2.1 Definition 2
2.2 Restricted Bands of Operation 2
2.3 Limitation 2
2.4 Labeling Requirement 3
2.5 User Information 3

3. SYSTEM TEST CONFIGURATION 4

3.1 Justification 4
3.2 Devices for Tested System 4

4 RADIATED EMISSION MEASUREMENT 5

4.1 Applicable Standard 5
4.2 Measurement Procedure 5
4.3 Measuring Instrument 7
4.4 Test Data 8
4.4.1 Fundamental and Harmonics 8
4.4.2 Other Emissions 11
4.5 Field Strength Calculation 11
4.6 Radiated Measurement Photos 12

5 CONDUCTED EMISSION MEASUREMENT 15

5.1 Standard Applicable 15

6 ANTENNA REQUIREMENT 16

6.1 Standard Applicable 16
6.2 Antenna Construction 16

7 EMISSION BAND MEASUREMENT 17

7.1 Standard Applicable 17
7.2 Measurement Procedure 17
7.3 Measurement Equipment 17
7.4 Measurement Data 17

APPENDIX 1 : PLOTTED DATA FOR EMISSION BAND MEASUREMENT 18

1. GENERAL INFORMATION

1.1 Product Description

a) Type of EUT	: FM MODULAR
b) Trade Name	: ROSEN
c) Model No	: Wireless FM Transmitter
d) Frequency Modulation	: 88.1~107.9 MHz
e) Power Supply	: 5.0 V DC

1.2 Characteristics of Device:

The EUT is a 12-channel FM transmitter designed to transmit audio signals over the FM frequency band to enable users to listen to audio from an independent video system over the existing car audio system via the radio.

1.3 Test Methodology

Both conducted and radiated testing was performed according to the procedures in

chapter 13 of ANSI C63.4 (2003)

The equipment under test was operated in its normal operating mode for the purpose of the measurements. The test signal is 1kHz standard test audio signal.

The receiving antenna polarized horizontally was varied from 1 to 4 meters and the wooden turntable was rotated through 360 degrees to obtain the highest reading on the field strength meter or on the display of the spectrum analyzer. And also, each emission was to be maximized by changing the orientation of the equipment under test.

1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the roof top of Building at No.34, Lin 5, Ding Fu Tsun, Linkou Hsiang, Taipei Hsien, Taiwan, R.O.C.
This site has been fully described in a report submitted to your office, and accepted in a letter dated Dec. 03, 2002.

2. DEFINITION AND LIMITS

2.1 Definition

Intentional radiator:
A device that intentionally generates and emits radio frequency energy by radiation or induction.

2.2 Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42-16.423	399.9-410	4.5-5.15
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	2655-2900	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	3360-4400	Above 38.6
13.36-13.41			

Remark "**" : Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

2.3 Limitation

(1) Conducted Emission Limits :

Except for Class A digital devices, for equpment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency MHz	Quasi Peak dBµV	Average dBµV
0.15 - 0.5	66-56*	56-46*
0.5 - 5.0	56	46
5.0 - 30.0	60	50

* Decreases with the logarithm of the frequency

(2) Radiated Emission Limits :

According to 15.239 the field strength of emissions from intentional radiators operated under these frequency bands shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental	
	μV/meter	dBμV/meter
88-108	250	48

Field strength limits are at the distance of 3 meters, emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209,as following table:

Other Frequencies (MHz)	Field Strength of Fundamental	
	μV/meter	dBμV/meter
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

(3) Antenna Requirement :

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

(4) Emissions Band Limits :

According to 15.239(a), emissions from the intentional radiator shall be confined within a band 200kHz wide centered on the operating frequency. The 200 kHz band shall lie wholly within the frequency range of 88-108 MHz.

2.4 Labeling Requirement

The device shall bear the following statement in a conspicuous location on the device :

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

2.5 User Information

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

3. SYSTEM TEST CONFIGURATION

3.1 Justification

For both radiated and conducted emissions, the system was tested in a stand-alone configuration. The peripherals other than EUT were connected in normally standing by situation.

All measurement were intentional to maximum the emissions from EUT by varying the connection cables, therefore, the test result is sure to meet the applicable requirement.

3.2 Devices for Tested System

Device	Manufacture	Model / FCC ID.	Description
FM MODULAR*	Rosen Entertainment Systems.	Wireless FM Transmitter /TI79295300	----
DC Power Suppy	GW	GPC-3030D	1.0m Unshielded DC Cable
Walkman	AIWA	TAI93	----

Remark "*" means equipment under test.

4 RADIATED EMISSION MEASUREMENT

4.1 Applicable Standard

For intentional radiators operation in the band 88 – 108 MHz, the radiated emission shall comply with §15.239(b) & 15.239(c).

4.2 Measurement Procedure

1. Setup the configuration per figure 1 and 2 for frequencies measured below and above 1 GHz respectively.
2. For emission frequencies measured below 1 GHz, a pre-scan is performed in a shielded chamber to determine the accurate frequencies of higher emissions will be checked on a open test site. As the same purpose, for emission frequencies measured above 1 GHz, a pre-scan also be performed with a 1 meter measuring distance before final test.
3. For emission frequencies measured below and above 1 GHz, set the spectrum analyzer on a 100 kHz and 1 MHz resolution bandwidth respectively for each frequency measured in step 2.
4. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0° to 360° with a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading. A RF test receiver is also used to confirm emissions measured.
5. Repeat step 4 until all frequencies need to be measured were complete.
6. Repeat step 5 with search antenna in vertical polarized orientations.
7. Check the three frequencies of highest emission with varying the placement of cables associated with EUT to obtain the worse case and record the result.

Figure 1 : Frequencies measured at 30MHz to 1 GHz configuration

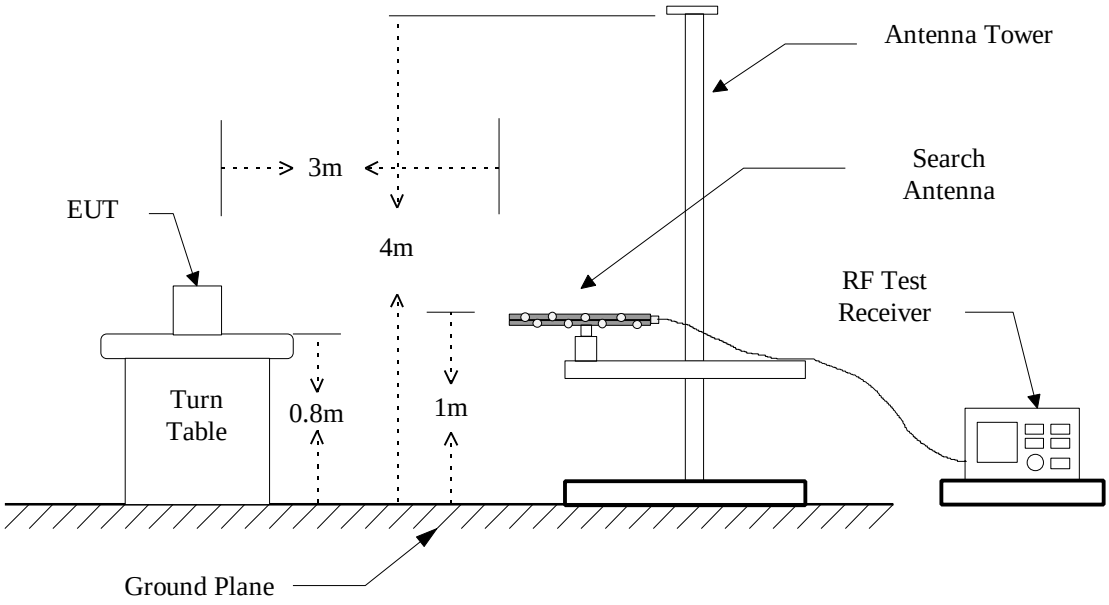
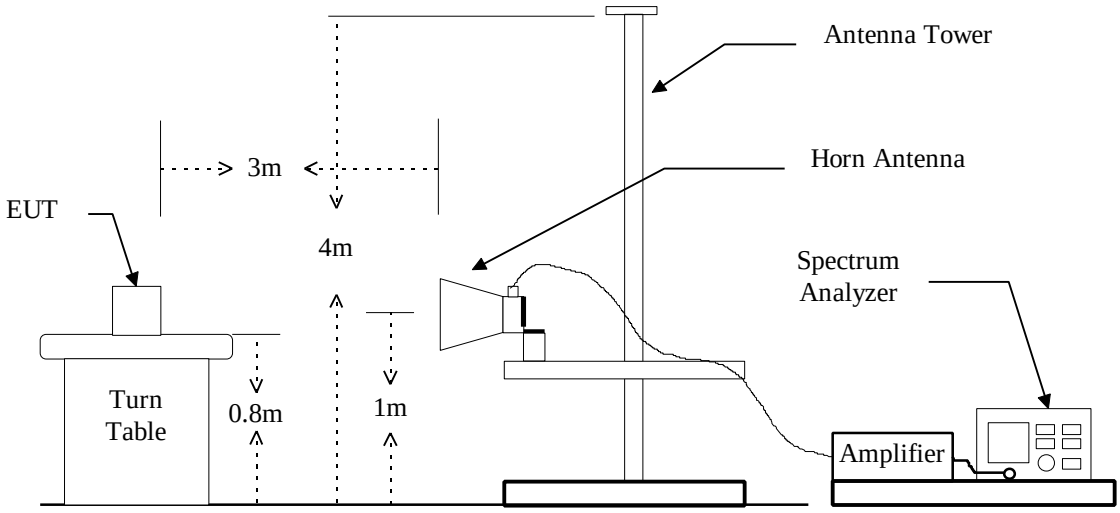


Figure 2 : Frequencies measured above 1 GHz configuration



4.3 Measuring Instrument

The following instrument are used for radiated emissions measurement:

Equipment	Manufacturer	Model No.	Next Cal. Date
Test Receiver	Rohde & Schwarz	ESVS30	09/05/2005
Amplifier	HP	8447D	10/17/2005
Spectrum	R&S	FSP3	10/28/2005
Log-periodic Antenna	EMCO	3146	10/05/2005
Biconical Antenna	EMCO	3110B	10/05/2005
Double Ridged Antenna	EMCO	3115	04/13/2006
Amplifier	HP	8449B	09/07/2005
Amplifier	HP	83051A	04/18/2006
Spectrum	Rohde & Schwarz	FSP40	07/05/2006
Spectrum	HP	8564E	08/08/2006

Measuring instrument setup in measured frequency band when specified detector function is used :

Frequency Band (MHz)	Instrument	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	RF Test Receiver	Quasi-Peak	120 kHz	N/A
	Spectrum Analyzer	Peak	100 kHz	100 kHz
Above 1000	Spectrum Analyzer	Peak	1 MHz	1 MHz
	Spectrum Analyzer	Average	1 MHz	10Hz

4.4 Test Data

4.4.1 Fundamental and Harmonics

A. Fundamental

Fundamental Frequency : 88.1 MHz Audio Modulation : 1 kHz
Test Date : Aug. 16, 2005 Temperature : 26 °C Humidity : 55 %

Frequency	Reading (dBuV)				Factor	Result @3m		Limit @3m		Margin	Table	Ant.
	H		V		(dB)	(dBuV/m)		(dBuV/m)			Deg.	High
(MHz)	Peak	Ave	Peak	Ave	Corr.	Peak	Ave	Peak	Ave	(dB)	(Deg.)	(m)
88.099	53.0	***	42.0	***	-14.2	38.8	***	68.0	48.0	-29.2	186	1.2

Fundamental Frequency : 106.7 MHz Audio Modulation : 1 kHz
Test Date : Oct. 13, 2005 Temperature : 24 °C Humidity : 60 %

Frequency	Reading (dBuV)				Factor	Result @3m		Limit @3m		Margin	Table	Ant.
	H		V		(dB)	(dBuV/m)		(dBuV/m)			Deg.	High
(MHz)	Peak	Ave	Peak	Ave	Corr.	Peak	Ave	Peak	Ave	(dB)	(Deg.)	(m)
106.700	52.4	***	56.6	***	-12.4	44.2	***	68.0	48.0	-23.8	185	1.5

Fundamental Frequency : 107.9 MHz Audio Modulation : 1 kHz
Test Date : Aug. 16, 2005 Temperature : 26 °C Humidity : 55 %

Frequency	Reading (dBuV)				Factor	Result @3m		Limit @3m		Margin	Table	Ant.
	H		V		(dB)	(dBuV/m)		(dBuV/m)			Deg.	High
(MHz)	Peak	Ave	Peak	Ave	Corr.	Peak	Ave	Peak	Ave	(dB)	(Deg.)	(m)
107.902	59.8	***	52.0	***	-12.2	47.6	***	68.0	48.0	-20.4	186	1.2

Note :

1. *Item of margin shown in above table refer to average limit.*
2. *It is considered that the results of average comply with average limit when measuring data with a peak function detector meet the average limit. Mark "***" means that Peak result is meet average limit.*
3. *Remark "---" means that the emissions level is too low to be measured.*
4. *Item "Margin" referred to Average limit while there is only peak result.*
5. *The expanded uncertainty of the radiated emission tests is 3.53 dB.*

B. Harmonics & Other Spurious

Frequency : 88.1 MHz Audio Modulation : 1 kHz
Test Date : Aug. 16, 2005 Temperature : 26 °C Humidity : 55 %

Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)	Corrected Factor (dB)	Result @3m (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (m)
176.198	H	48.7	-9.1	39.6	43.5	-3.9	188	1.1
264.297	H	44.0	-3.8	40.2	46.0	-5.8	179	1.2
352.396	H	48.8	-10.1	38.7	46.0	-7.3	190	1.0
440.495	H	44.1	-5.6	38.5	46.0	-7.5	179	1.2
528.594	H	33.8	-5.0	28.8	46.0	-17.2	190	1.0
616.693	H/V	---	-3.7	---	46.0	---	---	---
704.792	H/V	---	-1.0	---	46.0	---	---	---
792.891	H/V	---	0.4	---	46.0	---	---	---
880.990	H/V	---	2.3	---	46.0	---	---	---

Frequency : 106.7 MHz Audio Modulation : 1 kHz
Test Date : Oct. 13, 2005 Temperature : 24 °C Humidity : 60 %

Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)	Corrected Factor (dB)	Result @3m (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (m)
213.400	V	35.7	-6.3	29.4	43.5	-14.1	188	1.1
320.100	V	36.9	-6.8	30.1	46.0	-15.9	179	1.2
426.800	H/V	---	-5.5	---	46.0	---	---	---
533.500	H/V	---	-5.1	---	46.0	---	---	---
640.200	H/V	---	-3.1	---	46.0	---	---	---
746.900	H/V	---	-0.4	---	46.0	---	---	---
853.600	H/V	---	2.2	---	46.0	---	---	---
960.300	H/V	---	3.3	---	54.0	---	---	---
1067.000	H/V	---	-9.4	---	54.0	---	---	---

Note :

1. *Item of margin shown in above table refer to average limit.*
2. *It is considered that the results of average comply with average limit when measuring data with a peak function detector meet the average limit. Mark "***" means that Peak result is meet average limit.*
3. *Remark "---" means that the emissions level is too low to be measured.*
4. *Item "Margin" referred to Average limit while there is only peak result.*
5. *The expanded uncertainty of the radiated emission tests is 3.53 dB.*

Frequency : 107.9 MHz Audio Modulation : 1 kHz
Test Date : Aug. 16, 2005 Temperature : 26 °C Humidity : 55 %

Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)	Corrected Factor (dB)	Result @3m (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (m)
215.804	H	45.9	-6.1	39.8	43.5	-3.7	184	1.1
323.706	H	46.9	-6.7	40.2	46.0	-5.8	176	1.3
431.608	H	45.7	-5.5	40.2	46.0	-5.8	192	1.0
539.510	H	34.0	-5.1	28.9	46.0	-17.1	192	1.0
647.412	H/V	---	-2.9	---	46.0	---	---	---
755.314	H/V	---	-0.3	---	46.0	---	---	---
863.216	H/V	---	2.3	---	46.0	---	---	---
971.118	H/V	---	3.3	---	54.0	---	---	---

Note :

1. *Item of margin shown in above table refer to average limit.*
2. *It is considered that the results of average comply with average limit when measuring data with a peak function detector meet the average limit. Mark "***" means that Peak result is meet average limit.*
3. *Remark "---" means that the emissions level is too low to be measured.*
4. *Item "Margin" referred to Average limit while there is only peak result.*
5. *The expanded uncertainty of the radiated emission tests is 3.53 dB.*

4.4.2 Other Emissions

1. Operation Mode : Installed inside the host G10
Test Date : Oct. 13, 2005 Temperature : 24 °C Humidity : 60 %

Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)	Corrected Factor (dB)	Result @3m (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (m)
125.710	V	52.1	-11.2	40.9	43.5	-2.6	265	0.9
205.620	V	47.8	-6.8	41.0	43.5	-2.5	30	1.0
335.100	V	50.7	-8.2	42.5	46.0	-3.5	150	1.5
417.210	V	49.0	-5.8	43.2	46.0	-2.8	180	0.8
568.910	V	48.1	-5.3	42.8	46.0	-3.2	60	1.2
715.110	V	44.6	-0.9	43.7	46.0	-2.3	130	1.0

2. Operation Mode : Installed inside the host G10
Test Date : Oct. 13, 2005 Temperature : 24 °C Humidity : 60 %

Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)	Corrected Factor (dB)	Result @3m (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (m)
134.110	V	51.7	-11.2	40.5	43.5	-3.0	120	1.2
256.771	V	46.9	-3.9	43.0	46.0	-3.0	110	1.1
348.250	V	52.7	-10.2	42.5	46.0	-3.5	100	1.2
457.120	V	48.0	-5.3	42.7	46.0	-3.3	60	1.0
688.910	V	43.0	-1.0	42.0	46.0	-4.0	250	1.0
754.120	V	42.8	-0.3	42.5	46.0	-3.5	150	1.5

Note :

1. *Remark "---" means that the emissions level is too low to be measured.*
2. *The expanded uncertainty of the radiated emission tests is 3.53 dB.*

4.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. For the limit is employed average value, therefore the peak value can be transferred to average value by subtracting the duty factor. The basic equation with a sample calculation is as follows:

Peak = Reading + Corrected Factor

where

Corr. Factor = Antenna Factor + Cable Factor - Amplifier Gain (if any)

4.6 Radiated Measurement Photos

(Mode: G10)

(Mode: G8)

5 CONDUCTED EMISSION MEASUREMENT

5.1 Standard Applicable

This EUT is excused from investigation of conducted emission, for it is powered by battery only. According to §15.207 (c), measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.

For intentional device, Line Conducted Emission Limits are in accordance to §15.207(a)

6 ANTENNA REQUIREMENT

6.1 Standard Applicable

According to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

6.2 Antenna Construction

The antenna is permanently mounted on EUT, no consideration of replacement.

7 EMISSION BAND MEASUREMENT

7.1 Standard Applicable

According to 15.239(a), emissions from the intentional radiator shall be confined within a band 200kHz wide centered on the operating frequency. The 200 kHz band shall lie wholly within the frequency range of 88-108 MHz.

7.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 1 and measurement the turn on the EUT. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 10 kHz and 100kHz respectively with a convenient frequency span including 200kHz bandwidth of the emission.
4. Mark the bandwidth of 200kHz points and plot the graph on spectrum analyzer.
5. Repeat above procedures until all measured frequencies were complete.

7.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Next Cal. Date
Spectrum Analyzer	Rohde & Schwarz	FSP40	07/05/2006

7.4 Measurement Data

Test Date : Aug. 16, 2005 Temperature : 26 °C Humidity : 55%
Audio Modulation : 1 kHz

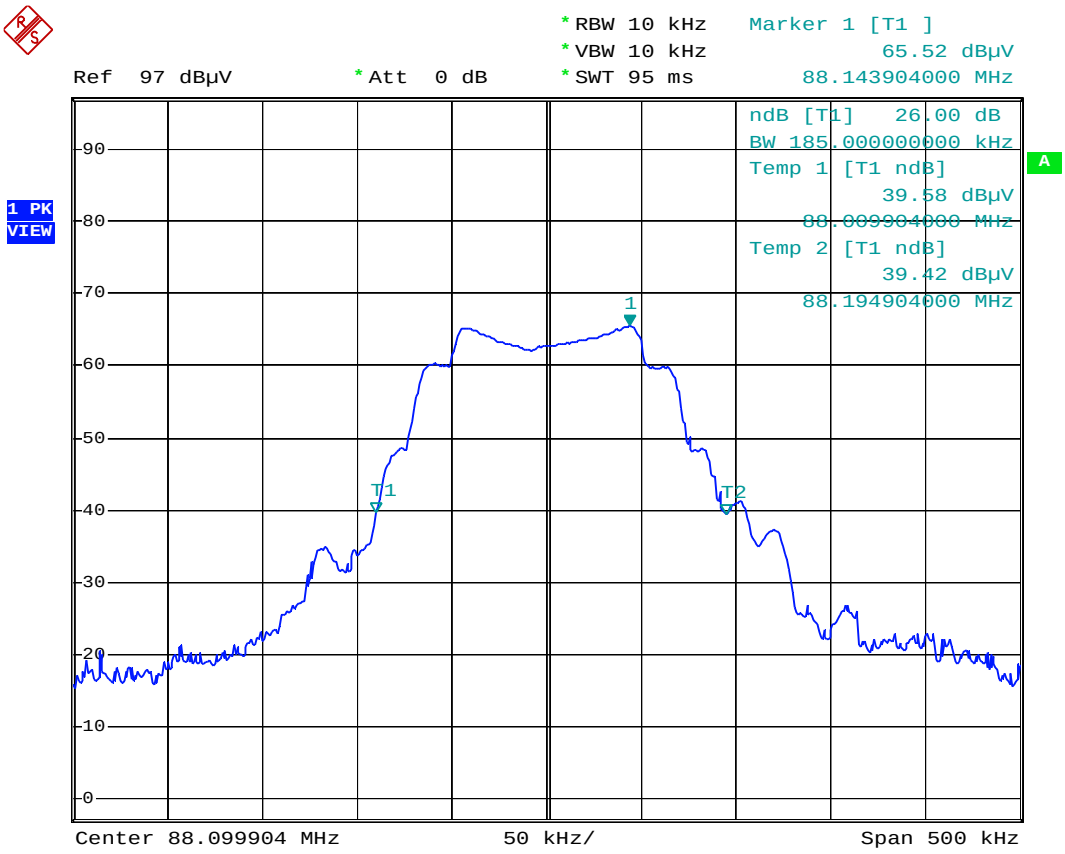
Test result:
The 26 dB bandwidth of 88.099 MHz = 185 kHz < 200 kHz.
The 26 dB bandwidth of 107.902 MHz = 185 kHz < 200 kHz.
The 200 Khz band lie wholly within the frequency range of 88-108 MHz.

Test Date : Oct. 12, 2005 Temperature : 25 °C Humidity : 58%
Audio Modulation : 1 kHz
Test result:
The 26 dB bandwidth of 106.700 MHz = 174 kHz < 200 kHz.

Note :

1. **Bandwidth test was done with 1 kHz audio modulation input signal. There is no user controlled function.**
2. **Please see appendix 1 for Plotted Data.**

Appendix 1 : Plotted Data For Emission Band Measurement



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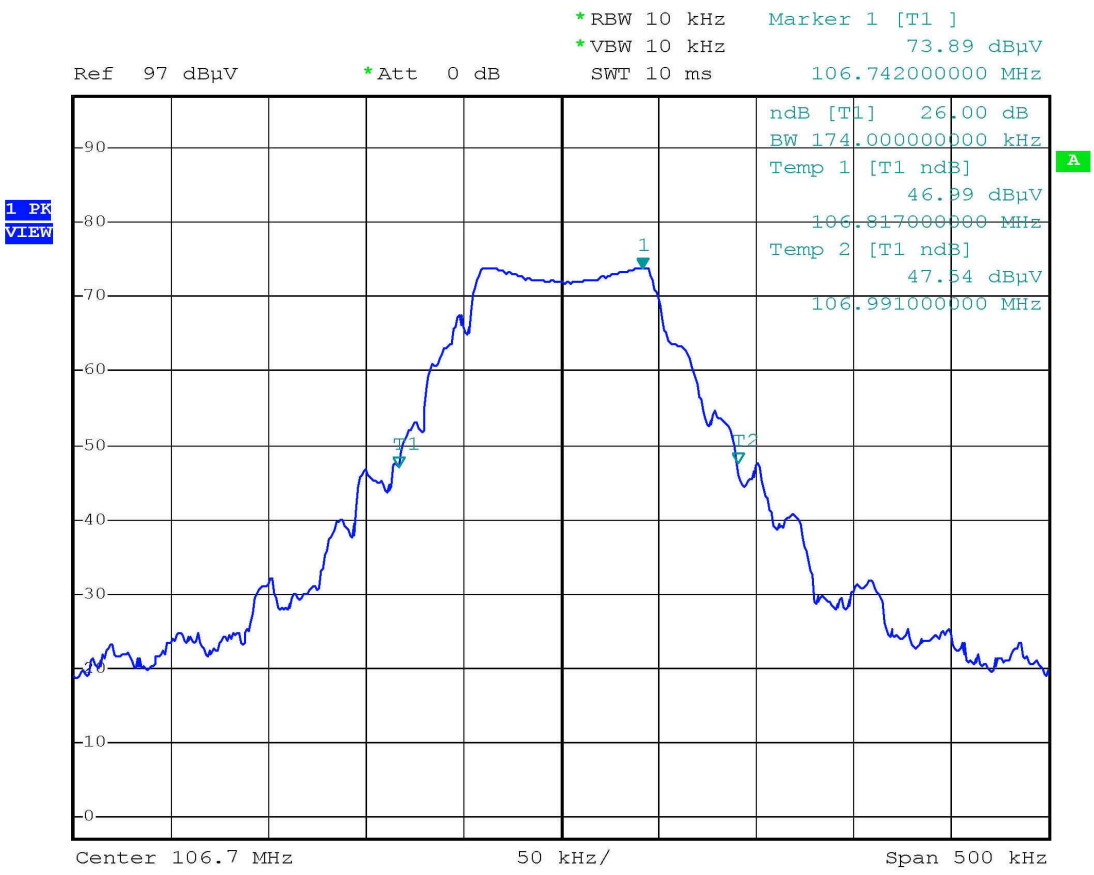

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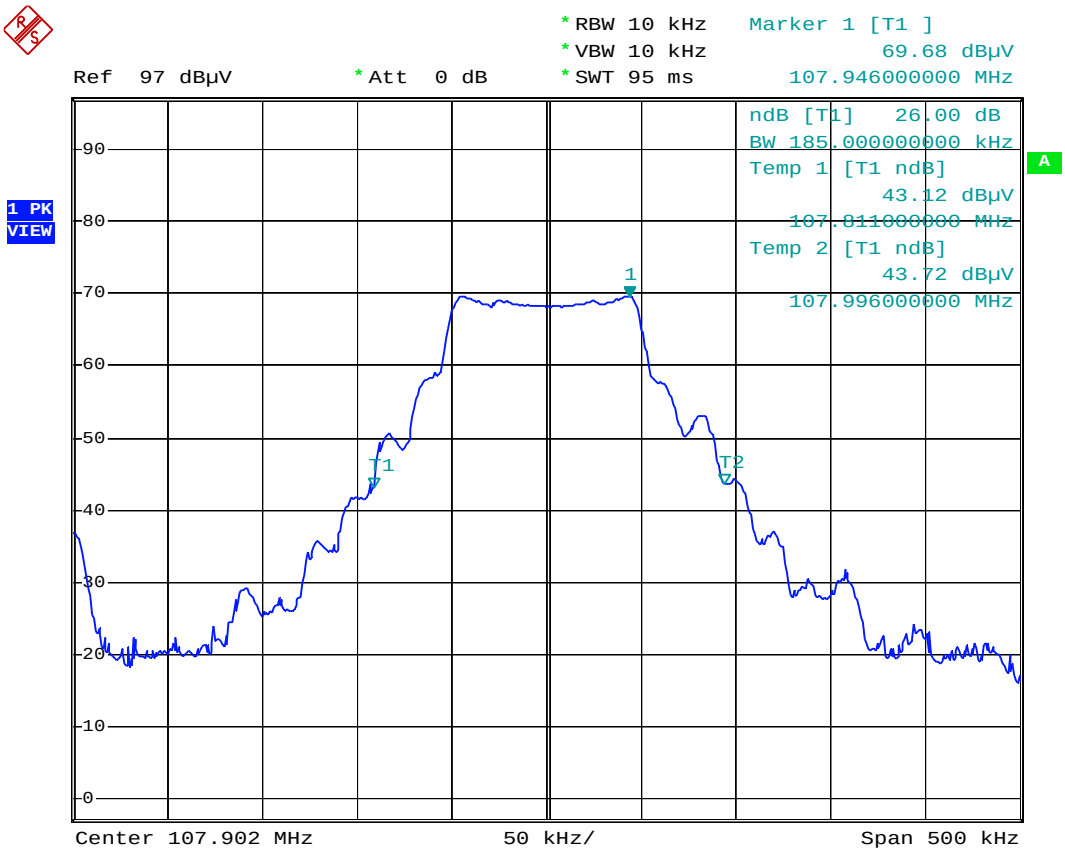
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*VBW 10 kHz
*SWT 95 ms
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69.68 dBµV
107.946000000 MHz
Ref 97 dBµV
*Att 0 dB
ndB [T1] 26.00 dB
BW 185.000000000 kHz
Temp 1 [T1 ndB]
43.12 dBµV
107.811000000 MHz
Temp 2 [T1 ndB]
43.72 dBµV
107.996000000 MHz
1 PK
VIEW
A
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80
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50
40
30
20
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1
T1
T2
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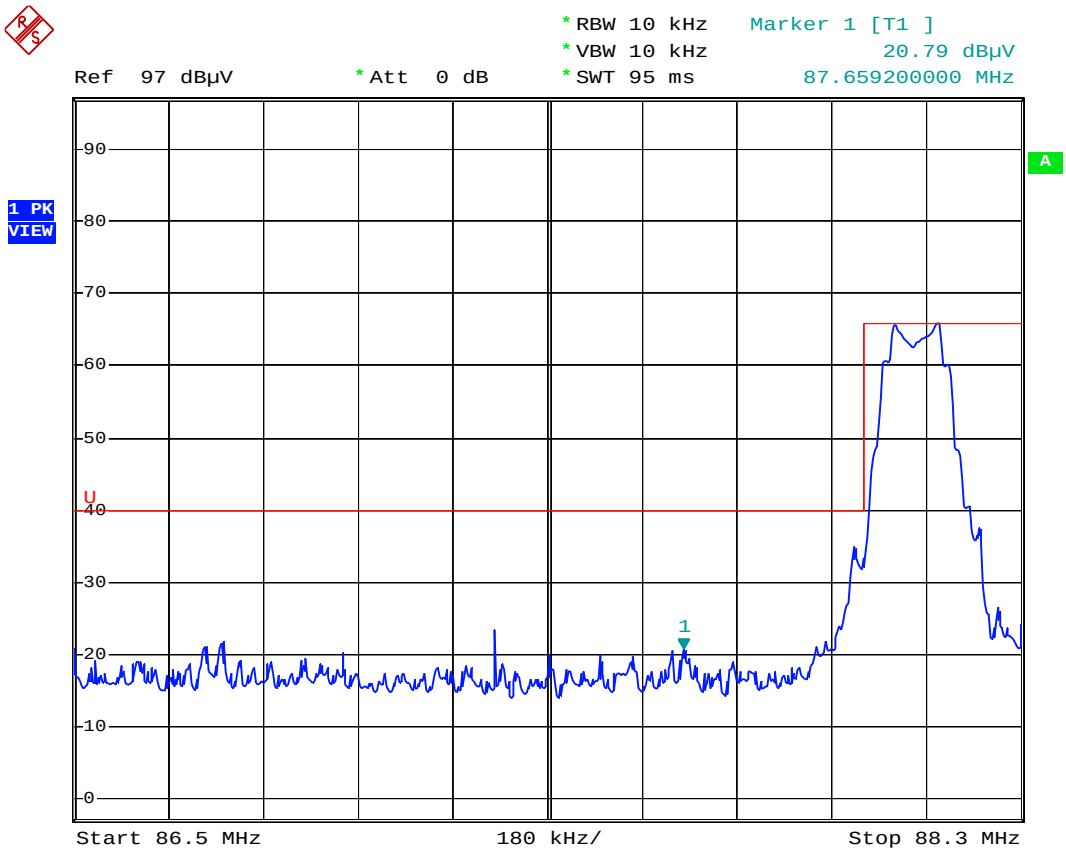
50 kHz/
Span 500 kHz



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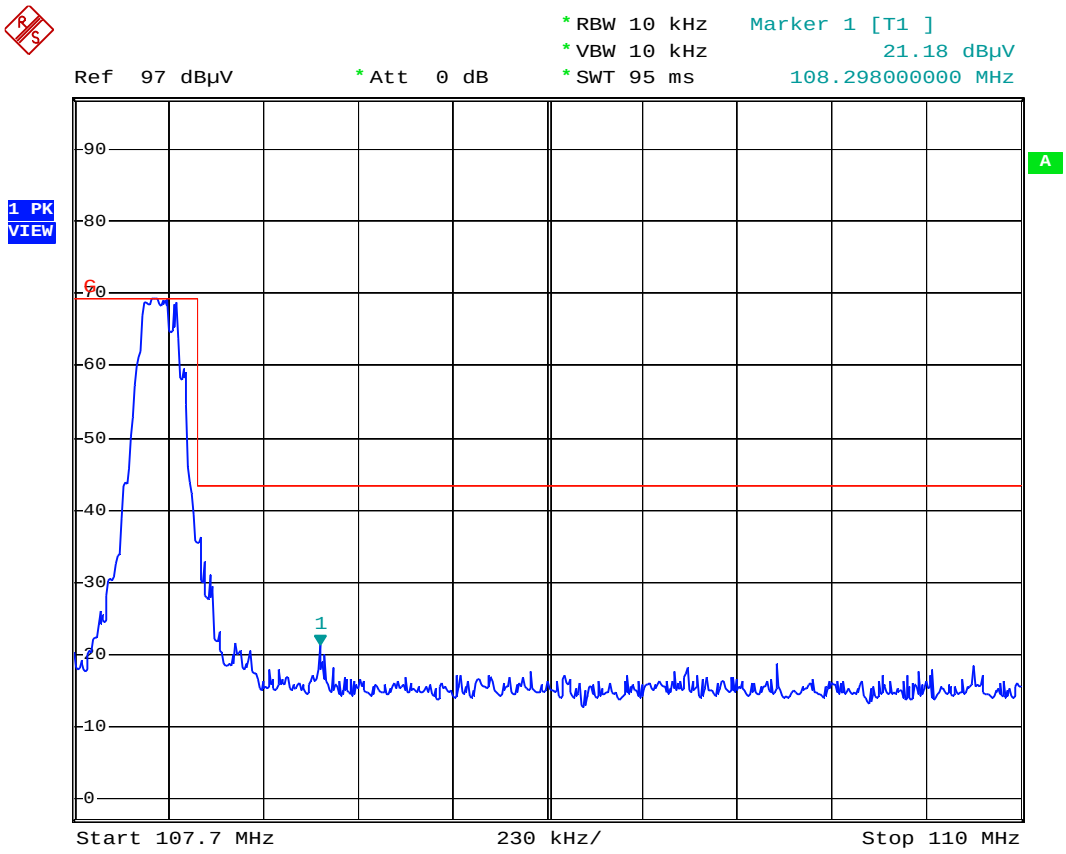

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