

# Certification of Compliance

CFR 47 Part 15 Subpart C Intentional Radiators

Test Report File No. 03-IST-333 Date of Issue Dec. 22. 2003

Model TX-1000

Kind of Product FM Transmitter

Applicant JUNG SOFT Co., Ltd.

Address 274-5, Seohyun-Dong, Bundang-Ku, Seongnam-City  
Kyonggi-Do, Korea

Manufacturer JUNG SOFT Co., Ltd.

Address 274-5, Seohyun-Dong, Bundang-Ku, Seongnam-City  
Kyonggi-Do, Korea

Test Result	(*) Positive	( ) Negative
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Reviewed By

Approved By



J.H. Lee / General Manager of EMC



G. Chung / Chief

- Investigations requested : Measurement to the relevant clauses of F.C.C rules and regulations Part 15 Subpart C - Intentional Radiators
- The test report with appendix consists of 12 pages.
- The test result only responds to the tested sample.
- It is not allowed to copy this report even partly without the allowance of IST EMC Laboratory.
- This equipment as for has been shown to be capable of continued compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4 1992.



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Conducted emissions	0.15 MHz - 30 MHz    Not Applicable
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Radiated emissions	30 MHz - 1 GHz    Applicable
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## INFORMATIONS OF TEST LABORATORY

EMC LABORATORY of IST Co., Ltd. (Yongin Lab., **Filed to FCC**)  
San 21-8, Goan-Ri, Baekam-Myun, Yongin-City  
Kyonggi-Do, 449-860, Korea  
TEL : +82 31 333 4093                      FAX : +82 31 333 4094

EMC LABORATORY of IST Co., Ltd. (Yangji Lab., **Filed to FCC**)  
80, Jeil-RI, Yangji-Myun, Yongin-City  
Kyonggi-Do, 449-825, Korea  
TEL : +82 31 323 3012                      FAX : +82 31 323 3014

## ENVIRONMENTAL CONDITIONS

Temperature	18 °C
Humidity	45 %
Atmospheric pressure	1002 mbar

## POWER SUPPLY SYSTEM USED

AUTO BATTERY                      DC 12V

## Product Information

Signal Format	Standard FM Stereo / 38kHz subcarrier
Audio Range	15Hz ~ 15kHz
S/N Ratio	> 60dB
Total Harmonic Distortion	Max. 0.3%
Channel Separation	Typical 40dB
Channel Balance	±2dB
Power	Automobile 12V DC / AAA 1.5V (combined)
Interface	Mini Earphone stereo jack
Switch	Frequency Selection / Power Selection
Exterior	20.6 × 30.0 × 10.0 (mm)
Weight	28g

Find product information in User's manual.

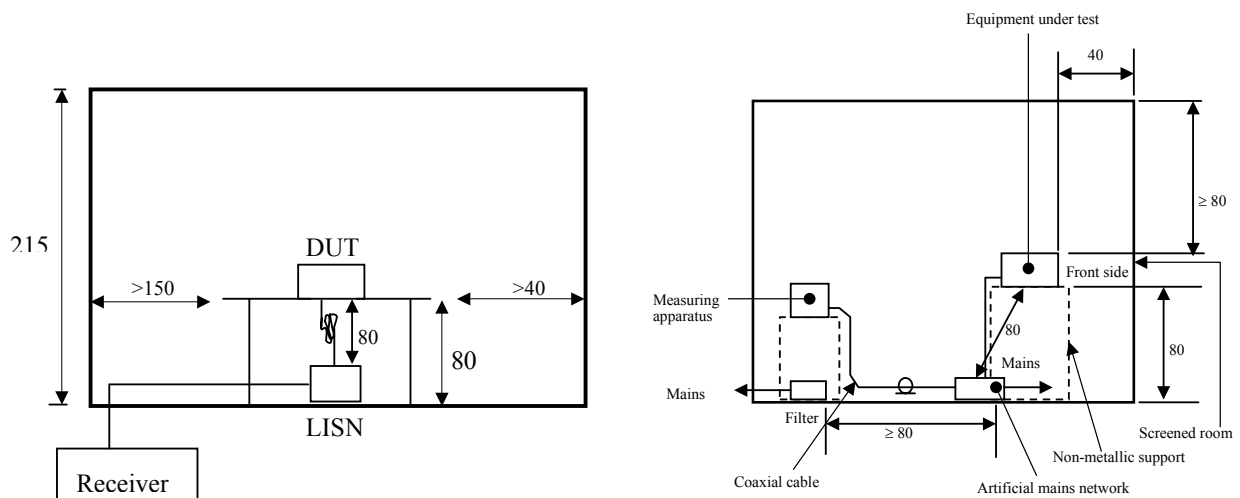
## DESCRIPTIONS OF TEST

### Conducted Emissions:

The measurement were performed over the frequency range of 0.45MHz to 30MHz using a 50 $\Omega$ /50uH LISN as the input transducer to a Spectrum Analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Peak" amplitude within an bandwidth of 10KHz or for "quasi-peak" within a bandwidth of 9KHz.

#### - Procedure of Test

The line-conducted facility is located in a shielded room. The wooden table 80cm height is placed 40cm away from the vertical wall and 1.5m away from the other wall of the shielded room. The LISNs are bonded to bottom of the shielded room. The EUT is located on the wooden table with distance more than 80cm from the LISN and powered from the powered LISN .The peripheral equipment is powered from the other LISN. Power to the LISNs are filtered by a noise cutting power line filters. All electrical cables are shielded by braided tinned steel tubing with inner  $\phi$  1.2cm. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the appropriate LISN. All interconnecting cables more than 1m were shortened by non-inductive bundling to a 1m length. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating conditions. The RF output of the LISN was connected to the R/S receiver to determine the frequency producing the maximum emission from the EUT. The frequency producing the maximum level was re-measured using Quasi-Peak detector and average detector by manual measurement or final measurement program of R&S, after scanned by automatic Peak mode for frequency range from 0.15 to 30MHz. The bandwidth of the receiver was set to 10kHz. The EUT, peripheral equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission.



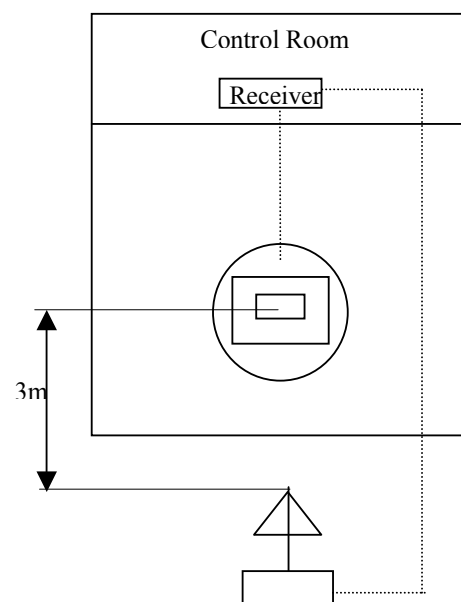
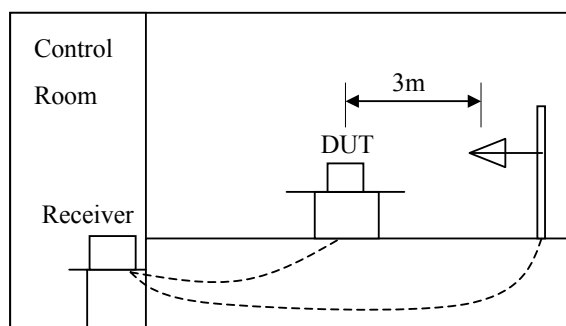
## DESCRIPTION OF TEST

### Radiated Emissions:

The measurement was performed over the frequency range of 30MHz to 1GHz using antenna as the input transducer to a Spectrum analyzer or a Field Intensity Meter. The measurement was made with the detector set for "quasi-peak" within a bandwidth of 120KHz.

#### **- Procedure of Test**

Preliminary measurements were made at 3 meter using bi-conical and log-periodic antennas, and spectrum analyzer to determine the frequency producing the max. emission in anechoic chamber. Appropriate precaution was taken to ensure that all emission from the EUT were maximized and investigated. The system configuration, mode of operation, turn-table azimuth and height with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30MHz to 230MHz using bi-conical antenna and 230 to 1000MHz using log-periodic antenna. Above 1GHz, linearly polarized double ridge horn antennas were used. Final measurements were made at open site with 3 or 10 meters test distance using Bi-log antenna, Bi-conical antenna, Log-periodic antenna or horn antenna. The OATS have been verified in regular for its normalized site attenuations. The test equipment was placed on a wooden table. Sufficient time for the EUT, peripheral equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined by manual. The detector function was set to Peak mode or Average mode and the bandwidth of the receiver was set to 120kHz or 1MHz depending on the frequency of type of signal. The EUT, peripheral equipment and interconnecting cables were configured as same in chamber, were placed on top of a 0.8-meter high nonmetallic 1 x 1.5 meter table. The EUT, peripheral equipment, and interconnecting cables were re-arranged and manipulated to maximize each emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation to the EUT and/or peripheral equipment and changing the polarity of the antenna, whichever determined the worst-case emission.



## SUMMARY

☐ Conducted Emission

The requirements are  
Minimum limit margin  
Maximum limit exceeding

☐ MET

☐ Not MET

**Remarks :**

☒ Radiated Emission

The requirements are  
Minimum limit margin  
Maximum limit exceeding

☒ MET

☐ Not MET

27.2dB at 88.3MHz

**Remarks : With average detector**

Reported By



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H.C. Kim / EMC Engineer

Note :

☒ means the test is applicable, ☐ is not applicable.

## TEST CONDITIONS AND DATA

### Conducted Emissions

[Not Applicable]

#### ◆ Test Equipment Used

<u>Model Name</u>	<u>Manufacturer</u>	<u>Description</u>	<u>Next Cal. Date</u>
ESH3	Rohde Schwarz	Receiver	Dec. 12, 2004
ESH2-Z5	Rohde Schwarz	LISN	Dec. 12, 2004
NMLK8121	Schwarzbeck	LISN	Dec. 12, 2004
ESH3-Z2	Rohde Schwarz	Pulse Limiter	Dec. 12, 2004

#### ◆ Auxiliary Equipment Used

<u>Model Name</u>	<u>Manufacturer</u>	<u>Descriptions</u>	<u>FCC Compliance information</u>
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#### ◆ Test Program

◆ Test Area                      Shielded Room

Note :

## TEST CONDITIONS AND DATA

### Radiated Emission

#### [Applicable]

#### ◆ Test Equipment Used

Model Name	Manufacturer	Description	Next Cal. Date
ESVS10	Rohde & Schwarz	Receiver	Dec. 12, 2004
HUF Z3	Rohde & Schwarz	Log-periodic Antenna	Jun. 21, 2004
VHA9103	SCHWARZBECK	Bi-conical Antenna	Jun. 20, 2004
E7402A	Agilent	Spectrum Analyzer	Dec. 12, 2004
HK116	Rohde & Schwarz	Bi-conical Antenna	Jun. 18, 2004
HL223	Rohde & Schwarz	Log-periodic Antenna	Jun. 18, 2004

#### ◆ Auxiliary Equipment Used

Model Name	Manufacturer	Descriptions	FCC Compliance information
CA-K20MT	CM Tech	MP3 Player	FCC ID : QHBCMT2003K

◆ Test Program                      FM Transmitting

◆ Test Area                              Compact Chamber / Open Area Test Site

*Note : The test signal 1kHz was used by MP3 player. The volume of MP3 was adjusted by maximum. It was investigated the emission characteristic of AAA battery powered operation and automobile battery powered operation. The last condition was employed because its maximum emission characteristics.*

### Radiated Emissions

(Disturbance Radiation)

- The measured values are as following

Freq. (MHz)	Reading (dBuV/m) PEAK	C.Loss (dB)	Ant. Factor (dBuV/m)	Azimuth (° )	Ant. Height (cm)	Pol. (H/V)	Limits (dBuV/m)	Result (dB)	Margin [dB]
Peak									
88.1	22.8	1.8	8.1	180	189	H	74.0	32.7	41.3
88.3	22.9	1.8	8.1	180	192	H	74.0	32.8	41.2
88.5	22.5	1.8	8.1	180	188	H	74.0	32.4	41.6
88.7	22.4	1.8	8.2	180	190	H	74.0	32.4	41.6
Average									
88.1	16.7	1.8	8.1	180	189	H	54.0	26.6	27.4
88.3	16.9	1.8	8.1	180	192	H	54.0	26.8	27.2
88.5	16.7	1.8	8.1	180	188	H	54.0	26.6	27.4
88.7	16.6	1.8	8.2	180	190	H	54.0	26.6	27.4

End of data

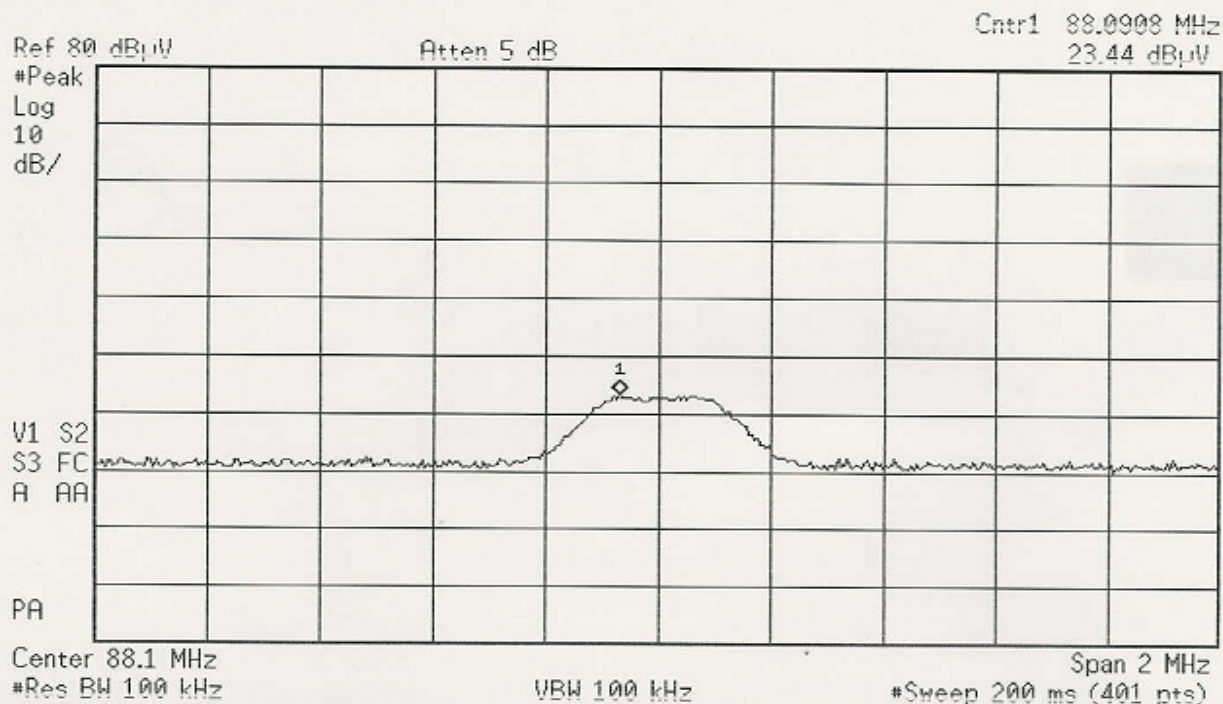
Note :

*It couldn't be measured any spurious emission or harmonic emissions  
 Even though it was investigated the emission characteristics for whole range.  
 Consequently there was no spurious and harmonics.*

*Also it was checked normal operation in a car after tesiting.*

***Please refer to following pages for compact chamber test results.***

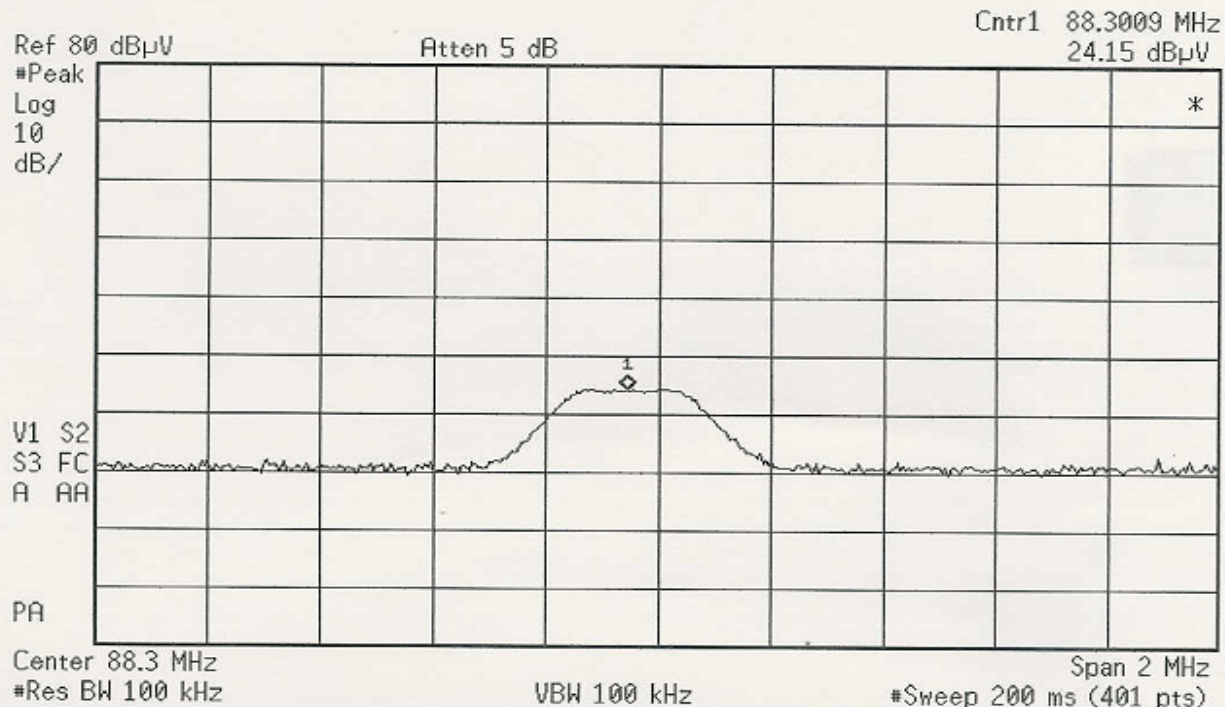
Agilent 14:02:01 Dec 22, 2003



**88.1MHz** (Max. Hold mode for dual polarity)

Evaluation : 32.04[dB]=23.44 (reading) +8.0 (AF) +0.6 (CL)

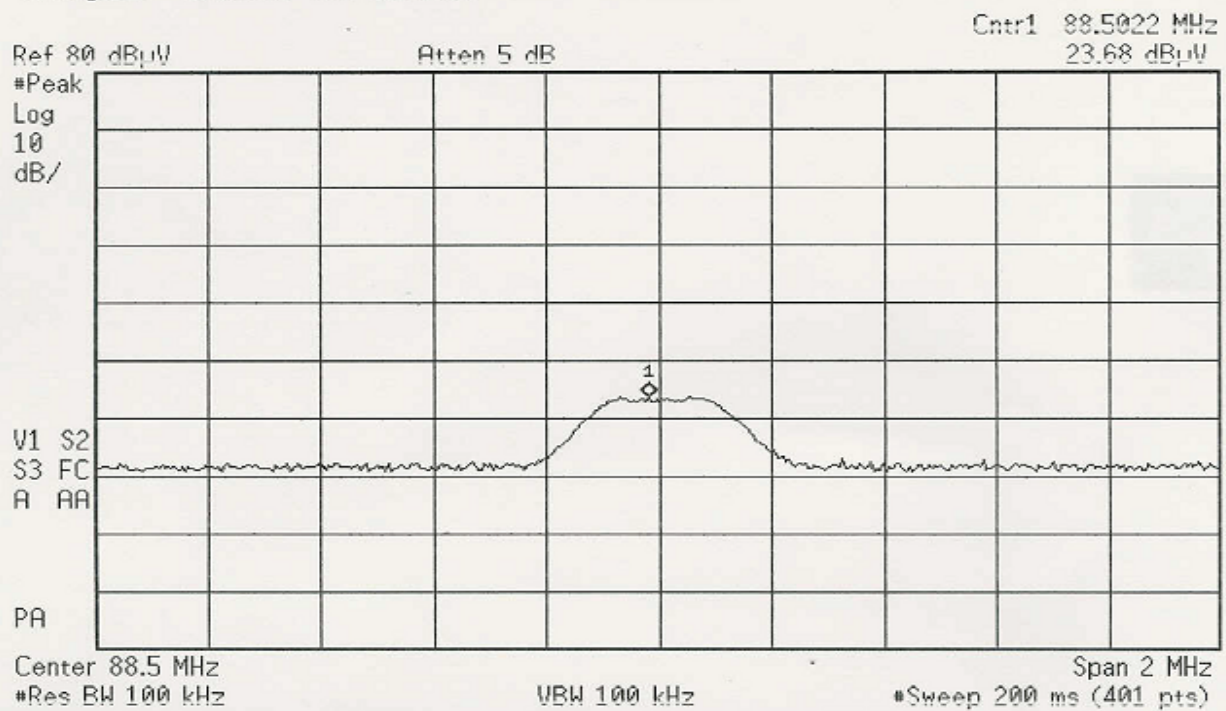
Agilent 12:13:44 Dec 22, 2003



**88.3MHz** (Max. Hold mode for dual polarity)

Evaluation : 32.75[dB]=24.15 (reading) +8.0 (AF) +0.6 (CL)

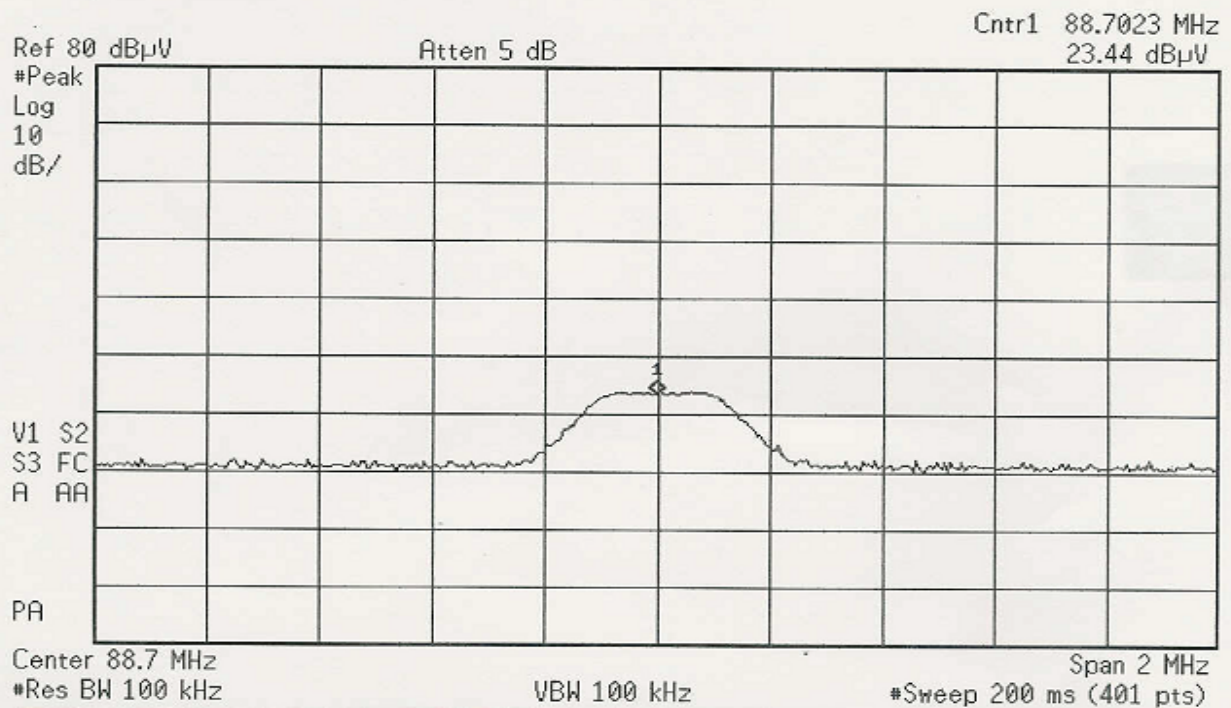
Agilent 13:52:43 Dec 22, 2003



**88.5MHz** (Max. Hold mode for dual polarity)

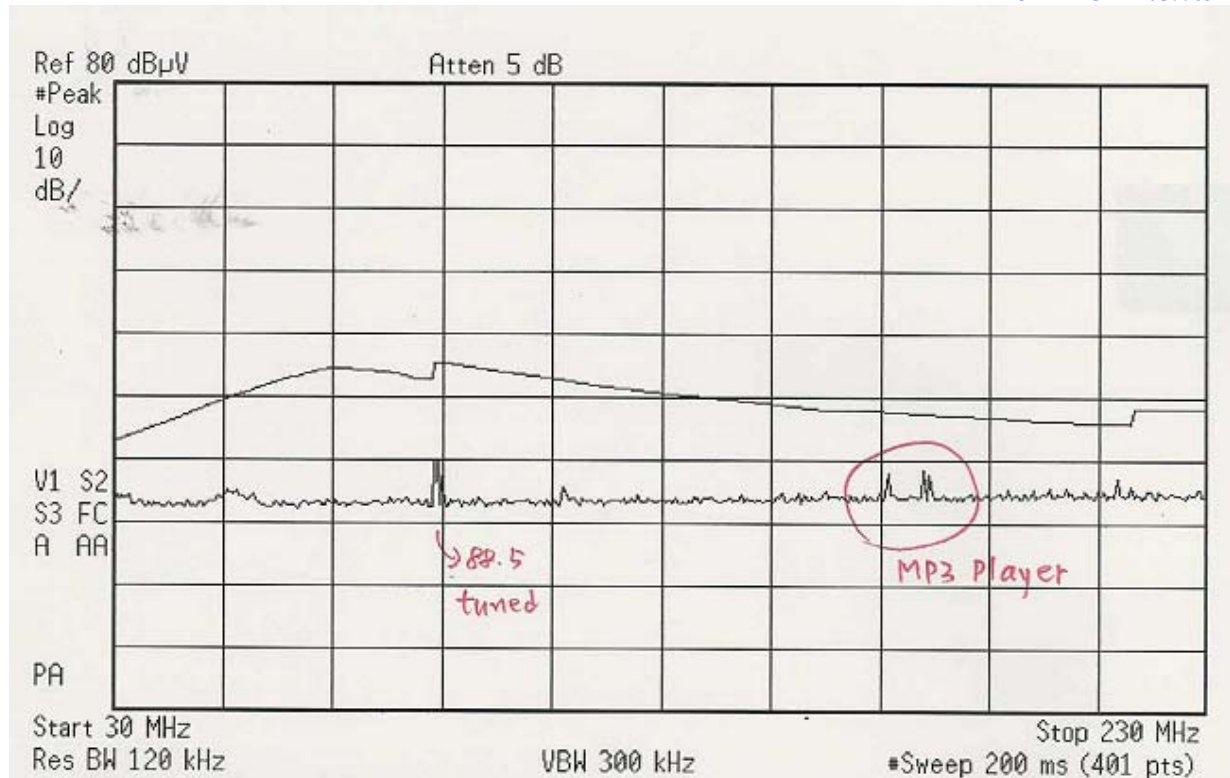
Evaluation : 32.28[dB]=23.68(reading)+8.0(AF)+0.6(CL)

Agilent 12:18:51 Dec 22, 2003

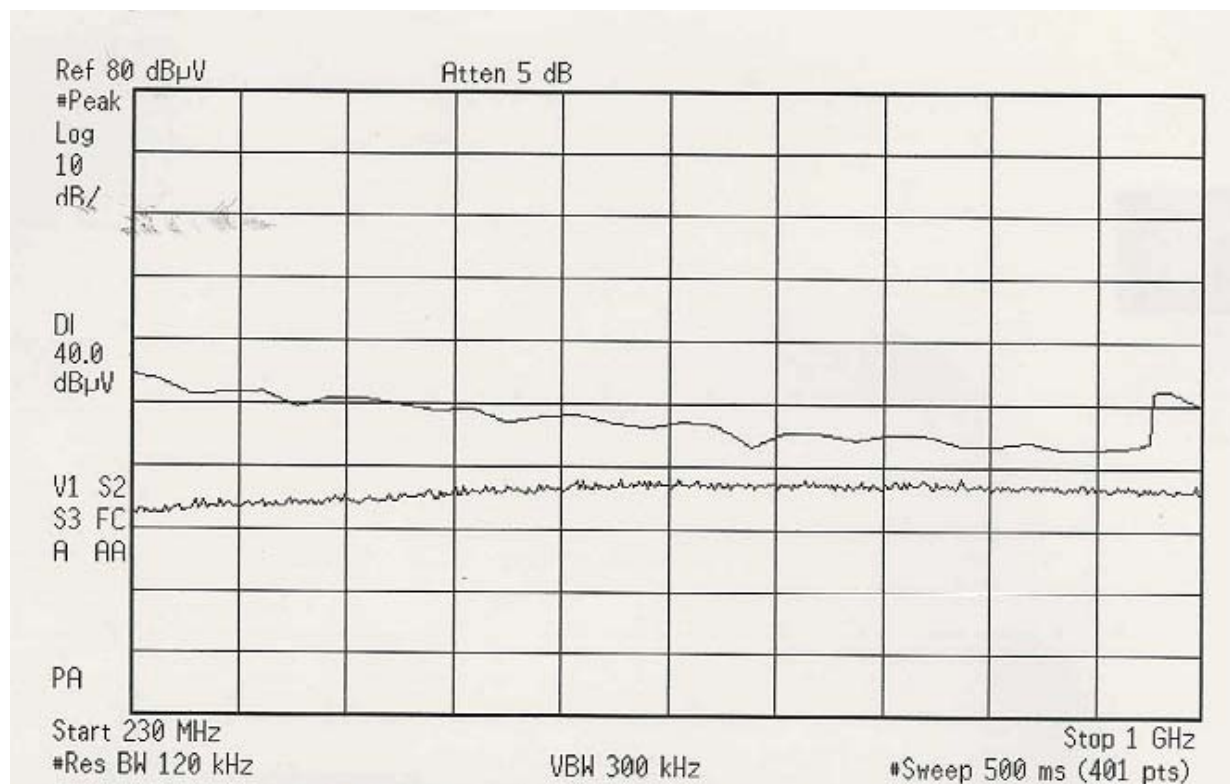


**88.7MHz** (Max. Hold mode for dual polarity)

Evaluation : 32.04[dB]=23.44(reading)+8.0(AF)+0.6(CL)



Spurious and Harmonic Investigation (88.5MHz tuned)



Spurious and Harmonic Investigation (88.5MHz tuned)