

EMC TEST REPORT For FCC



Test Report No. : CTK02-F033

Date of Issue : April 17, 2002

Model/Type No: : TX-101

Kind of Product : FM-TRANSMITTER

TX Frequency Range : 88.0 MHz, 88.4 MHz and 89.2 MHz.

Applicant : Sky Sound Corporation

Applicant Address : RM.803, Nok-Won Bldg., #302, Haan 1-Dong,
Kwangmyung-City, Kyungki-Do, Korea

Manufacturer : D&A Corporation

Manufacturer Address : #305 Kyungki Venture Bldg., 1017, Inkye-Dong, Paldal-Gu,
Suwon City, Kyungki-Do, Korea

Contact Person : Kwang-Hyung Lee /President

Telephone : +82-2-897-7676

Received Date : March 4, 2002

Test period : Start: March 4, 2002 End: March 27, 2002

Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

The test results presented in this report relate only to the object tested.

CERTITEK Standards Laboratory Co., Ltd. is accredited by Korea Laboratory Accreditation Scheme (KOLAS) which signed the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement (MRA) for the above test item(s) and test method(s).

Tested by



Michael Jang
EMC Test Engineer
Date: April 17, 2002

Reviewed by



James Hong
EMC Technical Manager
Date: April 17, 2002



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REPORT REVISION HISTORY

| Date | Revision | Page No |
|---------------|---------------------|---------|
| Apr. 17, 2002 | (CTK02-F033) Issued | All |
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1.0 General Product Description

The product is FM TRANSMITTER.

1.0.1 Tested Equipment

- ☒ Unless otherwise indicated, all tests were conducted on Model SFM-1.
- ☐ Tests performed on _____ were considered to be representative of Model(s) _____.

1.0.2 Equipment Size, Mobility and Identification

Dimensions: Approx. 76 by 16 ☒ mm ☐ in

Mobility: ☐ Hand-Held ☒ Table-top ☐ Floor-standing

☒ Used in a vehicle

Serial No.: Not applicable

1.0.3 Electrical Ratings

Input: 6 V dc – 24 V dc

Output: Not applicable

1.0.4 Test Voltage & Frequency

Unless indicated otherwise on the individual data sheet or test results, the test voltage and frequency was as indicated below.

Voltage: 12 V dc (with DC Power Supply) and

Frequency: Not applicable

1.0.5 Clock & Other Frequencies Utilized

7.6MHz

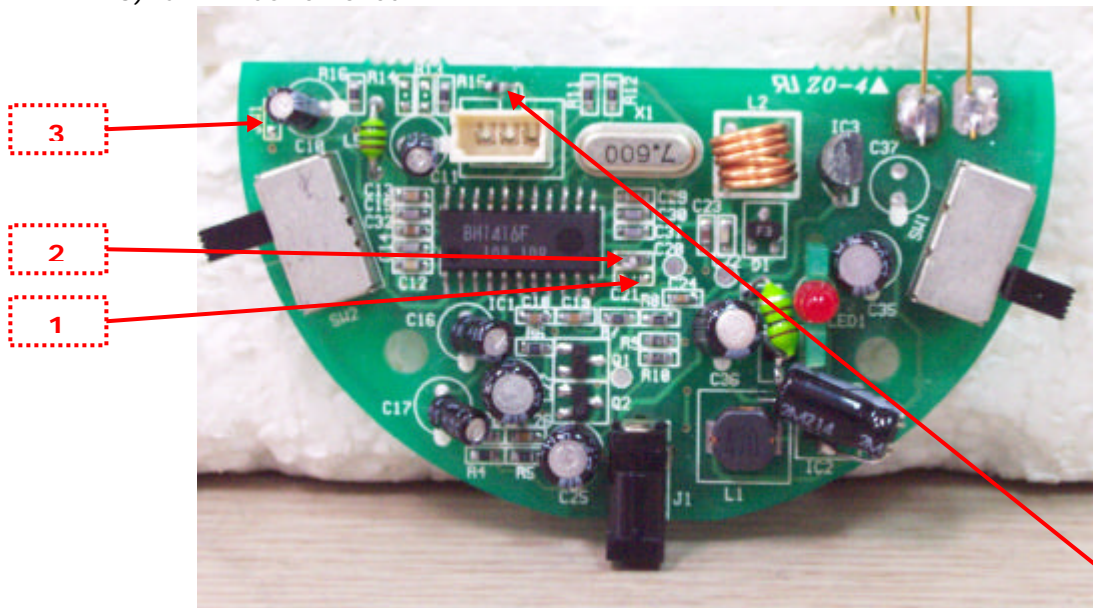
1.1 Model Differences

Not applicable

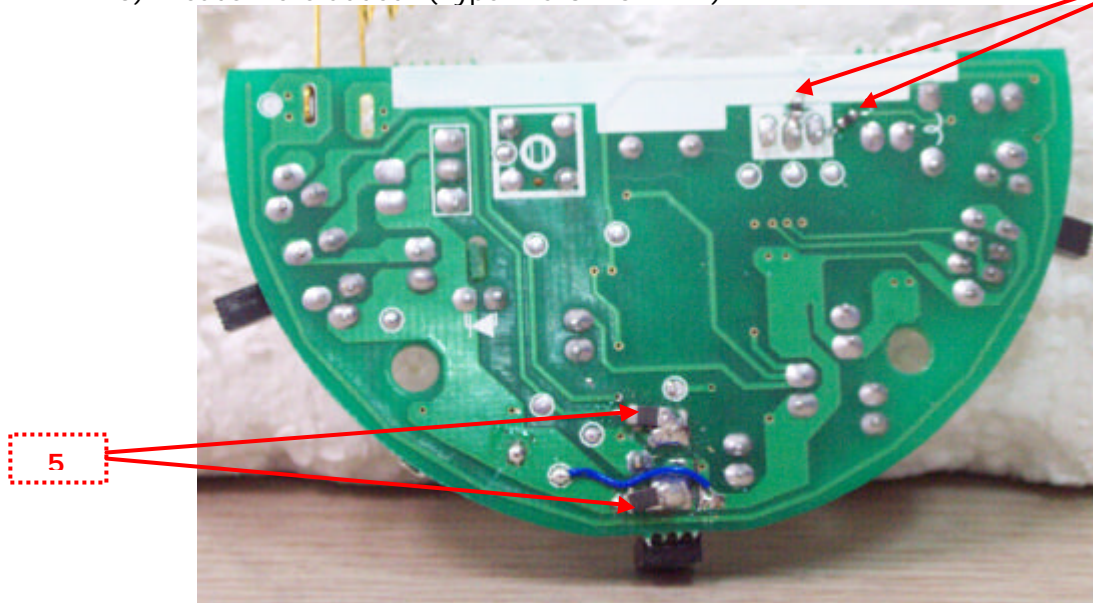
1.2 Device Modifications

The following modifications were necessary for compliance:

- 1) Capacitor (C21) was removed.
- 2) Resistor (68) was added to reduce the radiated emission.
- 3) JW1 was removed.



- 4) Beads were added. (Type: FCM1608K-601 T02)
- 5) Beads were added. (Type: FCI3216-R27K)



1.3 EUT Configuration(s)

See Appendix A for individual test set-up configuration(s). The following peripheral devices and/or interface cables were connected during the measurement:

☒ Peripheral Devices

| Device | Manufacturer | Model No. | Serial No. | FCC ID or DoC |
|-----------------|---------------------|-----------|------------|---------------|
| DC Power Supply | HP | E3620 | KR40300004 | - |
| Cassette | Ace-Ohayo Co., Ltd. | LL-2330 | - | - |

☒ Cable Description

| # | Description | Ferrited | Length (m) | Other Details |
|---|--|----------|------------|-----------------------------------|
| 1 | DC Power Supply Power Cord, Unshielded | No | 1.8 | Connect to AC Power |
| 2 | DC Power Supply Output Cable, Unshielded | No | 0.9 | Connect to EUT Power Cable |
| 3 | EUT Power Cable, Unshielded | No | 0.45 | Connect to DC Power Supply Output |
| 4 | Cable, Unshielded | No | 0.3 | Between EUT and Cassette |

N/a = Not available

1.4 Test Software

- ☐ Pinging
☐ Windows Media Player

1.5 EUT Operating Mode(s)

Equipment under test was operated during the measurement under the following conditions:

- ☐ Test program (H-Pattern) ☐ Test program (color bar)
☐ Standby ☒ Practice operation

1.6 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

1.7 Test Facility

The measurement facility is located at 386-1, Ho-Dong, Yongin-City, Kyungki-Do, Korea 449-100. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

1.8 Measurement Procedure

Preliminary AC power line conducted emissions tests were performed shielded room. To find worst mode, several typical mode and typical cable position were tested. Final AC power line conducted emissions test was performed shielded room. (location is same as Preliminary test)





Based on the preliminary tests of the EUT, final test was proceeded worst case test mode and cable configuration.

Preliminary radiated emissions test were performed anechoic chamber (Distance of antenna and EUT was 3 m). To find worst mode, several typical mode and typical cable position were tested and peak level and frequency were recorded.

Final radiated emissions test was performed Open Area Test Site. Based on the preliminary tests of the EUT, final test was proceeded worst case test mode and cable configuration.

* Measurement procedures was In accordance with ANSI C63.4-1992 7.2.3, 7.2.4, 8.3.1.1, 8.3.1.2

1.9 Laboratory Accreditations and Listings

| Country | Agency | Scope of Accreditation | Logo |
|---------------|--------|---|---|
| USA | FCC | 3 and 10 meter Open Area Test Sites to perform FCC Part 15/18 measurements. |  93250 |
| JAPAN | VCCI | 10 meter Open Area Test Site and one conducted site. |  R-948, C-986 |
| KOREA | MIC | EMI (CE, RE) EMS (ESD, Burst, RS, Surge, CS, Power-Frequency Susceptibility, Voltage Dips and Short Interruptions) |  No. 51, KR0025 |
| International | KOLAS | EMC |  NO. 119 |

2.0 Emissions Test Regulations

The emissions tests were performed according to following regulations:

- | | | |
|---|---|---|
| <input type="checkbox"/> EN 50081-1 /1992 | | |
| <input type="checkbox"/> EN 55011 /1998 | <input type="checkbox"/> Group 1 | <input type="checkbox"/> Group 2 |
| | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> EN 55013 /A12:1994 | | |
| <input type="checkbox"/> EN 55014 /1987 | <input type="checkbox"/> Household appliances and similar | |
| | <input type="checkbox"/> Portable tools | |
| | <input type="checkbox"/> Semiconductor devices | |
| <input type="checkbox"/> EN 55014 /A2:1990 | | |
| <input type="checkbox"/> EN 55014 /1993 | <input type="checkbox"/> Household appliances and similar | |
| | <input type="checkbox"/> Portable tools | |
| | <input type="checkbox"/> Semiconductor devices | |
| <input type="checkbox"/> EN 55015 /1987 | | |
| <input type="checkbox"/> EN 55015 /A1:1990 | | |
| <input type="checkbox"/> EN 55015 /1993 | | |
| <input type="checkbox"/> EN 55022 /A1:1995 | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> EN 55022 /1998 | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> EN 61000-3-2 /1995 (EN 60555 Part 2 /4.87) | | |
| <input type="checkbox"/> EN 61000-3-3 /1995 (EN 60555 Part 3 /4.87) | | |
| <input type="checkbox"/> BS | | |
| <input type="checkbox"/> VCCI V-3/99.05 : 1999 | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input checked="" type="checkbox"/> FCC Part 15 SUBPART B | <input type="checkbox"/> Class A | <input checked="" type="checkbox"/> Class B |
| <input checked="" type="checkbox"/> FCC Part 15 SUBPART C | <input type="checkbox"/> Class A | <input checked="" type="checkbox"/> Class B |
| <input type="checkbox"/> AS 3548 (1992) | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> CISPR 11 (1990) | <input type="checkbox"/> Group 1 | <input type="checkbox"/> Group 2 |
| | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |
| <input type="checkbox"/> CISPR 22 (1993) | <input type="checkbox"/> Class A | <input type="checkbox"/> Class B |



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2.1 Conducted Voltage Emissions

Test Date

Not Applicable

Test Location

EMI-CE: Shielded Room

Test Instruments

| | | | |
|---|---------------|--------|------------|
| <input type="checkbox"/> Field Strength Meter | Rohde Schwarz | ESHS30 | 828144/002 |
|---|---------------|--------|------------|

Test Accessories

| | | | |
|-------------------------------------|------|------------|------------|
| <input type="checkbox"/> LISN | EMCO | 3825/2 | 9409-2246 |
| <input type="checkbox"/> LISN | EMCO | 3825/2 | 9607-2574 |
| <input type="checkbox"/> LISN | EMCO | 3825/2 | 9206-1971 |
| <input type="checkbox"/> Control PC | HP | Vectra 500 | SG72000192 |

Frequency Range of Measurement

☐ 150 kHz to 30 MHz
☐ 450 kHz to 30 MHz
☐ _____

Instrument Settings

IF Band Width: 9 kHz

Test Results

The requirements are:

| | |
|---|--|
| <input type="checkbox"/> MET | minimum margin is _____ dB μ V at _____ MHz |
| <input type="checkbox"/> NOT MET | limit exceeded by maximum of _____ dB μ V at _____ MHz |
| <input type="checkbox"/> NOT APPLICABLE | |

Remarks

See Appendix A for test data.

2.2 Radiated Electric Field Emissions

Test Date

March 27, 2002

Test Location

- ☐ EMI-OATS: Testing was performed at a test distance of 10 m
☒ EMI-OATS: Testing was performed at a test distance of 3 m

Test Instruments

☒ Field Strength Meter Rohde Schwarz ESVS30 826638/008

Test Accessories

| | | | |
|---|-------------|---------|------------|
| <input checked="" type="checkbox"/> ULTRA Broadband Antenna | R & S | HL562 | 361324/014 |
| <input type="checkbox"/> Biconical Antenna | Schwarzbeck | BBA9106 | 41-00201 |
| <input type="checkbox"/> Biconical Antenna | EMCO | 3110B | 9607-2564 |
| <input type="checkbox"/> Log-periodic Antenna | EMCO | 3146 | 9607-4567 |

Frequency Range of Measurement

30 MHz to 1 GHz

Instrument Settings

IF Band Width: 120 kHz

Test Results

The requirements are:

☒ MET

With DC Power Supply;

At 88.0 MHz: Minimum margin is 11.5 dB μ V/m at 92.80 MHz.

At 88.4 MHz: Minimum margin is 13.7 dB μ V/m at 83.30 MHz.

At 89.2 MHz: Minimum margin is 10.7 dB μ V/m at 91.40 MHz.

- ☐ NOT MET limit exceeded by maximum of ____ dB μ V/m at ____ MHz
☐ NOT APPLICABLE

Remarks

See Appendix A for test data

2.3 Intentional radiator 200kHz Bandwidth

Test Date

March 27, 2002

Test Location

Shielded Room

Test Instruments

| | | | |
|---|----|-------|------------|
| <input checked="" type="checkbox"/> Spectrum Analyzer | HP | 8590A | 2839A03633 |
|---|----|-------|------------|

Test Accessories

| | | | |
|--|-------------|---------|------------|
| <input type="checkbox"/> ULTRA Broadband Antenna | R & S | HL562 | 361324/014 |
| <input type="checkbox"/> Biconical Antenna | Schwarzbeck | BBA9106 | 41-00201 |
| <input type="checkbox"/> Biconical Antenna | EMCO | 3110B | 9607-2564 |
| <input type="checkbox"/> Log-periodic Antenna | EMCO | 3146 | 9607-4567 |

Frequency Range of Measurement

88.0 MHz, 88.4 MHz and 89.2 MHz.

Instrument Settings

RES BW : 10 kHz

VBW : 10 kHz

Test Results

The requirements are:

- ☒ MET
☐ NOT MET
☐ NOT APPLICABLE

Remarks

See Appendix A for test data

2.4 Intentional radiator Field Strength of Radiation

Test Date

March 27, 2002

Test Location

- ☐ EMI-OATS: Testing was performed at a test distance of 10 m
☒ EMI-OATS: Testing was performed at a test distance of 3 m

Test Instruments

☒ Field Strength Meter Rohde Schwarz ESVS30 826638/008

Test Accessories

| | | | |
|---|-------------|---------|------------|
| <input checked="" type="checkbox"/> ULTRA Broadband Antenna | R & S | HL562 | 361324/014 |
| <input type="checkbox"/> Biconical Antenna | Schwarzbeck | BBA9106 | 41-00201 |
| <input type="checkbox"/> Biconical Antenna | EMCO | 3110B | 9607-2564 |
| <input type="checkbox"/> Log-periodic Antenna | EMCO | 3146 | 9607-4567 |

Frequency Range of Measurement

88.0 MHz, 88.4 MHz and 89.2 MHz.

Instrument Settings

IF Band Width: 120 kHz

Test Results

The requirements are:

☒ MET

With DC Power Supply;

At 88.0 MHz: Minimum margin is 1.4 dB μ V/m at 88.00 MHz.

At 88.4 MHz: Minimum margin is 1.4 dB μ V/m at 88.40 MHz.

At 89.2 MHz: Minimum margin is 1.4 dB μ V/m at 89.20 MHz.

- ☐ NOT MET limit exceeded by maximum of ____ dB μ V/m at ____ MHz
☐ NOT APPLICABLE

Remarks

See Appendix A for test data

2.5 Intentional radiator Field Strength of Spurious

Test Date

March 27, 2002

Test Location

- ☐ EMI-OATS: Testing was performed at a test distance of 10 m
☒ EMI-OATS: Testing was performed at a test distance of 3 m

Test Instruments

☒ Field Strength Meter Rohde Schwarz ESVS30 826638/008

Test Accessories

| | | | |
|---|-------------|---------|------------|
| <input checked="" type="checkbox"/> ULTRA Broadband Antenna | R & S | HL562 | 361324/014 |
| <input type="checkbox"/> Biconical Antenna | Schwarzbeck | BBA9106 | 41-00201 |
| <input type="checkbox"/> Biconical Antenna | EMCO | 3110B | 9607-2564 |
| <input type="checkbox"/> Log-periodic Antenna | EMCO | 3146 | 9607-4567 |

Frequency Range of Measurement

30 MHz to 1 GHz

Instrument Settings

IF Band Width: 120 kHz

Test Results

The requirements are:

☒ MET

With DC Power Supply;

At 88.0 MHz: Minimum margin is 13.3 dB μ V/m at 175.80 MHz.

At 88.4 MHz: Minimum margin is 14.0 dB μ V/m at 177.20 MHz.

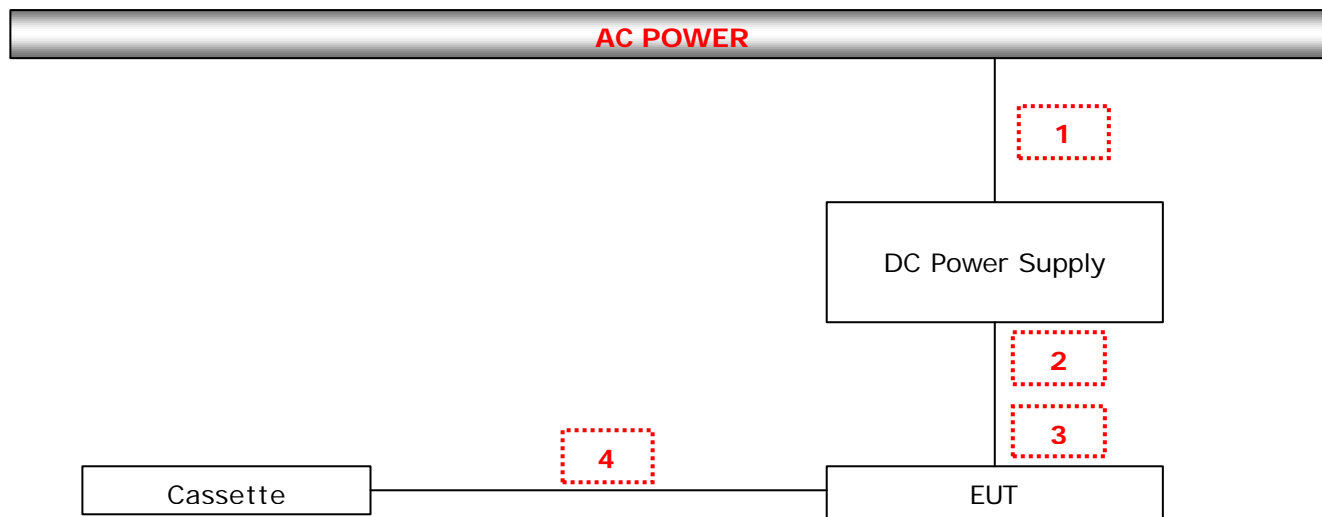
At 89.2 MHz: Minimum margin is 14.0 dB μ V/m at 178.50 MHz.

- ☐ NOT MET limit exceeded by maximum of ____ dB μ V/m at ____ MHz
☐ NOT APPLICABLE

Remarks

See Appendix A for test data

Configuration





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Not Applicable

Not Applicable



Radiated Electric Field Emissions (Quasi-Peak reading) at 88.0 MHz with DC Power Supply

| Frequency [MHz] | Reading [dBuV] | Pol. | Height [m] | Correction Factor | | Limits [dBuV/m] | Result [dBuV/m] | Margin [dB] |
|--------------------|-------------------|------|---------------|----------------------|-------|--------------------|--------------------|----------------|
| | | | | Antenna | Cable | | | |
| 56.30 | 17.8 | V | 1.0 | 3.6 | 0.6 | 40.0 | 22.0 | 18.0 |
| 84.00 | 13.7 | V | 1.0 | 8.7 | 0.9 | 40.0 | 23.3 | 16.7 |
| 92.80 | 22.1 | V | 1.0 | 9.0 | 0.9 | 43.5 | 32.0 | 11.5 |
| 101.60 | 15.5 | V | 1.0 | 9.4 | 1.0 | 43.5 | 25.9 | 17.6 |
| 119.80 | 13.7 | V | 1.0 | 9.7 | 1.1 | 43.5 | 24.5 | 19.0 |
| 123.20 | 18.7 | V | 1.0 | 9.6 | 1.1 | 43.5 | 29.3 | 14.2 |
| 124.50 | 18.9 | V | 1.0 | 9.4 | 1.1 | 43.5 | 29.4 | 14.1 |



Radiated Electric Field Emissions (Quasi-Peak reading) at 88.4 MHz with DC Power Supply

| Frequency [MHz] | Reading [dBuV] | Pol. | Height [m] | Correction Factor | | Limits [dBuV/m] | Result [dBuV/m] | Margin [dB] |
|--------------------|-------------------|------|---------------|----------------------|-------|--------------------|--------------------|----------------|
| | | | | Antenna | Cable | | | |
| 53.00 | 18.5 | V | 1.0 | 6.2 | 0.6 | 40.0 | 25.3 | 14.7 |
| 56.30 | 18.6 | V | 1.0 | 3.6 | 0.6 | 40.0 | 22.8 | 17.2 |
| 83.30 | 16.8 | H | 4.0 | 8.6 | 0.9 | 40.0 | 26.3 | 13.7 |
| 92.80 | 13.5 | V | 1.0 | 9.0 | 0.9 | 43.5 | 23.4 | 20.1 |
| 122.50 | 18.4 | V | 1.0 | 9.6 | 1.1 | 43.5 | 29.0 | 14.5 |
| 144.80 | 14.8 | V | 1.0 | 7.8 | 1.4 | 43.5 | 24.0 | 19.5 |
| 229.80 | 16.0 | H | 4.0 | 8.4 | 2.0 | 46.0 | 26.4 | 19.7 |



Radiated Electric Field Emissions (Quasi-Peak reading) at 89.2 MHz with DC Power Supply

| Frequency [MHz] | Reading [dBuV] | Pol. | Height [m] | Correction Factor | | Limits [dBuV/m] | Result [dBuV/m] | Margin [dB] |
|--------------------|-------------------|------|---------------|----------------------|-------|--------------------|--------------------|----------------|
| | | | | Antenna | Cable | | | |
| 84.70 | 14.7 | V | 1.0 | 8.7 | 0.9 | 40.0 | 24.3 | 15.8 |
| 87.40 | 17.5 | V | 1.0 | 8.8 | 1.0 | 40.0 | 27.3 | 12.7 |
| 91.40 | 22.9 | V | 1.0 | 9.0 | 0.9 | 43.5 | 32.8 | 10.7 |
| 95.50 | 15.0 | V | 1.0 | 8.9 | 0.9 | 43.5 | 24.8 | 18.7 |
| 117.80 | 14.1 | V | 1.0 | 9.6 | 1.1 | 43.5 | 24.8 | 18.7 |
| 121.10 | 19.0 | V | 1.0 | 9.7 | 1.1 | 43.5 | 29.8 | 13.7 |
| 125.20 | 15.0 | V | 1.0 | 9.4 | 1.1 | 43.5 | 25.5 | 18.0 |
| 169.10 | 17.3 | V | 1.0 | 7.1 | 1.6 | 43.5 | 26.0 | 17.6 |



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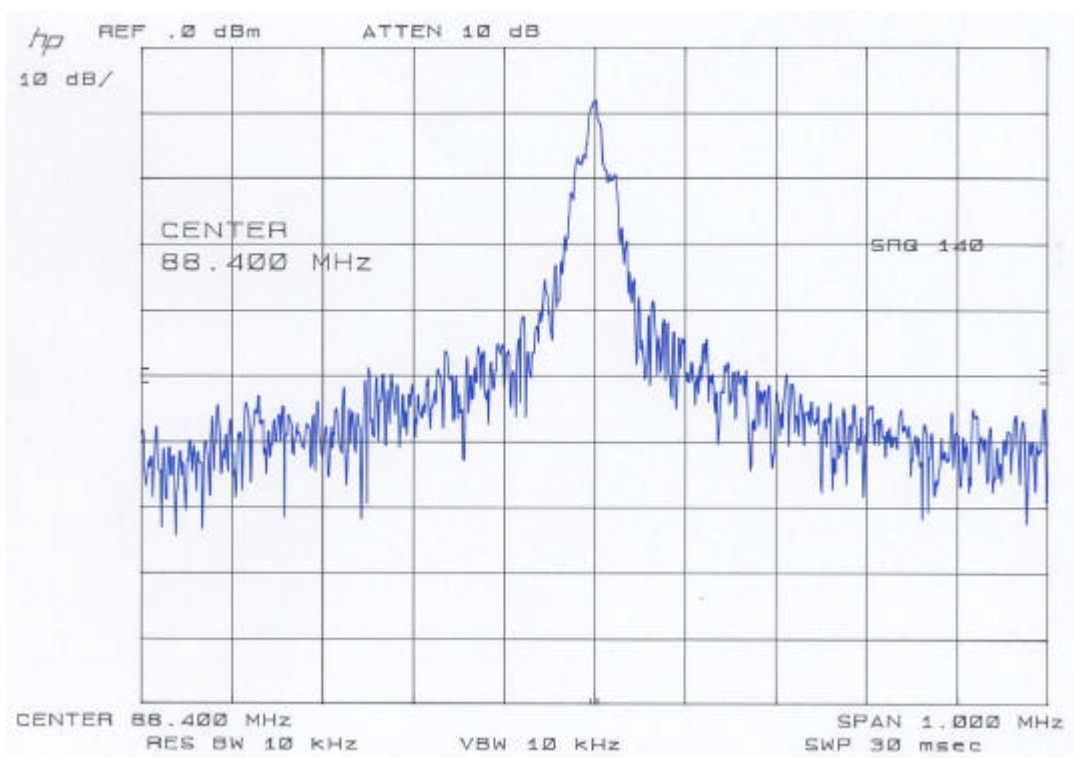
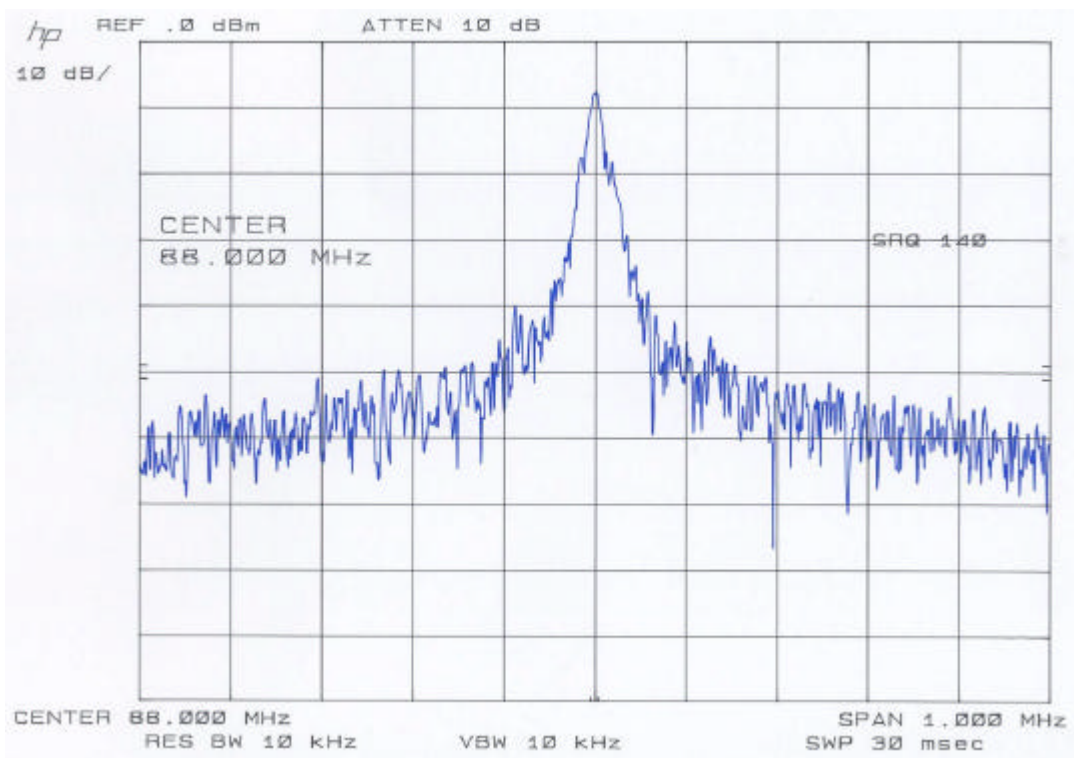
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Intentional radiator 200kHz Bandwidth





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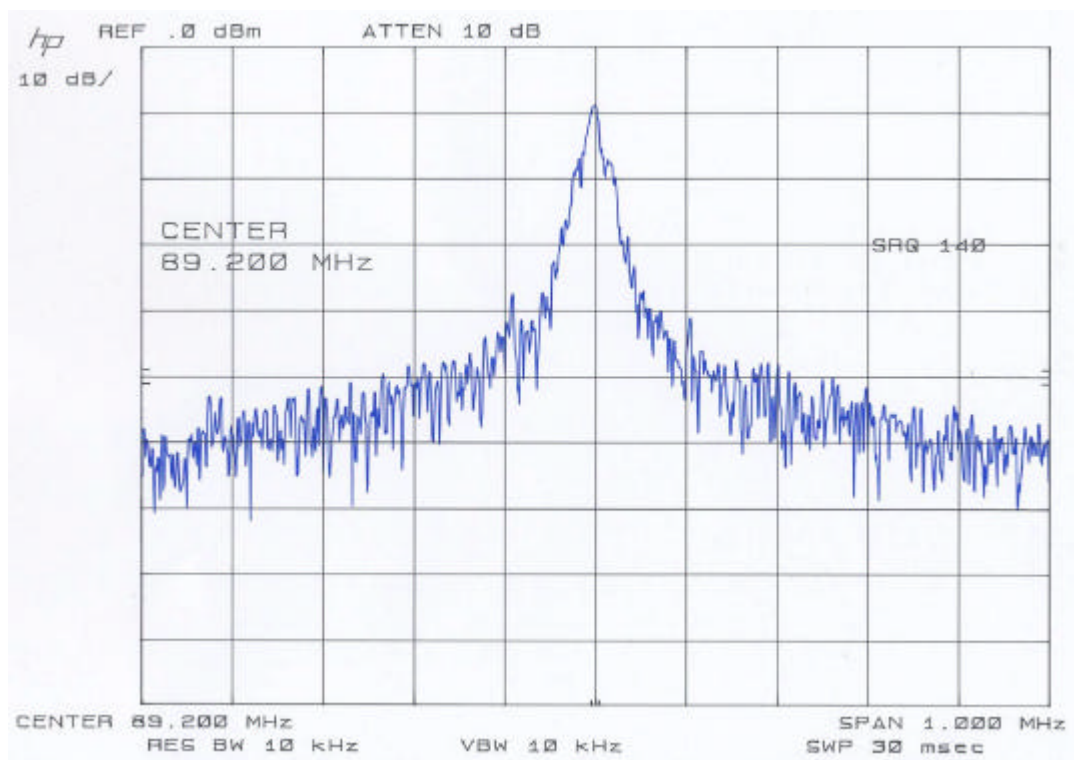
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Intentional radiator Field Strength of Radiation (Quasi-Peak reading) with DC Power Supply

[illegible]



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