# ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LOW POWER, NON-LICENSED TRANSMITTER

| | |
|---|---|
| **Test Report No.** | **: E071R-041** |
| **AGR No.** | **: A071A-085** |
| **Applicant** | **: Smart Power Solutions Inc.** |
| **Address** | **: 1FL, VentureTown Jangyoungsilkwan, 1688-5, Sinil-dong, Daeduck-gu, Daejeon, 306-203, Korea** |
| **Manufacturer** | **: Smart Power Solutions Inc.** |
| **Address** | **: 1FL, VentureTown Jangyoungsilkwan, 1688-5, Sinil-dong, Daeduck-gu, Daejeon, 306-203, Korea** |
| **Type of Equipment** | **: FM Transmitter** |
| **FCC ID.** | **: UQBEIBPFM-2** |
| **Model Name** | **: DRPWFMN2** |
| **Serial number** | **: N/A** |
| **Total page of Report** | **: 15 pages (including this page)** |
| **Date of Incoming** | **: January 16, 2007** |
| **Date of Issuing** | **: January 22, 2007** |

## SUMMARY

The equipment complies with the regulation of ***FCC CRF 47 PART 15, SUBPART C, SECTION 15.239***.
This test report contains only the results of a single test of the sample supplied for the examination. It is not a general valid assessment of the features of the respective products of the mass-production.

Prepared by: 
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# *CONTENTS*

Page



 

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# 1. VERIFICATION OF COMPLIANCE

-. APPLICANT : Smart Power Solutions Inc.

-. ADDRESS : 1FL, VentureTown Jangyoungsilkwan, 1688-5, Sinil-dong, Daeduck-gu, Daejeon, 306-203, Korea

-. CONTACT PERSON : Mr. Sang-Min, Kim / Manager

-. TELEPHONE NO : +82-42-936-4905

-. BRAND NAME : Duracell

-. FCC ID : UQBEIBPFM-2

-. MODEL NAME : DRPWFMN2

-. SERIAL NUMBER : N/A

-. DATE : January 22, 2007

| | |
|---|---|
| DEVICE TYPE | DXX – Part 15 Low Power Communication Device Transmitter |
| E.U.T. DESCRIPTION | FM Transmitter |
| THIS REPORT CONCERNS | ORIGINAL GRANT |
| MEASUREMENT PROCEDURES | Charter 7 and 13 of ANSI C63.4: 2003 |
| TYPE OF EQUIPMENT TESTED | PRE-PRODUCTION |
| KIND OF EQUIPMENT AUTHORIZATION REQUESTED | CERTIFICATION |
| EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S) | FCC PART 15 SECTION 15.239 |
| MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE | No |
| FINAL TEST WAS CONDUCTED ON | 3 METER OPEN AREA TEST SITE |

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

 

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# 2. GENERAL INFORMATION

## 2.1 Product Description

The Smart Power Solutions Inc., Model DRPWFMN2 (referred to as the EUT in this report) is a FM Transmitter that has been designed to enhance the functionality of iPod by combining the convenience of an FM transmitter with an extended battery and a protective silicon case. This test report only covers for FM transmitting mode. Charging mode and peripheral device mode will be issued by Declaration of Conformity report. Product specification described herein was obtained from product data sheet or user's manual.

| | |
|---|---|
| CHASSIS TYPE | Plastic |
| LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1MHz) | 19 MHz |
| FREQUENCY RANGE | 88.1 MHz ~ 107.9 MHz (range into 100 kHz Step) |
| ELECTRICAL RATING | DC 5V from a internal rechargeable battery |
| NUMBER OF LAYER | 2 Layers: Main Board and Connector Board |
| EXTERNAL CONNECTOR | DC In/Out, Audio In/Out |

## 2.2 Model Differences

-. None

## 2.3 Related Submittal(s) / Grant(s)

-. Original submittal only

## 2.4 Test System Details

The model numbers for all the equipments which were used in the tested system is:

| Model | Manufacturer | FCC ID | Description | Connected to |
|---|---|---|---|---|
| DRPWFMN2 | Smart Power Solutions Inc. | UQBEIBPFM-2 | FM Transmitter (EUT) | - |
| iPod | Apple Computer | DoC | MP3 Player | EUT |

## 2.5 Test Methodology

The radiated testing was performed according to the procedures in chapter 7, 13 of ANSI C63.4: 2003 and performed at a distance of 3 meters from EUT to the antenna.

## 2.6 Test Facility

The open area test site and conducted measurement facilities are located on at 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-080, Korea. Description details of test facilities were submitted to the Commission on August 30, 2005. (Registration Number: 340658)


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# 3. SYSTEM TEST CONFIGURATION

## 3.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

| DEVICE TYPE | MANUFACTURER | MODEL/PART NUMBER | FCC ID |
|---|---|---|---|
| Main Board | Smart Power Solutions Inc. | PFMNV0.1 | N/A |
| Connector Board | Smart Power Solutions Inc. | PFMNCONNV0.1 | N/A |

## 3.2 EUT exercise Software

-. The Model, DRPWFMN2 is included a FM transmitter designed to operate on function in the 88.1~ 107.9 MHz. The EUT has audio input ports, so the EUT was played mp3 music files which was saved in iPod Nano mp3 player with maximum audio output mode during the test.

-. According to the manufacturer's specification, the EUT cannot operate transmitting function when the EUT is in charging mode, so the test was not performed.

## 3.3 Cable Description

| Ports Name | Shielded | Ferrite Bead | Metal Hood | Length (m) | Connected to |
|---|---|---|---|---|---|
| Audio In/Out | N | N | BOTH END | 1.5 | MP3 Player |
| DC In/Out | N | N | EUT END | 1.2 | - |

## 3.4 Equipment Modifications

-. None


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### 3.5 Configuration of Test System

**Line Conducted Test**: It is not need to test this requirement, because the EUT shall be operated by internal rechargeable battery.

**Radiated Emission Test**: Preliminary radiated emissions test were conducted using the procedure in ANSI C63.4: 2003 8.3.1.1 and 13.1.4.1 to determine the worse operating conditions. Final radiated emission tests were conducted at 3 meter open area test site.

**Occupied Bandwidth Measurement**:

This measurement is performed with the antenna located close enough to give a full-scale deflection of the modulated carrier on the spectrum analyzer. The EUT has audio input ports, so the EUT was tested with iPod nano(MP3 Player) maximum audio input mode during the test.

### 3.6 Antenna Requirement

According to section 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.

**Antenna Construction:**

FM transmitter antenna of the EUT is fixed inside the EUT, no consideration of replacement by the user.

## 4. PRELIMINARY TEST

### 4.1 AC Power line Conducted Emission Test

During Preliminary Test, the following operating mode was investigated

| Operation Mode | The Worse operating condition (Please check one only) |
|---|---|
| It is not need to test this requirement, because the EUT cannot operate transmit function when the EUT is in charging mode. This test was covered in Test Report for DoC procedure. | |

### 4.2 Radiated Emission Test

During Preliminary Test, the following operating mode was investigated

| Operation Mode | The Worse operating condition (Please check one only) |
|---|---|
| Transmit the RF Signal continuously | X |


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## 5. FINAL RESULT OF MEASURMENT

Preliminary test was done in normal operation mode. And the final measurement was selected for the maximized emission level

### 5.1 Radiated Emission Test (Within the permitted 200 kHz band)

The following table shows the highest levels of radiated emission on both polarizations of horizontal and vertical.

Humidity Level : 33 % Temperature: 13°C
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.239 (b)
Type of Test : Low Power Communication Device Transmitter
Result : PASSED BY –10.23 dB at 98.00 MHz

EUT : FM Transmitter Date: January 18, 2007
Distance : 3 Meter

| Radiated Emission | | | Ant | Correction Factors | | Total | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| Freq. (MHz) | Amp. (dBuV) | Detect Mode | Pol. | Ant. (dBuV/m) | Cable (dB) | Amp. (dBuV/m) | (dBuV/m) | (dB) |
| 88.10 | 24.50 | Peak | H | 7.89 | 2.36 | 34.75 | 48.00 | -13.25 |
| 98.00 | 25.70 | Peak | H | 9.67 | 2.40 | 37.77 | 48.00 | -10.23 |
| 107.90 | 23.00 | Peak | H | 11.07 | 2.48 | 36.55 | 48.00 | -11.45 |

Radiated Emission Tabulated Data

Remark: The peak values at each frequency were investigated under average limit, so the average mode was not performed.

**Tested by: Eung-Chan, Kim / Test Engineer**



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## 5.2 Radiated Emission Test (Outside of the specified 200 kHz band)

The following table shows the highest levels of radiated emission on both polarizations of horizontal and vertical.

Humidity Level : 33 % Temperature: 13 °C

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209 (a)

Type of Test : Low Power Communication Device Transmitter

Result : PASSED BY –5.38 dB at 161.00 MHz

EUT : FM Transmitter Date: January 18, 2007

Frequency range : 30MHz – 1000MHz

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)

Distance : 3 Meter

Remark : Other emissions

| Radiated Emission | | Ant | Correction Factors | | Total | FCC | |
|---|---|---|---|---|---|---|---|
| Freq. (MHz) | Amp. (dBuV) | Pol. | Ant. (dBuV/m) | Cable (dB) | Amp. (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
| 52.20 | 8.50 | H | 10.31 | 1.60 | 20.41 | 40.00 | -19.59 |
| 213.10 | 10.50 | H | 16.55 | 3.50 | 30.55 | 43.52 | -12.97 |
| 320.00 | 9.50 | H | 15.26 | 3.92 | 28.68 | 46.02 | -17.34 |
| 428.20 | 7.20 | H | 17.56 | 4.81 | 29.57 | 46.02 | -16.45 |

**Tested by: Eung-Chan, Kim / Test Engineer**

 

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## 5.3 Bandwidth of the operating frequency

Humidity Level : 42 % Temperature: 16 °C

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.239 (a)

Result : PASSED

EUT : FM Transmitter Date: January 18, 2007

Operating Condition : Transmit the RF signal.

Minimum Resolution Bandwidth : 10 kHz

Remark : Refer to test data in next page.

| Frequency (MHz) | Measured Value (kHz) | Limit (kHz) | Margin (kHz) |
|---|---|---|---|
| 88.1 | 172.0 | 200 | -28.0 |
| 98.0 | 168.0 | | -32.0 |
| 107.9 | 185.5 | | -14.5 |

**Tested by: Eung-Chan, Kim / Test Engineer**



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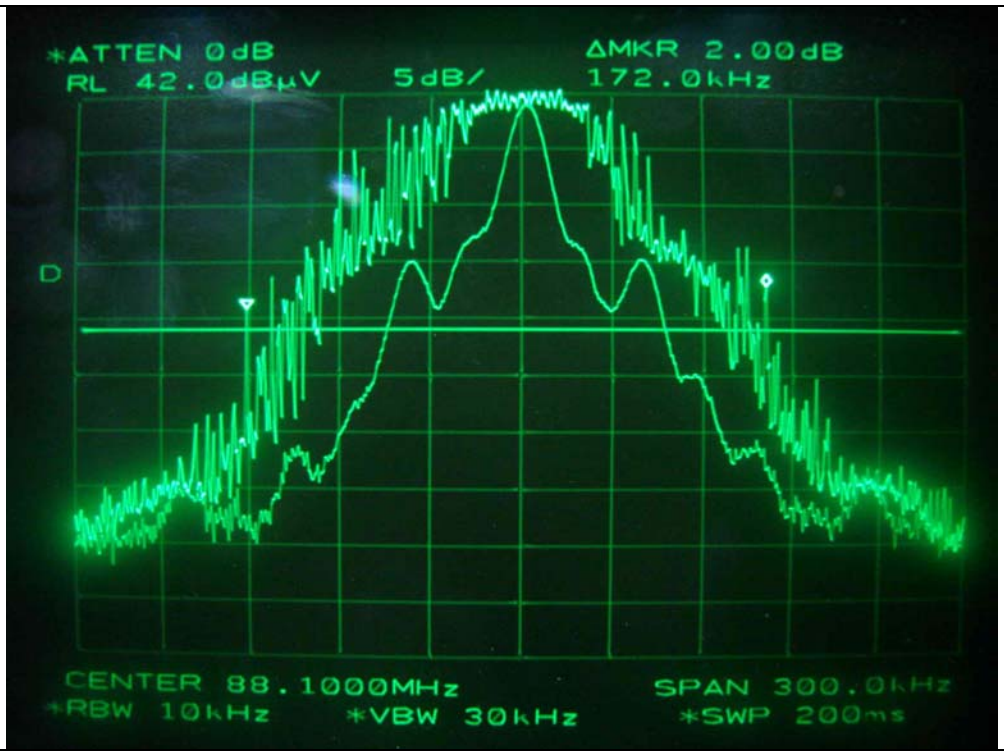
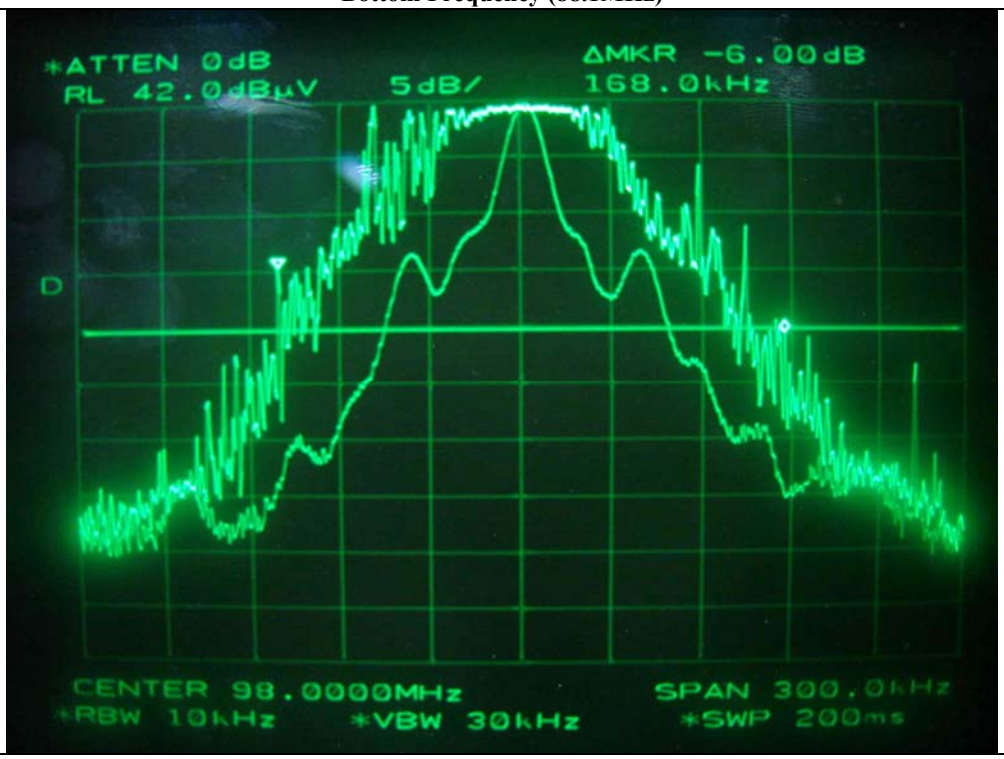



**Bottom Frequency (88.1MHz)**




**Middle Frequency (98.0MHz)**

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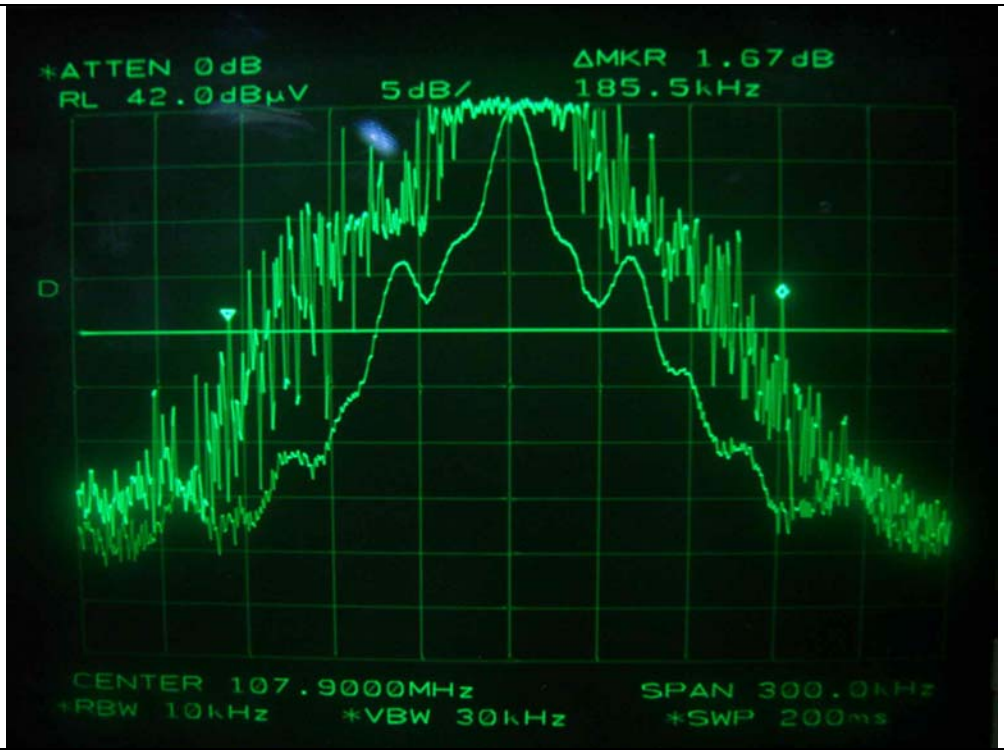


**Top Frequency(107.9 MHz)**



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## 5.4 Tuning Range of the operating frequency

| | | |
|---|---|---|
| Humidity Level | : 42 % | Temperature: 16 °C |
| Limits apply to | : FCC CFR 47, PART 15, SUBPART C, SECTION 15.239 (a) | |
| Result | : PASSED | |

| | |
|---|---|
| EUT | : FM Transmitter Date: January 18, 2007 |
| Operating Condition | : The lowest and highest frequency was adjusted by manual using up/down button on the side of the EUT and the spectrum was in max hold mode for capturing the spectrum. |
| Test Result | : Met the requirement. Refer to test data in next page. |

**Tested by: Eung-Chan, Kim / Test Engineer**



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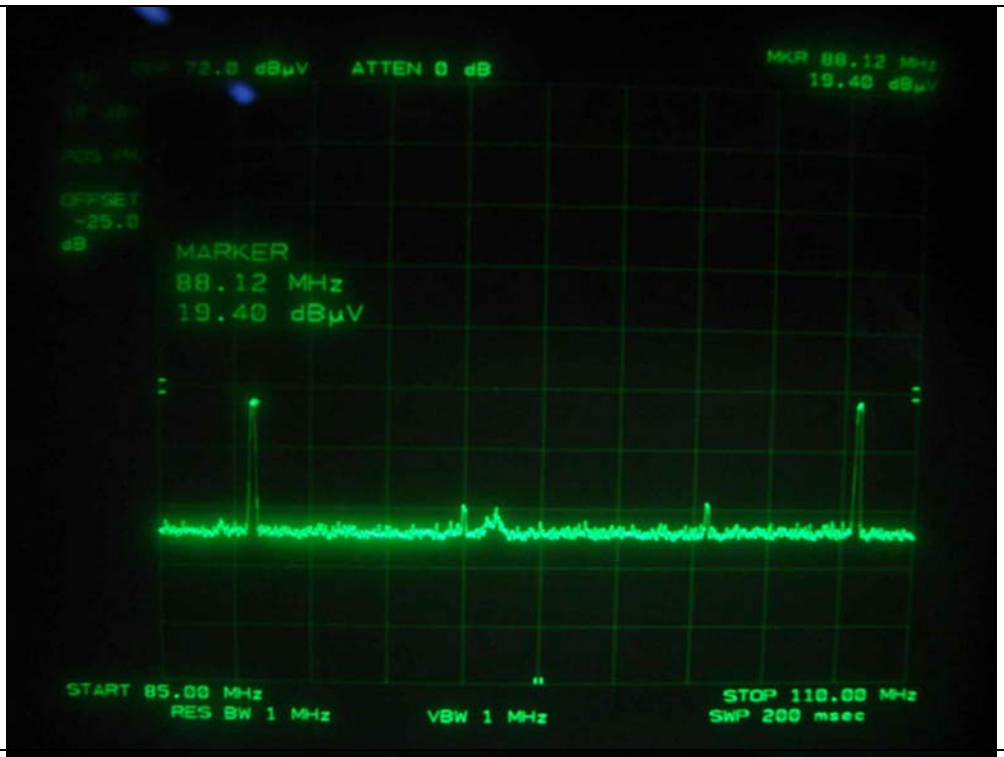


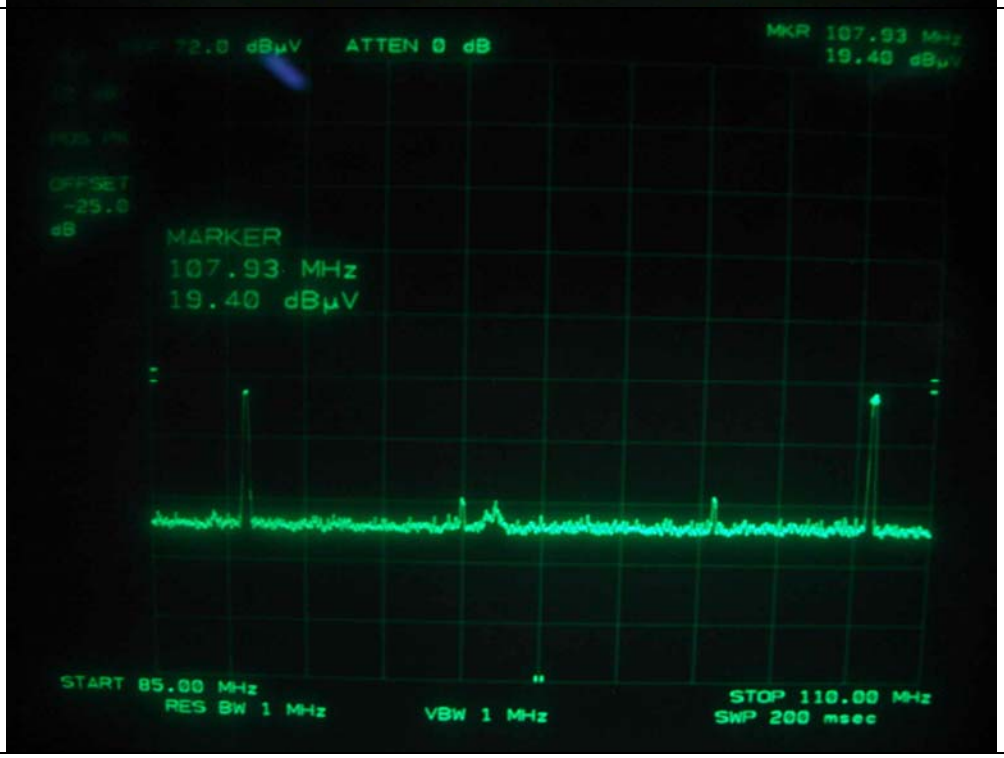


 

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## 6. FIELD STRENGTH CALCULATION

Meter readings are compared to the specification limit correcting for antenna and cable losses

| | | |
|---|---|---|
| + | Meter reading | (dBuV) |
| + | Cable Loss | (dB) |
| + | Antenna Factor (Loss) | (dB/meter) |
| = | Corrected Reading | (dBuV/meter) |
| - | Specification Limit | (dBuV/meter) |
| = | dB Relative to Spec | (+/- dB) |



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## 7. LIST OF TEST EQUIPMENT

| No. | EQUIPMENTS | MFR. | MODEL | SER. NO. | LAST CAL | DUE CAL | USE |
|---|---|---|---|---|---|---|---|
| 1. | Test receiver | R/S | ESVS10 | 827864/005 | DEC/06 | 12MONTH | ■ |
| 2. | Test receiver | R/S | ESHS 10 | 834467/007 | MAY/06 | 12MONTH | |
| 3. | Spectrum analyzer | HP | 8566B | 3407A08547 | JUN/06 | 12MONTH | ■ |
| 4. | TRILOG Broadband Antenna | Schwarzbeck | VULB9163 | VULB9163 166 | MAY/06 | 12MONTH | |
| 5. | Biconical antenna | EMCO | 3110 | 9003-1121 | FEB/06 | 12MONTH | |
| | | Schwarzbeck | VHA9103 | 91031852 | FEB/06 | | ■ |
| 6. | Log Periodic antenna | EMCO | 3146 | 9001-2614 | FEB/06 | 12MONTH | |
| | | Schwarzbeck | 9108-A(494) | 62281001 | FEB/06 | | ■ |
| 7. | LISN | EMCO | 3825/2 | 9109-1867 | JUL/06 | 12MONTH | |
| | | | | 9109-1869 | JUL/06 | | |
| | | Schwarzbeck | NSLK 8126 | 8126-404 | JUL/06 | | |
| 8. | Position Controller | HD GmbH | HD100 | N/A | N/A | N/A | ■ |
| 9. | Turn Table | HD GmbH | DS420S | N/A | N/A | N/A | ■ |
| 10. | Antenna Master | HD GmbH | MA240 | N/A | N/A | N/A | ■ |

 

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