



**MET Laboratories, Inc.** *Safety Certification - EMI - Telecom Environmental Simulation*

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June 27, 2003

Mr. Larry D'Agati  
Telephonics Wireless Corporation  
2290 West Eau Gallie Boulevard  
Suite 110  
Melbourne, FL 32935

Reference: NanoCell 300-1000-001  
FCC ID: Q821904HI0001000

Dear Mr. D'Agati:

Enclosed is the EMC Test Report for the Telephonics Wireless Corporation PCS-1900 NanoCell . The Telephonics Wireless Corporation PCS-1900 NanoCell was tested to the requirements of the FCC Rules and Regulations, Part 24 Subpart E, of Title 47 of the CFR, for a Broadband PCS device.

Thank you for using the testing services of MET Laboratories. If you have any questions regarding these results or if MET can be of further assistance to you, please feel free to contact me. We appreciate your business and look forward to working with you again soon.

Kindest Regards,  
MET LABORATORIES, INC.

Marianne T. Bosley  
TCB Administrator

Enclosures: (\Telephonics Wireless Corporation\EMC13805-FCC24)

DOCTEM-23 Jan 02

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**Electro-Magnetic Compatibility  
Test Report**

for the  
**Telephonics Wireless Corporation  
PCS-1900 NanoCell**

**Tested Under**

FCC Part 24, Subpart E  
Title 47 of the CFR  
for Broadband PCS Devices

**MET REPORT: EMC13805-FCC24**

June 11, 2002

**PREPARED FOR:**

Telephonics Wireless Corporation  
2290 West Eau Gallie Boulevard, Suite 110  
Melbourne, FL 32935

**PREPARED BY:**

MET Laboratories, Inc.  
914 West Patapsco Avenue  
Baltimore, Maryland 21230-3432

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**Electro-Magnetic Compatibility  
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for the

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**Tested Under**

FCC Part 24 Subpart E  
Title 47 of the CFR  
for Broadband PCS Devices

**MET REPORT: EMC13805-FCC24**

**PREPARED FOR:**

Telephonics Wireless Corporation  
2290 West Eau Gallie Boulevard, Suite 110  
Melbourne, FL 32935

  
\_\_\_\_\_  
Len Knight, Manager  
Electromagnetic Compatibility Testing

  
\_\_\_\_\_  
Marianne T. Bosley  
EMC Administrator

**Engineering Statement:** The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Part 24, Subpart E, of the FCC Rules under normal use and maintenance.



\_\_\_\_\_  
Liming Xu  
Project Engineer

**REPORT STATUS SHEET**

| <b>Revision</b> | <b>Report/ Revision Date</b> | <b>Reason for Revision</b> |
|-----------------|------------------------------|----------------------------|
| i               | June 27, 2003                | Initial Draft Issue.       |

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## List of Terms and Abbreviations

|          |                                                                                                                            |
|----------|----------------------------------------------------------------------------------------------------------------------------|
| AC       | Alternating Current                                                                                                        |
| Cal      | Calibration                                                                                                                |
| <i>d</i> | Measurement Distance                                                                                                       |
| dB       | Decibels                                                                                                                   |
| dBFA     | Decibels above one <b>microamp</b>                                                                                         |
| dBV      | Decibels above one <b>microvolt</b>                                                                                        |
| dBFA/m   | Decibels above one <b>microamp per meter</b>                                                                               |
| dBV/m    | Decibels above one <b>microvolt per meter</b>                                                                              |
| DC       | Direct Current                                                                                                             |
| E        | Electric Field                                                                                                             |
| DSL      | Digital Subscriber Line                                                                                                    |
| ESD      | Electrostatic Discharge                                                                                                    |
| EUT      | Equipment Under Test                                                                                                       |
| <i>f</i> | Frequency                                                                                                                  |
| FCC      | Federal Communications Commission                                                                                          |
| CISPR    | Comite International Special des Perturbations Radioelectriques<br>(International Special Committee on Radio Interference) |
| GRP      | Ground Reference Plane                                                                                                     |
| H        | Magnetic Field                                                                                                             |
| HCP      | Horizontal Coupling Plane                                                                                                  |
| Hz       | Hertz                                                                                                                      |
| IEC      | International Electrotechnical Commission                                                                                  |
| kHz      | kilohertz                                                                                                                  |
| kPa      | kilopascal                                                                                                                 |
| kV       | kilovolt                                                                                                                   |
| LISN     | Line Impedance Stabilization Network                                                                                       |
| MHz      | Megahertz                                                                                                                  |
| FH       | <b>microhenry</b>                                                                                                          |
| FF       | <b>microfarad</b>                                                                                                          |
| Fs       | <b>microseconds</b>                                                                                                        |
| NEBS     | Network Equipment-Building System                                                                                          |
| PRF      | Pulse Repetition Frequency                                                                                                 |
| RF       | Radio Frequency                                                                                                            |
| RMS      | Root-Mean-Square                                                                                                           |
| TWT      | Traveling Wave Tube                                                                                                        |
| V/m      | Volts <b>per meter</b>                                                                                                     |
| VCP      | Vertical Coupling Plane                                                                                                    |

**Summary of Test Results**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 24, Subpart E. All tests were conducted using measurement procedure ANSI C63.4-1992.

|                                   |                                                                                 |
|-----------------------------------|---------------------------------------------------------------------------------|
| Type of Submission/<br>Rule Part: | Original Filing/Part 24                                                         |
| EUT:                              | Telephonics Wireless Corporation PCS-1900 NanoCell Pre-Production Unit          |
| FCC ID:                           | Q821904HI0001000                                                                |
| Type of Emissions:                | 240KGXW ( Up Link ) And 233KGXW ( Down Link )                                   |
| RF Power Output:                  | GSM 2.2 Watts (33.33dBm) for Down Link<br>GSM 0.34 Watts (25.17dBm) for Up Link |
| Frequency Range<br>(MHz):         | 1850.2- 1909.6 MHz (Up Link) And 1930.2 - 1989.6 MHz ( Down Link )              |
| Frequency Stability:              | 10 Hz                                                                           |

**Table 1.****Summary of Test Data**

| Name of Test                                                     | FCC Rule Part/Section   | Results  |
|------------------------------------------------------------------|-------------------------|----------|
| RF Power Output                                                  | 2.1046; 24.232 (a), (c) | Complies |
| Modulation Characteristics                                       | 2.1047 (a)              | Complies |
| Occupied Bandwidth                                               | 2.1049                  | Complies |
| Spurious Emissions at Antenna Terminals                          | 2.1051; 24.238 (a)      | Complies |
| Spurious Emissions at Antenna Terminals<br>Frequency Block Edges | 2.1051; 24.238 (b)      | Complies |
| Radiated Spurious Emissions                                      | 2.1053; 24.238 (a)      | Complies |
| Frequency Stability over temperature variations                  | 2.1055 (a) (1)          | Complies |
| Frequency Stability over battery power                           | 2.1055 (d) (2)          | Complies |
| Frequency Stability over supply voltage variations               | 2.1055 (d) (1)          | Complies |

**Table 2.**

---

## **I. Executive Summary**

---

## Executive Summary

### A. Purpose of Test

An EMC evaluation to determine compliance of the PCS-1900 NanoCell with the requirements of Part 24, Subpart E was conducted. (All references are to the most current version of Title 47 of the Code of Federal Regulations in effect). In accordance with §2.1033, the following data is presented in support of the Certification of the NanoCell. Telephonics Wireless Corporation, should retain a copy of this document, and it should be kept on file for at least five years after the manufacturing of the NanoCell has been **permanently** discontinued.

### B. Executive Summary

The EUT, as supplied to MET Laboratories, complied with the requirements stated in this test report.

| References                    | Description                                                                                                                           |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Purchase Order # T46394       | Telephonics Wireless Corporation Purchase Order for the PCS-1900 NanoCell Testing                                                     |
| ANSI-C63.4:1992               | Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40 GHz |
| FCC 47CFR, Chapter 1, Part 2  | Title 47 Code of Federal Regulations Part 2 - Frequency Allocations and Radio Treaty Matters; General Rules and Regulations           |
| FCC 47CFR, Chapter 1, Part 15 | Title 47 Code of Federal Regulations Part 15 - Radio Frequency Devices                                                                |
| FCC 47CFR, Chapter 1, Part 24 | Title 47 Code of Federal Regulations Part 24 -E                                                                                       |

**Table 3. References**

---

## II. General

---

**A. Test Site**

All testing was conducted at MET Laboratories, Inc., 914 West Patapsco Avenue, Baltimore, Maryland 21230-3432. Radiated Emissions measurements were performed inside of a three-meter Semi Anechoic Chamber (equivalent to an Open Area Test Site, OATS). In accordance with §2.948(a)(2), a complete site description is filed with the Commission's Laboratory in Columbia, Maryland. MET Laboratories has been accredited by the National Voluntary Laboratory Accreditation Program (Lab Code: 100273-0).

**B. Description of Test Sample**

The EUT is a Wireless Base Transceiver Station

**C. General Test Setup**

The Telephonics Wireless Corporation NanoCell was configured to program the EUT to output a GMSK Modulation type PCS RF signal. The EUT was configured for maximum signal gain and bandwidth. The EUT was operated in a manner representative of the typical usage of the equipment. During all testing, system components were manipulated within the confines of typical usage to maximize each emission.

**D. Mode of Operation**

The Telephonics Wireless Corporation NanoCell was configured in accordance with the manufacturer's instructions and was operated as follows for all testing contained in this report unless stated otherwise:

**E. Antenna Specifications:**

No antenna was needed for this EUT.

**F. Modifications:**

No modifications were made during testing.

**G. Disposition of Test Sample:**

Mr. Larry D'Agati  
Telephonics Wireless Corporation  
2290 West Eau Gallie Boulevard  
Suite 110  
Melbourne, FL 32935

---

### **III. Electromagnetic Compatibility RF Power Output Requirements**

---

**Test Type:** RF Power Output

**Technical Specifications:** §2.1046 and §24.232(a), (c)

**Measurement Procedures:**

As required by 47 CFR 2.1046, *RF power output measurements* were made at the RF output terminals using an attenuator and spectrum analyzer. This test was performed with carrier modulated by a GMSK modulated signal.

**Results:**

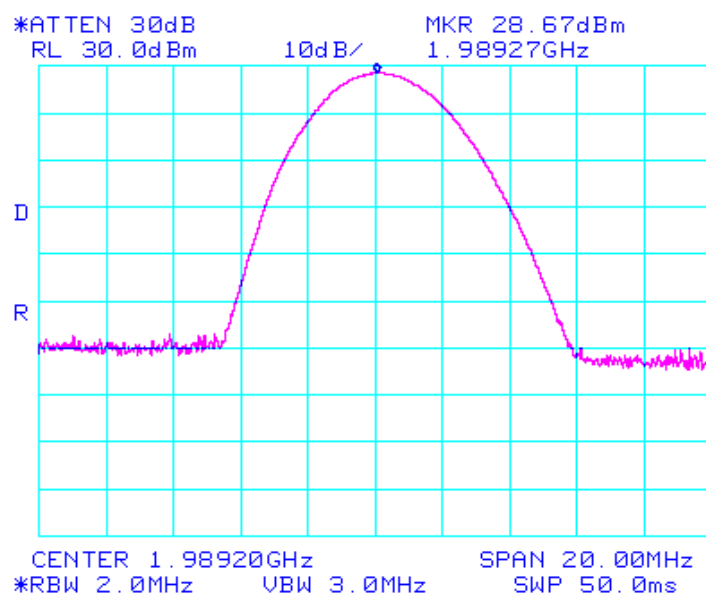
Equipment complies with 47CFR 2.1046 and 24.232(a), (c). The EUT conducted power does not exceed limit at the carrier frequency.

All RF Power output measurements were conducted peak envelope power with instrument set RBW=1 or 2 MHz; the results are the same, which verified by a digital power meter (HP436A power meter and HP8481B power sensor).

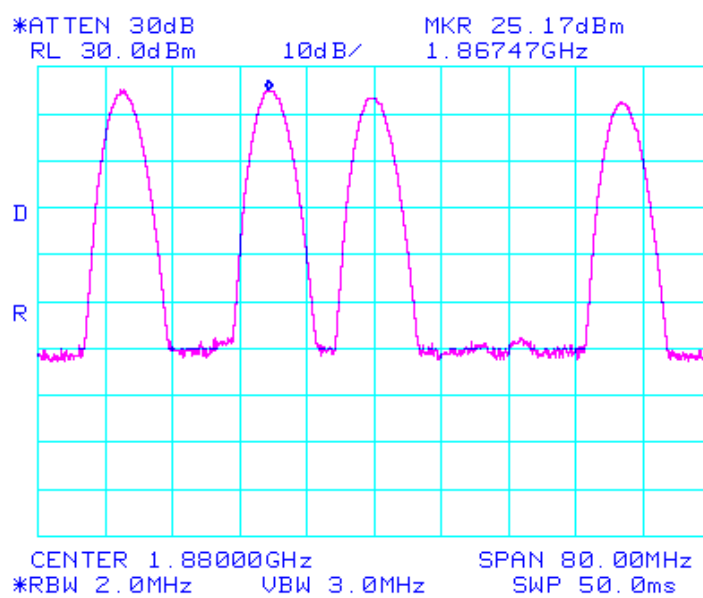
The following pages show measurements of RF power output (conducted):

GSM 2.2 Watts (33.33dBm) for Down Link

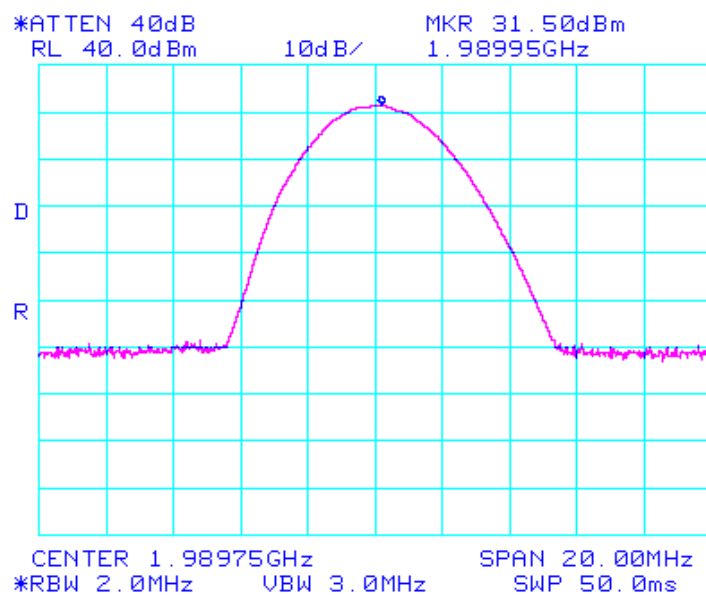
GSM 0.34 Watts (25.17dBm) for Up Link



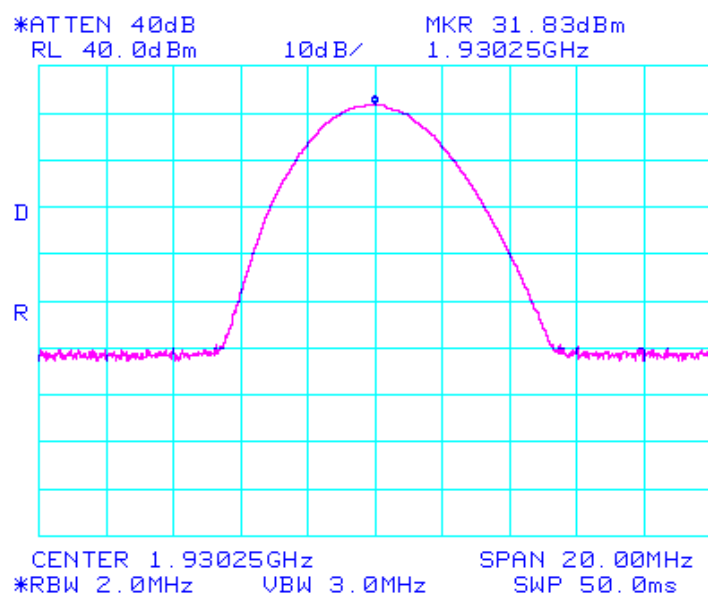
nBS Beacon RF Output Power



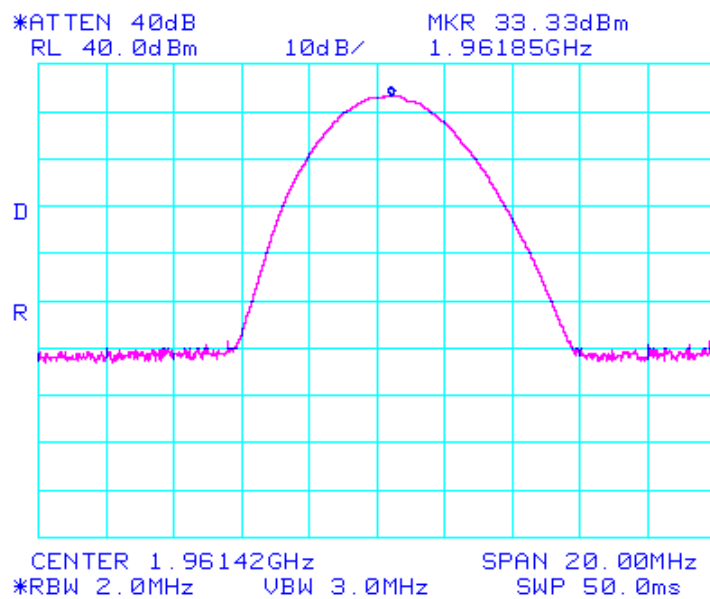
nMS RF Output Power



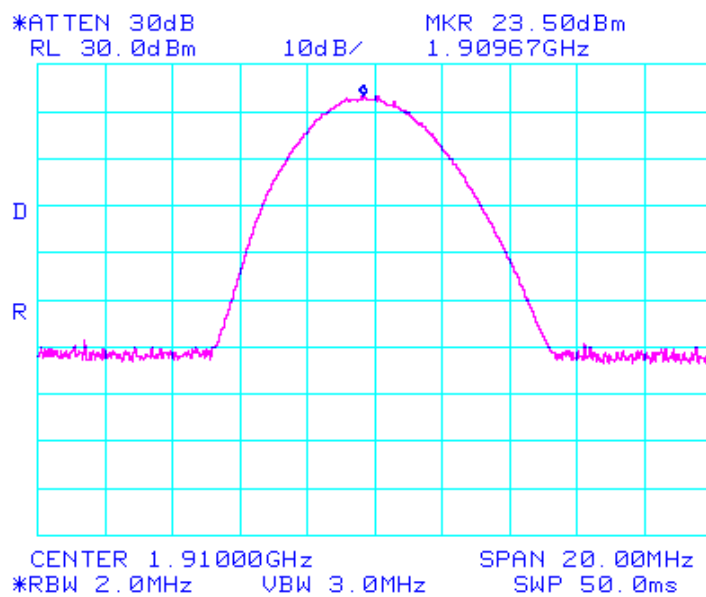
nBTS Beacon RF Output Power  
@ high channel



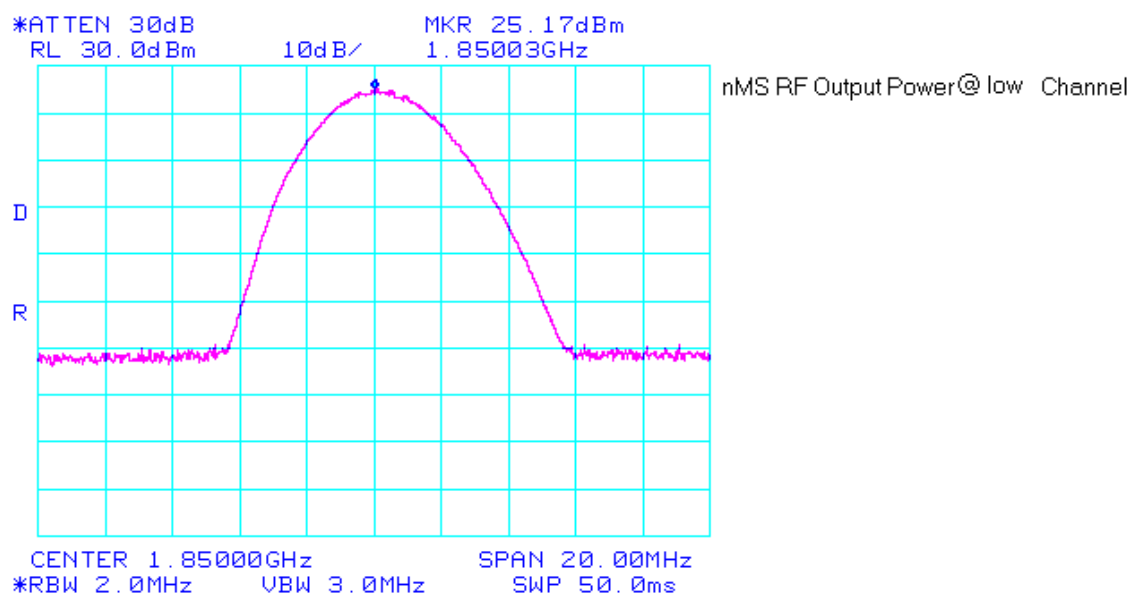
nBTS Beacon RF Output Power  
@ low channel

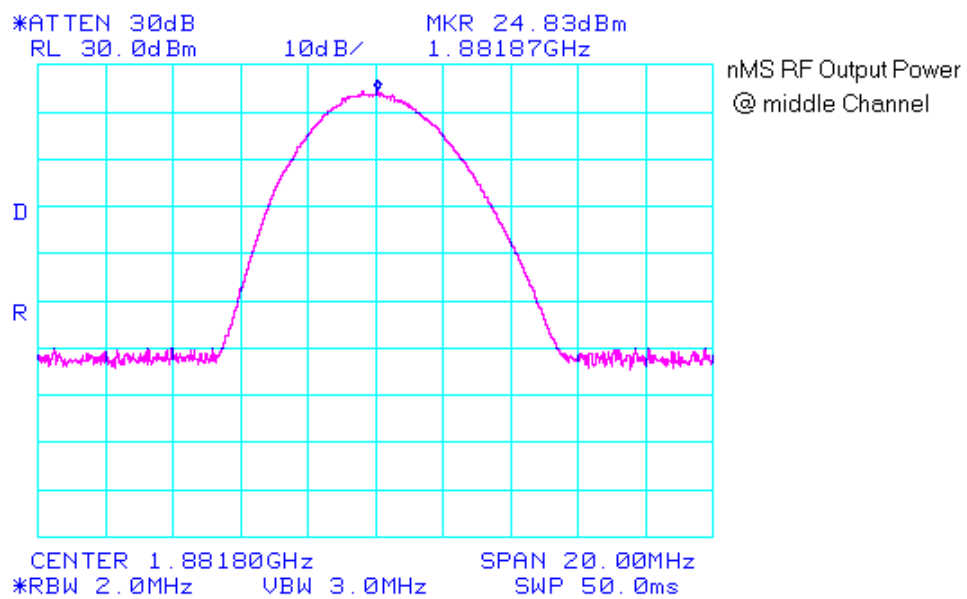


nBTS Beacon RF Output Power  
@ middle channel



nMS RF Output Power @ high Channel







**Figure 1. Photograph of Part 24 Tests Setup**

**Test Engineer:** Liming Xu

**Test Date:** June 10, 2003

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## **IV. Electromagnetic Compatibility Modulation Characteristics Requirements**

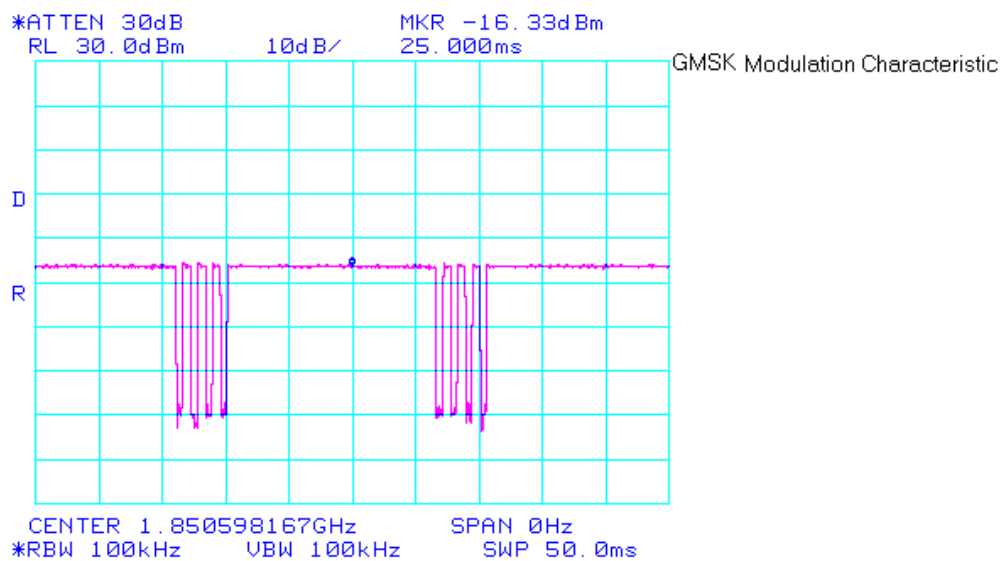
---

**Test Type:** Modulation Characteristics

**Technical Specification:** §2.1047(a)

**Measurements Procedure:** The EUT uses GMSK modulation. In GMSK modulation, voice or data information is digitized and coded into a bit stream. The bits are conveyed through precise phase changes in the carrier.

**Results:** The following plots give a detailed explanation of the modulation scheme used in the EUT of the PCS Band



**Test Engineer:** Liming Xu

**Test Date:** June 10, 2003

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## **V. Electromagnetic Compatibility Occupied Bandwidth Requirements**

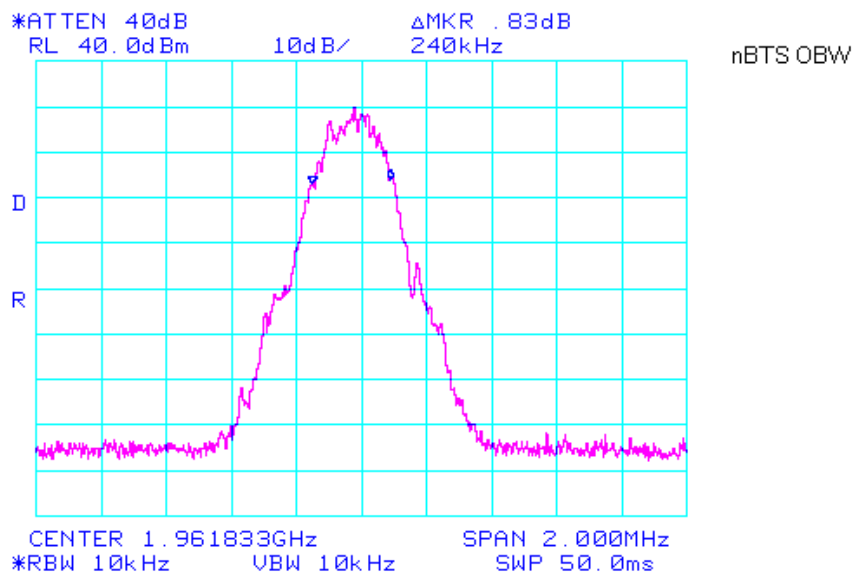
---

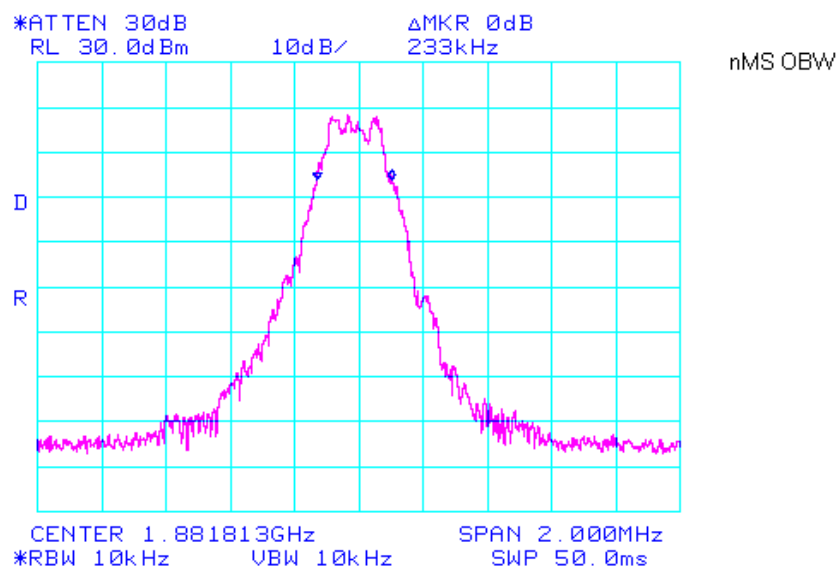
**Test Type:** Occupied Bandwidth

**Technical Specifications:** §2.1049

**Measurement Procedures:** As required by §2.1049 of CFR 47, *occupied bandwidth measurements* were made on the EUT. The EUT was configured to transmit a GMSK modulated carrier signal. Using an IF bandwidth of 10KHz, we determined the occupied bandwidth of the emission at the center of the selectable channel range.

**Results:** Equipment complies with Section 2.1049. Plots of the occupied bandwidth, as measured at the RF output port follow:





**Test Engineer:** Liming Xu

**Test Date:** June 10, 2003

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## **VI. Electromagnetic Compatibility Emissions Requirements**

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## Spurious Emissions at Antenna Terminals

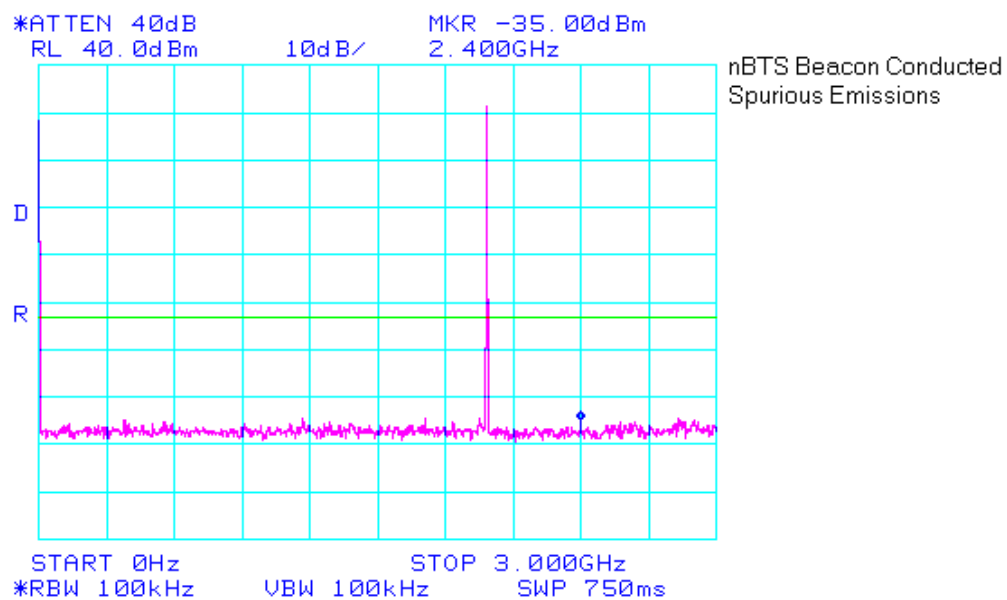
**Technical Specifications:** §2.1051 and §24.238(a)

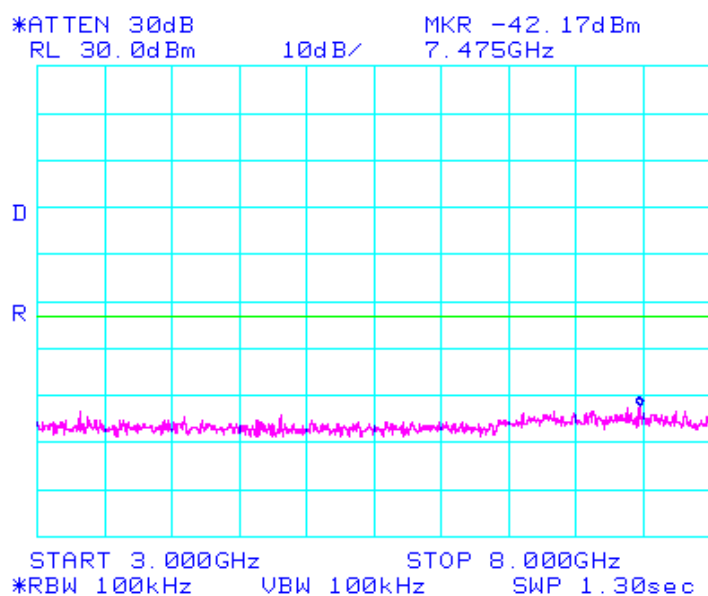
**Measurement Procedures:** As required by 47 CFR 2.1051, *spurious emissions at antenna terminal measurements* were made at the RF output terminals using a 50 A attenuation and spectrum analyzer set for a 100 kHz bandwidth. The RBW of 100 kHz was used to investigate and search for spurious emissions; any spurs found with this technique are to be remeasured with the appropriate 1MHz RBW. There were no detectable spurious emissions for this EUT. This test was performed with Digitally modulated carrier signals, and the EUT was adjusted for continuous transmission on frequencies across the operating band. The frequency spectrum was investigated from 9.0 KHz to 20.0 GHz. For measuring emissions above 2 GHz, a high-pass filter was used to eliminate the fundamental transmit frequency to prevent possible saturation effects on the front end of the spectrum analyzer.

**Results:** The following table and plots are included to illustrate compliance with the requirements of 47 CFR Part 24.238(a):

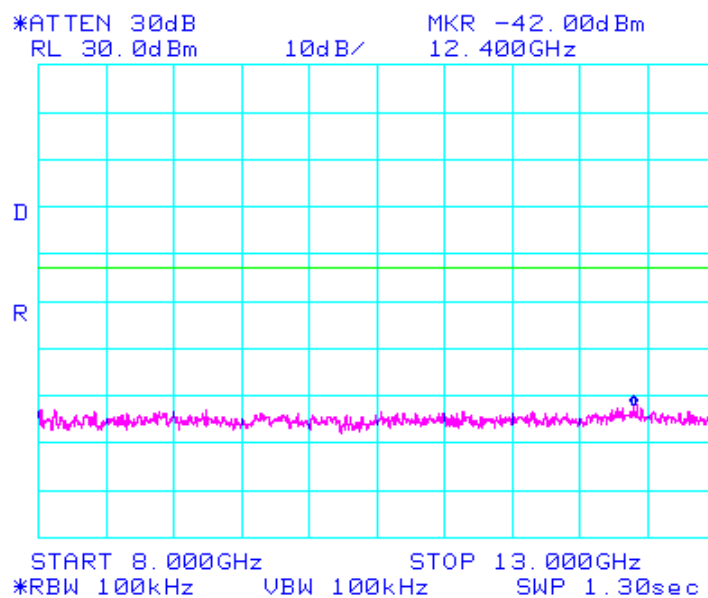
| Frequency Range     | Emission Frequency | Emission Level (dBm) | Limit (dBm) |
|---------------------|--------------------|----------------------|-------------|
| 9 kHz - 3.0 GHz     | 2.4GHz             | -35 (noise floor)    | -13.1       |
| 3.0 GHz - 8.0 GHz   | 7.475 GHz          | -42.17 (noise floor) | -13.1       |
| 8.0 GHz - 14.0 GHz  | 12.4 GHz           | -42.0 (noise floor)  | -13.1       |
| 14.0 GHz - 20.0 GHz | 14.902 Ghz         | -39.67 (noise floor) | -13.1       |

**Table 4. Spurious Emissions Measurements (antenna terminals) for nBTS Beacon**

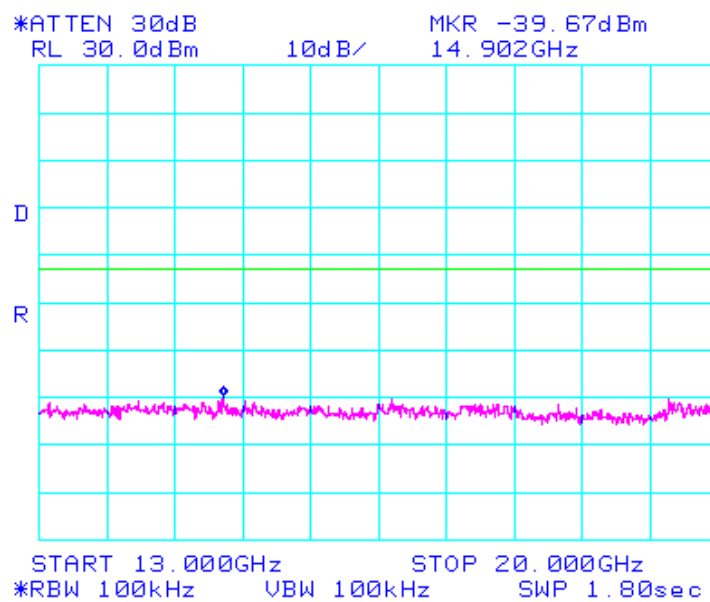




nBTS Beacon Conducted  
Spurious Emissions



nBTS Beacon Conducted  
Spurious Emissions

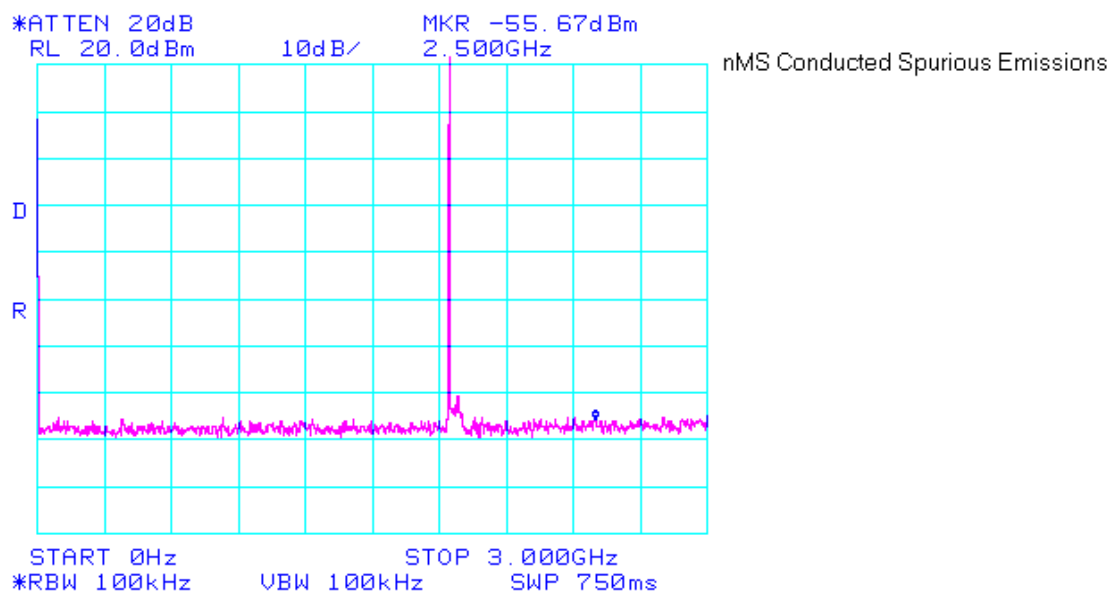


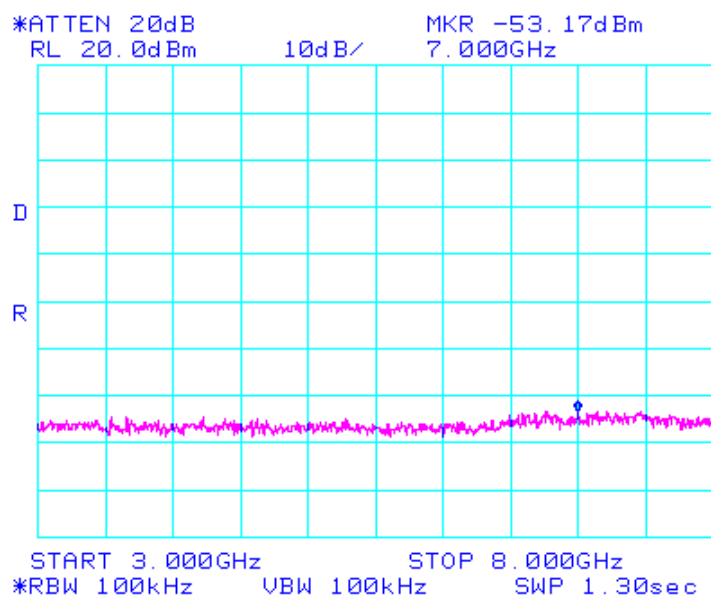
nBTS Beacon Conducted  
Spurious Emissions

**Results:** The following table and plots are included to illustrate compliance with the requirements of 47 CFR Part 24.238(a):

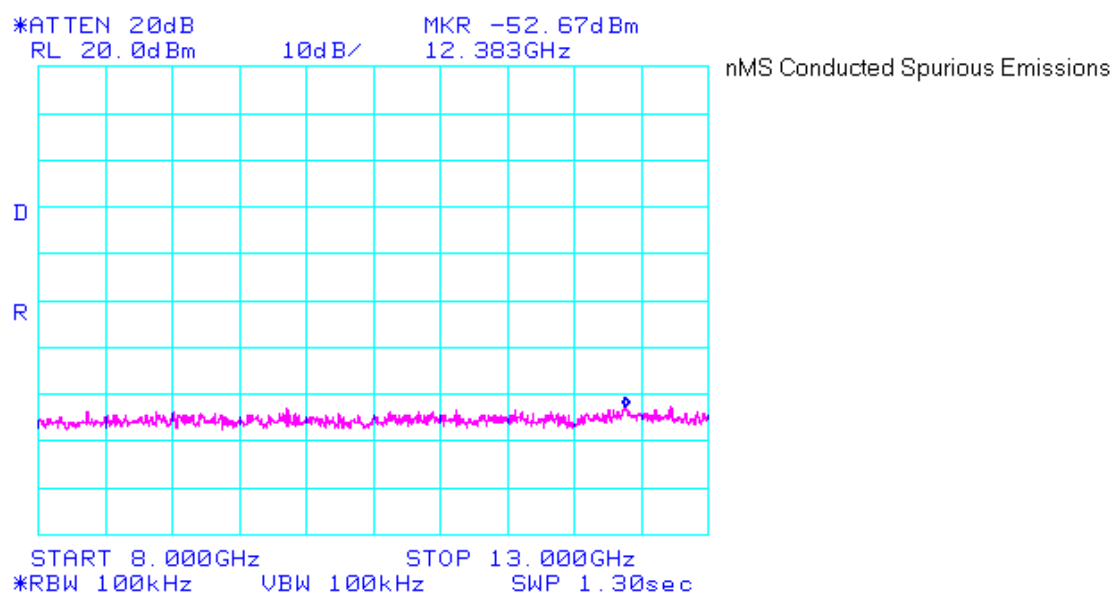
| Frequency Range     | Emission Frequency | Emission Level (dBm) | Limit (dBm) |
|---------------------|--------------------|----------------------|-------------|
| 9 kHz - 3.0 GHz     | 2.5 GHz            | -55.67 (noise floor) | -13.1       |
| 3.0 GHz - 8.0 GHz   | 7.0 GHz            | -53.17 (noise floor) | -13.1       |
| 8.0 GHz - 14.0 GHz  | 12.383 GHz         | -52.67 (noise floor) | -13.1       |
| 14.0 GHz - 20.0 GHz | 14.167 GHz         | -50.17 (noise floor) | -13.1       |

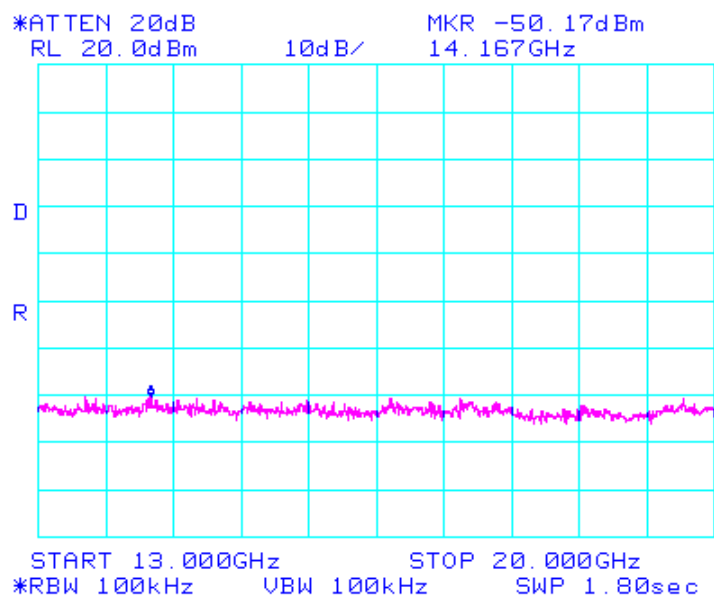
**Table 5. Spurious Emissions Measurements (antenna terminals) for nMS Beacon**





nMS Conducted Spurious Emissions



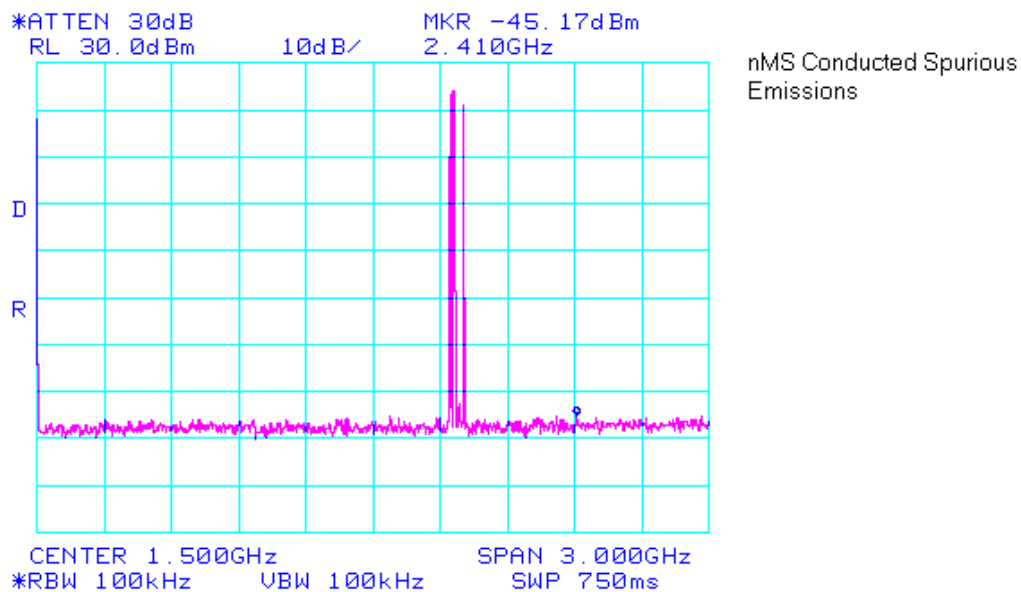


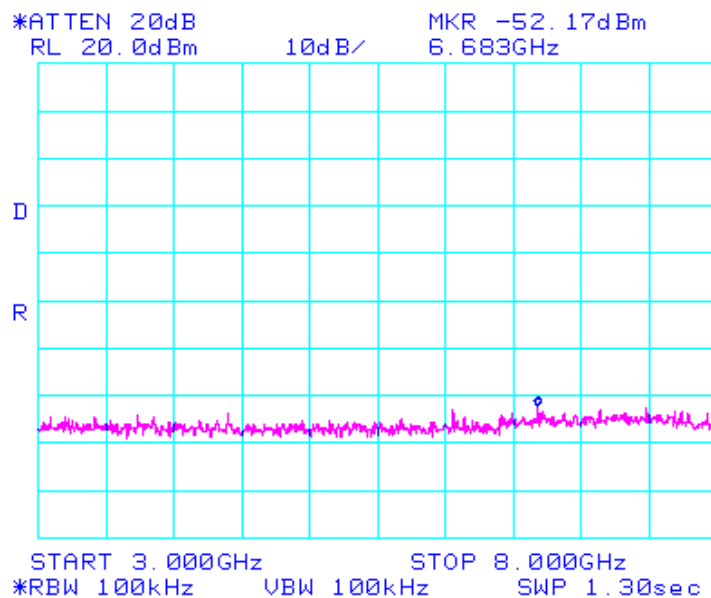
nMS Conducted Spurious Emissions

**Results:** The following table and plots are included to illustrate compliance with the requirements of 47 CFR Part 24.238(a):

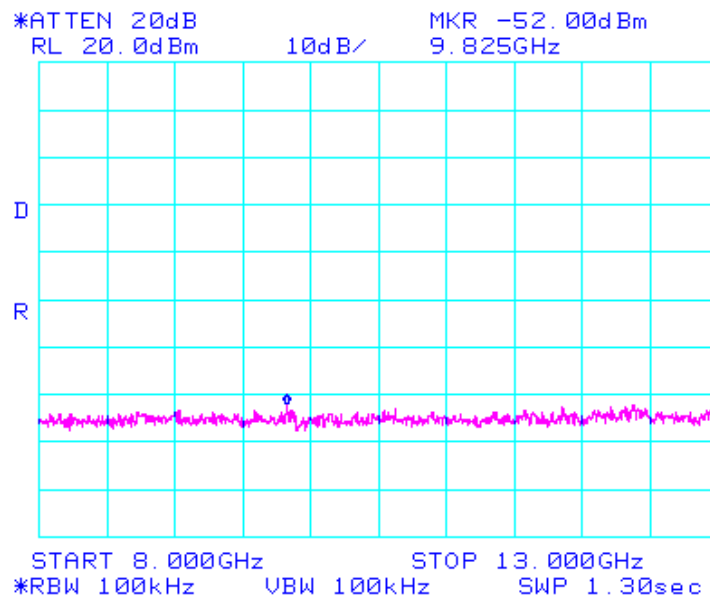
| Frequency Range     | Emission Frequency | Emission Level (dBm) | Limit (dBm) |
|---------------------|--------------------|----------------------|-------------|
| 9 kHz - 3.0 GHz     | 2.41 GHz           | -45.17 (noise floor) | -13.1       |
| 3.0 GHz - 8.0 GHz   | 6.683 GHz          | -52.12 (noise floor) | -13.1       |
| 8.0 GHz - 14.0 GHz  | 9.825 GHz          | -52.0 (noise floor)  | -13.1       |
| 14.0 GHz - 20.0 GHz | 14.505 GHz         | -49.33 (noise floor) | -13.1       |

**Table 6. Spurious Emissions Measurements (antenna terminals) for nMS Beacon-Muilt-Channel**

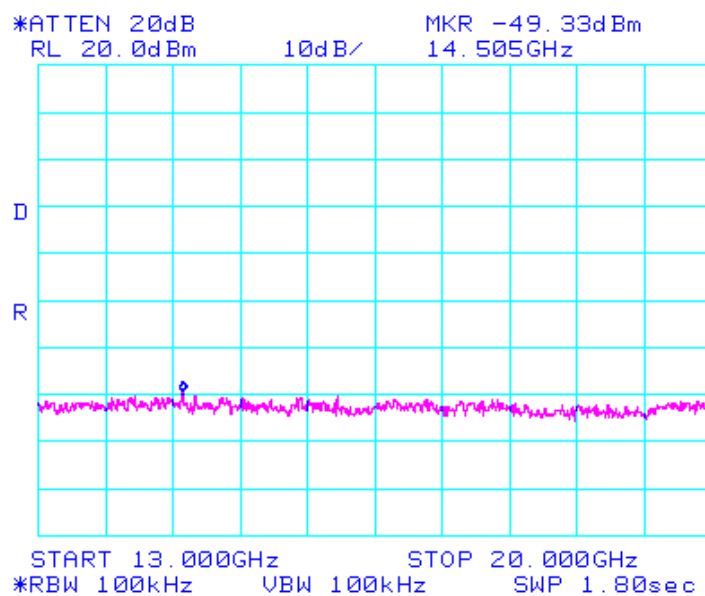




nMS Conducted Spurious  
Emissions



nMS Conducted Spurious  
Emissions

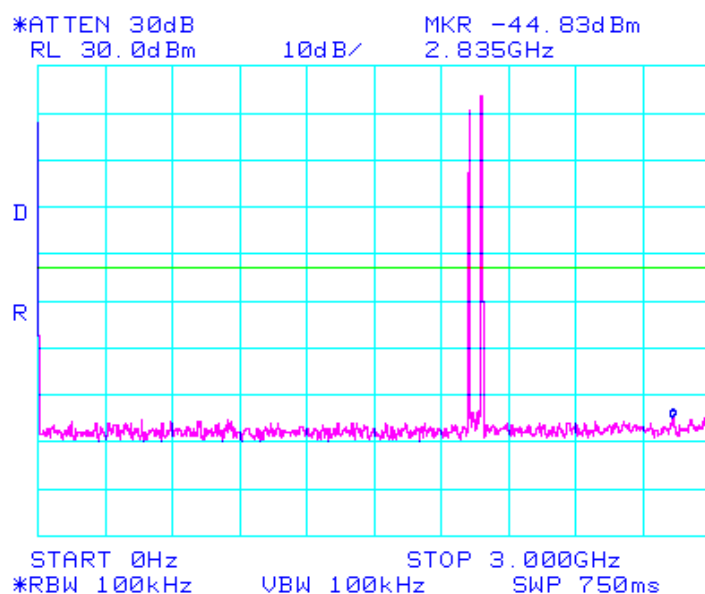


nMS Conducted Spurious  
Emissions

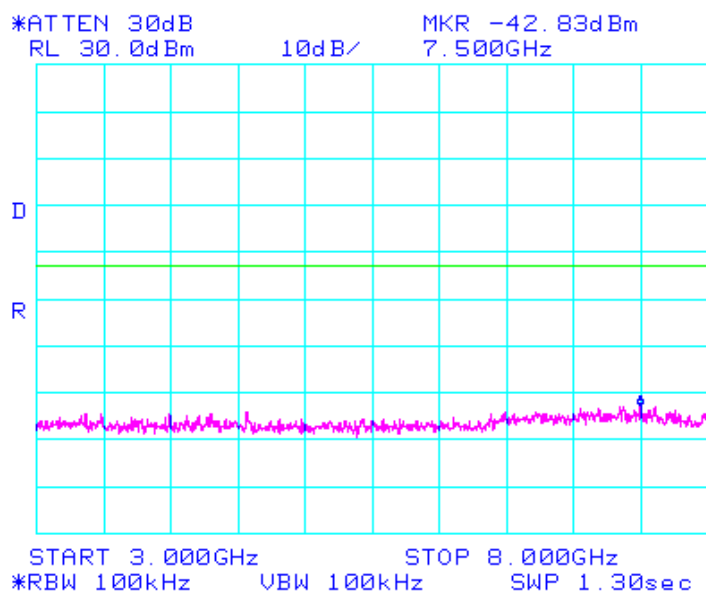
**Results:** The following table and plots are included to illustrate compliance with the requirements of 47 CFR Part 24.238(a):

| Frequency Range     | Emission Frequency | Emission Level (dBm) | Limit (dBm) |
|---------------------|--------------------|----------------------|-------------|
| 9 kHz - 3.0 GHz     | 2.835 GHz          | -44.83 (noise floor) | -13.1       |
| 3.0 GHz - 8.0 GHz   | 7.5 GHz            | -42.83 (noise floor) | -13.1       |
| 8.0 GHz - 14.0 GHz  | 11.633 GHz         | -41.83 (noise floor) | -13.1       |
| 14.0 GHz - 20.0 GHz | 16.675 GHz         | -40.17 (noise floor) | -13.1       |

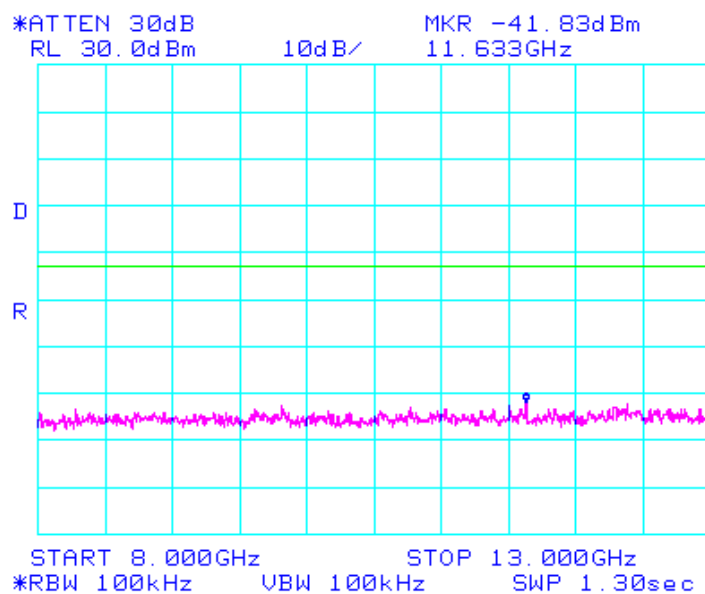
**Table 7. Spurious Emissions Measurements (antenna terminals) for nBS Beacon-Muilt-Channel**



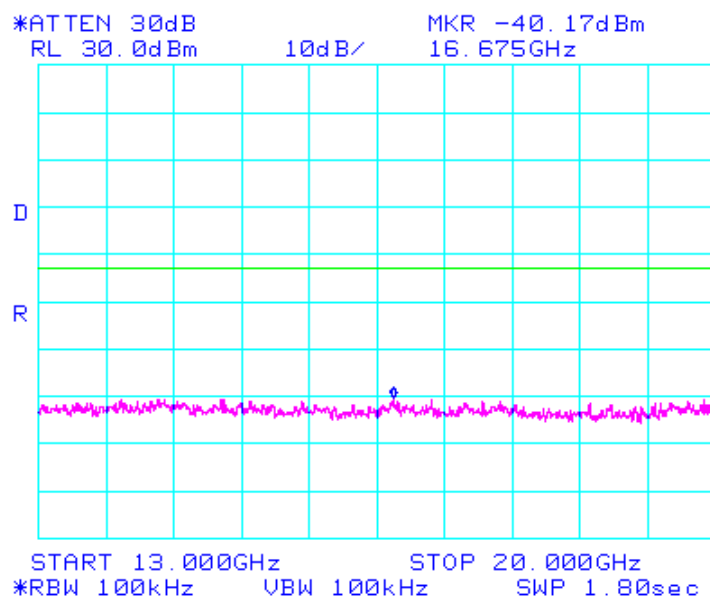
nBS Beacon Conducted Spurious Emissions



nBS Beacon Conducted Spurious  
Emissions



nBS Beacon Conducted Spurious  
Emissions



nBS Beacon Conducted Spurious  
Emissions

Test Engineer: Liming Xu

Test Date: June 11, 2003

**Spurious Emissions at Antenna Terminals at Block Edges +/- 1MHz**

**Technical Specifications:** §2.1051 and §24.238(b)

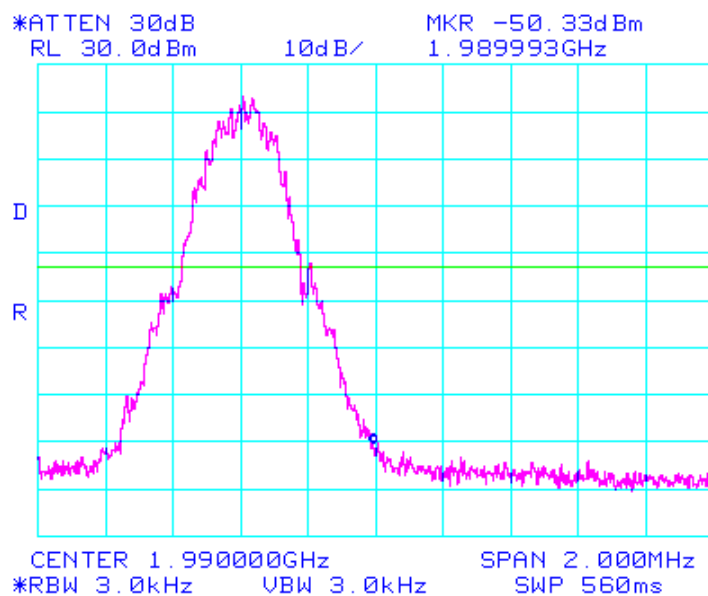
**Measurement Procedures:** As recommended in FCC Part 24, greater than or equal to 1% of emission spectrum bandwidth was chosen to measure the peak of any emission inside the 1.0 MHz frequency band adjacent to each frequency block edge. All other frequencies were measured using a 3 KHz RBW. The unit was exercised using signal types required by §2.1049.

**Results:** Modulation products outside of this band are attenuated at least  $43 + 10 \log(P)$  below the level of the modulated carrier. A Plot of the spurious emissions at +/- 1 MHz around the transmit frequency, as measured at the antenna port, appears on the following page.

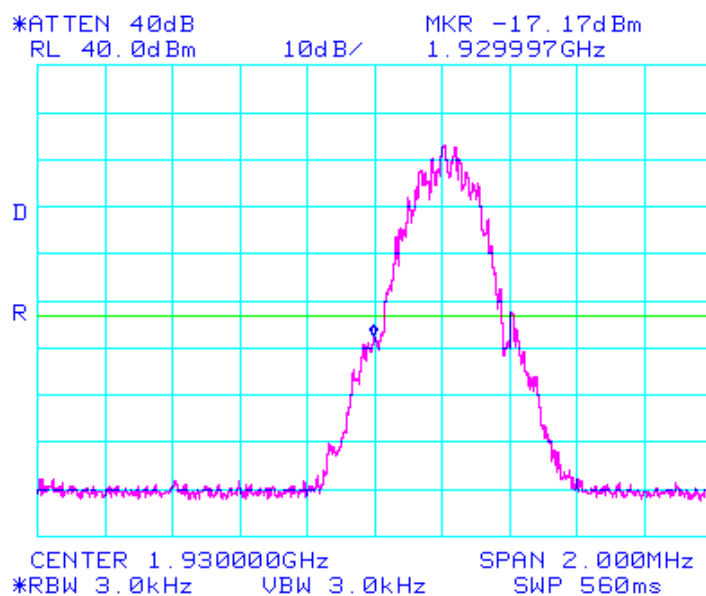
**SPURIOUS EMISSION FREQUENCY BLOCKS**

| Frequency Block<br>(MHz) | Down Link<br>(CH#) | Up Link<br>(CH#) |
|--------------------------|--------------------|------------------|
| A<br>(1930 -)            | 512<br>(1930.2)    | 512<br>(1850.2)  |
| C<br>(- 1990)            | 809<br>(1989.6)    | 809<br>(1909.6)  |

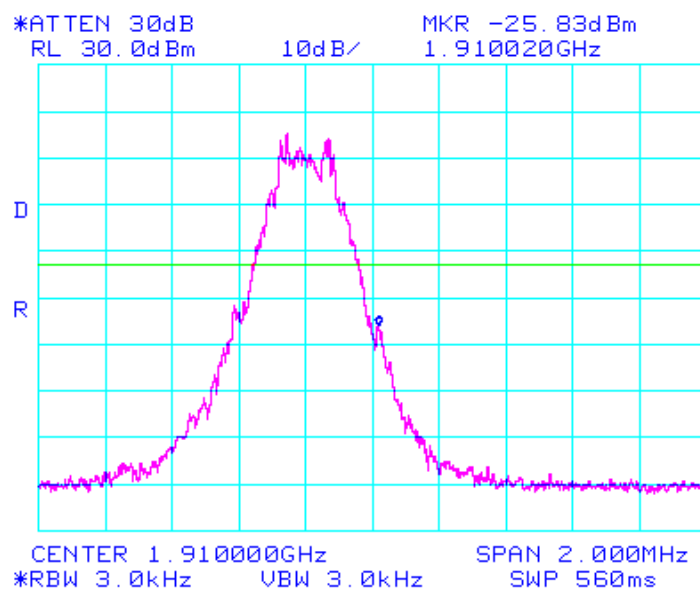
**Table 8. Spurious Emissions (Band Edges)**



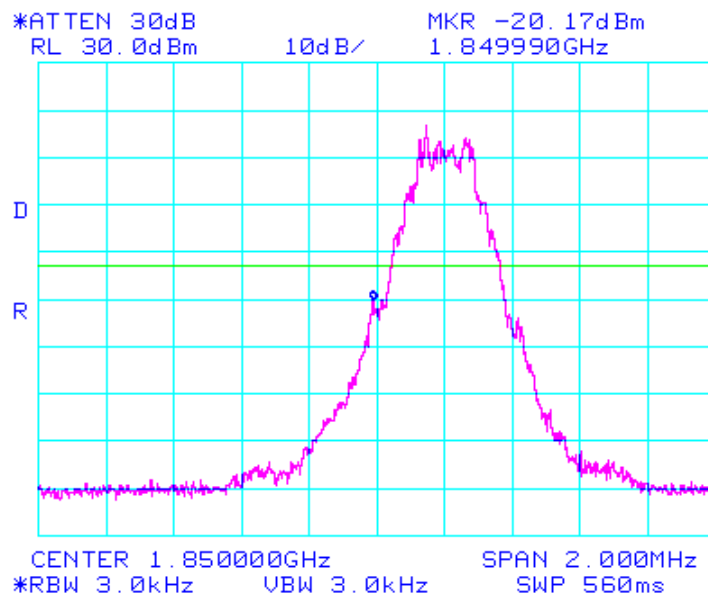
nBTS Beacon Bandedge Power  
at high side



nBTS Beacon Bandedge Power  
at low side



nMS Beacon Bandedge Power  
at high side



nMS Beacon Bandedge Power  
at low side

Test Engineer: Liming Xu

Test Date: June 13, 2003

**Radiated Emissions****Technical Specifications:** §2.1053 and §24.238(a)

**Measurement Procedures:** As required by §2.1053, *field strength of spurious radiation measurements* were made in accordance with the general procedures of ANSI C63.4-1992 "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" and TIA/EIA 603 substitution method.

Preliminary radiated emission measurements were performed inside a shielded chamber. The EUT was operated in a manner representative of the typical usage of the equipment. During testing, system components were manipulated with the confines of typical usage to maximize each emission. preliminary measurements was used as a guide for making final measurements in a 3 meter semi-anechoic chamber (equivalent to an Open Area Test Site). The unit was scanned over the frequency range of the lowest system oscillator value to 20 GHz.

The Radiated Spurious Emissions *Limit* is obtained by the following:

Based on an output power (as measured at the output of the Amplifier) of 2.5 watts:

$$P_o = 2.5 \text{ W}$$

the radiated power level of all spurious emissions must be attenuated by at least  $43 + 10\log(P_o)$  below  $P_o$ , yielding:

$$P_o - [43 + 10\log(P_o)] = -13\text{dBm}$$

**Results:**

All of the measurable radiated emissions are related to the digital device portion of the EUT, and thus are compared to the 47CFR 15 Class B field strength limit. Mathematical calculations indicate that these field strengths yield radiated power levels greater than 30 dB below the -13 dBm limit for spurious emissions from the transmitter portion of the EUT calculated above. There were no observable radiated emissions from the transmitter portion of the EUT.

The Spurious Radiated Emissions were measured from 1GHz to 20 GHz for the EUT. There were no detectable spurious emissions in that frequency range. The device complies with 47 CFR 2.1053; 24.238(a).

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## **VII. Electromagnetic Compatibility Frequency Stability Requirements**

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**Frequency Stability over Temperature Variations****Technical Specifications:** §2.1055(a)(1) and 24.135(a)

**Measurement Procedures:** As required by §2.1055(a)(1) of CFR 47, *frequency tolerance measurements* were made over the temperature range of -30EC to +50EC. The frequency measurements were made using direct input to a spectrum analyzer. Climatic control was accomplished using an environmental simulation chamber. The temperature was first lowered to -30EC and then raised hourly in 10E increments. The unit remained in the chamber during temperature transitions and during the measurement process.

**Results:** Frequency tolerance of carrier signal: +/- 0.0001% (+/- 1ppm) for a temperature variation from - 30EC to + 50EC at normal supply voltage.

| Temperature (EC) | Carrier Frequency (CH 661) (GHz) | Frequency Deviation (Hz) | Deviation Limit (KHz) |
|------------------|----------------------------------|--------------------------|-----------------------|
| -30              | 1.960,000,00                     | 10 *                     | ± 1.96                |
| -20              | 1.960,000,00                     | 10 *                     | ± 1.96                |
| -10              | 1.960,000,00                     | 10 *                     | ± 1.96                |
| 0                | 1.960,000,00                     | 10 *                     | ± 1.96                |
| +10              | 1.960,000,00                     | 10 *                     | ± 1.96                |
| +20              | 1.960,000,00                     | 10 *                     | ± 1.96                |
| +30              | 1.960,000,00                     | 10 *                     | ± 1.96                |
| +40              | 1.960,000,00                     | 10 *                     | ± 1.96                |
| +50              | 1.960,000,00                     | 10 *                     | ± 1.96                |

**Table 9. CARRIER FREQUENCY DEVIATIONS DUE TO TEMPERATURE INSTABILITY**

- \* The frequency deviation is less than 10 Hz,
- \* There is no detectable frequency variation when the frequency counter was set to 10Hz resolution.

The unit meets the requirements of 2.1055 (a)(1)

**Test Engineer: Liming Xu**

**Test Date: June 13, 2003**

**Frequency Stability over Voltage Variations**

**Technical Specifications:** §2.1055(d)(2)

**Measurement Procedures:** As required by §2.1055(d)(2) of CFR 47, *frequency tolerance measurements* were made over changes in the supply voltage to the EUT from 85% to 115% of the nominal supply voltage using a variable transformer to vary the AC supply. The frequency measurements were made using direct input to a spectrum analyzer.

**Results:**

Frequency tolerance of carrier signal:  $\pm 0.0001\%$  for a variation in primary voltage from 85% to 115% of the **rated supply**.

| Percentage of Rated Supply | AC Voltage (VAC @ 60 Hz) | Carrier Frequency (GHz) | Frequency Deviation (Hz) | Deviation Limit (kHz) |
|----------------------------|--------------------------|-------------------------|--------------------------|-----------------------|
| 85%                        | 102                      | 1.960,000,00            | 10 *                     | $\pm 1.96$            |
| 100%                       | 120                      | 1.960,000,00            | 10 *                     | $\pm 1.96$            |
| 115%                       | 138                      | 1.960,000,00            | 10 *                     | $\pm 1.96$            |

**Table 10. Carrier Frequency Deviations Due to Voltage Variations**

The unit meets the requirements of 2.1055 (d)(2)

\* The frequency deviation is less than 10 Hz,

\* There is no detectable frequency variation when the frequency counter was set to 10Hz resolution.

**Test Engineer: Liming Xu**

**Test Date: June 13, 2003**

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## **VIII. Test Equipment**

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| <b>MET #</b> | <b>Manufacturer</b>      | <b>Model #</b>   | <b>Model</b> | <b>Cal Date</b> | <b>Cal Due</b> |
|--------------|--------------------------|------------------|--------------|-----------------|----------------|
| 1T4300       | SEMI-ANECHOICCHAMBER # 1 | EMC TEST SYSTEMS | NONE         | 08/21/2002      | 08/21/2003     |
| 1T4303       | ANTENNA; BILOG           | SCHAFNER - CHASE | CBL6140A     | 4/9/2003        | 4/9/2004       |
| 1T4302       | EMI Receiver             | HP               | 8546A        | 09/17/2002      | 09/17/2003     |
| 1T4288       | Spectrum Analyzer        | HP               | 8563A        | 6/11/2003       | 6/11/2004      |

**Table 11.                    Test Equipment List**

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## **IX. Certification Label & User's Manual Information**

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## A. Certification Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart I — Marketing of Radio frequency devices:

### § 2.801 Radio-frequency device defined.

As used in this part, a radio-frequency device is any device which in its operation is capable of Emitting radio-frequency energy by radiation, conduction, or other means. Radio- frequency devices include, but are not limited to:

- (a) The various types of radio communication transmitting devices described throughout this chapter.
- (b) The incidental, unintentional and intentional radiators defined in Part 15 of this chapter.
- (c) The industrial, scientific, and medical equipment described in Part 18 of this chapter.
- (d) Any part or component thereof which in use emits radio-frequency energy by radiation, conduction, or other means.

### § 2.803 Marketing of radio frequency devices prior to equipment authorization.

- (a) Except as provided elsewhere in this chapter, no person shall sell or lease, or offer for sale or lease (including advertising for sale or lease), or import, ship or distribute for the purpose of selling or leasing or offering for sale or lease, any radio frequency device unless:
  - (1) In the case of a device subject to certification, such device has been authorized by the Commission in accordance with the rules in this chapter and is properly identified and labeled as required by §2.925 and other relevant sections in this chapter; or
  - (2) In the case of a device that is not required to have a grant of equipment authorization issued by the Commission, but which must comply with the specified technical standards prior to use, such device also complies with all applicable administrative (including verification of the equipment or authorization under a Declaration of Conformity, where required), technical, labeling and identification requirements specified in this chapter.
- (d) Notwithstanding the provisions of paragraph (a) of this section, the offer for sale solely to business, commercial, industrial, scientific or medical users (but not an offer for sale to other parties or to end users located in a residential environment) of a radio frequency device that is in the conceptual, developmental, design or pre-production stage is permitted prior to equipment authorization or, for devices not subject to the equipment authorization requirements, prior to a determination of compliance with the applicable technical requirements *provided* that the prospective buyer is advised in writing at the time of the offer for sale that the equipment is subject to the FCC rules and that the equipment will comply with the appropriate rules before delivery to the buyer or to centers of distribution.

- (e)(1) Notwithstanding the provisions of paragraph (a) of this section, prior to equipment authorization or determination of compliance with the applicable technical requirements any radio frequency device may be operated, but not marketed, for the following purposes and under the following conditions:
- (i) Compliance testing;
  - (ii) Demonstrations at a trade show provided the notice contained in paragraph (c) of this section is displayed in a conspicuous location on, or immediately adjacent to, the device;
  - (iii) Demonstrations at an exhibition conducted at a business, commercial, industrial, scientific or medical location, but excluding locations in a residential environment, provided the notice contained in paragraphs (c) or (d) of this section, as appropriate, is displayed in a conspicuous location on, or immediately adjacent to, the device;
  - (iv) Evaluation of product performance and determination of customer acceptability, provided such operation takes place at the manufacturer's facilities during developmental, design or pre-production states; or
  - (v) Evaluation of product performance and determination of customer acceptability where customer acceptability of a radio frequency device cannot be determined at the manufacturer's facilities because of size or unique capability of the device, provided the device is operated at a business, commercial, industrial, scientific or medical user's site, but not at a residential site, during the development, design or pre-production stages.
- (e)(2) For the purpose of paragraphs (e)(1)(iv) and (e)(1)(v) of this section, the term *manufacturer's facilities* includes the facilities of the party responsible for compliance with the regulations and the manufacturer's premises, as well as the facilities of other entities working under the authorization of the responsible party in connection with the development and manufacture, but not the marketing, of the equipment.
- (f) For radio frequency devices subject to verification and sold solely to business, commercial, industrial, scientific and medical users (excluding products sold to other parties or for operation in a residential environment), parties responsible for verification of the devices shall have the option of ensuring compliance with the applicable technical specifications of this chapter at each end user's location after installation, provided that the purchase or lease agreement includes a proviso that such a determination of compliance be made and is the responsibility of the party responsible for verification of the equipment.

**The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart J — Equipment Authorization Procedures:**

**§ 2.901 Basis and Purpose**

- (a) In order to carry out its responsibilities under the Communications Act and the various treaties and international regulations, and in order to promote efficient use of the radio spectrum, the Commission has developed technical standards for radio frequency equipment and parts or components thereof. The technical standards applicable to individual types of equipment are found in that part of the rules governing the service

wherein the equipment is to be operated.<sup>1</sup> In addition to the technical standards provided, the rules governing the service may require that such equipment be verified by the manufacturer or importer, be authorized under a Declaration of Conformity, or receive an equipment authorization from the Commission by one of the following procedures: certification or registration.

- (b) The following sections describe the verification procedure, the procedure for a Declaration of Conformity, or the procedures to be followed in obtaining certification from the Commission and the conditions attendant to such a grant, whichever is applicable.

#### **§ 2.907 Certification.**

- (a) Certification is an equipment authorization issued by the Commission, based on representation and test data submitted by the applicant.
- (b) Certification attaches to all units subsequently marketed by the grantee which are identical (see Section 2.908) to the sample tested except for permissive changes or other variations authorized by the Commission pursuant to Section 2.1043.

#### **§ 2.948 Description of measurement facilities.**

- (a) Each party making measurements of equipment that is subject to an equipment authorization under Part 15 or Part 18 of this chapter, regardless of whether the measurements are filed with the Commission or kept on file by the party responsible for compliance of equipment marketed within the U.S. or its possessions, shall compile a description of the measurement facilities employed.
  - (1) If the measured equipment is subject to the verification procedure, the description of the measurement facilities shall be retained by the party responsible for verification of the equipment.
  - (i) If the equipment is verified through measurements performed by an independent laboratory, it is acceptable for the party responsible for verification of the equipment to rely upon the description of the measurement facilities retained by or placed on file with the Commission by that laboratory. In this situation, the party responsible for the verification of the equipment is not required to retain a duplicate copy of the description of the measurement facilities.
  - (ii) If the equipment is verified based on measurements performed at the installation site of the equipment, no specific site calibration data is required. It is acceptable to retain the description of the measurement facilities at the site at which the measurements were performed.
- (2) If the equipment is to be authorized by the Commission under the certification procedure, the description of the measurement facilities shall be filed with the Commission's Laboratory in Columbia, Maryland. The data describing the measurement facilities need only be filed once but must be updated as changes are made to the

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<sup>1</sup>In this case, the equipment is subject to the rules of Part 15. More specifically, the equipment falls under Subpart C (of Part 15), which deals with intentional radiators.

measurement facilities or as otherwise described in this section. At least every three years, the organization responsible for filing the data with the Commission shall certify that the data on file is current.

**END OF REPORT**