**M. Flom Associates, Inc. - Global Compliance Center**
3356 North San Marcos Place, Suite 107, Chandler, Arizona 85225-7176
www.mflom.com general@mflom.com (480) 926-3100, FAX: 926-3598

# Transmitter Certification

of

FCC ID: LJPNPL-5
Model: NPL-5

Serial Number of units tested: 004400201628573 and 004400201628540

to

**Federal Communications Commission**

Rule Part(s) 24E, Confidentiality

**Date Of Report:** March 4, 2004

**On the Behalf of the Applicant**:

Nokia Corporation

**At the Request of**: P.O. Part of D91-475684/01/20/2004

Nokia Corporation
Elektroniikkatie 10
Fin-90570
Oulu, Finland

Attention of: Kare Oksanen, R&D Type Approvals
kare.oksanen@nokia.com
011 358 7180 08000; FAX: 011 358 7180 47222

Supervised By: Morton Flom, P. Eng.

**List of Exhibits**
(FCC **Certification** (PCS Transmitters) - Revised 9/28/98)

Applicant: Nokia Corporation

FCC ID: LJPNPL-5

**By Applicant**:

1. Letter of Authorization

2. Identification Drawings, 2.1033(c)(11)
   - __ Id Label
   - __ Location of Label
   - __ Compliance Statement
   - __ Location of Compliance Statement

3. Photographs, 2.1033(c)(12)

4. Confidentiality Request: 0.457 And 0.459

5. Documentation: 2.1033(c)
   - (3) User Manual
   - (9) Tune Up Info
   - (10) Schematic Diagram
   - (10) Circuit Description
   - Block Diagram
   - Parts List
   - Active Devices

**By M.F.A. Inc.**

A. Testimonial & Statement of Certification

B. Statement of Qualifications

The applicant has been cautioned as to the following:

15.21 Information to User.

The users manual or instruction manual for an intentional 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.

15.27(a) Special Accessories.

Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator, the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer, without additional charge.

Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.909 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.

# Table of Contents

*Required information per ISO/IEC Guide 25-1990, paragraph 13.2:*

a) **Test Report**

b) Laboratory: M. Flom Associates, Inc.
(FCC: 31040/SIT) 3356 N. San Marcos Place, Suite 107
(Canada: IC 2044) Chandler, AZ 85225
c) Report Number: d0430016

d) Client: Nokia Corporation
Elektroniikkatie 10
Fin-90570
Oulu, Finland
e) Identification: NPL-5
FCC ID: LJPNPL-5
Description: GSM900/1800/1900 Cellular Telephone

f) EUT Condition: Not required unless specified in individual tests.

g) Report Date: March 4, 2004
EUT Received: February 23, 2004

h, j, k): As indicated in individual tests.
i) Sampling method: No sampling procedure used.
l) Uncertainty: In accordance with MFA internal quality manual.

m) Supervised by:

Morton Flom, P. Eng.

n) Results: The results presented in this report relate only to the item tested.

o) Reproduction: This report must not be reproduced, except in full, without written permission from this laboratory.

**Accessories Used During Testing:**

| Type | Model | MFA Number |
|---|---|---|
| Charger | AC-1 | S01096 |
| Charger | ACP-12 | S01275 |
| Charger | ACP-8 | S01250 |
| Charger | ACP-7 | S01248 |
| Stereo Headset | HDS-3 | S00566 |
| Headset | HS-8 | S01097 |
| Fashion Headset | HS-3 | S01098 |
| Boom Headset | HDB-4 | S00731 |
| Headset | HS-5 | S00730 |
| Loopset | LPS-4 | S00564 |
| Battery | BL-5B | S01099 |
| Battery | BL-5B | S01100 |
| RF ID Cover | CC-197D | S01101 |

**List of General Information Required for Certification**

In Accordance with FCC Rules and Regulations,
Volume II, Part 2 and to

24E, Confidentiality

**Sub-Part 2.1033**
(c)(1): **Name and Address of Applicant**:

Nokia Corporation
Elektroniikkatie 10
Fin-90570
Oulu, Finland

**Manufacturer**:

Nokia Komarom Kft.
2900 Komarom
Nokia u. 1. Hungary

(c)(2): **FCC ID**: LJPNPL-5

**Model Number**: NPL-5

(c)(3): **Instruction Manual(s)**:

Please See Attached Exhibits

(c)(4): **Type of Emission**: 300KGXW, 300KG7W

(c)(5): **FREQUENCY RANGE, MHz**: 1850.2 to 1909.8

(c)(6): **Power Rating, Watts**: 28.5 EIRP
24.1 EIRP

___ Switchable x Variable ___ N/A

(c)(7): **Maximum Power Rating, Watts**: 2

**Subpart 2.1033** (continued)

(c)(8): Voltages & Currents in All Elements in Final RF Stage, Including Final Transistor or Solid State Device:

| | | |
|---|---|---|
| Collector Current, A | = | 2 |
| Collector Voltage, Vdc | = | 4.2 |
| Supply Voltage, Vdc | = | 3.9 |

(c)(9): **Tune-Up Procedure**:

Please See Attached Exhibits

(c)(10): **Circuit Diagram/Circuit Description**:
Including description of circuitry & devices provided for determining and stabilizing frequency, for suppression of spurious radiation, for limiting modulation and limiting power.

Please See Attached Exhibits

(c)(11): **Label Information**:

Please See Attached Exhibits

(c)(12): **Photographs**:

Please See Attached Exhibits

(c)(13): **Digital Modulation Description**:

___ Attached Exhibits
_x_ N/A

(c)(14): **Test and Measurement Data**:

Follows

Sub-part
**2.1033(c)(14): Test and Measurement Data**

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations, Volume II; Part 2, Sub-part J, Sections 2.947, 2.1033(c), 2.1041, 2.1046, 2.1047, 2.1079, 2.1051, 2.1053, 2.1055, 2.1057 and the following individual Parts:

_____ 21 – Domestic Public Fixed Radio Services
_____ 22 – Public Mobile Services
_____ 22 Subpart H - Cellular Radiotelephone Service
_____ 22.901(d) - Alternative technologies and auxiliary services
_____ 23 – International Fixed Public Radiocommunication services
_x_ 24 – Personal Communications Services
_____ 74 Subpart H - Low Power Auxiliary Stations
_____ 80 – Stations in the Maritime Services
_____ 80 Subpart E - General Technical Standards
_____ 80 Subpart F - Equipment Authorization for Compulsory Ships
_____ 80 Subpart K - Private Coast Stations and Marine Utility Stations
_____ 80 Subpart S - Compulsory Radiotelephone Installations for Small Passenger Boats
_____ 80 Subpart T - Radiotelephone Installation Required for Vessels on the Great Lakes
_____ 80 Subpart U - Radiotelephone Installations Required by the Bridge-to-Bridge Act
_____ 80 Subpart V - Emergency Position Indicating Radiobeacons (EPIRB'S)
_____ 80 Subpart W - Global Maritime Distress and Safety System (GMDSS)
_____ 80 Subpart X - Voluntary Radio Installations
_____ 87 – Aviation Services
_____ 90 – Private Land Mobile Radio Services
_____ 94 – Private Operational-Fixed Microwave Service
_____ 95 Subpart A - General Mobile Radio Service (GMRS)
_____ 95 Subpart C - Radio Control (R/C) Radio Service
_____ 95 Subpart D - Citizens Band (CB) Radio Service
_____ 95 Subpart E - Family Radio Service
_____ 95 Subpart F - Interactive Video and Data Service (IVDS)
_____ 97 - Amateur Radio Service
_____ 101 – Fixed Microwave Services

**Standard Test Conditions**
**and**
**Engineering Practices**

Except as noted herein, the following conditions and procedures were observed during the testing:

In accordance with ANSI C63.4-1992/2000 Draft, section 6.1.9, and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104 °F) unless the particular equipment requirements specify testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

Prior to testing, the EUT was tuned up in accordance with the manufacturer's alignment procedures. All external gain controls were maintained at the position of maximum and/or optimum gain throughout the testing.

Measurement results, unless otherwise noted, are worst case measurements.

For PCS Equipment:

Pursuant to Section 24.51(d), the EUT complies with IEEE C95.1-1991, "IEEE Standards for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz."

The EUT uses digital modulation, as such, measurements of the modulation characteristics are not applicable. The applicant has provided a description of the modulation particular to the EUT.

Pursuant to Section 24.238(c), the EUT was tested at it's lowest and highest possible tuned frequencies.

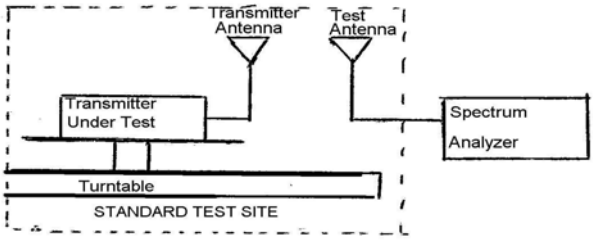
Page Number 6 of 30.

**Name of Test**: EIRP Carrier Power (Radiated)

**Specification**: TIA/EIA 603A (Substitution Method)

**2.2.17.1 Definition**: The average radiated power of a licensed device is the equivalent power required, when delivered to a half-wave dipole or horn antenna, to produce at a distant point the same average received power as produced by the licensed device.

**2.2.17.2 Method of Measurement**:
a) Connect the equipment as illustrated. Place the transmitter to be tested on the turntable in the standard test site.




b) Raise and lower the test antenna from 1m to 4m and rotate turntable from 0° to 360°. Record the highest received signal in dB as ET.

c) Replace the transmitter under test with a substitution antenna. The center of the antenna should be at the same location as the transmitter under test. Connect the antenna to a signal generator with a known output power level using the same modulation as with the transmitter. Raise and lower the test antenna like in step b) and record the highest received signal in dB as ES.

d) Calculate radiated power as following:
Radiated power = Level + ET – ES + GainAnt

ET Signal level received from transmitter
ES Signal level received from substitution antenna

RESULTS ATTACHED

Page Number 7 of 30.

**Test Results For:** ERP/EIRP Carrier Power (Radiated)

| Freq MHz | Level dBm | Antenna Gain dBi | $E_T - E_S$ dBm | P ol | Radiated P Out dbm | Radiated P Out Watts |
|---|---|---|---|---|---|---|
| **GSM1900/GPRS1900** | | | | | | |
| 1850.2 | 23.8 | +0.2 | 85.6-81.1 | H | 28.5 EIRP | 0.708 |
| 1880.0 | 23.8 | -0.5 | 84.7-80.4 | H | 27.6 EIRP | 0.575 |
| 1909.8 | 24.0 | -0.8 | 83.5-80.6 | H | 26.1 EIRP | 0.407 |
| **EGPRS1900** | | | | | | |
| 1850.2 | 19.9 | +0.2 | 83.7-79.7 | H | 24.1 EIRP | 0.257 |
| 1880.0 | 19.8 | -0.5 | 81.9-79.1 | H | 22.1 EIRP | 0.162 |
| 1909.8 | 19.5 | -0.8 | 81.1-79.1 | V | 20.7 EIRP | 0.117 |

SAMPLE CALCULATION:

P ANT OUT + ANT GAIN + $E_T - E_S$ = P.O. RADIATED

23.8 + 0.2 + 85.6 – 81.1 = 28.5 dbm EIRP

= 0.708 W EIRP

ANTENNA: EMCO 3125-1880 dipole s/n 1010 cal. 21-Oct-02

**Name of Test**: Transmitter Conducted Measurements

**Specification**: 47 CFR 2.1051: Unwanted (spurious) Emissions
2.1049(c), 24.238(b): Occupied Bandwidth
24: Emissions at Band Edges

**Guide**: As indicated on page **Error! Bookmark not defined.**

**Test Equipment**: As per attached page

## Measurement Procedure

1. The EUT and test equipment were set up as shown on the following page with the Spectrum Analyzer connected.

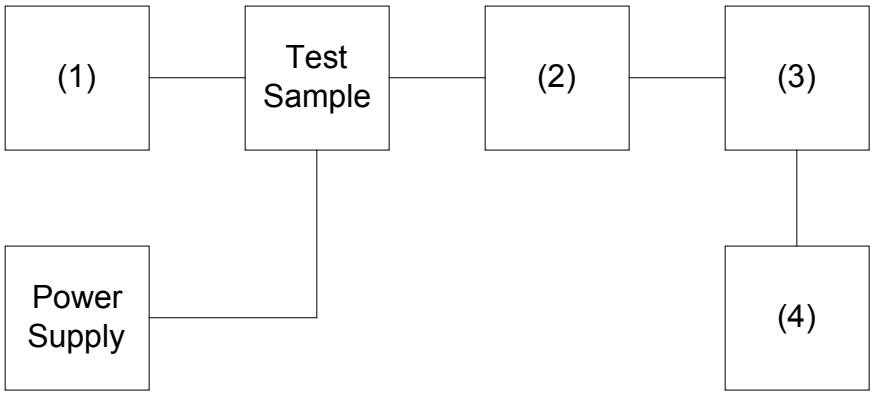
2. The low and high channels for all RF powers within the designated frequency block(s) were measured.

3. Measurement Results: Attached

Performed By: Daniel M. Dillon, Test Engineer

**Transmitter Spurious Emission**

Test A. Occupied Bandwidth (In-Band Spurious)
Test B. Out-of-Band Spurious




Transmitter Test Set Up

| | Asset | Description | s/n |
|---|---|---|---|
| (1) **Audio Oscillator/Generator** | | | |
| X | i00017 | HP 8903A Audio Analyzer | 2216A01753 |
| | i00002 | HP 3336B Synthesizer / Level Gen. | 1931A01465 |
| (2) **Coaxial Attenuator** | | | |
| X | i00231/2 | PASTERNACK PE7021-30 (30 dB) | 231 or 232 |
| | i0012/3 | NARDA 766 (10 dB) | 7802 or 7802A |
| (3) **Filters; Notch, HP, LP, BP** | | | |
| | i00126 | Eagle TNF-1 Notch Filter | 100-250 |
| | i00125 | Eagle TNF-1 Notch Filter | 50-60 |
| | i00124 | Eagle TNF-1 Notch Filter | 250-850 |
| (4) **Spectrum Analyzer** | | | |
| X | i00048 | HP 8566B Spectrum Analyzer | 2511A01467 |
| | i00029 | HP 8563E Spectrum Analyzer | 3213A00104 |

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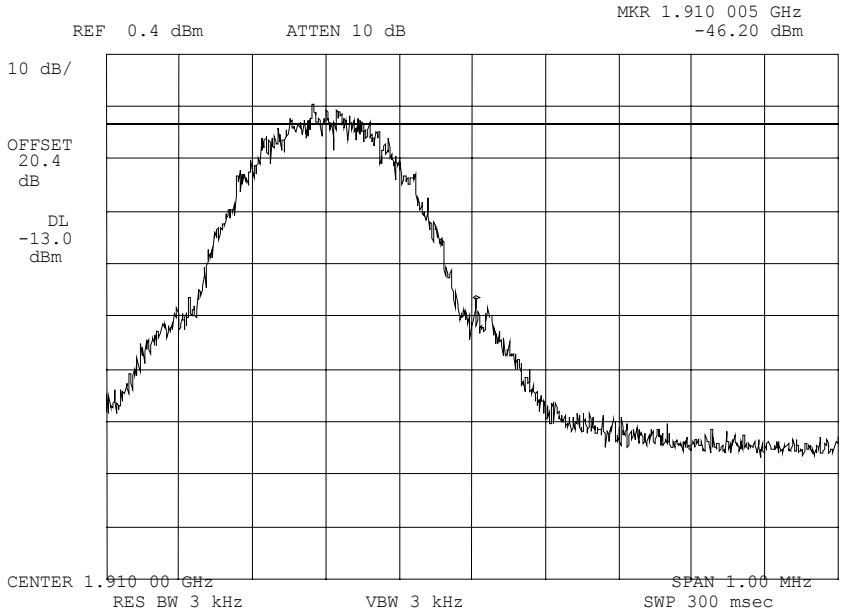
**Name of Test**: Emission at Band Edges (Conducted)
g0420079: 2004-Feb-23 Mon 11:47:00
State: 1:Low Power




Power: LOW
Modulation: GSM/GPRS 1900
UPPER BAND EDGE

Performed By: Daniel M. Dillon, Test Engineer

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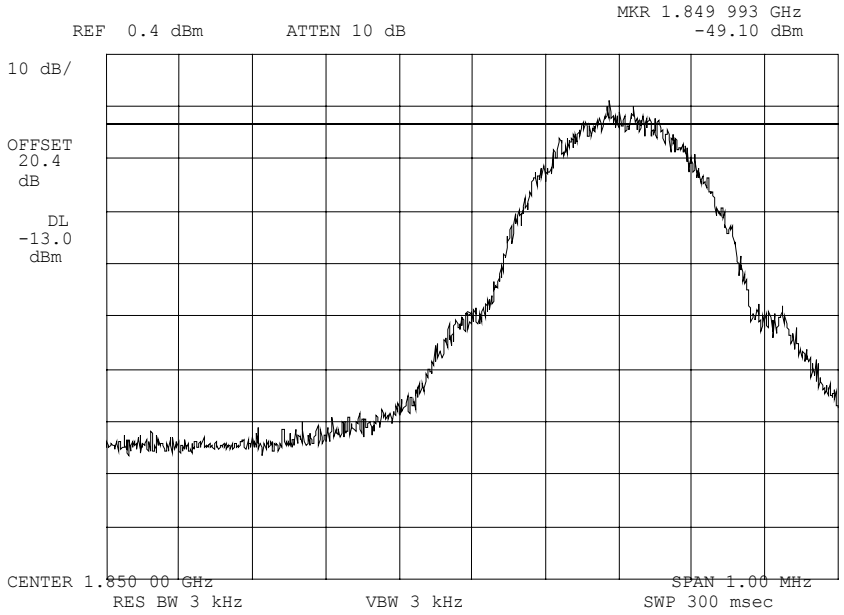
**Name of Test**: Emission at Band Edges (Conducted)
g0420081: 2004-Feb-23 Mon 11:50:00
State: 1:Low Power




Power: LOW
Modulation: GSM/GPRS 1900
LOWER BAND EDGE

Performed By: Daniel M. Dillon, Test Engineer

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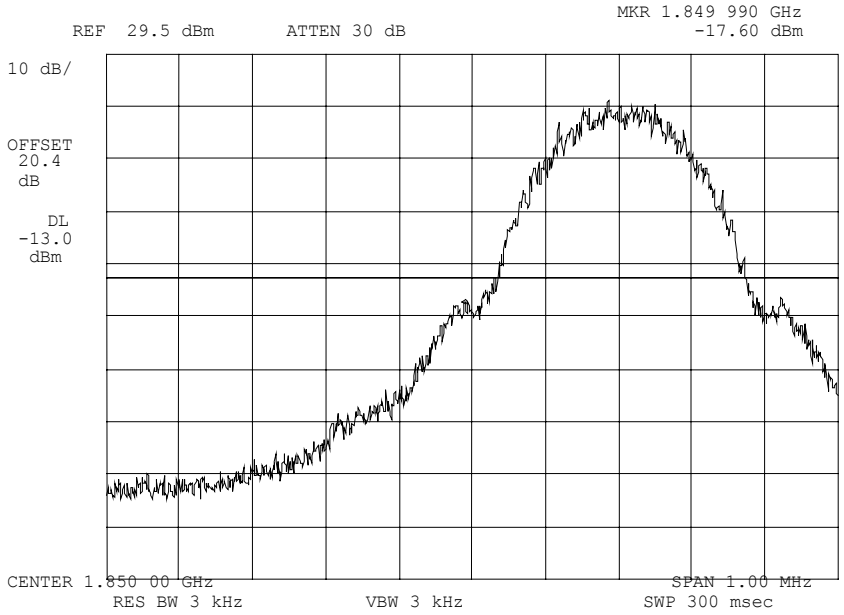
**Name of Test**: Emission at Band Edges (Conducted)
g0420077: 2004-Feb-23 Mon 11:45:00
State: 2:High Power




Power: HIGH
Modulation: GSM/GPRS 1900
LOWER BAND EDGE

Performed By: Daniel M. Dillon, Test Engineer

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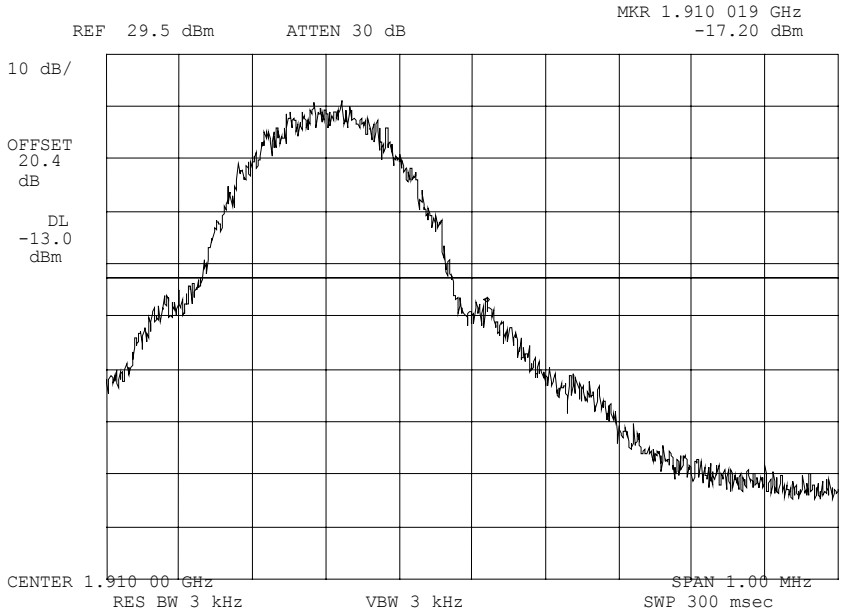
**Name of Test**: Emission at Band Edges (Conducted)
g0420078: 2004-Feb-23 Mon 11:46:00
State: 2:High Power




Power: HIGH
Modulation: GSM/GPRS 1900
UPPER BAND EDGE

Performed By: Daniel M. Dillon, Test Engineer

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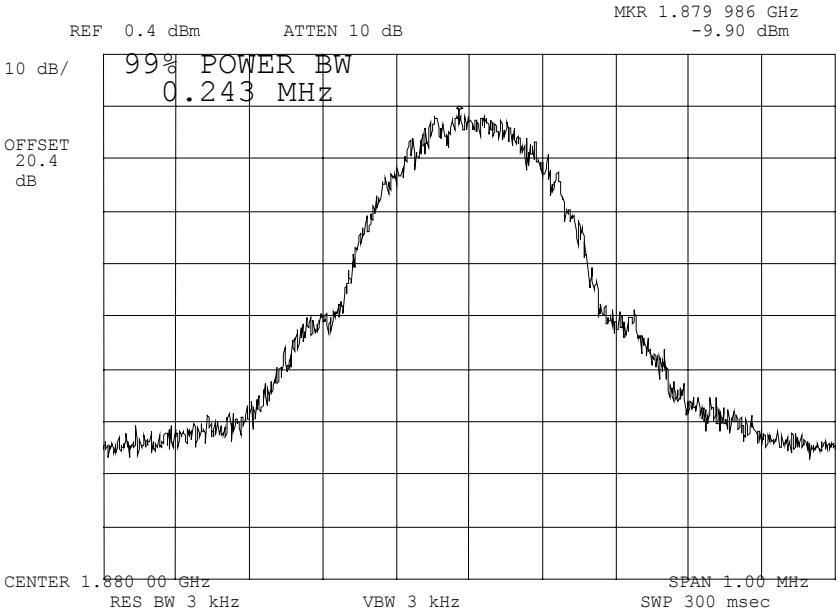
**Name of Test**: Emission Masks (Occupied Bandwidth)
g0420080: 2004-Feb-23 Mon 11:48:00
State: 1:Low Power




Power: LOW
Modulation: GSM/GPRS 1900
99% BANDWIDTH

Performed By: Daniel M. Dillon, Test Engineer

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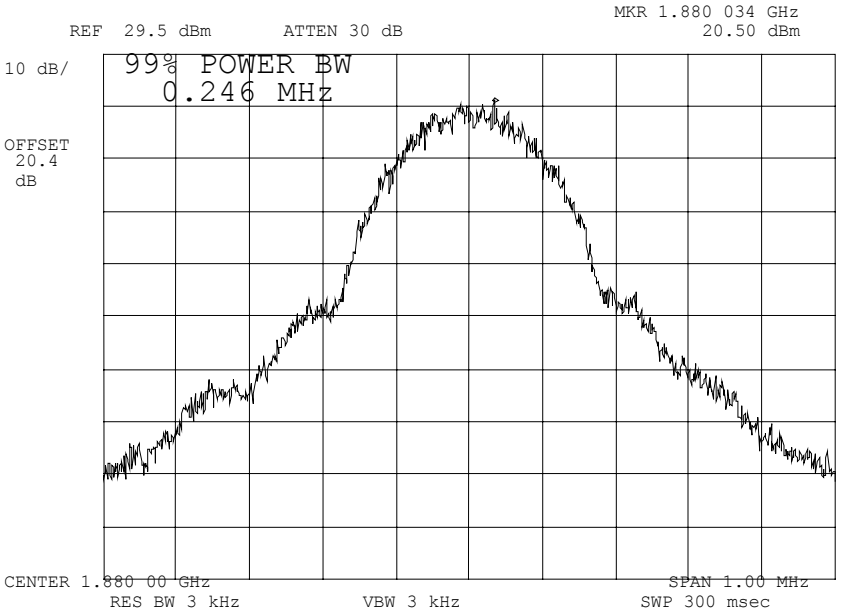
**Name of Test**: Emission Masks (Occupied Bandwidth)
g0420076: 2004-Feb-23 Mon 11:43:00
State: 2:High Power




Power: HIGH
Modulation: GSM/GPRS 1900
99% BANDWIDTH

Performed By: Daniel M. Dillon, Test Engineer

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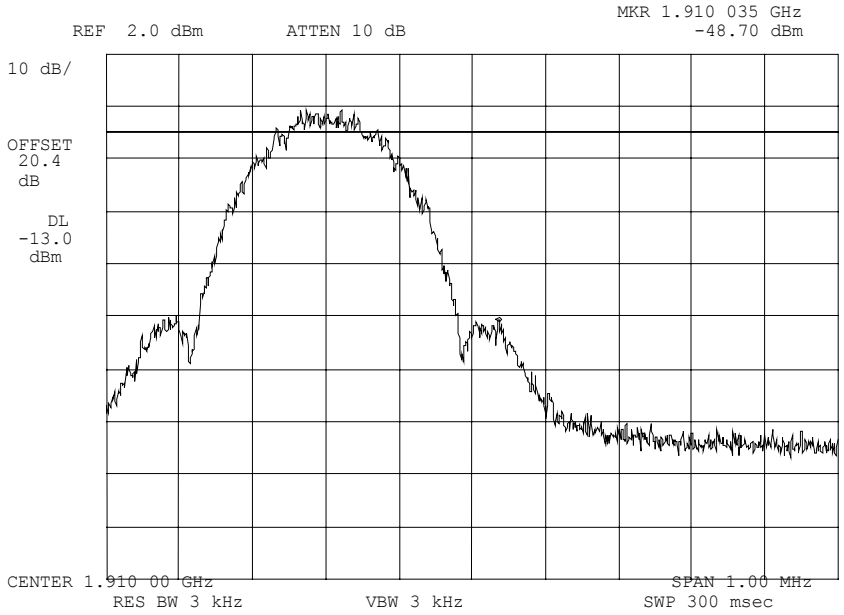
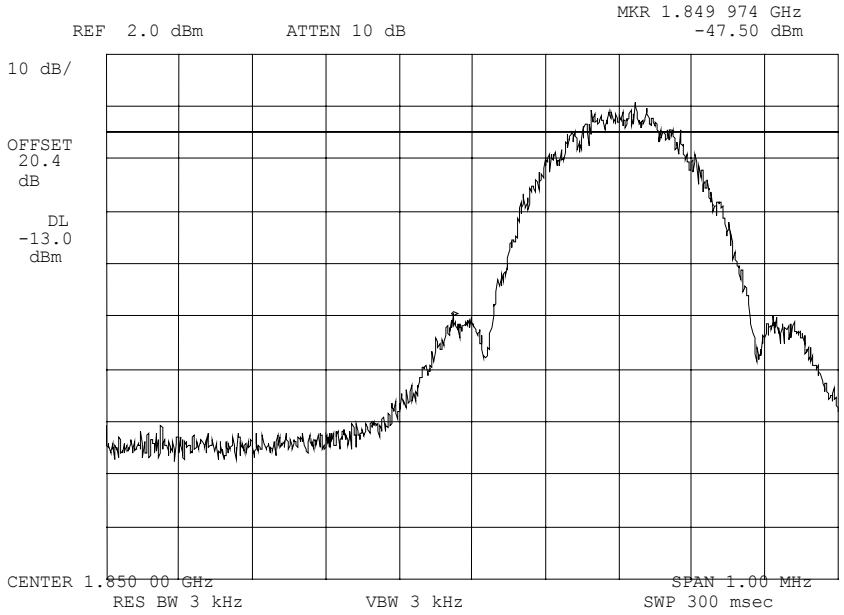
**Name of Test**: Emission at Band Edges (Conducted)
g0420085: 2004-Feb-23 Mon 11:56:00
State: 1:Low Power




Power: LOW
Modulation: EGPRS 1900
UPPER BAND EDGE

Performed By: Daniel M. Dillon, Test Engineer

**Name of Test**: Emission at Band Edges (Conducted)
g0420087: 2004-Feb-23 Mon 11:59:00
State: 1:Low Power




Power: LOW
Modulation: EGPRS 1900
LOWER BAND EDGE

Performed By: Daniel M. Dillon, Test Engineer

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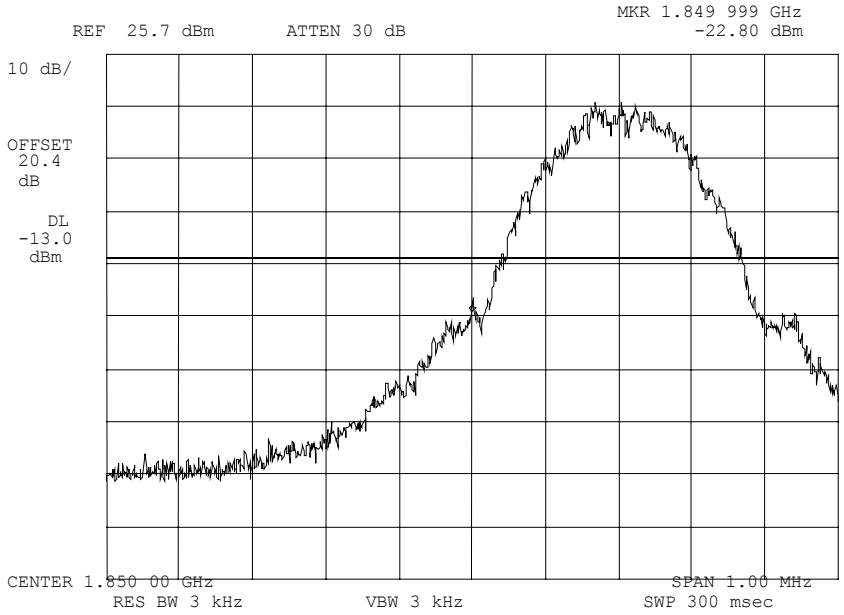
**Name of Test**: Emission at Band Edges (Conducted)
g0420082: 2004-Feb-23 Mon 11:51:00
State: 2:High Power




Power: HIGH
Modulation: EGPRS 1900
LOWER BAND EDGE

Performed By: Daniel M. Dillon, Test Engineer

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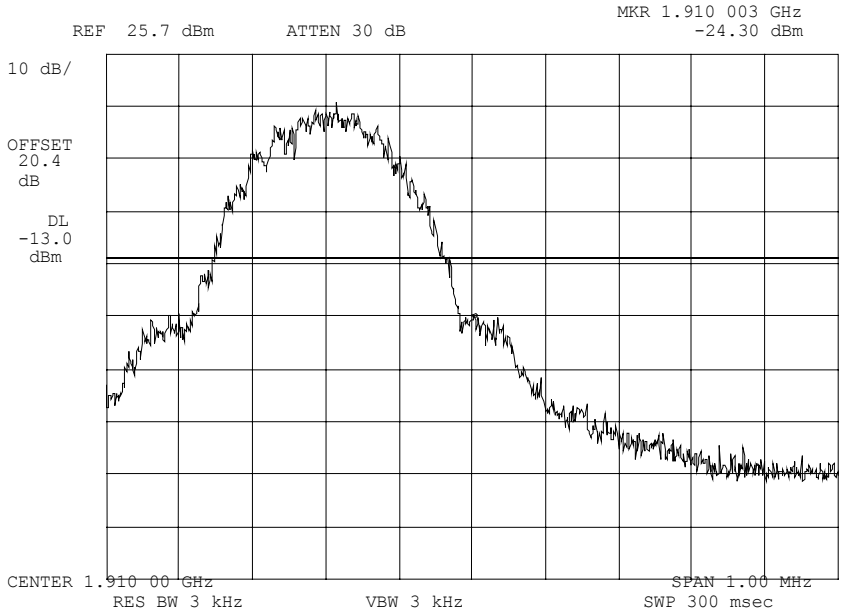
**Name of Test**: Emission at Band Edges (Conducted)
g0420084: 2004-Feb-23 Mon 11:53:00
State: 2:High Power




Power: HIGH
Modulation: EGPRS 1900
UPPER BAND EDGE

Performed By: Daniel M. Dillon, Test Engineer

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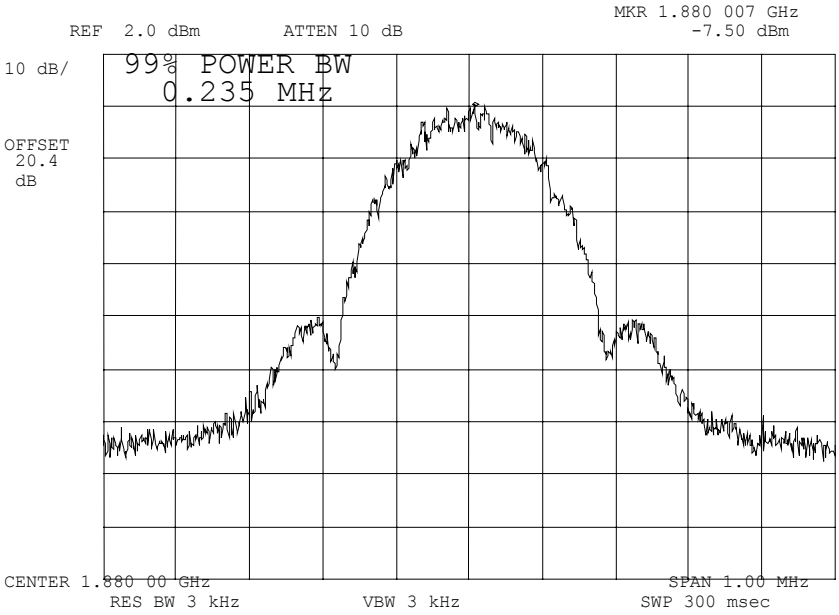
**Name of Test**: Emission Masks (Occupied Bandwidth)
g0420086: 2004-Feb-23 Mon 11:57:00
State: 1:Low Power




Power: LOW
Modulation: EGPRS 1900
99% BANDWIDTH

Performed By: Daniel M. Dillon, Test Engineer

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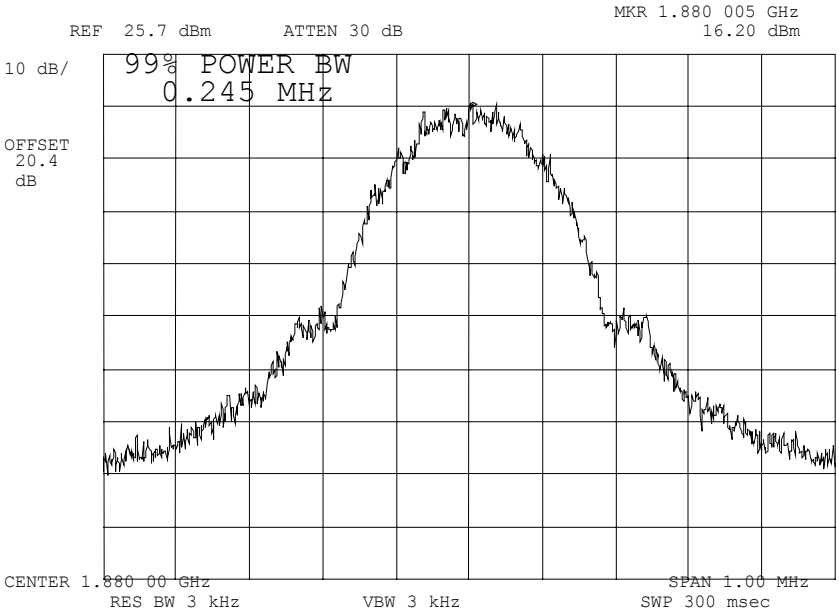
**Name of Test**: Emission Masks (Occupied Bandwidth)
g0420083: 2004-Feb-23 Mon 11:52:00
State: 2:High Power




Power: HIGH
Modulation: EGPRS 1900
99% BANDWIDTH

Performed By: Daniel M. Dillon, Test Engineer

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**Name of Test**: Field Strength of Spurious Radiation

**Specification**: 47 CFR 2.1053(a)

**Guide**: ANSI/TIA/EIA-603-1992/2001, Paragraph 1.2.12 and Table 16, 47 CFR 22.917

**Measurement Procedure**

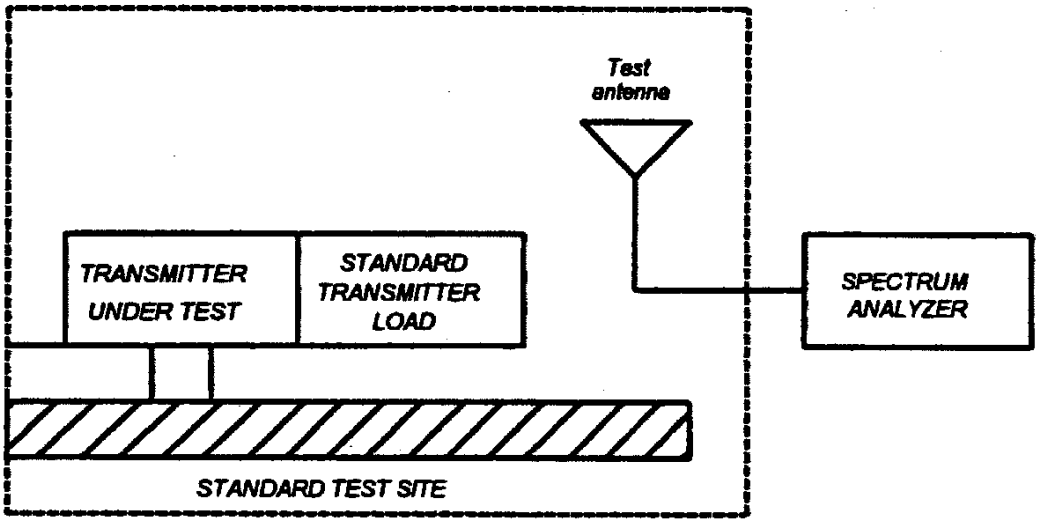
1.2.12.1 Definition: Radiated spurious emissions are emissions from the equipment when transmitting into a non-radiating load on a frequency or frequencies which are outside an occupied band sufficient to ensure transmission of information of required quality for the class of communications desired.

1.2.12.2 Method of Measurement

A) Connect the equipment as illustrated

B) Adjust the spectrum analyzer for the following settings:
1) Resolution Bandwidth 100 kHz (<1 GHZ), 1 MHZ (> 1GHz).
2) Video Bandwidth ≥ 3 times Resolution Bandwidth, or 30 kHz (22.917)
3) Sweep Speed ≤2000 Hz/second
4) Detector Mode = Mean or Average Power

C) Place the transmitter to be tested on the turntable in the standard test site. The transmitter is transmitting into a non-radiating load which is placed on the turntable. The RF cable to this load should be of minimum length.



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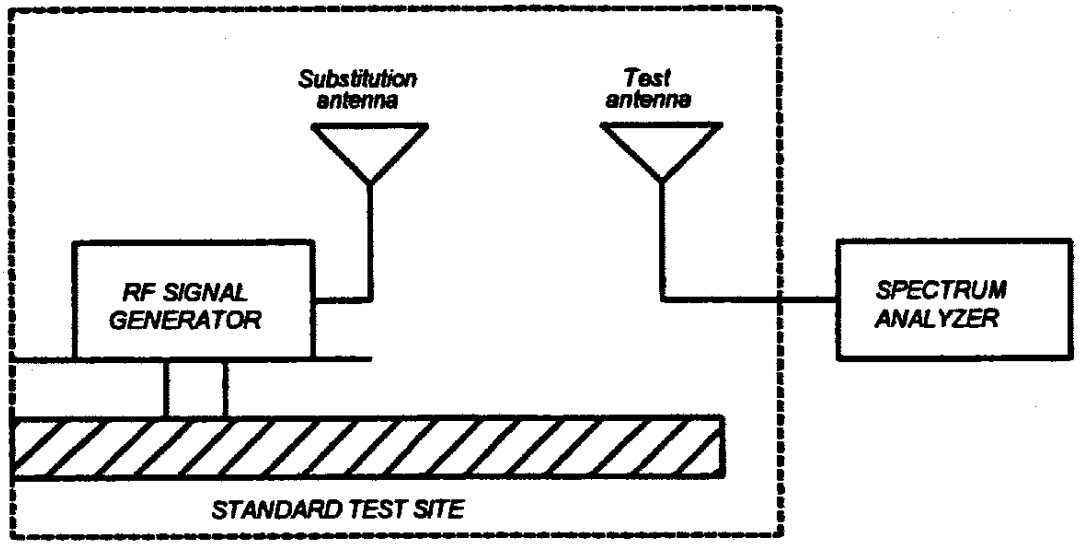
**Name of Test**: Field Strength of Spurious Radiation (Cont.)

D) For each spurious measurement the test antenna should be adjusted to the correct length for the frequency involved. This length may be determined from a calibration ruler supplied with the equipment. Measurements shall be made from the lowest radio frequency generated in the equipment to the tenth harmonic of the carrier, except for the region close to the carrier equal to ± the test bandwidth (see section 1.3.4.4).

E) For each spurious frequency, raise and lower the test antenna from 1 m to 4 m to obtain a maximum reading on the spectrum analyzer with the test antenna at horizontal polarity. Repeat this procedure to obtain the highest possible reading. Record this maximum reading.

F) Repeat step E) for each spurious frequency with the test antenna polarized vertically.




G) Reconnect the equipment as illustrated.

H) Keep the spectrum analyzer adjusted as in step B).

I) Remove the transmitter and replace it with a substitution antenna (the antenna should be half-wavelength for each frequency involved). The center of the substitution antenna should be approximately at the same location as the center of the transmitter. At lower frequencies, where the substitution antenna is very long, this will be impossible to achieve when the antenna is polarized vertically. In such case the lower end of the antenna should be 0.3 m above the ground.

**Name of Test**: Field Strength of Spurious Radiation (Cont.)

J) Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a non-radiating cable. With the antennas at both ends horizontally polarized and with the signal generator tuned to a particular spurious frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.

K) Repeat step J) with both antennas vertically polarized for each spurious frequency.

L) Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps J) and K) by the power loss in the cable between the generator and the antenna and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna.

M) The levels recorded in step L) are absolute levels of radiated spurious emissions in dBm. The radiated spurious emissions in dB can be calculated by the following:

Radiated spurious emissions dB =
$10\log_{10}$(TX power in watts/0.001) – the levels in step l)

NOTE: It is permissible that other antennas provided can be referenced to a dipole.

Test Equipment:

| | Asset | Description | s/n | Cycle (Per ANSI C63.4-1992/2000 Draft, 10.1.4) | Last Cal |
|---|---|---|---|---|---|
| **Transducer** | | | | | |
| | i00088 | EMCO 3109-B 25MHz-300MHz | 2336 | 12 mo. | Sep-03 |
| X | i00089 | Aprel 2001 200MHz-1GHz | 001500 | 12 mo. | Sep-03 |
| X | i00103 | EMCO 3115 1GHz-18GHz | 9208-3925 | 12 mo. | Jan-03 |
| **Amplifier** | | | | | |
| X | i00028 | HP 8449A | 2749A00121 | 12 mo. | May-03 |
| **Spectrum Analyzer** | | | | | |
| X | i00029 | HP 8563E | 3213A00104 | 12 mo. | May-03 |
| X | i00033 | HP 85462A | 3625A00357 | 12 mo. | Aug-03 |
| **Substitution Generator** | | | | | |
| X | i00067 | HP 8920A Communication TS | 3345U01242 | 12 mo. | Oct-03 |
| | i00207 | HP 8753D Network Analyzer | 3410A08514 | 12 mo. | Jul-03 |

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**Name of Test**: Field Strength of Spurious Radiation

g0420096: 2004-Feb-24 Tue 08:25:00
State: 2:High Power GSM/GPRS 1900

| Frequency Tuned, MHz | Frequency Emission, MHz | EIRP, dBm | EIRP, dBc |
|---|---|---|---|
| 1880.000000 | 3759.725000 | -36.7 | ≤ -65.2 |
| 1880.000000 | 3759.803333 | -35.4 | ≤ -63.9 |
| 1880.000000 | 5640.383333 | -37.5 | ≤ -66 |
| 1880.000000 | 7520.383333 | -37 | ≤ -65.5 |
| 1880.000000 | 9400.006667 | -33.9 | ≤ -62.4 |
| 1880.000000 | 11280.006667 | -26.5 | ≤ -55 |
| 1880.000000 | 13160.006667 | -39.9 | ≤ -68.4 |
| 1880.000000 | 15040.006667 | -37 | ≤ -65.5 |
| 1880.000000 | 16920.006667 | -45.4 | ≤ -73.9 |

g0420099: 2004-Feb-24 Tue 14:17:00
State: 2:High Power EGPRS 1900

| Frequency Tuned, MHz | Frequency Emission, MHz | EIRP, dBm | EIRP, dBc |
|---|---|---|---|
| 1880.000000 | 3759.941667 | -38.2 | ≤ -62.3 |
| 1880.000000 | 3759.980000 | -39.9 | ≤ -64 |
| 1880.000000 | 5639.981667 | -52.6 | ≤ -76.7 |
| 1880.000000 | 7519.983334 | -50.3 | ≤ -74.4 |
| 1880.000000 | 9399.985001 | -47.5 | ≤ -71.6 |
| 1880.000000 | 11279.986668 | -38.7 | ≤ -62.8 |
| 1880.000000 | 13159.988335 | -52.9 | ≤ -77 |
| 1880.000000 | 15039.990002 | -47.5 | ≤ -71.6 |
| 1880.000000 | 16919.991669 | -60.4 | ≤ -84.5 |

Performed By: Daniel M. Dillon, Test Engineer

**Name of Test**: Frequency Stability (Temperature Variation)

**Specification**: 47 CFR 2.1055(a)(1), 24.235

**Test Conditions**: As Indicated

**Test Equipment**: As per attached page

**Measurement Procedure**

1. The EUT and test equipment were set up as shown on the following page.

2. With all power removed, the temperature was decreased to -30°C and permitted to stabilize for three hours. Power was applied and the maximum change in frequency was noted within one minute.

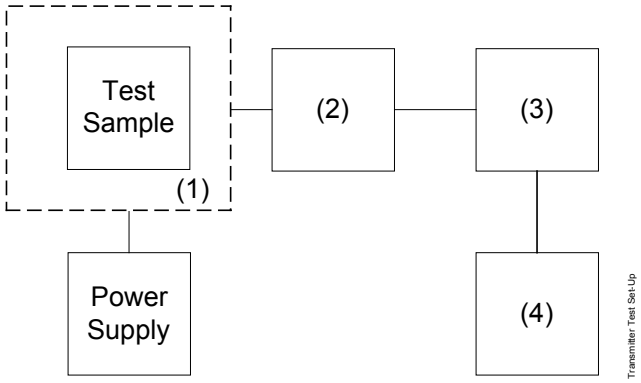
3. With power OFF, the temperature was raised in 10°C steps. The sample was permitted to stabilize at each step for at least one-half hour. Power was applied and the maximum frequency change was noted within one minute.

4. The temperature tests were performed for the worst case.

5. Measurement Results: Attached

**Transmitter Test Set-Up**

Frequency Stability: Temperature Variation
Frequency Stability: Voltage Variation




| | Asset | Description | s/n |
|---|---|---|---|
| (1) **Temperature, Humidity, Vibration** | | | |
| X | i00027 | Tenney Temp. Chamber | 9083-765-234 |
| (2) **Coaxial Attenuator** | | | |
| X | i00231/2 | PASTERNACK PE7021-30 (30 dB) | 231 or 232 |
| | i00122/3 | NARDA 766 (10 dB) | 7802 or 7802A |
| (3) **RF Power** | | | |
| X | i00067 | HP 8920A Communications TS | 3345U01242 |
| (4) **Frequency Counter** | | | |
| X | i00067 | HP 8920A Communications TS | 3345U01242 |

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**Name of Test**: Frequency Stability (Temperature Variation)

| °C | Change, Hz | Change, ppm |
|---|---|---|
| -30 | +29.7 | 0.0 |
| -20 | +22.9 | 0.0 |
| -10 | -35.9 | 0.0 |
| 0 | -34.9 | 0.0 |
| 10 | -23.2 | 0.0 |
| 20 | +30.3 | 0.0 |
| 30 | +27.6 | 0.0 |
| 40 | +16.6 | 0.0 |
| 50 | +26.6 | 0.0 |

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**Name of Test**: Frequency Stability (Voltage Variation)

**Specification**: 47 CFR 2.1055(d)(1)

**Guide**: As indicated on page **Error! Bookmark not defined.**

**Test Equipment**: As per previous page

**Measurement Procedure**

1. The EUT was placed in a temperature chamber at 25±5°C and connected as for "Frequency Stability - Temperature Variation" test.

2. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value measured at the input to the EUT.

3. The variation in frequency was measured for the worst case.

**Results**: Frequency Stability (Voltage Variation)

| % of STV | Voltage | Frequency, MHz | Change, Hz | Change, ppm |
|---|---|---|---|---|
| B.E.P. | 3.35 | 1879.9999783 | -21.7 | 0.0 |

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**Name of Test**: Necessary Bandwidth and Emission Bandwidth

**Specification**: 47 CFR 2.202(g)

Modulation = 300KGXW

**Necessary Bandwidth**:

Necessary Bandwidth ($B_N$), kHz = 300
(measured at the 99.75% power bandwidth)

Modulation = 300KG7W

**Necessary Bandwidth**:

Necessary Bandwidth ($B_N$), kHz = 300
(measured at the 99.75% power bandwidth)

Performed By: Daniel M. Dillon, Test Engineer

END OF TEST REPORT

# Testimonial and Statement of Certification

**This is to certify that**:

1. **That** the application was prepared either by, or under the direct supervision of, the undersigned.

2. **That** the technical data supplied with the application was taken under my direction and supervision.

3. **That** the data was obtained on representative units, randomly selected.

4. **That**, to the best of my knowledge and belief, the facts set forth in the application and accompanying technical data are true and correct.

Certifying Engineer: Morton Flom, P. Eng.