

**M. Flom Associates, Inc. - Global Compliance Center**

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Transmitter Certification

of

FCC ID: LJPRM-37

Model: RM-37

Serial Number of units tested: 004400/43/164694/0 and 004400/43/164684/1

to

Federal Communications Commission

Rule Part(s) 24E, Confidentiality

Date Of Report: March 24, 2004**On the Behalf of the Applicant:**

Nokia Corporation

At the Request of:

P.O. D91-4809428/03/15/2004

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:

A handwritten signature in black ink that reads 'M. Flom P. Eng.' with a stylized flourish at the end.

Morton Flom, P. Eng.

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.

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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: d0430053
- d) Client: Nokia Corporation
Elektroniikkatie 10
Fin-90570
Oulu, Finland
- e) Identification: RM-37
FCC ID: LJPRM-37
- Description: GSM 900/1800/1900 Cellular Telephone
- f) EUT Condition: Not required unless specified in individual tests.
- g) Report Date: March 24, 2004
EUT Received: March 15, 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	ACP-12U	S01275
Charger	ACP-8U	S01250
Charger	ACP-7U	S01248
Desktop Stand	DCU-14	S00729
Music Stand	DT-1	S00728
Stereo Headset	HDS-3	S00566
Boom Headset	HDB-4	S00721
Loopset	LPS-4	S00564
USB Cable	DKU-5	S01180
TTY Adapter	HAD-10	S01181
Battery	BLD-3	S01190

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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.
Nokia utca 1.
2901 Komarom, Hungary

Nokia china/Beijing/Kaifaqu-Donghuan Zhonglu
GongHuan Zhonglu
Beijing, P.R.C 100176

(c)(2): **FCC ID:** LJPRM-37

Model Number: RM-37

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

Please See Attached Exhibits

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

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

(c)(6): **Power Rating, Watts:** 32.1 EIRP, dbm
 ___ Switchable _x Variable ___ N/A

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

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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	= 1.1
Collector Voltage, Vdc	= 4.7 max
Supply Voltage, Vdc	= 3.6

(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
☒ N/A

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

Follows

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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
- ☒ 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

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**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.

Guides:

This device was tested using the following Guide(s):

TIA/EIA 603-1993

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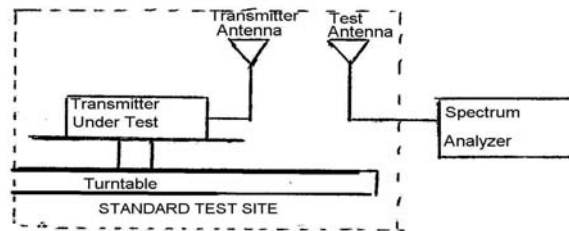
Name of Test: EIRP Carrier Power (Radiated)

Specification: TIA/EIA 603A (Substitution Method)

Definition: The average radiated power of device is the equivalent power required, when delivered to a substitution antenna, to produce at a distant point the same average received power as produced by the licensed device.

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 E_T .

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 E_S .

d) Calculate radiated power as following:

$$\text{Radiated power} = \text{Level} + E_T - E_S + \text{Gain}_{\text{Ant}}$$

E_T Signal level received from transmitter

E_S Signal level received from substitution antenna

RESULTS ATTACHED

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Name of Test: EIRP Carrier Power (Radiated)

Results					
Freq MHz	Level dBm	Antenna Gain dBi	E _T – E _S dBm	Radiated P Out dbm	Radiated P Out Watts
GSM1900/GPRS1900					
1850.2	24.3	+0.2	83.8-76.2	32.1 EIRP	1.622
1880.0	24.2	-0.5	84.7-77.2	31.2 EIRP	1.318
1909.8	24.2	-0.8	84.3-78.2	29.5 EIRP	0.891

SAMPLE CALCULATION:

$$P_{\text{ANT OUT}} + \text{ANT GAIN} + E_T - E_S = P.O. \text{ RADIATED}$$

$$24.3 + 0.2 + 83.8 - 76.2 = 32.1 \text{ dbm EIRP}$$

$$= 1.622 \text{ W EIRP}$$

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

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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 5

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



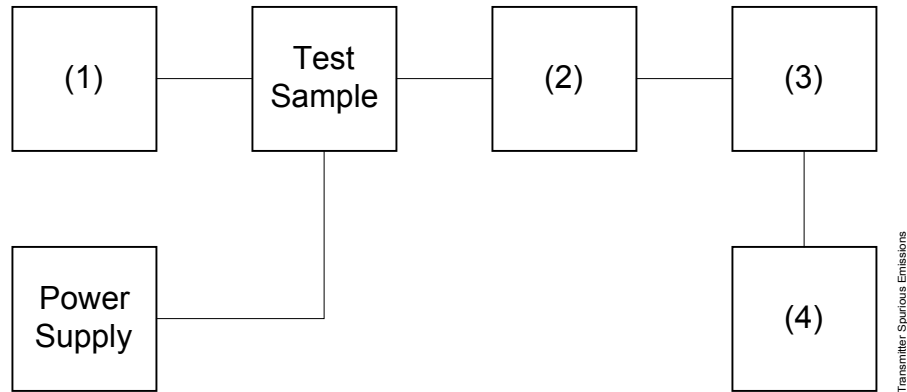
Performed By:

David E. Lee, Lab Manager

Transmitter Spurious Emission

Test A. Occupied Bandwidth (In-Band Spurious)

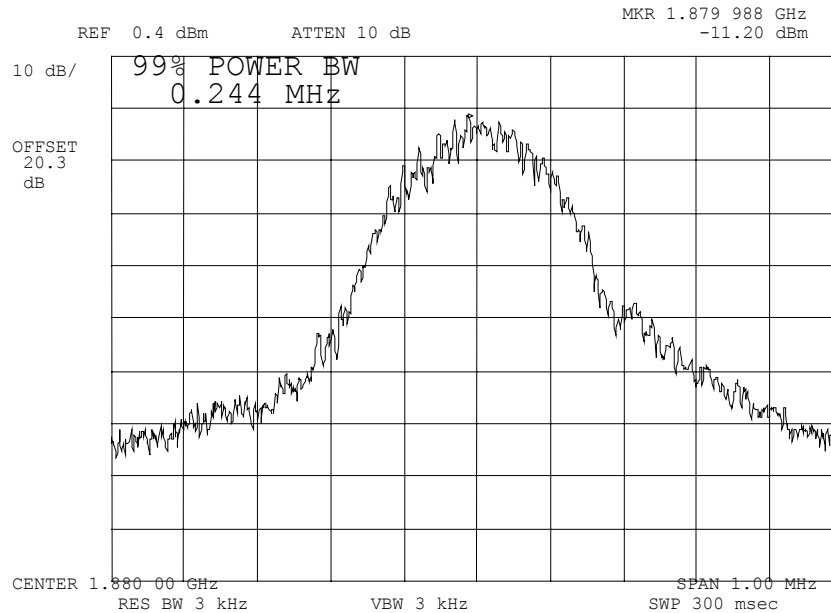
Test B. Out-of-Band Spurious



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	PASTERNAK 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 Masks (Occupied Bandwidth)
g0430027: 2004-Mar-16 Tue 10:20:00
State: 1:Low Power



Power:
Modulation:

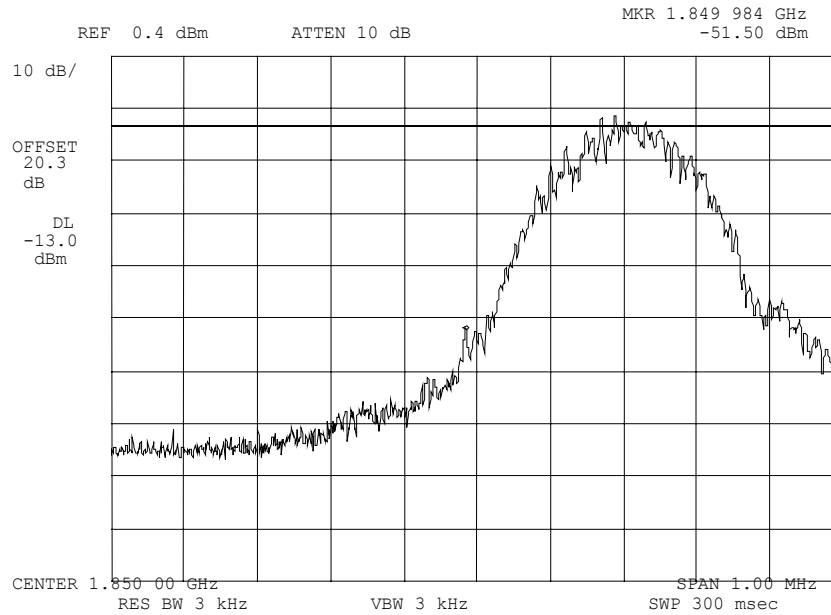
LOW
MID 99%

Performed By:

David E. Lee, Lab Manager

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Name of Test: Emission Masks (Occupied Bandwidth)
g0430028: 2004-Mar-16 Tue 10:22:00
State: 1:Low Power



Power:
Modulation:

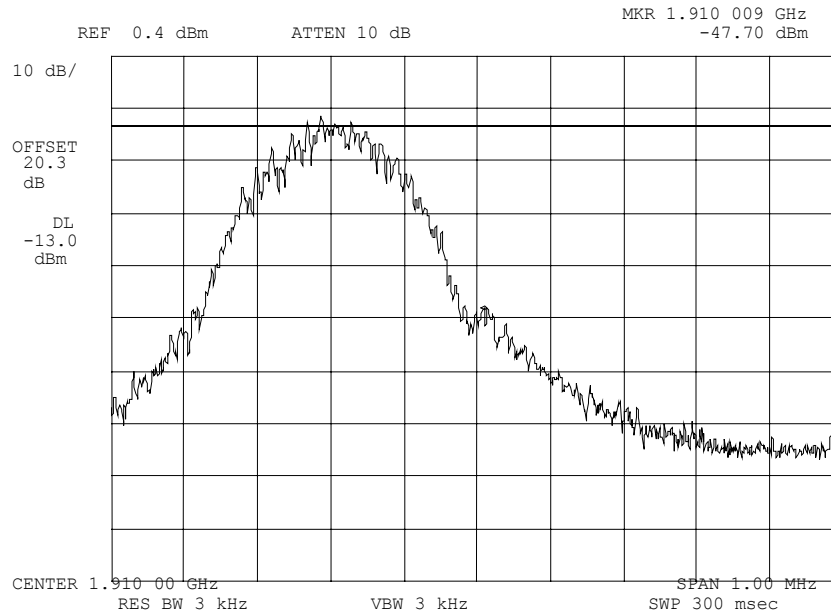
LOW
LOWER BAND EDGE

Performed By:

David E. Lee, Lab Manager

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Name of Test: Emission Masks (Occupied Bandwidth)
g0430029: 2004-Mar-16 Tue 10:23:00
State: 1:Low Power



Power:
Modulation:

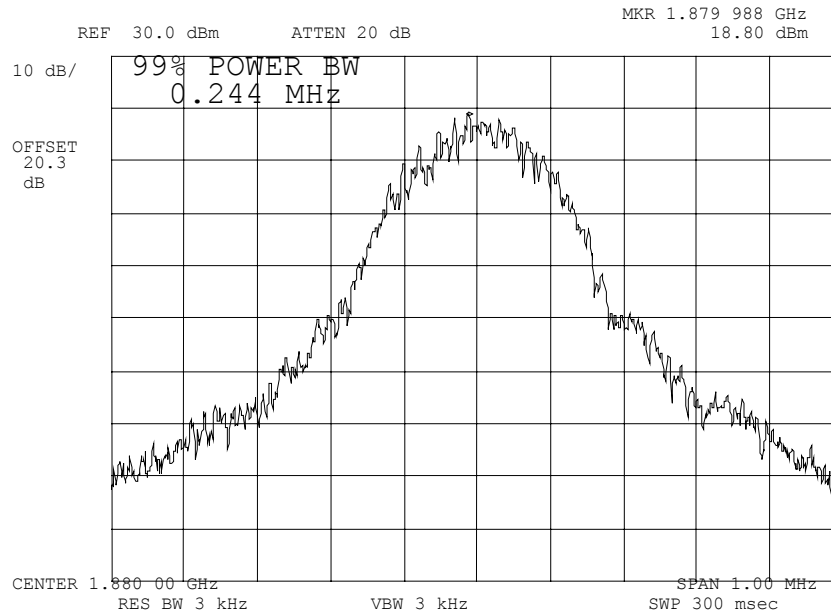
LOW
UPPER BAND EDGE

Performed By:

David E. Lee, Lab Manager

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Name of Test: Emission Masks (Occupied Bandwidth)
g0430023: 2004-Mar-15 Mon 16:44:00
State: 2:High Power



Power:
Modulation:

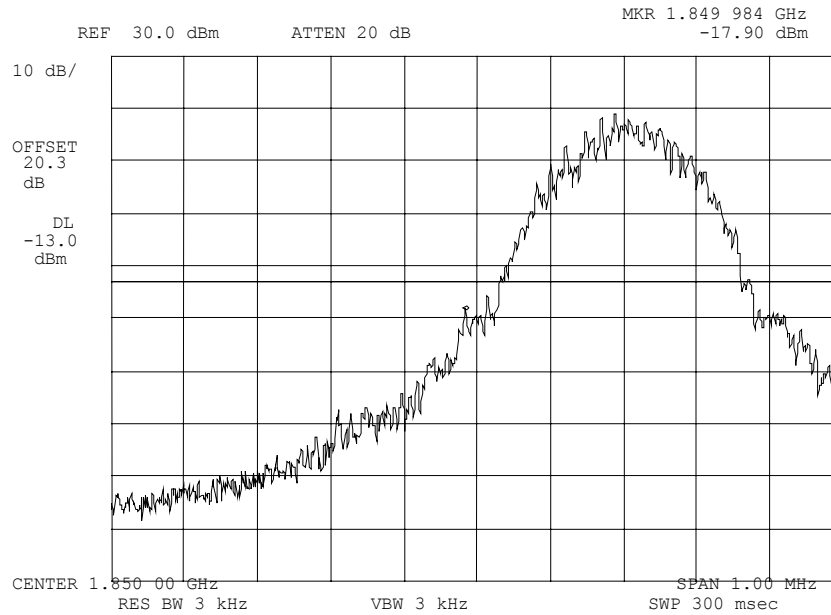
HIGH
MID 99%

Performed By:

David E. Lee, Lab Manager

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Name of Test: Emission Masks (Occupied Bandwidth)
g0430024: 2004-Mar-15 Mon 16:46:00
State: 2:High Power



Power:
Modulation:

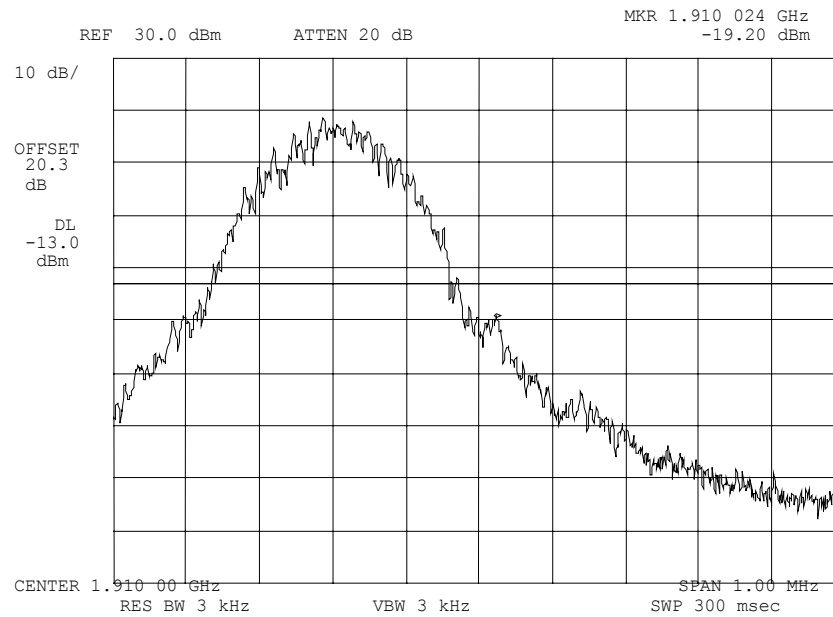
HIGH
LOWER BAND EDGE

Performed By:

David E. Lee, Lab Manager

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Name of Test: Emission Masks (Occupied Bandwidth)
g0430025: 2004-Mar-15 Mon 16:49:00
State: 2:High Power



Power:
Modulation:

HIGH
UPPER BAND EDGE

Performed By:

David E. Lee, Lab Manager

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Name of Test: Field Strength of Spurious Radiation

Specification: 47 CFR 2.1053(a)

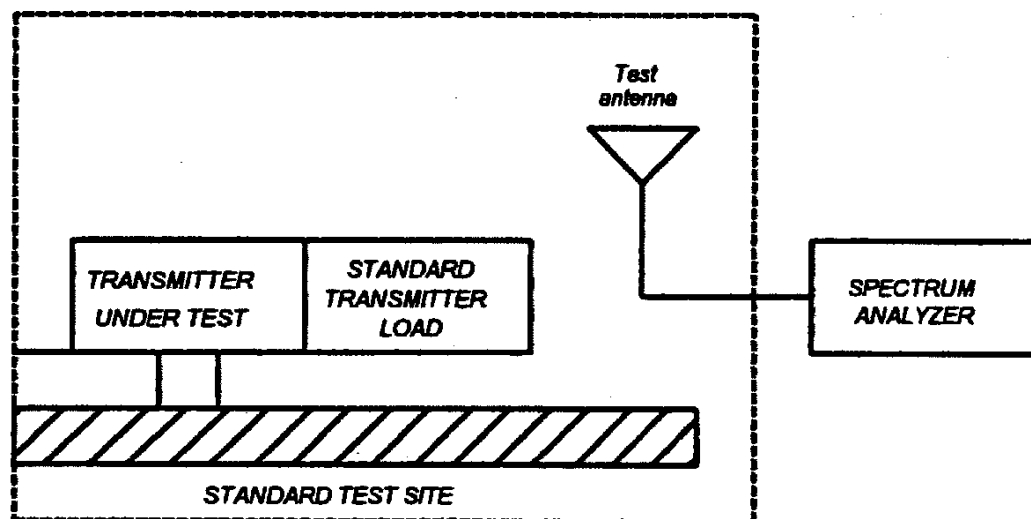
Guide: ANSI/TIA/EIA-603-1992/2001, Paragraph 1.2.12 and Table 16, 47 CFR 22.917

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.

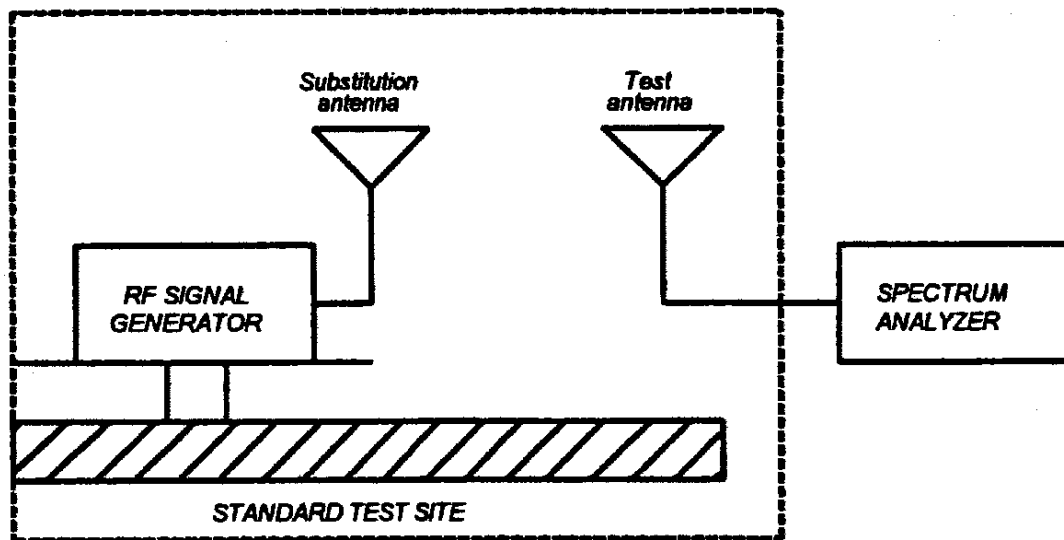
1.2.12.2 Method of Measurement

- 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.



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 $\pm$ 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.

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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:

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

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

Test Equipment:

Asset	Description	s/n	Cycle	Last Cal
Transducer				
i00088	EMCO 3109-B 25MHz-300MHz	2336	12 mo.	Sep-03
X i00089	Apriel 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
g0430002: 2004-Mar-15 Mon 09:10:00
State: 2:High Power

Frequency Tuned, MHz	Frequency Emission, MHz	EIRP, dBm	EIRP, dBc
1909.800000	3759.941667	-27.7	-59.8
1909.800000	5640.025000	-30.7	-62.8
1880.000000	7519.883333	-36.2	-68.3
1880.000000	9400.183333	-31.8	-63.9
1880.000000	11280.183333	-25.8	-57.9
1880.000000	13160.183333	-43.4	-75.5
1880.000000	15040.183333	-36.8	-68.9
1880.000000	16920.183333	-47.2	-79.3



Performed By:

David E. Lee, Lab Manager

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Name of Test: Frequency Stability (Temperature Variation)

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

Guide: As indicated on page 5

Test Conditions: As Indicated

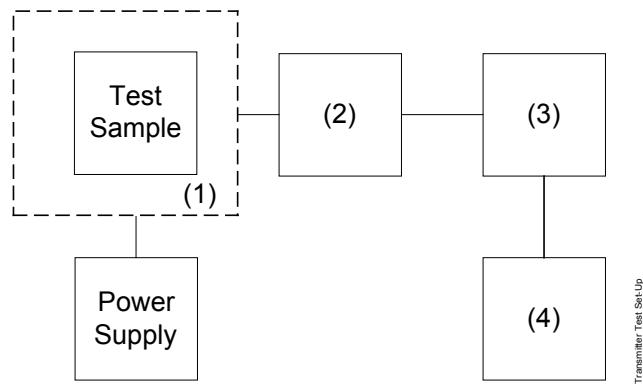
Test Equipment: As per previous page

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	PASTERNAK 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	35.9	0.0
-20	32.6	0.0
-10	36.3	0.0
0	27.6	0.0
10	49.7	0.0
20	24.0	0.0
30	35.6	0.0
40	44.8	0.0
50	41.7	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 5

Test Equipment: As per previous page

Measurement Procedure

1. The EUT was placed in a temperature chamber at $25\pm5^{\circ}\text{C}$ 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)

BATTERY END POINT (Voltage) = 3.35

% of STV	Voltage	Frequency, MHz	Change, Hz	Change, ppm
100	3.9	1880.0000240	24.0	0.0
B.E.P.	3.35	1880.0000334	33.4	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)



Performed By:
END

OF

David E. Lee, Lab Manager
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:

A handwritten signature in black ink, appearing to read "M. Flom P. Eng.", with a horizontal line drawn underneath the signature.

Morton Flom, P. Eng.