



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

3356 North San Marcos Place, Suite 107, Chandler, Arizona 85225-7176

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Date: June 9, 2000

Federal Communications Commission  
Via: Electronic Filing

Attention: Authorization & Evaluation Division

Applicant: Nokia Mobile Phones, Inc.  
Equipment: 5170i, Type NSD-1FW  
FCC ID: GMLNSD-1FW  
FCC Rules: 24, Confidentiality

Gentlemen:

On behalf of the Applicant, enclosed please find Application Form 731, Engineering Test Report and all pertinent documentation, the whole for approval of the referenced equipment as shown.

Filing fees are attached.

We trust the same is in order. Should you need any further information, kindly contact the writer who is authorized to act as agent.

Sincerely yours,

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.

enclosure(s)  
cc: Applicant  
MF/cvr

LIST OF EXHIBITS  
(FCC **CERTIFICATION** (PCS TRANSMITTERS) - REVISED 9/28/98)

APPLICANT: Nokia Mobile Phones, Inc.

FCC ID: GMLNSD-1FW

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



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Sub-part  
2.1033(c):

EQUIPMENT IDENTIFICATION

FCC ID: GMLNSD-1FW

NAMEPLATE DRAWING

ATTACHED, EXHIBIT 1.

LOCATION

AS PER LABEL DRAWING(S)

DATE OF REPORT

June 9, 2000

SUPERVISED BY:

A handwritten signature in black ink, reading 'M. Flom P. Eng.' with a stylized, cursive-like script.

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 85224

c) Report Number: d0060011

d) Client: Nokia Mobile Phones  
12278 Scripps Summit Dr.  
San Diego, CA 92131

e) Identification: 5170i, Type NSD-1FW  
FCC ID: GMLNSD-1FW  
Description: PCS Band CDMA Cellular Transceiver

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

g) Report Date: June 9, 2000  
EUT Received May 17, 2000

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.

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LIST OF GENERAL INFORMATION REQUIRED FOR CERTIFICATION

IN ACCORDANCE WITH FCC RULES AND REGULATIONS,  
VOLUME II, PART 2 AND TO

24, Confidentiality

Sub-part 2.1033

(c)(1): NAME AND ADDRESS OF APPLICANT:

Nokia Mobile Phones, Inc.  
6200 Courtney Campbell Causeway, Suite 900  
P.O. Box 30730  
Tampa, Florida 33630-3730

MANUFACTURER:

Nokia Mobile Phones Manufacturing (USA), Inc.  
5650 Alliance Gateway  
Fort Worth, TX 76178

(c)(2): FCC ID: GMLNSD-1FW

MODEL NO: 5170i, Type NSD-1FW

(c)(3): INSTRUCTION MANUAL(S):

PLEASE SEE ATTACHED EXHIBITS

(c)(4): TYPE OF EMISSION: 1M25F9W

(c)(5): FREQUENCY RANGE, MHz: 1851.25 to 1908.75

(c)(6): POWER RATING, Watts: 0.006 to 0.16 EIRP  
    Switchable       x   Variable      N/A

(c)(7): MAXIMUM POWER RATING, Watts: 2

PAGE NO. 3 of 18.

Subpart 2.1033 (continued)

(c)(8): VOLTAGES & CURRENTS IN ALL ELEMENTS IN FINAL R. F. STAGE,  
INCLUDING FINAL TRANSISTOR OR SOLID STATE DEVICE:

COLLECTOR CURRENT, A = per manual  
COLLECTOR VOLTAGE, Vdc = per manual  
SUPPLY VOLTAGE, Vdc = 3.8

(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



PAGE NO.

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M. Flom Associates, Inc. is accredited by the American Association for Laboratory Accreditation (A2LA) as shown in the scope below.



**THE AMERICAN  
ASSOCIATION  
FOR LABORATORY  
ACCREDITATION**

**ACCREDITED LABORATORY**

A2LA has accredited


**M. FLOM ASSOCIATES, INC.**  
**Chandler, AZ**

for technical competence in the field of

**Electrical (EMC) Testing**


The accreditation covers the specific tests and types of tests listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO/IEC Guide 25-1990 "General Requirements for the Competence of Calibration and Testing Laboratories" (equivalent to relevant requirements of the ISO 9000 series of standards) and any additional program requirements in the identified field of testing.

Presented this 24<sup>th</sup> day of November, 1998.



*Peter Nijzen*  
President  
For the Accreditation Council  
Certificate Number 1008.01  
Valid to December 31, 2000

For tests or types of tests to which this accreditation applies, please refer to the laboratory's Electrical (EMC) Scope of Accreditation



**American Association for Laboratory Accreditation**

SCOPE OF ACCREDITATION TO ISO/IEC GUIDE 25-1990 AND EN 45001

M. FLOM ASSOCIATES, INC.  
Electronic Testing Laboratory  
3356 North San Marcos Place, Suite 107  
Chandler, AZ 85225  
Morton Flom Phone: 480 926 3100

**ELECTRICAL (EMC)**

Valid to: December 31, 2000 Certificate Number: 1008-01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following electromagnetic compatibility tests:

Tests	Standard(s)
RF Emissions	FCC Part 15 (Subparts B and C) using ANSI C63.4-1992; CISPR 11; CISPR 13; CISPR 14; CISPR 22; EN 55011; EN 55013; EN 55014; EN 55022; EN 50081-1; EN 50081-2; FCC Part 18; ICES-003; AS/NZS 1044; AS/NZS 1053; AS/NZS 3548; AS/NZS 4251.1; CNS 13438
RF Immunity	EN 50082-1; EN 50082-2; AS/NZS 4251.1
Radiated Susceptibility	EN 61000-4-3; ENV 50140; ENV 50204; IEC 1000-4-3; IEC 801-3
ESD	EN 61000-4-2; IEC 1000-4-2; IEC 801-2
EFT	EN 61000-4-4; IEC 1000-4-4; IEC 801-4
Surge	EN 61000-4-5; ENV 50142; IEC 1000-4-5; IEC 801-5
47 CFR (FCC)	2, 21, 22, 23, 24, 74, 80, 87, 90, 95, 97

Revised 2/2/2000

*Peter Nijzen*

5301 Buckeystown Pike, Suite 350 • Frederick, MD 21704-8370 • Phone: 301 644 3248 • Fax: 301 662 2974

"This laboratory is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this report have been determined in accordance with the laboratory's terms of accreditation unless stated otherwise in the report."

Should this report contain any data for tests for which we are not accredited, or which have been undertaken by a subcontractor that is not A2LA accredited, such data would not be covered by this laboratory's A2LA accreditation.

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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
- 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

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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, 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/IS-95A-1995

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NAME OF TEST: Carrier Output Power (Radiated)

SPECIFICATION: 47 CFR 2.1046(a), 24.232(b)

GUIDE: As indicated on page 6

TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDURE (RADIATED)

1. The EUT was placed on an open-field site and its radiated field strength at a known distance was measured by means of a spectrum analyzer. Equivalent loading was calculated from the equation  $P_t = ((E \times R)^2 / 30)$  watts, where  $R = 3m$ .
2. Measurement accuracy is  $\pm 1.5$  dB.

MEASUREMENT RESULTS

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV/m	CF, dB	EIRP, dBm	EIRP, Watts
1851.250	1851.380000	76.4	40.7	21.8	0.15
1880.000	1880.250000	76.1	41.0	21.9	0.16
1908.750	1908.630000	74.5	41.3	20.6	0.12

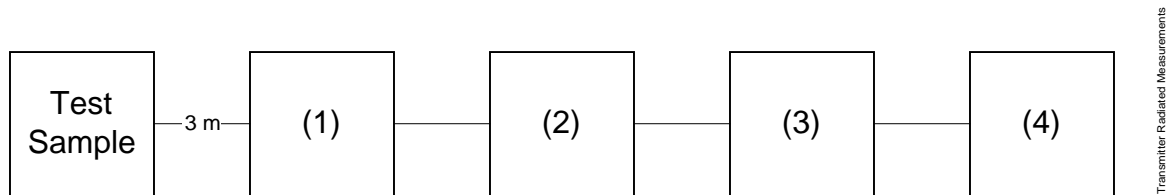
SUPERVISED BY:



Morton Flom, P. Eng.

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TRANSMITTER RADIATED MEASUREMENTS

Asset	Description (as applicable)	s/n
(1)	<u>TRANSDUCER</u>	
i00091	Emco 3115	001469
i00089	Aprcl Log Periodic	001500
(2)	<u>HIGH PASS FILTER</u>	
i00	Narda $\mu$ PAD (In-Band Only)	
i00	Trilithic (Out-Of-Band Only)	
(3)	<u>PREAMP</u>	
i00028	HP 8449 (+30 dB)	2749A00121
(4)	<u>SPECTRUM ANALYZER</u>	
i00048	HP 8566B	2511A01467
i00043	HP 8558B	2004A02076
i00057	HP 8557A	1531A00191
i00029	HP 8563E	3213A00104

PAGE NO. 9 of 18.

NAME OF TEST: Transmitter Conducted Measurements

SPECIFICATION: 47 CFR 2.1049(c), 24.238(b): Occupied Bandwidth

GUIDE: As indicated on page 6

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

SUPERVISED BY:



Morton Flom, P. Eng.

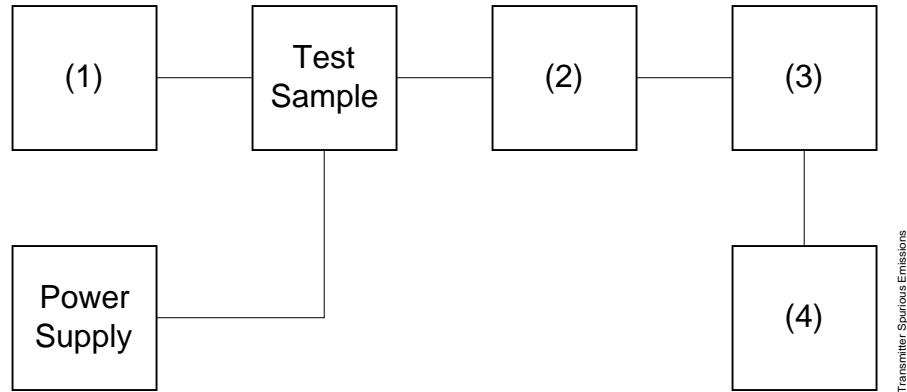
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TRANSMITTER SPURIOUS EMISSION

TEST A. OCCUPIED BANDWIDTH (IN-BAND SPURIOUS)

TEST B. OUT-OF-BAND SPURIOUS



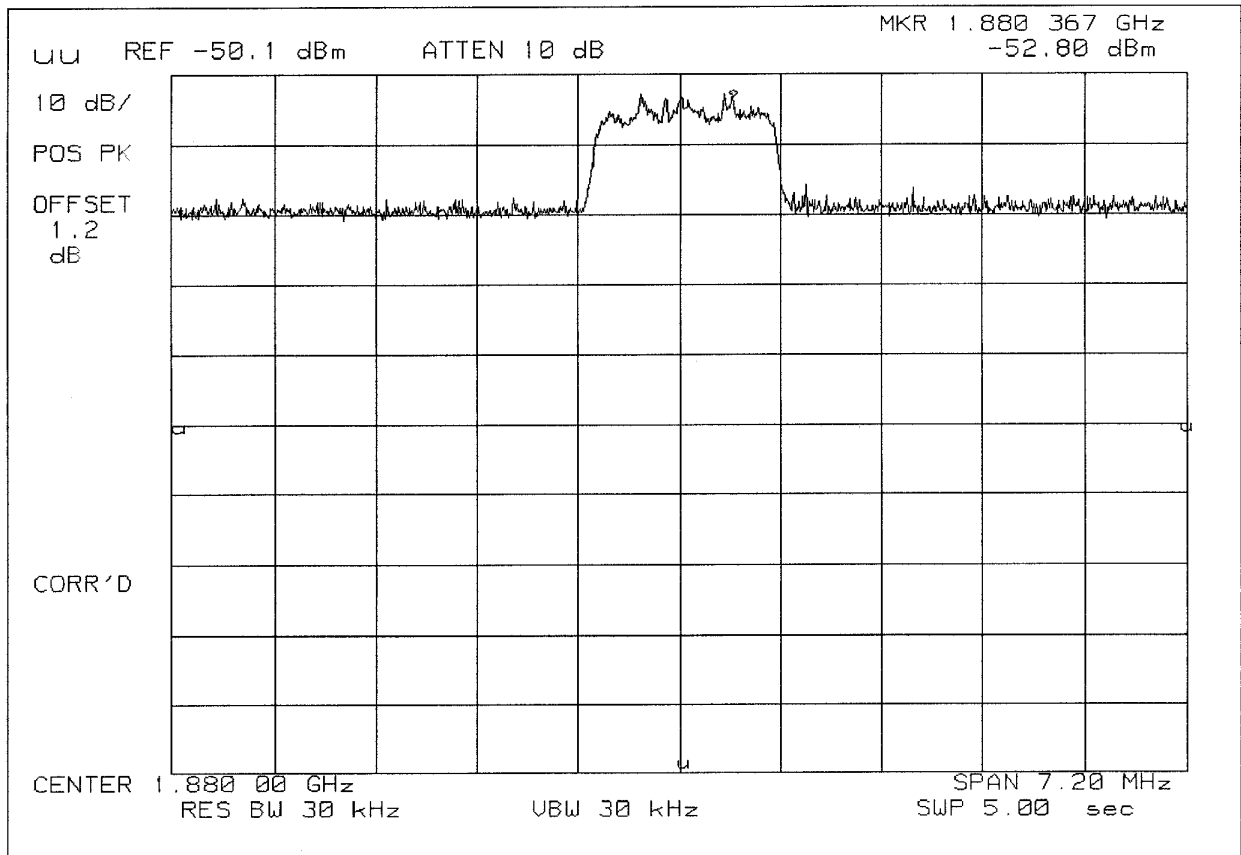
Asset Description (as applicable)	s/n
(1) <u>AUDIO OSCILLATOR/GENERATOR</u>	
i00010 HP 204D	1105A04683
i00017 HP 8903A	2216A01753
i00012 HP 3312A	1432A11250
(2) <u>COAXIAL ATTENUATOR</u>	
i00122 Narda 766-10	7802
i00123 Narda 766-10	7802A
i00069 Bird 8329 (30 dB)	1006
i00113 Sierra 661A-3D	1059
(3) <u>FILTERS; NOTCH, HP, LP, BP</u>	
i00126 Eagle TNF-1	100-250
i00125 Eagle TNF-1	50-60
i00124 Eagle TNF-1	250-850
(4) <u>SPECTRUM ANALYZER</u>	
i00048 HP 8566B	2511A01467
i00029 HP 8563E	3213A00104

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SPECTRUM ANALYZER PRESENTATION  
 NOKIA, 5170i  
 2000-FEB-16, 13:45, WED

POWER: LOW  
 MODULATION: CDMA PCS



*M. Flom P. Eng.*

SUPERVISED BY:

Morton Flom, P. Eng.

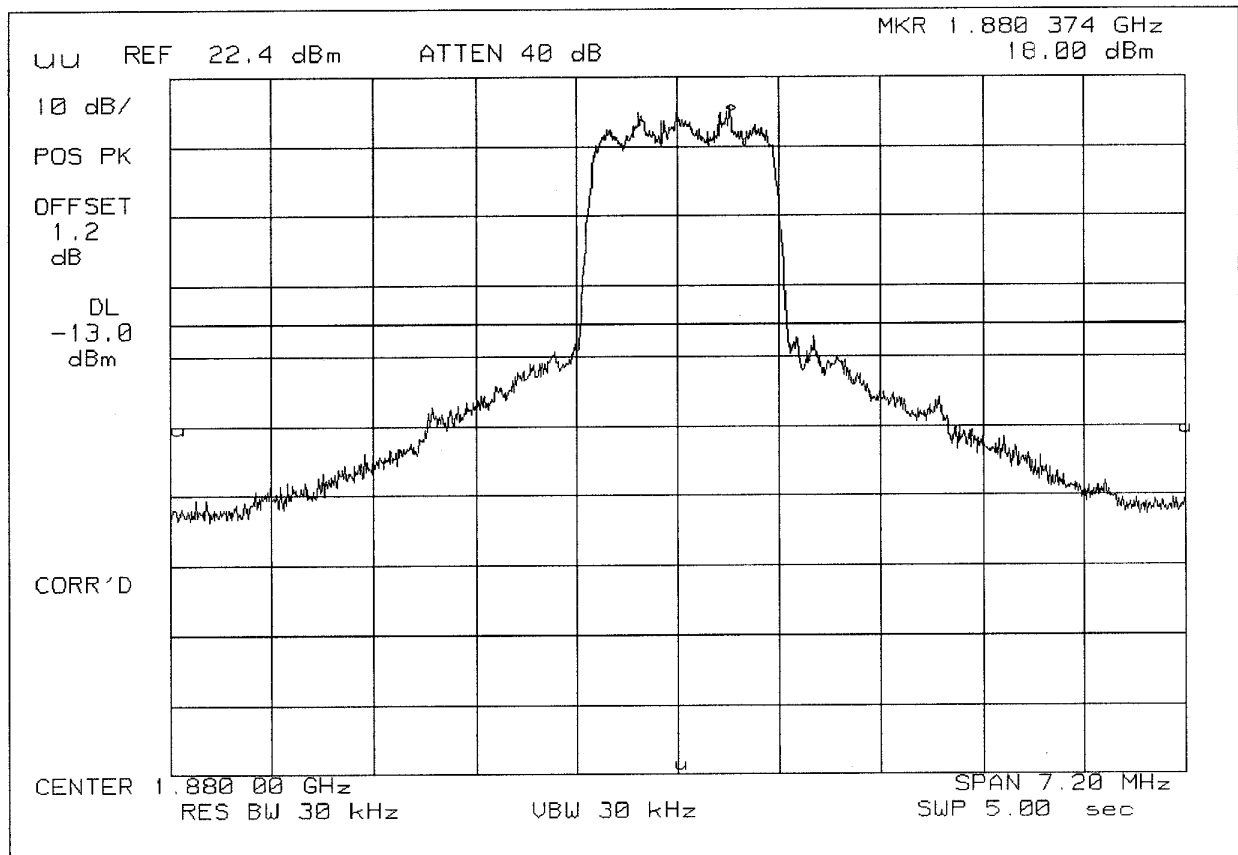


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SPECTRUM ANALYZER PRESENTATION  
 NOKIA, 5170i  
 2000-FEB-16, 13:42, WED

POWER: HIGH  
 MODULATION: CDMA PCS



*M. Flom P. Eng*

SUPERVISED BY:

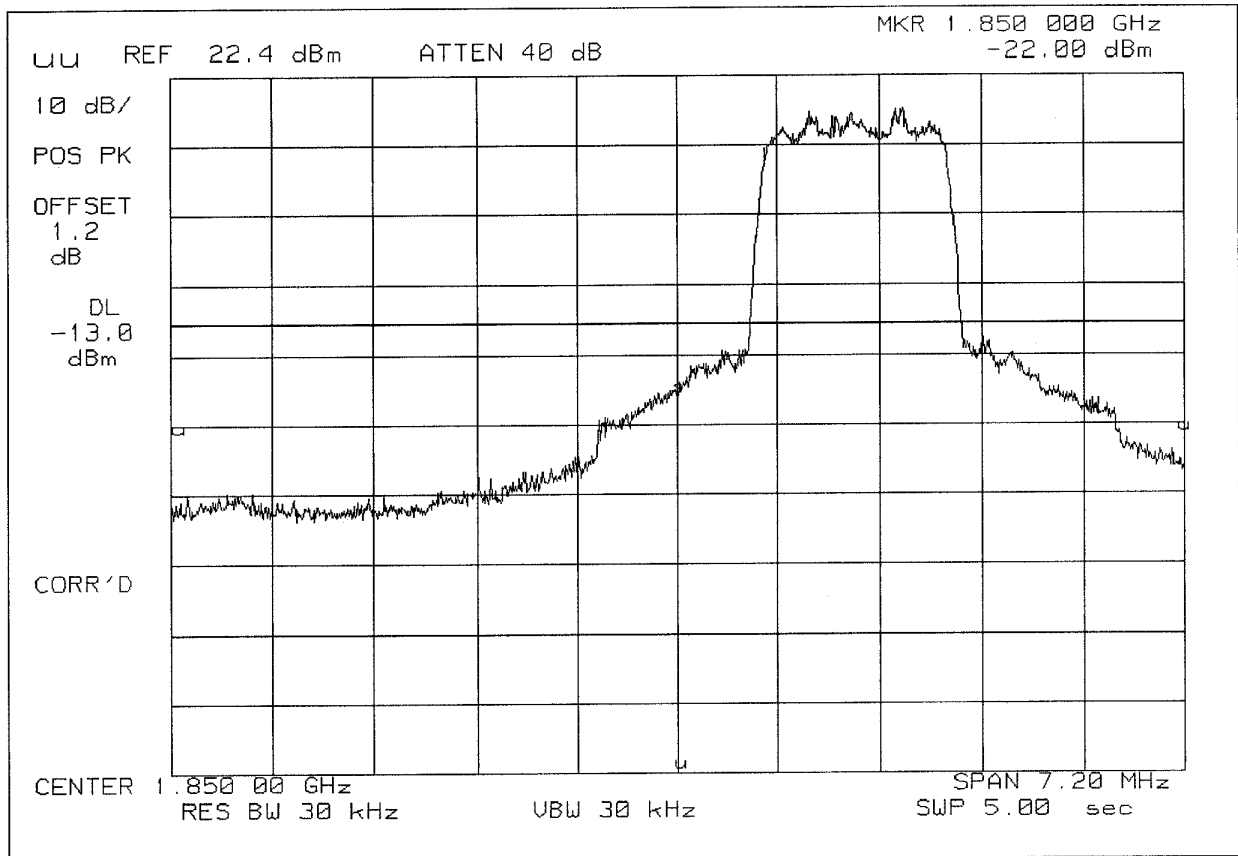
Morton Flom, P. Eng.

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SPECTRUM ANALYZER PRESENTATION  
 NOKIA, 5170i  
 2000-FEB-16, 13:52, WED

POWER: HIGH  
 MODULATION: CDMA PCS  
 REMARK: LOWER BANDEDGE CHANNEL 025



*Morton Flom P. Eng.*

SUPERVISED BY:

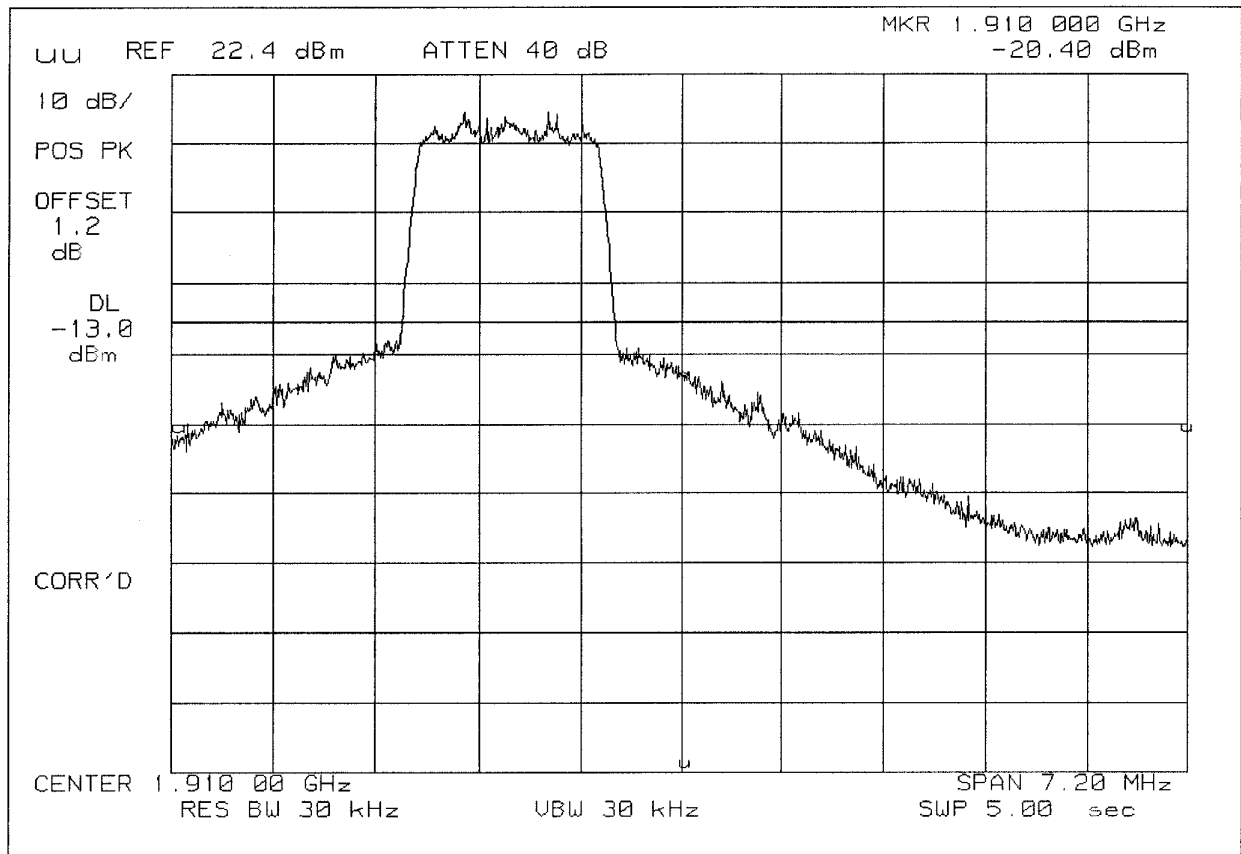
Morton Flom, P. Eng.

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SPECTRUM ANALYZER PRESENTATION  
 NOKIA, 5170i  
 2000-FEB-16, 13:56, WED

POWER: HIGH  
 MODULATION: CDMA PCS  
 REMARK: UPPER BANDEDGE CHANNEL 1175



SUPERVISED BY:

Morton Flom, P. Eng.

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NAME OF TEST: Field Strength of Spurious Radiation

SPECIFICATION: 47 CFR 2.1053(a)

GUIDE: As indicated on page 6

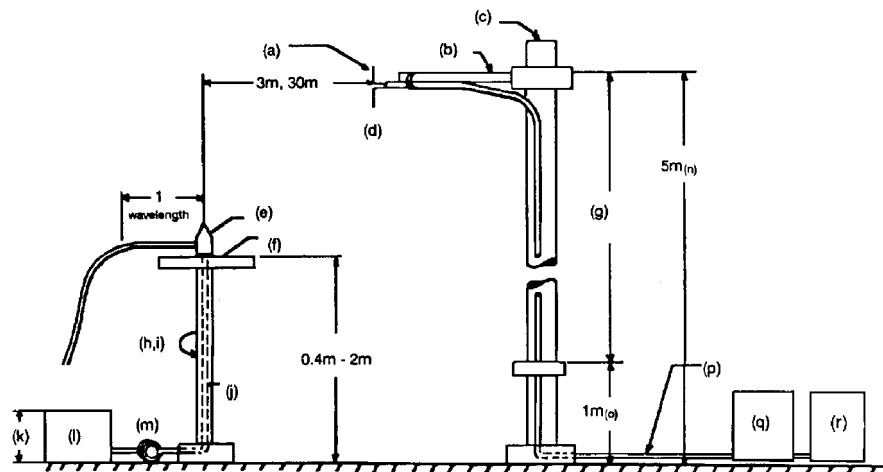
TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDURE

1. A description of the measurement facilities was filed with the FCC and was found to be in compliance with the requirements of Section 15.38, by letter from the FCC dated March 3, 1997, FILE 31040/SIT. All pertinent changes will be reported to the Commission by up-date prior to March 2000.
2. At first, in order to locate all spurious frequencies and approximate amplitudes, and to determine proper equipment functioning, the test sample was set up at a distance of three meters from the test instrument. Valid spurious signals were determined by switching the power on and off.
3. In the field, the test sample was placed on a wooden turntable above ground at three (or thirty) meters away from the search antenna. Excess power leads were coiled near the power supply.  
  
The cables were oriented in order to obtain the maximum response. At each emission frequency, the turntable was rotated and the search antennas were raised and lowered vertically.
4. The emission was observed with both a vertically polarized and a horizontally polarized search antenna and the worst case was used.
6. The field strength of each emission within 20 dB of the limit was recorded and corrected with the appropriate cable and transducer factors.
7. The worst case for all channels is shown.
8. Measurement results: ATTACHED FOR WORST CASE

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RADIATED TEST SETUP

## NOTES:

- (a) Search Antenna - Rotatable on boom  
 (b) Non-metallic boom  
 (c) Non-metallic mast  
 (d) Adjustable horizontally  
 (e) Equipment Under Test  
 (f) Turntable  
 (g) Boom adjustable in height.  
 (h) External control cables routed horizontally at least one wavelength.  
 (i) Rotatable  
 (j) Cables routed through hollow turntable center  
 (k) 30 cm or less  
 (l) External power source  
 (m) 10 cm diameter coil of excess cable  
 (n) 25 cm (V), 1 m-7 m (V, H)  
 (o) 25 cm from bottom end of 'V', 1m normally  
 (p) Calibrated Cable at least 10m in length  
 (q) Amplifier (optional)  
 (r) Spectrum Analyzer

Asset Description  
 (as applicable)

s/n

Cycle

Last Cal

Per ANSI C63.4-1992, 10.1.4

TRANSDUCER

i00088	EMCO 3109-B 25MHz-300MHz	2336	12 mo.	Sep-99
i00089	Apriel 2001 200MHz-1GHz	001500	12 mo.	Sep-99
i00103	EMCO 3115 1GHz-18GHz	9208-3925	12 mo.	Sep-99
i00065	EMCO 3301-B Active Monopole	2635	12 mo.	Sep-99

AMPLIFIER

i00028	HP 8449A	2749A00121	12 mo.	Mar-99
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SPECTRUM ANALYZER

i00029	HP 8563E	3213A00104	12 mo.	Aug-99
i00033	HP 85462A	3625A00357	12 mo.	May-99
i00048	HP 8566B	2511AD1467	6 mo.	May-99

PAGE NO.

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EMISSIONS (TX1)  
 NOKIA, 5170i  
 2000-FEB-15, 11:41, TUE

TUNED MHz	EMISSION MHz	LEVEL dBuV/m	@m	C.F. dB	CALC. dBuV/m	@m	EIRP dBm	FLAG
1880.000	3760.116667	57.2	3	5.3	62.5	3	-32.8	AR
1880.000	5640.183333	52.7	3	9.0	61.6	3	-33.6	A-
1880.000	7520.000000	37.2	3	12.5	49.7	3	-45.5	AR
1880.000	9400.000000	36.5	3	14.7	51.2	3	-44.0	AR
1880.000	11280.000000	36.2	3	14.7	50.8	3	-44.4	AR
1880.000	13160.000000	36.7	3	17.9	54.5	3	-40.7	A-
1880.000	15040.000000	37.5	3	15.1	52.6	3	-42.7	A-
1880.000	16920.000000	37.7	3	20.4	58.1	3	-37.1	A-

PAGE NO. 18 of 18.  
NAME OF TEST: Necessary Bandwidth and Emission Bandwidth  
SPECIFICATION: 47 CFR 2.202(g)

MODULATION = 1M25F9W

NECESSARY BANDWIDTH:

NECESSARY BANDWIDTH ( $B_N$ ), kHz = 1250  
(measured at the 99.75% power bandwidth)



SUPERVISED BY:

Morton Flom, P. Eng.

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, reading "M. Flom P. Eng.", with a horizontal line drawn underneath the signature.

Morton Flom, P. Eng.