



Test & Certification Center (TCC) - Dallas

FCC ID: GMLNPB-1NB

Test Report #: 03-EM-0101.001

September 08, 2003

Accredited Laboratory
Certificate Number: 1819-01

Ver 1.0

CFR 47 Part 2, 22, and 24 Test Report

Test Report Number: 03-EM-0101.001

Terminal device:FCC ID: GMLNPB-1NB, Model 3390, HW: 15.10, SW: 7.14
(Detailed information is listed in section 4).

Originator: Mark Severson
Function: TCC - Dallas - EMC
Version/Status: 1.0, Approved
Location: TCC Directories
Date: Sept 08, 2003

Change History:

Version	Date	Status	Handled By	Comments
0.1	Sept 04 2003	Draft	Mark Severson	
0.2	Sept 04 2003	Reviewed	M.Mobley	
1.0	Sept 08 2003	Approved	A. Ewing	

Testing laboratory:

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Nokia Mobile Phones, Inc
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Irving, Texas 75039
U.S.A.
Tel. 972-894-5000
Fax. 972-894-4988

Client:

Nokia Mobile Phones
Model 3390, FCC ID: GMLNPB-1NB
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Date and signatures:

Sept 08, 2003

For the contents:

Nerina Walton, EMC Engineer
Technical Review

Alan C. Ewing, General Manager
Manager Review

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1. GENERAL

1.1 Quality System

The quality system in place for TCC-Dallas conforms to ISO/IEC 17025 and has been audited to the standard by A2LA (American Association of Laboratory Accreditation). The appendix of this report contains the scope of accreditation for A2LA. TCC – Dallas has also been audited using the ISO 9000 Quality System, as part of Nokia Mobile Phones, Inc., by ABS (American Bureau of Shipping) Quality Evaluations Inc.

TCC-Dallas is a recognized laboratory with the Federal Communications Commission in filing applications for Certification under Parts 15 and 18, Registration Number 100060, and Industry Canada, Registration Number IC 661.

1.2 List of General Information Required for Certification

This list is in accordance with FCC Rules and Regulations, CFR 47, Part 2, and to 22H, 24E, Confidentiality.

1.2.1 Sub-part 2.1033(c)(1)

Name and Address of Applicant: Nokia Mobile Phones, Inc. 6021 Connection Drive, Irving, Texas,
75039, USA

Manufacturer: Nokia Brazil Manaus AM
Rod. Torquato Tapajós, 7200 KM 12 - Tarumã
Postal code: 69048-660
Manaus, Amazonas, Brazil

Nokia Mexico, S.A. DE C.V.
Ave. Ind. Rio Bravo s/n, Parque Ind. del Nte.
Cd. Reynosa, Tam. CP, 88730

1.2.2 Sub-part 2.1033(c)(2)

FCC ID: FCC ID: GMLNPB-1NB

Model No: Model 3390

1.2.3 Sub-part 2.1033(c)(3)

Instruction Manual(s):
Refer to attached EXHIBITS

1.2.4 Sub-part 2.1033(c)(4)

Type of Emission: 256KGXW

1.2.5 Sub-part 2.1033(c)(5)

Frequency Range, MHz: 1850.2 to 1909.8

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1.2.6 Sub-part 2.1033(c)(6)

Power Rating, Watts: 0.822W GSM PCS☐ Switchable ☒ Variable ☐ N/A

FCC Grant Note: BC- The output power is continuously variable from the value listed in this entry to 5%-10% of the value listed.

1.2.7 Sub-part 2.1033(c)(7)

Maximum Power Rating, Watts: 0.822W

1.2.8 Sub-part 2.1033(c)(8)

Voltages & Currents in all elements in final R.F. Stage, including final transistor or solid-state device:

Collector Current, A = 0.228

Collector Voltage, Vdc = 3.6

Supply Voltage, Vdc = 3.6

1.2.9 Sub-part 2.1033(c)(9)

Tune-up Procedure:
Refer to attached EXHIBITS

1.2.10 Sub-part 2.1033(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.

Refer to attached EXHIBITS

1.2.11 Sub-part 2.1033(c)(11)

Label Information:
Refer to attached EXHIBITS

1.2.12 Sub-part 2.1033(c)(12)

Photographs:
Refer to attached EXHIBITS

1.2.13 Sub-part 2.1033(c)(13)

Digital Modulation Description:
N/A

1.2.14 Sub-part 2.1033(c)(14)

Test and Measurement Data:
FOLLOWS

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1.3 Objective

All tests and measurement data shown was performed to determine whether the selected handset was in compliance as specified in FCC: CFR47 Parts 2.947, 2.1033(c), 2.1041, 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, Part 22, and Part 24.

1.4 Test Summary

Test Results: *The test result relates only to those tested devices mentioned in Section 4 of this test report.*

Test Performed	Reference	Section of Report	Complies / Does not comply
RF Power Output (Radiated)	FCC Part 24.232(b)	6	Complies
Occupied Bandwidth: Transmitter Conducted Measurements	FCC Part 2.1049(c)(1), 24.238(a)(b)	7	Complies
Spurious Emissions at Antenna Terminals	FCC Part 2.1051	8	Complies
Field Strength of Spurious Radiation	FCC Part 2.1053	9	Complies
Frequency Stability (Temperature Variation)	FCC Part 2.1055(a)(1)(b), 24.235	10	Complies
Frequency Stability (Voltage Variation)	FCC Part 2.1055(d)(1)(2), 24.235	11	Complies

2. STANDARDS BASIS

Testing has been carried out in accordance with:

REF.	Code of the standard	Name of the standard
1	ANSI C63.4	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz.
2	FCC: CFR 47 Part 2	Code of Federal Regulations (CFR) Title 47, Part 2 – Frequency Allocations and Radio Treaty Matters; General Rules and Regulations: Subpart J – Equipment Authorization Procedures
3	FCC: CFR 47 Part 22	Code of Federal Regulations (CFR) Title 47, Part 22 – Public Mobile Services: Subpart H – Cellular Radiotelephone Service
4	FCC: CFR 47 Part 24	Code of Federal Regulations (CFR) Title 47, Part 24 – Personal Communications Services: Subpart E – Broadband PCS
5	ANSI/TIA/EIA 603-A	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
6	RSS-132	800 MHz Cellular Telephones Employing New Technologies
7	RSS-133	2 GHz Personal Communications Services, Industry Canada
8	RSS-212	Test Facilities and Test Methods for Radio Equipment, Industry Canada (Provisional)
9	RSP-100	Radio Equipment Certification Procedure

Note: Unless otherwise stated, (by reference to a version number and a publication date), the latest version of the above documents applies.

Deviations:

Not Applicable.

3. LIST OF ABBREVIATIONS, ACRONYMS AND TERMS

3.1 Abbreviations

dB - decibel

dBm - decibels per milliwatt (absolute measurement)

GHz - gigahertz or 1000000000 hertz

kHz - kilohertz or 1000 hertz

MHz - megahertz or 1000000 hertz

3.2 Acronyms

AMPS - Advanced Mobile Phone System

BSS - Base Station Simulator

CDMA - Code Division Multiple Access

EDRP - Effective Dipole Radiated Power

EIRP - Effective Isotropic Radiated Power

EMC - Electromagnetic Compatibility

EMI - Electromagnetic Interference

EUT - Equipment under Test

GSM - Global System for Mobile communications

PCS - Personal Communications Services

RF - Radio Frequency

TDMA - Time Division Multiple Access

3.3 Terms

Base Station Simulator (BSS) - simulates all the necessary signals that a phone would experience while on a live network. There are many types of base station simulators catering for all current protocols, i.e., GSM, AMPS, TDMA, and CDMA.

Cellular - refers to a frequency in the 800MHz band.

PCS - refers to a frequency in the 1900MHz band.

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4. EQUIPMENT-UNDER-TEST (EUT)

The results in this report relate only to the items listed below:

4.1 Description of Tested Device(s):

Test Performed	Mode of Operation	Date of Receipt	Condition of Sample	Item	Identifying Information
2.1053, 24.232(b)(c)	GSM 1900	25 March 2003	Good	Phone	Type: NPB-1NB Build: 15.10 SW: 7.14 IMEI: 010072/72/290613/5
2.1049(c)(1), 2.1051, 2.1055(d)(1)(2), 2.1055(a)(1)(b), 24.235, 24.238(a)(b)	GSM 1900	25 March 2003	Good	Phone	Type: NPB-1NB Build: 15.10 SW: 7.14 IMEI: 010072/72/290619/2
2.1049(c)(1), 2.1051, 2.1053, 2.1055(d)(1)(2), 2.1055(a)(1)(b), 24.232(b)(c), 24.235, 24.238(a)(b)	GSM 1900	25 March 2003	Good	Battery	Type: BMC-2 Other: 3.6v Li-ion

4.2 Photograph of Tested Device(s):

Refer to attached EXHIBITS

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5. TEST EQUIPMENT LIST

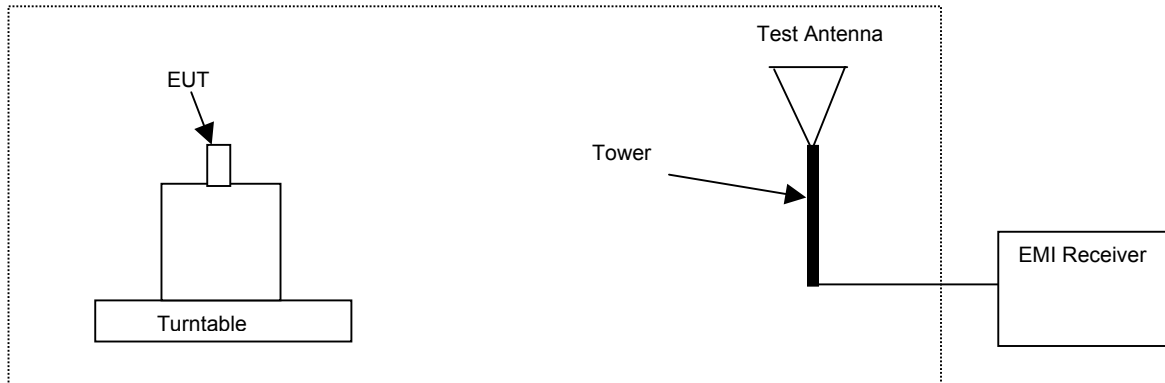
The listing below indicates the test equipment utilized for the test (s). Calibration interval on all items listed can be obtained from the Engineering Services Group within NMP, Product Creation - Dallas. Where relevant, measuring equipment is subjected to in-service checks between testing. TCC - Dallas shall notify clients promptly, in writing, of identification of defective measuring equipment that casts doubt on the validity of results given in this report..

Test/ Section of Report	NMP#	Test Equipment	Mfr. #	Model #
6, 9	02625	Base Station Simulator	Rhode & Schwarz	CMU200
7, 8, 10	02666	Base Station Simulator	Rhode & Schwarz	CMU200
9	00001	RF preamplifier	Agilent	HP8449B
9	02679	Spectrum Analyzer	Agilent	E7405A
10, 11	00837	Temperature Chamber	Tenney Junior	TUJR
10, 11	00627	Variable Power Supply	Agilent	E3631A
6	00147	Power Meter	Boonton	4232A
6	00163	Power Sensor	Boonton	51015
6, 9	02868	Biconilog Antenna	EMCO	3142
6, 9	00367/ 00368	EMI Receiver	Agilent	8546A, 85460A
6, 9	02857	Horn Antenna	EMCO	3115
6, 9	02858	Horn Antenna	EMCO	3115
6, 9	02671	Signal Generator	Agilent	83630B
6, 9	02846	Turntable and Tower Controller	Sunol	Turntable FM2022, Controller 2846
7, 8	02664/ 02665	EMI Receiver	Agilent	8546A, 85460A
7, 8	N/A	3GHz High Pass Filter	Trilithic Inc.	4HC2900/18000-1.1-KK
7, 8	N/A	2GHz High Pass Filter	Trilithic Inc.	3HC1900/18000-1-KK
7, 8	N/A	1GHz High Pass Filter	Wainwright.	WHK949-9SS
7, 8	03155	Power Splitter (must have 6 dB insertion loss)	HP	33120A
7, 8	N/A	6dB Attenuator	Weinshcel	Model 2
7, 8	N/A	Tunable Notch Filter	K&L	5TNF-500/1000-N/N
8	02680	Spectrum Analyzer	Agilent	E7405A

6. RF POWER OUTPUT (RADIATED)

Specification: FCC Part 22.913(a), 24.232(b)(c)

6.1 Setup



6.2 Pass/Fail Criteria

Band	FCC Limit (dBm)
Cellular	38.5 (EDRP)
PCS	33.0 (EIRP)

6.3 Detailed Test Results

Test Technician / Engineer	Michael Sundstrom	
Date of Measurement	26 March 2003	
Temperature / Humidity	22-26°C	37-51%RH
Test Result	Complies with FCC Part 24.232(b)	

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PCS Band**GSM 1900 MHz, Channel 512**

Freq Max (MHz)	EIRP EMI (dBm)	Pol.
1850.2	28.48	V

GSM 1900 MHz, Channel 661

Freq Max (MHz)	EIRP EMI (dBm)	Pol.
1880.0	28.80	V

GSM 1900 MHz, Channel 810

Freq Max (MHz)	EIRP EMI (dBm)	Pol.
1909.8	29.15	V

6.4 Measurement Uncertainty

The measurement uncertainty for this test is +/- 2.4dB for 800 to 2000 MHz.

7. OCCUPIED BANDWIDTH (TRANSMITTER CONDUCTED MEASUREMENTS)

Specification: FCC Part 2.1049(c)(1), 24.238(a)(b)

7.1 Setup

Testing was performed with the EUT connected to a 6dB attenuator, 6dB splitter, filter bank and then to the EMI receiver. The base station simulator was connected to the other port of the splitter to establish a call.

7.2 Pass/Fail Criteria

Occupied Bandwidth, Out of Band

Band	Frequency Range (MHz)	FCC Limits (dBm)
Cellular 800, Low Channel	< 824	-13
Cellular 800, High Channel	> 849	-13
PCS 1900, Low Channel	< 1850	-13
PCS 1900, High Channel	> 1910	-13

Occupied Bandwidth, In Band

No pass/fail, these plots are used to determine emission designators.

7.3 Detailed Test Results

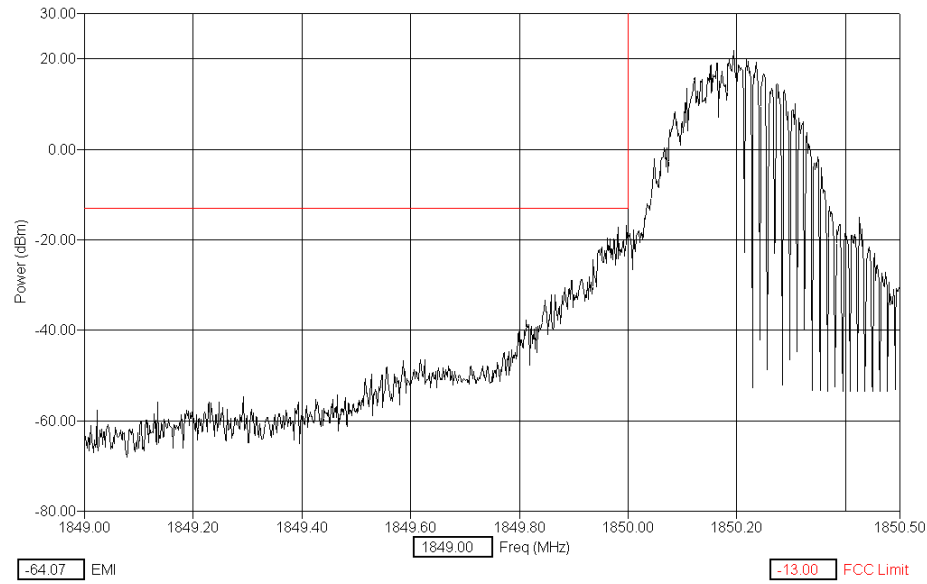
Test Technician / Engineer	Mark Severson	
Date of Measurement	27 March 2003	
Temperature / Humidity	23°C	45%RH
Test Result	Complies with FCC Part 2.1049(c)(1), 24.238(a)(b)	

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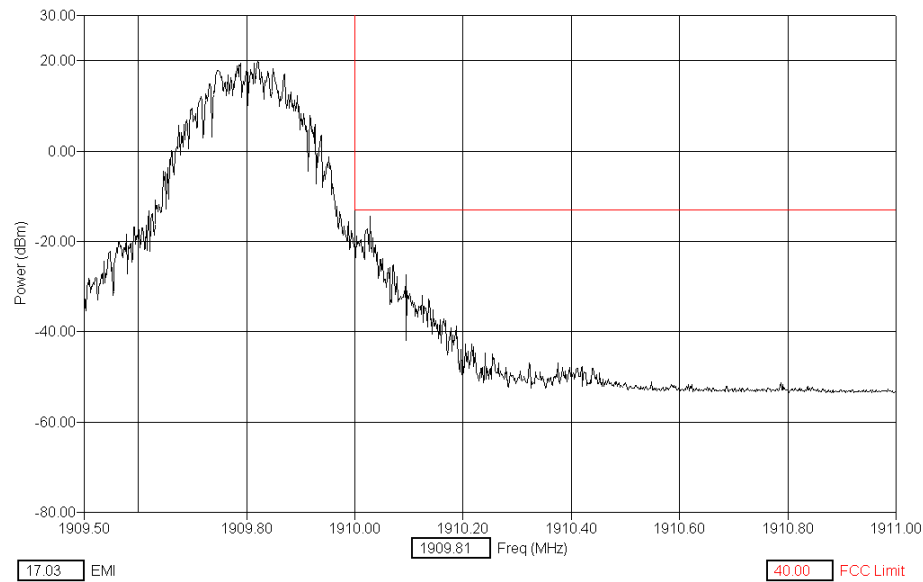
PCS Band, GSM 1900, Channel 512

3 kHz RBW/VBW, 100ms Sweep Time, ref to power level



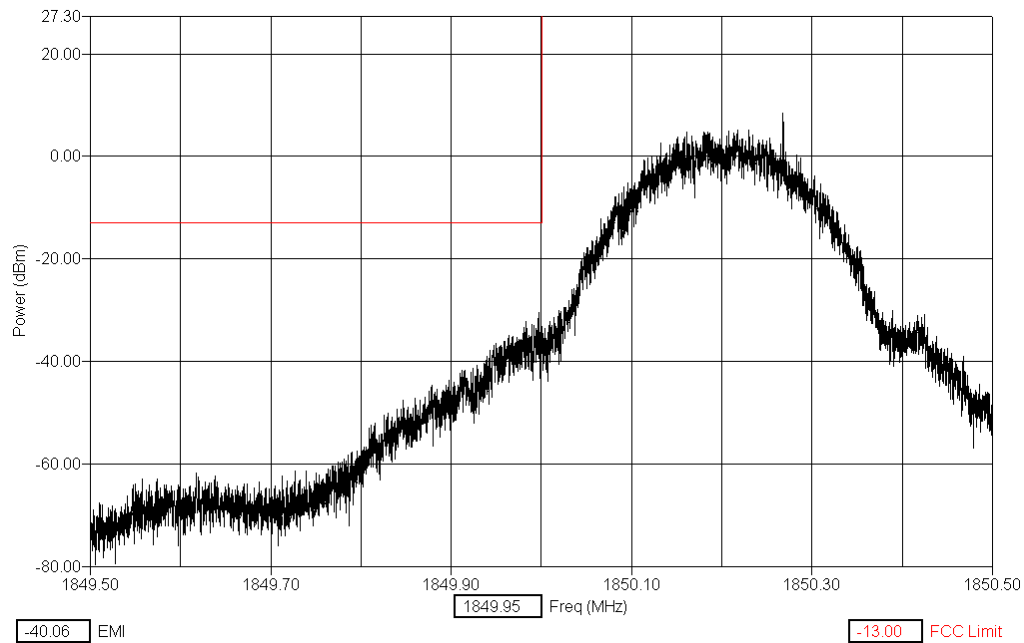
PCS Band, GSM 1900, Channel 810

3 kHz RBW/VBW, 100ms Sweep Time, ref to power level

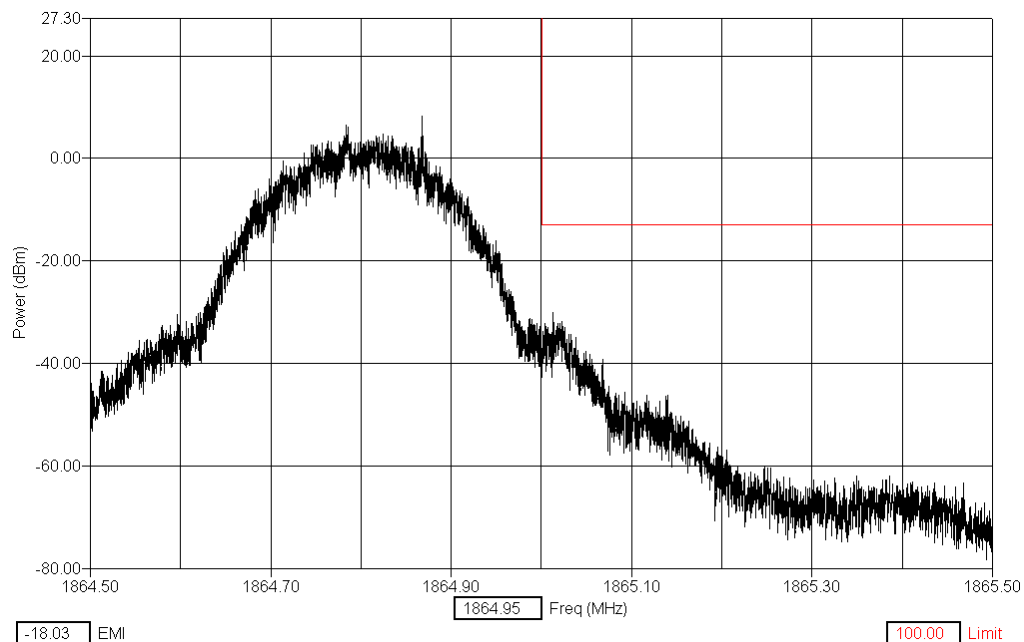


7.4 Block Edge Requirements

PCS GSM1900 Block A Lower Edge Channel 512



PCS GSM1900 Block A Upper Edge Channel 585



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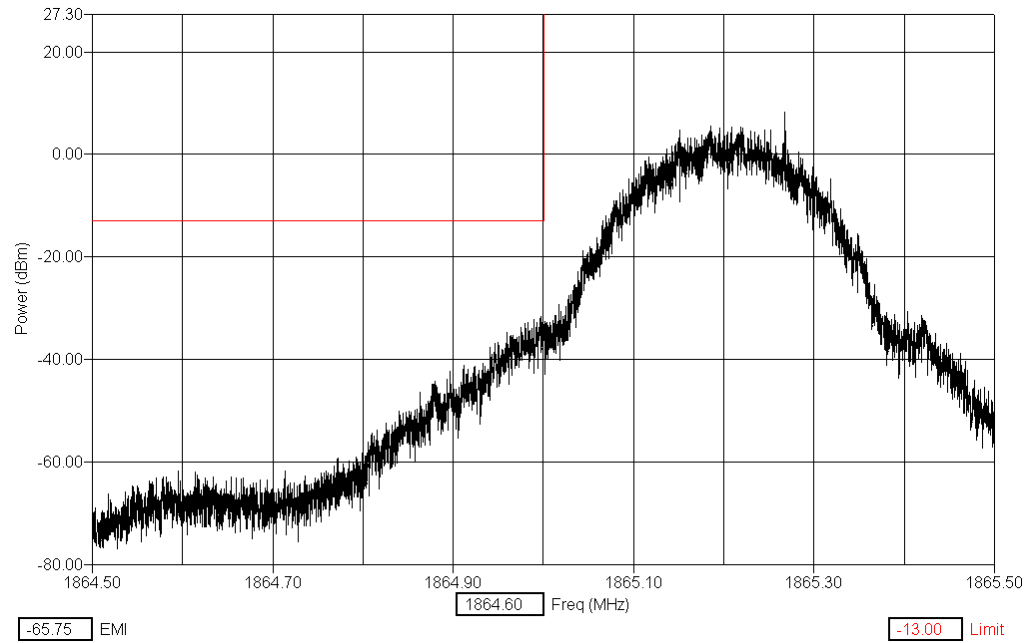
FCC ID: GMLNPB-1NB

Test Report #: 03-EM-0101.001

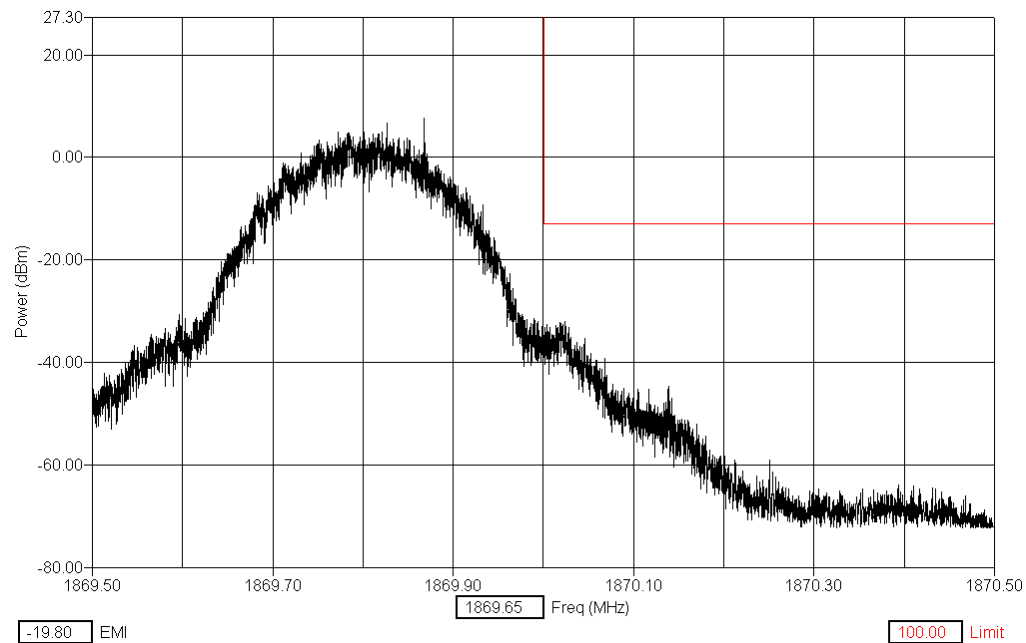
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PCS GSM1900 Block D Lower Edge Channel 587



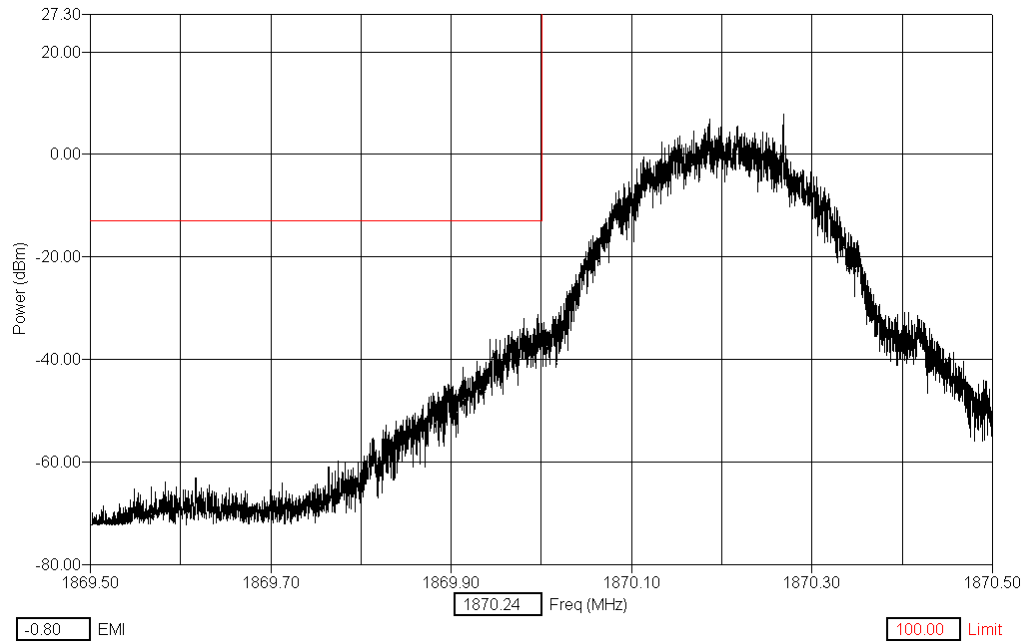
PCS GSM1900 Block D Upper Edge Channel 610



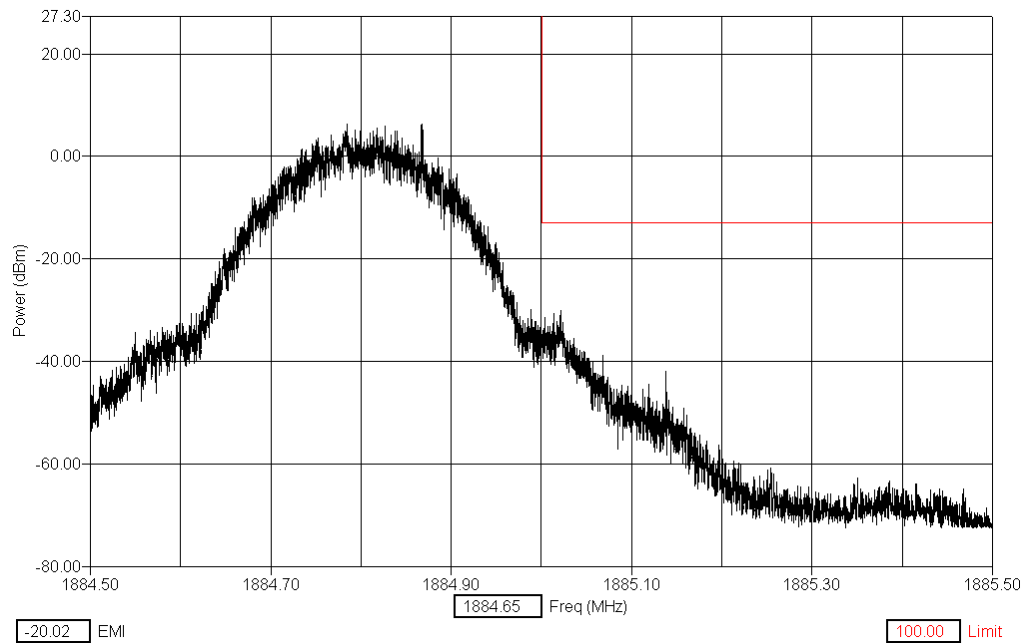
Test & Certification Center (TCC) - Dallas
 FCC ID: GMLNPB-1NB
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PCS GSM1900 Block B Lower Edge Channel 612



PCS GSM1900 Block B Upper Edge Channel 685



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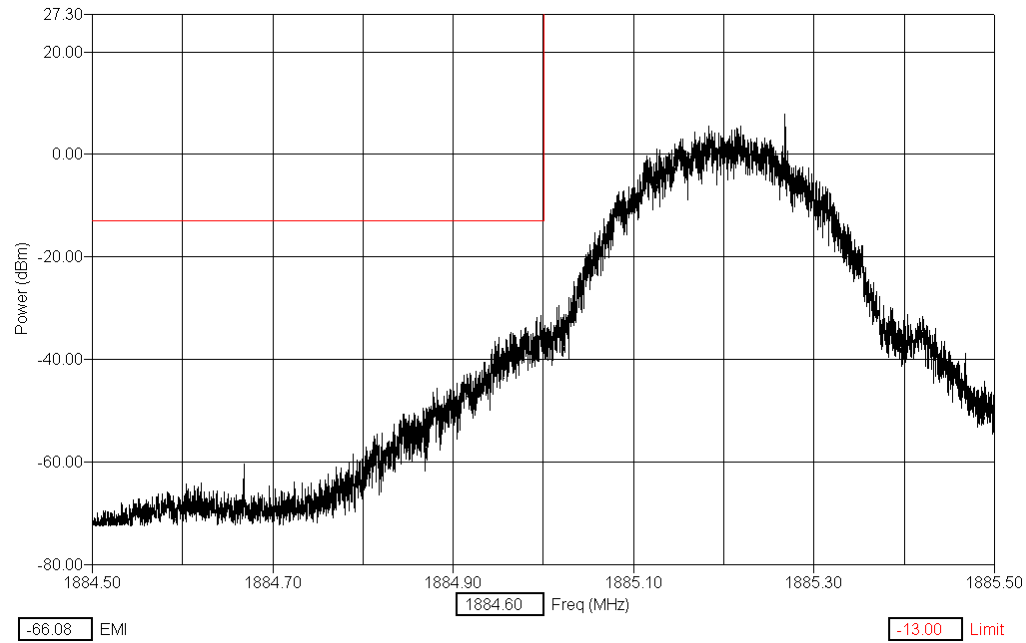
FCC ID: GMLNPB-1NB

Test Report #: 03-EM-0101.001

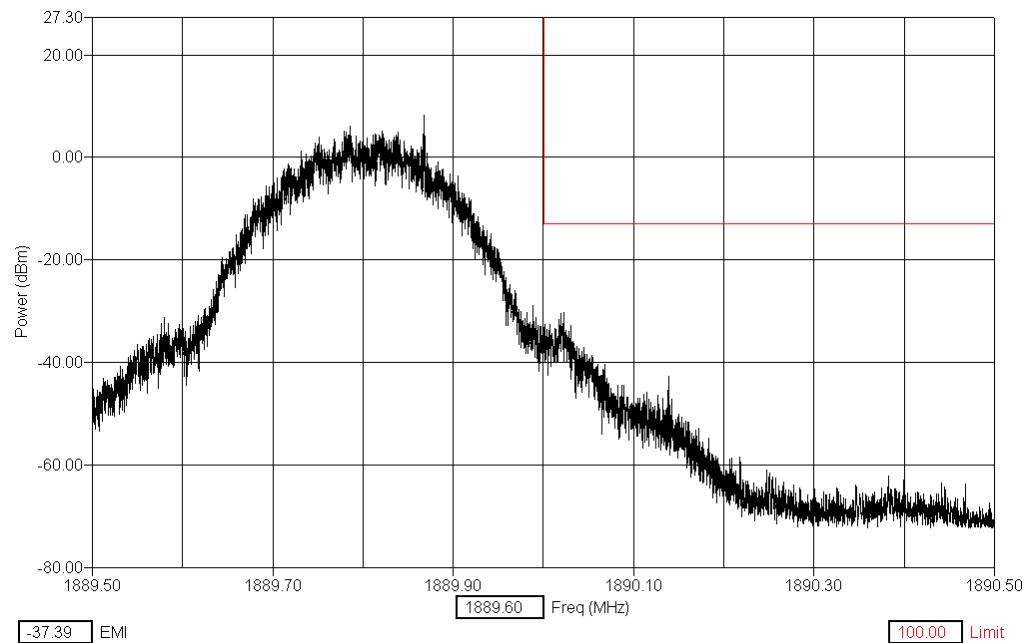
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PCS GSM1900 Block E Lower Edge Channel 687



PCS GSM1900 Block E Upper Edge Channel 710



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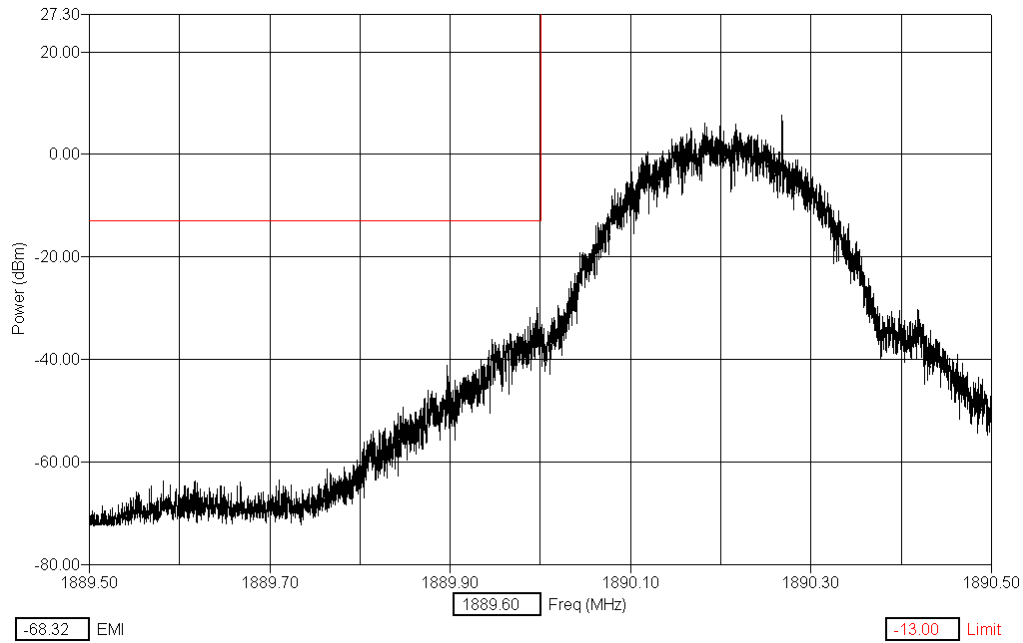
FCC ID: GMLNPB-1NB

Test Report #: 03-EM-0101.001

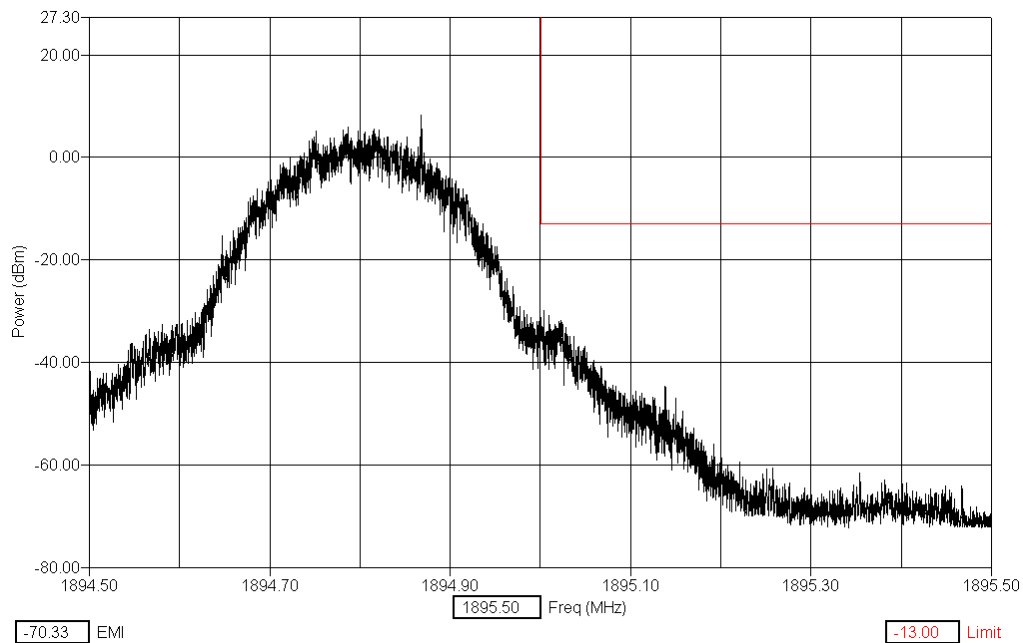
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PCS GSM1900 Block F Lower Edge Channel 712



PCS GSM1900 Block F Upper Edge Channel 735



Test & Certification Center (TCC) - Dallas

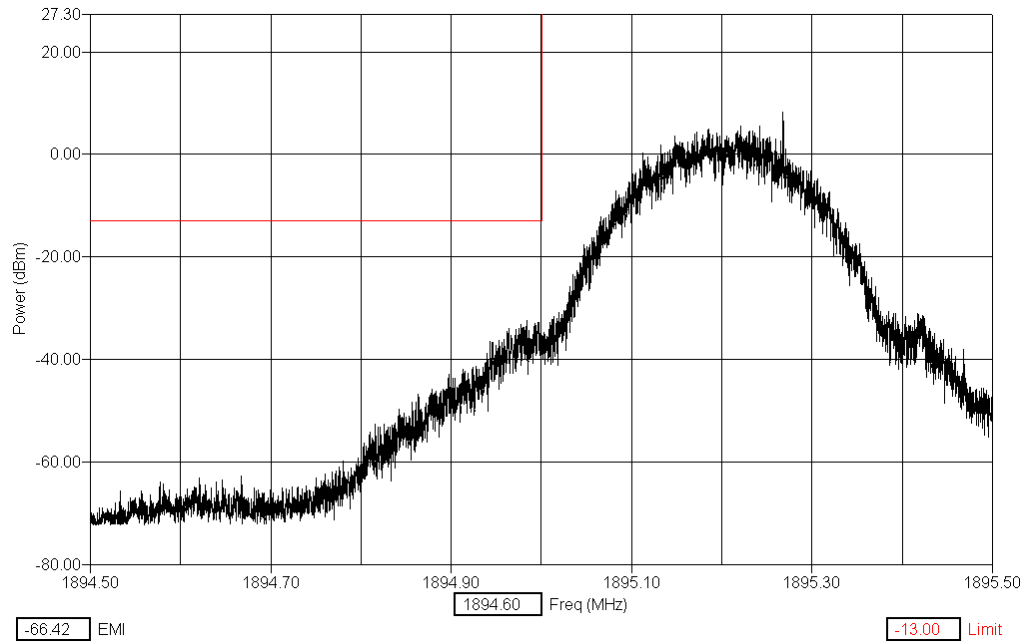
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Test Report #: 03-EM-0101.001

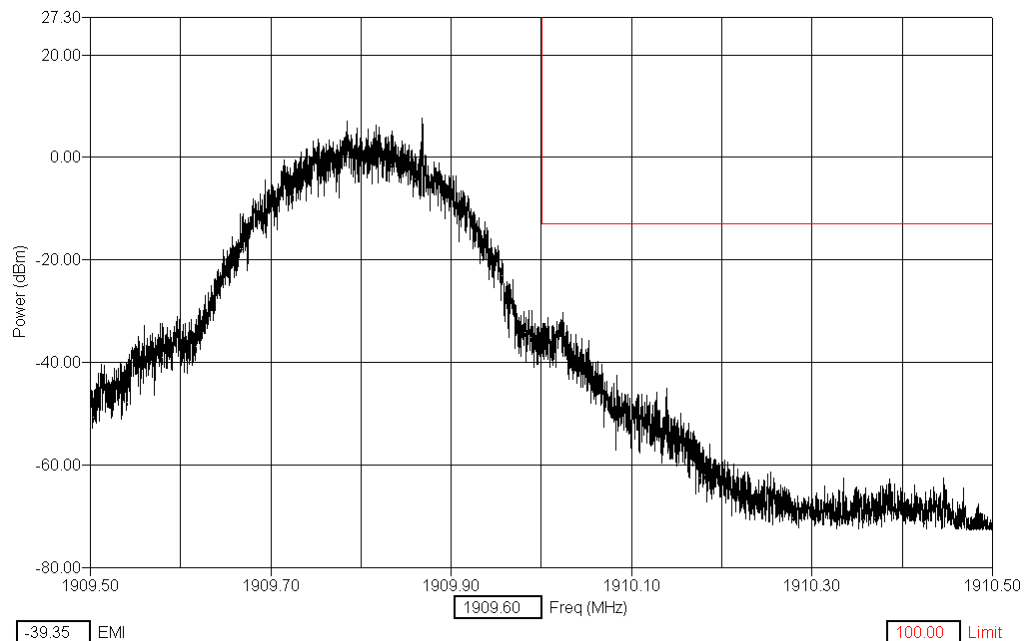
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PCS GSM1900 Block C Lower Edge Channel 737



PCS GSM1900 Block C Upper Edge Channel 810



7.5 Measurement Uncertainty

The measurement uncertainty for this test is +/- 3.7dB for 100kHz - 1000MHz and +/- 5.3dB for 1 - 20GHz.

8. SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Specification: FCC Part 2.1051

8.1 Setup

Testing was performed with the EUT connected to a 6dB attenuator, 6dB splitter, filter bank and then to the EMI receiver. The base station simulator was connected to the other port of the splitter to establish a call. Filters were introduced to reduce or eliminate spurious emission, which could be generated internally in the EMI receiver.

8.2 Pass/Fail Criteria

Band	Frequency Range (MHz)	FCC Limits (dBm)
Cellular / PCS	30 – 20000 *	-13

- Frequency to be investigated up to the 10th harmonic of the highest clock or frequency used.

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8.3 Detailed Test Results

Test Technician / Engineer	Mark Severson	
Date of Measurement	27 March 2003	
Temperature / Humidity	23°C	45%RH
Test Result	Complies with FCC part 2.1051	

EMI (dBm) = trace (dBuV) + cable loss (dB) + filter loss (dB).

PCS Band, GSM 1900 MHz, Channel 661

Freq (Max) (MHz)	(PK) Trace (dBm)	Cable (dB)	Filter (dB)	(PK) EMI (dBm)	FCC Limit (dBm)
3761.07	-46.82	1.57	3.33	-41.91	-13.00
5640.45	-44.19	1.93	3.71	-38.55	-13.00
7521.74	-42.55	2.08	4.19	-36.27	-13.00
9400.91	-44.00	2.82	4.66	-36.52	-13.00
11282.89	-44.37	3.20	5.30	-35.86	-13.00
13161.20	-43.68	3.25	5.95	-34.48	-13.00
15038.55	-41.37	3.25	6.52	-31.60	-13.00
16918.70	-43.73	3.49	7.49	-32.75	-13.00
18797.88	-43.81	4.16	8.40	-31.24	-13.00

8.4 Measurement Uncertainty

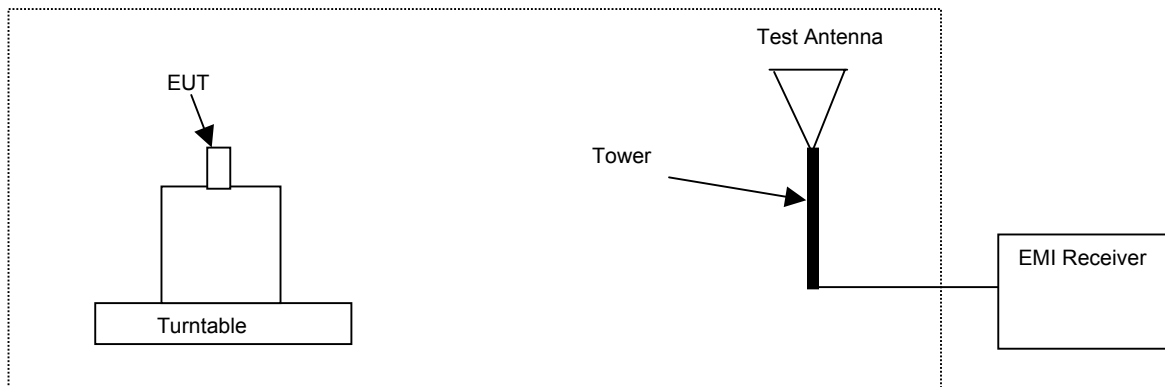
The measurement uncertainty for this test is +/- 3.7dB for 100kHz - 1000MHz and +/- 5.3dB for 1 - 20GHz.

9. FIELD STRENGTH OF SPURIOUS RADIATION

Specification: FCC Part 2.1053

9.1 Setup

Test equipment set-up.



9.2 Pass/Fail Criteria

Band	Frequency Range (MHz)	FCC Limit (dBm)
Cellular / PCS	30 – 20000*	-13

- Frequency to be investigated up to the 10th harmonic of the highest clock or frequency used.

Substitution method according to ANSI/TIA/EIA 603-1 was used for final measurements.

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9.3 Detailed Test Results

Test Technician / Engineer	Michael Sundstrom	
Date of Measurement	26 – 27 March, 2003	
Temperature / Humidity	23-26°C	36-43%RH
Test Result	Complies with FCC Part 2.1053	

PCS Band, GSM 1900 MHz, Channel 661

Tuned Frequency (MHz)	Frequency Max (MHz)	(PK) EMI (dBm)	dBc	FCC Limit (dBm)	Polarity
1880.0	3760.00	-28.52	-57.32	-13	H
1880.0	3760.00	-29	-57.80	-13	V
1880.0	5640.00	-23.38	-52.18	-13	H
1880.0	5640.00	-24.53	-53.33	-13	V
1880.0	7520.00	-36.58	-65.38	-13	H
1880.0	7520.00	-38.55	-67.35	-13	V
1880.0	9400.00	-36.62	-65.42	-13	H
1880.0	9400.00	-36.62	-65.42	-13	V
1880.0	11280.00	-34	-62.80	-13	H
1880.0	11280.00	-35.01	-63.81	-13	V
1880.0	13160.00	-30.98	-59.78	-13	H
1880.0	13160.00	-29.66	-58.46	-13	V
1880.0	15040.00	-29.04	-57.84	-13	H
1880.0	15040.00	-29.25	-58.05	-13	V
1880.0	16920.00	-28.21	-57.01	-13	H
1880.0	16920.00	-28.01	-56.81	-13	V
1880.0	18800.00	-22.73	-51.53	-13	H
1880.0	18800.00	-21.64	-50.44	-13	V

9.4 Measurement Uncertainty

The measurement uncertainty for this test is +/- 5.2dB for 30-300MHz; +/- 5.2dB for 300-1000MHz, +/- 5.6dB for 1-6GHz and +/-6.8 for 6-18GHz.

Test & Certification Center (TCC) - Dallas

FCC ID: GMLNPB-1NB

Test Report #: 03-EM-0101.001

September 08, 2003

Ver 1.0

10. FREQUENCY STABILITY (TEMPERATURE VARIATION)

Specification: FCC Part 2.1055(a)(1)(b), 24.235

10.1 Setup

The EUT was connected to the base station simulator to measure the RF power output.

10.2 Pass/Fail Criteria

Not Applicable

10.3 Detailed Test Results

Test Technician / Engineer	Mark Severson	
Date of Measurement	30 March 2003	
Temperature / Humidity	23°C	43%RH
Test Result	At max power setting, was tested in accordance with FCC Part 2.1055(a)(1)(b), 24.235	

GSM 1900 MHz, Call Mode, Channel 661, Frequency 1880.00 MHz

Temp. (°C)	Change (Hz)
-30	31
-20	35
-10	29
0	26
10	-14
20	22
30	23
40	47
50	26

Test & Certification Center (TCC) - Dallas
FCC ID: GMLNPB-1NB
Test Report #: 03-EM-0101.001
September 08, 2003

Ver 1.0

11. FREQUENCY STABILITY (VOLTAGE VARIATION)

Specification: FCC Part 2.1055(d)(1)(2), 24.235

11.1 Setup

The EUT was connected to the base station simulator to measure the RF power output.

11.2 Pass/Fail Criteria

Not Applicable

11.3 Detailed Test Results

Test Technician / Engineer	Mark Severson	
Date of Measurement	30 March 2003	
Temperature / Humidity	23°C	23°C
Test Result	At max power setting, was tested in accordance with 2.1055(d)(1)(2), 24.235	

GSM 1900 MHz, Call Mode, Channel 660, Frequency 1880.00 MHz

% of STV	Voltage	Change (Hz)
BEP	3.17	-73
85%	3.23	-21
Nom.	3.8	46
115%	4.37	36

Test & Certification Center (TCC) - Dallas

FCC ID: GMLNPM-8X
Test Report #: 02-RF-0192
27-Feb-03

Ver 1.0

APPENDIX

TCC-Dallas is accredited by the American Association for Laboratory Accreditation (A2LA) as shown in the scope below:



Test & Certification Center (TCC) - Dallas

FCC ID: GMLNPM-8X
Test Report #: 02-RF-0192
27-Feb-03

Ver 1.0

American Association for Laboratory Accreditation

SCOPE OF ACCREDITATION TO ISO/IEC 17025:1999

NOKIA MOBILE PHONES
TEST & CERTIFICATION CENTER - DALLAS
6021 Connection Drive
Irving, TX 75039
Alan Ewing Phone: 972 894 4744

ELECTRICAL

Valid to: November 30, 2003

Certificate Number: 1819-01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following Electromagnetic Compatibility (EMC), Specific Absorption Rate (SAR), and tests on wireless communications devices:

Tests	Test Method
<i>Emissions</i>	
Conducted and Radiated	CFR 47 Part 2, 15, 22, 24 CISPR 22; EN 55022 ICES-003; RSS-128, 132 and 133 3GPP TS 51.010-1 Section 12.2 ETSI EN 301 489-1; EN 301 489-7 (using ANSI C63.4 and RSS-212)
Specific Absorption Rate	IEEE 1528 EN 50360; EN 50361 CFR 47 Parts 2 and 24 OET Bulletin 65 and Supplement C RSS-102
<i>Immunity</i>	
Vehicular Immunity	ISO 7637-1; ETSI EN 301 489-1; EN 301 489-7
Electrostatic Discharge (ESD)	EN 61000-4-2; ETSI EN 301 489-1; EN 301 489-7
RF Radiated	EN 61000-4-3; ETSI EN 301 489-1; EN 301 489-7
Electrical Fast Transient/Burst	EN 61000-4-4; ETSI EN 301 489-1; EN 301 489-7
Surge	EN 61000-4-5; ETSI EN 301 489-1; EN 301 489-7
Conducted	EN 61000-4-6; ETSI EN 301 489-1; EN 301 489-7
Voltage Dips, Short Interruptions and Voltage Variations	EN 61000-4-11; ETSI EN 301 489-1; EN 301 489-7

(A2LA Cert. No. 1819.01) Revised 09/18/02

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5301 Buckeystown Pike, Suite 350 • Frederick, MD 21704-8373 • Phone: 301-644 3248 • Fax: 301-662 2974

Tests

Wireless

GSM (850/900/1800/1900 MHz)

TDMA

Test Method

3GPP TS 51.010-1, -2, -3

3GPP TS 11.10-4

PTCRB NAPRD.03

CTIA TDMA/AMPS Test Plan (excluding Sections 7.3.3 & 7.3.4)

TI/EIA-136-270

(A2LA Cert. No. 1819.01) Revised 09/18/02

Page 2 of 2

"This laboratory is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this report have been determined to be 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, such data would not be covered by this laboratory's A2LA accreditation.