

Test & Certification Center (TCC) - Dallas

FCC ID: LJPNC-1X
Test Report #: 03-EM-0144.001
15 July 2003

Accredited Laboratory
Certificate Number: 1819-01

Ver 1.0

CFR 47 Part 2, 22, and 24 Test Report

Test Report Number: 03-EM-0144.001

Terminal device:

FCC ID: LJPNC-1X, Model: 1220, Type: NKC-1X, HW: 1116f, SW: 6.00
(Detailed information is listed in section 4).

Originator: Jesse Torres
Function: TCC - Dallas - EMC
Version/Status: 1.0 Approved
Location: TCC Directories
Date: 02 July 2003

Change History:

Version	Date	Status	Handled By	Comments
0.1	27 June 2003	Draft	Jesse Torres	Draft
0.2	02 July 2003	Reviewed	M.Mobley	Reviewed
1.0		Approved	Alan Ewing	Approved

Testing laboratory:

Test & Certification Center (TCC) Dallas
Nokia Mobile Phones, Inc
6021 Connection Drive
Irving, Texas 75039
U.S.A.
Tel. 972-894-5000

Client:

Nokia Corporation
Nokia Mobile Phones
Model 1220, FCC ID: LJPNC-1X
Elektroniikkatie 10
FIN-90570 OULU
FINLAND
Tel. 011 358 7180 08000
Fax 011 358 7180 47861

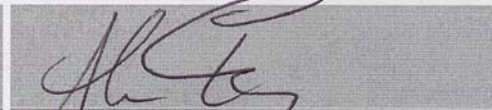
Date and signatures:

02 July 2003

For the contents:



Nerina Walton, EMC Engineer
Technical Review



Alan C. Ewing, General Manager
Manager Review

TABLE OF CONTENTS

1. GENERAL.....	4
1.1 QUALITY SYSTEM	4
1.2 LIST OF GENERAL INFORMATION REQUIRED FOR CERTIFICATION	4
1.3 OBJECTIVE.....	7
1.4 TEST SUMMARY	7
2. STANDARDS BASIS	8
3. LIST OF ABBREVIATIONS, ACRONYMS AND TERMS.....	9
3.1 ABBREVIATIONS	9
3.2 ACRONYMS	9
3.3 TERMS.....	9
4. EQUIPMENT-UNDER-TEST (EUT)	10
4.1 DESCRIPTION OF TESTED DEVICE(S):	10
4.2 PHOTOGRAPH OF TESTED DEVICE(S):	10
5. TEST EQUIPMENT LIST.....	11
6. RF POWER OUTPUT (RADIATED).....	12
6.1 SETUP	12
6.2 PASS/FAIL CRITERIA.....	12
6.3 DETAILED TEST RESULTS	12
6.4 MEASUREMENT UNCERTAINTY	12
7. OCCUPIED BANDWIDTH (TRANSMITTER CONDUCTED MEASUREMENTS)	13
7.1 SETUP	13
7.2 PASS/FAIL CRITERIA.....	13
7.3 DETAILED TEST RESULTS	13
7.4 MEASUREMENT UNCERTAINTY	13
8. SPURIOUS EMISSIONS AT ANTENNA TERMINALS	14
8.1 SETUP	14
8.2 PASS/FAIL CRITERIA.....	14
8.3 DETAILED TEST RESULTS	14
8.4 MEASUREMENT UNCERTAINTY	14
9. FIELD STRENGTH OF SPURIOUS RADIATION.....	15
9.1 SETUP	15
9.2 PASS/FAIL CRITERIA.....	15
9.3 DETAILED TEST RESULTS	16
9.4 MEASUREMENT UNCERTAINTY	17
10. FREQUENCY STABILITY (TEMPERATURE VARIATION).....	18
10.1 SETUP	18
10.2 PASS/FAIL CRITERIA.....	18
10.3 DETAILED TEST RESULTS	18
11. FREQUENCY STABILITY (VOLTAGE VARIATION).....	19
11.1 SETUP	19

Test & Certification Center (TCC) - Dallas

FCC ID: LJPNKC-1X

Test Report #: 03-RF-0144.001

15 July 2003

Ver 1.0

11.2	PASS/FAIL CRITERIA.....	19
11.3	DETAILED TEST RESULTS	19
APPENDIX.....		20

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Test & Certification Center (TCC) - Dallas

FCC ID: LJPNKC-1X

Test Report #: 03-RF-0144.001

15 July 2003

Ver 1.0

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 Corporation
Nokia Mobile Phones
Elektroniikkatie 10
FIN-90570 OULU
FINLAND

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

Nokia TMC Ltd
973-6 Yangduck-Dong
Hwe won-ku, Masan
Korea

1.2.2 Sub-part 2.1033(c)(2)

FCC ID: LJPNKC-1X

Model No: 1220

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: 40K0F1D, 40K0F8W

Test & Certification Center (TCC) - Dallas

FCC ID: LJPNKC-1X

Test Report #: 03-RF-0144.001

15 July 2003

Ver 1.0

1.2.5 Sub-part 2.1033(c)(5)

Frequency Range, MHz: 824.2 to 848.8

1.2.6 Sub-part 2.1033(c)(6)

Power Rating, Watts: 0.257 ERDP AMPS
0.891 ERDP Cellular Band - TDMA

☐ 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.

Test & Certification Center (TCC) - Dallas

FCC ID: LJPNC-1X

Test Report #: 03-RF-0144.001

15 July 2003

Ver 1.0

1.2.7 Sub-part 2.1033(c)(7)

Maximum Power Rating, Watts: 0.9

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 = per manual

Collector Voltage, Vdc = per manual

Supply Voltage, Vdc = 3.8

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

Test & Certification Center (TCC) - Dallas

FCC ID: LJPNKC-1X

Test Report #: 03-RF-0144.001

15 July 2003

Ver 1.0

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 22.913(a) / 24.232(b)	6	Not Tested
Occupied Bandwidth: Transmitter Conducted Measurements	FCC Part 2.1049(c)(1), 24.238(a)(b)	7	Not Tested
Spurious Emissions at Antenna Terminals	FCC Part 2.1051	8	Not Tested
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	Not Tested
Frequency Stability (Voltage Variation)	FCC Part 2.1055(d)(1)(2), 24.235	11	Not Tested

Test & Certification Center (TCC) - Dallas

FCC ID: LJPNC-1X

Test Report #: 03-RF-0144.001

15 July 2003

Ver 1.0

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	RSS-132	800 MHz Cellular Telephones Employing New Technologies
6	RSS-133	2 GHz Personal Communications Services, Industry Canada
7	RSS-212	Test Facilities and Test Methods for Radio Equipment, Industry Canada (Provisional)
8	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

ERP - Effective Radiated Power

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.

Test & Certification Center (TCC) - Dallas

FCC ID: LJPNKC-1X

Test Report #: 03-RF-0144.001

15 July 2003

Ver 1.0

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, 22.913(a), 24.232(b)(c)	AMPS TDMA 800/1900	23-June-2003	Good	Phone	FCC ID: LJPNKC-1X Type: NKC-1X HW: 1116f SW: 6.00 ESN: 07202006351
2.1049(c)(1), 2.1051, 2.1055(d)(1)(2), 2.1055(a)(1)(b), 22.917, 24.235, 24.238(a)(b)	N/A	N/A	N/A	N/A	Not Tested
2.1049(c)(1), 2.1051, 2.1053, 2.1055(d)(1)(2), 2.1055(a)(1)(b), 22.913(a), 22.917, 24.232(b)(c), 24.235, 24.238(a)(b)	N/A	N/A	N/A	N/A	Not Tested

4.2 Photograph of Tested Device(s):

Refer to attached EXHIBITS

Test & Certification Center (TCC) - Dallas
 FCC ID: LJPNC-1X
 Test Report #: 03-RF-0144.001
 15 July 2003

Ver 1.0

5. TEST EQUIPMENT LIST

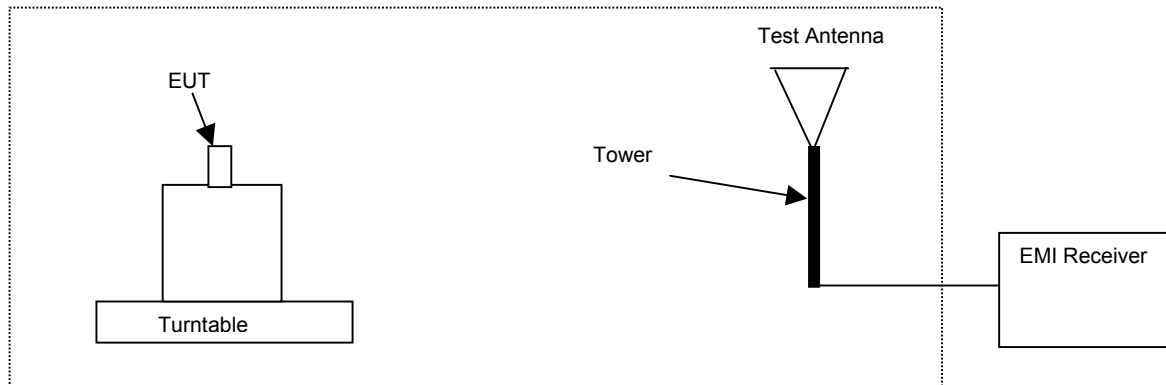
The listing below indicates the test equipment utilized for the test (s). Calibration interval on all items listed can be obtained from the Engineering Services Group within NMP, Product Creation - Dallas. Where relevant, measuring equipment is subjected to in-service checks between testing. TCC - Dallas 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, 7, 8, 9, 10, 11	N/A	3GHz High Pass Filter	Trilithic Inc.	4HC2900/18000-1.1-KK
6, 7, 8, 9, 10, 11	N/A	2GHz High Pass Filter	Trilithic Inc.	3HC1900/18000-1-KK
6, 7, 8, 9, 10, 11	N/A	1GHz High Pass Filter	Wainwright.	WHK949-9SS
7, 8	N/A	Power Splitter (must have 6 dB insertion loss)	HP	N/A
7, 8	N/A	EMI Receiver	Agilent	N/A
7, 8	N/A	6dB Attenuator	Weinshcel	N/A
7, 8	N/A	Spectrum Analyzer	Agilent	N/A
6, 9	02868	Biconilog Antenna	ETS	3142B
6, 9	00367/ 00368	EMI Receiver	Agilent	8546A / 85460A
6, 9	02858	Horn Antenna	EMCO	3115
6, 9	00065	Horn Antenna	EMCO	3115
6, 9	02846	Turntable and Tower Controller	Sunol	Turntable FM2022, Controller 2846
6, 9	02679	Spectrum Analyzer	Agilent	E7405A
6, 9	02671	Signal Generator	Agilent	83630B
10	N/A	Temperature Chamber	Tenney Environmental	
9	00001	RF preamplifier	Agilent	HP8449B
9	02996	Power Meter	Boonton	4232A

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 Not Performed

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

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

7.3 Detailed Test Results

Test Not Performed

7.4 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.

8.3 Detailed Test Results

Test Not Performed

8.4 Measurement Uncertainty

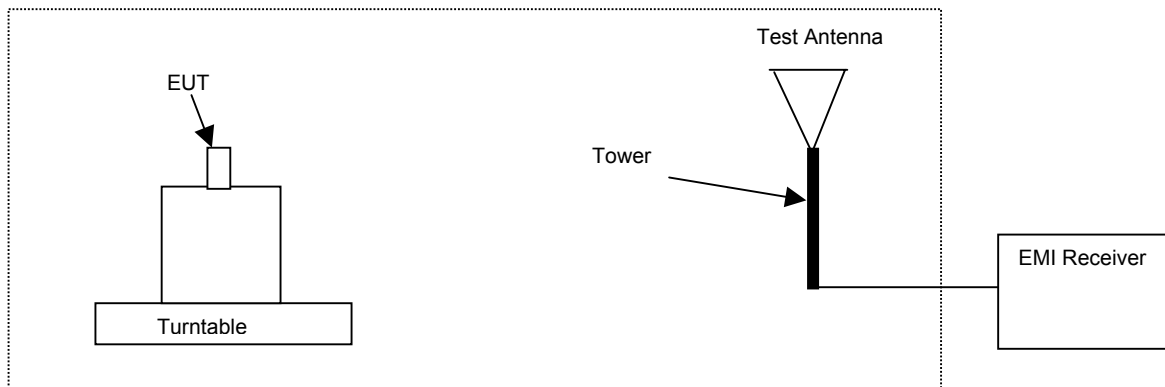
The measurement uncertainty for this test is +/- 3.7dB for 100kHz - 1000MHz and +/- 5.3dB for 1 - 20GHz.

9. FIELD STRENGTH OF SPURIOUS RADIATION

Specification: FCC Part 2.1053

9.1 Setup

Test equipment set-up.

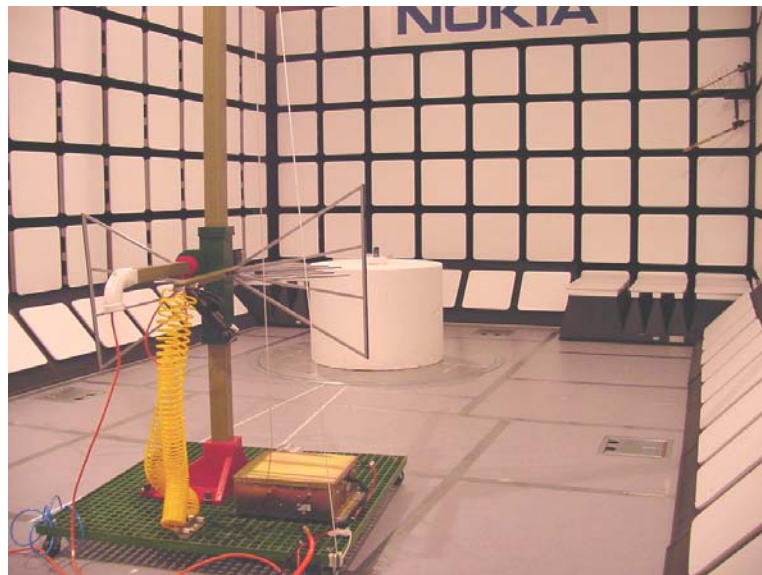


9.2 Pass/Fail Criteria

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.



Test & Certification Center (TCC) - Dallas
FCC ID: LJPNKC-1X
Test Report #: 03-RF-0144.001
15 July 2003

Ver 1.0

9.3 Detailed Test Results

Test Technician / Engineer	Jesse Torres	
Date of Measurement	27-Jun-03	
Temperature / Humidity	23 to 24 °C	36 to 44 %RH
Test Result	Complies with FCC Part 2.1053	

Cellular Band, AMPS 836.52 MHz, Channel 384

Tuned Frequency (MHz)	Frequency Max (MHz)	(PK) EDRP (dBm) Horizontal	(PK) EDRP (dBm) Vertical	FCC Limit (dBm)
836.52	* 1673.04	-45.17	-43.70	-13
836.52	* 2509.56	-28.48	-23.57	-13
836.52	3346.08	-29.92	-28.20	-13
836.52	4182.60	-28.26	-28.21	-13
836.52	5019.12	-25.88	-25.71	-13
836.52	5855.64	-22.45	-23.17	-13
836.52	6692.16	-23.16	-22.64	-13
836.52	7528.68	-23.16	-22.64	-13
836.52	8365.20	-23.16	-22.64	-13

* Substitution method used

Test & Certification Center (TCC) - Dallas
FCC ID: LJPNKC-1X
Test Report #: 03-RF-0144.001
15 July 2003

Ver 1.0

Cellular Band, TDMA 800, Channel 384

Tuned Frequency (MHz)	Frequency Max (MHz)	(PK) EDRP (dBm) Horizontal	(PK) EDRP (dBm) Vertical	FCC Limit (dBm)
836.52	* 1673.04	-41.72	-37.78	-13
836.52	* 2509.56	-26.86	-24.48	-13
836.52	3346.08	-30.87	-32.21	-13
836.52	4182.60	-28.28	-27.52	-13
836.52	5019.12	-25.67	-24.93	-13
836.52	5855.64	-23.54	-22.78	-13
836.52	6692.16	-41.47	-43.76	-13
836.52	7528.68	-41.23	-40.96	-13
836.52	8365.20	-39.89	-39.07	-13

*Substitution method used

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: LJPNC-1X

Test Report #: 03-RF-0144.001

15 July 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 Not Performed

Test & Certification Center (TCC) - Dallas

FCC ID: LJPNC-1X

Test Report #: 03-RF-0144.001

15 July 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 Not Performed

Test & Certification Center (TCC) - Dallas

FCC ID: LJPNKC-1X

Test Report #: 03-RF-0144.001

15 July 2003

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: LJPNC-1X

Test Report #: 03-RF-0144.001

15 July 2003

Ver 1.0

 American Association for Laboratory Accreditation		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) TTA/EIA-136-270
SCOPE OF ACCREDITATION TO ISO/IEC 17025-1:1999 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		
Emissions			
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		
Immunity			
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

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



Page 1 of 2



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.