# CFR 47 Part 2, 22, and 24 Test Report

## Test Report Number: WR901.001a

**Terminal device:** FCC ID: QMNRM-124 Model: 2855i Type: RM-124 HW: 2001 SW: VR100_05wk21_18.nep (Detailed information is listed in section 4).

| | |
|---|---|
| Originator: | Cindy Trinh |
| Function: | TCC - Dallas – EMC |
| Version/Status: | 1.0 Approved |
| Location: | TCC Directories |
| Date: | October 21, 2005 |

**Change History:**

| *Version* | *Date* | *Status* | *Handled By* | *Comments* |
|---|---|---|---|---|
| 0.1 | 18-Oct-05 | Draft | Cindy Trinh | |
| 0.2 | 18-Oct-05 | Proposal | Cindy Trinh | |
| 0.3 | 21-Oct-05 | Reviewed | Mark Severson | |
| 1.0 | 21-Oct-05 | Approved | Mark Severson | |

**Testing laboratory:**
Test & Certification Center (TCC) Dallas
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U.S.A.

Tel. 972-894-5000

**Client:**
Nokia Inc.
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CA 92131
USA
Tel. +1858 831 5000
Fax. +1 858 831 6500

**Date and signatures:** **October 21, 2005**

For the contents:

| Cindy Trinh | Mark Severson |
|---|---|
| **Test Operator** | **Technical 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). 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 661N.

### 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 Inc.
San Diego
12278 Scripps Summit Dr.
San Diego
CA 92131
USA
Tel. +1858 831 5000
Fax. +1 858 831 6500

Manufacturer:

Nokia Inc.
San Diego
12278 Scripps Summit Dr.
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CA 92131
USA
Tel. +1858 831 5000
Fax. +1 858 831 6500

1.2.2 Sub-part 2.1033(c)(2)

FCC ID: QMNRM-124

Model No: 2855i

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: 40K0F8W / 40K0F1D / 1M25F9W

1.2.5 Sub-part 2.1033(c)(5)

Frequency Range, MHz: 824.04MHz – 848.97MHz

1851.25MHz – 1908.75MHz

1.2.6 Sub-part 2.1033(c)(6)

Power Rating, Watts: 0.207 W AMPS
0.167 W CDMA Cellular
0.235 W CDMA 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: 0.235W

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 = 0.64
Collector Voltage, Vdc = 3.7
Supply Voltage, Vdc = 3.7

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

### 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),2.1046,2.1053, 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 / Not Tested |
|---|---|---|---|
| RF Power Output (Radiated) | FCC Part 22.913(a) / 24.232(b) | 6 | Complies |
| Field Strength of Spurious Radiation | FCC Part 2.1053 | 7 | 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 | RSS-128 | 800 MHz Dual-Mode TDMA Cellular Telephones |
| 6 | RSS-129 | 800 MHz Dual-Mode CDMA Cellular Telephones |
| 7 | RSS-132 | 800 MHz Cellular Telephones Employing New Technologies |
| 8 | RSS-133 | 2 GHz Personal Communications Services, Industry Canada |
| 9 | RSS-212 | Test Facilities and Test Methods for Radio Equipment, Industry Canada (Provisional) |
| 10 | 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

dBc - decibels from carrier

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.

## 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 |
|---|---|---|---|---|---|
| FCC Part 22.913(a) / 24.232(b) FCC Part 2.1053 | AMPS, CDMA 800/1900 | 18-Oct-05 | Functional | Phone | FCC ID: QMNRM-124<br>Type: RM-124<br>HW: 2001<br>SW: VR100_05wk21_18.nep<br>ESN: 03306001520 |
| FCC Part 22.913(a) / 24.232(b) FCC Part 2.1053 | AMPS, CDMA 800/1900 | N/A | N/A | Battery | Type: BL-6C<br>Other: 3.7 Vdc |
| FCC Part 22.913(a) / 24.232(b) FCC Part 2.1053 | AMPS, CDMA 800/1900 | N/A | N/A | Headset | Type: HS-9 |
| FCC Part 22.913(a) / 24.232(b) FCC Part 2.1053 | AMPS, CDMA 800/1900 | N/A | N/A | Charger | Type: AC-3U |

### 4.2 Photograph of Tested Device(s):

See Exhibits

## 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.

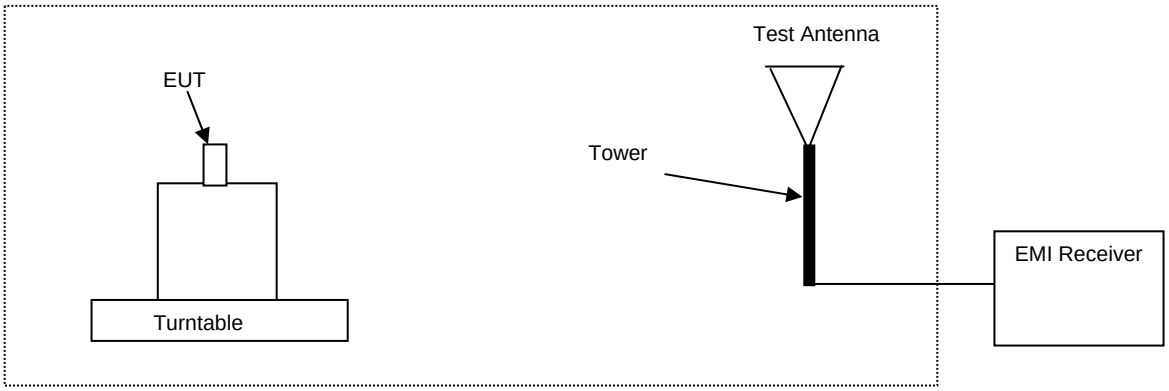
| Section of Report | NMP# | Test Equipment | Mfr. # | Model # | Calibration Due Date | Calibration Interval |
|---|---|---|---|---|---|---|
| 6,7 | 02661 | EMI Receiver | Agilent | 8546A / 85460A | 03-Jun-06 | 12 months |
| 6,7 | 02601 | Base Station | R&D | CMU-200 | 26-Nov-05 | 12 months |
| 6,7 | 02679 | Spectrum Analyzer | Agilent | E7405A | 01-Jun-06 | 12 months |
| 6,7 | 01472 | Biconilog Antenna | ETS | 3142B | 16-May-06 | 12 months |
| 6,7 | 00064 | Horn Antenna | EMCO | 3115 | 27-Apr-06 | 12 months |
| 6,7 | 03960 | Horn Antenna | EMCO | 3116 | 06-May-06 | 12 months |
| 6,7 | 02836 | Turntable and Tower Controller | Sunol | FM2022 & 2846 | N/A | NCR |

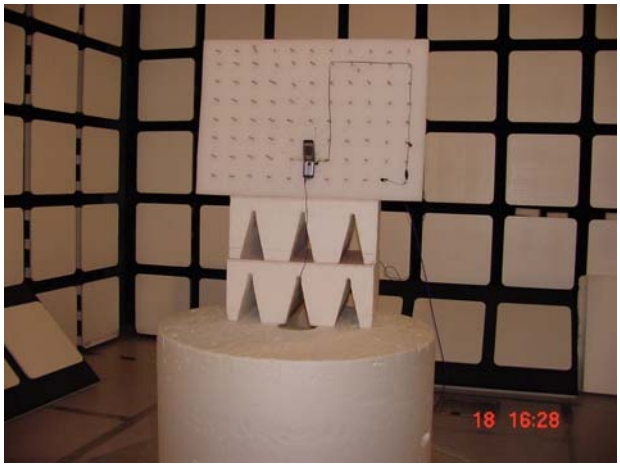
## 6. RF POWER OUTPUT (RADIATED)

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

### 6.1 Setup

ERP values are calculated using the substitution method in accordance with TIA 603. The phone is set to transmit maximum power and the maximum measured level is recorded. A signal generator is then used to drive a substitute transmit antenna until the equivalent level is measured. The power into the transmit antenna is then measured.




### 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** | Cindy Trinh |
| **Date of Measurement** | 18-Oct-05 |
| **Temperature** | 23 to 24 °C |
| **Humidity** | 42 to 46 %RH |
| **Test Result** | Complies with FCC Part 22.913(a) and FCC Part 24.232(b) |

Note: measurements were performed with RBW=1 MHz and VBW=3 MHz

**AMPS**

| Freq (MHz) | EDRP (dBm) | Ttbl Agl (deg) | Twr Ht (cm) | Pol |
|---|---|---|---|---|
| 824.04 | 21.87 | 31.00 | 149.00 | V |
| 836.52 | 22.73 | 31.00 | 150.00 | V |
| 848.97 | 22.78 | 31.00 | 149.00 | V |

| Freq (MHz) | EDRP (dBm) | Ttbl Agl (deg) | Twr Ht (cm) | Pol |
|---|---|---|---|---|
| 824.04 | 23.16 | 179.00 | 150.00 | H |
| 836.52 | 22.61 | 0.00 | 149.00 | H |
| 848.97 | 21.97 | 0.00 | 150.00 | H |

**CDMA 800**

| Freq (MHz) | EDRP (dBm) | Ttbl Agl (deg) | Twr Ht (cm) | Pol |
|---|---|---|---|---|
| 824.70 | 21.36 | 37.00 | 149.00 | V |
| 836.52 | 22.22 | 38.00 | 150.00 | V |
| 848.31 | 22.06 | 32.00 | 150.00 | V |

| Freq (MHz) | EDRP (dBm) | Ttbl Agl (deg) | Twr Ht (cm) | Pol |
|---|---|---|---|---|
| 824.70 | 20.37 | 344.00 | 151.00 | H |
| 836.52 | 20.03 | 347.00 | 150.00 | H |
| 848.31 | 20.25 | 354.00 | 150.00 | H |

**CDMA 1900**

| Freq (MHz) | EIRP (dBm) | Ttbl Agl (deg) | Twr Ht (cm) | Pol |
|---|---|---|---|---|
| 1851.25 | 22.19 | 0.00 | 149.00 | V |
| 1880.00 | 23.71 | 1.00 | 150.00 | V |
| 1908.75 | 22.94 | 4.00 | 150.00 | V |

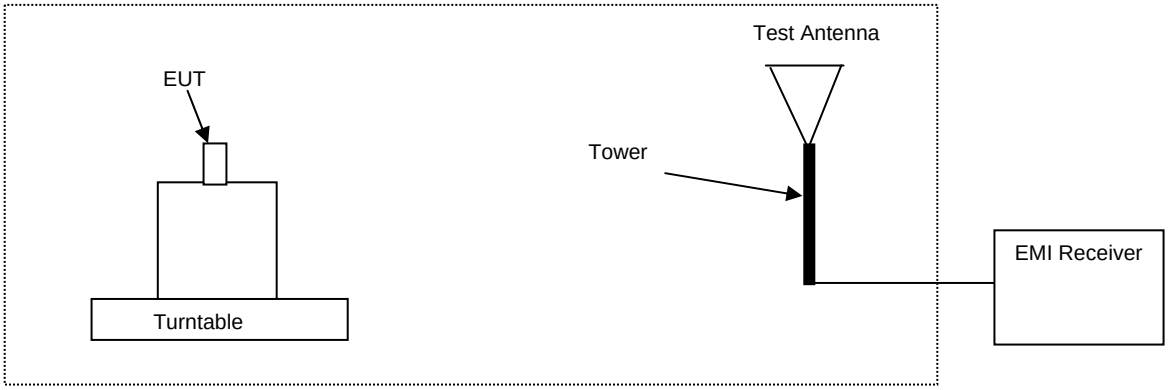
| Freq (MHz) | EIRP (dBm) | Ttbl Agl (deg) | Twr Ht (cm) | Pol |
|---|---|---|---|---|
| 1851.25 | 21.26 | 43.00 | 150.00 | H |
| 1880.00 | 22.34 | 44.00 | 151.00 | H |
| 1908.75 | 22.17 | 42.00 | 150.00 | H |

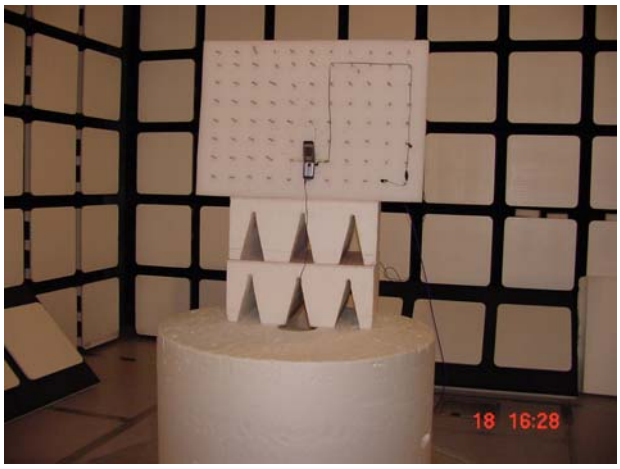
## 7. FIELD STRENGTH OF SPURIOUS RADIATION

***Specification: FCC Part 2.1053***

### 7.1 Setup

Test equipment set-up.




### 7.2 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.

## 7.3 Detailed Test Results

| | |
|---|---|
| **Test Technician / Engineer** | Cindy Trinh |
| **Date of Measurement** | 18-Oct-05 |
| **Temperature** | 23 to 24°C |
| **Humidity** | 44 to 46 %RH |
| **Test Result** | Complies with FCC Part 2.1053 |

Note: 30MHz to 1GHz were performed with 1MHz RBW/VBW; 1GHz to 3GHz were performed with 1MHz RBW/VBW; 3GHz to 6GHz were performed with 3MHz RBW/VBW; 6GHz to 18GHz were performed with 1MHz RBW/VBW.

**AMPS, Channel 384**

**EDRP for Channel 384: 22.7 dBm**

| Freq Max (MHz) | (PK) EMI (dBm) | dBc | FCC Limit (dBm) | Pol. |
|---|---|---|---|---|
| 1673.04 | -32.81 | -55.5 | -13.0 | H |
| 1673.04 | -30.17 | -52.9 | -13.0 | V |
| 2509.56 | -30.44 | -53.1 | -13.0 | H |
| 2509.56 | -29.16 | -51.9 | -13.0 | V |
| 3346.08 | -47.38 | -70.1 | -13.0 | H |
| 3346.08 | -46.11 | -68.8 | -13.0 | V |
| 4182.6 | -49.77 | -72.5 | -13.0 | H |
| 4182.6 | -48.41 | -71.1 | -13.0 | V |
| 5019.12 | -49.14 | -71.8 | -13.0 | H |
| 5019.12 | -52.03 | -74.7 | -13.0 | V |
| 5855.64 | -54.23 | -76.9 | -13.0 | H |
| 5855.64 | -53.93 | -76.6 | -13.0 | V |
| 6692.16 | -55.14 | -77.8 | -13.0 | H |
| 6692.16 | -56.32 | -79.0 | -13.0 | V |
| 7528.68 | -56.31 | -79.0 | -13.0 | H |
| 7528.68 | -55.13 | -77.8 | -13.0 | V |
| 8365.2 | -55.83 | -78.5 | -13.0 | H |
| 8365.2 | -56.32 | -79.0 | -13.0 | V |

**CDMA 800, Channel 384**

**EDRP for Channel 384: 22.2 dBm**

| Freq Max (MHz) | (AVG) EMI (dBm) | dBc | FCC Limit (dBm) | Pol. |
|---|---|---|---|---|
| 1673.04 | -47.43 | -69.7 | -13.0 | H |
| 1673.04 | -42.21 | -64.4 | -13.0 | V |
| 2509.56 | -42.02 | -64.2 | -13.0 | H |
| 2509.56 | -41.99 | -64.2 | -13.0 | V |
| 3346.08 | -55.79 | -78.0 | -13.0 | H |
| 3346.08 | -46.81 | -69.0 | -13.0 | V |
| 4182.6 | -59.75 | -82.0 | -13.0 | H |
| 4182.6 | -59.31 | -81.5 | -13.0 | V |
| 5019.12 | -60.85 | -83.1 | -13.0 | H |
| 5019.12 | -63.32 | -85.5 | -13.0 | V |
| 5855.64 | -64.66 | -86.9 | -13.0 | H |
| 5855.64 | -63.89 | -86.1 | -13.0 | V |
| 6692.16 | -65.56 | -87.8 | -13.0 | H |
| 6692.16 | -65.68 | -87.9 | -13.0 | V |
| 7528.68 | -65.12 | -87.3 | -13.0 | H |
| 7528.68 | -65.33 | -87.6 | -13.0 | V |
| 8365.2 | -63.84 | -86.1 | -13.0 | H |
| 8365.2 | -64.57 | -86.8 | -13.0 | V |

**CDMA 1900, Channel 600**

**EIRP for Channel 600: 23.7 dBm**

| Freq Max (MHz) | (AVG) EMI (dBm) | dBc | FCC Limit (dBm) | Pol. |
|---|---|---|---|---|
| 3760 | -52.61 | -76.3 | -13.0 | H |
| 3760 | -56.20 | -79.9 | -13.0 | V |
| 5640 | -43.41 | -67.1 | -13.0 | H |
| 5640 | -35.21 | -58.9 | -13.0 | V |
| 7520 | -53.22 | -76.9 | -13.0 | H |
| 7520 | -58.09 | -81.8 | -13.0 | V |
| 9400 | -56.50 | -80.2 | -13.0 | H |
| 9400 | -54.64 | -78.4 | -13.0 | V |
| 11280 | -49.92 | -73.6 | -13.0 | H |
| 11280 | -55.66 | -79.4 | -13.0 | V |
| 13160 | -57.05 | -80.8 | -13.0 | H |
| 13160 | -57.60 | -81.3 | -13.0 | V |
| 15040 | -57.71 | -81.4 | -13.0 | H |
| 15040 | -57.69 | -81.4 | -13.0 | V |
| 16920 | -56.60 | -80.3 | -13.0 | H |
| 16920 | -56.54 | -80.3 | -13.0 | V |