

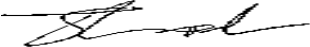
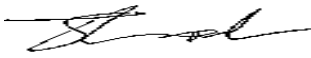


TEST REPORT FROM RADIO FREQUENCY INVESTIGATION LTD.

Test Of: Nokia Corporation.
NHL-4U GSM 1900 Mobile Phone

To: FCC Part 24.232

Test Report Serial No:
RFI/MPTB1/RP43814JD01C

This Test Report Is Issued Under The Authority Of Richard Jacklin, Operations Director: 	Checked By: 
Tested By: 	Release Version No: PDF01
Issue Date: 23 August 2002	Test Dates 25 July 2002

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The results in this report apply only to the sample(s) tested.

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Conformance Testing Department

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1. Client Information

Company Name:	Nokia Corporation
Address:	PO Box 86 FIN-24101 Salo Finland
Contact Name:	Mr I Kojola

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2. Equipment Under Test (EUT)

The following information has been supplied by the client:

2.1. Identification Of Equipment Under Test (EUT)

Brand Name:	Nokia Corporation
Model Name or Number:	7210
Unique Type Identification:	NHL-4U
Serial Number:	004400/10/000052/8
Country of Manufacture:	Finland
FCC ID Number:	None stated by client
Date of Receipt:	25 July 2002

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2.2. Description Of EUT

The equipment under test is a Triple band GSM (900/1800/1900), Colour display, SMS, Integrated Hands-Free Speaker, GPRS, Stereo FM Radio.

2.3. Modifications Incorporated In EUT

The EUT has not been modified from what is described by the Model Number and Unique Type Identification stated above.

2.4. Additional Information Related To Testing

Power Supply Requirement: (non-removable lithium ion battery)	Internal battery supply of 4.1 V
Power Supply Requirement: (AC Battery Charger)	Nominal 115 V / 60 Hz
Intended Operating Environment:	Within GSM Network Coverage
Equipment Category:	Mobile Telephony
Type of Unit:	Mobile Station
Weight:	83g
Dimensions:	106 mm (L) x 44 mm (W) x 17.5 mm (D)
Interface Ports:	System Connector, Charger connector
Transmit Frequency	B, M and T (1850.2, 1880.0 and 1909.8 MHz)
Receive Frequency	B, M and T (1930.2, 1960.0 and 1989.8 MHz)
Maximum Power Output	1 Watt Max
FM-Radio	87 to 108 MHz

2.5. Support Equipment

The following support equipment was used to exercise the EUT during testing:

Description:	Power Supply
Brand Name:	Not stated by client
Model Name or Number:	ACP-12E
Serial Number:	Not stated by client
FCC ID Number:	Not stated by client
Cable Length And Type:	Not stated by client
Connected to Port:	Charging Connector

Description:	Battery
Brand Name:	Not stated by client
Model Name or Number:	BLD-3
Serial Number:	Not stated by client
FCC ID Number:	Not stated by client
Cable Length And Type:	Not stated by client
Connected to Port:	Not stated by client

Description:	Mono Headset
Brand Name:	Not stated by client
Model Name or Number:	HDB-4
Serial Number:	Not stated by client
FCC ID Number:	Not stated by client
Cable Length And Type:	Not stated by client
Connected to Port:	System connector of phone

3. Test Specification, Methods And Procedures

3.1. Test Specification

Reference:	FCC Part 24 2001: Subpart E Sections 24.232
Title:	Code of Federal Regulations, Part 24 (47CFR) Personal Communication Services.
Comments:	A description of the test facility used for this test is on file with, and has been accepted by, the Federal Communications Commission as required by Section 2.948 of Federal Rules.
Purpose of Test:	To determine whether the equipment complied with the requirements of the specification for the purposes of certification.

3.2. Methods And Procedures

The methods and procedures used were as detailed in:

47CFR: Part 24 (2001)

Title: Federal Communications Commission: Code of Federal Regulations 47:
Personal Communication Services.

47CFR: Part 15 (2001)

Title: Federal Communications Commission: Code of Federal Regulations 47:
Telecommunication

47CFR: Part 2 (2001)

Title: Federal Communications Commission: Code of Federal Regulations 47:
Telecommunication

ANSI C63.2 (1996)

Title: American National Standard for Instrumentation - Electromagnetic noise and field strength.

ANSI C63.4 (2001)

Title: American National Standard Methods of Measurement of Electromagnetic Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

ANSI C63.5 (1998)

Title: American National Standard for the Calibration of antennas used for Radiated Emission measurements in Electromagnetic Interference (EMI) control.

ANSI C63.7 (1988)

Title: American National Standard Guide for Construction of Open Area Test Sites for performing Radiated Emission Measurements.

CISPR 16-1 (1999)

Title: Specification for radio disturbance and immunity measuring apparatus and methods. Part 1. Radio disturbance and immunity measuring apparatus.

3.3. Definition Of Measurement Equipment

The measurement equipment used complied with the requirements of the standards referenced in the Methods & Procedures section above. Appendix 1 contains a list of the test equipment used.

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4. Deviations From The Test Specification

None.

5. Operation Of The EUT During Testing

5.1. Operating Conditions

The EUT was tested in a normal laboratory environment.

During testing, the EUT was powered by an internal battery supply of 4.1 Volts DC with an AC 110 Volt mains charger connected.

5.2. Operating Modes

The EUT was tested in the following operating modes:

- Call Mode full power.

5.3. Configuration and Peripherals

The EUT was tested in the following configuration:

Charger + Phone + Headset.

NB Section 2 of this report contains a full list of support equipment used and Appendix 3 contains a schematic diagram of the test configuration.

6. Summary Of Test Results

6.1. Call Mode

Range Of Measurements	Specification Reference	Mode of Operation	Port Type	Compliance Status
Carrier Output Power (EIRP)	Part 24 of CFR 47: 2001, Section 24.232	Transmit	Antenna	Complied

6.2. Location Of Tests

All the measurements described in this report were performed at the premises of Radio Frequency Investigation Ltd, Ewhurst Park, Ramsdell, Basingstoke, Hampshire, RG26 5RQ, England.

7. Measurements, Examinations And Derived Results

7.1. General Comments

7.1.1. This section contains test results only. Details of the test methods and procedures can be found in Appendix 3 of this report.

7.1.2. Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to Section 8 for details of measurement uncertainties.

7.1.3. The term "Call Mode" is used to signify Transmitter active and in normal mode of operation.

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7.2. Carrier Output Power: Call Mode: (EIRP): Section 24.232

7.2.1. Tests were performed to identify the maximum transmit power in accordance with FCC Part 24.232 for EIRP.

7.2.2. Results are shown for the EUT set to Bottom, Middle and Top channels using a fully charged battery. With AC 110 volts mains charger connected. The battery nominally charged voltage is declared at 4.1 Volts:

Results

Channel	Frequency (MHz)	Antenna Polarity (H/V)	Maximum Transmitter EIRP (dBm)	Limit EIRP (dBm)	Margin	Result
Bottom (512)	1850.2	Vert	26.37	33.0	6.63	Complied
Middle (660)	1879.8	Vert	27.80	33.0	5.20	Complied
Top (810)	1909.8	Vert	27.63	33.0	5.37	Complied

8. Measurement Uncertainty

8.1. No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently, the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

8.2. The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

8.3. The uncertainty of the result may need to be taken into account when interpreting the measurement results.

8.4. The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor, such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

Measurement Type	Range	Confidence Level	Calculated Uncertainty
Carrier Output Power (EIRP)	Not applicable	95%	+/- 4.0 dB

8.5. The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty, the published guidance of the appropriate accreditation body is followed.

Appendix 1. Test Equipment Used

Instrument	Manufacturer	Model	RFI No.
Horn Antenna	Eaton	9188-2	A027
Horn Antenna	Eaton	91888-2	A028
3020A	Narda	3020A	A031
Site 2 Controller SC144	Unknown	SC144	A1255
Narda 771-03 Attenuator	Narda	771-03	A262
Coaxial Cable	Rosenburger	UFA210A-1-1181-70X70	A428
Cable	Rosenberger	UFA210A-1-1181-70x70	C225
SMGU Signal Generator	Rohde & Schwarz	SMGU	G011
Generator	Hewlett Packard	83650L	G085
NRV Power Meter	Rohde & Schwarz	NRV	M010
NRV-Z1 Power Sensor	Rohde & Schwarz	NRV-Z1	M011
Fluke 87 Multimeter	Fluke	87	M025
ESMI Spectrum Analyser / Receiver	Rohde & Schwarz	ESMI	M069
GSM Test set	Hewlett Packard	8922M	M1013
DCS Test set	Hewlett Packard	83220E	M1014
Thermo-Hygro	RS Components	RS212-124	M191

NB In accordance with UKAS requirements, all the measurement equipment is on a calibration schedule.

Appendix 2. Measurement Methods

A2.1 FCC Part 24.232: Effective Isotropic Radiated Power (EIRP)

A2.1.1 EIRP measurements were performed in accordance with the standard, against appropriate limits.

A2.1.2 The EIRP was measured with the EUT arranged on a non-conducting table on an open area test site using an antenna height of 1.5 m and a measurement distance of 3 m

A2.1.3 The level of the EIRP was maximised by rotating the table.

A2.1.4 Once the final amplitude (maximised) had been ascertained, the EIRP was measured using a substitution method whereby the EUT was replaced by a broadband horn antenna and a signal generator. The level of the signal generator is increased or decreased until the amplitude indicated on the measurement receiver matches that from the EUT. Once this has been achieved the final EIRP is calculated as being the signal generator output level minus the interconnecting cable loss plus the substitution antenna gain.

A2.1.5 All measurements were performed using broadband Horn antennas.

A2.1.6 The test equipment settings for EIRP measurements were as follows:

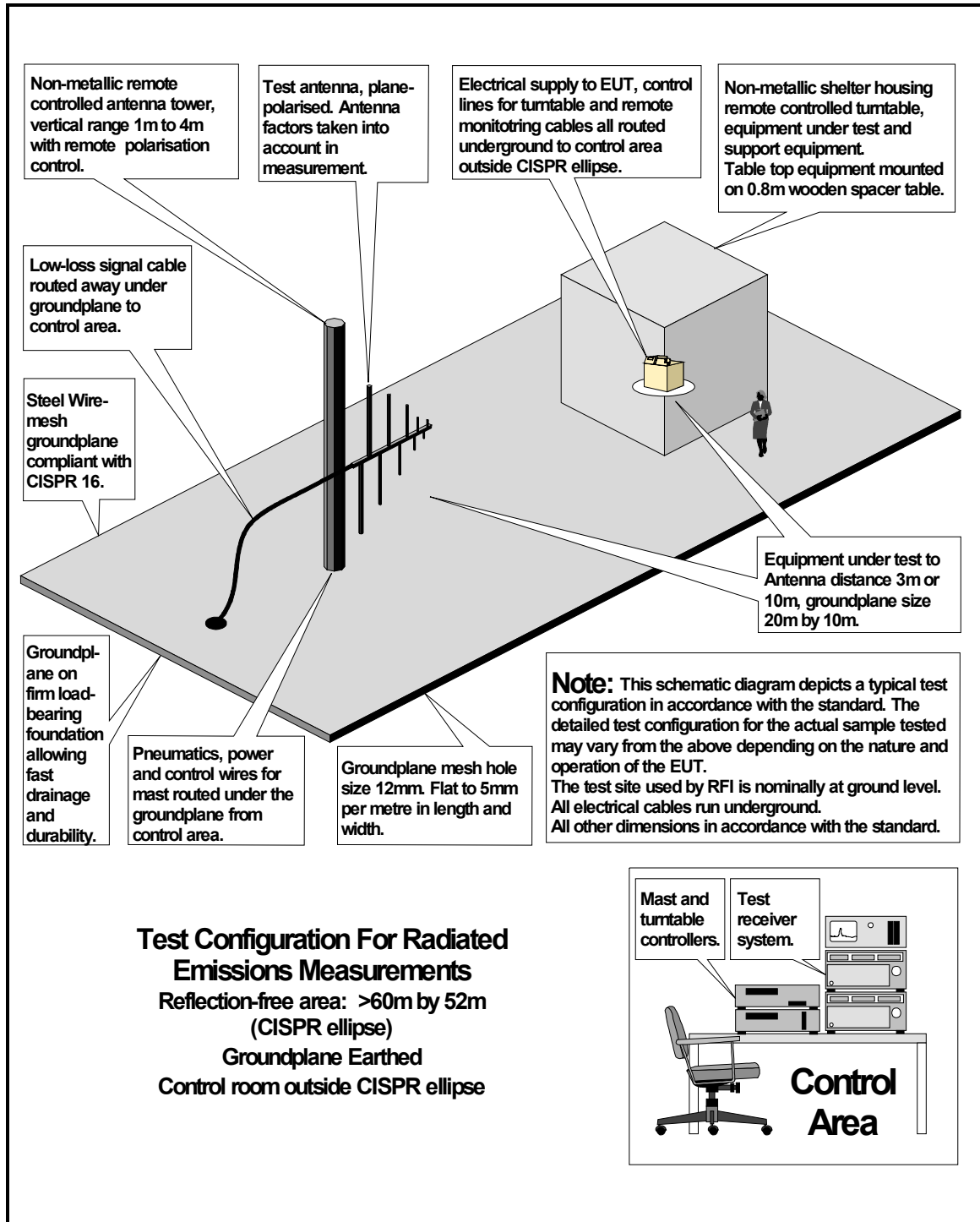
Receiver Function	Final Measurements
Detector Type:	Peak
Mode:	Not applicable
Bandwidth:	1 MHz
Amplitude Range:	20 dB
Measurement Time:	> 1 s
Observation Time:	> 15 s
Sweep Time:	Coupled

Appendix 3. Test Configuration Drawings

This appendix contains the following drawings:

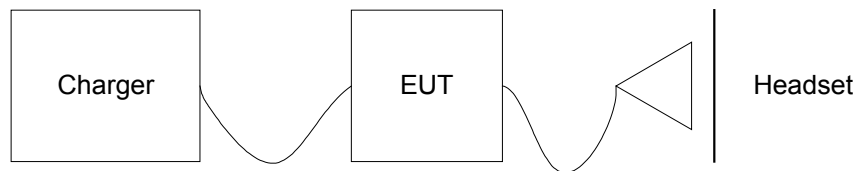
Drawing Reference Number	Title
DRG\43814JD01\EMIRAD	Test configuration for measurement of radiated emissions
DRG\43814JD01\001	Schematic diagram of the EUT, support equipment and interconnecting cables used for the test

DRG\43814JD01\EMIRAD



DRG\43814JD01\001

Configuration of EUT and Local Support Equipment



Configuration of Remote Support Equipment

Appendix 4. Photographs of EUT

This appendix contains the following photographs:

Photo Reference Number	Title
PHT\43814JD01\001	Front view of radiated emissions.
PHT\43814JD01\002	Rear view of radiated emissions.

These pages are not included in the total number of pages for this report.

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PHT\43814JD01\001 Front view of radiated emissions.



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Test Of: Nokia Corporation.
NHL-4U GSM 1900 Mobile Phone
To: RSS-133 and C108.8-M1983

PHT\43814JD01\001 Rear view of radiated emissions.

