

CETECOM ICT Services GmbH

Radio Satellite Communication

Untertürkheimer Straße 6-10 · D-66117 Saarbrücken

Telefon: +49 (0)681 598-0

Telefax: -9075

RSC14

issued test report consists of 13 Pages

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Recognized by the
Federal Communications Commission
Anechoic chamber registration no: 90462 (FCC)
Anechoic chamber registration no: 3436 (IC)
TCB ID: DE 0001



Accredited by the
German Accreditation Council
DAR-Registration Number
TTI-P-G 081/94-D0



Independent ETSI
compliance test house



Accredited Bluetooth™ Test Facility (BQTF)

Test Report No.: 2-3697-01-01/04
FCC Part 15.247 / CANADA RSS-210
Output Power RA-3
FCC ID: PDNRA-3
IC : 661R-RA3

CETECOM – ICT Services GmbH
Untertürkheimerstr. 6-10
66117 Saarbrücken, Germany
Telephone: + 49 (0) 681 / 598-0
Fax: + 49 (0) 681 / 598-9075

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1 General information

1.1 Notes

The test results of this test report relate exclusively to the test item specified in 1.5. The CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the CETECOM ICT Services GmbH.

Technical responsibility for area of testing :

2004-08-13 RSC 8411 Berg M..

Date

Section

Name

Signature



Technical responsibility for area of testing :

2004-08-13 RSC8412 Hausknecht D.

Date

Section

Name

Signature



1.2 Testing laboratory

CETECOM ICT Services GmbH

Untertürkheimer Straße 6 - 10

66117 Saarbrücken

Germany

Telephone : + 49 681 598 - 9100

Telefax : + 49 681 598 - 9075

E-mail : info@ict.cetecom.de

Internet : www.cetecom-ict.de

Accredited testing laboratory

DAR-registration number : TTI-P-G-081/94-D0

Accredited BluetoothTM Test Facility (BQTF)

BLUETOOTHTM is a trademark owned by Bluetooth SIG, Inc. and licensed to CETECOM

1.3 Details of applicant

Name : Nokia Corporation

Street : P.O.Box 68

City : Fin-33721 Tampere

Country : Finland

Telephone: +358 (0) 718 04 6800

Telefax :

Contact : Mr. Janne Ilkka

Telephone: +358 (0)50 38 38 783

1.3 Application details

Date of receipt of application : 2004-07-13

Date of receipt of test item : 2004-06-23

Date of test : 2004-06-26

1.4 Test item

Type of equipment: GSM / PCS Mobile Handset (GSM 900/1800/PCS 1900) with Wlan 802.11b
Type name: RA-2 / Nokia 9500 Communicator

Manufacturer: Nokia Corporation
Address: Keilalahdentie 4
City: Fin-02150 Espoo
Country: Finland

Frequency: 2412 to 2472 MHz
Type of modulation: 17M0P7D (DSSS) Ch. Sep. : 5 MHz
Number of channels: 13
Antenna: Integral antenna
Power supply (normal): 3,7V DC Li-Polymer Battery
Output power GSM 850: cond.: 24.84 dBm Peak, EIRP: 23.76 dBm / 237.7 mW

Transmitter Spurious (worst case) Not measured
Receiver Spurious (worst case) Not measured

FCC ID: PDNRA-3
Certification No. IC: 661R-RA3
Open Area Test Site IC No.: 3436
IC Standards RSS210 Issue 5 November 2001

ATTESTATION:

DECLARATION OF COMPLIANCE: I declare that the testing was performed or supervised by me; that the test measurements were made in accordance with the above-mentioned Industry Canada standard(s); and that the equipment identified in this application has been subjected to all the applicable test conditions specified in the Industry Canada standards and all of the requirements of the standard have been met.

Laboratory Manager :

2004-07-27	RSC 8411	Berg M.	
Date	Section	Name	

1.6 Test standards: FCC Part 15 §15.247 / CANADA RSS-210**Test set-up:**

We measured at 11 Mbit/s (DSSS)

We also used special test software to set the samples in the required modes.

Radiated Test: S/N: 004400.49.175235.6

Conducted Test: S/N: 004400.49.175233.1

2 Technical test

2.1 Summary of test results

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 25 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are conform with specifications ANSI C63.2-1987 clause 15 and ANSI C63.4-1992 clause 4.1.5. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received.

The wanted and unwanted emissions are received by spectrum analyzers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63-4-1992 clause 4.2.

Antennas are conform with ANSI C63.2-1996 item 15.

9 kHz - 30 MHz: Quasi Peak measurement, 9kHz Bandwidth, loop antenna.

30 MHz - 200 MHz: Quasi Peak measurement, 120KHz Bandwidth, biconical antenna

200MHz - 1GHz: Quasi Peak measurement, 120KHz Bandwidth, log periodic antenna

>1GHz: Average, RBW 1MHz, VBW 10 Hz, wave-guide horn

All measurement settings are according to FCC 15.35, 15.205, 15.209, 15.247 and the „Measurement guidelines for DSSS systems“.

No deviations from the technical specification(s) were ascertained in the course of the tests performed.

The product fulfills also the requirements for CANADA RSS-210.

FINAL VERDICT : PASS

2.2 Test report

TEST REPORT

Test Report No. : 2-3697-01-01/04

TEST REPORT REFERENCE

LIST OF MEASUREMENTS

PARAMETER TO BE MEASURED	PAGE
Antenna Gain SUBCLAUSE § 15.204	9
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**Antenna Gain
Reference****SUBCLAUSE § 15.204**

The antenna gain of the complete system is calculated by the difference of conducted power of the module and the radiated power in EIRP with DSSS modulation .

	low channel	mid channel	high channel
Conducted power	24.84 dBm	24.59 dBm	24.32 dBm
Radiated power (EIRP)	23.76 dBm	23.65 dBm	22.57 dBm
Gain	-1.08 dBi	-0.94 dBi	-1.75 dBi

Gain =radiated power (EIRP (substituted power)) - conducted power .

**MAXIMUM PEAK OUTPUT POWER
(CONDUCTED)**

SUBCLAUSE § 15.247 (b) (1)

DSSS System

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2412	2437	2462
T _{nom} (23.0)°C	V _{nom} (5.0)V	Peak :24.17	Peak :23.92	Peak :23.65
Correction factor		+0.67 dB		
Final corrected result		Peak :24.84 AV : 17.00	Peak :24.59 AV : 16.70	Peak :24.32 AV : 16.40
Measurement uncertainty		±0.5dB		

RBW/VBW : 10 MHzThe correction factor is calculated by $10 \cdot \log (\text{measured BW} / \text{used BW})$ (dB)

$$10 \cdot \log (11.663 \text{ MHz} / 10 \text{ MHz}) = 0.67 \text{ dB}$$

LIMIT

SUBCLAUSE § 15.247 (b) (1)

Frequency range	RF power output
2400-2483.5 MHz	1.0 Watt/ 30dBm

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
 (for reference numbers see test equipment listing)

**MAXIMUM PEAK OUTPUT POWER
(RADIATED)**
SUBCLAUSE § 15.247 (b) (1)
DSSS System

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (mW)		
Frequency (MHz)		2412	2437	2462
T _{nom} (23.0)°C	V _{nom} (3.7)V	23.09 dBm	22.98 dBm	21.90 dBm
Correction factor		+0.67 dB		
Final corrected result		237.7 mW 23.76 dBm	231.7 mW 23.65 dBm	180.7 mW 22.57dBm
Measurement uncertainty		±3dB		

RBW/VBW : 10 MHz
The correction factor is calculated by $10 \cdot \log (\text{measured BW} / \text{used BW})$ (dB)

$$\underline{10 \cdot \log (11.663 \text{ MHz} / 10 \text{ MHz}) = 0.67 \text{ dB}}$$

Measured at a distance of 3m
LIMIT
SUBCLAUSE § 15.247 (b) (1)

Frequency range	RF power output
2400-2483.5 MHz	1.0 Watt / 30 dBm

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

To simplify the identification on each page of the test equipment used, on each page of the test report, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory, below.

No	Instrument/Ancillary	Type	Manufacturer	Serial No.	Calibrated
01	Spectrum Analyzer	8566 A	Hewlett-Packard	1925A00257	Yes
02	Analyzer Display	8566 A	Hewlett-Packard	1925A00860	Yes
03	Oscilloscope	7633	Tektronix	230054	Yes
04	Radio Communication Analyzer	CMTA 54	Rohde & Schwarz	894 043/010	Yes
05	System Power Supply	6038 A	Hewlett-Packard	2848A07027	Yes
06	Signal Generator	8111 A	Hewlett-Packard	2215G00867	Yes
07	Signal Generator	8662 A	Hewlett-Packard	2224A01012	Yes
08	Function Generator	AFGU	Rohde & Schwarz	862 480/032	Yes
09	Regulating Transformer	MPL	Erfi	91350	n.a.
10	LISN	NNLA 8120	Schwarzbeck	8120331	Yes
11	Relay-Matrix	PSU	Rohde & Schwarz	893 285/020	Yes
12	Power-Meter	436 A	Hewlett-Packard	2101A12378	Yes
13	Power-Sensor	8484 A	Hewlett-Packard	2237A10156	Yes
14	Power-Sensor	8482 A	Hewlett-Packard	2237A00616	Yes
15	Modulation Meter	9008	Racal-Dana	2647	Yes
16	Frequency Counter	5340 A	Hewlett-Packard	1532A03899	Yes
17	Anechoic Chamber	---	MWB	87400/002	Yes
18	Spectrum Analyzer	85660 B	Hewlett-Packard	2747A05306	Yes
19	Analyzer Display	85662 A	Hewlett-Packard	2816A16541	Yes
20	Quasi Peak Adapter	85650 A	Hewlett-Packard	2811A01131	Yes
21	RF-Preselector	85685 A	Hewlett-Packard	2833A00768	Yes
22	Biconical Antenna	3104	Emco	3758	Yes
23	Log. Per. Antenna	3146	Emco	2130	Yes
24	Double Ridged Horn	3115	Emco	3088	Yes
25	EMI-Testreceiver	ESAI	Rohde & Schwarz	863 180/013	Yes
26	EMI-Analyzer-Display	ESAI-D	Rohde & Schwarz	862 771/008	Yes
27	Biconical Antenna	HK 116	Rohde & Schwarz	888 945/013	Yes
28	Log. Per. Antenna	HL 223	Rohde & Schwarz	825 584/002	Yes
29	Relay-Switch-Unit	RSU	Rohde & Schwarz	375 339/002	Yes
30	Highpass	HM985955	FSY Microwave	001	n.a.
31	Amplifier	P42-GA29	Tron-Tech	B 23602	Yes
32	Anechoic Chamber		Frankonia		Yes
33	Control Computer	PSM 7	Rohde & Schwarz	834 621/004	Yes
34	EMI Test Receiver	ESMI	Rohde & Schwarz	827 063/010	Yes
35	EMI Test Receiver	Display	Rohde & Schwarz	829 808/010	Yes

No	Instrument/Ancillary	Type	Manufacturer	Serial No.	Calibrated
36	Control Computer	HD 100	Deisel	100/322/93	n.a.
37	Relay Matrix	PSN	Rohde & Schwarz	829 065/003	Yes
38	Control Unit	GB 016 A2	Rohde & Schwarz	344 122/008	Yes
39	Relay Switch Unit	RSU	Rohde & Schwarz	316 790/001	Yes
40	Power Supply	6032A	Hewlett Packard	2846A04063	Yes
41	Spectrum Monitor	EZM	Rohde & Schwarz	883 720/006	n.a.
42	Measuring Receiver	ESH 3	Rohde & Schwarz	890 174/002	Yes
43	Measuring Receiver	ESVP	Rohde & Schwarz	891 752/005	Yes
44	Bicon Ant. 20-300MHz	HK 116	Rohde & Schwarz	833 162/011	Yes
45	Logper Ant. 0.3-1 GHz	HL 223	Rohde & Schwarz	832 914/010	Yes
46	Amplifier 0.1-4 GHz	AFS4	Miteq Inc.	206461	Yes
47	Logper Ant. 1-18 GHz	HL 024 A2	Rohde & Schwarz	342 662/002	Yes
48	Polarisation Network	HL 024 Z1	Rohde & Schwarz	341 570/002	Yes
49	Double Ridged Horn Antenna 1-26.5 GHz	3115	EMCO	9107-3696	Yes
50	Microw. Sys. Amplifier 0.5- 26.5 GHz	8317A	Hewlett Packard	3123A00105	Yes
51	Audio Analyzer	UPD	Rohde & Schwarz	1030.7500.04	Yes
52	Controler	PSM 7	Rohde & Schwarz	883 086/026	Yes
53	DC V-Network	ESH3-Z6	Rohde & Schwarz	861 406/005	Yes
54	DC V-Network	ESH3-Z6	Rohde & Schwarz	893 689/012	Yes
55	AC 2 Phase V-Network	ESH3-Z5	Rohde & Schwarz	861 189/014	Yes
56	AC 2 Phase V-Network	ESH3-Z5	Rohde & Schwarz	894 981/019	Yes
57	AC-3 Phase V-Network	ESH2-Z5	Rohde & Schwarz	882 394/007	Yes
58	Power Supply	6032A	Rohde & Schwarz	2933A05441	Yes
59	RF-Test Receiver	ESVP.52	Rohde & Schwarz	881 487/021	Yes
60	Spectrum Monitor	EZM	Rohde & Schwarz	883 086/026	n.a.
61	RF-Test Receiver	ESH3	Rohde & Schwarz	881 515/002	Yes
62	Relay Matrix	PSU	Rohde & Schwarz	882 943/029	Yes
63	Relay Matrix	PSU	Rohde & Schwarz	828 628/007	Yes
64	Spectrum Analyzer	FSIQ 26	Rohde & Schwarz	119.6001.27	Yes
65	Spectrum Analyzer	HP 8565E	Hewlett Packard	3473A00773	Yes
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