

Recognized by the
Federal Communications Commission
FCC-Identification Number: 90462
TCB ID: DE 0001



Anechoic chamber registration no.: 3463 (IC)

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.: 2-3613-01-01/04

FCC Part 15.225

CC-197D

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.

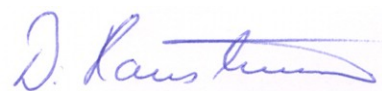
Test laboratory manager:

2004-06-08	RSC - 8411	Berg M.
Date	Section	Name


Signature

Technical responsibility for area of testing:

2004-06-08	RSC - 8412	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 - 0

Telefax : + 49 681 598 - 9075

E-mail : Michael.Berg@ict.cetecom.de

Internet : www.cetecom-ict.de

Accredited testing laboratory

Accredited by : Regulierungsbehörde für Telekommunikation und Post (RegTP)

Listed by : Federal Communications Commission (FCC)

Authority	Identification/Registration No.
RegTP	TTI-P-G 081/94-D0
FCC	90462

1.3 Details of applicant

Name : NOKIA Corporation

Street : P.O. Box 300

City : FIN-90401 OULU

Country : Finland

Telephone : +358 7180 08000

Telefax : +358 7180 44911

Contact : Kare Oksanen

Telephone : +358 7180 58667

Contact person:

Name : Kare Oksanen

Telephone : +358 7180 58667

Telex : +358 7180 44911

E-mail : Kare.oksanen@nokia.com

1.4 Application details

Date of receipt of test item : 2004-04-26

Date of test : 2004-04-30

Person(s) who have been : Raimo Ikonen

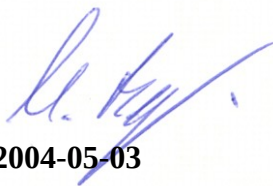
present during the test :

1.5 Test item**Test Report Cover Sheet**

Company Number:	661E
Model Number:	CC-197D
Product Name:	
Manufacturer:	Nokia Corporation
Tested to Radio Standards Specification(RSS) No.:	210 Issue 5
Open Area Test Site Industry Canada Number:	3463
Frequency Range (or fixed frequency):	13.56 MHz
R:F: Power in Watts:	
Field Strength (at what distance):	50 dBμV/m in 3m
Occupied Bandwidth (99% BW):	5.48 kHz
Type of Modulation:	Amplitude
Emission Designator (TRC-43):	2K12A1DBN
Transmitter Spurious (worst case):	39.2dBμV/m in 3m
Receiver Spurious (worst case):	-.-
IC no.	661E-R1
FCC ID no.	LJPR1
Temperature range	-20°C to +50°C
Power supply	3.7 V DC via Battery from Mobile

ATTESTATION: I attest that the testing was performed or supervised by me; that the test measurements were made in accordance with the above-mentioned departmental standard(s), and that the radio equipment identified in this application has been subject to all the applicable test conditions specified in the departmental standards and all of the requirements of the standards have been met.

Signature:



Date: 2004-05-03

NAME AND TITLE (Please print or type):

Berg Michael, Project Engineer

Note: This form must be completed and provided with the submission.

**1.6 Test specifications: FCC Part 15 §15.225
CANADA RSS-210 Issue 5**

2 Technical test

2.1 Summary of test results

FCC Part 15 Subpart B

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 20 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 C63.2-1996 clause 15 and ANSI C63.4-2001 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 set-ups 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 C63.4-2001 clause 4.2.

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

150 kHz - 30 MHz: Quasi Peak measurement, 9kHz Bandwidth, passive 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 15.225 and 15.207

The product fulfils also the requirements for CANADA RSS-210 Issue 5

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

FINAL VERDICT : PASS

2.2 Test report

TEST REPORT

Test report no: 2-3613-01-01/04

LIST OF MEASUREMENTS.

The list of measured parameters is given below.

FCC

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Equipment under test : CC-197D

Ambient temperature : 23°C

Relative humidity : 48%

SPURIOUS RADIATION

§ 15.209 / § 15.225

SPURIOUS EMISSIONS LEVEL (µV/m)								
13.56 MHz								
f (MHz)	Detector				Level (µV/m)	Limit (µV/m)	Margin (dB)	Results
0.0787	QP				0.009	30.48	70.08	pass
36.3	PK				14.1	100	17.0	pass
39.06	PK				17.8	100	15.0	pass
41.02	PK				44.7	100	7.0	pass
45.23	PK				35.5	100	9.0	pass
51.61	PK				13.5	100	17.4	pass
55.27	PK				18.2	100	14.8	pass
62.76	PK				13.2	100	17.6	pass
3321.9	PK				81.3	500	11.8	pass
3717.2	PK				91.2	500	10.8	pass
Measurement uncertainty		±3 dB						

f < 1 GHz : RBW/VBW: 100 kHz

f ≥ 1GHz : RBW/VBW: 1 MHz

H = Horizontal ; V= Vertical

(to convert the measuring distance from 3m to 30m and 3 to 300m a correction factor from 40 dB/decade was used.)

Sample for 0.0787 MHz : 39 dBµV/m in 3m related to -41 dBµV/m in 300m (39 dBµV/m – 80 dB)
-41 dBµV/m = 0.009µV/m

Limits

SUBCLAUSE § 15.209

Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17 – 24: 53 , 54 , 62

Equipment under test : CC-197D

Ambient temperature : 23°C

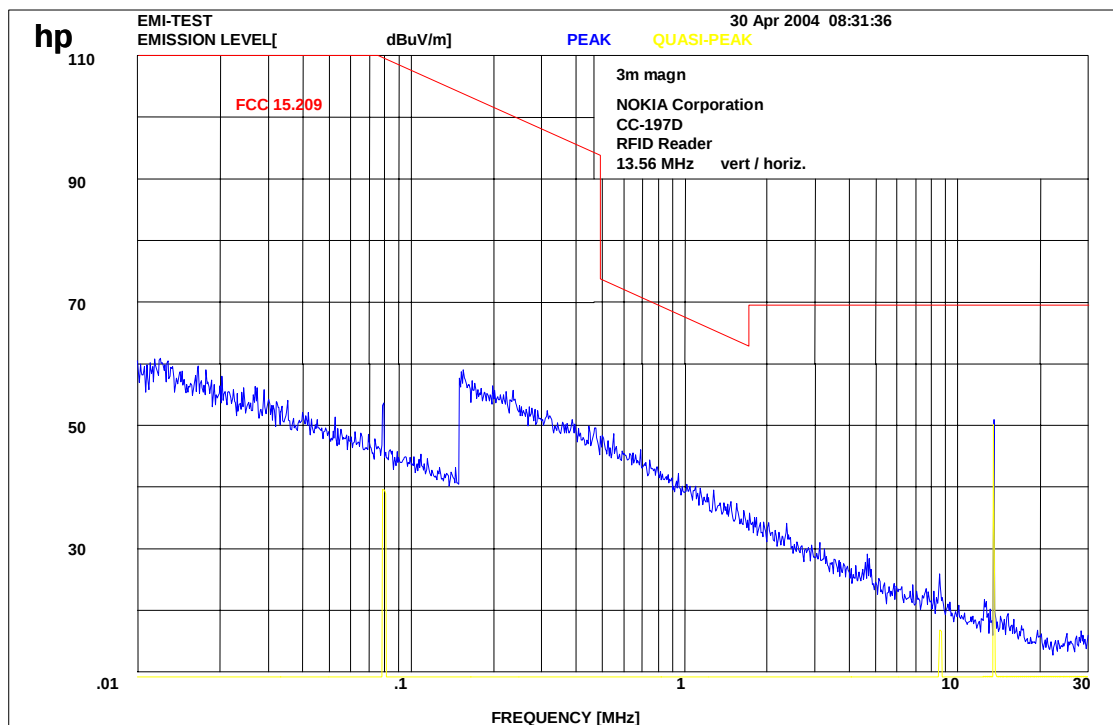
Relative humidity : 48%

Plots of the measurements

SCANTABELLE: "FCC 15 magn"

Kurzbeschreibung: Voltage Mains 1.60

Start-Frequenz	Stop-Frequenz	Schrittweite	Detektor	Meßzeit	ZF-Bandbr.	Transducer
9.0 kHz	150.0 kHz	100.0 Hz	MaxPeak	100.0 ms	0.2 kHz	HFH2-Z2 (dBµV/m)
150.0 kHz	30.0 MHz	10.0 kHz	MaxPeak	100.0 ms	10 kHz	HFH2-Z2 (dBµV/m)



Measurement distance 3m

This measurement was done in 3 polarisation's, the plot shows the worst case (Coil antenna and controller PCB horizontal)

Field strength of the Fundamental : 50 dBµV/m in 3m or 10 dBµV/m in 30m

(to convert the measuring distance from 3m to 30m and 3 to 300m a correction factor from 40 dB/decade was used.)

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17 – 24: 53 , 54 , 62

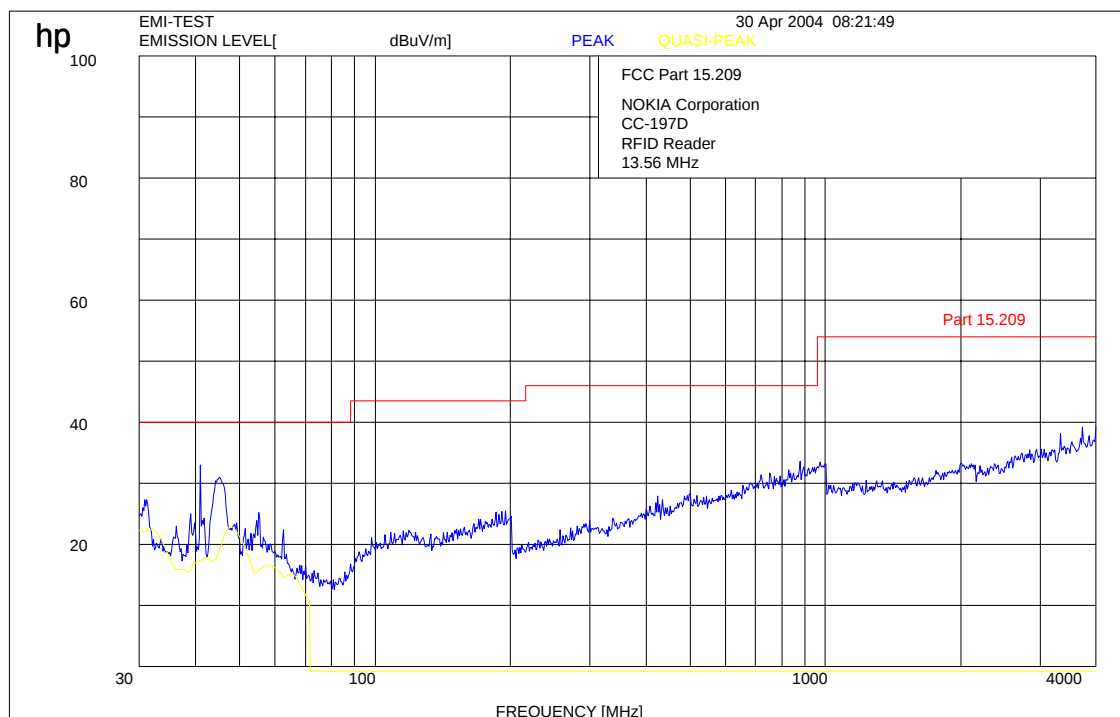
Equipment under test : CC-197D

Ambient temperature : 23°C

Relative humidity : 48%

Plots of the measurements

Spurious 30 MHz – 4 GHz (Quasi Peak below 1 GHz)



$f < 1 \text{ GHz}$: RBW/VBW: 100 kHz

$f \geq 1 \text{ GHz}$: RBW/VBW: 1 MHz

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

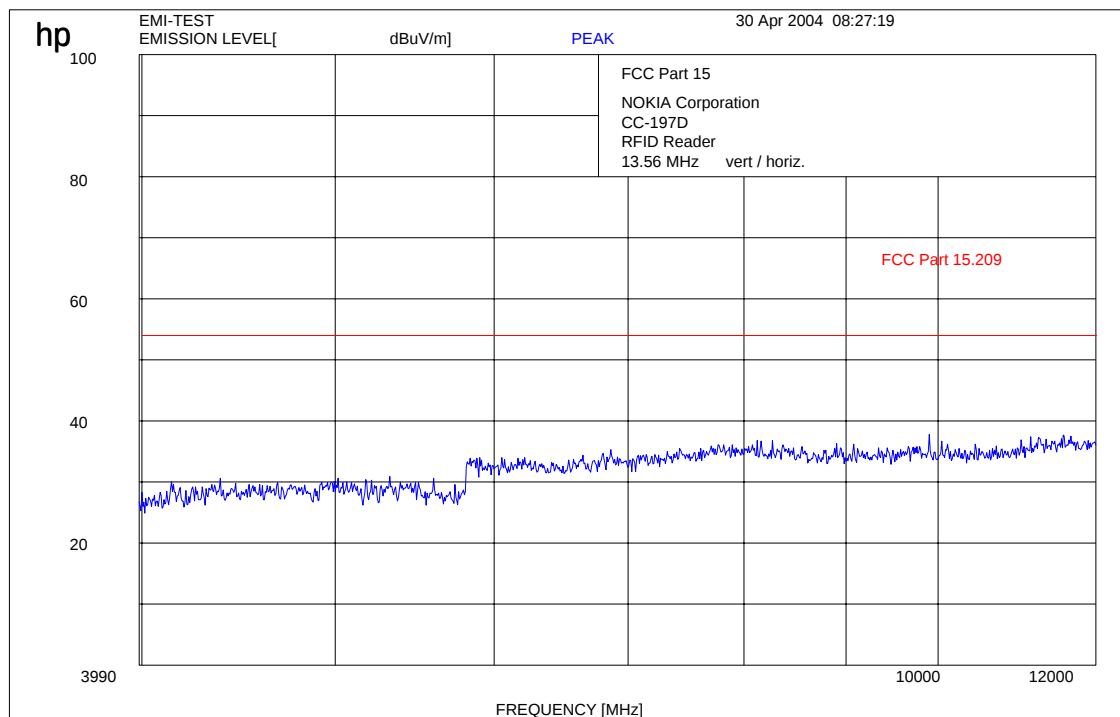
17 – 24: 53 , 54 , 62

Equipment under test : CC-197D

Ambient temperature : 23°C

Relative humidity : 48%

Spurious 4 GHz – 12 GHz



above 12 GHz no traceable peak found

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

17 – 24: 53 , 54 , 62

Test report no.:2-3613-01-01/04

Issue date: 2004-05-06

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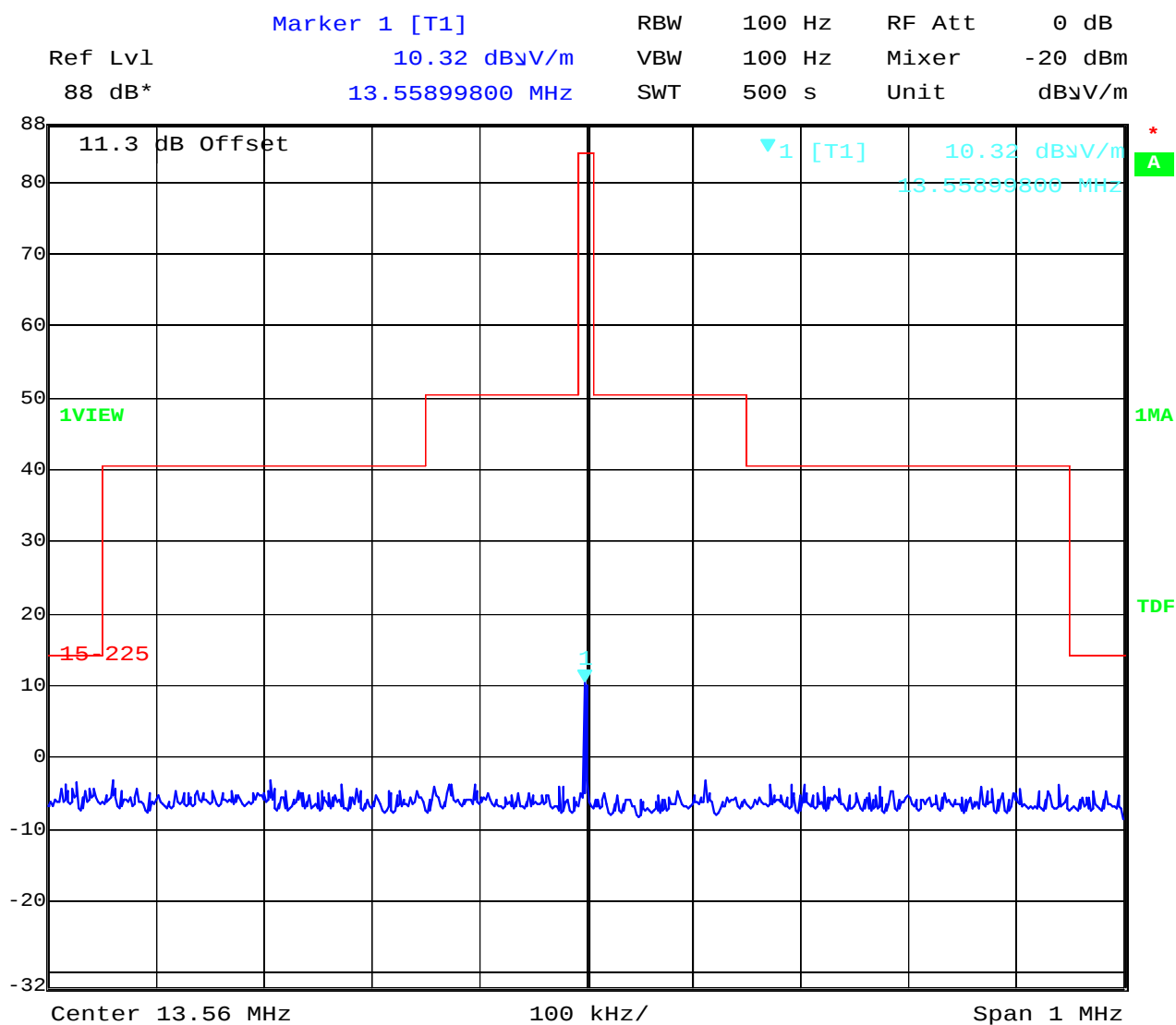
Equipment under test : CC-197D

Ambient temperature : 23°C

Relative humidity : 48%

EMISSION MASK

§ 15.225



Date: 30.APR.2004 10:14:09

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

Equipment under test : CC-197D**Ambient temperature : 23°C****Relative humidity : 48%****Frequency Tolerance****§ 15.225 (e)****Method of Measurement:**

1. Measure the carrier frequency at room temperature.
2. Subject the mobile station to overnight soak at -20 C.
3. With the mobile station, powered with 3.7 Volts, measure the carrier frequency. These measurements should be made within 2 minutes of powering up the mobile station, to prevent significant self warming.
4. Repeat the above measurements at 10 C increments from -20 C to +50 C. Allow at least 1 1/2 hours at each temperature, un-powered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal 3.7 Volts. Vary supply voltage from minimum 3.2 Volts to maximum 4.2 Volts, in 11 steps re-measuring carrier frequency at each voltage. Pause at 3.7 V dc Volts for 1 1/2 hours un-powered, to allow any self heating to stabilize, before continuing.
6. At all temperature levels hold the temperature to +/- 0.5 C during the measurement procedure.

Measurement Limit:

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

Equipment under test : CC-197D
Ambient temperature : 23°C
Relative humidity : 48%
AFC FREQ ERROR vs. VOLTAGE

Voltage (V)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
3.2	-99	-0,00073009	-7,3009
3.3	-99	-0,00073009	-7,3009
3.4	-99	-0,00073009	-7,3009
3.5	-99	-0,00073009	-7,3009
3.6	-99	-0,00073009	-7,3009
3.7	-99	-0,00073009	-7,3009
3.8	-99	-0,00073009	-7,3009
3.9	-99	-0,00073009	-7,3009
4.0	-99	-0,00073009	-7,3009
4.1	-101	-0,00074484	-7,4484
4.2	-101	-0,00074484	-7,4484

AFC FREQ ERROR vs. TEMPERATURE

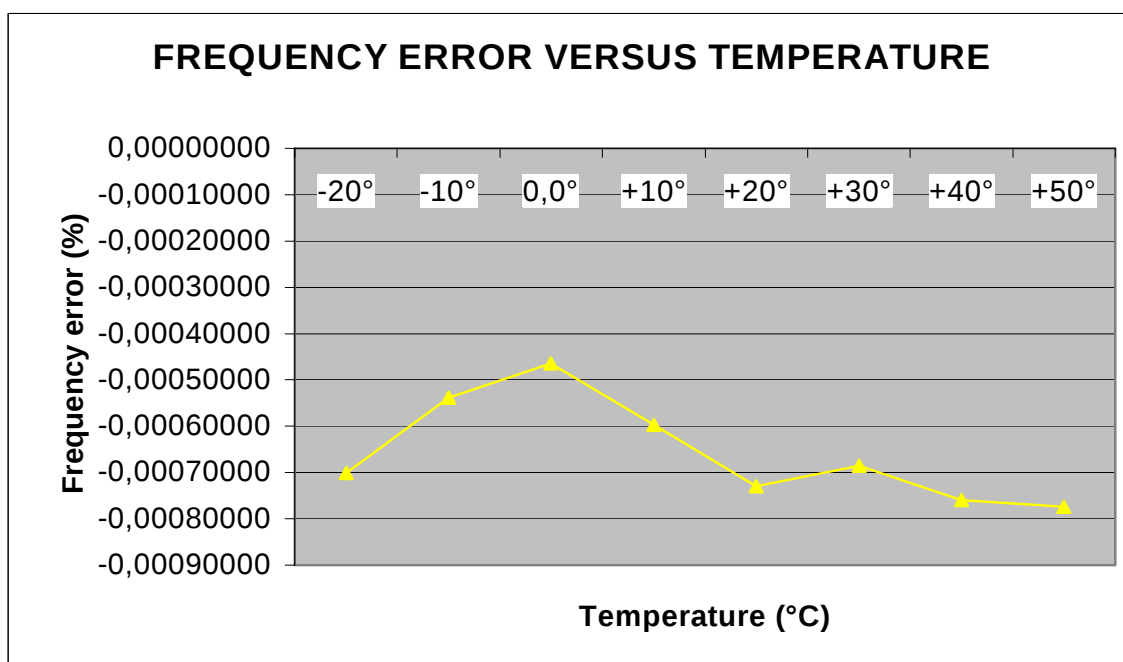
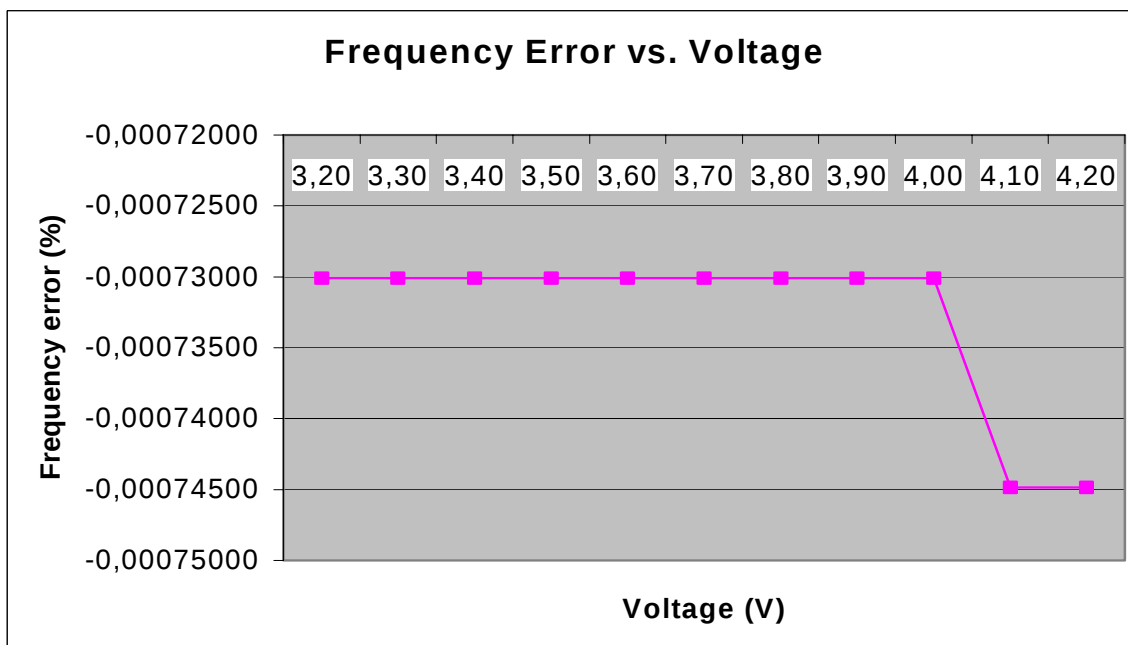
TEMPERATURE (°C)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
-20	-95	-0,00070059	-7,0059
-10	-73	-0,00053835	-5,3835
±0.0	-63	-0,00046460	-4,6460
+10	-81	-0,00059735	-5,9735
+20	-99	-0,00073009	-7,3009
+30	-93	-0,00068584	-6,8584
+40	-103	-0,00075959	-7,5959
+50	-105	-0,00077434	-7,7434

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

Equipment under test : CC-197D

Ambient temperature : 23°C

Relative humidity : 48%



Equipment under test : CC-197D

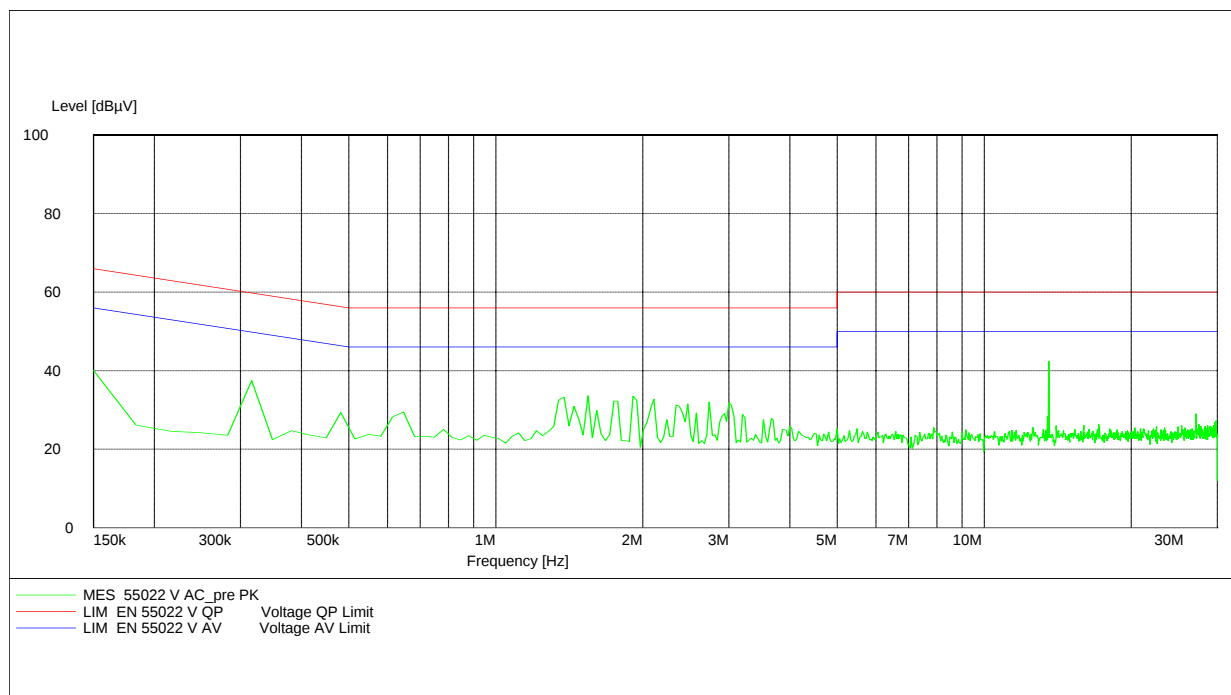
Ambient temperature : 23°C

Relative humidity : 48%

Conducted emissions

§ 15.107/207

EUT: CC197D
 Manufacturer: NOKIA Corporation
 Operating Condition: normal reading mode
 Test Site: Room 006 (Shielded chamber)
 Operator: Berg M.
 Test Specification: CISPR 22
 Comment: 115V / 60 Hz
 Start of Test: 30.04.04 / 09:29:09



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

Test report no.:2-3613-01-01/04

Issue date: 2004-05-06

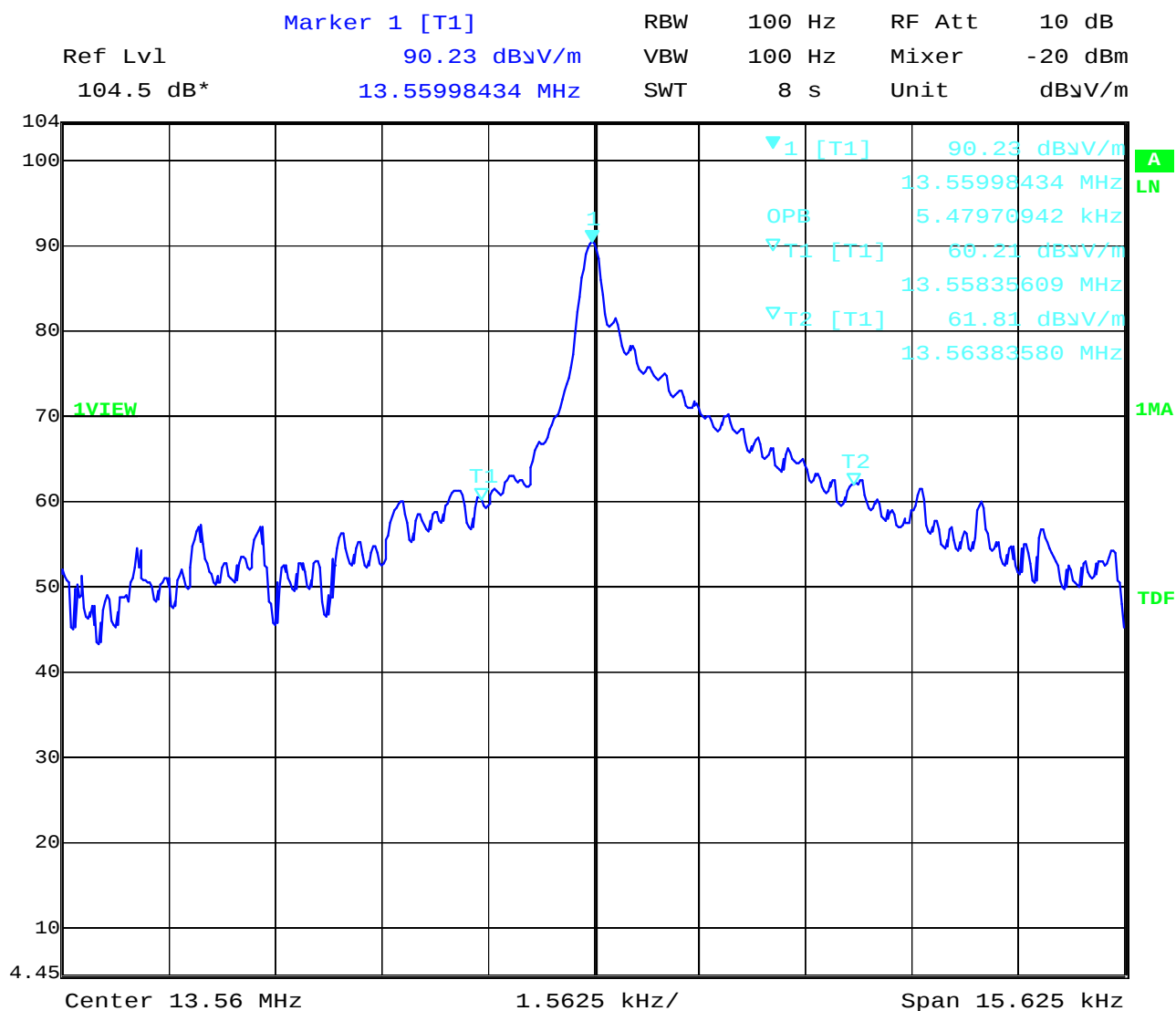
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Equipment under test : CC-197D

Ambient temperature : 23°C

Relative humidity : 48%

20 dB Bandwidth



Date: 30.APR.2004 09:56:03

20 dB Bandwidth : 5.4797 kHz

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

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
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
68					