

EMC Test Report For RA-4



T183 (EN ISO/IEC 17025)

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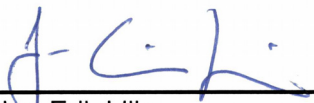
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1 CUSTOMER INFORMATION

| | |
|--|---|
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| FCC registration number IC file number: | 94436 (June 14, 2002) IC 3608 (March 5, 2003) |
| Client: | Nokia Corporation Joensuunkatu 7 FIN-24100 SALO BOX 86 FIN-24101 SALO Tel. +358-71-8008000 Fax. +358-71-8044277 |
| Contact person: | Timo Seppälä |
| Receipt of EUT: | 26.1.2005 |
| Date of testing: | 28.1-1.2.2005 |
| Date of report: | 04.02.2005 |

The tests listed in this report have been done to demonstrate compliance with the applicable requirements in FCC rules Part 15 and IC standard ICES-003.

Contents approved:

| |
|---|
|  |
| Jan-Erik Lilja Senior Test Engineer |

2 EUT AND ACCESSORY INFORMATION

2.1 EUT description

The EUT is a mobile phone EUT is a dual triple band (GSM 850/1800/1900 EGPRS) mobile phone.

The highest internal frequency of the EUT is 3979.6 MHz.

2.2 EUT and accessories

The table below lists all EUTs and accessories used in the tests. Later in this test report, only numbers in the last column are used to refer to the devices in each test.

| | Name | Type | S/N | Number |
|-------------|----------------------------|---------------------------|-----------------------------|--------|
| EUT | Mobile phone | RA-4 | 004400571630423 | 40164 |
| Accessories | Battery | BP-6M | - | 40169 |
| | Charger | ACP-12 | - | 40172 |
| | USB cable | DKU-2 | - | 40174 |
| | Digital camera | DS-7 | 7102516 | 40076 |
| | Printer | HP deskjet 1600CC3540A | USB8302546 | 40077 |
| | Laptop PC | LATITUDE CP M233XT | 0009321C-12800-8A5- 2913 | 40078 |
| | Laptop charger | PA-2 | 00085391 | 40080 |
| | Laptop PC | LATITUDE D600 | 0009321C-12800-8A5- 2913 | 40085 |
| | Laptop charger | AA22850 | 00085391 | 40086 |
| | Parallel cable for printer | - | - | 40087 |
| | Serial cable for camera | - | - | 40088 |

Note! Phone HW ID is 5300

SUMMARY OF TEST RESULTS

| Section in CFR 47 | Section in ICES-003 | | Result |
|-------------------|---------------------|----------------------------------|--------|
| 15.107,a | 5.3 | AC powerline conducted emissions | PASS |
| 15.109,a | 5.5 | Radiated emissions | PASS |

3 STANDARDS AND MEASUREMENT METHODS

The tests were performed in guidance of CFR 47 Part 15 Subpart B, ANSI C63.4 (2001), ICES-003 and CISPR 22. Deviations, modifications or clarifications (if any) to above mentioned documents are written in each section under "Test method".

4 TEST RESULTS

4.1 AC powerline conducted emissions

| | |
|------------------------------|---|
| EUT | 40164 |
| Accessories | 40169, 40172, 40174 ,40076, 40077, 40078, 40080, 40085, 40086, 40087, 40088 |
| Temp, Humidity, Air Pressure | 19°C 52 % RH 1019 mbar |
| Date of measurement | 28.1.2005 |
| FCC rule part | §15.107 |
| ICES-003 section | 5.3 |
| Measured by | Jari Jantunen |
| Result | PASS |

4.1.1 Limit

CISPR 22 Class B limit

| Frequency band (MHz) | Quasi-peak limit (dBμV) | Average limit (dBμV) |
|----------------------|-------------------------|----------------------|
| 0.15 – 0.5 | 66 – 56 | 56 – 46 |
| 0.5 – 5 | 56 | 46 |
| 5 – 30 | 60 | 50 |

4.1.2 EUT operation mode

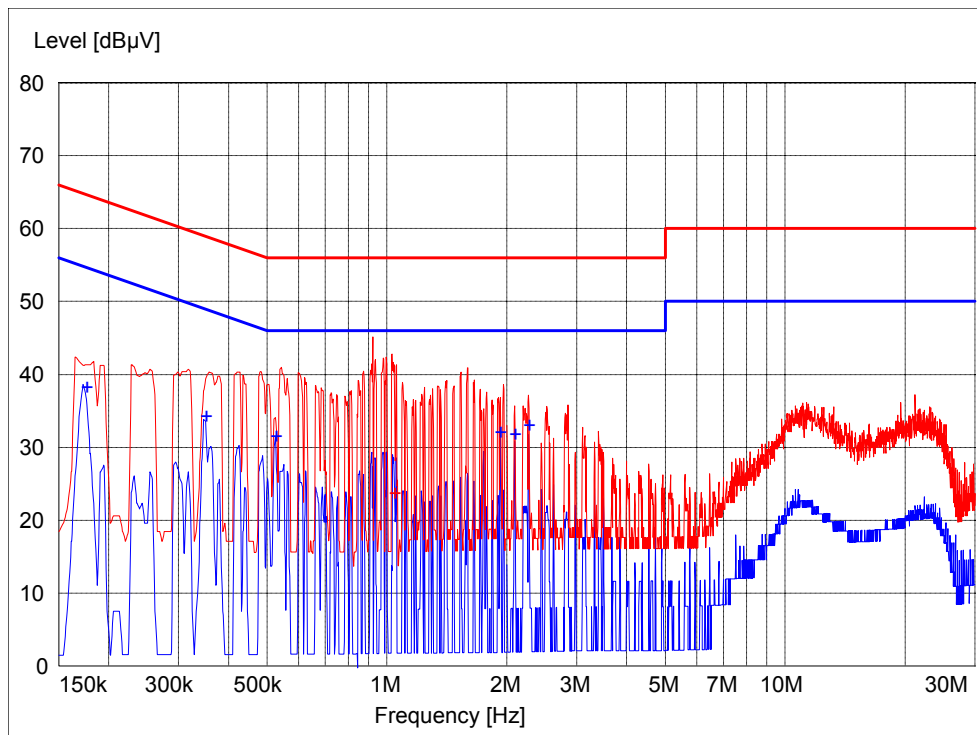
| | |
|-----------------------|--|
| EUT operation mode | GSM 1900, idle mode, BlueTooth standby |
| EUT operation voltage | 115V/60Hz |

4.1.3 EUT test setup



Picture 1 EUT test setup

4.1.4 Emission measurement data



Picture 2 Emission measurement data

Table 1 Emission measurement data, average detector

| Frequency MHz | Level dBμV | Transd dB | Limit dBμV | Margin | Detector dB | Line | PE |
|---------------|------------|-----------|------------|--------|-------------|------|-----|
| 0.177000 | 38.20 | 10.10 | 54.60 | 16.40 | AV | L1 | GND |
| 0.352500 | 34.30 | 10.10 | 48.90 | 14.60 | AV | L1 | GND |
| 0.528000 | 31.60 | 10.20 | 46.00 | 14.40 | AV | L1 | GND |
| 1.932000 | 32.10 | 10.40 | 46.00 | 13.90 | AV | L1 | GND |
| 2.107500 | 31.80 | 10.40 | 46.00 | 14.20 | AV | L1 | GND |
| 2.283000 | 33.00 | 10.50 | 46.00 | 13.00 | AV | L1 | GND |

Table 2 Emission measurement data, quasi peak detector

| Frequency MHz | Level dBμV | Transd dB | Limit dBμV | Margin | Detector dB | Line | PE |
|---------------|------------|-----------|------------|--------|-------------|------|-----|
| 1.050000 | 23.70 | 10.30 | 56.00 | 32.30 | QP | N | GND |

4.2 Radiated emissions

| | |
|------------------------------|---|
| EUT | 40164 |
| Accessories | 40169, 40172, 40174, 40076, 40077, 40078, 40080, 40085, 40086, 40087, 40088 |
| Temp, Humidity, Air Pressure | 21°C 48 %RH 996 mbar |
| Date of measurement | 1.2.2005 |
| FCC rule part | §15.109 |
| ICES-003 section | 5.5 |
| Measured by | Jari Jantunen |
| Result | PASS |

4.2.1 Test method and level, 30 MHz – 8500 MHz

The test was made according to ANSI C63.4 (2001) with following exceptions and additions:

- 1) The measurement was made in semi-anechoic chamber at measurement distance of 3m. The chamber had ferrite and absorber lining in all walls and ceiling, the floor was metal covered.
- 2) The measurement was divided in two parts; prescan and final measurement.

4.2.1.1 Prescan

- a) The EUT was set on the turntable and measuring antenna in horizontal polarization at 1m.
- b) The turntable was set to 0 degrees.
- c) The receiver was set to record the maximum level using peak detector.
- d) The antenna was raised from 1m to 4m in 1 meter steps.
- e) For each antenna height the table was rotated full turn in 30 degree steps.
- f) Antenna polarization was changed to vertical and phases b - e repeated.
- g) All suspect frequencies were recorded in a file.
- h) At every suspect frequency the turntable was rotated around, antenna scanned and the polarization changed to find the maximum levels.

4.2.1.2 Final measurement

- a) The final measurement was run at suspect frequencies only using peak, quasipeak and average detector.
- b) The turntable was rotated full turn to find out the worst azimuth.
- c) On those azimuths obtained in b, the antenna was scanned from 1m to 4m to find out the worst elevation.
- d) Phases b and c were repeated with another antenna polarization.
- e) Obtained values were reported

CISPR 22 Class B limit (3m measuring distance)

| Frequency band (MHz) | Quasi-peak limit (dBμV/m) |
|----------------------|---------------------------|
| 30 – 230 | 40 |
| 230 – 1000 | 47 |

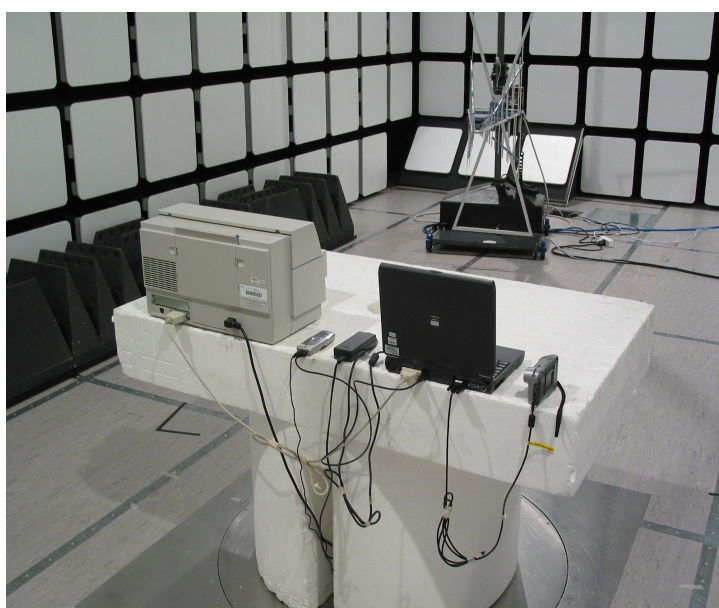
Class B limit (3m measuring distance)

| Frequency band (MHz) | Limit (µV/m) | Limit (dBµV/m) | Detector |
|----------------------|--------------|----------------|----------|
| 1000-8500 | 500 / 5000 | 54 / 74 | AV / PK |

4.2.2 EUT operation mode

| | |
|-----------------------|--|
| EUT operation mode | GSM 1900, idle mode, BlueTooth standby |
| EUT operation voltage | 115V/60Hz |

4.2.3 EUT test setup



Picture 3 EUT test setup

4.2.4 Emission measurement data, 30 MHz – 8500 MHz

The measurement results were obtained as described below.

$$E[uV / m] = U_{RX} + A_{CABLE} + AF - G_{PREAMP}$$

Where

U_{RX} receiver reading
A_{CABLE} Attenuation of the cable
AF Antenna factor
G_{PREAMP} Gain of the preamplifier

Table 3 GSM 1900, low channel, peak detector

| Frequency MHz | Level dBµV/m | Margin dB | Polarisation |
|------------------|-----------------|--------------|--------------|
| 3860.000000 | 41.90 | 32.10 | VERTICAL |
| 7720.000000 | 45.80 | 28.20 | VERTICAL |

Table 4 GSM 1900, low channel, average detector

| Frequency MHz | Level dBµV/m | Margin dB | Polarisation |
|------------------|-----------------|--------------|--------------|
| 3860.000000 | 29.60 | 24.40 | VERTICAL |
| 7720.000000 | 32.60 | 21.40 | VERTICAL |

Table 5 GSM 1900, mid channel, quasi-peak detector

| Frequency MHz | Level dBµV/m | Margin dB | Polarisation |
|------------------|-----------------|--------------|--------------|
| 30.400000 | 28.70 | 11.30 | VERTICAL |
| 41.864529 | 31.80 | 8.20 | VERTICAL |
| 449.798196 | 37.60 | 8.40 | VERTICAL |

Table 6 GSM 1900, mid channel, peak detector

| Frequency MHz | Level dBµV/m | Margin dB | Polarisation |
|------------------|-----------------|--------------|--------------|
| 3920.000000 | 42.60 | 31.40 | VERTICAL |
| 7840.000000 | 46.60 | 27.40 | HORIZONTAL |

Table 7 GSM 1900, mid channel, average detector

| Frequency MHz | Level dBµV/m | Margin dB | Polarisation |
|------------------|-----------------|--------------|--------------|
| 3920.000000 | 31.50 | 22.50 | VERTICAL |
| 7840.000000 | 34.70 | 19.30 | HORIZONTAL |

Table 8 GSM 1900, high channel, peak detector

| Frequency MHz | Level dBµV/m | Margin dB | Polarisation |
|------------------|-----------------|--------------|--------------|
| 3980.000000 | 41.80 | 32.20 | VERTICAL |
| 7960.000000 | 46.30 | 27.70 | VERTICAL |

Table 9 GSM 1900, high channel, average detector

| Frequency MHz | Level dBµV/m | Margin dB | Polarisation |
|------------------|-----------------|--------------|--------------|
| 3980.000000 | 29.60 | 24.40 | VERTICAL |
| 7960.000000 | 33.00 | 21.00 | VERTICAL |