

## GSM 1900 Test Report for RH-36

Test Report no.: Salo\_FCC\_0504\_03.doc  
Number of pages: 7

Date of Report: 24.01.2005  
Customer's: Ole Sorensen  
Contact person:  
Responsible: Kai Uusitalo  
Test engineer:

Testing laboratory: TCC Nokia Salo Laboratory  
P.O. Box 86  
Joensuunkatu 7H / Kiila 1B  
FIN-24101 SALO, FINLAND  
Tel. +358 (0) 7180 08000  
Fax. +358 (0) 7180 45220  
FCC Reg. # 533467, Sep 2004  
IC File # 46405-5385, Sep 2004

Client: Nokia Corporation  
Frederikskaj  
1790 COPENHAGEN V  
DENMARK  
Tel. +45 33 292929  
Fax. +45 33 292934

Tested devices/  
accessories: **Phone RH-36 / Battery BL-5C and AC-Charger ACP-12**

Supplement reports: -

Testing has been  
carried out in  
accordance with: The tests listed in this report have been done to demonstrate compliance with the applicable requirements in FCC rules Part 24 and IC standard RSS-133.

Documentation: The test report must always be reproduced in full; reproduction of an excerpt only is subject to written approval of the testing laboratory. The documentation of the testing performed on the tested devices is archived for 15 years at TCC Salo.

Test Results: **The EUT complies with the requirements in respect of all parameters subject to the test.**  
The test results relate only to devices specified in this document

Date and signatures  
for the contents:

24-01-2005



Kai Uusitalo  
Senior Design Engineer, EMC

## CONTENTS

|                                        |          |
|----------------------------------------|----------|
| <b>1. Summary of test results.....</b> | <b>3</b> |
| <b>2. EUT Information.....</b>         | <b>3</b> |
| 2.1. EUT description.....              | 3        |
| <b>3. EUT Test Setup .....</b>         | <b>3</b> |
| <b>4. Applicable Standards .....</b>   | <b>3</b> |
| <b>5. Radiated RF output.....</b>      | <b>4</b> |
| 5.1. Test setup .....                  | 4        |
| 5.2. Test method .....                 | 5        |
| 5.3. EUT operation mode .....          | 5        |
| 5.4. Limit.....                        | 5        |
| 5.5. Results .....                     | 5        |
| <b>6. Test equipment .....</b>         | <b>7</b> |
| 6.1. Radiated measurements .....       | 7        |

## 1. Summary of test results

| Section in CFR 47             | Section in RSS-133 |                                            | Result |
|-------------------------------|--------------------|--------------------------------------------|--------|
| §2.1046 (a)                   | 6.2                | Conducted RF output                        | -      |
| §24.232 (b)                   | 6.2                | Radiated RF output                         | PASS   |
| §2.1049 (h)                   | 5.6                | 99% occupied bandwidth                     | -      |
| §24.238 (a)                   | 6.3                | Bandedge compliance                        | -      |
| §24.238 (a), §2.1051          | 6.3                | Spurious emissions at antenna terminals    | -      |
| §24.238 (a), §2.1053          | 6.3                | Spurious radiated emission                 | -      |
| §24.235, §2.1055<br>(a)(1)(b) | 7                  | Frequency stability, temperature variation | -      |
| §24.235, §2.1055<br>(d)(1)(2) | 7                  | Frequency stability, voltage variation     | -      |

PASS Pass

FAIL Fail

X Measured, but there is no applicable performance criteria

NA Not Applicable

- Not Measured

## 2. EUT Information

| Product    | Type    | SN                         | HW   | MV | SW   | DUT   |
|------------|---------|----------------------------|------|----|------|-------|
| Phone      | RH-36   | 01044100/158878/3          | 0874 | -  | 4.22 | 10296 |
| Battery    | BL-5C   | 0670400382066L24721BI91639 | -    | -  | -    | 10297 |
| AC-Charger | ACP-12E | 0675294394349J493120295910 | -    | -  | -    | 10070 |

### 2.1. EUT description

The EUT is dual band ( 850MHz/1900MHz) GSM mobile phone

The EUT was not modified during the tests.

## 3. EUT Test Setup

For each test the EUT was exercised to find the worst case of operation modes and device configuration.

## 4. Applicable Standards

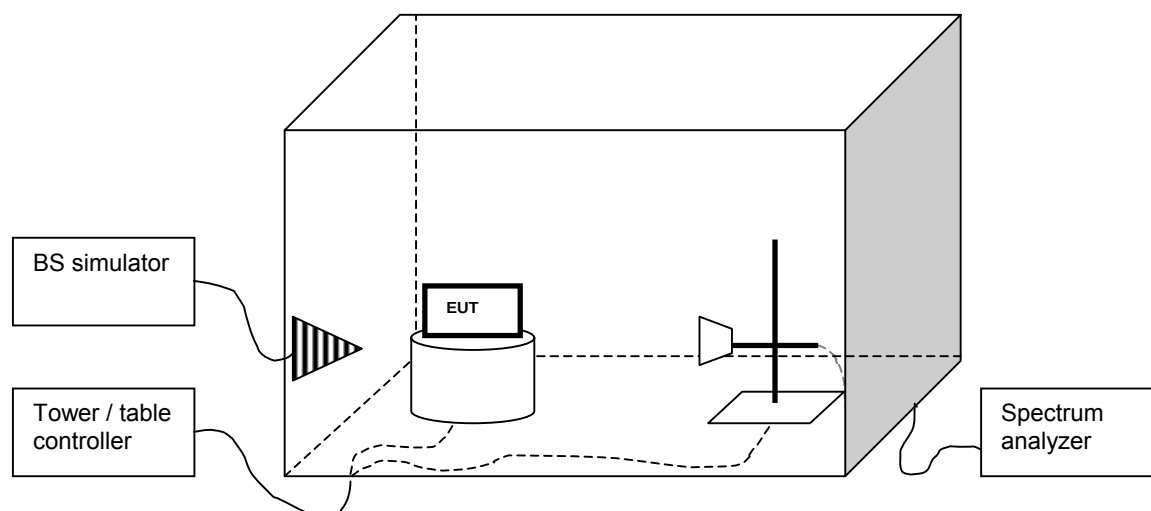
The tests were performed in guidance of CFR 47, part 24 and part 2, ANSI/TIA/EIA-603-A and RSS-133. Deviations, modifications or clarifications (if any) to above mentioned documents are written in each section under "Test method" for each test case.

## 5. Radiated RF output

|                              |                                    |
|------------------------------|------------------------------------|
| EUT                          | RH-36, DUT 10296                   |
| Accessories                  | BL-5C, DUT 10297; ACP-12, DUT10070 |
| Temp, Humidity, Air Pressure | 19 °C, 50 RH%, 980 mbar            |
| Date of measurement          | 15.12.2004                         |
| FCC rule part                | §24.232 (b)                        |
| RSS-133 section              | 6.2                                |
| Measured by                  | Tomi Lipponen                      |

### 5.1. Test setup

The EUT was set on a non-conductive turn table, 80 cm high, in a semi-anechoic chamber with a reflective ground plane. In the corner of the chamber was a communication antenna, which was connected to the BS simulator located in the operators control room. The radiated power from the EUT was measured with an antenna fixed to a antenna tower. The tower and turn table were remotely controlled to turn the EUT, change the antenna polarization and hoist/lower the antenna. The scan height was from 1 to 4 meter. The measured signal was routed from the measuring antenna to the spectrum analyzer. The BS simulator was used to set the TX channel and power level and modulate the TX signal with different bit patterns. The measuring distance was 3 meter.



## 5.2. Test method

- The maximum power level was searched by moving the turn table and the measuring antenna and manipulating the EUT. This level ( $P_{EUT}$ ) was recorded.
- The EUT was replaced with a substituting antenna.
- The substituting antenna was fed with the power ( $P_{Subst\_TX}$ ) giving a convenient reading on the spectrum analyzer. That reading ( $P_{Subst\_RX}$ ) on spectrum analyzer was recorded.

## 5.3. EUT operation mode

|                    | GSM                                              | GPRS | EGPRS |
|--------------------|--------------------------------------------------|------|-------|
| EUT operation mode | TX on, 1 time slot transmission, GMSK modulation | -    | -     |
| EUT channel        | 512, 661, 810                                    | -    | -     |
| EUT TX power level | Maximum                                          | -    | -     |

## 5.4. Limit

| EIRP [W] |
|----------|
| $\leq 2$ |

## 5.5. Results

The formula below was used to calculate the EIRP of the EUT.  $P_{subst\_TX[dBm]}$ ,  $P_{subst\_RX[dBm]}$ ,  $L_{Cable[dB]}$  and  $G_{substitute\_antenna[dBi]}$  factors are combined in one correction factor.

$$P_{EIRP[W]} = \frac{10^{(P_{Subst\_TX[dBm]} + (P_{EUT[dBm]} - P_{Subst\_RX[dBm]}) + G_{Substitute\_antenna[dBi]} - L_{Cable[dB]}) / 10}}{1000}$$

where the variables are as follows:

|                                |                                                                         |
|--------------------------------|-------------------------------------------------------------------------|
| $P_{EUT[dBm]}$                 | Measured power level (from step a in 5.2) from the EUT                  |
| $P_{Subst\_TX[dBm]}$           | Power (from step c in 5.2) fed to the substituting antenna              |
| $P_{Subst\_RX[dBm]}$           | Power (from step c in 5.2) received with the spectrum analyzer          |
| $G_{Substitute\_antenna[dBi]}$ | Gain of the substitutive antenna over isotropic radiator                |
| $L_{Cable[dB]}$                | Loss of the cable between signal generator and the substituting antenna |

**Mode: GSM 1900**

| EUT Channel | P <sub>eut</sub> [dBm] | Correction factor [dB] | EIRP [dBm] | EIRP [W] |
|-------------|------------------------|------------------------|------------|----------|
| 512         | -12.5                  | 42.0                   | 29.5       | 0.891    |
| 661         | -9.1                   | 41.7                   | 32.6       | 1.820    |
| 810         | -10.1                  | 41.6                   | 31.5       | 1.413    |

## 6. Test equipment

Each test equipment is calibrated once a year, except antennas which are calibrated every second year.

### 6.1. Radiated measurements

| #    | Equipment                          | Type                           | Manufacturer         |
|------|------------------------------------|--------------------------------|----------------------|
| 1740 | Digital Radio Communication Tester | CMD 55                         | R&S                  |
| 1875 | Thermo- Hygrograph                 | 00.02520.150700                | Lambrecht            |
| 2004 | Relay Switch Unit                  | RSU                            | R&S                  |
| 2043 | Band Reject Filter                 | WRCA824/849-0,2-6SS            | Wainwright           |
| 2044 | Band Reject Filter                 | WRCA870/915-0,2-6SS            | Wainwright           |
| 2047 | Band Reject Filter                 | WRCC1800/2000-0.2-10SS         | Wainwright           |
| 2048 | Band Reject Filter                 | WRCC1700/1800-0.2-10SS         | Wainwright           |
| 2051 | High Pass Filter                   | 4HC1700-1-KK                   | R&S                  |
| 2116 | Controller                         | EMCO MODEL 2090                | ETS                  |
| 2133 | Power Meter                        | NRVS                           | R&S                  |
| 2134 | Power Sensor                       | NRV-Z32                        | R&S                  |
| 2135 | Coupling and Decoupling Network    | CDN 801-M3                     | LÜTHI                |
| 2138 | Ultra Broadband Antenna            | HL562                          | R&S                  |
| 2144 | Attenuator                         | 6803.17B                       | Huber-Suhner         |
| 2176 | Coupling and Decoupling Network    | CDN 801-M3                     | LÜTHI                |
| 2180 | Digital Radio Communication Tester | CMU200                         | R&S                  |
| 2231 | Band Reject Filter                 | WRCG1947/1953-1940/1960-40/6SS | Wainwright           |
| 2330 | EMI Test receiver                  | ESIB26                         | R&S                  |
| 2334 | GPIB Switch 2 to 1                 | -                              | National Instruments |
| 2347 | Digital Radio Communication Tester | CMU200                         | R&S                  |
| 2348 | Yaesu controller                   | G-1000DXC                      | YAESU                |
| 2349 | Computer controller (Yaesu)        | GS-232B                        | YAESU                |
| -    | RF Emission Software               | ES-K1 v.1.71                   | R&S                  |