

GSM 1900 Test Report RH-12

Test Report no.:	Cph_FCC_0505_01.doc	Date of Report:	02/02/05
Number of pages:	11	Customer's Contact person:	Anders Nielsen
		Responsible Test engineer:	Jesper Nielsen
Testing laboratory:	TCC Copenhagen Nokia Danmark A/S Frederikskaj DK-1790 Copenhagen V Denmark Tel. +45 33 29 29 29 Fax. +45 33 29 20 01 FCC Reg. # 99059, June 2003 IC File # 4820, January 2004 IC File # 4820-1, February 2004	Client:	Nokia Corporation Frederikskaj 1790 COPENHAGEN V DENMARK Tel. +45 33 292929 Fax. +45 33 292934
Tested devices/ accessories:	Phone; RH-12, Battery; BL-5C		
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 Copenhagen.		
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:	02/02/05  Allan Franch Henriksen Test engineer		

CONTENTS

1. Summary of test results.....	3
2. EUT Information.....	3
2.1. EUT description.....	3
3. EUT Test Setup	3
4. Applicable Standards	3
5. Bandedge compliance.....	4
5.1. Test setup	4
5.2. EUT operation mode	4
5.3. Limit.....	5
5.4. Results	5
5.5. Screen shots	5
6. Spurious radiated emission.....	8
6.1. Test setup	8
6.2. Test method	8
6.3. EUT operation mode	9
6.4. Limit.....	9
6.5. Results	9
7. Test equipment	11
7.1. Radiated measurements	11

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	-
§2.1049 (h)	5.6	99% occupied bandwidth	-
§24.238 (a)	6.3	Bandedge compliance	PASS
§24.238 (a), §2.1051	6.3	Spurious emissions at antenna terminals	-
§24.238 (a), §2.1053	6.3	Spurious radiated emission	PASS
§24.235, §2.1055 (a)(1)(b)	7	Frequency stability, temperature variation	-
§24.235, §2.1055 (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-12	-	0730	-	04.44	28883
Battery	BL-5C	0670400363563 L383310603000	4.0	-	-	28870

2.1. EUT description

The EUT is a triple band (900MHz/1800MHz/1900MHz) GSM / EGRPS mobile phone with a camera and supporting bluetooth.

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

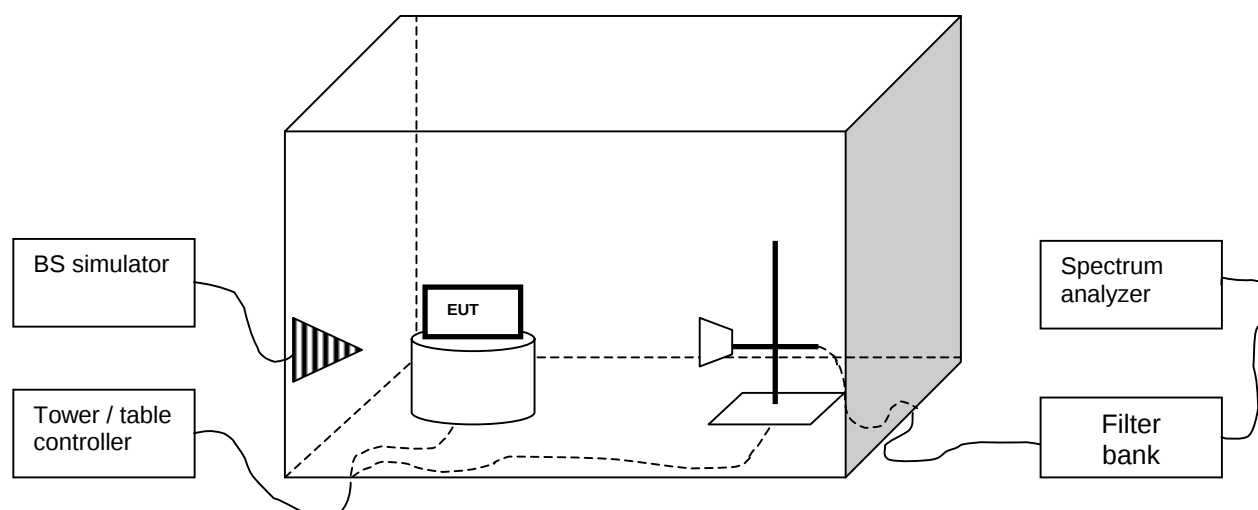
The tests were performed in guidance of CFR 47, part 24 and part 2, ANSI/TIA/EIA-603-A and RSS-133. Deviations, modifications or clarifications (if any) to above mentioned documents are written in each section under "Test method" for each test case.

5. Bandedge compliance

EUT	RH-12 dut#28883		
Accessories	BL-5C dut#28870		
Temp, Humidity, Air Pressure	20.1 °C	38.5 %	1020 mbar
Date of measurement	Feb. 1 st 2005		
FCC rule part	§24.238 (a)		
RSS-133 section	6.3		
Measured by	Jesper Nielsen		
Result	Passed		

5.1. Test setup

The BS simulator was used to set the TX channel and power level and modulate the TX signal with different bit patterns.



The emission at both band edges were searched and maximized by moving the turn table and measuring antenna and manipulating the EUT.

The band edge measurement sweeps were then performed in the position/polarity in which the radiated output power from the EUT was highest.

5.2. EUT operation mode

EUT operation mode GSM	TX on, 1 time slot transmission, PRBS 2E9-1 data stream
EUT operation mode EGPRS	TX on, 2 time slot transmission, PRBS 2E9-1 data stream
EUT channel	See section 7.4
EUT TX power level	Maximum

5.3. Limit

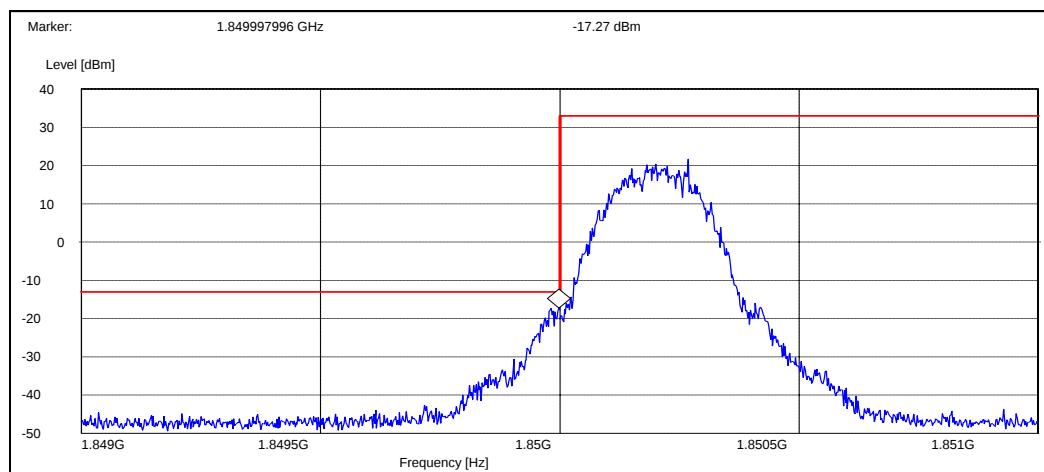
Frequency [MHz]	Level [dBm]
<1850 or 1910<	-13

5.4. Results

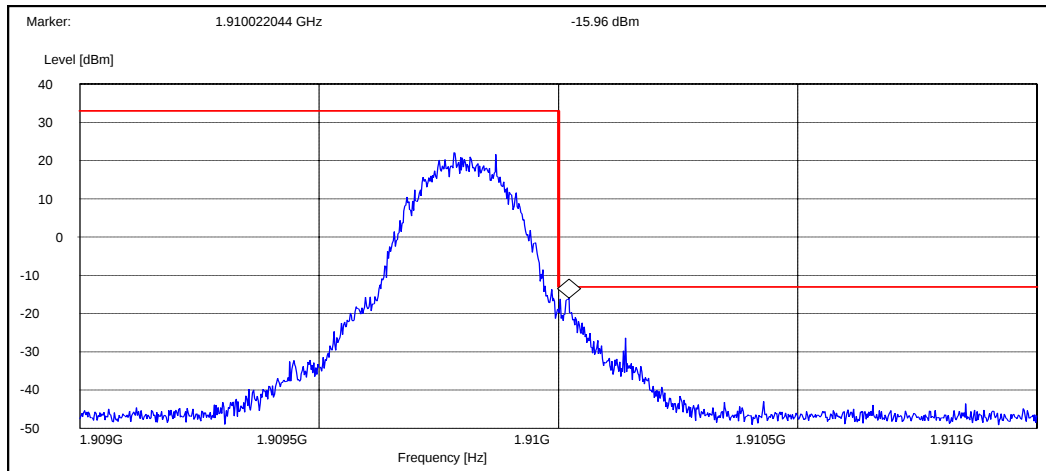
The line in the screen shots is the -13dBm limit line. The results were corrected with measurement path loss set as "offset" in the spectrum analyzer.

EUT Channel	Level [dBm]
512, GSM	-17.27
810, GSM	-15.96
512, EGPRS	-20.04
810, EGPRS	-19.79

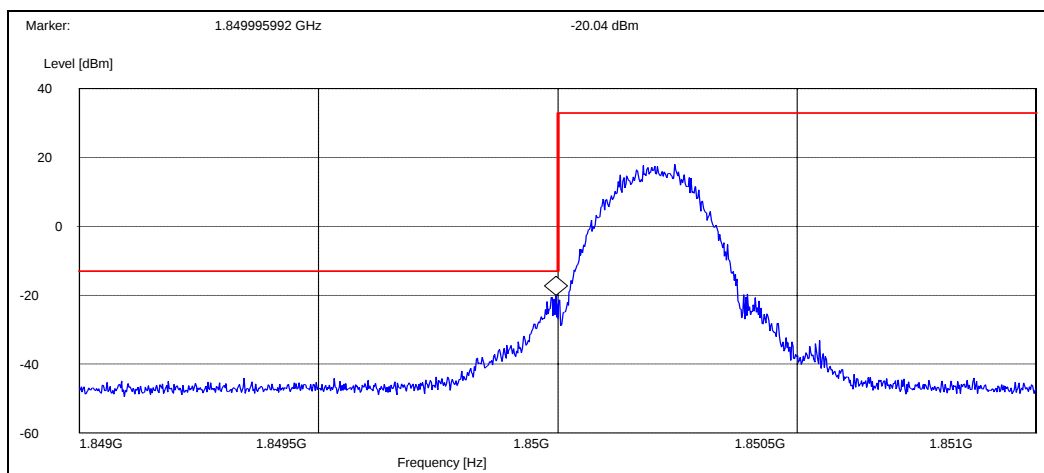
5.5. Screen shots



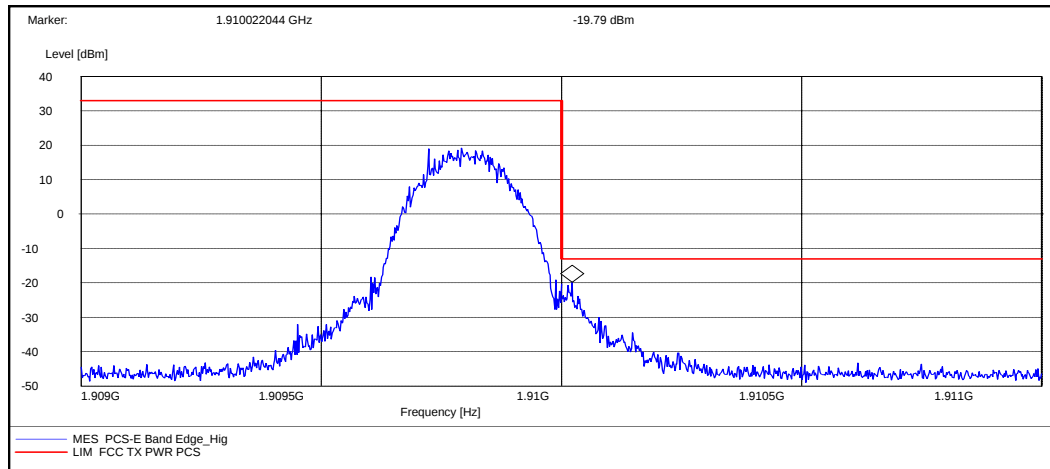
Lower bandedge, channel 512 GSM 3KHz Bw and VBw



Upper bandedge, channel 810 GSM 3KHz Bw and VBw



Lower bandedge, channel 512 EGPRS 3KHz Bw and VBw



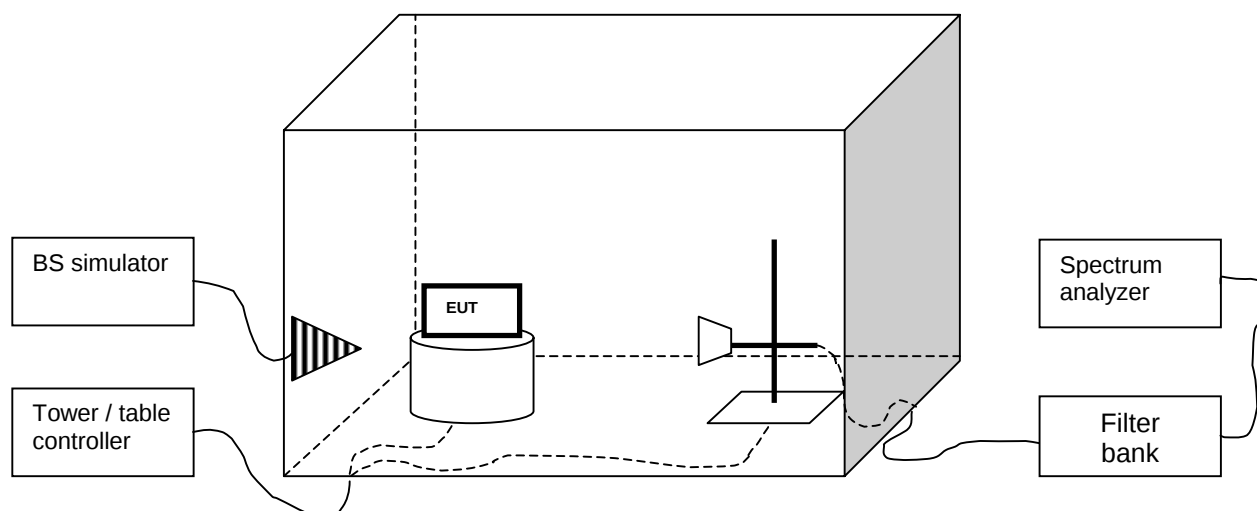
Upper bandedge, channel 810 EGPRS 3KHz Bw and VBw

6. Spurious radiated emission

EUT	RH-12 dut#28883		
Accessories	BL-5C dut#28870		
Temp, Humidity, Air Pressure	20.1 °C	38.5 %	1020 mbar
Date of measurement	Feb. 1 st 2005		
FCC rule part	§24.238 (a), §2.1053		
RSS-133 section	6.3		
Measured by	Jesper Nielsen		
Result	Passed		

6.1. Test setup

A set of LP/HP/BS filters was used to prevent overloading 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 test was done manually.



6.2. Test method

- The emissions were searched and maximized by moving the turn table and measuring antenna and manipulating the EUT.
- All suspicious frequencies with emission levels were recorded.
- The EUT was replaced with a substituting antenna.
- For each frequency recorded, the substituting antenna was fed with the power (from signal generator) giving the same reading as in (b). These power levels were reported.

6.3. EUT operation mode

	GSM/GPRS	EGPRS
EUT operation mode	TX on, 1 time slot transmission GPRS TX on, x time slot transmission	TX on, 2 time slot transmission
EUT channel	661	661
EUT TX power level	Maximum	Maximum

6.4. Limit

Frequency [MHz]	Level [dBm]
30 – 19100	-13

6.5. Results

The formula below was used to calculate the EIRP of the spurious emissions. If there were no emissions closer than 20dB below the limit line, then the emission levels were documented only at the transmitter's mid-channel harmonics.

$$P_{\text{Emission}}[\text{dBm}] = P_{\text{SubstTX}}[\text{dBm}] - L_{\text{Cable}}[\text{dB}] + G_{\text{Antenna}}[\text{dBi}]$$

where the variables are as follows:

$P_{\text{Measured}}[\text{dBm}]$	Measured emission level (from step b in 8.2)
$P_{\text{Subst_TX}}[\text{dBm}]$	Signal generator power (from step d in 8.2) fed to the substituting antenna
$L_{\text{Cable}}[\text{dB}]$	Loss of the cable between antenna and signal generator (from step d in 8.2)
$G_{\text{Antenna}}[\text{dBi}]$	Gain of the substitutive antenna over isotropic radiator

Emission levels, channel 661, GSM

Frequency [MHz]	P _{Measured} [dBm]	P _{Subst TX} [dBm]	L _{Cable} [dB]	G _{Antenna} [dBi]	P _{Emission} [dBm]
3760,00	-51.30	-40.5	8.84	15.80	-33.54
5640,00	-62.48	-52.2	11.48	18.03	-45.65

Emission levels, channel 661, EGPRS

Frequency [MHz]	P _{Measured} [dBm]	P _{Subst TX} [dBm]	L _{Cable} [dB]	G _{Antenna} [dBi]	P _{Emission} [dBm]
3760,00	-57.93	-47.13	8.84	15.80	-40.17
5640,00	-65.59	-55.31	11.48	18.03	-48.76

7. Test equipment

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

7.1. Radiated measurements

Equipment #	Equipment	Type	Serial #	Manufacturer
14993	EMI Test Receiver 9KHz-2750MHz	ESCS30	847124/001	Rohde&Schwarz
15191	Turntable Contoller Unit	G-800SDX	ONO10000	YAESU
14900	Antenna Controller	HD100	100\552	HD GmbH
18792	Multi Device Controller	2090	1606	ETS-EMCO
13829	Turntable Controller	4630-100	100/510	Comtest
14963	RF Preamplifier 100MHz-4GHz (Metal Chassis)	AFS3-00100400	571131	Miteq/NMP Cph
13668	BiLog Antenna 30- 2000MHz	BiLog-CBL6112A	2259	Chase
18861	EMI Test Receiver 20Hz-26,5GHz	ESI	833362/004	Rohde&Schwarz
12679	Dual Log Periodic Antenna 1-26.5 GHz	HL025	-----	Rohde&Schwarz
18860	Ultra Broadband Antenna Ultralog 30- 3000MHz	HL562	100154	Rohde&Schwarz
18773	Shielded Chamber	RFD-100	2420	ETS-Lindgren
18774	Shielded Chamber	RFSD-F/A-100	2425	ETS-Lindgren
18324	High Pass Filter 3GHz SMA f Conn	WHJS3000-10SS	1	Wainwright
14114	Highpass Filter 1000MHz-4500MHz	WHK1000-12SS	1	Wainwright
13918	Highpass Filter 2000-4000MHz 50OHM SMA Conn	WHKS2000-10SS		Wainwright Instruments
13937	Ultra Stable Notch Filter 902,4MHz	WRCA902.4-0.2/40- 6SS		Wainwright Instruments
13936	Ultra Stable Notch Filter 1747,5MHz	WRCD1747.5- 0.2/40-10SS		Wainwright Instruments
16633	Ultra Stable Notch Filter 1880,0MHz	WRCD1880.0- 0.2/40-10SS		Wainwright Instruments