

GSM 1900 Test Report for RM-30

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Number of pages:	14	Customer's Contact person:	Timo Seppala
		Responsible Test engineer:	Ruben Hansen

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 P.O. Box 86 Joensuunkatu 7 FIN-24101 SALO, FINLAND Tel. +358 (0) 7180 08000 Fax. +358 (0) 7180 44277
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Tested devices/ accessories: **Phone; RM-30, Battery; BL-5B**

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: 11/08/04



Allan Franch Henriksen
Test engineer

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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	RM-30	004400/39/163941/4	3058		3.01	28828
Phone	BL-5B	0670455363807 L162C10100746				28829

2.1. EUT description

The EUT is a dual band (900MHz/1800MHz/1900MHz) GSM and E-GPRS mobile phone with a camera.

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.

The test setup photographs are in Appendix A

4. Applicable Standards

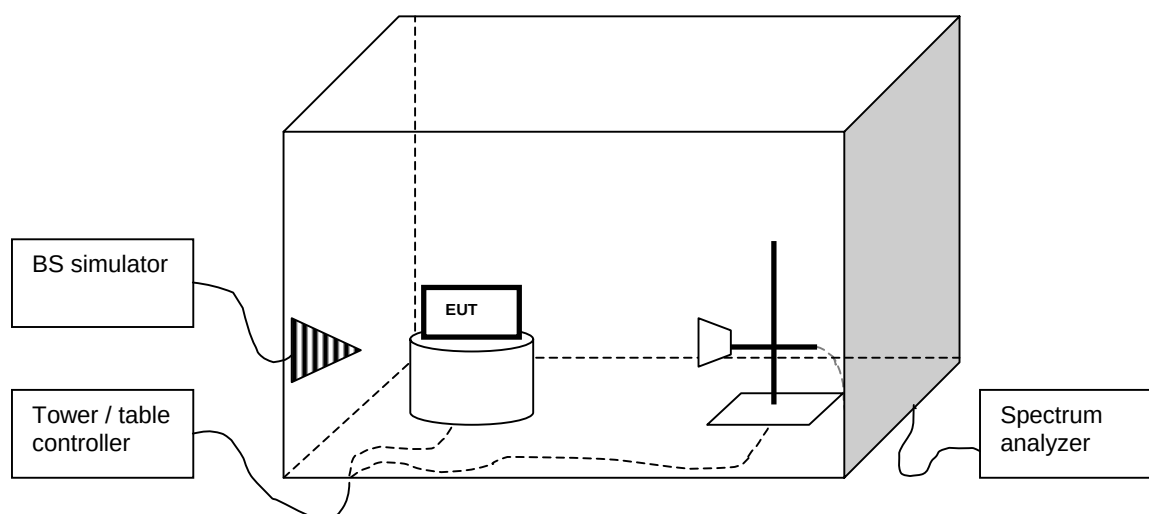
The tests were performed in guidance of CFR 47, part 24 and part 2, ANSI/TIA/EIA-603-A and RSS-133. Deviations, modifications or clarifications (if any) to above mentioned documents are written in each section under "Test method" for each test case.

5. Bandedge compliance

EUT	RM-30 dut#28828		
Accessories	BL-5B dut#28829		
Temp, Humidity, Air Pressure	20.0 °C	34.0 RH%	1014 mbar
Date of measurement	Nov 6 th 2004		
FCC rule part	§24.238 (a)		
RSS-133 section	6.3		
Measured by	Jesper Nielsen		
Result	Passed		

5.1. Test setup

The EUT was set on a non-conductive turntable in a semi anechoic chamber. In the corner of the chamber there was a communication antenna, which was connected to the BS simulator located outside the chamber. 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 and change the antenna polarization. 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.



5.2. Test method

- The EUT and antenna was adjusted to the position/polarity that created the maximum radiated power.
- The maximum radiated power was used as an calibration offset for the spectrum analyzer.
- A screendump of the measurement with a marker set to the highest peak outside the band edge was recorded.

5.3. EUT operation mode

	GSM/GPRS	E-GPRS
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EUT operation mode	TX on, 1 time slot transmission, GSM/GPRS	TX on, 2 time slot transmission, EGPRS
EUT channel	512 and 810	512 and 810
EUT TX power level	0 (Max.)	0 (Max.)

5.4. Limit

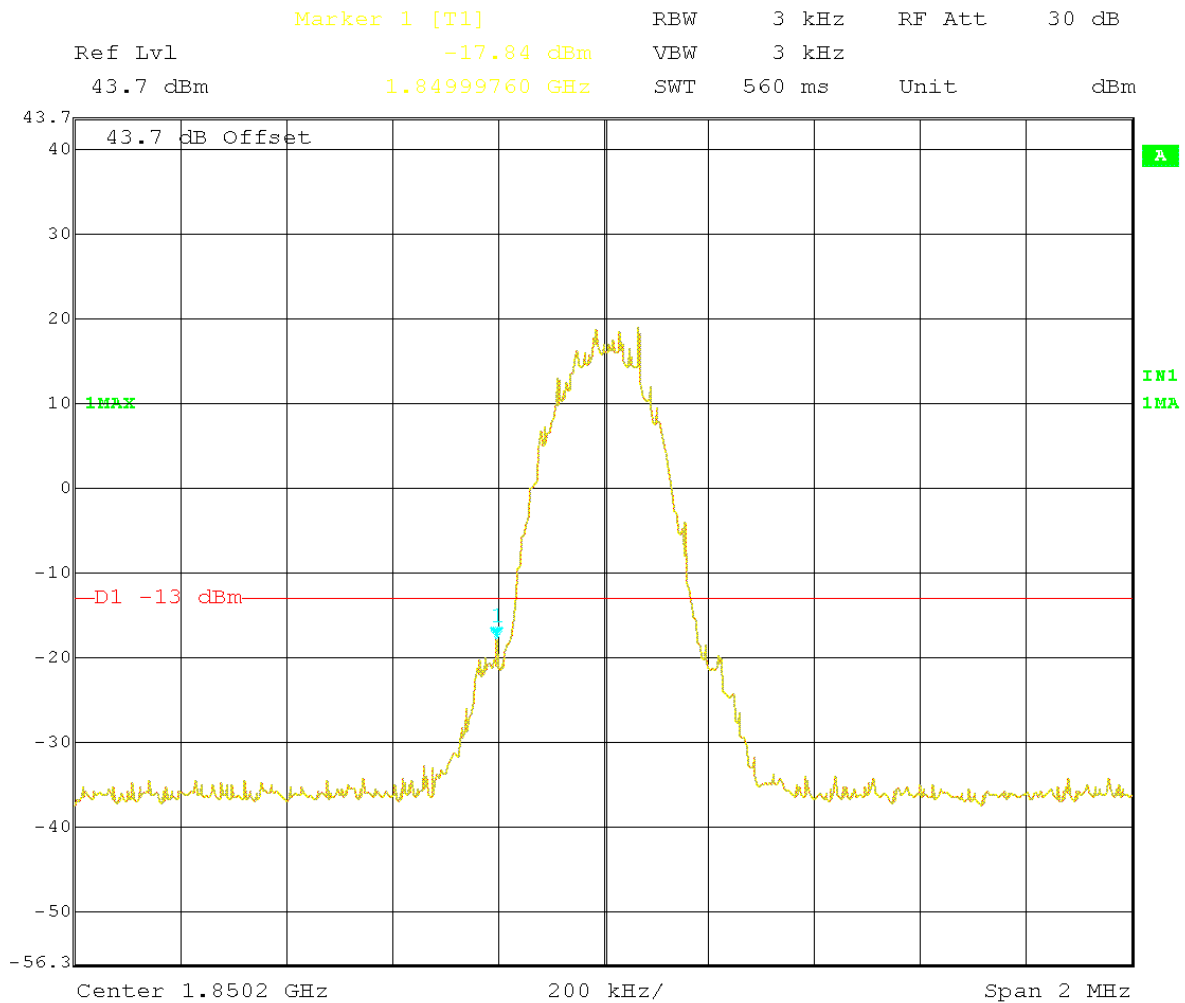
Frequency [MHz]	Level [dBm]
<1850 or 1910<	-13

5.5. Results GSM

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.

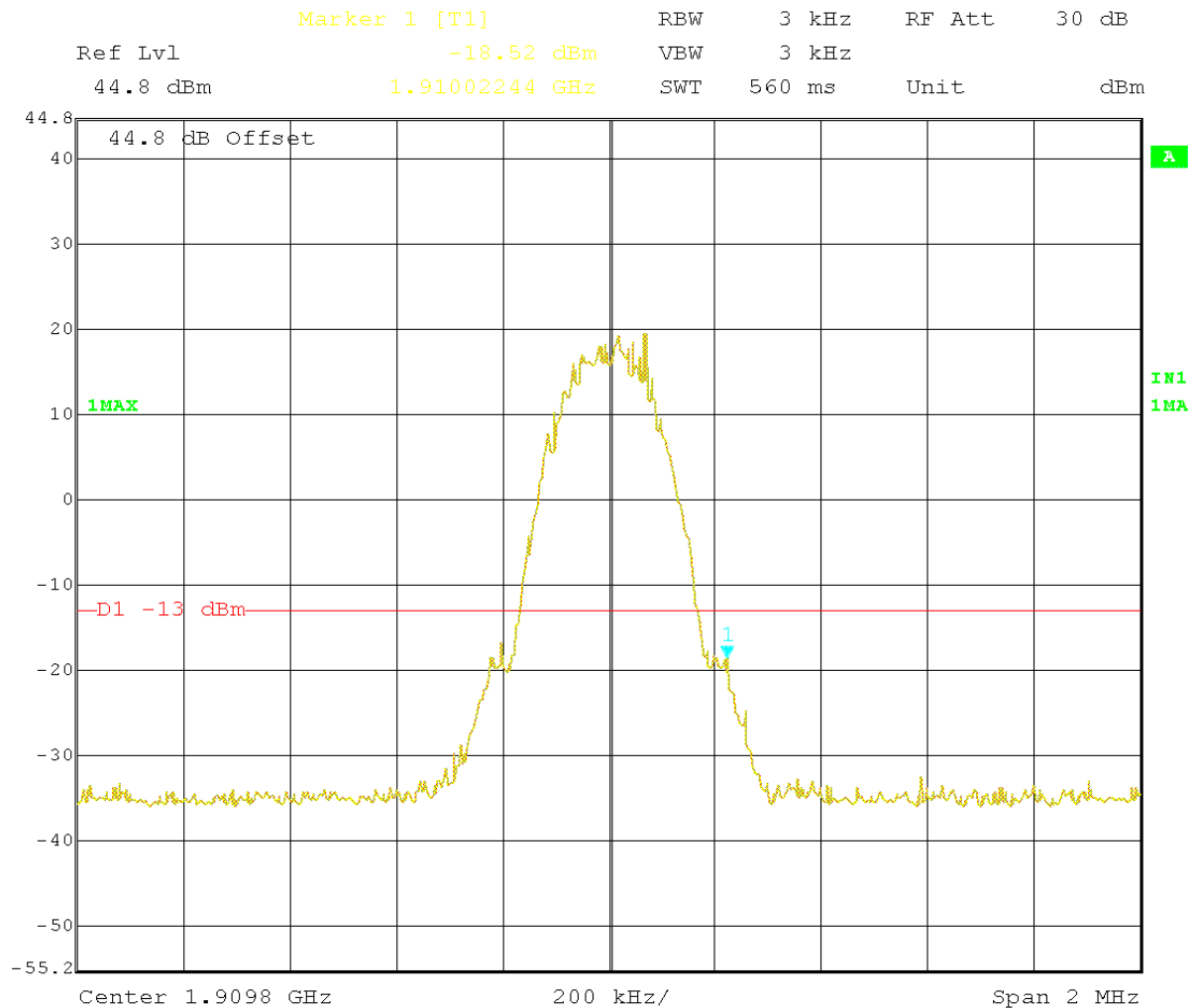
EUT Channel	Level [dBm]
512	-17.84
810	-18.52

5.6. Screen shots



Date: 6.NOV.2004 18:07:41

Lower bandedge, GSM channel 512 RBw 3KHz VBw 3KHz



Date: 6.NOV.2004 18:21:01

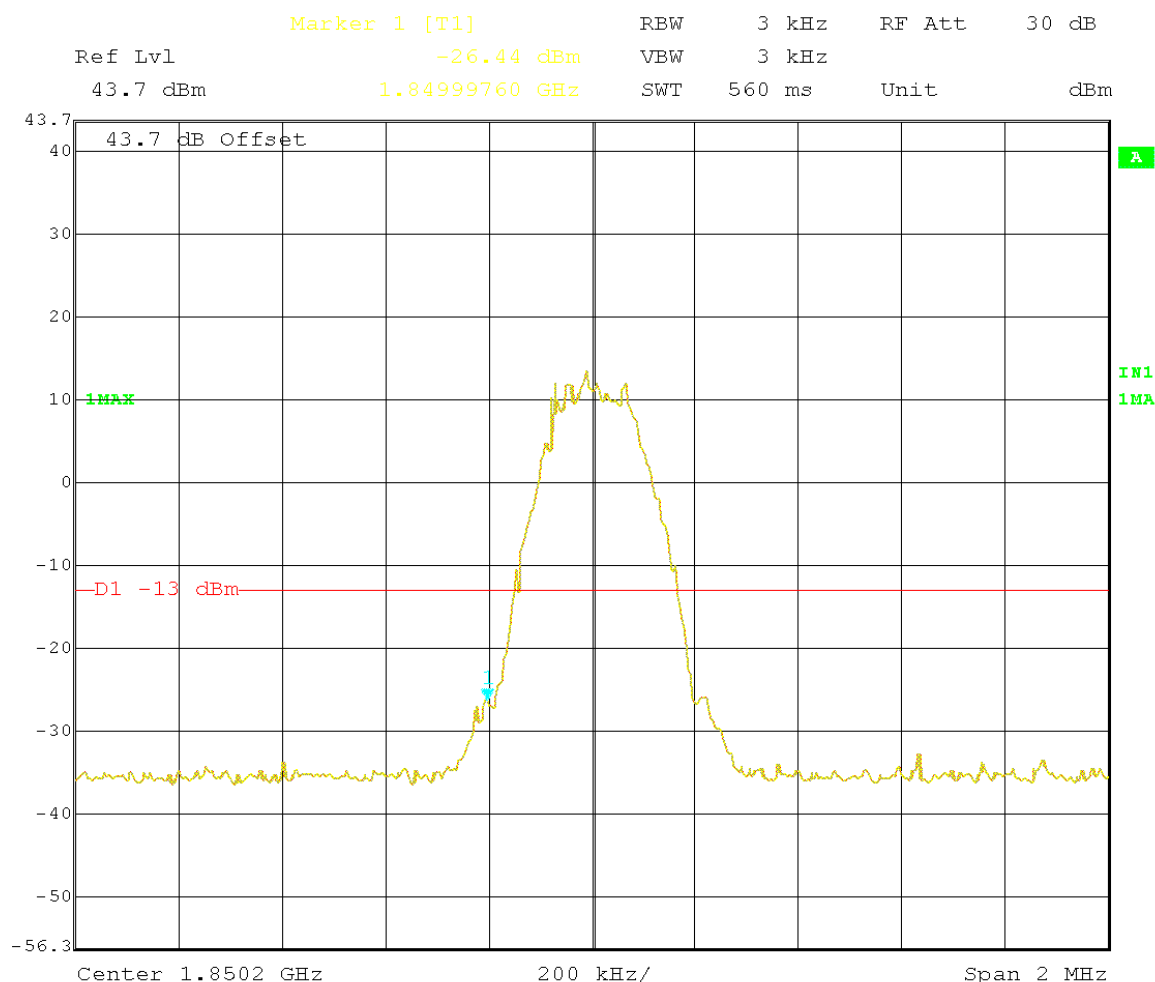
Upper bandedge, GSM channel 810 RBw 3KHz VBw 3KHz

5.7. Results E-GPRS

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.

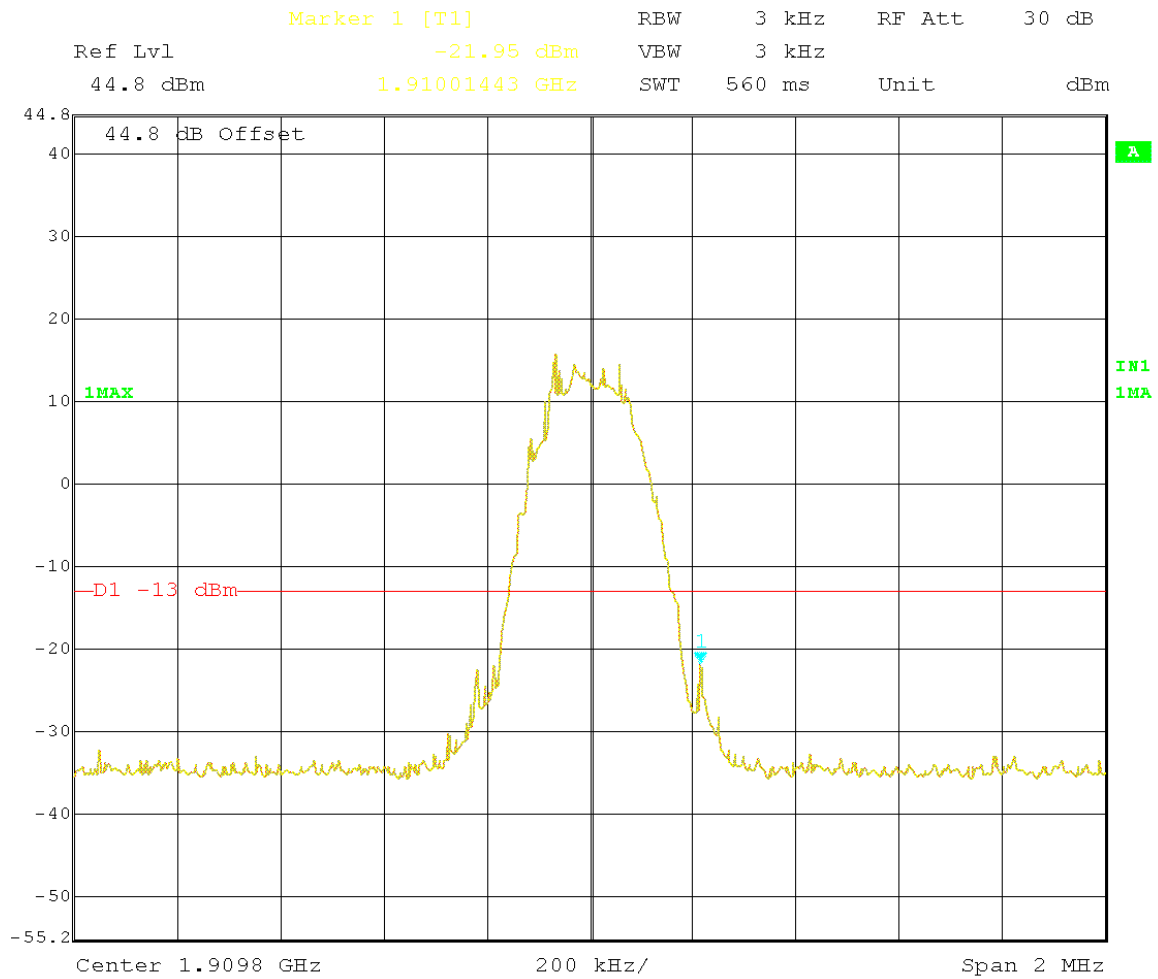
EUT Channel	Level [dBm]
512	-26.44
810	-21.95

5.8. Screen shots



Date: 6.NOV.2004 19:00:09

Picture 5. Lower bandedge, E-GPRS channel 512 RBw 3KHz VBw 3KHz



Date: 6.NOV.2004 19:14:59

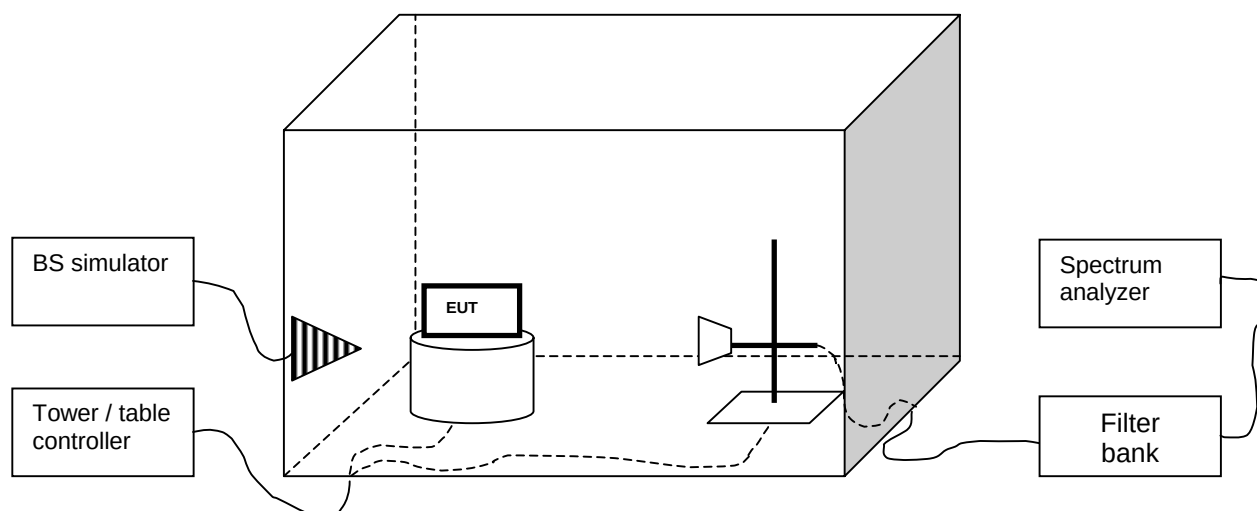
Picture 6. Upper bandedge, E-GPRS channel 810 RBw 3KHz VBw 3KHz

6. Spurious radiated emission

EUT	RM-30 Dut#28828		
Accessories	BL-5B Dut#28829		
Temp, Humidity, Air Pressure	20°C	35RH%	1023mbar
Date of measurement	Nov. 8 th 2004		
FCC rule part	§24.238 (a), §2.1053		
RSS-133 section	6.3		
Measured by	Christian Andersen		
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	EGPRS
EUT operation mode	TX on, 1 time slot transmission, GSM/GPRS modulation	TX on, 2 time slot transmission, EGPRS
EUT channel	661	661
EUT TX power level	0 (Max)	0 (Max)

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.

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

where the variables are as follows:

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

Emission levels, channel 661, GSM/GPRS

Frequency [MHz]	P _{Measured} [dBm]	P _{Subst TX} [dBm]	L _{Cable} [dB]	G _{Antenna} [dBi]	P _{Emission} [dBm]
3760,00	-46.58	-34.5	8.73	15.80	-27,43
5640,00	-49.82	-37.8	11.53	18.03	-31,30

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	-50.84	-38.7	8.73	15.80	-31,63
5640,00	-57	-45.4	11.53	18.03	-38,90

7. Test equipment

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

7.1. Conducted measurements

Equipment #	Equipment	Type	Serial #	Manufacturer
13357	Signal Generator	SMP 02		Rohde & Schwarz
13302	Spectrum Analyzer	8596E		Hewlet Packard
13524	BS Simulator	CMD-55		Rohde & Schwartz
17277	Multimeter	34401A		Agilent
15761	DC Power Supply	E3632A		Hewlet Packard
13371	Temperature chamber	2800		Thermotron
-	RF Attenuator	23-10-34		Weinchel
-	Power Divider	-		Suhner
17796	BS Simulator	4400M		Wavetek
-	Antenna Mast	-		Deisel
14900	Antenna Mast Controller	HD-100		Deisel
15191	Turn Table	G-800SDX		Yaesu
13668	Antenna	CBL6112A		Chase
13935	Two Line Artificial Mains Network	ESH-3-Z5		Rohde & Schwarz
13666	EMI Test Receiver	ESPC		Rohde & Schwarz

7.2. 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-	BiLog-CBL6112A	2259	Chase

	2000MHz			
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