

# EMC Test Report for **RM-31**



**T183 (EN ISO/IEC 17025)**

**CONTENTS**

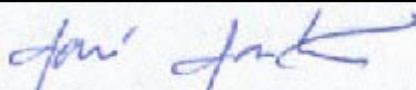
1	CUSTOMER INFORMATION .....	3
2	EUT AND ACCESSORY INFORMATION .....	4
2.1	EUT description .....	4
2.2	EUT and accessories .....	4
3	STANDARDS AND MEASUREMENT METHODS .....	6
4	TEST RESULTS .....	7
4.1	AC powerline conducted emissions .....	7
4.1.1	Limit .....	7
4.1.2	EUT operation mode .....	7
4.1.3	EUT test setup .....	8
4.1.4	Emission measurement data .....	9
4.2	Radiated emissions .....	10
4.2.1	Test method and level, 30 MHz – 8500 MHz .....	10
4.2.2	EUT operation mode .....	11
4.2.3	EUT test setup .....	11
4.2.4	Emission measurement data, 30 MHz – 8500 MHz .....	12

## 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 Lise Meitner Strasse 10 89081 ULM Germany  Tel. +49-731-1754-0 Fax. +49-731-1754-6800
Contact person:	Timo Seppälä
Receipt of EUT:	19.10.2004
Date of testing:	22.,28.10.2004
Date of report:	28.10.2004

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:



Jari Jantunen  
EMC test engineer

## 2 EUT AND ACCESSORY INFORMATION

### 2.1 EUT description

The EUT is a 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.

	Device	Type	S/N	HW	SW	EUT number
<b>EUT</b>	Mobile phone	RM-31	004400381776689	3006	3.01	40091
	Mobile phone	RM-31	004400381775988	3006	3.01	40092
<b>Accessories</b>	Battery	BL-5B	L162C10100700	-	-	40093
	AC charger	ACP-12E	0675294399791L277AA0008495	-	-	40094

**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	40092		
Accessories	40093, 40094		
Temp, Humidity, Air Pressure	21°C	49 % RH	1009 mbar
Date of measurement	28.10.2004		
FCC rule part	§15.107		
ICES-003 section	5.3		
Measured by	Jari Jantunen		
Result	<b>PASS</b>		

#### 4.1.1 Limit

**CISPR 22 Class B limit**

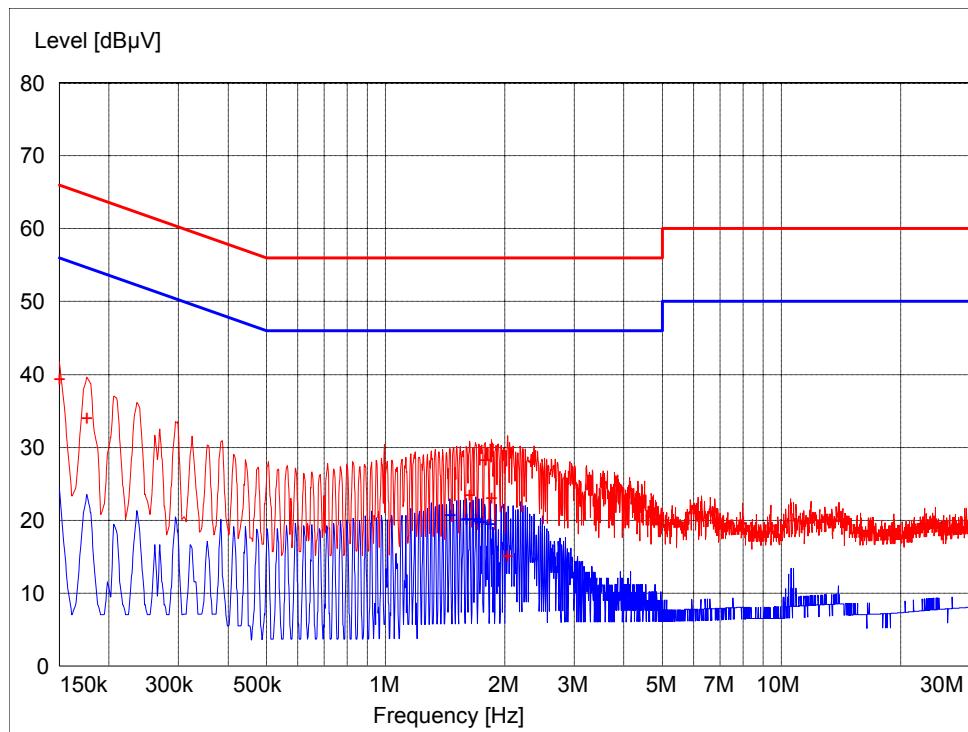
Frequency band (MHz)	Quasi-peak limit (dB $\mu$ V)	Average limit (dB $\mu$ V)
0.15 – 0.5	66 – 56	56 – 46
0.5 – 5	56	46
5 – 30	60	50

#### 4.1.2 EUT operation mode

EUT operation mode	GSM 1900, idle mode
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 dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin	Detector dB	Line	PE
1.455010	20.70	10.40	46.00	25.30	AV	L1	GND
1.603307	20.20	10.40	46.00	25.80	AV	L1	GND
1.692285	20.10	10.40	46.00	25.90	AV	L1	GND
1.721944	19.90	10.40	46.00	26.10	AV	L1	GND
1.751603	19.80	10.40	46.00	26.20	AV	L1	GND
1.840581	19.50	10.40	46.00	26.50	AV	L1	GND

**Table 2 Emission measurement data, quasi peak detector**

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin	Detector dB	Line	PE
0.150000	39.30	10.10	66.00	26.70	QP	N	GND
0.175952	34.00	10.10	64.70	30.70	QP	L1	GND
1.629259	23.50	10.10	56.00	32.50	QP	L1	GND
1.784970	28.30	10.10	56.00	27.70	QP	L1	GND
1.851703	23.00	10.10	56.00	33.00	QP	L1	GND
2.036072	15.00	10.10	56.00	41.00	QP	L1	GND

## 4.2 Radiated emissions

EUT	40092		
Accessories	40093, 40094		
Temp, Humidity, Air Pressure	19°C	48 %RH	1006 mbar
Date of measurement	22.10.2004		
FCC rule part	§15.109		
ICES-003 section	5.5		
Measured by	Jan-Erik Lilja		
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 (dB $\mu$ V/m)
30 – 230	40
230 – 1000	47

#### Class B limit (3m measuring distance)

Frequency band (MHz)	Limit ( $\mu$ V/m)	Limit (dB $\mu$ V/m)	Detector
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1000-8500	500 / 5000	54 / 74	AV / PK
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#### 4.2.2 EUT operation mode

EUT operation mode	GSM 1900, idle mode
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 Highest emission below 1 GHz**

Freq [MHz]	EMI QP [dB $\mu$ V/m]	Polarization
49.478958	17.50	VERTICAL
53.948096	15.90	VERTICAL
79.720040	13.40	VERTICAL
171.343287	8.70	VERTICAL
178.958317	14.00	VERTICAL

**Table 4 Highest emission above 1 GHz**

Freq [MHz]	EMI AVG [dB $\mu$ V/m]	Polarization
3895.79158	35.20	HORIZONTAL