TCC
Oulu

T213 (EN ISO/IEC 17025)

GSM 1900 Test Report for RM-72

Test Report no.:	Oulu_FCC_0504_02.doc	**Date of Report:**	25.01.2005
Number of pages:	7	**Customer's Contact person:**	Stefan Emery
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Tested devices/ accessories:	**Phone RM-72, Battery BL-5C, 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 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:

Juho Tuohino
EMC Laboratory 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	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 (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-72	355386/00/000014/5	0400	-	3.06	28787
Battery	BL-5C	067040063563353212	-	-	-	30313
AC-Charger	ACP-12	047982	1.3	-	-	30100

2.1. EUT description

The EUT is a dual band (850MHz/1800MHz/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.
The test setup photograph 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.

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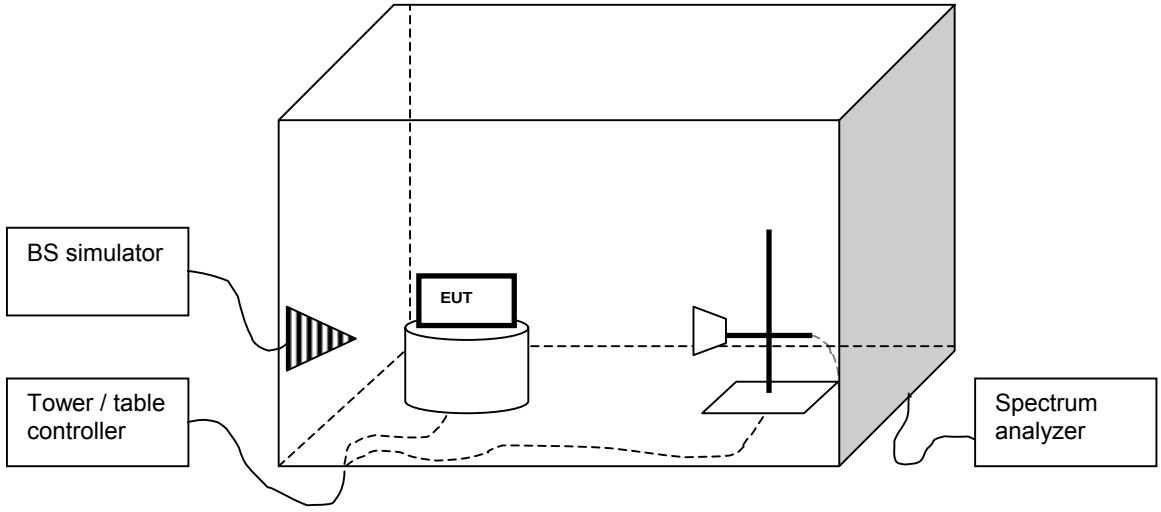
5. Radiated RF output

EUT	RM-72 28787		
Accessories	BL-4C 30277, ACP-12 0100		
Temp, Humidity, Air Pressure	20 ºC	48 RH%	1029 mbar
Date of measurement	25.01.2004		
FCC rule part	§24.232 (b)		
RSS-133 section	6.2		
Measured by	Juho Tuohino		

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 operaters 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 heigth 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.



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5.2. Test method

a) 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.

b) The EUT was replaced with a substituting antenna.

c) 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	EGPRS
EUT operation mode	TX on, 1 time slot transmission, GMSK modulation	TX on, 2 time slot transmission, 8PSK modulation
EUT channel	512, 661, 810	512, 661, 810
EUT TX power level	0 (+30dBm)	0 (+30dBm)

5.4. Limit

EIRP [W]
= 2

5.5. Results

The formula below was used to calculate the EIRP of the EUT.

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

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

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Mode: GSM 1900

EUT Channel	P eut [dBm]	P subst TX [dBm]	P subst RX [dBm]	Cable Loss [dB]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [W]
512	0.70	10	-32.30	12.6	0.7	31.10	1.288
661	-2.00	10	-33.30	12.7	1.0	29.60	0.912
810	-3.50	10	-33.80	12.8	1.4	28.90	0.776

Mode: GPRS

EUT Channel	P eut [dBm]	P subst TX [dBm]	P subst RX [dBm]	Cable Loss [dB]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [W]
512	-4.62	10	-34.96	12.6	0.7	28.44	0.698
661	-6.16	10	-35.38	12.7	1.0	27.52	0.565
810	-7.28	10	-35.69	12.8	1.4	27.01	0.502

Mode: E-GPRS

EUT Channel	P eut [dBm]	P subst TX [dBm]	P subst RX [dBm]	Cable Loss [dB]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [W]
512	-1.60	10	-33.45	12.6	0.7	29.95	0.989
661	-3.20	10	-33.90	12.7	1.0	29.00	0.794
810	-4.42	10	-34.26	12.8	1.4	28.44	0.698

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6. Test equipment

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

6.1. Conducted measurements

Equipment #	Equipment	Type	Serial #	Manufacturer
450113	Two Line V-Network	ESH3-Z5		R&S
590230	Impulse Limiter	ESH3-Z2		R&S
640018	AC Power Source	6811B		Agilent
720017	EMI Test Receiver	ESMI-RF53		R&S
210282	Radio Communication Tester	CMU200		R&S

6.2. Radiated measurements

Equipment #	Equipment	Type	Serial #	Manufacturer
110167	Signal Generator	SMR27		R&S
550089	Log. Per. Anten	HL025		R&S
550179	Mast	7-TR		EMCO
560178	Signal Switching Unit	EMCSSU		Orbis
590165	Band Reject Filter	WRCA836.0		Wainwright
590166	Ultra St. Notch Filter	WRCD1880.0		Wainwright
590167	Ultra St. Notch Filter	WRCD1747		Wainwright
590168	Band Reject Filter	WRCA902.0		Wainwright
610406	Power Supply	EL302D		Tti
720061	EMI Test Receiver	ESI26		R&S
210157	Radio Communication Tester	CMU200		R&S
450127	Two Line V-Network	3810/2		EMCO
450128	Two Line V-Network	3810/2		EMCO
540154	Power Meter	E4416A		HP
540156	Power Sensor	E9327A		HP
550114	Antenna	CBL6143		Schaffner
550130	Mast	2075-2		EMCO
710096	Anechoic chamber	RFD-F/A-10		ETS
720085	Multi-Device Controller	2090		EMCO
720086	Turntable	2088-0.63		EMCO
410420	Multimeter	83-3		Fluke

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