TCC
Nokia

T117 (EN ISO/IEC 17025)

GSM 850 Test Report for RM-68

Test Report no.:	Salo_FCC_0503_04.doc	**Date of Report:**	20.01.2005
Number of pages:	8	**Customer's Contact person:**	Ulla Valjakka
		Responsible Test engineer:	Kai Uusitalo
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 P.O. Box 86 Joensuunkatu 7 FIN-24101 SALO, FINLAND Tel. +358 (0) 7180 08000 Fax. +358 (0) 7180 44277
Tested devices/ accessories:	**Phone RM-68 / 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:

20-01-2005

Kai Uusitalo
Senior Design Engineer, EMC

CONTENTS

FCC IC: PYARM-68
IC: 661V-RM68

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

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-68	004400/56/160026/1	2140	-	4.241	10298
Battery	BL-5C	0670400363563L426220609195	-	-	-	10289
AC- Charger	ACP-12E	0675294409049L293011322238	1.3	0.2	-	10262

2.1. EUT description

The EUT is triple 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.

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.

FCC IC: PYARM-68
IC: 661V-RM68

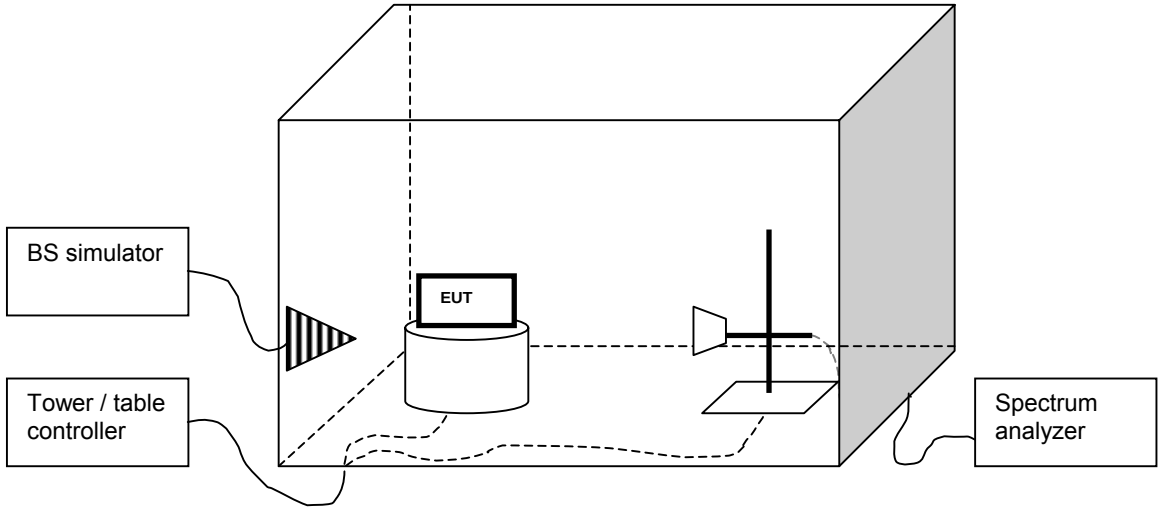
TCC Nokia Salo Laboratory
P.O. Box 86
Joensuunkatu 7H / Kiila 1B
FIN-24101 SALO, FINLAND
Tel. +358 (0) 7180 08000
Fax. +358 (0) 7180 45220

5. Radiated RF output

EUT	RM-68, DUT 10298
Accessories	BL-5C, DUT 10289; ACP-12, DUT10262
Temp, Humidity, Air Pressure	19 ºC, 50 RH%, 980 mbar
Date of measurement	04.01.2005
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 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.



FCC IC: PYARM-68
IC: 661V-RM68

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

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	GPRS	EGPRS
EUT operation mode	TX on, 1 time slot transmission, GMSK modulation	TX on, 2 time slot transmission, 8PSK modulation	TX on, 1 time slot transmission, 8PSK modulation
EUT channel	128, 190, 251	128, 190, 251	128, 190, 251
EUT TX power level	Maximum	Maximum	Maximum

5.4. Limit

ERP [W]
≤ 8

5.5. Results

The formula below was used to calculate the ERP 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

FCC IC: PYARM-68
IC: 661V-RM68

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

Mode: GSM 850, Flip closed

EUT Channel	P eut [dBm]	Correction factor [dB]	ERP [dBm]	ERP [W]
128	-5.7	32.0	26.30	0.427
190	-3.1	31.7	28.60	0.724
251	-1.5	32.2	30.70	1.175

Mode: GSM 850, Flip open

EUT Channel	P eut [dBm]	Correction factor [dB]	ERP [dBm]	ERP [W]
128	-4.9	32.0	27.10	0.513
190	-2.9	31.7	28.80	0.759
251	-1.7	32.2	30.50	1.122

Mode: GPRS 850, Flip closed

EUT Channel	P eut [dBm]	Correction factor [dB]	ERP [dBm]	ERP [W]
128	-8.6	32.0	23.40	0.219
190	-6.0	31.7	25.70	0.372
251	-5.5	32.2	26.74	0.472

Mode: GPRS 850, Flip open

EUT Channel	P eut [dBm]	Correction factor [dB]	ERP [dBm]	ERP [W]
128	-8.3	32.0	23.70	0.234
190	-6.1	31.7	25.56	0.360
251	-6.8	32.2	25.38	0.345

FCC IC: PYARM-68
IC: 661V-RM68

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

Mode: E-GPRS 850, Flip closed

EUT Channel	P eut [dBm]	Correction factor [dB]	ERP [dBm]	ERP [W]
128	-9.8	32.0	22.23	0.167
190	-6.7	31.7	25.02	0.318
251	-7.5	32.2	24.70	0.295

Mode: E-GPRS 850, Flip open

EUT Channel	P eut [dBm]	Correction factor [dB]	ERP [dBm]	ERP [W]
128	-9.7	32.0	22.27	0.169
190	-7.2	31.7	24.48	0.281
251	-8.7	32.2	23.50	0.224

FCC IC: PYARM-68
IC: 661V-RM68

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

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

FCC IC: PYARM-68
IC: 661V-RM68

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