

FCC Part 15B Compliance Test Report

Test Report no.:	Tre_FCC_0537_05.doc	Date of Report:	3.10.2005
Number of pages:	12	Customer's Contact person:	Alison Kingston
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FCC listing no.:	94436		
IC recognition no.:	3608		
Tested devices/ accessories:	GSM phone RM-99 / Battery BL-5C, AC-charger AC-4, Memory card MU-30, Laptop IBM Thinkpad T22, AC adapter 02K6543, Printer HP deskjet 1600CC3540A, Digital camera FUJI DS-7, Serial cable for camera, Parallel cable for printer		
FCC ID:	QFXRM-99	IC:	661Z-RM99
Supplement reports:	-		
Testing has been carried out in accordance with:	CFR 47, FCC rules Part 15 Subpart B, ANSI C63.4 (2003), ICES-003, CISPR 22 and IC standards RSS-132, RSS-133 and RSS-210. Deviations, modifications or clarifications (if any) to above mentioned documents are written in each section under "Test method and limit".		
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 Nokia.		
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 signature for the contents:			

Jari Jantunen, System Manager

1. Summary for FCC Part 15B Compliance Test Report

Date of receipt	12.9.2005
Testing completed	14.9.2005
The customer's contact person	Alison Kingston
Test Plan referred to	\EMC\TESTPLAN\
Notes	-
Document name	T:\Projects\RM-99\EMC\Results\FCC\Tre_FCC_0537_05.doc

1.1. EUT and Accessory Information

The EUT is a triple band (GSM900/1800/1900) mobile phone with GPRS, EGPRS and Bluetooth. GSM band is tested in TX/RX mode. Bluetooth is tested with maximum rated TX power.

Product	Type	SN	HW	MV	SW	DUT
GSM phone	RM-99	004400731614614	5601	-	2.0531.5.1	40335
Battery	BL-5C	M034111101614	-	-	-	40337
AC-Charger	AC-4	-	1.1	1.0	-	40341
Memory Card	MU-30	-	-	-	-	40376
Data cable	CA-53	-	-	-	-	40339
Laptop	IBM Thinkpad T22	555V2PT	-	-	-	40201
AC Adapter	02K6543	-	-	-	-	40202
Printer	HP deskjet 1600CC3540A	USB8302546	-	-	-	40077
Digital camera	FUJI DS-7	7102516	-	-	-	40076
Serial cable for camera	-	-	-	-	-	40088
Parallel cable for printer	-	-	-	-	-	40087

1.2. Summary of Test Results

GSM 1900:

Section in CFR 47	Section in ICES-003 (RSS-133)	Name of the test	Result
15.107, a	5.3	AC powerline conducted emissions	PASSED
15.109, a	5.5 (9)	Radiated emissions	PASSED

Bluetooth:

Section in CFR 47	Section in ICES-003	Name of the test	Result
15.107, a	5.3	AC powerline conducted emissions	PASSED
15.109, a	5.5	Radiated emissions	PASSED

PASSED

The EUT complies with the essential requirements in the standard.

FAILED

The EUT does not comply with the essential requirements in the standard.

NP

The test was not performed by the TCC Nokia Tampere Laboratory.

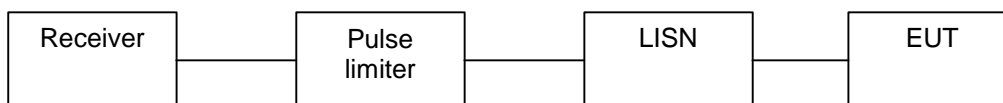
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2. AC powerline conducted emissions (FCC §15.107, ICES-003 section 5.3)

EUT with DUT number	RM-99 DUT 40335
Accessories with DUT numbers	BL-5C DUT 40337, AC-4 DUT 40341, CA-53 DUT 40339, MU-30 DUT 40376, IBM Thinkpad T22 DUT 40201, 02K6543 DUT 40202, HP deskjet 1600CC3540A DUT 40077, FUJI DS-7 DUT 40076, Serial cable for camera DUT 40088, Parallel cable for printer DUT 40087
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	GSM 1900 TX on, channel 661
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	18 / 51 / 100.1
Date of measurements	14.9.2005
Measured by	Jari Jantunen

2.1. Test setup



2.2. Test method and limit

The measurement is made according to ANSI C63.4-2003 as follows:

The EUT is placed on a wooden table 80 cm above the reference groundplane.

The EUT is connected via LISN to a test power supply.

The measurement results are obtained as described below:

$$U [dB\mu V] = U_{RX} + A_{TOT}$$

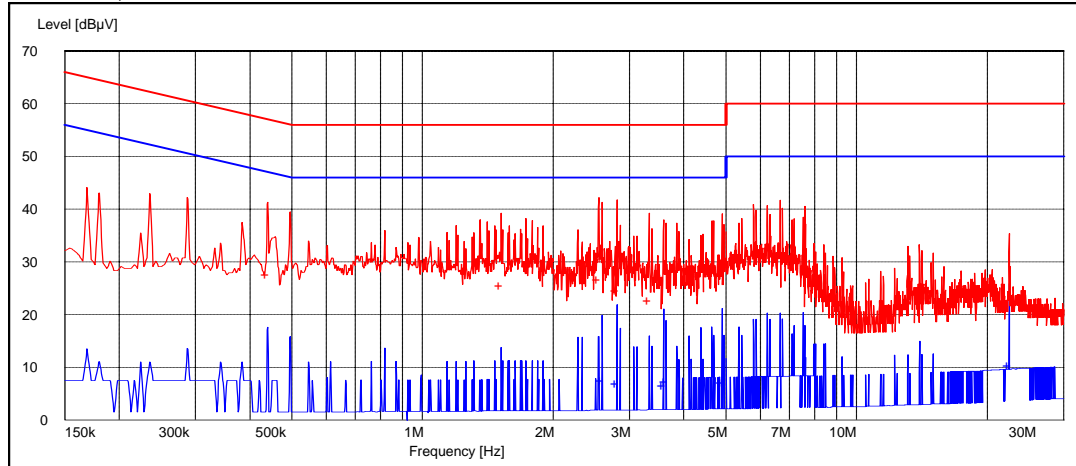
Where U_{RX} is receiver reading and A_{TOT} is total correction factor including cable and pulse limiter attenuations.

CISPR 22 Class B limits

Frequency range [MHz]	Quasi peak limit [dBμV]	Average limit [dBμV]
0.15 - 0.5	66 - 56	56 - 46
0.5 - 5	56	46
5 - 30	60	50

2.3. GSM 1900 Test results

TX mode, channel 661



Quasi peak (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Line	Result
0.439178	27.70	L1	PASSED
1.518036	25.60	N	PASSED
2.547094	26.70	L1	PASSED
2.595190	30.70	N	PASSED
2.805611	24.70	L1	PASSED
3.328657	22.70	N	PASSED

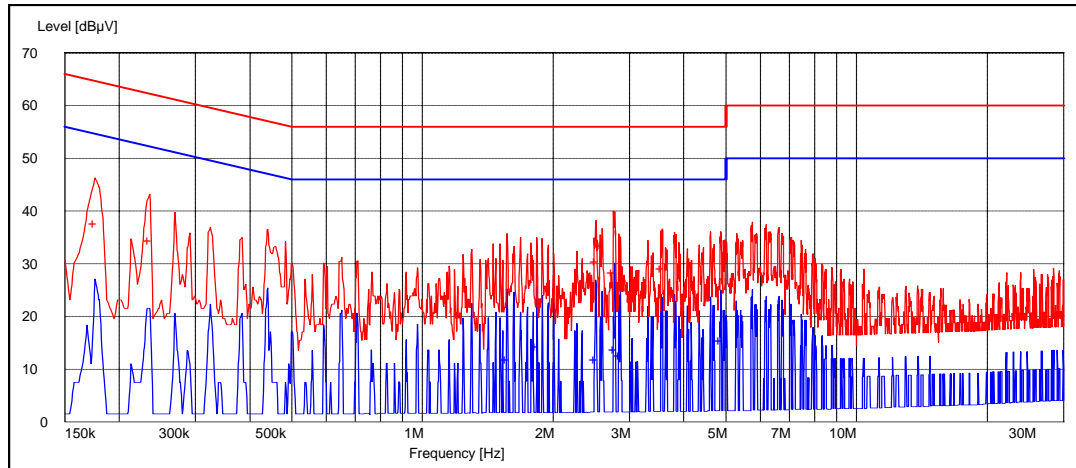
Average (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Line	Result
2.595190	7.70	L1	PASSED
2.805611	7.10	L1	PASSED
3.593186	6.60	L1	PASSED
3.641283	7.40	L1	PASSED
4.903808	7.30	L1	PASSED
22.484970	10.40	L1	PASSED

2.4. Bluetooth Test results

2.5. GFSK modulation, PRBS packet type

Channel 40



Quasi peak (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Line	Result
0.175952	37.80	L1	PASSED
0.235271	34.50	L1	PASSED
2.511022	30.50	L1	PASSED
2.595190	33.50	L1	PASSED
2.751503	28.40	L1	PASSED
3.569138	29.30	L1	PASSED

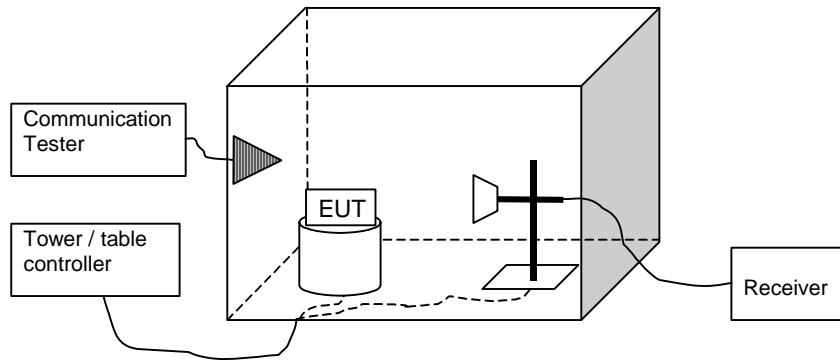
Average (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Line	Result
1.566232	11.90	L1	PASSED
1.833166	14.40	L1	PASSED
2.505010	11.90	L1	PASSED
2.775551	13.90	N	PASSED
2.859719	12.60	L1	PASSED
4.867735	15.50	L1	PASSED

3. Radiated emissions
(FCC §15.109, ICES-003 section 5.5, RSS-132 6.6, RSS-133 9)

EUT with DUT number	RM-99 DUT 40335
Accessories with DUT numbers	BL-5C DUT 40337, AC-4 DUT 40341, CA-53 DUT 40339, MU-30 DUT 40376, IBM Thinkpad T22 DUT 40201, 02K6543 DUT 40202, HP deskjet 1600CC3540A DUT 40077, FUJI DS-7 DUT 40076, Serial cable for camera DUT 40088, Parallel cable for printer DUT 40087
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23 / 44 / 100.1
Date of measurements	14.9.2005
Measured by	Jari Jantunen

3.1. Test setup



3.2. Test method and limit

The measurement is made according to ANSI C63.4-2003as follows:

The measurement is performed in the Semi-Anechoic Chamber with conducting metal floor.

The measurement distance is 3 m.

The EUT is placed on a nonconductive plate at 80 cm height.

For each suspected frequency, the turntable is rotated 360 degrees and antenna is scanned from 1 to 4 m. This is repeated for both horizontal and vertical receive antenna polarizations.

The emissions less than 20 dB below the permissible value are reported.

The measurement results are obtained as described below:

$$E [\mu V/m] = U_{RX} + A_{TOT}$$

Where U_{RX} is receiver reading and A_{TOT} is total correction factor including cable loss, antenna factor and preamplifier gain ($A_{TOT} = L_{CABLES} + AF - G_{PREAMP}$).

CISPR 22 and FCC Part 15 Class B limits (3 m measurement distance)

Frequency range [MHz]	Quasi peak limit [dB μ V/m]	Average limit [dB μ V/m]	Peak limit [dB μ V/m]
30 - 230	40	-	-
230 - 1000	47	-	-
Above 1000	-	54	74

3.3. GSM 1900 Test results

RX mode, channel 512

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Polarisation	Result
3860.000000	41.50	118.85	43.80	-2.30	VERTICAL	PASSED
7720.000000	46.30	206.54	42.10	4.20	HORIZONTAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Polarisation	Result
3860.000000	28.80	27.54	31.10	-2.30	VERTICAL	PASSED
7720.000000	33.70	48.42	29.50	4.20	HORIZONTAL	PASSED

RX mode, channel 661

Quasi peak (RBW: 120 kHz)

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Polarisation	Result
49.578958	18.50	8.41	53.60	-35.10	VERTICAL	PASSED
55.571944	23.90	15.67	62.20	-38.30	VERTICAL	PASSED
645.790581	18.80	8.71	44.30	-25.50	VERTICAL	PASSED
897.997595	34.50	53.09	56.90	-22.40	VERTICAL	PASSED

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Polarisation	Result
3920.000000	41.20	114.82	43.20	-2.00	VERTICAL	PASSED
7840.000000	46.40	208.93	41.80	4.60	HORIZONTAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Polarisation	Result
1166.332665	24.60	16.98	44.30	-19.70	VERTICAL	PASSED
1260.019038	37.20	72.44	56.40	-19.20	VERTICAL	PASSED
2933.365731	31.80	38.90	37.20	-5.40	VERTICAL	PASSED
7989.979960	32.40	41.69	27.50	4.90	HORIZONTAL	PASSED

RX mode, channel 810

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Polarisation	Result
3980.000000	46.40	208.93	48.10	-1.70	HORIZONTAL	PASSED
7960.000000	46.90	221.31	42.10	4.80	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Polarisation	Result
3980.000000	29.80	30.90	31.50	-1.70	HORIZONTAL	PASSED
7960.000000	34.20	51.29	29.40	4.80	HORIZONTAL	PASSED

3.4. Bluetooth Test results

TX mode, channel 0

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Polarisation	Result
4804.000000	59.80	977.24	60.10	-0.30	HORIZONTAL	PASSED
7206.000000	50.60	338.84	47.60	3.00	VERTICAL	PASSED
9608.000000	48.60	269.15	39.30	9.30	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Polarisation	Result
4804.000000	51.10	358.92	51.40	-0.30	HORIZONTAL	PASSED
7206.000000	36.70	68.39	33.70	3.00	VERTICAL	PASSED
9608.000000	35.20	57.54	25.90	9.30	VERTICAL	PASSED

TX mode, channel 40

Quasi peak (RBW: 120 kHz)

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Polarisation	Result
109.118236	25.00	17.78	59.40	-34.40	HORIZONTAL	PASSED
121.823246	27.10	22.65	60.70	-33.60	VERTICAL	PASSED
245.791784	28.00	25.12	62.00	-34.00	HORIZONTAL	PASSED

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Polarisation	Result
4803.603206	41.10	113.50	41.40	-0.30	HORIZONTAL	PASSED
4883.767535	54.30	518.80	55.00	-0.70	HORIZONTAL	PASSED
4946.393788	43.90	156.68	44.20	-0.30	VERTICAL	PASSED
7325.651303	49.60	302.00	46.20	3.40	VERTICAL	PASSED
17998.491984	57.30	732.82	35.00	22.30	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Polarisation	Result
4883.767535	44.00	158.49	44.70	-0.70	HORIZONTAL	PASSED
4945.393788	29.60	30.20	29.90	-0.30	VERTICAL	PASSED
7325.651303	36.60	67.61	33.20	3.40	VERTICAL	PASSED
17993.991984	43.50	149.62	21.40	22.10	VERTICAL	PASSED

TX mode, channel 78

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Polarisation	Result
4960.000000	54.90	555.90	55.00	-0.10	VERTICAL	PASSED
7440.000000	49.60	302.00	45.20	4.40	VERTICAL	PASSED
9920.000000	48.10	254.10	38.90	9.20	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Polarisation	Result
4960.000000	45.40	186.21	45.50	-0.10	VERTICAL	PASSED
7440.000000	37.60	75.86	33.20	4.40	VERTICAL	PASSED
9920.000000	34.80	54.95	25.60	9.20	VERTICAL	PASSED

4. Test Equipment

4.1. Conducted measurements

Eq. No	Equipment	Type	Manufacturer	Used in
TM37610	Spectrum analyzer	FSU	R&S	15C,22/24
TM37678	Radio communication tester	CMU-200	R&S	15C,22/24
	Attenuator 10 dB	6251.17.A	Huber+Suhner AG	15C,22/24
TM22901	Step attenuator 110dB	8496A	Agilent	15C,22/24
TM37499	Power splitter	11667A	Agilent	15C,22/24
	Temperature chamber	VT4002	Vötsch	15C,22/24
TM38112	DC power supply	6632A	Agilent	15C,22/24
TM38111	Multimeter	34401A	Agilent	15C,22/24
TM38845	EMI receiver	ESI 40	R&S	15B,15C
TM37773	Radio communication tester	CMU-200	R&S	15B,15C
TM38631	Signal generator	83640L	Agilent	15B,15C
TM38114	DC power supply	6632A	Agilent	15B,15C
TM22835	Multimeter	87	Fluke	15B,15C
TM30600	Pulse Limiter	ESH3-Z2	R&S	15B,15C
TM26490	LISN 50 µH	ESH3-Z5/	R&S	15B,15C
TM30636	LISN 50 µH	L2-16/	PMM	15B,15C

4.2. Radiated measurements

Eq. No	Equipment	Type	Manufacturer	Used in
TM30599	3m semi-anechoic chamber		TDK	15B,15C, 22/24
TM38845	EMI receiver	ESI 40	R&S	15B,15C, 22/24
TM37498	Preamplifier	AMF-5D-020180-26-10P	MITEQ	15B,15C, 22/24
TM37523	Preamplifier	AMF-4D-10M-3G-25-20P	MITEQ	15B,15C, 22/24
TM37516	Biconilog antenna	HL562	R&S	15B,15C, 22/24
TM26496	Double ridged waveguide antenna	3115	EMCO	15B,15C, 22/24
TM39158	Horn antenna	3116	EMCO	15B,15C, 22/24
TM26492	Reference dipole set	UHAP/VHAP	Schwarzbeck	15B,15C, 22/24
TM37501	Dipole antenna	3125-870	EMCO	22/24
TM37502	Dipole antenna	3125-1880	EMCO	22/24
TM37773	Radio communication tester	CMU-200	R&S	15B,15C, 22/24
TM38631	Signal generator	83640L	Agilent	15B,15C, 22/24
TM38066	High pass filter	4HC3000/18000-3-KK	Trilithic	15B,15C, 22/24
	High pass filter	WHK2010-10SS	Trilithic	15B,15C, 22/24
	Low pass filter	WLK1750-10SS	Trilithic	15B,15C, 22/24
TM26511	Tunable notch filter	WRCA870	Wainwright	22/24
TM38215	Tunable notch filter	WRCD1850/1910-0.2/40	Wainwright	22/24
TM38214	Band reject filter	WRCT 2402/2480-2400/2483.5-30	Wainwright	15C
TM30642	Turntable controller	HD-100	Deisel	15B,15C, 22/24
TM26500	Turntable	DS412	Deisel	15B,15C, 22/24
TM38842	Antenna mast controller	2090	EMCO	15B,15C, 22/24
TM38843	Antenna mast	2075	EMCO	15B,15C, 22/24
TM38114	DC power supply	6632A	Agilent	15B,15C, 22/24
TM22835	Multimeter	87	Fluke	15B,15C, 22/24