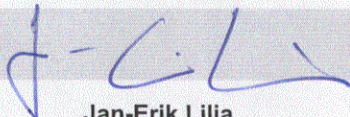


FCC Part 15C Compliance Test Report

Test Report no.:	Tre_FCC_0514_01.doc	Date of Report:	08.04.2005
Number of pages:	26	Customer's Contact person:	Tero Huhtala
Testing laboratory:	TCC Nokia Tampere Laboratory P.O. Box 68 Sinitaival 5 FIN-33720 TAMPERE, FINLAND Tel. +358 (0) 7180 46800 Fax. +358 (0) 7180 46880	Client:	Nokia Corporation P.O. Box 50 Mattianniemi 6-8 FIN-40101 JYVÄSKYLÄ, FINLAND Tel. +358 (0) 7180 08000 Fax. +358 (0) 7180 78000
FCC listing no.:	94436		
IC recognition no.:	3608		
Tested devices/ accessories:	Phone RM-42 / Battery BL-5B / Charger AC-4 / Headset HDS-3 / Memory card MU-2		
FCC ID:	QURRM-42	IC:	661AC-RM42
Supplement reports:	-		
Testing has been carried out in accordance with:	CFR 47, FCC rules Part 15 Subpart C, ANSI C63.4 (2003) and IC standard 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:	08-04-2005  Jan-Erik Lilja Senior Test Engineer		

1. Summary for FCC Part 15C Compliance Test Report

Date of receipt	21.3.2005
Testing completed	7.4.2005
The customer's contact person	Tero Huhtala
Test Plan referred to	T:\Projects\RM-42\testplans\EMC\TCC\ RM-42_EMCTestplan.xls
Notes	-
Document name	T:\Projects\RM-42\results\emc\FCC\Tre_FCC_0514_01.doc

1.1. EUT and Accessory Information

The EUT is a Bluetooth device. Bluetooth is tested with maximum rated TX power.

Product	Type	SN	HW	MV	SW	DUT
Phone	RM-42	004400371640630	1014	-	0.31.3	40189
Phone	RM-42	004400371640622	1014	-	0.31.3	40187
Battery	BL-5B	-	7.0	-	-	40179
Battery	BL-5B	-	7.0	-	-	40190
Charger	AC-4	042	1.0	1.0	-	40195
Headset	HDS-3	-	4.0	7.2	4.0	40200
memory card	MU-2	SVSJ378AA 450	-	-	-	40193
Data cable	CA-53	1749	B3	2.0	-	40199
Digital camera	DS-7	-	-	-	-	40076
Printer	HP deskjet	-	-	-	-	40077
Laptop computer	IBM Thinkpad T22	-	-	-	-	40201
Parallel cable for printer	-	-	-	-	-	40087
Serial cable for camera	-	-	-	-	-	40088

1.2. Summary of Test Results

Bluetooth:

Section in CFR 47	Section in RSS-210	Name of the test	Result
15.247(b)(1)	6.2.2(o)(a3)	Peak output power	PASSED
15.247(c)	6.2.2 (o)(e1)	Band edge compliance of RF emissions	PASSED
15.247(c)	6.2.2 (o)(e1)	Spurious RF conducted emissions	PASSED
15.247(c), 15.209	6.2.2 (o)(e1)	Spurious radiated emissions	PASSED
15.207	6.6	AC powerline conducted emissions	PASSED
15.247(a)(1)	6.2.2(o)(a3)	20 dB bandwidth	PASSED
15.247(a)(1)	6.2.2(o)(a1)	Carrier frequency separation	PASSED
15.247(a)(1)(iii)	Amend I(ii)	Number of hopping frequencies	PASSED
15.247(a)(1)(iii)	Amend I(ii)	Time of occupancy	PASSED

PASSED
FAILED
NP

The EUT complies with the essential requirements in the standard.
The EUT does not comply with the essential requirements in the standard.
The test was not performed by the TCC Nokia Tampere Laboratory.

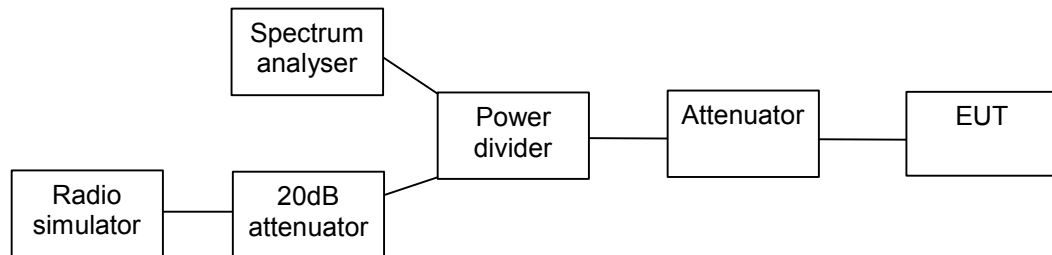
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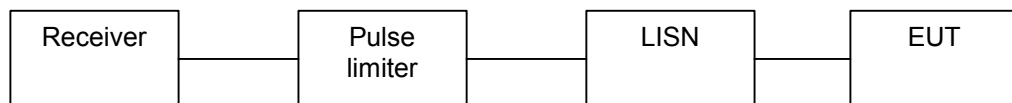
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2. Test setups

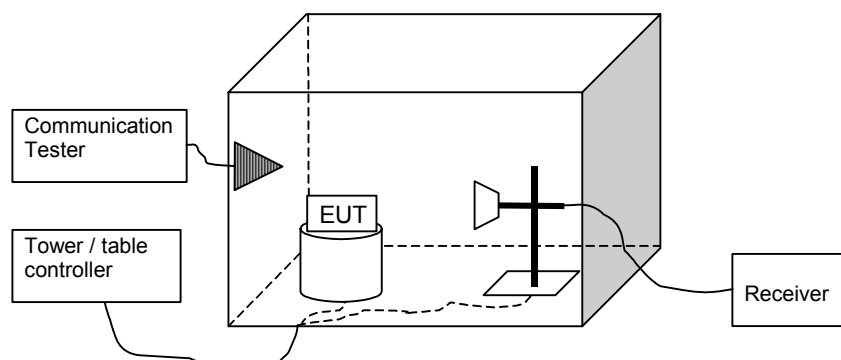
2.1. Conducted RF test setup



2.2. AC powerline conducted emissions test setup



2.3. Spurious radiated emissions test setup



3. Peak output power (FCC §15.247(b)(1), RSS-210 6.2.2(o)(a3))

EUT with DUT number	Phone RM- 42 40189
Accessories with DUT numbers	Battery BL-5B 40179
Operation Voltage V / Hz	
Result	PASSED
Remarks	-
Temp °C / Humidity RH % / Air Pressure kPa	23 / 38 / 101.4
Date of measurements	05.04.2005
Measured by	Jan-Erik Lilja

3.1. Test method and limit

The measurement is made according to FCC rules part 15.247 and IC standard RSS-210.

Limits for peak output power measurements

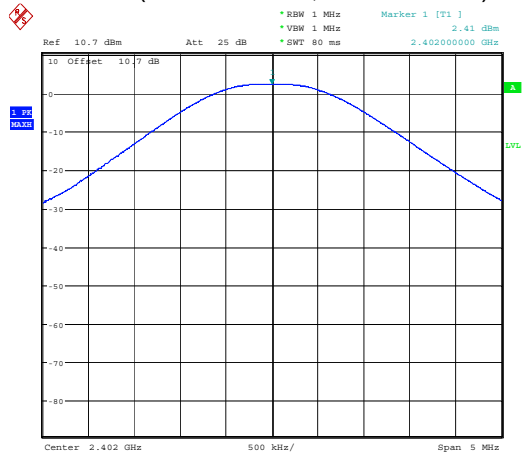
Frequency range / MHz	Limit / W	Limit / dBm
2400 – 2483.5	≤ 1	≤ 30

3.2. Bluetooth Test results

3.2.1 GSFK modulation, PRBS packet type

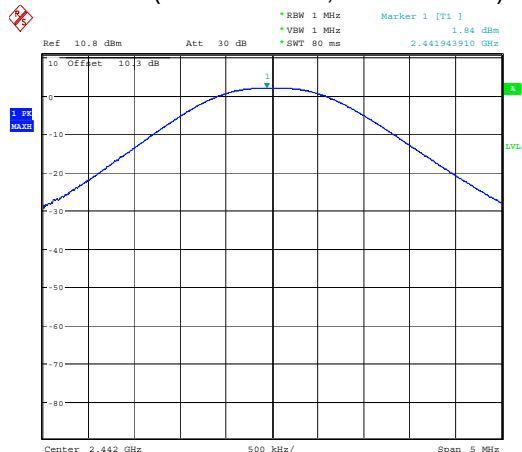
Channel	Frequency / MHz	Level / dBm	Level / W	A_{CORRECTION} / dB	Result
0	2402	2.41	0.0017	10.7	PASSED
40	2442	1.84	0.0015	10.8	PASSED
78	2480	1.80	0.0015	10.3	PASSED

Channel 0 (Peak detector, RBW: 1 MHz)



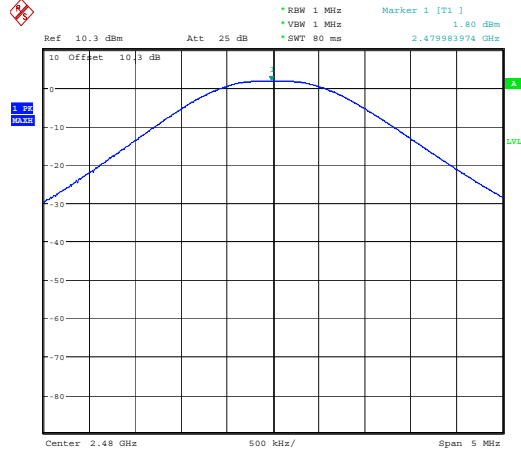
Date: 5.APR.2005 16:32:55

Channel 40 (Peak detector, RBW: 1 MHz)



Date: 5.APR.2005 16:38:05

Channel 78 (Peak detector, RBW: 1 MHz)



Date: 5.APR.2005 16:36:43

4. Band edge compliance of RF emissions (FCC §15.247(c), RSS-210 6.2.2(o)(e1))

EUT with DUT number	Phone 40187
Accessories with DUT numbers	Charger 40195, Battery 40190, headset 40200, memory card 40193
Operation Voltage V / Hz	115 / 60
Result	PASSED
Remarks	-
Temp °C / Humidity RH % / Air Pressure kPa	21 / 48 / 100.5
Date of measurements	6.4.2005
Measured by	Jan-Erik Lilja

4.1. Test method and limit

The measurement is made according to FCC rules part 15.247 and IC standard RSS-210.

Limits for band edge compliance of RF emissions measurements (3 m measurement distance)

Frequency range / MHz	Limit Average / dBµV/m	Limit Peak / dBµV/m
Below 2390 and above 2483.5	≤ 54	≤ 74

4.2. Bluetooth Test results

4.2.1 GFSK modulation, PRBS packet type

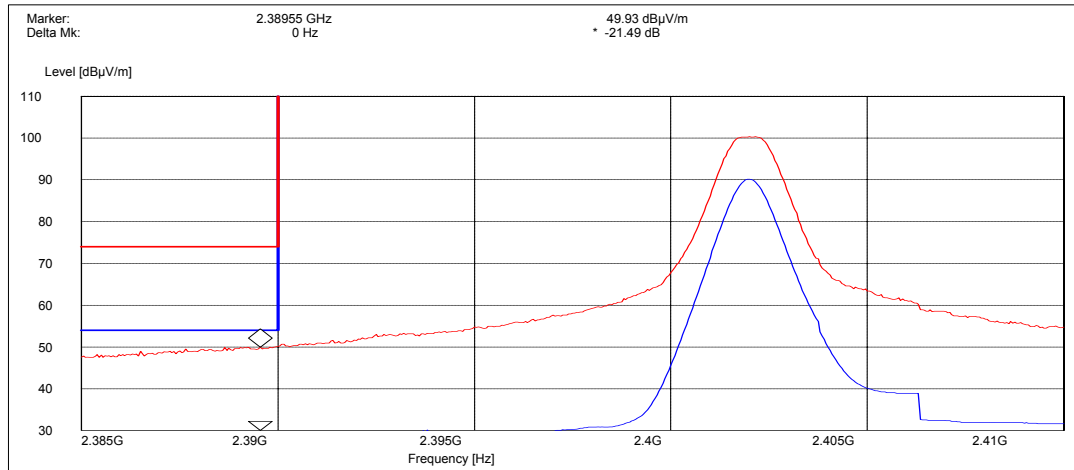
Average (RBW: 1 MHz)

Channel	Level / dBµV/m	Result
0	28.44	PASSED
78	34.53	PASSED
Hopping on, low end	27.72	PASSED
Hopping on, high end	30.86	PASSED

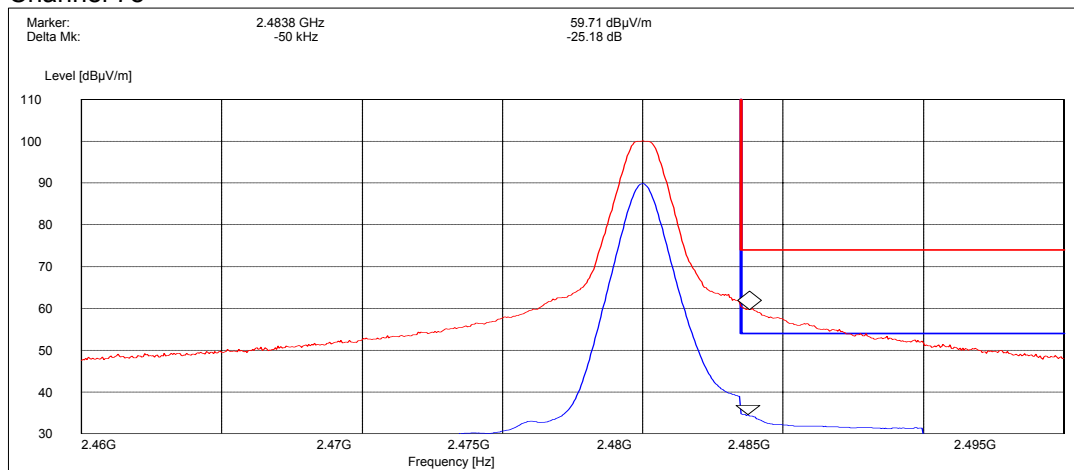
Peak (RBW: 1 MHz)

Channel	Level / dBµV/m	Result
0	49.93	PASSED
78	59.71	PASSED
Hopping on, low end	49.76	PASSED
Hopping on, high end	59.59	PASSED

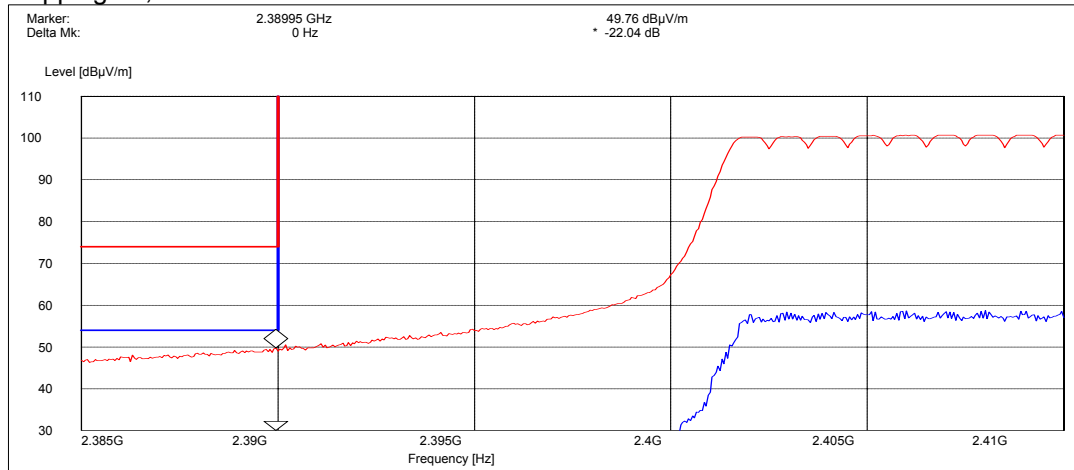
Channel 0



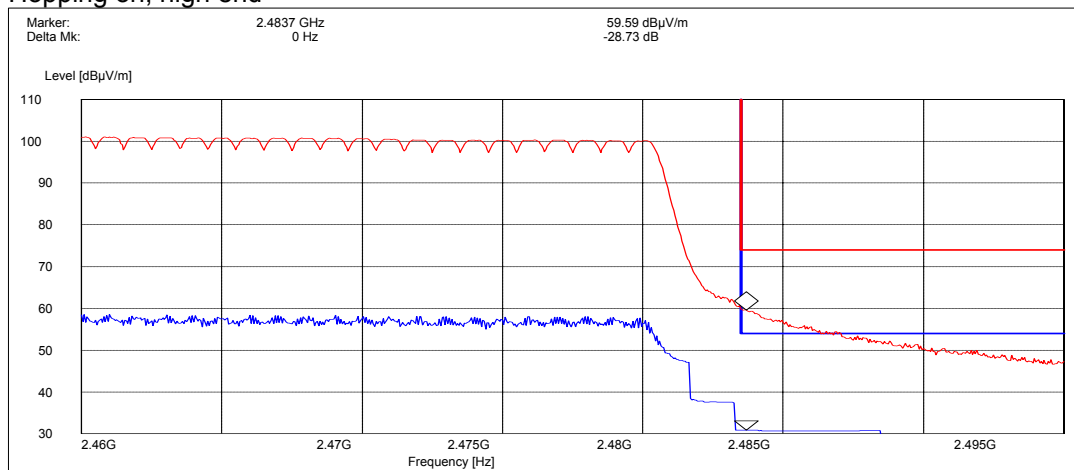
Channel 78



Hopping on, low end



Hopping on, high end



5. Spurious RF conducted emissions (FCC §15.247(c), RSS-210 6.2.2(o)(e1))

EUT with DUT number	Phone RM- 42 40189
Accessories with DUT numbers	Battery BL-5B 40179
Operation Voltage V / Hz	-
Result	PASSED
Remarks	-
Temp °C / Humidity RH % / Air Pressure kPa	24 / 37 / 100.4
Date of measurements	07.04.2005
Measured by	Jan-Erik Lilja

5.1. Test method and limit

The measurement is made according to FCC rules part 15.247 and IC standard RSS-210.

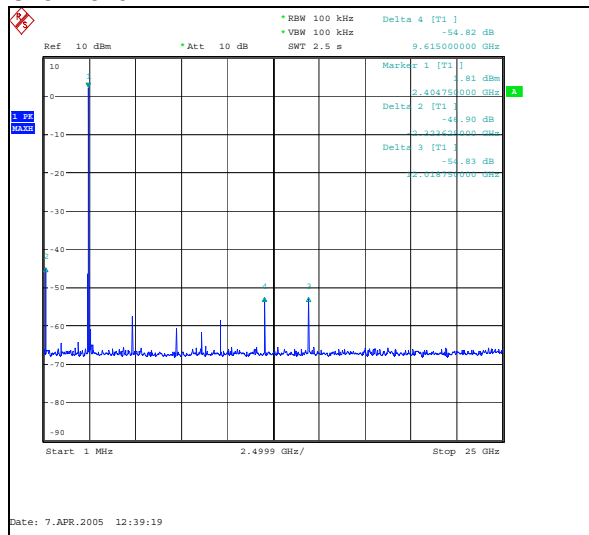
Limits for spurious RF conducted emissions measurements

Frequency range / MHz	Limit / dBc
1 – 25000	≤ -20

5.2. Bluetooth Test results

5.2.1 GFSK modulation, PRBS packet type

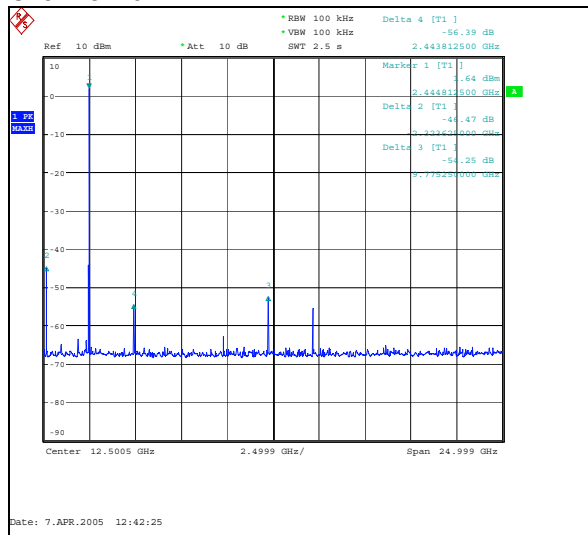
Channel 0



Frequency / MHz	Level / dBc	Result
81.125	-46.9	PASSED
14412.5	-54.8	PASSED

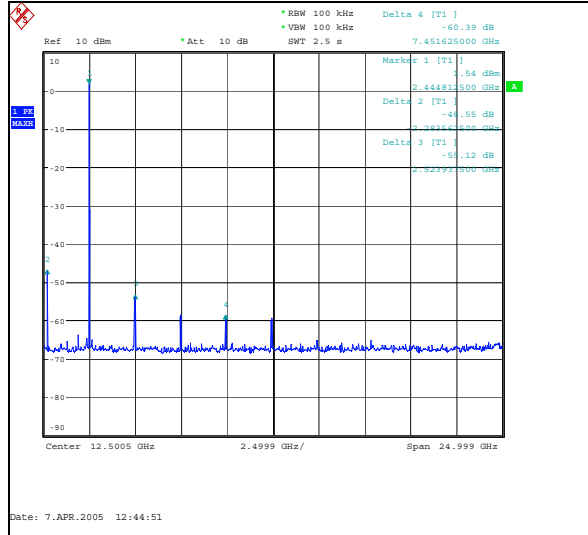
12019.75	-54.8	PASSED
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Channel 40



Frequency / MHz	Level / dBc	Result
222.187	-46.47	PASSED
12220.063	-54.25	PASSED
4889.625	-53.39	PASSED

Channel 78



Frequency / MHz	Level / dBc	Result
162.249	-48.55	PASSED
4968.75	-55.12	PASSED
9896.438	-60.39	PASSED

6. Spurious radiated emissions

(FCC §15.247(c), §15.209, RSS-210 6.2.2(o)(e1))

EUT with DUT number	Phone 40187
Accessories with DUT numbers	Charger 40195, Battery 40190, headset 40200, memory card 40193
Operation Voltage V / Hz	115 / 60
Result	PASSED
Remarks	
Temp °C / Humidity RH % / Air Pressure kPa	21 / 48 / 100.5
Date of measurements	06.04.2005
Measured by	Jari Jantunen

6.1. Test method and limit

The measurement is made according to FCC rules part 15.247 and IC standard RSS-210 as follows:

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with absorbers on the floor and measuring antenna at fixed height using 2-axis EUT position system.

The Final Measurement is performed in the Semi-Anechoic Chamber with conducting metal floor, if the Preliminary Measurement results are closer than 20 dB to the permissible value.

The EUT is placed at nonconductive plate at the turntable center.

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:

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

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

Limits for spurious radiated emissions measurements (3 m measurement distance)

Frequency range / MHz	Limit / $\mu V/m$	Limit / dB $\mu V/m$	Detector
30 – 88	100	40	Quasi peak
88 – 216	150	43.5	Quasi peak
216 – 960	200	46	Quasi peak
960 – 1000	500	54	Quasi peak
Above 1000	500	54	Average
Above 1000	5000	74	Peak

6.2. Bluetooth Test results

6.2.1 GFSK modulation, PRBS packet type

Channel 0

Quasi peak (RBW: 120 kHz)

Frequency / MHz	Level / dB μ V/m	Level / μ V/m	A _{CORRECTION} / dB	Polarisation	Result
37.928958	25.70	19.28	-24.40	VERTICAL	PASSED
38.116232	26.40	20.89	-24.40	VERTICAL	PASSED

Peak (RBW: 1 MHz)

Frequency / MHz	Level / dB μ V/m	Level / μ V/m	A _{CORRECTION} / dB	Polarisation	Result
4804.000000	41.20	114.82	-2.00	VERTICAL	PASSED
7206.000000	44.40	165.96	1.80	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency / MHz	Level / dB μ V/m	Level / μ V/m	A _{CORRECTION} / dB	Polarisation	Result
4804.000000	28.10	25.41	-2.00	VERTICAL	PASSED
7206.000000	31.60	38.02	1.80	VERTICAL	PASSED

Channel 40

Quasi peak (RBW: 120 kHz)

Frequency / MHz	Level / dB μ V/m	Level / μ V/m	A _{CORRECTION} / dB	Polarisation	Result
38.160621	26.80	21.88	-24.50	VERTICAL	PASSED
38.205110	25.80	19.50	-24.50	VERTICAL	PASSED

Peak (RBW: 1 MHz)

Frequency / MHz	Level / dB μ V/m	Level / μ V/m	A _{CORRECTION} / dB	Polarisation	Result
4882.000000	41.50	118.85	-2.40	VERTICAL	PASSED
7323.000000	45.40	186.21	2.40	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency / MHz	Level / dB μ V/m	Level / μ V/m	A _{CORRECTION} / dB	Polarisation	Result
4882.000000	28.40	26.30	-2.40	VERTICAL	PASSED
7323.000000	32.20	40.74	2.40	VERTICAL	PASSED

Channel 78

Quasi peak (RBW: 120 kHz)

Frequency / MHz	Level / dB μ V/m	Level / μ V/m	A _{CORRECTION} / dB	Polarisation	Result
38.371844	26.50	21.13	-24.50	VERTICAL	PASSED
38.544890	25.50	18.84	-24.60	VERTICAL	PASSED

Peak (RBW: 1 MHz)

Frequency / MHz	Level / dB μ V/m	Level / μ V/m	A _{CORRECTION} / dB	Polarisation	Result
4960.000000	42.80	138.04	-1.40	VERTICAL	PASSED
7440.000000	45.00	177.83	2.40	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency / MHz	Level / dB μ V/m	Level / μ V/m	A _{CORRECTION} / dB	Polarisation	Result
4960.000000	30.00	31.62	-1.40	VERTICAL	PASSED
7440.000000	32.00	39.81	2.40	VERTICAL	PASSED

7. AC powerline conducted emissions (FCC §15.207, RSS-210 6.6)

EUT with DUT number	RM-42 DUT 40187
Accessories with DUT numbers	BL-5B DUT 40190, AC-4 DUT 40195, CA-53 DUT 40199, DS-7 DUT 40076, HP deskjet DUT 40077, IBM Thinkpad T22 DUT 40201, 02K6543 DUT 40202, Parallel cable for printer DUT 40087, Serial cable for camera DUT 40088
Operation Voltage V / Hz	115 / 60
Result	PASSED
Remarks	GSM 1900 RX mode, channel 661 and Bluetooth TX mode, channel 38
Temp °C / Humidity RH % / Air Pressure kPa	19 / 50 / 100.7
Date of measurements	5.4.2005
Measured by	Jari Jantunen

7.1. Test method and limit

The measurement is made according to FCC rules part 15.247 and IC standard RSS-210 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:

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

Where U_{RX} is receiver reading and $A_{CORRECTIONS}$ is combined correction factor including cable and pulse limiter attenuations.

CISPR 22 Class B limits

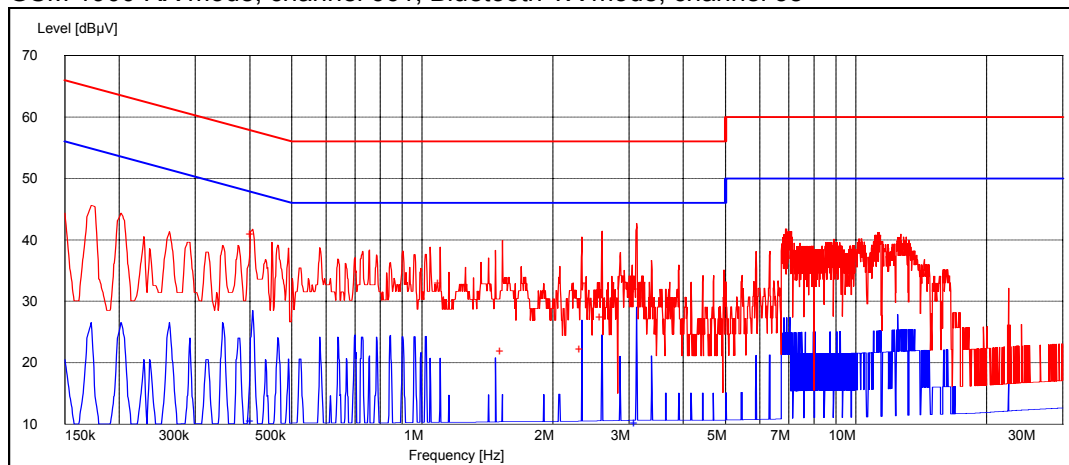
Frequency range / MHz	Quasi peak limit / dBμV	Average limit / dBμV
0.15 - 0.5	66 - 56	56 - 46
0.5 - 5	56	46
5 - 30	60	50

7.2. Bluetooth Test results

7.2.1 GFSK modulation, PRBS packet type

Channel 40

GSM 1900 RX mode, channel 661, Bluetooth TX mode, channel 38



Quasi peak (RBW: 9 kHz)

Frequency / MHz	Level / dBμV	Line	Result
0.405812	41.00	L1	PASSED
1.099098	32.90	L1	PASSED
1.529158	21.80	N	PASSED
2.336673	22.20	N	PASSED
2.601202	27.50	N	PASSED
3.124248	32.00	N	PASSED

Average (RBW: 9 kHz)

Frequency / MHz	Level / dBμV	Line	Result
0.405812	10.50	N	PASSED
0.961924	6.70	L1	PASSED
1.021242	6.70	L1	PASSED
2.336673	8.60	N	PASSED
2.601202	8.40	N	PASSED
3.118236	10.20	N	PASSED

8. 20 dB bandwidth (FCC §15.247(a)(1), RSS-210 6.2.2(o)(a3))

EUT with DUT number	Phone RM- 42 40189
Accessories with DUT numbers	Battery BL-5B 40179
Operation Voltage V / Hz	-
Result	PASSED
Remarks	-
Temp °C / Humidity RH % / Air Pressure kPa	23 / 38 / 101.4
Date of measurements	05.04.2005
Measured by	Jan-Erik Lilja

8.1. Test method and limit

The measurement is made according to FCC rules part 15.247 and IC standard RSS-210.

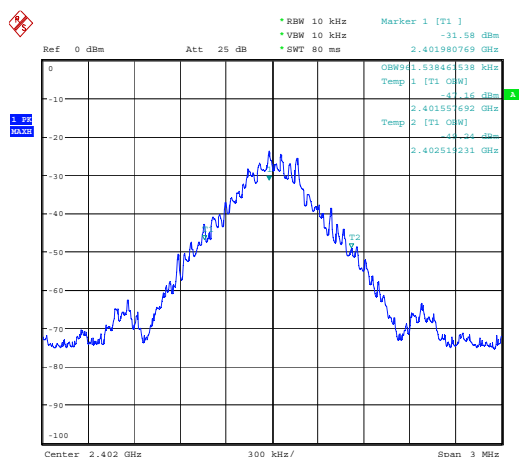
Limits for 20 dB bandwidth measurements

Limit / MHz
≤ 1

8.2. Bluetooth Test results

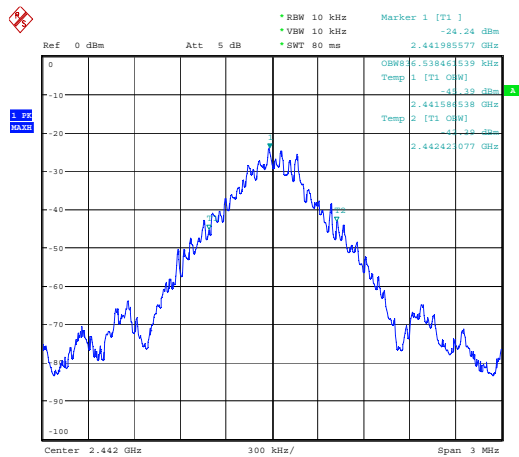
8.2.1 GFSK modulation, PRBS packet type

Channel	20 dB bandwidth / kHz	Result
0	961.5	PASSED
40	836.5	PASSED
78	831.7	PASSED



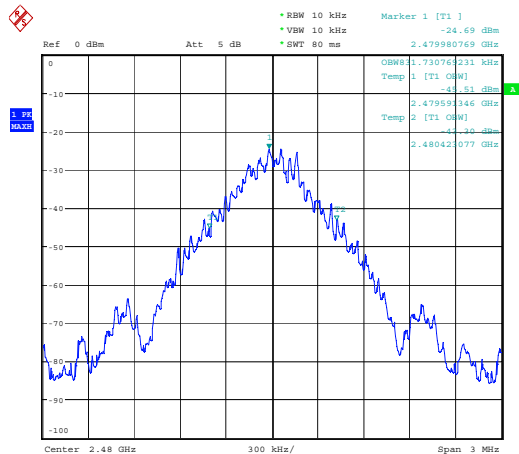
Date: 5.APR.2005 14:29:16

Channel 0



Date: 5.APR.2005 14:32:33

Channel 40



Date: 5.APR.2005 14:36:16

Channel 78

9. Carrier frequency separation (FCC §15.247(a)(1), RSS-210 6.2.2(o)(a1))

EUT with DUT number	Phone RM- 42 40189
Accessories with DUT numbers	Battery BL-5B 40179
Operation Voltage V / Hz	-
Result	PASSED
Remarks	-
Temp °C / Humidity RH % / Air Pressure kPa	23 / 38 / 101.4
Date of measurements	05.04.2005
Measured by	Jan-Erik Lilja

9.1. Test method and limit

The measurement is made according to FCC rules part 15.247 and IC standard RSS-210.

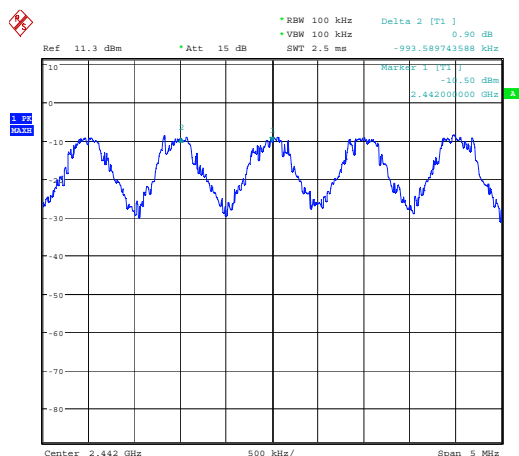
Limits for carrier frequency separation measurements

Limit / MHz
≥ 0.025 or 20 dB bandwidth

9.2. Bluetooth Test results

9.2.1 GFSK modulation, PRBS packet type

Carrier frequency separation / kHz	Result
993.6	PASSED



Date: 5.APR.2005 11:39:01

Hopping on, carrier frequency separation of channels 39 and 40

10. Number of hopping frequencies (FCC §15.247(a)(1)(iii), RSS-210 Amend I(ii))

EUT with DUT number	Phone RM- 42 40189
Accessories with DUT numbers	Battery BL-5B 40179
Operation Voltage V / Hz	-
Result	PASSED
Remarks	-
Temp °C / Humidity RH % / Air Pressure kPa	23 / 38 / 101.4
Date of measurements	05.04.2005
Measured by	Jan-Erik Lilja

10.1. Test method and limit

The measurement is made according to FCC rules part 15.247 and IC standard RSS-210.

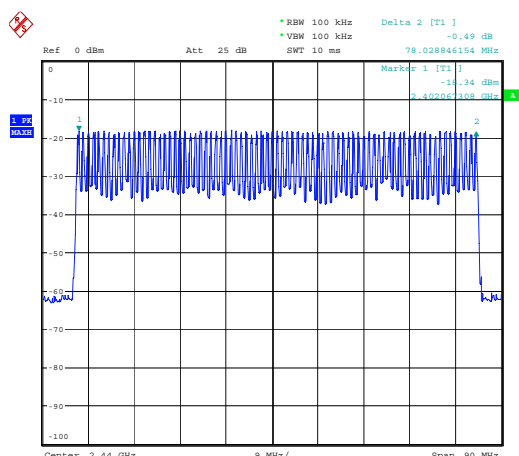
Limits for number of hopping frequencies measurements

Limit / number
≥ 75

10.2. Bluetooth Test results

10.2.1 GFSK modulation, PRBS packet type

Measured number of hopping frequencies	Result
79	PASSED



Date: 5.APR.2005 13:57:43

Hopping on, number of hopping frequencies

11. Time of occupancy (FCC §15.247(a)(1)(iii), RSS-210 Amend I(ii))

EUT with DUT number	Phone RM- 42 40189
Accessories with DUT numbers	Battery BL-5B 40179
Operation Voltage V / Hz	-
Result	PASSED
Remarks	-
Temp °C / Humidity RH % / Air Pressure kPa	23 / 38 / 101.4
Date of measurements	05.04.2005
Measured by	Jan-Erik Lilja

11.1. Test method and limit

The measurement is made according to FCC rules part 15.247 and IC standard RSS-210 as follows:

The total time of occupancy is get by multiplying the measured number of transmissions occurred during 31.6 second period with the duration of one transmission.

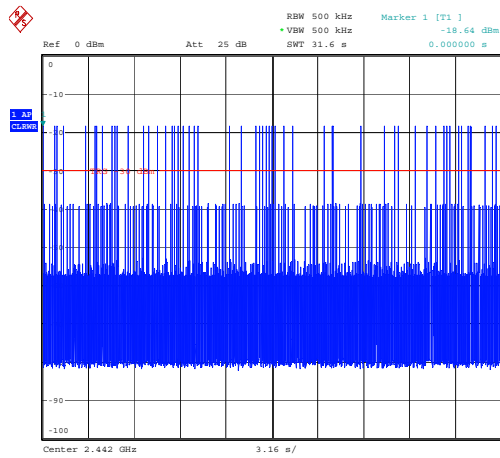
Limits for time of occupancy measurements

Limit / s
≤ 0.4

11.2. Bluetooth test results

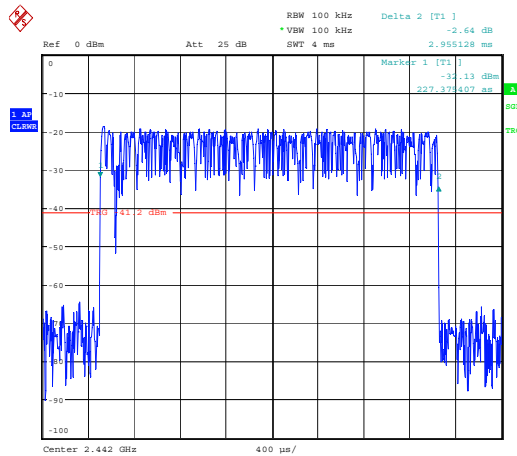
11.2.1 GFSK modulation, PRBS packet type

Measured number of transmissions	Duration of one ransmission / ms	Time of occupancy / s	Result
53	2.955	0.156	PASSED



Date: 5.APR.2005 14:16:16

Hopping on, number of transmissions, channel 40



Date: 5.APR.2005 14:20:27

Hopping on, duration of one transmission, channel 40

12. Test Equipment

12.1. 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

12.2. 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