

FCC Part 15C Compliance Test Report

Test Report no.:	Tre_FCC_0546_04.doc	Date of Report:	30.11.2005
Number of pages:	55	Customer's Contact person:	Tero Huhtala
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FCC listing no.:	94436		
IC recognition no.:	3608		
Tested devices/ accessories:	GSM phone RM-24 / Battery BL-6C, AC charger ACP-12, Headset HS-5, Data cable CA-53, Laptop Dell Latitude C640, AC adapter ADP-90FB, Printer HP deskjet 1600CC3540A, Digital camera FUJI DS-7, Serial cable for camera, Parallel cable for printer		
FCC ID:	PYARM-24	IC:	661V-RM24
Supplement reports:	-		
Testing has been carried out in accordance with:	CFR 47, FCC rules Part 15 Subpart C, ANSI C63.4 (2003), IC standards RSS-GEN 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:			

Jan-Erik Lilja, System Manager

1. Summary for FCC Part 15C Compliance Test Report

Date of receipt	14.11.2005
Testing completed	28.11.2005
The customer's contact person	Tero Huhtala
Test Plan referred to	\EMC\TESTPLAN\
Notes	-
Document name	T:\Projects\RM-24\EMC\Results\FCC\Tre_FCC_0546_04.doc

1.1. EUT and Accessory Information

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

Product	Type	SN	HW	MV	SW	DUT
Phone	RM-24	004400701628990	3150	-	200542_RnD_Zeus	40442
Phone	RM-24	004400701628941	3150	-	200542_RnD_Zeus	40444
Battery	BL-6C	-	4.2	-	-	40446
Battery	BL-6C	-	4.2	-	-	40447
Charger	ACP-12	-	1.3	-	-	40452
Headset	HS-5					40450
Data cable	CA-53	108882525508	-	4.0	-	40449
Laptop	DELL Latitude C640	4F343	-	-	-	40293
AC Adapter	ADP-90FB	TH-06G356-17971-2CK-A4G0	-	-	-	40294
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

Bluetooth:

Section in CFR 47	Section in RSS-GEN or RSS-210	Name of the test	Result
15.247(b)(1)	A8.4 (2)	Peak output power	Passed
15.247(c)	A8.5	Band edge compliance of RF emissions	Passed
15.247(c)	A8.5	Spurious RF conducted emissions	Passed
15.247(c), 15.209	A8.5	Spurious radiated emissions	Passed
15.207	7.2.2	AC powerline conducted emissions	Passed
15.247(a)(1)	A8.1 (1)	20 dB bandwidth	Passed
15.247(a)(1)	A8.1 (2)	Carrier frequency separation	Passed
15.247(a)(1)(iii)	A8.1 (4)	Number of hopping frequencies	Passed
15.247(a)(1)(iii)	A8.1 (4)	Time of occupancy	Passed

WLAN:

Section in CFR 47	Section in RSS-210	Name of the test	Result
15.247(b)(1)	A8.4 (4)	Peak output power	Passed
15.247(c)	A8.5	Band edge compliance of RF emissions	Passed
15.247(c)	A8.5	Spurious RF conducted emissions	Passed
15.247(c), 15.209	A8.5	Spurious radiated emissions	Passed
15.207	7.2.2	AC powerline conducted emissions	Passed
15.247(a)(2)	A8.2 (1)	6 dB bandwidth	Passed
15.247(e)	A8.2 (2)	Power spectral density	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.

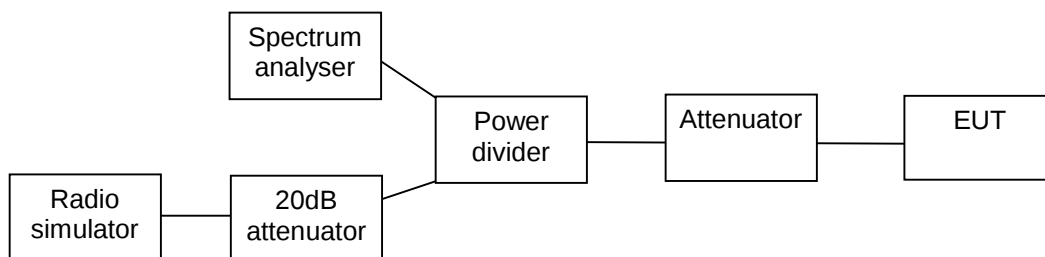
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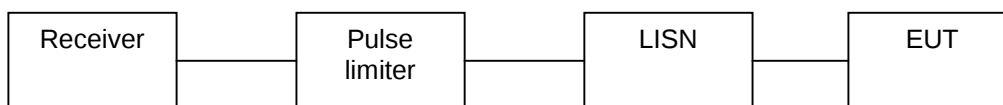
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2. Test setups

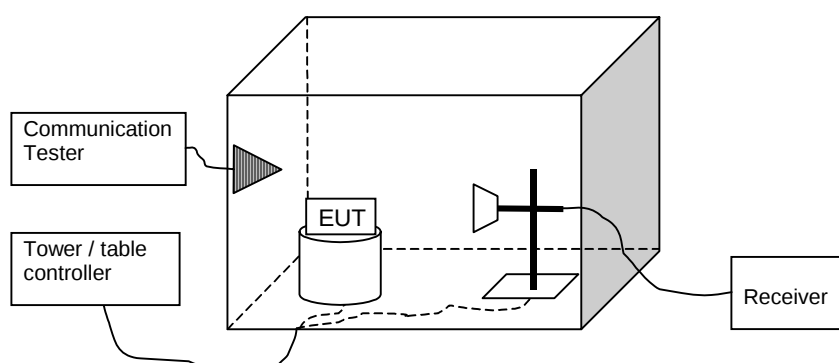
2.1. Conducted RF test setup



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 A8.4 (2))

EUT with DUT number	Phone: DUT 40444
Accessories with DUT numbers	Battery: DUT 40446
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23/50/98.9
Date of measurements	16.11.2005
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

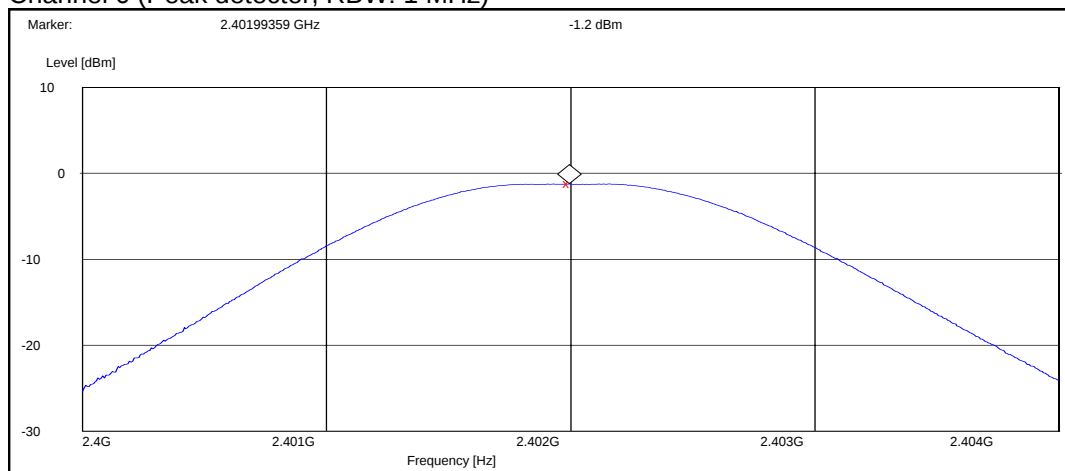
Frequency range [MHz]	Limit [W]	Limit [dBm]
2400 – 2483.5	≤ 1	≤ 30

3.2. Bluetooth Test results

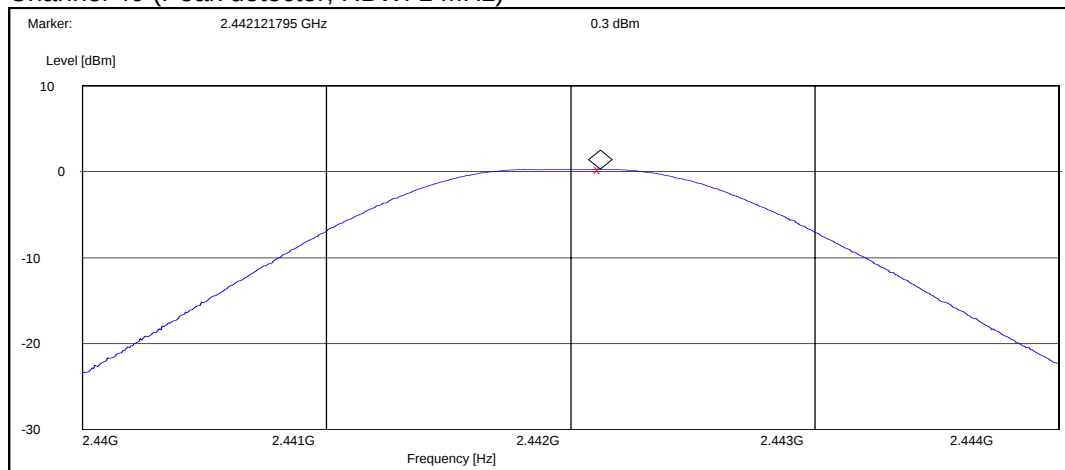
3.2.1 GSKF modulation, PRBS packet type

Channel	P [dBm]	P [mW]	Result
0	-1.20	0.759	Passed
40	0.30	1.072	Passed
78	0.50	1.122	Passed

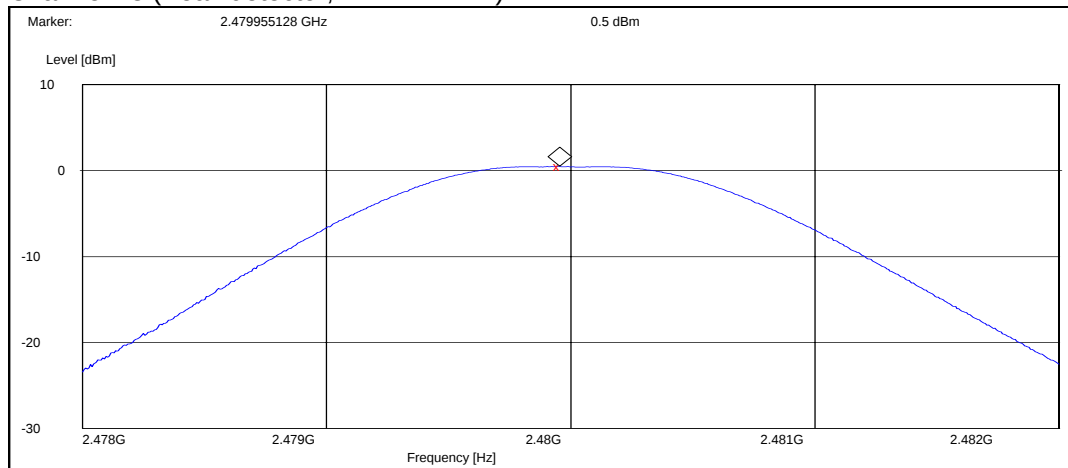
Channel 0 (Peak detector, RBW: 1 MHz)



Channel 40 (Peak detector, RBW: 1 MHz)



Channel 78 (Peak detector, RBW: 1 MHz)



4. Band edge compliance of RF emissions (FCC §15.247(c), RSS-210 A8.5)

EUT with DUT number	RM-24 DUT 40442
Accessories with DUT numbers	BL-6C DUT 40447, ACP-12 DUT 40452, HS-5 DUT 40450
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23 / 44 / 100.6
Date of measurements	18.11.2005
Measured by	Jari Jantunen

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

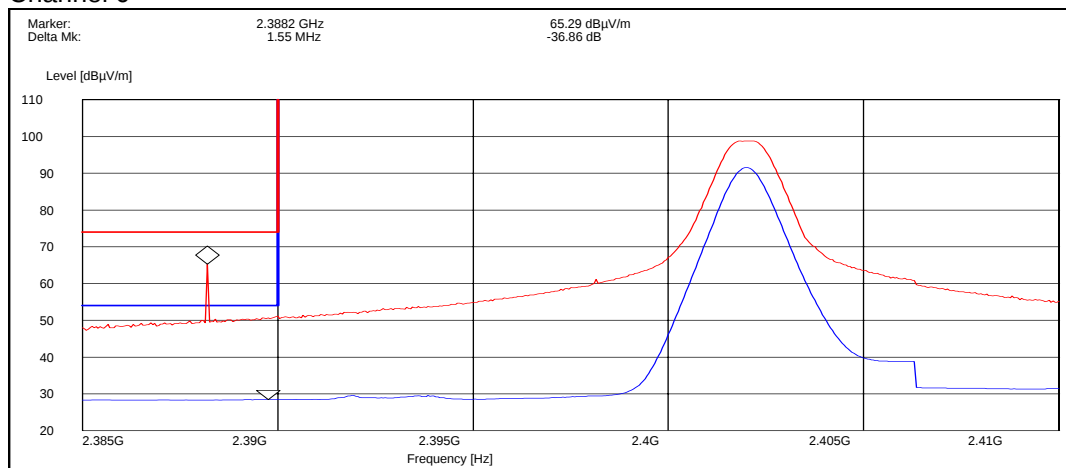
Average (RBW: 1 MHz)

Channel	E [dB μ V/m]	Result
0	28.43	PASSED
78	33.98	PASSED
Hopping on, low end	28.20	PASSED
Hopping on, high end	30.79	PASSED

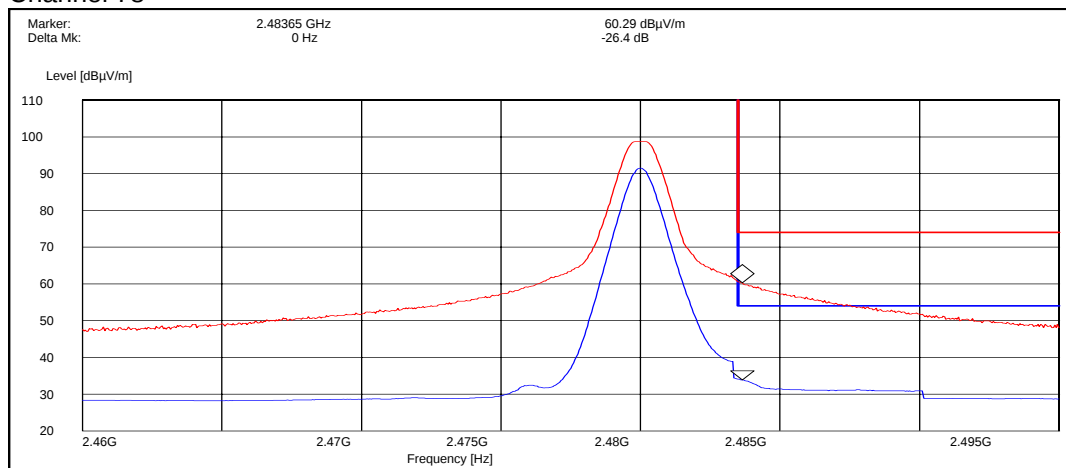
Peak (RBW: 1 MHz)

Channel	E [dB μ V/m]	Result
0	65.29	PASSED
78	60.29	PASSED
Hopping on, low end	49.94	PASSED
Hopping on, high end	59.91	PASSED

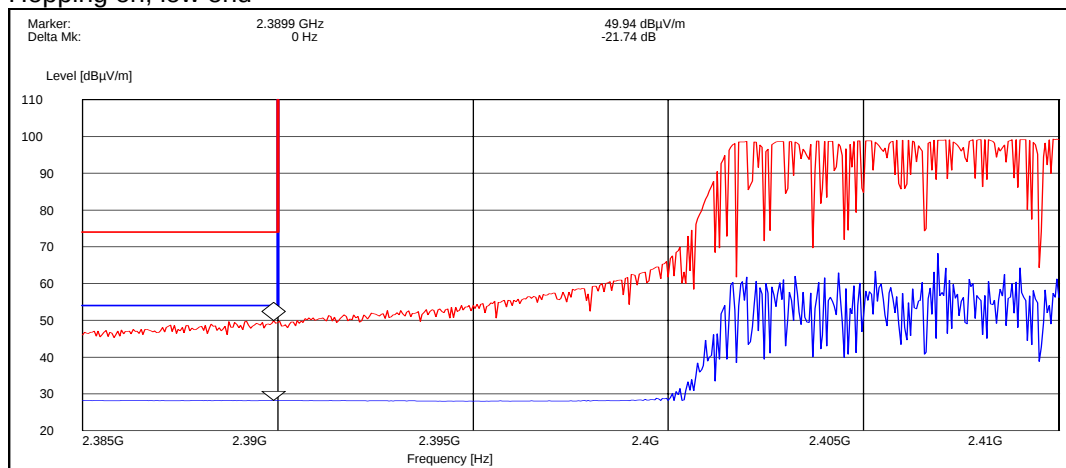
Channel 0



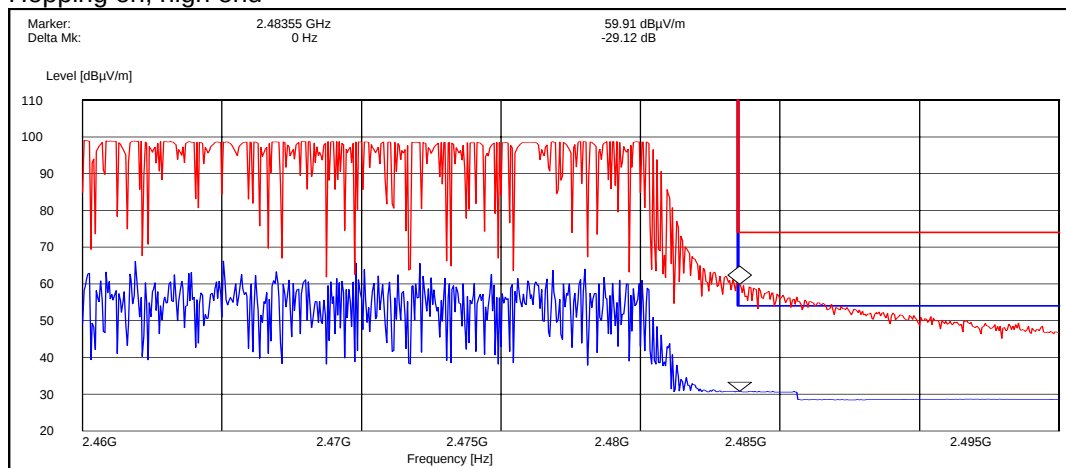
Channel 78



Hopping on, low end



Hopping on, high end



5. Spurious RF conducted emissions (FCC §15.247(c), RSS-A8.5)

EUT with DUT number	Phone: DUT 40444
Accessories with DUT numbers	Battery: DUT 40446
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23/50/98.9
Date of measurements	16.11.2005
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.

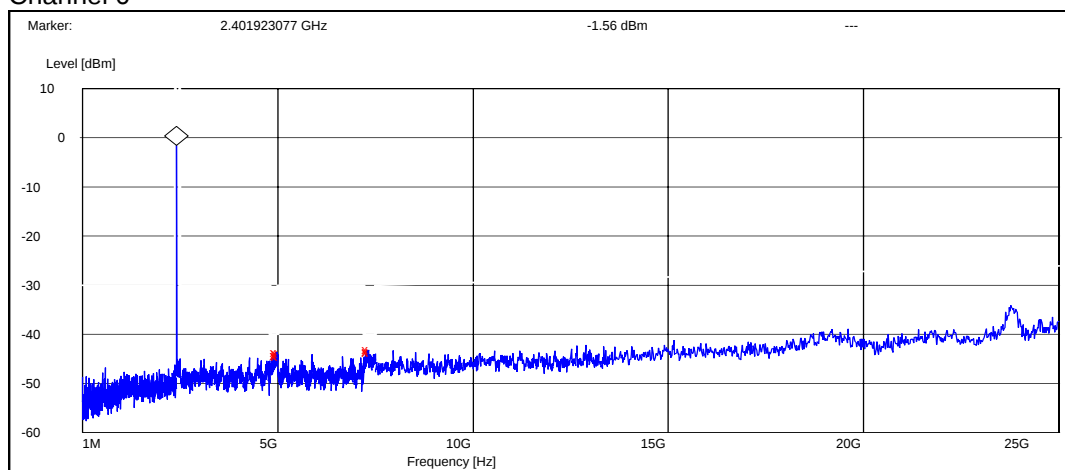
Limits for spurious RF conducted emissions measurements

Frequency range [MHz]	Limit [dBc]
1 – 25000	≤ -20

5.2. Bluetooth Test results

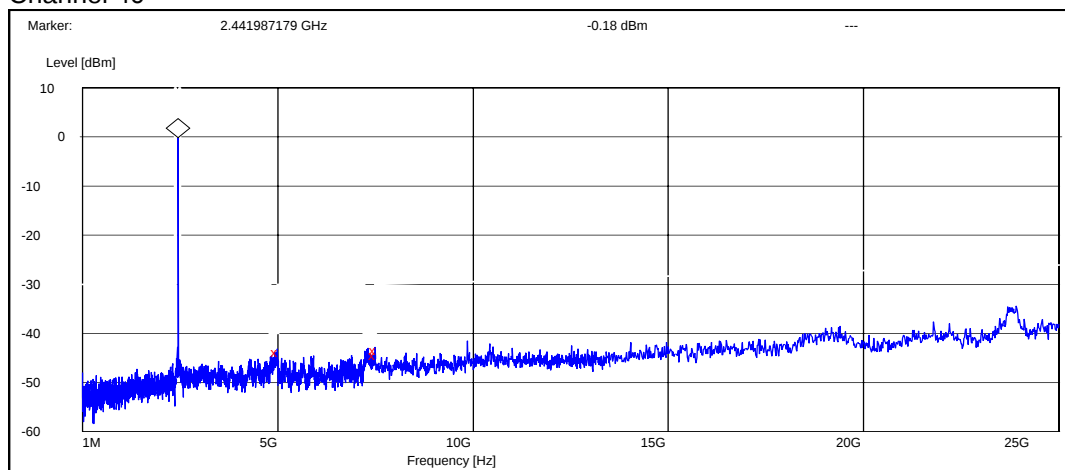
5.2.1 GFSK modulation, PRBS packet type

Channel 0



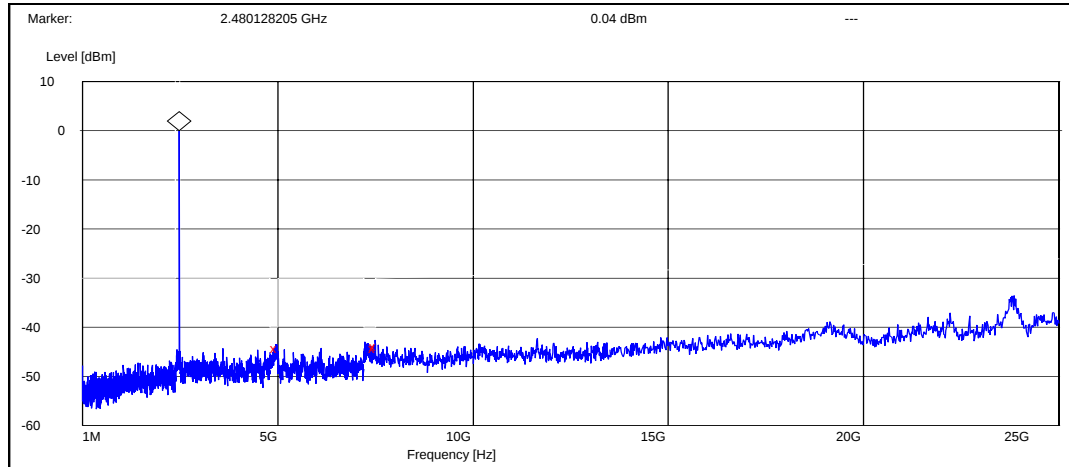
Frequency [MHz]	P [dBc]	Result
4979.137179	-42.641142	Passed
4999.850000	-42.441142	Passed
7324.438462	-41.441142	Passed

Channel 40



Frequency [MHz]	P [dBc]	Result
4984.615385	-43.720084	Passed
7495.192308	-44.320084	Passed
7500.000000	-43.220084	Passed

Channel 78



Frequency [MHz]	P [dBc]	Result
4981.410256	-44.239278	Passed
7492.788462	-44.339278	Passed
7500.000000	-43.939278	Passed

6. Spurious radiated emissions (FCC §15.247(c), §15.209, RSS-210 A8.5)

EUT with DUT number	RM-24 DUT 40442
Accessories with DUT numbers	BL-6C DUT 40447, ACP-12 DUT 40452, HS-5 DUT 40450
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23 / 45 / 99.7
Date of measurements	17.11.2005
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:

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

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

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

Frequency range [MHz]	Limit [$\mu\text{V/m}$]	Limit [dB $\mu\text{V/m}$]	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

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dB $\mu\text{V/m}$]	E [$\mu\text{V/m}$]	U _{RX} [dB μV]	A _{TOT} [dB]	Polarisation	Result
4804.000000	40.50	105.93	40.80	-0.30	VERTICAL	PASSED
7206.000000	42.70	136.46	39.70	3.00	HORIZONTAL	PASSED
9608.000000	46.00	199.53	36.70	9.30	HORIZONTAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dB $\mu\text{V/m}$]	E [$\mu\text{V/m}$]	U _{RX} [dB μV]	A _{TOT} [dB]	Polarisation	Result
4804.000000	28.60	26.92	28.90	-0.30	VERTICAL	PASSED
7206.000000	30.50	33.50	27.50	3.00	HORIZONTAL	PASSED
9608.000000	33.40	46.77	24.10	9.30	HORIZONTAL	PASSED

Channel 40

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dB $\mu\text{V/m}$]	E [$\mu\text{V/m}$]	U _{RX} [dB μV]	A _{TOT} [dB]	Polarisation	Result
7348.695391	44.60	169.82	40.20	4.40	VERTICAL	PASSED
7421.837675	44.50	167.88	40.00	4.50	HORIZONTAL	PASSED
10467.441884	47.30	231.74	39.30	8.00	HORIZONTAL	PASSED
10502.500000	46.10	201.84	38.20	7.90	HORIZONTAL	PASSED
10598.704409	46.90	221.31	38.10	8.80	HORIZONTAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dB $\mu\text{V/m}$]	E [$\mu\text{V/m}$]	U _{RX} [dB μV]	A _{TOT} [dB]	Polarisation	Result
7347.195391	31.50	37.58	27.20	4.30	VERTICAL	PASSED
7419.337675	31.90	39.36	27.40	4.50	HORIZONTAL	PASSED
10444.883768	33.20	45.71	25.70	7.50	HORIZONTAL	PASSED
10499.500000	33.40	46.77	25.60	7.80	HORIZONTAL	PASSED
10526.546092	33.90	49.55	25.60	8.30	HORIZONTAL	PASSED
10573.648297	34.00	50.12	25.50	8.50	HORIZONTAL	PASSED

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	42.60	134.90	42.70	-0.10	HORIZONTAL	PASSED
7440.000000	44.50	167.88	40.10	4.40	VERTICAL	PASSED
9920.000000	46.30	206.54	37.10	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	30.00	31.62	30.10	-0.10	HORIZONTAL	PASSED
7440.000000	31.80	38.90	27.40	4.40	HORIZONTAL	PASSED
9920.000000	33.70	48.42	24.50	9.20	HORIZONTAL	PASSED

7. AC powerline conducted emissions (FCC §15.207, RSS-GEN 7.2.2)

EUT with DUT number	RM-24 DUT 40442
Accessories with DUT numbers	BL-6C DUT 40447, ACP-12 DUT 40452, CA-53 DUT 40449, DELL Latitude C640 DUT 40293, AC adapter ADP-90FB DUT 40294, 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	Continuous data transfer was active between the phone and the computer during the test
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	19 / 51 / 99.4
Date of measurements	28.11.2005
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-GEN 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:

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

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

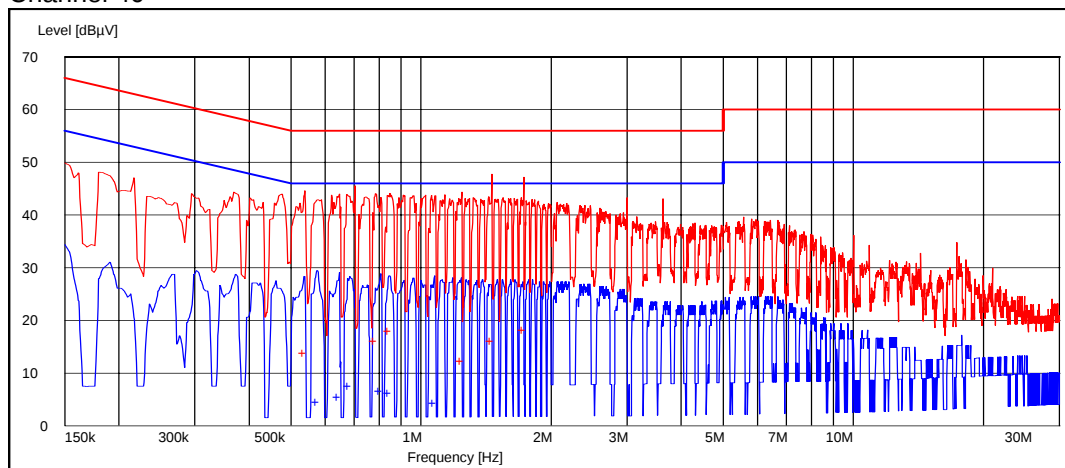
CISPR 22 Class B limits

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

7.2. Bluetooth Test results

7.2.1 GFSK modulation, PRBS packet type

Channel 40



Quasi peak (RBW: 9 kHz)

Frequency [MHz]	U [dBμV]	Line	Result
0.539279	13.80	N	PASSED
0.783968	16.10	N	PASSED
0.846994	17.90	N	PASSED
1.243687	12.20	N	PASSED
1.458717	16.10	N	PASSED
1.729359	18.20	N	PASSED

Average (RBW: 9 kHz)

Frequency [MHz]	U [dBμV]	Line	Result
0.576353	4.50	N	PASSED
0.646794	5.40	N	PASSED
0.683868	7.60	N	PASSED
0.806212	6.60	N	PASSED
0.846994	6.30	N	PASSED
1.076854	4.30	N	PASSED

8. 20 dB bandwidth (FCC §15.247(a)(1), RSS-210 A8.1 (1))

EUT with DUT number	Phone: DUT 40444
Accessories with DUT numbers	Battery: DUT 40446
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23/50/98.9
Date of measurements	16.11.2005
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

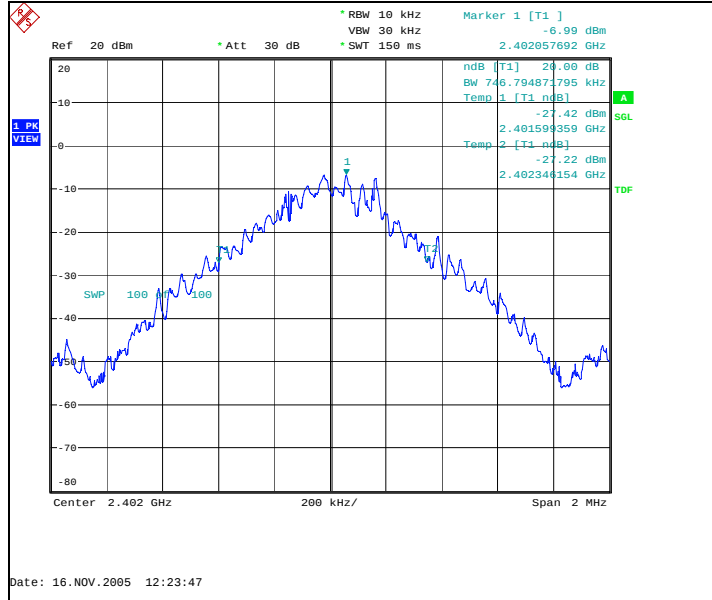
Limit [MHz]
N/A

8.2. Bluetooth Test results

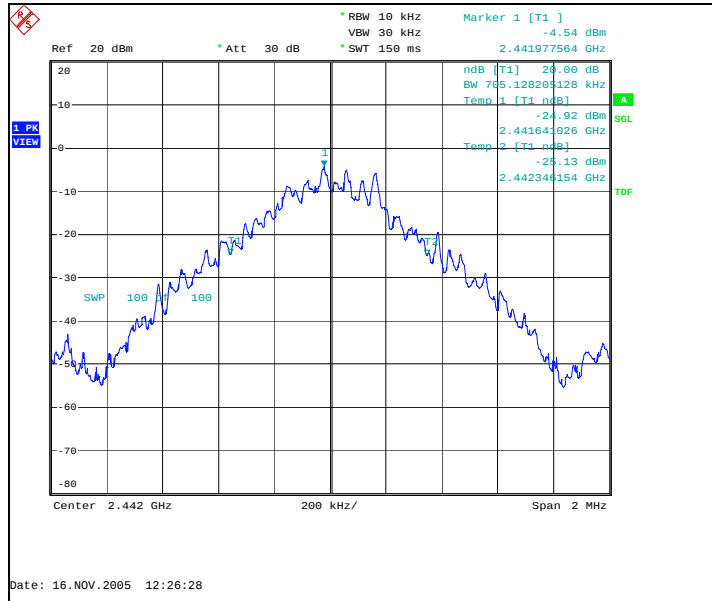
8.2.1 GFSK modulation, PRBS packet type

Channel	20 dB bandwidth [kHz]	Result
0	746.795	Passed
40	705.128	Passed
78	701.923	Passed

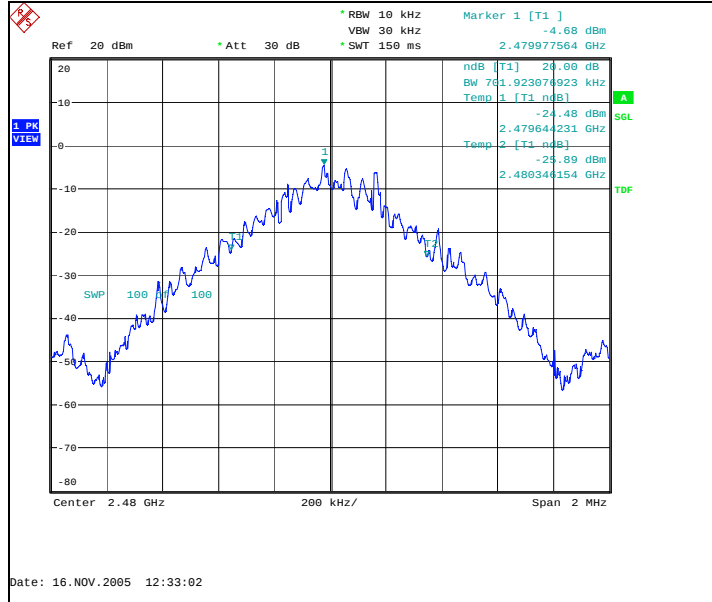
Channel 0



Channel 40



Channel 78



9. Carrier frequency separation (FCC §15.247(a)(1), RSS-210 A8.1 (2))

EUT with DUT number	Phone: DUT 40444
Accessories with DUT numbers	Battery: DUT 40446
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23/50/98.9
Date of measurements	16.11.2005
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

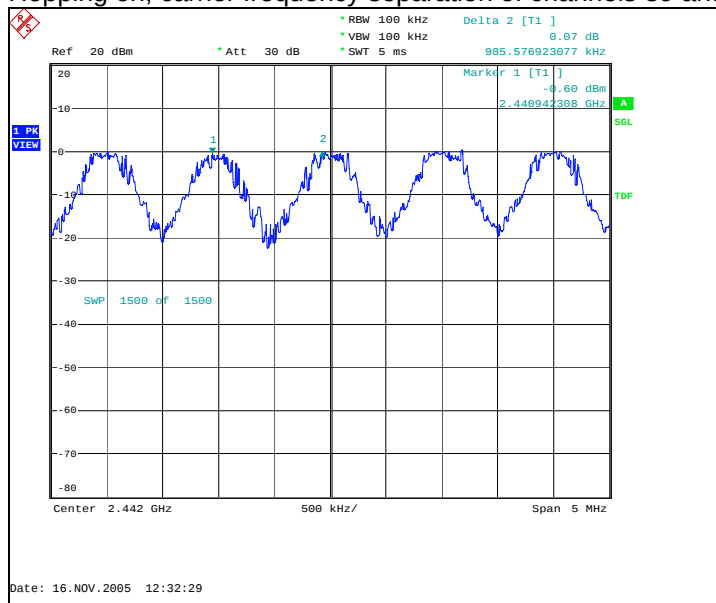
Limit [MHz]
≥ 0.025 or $2/3$ of the 20 dB bandwidth

9.2. Bluetooth Test results

9.2.1 GFSK modulation, PRBS packet type

Carrier frequency separation [kHz]	Result
985.577	Passed

Hopping on, carrier frequency separation of channels 39 and 40



10. Number of hopping frequencies (FCC §15.247(a)(1)(iii), RSS-210 A8.1 (4))

EUT with DUT number	Phone: DUT 40444
Accessories with DUT numbers	Battery: DUT 40446
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23/50/98.9
Date of measurements	16.11.2005
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

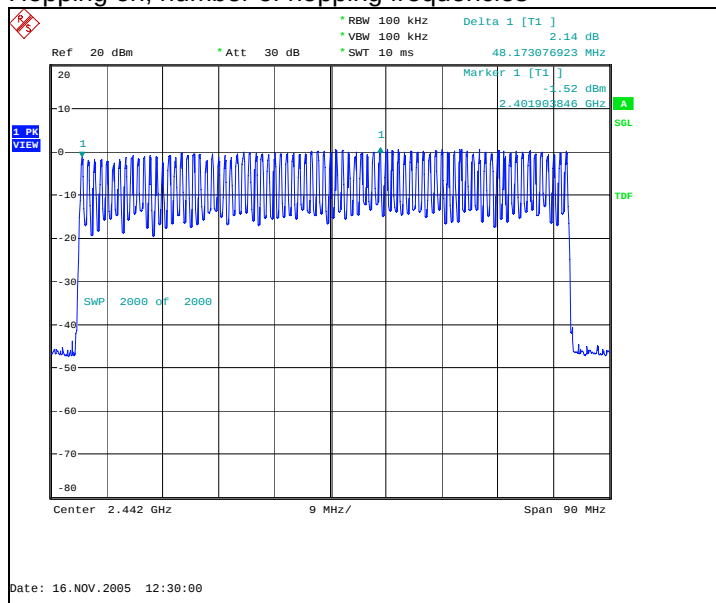
Limit [number]
≥ 15

10.2. Bluetooth Test results

10.2.1 GFSK modulation, PRBS packet type

Measured number of hopping frequencies	Result
79	Passed

Hopping on, number of hopping frequencies



11. Time of occupancy (FCC §15.247(a)(1)(iii), RSS-210 A8.1 (4))

EUT with DUT number	Phone: DUT 40444
Accessories with DUT numbers	Battery: DUT 40446
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23/50/98.9
Date of measurements	16.11.2005
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

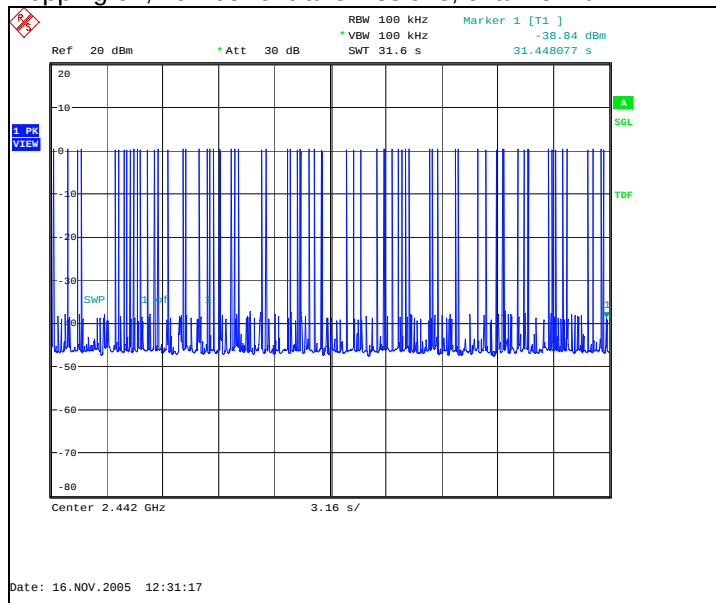
Limit [s]
≤ 0.4

11.2. Bluetooth test results

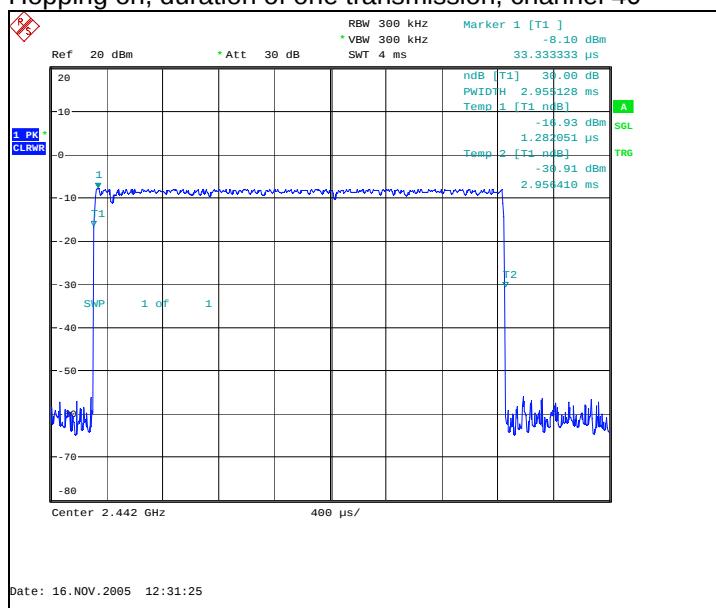
11.2.1 GFSK modulation, PRBS packet type

Measured number of transmissions	Duration of one transmission [μ s]	Time of occupancy [s]	Result
67	2955.128	0.197994	Passed

Hopping on, number of transmissions, channel 40



Hopping on, duration of one transmission, channel 40



12. Peak output power (FCC §15.247(b)(1), RSS-210 A8.4 (4))

EUT with DUT number	Phone: DUT 40444
Accessories with DUT numbers	Battery: DUT 40446
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23/50/98.9-100.1
Date of measurements	16-17.11.2005
Measured by	Jan-Erik Lilja

12.1. 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

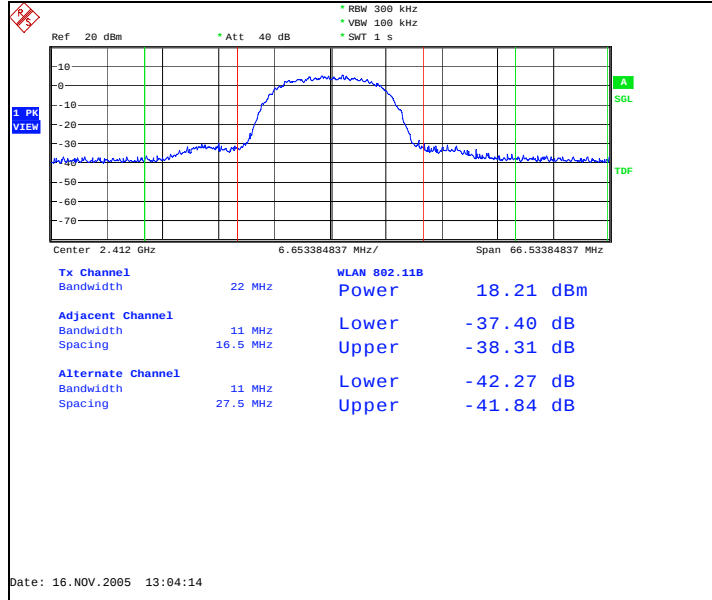
Frequency range [MHz]	Limit [W]	Limit [dBm]
2400 – 2483.5	≤ 1	≤ 30

12.2. WLAN Test results

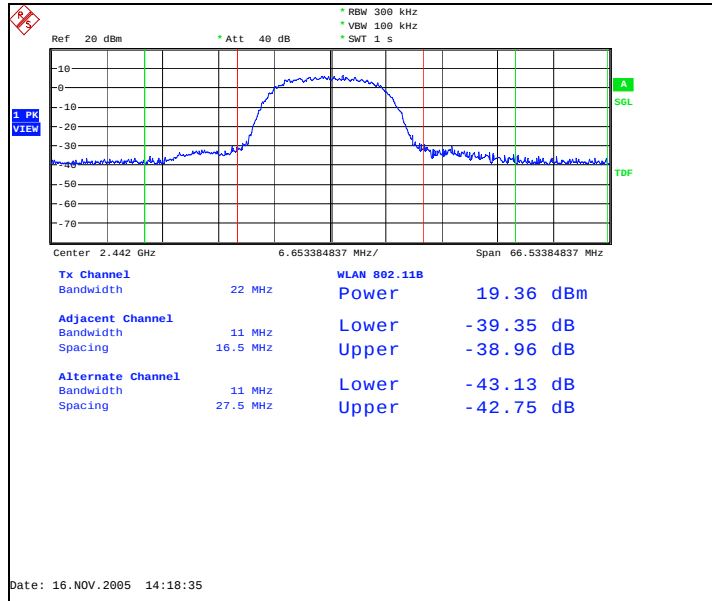
12.2.1 DSSS mode, QPSK modulation, 11 Mbps data rate

Channel	P [dBm]	P [W]	Result
1	18.21	0.066	Passed
7	19.36	0.086	Passed
11	18.97	0.079	Passed

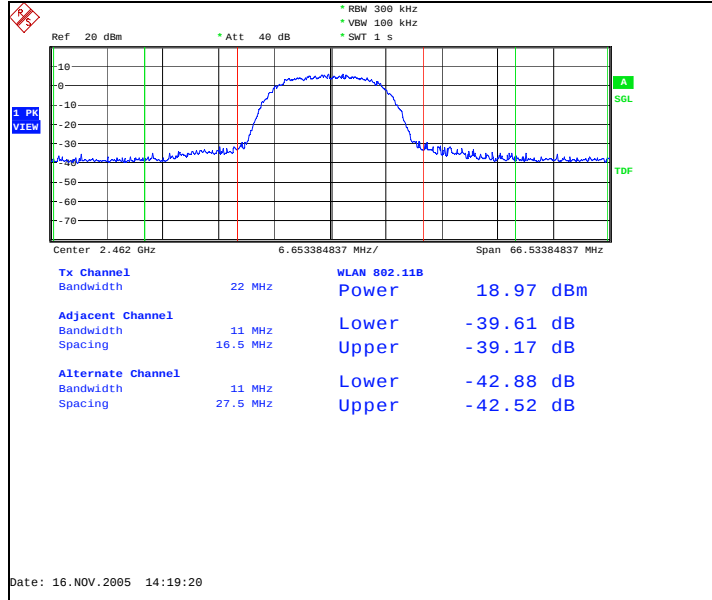
Channel 1



Channel 7



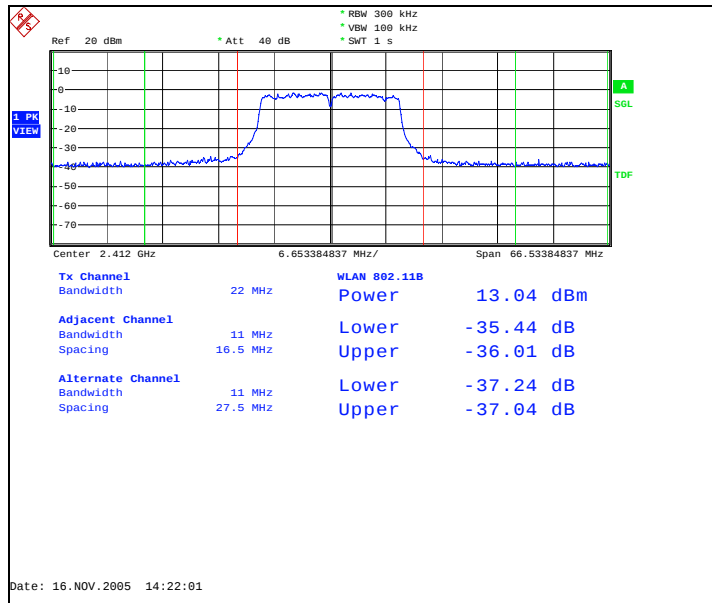
Channel 11



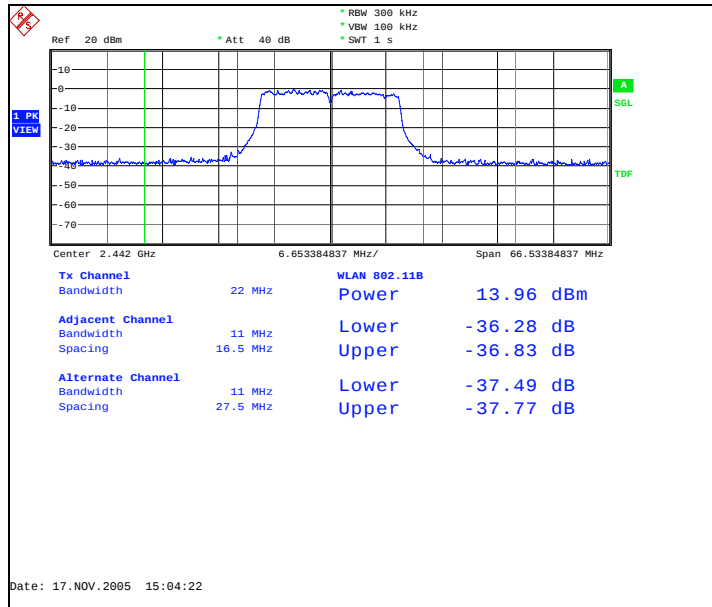
12.2.2 OFDM mode, 64QAM modulation, 48 Mbps data rate

Channel	P [dBm]	P [W]	Result
1	13.04	0.020	Passed
7	13.96	0.025	Passed
11	13.93	0.025	Passed

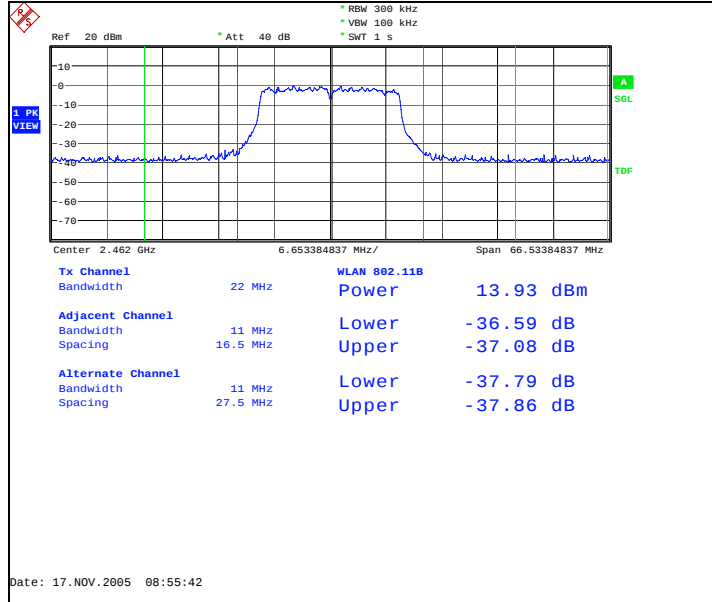
Channel 1



Channel 7



Channel 11



13. Band edge compliance of RF emissions (FCC §15.247(c), RSS-210 A8.5)

EUT with DUT number	RM-24 DUT 40442
Accessories with DUT numbers	BL-6C DUT 40447, ACP-12 DUT 40452, HS-5 DUT 40450
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23 / 44 / 100.6
Date of measurements	18.11.2005
Measured by	Jari Jantunen

13.1. 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

13.2. WLAN Test results

13.2.1 DSSS mode, QPSK modulation, 11 Mbps data rate

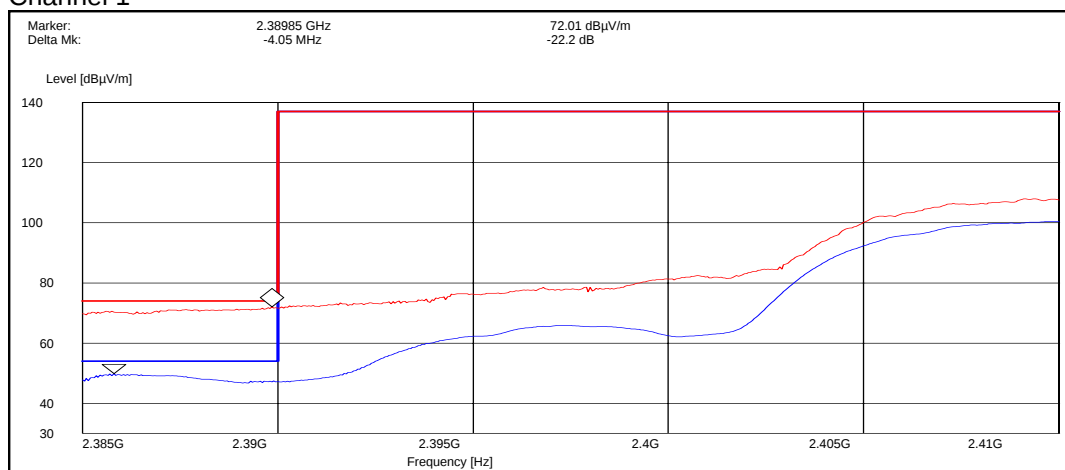
Average (RBW: 1 MHz)

Channel	E [dB μ V/m]	Result
1	49.81	PASSED
11	48.29	PASSED

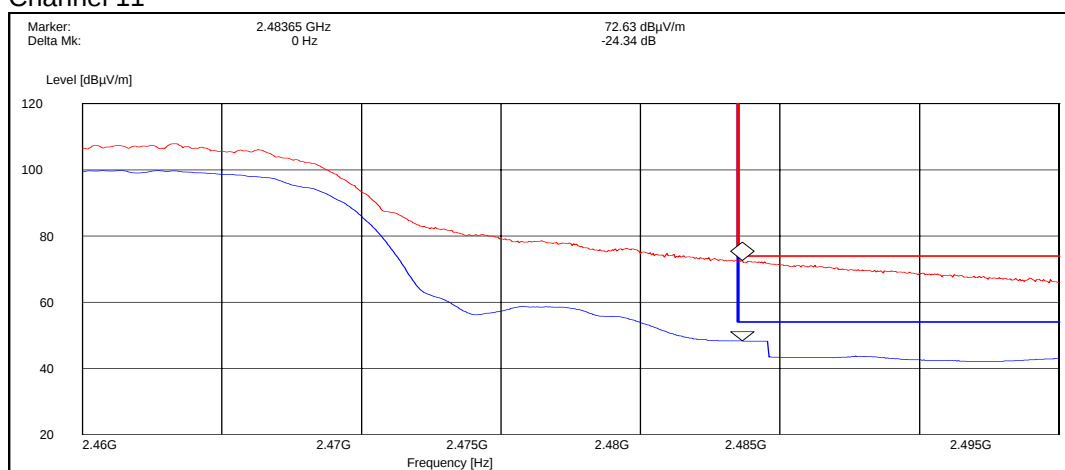
Peak (RBW: 1 MHz)

Channel	E [dB μ V/m]	Result
1	72.01	PASSED
11	72.63	PASSED

Channel 1



Channel 11



13.2.2 OFDM mode, 64QAM modulation, 48 Mbps data rate

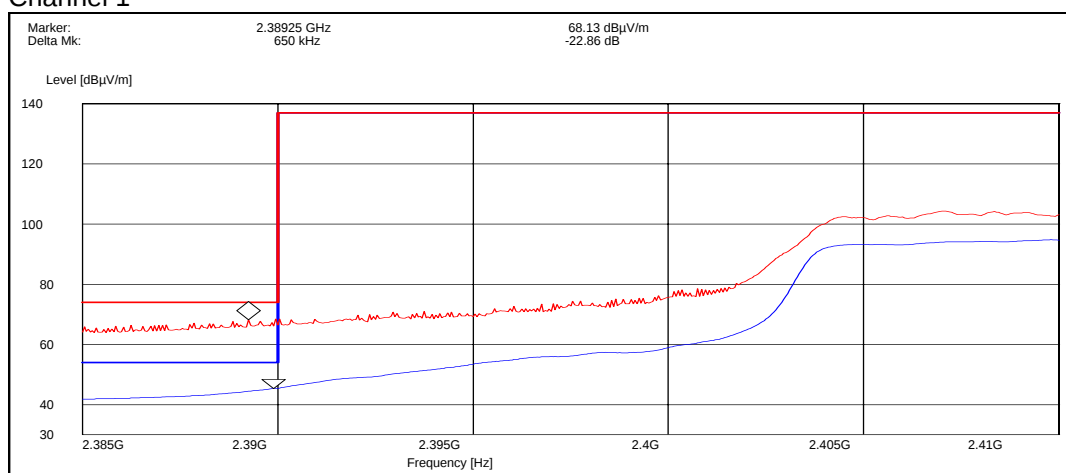
Average (RBW: 1 MHz)

Channel	E [dB μ V/m]	Result
1	45.27	PASSED
11	43.78	PASSED

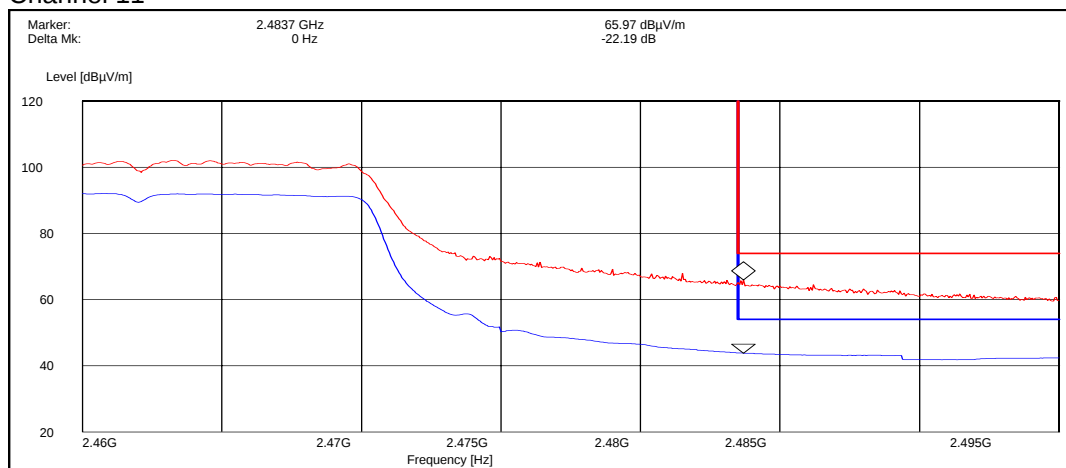
Peak (RBW: 1 MHz)

Channel	E [dB μ V/m]	Result
1	68.13	PASSED
11	65.97	PASSED

Channel 1



Channel 11



14. Spurious RF conducted emissions (FCC §15.247(c), RSS-210 A8.5)

EUT with DUT number	Phone: DUT 40444
Accessories with DUT numbers	Battery: DUT 40446
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23/50/98.9-100.1
Date of measurements	16-17.11.2005
Measured by	Jan-Erik Lilja

14.1. Test method and limit

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

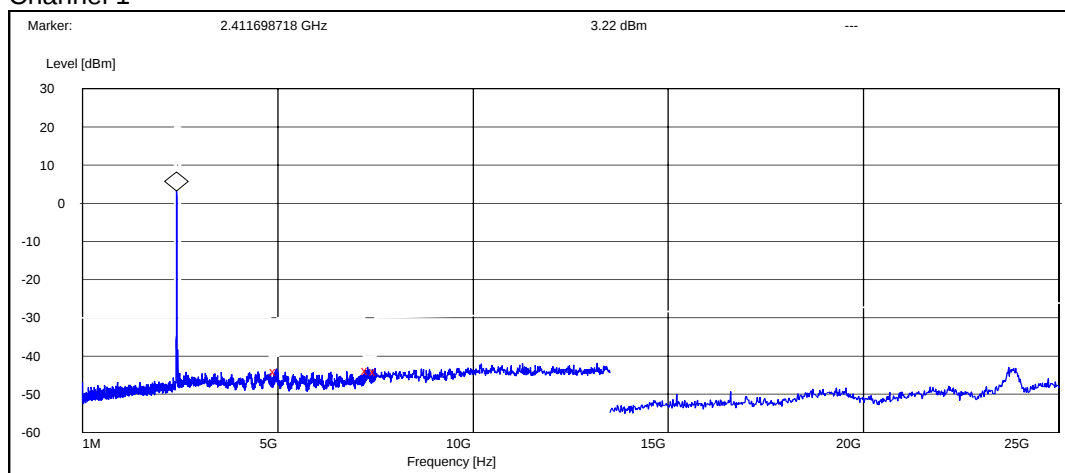
Limits for spurious RF conducted emissions measurements

Frequency range [MHz]	Limit [dBc]
1 – 25000	≤ -20

14.2. WLAN Test results

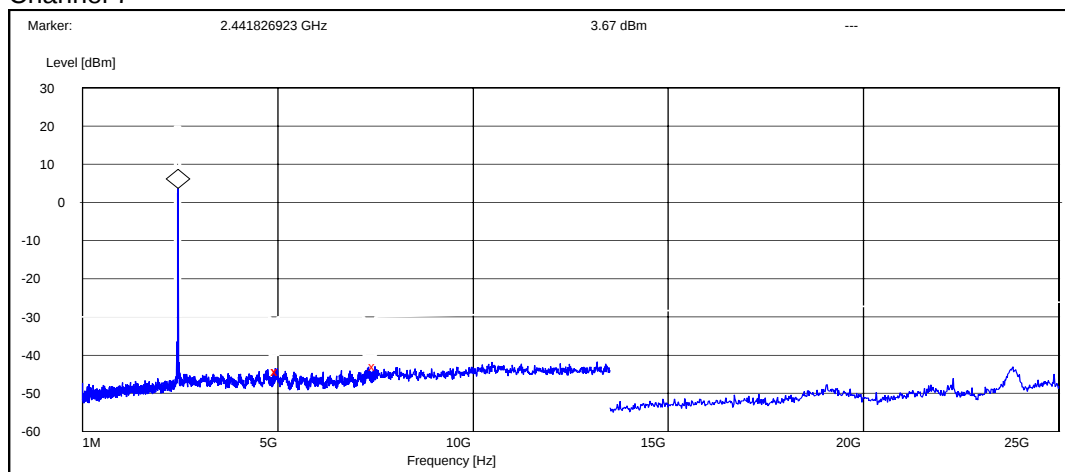
14.2.1 DSSS mode, QPSK modulation, 11 Mbps data rate

Channel 1



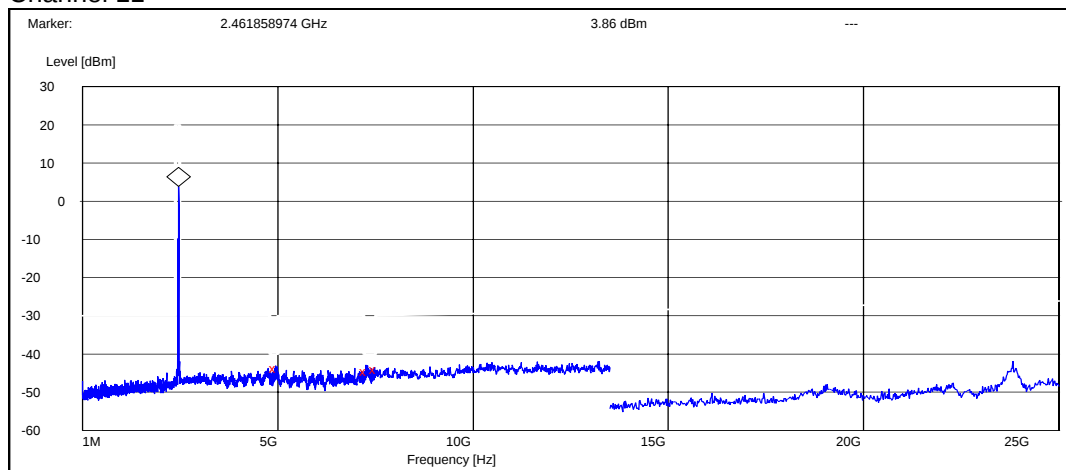
Frequency [MHz]	P [dBc]	Result
4966.666667	-47.222872	Passed
7293.750000	-46.922872	Passed
7500.000000	-47.222872	Passed

Channel 7



Frequency [MHz]	P [dBc]	Result
4991.025641	-47.867233	Passed
5000.000000	-47.867233	Passed
7495.192308	-46.567233	Passed

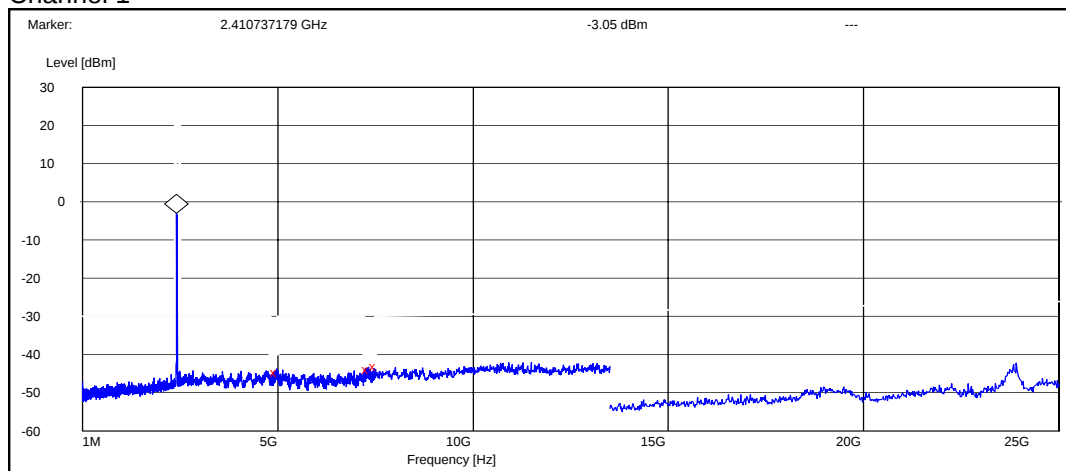
Channel 11



Frequency [MHz]	P [dBc]	Result
4944.230769	-47.660696	Passed
7257.211538	-48.460696	Passed
7500.000000	-47.860696	Passed

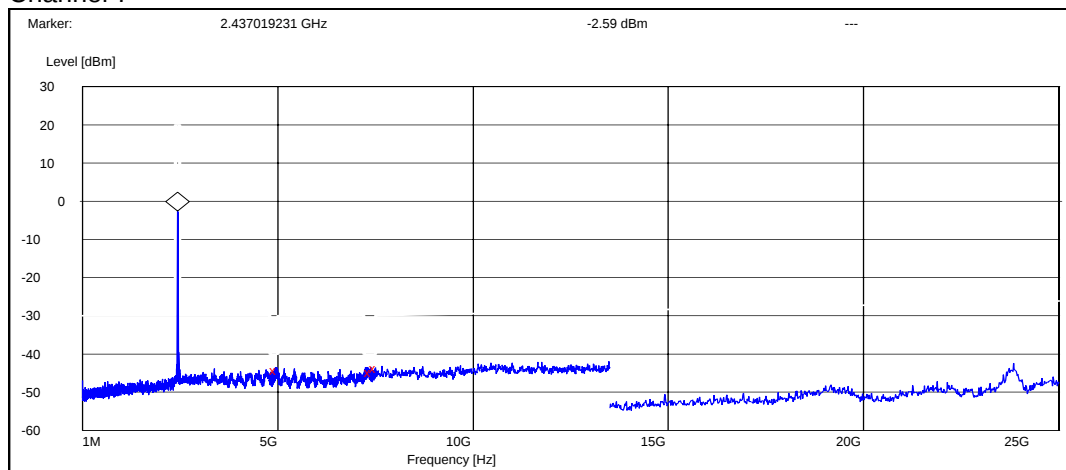
14.2.2 OFDM mode, 64QAM modulation, 48 Mbps data rate

Channel 1



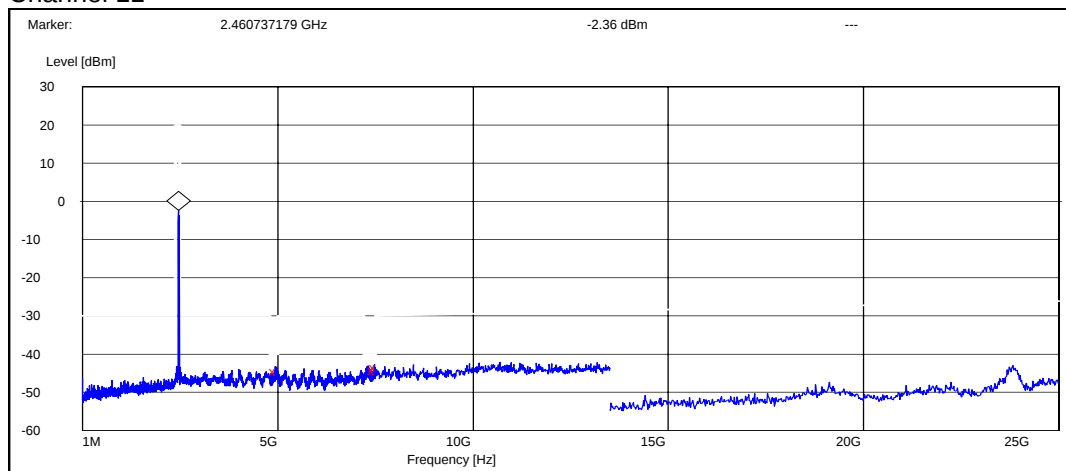
Frequency [MHz]	P [dBc]	Result
4981.410256	-41.554256	Passed
7332.211538	-40.754256	Passed
7500.000000	-39.954256	Passed

Channel 7



Frequency [MHz]	P [dBc]	Result
4966.666667	-41.713635	Passed
7378.846154	-42.113635	Passed
7500.000000	-41.013635	Passed

Channel 11



Frequency [MHz]	P [dBc]	Result
4942.948718	-42.235844	Passed
7475.000000	-41.835844	Passed
7500.000000	-41.035844	Passed

15. Spurious radiated emissions (FCC §15.247(c), §15.209, RSS-210 A8.5)

EUT with DUT number	RM-24 DUT 40442
Accessories with DUT numbers	BL-6C DUT 40447, ACP-12 DUT 40452, HS-5 DUT 40450
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 45 / 103.2
Date of measurements	21.11.2005
Measured by	Jari Jantunen

15.1. 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:

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

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

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

Frequency range [MHz]	Limit [$\mu\text{V/m}$]	Limit [dB $\mu\text{V/m}$]	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

15.2. WLAN Test results

15.2.1 DSSS mode, QPSK modulation, 11 Mbps data rate

Channel 1

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dB $\mu\text{V/m}$]	E [$\mu\text{V/m}$]	U _{RX} [dB μV]	A _{TOT} [dB]	Polarisation	Result
4824.000000	48.20	257.04	48.80	-0.60	HORIZONTAL	PASSED
7236.000000	44.70	171.79	41.50	3.20	HORIZONTAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dB $\mu\text{V/m}$]	E [$\mu\text{V/m}$]	U _{RX} [dB μV]	A _{TOT} [dB]	Polarisation	Result
4824.000000	38.10	80.35	38.70	-0.60	HORIZONTAL	PASSED
7236.000000	32.20	40.74	29.00	3.20	HORIZONTAL	PASSED

Channel 7

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dB $\mu\text{V/m}$]	E [$\mu\text{V/m}$]	U _{RX} [dB μV]	A _{TOT} [dB]	Polarisation	Result
4883.767535	53.90	495.45	54.60	-0.70	HORIZONTAL	PASSED
7327.655311	45.00	177.83	41.50	3.50	HORIZONTAL	PASSED
10482.465932	46.70	216.27	38.70	8.00	HORIZONTAL	PASSED
10550.604208	47.40	234.42	39.10	8.30	HORIZONTAL	PASSED
17996.985972	56.20	645.65	34.00	22.20	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dB $\mu\text{V/m}$]	E [$\mu\text{V/m}$]	U _{RX} [dB μV]	A _{TOT} [dB]	Polarisation	Result
4883.767535	43.10	142.89	43.80	-0.70	HORIZONTAL	PASSED
7327.655311	32.20	40.74	28.70	3.50	HORIZONTAL	PASSED
10552.604208	33.70	48.42	25.40	8.30	HORIZONTAL	PASSED
17995.485972	43.30	146.22	21.10	22.20	VERTICAL	PASSED

Channel 11

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4924.000000	54.30	518.80	54.90	-0.60	HORIZONTAL	PASSED
7386.000000	44.90	175.79	40.60	4.30	HORIZONTAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4924.000000	43.50	149.62	44.10	-0.60	HORIZONTAL	PASSED
7386.000000	32.20	40.74	27.90	4.30	HORIZONTAL	PASSED

15.2.2 OFDM mode, 64QAM modulation, 48 Mbps data rate

Channel 1

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4824.000000	43.60	151.36	44.20	-0.60	HORIZONTAL	PASSED
7236.000000	43.20	144.54	40.00	3.20	HORIZONTAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4824.000000	32.50	42.17	33.10	-0.60	HORIZONTAL	PASSED
7236.000000	30.90	35.08	27.70	3.20	HORIZONTAL	PASSED

Channel 7

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4884.267535	47.00	223.87	47.70	-0.70	HORIZONTAL	PASSED
7313.129259	43.80	154.88	40.20	3.60	VERTICAL	PASSED
7346.695391	44.00	158.49	39.70	4.30	HORIZONTAL	PASSED
7418.839679	44.90	175.79	40.40	4.50	HORIZONTAL	PASSED
7427.349699	44.80	173.78	40.30	4.50	HORIZONTAL	PASSED
10476.455912	47.20	229.09	39.10	8.10	HORIZONTAL	PASSED
17992.993988	56.30	653.13	34.20	22.10	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4884.267535	31.60	38.02	32.30	-0.70	HORIZONTAL	PASSED
7311.629259	31.00	35.48	27.40	3.60	VERTICAL	PASSED
7344.195391	31.40	37.15	27.20	4.20	HORIZONTAL	PASSED
7418.339679	31.80	38.90	27.30	4.50	HORIZONTAL	PASSED
7422.349699	31.80	38.90	27.30	4.50	HORIZONTAL	PASSED
17993.493988	43.20	144.54	21.10	22.10	VERTICAL	PASSED

Channel 11

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4924.000000	47.80	245.47	48.40	-0.60	HORIZONTAL	PASSED
7386.000000	44.40	165.96	40.10	4.30	HORIZONTAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4924.000000	35.50	59.57	36.10	-0.60	HORIZONTAL	PASSED
7386.000000	31.60	38.02	27.30	4.30	HORIZONTAL	PASSED

16. AC powerline conducted emissions (FCC §15.207, RSS-GEN 7.2.2)

EUT with DUT number	RM-24 DUT 40442
Accessories with DUT numbers	BL-6C DUT 40447, ACP-12 DUT 40452, HS-5 DUT 40450
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	20 / 50 / 102.9
Date of measurements	23.11.2005
Measured by	Jari Jantunen

16.1. Test method and limit

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

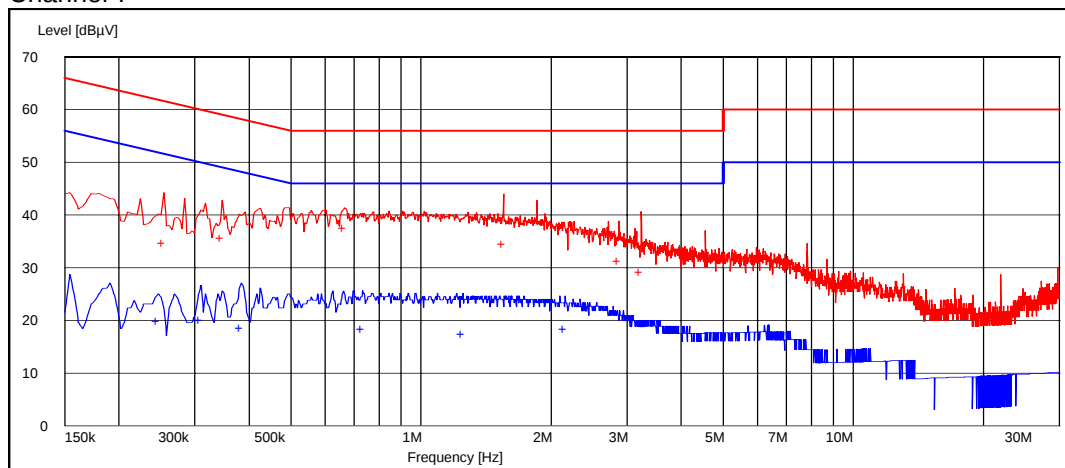
CISPR 22 Class B limits

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

16.2. WLAN Test results

16.2.1 DSSS mode, QPSK modulation, 11 Mbps data rate

Channel 7



Quasi peak (RBW: 9 kHz)

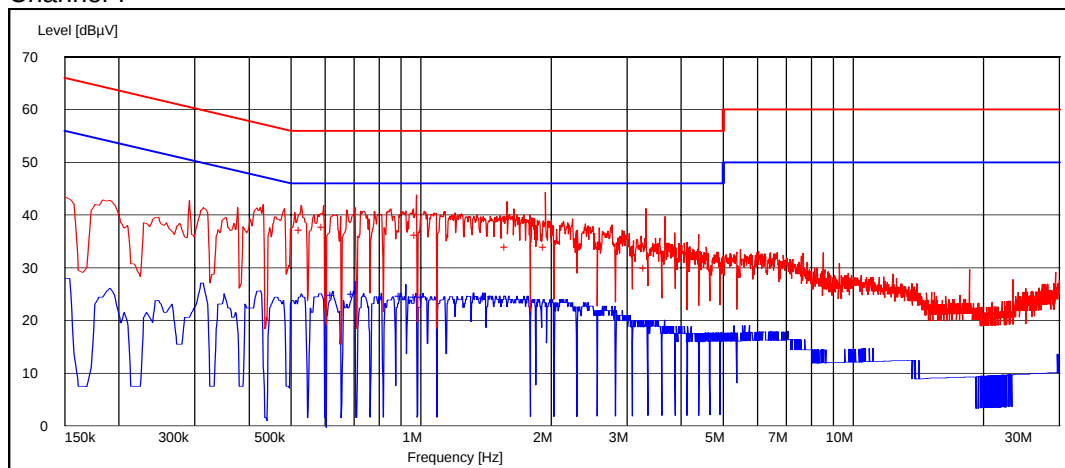
Frequency [MHz]	U [dBμV]	Line	Result
0.253808	34.70	N	PASSED
0.346493	35.70	L1	PASSED
0.665331	37.50	L1	PASSED
1.551403	34.50	L1	PASSED
2.871743	31.30	L1	PASSED
3.232465	29.10	N	PASSED

Average (RBW: 9 kHz)

Frequency [MHz]	U [dBμV]	Line	Result
0.246393	19.80	L1	PASSED
0.309419	20.10	N	PASSED
0.383567	18.60	N	PASSED
0.732064	18.40	N	PASSED
1.251102	17.50	L1	PASSED
2.156313	18.40	L1	PASSED

16.2.2 OFDM mode, 64QAM modulation, 48 Mbps data rate

Channel 7



Quasi peak (RBW: 9 kHz)

Frequency [MHz]	U [dBμV]	Line	Result
0.528156	37.10	L1	PASSED
0.594890	37.60	L1	PASSED
0.976754	36.10	L1	PASSED
1.581062	33.90	L1	PASSED
1.940681	34.00	L1	PASSED
3.316633	29.90	L1	PASSED

Average (RBW: 9 kHz)

Frequency [MHz]	U [dBμV]	Line	Result
0.624549	24.90	L1	PASSED
0.698697	25.00	L1	PASSED
0.898898	24.60	L1	PASSED
0.973046	24.40	L1	PASSED
1.010120	24.40	L1	PASSED
1.406814	24.20	L1	PASSED

17. 6 dB bandwidth

(FCC §15.247(a)(2), RSS-210 A8.2 (1))

EUT with DUT number	Phone: DUT 40444
Accessories with DUT numbers	Battery: DUT 40446
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23/50/98.9 - 100.1
Date of measurements	16-17.11.2005
Measured by	Jan-Erik Lilja

17.1. Test method and limit

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

Limits for 6 dB bandwidth measurements

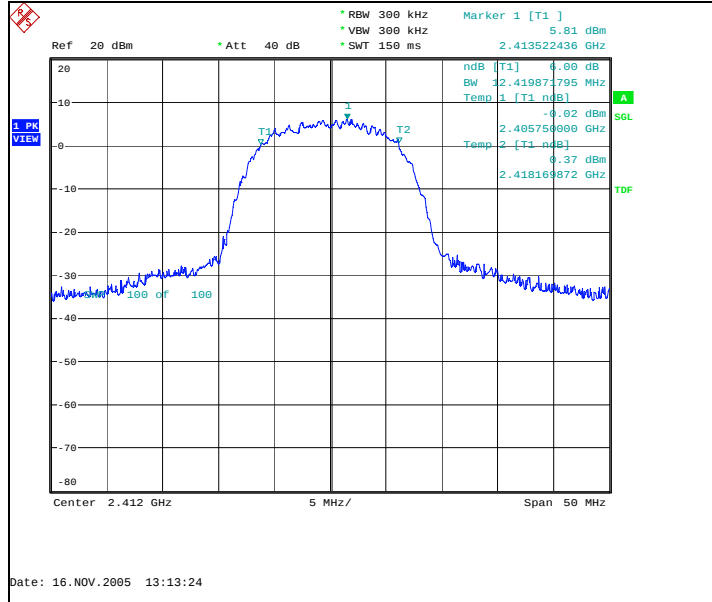
Limit [kHz]
≥ 500

17.2. WLAN test results

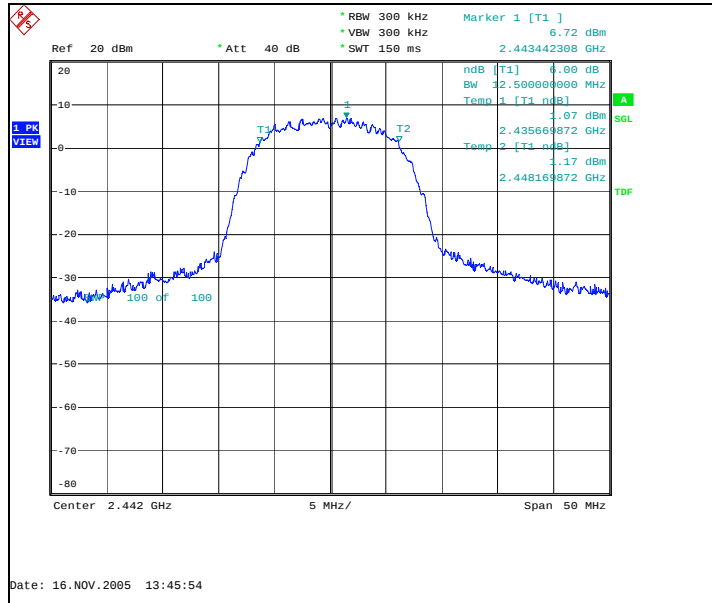
17.2.1 DSSS mode, QPSK modulation, 11 Mbps data rate

Channel	6 dB bandwidth [kHz]	Result
1	12419.872	Passed
7	12500.000	Passed
11	12500.000	Passed

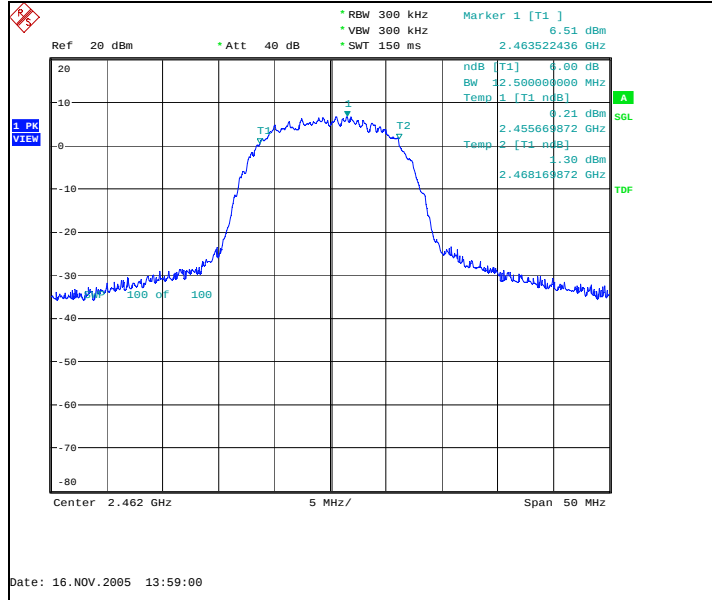
Channel 1



Channel 7



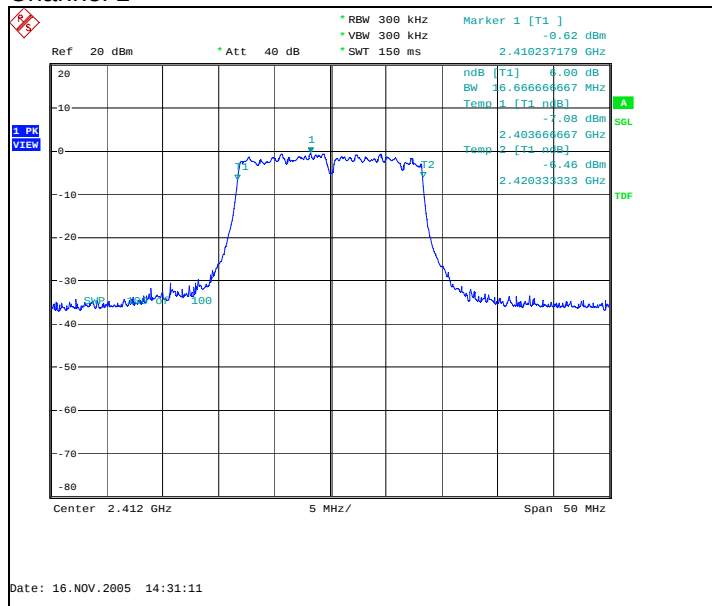
Channel 11



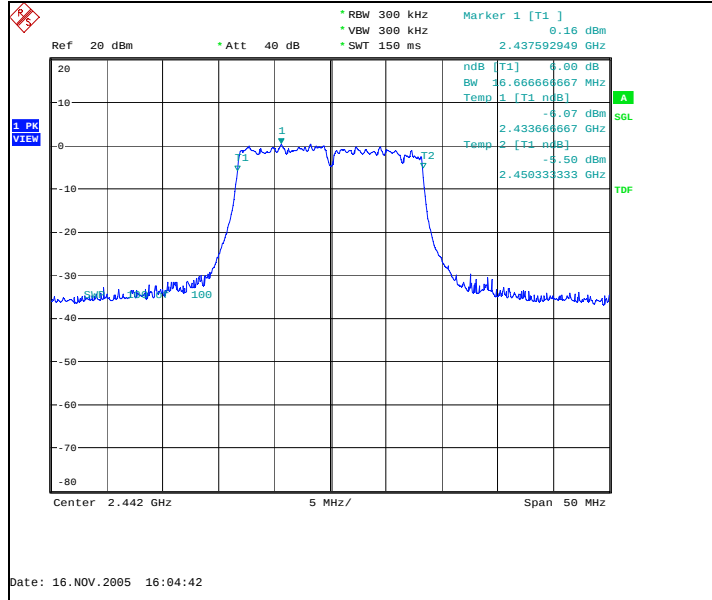
17.2.2 OFDM mode, 64QAM modulation, 48 Mbps data rate

Channel	6 dB bandwidth [kHz]	Result
1	16666.667	Passed
7	16666.667	Passed
11	16666.667	Passed

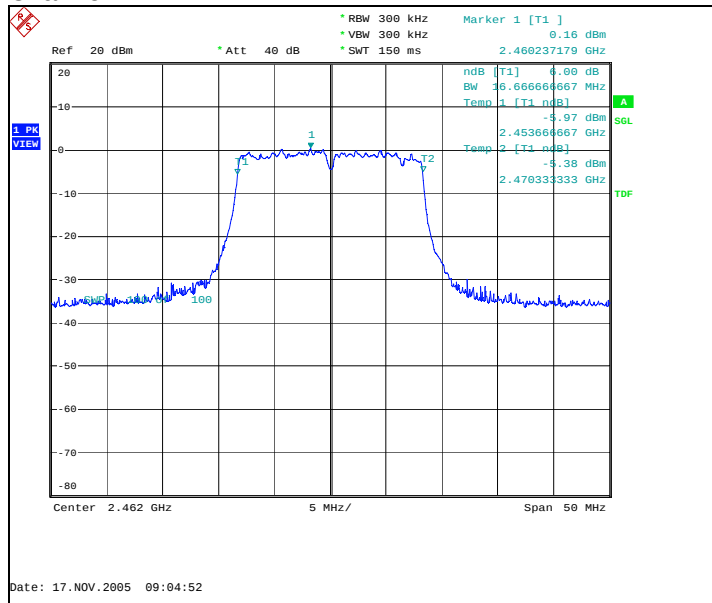
Channel 1



Channel 7



Channel 11



18. Power spectral density (FCC §15.247(e), RSS-210 A8.2 (2))

EUT with DUT number	Phone: DUT 40444
Accessories with DUT numbers	Battery: DUT 40446
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23/50/98.9-100.1
Date of measurements	16-17.11.2005
Measured by	Jan-Erik Lilja

18.1. Test method and limit

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

Limits for power spectral density measurements

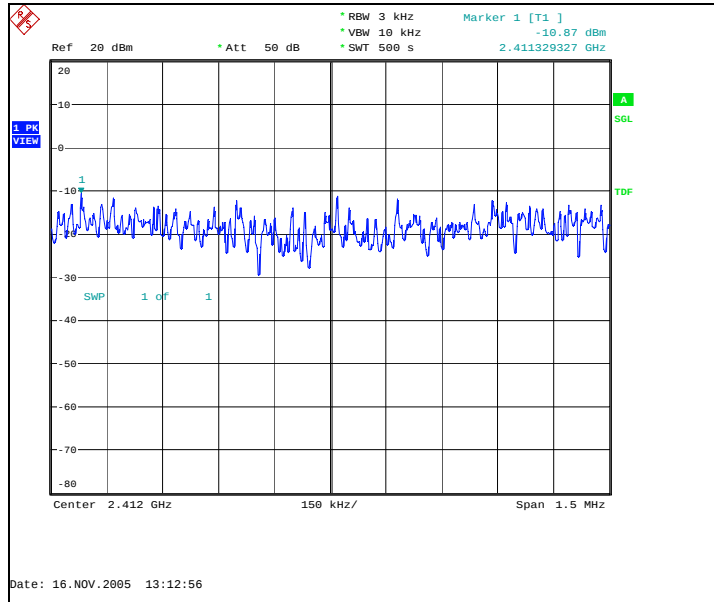
Limit [dBm] @ 3 kHz
≤ 8

18.2. WLAN test results

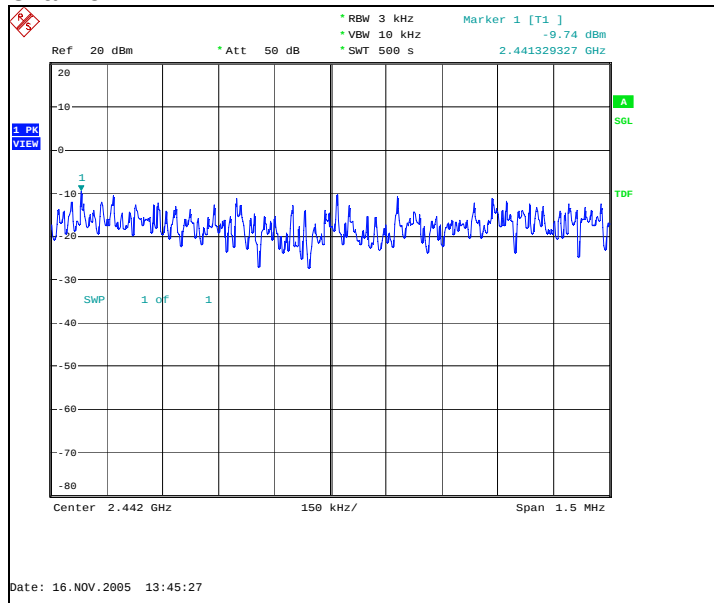
18.2.1 DSSS mode, QPSK modulation, 11 Mbps data rate

Channel	P [dBm]	Result
1	-10.87	Passed
7	-9.74	Passed
11	-10.07	Passed

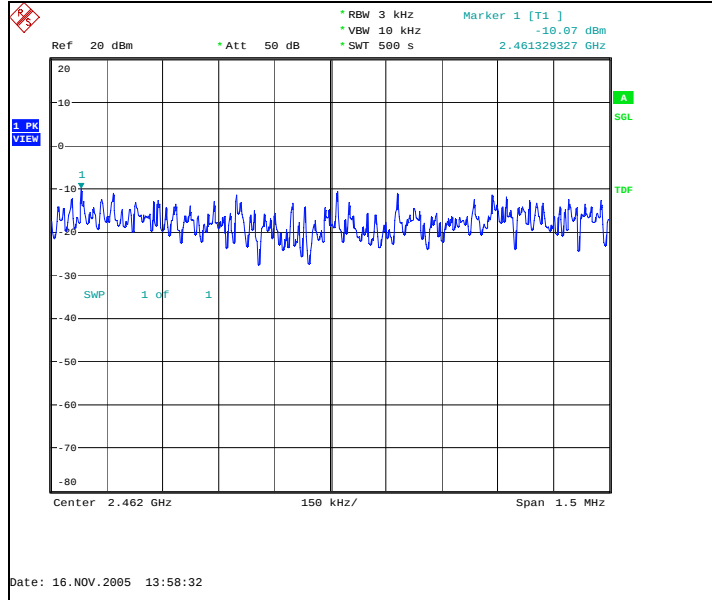
Channel 1



Channel 7



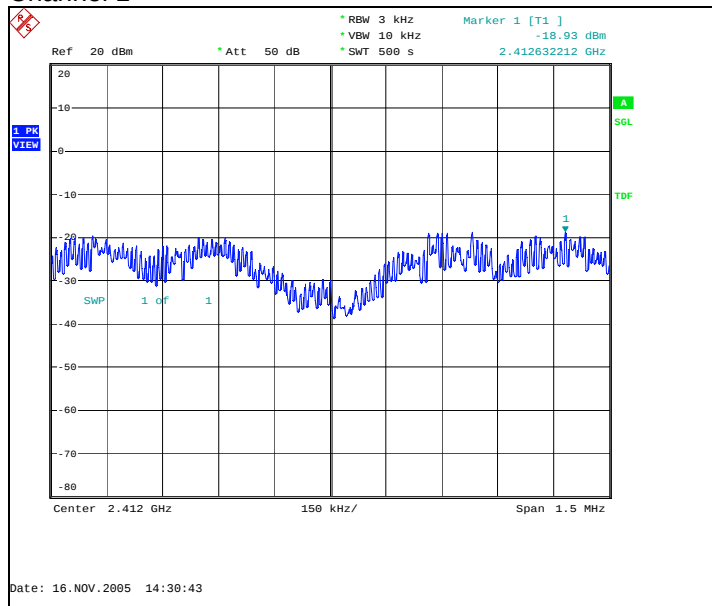
Channel 11



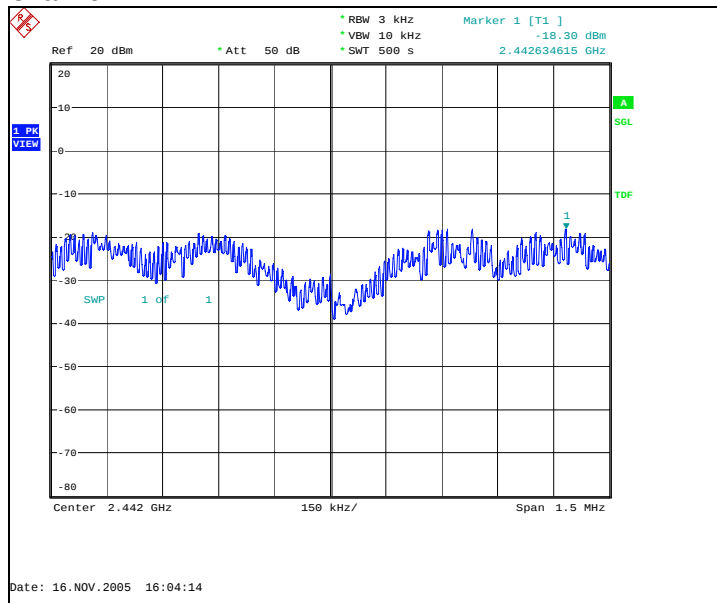
18.2.2 OFDM mode, 64QAM modulation, 48 Mbps data rate

Channel	P [dBm]	Result
1	-18.93	Passed
7	-18.30	Passed
11	-18.25	Passed

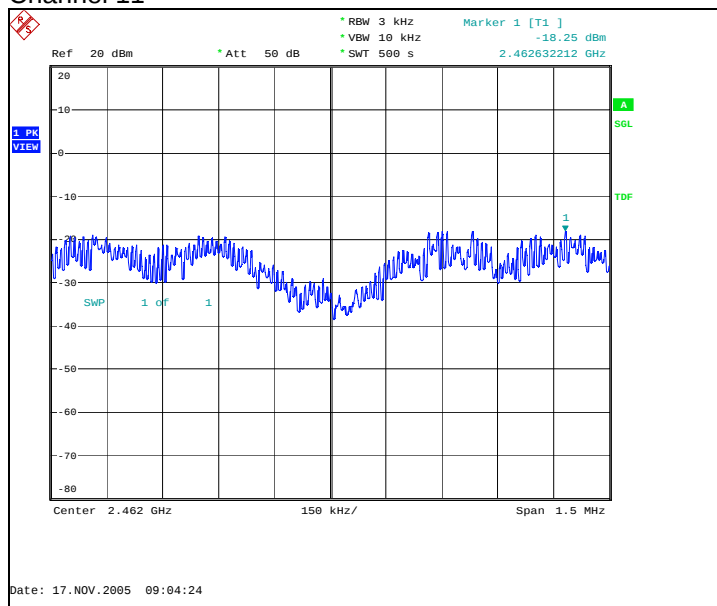
Channel 1



Channel 7



Channel 11



19. Test Equipment

19.1. 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

19.2. 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