

FCC Part 15C Compliance Test Report

Test Report no.:	Tre_FCC_0540_01.doc	Date of Report:	24.10.2005
Number of pages:	52	Customer's Contact person:	Ulla Valjakka
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FCC listing no.:	94436		
IC recognition no.:	3608		
Tested devices/ accessories:	GSM phone RM-49 / Battery BL-5C, AC charger ACP-12E, Headset HS-5, Memory card MU-1, Data cable DKU-2, 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:	PYARM-49	IC:	661V-RM49
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:			

Jari Jantunen, System Manager

1. Summary for FCC Part 15C Compliance Test Report

Date of receipt	21.9.2005
Testing completed	24.10.2005
The customer's contact person	Ulla Valjakka
Test Plan referred to	\\EMC\\TESTPLAN\\
Notes	-
Document name	T:\\Projects\\RM-49\\results\\emc\\FCC\\Tre_FCC_0540_01.doc

1.1. EUT and Accessory Information

The EUT is a quad band (GSM900/1800/1900 and WCDMA2100) 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-49	004400701695460	5.1	-	05w38.2	40357
Phone	RM-49	004400701695833	5.1	-	05w38.2	40359
Battery	BL-5C	M112111010314	6.3	-	-	40360
Battery	BL-5C	M112111010300	6.3	-	-	40361
AC-Charger	ACP-12E	-	1.3	0.2	-	40363
Headset	HS-5	-	0.3	1.5	-	40364
Memory Card	MU-1	-	-	-	-	40367
Data cable	DKU-2	-	-	-	-	40365
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

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

WLAN:

Section in CFR 47	Section in RSS-210	Name of the test	Result
15.247(b)(1)	6.2.2(o)(b)	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)(2)	Amend I(iv)	6 dB bandwidth	PASSED
15.247(e)	Amend I(iv)	Power spectral density	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.

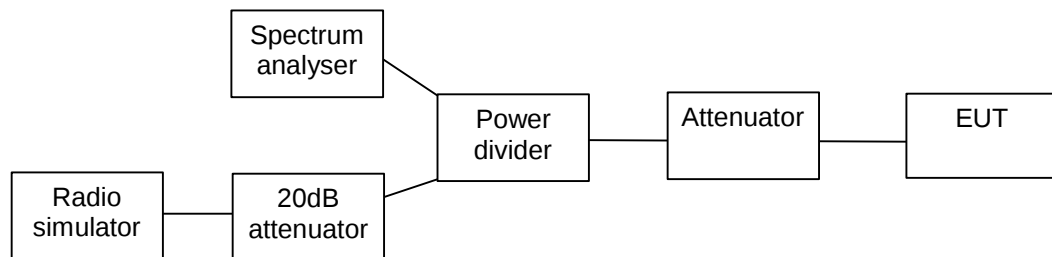
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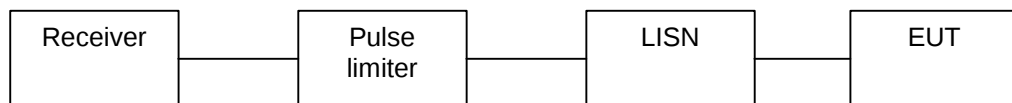
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2. Test setups

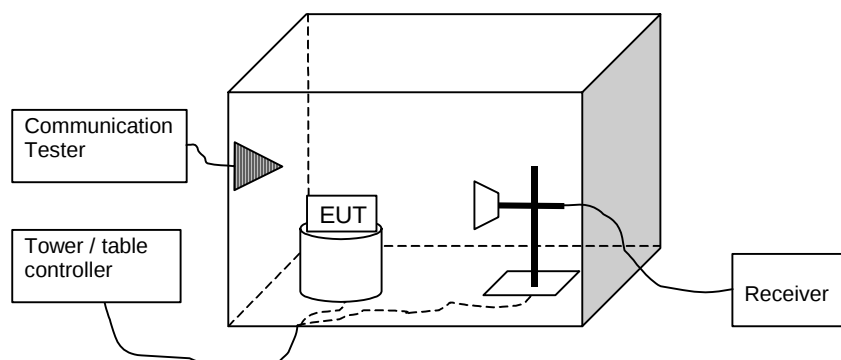
2.1. Conducted RF test setup



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: DUT 40359
Accessories with DUT numbers	Battery: DUT 40361
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22/51/102.4
Date of measurements	19.10.2005
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

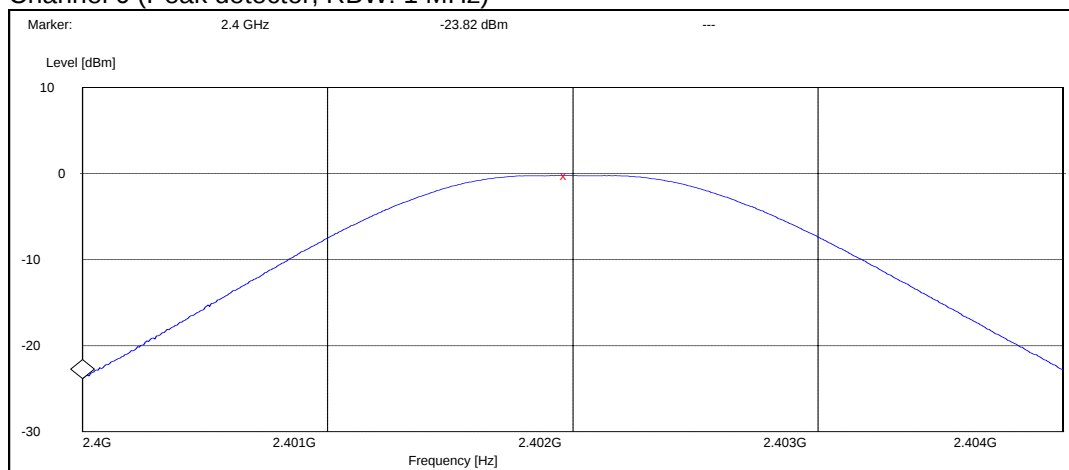
Frequency range [MHz]	Limit [W]	Limit [dBm]
2400 – 2483.5	≤ 1	≤ 30

3.2. Bluetooth Test results

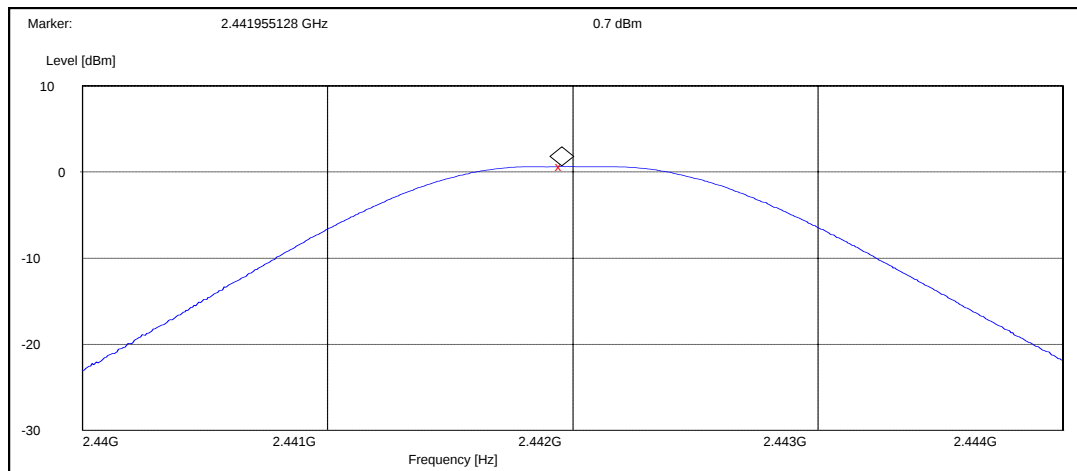
3.2.1 GSKF modulation, PRBS packet type

Channel	P [dBm]	P [mW]	Result
0	-0.20	0.955	Passed
40	0.70	1.175	Passed
78	0.70	1.175	Passed

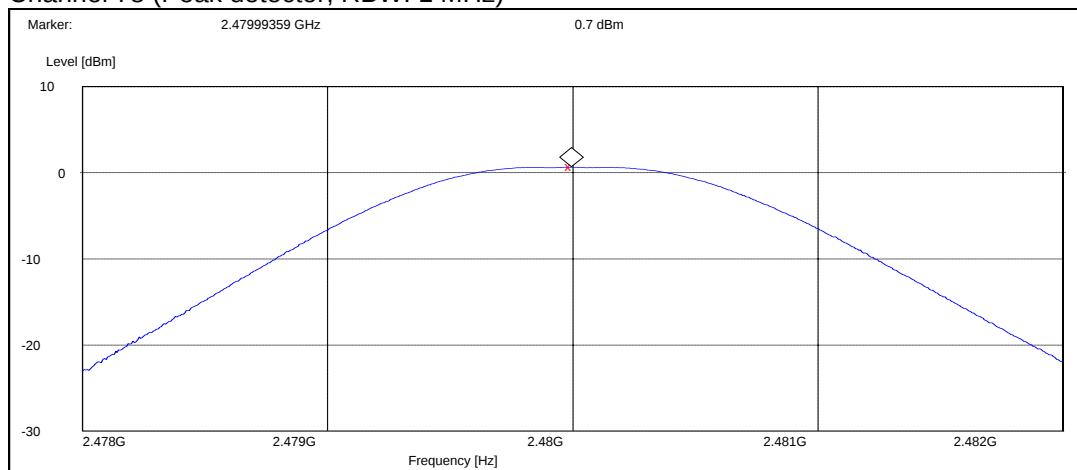
Channel 0 (Peak detector, RBW: 1 MHz)



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 6.2.2(o)(e1))

EUT with DUT number	RM-49 DUT 40357
Accessories with DUT numbers	BL-5C DUT 40360, AC-12E DUT 40363, HS-5 DUT 40364, MU-1 DUT 40367
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23 / 44 / 99.4
Date of measurements	21.10.2005
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

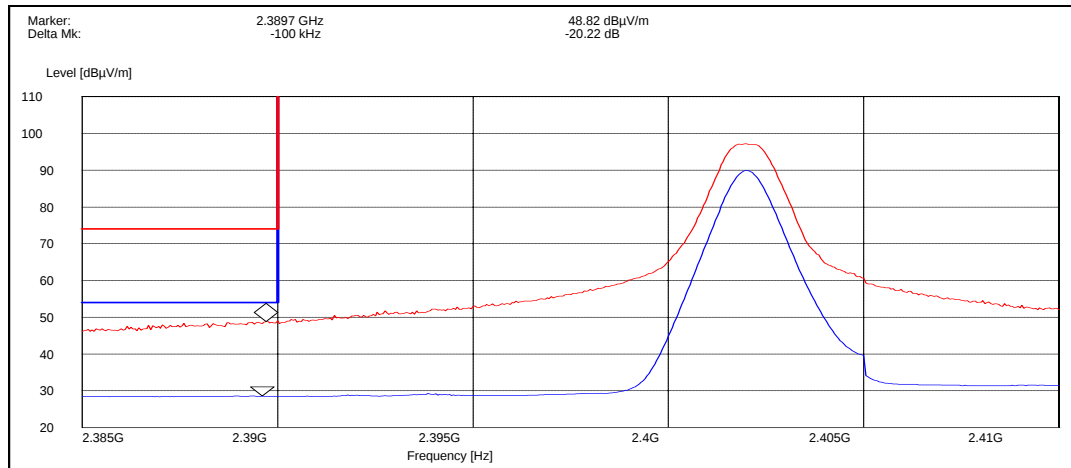
Average (RBW: 1 MHz)

Channel	E [dB μ V/m]	Result
0	28.60	PASSED
78	29.00	PASSED
Hopping on, low end	28.32	PASSED
Hopping on, high end	30.79	PASSED

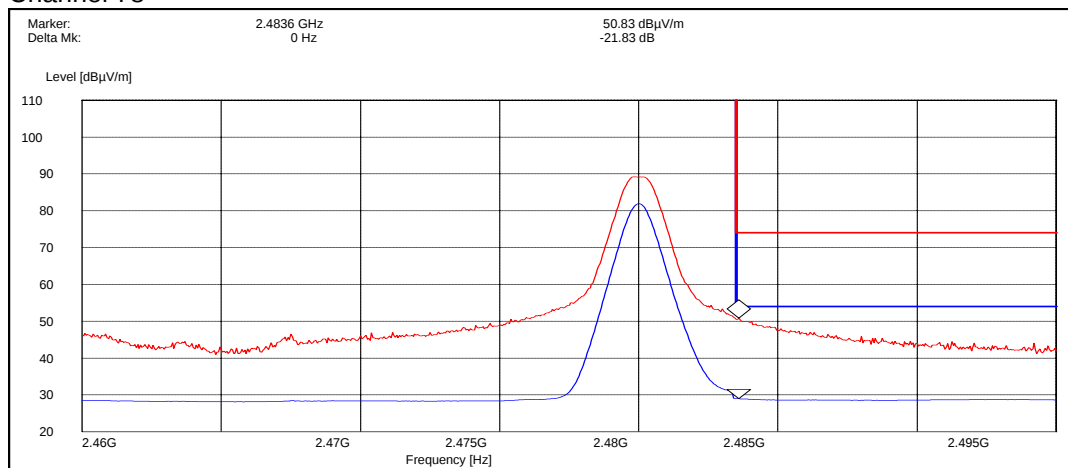
Peak (RBW: 1 MHz)

Channel	E [dB μ V/m]	Result
0	48.82	PASSED
78	50.83	PASSED
Hopping on, low end	47.79	PASSED
Hopping on, high end	56.80	PASSED

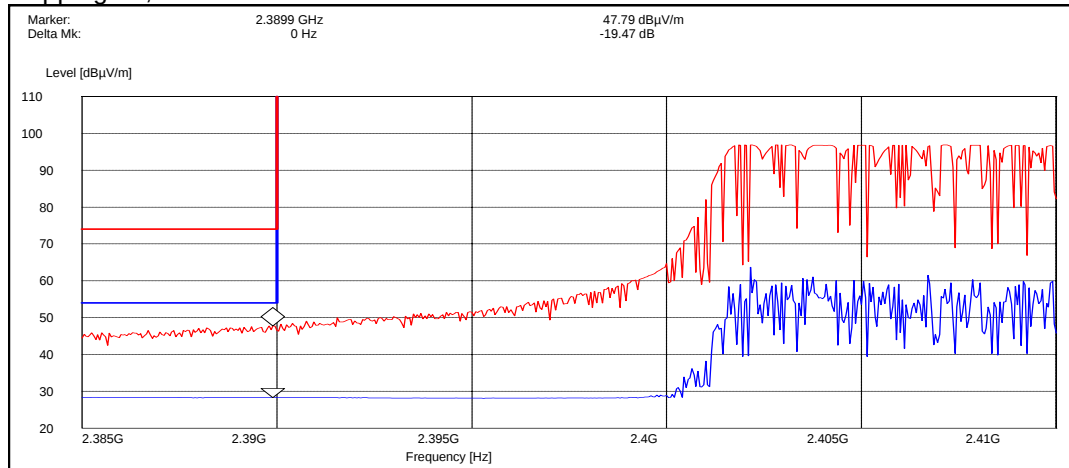
Channel 0



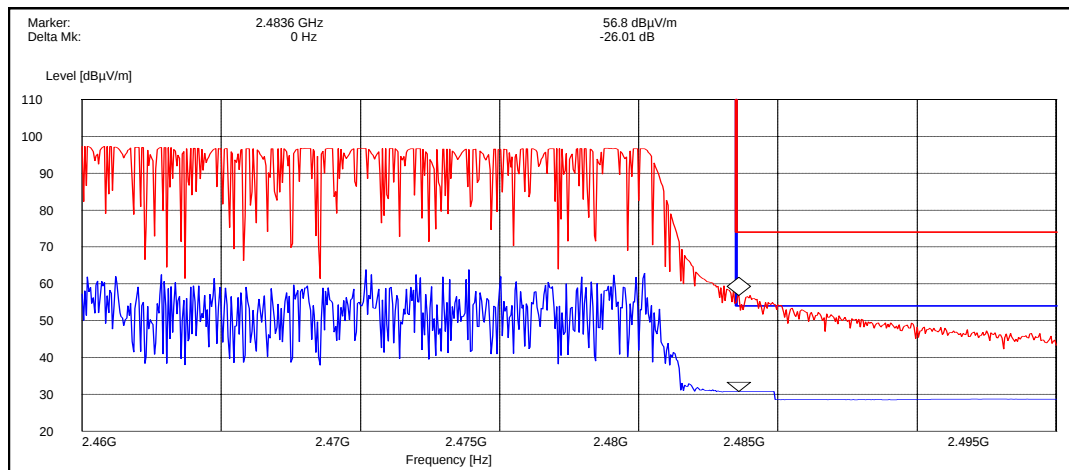
Channel 78



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: DUT 40359
Accessories with DUT numbers	Battery: DUT 40361
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22/51/102.4
Date of measurements	19.10.2005
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.

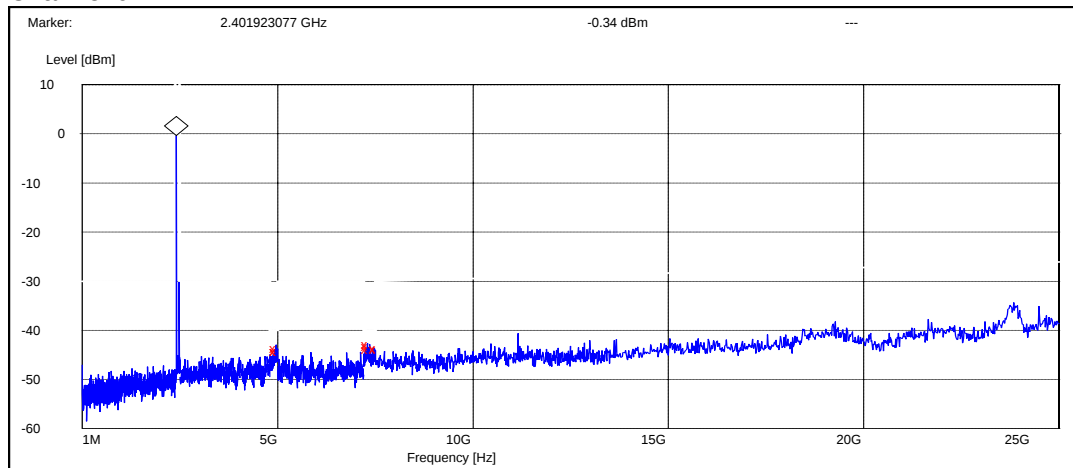
Limits for spurious RF conducted emissions measurements

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

5.2. Bluetooth Test results

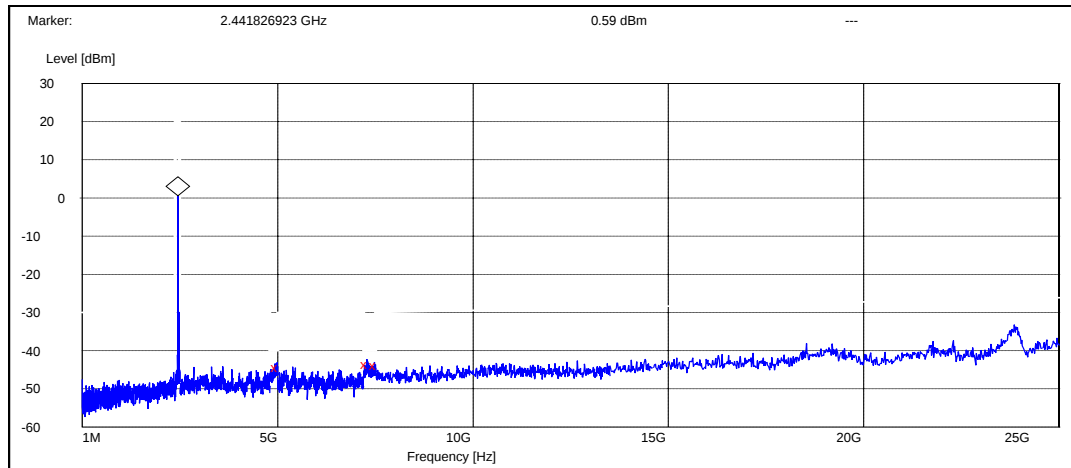
5.2.1 GFSK modulation, PRBS packet type

Channel 0



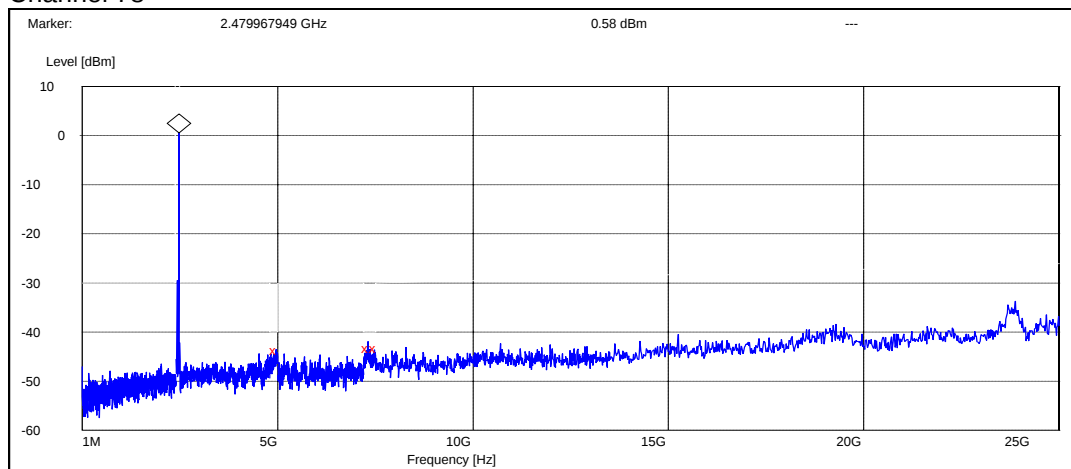
Frequency [MHz]	P [dBc]	Result
4961.488462	-43.361327	Passed
7297.746154	-43.461327	Passed
7499.950000	-43.361327	Passed

Channel 40



Frequency [MHz]	P [dBc]	Result
4990.064103	-44.793350	Passed
7285.576923	-44.093350	Passed
7500.000000	-44.293350	Passed

Channel 78



Frequency [MHz]	P [dBc]	Result
4960.897436	-44.378535	
7306.730769	-43.878535	
7500.000000	-43.978535	

6. Spurious radiated emissions (FCC §15.247(c), §15.209, RSS-210 6.2.2(o)(e1))

EUT with DUT number	RM-49 DUT 40357
Accessories with DUT numbers	BL-5C DUT 40360, AC-12E DUT 40363, HS-5 DUT 40364, MU-1 DUT 40367
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23 / 44 / 99.4
Date of measurements	21.10.2005
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	46.80	218.78	47.10	-0.30	HORIZONTAL	PASSED
7206.000000	43.90	156.68	40.90	3.00	VERTICAL	PASSED
9608.000000	46.30	206.54	37.00	9.30	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
4804.000000	36.40	66.07	36.70	-0.30	HORIZONTAL	PASSED
7206.000000	31.50	37.58	28.50	3.00	VERTICAL	PASSED
9608.000000	33.80	48.98	24.50	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
4884.267535	47.40	234.42	48.10	-0.70	HORIZONTAL	PASSED
7326.153307	45.60	190.55	42.20	3.40	VERTICAL	PASSED
17949.899800	56.30	653.13	34.60	21.70	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	36.10	63.83	36.80	-0.70	HORIZONTAL	PASSED
7326.153307	33.10	45.19	29.70	3.40	VERTICAL	PASSED
17946.899800	42.90	139.64	21.20	21.70	VERTICAL	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	46.30	206.54	46.40	-0.10	HORIZONTAL	PASSED
7440.000000	46.80	218.78	42.40	4.40	VERTICAL	PASSED
9920.000000	46.60	213.80	37.40	9.20	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
4960.000000	35.60	60.26	35.70	-0.10	HORIZONTAL	PASSED
7440.000000	33.80	48.98	29.40	4.40	VERTICAL	PASSED
9920.000000	34.10	50.70	24.90	9.20	HORIZONTAL	PASSED

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

EUT with DUT number	RM-49 DUT 40357
Accessories with DUT numbers	BL-5C DUT 40360, AC-12E DUT 40363, MU-1 DUT 40367, DKU-2 DUT 40365, 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]	19 / 50 / 100.7
Date of measurements	24.10.2005
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:

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

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

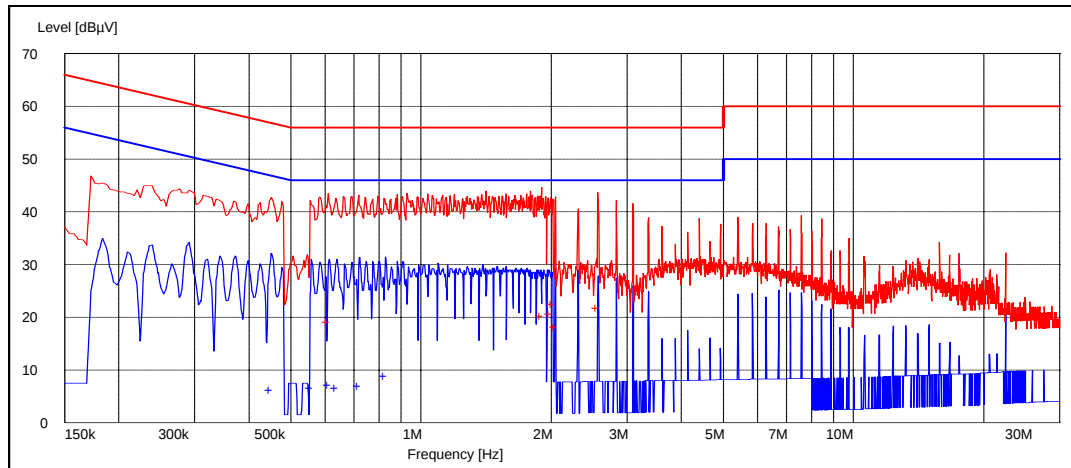
CISPR 22 Class B limits

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

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
0.609719	19.20	L1	PASSED
1.899900	20.30	L1	PASSED
1.992585	20.60	L1	PASSED
2.018036	22.50	L1	PASSED
2.048096	18.20	L1	PASSED
2.565130	21.80	L1	PASSED

Average (RBW: 9 kHz)

Frequency [MHz]	U [dBμV]	Line	Result
0.450301	6.30	L1	PASSED
0.557816	6.50	L1	PASSED
0.613427	7.10	L1	PASSED
0.639379	6.50	N	PASSED
0.720942	7.00	L1	PASSED
0.828457	8.90	L1	PASSED

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

EUT with DUT number	Phone: DUT 40359
Accessories with DUT numbers	Battery: DUT 40361
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22/51/102.4
Date of measurements	19.10.2005
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

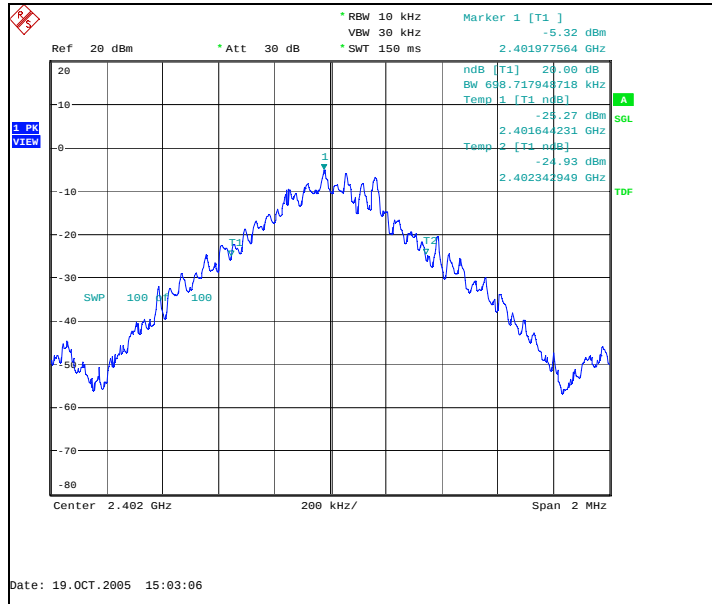
Limit [MHz]
≤ 1

8.2. Bluetooth Test results

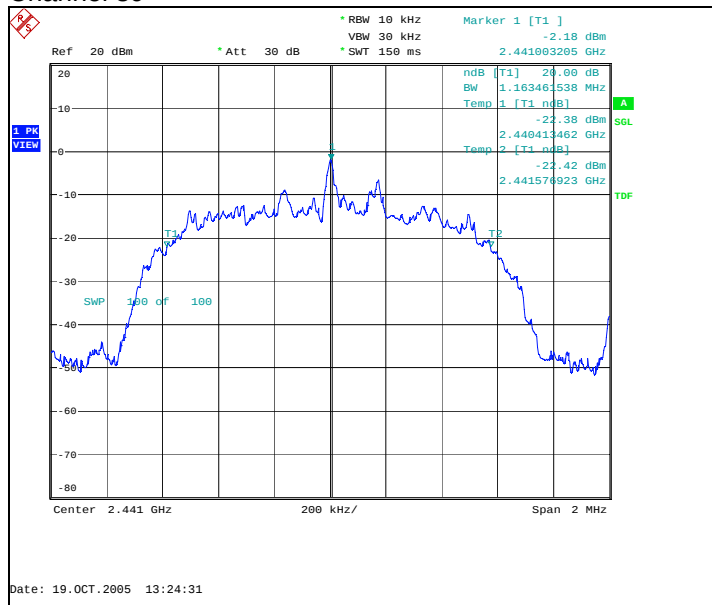
8.2.1 GFSK modulation, PRBS packet type

Channel	20 dB bandwidth [kHz]	Result
0	698.718	Passed
39	701.923	Passed
78	746.795	Passed

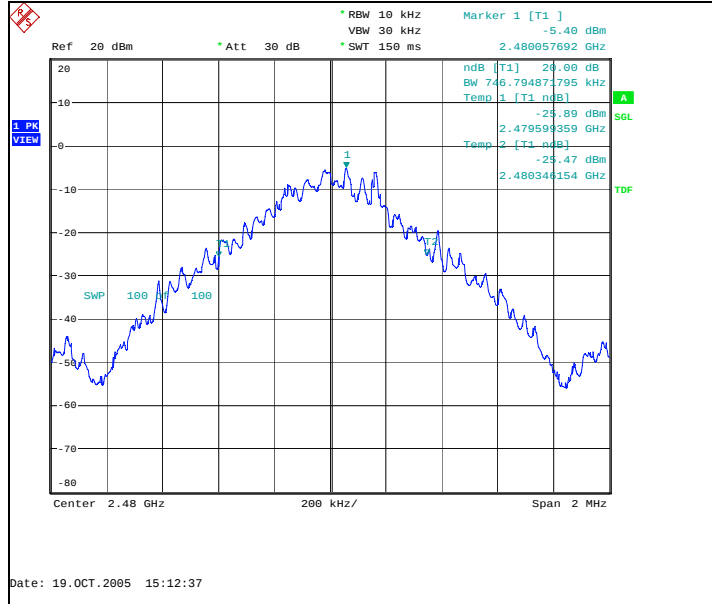
Channel 0



Channel 39



Channel 78



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

EUT with DUT number	Phone: DUT 40359
Accessories with DUT numbers	Battery: DUT 40361
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22/51/102.4
Date of measurements	19.10.2005
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

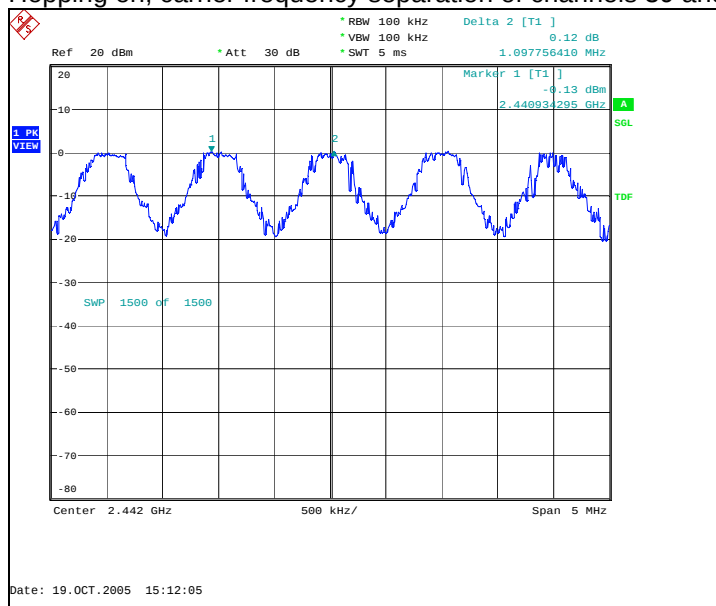
Limit [MHz]
N/A

9.2. Bluetooth Test results

9.2.1 GFSK modulation, PRBS packet type

Carrier frequency separation [kHz]	Result
1097.756	Passed

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: DUT 40359
Accessories with DUT numbers	Battery: DUT 40361
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22/51/102.4
Date of measurements	19.10.2005
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

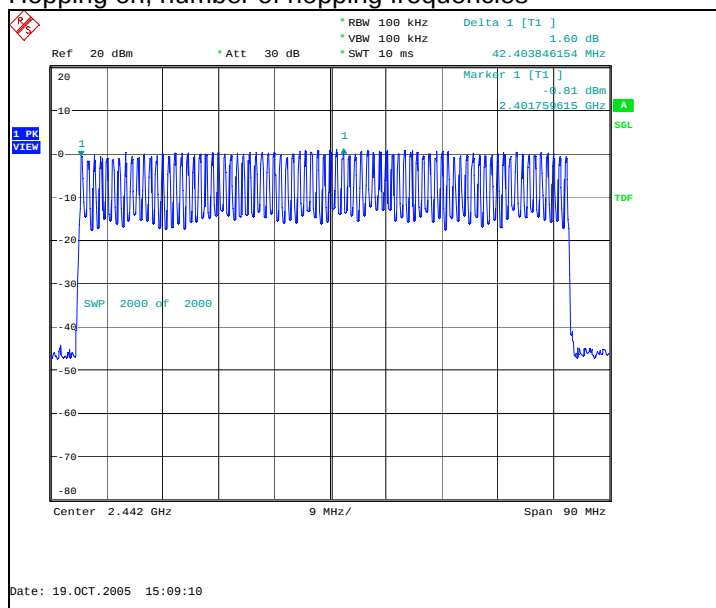
Limit [number]
≥ 75

10.2. Bluetooth Test results

10.2.1 GFSK modulation, PRBS packet type

Measured number of hopping frequencies	Result
79	Passed

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: DUT 40359
Accessories with DUT numbers	Battery: DUT 40361
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22/51/102.4
Date of measurements	19.10.2005
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

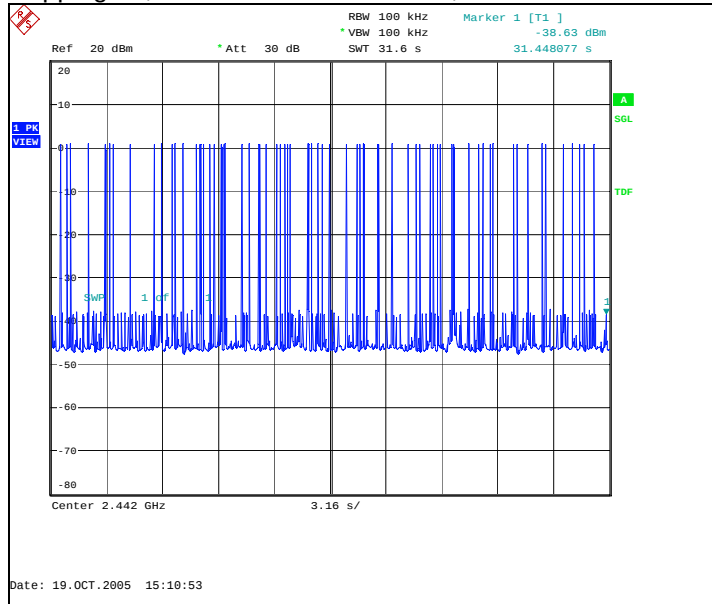
Limit [s]
≤ 0.4

11.2. Bluetooth test results

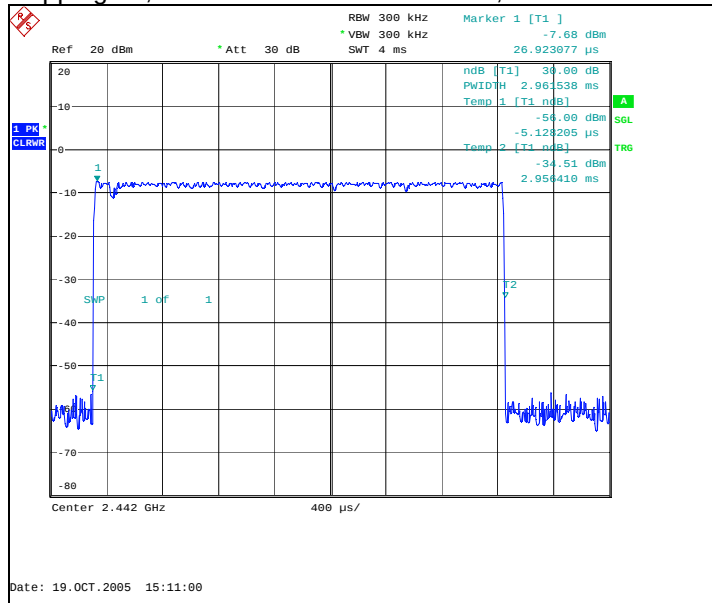
11.2.1 GFSK modulation, PRBS packet type

Measured number of transmissions	Duration of one transmission [μs]	Time of occupancy [s]	Result
66	2961.538	0.195462	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 6.2.2(o)(b))

EUT with DUT number	Phone: DUT 40359
Accessories with DUT numbers	Battery: DUT 40361
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22/53/101.2
Date of measurements	20.10.2005
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

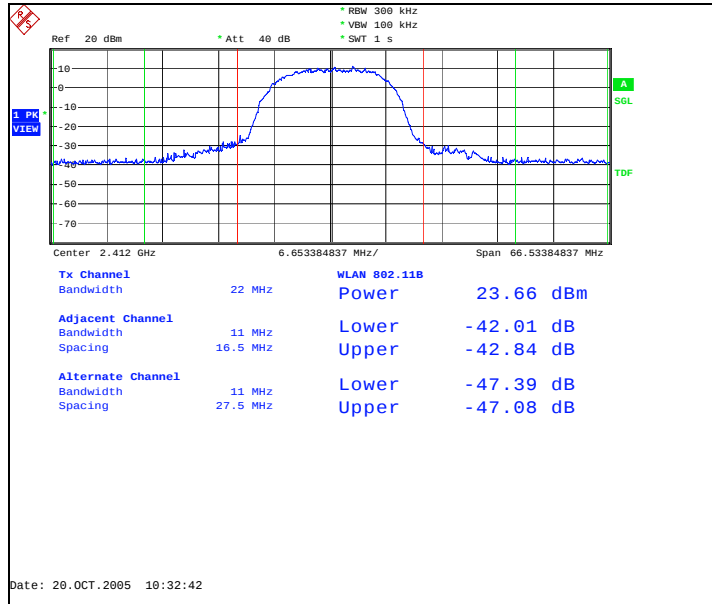
Frequency range [MHz]	Limit [W]	Limit [dBm]
2400 – 2483.5	≤ 1	≤ 30

12.2. WLAN Test results

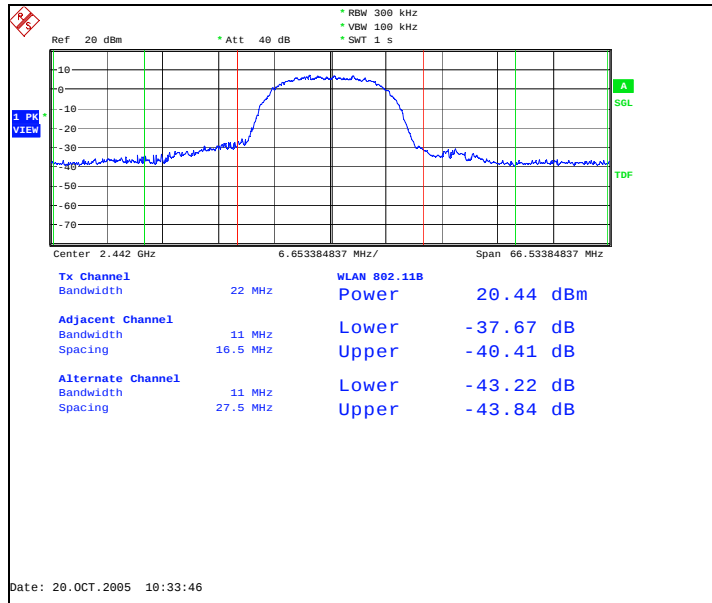
12.2.1 DSSS mode, QPSK modulation, 5.5 Mbps data rate

Channel	P [dBm]	P [W]	Result
1	23.66	0.232	Passed
7	20.44	0.111	Passed
11	21.28	0.134	Passed

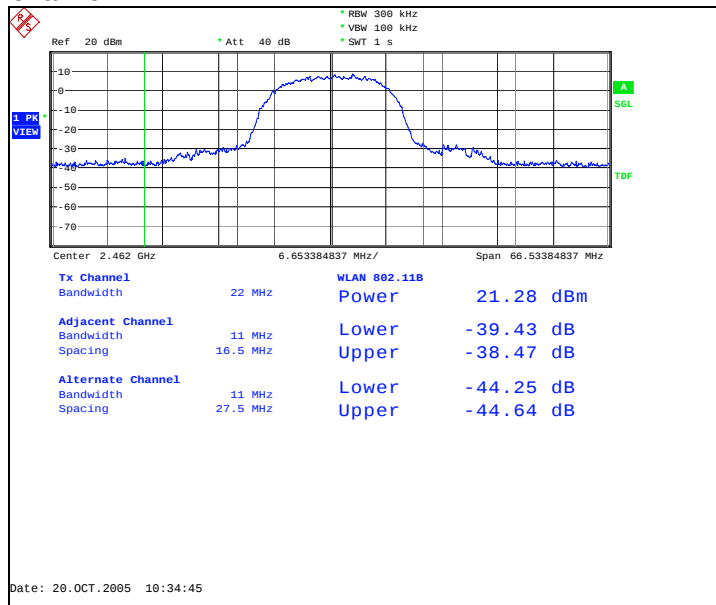
Channel 1



Channel 7



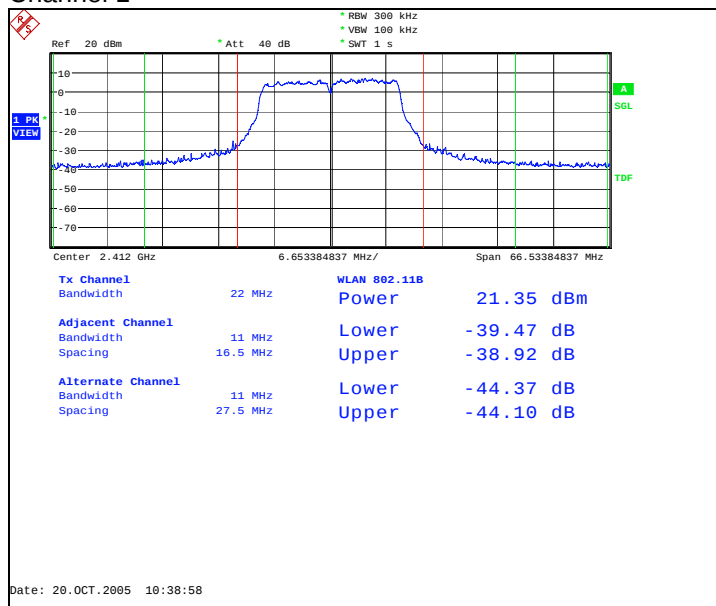
Channel 11



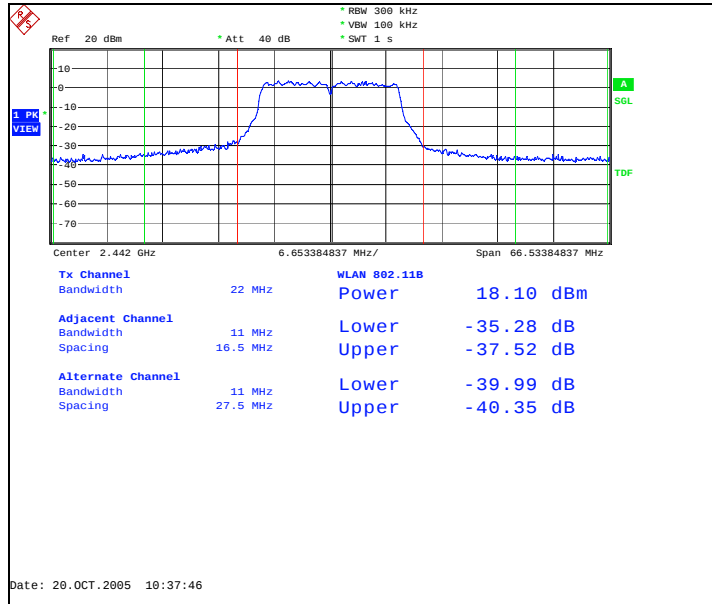
12.2.2 OFDM mode, BPSK modulation, 6 Mbps data rate

Channel	P [dBm]	P [W]	Result
1	21.35	0.136	Passed
7	18.10	0.065	Passed
11	18.67	0.074	Passed

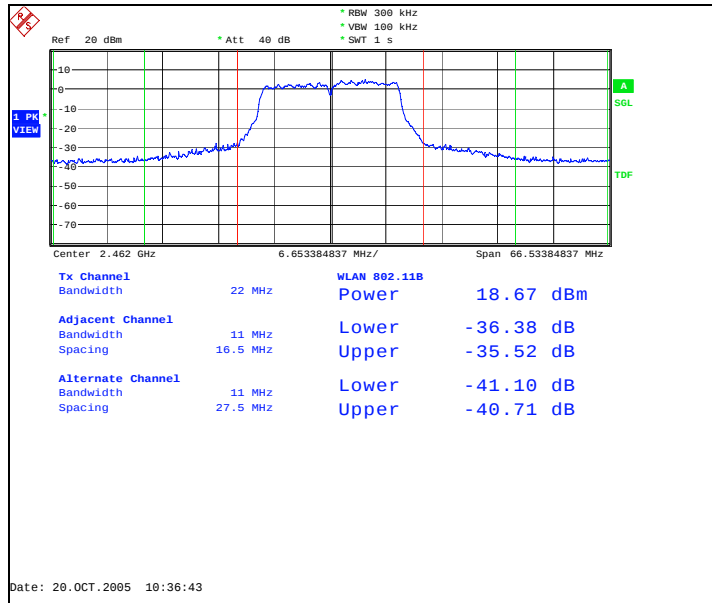
Channel 1



Channel 7



Channel 11



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

EUT with DUT number	RM-49 DUT 40357
Accessories with DUT numbers	BL-5C DUT 40360, AC-12E DUT 40363, HS-5 DUT 40364, MU-1 DUT 40367
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23 / 43 / 101.9
Date of measurements	3.10.2005
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, 5.5 Mbps data rate

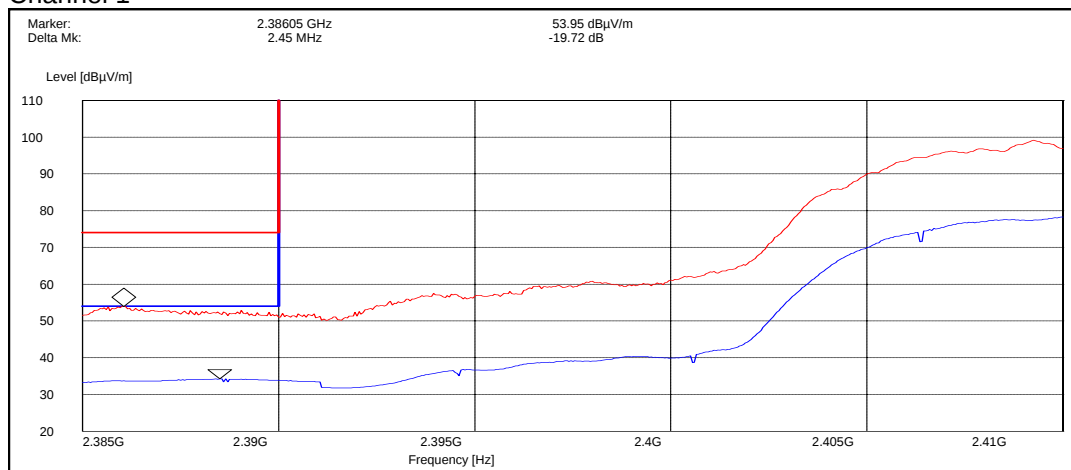
Average (RBW: 1 MHz)

Channel	E [dB μ V/m]	Result
1	34.23	PASSED
11	36.06	PASSED

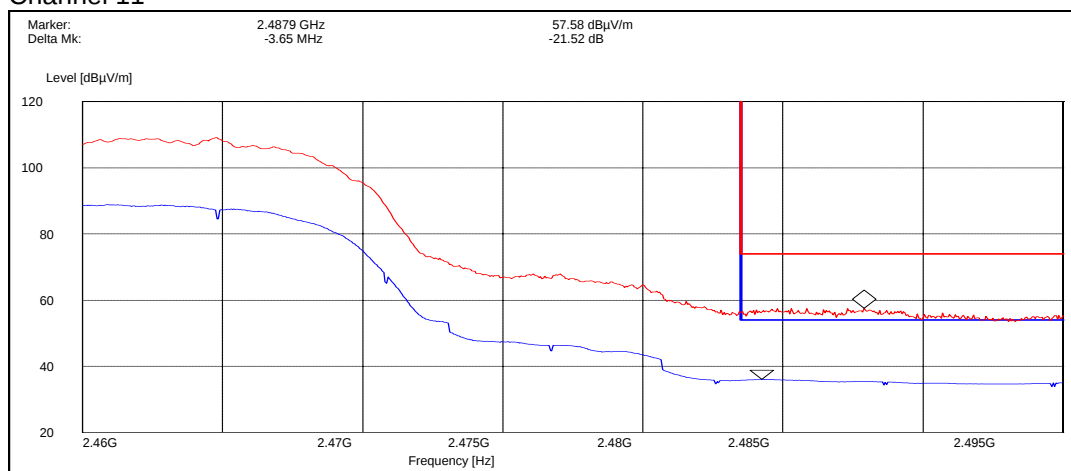
Peak (RBW: 1 MHz)

Channel	E [dB μ V/m]	Result
1	53.95	PASSED
11	57.58	PASSED

Channel 1



Channel 11



13.2.2 OFDM mode, BPSK modulation, 6 Mbps data rate

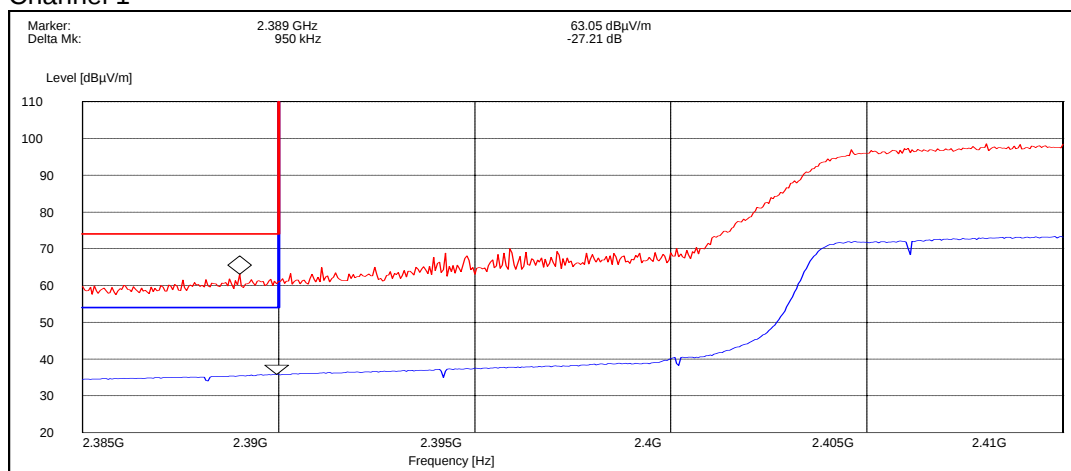
Average (RBW: 1 MHz)

Channel	E [dBμV/m]	Result
1	35.84	PASSED
11	42.22	PASSED

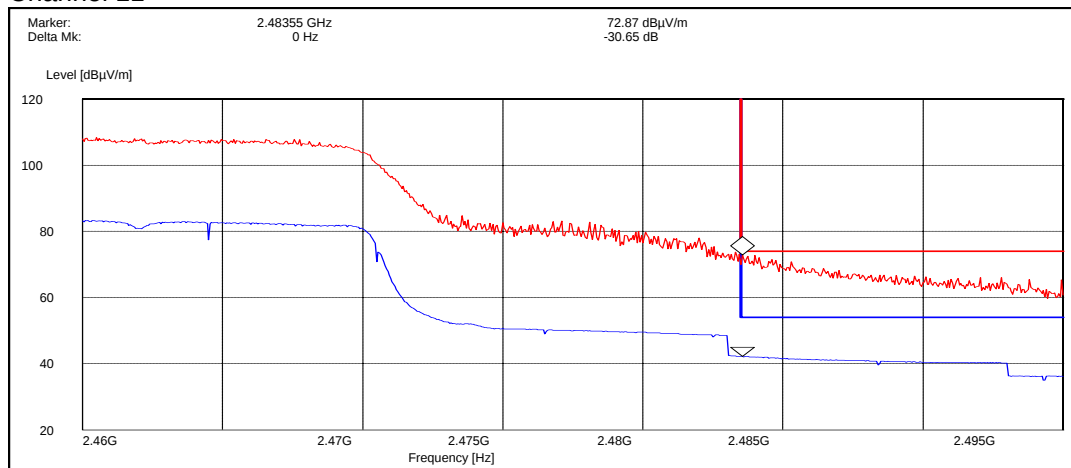
Peak (RBW: 1 MHz)

Channel	E [dBμV/m]	Result
1	63.05	PASSED
11	72.87	PASSED

Channel 1



Channel 11



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

EUT with DUT number	Phone: DUT 40359
Accessories with DUT numbers	Battery: DUT 40361
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22/53/101.2
Date of measurements	20.10.2005
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.

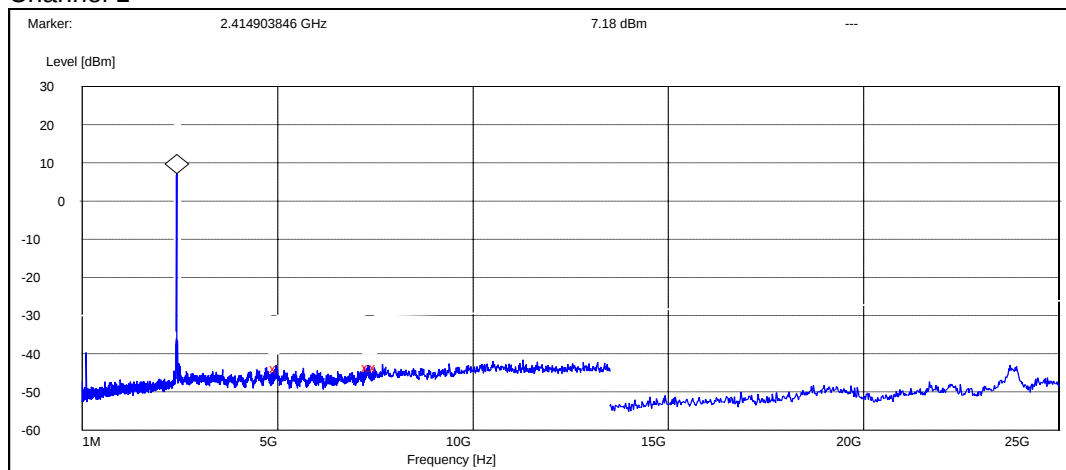
Limits for spurious RF conducted emissions measurements

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

14.2. WLAN Test results

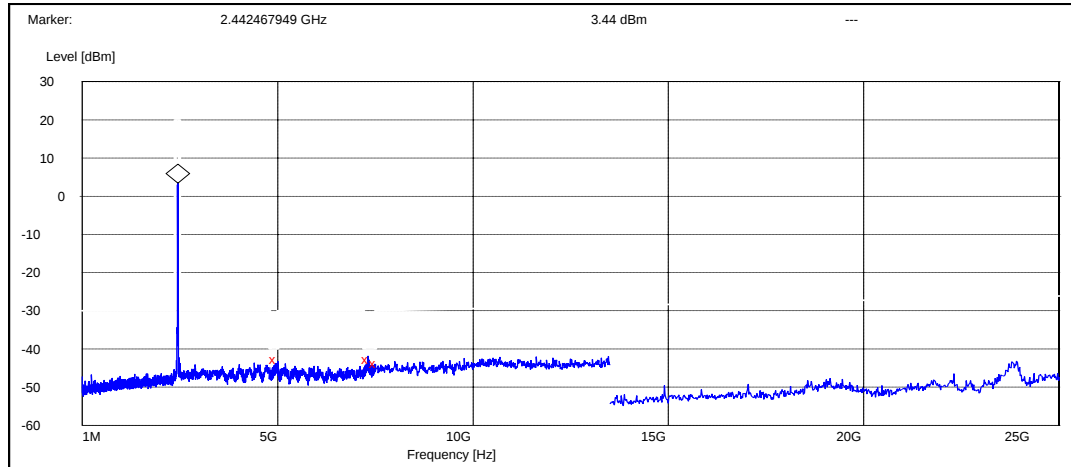
14.2.1 DSSS mode, QPSK modulation, 5.5 Mbps data rate

Channel 1



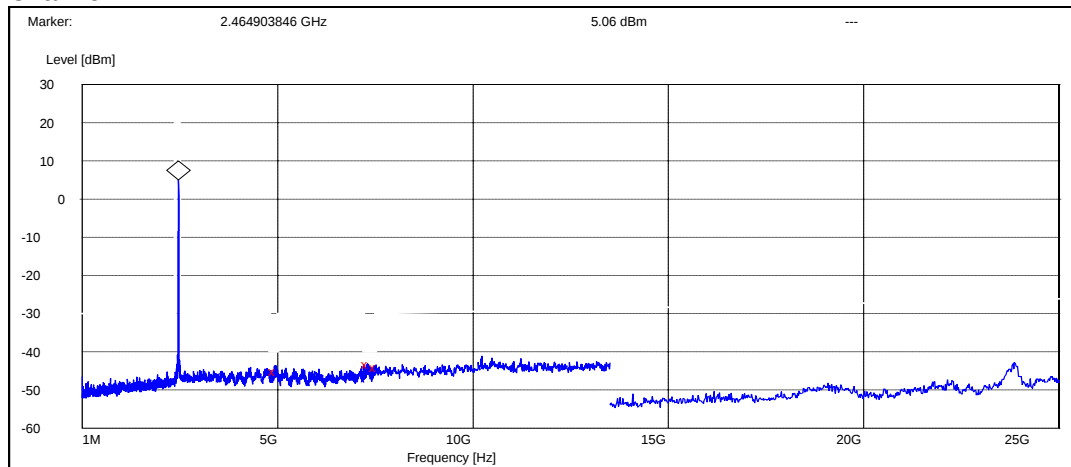
Frequency [MHz]	P [dBc]	Result
4962.179487	-50.881266	Passed
7308.173077	-50.781266	Passed
7500.000000	-50.781266	Passed

Channel 7



Frequency [MHz]	P [dBc]	Result
4948.397436	-46.136290	Passed
7311.057692	-46.236290	Passed
7500.000000	-47.136290	Passed

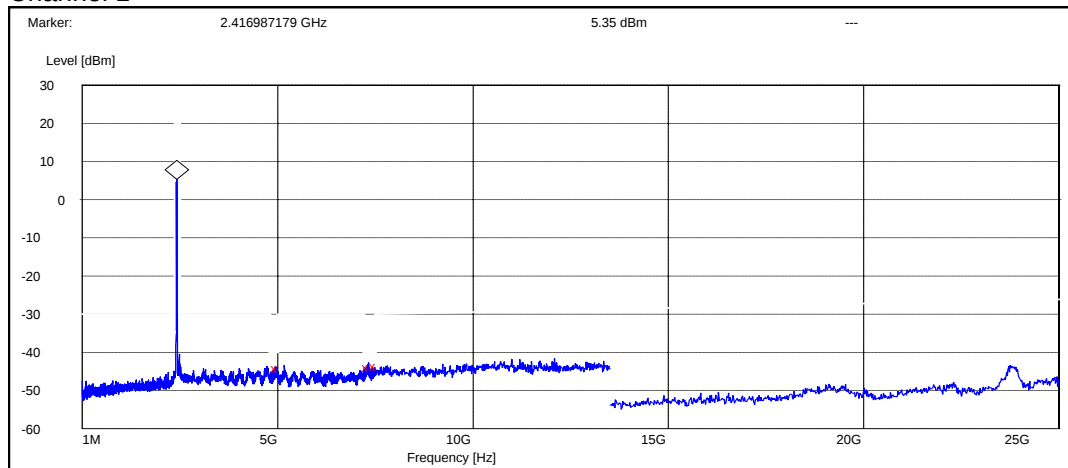
Channel 11



Frequency [MHz]	P [dBc]	Result
4928.525641	-50.058129	Passed
7293.269231	-48.258129	Passed
7500.000000	-48.958129	Passed

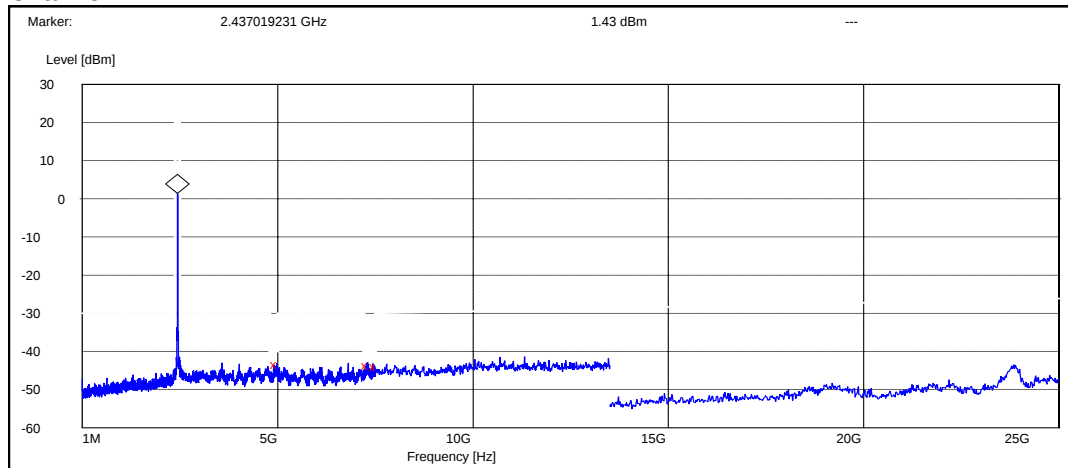
14.2.2 OFDM mode, BPSK modulation, 6 Mbps data rate

Channel 1



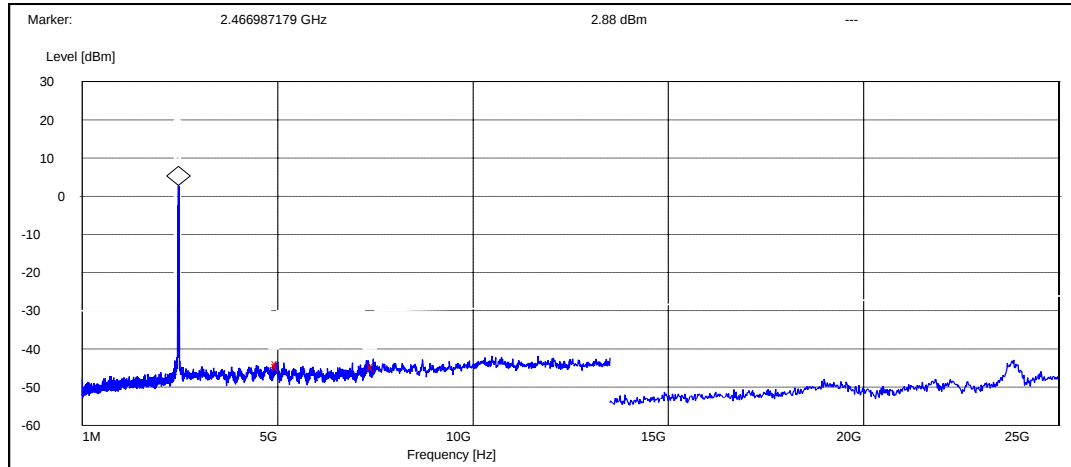
Frequency [MHz]	P [dBc]	Result
4987.500000	-49.446103	Passed
7325.480769	-49.346103	Passed
7500.000000	-48.946103	Passed

Channel 7



Frequency [MHz]	P [dBc]	Result
4979.166667	-44.727429	Passed
7295.673077	-44.927429	Passed
7500.000000	-45.227429	Passed

Channel 11



Frequency [MHz]	P [dBc]	Result
4998.076923	-46.676256	Passed
5000.000000	-47.476256	Passed
7449.519231	-47.376256	Passed

15. Spurious radiated emissions (FCC §15.247(c), §15.209, RSS-210 6.2.2(o)(e1))

EUT with DUT number	RM-49 DUT 40357
Accessories with DUT numbers	BL-5C DUT 40360, AC-12E DUT 40363, HS-5 DUT 40364, MU-1 DUT 40367
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23 / 43 / 101.9
Date of measurements	3.10.2005
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, 5.5 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	51.20	363.08	51.80	-0.60	VERTICAL	PASSED
7236.000000	46.60	213.80	43.40	3.20	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
4824.000000	30.90	35.08	31.50	-0.60	VERTICAL	PASSED
7236.000000	32.10	40.27	28.90	3.20	VERTICAL	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
4884.000000	51.30	367.28	52.00	-0.70	HORIZONTAL	PASSED
7326.000000	47.80	245.47	44.40	3.40	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
4884.000000	32.00	39.81	32.70	-0.70	HORIZONTAL	PASSED
7326.000000	32.30	41.21	28.90	3.40	VERTICAL	PASSED

Channel 11

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
4924.000000	48.50	266.07	49.10	-0.60	HORIZONTAL	PASSED
7386.000000	46.30	206.54	42.00	4.30	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4924.000000	30.70	34.28	31.30	-0.60	HORIZONTAL	PASSED
7386.000000	32.50	42.17	28.20	4.30	VERTICAL	PASSED

15.2.2 OFDM mode, BPSK modulation, 6 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	45.60	190.55	46.20	-0.60	HORIZONTAL	PASSED
7236.000000	47.50	237.14	44.30	3.20	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4824.000000	30.40	33.11	31.00	-0.60	VERTICAL	PASSED
7236.000000	31.70	38.46	28.50	3.20	VERTICAL	PASSED

Channel 7

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4884.000000	46.60	213.80	47.30	-0.70	VERTICAL	PASSED
7326.000000	49.00	281.84	45.60	3.40	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4884.000000	31.20	36.31	31.90	-0.70	HORIZONTAL	PASSED
7326.000000	32.30	41.21	28.90	3.40	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	43.20	144.54	43.80	-0.60	HORIZONTAL	PASSED
7386.000000	47.50	237.14	43.20	4.30	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4924.000000	32.40	41.69	33.00	-0.60	HORIZONTAL	PASSED
7386.000000	32.30	41.21	28.00	4.30	VERTICAL	PASSED

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

EUT with DUT number	RM-49 DUT 40357
Accessories with DUT numbers	BL-5C DUT 40360, AC-12E DUT 40363, MU-1 DUT 40367, DKU-2 DUT 40365, 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]	19 / 50 / 100.7
Date of measurements	24.10.2005
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-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:

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

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

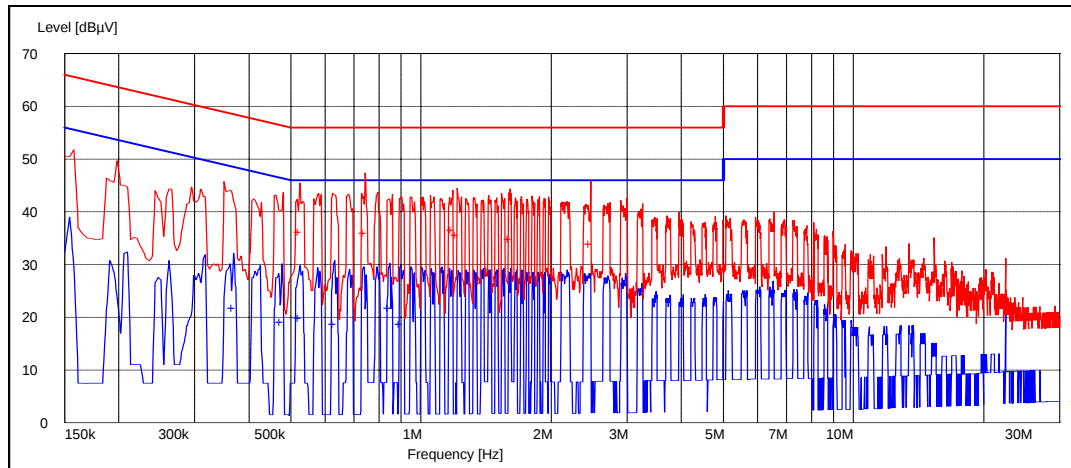
CISPR 22 Class B limits

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, 5.5 Mbps data rate

Channel 7



Quasi peak (RBW: 9 kHz)

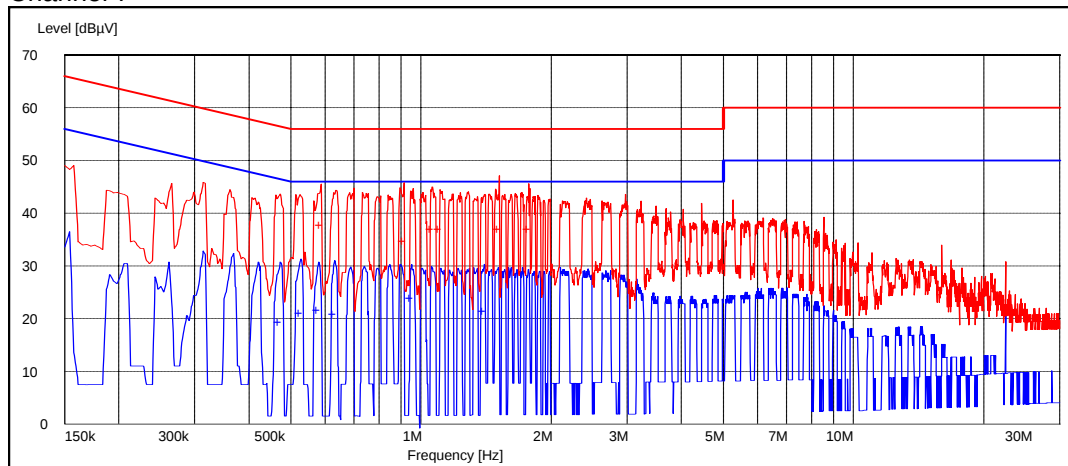
Frequency [MHz]	U [dBμV]	Line	Result
0.524449	36.20	N	PASSED
0.743186	36.00	N	PASSED
1.184369	36.50	L1	PASSED
1.214028	35.70	N	PASSED
1.607014	34.90	N	PASSED
2.468938	34.00	N	PASSED

Average (RBW: 9 kHz)

Frequency [MHz]	U [dBμV]	Line	Result
0.368737	21.70	L1	PASSED
0.476253	19.20	N	PASSED
0.524449	19.80	L1	PASSED
0.631964	18.70	L1	PASSED
0.846994	21.70	L1	PASSED
0.898898	18.80	L1	PASSED

16.2.2 OFDM mode, BPSK modulation, 6 Mbps data rate

Channel 7



Quasi peak (RBW: 9 kHz)

Frequency [MHz]	U [dBμV]	Line	Result
0.587475	37.80	L1	PASSED
0.913727	34.70	N	PASSED
1.062024	37.10	L1	PASSED
1.106513	37.10	N	PASSED
1.518036	36.90	L1	PASSED
1.777555	37.10	L1	PASSED

Average (RBW: 9 kHz)

Frequency [MHz]	U [dBμV]	Line	Result
0.472545	19.30	N	PASSED
0.528156	21.00	N	PASSED
0.580060	21.70	N	PASSED
0.631964	20.90	N	PASSED
0.950802	24.00	N	PASSED
1.403106	21.50	N	PASSED

17. 6 dB bandwidth

(FCC §15.247(a)(2), RSS-210 Amend I(iv))

EUT with DUT number	Phone: DUT 40359
Accessories with DUT numbers	Battery: DUT 40361
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22/53/101.2
Date of measurements	20.10.2005
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

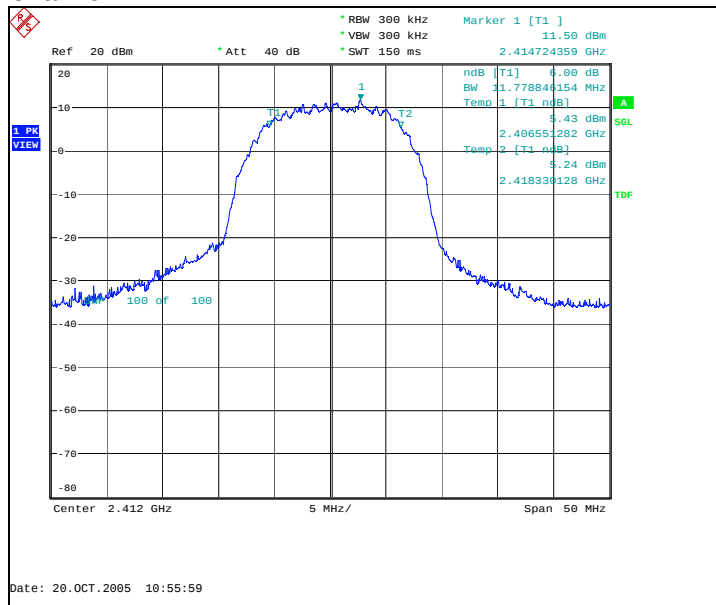
Limit [kHz]
≥ 500

17.2. WLAN test results

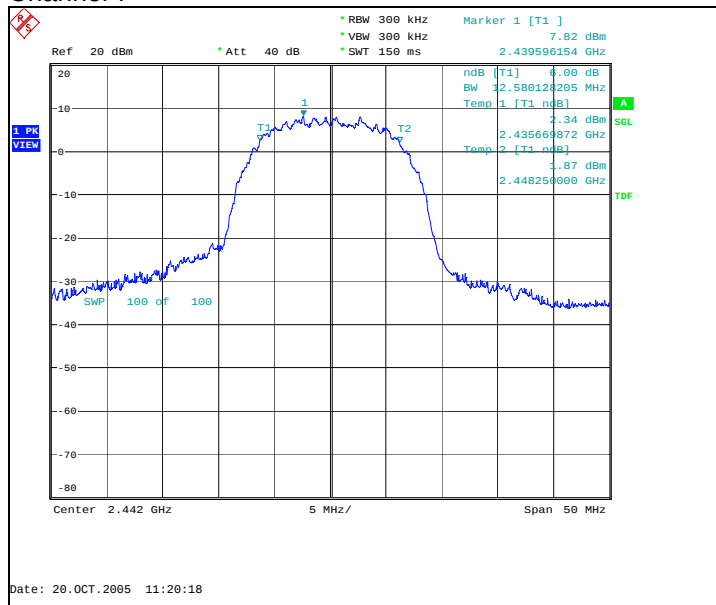
17.2.1 DSSS mode, QPSK modulation, 5.5 Mbps data rate

Channel	6 dB bandwidth [kHz]	Result
1	11778.846	Passed
7	12580.128	Passed
11	11698.718	Passed

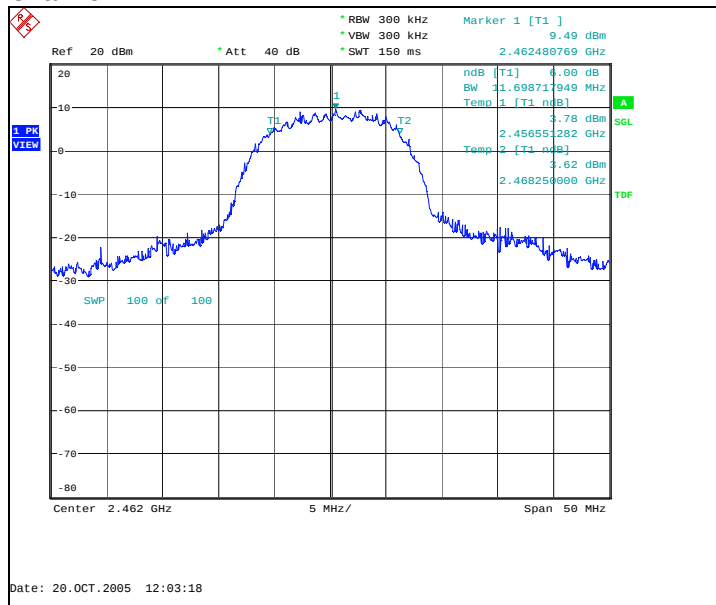
Channel 1



Channel 7



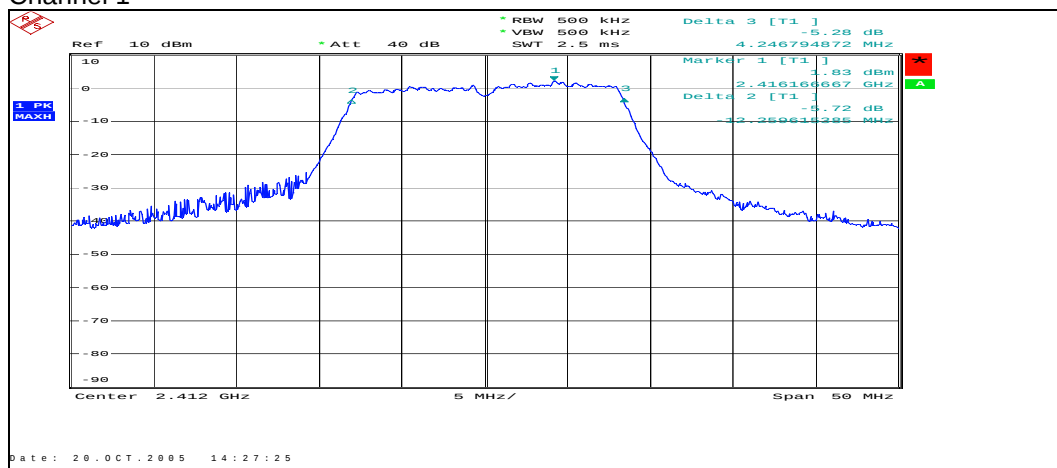
Channel 11



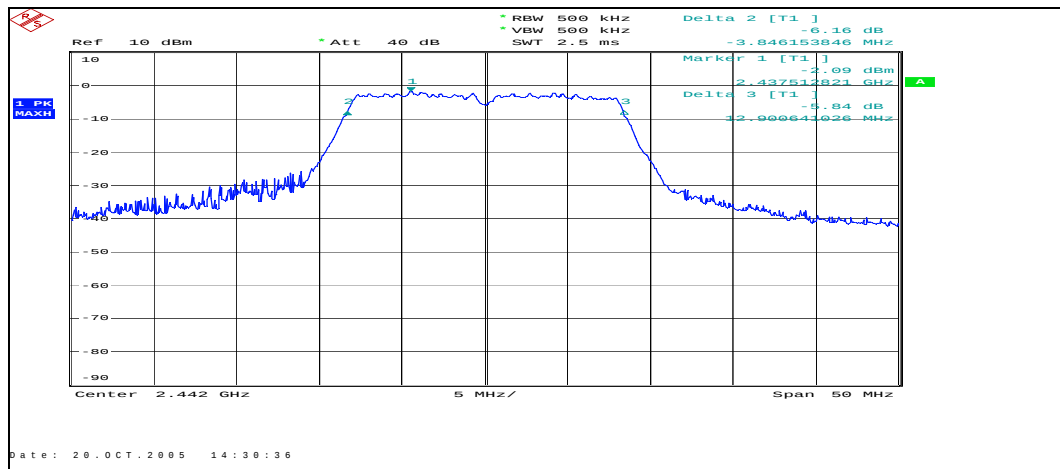
17.2.2 OFDM mode, BPSK modulation, 6 Mbps data rate

Channel	6 dB bandwidth [kHz]	Result
1	16506.4	Passed
7	16746.8	Passed
11	16506.4	Passed

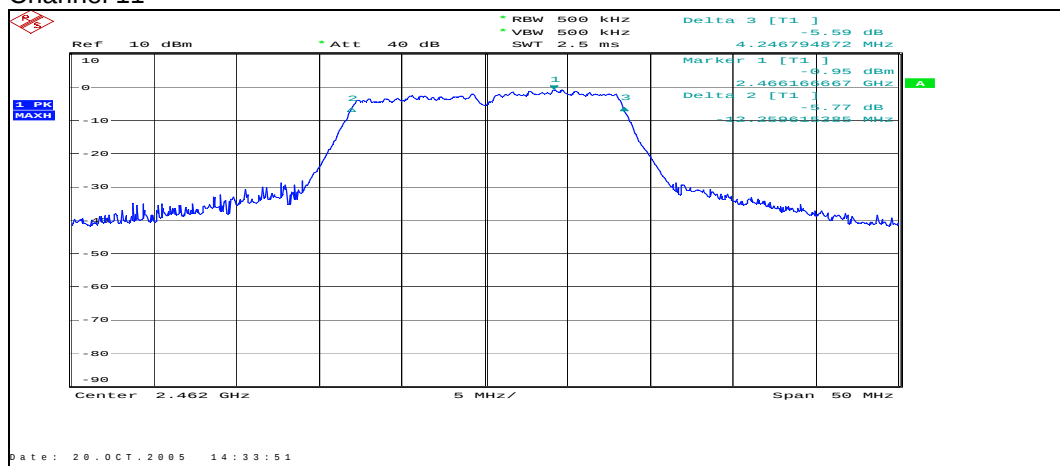
Channel 1



Channel 7



Channel 11



18. Power spectral density (FCC §15.247(e), RSS-210 Amend I(iv))

EUT with DUT number	Phone: DUT 40359
Accessories with DUT numbers	Battery: DUT 40361
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22/53/101.2
Date of measurements	20.10.2005
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

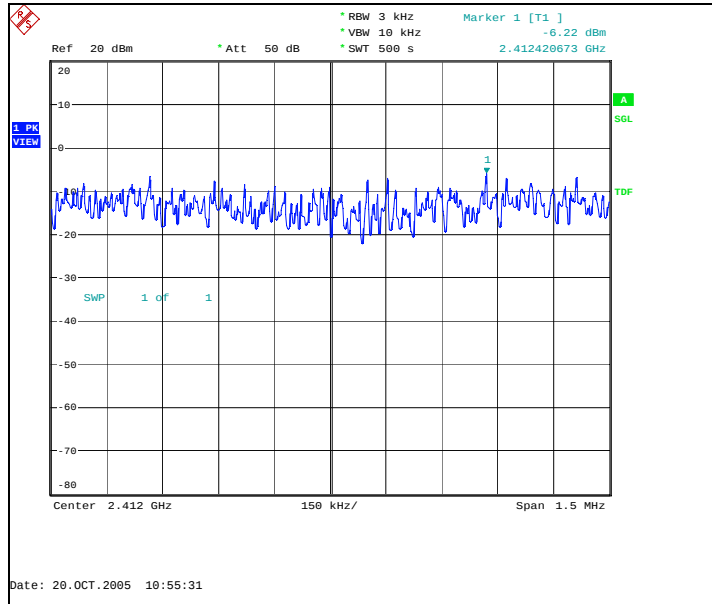
Limit [dBm] @ 3 kHz
≤ 8

18.2. WLAN test results

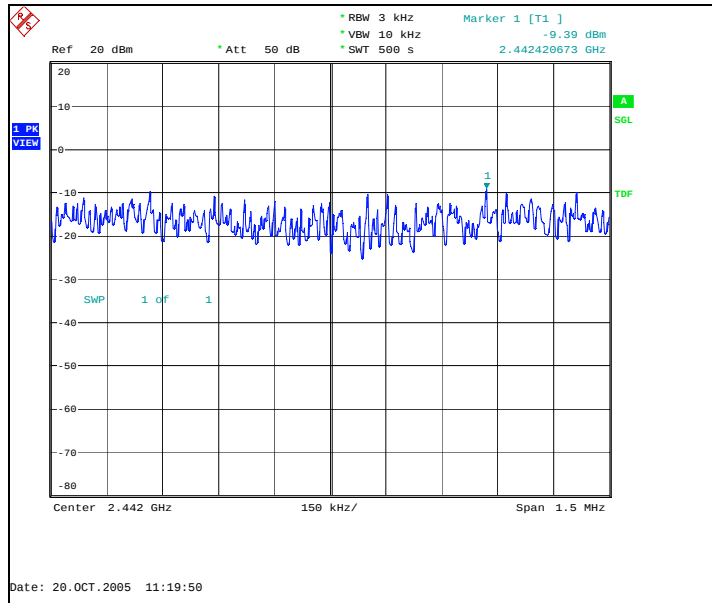
18.2.1 DSSS mode, QPSK modulation, 5.5 Mbps data rate

Channel	P [dBm]	Result
1	-6.22	Passed
7	-9.39	Passed
11	-8.43	Passed

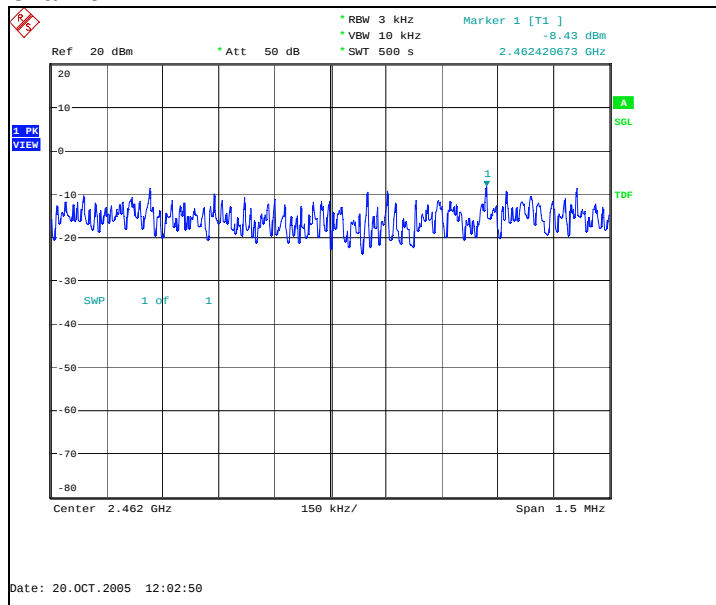
Channel 1



Channel 7



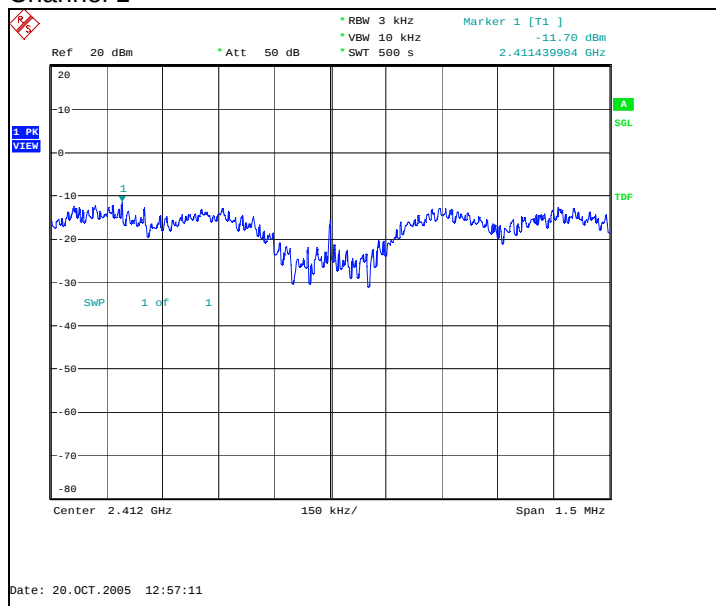
Channel 11



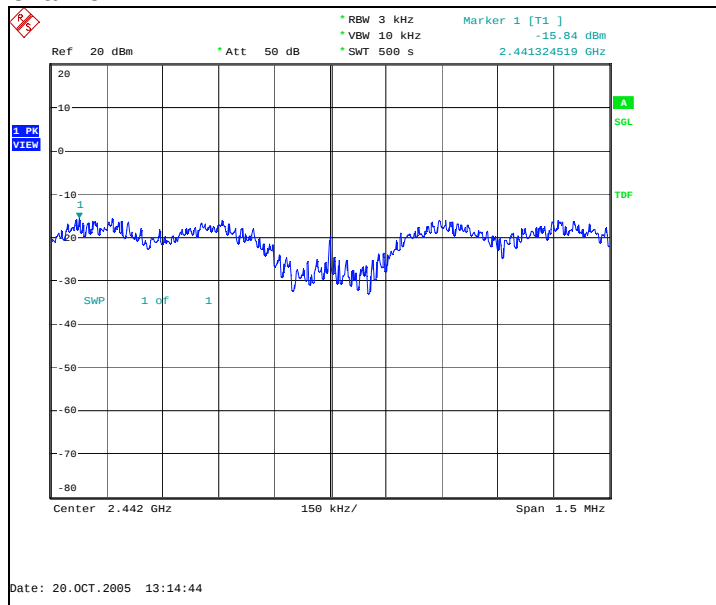
18.2.2 OFDM mode, BPSK modulation, 6 Mbps data rate

Channel	P [dBm]	Result
1	-11.70	Passed
7	-15.84	Passed
11	-15.41	Passed

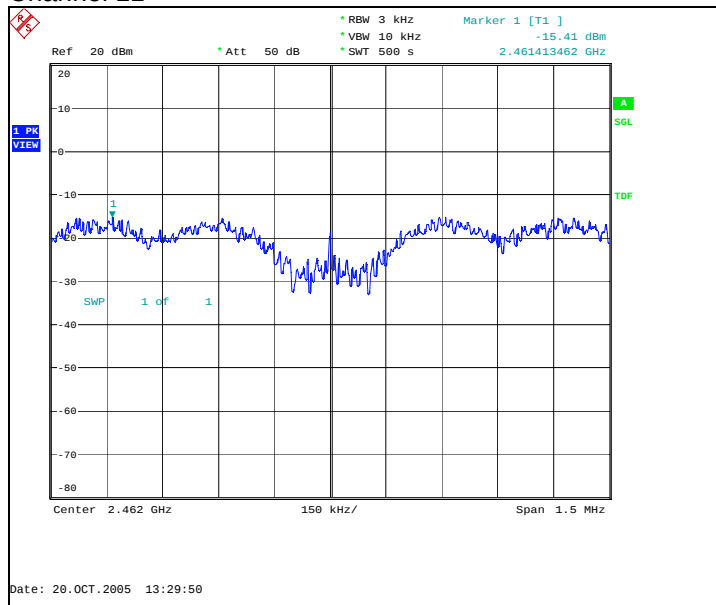
Channel 1



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