FCC Part 15C Compliance Test Report

Test Report no.:	Tre_FCC_0548_02.doc	**Date of Report:**	8.12.2005
Number of pages:	53	**Customer's Contact person:**	Harri Vähämiko
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 86 Joensuunkatu 7 FIN-24101 SALO, FINLAND Tel. +358 (0) 7180 08000 Fax. +358 (0) 7180 44277
FCC listing no.: **IC recognition no.:**	94436 3608		
Tested devices/ accessories:	**GSM phone RM-89 / Battery BP-5L, AC charger AC-4E, Headset HS-5, Memory card Mini SD 64, 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-89	**IC:**	661V-RM89
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:	 Digitally signed by Jan-Erik Lilja DN: CN = Jan-Erik Lilja, C = FI, O = TCC nokia, OU = TCC Nokia Tampere Location: Tampere Date: 2005.12.09 11:10:04 +02'00'		

Jan-Erik Lilja, System Manager

1. Summary for FCC Part 15C Compliance Test Report

Date of receipt	1.12.2005
Testing completed	8.12.2005
The customer's contact person	Harri Vähämiko
Test Plan referred to	\EMC\TESTPLAN\
Notes	-
Document name	T:\Projects\RM-89\EMC\Results\FCC\Tre_FCC_0548_02.doc

1.1. EUT and Accessory Information

The EUT is a quadri band (GSM850/900/1800/1900) 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
GSM phone	RM-89	004400611714153	5010	-	05w42.1	40456
GSM phone	RM-89	004400611714542	5010	-	05w42.1	40457
Battery	BP-5L	M441110399298	11	-	-	40458
Battery	BP-5L	M441110399297	11	-	-	40459
AC-Charger	AC-4E	-	3.22	-	-	40460
Headset	HS-5	20	2.0	2.1	-	40462
Memory Card	Mini SD 64	-	-	-	-	40466
Data cable	CA-53	-	1.0	1.0	-	40464
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

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

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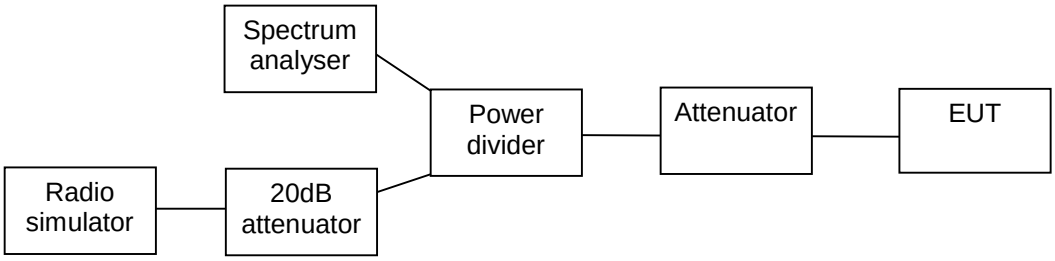
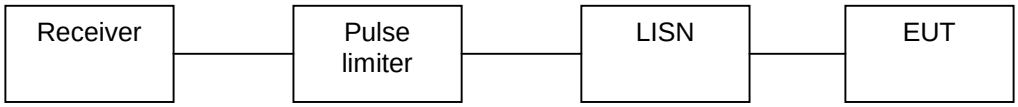
2. Test setups

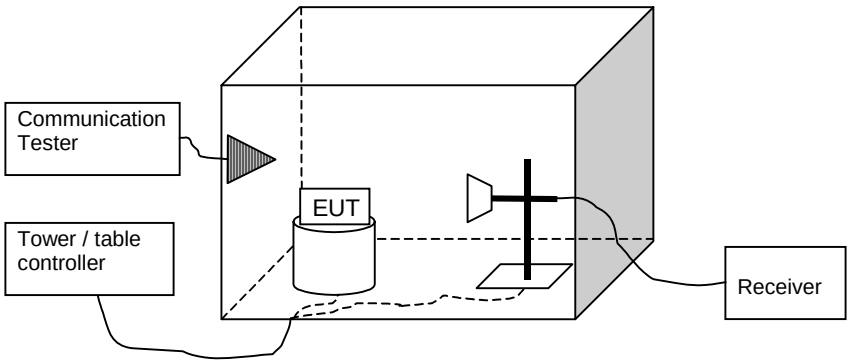
2.1. Conducted RF test setup



2.2. AC powerline conducted emissions test setup



2.3. Spurious radiated emissions test setup



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3. Peak output power
(FCC §15.247(b)(1), RSS-210 A8.4 (2))

EUT with DUT number	Phone: DUT 40457
Accessories with DUT numbers	Battery: DUT 40459
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23/49/100.6
Date of measurements	1.12.2005
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

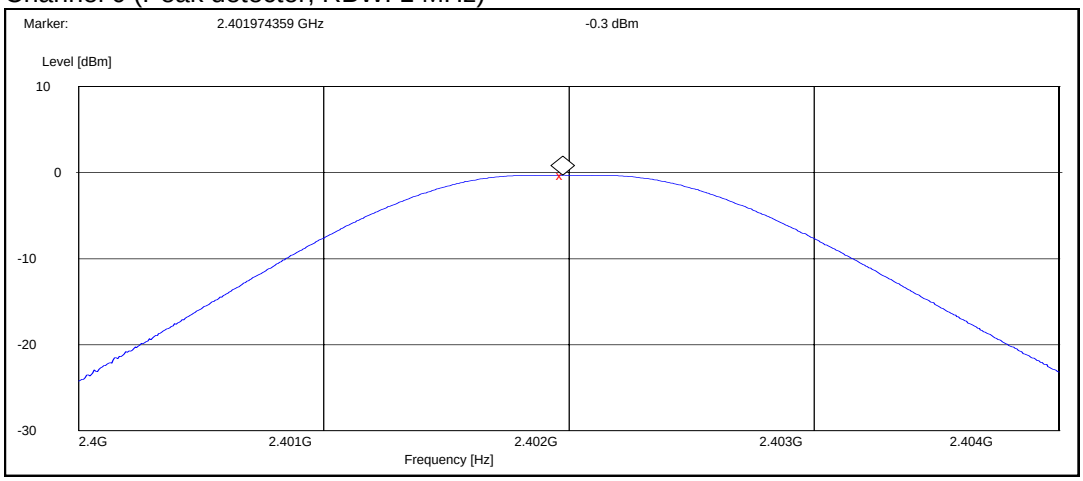
Frequency range [MHz]	Limit [W]	Limit [dBm]
2400 – 2483.5	≤ 1	≤ 30

3.2. Bluetooth Test results

3.2.1 GSFK modulation, PRBS packet type

Channel	P [dBm]	P [mW]	Result
0	-0.30	0.933	Passed
40	-0.10	0.977	Passed
78	-0.30	0.933	Passed

Channel 0 (Peak detector, RBW: 1 MHz)



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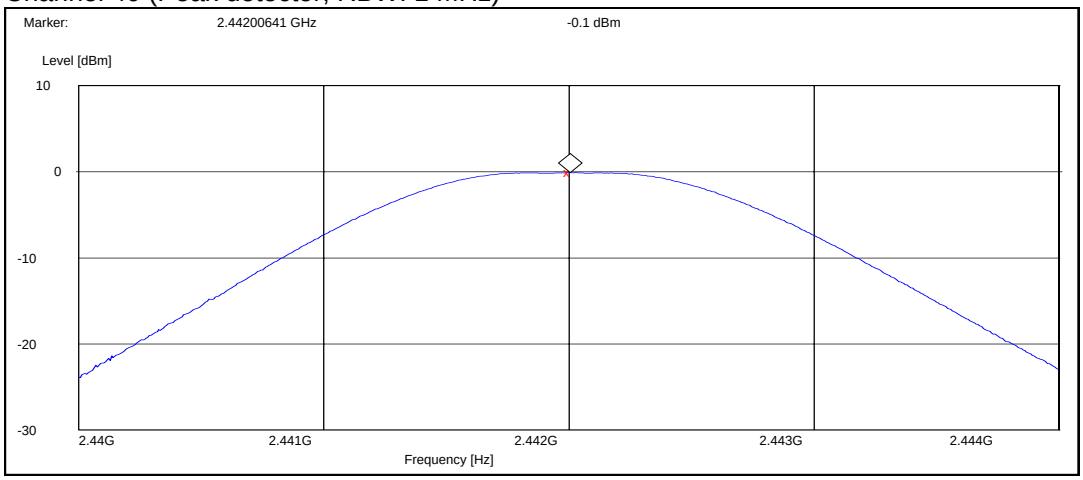
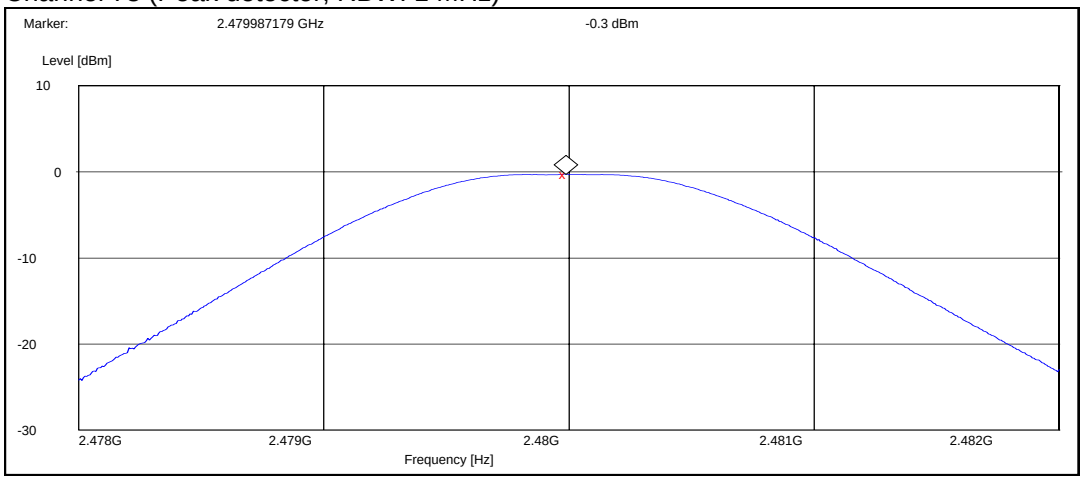
Channel 40 (Peak detector, RBW: 1 MHz)



Channel 78 (Peak detector, RBW: 1 MHz)



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4. Band edge compliance of RF emissions

(FCC §15.247(c), RSS-210 A8.5)

EUT with DUT number	RM-89 DUT 40456
Accessories with DUT numbers	BP-5L DUT 40458, AC-4E DUT 40460, HS-5 DUT 40462, Mini SD 64 DUT 40466
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23 / 46 / 102.1
Date of measurements	7.12.2005
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

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4.2. Bluetooth Test results

4.2.1 GFSK modulation, PRBS packet type

Average (RBW: 1 MHz)

Channel	E [dBµV/m]	Result
0	28.32	PASSED
78	31.81	PASSED
Hopping on, low end	28.20	PASSED
Hopping on, high end	30.80	PASSED

Peak (RBW: 1 MHz)

Channel	E [dBµV/m]	Result
0	46.18	PASSED
78	55.59	PASSED
Hopping on, low end	45.49	PASSED
Hopping on, high end	60.30	PASSED

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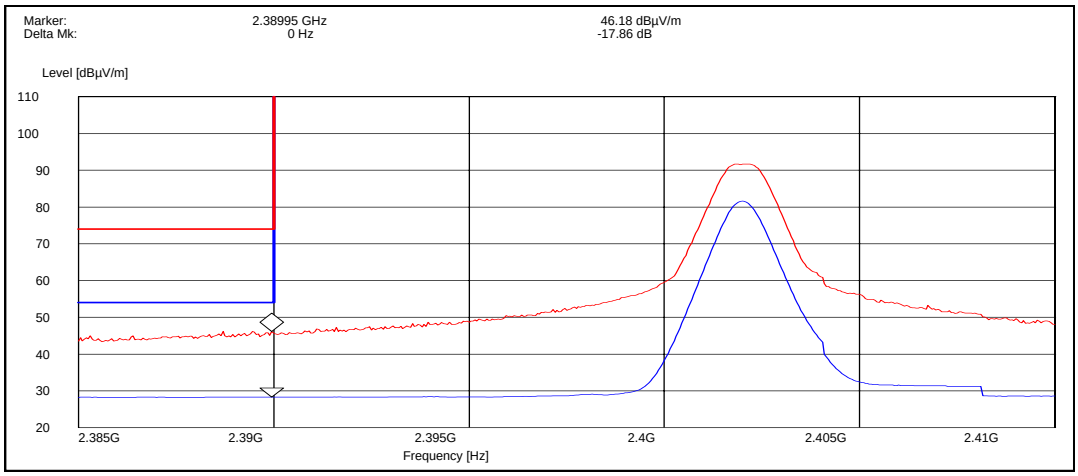
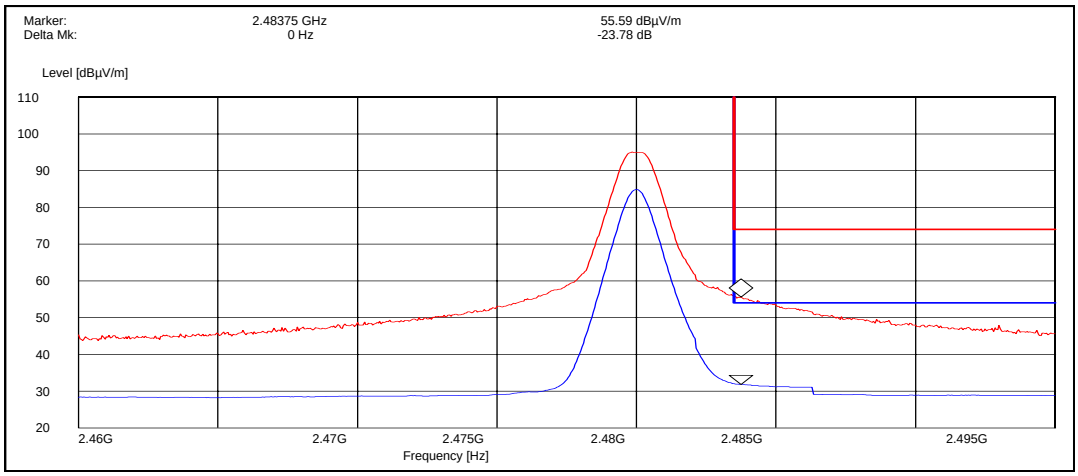
Channel 0



Channel 78



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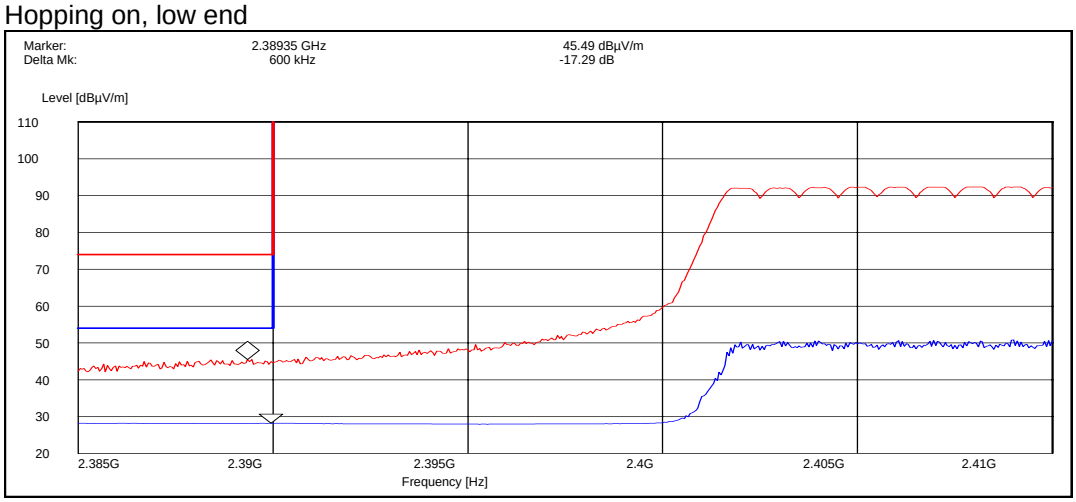
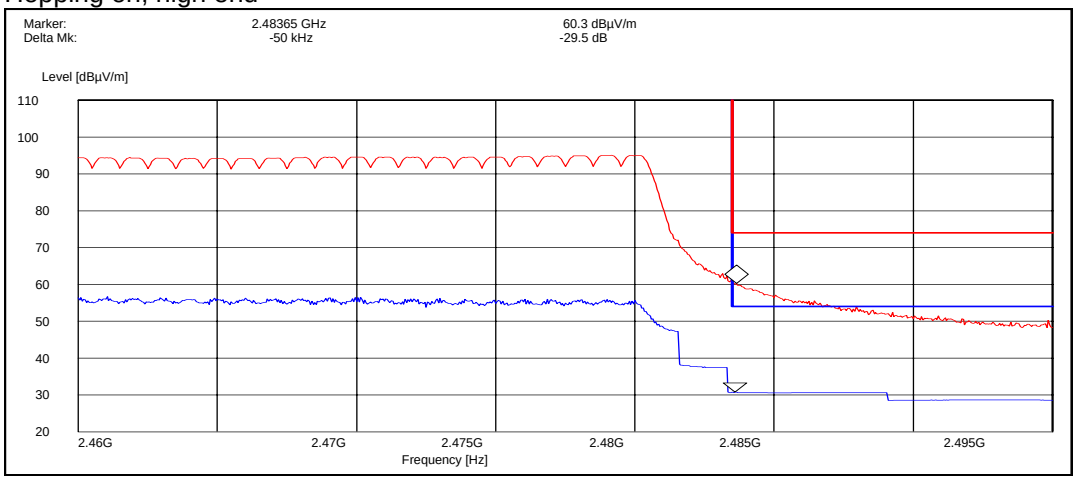
Hopping on, low end



Hopping on, high end



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

EUT with DUT number	Phone: DUT 40457
Accessories with DUT numbers	Battery: DUT 40459
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23/49/100.6
Date of measurements	1.12.2005
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.

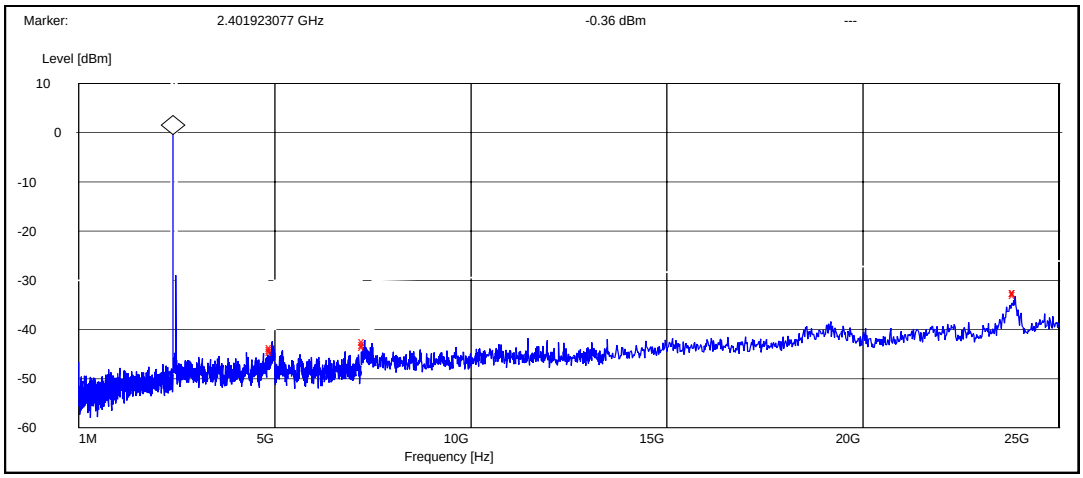
Limits for spurious RF conducted emissions measurements

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
4932.021795	-43.340865	Passed
7304.957692	-42.740865	Passed
23875.451282	-32.140865	Passed

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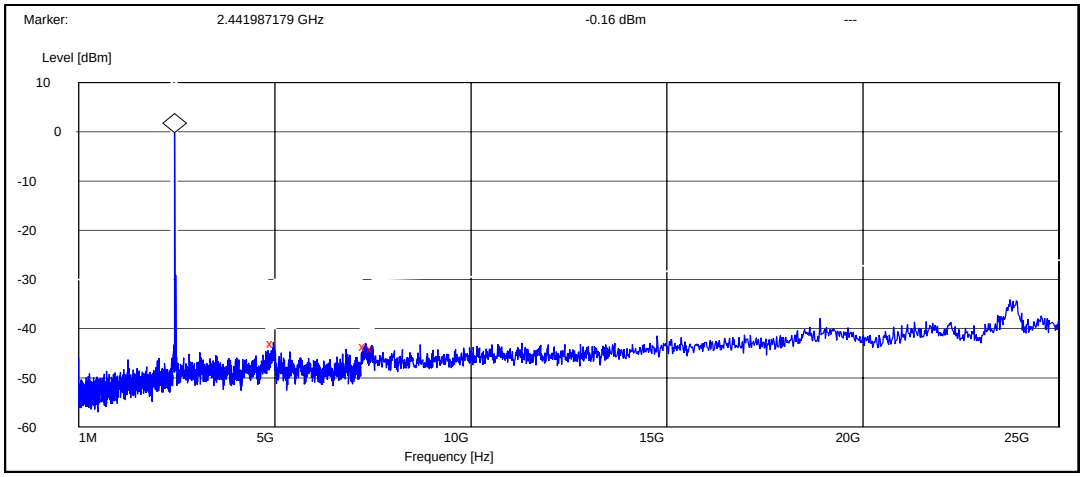
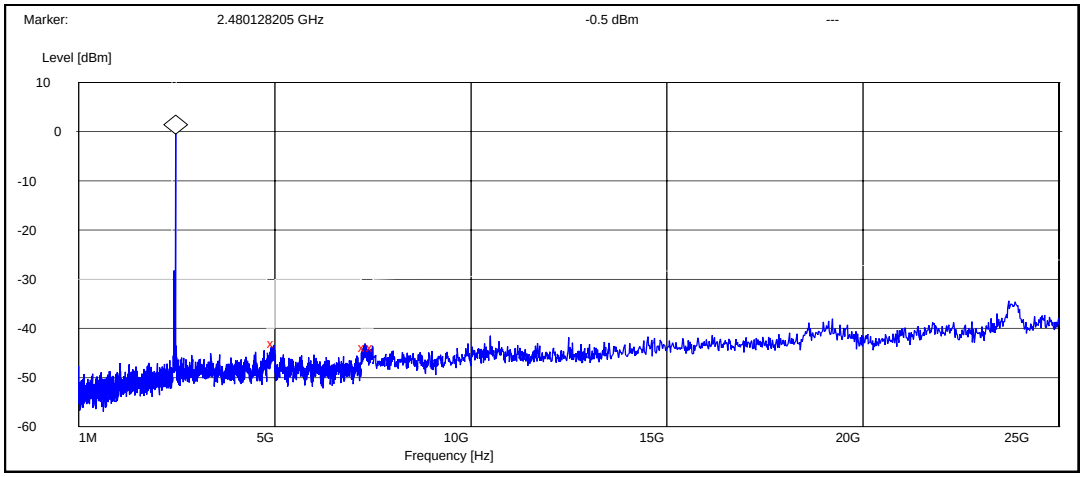
Channel 40



Frequency [MHz]	P [dBc]	Result
4961.538462	-42.841080	Passed
7317.788462	-43.541080	Passed
7500.000000	-43.941080	Passed

Channel 78



Frequency [MHz]	P [dBc]	Result
4974.679487	-42.503923	Passed
7298.076923	-43.403923	Passed
7500.000000	-43.403923	Passed

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

EUT with DUT number	RM-89 DUT 40456
Accessories with DUT numbers	BP-5L DUT 40458, AC-4E DUT 40460, HS-5 DUT 40462, Mini SD 64 DUT 40466
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23 / 46 / 102.1
Date of measurements	7.12.2005
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 ($A_{TOT} = L_{CABLES} + AF - G_{PREAMP}$).

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

Frequency range [MHz[	Limit [µV/m]	Limit [dBµV/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 [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Polarisation	Result
4804.000000	40.50	105.93	40.80	-0.30	HORIZONTAL	PASSED
7206.000000	43.30	146.22	40.30	3.00	HORIZONTAL	PASSED
9608.000000	46.60	213.80	37.30	9.30	HORIZONTAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Polarisation	Result
4804.000000	28.10	25.41	28.40	-0.30	VERTICAL	PASSED
7206.000000	30.80	34.67	27.80	3.00	HORIZONTAL	PASSED
9608.000000	33.50	47.32	24.20	9.30	VERTICAL	PASSED

Channel 40

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Polarisation	Result
4949.893788	41.00	112.20	41.20	-0.20	VERTICAL	PASSED
7350.195391	44.80	173.78	40.40	4.40	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Polarisation	Result
4950.393788	28.30	26.00	28.50	-0.20	VERTICAL	PASSED
7413.331663	31.90	39.36	27.40	4.50	HORIZONTAL	PASSED

Channel 78

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Polarisation	Result
4960.000000	41.80	123.03	41.90	-0.10	VERTICAL	PASSED
7440.000000	45.30	184.08	40.90	4.40	HORIZONTAL	PASSED

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9920.000000	46.80	218.78	37.60	9.20	HORIZONTAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Polarisation	Result
4960.000000	28.40	26.30	28.50	-0.10	VERTICAL	PASSED
7440.000000	31.90	39.36	27.50	4.40	HORIZONTAL	PASSED
9920.000000	33.90	49.55	24.70	9.20	VERTICAL	PASSED

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7. AC powerline conducted emissions

(FCC §15.207, RSS-GEN 7.2.2)

EUT with DUT number	RM-89 DUT 40456
Accessories with DUT numbers	BP-5L DUT 40458, AC-4E DUT 40460, Mini SD 64 DUT 40466, CA-53 DUT 40464, 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]	18 / 52 / 102.5
Date of measurements	8.12.2005
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:

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

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

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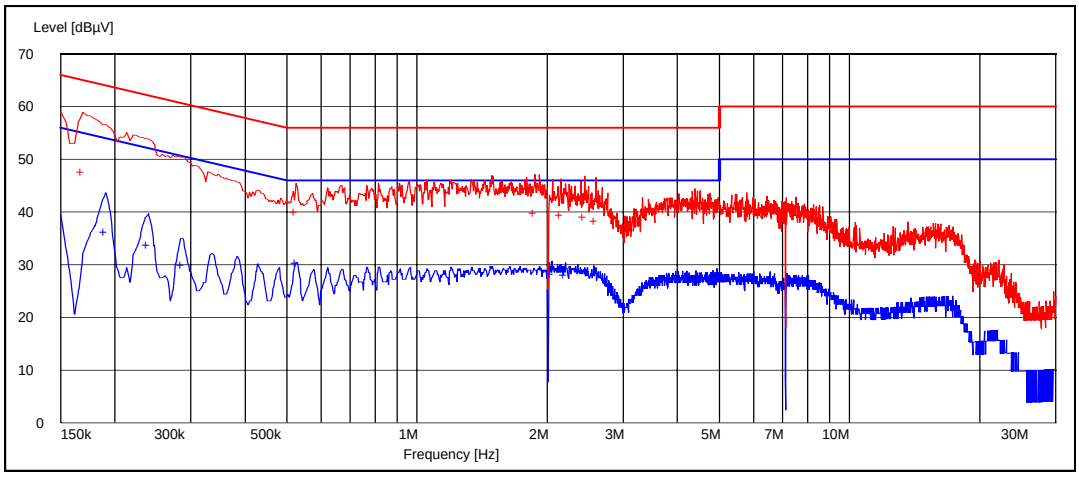
7.2. Bluetooth Test results

7.2.1 GFSK modulation, PRBS packet type

Channel 40



Quasi peak (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Line	Result
0.168537	47.60	N	PASSED
0.524449	39.90	L1	PASSED
1.873948	39.70	N	PASSED
2.156313	39.40	N	PASSED
2.444890	39.00	N	PASSED
2.589178	38.40	N	PASSED

Average (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Line	Result
0.190782	36.20	N	PASSED
0.238978	33.80	L1	PASSED
0.287174	29.90	L1	PASSED
0.528156	30.20	N	PASSED
2.054108	28.30	N	PASSED
2.204409	28.00	L1	PASSED

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8. 20 dB bandwidth

(FCC §15.247(a)(1), RSS-210 A8.1 (1))

EUT with DUT number	Phone: DUT 40457
Accessories with DUT numbers	Battery: DUT 40459
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23/49/100.6
Date of measurements	1.12.2005
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	762.821	Passed
78	762.821	Passed

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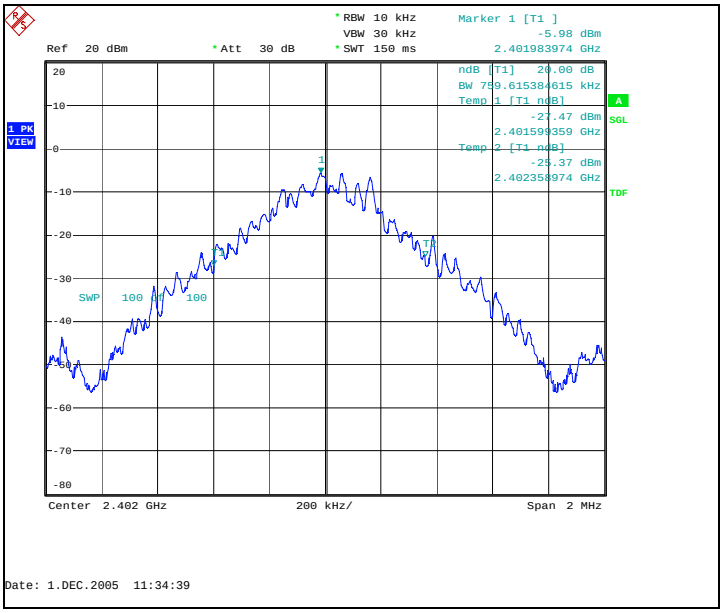
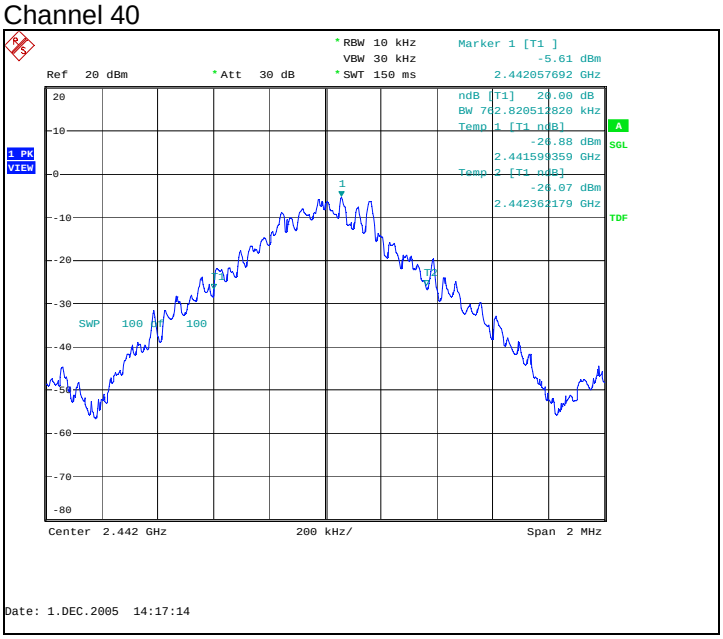
Channel 0



Channel 40



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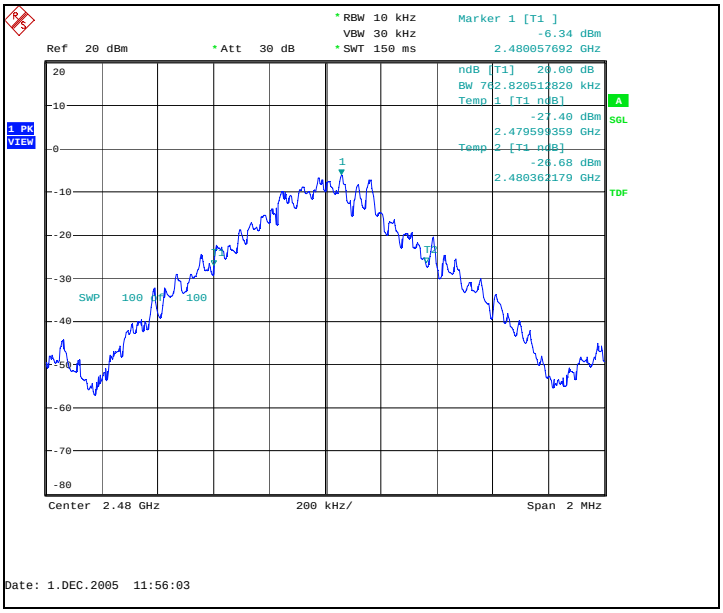
Channel 78



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9. Carrier frequency separation

(FCC §15.247(a)(1), RSS-210 A8.1 (2))

EUT with DUT number	Phone: DUT 40457
Accessories with DUT numbers	Battery: DUT 40459
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23/49/100.6
Date of measurements	1.12.2005
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
1057.692	Passed

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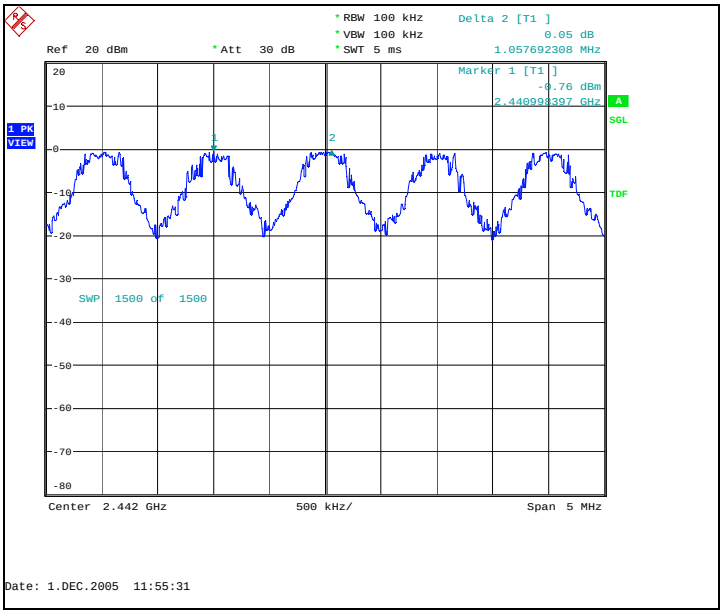
Hopping on, carrier frequency separation of channels 39 and 40



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10. Number of hopping frequencies

(FCC §15.247(a)(1)(iii), RSS-210 A8.1 (4))

EUT with DUT number	Phone: DUT 40457
Accessories with DUT numbers	Battery: DUT 40459
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23/49/100.6
Date of measurements	1.12.2005
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

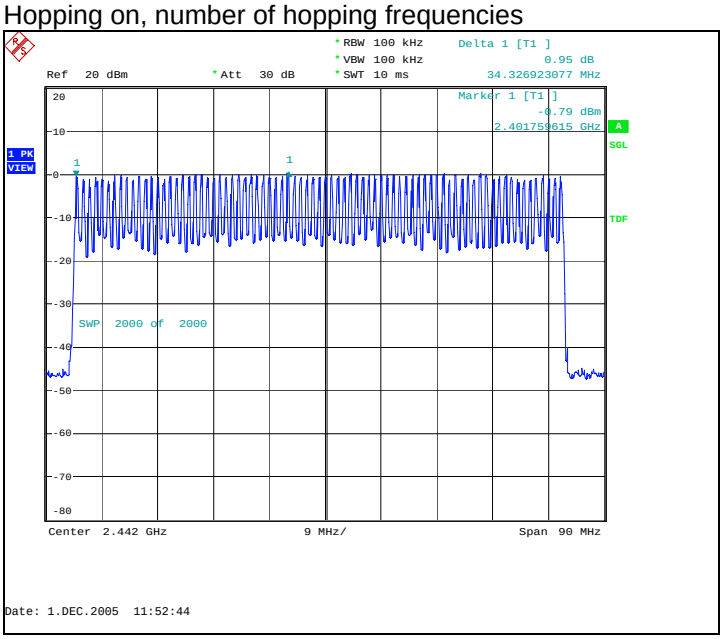
Limit [number]
≥ 15

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



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11. Time of occupancy

(FCC §15.247(a)(1)(iii), RSS-210 A8.1 (4))

EUT with DUT number	Phone: DUT 40457
Accessories with DUT numbers	Battery: DUT 40459
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23/49/100.6
Date of measurements	1.12.2005
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
68	2961.538	0.201385	PASSED

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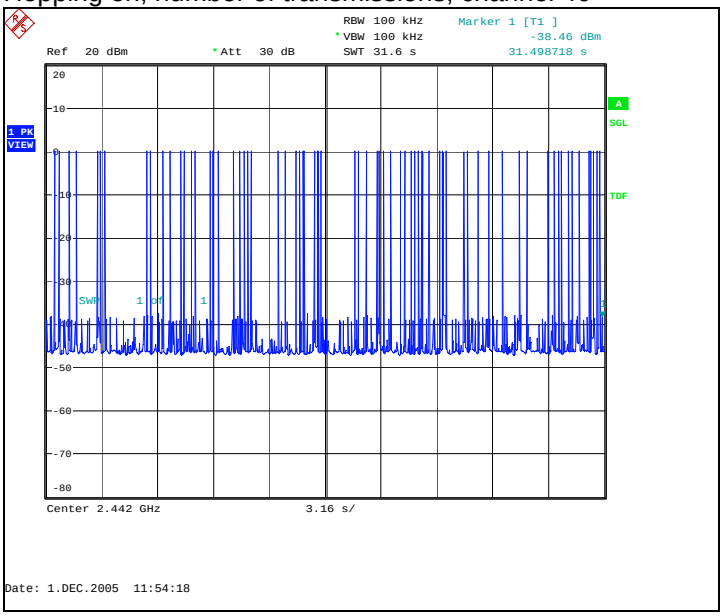
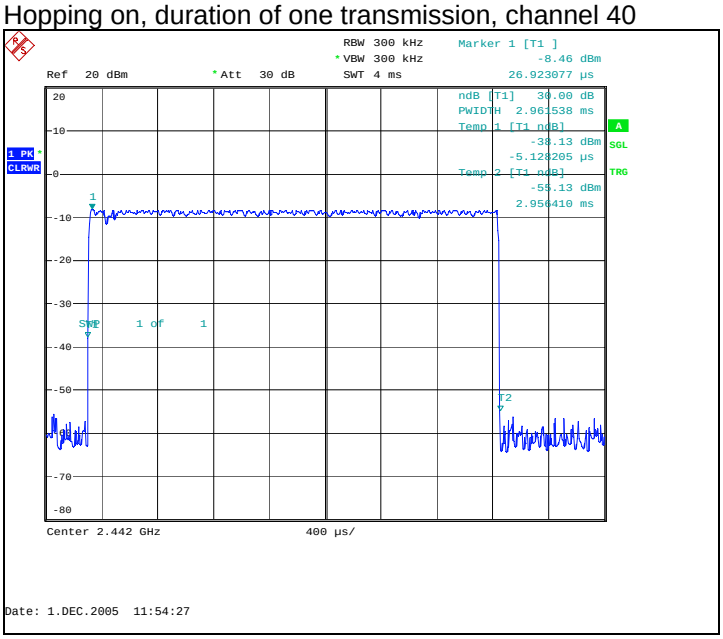
Hopping on, number of transmissions, channel 40



Hopping on, duration of one transmission, channel 40



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12. Peak output power

(FCC §15.247(b)(1), RSS-210 A8.4 (4))

EUT with DUT number	Phone: DUT 40457
Accessories with DUT numbers	Battery: DUT 40459
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23/49/100.6-100.9
Date of measurements	1-2.12.2005
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	22.18	0.165	Passed
7	22.55	0.180	Passed
11	22.43	0.175	Passed

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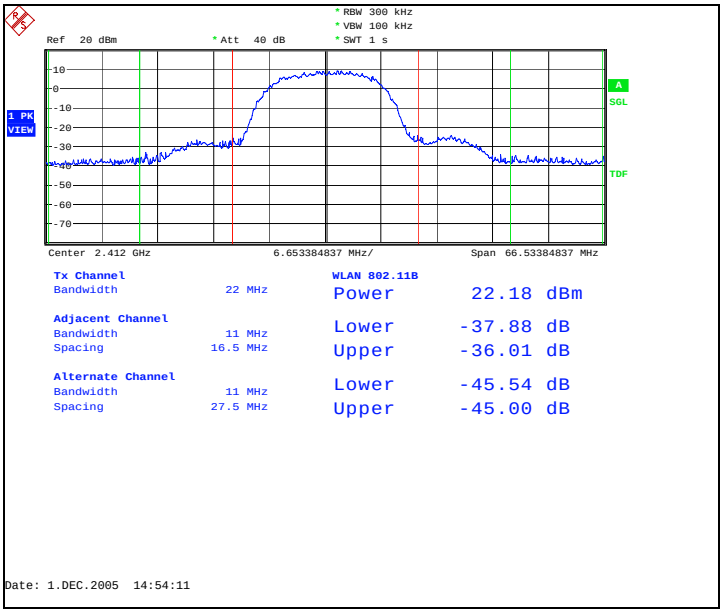
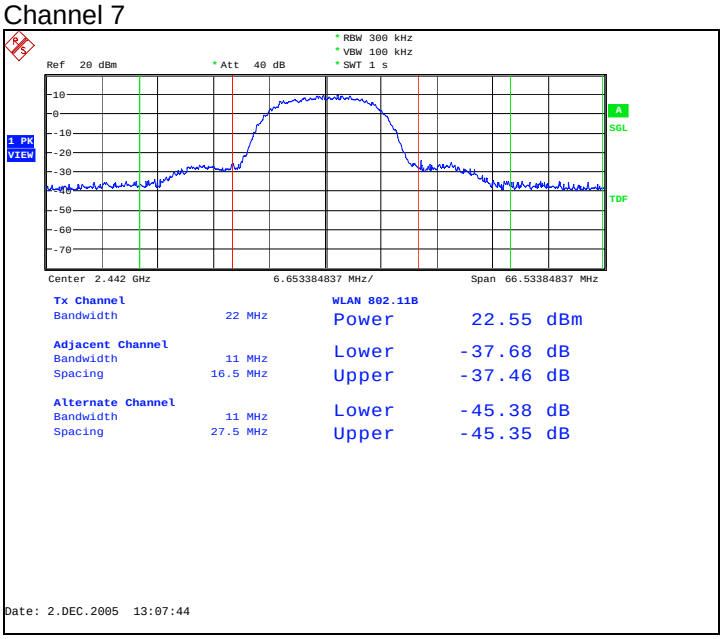
Channel 1



Channel 7



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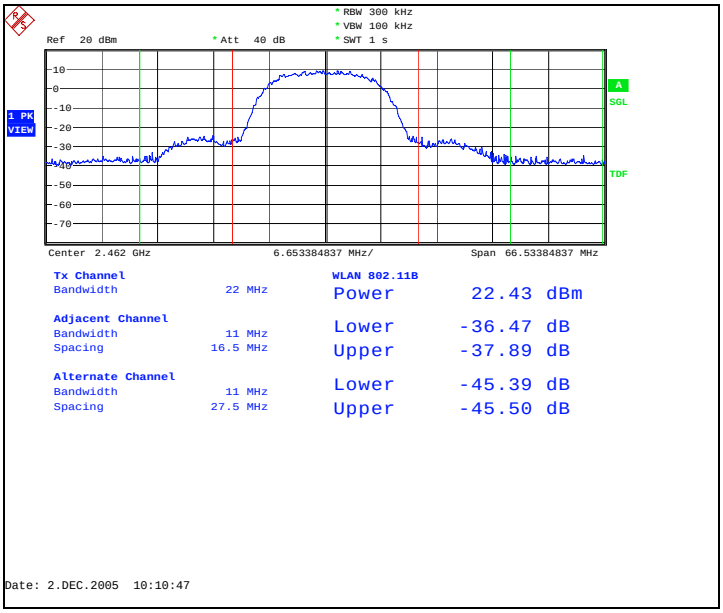
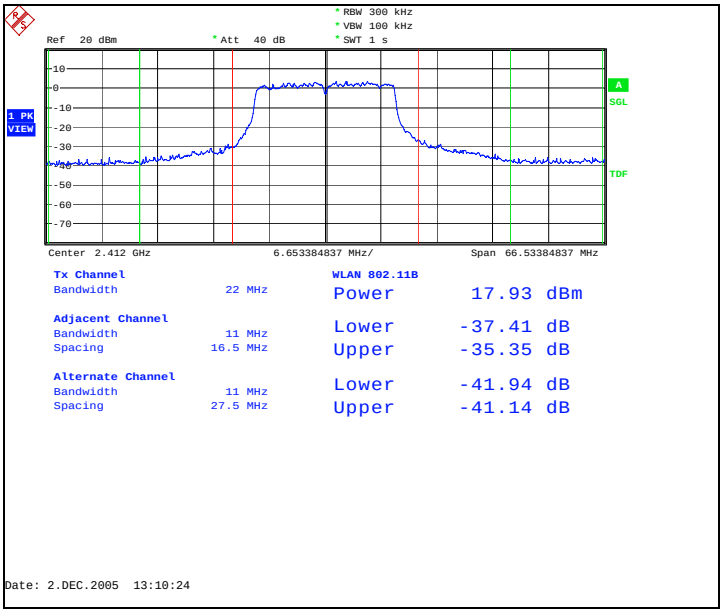
Channel 11



12.2.2 OFDM mode, BPSK modulation, 48 Mbps data rate

Channel	P [dBm]	P [W]	Result
1	17.93	0.062	Passed
7	17.95	0.062	Passed
11	18.19	0.066	Passed

Channel 1



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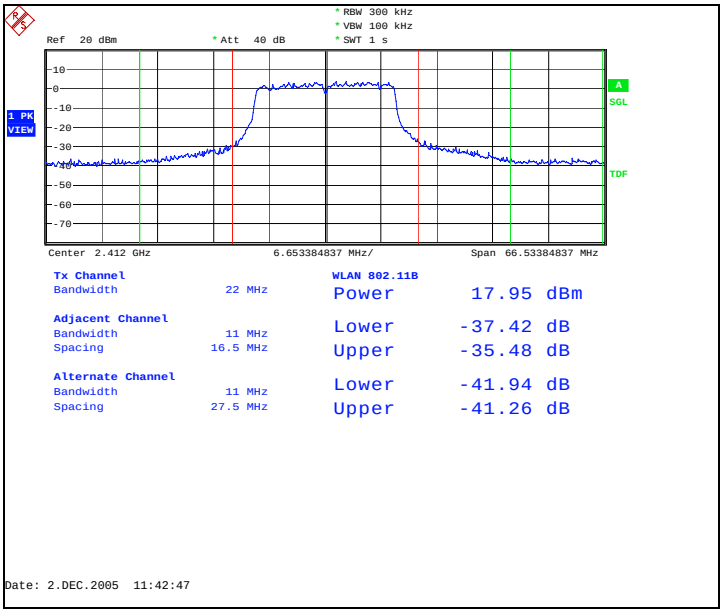
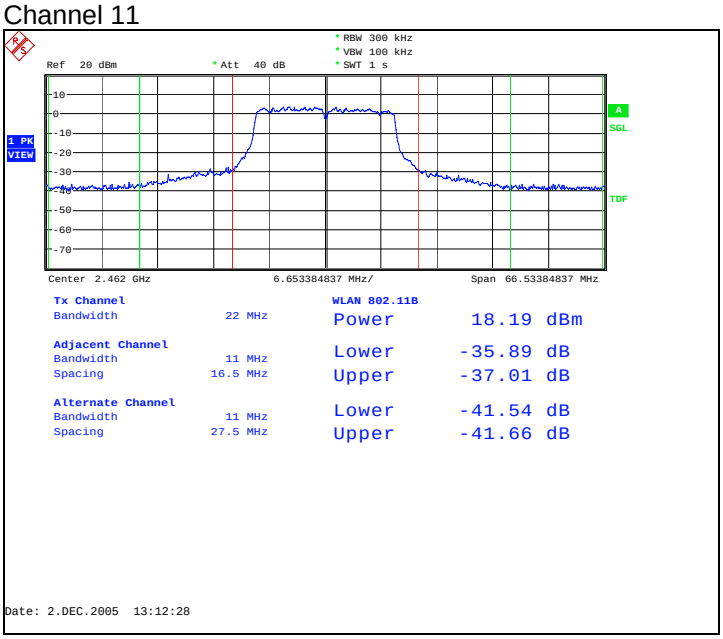
Channel 7



Channel 11



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13. Band edge compliance of RF emissions

(FCC §15.247(c), RSS-210 A8.5)

EUT with DUT number	RM-89 DUT 40456
Accessories with DUT numbers	BP-5L DUT 40458, AC-4E DUT 40460, HS-5 DUT 40462, Mini SD 64 DUT 40466
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23 / 44 / 101.7
Date of measurements	5.12.2005
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

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13.2. WLAN Test results

13.2.1 DSSS mode, QPSK modulation, 11 Mbps data rate

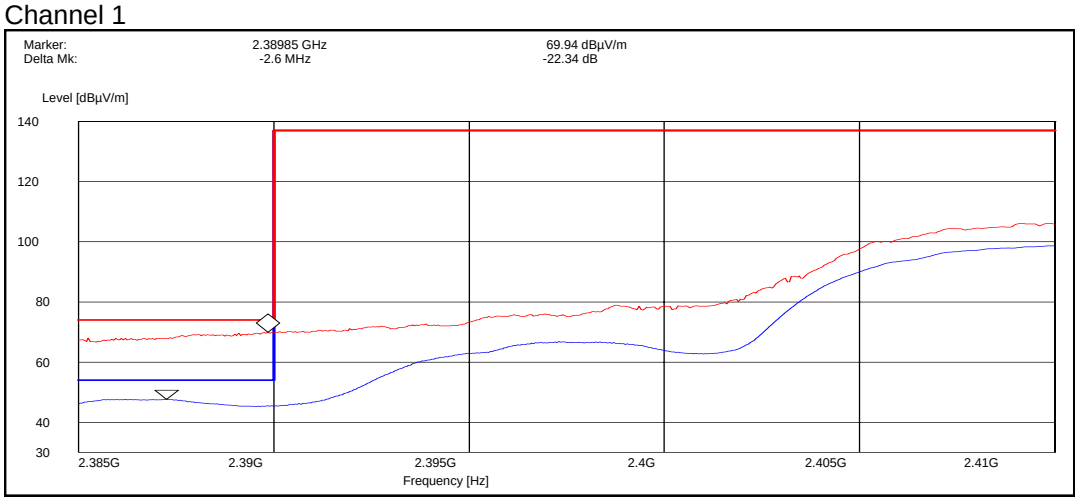
Average (RBW: 1 MHz)

Channel	E [dBµV/m]	Result
1	47.60	PASSED
11	42.97	PASSED

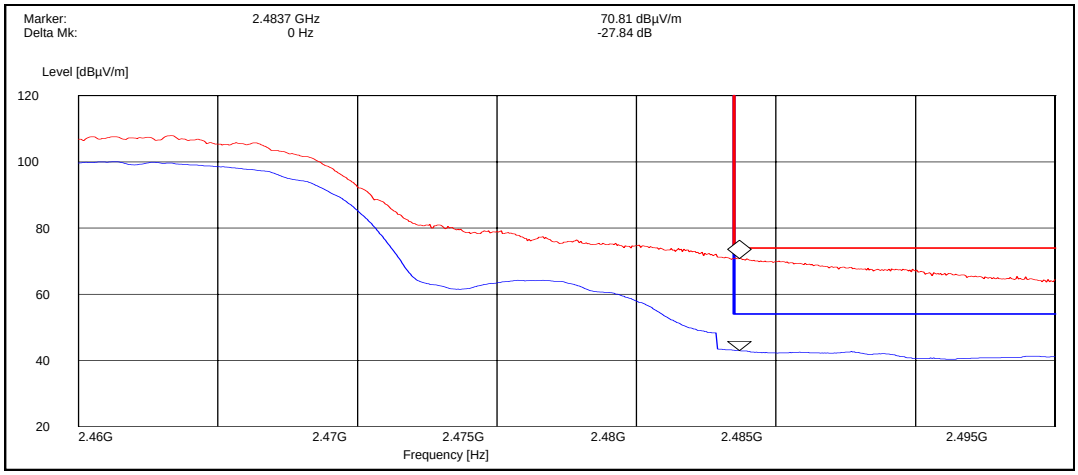
Peak (RBW: 1 MHz)

Channel	E [dBµV/m]	Result
1	69.94	PASSED
11	70.81	PASSED

Channel 1



Channel 11



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13.2.2 OFDM mode, BPSK modulation, 48 Mbps data rate

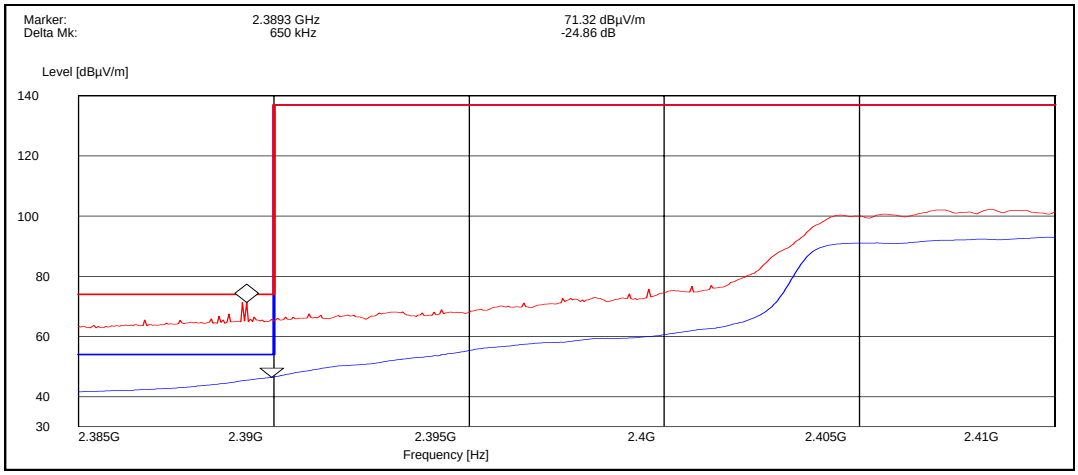
Average (RBW: 1 MHz)

Channel	E [dBµV/m]	Result
1	46.46	PASSED
11	46.73	PASSED

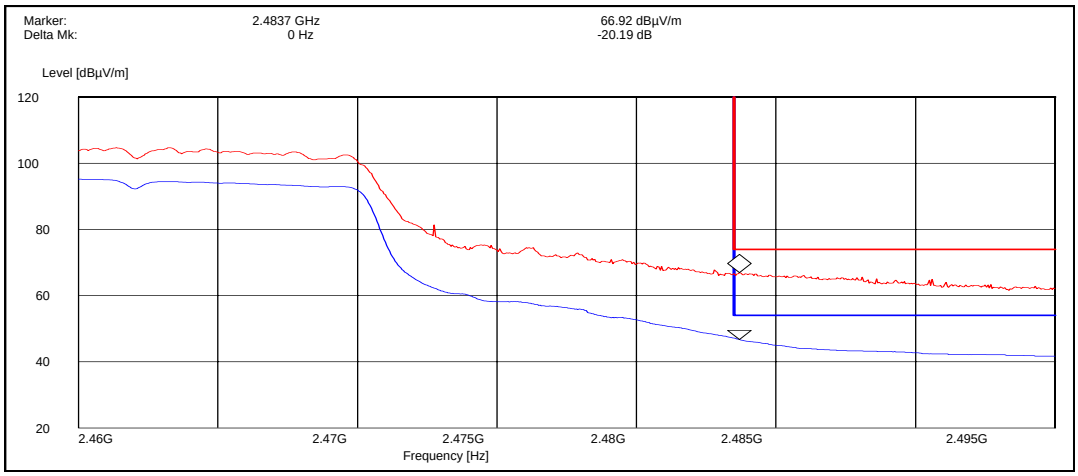
Peak (RBW: 1 MHz)

Channel	E [dBµV/m]	Result
1	71.32	PASSED
11	66.92	PASSED

Channel 1



Channel 11



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

EUT with DUT number	Phone: DUT 40457
Accessories with DUT numbers	Battery: DUT 40459
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23/49/100.9
Date of measurements	2.12.2005
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.

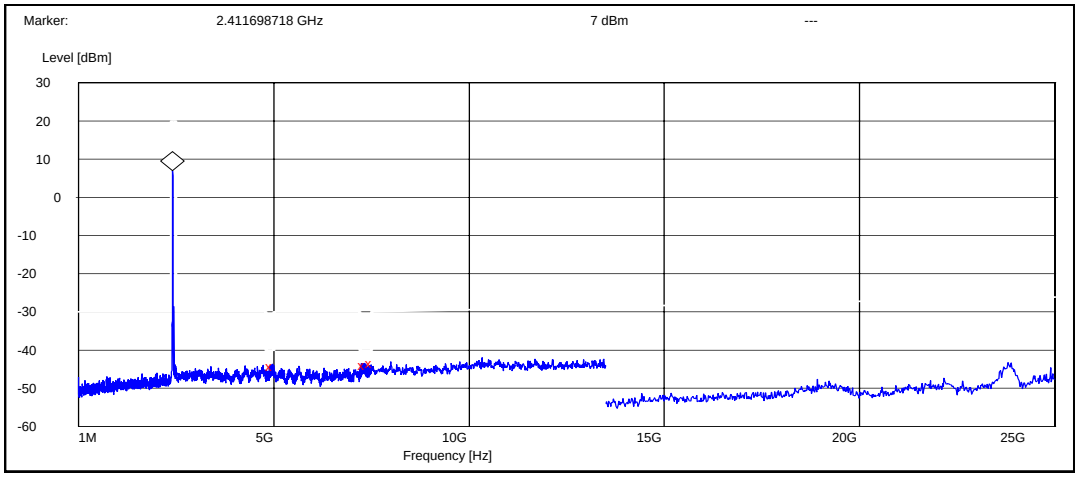
Limits for spurious RF conducted emissions measurements

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
4964.423077	-51.195180	Passed
7322.596154	-50.995180	Passed
7500.000000	-50.495180	Passed

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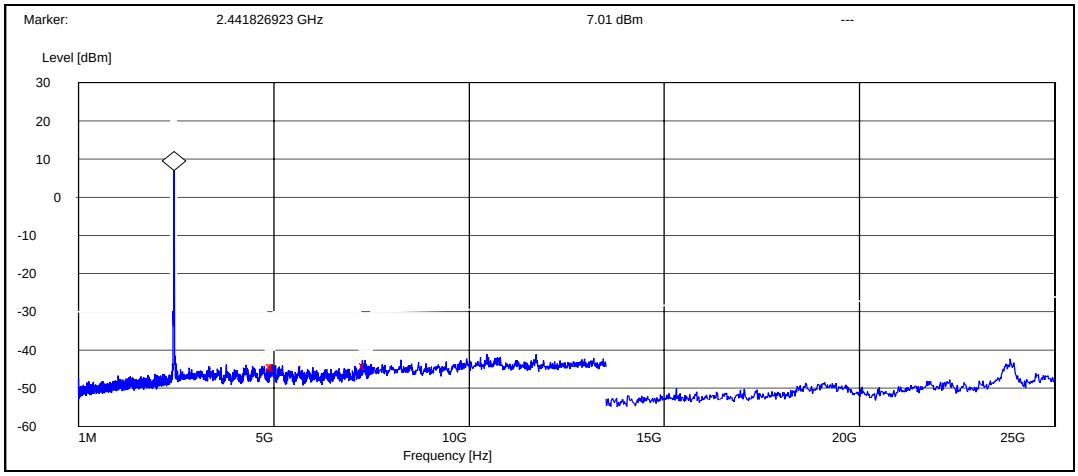
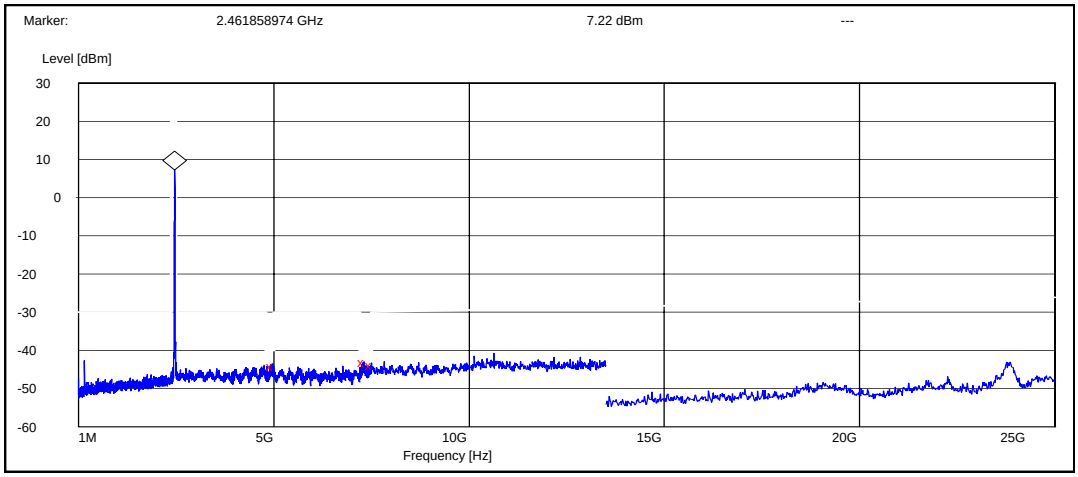
Channel 7



Frequency [MHz]	P [dBc]	Result
4967.628205	-51.410151	Passed
5000.000000	-51.310151	Passed
7334.134615	-51.010151	Passed

Channel 11



Frequency [MHz]	P [dBc]	Result
4970.192308	-51.418233	Passed
7308.653846	-50.318233	Passed
7500.000000	-51.118233	Passed

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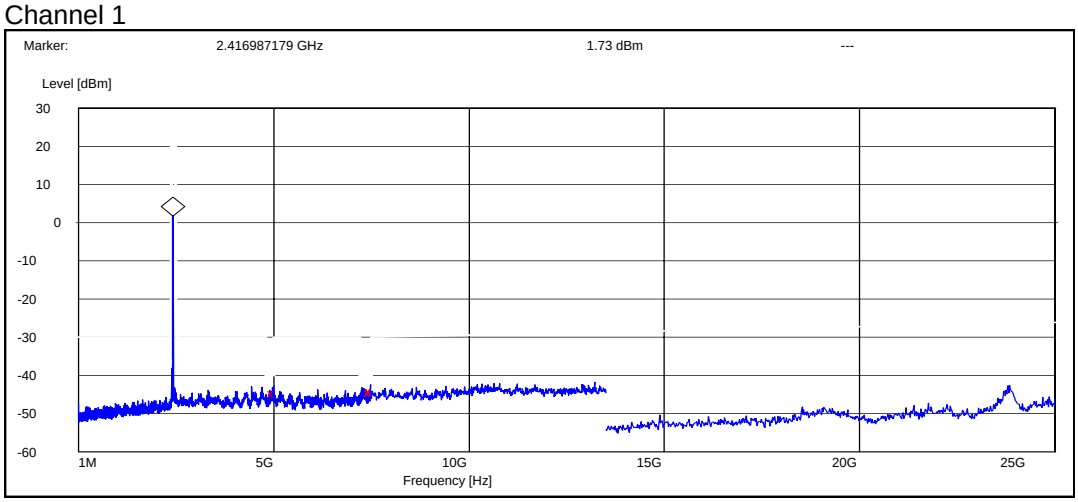
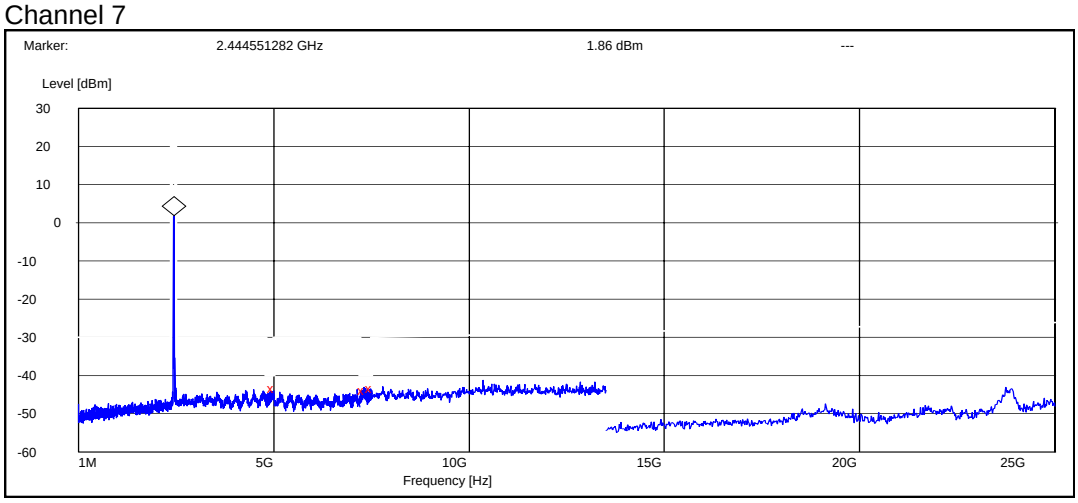
14.2.2 OFDM mode, BPSK modulation, 48 Mbps data rate

Channel 1



Frequency [MHz]	P [dBc]	Result
5000.000000	-46.434576	Passed
7472.115385	-46.034576	Passed
7500.000000	-45.934576	Passed

Channel 7



Frequency [MHz]	P [dBc]	Result
4997.115385	-45.357927	Passed
7307.211538	-45.757927	Passed
7500.000000	-45.357927	Passed

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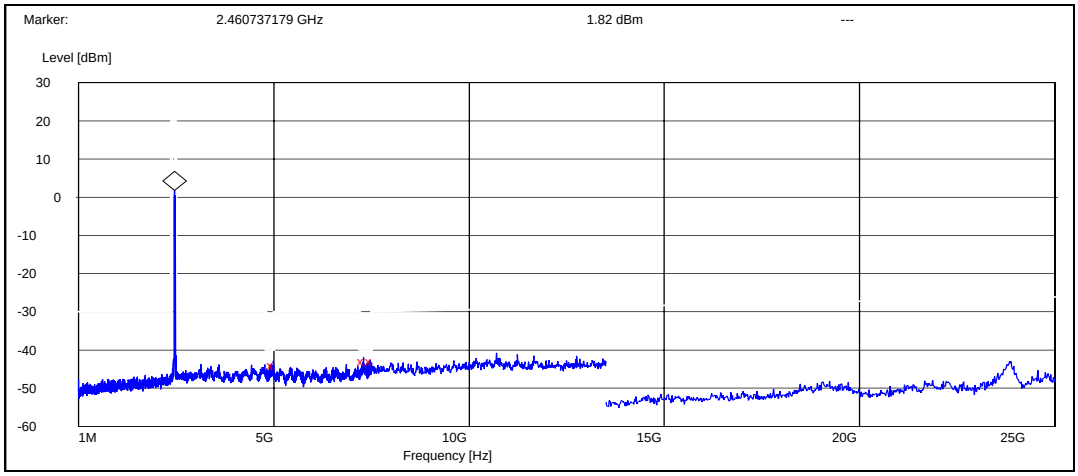
Channel 11



Frequency [MHz]	P [dBc]	Result
4984.615385	-45.719576	Passed
7297.596154	-44.719576	Passed
7500.000000	-44.819576	Passed

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

EUT with DUT number	RM-89 DUT 40456
Accessories with DUT numbers	BP-5L DUT 40458, AC-4E DUT 40460, HS-5 DUT 40462, Mini SD 64 DUT 40466
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23 / 45 / 101.0
Date of measurements	2.12.2005
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 ($A_{TOT} = L_{CABLES} + AF - G_{PREAMP}$).

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

Frequency range [MHz[	Limit [µV/m]	Limit [dBµV/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 [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Polarisation	Result
4824.000000	46.40	208.93	47.00	-0.60	VERTICAL	PASSED
7236.000000	46.00	199.53	42.80	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	33.60	47.86	34.20	-0.60	VERTICAL	PASSED
7236.000000	33.80	48.98	30.60	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
4883.767535	44.00	158.49	44.70	-0.70	HORIZONTAL	PASSED
7326.155311	47.30	231.74	43.90	3.40	HORIZONTAL	PASSED
7326.651303	47.30	231.74	43.90	3.40	VERTICAL	PASSED
12035.574148	48.10	254.10	36.10	12.00	HORIZONTAL	PASSED
17991.987976	57.30	732.82	35.30	22.00	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Polarisation	Result
4883.767535	30.20	32.36	30.90	-0.70	HORIZONTAL	PASSED
7324.151303	35.80	61.66	32.40	3.40	VERTICAL	PASSED
7327.155311	35.50	59.57	32.00	3.50	HORIZONTAL	PASSED
17997.987976	43.60	151.36	21.40	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	47.10	226.46	47.70	-0.60	HORIZONTAL	PASSED
7386.000000	47.10	226.46	42.80	4.30	HORIZONTAL	PASSED

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Average (RBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Polarisation	Result
4924.000000	34.00	50.12	34.60	-0.60	HORIZONTAL	PASSED
7386.000000	35.00	56.23	30.70	4.30	HORIZONTAL	PASSED

15.2.2 OFDM mode, BPSK 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	40.30	103.51	40.90	-0.60	HORIZONTAL	PASSED
7236.000000	43.60	151.36	40.40	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	28.30	26.00	28.90	-0.60	VERTICAL	PASSED
7236.000000	31.60	38.02	28.40	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
7329.657315	45.30	184.08	41.70	3.60	HORIZONTAL	PASSED
7866.733467	45.20	181.97	40.30	4.90	HORIZONTAL	PASSED
17994.495992	57.10	716.14	35.00	22.10	HORIZONTAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Polarisation	Result
7329.157315	32.20	40.74	28.60	3.60	HORIZONTAL	PASSED
7805.611222	31.80	38.90	27.30	4.50	HORIZONTAL	PASSED
17996.995992	43.60	151.36	21.40	22.20	HORIZONTAL	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	42.10	127.35	42.70	-0.60	HORIZONTAL	PASSED
7386.000000	45.20	181.97	40.90	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	29.10	28.51	29.70	-0.60	HORIZONTAL	PASSED
7386.000000	32.80	43.65	28.50	4.30	HORIZONTAL	PASSED

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16. AC powerline conducted emissions

(FCC §15.207, RSS-GEN 7.2.2)

EUT with DUT number	RM-89 DUT 40456
Accessories with DUT numbers	BP-5L DUT 40458, AC-4E DUT 40460, Mini SD 64 DUT 40466, CA-53 DUT 40464, 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]	18 / 52 / 102.5
Date of measurements	8.12.2005
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

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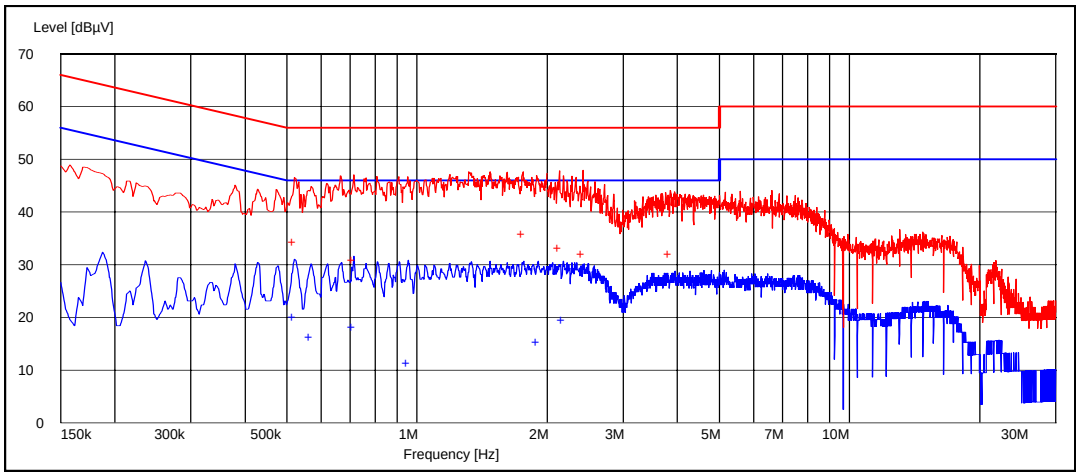
16.2. WLAN Test results

16.2.1 DSSS mode, QPSK modulation, 11 Mbps data rate

Channel 7



Quasi peak (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Line	Result
0.520741	34.20	L1	PASSED
0.713527	30.90	L1	PASSED
1.759018	35.90	N	PASSED
2.138277	33.20	N	PASSED
2.420842	32.10	N	PASSED
3.851703	31.90	N	PASSED

Average (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Line	Result
0.520741	20.10	N	PASSED
0.568938	16.30	N	PASSED
0.713527	18.10	L1	PASSED
0.954509	11.30	L1	PASSED
1.907315	15.30	N	PASSED
2.180361	19.50	N	PASSED

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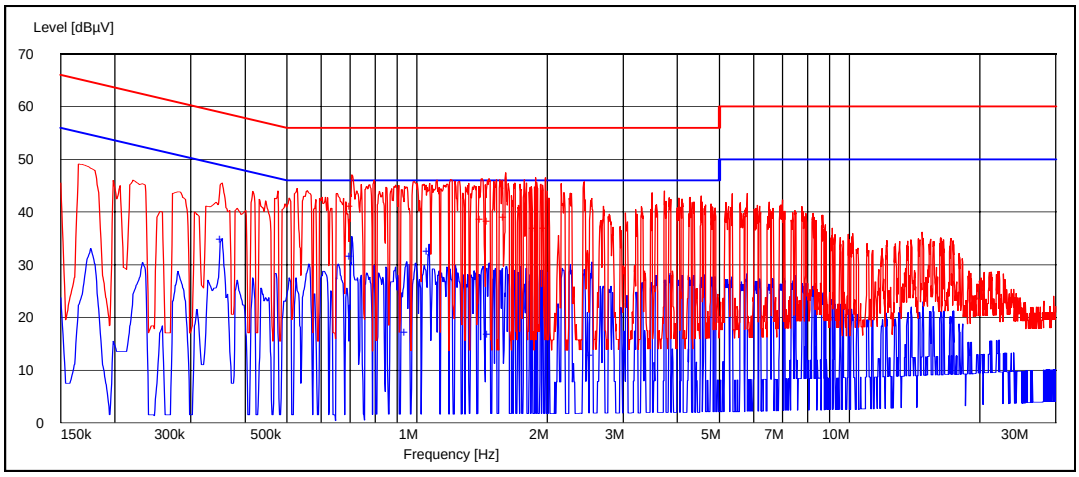
16.2.2 OFDM mode, BPSK modulation, 48 Mbps data rate

Channel 7



Quasi peak (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Line	Result
0.706112	41.10	N	PASSED
1.414228	38.70	N	PASSED
1.466132	38.20	N	PASSED
1.603307	39.00	N	PASSED
1.881363	37.00	N	PASSED
1.981463	36.90	N	PASSED

Average (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Line	Result
0.353908	34.80	N	PASSED
0.706112	31.70	N	PASSED
0.947094	17.20	N	PASSED
1.065731	32.50	N	PASSED
1.469840	16.90	N	PASSED
2.535070	12.90	L1	PASSED

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17. 6 dB bandwidth

(FCC §15.247(a)(2), RSS-210 A8.2 (1))

EUT with DUT number	Phone: DUT 40457
Accessories with DUT numbers	Battery: DUT 40459
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23/49/100.6-100.9
Date of measurements	1-2.12.2005
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	11858.974	Passed
7	11858.974	Passed
11	12500.000	Passed

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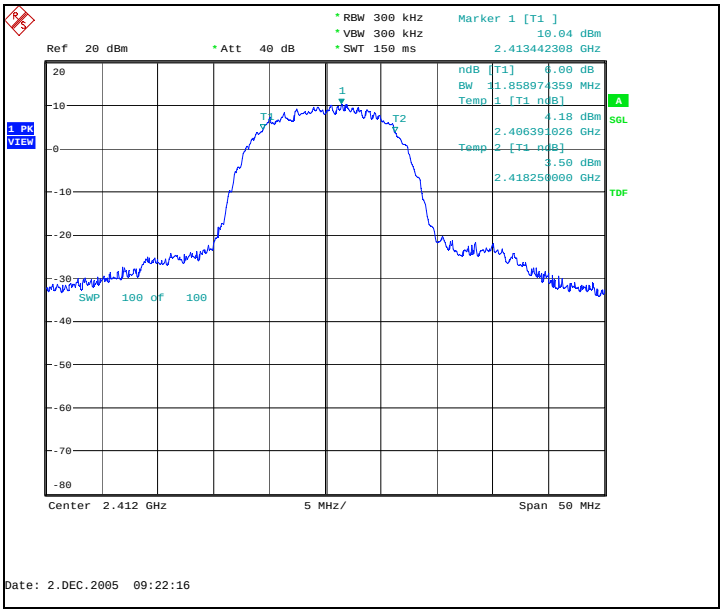
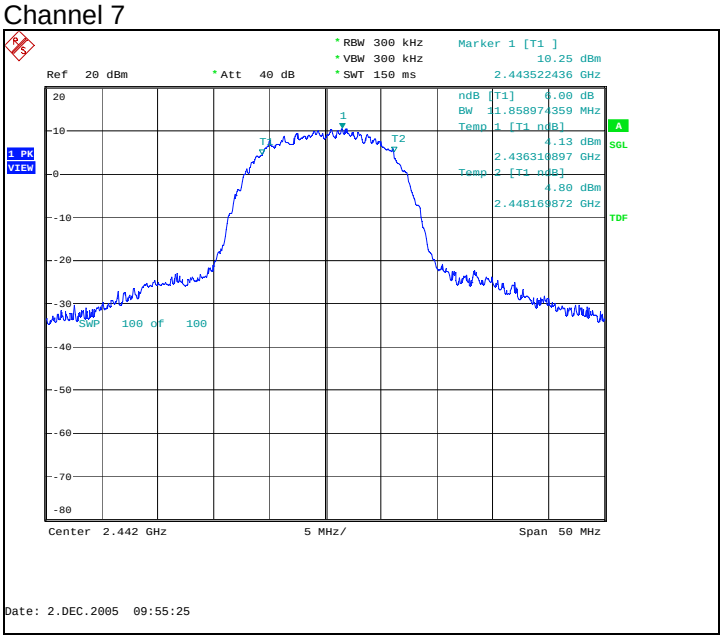
Channel 1



Channel 7



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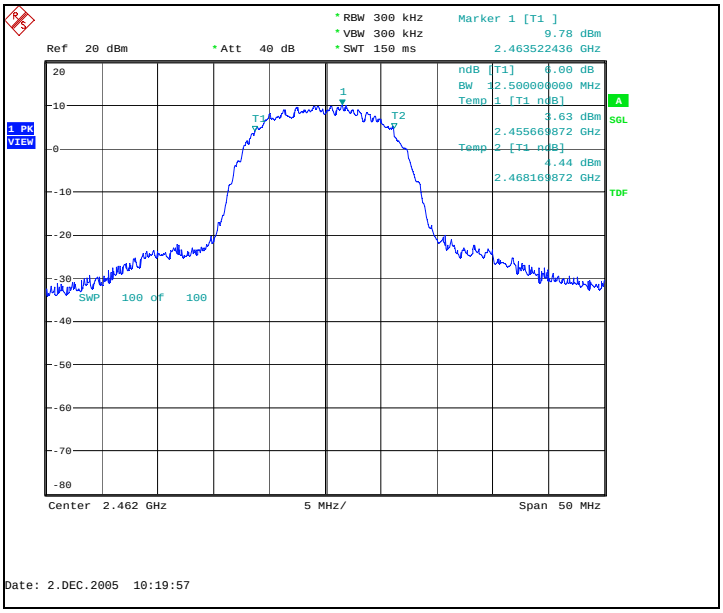
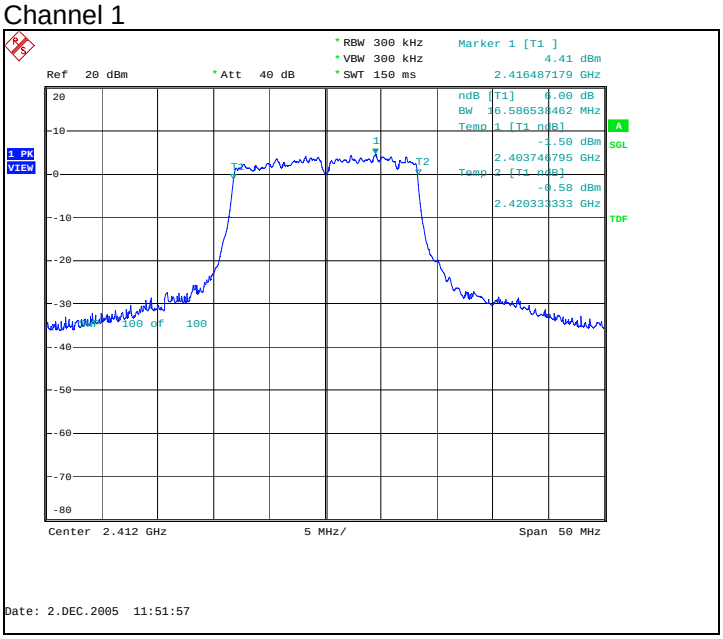
Channel 11



17.2.2 OFDM mode, BPSK modulation, 48 Mbps data rate

Channel	6 dB bandwidth [kHz]	Result
1	16586.538	Passed
7	16586.538	Passed
11	16666.667	Passed

Channel 1



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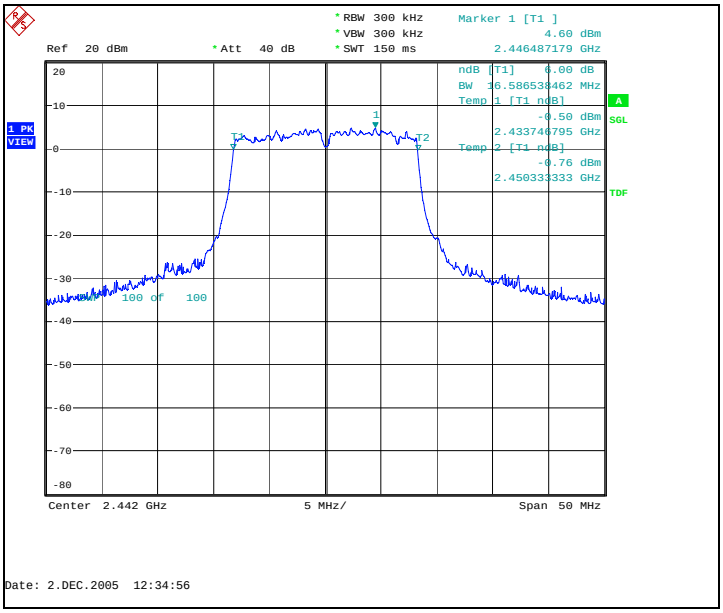
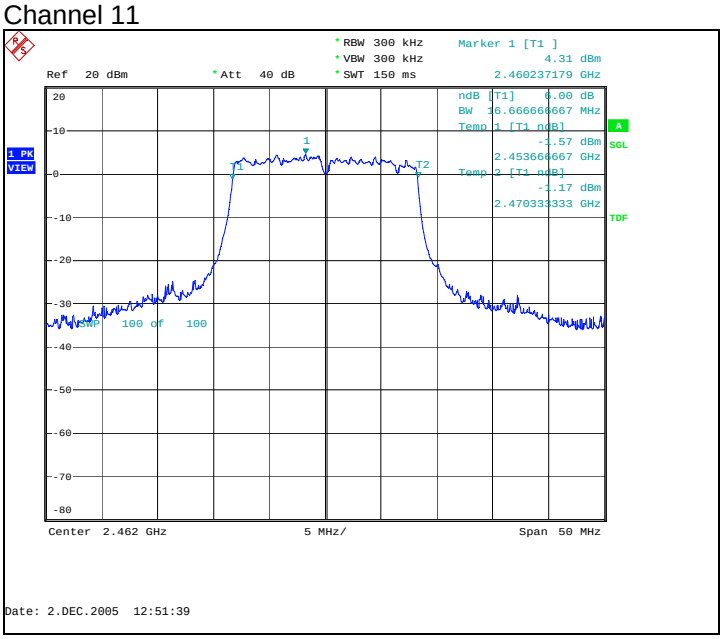
Channel 7



Channel 11



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18. Power spectral density

(FCC §15.247(e), RSS-210 A8.2 (2))

EUT with DUT number	Phone: DUT 40457
Accessories with DUT numbers	Battery: DUT 40459
Operation Voltage [V] / [Hz]	-
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23/49/100.6
Date of measurements	1.12.2005
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	-6.93	Passed
7	-6.64	Passed
11	-6.67	Passed

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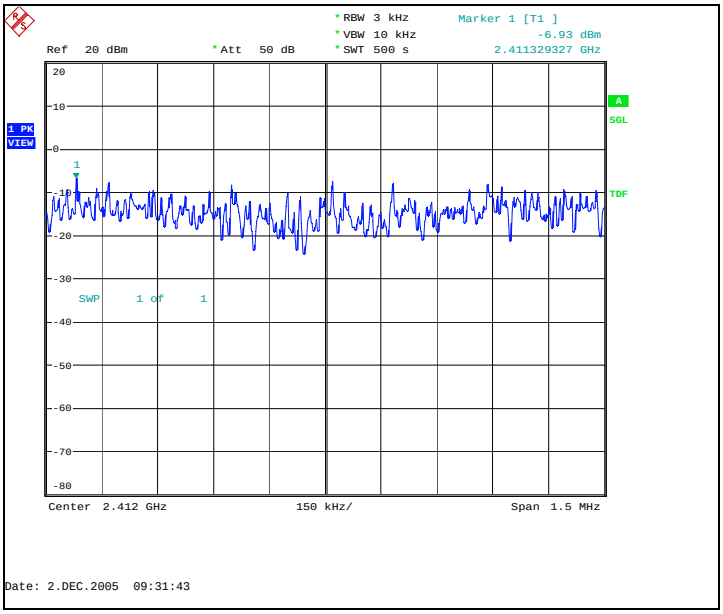
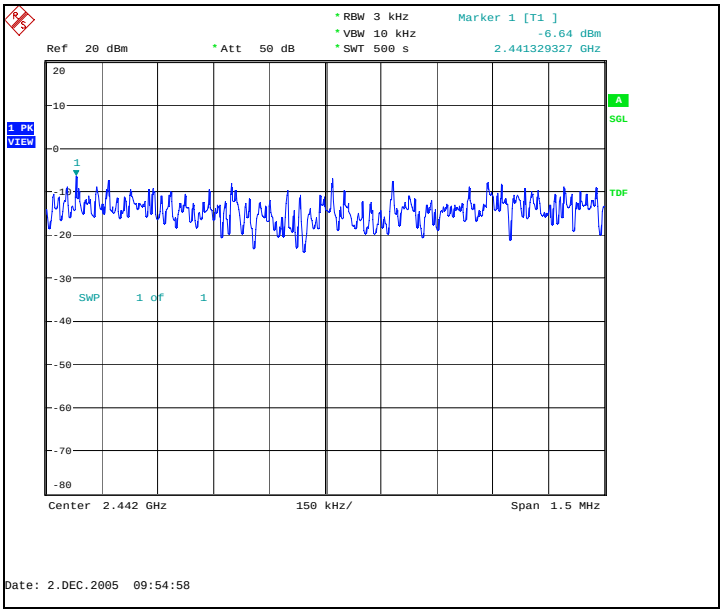
Channel 1



Channel 7



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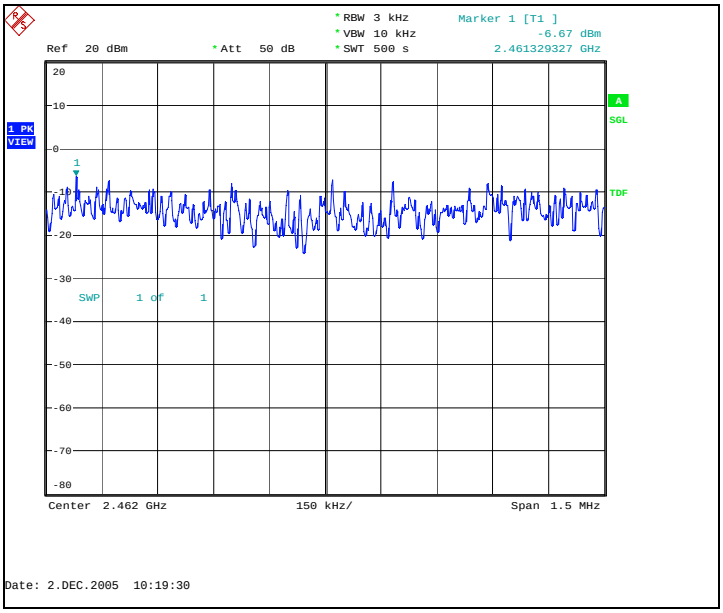
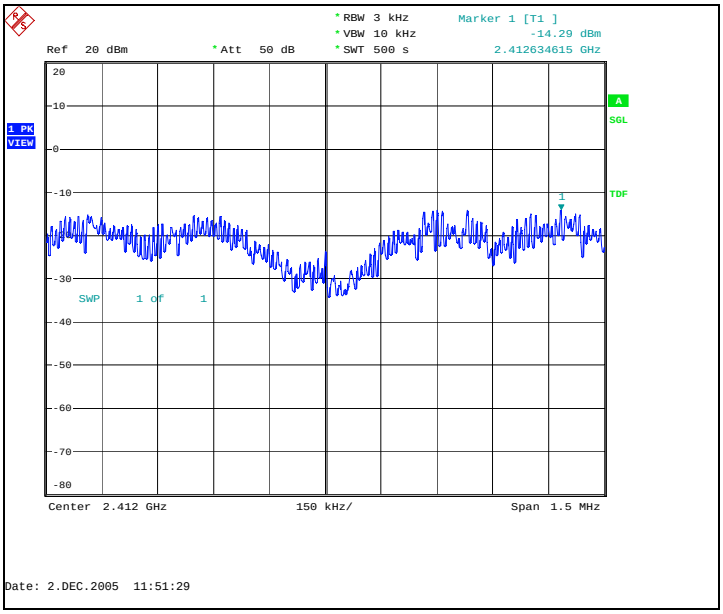
Channel 11



18.2.2 OFDM mode, BPSK modulation, 48 Mbps data rate

Channel	P [dBm]	Result
1	-14.29	Passed
7	-13.73	Passed
11	-14.16	Passed

Channel 1



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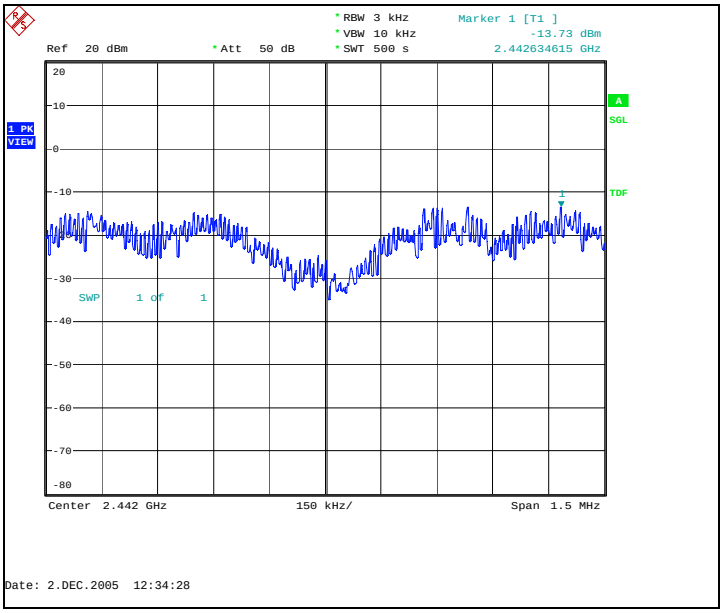
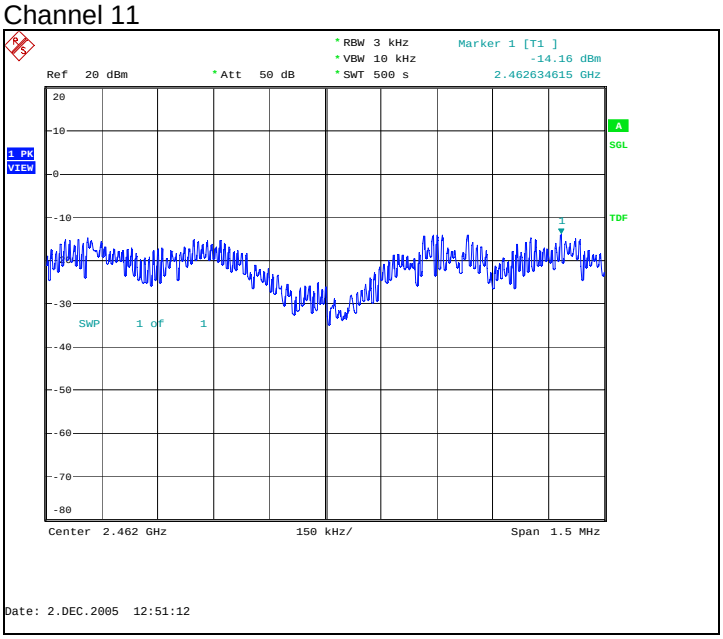
Channel 7



Channel 11



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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

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