Bluetooth test report
for
RA-2

Report Date: June 12, 2004

Signatures:

Tested by:

Marko Turkkila Testing Engineer

Contents approved:

Tomi Nyberg Laboratory Manager

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1 LABORATORY INFORMATION

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FCC registration number: **IC file number:**	910391 (January 27, 2003) IC 4616 (May 14, 2003)

2 CUSTOMER INFORMATION

Client	Nokia Corporation Keilalahdentie 2-4 02150 Espoo PL 226 00045 NOKIA GROUP Tel: 07180 08000
Contact person:	Juha Tuominen Nokia Corporation / TCC Salo P.O. Box 86 (Joensuunkatu 7C) FIN -24101 SALO FINLAND Tel: +358 7180 08000 Fax: +358 7180 44123
Receipt of EUT:	June 09, 2004
Testing date:	June 09 – 14, 2004
Report date:	June 12, 2004

The tests listed in this report have been done to demonstrate compliance to the FCC rules section §15.247, §15.207 and IC standard RSS-210.

3 SUMMARY OF TEST RESULTS

Section in CFR 47	Section in RSS-210	Test	Result
15.247, a1	6.2.2 (o), a1	Carrier frequency separation	PASS
15.247, a1ii	6.2.2 (o), a3	Number of hopping frequencies	PASS
15.247, a 1 iii	6.2.2 (o), a3	Time of occupancy	PASS
15.247, a	6.2.2 (o), a1	20dB bandwidth	PASS
15.247, b1	6.2.2 (o), a3	Peak output power	PASS
15.247, c	6.2.2 (o), e1	Band-edge compliance of RF emissions	PASS
15.207	6.6	AC power line conducted emissions	PASS
15.247, c	6.2.2 (o), e1	Spurious RF conducted emissions	PASS
15.247, c	6.2.2 (o), e1	Spurious radiated emissions	PASS

PASS Pass
FAIL Fail
X Measured, but there is no applicable performance criteria
- Not done

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4 EUT INFORMATION

The EUT and accessories used in the tests are listed below. Later in this report only EUT numbers are used as reference.

	Device	Type	S/N	EUT number
EUT	GSM 1900 Mobile phone	RA-2	004400/41/170555/9	17001
	GSM 1900 Mobile phone	RA-2	004400/41/170554/2	17002
Accessories	Battery,	BP-5L	V.12	17003

Notes: EUT 07002 was equipped with antenna connector for conducted measurements

4.1 EUT description

EUT is a GSM 1900 mobile phone with BT and WLAN functions.

The EUT was not modified during the tests.

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5 EUT TEST SETUPS

For each test the EUT was exercised to find out the worst case of operation modes and device configuration.

Two different test setups were used: one for conducted measurements, another for radiated measurements. One EUT was equipped with an external antenna connector for conductive measurements.

The test setup photographs are in the document referenced in section 17.

6 APPLICABLE STANDARDS

The tests were performed in guidance of CFR 47 Part 15.247 and 15.207, Part 2, FCC public notice DA 00-705 (March 30, 2000), ANSI C63.4 (1992), RSS-210 (Issue 5, November 2001) and CISPR-22.

Deviations, modifications or clarifications (if any) to above mentioned documents are written in each section under "Test method" for each test case.

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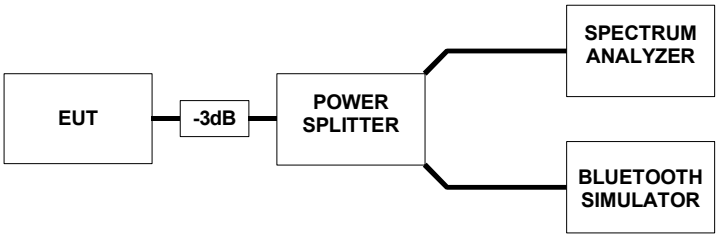
7 CARRIER FREQUENCY SEPARATION

EUT	17002		
Accessories	17003		
Temp, Humidity, Air Pressure	20 ºC	52 RH%	1006 hPa
Date of measurement	June 11, 2004		
FCC rule part	§15.247 (a) (1)		
RSS-210 section	6.2.2 (o), a1		
Measured by	Marko Turkkila		

7.1 Test setup and testing method

The Bluetooth simulator was used to:

- set the EUT channel (0 – 78)
- set the number of EUT TX slots (1, 3, 5)
- set the EUT to TX, RX and TX/RX mode
- enable/disable frequency hopping
- select between several different test modulation patterns



Picture 1: Test setup for carrier frequency separation measurement

Spectrum analyzer was set to sweep the Bluetooth operating band 2.40 – 2.483 GHz.
100 kHz resolution bandwidth and maximum hold function was used to measure the EUT transmission over sufficient time. Carrier frequency separation was read from the screen.

7.2 EUT operation mode

EUT operation mode	Connection, DM5, PRBS
EUT channel	Hopping
EUT TX power level	0 dBm

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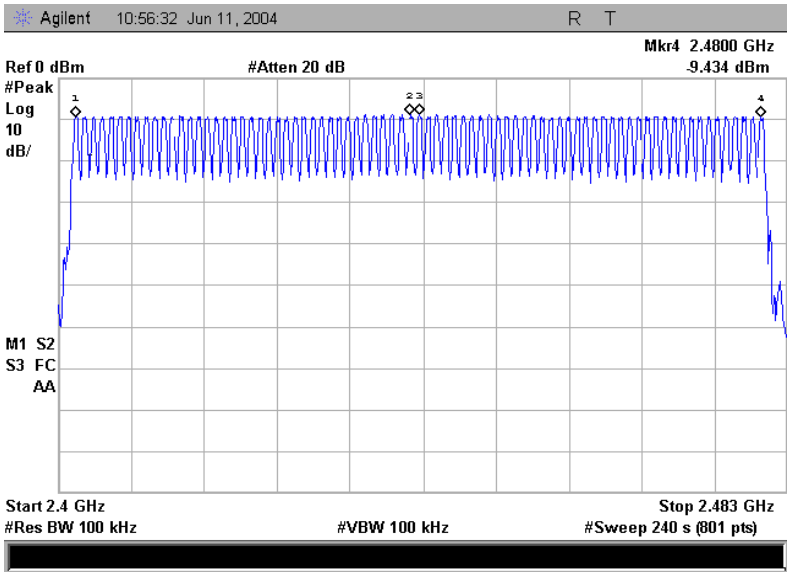
7.3 Results

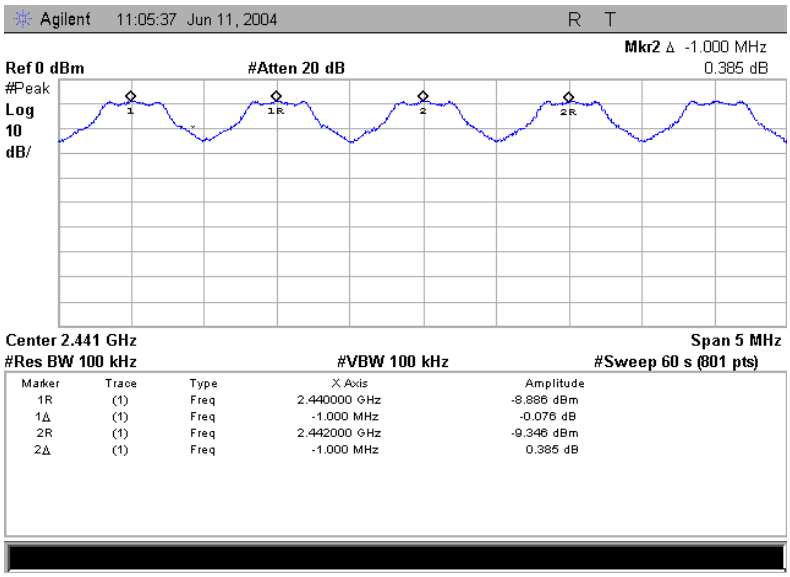
Table 1: Carrier frequency separation measurement results

Limit	Result
≥ 0.025 or 20dB BW	1.00 MHz

7.4 Screen shots



Picture 2: Carrier frequency separation, General overview of the spectrum



Picture 3: Carrier frequency separation, Channels 38 and 39

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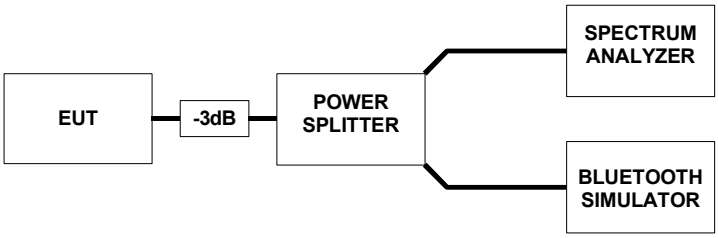
8 NUMBER OF HOPPING FREQUENCIES

EUT	17002		
Accessories	17003		
Temp, Humidity, Air Pressure	20 ºC	52 RH%	1006 hPa
Date of measurement	June 11, 2004		
FCC rule part	§15.247(a) (2)		
RSS-210 section	6.2.2 (o), a3		
Measured by	Marko Turkkila		

8.1 Test setup

The Bluetooth simulator was used to:

- set the EUT channel (0 – 78)
- set the number of EUT TX slots (1, 3, 5)
- set the EUT to TX, RX and TX/RX mode
- enable/disable frequency hopping
- select between several different test modulation patterns



Picture 4: Test setup for measurement of number of hopping frequencies

Spectrum analyzer was set to sweep the Bluetooth operating band 2.40 – 2.483 GHz.
100 kHz resolution bandwidth and maximum hold function was used to measure the EUT transmission over sufficient time. Number of hopping frequencies was calculated from the screen.

8.2 EUT operation mode

EUT operation mode	Connection, DM5, PRBS
EUT channel	Hopping
EUT TX power level	0 dBm

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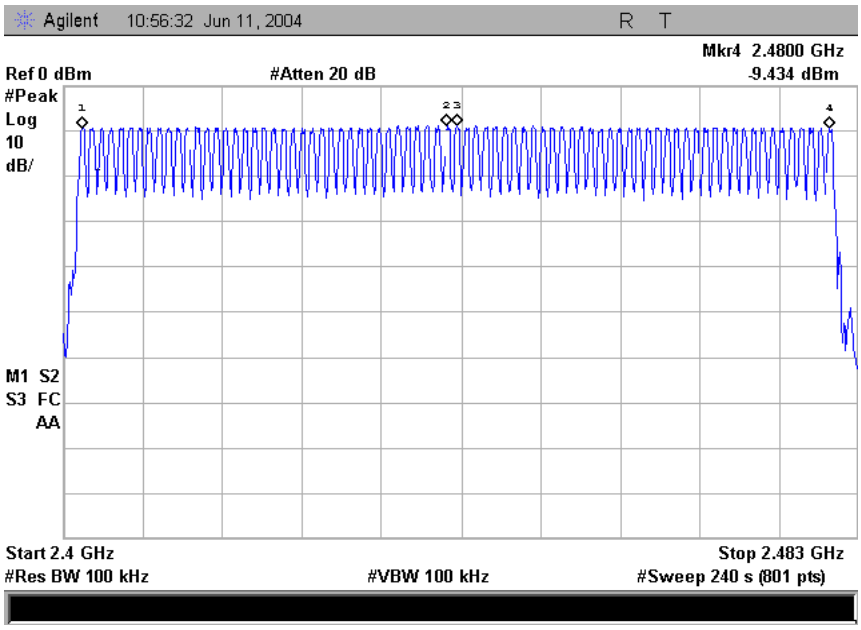
8.3 Results

Table 2: Number of hopping frequencies measurement results

Limit	Result
≥ 75	79

8.4 Screen shots



Picture 5: Number of hopping frequencies measurement

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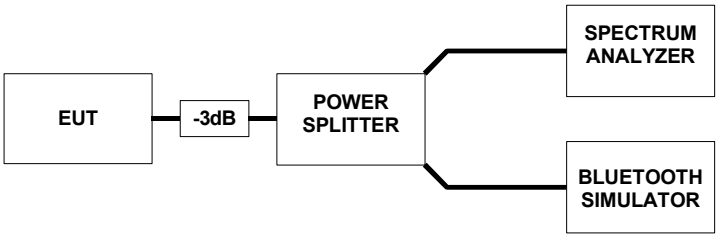
9 TIME OF OCCUPANCY

EUT	17002		
Accessories	17003		
Temp, Humidity, Air Pressure	20 ºC	52 RH%	1006hPa
Date of measurement	June 11, 2004		
FCC rule part	§15.247 (a) (1) iii		
RSS-210 section	6.2.2 (o), a3		
Measured by	Marko Turkkila		

9.1 Test setup and testing method

The Bluetooth simulator was used to:

- set the EUT channel (0 – 78)
- set the number of EUT TX slots (1, 3, 5)
- set the EUT to TX, RX and TX/RX mode
- enable/disable frequency hopping
- select between several different test modulation patterns



Picture 6: Test setup for conducted RF output power measurement

Spectrum analyzer with single sweep and 0 Hz span was used to monitor the transmitter operation over time.

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9.2 Connection mode

9.2.1 EUT operation mode

EUT operation mode	Connection, DH5, PRBS
EUT channel	Hopping
EUT TX power level	0 dBm

9.2.2 Results

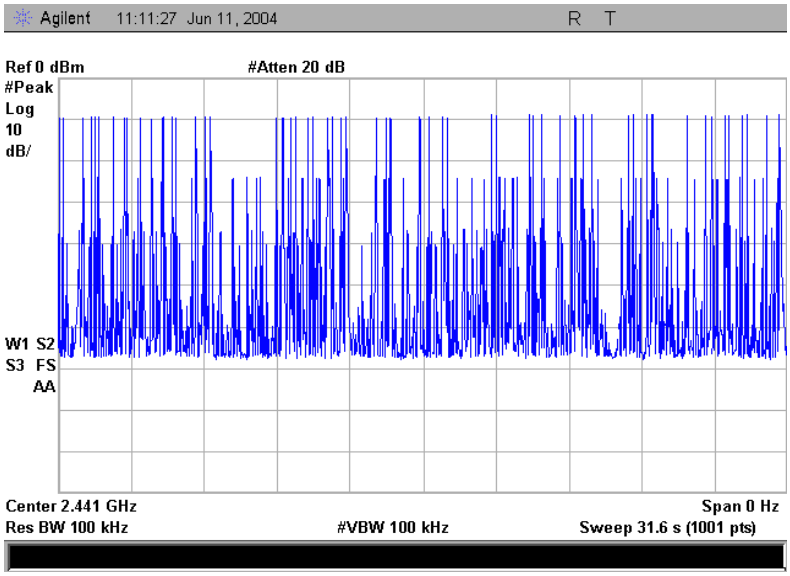
Table 3: Time of occupancy during connection mode measurement results

Limit	Result
≤ 0.4 s over 31.6 s period	0.162 s

Limit:
In the connection mode Bluetooth uses 79 channels. As defined in §15.247 (a) (1) iii, the limit for time of occupancy is 0.4s over time of number of channels multiplied with 0.4s (79 * 0.4s = 31.6 s).

Results:
In measurement time of 31.6 s, total of 57 transmissions occurred. The duration of one transmission was 2.85ms. Based on these measurements the transmitter operated 57 * 2.85 ms = 0.162 s during the 31.6 s period

9.2.3 Screen shots



Picture 7: Number of transmissions on connection state, channel 39

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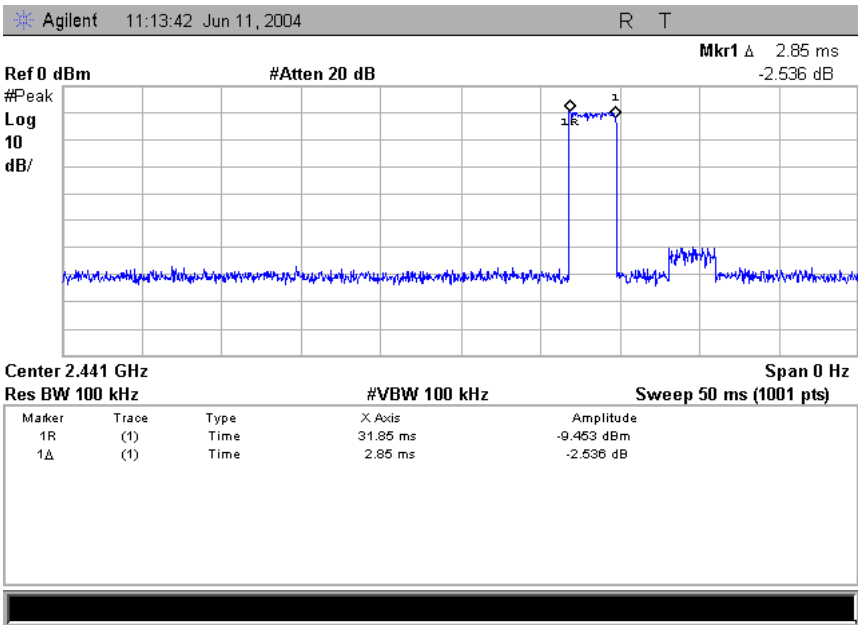

Picture 8: Duration of one transmission on connection state, channel 39

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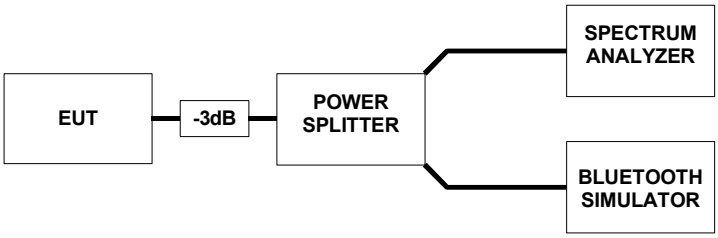
10 20 dB BANDWIDTH

EUT	17002		
Accessories	17003		
Temp, Humidity, Air Pressure	20 ºC	52 RH%	1006 hPa
Date of measurement	June 11, 2004		
FCC rule part	§15.247 (a) (1)		
RSS-210 section	6.2.2 (o), a1		
Measured by	Marko Turkkila		

10.1 Test setup and measurement method

The Bluetooth simulator was used to:

- set the EUT channel (0 – 78)
- set the number of EUT TX slots (1, 3, 5)
- set the EUT to TX, RX and TX/RX mode
- enable/disable frequency hopping
- select between several different test modulation patterns



Picture 9: Test setup for conducted RF output power measurement

The 20dB bandwidth was measured using 10 kHz resolution bandwidth and maximum hold function of the spectrum analyzer. 20dB bandwidth was defined by measuring the maximum level on the measured channel and by placing display line 20 dB below this value and by reading the bandwidth from the intersection of the measured trace and display line.

10.2 EUT operation mode

EUT operation mode	Connection, DM5, PRBS
EUT channel	0, 39 and 78
EUT TX power level	0 dBm

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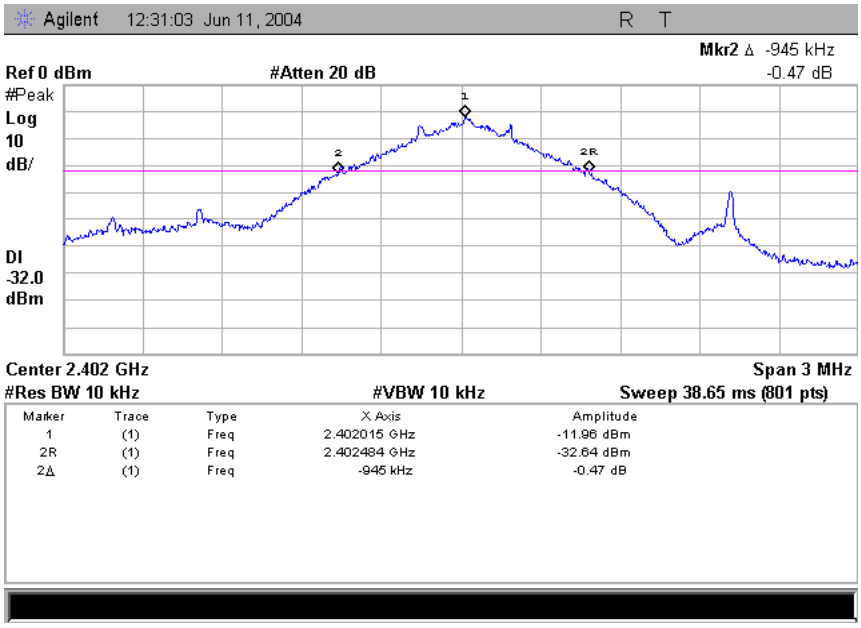
10.3 Results

Table 4: 20dB bandwidth measurement results

EUT Channel	Limit (MHz)	Measured value (MHz)
0	≤ 1.0	0.945
39		0.915
78		0.923

10.4 Screen shots



Picture 10: 20dB Bandwidth measurement result, Channel 0

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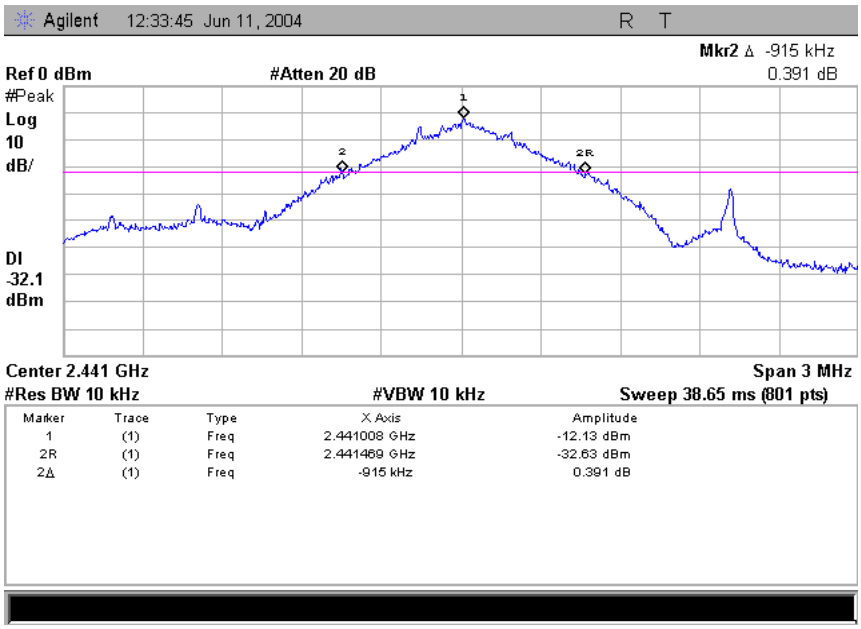
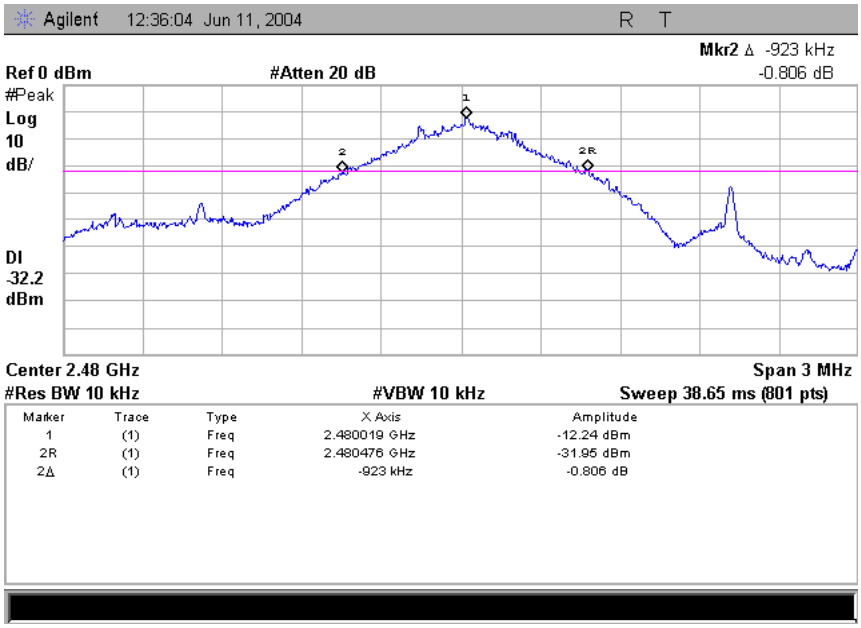


Picture 11: 20dB Bandwidth measurement result, Channel 39



Picture 12: 20dB Bandwidth measurement result, Channel 78

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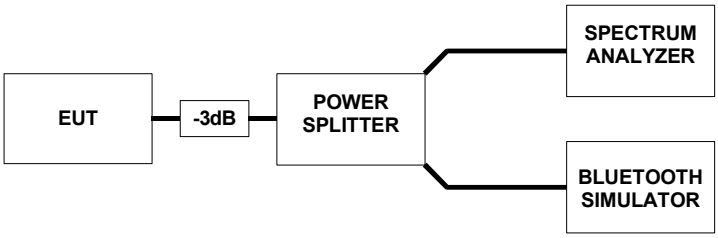
11 PEAK OUTPUT POWER

EUT	17002		
Accessories	17003		
Temp, Humidity, Air Pressure	20 ºC	53 RH%	1006 hPa
Date of measurement	June 11, 2004		
FCC rule part	§15.247 (b) (1)		
RSS-210 section	6.2.2 (o), a3		
Measured by	Marko Turkkila		

11.1 Test setup and measurement method

The Bluetooth simulator was used to:

- set the EUT channel (0 – 78)
- set the number of EUT TX slots (1, 3, 5)
- set the EUT to TX, RX and TX/RX mode
- enable/disable frequency hopping
- select between several different test modulation patterns



Picture 13: Test setup for conducted RF output power measurement

In the peak output power measurement the power splitter, attenuator and cable attenuations were measured prior to the power measurement and set as parameter for external preamplifier gain in the spectrum analyzer to correct the reading of the peak output power. Spectrum analyzer subtracts the set PG value shown in the screenshots from the measured reading.
The measurement was made using 1 MHz resolution bandwidth and 1 MHz video bandwidth and maximum hold function to record the maximum peak output power.

11.2 EUT operation mode

EUT operation mode	Connection, DM5, PRBS
EUT channel	0, 39 and 78
EUT TX power level	0 dBm

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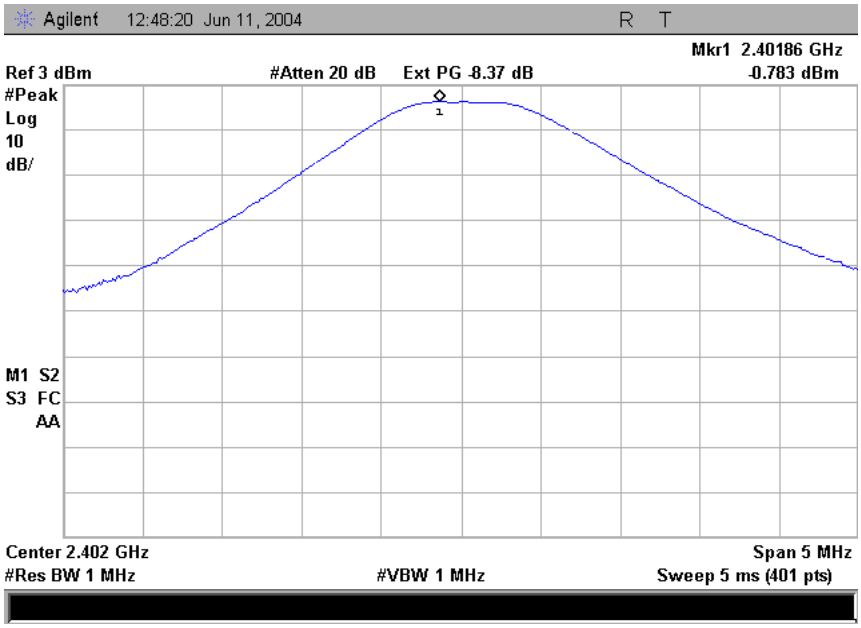
11.3 Results

Table 5: Peak output power measurement results

EUT Channel	Limit (W)	Test result (W)	Limit (dBm)	Test result (dBm)
0	≤ 1	0.0008	≤ 30	-0.783
39		0.0009		-0.690
78		0.0008		-0.849

11.4 Screen shots



Picture 14: Peak output power, channel 0

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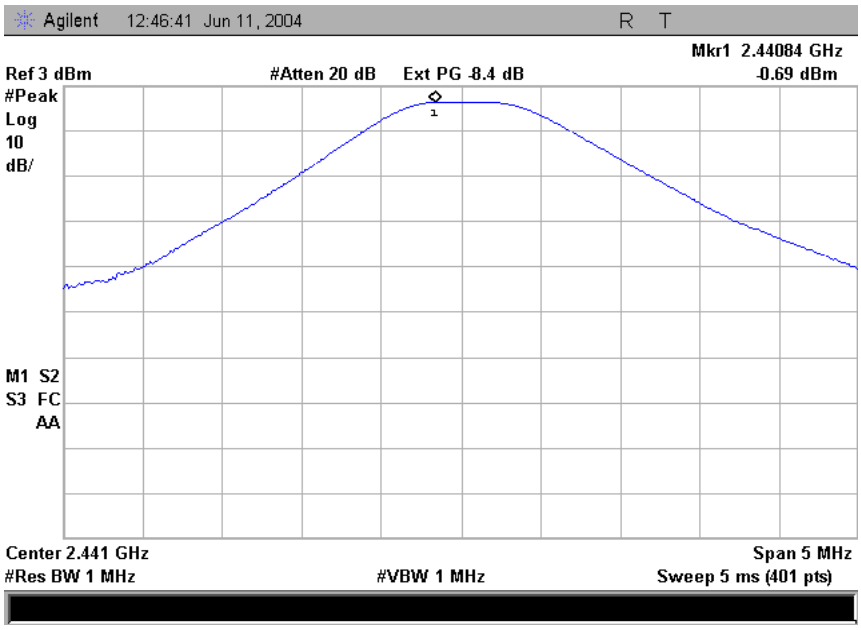
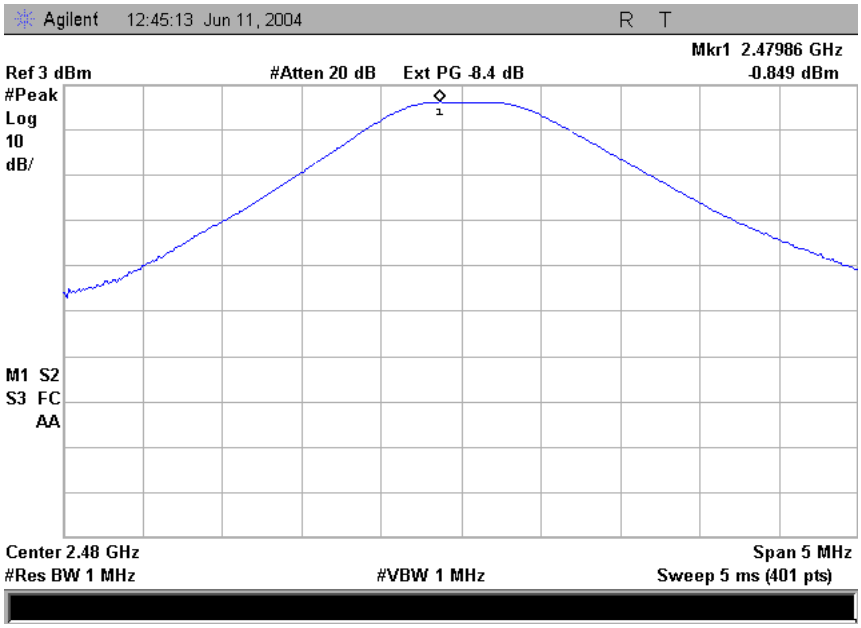


Picture 15: Peak output power, channel 39



Picture 16: Peak output power, channel 78

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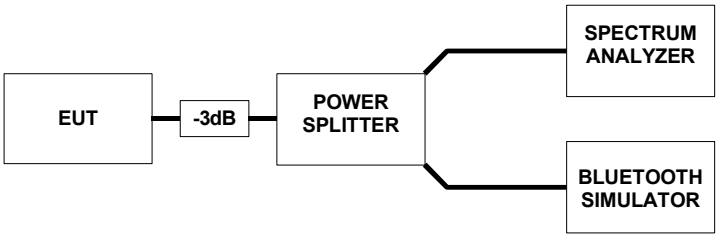
12 BAND-EDGE COMPLIANCE OF RF CONDUCTED EMISSIONS

EUT	17002		
Accessories	17003		
Temp, Humidity, Air Pressure	20 ºC	53 RH%	1006 hPa
Date of measurement	June 11, 2004		
FCC rule part	§15.247 (c) (1)		
RSS-210 section	6.2.2 (o), e1		
Measured by	Marko Turkkila		

12.1 Test setup and measurement method

The Bluetooth simulator was used to:

- set the EUT channel (0 – 78)
- set the number of EUT TX slots (1, 3, 5)
- set the EUT to TX, RX and TX/RX mode
- enable/disable frequency hopping
- select between several different test modulation patterns



Picture 17: Test setup for band edge compliance measurement

Band edge compliance of RF-conducted emissions was measured by setting the band edge as center frequency in the spectrum analyzer and measuring the power on the transmission on channels 0 and 79. The measured power and power on the band edge was then compared.

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12.2 Hopping enabled

12.2.1 EUT operation mode

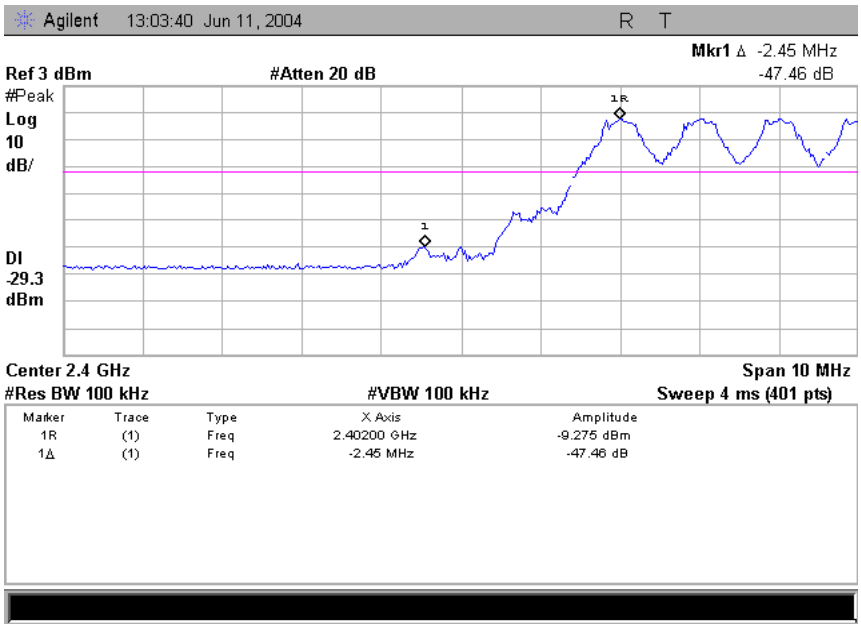
EUT operation mode	Connection, DH5, PRBS
EUT channel	Hopping
EUT TX power level	0 dBm

12.2.2 Results

Table 6: Number of hopping frequencies measurement results

EUT Channel	Limit (dBc)	Test result (dBc)
0	≤ -20	-47.5
78		-49.8

12.2.3 Screen shots



Picture 18: Band edge compliance, channel 0, hopping enabled

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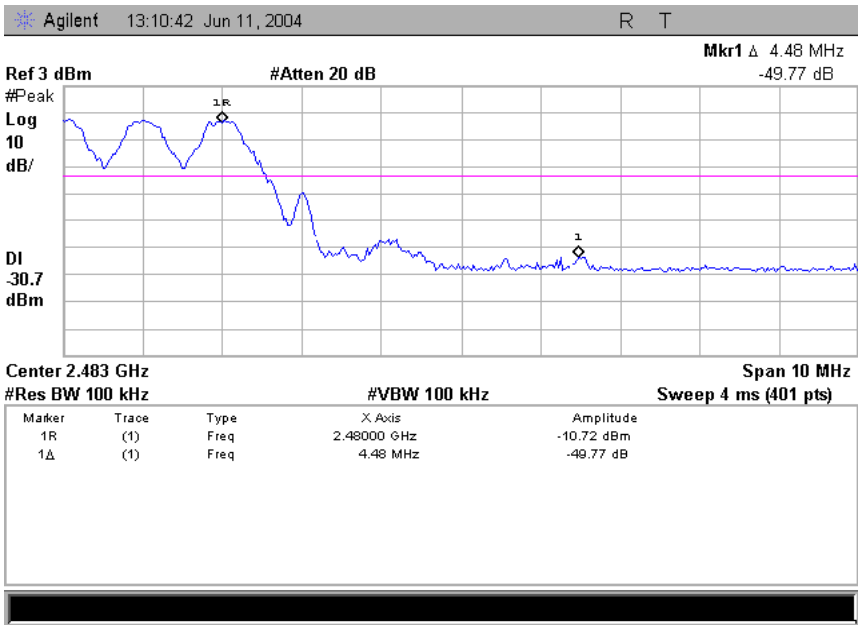

Picture 19: Band edge compliance, channel 78, hopping enabled

12.3 Hopping disabled

12.3.1 EUT operation mode

EUT operation mode	Connection, DM5, PRBS
EUT channel	0 (2402 MHz), 78 (2480 MHz)
EUT TX power level	0 dBm

12.3.2 Results

Table 7: Band edge compliance measurement results

EUT Channel	Limit (dBc)	Test result (dBc)
0	≤ -20	-47.9
79		-49.2

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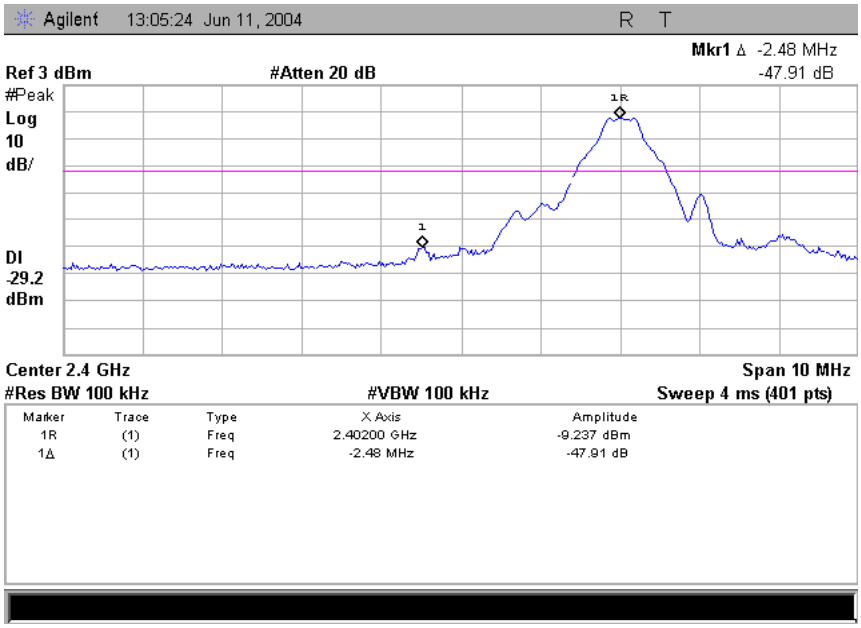
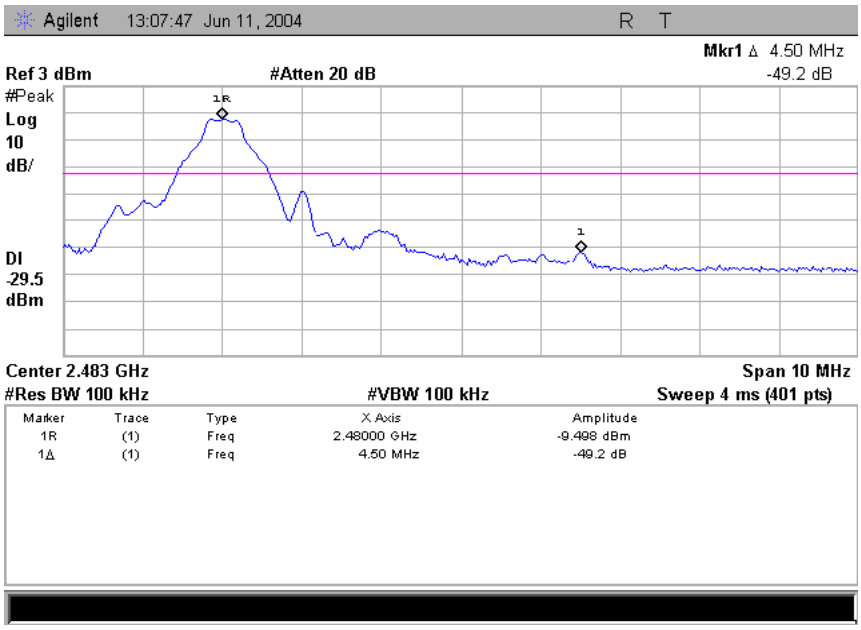
12.3.3 Screen shots



Picture 20: Band edge compliance, channel 0, hopping disabled



Picture 21: Band edge compliance, channel 78, hopping disabled

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13 AC POWERLINE CONDUCTED EMISSIONS

EUT	17001		
Accessories	17003		
Temp, Humidity, Air Pressure	21 ºC	35 RH%	1004 hPa
Date of measurement	March 23, 2004		
FCC rule part	§15.207		
RSS-210 section	6.6		
Measured by	Marko Turkkila		

13.1 Test setup and measurement method

The EUT was set according to ANSI C63.4-1992, figure 9a

13.2 EUT operation mode

EUT operation mode	Connection, DH5, PRBS
EUT channel	Hopping
EUT TX power level	0 dBm
EUT operation voltage	110 VAC / 60 Hz

13.3 Limits

Table 8: AC power line conducted emission measurement results

Frequency band (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

* The limit decreases linearly with the logarithm of the frequency

13.4 Results

The measurement results were adjusted with the attenuation of the cable between the LISN and receiver by the computer controlling the test system

Peaks closer than 6 dB to the quasi peak limit were measured using quasi peak detector. These values have been listed in Table 9 and Table 10.

Blue curve: Peak detector.

Green curve: Average detector

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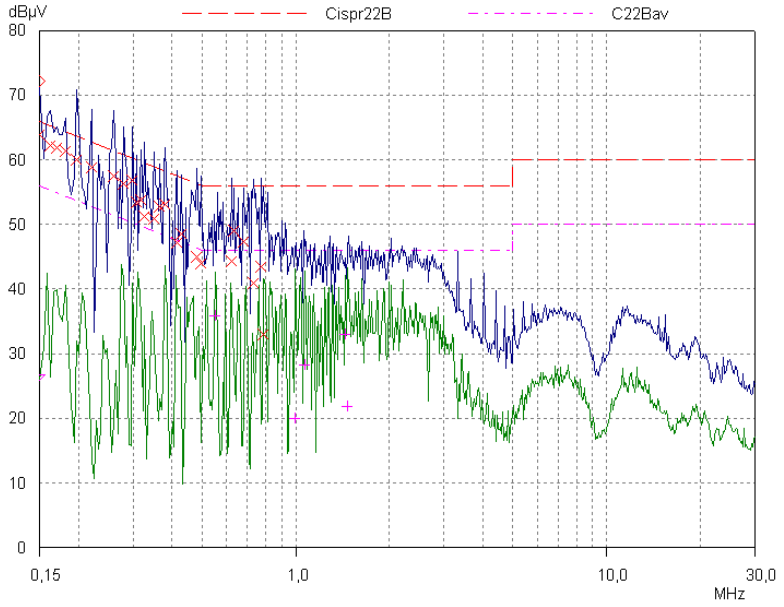
Picture 22: AC power line emissions, line L.



Picture 23: AC power line emissions, line N

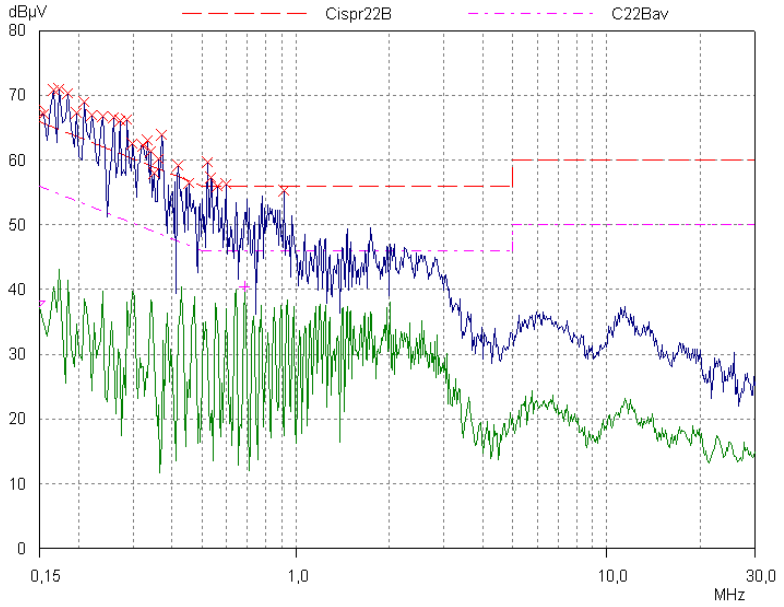


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Table 9: Highest emissions, line L

Frequency (MHz)	QP (dBµV)	Limit (dBµV)	Margin (dB)
0,15	64,0	66,0	2,0
0,16	62,2	65,4	3,2
0,17	61,9	65,0	3,1
0,18	61,4	64,4	3,0
0,20	60,1	63,7	3,7
0,22	58,9	62,8	3,9
0,26	57,5	61,5	4,0
0,28	56,3	60,9	4,6
0,30	56,9	60,3	3,4
0,31	53,4	60,1	6,7
0,32	53,8	59,8	6,0
0,33	51,2	59,6	8,3
0,35	50,9	59,0	8,1
0,36	52,7	58,6	6,0
0,38	53,2	58,3	5,1
0,42	47,1	57,5	10,4
0,43	48,5	57,3	8,8
0,48	44,9	56,4	11,4
0,49	44,0	56,1	12,1
0,62	44,3	56,0	11,7
0,63	49,0	56,0	7,0
0,68	47,3	56,0	8,7
0,73	40,9	56,0	15,1
0,77	43,4	56,0	12,6
0,79	32,9	56,0	23,1

Frequency (MHz)	AV (dBµV)	Limit (dBµV)	Margin (dB)
0,55	35,8	46,0	10,2
1,00	19,9	46,0	26,1
1,07	28,2	46,0	17,8
1,45	33,0	46,0	13,0
1,47	21,8	46,0	24,2

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Table 10: Highest emissions, line N

Frequency (MHz)	QP (dBµV)	Limit (dBµV)	Margin (dB)
0,15	55,4	65,8	10,4
0,17	52,9	65,2	12,3
0,17	52,3	64,8	12,5
0,19	52,4	64,3	11,8
0,20	50,2	63,7	13,5
0,21	50,1	63,3	13,2
0,22	50,0	62,8	12,8
0,24	49,5	62,1	12,6
0,26	48,4	61,5	13,0
0,27	47,2	61,1	13,9
0,29	45,7	60,6	15,0
0,30	46,9	60,3	13,4
0,32	45,0	59,7	14,7
0,33	43,0	59,4	16,4
0,34	51,3	59,2	7,9
0,35	49,9	59,0	9,1
0,36	54,1	58,7	4,6
0,37	49,4	58,5	9,1
0,42	48,7	57,5	8,7
0,45	46,3	56,8	10,5
0,52	50,0	56,0	6,0
0,53	45,2	56,0	10,8
0,56	47,3	56,0	8,8
0,60	47,0	56,0	9,0
0,92	38,4	56,0	17,6

Frequency (MHz)	AV (dBµV)	Limit (dBµV)	Margin (dB)
0,69	30,8	46,0	15,2

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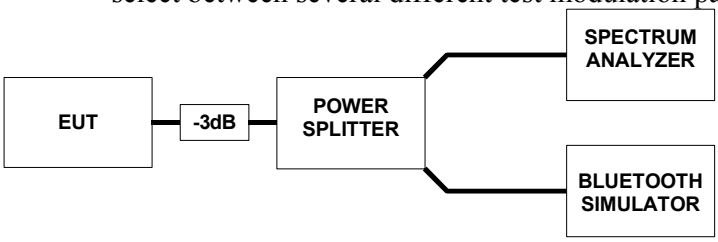
14 SPURIOUS RF CONDUCTED EMISSIONS

EUT	17002		
Accessories	17003		
Temp, Humidity, Air Pressure	23 ºC	52 RH%	1002 hPa
Date of measurement	June 12, 2004		
FCC rule part	§15.247 (c) (2)		
RSS-210 section	6.2.2 (o), e1		
Measured by	Marko Turkkila		

14.1 Test setup and measurement method

The Bluetooth simulator was used to:

- set the EUT channel (0 – 78)
- set the number of EUT TX slots (1, 3, 5)
- set the EUT to TX, RX and TX/RX mode
- enable/disable frequency hopping
- select between several different test modulation patterns



Picture 24: Test setup for band edge compliance measurement

Spectrum analyzer and automated software were used to record conducted spurious emissions on frequency range 30 MHz – 25 GHz. Frequency range was scanned using 100 kHz resolution bandwidth and 50 kHz steps.
Spurious emissions levels relative to the carrier level were read from the measured results.

14.2 EUT operation mode

EUT operation mode	Connection, DM5, PRBS
EUT channel	0, 39 and 78
EUT TX power level	0 dBm

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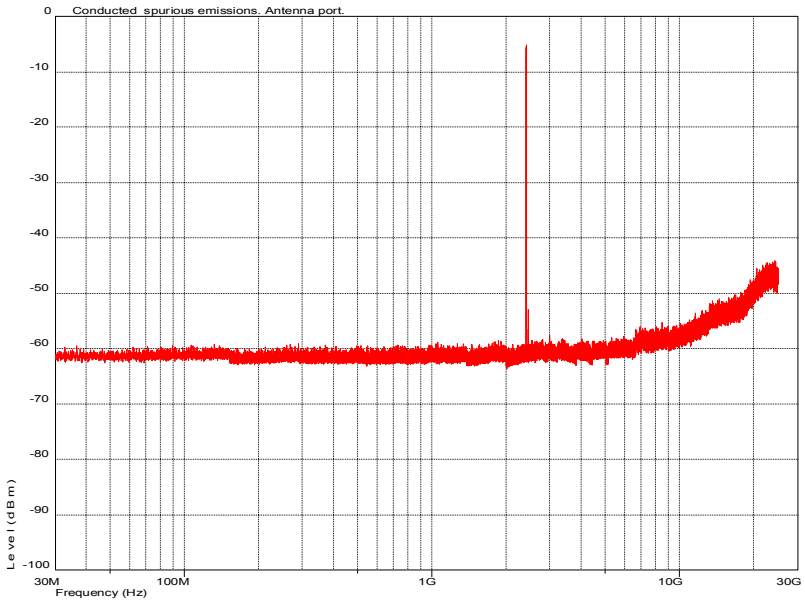
14.3 Limit

EUT Channel	Limit (dBc)
0	≤ -20
39	
78	

14.4 Results

All spurious emissions measured were least 45 dB below the carrier level.



Picture 25: Conducted spurious emissions on antenna port, Channel 0

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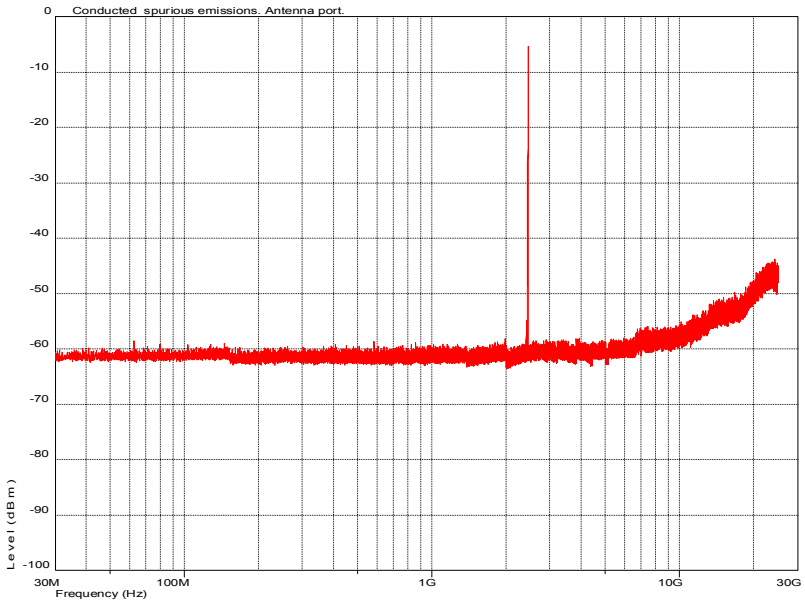
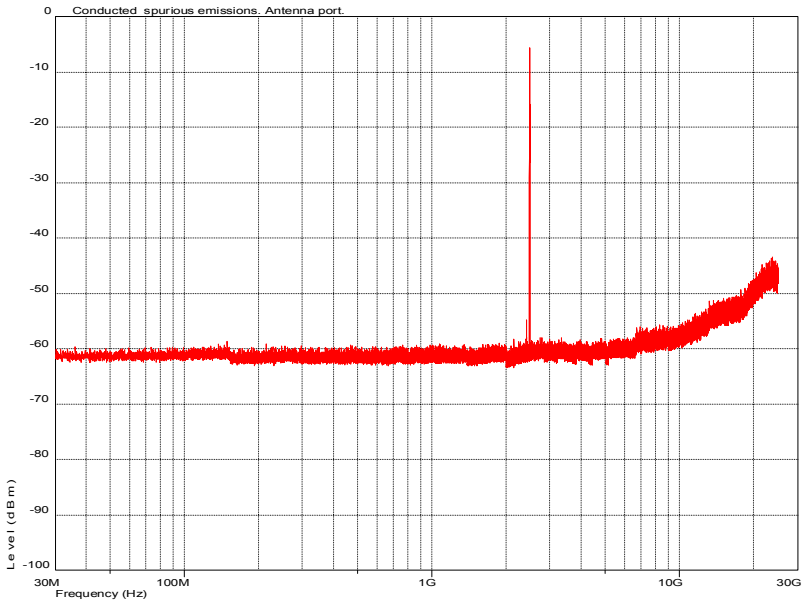


Picture 26: Conducted spurious emissions on antenna port, Channel 39



Picture 27: Conducted spurious emissions on antenna port, Channel 78

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15 RADIATED SPURIOUS EMISSIONS

EUT	17001		
Accessories	17003		
Temp, Humidity, Air Pressure	24 ºC	42 RH%	1010 hPa
Date of measurement	June 10-11, 2004		
FCC rule part	§15.247 (c) (1)		
RSS-210 section	6.2.2 (o), e1		
Measured by	Marko Turkkila		

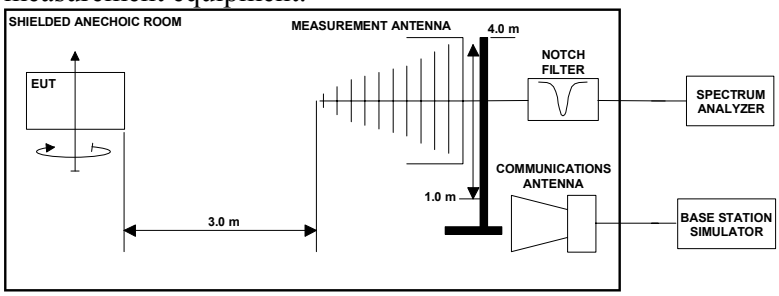
15.1 Test setup

The Bluetooth simulator was used to:

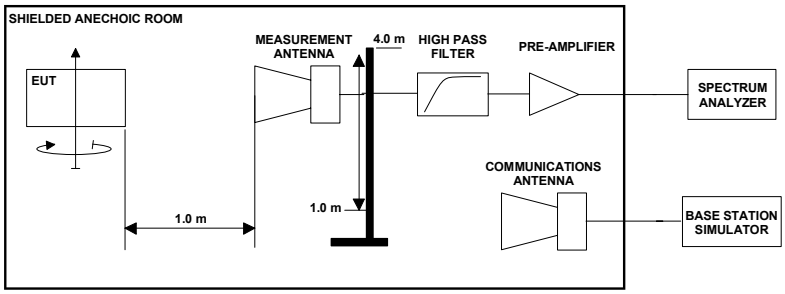
- set the EUT channel (0 – 78)
- set the number of EUT TX slots (1, 3, 5)
- set the EUT to TX, RX and TX/RX mode
- enable/disable frequency hopping

select between several different test modulation patterns

The test was done using an automated test system, where a computer controlled the measurement equipment.



Picture 28: Test setup for radiated spurious emissions measurement on below 3 GHz frequencies



Picture 29: Test setup for radiated spurious emissions measurement on above 3 GHz frequencies

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15.2 Test method

1. The emissions were searched and maximized by moving the turntable, changing the measuring antenna polarization and height and manipulating the EUT.
2. Levels of suspicious signals and levels of EUT transmitter harmonics were recorded.
3. The recorded levels were corrected in the automated test system with the measurement antenna factor, cable attenuations and filter attenuation.
4. The corrected values, giving the EUT radiated spurious emission levels as dBµV/m at 3 m (1m over 3GHz) distance, are reported.

15.3 EUT operation mode

EUT operation mode	Connection mode, DM5, PRBS
EUT channel	0 (2402 MHZ), 39 (2441 MHz) and 78 (2480 MHz)
EUT TX power level	0 dBm

15.4 Limit

Table 11: Radiated spurious emission limits at measurement distance 3m

Frequency band (MHz)	3m Limit (µV/m)	3m Limit (dBµV/m)	Detector
30 – 88	100	40	QP
88 -216	150	43.5	QP
216 - 960	200	46	QP
960 - 1000	500	54.0	QP
1000 - 25000	500	54.0	AVG
1000 - 25000	5000	74.0	PEAK

Table 12: Radiated spurious emission limits at measurement distance 1m

Frequency of emission [MHz]	1m Limit [µV / m]	1m Limit [dBµV/m]	Measurement detector type
Above 1000	500	63.5	Average
Above 1000	5000	83.5	Peak

As default, all emissions were compared against the general limits. If any emission exceeded that limit, it was further checked, if it was outside the restricted band thus complying with the -20dBc requirement.

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15.5 Results

Measurement system noise level was least 15 dB below the spurious emission limit. Only levels of suspicious signals and transmitter harmonic frequencies, which were above the measurement system noise, are reported.

Table 13: Emission levels PEAK detector, channel 0, Flip closed

Freq MHz	Measured Value dBuV	Correction Factor dB	Result dBuV/m	EUT orientation	Antenna Pol.	Antenna height	Turntable angle
4804	47.14	-8.47	38.67	Hor	Hor	1.25	183
7206	43.76	1.57	45.33	Hor	Ver	1.8	144
9608	44.78	2.06	46.84	Hor	Hor	1.95	107

Table 14: Emission levels PEAK detector, channel 39, Flip closed

Freq MHz	Measured Value dBuV	Correction Factor dB	Result dBuV/m	EUT orientation	Antenna Pol.	Antenna height	Turntable angle
4882	47.36	-7.82	39.54	Hor	Ver	1.65	154
7323	44.92	2.11	47.03	Hor2	Ver	1.55	355
9764	45.25	2.21	47.46	Ver	Hor	1	331

Table 15: Emission levels PEAK detector, channel 78, Flip closed

Freq MHz	Measured Value dBuV	Correction Factor dB	Result dBuV/m	EUT orientation	Antenna Pol.	Antenna height	Turntable angle
4960	46.82	-7.36	39.46	Hor	Ver	2	262
7440	44.46	2.29	46.75	Hor	Ver	1.5	0
9920	44.84	2.19	47.03	Hor	Ver	1.65	267

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Table 16: Emission levels AVERAGE detector, channel 0, Flip closed

Freq MHz	Measured Value dBuV	Correction Factor dB	Result dBuV/m	EUT orientation	Antenna Pol.	Antenna height	Turntable angle
4804	34.17	-8.47	25.7	Hor	Hor	1.25	183
7206	30.16	1.57	31.73	Hor	Ver	1.8	144
9608	31.23	2.06	33.29	Hor	Hor	1.95	107

Table 17: Emission levels AVERAGE detector, channel 39, Flip closed

Freq MHz	Measured Value dBuV	Correction Factor dB	Result dBuV/m	EUT orientation	Antenna Pol.	Antenna height	Turntable angle
4882	33.34	-7.82	25.52	Hor2	Hor	1	249
7323	29.67	2.11	31.78	Hor	Ver	1.75	102
9764	31.49	2.21	33.7	Hor2	Ver	1.4	287

Table 18: Emission levels AVERAGE detector, channel 78, Flip closed

Freq MHz	Measured Value dBuV	Correction Factor dB	Result dBuV/m	EUT orientation	Antenna Pol.	Antenna height	Turntable angle
4960	33.33	-7.36	25.97	Hor	Ver	2	262
7440	29.82	2.29	32.11	Hor	Ver	1.5	0
9920	31.6	2.19	33.79	Hor	Ver	1.65	267

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Table 19: Emission levels PEAK detector, channel 0, Flip open

Freq MHz	Measured Value dBuV	Correction Factor dB	Result dBuV/m	EUT orientation	Antenna Pol.	Antenna height	Turntable angle
4804	47.17	-8.47	38.7	Hor	Hor	1.2	102
7206	44.02	1.57	45.59	Hor	Hor	1.3	91
9608	44.77	2.06	46.83	Hor	Ver	2	10

Table 20: Emission levels PEAK detector, channel 39, Flip open

Freq MHz	Measured Value dBuV	Correction Factor dB	Result dBuV/m	EUT orientation	Antenna Pol.	Antenna height	Turntable angle
4882	46.97	-7.82	39.15	Ver	Ver	1.5	318
7323	44.17	2.11	46.28	Hor2	Ver	1.45	203
9764	45.5	2.21	47.71	Hor	Ver	1.7	87

Table 21: Emission levels PEAK detector, channel 78, Flip open

Freq MHz	Measured Value dBuV	Correction Factor dB	Result dBuV/m	EUT orientation	Antenna Pol.	Antenna height	Turntable angle
4960	47.66	-7.36	40.3	Hor	Hor	1.95	145
7440	43.2	2.29	45.49	Hor	Hor	1.45	266
9920	44.94	2.19	47.13	Hor	Ver	1.6	253

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Table 22: Emission levels AVERAGE detector, channel 0, Flip open

Freq MHz	Measured Value dBuV	Correction Factor dB	Result dBuV/m	EUT orientation	Antenna Pol.	Antenna height	Turntable angle
4804	34.18	-8.47	25.71	Hor	Ver	1.2	102
7206	30.2	1.57	31.77	Hor	Ver	1.3	91
9608	31.24	2.06	33.3	Hor	Hor	2	10

Table 23: Emission levels AVERAGE detector, channel 39, Flip open

Freq MHz	Measured Value dBuV	Correction Factor dB	Result dBuV/m	EUT orientation	Antenna Pol.	Antenna height	Turntable angle
4882	33.49	-7.82	25.67	Hor2	Ver	1	151
7323	29.82	2.11	31.93	Ver	Ver	1.3	226
9764	31.6	2.21	33.81	Hor	Ver	1.7	87

Table 24: Emission levels AVERAGE detector, channel 78, Flip open

Freq MHz	Measured Value dBuV	Correction Factor dB	Result dBuV/m	EUT orientation	Antenna Pol.	Antenna height	Turntable angle
4960	33.38	-7.36	26.02	Hor	Hor	1.95	145
7440	29.74	2.29	32.03	Hor	Hor	1.45	266
9920	31.57	2.19	33.76	Hor	Ver	1.6	253

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16 TEST EQUIPMENT

All testing and measurement equipment has been calibrated once a year, except the antennas which are calibrated every two years.

16.1 Conducted measurements

Equipment	Manufacturer	Model
Spectrum Analyzer	Agilent	E7405A
Bluetooth Simulator	Anritsu	MT 8850A
Measurement receiver	Rohde & Schwarz	ESCS 30
Attenuator 3 dB	Narda	779-3
Power splitter	Mini Circuits	ZFSC-2-4
Power splitter	Narda	4426-2
Transient limiter / 10 dB attenuator	Chase	CFL 9206
Line Impedance Stabilization Network (LISN)	Rohde & Schwarz	ESH 3-Z5

16.2 Radiated measurements

Equipment	Manufacturer	Model
Spectrum Analyzer	Agilent	E7405A
Bluetooth simulator	Anritsu	MT 8850A
Antenna	Chase	CBL 6140
Antenna	Schwarzbeck	BBHA 9120D
High pass filter	Wainwright Instruments	WHK3.0/18GST
Pre-amplifier	JCA	118-400
Turn table / antenna mast controller	EMCO	2090
Antenna mast	EMCO	2075-2

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17 TEST SETUP PHOTOGRAPHS

Test setup photograph can be found in a separate document

T04-048B-EMC _PHOTOS.doc

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