Bluetooth test report
for

NHL-9

Report Date: November 4, 2003

Signatures:

Tested by:

Antti Teronen Testing Engineer

Contents approved:

Tomi Nyberg Laboratory Manager

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1 LABORATORY INFORMATION

Test Laboratory	Konette Design Center Oy EMC Laboratory Koneenkatu 12 / K17 05830 Hyvinkää FINLAND Tel: +358 20 475 2800 Fax: +358 20 475 2719 e-mail: firstname.surname@ette.com
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:	Jarkko Luoma Nokia Corporation / TCC Salo P.O. Box 86 (Joensuunkatu 7E / Kiila 1B) FIN -24101 SALO FINLAND Tel: +358 7180 42913 Fax: +358 7180 45220 E-mail: jarkko.luoma@nokia.com
Receipt of EUT:	October 2, 2003
Testing date:	October 6 – 8, 2003
Report date:	October 9, 2003

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.

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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	NHL-9	004400/32/172503/6	05601
	GSM 1900 Mobile phone	NHL-9	004400/32/172513/5	05602
Accessories	Battery,	BL-5C	067040070341320111	05603
	Battery	BL-5C	067040070341315211	05604
	Charger	ACP-12E	0675294 3943491 4841100 04857	05605

Notes: EUT 05601 equipped with antenna connector for conducted measurements

4.1 EUT description

EUT is a triple band (GSM850 / GSM 1800 / GSM 1900) mobile phone with Bluetooth functionality.

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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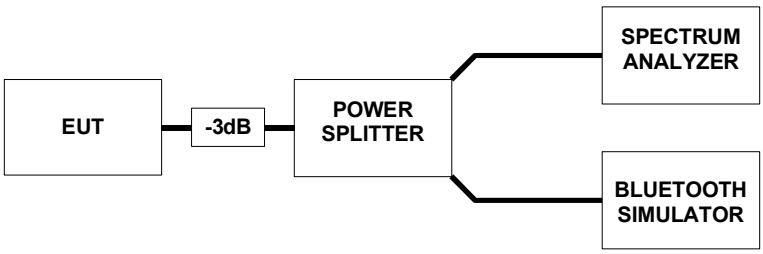
7 CARRIER FREQUENCY SEPARATION

EUT	05601		
Accessories	05603		
Temp, Humidity, Air Pressure	22 ºC	60 RH%	998 hPa
Date of measurement	October 7, 2003		
FCC rule part	§15.247 (a) (1)		
RSS-210 section	6.2.2 (o), a1		
Measured by	Antti Teronen		

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 – 2.4835 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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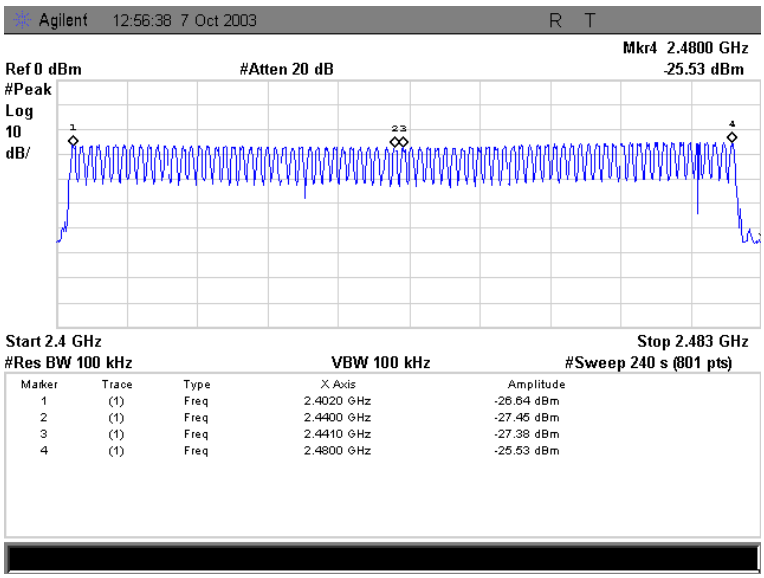
7.3 Results

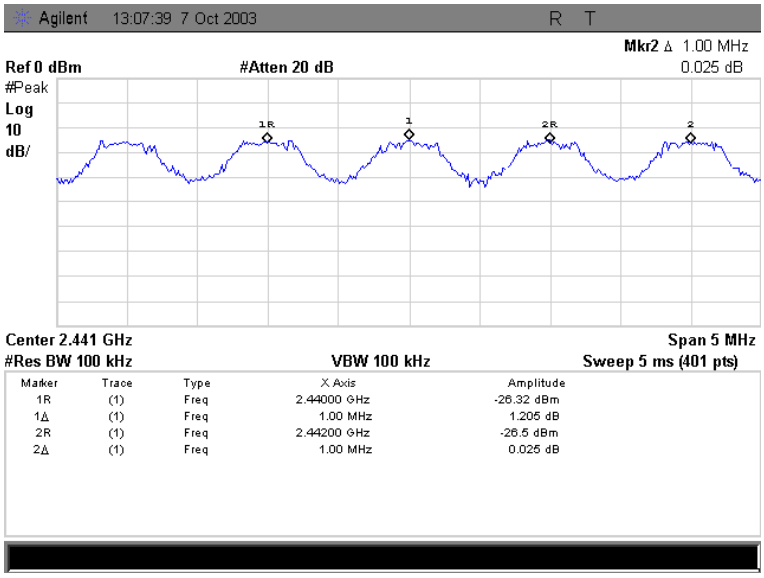
Table 1: Carrier frequency separation measurement results

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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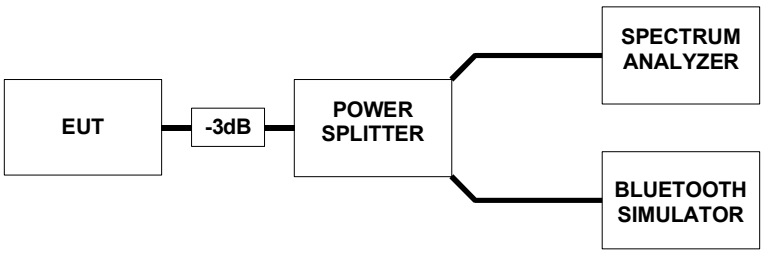
8 NUMBER OF HOPPING FREQUENCIES

EUT	05601		
Accessories	05603		
Temp, Humidity, Air Pressure	22 ºC	60 RH%	998 hPa
Date of measurement	October 7, 2003		
FCC rule part	§15.247(a) (2)		
RSS-210 section	6.2.2 (o), a3		
Measured by	Antti Teronen		

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 – 2.4835 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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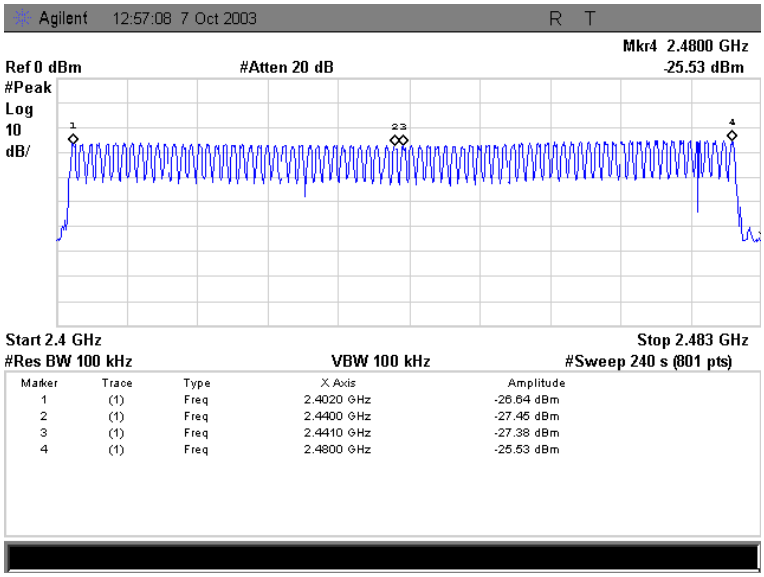
8.3 Results

Table 2: Number of hopping frequencies measurement results

Limit	Result
≥ 75	79

8.4 Screen s9hots



Picture 5: Number of hopping frequencies measurement

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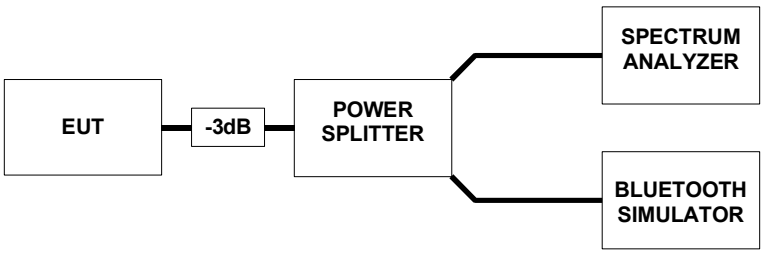
9 TIME OF OCCUPANCY

EUT	05601		
Accessories	05603		
Temp, Humidity, Air Pressure	22 ºC	60 RH%	998 hPa
Date of measurement	October 7 – 8, 2003		
FCC rule part	§15.247 (a) (1) iii		
RSS-210 section	6.2.2 (o), a3		
Measured by	Antti Teronen		

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 Page mode

9.2.1 EUT operation mode

EUT operation mode	Page
EUT channel	Hopping
EUT TX power level	0 dBm

9.2.2 Results

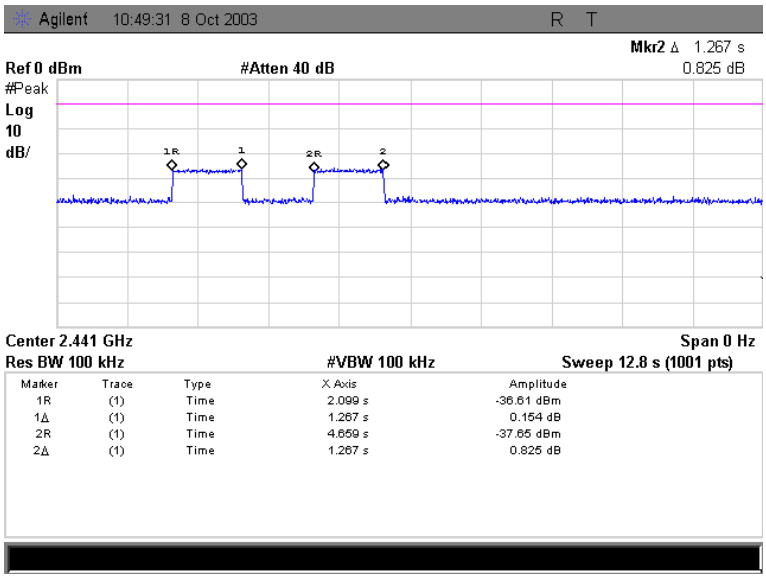
Table 3: Time of occupancy during paging mode measurement results

Limit	Result
≤ 0.4 s over 12.8 s period	0.0429 s

Limit:
In the paging mode Bluetooth uses a reduced hopping pattern (32 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 (32 * 0.4s = 12.8 s).

Results:
The complete paging cycle took 1.267 + 1.267 = 2.534 s , during which the transmitter operated at every 10.05 ms.
The duration of one transmission was 170 µs.
Based on these measurements, one channel was occupied
(2.534 s / 10.05 ms) * 170 µs = 0.0429 s during the 12.8 s period

9.2.3 Screen shots



Picture 7: Complete paging cycle, channel 39

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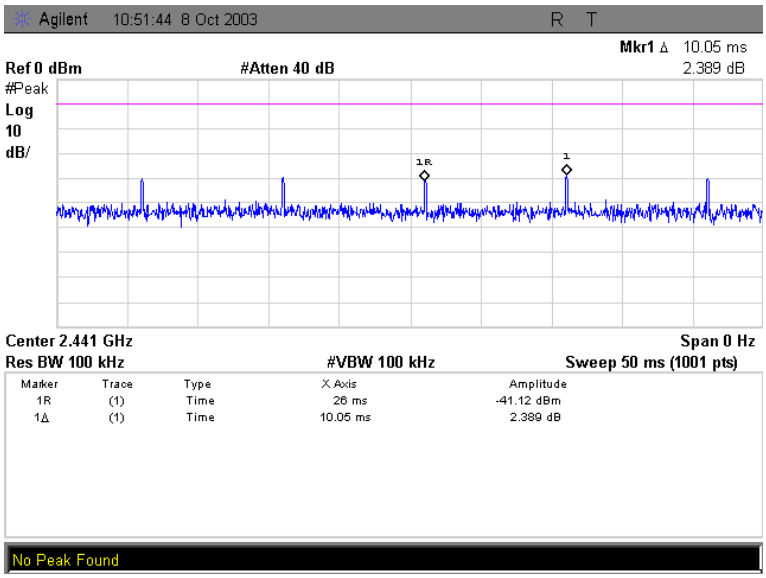
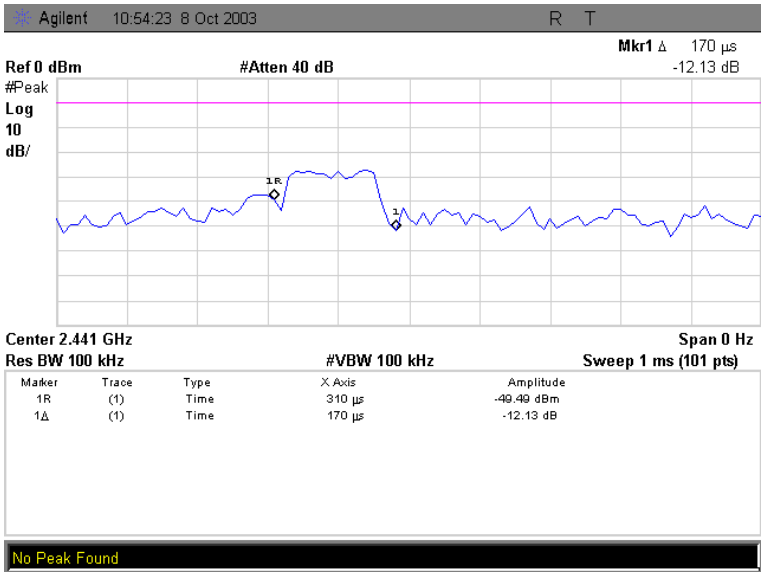


Picture 8: Transmission interval during paging cycle, channel 39



Picture 9: Duration of one transmission during paging cycle, channel 39

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9.3 Inquiry mode

9.3.1 EUT operation mode

EUT operation mode	Inquiry
EUT channel	Hopping
EUT TX power level	0 dBm

9.3.2 Results

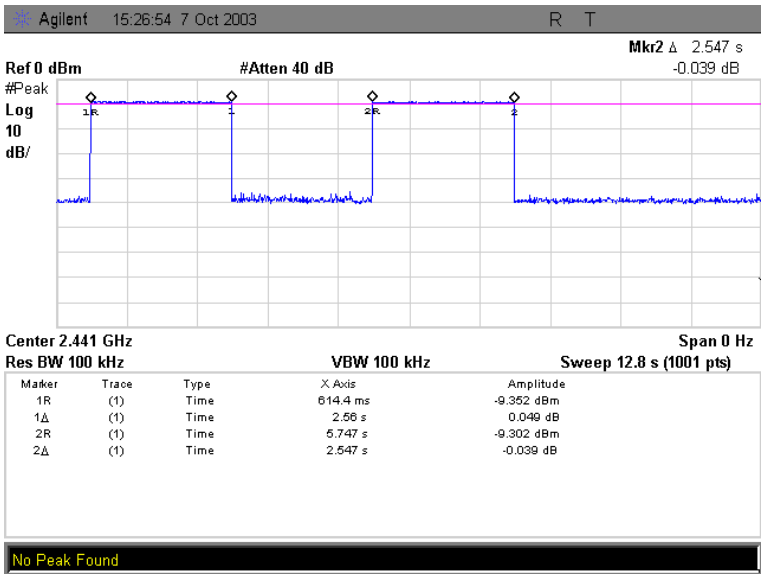
Table 4: Time of occupancy during inquiring mode measurement results

Limit	Result
≤ 0.4 s over 12.8 s period	0.0915 s

Limit:
In the inquiry mode Bluetooth uses a reduced hopping pattern (32 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 (32 * 0.4s = 12.8 s).

Results:
The complete inquiry cycle took 2,56 + 2,547 = 5.107 s , during which the transmitter operated at every 10.05 ms.
The duration of one transmission was 180 µs.
Based on these measurements, one channel was occupied
(5.107 s / 10.05 ms) * 180 µs = 0.0915 s during the 12.8 s period.

9.3.3 Screen shots



Picture 10: Complete inquiry cycle, channel 39

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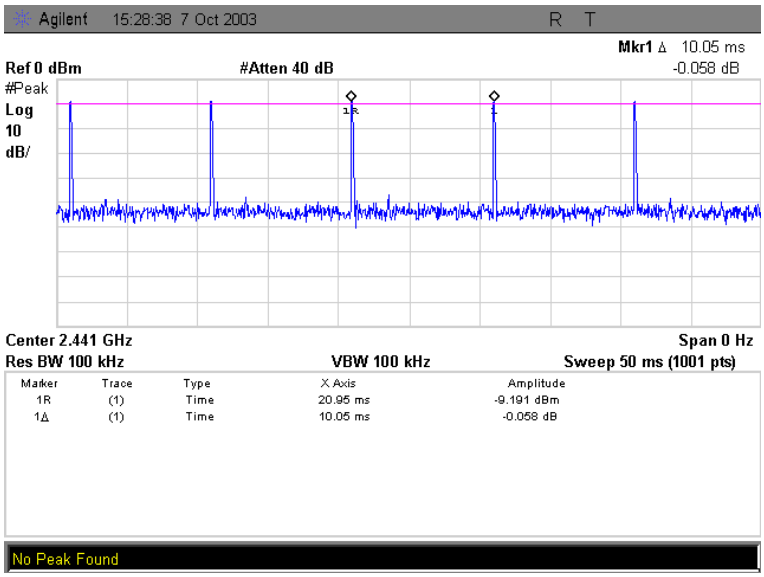
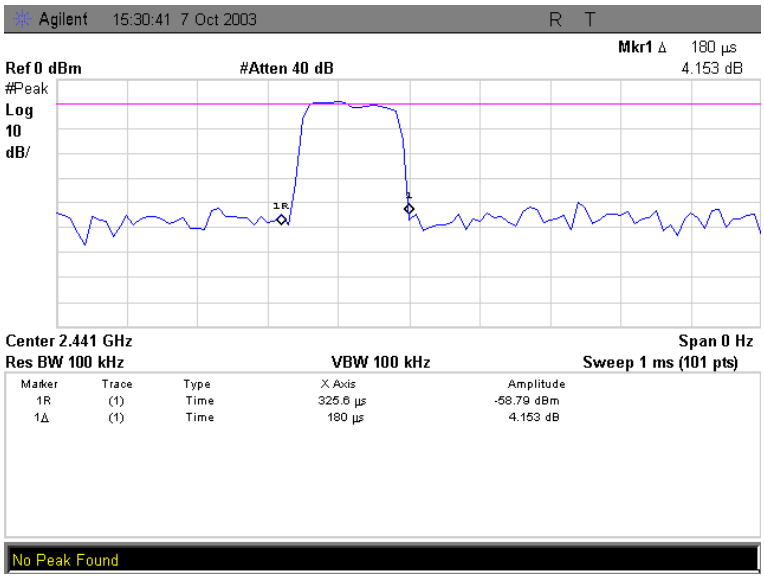


Picture 11: Transmission interval during inquiry cycle, channel 39



Picture 12: Duration of one transmission during inquiry, channel 39

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9.4 Connection mode

9.4.1 EUT operation mode

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

9.4.2 Results

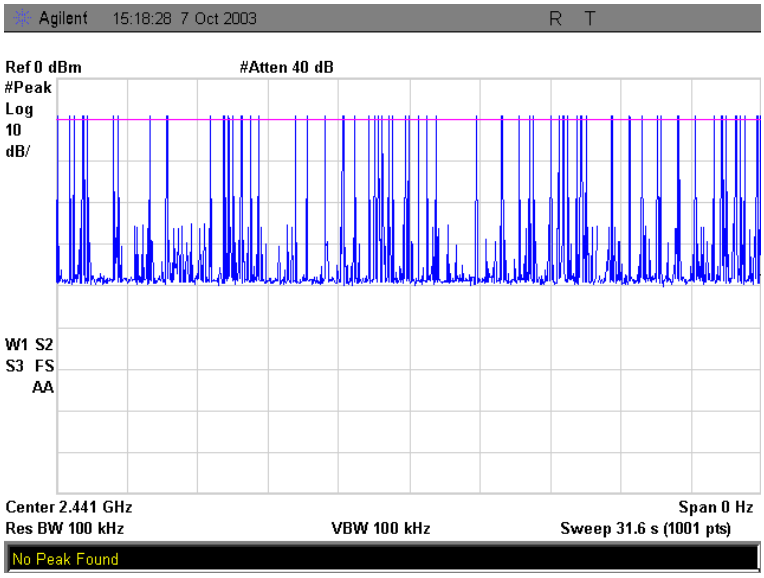
Table 5: Time of occupancy during connection mode measurement results

Limit	Result
≤ 0.4 s over 31.6 s period	0.175 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 59 transmissions occurred. The duration of one transmission was 2.95ms. Based on these measurements the transmitter operated 59 * 2.95 ms = 0.175 s during the 31.6 s period

9.4.3 Screen shots



Picture 13: Number of transmissions on connection state, channel 39

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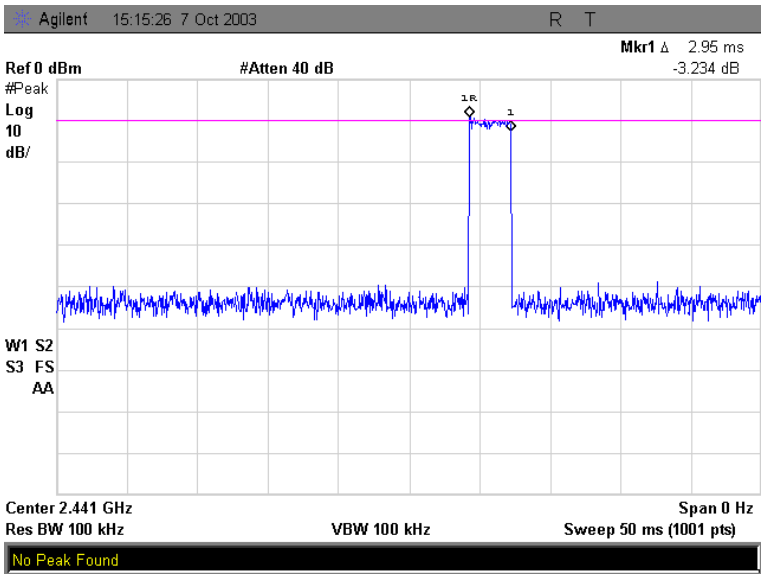

Picture 14: Duration of one transmission on connection state, channel 39

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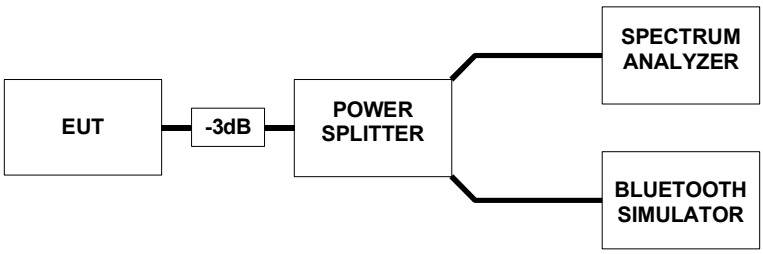
10 20 dB BANDWIDTH

EUT	05601		
Accessories	05603		
Temp, Humidity, Air Pressure	22 ºC	60 RH%	998 hPa
Date of measurement	October 7, 2003		
FCC rule part	§15.247 (a) (1)		
RSS-210 section	6.2.2 (o), a1		
Measured by	Antti Teronen		

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 15: 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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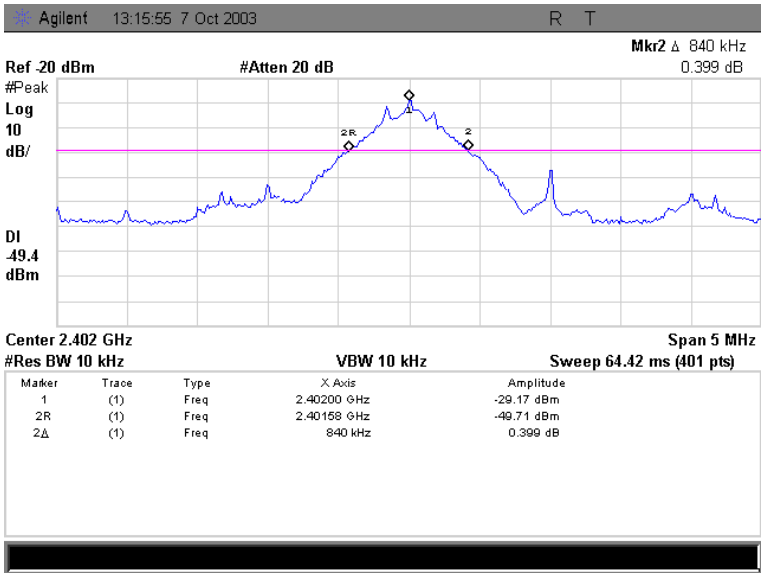
10.3 Results

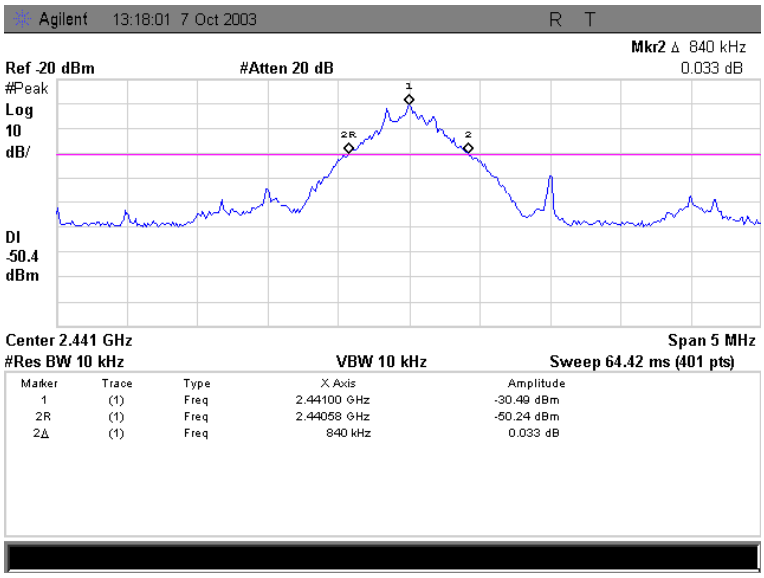
Table 6: 20dB bandwidth measurement results

EUT Channel	Limit (MHz)	Measured value (MHz)
0	≤1.0	0.840
39		0.840
78		0.840

10.4 Screen shots



Picture 16: 20dB Bandwidth measurement result, Channel 0



Picture 17: 20dB Bandwidth measurement result, Channel 39

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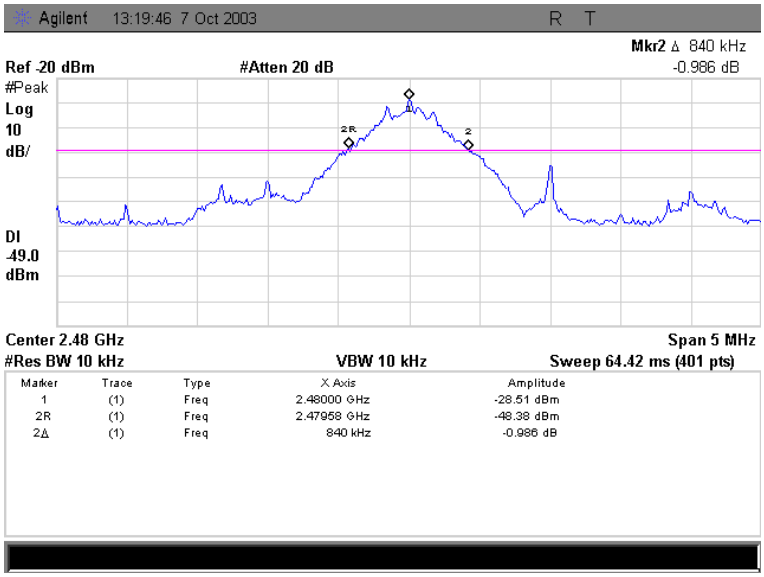

Picture 18: 20dB Bandwidth measurement result, Channel 78

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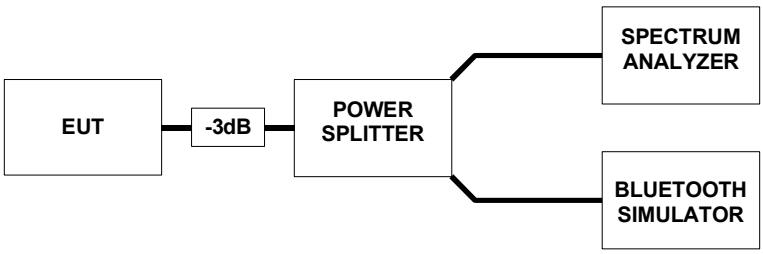
11 PEAK OUTPUT POWER

EUT	05601		
Accessories	05603		
Temp, Humidity, Air Pressure	20 ºC	60 RH%	998 hPa
Date of measurement	October 7, 2003		
FCC rule part	§15.247 (b) (1)		
RSS-210 section	6.2.2 (o), a3		
Measured by	Antti Teronen		

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 19: 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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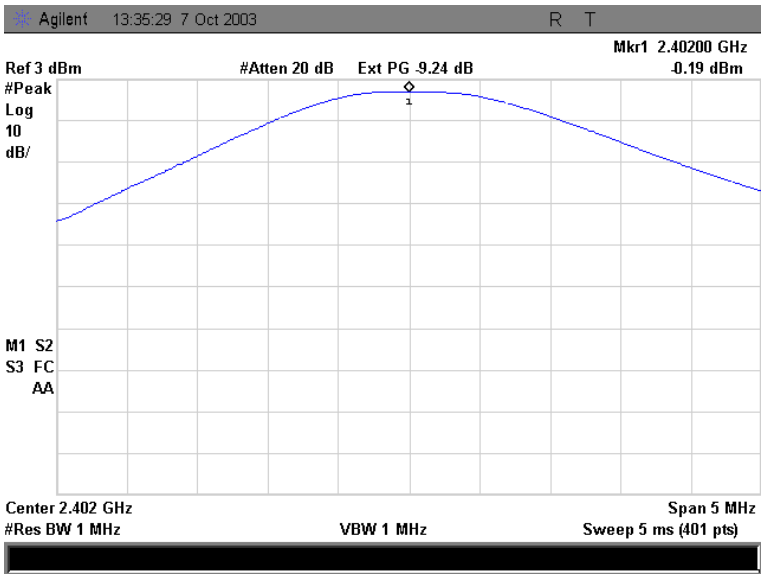
11.3 Results

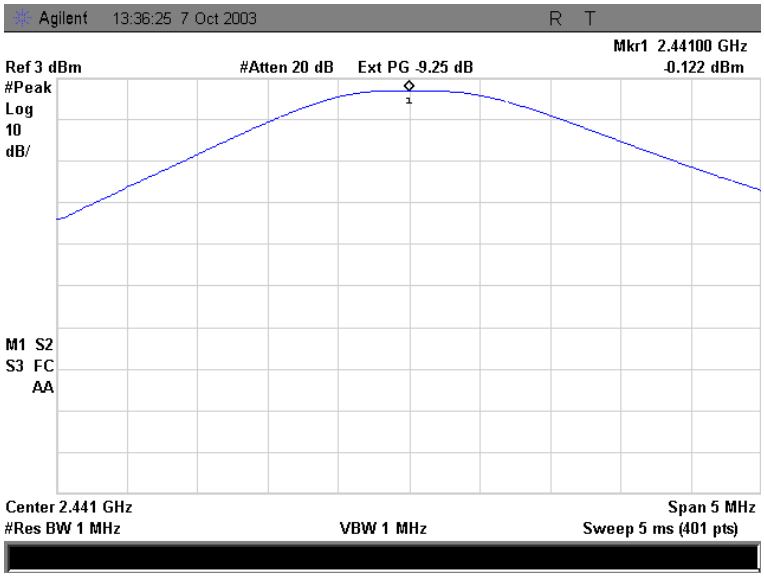
Table 7: Peak output power measurement results

EUT Channel	Limit (W)	Test result (W)	Limit (dBm)	Test result (dBm)
0	≤ 1	0.00096	≤ 30	-0.19
39		0.00097		-0.122
78		0.00102		0.065

11.4 Screen shots



Picture 20: Peak output power, channel 0



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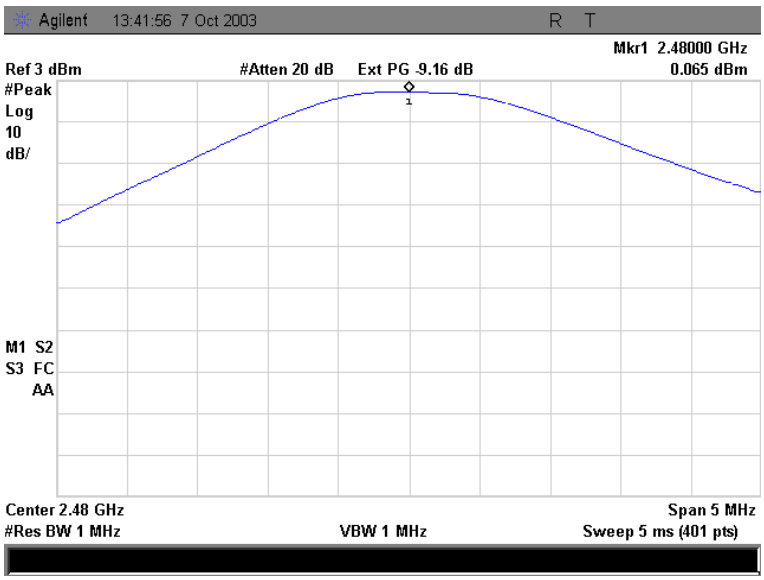
Picture 21: Peak output power, channel 39



Picture 22: Peak output power, channel 78

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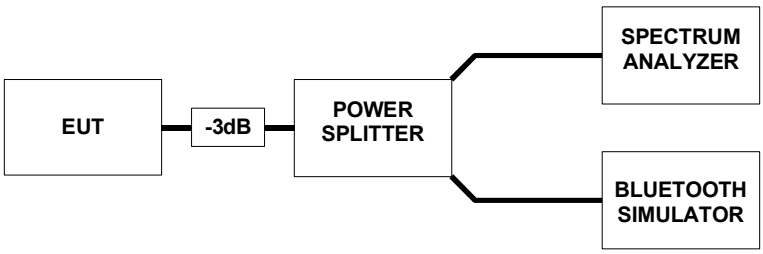
12 BAND-EDGE COMPLIANCE OF RF CONDUCTED EMISSIONS

EUT	05601		
Accessories	05603		
Temp, Humidity, Air Pressure	22 ºC	60 RH%	998 hPa
Date of measurement	October 7, 2003		
FCC rule part	§15.247 (c) (1)		
RSS-210 section	6.2.2 (o), e1		
Measured by	Antti Teronen		

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 23: 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

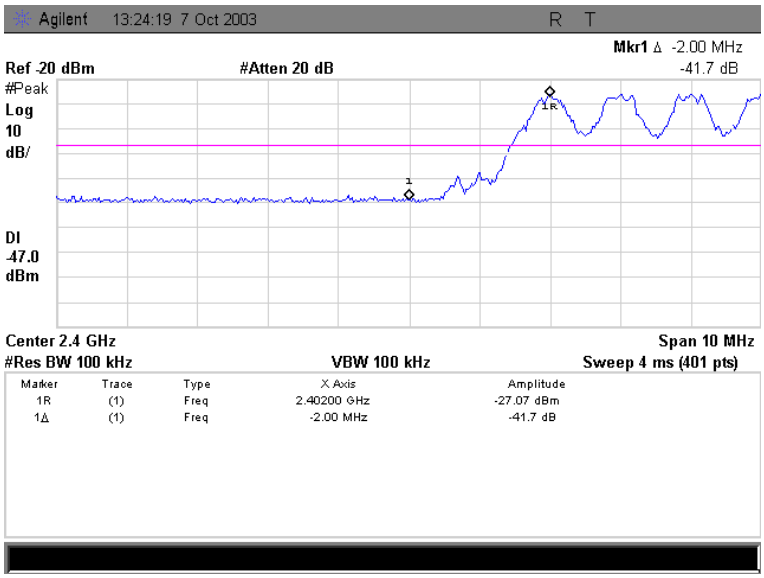
EUT operation mode	Connection, DH5, PRBS
EUT channel	Hopping
EUT TX power level	0 dBm

12.2.2 Results

Table 8: Number of hopping frequencies measurement results

EUT Channel	Limit (dBc)	Test result (dBc)
0	≤ -20	-41.7
78		-44.4

12.2.3 Screen shots



Picture 24: Band edge compliance, channel 0, hopping enabled

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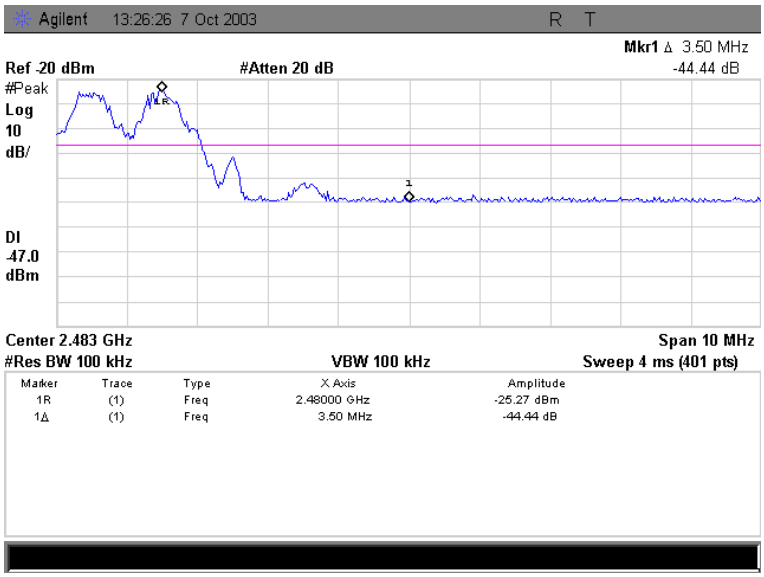

Picture 25: Band edge compliance, channel 78, hopping enabled

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 9: Band edge compliance measurement results

EUT Channel	Limit (dBc)	Test result (dBc)
0	≤ -20	-40.5
79		-46.3

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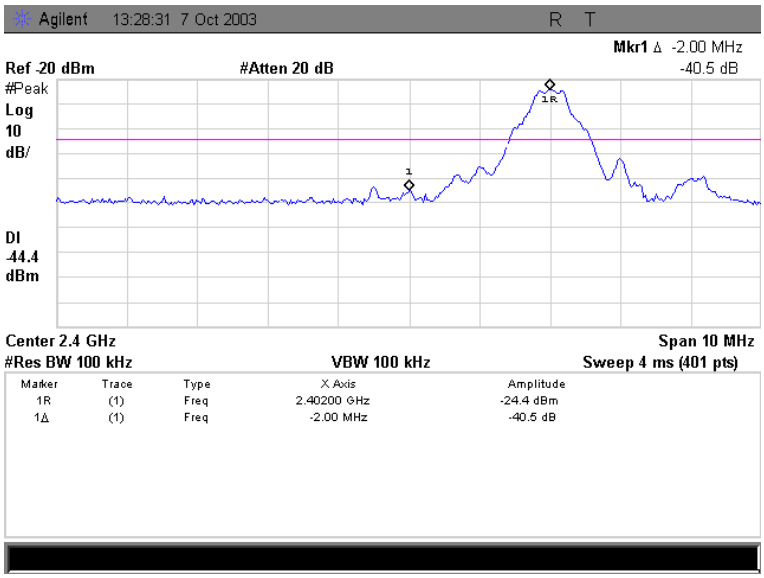
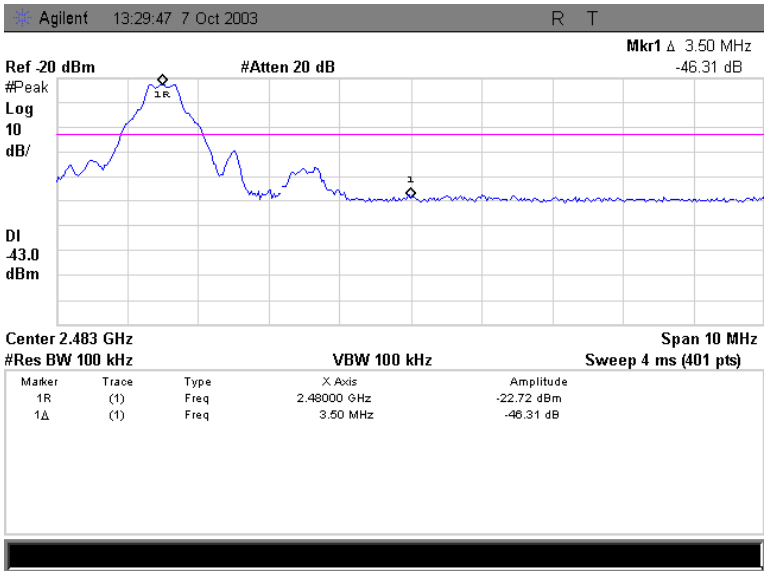
12.3.3 Screen shots



Picture 26: Band edge compliance, channel 0, hopping disabled



Picture 27: Band edge compliance, channel 78, hopping disabled

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13 AC POWERLINE CONDUCTED EMISSIONS

EUT	05602		
Accessories	05604, 05605		
Temp, Humidity, Air Pressure	22 ºC	60 RH%	998 hPa
Date of measurement	October 8, 2003		
FCC rule part	§15.207		
RSS-210 section	6.6		
Measured by	Antti Teronen		

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 10: 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 11 and Table 12.

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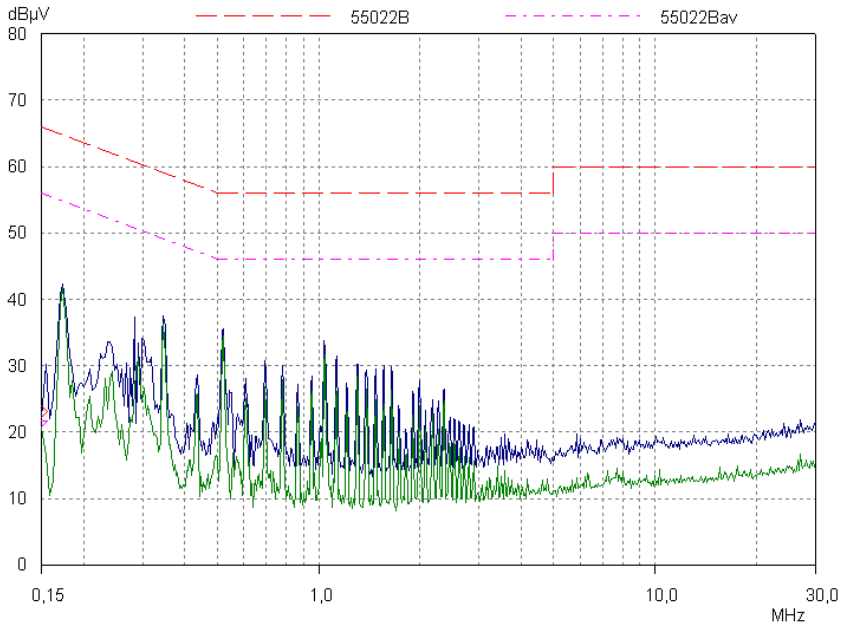
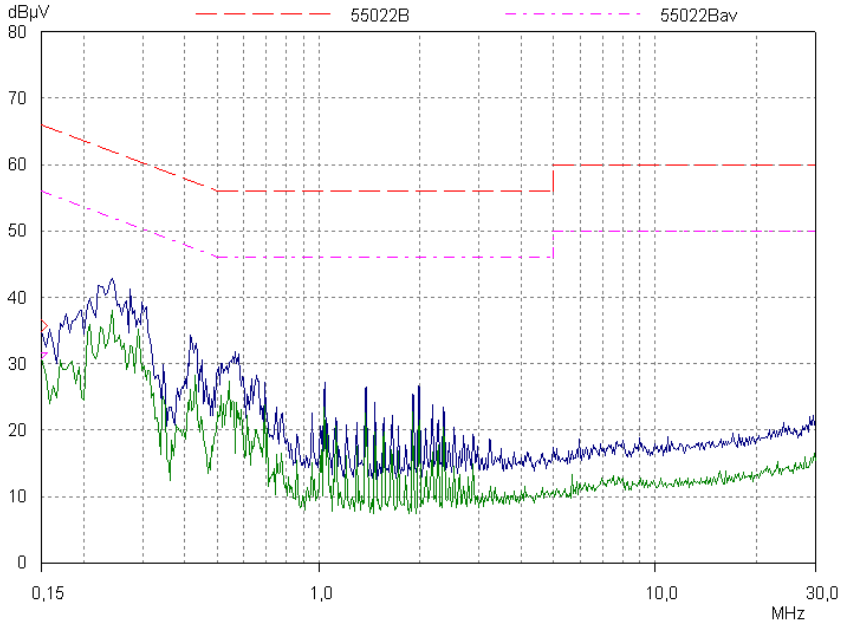


Picture 28: AC power line emissions, line L



Picture 29: AC power line emissions, line N

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Table 11: Highest emissions, line L

Frequency (MHz)	Result (dBµV)	Limit (dBµV)	Margin (dB)

Table 12: Highest emissions, line N

Frequency (MHz)	Result (dBµV)	Limit (dBµV)	Margin (dB)

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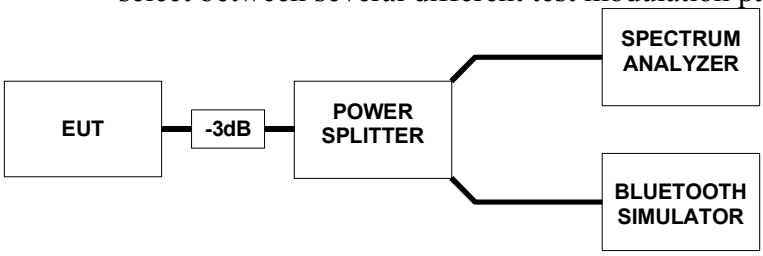
14 SPURIOUS RF CONDUCTED EMISSIONS

EUT	05601		
Accessories	05603		
Temp, Humidity, Air Pressure	20 ºC	60 RH%	998 hPa
Date of measurement	October 8, 2003		
FCC rule part	§15.247 (c) (2)		
RSS-210 section	6.2.2 (o), e1		
Measured by	Antti Teronen		

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 30: 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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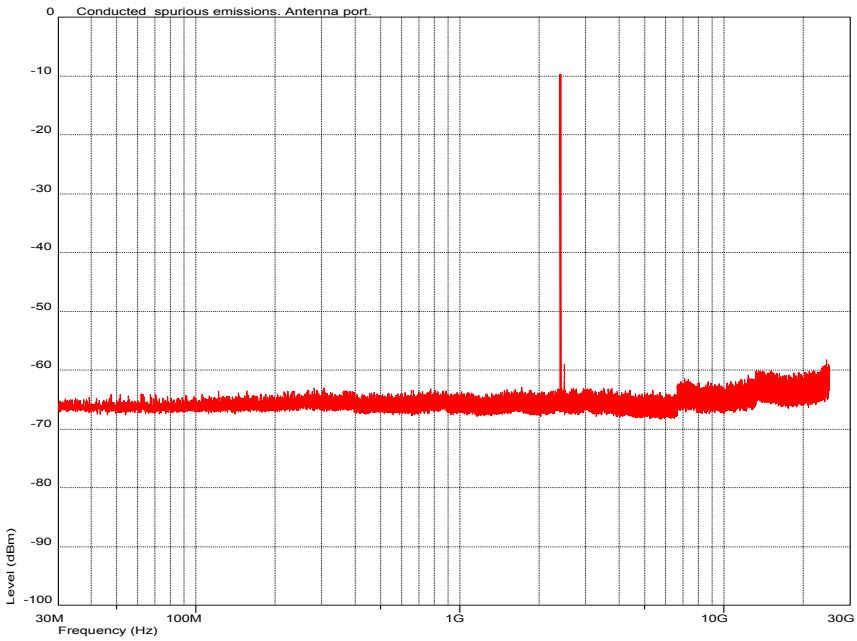
14.3 Limit

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

14.4 Results

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



Picture 31: Conducted spurious emissions on antenna port, Channel 0

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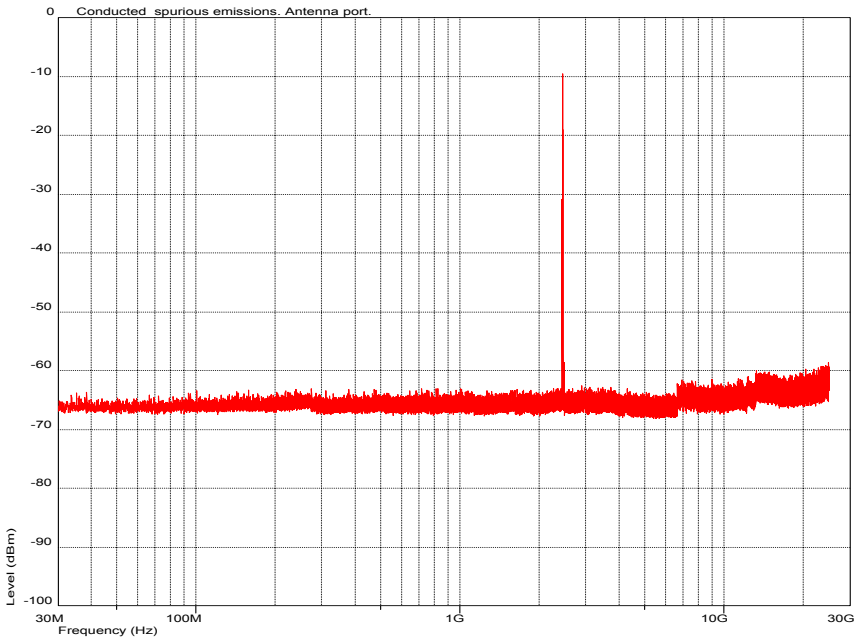
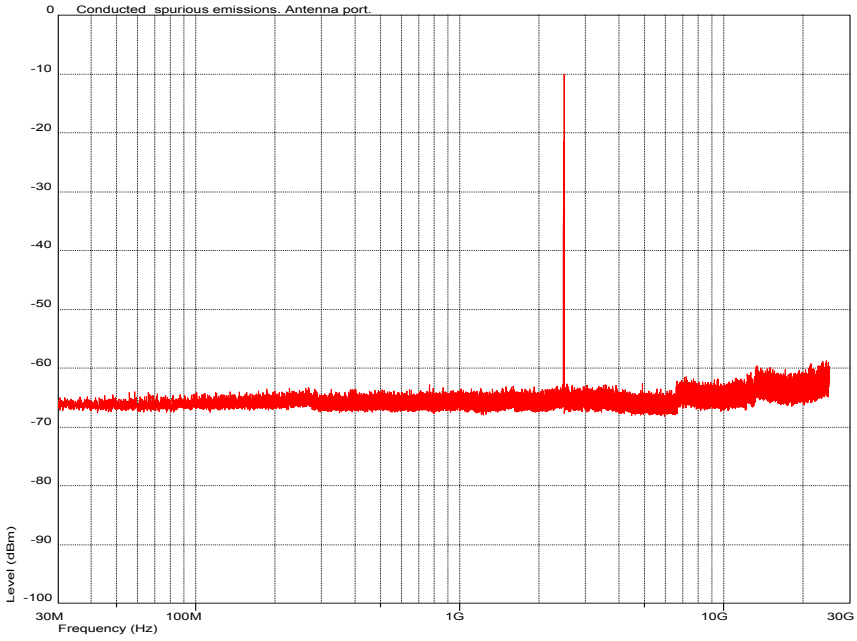


Picture 32: Conducted spurious emissions on antenna port, Channel 39



Picture 33: Conducted spurious emissions on antenna port, Channel 78

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15 RADIATED SPURIOUS EMISSIONS

EUT	05602		
Accessories	05604		
Temp, Humidity, Air Pressure	21 ºC	32 RH%	1002 hPa
Date of measurement	November 3-4, 2003		
FCC rule part	§15.247 (c) (1)		
RSS-210 section	6.2.2 (o), e1		
Measured by	Antti Teronen		

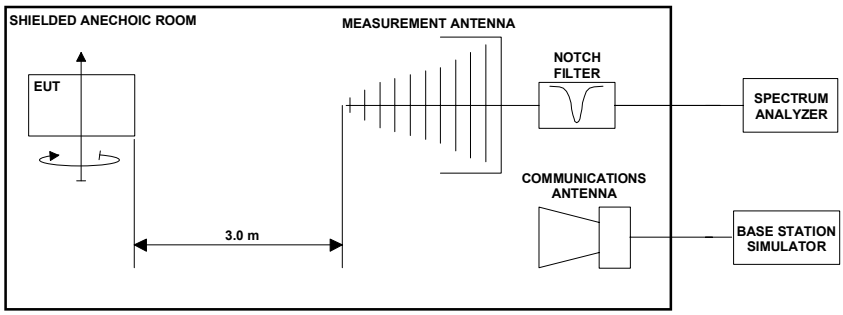
15.1 Test setup

The Bluetooth simulator was used to:

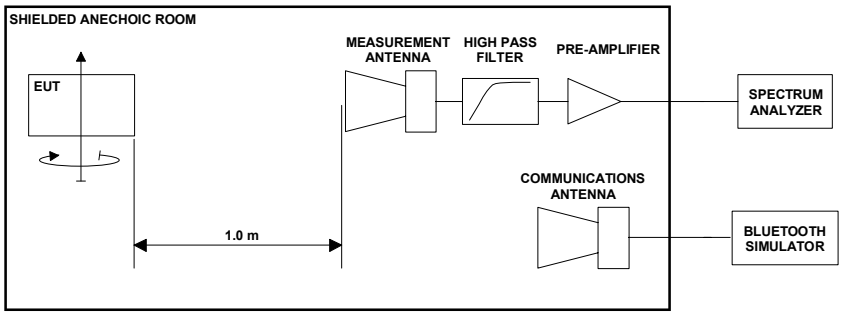
- set the EUT channel (0 – 78)
- set the number of EUT TX slots (1, 3, 5)
- set the EUT to TX, RX and TX/RX mode
- enable/disable frequency hopping

select between several different test modulation patterns

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



Picture 34: Test setup for radiated spurious emissions measurement on below 3 GHz frequencies



Picture 35: Test setup for radiated spurious emissions measurement on 3 GHz and above 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 , are reported. Below 3 GHz 3m measuring distance was used and above 3 GHz 1m measuring distance was used.

5. Test was made both with the EUT flip open and closed

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

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	AVERAGE
1000 - 25000	5000	74.0	PEAK
Frequency band (MHz)	**1m Limit (µV/m)**	**1m Limit (dBµV/m)**	**Detector**
1000 - 25000	1500	63.5	AVERAGE
1000 - 25000	15000	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

The formula below was used to calculate the filed strength of spurious emissions

$$Result[\mathrm{dB}\mu\mathrm{V/m}] = Measured\ value[\mathrm{dB}\mu\mathrm{V}] + AF[\mathrm{dB/m}] - G_{PreAmp}[\mathrm{dB}] + CableLoss[\mathrm{dB}]$$
$$= Measured\ value[\mathrm{dB}\mu\mathrm{V/m}] + CF[\mathrm{dB/m}]$$

where the variable are as follows:

Result[dBµV/m]	Spurious emission field strength
Measured value[dBµV]	Spectrum analyzer reading
AF [dB/m]	Measuring antenna antenna factor
G_{PreAmp}[dB]	Preamplifier Gain
CableLoss[dB]	Connecting cable and filter losses
CF[dB/m]	Correction factor used in the automated test system

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.

In the tables below, the abbreviated column titles are:

f [MHz]	Measured frequency
EUT H/V	EUT Orientation, Horizontal / Vertical
Pol H/V	Measuring antenna polarization, Horizontal / Vertical
Height [m]	Measuring antenna height from reference ground in meters
TT [deg]	Turn table angle in degrees

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15.5.1 EUT flip closed

Table 13: Emission levels, channel 0, PEAK detector

f [MHz]	Measured value [dBµV]	CF [dB/m]	1m Result [dBµV/m]	1m Limit [dBµV/m]	EUT H/V	Pol H/V	Height [m]	TT [deg]
4804.0	49.5	-8.2	41.3	83.5	V	V	1.0	250
7206.0	44.9	1.1	46.0	83.5	H	V	1.3	60
9608.0	47.1	0.4	47.5	83.5	H	V	1.9	0
12010.0	42.1	6.0	48.1	83.5	V	V	1.6	250

Table 14: Emission levels, channel 0, AVERAGE detector

f [MHz]	Measured value [dBµV]	CF [dB/m]	1m Result [dBµV/m]	1m Limit [dBµV/m]	EUT H/V	Pol H/V	Height [m]	TT [deg]
4804.0	36.7	-8.2	28.4	63.5	V	V	1.0	250
7206.0	31.3	1.1	32.5	63.5	V	H	2.0	120
9608.0	33.4	0.4	33.9	63.5	V	V	1.7	110
12010.0	28.7	6.0	34.7	63.5	V	V	1.6	250

Table 15: Emission levels, channel 39, PEAK detector

f [MHz]	Measured value [dBµV]	CF [dB/m]	1m Result [dBµV/m]	1m Limit [dBµV/m]	EUT H/V	Pol H/V	Height [m]	TT [deg]
4882.0	51.3	-7.8	43.5	83.5	H	H	1.1	280
7323.0	44.4	1.4	45.7	83.5	H	H	1.9	350
9764.0	47.0	0.9	47.8	83.5	V	H	1.6	290
12205.0	42.5	6.1	48.6	83.5	V	V	1.6	180

Table 16: Emission levels, channel 39, AVERAGE detector

f [MHz]	Measured value [dBµV]	CF [dB/m]	1m Result [dBµV/m]	1m Limit [dBµV/m]	EUT H/V	Pol H/V	Height [m]	TT [deg]
4882.0	38.4	-7.8	30.6	63.5	H	H	1.1	280
7323.0	31.3	1.4	32.7	63.5	V	V	1.2	180
9764.0	33.5	0.9	34.4	63.5	V	H	1.6	290
12205.0	28.9	6.1	35.0	63.5	H	V	1.5	230

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Table 17: Emission levels, channel 78, PEAK detector

f [MHz]	Measured value [dBµV]	CF [dB/m]	1m Result [dBµV/m]	1m Limit [dBµV/m]	EUT H/V	Pol H/V	Height [m]	TT [deg]
4960.0	51.0	-7.4	43.6	83.5	V	V	1.0	260
7440.0	45.0	1.6	46.6	83.5	H	V	1.5	200
9920.0	46.7	1.4	48.1	83.5	H	H	1.6	300

Table 18: Emission levels, channel 78, AVERAGE detector

f [MHz]	Measured value [dBµV]	CF [dB/m]	1m Result [dBµV/m]	1m Limit [dBµV/m]	EUT H/V	Pol H/V	Height [m]	TT [deg]
4960.0	40.0	-7.4	32.6	63.5	V	V	1.1	260
7440.0	31.3	1.6	32.9	63.5	H	V	1.5	200
9920.0	33.1	1.4	34.5	63.5	H	H	1.6	300

15.5.2 EUT flip open

Table 19: Emission levels, channel 0, PEAK detector

f [MHz]	Measured value [dBµV]	CF [dB/m]	1m Result [dBµV/m]	1m Limit [dBµV/m]	EUT H/V	Pol H/V	Height [m]	TT [deg]
4804.0	49.4	-8.2	41.1	83.5	V	V	1.2	260
7206.0	45.0	1.1	46.2	83.5	H	V	1.3	60
9608.0	46.9	0.4	47.3	83.5	H	V	1.1	60
12010.0	42.1	6.0	48.1	83.5	V	H	1.0	60

Table 20: Emission levels, channel 0, AVERAGE detector

f [MHz]	Measured value [dBµV]	CF [dB/m]	1m Result [dBµV/m]	1m Limit [dBµV/m]	EUT H/V	Pol H/V	Height [m]	TT [deg]
4804.0	36.0	-8.2	27.7	63.5	V	V	1.2	260
7206.0	31.3	1.1	32.5	63.5	V	V	1.1	280
9608.0	33.5	0.4	33.9	63.5	V	V	1.2	120
12010.0	28.7	6.0	34.7	63.5	H	H	1.2	0

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Table 21: Emission levels, channel 39, PEAK detector

f [MHz]	Measured value [dBµV]	CF [dB/m]	1m Result [dBµV/m]	1m Limit [dBµV/m]	EUT H/V	Pol H/V	Height [m]	TT [deg]
4882.0	52.3	-7.8	44.5	83.5	H	H	1.0	280
7323.0	44.7	1.4	46.1	83.5	H	V	1.4	0
9764.0	47.6	0.9	48.5	83.5	V	H	1.2	300
12205.0	42.7	6.1	48.8	83.5	V	H	1.9	110

Table 22: Emission levels, channel 39, AVERAGE detector

f [MHz]	Measured value [dBµV]	CF [dB/m]	1m Result [dBµV/m]	1m Limit [dBµV/m]	EUT H/V	Pol H/V	Height [m]	TT [deg]
4882.0	39.7	-7.8	31.9	63.5	H	H	1.0	280
7323.0	31.3	1.4	32.6	63.5	V	V	1.0	0
9764.0	33.5	0.9	34.4	63.5	V	H	1.2	300
12205.0	28.9	6.1	35.0	63.5	H	H	2.0	350

Table 23: Emission levels, channel 78, PEAK detector

f [MHz]	Measured value [dBµV]	CF [dB/m]	1m Result [dBµV/m]	1m Limit [dBµV/m]	EUT H/V	Pol H/V	Height [m]	TT [deg]
4960.0	51.7	-7.4	44.3	83.5	V	V	1.0	290
7440.0	44.5	1.6	46.2	83.5	H	H	1.1	40
9920.0	46.4	1.4	47.8	83.5	V	H	1.6	300
12400.0	42.7	6.2	48.9	83.5	V	V	1.5	200

Table 24: Emission levels, channel 78, AVERAGE detector

f [MHz]	Measured value [dBµV]	CF [dB/m]	1m Result [dBµV/m]	1m Limit [dBµV/m]	EUT H/V	Pol H/V	Height [m]	TT [deg]
4960.0	38.5	-7.4	31.1	63.5	V	V	1.0	290
7440.0	31.2	1.6	32.8	63.5	V	H	1.0	90
9920.0	33.0	1.4	34.4	63.5	V	H	1.6	300
12400.0	29.1	6.2	35.2	63.5	V	V	1.5	200

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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
Measurement receiver	Rohde & Schwarz	ESCS 30
Attenuator 3 dB	Narda	779-3
Power splitter	Mini Circuits	ZFSC-2-4
Power splitter	Narda	4426-2
Bluetooth Testerr	Anritsu	MT 8852A
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
Antenna	Chase	CBL 6140
Antenna	Schwarzbeck	BBHA 9120D
High pass filter	Wainwright Instruments	WHK3.0/18GST
Band Reject filter	Wainwright instruments	WRCT 2400/2483 -45/10EE
Pre-amplifier	JCA	118-400
Turn table / antenna mast controller	EMCO	2090
Antenna mast	EMCO	2075-2
Bluetooth Tester	Anritsu	MT 8852A

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17 TEST SETUP PHOTOGRAPHS

Test setup photograph can be found in a separate document

T03-056B2-EMC_PHOTOS.doc

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