

FCC Part 15C Compliance Test Report

Test Report no.:	Cph_FCC_0607_01.doc	Date of Report:	22-02-2006
Number of pages:	29	Customer's Contact person:	Jukka Pekkala
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FCC listing no.:	99059		
IC recognition no.:	4820 and 4820-1		
Tested devices/ accessories:	Phone; RM-115 (HW: 0500), Battery; BL-4C, AC-Charger; AC-3E, Headset; HS-23		
FCC ID:	PPIRM-115	IC:	661U-RM115
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:			

Allan F. Henriksen, Engineer

1. Summary for FCC Part 15C Compliance Test Report

Date of receipt	16-02-2006
Testing completed	22-02-2006
The customer's contact person	Jukka Pekkala
Test Plan referred to	T:\Projects\RM-115\TestPlan_RS\RM115_RS_test_plan.xls
Notes	None
Document name	T:\Projects\RM-115\EMC\Results\FCC\Cph_FCC_0607_01.doc

1.1. EUT and Accessory Information

The EUT is a quadric band (GSM850/900/1800/1900) mobile phone with GPRS, EGPRS and Bluetooth. Bluetooth is tested with maximum rated TX power.

Product	Type	SN	HW	MV	SW	DUT
Phone	RM-115	004400/85/172388/0	0500	-	3.08	28115
Phone	RM-115	004400/85/172231/2	0500	-	3.08	28096
Battery	BL-4C	067038610717244111	-	-	-	28106
Battery	BL-4C	067038610717244111	-	-	-	28097
AC Charger	AC-3E	3997915413051200036;0675370	-	-	-	28105
AC-Charger	AC-3E	3997915413051200037;0675370	-	-	-	28103
Headset	HS-23	FM2550741Q	-	-	-	28104
Headset	HS-23	FM2550741Q	-	-	-	28102

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	N.P.
15.247(c)	A8.5	Spurious RF conducted emissions	Passed
15.247(c), 15.209	A8.5	Spurious radiated emissions	N.P.
15.207	7.2.2	AC power line 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

PASSED

FAILED

NP

The EUT complies with the essential requirements in the standard.

The EUT does not comply with the essential requirements in the standard.

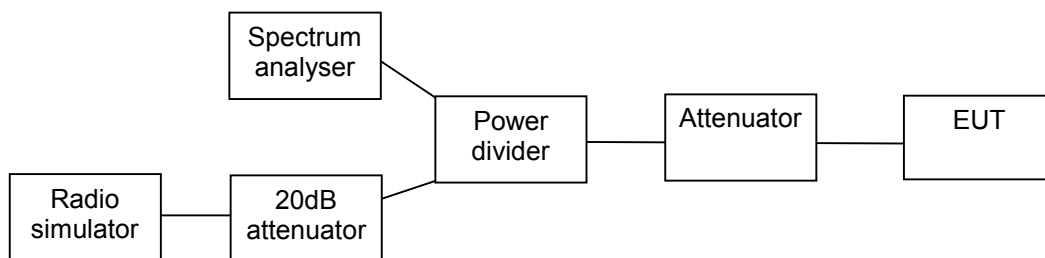
The test was not performed by the TCC Nokia Copenhagen Laboratory.

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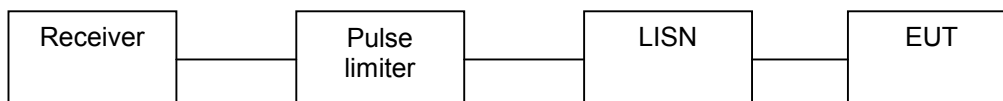
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2. Test set-ups

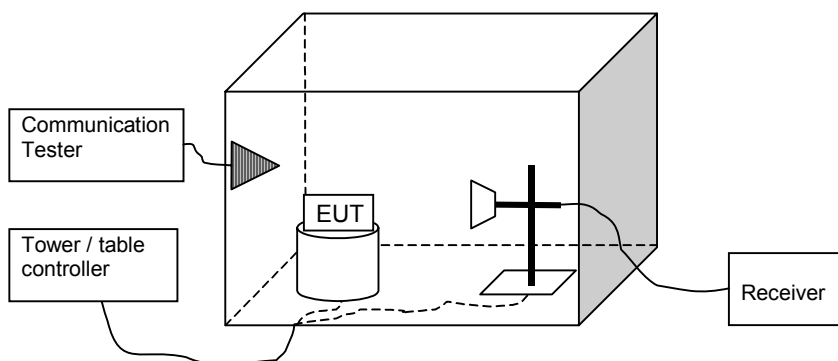
2.1. Conducted RF test set-up



2.2. AC power line conducted emissions test set-up



2.3. Spurious radiated emissions test set-up



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

EUT with DUT number	RM-115 dut 28115, BL-4C dut 28106
Accessories with DUT numbers	AC-3E dut 28105, HS-23 dut 28104
Operation Voltage [V] / [Hz]	230 / 50
Result	Passed
Remarks	The Phoenix SW used to activate BT in EDR 8DPSK modulation mode in the phone is setting up the mid. channel to 39 as default. The R&S Test SW is measuring on channel 40. It has however no effect on the result.
Temp [°C] / Humidity [%RH] / Air Pressure [mBar]	23.9 / 43 1016.1
Date of measurements	20-02-2006
Measured by	Jan Engelbrechtsen

3.1. Test method and limit

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

Limits for peak output power measurements

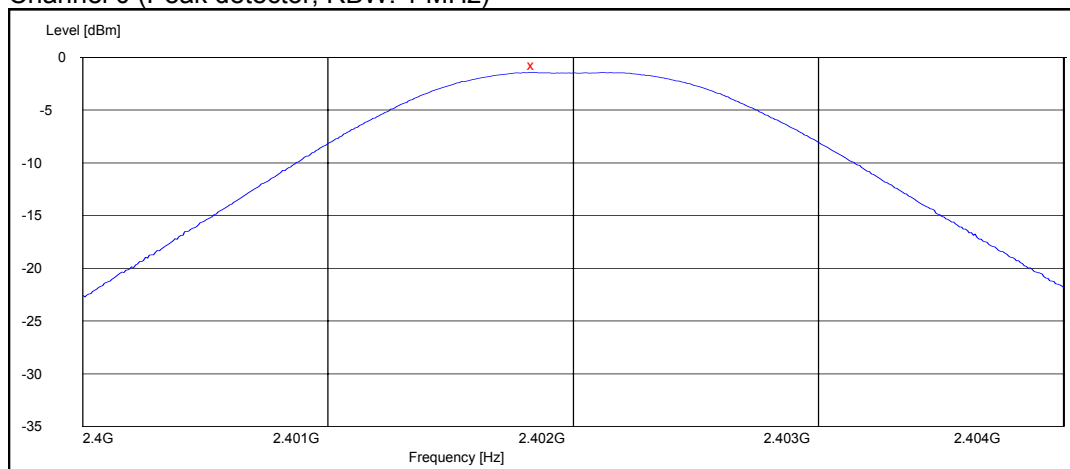
Frequency range [MHz]	Limit [W]	Limit [dBm]
2400 – 2483.5	≤ 1	≤ 30

3.2. Bluetooth Test results

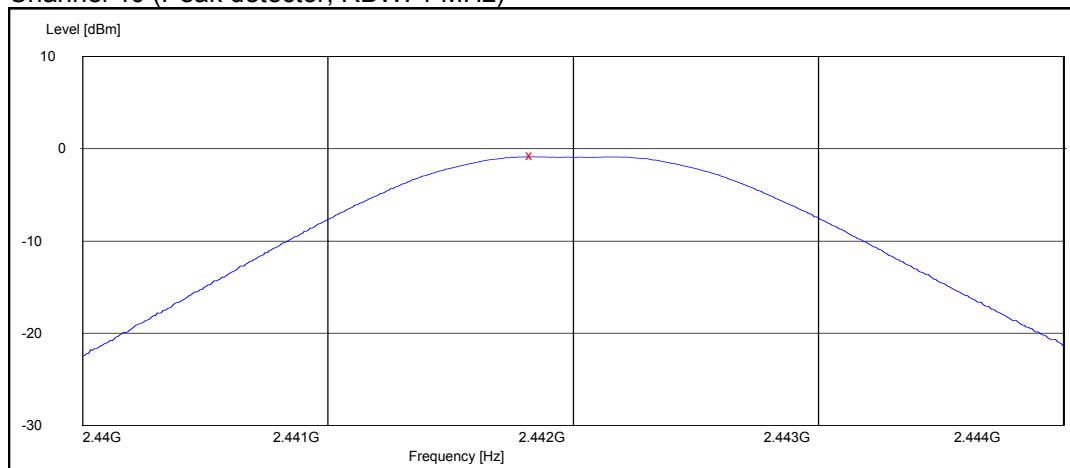
3.2.1 GSKF modulation, PRBS packet type

Channel	P [dBm]	P [mW]	Result
0	-0.70	0.851	Passed
40	-0.70	0.851	Passed
78	-0.70	0.851	Passed

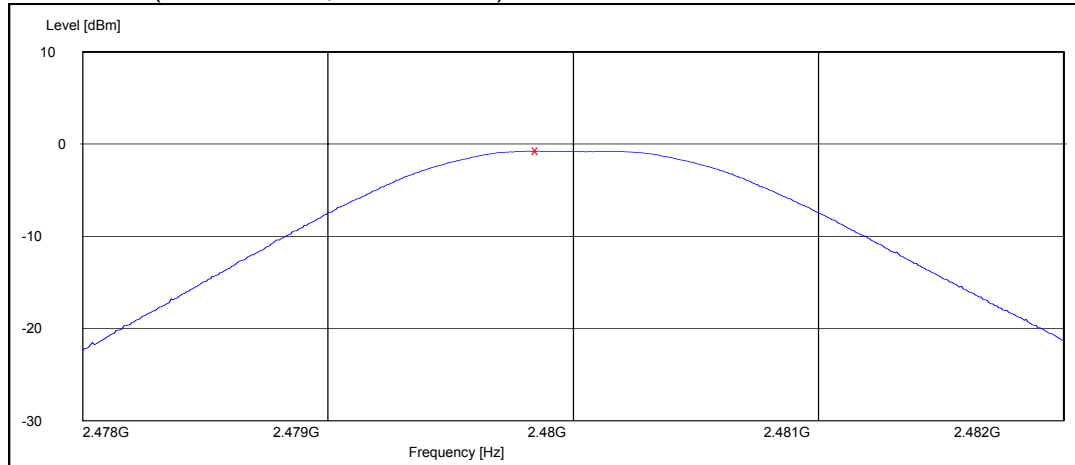
Channel 0 (Peak detector, RBW: 1 MHz)



Channel 40 (Peak detector, RBW: 1 MHz)



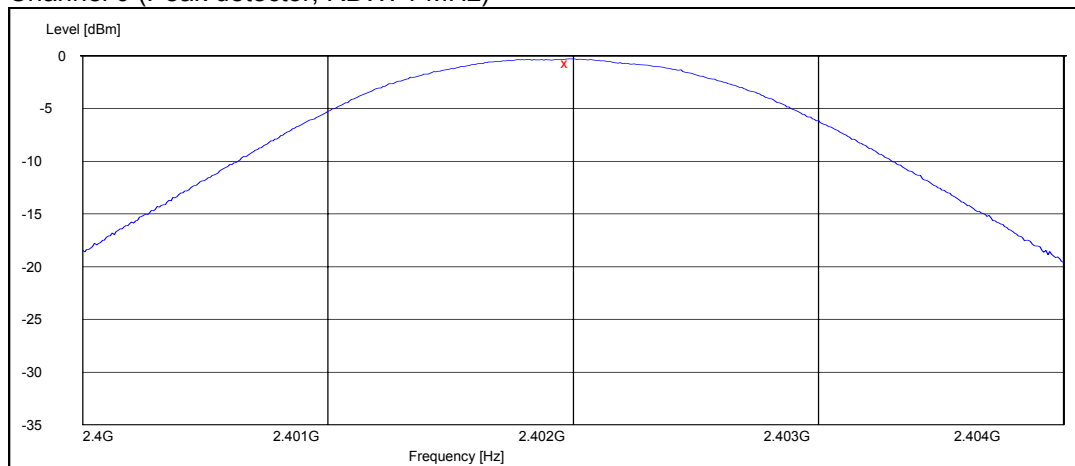
Channel 78 (Peak detector, RBW: 1 MHz)



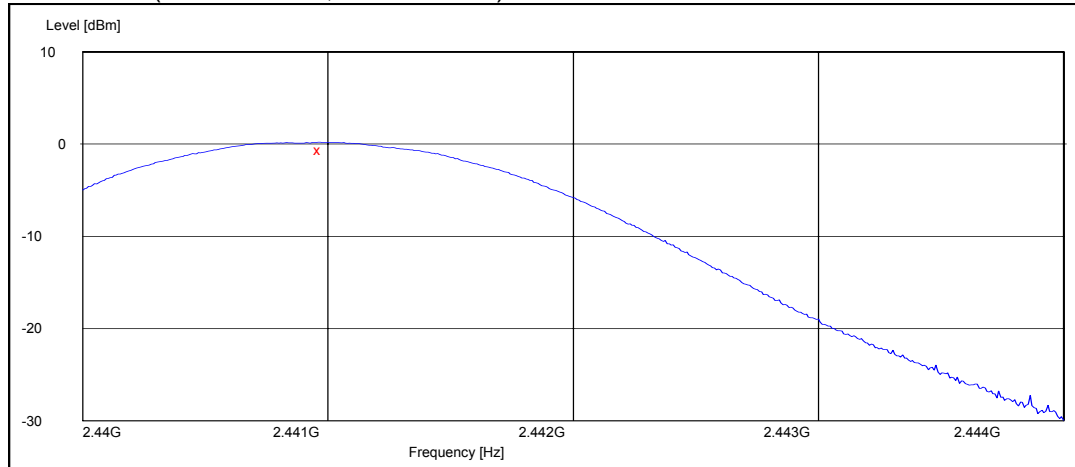
3.2.2 8DPSK modulation, PRBS packet type

Channel	P [dBm]	P [mW]	Result
0	-0.70	0.851	Passed
40	-0.70	0.851	Passed
78	-0.70	0.851	Passed

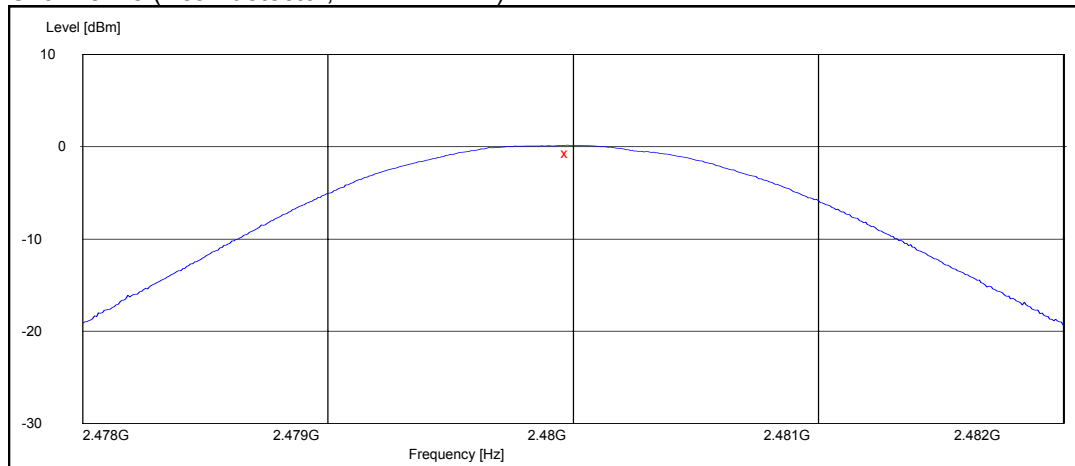
Channel 0 (Peak detector, RBW: 1 MHz)



Channel 39 (Peak detector, RBW: 1 MHz)



Channel 78 (Peak detector, RBW: 1 MHz)



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

EUT with DUT number	RM-115 dut 28115, BL-4C dut 28106
Accessories with DUT numbers	AC-3E dut 28105, HS-23 dut 28104
Operation Voltage [V] / [Hz]	230 / 50
Result	Passed
Remarks	None
Temp [°C] / Humidity [%RH] / Air Pressure [mBar]	23.6 / 42.0 1024.9
Date of measurements	21-02-2006
Measured by	Jan Engelbrechtsen

4.1. Test method and limit

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

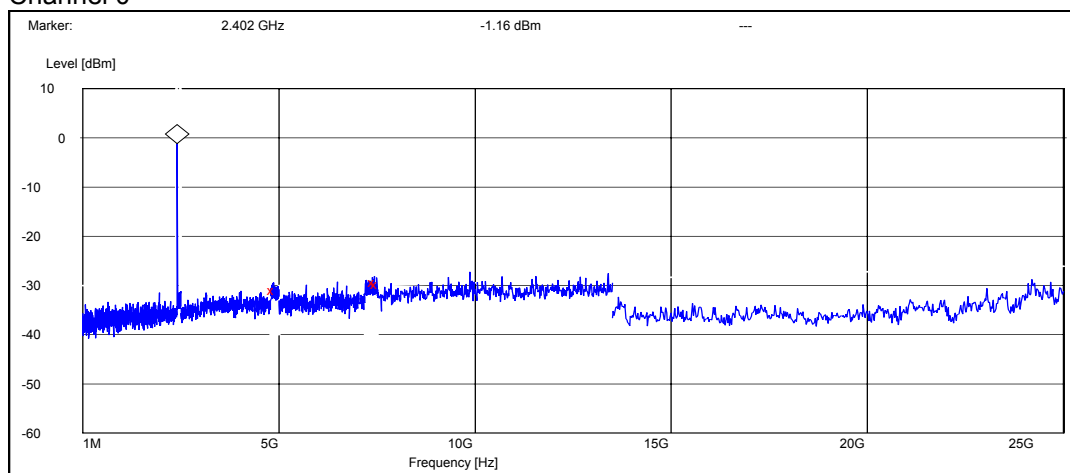
Limits for spurious RF conducted emissions measurements

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

4.2. Bluetooth Test results

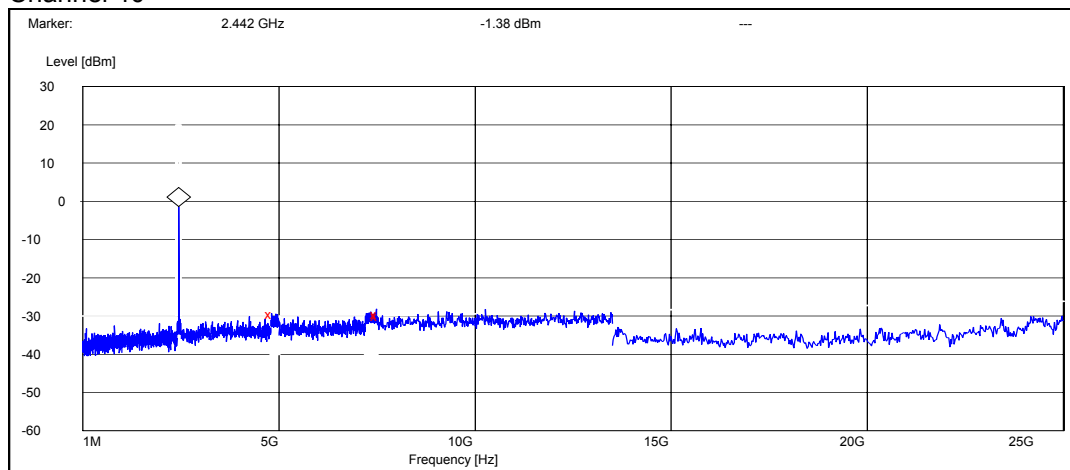
4.2.1 GFSK modulation, PRBS packet type

Channel 0



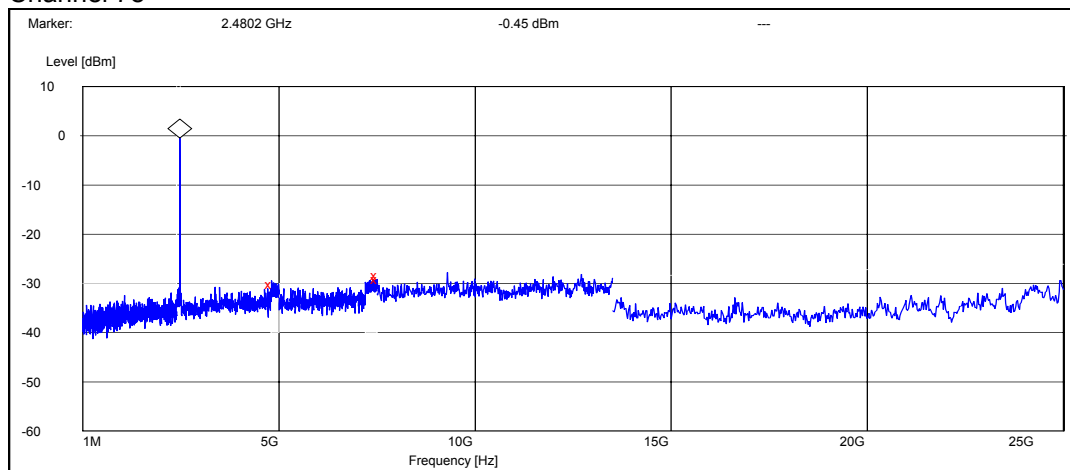
Frequency [MHz]	P [dBc]	Result
4872.800000	-29.935019	Passed
7438.200000	-28.235019	Passed
7500.000000	-28.535019	Passed

Channel 40



Frequency [MHz]	P [dBc]	Result
4809.200000	-28.324602	Passed
7494.000000	-28.324602	Passed
7500.000000	-28.824602	Passed

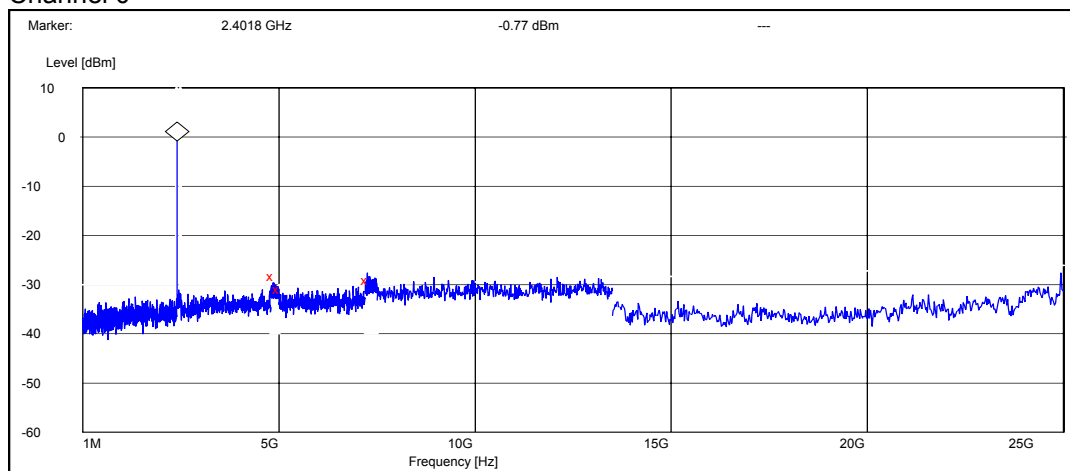
Channel 78



Frequency [MHz]	P [dBc]	Result
4815.200000	-29.747260	Passed
7498.200000	-28.647260	Passed
7500.000000	-27.847260	Passed

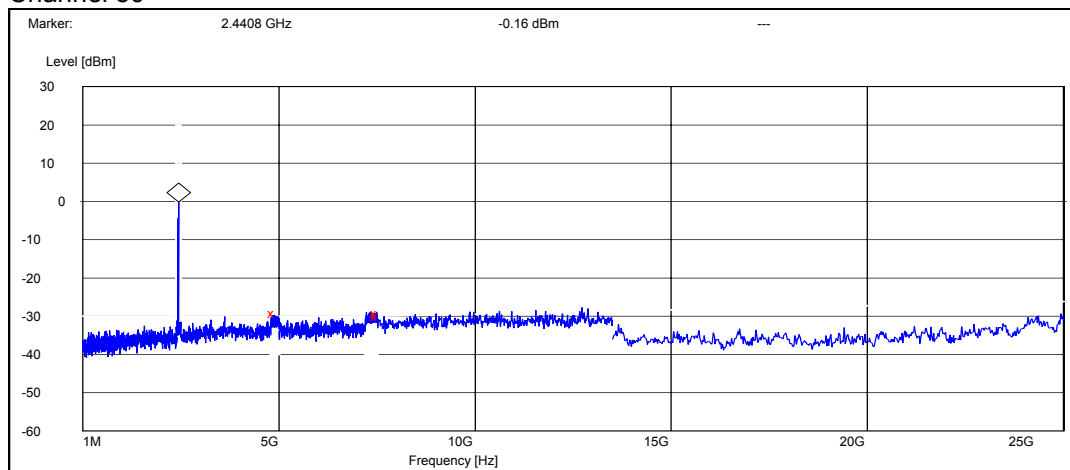
4.2.2 8DPSK modulation, PRBS packet type

Channel 0



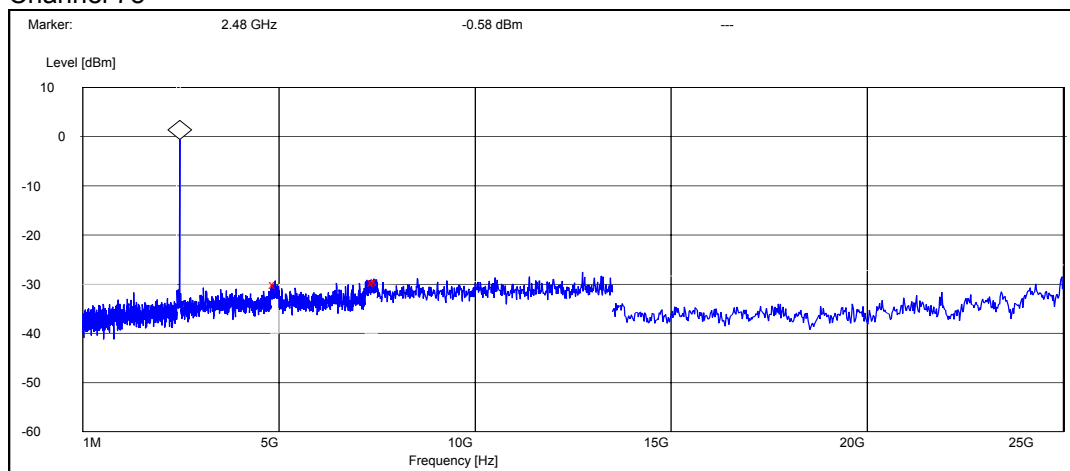
Frequency [MHz]	P [dBc]	Result
4847.200000	-27.531045	Passed
5000.000000	-30.131045	Passed
7255.800000	-28.431045	Passed

Channel 39



Frequency [MHz]	P [dBc]	Result
4883.200000	-29.038929	Passed
7495.200000	-29.138929	Passed
7500.000000	-29.838929	Passed

Channel 78



Frequency [MHz]	P [dBc]	Result
4913.200000	-29.418136	Passed
7426.200000	-29.018136	Passed
7500.000000	-28.818136	Passed

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

EUT with DUT number	RM-115 Dut # 28096
Accessories with DUT numbers	BL-4C Dut # 28097 + AC-3E Dut # 28103 + HS-23 Dut # 28102
Operation Voltage [V] / [Hz]	115 / 60
Result	Passed
Remarks	None
Temp [°C] / Humidity [%RH] / Air Pressure [mBar]	21.7 / 40.0 1034.7
Date of measurements	22-02-2006
Measured by	Allan F. Henriksen

5.1. 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.

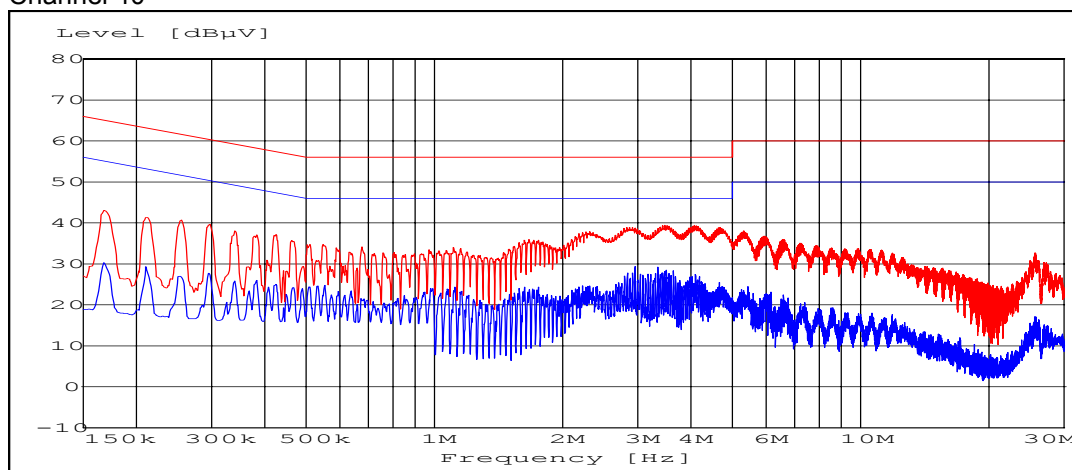
CISPR 22 Class B limits

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

5.2. Bluetooth Test results

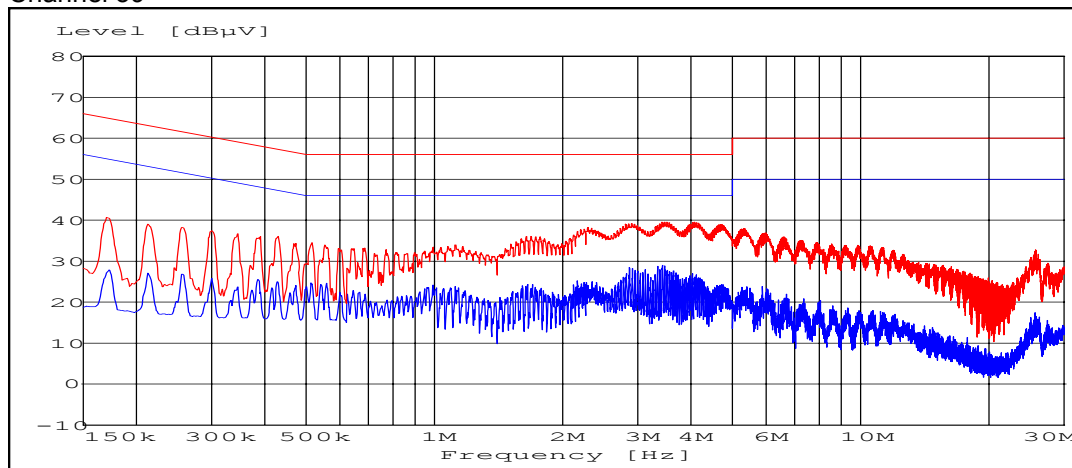
5.2.1 GFSK modulation, PRBS packet type

Channel 40



5.2.2 8DPSK modulation, PRBS packet type

Channel 39



6. 20 dB bandwidth (FCC §15.247(a)(1), RSS-210 A8.1 (1))

EUT with DUT number	RM-115 dut 28115, BL-4C dut 28106
Accessories with DUT numbers	AC-3E dut 28105, HS-23 dut 28104
Operation Voltage [V] / [Hz]	230 / 50
Result	Passed
Remarks	None
Temp [°C] / Humidity [%RH] / Air Pressure [mBar]	23.6 / 42.0 1024.9
Date of measurements	21-02-2006
Measured by	Jan Engelbrechtsen

6.1. 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

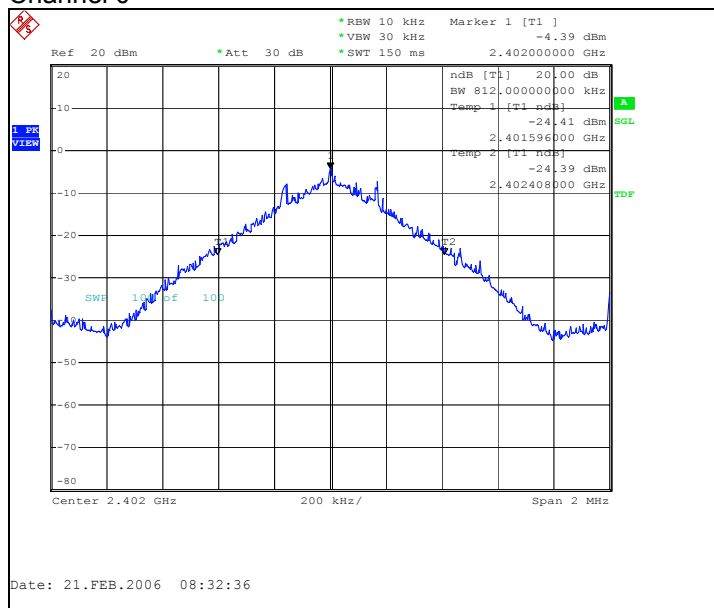
Limit [MHz]
N/A

6.2. Bluetooth Test results

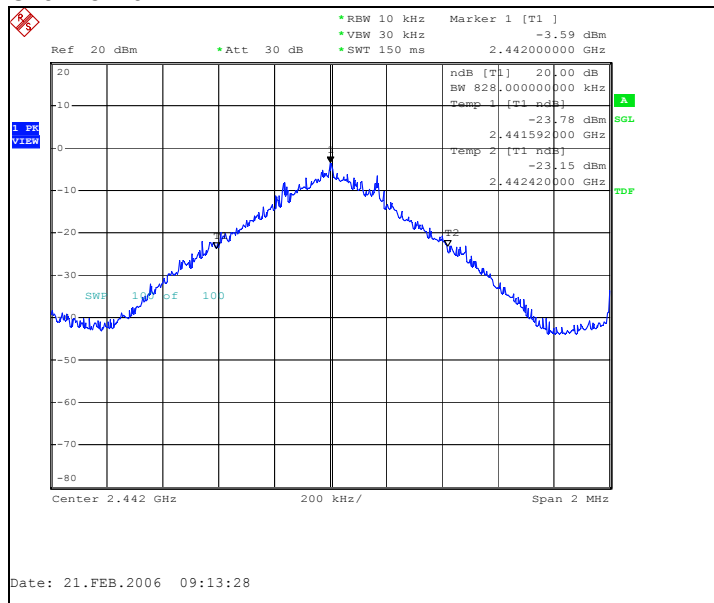
6.2.1 GFSK modulation, PRBS packet type

Channel	20 dB bandwidth [kHz]	Result
0	812.000	Pass
40	828.000	Pass
78	852.000	Pass

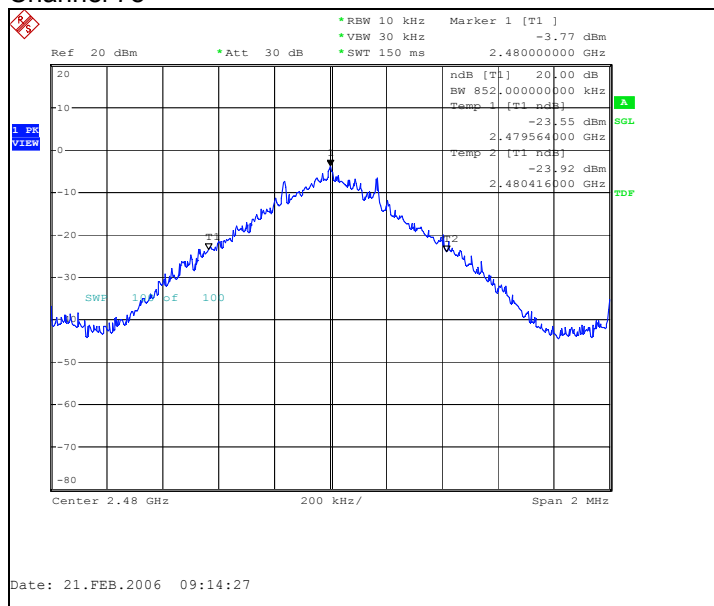
Channel 0



Channel 40



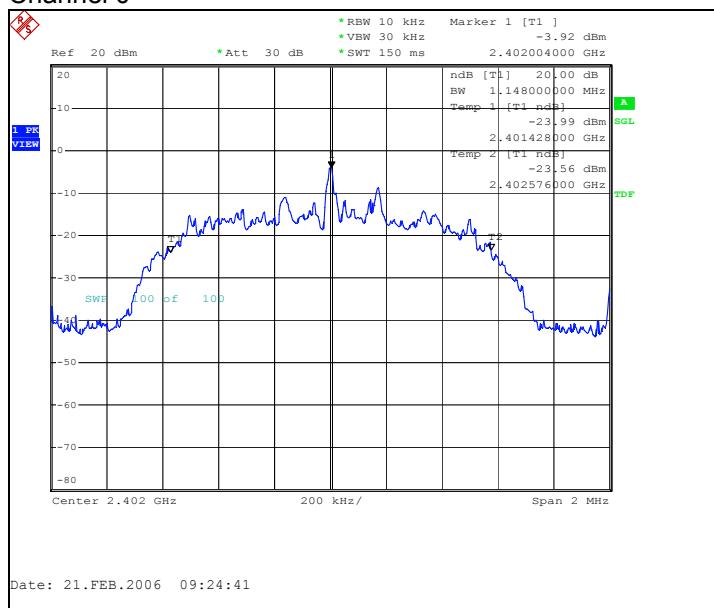
Channel 78



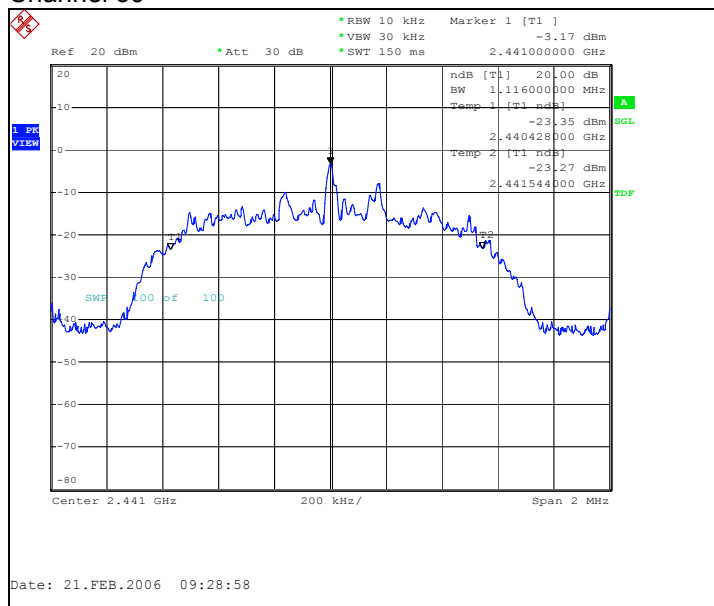
6.2.2 8DPSK modulation, PRBS packet type

Channel	20 dB bandwidth [kHz]	Result
0	1148.000	Pass
39	1116.000	Pass
78	1164.000	Pass

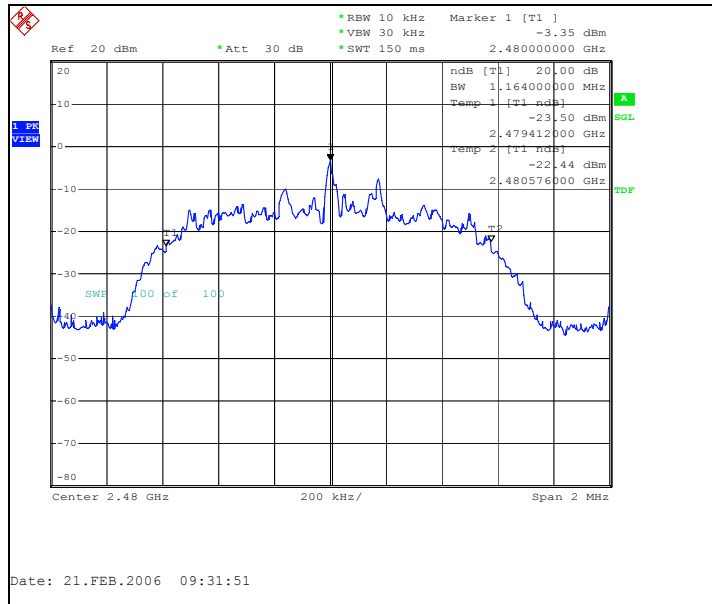
Channel 0



Channel 39



Channel 78



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

EUT with DUT number	RM-115 dut 28115, BL-4C dut 28106
Accessories with DUT numbers	AC-3E dut 28105, HS-23 dut 28104
Operation Voltage [V] / [Hz]	230 / 50
Result	Passed
Remarks	None
Temp [°C] / Humidity [%RH] / Air Pressure [mBar]	23.6 / 42.0 1024.9
Date of measurements	21-02-2006
Measured by	Jan Engelbrechtsen

7.1. 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

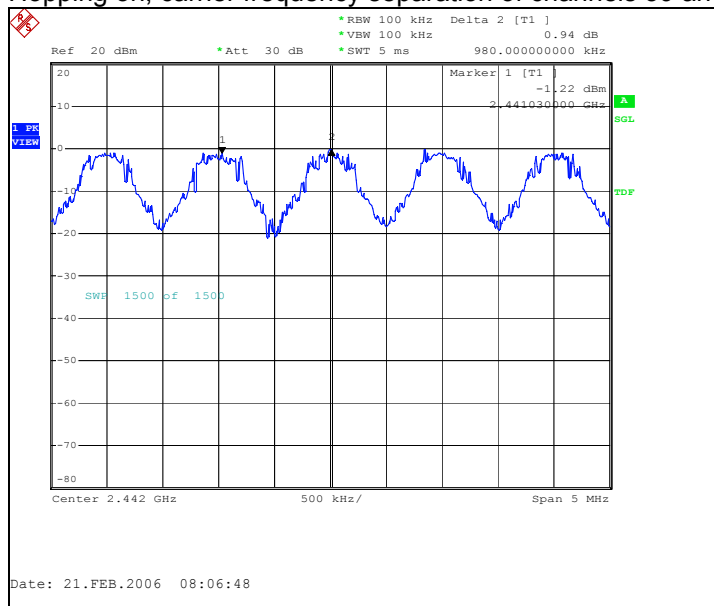
Limit [MHz]
≥ 0.025 or $2/3$ of the 20 dB bandwidth

7.2. Bluetooth Test results

7.2.1 GFSK modulation, PRBS packet type

Carrier frequency separation [kHz]	Result
980	Passed

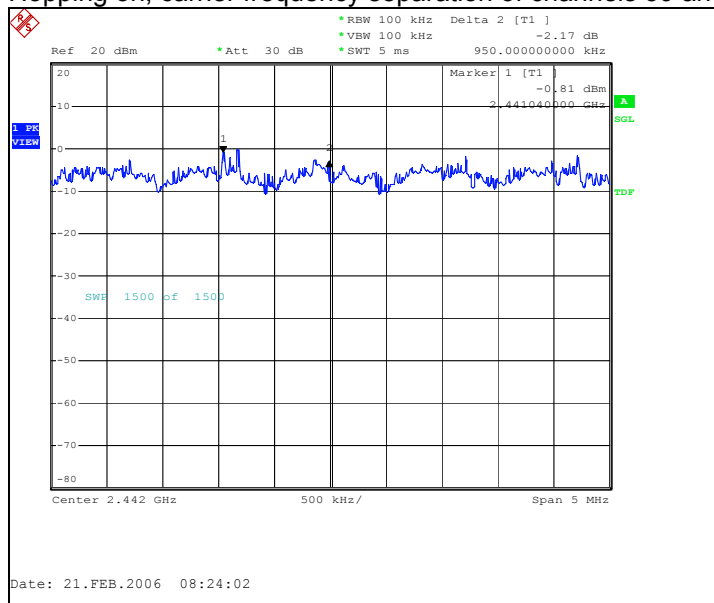
Hopping on, carrier frequency separation of channels 39 and 40



7.2.2 8DPSK modulation, PRBS packet type

Carrier frequency separation [kHz]	Result
950	Passed

Hopping on, carrier frequency separation of channels 39 and 40



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

EUT with DUT number	RM-115 dut 28115, BL-4C dut 28106
Accessories with DUT numbers	AC-3E dut 28105, HS-23 dut 28104
Operation Voltage [V] / [Hz]	230 / 50
Result	Passed
Remarks	None
Temp [°C] / Humidity [%RH] / Air Pressure [mBar]	23.6 / 42.0 1024.9
Date of measurements	21-02-2006
Measured by	Jan Engelbrechtsen

8.1. 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

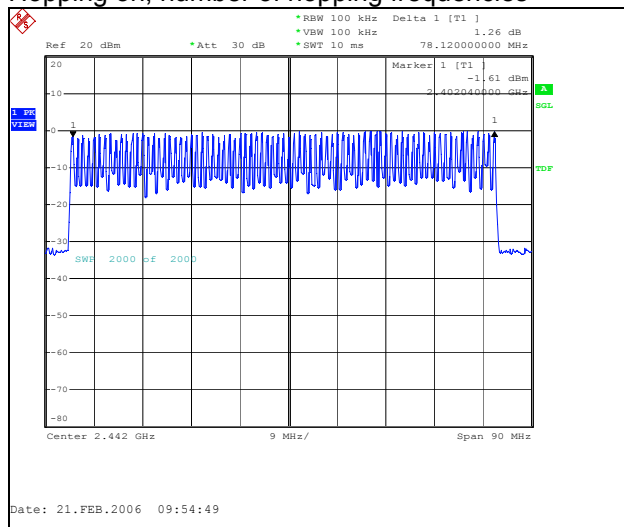
Limit [number]
≥ 15

8.2. Bluetooth Test results

8.2.1 GFSK modulation, PRBS packet type

Measured number of hopping frequencies	Result
79	Passed

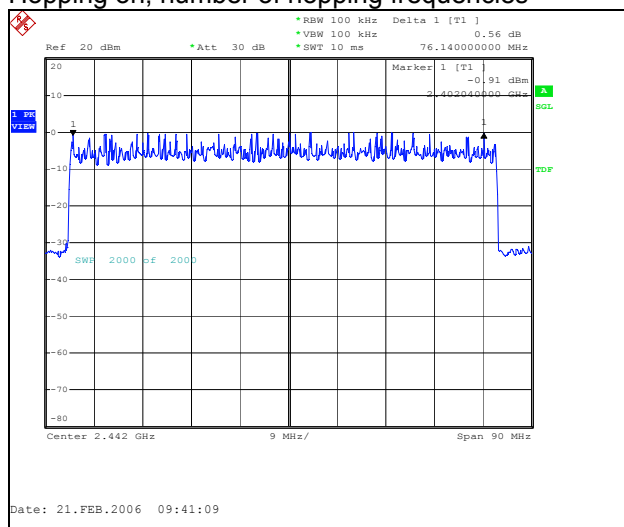
Hopping on, number of hopping frequencies



8.2.2 8DPSK modulation, PRBS packet type

Measured number of hopping frequencies	Result
26	Passed

Hopping on, number of hopping frequencies



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

EUT with DUT number	RM-115 dut 28115, BL-4C dut 28106
Accessories with DUT numbers	AC-3E dut 28105, HS-23 dut 28104
Operation Voltage [V] / [Hz]	230 / 50
Result	Passed
Remarks	None
Temp [°C] / Humidity [%RH] / Air Pressure [mBar]	23.7 / 42.0 1024.9
Date of measurements	21-02-2006
Measured by	Jan Engelbrechtsen

9.1. 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

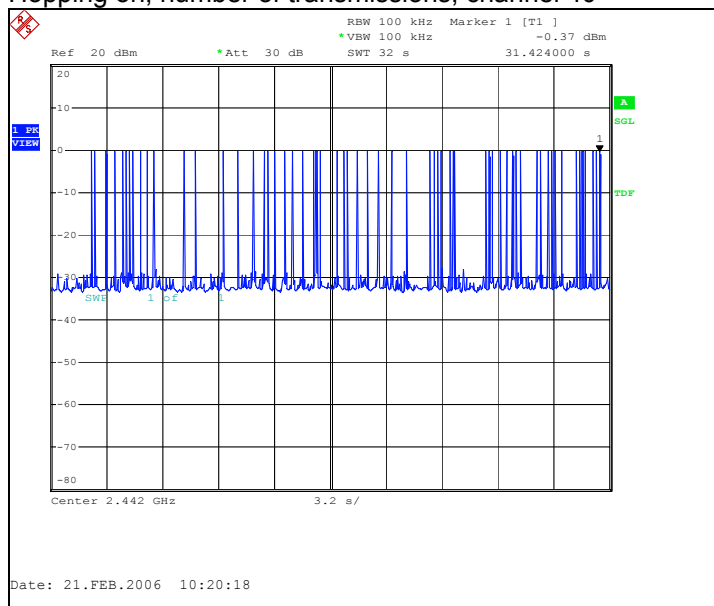
Limit [s]
≤ 0.4

9.2. Bluetooth test results

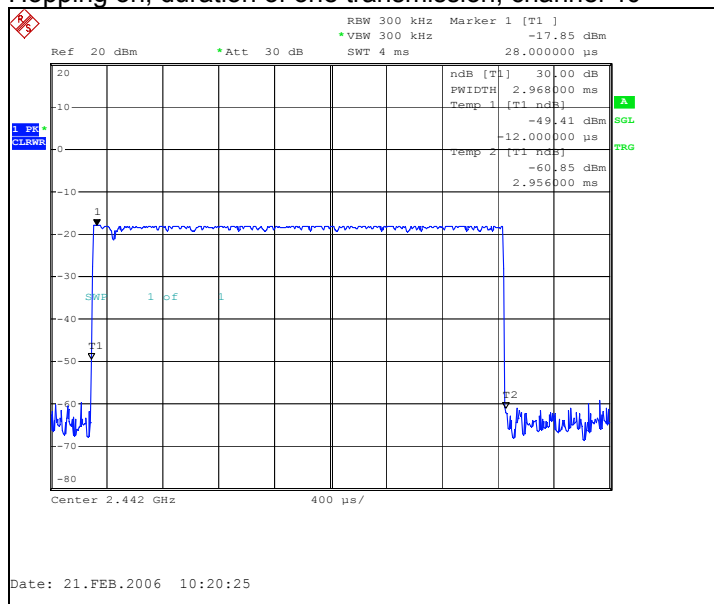
9.2.1 GFSK modulation, PRBS packet type

Measured number of transmissions	Duration of one transmission [μs]	Time of occupancy [s]	Result
61	2968.000	0.181048	Passed

Hopping on, number of transmissions, channel 40



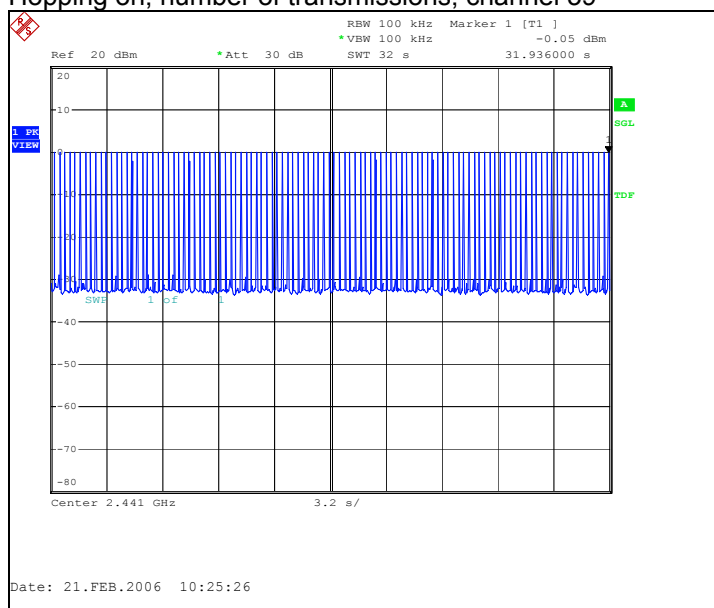
Hopping on, duration of one transmission, channel 40



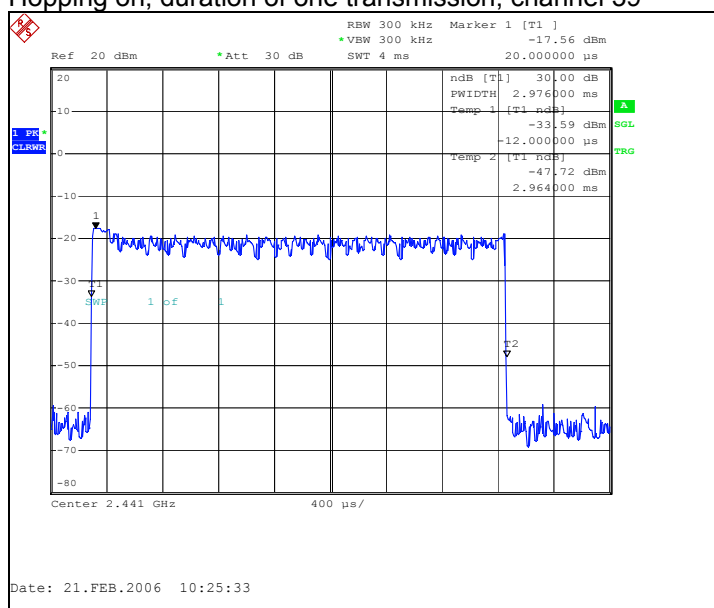
9.2.2 8DPSK modulation, PRBS packet type

Measured number of transmissions	Duration of one transmission [μs]	Time of occupancy [s]	Result
109	2976.000	0.324384	Passed

Hopping on, number of transmissions, channel 39



Hopping on, duration of one transmission, channel 39



10. Test Equipment

10.1. Conducted measurements

Eq. No	Equipment	Type	Manufacturer	Used in
13037	Power Supply 0-15V 10A	EA3012	LP Instruments	15B,15C
13513	Pulse Limiter 9KHz-30MHz	ESH3Z2	Rohde&Schwarz	15B,15C
13666	EMI Test Reciever 9KHz-2,5GHz	ESPC	Rohde&Schwarz	15B,15C
13935	Two Lines Artificial Mains Network	ESH3-Z5	Rohde&Schwarz	15B,15C
16995	Directional Coupler 20dB 0,5-2,0 GHz SMA Conn.	1538RA-20	Weinschel	15B,15C
18772	Shielded Chamber	RFD-100	ETS-Lindgren	15B,15C
19171	Universal Radio Communication Tester	CMU200	Rohde&Schwarz	15B,15C
11386	System DC Power Supply	HP6632A	Hewlett Packard	22.24
11487	Network analyzer 300KHz-3,0GHz	HP8753A	Hewlett Packard	22.24
11584	Spectrum analyzer 50Hz-6,5GHz	HP8561B	Hewlett Packard	22.24
13134	Tracking generator	HP85645A	Hewlett Packard	22.24
13302	Spectrum Analyzer 9KHz-12.8GHz	HP8596E	Hewlett Packard	22.24
13371	Temperature Chamber	S-1,2C	Thermotron	22.24
13524	Digital Radiocomm. Tester	CMD55	Rohde&Schwarz	22.24
14807	S - Parameter Test Set 300KHz-6GHz	HP85047A	Hewlett Packard	22.24
15859	Digital Radio Communication Test Set	4201S	Wavetek	22.24
17277	Multimeter Digital 6 1/2 Digit	AT34401A	Agilent Technologies	22.24
17796	Radio Communication Test Set	4400M	Wavetek	22.24
19374	Resonant Dipole Antenna 850MHz SMA m Conn.	-	NMP Cph	22.24
19375	Resonant Dipole Antenna 1900MHz SMA m Conn.	-	NMP Cph	22.24
13037	Power Supply 0-15V 10A	EA3012	LP Instruments	15B,15C

10.2. Radiated measurements

Eq. No	Equipment	Type	Manufacturer	Used in
14020	Programmable Relay Switching System	-	Pickering	15B,15C,22,24
18792	Multi Device Controller	2090	ETS-EMCO	15B,15C,22,24
13829	Turntable Controller	4630-100	Comtest	15B,15C,22,24
14963	RF Preamplifier 100MHz-4GHz (Metal Chassis)	AFS3-00100400	Miteq/NMP Cph	15B,15C,22,24
13668	BiLog Antenna 30-2000MHz	BiLog-CBL6112A	Chase	15B,15C,22,24
18861	EMI Test Receiver 20Hz-26,5GHz	ESI	Rohde&Schwarz	15B,15C,22,24
12679	Dual Log Periodic Antenna 1-18 GHz	HL025	Rohde&Schwarz	15B,15C,22,24
18860	Ultra Broadband Antenna	HL562	Rohde&Schwarz	15B,15C,22,24

Eq. No	Equipment	Type	Manufacturer	Used in
	Ultralog 30-3000MHz			
18773	Shielded Chamber	RFD-100	ETS-Lindgren	15B,15C,22,24
18774	Shielded Chamber	RFSD-F/A-100	ETS-Lindgren	15B,15C,22,24
18324	High Pass Filter 3GHz SMA f Conn	WHJS3000-10SS	Wainwright	15B,15C,22,24
14114	Highpass Filter 1000MHz-4500MHz	WHK1000-12SS	Wainwright	15B,15C,22,24
13918	Highpass Filter 2000-4000MHz 50OHM SMA Conn	WHKS2000-10SS	Wainwright Instruments	15B,15C,22,24
13937	Ultra Stable Notch Filter 902,4MHz	WRCA902.4-0.2/40-6SS	Wainwright Instruments	15B,15C,22,24
13936	Ultra Stable Notch Filter 1747,5MHz	WRCD1747.5-0.2/40-10SS	Wainwright Instruments	15B,15C,22,24
13917	Highpass Filter 1000-3000MHz 50OHM SMA Conn	WHKS1000-10SS	Wainwright Instruments	15B,15C,22,24
14188	Ultra Stable Notch Filter 902,4MHz	WRCA902.4-0.2/40-6SS	Wainwright	15B,15C,22,24
14187	Ultra Stable Notch Filter 1747,5MHz	WRCD1747.5-0.2/40-10SS	Wainwright	15B,15C,22,24
16633	Ultra Stable Notch Filter 1880,0MHz	WRCD1880.0-0.2/40-10SS	Wainwright	15B,15C,22,24
18323	Band reject filter 1947-1953MHz 40dB	WRCG1947/1953-1940/1960-40/6SS	Wainwright	15B,15C,22,24
15190	Infra Red Remote Control Unit	4630	Emco	22,24,15B,15C
14993	EMI Test Receiver 9KHz-2750MHz	ESCS30	Rohde&Schwarz	22,24,15B,15C
15191	Turntable Contoller Unit	G-800SDX	YAESU	22,24,15B,15C
14900	Antenna Controller	HD100	HD GmbH	22,24,15B,15C