

FCC Part 15C Compliance Test Report

Test Report no.:	Tre_FCC_0651_02.doc	Date of Report:	3.1.2006
Number of pages:	36	Customer's Contact person:	Jarkko Luoma
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	Customer:	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.:	94436		
IC recognition no.:	3608		
Tested devices/ accessories:	GSM phone RA-6 / Battery BP-4L		
FCC ID:	PYARA-6	IC:	661V-RA6
Supplement reports:	-		
Testing has been carried out in accordance with:	CFR 47, FCC rules Part 15 Subpart C, ANSI C63.4 (2003), Public Notice DA 00-705, DTS procedures KDB 558074, 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:			

Jari Jantunen, System Manager

1. Summary for FCC Part 15C Compliance Test Report

Date of receipt	18.12.2006
Testing completed	3.1.2007
The customer's contact person	Jarkko Luoma
Test Plan referred to	\\EMC\\TESTPLAN\\
Notes	-
Document name	T:\\Projects\\RA-6\\EMC\\Results\\FCC\\Tre_FCC_0651_02.doc

1.1. EUT and Accessory Information

The EUT is a 5-band (GSM850/900/1800/1900 and WCDMA Band I) 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	RA-6	004400911738688	4100		06.46.00	40909
Battery	BP-4L		Proto V4	-	-	40910

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)	Conducted peak output power	PASSED
15.247(c)	A8.5	Band edge compliance of RF emissions	NP
15.247(c)	A8.5	Spurious RF conducted emissions	PASSED
15.247(c), 15.209	A8.5	Spurious radiated emissions	NP
15.207	7.2.2	AC powerline conducted emissions	NP
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

WLAN:

Section in CFR 47	Section in RSS-210	Name of the test	Result
15.247(b)(1)	A8.4 (4)	Conducted peak output power	PASSED
15.247(c)	A8.5	Band edge compliance of RF emissions	NP
15.247(c)	A8.5	Spurious RF conducted emissions	PASSED
15.247(c), 15.209	A8.5	Spurious radiated emissions	NP
15.207	7.2.2	AC powerline conducted emissions	NP
15.247(a)(2)	A8.2 (1)	6 dB bandwidth	PASSED
15.247(e)	A8.2 (2)	Power spectral density	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 Tampere Laboratory.

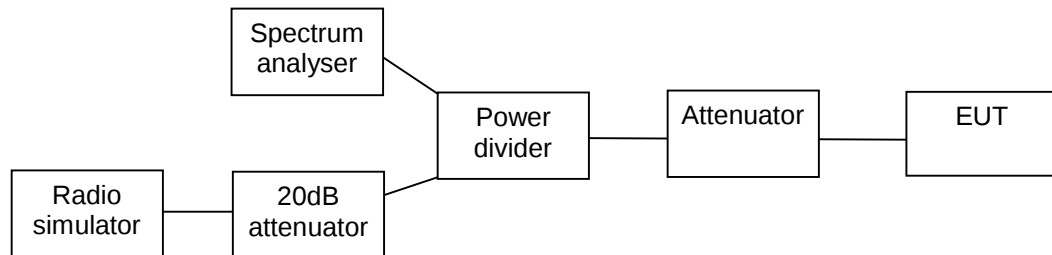
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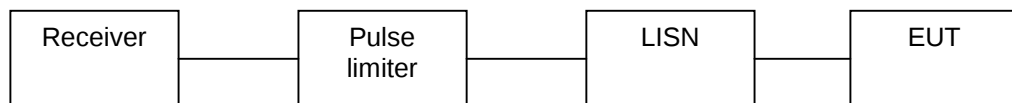
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2. Test setups

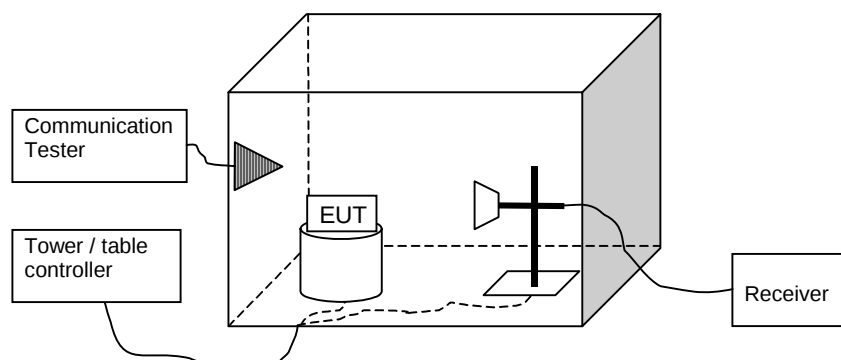
2.1. Conducted RF test setup



2.2. AC powerline conducted emissions test setup



2.3. Spurious radiated emissions test setup



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

EUT with DUT number	RA-6 DUT 40909
Accessories with DUT numbers	BP-4L DUT 40910
Operation Voltage [V] / [Hz]	Nominal
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	20 / 44 / 100.4
Date of measurements	18.12.2006
Measured by	Jari Jantunen

3.1. Test method and limit

The measurement is made according to Public notice DA 00-705 and IC standard RSS-210.

Limits for conducted peak output power measurements

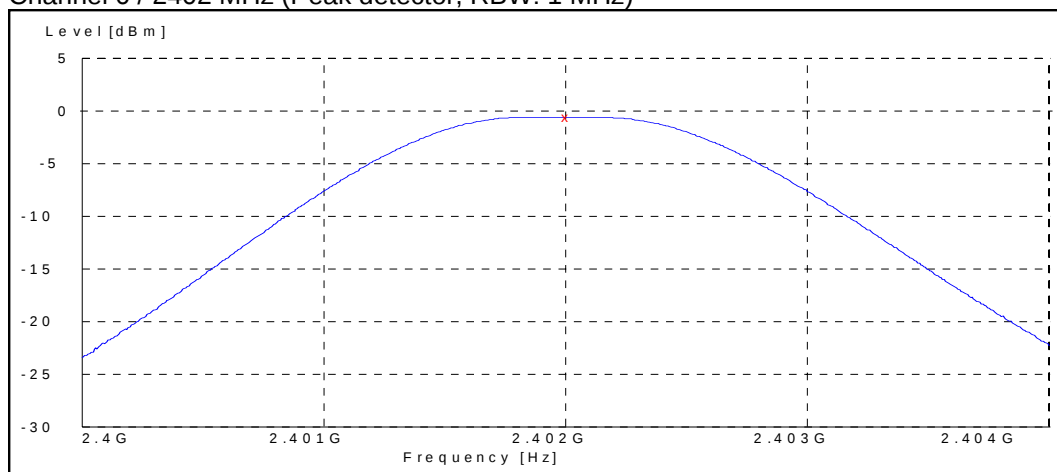
Frequency range [MHz]	Limit [W]	Limit [dBm]
2400 – 2483.5	≤ 1	≤ 30

3.2. Bluetooth Test results

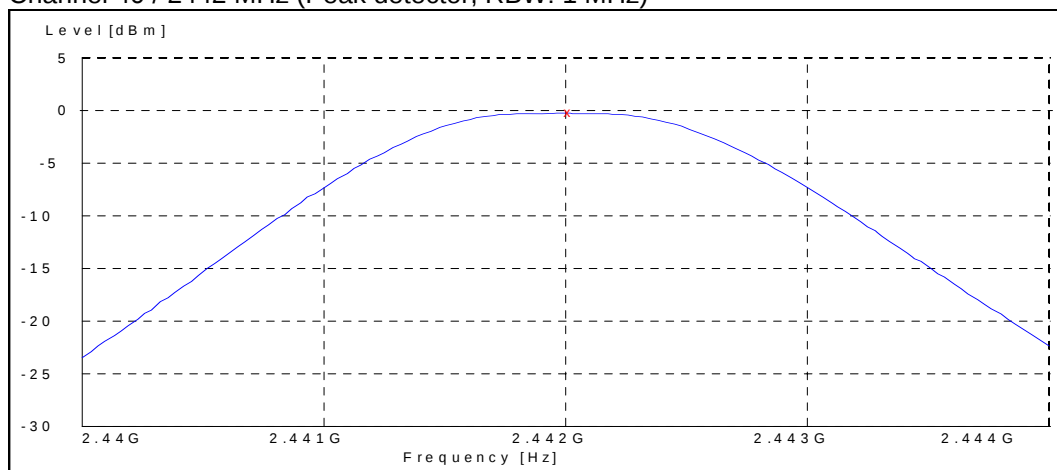
3.2.1 GFSK modulation, PRBS packet type

Channel / f_c [MHz]	P [dBm]	P [mW]	Result
0 / 2402	-0.60	0.871	PASSED
40 / 2442	-0.20	0.955	PASSED
78 / 2480	-0.50	0.891	PASSED

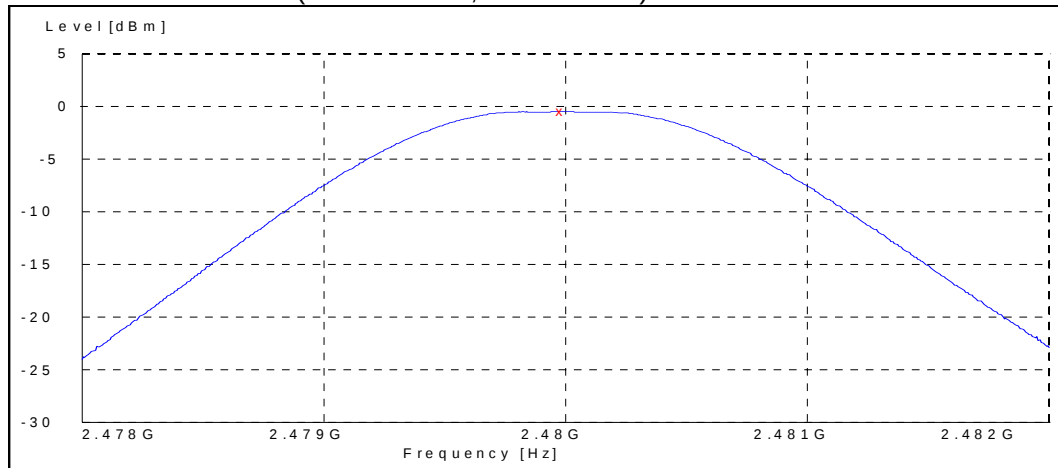
Channel 0 / 2402 MHz (Peak detector, RBW: 1 MHz)



Channel 40 / 2442 MHz (Peak detector, RBW: 1 MHz)



Channel 78 / 2480 MHz (Peak detector, RBW: 1 MHz)



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

EUT with DUT number	RA-6 DUT 40909
Accessories with DUT numbers	BP-4L DUT 40910
Operation Voltage [V] / [Hz]	Nominal
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	20 / 44 / 100.4
Date of measurements	18.12.2006
Measured by	Jari Jantunen

4.1. Test method and limit

The measurement is made according to Public notice DA 00-705 and IC standard RSS-210.

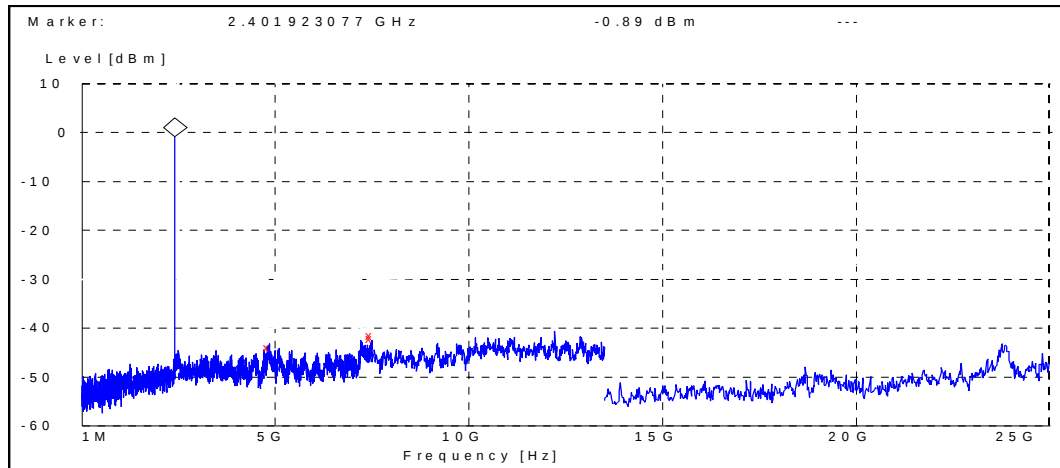
Limits for spurious RF conducted emissions measurements

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

4.2. Bluetooth Test results

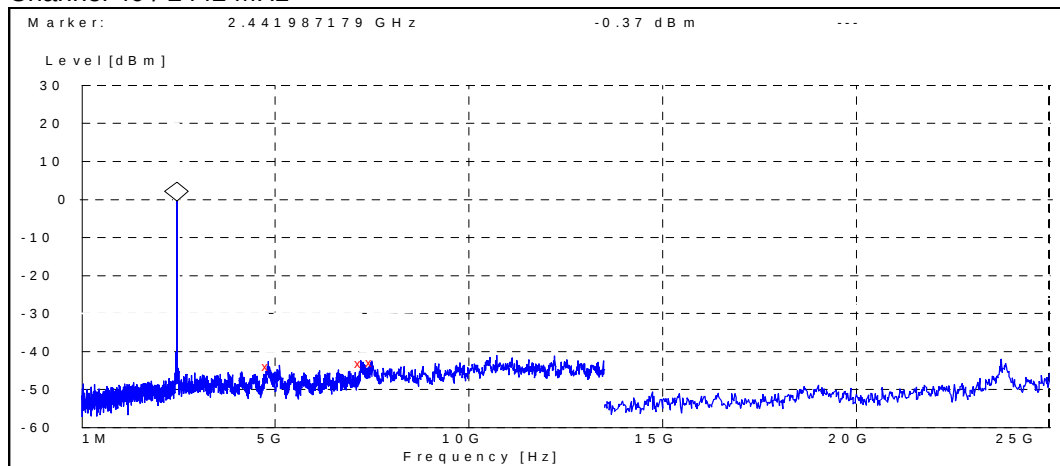
4.2.1 GFSK modulation, PRBS packet type

Channel 0 / 2402 MHz



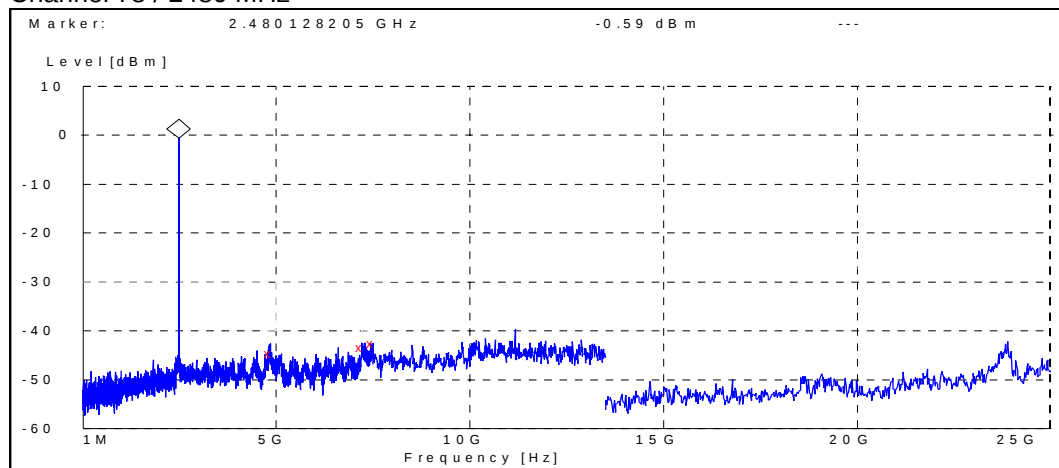
Frequency [MHz]	P [dBc]	Result
4833.012821	-43.012694	PASSED
7490.865385	-40.512694	PASSED
7500.000000	-41.212694	PASSED

Channel 40 / 2442 MHz



Frequency [MHz]	P [dBc]	Result
4811.538462	-43.632967	PASSED
7215.384615	-42.732967	PASSED
7500.000000	-42.532967	PASSED

Channel 78 / 2480 MHz



Frequency [MHz]	P [dBc]	Result
4842.948718	-43.907577	PASSED
7209.615385	-42.707577	PASSED
7500.000000	-42.007577	PASSED

5. 20 dB bandwidth (FCC §15.247(a)(1), RSS-210 A8.1 (1))

EUT with DUT number	RA-6 DUT 40909
Accessories with DUT numbers	BP-4L DUT 40910
Operation Voltage [V] / [Hz]	Nominal
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 43 / 101.4
Date of measurements	19.12.2006
Measured by	Jari Jantunen

5.1. Test method and limit

The measurement is made according to Public notice DA 00-705 and IC standard RSS-210.

Limits for 20 dB bandwidth measurements

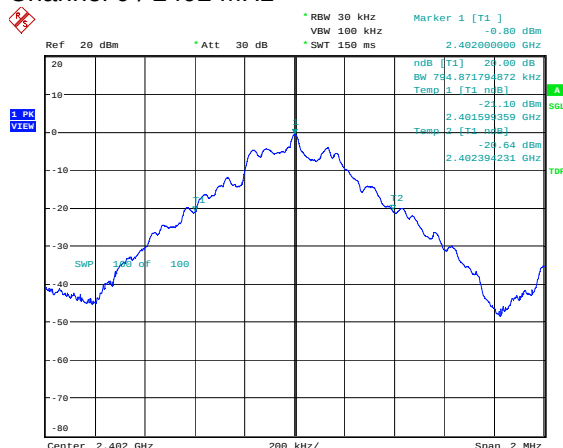
Limit [MHz]
N/A

5.2. Bluetooth Test results

5.2.1 GFSK modulation, PRBS packet type

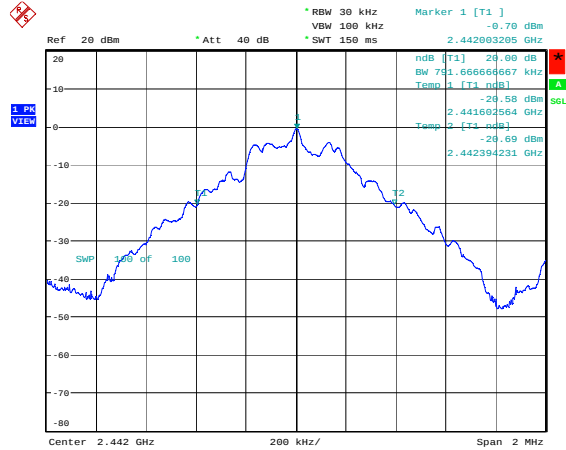
Channel / f _c [MHz]	20 dB bandwidth [kHz]	Result
0 / 2402	794.872	PASSED
40 / 2442	791.667	PASSED
78 / 2480	794.872	PASSED

Channel 0 / 2402 MHz



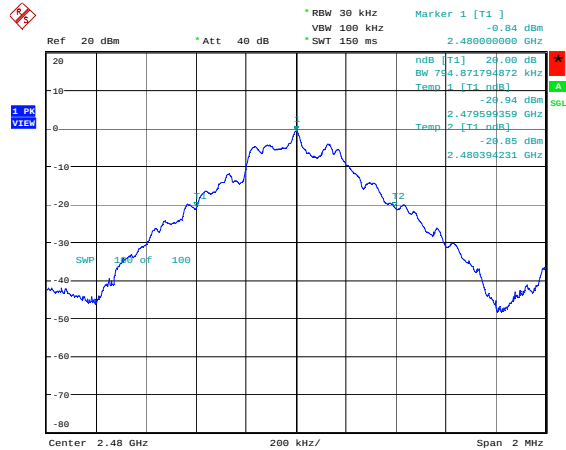
Date: 19.DEC.2006 14:34:23

Channel 40 / 2442 MHz



Date: 19.DEC.2006 15:15:04

Channel 78 / 2480 MHz



Date: 19.DEC.2006 15:19:15

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

EUT with DUT number	RA-6 DUT 40909
Accessories with DUT numbers	BP-4L DUT 40910
Operation Voltage [V] / [Hz]	Nominal
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 43 / 101.4
Date of measurements	19.12.2006
Measured by	Jari Jantunen

6.1. Test method and limit

The measurement is made according to Public notice DA 00-705 and IC standard RSS-210.

Limits for carrier frequency separation measurements

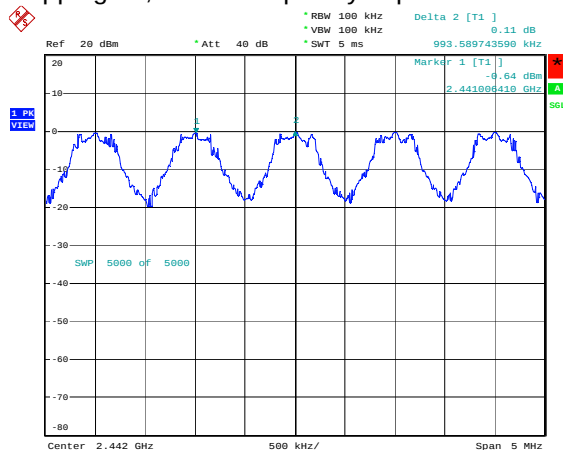
Limit [MHz]
≥ 0.025 or $2/3$ of the 20 dB bandwidth

6.2. Bluetooth Test results

6.2.1 GFSK modulation, PRBS packet type

Carrier frequency separation [kHz]	Result
993.590	PASSED

Hopping on, carrier frequency separation of channels 39 / 2441 MHz and 40 / 2442 MHz



Date: 19. DEC. 2006 14:17:57

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

EUT with DUT number	RA-6 DUT 40909
Accessories with DUT numbers	BP-4L DUT 40910
Operation Voltage [V] / [Hz]	Nominal
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	20 / 44 / 100.4
Date of measurements	18.12.2006
Measured by	Jari Jantunen

7.1. Test method and limit

The measurement is made according to Public notice DA 00-705 and IC standard RSS-210.

Limits for number of hopping frequencies measurements

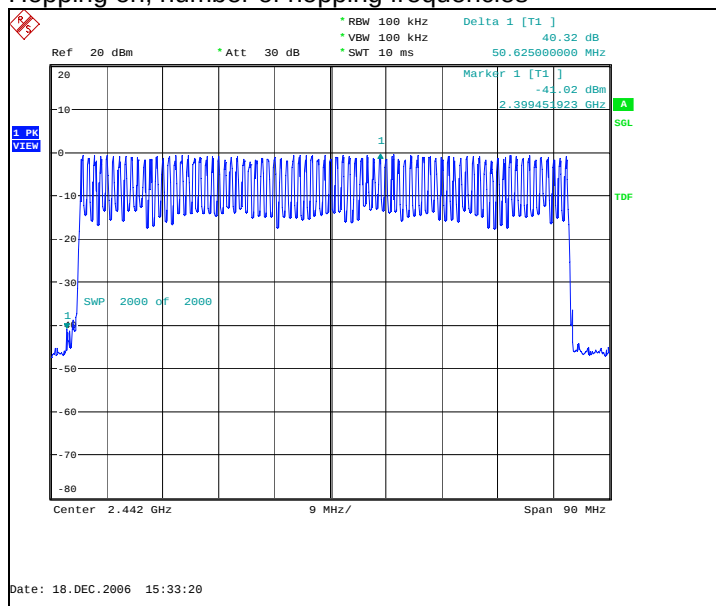
Limit [number]
≥ 15

7.2. Bluetooth Test results

7.2.1 GFSK modulation, PRBS packet type

Measured number of hopping frequencies	Result
80.00	PASSED

Hopping on, number of hopping frequencies



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

EUT with DUT number	RA-6 DUT 40909
Accessories with DUT numbers	BP-4L DUT 40910
Operation Voltage [V] / [Hz]	Nominal
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 43 / 101.4
Date of measurements	19.12.2006
Measured by	Jari Jantunen

8.1. Test method and limit

The measurement is made according to Public notice DA 00-705 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

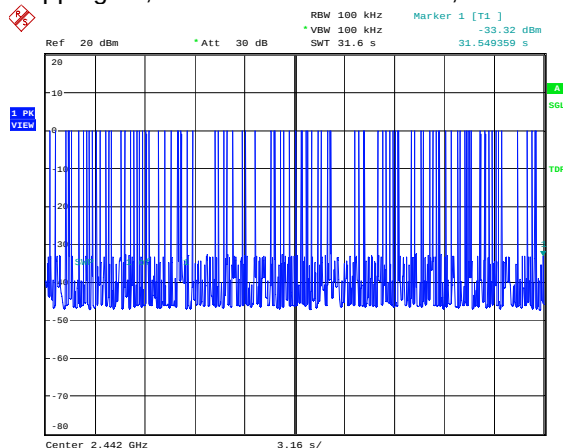
Limit [s]
≤ 0.4

8.2. Bluetooth test results

8.2.1 GFSK modulation, PRBS packet type

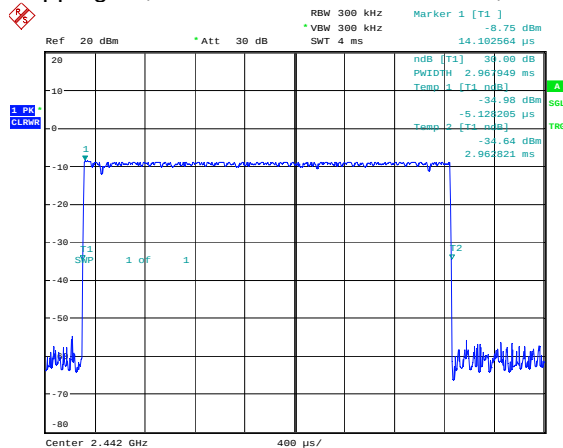
Measured number of transmissions	Duration of one transmission [μs]	Time of occupancy [s]	Result
91	2967.949	0.270083	PASSED

Hopping on, number of transmissions, channel 40 / 2442 MHz



Date: 19.DEC.2006 13:53:59

Hopping on, duration of one transmission, channel 40 / 2442 MHz



Date: 19.DEC.2006 13:54:10

9. Conducted peak output power (FCC §15.247(b)(1), RSS-210 A8.4 (4))

EUT with DUT number	RA-6 DUT 40909
Accessories with DUT numbers	BP-4L DUT 40910
Operation Voltage [V] / [Hz]	Nominal
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 43 / 99.4
Date of measurements	3.1.2007
Measured by	Jari Jantunen

9.1. Test method and limit

The measurement is made according to DTS procedures KDB 558074 and IC standard RSS-210.

Limits for conducted peak output power measurements

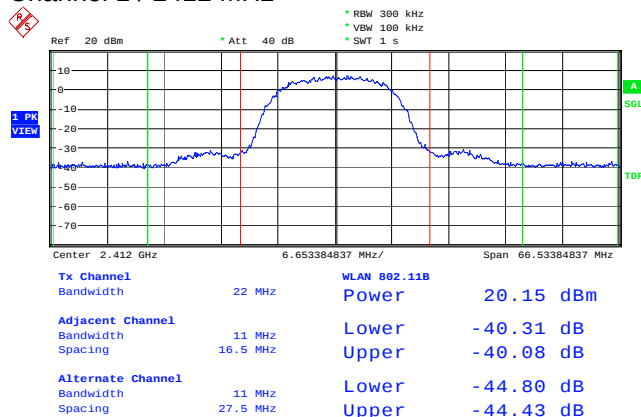
Frequency range [MHz]	Limit [W]	Limit [dBm]
2400 – 2483.5	≤ 1	≤ 30

9.2. WLAN Test results

9.2.1 DSSS mode, QPSK modulation, 11 Mbps data rate

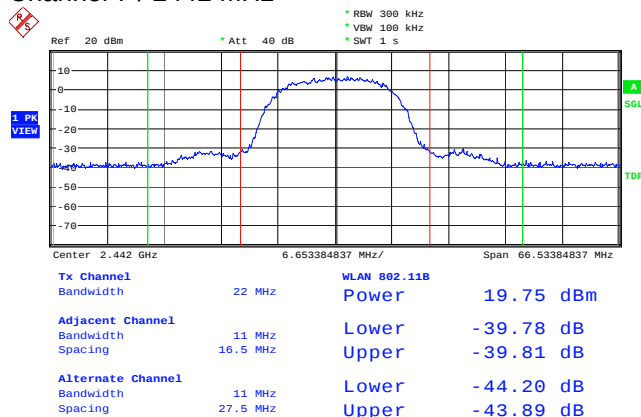
Channel / f _c [MHz]	P [dBm]	P [W]	Result
1 / 2412	20.15	0.1035	PASSED
7 / 2442	19.75	0.0944	PASSED
11 / 2462	20.40	0.1096	PASSED

Channel 1 / 2412 MHz



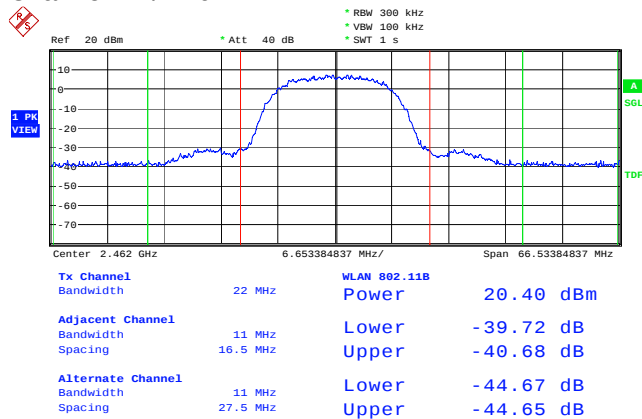
Date: 3.JAN.2007 11:34:51

Channel 7 / 2442 MHz



Date: 3.JAN.2007 11:33:54

Channel 11 / 2462 MHz

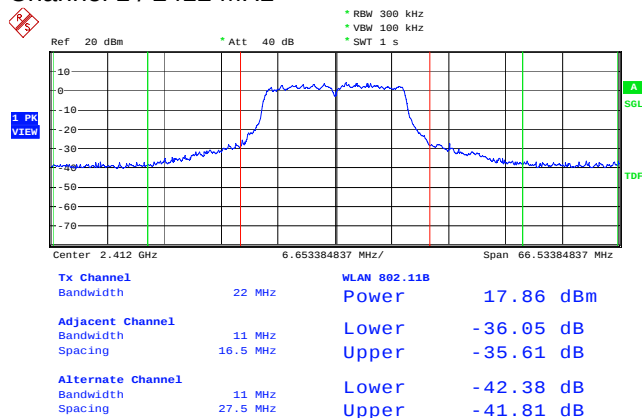


Date: 3. JAN. 2007 11:33:03

9.2.2 OFDM mode, BPSK modulation, 6 Mbps data rate

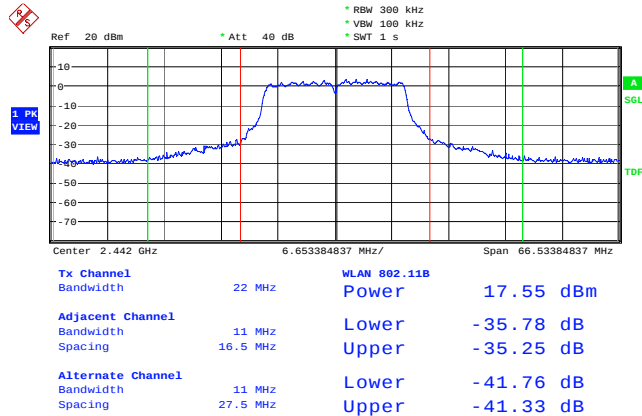
Channel / f _c [MHz]	P [dBm]	P [W]	Result
1 / 2412	17.86	0.0611	PASSED
7 / 2442	17.55	0.0569	PASSED
11 / 2462	17.58	0.0573	PASSED

Channel 1 / 2412 MHz



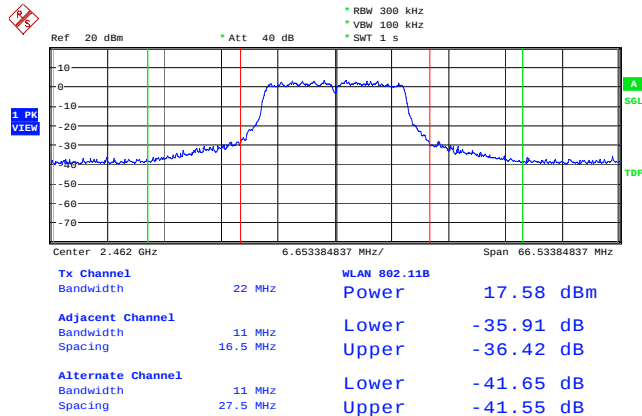
Date: 3. JAN. 2007 11:29:41

Channel 7 / 2442 MHz



Date: 3. JAN. 2007 11:30:49

Channel 11 / 2462 MHz



Date: 3. JAN. 2007 11:31:54

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

EUT with DUT number	RA-6 DUT 40909
Accessories with DUT numbers	BP-4L DUT 40910
Operation Voltage [V] / [Hz]	Nominal
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 43 / 99.4
Date of measurements	3.1.2007
Measured by	Jari Jantunen

10.1. Test method and limit

The measurement is made according to DTS procedures KDB 558074 and IC standard RSS-210.

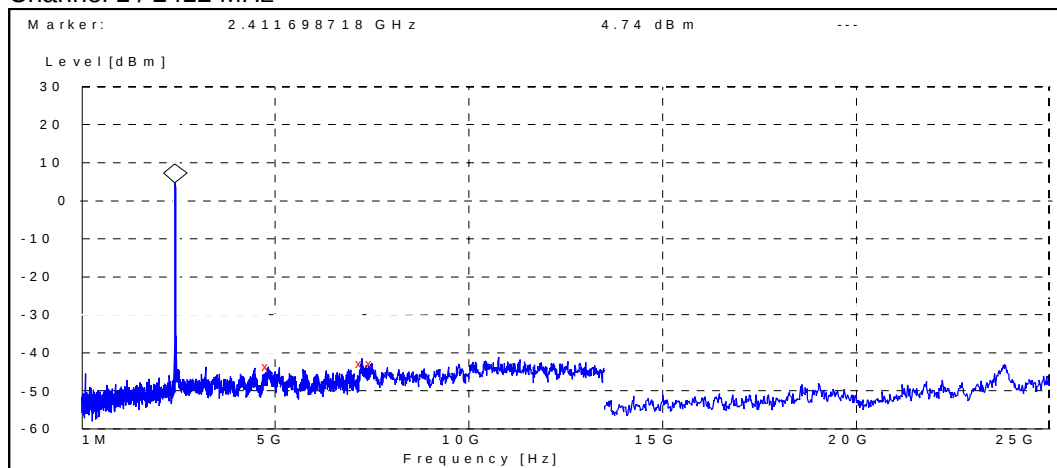
Limits for spurious RF conducted emissions measurements

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

10.2. WLAN Test results

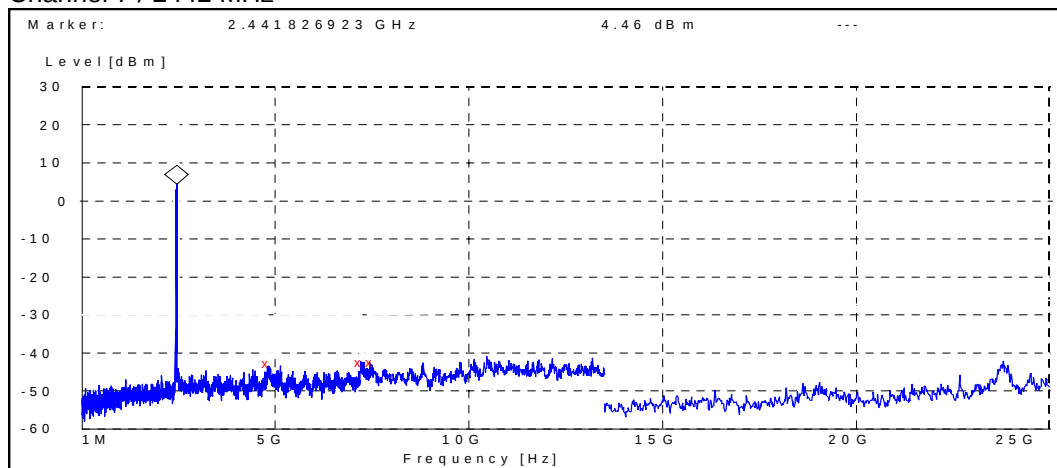
10.2.1 DSSS mode, QPSK modulation, 11 Mbps data rate

Channel 1 / 2412 MHz



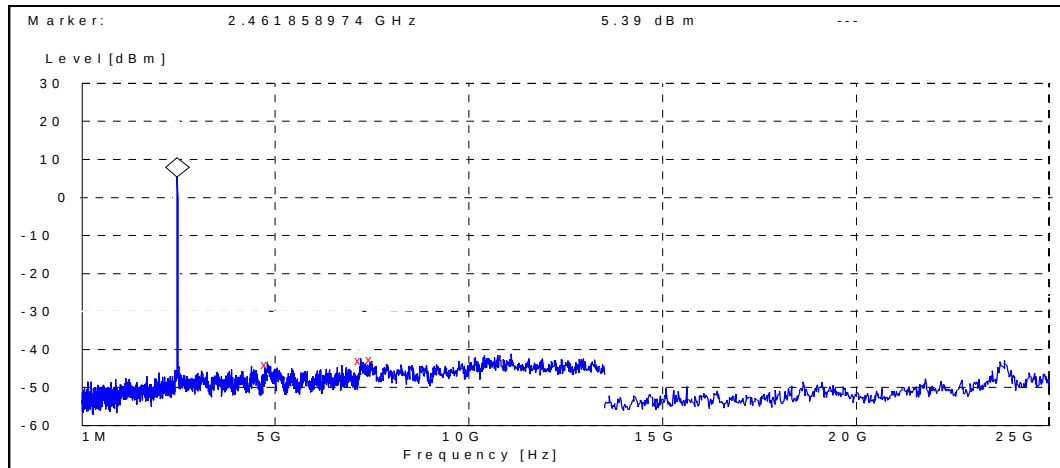
Frequency [MHz]	P [dBc]	Result
4813.461538	-48.438067	PASSED
7243.750000	-47.638067	PASSED
7500.000000	-47.638067	PASSED

Channel 7 / 2442 MHz



Frequency [MHz]	P [dBc]	Result
4809.294872	-47.156665	PASSED
7223.557692	-46.956665	PASSED
7500.000000	-46.956665	PASSED

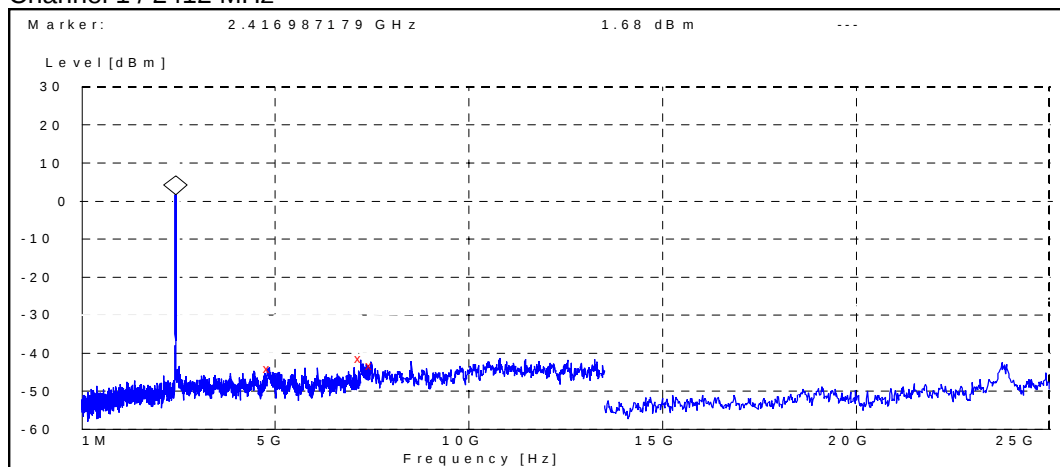
Channel 11 / 2462 MHz



Frequency [MHz]	P [dBc]	Result
4804.487179	-49.290695	PASSED
7208.653846	-48.190695	PASSED
7500.000000	-47.890695	PASSED

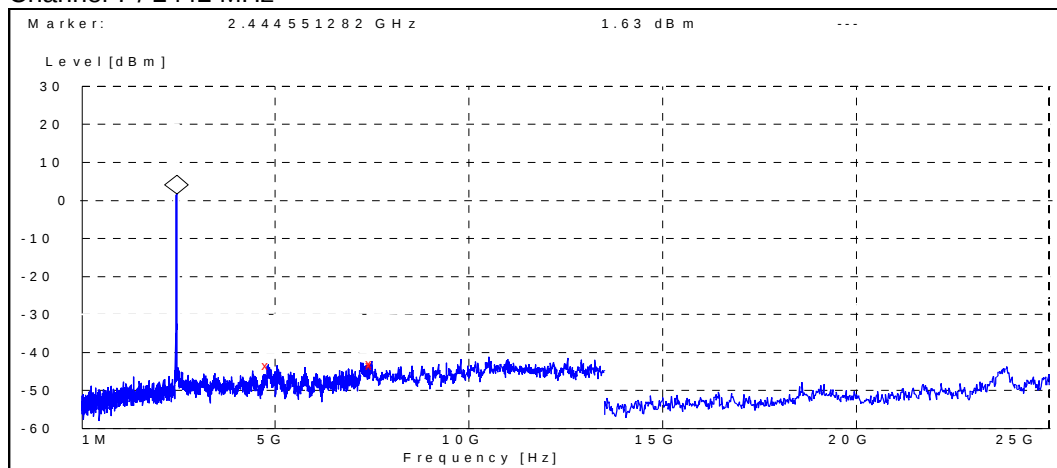
10.2.2 OFDM mode, BPSK modulation, 6 Mbps data rate

Channel 1 / 2412 MHz



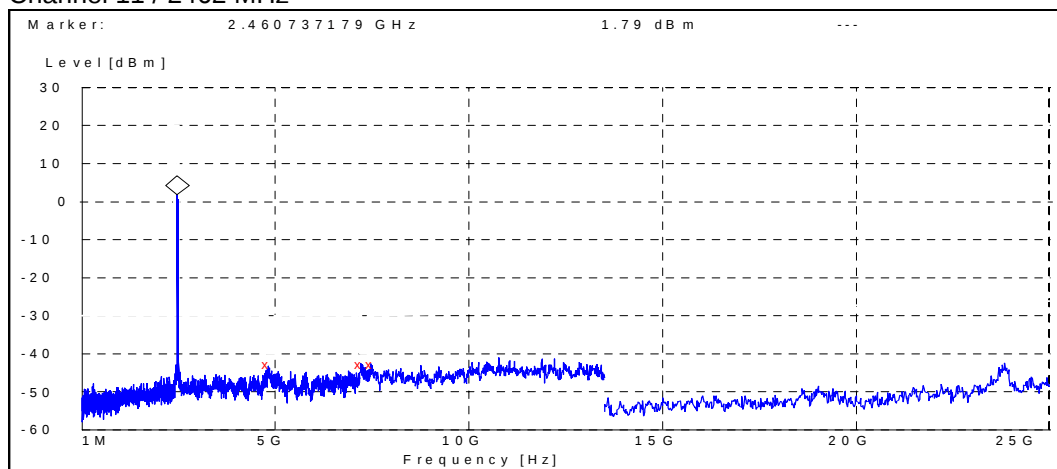
Frequency [MHz]	P [dBc]	Result
4846.153846	-45.681384	PASSED
7204.326923	-43.081384	PASSED
7500.000000	-44.881384	PASSED

Channel 7 / 2442 MHz



Frequency [MHz]	P [dBc]	Result
4812.500000	-45.129168	PASSED
7496.634615	-44.429168	PASSED
7500.000000	-45.029168	PASSED

Channel 11 / 2462 MHz



Frequency [MHz]	P [dBc]	Result
4817.307692	-44.688654	PASSED
7208.653846	-44.688654	PASSED
7500.000000	-44.588654	PASSED

11. 6 dB bandwidth (FCC §15.247(a)(2), RSS-210 A8.2 (1))

EUT with DUT number	RA-6 DUT 40909
Accessories with DUT numbers	BP-4L DUT 40910
Operation Voltage [V] / [Hz]	Nominal
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 43 / 99.4
Date of measurements	3.1.2007
Measured by	Jari Jantunen

11.1. Test method and limit

The measurement is made according to DTS procedures KDB 558074 and IC standard RSS-210.

Limits for 6 dB bandwidth measurements

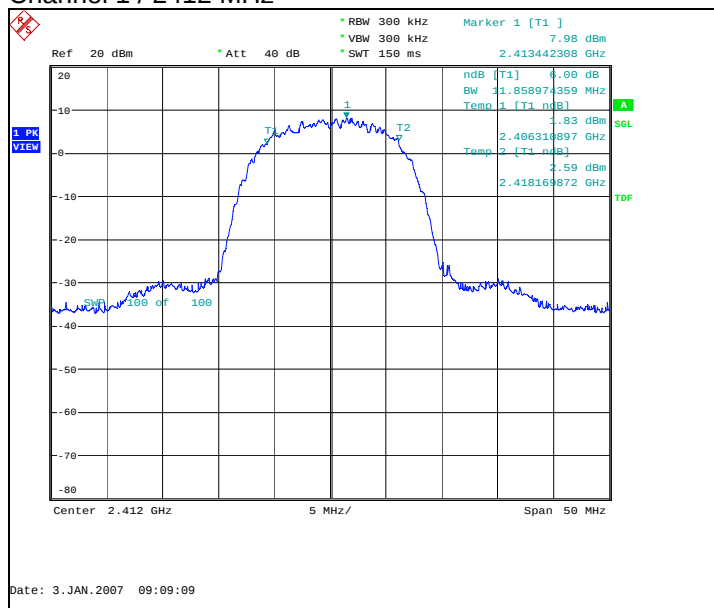
Limit [kHz]
≥ 500

11.2. WLAN test results

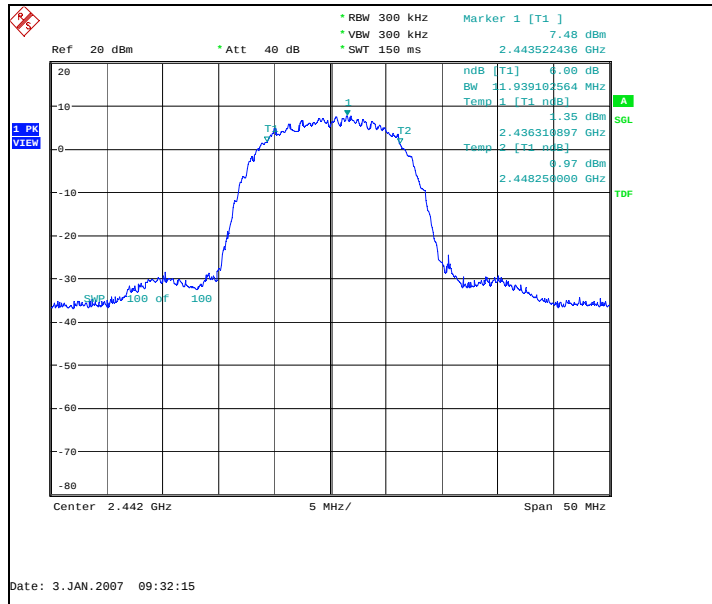
11.2.1 DSSS mode, QPSK modulation, 11 Mbps data rate

Channel / f _c [MHz]	6 dB bandwidth [kHz]	Result
1	11858.974	PASSED
7	11939.103	PASSED
11	12099.359	PASSED

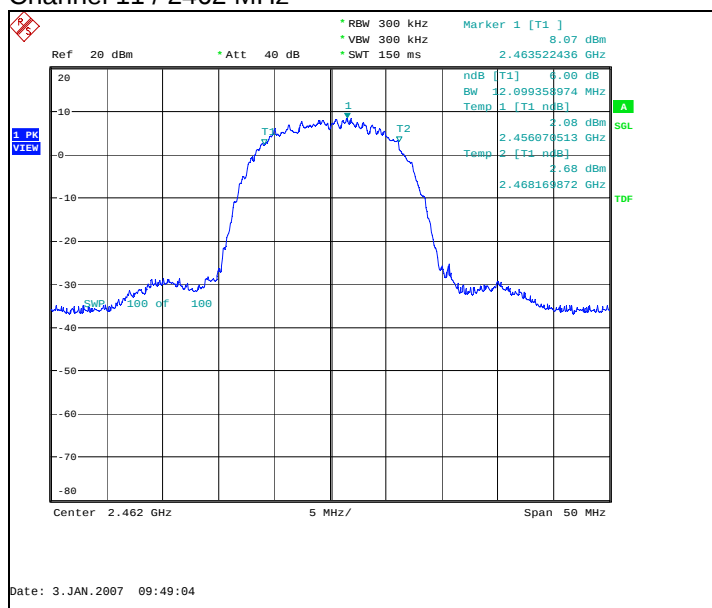
Channel 1 / 2412 MHz



Channel 7 / 2442 MHz



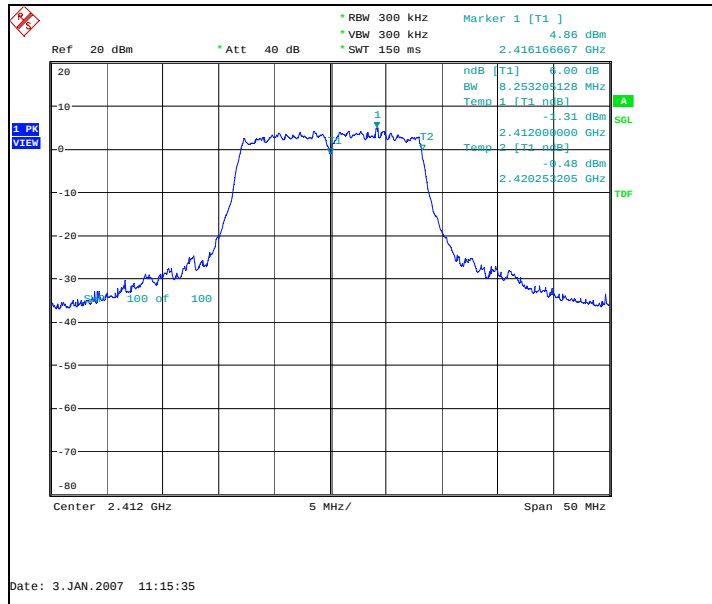
Channel 11 / 2462 MHz



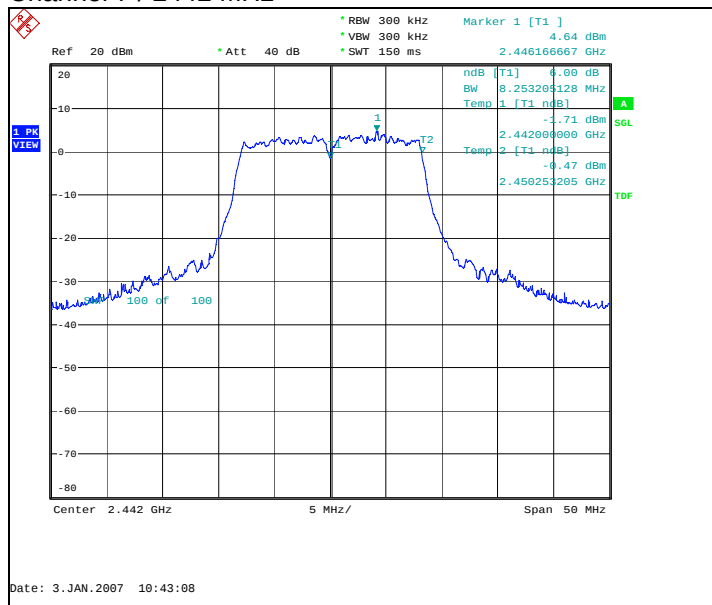
11.2.2 OFDM mode, BPSK modulation, 6 Mbps data rate

Channel / f_c [MHz]	6 dB bandwidth [kHz]	Result
1	8253.205	PASSED
7	8253.205	PASSED
11	16426.282	PASSED

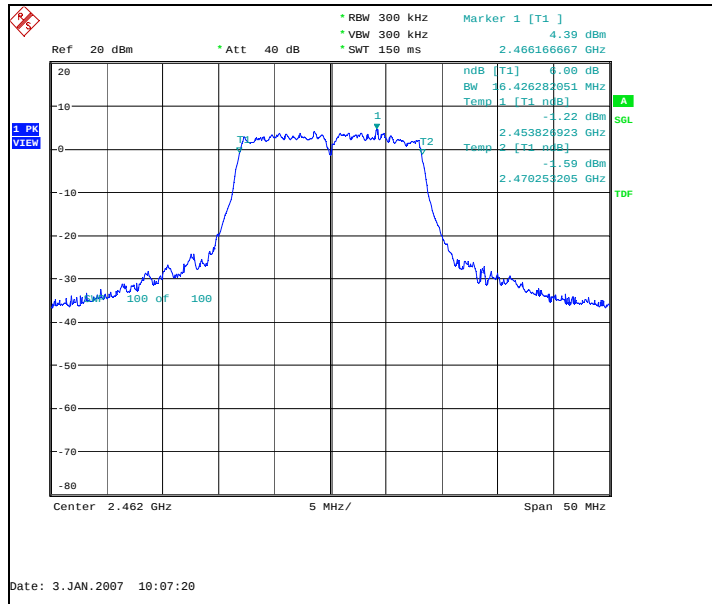
Channel 1 / 2412 MHz



Channel 7 / 2442 MHz



Channel 11 / 2462 MHz



12. Power spectral density (FCC §15.247(e), RSS-210 A8.2 (2))

EUT with DUT number	RA-6 DUT 40909
Accessories with DUT numbers	BP-4L DUT 40910
Operation Voltage [V] / [Hz]	Nominal
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 43 / 99.4
Date of measurements	3.1.2007
Measured by	Jari Jantunen

12.1. Test method and limit

The measurement is made according to DTS procedures KDB 558074 and IC standard RSS-210.

Limits for power spectral density measurements

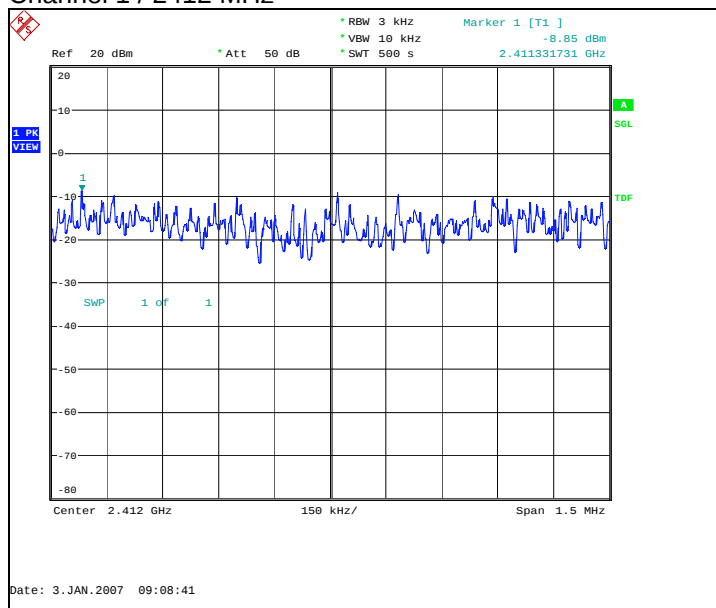
Limit [dBm] @ 3 kHz
≤ 8

12.2. WLAN test results

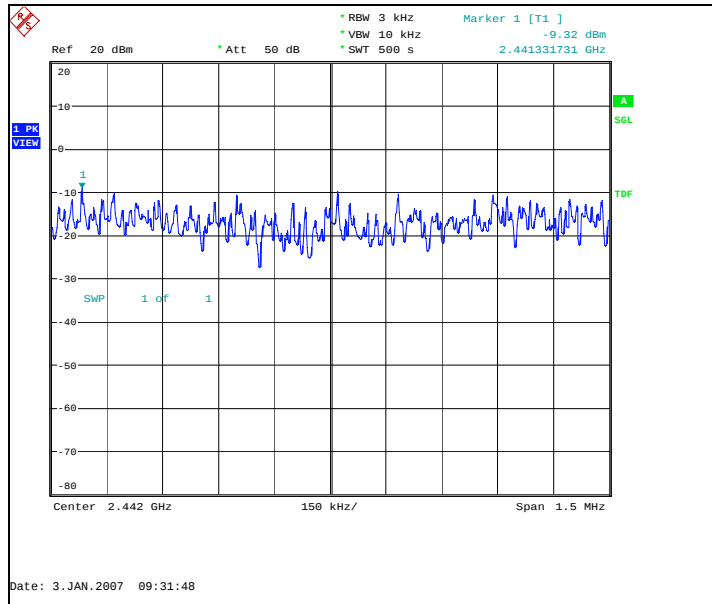
12.2.1 DSSS mode, QPSK modulation, 11 Mbps data rate

Channel / f_c [MHz]	P [dBm]	Result
1 / 2412	-8.85	PASSED
7 / 2442	-9.32	PASSED
11 / 2462	-8.48	PASSED

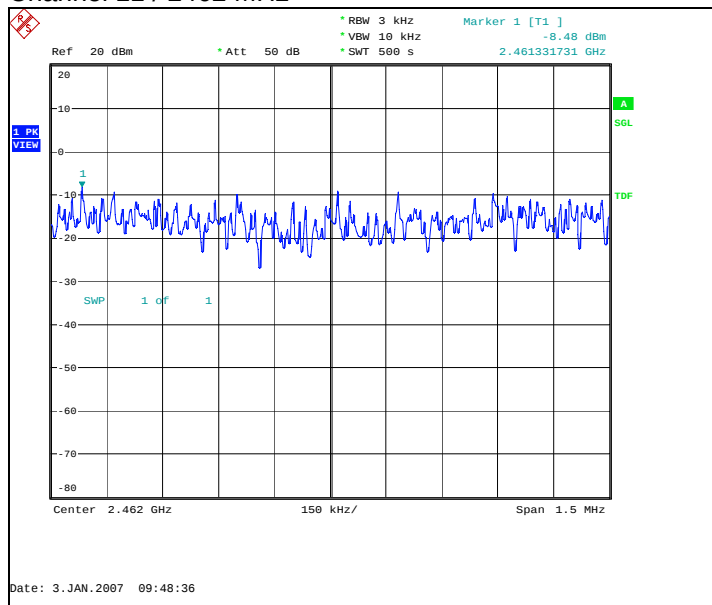
Channel 1 / 2412 MHz



Channel 7 / 2442 MHz



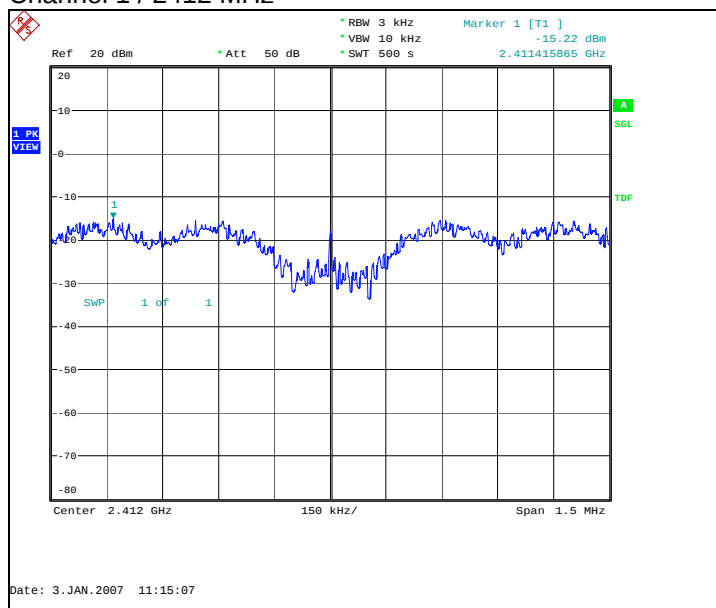
Channel 11 / 2462 MHz



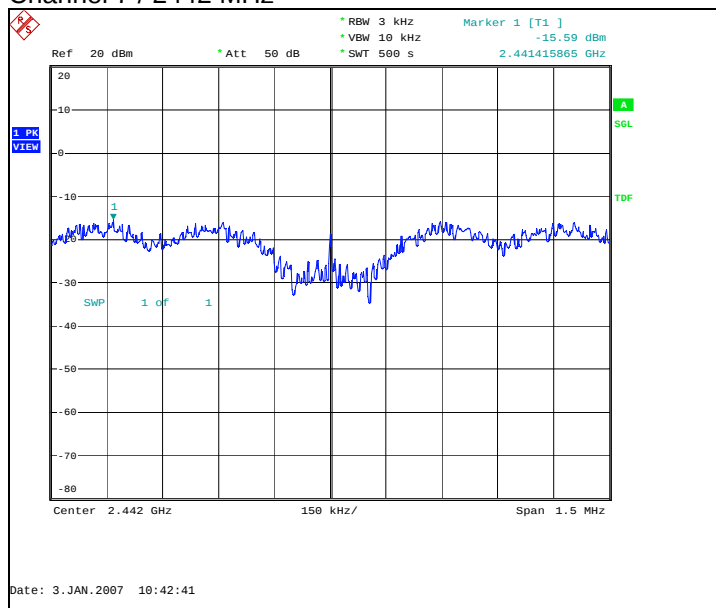
12.2.2 OFDM mode, BPSK modulation, 6 Mbps data rate

Channel / f_c [MHz]	P [dBm]	Result
1 / 2412	-15.22	PASSED
7 / 2442	-15.59	PASSED
11 / 2462	-15.38	PASSED

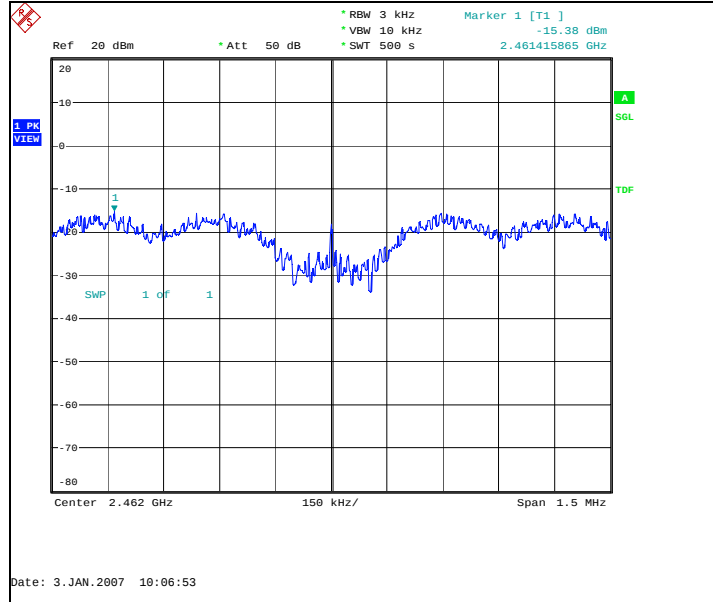
Channel 1 / 2412 MHz



Channel 7 / 2442 MHz



Channel 11 / 2462 MHz



13. Test Equipment

13.1. Conducted measurements

Eq. No	Equipment	Type	Manufacturer	Used in
TM37610	Spectrum analyzer	FSU	R&S	22/24, 15C
TM37678	Radio communication tester	CMU-200	R&S	22/24, 15C
	Attenuator 10 dB	6251.17.A	Huber+Suhner AG	22/24, 15C
TM37499	Power splitter	11667A	Agilent	22/24, 15C
	Temperature chamber	VT4002	Vötsch	22/24, 15C
TM38112	DC power supply	6632A	Agilent	22/24, 15C
TM38111	Multimeter	34401A	Agilent	22/24, 15C
	EMI Test receiver	ESPC	R&S	15C, 15B
TM37773	Radio communication tester	CMU-200	R&S	15C, 15B
TM38631	Signal generator	83640L	Agilent	15C, 15B
TM38114	DC power supply	6632A	Agilent	15C, 15B
TM22835	Multimeter	87	Fluke	15C, 15B
TM30600	Pulse Limiter	ESH3-Z2	R&S	15C, 15B
TM26490	LISN 50 µH	ESH3-Z5/	R&S	15C, 15B
TM30636	LISN 50 µH	L2-16/	PMM	15C, 15B

13.2. Radiated measurements

Eq. No	Equipment	Type	Manufacturer	Used in
TM30599	3m semi-anechoic chamber		TDK	22/24, 15C, 15B
TM38845	EMI receiver	ESI 40	R&S	22/24, 15C, 15B
TM37498	Preamplifier	AMF-5D-020180-26-10P	MITEQ	22/24, 15C, 15B
TM37523	Preamplifier	AMF-4D-10M-3G-25-20P	MITEQ	22/24, 15C, 15B
TM37516	Biconilog antenna	HL562	R&S	22/24, 15C, 15B
TM26496	Double ridged waveguide antenna	3115	EMCO	22/24, 15C, 15B
TM39158	Horn antenna	3116	EMCO	22/24, 15C, 15B
TM26492	Reference dipole set	UHAP/VHAP	Schwarzbeck	22/24, 15C, 15B
TM37501	Dipole antenna	3125-870	EMCO	22/24
TM37502	Dipole antenna	3125-1880	EMCO	22/24
TM37773	Radio communication tester	CMU-200	R&S	22/24, 15C, 15B
TM38631	Signal generator	83640L	Agilent	22/24, 15C, 15B
TM38066	High pass filter	4HC3000/18000-3-KK	Trilithic	22/24, 15C, 15B
	High pass filter	WHK2010-10SS	Trilithic	22/24, 15C, 15B
	Low pass filter	WLK1750-10SS	Trilithic	22/24, 15C, 15B
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	22/24, 15C, 15B
TM26500	Turntable	DS412	Deisel	22/24, 15C, 15B
TM38842	Antenna mast controller	2090	EMCO	22/24, 15C, 15B
TM38843	Antenna mast	2075	EMCO	22/24, 15C, 15B
TM38114	DC power supply	6632A	Agilent	22/24, 15C, 15B
TM22835	Multimeter	87	Fluke	22/24, 15C, 15B