

FCC Part 15C Compliance Test Report

Test Report no.:	Tre_FCC_0640_03.doc	Date of Report:	17.10.2006
Number of pages:	31	Customer's Contact person:	Jorma Hanni
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 50 Elektroniikkatie 10 FIN-90571 OULU, FINLAND Tel. +358 (0) 7180 08000 Fax. +358 (0) 7180 47222
FCC listing no.:	94436		
IC recognition no.:	3608		
Tested devices/ accessories:	GSM phone RM-188 / Battery BL-5C, Headset HS-5 and AC- Charger AC-3		
FCC ID:	LJPRM-188	IC:	661E-RM188
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	4.10.2006
Testing completed	12.10.2006
The customer's contact person	Jorma Hanni
Test Plan referred to	\\EMC\\TESTPLAN\\
Notes	-
Document name	T:\\Projects\\RM-188\\EMC\\Results\\FCC\\Tre_FCC_0640_03.doc

1.1. EUT and Accessory Information

The EUT is a WLAN device. WLAN is tested with maximum rated TX power.

Product	Type	SN	HW	MV	SW	DUT
GSM phone	RM-188	004400881613929	12051001	-	3.19	40839
GSM phone	RM-188	004400881613853	12051001	-	3.19	40845
Battery	BL-5C	-	-	-	-	40379
Battery	BL-5C	-	-	-	-	40846
AC Charger	AC-3E	-	-	-	-	40843
Headset	HS-5	-	-	-	-	40844

1.2. Summary of Test Results

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	PASSED
15.207	7.2.2	AC powerline conducted emissions	PASSED
15.247(a)(2)	A8.2 (1)	6 dB bandwidth	PASSED
15.247(e)	A8.2 (2)	Power spectral density	PASSED

PASSED

The EUT complies with the essential requirements in the standard.

FAILED

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

NP

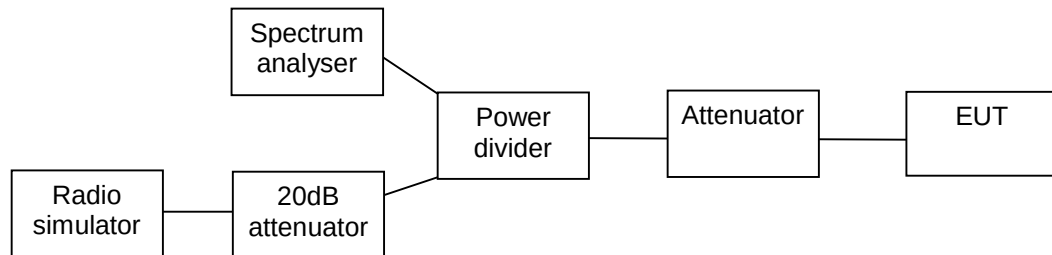
The test was not performed by the TCC Nokia Tampere Laboratory.

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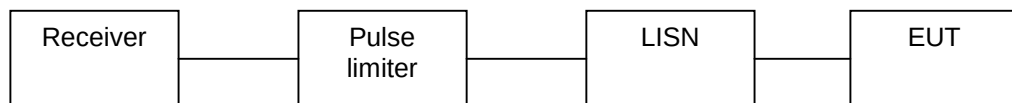
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2. Test setups

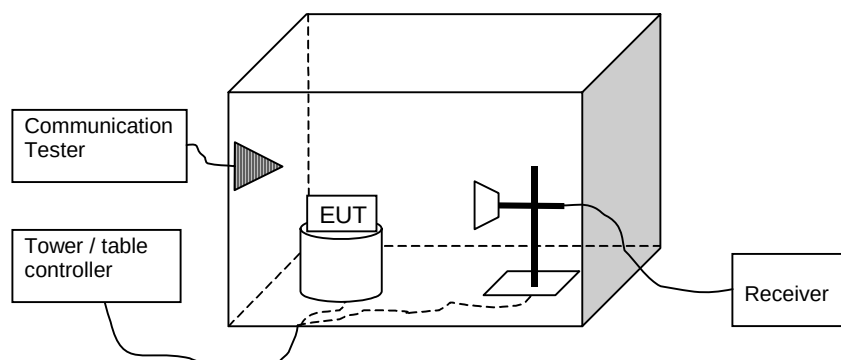
2.1. Conducted RF test setup



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 (4))

EUT with DUT number	RM-188 DUT 40845
Accessories with DUT numbers	BL-5C DUT 40846
Operation Voltage [V] / [Hz]	3.7 VDC
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 42 / 99.9
Date of measurements	4.10.2006
Measured by	Juho Tuohino

3.1. 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

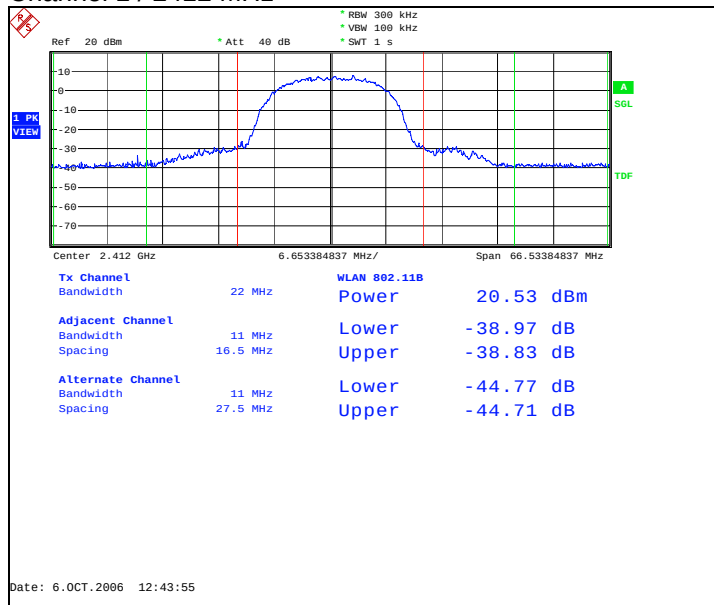
Frequency range [MHz]	Limit [W]	Limit [dBm]
2400 – 2483.5	≤ 1	≤ 30

3.2. WLAN Test results

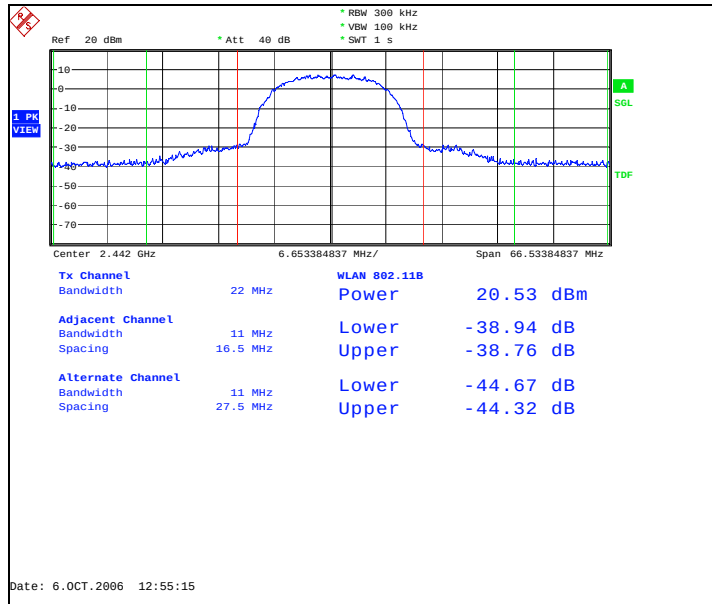
3.2.1 DSSS mode, QPSK modulation, 5.5 Mbps data rate

Channel / f _c [MHz]	P [dBm]	P [W]	Result
1 / 2412	20.53	0.113	Passed
7 / 2442	20.53	0.113	Passed
11 / 2462	20.44	0.111	Passed

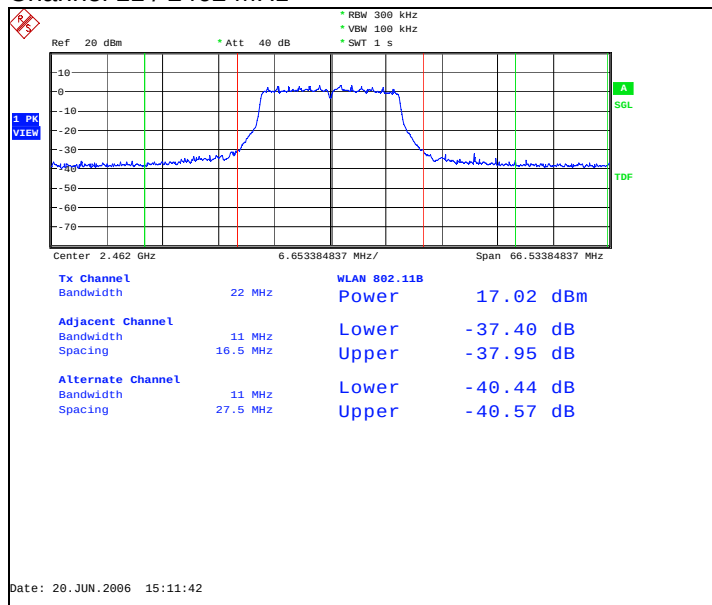
Channel 1 / 2412 MHz



Channel 7 / 2442 MHz



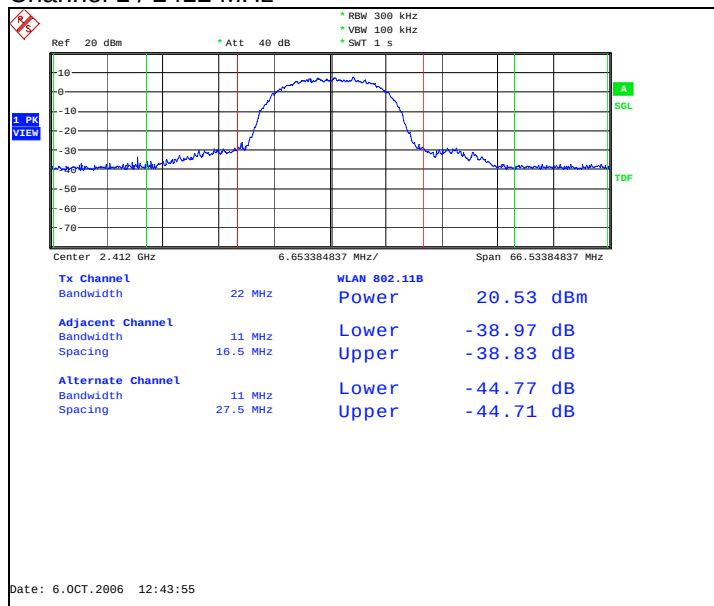
Channel 11 / 2462 MHz



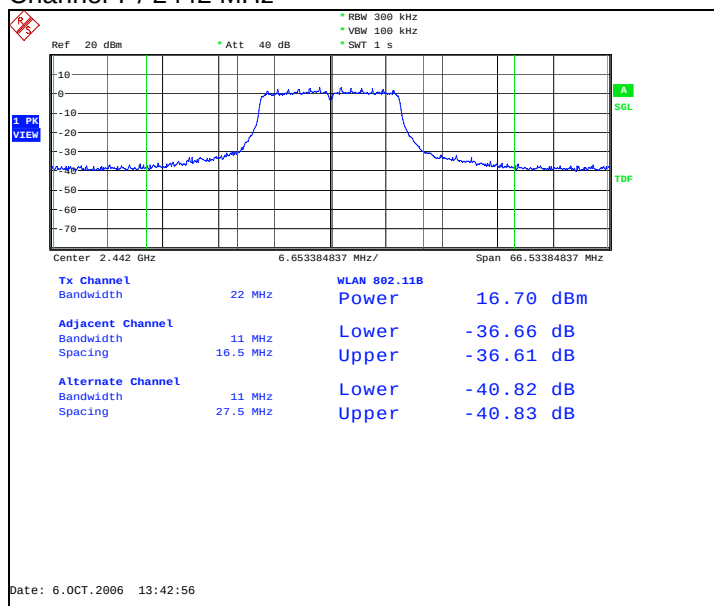
3.2.2 OFDM mode, 64QAM modulation, 48 Mbps data rate

Channel / f _c [MHz]	P [dBm]	P [W]	Result
1 / 2412	17.71	0.059	Passed
7 / 2442	17.34	0.054	Passed
11 / 2462	17.34	0.054	Passed

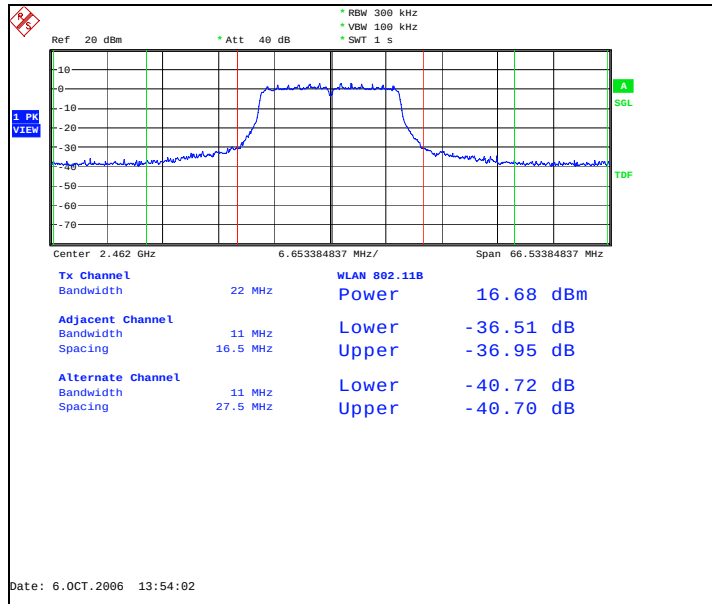
Channel 1 / 2412 MHz



Channel 7 / 2442 MHz



Channel 11 / 2462 MHz



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

EUT with DUT number	RM-188 DUT 40845
Accessories with DUT numbers	BL-5C DUT 40846
Operation Voltage [V] / [Hz]	3.7 VDC
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 42 / 99.9
Date of measurements	4.10.2006
Measured by	Juho Tuohino

4.1. Test method and limit

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

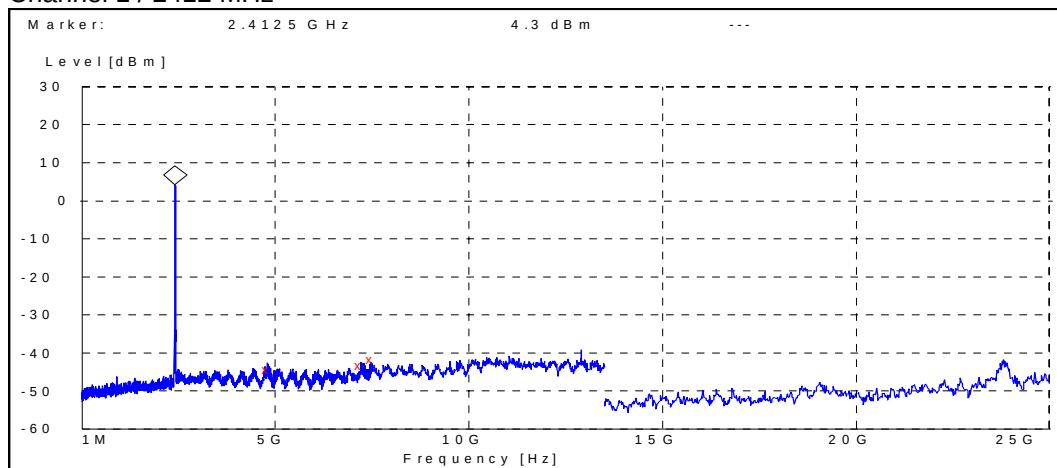
Limits for spurious RF conducted emissions measurements

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

4.2. WLAN Test results

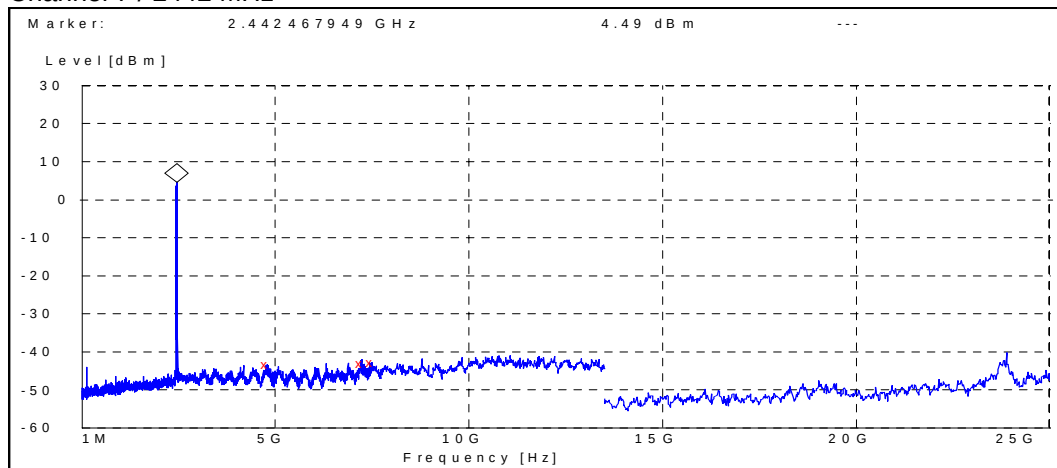
4.2.1 DSSS mode, QPSK modulation, 5.5 Mbps data rate

Channel 1 / 2412 MHz



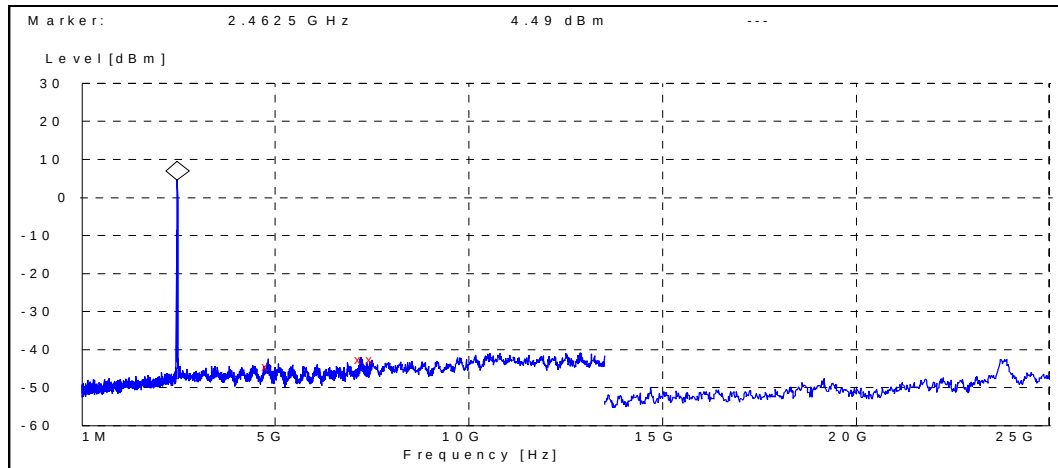
Frequency [MHz]	P [dBc]	Result
4805.769231	-48.503259	Passed
7221.153846	-47.603259	Passed
7500.000000	-46.003259	Passed

Channel 7 / 2442 MHz



Frequency [MHz]	P [dBc]	Result
4805.128205	-47.889696	Passed
7232.692308	-47.489696	Passed
7500.000000	-47.189696	Passed

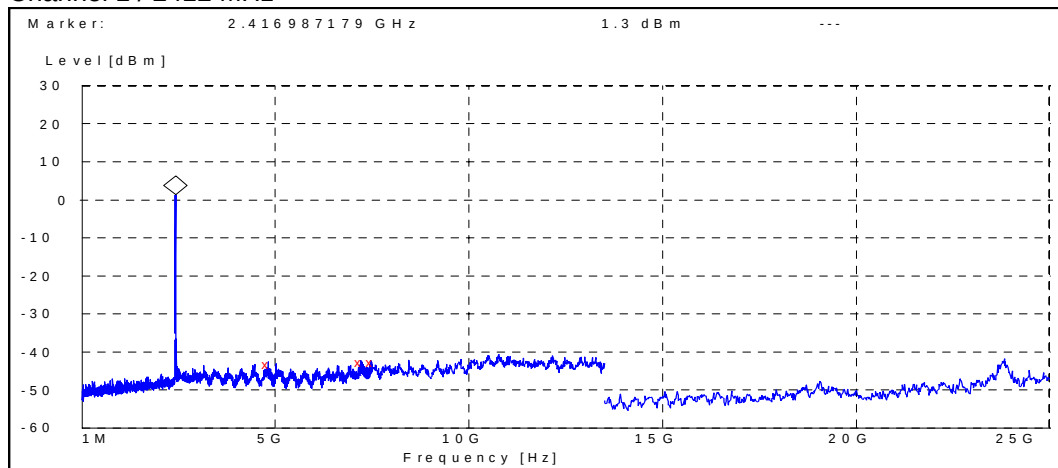
Channel 11 / 2462 MHz



Frequency [MHz]	P [dBc]	Result
4816.025641	-48.789964	Passed
7221.634615	-47.189964	Passed
7500.000000	-47.189964	Passed

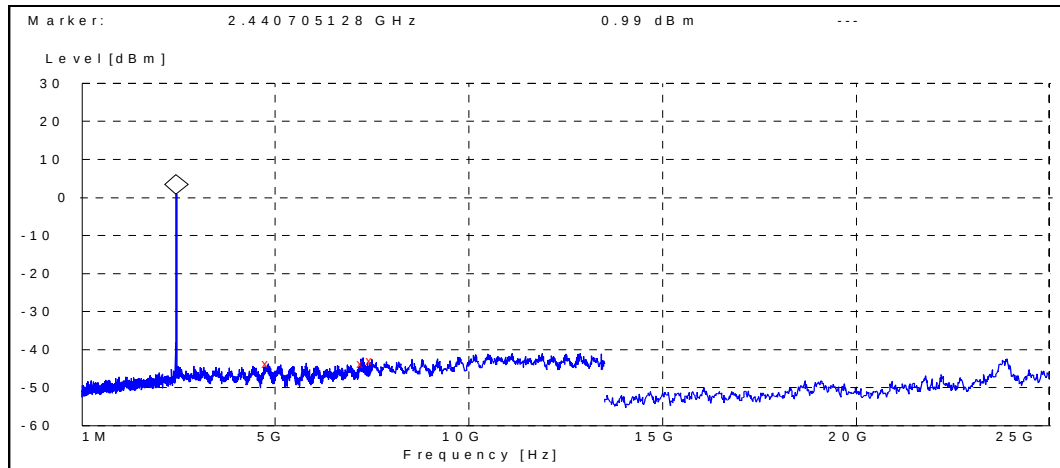
4.2.2 OFDM mode, 64QAM modulation, 48 Mbps data rate

Channel 1 / 2412 MHz



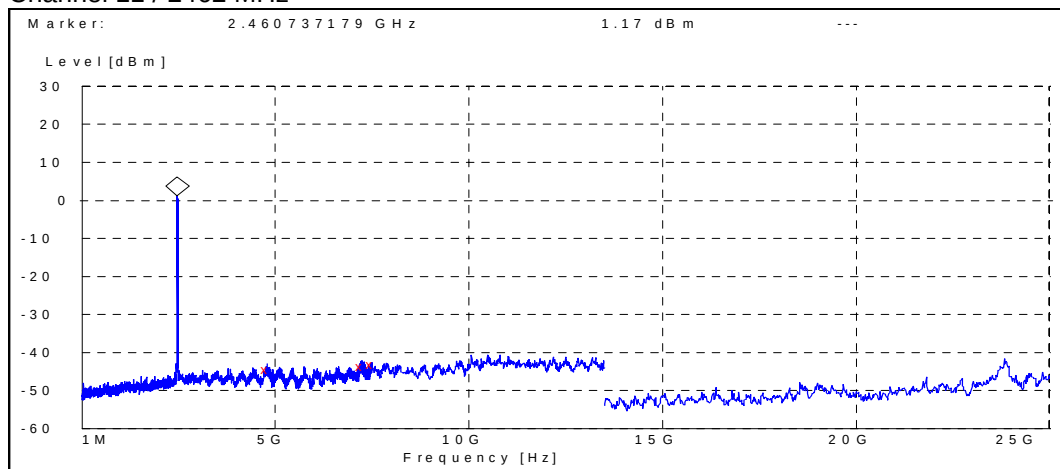
Frequency [MHz]	P [dBc]	Result
4809.294872	-44.600929	Passed
7200.480769	-44.100929	Passed
7500.000000	-44.200929	Passed

Channel 7 / 2442 MHz



Frequency [MHz]	P [dBc]	Result
4816.987179	-44.485383	Passed
7252.403846	-44.685383	Passed
7500.000000	-43.885383	Passed

Channel 11 / 2462 MHz



Frequency [MHz]	P [dBc]	Result
4805.128205	-45.572366	Passed
7249.038462	-44.772366	Passed
7500.000000	-44.172366	Passed

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

EUT with DUT number	RM-188 DUT 40839
Accessories with DUT numbers	BL-5C DUT 40379, AC-3 DUT 40843, HS-5 DUT 40844
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23 / 46 / 102.9
Date of measurements	12.10.2006
Measured by	Jari Jantunen

5.1. Test method and limit

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

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with absorbers on the floor and measuring antenna at fixed height using 2-axis EUT position system.

The Final Measurement is performed in the Semi-Anechoic Chamber with conducting metal floor, if the Preliminary Measurement results are closer than 20 dB to the permissible value.

The EUT is placed at nonconductive plate at the turntable center.

For each suspected frequency, the turntable is rotated 360 degrees and antenna is scanned from 1 to 4 m. This is repeated for both horizontal and vertical receive antenna polarizations.

The emissions less than 20 dB below the permissible value are reported.

The measurement results are obtained as described below:

$$E [\mu V/m] = U_{RX} + A_{TOT}$$

Where U_{RX} is receiver reading and A_{TOT} is total correction factor including cable loss, antenna factor and preamplifier gain ($A_{TOT} = L_{CABLES} + AF - G_{PREAMP}$).

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

Frequency range [MHz]	Limit [$\mu\text{V/m}$]	Limit [dB $\mu\text{V/m}$]	Detector
30 – 88	100	40	Quasi peak
88 – 216	150	43.5	Quasi peak
216 – 960	200	46	Quasi peak
960 – 1000	500	54	Quasi peak
Above 1000	500	54	Average
Above 1000	5000	74	Peak

5.2. WLAN Test results

5.2.1 DSSS mode, QPSK modulation, 5.5 Mbps data rate

Channel 1 / 2412 MHz

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dB $\mu\text{V/m}$]	E [$\mu\text{V/m}$]	U _{RX} [dB μV]	A _{TOT} [dB]	Polarisation	Result
4824.000000	43.60	151.36	45.30	-1.70	HORIZONTAL	PASSED
7236.000000	42.60	134.90	40.60	2.00	HORIZONTAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dB $\mu\text{V/m}$]	E [$\mu\text{V/m}$]	U _{RX} [dB μV]	A _{TOT} [dB]	Polarisation	Result
4824.000000	31.10	35.89	32.80	-1.70	HORIZONTAL	PASSED
7236.000000	29.50	29.85	27.50	2.00	VERTICAL	PASSED

Channel 7 / 2442 MHz

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dB $\mu\text{V/m}$]	E [$\mu\text{V/m}$]	U _{RX} [dB μV]	A _{TOT} [dB]	Polarisation	Result
4878.757515	42.00	125.89	43.60	-1.60	VERTICAL	PASSED
4883.767535	43.90	156.68	45.50	-1.60	VERTICAL	PASSED
4889.779559	42.00	125.89	43.50	-1.50	VERTICAL	PASSED
7321.639279	43.50	149.62	41.20	2.30	HORIZONTAL	PASSED
7328.153307	43.90	156.68	41.60	2.30	VERTICAL	PASSED
7411.329659	42.70	136.46	39.90	2.80	HORIZONTAL	PASSED
17924.853707	55.00	562.34	33.90	21.10	HORIZONTAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dB $\mu\text{V/m}$]	E [$\mu\text{V/m}$]	U _{RX} [dB μV]	A _{TOT} [dB]	Polarisation	Result
4878.757515	30.80	34.67	32.40	-1.60	VERTICAL	PASSED
4884.267535	29.90	31.26	31.50	-1.60	VERTICAL	PASSED
4890.279559	28.30	26.00	29.80	-1.50	VERTICAL	PASSED
7320.639279	29.60	30.20	27.30	2.30	HORIZONTAL	PASSED
7323.653307	30.00	31.62	27.70	2.30	VERTICAL	PASSED
7416.829659	30.10	31.99	27.30	2.80	HORIZONTAL	PASSED
17924.353707	42.10	127.35	21.00	21.10	HORIZONTAL	PASSED

Channel 11 / 2462 MHz

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4924.000000	44.50	167.88	45.90	-1.40	VERTICAL	PASSED
7386.000000	42.80	138.04	40.20	2.60	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4924.000000	30.40	33.11	31.80	-1.40	HORIZONTAL	PASSED
7386.000000	30.40	33.11	27.80	2.60	VERTICAL	PASSED

5.2.2 OFDM mode, 64QAM modulation, 48 Mbps data rate

Channel 1 / 2412 MHz

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4824.000000	40.50	105.93	42.20	-1.70	HORIZONTAL	PASSED
7236.000000	42.50	133.35	40.50	2.00	HORIZONTAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4824.000000	28.10	25.41	29.80	-1.70	HORIZONTAL	PASSED
7236.000000	29.30	29.17	27.30	2.00	VERTICAL	PASSED

Channel 7 / 2442 MHz

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4884.769539	41.20	114.82	42.80	-1.60	VERTICAL	PASSED
4886.275551	41.10	113.50	42.70	-1.60	VERTICAL	PASSED
7279.063126	42.90	139.64	40.50	2.40	VERTICAL	PASSED
7414.831663	42.70	136.46	39.90	2.80	VERTICAL	PASSED
17994.991984	55.00	562.34	33.70	21.30	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4884.269539	29.00	28.18	30.60	-1.60	VERTICAL	PASSED
4888.775551	28.10	25.41	29.60	-1.50	VERTICAL	PASSED
7281.063126	30.10	31.99	27.70	2.40	VERTICAL	PASSED
7416.331663	30.10	31.99	27.30	2.80	VERTICAL	PASSED
17998.491984	42.50	133.35	21.20	21.30	VERTICAL	PASSED

Channel 11 / 2462 MHz

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Polarisation	Result
4924.000000	42.10	127.35	43.50	-1.40	HORIZONTAL	PASSED
7386.000000	43.30	146.22	40.70	2.60	HORIZONTAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Polarisation	Result
4924.000000	30.90	35.08	32.30	-1.40	HORIZONTAL	PASSED
7386.000000	30.00	31.62	27.40	2.60	VERTICAL	PASSED

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

EUT with DUT number	RM-188 DUT 40839
Accessories with DUT numbers	BL-5C DUT 40379, AC-3 DUT 40843, HS-5 DUT 40844
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23 / 45 / 102.7
Date of measurements	11.10.2006
Measured by	Jari Jantunen

6.1. Test method and limit

The measurement is made according to DTS procedures KDB 558074 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.

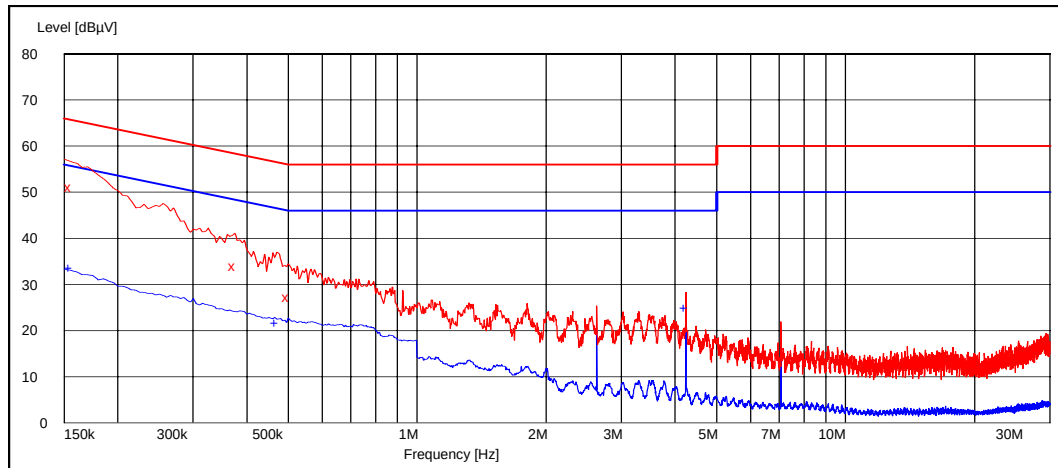
CISPR 22 Class B limits

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

6.2. WLAN Test results

6.2.1 DSSS mode, QPSK modulation, 5.5 Mbps data rate

Channel 7 / 2442 MHz



Quasi peak (RBW: 9 kHz)

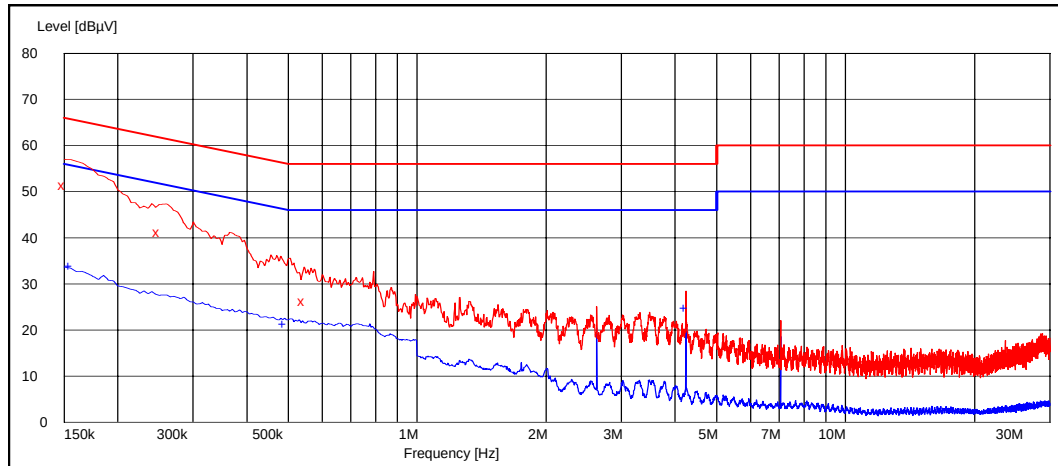
Frequency [MHz]	U [dBμV]	Line	Result
0.155000	51.10	N	PASSED
0.375000	34.00	N	PASSED
0.500000	27.20	N	PASSED

Average (RBW: 9 kHz)

Frequency [MHz]	U [dBμV]	Line	Result
0.155000	33.60	L1	PASSED
0.470000	21.50	L1	PASSED
4.240000	24.80	N	PASSED

6.2.2 OFDM mode, QPSK modulation, 48 Mbps data rate

Channel 7 / 2442 MHz



Quasi peak (RBW: 9 kHz)

Frequency [MHz]	U [dBμV]	Line	Result
0.150000	51.50	L1	PASSED
0.250000	41.30	L1	PASSED
0.545000	26.20	N	PASSED

Average (RBW: 9 kHz)

Frequency [MHz]	U [dBμV]	Line	Result
0.155000	33.70	L1	PASSED
0.490000	21.30	L1	PASSED
4.240000	24.70	N	PASSED

7. 6 dB bandwidth (FCC §15.247(a)(2), RSS-210 A8.2 (1))

EUT with DUT number	RM-188 DUT 40845
Accessories with DUT numbers	BL-5C DUT 40846
Operation Voltage [V] / [Hz]	3.7 VDC
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 42 / 99.9
Date of measurements	4.10.2006
Measured by	Juho Tuohino

7.1. 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

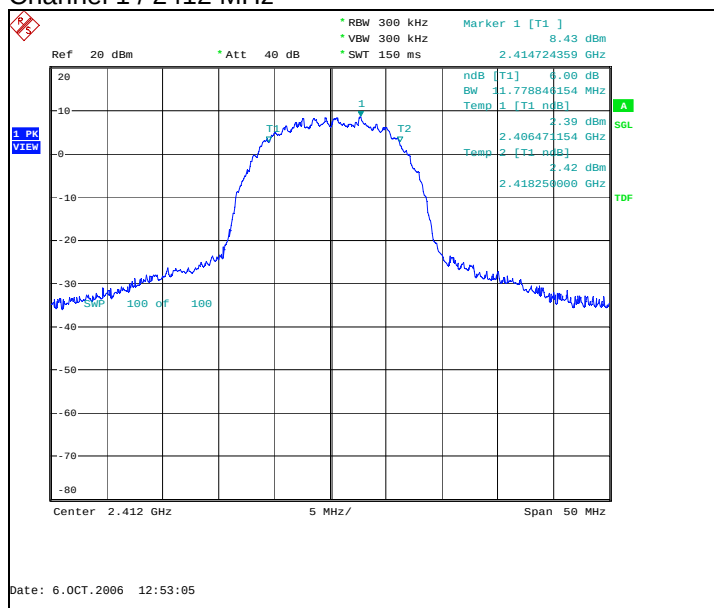
Limit [kHz]
≥ 500

7.2. WLAN test results

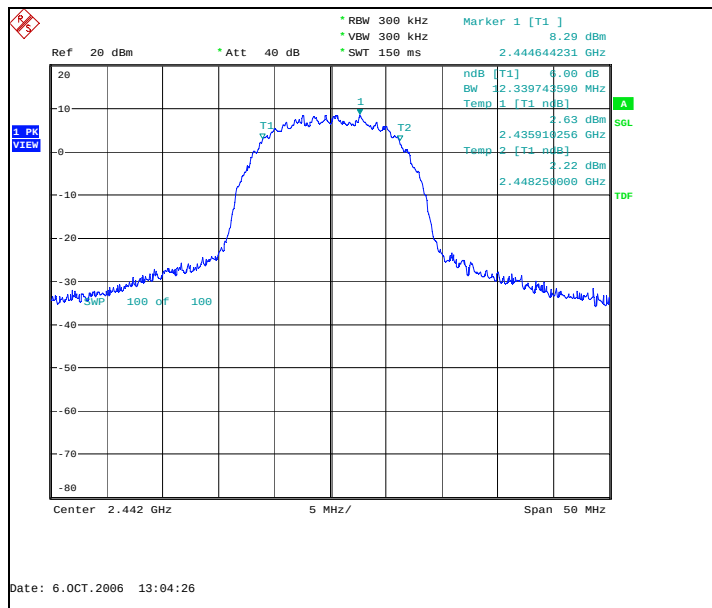
7.2.1 DSSS mode, QPSK modulation, 5.5 Mbps data rate

Channel / f _c [MHz]	6 dB bandwidth [kHz]	Result
1	11778.846	Passed
7	12339.744	Passed
11	12339.744	Passed

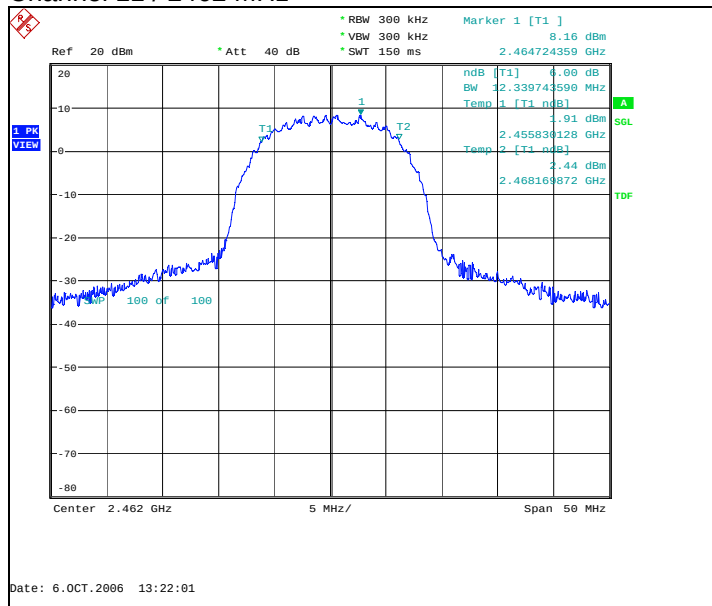
Channel 1 / 2412 MHz



Channel 7 / 2442 MHz



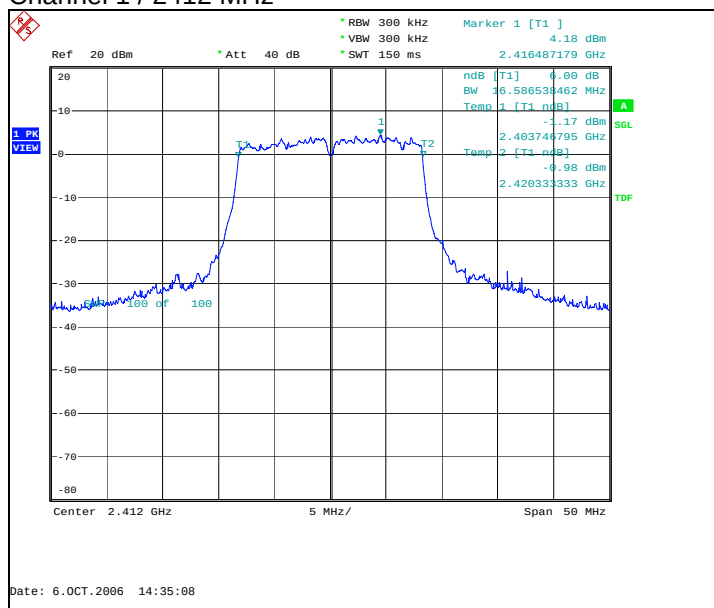
Channel 11 / 2462 MHz



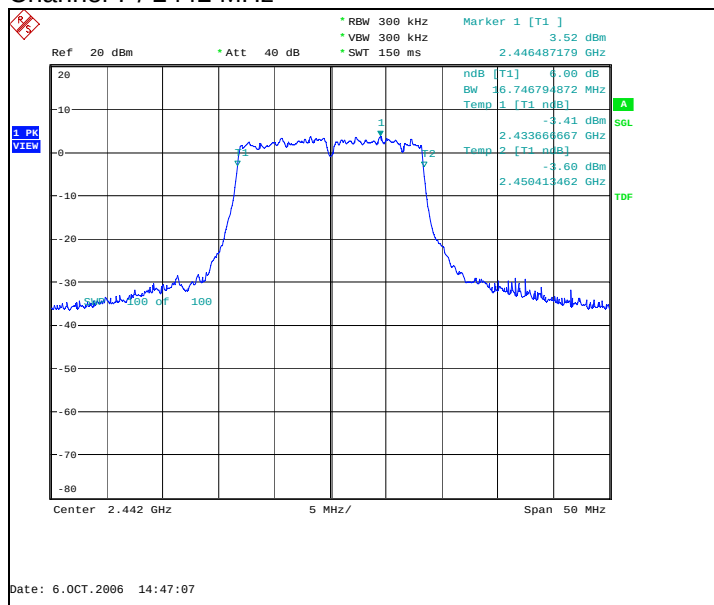
7.2.2 OFDM mode, 64QAM modulation, 48 Mbps data rate

Channel / f _c [MHz]	6 dB bandwidth [kHz]	Result
1	16586.538	Passed
7	16746.795	Passed
11	16666.667	Passed

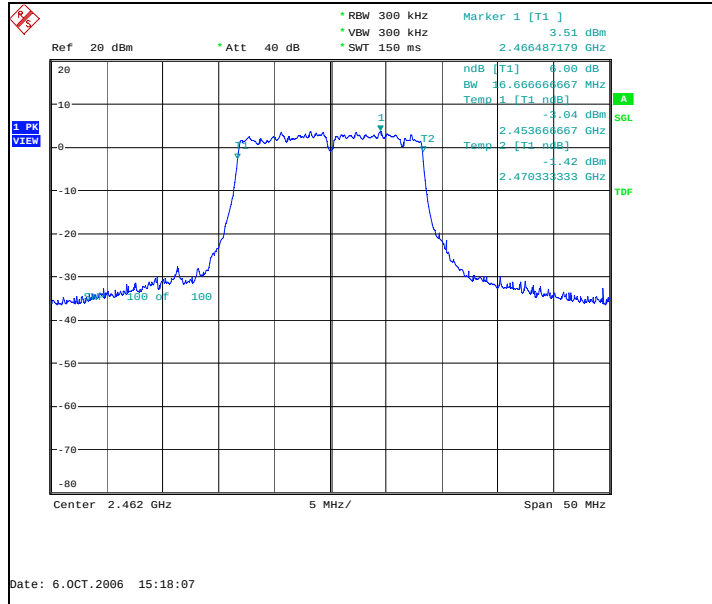
Channel 1 / 2412 MHz



Channel 7 / 2442 MHz



Channel 11 / 2462 MHz



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

EUT with DUT number	RM-188 DUT 40845
Accessories with DUT numbers	BL-5C DUT 40846
Operation Voltage [V] / [Hz]	3.7 VDC
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 42 / 99.9
Date of measurements	4.10.2006
Measured by	Juho Tuohino

8.1. 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

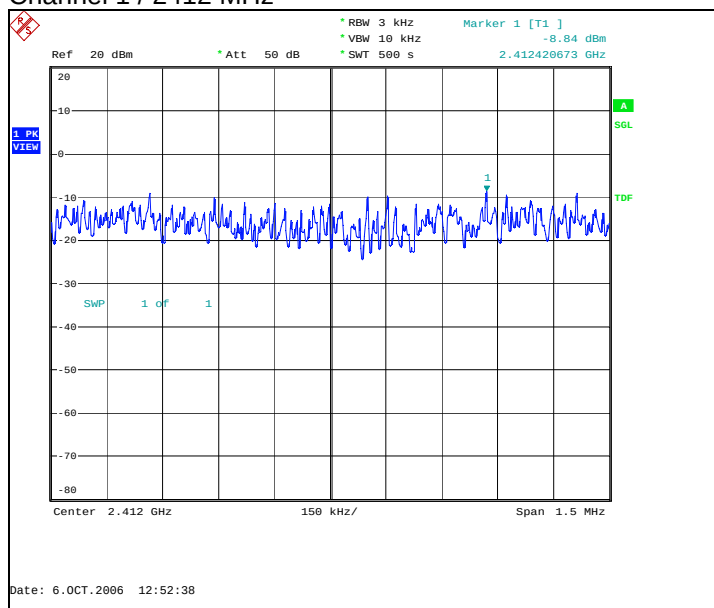
Limit [dBm] @ 3 kHz
≤ 8

8.2. WLAN test results

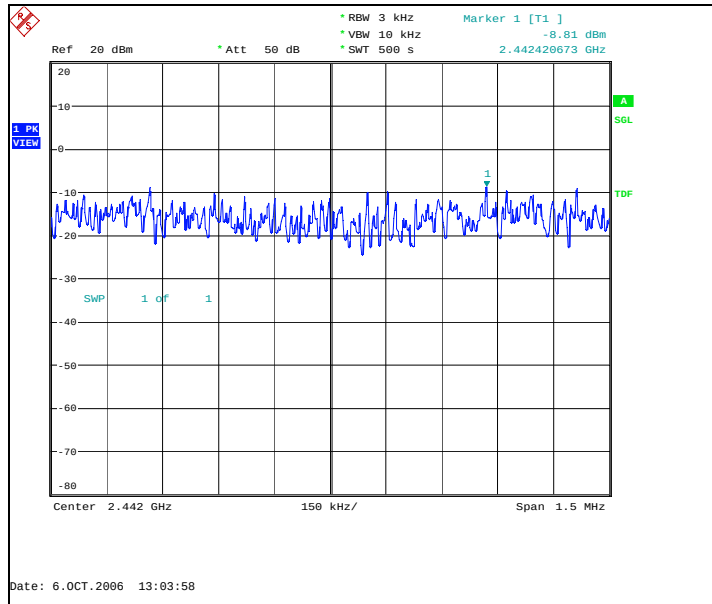
8.2.1 DSSS mode, QPSK modulation, 5.5 Mbps data rate

Channel / f_c [MHz]	P [dBm]	Result
1 / 2412	-8.84	Passed
7 / 2442	-8.81	Passed
11 / 2462	-8.91	Passed

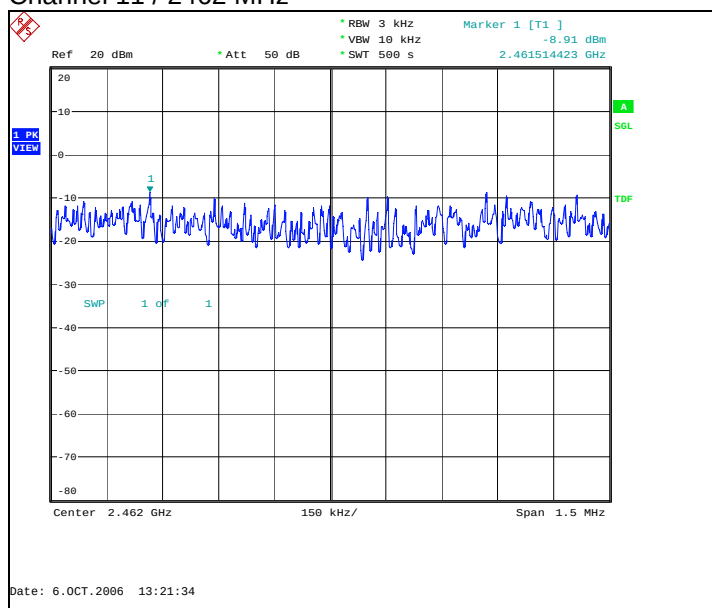
Channel 1 / 2412 MHz



Channel 7 / 2442 MHz



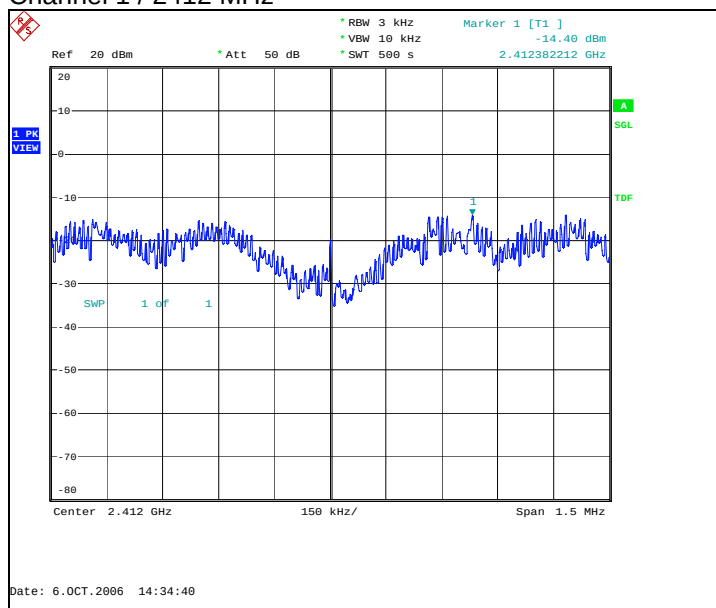
Channel 11 / 2462 MHz



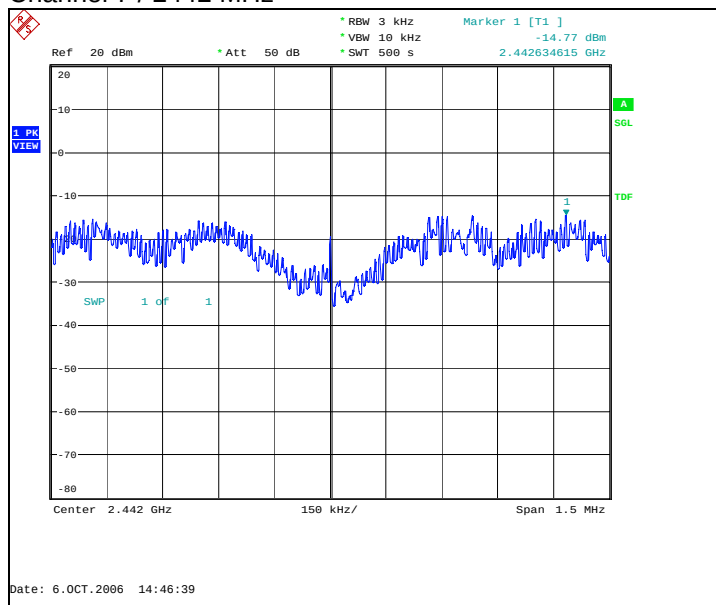
8.2.2 OFDM mode, 64QAM modulation, 48 Mbps data rate

Channel / f_c [MHz]	P [dBm]	Result
1 / 2412	-14.40	Passed
7 / 2442	-14.77	Passed
11 / 2462	-14.67	Passed

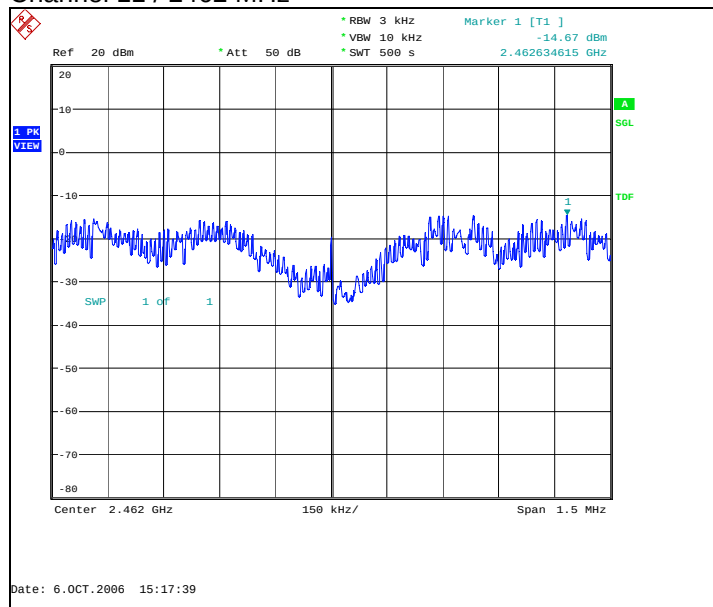
Channel 1 / 2412 MHz



Channel 7 / 2442 MHz



Channel 11 / 2462 MHz



9. Test Equipment

9.1. 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

9.2. 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