

FCC Part 15C Compliance Test Report

Test Report no.:	Salo_FCC_0531_02.doc	Date of Report:	17.08.2005
Number of pages:	41	Customer's Contact person:	Tomi Latvasalo
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FCC listing no.:	533467		
IC recognition no.:	5385		
Tested devices/ accessories:	BT/WLAN Browser SU-18 / Battery BP-5L		
FCC ID:	LJPSU-18	IC:	661E-SU18
Supplement reports:	-		
Testing has been carried out in accordance with:	CFR 47, FCC rules Part 15 Subpart C, ANSI C63.4 (2003) and IC standard 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:			

Tomi Lipponen, System Manager

1. Summary for FCC Part 15C Compliance Test Report

Date of receipt	05.08.2005
Testing completed	05.08.2005
The customer's contact person	Tomi Latvasalo
Test Plan referred to	T:\Projects\accessor\SU-18\testplans\EMC\Tcc\SU-18_testplan.xls
Notes	-
Document name	T:\Projects\accessor\SU-18\results\emc\FCC\Salo_FCC_0531_02.doc

1.1. EUT and Accessory Information

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

Product	Type	SN	HW	MV	SW	DUT
BT/WLAN Browser	SU-18	UQ0001284	1601	-	SU-18R_0.2005.27-2_TA_MRO	10688
BT/WLAN Browser	SU-18	UQ0001703	1601	-	SU-18R_0.2005.27-2_TA_MRO	10689
Battery	BP-5L	0670390393213 M053110263574	-	-	-	10690

1.2. Summary of Test Results

Bluetooth:

Section in CFR 47	Section in RSS-210	Name of the test	Result
15.247(b)(1)	6.2.2(o)(a3)	Peak output power	PASSED
15.247(c)	6.2.2 (o)(e1)	Band edge compliance of RF emissions	-
15.247(c)	6.2.2 (o)(e1)	Spurious RF conducted emissions	PASSED
15.247(c), 15.209	6.2.2 (o)(e1)	Spurious radiated emissions	-
15.207	6.6	AC powerline conducted emissions	-
15.247(a)(1)	6.2.2(o)(a3)	20 dB bandwidth	PASSED
15.247(a)(1)	6.2.2(o)(a1)	Carrier frequency separation	PASSED
15.247(a)(1)(iii)	Amend I(ii)	Number of hopping frequencies	PASSED
15.247(a)(1)(iii)	Amend I(ii)	Time of occupancy	PASSED

WLAN:

Section in CFR 47	Section in RSS-210	Name of the test	Result
15.247(b)(1)	6.2.2(o)(b)	Peak output power	PASSED
15.247(c)	6.2.2(o)(e1)	Band edge compliance of RF emissions	-
15.247(c)	6.2.2(o)(e1)	Spurious RF conducted emissions	PASSED
15.247(c), 15.209	6.2.2(o)(e1)	Spurious radiated emissions	-
15.207	6.6	AC powerline conducted emissions	-
15.247(a)(2)	Amend I(iv)	6 dB bandwidth	PASSED
15.247(e)	Amend I(iv)	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 Salo Laboratory.

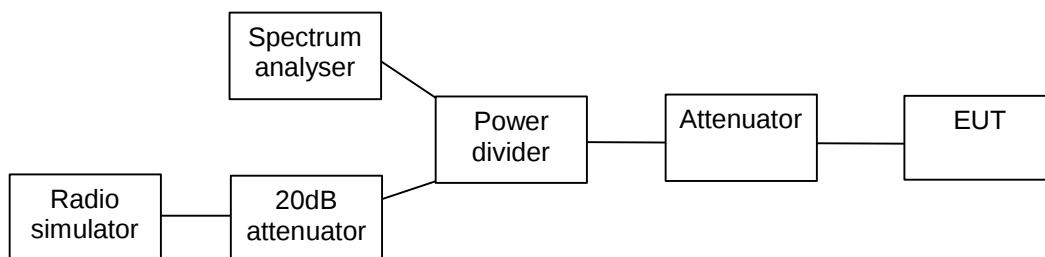
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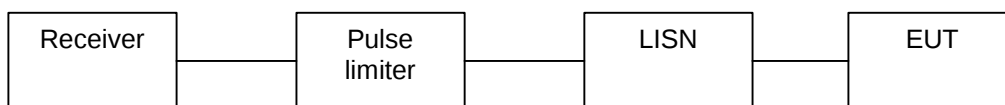
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2. Test setups

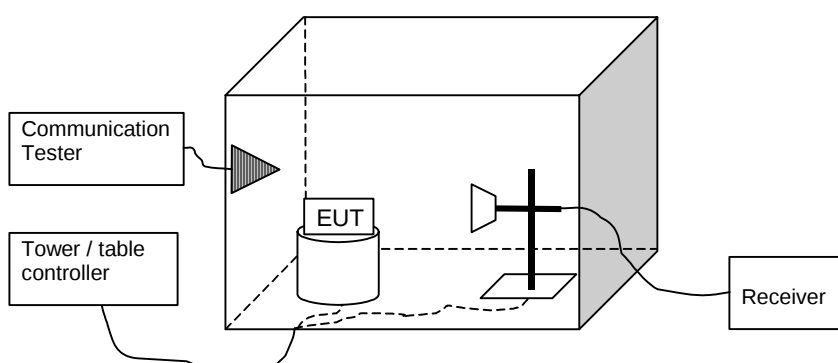
2.1. Conducted RF test setup



2.2. AC powerline conducted emissions test setup



2.3. Spurious radiated emissions test setup



3. Peak output power (FCC §15.247(b)(1), RSS-210 6.2.2(o)(a3))

EUT with DUT number	SU-18, DUT 10688
Accessories with DUT numbers	BP-5L, DUT 10690
Operation Voltage [V] / [Hz]	115/60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21.6/54.7/100.5
Date of measurements	05.08.2005
Measured by	Kai Uusitalo

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

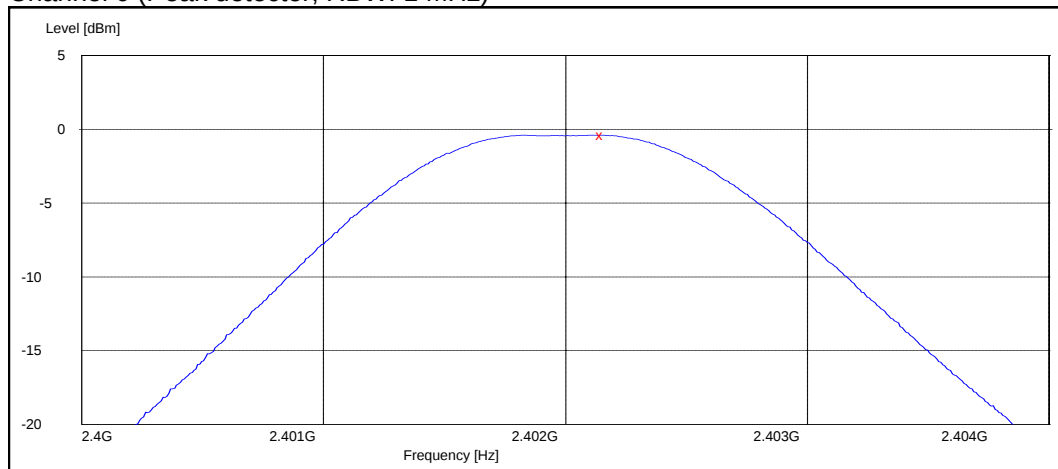
Frequency range [MHz]	Limit [W]	Limit [dBm]
2400 – 2483.5	≤ 1	≤ 30

3.2. Bluetooth Test results

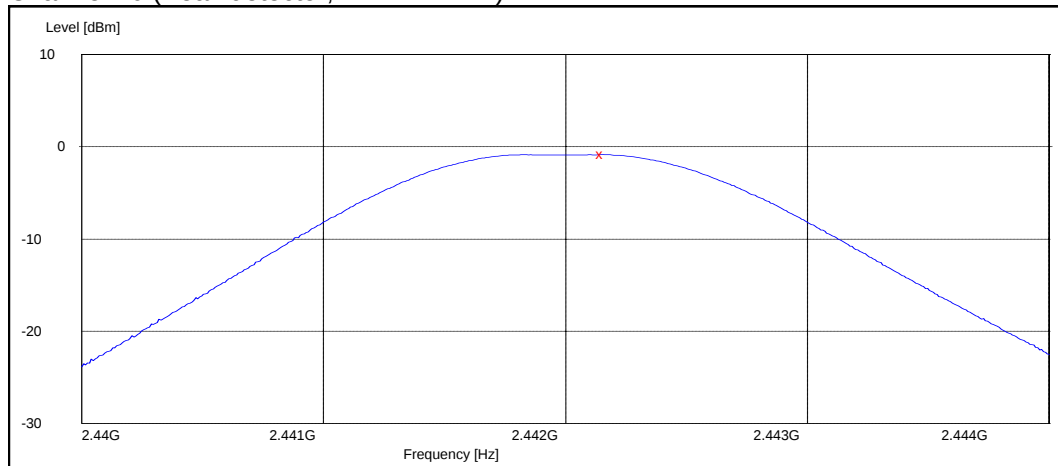
3.2.1 GSKF modulation, PRBS packet type

Channel	P [dBm]	P [mW]	Result
0	-0.40	0.912	PASSED
40	-0.80	0.832	PASSED
78	-1.10	0.776	PASSED

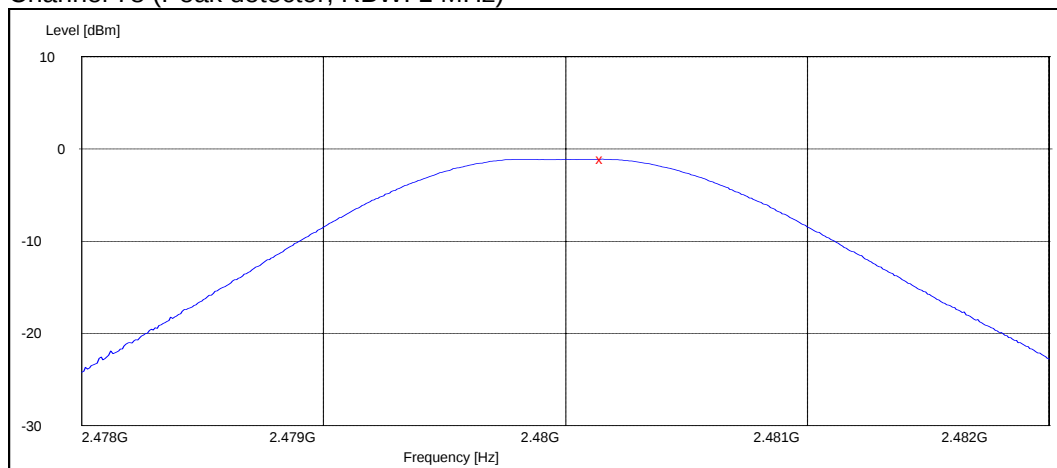
Channel 0 (Peak detector, RBW: 1 MHz)



Channel 40 (Peak detector, RBW: 1 MHz)



Channel 78 (Peak detector, RBW: 1 MHz)



4. Spurious RF conducted emissions (FCC §15.247(c), RSS-210 6.2.2(o)(e1))

EUT with DUT number	SU-18, DUT 10688
Accessories with DUT numbers	BP-5L, DUT 10690
Operation Voltage [V] / [Hz]	115/60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21.6/54.7/100.5
Date of measurements	05.08.2005
Measured by	Kai Uusitalo

4.1. Test method and limit

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

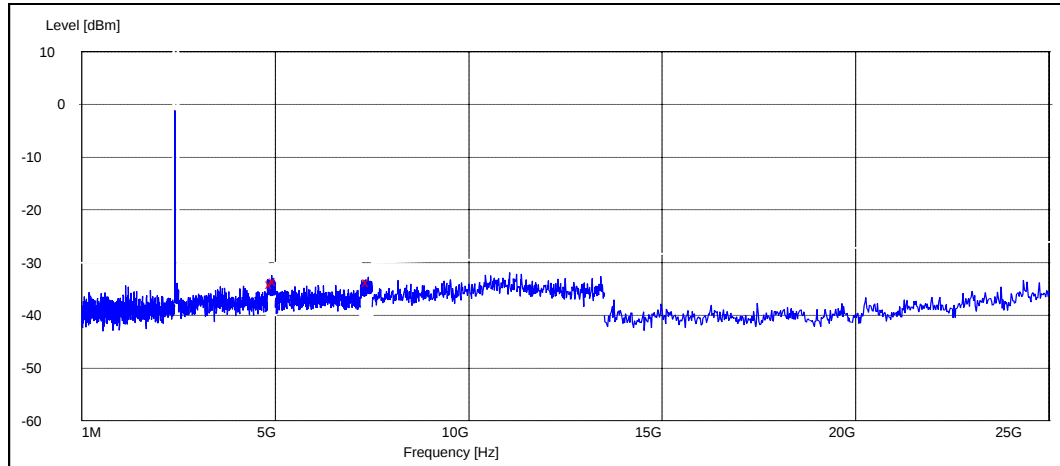
Limits for spurious RF conducted emissions measurements

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

4.2. Bluetooth Test results

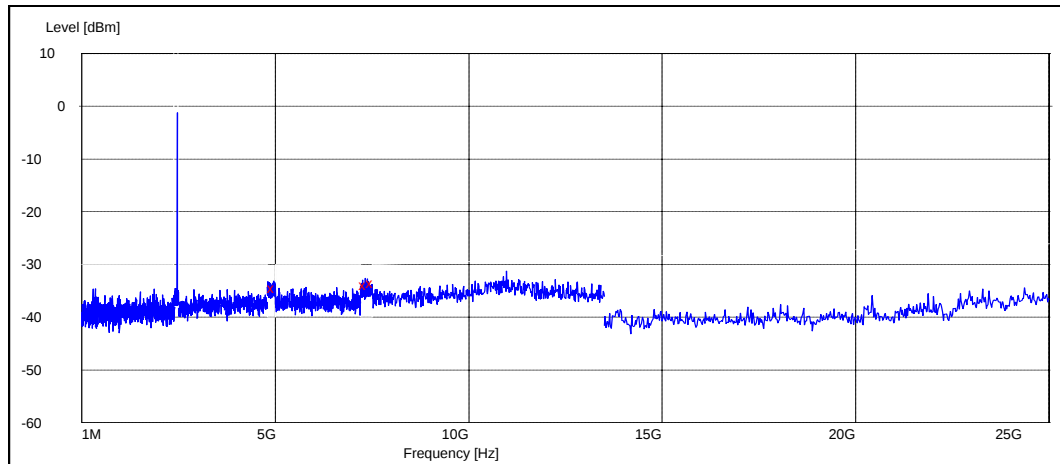
4.2.1 GFSK modulation, PRBS packet type

Channel 0



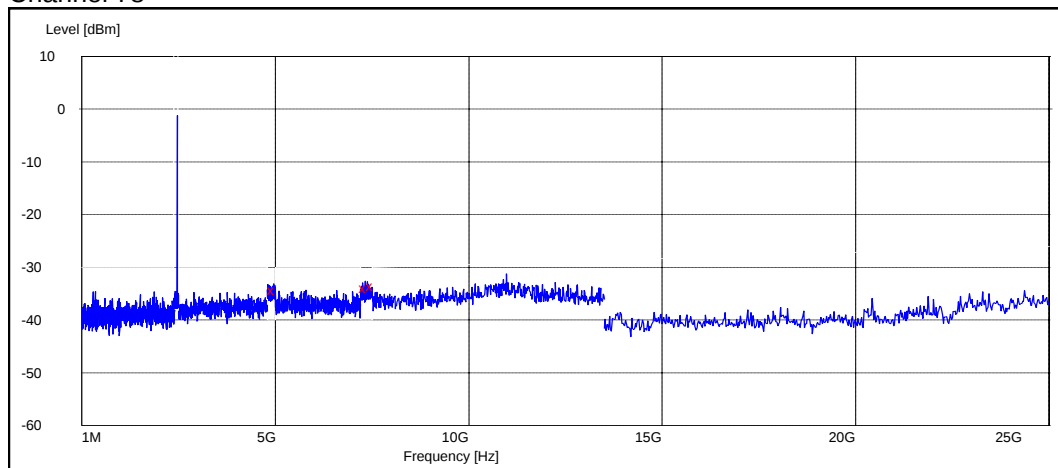
Frequency [MHz]	P [dBc]	Result
4912.400000	-32.962090	PASSED
5000.000000	-32.362090	PASSED
7413.000000	-32.662090	PASSED

Channel 40



Frequency [MHz]	P [dBc]	Result
4938.400000	-31.962090	PASSED
5000.000000	-32.262090	PASSED
7351.200000	-31.362090	PASSED

Channel 78



Frequency [MHz]	P [dBc]	Result
4966.000000	-33.192090	PASSED
7333.200000	-32.692090	PASSED
7500.000000	-32.292090	PASSED

5. 20 dB bandwidth (FCC §15.247(a)(1), RSS-210 6.2.2(o)(a3))

EUT with DUT number	SU-18, DUT 10688
Accessories with DUT numbers	BP-5L, DUT 10690
Operation Voltage [V] / [Hz]	115/60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21.6/54.7/100.5
Date of measurements	05.08.2005
Measured by	Kai Uusitalo

5.1. 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

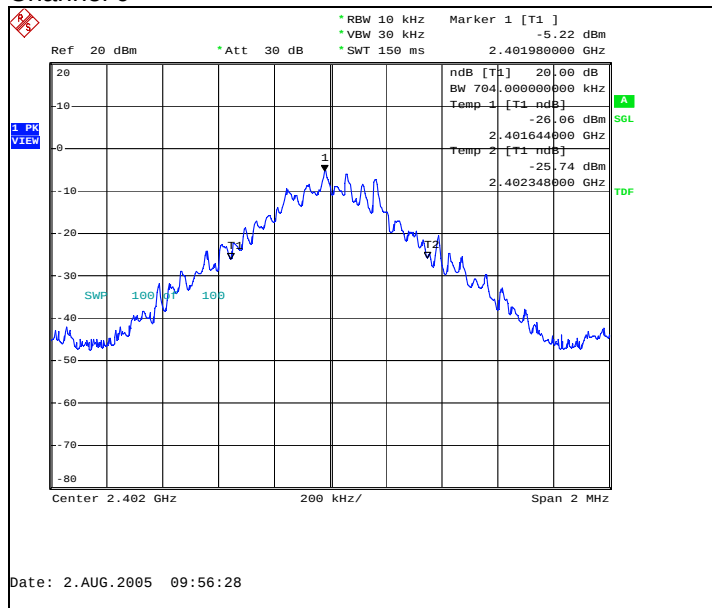
Limit [MHz]
≤ 1

5.2. Bluetooth Test results

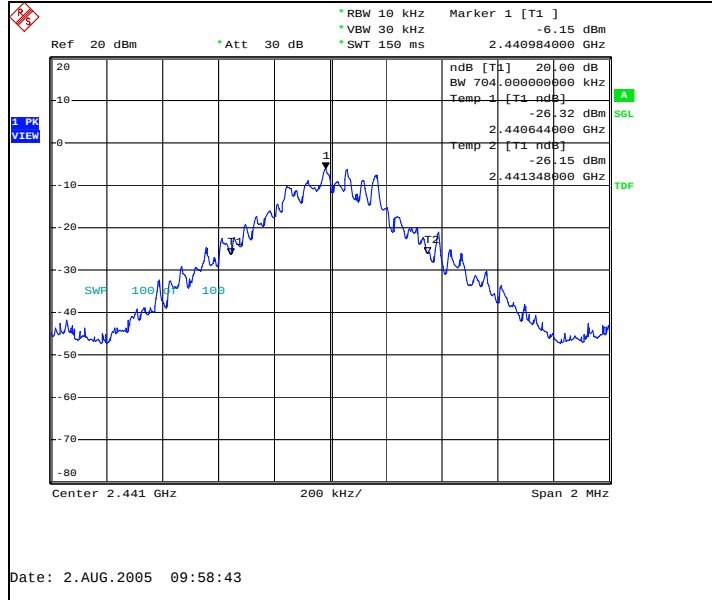
5.2.1 GFSK modulation, PRBS packet type

Channel	20 dB bandwidth [kHz]	Result
0	704.000	PASSED
40	704.000	PASSED
78	704.000	PASSED

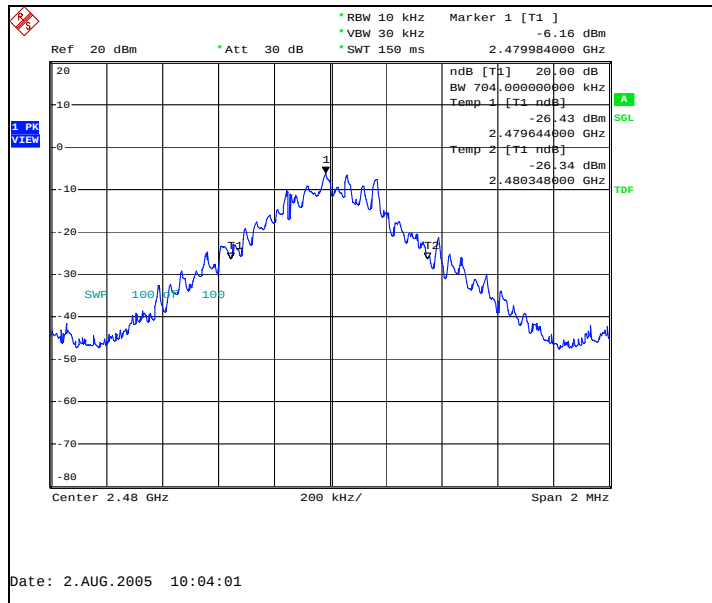
Channel 0



Channel 40



Channel 78



6. Carrier frequency separation (FCC §15.247(a)(1), RSS-210 6.2.2(o)(a1))

EUT with DUT number	SU-18, DUT 10688
Accessories with DUT numbers	BP-5L, DUT 10690
Operation Voltage [V] / [Hz]	115/60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21.6/54.7/100.5
Date of measurements	05.08.2005
Measured by	Kai Uusitalo

6.1. 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

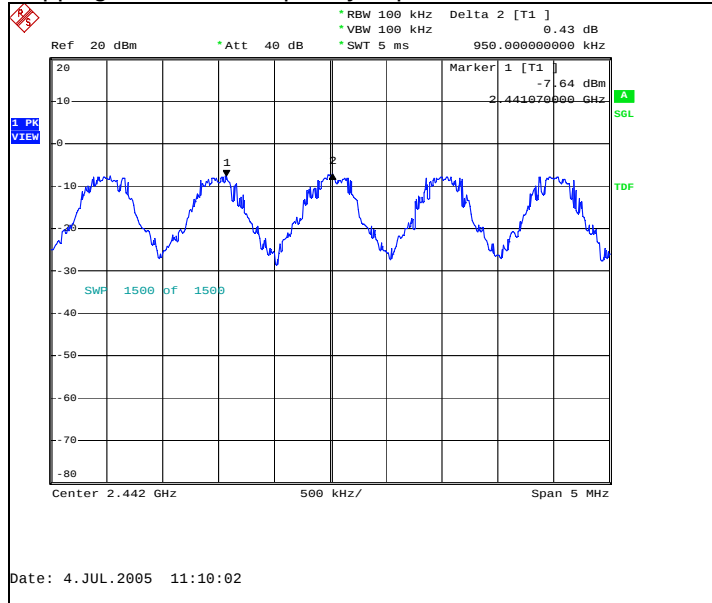
Limit [MHz]
≥ 0.025 or 20 dB bandwidth

6.2. Bluetooth Test results

6.2.1 GFSK modulation, PRBS packet type

Carrier frequency separation [kHz]	Result
950	PASSED

Hopping on, carrier frequency separation of channels 39 and 40



7. Number of hopping frequencies (FCC §15.247(a)(1)(iii), RSS-210 Amend I(ii))

EUT with DUT number	SU-18, DUT 10688
Accessories with DUT numbers	BP-5L, DUT 10690
Operation Voltage [V] / [Hz]	115/60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21.6/54.7/100.5
Date of measurements	05.08.2005
Measured by	Kai Uusitalo

7.1. 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

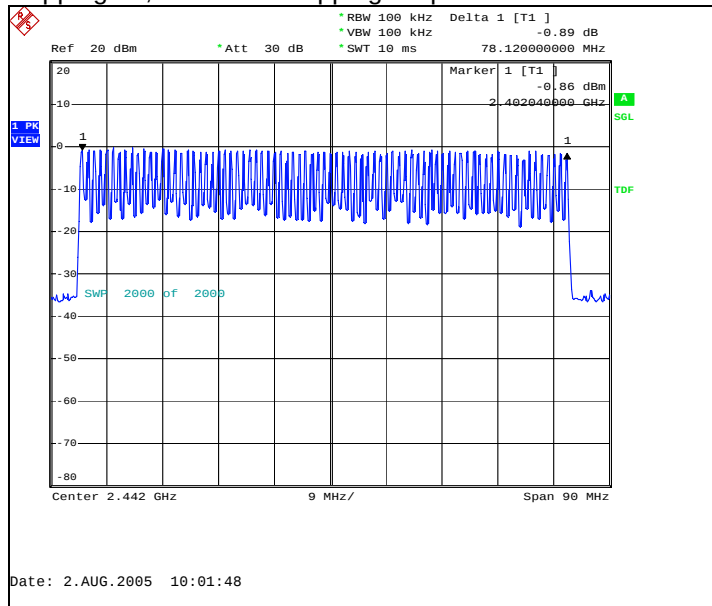
Limit [number]
≥ 75

7.2. Bluetooth Test results

7.2.1 GFSK modulation, PRBS packet type

Measured number of hopping frequencies	Result
79	PASSED

Hopping on, number of hopping frequencies



8. Time of occupancy (FCC §15.247(a)(1)(iii), RSS-210 Amend I(ii))

EUT with DUT number	SU-18, DUT 10688
Accessories with DUT numbers	BP-5L, DUT 10690
Operation Voltage [V] / [Hz]	115/60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21.6/54.7/100.5
Date of measurements	05.08.2005
Measured by	Kai Uusitalo

8.1. 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

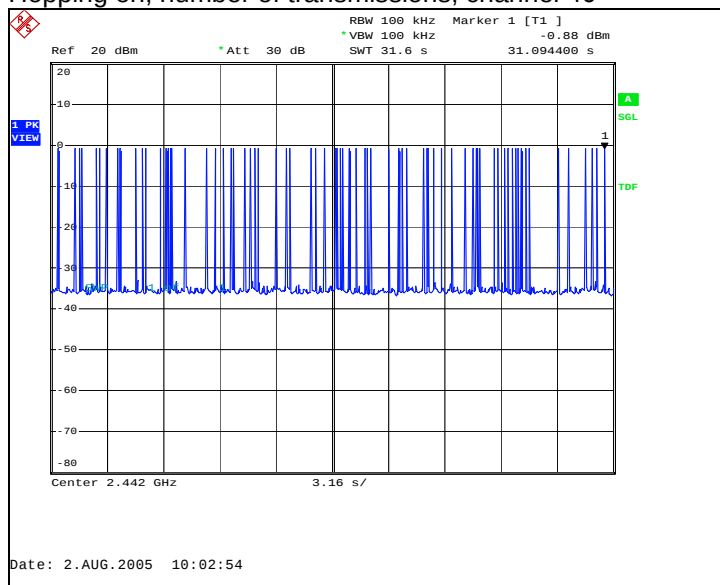
Limit [s]
≤ 0.4

8.2. Bluetooth test results

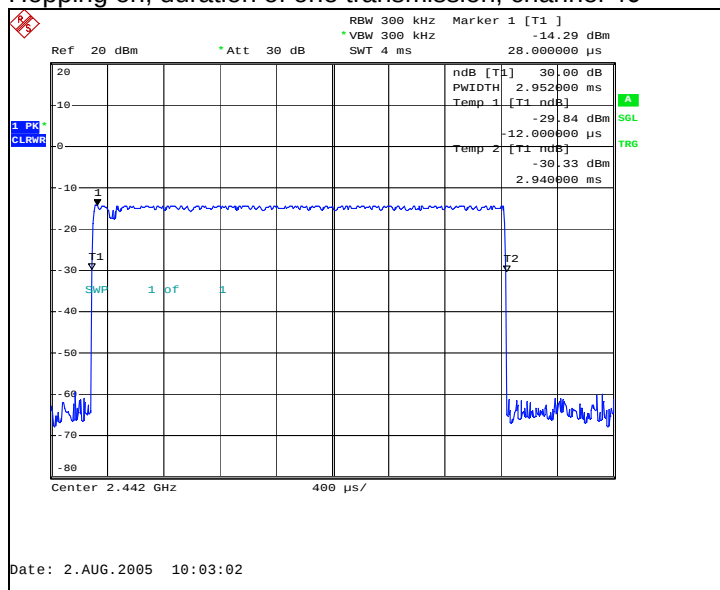
8.2.1 GFSK modulation, PRBS packet type

Measured number of transmissions	Duration of one transmission [μs]	Time of occupancy [s]	Result
69	2952.000	0.203688	PASSED

Hopping on, number of transmissions, channel 40



Hopping on, duration of one transmission, channel 40



9. Peak output power (FCC §15.247(b)(1), RSS-210 6.2.2(o)(b))

EUT with DUT number	SU-18, DUT 10689
Accessories with DUT numbers	BP-5L, DUT 10690
Operation Voltage [V] / [Hz]	115/60
Result	PASSED
Remarks	In DSSS mode the power reduction is not in use and then highest data rate has selected for testing from 1, 2, 5.5 and 11 Mbps possible data rates. In OFDM mode the power reduction is in use. The power reduction is working on the highest data rates, then the slowest data rate has been selected from 6, 9, 12, 18, 24, 36, 48 and 54 Mbps possible data rates.
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21.6/54.7/100.5
Date of measurements	05.08.2005
Measured by	Kai Uusitalo

9.1. 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

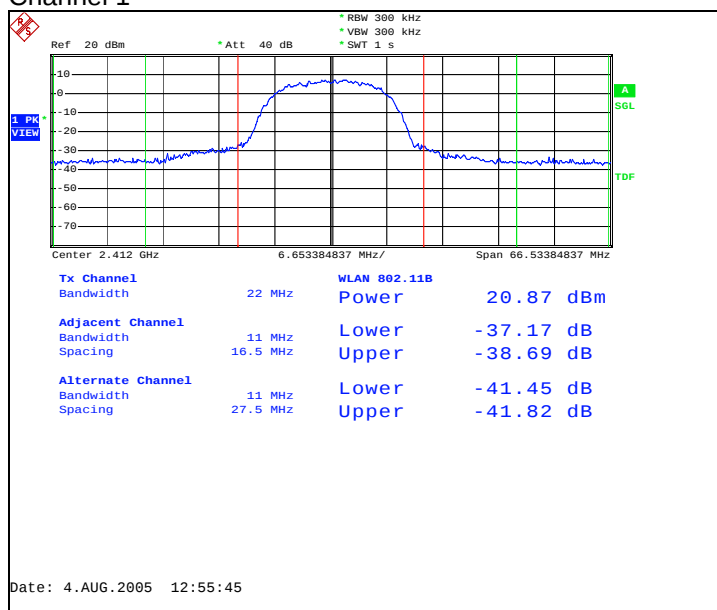
Frequency range [MHz]	Limit [W]	Limit [dBm]
2400 – 2483.5	≤ 1	≤ 30

9.2. WLAN Test results

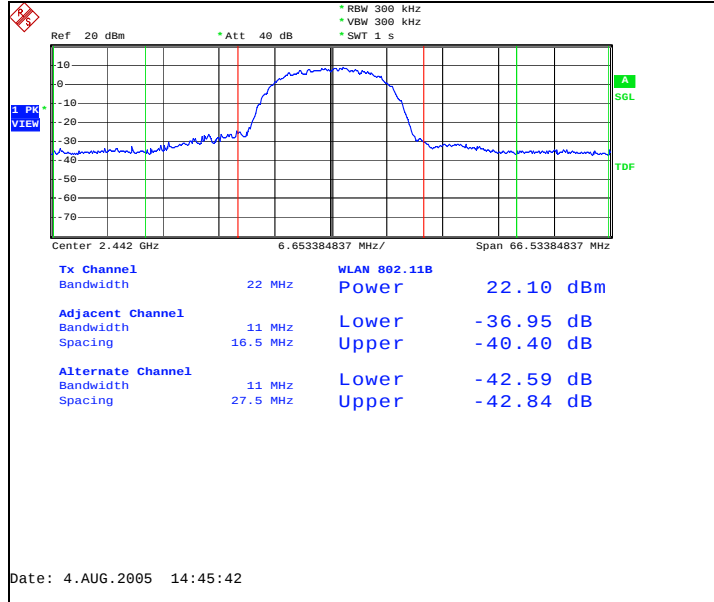
9.2.1 DSSS mode, QPSK modulation, 11 Mbps data rate

Channel	P [dBm]	P [W]	Result
1	20.87	0.122	PASSED
7	22.10	0.161	PASSED
11	20.17	0.104	PASSED

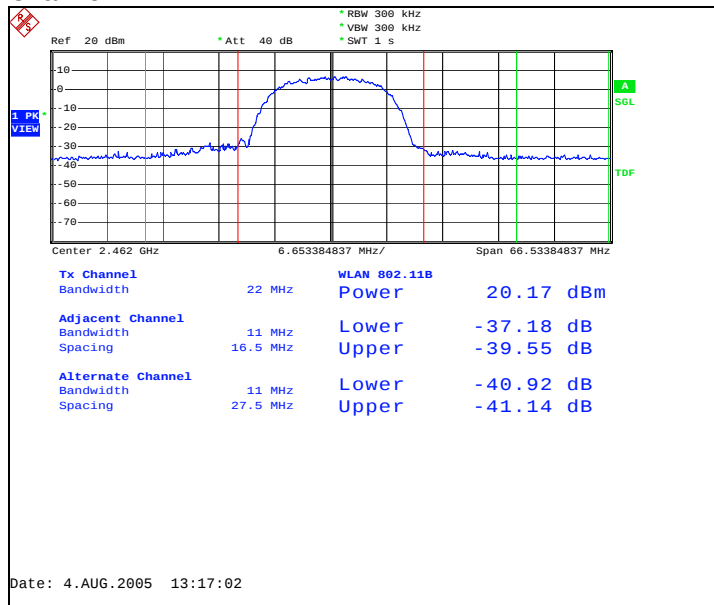
Channel 1



Channel 7



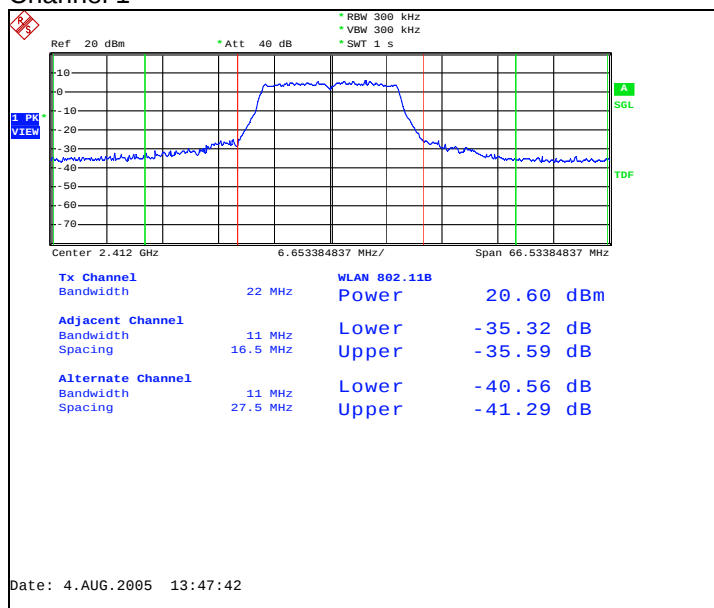
Channel 11



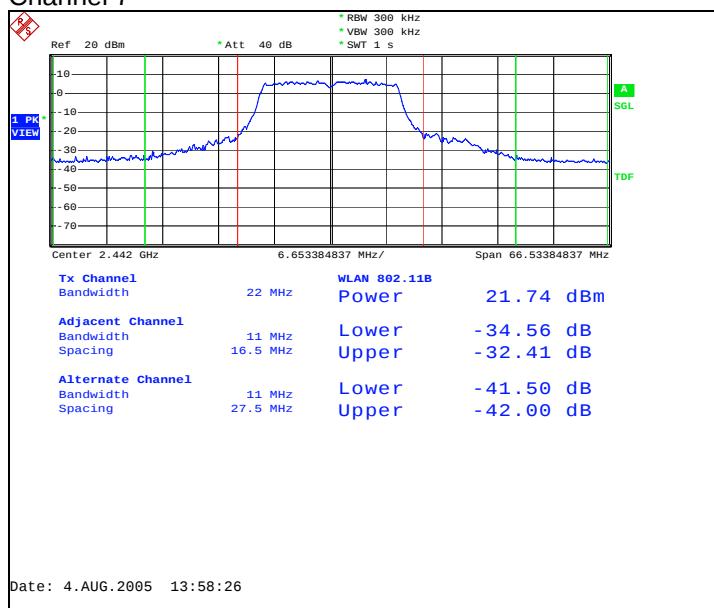
9.2.2 OFDM mode, BPSK modulation, 6 Mbps data rate

Channel	P [dBm]	P [W]	Result
1	20.60	0.115	PASSED
7	21.74	0.149	PASSED
11	19.86	0.097	PASSED

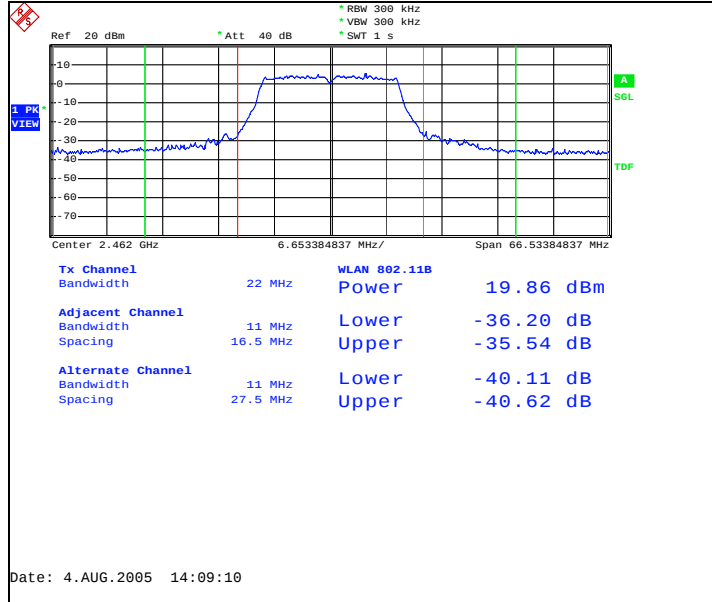
Channel 1



Channel 7



Channel 11



10. Spurious RF conducted emissions

(FCC §15.247(c), RSS-210 6.2.2(o)(e1))

EUT with DUT number	SU-18, DUT 10689
Accessories with DUT numbers	BP-5L, DUT 10690
Operation Voltage [V] / [Hz]	115/60
Result	PASSED
Remarks	In DSSS mode the power reduction is not in use and then highest data rate has selected for testing from 1, 2, 5.5 and 11 Mbps possible data rates. In OFDM mode the power reduction is in use. The power reduction is working on the highest data rates, then the slowest data rate has been selected from 6, 9, 12, 18, 24, 36, 48 and 54 Mbps possible data rates
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21.6/54.7/100.5
Date of measurements	05.08.2005
Measured by	Kai Uusitalo

10.1. Test method and limit

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

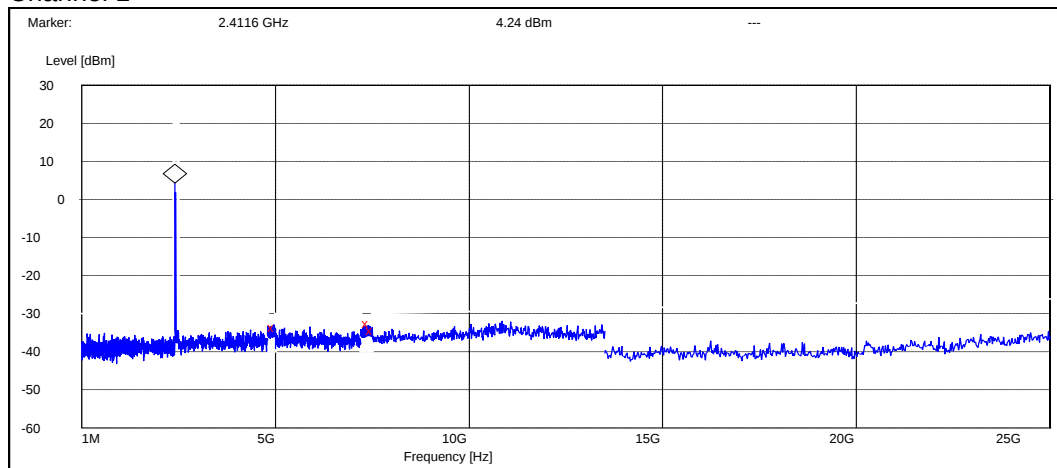
Limits for spurious RF conducted emissions measurements

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

10.2. WLAN Test results

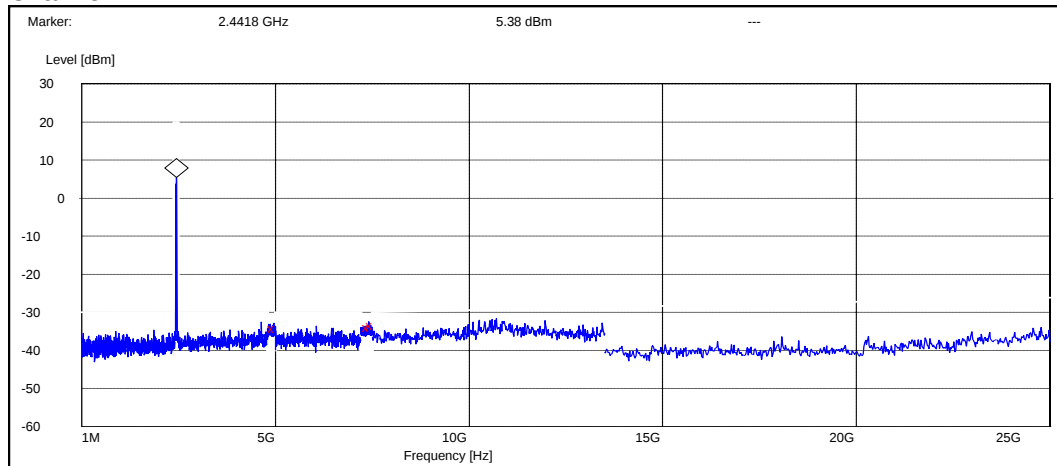
10.2.1 DSSS mode, QPSK modulation, 11 Mbps data rate

Channel 1



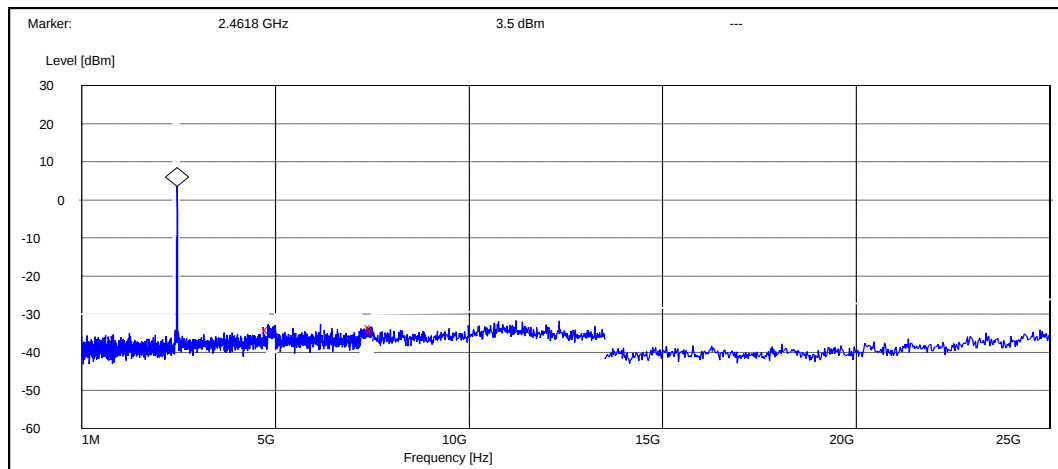
Frequency [MHz]	P [dBc]	Result
4969.200000	-37.739676	PASSED
7391.400000	-36.739676	PASSED
7500.000000	-38.539676	PASSED

Channel 7



Frequency [MHz]	P [dBc]	Result
4962.800000	-39.677814	PASSED
7405.800000	-39.177814	PASSED
7500.000000	-38.777814	PASSED

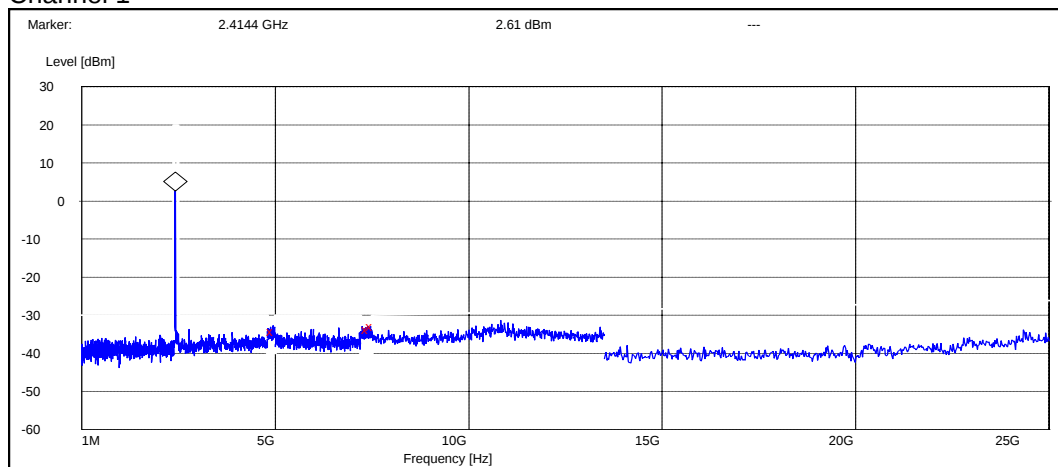
Channel 11



Frequency [MHz]	P [dBc]	Result
4817.600000	-37.395245	PASSED
7464.000000	-37.095245	PASSED
7500.000000	-37.695245	PASSED

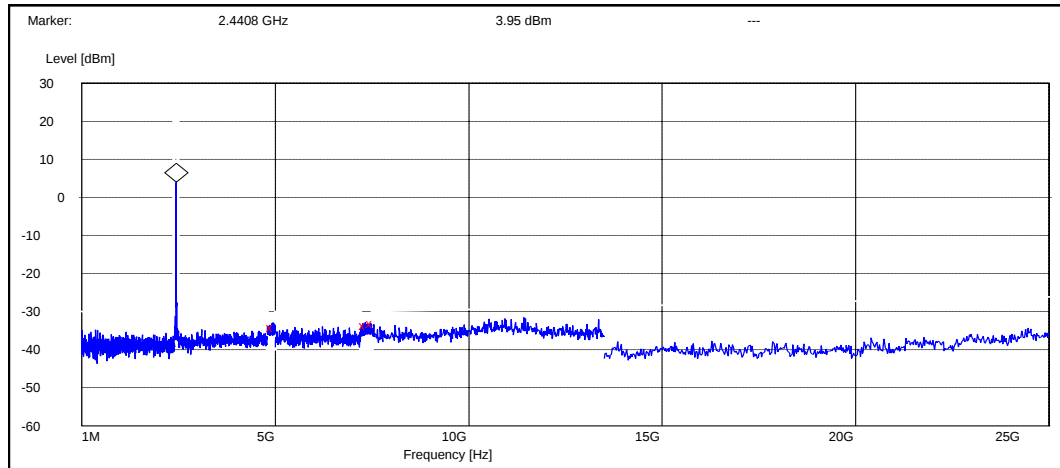
10.2.2 OFDM mode, BPSK modulation, 6 Mbps data rate

Channel 1



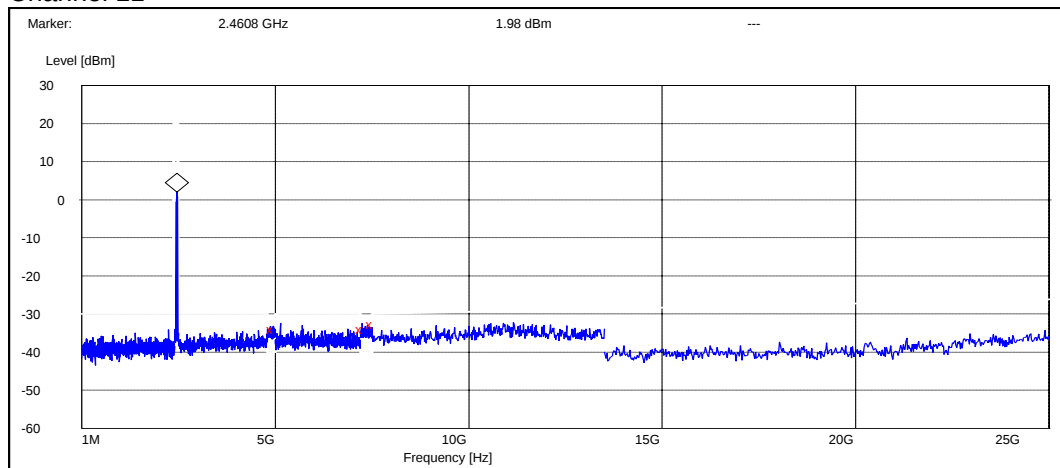
Frequency [MHz]	P [dBc]	Result
4942.400000	-36.806223	PASSED
7391.400000	-36.206223	PASSED
7500.000000	-35.606223	PASSED

Channel 7



Frequency [MHz]	P [dBc]	Result
4936.800000	-38.048859	PASSED
7327.200000	-37.648859	PASSED
7500.000000	-37.148859	PASSED

Channel 11



Frequency [MHz]	P [dBc]	Result
4954.000000	-35.882153	PASSED
7250.400000	-35.882153	PASSED
7500.000000	-34.682153	PASSED

11. 6 dB bandwidth (FCC §15.247(a)(2), RSS-210 Amend I(iv))

EUT with DUT number	SU-18, DUT 10689
Accessories with DUT numbers	BP-5L, DUT 10690
Operation Voltage [V] / [Hz]	115/60
Result	PASSED
Remarks	In DSSS mode the power reduction is not in use and then highest data rate has selected for testing from 1, 2, 5.5 and 11 Mbps possible data rates. In OFDM mode the power reduction is in use. The power reduction is working on the highest data rates, then the slowest data rate has been selected from 6, 9, 12, 18, 24, 36, 48 and 54 Mbps possible data rates
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21.6/54.7/100.5
Date of measurements	05.08.2005
Measured by	Kai Uusitalo

11.1. Test method and limit

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

Limits for 6 dB bandwidth measurements

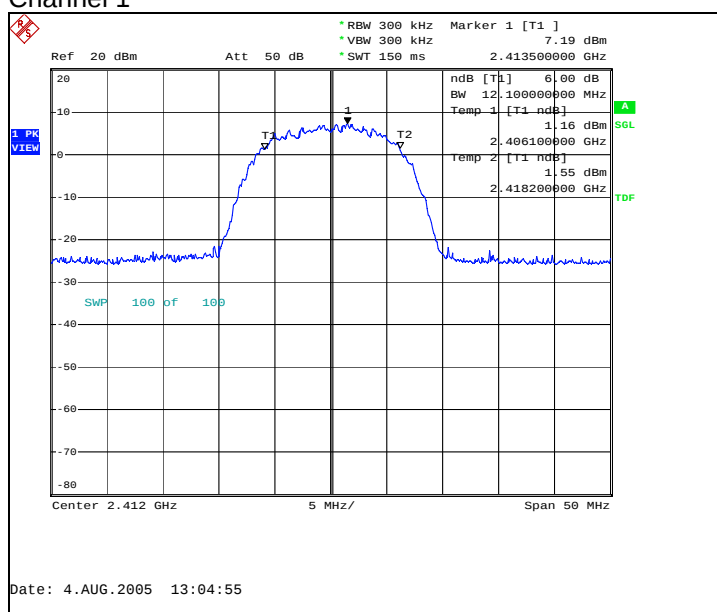
Limit [kHz]
≥ 500

11.2. WLAN test results

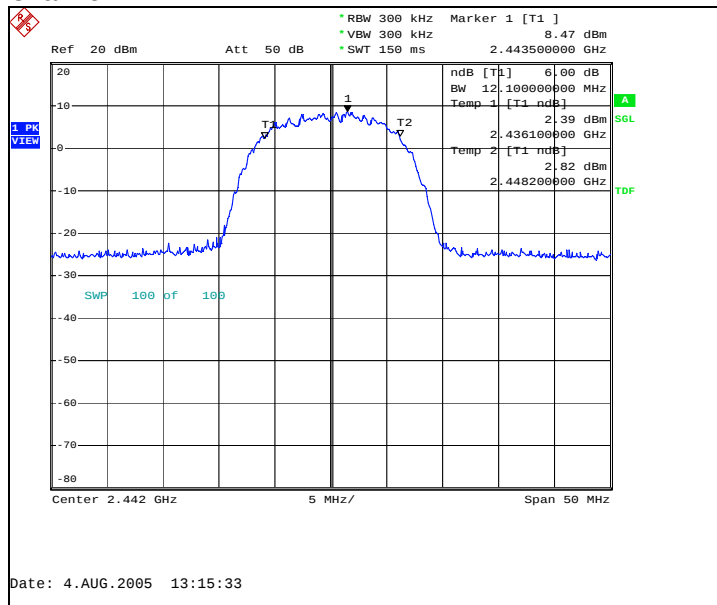
11.2.1 DSSS mode, QPSK modulation, 11 Mbps data rate

Channel	6 dB bandwidth [kHz]	Result
1	12100.000	PASSED
7	12100.000	PASSED
11	12500.000	PASSED

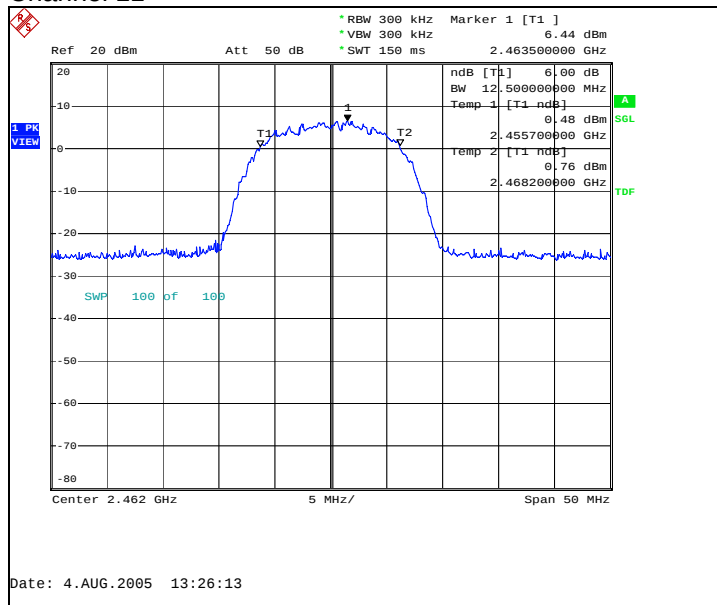
Channel 1



Channel 7



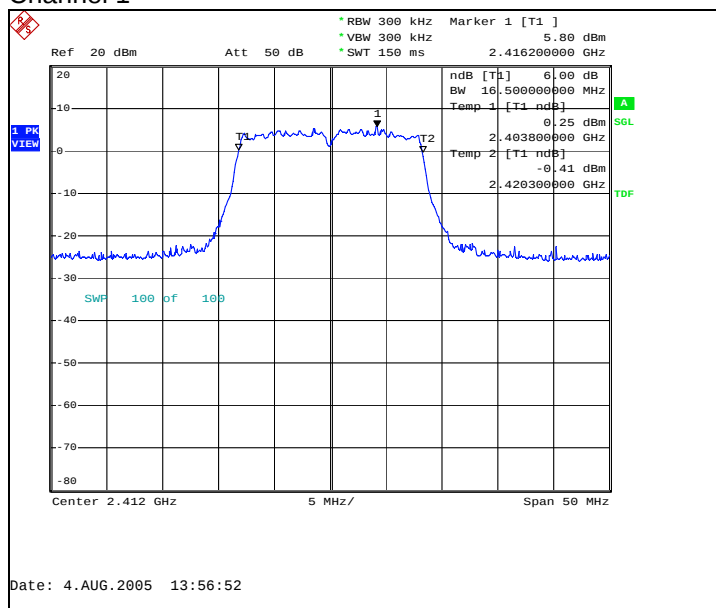
Channel 11



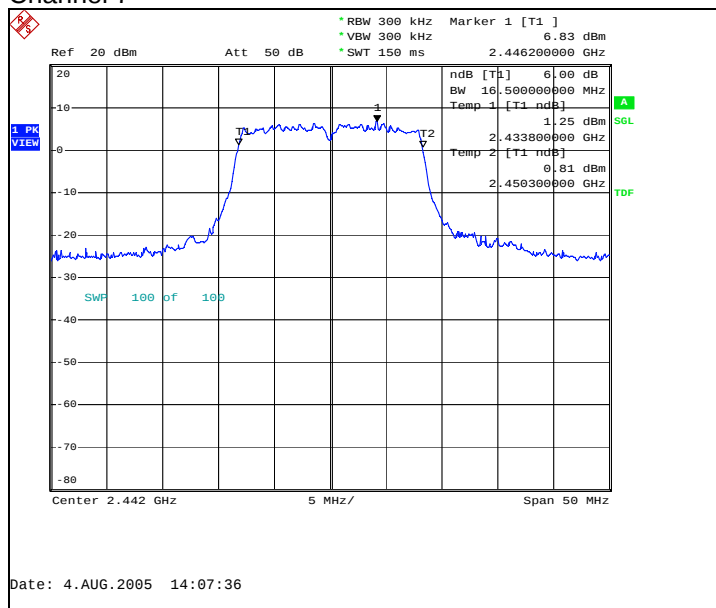
11.2.2 OFDM mode, BPSK modulation, 6 Mbps data rate

Channel	6 dB bandwidth [kHz]	Result
1	16500.000	PASSED
7	16500.000	PASSED
11	16500.000	PASSED

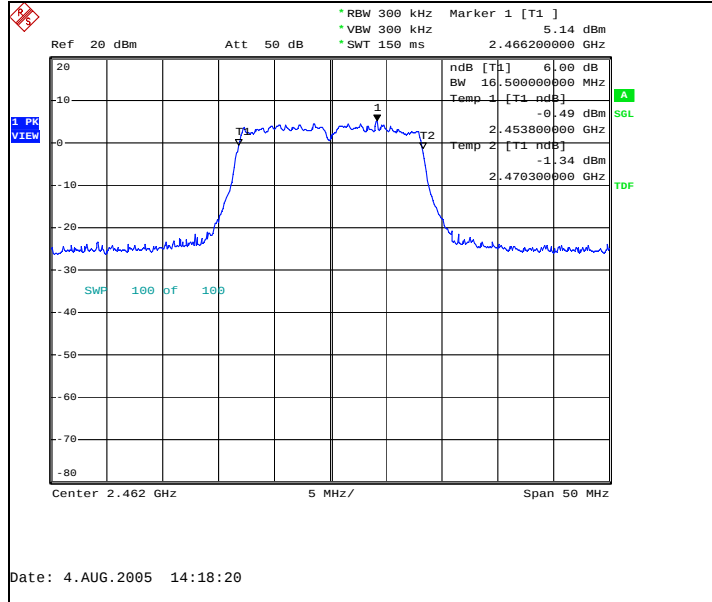
Channel 1



Channel 7



Channel 11



12. Power spectral density (FCC §15.247(e), RSS-210 Amend I(iv))

EUT with DUT number	SU-18, DUT 10689
Accessories with DUT numbers	BP-5L, DUT 10690
Operation Voltage [V] / [Hz]	115/60
Result	PASSED
Remarks	In DSSS mode the power reduction is not in use and then highest data rate has selected for testing from 1, 2, 5.5 and 11 Mbps possible data rates. In OFDM mode the power reduction is in use. The power reduction is working on the highest data rates, then the slowest data rate has been selected from 6, 9, 12, 18, 24, 36, 48 and 54 Mbps possible data rates.
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21.6/54.7/100.5
Date of measurements	05.08.2005
Measured by	Kai Uusitalo

12.1. Test method and limit

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

Limits for power spectral density measurements

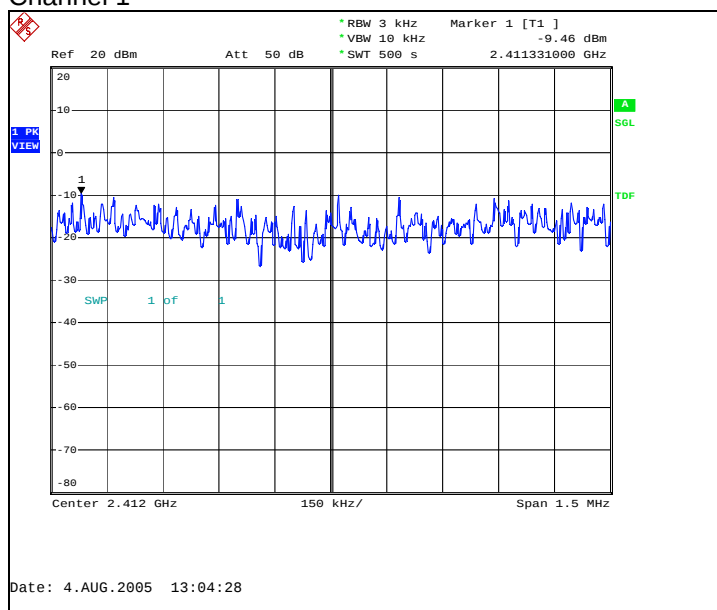
Limit [dBm] @ 3 kHz
≤ 8

12.2. WLAN test results

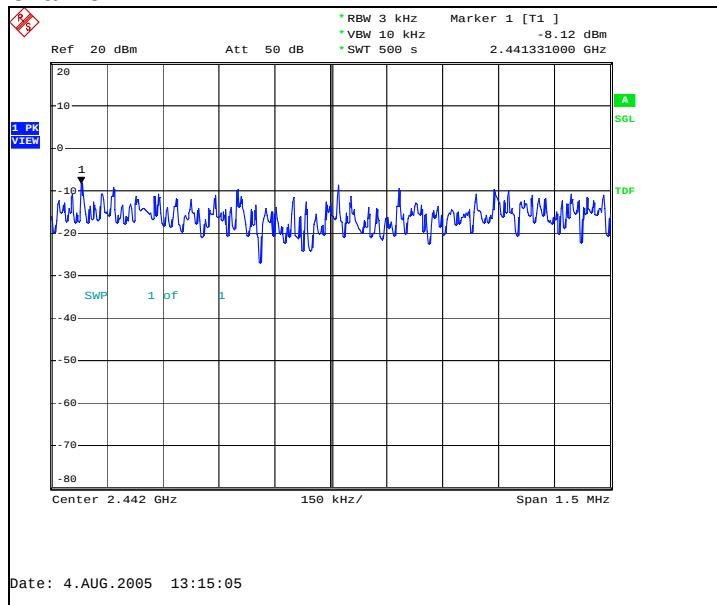
12.2.1 DSSS mode, QPSK modulation, 11 Mbps data rate

Channel	P [dBm]	Result
1	-9.46	PASSED
7	-8.12	PASSED
11	-10.02	PASSED

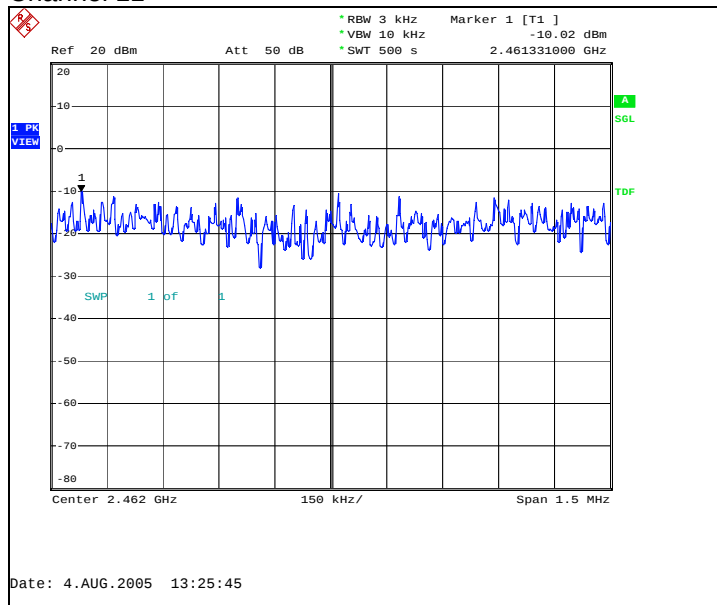
Channel 1



Channel 7



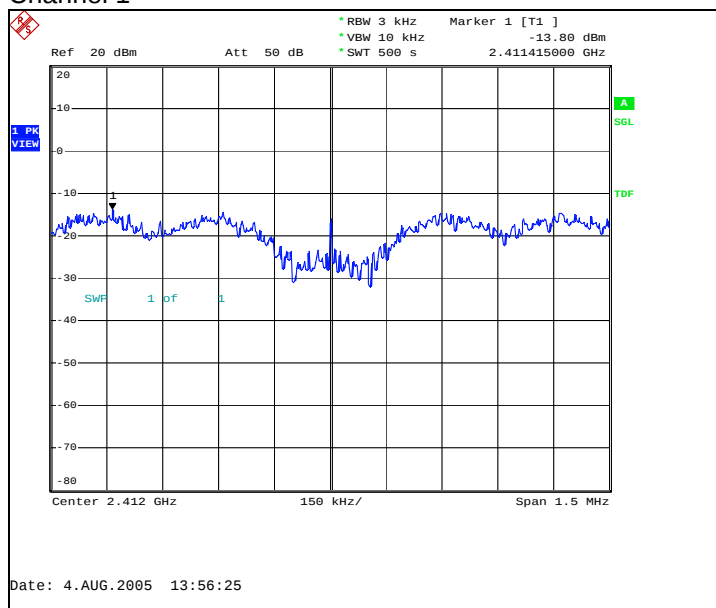
Channel 11



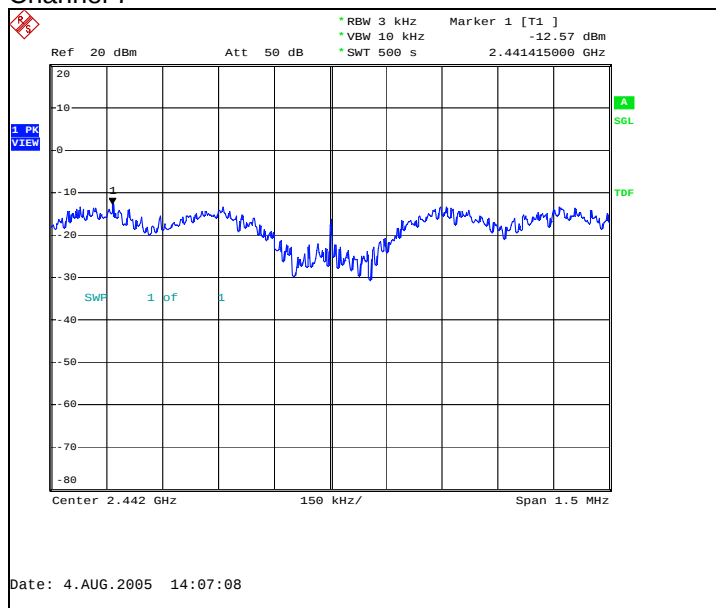
12.2.2 OFDM mode, BPSK modulation, 6 Mbps data rate

Channel	P [dBm]	Result
1	-13.80	PASSED
7	-12.57	PASSED
11	-14.42	PASSED

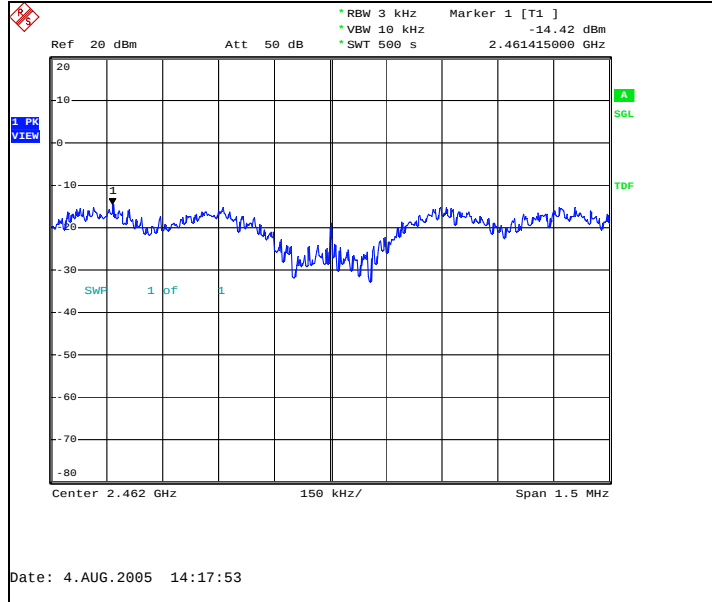
Channel 1



Channel 7



Channel 11



13. Test Equipment

13.1. Conducted measurements

Eq. No	Equipment	Type	Manufacturer	Used in
1742	EMI Test Receiver	ESMI	R&S	15C, 15B
1759	LISN 50 µH	ESH3-Z5	R&S	15C, 15B
1872	Thermo- Hygrograph	00.02520.150700	Lambrecht	15C, 15B
1916	Radio Communication tester	CMTA84	R&S	15C, 15B
2039	Power Supply	PL330QMD	THURLBY	15C, 15B
2060	LISN 50 µH	ESH3-Z5	R&S	15C, 15B
2068	CDN-Antenna line	S1	NMP	15C, 15B
2097	Pulse Limiter	ESH3-Z2	R&S	15C, 15B
2111	Multimeter	TX3	Tektronix	15C, 15B
2156	Digital Radio Communication Tester	CMU200	R&S	15C, 15B
2206	Signal generator	SMX	R&S	15C, 15B
2335	GPIB Switch 2 to 1	-	National Instruments	15C, 15B
2347	Digital Radio Communication Tester	CMU200	R&S	22/24, 15C, 15B
2352	Spectrum Analyzer	FSP	R&S	22/24, 15C
2359	Temperature Test system	VT4002	Vötsch Industrietechnik	22/24
2360	Serial Bus Converter	Serial 488A	IO Tech	22/24
2362	Power Supply	NGPX 70/5	R&S	22/24
-	RF Emission Software	ES-K1 v.1.60	R&S	15C, 15B

13.2. Radiated measurements

Eq. No	Equipment	Type	Manufacturer	Used in
1748	Log. per. Antenna	HL025	R&S	22/24, 15C
1749	Log. per. Antenna	HL025	R&S	22/24, 15C
1875	Thermo- Hygrograph	00.02520.150700	Lambrecht	22/24, 15C, 15B
1917	Radio Communication tester	CMTA84	R&S	22/24, 15C, 15B
1933	Precision half-wave dipole antennas	HZ-13	R&S	22/24, 15C
1938	Precision half-wave dipole antennas	HZ-12	R&S	22/24, 15C
2004	Relay Switch Unit	RSU	R&S	22/24, 15C, 15B
2006	Radiation Reference Source	VSQ	MEB	22/24, 15C, 15B
2009	Signal generator	SMP 22	R&S	22/24, 15C, 15B
2019	Multimeter	34401A	HP	22/24, 15C, 15B
2027	Coupling and Decoupling Network	M2 (modified) DC1	MEB	22/24, 15C, 15B
2028	Coupling and Decoupling Network	M3 (modified) DC2	MEB	22/24, 15C, 15B
2029	Power Supply	PL330	THURLBY	22/24, 15C
2043	Band Reject Filter	WRCA824/849-0,2-6SS	Wainwright	22/24, 15C, 15B
2047	Band Reject Filter	WRCC1800/2000-0.2-10SS	Wainwright	22/24, 15C, 15B
2051	High Pass Filter	4HC1700-1-KK	R&S	22/24, 15C
2057	Log. per. Antenna	HL025	R&S	22/24, 15C

Eq. No	Equipment	Type	Manufacturer	Used in
2109	Power Supply	PL330QMD	THURLBY	22/24, 15C, 15B
2110	Multimeter	34401A	HP	22/24, 15C, 15B
2112	Multimeter	TX3	Tektronix	22/24, 15C, 15B
2116	Controller	EMCO MODEL 2090	ETS	22/24, 15C, 15B
2133	Power Meter	NRVS	R&S	22/24, 15C
2134	Power Sensor	NRV-Z32	R&S	22/24, 15C
2135	Coupling and Decoupling Network	CDN 801-M3	LÜTHI	22/24, 15C, 15B
2138	Ultra Broadband Antenna	HL562	R&S	22/24, 15C, 15B
2140	Biconical Antenna	EMCO93110B	EMCO	22/24, 15C
2142	Log.-per.-dipol Antenna	3146	EMCO	22/24, 15C
2144	Attenuator	6803.17B	Huber-Suhner	22/24, 15C, 15B
2150	High Pass Filter	F-15041	RLC ELECTRONICS	22/24, 15C
2176	Coupling and Decoupling Network	CDN 801-M3	LÜTHI	22/24, 15C, 15B
2180	Digital Radio Communication Tester	CMU200	R&S	22/24, 15C, 15B
2188	Preamplifier	AFS4-00100300-20-23P-6	MITEQ	22/24, 15C, 15B
2330	EMI Test receiver	ESIB26	R&S	22/24, 15C, 15B
2334	GPIO Switch 2 to 1	-	National Instruments	22/24, 15C, 15B
2348	Yaesu controller	G-1000DXC	YAESU	22/24, 15C, 15B
2349	Computer controller (Yaesu)	GS-232B	YAESU	22/24, 15C, 15B
2350	Preamplifier	AMF-6D-020180-29-20P	MITEQ	22/24, 15C
2361	Anechoic chamber	3 meter semi/full anechoic chamber	Euroshield	22/24, 15C, 15B
2398	Horn antenna	HF906	R&S	22/24, 15C
-	RF Emission Software	ES-K1 v.1.71	R&S	22/24, 15C, 15B