FCC Part 15C Compliance Test Report

Test Report no.:	FCC15CWLAN_RM-979_03.docx	**Date of Report:**	10-Feb-2014
Number of pages:	35	**Customer's Contact person:**	Juha Paukku
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 68 Sinitaival 5 FIN-33720 TAMPERE, FINLAND Tel. +358 (0) 7180 46800 Fax. +358 (0) 7180 46880
FCC listing no.: **IC recognition no.:**	94436 661AK-1		
Tested devices/ accessories:	**Phone RM-979 / Battery BL-5H / AC charger AC-20E / Headset WH-108 / Dummy Battery SD-128**		
FCC ID:	PDNRM-979	**IC:**	661R-RM979
Supplement reports:	-		
Testing has been carried out in accordance with:	**CFR 47, FCC rules Part 15 Subpart C, ANSI C63.4 (2003), DTS procedures KDB 558074, IC standards. 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:	Hannu Söderholm 2014.02.10 14:13:00 +02'00'		

Hannu Söderholm, Specialist, EMC

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1. Summary for FCC Part 15C Compliance Test Report

Date of receipt	16-Jan-2014
Testing completed	28-Jan-2014
The customer's contact person	Juha Paukku
Test Plan referred to	T:\Projects\RM-977\TestPlan\RS_testplan_RM-977.xlsm
Notes	-
Document name	T:\Projects\RM-977\EMC\FCC15CWLAN_RM-977_08.docx

1.1. EUT and Accessory Information

The EUT is a mobile phone with following features:
GSM/WCDMA/WLAN/Bluetooth
The EUT is tested with maximum rated TX power.

Devices under tests

Product	Type	SN	HW	MV	SW	DUT
Phone	RM-977	004402476801257	2205	-	1052.0000.1351.10049	43137
Phone	RM-977	004402476801331	2205	-	1052.0000.1351.10049	43141
Dummy Battery	SD-128	-	v0.1	-	-	43138
Battery	BL-5H LGC	495540349401010537 2;0670699	V3.0 PWB ver 2.0	-	-	43139
AC charger	AC-20E	486867341135112686 5;0675628	-	-	-	43140
Headset	WH-108	2376171	-	-	-	43142
Phone	RM-977	00442476801315	2205		1052.0000.1351.10049	43133
Battery	BL-5H		LGC V3.0			43134
Charger	AC-20E Phihong					43135
Headset	WH-108					43136

1.2. Summary of Test Results

WLAN:

Section in CFR 47	Section in RSS-GEN or RSS-210	Name of the test	Result
15.247(b)(1)	A8(0.4(4))	Conducted peak output power	PASSED
15.247(d), 15.205(b)	A8(0.5)	Band edge compliance of RF emissions	PASSED
15.247(d)	A8(0.5)	Spurious RF conducted emissions	PASSED
15.247(d), 15.209	A8(0.5)	Spurious radiated emissions	PASSED
15.207	7.2.2	AC powerline conducted emissions	PASSED
15.247(a)(2)	A8(0.1(1))	6dB(bandwidth)	PASSED
15.247(e)	A8(0.1(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 Laboratory.

The test results of PDNRM-977 are re-used for certification of the PDNRM-979.
The table above indicates the results, which will be re-used.

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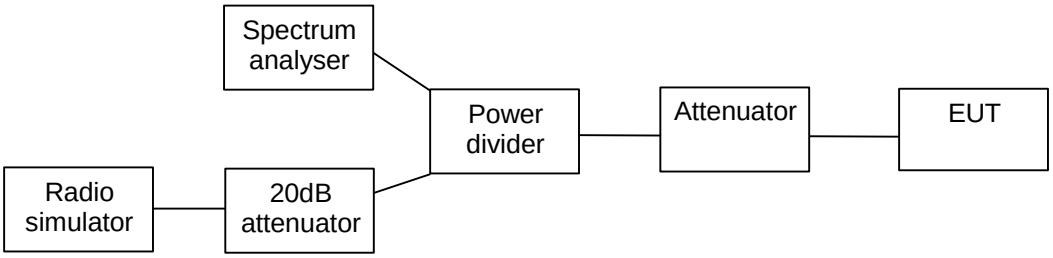
2. Conducted peak output power

(15.247(b)(1), RSS-210 A8.4 (4))

EUT with DUT number	RM-977, DUT 43137
Accessories with DUT numbers	SD-128, DUT 43138
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 31 / 103.0
Date of measurements	21-Jan-2014
Measured by	Timo Raiskio

2.1. Test Setup



2.2. 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 5725 - 5850	<= 1	<= 30

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2.3. Power results summary, all modes

Channel / f_C [MHz]	Mode	Modulation	Data rate	Level [dBm]
6 / 2437	802.11b	BPSK	1 Mbps	19.73
6 / 2437	802.11b	QPSK	2 Mbps	19.95
6 / 2437	802.11b	QPSK	5.5 Mbps	22.66
6 / 2437	802.11b	QPSK	5.5 Mbps	21.59
6 / 2437	802.11b	QPSK	11 Mbps	22.86
6 / 2437	802.11g	BPSK	6 Mbps	24.56
6 / 2437	802.11g	BPSK	9 Mbps	24.55
6 / 2437	802.11g	QPSK	12 Mbps	24.25
6 / 2437	802.11g	QPSK	18 Mbps	24.25
6 / 2437	802.11g	16QAM	24 Mbps	24.54
6 / 2437	802.11g	16QAM	36 Mbps	23.63
6 / 2437	802.11g	64QAM	48 Mbps	21.85
6 / 2437	802.11g	64QAM	54 Mbps	20.83
6 / 2437	802.11n	BPSK	6.5 / 7.25 Mbps	24.76
6 / 2437	802.11n	QPSK	13.0 / 14.4 Mbps	24.34
6 / 2437	802.11n	QPSK	19.5 / 21.7 Mbps	24.3
6 / 2437	802.11n	16QAM	26.0 / 28.9 Mbps	24.64
6 / 2437	802.11n	16QAM	39.0 / 43.3 Mbps	22.85
6 / 2437	802.11n	64QAM	52.0 / 57.8 Mbps	21.88
6 / 2437	802.11n	64QAM	58.5 / 65.0 Mbps	19.77
6 / 2437	802.11n	64QAM	65.0 / 72.2 Mbps	19

2.4. Power results summary, selected modes

Channel / f_C [MHz]	Mode	Modulation	Data rate	Level [dBm]
1 / 2412	802.11n	BPSK	6.5 / 7.25 Mbps	19.89
6 / 2437	802.11n	BPSK	6.5 / 7.25 Mbps	24.76
11 / 2462	802.11n	BPSK	6.5 / 7.25 Mbps	19.91
1 / 2412	802.11n	16QAM	26.0 / 28.9 Mbps	20.1
6 / 2437	802.11n	16QAM	26.0 / 28.9 Mbps	24.64
11 / 2462	802.11n	16QAM	26.0 / 28.9 Mbps	19.93

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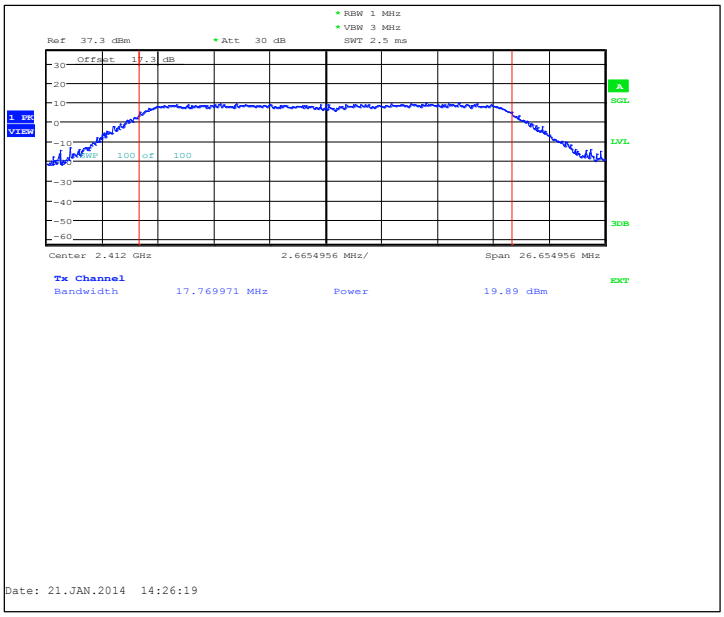
2.5. WLAN Test results

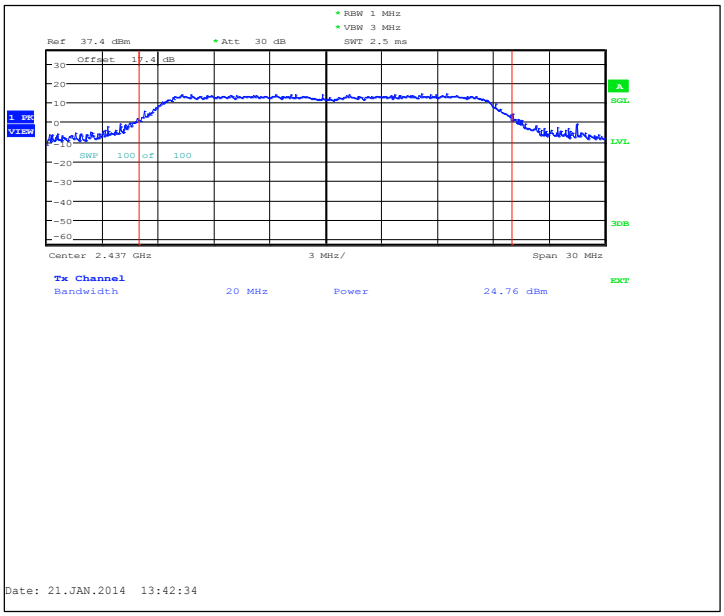
2.5.1 802.11n mode, BPSK modulation, 6.5 / 7.25 Mbps data rate

Channel / f_C [MHz]	P [dBm]	P [mW]	Result
1 / 2412	19.89	97.499	PASSED
6 / 2437	24.76	299.226	PASSED
11 / 2462	19.91	97.949	PASSED

Channel 1 / 2412 MHz



Channel 6 / 2437 MHz



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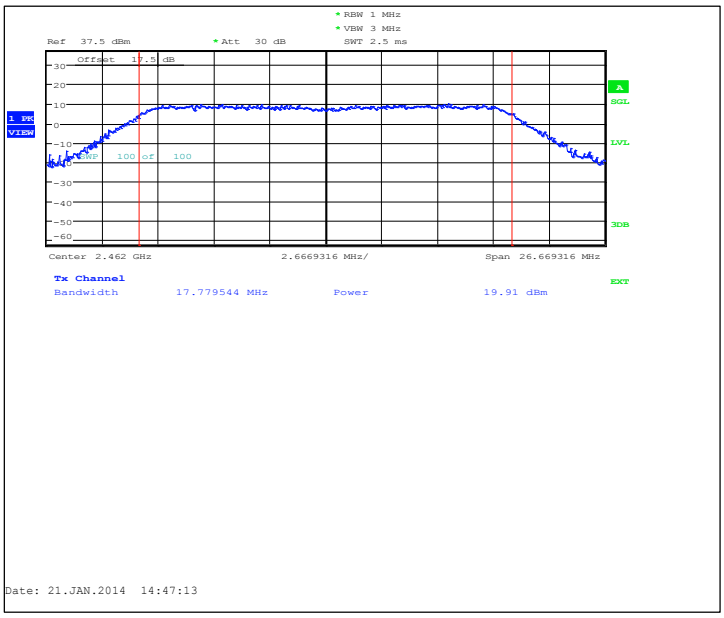
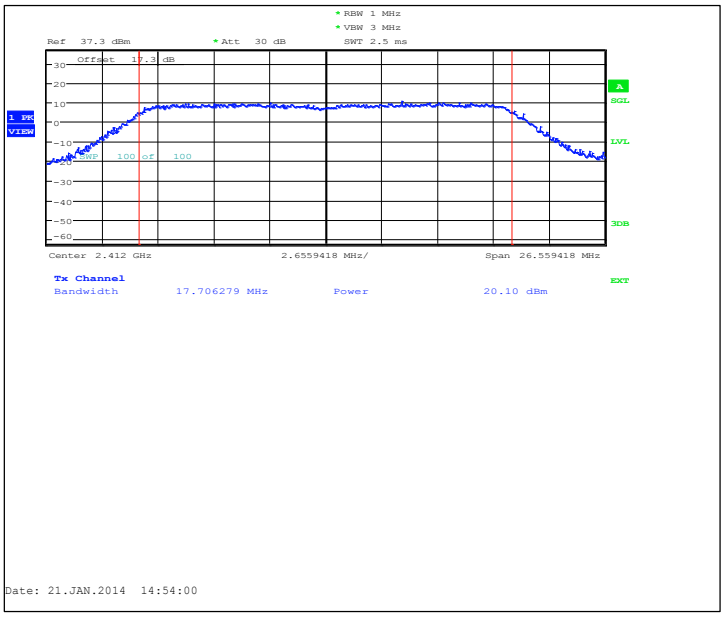
Channel 11 / 2462 MHz



2.5.2 802.11n mode, 16QAM modulation, 26.0 / 28.9 Mbps data rate

Channel / f_C [MHz]	P [dBm]	P [mW]	Result
1 / 2412	20.1	102.329	PASSED
6 / 2437	24.64	291.072	PASSED
11 / 2462	19.93	98.401	PASSED

Channel 1 / 2412 MHz



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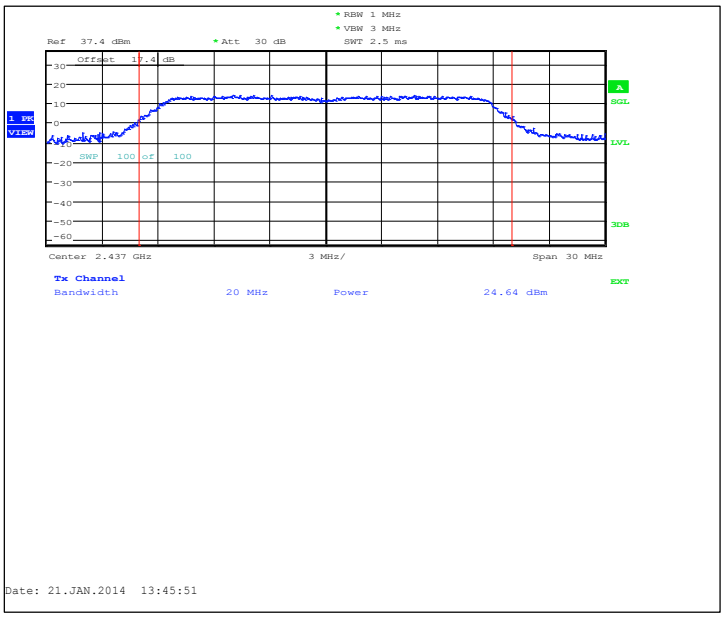
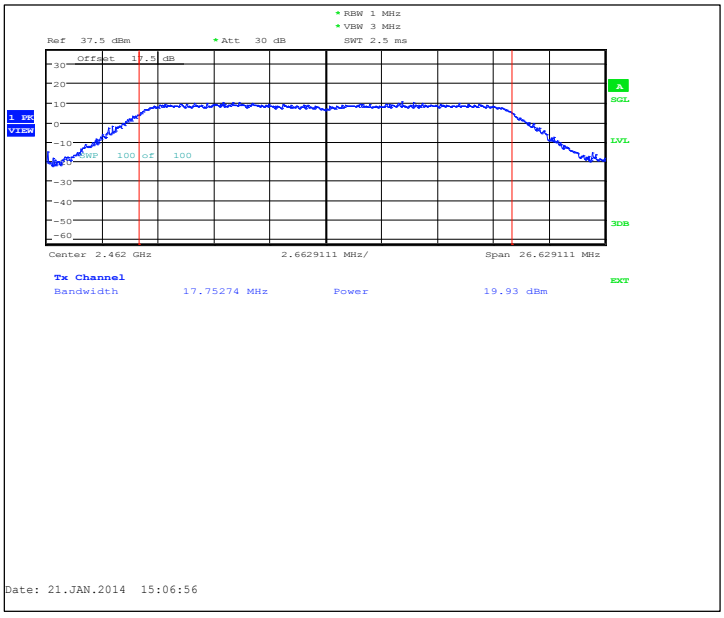
Channel 6 / 2437 MHz



Channel 11 / 2462 MHz



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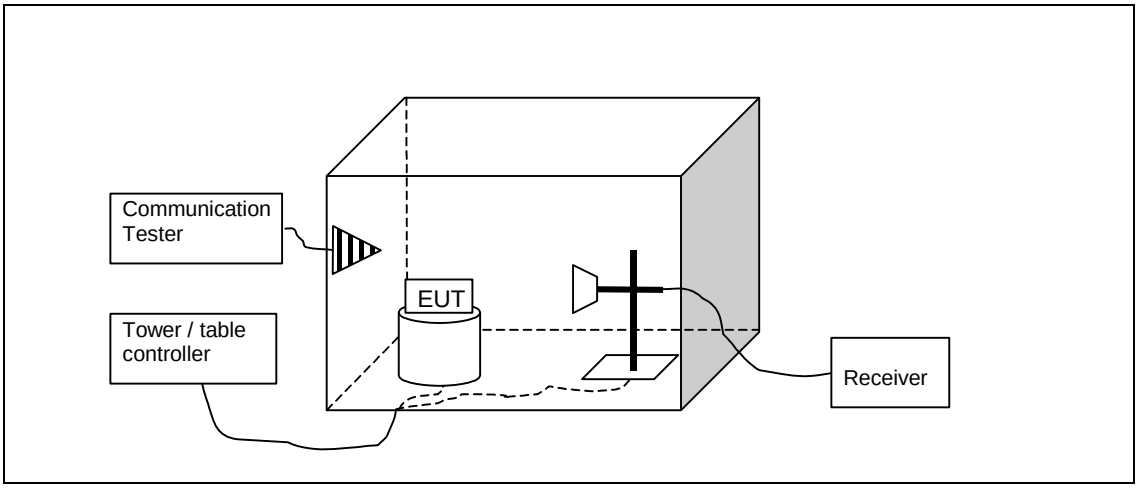
3. Band edge compliance of RF emissions
(FCC §15.247(d), 15.205(b), RSS-210 A8.5)

EUT with DUT number	RM-977, DUT 43133
Accessories with DUT numbers	BL-5H, DUT 43134 ; AC-20E Phihong, DUT 43135 ; WH-108, DUT 43136
Operation Voltage [V] / [Hz]	110 / 50
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	24 / 47 / 103.4
Date of measurements	28-Jan-2014
Measured by	Hannu Söderholm

3.1.1 Test setup



3.2. Test method and limit

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

The measurement results are obtained as described below:

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

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

Limits for band edge compliance of RF emissions measurements (3 m measurement distance)

Frequency range [MHz]	Limit
Below 2390 and above 2483.5	54 dBuV/m (avg) and 74 dBuV/m (pk)

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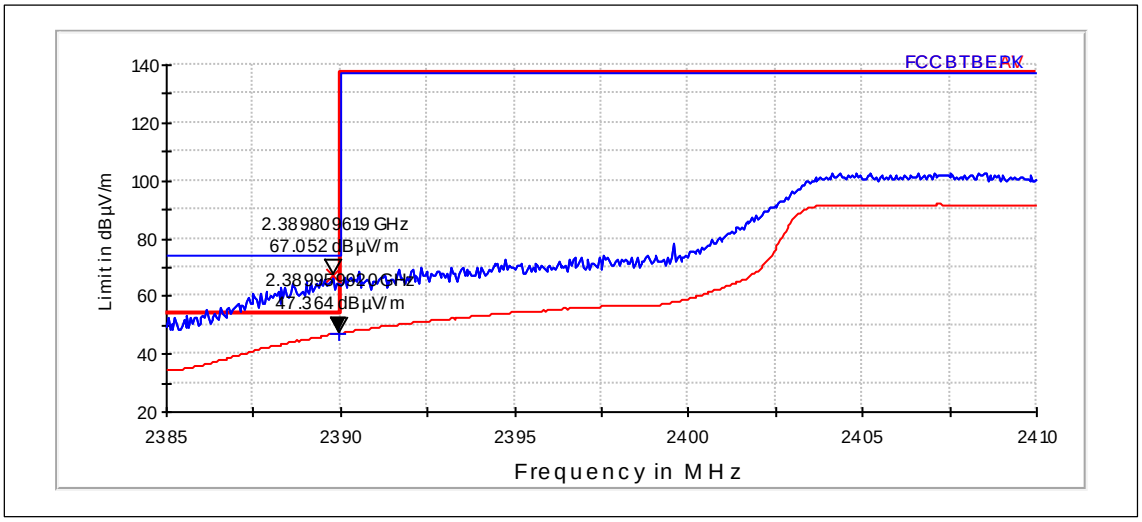
3.3. WLAN test results

3.3.1 802.11n, BPSK modulation, 6.5 / 7.25 Mbps data rate.

Channel 1 / 2412 MHz



Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Correction [dB]	Results
2390	67.05	2252.164	79.26	-12.21	-12.212	PASSED

Average (RBW: 1 MHz, VBW: 10 Hz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Correction [dB]	Results
2390	47.36	233.453	59.57	-12.21	-12.212	PASSED

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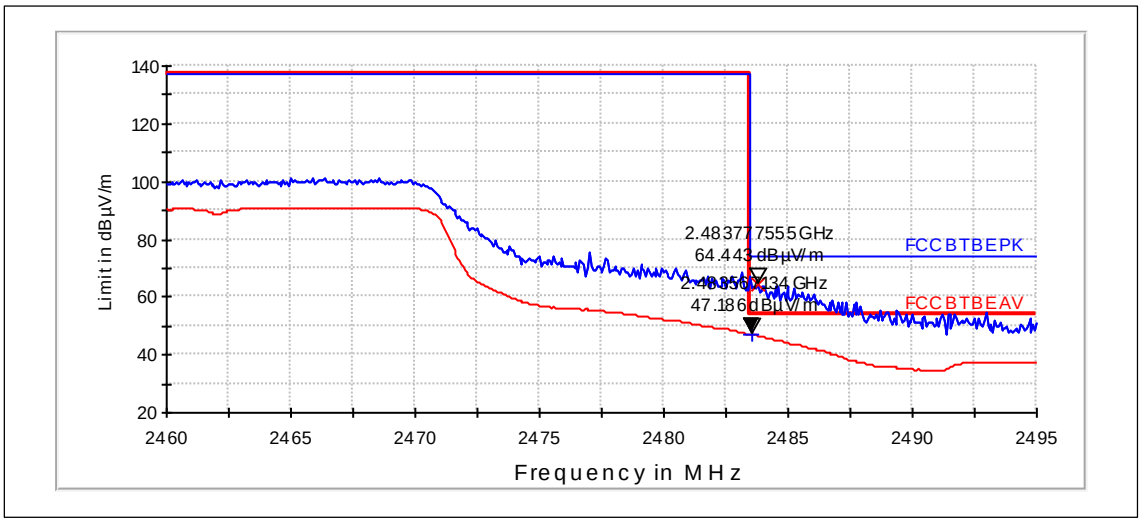
Channel 11 / 2462 MHz



Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Correction [dB]	Results
2484	64.44	1667.823	76.62	-12.18	-12.178	PASSED

Average (RBW: 1 MHz, VBW: 10 Hz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Correction [dB]	Results
2484	47.19	228.718	59.37	-12.18	-12.178	PASSED

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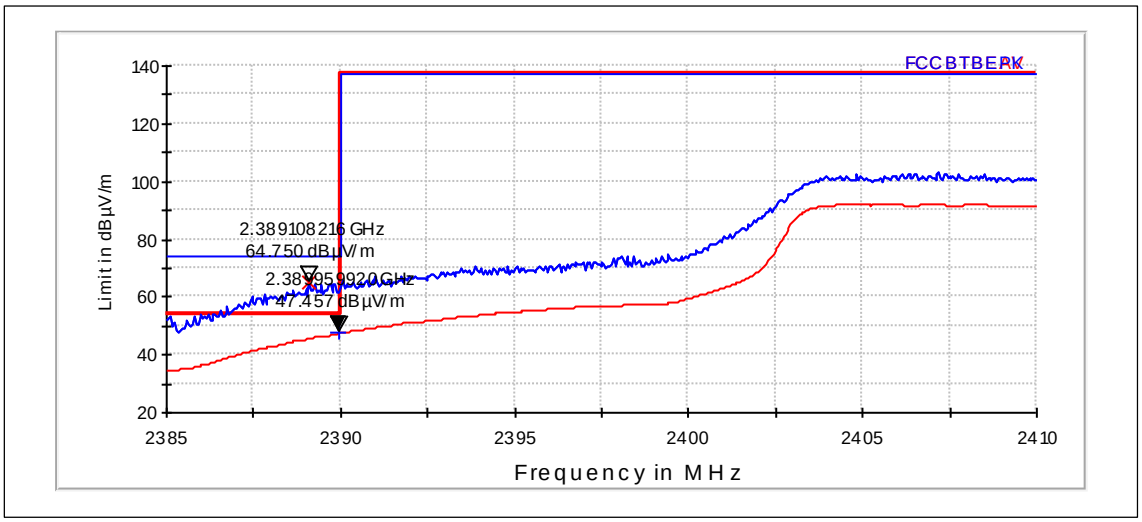
3.3.2 802.11n, 16QAM modulation, 26.0 / 28.9 Mbps data rate.

Channel 1 / 2412 MHz



Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Correction [dB]	Results
2389	64.75	1727.826	76.96	-12.21	-12.212	PASSED

Average (RBW: 1 MHz, VBW: 10 Hz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Correction [dB]	Results
2390	47.46	235.966	59.67	-12.21	-12.212	PASSED

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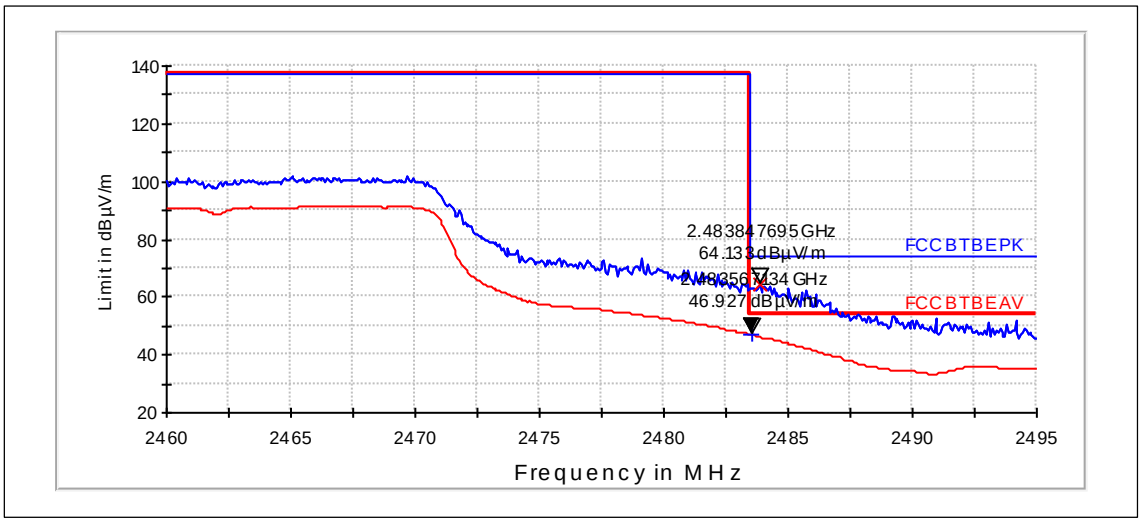
Channel 11 / 2462 MHz



Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Correction [dB]	Results
2484	64.13	1609.348	76.31	-12.18	-12.178	PASSED

Average (RBW: 1 MHz, VBW: 10 Hz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Correction [dB]	Results
2484	46.93	221.998	59.11	-12.18	-12.178	PASSED

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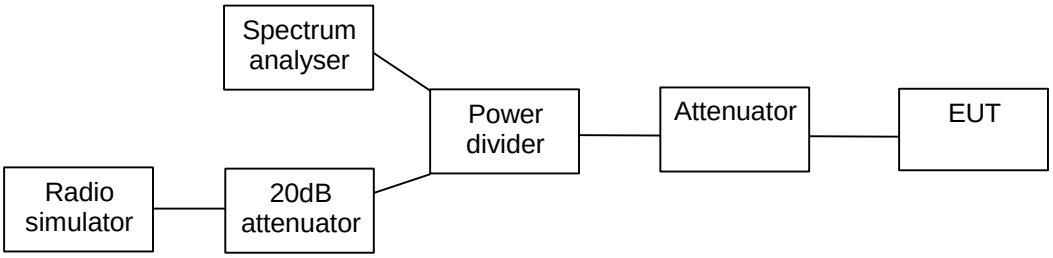
4. Spurious RF conducted emissions
(FCC §15.247(d), RSS-210 A8.5)

EUT with DUT number	RM-977, DUT 43137
Accessories with DUT numbers	SD-128, DUT 43138
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 31 / 103.0
Date of measurements	21-Jan-2014
Measured by	Timo Raiskio

4.1. Test Setup



4.2. Test method and limit

The measurement is made according to Public notice KDB 558 074 and IC standard RSS-210.

The reference level for the -20 dBc measurement was obtained as instructed in section 11.2 of the KDB 558074, using span of 1.5 times the OBW.

Limits for spurious RF conducted emissions measurements

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

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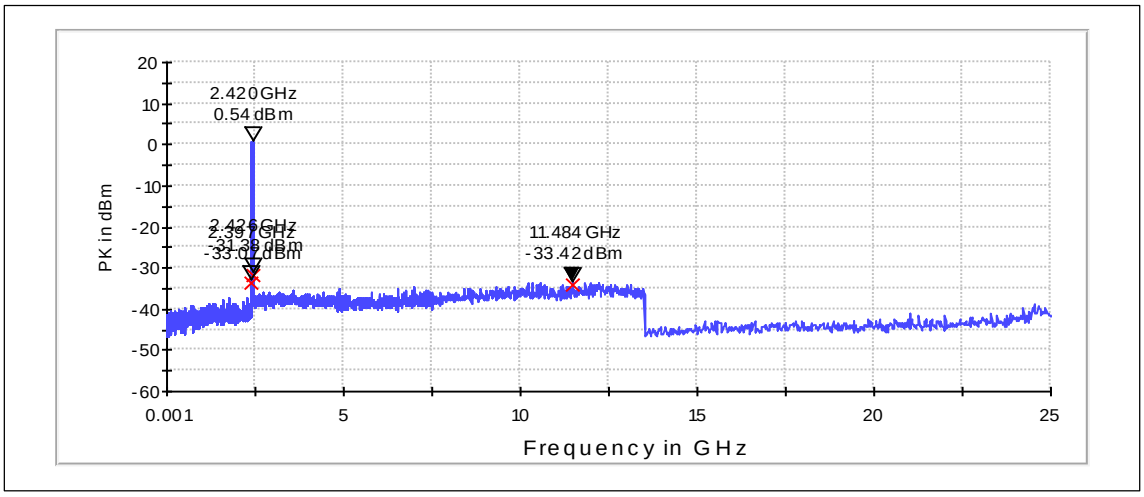
4.3. WLAN Test results

4.3.1 802.11n mode, BPSK modulation, 6.5 / 7.25 Mbps data rate

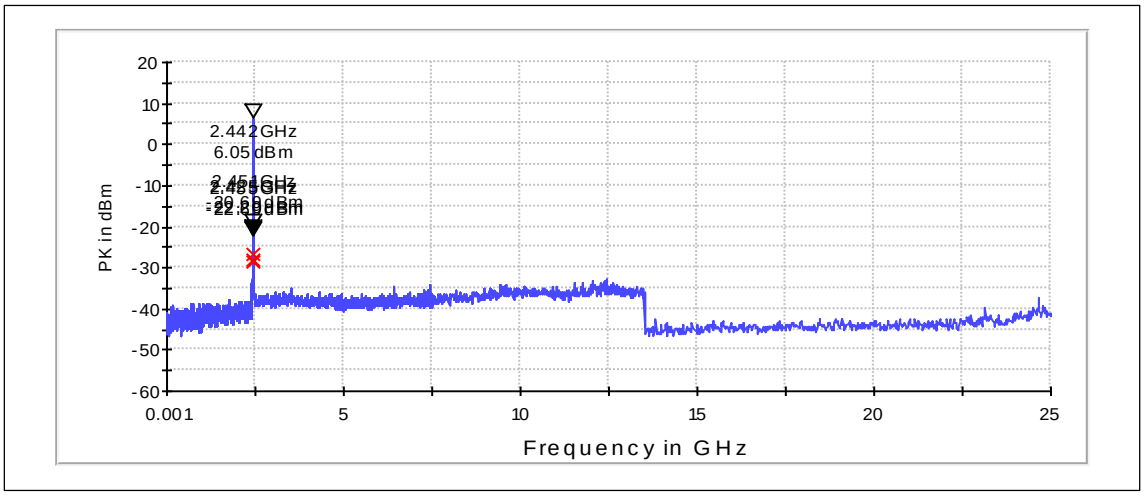
Channel 1 / 2412 MHz



Peak (RBW: 100 kHz, VBW: 300 kHz)

Frequency [MHz]	P [dBc]	Result
2425.758	-31.92	PASSED
2397.388	-33.61	PASSED
11484.000	-33.96	PASSED

Channel 6 / 2437 MHz



Peak (RBW: 100 kHz, VBW: 300 kHz)

Frequency [MHz]	P [dBc]	Result
2450.708	-26.73	PASSED
2425.144	-28.25	PASSED
2455.416	-28.73	PASSED

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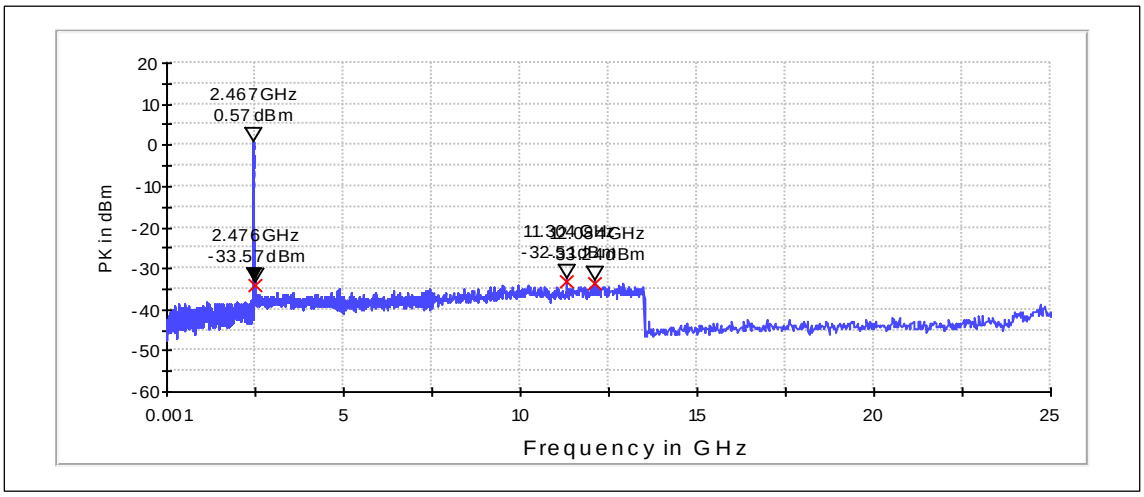
Channel 11 / 2462 MHz

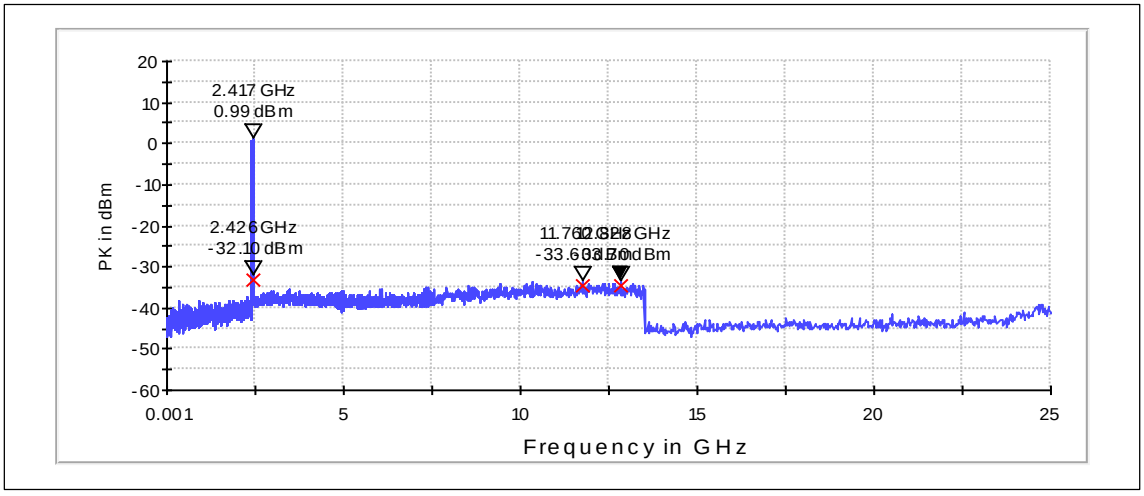


Peak (RBW: 100 kHz, VBW: 300 kHz)

Frequency [MHz]	P [dBc]	Result
11304.000	-33.08	PASSED
12084.000	-33.80	PASSED
2475.658	-34.13	PASSED

4.3.2 802.11n mode, 16QAM modulation, 26.0 / 28.9 Mbps data rate

Channel 1 / 2412 MHz



Peak (RBW: 100 kHz, VBW: 300 kHz)

Frequency [MHz]	P [dBc]	Result
2425.758	-33.09	PASSED
11760.000	-34.59	PASSED
12828.000	-34.69	PASSED

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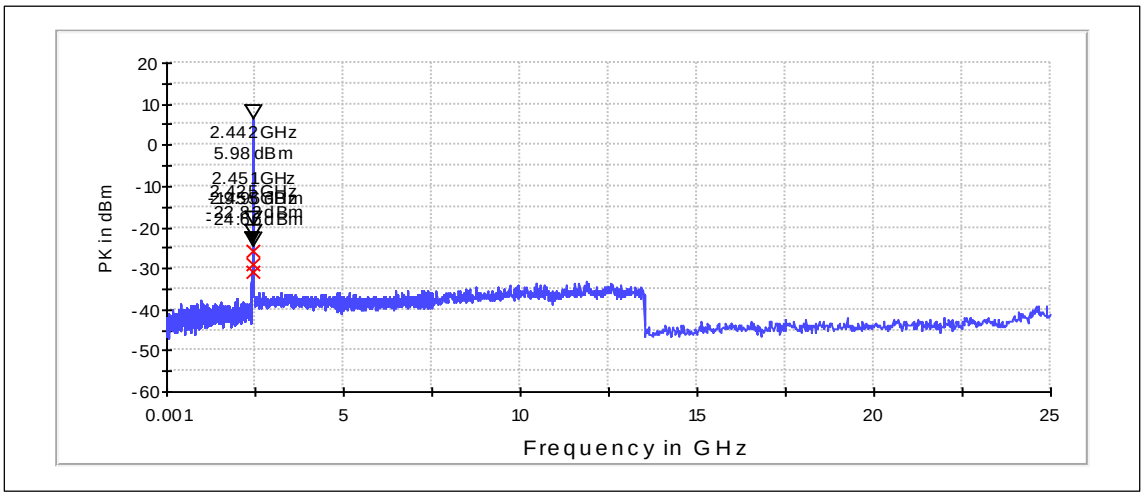
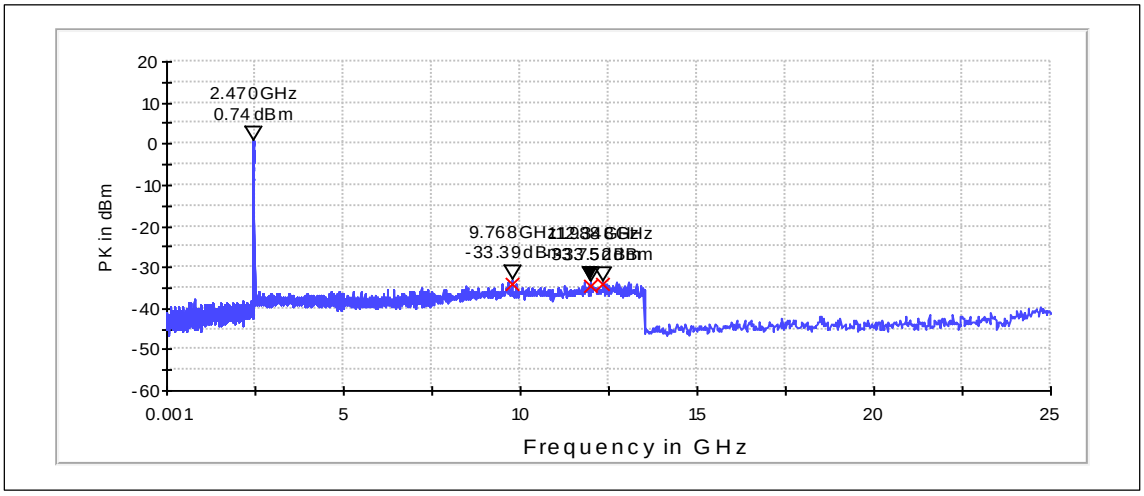
Channel 6 / 2437 MHz



Peak (RBW: 100 kHz, VBW: 300 kHz)

Frequency [MHz]	P [dBc]	Result
2450.708	-25.94	PASSED
2425.144	-28.80	PASSED
2455.416	-30.64	PASSED

Channel 11 / 2462 MHz



Peak (RBW: 100 kHz, VBW: 300 kHz)

Frequency [MHz]	P [dBc]	Result
9768.000	-34.12	PASSED
12348.000	-34.26	PASSED
11988.000	-34.49	PASSED

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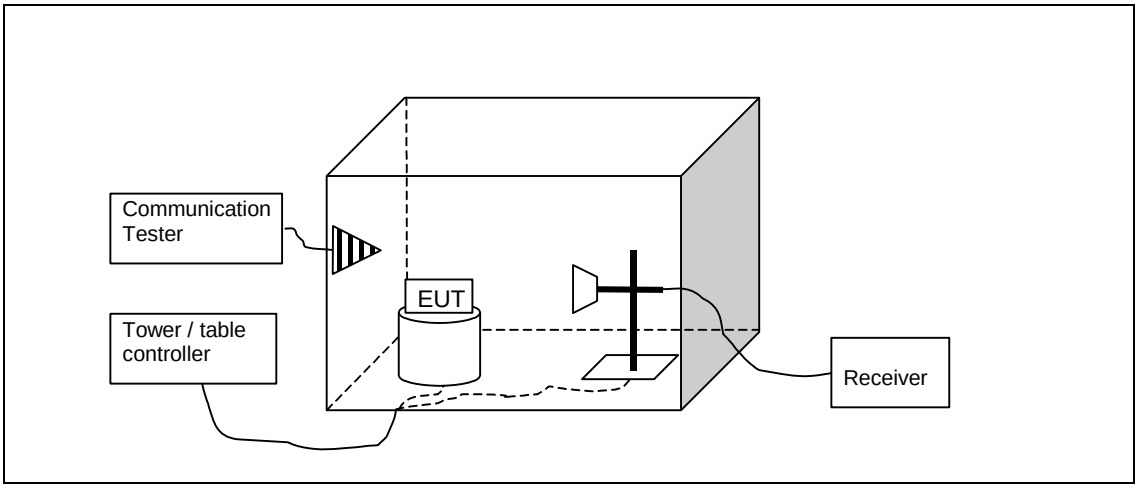
5. Spurious radiated emissions
(FCC §15.247(d), §15.209, RSS-210 A8.5)

EUT with DUT number	RM-977, DUT 43133
Accessories with DUT numbers	BL-5H, DUT 43134 ; AC-20E Phihong, DUT 43135 ; WH-108, DUT 43136
Operation Voltage [V] / [Hz]	110 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	24 / 47 / 103.4
Date of measurements	28-Jan-2014
Measured by	Hannu Söderholm

5.1.1 Test setup



5.2. 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.

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The measurement results are obtained as described below:

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

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

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

Frequency range [MHz]	Limit [µV/m]	Limit [dBµV/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

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5.3. WLAN test results

5.3.1 802.11n, BPSK modulation, 6.5 / 7.25 Mbps data rate.

Channel 1 / 2412 MHz
Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Margin	Limit [dBµV/m]	Results
4824.1	41.12	113.737	45.89	-4.77	32.9	74	PASSED
7236.9	44.96	177.052	44.05	0.91	50.3	95	PASSED

Average (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Margin	Limit [dBµV/m]	Results
4824.1	29.11	28.55	33.88	-4.77	24.9	54	PASSED
7236.9	31.98	39.737	31.07	0.91	---	---	PASSED

Channel 6 / 2437 MHz
Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Margin	Limit [dBµV/m]	Results
4878.4	40.35	104.136	44.88	-4.53	33.6	74	PASSED
7321.5	45.18	181.593	43.92	1.27	28.8	74	PASSED

Quasi peak (RBW: 100 kHz, VBW: 100 kHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Margin	Limit [dBµV/m]	Results
31.29	33.78	48.876	54.16	-20.38	6.2	40	PASSED
31.44	34.07	50.513	54.52	-20.45	5.9	40	PASSED
956.014	39.94	99.357	56.99	-17.05	6.1	46	PASSED

Average (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Margin	Limit [dBµV/m]	Results
4878.4	27.47	23.635	32	-4.53	26.5	54	PASSED
7321.5	31.77	38.748	30.51	1.27	22.2	54	PASSED

Channel 11 / 2462 MHz
Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Margin	Limit [dBµV/m]	Results
4925.3	39.94	99.334	44.33	-4.39	34	74	PASSED
7385.3	45.15	180.884	43.5	1.65	28.8	74	PASSED

Average (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Margin	Limit [dBµV/m]	Results
4925.3	27.71	24.305	32.1	-4.39	26.3	54	PASSED
7385.3	31.92	39.423	30.27	1.65	22.1	54	PASSED

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5.3.2 802.11n, 16QAM modulation, 26.0 / 28.9 Mbps data rate.

Channel 1 / 2412 MHz
Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Margin	Limit [dBµV/m]	Results
4824.1	41.73	122.082	46.5	-4.77	32.2	74	PASSED
7234.3	44.54	168.597	43.64	0.9	50.7	95	PASSED

Average (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Margin	Limit [dBµV/m]	Results
4824.1	29.87	31.135	34.64	-4.77	24.1	54	PASSED
7234.3	31.67	38.309	30.77	0.9	---	---	PASSED

Channel 6 / 2437 MHz
Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Margin	Limit [dBµV/m]	Results
4879.7	40.08	100.914	44.61	-4.53	33.9	74	PASSED
7320.9	44.49	167.668	43.23	1.27	29.5	74	PASSED

Quasi peak (RBW: 100 kHz, VBW: 100 kHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Margin	Limit [dBµV/m]	Results
31.26	33.3	46.249	53.67	-20.37	6.7	40	PASSED
31.35	33.6	47.869	54.01	-20.41	6.4	40	PASSED
35.752	31.04	35.625	53.36	-22.32	9	40	PASSED

Average (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Margin	Limit [dBµV/m]	Results
4879.7	27.48	23.646	32.01	-4.53	26.5	54	PASSED
7320.9	31.98	39.715	30.72	1.27	22	54	PASSED

Channel 11 / 2462 MHz
Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Margin	Limit [dBµV/m]	Results
4924	41.12	113.789	45.52	-4.4	32.9	74	PASSED
7384	45.27	183.4	43.64	1.63	28.7	74	PASSED

Average (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Margin	Limit [dBµV/m]	Results
4924	28.79	27.52	33.19	-4.4	25.2	54	PASSED
7384	32.26	41.011	30.63	1.63	21.7	54	PASSED

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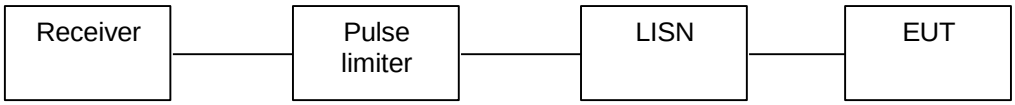
6. AC powerline conducted emissions
(FCC §15.207, RSS-GEN 7.2.2)

EUT with DUT number	RM-977, DUT 43141
Accessories with DUT numbers	BL-5H LGC, DUT 43139 ; AC-20E, DUT 43140 ; WH-108, DUT 43142
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 33 / 101.6
Date of measurements	24-Jan-2014
Measured by	Jari Jantunen

6.1. Test Setup



6.2. Test method and limit

The measurement is made according to procedure KDB 558074 and IC standard RSS-GEN as follows:

The EUT is placed on a wooden table 80 cm above the reference ground plane.

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

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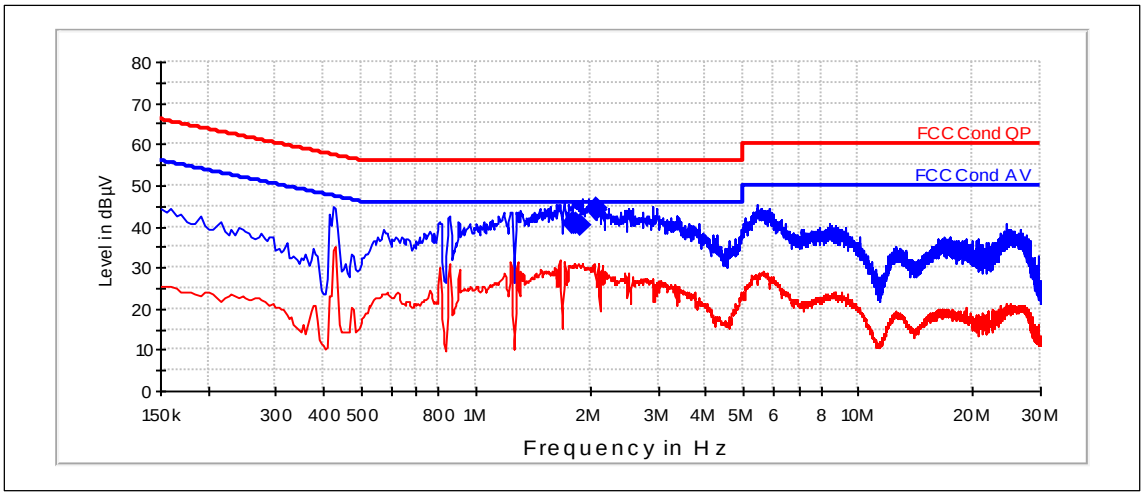
6.3. WLAN Test results

6.3.1 802.11n mode, BPSK modulation, 6.5 / 7.25 Mbps data rate

Channel 6 / 2437 MHz



QuasiPeak (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Line	Result
1.795	40.68	L1	PASSED
1.82	40.91	L1	PASSED
1.84	40.6	L1	PASSED
1.88	40.31	L1	PASSED
2.07	43.98	L1	PASSED
2.08	44.21	L1	PASSED

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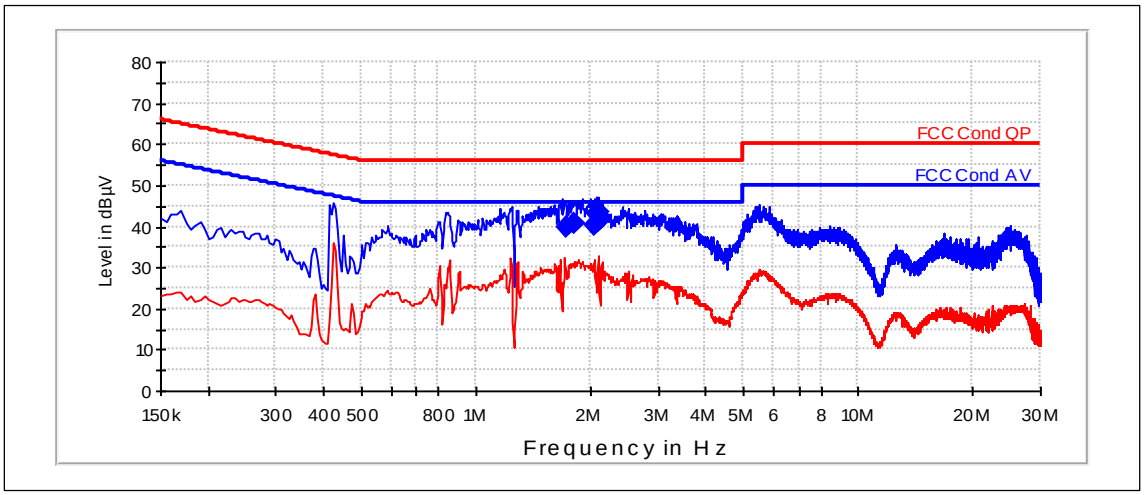
6.3.2 802.11n mode, 16QAM modulation, 26.0 / 28.9 Mbps data rate

Channel 6 / 2437 MHz



QuasiPeak (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Line	Result
1.725	39.66	L1	PASSED
1.82	40.88	L1	PASSED
2.05	40.07	L1	PASSED
2.08	42.99	L1	PASSED
2.085	43.25	L1	PASSED
2.095	41.06	L1	PASSED

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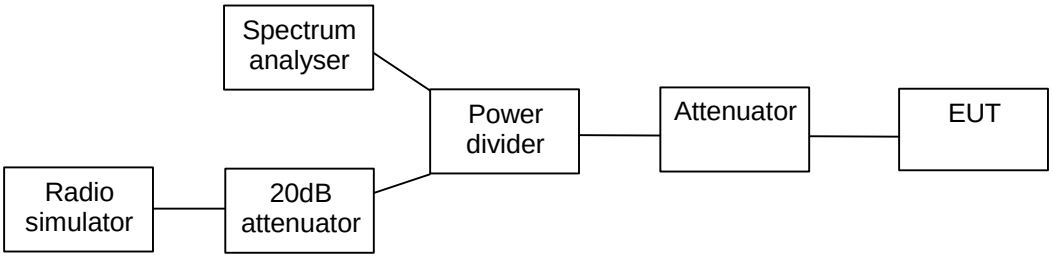
7. 6 dB bandwidth

(FCC §15.247(a)(2), RSS-210 A8.2 (1))

EUT with DUT number	RM-977, DUT 43137
Accessories with DUT numbers	SD-128, DUT 43138
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 31 / 103.0
Date of measurements	21-Jan-2014
Measured by	Timo Raiskio

7.1. Test Setup



7.2. 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

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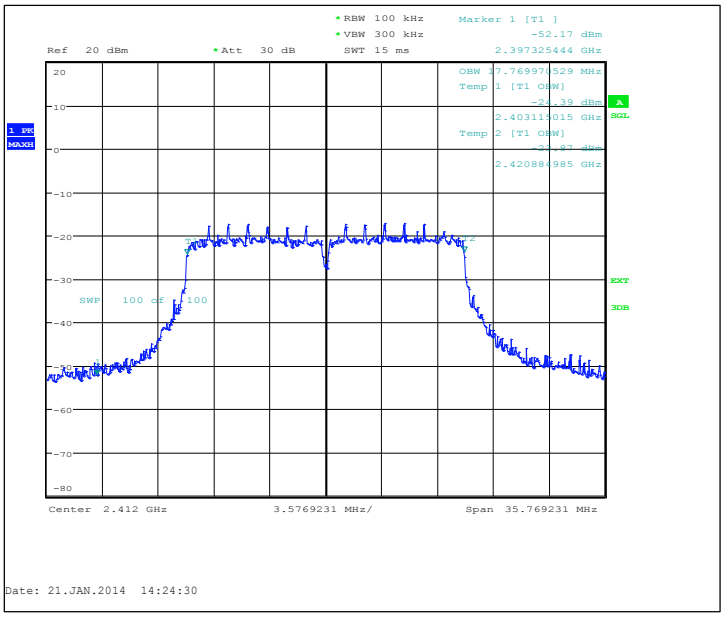
7.3. WLAN Test results

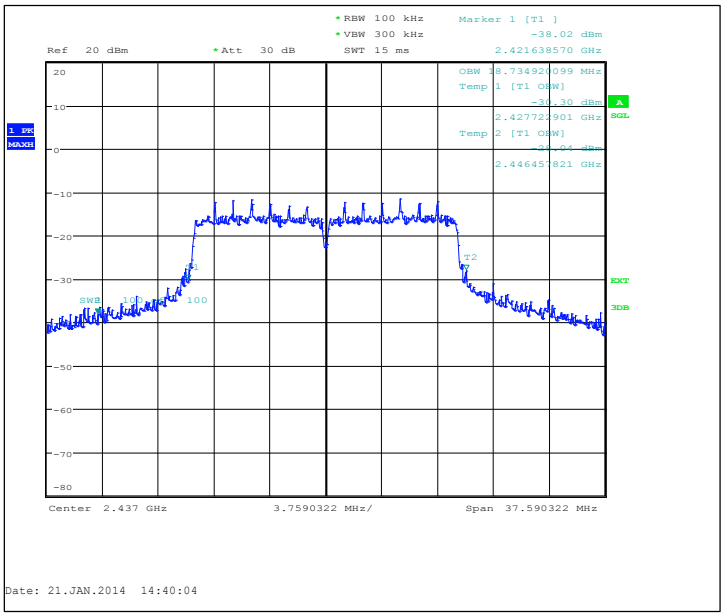
7.3.1 802.11n mode, BPSK modulation, 6.5 / 7.25 Mbps data rate

Channel / f_C [MHz]	6 dB bandwidth [kHz]	Result
1 / 2412	17770	PASSED
6 / 2437	18734.9	PASSED
11 / 2462	17779.5	PASSED

Channel 1 / 2412 MHz



Channel 6 / 2437 MHz



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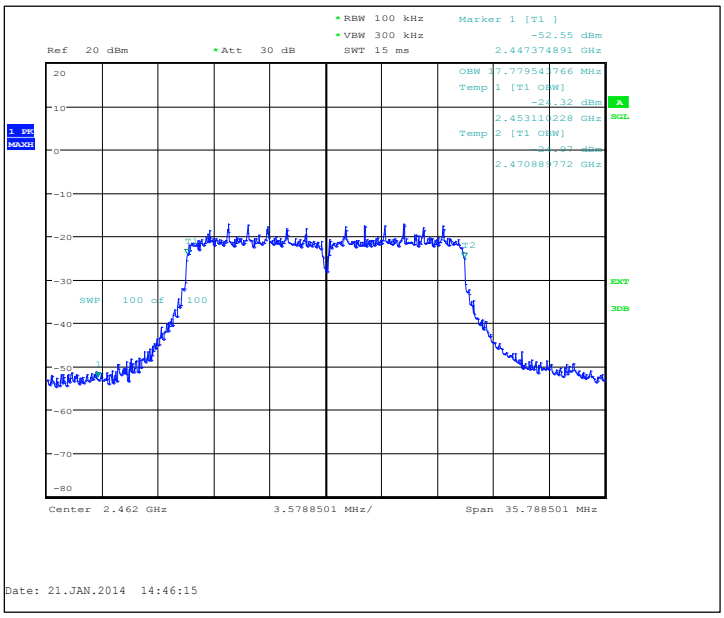
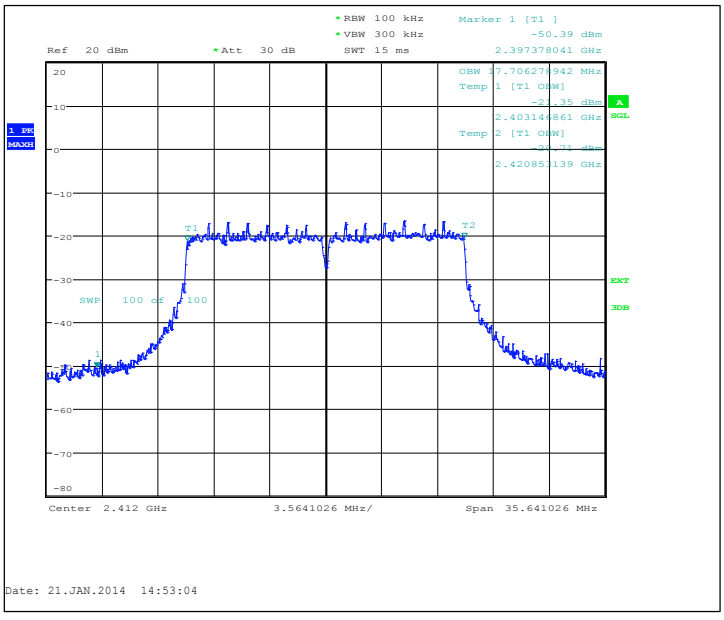
Channel 11 / 2462 MHz



7.3.2 802.11n mode, 16QAM modulation, 26.0 / 28.9 Mbps data rate

Channel / f_C [MHz]	6 dB bandwidth [kHz]	Result
1 / 2412	17706.3	PASSED
6 / 2437	18041.9	PASSED
11 / 2462	17752.7	PASSED

Channel 1 / 2412 MHz



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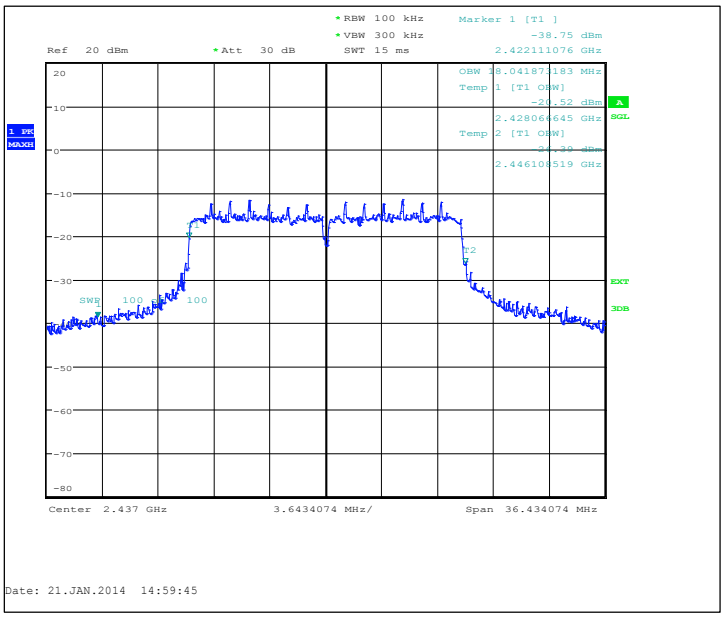
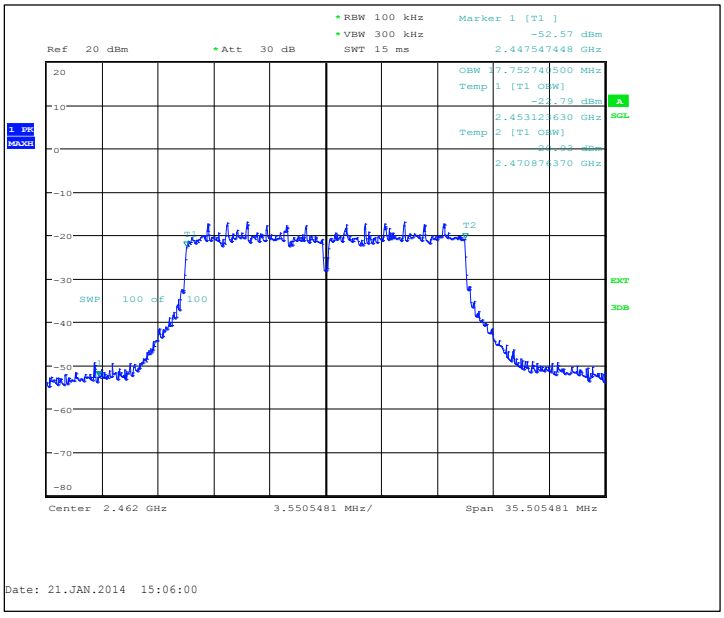
Channel 6 / 2437 MHz



Channel 11 / 2462 MHz



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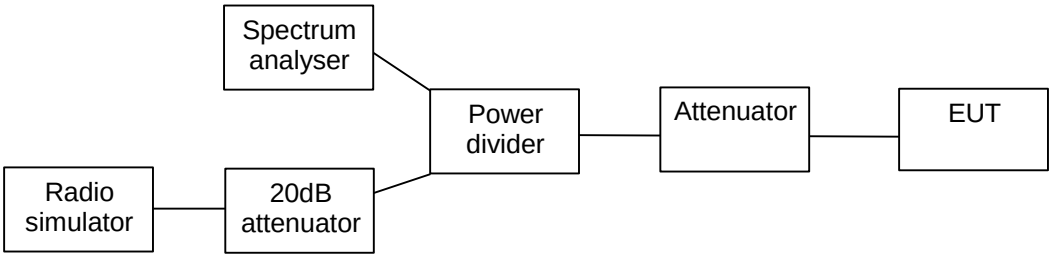
8. Power spectral density
(FCC §15.247(e), RSS-210 A8.2 (2))

EUT with DUT number	RM-977, DUT 43137
Accessories with DUT numbers	SD-128, DUT 43138
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 31 / 103.0
Date of measurements	21-Jan-2014
Measured by	Timo Raiskio

8.1. Test Setup



8.2. 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

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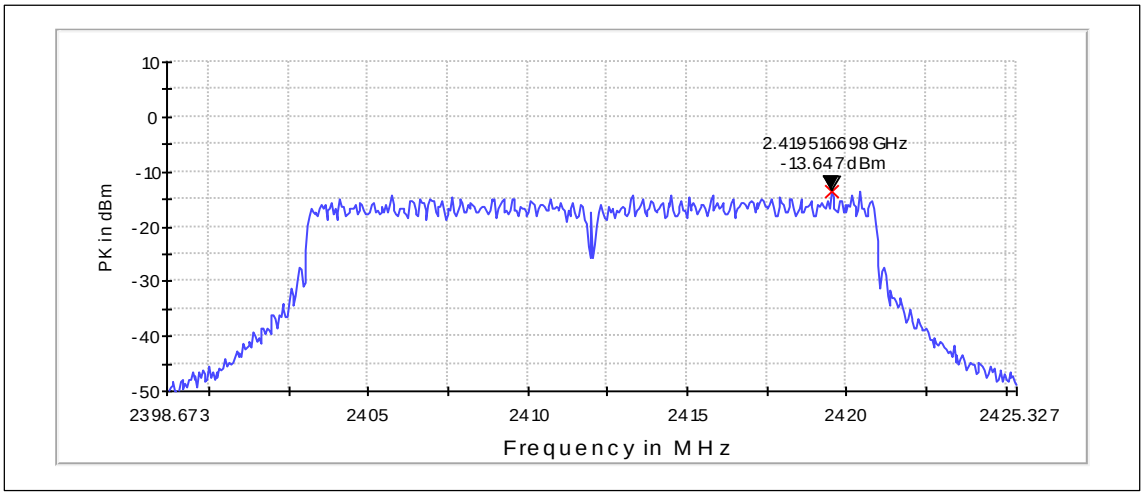
8.3. WLAN Test results

8.3.1 802.11n mode, BPSK modulation, 6.5 / 7.25 Mbps data rate

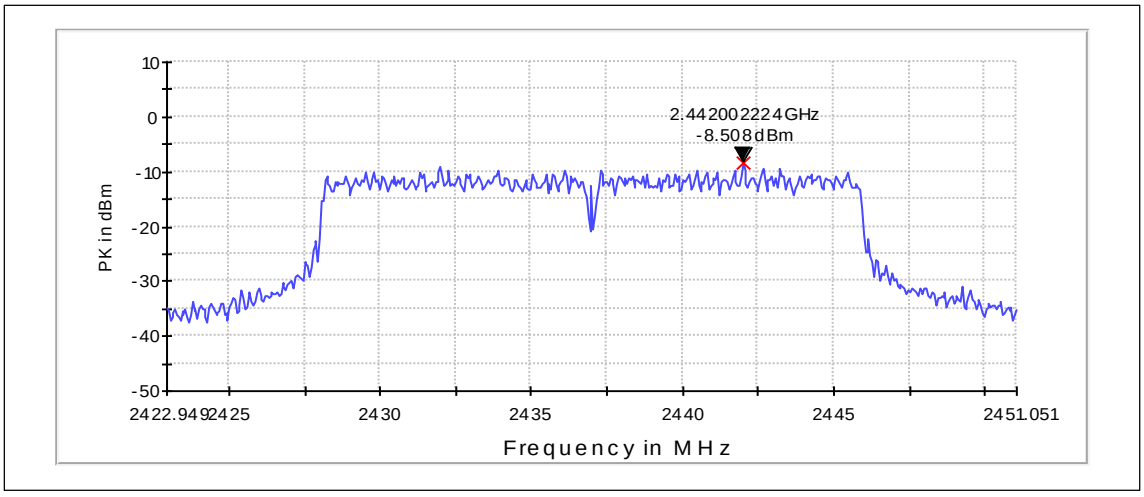
Peak (RBW: 3 kHz, VBW: 10 kHz, Max hold)

Channel / f_C [MHz]	P [dBm]	Result
1 / 2412	-13.65	PASSED
6 / 2437	-8.51	PASSED
11 / 2462	-13.56	PASSED

Channel 1 / 2412 MHz



Channel 6 / 2437 MHz



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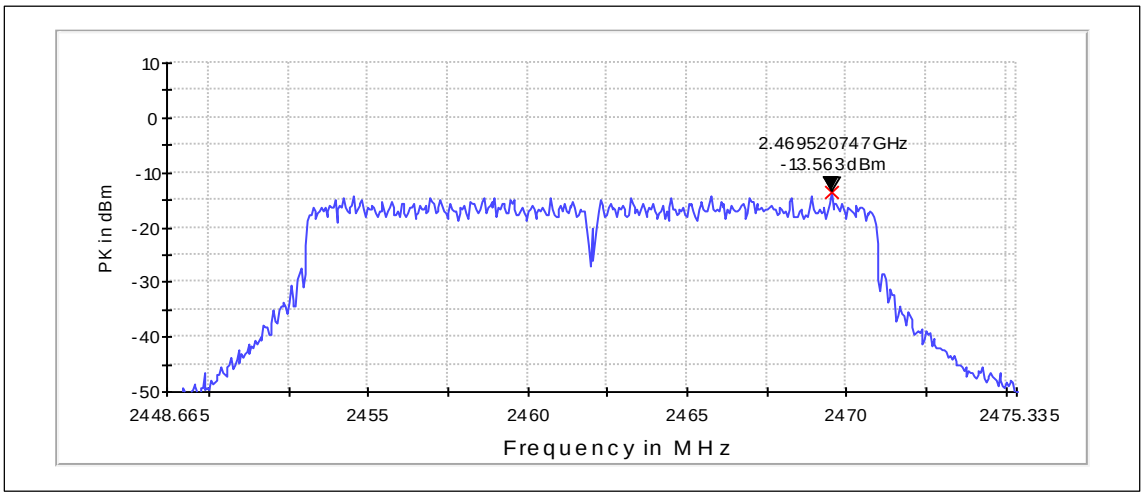
Channel 11 / 2462 MHz

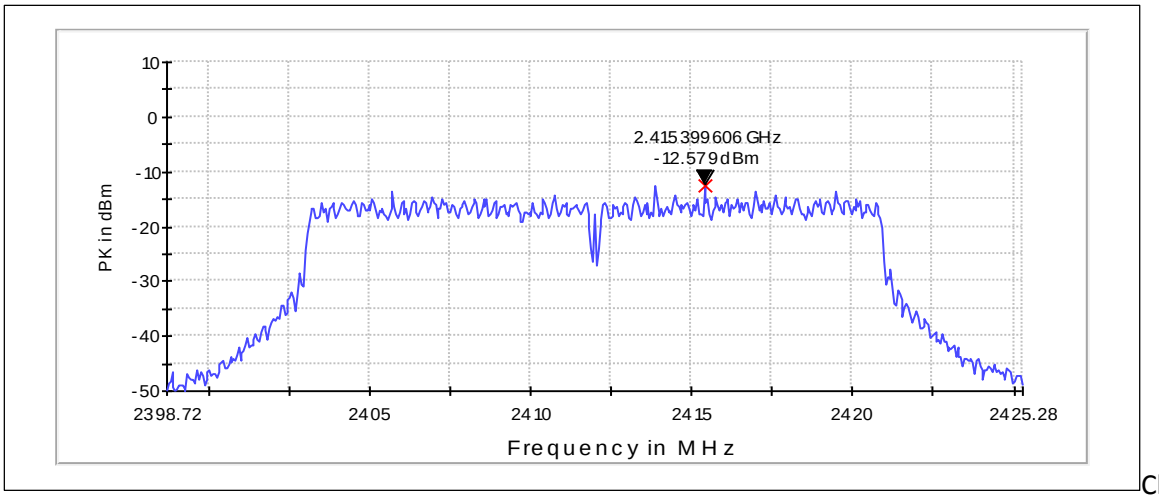


8.3.2 802.11n mode, 16QAM modulation, 26.0 / 28.9 Mbps data rate

Peak (RBW: 3 kHz, VBW: 10 kHz, Max hold)

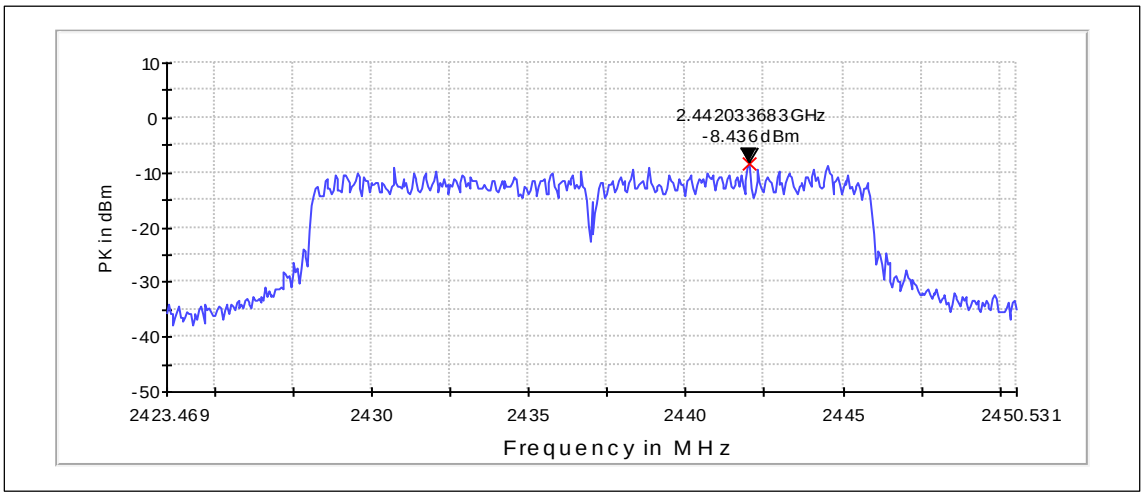
Channel / f_C [MHz]	P [dBm]	Result
1 / 2412	-12.58	PASSED
6 / 2437	-8.44	PASSED
11 / 2462	-12.82	PASSED

Channel 1 / 2412 MHz

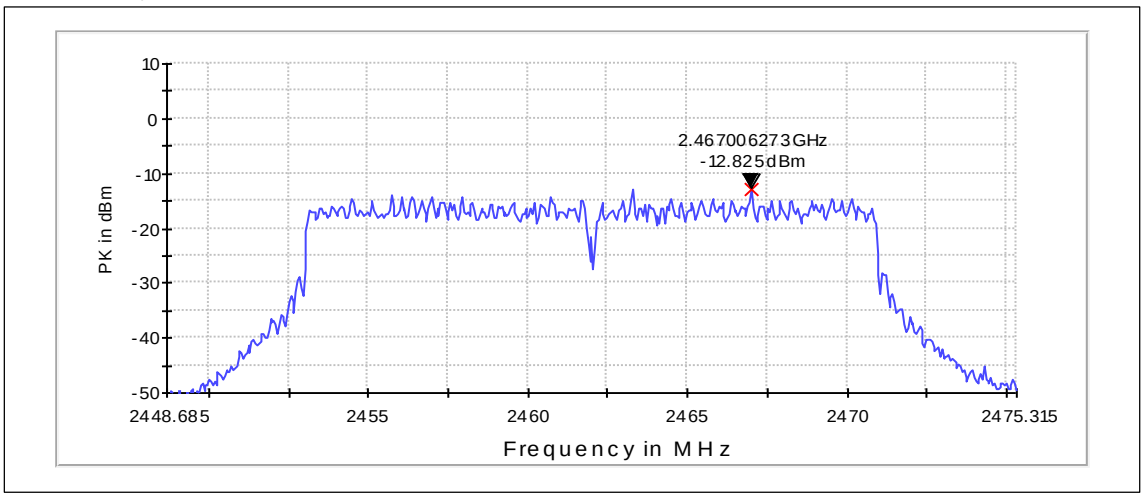


Channel 6

Channel 6 / 2437 MHz



Channel 11 / 2462 MHz



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9. Test Equipment

9.1. Conducted measurements

Eq. No	Equipment	Type	Manufacturer	Used in
TM37773	Communication Tester	CMU200	R&S	22/24/27, 15B
TM30600	Impulse limiter	ESH3-Z2	R&S	15C, 15B
TM26490	LISN 50 µH	ESH3-Z5	R&S	15C, 15B
TM26491	LISN 50 µH	ESH3-Z5	R&S	15C, 15B
TM37610	Spectrum Analyzer	FSU26	R&S	22/24/27, 15C, 15E
TM23007	Oscilloscope	TDS684B	Tektronix	15E
TM22806	Battery	BAT 20/E	Fiskars	15C, 15B
TM22805	UPS	PS 20/1.2	Fiskars	15C, 15B
-	Temperature and humidity logger	175-H2	Testo	15C, 15B
-	Temperature and humidity logger	175-H2	Testo	22/24/27, 15C
-	Air pressure and temperature logger	635-2	Testo	22/24/27, 15C, 15B
-	Air pressure sensor	0638-1835	Testo	22/24/27, 15C, 15B
-	Temperature test chamber	VT 4002	Vötsch	22/24/27
2001	Bluetooth tester	CBT	R&S	15C, 15B
2009	LISN 50 µH	ENV216	R&S	15C, 15B
2010	LISN 50 µH	ENV216	R&S	15C, 15B
2012	Power splitter	11667B	Agilent	22/24/27, 15C
2013	Attenuator	8493C	Agilent	22/24/27, 15C
2014	Attenuator	8493C	Agilent	22/24/27, 15C
2019	Power splitter	ZN2PD-9G-S+	Mini-Circuits	15E
2020	Power splitter	ZN2PD-9G-S+	Mini-Circuits	15E
2021	Communication Tester	CMW500	R&S	22/24/27
2022	Communication Tester	CMU200	R&S	22/24/27
2023	Spectrum Analyzer	ESMI-RF	R&S	15B/15C
2024	Analyzer display unit	ESAI-D	R&S	15B/15C
2026	Signal Generator	SMF 100A	R&S	22/24/27, 15C, 15E, 15B

9.2. Radiated measurements

Eq. No	Equipment	Type	Manufacturer	Used in
-	Antenna	BBHA 9120 D	Schwarzbeck	22/24/27, 15C
TM37678	Communication Tester	CMU200	R&S	22/24/27, 15B
TM38845	Receiver	ESIB 26	R&S	22/24/27, 15C, 15E, 15B
-	Antenna	HL562	R&S	22/24/27, 15C, 15E, 15B
-	Turntable	2188	EMCO	22/24/27, 15C, 15E, 15B
-	Turntable controller	2090	EMCO	22/24/27, 15C, 15E, 15B
-	RF system panel	OSP130	R&S	22/24/27, 15C, 15E, 15B
-	Mini mast	2075-2	ETS Lindgren	22/24/27, 15C, 15B
TM38843	Mini mast	2075	Emco	22/24/27, 15C, 15B
TM38842	Antenna mast controller	2090	Emco	22/24/27, 15C, 15B
TM30643	LISN 50 µH	LISN-5-20-2	FCC	22/24/27, 15C, 15B
TM30644	LISN 50 µH	LISN-5-20-2	FCC	22/24/27, 15C, 15B
-	Temperature and humidity logger	175-H2	Testo	22/24/27, 15C, 15B
-	Air pressure and temperature logger	635-2	Testo	22/24/27, 15C, 15B

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Eq. No	Equipment	Type	Manufacturer	Used in
-	Air pressure sensor	0638-1835	Testo	22/24/27, 15C, 15B
TM37523	Preamplifier	AMF-4D-10M-3G-25-20P	Miteq	22/24/27, 15C, 15B
TM37498	Preamplifier	AMF-5D-020180-26-10P	Miteq	22/24/27, 15C, 15B
TM30599	Semi anechoic chamber	UNKNOWN	TDK	22/24/27, 15C, 15B
TM22638	Power supply	OL63743-901	-	22/24/27, 15C, 15E, 15B
TM38066	High pass filter	WHKX3.0/18G-12SS	Wainwright	22/24/27, 15C, 15E, 15B
2028	High pass filter	WHKX 1.0/15G-12SS	Wainwright	22/24/27, 15C,15E, 15B
TM37545	Tunable notch filter	800.0/960.0-0.2/40-8SSK	Wainwright	22
TM26512	Tunable notch filter	WRCD1850/1910-0.2/40-10SSK	Wainwright	24
-	Band reject filter	WRCG1877/1883-1870/1890-40/6EE	Wainwright	24
-	Band reject filter	WRCG1729.4/1735.4-1722.4/1742.4-40/6SS	Wainwright	27
TM23892	Controller	G-1000SDX	Yaesu	22/24/27, 15C, 15E
2001	Bluetooth tester	CBT	R&S	15C, 15B
6023	Antenna	VUBA 9117	Schwarzbeck	22/24/27
2021	Communication Tester	CMW500	R&S	22/24/27
2025	Antenna	HFH2-Z2	R&S	15C
2026	Signal Generator	SMF 100A	R&S	22/24/27, 15C, 15E, 15B
2052	Antenna	BBHA 9120 D	Schwarzbeck	22/24/27, 15C, 15B, 15E
-	Antenna	QSH18S20	Q-Par	22/24/27, 15C, 15B, 15E
-	Antenna	QSH20S20	Q-Par	22/24/27, 15C, 15B, 15E
-	Antenna	QSH20S20	Q-Par	22/24/27, 15C, 15B, 15E

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