

FCC Part 15C Compliance Test Report

Test Report no.:	FCC15CWLAN_RM-975_03.docx	Date of Report:	28-Apr-2014
Number of pages:	49	Customer's Contact person:	Juha Paukku
Testing laboratory:	TCC Nokia Salo Laboratory P.O.Box(86) Joensuunkatu 7H / Kiila 1B FIN-24101 SALO, FINLAND Tel. +358 (0) 7180 08000 Fax. +358 (0) 7180 45220	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.:	533467		
IC recognition no.:	661V-1		
Tested devices/ accessories:	Phone RM-975 / Battery BL-5H / AC-Charger AC-20E / Headset WH-108		
FCC ID:	PDNRM-975	IC:	661R-RM975
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:			

Kalle Hannila, System Manager, EMC

1. Summary for FCC Part 15C Compliance Test Report

Date of receipt	02-Apr-2014
Testing completed	17-Apr-2014
The customer's contact person	Juha Paukku
Test Plan referred to	T:\Projects\RM-975\TestPlan\RS_testplan_RM-975.xlsm
Notes	-
Document name	T:\Projects\RM-975\EMC\FCC15CWLAN_RM-975_03.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-975	004402478041753	2020	-	01961.00014.14112.00000	18142
Battery	BL-5H	495540349401010729000670699	-	-	-	18146
AC-Charger	AC-20E	486867341132113562700675628	-	-	-	18148
Headset	WH-108	-	-	-	-	18150
Phone	RM-975	004402478041290	2020	-	01061.00014.14112.00000	18156
Headset	WH-108	-	-	-	-	18149
Phone	RM-975	004402478041290	2020	-	01061.00014.14112.00000	18156
Battery	BL-5H	495540349401010547400670699	-	-	-	17993
Headset	WH-108	2376171	-	-	-	17990
AC-Charger	AC-20E	409049327155040250700675628	-	-	-	17995

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
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 Laboratory.

CONTENTS

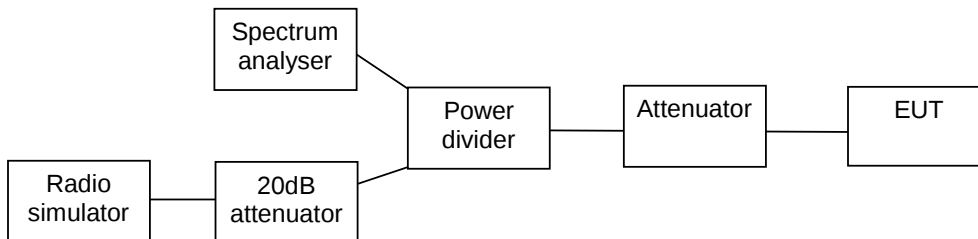
1. Summary for FCC Part 15C Compliance Test Report.....	2
1.1. EUT and Accessory Information.....	2
1.2. Summary of Test Results.....	2
2. Conducted peak output power (15.247(b)(1), RSS-210 A8.4 (4))	5
2.1. Test Setup.....	5
2.2. Test method and limit.....	5
2.3. Power results summary.....	6
2.4. WLAN Test results	7
3. Spurious RF conducted emissions (FCC §15.247(d), RSS-210 A8.5).....	23
3.1. Test Setup.....	23
3.2. Test method and limit.....	23
3.3. WLAN Test results	24
4. 6 dB bandwidth (FCC §15.247(a)(2), RSS-210 A8.2 (1)).....	27
4.1. Test Setup.....	27
4.2. Test method and limit.....	27
4.3. WLAN Test results	28
5. Power spectral density (FCC §15.247(e), RSS-210 A8.2 (2))	32
5.1. Test Setup.....	32
5.2. Test method and limit.....	32
5.3. WLAN Test results	33
6. AC powerline conducted emissions (FCC §15.207, RSS-GEN 7.2.2)	36
6.1. Test Setup.....	36
6.2. Test method and limit.....	36
6.3. WLAN Test results	37
7. Band edge compliance of RF emissions (FCC 15.247(d), 15.205(b), RSS-210 A8(0.5))	39
7.2. Test method and limit.....	39
7.3. WLAN test results	40
8. Radiated emissions (FCC ???, RSS-210 WLAN)	44
8.2. Test method and limit.....	44

8.3.	WLAN test results	46
9.	Test Equipment.....	48
9.1.	Conducted measurements	48
9.2.	Radiated measurements	48

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

EUT with DUT number	RM-975, DUT 18142
Accessories with DUT numbers	BL-5H, DUT 18146 ; AC-20E, DUT 18148 ; WH-108, DUT 18150
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 53 / 101.8
Date of measurements	03-Apr-2014
Measured by	Jari Keto

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

2.3. Power results summary

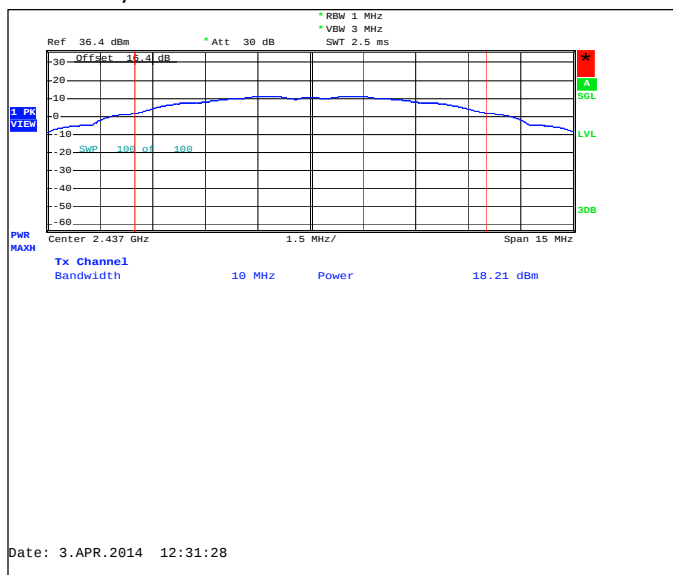
Channel / f_c [MHz]	Mode	Modulation	Data rate	Level [dBm]
6 / 2437	802.11b	BPSK	1 Mbps	18.21
6 / 2437	802.11b	QPSK	2 Mbps	17.93
6 / 2437	802.11b	QPSK	5.5 Mbps	19.17
6 / 2437	802.11b	QPSK	11 Mbps	20.34
6 / 2437	802.11g	BPSK	6 Mbps	23.08
6 / 2437	802.11g	BPSK	9 Mbps	22.9
6 / 2437	802.11g	QPSK	12 Mbps	22.65
6 / 2437	802.11g	QPSK	18 Mbps	22.62
6 / 2437	802.11g	16QAM	24 Mbps	22.99
6 / 2437	802.11g	16QAM	36 Mbps	21.83
6 / 2437	802.11g	64QAM	48 Mbps	21.03
6 / 2437	802.11g	64QAM	54 Mbps	19.94
6 / 2437	802.11n	BPSK	6.5 / 7.25 Mbps	23.24
6 / 2437	802.11n	QPSK	13.0 / 14.4 Mbps	22.75
6 / 2437	802.11n	QPSK	19.5 / 21.7 Mbps	22.68
6 / 2437	802.11n	16QAM	26.0 / 28.9 Mbps	23.06
6 / 2437	802.11n	16QAM	39.0 / 43.3 Mbps	20.83
6 / 2437	802.11n	64QAM	52.0 / 57.8 Mbps	19.87
6 / 2437	802.11n	64QAM	58.5 / 65.0 Mbps	19.85
6 / 2437	802.11n	64QAM	65.0 / 72.2 Mbps	17.9
1 / 2412	802.11n	BPSK	6.5 / 7.25 Mbps	20.03
11 / 2462	802.11n	BPSK	6.5 / 7.25 Mbps	18.21
1 / 2412	802.11n	16QAM	26.0 / 28.9 Mbps	20.02
11 / 2462	802.11n	16QAM	26.0 / 28.9 Mbps	18.46

2.4. WLAN Test results

2.4.1 802.11b mode, BPSK modulation, 1 Mbps data rate

Channel / f _c [MHz]	P [dBm]	P [mW]	Result
6 / 2437	18.21	66.222	PASSED

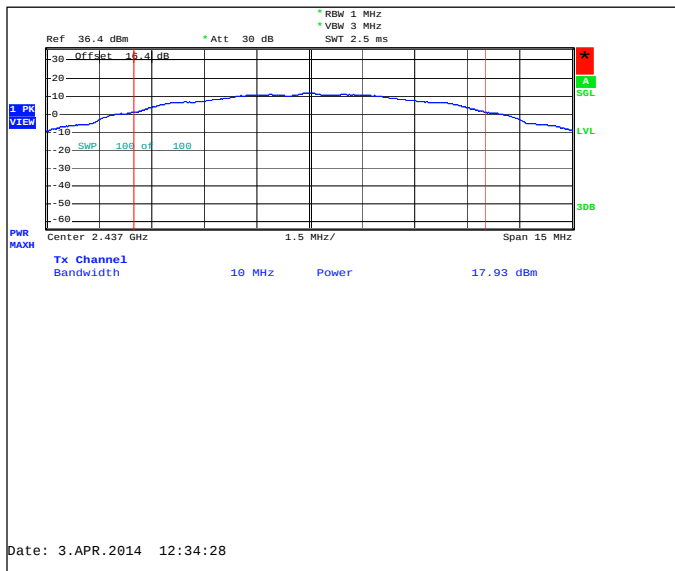
Channel 6 / 2437 MHz



2.4.2 802.11b mode, QPSK modulation, 2 Mbps data rate

Channel / f _c [MHz]	P [dBm]	P [mW]	Result
6 / 2437	17.93	62.087	PASSED

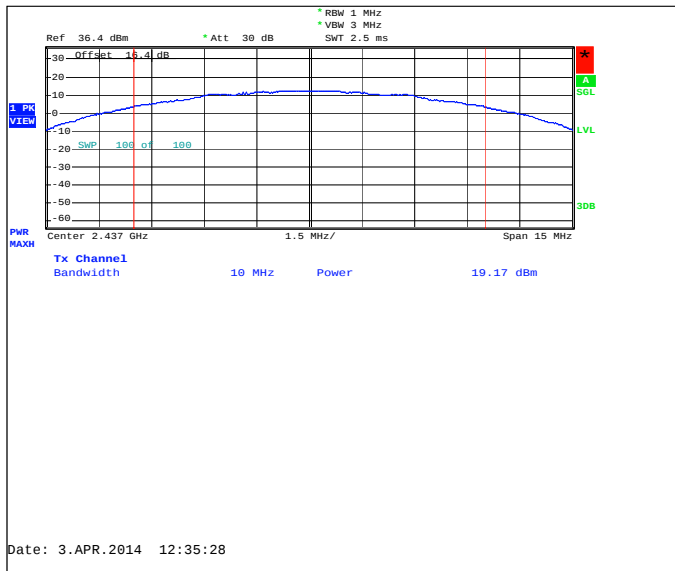
Channel 6 / 2437 MHz



2.4.3 802.11b mode, QPSK modulation, 5.5 Mbps data rate

Channel / f _c [MHz]	P [dBm]	P [mW]	Result
6 / 2437	19.17	82.604	PASSED

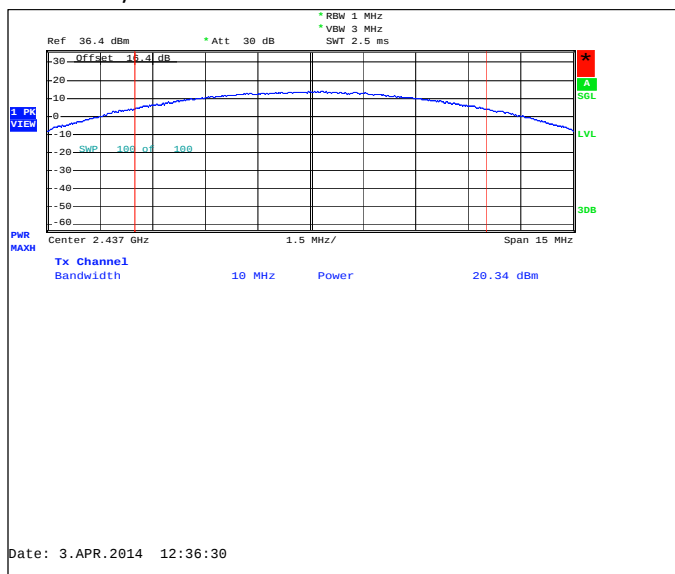
Channel 6 / 2437 MHz



2.4.4 802.11b mode, QPSK modulation, 11 Mbps data rate

Channel / f_c [MHz]	P [dBm]	P [mW]	Result
6 / 2437	20.34	108.143	PASSED

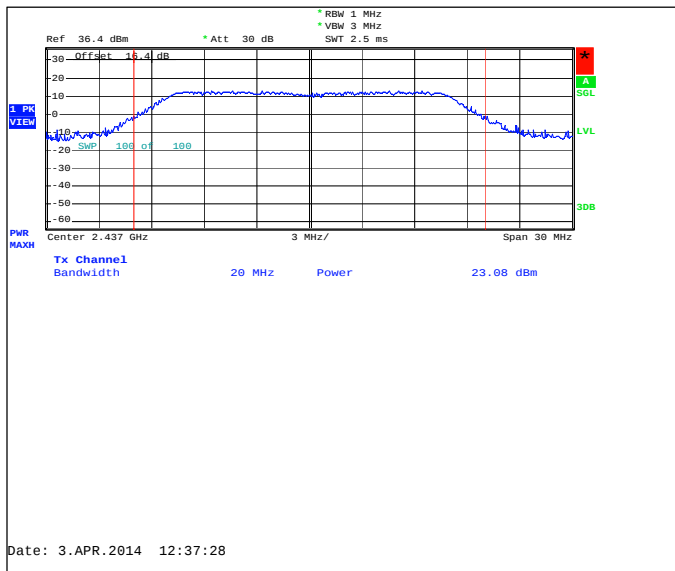
Channel 6 / 2437 MHz



2.4.5 802.11g mode, BPSK modulation, 6 Mbps data rate

Channel / f_c [MHz]	P [dBm]	P [mW]	Result
6 / 2437	23.08	203.236	PASSED

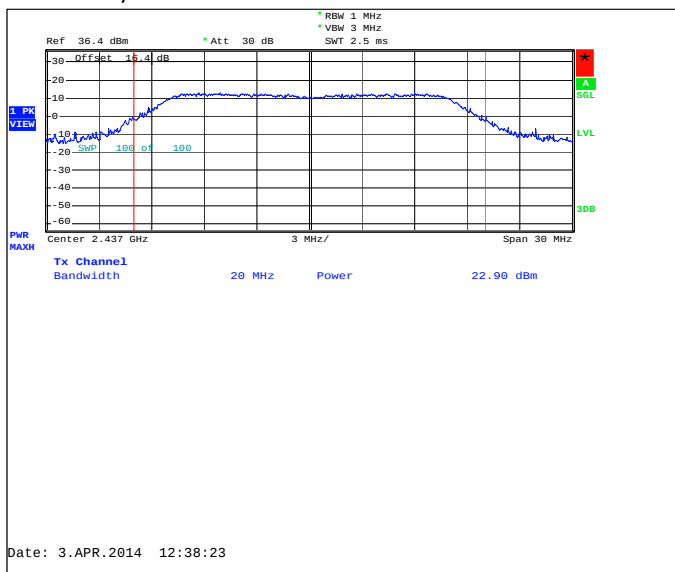
Channel 6 / 2437 MHz



2.4.6 802.11g mode, BPSK modulation, 9 Mbps data rate

Channel / f _c [MHz]	P [dBm]	P [mW]	Result
6 / 2437	22.9	194.984	PASSED

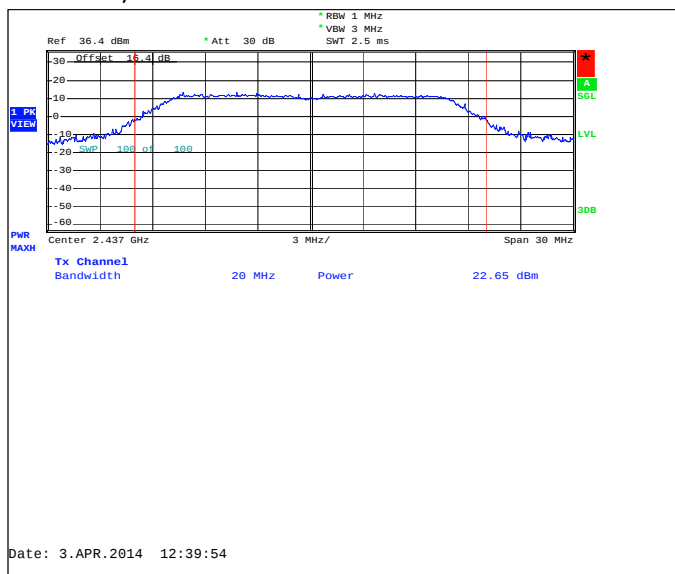
Channel 6 / 2437 MHz



2.4.7 802.11g mode, QPSK modulation, 12 Mbps data rate

Channel / f_c [MHz]	P [dBm]	P [mW]	Result
6 / 2437	22.65	184.077	PASSED

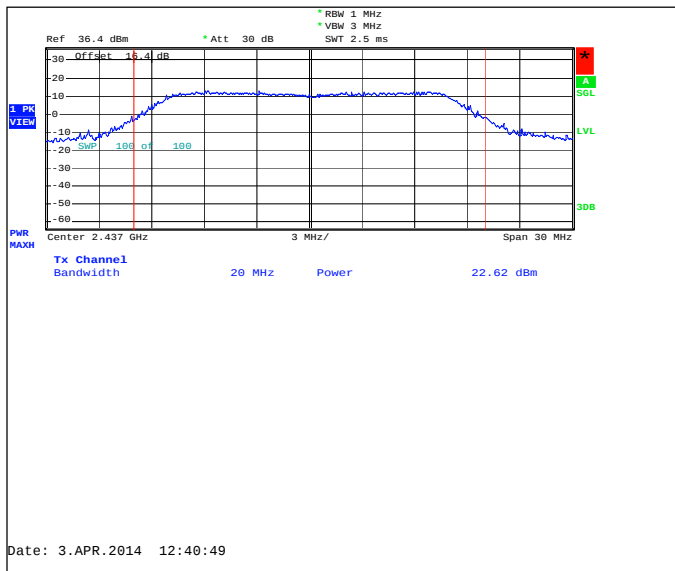
Channel 6 / 2437 MHz



2.4.8 802.11g mode, QPSK modulation, 18 Mbps data rate

Channel / f_c [MHz]	P [dBm]	P [mW]	Result
6 / 2437	22.62	182.81	PASSED

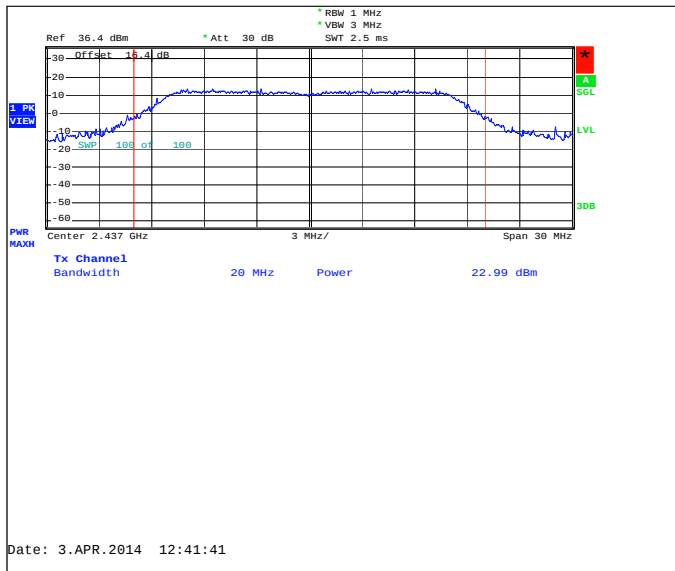
Channel 6 / 2437 MHz



2.4.9 802.11g mode, 16QAM modulation, 24 Mbps data rate

Channel / f _c [MHz]	P [dBm]	P [mW]	Result
6 / 2437	22.99	199.067	PASSED

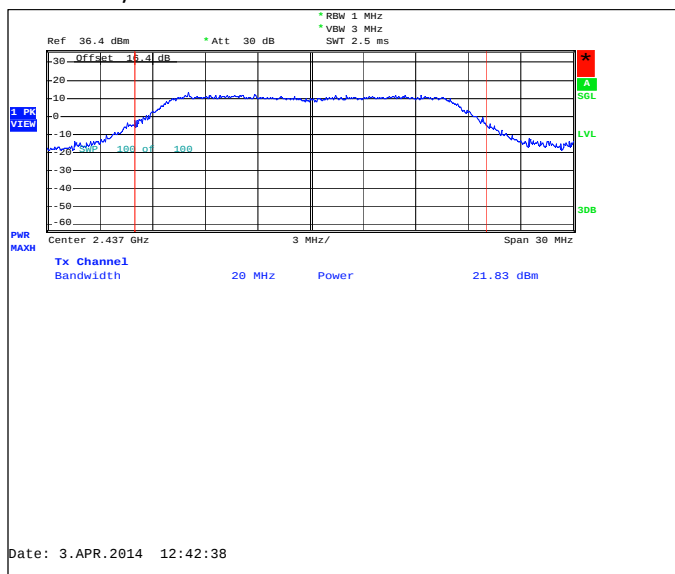
Channel 6 / 2437 MHz



2.4.10 802.11g mode, 16QAM modulation, 36 Mbps data rate

Channel / f _c [MHz]	P [dBm]	P [mW]	Result
6 / 2437	21.83	152.405	PASSED

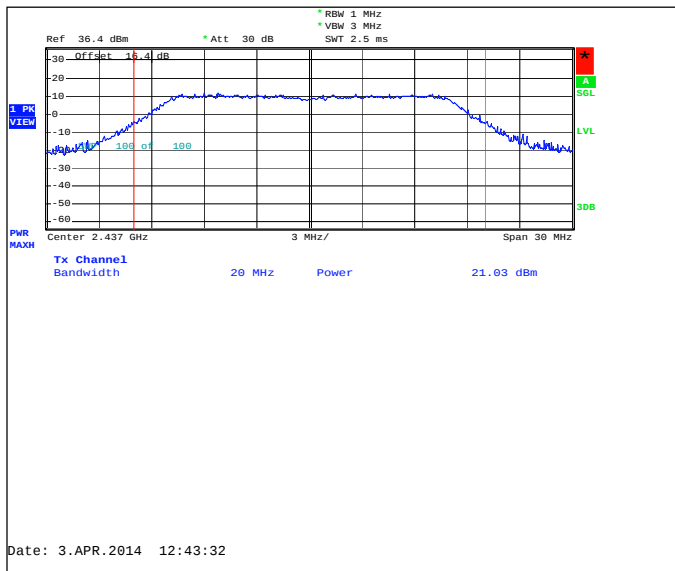
Channel 6 / 2437 MHz



2.4.11 802.11g mode, 64QAM modulation, 48 Mbps data rate

Channel / f _c [MHz]	P [dBm]	P [mW]	Result
6 / 2437	21.03	126.765	PASSED

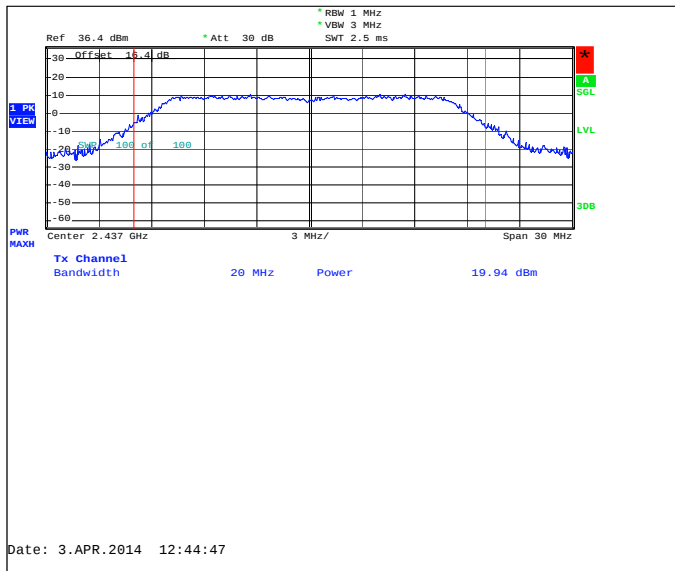
Channel 6 / 2437 MHz



2.4.12 802.11g mode, 64QAM modulation, 54 Mbps data rate

Channel / f _c [MHz]	P [dBm]	P [mW]	Result
6 / 2437	19.94	98.628	PASSED

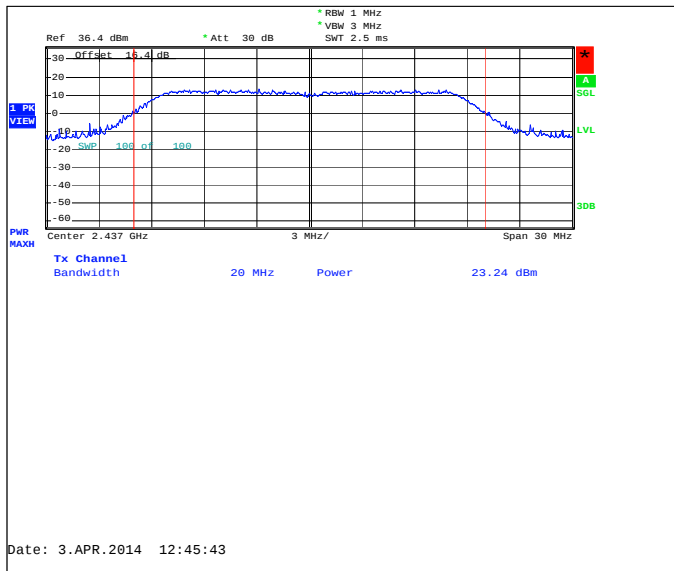
Channel 6 / 2437 MHz



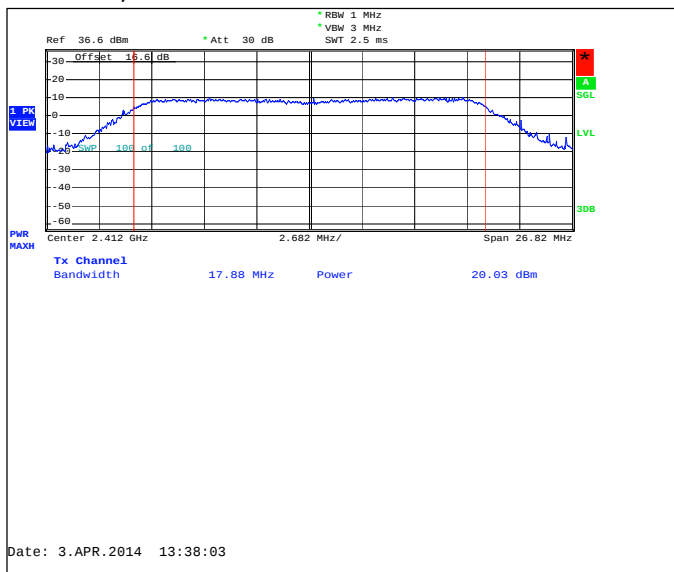
2.4.13 802.11n mode, BPSK modulation, 6.5 / 7.25 Mbps data rate

Channel / f_c [MHz]	P [dBm]	P [mW]	Result
6 / 2437	23.24	210.863	PASSED
1 / 2412	20.03	100.693	PASSED
11 / 2462	18.21	66.222	PASSED

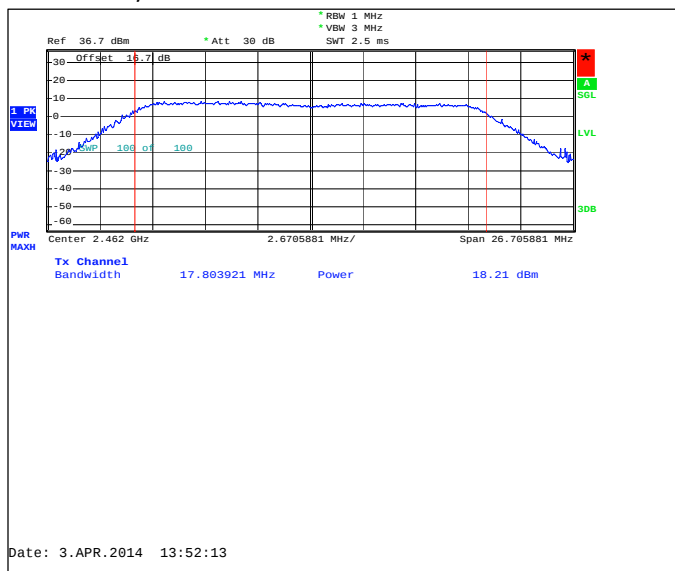
Channel 6 / 2437 MHz



Channel 1 / 2412 MHz



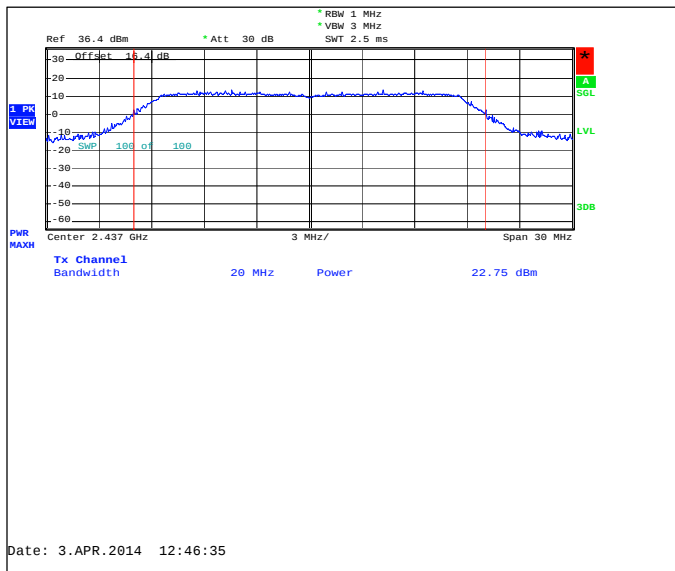
Channel 11 / 2462 MHz



2.4.14 802.11n mode, QPSK modulation, 13.0 / 14.4 Mbps data rate

Channel / f _c [MHz]	P [dBm]	P [mW]	Result
6 / 2437	22.75	188.365	PASSED

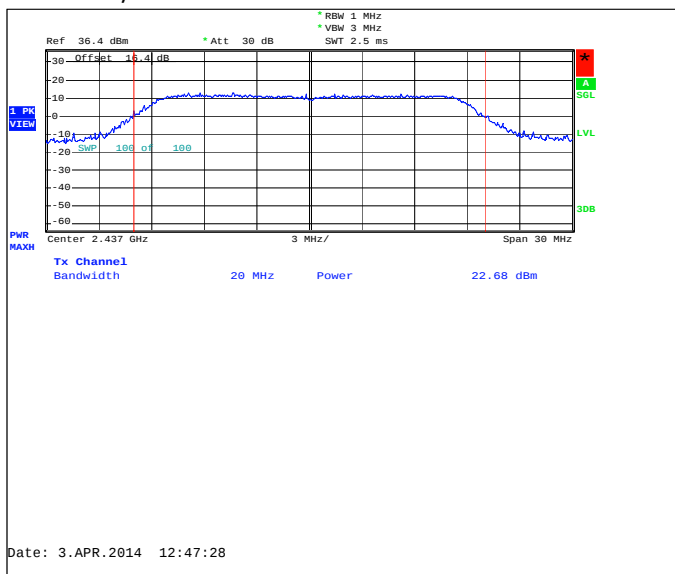
Channel 6 / 2437 MHz



2.4.15 802.11n mode, QPSK modulation, 19.5 / 21.7 Mbps data rate

Channel / f _c [MHz]	P [dBm]	P [mW]	Result
6 / 2437	22.68	185.353	PASSED

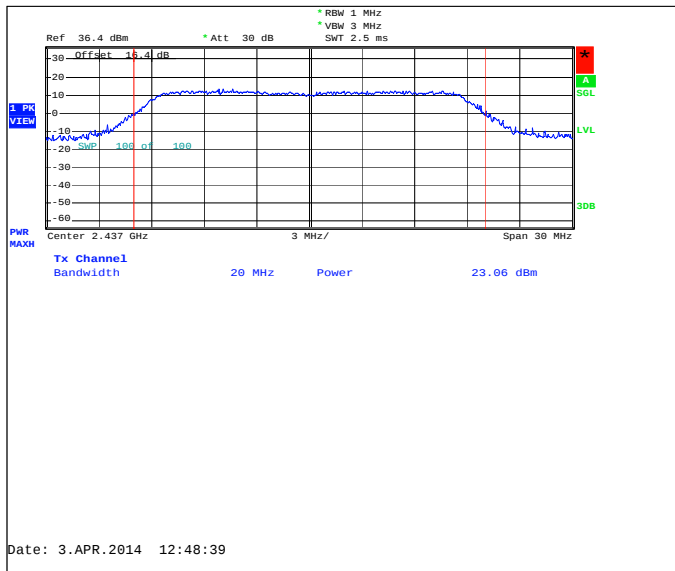
Channel 6 / 2437 MHz



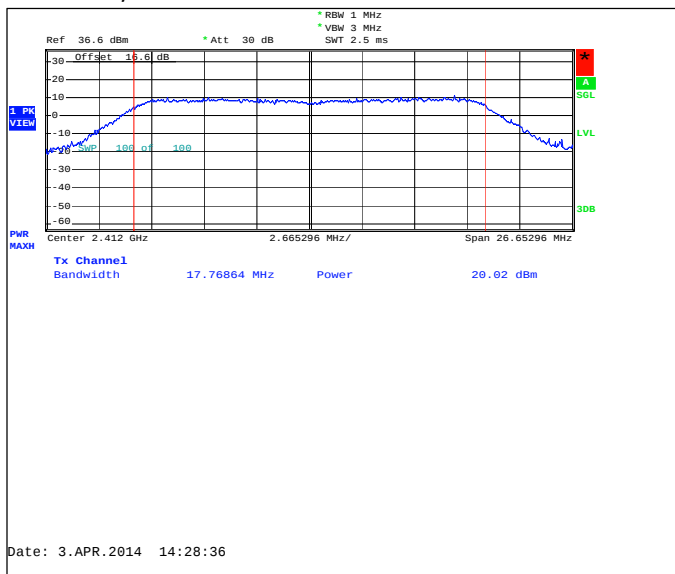
2.4.16 802.11n mode, 16QAM modulation, 26.0 / 28.9 Mbps data rate

Channel / f _c [MHz]	P [dBm]	P [mW]	Result
6 / 2437	23.06	202.302	PASSED
1 / 2412	20.02	100.462	PASSED
11 / 2462	18.46	70.146	PASSED

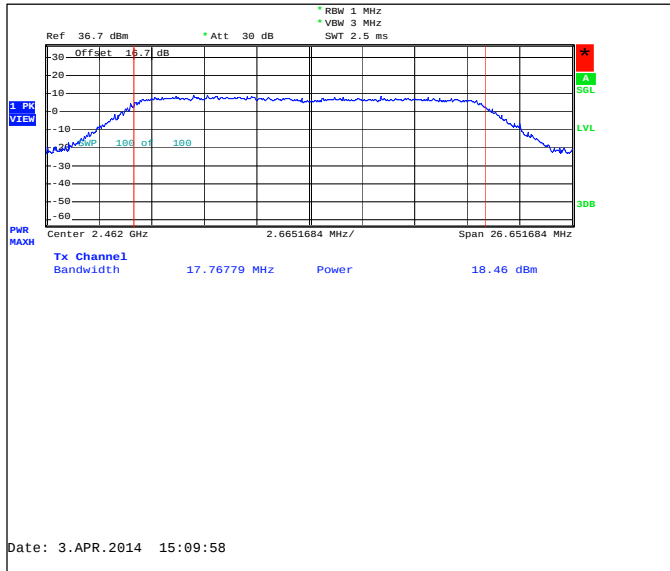
Channel 6 / 2437 MHz



Channel 1 / 2412 MHz



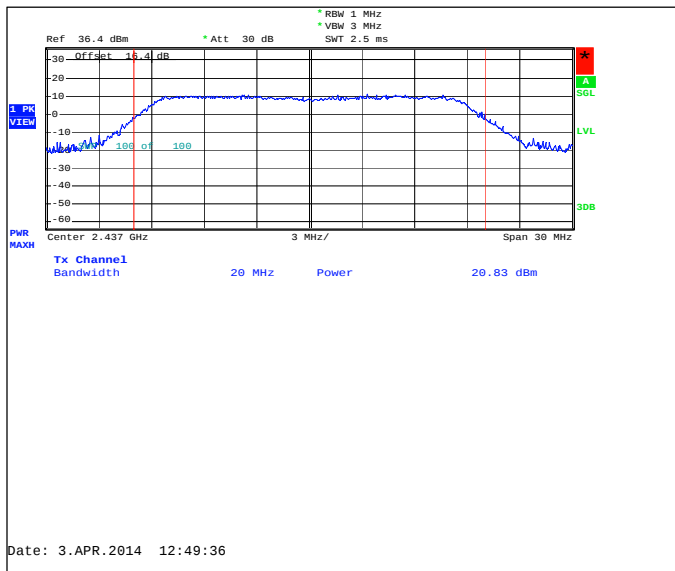
Channel 11 / 2462 MHz



2.4.17 802.11n mode, 16QAM modulation, 39.0 / 43.3 Mbps data rate

Channel / f _c [MHz]	P [dBm]	P [mW]	Result
6 / 2437	20.83	121.06	PASSED

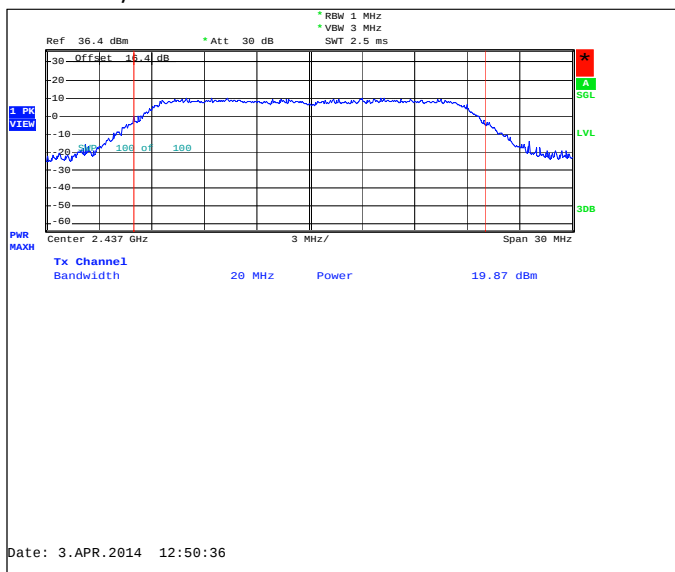
Channel 6 / 2437 MHz



2.4.18 802.11n mode, 64QAM modulation, 52.0 / 57.8 Mbps data rate

Channel / f _c [MHz]	P [dBm]	P [mW]	Result
6 / 2437	19.87	97.051	PASSED

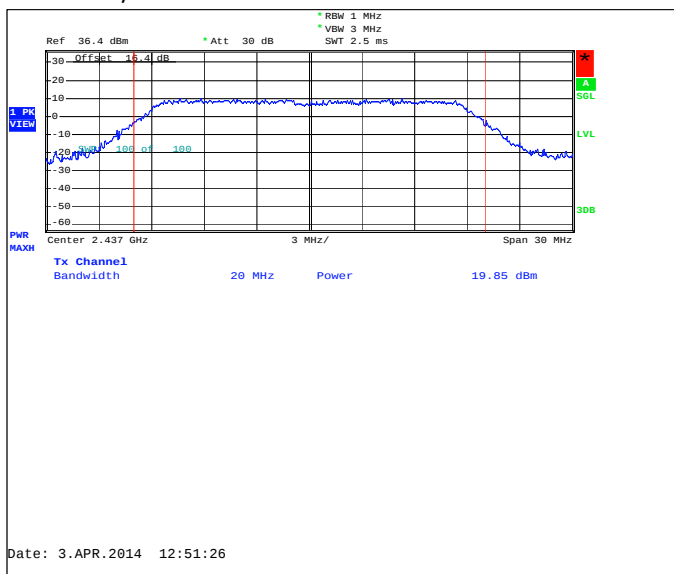
Channel 6 / 2437 MHz



2.4.19 802.11n mode, 64QAM modulation, 58.5 / 65.0 Mbps data rate

Channel / f_c [MHz]	P [dBm]	P [mW]	Result
6 / 2437	19.85	96.605	PASSED

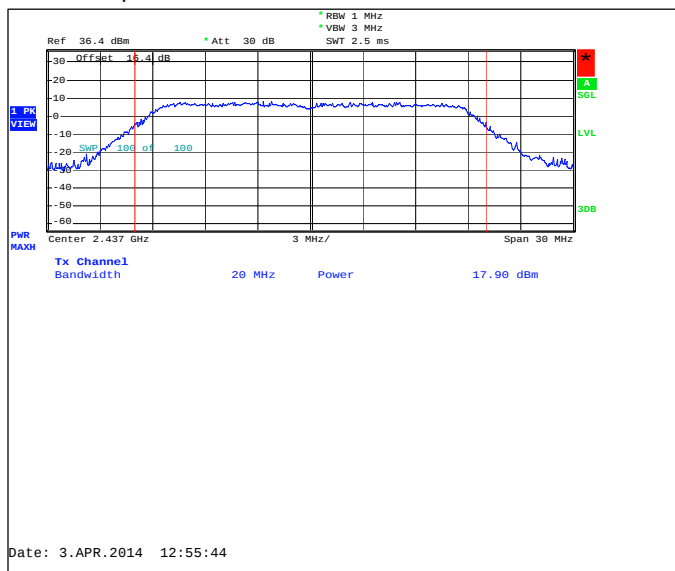
Channel 6 / 2437 MHz



2.4.20 802.11n mode, 64QAM modulation, 65.0 / 72.2 Mbps data rate

Channel / f_c [MHz]	P [dBm]	P [mW]	Result
6 / 2437	17.9	61.66	PASSED

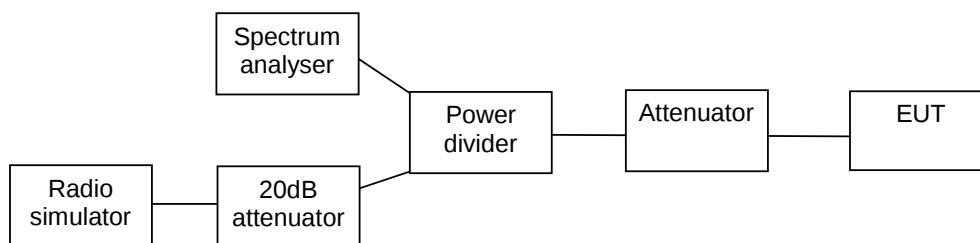
Channel 6 / 2437 MHz



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

EUT with DUT number	RM-975, DUT 18142
Accessories with DUT numbers	BL-5H, DUT 18146 ; AC-20E, DUT 18148 ; WH-108, DUT 18150
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 53 / 101.8
Date of measurements	03-Apr-2014
Measured by	Jari Keto

3.1. Test Setup



3.2. 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.

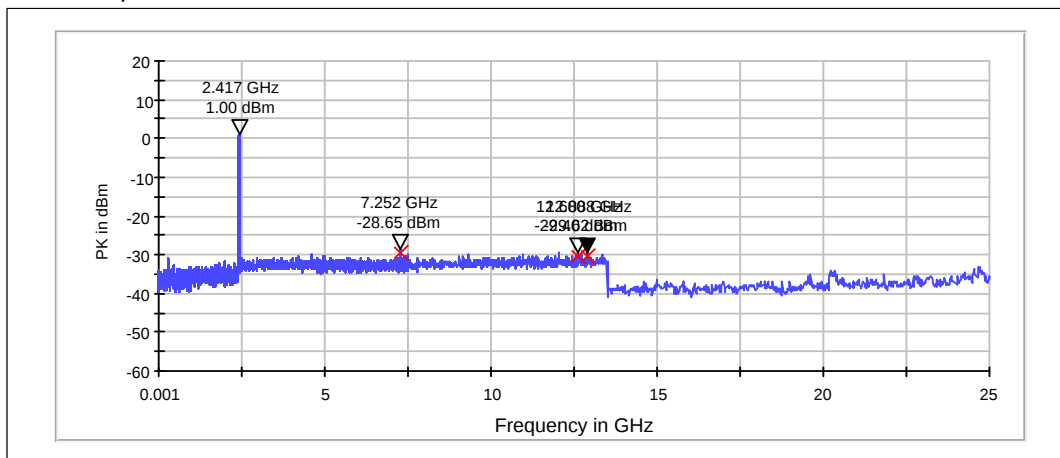
Limits for spurious RF conducted emissions measurements

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

3.3. WLAN Test results

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

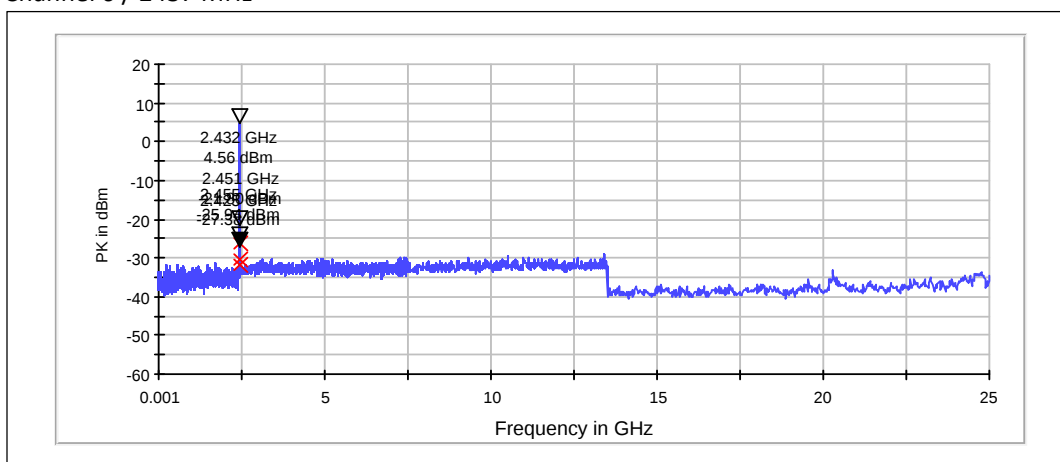
Channel 1 / 2412 MHz



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

Frequency [MHz]	P [dBc]	Result
7252.200	-29.64	PASSED
12600.000	-30.40	PASSED
12888.000	-30.62	PASSED

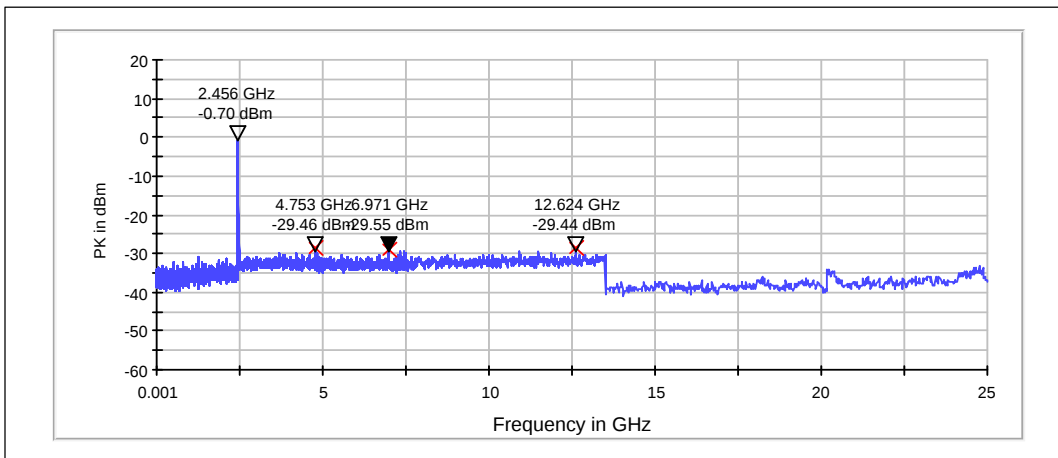
Channel 6 / 2437 MHz



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

Frequency [MHz]	P [dBc]	Result
2450.708	-26.36	PASSED
2455.416	-30.50	PASSED
2425.144	-31.94	PASSED

Channel 11 / 2462 MHz

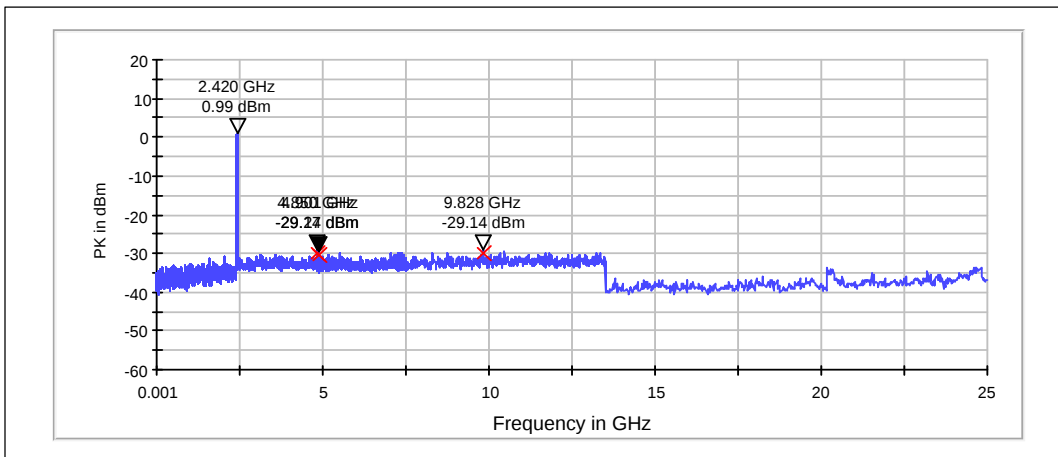


Peak (RBW: 100 kHz, VBW: 300 kHz)

Frequency [MHz]	P [dBc]	Result
12624.000	-28.74	PASSED
4753.420	-28.76	PASSED
6971.200	-28.85	PASSED

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

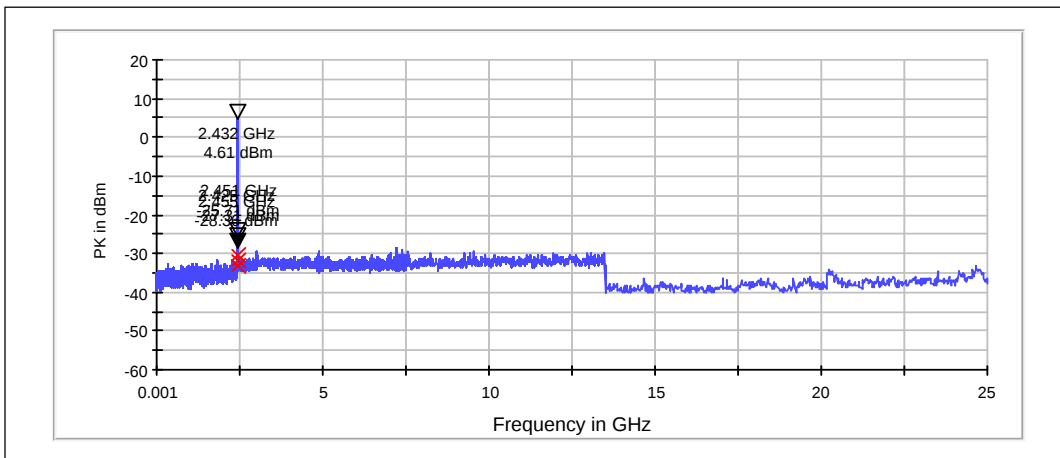
Channel 1 / 2412 MHz



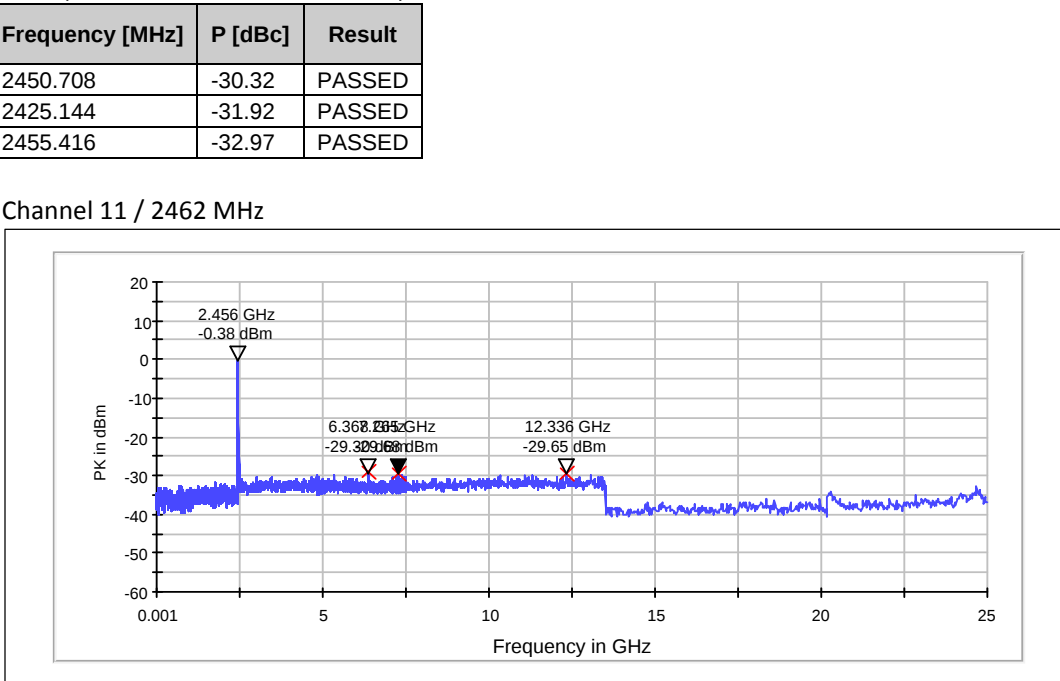
Peak (RBW: 100 kHz, VBW: 300 kHz)

Frequency [MHz]	P [dBc]	Result
4850.400	-30.14	PASSED
9828.000	-30.14	PASSED
4900.800	-30.26	PASSED

Channel 6 / 2437 MHz



Channel 11 / 2462 MHz



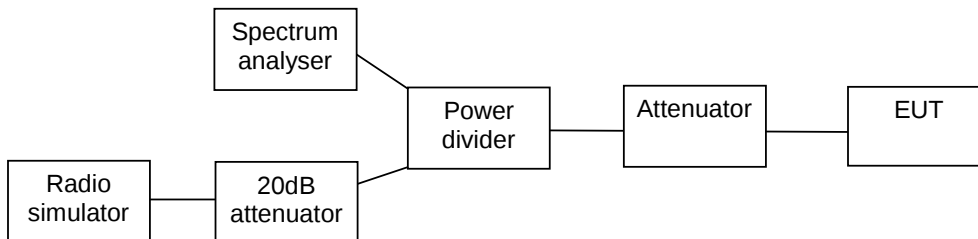
Channel 11 / 2462 MHz

Frequency [MHz]	P [dBc]	Result
6368.400	-28.93	PASSED
12336.000	-29.27	PASSED
7264.800	-29.30	PASSED

4. 6 dB bandwidth (FCC §15.247(a)(2), RSS-210 A8.2 (1))

EUT with DUT number	RM-975, DUT 18142
Accessories with DUT numbers	BL-5H, DUT 18146 ; AC-20E, DUT 18148 ; WH-108, DUT 18150
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 53 / 101.8
Date of measurements	03-Apr-2014
Measured by	Jari Keto

4.1. Test Setup



4.2. 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

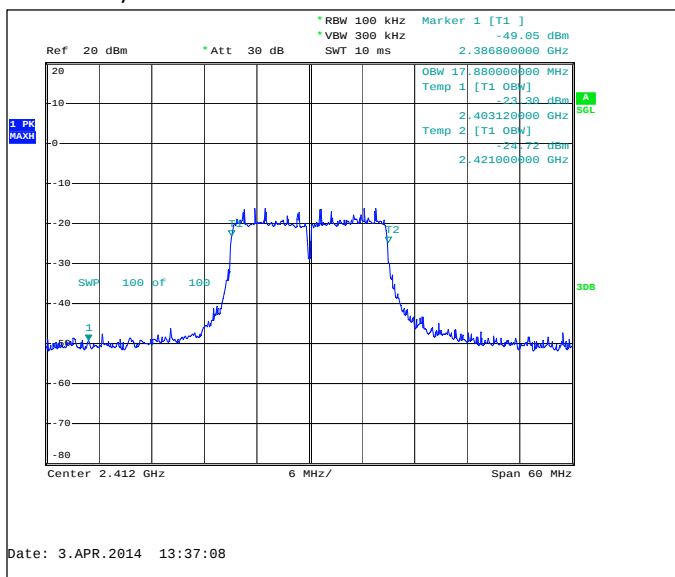
Limit [kHz]
>= 500

4.3. WLAN Test results

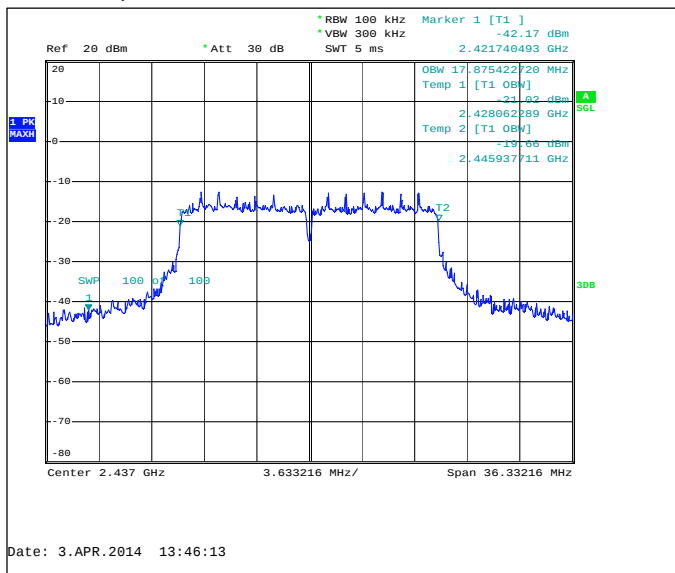
4.3.1 802.11n mode, BPSK modulation, 6.5 / 7.25 Mbps data rate

Channel / f _c [MHz]	6 dB bandwidth [kHz]	Result
1 / 2412	17880	PASSED
6 / 2437	17875.4	PASSED
11 / 2462	17803.9	PASSED

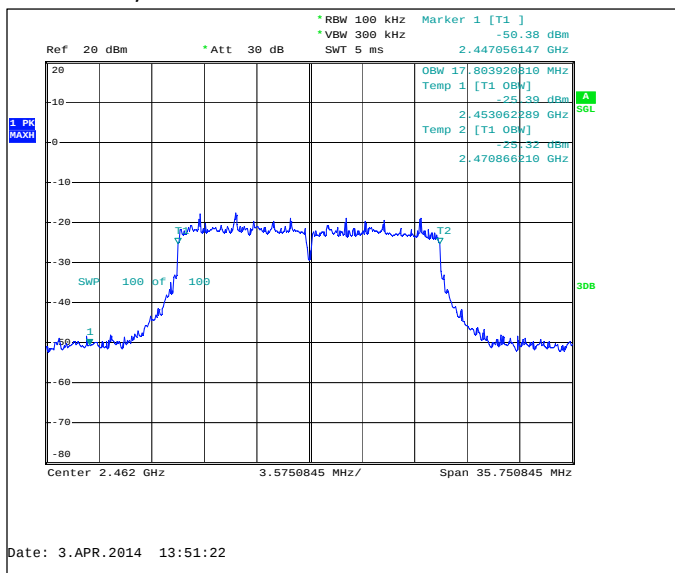
Channel 1 / 2412 MHz



Channel 6 / 2437 MHz



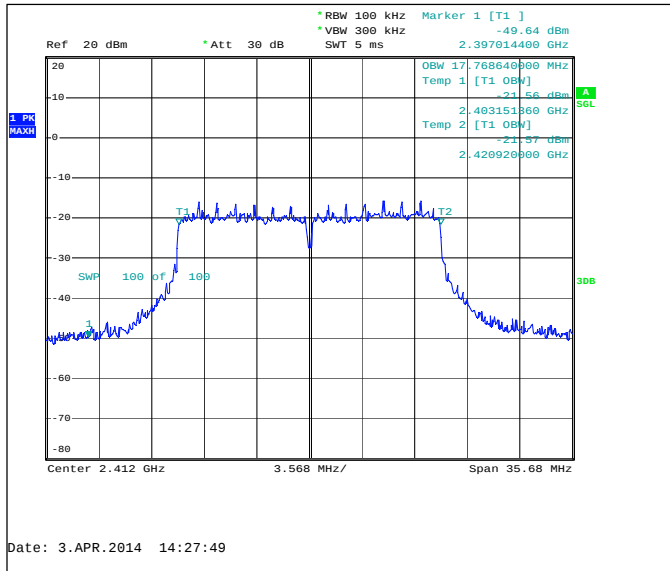
Channel 11 / 2462 MHz



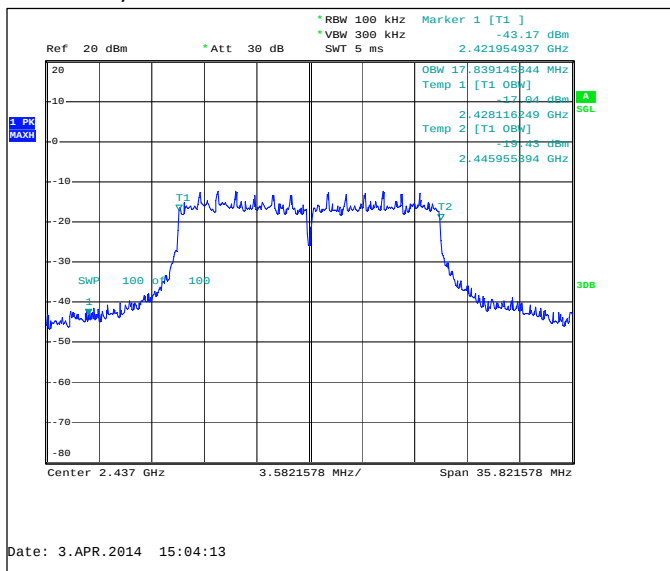
4.3.2 802.11n mode, 16QAM modulation, 26.0 / 28.9 Mbps data rate

Channel / f _c [MHz]	6 dB bandwidth [kHz]	Result
1 / 2412	17768.6	PASSED
6 / 2437	17839.1	PASSED
11 / 2462	17767.8	PASSED

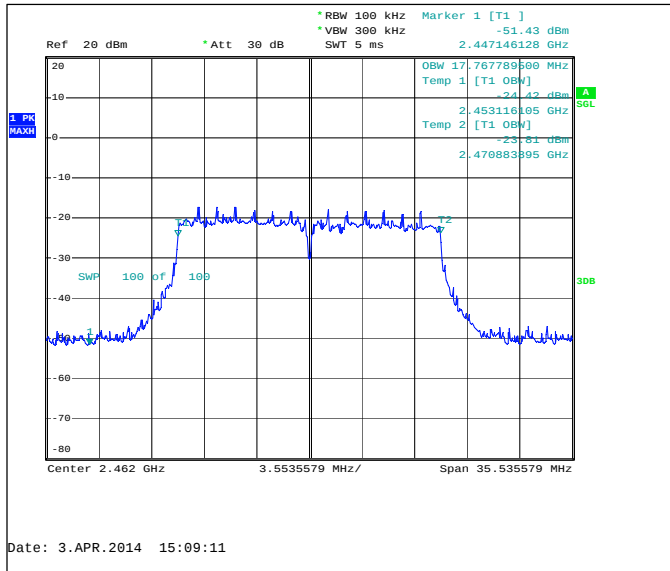
Channel 1 / 2412 MHz



Channel 6 / 2437 MHz



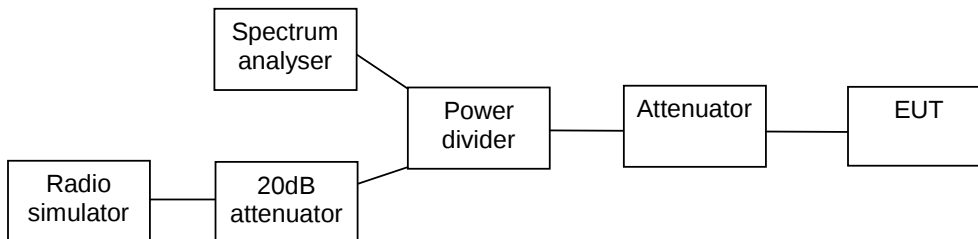
Channel 11 / 2462 MHz



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

EUT with DUT number	RM-975, DUT 18142
Accessories with DUT numbers	BL-5H, DUT 18146 ; AC-20E, DUT 18148 ; WH-108, DUT 18150
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 53 / 101.8
Date of measurements	03-Apr-2014
Measured by	Jari Keto

5.1. Test Setup



5.2. 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

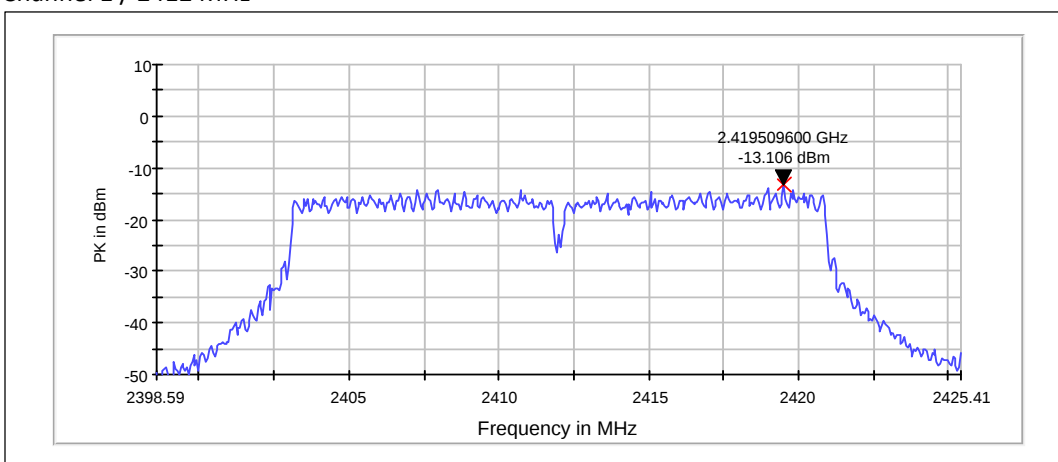
5.3. WLAN Test results

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

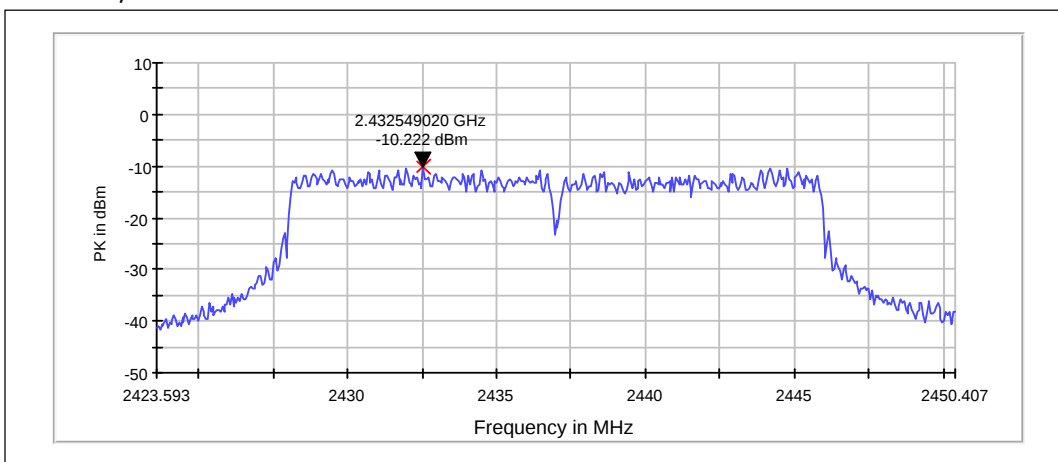
Peak (RBW: 3 kHz, VBW: 10 kHz, Max hold)

Channel / f _c [MHz]	P [dBm]	Result
1 / 2412	-13.11	PASSED
6 / 2437	-10.22	PASSED
11 / 2462	-14.77	PASSED

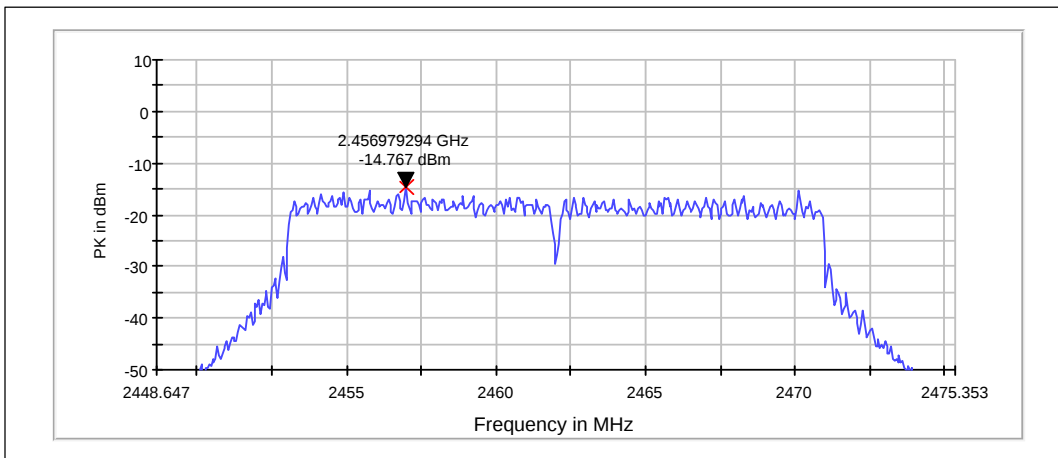
Channel 1 / 2412 MHz



Channel 6 / 2437 MHz



Channel 11 / 2462 MHz

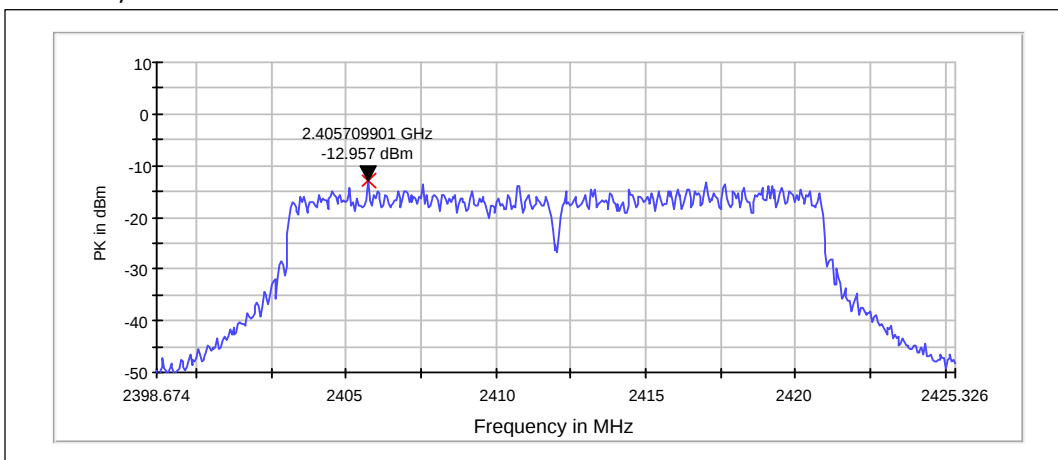


5.3.2 802.11n mode, 16QAM modulation, 26.0 / 28.9 Mbps data rate

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

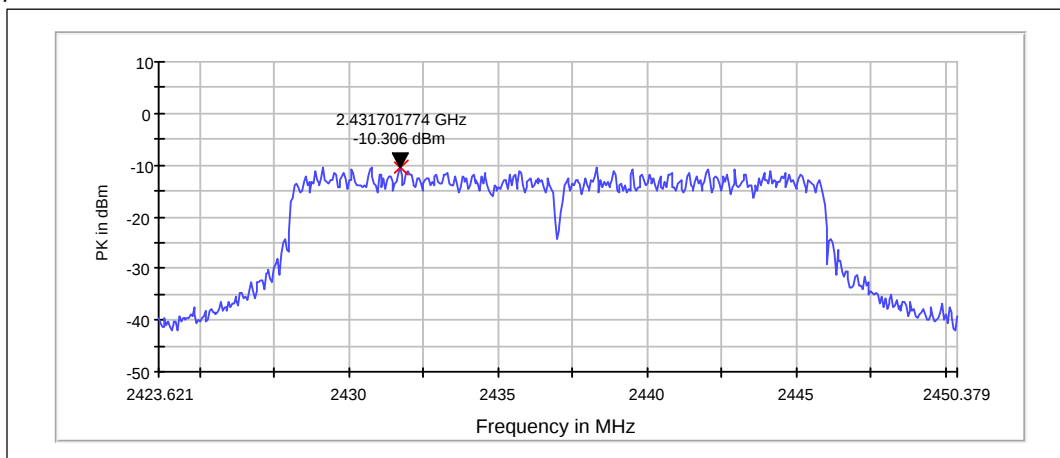
Channel / f_c [MHz]	P [dBm]	Result
1 / 2412	-12.96	PASSED
6 / 2437	-10.31	PASSED
11 / 2462	-13.85	PASSED

Channel 1 / 2412 MHz

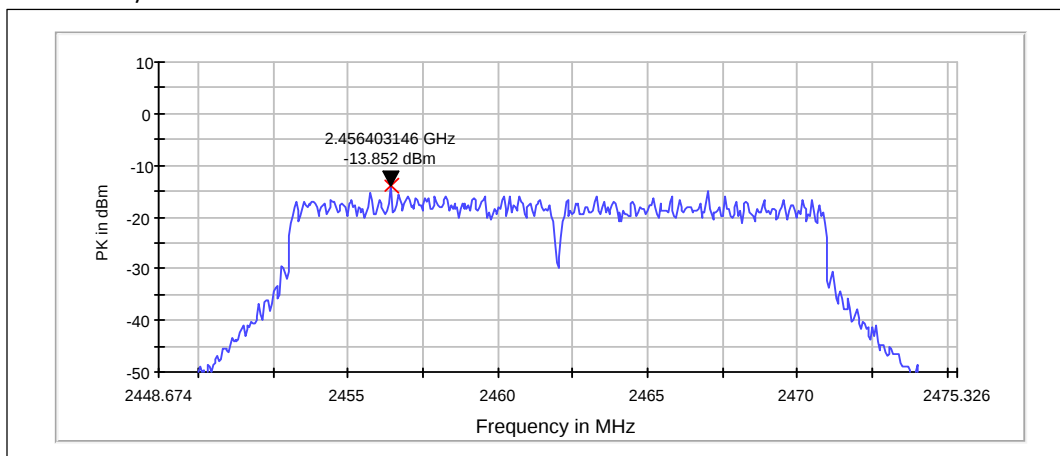


Channel 6

/ 2437 MHz



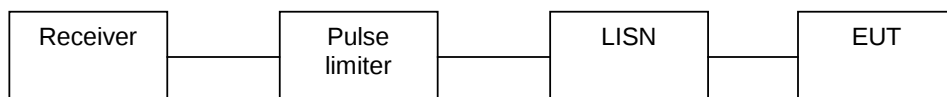
Channel 11 / 2462 MHz



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

EUT with DUT number	RM-975, DUT 18156
Accessories with DUT numbers	BL-5H, DUT 18146 ; AC-20E, DUT 18148 ; WH-108, DUT 18149
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 37 / 102.6
Date of measurements	09-Apr-2014
Measured by	Jari Keto

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 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.

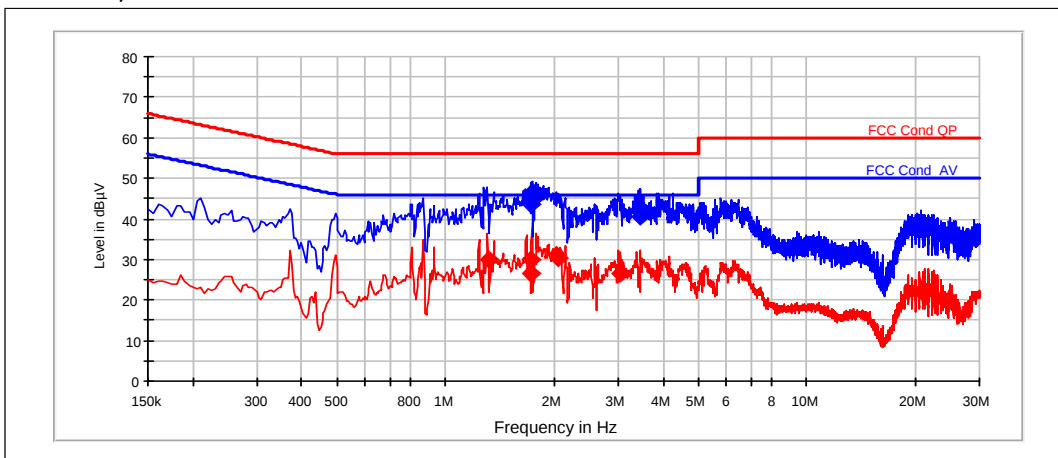
CISPR 22 Class B limits

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

6.3. 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)

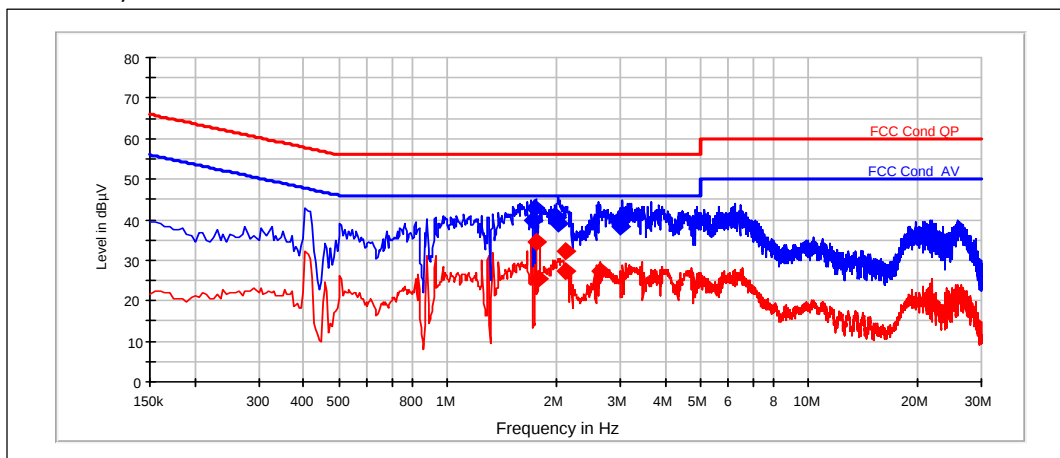
Frequency [MHz]	U [dBμV]	Line	Result
1.715	43.42	N	PASSED
1.74	46.62	N	PASSED
1.775	45.41	N	PASSED
3.445	40.57	N	PASSED
3.45	41.95	N	PASSED
3.475	42.33	N	PASSED

Average (RBW: 9 kHz)

Frequency [MHz]	U [dBμV]	Line	Result
1.31	29.82	N	PASSED
1.725	26.54	N	PASSED
1.73	29.79	N	PASSED
2.015	31.17	N	PASSED
2.06	30.31	N	PASSED
3.03	26.39	N	PASSED

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
1.73	39.68	L1	PASSED
1.745	42.95	N	PASSED
2.01	40.55	N	PASSED
2.025	39.08	N	PASSED
3	38.22	N	PASSED

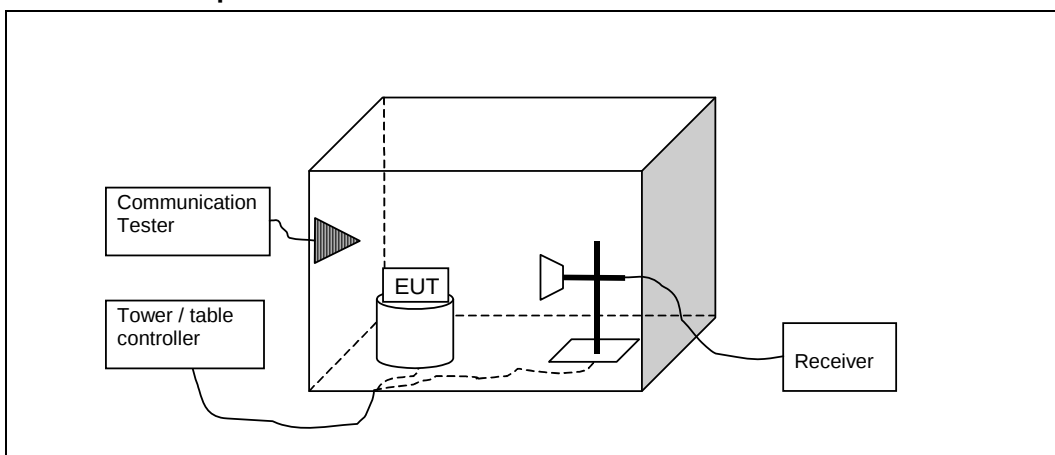
Average (RBW: 9 kHz)

Frequency [MHz]	U [dBμV]	Line	Result
1.755	34.64	N	PASSED
1.78	25.38	L1	PASSED
2.12	27.26	N	PASSED
2.125	32.27	N	PASSED
2.635	27.21	N	PASSED

7. Band edge compliance of RF emissions (FCC 15.247(d), 15.205(b), RSS-210 A8(0.5))

EUT with DUT number	RM-975, DUT 18156
Accessories with DUT numbers	BL-5H, DUT 17993 ; WH-108, DUT 17990 ; AC-20E, DUT 17995
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 42 / 101.4
Date of measurements	17-Apr-2014
Measured by	Sami Lehtonen

7.1.1 Test setup



7.2. 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 ($A_{TOT} = L_{CABLES} + A_F - G_{PREAMP}$).

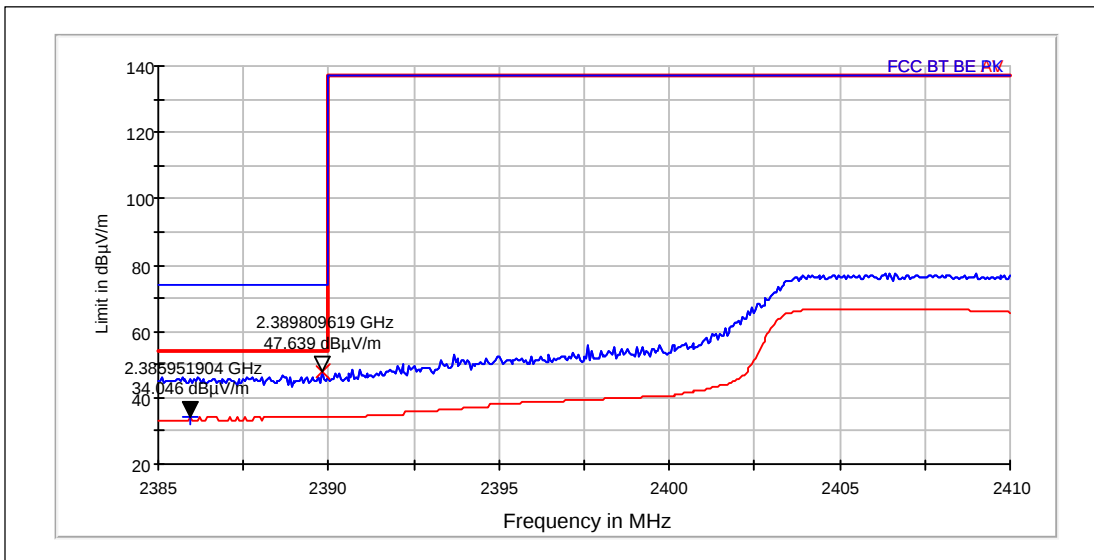
Limits for band edge compliance of RF emissions measurements (3 m measurement distance)

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

7.3. WLAN test results

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

Channel 1 / 2412 MHz



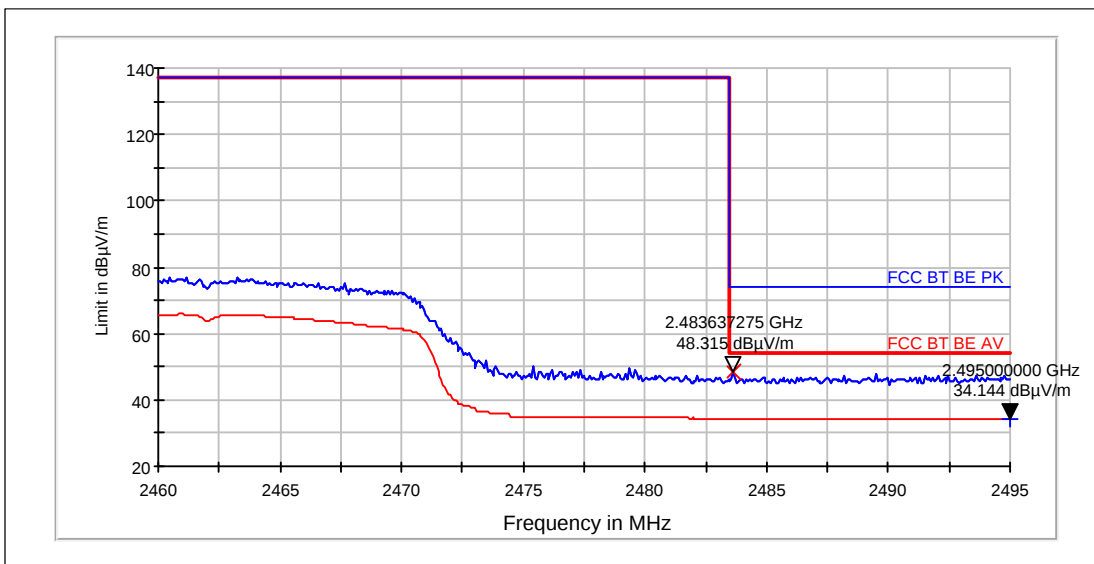
Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Results
2390	47.64	240.963	46.76	0.88	PASSED

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

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Results
2386	34.05	50.385	33.17	0.88	PASSED

Channel 11 / 2462 MHz



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

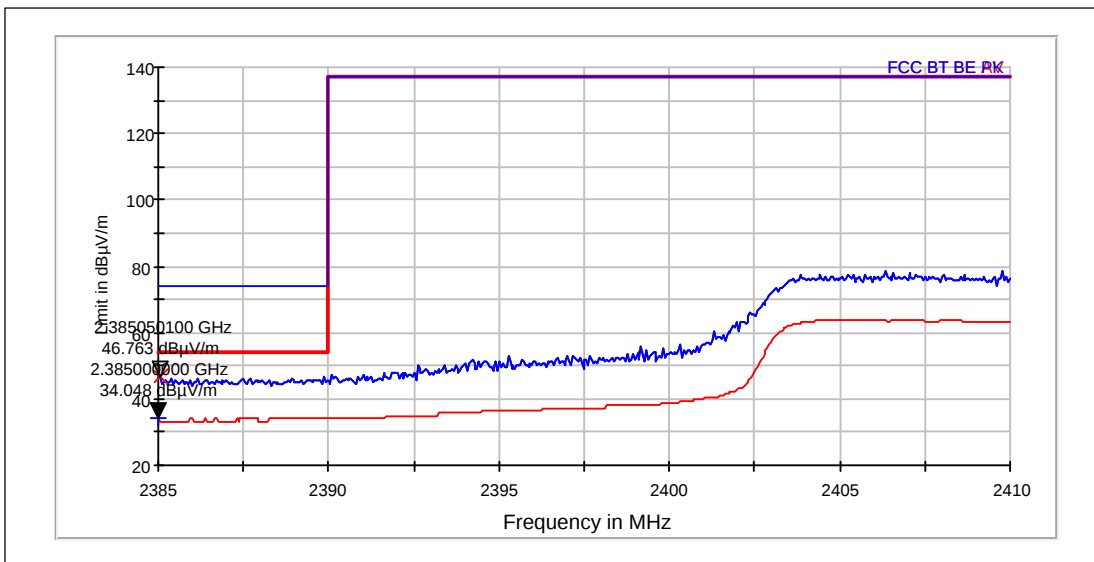
Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Results
2484	48.32	260.465	47.33	0.99	PASSED

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

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Results
2495	34.14	50.957	33.15	0.99	PASSED

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

Channel 1 / 2412 MHz



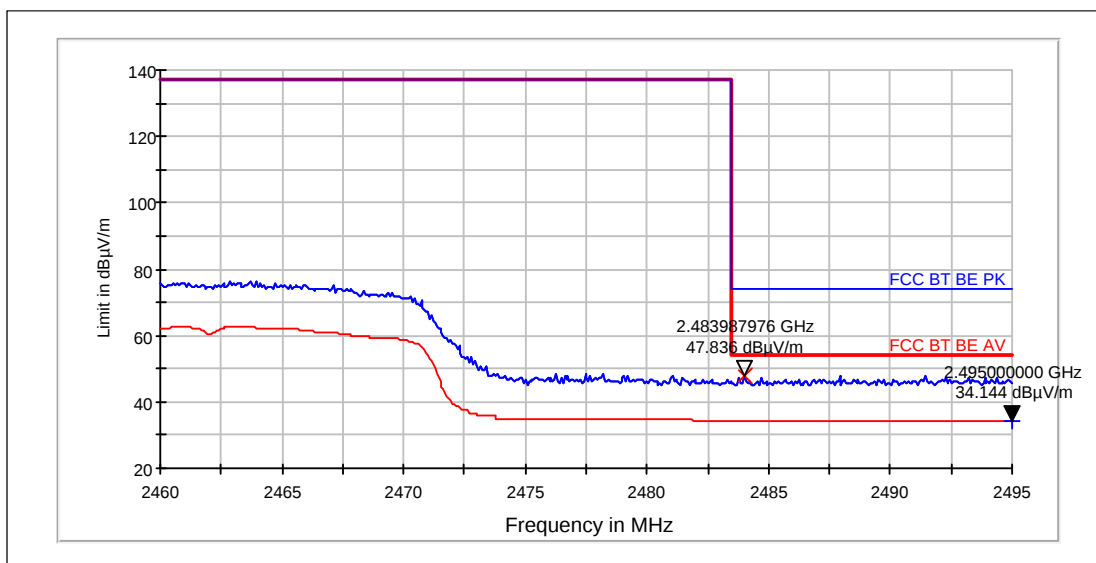
Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Results
2385	46.76	217.846	45.88	0.88	PASSED

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

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Results
2385	34.05	50.396	33.17	0.88	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]	Results
2484	47.84	246.49	46.85	0.99	PASSED

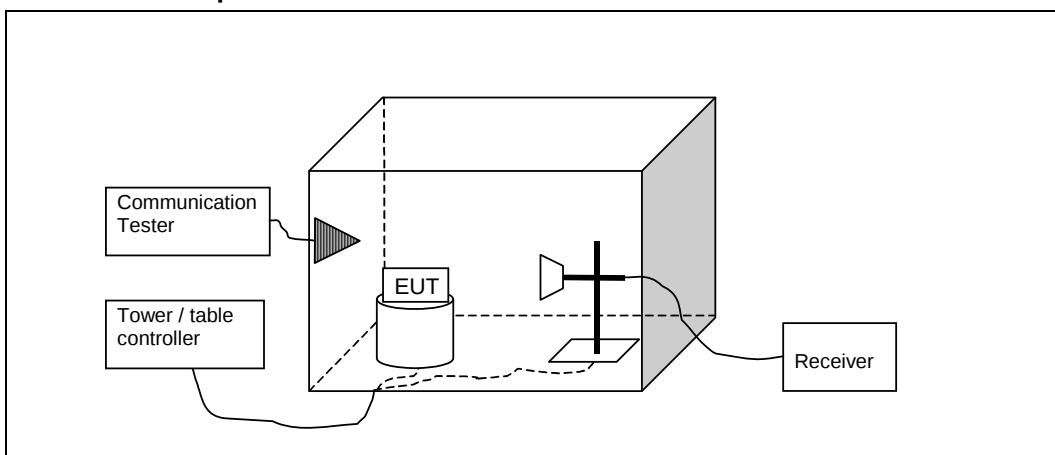
Average (RBW: 1 MHz, VBW: 10 Hz)

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Results
2495	34.14	50.957	33.15	0.99	PASSED

8. Radiated emissions (FCC ???, RSS-210 WLAN)

EUT with DUT number	RM-975, DUT 18156
Accessories with DUT numbers	BL-5H, DUT 17993 ; WH-108, DUT 17990 ; AC-20E, DUT 17995
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 42 / 101.4
Date of measurements	17-Apr-2014
Measured by	Sami Lehtonen

8.1.1 Test setup



8.2. 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.

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 [$\mu V/m$]	Limit [$dB\mu V/m$]	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

8.3. WLAN test results

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

Channel 6 / 2437 MHz

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

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Limit [dBμV/m]	Margin	Results
34.768	21.22	11.508	27.62	-6.4	40	18.78	PASSED
40.029	24.55	16.885	34.25	-9.7	40	15.45	PASSED
77.263	19.79	9.761	37.19	-17.4	40	20.21	PASSED

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

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Limit [dBμV/m]	Margin	Results
4880	41.01	112.331	42.61	-1.6	74	32.97	PASSED
7318.2	46.99	223.615	43.19	3.8	74	26.99	PASSED

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

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Limit [dBμV/m]	Margin	Results
4880	27.94	24.946	29.54	-1.6	54	26.04	PASSED
7318.2	33.92	49.659	30.12	3.8	54	20.06	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]	Limit [dBμV/m]	Margin	Results
4922.9	41.05	112.85	42.75	-1.7	74	32.93	PASSED
7386.6	47.24	230.144	42.74	4.5	74	26.74	PASSED

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

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Limit [dBμV/m]	Margin	Results
4922.9	28.07	25.322	29.77	-1.7	54	25.91	PASSED
7386.6	33.73	48.585	29.23	4.5	54	20.25	PASSED

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]	Limit [dBμV/m]	Margin	Results
4823.2	45.39	185.994	47.39	-2	74	28.59	PASSED
7234.5	53.88	494.311	50.58	3.3	95	41.35	PASSED

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

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Limit [dBμV/m]	Margin	Results
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4823.2	31.09	35.851	33.09	-2	54	22.89	PASSED
7234.5	38.92	88.308	35.62	3.3	---	---	PASSED

8.3.2 802.11n, 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]	Limit [dBμV/m]	Margin	Results
4824.2	46	199.526	47.9	-1.9	74	27.98	PASSED
7237.5	53.53	474.788	50.33	3.2	95	41.7	PASSED

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

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Limit [dBμV/m]	Margin	Results
4824.2	31.34	36.898	33.24	-1.9	54	22.64	PASSED
7237.5	37.76	77.268	34.56	3.2	---	---	PASSED

Channel 6 / 2437 MHz

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

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Limit [dBμV/m]	Margin	Results
39.766	24.4	16.596	33.9	-9.5	40	15.6	PASSED
40.779	24.99	17.762	35.19	-10.2	40	15.01	PASSED
592.004	27.64	24.099	34.14	-6.5	46	18.38	PASSED

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

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Limit [dBμV/m]	Margin	Results
4878.4	41.47	118.44	43.07	-1.6	74	32.51	PASSED
7319.1	46.27	205.826	42.47	3.8	74	27.71	PASSED

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

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Limit [dBμV/m]	Margin	Results
4878.4	27.73	24.35	29.33	-1.6	54	26.25	PASSED
7319.1	33.49	47.261	29.69	3.8	54	20.49	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]	Limit [dBμV/m]	Margin	Results
4922.9	41.05	112.85	42.75	-1.7	74	32.93	PASSED
7386.6	47.24	230.144	42.74	4.5	74	26.74	PASSED

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

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Limit [dBμV/m]	Margin	Results
4922.9	28.07	25.322	29.77	-1.7	54	25.91	PASSED
7386.6	33.73	48.585	29.23	4.5	54	20.25	PASSED

9. Test Equipment

9.1. Conducted measurements

Eq. No	Equipment	Type	Manufacturer	Used in
6039	USB Interface	5541765	Testo	22/24/27, 15C, 15B
6044	V-network	ESH3-Z6	R&S	-
2059	V-network	ESH3-Z6	R&S	-
1759	LISN 50 µH	ESH3-Z5	R&S	22/24/27, 15C, 15B
2097	Pulse Limiter	ESH3-Z2	R&S	22/24/27, 15C, 15B
1999	Receiver	ESIB26	R&S	22/24/27, 15C, 15B
2180	Communication Tester	CMU200	R&S	22/24/27, 15C, 15B
2390	Directional Coupler	DC2600	AR	-
-	RF immunity / Emission Software	EMC32	R&S	22/24/27, 15C, 15B
2060	LISN 50 µH	ESH3-Z5	R&S	15C, 15B
1759	LISN 50 µH	ESH3-Z5	R&S	15C, 15B
2039	Power Supply	PL330QMD	Thurlby	15C, 15B
6036	Data Logger	175-H2	Testo	22/24/27, 15C, 15B
2359	Temperature Test Chamber	VT4002	Vötsch	22/24/27
2352	Spectrum Analyzer	FSP-30	R&S	22/24/27, 15C
6109	Communication Tester	CMU200	R&S	22/24/27, 15C
6246	Power Supply	66332A	HP	22/24/27, 15C
1992	Signal Generator	83630B	Agilent	15C, 15B
6098	Signal Generator	8648C	Agilent	-
6046	Attenuator 10dB	8493C	Agilent	22/24/27, 15C
6047	Attenuator 20dB	8493C	Agilent	22/24/27, 15C
6045	Power splitter	11667B	Agilent	22/24/27, 15C
6247	Communication Tester	CBT	R&S	22/24/27, 15C 15B
6052	Communication Tester	CMU200	R&S	22/24/27, 15C 15B
6248	Power Supply	6632B	-	22/24/27, 15C 15B
6106	Spectrum Analyzer	FSP-30	R&S	22/24/27, 15C 15B
6113	Signal Generator	SMF100A	R&S	22/24/27, 15C 15B
6202	Temperature Test Chamber	VT4002	Vötsch	22/24/27, 15C 15B
6122	Power Splitter	11667B	Agilent	22/24/27, 15C 15B
6134	Attenuator 10dB	BW-S10-2W263+	Mini-Circuits	22/24/27, 15C
6136	Attenuator 20dB	BW-S20-2W263+	Mini-Circuits	22/24/27, 15C
6103	Bluetooth tester	CBT	R&S	22/24/27, 15C 15B
6250	Power Supply	6651A	Agilent	22/24/27, 15C 15B
6108	Communication Tester	CMU200	R&S	22/24/27, 15C 15B
6105	Spectrum Analyzer	FSV-30	R&S	22/24/27, 15C 15B
6251	Temperature Test Chamber	VT4002	Vötsch	22/24/27, 15C 15B
6243	Power Splitter	1167B	Agilent	22/24/27, 15C 15B
6245	Attenuator 10dB	BW-S10-2W263+	Mini-Circuits	22/24/27, 15C 15B
6244	Attenuator 20dB	BW-S20-2W263+	Mini-Circuits	22/24/27, 15C 15B

9.2. Radiated measurements

Eq. No	Equipment	Type	Manufacturer	Used in
2388	Bluetooth Tester	CBT	R&S	15B
10479	Communication Tester	CMW500	R&S	22/24/27, 15C, 15B
2347	Communication Tester	CMU200	R&S	22/24/27, 15C, 15B
2009	Signal Generator	SMP 22	R&S	22/24/27, 15C, 15B
2348	Controller	G-1000DXC	Yaesu	22/24/27, 15C, 15B
2349	Computer Controller	g-1000DXC	Yaesu	22/24/27, 15C, 15B
2116	Controller	EMCO 2090	ETS	22/24/27, 15C, 15B
2109	Power Supply	PL330QMD	Thurlby	22/24/27, 15C, 15B
2353	Receiver	ESIB26	R&S	22/24/27, 15C, 15B
6115	Open switch and control unit	OSP 130	R&S	22/24/27, 15C 15B
6116	Open switch and control unit	OSP 150	R&S	22/24/27, 15C 15B

Eq. No	Equipment	Type	Manufacturer	Used in
6117	Open switch and control unit	OSP 150	R&S	22/24/27, 15C, 15B
6131	Notch Filter	WRCT902.4-0.4/40-8SS	Wainwright	22/24/27, 15C, 15B
6130	Notch Filter	WRCD1880-1.1.25/50-10SS	Wainwright	22/24/27
6159	Band Reject Filter	WRCD1747.8-0.4/40-5SS	Wainwright	22/24/27, 15C, 15B
6158	Band Reject Filter	WRCT836.6-0.4/40-8SS	Wainwright	22/24/27, 15C, 15B
6197	Band Reject Filter	WRCJV2531/2539-2523/2547-60/12SS	Wainwright	22/24/27, 15C, 15B
2231	Band Reject Filter	WRCG1947/1953-1940/1960-40/6SS	Wainwright	22/24/27, 15C, 15B
2391	Band Reject Filter	WRCG1729.4/1735.4-1722.4/1742.4-40/6SS	Wainwright	27
2386	Band Reject Filter	WRCG1764.4/1770.4-1760.4/1774.4-40/6SS	Wainwright	22/24/27, 15C, 15B
2385	Band Reject Filter	WRCG1744.4/1750.4-1740.4/1754.4-40/6SS	Wainwright	22/24/27, 15C, 15B
2357	Band Reject Filter	WRCG2400/2483-2390/2493-35/10SS	Wainwright	15C
2188	Preamplifier	AFS4-00100300-20-23P-6	Miteq	22/24/27, 15C, 15B
6195	High Pass Filter	-	Wainwright	22/24/27, 15C, 15B
2364	Band Reject Filter	WRCG1877/1883 - 1870/1890-40/6SS	Wainwright	24
2361	Anechoic Chamber	3 m Semi / Full Anechoic Chamber	Euroshield	22/24/27, 15C, 15B
6212	Antenna Array system	-	TCC	22/24/27, 15C, 15B
-	RF immunity / Emission Software	EMC32	R&S	22/24/27, 15C, 15B
6089	Antenna	HFH2-Z2	R&S	15C, 15B
2027	CDN	M2 (modified) DC1	MEB	22/24/27, 15C, 15B
2028	CDN	M3 (modified) DC2	MEB	22/24/27, 15C, 15B
2176	CDN	CDN 801-M3	Lüthi	22/24/27, 15C, 15B
2135	CDN	CDN 801-M3	Lüthi	22/24/27, 15C, 15B
2029	Power Supply	PL330	Thurlby	22/24/27, 15C
6038	Data Logger	Testo 580	Testo	22/24/27, 15C, 15B
6037	Data Logger	175-H2	Testo	22/24/27, 15C, 15B
6039	USB Interface	5541765	Testo	22/24/27, 15C, 15B