FCC Part 15C Compliance Test Report

Test Report no.:	FCC15CWLAN_RM-1062_61	**Date of Report:**	16-Dec-2014
Number of pages:	57	**Customer's Contact person:**	Jari Rontu
Testing laboratory:	TCC Microsoft Salo Laboratory P.O.Box(86) Joensuunkatu 7E FIN-24101 SALO, FINLAND Tel. +358 (0) 7180 08000 Fax. +358 71 80 44122	**Customer:**	Microsoft P.O.Box(86) Joensuunkatu 7E FIN-24101 SALO, FINLAND Tel. +358 (0) 7180 08000 Fax. +358 71 80 44122
FCC listing no.: **IC recognition no.:**	533467 661V-1		
Tested devices/ accessories:	**Phone RM-1062 / Dummy Battery SD-238R / Battery BV-T4B / Headset WH-108 / Ac-Charger AC-20E**		
FCC ID:	PYARM-1062	**IC:**	-
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, RSS-210 (Issue 8, December 2010). 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 Microsoft.		
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:	 Lehtonen Sami.K 2014.12.16 11:28:41 +02'00'		

Sami Lehtonen, Specialist, EMC

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1. Summary for FCC Part 15C Compliance Test Report

Date of receipt	28-Oct-2014
Testing completed	18-Nov-2014
The customer's contact person	Jari Rontu
Test Plan referred to	T:\Projects\RM-1062\TestPlan\RS_Testplan_RM-1062.xlsm
Notes	-
Document name	T:\Projects\RM-1062\EMC\FCC15CWLAN_RM-1062_61.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-1062	004402740524420	3202		02148.00000.14431.29000	18682
Dummy Battery	SD-238R		v.1	-	-	18687
AC-Charger	AC-20E	40904941566707116330675628	CE	-	-	18633
Headset	WH-108	2265171	-	-	-	18677
Phone	RM-1062	004402740524313	3202	-	02148.00000.14431.29000	18708
Battery	BV-T4B	4181574345C10104559ö0670764	V1.0	-	-	18709
Phone	RM-1062	004402740524438	3202		02148.00000.14431.29000	18683
Dummy Battery	SD-238R		v.1	-	-	18686
Phone	RM-1062	004402740524461	3202	-	02148.00000.14431.29000	18732
Battery	BV-T4B	4181574345C10103838;0670764	V1.0	-	-	18733
Headset	WH-108	4235VFA	-	-	-	18698
Ac-Charger	AC-20E	40904941566707114550675628	-	-	-	18697

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)	A8.4(4)	Conducted peak output power	PASSED
15.247(d), 15.205(b)	A8.5	Band edge compliance of RF emissions	PASSED
15.247(d)	A8.5	Spurious RF conducted emissions	PASSED
15.247(d), 15.209	A8.5	Spurious radiated emissions	PASSED
15.207	7.2.4	AC powerline conducted emissions	PASSED
15.247(a)(2)	A8.2(a)	6dB(bandwidth)	PASSED
15.247(e)	A8.2(b)	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 Microsoft Laboratory.

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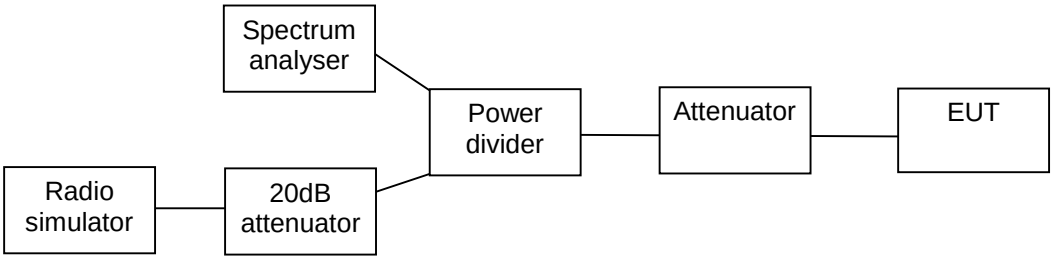
2. Conducted peak output power
(FCC §15.247(b)(1), RSS-210 A8.4(4))

EUT with DUT number	RM-1062, DUT 18682
Accessories with DUT numbers	SD-238R, DUT 18687
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [ºC] / Humidity [%RH] / Air Pressure [kPa]	22 / 59 / 102.8
Date of measurements	30-Oct-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

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2.3. Power results summary

Channel / f_C [MHz]	Mode	Modulation	Data rate	Level [dBm]
1 / 2412	802.11g	QPSK	12 Mbps	22.55
11 / 2462	802.11g	QPSK	12 Mbps	18.96
1 / 2412	802.11g	BPSK	6 Mbps	23.45
11 / 2462	802.11g	BPSK	6 Mbps	19.36
6 / 2437	802.11b	BPSK	1 Mbps	19.04
6 / 2437	802.11b	QPSK	2 Mbps	18.67
6 / 2437	802.11b	QPSK	5.5 Mbps	20.05
6 / 2437	802.11b	QPSK	11 Mbps	21.31
6 / 2437	802.11g	BPSK	6 Mbps	23.21
6 / 2437	802.11g	BPSK	9 Mbps	22.73
6 / 2437	802.11g	QPSK	12 Mbps	22.4
6 / 2437	802.11g	QPSK	18 Mbps	22.1
6 / 2437	802.11g	16QAM	24 Mbps	22.26
6 / 2437	802.11g	16QAM	36 Mbps	21.77
6 / 2437	802.11g	16QAM	48 Mbps	21.37
6 / 2437	802.11g	16QAM	54 Mbps	20.26
6 / 2437	802.11n	BPSK	6.5 / 7.25 Mbps	22.17
6 / 2437	802.11n	QPSK	13.0 / 14.4 Mbps	21.85
6 / 2437	802.11n	QPSK	19.5 / 21.7 Mbps	21.96
6 / 2437	802.11n	16QAM	26.0 / 28.9 Mbps	21.97
6 / 2437	802.11n	16QAM	39.0 / 43.3 Mbps	21.78
6 / 2437	802.11n	64QAM	52.0 / 57.8 Mbps	21.81
6 / 2437	802.11n	64QAM	58.5 / 65.0 Mbps	20.21
6 / 2437	802.11n	64QAM	65.0 / 72.2 Mbps	17.96

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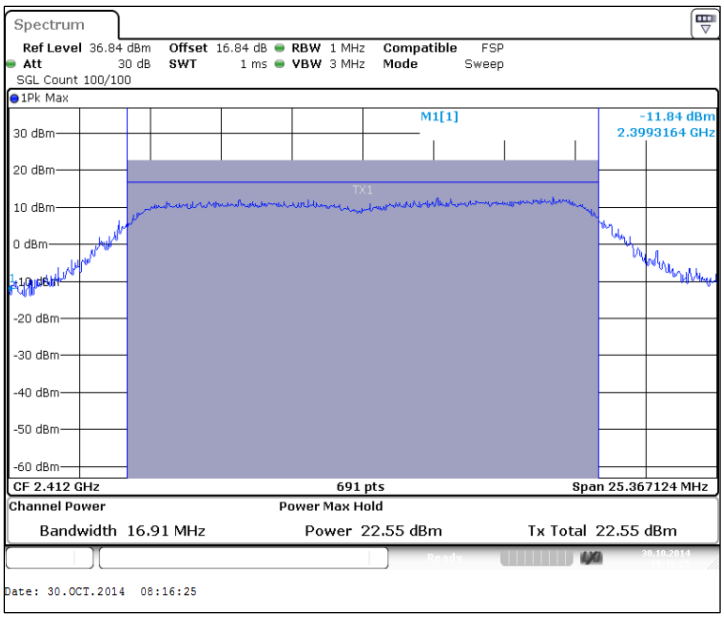
2.4. WLAN Test results

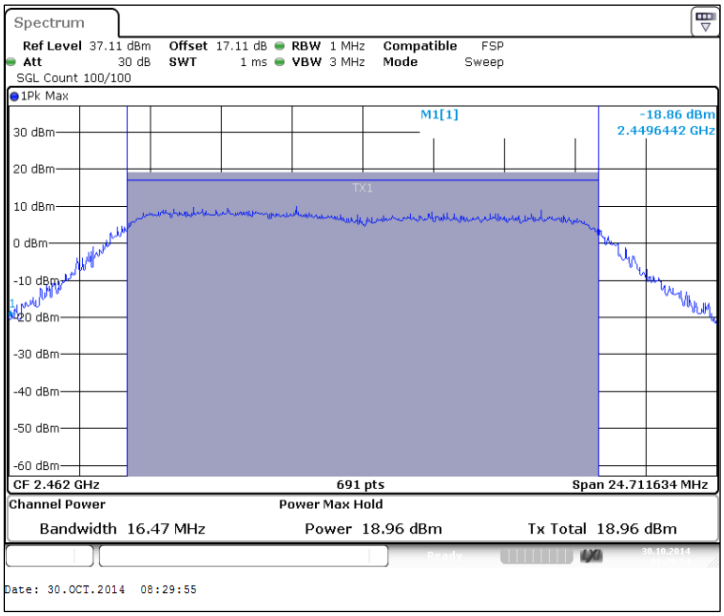
2.4.1 802.11g mode, QPSK modulation, 12 Mbps data rate

Channel / f_C [MHz]	P [dBm]	P [mW]	Result
1 / 2412	22.55	179.887	PASSED
11 / 2462	18.96	78.705	PASSED

Channel 1 / 2412 MHz



Channel 11 / 2462 MHz



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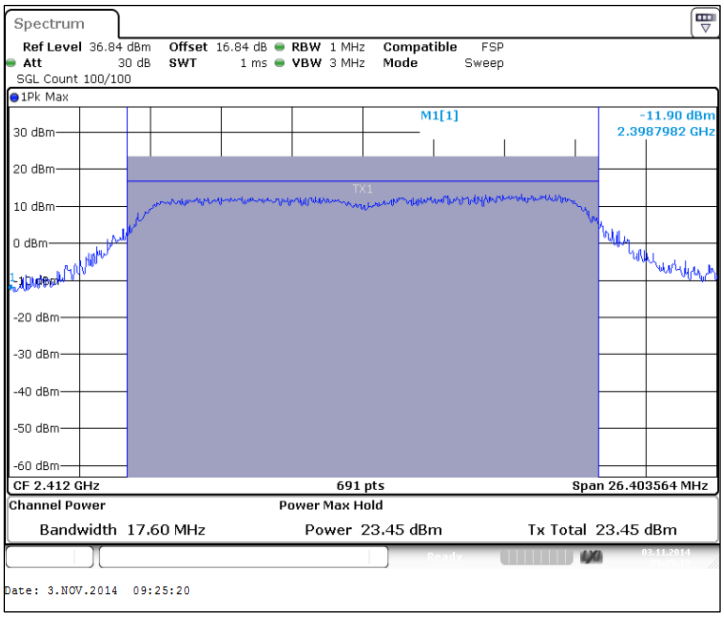
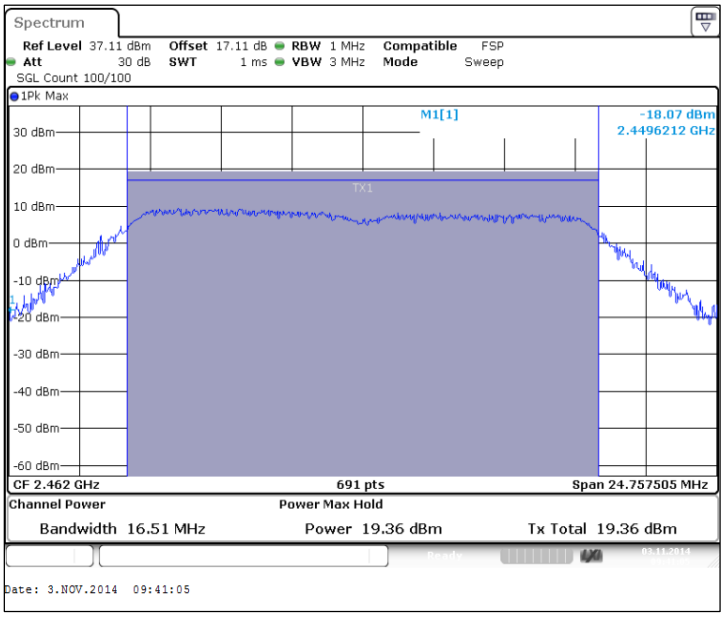
2.4.2 802.11g mode, BPSK modulation, 6 Mbps data rate

Channel / f_C [MHz]	P [dBm]	P [mW]	Result
1 / 2412	23.45	221.309	PASSED
11 / 2462	19.36	86.298	PASSED

Channel 1 / 2412 MHz



Channel 11 / 2462 MHz



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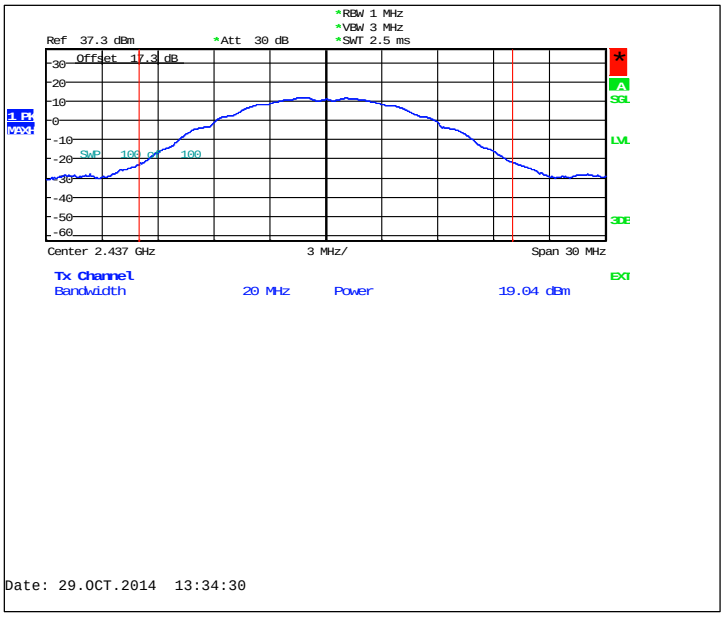
2.4.3 802.11b mode, BPSK modulation, 1 Mbps data rate

Channel / f_C [MHz]	P [dBm]	P [mW]	Result
6 / 2437	19.04	80.168	PASSED

Channel 6 / 2437 MHz



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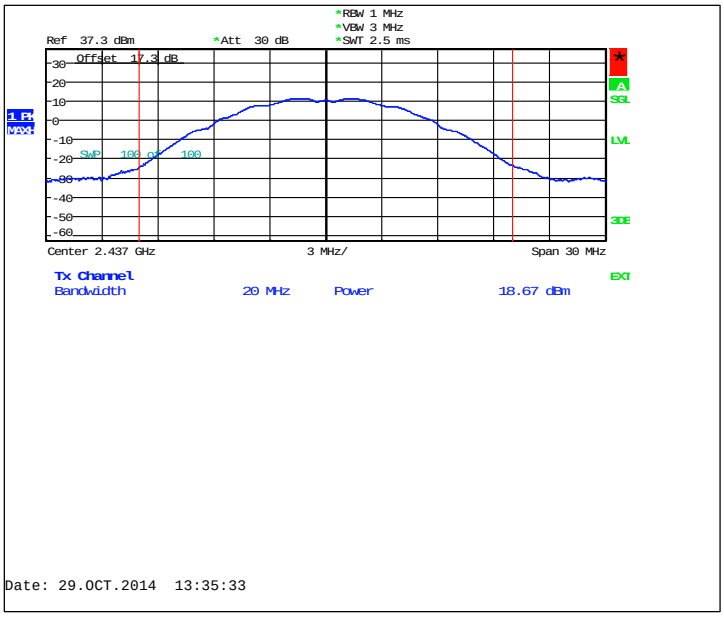
2.4.4 802.11b mode, QPSK modulation, 2 Mbps data rate

Channel / f_C [MHz]	P [dBm]	P [mW]	Result
6 / 2437	18.67	73.621	PASSED

Channel 6 / 2437 MHz



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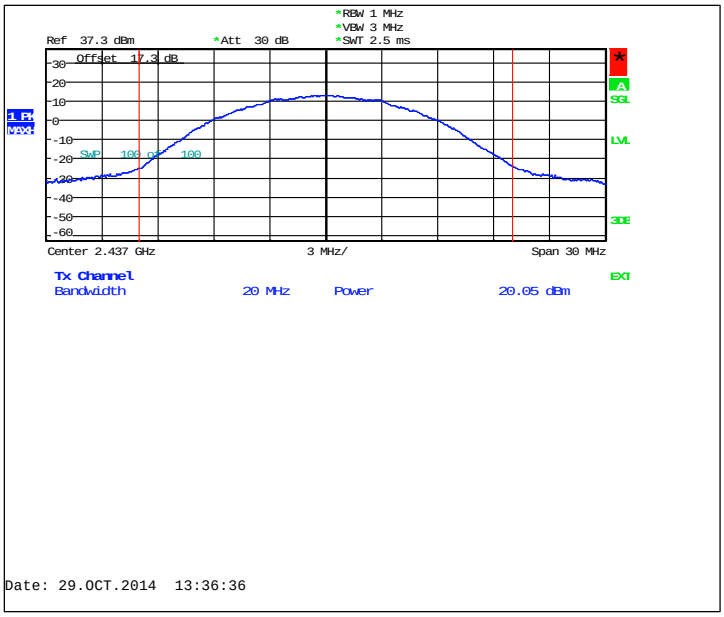
2.4.5 802.11b mode, QPSK modulation, 5.5 Mbps data rate

Channel / f_C [MHz]	P [dBm]	P [mW]	Result
6 / 2437	20.05	101.158	PASSED

Channel 6 / 2437 MHz



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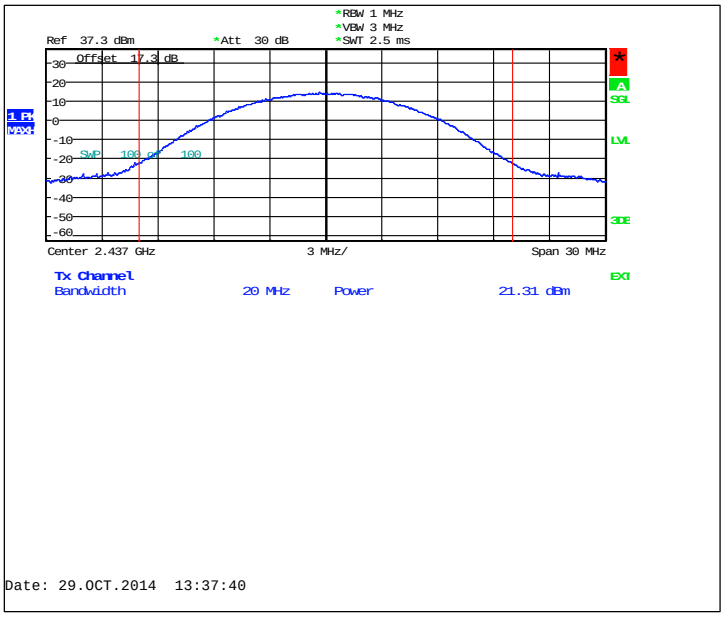
2.4.6 802.11b mode, QPSK modulation, 11 Mbps data rate

Channel / f_C [MHz]	P [dBm]	P [mW]	Result
6 / 2437	21.31	135.207	PASSED

Channel 6 / 2437 MHz



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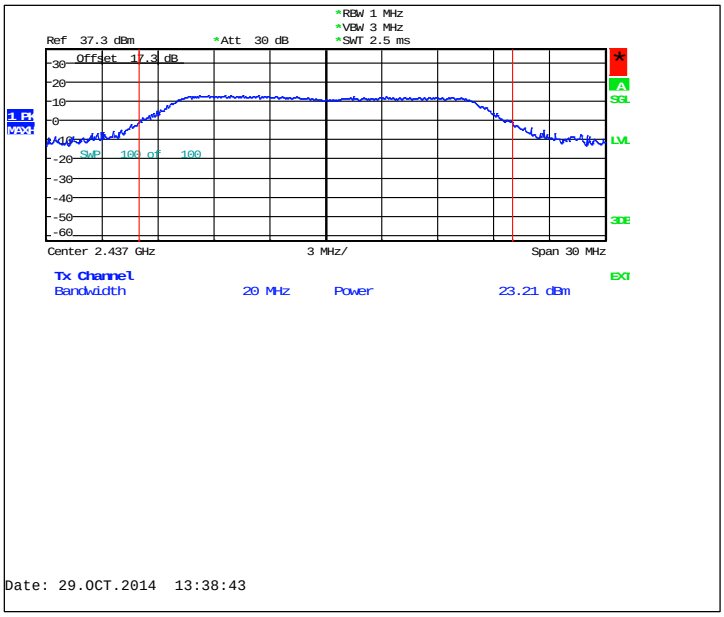
2.4.7 802.11g mode, BPSK modulation, 6 Mbps data rate

Channel / f_C [MHz]	P [dBm]	P [mW]	Result
6 / 2437	23.21	209.411	PASSED

Channel 6 / 2437 MHz



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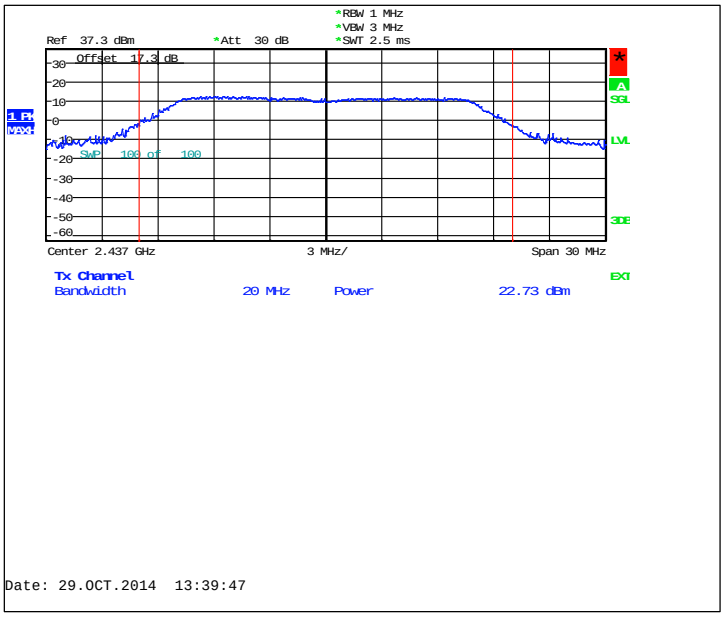
2.4.8 802.11g mode, BPSK modulation, 9 Mbps data rate

Channel / f_C [MHz]	P [dBm]	P [mW]	Result
6 / 2437	22.73	187.499	PASSED

Channel 6 / 2437 MHz



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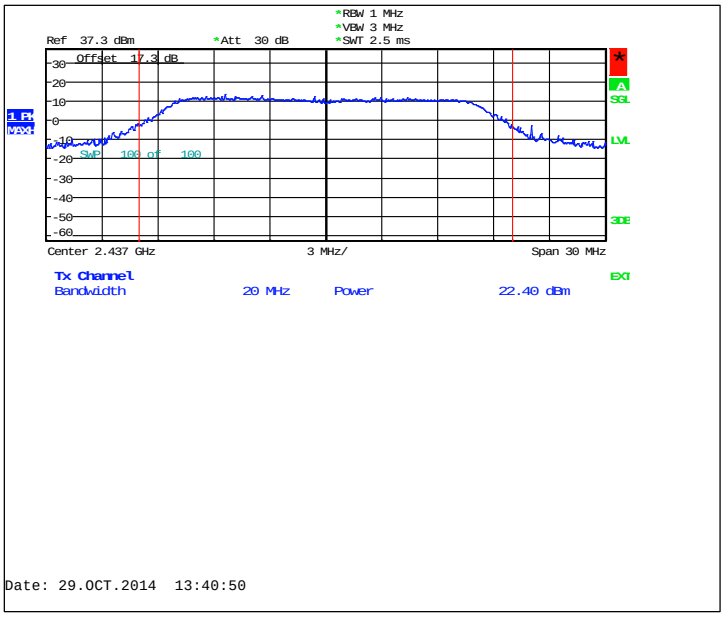
2.4.9 802.11g mode, QPSK modulation, 12 Mbps data rate

Channel / f_C [MHz]	P [dBm]	P [mW]	Result
6 / 2437	22.4	173.78	PASSED

Channel 6 / 2437 MHz



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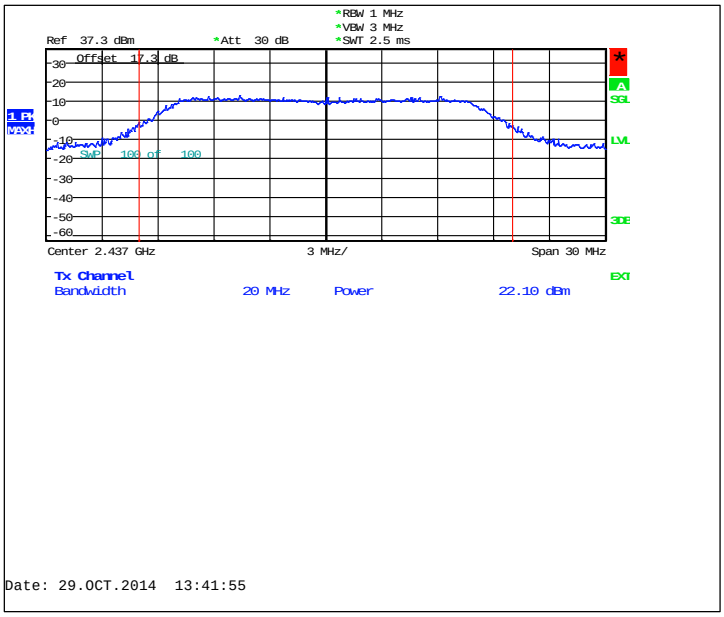
2.4.10 802.11g mode, QPSK modulation, 18 Mbps data rate

Channel / f_C [MHz]	P [dBm]	P [mW]	Result
6 / 2437	22.1	162.181	PASSED

Channel 6 / 2437 MHz



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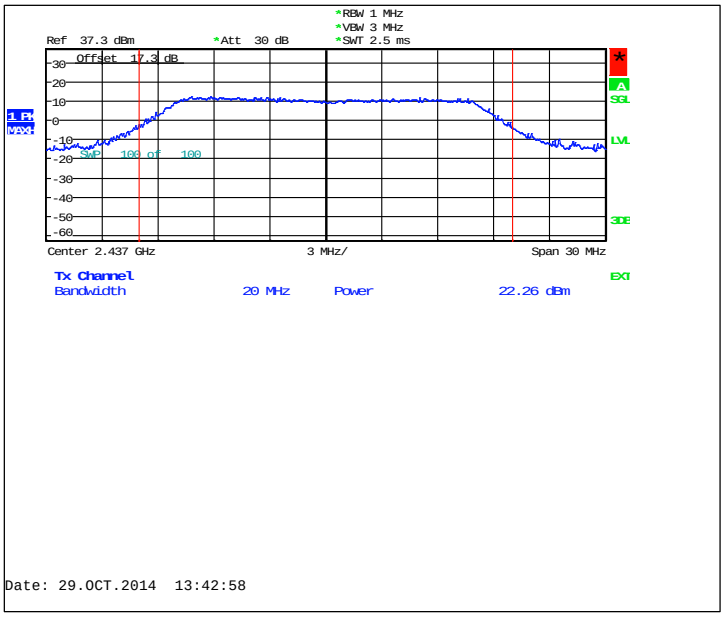
2.4.11 802.11g mode, 16QAM modulation, 24 Mbps data rate

Channel / f_C [MHz]	P [dBm]	P [mW]	Result
6 / 2437	22.26	168.267	PASSED

Channel 6 / 2437 MHz



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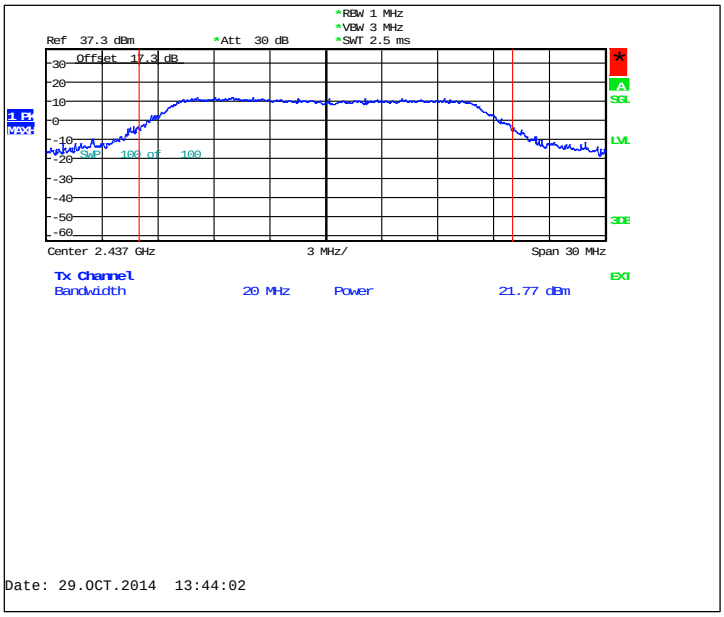
2.4.12 802.11g mode, 16QAM modulation, 36 Mbps data rate

Channel / f_C [MHz]	P [dBm]	P [mW]	Result
6 / 2437	21.77	150.314	PASSED

Channel 6 / 2437 MHz



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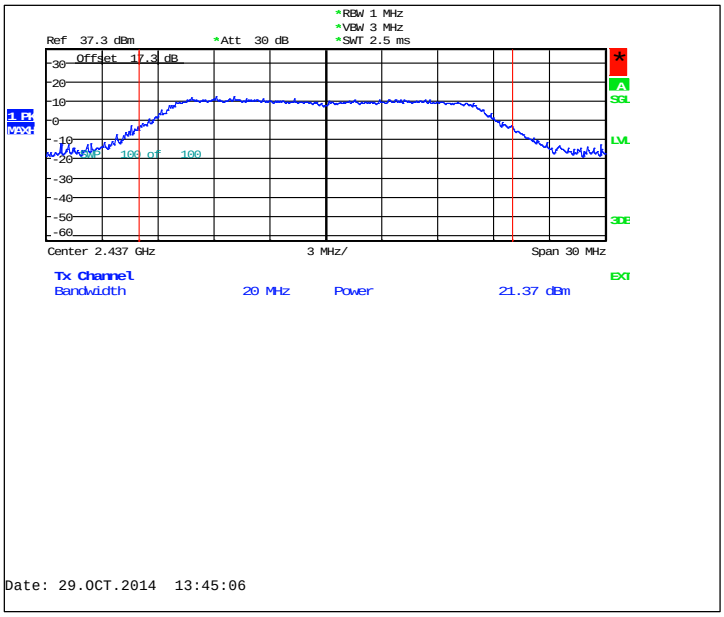
2.4.13 802.11g mode, 16QAM modulation, 48 Mbps data rate

Channel / f_C [MHz]	P [dBm]	P [mW]	Result
6 / 2437	21.37	137.088	PASSED

Channel 6 / 2437 MHz



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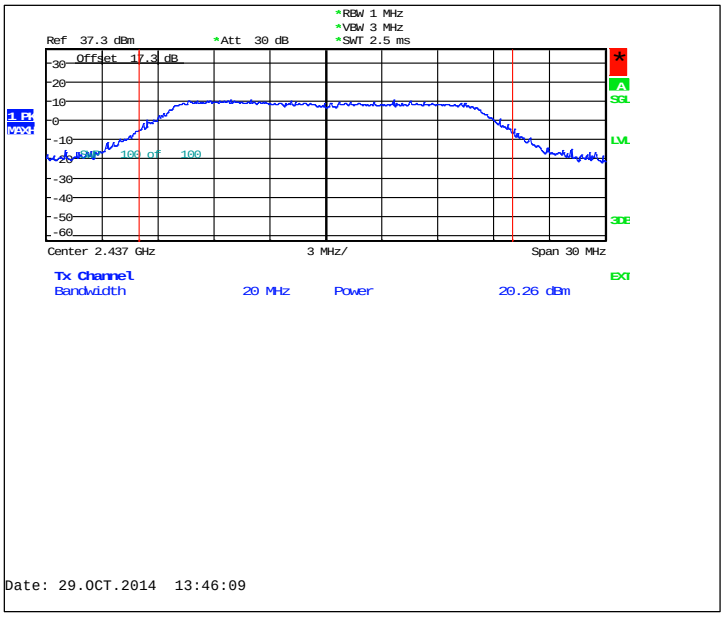
2.4.14 802.11g mode, 16QAM modulation, 54 Mbps data rate

Channel / f_C [MHz]	P [dBm]	P [mW]	Result
6 / 2437	20.26	106.17	PASSED

Channel 6 / 2437 MHz



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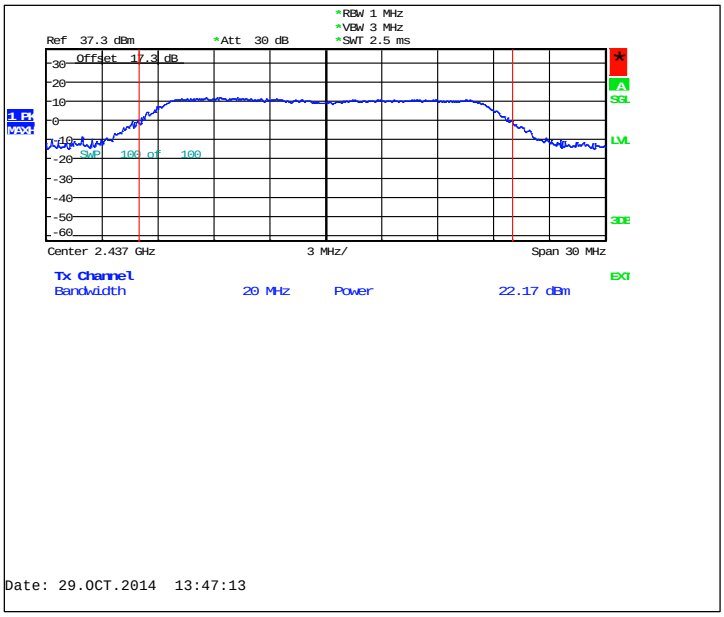
2.4.15 802.11n mode, BPSK modulation, 6.5 / 7.25 Mbps data rate

Channel / f_C [MHz]	P [dBm]	P [mW]	Result
6 / 2437	22.17	164.816	PASSED

Channel 6 / 2437 MHz



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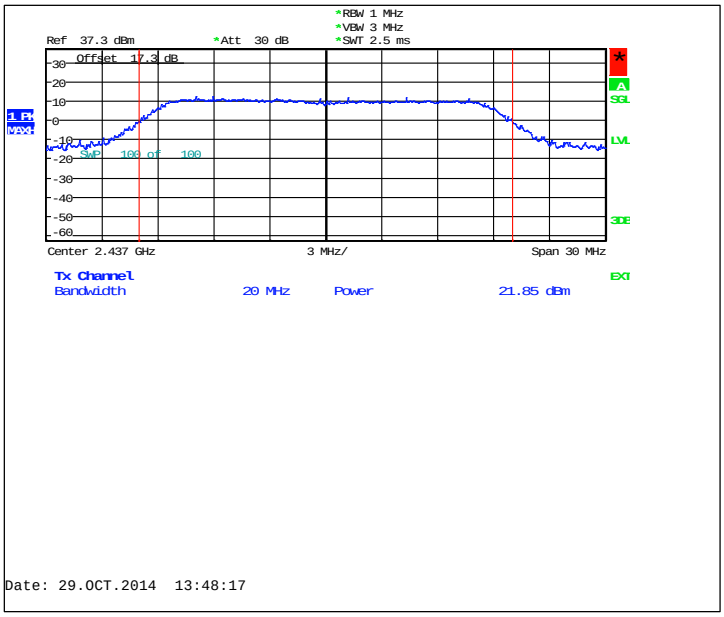
2.4.16 802.11n mode, QPSK modulation, 13.0 / 14.4 Mbps data rate

Channel / f_C [MHz]	P [dBm]	P [mW]	Result
6 / 2437	21.85	153.109	PASSED

Channel 6 / 2437 MHz



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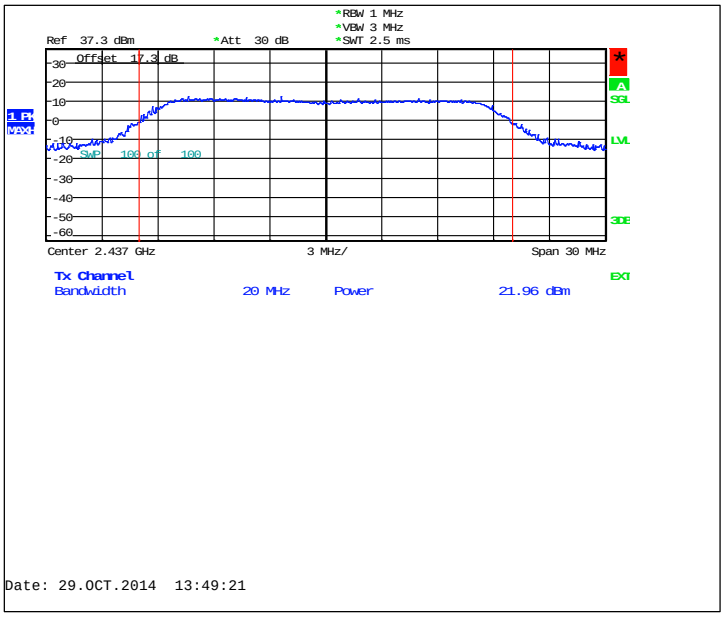
2.4.17 802.11n mode, QPSK modulation, 19.5 / 21.7 Mbps data rate

Channel / f_C [MHz]	P [dBm]	P [mW]	Result
6 / 2437	21.96	157.036	PASSED

Channel 6 / 2437 MHz



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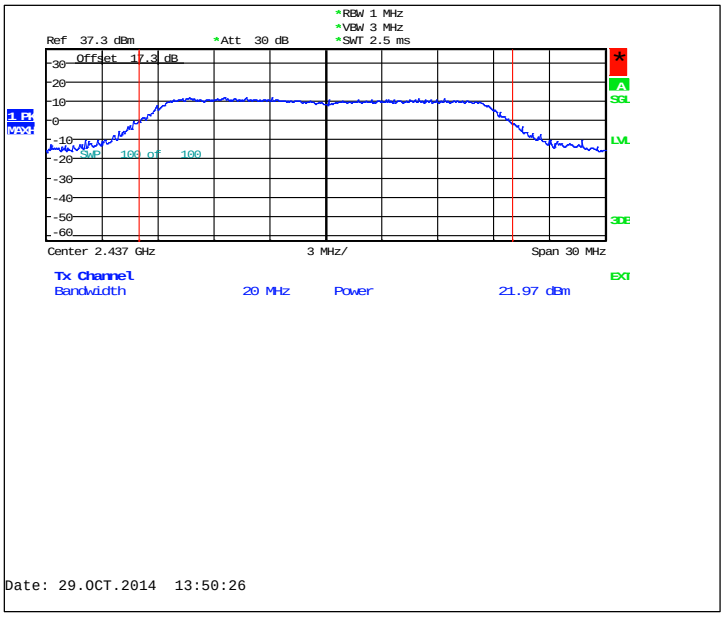
2.4.18 802.11n mode, 16QAM modulation, 26.0 / 28.9 Mbps data rate

Channel / f_C [MHz]	P [dBm]	P [mW]	Result
6 / 2437	21.97	157.398	PASSED

Channel 6 / 2437 MHz



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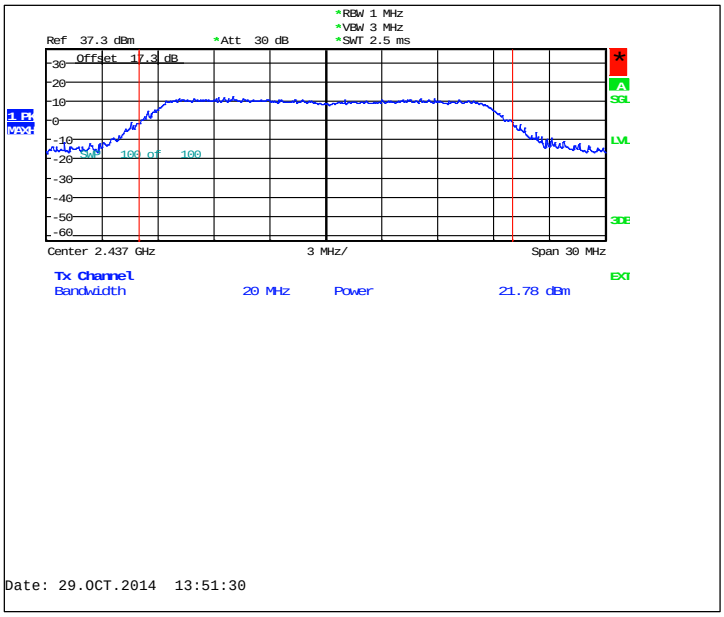
2.4.19 802.11n mode, 16QAM modulation, 39.0 / 43.3 Mbps data rate

Channel / f_C [MHz]	P [dBm]	P [mW]	Result
6 / 2437	21.78	150.661	PASSED

Channel 6 / 2437 MHz



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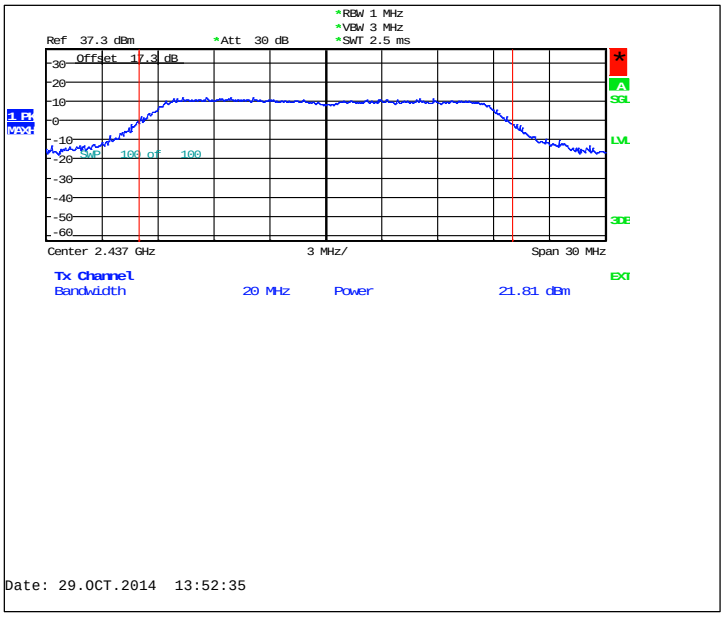
2.4.20 802.11n mode, 64QAM modulation, 52.0 / 57.8 Mbps data rate

Channel / f_C [MHz]	P [dBm]	P [mW]	Result
6 / 2437	21.81	151.705	PASSED

Channel 6 / 2437 MHz



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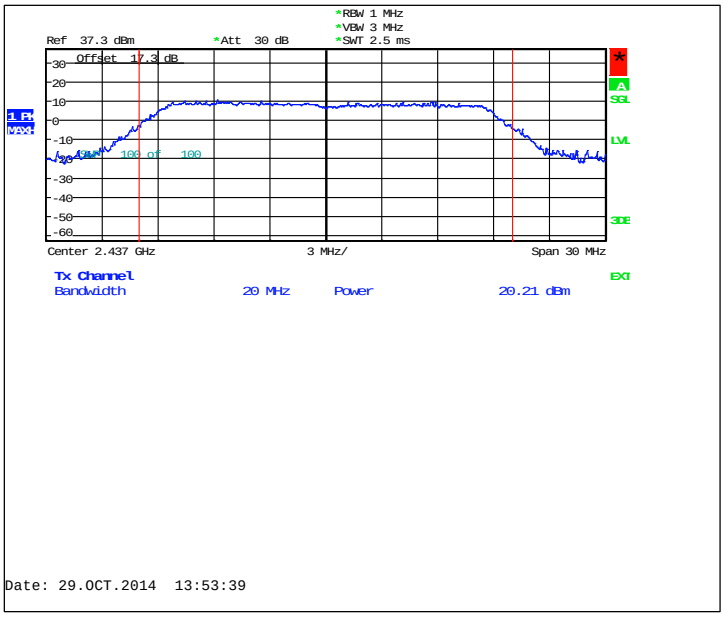
2.4.21 802.11n mode, 64QAM modulation, 58.5 / 65.0 Mbps data rate

Channel / f_C [MHz]	P [dBm]	P [mW]	Result
6 / 2437	20.21	104.954	PASSED

Channel 6 / 2437 MHz



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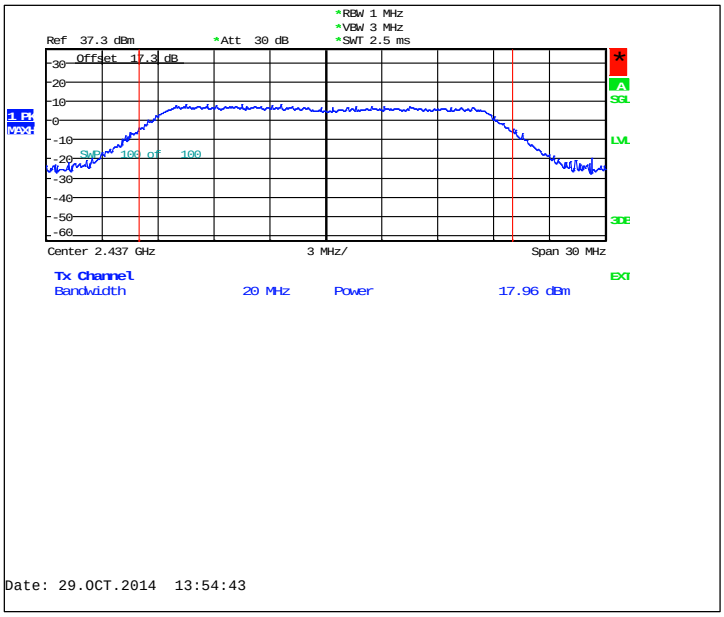
2.4.22 802.11n mode, 64QAM modulation, 65.0 / 72.2 Mbps data rate

Channel / f_C [MHz]	P [dBm]	P [mW]	Result
6 / 2437	17.96	62.517	PASSED

Channel 6 / 2437 MHz



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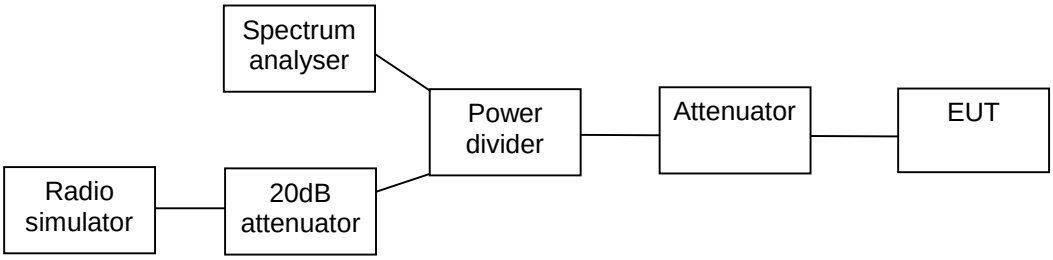
3. Spurious RF conducted emissions
(FCC §15.247(d), RSS-210 A8.5)

EUT with DUT number	RM-1062, DUT 18682
Accessories with DUT numbers	SD-238R, DUT 18687
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [ºC] / Humidity [%RH] / Air Pressure [kPa]	22 / 59 / 102.8
Date of measurements	30-Oct-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

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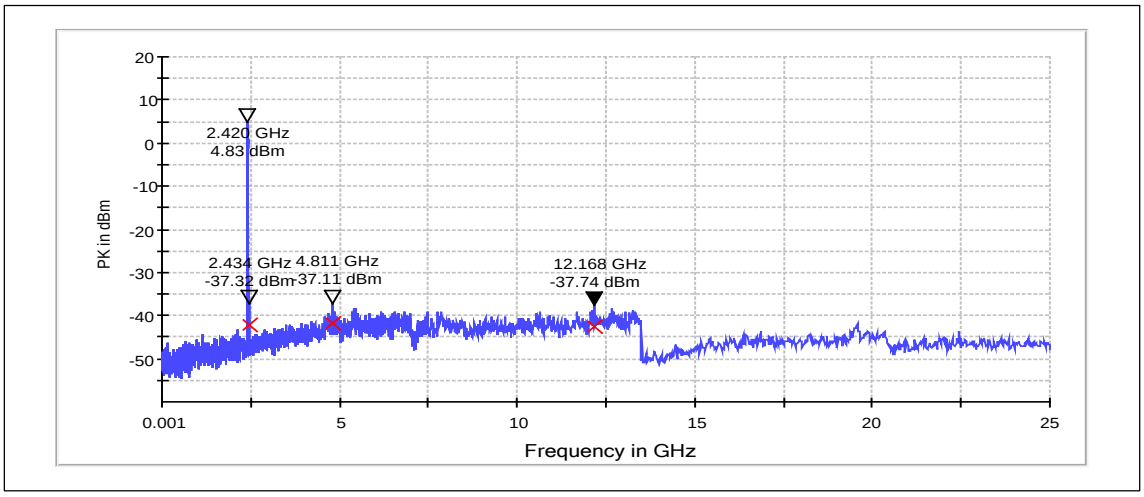
3.3. WLAN Test results

3.3.1 802.11g mode, QPSK modulation, 12 Mbps data rate

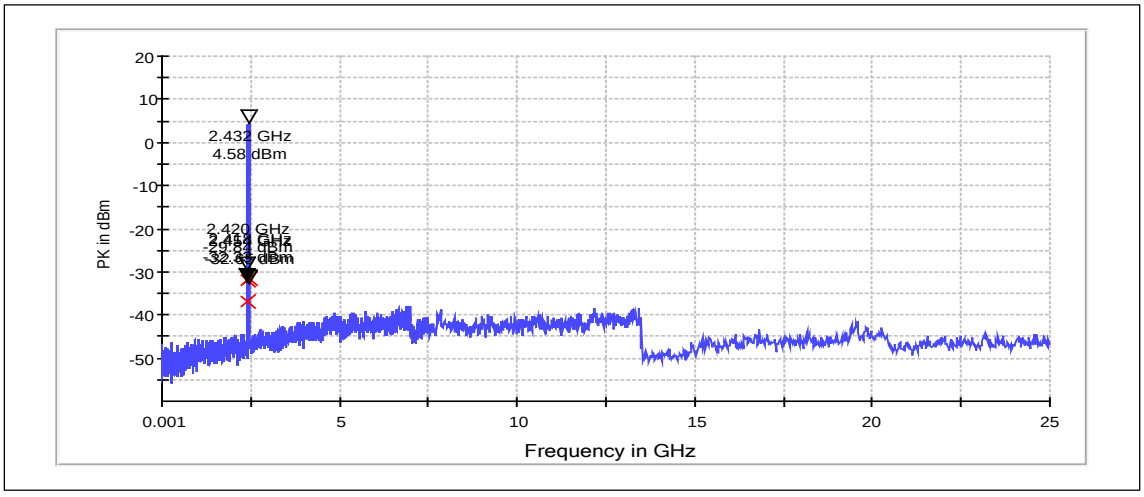
Channel 1 / 2412 MHz



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

Frequency [MHz]	P [dBc]	Result
4811.200	-41.93	PASSED
2433.654	-42.14	PASSED
12168.000	-42.57	PASSED

Channel 6 / 2437 MHz



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

Frequency [MHz]	P [dBc]	Result
2453.619	-31.54	PASSED
2420.381	-31.93	PASSED
2417.540	-36.92	PASSED

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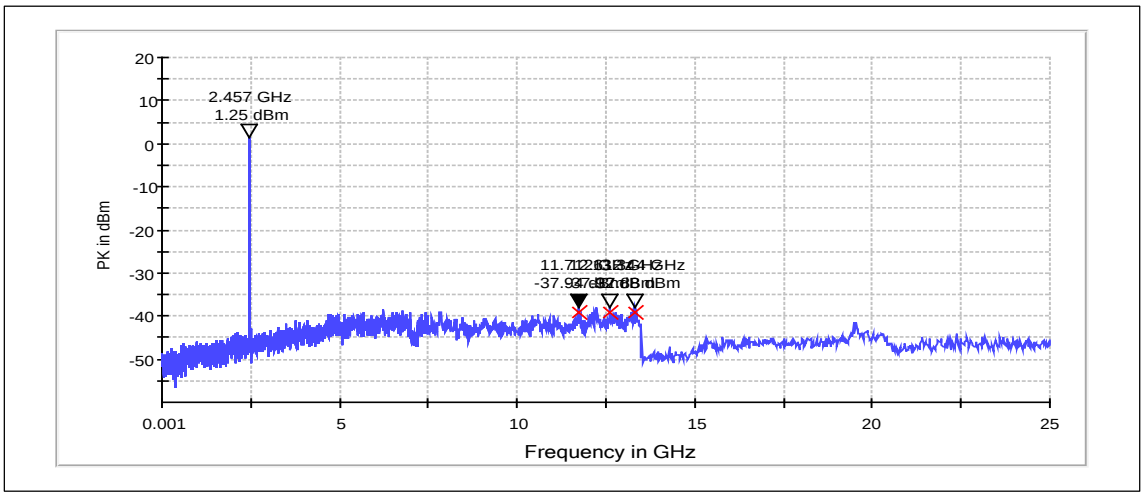
Channel 11 / 2462 MHz



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

Frequency [MHz]	P [dBc]	Result
13344.000	-39.13	PASSED
12612.000	-39.18	PASSED
11712.000	-39.20	PASSED

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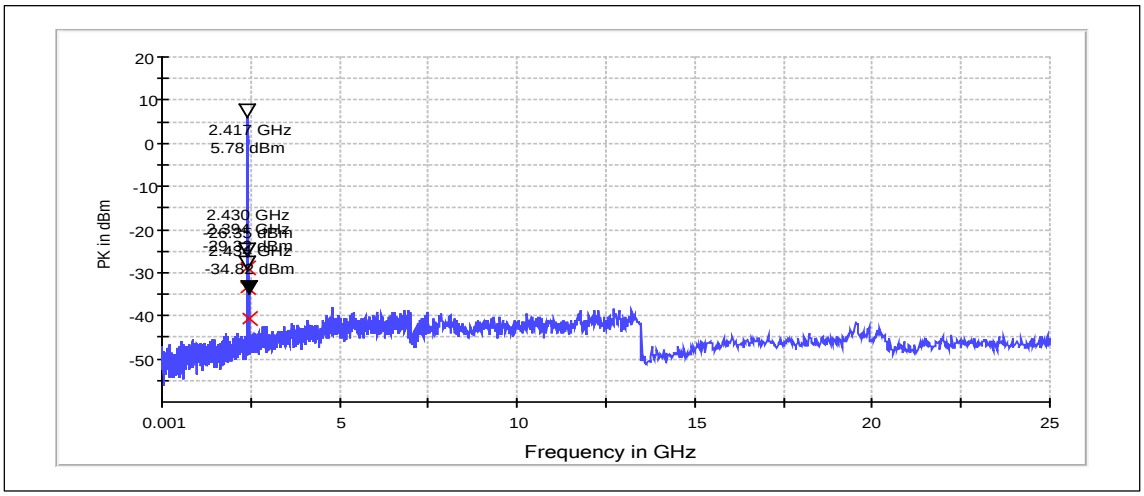
3.3.2 802.11g mode, BPSK modulation, 6 Mbps data rate

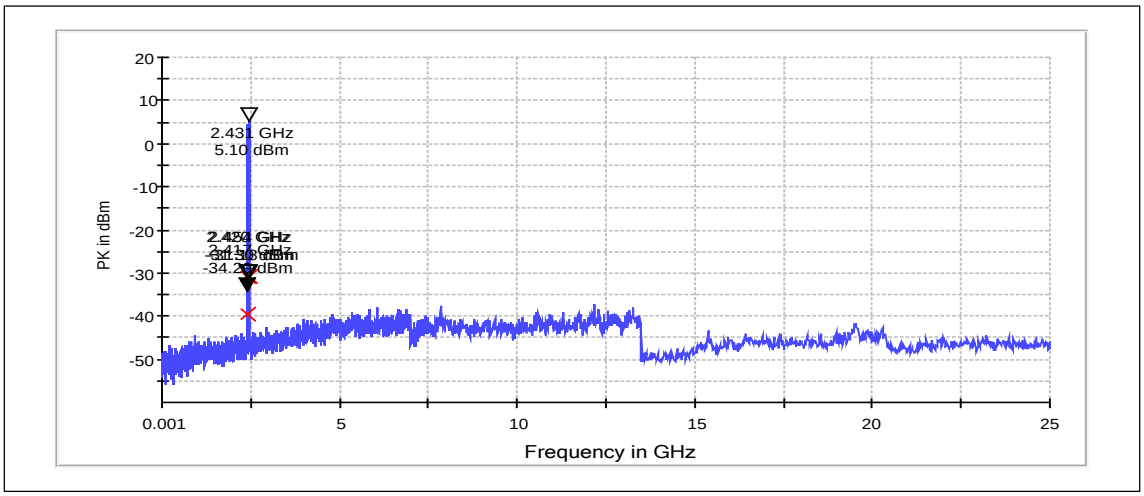
Channel 1 / 2412 MHz



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

Frequency [MHz]	P [dBc]	Result
2429.602	-29.00	PASSED
2394.398	-33.62	PASSED
2434.343	-40.60	PASSED

Channel 6 / 2437 MHz



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

Frequency [MHz]	P [dBc]	Result
2453.993	-30.78	PASSED
2420.007	-30.95	PASSED
2417.167	-39.40	PASSED

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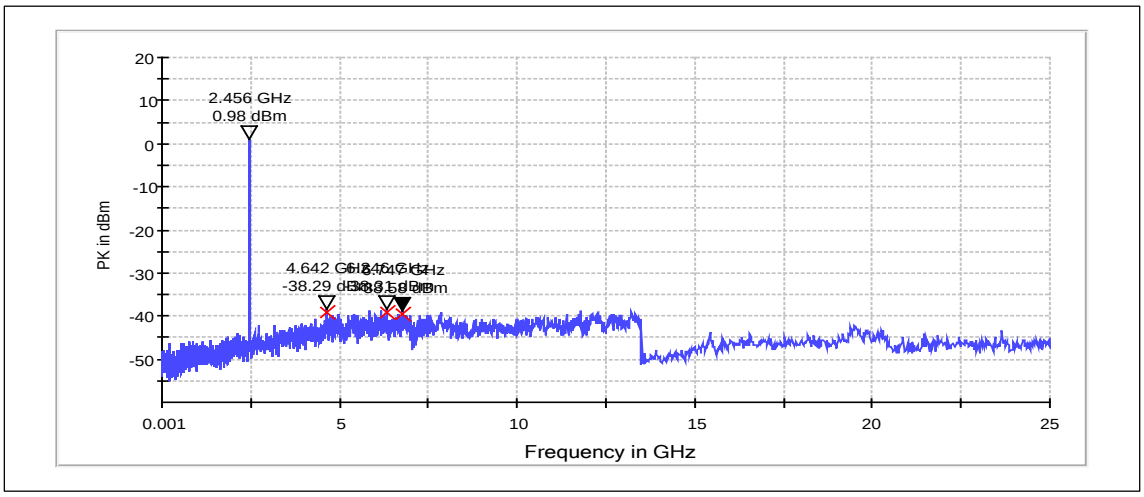
Channel 11 / 2462 MHz



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

Frequency [MHz]	P [dBc]	Result
4642.138	-39.27	PASSED
6346.400	-39.30	PASSED
6746.800	-39.56	PASSED

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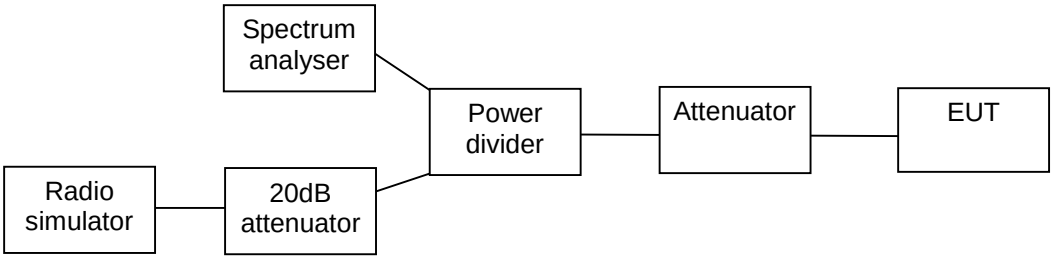
4. 6dB(bandwidth)

(FCC §15.247(a)(2), RSS-210 A8.2(a))

EUT with DUT number	RM-1062, DUT 18682
Accessories with DUT numbers	SD-238R, DUT 18687
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [ºC] / Humidity [%RH] / Air Pressure [kPa]	22 / 59 / 102.8
Date of measurements	30-Oct-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

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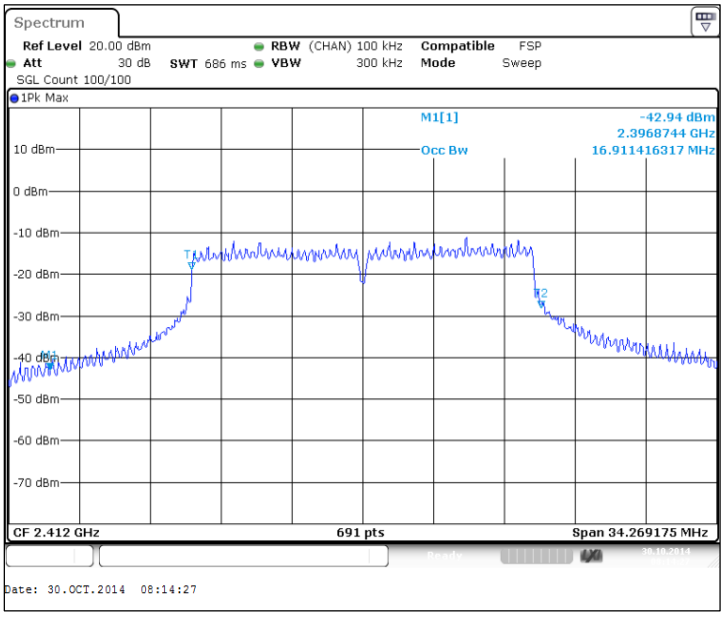
4.3. WLAN Test results

4.3.1 802.11g mode, QPSK modulation, 12 Mbps data rate

Channel / f_C [MHz]	6 dB bandwidth [kHz]	Result
1 / 2412	16911.4	PASSED
6 / 2437	16619	PASSED
11 / 2462	16474.4	PASSED

Channel 1 / 2412 MHz



Channel 6 / 2437 MHz

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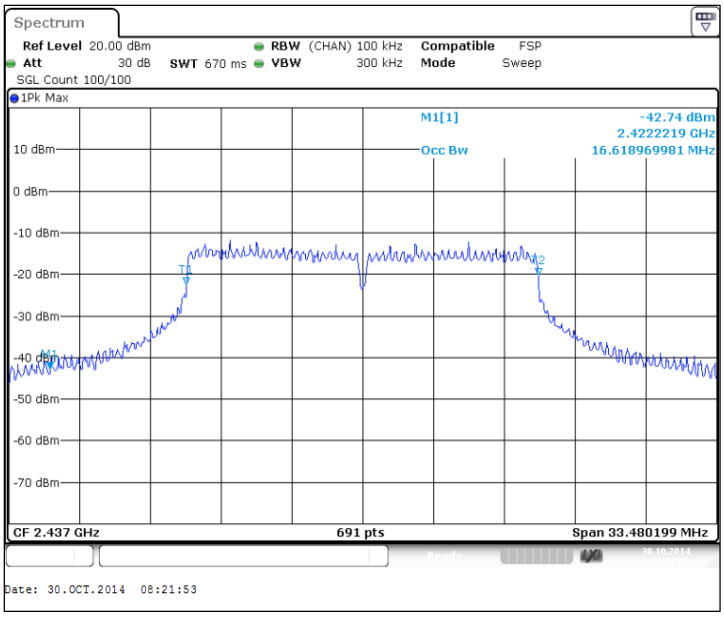
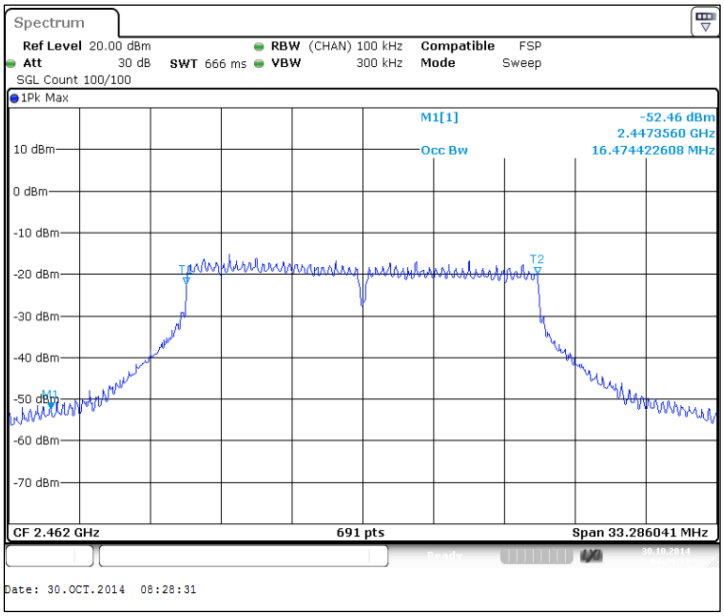


Channel 11 / 2462 MHz



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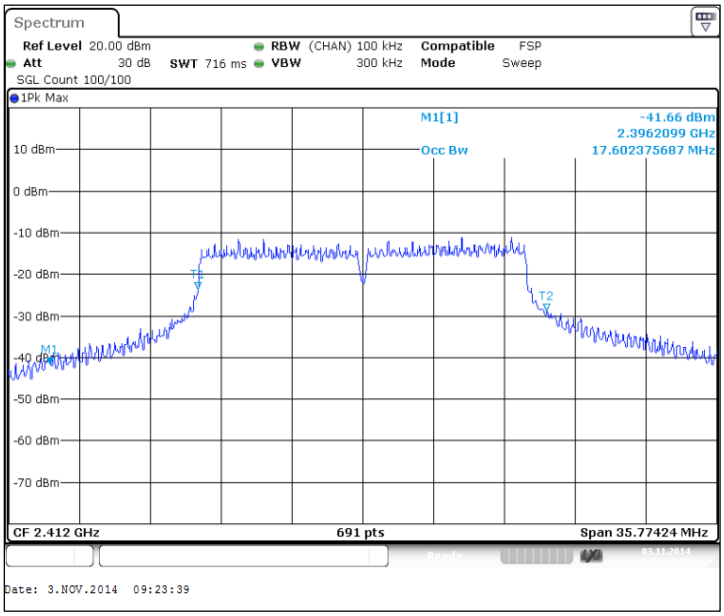
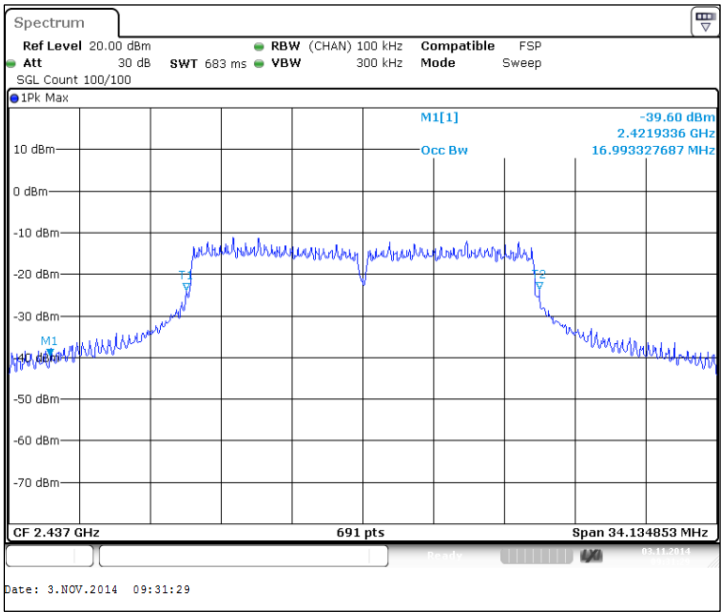
4.3.2 802.11g mode, BPSK modulation, 6 Mbps data rate

Channel / f_C [MHz]	6 dB bandwidth [kHz]	Result
1 / 2412	17602.4	PASSED
6 / 2437	16993.3	PASSED
11 / 2462	16505	PASSED

Channel 1 / 2412 MHz



Channel 6 / 2437 MHz



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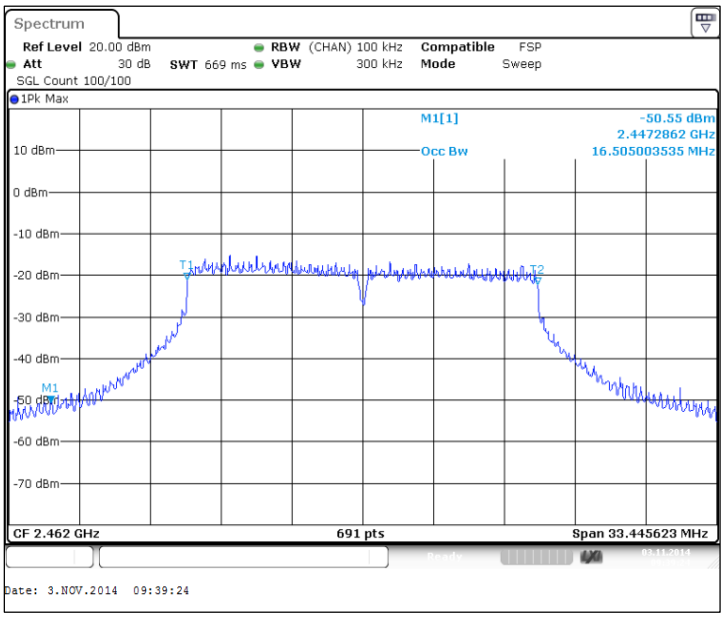
Channel 11 / 2462 MHz



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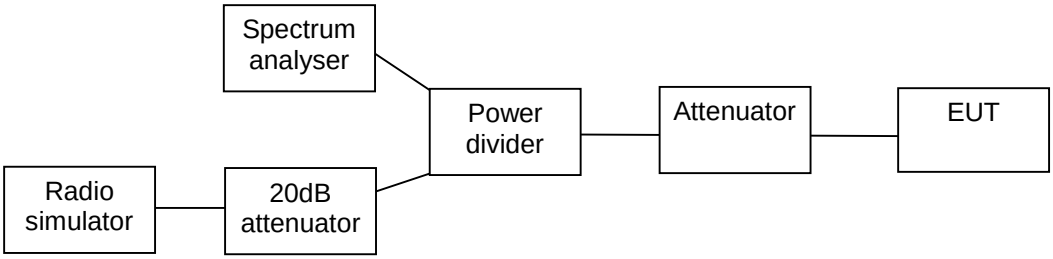
5. Power spectral density
(FCC §15.247(e), RSS-210 A8.2(b))

EUT with DUT number	RM-1062, DUT 18682
Accessories with DUT numbers	SD-238R, DUT 18687
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [ºC] / Humidity [%RH] / Air Pressure [kPa]	22 / 59 / 102.8
Date of measurements	30-Oct-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

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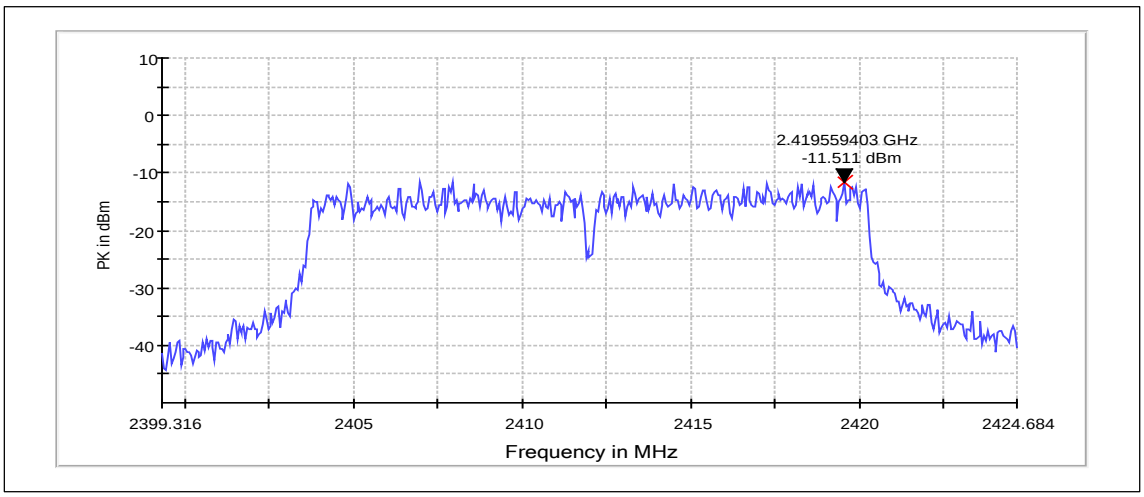
5.3. WLAN Test results

5.3.1 802.11g mode, QPSK modulation, 12 Mbps data rate

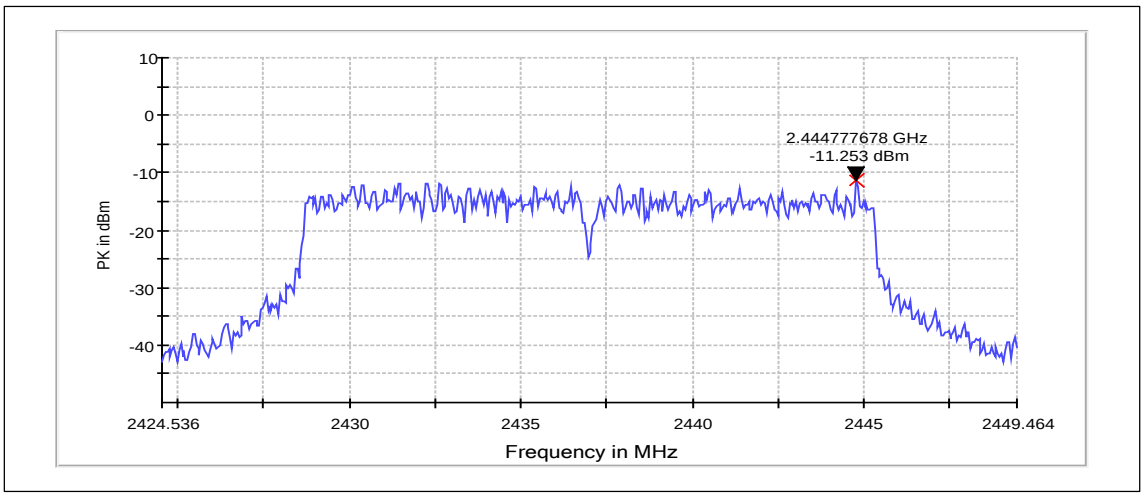
Peak (RBW: 3 kHz, VBW: 10 kHz, Max hold)

Channel / f_C [MHz]	P [dBm]	Result
1 / 2412	-11.51	PASSED
6 / 2437	-11.25	PASSED
11 / 2462	-15.03	PASSED

Channel 1 / 2412 MHz



Channel 6 / 2437 MHz



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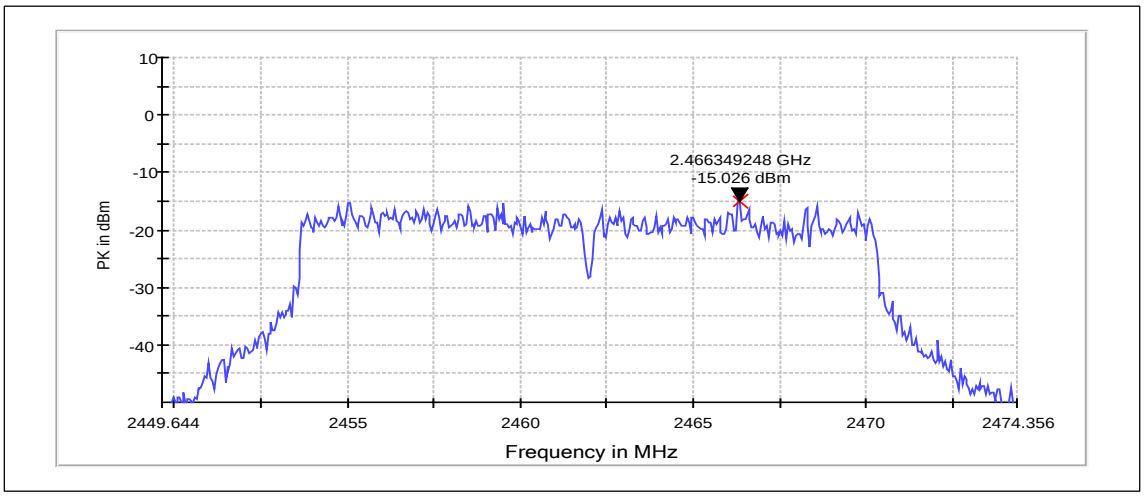
Channel 11 / 2462 MHz

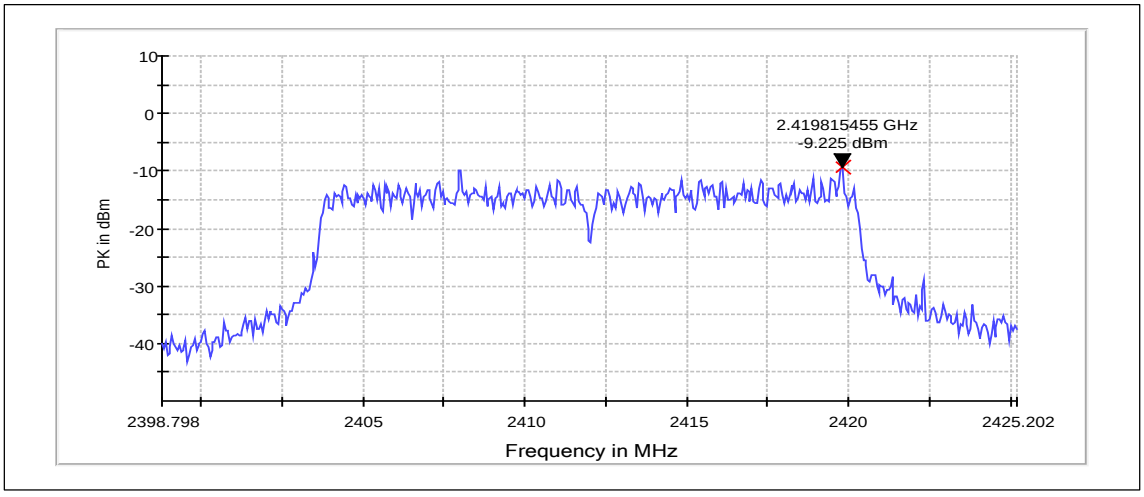


5.3.2 802.11g mode, BPSK modulation, 6 Mbps data rate

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

Channel / f_C [MHz]	P [dBm]	Result
1 / 2412	-9.23	PASSED
6 / 2437	-9.44	PASSED
11 / 2462	-14.44	PASSED

Channel 1 / 2412 MHz



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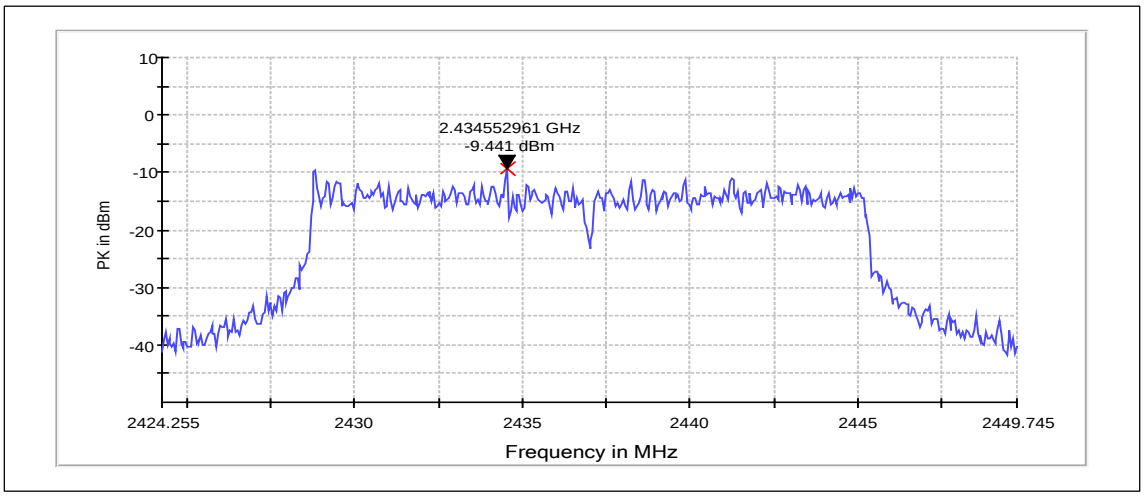
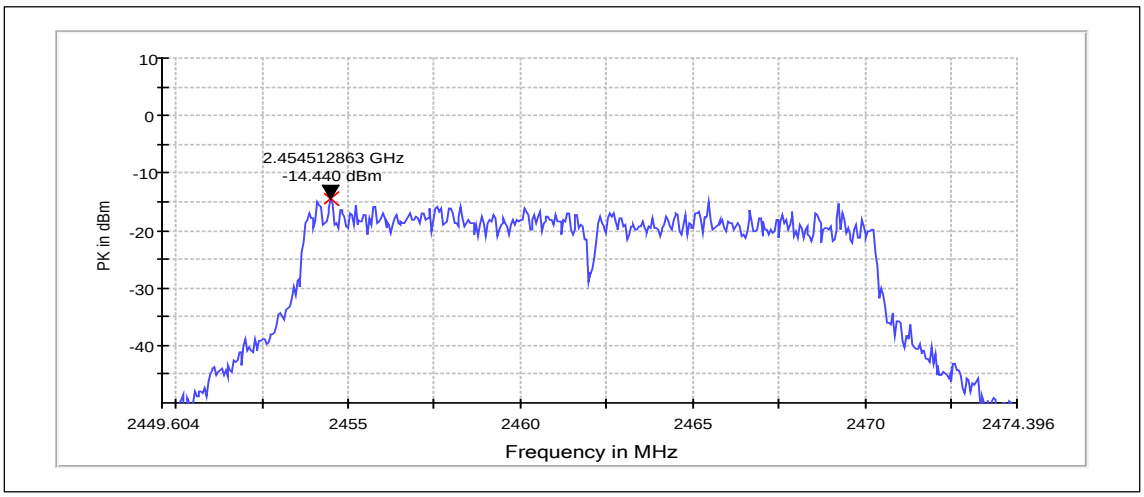
Channel 6 / 2437 MHz



Channel 11 / 2462 MHz



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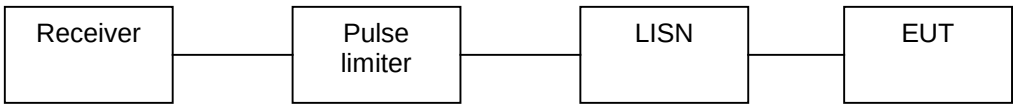
6. AC powerline conducted emissions
(FCC §15.207, RSS-210 7.2.4)

EUT with DUT number	RM-1062, DUT 18708
Accessories with DUT numbers	BV-T4B, DUT 18709 ; AC-20E, DUT 18633 ; WH-108, DUT 18677
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [ºC] / Humidity [%RH] / Air Pressure [kPa]	22 / 59 / 102.8
Date of measurements	10-Nov-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

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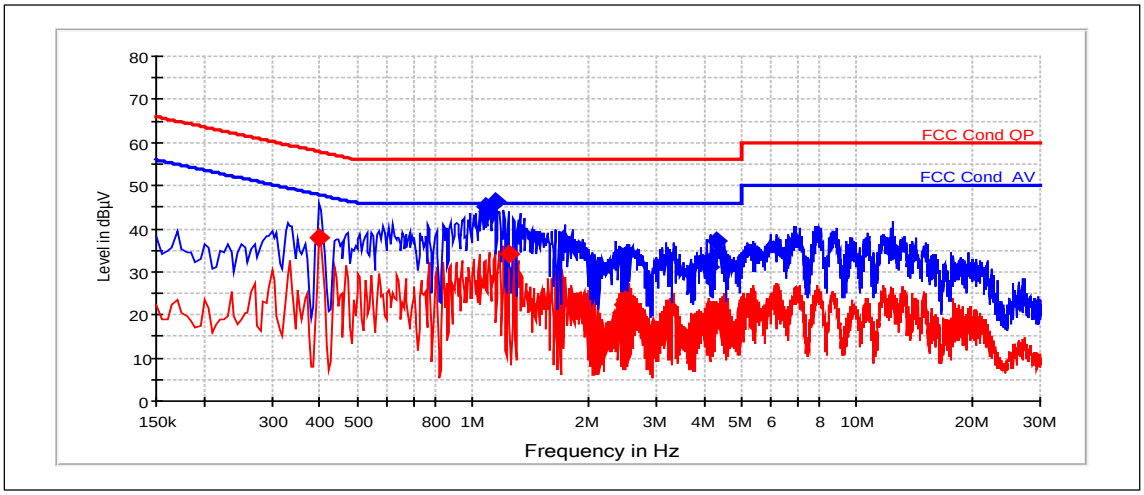
6.3. Bluetooth Low Energy Test results

Channel 20 / 2442 MHz



QuasiPeak (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Line	Result
1.085	44.98	L1	PASSED
1.095	43.97	L1	PASSED
1.14	46.11	L1	PASSED
4.105	31.17	L1	PASSED
4.285	37.07	L1	PASSED
12.37	34.82	L1	PASSED

Average (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Line	Result
0.4	37.81	L1	PASSED
1.24	34.22	L1	PASSED
2.44	20.29	L1	PASSED
2.48	22.27	L1	PASSED
2.485	23.67	L1	PASSED

6.4. WLAN Test results

6.4.1 802.11g mode, BPSK modulation, 6 Mbps data rate

Channel 6 / 2437 MHz

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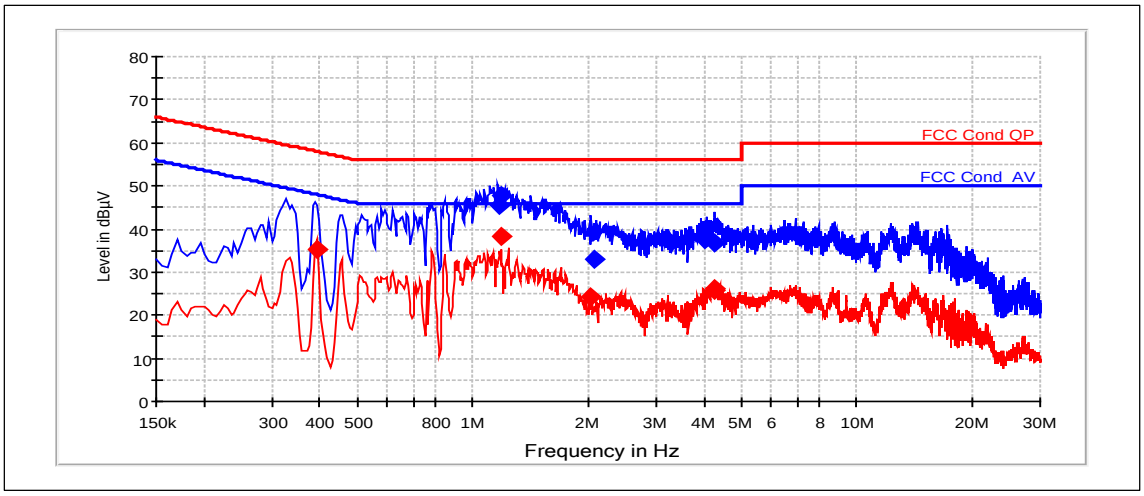

QuasiPeak (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Line	Result
1.175	45.68	L1	PASSED
1.18	47.81	L1	PASSED
2.075	33.15	L1	PASSED
4.005	37.5	L1	PASSED
4.25	36.87	L1	PASSED

Average (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Line	Result
0.395	35.36	L1	PASSED
1.18	38.29	L1	PASSED
2.025	24.44	L1	PASSED
4.235	25.86	L1	PASSED
4.28	26.29	L1	PASSED

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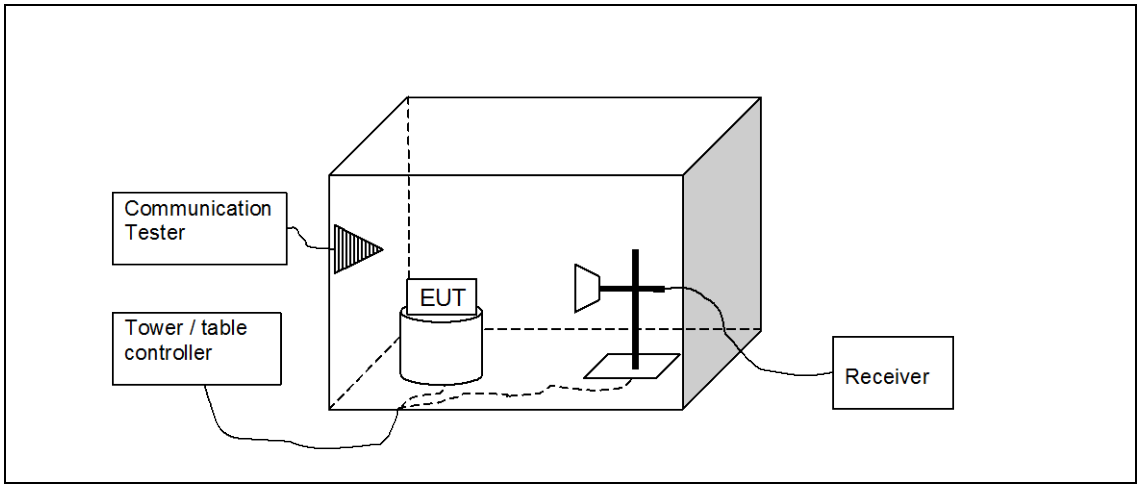
7. Band edge compliance of RF emissions
(FCC 15.247(d), 15.205(b), RSS-210 A8.5)

EUT with DUT number	RM-1062, DUT 18732
Accessories with DUT numbers	BV-T4B, DUT 18733
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [ºC] / Humidity [%RH] / Air Pressure [kPa]	22 / 59 /102,8
Date of measurements	17-Nov-2014
Measured by	Jari Keto

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)

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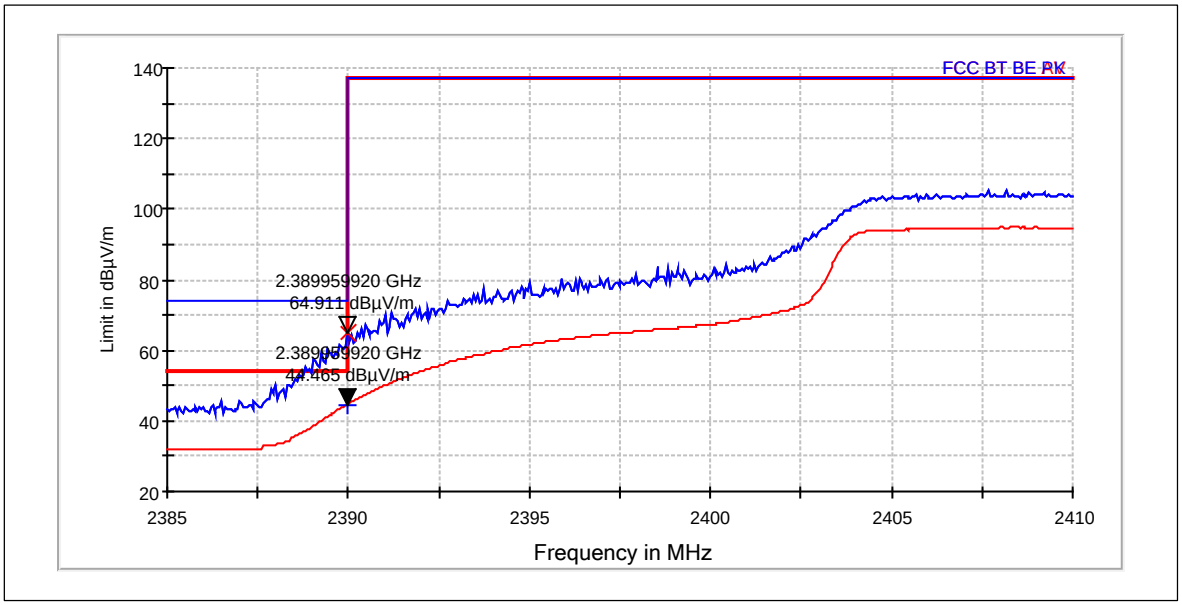
7.3. WLAN test results

7.3.1 802.11g, BPSK modulation, 6 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	64.91	1760.151	66.27	-1.36	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Results
2390	44.47	167.205	45.83	-1.36	PASSED

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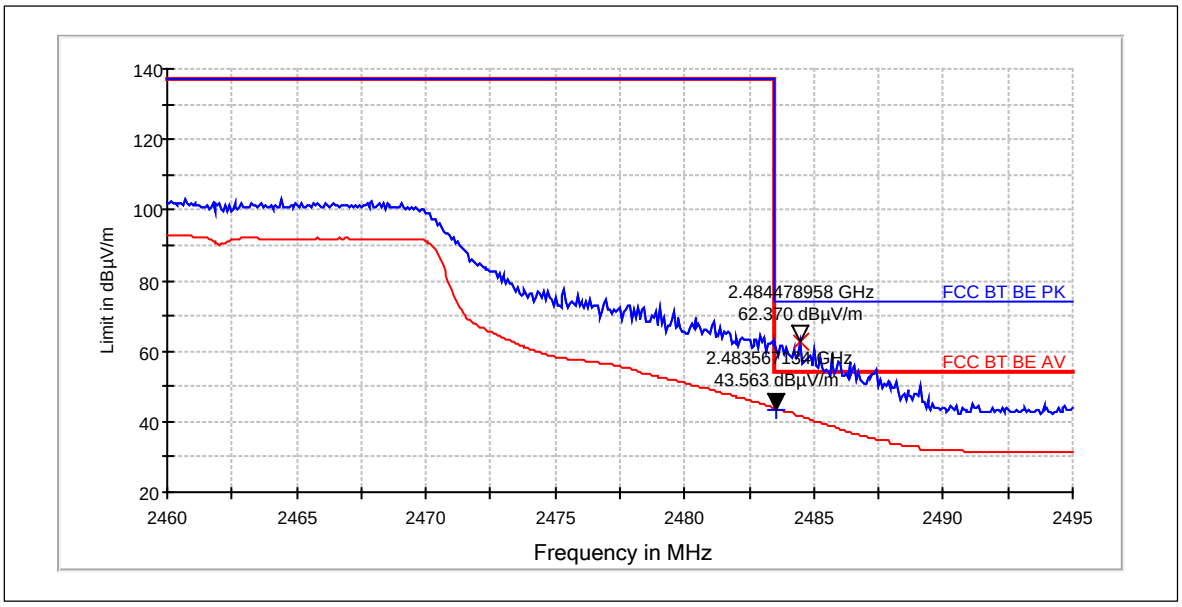
Channel 11 / 2462 MHz



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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Results
2484	62.37	1313.711	64.19	-1.82	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Results
2484	43.56	150.713	45.38	-1.82	PASSED

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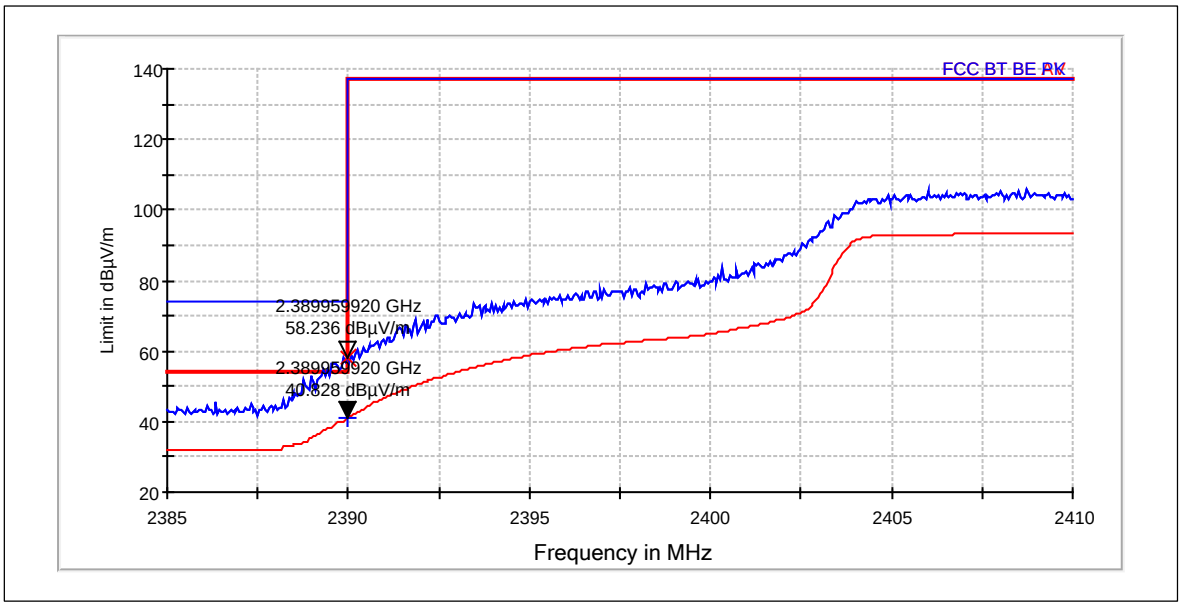
7.3.2 802.11g, QPSK modulation, 12 Mbps data rate.

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	58.24	816.206	59.6	-1.36	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Results
2390	40.83	110.002	42.19	-1.36	PASSED

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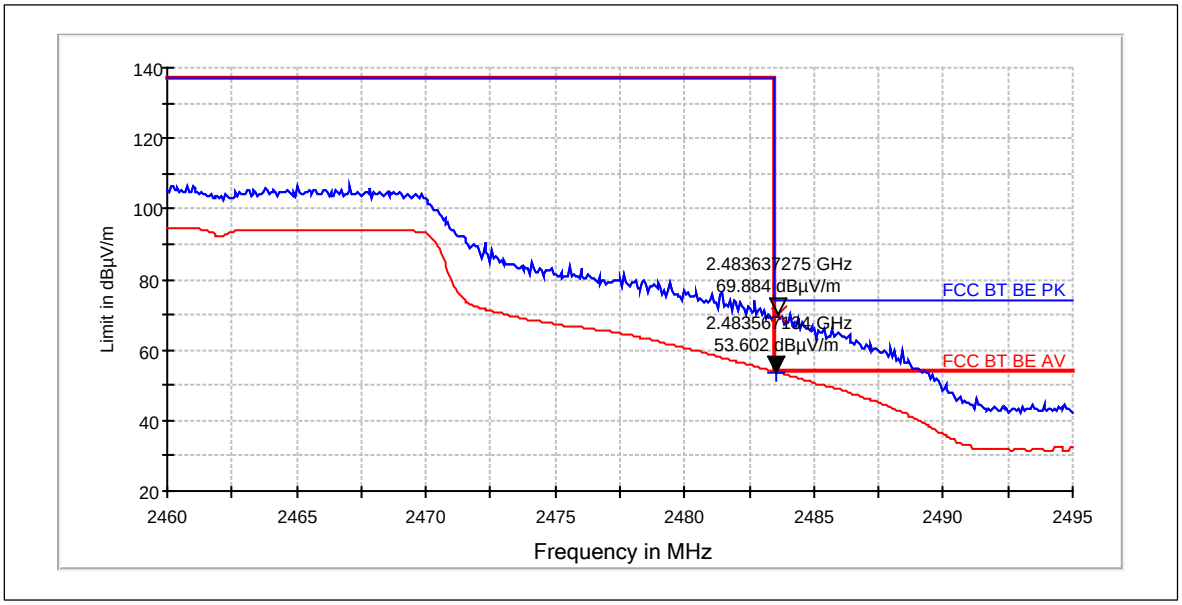
Channel 11 / 2462 MHz



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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Results
2484	69.88	3120.326	71.7	-1.82	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Results
2484	53.6	478.74	55.42	-1.82	PASSED

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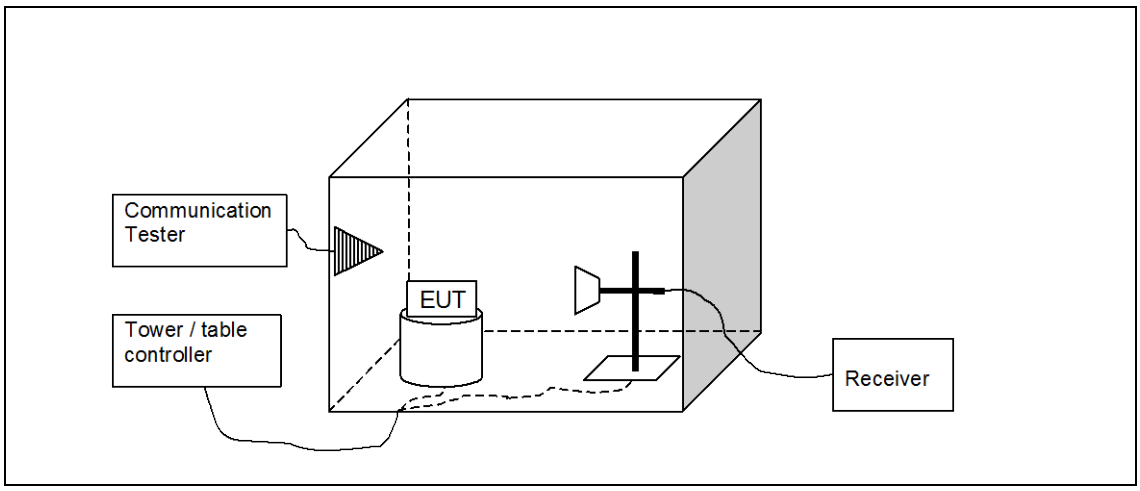
8. Spurious radiated emissions
(FCC 15.247(d), 15.209, RSS-210 A8.5)

EUT with DUT number	RM-1062, DUT 18732
Accessories with DUT numbers	BV-T4B, DUT 18733
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [ºC] / Humidity [%RH] / Air Pressure [kPa]	22 / 59 /102,8
Date of measurements	17-Nov-2014
Measured by	Jari Keto

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 is made up to 10th harmonic of the EUT highest TX channel.

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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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8.3. WLAN test results

8.3.1 802.11g, BPSK modulation, 6 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
37.432	24.93	17.64	31.53	-6.6	40	15.07	PASSED
39.136	26.27	20.583	33.87	-7.6	40	13.73	PASSED
40.689	31.77	38.77	40.37	-8.6	40	8.23	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
4881.2	49.38	294.442	50.58	-1.2	74	24.6	PASSED
7318.1	49.46	297.167	45.26	4.2	74	24.52	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
4881.2	31.82	38.994	33.02	-1.2	54	22.16	PASSED
7318.1	35.85	62.015	31.65	4.2	54	18.13	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
4822.4	58.44	835.603	59.74	-1.3	74	15.54	PASSED
7237.7	49	281.838	45.2	3.8	95	46.23	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
4822.4	41.45	118.168	42.75	-1.3	54	12.53	PASSED
7237.7	35.47	59.361	31.67	3.8	---	---	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]	Limit [dBµV/m]	Margin	Results
4923.4	52.11	403.181	53.21	-1.1	74	21.87	PASSED
7387.3	50.12	320.627	45.42	4.7	74	23.86	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
4923.4	36.93	70.226	38.03	-1.1	54	17.05	PASSED
7387.3	35.29	58.143	30.59	4.7	54	18.69	PASSED

8.3.2 802.11g, QPSK modulation, 12 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
35.638	25.78	19.454	31.28	-5.5	40	14.22	PASSED
40.683	31.58	37.931	40.18	-8.6	40	8.42	PASSED
40.689	31.46	37.411	40.06	-8.6	40	8.54	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
4881.2	45.49	188.148	46.69	-1.2	74	28.49	PASSED
7321.5	48.06	252.93	43.86	4.2	74	25.92	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
4881.2	30.92	35.156	32.12	-1.2	54	23.06	PASSED
7321.5	34.51	53.15	30.31	4.2	54	19.47	PASSED

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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
4823.5	56.27	650.879	57.57	-1.3	74	17.71	PASSED
7236.5	47.01	224.13	43.21	3.8	95	48.22	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
4823.5	38.9	88.105	40.2	-1.3	54	15.08	PASSED
7236.5	34.46	52.845	30.66	3.8	---	---	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
4922.1	51.43	372.821	52.63	-1.2	74	22.55	PASSED
7385.6	54.56	534.564	49.86	4.7	74	19.42	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
4922.1	36.97	70.55	38.17	-1.2	54	17.01	PASSED
7385.6	40.17	101.976	35.47	4.7	54	13.81	PASSED

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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

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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

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