

FCC Part 15C Compliance Test Report

Test Report no.:	FCC15CWLAN_RM-680_09.docx	Date of Report:	12-Apr-2011
Number of pages:	15	Customer's Contact person:	Juvani Jyrki
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FCC listing no.:	94436		
IC recognition no.:	661AK-1		
Tested devices/ accessories:	Phone RM-680 / AC charger AC-10E / Headset WH-701		
FCC ID:	LJPRM-680	IC:	661E-RM680
Supplement reports:	-		
Testing has been carried out in accordance with:	CFR 47, FCC rules Part 15 Subpart C, ANSI C63.4 (2003), Public Notice DA 00-705, DTS procedures KDB 558074, IC standards, RSS-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 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 Soderholm, Senior Engineer, EMC

1. Summary for FCC Part 15C Compliance Test Report

Date of receipt	24-Mar-2011
Testing completed	11-Apr-2011
The customer's contact person	Juvani Jyrki
Test Plan referred to	T:\Projects\RM-680\TestPlan\RS_testplan_RM-680.xls
Notes	-
Document name	T:\Projects\RM-680\EMC\FCC15CWLAN_RM-680_09.docx

1.1. EUT and Accessory Information

The EUT is a 9-band (GSM850/900/1800/1900) and WCDMA Band (I/II(1900)/IV(1700)/V(850)/VIII) mobile phone with GPRS, EGPRS, HSDPA, HSUPA and WLAN and Bluetooth. Bluetooth and WLAN are tested with maximum rated TX power.

Product	Type	SN	HW	MV	SW	DUT
Phone	RM-680	004402132933882	1122	-		42512
AC charger	AC-10E	3997910133012207808;0675408	-	-	-	42514
Headset	WH-701	069482302751A600121	-	-	-	42517

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	NP
15.247(d)	A8.5	Band edge compliance of RF emissions	PASSE
15.247(d)	A8.5	Spurious RF conducted emissions	NP
15.247(d), 15.209	A8.5	Spurious radiated emissions	PASSED
15.207	7.2.2	AC powerline conducted emissions	NP
15.247(a)(2)	A8.2 (a)	6dB(bandwidth)	NP
15.247(e)	A8.2 (b)	Power spectral density	NP

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.

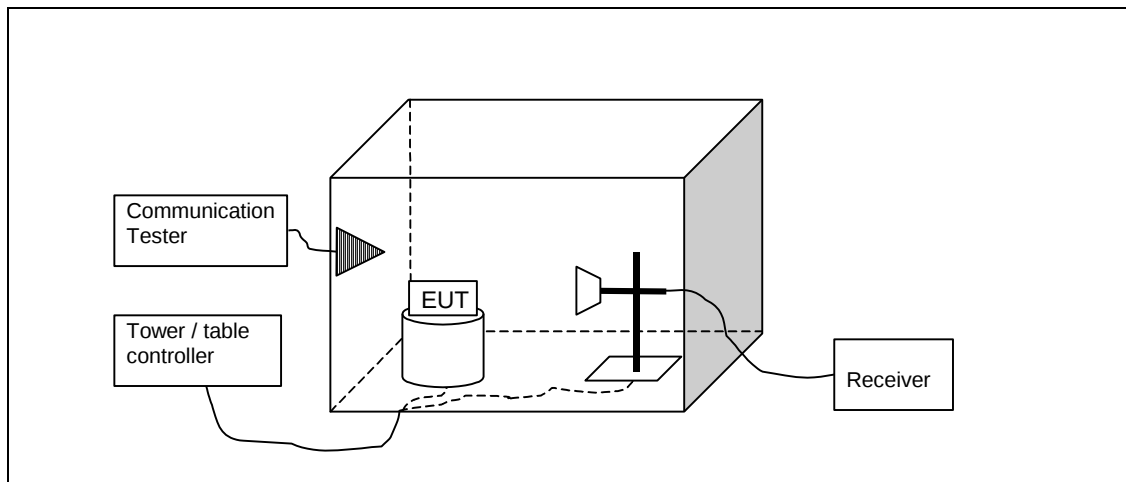
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2. Band edge compliance of RF emissions (FCC §15.247(d), RSS-210 A8.5)

EUT with DUT number	RM-680 DUT42512
Accessories with DUT numbers	AC-10E DUT42514, WH-701 DUT42517
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	24 / 45 / 100
Date of measurements	11-Apr-2011
Measured by	Hannu Söderholm

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

Frequency range [MHz]	Limit Average [dBμV/m]	Limit Peak [dBμV/m]
Below 2390 and above 2483.5	≤54	≤74

2.3. WLAN Test results

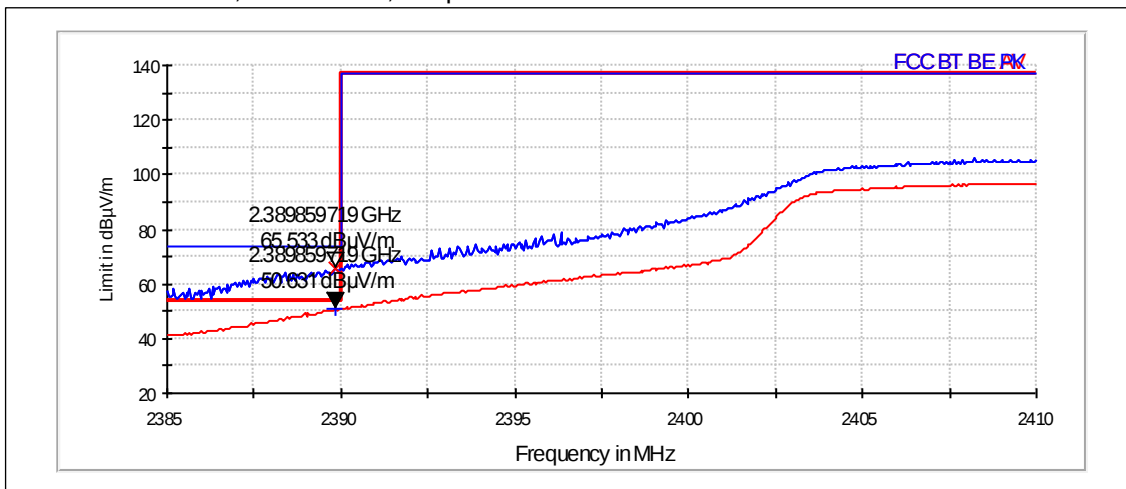
Average (RBW: 1 MHz, VBW: 1 MHz)

Channel / f_c [MHz]	E [dB μ V/m]	Result
1 / 2412 (802.11n HT20 MCS 0)	50.63	PASSED
11 / 2462 (802.11n HT20 MCS 0)	51.7	PASSED
1 / 2412 (DSSS, 11Mbps)	43.42	PASSED
11 / 2462 (DSSS, 11 Mbps)	48.49	PASSED
1 / 2412 (OFDM, 6 Mbps)	48.25	PASSED
11 / 2462 (OFDM, 6 Mbps)	49.73	PASSED

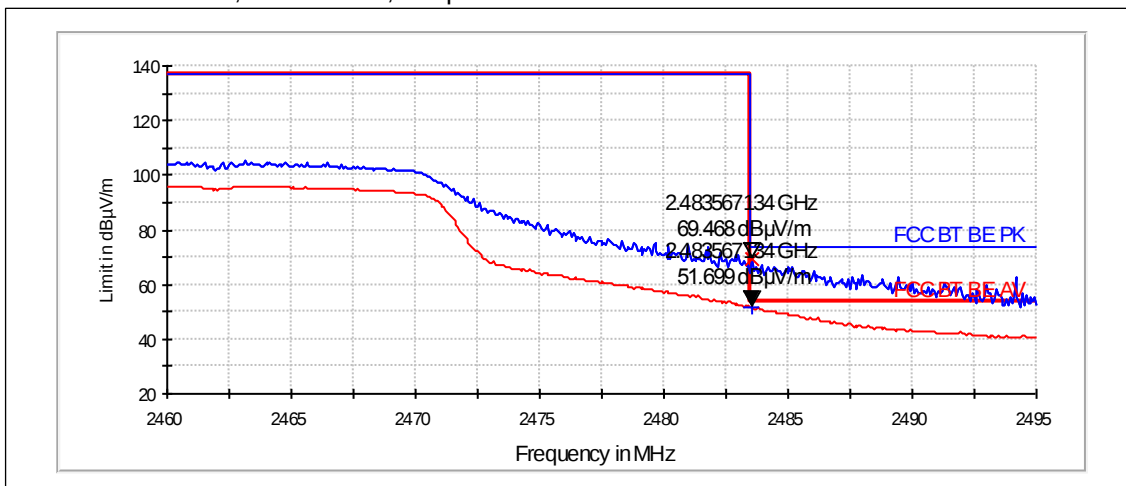
Peak (RBW: 1 MHz, VBW: 1 MHz)

Channel / f_c [MHz]	E [dB μ V/m]	Result
1 / 2412 (802.11n HT20 MCS 0)	65.53	PASSED
11 / 2462 (802.11n HT20 MCS 0)	69.47	PASSED
1 / 2412 (DSSS, 11Mbps)	53.19	PASSED
11 / 2462 (DSSS, 11 Mbps)	55.34	PASSED
1 / 2412 (OFDM, 6 Mbps)	65.58	PASSED
11 / 2462 (OFDM, 6 Mbps)	65.84	PASSED

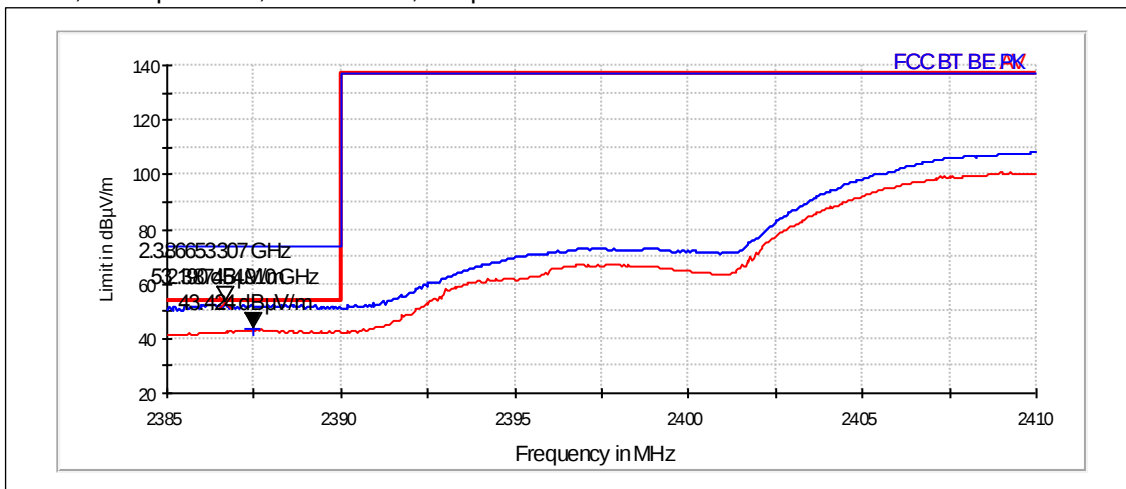
802.11n HT20 MCS 0, modulation, Mbps data rate. Channel 1 / 2412 MHz



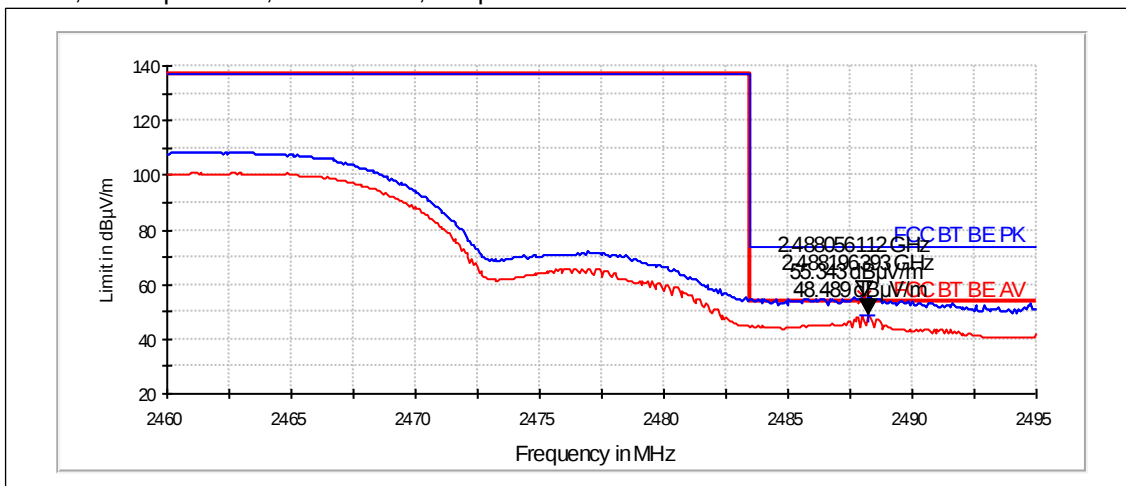
802.11n HT20 MCS 0, modulation, Mbps data rate. Channel 11 / 2462 MHz



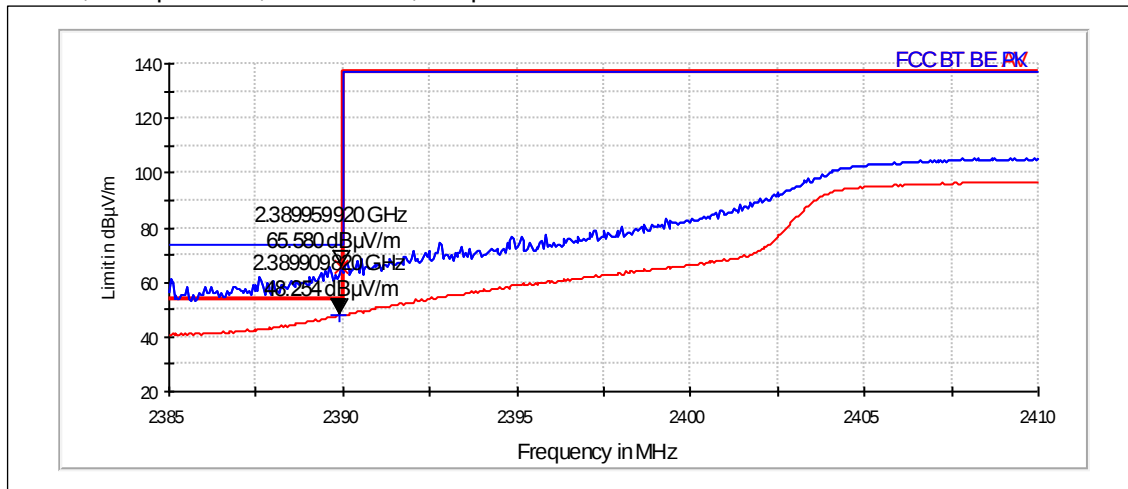
DSSS, 11Mbps mode, modulation, Mbps data rate. Channel 1 / 2412 MHz



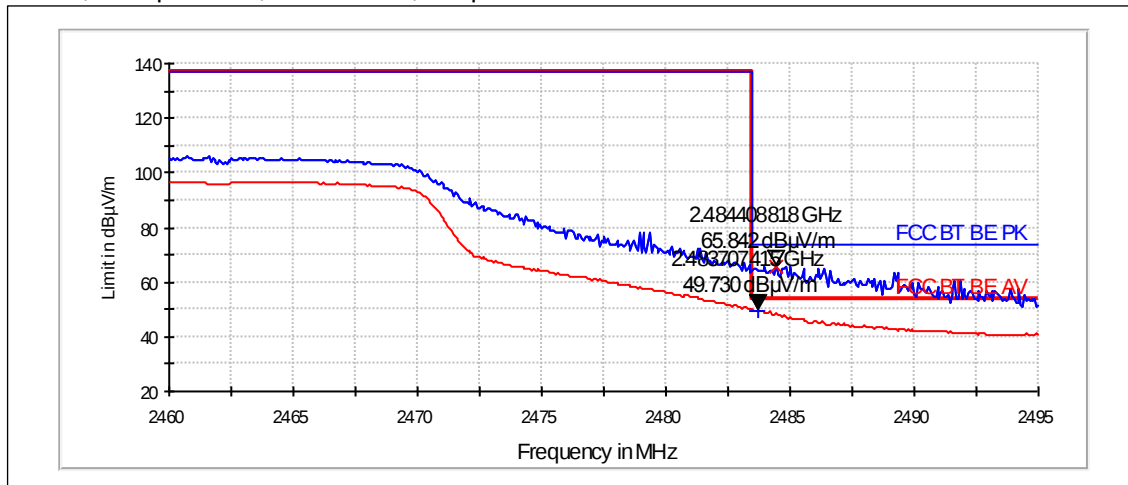
DSSS, 11 Mbps mode, modulation, Mbps data rate. Channel 11 / 2462 MHz



OFDM, 6 Mbps mode, modulation, Mbps data rate. Channel 1 / 2412 MHz



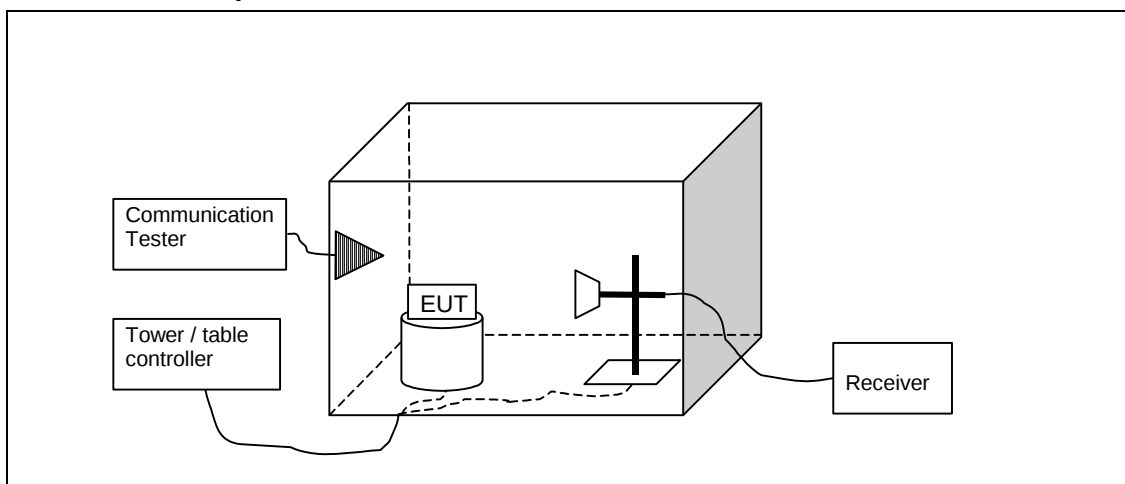
OFDM, 6 Mbps mode, modulation, Mbps data rate. Channel 11 / 2462 MHz



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

EUT with DUT number	RM-680, DUT 42512
Accessories with DUT numbers	AC-10E, DUT 42514 ; WH-701, DUT 42517
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	24 / 45 / 100
Date of measurements	01-Apr-2011 to 11-Apr-2011
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 as follows:

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

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

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

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

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

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

The measurement results are obtained as described below:

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

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

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

3.3. WLAN Test results

3.3.1 OFDM, 6Mbps

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]	Polarisation	Result
4822.2	40.95	111.519	43.58	-2.63	HORIZONTAL	PASSED
7235	44.05	159.313	42.91	1.14	VERTICAL	PASSED

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

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4822.2	27.61	24.002	30.24	-2.63	HORIZONTAL	PASSED
7235	30.72	34.34	29.58	1.14	VERTICAL	PASSED

Channel 7 / 2442 MHz

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

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
117.216	12.68	4.306	39.72	-27.04	VERTICAL	PASSED
117.924	32.32	41.295	59.36	-27.04	VERTICAL	PASSED
118.357	13.54	4.751	40.58	-27.04	VERTICAL	PASSED
118.888	13.59	4.781	40.63	-27.04	VERTICAL	PASSED
119.12	13.48	4.722	40.51	-27.03	VERTICAL	PASSED
119.62	13.04	4.485	40.07	-27.03	VERTICAL	PASSED
946.012	38.12	80.501	52.58	-14.46	HORIZONTAL	PASSED

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

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
3912.422	39.73	96.973	42.4	-2.67	VERTICAL	PASSED
3938.179	40.62	107.387	43.31	-2.69	HORIZONTAL	PASSED

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

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
3912.422	27.14	22.74	29.81	-2.67	VERTICAL	PASSED
3938.179	27.49	23.689	30.18	-2.69	HORIZONTAL	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]	Polarisation	Result
4925	42.63	135.301	44.52	-1.89	HORIZONTAL	PASSED
7388	44.07	159.772	42.53	1.54	HORIZONTAL	PASSED

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

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4925	29.43	29.604	31.32	-1.89	HORIZONTAL	PASSED
7388	31.24	36.484	29.7	1.54	HORIZONTAL	PASSED

3.4. WLAN Test results

3.4.1 DSSS, 11Mbps

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]	Polarisation	Result
4823.9	43.92	157.072	46.54	-2.62	VERTICAL	PASSED
7235.4	43.92	157	42.78	1.14	HORIZONTAL	PASSED

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

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4823.9	31.22	36.375	33.84	-2.62	VERTICAL	PASSED
7235.4	30.87	34.97	29.73	1.14	HORIZONTAL	PASSED

Channel 7 / 2442 MHz

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

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
114.673	10.23	3.246	37.31	-27.08	VERTICAL	PASSED
117.328	9.26	2.905	36.3	-27.04	VERTICAL	PASSED
118.495	12.59	4.262	39.63	-27.04	VERTICAL	PASSED
118.779	31.85	39.129	58.89	-27.04	VERTICAL	PASSED
118.897	13.04	4.485	40.08	-27.04	VERTICAL	PASSED
179.11	9.49	2.981	38.21	-28.72	VERTICAL	PASSED
945.962	37.85	78.055	52.31	-14.46	HORIZONTAL	PASSED

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

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
3924.349	40.37	104.388	43.03	-2.66	HORIZONTAL	PASSED
3944.187	40.47	105.609	43.17	-2.7	HORIZONTAL	PASSED

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

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
3924.349	27.68	24.202	30.34	-2.66	HORIZONTAL	PASSED
3944.187	27.73	24.344	30.43	-2.7	HORIZONTAL	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]	Polarisation	Result
4923.9	50.25	325.387	52.19	-1.94	HORIZONTAL	PASSED
7387.5	44.45	166.859	42.91	1.54	HORIZONTAL	PASSED

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

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4923.9	38.37	82.842	40.31	-1.94	HORIZONTAL	PASSED
7387.5	30.99	35.445	29.45	1.54	HORIZONTAL	PASSED

3.5. WLAN Test results

3.5.1 802.11n HT20 MCS 0

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]	Polarisation	Result
4825	40.64	107.659	43.39	-2.75	VERTICAL	PASSED
7236.5	43.87	156.135	42.73	1.14	VERTICAL	PASSED

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

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4825	27.58	23.944	30.33	-2.75	VERTICAL	PASSED
7236.5	31.01	35.502	29.87	1.14	VERTICAL	PASSED

Channel 7 / 2442 MHz

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

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
115.671	15.2	5.756	42.24	-27.04	VERTICAL	PASSED
117.412	13.19	4.565	40.23	-27.04	VERTICAL	PASSED
118.023	13.48	4.721	40.52	-27.04	VERTICAL	PASSED
118.215	12.8	4.366	39.84	-27.04	VERTICAL	PASSED
118.856	12.22	4.085	39.26	-27.04	VERTICAL	PASSED
946.012	38.61	85.202	53.07	-14.46	HORIZONTAL	PASSED
948.136	22.83	13.845	37.33	-14.5	HORIZONTAL	PASSED

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

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
3919.134	40.59	107.004	43.26	-2.67	HORIZONTAL	PASSED
3941.887	41.11	113.566	43.8	-2.69	VERTICAL	PASSED

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

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
3919.134	28.03	25.194	30.7	-2.67	HORIZONTAL	PASSED
3941.887	28.11	25.451	30.8	-2.69	VERTICAL	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]	Polarisation	Result
4925.2	42.86	138.963	44.75	-1.89	VERTICAL	PASSED
7386.4	44.14	161.12	42.61	1.53	VERTICAL	PASSED

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

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4925.2	29.42	29.567	31.31	-1.89	VERTICAL	PASSED
7386.4	31.06	35.744	29.53	1.53	VERTICAL	PASSED

4. Test Equipment

4.1. Conducted measurements

Eq. No	Equipment	Type	Manufacturer	Used in
TM38112	Power supply	6632A	Agilent	22/24/27, 15C
TM38631	Signal Generator	83640L	Agilent	22/24/27, 15C, 15B
OM06312	Signal Generator	E4422B	Agilent	22/24
TM37678	Communication Tester	CMU200	R&S	22/24/27, 15C, 15B
TM37773	Communication Tester	CMU200	R&S	22/24/27, 15C, 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
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
2058	Receiver	ESPC	R&S	15C, 15B
2001	Bluetooth tester	CBT	R&S	22/24/27, 15C, 15B
2002	Communication Tester	CMU200	R&S	22/24/27
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

4.2. Radiated measurements

Eq. No	Equipment	Type	Manufacturer	Used in
TM38114	Power supply	6632A	Agilent	22/24/27, 15C, 15B
TM38631	Signal Generator	83640L	Agilent	22/24/27, 15C, 15B
TM38323	Preamplifier	PA-02 18-26 GHz	EMC Automation	22/24/27, 15C, 15B
-	Antenna	BBHA 9120 D	Schwarzbeck	22/24/27, 15C
TM26497	Antenna	3115	Emco	22/24/27, 15C, 15B
TM37678	Communication Tester	CMU200	R&S	22/24/27, 15C, 15B
TM37773	Communication Tester	CMU200	R&S	22/24/27, 15C, 15B
TM38845	Receiver	ESIB 26	R&S	22/24/27, 15C, 15B
-	Antenna	HL562	R&S	22/24/27, 15C, 15B
-	Turntable	2188	EMCO	22/24/27, 15C, 15B
-	Turntable controller	2090	EMCO	22/24/27, 15C, 15B
-	RF system panel	TS-RSP	R&S	22/24/27, 15C, 15B
-	RF system panel	TS-RSP	R&S	22/24/27, 15C, 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
-	Air pressure sensor	0638-1835	Testo	22/24/27, 15C, 15B

Eq. No	Equipment	Type	Manufacturer	Used in
TM39180	Laser distance meter	Disto Pro	Leica	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 chambre	UNKNOWN	TDK	22/24/27, 15C, 15B
TM22638	Power supply	OL63743-901	-	22/24/27, 15C, 15B
TM38066	High pass filter	4HC3000/18000-3-KK	Trilithic	22/24/27, 15C, 15B
-	High pass filter	WHKX 1.6/15G-12SS	Wainwright	22/24/27, 15C, 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
-	Band reject filter	WRCG832/838-825/848-40/5SS	Wainwright	22
TM23892	Controller	G-1000SDX	Yaesu	22/24/27
2001	Bluetooth tester	CBT	R&S	22/24/27, 15C, 15B
6023	Antenna	VUBA 9117	Schwarzbeck	22/24/27, 15C