

FCC Part 15C Compliance Test Report

Test Report no.:	FCC15C_RM-695_18.docx	Date of Report:	05-Nov-2010
Number of pages:	16	Customer's Contact person:	Sonja Länkinen
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FCC listing no.:	94436		
IC recognition no.:	661AK-1		
Tested devices/ accessories:	Phone RM-659 / AC charger AC-10E, Headset WH-702		
FCC ID:	QMNRM-659	IC:	661X-RM659
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. 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:			

Jari Jantunen, System Manager, EMC

1. Summary for FCC Part 15C Compliance Test Report

Date of receipt	28-Oct-2010
Testing completed	04-Nov-2010
The customer's contact person	Sonja Länkinen
Test Plan referred to	T:\Projects\RM-659\TestPlan\RS_testplan_RM-659_CR_HW0410.xls
Notes	-
Document name	T:\Projects\RM-659\EMC\FCC15C_RM659_18.docx

1.1. EUT and Accessory Information

The EUT is a 7-band (GSM850/900/1800/1900 and WCDMA Band I/II(1900)/V(850)) mobile phone with GPRS, EGPRS, Bluetooth and WLAN. Bluetooth and WLAN are tested with maximum rated TX power.

Product	Type	SN	HW	MV	SW	DUT
Phone	RM-659	004402133031835	0410	-	011.518.01	42367
AC charger	AC-10E	3997918302050503855;0675408	-	-	-	14896
Headset	WH-702	06948940301Q2R00147	-	-	-	42373

1.1. 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	PASSED
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)	6 dB 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

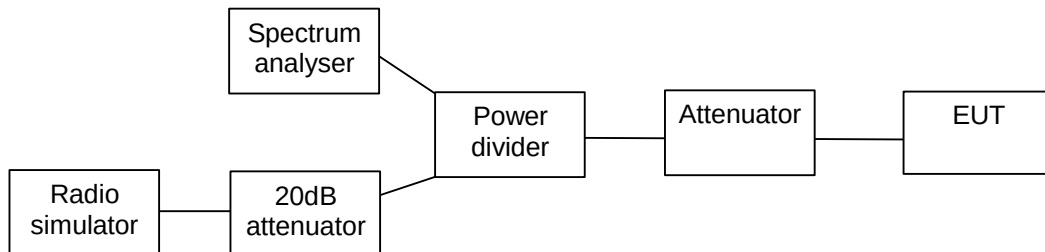
The test was not performed by the TCC Nokia Tampere Laboratory.

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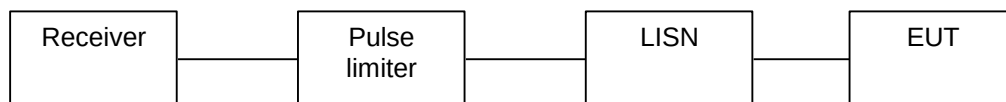
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2. Test setups

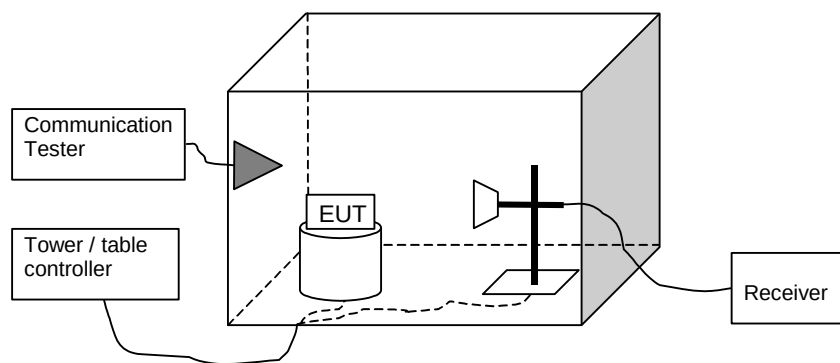
2.1. Conducted RF test setup



2.2. AC powerline conducted emissions test setup



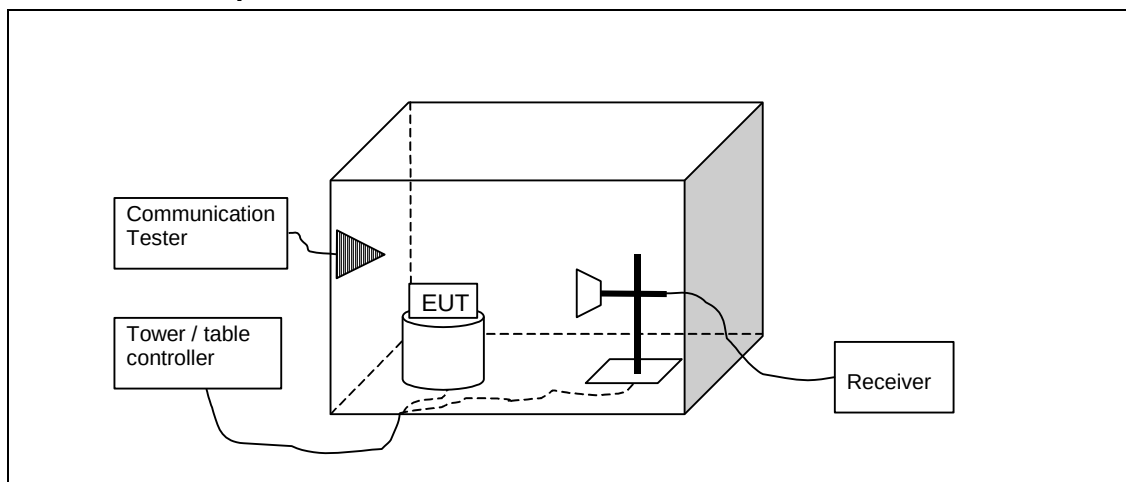
2.3. Radiated test setup



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

EUT with DUT number	RM-659 DUT 42367
Accessories with DUT numbers	AC-10E DUT 42405 ; WH-702 DUT 42373
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23 / 47 / 96.8
Date of measurements	04-Nov-2010
Measured by	Jari Jantunen

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.

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

3.2.1 OFDM mode, BPSK modulation, 6 Mbps data rate

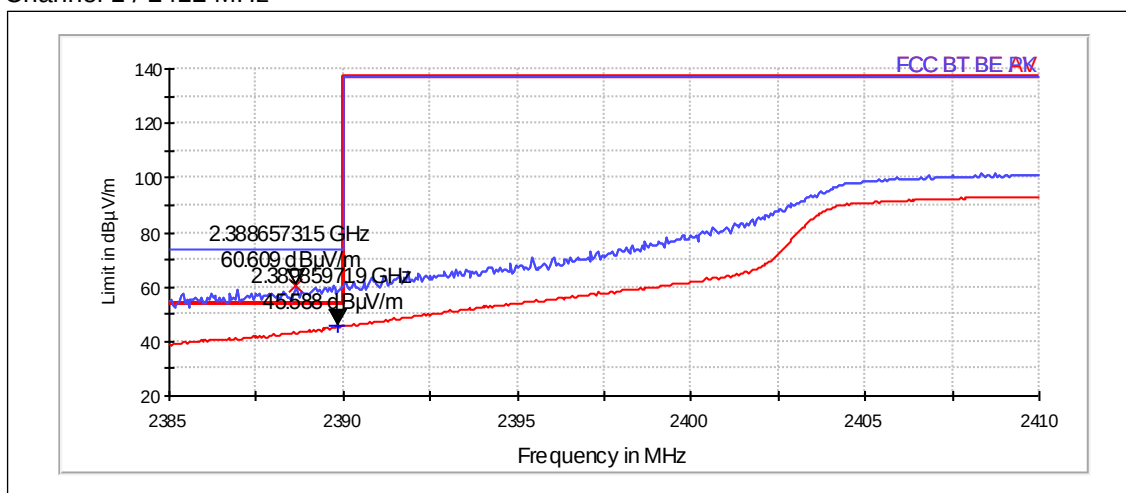
Average (RBW: 1 MHz, VBW: 1 MHz)

Channel / f_c [MHz]	E [dB μ V/m]	Result
1 / 2412	45.59	PASSED
11 / 2462	43.45	PASSED

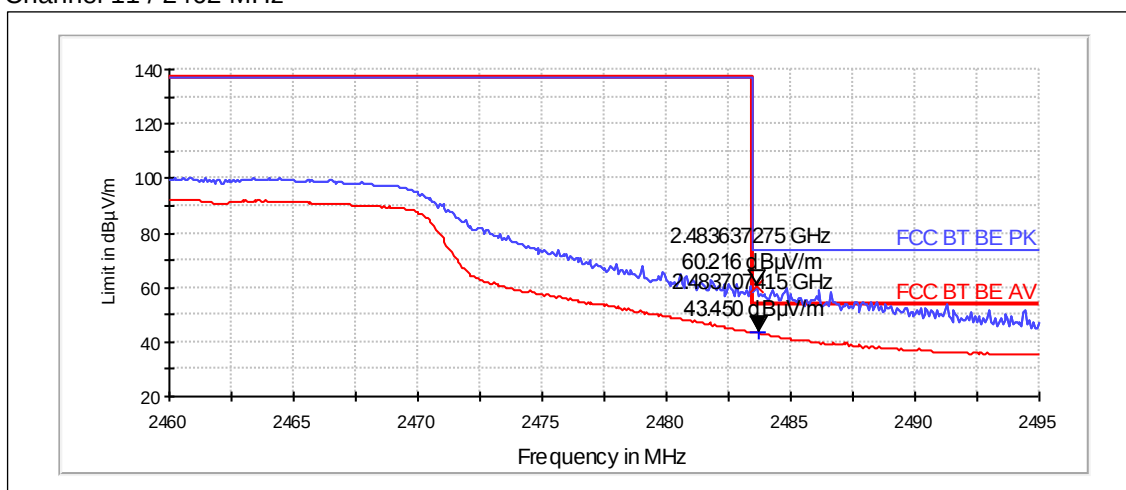
Peak (RBW: 1 MHz, VBW: 1 MHz)

Channel / f_c [MHz]	E [dB μ V/m]	Result
1 / 2412	60.61	PASSED
11 / 2462	60.22	PASSED

Channel 1 / 2412 MHz



Channel 11 / 2462 MHz



3.2.2 DSSS mode, QPSK modulation, 11 Mbps data rate

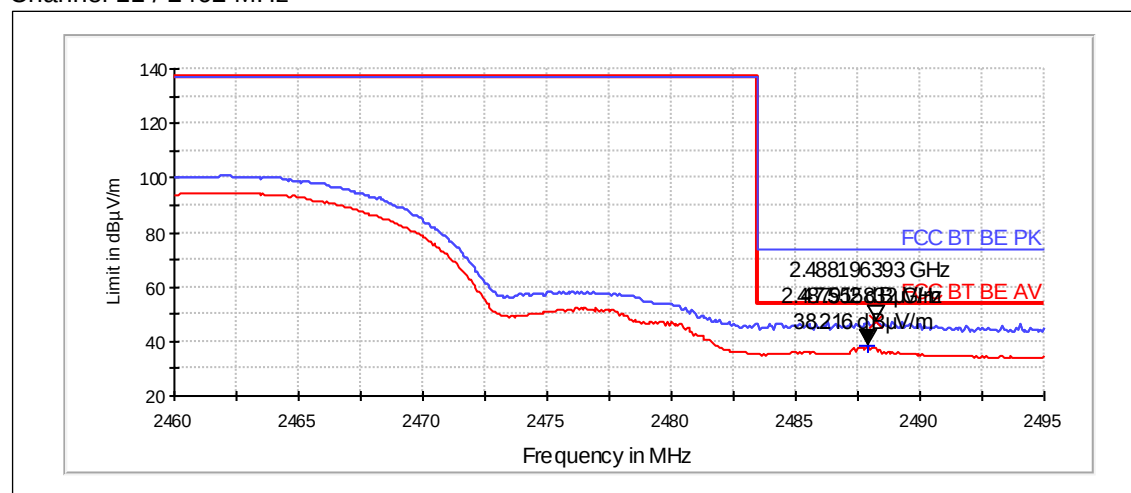
Average (RBW: 1 MHz, VBW: 1 MHz)

Channel / f_c [MHz]	E [dB μ V/m]	Result
11 / 2462	38.22	PASSED
1 / 2412	34.49	PASSED

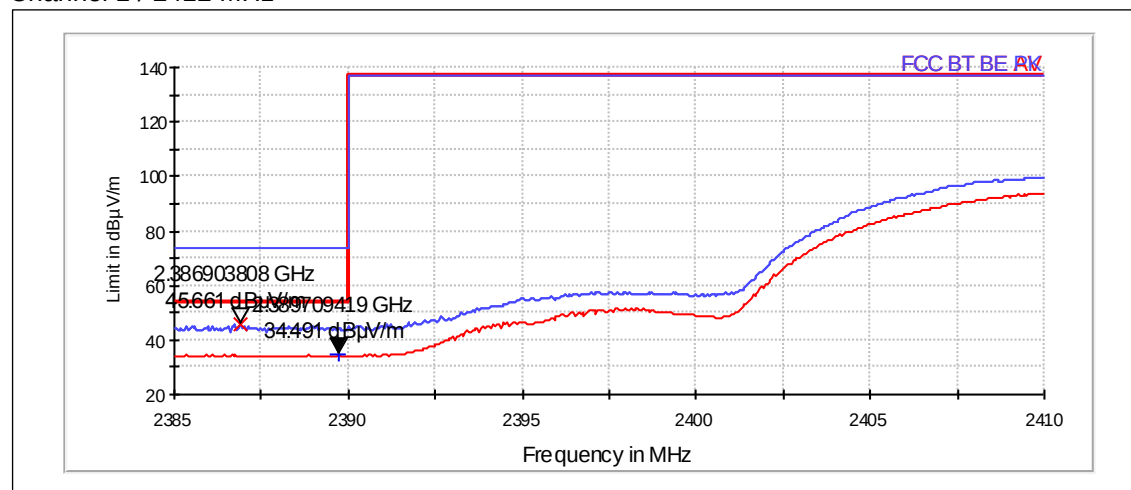
Peak (RBW: 1 MHz, VBW: 1 MHz)

Channel / f_c [MHz]	E [dB μ V/m]	Result
11 / 2462	47.55	PASSED
1 / 2412	45.66	PASSED

Channel 11 / 2462 MHz



Channel 1 / 2412 MHz



3.2.3 802.11n HT20 MCS 0

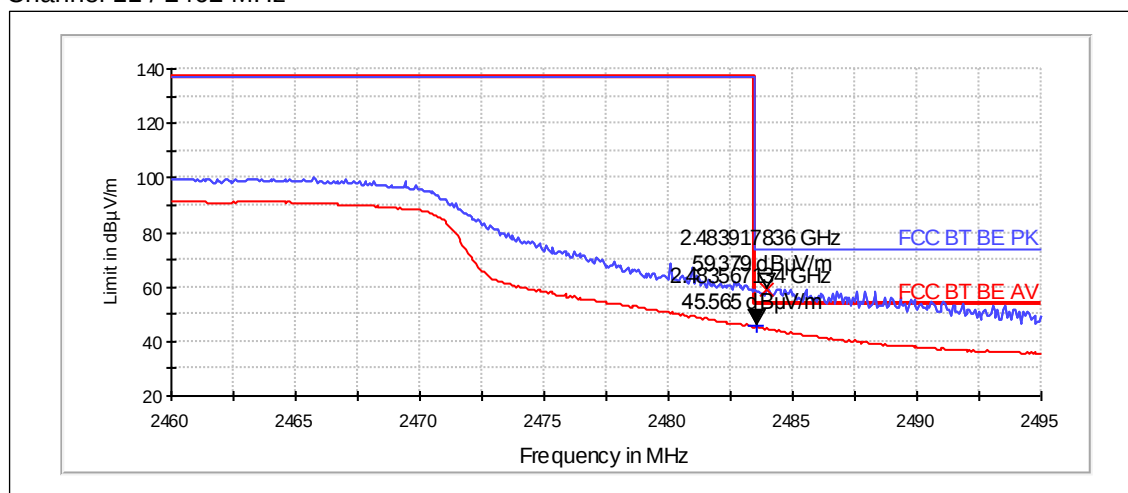
Average (RBW: 1 MHz, VBW: 1 MHz)

Channel / f_c [MHz]	E [dB μ V/m]	Result
11 / 2462	45.57	PASSED
1 / 2412	45.34	PASSED

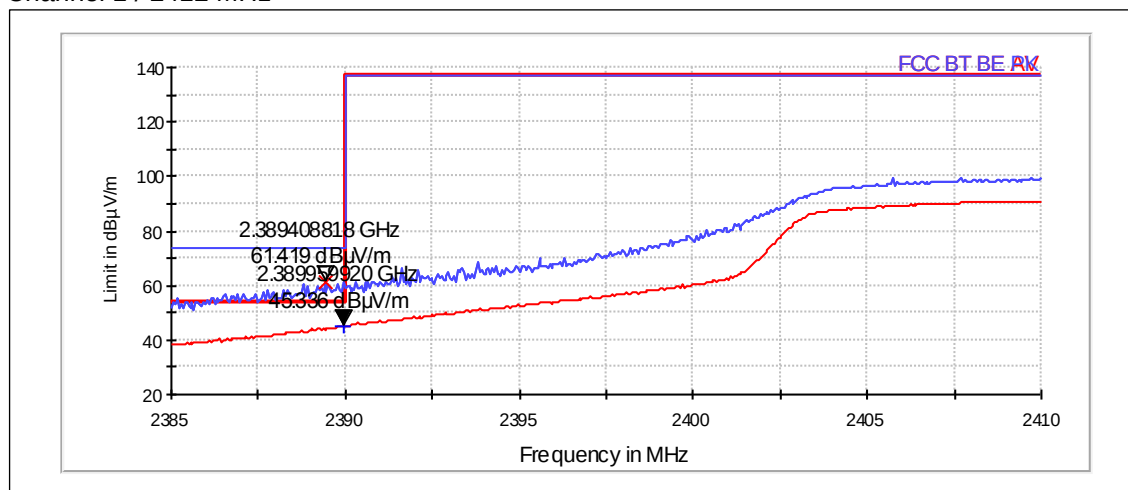
Peak (RBW: 1 MHz, VBW: 1 MHz)

Channel / f_c [MHz]	E [dB μ V/m]	Result
11 / 2462	59.38	PASSED
1 / 2412	61.42	PASSED

Channel 11 / 2462 MHz



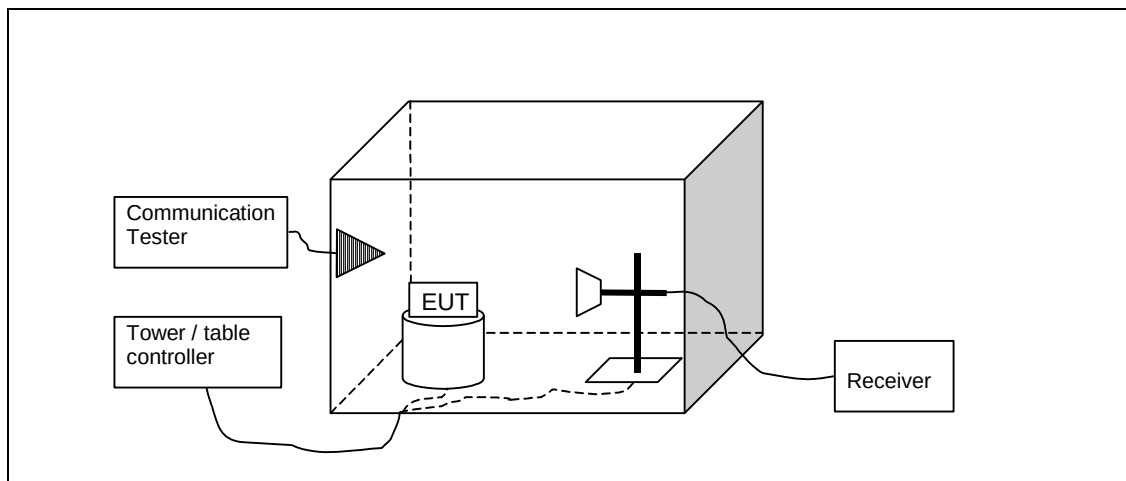
Channel 1 / 2412 MHz



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

EUT with DUT number	RM-659 DUT 42367
Accessories with DUT numbers	AC-10E DUT 42405 ; WH-702 DUT 42373
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23 / 47 / 96.5
Date of measurements	03-Nov-2010
Measured by	Jari Jantunen

4.1.1 Test Setup



4.2. 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

4.3. WLAN Test results

4.3.1 OFDM mode, BPSK modulation, 6 Mbps data rate

TX mode, channel 1 / 2412 MHz

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

Frequency [MHz]	E[dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4823.6	27.46	16.71	30.07	-2.61	HORIZONTAL	PASSED
7234.7	30.75	34.47	29.62	1.13	VERTICAL	PASSED

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

Frequency [MHz]	E[dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4823.6	40.64	107.65	43.25	-2.61	HORIZONTAL	PASSED
7234.7	44.00	158.49	42.87	1.13	VERTICAL	PASSED

TX mode, channel 7 / 2442 MHz

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

Frequency [MHz]	E[dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
3915.329	27.59	23.96	30.24	-2.65	HORIZONTAL	PASSED
3938.178	27.52	23.77	30.2	-2.68	VERTICAL	PASSED
17839.275	46.68	215.77	26.94	19.74	VERTICAL	PASSED

QuasiPeak(RBW: 120 kHz)

Frequency [MHz]	E[dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
30.18	29.17	28.74	50.69	-21.52	VERTICAL	PASSED
30.72	28.37	26.21	50.14	-21.77	VERTICAL	PASSED
30.78	28.28	25.94	50.08	-21.8	VERTICAL	PASSED
30.9	22.4	13.18	52.83	-21.93	VERTICAL	PASSED

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

Frequency [MHz]	E[dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
3915.329	40.2	102.33	42.85	-2.65	HORIZONTAL	PASSED
3938.178	40.97	111.81	43.65	-2.68	VERTICAL	PASSED
17839.275	59.25	917.28	39.51	19.74	VERTICAL	PASSED

TX mode, channel 11 / 2462 MHz

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

Frequency [MHz]	E[dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4925.5	29.15	28.67	31.04	-1.89	HORIZONTAL	PASSED
7387	30.77	34.55	29.24	1.53	VERTICAL	PASSED

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

Frequency [MHz]	E[dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4925.5	42.29	130.17	44.18	-1.89	HORIZONTAL	PASSED
7387	44.15	161.25	42.62	1.53	VERTICAL	PASSED

4.3.2 DSSS mode, QPSK modulation, 11 Mbps data rate

TX mode, channel 1 / 2412 MHz

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

Frequency [MHz]	E[dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4823.8	28.11	25.44	30.72	-2.61	HORIZONTAL	PASSED
7234.7	30.81	34.71	29.68	1.13	VERTICAL	PASSED

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

Frequency [MHz]	E[dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4823.8	41.30	116.14	43.91	-2.61	HORIZONTAL	PASSED
7234.7	43.50	149.62	42.37	1.13	VERTICAL	PASSED

TX mode, channel 7 / 2442 MHz

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

Frequency [MHz]	E[dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
3915.429	27.36	23.33	30.02	-2.66	VERTICAL	PASSED
17838.073	46.65	215.03	26.85	19.8	VERTICAL	PASSED

QuasiPeak(RBW: 120 kHz)

Frequency [MHz]	E[dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
30.18	22.45	13.26	43.97	-21.52	VERTICAL	PASSED
30.24	28.81	27.57	50.52	-21.71	VERTICAL	PASSED
30.532	25.79	19.48	47.50	-21.71	VERTICAL	PASSED

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

Frequency [MHz]	E[dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
3915.429	40.33	103.87	42.99	-2.66	VERTICAL	PASSED
17838.073	59.6	954.99	39.8	19.8	VERTICAL	PASSED

Channel 11 / 2462 MHz

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

Frequency [MHz]	E[dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4923.8	29.38	29.44	31.3	-1.92	HORIZONTAL	PASSED
7386.5	30.83	34.79	29.3	1.53	HORIZONTAL	PASSED

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

Frequency [MHz]	E[dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
4923.8	42.38	131.52	44.3	-1.92	HORIZONTAL	PASSED
7386.5	43.76	154.17	42.23	1.53	HORIZONTAL	PASSED

4.3.3 802.11n 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
4823	40.11	101.309	42.74	-2.63	HORIZONTAL	PASSED
7235.1	43.62	151.705	42.48	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
4823	27.24	23.025	29.87	-2.63	HORIZONTAL	PASSED
7235.1	30.56	33.74	29.42	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
30.06	28.7	27.218	50.22	-21.52	VERTICAL	PASSED
30.54	19.45	9.391	41.16	-21.71	VERTICAL	PASSED
30.57	28.15	25.551	49.87	-21.72	VERTICAL	PASSED
30.78	27.55	23.84	49.35	-21.8	VERTICAL	PASSED
35.029	28.41	26.345	51.83	-23.42	VERTICAL	PASSED

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

Frequency [MHz]	E [dBμV/m]	E [μV/m]	U _{RX} [dBμV]	A _{TOT} [dB]	Polarisation	Result
2495.311	50.63	339.977	55.99	-5.36	HORIZONTAL	PASSED
3921.843	40.2	102.341	42.87	-2.67	HORIZONTAL	PASSED
17904.406	59.85	983.105	40.17	19.68	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
2495.311	34.02	50.217	39.38	-5.36	HORIZONTAL	PASSED
3921.843	27.45	23.567	30.12	-2.67	HORIZONTAL	PASSED
17904.406	46.29	206.253	26.61	19.68	VERTICAL	PASSED

Channel 11 / 2462 MHz

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

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Polarisation	Result
4926	42.02	126.168	43.92	-1.9	HORIZONTAL	PASSED
7384.1	43.24	145.194	41.72	1.52	HORIZONTAL	PASSED

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

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Polarisation	Result
4926	28.99	28.155	30.89	-1.9	HORIZONTAL	PASSED
7384.1	30.68	34.21	29.16	1.52	HORIZONTAL	PASSED

5. Test Equipment

5.1. 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 μ H	ESH3-Z5	R&S	15C, 15B
TM26491	LISN 50 μ H	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 μ H	ENV216	R&S	15C, 15B
2010	LISN 50 μ H	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

5.2. 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
TM26500	Turntable	DS412	Deisel	22/24/27, 15C, 15B
TM30642	Mast/turntable controller	HD-100	Deisel	22/24/27, 15C, 15B
TM38990	Remote switching module	RSM1	EMC Automation	22/24/27, 15C, 15B
TM38341	System interface	SI-300	EMC Automation	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	Controller	2090	Emco	22/24/27, 15C, 15B
TM39158	Antenna	3116	Emco	22/24/27, 15C, 15B
TM30643	LISN 50 μ H	LISN-5-20-2	FCC	22/24/27, 15C, 15B
TM30644	LISN 50 μ H	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

Eq. No	Equipment	Type	Manufacturer	Used in
-	Air pressure sensor	0638-1835	Testo	22/24/27, 15C, 15B
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
-	Preamplifier	AFS4-00100300-20-23P6	Miteq	15C
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	Torqueleader	22/24/27, 15C, 15B
TM38066	High pass filter	4HC3000/18000-3-KK	Trilithic	22/24/27, 15C, 15B
TM26511	Tunable notch filter	WRCA870/	Wainwright	27
TM38215	Band reject filter	WRCD 1920/1980-1918/1982-40/20	Wainwright UMTS	27
TM38214	Band reject filter	WRCT 2402/2480-2400/2483.5-30/	Wainwright ISM	15C
-	Band reject filter	WRCG1877/1883-1870/1890-40/6EE	Wainwright	27
-	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	27
TM23892	Controller	G-1000SDX	Yaesu	22/24/27
2001	Bluetooth tester	CBT	R&S	22/24/27, 15C, 15B
-	Antenna	SBA 9113	Schwarzbeck	22/24/27
6023	Antenna	VUBA 9117	Schwarzbeck	22/24/27, 15C