

FCC Part 15C Compliance Test Report

Test Report no.:	FCC15CWLANg_RM-835_15.docx	Date of Report:	20-Feb-2012
Number of pages:	16	Customer's Contact person:	Hu Dongji
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FCC listing no.:	94436		
IC recognition no.:	661AK-1		
Tested devices/ accessories:	Phone RM-835 / Battery BP-3L / Charger AC-50E / Data cable CA-190CD		
FCC ID:	QTLRM-835	IC:	661AB-RM835
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:			

Jari Jantunen, System Manager, EMC

1. Summary for FCC Part 15C Compliance Test Report

Date of receipt	06-Feb-2012
Testing completed	15-Feb-2012
The customer's contact person	Hu Dongji
Test Plan referred to	T:\Projects\RM-835\TestPlan\RS_testplan_RM-835.xls
Notes	-
Document name	T:\Projects\RM-835\EMC\FCC15CWLANg_RM-835_15.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, modulated with pseudo random bit sequence (PRBS9).

Devices under tests

Product	Type	SN	HW	MV	SW	DUT
Phone	RM-835	004402136881475;059N247	2011	-	1052.0000.8741.12030_33.GCF	42780
Battery	BP-3L	4955501503210101255	-	-	-	42766
Charger	AC-50E	4090492023260400093	-	-	-	42768
Data cable	CA-190CD	-	-	-	-	42770

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), 15.205(b)	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)	6dB(bandwidth)	NP
15.247(e)	A8.2 (b)	Power spectral density	NP

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.

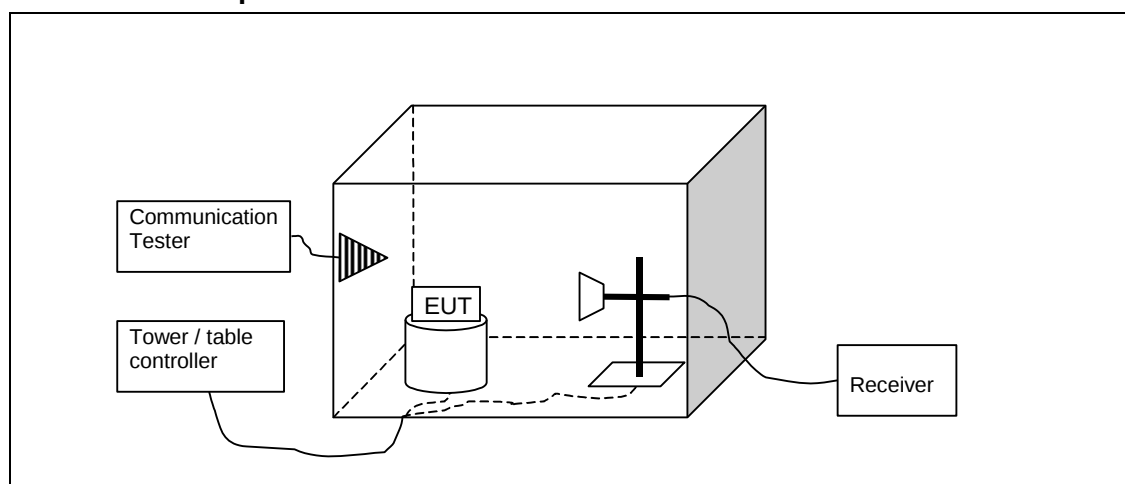
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2. Band edge compliance of RF emissions (FCC §15.247(d), 15.205(b), RSS-210 A8.5)

EUT with DUT number	RM-835, DUT 42780
Accessories with DUT numbers	BP-3L, DUT 42766 ; AC-50E, DUT 42768 ; CA-190CD, DUT 42770
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	25 / 54 / 100.2
Date of measurements	15-Feb-2012
Measured by	Timo Raiskio

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. WLANg Test results

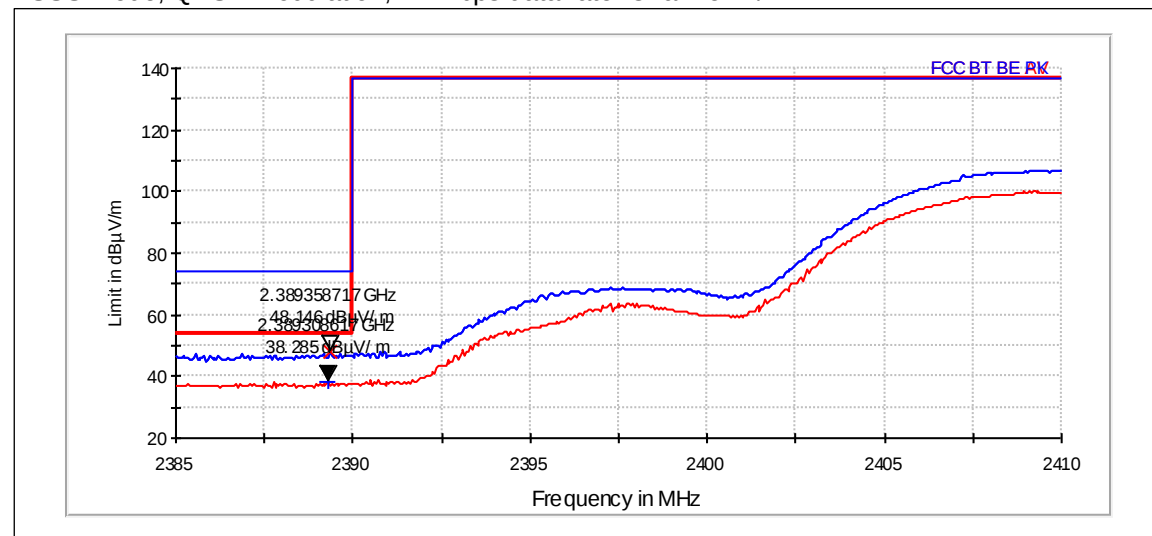
Average (RBW: 1 MHz, VBW: 1 MHz)

Channel / f_c [MHz]	E [dB μ V/m]	Result
1 / 2412 (DSSS,QPSK,11)	38.29	PASSED
11 / 2462 (DSSS,QPSK,11)	37.47	PASSED
1 / 2412 (OFDM, BPSK, 6)	52.93	PASSED
11 / 2462 (OFDM, BPSK, 6)	51.4	PASSED
1 / 2412 (802.11n, HT20, MCS0)	49.33	PASSED
11 / 2462 (802.11n, HT20, MCS0)	46.19	PASSED

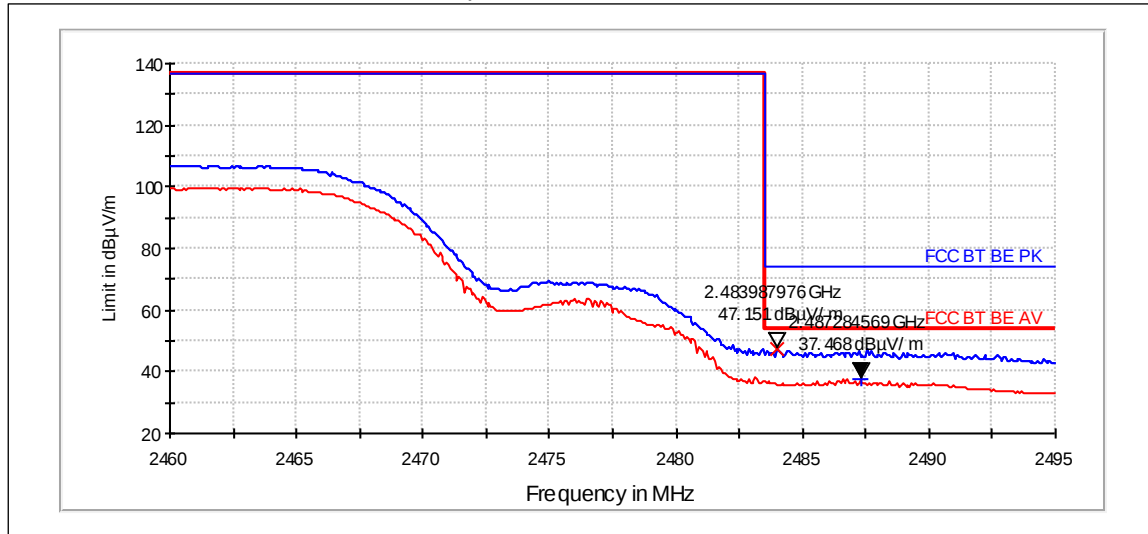
Peak (RBW: 1 MHz, VBW: 1 MHz)

Channel / f_c [MHz]	E [dB μ V/m]	Result
1 / 2412 (DSSS,QPSK,11)	48.15	PASSED
11 / 2462 (DSSS,QPSK,11)	47.15	PASSED
1 / 2412 (OFDM, BPSK, 6)	68.05	PASSED
11 / 2462 (OFDM, BPSK, 6)	66.27	PASSED
1 / 2412 (802.11n, HT20, MCS0)	66.75	PASSED
11 / 2462 (802.11n, HT20, MCS0)	62.58	PASSED

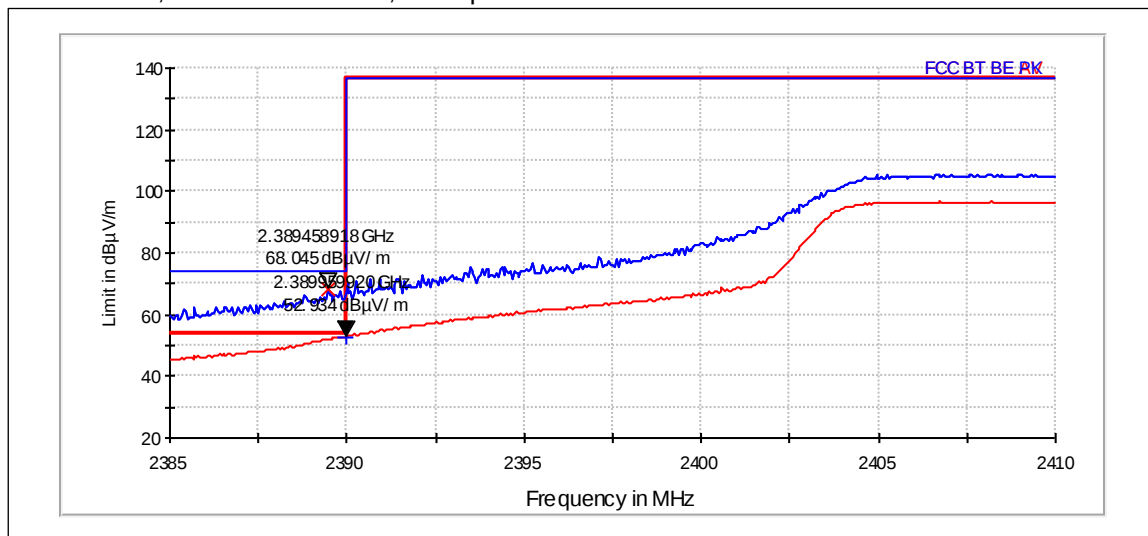
DSSS mode, QPSK modulation, 11 Mbps data rate. Channel 1 / 2412 MHz



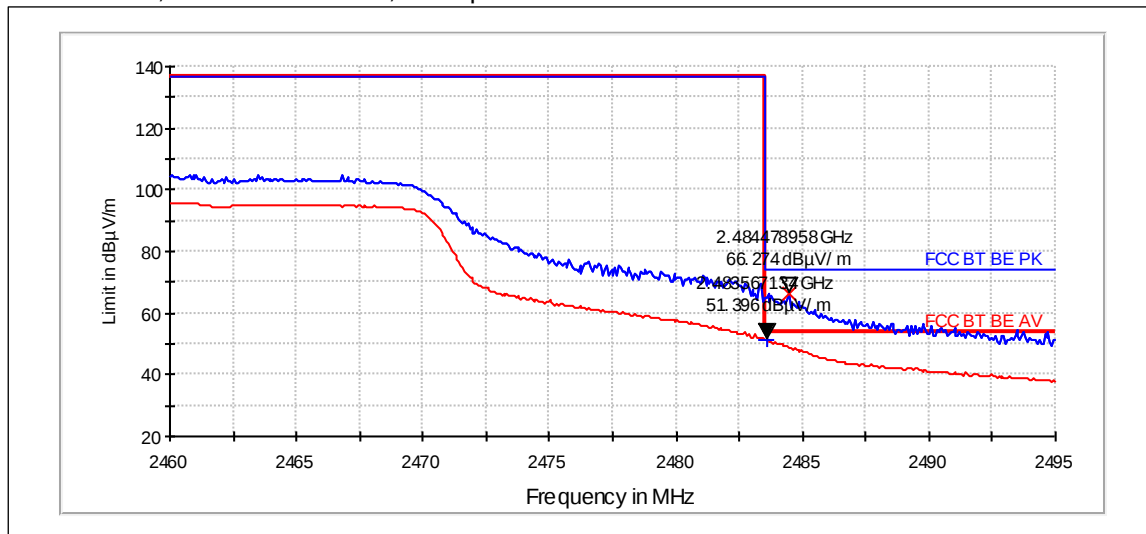
DSSS mode, QPSK modulation, 11 Mbps data rate. Channel 11 / 2462 MHz



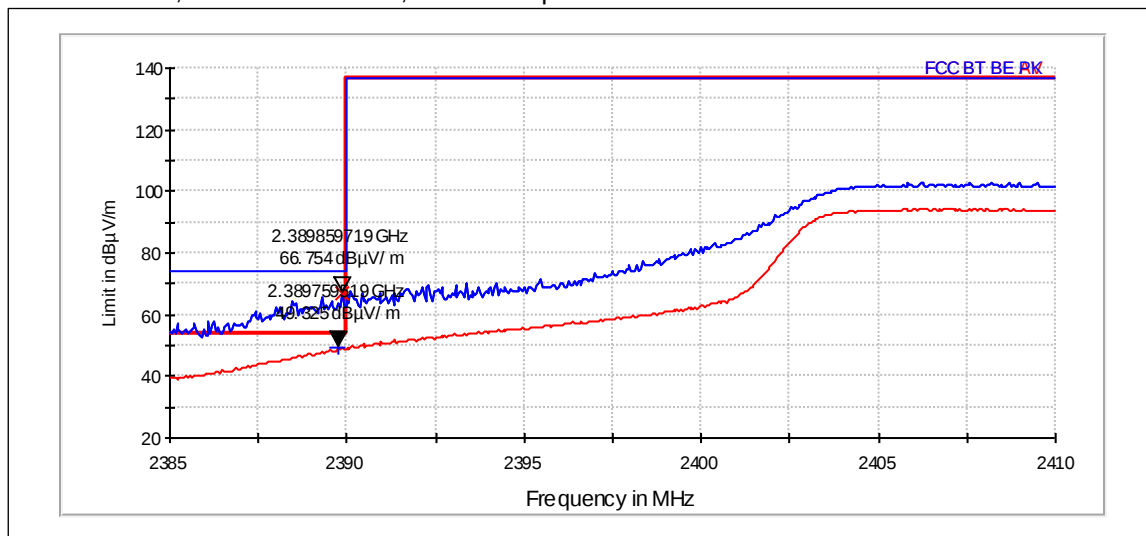
OFDM mode, BPSK modulation, 6 Mbps data rate. Channel 1 / 2412 MHz



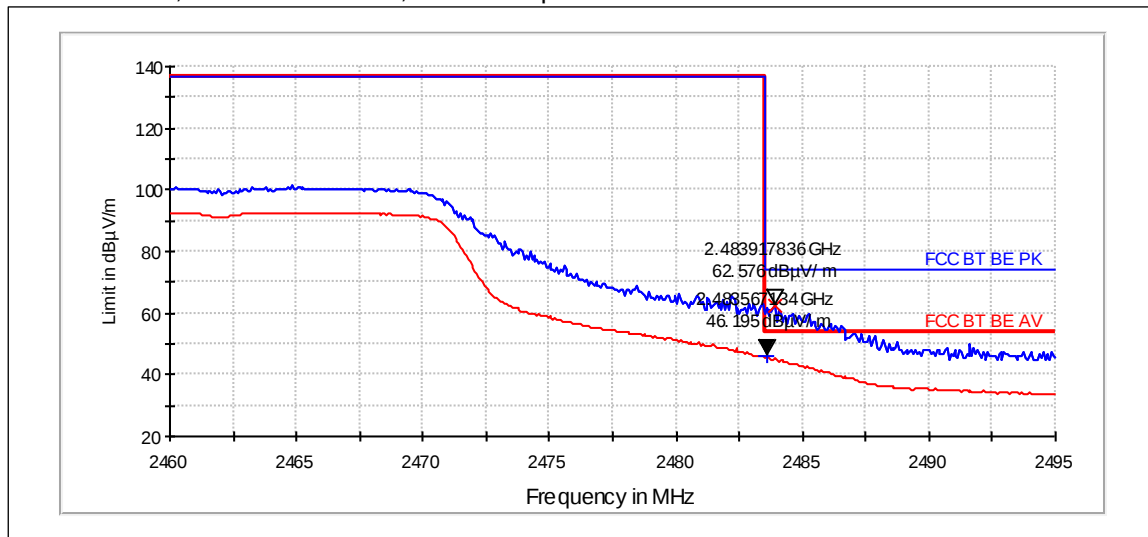
OFDM mode, BPSK modulation, 6 Mbps data rate. Channel 11 / 2462 MHz



802.11n mode, HT20 modulation, MCS0 Mbps data rate. Channel 1 / 2412 MHz



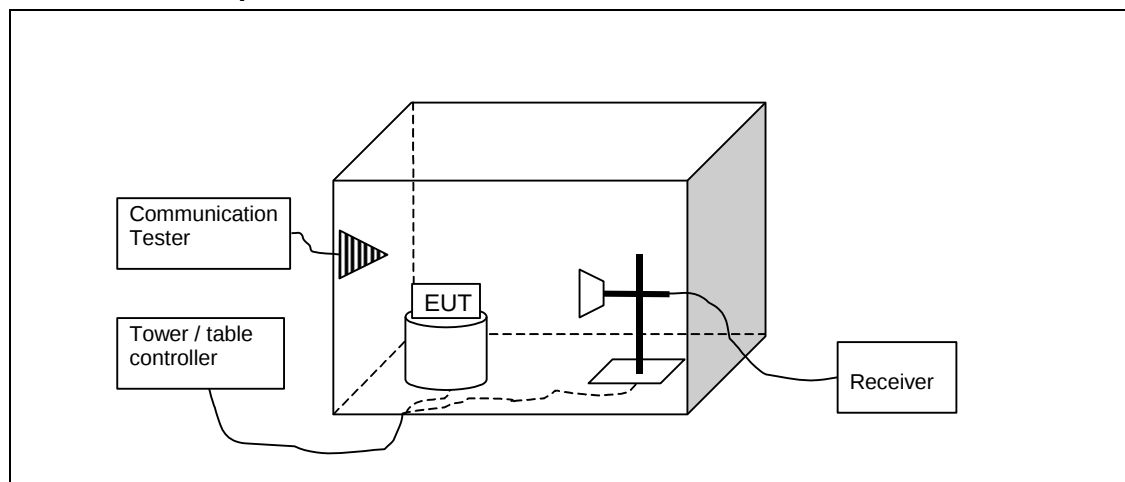
802.11n mode, HT20 modulation, MCS0 Mbps data rate. Channel 11 / 2462 MHz



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

EUT with DUT number	RM-835, DUT 42780
Accessories with DUT numbers	BP-3L, DUT 42766 ; AC-50E, DUT 42768 ; CA-190CD, DUT 42770
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	25 / 54 / 100.2
Date of measurements	15-Feb-2012
Measured by	Timo Raiskio

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:

$$E [\mu V/m] = U_R X + A_{TO} T$$

Where $U_R X$ is receiver reading and $A_{TO} T$ is total correction factor including cable loss, antenna factor and preamplifier gain ($A_{TO} T = L_{CABLE} S + A^F - G_{PREAMP}$).

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

Frequency range [MHz]	Limit [$\mu\text{V/m}$]	Limit [dB $\mu\text{V/m}$]	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 DSSS, 11Mbps, QPSK

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
4824.7	41.42	117.761	43.63	-2.21	VERTICAL	PASSED
7234.4	43.47	149.039	41.82	1.65	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
4824.7	28.38	26.254	30.59	-2.21	VERTICAL	PASSED
7234.4	30.84	34.834	29.19	1.65	VERTICAL	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]	Polarisation	Result
33.94	22.39	13.164	45.38	-22.99	VERTICAL	PASSED
33.986	22.69	13.632	45.7	-23.01	VERTICAL	PASSED
872.475	32.56	42.467	47.96	-15.4	HORIZONTAL	PASSED
909.306	21.56	11.97	37.16	-15.6	VERTICAL	PASSED
946.052	30.4	33.117	44.97	-14.57	HORIZONTAL	PASSED
950.23	26	19.95	40.69	-14.69	HORIZONTAL	PASSED
956.002	32.59	42.584	47.23	-14.64	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
3912.325	39.48	94.211	42.84	-3.36	HORIZONTAL	PASSED
3941.381	39.81	97.803	42.97	-3.16	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
3912.325	26.28	20.609	29.64	-3.36	HORIZONTAL	PASSED
3941.381	26.59	21.348	29.75	-3.16	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
4925.9	41.31	116.292	43.63	-2.32	HORIZONTAL	PASSED
7385.3	43.83	155.418	41.81	2.02	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
4925.9	28.47	26.509	30.79	-2.32	HORIZONTAL	PASSED
7385.3	30.97	35.355	28.95	2.02	VERTICAL	PASSED

3.3.2 OFDM, 6Mbps, BPSK

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
4824	47.45	235.695	49.63	-2.18	VERTICAL	PASSED
7237.9	43.72	153.479	42.06	1.66	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
4824	34.39	52.42	36.57	-2.18	VERTICAL	PASSED
7237.9	31.1	35.9	29.44	1.66	VERTICAL	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]	Polarisation	Result
37.118	17.79	7.757	42.01	-24.22	VERTICAL	PASSED
42.358	12.77	4.35	39.13	-26.36	VERTICAL	PASSED
42.367	12.49	4.212	38.86	-26.37	VERTICAL	PASSED
46.051	9.85	3.107	38.01	-28.16	VERTICAL	PASSED
46.915	10.32	3.28	39.02	-28.7	VERTICAL	PASSED
47.92	10.07	3.187	39.4	-29.33	VERTICAL	PASSED
52.096	8.74	2.737	40.9	-32.16	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
3904.607	39.57	95.17	42.84	-3.27	VERTICAL	PASSED
4874.048	47.02	224.285	49.06	-2.04	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
3904.607	26.51	21.169	29.78	-3.27	VERTICAL	PASSED
4874.048	34.17	51.098	36.21	-2.04	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
4924	48.23	257.78	50.49	-2.26	VERTICAL	PASSED
7385.2	44.07	159.772	42.07	2	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
4924	35.28	58.043	37.54	-2.26	VERTICAL	PASSED
7385.2	31.01	35.526	29.01	2	HORIZONTAL	PASSED

3.3.3 802.11n, HT20, MCS0

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
4823.6	43.52	149.934	45.7	-2.18	VERTICAL	PASSED
7237.1	43.47	149.039	41.82	1.65	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
4823.6	30.07	31.879	32.25	-2.18	VERTICAL	PASSED
7237.1	30.88	35.011	29.23	1.65	VERTICAL	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]	Polarisation	Result
33.481	22.57	13.443	45.39	-22.82	VERTICAL	PASSED
33.516	22.79	13.783	45.62	-22.83	VERTICAL	PASSED
33.568	22.65	13.572	45.5	-22.85	VERTICAL	PASSED
33.577	22.49	13.315	45.34	-22.85	VERTICAL	PASSED
34.125	22.3	13.033	45.36	-23.06	VERTICAL	PASSED
872.475	31.39	37.094	46.79	-15.4	HORIZONTAL	PASSED
956.002	32.5	42.15	47.14	-14.64	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
3923.449	39.2	91.17	42.59	-3.39	HORIZONTAL	PASSED
3930.46	39.48	94.178	42.71	-3.23	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
3923.449	26.23	20.49	29.62	-3.39	HORIZONTAL	PASSED
3930.46	26.41	20.905	29.64	-3.23	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	44.85	174.683	47.09	-2.24	VERTICAL	PASSED
7387.8	43.97	158.016	41.93	2.04	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
4925.2	31.49	37.54	33.73	-2.24	VERTICAL	PASSED
7387.8	31.07	35.752	29.03	2.04	HORIZONTAL	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	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, 15C
2009	LISN 50 µH	ENV216	R&S	15C, 15B
2010	LISN 50 µH	ENV216	R&S	15C, 15B
2012	Power splitter	11667B	Agilent	22/24/27, 15C
2013	Attenuator	8493C	Agilent	22/24/27, 15C
2014	Attenuator	8493C	Agilent	22/24/27, 15C
2019	Power splitter	ZN2PD-9G-S+	Mini-Circuits	15E
2020	Power splitter	ZN2PD-9G-S+	Mini-Circuits	15E

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
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
TM39180	Laser distance meter	Disto Pro	Leica	22/24/27, 15C, 15B

Eq. No	Equipment	Type	Manufacturer	Used in
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