

FCC Part 15C Compliance Test Report

Test Report no.:	FCC15CWLAN_RM-1104_30	Date of Report:	19-oct-2015
Number of pages:	31	Customer's Contact person:	Jari Rontu
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FCC listing no.:	533467		
IC recognition no.:	661V-1		
Tested devices/ accessories:	Phone RM-1104 / Battery (Samsung) BV-T5E / Charger AC-100E / Headset WH-308		
FCC ID:	PYASTT	IC:	661X-STT
Supplement reports:	-		
Testing has been carried out in accordance with:	CFR 47, FCC rules Part 15 Subpart C, ANSI C63.4 (2014), 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:			

Hannu Söderholm, Engineer, EMC

1. Summary for FCC Part 15C Compliance Test Report

Date of receipt	01-Jul-2015
Testing completed	13-Aug-2015
The customer's contact person	Jari Rontu
Test Plan referred to	T:\Projects\RM-1104\TestPlan\RS_TestPlan_RM-1104_EMCC_FCC.xlsm
Notes	-
Document name	T:\Projects\RM-1104\EMCC\FCC15CWLAN_RM-1104_30.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-1104	004402742176864;059X034	2012	S2	01066.00001.15257.14000	100206
Battery (Samsung)	BV-T5E	4181575182S10605359;0670775	V6	-	-	100208
Charger	AC-100E	409049512558030174860675758	0.3	B2.0	-	100196
Headset	WH-308	-	-	-	-	100195
Phone	RM-1104	004402742178605;059X034	2012	S2	01066.00001.15257.14000	100205
Battery (Samsung)	BV-T5E	4181575182S10605022;0670775	V6	-	-	100210
Charger	AC-100E	4090495125580301585;0675758	0.3	B2.0	-	100026
Headset	WH-308	51251B1	-	-	-	100028

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	7.2.4	AC powerline conducted emissions	PASSED
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 Microsoft Laboratory.

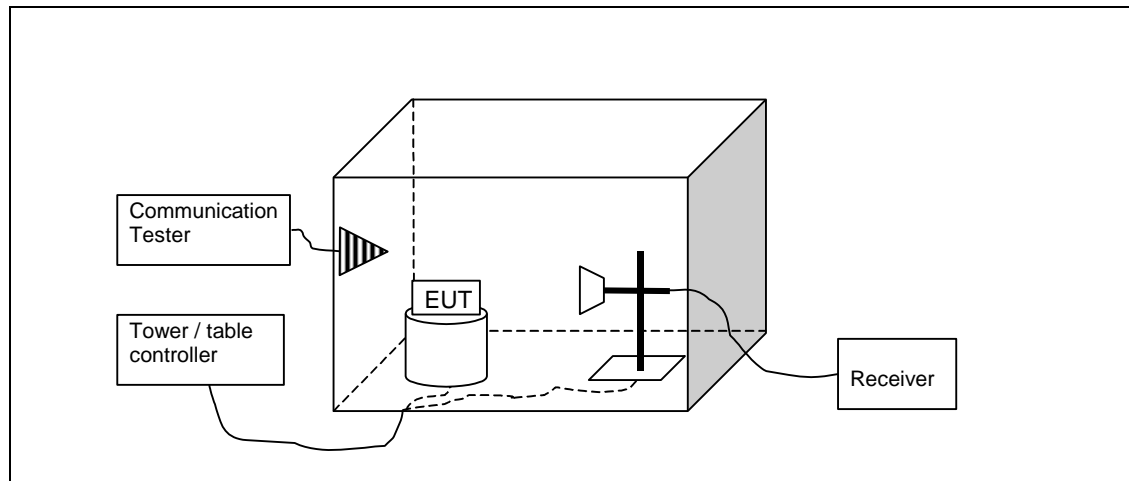
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2. Band edge compliance of RF emissions (FCC 15.247(d), 15.205(b), RSS-210 A8.5)

EUT with DUT number	RM-1104, DUT 100206
Accessories with DUT numbers	BV-T5E, DUT 100208 ; AC-100E, DUT 100196 ; WH-308, DUT 100195
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	Antenna 1 and 2.
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 45 / 101.0
Date of measurements	16-Jul-2015
Measured by	Kalle Hannila / Ville Mannermaa

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.

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

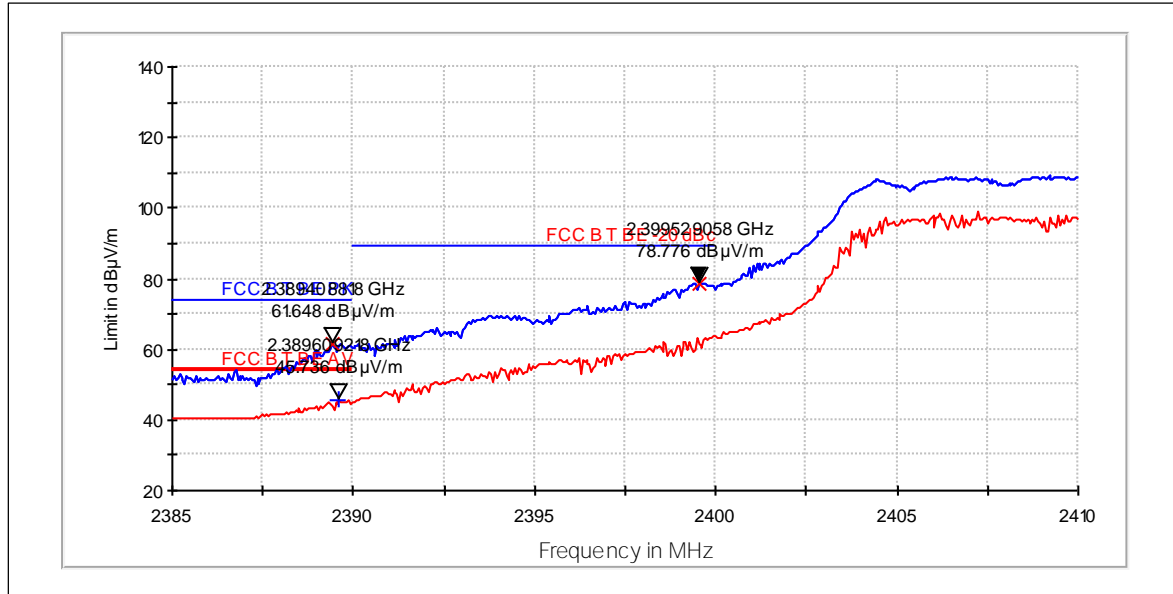
Limits for band edge compliance of RF emissions measurements (3 m measurement distance)

Frequency range [MHz]	Limit
Below 2390 and above 2483.5	54 dBuV/m (avg) and 74 dBuV/m (pk)
2390 - 2400	-20 dBc (pk)

2.3. WLAN test results

2.3.1 802.11g, BPSK modulation, 9 Mbps data rate, Antenna 1 and 2.

Channel 1 / 2412 MHz



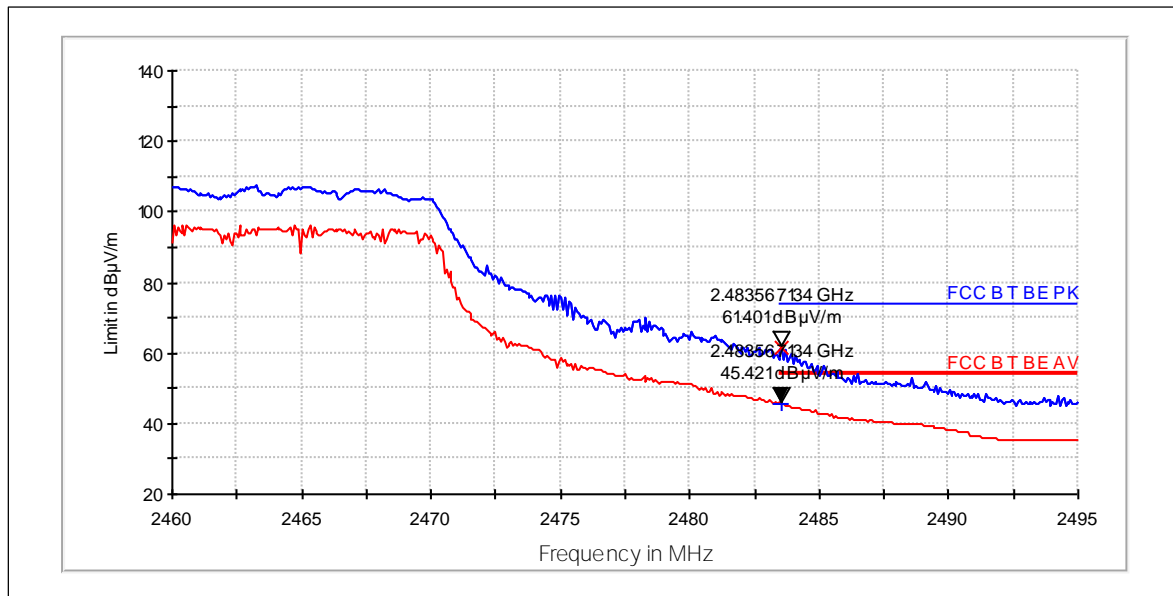
Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U _{RX} [dBµV]	A _{TOT} [dB]	Results
2389	61.65	1208.927	61.47	0.18	PASSED
2400	78.78	8685.604	78.6	0.18	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U _{RX} [dBµV]	A _{TOT} [dB]	Results
2390	45.74	193.553	45.56	0.18	PASSED

Channel 11 / 2462 MHz



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

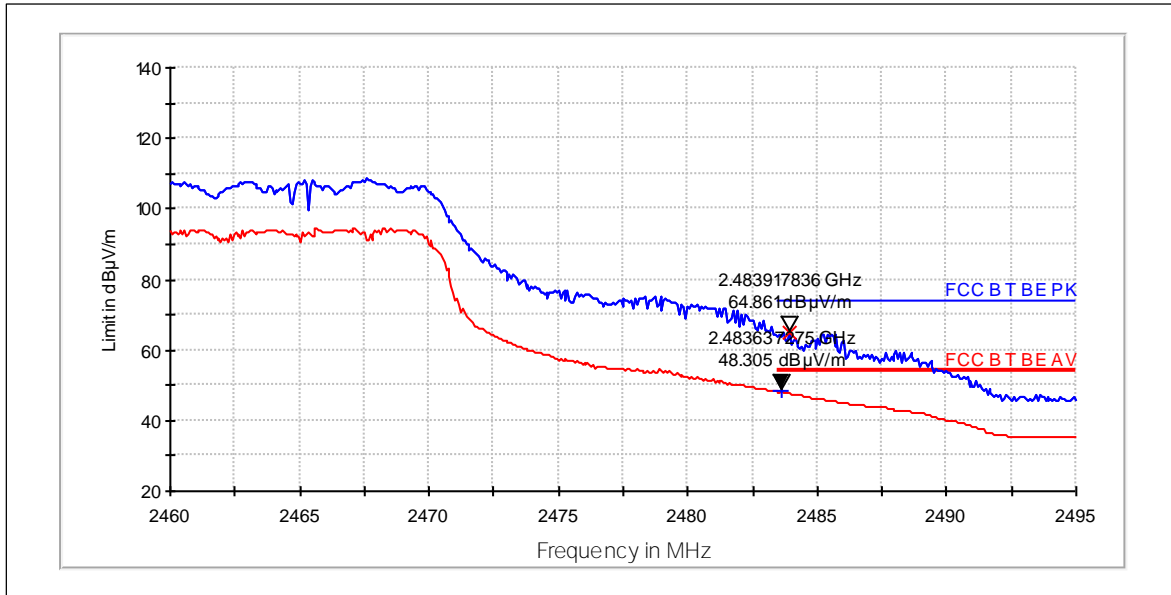
Frequency [MHz]	E [dBµV/m]	E [µV/m]	U _{RX} [dBµV]	A _{TOT} [dB]	Results
2484	61.4	1175.033	61.2	0.2	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U _{RX} [dBµV]	A _{TOT} [dB]	Results
2484	45.42	186.659	45.22	0.2	PASSED

2.3.2 802.11g, 16QAM modulation, 24 Mbps data rate, Antenna 1 and 2.

Channel 11 / 2462 MHz



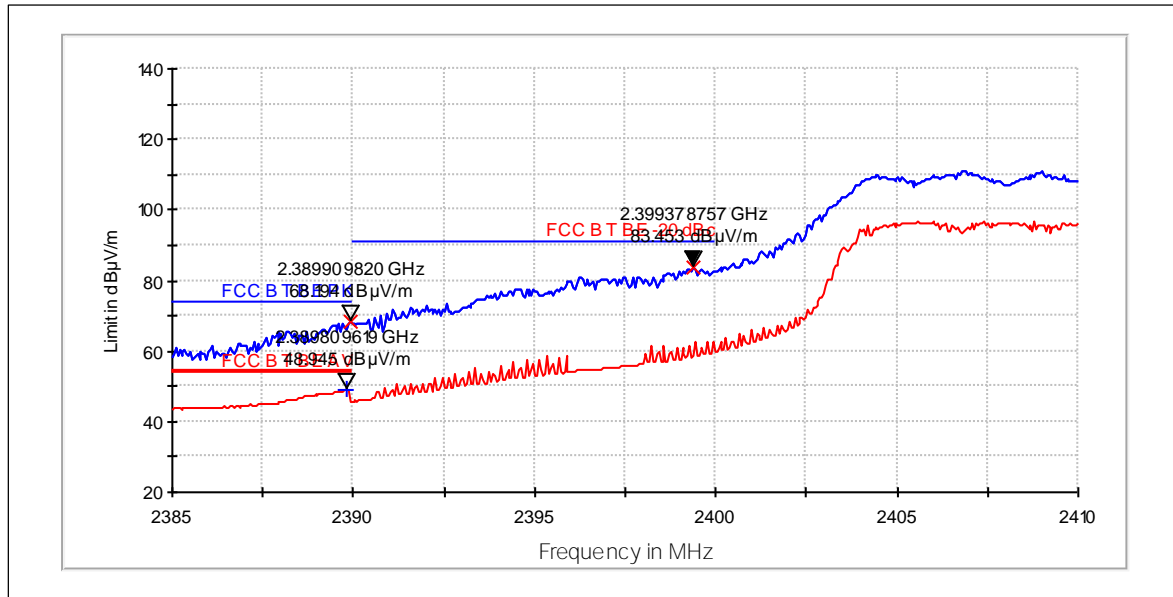
Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U _{RX} [dBµV]	A _{TOT} [dB]	Results
2484	64.86	1750.048	64.66	0.2	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U _{RX} [dBµV]	A _{TOT} [dB]	Results
2484	48.31	260.166	48.11	0.2	PASSED

Channel 1 / 2412 MHz



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

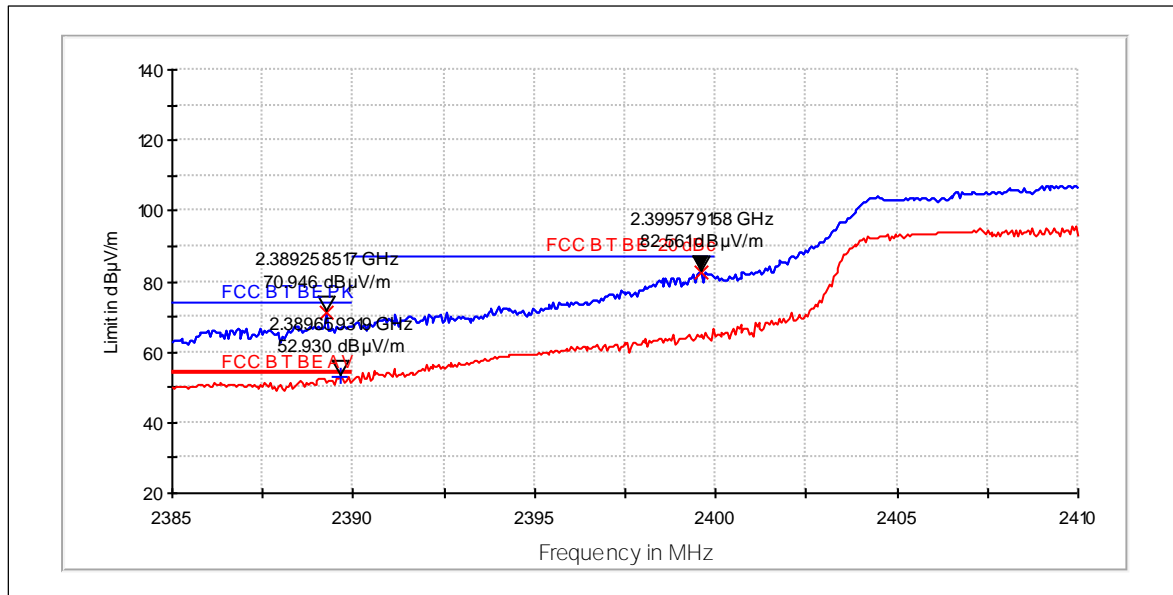
Frequency [MHz]	E [dBµV/m]	E [µV/m]	URX [dBµV]	ATOT [dB]	Results
2390	68.19	2568.621	68.01	0.18	PASSED
2399	83.45	14881.613	83.27	0.18	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	URX [dBµV]	ATOT [dB]	Results
2390	48.95	280.059	48.77	0.18	PASSED

2.3.3 802.11n, BPSK modulation, 13.5 / 15.0 Mbps data rate, Antenna 1 and 2.

Channel 3 / 2412 MHz



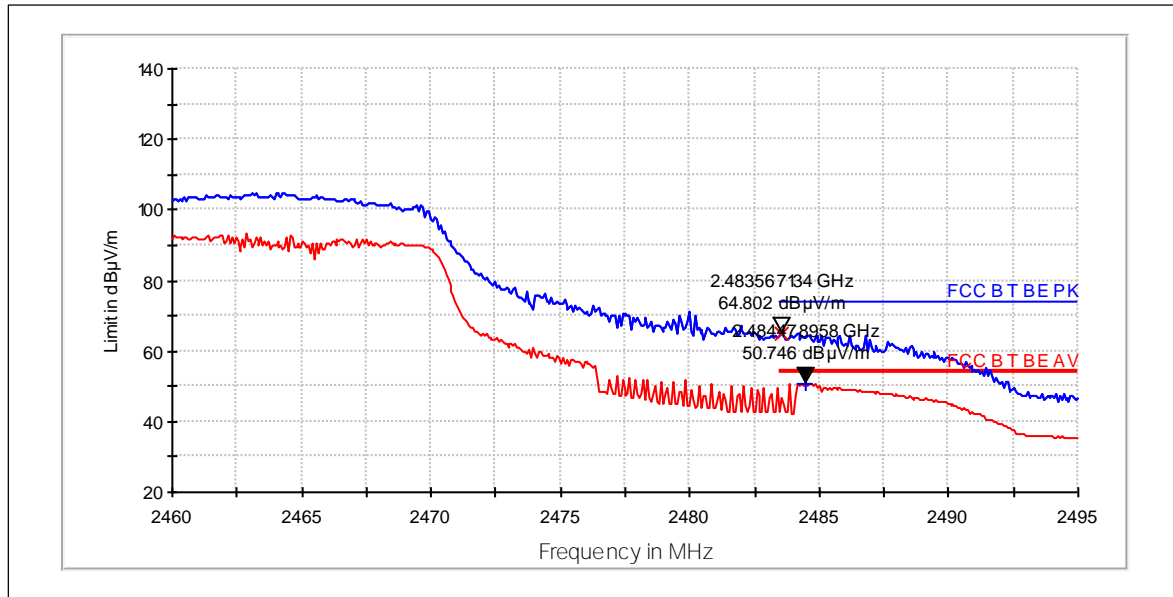
Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U _{RX} [dBµV]	A _{TOT} [dB]	Results
2389	70.95	3526.144	70.77	0.18	PASSED
2400	82.56	13429.196	82.38	0.18	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U _{RX} [dBµV]	A _{TOT} [dB]	Results
2390	52.93	443.098	52.75	0.18	PASSED

Channel 9 / 2462 MHz



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

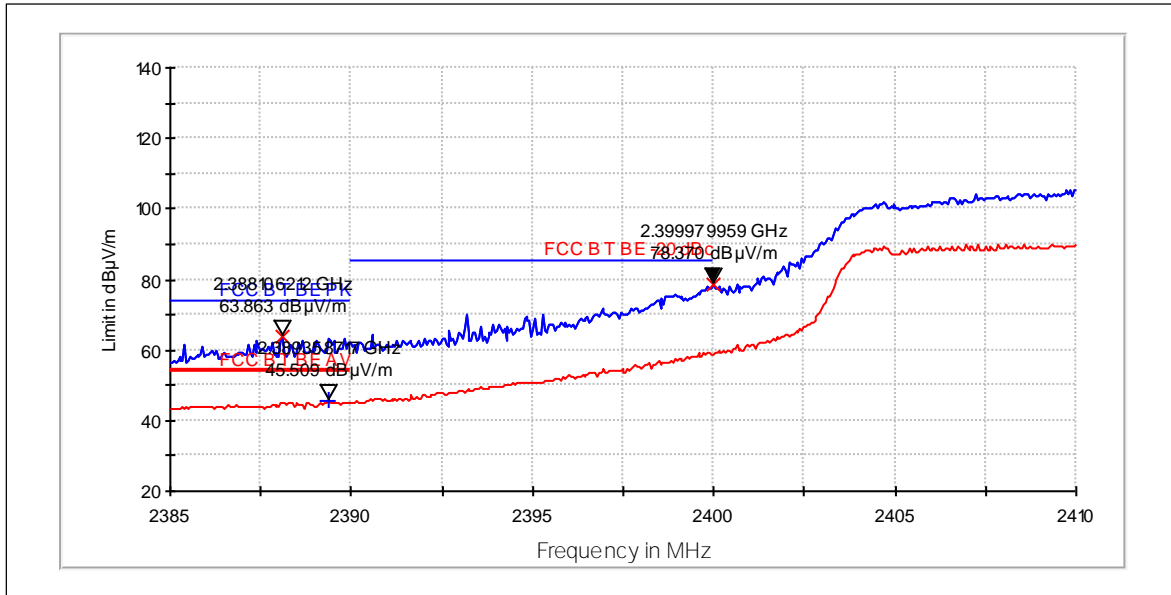
Frequency [MHz]	E [dBµV/m]	E [µV/m]	U _{RX} [dBµV]	A _{TOT} [dB]	Results
2484	64.8	1738.201	64.6	0.2	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U _{RX} [dBµV]	A _{TOT} [dB]	Results
2484	50.75	344.588	50.55	0.2	PASSED

2.3.4 802.11n, QPSK modulation, 40.5 / 45.0 Mbps data rate, Antenna 1 and 2.

Channel 3 / 2412 MHz



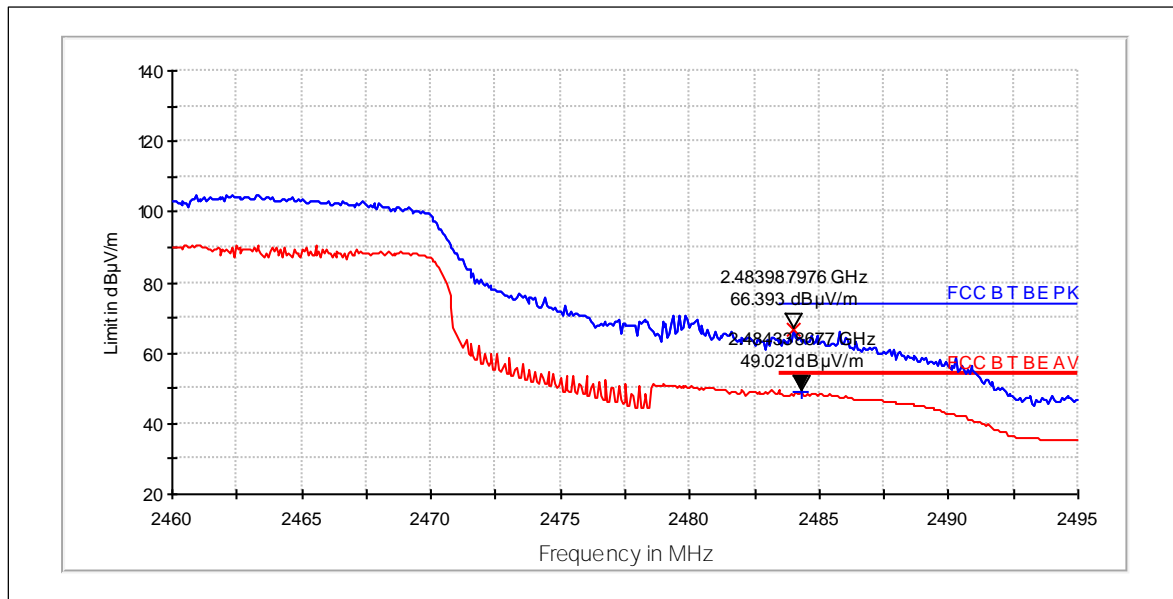
Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U _{RX} [dBµV]	A _{TOT} [dB]	Results
2388	63.86	1560.091	63.68	0.18	PASSED
2400	78.37	8288.959	78.19	0.18	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U _{RX} [dBµV]	A _{TOT} [dB]	Results
2389	45.51	188.56	45.33	0.18	PASSED

Channel 9 / 2462 MHz



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

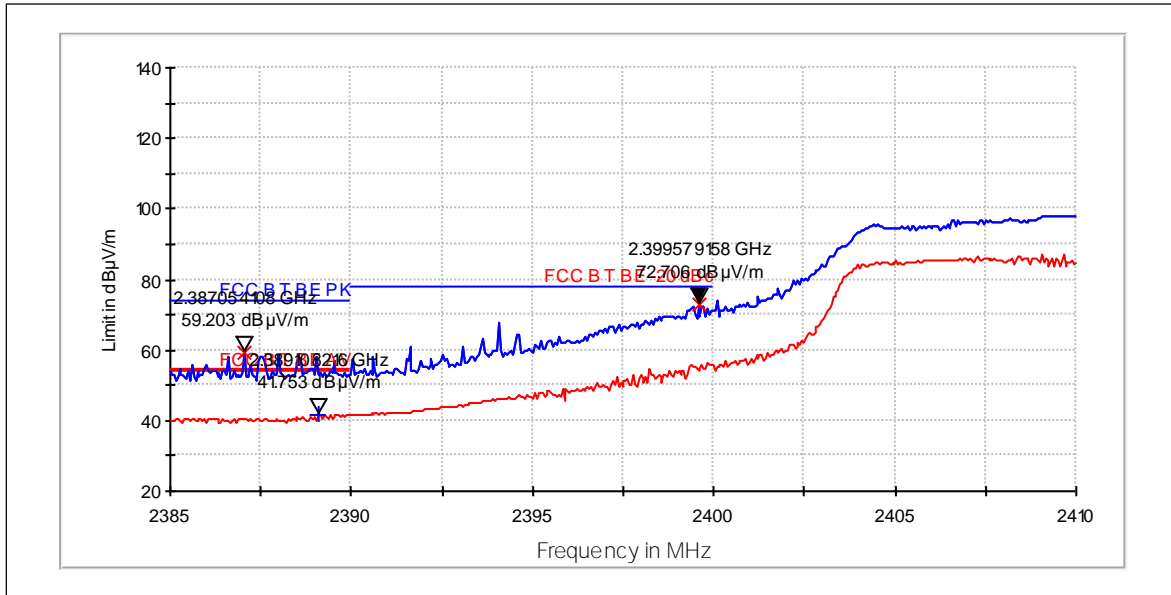
Frequency [MHz]	E [dBµV/m]	E [µV/m]	U _{RX} [dBµV]	A _{TOT} [dB]	Results
2484	66.39	2087.613	66.19	0.2	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U _{RX} [dBµV]	A _{TOT} [dB]	Results
2484	49.02	282.521	48.82	0.2	PASSED

2.3.5 802.11n, BPSK modulation, 6.5 / 7.25 Mbps data rate. Antenna 1 and 2.

Channel 1-5 / 2422MHz



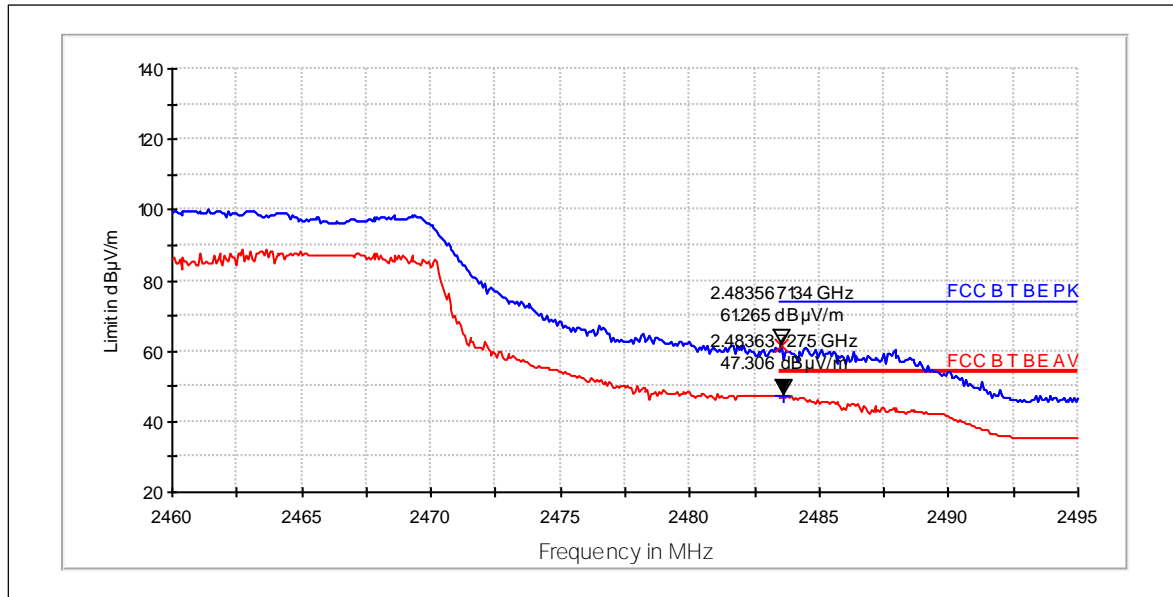
Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U _{RX} [dBµV]	A _{TOT} [dB]	Results
2387	59.2	912.326	59.02	0.18	PASSED
2400	72.71	4318.173	72.53	0.18	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U _{RX} [dBµV]	A _{TOT} [dB]	Results
2389	41.75	122.363	41.57	0.18	PASSED

Channel 7-11 / 2452MHz



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

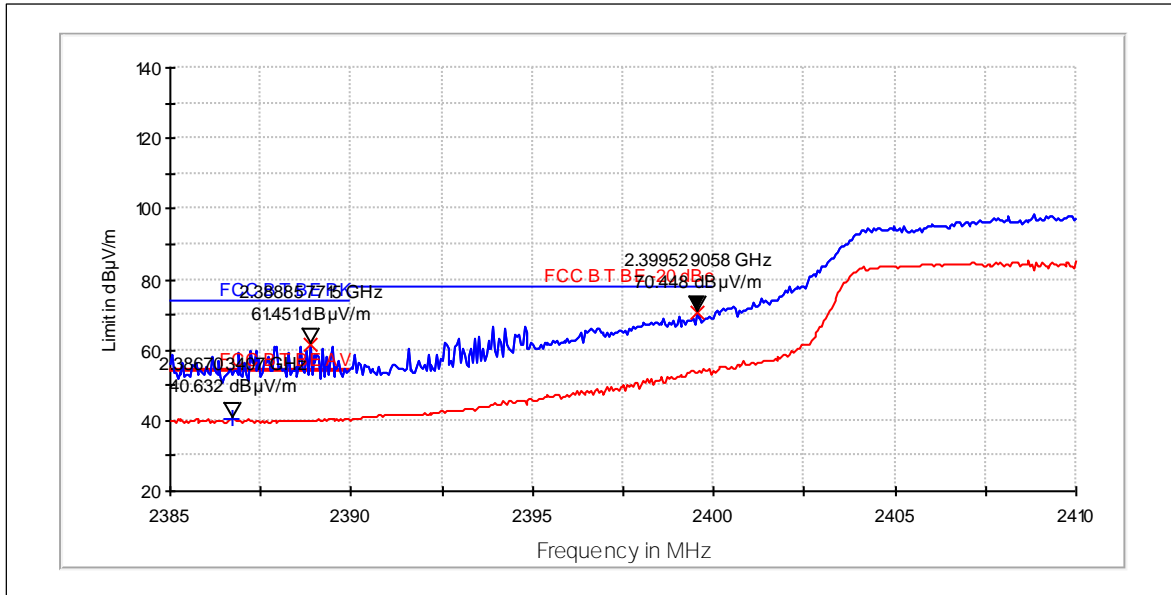
Frequency [MHz]	E [dBµV/m]	E [µV/m]	U _{RX} [dBµV]	A _{TOT} [dB]	Results
2484	61.27	1156.778	61.09	0.18	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U _{RX} [dBµV]	A _{TOT} [dB]	Results
2484	47.31	231.9	47.13	0.18	PASSED

2.3.6 802.11n, QPSK modulation, 27.0 / 30.0 Mbps data rate. Antenna 1 and 2.

Channel 1-5 / 2422MHz



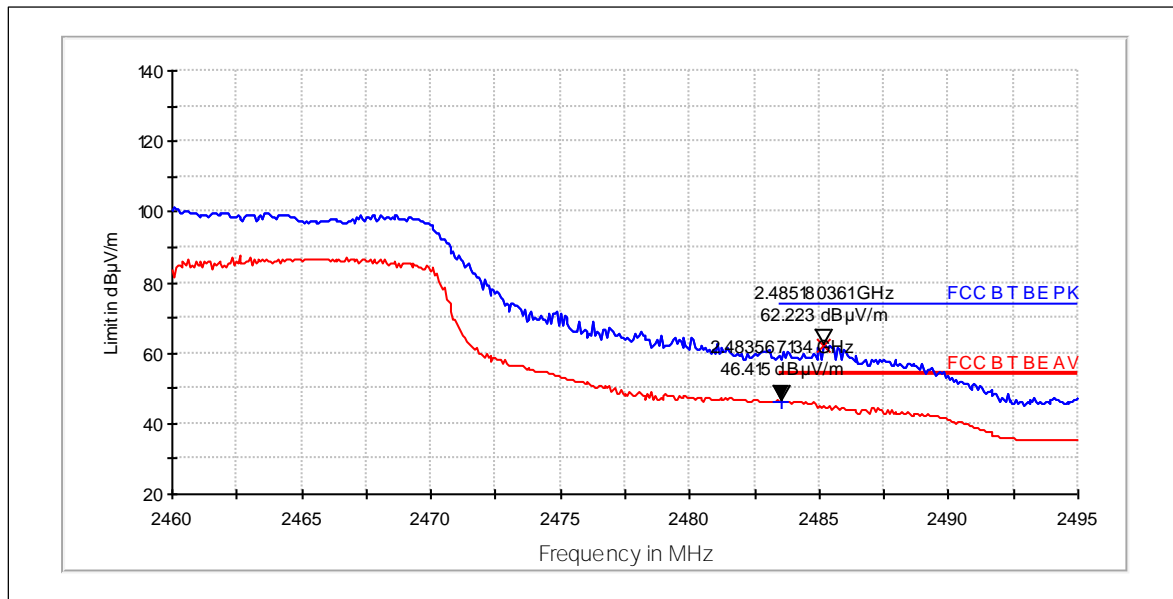
Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U _{RX} [dBµV]	A _{TOT} [dB]	Results
2389	61.45	1181.816	61.27	0.18	PASSED
2400	70.45	3329.661	70.27	0.18	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U _{RX} [dBµV]	A _{TOT} [dB]	Results
2387	40.63	107.547	40.45	0.18	PASSED

Channel 7-11 / 2452MHz



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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U _{RX} [dBµV]	A _{TOT} [dB]	Results
2485	62.22	1291.665	62.04	0.18	PASSED

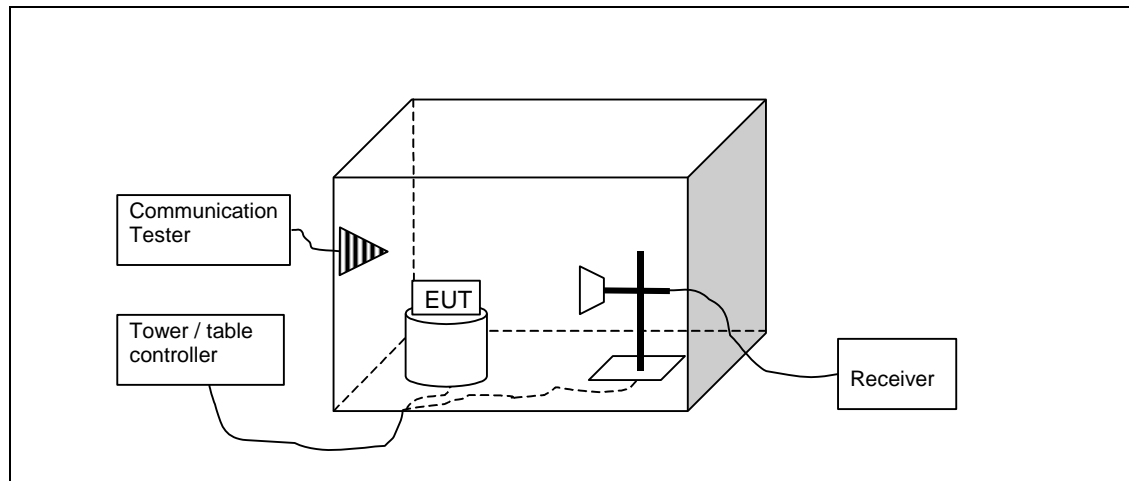
Average (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U _{RX} [dBµV]	A _{TOT} [dB]	Results
2484	46.42	209.291	46.24	0.18	PASSED

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

EUT with DUT number	RM-1104, DUT 100206
Accessories with DUT numbers	BV-T5E, DUT 100208 ; AC-100E, DUT 100196 ; WH-308, DUT 100195
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	Antenna 1 and 2
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 45 / 101.9
Date of measurements	13-Aug-2015
Measured by	Kalle Hannila

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

The measurement results are obtained as described below:

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

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

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

Frequency range [MHz]	Limit [$\mu V/m$]	Limit [dB $\mu V/m$]	Detector
30 - 88	100	40	Quasi peak
88 – 216	150	43.5	Quasi peak
216 – 960	200	46	Quasi peak
960 – 1000	500	54	Quasi peak
Above 1000	500	54	Average
Above 1000	5000	74	Peak

3.2.1 802.11n, BPSK modulation, 6.5 / 7.25 Mbps data rate.

Channel 1-5 / 2422MHz

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
201.606	26.57	21.306	43.67	-17.1	44	16.95	PASSED
201.612	26.35	20.773	43.45	-17.1	44	17.17	PASSED
204.81	25.1	17.989	41.9	-16.8	44	18.42	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
4844.2	43	141.254	44.7	-1.7	74	30.98	PASSED
7265.2	46.78	218.273	43.08	3.7	74	27.2	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
4844.2	29.9	31.261	31.6	-1.7	54	24.08	PASSED
7265.2	33.47	47.152	29.77	3.7	54	20.51	PASSED

Channel 7-11 / 2452MHz

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
199.908	25.75	19.387	42.95	-17.2	44	17.77	PASSED
201.582	26.81	21.903	43.91	-17.1	44	16.71	PASSED
201.606	26.77	21.802	43.87	-17.1	44	16.75	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
4902.4	42.18	128.529	43.78	-1.6	74	31.8	PASSED
7357.5	47.01	224.13	42.81	4.2	74	26.97	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
4902.4	29.2	28.84	30.8	-1.6	54	24.78	PASSED
7357.5	33.91	49.602	29.71	4.2	54	20.07	PASSED

Channel 4-8 / 2437MHz

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

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Limit [dB μ V/m]	Margin	Results
199.908	25.59	19.033	42.79	-17.2	44	17.93	PASSED
201.606	26.41	20.917	43.51	-17.1	44	17.11	PASSED
201.612	26.41	20.917	43.51	-17.1	44	17.11	PASSED

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]	Limit [dB μ V/m]	Margin	Results
4881.2	41.66	121.06	43.26	-1.6	74	32.32	PASSED
7320.5	45.97	198.838	42.07	3.9	74	28.01	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]	Limit [dB μ V/m]	Margin	Results
4881.2	28.95	28.022	30.55	-1.6	54	25.03	PASSED
7320.5	32.96	44.463	29.06	3.9	54	21.02	PASSED

3.2.2 802.11n, QPSK modulation, 27.0 / 30.0 Mbps data rate.

Channel 4-8 / 2437MHz

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

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Limit [dB μ V/m]	Margin	Results
30	23.75	15.399	26.75	-3	40	16.25	PASSED
201.606	27.01	22.413	44.11	-17.1	44	16.51	PASSED
201.612	26.77	21.802	43.87	-17.1	44	16.75	PASSED

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]	Limit [dB μ V/m]	Margin	Results
4879.2	41.81	123.169	43.31	-1.5	74	32.17	PASSED
7320.4	46.21	204.409	42.31	3.9	74	27.77	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]	Limit [dB μ V/m]	Margin	Results
4879.2	28.87	27.765	30.37	-1.5	54	25.11	PASSED
7320.4	32.82	43.752	28.92	3.9	54	21.16	PASSED

Channel 1-5 / 2422MHz

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

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Limit [dB μ V/m]	Margin	Results
30.09	23.82	15.524	26.82	-3	40	16.18	PASSED
201.582	26.75	21.752	43.85	-17.1	44	16.77	PASSED

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]	Limit [dB μ V/m]	Margin	Results
2386.9	62.96	1406.048	60.16	2.8	74	11.02	PASSED
4844.9	41.93	124.882	43.63	-1.7	74	32.05	PASSED
7265.9	46.28	206.063	42.58	3.7	74	27.7	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]	Limit [dB μ V/m]	Margin	Results
2386.9	40.63	107.523	37.83	2.8	54	13.35	PASSED
4844.9	28.97	28.087	30.67	-1.7	54	25.01	PASSED
7265.9	33.33	46.398	29.63	3.7	54	20.65	PASSED

Channel 7-11 / 2452MHz

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

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Limit [dB μ V/m]	Margin	Results
30.06	23.71	15.329	26.71	-3	40	16.29	PASSED
201.612	26.77	21.802	43.87	-17.1	44	16.75	PASSED
904.369	24.41	16.615	27.21	-2.8	46	21.61	PASSED

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]	Limit [dB μ V/m]	Margin	Results
4903.9	43.15	143.714	44.75	-1.6	74	30.83	PASSED
7355.1	46.47	210.62	42.27	4.2	74	27.51	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]	Limit [dB μ V/m]	Margin	Results
4903.9	29.81	30.939	31.41	-1.6	54	24.17	PASSED
7355.1	33.85	49.261	29.65	4.2	54	20.13	PASSED

3.2.3 802.11g, BPSK modulation, 9 Mbps data rate.

Channel 1 / 2412 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]	Limit [dB μ V/m]	Margin	Results
4824.4	46.55	212.569	48.25	-1.7	74	27.43	PASSED
7234.2	46.21	204.409	42.61	3.6	95	49.02	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]	Limit [dB μ V/m]	Margin	Results
4824.4	33.01	44.72	34.71	-1.7	54	20.97	PASSED
7234.2	33.51	47.37	29.91	3.6	---	---	PASSED

Channel 6 / 2437 MHz

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

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Limit [dB μ V/m]	Margin	Results
199.968	25.72	19.32	42.92	-17.2	44	17.8	PASSED
201.606	26.22	20.464	43.32	-17.1	44	17.3	PASSED
201.612	26.3	20.654	43.4	-17.1	44	17.22	PASSED

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]	Limit [dB μ V/m]	Margin	Results
4879	42.03	126.328	43.53	-1.5	74	31.95	PASSED
7318.4	45.47	187.715	41.67	3.8	74	28.51	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]	Limit [dB μ V/m]	Margin	Results
4879	29.12	28.576	30.62	-1.5	54	24.86	PASSED
7318.4	32.77	43.501	28.97	3.8	54	21.21	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]	Limit [dB μ V/m]	Margin	Results
4924.9	43.86	155.955	45.36	-1.5	74	30.12	PASSED
7387	46.59	213.55	42.19	4.4	74	27.39	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]	Limit [dB μ V/m]	Margin	Results
4924.9	30.88	34.995	32.38	-1.5	54	23.1	PASSED
7387	33.62	47.973	29.22	4.4	54	20.36	PASSED

3.2.4 802.11g, 16QAM modulation, 24 Mbps data rate.

Channel 1 / 2412 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]	Limit [dB μ V/m]	Margin	Results
4824.1	47.87	247.457	49.57	-1.7	74	26.11	PASSED
7234.7	46.86	220.293	43.26	3.6	95	48.37	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]	Limit [dB μ V/m]	Margin	Results
4824.1	34.21	51.345	35.91	-1.7	54	19.77	PASSED
7234.7	33.22	45.814	29.62	3.6	---	---	PASSED

Channel 6 / 2437 MHz

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

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Limit [dB μ V/m]	Margin	Results
199.968	26.62	21.429	43.82	-17.2	44	16.9	PASSED
201.582	27.05	22.516	44.15	-17.1	44	16.47	PASSED
201.606	27.37	23.361	44.47	-17.1	44	16.15	PASSED

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]	Limit [dB μ V/m]	Margin	Results
4881	41.6	120.226	43.2	-1.6	74	32.38	PASSED
7320.4	46.04	200.447	42.14	3.9	74	27.94	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]	Limit [dB μ V/m]	Margin	Results
4881	28.7	27.227	30.3	-1.6	54	25.28	PASSED
7320.4	32.61	42.707	28.71	3.9	54	21.37	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]	Limit [dB μ V/m]	Margin	Results
4924.1	44.78	173.38	46.28	-1.5	74	29.2	PASSED
7384.2	47.3	231.739	42.9	4.4	74	26.68	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]	Limit [dB μ V/m]	Margin	Results
4924.1	31.22	36.392	32.72	-1.5	54	22.76	PASSED
7384.2	33.7	48.417	29.3	4.4	54	20.28	PASSED

3.2.5 802.11n, BPSK modulation, 13.5 / 15.0 Mbps data rate.

Channel 1 / 2412 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]	Limit [dB μ V/m]	Margin	Results
4823.5	41.92	124.738	43.62	-1.7	74	32.06	PASSED
7234.4	46.21	204.409	42.61	3.6	95	49.02	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]	Limit [dB μ V/m]	Margin	Results
4823.5	28.94	27.99	30.64	-1.7	54	25.04	PASSED
7234.4	33.45	47.044	29.85	3.6	---	---	PASSED

Channel 6 / 2437 MHz

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

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Limit [dB μ V/m]	Margin	Results
199.938	25.93	19.792	43.13	-17.2	44	17.59	PASSED
203.22	25.26	18.323	42.16	-16.9	44	18.26	PASSED
906.589	24.31	16.425	27.11	-2.8	46	21.71	PASSED

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]	Limit [dB μ V/m]	Margin	Results
4880	41.98	125.603	43.48	-1.5	74	32	PASSED
7320.1	45.48	187.932	41.58	3.9	74	28.5	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]	Limit [dB μ V/m]	Margin	Results
4880	28.56	26.792	30.06	-1.5	54	25.42	PASSED
7320.1	32.7	43.152	28.8	3.9	54	21.28	PASSED

Channel 6 / 2437 MHz

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

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Limit [dB μ V/m]	Margin	Results
199.782	25.74	19.364	42.94	-17.2	44	17.78	PASSED
199.938	26.25	20.535	43.45	-17.2	44	17.27	PASSED
201.606	26.64	21.478	43.74	-17.1	44	16.88	PASSED
203.22	25.26	18.323	42.16	-16.9	44	18.26	PASSED
906.589	24.31	16.425	27.11	-2.8	46	21.71	PASSED

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]	Limit [dB μ V/m]	Margin	Results
4880	41.98	125.603	43.48	-1.5	74	32	PASSED
7319.6	45.58	190.108	41.68	3.9	74	28.4	PASSED
7320.1	45.48	187.932	41.58	3.9	74	28.5	PASSED
7320.2	45.21	182.18	41.31	3.9	74	28.77	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]	Limit [dB μ V/m]	Margin	Results
4880	28.56	26.792	30.06	-1.5	54	25.42	PASSED
7319.6	32.56	42.462	28.66	3.9	54	21.42	PASSED
7320.1	32.7	43.152	28.8	3.9	54	21.28	PASSED
7320.2	32.57	42.511	28.67	3.9	54	21.41	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]	Limit [dB μ V/m]	Margin	Results
4925.2	41.79	122.885	43.29	-1.5	74	32.19	PASSED
7384.1	47.56	238.781	43.16	4.4	74	26.42	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]	Limit [dB μ V/m]	Margin	Results
4925.2	28.95	28.022	30.45	-1.5	54	25.03	PASSED
7384.1	33.65	48.139	29.25	4.4	54	20.33	PASSED

3.2.6 802.11n, QPSK modulation, 40.5 / 45.0 Mbps data rate.

Channel 1 / 2412 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]	Limit [dB μ V/m]	Margin	Results
4825.1	42.08	127.057	43.78	-1.7	74	31.9	PASSED
7234.8	46.07	201.141	42.47	3.6	95	49.16	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]	Limit [dB μ V/m]	Margin	Results
4825.1	28.99	28.151	30.69	-1.7	54	24.99	PASSED
7234.8	33.42	46.881	29.82	3.6	---	---	PASSED

Channel 6 / 2437 MHz

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

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Limit [dB μ V/m]	Margin	Results
201.582	25.9	19.724	43	-17.1	44	17.62	PASSED
201.606	26.04	20.045	43.14	-17.1	44	17.48	PASSED
204.81	25.56	18.967	42.36	-16.8	44	17.96	PASSED

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]	Limit [dB μ V/m]	Margin	Results
4880.5	41.98	125.603	43.58	-1.6	74	32	PASSED
7321.4	45.51	188.582	41.61	3.9	74	28.47	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]	Limit [dB μ V/m]	Margin	Results
4880.5	28.62	26.977	30.22	-1.6	54	25.36	PASSED
7321.4	32.65	42.904	28.75	3.9	54	21.33	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]	Limit [dB μ V/m]	Margin	Results
4924.7	42.34	130.918	43.84	-1.5	74	31.64	PASSED
7384.3	46.69	216.023	42.29	4.4	74	27.29	PASSED

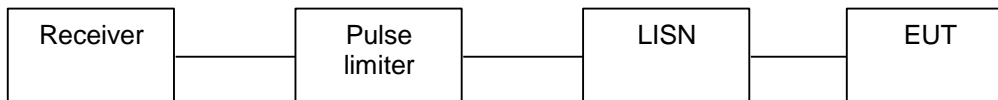
Average (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dB μ V/m]	E [μ V/m]	U _{RX} [dB μ V]	A _{TOT} [dB]	Limit [dB μ V/m]	Margin	Results
4924.7	28.93	27.958	30.43	-1.5	54	25.05	PASSED
7384.3	33.78	48.865	29.38	4.4	54	20.2	PASSED

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

EUT with DUT number	RM-1104, DUT 100205
Accessories with DUT numbers	BV-T5E, DUT 100210 ; AC-100E, DUT 100026 ; WH-308, DUT 100028
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	19.4 / 66.5 / 102.3
Date of measurements	03-Jul-2015
Measured by	Tomi Lipponen

4.1. Test Setup



4.2. 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.

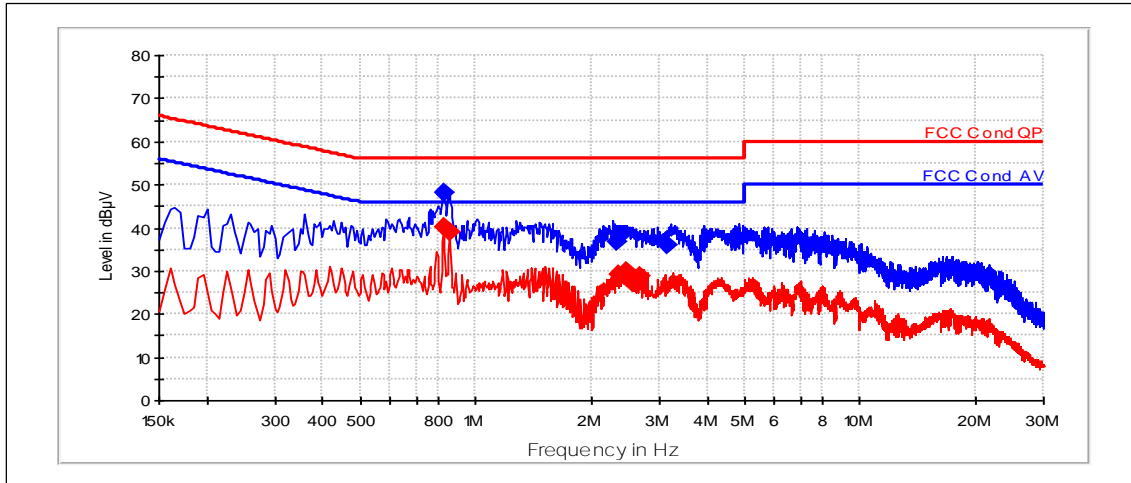
CISPR 22 Class B limits

Frequency range [MHz]	Quasi peak limit [dB μ V]	Average limit [dB μ V]
0.15 - 0.5	66 - 56	56 - 46
0.5 - 5	56	46
5 - 30	60	50

4.3. WLAN Test results

4.3.1 802.11g mode, BPSK modulation, 9 Mbps data rate

Channel 6 / 2437 MHz



QuasiPeak (RBW: 9 kHz)

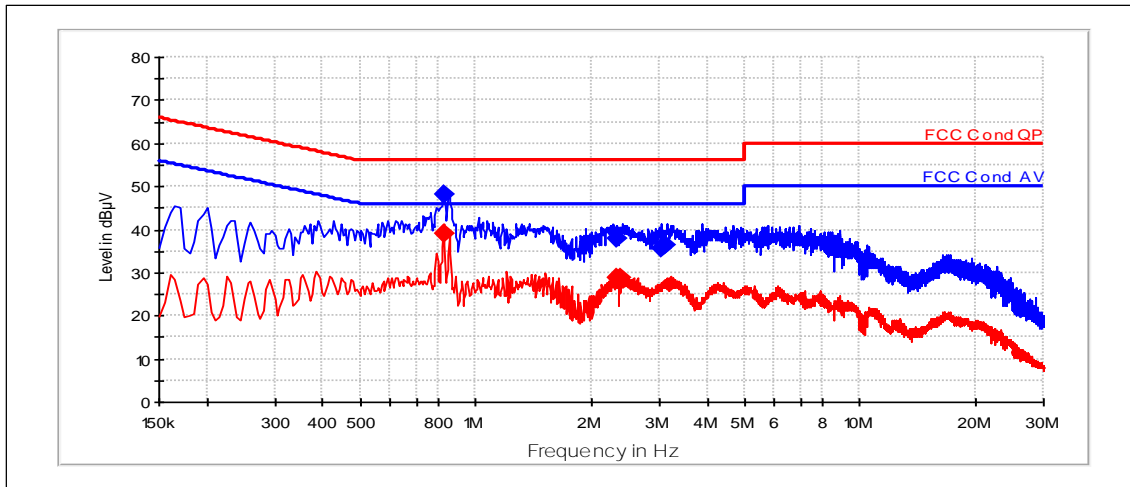
Frequency [MHz]	U [dBµV]	Line	Result
0.825	48.17	N	PASSED
2.32	36.91	N	PASSED
2.375	38.21	N	PASSED
3.145	35.97	N	PASSED

Average (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Line	Result
0.825	40.33	N	PASSED
0.855	39.12	N	PASSED
2.345	29.16	N	PASSED
2.475	29.96	N	PASSED
2.665	28.83	N	PASSED

4.3.2 802.11g mode, 16QAM modulation, 24 Mbps data rate

Channel 6 / 2437 MHz



QuasiPeak (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Line	Result
0.825	48.09	N	PASSED
2.33	37.86	N	PASSED
3.035	35.81	N	PASSED
3.13	36.47	N	PASSED

Average (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Line	Result
0.825	39.12	N	PASSED
2.315	28.68	N	PASSED
2.38	28.86	N	PASSED

5. Test Equipment

5.1. 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

5.2. Radiated measurements

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

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

END OF REPORT