FCC Part 15C Compliance Test Report

Test Report no.:	FCC15C_RM-691_07.docx	**Date of Report:**	10-Feb-2011
Number of pages:	16	**Customer's Contact person:**	Alison Lenaghan
Testing laboratory:	TCC Nokia Tampere Laboratory P.O. Box 68 Sinitaival 5 FIN-33720 TAMPERE, FINLAND Tel. +358 (0) 7180 46800 Fax. +358 (0) 7180 46880	**Customer:**	Nokia Corporation Nokia House Summit Avenue, Southwood FARNBOROUGH HAMPSHIRE GU14 0NG UK Tel. +44 1252 866000 Fax. +44 1252 866001
FCC listing no.: **IC recognition no.:**	94436 661AK-1		
Tested devices/ accessories:	**Phone RM-691 / Battery BL-5K / AC charger AC-15E / Headset WH-102**		
FCC ID:	QFXRM-691	**IC:**	661Z-RM691
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 7, June 2007). 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:	 Digitally signed by Jari Jantunen Date: 2011.02.10 12:33:16 +02'00'		

Jari Jantunen, System Manager, EMC

1. Summary for FCC Part 15C Compliance Test Report

Date of receipt	14-Jan-2011
Testing completed	18-Jan-2011
The customer's contact person	Alison Lenaghan
Test Plan referred to	T:\Projects\RM-691\TestPlan\RS_testplan_RM-691.xls
Notes	-
Document name	T:\Projects\RM-691\EMC\FCC15C_RM-691_07.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 and FM transmitter. Bluetooth and WLAN are tested with maximum rated TX power.

Product	Type	SN	HW	MV	SW	DUT
Phone	RM-691	004402134040447	5000	-	020.022	42453
Battery	BL-5K	4620400321K10100712;0670580	-	-	-	42455
AC charger	AC-15E	4090499512230700758;0675463	-	-	-	42457
Headset	WH-102	0694323939454109378	-	-	-	42459

1.2. Summary of Test Results

Bluetooth:

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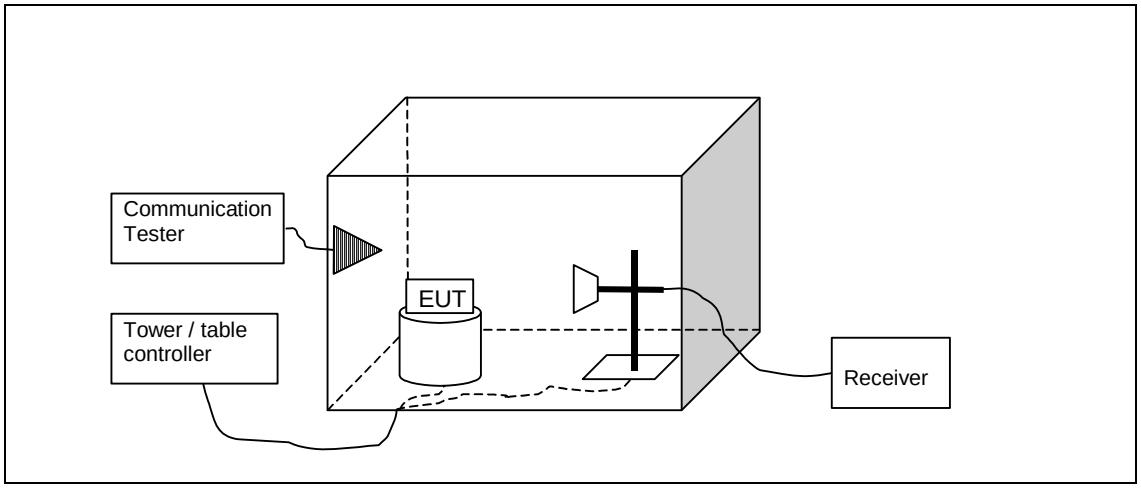
2. Band edge compliance of RF emissions
(FCC §15.247(d), RSS-210 A8.5)

EUT with DUT number	RM-691, DUT 42453
Accessories with DUT numbers	BL-5K, DUT 42455 ; AC-15E, DUT 42457 ; WH-102, DUT 42459
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 52 / 99.0
Date of measurements	18-Jan-2011
Measured by	Jari Jantunen

2.1.1 Test Setup



2.2. Test method and limit

The measurement is made according to Public notice DA 00-705 and IC standard RSS-210.

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 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

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2.3. Bluetooth Test results

2.3.1 GFSK modulation, PRBS packet type

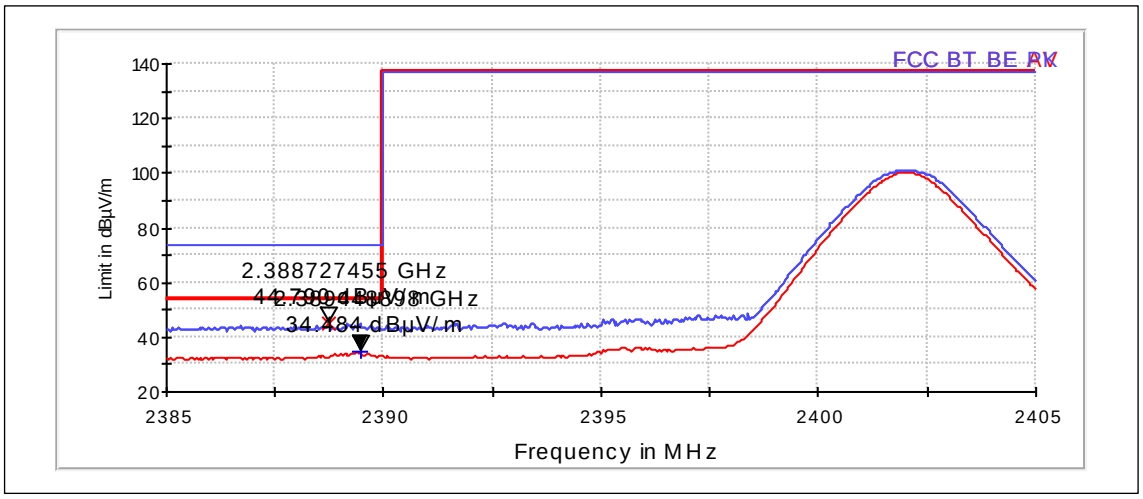
Average (RBW: 1 MHz, VBW: 1 MHz)

Channel / f_C [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Result
0 / 2402	34.48	52.993	43.4	-8.92	PASSED
Hopping on, low end	35.78	61.51	44.7	-8.92	PASSED
78 / 2480	49.69	305.213	58.4	-8.71	PASSED
Hopping on, high end	50.07	318.908	58.78	-8.71	PASSED

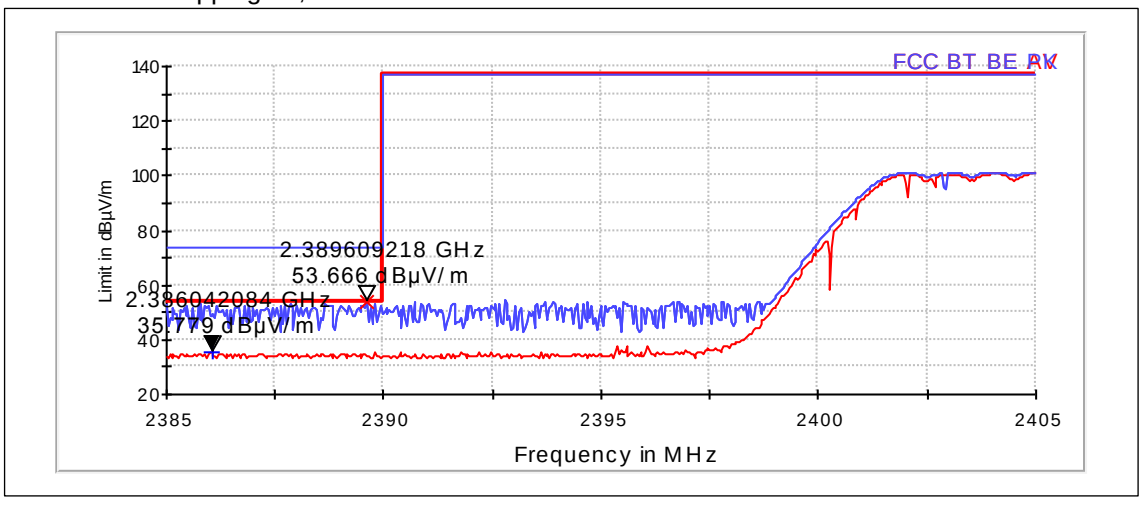
Peak (RBW: 1 MHz, VBW: 1 MHz)

Channel / f_C [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Result
0 / 2402	44.79	173.585	53.71	-8.92	PASSED
Hopping on, low end	53.67	482.265	62.59	-8.92	PASSED
78 / 2480	55.69	608.874	64.4	-8.71	PASSED
Hopping on, high end	56.29	652.114	65	-8.71	PASSED

GFSK mode. Channel 0 / 2402 MHz



GFSK mode. Hopping on, low end



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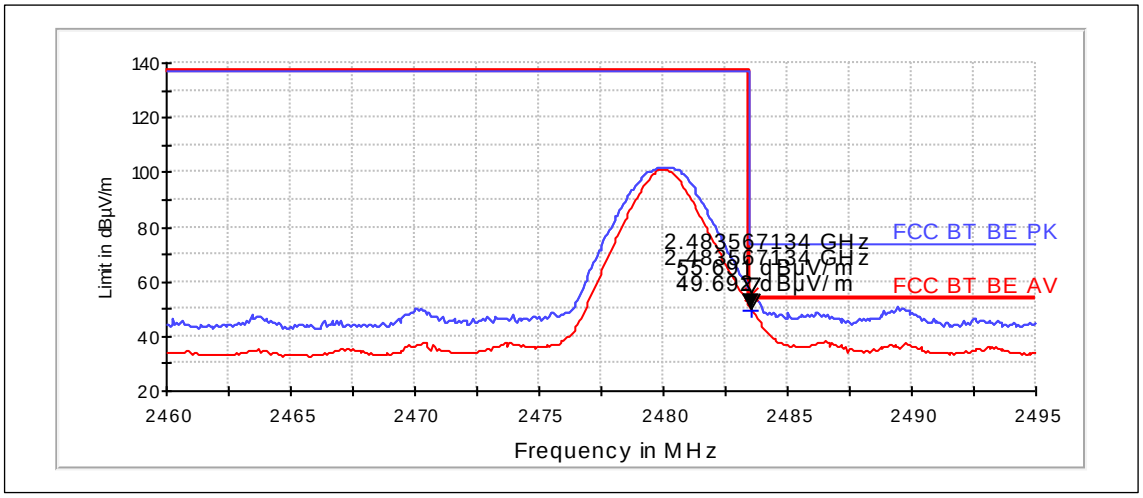
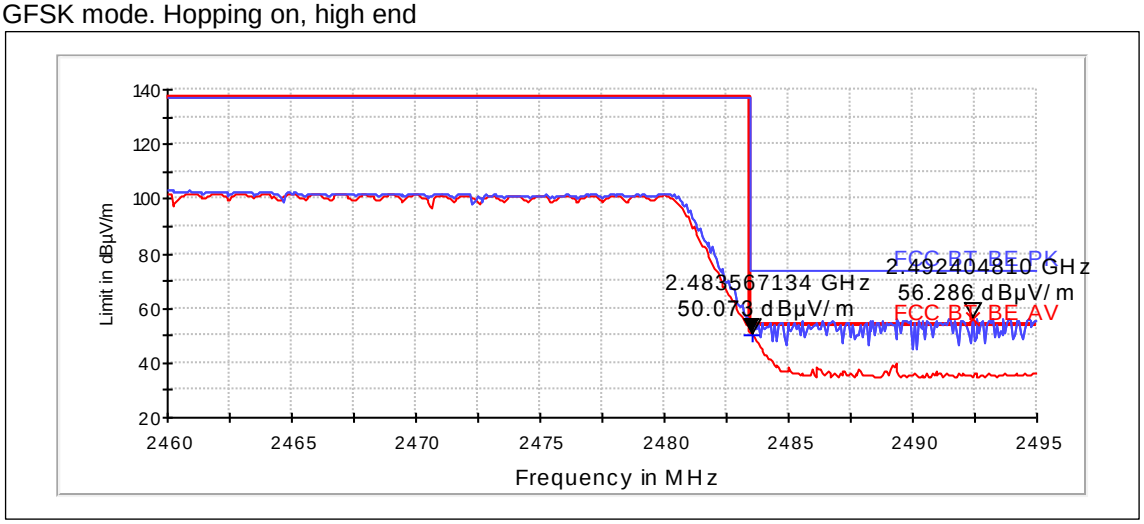
GFSK mode. Channel 78 / 2480 MHz



GFSK mode. Hopping on, high end



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2.3.2 8DPSK modulation, PRBS packet type

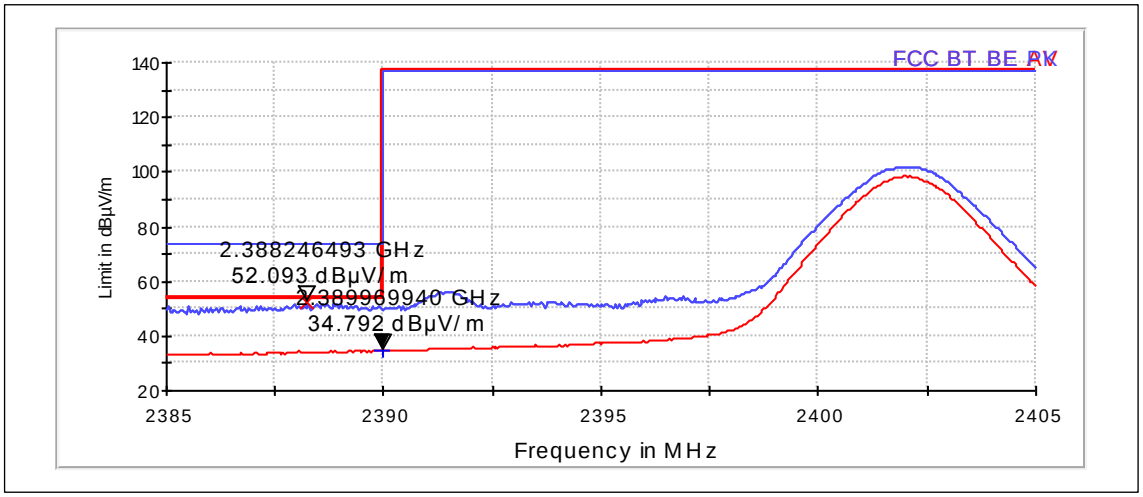
Average (RBW: 1 MHz, VBW: 1 MHz)

Channel / f_C [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Result
0 / 2402	34.79	54.905	43.71	-8.92	PASSED
Hopping on, low end	35.35	58.538	44.27	-8.92	PASSED
78 / 2480	50.89	350.212	59.6	-8.71	PASSED
Hopping on, high end	51.59	379.56	60.3	-8.71	PASSED

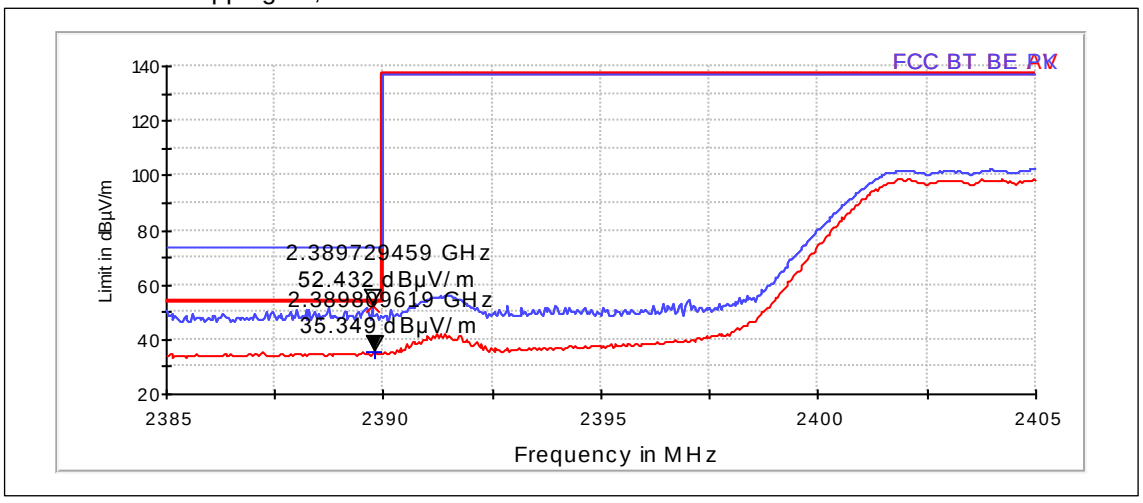
Peak (RBW: 1 MHz, VBW: 1 MHz)

Channel / f_C [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Result
0 / 2402	52.09	402.409	61.01	-8.92	PASSED
Hopping on, low end	52.43	418.421	61.35	-8.92	PASSED
78 / 2480	58.65	855.616	67.36	-8.71	PASSED
Hopping on, high end	57.39	740.522	66.1	-8.71	PASSED

8DPSK mode. Channel 0 / 2402 MHz



8DPSK mode. Hopping on, low end



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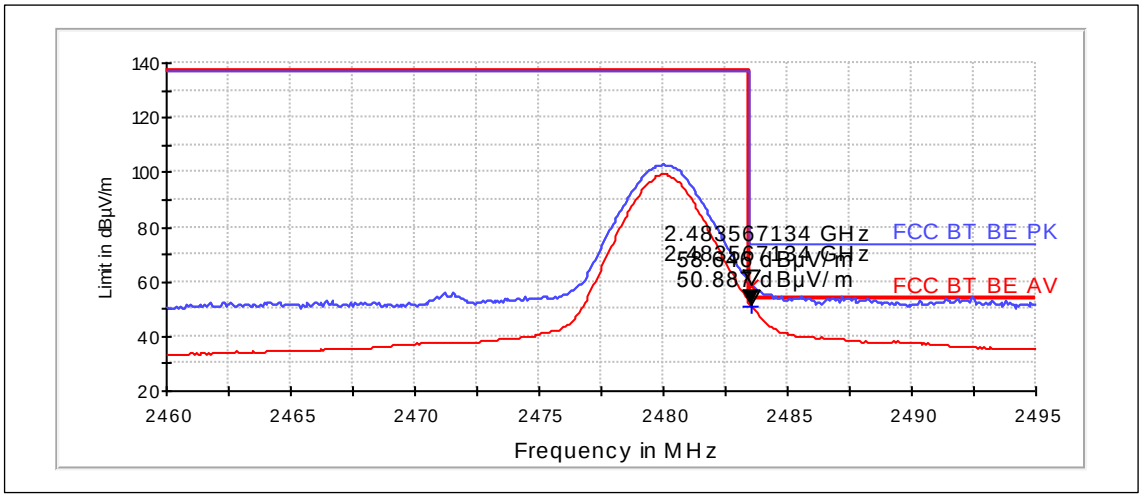
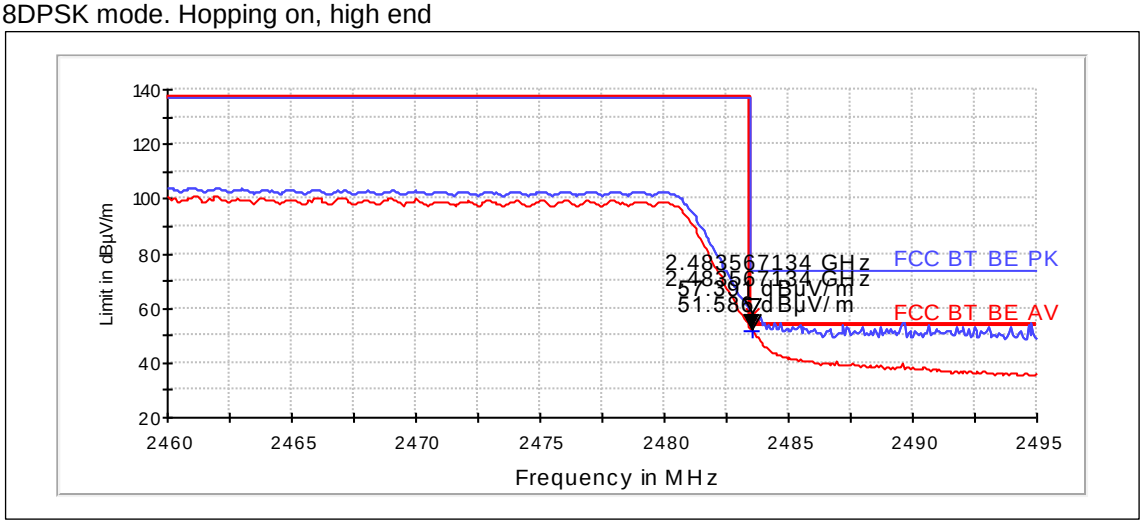
8DPSK mode. Channel 78 / 2480 MHz



8DPSK mode. Hopping on, high end



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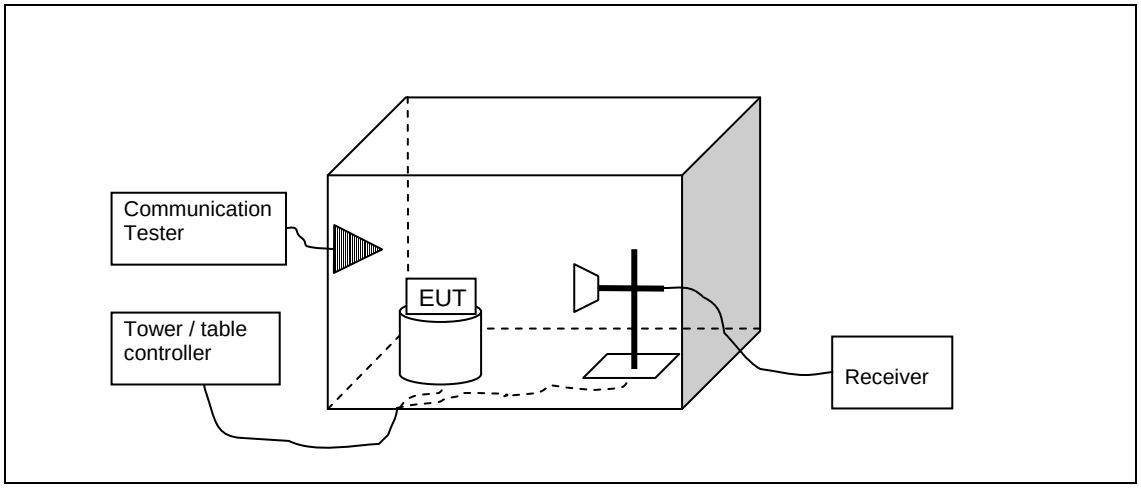
3. Spurious radiated emissions

(FCC §15.247(d), §15.209, RSS-210 A8.5)

EUT with DUT number	RM-691, DUT 42453
Accessories with DUT numbers	BL-5K, DUT 42455 ; AC-15E, DUT 42457 ; WH-102, DUT 42459
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 52 / 99.0
Date of measurements	18-Jan-2011
Measured by	Jari Jantunen

3.1.1 Test Setup



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3.2. Test method and limit

The measurement is made according to Public notice DA 00-705 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 [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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3.3. Bluetooth Test results

3.3.1 GFSK modulation, PRBS packet type

Channel 78 / 2480 MHz
Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Polarisation	Result
4958	46.06	200.956	47.92	-1.86	HORIZONTAL	PASSED
7440.7	43.38	147.503	41.91	1.47	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
4958	28.69	27.205	30.55	-1.86	HORIZONTAL	PASSED
7440.7	30.24	32.505	28.77	1.47	HORIZONTAL	PASSED

Channel 0 / 2402 MHz
Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Polarisation	Result
4804.2	43.93	157.181	46.68	-2.75	HORIZONTAL	PASSED
7204.5	42.98	140.913	42.16	0.82	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
4804.2	26.84	21.971	29.59	-2.75	HORIZONTAL	PASSED
7204.5	30.2	32.359	29.38	0.82	VERTICAL	PASSED

Channel 40 / 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
34.891	32.38	41.567	55.74	-23.36	VERTICAL	PASSED
34.9	24.77	17.326	48.14	-23.37	VERTICAL	PASSED
35	24.63	17.047	48.03	-23.4	VERTICAL	PASSED
35.402	23.95	15.753	47.51	-23.56	VERTICAL	PASSED
35.571	24.34	16.485	47.97	-23.63	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
2495.422	54.28	517.488	59.64	-5.36	HORIZONTAL	PASSED
3914.231	40.52	106.206	43.19	-2.67	HORIZONTAL	PASSED
3943.187	39.98	99.724	42.68	-2.7	VERTICAL	PASSED
17847.495	59.63	957.745	39.61	20.02	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
2495.422	32.1	40.286	37.46	-5.36	HORIZONTAL	PASSED
3914.231	26.91	22.162	29.58	-2.67	HORIZONTAL	PASSED
3943.187	27.2	22.903	29.9	-2.7	VERTICAL	PASSED
17847.495	46.65	215.13	26.63	20.02	VERTICAL	PASSED

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3.3.2 8DPSK modulation, PRBS packet type

Channel 78 / 2480 MHz
Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Polarisation	Result
4960.4	42.28	129.957	44.01	-1.73	HORIZONTAL	PASSED
7441.1	43.51	149.744	42.04	1.47	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
4960.4	28.82	27.618	30.55	-1.73	HORIZONTAL	PASSED
7441.1	30.18	32.296	28.71	1.47	VERTICAL	PASSED

Channel 0 / 2402 MHz
Peak (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Polarisation	Result
4805.3	47.85	246.831	50.59	-2.74	HORIZONTAL	PASSED
7207.8	43.24	145.228	42.42	0.82	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
4805.3	26.81	21.893	29.55	-2.74	HORIZONTAL	PASSED
7207.8	30.23	32.471	29.41	0.82	HORIZONTAL	PASSED

Channel 40 / 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
34.71	22.72	13.673	46.01	-23.29	VERTICAL	PASSED
34.949	32.69	43.117	56.07	-23.38	VERTICAL	PASSED
35.091	25.38	18.58	48.82	-23.44	VERTICAL	PASSED
35.27	23.72	15.346	47.23	-23.51	VERTICAL	PASSED
35.462	32.8	43.631	56.39	-23.59	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
4889.98	43.47	149.056	45.68	-2.21	HORIZONTAL	PASSED
4914.627	46.47	210.644	48.54	-2.07	HORIZONTAL	PASSED
17965.93	59.54	948.637	39.72	19.82	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
4889.98	28.28	25.93	30.49	-2.21	HORIZONTAL	PASSED
4914.627	28.77	27.457	30.84	-2.07	HORIZONTAL	PASSED
17965.93	46.08	201.442	26.26	19.82	HORIZONTAL	PASSED

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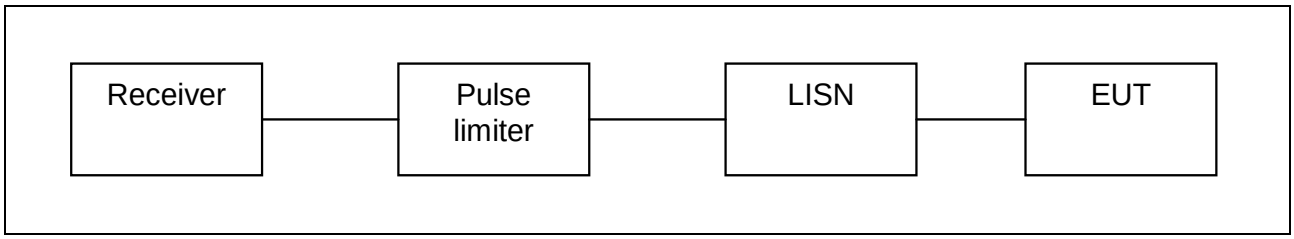
4. AC powerline conducted emissions

(FCC §15.207, RSS-GEN 7.2.2)

EUT with DUT number	RM-691, DUT 42453
Accessories with DUT numbers	BL-5K, DUT 42455 ; AC-15E, DUT 42457 ; WH-102, DUT 42459
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	20 / 50 / 99.4
Date of measurements	25-Jan-2011
Measured by	Jari Jantunen

4.1.1 Test Setup



4.2. Test method and limit

The measurement is made according to ANSI C63.4-2003 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:

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

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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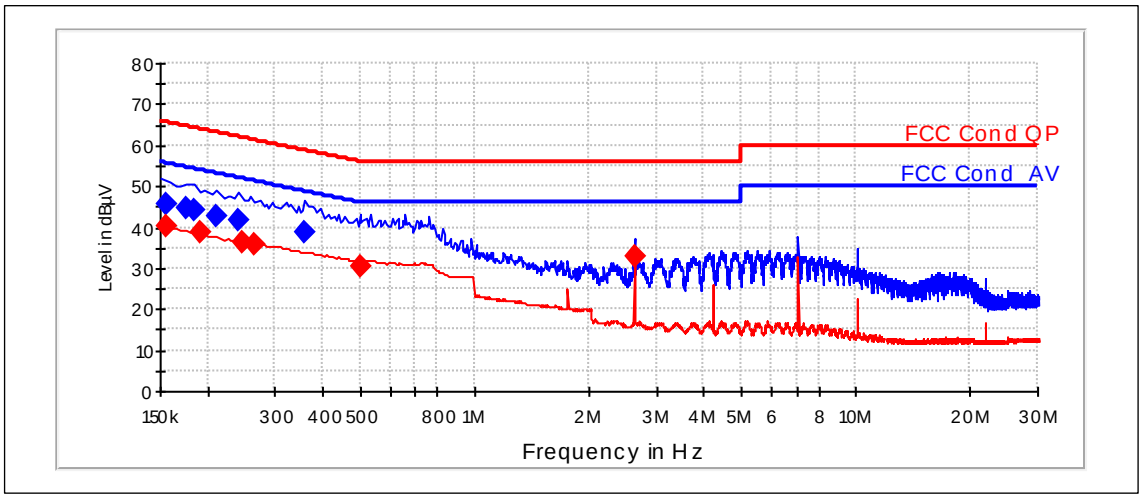
4.3. Bluetooth Test results

4.3.1 GFSK modulation, PRBS packet type

Channel 40 / 2442 MHz



Quasi peak

Frequency [MHz]	U [dBµV]	IF-BW[kHz]	Line	Margin	Result
0.155	45.67	10	N	20.03	PASSED
0.175	44.57	10	N	20.12	PASSED
0.185	44.03	10	N	20.26	PASSED
0.21	42.87	10	N	20.31	PASSED
0.24	41.93	10	L1	20.2	PASSED
0.36	38.66	10	N	20.03	PASSED

Average

Frequency [MHz]	U [dBµV]	IF-BW[kHz]	Line	Margin	Result
0.155	40.39	10	N	15.33	PASSED
0.19	38.89	10	N	15.14	PASSED
0.245	36.31	10	N	15.62	PASSED
0.265	35.76	10	L1	15.47	PASSED
0.5	30.66	10	N	15.3	PASSED
2.625	32.91	10	N	13.1	PASSED

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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 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

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
-	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

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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	F-90-1500-6-R	RLC Electronics	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

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