

FCC Part 15C Compliance Test Report

Test Report no.:	FCC15CBT_RM-884_06.docx	Date of Report:	26-Jun-2012
Number of pages:	23	Customer's Contact person:	Tobias Cremer
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FCC listing no.:	94436		
IC recognition no.:	661AK-1		
Tested devices/ accessories:	Phone RM-884 / Battery BL-5J / AC charger AC-11E / Headset WH-102		
FCC ID:	PPIRM-884	IC:	-
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:			

Kalle Hannila, Engineer, EMC & SAR

1. Summary for FCC Part 15C Compliance Test Report

Date of receipt	03-Oct-2011
Testing completed	20-Oct-2011
The customer's contact person	Tobias Cremer
Test Plan referred to	T:\Projects\RM-813\TestPlan\RS_testplan_RM-813.xls
Notes	-
Document name	T:\Projects\RM-813\EMC\FCC15CBT_RM-813_02.docx

1.1. EUT and Accessory Information

The EUT is a 8-band mobile phone:

GSM850/900/1800/1900/GPRS/EGPRS/Monopole without GND reflector (GSM/WCDMA)

WCDMA I/II(1900)/V(850)/VIII/HSDPA/HSUPA/Monopole without GND reflector (GSM/WCDMA)

WLAN/Bluetooth

The EUT is tested with maximum rated TX power, modulated with pseudo random bit sequence (PRBS9).

Product	Type	SN	HW	MV	SW	DUT
Phone	RM-813	004402136622101	0150	-	jc13.32	42686
Battery	BL-5J	4175351253D10101414;0670573	-	-	-	42688
AC charger	AC-11E	4090491212970501626;0675479	-	-	-	42689
Headset	WH-102	06943231163V4121358	-	-	-	42690

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(0.4(2))	Conducted peak output power	NP
15.247(d)	A8(0.5)	Band edge compliance of RF emissions	PASSED
15.247(d)	A8(0.5)	Spurious RF conducted emissions	NP
15.247(d), 15.209	A8(0.5)	Spurious radiated emissions	PASSED
15.207	7.2.2	AC powerline conducted emissions	PASSED
15.247(a)(1)	A8(0.1(1))	20dB(bandwidth)	NP
15.247(a)(1)	A8(0.1(2))	Carrier frequency separation	NP
15.247(a)(1)(iii)	A8(0.1(4))	Number of hopping frequencies	NP
15.247(a)(1)(iii)	A8(0.1(4))	Time of occupancy	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.

The test results of PPIRM-813 are re-used for certification of the PPIRM-884. The table above indicates the results, which will be re-used.

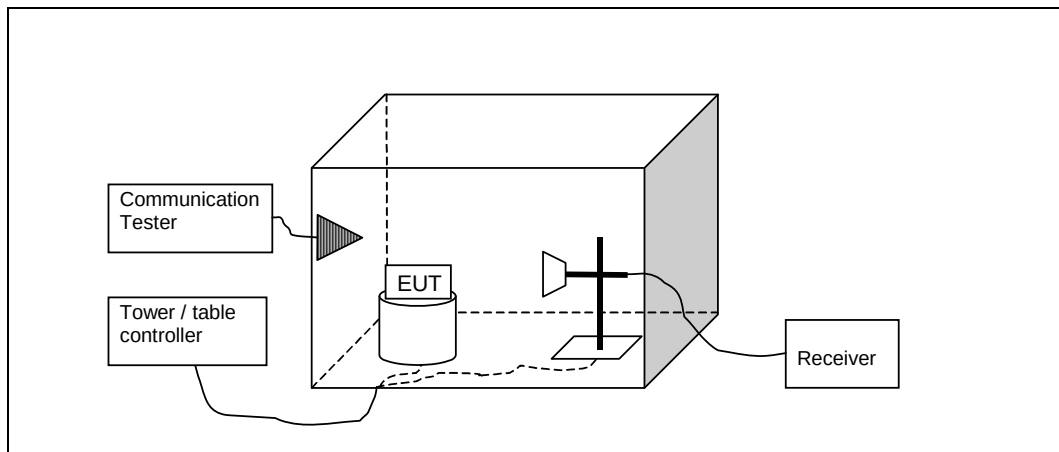
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2. Band edge compliance of RF emissions (FCC §15.247(d), RSS-210 A8.5)

EUT with DUT number	RM-813, DUT 42686
Accessories with DUT numbers	BL-5J, DUT 42688 ; AC-11E, DUT 42689 ; WH-102, DUT 42690
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21-24 / 45-52 / 99.1-99.9
Date of measurements	03.. 24-Oct-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 results of in-band field strength measurements of the fundamental emission are found in section 3.

The band edge results were obtained using Marker-Delta method as below:

$$E [dB\mu V/m] = \text{Fundamental emission}[dB\mu V] - \text{Delta}[dB]$$

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. Bluetooth Test results

GFSK modulation, PRBS packet type, Marker-Delta Method

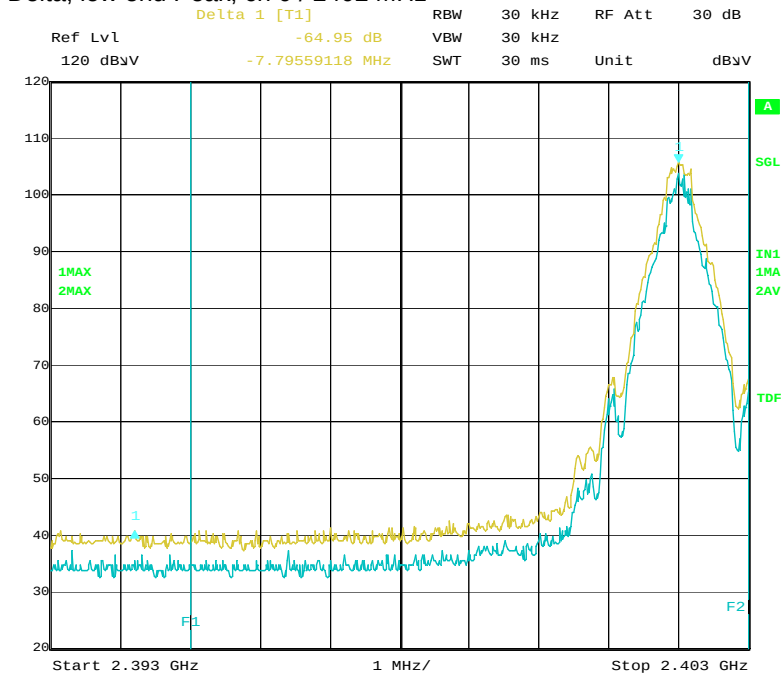
Average

Channel / f _c [MHz]	E [dBμV/m]	Fundamental emission [dBμV]	Delta [dB]	Result
0 / 2402	40.78	107.25	66.47	PASSED
Hopping on, Low end	41.62	107.25	65.63	PASSED
78 / 2480	41.54	107.88	66.34	PASSED
Hopping on, High end	40.24	107.88	67.64	PASSED

Peak

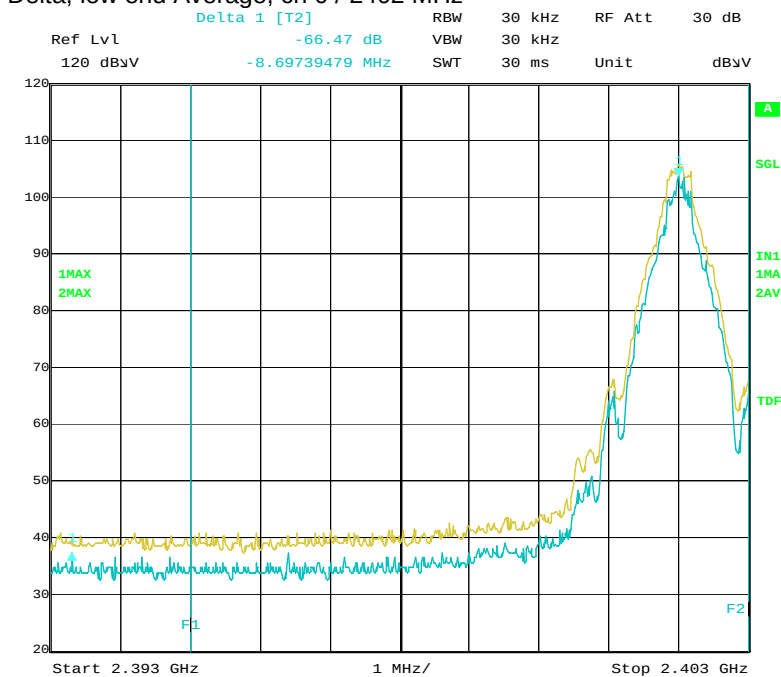
Channel / f _c [MHz]	E [dBμV/m]	Fundamental emission [dBμV]	Delta [dB]	Result
0 / 2402	43.80	108.75	64.95	PASSED
Hopping on, Low end	45.05	108.75	63.70	PASSED
78 / 2480	43.75	107.93	64.18	PASSED
Hopping on, High end	43.37	107.93	64.56	PASSED

Delta, low end Peak, ch 0 / 2402 MHz



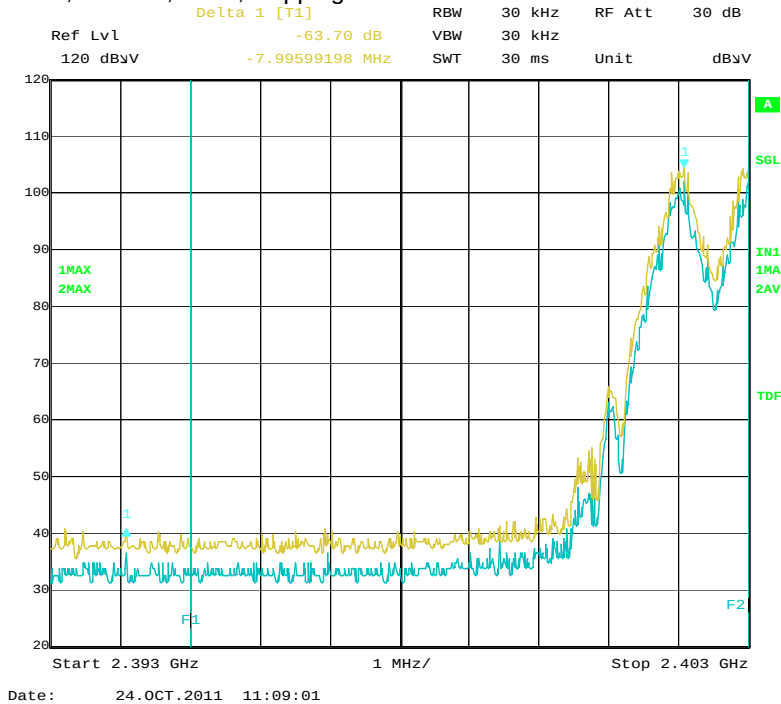
Date: 24.OCT.2011 11:04:29

Delta, low end Average, ch 0 / 2402 MHz

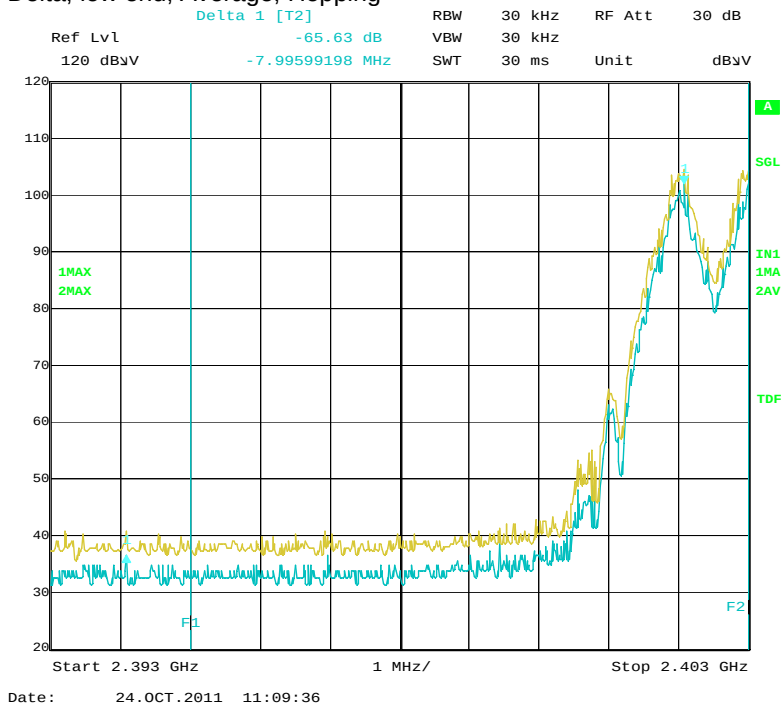


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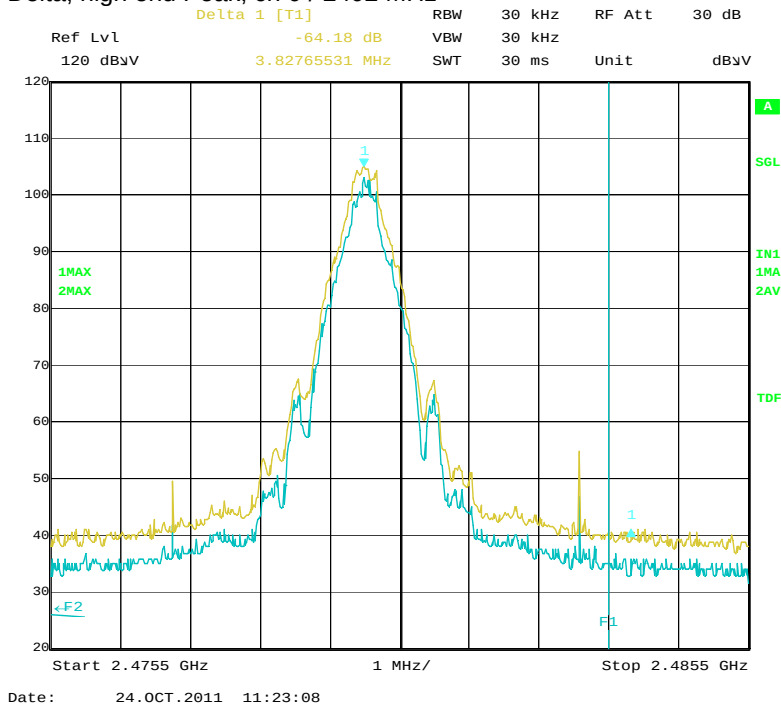
Delta, low end, Peak, Hopping



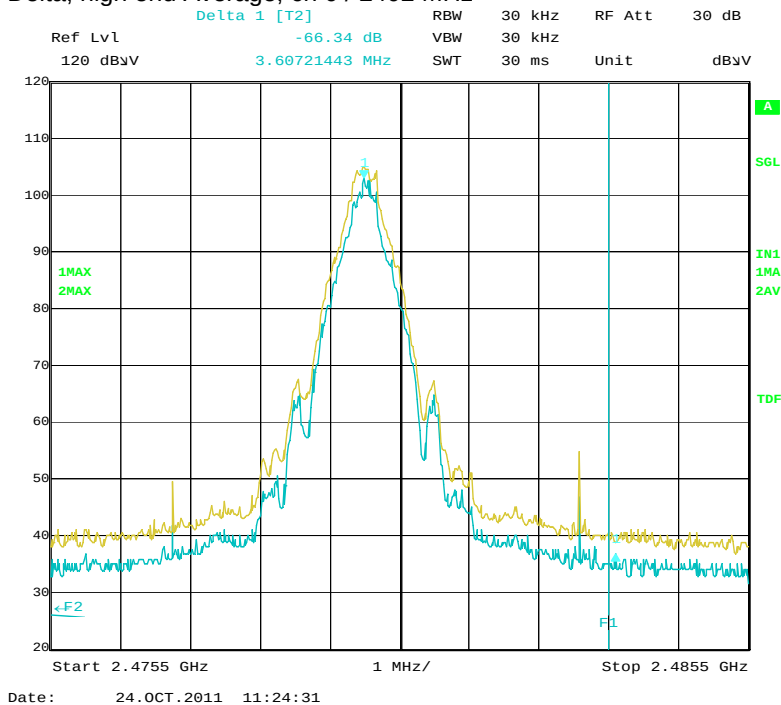
Delta, low end, Average, Hopping



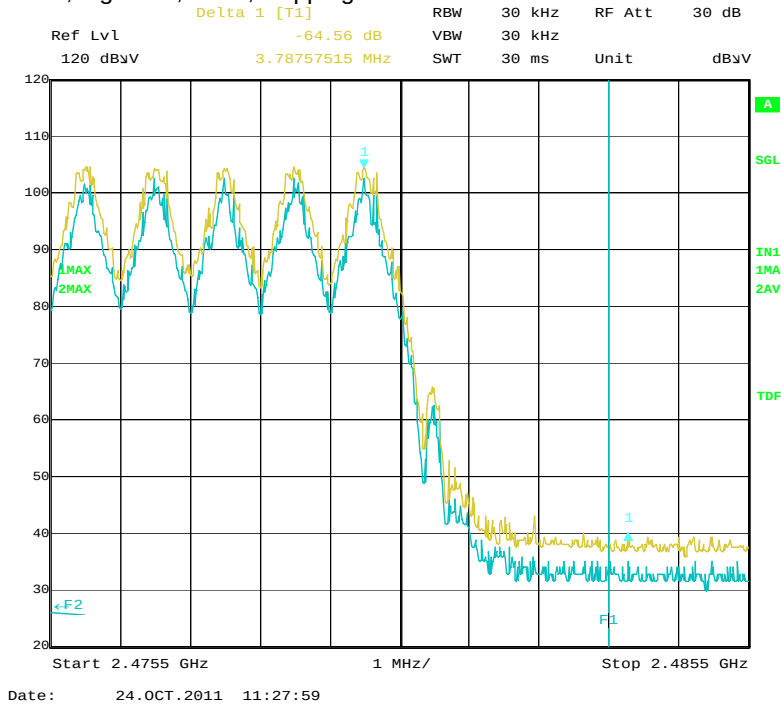
Delta, high end Peak, ch 0 / 2402 MHz



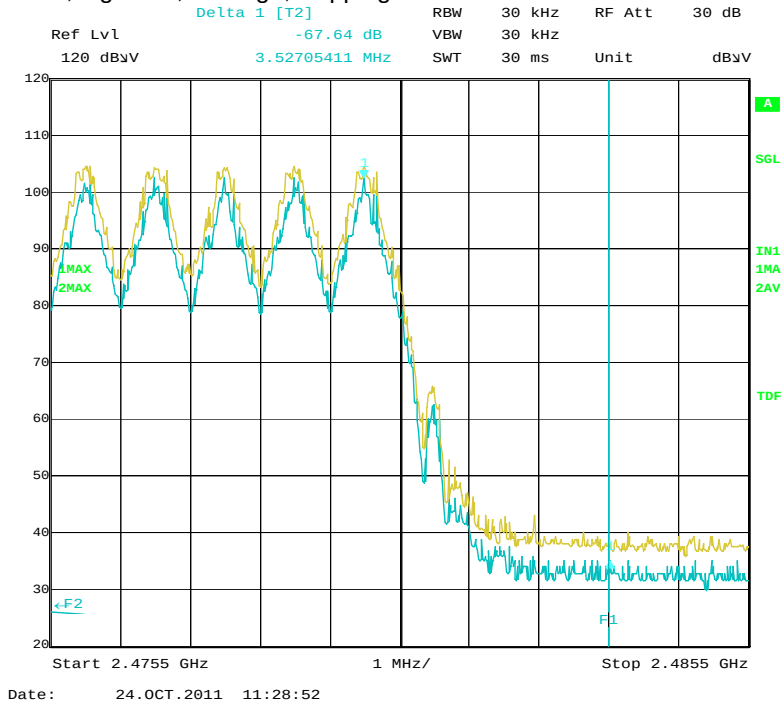
Delta, high end Average, ch 0 / 2402 MHz



Delta, high end, Peak, Hopping



Delta, high end, Average, Hopping



2.3.1 8DPSK modulation, PRBS packet type, Marker-Delta method

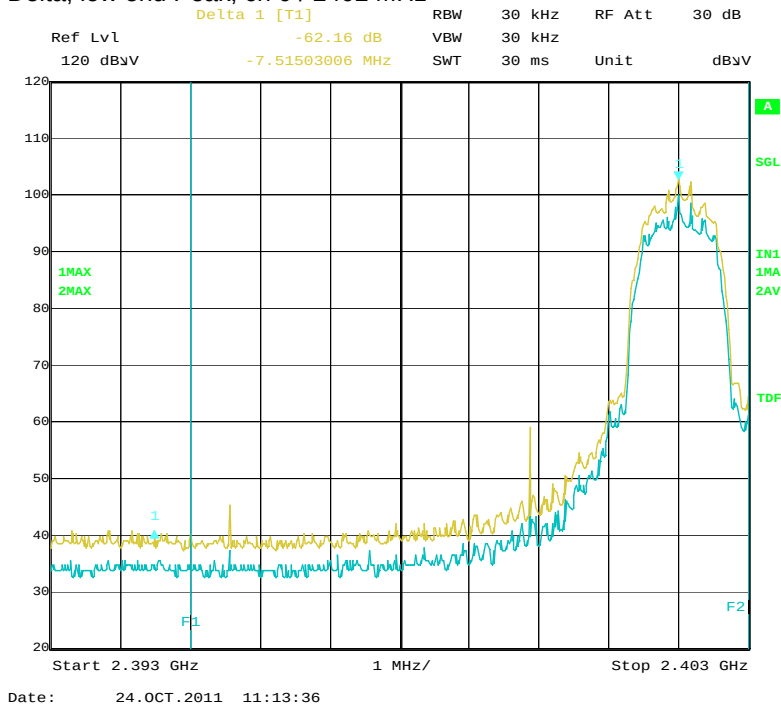
Average

Channel / f _c [MHz]	E [dBμV/m]	Fundamental emission [dBμV]	Delta [dB]	Result
0 / 2402	43.80	108.33	64.53	PASSED
Hopping on, Low end	49.16	108.33	59.17	PASSED
78 / 2480	43.43	107.59	64.16	PASSED
Hopping on, High end	46.31	107.59	61.28	PASSED

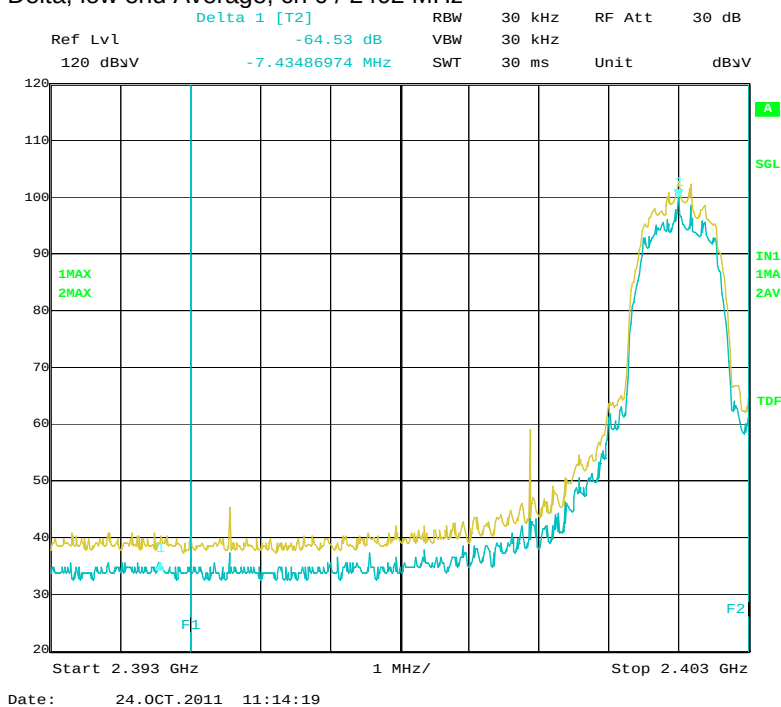
Peak

Channel / f _c [MHz]	E [dBμV/m]	Fundamental emission [dBμV]	Delta [dB]	Result
0 / 2402	46.65	108.81	62.16	PASSED
Hopping on, Low end	49.09	108.81	59.72	PASSED
78 / 2480	46.72	110.12	63.40	PASSED
Hopping on, High end	48.69	110.12	61.43	PASSED

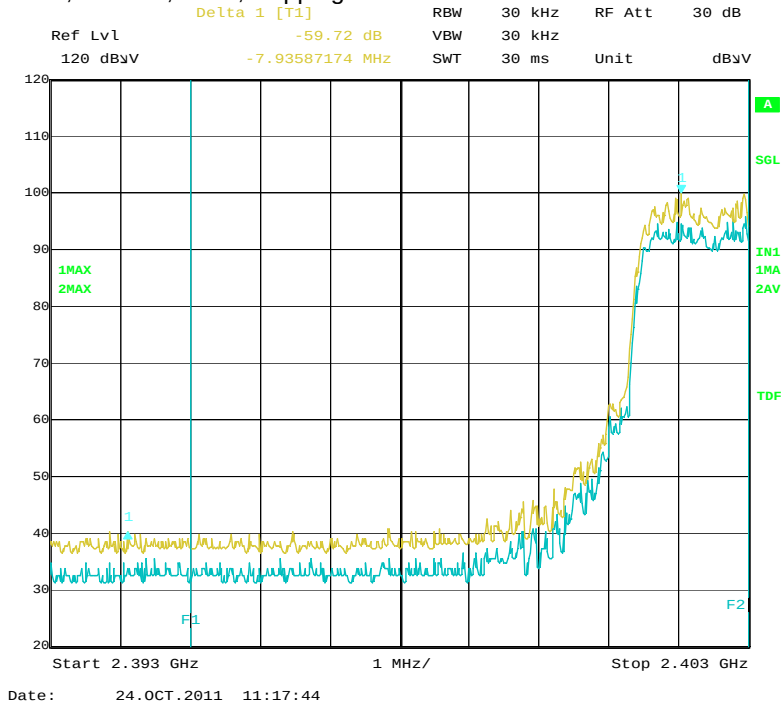
Delta, low end Peak, ch 0 / 2402 MHz



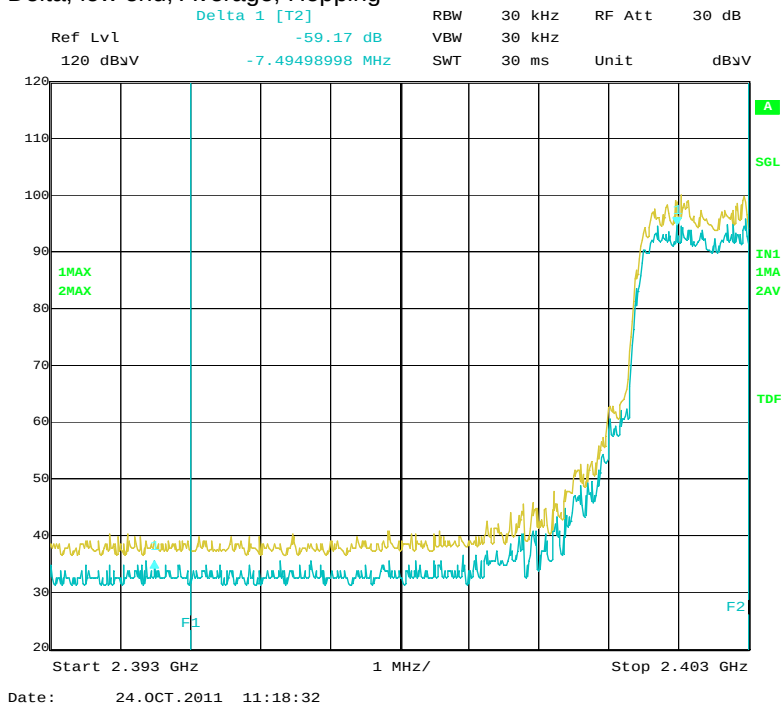
Delta, low end Average, ch 0 / 2402 MHz



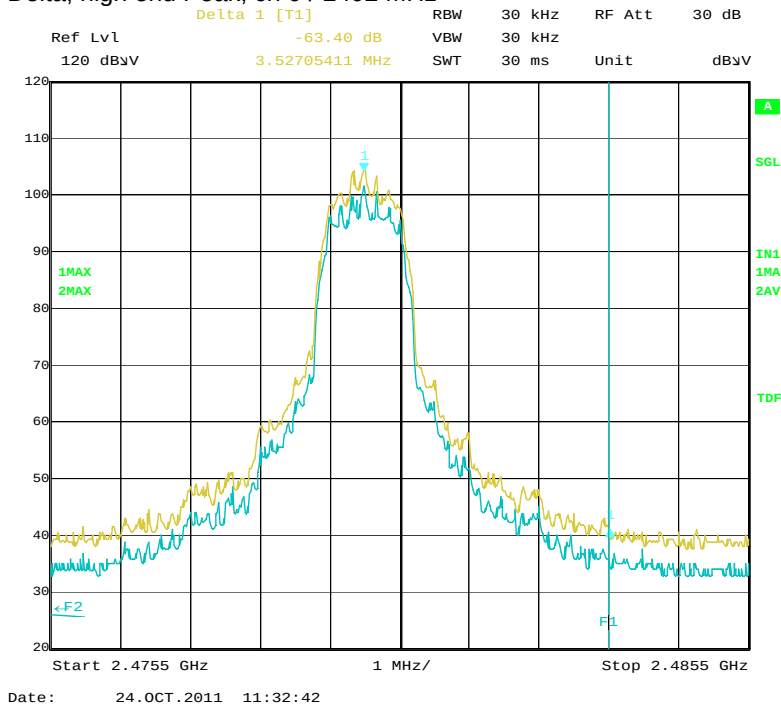
Delta, low end, Peak, Hopping



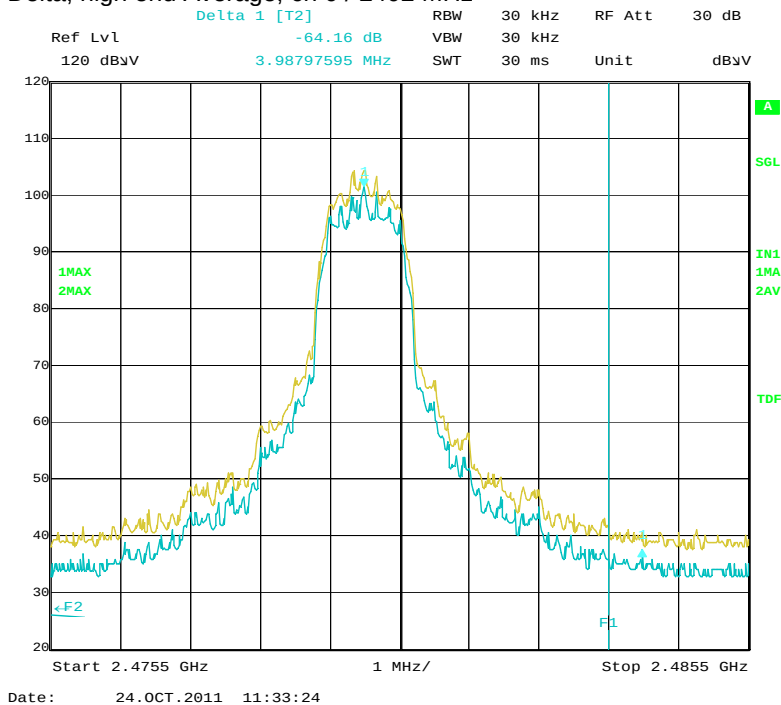
Delta, low end, Average, Hopping



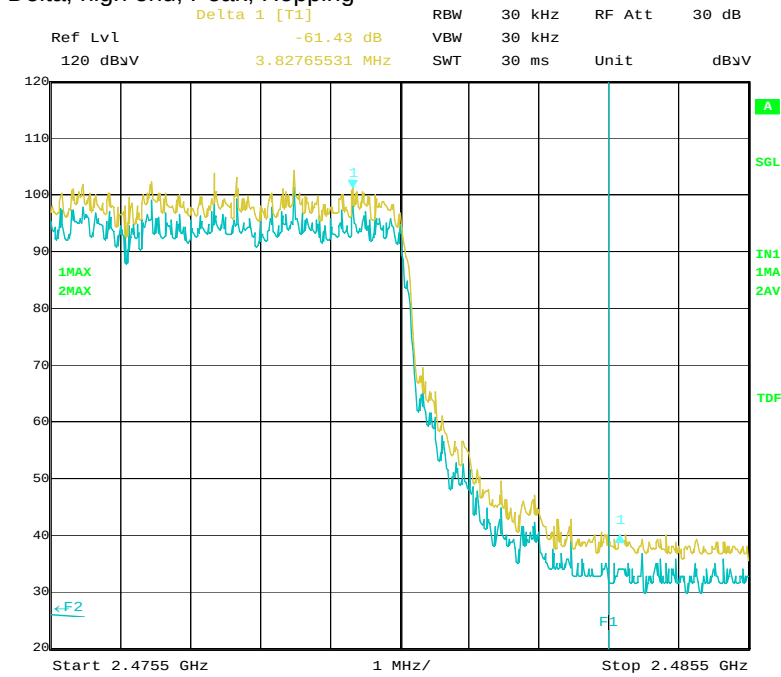
Delta, high end Peak, ch 0 / 2402 MHz



Delta, high end Average, ch 0 / 2402 MHz

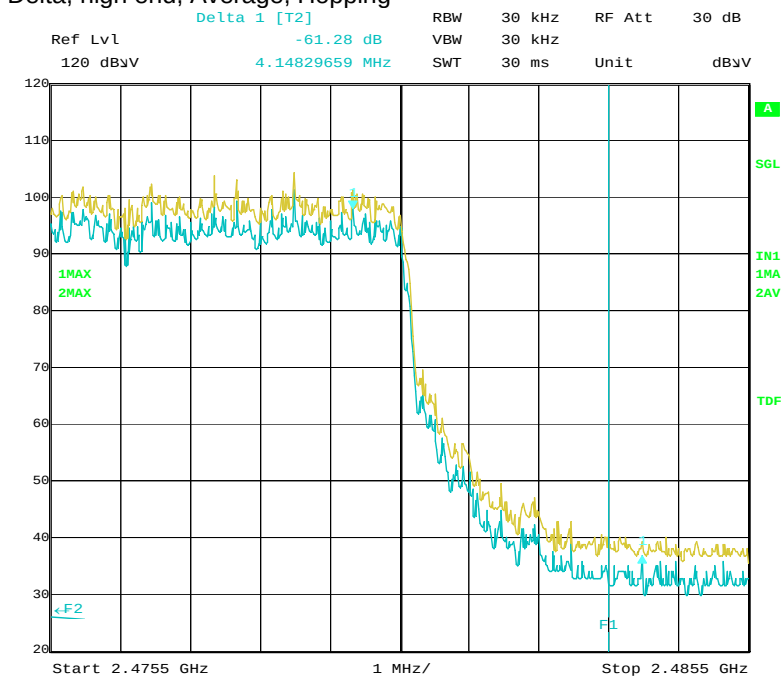


Delta, high end, Peak, Hopping



Date: 24.OCT.2011 11:37:16

Delta, high end, Average, Hopping



Date: 24.OCT.2011 11:37:52

3. AC powerline conducted emissions (FCC §15.207, RSS-GEN 7.2.2)

EUT with DUT number	RM-813, DUT 42686
Accessories with DUT numbers	BL-5J, DUT 42688 ; AC-11E, DUT 42689 ; WH-102, DUT 42690
Operation Voltage [V] / [Hz]	Nominal
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 46 / 98.4
Date of measurements	07-Oct-2011
Measured by	Hannu Söderholm

3.1. Test method and limit

The measurement is made according to Public notice DA 00-705 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:

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

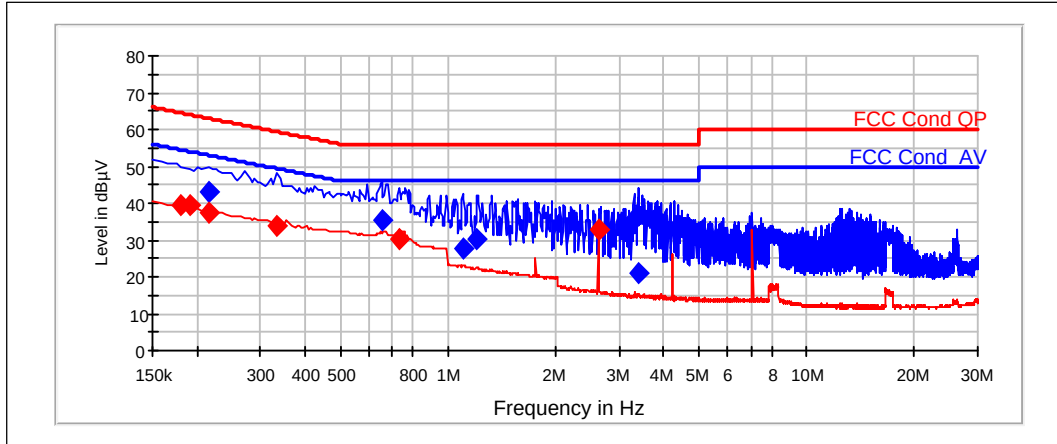
Where U_{RX} is receiver reading and A_{TOT} is total correction factor including cable and pulse limiter attenuations.

CISPR 22 Class B limits

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

3.2. Bluetooth Test results

TX mode, channel 40 / 2442 MHz



Quasi peak

Frequency [MHz]	Level [dBμV]	IF-BW[kHz]	Line	Margin	Result
0.215	42.88	10	N	20.11	PASSED
0.655	35.33	10	L1	20.7	PASSED
1.1	27.83	10	N	28.2	PASSED
1.205	30.48	10	L1	25.5	PASSED
3.305	35.88	10	L1	20.1	PASSED
3.4	21.04	10	N	35	PASSED

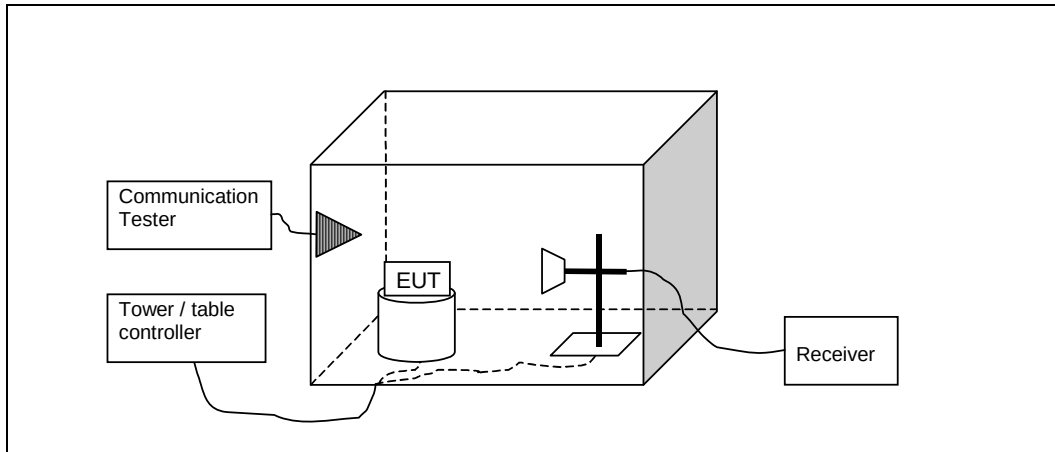
Average

Frequency [MHz]	Level [dBμV]	IF-BW[kHz]	Line	Margin	Result
0.18	39.26	10	L1	15.19	PASSED
0.19	39.45	10	N	14.64	PASSED
0.215	37.41	10	N	15.61	PASSED
0.335	33.94	10	N	15.43	PASSED
0.73	30.33	10	N	15.7	PASSED
2.625	32.58	10	L1	13.4	PASSED

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

EUT with DUT number	RM-813, DUT 42686
Accessories with DUT numbers	BL-5J, DUT 42688 ; AC-11E, DUT 42689 ; WH-102, DUT 42690
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 49 / 99.4
Date of measurements	03-Oct-2011
Measured by	Jari Jantunen

4.1.1 Test Setup



4.2. 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 [$\mu V/m$]	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. Bluetooth Test results

4.3.1 GFSK modulation, PRBS packet type

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
2402	108.75	273841.96	117.77	-9.02	HORIZONTAL	PASSED Note
4802.6	39.52	94.624	42.08	-2.56	HORIZONTAL	PASSED
7208	43.32	146.555	41.95	1.37	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
2402	108.25	258523.48	117.27	-9.02	HORIZONTAL	PASSED Note
4802.6	26.92	22.179	29.48	-2.56	HORIZONTAL	PASSED
7208	30.78	34.582	29.41	1.37	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
43.235	24.51	16.8	51.23	-26.72	VERTICAL	PASSED
47.543	28.46	26.494	57.51	-29.05	VERTICAL	PASSED
47.785	28.71	27.255	57.91	-29.2	VERTICAL	PASSED
47.906	26.65	21.503	54.56	-27.91	HORIZONTAL	PASSED
48.426	28.1	25.401	56.31	-28.21	HORIZONTAL	PASSED
48.467	27.72	24.33	55.95	-28.23	HORIZONTAL	PASSED
48.608	28.01	25.156	56.32	-28.31	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
3900.8	39.04	89.516	42.34	-3.3	VERTICAL	PASSED
3910.522	38.75	86.626	42.07	-3.32	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
3900.8	25.95	19.845	29.25	-3.3	VERTICAL	PASSED
3910.522	25.89	19.704	29.21	-3.32	HORIZONTAL	PASSED

Channel 78 / 2480 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
2480	107.93	249172.44	116.63	-8.70	HORIZONTAL	PASSED Note
4958.7	41.55	119.578	43.1	-1.55	VERTICAL	PASSED
7439.3	43.64	152.09	41.57	2.07	VERTICAL	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
2480	107.88	247742.21	116.58	-8.70	HORIZONTAL	PASSED Note
4958.7	28.9	27.852	30.45	-1.55	VERTICAL	PASSED
7439.3	30.93	35.213	28.86	2.07	VERTICAL	PASSED

Note: These are fundamental frequencies.

4.3.2 8DPSK modulation, PRBS packet type

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
2402	108.81	275740.15	117.83	-9.02	HORIZONTAL	PASSED Note
4805	39.77	97.331	42.34	-2.57	VERTICAL	PASSED
7204.9	43.95	157.58	42.59	1.36	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
2402	108.33	260915.57	117.35	-9.02	HORIZONTAL	PASSED Note
4805	26.95	22.261	29.52	-2.57	VERTICAL	PASSED
7204.9	30.75	34.455	29.39	1.36	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
42.736	26.39	20.867	52.89	-26.5	VERTICAL	PASSED
42.806	24.59	16.953	51.13	-26.54	VERTICAL	PASSED
47.674	27.25	23.038	56.38	-29.13	VERTICAL	PASSED
47.735	29.04	28.317	56.86	-27.82	HORIZONTAL	PASSED
47.797	27.99	25.084	55.84	-27.85	HORIZONTAL	PASSED
48.045	28.32	26.065	56.31	-27.99	HORIZONTAL	PASSED
48.986	26.41	20.924	54.93	-28.52	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
3912.022	38.5	84.11	41.83	-3.33	HORIZONTAL	PASSED
3942.987	39.69	96.516	42.85	-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
3912.022	25.82	19.552	29.15	-3.33	HORIZONTAL	PASSED
3942.987	26.12	20.226	29.28	-3.16	HORIZONTAL	PASSED

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
2480	110.12	320626.93	118.82	-8.70	HORIZONTAL	PASSED Note
4960.9	42.58	134.633	44.15	-1.57	HORIZONTAL	PASSED
7440.2	43.91	156.91	41.82	2.09	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
2480	107.59	239607.27	116.29	-8.70	HORIZONTAL	PASSED Note
4960.9	29.1	28.52	30.67	-1.57	HORIZONTAL	PASSED
7440.2	31.24	36.475	29.15	2.09	HORIZONTAL	PASSED

Note: These are fundamental frequencies.

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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
2019	Power splitter	ZN2PD-9G-S+	Mini-Circuits	15E
2020	Power splitter	ZN2PD-9G-S+	Mini-Circuits	15E

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
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