FCC Part 22/24 Compliance Test Report

Test Report no.:	FCC22&24_RM-846_37	**Date of Report:**	21-May-2013
Number of pages:	18	**Customer's Contact person:**	Juha Paukku
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 P.O. Box 68 Sinitaival 5 FIN-33720 TAMPERE, FINLAND Tel. +358 (0) 7180 46800 Fax. +358 (0) 7180 46880
FCC listing no.: **IC recognition no.:**	94436 661AK-1		
Tested devices/ accessories:	**Phone RM-846 / Battery BL-4J / Charger AC-50E / Data cable CA-190CD / Headset WH-108 / Dummy battery SD-116M**		
FCC ID:	PDNRM-846X	**IC:**	661R-RM846
Supplement reports:	-		
Testing has been carried out in accordance with:	**CFR 47, FCC rules Parts 22/24 , TIA-603-C-2004 and IC standards, RSS-GEN (Issue 3, December 2010), RSS-132 (Issue 2, September 2005), RSS-133 (Issue 5, February 2009). 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 cn=Jari Jantunen, o, ou, email=jari.a.jantunen@nokia.com, c=FI 2013.05.21 09:53:42 +03'00'		

Jari Jantunen, System Manager, EMC

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1. Summary for FCC Part 22/24 Compliance Test Report

Date of receipt	02-Oct-2012
Testing completed	16-Oct-2012
The customer's contact person	Juha Paukku
Test Plan referred to	T:\Projects\RM-846\TestPlan\RS_testplan_RM-846.xlsm
Notes	-
Document name	T:\Projects\RM-846\EMC\New FCC ID\FCC22&24_RM-846_37.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-846	004402471069694	1640	-	1030.1801.9200.9900.133	42913
Battery	BL-4J	49554022630A0100872;0670616	LG PWB Ver. 2.1	-	-	42914
Charger	AC-50E	4090492023260400093	-	-	-	42768
Data cable	CA-190CD	-	-	-	-	42786
Headset	WH-108	-	4.0	4.0	-	42921
Dummy battery	SD-116M	07484K 20169	0.1	-	-	42919
Phone	RM-846	004402471070056	1640	-	2.0.21570.1	42922
Battery	BL-4J	49554022020A0108950;0670616	LG PWB Ver. 2.1	-	-	42924
AC charger	AC-50E	4090492023260400600;0675619	HW0.5MW0.4PV04	-	-	42785
Data Cable	CA-190CD	-	-	-	-	42918
Headset	WH-108	-	4.0	4.0	-	42926

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1.2. Summary of Test Results

GSM850:

Section in CFR 47	Section in RSS-GEN or RSS-132	Name of the test	Result
§2.1046(a), 22.913(a)	4.4	Conducted RF output power	NP
§22.913(a)	4.4	Radiated RF output power	NP
§2.1049(h)	4.6.1	99 % occupied bandwidth	PASSED
§22.917(a)	4.5	Band edge compliance	NP
§22.917(a), §2.1051	4.5	Spurious emissions at antenna terminals	NP
§22.917(a), §2.1053	4.5	Spurious radiated emissions	PASSED
§2.1055(a)	4.3	Frequency stability, temperature variation	PASSED
§2.1055(d)	4.3	Frequency stability, voltage variation	PASSED

WCDMA 850 (Band V):

Section in CFR 47	Section in RSS-GEN or RSS-132	Name of the test	Result
§2.1046(a), 22.913(a)	4.4	Conducted RF output power	NP
§22.913(a)	4.4	Radiated RF output power	NP
§2.1049(h)	4.6.1	99 % occupied bandwidth	PASSED
§22.917(a)	4.5	Band edge compliance	NP
§22.917(a), §2.1051	4.5	Spurious emissions at antenna terminals	NP
§22.917(a), §2.1053	4.5	Spurious radiated emissions	PASSED
§2.1055(a)	4.3	Frequency stability, temperature variation	NP
§2.1055(d)	4.3	Frequency stability, voltage variation	NP

GSM1900:

Section in CFR 47	Section in RSS-GEN or RSS-133	Name of the test	Result
§2.1046(a)	6.4	Conducted RF output power	NP
§24.232(b)	6.4	Radiated RF output power	NP
§2.1049(h)	4.6.1	99 % occupied bandwidth	PASSED
§24.238(a)	6.5	Band edge compliance	NP
§24.238(a), §2.1051	6.5	Spurious emissions at antenna terminals	NP
§24.238(a), §2.1053	6.5	Spurious radiated emissions	PASSED
§2.1055(a)	6.3	Frequency stability, temperature variation	PASSED
§2.1055(d)	6.3	Frequency stability, voltage variation	PASSED

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WCDMA 1900 (Band II):

Section in CFR 47	Section in RSS-GEN or RSS-133	Name of the test	Result
§2.1046(a)	6.4	Conducted RF output power	NP
§24.232(b)	6.4	Radiated RF output power	NP
§2.1049(h)	4.6.1	99 % occupied bandwidth	PASSED
§24.238(a)	6.5	Band edge compliance	NP
§24.238(a), §2.1051	6.5	Spurious emissions at antenna terminals	NP
§24.238(a), §2.1053	6.5	Spurious radiated emissions	PASSED
§2.1055(a)	6.3	Frequency stability, temperature variation	NP
§2.1055(d)	6.3	Frequency stability, voltage variation	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 PDNRM-846 *are re-used for certification of the* PDNRM-846X*. The table above indicates the results, which will be re-used*.

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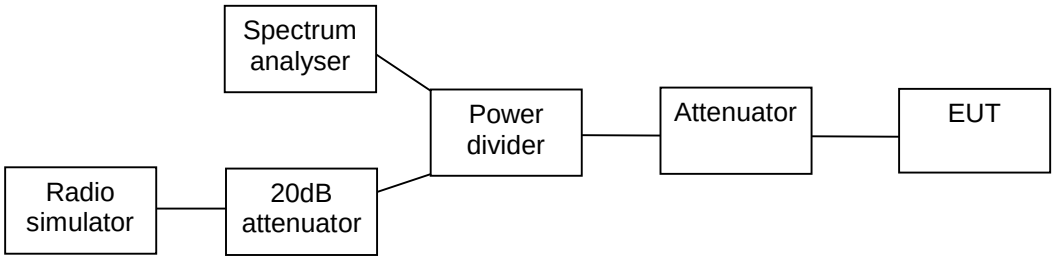
2. 99% occupied bandwidth
(FCC §2.1049(h), RSS-GEN 4.6.1)

EUT with DUT number	RM-846, DUT 42913
Accessories with DUT numbers	BL-4J, DUT 42914 ; AC-50E, DUT 42768 ; CA-190CD, DUT 42786 ; WH-108, DUT 42921
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 50 / 100.8
Date of measurements	04-Oct-2012
Measured by	Timo Raiskio

2.1. Test Setup



2.2. Test method and limit

The measurement is made according to FCC rules parts 22, 24 and IC standard RSS-GEN.

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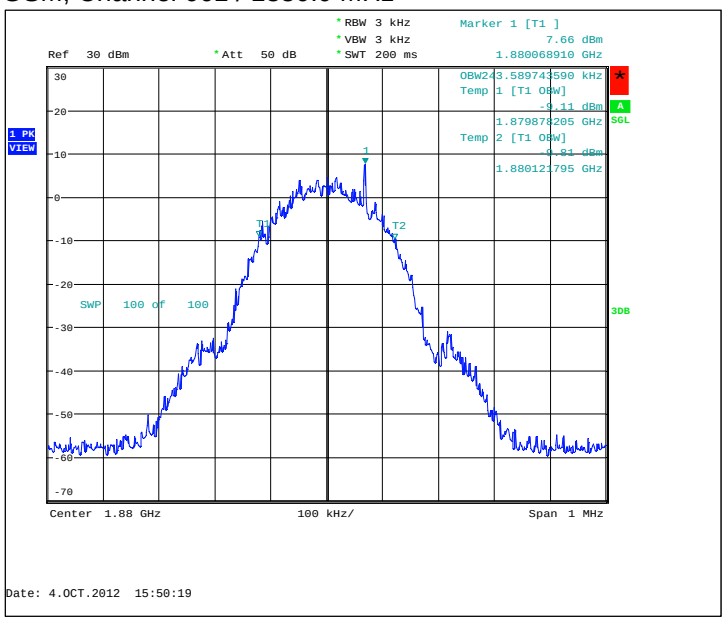
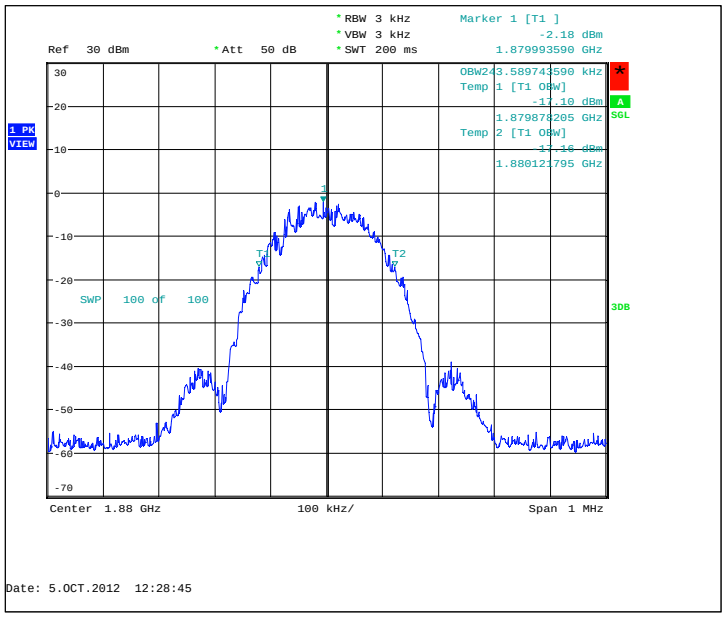
2.3. GSM 1900 Test results

Operation mode (TX on)	99% Occupied bandwidth [kHz]
GSM	243.6
EGPRS	243.6

GSM, Channel 661 / 1880.0 MHz



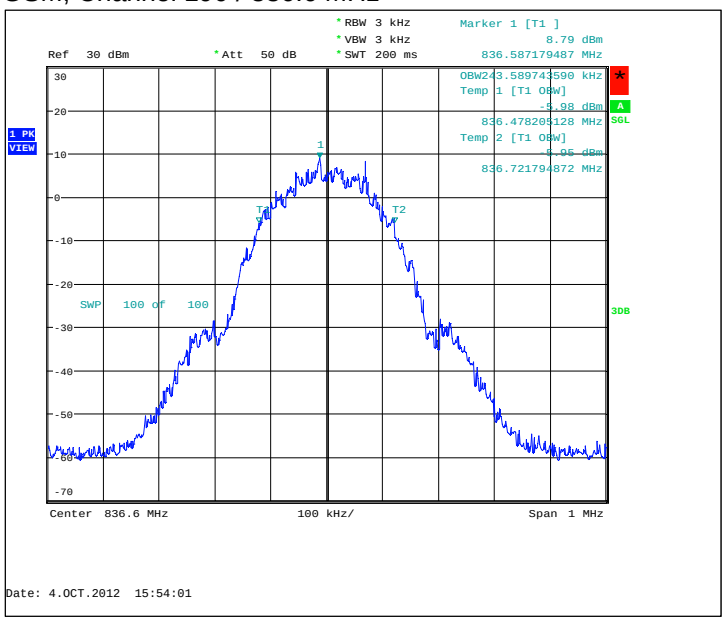
EGPRS, Channel 661 / 1880.0 MHz



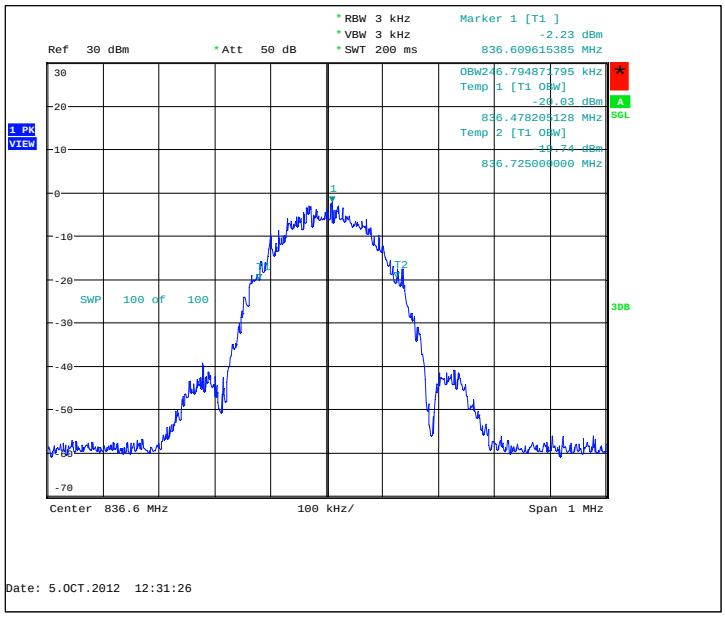
2.4. GSM 850 Test results

Operation mode (TX on)	99% Occupied bandwidth [kHz]
GSM	243.6
EGPRS	246.8

GSM, Channel 190 / 836.6 MHz



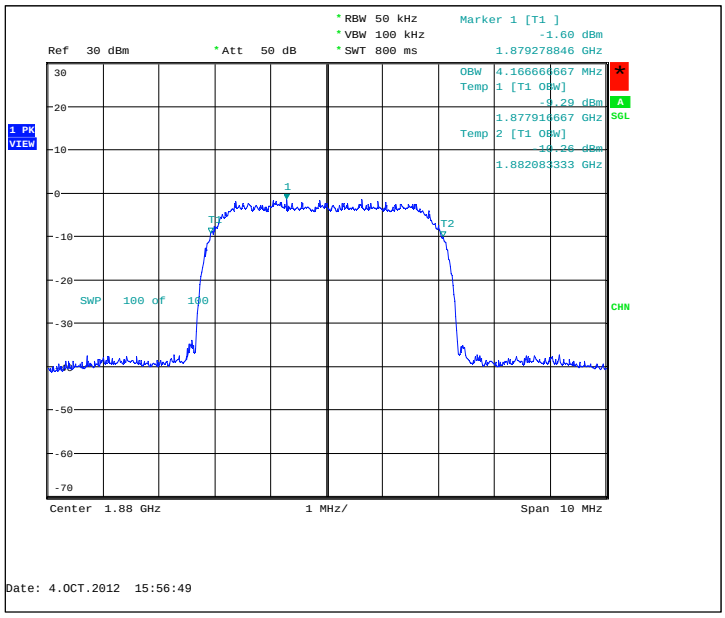
EGPRS, Channel 190 / 836.6 MHz



2.5. WCDMA 1900 Test results

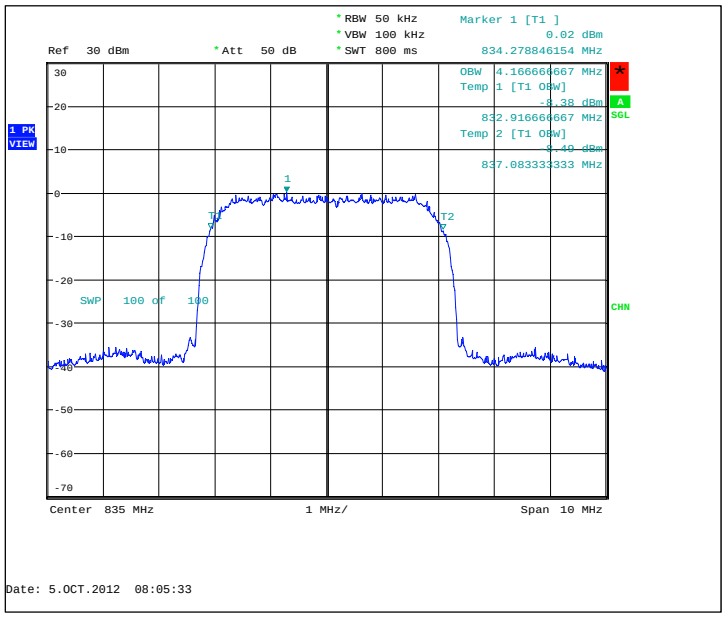
Operation mode (TX on)	99% Occupied bandwidth [kHz]
FDD	4166.7

FDD, Channel 9400 / 1880.0 MHz



2.6. WCDMA 850 Test results

FDD, Channel 4175 / 835.0 MHz



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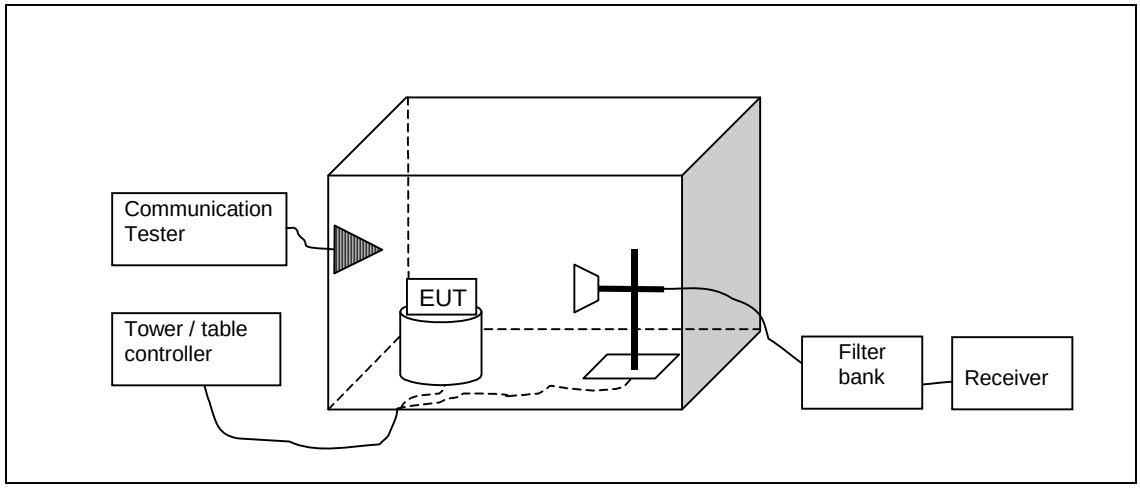
3. Spurious radiated emissions

(FCC §22.917(a), §2.1053, §24.238(a), §2.1053, RSS-132 4.5, RSS-133 6.5)

EUT with DUT number	RM-846, DUT 42922
Accessories with DUT numbers	BL-4J, DUT 42924 ; AC-50E, DUT 42785 ; CA-190CD, DUT 42918 ; WH-108, DUT 42926
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 49 / 100.1
Date of measurements	16-Oct-2012
Measured by	Hannu Söderholm

3.1.1 Test setup



3.2. Test method and limit

The measurement is made according to TIA-603-C-2004 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 substitution method is used.

The measurement results are obtained as described below:

$P\ [dBm] = P_{SUBST\ TX} + G_{SUBST\ TX\ ANT} - L_{SUBST\ CABLE}$

Where $P_{SUBST\ TX}$ is signal generator level, which produces the same receiver reading P_{MEAS} in dBm as EUT. $G_{SUBST\ TX\ ANT}$ is substitution antenna gain and $L_{SUBST\ CABLE}$ is the loss of the cable between the signal generator and the substitution antenna.

Limits for spurious radiated emissions measurements

Operation band	Frequency range [MHz]	Limit [dBm]
GSM850 / WCDMA850	30 - 8500	-13
GSM1900 / WCDMA1900	30 - 18000	-13

3.3. GSM850 TX test results

Peak detector

Frequency [MHz]	P [dBm]	P [µW]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarization	Results
1643.888	-58.02	0.00158	-52.39	-5.63	VERTICAL	PASSED
2509.619	-39.39	0.11503	-41.15	1.76	HORIZONTAL	PASSED
3316.232	-58.91	0.00128	-63.54	4.63	VERTICAL	PASSED
3395.351	-58.05	0.00157	-62.77	4.72	VERTICAL	PASSED

*Substitution method could not be utilized as no emissions above noise floor were found during measurements.

3.4. GSM850-E1 TX test results

Peak detector

Frequency [MHz]	P [dBm]	P [µW]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarization	Results
1685.271	-58.96	0.00127	-52.93	-6.03	VERTICAL	PASSED
2509.92	-45.84	0.02607	-47.6	1.76	HORIZONTAL	PASSED
3354.93	-57.67	0.00171	-62.45	4.78	VERTICAL	PASSED

*Substitution method could not be utilized as no emissions above noise floor were found during measurements.

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3.5. GSM1900 TX test results

Peak detector

Frequency [MHz]	P [dBm]	P [µW]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarization	Results
1603.362	-57.27	0.00187	-53.81	-3.46	VERTICAL	PASSED
2857.57	-48.91	0.01286	-55.51	6.6	VERTICAL	PASSED
2920.689	-49.65	0.01084	-56.41	6.76	HORIZONTAL	PASSED
3720.681	-53.95	0.00403	-62.14	8.19	VERTICAL	PASSED
5638.277	-48.85	0.01302	-59.93	11.08	VERTICAL	PASSED
7530.06	-49.73	0.01063	-63.95	14.22	VERTICAL	PASSED

*Substitution method could not be utilized as no emissions above noise floor were found during measurements.

3.6. GSM1900-E1 TX test results

Peak detector

Frequency [MHz]	P [dBm]	P [µW]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarization	Results
1627.229	-56.51	0.00223	-52.8	-3.71	VERTICAL	PASSED
2861.438	-48.84	0.01305	-55.42	6.58	VERTICAL	PASSED
2938.224	-49.64	0.01088	-56.35	6.71	HORIZONTAL	PASSED
3748.036	-54.58	0.00349	-63.05	8.47	VERTICAL	PASSED
5638.176	-50.26	0.00942	-61.33	11.07	VERTICAL	PASSED
7501.623	-50.71	0.0085	-64.69	13.98	VERTICAL	PASSED

*Substitution method could not be utilized as no emissions above noise floor were found during measurements.

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3.7. WCDMA 1900 (Band II) test results

Channel 9400 / 1880.0 MHz

FDD mode, Peak detector

Frequency [MHz]	P [dBm]	P [µW]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarization	Results
3758.497	-32.48	0.56442	-40.89	8.41	VERTICAL	PASSED
5642.144	-36.03	0.24969	-46.83	10.8	HORIZONTAL	PASSED
7527.555	-49.25	0.0119	-63.47	14.22	VERTICAL	PASSED
8107.275	-47.36	0.01836	-62.58	15.22	HORIZONTAL	PASSED

*Substitution method could not be utilized as no emissions above noise floor were found during measurements.

3.8. WCDMA 850 (Band V) test results

Channel 4175 / 835.0 MHz

FDD mode, Peak detector

Frequency [MHz]	P [dBm]	P [µW]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarization	Results
847.881	-48.33	0.01471	-80.74	32.41	HORIZONTAL	PASSED
848.586	-47.24	0.0189	-79.7	32.46	HORIZONTAL	PASSED
1005.892	-62.93	0.00051	-52.62	-10.31	HORIZONTAL	PASSED
1671.523	-46.84	0.02069	-40.58	-6.26	HORIZONTAL	PASSED
2501.463	-42.05	0.06239	-43.8	1.75	HORIZONTAL	PASSED
2501.944	-41.85	0.06533	-43.59	1.74	HORIZONTAL	PASSED

*Substitution method could not be utilized as no emissions above noise floor were found during measurements.

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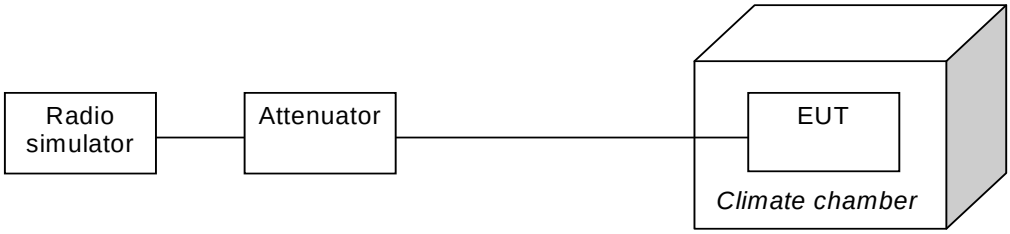
4. Frequency stability, temperature variation
(FCC §2.1055(a), RSS-132 4.3, RSS-133 6.3)

EUT with DUT number	RM-846, DUT 42913
Accessories with DUT numbers	BL-4J, DUT 42914 ; AC-50E, DUT 42768 ; CA-190CD, DUT 42786 ; WH-108, DUT 42921
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 50 / 100.8
Date of measurements	04-Oct-2012
Measured by	Timo Raiskio

4.1. Test Setup



4.2. Test method and limit

The measurement is made according to FCC rules parts 22, 24 and IC standard RSS-132, RSS-133 as follows:

The climate chamber temperature is set to the maximum value and the temperature is allowed to stabilize.
The EUT is placed in the chamber.
The EUT is set in idle mode for 15 minutes.
The EUT is set to transmit.
The transmit frequency error was measured immediately.
The steps c - e were repeated for each temperature.Limits for frequency stability, temperature variation measurements

Frequency deviation [ppm]
+\- 2.5

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4.3. GSM 850 Test results

GSM, Channel 190 / 836.6 MHz

Temperature [°C]	Frequency [MHz]	Deviation [Hz]	Deviation [ppm]	Result
50	836.6	-13.88	-0.0166	PASSED
40	836.6	-1.29	-0.0015	PASSED
30	836.6	-18.6	-0.0222	PASSED
20	836.6	12.27	0.0147	PASSED
10	836.6	-24.8	-0.0296	PASSED
0	836.6	-20.34	-0.0243	PASSED
-10	836.6	-5.04	-0.006	PASSED
-20	836.6	-9.49	-0.0113	PASSED
-30	836.6	-7.3	-0.0087	PASSED

4.4. GSM 1900 Test results

GSM, Channel 661 / 1880.0 MHz

Temperature [°C]	Frequency [MHz]	Deviation [Hz]	Deviation [ppm]	Result
50	1880	-15.82	-0.0084	PASSED
40	1880	-20.53	-0.0109	PASSED
30	1880	16.27	0.0087	PASSED
20	1880	-0.39	-0.0002	PASSED
10	1880	-32.67	-0.0174	PASSED
0	1880	-2.26	-0.0012	PASSED
-10	1880	-22.15	-0.0118	PASSED
-20	1880	-7.17	-0.0038	PASSED
-30	1880	0.13	0.0001	PASSED

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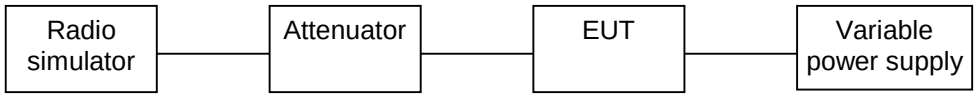
5. Frequency stability, voltage variation
(FCC §2.1055(d), RSS-132 4.3, RSS-133 6.3)

EUT with DUT number	RM-846, DUT 42913
Accessories with DUT numbers	SD-116M, DUT 42919 ; WH-108, DUT 42921
Operation Voltage [V] / [Hz]	3.5, 3.7 and 4.1 VDC
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 50 / 100.8
Date of measurements	04-Oct-2012
Measured by	Timo Raiskio

5.1. Test Setup



5.2. Test method and limit
The measurement is made according to FCC rules parts 22, 24 and IC standard RSS-132, RSS-133 as follows:

The EUT battery was replaced with an adjustable power supply. The frequency stability was measured at nominal voltage and at the battery cut-off point.
Limits for frequency stability, voltage variation measurements

Frequency deviation [ppm]
+\- 2.5

5.3. GSM 1900 Test results
GSM, Channel 661 / 1880.0 MHz

Voltage level [V]	Frequency [MHz]	Deviation [Hz]	Deviation [ppm]	Result
Max / 4.1	1880	-31.45	-0.0167	PASSED
Nominal / 3.7	1880	-13.56	-0.0072	PASSED
Battery cut-off point / 3.5	1880	-28.8	-0.0153	PASSED

5.4. GSM 850 Test results
GSM, Channel 190 / 836.6 MHz

Voltage level [V]	Frequency [MHz]	Deviation [Hz]	Deviation [ppm]	Result
Max / 4.1	836.6	-21.44	-0.0256	PASSED
Nominal / 3.7	836.6	-22.54	-0.0269	PASSED
Battery cut-off point / 3.5	836.6	-18.66	-0.0223	PASSED

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6. Test Equipment

6.1. 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
2023	Spectrum Analyzer	ESMI-RF	R&S	15B/15C
2024	Analyzer display unit	ESAI-D	R&S	15B/15C

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6.2. 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
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
2028	High pass filter	WHKX 1.0/15G-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
2025	Antenna	HFH2-Z2	R&S	15C

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