

FCC Part 22/24/27 Compliance Test Report

Test Report no.:	FCC22&24&27_RM-509_27	Date of Report:	13-Aug-2010
Number of pages:	24	Customer's Contact person:	Ralph Schwarz
Testing laboratory:	TCC Nokia Copenhagen Laboratory Frederikskaj 1790 COPENHAGEN V DENMARK Tel. +45 33 292929 Fax. +45 33 292934	Customer:	Nokia Corporation Lise Meitner Strasse 10 89081 ULM GERMANY Tel. +49 731 1754 0 Fax. +49 731 1754 6800
FCC listing no.:	99059		
IC recognition no.:	661AL-1		
Tested devices/ accessories:	Phone RM-509 / Battery BL-4S / Headset HS-105 / AC Charger AC-8E		
FCC ID:	PPIRM-509	IC:	661U-RM509
Supplement reports:			
Testing has been carried out in accordance with:	CFR 47, FCC rules Parts 22, 24 and 27, TIA-603-C-2004 and IC standards RSS-GEN (Issue 2, June 2007), RSS-132 (Issue 2, September 2005), RSS-133 (Issue 5, February 2009) and RSS-139 (Issue 2, 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:			

Christian Andersen, System Specialist, EMC

1. Summary for FCC Part 22/24/27 Compliance Test Report

Date of receipt	06-Aug-2010
Testing completed	12-Aug-2010
The customer's contact person	Ralph Schwarz
Test Plan referred to	T:\Projects\RM-509\TestPlan_RS\RS_testplan_RM-509_CR_HW0910.xls
Notes	-
Document name	FCC22&24&27_RM-509_27.docx

1.1. EUT and Accessory Information

The EUT is a 7-band (GSM850/900/1800/1900 and WCDMA Band I/IV(1700)/VIII) mobile phone with GPRS, EGPRS and 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-509	356934/03/539938/5	0910	-	Vp cc9.66	24144
Phone	RM-509	356934/03/539916/1	0910	-	Vp cc9.66	24141
Battery	BL-4S	3820668346160918030;0670578	-	-	-	24929
Headset	HS-105	06942878442G3104897	-	-	-	24819
AC Charger	AC-8E	1103339131030310156;0675387	-	-	-	24922

1.2. Summary of Test Results

GSM 850:

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	Passed
§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

GSM 1900:

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	Passed
§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

WCDMA 1700 (Band IV):

Section in CFR 47	Section in <i>RSS-GEN</i> or <i>RSS-139</i>	Name of the test	Result
§2.1046(a)	6.4	Conducted RF output power	NP
§27.50(d)(2)	6.4	Radiated RF output power	NP
§2.1049(h)	4.6.1	99 % occupied bandwidth	Passed
§27.53(g)	6.5	Band edge compliance	Passed
§27.53(g), §2.1051	6.5	Spurious emissions at antenna terminals	NP
§27.53(g), §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 Copenhagen Laboratory.

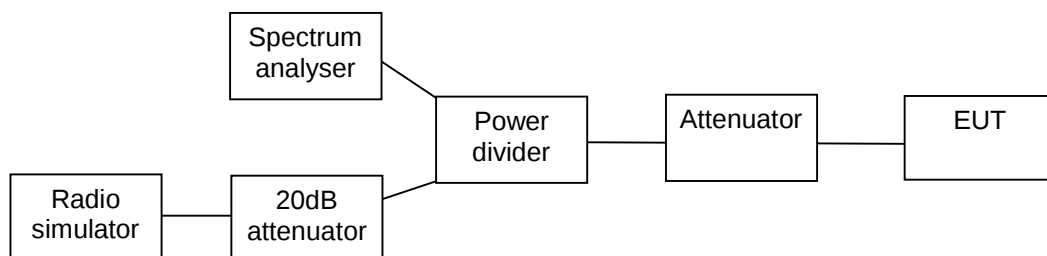
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3. 99 % occupied bandwidth (FCC §2.1049(h), RSS-GEN 4.6.1)

EUT with DUT number	RM-509, DUT 24141
Accessories with DUT numbers	BL-4S, DUT 24929 ; HS-105, DUT 24819 ; AC-8E, DUT 24922
Operation Voltage [V] / [Hz]	115 / 60
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 55 / 100.1
Date of measurements	10-Aug-2010
Measured by	Bo Moltved Christiansen

3.1. Test setup



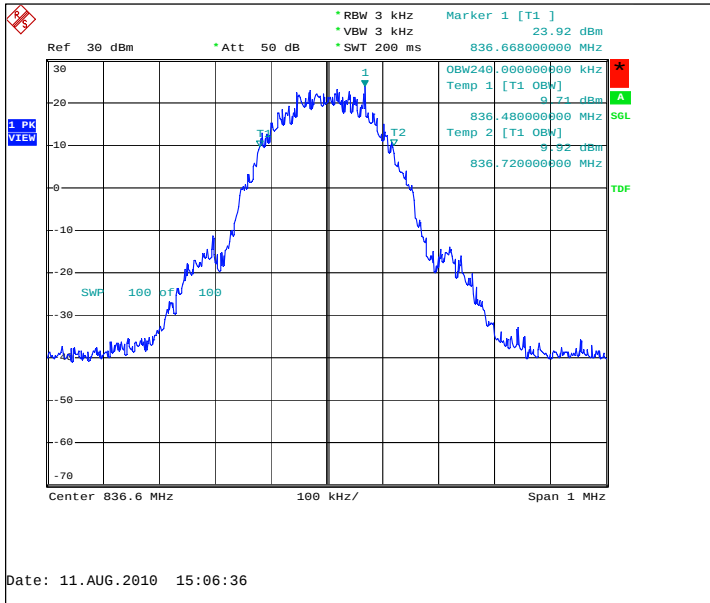
3.2. Test method and limit

The measurement is made according to FCC rules parts 22, 24 and 27 and IC standard RSS-GEN.

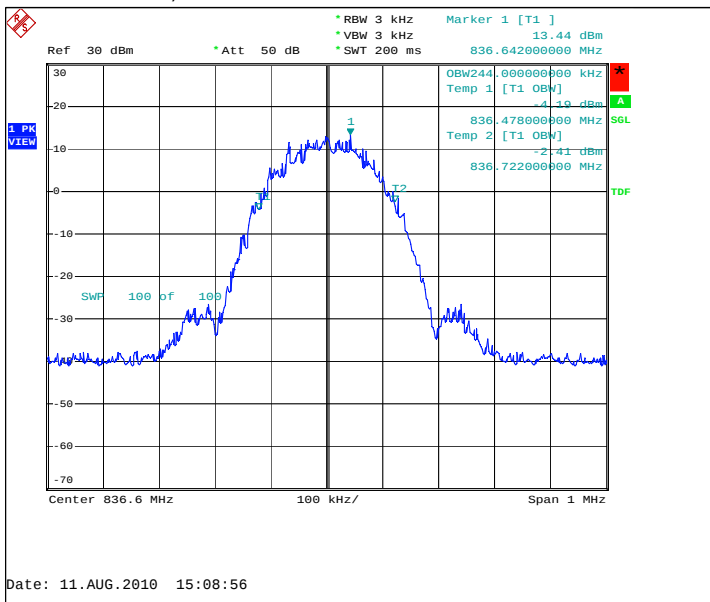
3.3. GSM 850 Test results

Operation mode (TX on)	99% occupied bandwidth [kHz]
GSM	240.000
EGPRS	244.000

GSM mode, channel 190 / 836.6 MHz



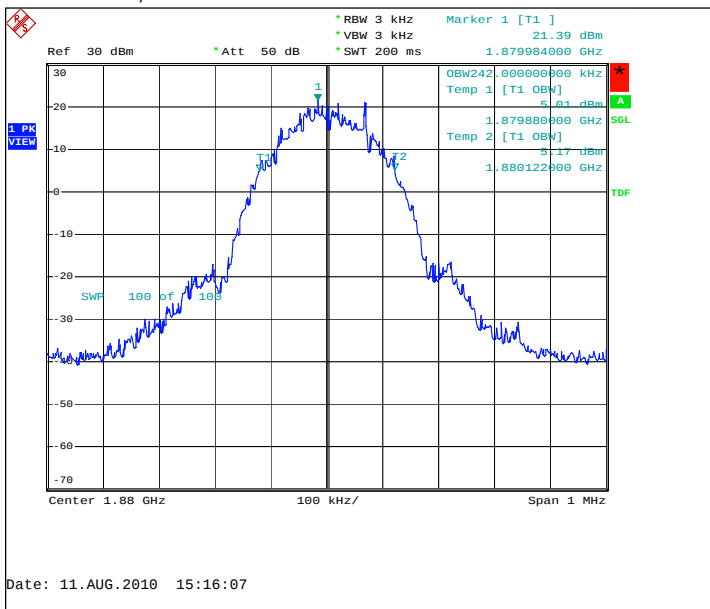
EGPRS mode, channel 190 / 836.6 MHz



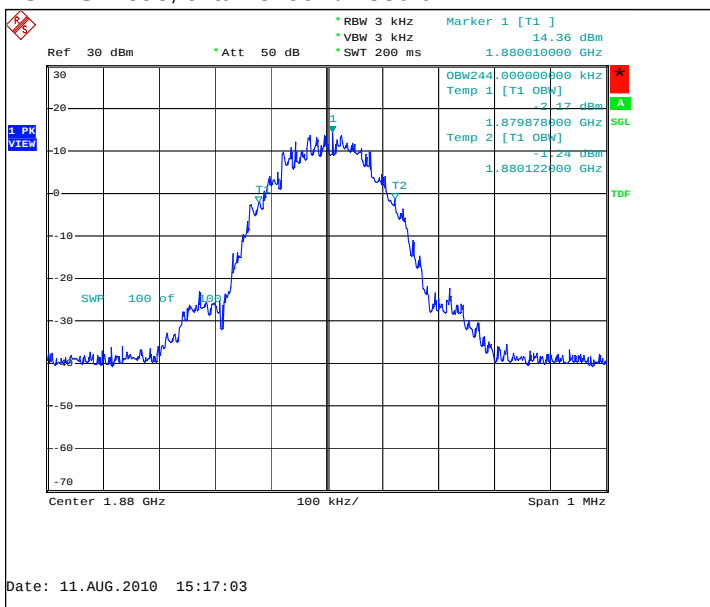
3.4. GSM 1900 Test results

Operation mode (TX on)	99% occupied bandwidth [kHz]
GSM	242.000
EGPRS	244.000

GSM mode, channel 661 / 1880.0 MHz



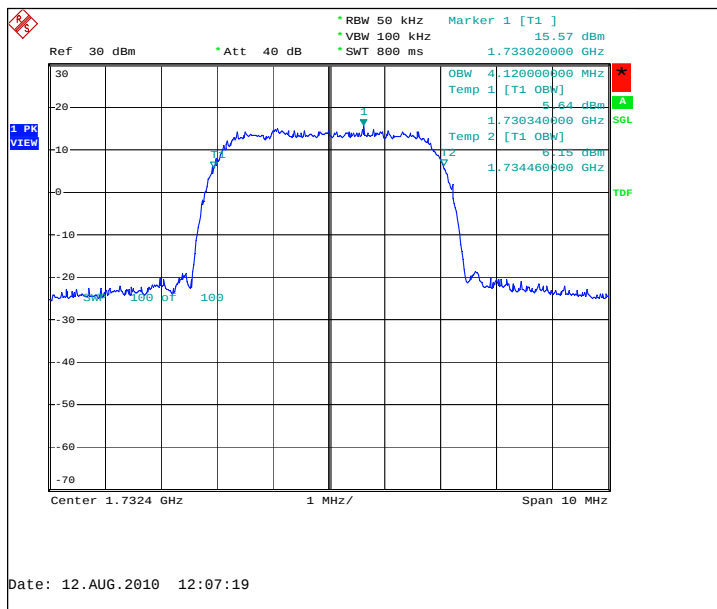
EGPRS mode, channel 661 / 1880.0 MHz



3.5. WCDMA 1700 Test results

Operation mode (TX on)	99% occupied bandwidth [kHz]
FDD	4120.000

Channel 1412 / 1732.4 MHz

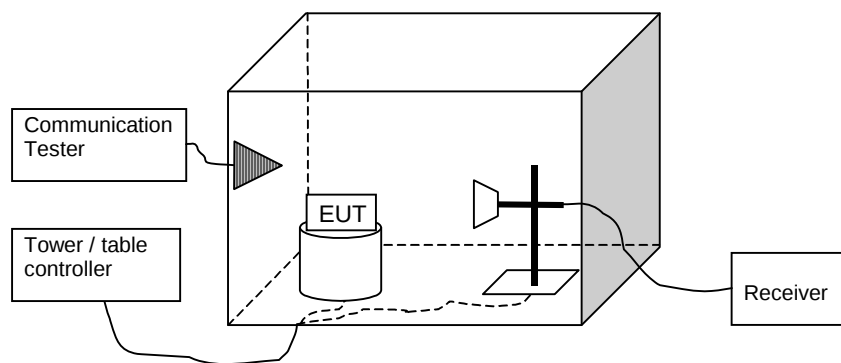


4. Band edge compliance

(FCC §22.917(a), 24.238(a), §27.53(g), RSS-132 4.5, RSS-133 6.5, RSS-139 6.5)

EUT with DUT number	RM-509, DUT 24144
Accessories with DUT numbers	BL-4S, DUT 24929 ; HS-105, DUT 24819 ; AC-8E, DUT 24922
Operation Voltage [V] / [Hz]	115 / 60
Result	Passed
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 55 / 100.1
Date of measurements	10-Aug-2010
Measured by	Christian Andersen

4.1. Test setup



4.2. Test method and limit

The measurement is made according to FCC rules parts 22, 24 and 27 and IC standards RSS-132, RSS-133 and RSS-139.

Limits for band edge compliance measurements

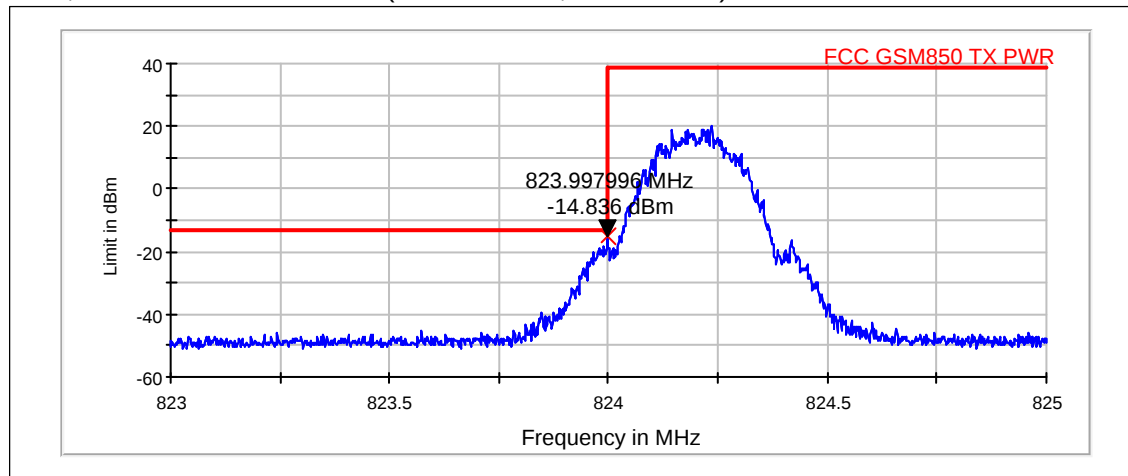
Operation band	Frequency range [MHz]	Limit [dBm]
GSM 850	Below 824 and above 849	-13
WCDMA 1700	Below 1710 and above 1755	-13
GSM 1900	Below 1850 and above 1910	-13

4.3. GSM 850 Test results

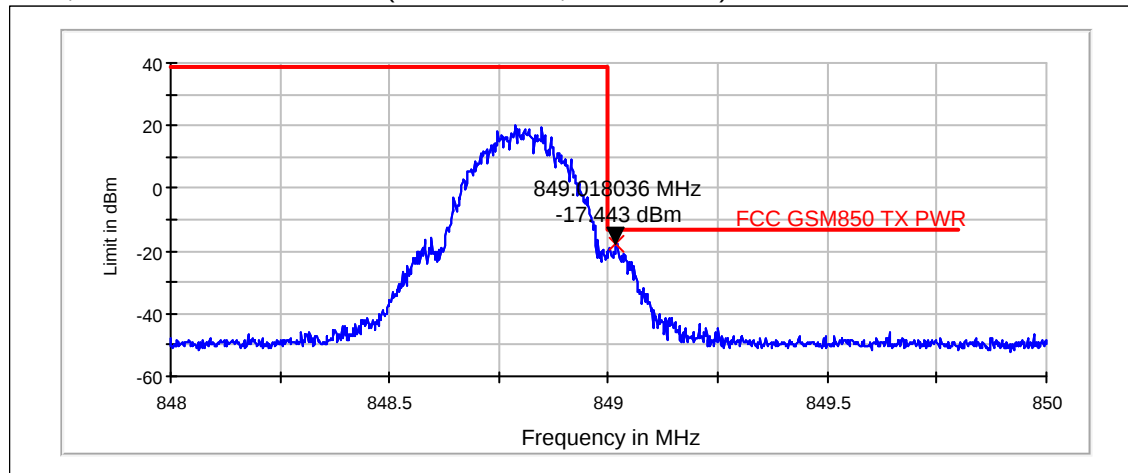
Phone flip open

Operation mode (TX on)	Channel / f_c [MHz]	Level [dBm]
GSM	128 / 824.2	-14.84
GSM	251 / 848.8	-17.44
EGPRS	128 / 824.2	-23.48
EGPRS	251 / 848.8	-27.92

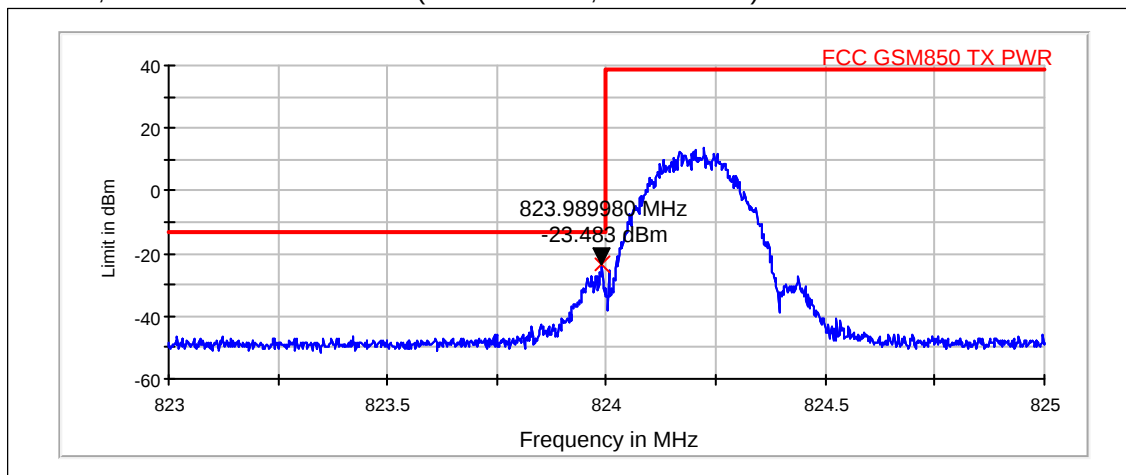
GSM, channel 128 / 824.2 MHz (Peak detector, RBW: 3 kHz)



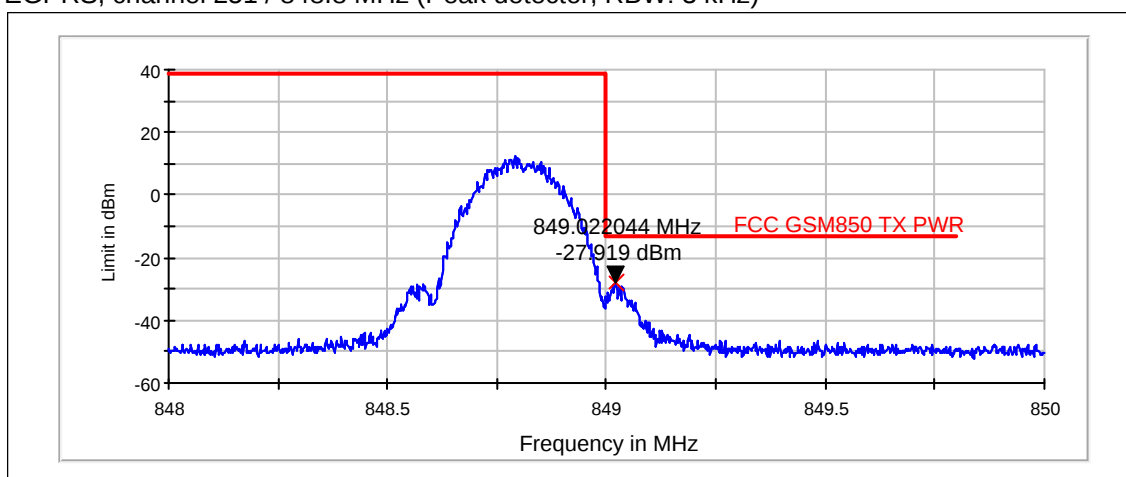
GSM, channel 251 / 848.8 MHz (Peak detector, RBW: 3 kHz)



EGPRS, channel 128 / 824.2 MHz (Peak detector, RBW: 3 kHz)



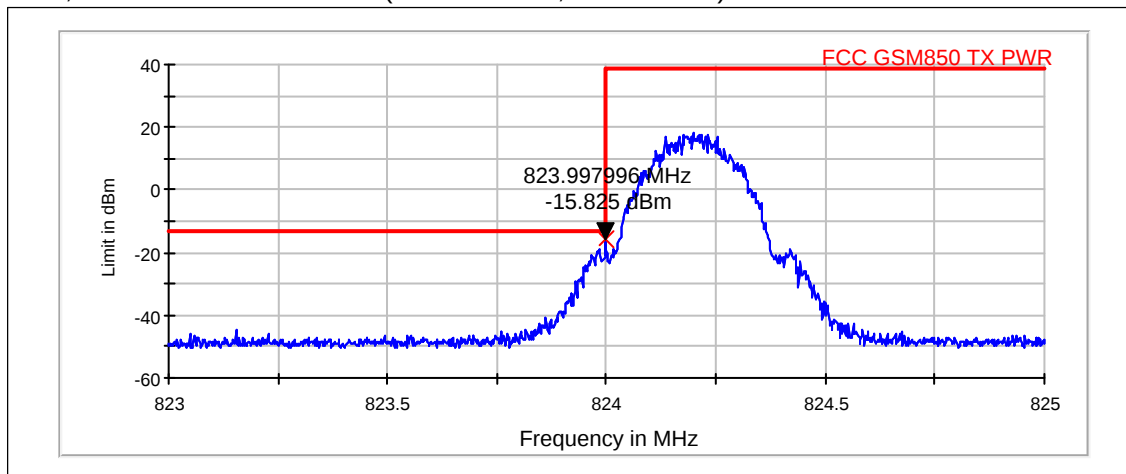
EGPRS, channel 251 / 848.8 MHz (Peak detector, RBW: 3 kHz)



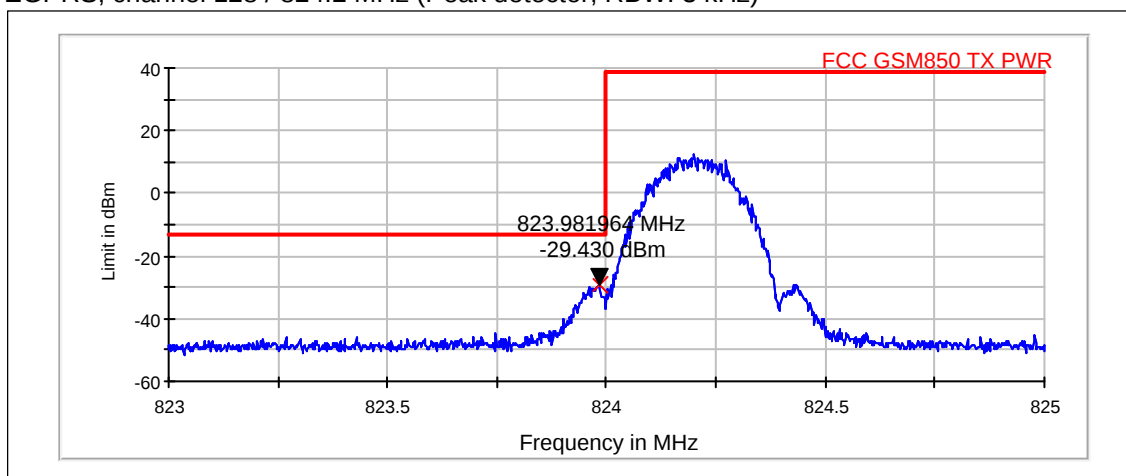
Phone flip closed

Operation mode (TX on)	Channel / f_c [MHz]	Level [dBm]
GSM	128 / 824.2	-15.82
EGPRS	128 / 824.2	-29.43
EGPRS	251 / 848.8	-28.07
GSM	251 / 848.8	-20.32

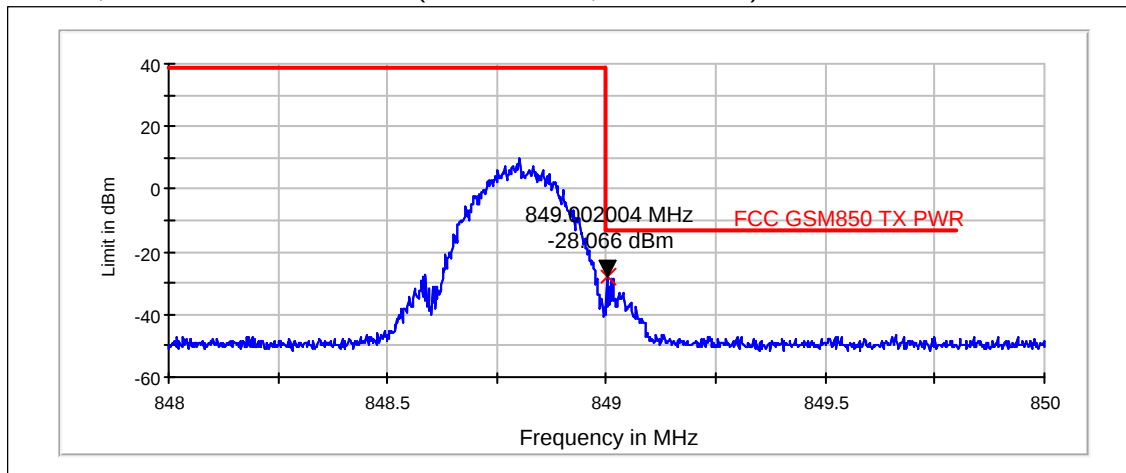
GSM, channel 128 / 824.2 MHz (Peak detector, RBW: 3 kHz)



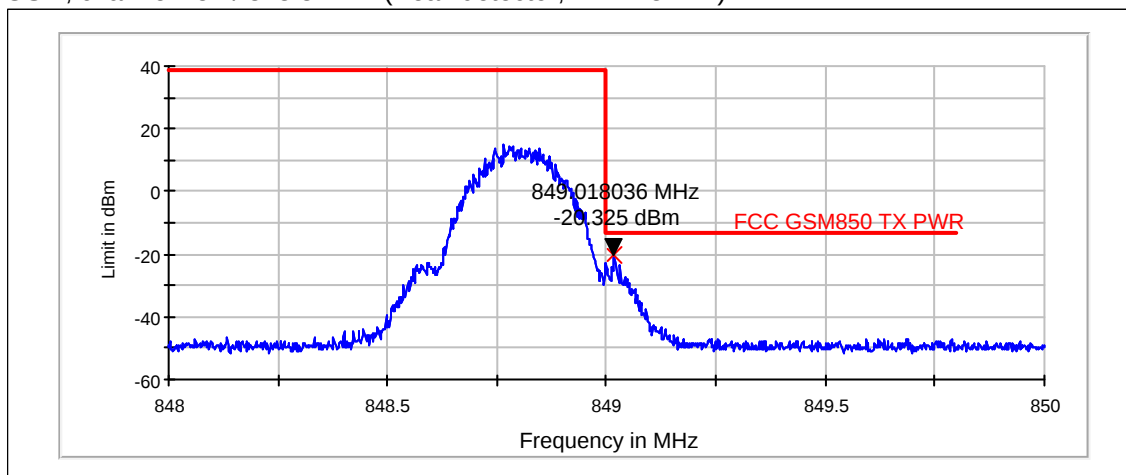
EGPRS, channel 128 / 824.2 MHz (Peak detector, RBW: 3 kHz)



EGPRS, channel 251 / 848.8 MHz (Peak detector, RBW: 3 kHz)



GSM, channel 251 / 848.8 MHz (Peak detector, RBW: 3 kHz)



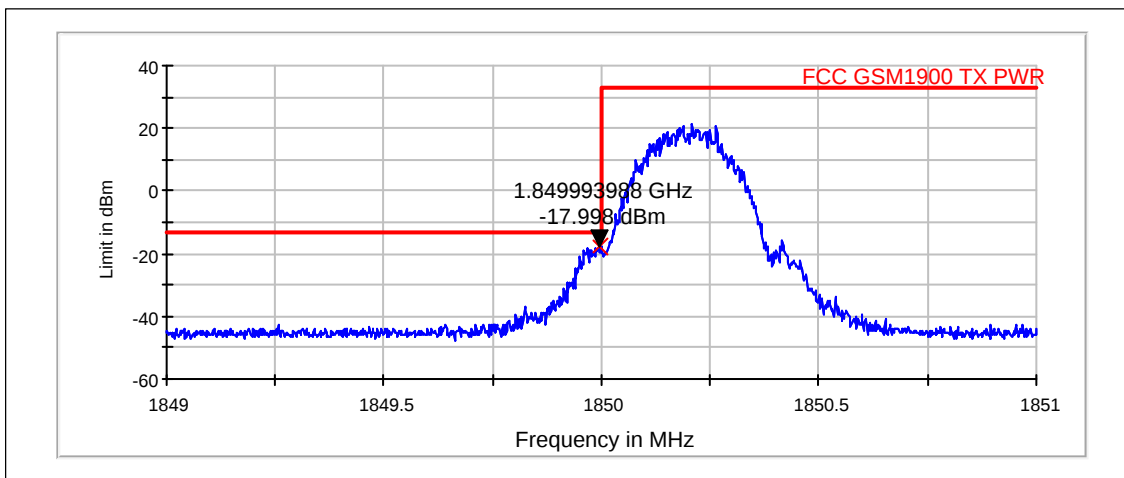
4.4. GSM 1900 Test results

Phone flip open

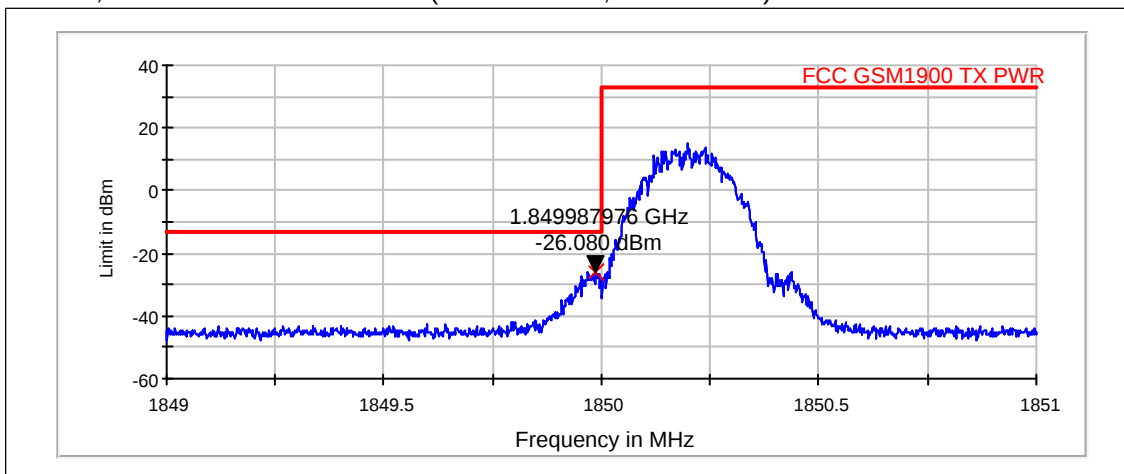
Operation mode (TX on)	Channel / f_c [MHz]	Level [dBm]
GSM	512 / 1850.2	-18
EGPRS	512 / 1850.2	-26.08
EGPRS	810 / 1909.8	-23.94
GSM	810 / 1909.8	-16.22

Phone flip open

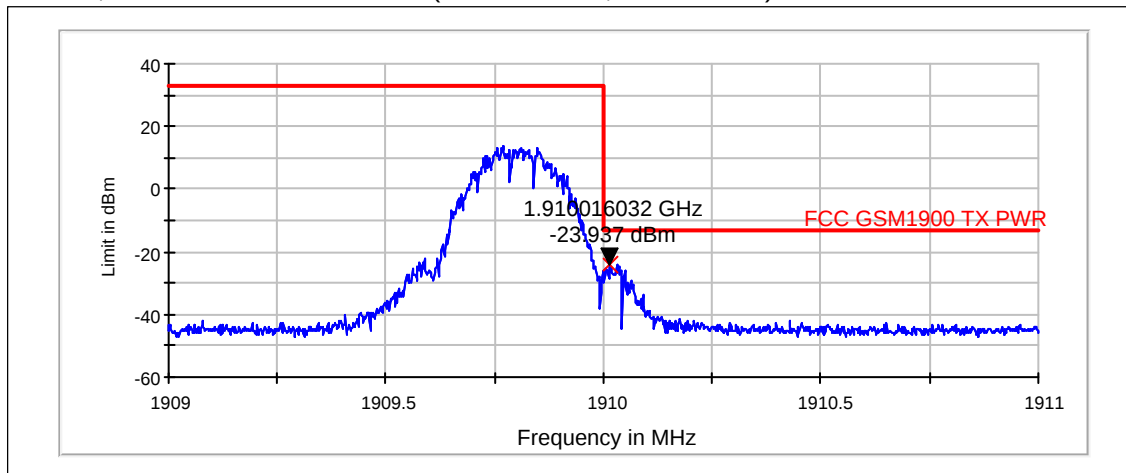
GSM, channel 512 / 1850.2 MHz (Peak detector, RBW: 3 kHz)



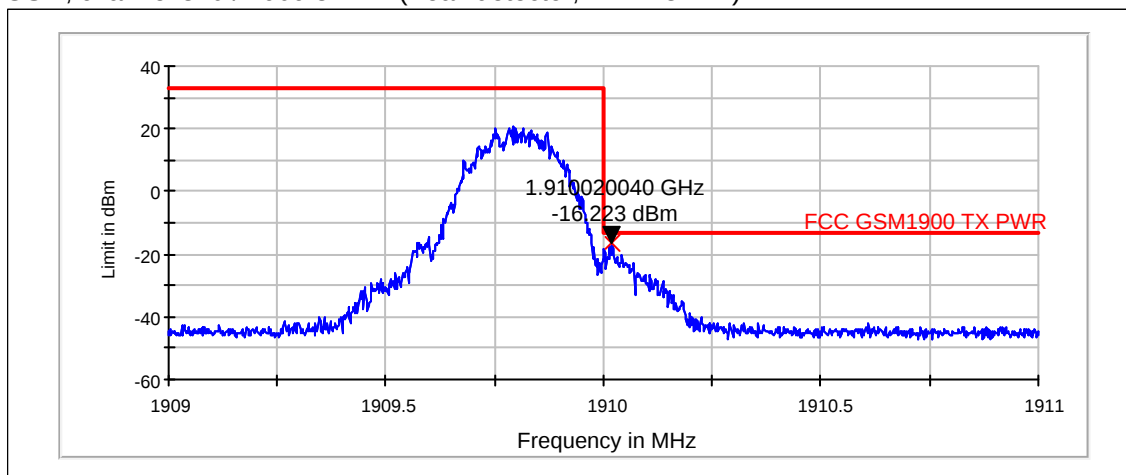
EGPRS, channel 512 / 1850.2 MHz (Peak detector, RBW: 3 kHz)



EGPRS, channel 810 / 1909.8 MHz (Peak detector, RBW: 3 kHz)



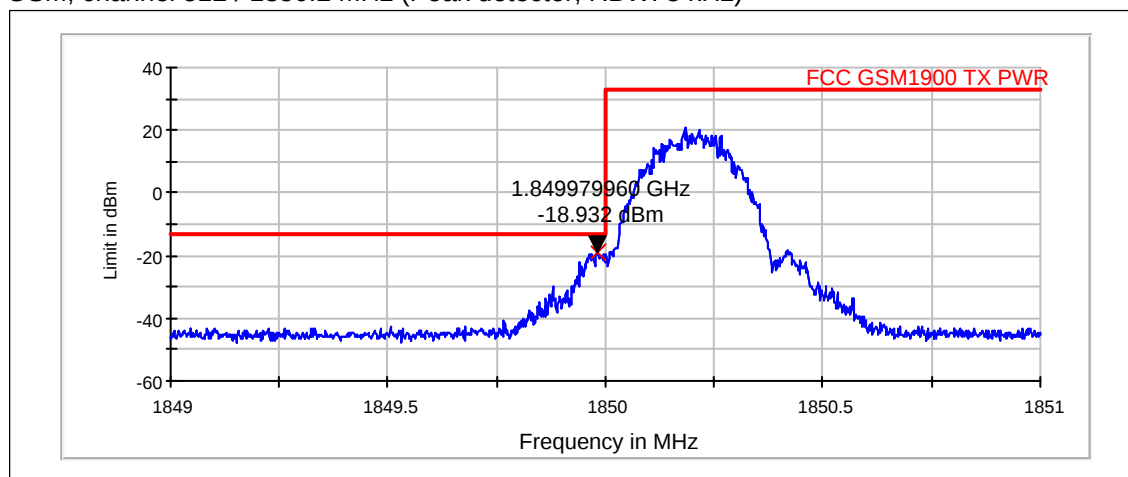
GSM, channel 810 / 1909.8 MHz (Peak detector, RBW: 3 kHz)



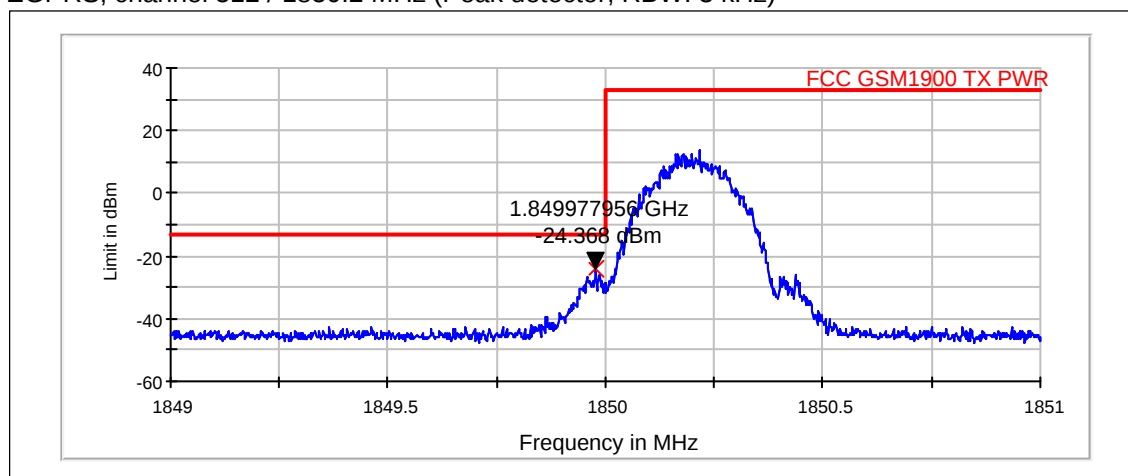
Phone flip closed

Operation mode (TX on)	Channel / f _c [MHz]	Level [dBm]
GSM	512 / 1850.2	-18.93
EGPRS	512 / 1850.2	-24.37
EGPRS	810 / 1909.8	-24.77
GSM	810 / 1909.8	-19.09

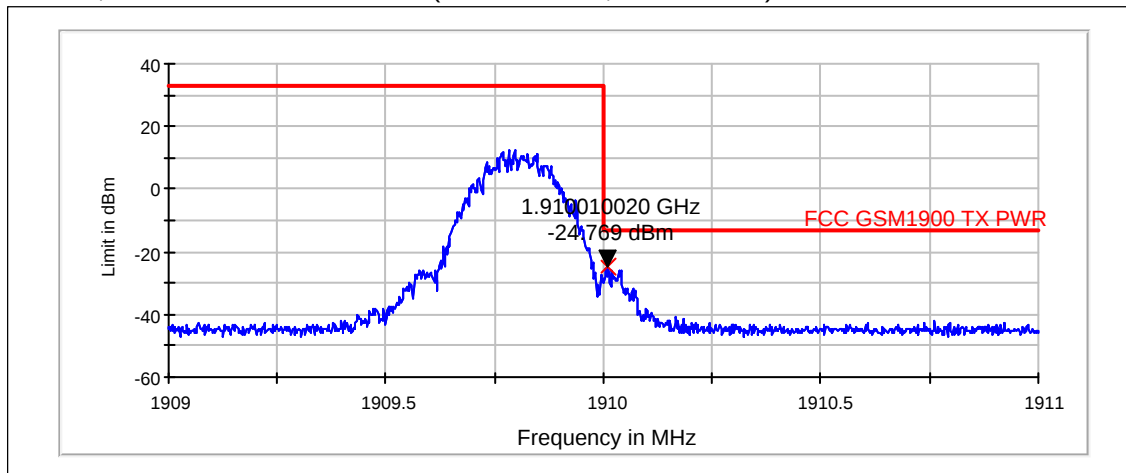
GSM, channel 512 / 1850.2 MHz (Peak detector, RBW: 3 kHz)



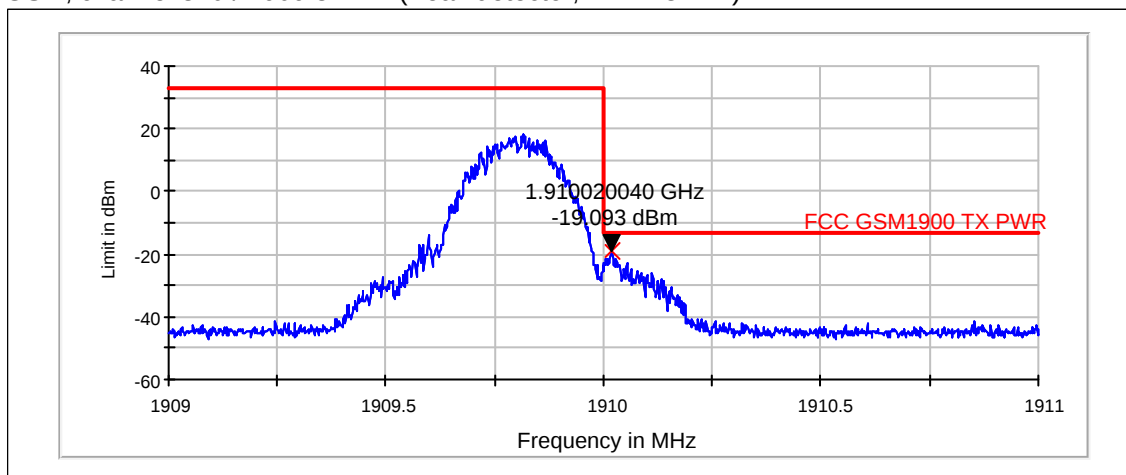
EGPRS, channel 512 / 1850.2 MHz (Peak detector, RBW: 3 kHz)



EGPRS, channel 810 / 1909.8 MHz (Peak detector, RBW: 3 kHz)



GSM, channel 810 / 1909.8 MHz (Peak detector, RBW: 3 kHz)

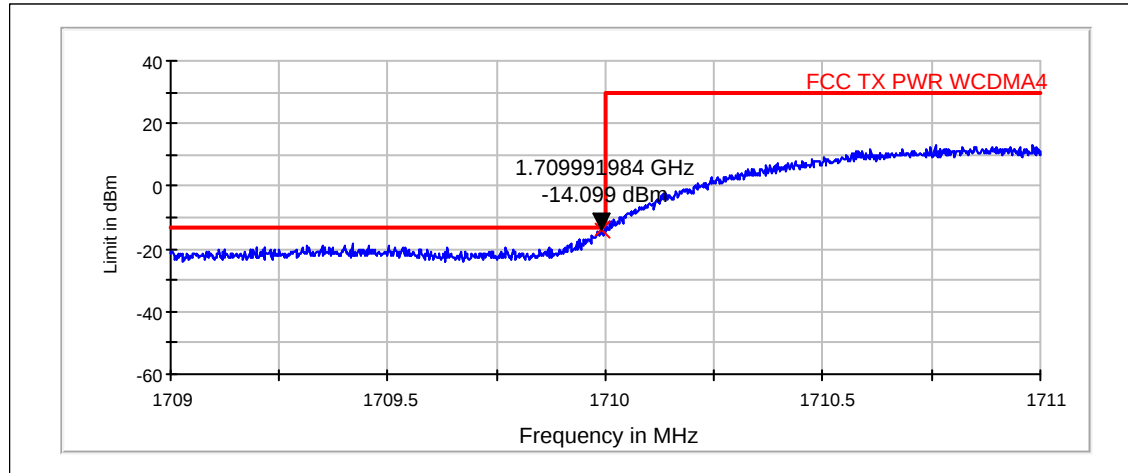


4.5. WCDMA 1700 Test results

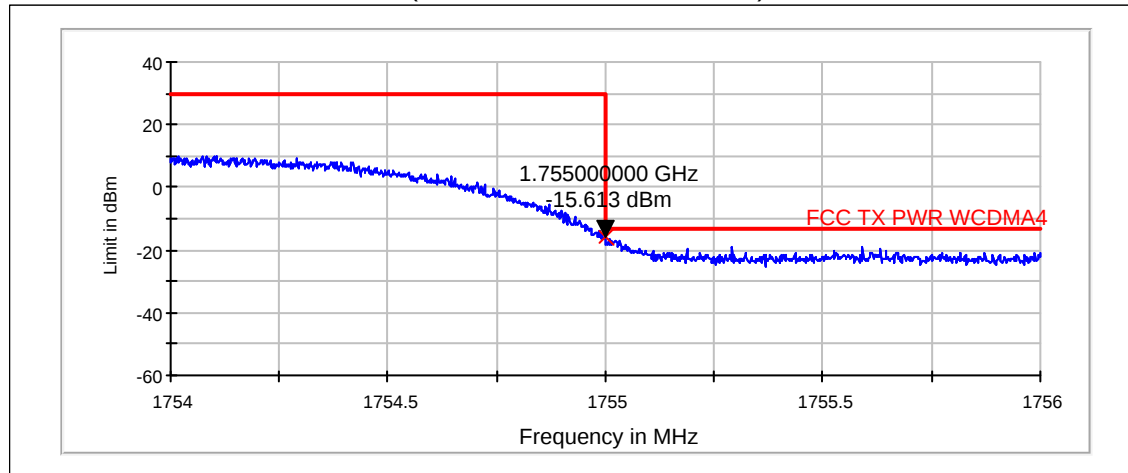
Phone flip open

Operation mode (TX on)	Channel / f_c [MHz]	Level [dBm]
FDD	1312 / 1712.4	-14.1
FDD	1513 / 1752.6	-15.61

FDD, channel 1312 / 1712.4 MHz (Peak detector, RBW: 50 kHz)



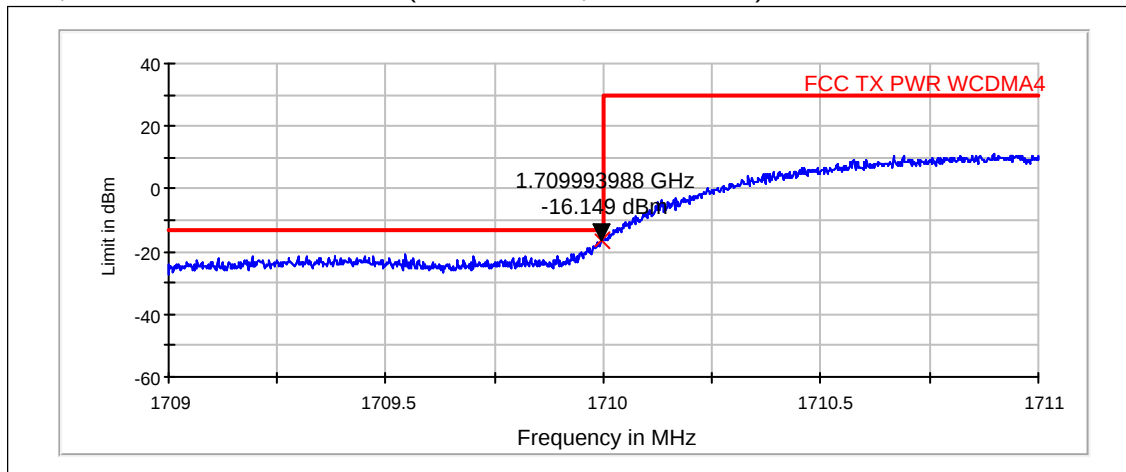
FDD, channel 1513 / 1752.6 MHz (Peak detector, RBW: 50 kHz)



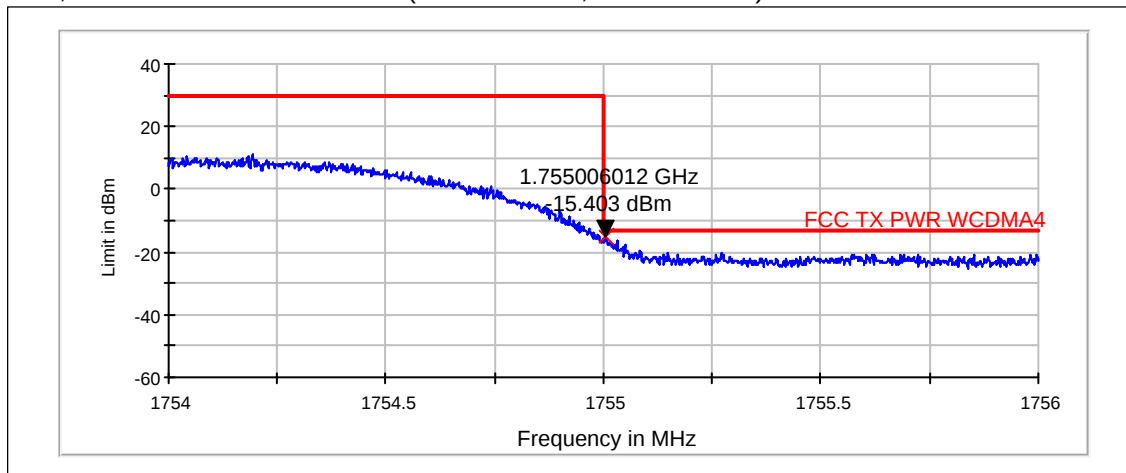
Phone flip closed

Operation mode (TX on)	Channel / f _c [MHz]	Level [dBm]
FDD	1312 / 1712.4	-16.15
FDD	1513 / 1752.6	-15.4

FDD, channel 1312 / 1712.4 MHz (Peak detector, RBW: 50 kHz)



FDD, channel 1513 / 1752.6 MHz (Peak detector, RBW: 50 kHz)

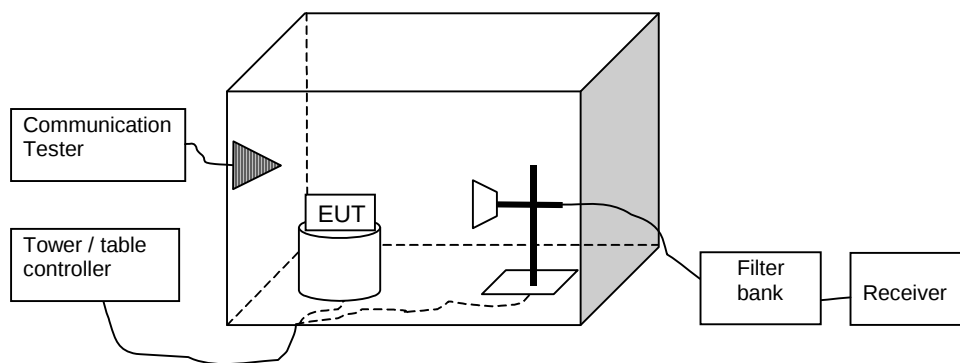


5. Spurious radiated emissions

(FCC §22.917(a), §24.238(a), §27.53(g), §2.1053, RSS-132 4.5, RSS-133 6.5, RSS-139 6.5)

EUT with DUT number	RM-509, DUT 24144
Accessories with DUT numbers	BL-4S, DUT 24929 ; HS-105, DUT 24819 ; AC-8E, DUT 24922
Operation Voltage [V] / [Hz]	115 / 60
Result	Passed
Remarks	Phone tested in flip open mode.
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 55 / 100.1
Date of measurements	10-Aug-2010
Measured by	Christian Andersen

5.1. Test setup



5.2. 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. Substitution values at each frequencies are measured beforehand and saved to the test software.

The substitution corrections are obtained as described below:

$$A_{SUBST} = P_{SUBST_TX} - P_{SUBST_RX} - L_{SUBST_CABLES} + G_{SUBST_TX_ANT}$$

Where A_{SUBST} is the final substitution correction including receive antenna gain. P_{SUBST_TX} is signal generator level, P_{SUBST_RX} is receiver level, L_{SUBST_CABLES} is cable losses including both TX and RX cables and $G_{SUBST_TX_ANT}$ is substitution antenna gain.

The measurement results are obtained as described below:

$$P [dBm] = P_{MEAS} + A_{TOT}$$

Where P_{MEAS} is receiver reading in dBm and A_{TOT} is total correction factor including cable loss, preamplifier gain and substitution correction ($A_{TOT} = L_{CABLES} - G_{PREAMP} + A_{SUBST}$).

Limits for spurious radiated emissions measurements

Operation band	Frequency range [MHz]	Limit [dBm]
WCDMA 850	30 - 8500	-13
GSM 1900 / WCDMA 1700	30 - 18000	-13

5.3. GSM 850 Test results

GSM mode, channel 190 / 836.6 MHz

Frequency [MHz]	P[dBm]	P [μW]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
848.668	-65.34	0.00029	-62.03	-3.31	VERTICAL	Passed
1673.219	-42.32	0.05861	-47.39	5.07	VERTICAL	Passed
1673.248	-41.81	0.06592	-46.88	5.07	VERTICAL	Passed
2509.539	-45.45	0.02851	-56.56	11.11	VERTICAL	Passed
2509.98	-44.47	0.03573	-55.59	11.12	VERTICAL	Passed
3368.016	-59.87	0.00103	-67.08	7.21	HORIZONTAL	Passed

EGPRS mode, channel 190 / 836.6 MHz

Frequency [MHz]	P[dBm]	P [μW]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
851.766	-66.71	0.00021	-63.4	-3.31	VERTICAL	Passed
1673.206	-42.82	0.05224	-47.89	5.07	VERTICAL	Passed
1673.267	-42.69	0.05383	-47.76	5.07	VERTICAL	Passed
2509.679	-47.1	0.0195	-58.21	11.11	VERTICAL	Passed
2509.719	-47.84	0.01644	-58.95	11.11	VERTICAL	Passed
3346.433	-56.62	0.00218	-64.4	7.78	HORIZONTAL	Passed

5.4. GSM 1900 Test results

GSM mode, channel 661 / 1880.0 MHz

Frequency [MHz]	P[dBm]	P [μ W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
9517.956	-41	0.07943	-68.78	27.78	VERTICAL	Passed
9630.301	-41.42	0.07211	-69.5	28.08	HORIZONTAL	Passed
9767.695	-40.97	0.07998	-69.3	28.33	HORIZONTAL	Passed
9794.349	-41.57	0.06966	-69.23	27.66	VERTICAL	Passed
17899.319	-29.47	1.1298	-76.63	47.16	VERTICAL	Passed
17982.855	-28.03	1.57398	-77.38	49.35	HORIZONTAL	Passed

EGPRS mode, channel 661 / 1880.0 MHz

Frequency [MHz]	P[dBm]	P [μ W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
9529.399	-40.89	0.08147	-69.03	28.14	VERTICAL	Passed
9652.244	-42.31	0.05875	-69.8	27.49	HORIZONTAL	Passed
9763.948	-41.42	0.07211	-69.52	28.1	HORIZONTAL	Passed
9824.95	-40.92	0.08091	-68.46	27.54	VERTICAL	Passed
17855.892	-30.94	0.80538	-75.78	44.84	VERTICAL	Passed
17983.747	-28.39	1.44877	-77.73	49.34	HORIZONTAL	Passed

5.5. WCDMA 1700 Test results

Channel 1412 / 1732.4 MHz

Frequency [MHz]	P[dBm]	P [μ W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
6926.613	-35.21	0.3013	-56.67	21.46	HORIZONTAL	Passed
9612.104	-42.64	0.05445	-70.19	27.55	VERTICAL	Passed
9623.447	-42.23	0.05984	-70.26	28.03	VERTICAL	Passed
9796.954	-41.29	0.0743	-69.2	27.91	HORIZONTAL	Passed
17825.411	-30.73	0.84528	-76.28	45.55	HORIZONTAL	Passed
17978.38	-28.68	1.35519	-78.08	49.4	HORIZONTAL	Passed

7. Test Equipment

7.1. Conducted measurements

Eq. No	Equipment	Type	Manufacturer	Used in
20168	Bluetooth Tester	CBT	Rohde&Schwarz	22/24/27, 15C, 15B
18772	Shielded Chamber	RFD-100	ETS-Lindgren	15C, 15B
13037	Power Supply 0-15V 10A	EA3012	LP Instruments	15C, 15B
13513	Pulse Limiter	ESH3Z2	Rohde&Schwarz	15C, 15B
13666	Receiver	ESPC	Rohde&Schwarz	15C, 15B
13935	LISN	ESH3-Z5	Rohde&Schwarz	15C, 15B
16995	Directional Coupler 20dB 0,5-2,0 GHz SMA Conn.	1538RA-20	Weinschel	15C, 15B
18772	Shielded Chamber	RFD-100	ETS-Lindgren	15C, 15B
19171	Communication Tester	CMU200	Rohde&Schwarz	15C, 15B
11386	DC Power Supply	HP6632A	Hewlett Packard	22/24/27, 15C, 15B
19678	Spectrum Analyzer	FSP	Rohde&Schwarz	22/24/27, 15C, 15B
16601	Communication Tester	CMU200	Rohde&Schwarz	22/24/27, 15C, 15B
19625	Climatic Chamber	VT4002EMC	Vötsch	22/24/27, 15C, 15B
13357	Signal Generator	SMP02	Rohde&Schwarz	22/24/27, 15C, 15B
19116	Power splitter	-	various	22/24/27, 15C, 15B
20544	Transformer. 230/115V	-	Nokia	22/24/27, 15C, 15B
20543	UPS. 700V/A 490W	PW 9120 700i	Powerware	22/24/27, 15C, 15B

7.2. Radiated measurements

Eq. No	Equipment	Type	Manufacturer	Used in
18792	Mast/turntable controller	2090	ETS-EMCO	22/24/27, 15C, 15B
18416	Communication Tester	CMU200	Rohde&Schwarz	22/24/27, 15C, 15B
20168	Bluetooth Tester	CBT	Rohde&Schwarz	22/24/27, 15C, 15B
13077	Power Supply	EA-3016	-	22/24/27, 15C, 15B
15742	Programmable Relay Switching System	-----	Pickering	22/24/27, 15C, 15B
20078	Relay 2x6 Chnl μ Wave Mux	10-785B-522	Pickering	22/24/27, 15C, 15B
14021	Relay Dual 6 Chnl μ Wave Mux	10-785-522	-	22/24/27, 15C, 15B
-	Relay Dual 6 Chnl μ Wave Mux	10-785-522	-	22/24/27, 15C, 15B
17644	Dual 6 Channel MUX Microwave Relay SMA 50 Ohm	10-785-522	Pickering	22/24/27, 15C, 15B
16948	Dual 6 Channel MUX Microwave Relay SMA 50 Ohm	10-785-522	Pickering	22/24/27, 15C, 15B
16949	Dual 6 Channel MUX Microwave Relay SMA 50 Ohm	10-785-522	Pickering	22/24/27, 15C, 15B
18861	Receiver	EMI Test Receiver 20Hz-26,5GHz ESI	Rohde&Schwarz	22/24/27, 15C, 15B
18860	Antenna	HL562	Rohde&Schwarz	22/24/27, 15C, 15B
18773	Anechoic chamber	RFD-100	ETS-Lindgren	22/24/27, 15C, 15B
18774	Anechoic chamber	RFSD-F/A-100	ETS-Lindgren	22/24/27, 15C, 15B
19151	High Pass Filter	WHJS3000-10SS	Wainwright	22/24/27, 15C, 15B
13937	Band reject filter	WRCA902.4-0.2/40-6SS	Wainwright Instruments	22/24/27, 15C, 15B
13936	Band reject filter	WRCD1747.5-0.2/40-10SS	Wainwright Instruments	22/24/27, 15C, 15B
14114	Highpass Filter	WHK1000-12SS	Wainwright Instruments	22/24/27, 15C, 15B
14188	Band reject filter	WRCA902.4-0.2/40-6SS	Wainwright	22/24/27, 15C, 15B
14187	Band reject filter	WRCD1747.5-0.2/40-10SS	Wainwright	22/24/27, 15C, 15B

Eq. No	Equipment	Type	Manufacturer	Used in
16633	Band reject filter	WRCD1880.0-0.2/40-10SS	Wainwright	22/24/27, 15C, 15B
19587	Band reject filter	WRCG2400/2483-2390/2493-35/10SS	Wainwright	22/24/27, 15C, 15B
20115	Band reject filter	-	Wainwright	22/24/27, 15C, 15B
20114	Band reject filter	WRCG1737/1743-1733/1747-40/6SS	Wainwright	22/24/27, 15C, 15B
20116	Band reject filter	WRCG832/83/-825/845-40/5SS	Wainwright	22/24/27, 15C, 15B
20698	Antenna	BBHA 9120 D	SCHWARZBECK	22/24/27, 15C, 15B
19966	Antenna	HFH2-Z2	Rohde&Schwarz	15C, 15B
13799	Signal Generator	SMP02	Rohde&Schwarz	22/24/27, 15C, 15B
15191	Turntable Contoller Unit	G-800SDX	YAESU	22/24/27, 15C, 15B
14900	Antenna Controller	HD100	HD GmbH	22/24/27, 15C, 15B
20544	Transformer. 230/115V	-	Nokia	22/24/27, 15C, 15B
20543	UPS. 700V/A 490W	PW 9120 700i	Powerware	22/24/27, 15C, 15B