TCC Nokia

FINAS Finnish Accreditation Service T117 (EN ISO/IEC 17025)

FCC Part 22/24 Compliance Test Report

Test Report no.:	Salo_FCC_0724_09.doc	**Date of Report:**	10.07.2007
Number of pages:	34	**Customer's Contact person:**	Tero Huhtala
Testing laboratory:	TCC Nokia Salo Laboratory P.O. Box 86 Joensuunkatu 7H / Kiila 1B FIN-24101 SALO, FINLAND Tel. +358 (0) 7180 08000 Fax. +358 (0) 7180 45220	**Customer:**	Nokia Corporation P.O. Box 68 Sinitaival 5 FIN-33721 TAMPERE, FINLAND Tel. +358 (0) 7180 08000 Fax. +358 (0) 7180 46880
FCC listing no.: **IC recognition no.:**	533467 5385		
Tested devices/ accessories:	**Phone RM-160 / Battery BL-6F, Dummy Battery SD-13, Control Unit AD-43, Headset HS-45 and AC-Charger AC-5U**		
FCC ID:	PDNRM-160	**IC:**	661R-RM160
Supplement reports:	-		
Testing has been carried out in accordance with:	**CFR 47, FCC rules FCC rules parts 22 and 24 and IC standards RSS-GEN, RSS-132 and RSS-133. 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 Sami K Lehtonen DN: cn=Sami K Lehtonen, c=FI, o=Nokia, ou=CertMT Date: 2007.07.10 14:52:55 +03'00'		

Sami Lehtonen, System Manager

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

Date of receipt	13.06.2007
Testing completed	04.07.2007
The customer's contact person	Tero Huhtala
Test Plan referred to	T:\Projects\RM-160\TestPlan_RS\RS_Testplan_RM-160.xls
Notes	-
Document name	T:\Projects\RM-160\EMC\Results\FCC\Salo_FCC_0724_09.doc

1.1. EUT and Accessory Information

The EUT is a 6-band (GSM850/900/1800/1900 and WCDMA Band II(1900)/V(850)) mobile phone with GPRS, EGPRS, Bluetooth and WLAN. 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-160	004400/82/172012/3	4000	-	V 10.2.001	12000
AC-Charger	AC-5U	3943497094090720279;0675542	-	-	-	11999
Battery	BL-6F	0000007205000100000;0670523	-	-	-	12004
Control Unit	AD-43	-	-	-	-	12002
Headset	HS-45	06946447156H1903135	-	-	-	12001
Phone	RM-160	004400/82/172024/8	4000	-	V 10.2.001	12016
Phone	RM-160	004400/82/172025/5	4000	-	V 10.2.001	12017
Phone	RM-160	004400/82/172039/6	4000	-	V 10.2.001	12024
Dummy Battery	SD-13	1002309K0451	proto v0.3	-	-	12033
Control Unit	AD-43	0694575710512609167	-	-	-	12026
Headset	HS-45	06946447156H1903139	-	-	-	12027

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)	*4.6*, 4.4	Conducted RF output power	NP
§22.913(a)	*4.6*, 4.4	Radiated RF output power	PASSED
§2.1049(h)	*4.4.1*	99 % occupied bandwidth	PASSED
§22.917(a)	*4.7*, 4.5	Band edge compliance	PASSED
§22.917(a), §2.1051	*4.7*, 4.5	Spurious emissions at antenna terminals	NP
§22.917(a), §2.1053	*4.7*, 4.5	Spurious radiated emissions	PASSED
§2.1055(a)	*4.5*, 4.3	Frequency stability, temperature variation	PASSED
§2.1055(d)	*4.5*, 4.3	Frequency stability, voltage variation	NP

GSM 1900:

Section in CFR 47	Section in RSS-133	Name of the test	Result
§2.1046(a)	6.2	Conducted RF output power	NP
§24.232(b)	6.2	Radiated RF output power	PASSED
§2.1049(h)	5.6	99 % occupied bandwidth	PASSED
§24.238(a)	6.3	Band edge compliance	PASSED
§24.238(a), §2.1051	6.3	Spurious emissions at antenna terminals	NP
§24.238(a), §2.1053	6.3	Spurious radiated emissions	PASSED

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§2.1055(a)	7	Frequency stability, temperature variation	PASSED
§2.1055(d)	7	Frequency stability, voltage variation	NP

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)	*4.6*, 4.4	Conducted RF output power	NP
§22.913(a)	*4.6*, 4.4	Radiated RF output power	PASSED
§2.1049(h)	*4.4.1*	99 % occupied bandwidth	PASSED
§22.917(a)	*4.7*, 4.5	Band edge compliance	PASSED
§22.917(a), §2.1051	*4.7*, 4.5	Spurious emissions at antenna terminals	NP
§22.917(a), §2.1053	*4.7*, 4.5	Spurious radiated emissions	PASSED
§2.1055(a)	*4.5*, 4.3	Frequency stability, temperature variation	PASSED
§2.1055(d)	*4.5*, 4.3	Frequency stability, voltage variation	NP

WCDMA 1900 (Band II):

Section in CFR 47	Section in RSS-133	Name of the test	Result
§2.1046(a)	6.2	Conducted RF output power	NP
§24.232(b)	6.2	Radiated RF output power	PASSED
§2.1049(h)	5.6	99 % occupied bandwidth	PASSED
§24.238(a)	6.3	Band edge compliance	PASSED
§24.238(a), §2.1051	6.3	Spurious emissions at antenna terminals	NP
§24.238(a), §2.1053	6.3	Spurious radiated emissions	PASSED
§2.1055(a)	7	Frequency stability, temperature variation	PASSED
§2.1055(d)	7	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 Salo Laboratory.

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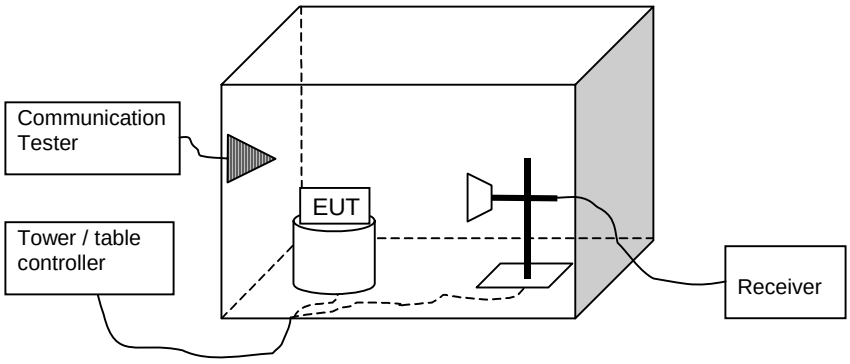
2. Radiated RF output power

(FCC §22.913(a), §24.232(b), RSS-GEN 4.6, RSS-132 4.4, RSS-133 6.2)

EUT with DUT number	RM-160, DUT 12016; RM-160, DUT 12017
Accessories with DUT numbers	AD-43, DUT 12002; HS-45, DUT 12001; AC-5U, DUT 11999; BL-6F DUT 12004
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 41 / 101
Date of measurements	25.06.2007
Measured by	Sami Lehtonen

2.1. Test setup



2.2. Test method and limit

The measurement is made according to TIA-603-B-2002 as follows:

The measurement is performed in the Anechoic Chamber with absorbers on the floor and measuring antenna at fixed height using 2-axis EUT position system. The turntable is rotated 360 degrees and this is repeated for both horizontal and vertical receive antenna polarizations.

The EUT is placed on a nonconductive plate at 170 cm height.

The substitution method is used. Substitution values at each frequencies are measured beforehand and saved to the test software.

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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 and substitution correction ($A_{TOT} = L_{CABLES} + A_{SUBST}$).

Limits for radiated RF output power measurements

Frequency range [MHz]	Limit [W]	Limit [dBm]
824 - 849	7	38.5
1850 - 1910	2	33

2.3. GSM 850 Test results

Slide Open:
GSM mode

Channel / f_C [MHz]	ERP [dBm]	ERP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
128 / 824.2	28.20	0.661	- 6.50	34.70	VERTICAL	PASSED
190 / 836.6	30.90	1.230	- 4.80	35.70	VERTICAL	PASSED
251 / 848.8	30.60	1.148	- 4.20	34.80	VERTICAL	PASSED

GPRS mode, 2 TX Slots

Channel / f_C [MHz]	ERP [dBm]	ERP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
128 / 824.2	19.30	0.085	- 15.40	34.70	VERTICAL	PASSED
190 / 836.6	22.20	0.166	- 13.50	35.70	VERTICAL	PASSED
251 / 848.8	22.20	0.166	- 12.60	34.80	VERTICAL	PASSED

GPRS mode, 3 TX Slot

Channel / f_C [MHz]	ERP [dBm]	ERP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
128 / 824.2	23.30	0.214	- 11.40	34.70	VERTICAL	PASSED
190 / 836.6	26.10	0.407	- 9.60	35.70	VERTICAL	PASSED
251 / 848.8	26.10	0.407	- 8.70	34.80	VERTICAL	PASSED

EGPRS mode, 1 TX Slot

Channel / f_C [MHz]	ERP [dBm]	ERP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
128 / 824.2	19.30	0.085	- 15.40	34.70	VERTICAL	PASSED
190 / 836.6	22.20	0.166	- 13.50	35.70	VERTICAL	PASSED
251 / 848.8	22.20	0.166	- 12.60	34.80	VERTICAL	PASSED

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Slide Closed:
GSM mode

Channel / f_C [MHz]	ERP [dBm]	ERP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
128 / 824.2	28.30	0.676	- 6.40	34.70	VERTICAL	PASSED
190 / 836.6	30.60	1.148	- 5.10	35.70	VERTICAL	PASSED
251 / 848.8	29.50	0.891	- 4.50	34.00	HORIZONTAL	PASSED

GPRS mode, 2 TX Slots

Channel / f_C [MHz]	ERP [dBm]	ERP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
128 / 824.2	25.30	0.339	- 9.40	34.70	VERTICAL	PASSED
190 / 836.6	27.60	0.575	- 8.10	35.70	VERTICAL	PASSED
251 / 848.8	27.20	0.525	- 6.80	34.00	HORIZONTAL	PASSED

GPRS mode, 3 TX Slot

Channel / f_C [MHz]	ERP [dBm]	ERP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
128 / 824.2	23.30	0.214	- 11.40	34.70	VERTICAL	PASSED
190 / 836.6	25.80	0.380	- 9.90	35.70	VERTICAL	PASSED
251 / 848.8	25.60	0.363	- 8.40	34.00	HORIZONTAL	PASSED

EGPRS mode, 1 TX Slot

Channel / f_C [MHz]	ERP [dBm]	ERP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
128 / 824.2	19.30	0.085	- 15.40	34.70	VERTICAL	PASSED
190 / 836.6	22.40	0.174	- 13.30	35.70	VERTICAL	PASSED
251 / 848.8	21.80	0.151	- 12.20	34.00	HORIZONTAL	PASSED

2.4. GSM 1900 Test results

Slide Open:
GSM mode

Channel / f_C [MHz]	EIRP [dBm]	EIRP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
512 / 1850.2	29.40	0.871	- 15.40	44.80	HORIZONTAL	PASSED
661 / 1880.0	29.60	0.912	- 15.50	45.10	HORIZONTAL	PASSED
810 / 1909.8	31.70	1.479	- 14.40	46.10	VERTICAL	PASSED

GPRS mode, 2 TX Slots

Channel / f_C [MHz]	EIRP [dBm]	EIRP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
512 / 1850.2	26.10	0.407	- 18.70	44.80	HORIZONTAL	PASSED
661 / 1880.0	26.20	0.417	- 18.90	45.10	HORIZONTAL	PASSED
810 / 1909.8	28.20	0.661	- 17.90	46.10	VERTICAL	PASSED

GPRS mode, 3 TX Slot

Channel / f_C [MHz]	EIRP [dBm]	EIRP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
512 / 1850.2	23.90	0.245	- 20.90	44.80	HORIZONTAL	PASSED
661 / 1880.0	23.70	0.234	- 21.40	45.10	HORIZONTAL	PASSED
810 / 1909.8	25.50	0.355	- 20.60	46.10	VERTICAL	PASSED

EGPRS mode, 1 TX Slot

Channel / f_C [MHz]	EIRP [dBm]	EIRP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
512 / 1850.2	24.00	0.251	- 20.80	44.80	HORIZONTAL	PASSED
661 / 1880.0	24.50	0.282	- 20.60	45.10	HORIZONTAL	PASSED
810 / 1909.8	26.60	0.457	- 19.50	46.10	VERTICAL	PASSED

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Slide Closed:
GSM mode

Channel / f_C [MHz]	EIRP [dBm]	EIRP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
512 / 1850.2	30.30	1.072	- 14.50	44.80	HORIZONTAL	PASSED
661 / 1880.0	30.80	1.202	- 14.30	45.10	VERTICAL	PASSED
810 / 1909.8	32.20	1.660	- 13.90	46.10	VERTICAL	PASSED

GPRS mode, 2 TX Slots

Channel / f_C [MHz]	EIRP [dBm]	EIRP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
512 / 1850.2	26.90	0.490	- 17.90	44.80	HORIZONTAL	PASSED
661 / 1880.0	27.40	0.550	- 17.70	45.10	VERTICAL	PASSED
810 / 1909.8	29.80	0.955	- 16.30	46.10	VERTICAL	PASSED

GPRS mode, 3 TX Slot

Channel / f_C [MHz]	EIRP [dBm]	EIRP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
512 / 1850.2	24.80	0.302	- 20.00	44.80	HORIZONTAL	PASSED
661 / 1880.0	25.50	0.355	- 19.60	45.10	VERTICAL	PASSED
810 / 1909.8	27.30	0.537	- 18.80	46.10	VERTICAL	PASSED

EGPRS mode, 1 TX Slot

Channel / f_C [MHz]	EIRP [dBm]	EIRP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
512 / 1850.2	24.90	0.309	- 19.90	44.80	HORIZONTAL	PASSED
661 / 1880.0	25.80	0.380	- 19.30	45.10	VERTICAL	PASSED
810 / 1909.8	27.70	0.589	- 18.40	46.10	VERTICAL	PASSED

2.5. WCDMA 850 Test results

Slide Open:

Channel / f_C [MHz]	ERP [dBm]	ERP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
4132 / 826.4	18.10	0.065	- 15.60	33.70	VERTICAL	PASSED
4175 / 835.0	18.80	0.076	- 15.00	33.80	VERTICAL	PASSED
4233 / 846.6	19.00	0.079	- 14.70	33.70	VERTICAL	PASSED

Slide Closed:

Channel / f_C [MHz]	ERP [dBm]	ERP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
4132 / 826.4	17.90	0.062	- 15.80	33.70	VERTICAL	PASSED
4175 / 835.0	17.90	0.062	- 15.90	33.80	VERTICAL	PASSED
4233 / 846.6	18.20	0.066	- 15.40	33.60	HORIZONTAL	PASSED

2.6. WCDMA 1900 Test results

Slide Open:

Channel / f_C [MHz]	EIRP [dBm]	EIRP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
9262 / 1852.4	23.00	0.200	- 22.30	45.30	HORIZONTAL	PASSED
9400 / 1880.0	22.40	0.174	- 23.30	45.70	HORIZONTAL	PASSED
9538 / 1907.6	23.60	0.229	- 22.70	46.30	VERTICAL	PASSED

Slide Closed

Channel / f_C [MHz]	EIRP [dBm]	EIRP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
9262 / 1852.4	23.60	0.229	- 21.70	45.30	HORIZONTAL	PASSED
9400 / 1880.0	24.10	0.257	- 22.00	46.10	VERTICAL	PASSED

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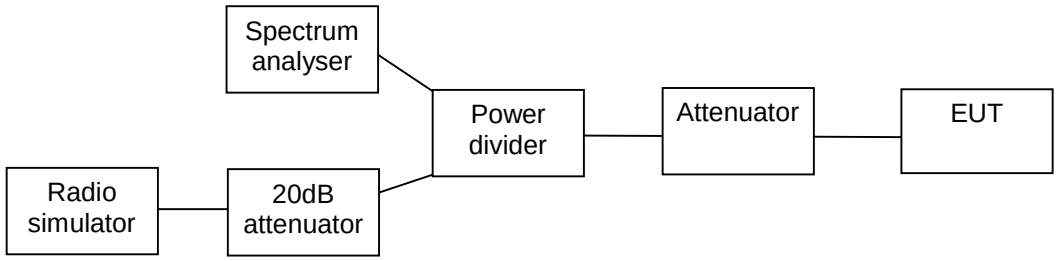
9538 / 1907.6	25.10	0.324	- 21.20	46.30	VERTICAL	PASSED

3. 99 % occupied bandwidth

(FCC §2.1049(h), RSS-GEN 4.4.1, RSS-133 5.6)

EUT with DUT number	RM-160, DUT 12024
Accessories with DUT numbers	SD-13, DUT 12033; AD-43, DUT 12026, HS-45, DUT 12027
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	Phone tested slide open mode.
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 42 / 101.3
Date of measurements	26.06.2007
Measured by	Jani Koskinen

3.1. Test setup



3.2. Test method and limit

The measurement is made according to FCC rules parts 22 and 24 and IC standards RSS-GEN and RSS-133.

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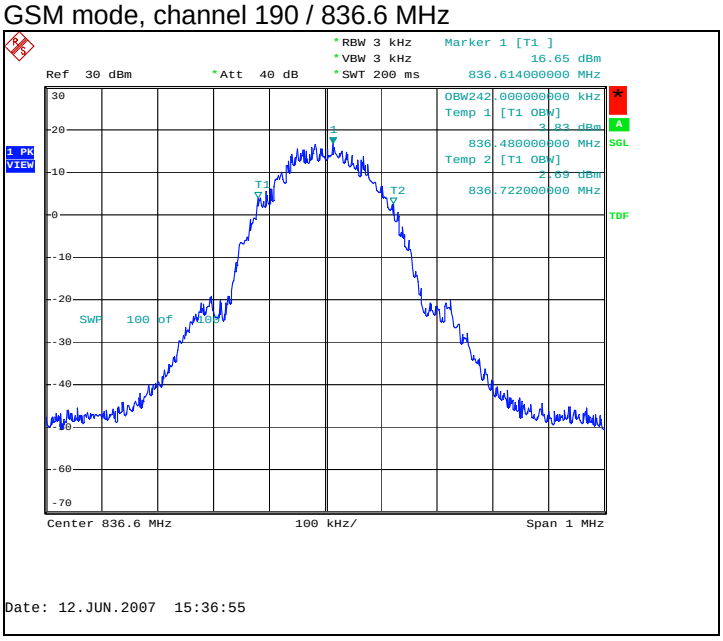
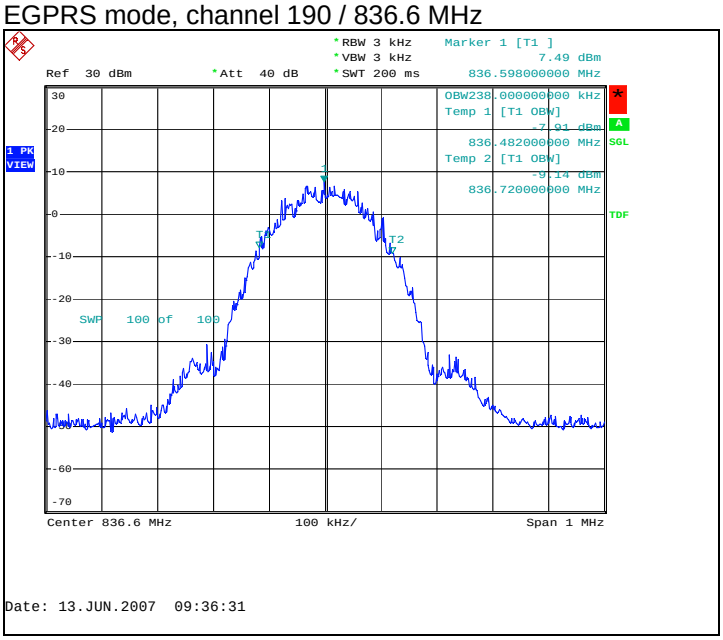
3.3. GSM 850 Test results

Operation mode (TX on)	99% occupied bandwidth [kHz]
GSM	242.000
EGPRS	238.000

GSM mode, channel 190 / 836.6 MHz



EGPRS mode, channel 190 / 836.6 MHz



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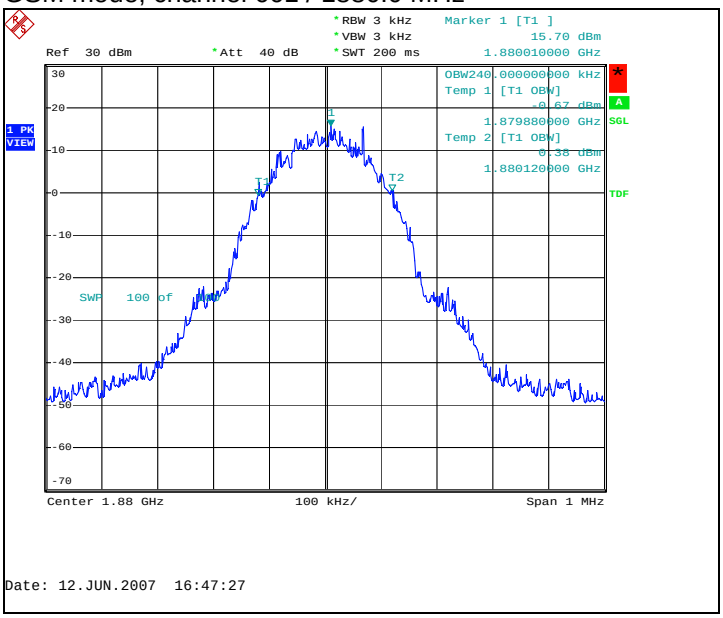
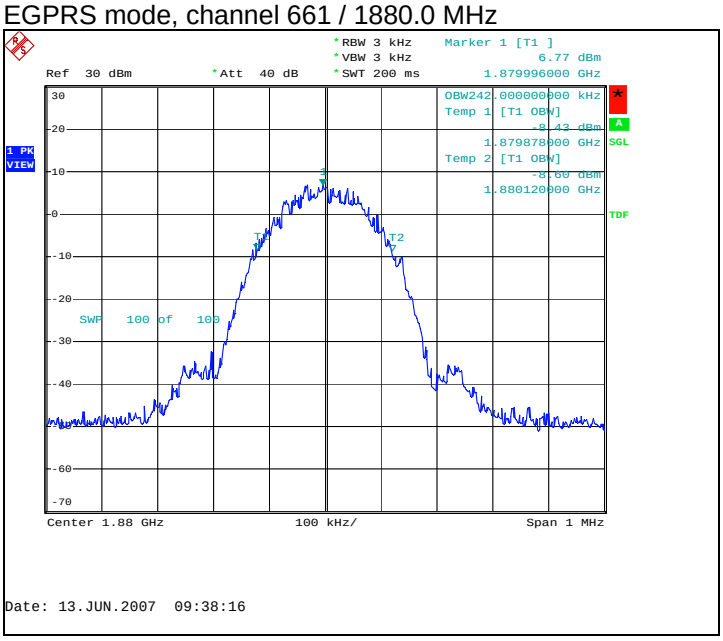
3.4. GSM 1900 Test results

Operation mode (TX on)	99% occupied bandwidth [kHz]
GSM	240.000
EGPRS	242.000

GSM mode, channel 661 / 1880.0 MHz



EGPRS mode, channel 661 / 1880.0 MHz



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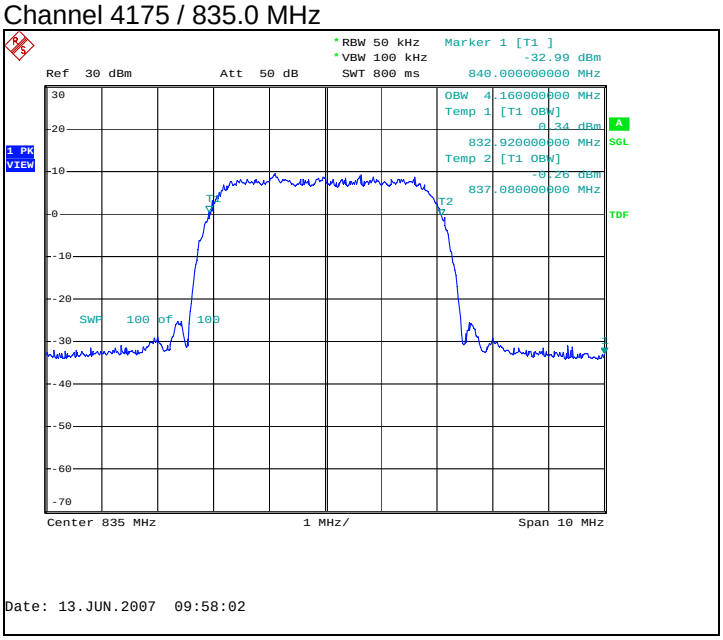
3.5. WCDMA 850 Test results

Operation mode (TX on)	99% occupied bandwidth [kHz]
FDD	4160.000

Channel 4175 / 835.0 MHz



3.6. WCDMA 1900 Test results

Operation mode (TX on)	99% occupied bandwidth [kHz]
FDD	4160.000

Channel 9400 / 1880.0 MHz

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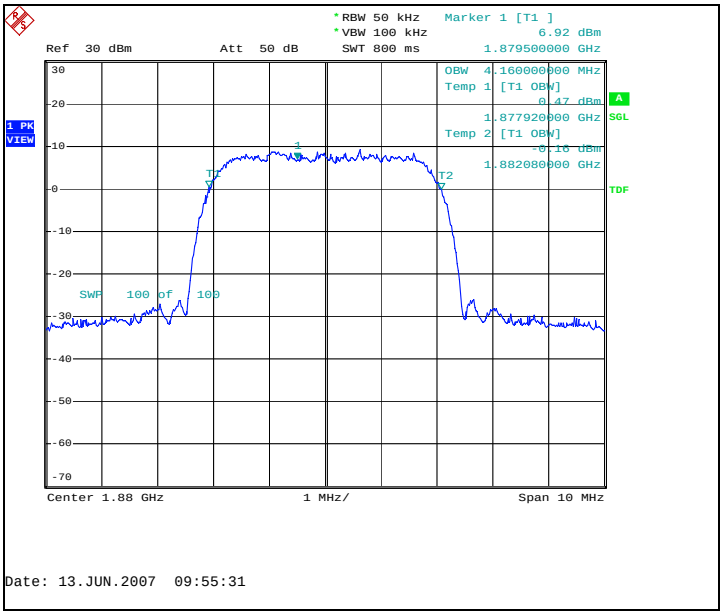

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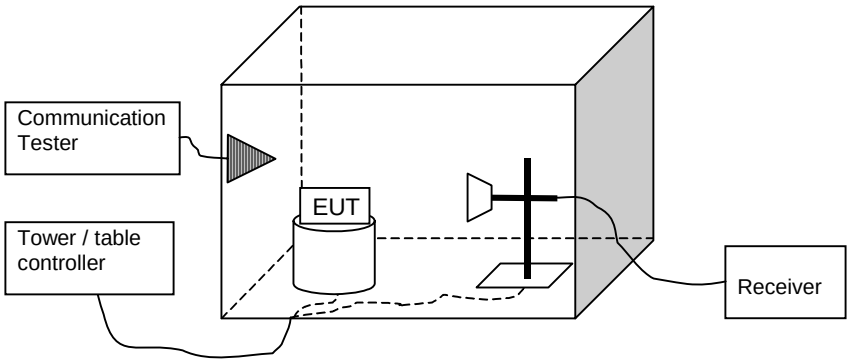
4. Band edge compliance

(FCC §22.917(a), 24.238(a), RSS-GEN 4.7, RSS-132 4.5, RSS-133 6.3)

EUT with DUT number	RM-160, DUT 12016; RM-160, DUT 12017
Accessories with DUT numbers	AD-43, DUT 12002; HS-45, DUT 12001; AC-5U, DUT 11999; BL-6F DUT 12004
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 41 / 101
Date of measurements	02.07.2007-04.07.2007
Measured by	Sami Lehtonen

4.1. Test setup



4.2. Test method and limit

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

Limits for band edge compliance measurements

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

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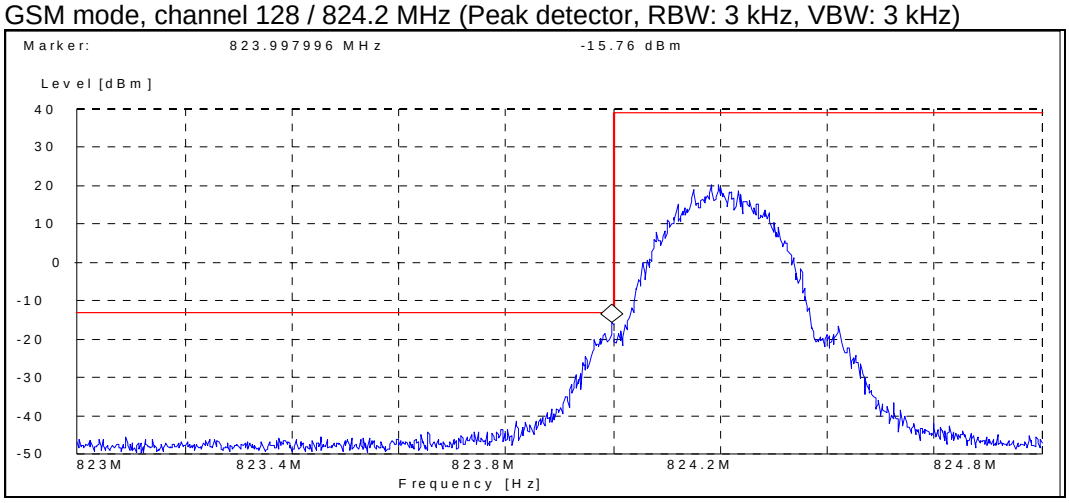
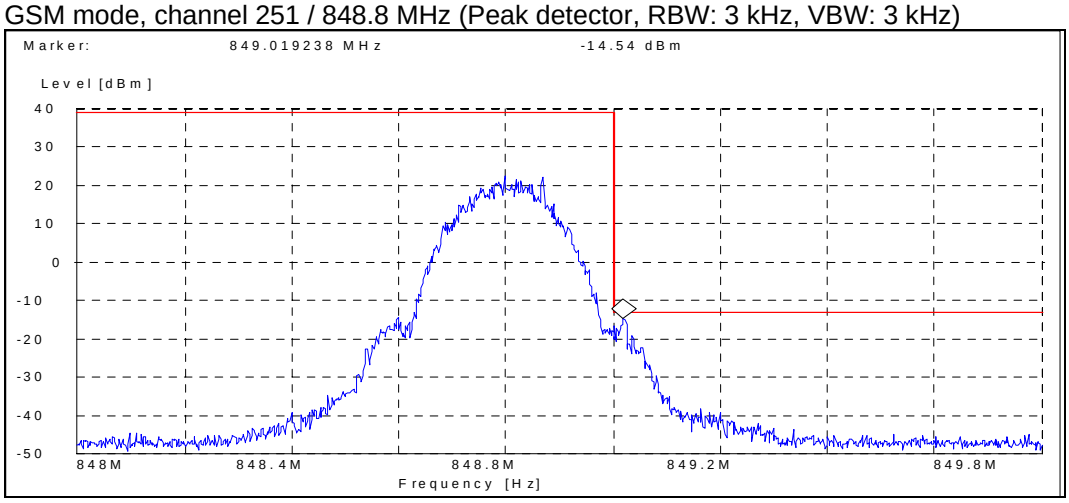
4.3. GSM 850 Test results

Operation mode (TX on)	Channel / f_C [MHz]	Level [dBm]
GSM	128 / 824.2	-15.76
GSM	251 / 848.8	-14.54
EGPRS	128 / 824.2	-32.19
EGPRS	251 / 848.8	-29.64

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



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



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

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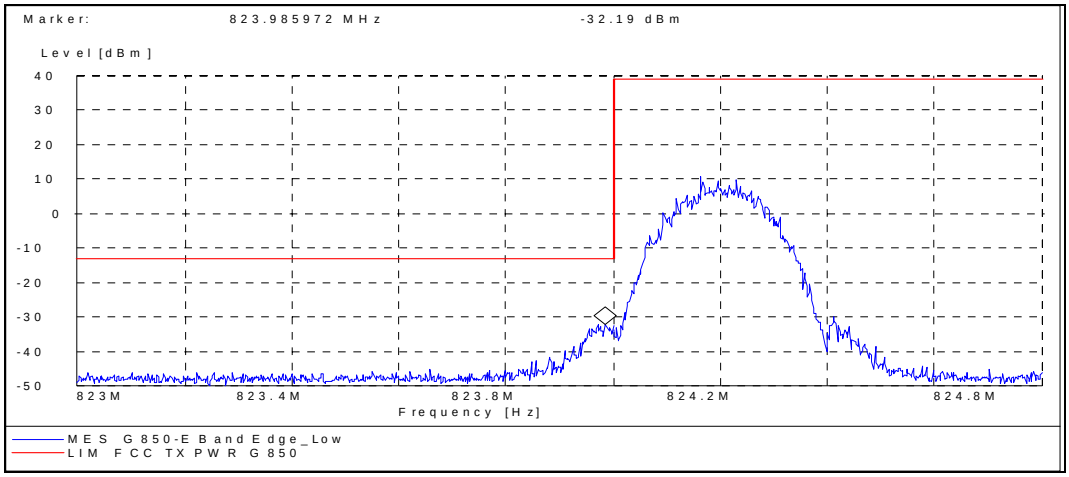
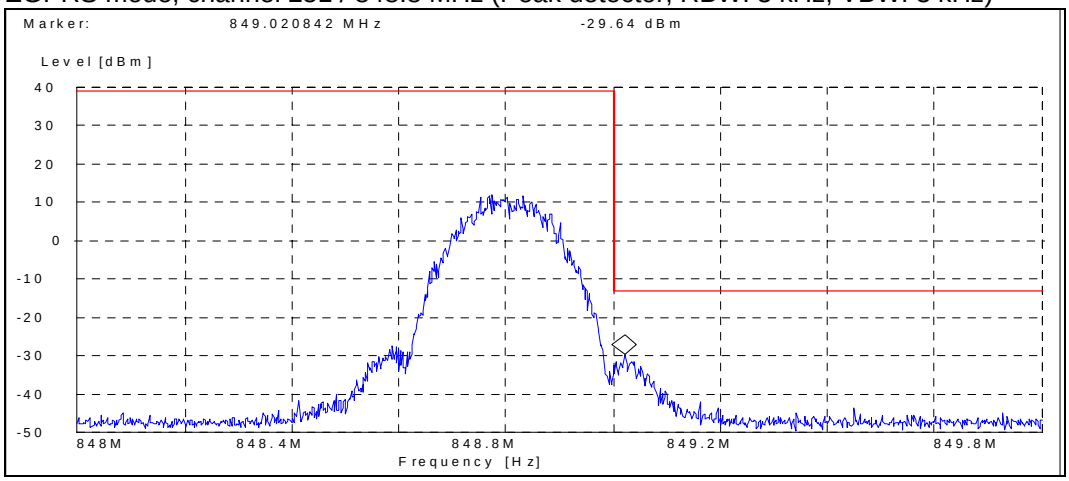


EGPRS mode, channel 251 / 848.8 MHz (Peak detector, RBW: 3 kHz, VBW: 3 kHz)



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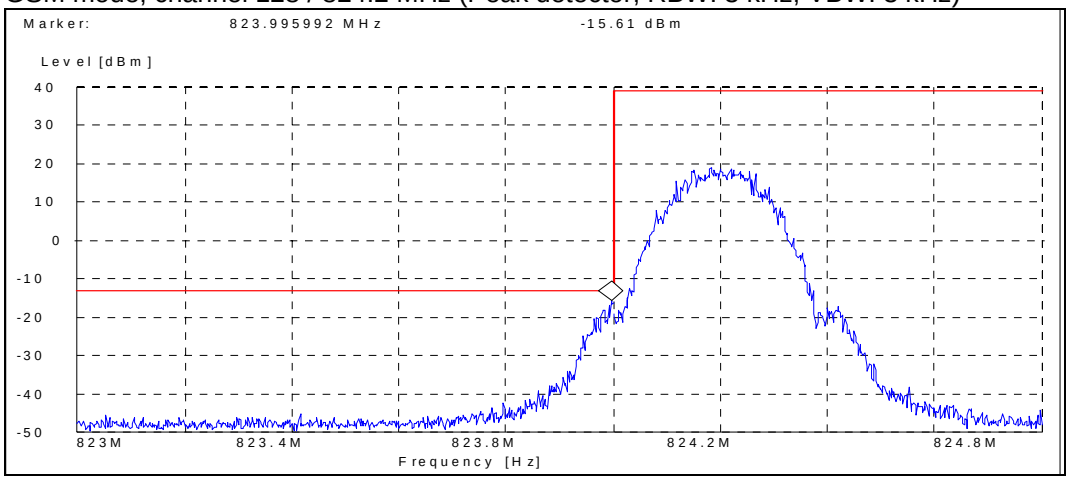
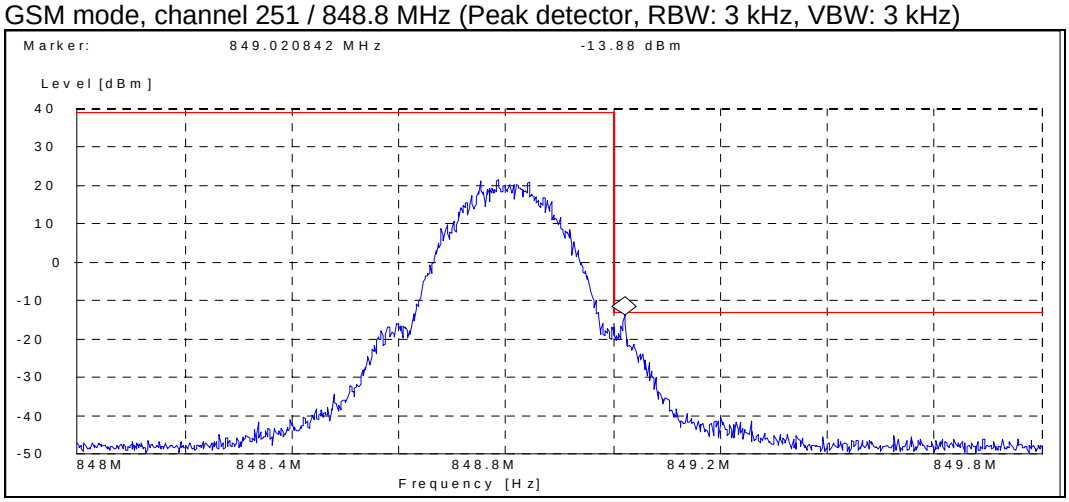
Slide closed:

Operation mode (TX on)	Channel / f_C [MHz]	Level [dBm]
GSM	128 / 824.2	-15.61
GSM	251 / 848.8	-13.88
EGPRS	128 / 824.2	-29.78
EGPRS	251 / 848.8	-29.06

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



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



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

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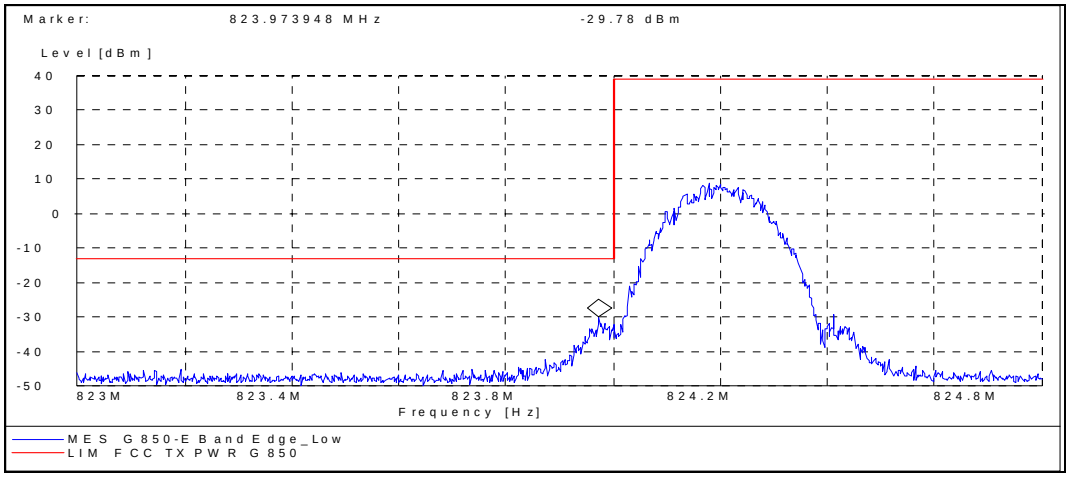
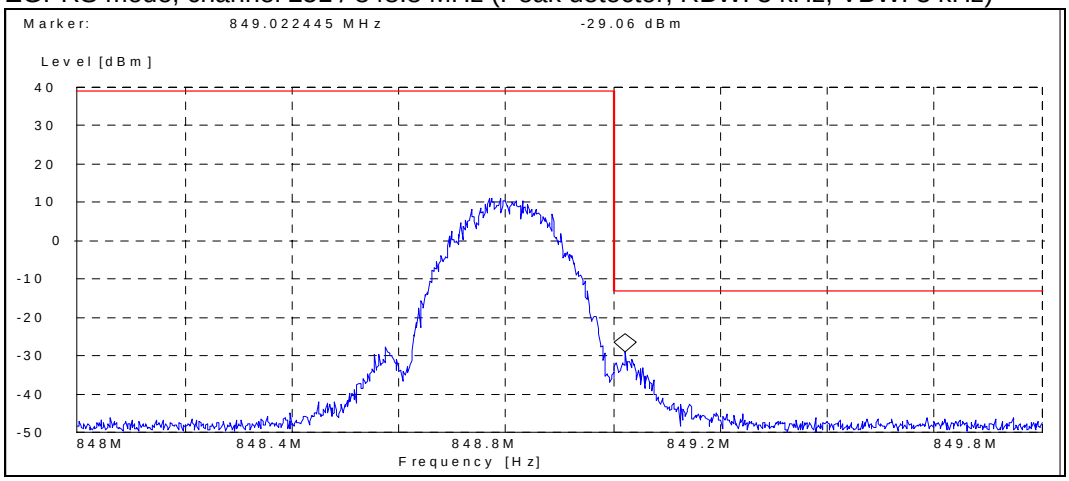


EGPRS mode, channel 251 / 848.8 MHz (Peak detector, RBW: 3 kHz, VBW: 3 kHz)



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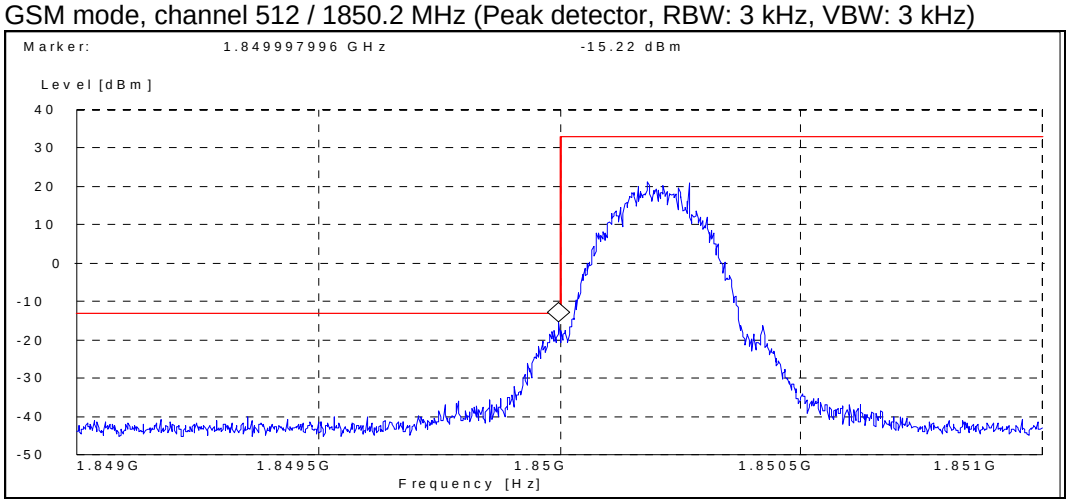
4.4. GSM 1900 Test results

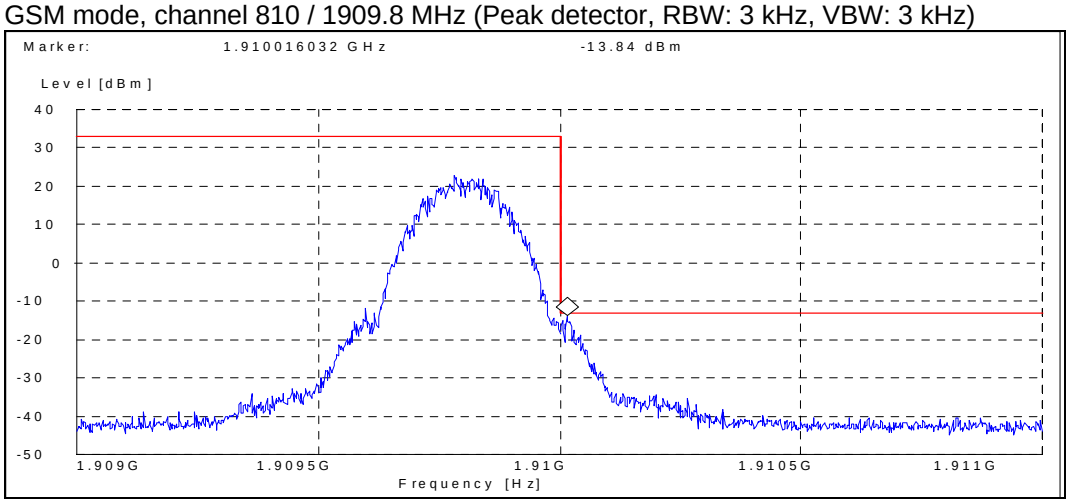
Slide open:

Operation mode (TX on)	Channel / f_C [MHz]	Level [dBm]
GSM	512 / 1850.2	-15.22
GSM	810 / 1909.8	-13.84
EGPRS	512 / 1850.2	-28.36
EGPRS	810 / 1909.8	-25.71

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



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



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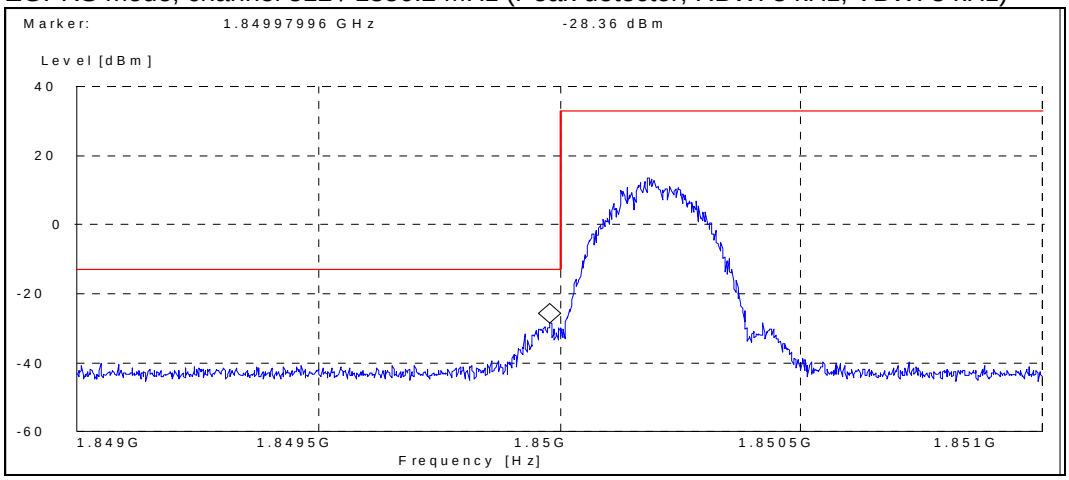
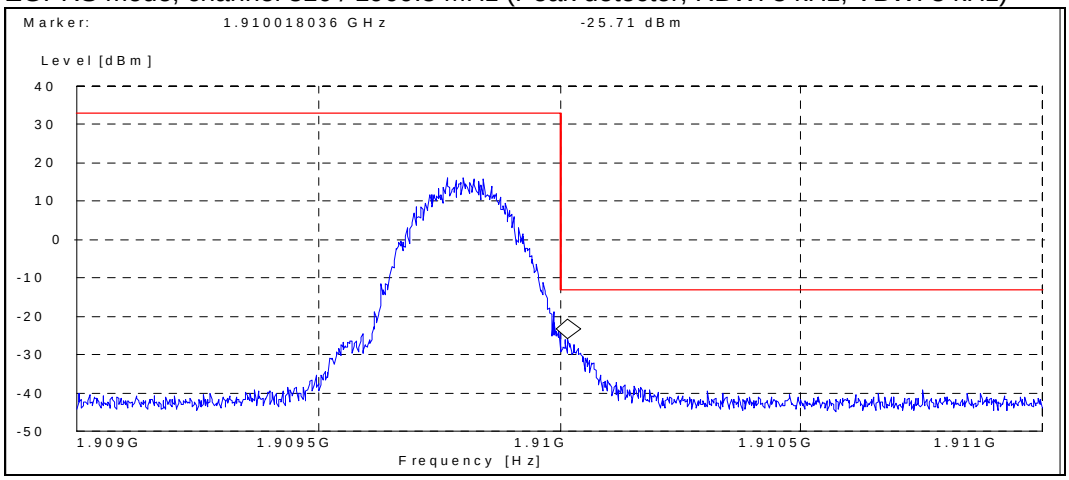
EGPRS mode, channel 512 / 1850.2 MHz (Peak detector, RBW: 3 kHz, VBW: 3 kHz)



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



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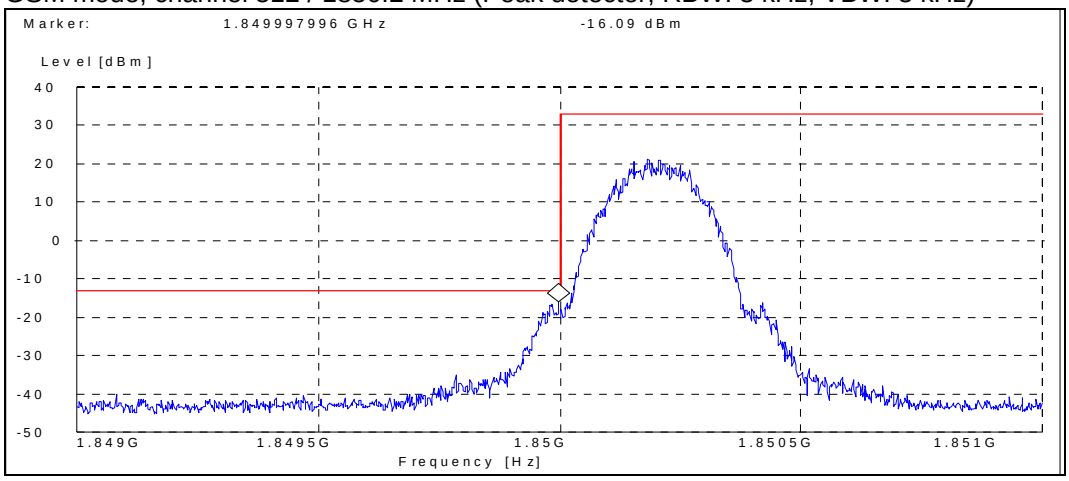
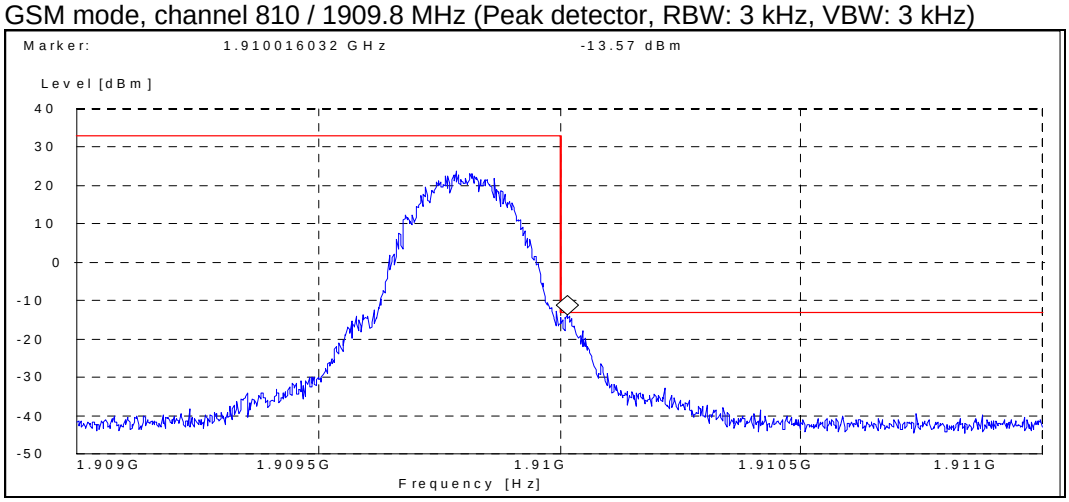
Slide closed:

Operation mode (TX on)	Channel / f_C [MHz]	Level [dBm]
GSM	512 / 1850.2	-16.09
GSM	810 / 1909.8	-13.57
EGPRS	512 / 1850.2	-27.23
EGPRS	810 / 1909.8	-24.14

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



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



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

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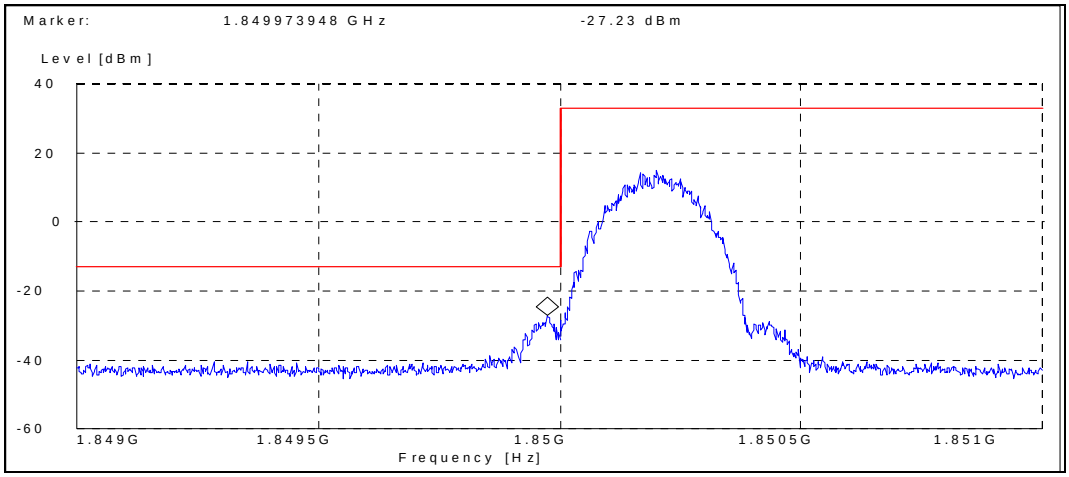
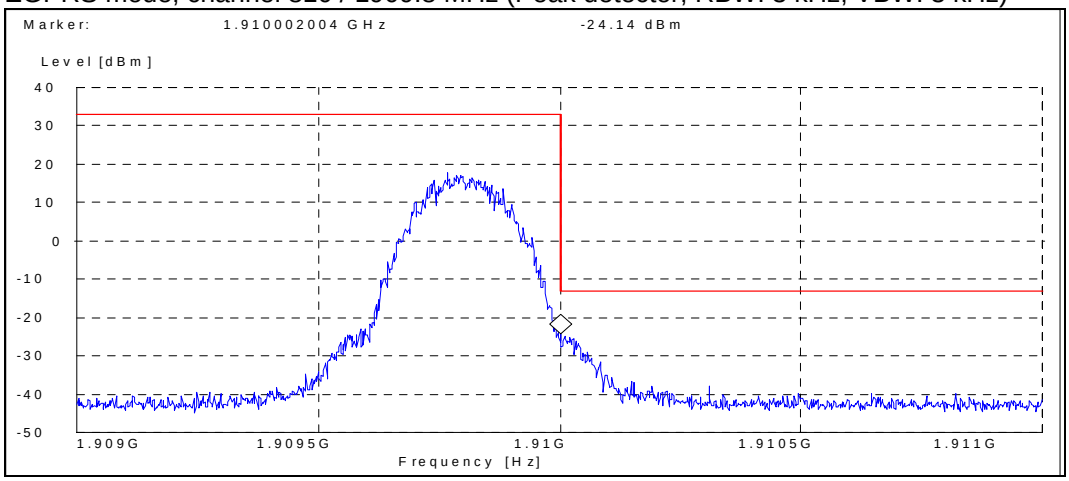


EGPRS mode, channel 810 / 1909.8 MHz (Peak detector, RBW: 3 kHz, VBW: 3 kHz)



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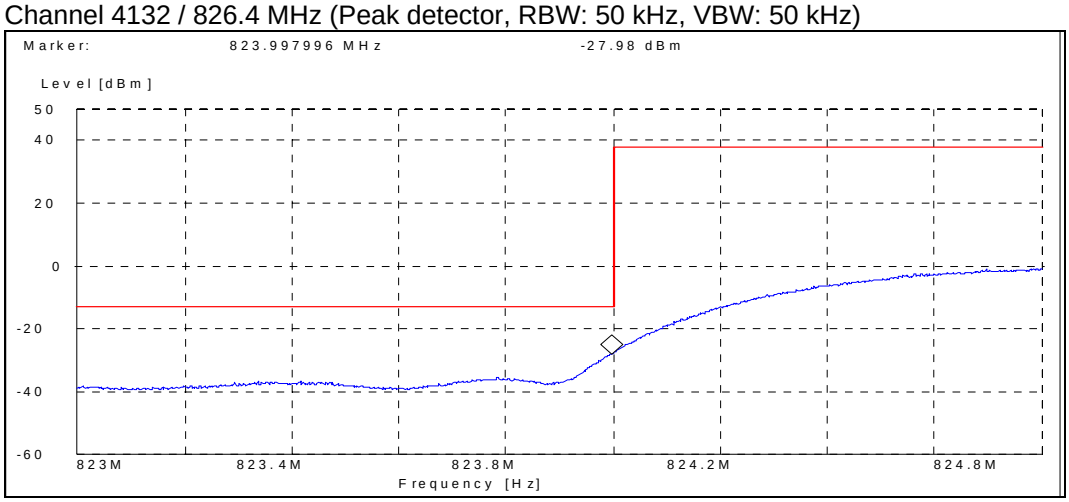
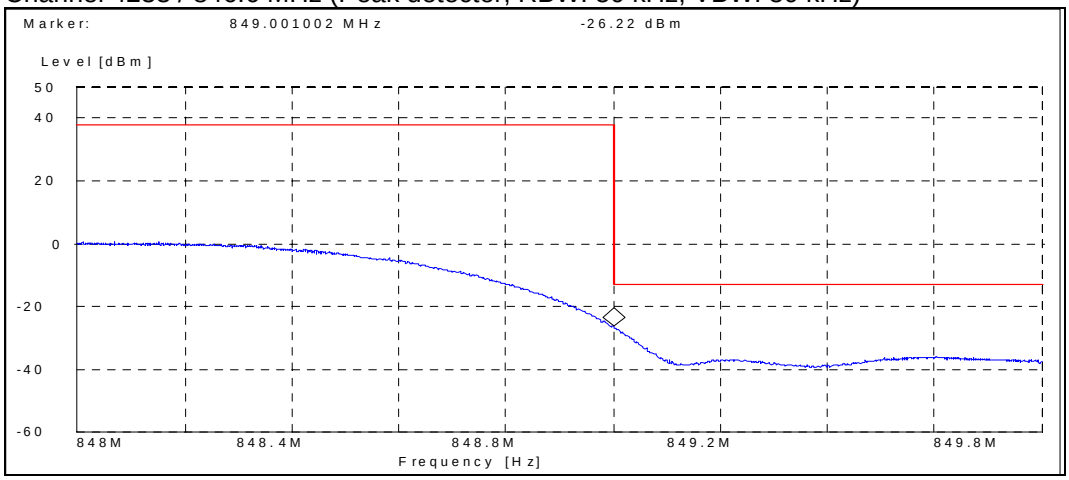
4.5. WCDMA 850 Test results

Operation mode (TX on)	Channel / f_C [MHz]	Level [dBm]
FDD	4132 / 826.4	-27.90
FDD	4233 / 846.6	-26.22

Channel 4132 / 826.4 MHz (Peak detector, RBW: 50 kHz, VBW: 50 kHz)



Channel 4233 / 846.6 MHz (Peak detector, RBW: 50 kHz, VBW: 50 kHz)



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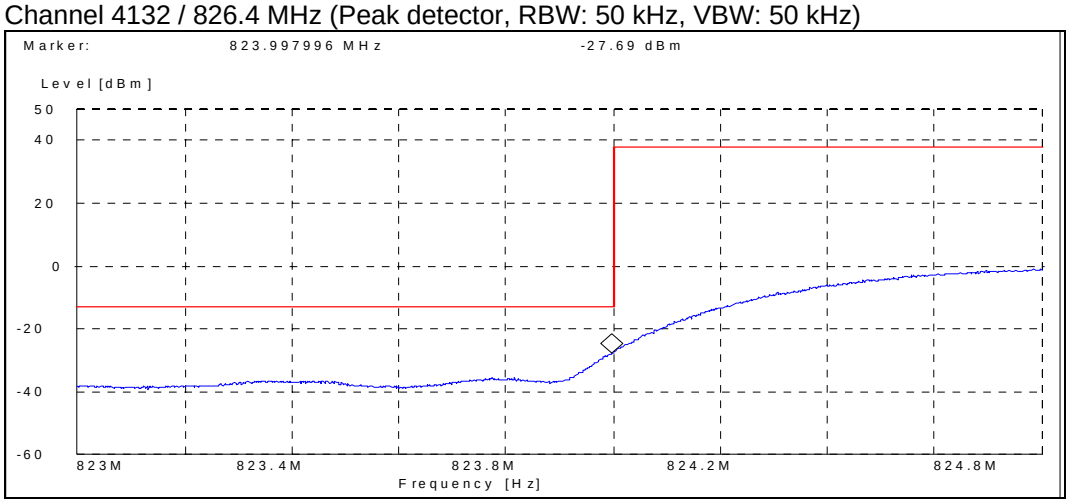
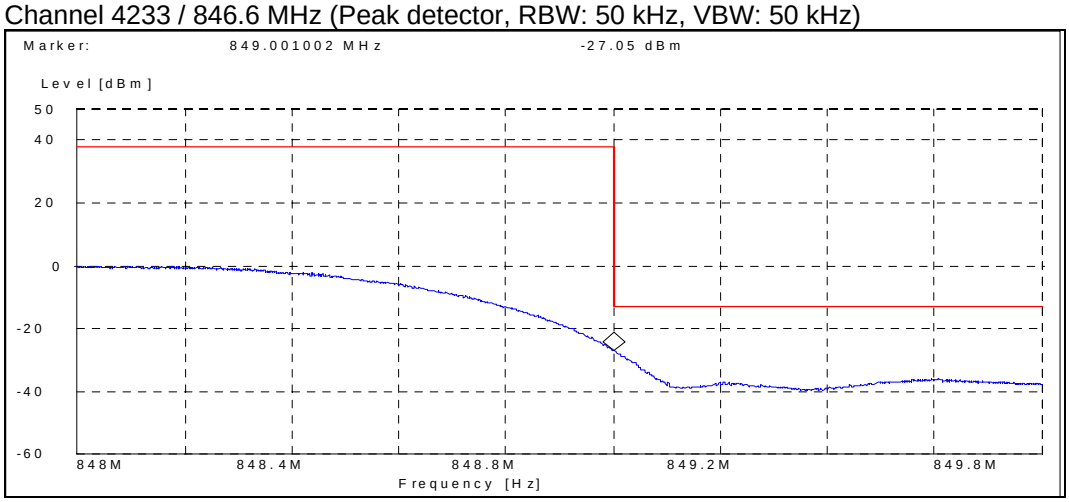
Slide closed:

Operation mode (TX on)	Channel / f_C [MHz]	Level [dBm]
FDD	4132 / 826.4	-27.69
FDD	4233 / 846.6	-27.05

Channel 4132 / 826.4 MHz (Peak detector, RBW: 50 kHz, VBW: 50 kHz)



Channel 4233 / 846.6 MHz (Peak detector, RBW: 50 kHz, VBW: 50 kHz)



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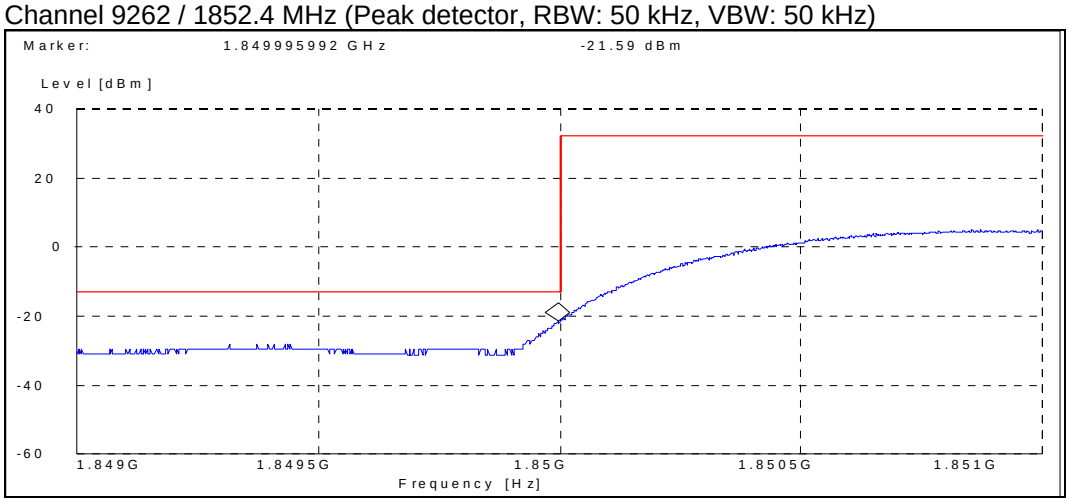
4.6. WCDMA 1900 Test results

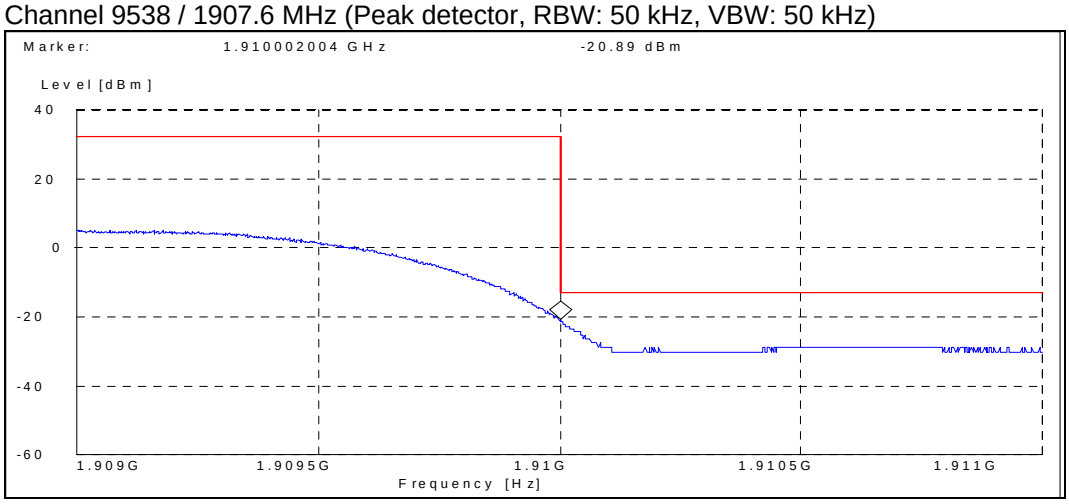
Slide open:

Operation mode (TX on)	Channel / f_C [MHz]	Level [dBm]
FDD	9262 / 1852.4	-21.59
FDD	9538 / 1907.6	-20.89

Channel 9262 / 1852.4 MHz (Peak detector, RBW: 50 kHz, VBW: 50 kHz)



Channel 9538 / 1907.6 MHz (Peak detector, RBW: 50 kHz, VBW: 50 kHz)



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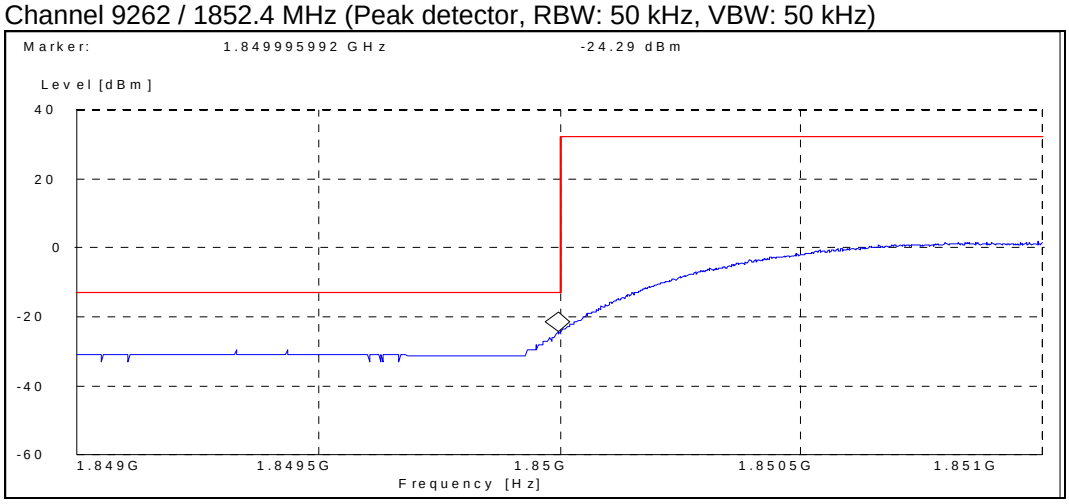
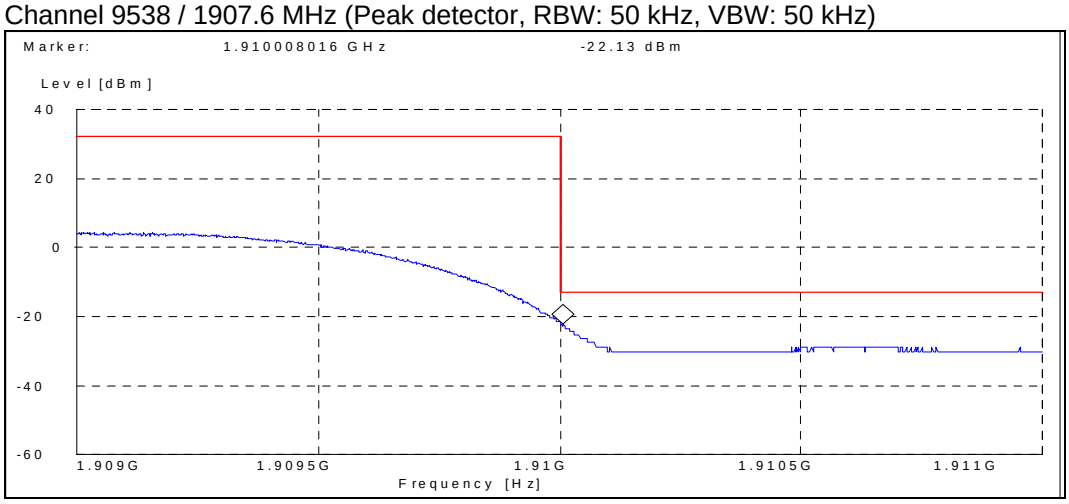
Slide closed:

Operation mode (TX on)	Channel / f_C [MHz]	Level [dBm]
FDD	9262 / 1852.4	-24.29
FDD	9538 / 1907.6	-22.13

Channel 9262 / 1852.4 MHz (Peak detector, RBW: 50 kHz, VBW: 50 kHz)



Channel 9538 / 1907.6 MHz (Peak detector, RBW: 50 kHz, VBW: 50 kHz)



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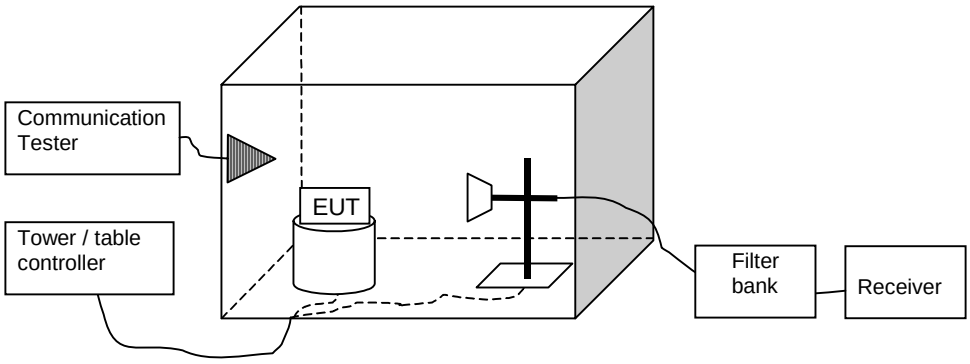
5. Spurious radiated emissions

(FCC §22.917(a), §24.238(a), §2.1053, RSS-GEN 4.7, RSS-132 4.5, RSS-133 6.3)

EUT with DUT number	RM-160, DUT 12000
Accessories with DUT numbers	AD-43, DUT 12002; HS-45, DUT 12001; AC-5U, DUT 11999; BL-6F DUT 12004
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 41 / 101
Date of measurements	15.06.2007
Measured by	Anni Manninen

5.1. Test setup



5.2. Test method and limit

The measurement is made according to TIA-603-B-2002 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.

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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 / WCDMA 1900	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
1673.143287	-45.30	0.02951	- 47.10	1.80	VERTICAL	PASSED
2509.820641	-41.90	0.06457	- 47.60	5.70	HORIZONTAL	PASSED
3346.689379	-48.00	0.01585	- 53.60	5.60	VERTICAL	PASSED
3355.713427	-56.50	0.00224	- 62.30	5.80	VERTICAL	PASSED

EGPRS mode, channel 190 / 836.6 MHz

Frequency [MHz]	P [dBm]	P [µW]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
1673.143287	-49.10	0.01230	- 50.90	1.80	VERTICAL	PASSED
2509.820641	-46.80	0.02089	- 52.50	5.70	HORIZONTAL	PASSED
3348.189379	-56.20	0.00240	- 61.90	5.70	VERTICAL	PASSED
3355.213427	-55.70	0.00269	- 61.50	5.80	VERTICAL	PASSED

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5.4. GSM 1900 Test results

GSM mode, channel 661 / 1880.0 MHz

Frequency [MHz]	P [dBm]	P [µW]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
3760.023046	-33.50	0.44668	- 40.80	7.30	VERTICAL	PASSED
5632.258517	-48.90	0.01288	- 60.60	11.70	HORIZONTAL	PASSED
5640.282565	-36.10	0.24547	- 48.10	12.00	VERTICAL	PASSED

EGPRS mode, channel 661 / 1880.0 MHz

Frequency [MHz]	P [dBm]	P [µW]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
3760.023046	-38.20	0.15136	- 45.50	7.30	VERTICAL	PASSED
5631.258517	-48.50	0.01413	- 60.20	11.70	HORIZONTAL	PASSED
5637.782565	-50.10	0.00977	- 62.10	12.00	VERTICAL	PASSED

5.5. WCDMA 850 Test results

Channel 4175 / 835.0 MHz

Frequency [MHz]	P [dBm]	P [µW]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
1667.937876	-53.40	0.00457	- 55.20	1.80	VERTICAL	PASSED
3352.697395	-56.50	0.00224	- 62.30	5.80	VERTICAL	PASSED

5.6. WCDMA 1900 Test results

Channel 9400 / 1880.0 MHz

Frequency [MHz]	P [dBm]	P [µW]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
3761.531062	-54.00	0.00398	- 60.60	6.60	VERTICAL	PASSED
5641.782565	-48.90	0.01288	- 60.70	11.80	VERTICAL	PASSED
5645.298597	-48.50	0.01413	- 60.30	11.80	HORIZONTAL	PASSED

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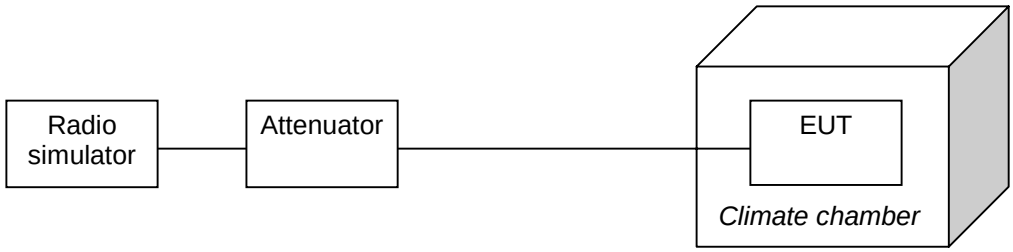
6. Frequency stability, temperature variation

(FCC §2.1055(a), RSS-GEN 4.5, RSS-132 4.3, RSS-133 7)

EUT with DUT number	RM-160, DUT 12024
Accessories with DUT numbers	SD-13, DUT 12033; AD-43, DUT 12026, HS-45, DUT 12027
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	Phone tested slide open mode.
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 42 / 101.3
Date of measurements	26.06.2007
Measured by	Jani Koskinen

6.1. Test setup



6.2. Test method and limit

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

a) The climate chamber temperature is set to the maximum value and the temperature is allowed to stabilize.
b) The EUT is placed in the chamber.
c) The EUT is set in idle mode for 15 minutes.
d) The EUT is set to transmit.
e) The transmit frequency error was measured immediately.
f) 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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6.3. GSM 850 Test results

GSM mode, channel 190 / 836.6 MHz

Temperature [°C]	Deviation [Hz]	Deviation [ppm]
50	-15	- 0.0179
40	-18	- 0.0215
30	-19	- 0.0227
20	-19	- 0.0227
10	-24	- 0.0287
0	-27	- 0.0323
-10	-22	- 0.0263
-20	-19	- 0.0227
-30	-26	- 0.0311

6.4. GSM 1900 Test results

GSM mode, channel 661 / 1880.0 MHz

Temperature [°C]	Deviation [Hz]	Deviation [ppm]
50	-60	- 0.0319
40	-47	- 0.0250
30	-40	- 0.0213
20	-55	- 0.0293
10	-45	- 0.0239
0	-56	- 0.0298
-10	-48	- 0.0255
-20	-36	- 0.0191
-30	-45	- 0.0239

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7. Test Equipment

7.1. Conducted measurements

Eq. No	Equipment	Type	Manufacturer	Used in
1742	EMI Test Receiver	ESMI	R&S	15C, 15B
1759	LISN 50 µH	ESH3-Z5	R&S	15C, 15B
1872	Thermo- Hygrograph	00.02520.150700	Lambrecht	15C, 15B
1916	Radio Communication tester	CMTA84	R&S	15C, 15B
2039	Power Supply	PL330QMD	THURLBY	15C, 15B
2060	LISN 50 µH	ESH3-Z5	R&S	15C, 15B
2068	CDN-Antenna line	S1	NMP	15C, 15B
2097	Pulse Limiter	ESH3-Z2	R&S	15C, 15B
2111	Multimeter	TX3	Tektronix	15C, 15B
2156	Digital Radio Communication Tester	CMU200	R&S	15C, 15B
2206	Signal generator	SMX	R&S	15C, 15B
2335	GPIB Switch 2 to 1	-	National Instruments	15C, 15B
2347	Digital Radio Communication Tester	CMU200	R&S	22/24, 15C, 15B
2352	Spectrum Analyzer	FSP	R&S	22/24, 15C
2359	Temperature Test system	VT4002	Vötsch Industrietechnik	22/24
2360	Serial Bus Converter	Serial 488A	IO Tech	22/24
2362	Power Supply	NGPX 70/5	R&S	22/24
2388	Bluetooth Tester	CBT	R&S	15C, 15B
-	RF Emission Software	ES-K1 v.1.71	R&S	22/24, 15C, 15B

7.2. Radiated measurements

Eq. No	Equipment	Type	Manufacturer	Used in
1748	Log. per. Antenna	HL025	R&S	22/24, 15C
1749	Log. per. Antenna	HL025	R&S	22/24, 15C
1875	Thermo- Hygrograph	00.02520.150700	Lambrecht	22/24, 15C, 15B
1917	Radio Communication tester	CMTA84	R&S	22/24, 15C, 15B
1933	Precision half-wave dipole antennas	HZ-13	R&S	22/24, 15C
1938	Precision half-wave dipole antennas	HZ-12	R&S	22/24, 15C
2006	Radiation Reference Source	VSQ	MEB	22/24, 15C, 15B
2009	Signal generator	SMP 22	R&S	22/24, 15C, 15B
2019	Multimeter	34401A	HP	22/24, 15C, 15B
2027	Coupling and Decoupling Network	M2 (modified) DC1	MEB	22/24, 15C, 15B
2028	Coupling and Decoupling Network	M3 (modified) DC2	MEB	22/24, 15C, 15B
2029	Power Supply	PL330	THURLBY	22/24, 15C, 15B
2043	Band Reject Filter	WRCA824/849-0,2-6SS	Wainwright	22/24, 15C, 15B
2047	Band Reject Filter	WRCC1800/2000-0.2-10SS	Wainwright	22/24, 15C, 15B
2051	High Pass Filter	4HC1700-1-KK	R&S	22/24, 15C
2057	Log. per. Antenna	HL025	R&S	22/24, 15C

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Eq. No	Equipment	Type	Manufacturer	Used in
2109	Power Supply	PL330QMD	THURLBY	22/24, 15C, 15B
2110	Multimeter	34401A	HP	22/24, 15C, 15B
2112	Multimeter	TX3	Tektronix	22/24, 15C, 15B
2116	Controller	EMCO MODEL 2090	ETS	22/24, 15C, 15B
2133	Power Meter	NRVS	R&S	22/24, 15C
2134	Power Sensor	NRV-Z32	R&S	22/24, 15C
2135	Coupling and Decoupling Network	CDN 801-M3	LÜTHI	22/24, 15C, 15B
2138	Ultra Broadband Antenna	HL562	R&S	22/24, 15C, 15B
2140	Biconical Antenna	EMCO93110B	EMCO	22/24, 15C
2142	Log.-per.-dipol Antenna	3146	EMCO	22/24, 15C
2144	Attenuator	6803.17B	Huber-Suhner	22/24, 15C, 15B
2150	High Pass Filter	F-15041	RLC ELECTRONICS	22/24, 15C
2176	Coupling and Decoupling Network	CDN 801-M3	LÜTHI	22/24, 15C, 15B
2180	Digital Radio Communication Tester	CMU200	R&S	22/24, 15C, 15B
2188	Preamplifier	AFS4-00100300-20-23P-6	MITEQ	22/24, 15C, 15B
2330	EMI Test receiver	ESIB26	R&S	22/24, 15C, 15B
2334	GPIB Switch 2 to 1	-	National Instruments	22/24, 15C, 15B
2348	Yaesu controller	G-1000DXC	YAESU	22/24, 15C, 15B
2349	Computer controller (Yaesu)	GS-232B	YAESU	22/24, 15C, 15B
2350	Preamplifier	AMF-6D-020180-29-20P	MITEQ	22/24, 15C
2361	Anechoic chamber	3 meter semi/full anechoic chamber	Euroshield	22/24, 15C, 15B
2398	Horn antenna	HF906	R&S	22/24, 15C
2363	Band Reject Filter	WRCG 832/838-825/845/5SS	Wainwright	22/24
2364	Band Reject Filter	WRCG1877/1883 - 1870/1890-40/6SS	Wainwright	22/24
2365	Relay Switch Unit	TS-RSP	R&S	22/24, 15C, 15B
2366	Relay Switch Unit	TS-RSP	R&S	22/24, 15C, 15B
2384	Band Reject Filter	WRCG832/838-825/845-40/5SS	Wainwright	22/24
2388	Bluetooth Tester	CBT	R&S	15C, 15B
-	RF Emission Software	ES-K1 v.1.71	R&S	22/24, 15C, 15B

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