

FCC Part 22/24 Compliance Test Report

Test Report no.:	Salo_FCC_0550_08.doc	Date of Report:	13.12.2005
Number of pages:	18	Customer's Contact person:	Tero Huhtala
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FCC listing no.:	533467		
IC recognition no.:	5385		
Tested devices/ accessories:	Phone RM-24 / Battery BL-6C, AC-Charger ACP-12 and Headset HS-5		
FCC ID:	PYARM-24	IC:	661V-RM24
Supplement reports:	-		
Testing has been carried out in accordance with:	CFR 47, FCC rules Parts 22 and 24, TIA-603-B-2002 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:			

Tomi Lipponen, System Manager

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

Date of receipt	12.12.2005
Testing completed	13.12.2005
The customer's contact person	Tero Huhtala
Test Plan referred to	T:\Projects\RM-24\TestPlan_RS\RM-24_TetsPlan_RS.xls
Notes	-
Document name	T:\Projects\RM-24\EMC\Results\FCC\Salo_FCC_0550_08.doc

1.1. EUT and Accessory Information

The EUT is a triple band (GSM850/1800/1900) 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-24	004400/70/162903/0	3150	-	V Series 60_30_200542_RnD_ Zeus	10905
Battery	BL-6C	0670461382066M325I11420261	-	-	-	10906
AC- Charger	ACP-12E	0675294394349K304120962076	-	-	-	10913
Headset	HS-5	-	-	-	-	10911

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	NP
§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	NP
§2.1055(a)	4.5, 4.3	Frequency stability, temperature variation	NP
§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	NP
§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	NP
§2.1055(a)	7	Frequency stability, temperature variation	NP
§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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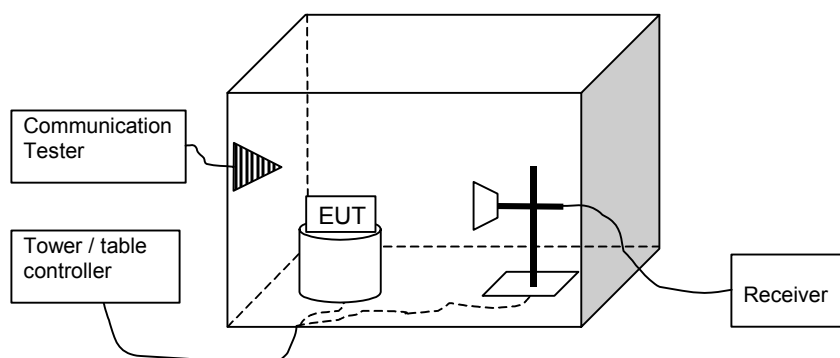
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2. Radiated RF output power

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

EUT with DUT number	RM-24, DUT 10905
Accessories with DUT numbers	BL-6C, DUT 10906; ACP-12, DUT 10913; HS-5, DUT 10911
Operation Voltage [V] / [Hz]	110 / 60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	20 / 50 / 102
Date of measurements	13.12.2005
Measured by	Tomi Lipponen

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.

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

GSM mode, flip closed

Channel	ERP [dBm]	ERP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
128	32.90	1.950	- 3.70	36.60	HORIZONTAL	PASSED
190	33.60	2.291	- 2.10	35.70	HORIZONTAL	PASSED
251	31.90	1.549	- 2.70	34.60	HORIZONTAL	PASSED

GPRS mode, 2 TX Slots, flip closed

Channel	ERP [dBm]	ERP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
128	30.50	1.122	- 6.10	36.60	HORIZONTAL	PASSED
190	31.30	1.349	- 4.40	35.70	HORIZONTAL	PASSED
251	29.70	0.933	- 4.90	34.60	HORIZONTAL	PASSED

EGPRS mode, 1 TX Slot, flip closed

Channel	ERP [dBm]	ERP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
128	28.40	0.692	- 8.20	36.60	HORIZONTAL	PASSED
190	29.10	0.813	- 6.60	35.70	HORIZONTAL	PASSED
251	27.20	0.525	- 7.40	34.60	HORIZONTAL	PASSED

GSM mode, flip open

Channel	ERP [dBm]	ERP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
128	32.80	1.905	- 3.80	36.60	HORIZONTAL	PASSED
190	33.20	2.089	- 2.50	35.70	HORIZONTAL	PASSED
251	31.10	1.288	- 3.50	34.60	HORIZONTAL	PASSED

GPRS mode, 2 TX Slots, flip open

Channel	ERP [dBm]	ERP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
128	29.80	0.955	- 6.80	36.60	HORIZONTAL	PASSED
190	30.20	1.047	- 5.50	35.70	HORIZONTAL	PASSED
251	28.40	0.692	- 6.20	34.60	HORIZONTAL	PASSED

EGPRS mode, 1 TX Slot, flip open

Channel	ERP [dBm]	ERP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
128	28.00	0.631	- 8.60	36.60	HORIZONTAL	PASSED
190	28.00	0.631	- 7.70	35.70	HORIZONTAL	PASSED
251	27.30	0.537	- 7.30	34.60	HORIZONTAL	PASSED

2.4. GSM 1900 Test results

GSM mode, flip closed

Channel	EIRP [dBm]	EIRP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
512	30.60	1.148	- 13.90	44.50	HORIZONTAL	PASSED
661	31.70	1.479	- 13.40	45.10	HORIZONTAL	PASSED
810	30.00	1.000	- 14.10	44.10	HORIZONTAL	PASSED

GPRS mode, 2 TX Slots, flip closed

Channel	EIRP [dBm]	EIRP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
512	27.30	0.537	- 17.20	44.50	HORIZONTAL	PASSED
661	29.60	0.912	- 15.50	45.10	HORIZONTAL	PASSED
810	27.20	0.525	- 16.90	44.10	HORIZONTAL	PASSED

EGPRS mode, 1 TX Slot, flip closed

Channel	EIRP [dBm]	EIRP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
512	27.60	0.575	- 16.90	44.50	HORIZONTAL	PASSED
661	28.80	0.759	- 16.30	45.10	HORIZONTAL	PASSED
810	26.60	0.457	- 17.50	44.10	HORIZONTAL	PASSED

GSM mode, flip open

Channel	EIRP [dBm]	EIRP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
512	29.10	0.813	- 15.40	44.50	HORIZONTAL	PASSED
661	29.90	0.977	- 15.20	45.10	HORIZONTAL	PASSED
810	29.90	0.977	- 14.20	44.10	HORIZONTAL	PASSED

GPRS mode, 2 TX Slots, flip open

Channel	EIRP [dBm]	EIRP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
512	26.60	0.457	- 17.90	44.50	HORIZONTAL	PASSED
661	27.20	0.525	- 17.90	45.10	HORIZONTAL	PASSED
810	27.00	0.501	- 17.10	44.10	HORIZONTAL	PASSED

EGPRS mode, 1 TX Slot, flip open

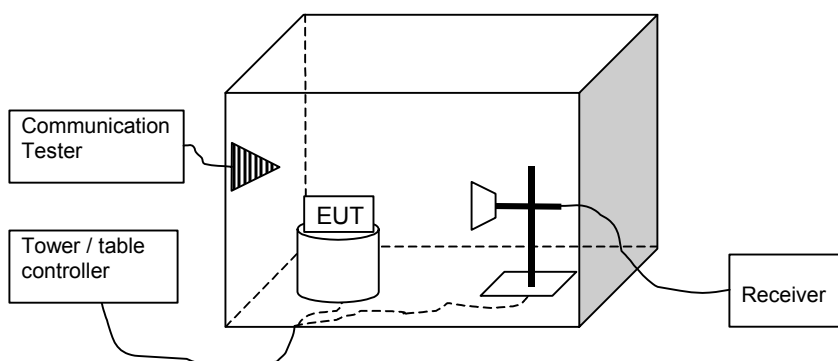
Channel	EIRP [dBm]	EIRP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
512	25.50	0.355	- 19.00	44.50	HORIZONTAL	PASSED
661	25.60	0.363	- 19.50	45.10	HORIZONTAL	PASSED
810	26.70	0.468	- 17.40	44.10	HORIZONTAL	PASSED

3. 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-24, DUT 10905
Accessories with DUT numbers	BL-6C, DUT 10906; ACP-12, DUT 10913; HS-5, DUT 10911
Operation Voltage [V] / [Hz]	110 / 60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	20 / 50 / 102
Date of measurements	13.12.2005
Measured by	Tomi Lipponen

3.1. Test setup



3.2. Test method and limit

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

Limits for band edge compliance measurements

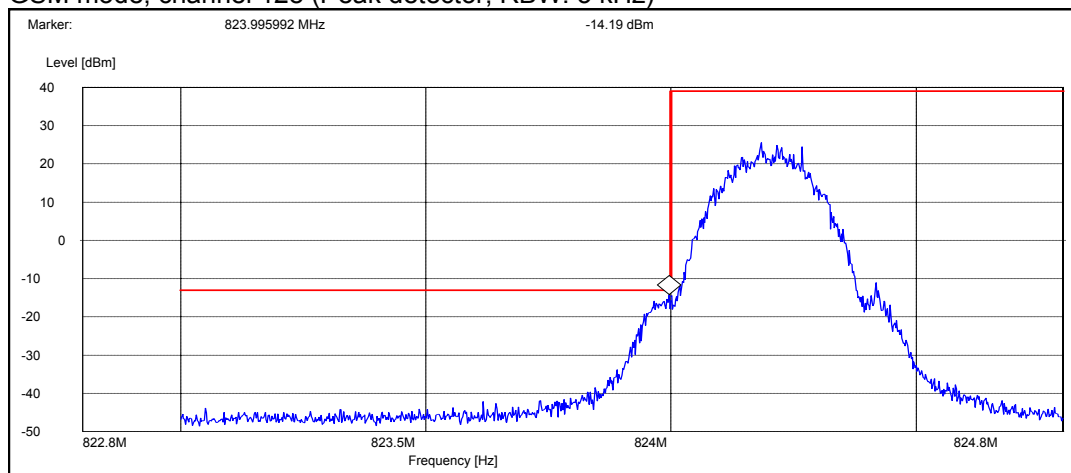
Operation band	Frequency range [MHz]	Limit [dBm]
GSM 850 / WCDMA 850	Below 824 and above 849	-13
GSM 1900 / WCDMA 1900	Below 1850 and above 1910	-13

3.3. GSM 850 Test results

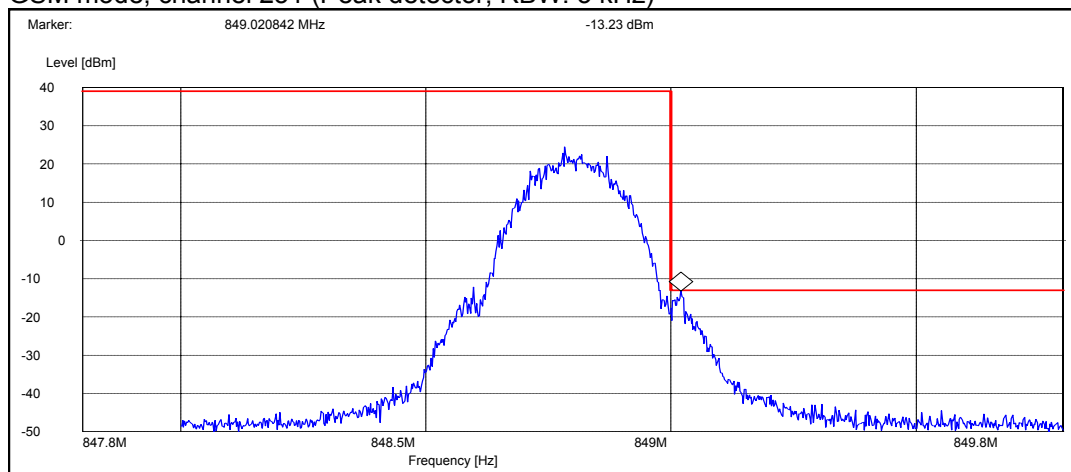
FLIP CLOSED:

Operation mode (TX on)	Channel	Level [dBm]
GSM	128	-14.19
GSM	251	-13.23
EGPRS	128	-19.96
EGPRS	251	-22.21

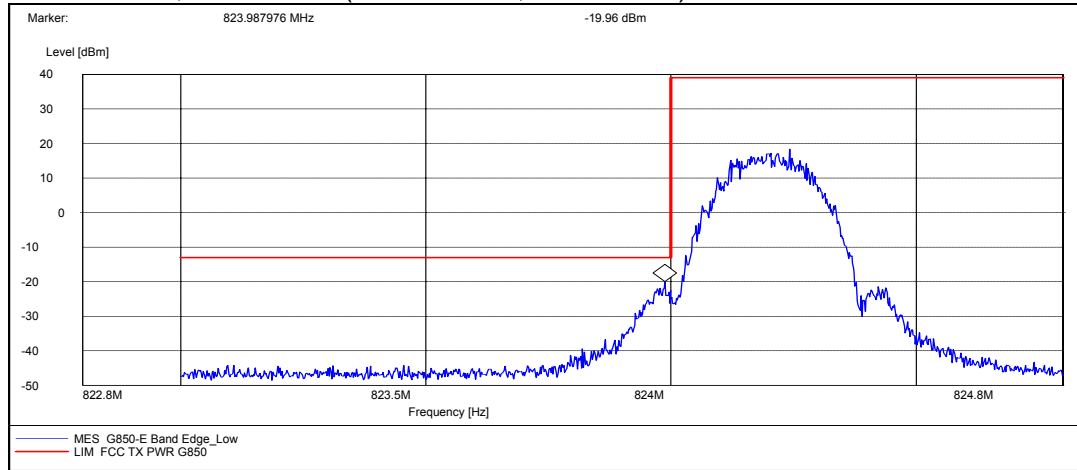
GSM mode, channel 128 (Peak detector, RBW: 3 kHz)



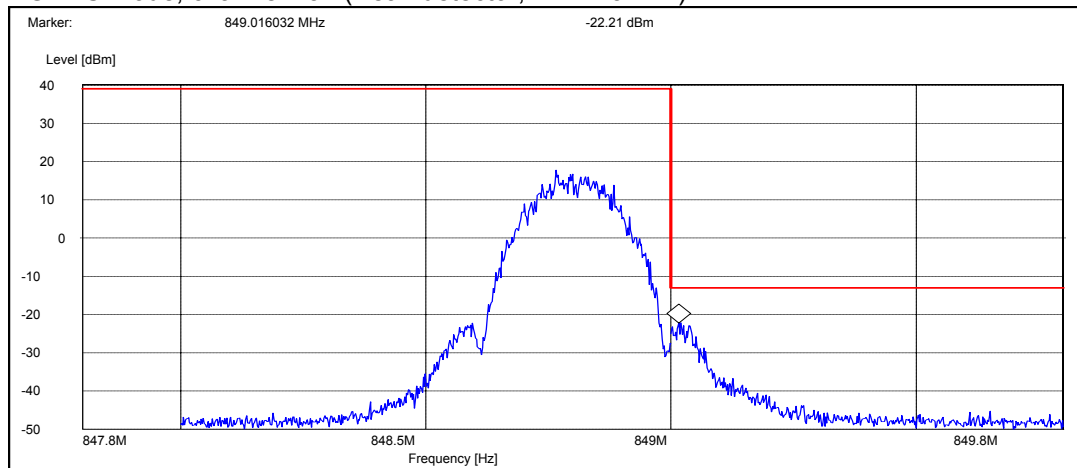
GSM mode, channel 251 (Peak detector, RBW: 3 kHz)



EGPRS mode, channel 128 (Peak detector, RBW: 3 kHz)



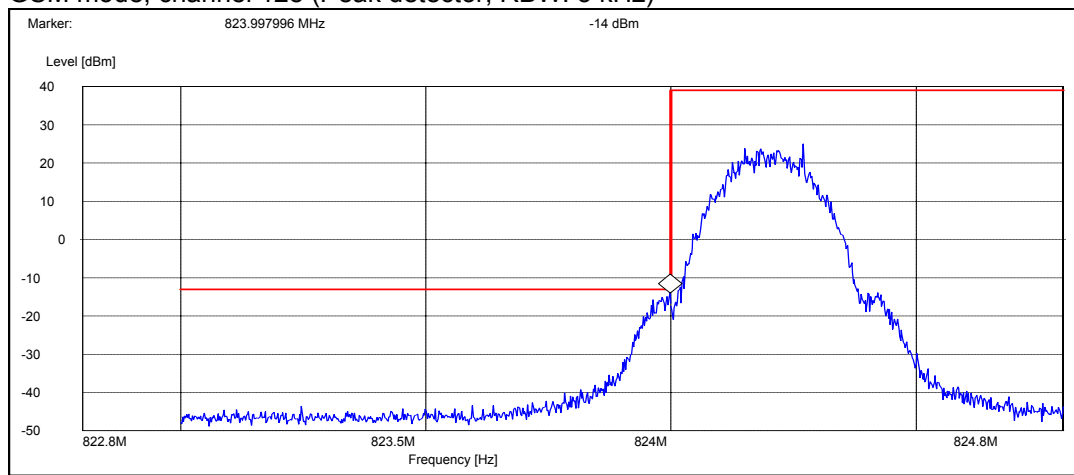
EGPRS mode, channel 251 (Peak detector, RBW: 3 kHz)



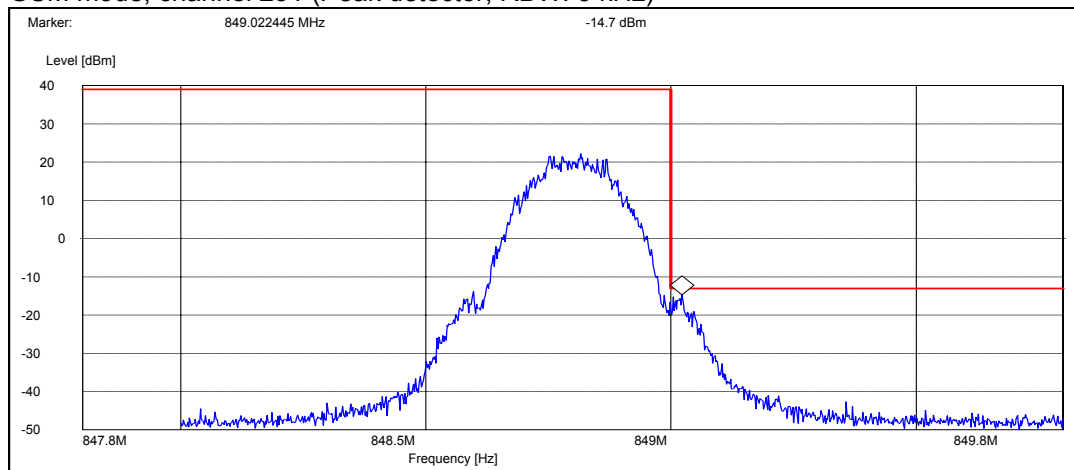
FLIP OPEN:

Operation mode (TX on)	Channel	Level [dBm]
GSM	128	-14.00
GSM	251	-14.70
EGPRS	128	-19.87
EGPRS	251	-22.77

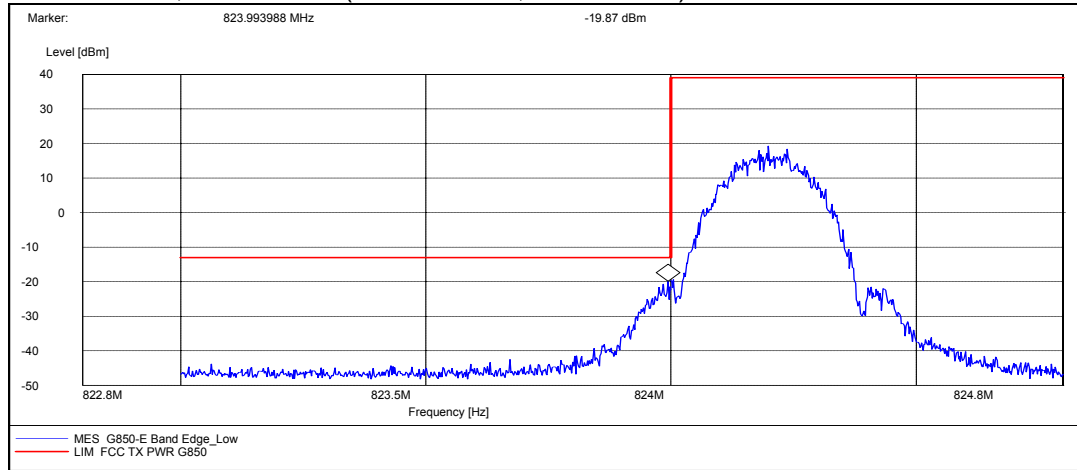
GSM mode, channel 128 (Peak detector, RBW: 3 kHz)



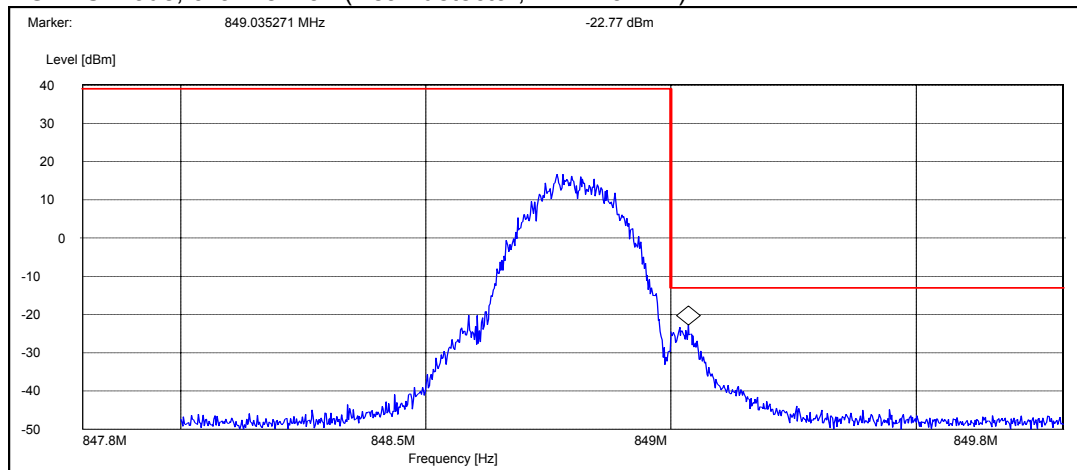
GSM mode, channel 251 (Peak detector, RBW: 3 kHz)



EGPRS mode, channel 128 (Peak detector, RBW: 3 kHz)



EGPRS mode, channel 251 (Peak detector, RBW: 3 kHz)

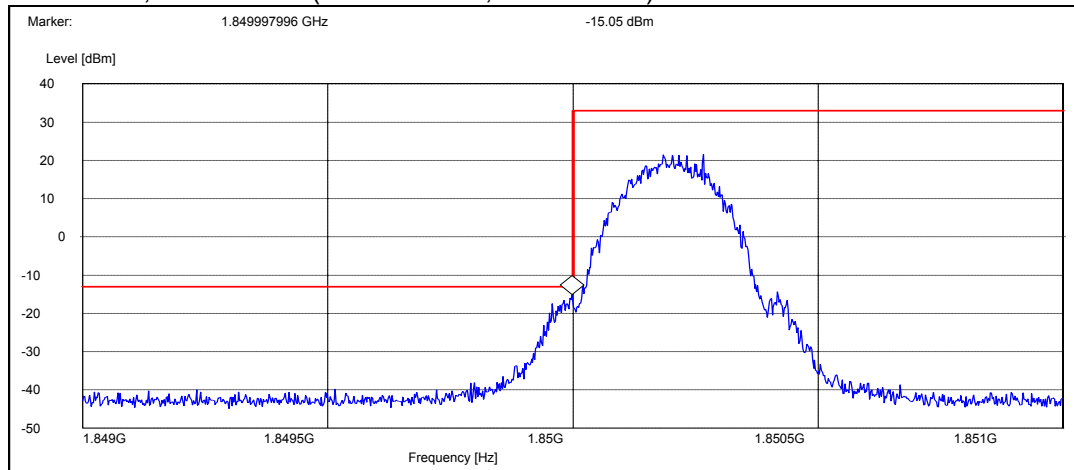


3.4. GSM 1900 Test results

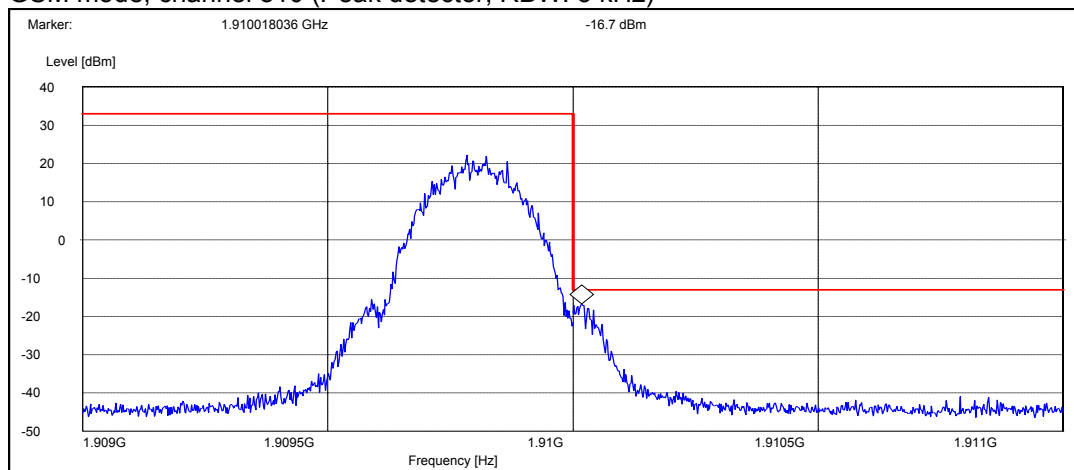
FLIP CLOSED:

Operation mode (TX on)	Channel	Level [dBm]
GSM	512	-15.05
GSM	810	-16.70
EGPRS	512	-21.83
EGPRS	810	-21.50

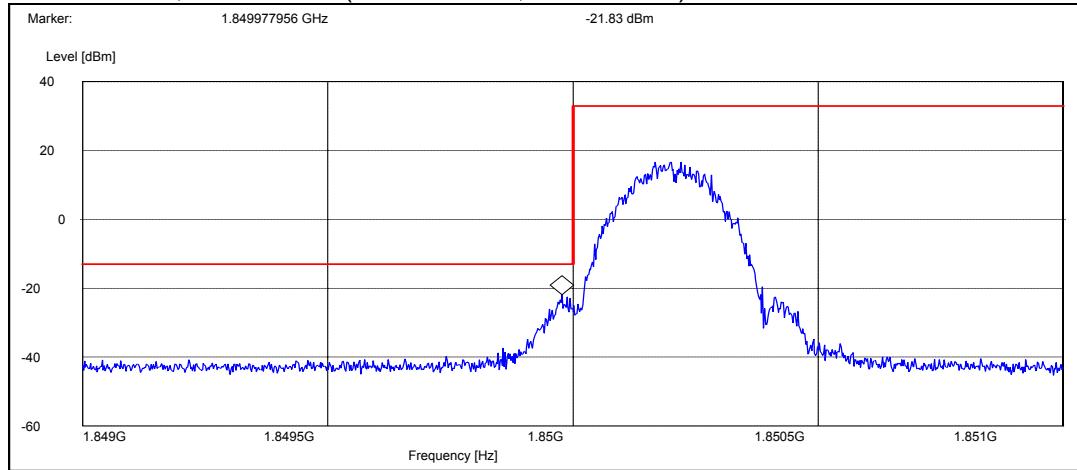
GSM mode, channel 512 (Peak detector, RBW: 3 kHz)



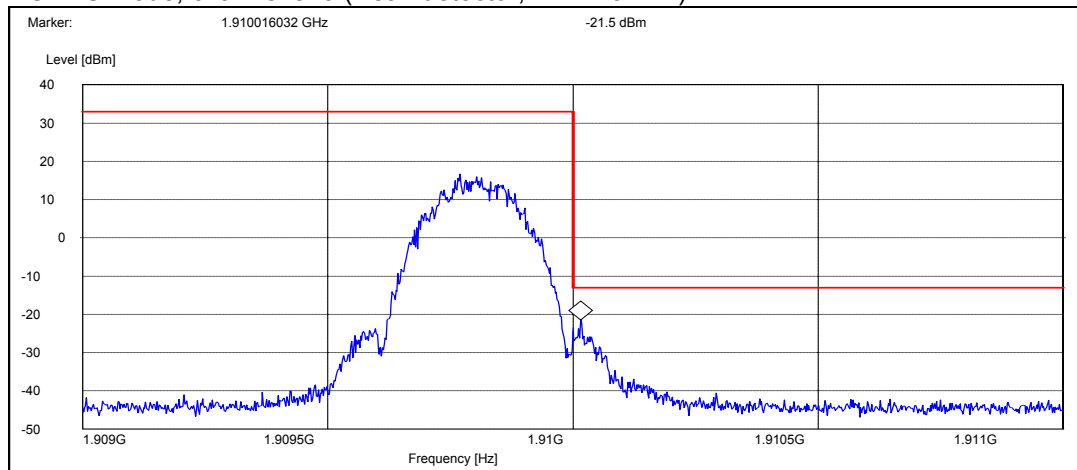
GSM mode, channel 810 (Peak detector, RBW: 3 kHz)



EGPRS mode, channel 512 (Peak detector, RBW: 3 kHz)



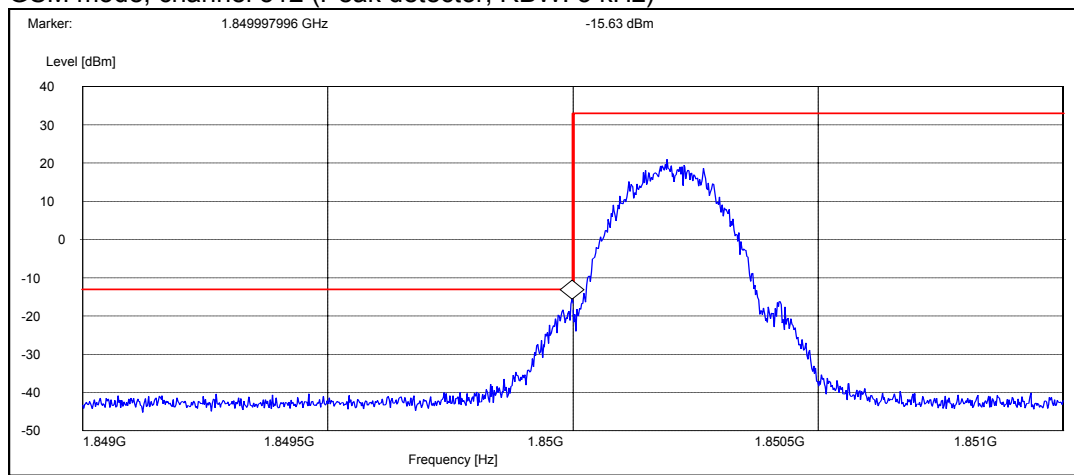
EGPRS mode, channel 819 (Peak detector, RBW: 3 kHz)



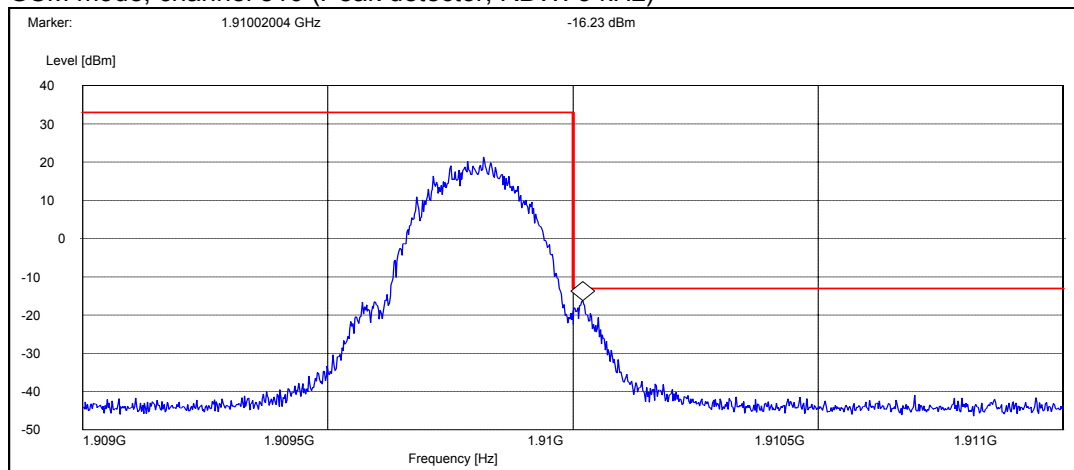
FLIP OPEN:

Operation mode (TX on)	Channel	Level [dBm]
GSM	512	-15.63
GSM	810	-16.23
EGPRS	512	-21.05
EGPRS	810	-21.58

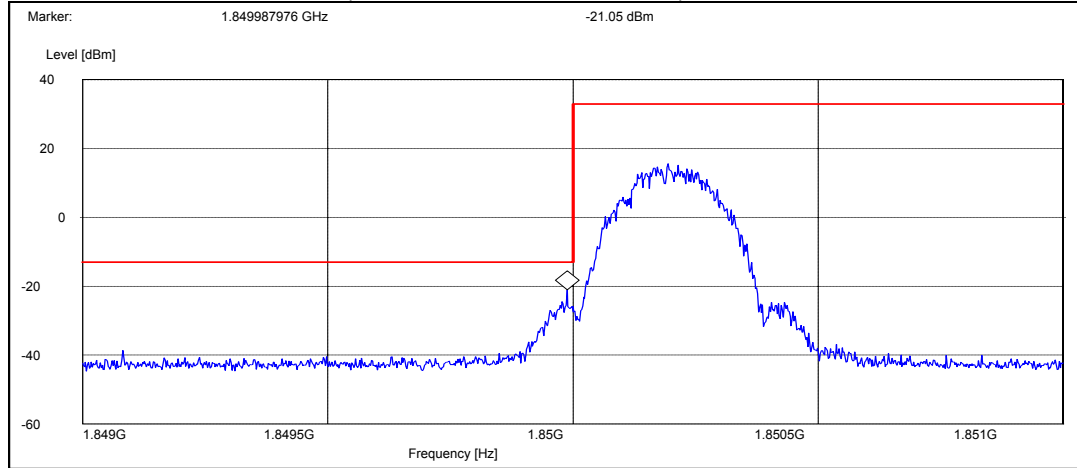
GSM mode, channel 512 (Peak detector, RBW: 3 kHz)



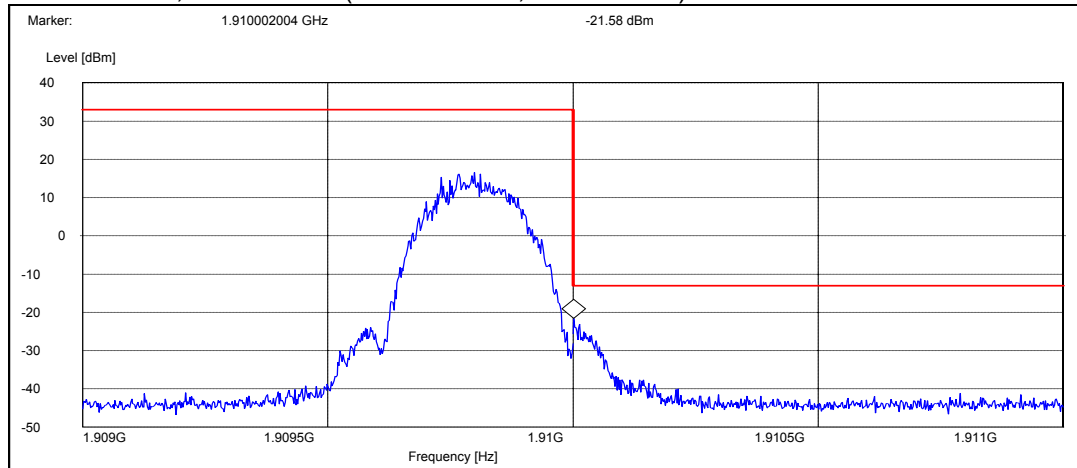
GSM mode, channel 810 (Peak detector, RBW: 3 kHz)



EGPRS mode, channel 512 (Peak detector, RBW: 3 kHz)



EGPRS mode, channel 819 (Peak detector, RBW: 3 kHz)



4. Test Equipment

4.1. 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
-	RF Emission Software	ES-K1 v.1.60	R&S	15C, 15B

4.2. 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
2004	Relay Switch Unit	RSU	R&S	22/24, 15C, 15B
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
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

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	GPIO 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
-	RF Emission Software	ES-K1 v.1.71	R&S	22/24, 15C, 15B