

FCC Part 22/24 Compliance Test Report

Test Report no.:	Tre_FCC_0922_19.doc	Date of Report:	02-Jun-2009
Number of pages:	27	Customer's Contact person:	Sonja Länkinen
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 12278 Scripps Summit Drive SAN DIEGO CA. 92131 USA Tel. +1 858 831 5000 Fax. +1 858 831 6500
FCC listing no.:	94436		
IC recognition no.:	661AK-1		
Tested devices/ accessories:	Phone RM-599 / Battery BP-4L, AC charger AC-8E, Headset HS-49		
FCC ID:	QMNRM-599	IC:	661X-RM599
Supplement reports:	-		
Testing has been carried out in accordance with:	CFR 47, FCC rules Parts 22 and 24, TIA-603-C-2004 and IC standards RSS-GEN (Issue 2, June 2007), RSS-132 (Issue 2, September 2005) and 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, Test System Manager

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

Date of receipt	26-May-2009
Testing completed	27-May-2009
The customer's contact person	Sonja Länkinen
Test Plan referred to	T:\Projects\RM-599\TestPlan_RS\RS_testplan_RM-599.xls
Notes	-
Document name	T:\Projects\RM-599\EMC\Results\FCC\Tre_FCC_0922_19.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 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-599	004401106223080	4000	-	03.16	41906
Battery	BP-4L	-	-	-	-	41394
AC charger	AC-8E	110338304100308331;0675387	-	-	-	41842
Headset	HS-49	-	-	-	-	41908

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	PASSED
§2.1049(h)	4.6.1	99 % occupied bandwidth	NP
§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	PASSED
§2.1049(h)	4.6.1	99 % occupied bandwidth	NP
§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 850 (Band V):

Section in CFR 47	Section in <i>RSS-GEN</i> or <i>RSS-132</i>	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	PASSED
§2.1049(h)	4.6.1	99 % occupied bandwidth	NP
§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

WCDMA 1900 (Band II):

Section in CFR 47	Section in <i>RSS-GEN</i> or <i>RSS-133</i>	Name of the test	Result
§2.1046(a)	6.4	Conducted RF output power	NP
§24.232(b)	6.4	Radiated RF output power	PASSED
§2.1049(h)	4.6.1	99 % occupied bandwidth	NP
§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

PASSED

FAILED

NP

The EUT complies with the essential requirements in the standard.

The EUT does not comply with the essential requirements in the standard.

The test was not performed by the TCC Nokia Tampere Laboratory.

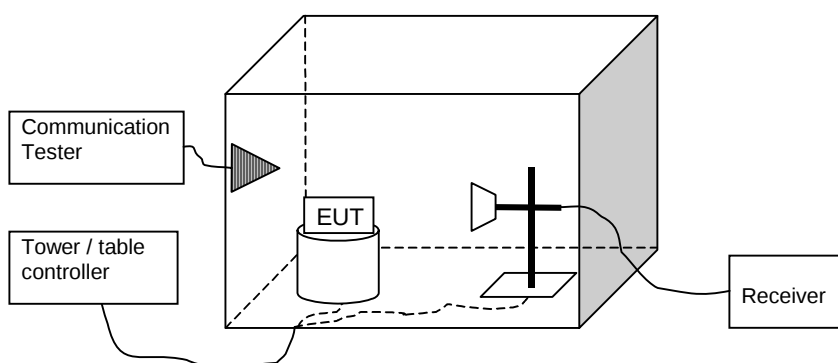
CONTENTS

1. Summary for FCC Part 22/24 Compliance Test Report	2
1.1. EUT and Accessory Information	2
1.2. Summary of Test Results	2
2. Radiated RF output power (FCC §22.913(a), §24.232(b), RSS-132 4.4, RSS-133 6.4)	5
2.1. Test setup	5
2.2. Test method and limit	5
2.3. GSM 850 Test results	6
2.4. GSM 1900 Test results	7
2.5. WCDMA 850 Test results	8
2.6. WCDMA 1900 Test results	8
3. Band Edge compliance (FCC §22.917(a), 24.238(a), RSS-132 4.5, RSS-133 6.5)	9
3.1. Test setup	9
3.2. Test method and limit	9
3.3. GSM 850 Test results Slide open	10
3.4. GSM 850 Test results Slide closed	12
3.5. GSM 1900 Test results Slide open	14
3.6. GSM 1900 Test results Slide closed	16
3.7. WCDMA 850 Test results Slide open	18
3.8. WCDMA 850 Test results Slide closed	19
3.9. WCDMA 1900 Test results Slide open	20
3.10. WCDMA 1900 Test results Slide closed	21
4. Spurious radiated emissions (FCC §22.917(a), §24.238(a), §2.1053, RSS-132 4.5, RSS-133 6.5)	22
4.1. Test setup	22
4.2. Test method and limit	22
4.3. GSM 850 Test results	23
4.4. GSM 1900 Test results	24
4.5. WCDMA 850 Test results	25
4.6. WCDMA 1900 Test results	25
5. Test equipment	26
5.1. Conducted measurements	26
5.2. Radiated measurements	26

2. Radiated RF output power (FCC §22.913(a), §24.232(b), RSS-132 4.4, RSS-133 6.4)

EUT with DUT number	RM-599 DUT 41906
Accessories with DUT numbers	BP-4L DUT 41394, AC-8E DUT 41842, HS-49 DUT 41908
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	Slide open/closed
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 47 / 99.8
Date of measurements	27-May-2009
Measured by	Jari Jantunen

2.1. Test setup



2.2. Test method and limit

The measurement is made according to TIA-603-C-2004 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 **slide open**

Channel / f_c [MHz]	ERP [dBm]	ERP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
128 / 824.2	24.10	0.257	- 9.20	33.30	HORIZONTAL	PASSED
190 / 836.6	24.10	0.257	- 9.20	33.30	VERTICAL	PASSED
251 / 848.8	23.60	0.229	- 9.20	32.80	VERTICAL	PASSED

EGPRS mode, 1 TX Slot **slide open**

Channel / f_c [MHz]	ERP [dBm]	ERP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
128 / 824.2	14.60	0.029	- 18.70	33.30	HORIZONTAL	PASSED
190 / 836.6	15.50	0.035	- 17.80	33.30	VERTICAL	PASSED
251 / 848.8	16.00	0.040	- 16.80	32.80	VERTICAL	PASSED

GSM mode **slide closed**

Channel / f_c [MHz]	ERP [dBm]	ERP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
128 / 824.2	28.30	0.676	- 5.00	33.30	HORIZONTAL	PASSED
190 / 836.6	29.00	0.794	- 4.10	33.10	HORIZONTAL	PASSED
251 / 848.8	29.30	0.851	- 3.20	32.50	HORIZONTAL	PASSED

EGPRS mode, 1 TX Slot **slide closed**

Channel / f_c [MHz]	ERP [dBm]	ERP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
128 / 824.2	18.90	0.078	- 14.40	33.30	HORIZONTAL	PASSED
190 / 836.6	19.30	0.085	- 13.80	33.10	HORIZONTAL	PASSED
251 / 848.8	19.30	0.085	- 13.20	32.50	HORIZONTAL	PASSED

2.4. GSM 1900 Test results

GSM mode **slide open**

Channel / f _c [MHz]	EIRP [dBm]	EIRP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
512 / 1850.2	30.60	1.148	- 11.90	42.50	VERTICAL	PASSED
661 / 1880.0	31.30	1.349	- 12.00	43.30	VERTICAL	PASSED
810 / 1909.8	30.60	1.148	- 12.60	43.20	VERTICAL	PASSED

EGPRS mode, 1 TX Slot **slide open**

Channel / f _c [MHz]	EIRP [dBm]	EIRP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
512 / 1850.2	26.70	0.468	- 15.80	42.50	VERTICAL	PASSED
661 / 1880.0	27.60	0.575	- 15.70	43.30	VERTICAL	PASSED
810 / 1909.8	27.60	0.575	- 15.60	43.20	VERTICAL	PASSED

GSM mode **slide closed**

Channel / f _c [MHz]	EIRP [dBm]	EIRP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
512 / 1850.2	26.60	0.457	- 15.00	41.60	HORIZONTAL	PASSED
661 / 1880.0	27.90	0.617	- 14.60	42.50	HORIZONTAL	PASSED
810 / 1909.8	27.30	0.537	- 15.50	42.80	HORIZONTAL	PASSED

EGPRS mode, 1 TX Slot **slide closed**

Channel / f _c [MHz]	EIRP [dBm]	EIRP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
512 / 1850.2	22.70	0.186	- 18.90	41.60	HORIZONTAL	PASSED
661 / 1880.0	24.20	0.263	- 18.30	42.50	HORIZONTAL	PASSED
810 / 1909.8	22.90	0.195	- 19.90	42.80	HORIZONTAL	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	17.60	0.058	- 13.90	31.50	HORIZONTAL	PASSED
4175 / 835.0	18.30	0.068	- 13.10	31.40	HORIZONTAL	PASSED
4233 / 846.6	18.70	0.074	- 12.80	31.50	HORIZONTAL	PASSED

Slide closed

Channel / f_c [MHz]	ERP [dBm]	ERP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
4132 / 826.4	17.70	0.059	- 13.80	31.50	HORIZONTAL	PASSED
4175 / 835.0	18.80	0.076	- 12.60	31.40	HORIZONTAL	PASSED
4233 / 846.6	19.30	0.085	- 12.20	31.50	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	22.90	0.195	- 20.00	42.90	VERTICAL	PASSED
9400 / 1880.0	23.90	0.245	- 19.00	42.90	VERTICAL	PASSED
9538 / 1907.6	23.30	0.214	- 19.70	43.00	VERTICAL	PASSED

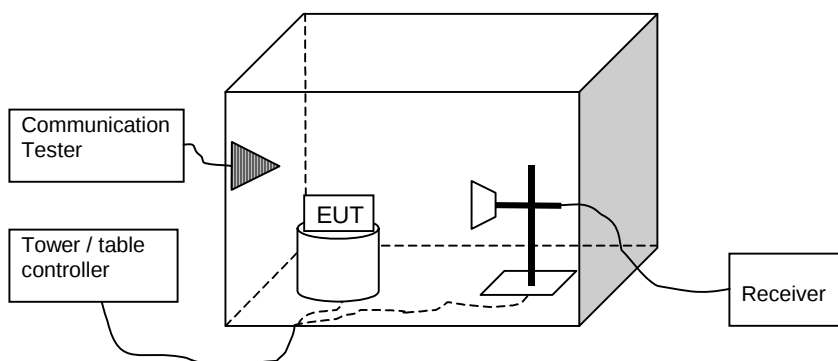
Slide closed

Channel / f_c [MHz]	EIRP [dBm]	EIRP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
9262 / 1852.4	19.30	0.085	- 23.40	42.70	HORIZONTAL	PASSED
9400 / 1880.0	21.10	0.129	- 21.60	42.70	HORIZONTAL	PASSED
9538 / 1907.6	21.00	0.126	- 22.00	43.00	VERTICAL	PASSED

3. Band Edge compliance (FCC §22.917(a), 24.238(a), RSS-132 4.5, RSS-133 6.5)

EUT with DUT number	RM-599 DUT 41906
Accessories with DUT numbers	BP-4L DUT 41394, AC-8E DUT 41842, HS-49 DUT 41908
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	Slide open/closed
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 47 / 99.8
Date of measurements	27-May-2009
Measured by	Jari Jantunen

3.1. Test setup



3.2. Test method and limit

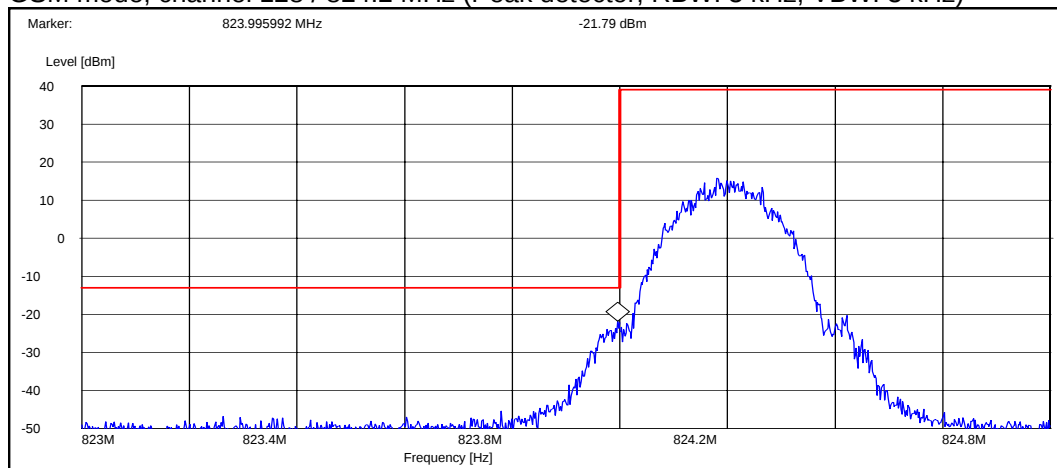
The measurement is made according to FCC rules parts 22 and 24 and IC standards RSS-132 and RSS-133.

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

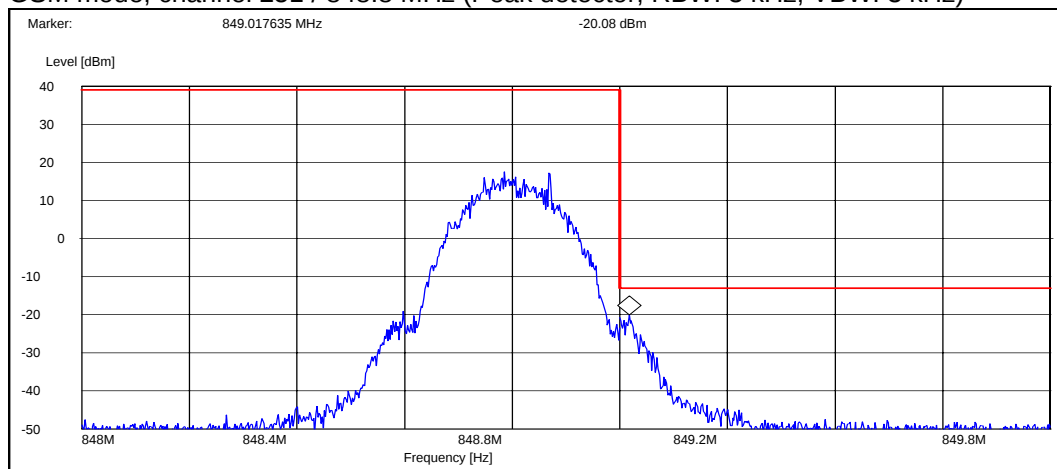
3.3. GSM 850 Test results Slide open

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



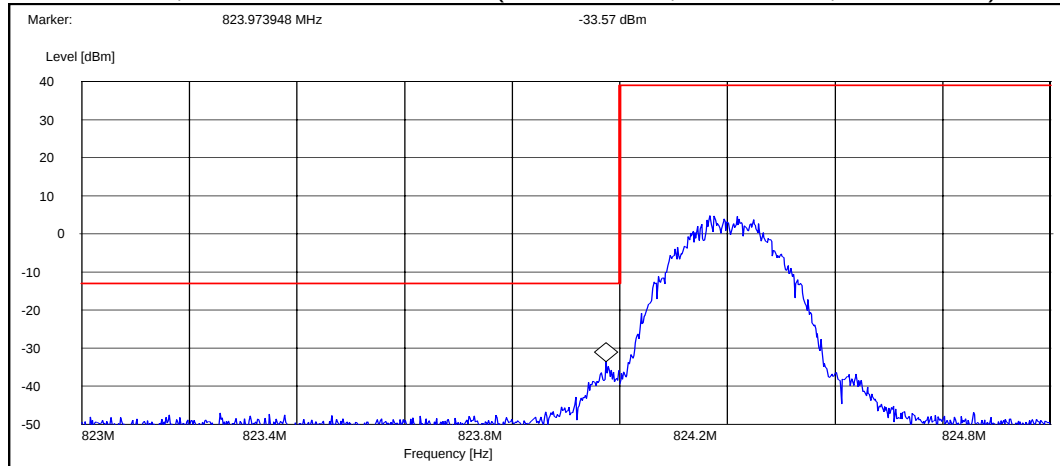
Operation mode (TX on)	Channel / f_c [MHz]	P [dBm]
GSM	128 / 824.2	-21.80

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



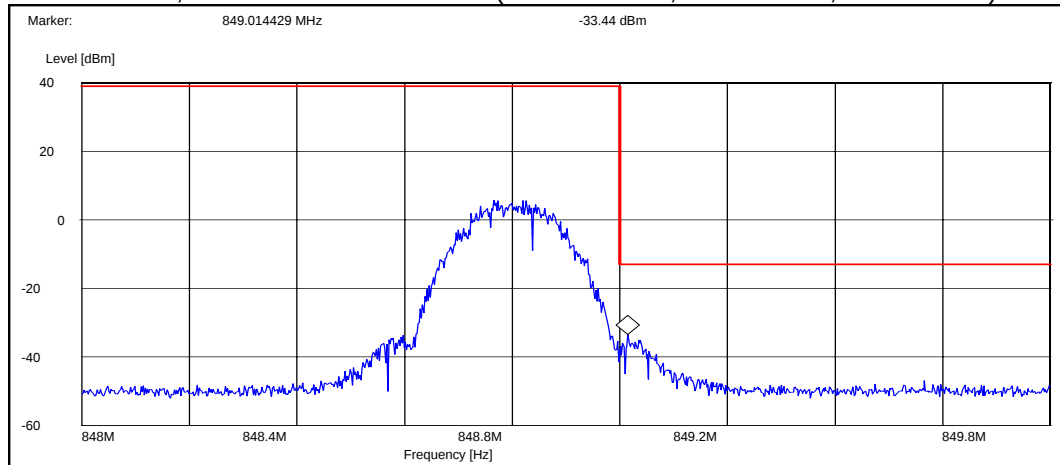
Operation mode (TX on)	Channel / f_c [MHz]	P [dBm]
GSM	251 / 848.8	-20.10

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



Operation mode (TX on)	Channel / f_c [MHz]	P [dBm]
EGPRS	128 / 824.2	-33.60

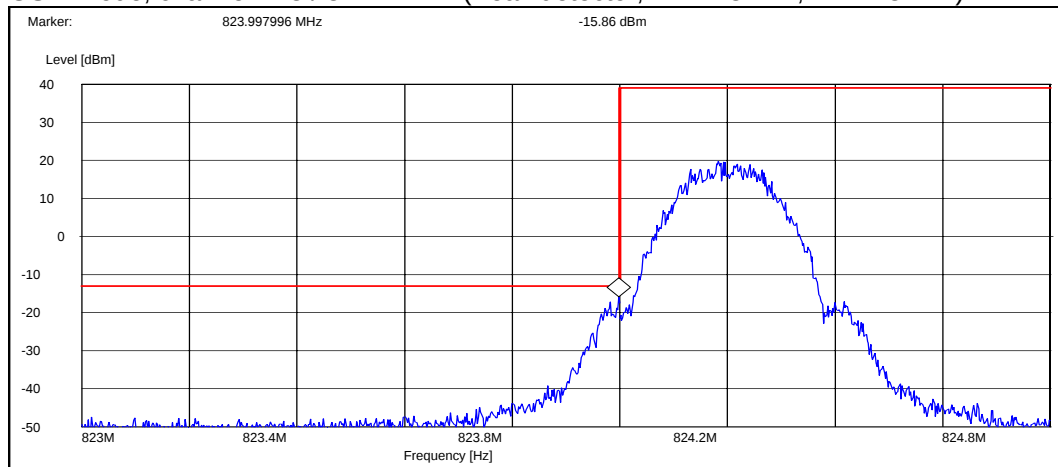
EGPRS mode, channel 251 / 848.8 MHz (Peak detector, RBW: 3 kHz, VBW: 3 kHz)



Operation mode (TX on)	Channel / f_c [MHz]	P [dBm]
EGPRS	251 / 848.8	-33.40

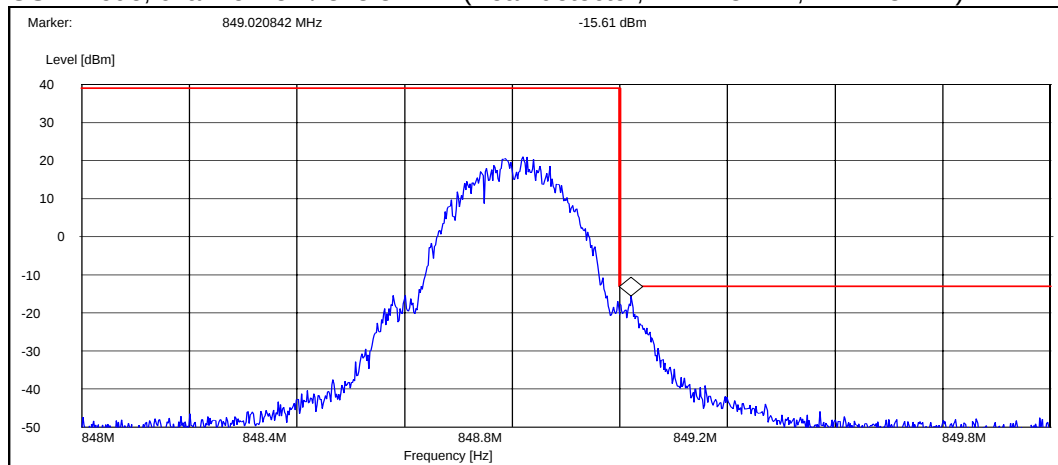
3.4. GSM 850 Test results Slide closed

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



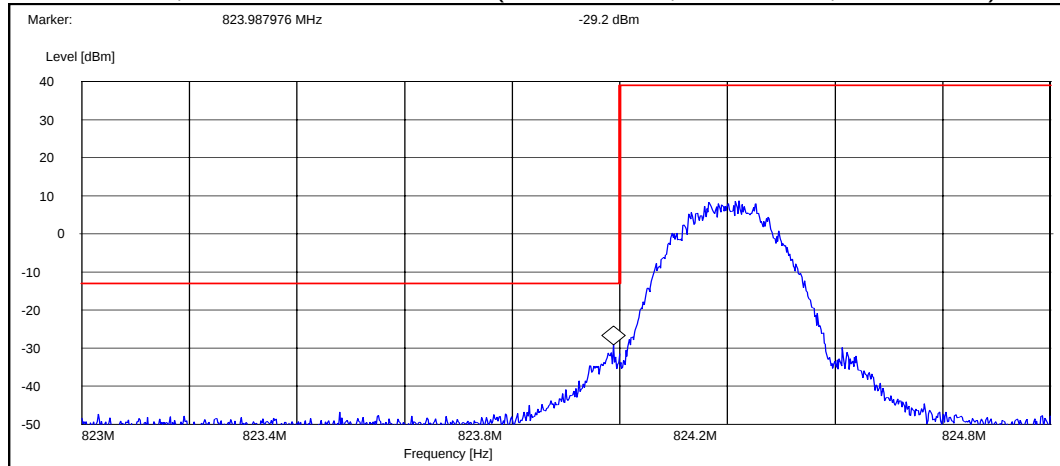
Operation mode (TX on)	Channel / f_c [MHz]	P [dBm]
GSM	128 / 824.2	-15.90

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



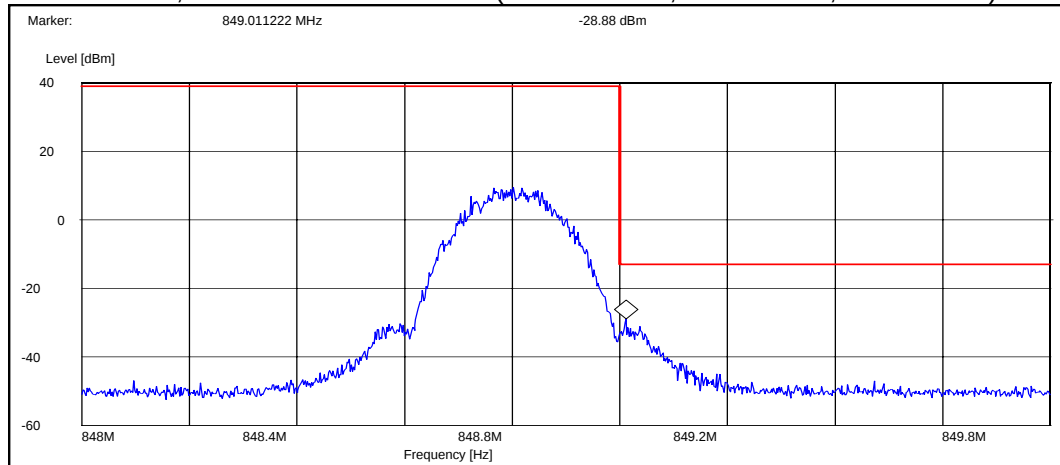
Operation mode (TX on)	Channel / f_c [MHz]	P [dBm]
GSM	251 / 848.8	-15.60

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



Operation mode (TX on)	Channel / f_c [MHz]	P [dBm]
EGPRS	128 / 824.2	-29.20

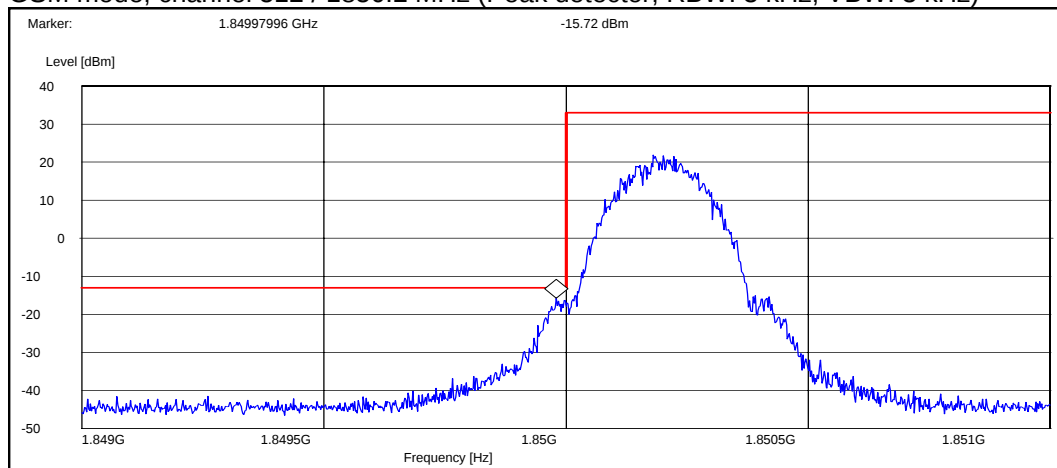
EGPRS mode, channel 251 / 848.8 MHz (Peak detector, RBW: 3 kHz, VBW: 3 kHz)



Operation mode (TX on)	Channel / f_c [MHz]	P [dBm]
EGPRS	251 / 848.8	-28.90

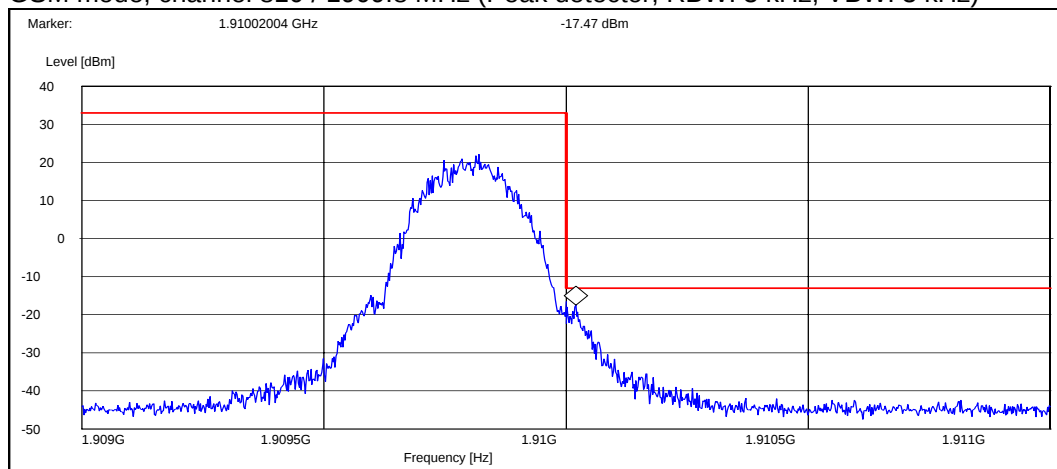
3.5. GSM 1900 Test results Slide open

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



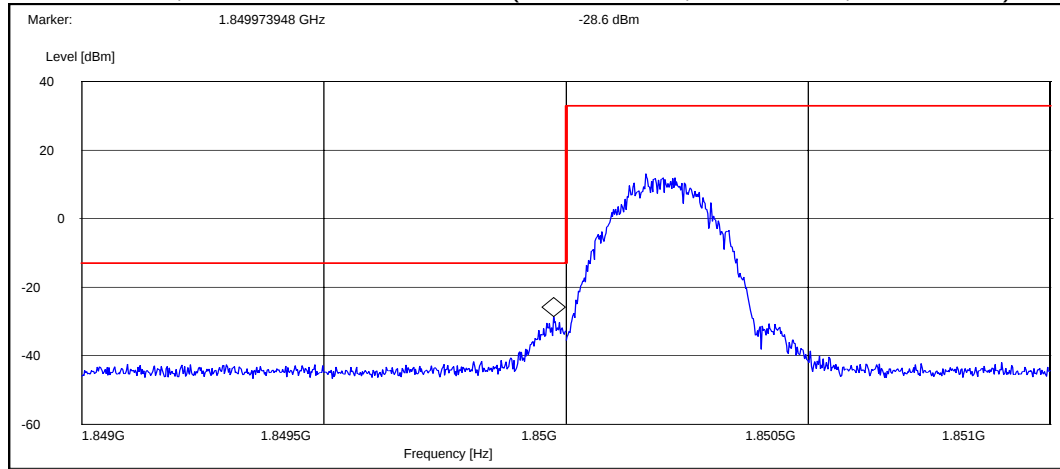
Operation mode (TX on)	Channel / f_c [MHz]	P [dBm]
GSM	512 / 1850.2	-15.70

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



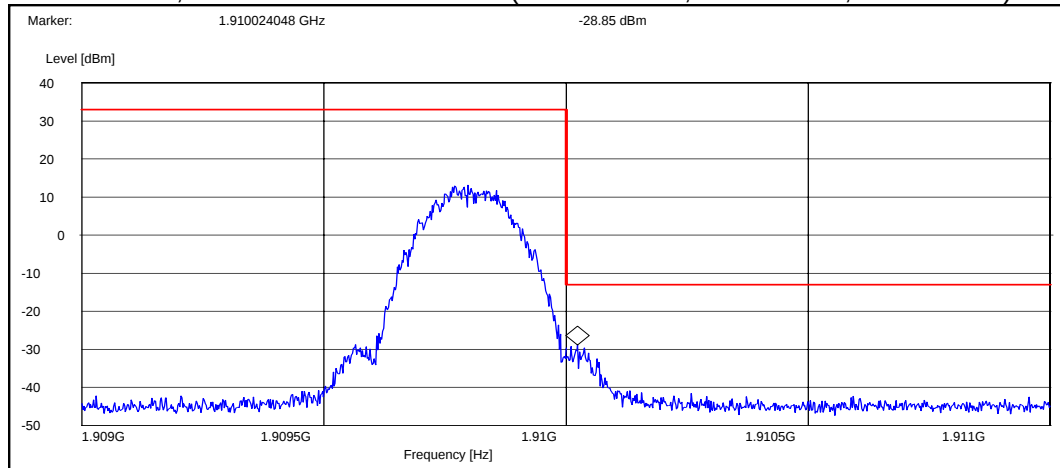
Operation mode (TX on)	Channel / f_c [MHz]	P [dBm]
GSM	810 / 1909.8	-17.50

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



Operation mode (TX on)	Channel / f_c [MHz]	P [dBm]
EGPRS	512 / 1850.2	-28.60

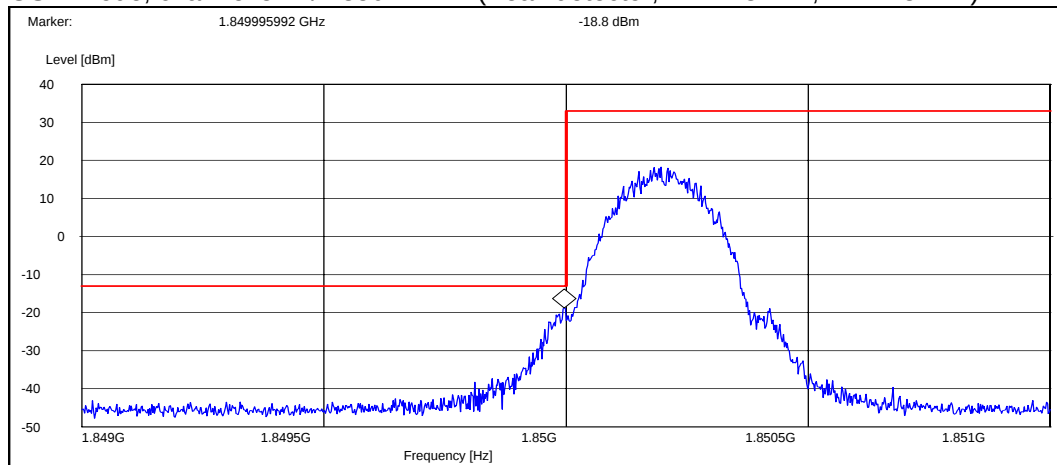
EGPRS mode, channel 810 / 1909.8 MHz (Peak detector, RBW: 3 kHz, VBW: 3 kHz)



Operation mode (TX on)	Channel / f_c [MHz]	P [dBm]
EGPRS	810 / 1909.8	-28.80

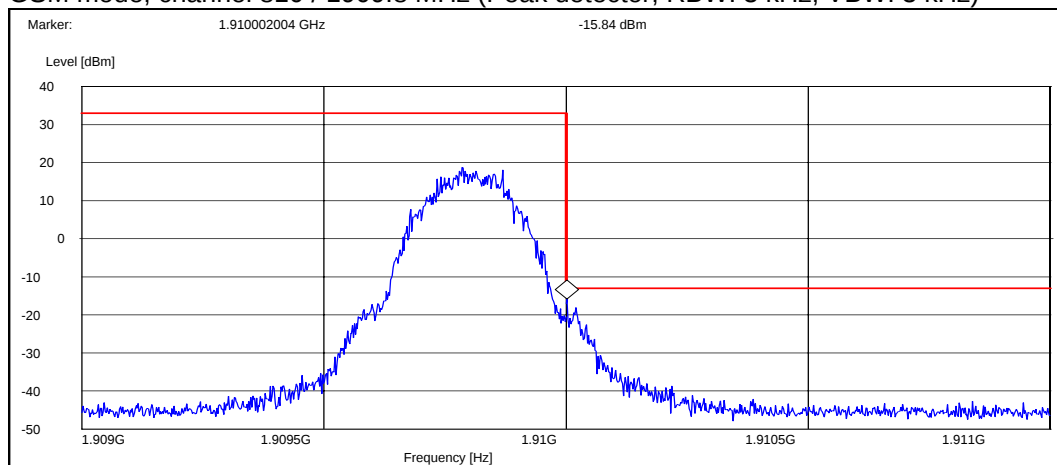
3.6. GSM 1900 Test results Slide closed

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



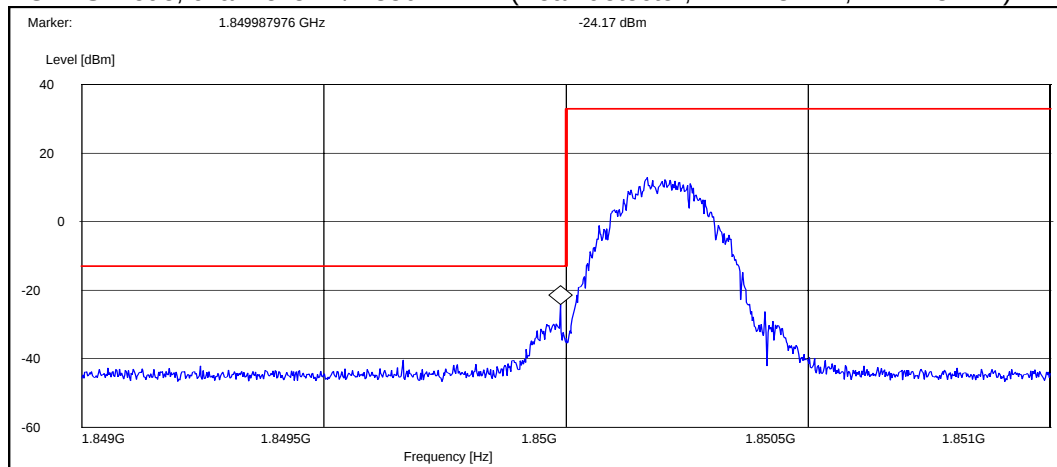
Operation mode (TX on)	Channel / f_c [MHz]	P [dBm]
GSM	512 / 1850.2	-18.80

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



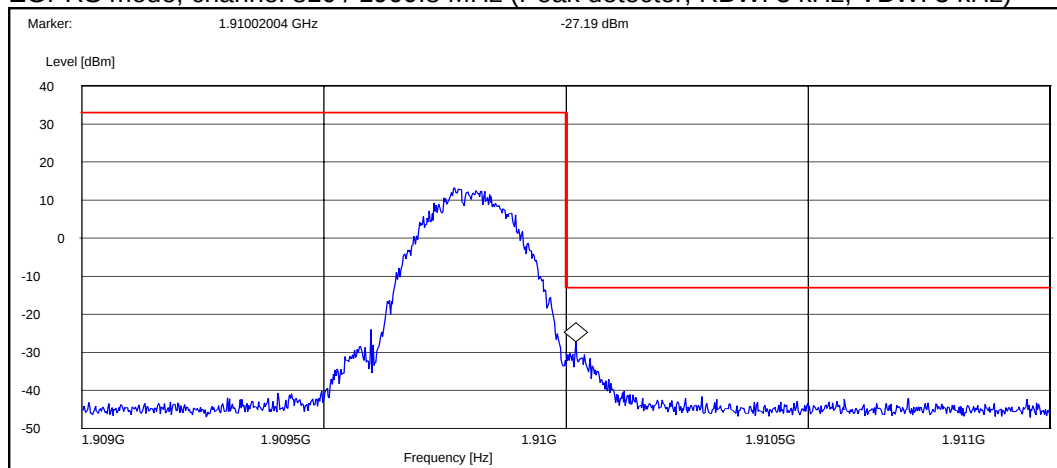
Operation mode (TX on)	Channel / f_c [MHz]	P [dBm]
GSM	810 / 1909.8	-15.80

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



Operation mode (TX on)	Channel / f_c [MHz]	P [dBm]
EGPRS	512 / 1850.2	-24.20

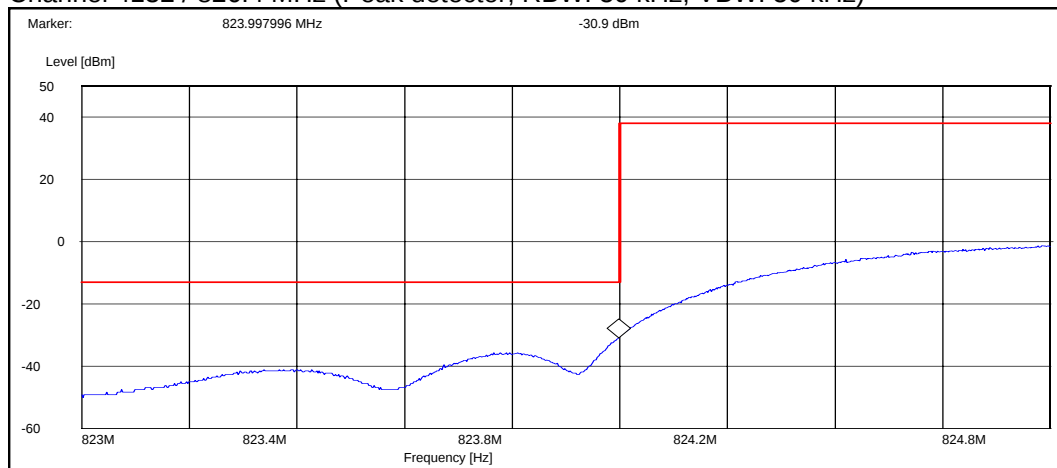
EGPRS mode, channel 810 / 1909.8 MHz (Peak detector, RBW: 3 kHz, VBW: 3 kHz)



Operation mode (TX on)	Channel / f_c [MHz]	P [dBm]
EGPRS	810 / 1909.8	-27.20

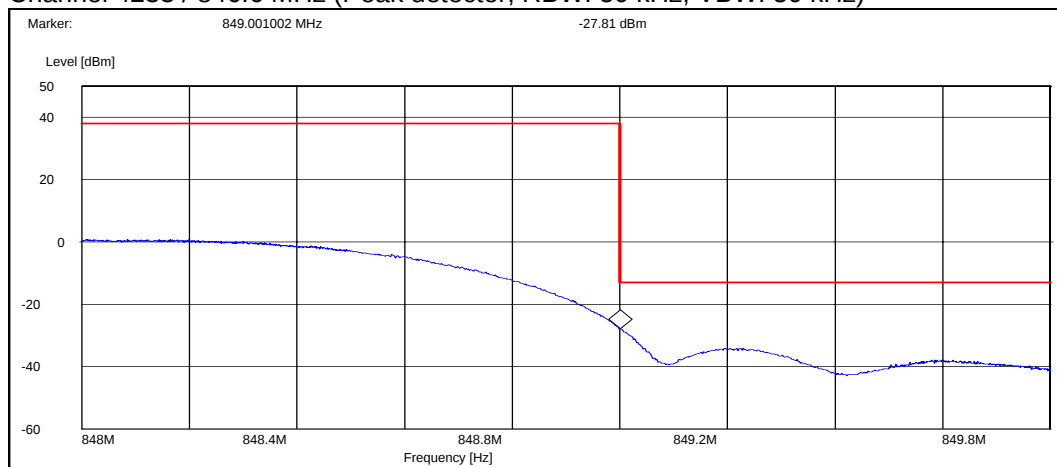
3.7. WCDMA 850 Test results Slide open

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



Operation mode (TX on)	Channel / f_c [MHz]	P [dBm]
FDD	4132 / 826.4	-30.90

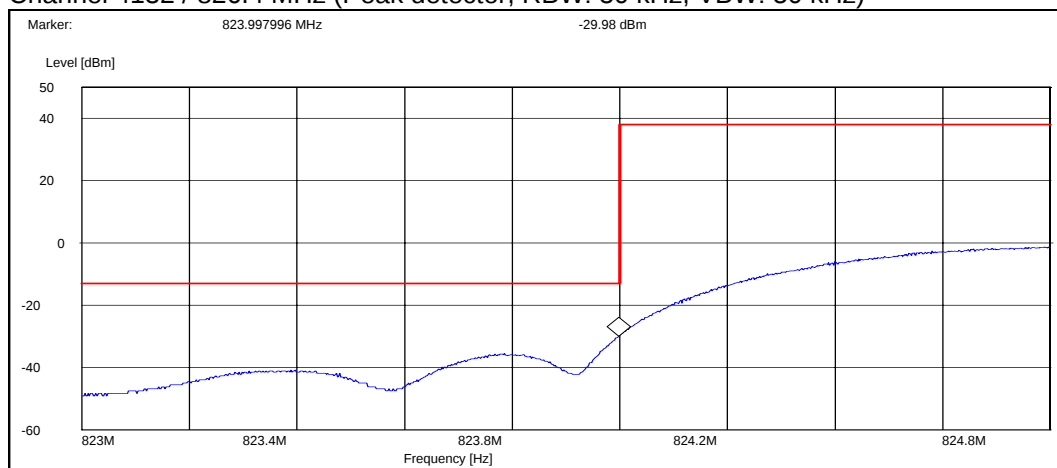
Channel 4233 / 846.6 MHz (Peak detector, RBW: 50 kHz, VBW: 50 kHz)



Operation mode (TX on)	Channel / f_c [MHz]	P [dBm]
FDD	4233 / 846.6	-27.80

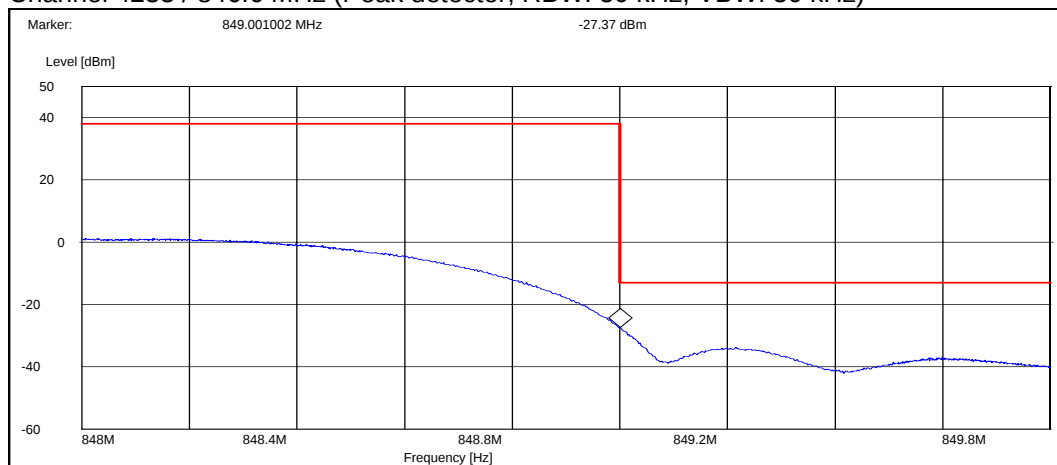
3.8. WCDMA 850 Test results Slide closed

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



Operation mode (TX on)	Channel / f_c [MHz]	P [dBm]
FDD	4132 / 826.4	-30.00

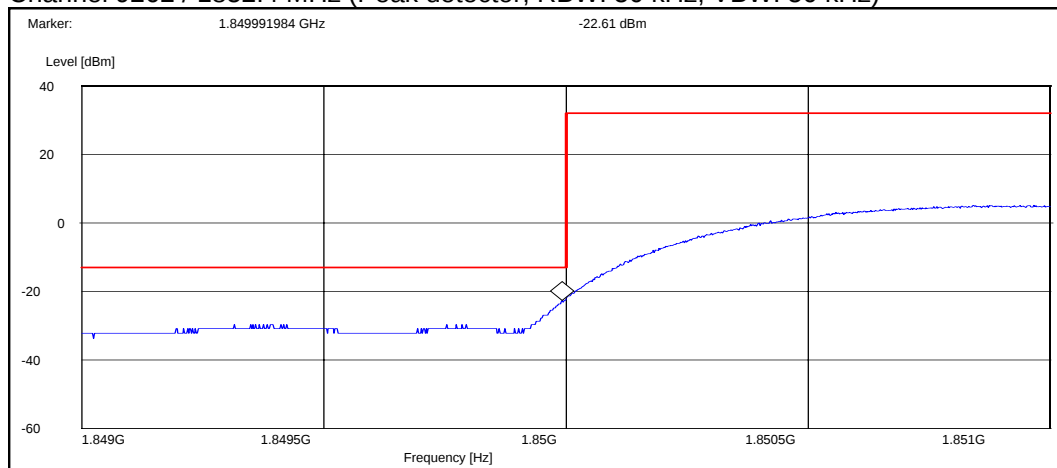
Channel 4233 / 846.6 MHz (Peak detector, RBW: 50 kHz, VBW: 50 kHz)



Operation mode (TX on)	Channel / f_c [MHz]	P [dBm]
FDD	4233 / 846.6	-27.40

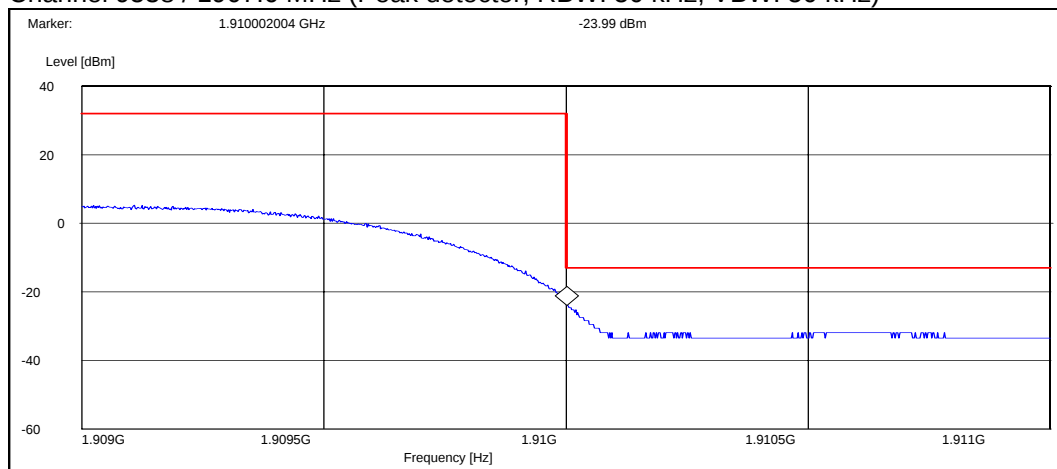
3.9. WCDMA 1900 Test results Slide open

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



Operation mode (TX on)	Channel / f_c [MHz]	P [dBm]
FDD	9262 / 1852.4	-22.60

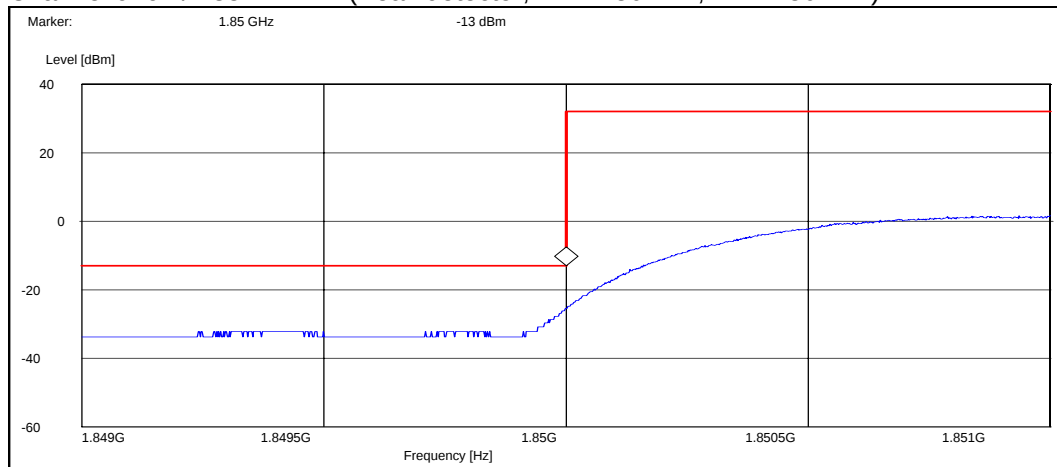
Channel 9538 / 1907.6 MHz (Peak detector, RBW: 50 kHz, VBW: 50 kHz)



Operation mode (TX on)	Channel / f_c [MHz]	P [dBm]
FDD	9538 / 1907.6	-24.00

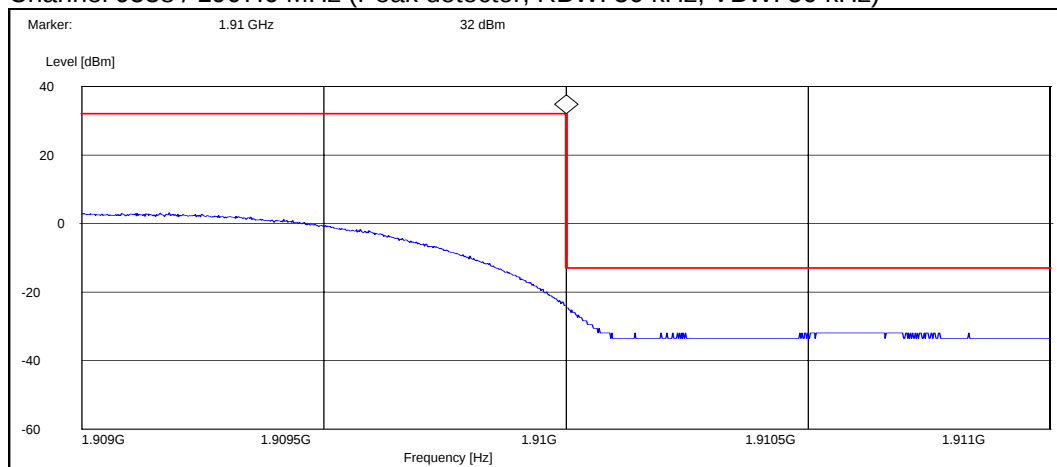
3.10. WCDMA 1900 Test results Slide closed

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



Operation mode (TX on)	Channel / f_c [MHz]	P [dBm]
FDD	9262 / 1852.4	-25.40

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

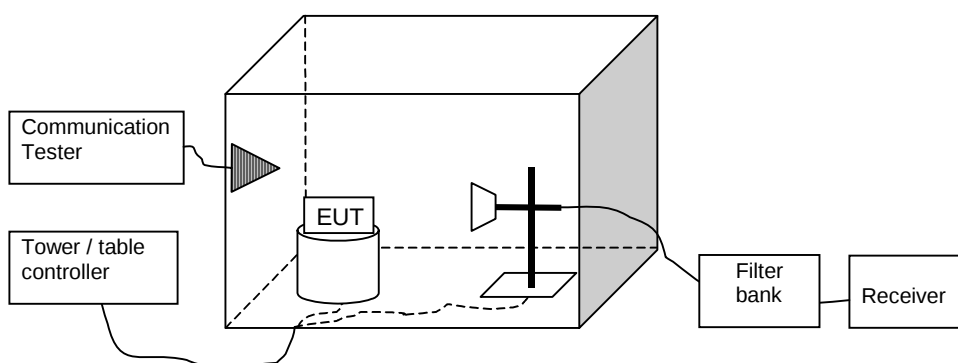


Operation mode (TX on)	Channel / f_c [MHz]	P [dBm]
FDD	9538 / 1907.6	-24.60

4. Spurious radiated emissions (FCC §22.917(a), §24.238(a), §2.1053, RSS-132 4.5, RSS-133 6.5)

EUT with DUT number	RM-599 DUT 41906
Accessories with DUT numbers	BP-4L DUT 41394, AC-8E DUT 41842, HS-49 DUT 41908
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	Slide open/closed
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 47 / 99.8
Date of measurements	27-May-2009
Measured by	Jari Jantunen

4.1. Test setup



4.2. 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 1900	30 - 18000	-13

4.3. GSM 850 Test results

GSM mode, channel 190 / 836.6 MHz slide open

Frequency [MHz]	P [dBm]	P [μW]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
1673.143287	-38.10	0.15488	- 32.00	- 6.10	VERTICAL	PASSED
2509.820641	-46.30	0.02344	- 47.40	1.10	HORIZONTAL	PASSED
3346.189379	-43.60	0.04365	- 48.00	4.40	HORIZONTAL	PASSED

EGPRS mode, channel 190 / 836.6 MHz slide open

Frequency [MHz]	P [dBm]	P [μW]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
1673.143287	-42.50	0.05623	- 36.40	- 6.10	VERTICAL	PASSED
2509.820641	-51.20	0.00759	- 52.30	1.10	HORIZONTAL	PASSED
3346.189379	-53.40	0.00457	- 57.80	4.40	HORIZONTAL	PASSED

GSM mode, channel 190 / 836.6 MHz slide closed

Frequency [MHz]	P [dBm]	P [μW]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
1673.143287	-42.30	0.05888	- 36.20	- 6.10	VERTICAL	PASSED
2509.820641	-46.90	0.02042	- 48.10	1.20	VERTICAL	PASSED
3346.689379	-46.10	0.02455	- 50.60	4.50	VERTICAL	PASSED

EGPRS mode, channel 190 / 836.6 MHz slide closed

Frequency [MHz]	P [dBm]	P [μW]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
1673.143287	-45.50	0.02818	- 39.40	- 6.10	VERTICAL	PASSED
2512.320641	-56.10	0.00245	- 57.30	1.20	VERTICAL	PASSED
3347.189379	-59.30	0.00117	- 63.80	4.50	VERTICAL	PASSED

4.4. GSM 1900 Test results

GSM mode, channel 661 / 1880.0 MHz slide open

Frequency [MHz]	P [dBm]	P [μW]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
3760.023046	-44.50	0.03548	- 53.70	9.20	HORIZONTAL	PASSED
5629.758517	-51.80	0.00661	- 62.50	10.70	HORIZONTAL	PASSED
5639.270541	-52.00	0.00631	- 62.70	10.70	HORIZONTAL	PASSED
5649.294589	-51.20	0.00759	- 61.90	10.70	VERTICAL	PASSED
5651.310621	-49.90	0.01023	- 60.60	10.70	VERTICAL	PASSED
7519.542084	-46.60	0.02188	- 61.60	15.00	HORIZONTAL	PASSED

EGPRS mode, channel 661 / 1880.0 MHz slide open

Frequency [MHz]	P [dBm]	P [μW]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
3760.023046	-49.10	0.01230	- 58.30	9.20	HORIZONTAL	PASSED
5630.258517	-51.50	0.00708	- 62.20	10.70	HORIZONTAL	PASSED
5637.770541	-51.90	0.00646	- 62.60	10.70	HORIZONTAL	PASSED
5650.294589	-50.00	0.01000	- 60.70	10.70	VERTICAL	PASSED
5654.310621	-51.30	0.00741	- 62.00	10.70	VERTICAL	PASSED
7520.042084	-50.90	0.00813	- 65.90	15.00	HORIZONTAL	PASSED

GSM mode, channel 661 / 1880.0 MHz slide closed

Frequency [MHz]	P [dBm]	P [μW]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
3760.015030	-45.80	0.02630	- 54.90	9.10	VERTICAL	PASSED
5640.282565	-39.30	0.11749	- 49.90	10.60	HORIZONTAL	PASSED
7520.042084	-45.50	0.02818	- 60.50	15.00	HORIZONTAL	PASSED

EGPRS mode, channel 661 / 1880.0 MHz slide closed

Frequency [MHz]	P [dBm]	P [μW]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
3760.015030	-49.10	0.01230	- 58.20	9.10	VERTICAL	PASSED
5640.282565	-45.90	0.02570	- 56.50	10.60	HORIZONTAL	PASSED
7521.542084	-51.60	0.00692	- 66.60	15.00	HORIZONTAL	PASSED

4.5. WCDMA 850 Test results

Channel 4175 / 835.0 MHz slide open

Frequency [MHz]	P [dBm]	P [μ W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
1668.437876	-42.90	0.05129	- 36.70	- 6.20	VERTICAL	PASSED
2501.204409	-55.60	0.00275	- 56.80	1.20	VERTICAL	PASSED
3343.181363	-56.80	0.00209	- 61.10	4.30	HORIZONTAL	PASSED

Channel 4175 / 835.0 MHz slide closed

Frequency [MHz]	P [dBm]	P [μ W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
1668.437876	-45.20	0.03020	- 39.00	- 6.20	VERTICAL	PASSED
3343.681363	-55.70	0.00269	- 60.00	4.30	HORIZONTAL	PASSED

4.6. WCDMA 1900 Test results

Channel 9400 / 1880.0 MHz slide open

Frequency [MHz]	P [dBm]	P [μ W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
3758.515030	-42.30	0.05888	- 51.50	9.20	VERTICAL	PASSED
5637.782565	-38.60	0.13804	- 49.30	10.70	VERTICAL	PASSED
7525.058116	-50.90	0.00813	- 66.00	15.10	VERTICAL	PASSED

Channel 4175 / 835.0 MHz slide closed

Frequency [MHz]	P [dBm]	P [μ W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
1668.437876	-45.20	0.03020	- 39.00	- 6.20	VERTICAL	PASSED
3343.681363	-55.70	0.00269	- 60.00	4.30	HORIZONTAL	PASSED

5. Test equipment

5.1. Conducted measurements

Eq. No	Equipment	Type	Manufacturer	Used in
TM30597	Power splitter	11667A	Agilent	22/24/27, 15C
TM37499	Power splitter	11667A	Agilent	22/24/27, 15C
TM38111	Multimeter	34401A	Agilent	22/24/27, 15C
TM38112	DC power supply	6632A	Agilent	22/24/27, 15C
TM22901	Attenuator	8496A	Agilent	22/24/27, 15C
TM30636	Artificial mains net	L2-16	PMM	15C, 15B
TM37678	Radio communication tester	CMU-200	R&S	22/24/27, 15C, 15B
TM37773	Radio communication tester	CMU-200	R&S	22/24/27, 15C, 15B
TM30600	Pulse Limiter	ESH3-Z2	R&S	15C, 15B
TM26490	LISN 50 μ H	ESH3-Z5	R&S	15C, 15B
TM37610	Spectrum analyzer	FSU	R&S	22/24/27, 15C
TM22835	Multimeter	87	Fluke	15C, 15B
TM37500	Microwave switch system	7116-MSW	Keithley	22/24/27, 15C, 15B
TM22638	Power supply	OL63743-901	Transmatic	22/24/27, 15C, 15B
	Temperature chamber	VT4002	Vötsch	22/24/27, 15C
2058	EMI Test receiver	ESPC	R&S	15C, 15B
2001	Bluetooth tester	CBT	R&S	22/24/27, 15C, 15B
2002	Radio communication tester	CMU-200	R&S	22/24/27, 15C, 15B

5.2. Radiated measurements

Eq. No	Equipment	Type	Manufacturer	Used in
TM30599	3m semi-anechoic chamber		TDK	22/24/27, 15C, 15B
TM38845	EMI receiver	ESI 40	R&S	22/24/27, 15C, 15B
TM37498	Preamplifier	AMF-5D-020180-26-10P	MITEQ	22/24/27, 15C, 15B
TM37523	Preamplifier	AMF-4D-10M-3G-25-20P	MITEQ	22/24/27, 15C, 15B
TM37516	Biconilog antenna	HL562	R&S	22/24/27, 15C, 15B
TM26496	Double ridged waveguide antenna	3115	EMCO	22/24/27, 15C, 15B
TM39158	Horn antenna	3116	EMCO	22/24/27, 15C, 15B
TM26492	Reference dipole set	UHAP/VHAP	Schwarzbeck	22/24/27, 15C, 15B
TM37501	Dipole antenna	3125-870	EMCO	22/24/27
TM37502	Dipole antenna	3125-1880	EMCO	22/24/27
TM37773	Radio communication tester	CMU-200	R&S	22/24/27, 15C, 15B
TM38631	Signal generator	83640L	Agilent	22/24/27, 15C, 15B
TM38066	High pass filter	4HC3000/18000-3-KK	Trilithic	22/24/27, 15C, 15B
TM26511	Tunable notch filter	WRCA870	Wainwright	22/24/27
TM38215	Tunable notch filter	WRCD1850/1910-0.2/40	Wainwright	22/24/27
TM38214	Band reject filter	WRCT 2402/2480-2400/2483.5-30	Wainwright	15C
TM30642	Mast/Turntable controller	HD-100	Deisel	22/24/27, 15C, 15B
TM26500	Turntable	DS412	Deisel	22/24/27, 15C, 15B
TM38842	Antenna mast controller	2090	EMCO	22/24/27, 15C, 15B
TM38843	Antenna mast	2075	EMCO	22/24/27, 15C, 15B
TM38114	DC power supply	6632A	Agilent	22/24/27, 15C, 15B
TM38323	Preamplifier	PA-02 18-26 GHz	EMC Automation	22/24/27, 15C, 15B
TM37678	Radio communication tester	CMU-200	R&S	22/24/27, 15C, 15B
TM22638	Power supply	OL63743-901	Transmatic	22/24/27, 15C, 15B
TM23892	Yaesu controller	G-1000SDX	Yaesu	22/24/27, 15C, 15B
2001	Bluetooth tester	CBT	R&S	22/24/27, 15C, 15B

Eq. No	Equipment	Type	Manufacturer	Used in
2002	Radio communication tester	CMU-200	R&S	22/24/27, 15C, 15B