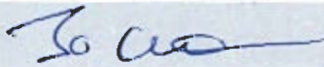


FCC Part 22/24 Compliance Test Report

Test Report no.:	Salo_FCC_0511_03.doc	Date of Report:	07.04.2005
Number of pages:	19	Customer's Contact person:	Alison Kingston
Testing laboratory:	TCC Nokia Salo Laboratory P.O. Box 86 Joensuunkatu 7H / Killa 1B FIN-24101 SALO, FINLAND Tel. +358 (0) 7180 08000 Fax. +358 (0) 7180 45220	Client:	Nokia Corporation Nokia House Summit Avenue, Southwood FARNBOROUGH HAMPSHIRE GU14 0NG UK Tel. +44 1252 866000 Fax. +44 1252 866001
FCC listing no.:	533467		
IC recognition no.:	5385		
Tested devices/ accessories:	Phone RM-13 / Battery BL-5X, AC- Charger ACP-12 and Headset HS-15		
FCC ID:	QTKRM-13	IC:	661AD-RM13
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-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:	07-04-2005 		
	Kai Uusitalo Senior Design Engineer, EMC		

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

Date of receipt	14.03.2005
Testing completed	01.04.2005
The customer's contact person	Alison Kingston
Test Plan referred to	T:\Projects\RM-13\testplans\EMC\TCC\RM-13_EMC_Test_Plan.xls
Notes	-
Document name	T:\Projects\RM-13\results\emc\FCC\Salo_FCC_0511_03.doc

1.1. EUT and Accessory Information

The EUT is a single band (GSM1900) 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-13	004400/64/170367/1	0400	-	03.01	10452
Phone	RM-13	004400/64/170355/6	0400	-	03.02	10460
Phone	RM-13	004400/64/170460/4	0400	-	03.02	10473
Battery	BL-5X	0670471392066M021010000311	-	-	-	10427
AC-Charger	ACP-12E	0675294394349J493120295910	-	-	-	10458
Headset	HS-15	0252	0.2	0.4	-	10549

1.2. Summary of Test Results

GSM 1900:

Section in CFR 47	Section in RSS-133	Name of the test	Result
§2.1046(a)	6.2	Conducted RF output power	-
§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	-
§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	PASSED

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 Salo Laboratory.

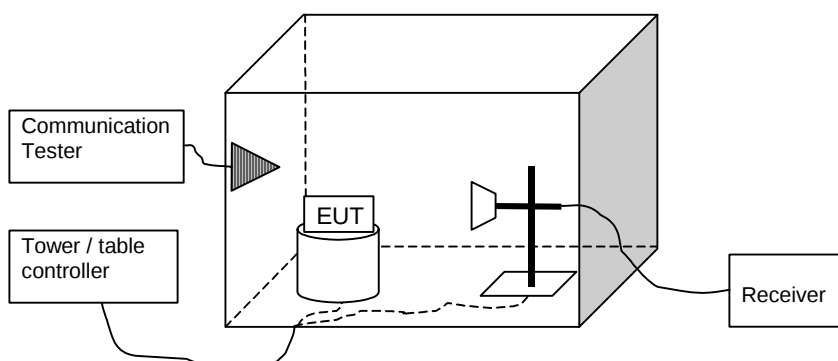
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2. Radiated RF output power (FCC §22.913(a), §22.232(b), RSS-132 6.4, RSS-133 6.2)

EUT with DUT number	RM-13, DUT 10426
Accessories with DUT numbers	BL-5X, DUT 10427; ACP-12, DUT 10458; HS-15, DUT 10549
Operation Voltage V / Hz	115V / 60Hz
Result	PASSED
Remarks	-
Temp °C / Humidity RH % / Air Pressure kPa	21 / 45 / 101.4
Date of measurements	14-15.03.2005
Measured by	Kai Uusitalo

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:

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

Where P_{MEAS} is receiver reading in dBm and $A_{CORRECTIONS}$ is combined correction factor including cable loss and substitution correction ($A_{CORRECTIONS} = L_{CABLES} + A_{SUBST}$).

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 1900 Test results

GSM mode, Flip open

Channel	Frequency / MHz	EIRP / dBm	EIRP / W	A _{CORRECTION} / dB	Polarisation	Result
512	1850.200000	28.30	0.676	45.50	VERTICAL	PASSED
661	1880.000000	27.50	0.562	43.20	VERTICAL	PASSED
810	1909.800000	28.20	0.661	44.00	HORIZONTAL	PASSED

EGPRS mode, 1 TX Slot, Flip open

Channel	Frequency / MHz	EIRP / dBm	EIRP / W	A _{CORRECTION} / dB	Polarisation	Result
512	1850.200000	28.30	0.676	45.50	VERTICAL	PASSED
661	1880.000000	26.90	0.490	44.00	HORIZONTAL	PASSED
810	1909.800000	27.30	0.537	44.00	HORIZONTAL	PASSED

GSM mode, Flip closed

Channel	Frequency / MHz	EIRP / dBm	EIRP / W	A _{CORRECTION} / dB	Polarisation	Result
512	1850.200000	31.60	1.445	44.90	HORIZONTAL	PASSED
661	1880.000000	29.20	0.832	44.00	HORIZONTAL	PASSED
810	1909.800000	30.60	1.148	44.00	HORIZONTAL	PASSED

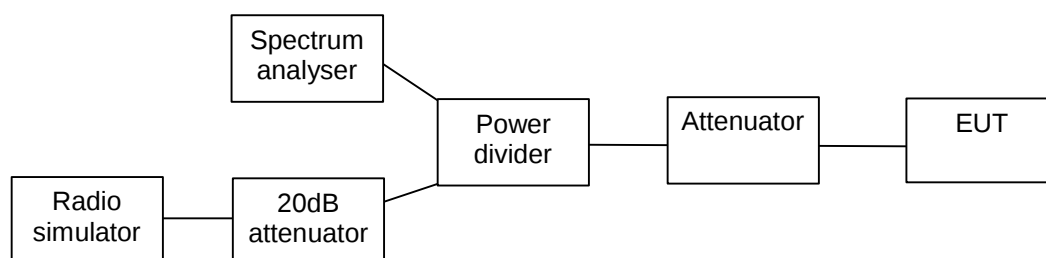
EGPRS mode, 1 TX Slot, Flip closed

Channel	Frequency / MHz	EIRP / dBm	EIRP / W	A _{CORRECTION} / dB	Polarisation	Result
512	1850.200000	31.20	1.318	44.90	HORIZONTAL	PASSED
661	1880.000000	28.70	0.741	44.00	HORIZONTAL	PASSED
810	1909.800000	29.70	0.933	44.00	HORIZONTAL	PASSED

3. 99 % occupied bandwidth (FCC §2.1049(h), RSS-132 4.2, RSS-133 5.6)

EUT with DUT number	RM-13, DUT 10473
Accessories with DUT numbers	BL-5X, DUT 10427; ACP-12, DUT 10458; HS-15, DUT 10549
Operation Voltage V / Hz	115V / 60Hz
Result	PASSED
Remarks	-
Temp °C / Humidity RH % / Air Pressure kPa	22 / 44 / 101.4
Date of measurements	30.03.2005
Measured by	Janne Niemi

3.1. Test setup



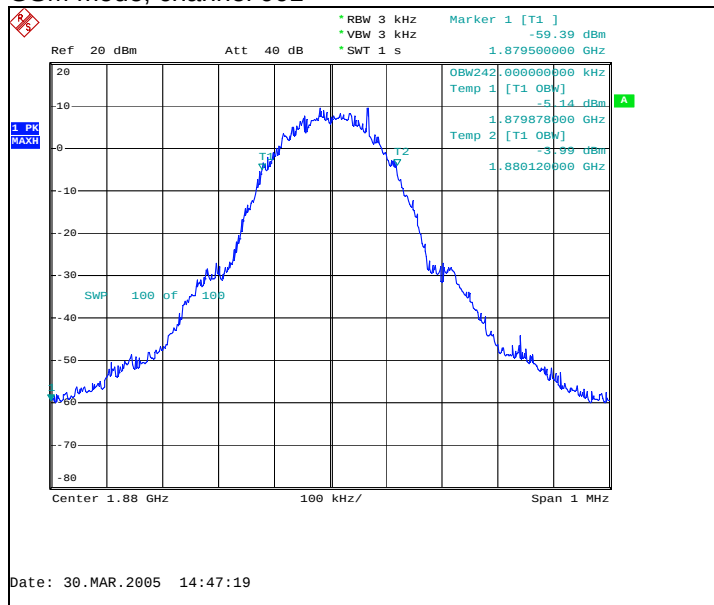
3.2. Test method and limit

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

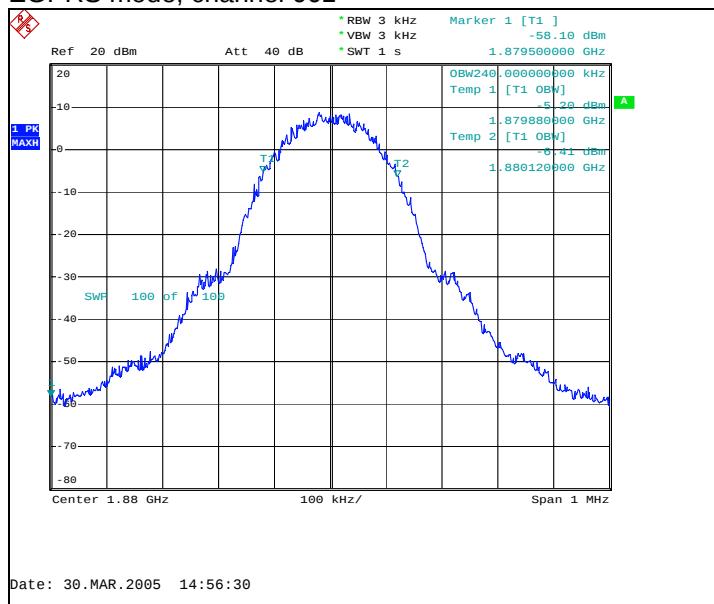
3.3. GSM 1900 Test results

Operation mode (TX on)	99% occupied bandwidth / kHz
GSM	240.00
EGPRS	242.00

GSM mode, channel 661



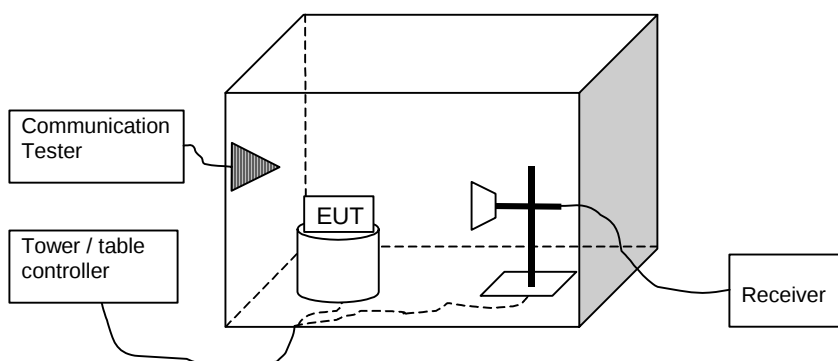
EGPRS mode, channel 661



4. Band edge compliance (FCC §22.917(a), 24.238(a), RSS-132 4.5, RSS-133 6.3)

EUT with DUT number	RM-13, DUT 10460
Accessories with DUT numbers	BL-5X, DUT 10427; ACP-12, DUT 10458; HS-15, DUT 10549
Operation Voltage V / Hz	115V / 60Hz
Result	PASSED
Remarks	-
Temp °C / Humidity RH % / Air Pressure kPa	22 / 44 / 101.4
Date of measurements	30.03.2005
Measured by	Tomi Lipponen

4.1. Test setup



4.2. Test method and limit

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

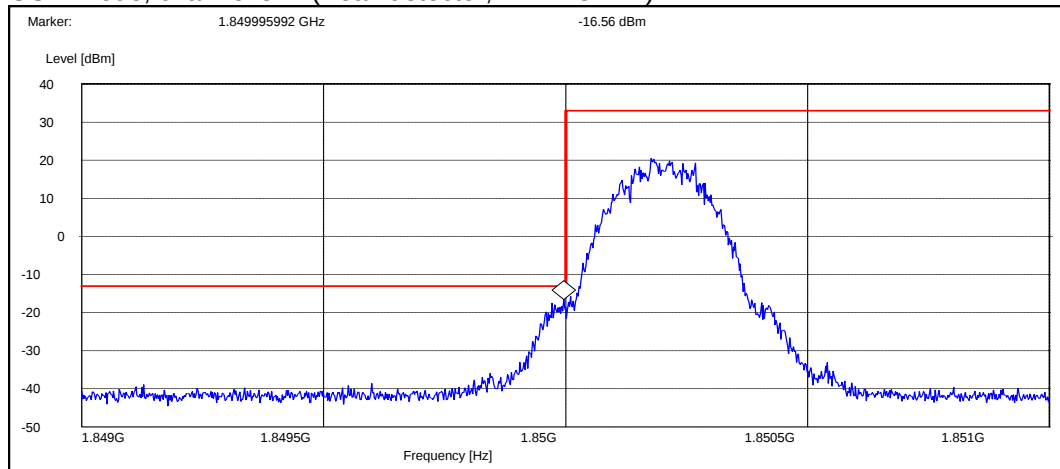
Limits for band edge compliance measurements

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

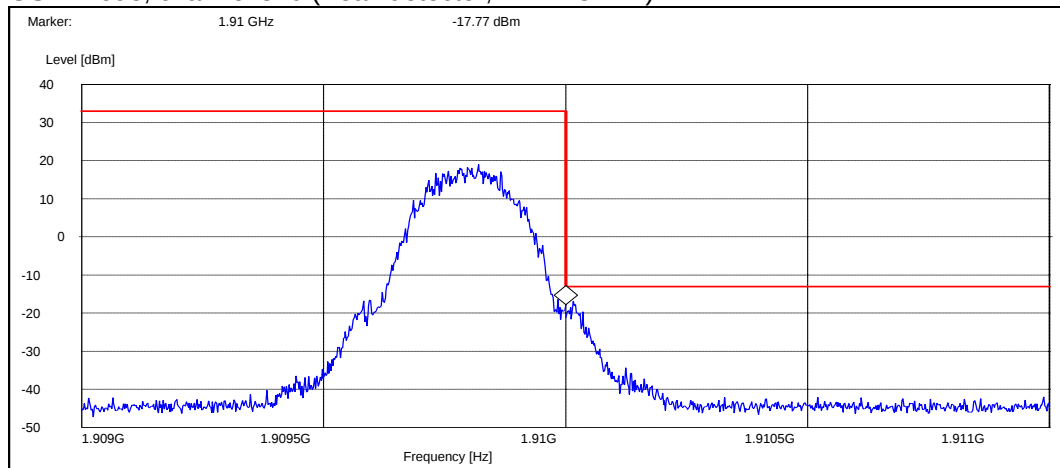
4.3. GSM 1900 Test results

Operation mode (TX on)	Channel	Level / dBm
GSM	512	-16.56
GSM	810	-17.77
EGPRS	512	-17.72
EGPRS	810	-18.41

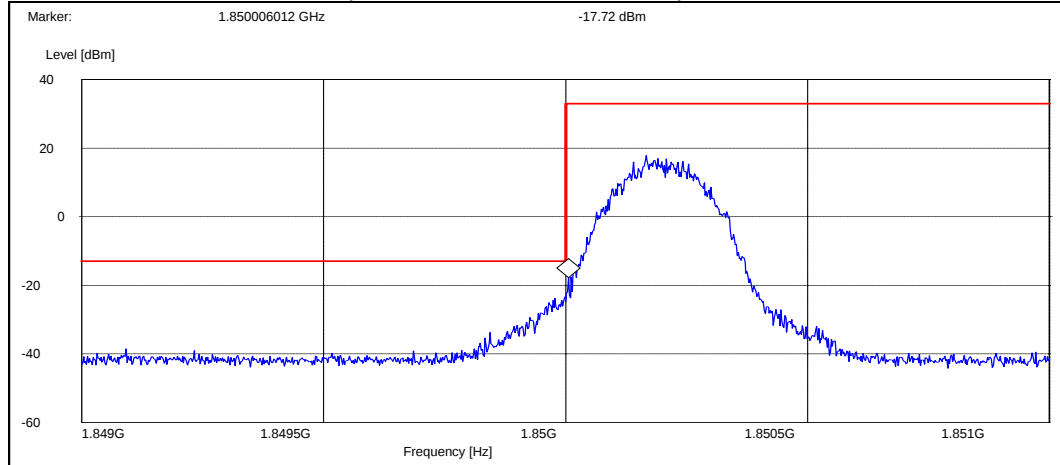
GSM mode, channel 512 (Peak detector, RBW: 3 kHz)



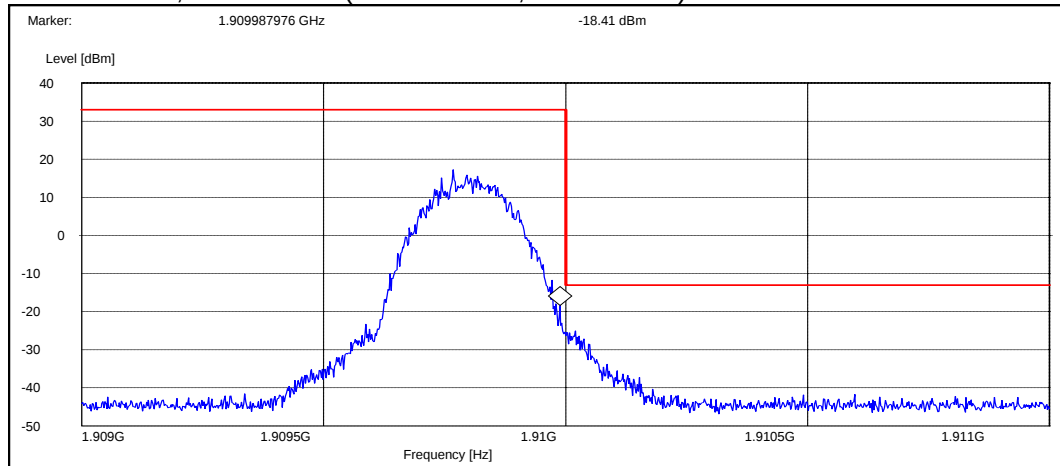
GSM mode, channel 810 (Peak detector, RBW: 3 kHz)



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



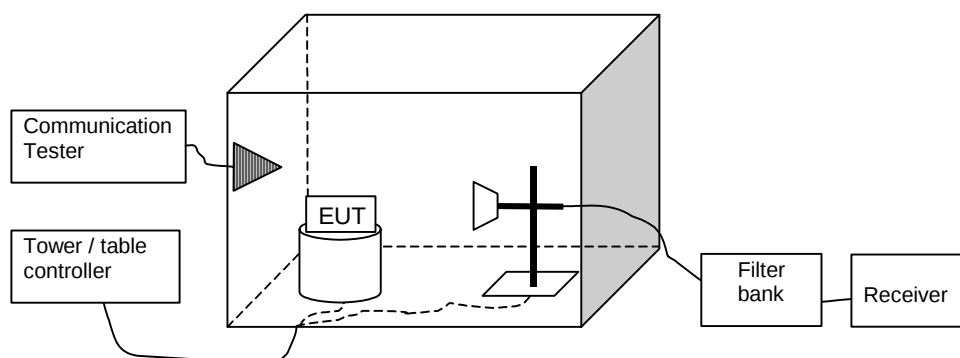
EGPRS mode, channel 819 (Peak detector, RBW: 3 kHz)



5. Spurious radiated emissions (FCC §22.917(a), §24.238(a), §2.1053, RSS-132 4.5, RSS-133 6.3)

EUT with DUT number	RM-13, DUT 10460
Accessories with DUT numbers	BL-5X, DUT 10427; ACP-12, DUT 10458; HS-15, DUT 10549
Operation Voltage V / Hz	115V / 60Hz
Result	PASSED
Remarks	-
Temp °C / Humidity RH % / Air Pressure kPa	22 / 44 / 101.4
Date of measurements	30.03.2005
Measured by	Tomi Lipponen

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.

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:

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

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

Limits for spurious radiated emissions measurements

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

5.3. GSM 1900 Test results

GSM mode, channel 661, flip open

Frequency / MHz	Level / dBm	Level / μ W	$A_{CORRECTION}$ / dB	Polarisation	Result
3751.998998	-53.30	0.00468	8.20	HORIZONTAL	PASSED
3760.023046	-46.60	0.02188	8.10	HORIZONTAL	PASSED
5627.254509	-50.20	0.00955	10.40	HORIZONTAL	PASSED
5640.278557	-40.00	0.10000	10.50	HORIZONTAL	PASSED
7537.574148	-47.70	0.01698	15.30	VERTICAL	PASSED

GSM mode, channel 661, flip closed

Frequency / MHz	Level / dBm	Level / μ W	$A_{CORRECTION}$ / dB	Polarisation	Result
3760.023046	-45.70	0.02692	8.10	HORIZONTAL	PASSED
5640.778557	-44.10	0.03890	10.30	VERTICAL	PASSED
7520.034068	-47.90	0.01622	15.20	VERTICAL	PASSED

EGPRS mode, channel 661, flip open

Frequency / MHz	Level / dBm	Level / μ W	A _{CORRECTION} / dB	Polarisation	Result
3760.023046	-47.10	0.01950	8.10	HORIZONTAL	PASSED
5639.782565	-37.50	0.17783	10.40	HORIZONTAL	PASSED
7509.526052	-48.40	0.01445	15.50	HORIZONTAL	PASSED

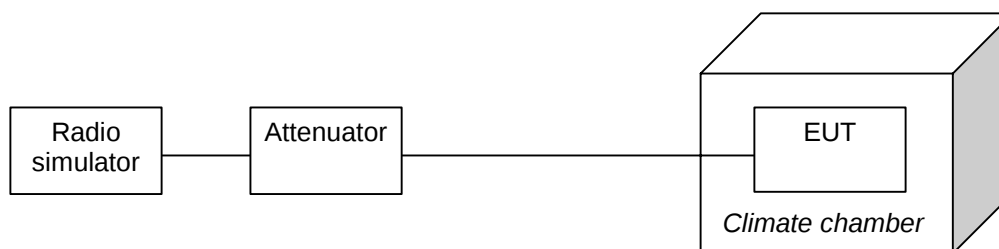
EGPRS mode, channel 661, flip closed

Frequency / MHz	Level / dBm	Level / μ W	A _{CORRECTION} / dB	Polarisation	Result
3760.523046	-53.50	0.00447	8.10	HORIZONTAL	PASSED
5637.282565	-50.00	0.01000	10.40	HORIZONTAL	PASSED
7515.026052	-48.10	0.01549	15.50	HORIZONTAL	PASSED

6. Frequency stability, temperature variation (FCC §2.1055(a), §2.1055(a), RSS-132 4.3, 6.3, RSS-133 7)

EUT with DUT number	RM-13, DUT 10473
Accessories with DUT numbers	BL-5X, DUT 10427; ACP-12, DUT 10458; HS-15, DUT 10549
Operation Voltage V / Hz	115V / 60Hz
Result	PASSED
Remarks	-
Temp °C / Humidity RH % / Air Pressure kPa	22 / 44 / 101.4
Date of measurements	31.03.2005
Measured by	Janne Niemi

6.1. Test setup



6.2. Test method and limit

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

- The climate chamber temperature is set to the minimum value and the temperature is allowed to stabilize.
- The EUT is placed in the chamber.
- The EUT is set in idle mode for 45 minutes.
- The EUT is set to transmit.
- The transmit frequency error was measured immediately.
- The steps c - e were repeated for each temperature.

Limits for frequency stability, temperature variation measurements

Frequency deviation / ppm
± 2.5

6.3. GSM 1900 Test results

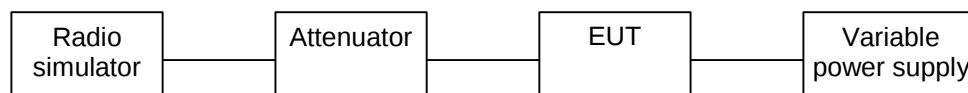
GSM mode, channel 661

Temperature / °C	Deviation / Hz	Deviation / ppm
-30	-37	-0.01968
-20	-38	-0.02021
-10	-39	-0.02074
0	-39	-0.02074
10	-41	-0.02180
20	-40	-0.02127
30	-27	-0.01436
40	-36	-0.01914
50	-44	-0.02340

7. Frequency stability, voltage variation (FCC §2.1055(d), RSS-132 4.3, 6.3, RSS-133 7)

EUT with DUT number	RM-13, DUT 10473
Accessories with DUT numbers	Dummy battery
Operation Voltage V / Hz	115V / 60Hz
Result	PASSED
Remarks	-
Temp °C / Humidity RH % / Air Pressure kPa	22 / 44 / 101.4
Date of measurements	31.03.2005
Measured by	Janne Niemi

7.1. Test setup



7.2. Test method and limit

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

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

Limits for frequency stability, voltage variation measurements

Frequency deviation / ppm
± 2.5

7.3. GSM 1900 Test results

GSM mode, channel 661

Voltage level / V	Deviation / Hz	Deviation / ppm
Nominal / 3.9	-39	-0.02074
Battery cut-off point / 3.2	-36	-0.01914

8. Test Equipment

8.1. 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
-	RF Emission Software	ES-K1 v.1.60	R&S	15C, 15B

8.2. 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
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

Eq. No	Equipment	Type	Manufacturer	Used in
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	Biconial 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
2398	Horn antenna	HF906	R&S	22/24, 15C
-	RF Emission Software	ES-K1 v.1.71	R&S	22/24, 15C, 15B