

FCC Part 22/24 Compliance Test Report

Test Report no.:	Tre_FCC_0838_01.doc	Date of Report:	03-Nov-2008
Number of pages:	16	Customer's Contact person:	Lasse Vaattovaara
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FCC listing no.:	94436		
IC recognition no.:	3608		
Tested devices/ accessories:	Phone RM-449 / Battery BP-4L, AC charger AC-8E, Headset HS-125, Dummy Battery SD-32		
FCC ID:	PYARM-449	IC:	661V-RM449
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), RSS-133 (Issue 4, February 2008) and RSS-139 (Issue 1, February 2008). 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	15-Sep-2008
Testing completed	02-Oct-2008
The customer's contact person	Lasse Vaattovaara
Test Plan referred to	T:\Projects\RM-449\TestPlan_RS\RS_Testplan_RM-449.xls
Notes	-
Document name	T:\Projects\RM-449\EMC\Results\FCC\Tre_FCC_0838_01.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-449	004401103174963	0691	-	100.21.55	41660
Phone	RM-449	004401103175028	0691	-	100.21.55	41656
Battery	BP-4L	-	-	-	-	41348
Battery	BP-4L	-	-	-	-	41658
AC-Charger	AC-8E	-	-	-	-	41662
Headset	HS-125	-	-	-	-	41661
Dummy Battery	SD-32	-	1.146	-	-	41249

1.2. Summary of Test Results

GSM 850:

Section in CFR 47	Section in RSS-GEN or RSS-132	Name of the test	Result
§2.1046(a), 22.913(a)	4.4	Conducted RF output power	NP
§22.913(a)	4.4	Radiated RF output power	NP
§2.1049(h)	4.6.1	99 % occupied bandwidth	PASSED
§22.917(a)	4.5	Band edge compliance	NP
§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	PASSED
§2.1055(d)	4.3	Frequency stability, voltage variation	PASSED

GSM 1900:

Section in CFR 47	Section in RSS-GEN or RSS-133	Name of the test	Result
§2.1046(a)	6.4	Conducted RF output power	NP
§24.232(b)	6.4	Radiated RF output power	NP
§2.1049(h)	4.6.1	99 % occupied bandwidth	PASSED
§24.238(a)	6.5	Band edge compliance	NP
§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	PASSED
§2.1055(d)	6.3	Frequency stability, voltage variation	PASSED

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	NP
§2.1049(h)	4.6.1	99 % occupied bandwidth	PASSED
§22.917(a)	4.5	Band edge compliance	NP
§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	NP
§2.1049(h)	4.6.1	99 % occupied bandwidth	PASSED
§24.238(a)	6.5	Band edge compliance	NP
§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.

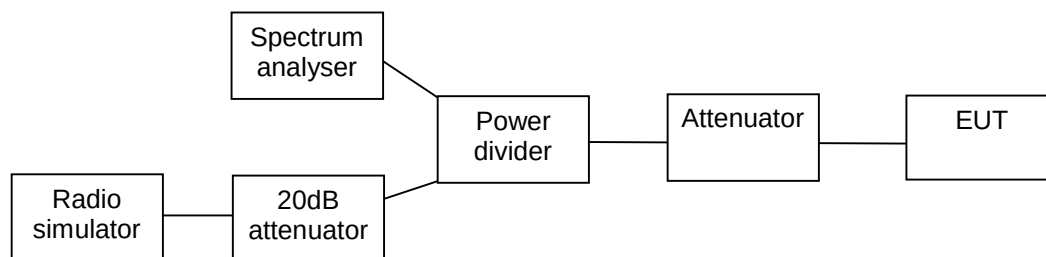
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2. 99 % occupied bandwidth (FCC §2.1049(h), RSS-GEN 4.6.1)

EUT with DUT number	RM-449 DUT 41656
Accessories with DUT numbers	BP-4L DUT 41348 / AC-8E DUT 41662 / HS-125 DUT 41661
Operation Voltage [V] / [Hz]	115/60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	20-21 / 48-50 / 98.3-103
Date of measurements	22-Sep and 02-Oct-2008
Measured by	Petteri Suni

2.1. Test setup



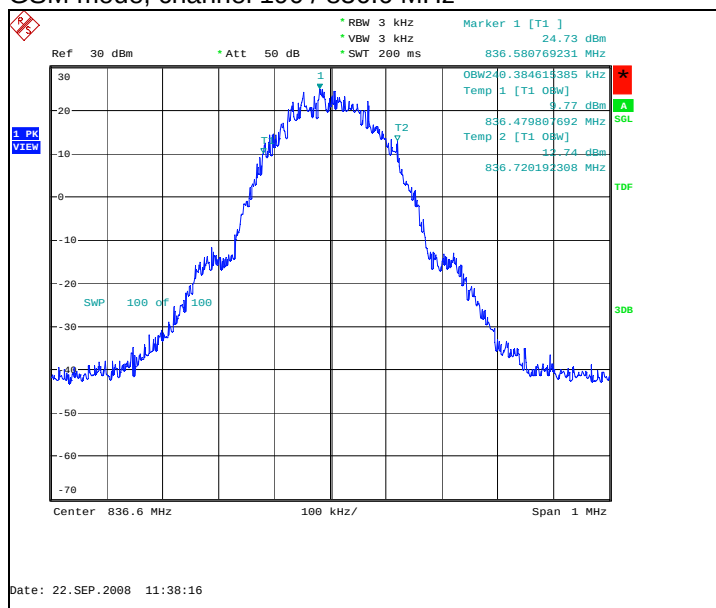
2.2. Test method and limit

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

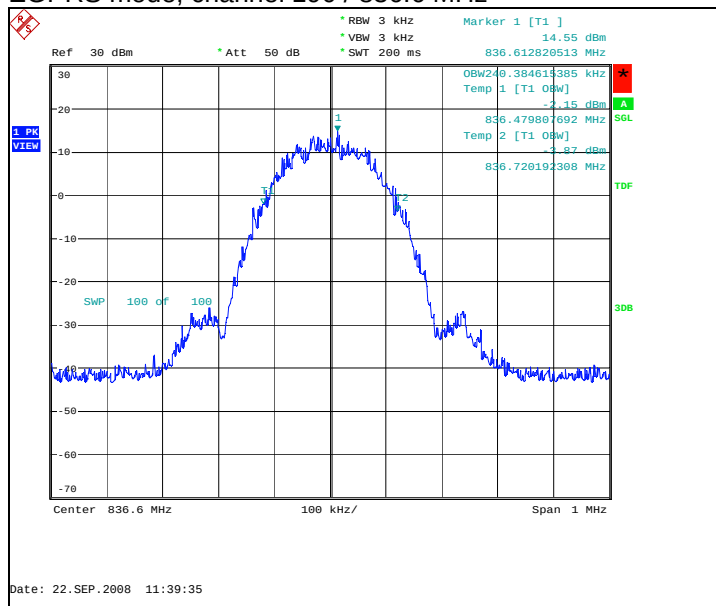
2.3. GSM 850 Test results

Operation mode (TX on)	99% occupied bandwidth [kHz]
GSM	240.385
EGPRS	240.385

GSM mode, channel 190 / 836.6 MHz



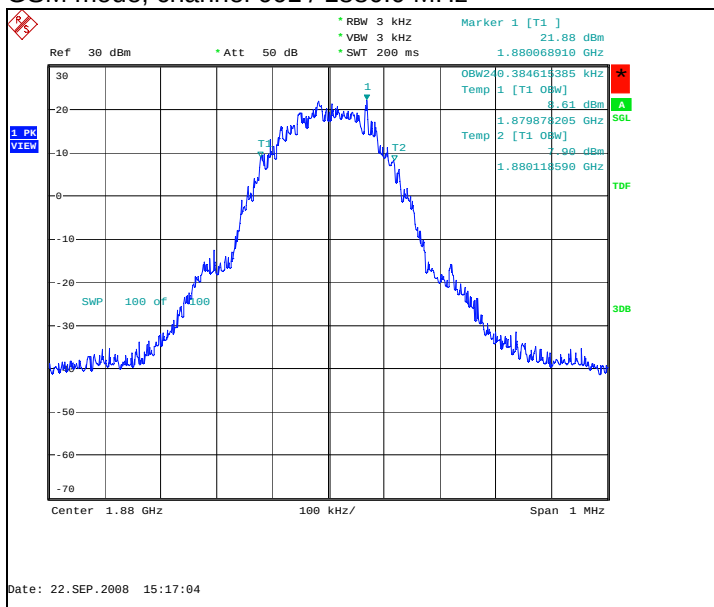
EGPRS mode, channel 190 / 836.6 MHz



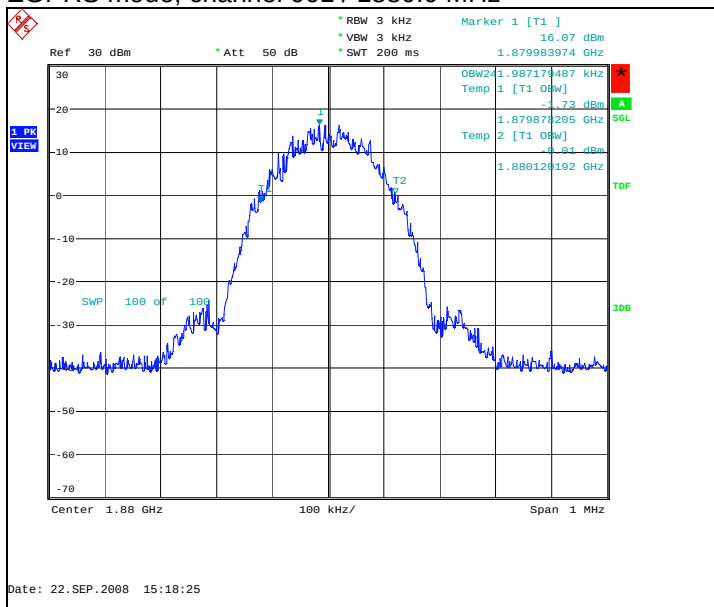
2.4. GSM 1900 Test results

Operation mode (TX on)	99% occupied bandwidth [kHz]
GSM	240.385
EGPRS	241.987

GSM mode, channel 661 / 1880.0 MHz



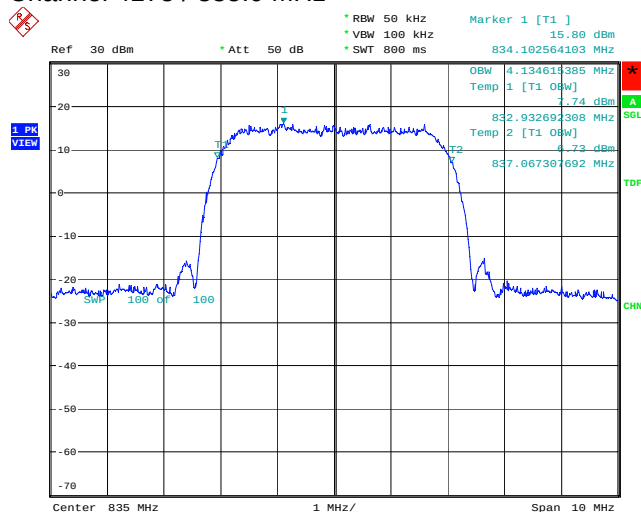
EGPRS mode, channel 661 / 1880.0 MHz



2.5. WCDMA 850 Test results

Operation mode (TX on)	99% occupied bandwidth [kHz]
FDD	4134.615

Channel 4175 / 835.0 MHz

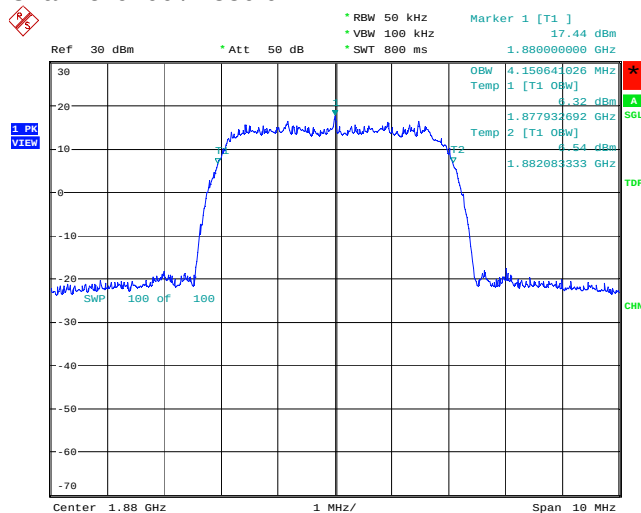


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2.6. WCDMA 1900 Test results

Operation mode (TX on)	99% occupied bandwidth [kHz]
FDD	4150.641

Channel 9400 / 1880.0 MHz

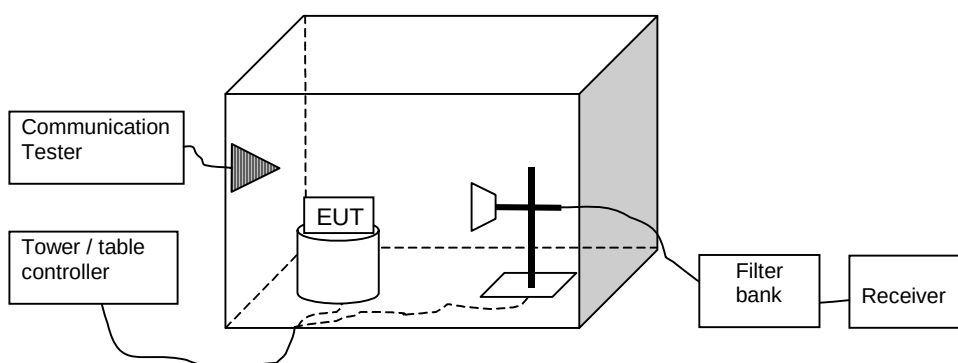


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3. Spurious radiated emissions (FCC §22.917(a), §24.238(a), §2.1053, RSS-132 4.5, RSS-133 6.5)

EUT with DUT number	RM-449 DUT 41660
Accessories with DUT numbers	BP-4L DUT 41658 / AC-8E DUT 41662 / HS-125 DUT 41661
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	23-24 / 46-48 / 102.7-103.2
Date of measurements	19 and 24-Sep-2008
Measured by	Jari Jantunen

3.1. Test setup



3.2. Test method and limit

The measurement is made according to TIA-603-C-2004 as follows:

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with absorbers on the floor and measuring antenna at fixed height using 2-axis EUT position system.

The Final Measurement is performed in the Semi-Anechoic Chamber with conducting metal floor, if the Preliminary Measurement results are closer than 20 dB to the permissible value.

The EUT is placed at nonconductive plate at the turntable center.

For each suspected frequency, the turntable is rotated 360 degrees and antenna is scanned from 1 to 4 m. This is repeated for both horizontal and vertical receive antenna polarizations.

The emissions less than 20 dB below the permissible value are reported.

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

The substitution corrections are obtained as described below:

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

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

The measurement results are obtained as described below:

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

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

Limits for spurious radiated emissions measurements

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

3.3. 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	-42.80	0.05248	- 36.50	- 6.30	HORIZONTAL	PASSED
2509.820641	-42.70	0.05370	- 43.80	1.10	HORIZONTAL	PASSED
3346.689379	-46.90	0.02042	- 50.40	3.50	HORIZONTAL	PASSED

EGPRS mode, channel 190 / 836.6 MHz

Frequency [MHz]	P [dBm]	P [μW]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
1673.143287	-55.50	0.00282	- 49.20	- 6.30	HORIZONTAL	PASSED
2509.820641	-51.50	0.00708	- 52.60	1.10	HORIZONTAL	PASSED
3346.189379	-57.50	0.00178	- 61.00	3.50	HORIZONTAL	PASSED

3.4. GSM 1900 Test results

GSM mode, channel 661 / 1880.0 MHz

Frequency [MHz]	P [dBm]	P [μ W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
3759.523046	-43.20	0.04786	- 51.60	8.40	HORIZONTAL	PASSED
5630.754509	-53.30	0.00468	- 63.00	9.70	VERTICAL	PASSED
5636.266533	-53.10	0.00490	- 62.70	9.60	HORIZONTAL	PASSED
7520.042084	-39.80	0.10471	- 54.60	14.80	VERTICAL	PASSED

EGPRS mode, channel 661 / 1880.0 MHz

Frequency [MHz]	P [dBm]	P [μ W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
3760.523046	-44.90	0.03236	- 53.30	8.40	HORIZONTAL	PASSED
5623.254509	-53.10	0.00490	- 62.80	9.70	VERTICAL	PASSED
5633.266533	-53.10	0.00490	- 62.70	9.60	HORIZONTAL	PASSED
7520.042084	-46.70	0.02138	- 61.50	14.80	VERTICAL	PASSED

3.5. WCDMA 850 Test results

Channel 4175 / 835.0 MHz

Frequency [MHz]	P [dBm]	P [μ W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
1667.527054	-50.30	0.00933	- 43.90	- 6.40	HORIZONTAL	PASSED
2506.115230	-54.10	0.00389	- 55.10	1.00	HORIZONTAL	PASSED
2520.142285	-55.90	0.00257	- 57.20	1.30	HORIZONTAL	PASSED
3345.697395	-59.90	0.00102	- 63.40	3.50	HORIZONTAL	PASSED

3.6. WCDMA 1900 Test results

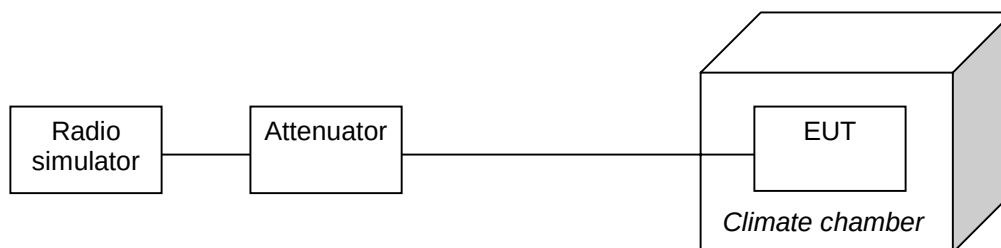
Channel 9400 / 1880.0 MHz

Frequency [MHz]	P [dBm]	P [μ W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
5608.710421	-53.70	0.00427	- 63.30	9.60	VERTICAL	PASSED
5636.778557	-47.70	0.01698	- 57.30	9.60	VERTICAL	PASSED
5657.306613	-52.40	0.00575	- 62.00	9.60	VERTICAL	PASSED
6936.879760	-51.40	0.00724	- 64.10	12.70	VERTICAL	PASSED
6969.935872	-53.30	0.00468	- 65.80	12.50	VERTICAL	PASSED
6975.951904	-53.40	0.00457	- 65.80	12.40	HORIZONTAL	PASSED

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

EUT with DUT number	RM-449 DUT 41656
Accessories with DUT numbers	BP-4L DUT 41348 / AC-8E DUT 41662 / HS-125 DUT 41661
Operation Voltage [V] / [Hz]	115/60
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	20 / 50 / 103
Date of measurements	22-Sep-2008
Measured by	Petteri Suni

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-132 and RSS-133 as follows:

- The climate chamber temperature is set to the maximum value and the temperature is allowed to stabilize.
- The EUT is placed in the chamber.
- The EUT is set in idle mode for 15 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

4.3. GSM 850 Test results

GSM mode, channel 190 / 836.6 MHz

Temperature [°C]	Deviation [Hz]	Deviation [ppm]
50	-15	-0.0179
40	-22	-0.0263
30	-21	-0.0251
20	-18	-0.0215
10	-20	-0.0239
0	-23	-0.0275
-10	-21	-0.0251
-20	-13	-0.0155
-30	-17	-0.0203

4.4. GSM 1900 Test results

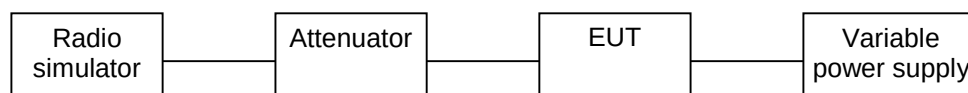
GSM mode, channel 661 / 1880.0 MHz

Temperature [°C]	Deviation [Hz]	Deviation [ppm]
50	-56	-0.0298
40	-64	-0.0340
30	-62	-0.0330
20	-58	-0.0309
10	-64	-0.0340
0	-49	-0.0261
-10	-54	-0.0287
-20	-57	-0.0303
-30	-39	-0.0207

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

EUT with DUT number	RM-449 DUT 41656
Accessories with DUT numbers	SD-32 DUT41249
Operation Voltage [V] / [Hz]	Nominal
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	20 / 50 / 103
Date of measurements	22-Sep-2008
Measured by	Petteri Suni

5.1. Test setup



5.2. Test method and limit

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

5.3. GSM 850 Test results

GSM mode, channel 190 / 836.6 MHz

Voltage level [V]	Deviation [Hz]	Deviation [ppm]
Battery cut-off point / 3.40	-12	-0.0143
Nominal / 3.70	-16	-0.0191

5.4. GSM 1900 Test results

GSM mode, channel 661 / 1880.0 MHz

Voltage level [V]	Deviation [Hz]	Deviation [ppm]
Battery cut-off point / 3.40	-43	-0.0229
Nominal / 3.70	-63	-0.0335

6. Test Equipment

6.1. 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	Transformatic	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

6.2. 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	Transformativ	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