

FCC Part 24 Compliance Test Report

Test Report no.:	FCC24_RM-638_04.doc	Date of Report:	02-Dec-2009
Number of pages:	15	Customer's Contact person:	Tobias Cremer
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FCC listing no.:	94436		
IC recognition no.:	661AK-1		
Tested devices/ accessories:	Phone RM-638 Hw 0115 / Battery BL-5CT, AC charger AC-8E, Headset WH-102, Dummy battery SD-28MOD2		
FCC ID:	PPIRM-638	IC:	661U-RM638
Supplement reports:	-		
Testing has been carried out in accordance with:	CFR 47, FCC rules Part 24, TIA-603-C-2004 and IC standard 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, System Manager, EMC

1. Summary for FCC Part 24 Compliance Test Report

Date of receipt	04-Nov-2009
Testing completed	06-Nov-2009
The customer's contact person	Tobias Cremer
Test Plan referred to	T:\Projects\RM-638\TestPlan_RS\RS_testplan_RM-638.xls
Notes	-
Document name	FCC24_RM-638_04.doc

1.1. EUT and Accessory Information

The EUT is a 3-band (GSM900/1800/1900) 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-638	004401109022901	0115	-	5.49	42082
Phone	RM-638	004401109022265	0115	-	5.49	42093
Battery	BL-5CT	3820669367195064397;0670555	-	-	-	42086
Battery	BL-5CT	3820669367195064425;0670555	-	-	-	42087
AC charger	AC-8E	4090499262040500403;0675387	-	-	-	42088
AC charger	AC-8E	4090499301040500071;0675387	-	-	-	42089
Headset	WH-102	06943238492I3104776	-	-	-	42090
Headset	WH-102	06943238492I3104796	-	-	-	42091
Dummy battery	SD-28MOD2	03.12.2008/03618	V.1.163	-	-	42092

1.2. Summary of Test Results

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	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	PASSED
§2.1055(d)	6.3	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 Tampere Laboratory.

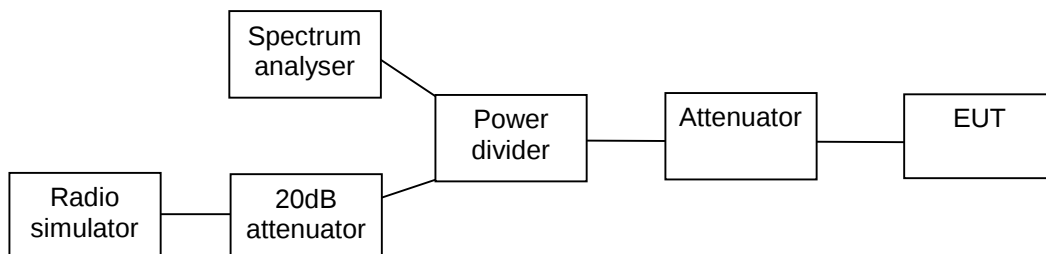
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2. 99 % occupied bandwidth (FCC §2.1049(h), RSS-GEN 4.6.1)

EUT with DUT number	RM-638 DUT 42093
Accessories with DUT numbers	BL-5CT DUT 42087
Operation Voltage [V] / [Hz]	Nominal
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	46 / 21 / 101.6
Date of measurements	06-Nov-2009
Measured by	Jari Jantunen

2.1. Test setup



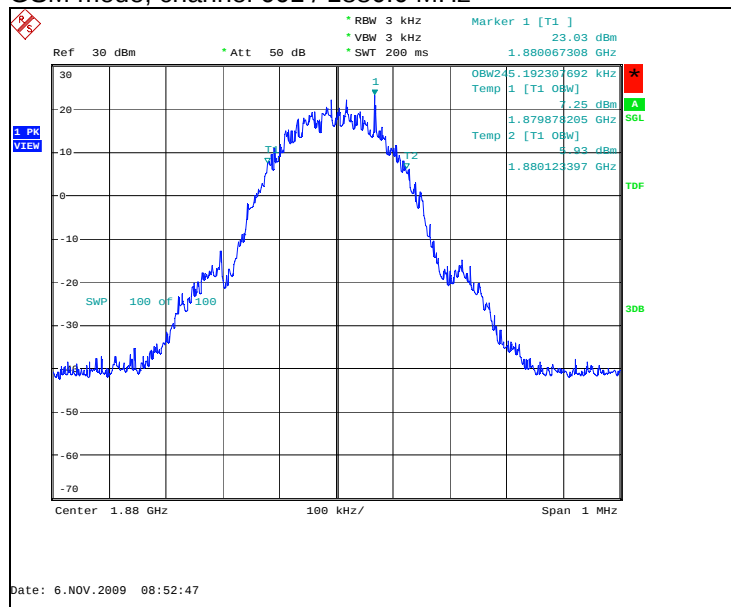
2.2. Test method and limit

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

2.3. GSM 1900 Test results

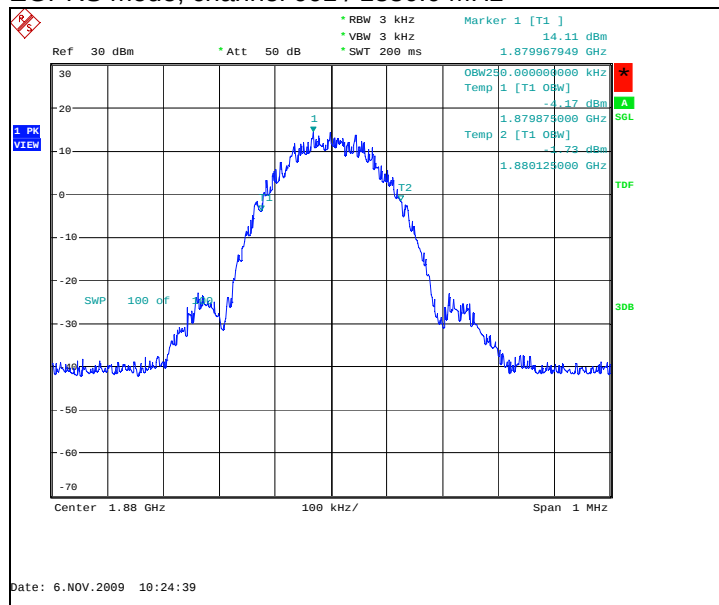
Operation mode (TX on)	99% occupied bandwidth [kHz]
GSM	245.192

GSM mode, channel 661 / 1880.0 MHz



Operation mode (TX on)	99% occupied bandwidth [kHz]
EGPRS	250.000

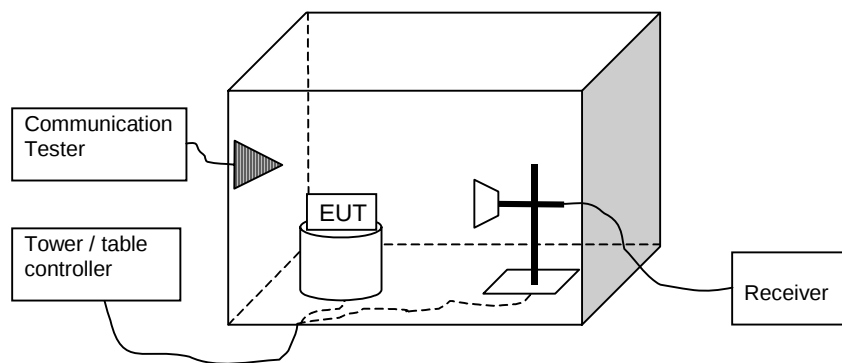
EGPRS mode, channel 661 / 1880.0 MHz



3. Band edge compliance (FCC 24.238(a), RSS-133 6.5)

EUT with DUT number	RM-638 DUT 42082
Accessories with DUT numbers	BL-5CT DUT 42086, AC-8E DUT 42088, WH-102 DUT 42090
Operation Voltage [V] / [Hz]	Nominal
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 47 / 101.4
Date of measurements	05-Nov-2009
Measured by	Hannu Söderholm

3.1. Test setup



3.2. Test method and limit

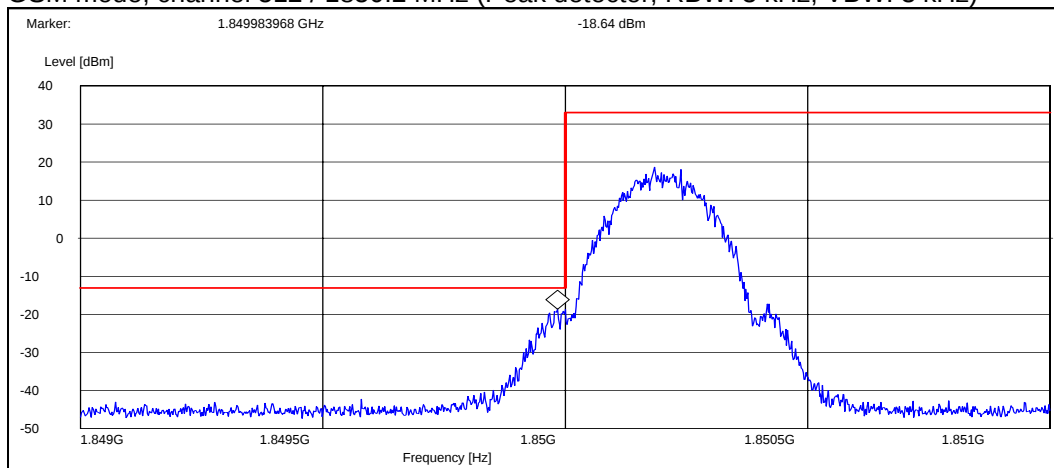
The measurement is made according to FCC rules part 24 and IC standard RSS-133.

Limits for band edge compliance measurements

Operation band	Frequency range [MHz]	Limit [dBm]
GSM 1900	Below 1850 and above 1910	-13

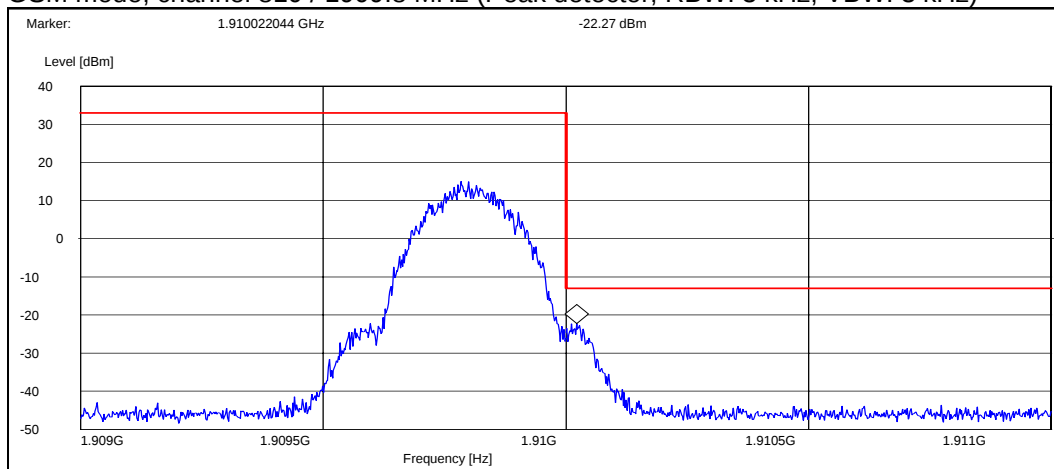
3.3. GSM 1900 Test results

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



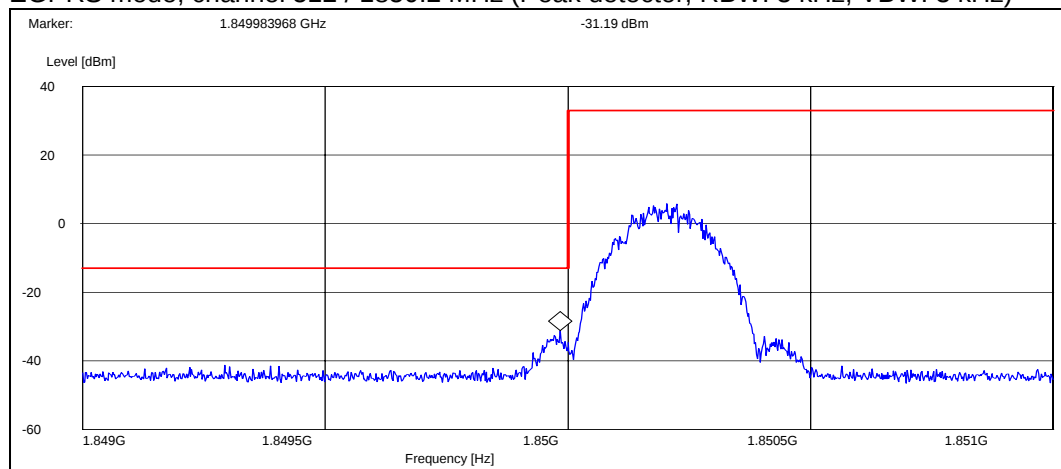
Operation mode (TX on)	Channel / f_c [MHz]	P [dBm]
GSM	512 / 1850.2	-18.60

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	-22.30

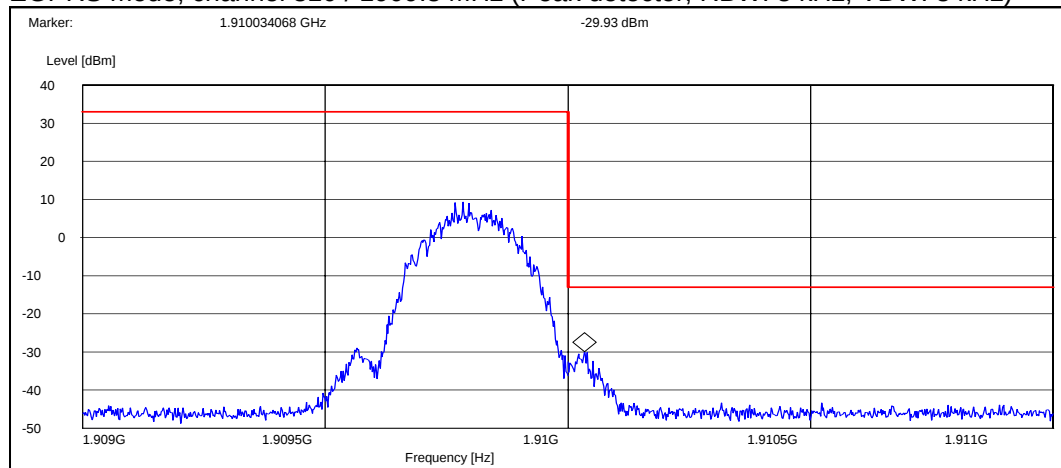
EGPRS mode, channel 512 / 1850.2 MHz (Peak detector, RBW: 3 kHz, VBW: 3 kHz)



Operation mode (TX on)	Channel / f_c [MHz]	P [dBm]
EGPRS	512 / 1850.2	-31.20

2

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

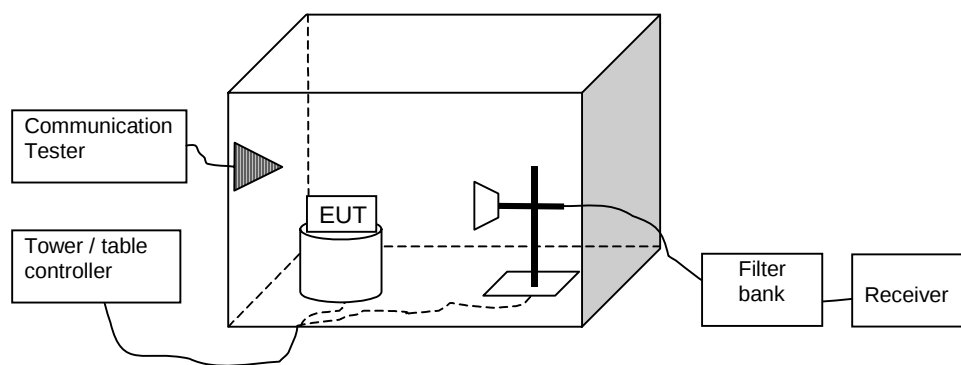


Operation mode (TX on)	Channel / f_c [MHz]	P [dBm]
EGPRS	810 / 1909.8	-29.90

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

EUT with DUT number	RM-638 DUT 42082
Accessories with DUT numbers	BL-5CT DUT 42086, AC-8E DUT 42088, WH-102 DUT 42090
Operation Voltage [V] / [Hz]	Nominal
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 47 / 101.4
Date of measurements	05-Nov-2009
Measured by	Hannu Söderholm

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]
GSM 1900	30 - 18000	-13

4.3. 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	-34.20	0.38019	- 43.60	9.40	HORIZONTAL	PASSED
5639.778557	-50.70	0.00851	- 62.00	11.30	HORIZONTAL	PASSED
7509.010020	-49.80	0.01047	- 65.30	15.50	HORIZONTAL	PASSED
7520.034068	-47.60	0.01738	- 63.30	15.70	VERTICAL	PASSED

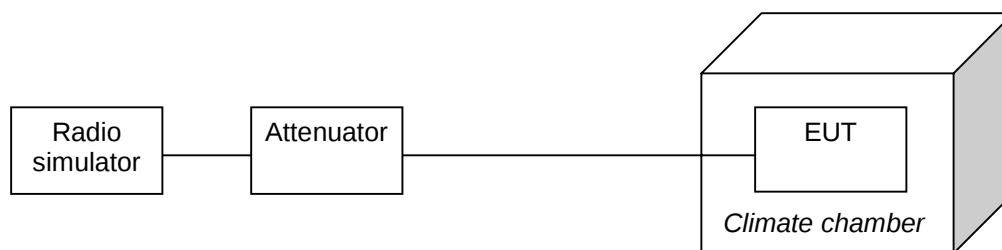
EGPRS mode, channel 661 / 1880.0 MHz

Frequency [MHz]	P [dBm]	P [μW]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Result
3760.023046	-41.30	0.07413	- 50.70	9.40	HORIZONTAL	PASSED
5640.278557	-50.80	0.00832	- 62.10	11.30	HORIZONTAL	PASSED
7507.510020	-50.10	0.00977	- 65.60	15.50	HORIZONTAL	PASSED
7520.534068	-49.20	0.01202	- 64.90	15.70	VERTICAL	PASSED

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

EUT with DUT number	RM-638 DUT 42093
Accessories with DUT numbers	BL-5CT DUT 42087, AC-8E DUT 42089, WH-102 DUT 42091
Operation Voltage [V] / [Hz]	230 / 50
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	46 / 21 / 101.6
Date of measurements	06-Nov-2009
Measured by	Jari Jantunen

5.1. Test setup



5.2. Test method and limit

The measurement is made according to FCC rules part 24 and IC standard 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

5.3. GSM 1900 Test results

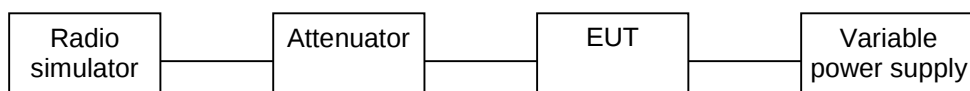
GSM mode, channel 661 / 1880.0 MHz

Temperature [°C]	Deviation [Hz]	Deviation [ppm]
50	-29	- 0.0154
40	-23	- 0.0122
30	-18	- 0.0096
20	26	0.0138
10	23	0.0122
0	26	0.0138
-10	26	0.0138
-20	26	0.0138
-30	26	0.0138

6. Frequency stability, voltage variation (FCC §2.1055(d), RSS-132 4.3, RSS-133 6.3, RSS-139 6.3)

EUT with DUT number	RM-638 DUT 42093
Accessories with DUT numbers	SD-28MOD2 DUT 42092
Operation Voltage [V] / [Hz]	3.5 VDC and 3.7 VDC
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	46 / 21 / 101.6
Date of measurements	06-Nov-2009
Measured by	Jari Jantunen

6.1. Test setup



6.2. Test method and limit

The measurement is made according to FCC rules parts 22, 24 and 27 and IC standards RSS-132, RSS-133 and RSS-139 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

6.3. GSM 1900 Test results

GSM mode, channel 661 / 1880.0 MHz

Voltage level [V]	Deviation [Hz]	Deviation [ppm]
Battery cut-off point / 3.50	25	0.0133
Nominal / 3.70	-45	- 0.0239

7. Test Equipment

7.1. 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

7.2. 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	WRCAR870	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
2002	Radio communication tester	CMU-200	R&S	22/24/27, 15C, 15B

