FCC Part 22/24/27 Compliance Test Report

Test Report no.:	FCC22&24&27_RM-984_03.docx	**Date of Report:**	04-Aug-2014
Number of pages:	40	**Customer's Contact person:**	Victoria Abadilla
Testing laboratory:	TCC Microsoft Salo Laboratory P.O.Box(86) Joensuunkatu 7E FIN-24101 SALO, FINLAND Tel. +358 (0) 7180 08000 Fax. +358 71 80 44122	**Customer:**	Microsoft 16620 West Bernardo Drive San Diego, CA 92127 USA Tel. +1 858 831 5000 Fax. +1 858 385 1598
FCC listing no.: **IC recognition no.:**	533467 661V-1		
Tested devices/ accessories:	**Phone RM-984 / Dummy Battery SD-240R / Battery BV-L4A / AC-Charger AC-60E / USB-Cable CA-190CD / Headset WH-208**		
FCC ID:	QMNRM-984	**IC:**	-
Supplement reports:	-		
Testing has been carried out in accordance with:	**CFR 47, FCC rules Parts 22/24/27, TIA-603-C-2004 and IC standards, RSS-GEN (Issue 3, December 2010), RSS-130 (Issue 1, October 2013), RSS-132 (Issue 2, September 2005), RSS-133 (Issue 5, February 2009), RSS-199 (Issue 1, January 2010). 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 Microsoft.		
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:			

Sami Lehtonen, Specialist, EMC

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1. Summary for FCC Part 22/24/27 Compliance Test Report

Date of receipt	19-Jun-2014
Testing completed	4-Jul-2014
The customer's contact person	Victoria Abadilla
Test Plan referred to	T:\Projects\RM-984\TestPlan\RS_testplan_RM-984.xlsm
Notes	-
Document name	Y:\Projects\RM-984\EMC\FCC22&24&27_RM-984_03.docx

1.1. EUT and Accessory Information

The EUT is a mobile phone with following features:
GSM/WCDMA/WLAN/Bluetooth
The EUT is tested with maximum rated TX power.

Devices under tests

Product	Type	SN	HW	MV	SW	DUT
Phone	RM-984	004402478222569ö059V6T6	0200	-	02028.00000.14224.06001	18429
Phone	RM-984	004402478222452ö059V6T6	0200	-	02028.00000.14224.06001	18426
Dummy Battery	SD-240R	-	V1.0	-	-	18430
Headset	WH-208	-	-	-	-	18431
Battery	BV-L4A	4181574243S1140002 6ö0670727	3.0	1.0	-	18427
Headset	WH-208	3342R31	-	-	-	18428
AC-Charger	AC-60E	4090493261610304125ö0675677	-	-	-	18217
USB-Cable	CA-190CD	07304562136C28	-	-	-	18219

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	PASSED
§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

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	PASSED
§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	PASSED
§2.1055(d)	4.3	Frequency stability, voltage variation	PASSED

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WCDMA 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	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

WCDMA 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	PASSED
§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	PASSED
§2.1055(d)	4.3	Frequency stability, voltage variation	PASSED

LTE7:

Section in CFR 47	Section in RSS-GEN or RSS-199	Name of the test	Result
§2.1046(a)	4.4	Conducted RF output power	NP
§27.50(h)(2)	4.4	Radiated RF output power	PASSED
§2.1049(h)	4.2	99 % occupied bandwidth	PASSED
§27.53(l)	4.5(b)	Band edge compliance	PASSED
§27.53(h), §2.1051	4.5(b)	Spurious emissions at antenna terminals	NP
§27.53(l), §2.1053	4.5(b)	Spurious radiated emissions	PASSED
§27.54	4.3	Frequency stability, temperature variation	PASSED
§27.54	4.3"	Frequency stability, voltage variation	PASSED

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 Microsoft Laboratory.

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CONTENTS

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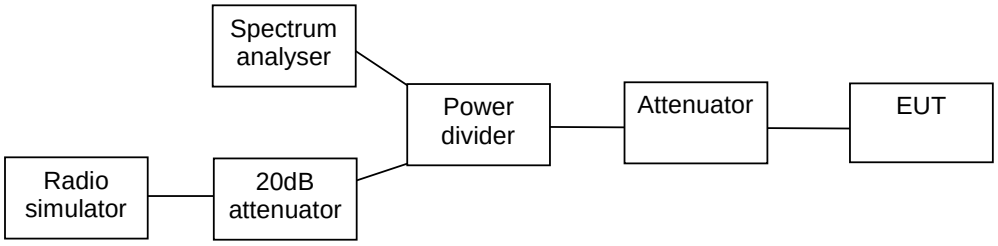
2. 99 % occupied bandwidth

(FCC §2.1049(h), RSS-133 4.6.1, RSS-132 4.6.1, RSS-199 4.2)

EUT with DUT number	RM-984, DUT 18429
Accessories with DUT numbers	SD-240R, DUT 18430 ; WH-208, DUT 18431
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 50 / 101
Date of measurements	24-Jun-2014
Measured by	Tomi Lipponen

2.1. Test Setup



2.2. Test method and limit

The measurement is made according to applicable FCC rule parts and IC standards.

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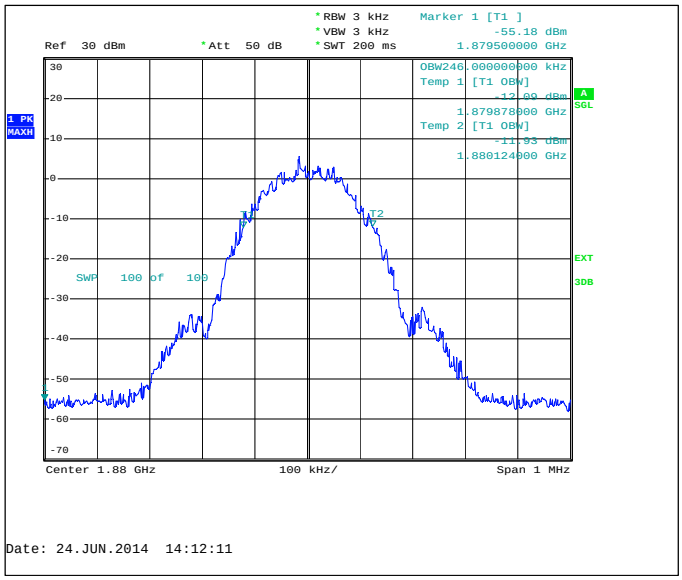
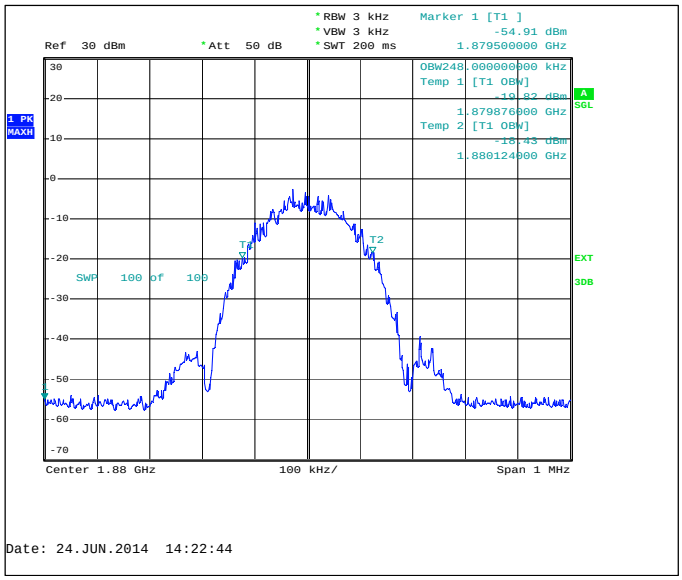
2.3. GSM 1900 Test results

Operation mode (TX on)	99% Occupied bandwidth [kHz]
GSM	246
EGPRS	248
GPRS	244

GSM, Channel 661 / 1880.0 MHz



EGPRS, Channel 661 / 1880.0 MHz



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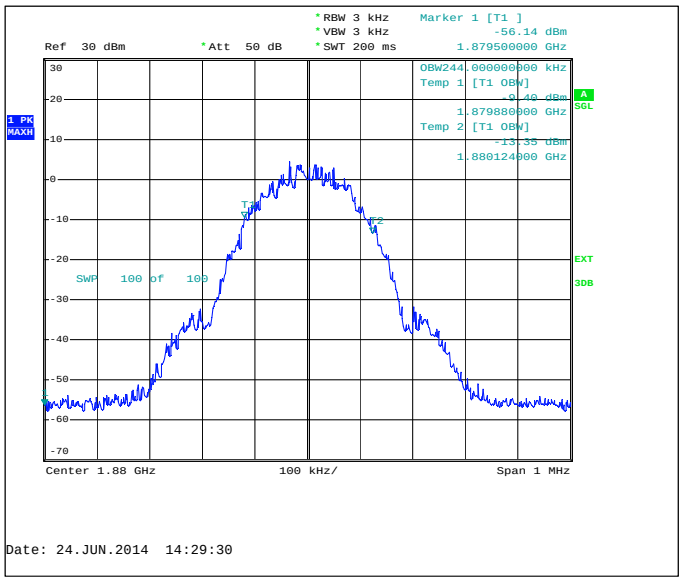
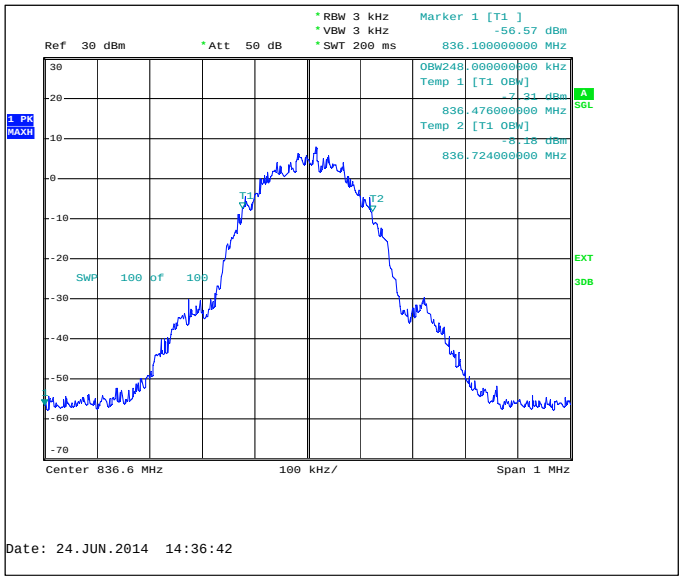
GPRS, Channel 661 / 1880.0 MHz



2.4. GSM 850 Test results

Operation mode (TX on)	99% Occupied bandwidth [kHz]
GSM	248
EGPRS	240
GPRS	246

GSM, Channel 190 / 836.6 MHz



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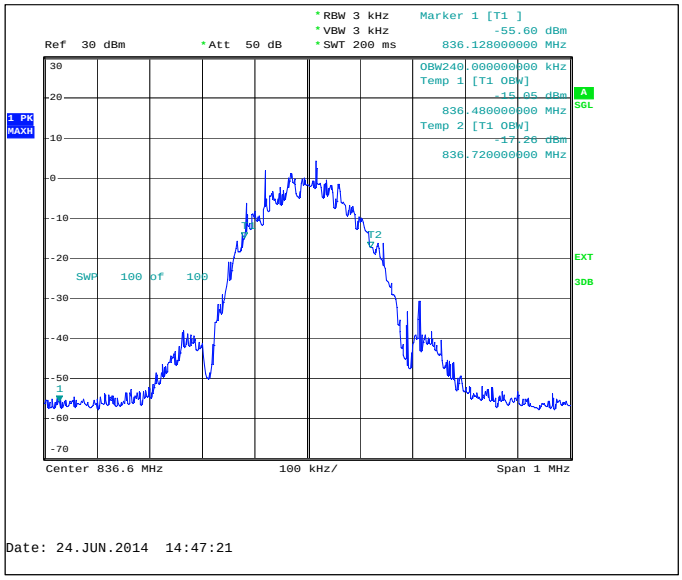
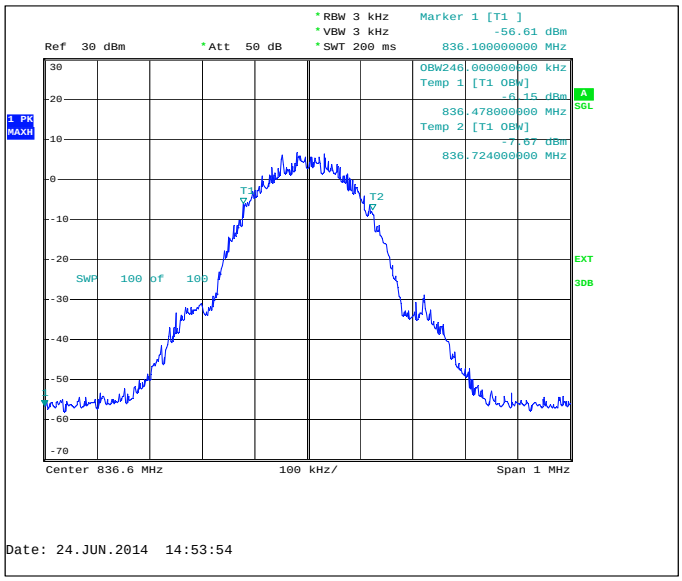
EGPRS, Channel 190 / 836.6 MHz



GPRS, Channel 190 / 836.6 MHz



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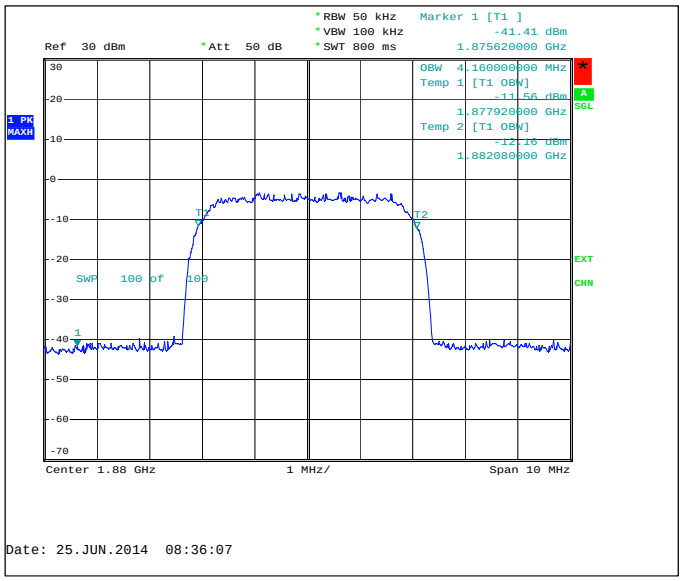
2.5. WCDMA 1900 Test results

Operation mode (TX on)	99% Occupied bandwidth [kHz]
FDD	4160

FDD, Channel 9400 / 1880.0 MHz



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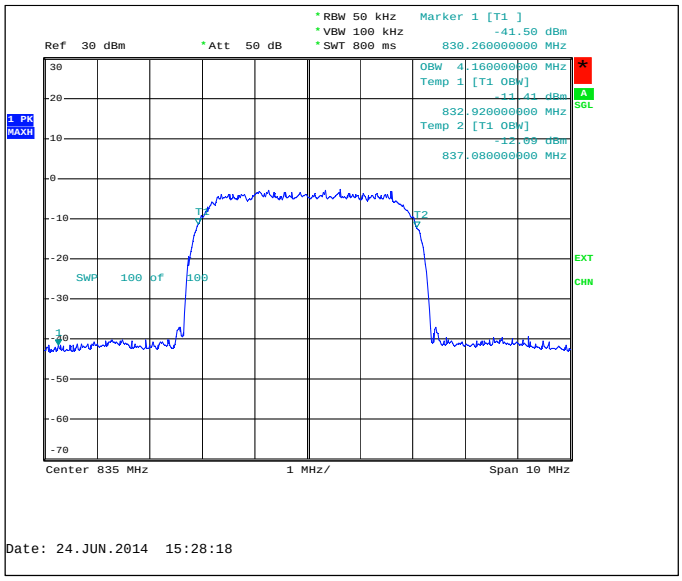
2.6. WCDMA 850 Test results

Operation mode (TX on)	99% Occupied bandwidth [kHz]
FDD	4160

FDD, Channel 4175 / 835.0 MHz



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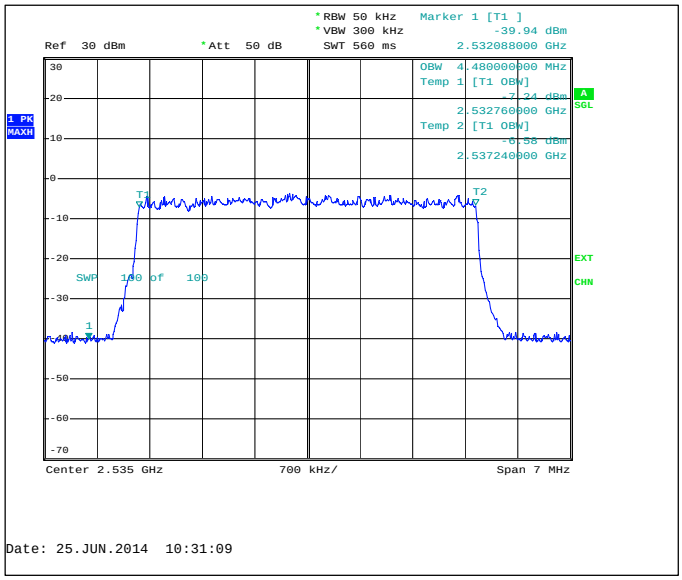
2.7. LTE7 Test results

Operation mode (TX on)	99% Occupied bandwidth [kHz]
FDD, CBW 5MHz, QPSK, 25 RB	4480
FDD, CBW 10MHz, QPSK, 50 RB	8970
FDD, CBW 15MHz, QPSK, 75 RB	13480
FDD, CBW 20MHz, QPSK, 100 RB	17850
FDD, CBW 5MHz, 16QAM, 25 RB	4480
FDD, CBW 10MHz, 16QAM, 50 RB	8940
FDD, CBW 15MHz, 16QAM, 75 RB	13440
FDD, CBW 20MHz, 16QAM, 100 RB	17900

FDD, CBW 5MHz, QPSK, 25 RB, Channel 21100 / 2535.0 MHz



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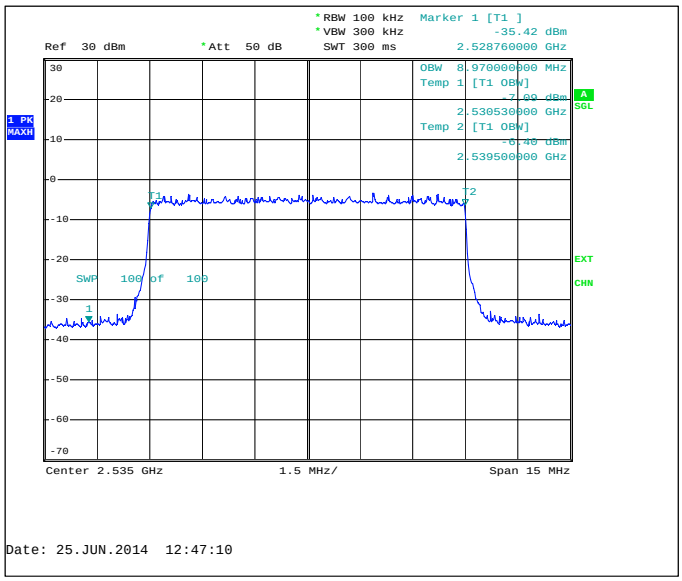
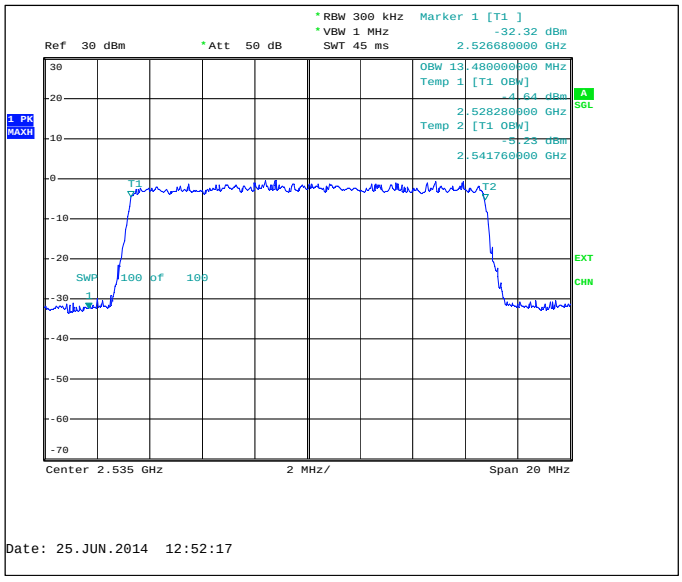
FDD, CBW 10MHz, QPSK, 50 RB, Channel 21100 / 2535.0 MHz



FDD, CBW 15MHz, QPSK, 75 RB, Channel 21100 / 2535.0 MHz



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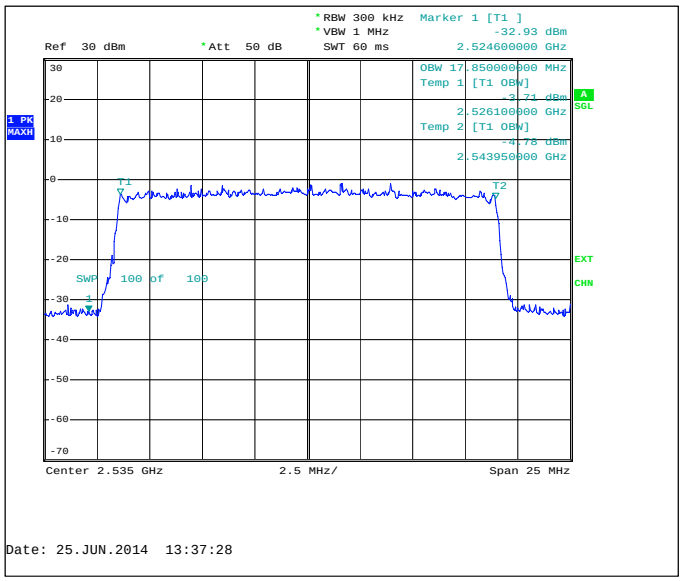
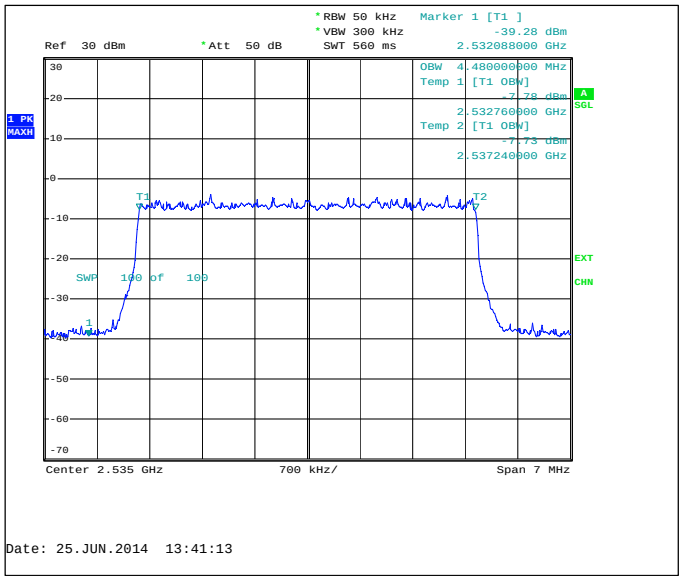
FDD, CBW 20MHz, QPSK, 100 RB, Channel 21100 / 2535.0 MHz



FDD, CBW 5MHz, 16QAM, 25 RB, Channel 21100 / 2535.0 MHz



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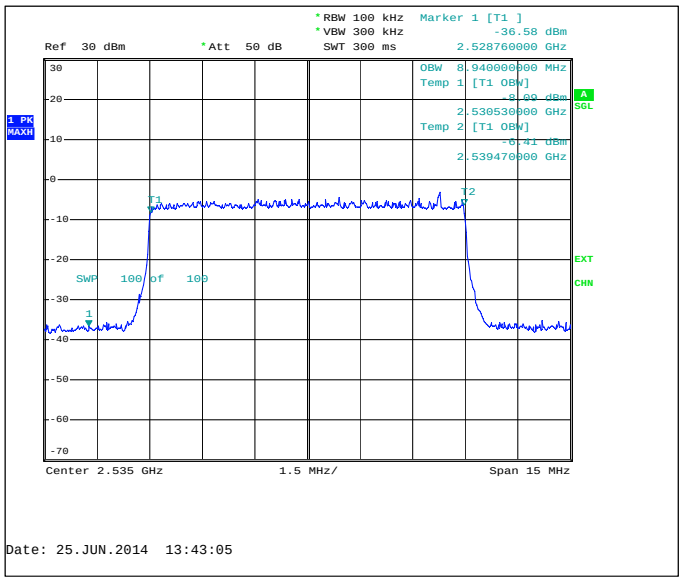
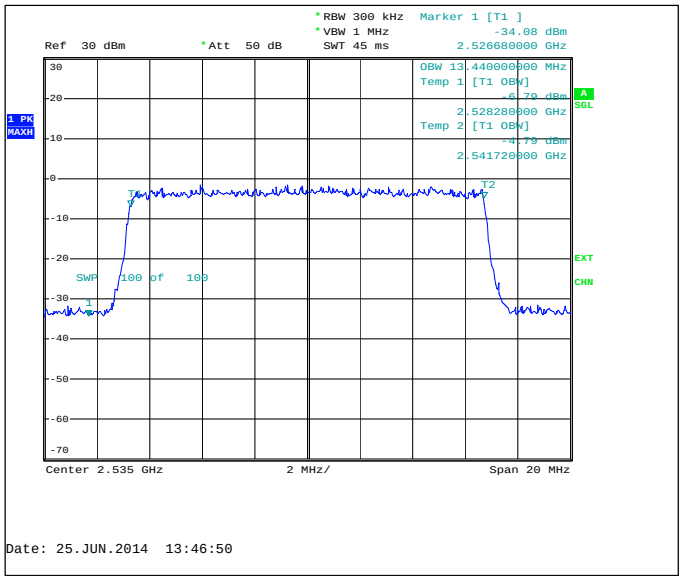
FDD, CBW 10MHz, 16QAM, 50 RB, Channel 21100 / 2535.0 MHz



FDD, CBW 15MHz, 16QAM, 75 RB, Channel 21100 / 2535.0 MHz



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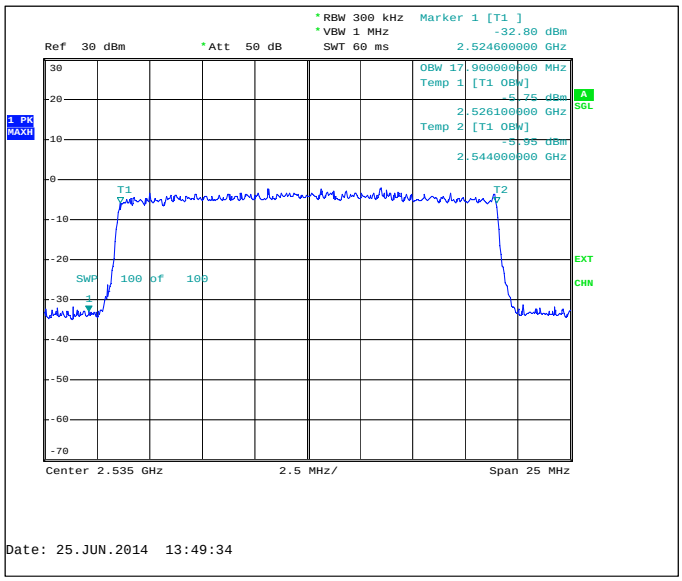
FDD, CBW 20MHz, 16QAM, 100 RB, Channel 21100 / 2535.0 MHz



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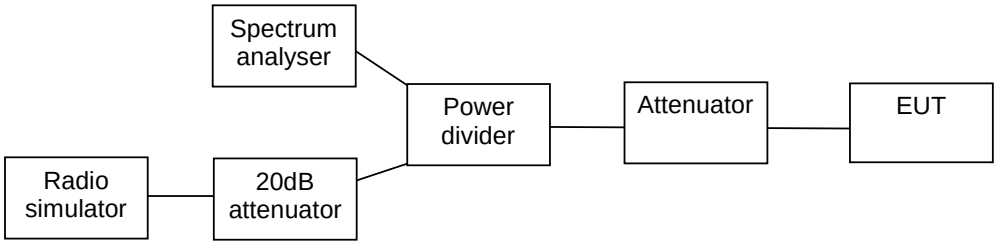
3. Band edge compliance

(FCC §24.238(a), §27.53(l), §22.917(a), RSS-133 6.5, RSS-132 4.5, RSS-199 4.5(b))

EUT with DUT number	RM-984, DUT 18429
Accessories with DUT numbers	SD-240R, DUT 18430 ; WH-208, DUT 18431
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 50 / 101
Date of measurements	24-Jun-2014
Measured by	Tomi Lipponen

3.1. Test Setup



3.2. Test method and limit

The measurement is made according to applicable FCC rule parts and IC standards.

Limits for band edge compliance measurements

Operation band	Frequency range [MHz]	Limit [dBm]
GSM 1900	Below 1850 and above 1910	-13
GSM 850	Below 824 and above 849	-13
WCDMA 1900	Below 1850 and above 1910	-13
WCDMA 850	Below 824 and above 849	-13
LTE7	Below 2494.5 2494.5 - 2499 2499 – 2500 2570 – 2571 2571 – 2575.5 Above 2575.5	-25 (RBW = 1 MHz, EiRP) -13 (RBW = 1 MHz, EiRP) -13 (RBW = 200 kHz, EiRP) -13 (RBW = 200 kHz, EiRP) -13 (RBW = 1 MHz, EiRP) -25 (RBW = 1 MHz, EiRP)

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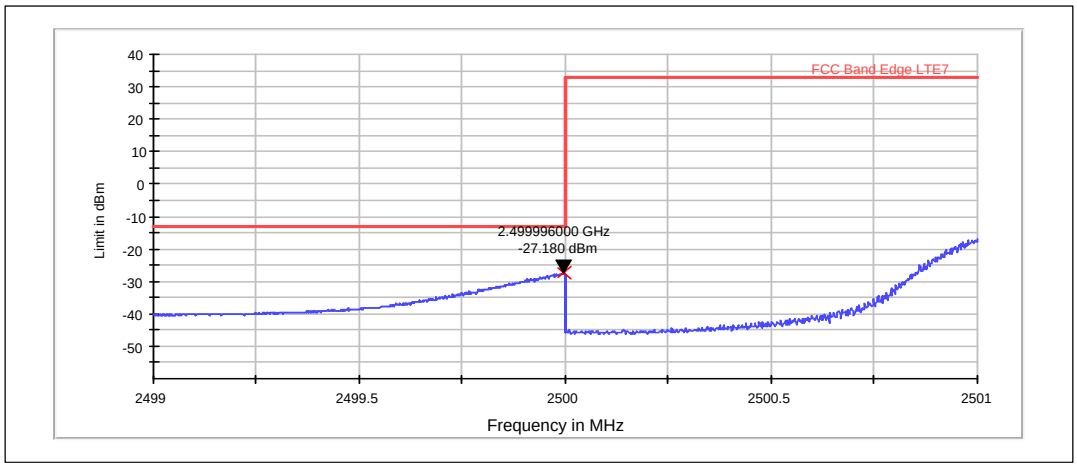
3.3. LTE7 Test results

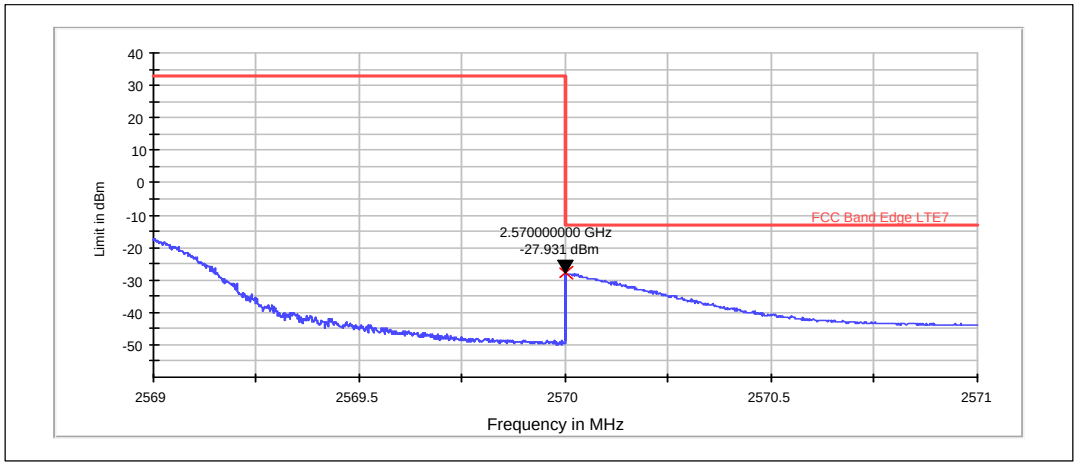
Channel 20850 / 2510 MHz



RMS detector, Max hold

Operation mode (TX on)	Frequency [MHz]	Level [dBm]	Result
FDD, CBW 20MHz, QPSK, 100 RB	2499.996	-27.18	PASSED

Channel 21350 / 2560 MHz



RMS detector, Max hold

Operation mode (TX on)	Frequency [MHz]	Level [dBm]	Result
FDD, CBW 20MHz, QPSK, 100 RB	2570.000	-27.93	PASSED

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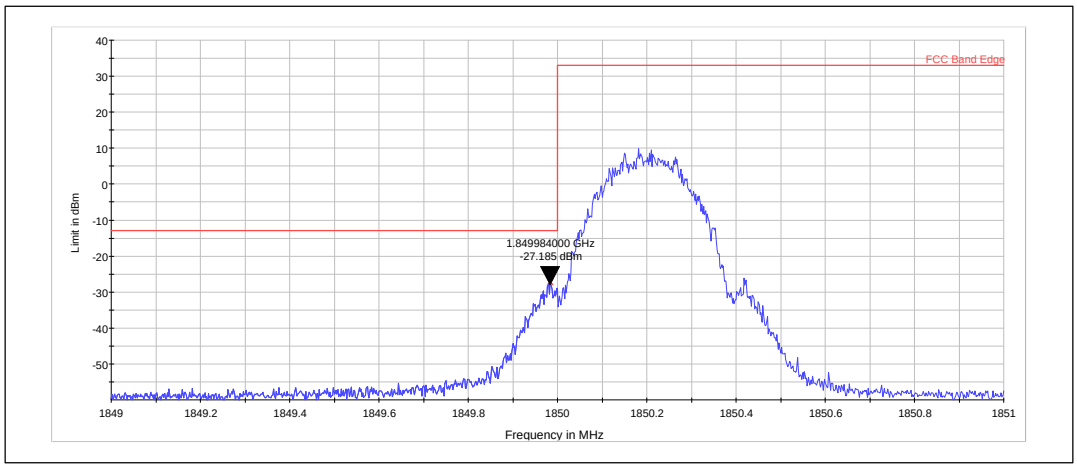
3.4. GSM 1900 Test results

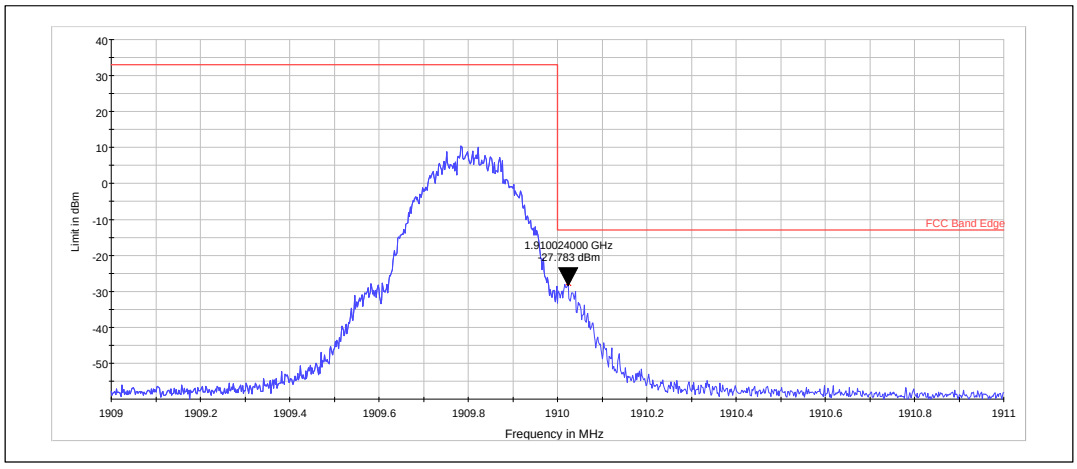
Channel 512 / 1850.2 MHz



RMS (RBW: 3 kHz, VBW: 3 kHz, Max hold)

Operation mode (TX on)	Frequency [MHz]	Level [dBm]	Result
GSM	1849.984	-27.18	PASSED

Channel 810 / 1909.8 MHz



RMS (RBW: 3 kHz, VBW: 3 kHz, Max hold)

Operation mode (TX on)	Frequency [MHz]	Level [dBm]	Result
GSM	1910.024	-27.78	PASSED

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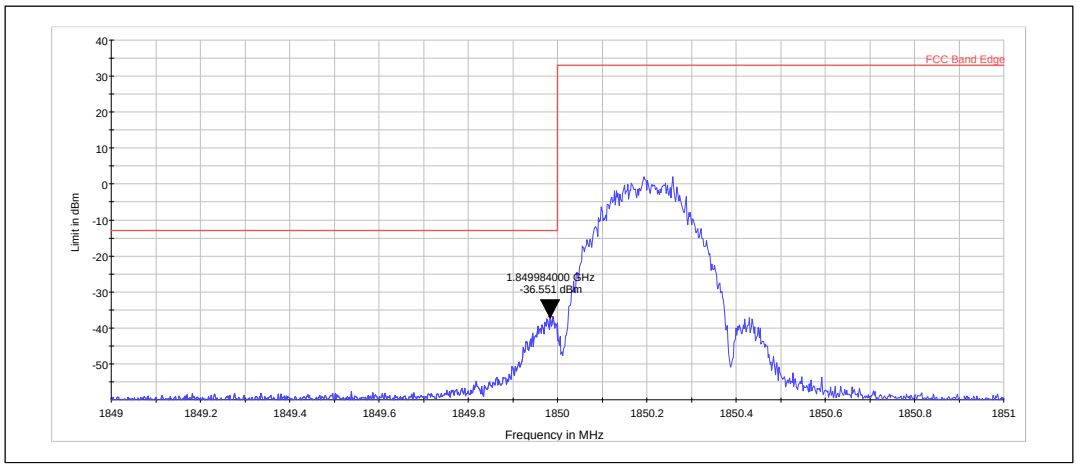
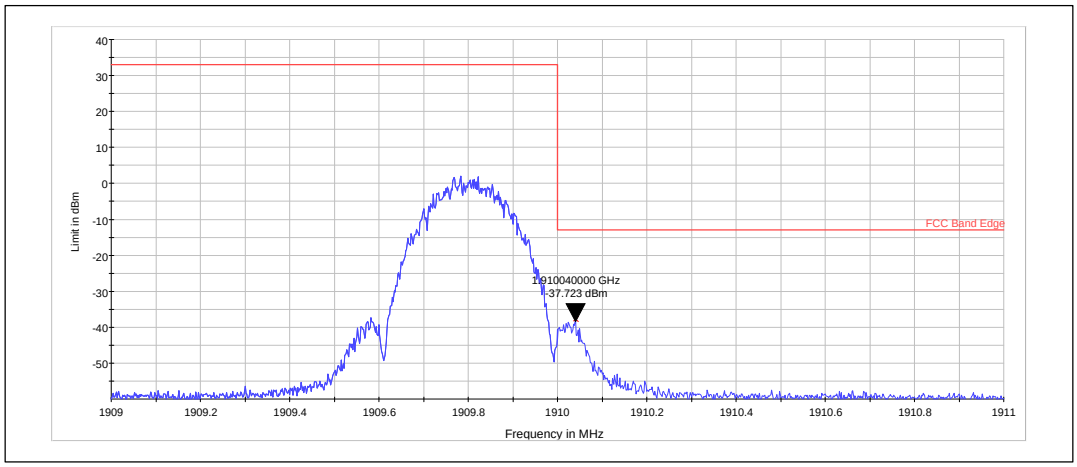
Channel 512 / 1850.2 MHz



RMS (RBW: 3 kHz, VBW: 3 kHz, Max hold)

Operation mode (TX on)	Frequency [MHz]	Level [dBm]	Result
EGPRS	1849.984	-36.55	PASSED

Channel 810 / 1909.8 MHz



RMS (RBW: 3 kHz, VBW: 3 kHz, Max hold)

Operation mode (TX on)	Frequency [MHz]	Level [dBm]	Result
EGPRS	1910.040	-37.72	PASSED

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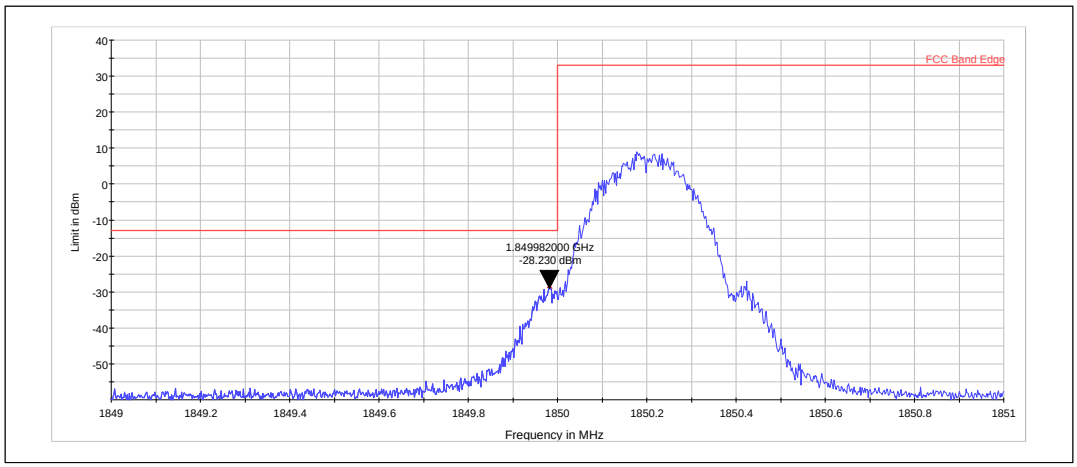
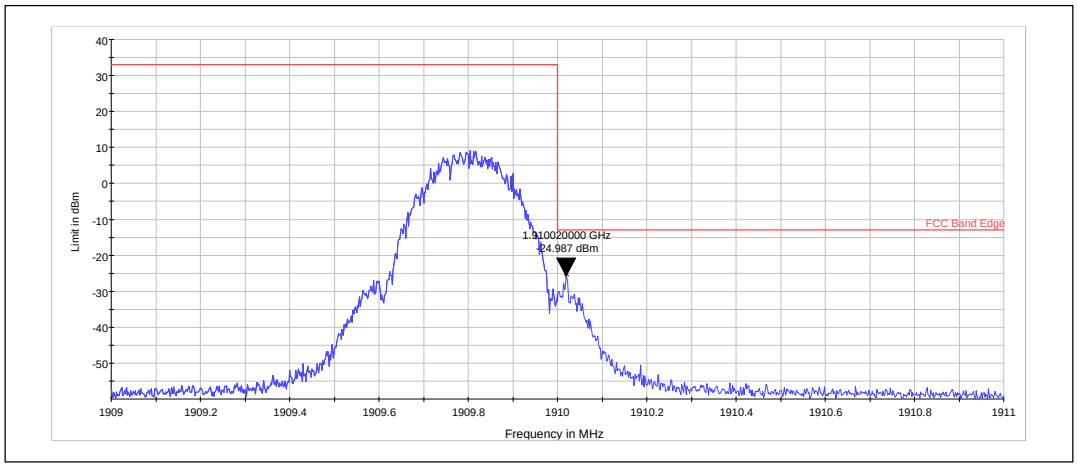
Channel 512 / 1850.2 MHz



RMS (RBW: 3 kHz, VBW: 3 kHz, Max hold)

Operation mode (TX on)	Frequency [MHz]	Level [dBm]	Result
GPRS	1849.982	-28.23	PASSED

Channel 810 / 1909.8 MHz



RMS (RBW: 3 kHz, VBW: 3 kHz, Max hold)

Operation mode (TX on)	Frequency [MHz]	Level [dBm]	Result
GPRS	1910.020	-24.99	PASSED

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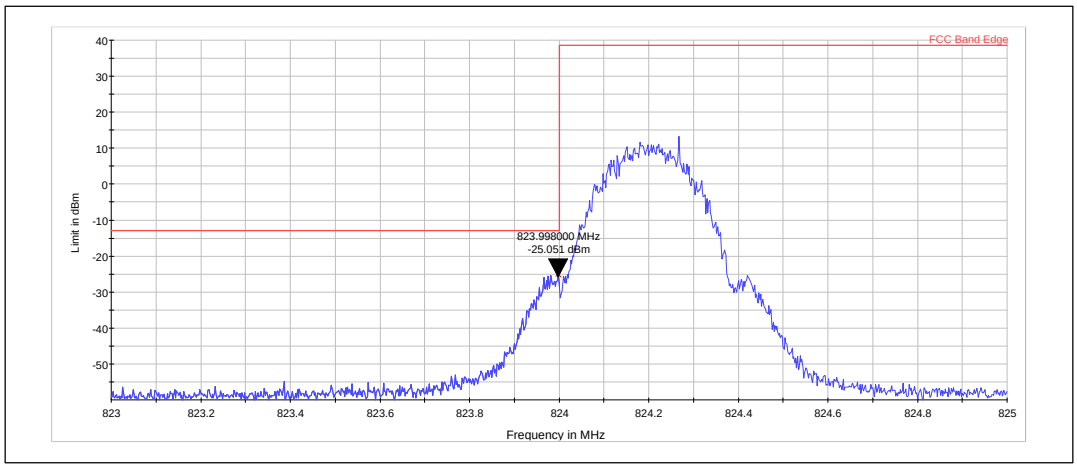
3.5. GSM 850 Test results

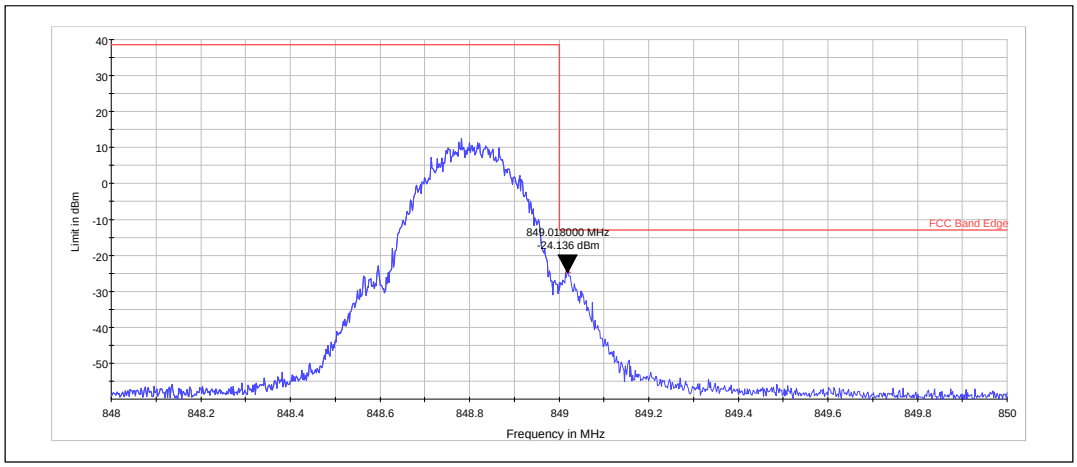
Channel 128 / 824.2 MHz



RMS (RBW: 3 kHz, VBW: 3 kHz, Max hold)

Operation mode (TX on)	Frequency [MHz]	Level [dBm]	Result
GSM	823.998	-25.05	PASSED

Channel 251 / 848.8 MHz



RMS (RBW: 3 kHz, VBW: 3 kHz, Max hold)

Operation mode (TX on)	Frequency [MHz]	Level [dBm]	Result
GSM	849.018	-24.14	PASSED

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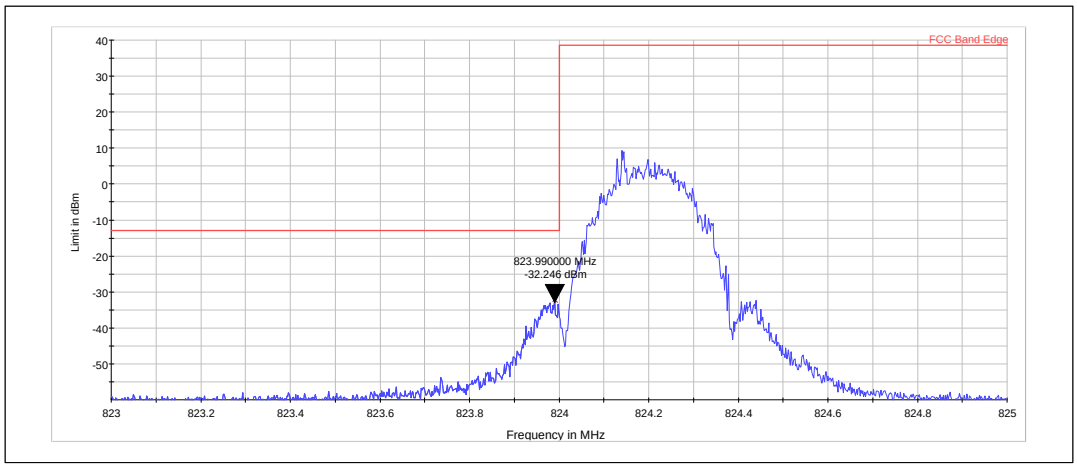
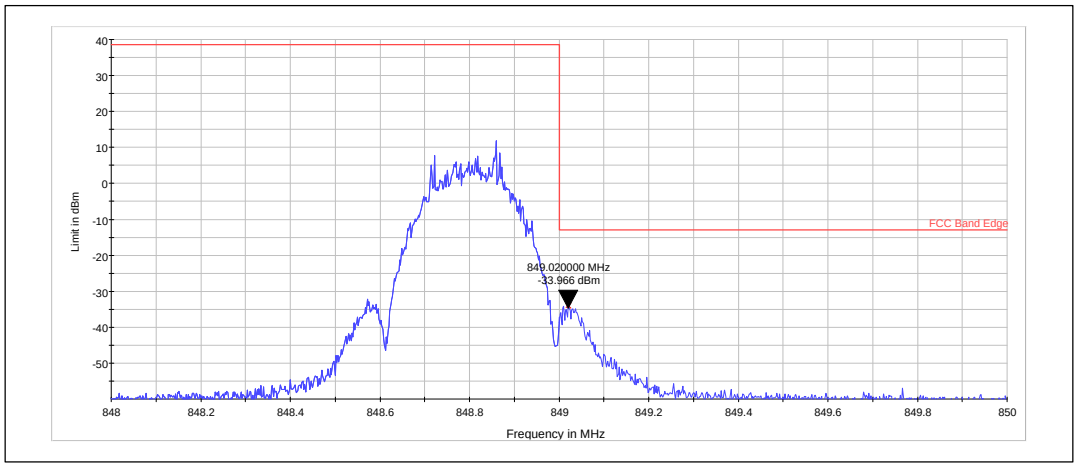
Channel 128 / 824.2 MHz



RMS (RBW: 3 kHz, VBW: 3 kHz, Max hold)

Operation mode (TX on)	Frequency [MHz]	Level [dBm]	Result
EGPRS	823.990	-32.25	PASSED

Channel 251 / 848.8 MHz



RMS (RBW: 3 kHz, VBW: 3 kHz, Max hold)

Operation mode (TX on)	Frequency [MHz]	Level [dBm]	Result
EGPRS	849.020	-33.97	PASSED

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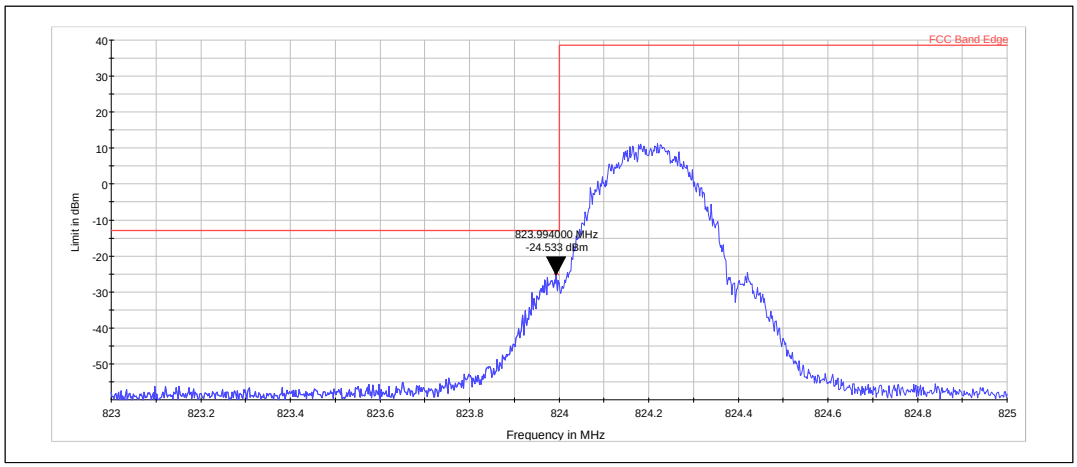
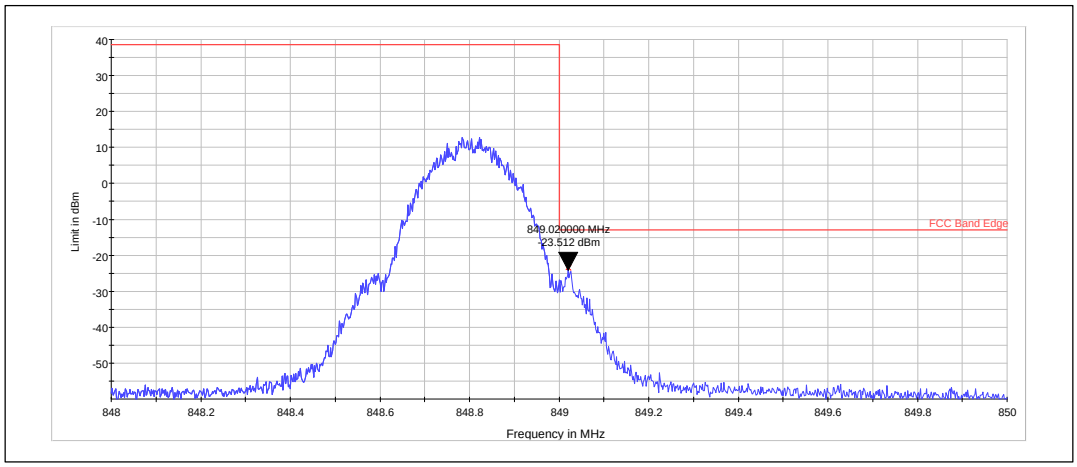
Channel 128 / 824.2 MHz



RMS (RBW: 3 kHz, VBW: 3 kHz, Max hold)

Operation mode (TX on)	Frequency [MHz]	Level [dBm]	Result
GPRS	823.994	-24.53	PASSED

Channel 251 / 848.8 MHz



RMS (RBW: 3 kHz, VBW: 3 kHz, Max hold)

Operation mode (TX on)	Frequency [MHz]	Level [dBm]	Result
GPRS	849.020	-23.51	PASSED

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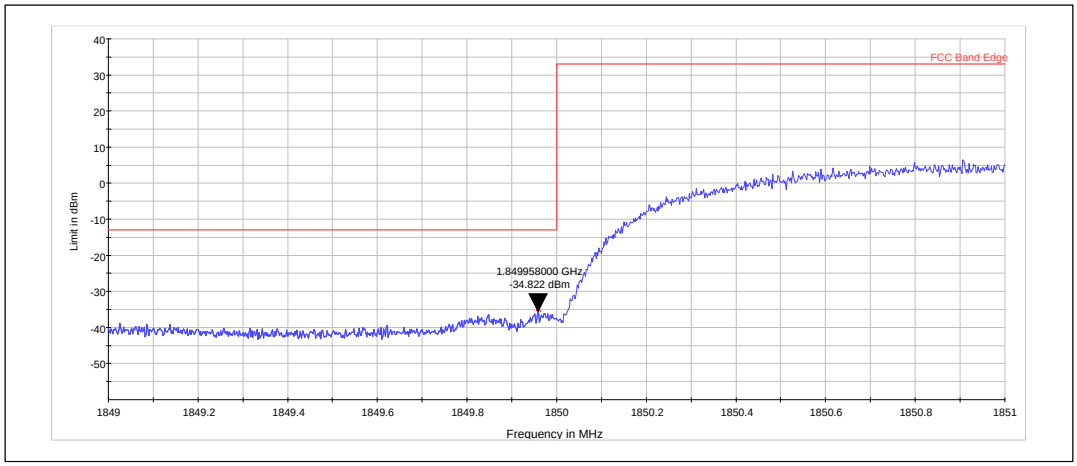
3.6. WCDMA 1900 Test results

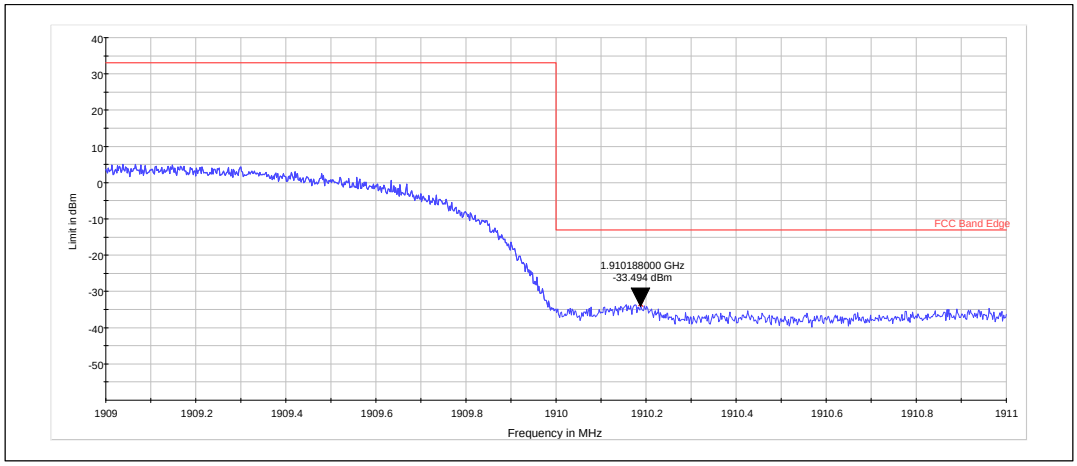
Channel 9262 / 1852.4 MHz



RMS (RBW: 50 kHz, VBW: 50 kHz, Max hold)

Operation mode (TX on)	Frequency [MHz]	Level [dBm]	Result
FDD	1849.958	-34.82	PASSED

Channel 9538 / 1907.6 MHz



RMS (RBW: 50 kHz, VBW: 50 kHz, Max hold)

Operation mode (TX on)	Frequency [MHz]	Level [dBm]	Result
FDD	1910.188	-33.49	PASSED

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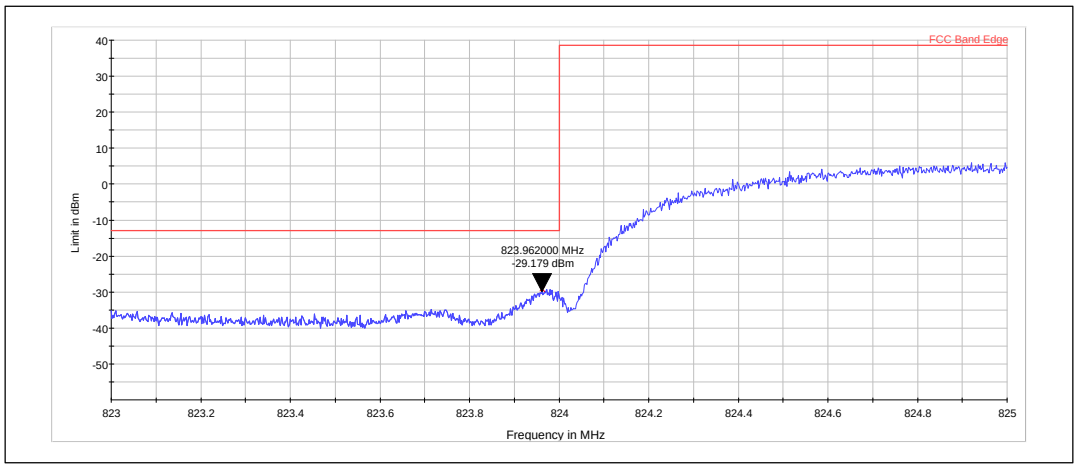
3.7. WCDMA 850 Test results

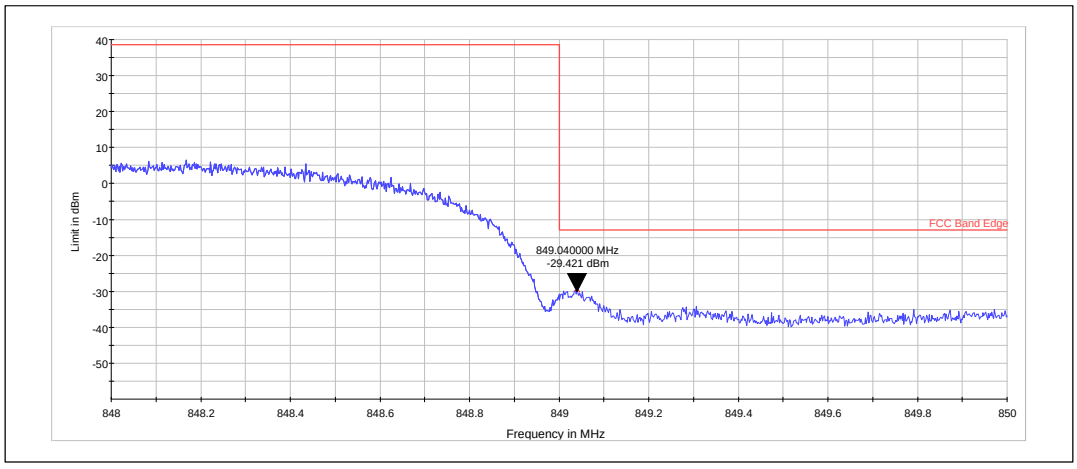
Channel 4132 / 826.4 MHz



RMS (RBW: 50 kHz, VBW: 50 kHz, Max hold)

Operation mode (TX on)	Frequency [MHz]	Level [dBm]	Result
FDD	823.962	-29.18	PASSED

Channel 4233 / 846.6 MHz



RMS (RBW: 50 kHz, VBW: 50 kHz, Max hold)

Operation mode (TX on)	Frequency [MHz]	Level [dBm]	Result
FDD	849.040	-29.42	PASSED

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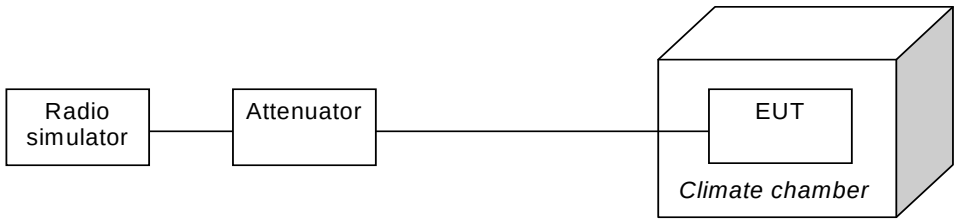
4. Frequency stability, temperature variation

(FCC §2.1055(a), §27.54, RSS-133 6.3, RSS-132 4.3, RSS-199 4.3)

EUT with DUT number	RM-984, DUT 18429
Accessories with DUT numbers	SD-240R, DUT 18430 ; WH-208, DUT 18431
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	Temperature range in this test is +50 – (-)28 Celsius, below this temperature transmitter shut down.
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 50 / 101
Date of measurements	24-Jun-2014
Measured by	Tomi Lipponen

4.1. Test Setup



4.2. Test method and limit

The measurement is made according to applicable FCC rule parts and IC standards 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

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4.3. GSM 1900 Test results

GSM, Channel 661 / 1880.0 MHz

Temperature [°C]	Frequency [MHz]	Deviation [Hz]	Deviation [ppm]	Result
50	1880.00	56.50000	0.0301	PASSED
40	1880.00	50.75000	0.027	PASSED
30	1880.00	50.43000	0.0268	PASSED
20	1880.00	46.56000	0.0248	PASSED
10	1880.00	44.43000	0.0236	PASSED
0	1880.00	45.14000	0.024	PASSED
-10	1880.00	47.14000	0.0251	PASSED
-20	1880.00	56.37000	0.03	PASSED
-28	1880.00	39.97000	0.0213	PASSED

4.4. GSM 850 Test results

GSM, Channel 190 / 836.6 MHz

Temperature [°C]	Frequency [MHz]	Deviation [Hz]	Deviation [ppm]	Result
50	836.60	3.55000	0.0042	PASSED
40	836.60	7.81000	0.0093	PASSED
30	836.60	8.01000	0.0096	PASSED
20	836.60	8.65000	0.0103	PASSED
10	836.60	3.03000	0.0036	PASSED
0	836.60	2.39000	0.0029	PASSED
-10	836.60	3.68000	0.0044	PASSED
-20	836.60	1.61000	0.0019	PASSED
-28	836.60	-7.30000	-0.0087	PASSED

4.5. WCDMA 1900 Test results

FDD, Channel 9400 / 1880.0 MHz

Temperature [°C]	Frequency [MHz]	Deviation [Hz]	Deviation [ppm]	Result
50	1880.00	-2.10571	-0.0011	PASSED
40	1880.00	1.63269	0.0009	PASSED
30	1880.00	7.17163	0.0038	PASSED
20	1880.00	0.77820	0.0004	PASSED
10	1880.00	-0.93079	-0.0005	PASSED
0	1880.00	-1.83106	-0.001	PASSED
-10	1880.00	-1.37329	-0.0007	PASSED
-20	1880.00	-0.59509	-0.0003	PASSED
-28	1880.00	6.51550	0.0035	PASSED

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4.6. WCDMA 850 Test results

FDD, Channel 4175 / 835.0 MHz

Temperature [°C]	Frequency [MHz]	Deviation [Hz]	Deviation [ppm]	Result
50	835.00	-1.99890	-0.0024	PASSED
40	835.00	-3.60107	-0.0043	PASSED
30	835.00	2.97546	0.0036	PASSED
20	835.00	-5.02014	-0.006	PASSED
10	835.00	0.10681	0.0001	PASSED
0	835.00	-0.85449	-0.001	PASSED
-10	835.00	2.04468	0.0024	PASSED
-20	835.00	-7.65991	-0.0092	PASSED
-28	835.00	4.98962	0.006	PASSED

4.7. LTE7 Test results

FDD, CBW 20MHz, QPSK, 100 RB, Channel 21100 / 2535.0 MHz

Temperature [°C]	Frequency [MHz]	Deviation [Hz]	Deviation [ppm]	Result
50	2535.00	-5.30720	-0.0021	PASSED
40	2535.00	2.53201	0.001	PASSED
30	2535.00	-7.25269	-0.0029	PASSED
20	2535.00	-1.02997	-0.0004	PASSED
10	2535.00	1.04427	0.0004	PASSED
0	2535.00	-0.20027	-0.0001	PASSED
-10	2535.00	5.89371	0.0023	PASSED
-20	2535.00	1.37329	0.0005	PASSED
-28	2535.00	1.53065	0.0006	PASSED

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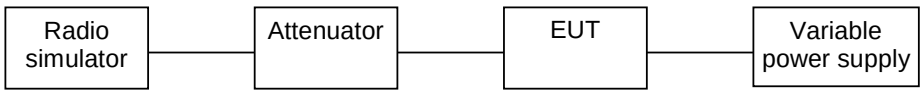
5. Frequency stability, voltage variation

(FCC §2.1055(d), §27.54, RSS-133 6.3, RSS-132 4.3, RSS-199 4.3")

EUT with DUT number	RM-984, DUT 18429
Accessories with DUT numbers	SD-240R, DUT 18430 ; WH-208, DUT 18431
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 50 / 101
Date of measurements	24-Jun-2014
Measured by	Tomi Lipponen

5.1. Test Setup



5.2. Test method and limit

The measurement is made according to applicable FCC rule parts and IC standards 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

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5.3. GSM 1900 Test results

GSM, Channel 661 / 1880.0 MHz

Voltage level [V]	Frequency [MHz]	Deviation [Hz]	Deviation [ppm]	Result
Max / 4.2	1880.00	49.07000	0.0261	PASSED
Battery cut-off point / 3.6	1880.00	54.05000	0.0288	PASSED
Nominal / 3.8	1880.00	52.37000	0.0279	PASSED

5.4. GSM 850 Test results

GSM, Channel 190 / 836.6 MHz

Voltage level [V]	Frequency [MHz]	Deviation [Hz]	Deviation [ppm]	Result
Max / 4.2	836.60	5.62000	0.0067	PASSED
Battery cut-off point / 3.6	836.60	9.30000	0.0111	PASSED
Nominal / 3.8	836.60	8.07000	0.0096	PASSED

5.5. WCDMA 1900 Test results

FDD, Channel 9400 / 1880.0 MHz

Voltage level [V]	Frequency [MHz]	Deviation [Hz]	Deviation [ppm]	Result
Max / 4.2	1880.00	-4.36401	-0.0023	PASSED
Battery cut-off point / 3.6	1880.00	-1.78528	-0.001	PASSED
Nominal / 3.8	1880.00	6.43921	0.0034	PASSED

5.6. WCDMA 850 Test results

FDD, Channel 4175 / 835.0 MHz

Voltage level [V]	Frequency [MHz]	Deviation [Hz]	Deviation [ppm]	Result
Max / 4.2	835.00	-0.45776	-0.0006	PASSED
Battery cut-off point / 3.6	835.00	1.19019	0.0014	PASSED
Nominal / 3.8	835.00	-3.70789	-0.0044	PASSED

5.7. LTE7 Test results

FDD, CBW 20MHz, QPSK, 100 RB, Channel 21100 / 2535.0 MHz

Voltage level [V]	Frequency [MHz]	Deviation [Hz]	Deviation [ppm]	Result
Max / 4.2	2535.00	2.38895	0.0009	PASSED
Battery cut-off point / 3.6	2535.00	-0.34332	-0.0001	PASSED
Nominal / 3.8	2535.00	2.00272	0.0008	PASSED

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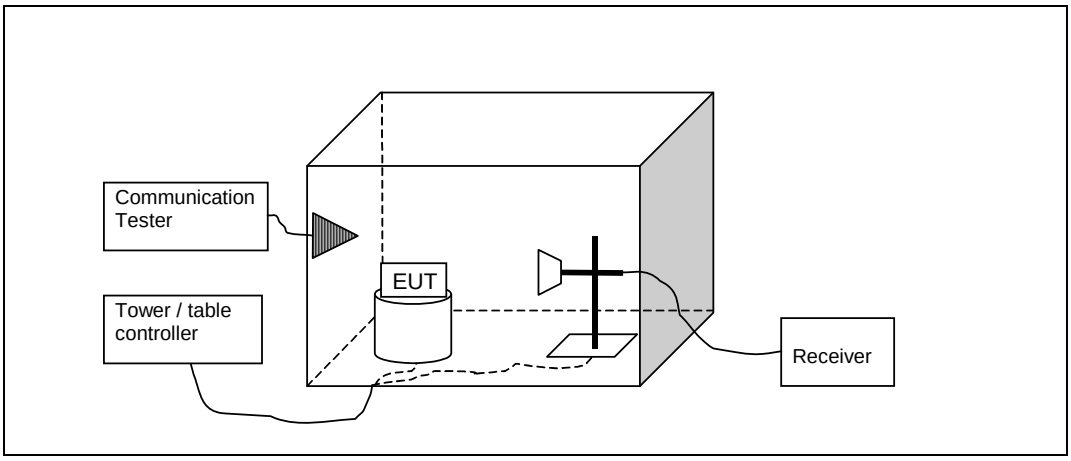
6. Radiated RF output power

(FCC §22.913(a), §27.50(h)(2), §24.232(b), RSS-132 4.4, RSS-133 6.4, RSS-199 4.4)

EUT with DUT number	RM-984, DUT 18426
Accessories with DUT numbers	BV-L4A, DUT 18427
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [ºC] / Humidity [%RH] / Air Pressure [kPa]	21 / 42 / 101
Date of measurements	27-Jun-2014
Measured by	Kalle Hannila / Kari Salminen

6.1.1 Test setup



6.2. 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.The measurement results are obtained as described below:

$P[dBm] = P_{SUBST\ TX} + P_{MEAS} - P_{SUBST\ RX} - L_{SUBST\ CABLES} + G_{SUBST\ TX\ ANT}$

Where $P_{SUBST\ TX}$ is signal generator level. P_{MEAS} is measured power level from the EUT. $P_{SUBST\ RX}$ is measured power level in substitute measurement. $L_{SUBST\ CABLE}$ is the loss of the cable between the signal generator and the substitution antenna and $G_{SUBST\ TX\ ANT}$ is substitution antenna gain.

Limits for radiated RF output power measurements

Frequency range [MHz]	Limit [W]	Limit [dBm]
824 - 849	7 ERP	38.5
1850 - 1910	2 EIRP	33

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6.3. GSM 850 test results

RMS detector

Channel / f_C [MHz]	ERP [dBm]	ERP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Results
128 / 824.2	30.76	1.19	-5.77	36.53	HORIZONTAL	PASSED
190 / 836.6	30.44	1.107	-5.34	35.78	VERTICAL	PASSED
251 / 848.8	28.91	0.778	-5.9	34.81	VERTICAL	PASSED

6.4. GSM 850 E-GPRS (MSC9) test results

RMS detector

Channel / f_C [MHz]	ERP [dBm]	ERP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Results
128 / 824.2	27.33	0.541	-9.2	36.53	HORIZONTAL	PASSED
190 / 836.6	27.46	0.557	-8.32	35.78	HORIZONTAL	PASSED
251 / 848.8	25.73	0.374	-8.75	34.48	HORIZONTAL	PASSED

6.5. GSM 1900 test results

RMS detector

Channel / f_C [MHz]	EIRP [dBm]	EIRP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Results
512 / 1850.2	25.17	0.329	-19.29	44.46	HORIZONTAL	PASSED
661 / 1880	25.82	0.382	-19.19	45.01	HORIZONTAL	PASSED
810 / 1909.8	24.47	0.28	-20.96	45.43	HORIZONTAL	PASSED

6.6. GSM 1900 E-GPRS (MSC9) test results

RMS detector

Channel / f_C [MHz]	EIRP [dBm]	EIRP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Results
512 / 1850.2	25.7	0.372	-18.76	44.46	HORIZONTAL	PASSED
661 / 1880	26.3	0.426	-18.71	45.01	HORIZONTAL	PASSED
810 / 1909.8	25.05	0.32	-20.38	45.43	HORIZONTAL	PASSED

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6.7. WCDMA 1900 test results

RMS detector

Channel / f_C [MHz]	EIRP [dBm]	EIRP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Results
9262 / 1852.4	23.83	0.242	-20.73	44.56	HORIZONTAL	PASSED
9400 / 1880	24.36	0.273	-20.65	45.01	HORIZONTAL	PASSED
9538 / 1907.6	22.99	0.199	-22.48	45.47	HORIZONTAL	PASSED

6.8. WCDMA 850 test results

RMS detector

Channel / f_C [MHz]	ERP [dBm]	ERP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Results
4132 / 826.4	21.14	0.13	-15.18	36.32	HORIZONTAL	PASSED
4175 / 835	21.29	0.135	-14.58	35.87	VERTICAL	PASSED
4233 / 846.6	20.14	0.103	-14.83	34.97	VERTICAL	PASSED

6.9. LTE7 test results

FDD, CBW 5MHz, QPSK, 1RB mid, RMS detector

Channel / f_C [MHz]	EIRP [dBm]	EIRP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Results
20775 / 2502.5	25.48	0.353	-23.76	49.24	HORIZONTAL	PASSED
21100 / 2535	24.64	0.291	-24.65	49.29	HORIZONTAL	PASSED
21425 / 2567.5	24.71	0.296	-24.22	48.93	HORIZONTAL	PASSED

FDD, CBW 5MHz, 16QAM, 1RB mid, RMS detector

Channel / f_C [MHz]	EIRP [dBm]	EIRP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Results
20775 / 2502.5	25.63	0.365	-23.61	49.24	HORIZONTAL	PASSED
21100 / 2535	24.52	0.283	-24.77	49.29	HORIZONTAL	PASSED
21425 / 2567.5	24.56	0.286	-24.37	48.93	HORIZONTAL	PASSED

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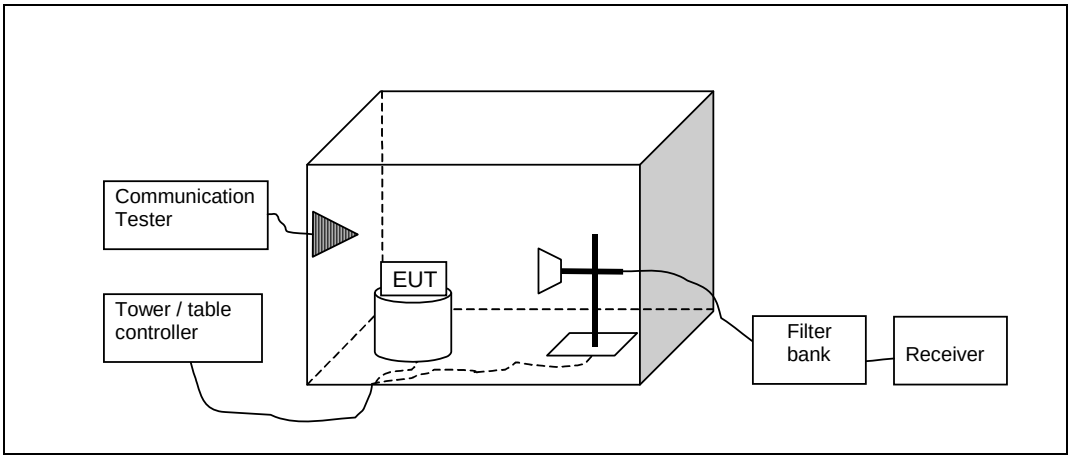
7. Spurious radiated emissions

(FCC §27.53(l), §24.238(a), §2.1053, §22.917(a), §2.1053, §2.1053, RSS-199 4.5(b), RSS-132 4.5, RSS-133 6.5)

EUT with DUT number	RM-984, DUT 18426
Accessories with DUT numbers	BV-L4A, DUT 18427 ; WH-208, DUT 18428 ; AC-60E, DUT 18217 ; CA-190CD, DUT 18219
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 42 / 101
Date of measurements	26-Jun-2014
Measured by	Kalle Hannila / Kari Salminen

7.1.1 Test setup



7.2. 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.

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The substitution method is used.

The measurement results are obtained as described below:

$P\ [dBm] = P_{SUBST\ TX} + G_{SUBST\ TX\ ANT} - L_{SUBST\ CABLE}$

Where $P_{SUBST\ TX}$ is signal generator level, which produces the same receiver reading P_{MEAS} in dBm as EUT. $G_{SUBST\ TX\ ANT}$ is substitution antenna gain and $L_{SUBST\ CABLE}$ is the loss of the cable between the signal generator and the substitution antenna.

Limits for spurious radiated emissions measurements

Operation band	Frequency range [MHz]	Limit [dBm]
LTE7	30 - 25700	-13
GSM 850	30 - 8500	-13
GSM 1900	30 - 19100	-13
WCDMA 1900	30 - 19100	-13
WCDMA 850	30 - 8500	-13

7.3. GSM 1900 E-GPRS (MSC9) test results

Peak detector

Frequency [MHz]	P [dBm]	P [µW]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Results
3767.074	-56.45	0.00226	-63.05	6.6	HORIZONTAL	PASSED
5646.874	-51.52	0.00705	-61.92	10.4	HORIZONTAL	PASSED

7.4. GSM 850 E-GPRS (MSC9) test results

Peak detector

Frequency [MHz]	P [dBm]	P [µW]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Results
1673.14	-47.69	0.01702	-53.09	5.4	HORIZONTAL	PASSED
2509.9	-46.62	0.02178	-58.52	11.9	HORIZONTAL	PASSED

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7.5. GSM 850 test results

Peak detector

Frequency [MHz]	P [dBm]	P [µW]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Results
1645.531	-57.41	0.00182	-63.41	6	VERTICAL	PASSED
1673.146	-48.75	0.01334	-55.15	6.4	VERTICAL	PASSED
1673.267	-46.52	0.02228	-52.92	6.4	VERTICAL	PASSED
1692.265	-56.96	0.00201	-63.26	6.3	VERTICAL	PASSED
2509.9	-43.53	0.04436	-55.43	11.9	HORIZONTAL	PASSED
2537.194	-52.27	0.00593	-64.37	12.1	HORIZONTAL	PASSED

7.6. GSM 1900 test results

Peak detector

Frequency [MHz]	P [dBm]	P [µW]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Results
9195.792	-45.04	0.03133	-65.84	20.8	HORIZONTAL	PASSED
9335.792	-43.87	0.04102	-66.27	22.4	VERTICAL	PASSED
9541.723	-43.27	0.0471	-65.27	22	HORIZONTAL	PASSED
9903.768	-43.08	0.0492	-65.88	22.8	VERTICAL	PASSED
9929.659	-43.35	0.04624	-65.65	22.3	VERTICAL	PASSED
9986.51	-44.08	0.03908	-65.88	21.8	VERTICAL	PASSED

7.7. WCDMA 1900 test results

Channel 9400 / 1880.0 MHz

FDD mode, Peak detector

Frequency [MHz]	P [dBm]	P [µW]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Results
1910.481	-49.95	0.01012	-59.35	9.4	HORIZONTAL	PASSED
3766.273	-56.49	0.00224	-63.19	6.7	VERTICAL	PASSED
5647.675	-50.08	0.00982	-60.58	10.5	VERTICAL	PASSED
7525.19	-47.09	0.01954	-63.19	16.1	VERTICAL	PASSED
9390.601	-44.08	0.03908	-65.28	21.2	VERTICAL	PASSED
9673.166	-43.43	0.04539	-65.63	22.2	VERTICAL	PASSED
9813.006	-43.49	0.04477	-65.09	21.6	HORIZONTAL	PASSED
9861.102	-43.27	0.0471	-65.27	22	HORIZONTAL	PASSED
9931.844	-42.77	0.05284	-65.07	22.3	VERTICAL	PASSED
9970.882	-43.62	0.04345	-65.32	21.7	HORIZONTAL	PASSED
11277.976	-41.2	0.07586	-64.7	23.5	VERTICAL	PASSED
13158.136	-51.21	0.00757	-68.01	16.8	HORIZONTAL	PASSED
15047.074	-49.49	0.01125	-71.59	22.1	VERTICAL	PASSED
16918.337	-47.59	0.01742	-72.99	25.4	VERTICAL	PASSED

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7.8. WCDMA 850 test results

Channel 4175 / 835.0 MHz

FDD mode, Peak detector

Frequency [MHz]	P [dBm]	P [µW]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Results
848.378	-45.71	0.02685	-80.61	34.9	VERTICAL	PASSED
848.502	-45.07	0.03112	-79.87	34.8	VERTICAL	PASSED
953.963	-40.85	0.08222	-79.75	38.9	VERTICAL	PASSED
960.251	-39.58	0.11015	-79.88	40.3	HORIZONTAL	PASSED
961.979	-40.05	0.09886	-80.05	40	HORIZONTAL	PASSED
964.053	-40.31	0.09311	-80.11	39.8	HORIZONTAL	PASSED
1668.497	-39.7	0.10715	-45.2	5.5	HORIZONTAL	PASSED
2501.132	-48.63	0.01371	-60.43	11.8	HORIZONTAL	PASSED
3344.549	-57.73	0.00169	-61.43	3.7	HORIZONTAL	PASSED
4180.431	-56.85	0.00207	-62.15	5.3	HORIZONTAL	PASSED
5002.886	-52.9	0.00513	-61.8	8.9	HORIZONTAL	PASSED
5843.176	-52.49	0.00564	-61.39	8.9	HORIZONTAL	PASSED
6683.467	-49.64	0.01086	-60.14	10.5	VERTICAL	PASSED
7506.804	-48.96	0.01271	-63.36	14.4	VERTICAL	PASSED
8341.723	-48.92	0.01282	-64.72	15.8	VERTICAL	PASSED

7.9. LTE2500 (Band 7) test results

Channel 21100 / 2535.0 MHz

FDD, CBW 5MHz, QPSK, 1 RB, RMS detector

Frequency [MHz]	P [dBm]	P [µW]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Results
5079.88	-62.63	0.00055	-73.03	10.4	VERTICAL	PASSED
7596.202	-58.39	0.00145	-74.29	15.9	HORIZONTAL	PASSED
10141.102	-53.87	0.0041	-76.07	22.2	VERTICAL	PASSED

Channel 21100 / 2535.0 MHz

FDD, CBW 5MHz, 16QAM, 1 RB, RMS detector

Frequency [MHz]	P [dBm]	P [µW]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Results
5070.461	-55.62	0.00274	-65.82	10.2	VERTICAL	PASSED
7604.299	-58.48	0.00142	-74.28	15.8	VERTICAL	PASSED
10137.695	-53.79	0.00418	-76.09	22.3	VERTICAL	PASSED

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8. Test Equipment

8.1. Conducted measurements

Eq. No	Equipment	Type	Manufacturer	Used in
6039	USB Interface	5541765	Testo	22/24/27, 15C, 15B
6044	V-network	ESH3-Z6	R&S	-
2059	V-network	ESH3-Z6	R&S	-
1759	LISN 50 µH	ESH3-Z5	R&S	22/24/27, 15C, 15B
2097	Pulse Limiter	ESH3-Z2	R&S	22/24/27, 15C, 15B
1999	Receiver	ESIB26	R&S	22/24/27, 15C, 15B
2180	Communication Tester	CMU200	R&S	22/24/27, 15C, 15B
2390	Directional Coupler	DC2600	AR	-
-	RF immunity / Emission Software	EMC32	R&S	22/24/27, 15C, 15B
2060	LISN 50 µH	ESH3-Z5	R&S	15C, 15B
1759	LISN 50 µH	ESH3-Z5	R&S	15C, 15B
2039	Power Supply	PL330QMD	Thurlby	15C, 15B
6036	Data Logger	175-H2	Testo	22/24/27, 15C, 15B
2359	Temperature Test Chamber	VT4002	Vötsch	22/24/27
2352	Spectrum Analyzer	FSP-30	R&S	22/24/27, 15C
6109	Communication Tester	CMU200	R&S	22/24/27, 15C
6246	Power Supply	66332A	HP	22/24/27, 15C
1992	Signal Generator	83630B	Agilent	15C, 15B
6098	Signal Generator	8648C	Agilent	-
6046	Attenuator 10dB	8493C	Agilent	22/24/27, 15C
6047	Attenuator 20dB	8493C	Agilent	22/24/27, 15C
6045	Power splitter	11667B	Agilent	22/24/27, 15C
6247	Communication Tester	CBT	R&S	22/24/27, 15C 15B
6052	Communication Tester	CMU200	R&S	22/24/27, 15C 15B
6248	Power Supply	6632B	-	22/24/27, 15C 15B
6106	Spectrum Analyzer	FSP-30	R&S	22/24/27, 15C 15B
6113	Signal Generator	SMF100A	R&S	22/24/27, 15C 15B
6202	Temperature Test Chamber	VT4002	Vötsch	22/24/27, 15C 15B
6122	Power Splitter	11667B	Agilent	22/24/27, 15C 15B
6134	Attenuator 10dB	BW-S10-2W263+	Mini-Circuits	22/24/27, 15C
6136	Attenuator 20dB	BW-S20-2W263+	Mini-Circuits	22/24/27, 15C
6103	Bluetooth tester	CBT	R&S	22/24/27, 15C 15B
6250	Power Supply	6651A	Agilent	22/24/27, 15C 15B
6108	Communication Tester	CMU200	R&S	22/24/27, 15C 15B
6105	Spectrum Analyzer	FSV-30	R&S	22/24/27, 15C 15B
6251	Temperature Test Chamber	VT4002	Vötsch	22/24/27, 15C 15B
6243	Power Splitter	1167B	Agilent	22/24/27, 15C 15B
6245	Attenuator 10dB	BW-S10-2W263+	Mini-Circuits	22/24/27, 15C 15B
6244	Attenuator 20dB	BW-S20-2W263+	Mini-Circuits	22/24/27, 15C 15B

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8.2. Radiated measurements

Eq. No	Equipment	Type	Manufacturer	Used in
2388	Bluetooth Tester	CBT	R&S	15B
10479	Communication Tester	CMW500	R&S	22/24/27, 15C, 15B
2347	Communication Tester	CMU200	R&S	22/24/27, 15C, 15B
2009	Signal Generator	SMP 22	R&S	22/24/27, 15C, 15B
2348	Controller	G-1000DXC	Yaesu	22/24/27, 15C, 15B
2349	Computer Controller	g-1000DXC	Yaesu	22/24/27, 15C, 15B
2116	Controller	EMCO 2090	ETS	22/24/27, 15C, 15B
2109	Power Supply	PL330QMD	Thurlby	22/24/27, 15C, 15B
2353	Receiver	ESIB26	R&S	22/24/27, 15C, 15B
6115	Open switch and control unit	OSP 130	R&S	22/24/27, 15C 15B
6116	Open switch and control unit	OSP 150	R&S	22/24/27, 15C 15B
6117	Open switch and control unit	OSP 150	R&S	22/24/27, 15C 15B
6131	Notch Filter	WRCT902.4-0.4/40-8SS	Wainwright	22/24/27, 15C 15B
6130	Notch Filter	WRCD1880-1.1.25/50-10SS	Wainwright	22/24/27
6159	Band Reject Filter	WRCD1747.8-0.4/40-5SS	Wainwright	22/24/27,15C, 15B
6158	Band Reject Filter	WRCT836.6-0.4/40-8SS	Wainwright	22/24/27,15C, 15B
6197	Band Reject Filter	WRCJV2531/2539-2523/2547-60/12SS	Wainwright	22/24/27,15C, 15B
2231	Band Reject Filter	WRCG1947/1953-1940/1960-40/6SS	Wainwright	22/24/27,15C, 15B
2391	Band Reject Filter	WRCG1729.4/1735.4-1722.4/1742.4-40/6SS	Wainwright	27
2386	Band Reject Filter	WRCG1764.4/1770.4-1760.4/1774.4-40/6SS	Wainwright	22/24/27, 15C, 15B
2385	Band Reject Filter	WRCG1744.4/1750.4-1740.4/1754.4-40/6SS	Wainwright	22/24/27, 15C, 15B
2357	Band Reject Filter	WRCG2400/2483-2390/2493-35/10SS	Wainwright	15C
2188	Preamplifier	AFS4-00100300-20-23P-6	Miteq	22/24/27, 15C, 15B
6195	High Pass Filter	-	Wainwright	22/24/27, 15C, 15B
2364	Band Reject Filter	WRCG1877/1883 - 1870/1890-40/6SS	Wainwright	24
2361	Anechoic Chamber	3 m Semi / Full Anechoic Chamber	Euroshield	22/24/27, 15C, 15B
6212	Antenna Array system	-	TCC	22/24/27, 15C, 15B
-	RF immunity / Emission Software	EMC32	R&S	22/24/27, 15C, 15B
6089	Antenna	HFH2-Z2	R&S	15C, 15B
2027	CDN	M2 (modified) DC1	MEB	22/24/27, 15C, 15B
2028	CDN	M3 (modified) DC2	MEB	22/24/27, 15C, 15B
2176	CDN	CDN 801-M3	Lüthi	22/24/27, 15C, 15B
2135	CDN	CDN 801-M3	Lüthi	22/24/27, 15C, 15B
2029	Power Supply	PL330	Thurlby	22/24/27, 15C
6038	Data Logger	Testo 580	Testo	22/24/27, 15C, 15B
6037	Data Logger	175-H2	Testo	22/24/27, 15C, 15B
6039	USB Interface	5541765	Testo	22/24/27, 15C, 15B

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