



FCC TEST REPORT FCC 47 CFR Part 22H Industry Canada RSS-132, Issue 2 Cellular Telephones Operating in the Bands 824-849MHz and 869-894MHz FCC 47 CFR Part 24E ISED RSS-133, Issue 5 2GHz Personal Communication Services	
Report Reference No.	G0M-1702-6295-TFC224GS-MU-V01
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	<div style="display: flex; justify-content: center; align-items: center;">   </div> <p style="text-align: center; margin-top: 5px;"> FCC Test Firm Designation Number: DE0008 IC Testing Laboratory site: 3470A-2 </p>
Applicant's name	eResearchTechnology GmbH
Address	Sieboldstrasse 3 97230 Estenfeld GERMANY
Test specification:	
Standard.....	47 CFR Part 22H, 47 CFR Part 24E RSS-132, Issue 3: 2013-01, RSS-133, Issue 6: 2013-01
Test scope.....	partial Radio compliance test
Equipment under test (EUT):	
Product description	Spirometer
Model No.	SpiroSphere - Main Unit
Additional Model(s)	None
Brand Name(s)	SpiroSphere
Hardware version	04.04.03
Firmware / Software version	Jet_Lib + Test_APP 0.14.0 ERT App: sd_SpiroSpherePackage-v1.1.19tgz
	FCC-ID: 2AAUFSPS001 IC: 11335A-SPS001
Test result	Passed

Possible test case verdicts:

- neither assessed nor tested : N/N
- required by standard but not appl. to test object : N/A
- required by standard but not tested : N/T
- not required by standard for the test object : N/R
- test object does meet the requirement : P (Pass)
- test object does not meet the requirement : F (Fail)

Testing:


Test Lab Temperature : 20 – 23 °C


Test Lab Humidity : 32 – 38 %

Date of receipt of test item : 2017-03-23

Date (s) of performance of tests : 2017-03-28 - 2017-04-03

Compiled by : Christian Weber

Tested by (+ signature) : Burkhard Pudell 
 (Responsible for Test)

Approved by (+ signature) : Christian Weber 
 (Head of Lab)

Date of issue : 2017-05-12

Total number of pages : 39

General remarks:

The test results presented in this report relate only to the object tested.
The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.

This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

Additional comments:

Test case reduction on radiated measurements only is based on the requirements for host integration for full modular approved transmitter modules (KDB 996369 D02) used by the EUT. The EUT uses a module with full modular approval according to FCC and IC rules. For details about the radio module see EUT description in section 1.

Version History

Version	Issue Date	Remarks	Revised by
01	2017-05-12	Initial Release	

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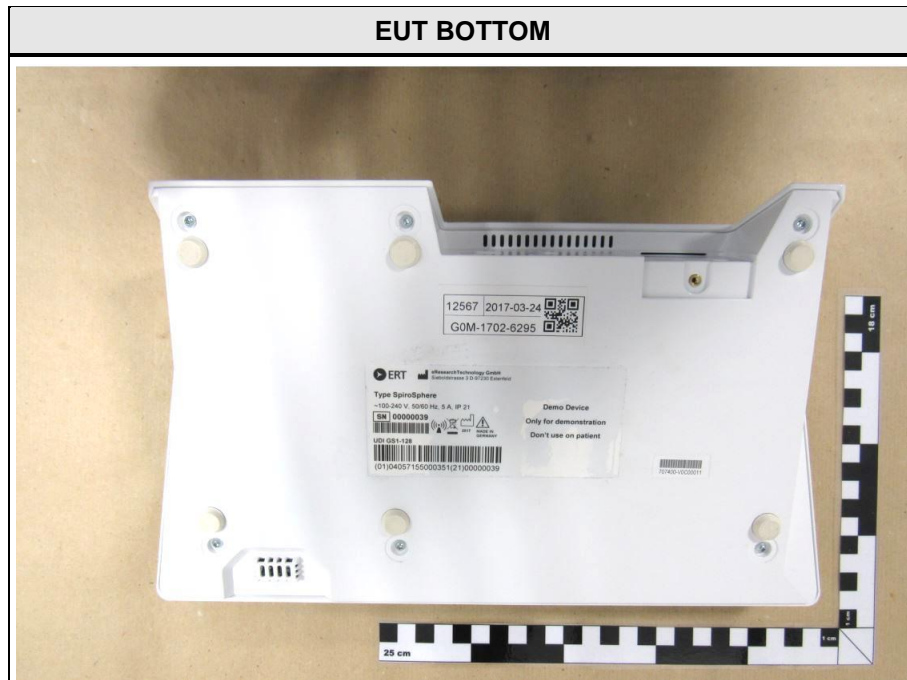
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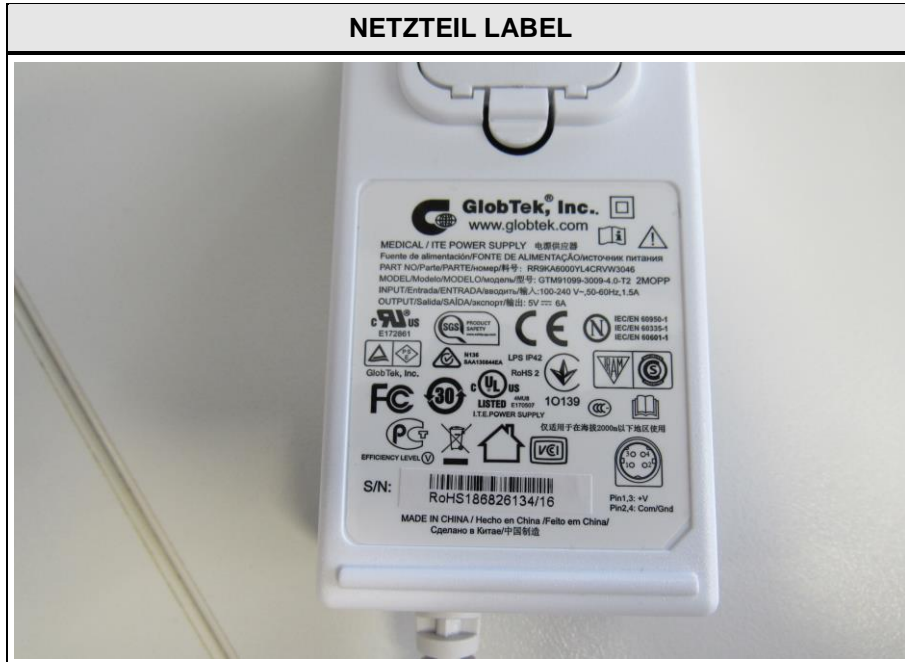
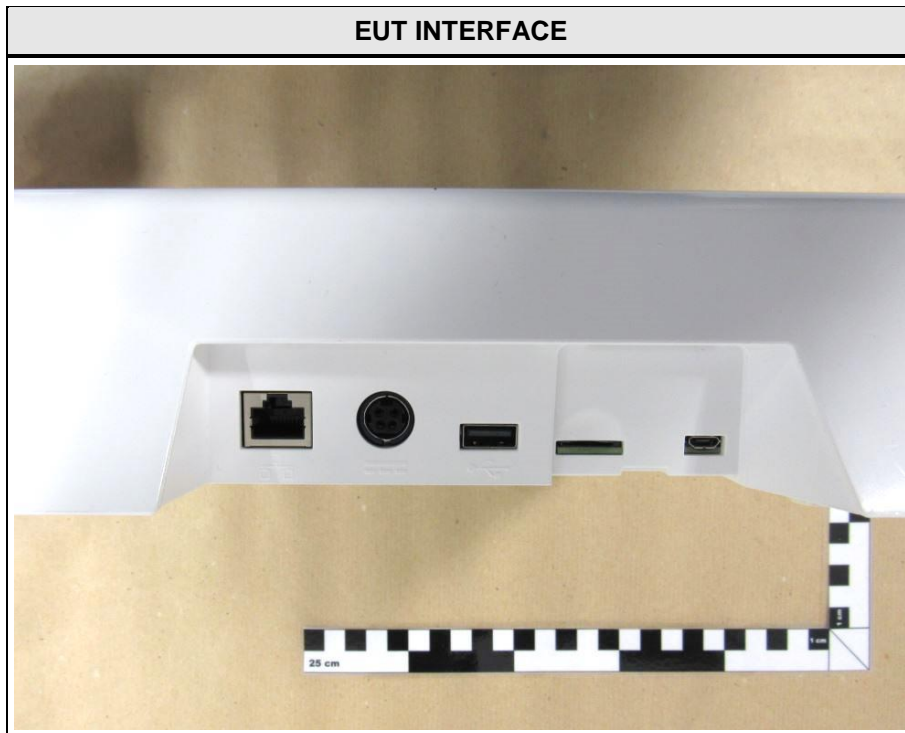
1 Equipment (Test item) Description

Description	Spirometer		
Model	SpiroSphere - Main Unit		
Additional Model(s)	None		
Brand Name(s)	SpiroSphere		
Serial number	None		
Hardware version	04.04.03		
Software / Firmware version	Jet_Lib + Test_APP 0.14.0 ERT App: sd_SpiroSphere Main UnitPackage-v1.1.19tgz		
PMN	SpiroSphere		
HVIN	SpiroSphere		
FVIN	N/A		
HMN	N/A		
FCC-ID	2AAUFSPS001		
IC	11335A-SPS001		
Equipment type	End product		
Equipment classification	Mobile Device (Human Body distance > 20 cm)		
Radio type	Transceiver		
Radio technology	GSM850 / PCS1900		
Operating frequency range	GSM850 : TX = 824 - 849 MHz, RX = 869 - 894 MHz GSM1900 : TX = 1850 - 1910 MHz, RX = 1930 - 1990 MHz		
Assigned frequency band	Cell. Service Block A & B : 824 - 849 MHz & 869 - 894 MHz Broadband PCS : 1850 - 1910 MHz & 1930 - 1990 MHz		
Main test frequencies GSM850	F _{LOW}	CH : 128 UL: 824.2 MHz	CH : 128 DL: 869.2 MHz
	F _{MID}	CH : 188 UL: 836.2 MHz	CH : 188 DL: 881.2 MHz
	F _{HIGH}	CH : 251 UL: 848.8 MHz	CH : 251 DL: 893.8 MHz
Main test frequencies GSM1900	F _{LOW}	CH : 512 UL: 1850.2 MHz	CH : 512 DL: 1930.2 MHz
	F _{MID}	CH : 661 UL: 1880.0 MHz	CH : 661 DL: 1960.0 MHz
	F _{HIGH}	CH : 810 UL: 1909.8 MHz	CH : 810 DL: 1989.8 MHz
Supported transmission modes	GPRS; EDGE		
Modulations	GPRS : GMSK; EDGE : BPSK		
Multislot class	10		
Number of antennas	1		

Radio module	Type	2G/3G radio module
	Model	HL8548
	Manufacturer	Sierra Wireless
	HW Version	none
	SW Version	5.5.14.0 or higher
	FCC-ID	N7NHL8548
	IC	2417C-HL8548
Antenna	Type	integrated
	Model	FXP14.07.0 100A
	Manufacturer	taoglas
	Gain	3 to 1.5 dBi (Declaration)
Manufacturer	eResearchTechnology GmbH Sieboldstrasse 3 97230 Estenfeld GERMANY	
Power supply	V _{NOM}	N/A
	V _{MIN}	N/A
	V _{MIN}	N/A
AC/DC-Adaptor	Model	GTM91099-3099-4.0-T2
	Vendor	GlobTec Inc.
	Input	110-240 V AC 50-60 Hz
	Output	5.0 V DC 6A

1.1 Photos – Equipment External





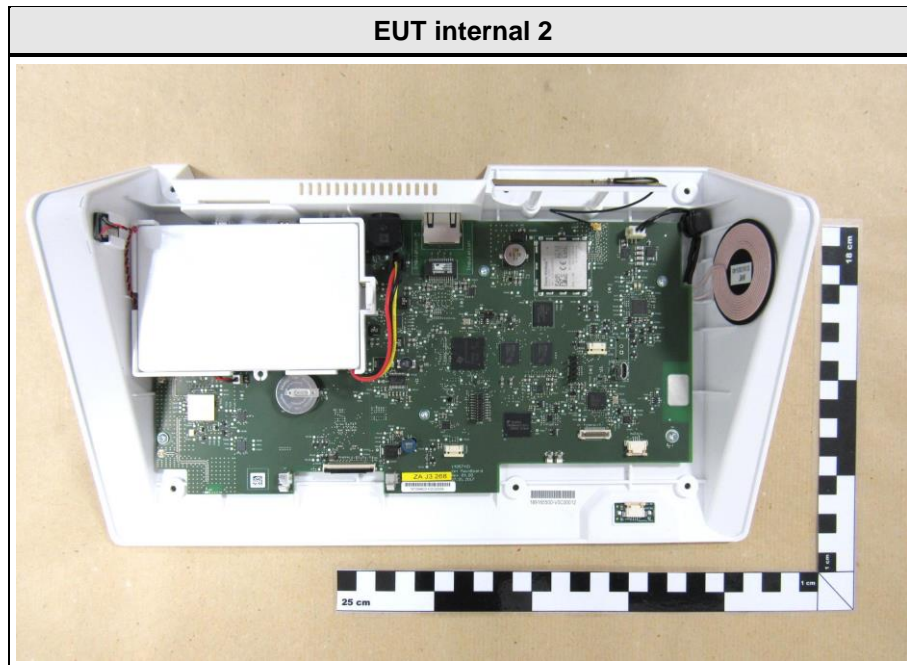
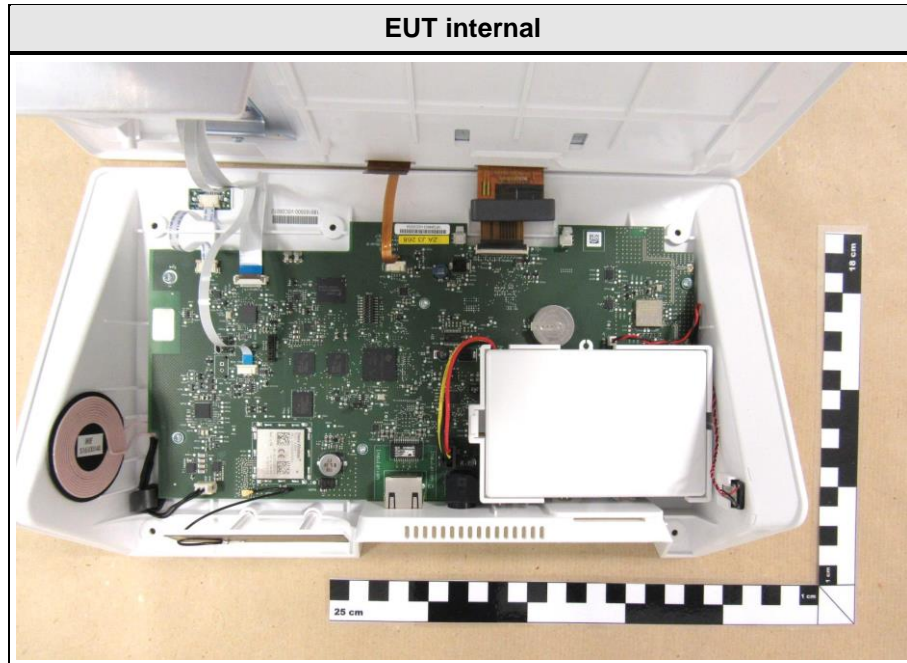
AC-DC ADAPTER BACK

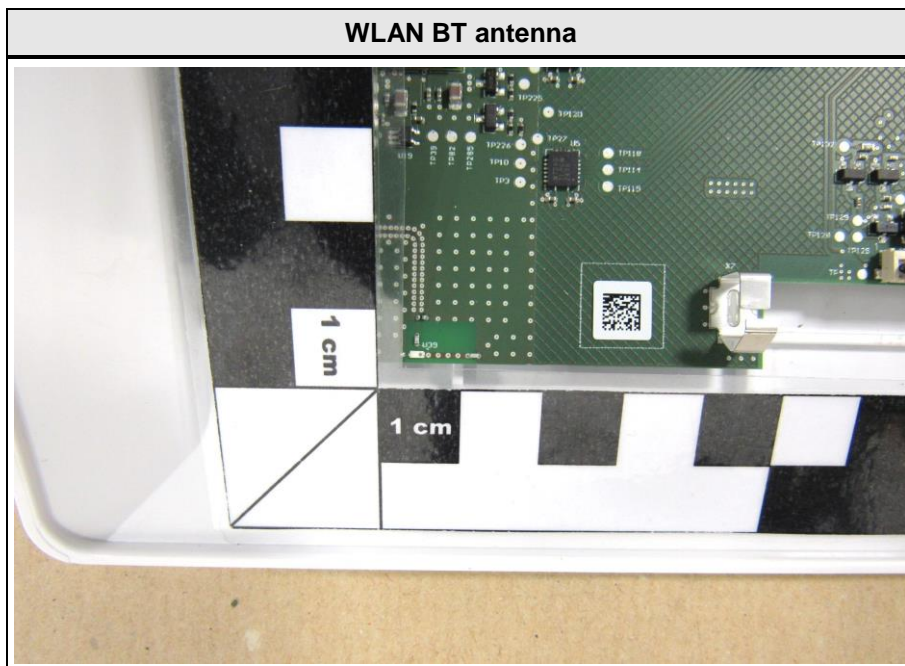
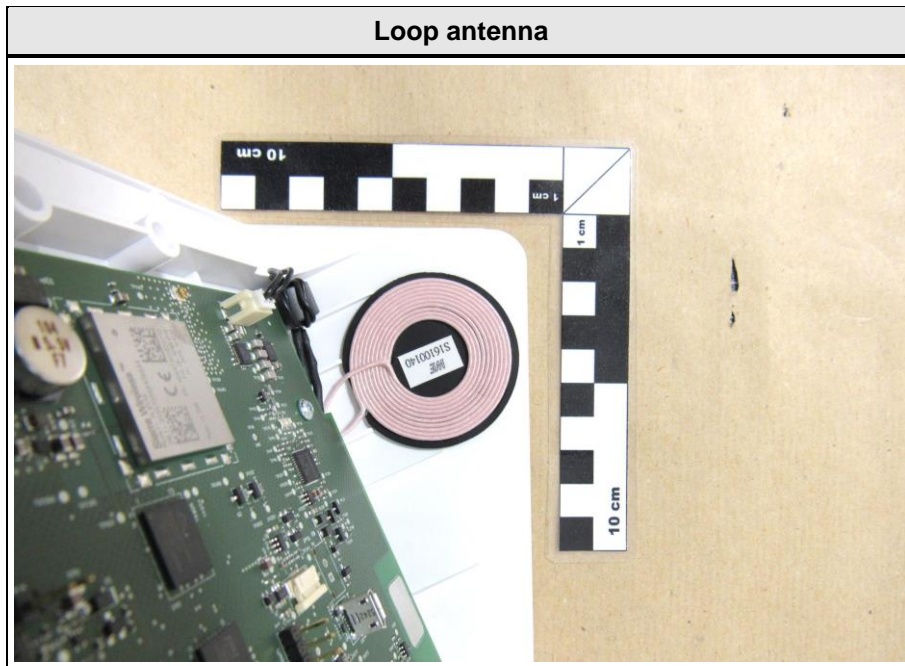


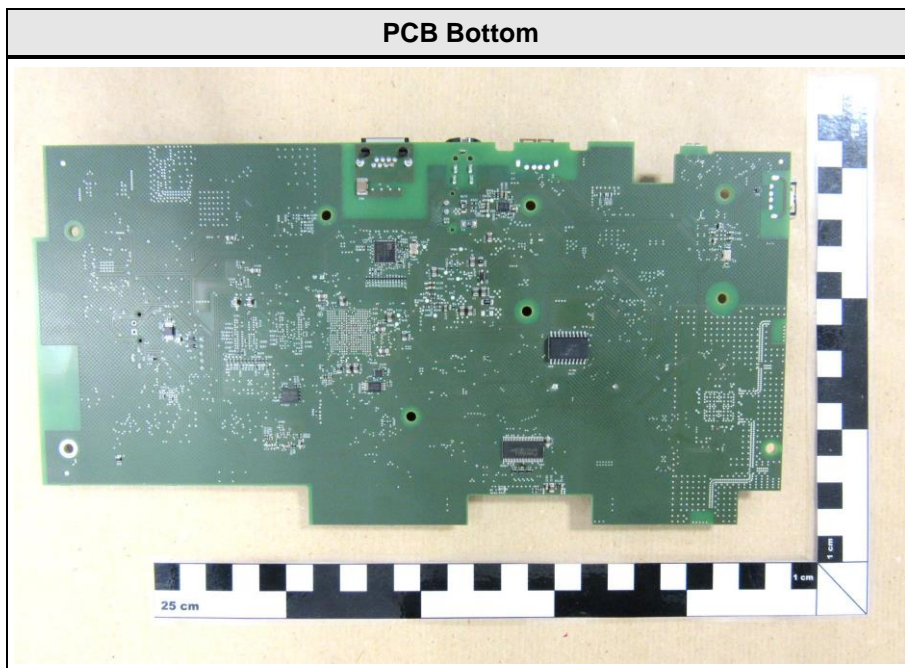
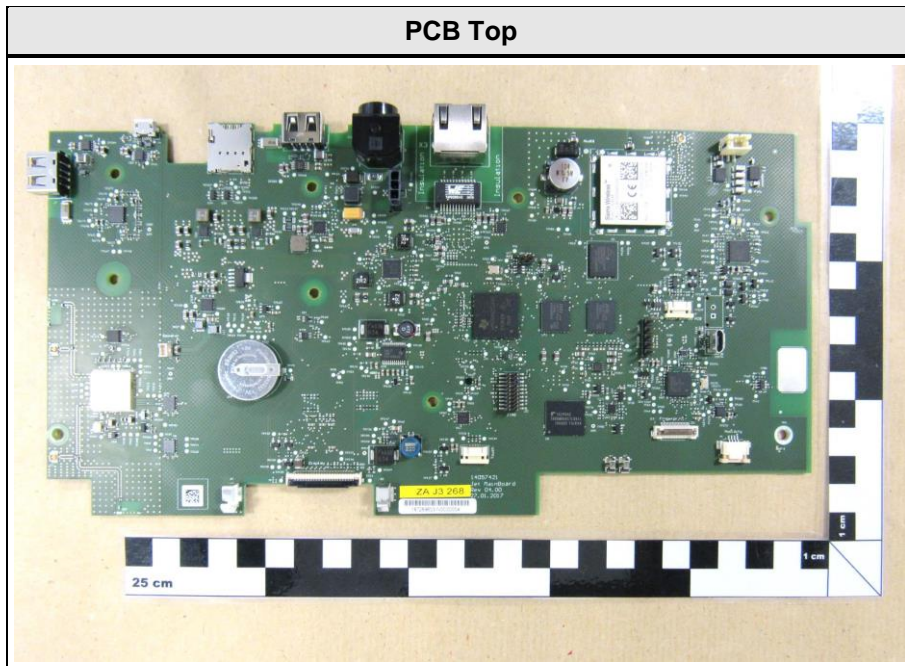
AC-DC ADAPTER SIDE



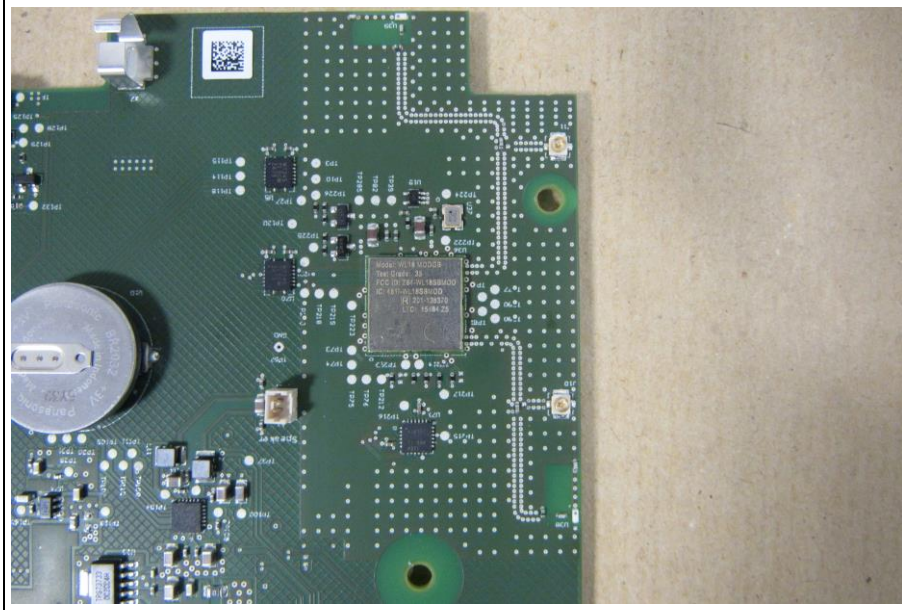
1.2 Photos – Equipment internal



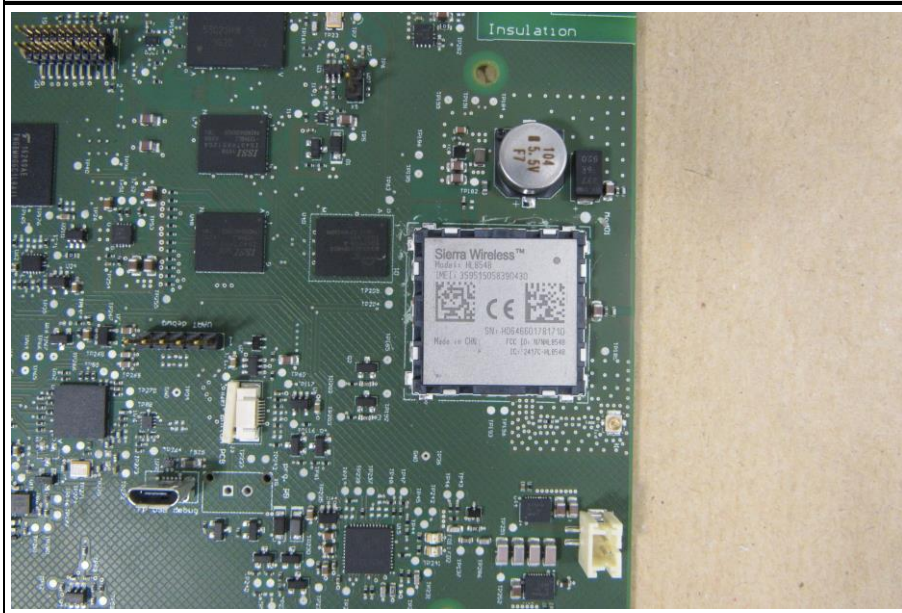




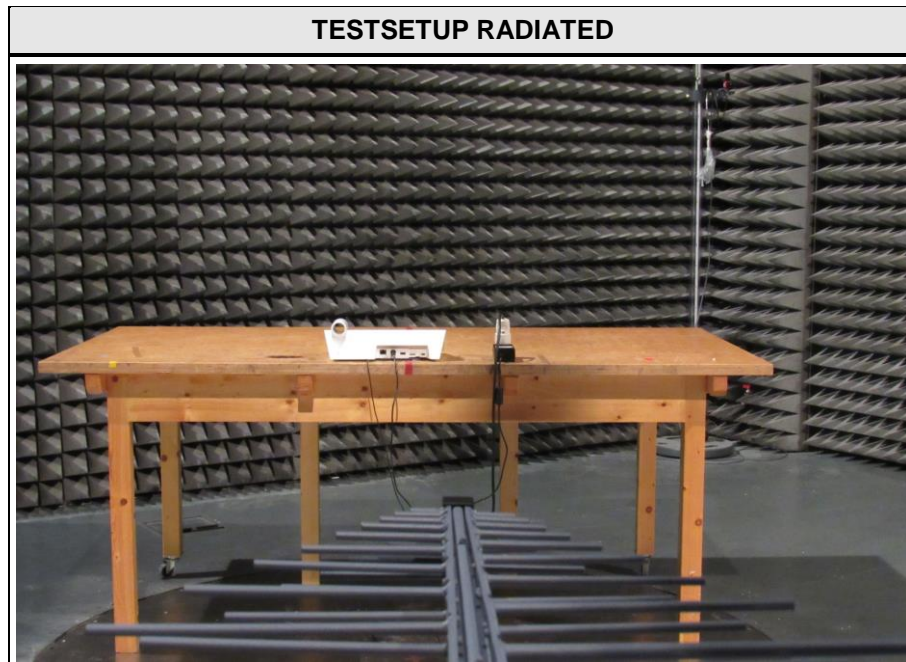
BT module



GSM module



1.3 Photos – Test setup



1.4 Supporting Equipment Used During Testing

Product Type*	Device	Manufacturer	Model No.	Comments
SIM	Network	R&S	CMW500	GSM -Tester
<p>*Note: Use the following abbreviations:</p> <p>AE : Auxiliary/Associated Equipment, or</p> <p>SIM : Simulator (Not Subjected to Test)</p> <p>CABL : Connecting cables</p>				

1.5 Test Modes

Mode #	Description	
GPRS	General conditions:	EUT powered by power supply. Active call to communication tester.
	Radio conditions:	Mode = transmit Connection = packet switched Modulation = GMSK Slot configuration = 1 up / 1 down Power level = Maximum
EDGE	General conditions:	EUT powered by power supply. Active call to communication tester.
	Radio conditions:	Mode = transmit Connection = packet switched Modulation = BPSK Slot configuration = 1 up / 1 down Power level = Maximum
IDLE	General conditions:	EUT powered by power supply. No Active call to communication tester.
	Radio conditions:	Mode = receive Connection = no (registered state) Modulation = GMSK Slot configuration = 1 up / 1 down

1.6 Test Equipment Used During Testing

Measurement Software			
Description	Manufacturer	Name	Version
EMC Test Software	Dare Instruments	Radimation	15.2.4

Occupied Bandwidth					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSIQ 26	EF00242	2016-04	2017-04

Radiated power					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Fully-anechoic chamber	Frankonia	AC 3	EF00199	-	-
Spectrum Analyzer	R&S	FSIQ 26	EF00242	2016-04	2017-04
LPD Antenna	R&S	HL 223	EF00187	2016-05	2019-05
Horn Antenna	R&S	BBHA 9120D	EF01153	2016-07	2017-07

Radiated spurious emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Semi-anechoic chamber	Frankonia	AC 1	EF00062	-	-
Spectrum Analyzer	R&S	FSEK 30	EF00168	2016-12	2017-12
Biconical Antenna	R&S	HK 116	EF00012	2016-05	2019-05
LPD Antenna	R&S	HL 223	EF00212	2016-04	2019-04
LPD Antenna	R&S	HL 025	EF00327	2015-10	2018-10

1.7 Sample emission level calculation

The following is a description of terms and a sample calculation, as appears in the radiated emissions data table. The numbers used in the calculation are for example only. There is no direct correlation to the specific data taken for the product described in this document:

Reading:

This is the reading obtained on the spectrum analyzer in dB μ V. Any external preamplifiers used are taken into account through internal analyzer settings.

A.F.:

This is the antenna factor for the receiving antenna. It is a conversion factor, which converts electric fields strengths to voltages, which can be measured directly on the spectrum analyzer. It is treated as a loss in dB. Cable losses have been included with the A.F. to simplify the calculations. The antenna factor is used in calculations as follows:

$$\text{Reading on Analyzer (dB}\mu\text{V)} + \text{A.F. (dB)} = \text{Net field strength (dB}\mu\text{V/m)}$$

Net:

This is the net field strength measurement (as shown above).

Limit:

This is the FCC Class B radiated emission limit (in units of dB μ V/m). The FCC limits are given in units of μ V/m. The following formula is used to convert the units of μ V/m to dB μ V/m:

$$\text{Limit (dB}\mu\text{V/m)} = 20 \cdot \log(\mu\text{V/m})$$

Margin:

This is the margin of compliance below the FCC limit. The units are given in dB. A negative margin indicates the emission was below the limit. A positive margin indicates that the emission exceeds the limit.

Example only:


$$\begin{array}{rclcl} \text{Reading} & + & \text{AF} & = & \text{Net Reading} & : & \text{Net reading} - \text{FCC limit} & = & \text{Margin} \\ 21.5 \text{ dB}\mu\text{V} & + & 26 \text{ dB} & = & 47.5 \text{ dB}\mu\text{V/m} & : & 47.5 \text{ dB}\mu\text{V/m} - 57.0 \text{ dB}\mu\text{V/m} & = & -9.5 \text{ dB} \end{array}$$

2 Result Summary

FCC 47 CFR Part 22H, 24E, ISED RSS-132, 133				
Product Specific Standard Section	Requirement – Test	Reference Method	Result	Remarks
RSS-Gen 6.6	Occupied Bandwidth	RSS-Gen 6.6 KDB 971168 ANSI C63.26-2015 5.4		Informational only
FCC § 24.235 FCC § 22.355 ISED RSS-132 § 4.3 ISED RSS-133 § 6.3	Frequency stability	FCC § 24.235 FCC § 22.355 ISED RSS-132 § 4.3 ISED RSS-133 § 6.3 KDB 971168 ANSI C63.26-2015 5.6	N/T	
FCC § 22.913(a)	Effective radiated power	ANSI/TIA-603-D KDB 971168	PASS	
FCC § 24.232(c) ISED RSS-132 § 4.4 ISED RSS-133 § 6.4	Equivalent isotropic radiated power	ANSI/TIA-603-D KDB 971168 ANSI C63.26-2015 5.2	PASS	
FCC § 24.232(d) ISED RSS-133 § 6.4	Peak to average ratio	KDB 971168	N/T	
FCC § 22.917(b) FCC § 24.238(b) ISED RSS-132 § 4.5 ISED RSS-133 § 6.5	Band-edge compliance	KDB 971168	N/T	
FCC § 22.917(a) FCC § 24.238(a) ISED RSS-132 § 4.5 ISED RSS-133 § 6.5	Conducted out-of-band emissions	KDB 971168 ANSI C63.26-2015 5.7	N/T	
FCC § 22.917(a) FCC § 24.238(a) ISED RSS-132 § 4.5 ISED RSS-133 § 6.5	Radiated out-of-band emissions	ANSI/TIA-603-D KDB 971168 ANSI C63.26-2015 5.5	PASS	
ISED RSS-132 § 4.6 ISED RSS-133 § 6.6 ISED RSS-Gen 7.1	Receiver radiated spurious emissions	ISED RSS-Gen 7.1 ANSI C63.4	PASS	
Remarks:				

3 Test Conditions and Results

3.1 Test Conditions and Results – Occupied Bandwidth

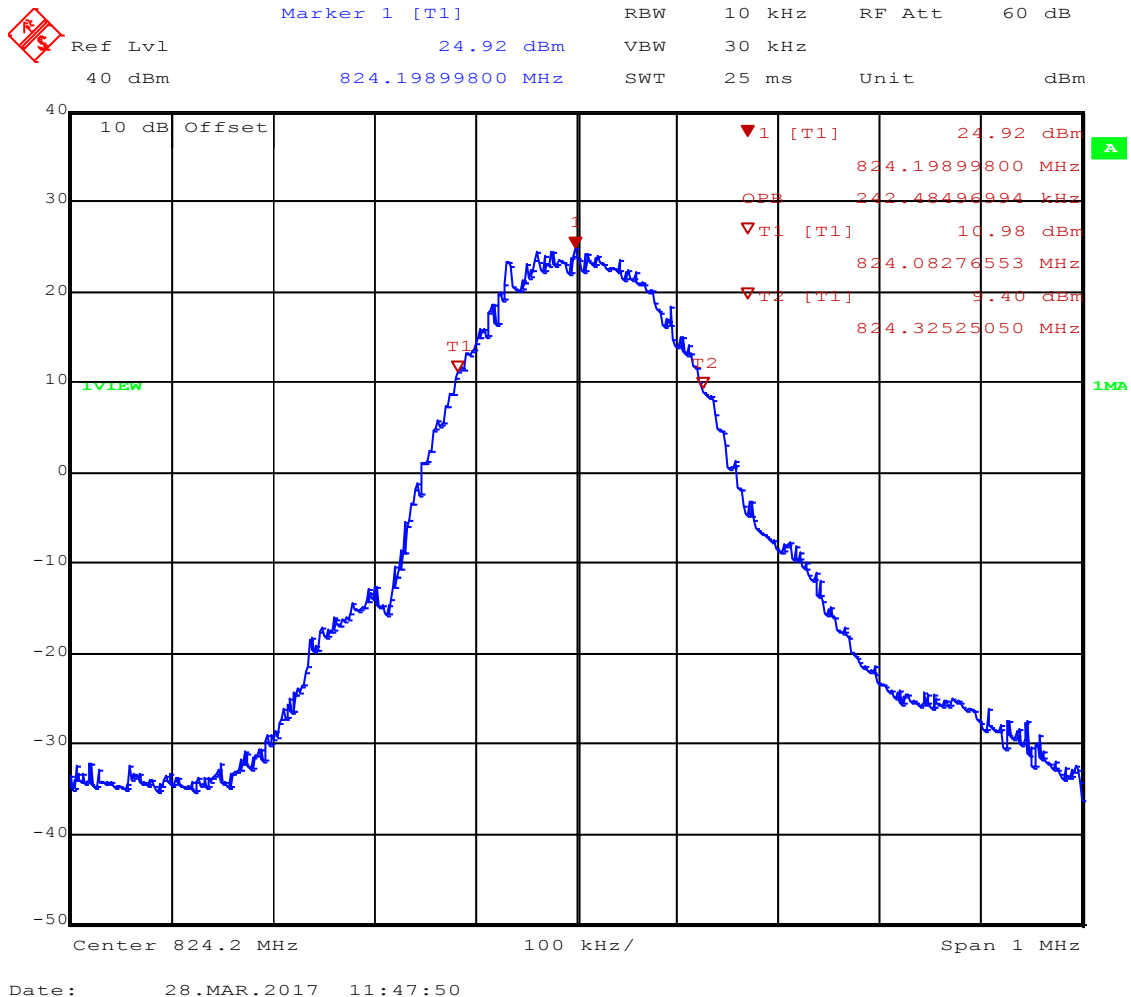
Occupied Bandwidth acc. to ISED RSS-Gen			
Test according to measurement reference	Reference Method		
	RSS-Gen 6.6 / KDB 971168 / ANSI C63.26-2015 5.4		
Test frequency range	Tested frequencies		
	$F_{LOW} / F_{MID} / F_{HIGH}$		
Limits			
None (Informational only)			
Test setup			
 <pre> graph LR SA[Spectrum Analyzer] --- EUT[EUT] </pre>			
Test procedure			
<ol style="list-style-type: none"> 1. EUT set to test mode (Communication tester is used if needed) 2. Span set to at least twice the emission spectrum 3. Resolution bandwidth set to 1 % of span 4. Occupied Bandwidth (99 %) measurement with spectrum analyzer built in measurement function 			
Test results – GSM850			
Channel	Frequency [MHz]	Mode	Occupied Bandwidth [kHz]
F_{LOW}	824.2	GPRS	242.5
F_{MID}	836.2	GPRS	242.5
F_{HIGH}	848.8	GPRS	242.5
F_{LOW}	824.2	EDGE	242.5
F_{MID}	836.2	EDGE	242.5
F_{HIGH}	848.8	EDGE	242.5

Test results – PCS1900			
Channel	Frequency [MHz]	Mode	Occupied Bandwidth [kHz]
F _{LOW}	1850.2	GPRS	244.5
F _{MID}	1880	GPRS	242.4
F _{HIGH}	1909.8	GPRS	244.5
F _{LOW}	1850.2	EDGE	258.5
F _{MID}	1880	EDGE	260.5
F _{HIGH}	1909.8	EDGE	260.5
Comments:			

Occupied Bandwidth – GSM850 F_{Low}
Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1702-6295

Applicant: eResearchTechnology GmbH
 EUT Name: Spirometer
 Model: SpiroSphere - MainUnit
 Test Site: Eurofins Product Service GmbH
 Operator: Burkhard Pudell
 Test Conditions: Tnom / Vnom
 Mode: GPRS 850 / CH: 128 / Gamma:3 (33 dBm) / Main Slot 2
 Test Date: 2017-03-28
 Verdict: NONE (INFORMATION ONLY)
 Note 1: A spectrum analyzer with an integrated 99% power bandwidth function is used
 Note 2: OBW = 242.5 kHz



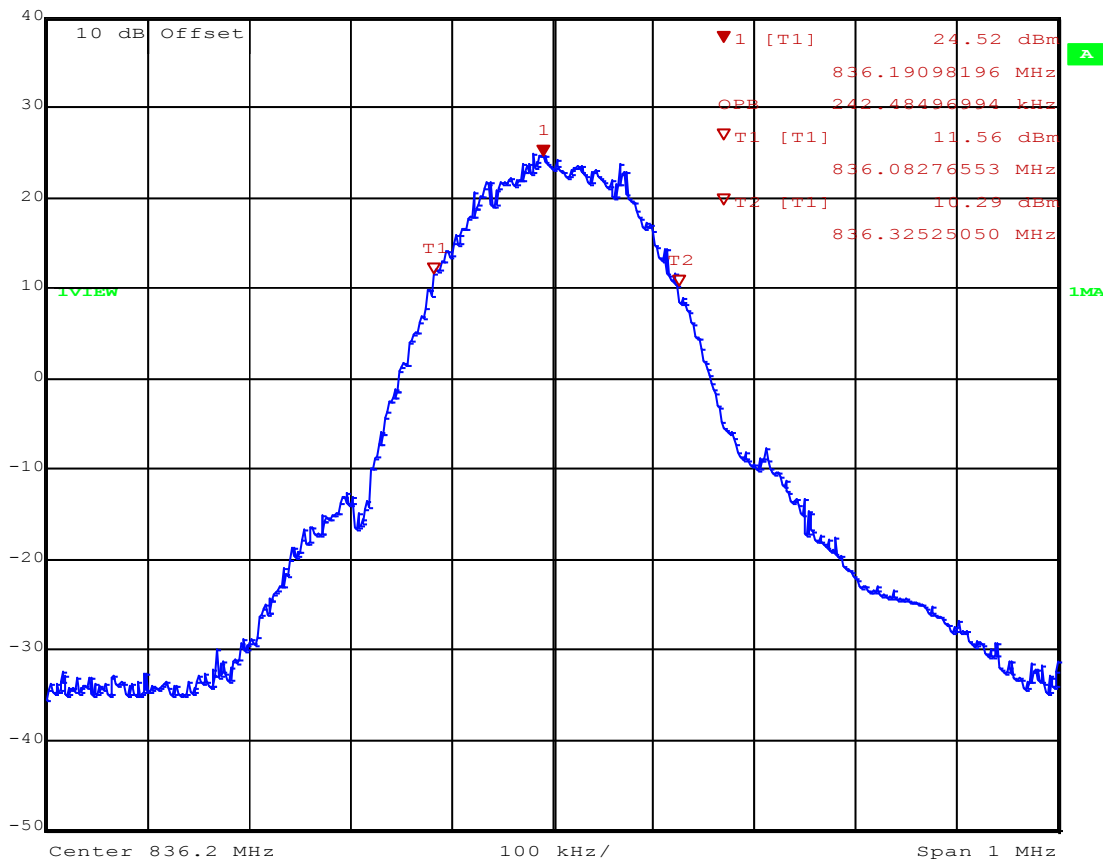
Occupied Bandwidth – GSM850 F_{MID}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1702-6295

Applicant: eResearchTechnology GmbH
 EUT Name: Spirometer
 Model: SpiroSphere - MainUnit
 Test Site: Eurofins Product Service GmbH
 Operator: Burkhard Pudell
 Test Conditions: Tnom / Vnom
 Mode: GPRS 850 / CH: 188 / Gamma:3 (33 dBm) / Main Slot 2
 Test Date: 2017-03-28
 Verdict: NONE (INFORMATION ONLY)
 Note 1: A spectrum analyzer with an integrated 99% power bandwidth function is used
 Note 2: OBW = 242.5 kHz

	Ref Lvl	24.52 dBm	RBW	10 kHz	RF Att	60 dB
	40 dBm	836.19098196 MHz	VBW	30 kHz	Unit	dBm
			SWT	25 ms		



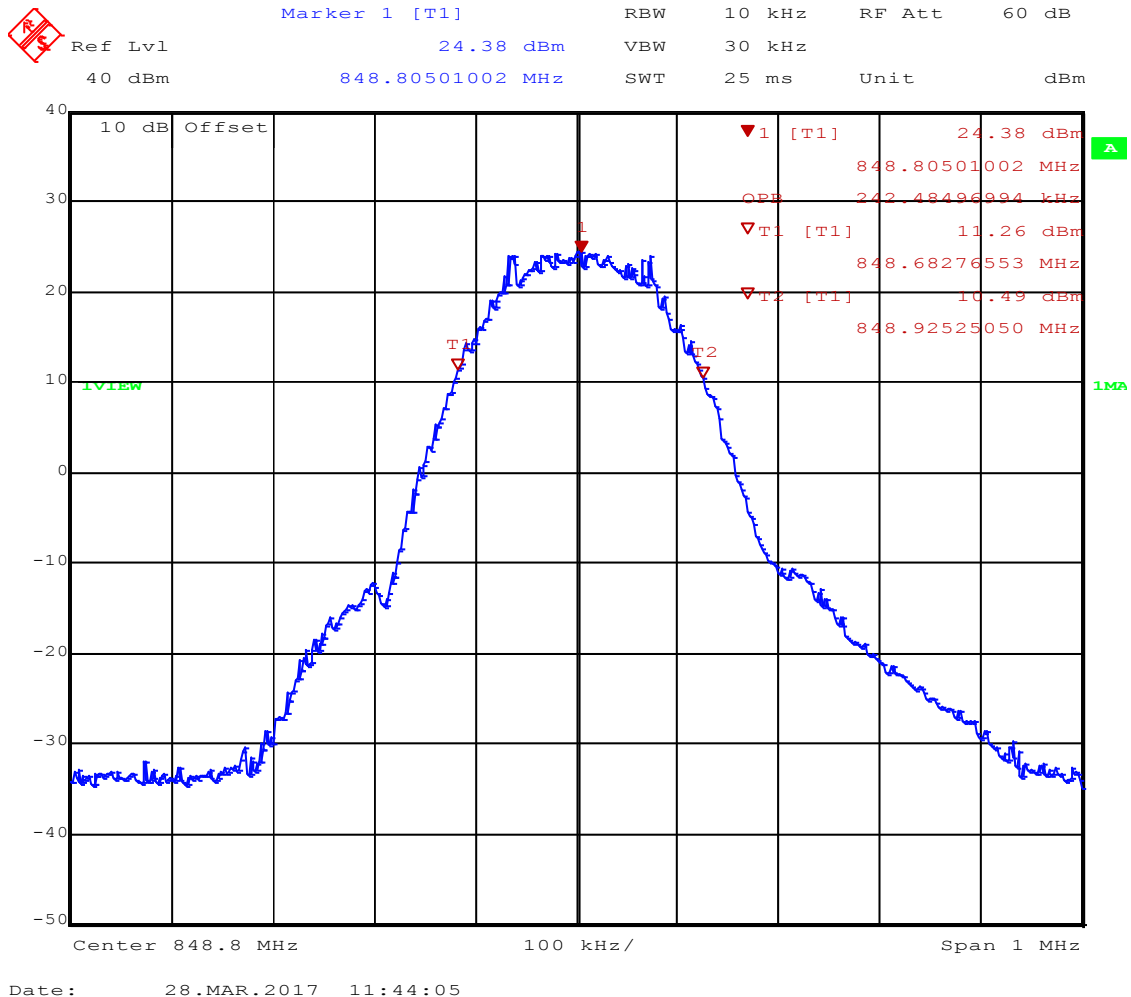
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Occupied Bandwidth – GSM850 F_{HIGH}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1702-6295

Applicant: eResearchTechnology GmbH
 EUT Name: Spirometer
 Model: SpiroSphere - MainUnit
 Test Site: Eurofins Product Service GmbH
 Operator: Burkhard Pudell
 Test Conditions: Tnom / Vnom
 Mode: GPRS 850 / CH: 251 / Gamma:3 (33 dBm) / Main Slot 2
 Test Date: 2017-03-28
 Verdict: NONE (INFORMATION ONLY)
 Note 1: A spectrum analyzer with an integrated 99% power bandwidth function is used
 Note 2: OBW = 242.5 kHz



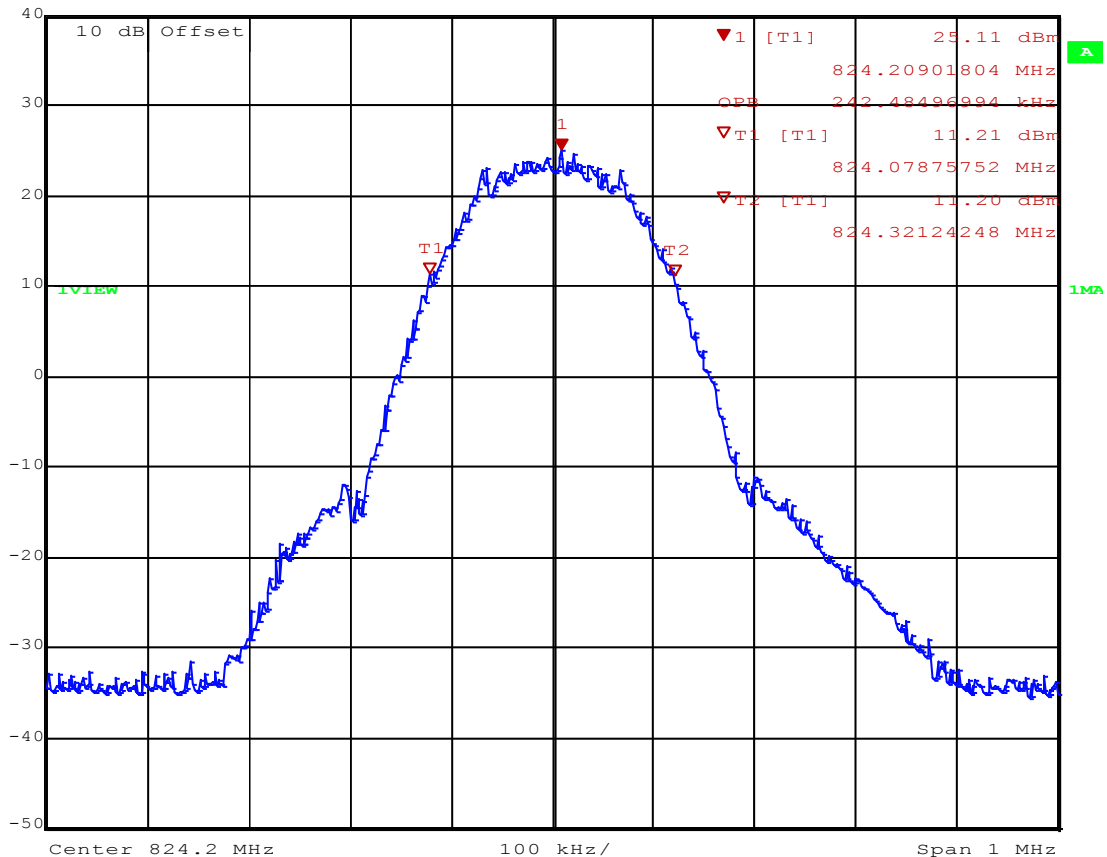
Occupied Bandwidth – EGPRS850 F_{Low}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1702-6295

Applicant: eResearchTechnology GmbH
 EUT Name: Spirometer
 Model: SpiroSphere - MainUnit
 Test Site: Eurofins Product Service GmbH
 Operator: Burkhard Pudell
 Test Conditions: Tnom / Vnom
 Mode: EDGE 850 / CH: 128 / Gamma:6 (27 dBm) / Main Slot 2
 Test Date: 2017-03-28
 Verdict: NONE (INFORMATION ONLY)
 Note 1: A spectrum analyzer with an integrated 99% power bandwidth function is used
 Note 2: OBW = 242.4 kHz

	Marker 1 [T1]	RBW	10 kHz	RF Att	60 dB
	Ref Lvl	25.11 dBm	VBW	30 kHz	
	40 dBm	824.20901804 MHz	SWT	150 ms	Unit dBm



Date: 28.MAR.2017 11:17:40

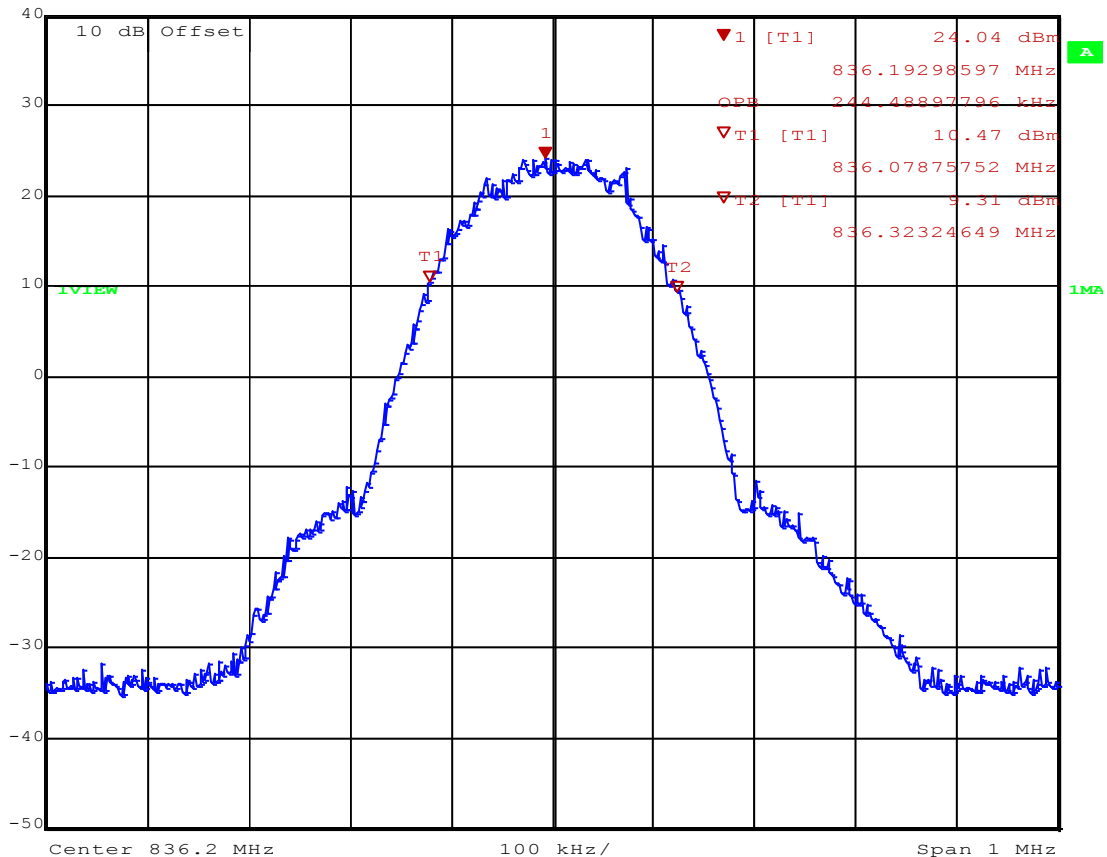
Occupied Bandwidth – EGPRS850 F_{MID}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1702-6295

Applicant: eResearchTechnology GmbH
 EUT Name: Spirometer
 Model: SpiroSphere - MainUnit
 Test Site: Eurofins Product Service GmbH
 Operator: Burkhard Pudell
 Test Conditions: Tnom / Vnom
 Mode: EDGE 850 / CH: 188 / Gamma:6 (27 dBm) / Main Slot 2
 Test Date: 2017-03-28
 Verdict: NONE (INFORMATION ONLY)
 Note 1: A spectrum analyzer with an integrated 99% power bandwidth function is used
 Note 2: OBW = 244.5 kHz

	Marker 1 [T1]	RBW	10 kHz	RF Att	60 dB
	Ref Lvl	24.04 dBm	VBW	30 kHz	
	40 dBm	836.19298597 MHz	SWT	150 ms	Unit dBm



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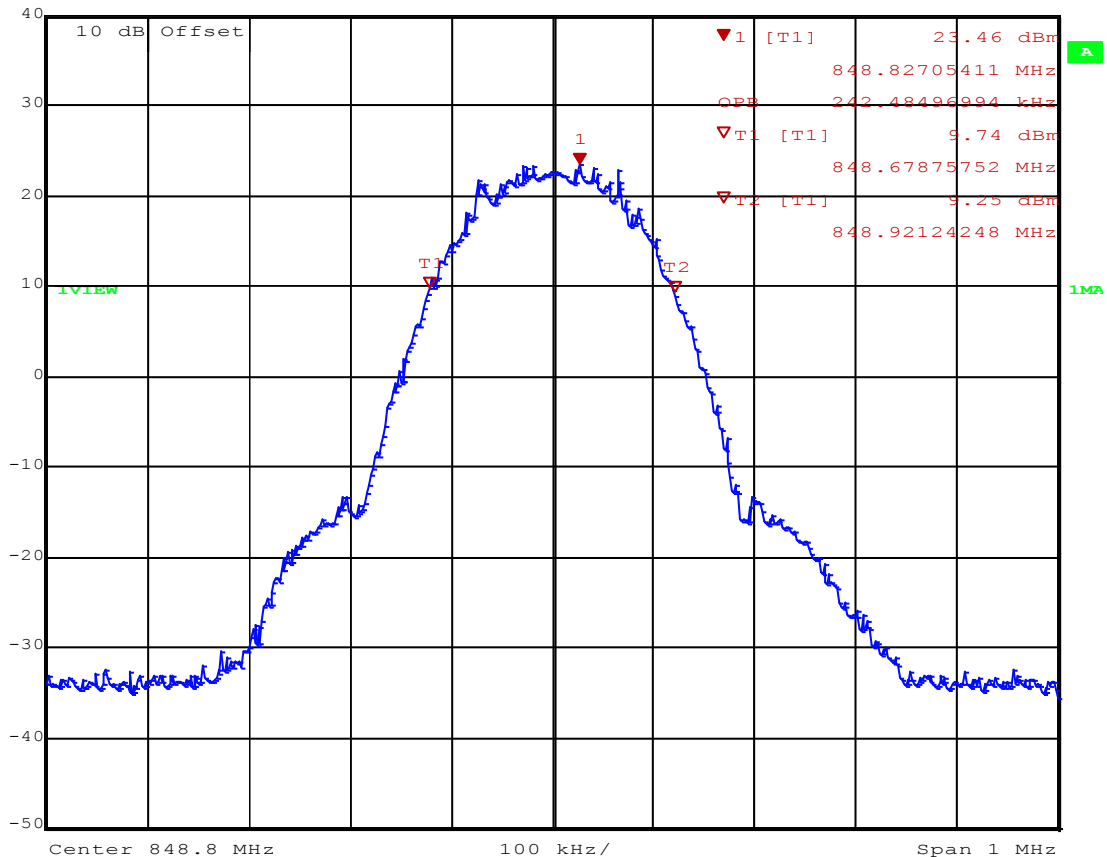
Occupied Bandwidth – EGPRS850 F_{HIGH}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1702-6295

Applicant: eResearchTechnology GmbH
 EUT Name: Spirometer
 Model: SpiroSphere - MainUnit
 Test Site: Eurofins Product Service GmbH
 Operator: Burkhard Pudell
 Test Conditions: Tnom / Vnom
 Mode: EDGE 850 / CH: 251 / Gamma:6 (27 dBm) / Main Slot 2
 Test Date: 2017-03-28
 Verdict: NONE (INFORMATION ONLY)
 Note 1: A spectrum analyzer with an integrated 99% power bandwidth function is used
 Note 2: OBW = 242.5 kHz

	Ref Lvl	23.46 dBm	RBW	10 kHz	RF Att	60 dB
	40 dBm	848.82705411 MHz	VBW	30 kHz		
			SWT	150 ms	Unit	dBm



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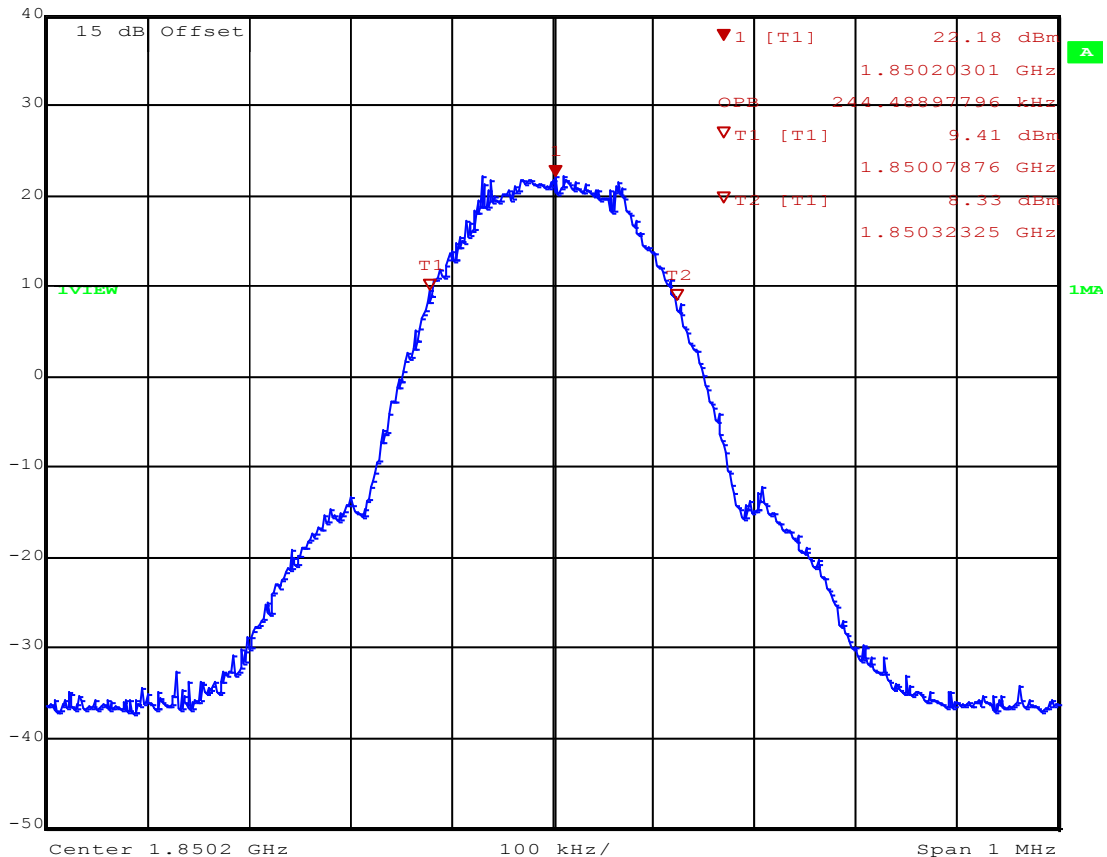
Occupied Bandwidth – GSM1900 F_{Low}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1702-6295

Applicant: eResearchTechnology GmbH
 EUT Name: Spirometer
 Model: SpiroSphere - MainUnit
 Test Site: Eurofins Product Service GmbH
 Operator: Burkhard Pudell
 Test Conditions: Tnom / Vnom
 Mode: GPRS 1900 / CH: 512 / Gamma:3 (30 dBm) / Main Slot 2
 Test Date: 2017-03-28
 Verdict: NONE (INFORMATION ONLY)
 Note 1: A spectrum analyzer with an integrated 99% power bandwidth function is used
 Note 2: OBW = 244.5 kHz

	Marker 1 [T1]	RBW	10 kHz	RF Att	50 dB
	Ref Lvl	22.18 dBm	VBW	30 kHz	
	40 dBm	1.85020301 GHz	SWT	150 ms	Unit dBm



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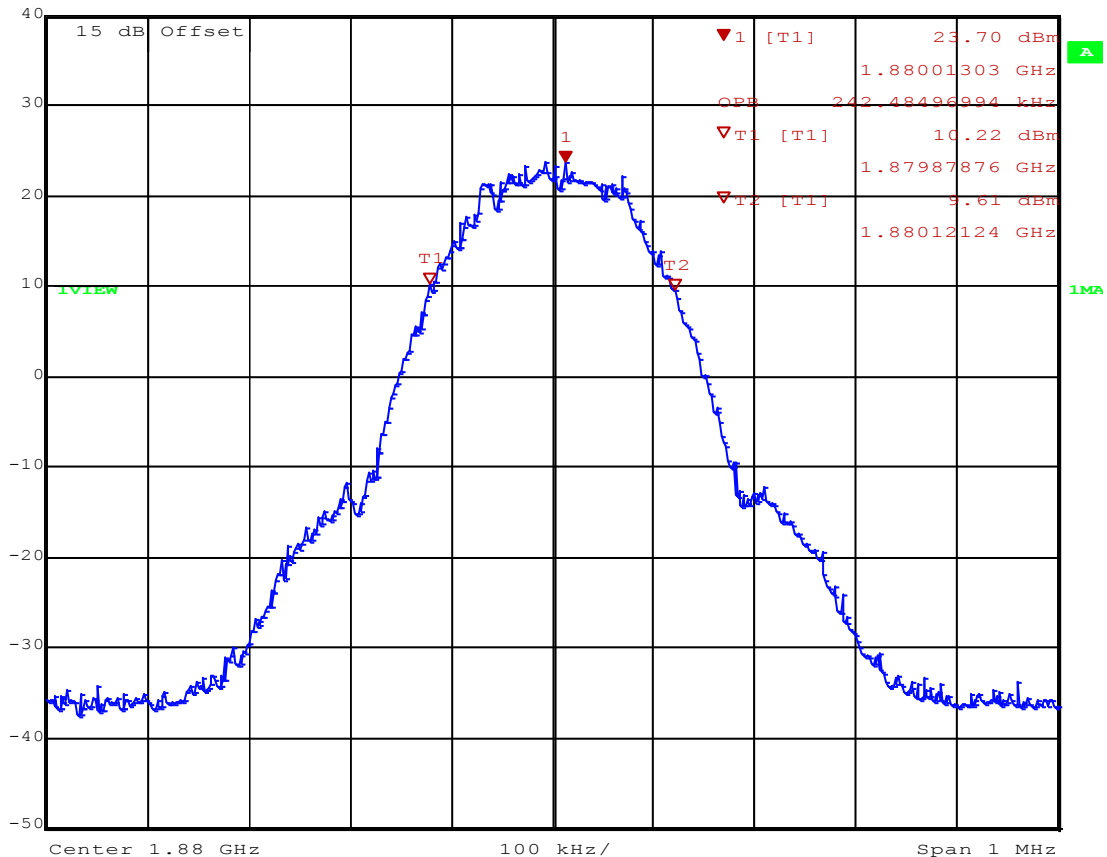
Occupied Bandwidth – GSM1900 F_{MID}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1702-6295

Applicant: eResearchTechnology GmbH
 EUT Name: Spirometer
 Model: SpiroSphere - MainUnit
 Test Site: Eurofins Product Service GmbH
 Operator: Burkhard Pudell
 Test Conditions: Tnom / Vnom
 Mode: GPRS 1900 / CH: 661 / Gamma:3 (30 dBm) / Main Slot 2
 Test Date: 2017-03-28
 Verdict: NONE (INFORMATION ONLY)
 Note 1: A spectrum analyzer with an integrated 99% power bandwidth function is used
 Note 2: OBW = 242.4 kHz

	Marker 1 [T1]	RBW	10 kHz	RF Att	50 dB
	Ref Lvl	23.70 dBm	VBW	30 kHz	
	40 dBm	1.88001303 GHz	SWT	150 ms	Unit dBm

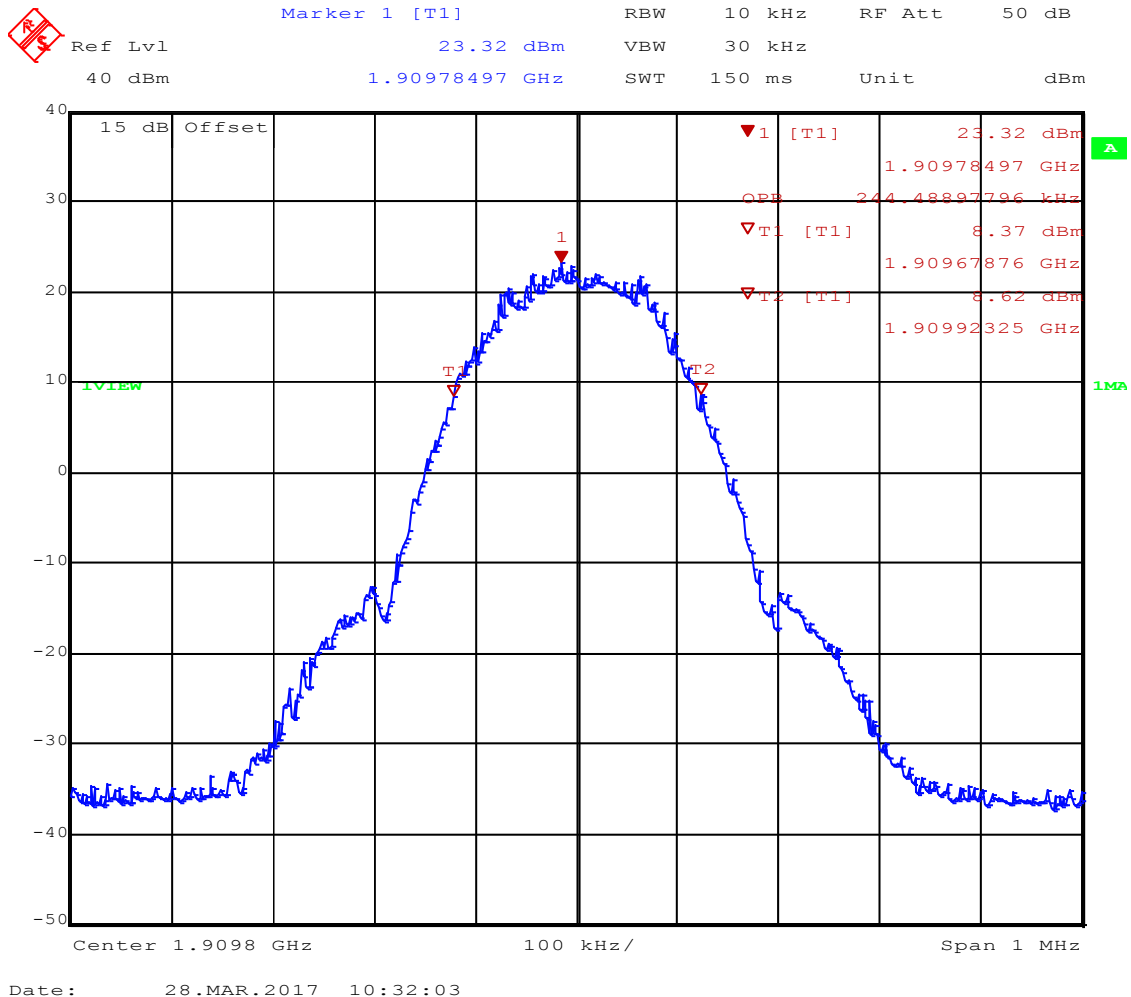


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Occupied Bandwidth – GSM1900 F_{HIGH}
Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1702-6295

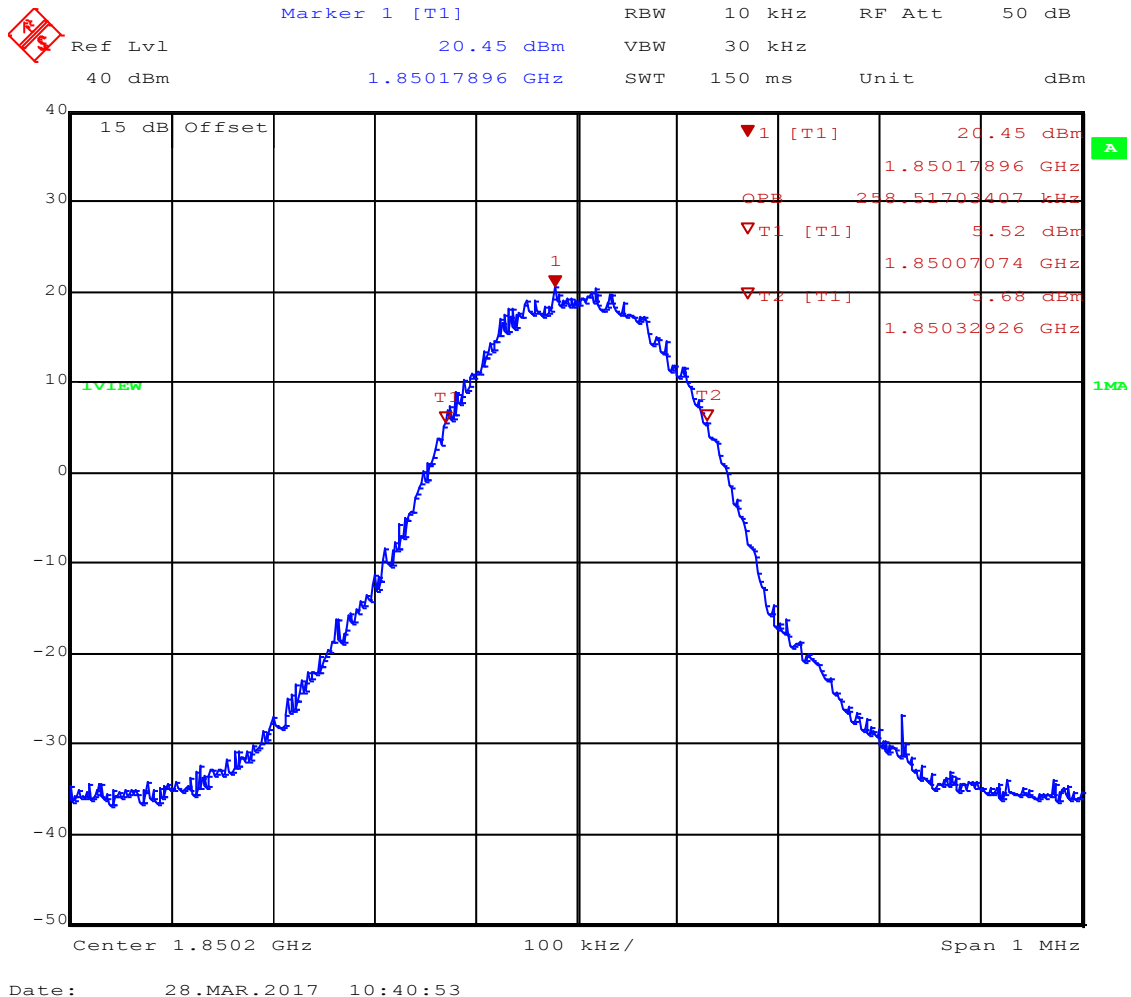
Applicant: eResearchTechnology GmbH
 EUT Name: Spirometer
 Model: SpiroSphere - MainUnit
 Test Site: Eurofins Product Service GmbH
 Operator: Burkhard Pudell
 Test Conditions: Tnom / Vnom
 Mode: GPRS 1900 / CH: 810 / Gamma:3 (30 dBm) / Main Slot 2
 Test Date: 2017-03-28
 Verdict: NONE (INFORMATION ONLY)
 Note 1: A spectrum analyzer with an integrated 99% power bandwidth function is used
 Note 2: OBW = 244.5 kHz



Occupied Bandwidth – EGPRS1900 F_{Low}
Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1702-6295

Applicant: eResearchTechnology GmbH
 EUT Name: Spirometer
 Model: SpiroSphere - MainUnit
 Test Site: Eurofins Product Service GmbH
 Operator: Burkhard Pudell
 Test Conditions: Tnom / Vnom
 Mode: EDGE 1900 / CH: 512 / Gamma:5 (26 dBm) / Main Slot 2
 Test Date: 2017-03-28
 Verdict: NONE (INFORMATION ONLY)
 Note 1: A spectrum analyzer with an integrated 99% power bandwidth function is used
 Note 2: OBW = 258.5 kHz



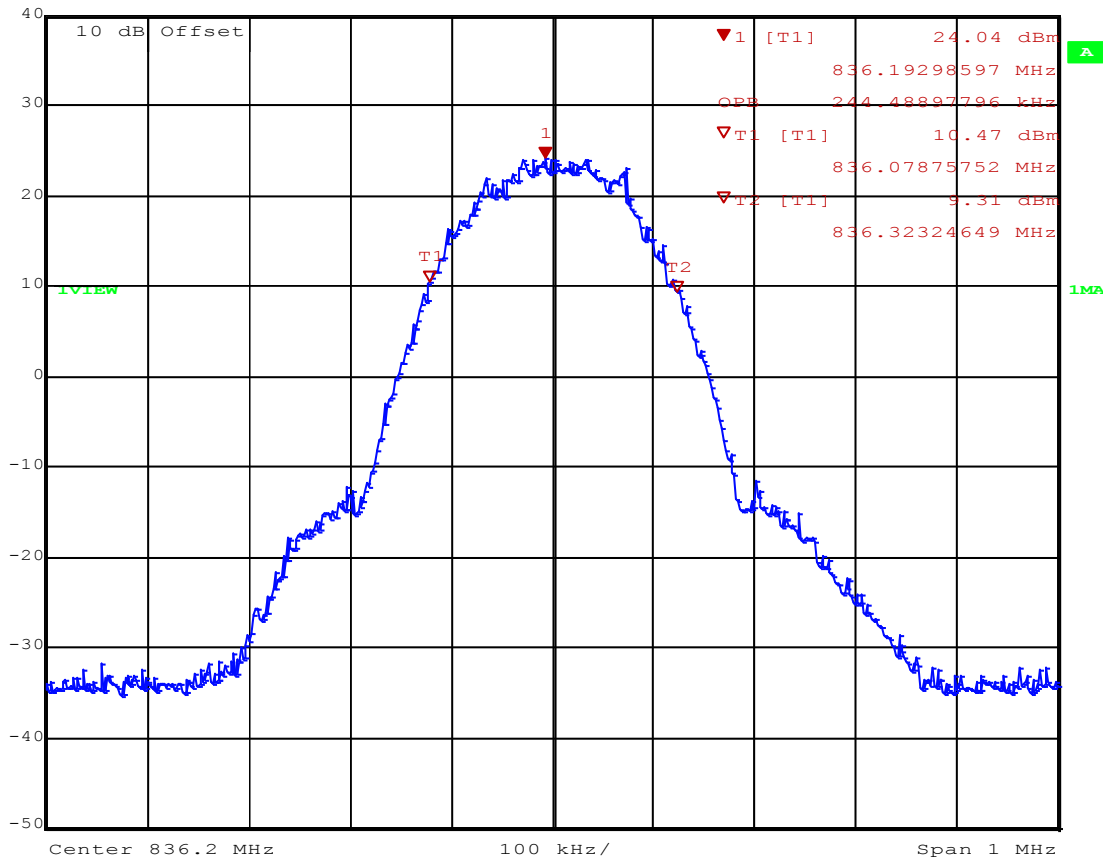
Occupied Bandwidth – EGPRS1900 F_{MID}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1702-6295

Applicant: eResearchTechnology GmbH
 EUT Name: Spirometer
 Model: SpiroSphere - MainUnit
 Test Site: Eurofins Product Service GmbH
 Operator: Burkhard Pudell
 Test Conditions: Tnom / Vnom
 Mode: EDGE 850 / CH: 188 / Gamma:6 (27 dBm) / Main Slot 2
 Test Date: 2017-03-28
 Verdict: NONE (INFORMATION ONLY)
 Note 1: A spectrum analyzer with an integrated 99% power bandwidth function is used
 Note 2: OBW = 244.5 kHz

	Marker 1 [T1]	RBW	10 kHz	RF Att	60 dB
	Ref Lvl	24.04 dBm	VBW	30 kHz	
	40 dBm	836.19298597 MHz	SWT	150 ms	Unit dBm

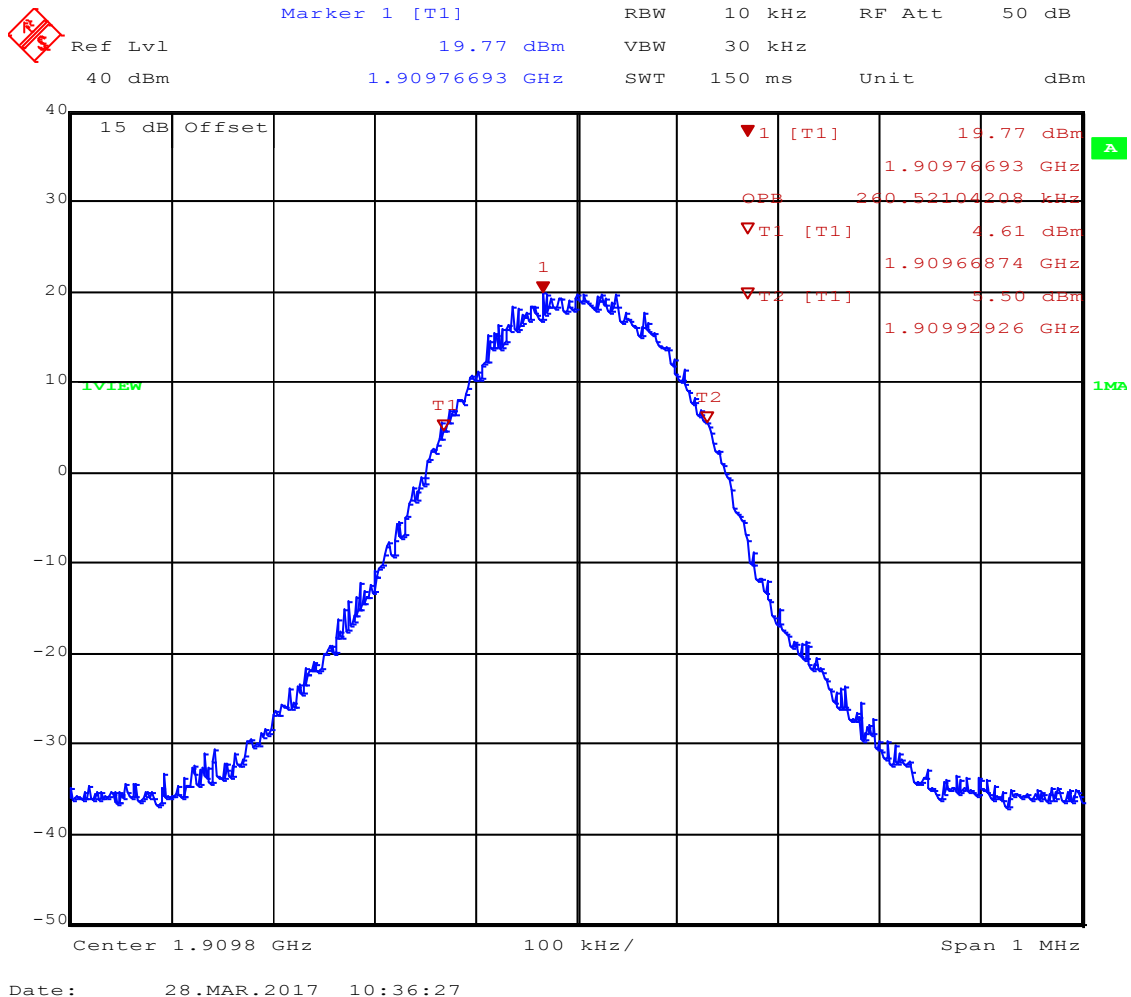


Date: 28.MAR.2017 11:20:22

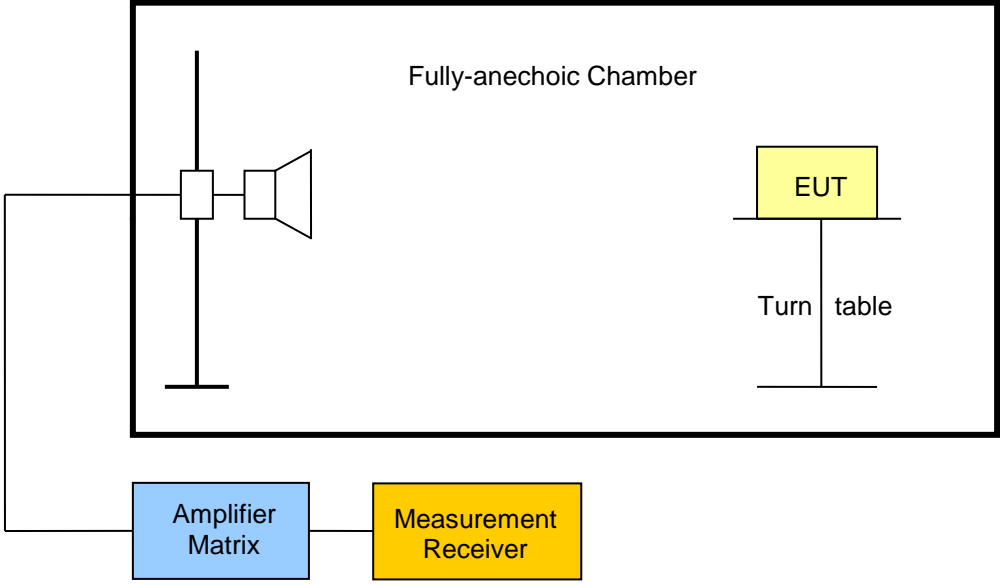
Occupied Bandwidth – EGPRS1900 F_{HIGH}
Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1702-6295

Applicant: eResearchTechnology GmbH
 EUT Name: Spirometer
 Model: SpiroSphere - MainUnit
 Test Site: Eurofins Product Service GmbH
 Operator: Burkhard Pudell
 Test Conditions: Tnom / Vnom
 Mode: EDGE 1900 / CH: 810 / Gamma:5 (26 dBm) / Main Slot 2
 Test Date: 2017-03-28
 Verdict: NONE (INFORMATION ONLY)
 Note 1: A spectrum analyzer with an integrated 99% power bandwidth function is used
 Note 2: OBW = 260.5 kHz

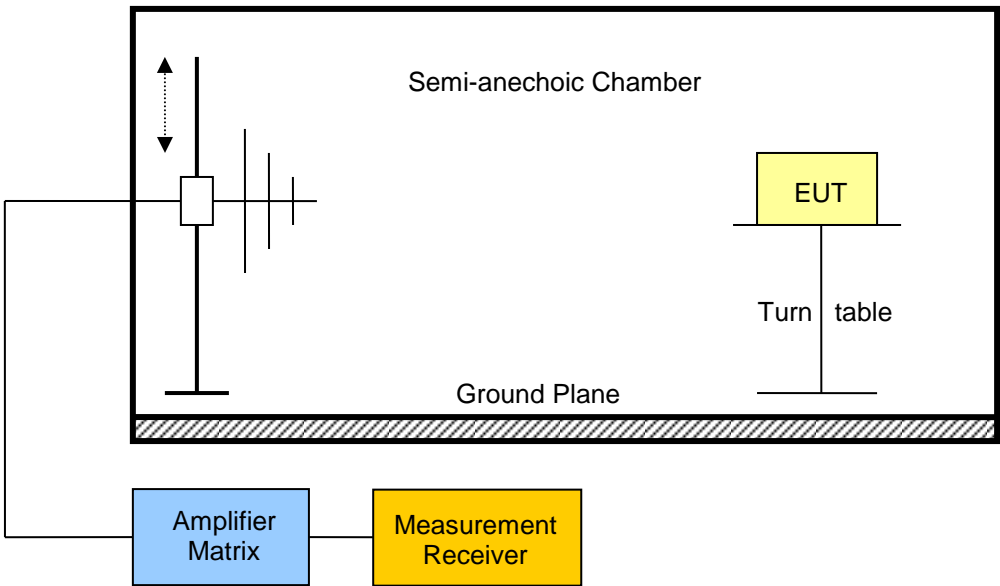


3.2 Test Conditions and Results – Effective radiated power / Equivalent isotropic radiated power

Radiated power acc. to FCC 22H / FCC 24E / ISED RSS-132 / ISED RSS-133		Verdict: PASS
EUT requirement rule parts and clause	Reference	
	FCC § 22.913(a) / FCC § 24.232(c) ISED RSS-132 § 4.4 / IC RSS-133 § 6.4	
Test according to measurement reference	Reference Method	
	FCC § 22.913(a) / FCC § 24.232(c) / ANSI/TIA-603-D ISED RSS-132 § 4.4 / ISED RSS-133 § 6.4 / ANSI C63.26-2015 5.2	
Test frequency range	Tested frequencies	
	$F_{LOW} / F_{MID} / F_{HIGH}$	
Limits		
Carrier Frequency range	Equipment type	Power limit
824-849 MHz	Mobile transmitter	FCC : 7 Watts (38.45 dBm) e.i.r.p. ISED : 11.5 Watts (40.60 dBm) e.i.r.p.
1850-1910 MHz	Mobile transmitter	FCC : 2 Watts (33 dBm) e.i.r.p. ISED : 2 Watts (33 dBm) e.i.r.p.
Test setup		
 <p>The diagram illustrates the test setup. A Fully-anechoic Chamber is shown with a measurement antenna on the left and an EUT (Equivalent Under Test) on a turn table on the right. The antenna is connected to an Amplifier Matrix, which is connected to a Measurement Receiver.</p>		
Test procedure		
<ol style="list-style-type: none"> 1. EUT set to test mode 2. The radiated power is measured with a measurement antenna in vertical polarization 3. To obtain maximum level the EUT is rotated 4. The EUT is replaced with a half-wave dipole and the power to the dipole is adjusted to obtain same radiated power measurement value 		

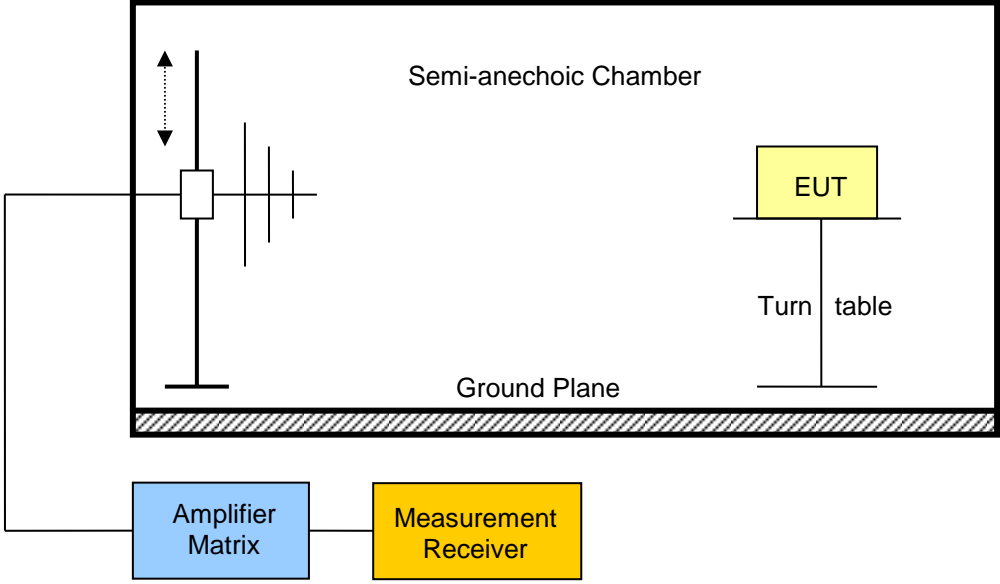
Test results – GSM850 E.R.P.							
Channel	Frequency [MHz]	Mode	Pol.	Power [dBm e.r.p]	Limit [dBm e.i.r.p]	Margin [dB]	Result
F _{LOW}	824.2	GPRS	hor	25.8	38.45	-12.65	PASS
F _{MID}	836.2	GPRS	hor	25.7	38.45	-12.75	PASS
F _{HIGH}	848.8	GPRS	hor	24.9	38.45	-13.55	PASS
F _{LOW}	824.2	EDGE	hor	20.6	38.45	-17.85	PASS
F _{MID}	836.2	EDGE	hor	20.4	38.45	-18.55	PASS
F _{HIGH}	848.8	EDGE	hor	19.5	38.45	-18.95	PASS
Test results – GSM850 E.I.R.P.							
Channel	Frequency [MHz]	Mode	Pol.	Power [dBm e.i.r.p]	Limit [dBm e.i.r.p]	Margin [dB]	Result
F _{LOW}	824.2	GPRS	hor	27.95	40.6	-12.65	PASS
F _{MID}	836.2	GPRS	hor	27.85	40.6	-12.75	PASS
F _{HIGH}	848.8	GPRS	hor	27.05	40.6	-13.55	PASS
F _{LOW}	824.2	EDGE	hor	22.75	40.6	-17.85	PASS
F _{MID}	836.2	EDGE	hor	22.55	40.6	-18.55	PASS
F _{HIGH}	848.8	EDGE	hor	21.65	40.6	-18.95	PASS
Test results – GSM1900 E.I.R.P.							
Channel	Frequency [MHz]	Mode	Pol.	Power [dBm e.i.r.p]	Limit [dBm e.i.r.p]	Margin [dB]	Result
F _{LOW}	1850.2	GPRS	ver	24.8	33	- 8.2	PASS
F _{MID}	1880	GPRS	ver	24.6	33	- 8.4	PASS
F _{HIGH}	1909.8	GPRS	ver	23.9	33	- 9.1	PASS
F _{LOW}	1850.2	EDGE	ver	22.9	33	-10.1	PASS
F _{MID}	1880	EDGE	ver	22.9	33	-10.1	PASS
F _{HIGH}	1909.8	EDGE	ver	21.7	33	-11.3	PASS
Comments:							

3.3 Test Conditions and Results – Transmitter radiated emissions

Transmitter radiated power acc. to FCC 22H / FCC 24E / ISED RSS-132 / ISED RSS-133		Verdict: PASS
Test according referenced standards	Reference Method	
	FCC § 22.917(a) / FCC § 24.238(a) ISED RSS-132 § 4.5 / ISED RSS-133 § 6.5	
Test according to measurement reference	Reference Method	
	ANSI/TIA-603-D / ANSI C63.26-2015 5.5	
Test frequency range	Tested frequencies	
	30 MHz – 10 th Harmonic	
Limits		
Carrier Frequency range	Limit	
824-849 MHz	Attenuation below transmitter power $\geq 43 + 10 \cdot \log_{10}(P)$ [dB] = -13 dBm	
1850-1910 MHz	Attenuation below transmitter power $\geq 43 + 10 \cdot \log_{10}(P)$ [dB] = -13 dBm	
Test setup		
		
Test procedure		
<ol style="list-style-type: none"> 1. EUT set to test mode 2. Maximum emission level is measured by rotating the EUT and adjusting the antenna height for vertical polarization 3. The EUT is replaced by a substitution antenna and generator 4. The power level is set to obtain the same power reading 5. Measurement is repeated for horizontal polarization 		

Test results – GSM850								
Channel	Frequency [MHz]	Mode	Emission [MHz]	Level [dbm]	Pol.	Limit [dBm]	Margin [dB]	
Comments: No significant spurious emissions								
Test results – GSM1900								
Channel	Frequency [MHz]	Mode	Emission [MHz]	Level [dbm]	Pol.	Limit [dBm]	Margin [dB]	
F _{LOW}	1850.2	GPRS	1850	-20,22	ver	- 13	-07.22	
F _{LOW}	1850.2	GPRS	1850	-18.80	hor	- 13	-05.80	
F _{MID}	1880.0	GPRS	No significant spurious emissions					
F _{HIGH}	1909.8	GPRS	1910	-18.83	ver	- 13	-05.83	
F _{HIGH}	1909.8	GPRS	1910	-16.40	hor	- 13	-03.40	
Comments:								

3.4 Test Conditions and Results – Receiver radiated emissions

Receiver radiated emissions acc. to ISED RSS-210		Verdict: PASS		
Test according referenced standards	Reference Method			
	ISED RSS-132 5.6 / 133 6.6			
Test according to measurement reference	Reference Method			
	ANSI C63.4			
Test frequency range	Tested frequencies			
	30 MHz – 5 th Harmonic			
EUT test mode	IDLE			
Limits				
Frequency range [MHz]	Detector	Limit [μ V/m]	Limit [dB μ V/m]	Limit Distance [m]
30 – 88	Quasi-Peak	100	40	3
88 – 216	Quasi-Peak	150	43.5	3
216 – 960	Quasi-Peak	200	46	3
960 – 1000	Quasi-Peak	500	54	3
> 1000	Average	500	54	3
Test setup				
 <p>The diagram illustrates the test setup. A Semi-anechoic Chamber is shown with a Ground Plane at the bottom. Inside the chamber, a Turn table is positioned, and an EUT (Equipment Under Test) is placed on top of it. An Amplifier Matrix is connected to the chamber, and its output is connected to a Measurement Receiver. The Amplifier Matrix is shown as a blue box, and the Measurement Receiver is shown as a yellow box.</p>				

Test procedure							
1. EUT set to receive mode (Communication tester is used if needed) 2. Span it set according to measurement range 3. Resolution bandwidth below 1GHz is set according to CISPR 16 with peak/quasi-peak detector and RBW of 1MHz with peak/average detector is used above 1GHz 4. Markers are set to peak emission levels							
Test results							
Channel	Frequency [MHz]	Emission [MHz]	Emission Level [db μ V/m]	Emission Level [μ V/m]	Det.	Limit [μ V/m]	Margin [μ V/m]
F _{MID}	850	342.824	35.85	62.02	pk	200	137,98
F _{MID}	850	875.846	35.76	61.38	pk	200	138,62
F _{MID}	850	1510	46.43	209.7	pk	500	290,3
F _{MID}	850	1510	45.62	191.0	pk	500	309.0
F _{MID}	850	2116	44.63	170.4	pk	500	329,6
F _{MID}	850	2116	45.99	199.3	pk	500	300,7
F _{MID}	850	2728	46.52	221.8	pk	500	278,2
F _{MID}	1900	340.8	36.34	65.61	pk	200	134,39
F _{MID}	1900	1515	46.33	207.3	pk	500	292,7
F _{MID}	1900	1515	46.04	200.4	pk	500	299,6
F _{MID}	1900	2116	46.81	219.0	pk	500	281.0
F _{MID}	1900	2728	47.59	239.6	pk	500	260,4
Comments: * Physical distance between EUT and measurement antenna. ** Emission level corresponds to ambient noise floor							