

RADIO REPORT FCC 47 CFR Part 22H ISED Canada RSS-132 Issue 3 Cellular Telephones Operating in the Bands 824-849 MHz and 869-894 MHz FCC 47 CFR Part 24E ISED RSS-133, Issue 6 2GHz Personal Communication Services		
Report Reference No	G0M-1712-7088-TFC224GS-V02	
Testing Laboratory	Eurofins Product Service GmbH	
Address	Storkower Str. 38c 15526 Reichenwalde Germany	
Accreditation	 A2LA Accredited Testing Laboratory, Certificate No.: 1983.01 FCC Test Firm Designation Number: DE0008 IC Testing Laboratory site: 3470A-2	
Applicant	FALCOM GmbH	
Address	Gewerbering 6 98704 Langewiesen GERMANY	
Test Specification	According to FCC/ISED rules	
Standard	47 CFR Part 22H, 47 CFR Part 24E RSS-132, Issue 3: 2013-01, RSS-133, Issue 6:2013-01	
Non-Standard Test Method	None	
Test Scope	partial compliance test	
Equipment under Test (EUT):		
Product Description	UMTS/GSM-Stick	
Model(s)	SAMBA3G-G	
Additional Model(s)	None	
Brand Name(s)	None	
Hardware Version(s)	F_311_rev01b	
Software Version(s)	None	
	FCC-ID: QIXSAMBA3G-G	IC: 5383A-SAMBA3GG
Test Result	PASSED	

Test Report No.: G0M-1712-7088-TFC224GS-V02

Eurofins Product Service GmbH
Storkower Str. 38c, D-15526 Reichenwalde, Germany

Possible test case verdicts:		
required by standard but not tested	N/T	
not required by standard	N/R	
not applicable to EUT	N/A	
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	2017-12-12	
Report:		
Compiled by	Sebastian Suckow	
Tested by (+ signature) (Responsible for Test)	Sebastian Suckow / Burkhard Pudell	
Approved by (+ signature) (Deputy Head of Lab)	Toralf Jahn	
Date of Issue	2018-04-23	
Total number of pages	31	
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:		

VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2018-02-13	Initial Release	
02	2018-04-23	Standard versions corrected.	S. Suckow

ABBREVIATIONS AND ACRONYMS

Acronyms	
Acronym	Description
EUT	Equipment Under Test
FCC	Federal Communications Commission
ISED	Innovation, Science and Economic Development Canada
RBW	Resolution bandwidth
RMS	Root mean square
VBW	Video bandwidth
V _{NOM}	Nominal supply voltage

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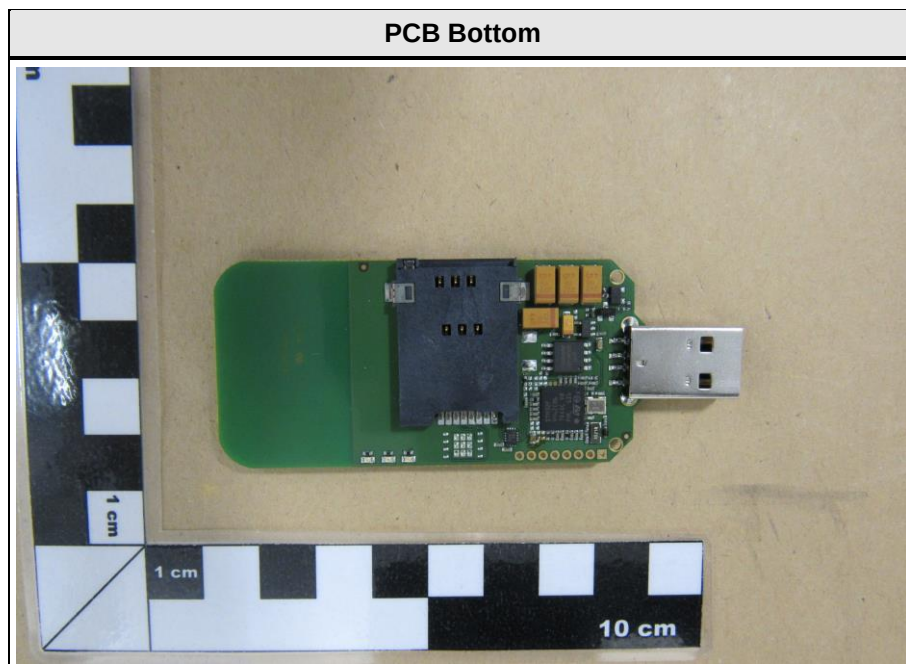
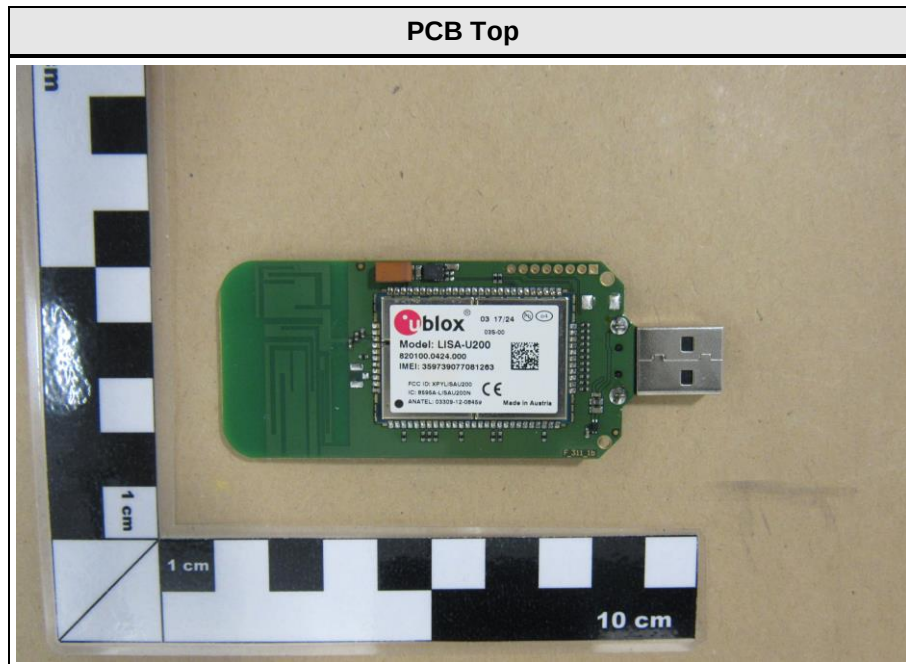
1 Equipment (Test Item) Under Test

Description	UMTS/GSM-Stick	
Model	SAMBA3G-G	
Additional Model(s)	None	
Brand Name(s)	None	
Serial Number(s)	None	
Hardware Version(s)	F_311_rev01b	
Software Version(s)	None	
PMN	SAMBA3G-G	
HVIN	UMTS/GSM-Stick	
FVIN	N/A	
HMN	N/A	
FCC-ID	QIXSAMBA3G-G	
IC	5383A-SAMBA3GG	
Equipment type	End Product	
Radio type	Transceiver	
Assigned frequency bands	GSM 850 = UL : 824 - 849 MHz DL : 869 – 894 MHz PCS 1900 = UL : 1850 – 1910 MHz DL : 1930 – 1990 MHz	
Radio technology	GSM	
Operating modes	GPRS	
Modulation	GMSK	
Number of modules	1	
Radio Module	Type	GSM/UMTS Module
	Model	LISA-U200
	Manufacturer	uBlox
	HW Version	146AB2
	SW Version	23.41
	FCC-ID	XPYLISAU200
	IC	8595A-LISAU200N
Antenna	Type	Integrated
	Model	Internal GSM/UMTS
	Manufacturer	FALCOM GmbH
	Gain	0 dBi
Supply Voltage	V _{NOM}	5 VDC via USB
Manufacturer	FALCOM GmbH Gewerbering 6 98704 Langewiesen GERMANY	

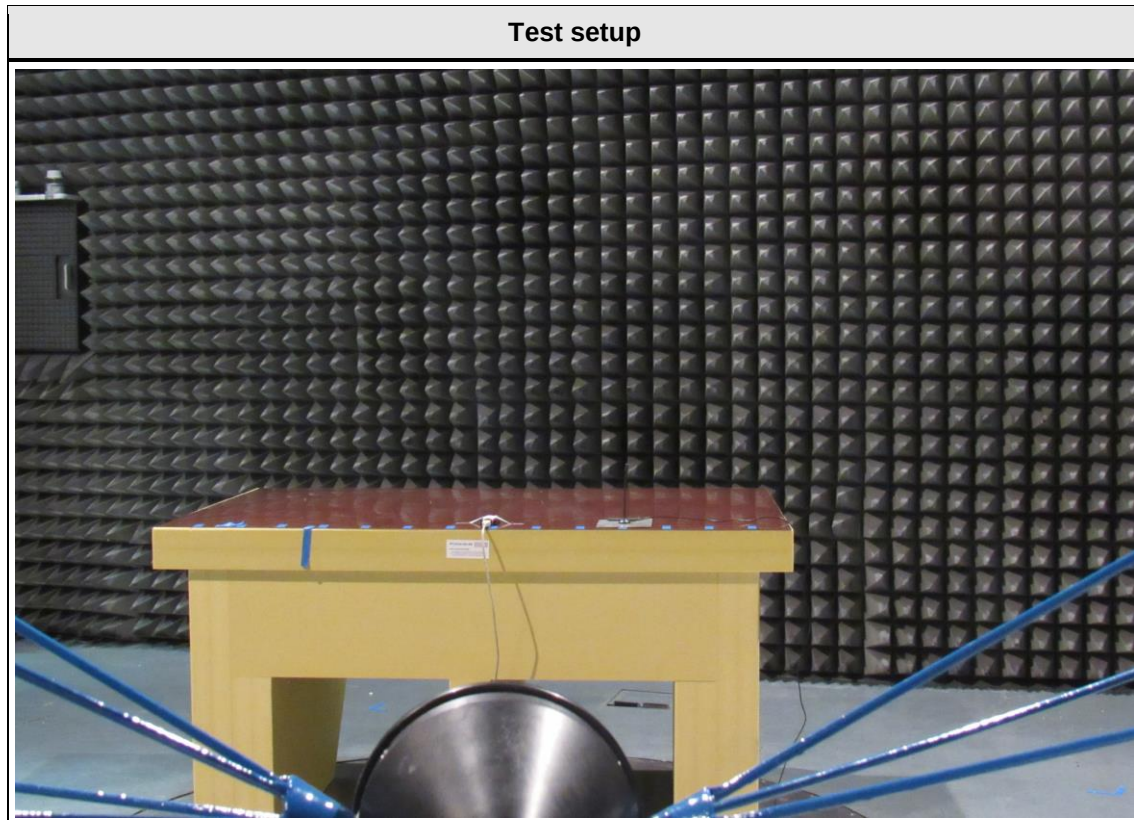
1.1 Photos – Equipment External



1.2 Photos – Equipment Internal



1.3 Photos – Test Setup



1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
SIM	Communication Tester	R&S	CMU200	GSM/UMTS - Tester
Description:				
AE	Auxillary Equipment			
SIM	Simulator			
CBL	Connecting Cable			
Comment:				

1.5 Test Modes

Mode	Description
GPRS	Mode = Transmit Power = Maximum Modulation = GMSK Number of time slots = 1 Duty cycle = 12.5%
Idle	Mode = Idle
Comment: Maximum power (worst case) was searched for all modulations and the various time slot configurations. Configuration with maximum burst output power was selected for compliance testing. The corresponding modes are given in this table.	

1.6 Test Frequencies

Designator	Mode	Channel	Frequency [MHz]
F1	Tx	128	824.2
F2	Tx	188	836.2
F3	Tx	251	848.8
F4	Rx	128	869.2
F5	Rx	188	881.2
F6	Rx	251	893.8
F7	Tx	512	1850.2
F8	Tx	661	1880.0
F9	Tx	810	1909.8
F10	Rx	512	1930.2
F11	Rx	661	1960.0
F12	Rx	810	1989.8

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 dBμV. 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 dBμV/m). The FCC limits are given in units of μV/m. The following formula is used to convert the units of μV/m to dBμV/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:

Reading + AF	= Net Reading	:	Net reading	- FCC limit	= Margin
+21.5 dBμV	+ 26 dB = 47.5 dBμV/m	:	47.5 dBμV/m	- 57.0 dBμV/m	= -9.5 dB

2 Result Summary

FCC 47 CFR Part 22H, 24E, ISED RSS-132, 133				
Product Standard Reference	Requirement	Reference Method	Result	Remarks
RSS-Gen 6.6	Occupied Bandwidth	ANSI C63.10	N/R	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	
Comment:				

Possible Test Case Verdicts	
PASS	Test object does meet the requirements
FAIL	Test object does not meet the requirements
N/T	Required by standard but not tested
N/R	Not required by standard for the test object

3 Test Conditions and Results

3.1 Test Conditions and Results - Occupied bandwidth

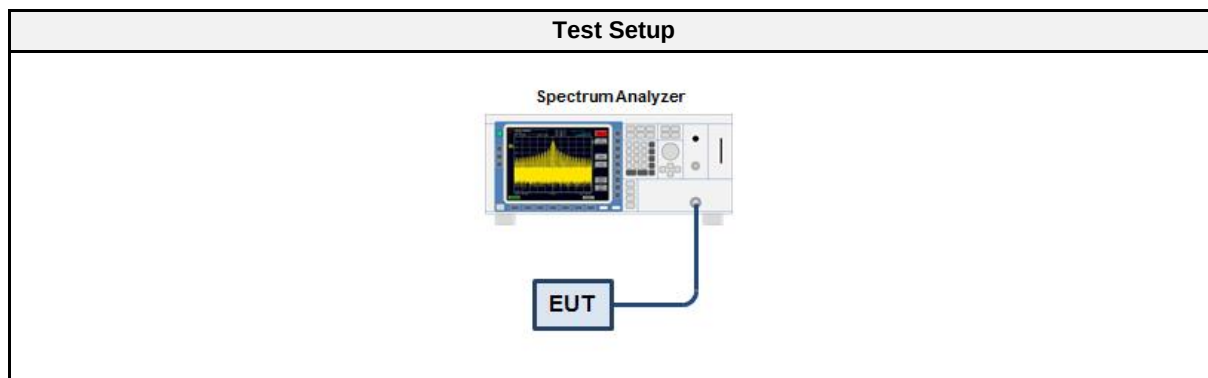
3.1.1 Information

Test Information	
Reference	ISED RSS-Gen 6.6
Measurement Method	KDB 971168/ANSI C63.26-2015 5.4
Operator	Sebastian Suckow
Date	2017-12-20

3.1.2 Limits

Limits
None (Informational only)

3.1.3 Setup



3.1.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSIQ 26	EF00151	2017-07	2018-07

3.1.5 Procedure

Test Procedure
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

3.1.6 Results

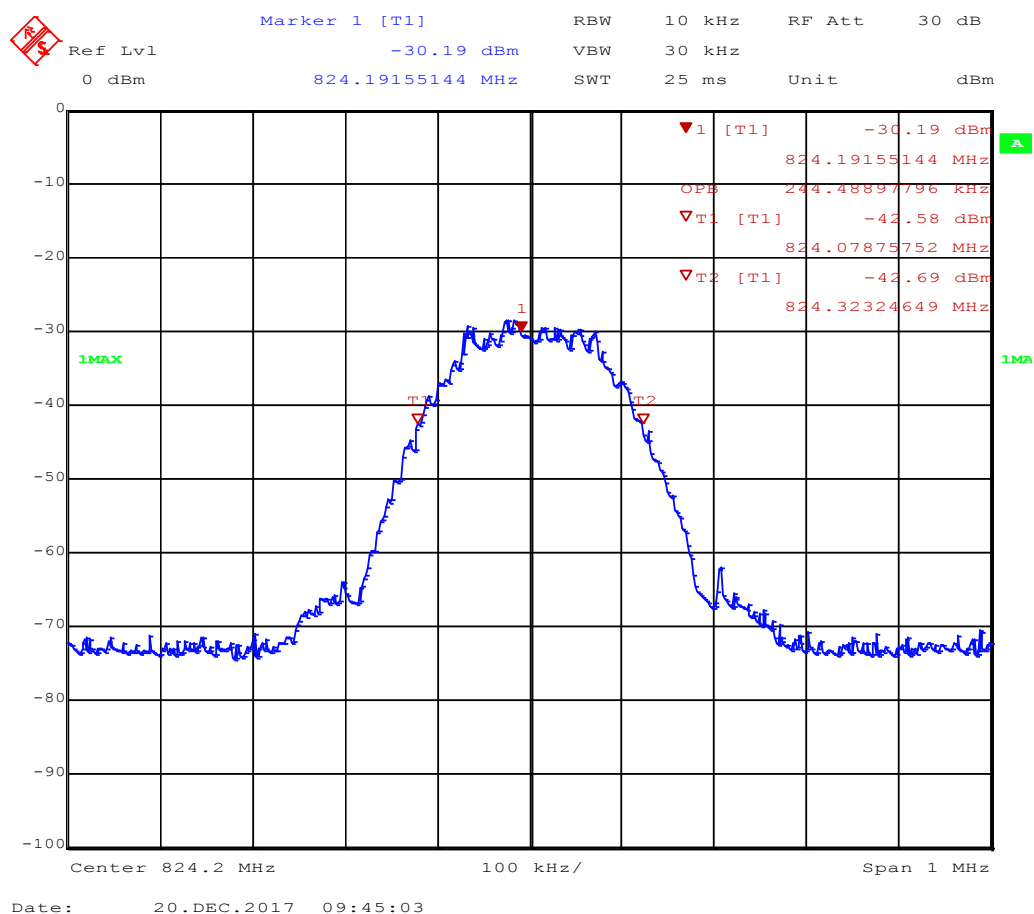
Test Results - GSM 850		
Frequency [MHz]	Mode	Occupied Bandwidth [kHz]
824.2	GPRS	244.49
836.2	GPRS	244.49
848.8	GPRS	244.49

Test Results - GSM 1900		
Frequency [MHz]	Mode	Occupied Bandwidth [kHz]
1850.2	GPRS	248.50
1880.0	GPRS	246.49
1909.8	GPRS	242.48

Occupied Bandwidth

Project Number: G0M-1712-7088

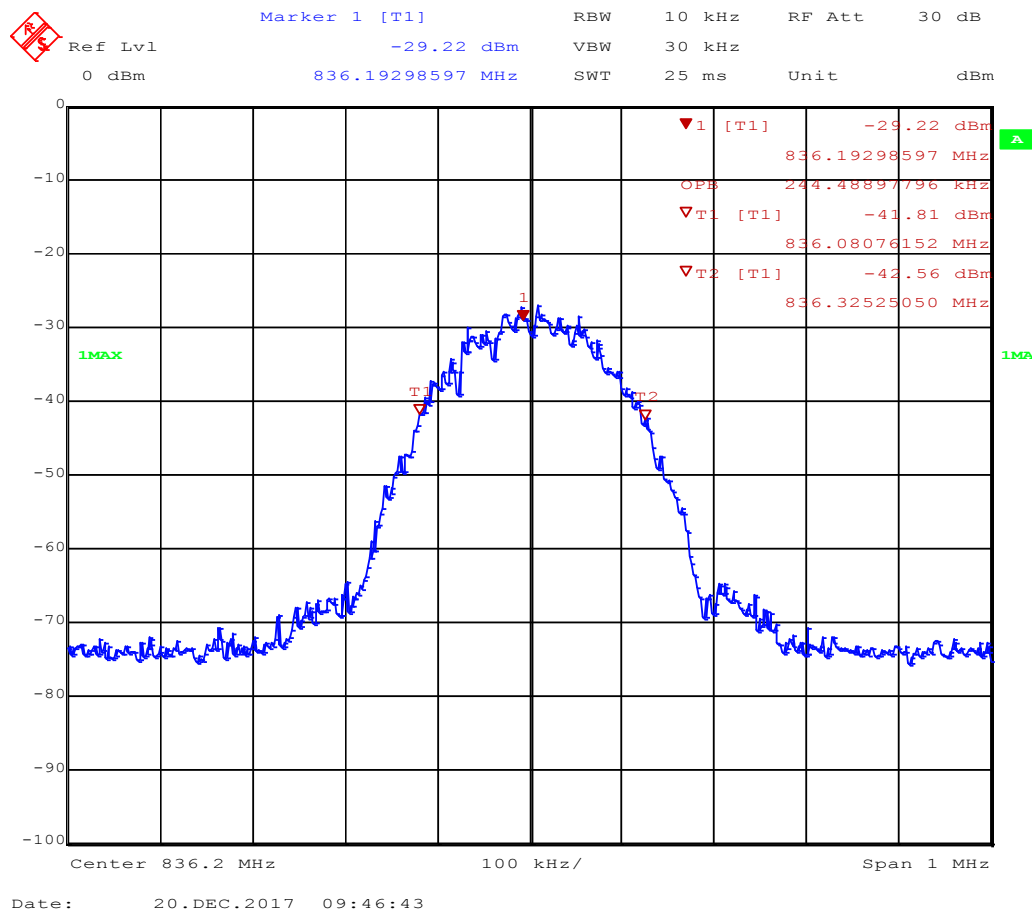
Applicant:	FALCOM GmbH
EUT Name:	UMTS/GSM-Stick
Model:	SAMBA3G-G
Test Site:	Eurofins Product Service GmbH
Operator:	Sebastian Suckow
Test Conditions:	Tnom / Vnom
Mode:	GSM 850 CH. 128
Test Date:	2017-12-20
Verdict:	NONE (INFORMATION ONLY)



Occupied Bandwidth

Project Number: G0M-1712-7088

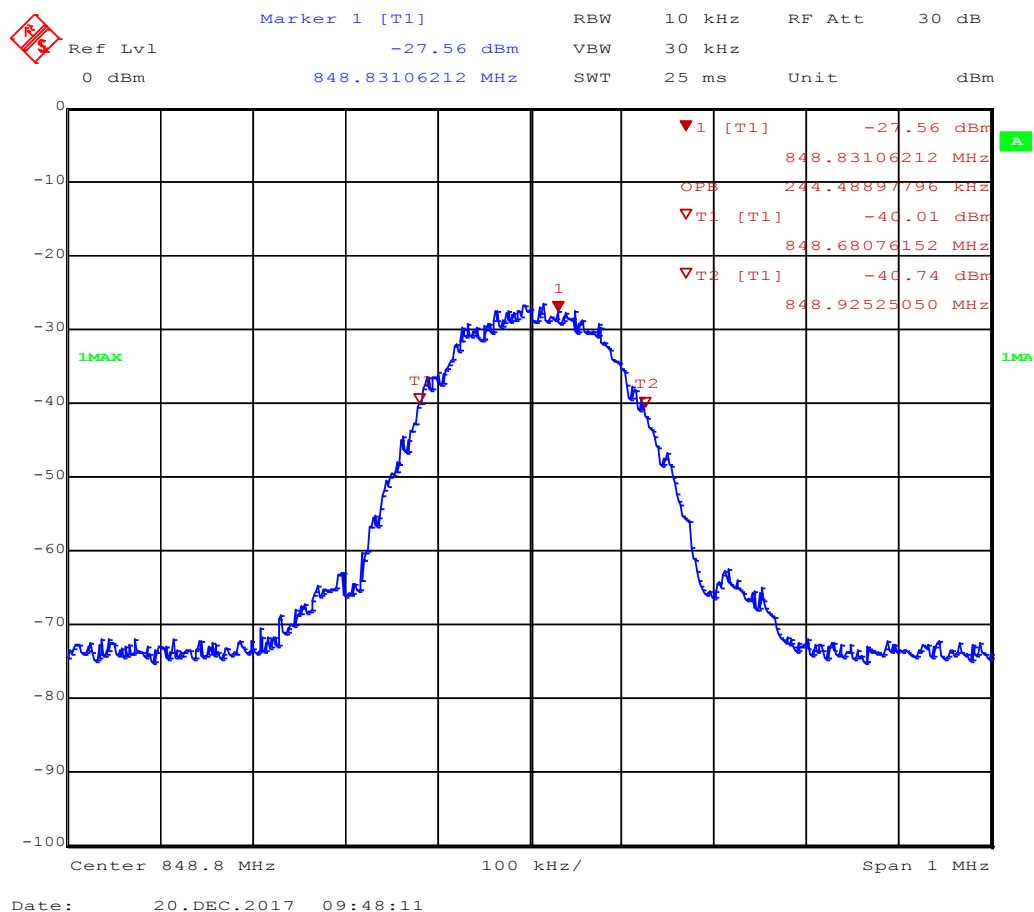
Applicant: FALCOM GmbH
 EUT Name: UMTS/GSM-Stick
 Model: SAMBA3G-G
 Test Site: Eurofins Product Service GmbH
 Operator: Sebastian Suckow
 Test Conditions: Tnom / Vnom
 Mode: GSM 850 CH. 188
 Test Date: 2017-12-20
 Verdict: NONE (INFORMATION ONLY)



Occupied Bandwidth

Project Number: G0M-1712-7088

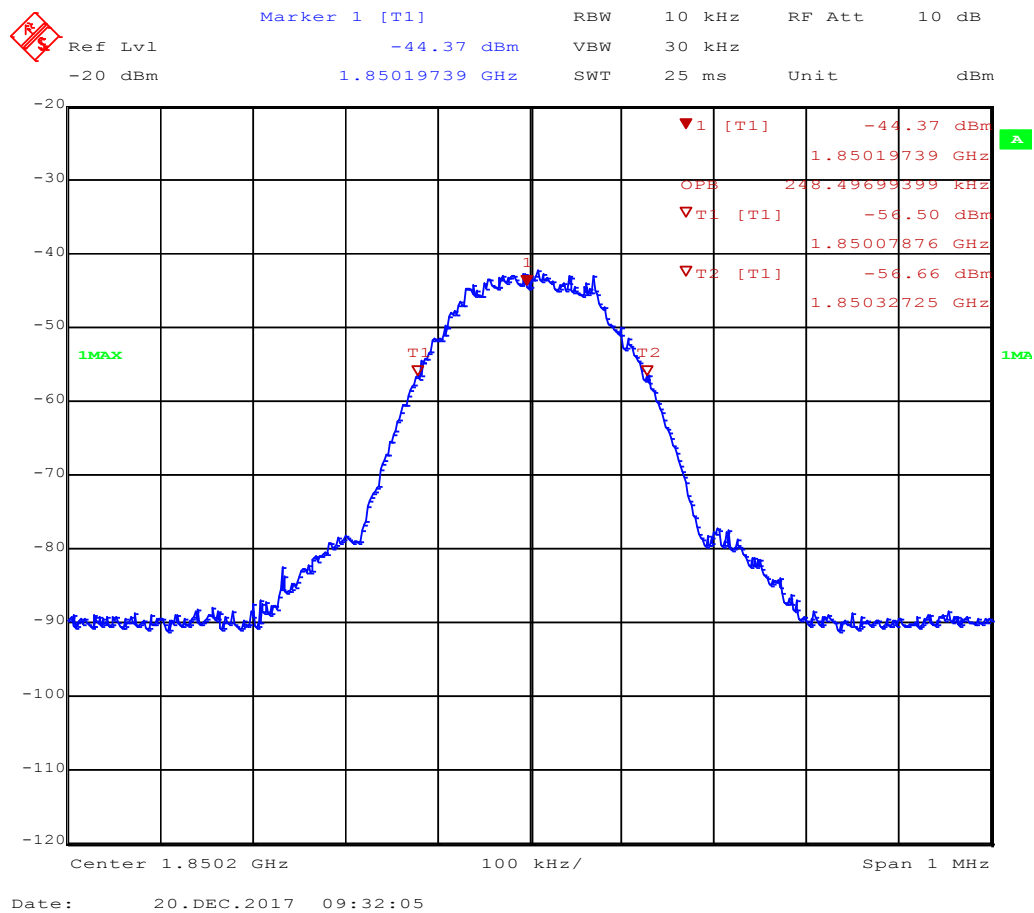
Applicant: FALCOM GmbH
 EUT Name: UMTS/GSM-Stick
 Model: SAMBA3G-G
 Test Site: Eurofins Product Service GmbH
 Operator: Sebastian Suckow
 Test Conditions: Tnom / Vnom
 Mode: GSM 850 CH. 251
 Test Date: 2017-12-20
 Verdict: NONE (INFORMATION ONLY)



Occupied Bandwidth

Project Number: G0M-1712-7088

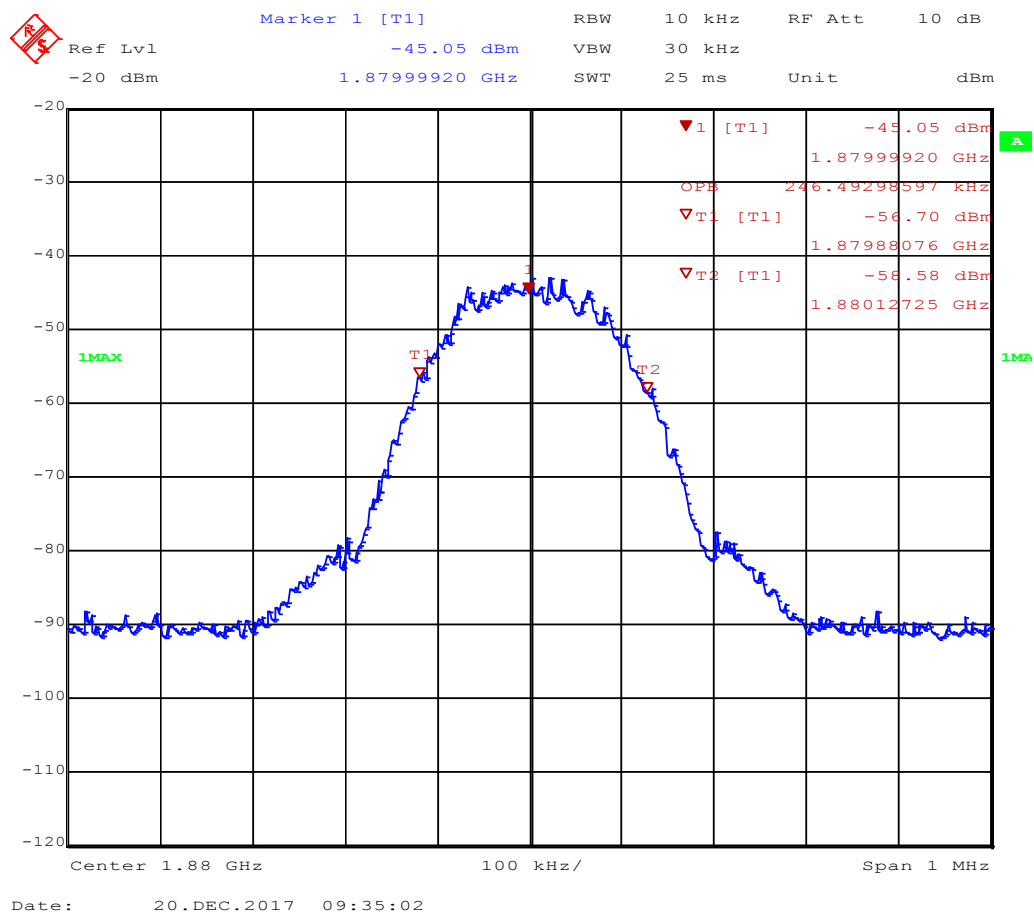
Applicant: FALCOM GmbH
EUT Name: UMTS/GSM-Stick
Model: SAMBA3G-G
Test Site: Eurofins Product Service GmbH
Operator: Sebastian Suckow
Test Conditions: Tnom / Vnom
Mode: GSM 1900 CH. 512
Test Date: 2017-12-20
Verdict: NONE (INFORMATION ONLY)



Occupied Bandwidth

Project Number: G0M-1712-7088

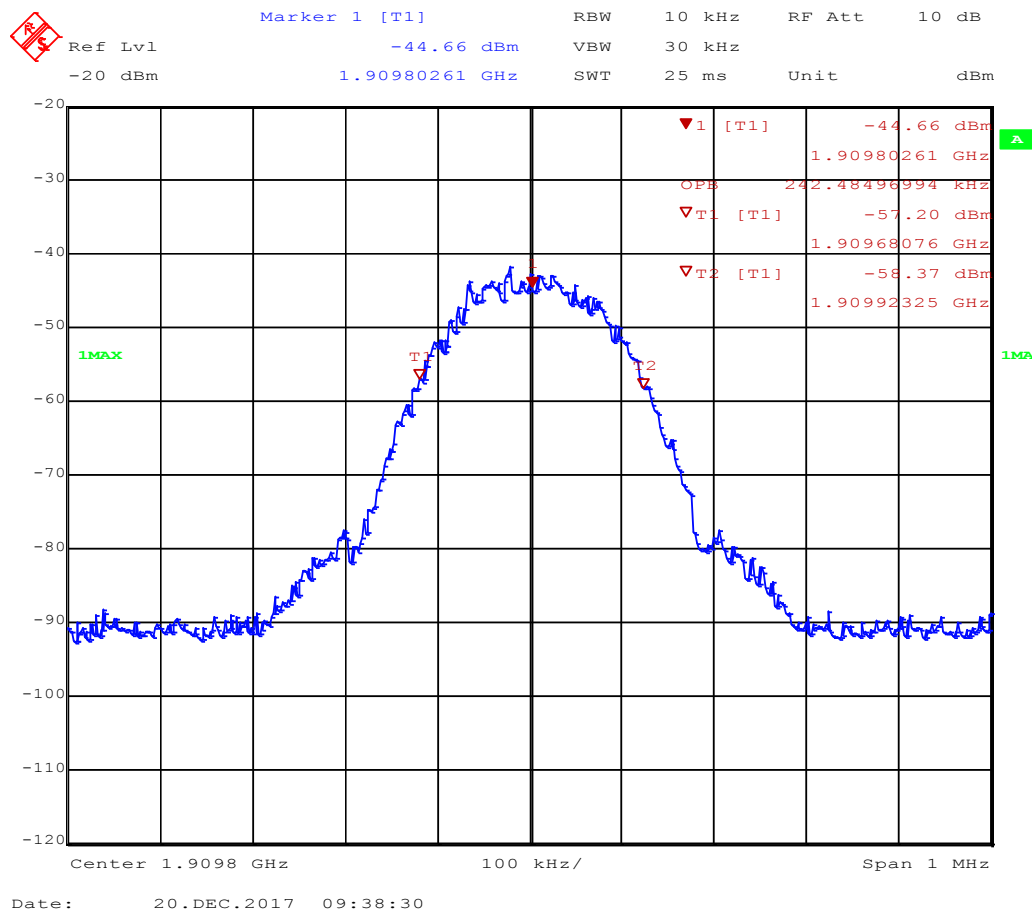
Applicant: FALCOM GmbH
 EUT Name: UMTS/GSM-Stick
 Model: SAMBA3G-G
 Test Site: Eurofins Product Service GmbH
 Operator: Sebastian Suckow
 Test Conditions: Tnom / Vnom
 Mode: GSM 1900 CH. 661
 Test Date: 2017-12-20
 Verdict: NONE (INFORMATION ONLY)



Occupied Bandwidth

Project Number: G0M-1712-7088

Applicant: FALCOM GmbH
EUT Name: UMTS/GSM-Stick
Model: SAMBA3G-G
Test Site: Eurofins Product Service GmbH
Operator: Sebastian Suckow
Test Conditions: Tnom / Vnom
Mode: GSM 1900 CH. 810
Test Date: 2017-12-20
Verdict: NONE (INFORMATION ONLY)



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

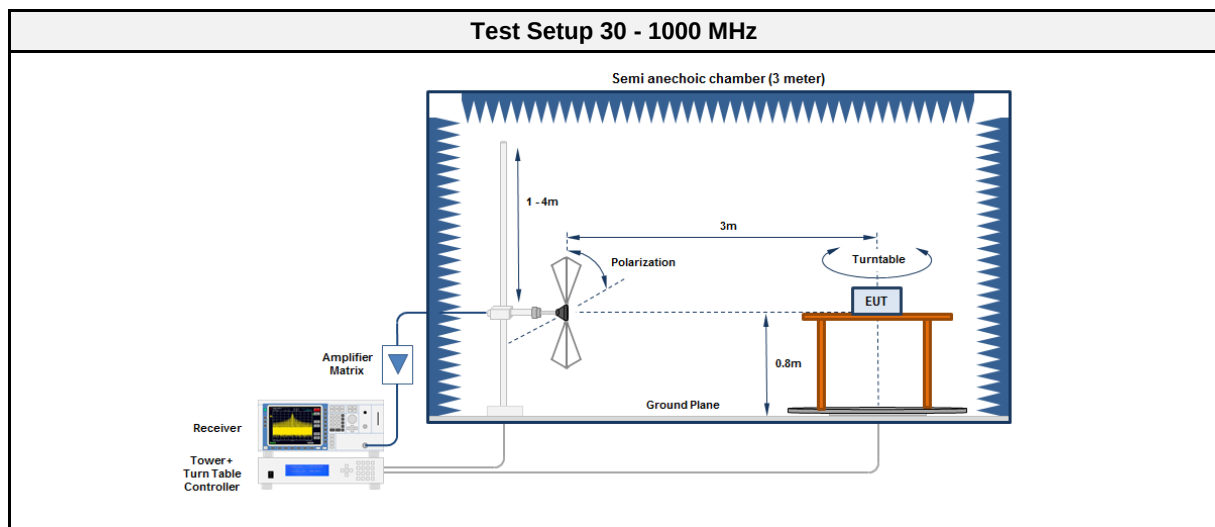
3.2.1 Information

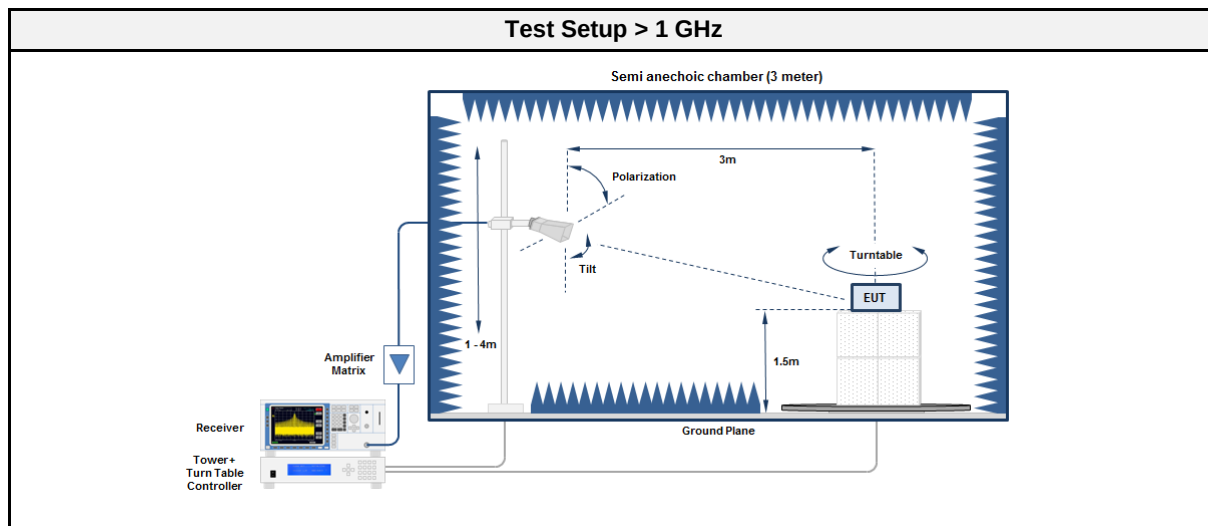
Test Information	
Reference	FCC § 22.913(a) / FCC § 24.232(c) ISED RSS-132 § 4.4 / IC RSS-133 § 6.4
Measurement Method	FCC § 22.913(a) / FCC § 24.232(c) / ANSI/TIA-603-D ISED RSS-132 § 4.4 / ISED RSS-133 § 6.4 / ANSI C63.26-2015 5.2
Operator	Sebastian Suckow
Date	2017-12-19

3.2.2 Limits

Limits		
Carrier frequency range [MHz]	Equipment type	Power limit
824 - 849	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	Mobile transmitter	FCC: 2 Watts (33 dBm) e.i.r.p. ISED: 2 Watts (33dBm) e.i.r.p.

3.2.3 Setup





3.2.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	-	-
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2017-08	2018-08
Antenna	R&S	HL 223	EF00187	2016-05	2019-05
Antenna	R&S	BBHA 9120D	EF01153	2017-08	2018-08

3.2.5 Procedure

Test Procedure
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

3.2.6 Results

Test Results - GSM850 E.R.P.						
Frequency [MHz]	Mode	Pol.	Power [e.r.p.]	Limit [e.r.p.]	Margin [dB]	Result
824.2	GPRS	hor	25.1	38.45	-13.35	PASS
836.2	GPRS	hor	26.1	38.45	-12.35	PASS
848.8	GPRS	hor	27.1	38.45	-11.35	PASS
Test Results - GSM850 E.I.R.P.						
Frequency [MHz]	Mode	Pol.	Power [e.i.r.p.]	Limit [e.i.r.p.]	Margin [dB]	Result
824.2	GPRS	hor	27.3	40.6	-13.30	PASS
836.2	GPRS	hor	28.3	40.6	-12.30	PASS
848.8	GPRS	hor	29.3	40.6	-11.30	PASS

Test Results - GSM1900 E.I.R.P.						
Frequency [MHz]	Mode	Pol.	Power [e.i.r.p.]	Limit [e.i.r.p.]	Margin [dB]	Result
1850.2	GPRS	hor	16.6	33	-16.40	PASS
1880.0	GPRS	hor	12.7	33	-20.30	PASS
1909.8	GPRS	hor	12.1	33	-20.90	PASS

3.3 Test Conditions and Results - Transmitter radiated emissions

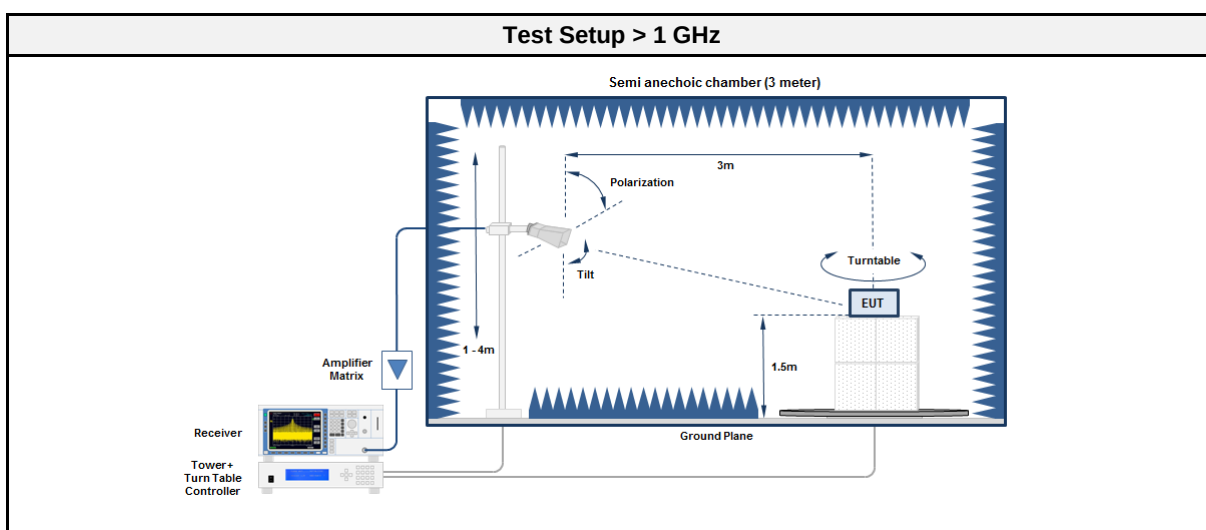
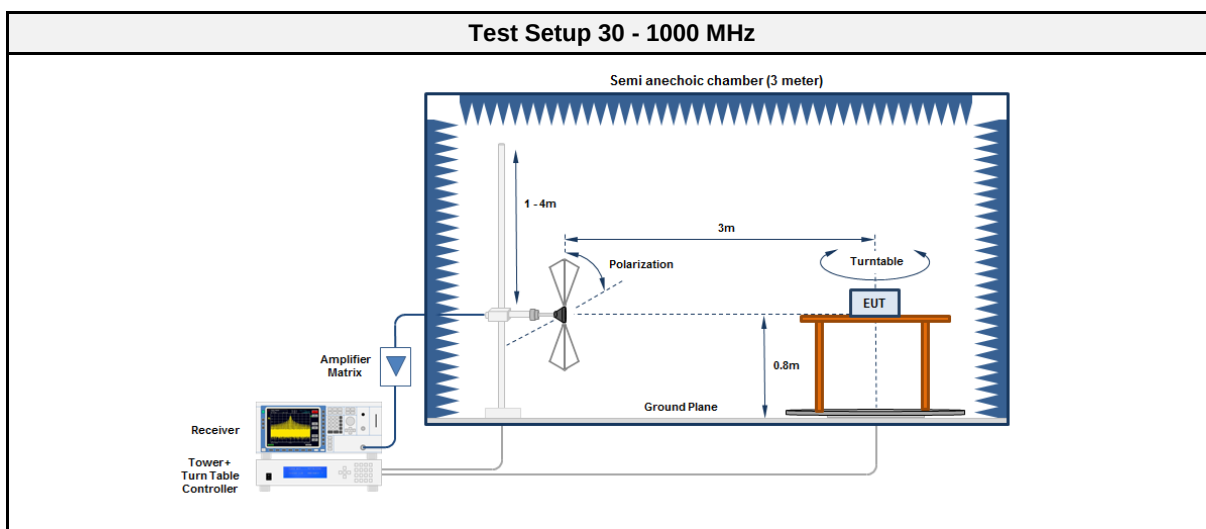
3.3.1 Information

Test Information	
Reference	FCC § 22.917(a) / FCC § 24.238(a) ISED RSS-132 § 4.5 / ISED RSS-133 § 6.5
Measurement Method	ANSI/TIA-603-D / ANSI C63.26-2015 5.5
Operator	Sebastian Suckow
Date	2017-12-19 – 2017-12-22

3.3.2 Limits

Limits	
Carrier frequency range [MHz]	Limit
824-849	Attenuation below transmitter power $\geq 43 + 10 \cdot \log_{10}(P)$ [dB] = -13 dBm
1850 - 1910	Attenuation below transmitter power $\geq 43 + 10 \cdot \log_{10}(P)$ [dB] = -13 dBm

3.3.3 Setup



3.3.4 Equipment

Test Equipment 30 - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	-	-
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2017-08	2018-08
Antenna	R&S	HK 116	EF00186	2016-02	2018-02
Antenna	R&S	HL 223	EF00202	2016-02	2018-02

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	-	-
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2017-08	2018-08
Antenna	R&S	BBHA 9120D	EF01153	2017-08	2018-08
Antenna	Amplifier Research	AT4560	EF01152	2017-10	2018-10

3.3.5 Procedure

Test Procedure 30 - 1000 MHz	
1. EUT is placed on a non conducting support at the center of a turn table 0.8 m above the ground 2. EUT set to test mode 3. The receiver is set to peak detection with max hold 4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m 5. All significant emissions are measured again using the corresponding final detector	

Test Procedure > 1 GHz	
1. EUT is placed on a non conducting support at the center of a turn table 1.5 m above the ground 2. EUT set to test mode 3. The receiver is set to peak detection with max hold 4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m 5. All significant emissions are measured again using the corresponding final detector	

3.3.6 Results

Test Results - GSM850						
Frequency [MHz]	Mode	Emission [MHz]	Level [dBm]	Pol.	Limit [dBm]	Margin [dB]
824.2	GPRS	823	-15.6	ver	-13	-02.60
824.2	GPRS	1648	-47.5	hor	-13	-34.50
836.2	GPRS	1672	-49.2	hor	-13	-36.20
836.2	GPRS	1672	-56.6	ver	-13	-43.60
848.8	GPRS	850	-15.0	hor	-13	-02.00
848.8	GPRS	850	-17.4	ver	-13	-04.40

Test Results - GSM1900						
Frequency [MHz]	Mode	Emission [MHz]	Level [dBm]	Pol.	Limit [dBm]	Margin [dB]
1850.2	GPRS	1850	-23.0	hor	-13	-10.00
1850.2	GPRS	14800	-42.6	hor	-13	-29.60
1880.0	GPRS	15040	-39.0	hor	-13	-26.00
1909.8	GPRS	1910	-26.1	hor	-13	-13.10
1909.8	GPRS	1910	-26.5	ver	-13	-13.50
1909.8	GPRS	15270	-36.1	hor	-13	-23.10

3.4 Test Conditions and Results - Receiver radiated emissions

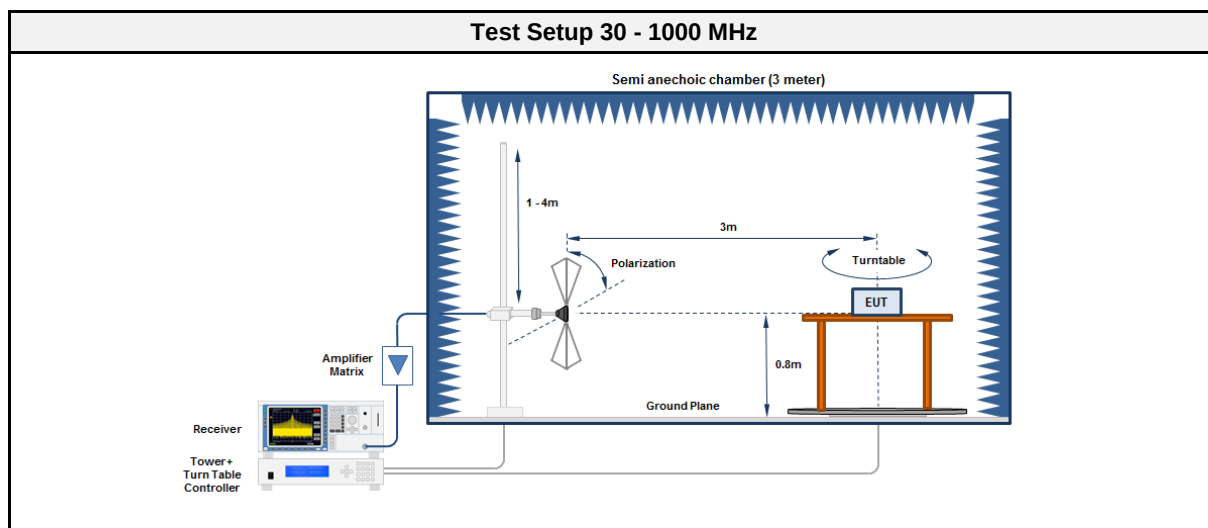
3.4.1 Information

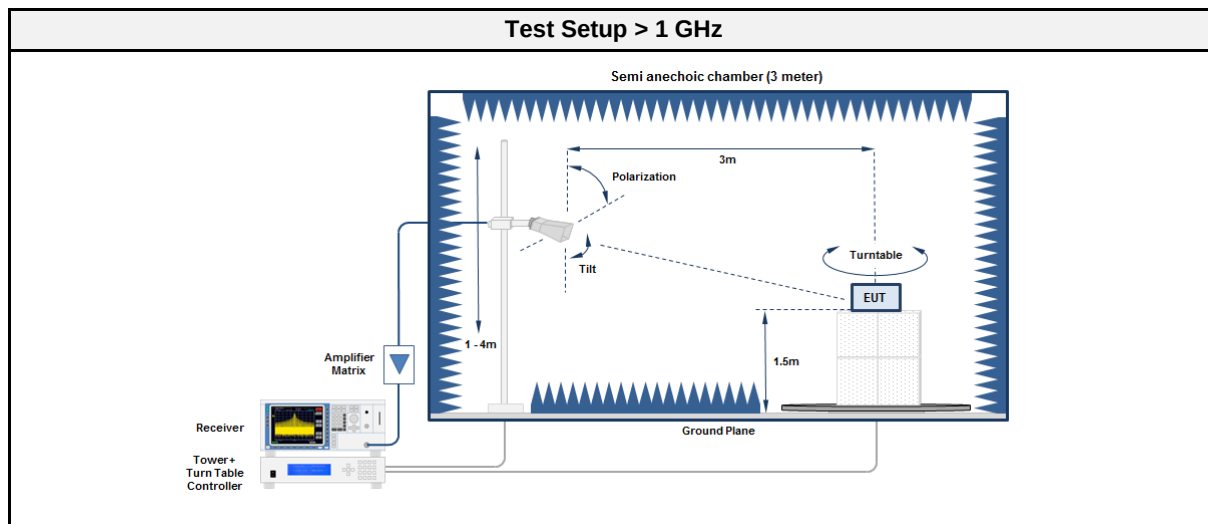
Test Information	
Reference	ISED RSS-132 5.6 / 133 6.6
Measurement Method	ANSI C63.4
Operator	Sebastian Suckow
Date	2017-12-19 – 2017-12-22

3.4.2 Limits

Limits				
Frequency [MHz]	Detector	Limit [$\mu\text{V/m}$]	Limit [$\text{dB}\mu\text{V/m}$]	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

3.4.3 Setup





3.4.4 Equipment

Test Equipment 30 - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	-	-
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2017-08	2018-08
Antenna	R&S	HK 116	EF00186	2016-02	2018-02
Antenna	R&S	HL 223	EF00202	2016-02	2018-02

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	-	-
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2017-08	2018-08
Antenna	R&S	BBHA 9120D	EF01153	2017-08	2018-08
Antenna	Amplifier Research	AT4560	EF01152	2017-10	2018-10

3.4.5 Procedure

Test Procedure 30 - 1000 MHz
1. EUT is placed on a non conducting support at the center of a turn table 0.8 m above the ground 2. EUT set to test mode 3. The receiver is set to peak detection with max hold 4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m 5. All significant emissions are measured again using the corresponding final detector

Test Procedure > 1 GHz
1. EUT is placed on a non conducting support at the center of a turn table 1.5 m above the ground 2. EUT set to test mode 3. The receiver is set to peak detection with max hold 4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m 5. All significant emissions are measured again using the corresponding final detector

3.4.6 Results

Test Results - GSM850						
Frequency [MHz]	Mode	Emission [MHz]	Level [dBμV/m]	Pol.	Limit [dBμV/m]	Margin [dB]
836.2	Idle	7495	50.17	ver	53.98	-03.81

Test Results - GSM1900						
Frequency [MHz]	Mode	Emission [MHz]	Level [dBμV/m]	Pol.	Limit [dBμV/m]	Margin [dB]
1880.0	Idle	1950	47.37	ver	53.98	-06.61