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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
Industry Canada RSS-133, Issue 5
2GHz Personal Communication Services

Report Reference No. ..... :	G0M-1601-5302-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 Filed Test Laboratory, Reg.-No.: 96970 IC OATS Filing assigned code: 3470A
Applicant's name ..... :	lesswire GmbH
Address ..... :	Rudower Chaussee 30 12489 Berlin GERMANY
Test specification:	
Standard..... :	47 CFR Part 22H, 47 CFR Part 24E RSS-132, Issue 3 : 2013-01, RSS-133, Issue 6 : 2013-01 RSS-Gen, Issue 4, 2014-11, ANSI/TIA-603-D-2010 KDB 971168
Equipment under test (EUT):	
Product description	WLAN-LTE-Router
Model No.	CCU5
Additional Model(s)	None
Brand Name(s)	None
Hardware version	C/BWIA3
Firmware / Software version	1.0.119
	FCC-ID: 2AHHACCU5 IC: N/A
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	2016-01-06	
Date (s) of performance of tests	2016-01-07 - 2016-01-11	
Compiled by	Burkhard Pudell	
Tested by (+ signature) (Responsible for Test)	Burkhard Pudell	B. Pudell
Approved by (+ signature) (Head of Lab)	Christian Weber	C. Weber
Date of issue	2016-03-24	
Total number of pages	44	

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.

Additional comments:

Test case selection is based on full modular approval of licensed transmitter module used by the EUT. The EUT uses a GSM/GPRS/WCDMA 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	2016-03-10	Initial Release	
02	2016-03-24	Hard- and Software Version corrected	C. Weber

REPORT INDEX

1 Equipment (Test item) Description

Description	WLAN-LTE-Router		
Model	CCU5		
Additional Model(s)	None		
Brand Name(s)	None		
Serial number	None		
Hardware version	C/BWIA3		
Software / Firmware version	1.0.119		
FCC-ID	QISME909TU-565		
IC	N/A		
Equipment type	End product		
Equipment classification	Mobile Device (Human Body distance > 20 cm)		
Radio type	Transceiver		
Radio technology	GSM850 / GSM1900 / UTRA (UMTS)		
Operating frequency range	GSM850 : TX = 824 - 849 MHz, RX = 869 - 894 MHz UMTS FDD V : TX = 824 - 849 MHz, RX = 869 - 894 MHz GSM1900: TX = 1850 - 1910 MHz, RX = 1930 - 1990 MHz UMTS FDD II : 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 UMTS FDD V	F_{LOW}	CH : 4133 UL: 826.6 MHz	CH : 4358 DL: 871.6 MHz
	F_{MID}	CH : 4175 UL: 835.0 MHz	CH : 4400 DL: 880.0 MHz
	F_{HIGH}	CH : 4232 UL: 846.4 MHz	CH : 4457 DL: 891.4 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
Main test frequencies UMTS FDD II	F_{LOW}	CH : 9263 UL: 1852.6 MHz	CH : 9663 DL: 1932.6 MHz
	F_{MID}	CH : 9400 UL: 1880.0 MHz	CH : 9800 DL: 1960.0 MHz
	F_{HIGH}	CH : 9537 UL: 1907.4 MHz	CH : 9937 DL: 1987.4 MHz
Supported transmission modes	GSM, GPRS, HSDPA; HSUPA		
Multislot class	12		
Channel raster	200kHz		
Number of antennas	1x TX, 1x RX		

Radio module	Type	GSM/3G module
	Model	ME909Tu-565
	Manufacturer	Huawei
	HW Version	P/N:55010129
	SW Version	00.02.08_US
	FCC-ID	QISME909TU-565
	IC	N/A
Antenna 1	Type	external dedicated
	Model	AN00899758
	Manufacturer	Techship
	Gain	2.14 dBi
Antenna 2	Type	external dedicated
	Model	AN00899758
	Manufacturer	Techship
	Gain	2.14 dBi
Manufacturer	lesswire GmbH Rudower Chaussee 30 12489 Berlin GERMANY	
Power supply	V_{NOM}	12 or 24 VDC (Car Battery only)
	V_{MIN}	N/A
	V_{MIN}	N/A
AC/DC-Adaptor	Model	N/A
	Vendor	N/A
	Input	N/A
	Output	N/A

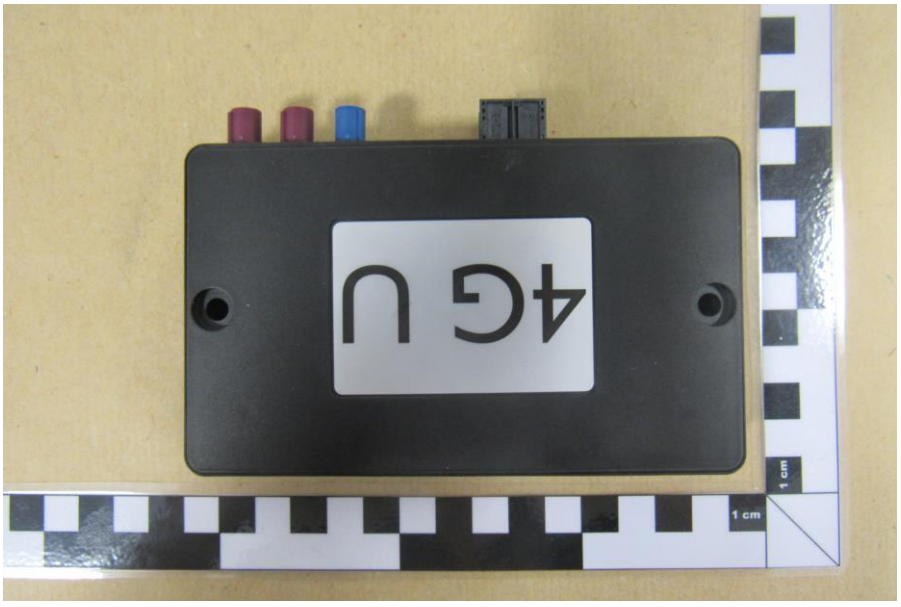
1.1 Photos – Equipment External

EUT FRONT

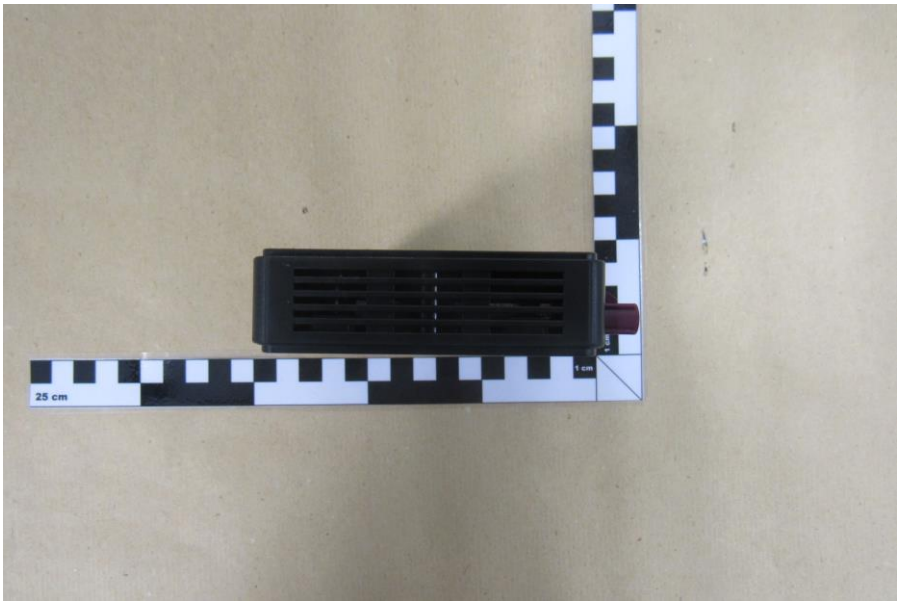

EUT BACK


EUT TOP

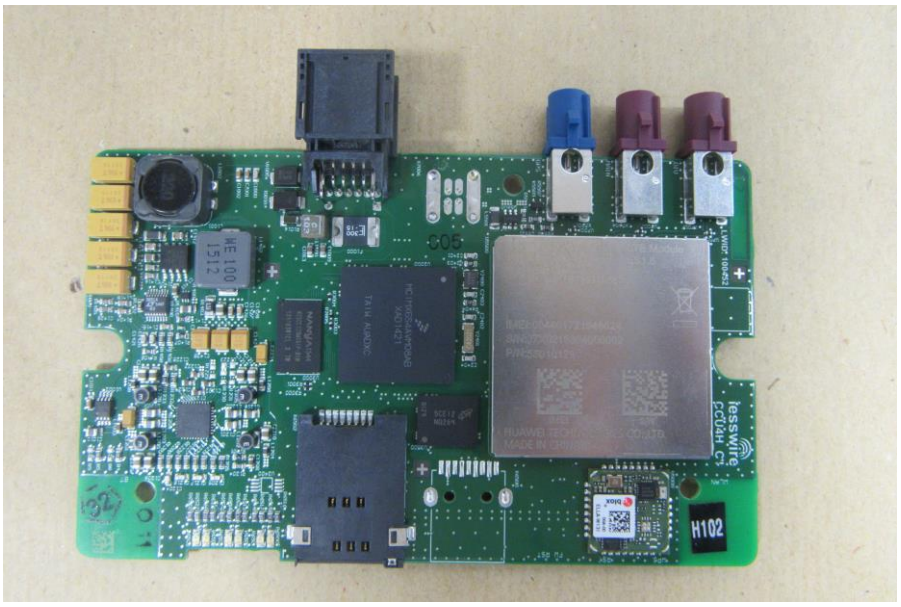
EUT BOTTOM

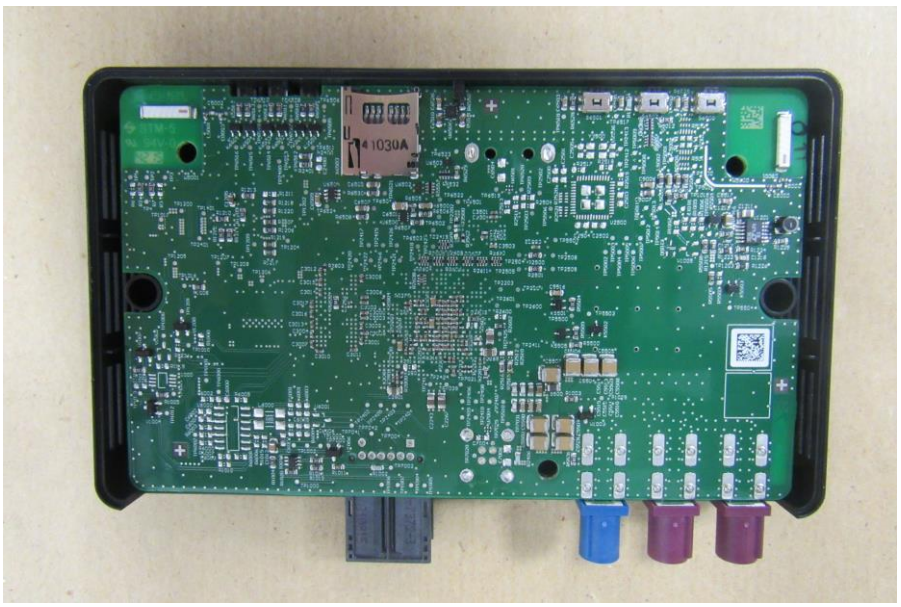


EUT LEFT


EUT RIGHT


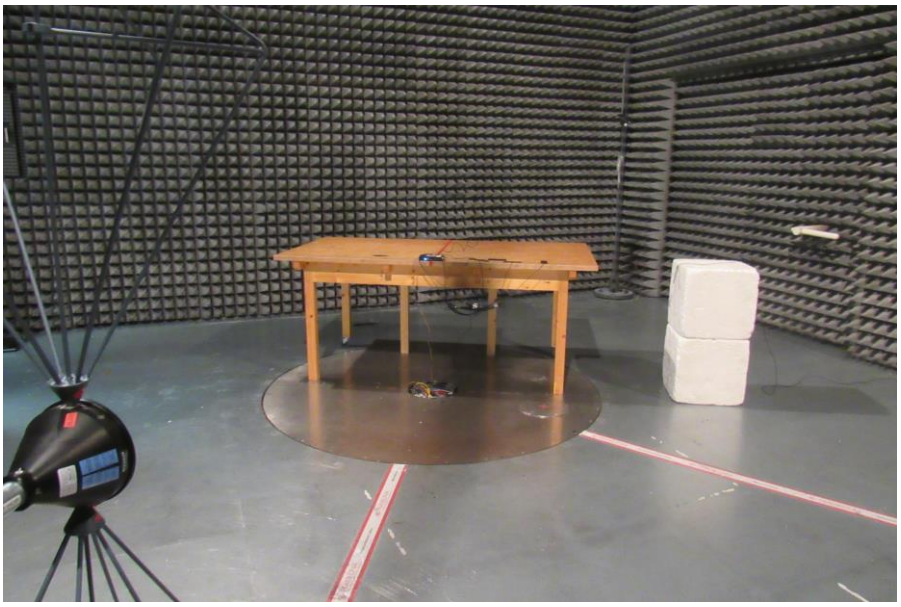
1.2 Photos – Equipment internal

EUT PCB FRONT


EUT PCB BACK


EUT 2-3G MODULE FRONT


1.3 Photos – Test setup

TESTSETUP


1.4 Supporting Equipment Used During Testing

Product Type*	Device	Manufacturer	Model No.	Comments
SIM	Network	R&S	CMU200	GSM-Tester

***Note:** Use the following abbreviations:

AE : Auxiliary/Associated Equipment, or

SIM : Simulator (Not Subjected to Test)

CABL : Connecting cables

1.5 Test Modes

Mode #	Description	
GPRS850	General conditions:	EUT powered by battery. External GSM/WCDMA and GPS antenna connected. Active call to communication tester.
	Radio conditions:	Mode = transmit Connection = Packet switched Modulation = GMSK Slot configuration = 1 up / 1 down Power level = Maximum
GPRS1900	General conditions:	EUT powered by battery. External GSM/WCDMA and GPS antenna connected. Active call to communication tester.
	Radio conditions:	Mode = transmit Connection = Packet switched Modulation = GMSK Slot configuration = 1 up / 1 down Power level = Maximum
EGPRS850	General conditions:	EUT powered by battery. External GSM/WCDMA and GPS antenna connected. Active call to communication tester.
	Radio conditions:	Mode = transmit Connection = Packet switched Modulation = 8-PSK Slot configuration = 1 up / 1 down Power level = Maximum
EGPRS1900	General conditions:	EUT powered by battery. External GSM/WCDMA and GPS antenna connected. Active call to communication tester.
	Radio conditions:	Mode = transmit Connection = Packet switched Modulation = 8-PSK Slot configuration = 1 up / 1 down Power level = Maximum
HSPA II	General conditions:	EUT powered by battery. External GSM/WCDMA and external GPS antenna connected. Active call to communication tester.
	Radio conditions:	Mode = transmit Connection = Packet Switched Modulation = QPSK Configuration = RMC 12.2kbps + HSPA Power level = Maximum

HSPA V	General conditions:	EUT powered by battery. External GSM/WCDMA and external GPS antenna connected. Active call to communication tester.
	Radio conditions:	Mode = transmit Connection = Packet Switched Modulation = QPSK Configuration = RMC 12.2kbps + HSPA Power level = Maximum
GSM850-RX	General conditions:	EUT powered by battery. External GSM/WCDMA and external GPS antenna connected.
	Radio conditions:	Mode = receive Connection = RX-Idle
GSM1900-RX	General conditions:	EUT powered by battery. External GSM/WCDMA and external GPS antenna connected.
	Radio conditions:	Mode = receive Connection = RX-Idle
WCDMA V- RX	General conditions:	EUT powered by battery. External GSM/WCDMA and external GPS antenna connected.
	Radio conditions:	Mode = receive Connection = Sign. RAB Cell FACH
WCDMA II- RX	General conditions:	EUT powered by battery. External GSM/WCDMA and external GPS antenna connected.
	Radio conditions:	Mode = receive Connection = Sign. RAB Cell FACH

1.6 Test Equipment Used During Testing

Measurement Software			
Description	Manufacturer	Name	Version
EMC Test Software	Dare Instruments	Radimation	2014.1.15

Occupied Bandwidth					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSP 30	EF00312	2015-02	2016-02

Radiated power					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Fully-anechoic chamber	Frankonia	AC 3	EF00199	--	--
Spectrum Analyzer	R&S	FSIQ 26	EF00242	2015-04	2016-04
Biconical Antenna	R&S	HK 116	EF00012	2013-02	2016-02
LPD Antenna	R&S	HL 223	EF00187	2014-03	2017-03
LPD Antenna	R&S	HL 025	EF00327	2015-10	2018-10
Communication tester	R&S	CMU 200	EF00305	2015-09	2016-09
Communication tester	R&S	CMW 500	EF00677	2014-10	2016-10

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	2016-01	2017-01
Biconical Antenna	R&S	HK 116	EF00012	2013-02	2016-02
LPD Antenna	R&S	HL 223	EF00212	2013-02	2016-02
LPD Antenna	R&S	HL 025	EF00327	2015-10	2018-10
Communication tester	R&S	CMU 200	EF00305	2015-09	2016-09
Communication tester	R&S	CMW 500	EF00677	2014-10	2016-10

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 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:

Reading on Analyzer (dBµV) + A.F. (dB) = Net field strength (dBµV/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:

Limit (dBµV/m) = 20*log (µV/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

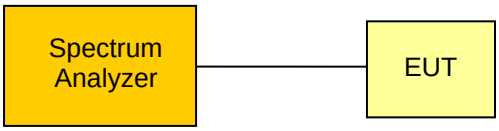
2 Result Summary

FCC 47 CFR Part 22H, 24E, IC 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		Informational only
FCC § 24.235 FCC § 22.355 IC RSS-132 § 4.3 IC RSS-133 § 6.3	Frequency stability	FCC § 24.235 FCC § 22.355 IC RSS-132 § 4.3 IC RSS-133 § 6.3 KDB 971168	N/R	
FCC § 22.913(a)	Effective radiated power	ANSI/TIA-603-D KDB 971168	PASS	
FCC § 24.232(c) IC RSS-132 § 4.4 IC RSS-133 § 6.4	Equivalent isotropic radiated power	ANSI/TIA-603-D KDB 971168	PASS	
FCC § 24.232(d) IC RSS-133 § 6.4	Peak to average ratio	FCC § 24.232(d) IC RSS-133 § 6.4 KDB 971168	N/R	
FCC § 22.917(b) FCC § 24.238(b) IC RSS-132 § 4.5 IC RSS-133 § 6.5	Band-edge compliance	FCC § 22.917(b) FCC § 24.238(b) IC RSS-132 § 4.5 IC RSS-133 § 6.5 KDB 971168	N/R	
FCC § 22.917(a) FCC § 24.238(a) IC RSS-132 § 4.5 IC RSS-133 § 6.5	Conducted out-of-band emissions	FCC § 22.917(a) FCC § 24.238(a) IC RSS-132 § 4.5 IC RSS-133 § 6.5 KDB 971168	N/R	
FCC § 22.917(a) FCC § 24.238(a) IC RSS-132 § 4.5 IC RSS-133 § 6.5	Radiated out-of-band emissions	ANSI/TIA-603-D KDB 971168	PASS	
IC RSS-132 § 4.6 IC RSS-133 § 6.6 IC RSS-Gen 7.1	Receiver radiated spurious emissions	IC RSS-132 § 4.6 IC RSS-133 § 6.6 IC RSS-Gen 7.1 KDB 971168	PASS	
Remarks:				

3 Test Conditions and Results

3.1 Test Conditions and Results – Occupied Bandwidth

Occupied Bandwidth acc. to IC RSS-Gen	
Test according to measurement reference	Reference Method
	RSS-Gen 6.6
Test frequency range	Tested frequencies
	F_{LOW} / F_{MID} / F_{HIGH}
Limits	
None (Informational only)	
Test setup	



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

Test results – GSM850

Channel	Frequency [MHz]	Mode	Occupied Bandwidth [kHz]
F_{LOW}	824.2	GPRS850	246.5
F_{MID}	836.2	GPRS850	250.5
F_{HIGH}	848.8	GPRS850	246.5
F_{LOW}	824.2	EGPRS850	244.5
F_{MID}	836.2	EGPRS850	246.5
F_{HIGH}	848.8	EGPRS850	246.5

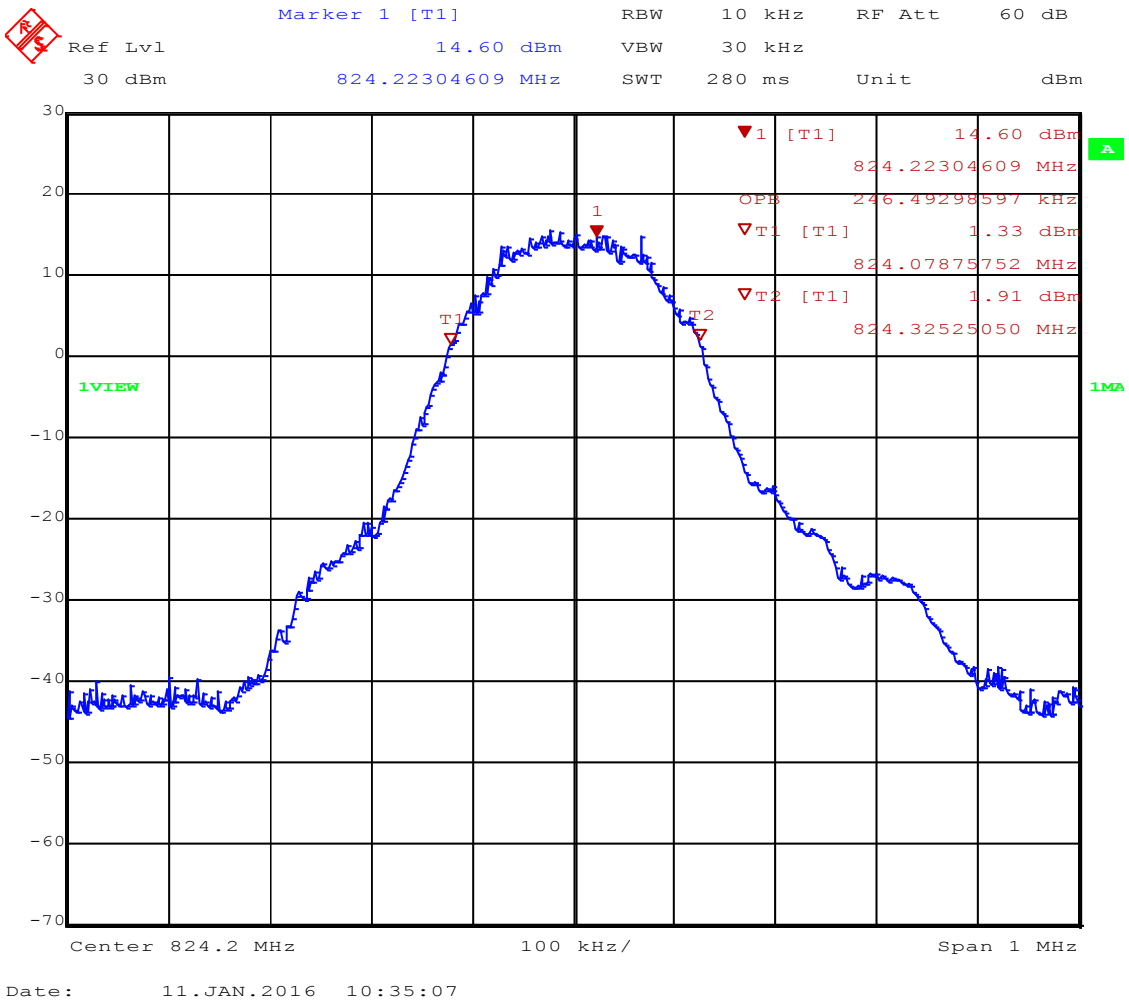
Test results – GSM1900			
Channel	Frequency [MHz]	Mode	Occupied Bandwidth [kHz]
F_{LOW}	1850.2	GPRS1900	244.5
F_{MID}	1880.0	GPRS1900	242.5
F_{HIGH}	1909.8	GPRS1900	242.5
F_{LOW}	1850.2	EGPRS1900	248.5
F_{MID}	1880.0	EGPRS1900	248.5
F_{HIGH}	1909.8	EGPRS1900	250.5
Test results – FDD II			
Channel	Frequency [MHz]	Mode	Occupied Bandwidth [MHz]
F_{LOW}	1852.6	HSPA II	4.168
F_{MID}	1880.0	HSPA II	4.188
F_{HIGH}	1907.4	HSPA II	4.228
Test results – FDD V			
Channel	Frequency [MHz]	Mode	Occupied Bandwidth [MHz]
F_{LOW}	826.6	HSPA V	4.188
F_{MID}	835.0	HSPA V	4.208
F_{HIGH}	846.4	HSPA V	4.348
Comments:			

Occupied Bandwidth – GPRS850 F_{LOW}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1601-5302

Applicant:	lesswire GmbH
EUT Name:	2G/3G/4G WLAN Hotspot
Model:	CCU5.3.1 (BWIA3)
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:	2016-01-11
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 246.5 kHz

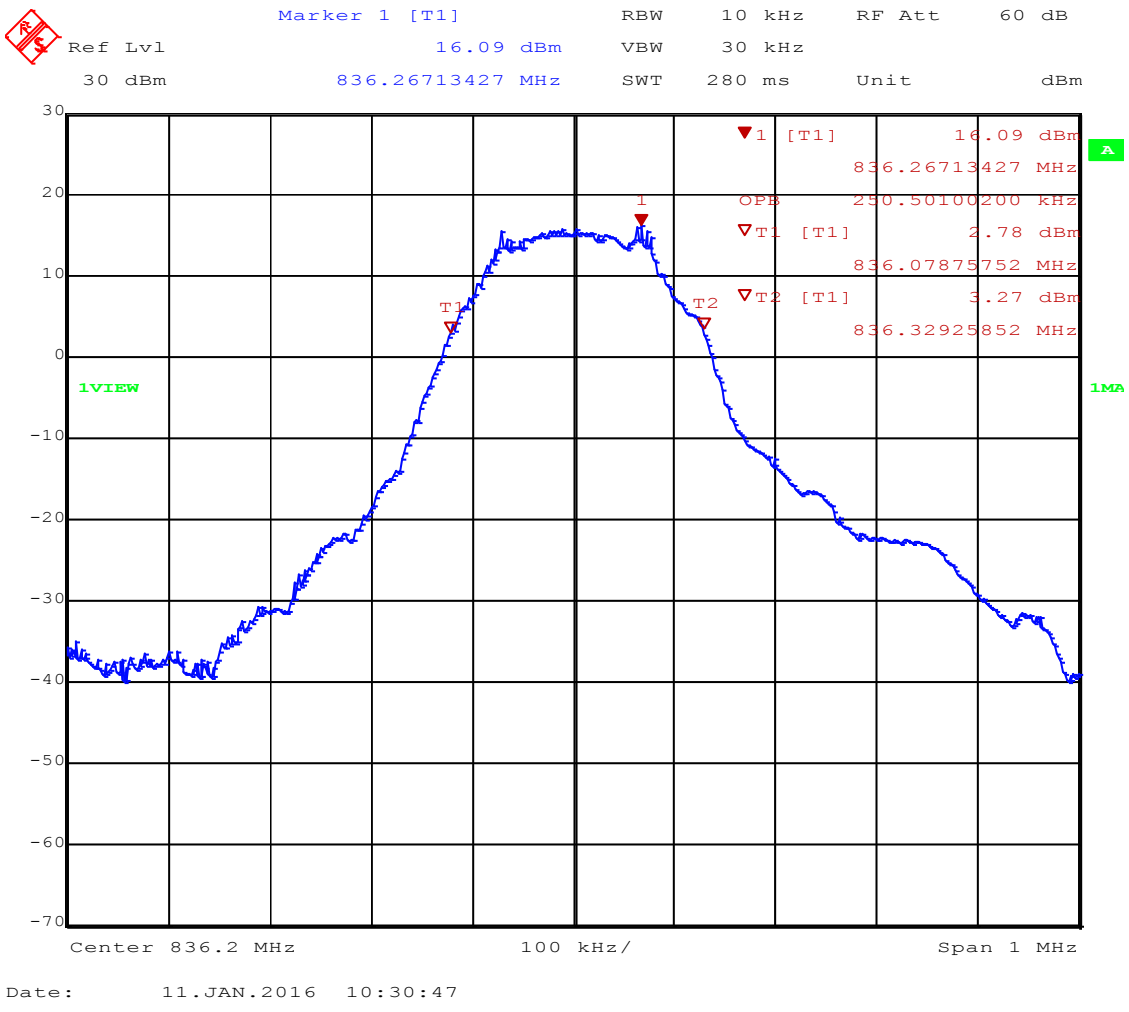


Occupied Bandwidth – GPRS850 F_{MID}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1601-5302

Applicant:	lesswire GmbH
EUT Name:	2G/3G/4G WLAN Hotspot
Model:	CCU5.3.1 (BWIA3)
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:	2016-01-11
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 250.5 kHz

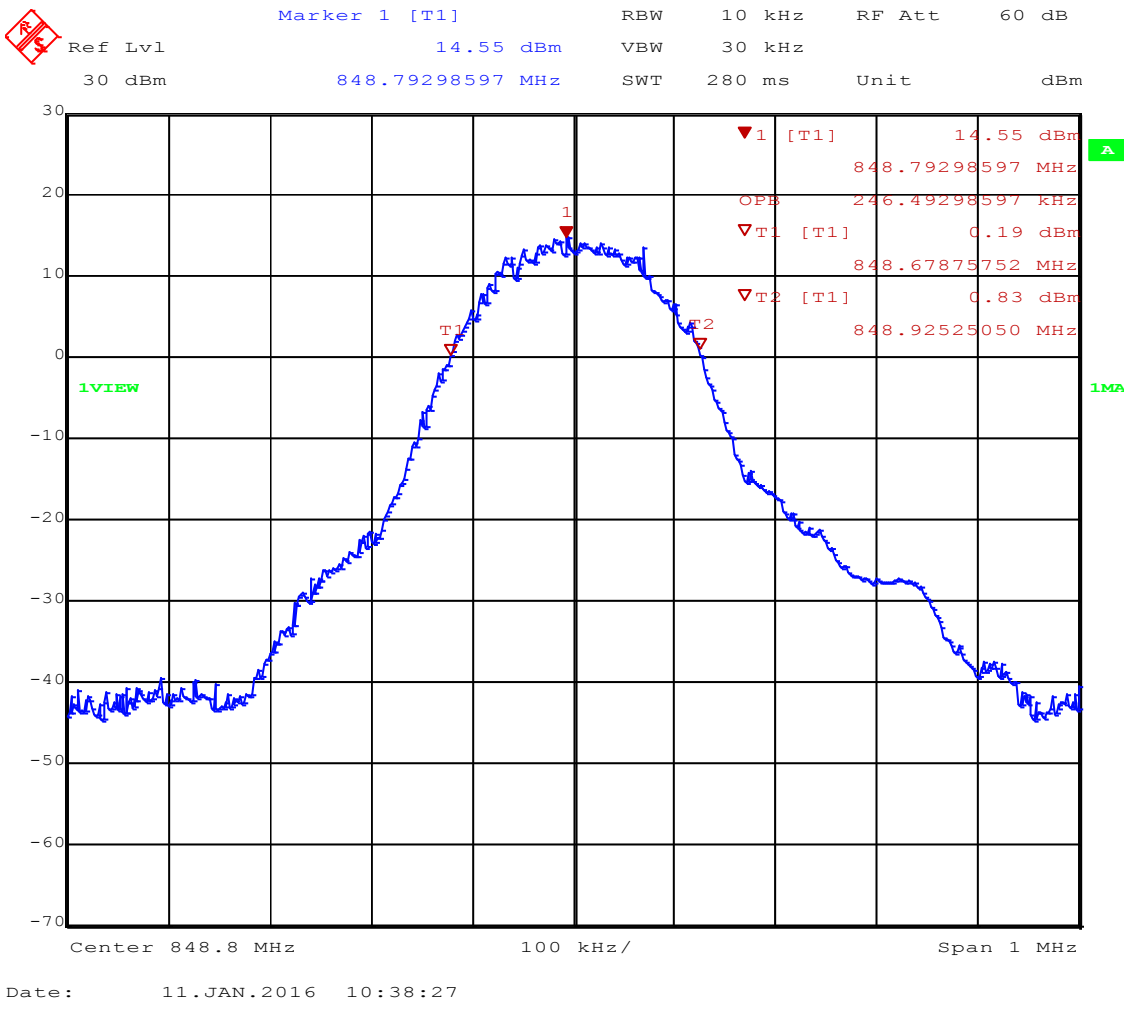


Occupied Bandwidth – GPRS850 F_{HIGH}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1601-5302

Applicant:	lesswire GmbH
EUT Name:	2G/3G/4G WLAN Hotspot
Model:	CCU5.3.1 (BWIA3)
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:	2016-01-11
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 246.5 kHz

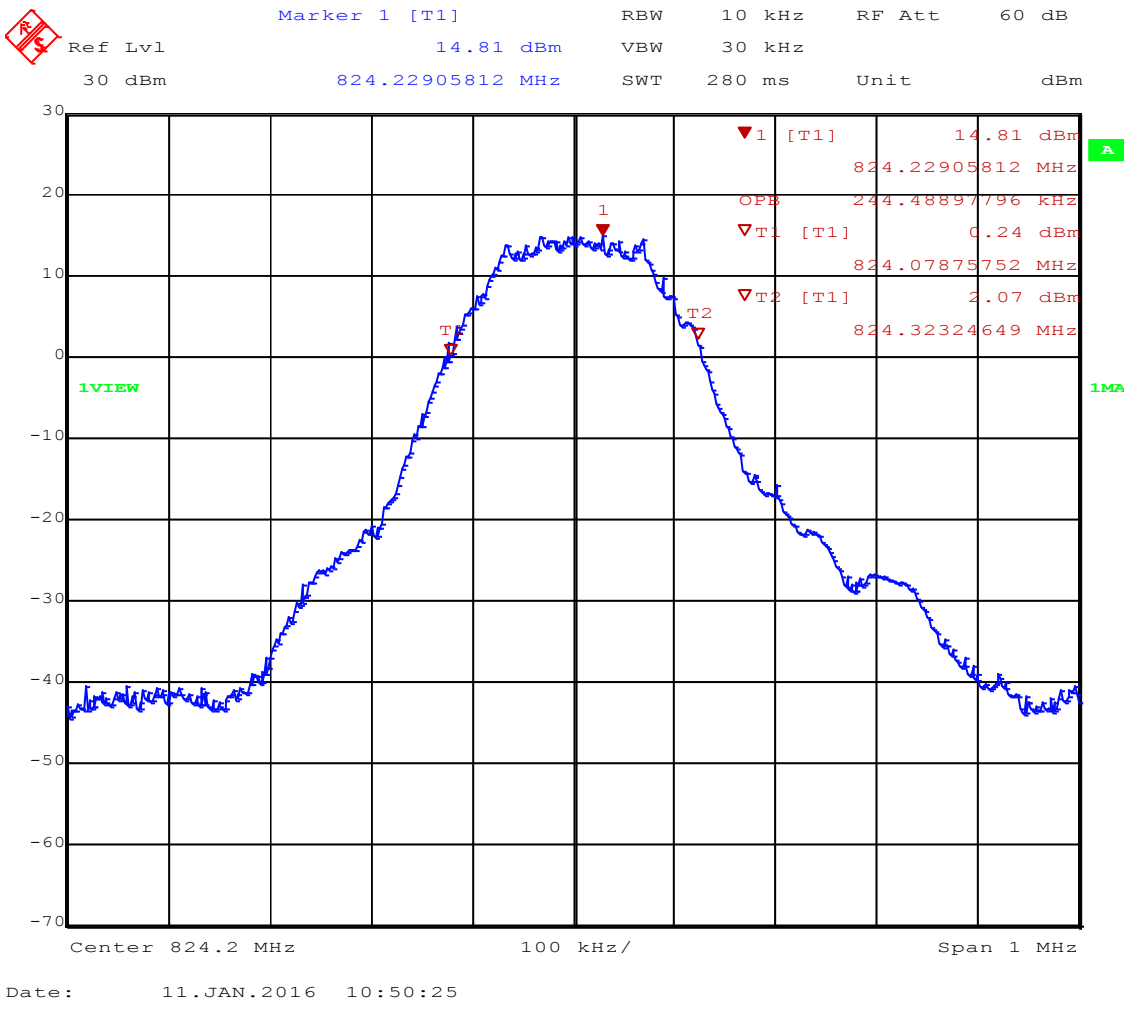


Occupied Bandwidth – EGPRS850 F_{LOW}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1601-5302

Applicant:	lesswire GmbH
EUT Name:	2G/3G/4G WLAN Hotspot
Model:	CCU5.3.1 (BWIA3)
Test Site:	Eurofins Product Service GmbH
Operator:	Burkhard Pudell
Test Conditions:	Tnom / Vnom
Mode:	EDGE 850 / CH: 128 / Gamma:5 (27 dBm) / Main Slot 2
Test Date:	2016-01-11
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 244.5 kHz

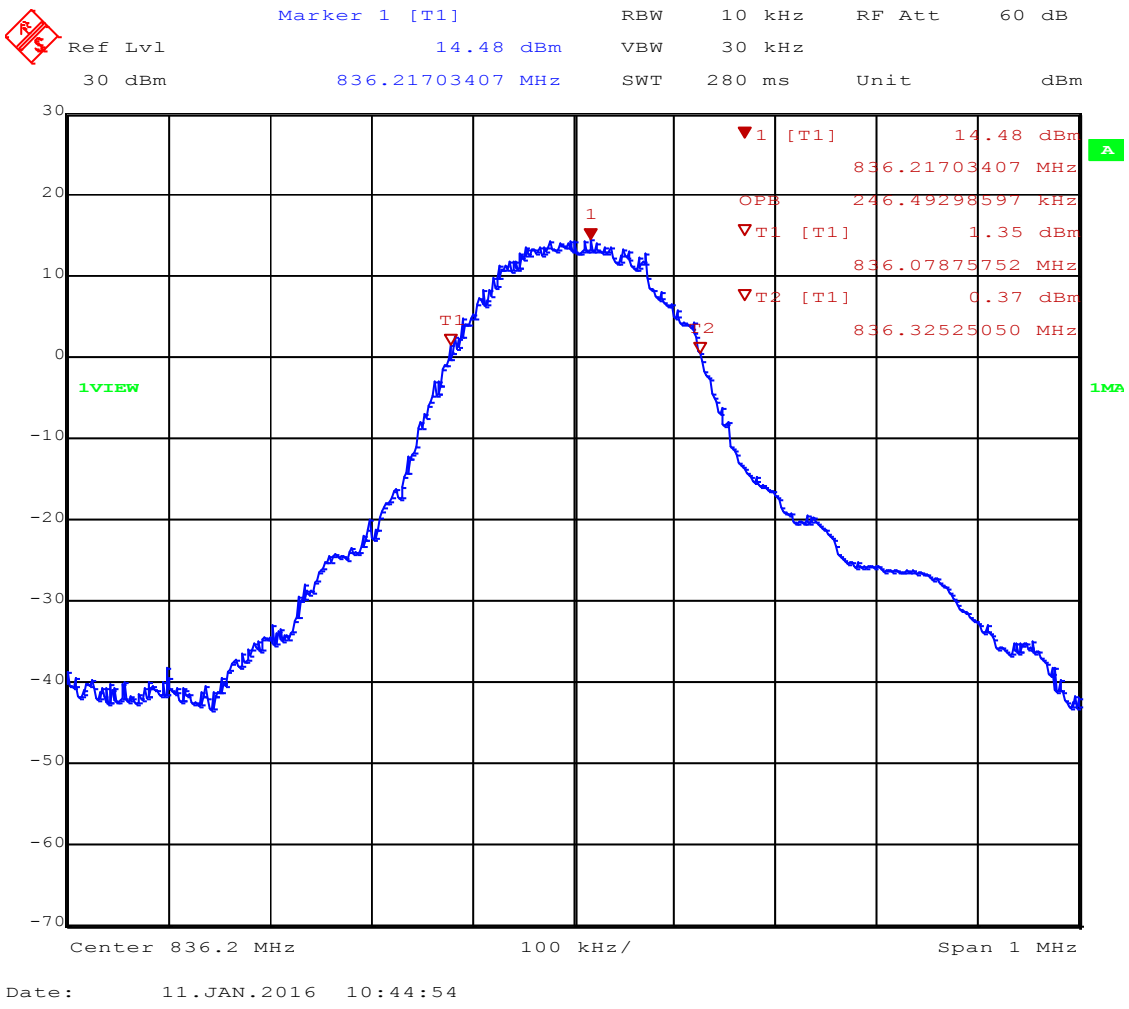


Occupied Bandwidth – EGPRS850 F_{MID}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1601-5302

Applicant:	lesswire GmbH
EUT Name:	2G/3G/4G WLAN Hotspot
Model:	CCU5.3.1 (BWIA3)
Test Site:	Eurofins Product Service GmbH
Operator:	Burkhard Pudell
Test Conditions:	Tnom / Vnom
Mode:	EDGE 850 / CH: 188 / Gamma:5 (27 dBm) / Main Slot 2
Test Date:	2016-01-11
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 246.5 kHz

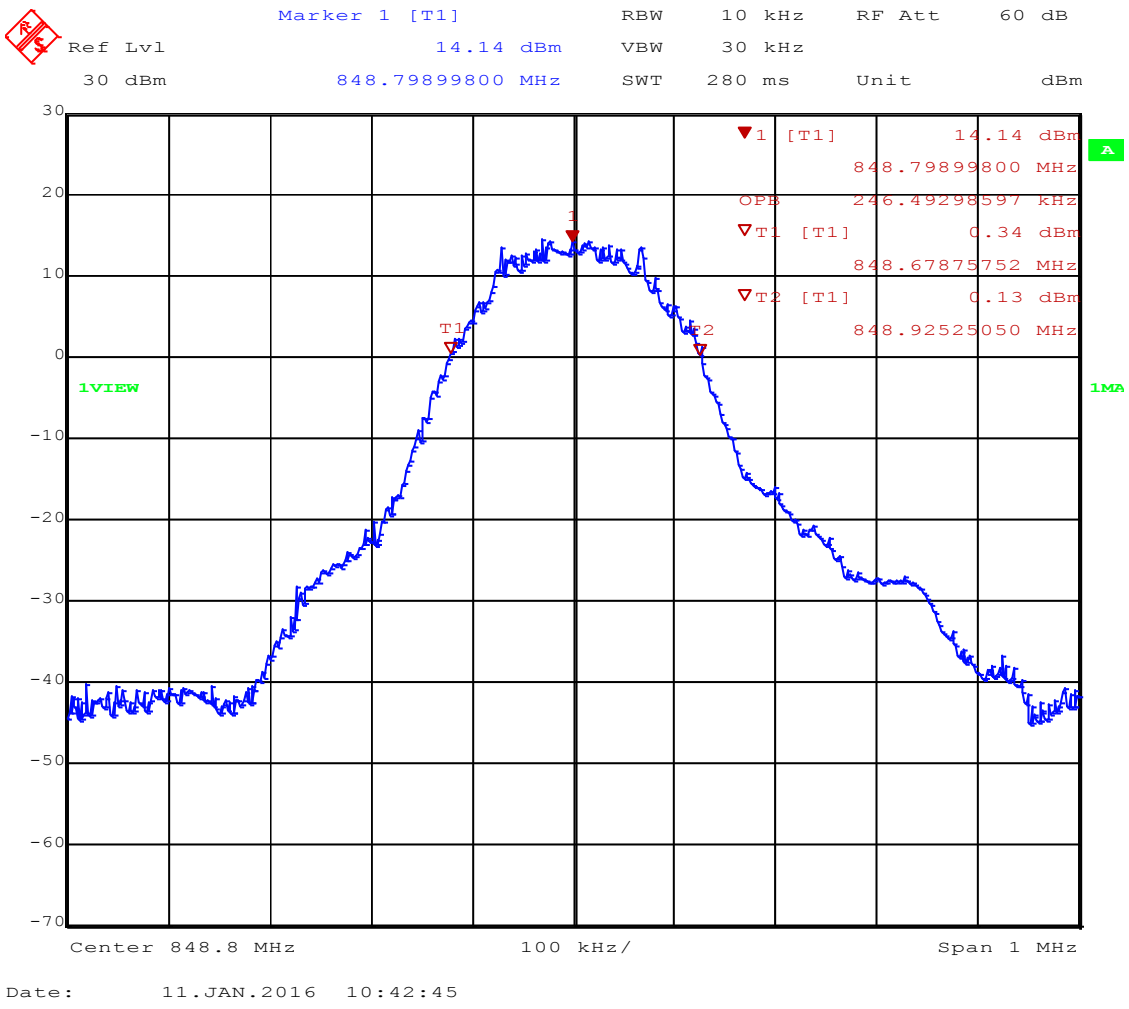


Occupied Bandwidth – EGPRS850 F_{HIGH}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1601-5302

Applicant:	lesswire GmbH
EUT Name:	2G/3G/4G WLAN Hotspot
Model:	CCU5.3.1 (BWIA3)
Test Site:	Eurofins Product Service GmbH
Operator:	Burkhard Pudell
Test Conditions:	Tnom / Vnom
Mode:	EDGE 850 / CH: 251 / Gamma:5 (27 dBm) / Main Slot 2
Test Date:	2016-01-11
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 246.5 kHz

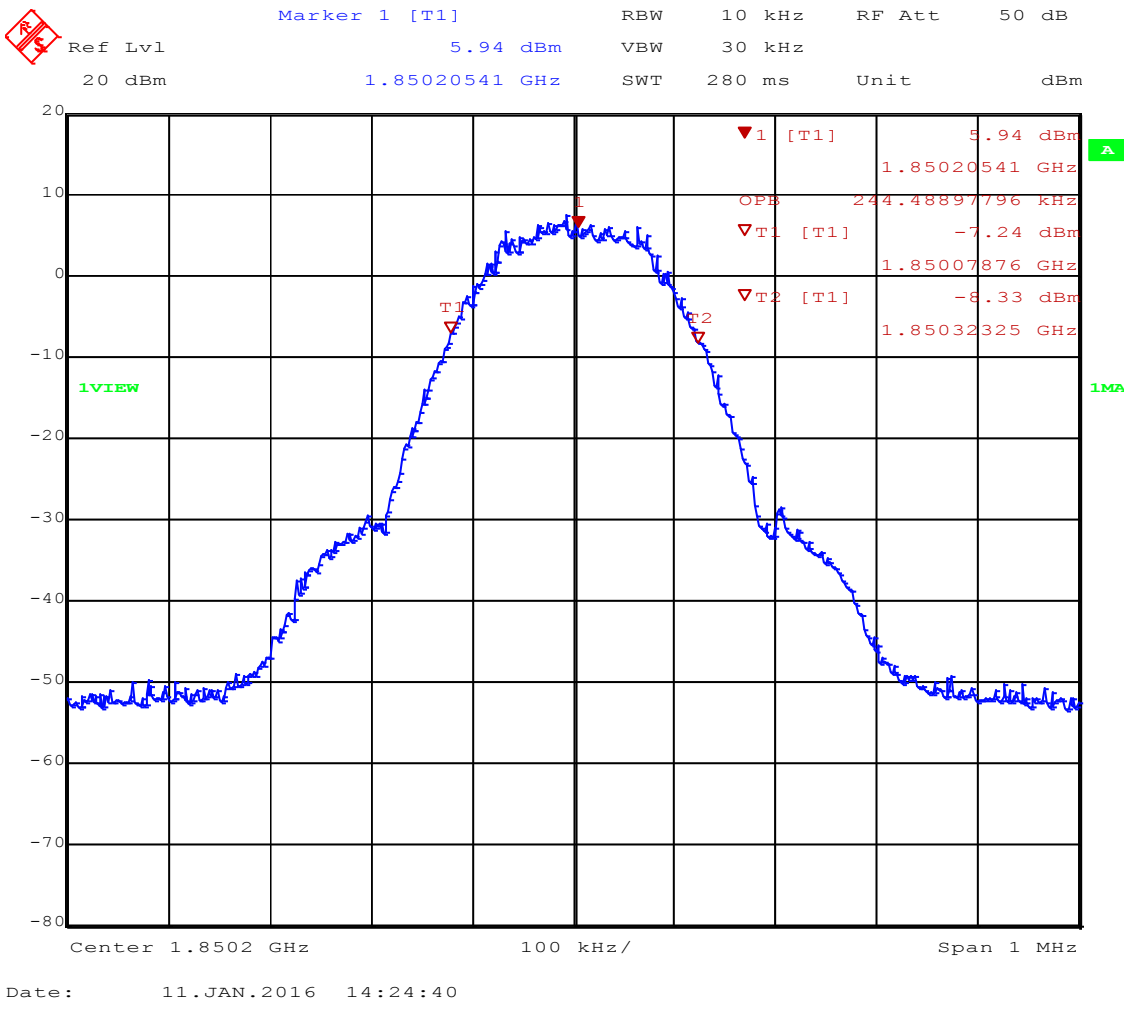


Occupied Bandwidth – GPRS1900 F_{Low}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1601-5302

Applicant:	lesswire GmbH
EUT Name:	2G/3G/4G WLAN Hotspot
Model:	CCU5.3.1 (BWIA3)
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:	2016-01-11
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 244.5 kHz

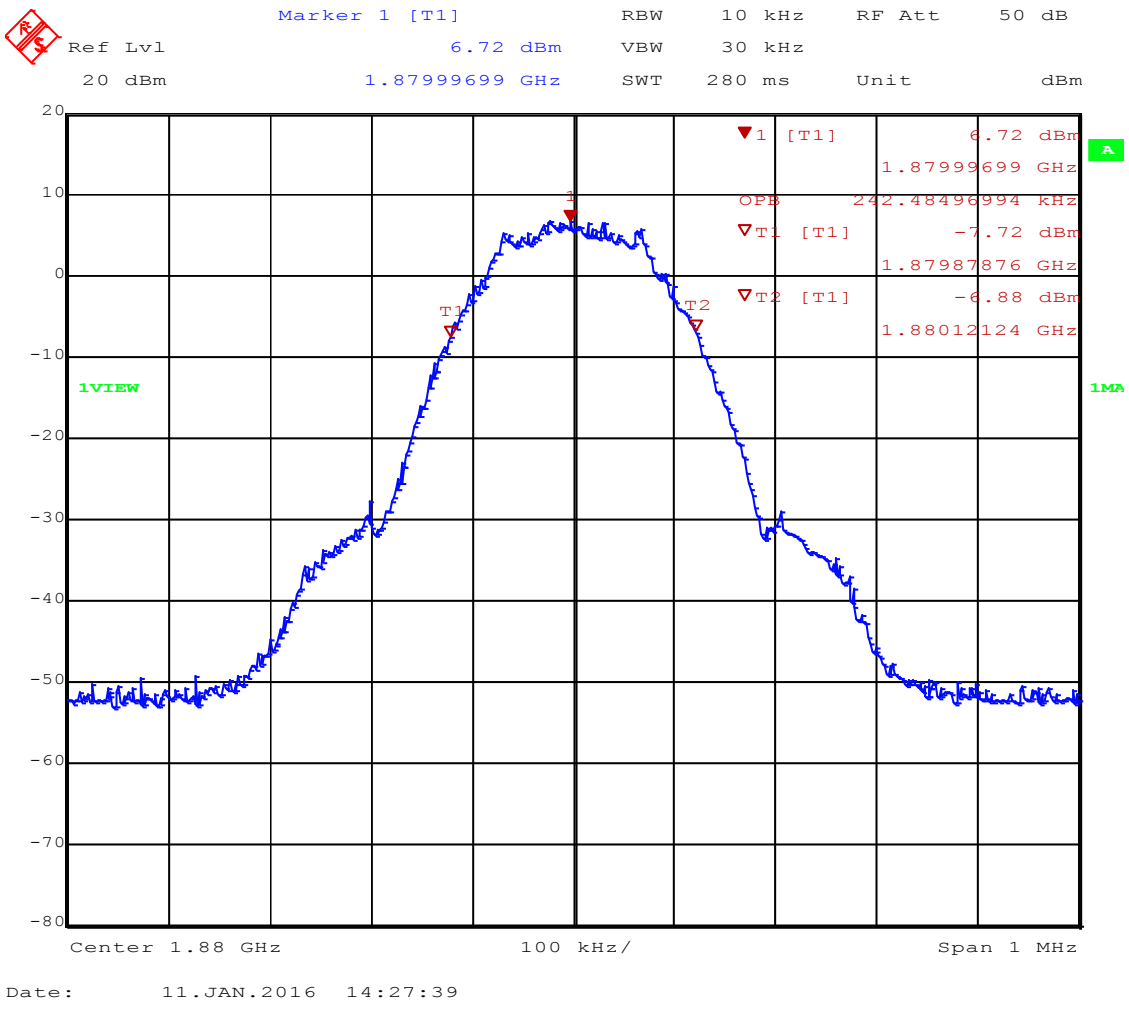


Occupied Bandwidth – GPRS1900 F_{MID}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1601-5302

Applicant:	lesswire GmbH
EUT Name:	2G/3G/4G WLAN Hotspot
Model:	CCU5.3.1 (BWIA3)
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:	2016-01-11
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 242.5 kHz

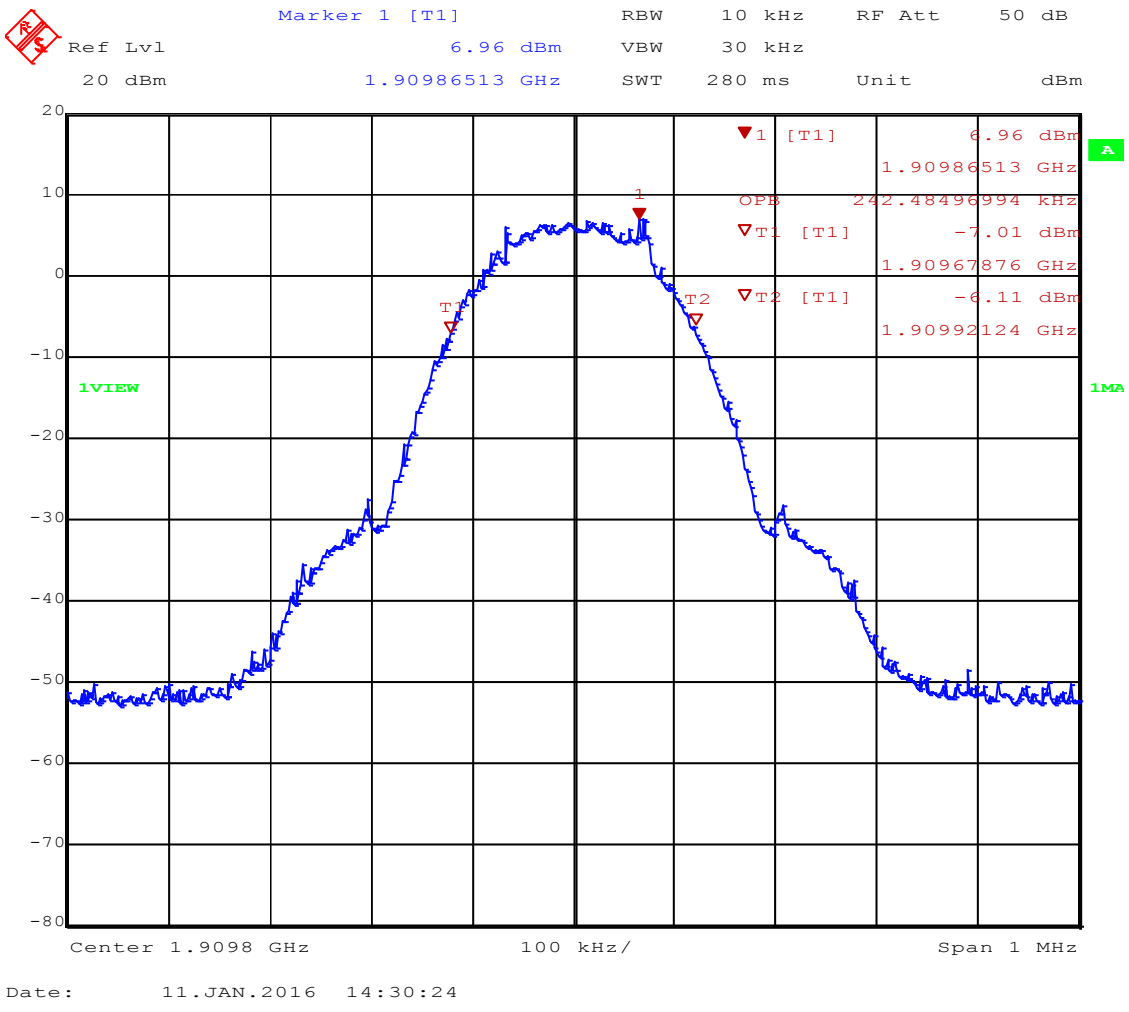


Occupied Bandwidth – GPRS1900 F_{HIGH}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1601-5302

Applicant:	lesswire GmbH
EUT Name:	2G/3G/4G WLAN Hotspot
Model:	CCU5.3.1 (BWIA3)
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:	2016-01-11
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 242.5 kHz

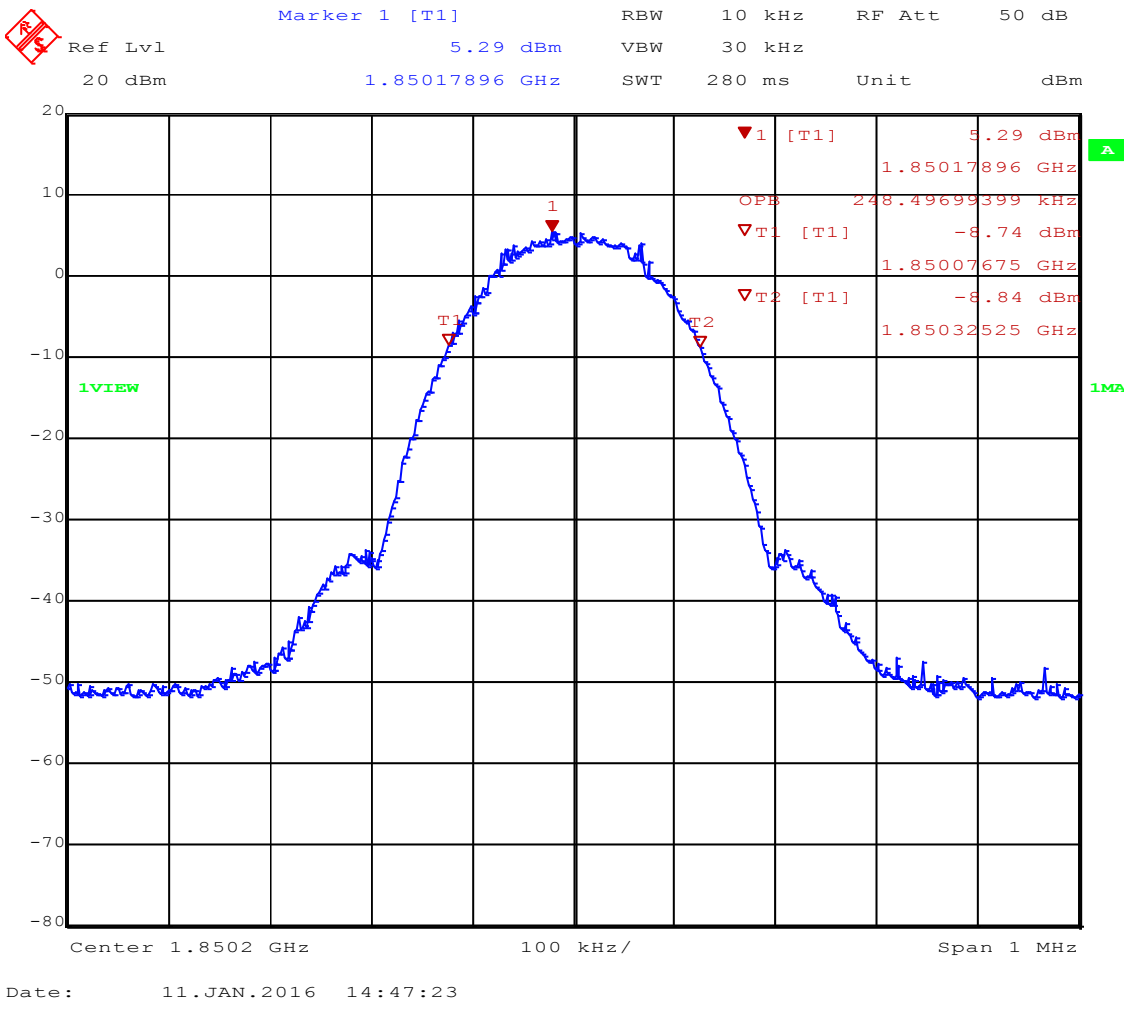


Occupied Bandwidth – EGPRS1900 F_{LOW}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1601-5302

Applicant:	lesswire GmbH
EUT Name:	2G/3G/4G WLAN Hotspot
Model:	CCU5.3.1 (BWIA3)
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:	2016-01-11
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 248.5 kHz

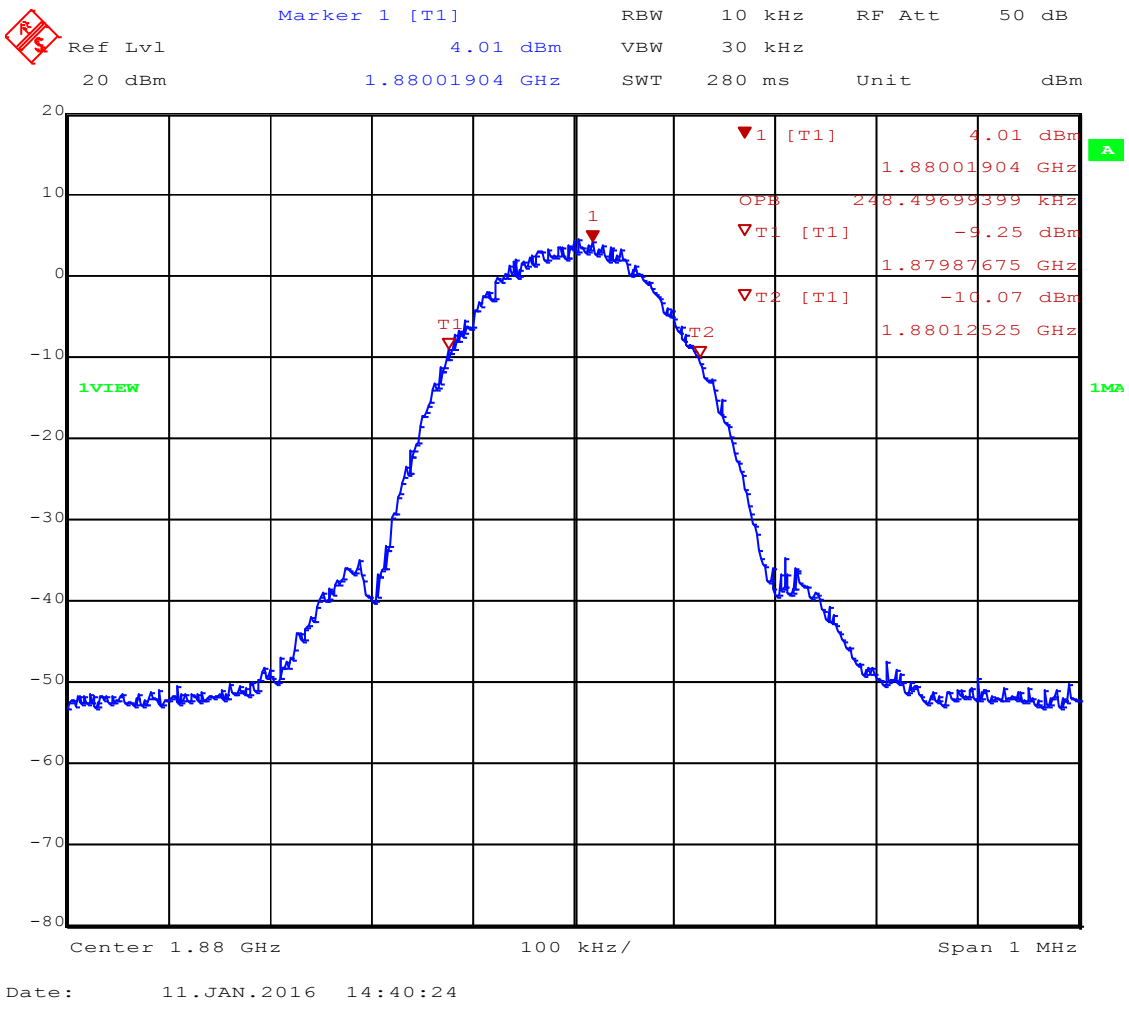


Occupied Bandwidth – EGPRS1900 F_{MID}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1601-5302

Applicant:	lesswire GmbH
EUT Name:	2G/3G/4G WLAN Hotspot
Model:	CCU5.3.1 (BWIA3)
Test Site:	Eurofins Product Service GmbH
Operator:	Burkhard Pudell
Test Conditions:	Tnom / Vnom
Mode:	EDGE 1900 / CH: 661 / Gamma:5 (26 dBm) / Main Slot 2
Test Date:	2016-01-11
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 248.5 kHz

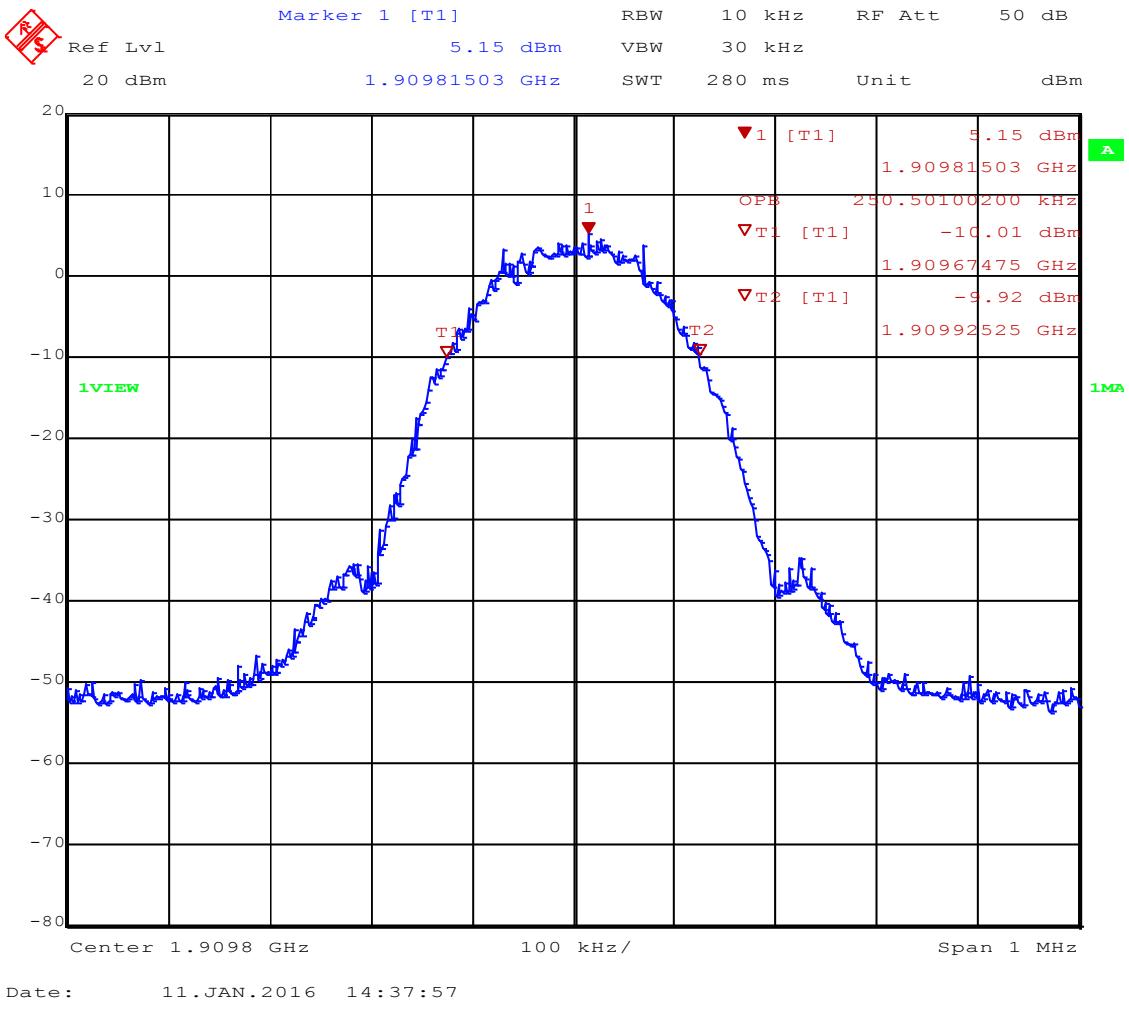


Occupied Bandwidth – EGPRS1900 F_{HIGH}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1601-5302

Applicant:	lesswire GmbH
EUT Name:	2G/3G/4G WLAN Hotspot
Model:	CCU5.3.1 (BWIA3)
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:	2016-01-11
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 250.5 kHz

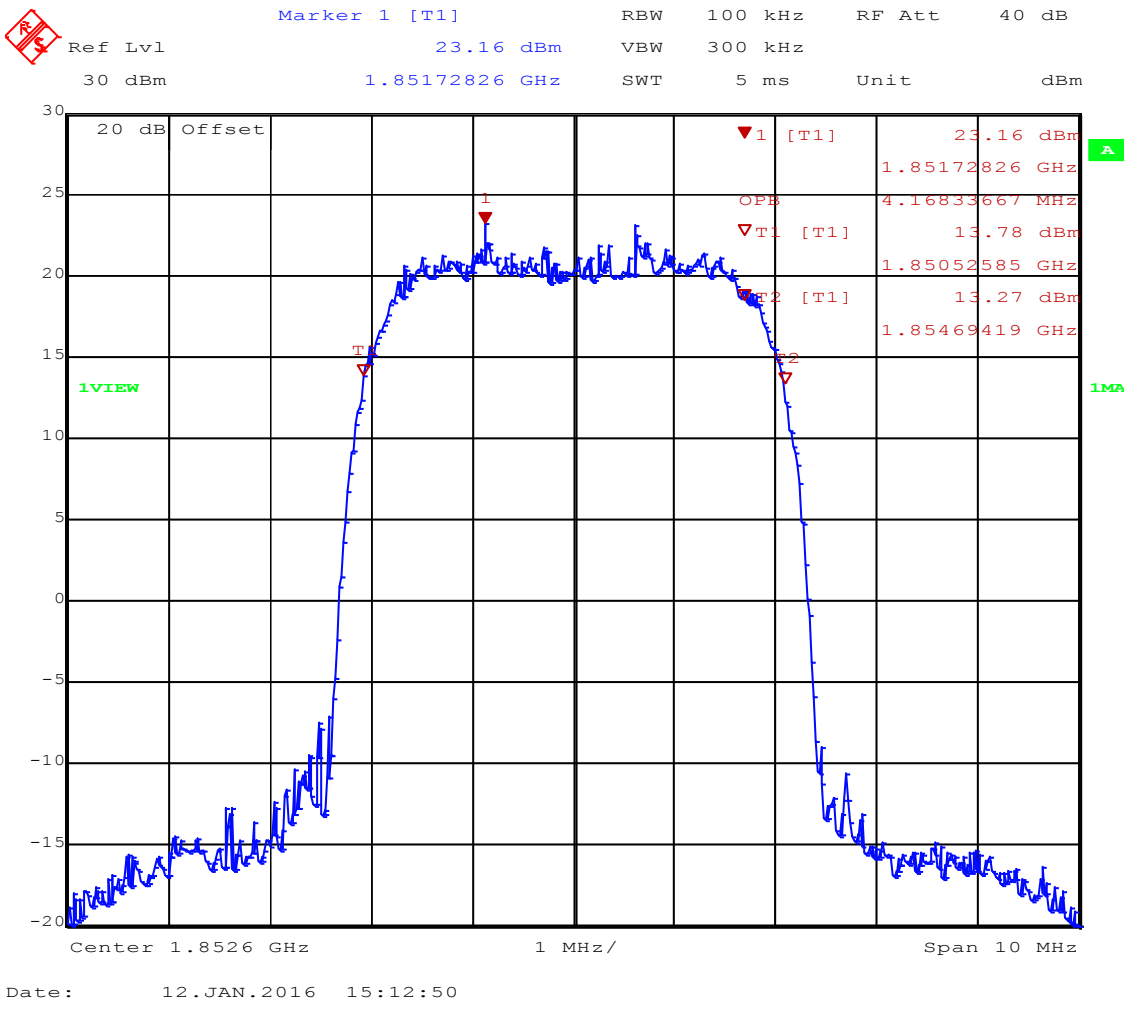


Occupied Bandwidth – FDD II F_{LOW}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1601-5302

Applicant:	lesswire GmbH
EUT Name:	2G/3G/4G WLAN Hotspot
Model:	CCU5.3.1 (BWIA3)
Test Site:	Eurofins Product Service GmbH
Operator:	Burkhard Pudell
Test Conditions:	Tnom / Vnom
Mode:	UMTS FDD II / CH: 9263 / HSUPA-HSDPA
Test Date:	2016-01-12
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 4.168 MHz

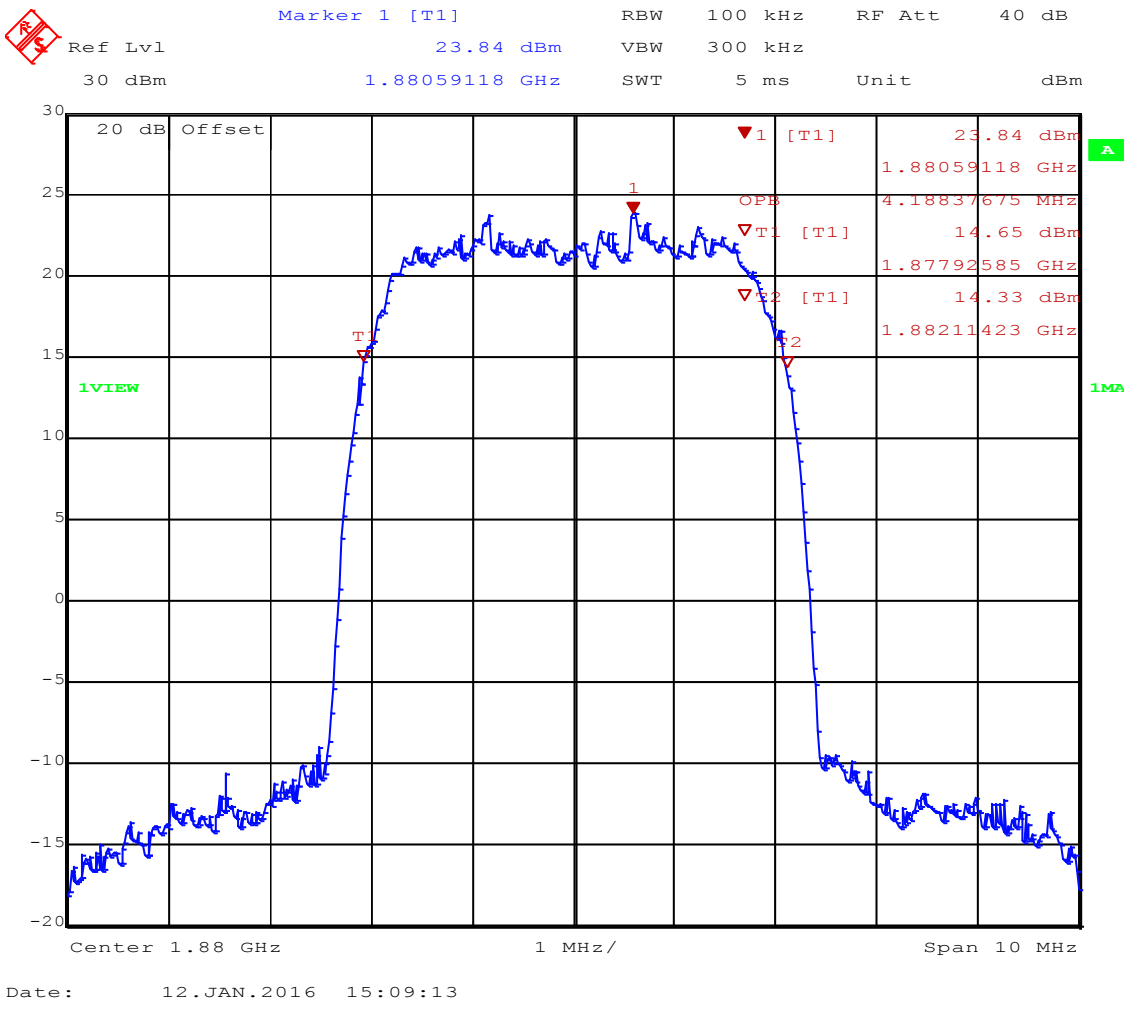


Occupied Bandwidth – FDD II F_{MID}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1601-5302

Applicant:	lesswire GmbH
EUT Name:	2G/3G/4G WLAN Hotspot
Model:	CCU5.3.1 (BWIA3)
Test Site:	Eurofins Product Service GmbH
Operator:	Burkhard Pudell
Test Conditions:	Tnom / Vnom
Mode:	UMTS FDD II / CH: 9400 / HSUPA-HSDPA
Test Date:	2016-01-12
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 4.188 MHz

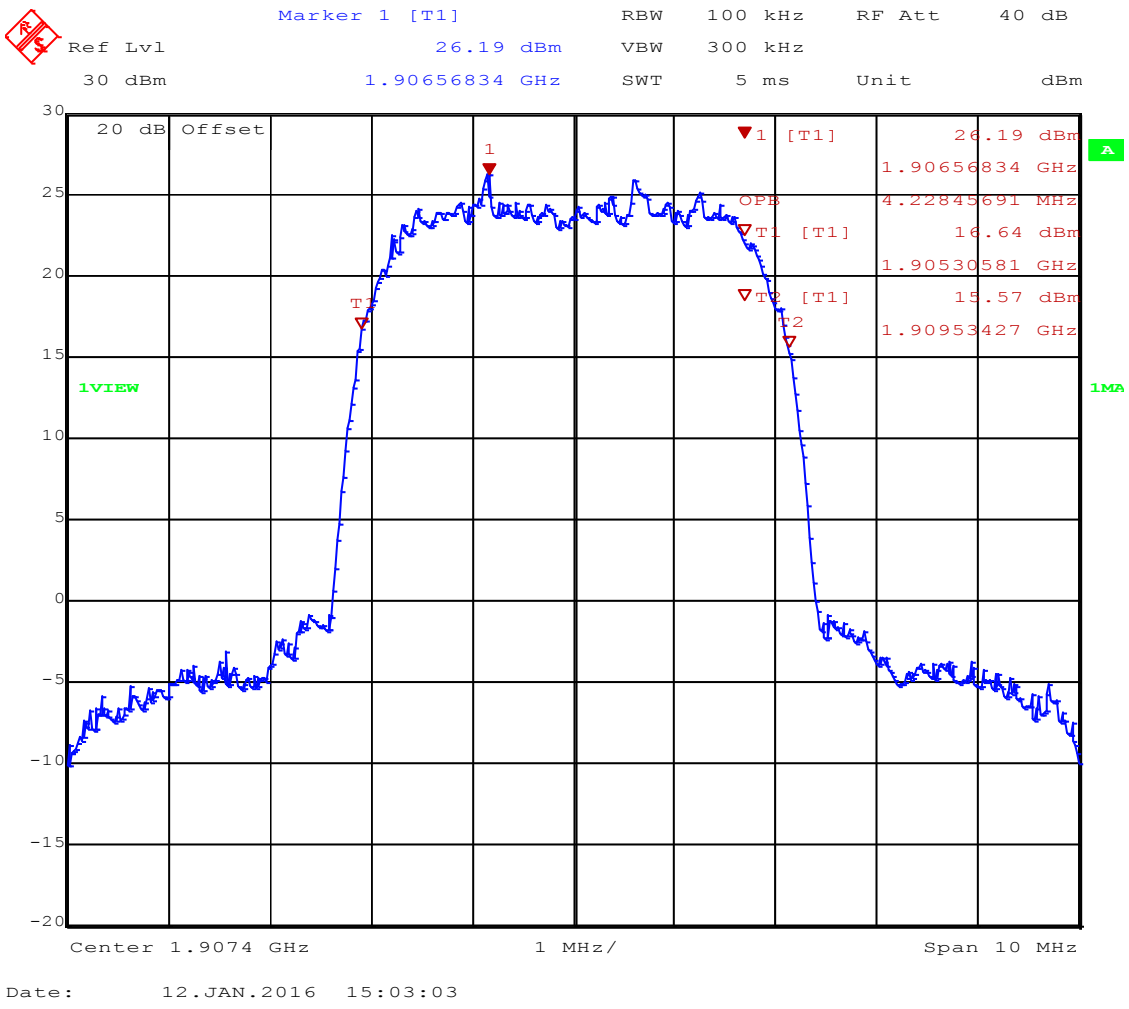


Occupied Bandwidth – FDD II F_{HIGH}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1601-5302

Applicant:	lesswire GmbH
EUT Name:	2G/3G/4G WLAN Hotspot
Model:	CCU5.3.1 (BWIA3)
Test Site:	Eurofins Product Service GmbH
Operator:	Burkhard Pudell
Test Conditions:	Tnom / Vnom
Mode:	UMTS FDD II / CH: 9537 / HSUPA-HSDPA
Test Date:	2016-01-12
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 4.228 MHz

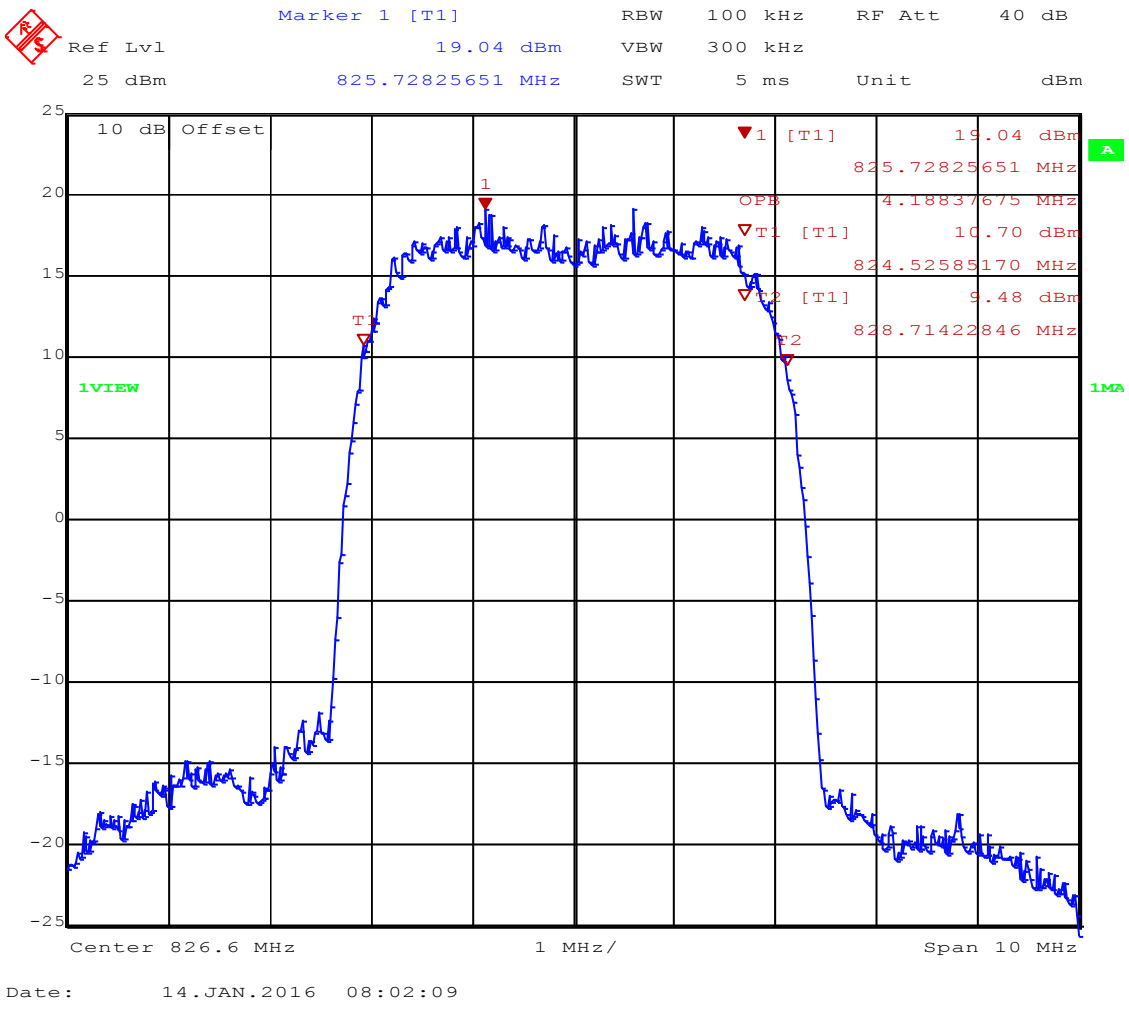


Occupied Bandwidth – FDD V F_{Low}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1601-5302

Applicant:	lesswire GmbH
EUT Name:	2G/3G/4G WLAN Hotspot
Model:	CCU5.3.1 (BWIA3)
Test Site:	Eurofins Product Service GmbH
Operator:	Burkhard Pudell
Test Conditions:	Tnom / Vnom
Mode:	UMTS FDD V / CH: 4133 / HSUPA-HSDPA
Test Date:	2016-01-14
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 4.188 MHz

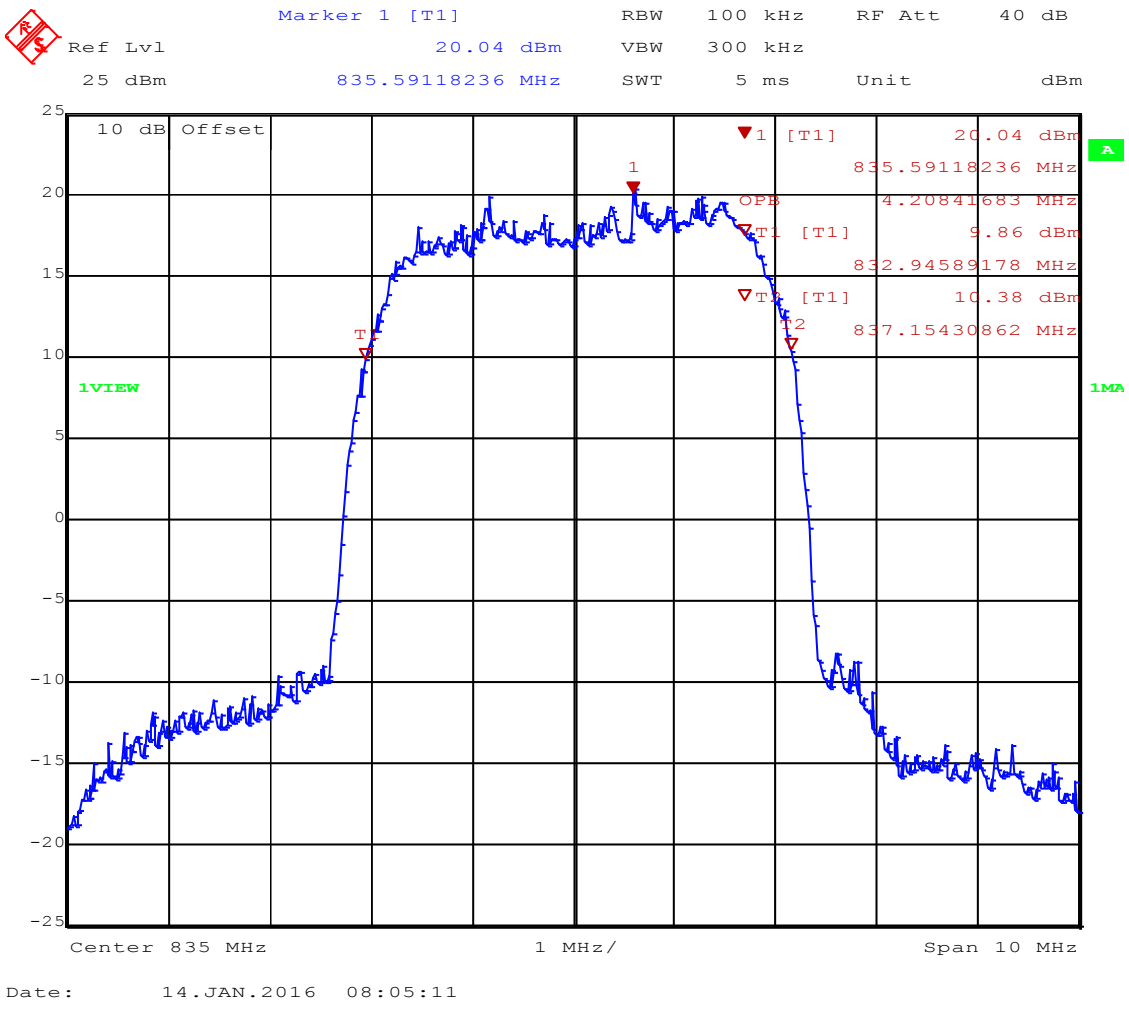


Occupied Bandwidth – FDD V F_{MID}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1601-5302

Applicant:	lesswire GmbH
EUT Name:	2G/3G/4G WLAN Hotspot
Model:	CCU5.3.1 (BWIA3)
Test Site:	Eurofins Product Service GmbH
Operator:	Burkhard Pudell
Test Conditions:	Tnom / Vnom
Mode:	UMTS FDD V / CH: 4175 / HSUPA-HSDPA
Test Date:	2016-01-14
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 4.208 MHz

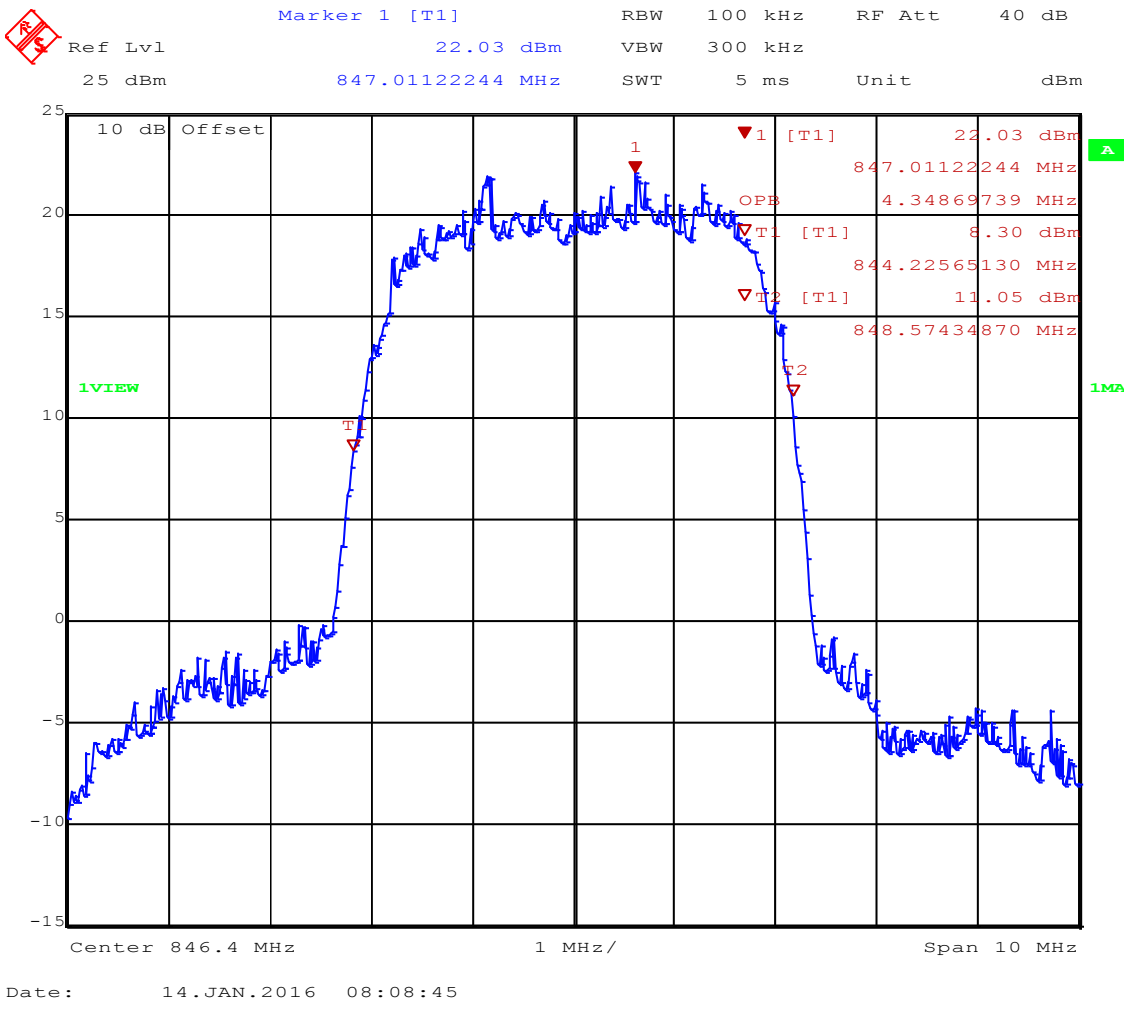


Occupied Bandwidth – FDD V F_{HIGH}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1601-5302

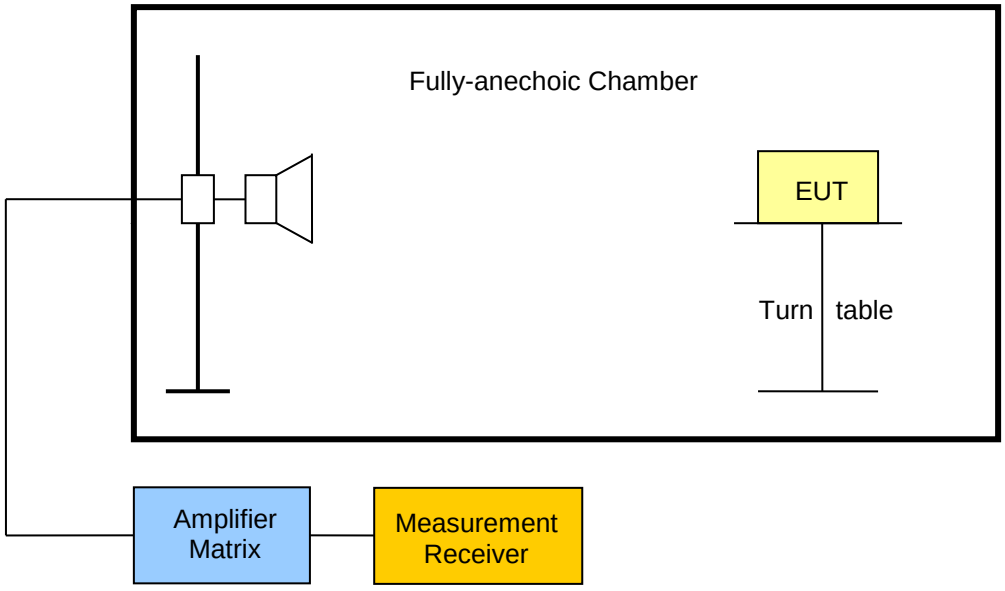
Applicant:	lesswire GmbH
EUT Name:	2G/3G/4G WLAN Hotspot
Model:	CCU5.3.1 (BWIA3)
Test Site:	Eurofins Product Service GmbH
Operator:	Burkhard Pudell
Test Conditions:	Tnom / Vnom
Mode:	UMTS FDD V / CH: 4232 / HSUPA-HSDPA
Test Date:	2016-01-14
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 4.348 MHz



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

Radiated power acc. to FCC 22H / FCC 24E / IC RSS-132 / IC RSS-133		**Verdict: PASS**
EUT requirement rule parts and clause	Reference	
	FCC § 22.913(a) / FCC § 24.232(c) IC 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 IC RSS-132 § 4.4 /IC RSS-133 § 6.4	
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.r.p. IC : 11.5 Watts (40.6 dBm) e.i.r.p.
1850-1910 MHz	Mobile transmitter	FCC : 2 Watts (33 dBm) e.i.r.p. IC : 2 Watts (33 dBm) e.i.r.p.

Test setup



Test procedure

1. EUT set to test mode
2. The radiated power is measured with a measurement antenna in ver + hor 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 / FDDV E.R.P.							
Channel	Frequency [MHz]	Mode	Pol.	Power [dBm e.r.p]	Limit [dBm e.r.p]	Margin [dB]	Result
F_{LOW}	824.2	GPRS850	ver	23.4	38.45	-15.05	PASS
F_{MID}	836.2	GPRS850	ver	23.9	38.45	-14.95	PASS
F_{HIGH}	848.8	GPRS850	ver	28.2	38.45	-10.25	PASS
F_{LOW}	824.2	EGPRS850	ver	23.1	38.45	-15.35	PASS
F_{MID}	836.2	EGPRS850	ver	20.3	38.45	-18.15	PASS
F_{HIGH}	848.8	EGPRS850	ver	24.6	38.45	-13.85	PASS
F_{LOW}	826.6	HSPA V	ver	20.3	38.45	-18.15	PASS
F_{MID}	835.0	HSPA V	ver	23.2	38.45	-15.25	PASS
F_{HIGH}	846.4	HSPA V	ver	25.1	38.45	-13.35	PASS
Test results – GSM850 / FDDV 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	GPRS850	ver	25.55	40.6	-15.05	PASS
F_{MID}	836.2	GPRS850	ver	26.05	40.6	-14.95	PASS
F_{HIGH}	848.8	GPRS850	ver	30.35	40.6	-10.25	PASS
F_{LOW}	824.2	EGPRS850	ver	25.25	40.6	-15.35	PASS
F_{MID}	836.2	EGPRS850	ver	21.45	40.6	-18.15	PASS
F_{HIGH}	848.8	EGPRS850	ver	25.75	40.6	-13.85	PASS
F_{LOW}	826.6	HSPA V	ver	22.45	40.6	-18.15	PASS
F_{MID}	835.0	HSPA V	ver	25.35	40.6	-15.25	PASS
F_{HIGH}	846.4	HSPA V	ver	27.25	40.6	-13.35	PASS
Test results – GSM1900 / FDDII 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	GPRS1900	ver	23.4	33	-9.6	PASS
F_{MID}	1880.0	GPRS1900	ver	23.9	33	-9.1	PASS
F_{HIGH}	1909.8	GPRS1900	ver	28.2	33	-4.8	PASS
F_{LOW}	1850.2	EGPRS1900	ver	23.5	33	-9.5	PASS
F_{MID}	1880.0	EGPRS1900	ver	23.9	33	-9.1	PASS
F_{HIGH}	1909.8	EGPRS1900	ver	23.7	33	-9.3	PASS
F_{LOW}	1852.6	HSPA II	ver	20.3	33	-12.7	PASS
F_{MID}	1880.0	HSPA II	ver	23.2	33	-9.8	PASS
F_{HIGH}	1907.4	HSPA II	ver	25.1	33	-7.9	PASS
Comments:							

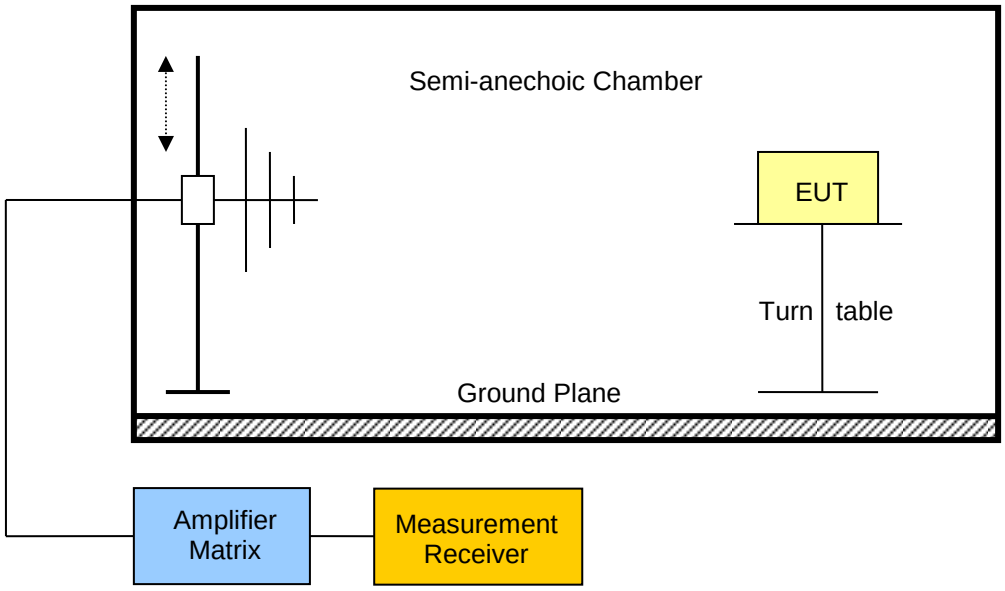
3.3 Test Conditions and Results – Transmitter radiated emissions

Transmitter radiated power acc. to FCC 22H / FCC 24E / IC RSS-132 / IC RSS-133	**Verdict: PASS**
Test according referenced standards	Reference Method
	FCC § 22.917(a) / FCC § 24.238(a) IC RSS-132 § 4.5 / IC RSS-133 § 6.5
Test according to measurement reference	Reference Method
	ANSI/TIA-603-D
Test frequency range	Tested frequencies
	30 MHz – 10th Harmonic

Limits

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

Test setup



Test procedure

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]
F_{LOW}	824.2	GPRS	823.996	ver	hor	-13.00	-07.81
F_{LOW}	824.2	GPRS	823.998	ver	ver	-13.00	-01.74
F_{MID}	836.2	no significant spurious emissions					
F_{HIGH}	848.8	GPRS	849.006	ver	ver	-13.00	-02.53
F_{HIGH}	848.8	GPRS	849.006	ver	hor	-13.00	-06.07
Test results – GSM1900							
Channel	Frequency [MHz]	Mode	Emission [MHz]	Level [dbm]	Pol.	Limit [dBm]	Margin [dB]
F_{LOW}	1850.2	GPRS	1850	-21.50	ver	-13.00	-08.52
F_{MID}	1880.0	no significant spurious emissions					
F_{HIGH}	1909.8	GPRS	1910	-19.90	ver	-13.00	-06.89
F_{HIGH}	1909.8	GPRS	1910	-28.40	hor	-13.00	-15.44
Test results – HSPA II							
Channel	Frequency [MHz]	Mode	Emission [MHz]	Level [dbm]	Pol.	Limit [dBm]	Margin [dB]
F_{LOW}	1852.6	HSPA	1844	-27.10	ver	-13.00	-14.08
F_{MID}	1880.0	no significant spurious emissions					
F_{HIGH}	1907.4	HSPA	1915	-22.70	ver	-13.00	-09.70
Test results – HSPA V							
Channel	Frequency [MHz]	Mode	Emission [MHz]	Level [dbm]	Pol.	Limit [dBm]	Margin [dB]
F_{LOW}	826.6	no significant spurious emissions					
F_{MID}	835.0						
F_{HIGH}	846.4						
Comments:							

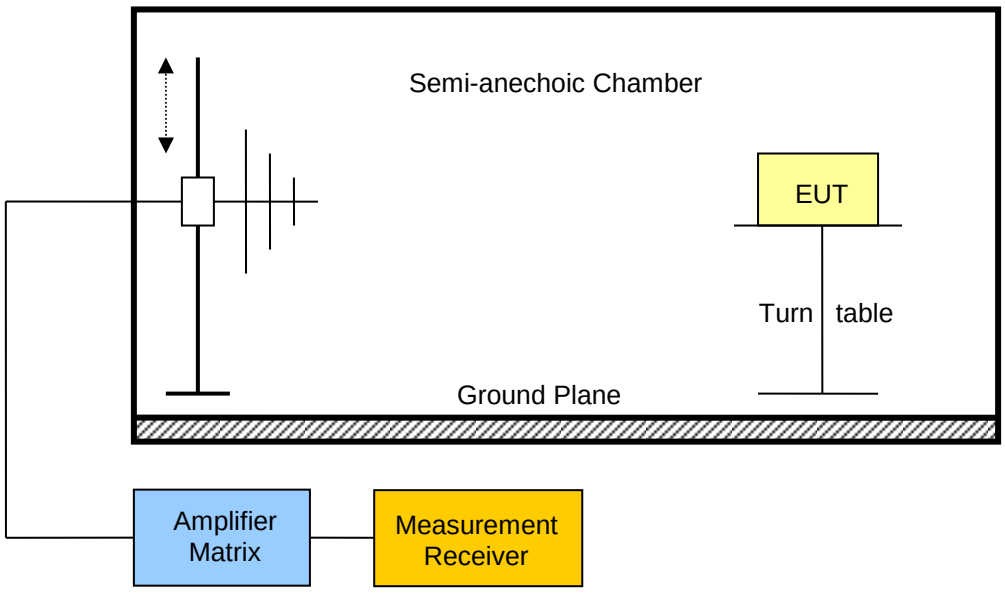
3.4 Test Conditions and Results – Receiver radiated emissions

Receiver radiated emissions acc. to IC RSS-132 / IC RSS-133	**Verdict: PASS**
Test according referenced standards	Reference Method
	IC RSS-132 5.6 / 133 6.6
Test according to measurement reference	Reference Method
	ANSI C63.4
Test frequency range	Tested frequencies
	30 MHz – 5th Harmonic
EUT test mode	Receive

Limits

Frequency range [MHz]	Detector	Limit [µV/m]	Limit [dBµV/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



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 – GSM850-RX							
Channel	Frequency [MHz]	Emission [MHz]	Emission Level [dbµV/m]	Pol	Det.	Limit [dbµV/m]	Margin [dB]
F_{MID}	836.2	875.2	36.24	ver	pk	46.00	-09.76
F_{MID}	836.2	7808	51.93	hor	pk	53.98	-02.05
F_{MID}	836.2	7912	52.12	ver	pk	53.98	-01.86
Test results WCDMA V-RX							
Channel	Frequency [MHz]	Emission [MHz]	Emission Level [dbµV/m]	Pol	Det.	Limit [dbµV/m]	Margin [dB]
F_{MID}	835	790.4	30.63	hor	pk	46.00	-15.37
F_{MID}	835	7272	52.04	ver	pk	53.98	-01.94
Test results GSM1900-RX							
Channel	Frequency [MHz]	Emission [MHz]	Emission Level [dbµV/m]	Pol	Det.	Limit [dbµV/m]	Margin [dB]
F_{MID}	1880	790.4	30.55	hor	pk	46.00	-15.45
F_{MID}	1880	3862	49.26	ver	pk	53.98	-04.72
F_{MID}	1880	790	30.35	hor	pk	46.00	-15.65
F_{MID}	1880	3862	49.40	ver	pk	53.98	-04.58
Test results WCDMA II-RX							
Channel	Frequency [MHz]	Emission [MHz]	Emission Level [dbµV/m]	Pol	Det.	Limit [dbµV/m]	Margin [dB]
F_{MID}	1880	no significant spurious emissions					

Comments:
* Physical distance between EUT and measurement antenna.
** Emission level corresponds to ambient noise floor