eurofins | Product Service

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-1603-5477-TFC224GS-V01
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 ..... :	Owlet GmbH
Address ..... :	Mosbacher Str. 9 65187 Wiesbaden GERMANY
Test specification:	
Standard..... :	47 CFR Part 22H, 47 CFR Part 24E RSS-132, Issue 3: 2013-01, RSS-133, Issue 6: 2013-01
Equipment under test (EUT):	
Product description	Luminaire Controller
Model No.	LUCO P7 CM
Additional Model(s)	None
Brand Name(s)	Owlet IoT
Hardware version	3A-2213-2100-7238-1111
Firmware / Software version	3.12.10.17
	FCC-ID: 2AIOB-LCP7CM IC: 21585-LCP7CM
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	2016-08-11	
Date (s) of performance of tests	2016-08-11 - 2016-08-16	
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	2016-09-08	
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.

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

Additional comments:

Test case selection is based on modular approval of licensed transmitter module used by the EUT. The EUT uses a 2G/3G module with 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	2016-09-08	Initial Release	

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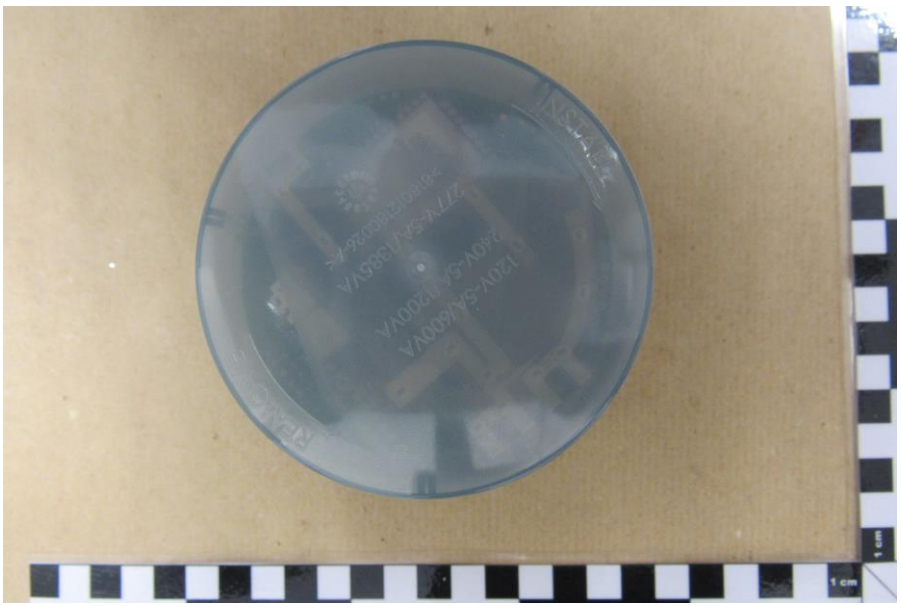
1 Equipment (Test item) Description

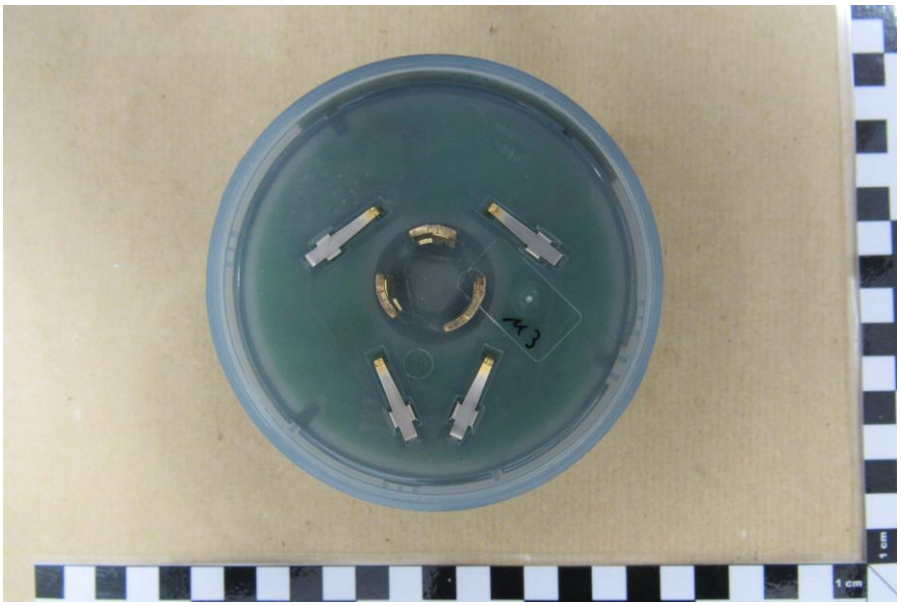
Description	Luminaire Controller		
Model	LUCO P7 CM		
Additional Model(s)	None		
Brand Name(s)	Owlet IoT		
Serial number	None		
Hardware version	3A-2213-2100-7238-1111		
Software / Firmware version	3.12.10.17		
PMN	N/A		
HVIN	LUCO P7 CM		
FVIN	N/A		
HMN	N/A		
FCC-ID	2AIOB-LCP7CM		
IC	21585-LCP7CM		
Equipment type	End product		
Equipment classification	Mobile Device (Human Body distance > 20 cm)		
Radio type	Transceiver		
Radio technology	GSM850 / GSM1900 / W-CDMA FDDII / W-CDMA FDDV		
Operating frequency range	GSM850 : TX = 824 - 849 MHz, RX = 869 - 894 MHz GSM1900 : TX = 1850 - 1910 MHz, RX = 1930 - 1990 MHz FDDV : TX = 824 - 849MHz, RX = 869 - 894MHz FDDII : TX = 1850 - 1910MHz, RX = 1930 - 1990MHz		
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
Main test frequencies FDDV	F_{LOW}	CH : 4132 UL: 826.4MHz	CH : 4357 DL: 871.4MHz
	F_{MID}	CH : 4182 UL: 836.4MHz	CH : 4407DL: 881.4MHz
	F_{HIGH}	CH : 4233 UL: 846.6MHz	CH : 4458DL: 891.6MHz
Main test frequencies FDDII	F_{LOW}	CH : 9262UL: 1852.4MHz	CH : 9662DL: 1932.4MHz
	F_{MID}	CH : 9400 UL: 1880.0MHz	CH : 9663DL: 1960.0MHz
	F_{HIGH}	CH : 9538 UL: 1907.6MHz	CH : 9938DL: 1987.6MHz
Supported transmission modes	GSM, GPRS, UMTS, HSDPA, HSUPA		
Modulations	GSM, GPRS: GMSK W-CDMA : QPSK		
Multislot class	12		

Number of antennas	1	
Radio module	Type	Five-Band 3G (HSPA) module
	Model	EHS8
	Manufacturer	Gemalto M2M GmbH
	HW Version	none
	SW Version	none
	FCC-ID	QIPEHS8
	IC	7803A-EHS8
Antenna	Type	integrated
	Model	LUCO P7 CM
	Manufacturer	Owlet
	Gain	2.0 dBi (declaration)
Manufacturer	Owlet GmbH Mosbacher Str. 9 65187 Wiesbaden GERMANY	
Power supply	V_{NOM}	120 VAC
	V_{MIN}	N/A
	V_{MIN}	N/A
AC/DC-Adaptor	Model	N/A
	Vendor	N/A
	Input	N/A
	Output	N/A

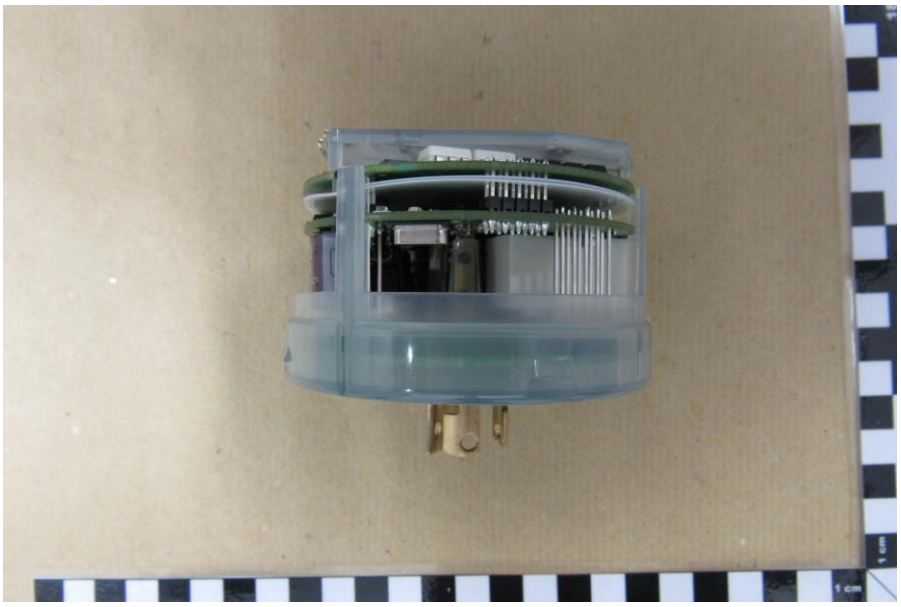
1.1 Photos – Equipment External

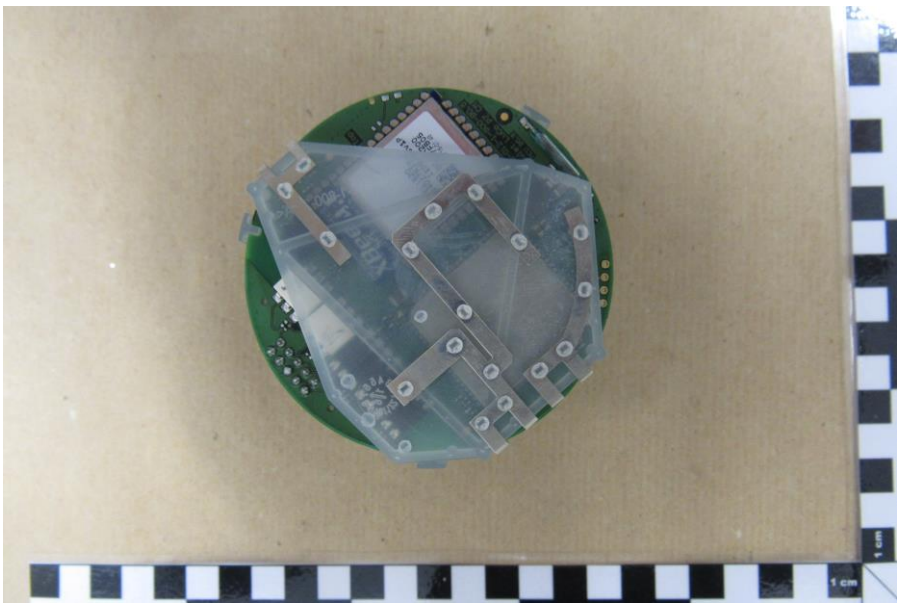
EUT SIDE

EUT TOP


EUT INTERFACE


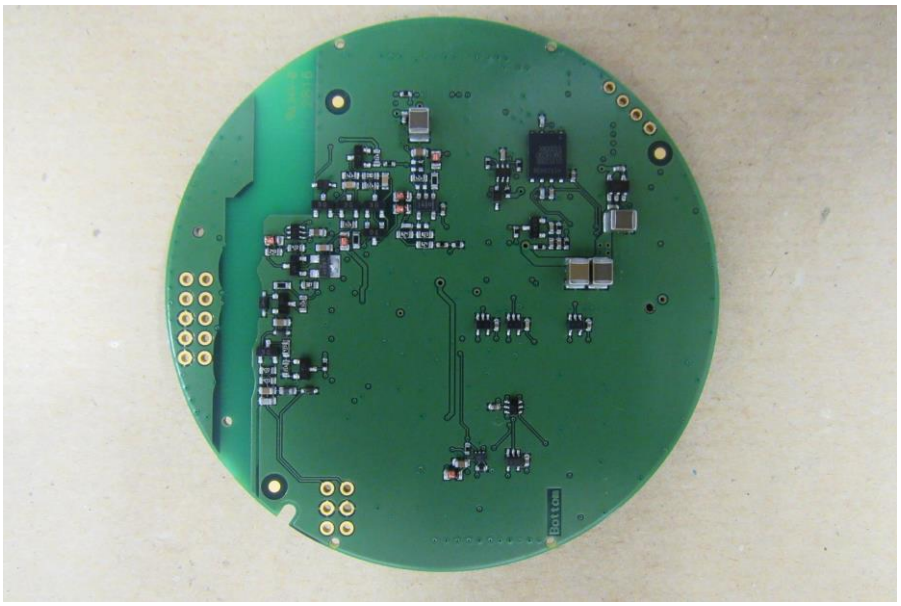
1.2 Photos – Equipment internal

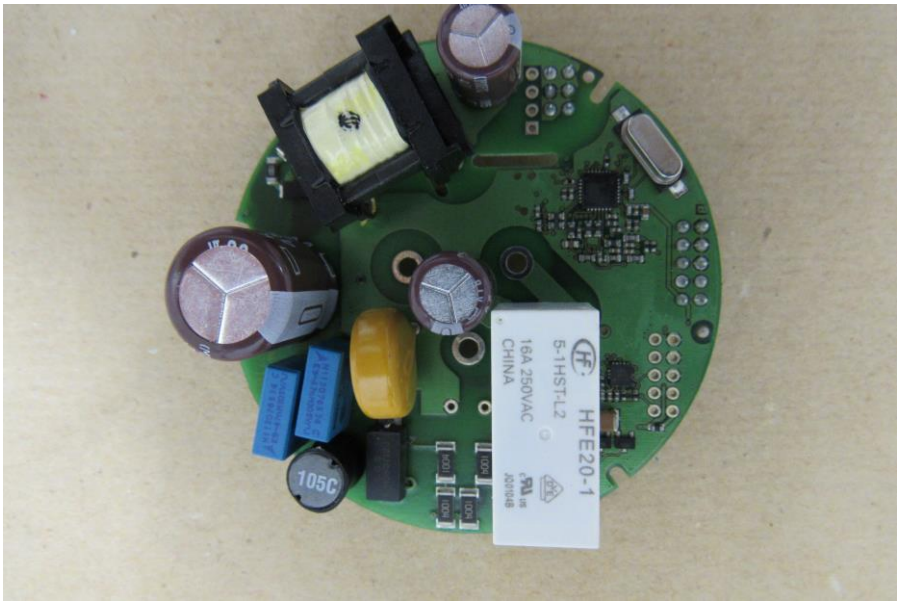
EUT SIDE


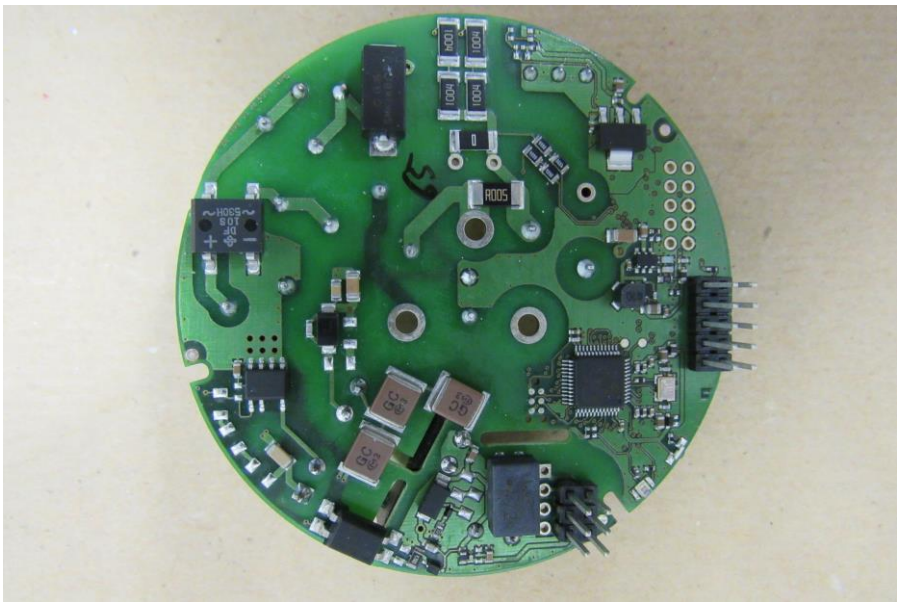
EUT TOP


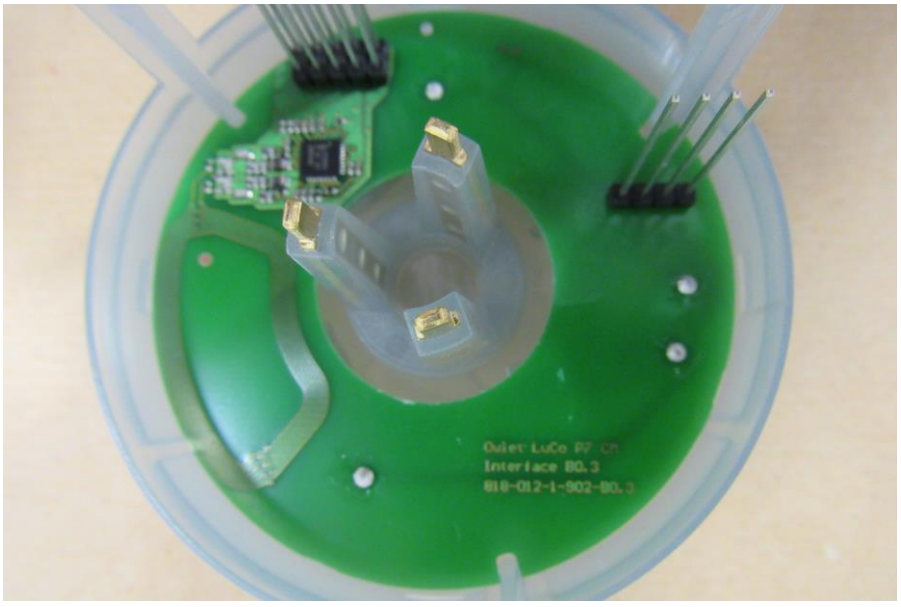
EUT PCB UPPER FRONT

EUT 2G/3G MODULE

EUT PCB UPPER BACK


EUT PCB MIDDLE FRONT


EUT PCB MIDDLE BACK


EUT PCB LOWER 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	CMW500	GSM-Tester
AE	Streeetlamp	none	none	Connection-Interface

***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 ac mains.
	Radio conditions:	Maximum power (worst case) was searched for GMSK, 8-PSK and the various time slot configurations. Tests were performed with: Modulation = GMSK Number of time slots = 1 Power level = maximum
GPRS1900	General conditions:	EUT powered by ac mains.
	Radio conditions:	Maximum power (worst case) was searched for GMSK, 8-PSK and the various time slot configurations. Tests were performed with: Modulation = GMSK Number of time slots = 1 Power level = maximum
WCDMA FDD II	General conditions:	EUT powered by ac mains.
	Radio conditions:	Mode = transmit Connection = Circuit & Packet switched Modulation = QPSK Configuration = RMC Power level = Maximum
WCDMA FDD V	General conditions:	EUT powered by ac mains.
	Radio conditions:	Mode = transmit Connection = Circuit & Packet switched Modulation = QPSK Configuration = RMC Power level = Maximum
Receive GSM	General conditions:	EUT powered by ac mains.
	Radio conditions:	Mode = standalone receive idle mode
Receive WCDMA	General conditions:	EUT powered by ac mains.
	Radio conditions:	Mode = standalone receive cell-fach mode

1.6 Test Equipment Used During Testing

Measurement Software			
Description	Manufacturer	Name	Version
EMC Test Software	Dare Instruments	Radimation	2015.2.4

Occupied Bandwidth					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSP 30	EF00312	2016-02	2017-02

Radiated power					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Fully-anechoic chamber	Frankonia	AC 3	EF00199	--	--
Spectrum Analyzer	R&S	FSIQ 26	EF00242	2016-04	2017-04
LPD Antenna	R&S	HL 223	EF00202	2016-02	2018-02
LPD Antenna	R&S	HL 025	EF00015	2015-07	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	2016-01	2017-01
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 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:

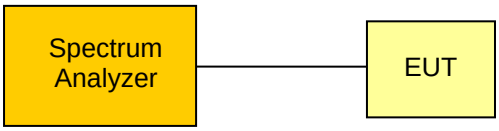
Reading	+	AF	=	Net Reading	:	Net reading - FCC limit = Margin
21.5 dBµV	+	26 dB	=	47.5 dBµV/m	:	47.5 dBµV/m - 57.0 dBµV/m = -9.5 dB

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 ANSI C63.26	N/R	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/T	Conducted results of licensed radio unaffected. See module radio report.
FCC § 22.913(a)	Effective radiated power	ANSI/TIA-603-D KDB 971168 ANSI C63.26	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 ANSI C63.26	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 ANSI C63.26	N/T	Conducted results of licensed radio unaffected. See module radio report
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 ANSI C63.26	N/T	Conducted results of licensed radio unaffected. See module radio report
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 ANSI C63.26	N/T	Conducted results of licensed radio unaffected. See module radio report
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 ANSI C63.26	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	Conducted results of licensed radio unaffected. See module radio report
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	GSM850	240.5
F_{MID}	836.2	GSM850	242.5
F_{HIGH}	848.8	GSM850	242.5
F_{LOW}	824.2	EGPRS850	242.5
F_{MID}	836.2	EGPRS850	246.5
F_{HIGH}	848.8	EGPRS850	242.5

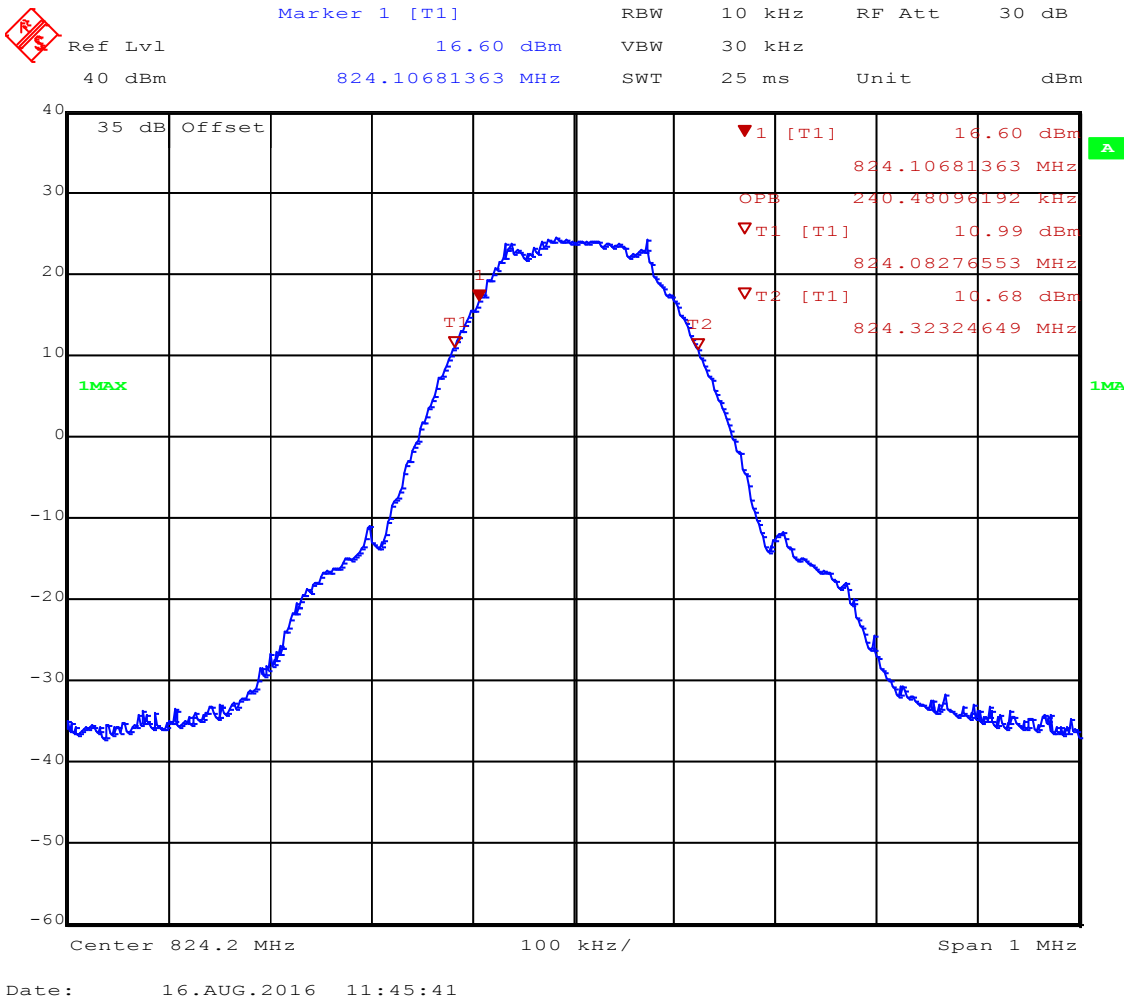
Test results – GSM1900			
Channel	Frequency [MHz]	Mode	Occupied Bandwidth [kHz]
F_{LOW}	1850.2	GSM1900	244.5
F_{MID}	1880	GSM1900	244.5
F_{HIGH}	1909.8	GSM1900	244.5
F_{LOW}	1850.2	EGPRS1900	250.5
F_{MID}	1880	EGPRS1900	246.5
F_{HIGH}	1909.8	EGPRS1900	246.5
Test results – UMTS FDDV			
Channel	Frequency [MHz]	Mode	Occupied Bandwidth [kHz]
F_{LOW}	826.6	UMTS FDDV	4.068
F_{MID}	835.0	UMTS FDDV	4.068
F_{HIGH}	846.4	UMTS FDDV	4.088
Test results – UMTS FDDII			
Channel	Frequency [MHz]	Mode	Occupied Bandwidth [kHz]
F_{LOW}	1852.6	UMTS FDDII	4.088
F_{MID}	1880.0	UMTS FDDII	4.168
F_{HIGH}	1907.4	UMTS FDDII	4.128
Comments:			

Occupied Bandwidth – GSM850 F_{Low}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1603-5477

Applicant:	Owlet GmbH
EUT Name:	Luminaire Controller
Model:	LUCO P7 CM
Test Site:	Eurofins Product Service GmbH
Operator:	Burkhard Pudell
Test Conditions:	Tnom / Vnom
Mode:	GPRS 850 / CH: 128 / Gamma:3 (33 dBm) / Main Slot 3
Test Date:	2016-08-16
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 240.5 kHz

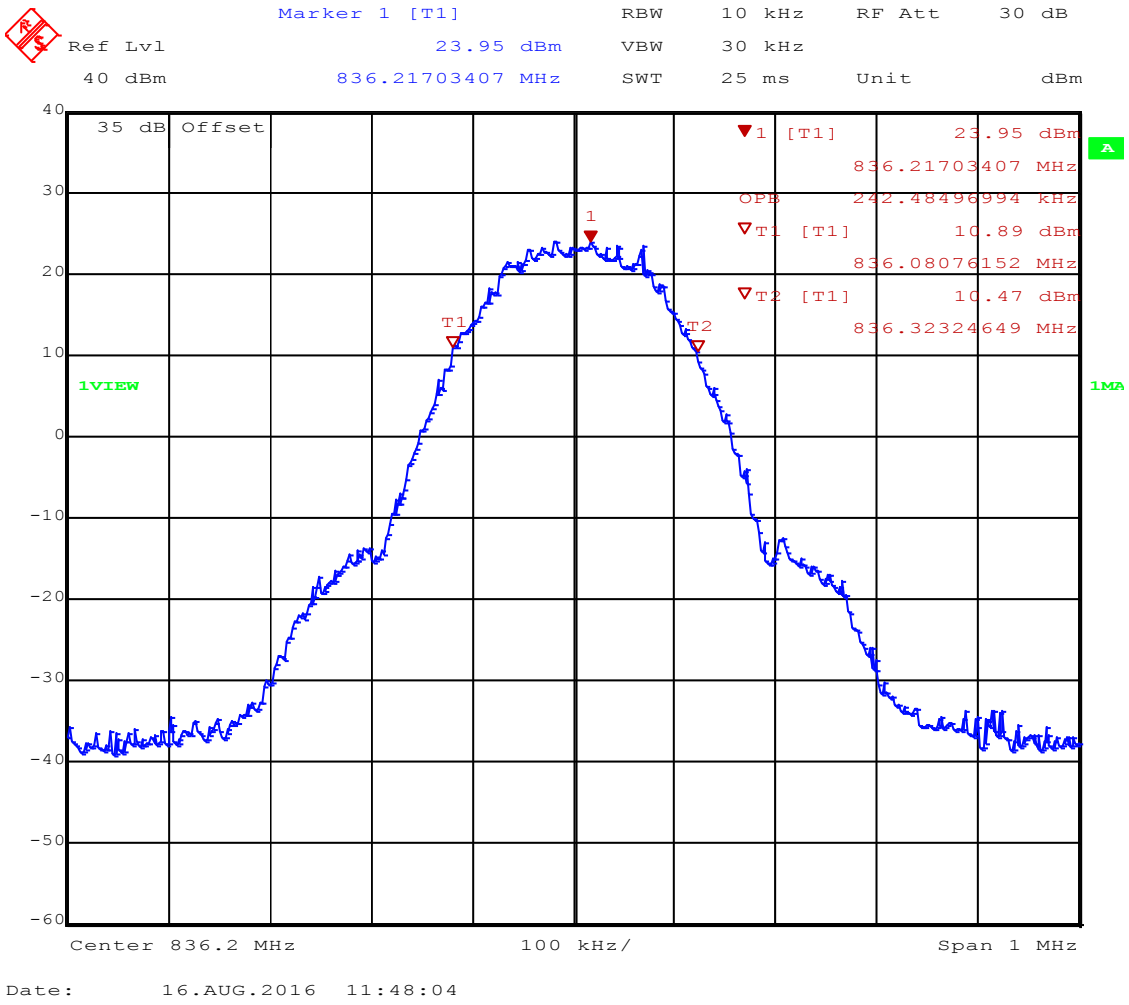


Occupied Bandwidth – GSM850 F_{MID}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1603-5477

Applicant:	Owlet GmbH
EUT Name:	Luminaire Controller
Model:	LUCO P7 CM
Test Site:	Eurofins Product Service GmbH
Operator:	Burkhard Pudell
Test Conditions:	Tnom / Vnom
Mode:	GPRS 850 / CH: 188 / Gamma:3 (33 dBm) / Main Slot 3
Test Date:	2016-08-16
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 242.5 kHz

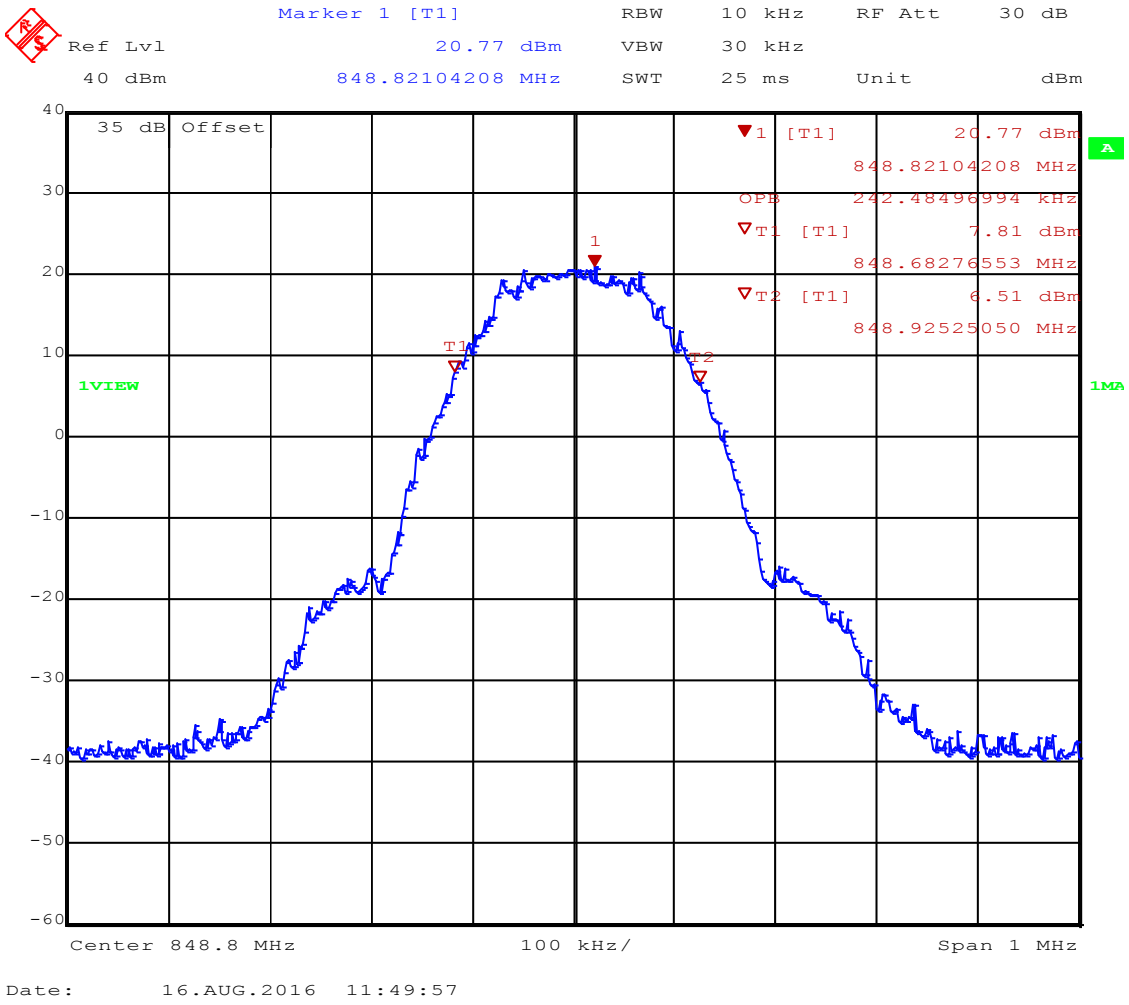


Occupied Bandwidth – GSM850 F_{HIGH}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1603-5477

Applicant:	Owlet GmbH
EUT Name:	Luminaire Controller
Model:	LUCO P7 CM
Test Site:	Eurofins Product Service GmbH
Operator:	Burkhard Pudell
Test Conditions:	Tnom / Vnom
Mode:	GPRS 850 / CH: 251 / Gamma:3 (33 dBm) / Main Slot 3
Test Date:	2016-08-16
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 242.5 kHz

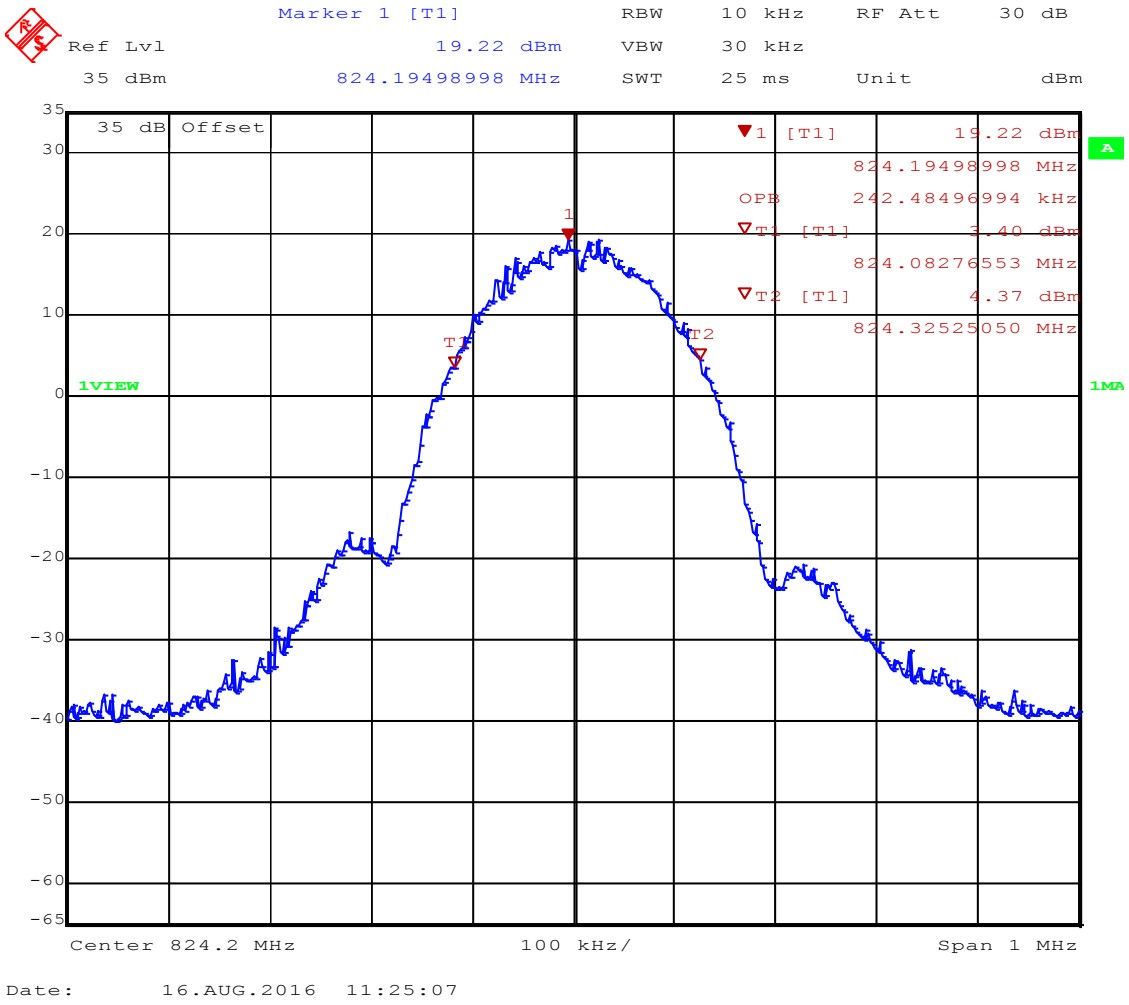


Occupied Bandwidth – EGPRS850 F_{LOW}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1603-5477

Applicant:	Owlet GmbH
EUT Name:	Luminaire Controller
Model:	LUCO P7 CM
Test Site:	Eurofins Product Service GmbH
Operator:	Burkhard Pudell
Test Conditions:	Tnom / Vnom
Mode:	EDGE 850 / CH: 128 / Gamma:6 (27 dBm) / Main Slot 3
Test Date:	2016-08-16
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 242.5 kHz

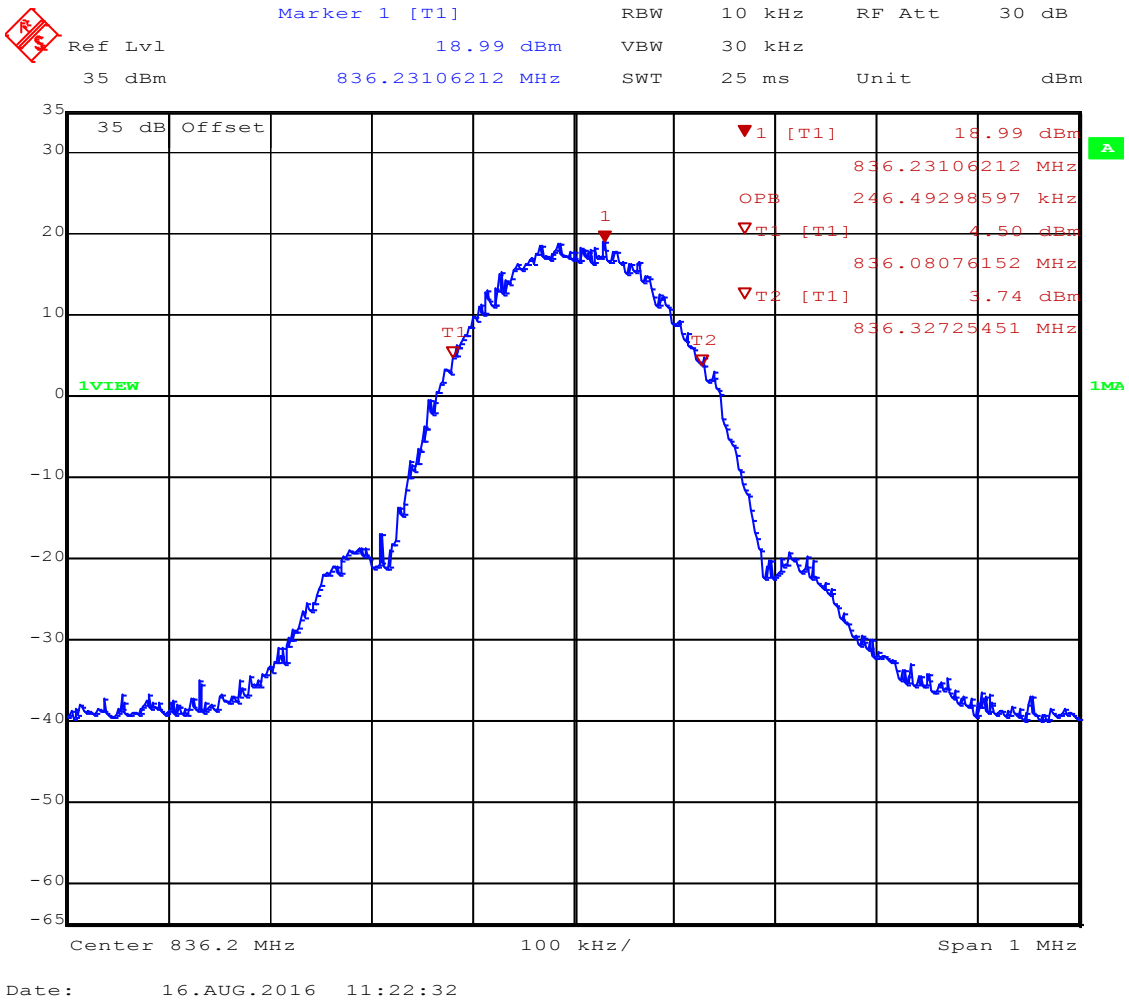


Occupied Bandwidth – EGPRS850 F_{MID}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1603-5477

Applicant:	Owlet GmbH
EUT Name:	Luminaire Controller
Model:	LUCO P7 CM
Test Site:	Eurofins Product Service GmbH
Operator:	Burkhard Pudell
Test Conditions:	Tnom / Vnom
Mode:	EDGE 850 / CH: 188 / Gamma:6 (27 dBm) / Main Slot 3
Test Date:	2016-08-16
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 246.5 kHz

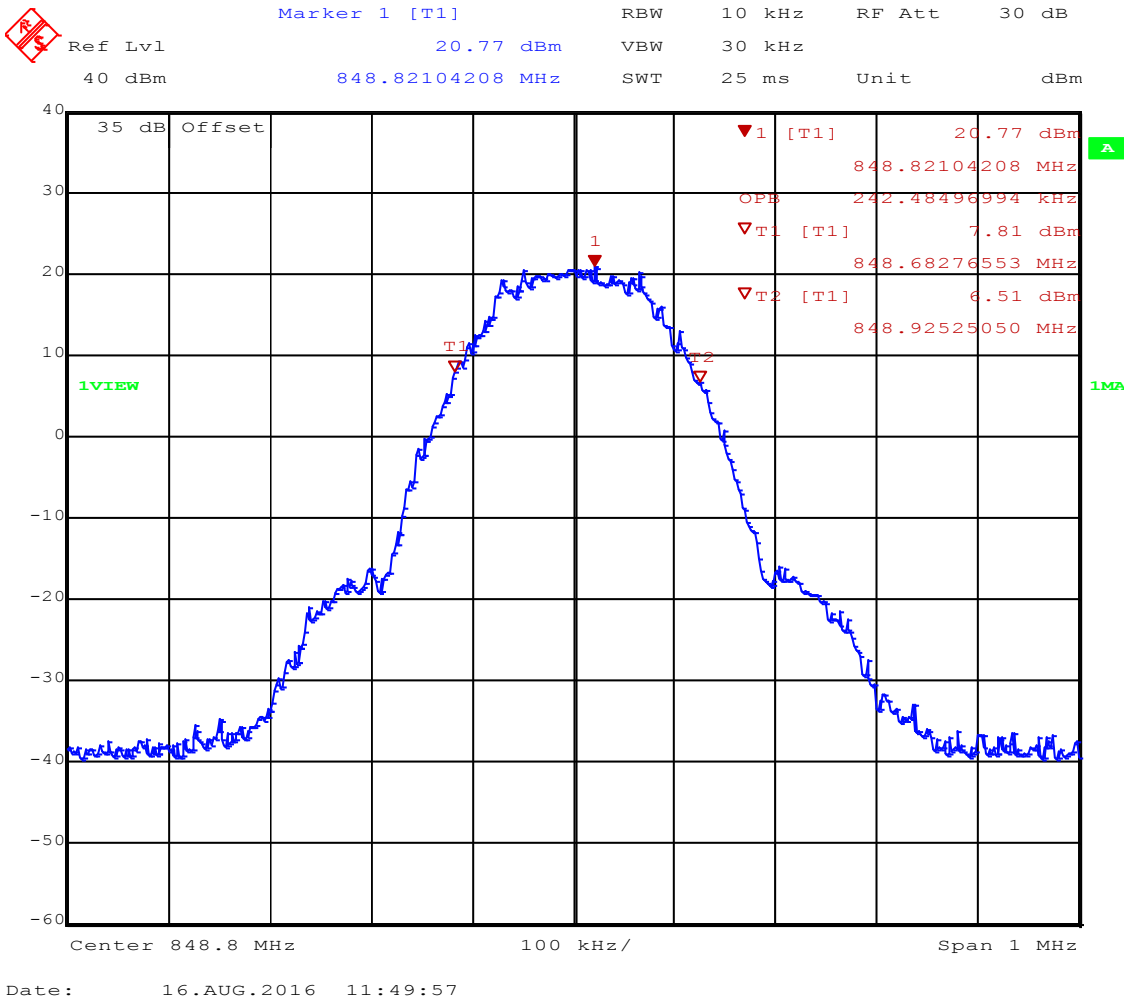


Occupied Bandwidth – EGPRS850 F_{HIGH}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1603-5477

Applicant:	Owlet GmbH
EUT Name:	Luminaire Controller
Model:	LUCO P7 CM
Test Site:	Eurofins Product Service GmbH
Operator:	Burkhard Pudell
Test Conditions:	Tnom / Vnom
Mode:	GPRS 850 / CH: 251 / Gamma:3 (33 dBm) / Main Slot 3
Test Date:	2016-08-16
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 242.5 kHz

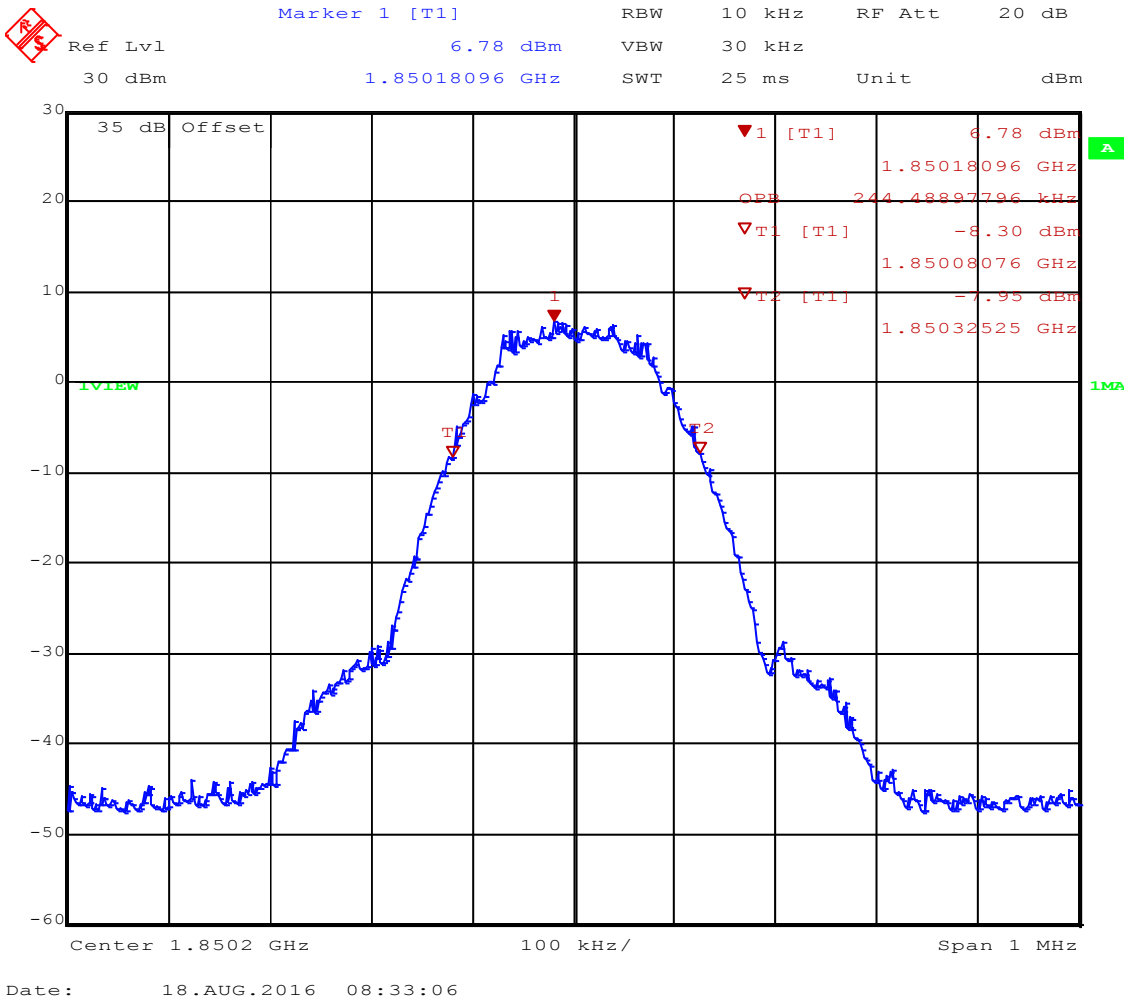


Occupied Bandwidth – GSM1900 F_{LOW}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1603-5477

Applicant:	Owlet GmbH
EUT Name:	Luminaire Controller
Model:	LUCO P7 CM
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:	2016-08-18
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 244.5 kHz

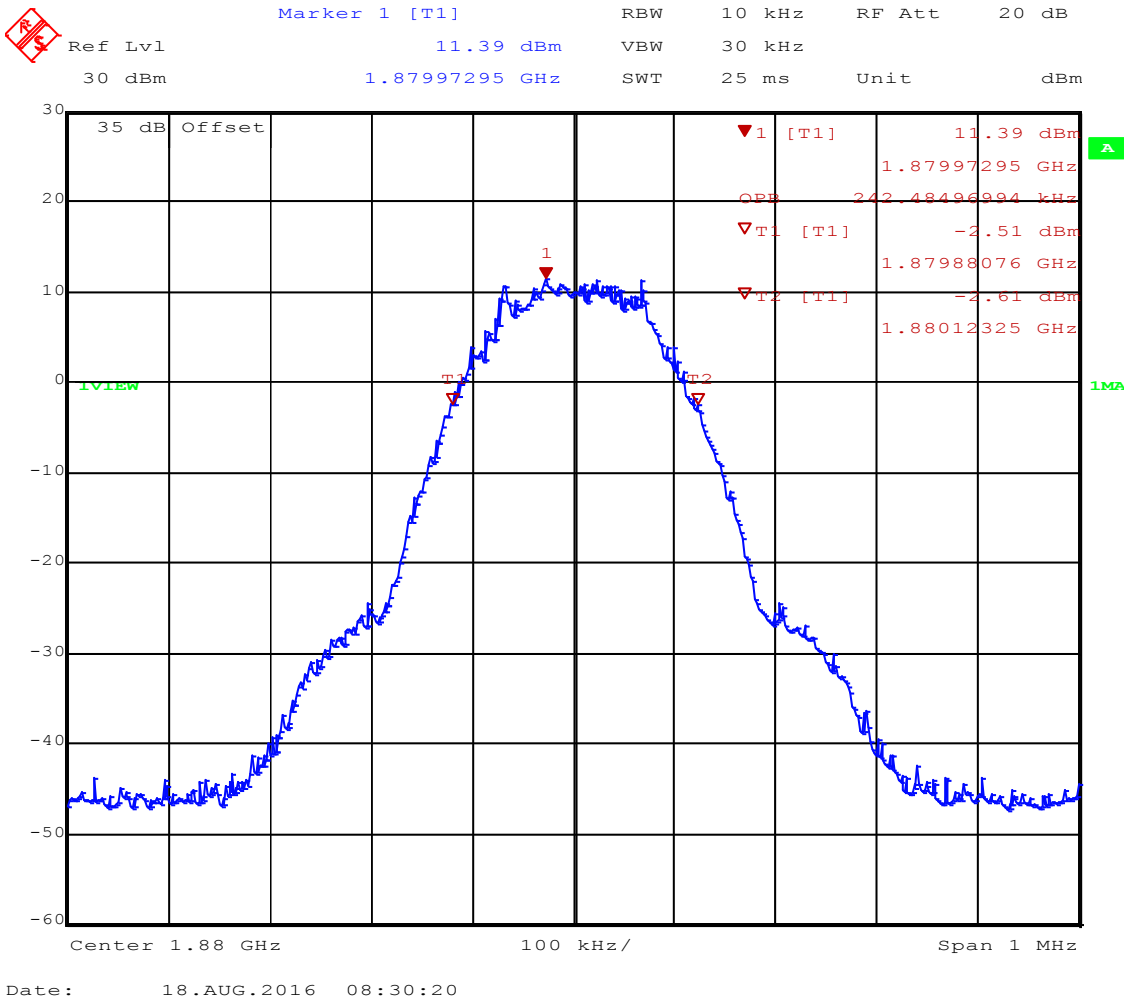


Occupied Bandwidth – GSM1900 F_{MID}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1603-5477

Applicant:	Owlet GmbH
EUT Name:	Luminaire Controller
Model:	LUCO P7 CM
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:	2016-08-18
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 244.5 kHz

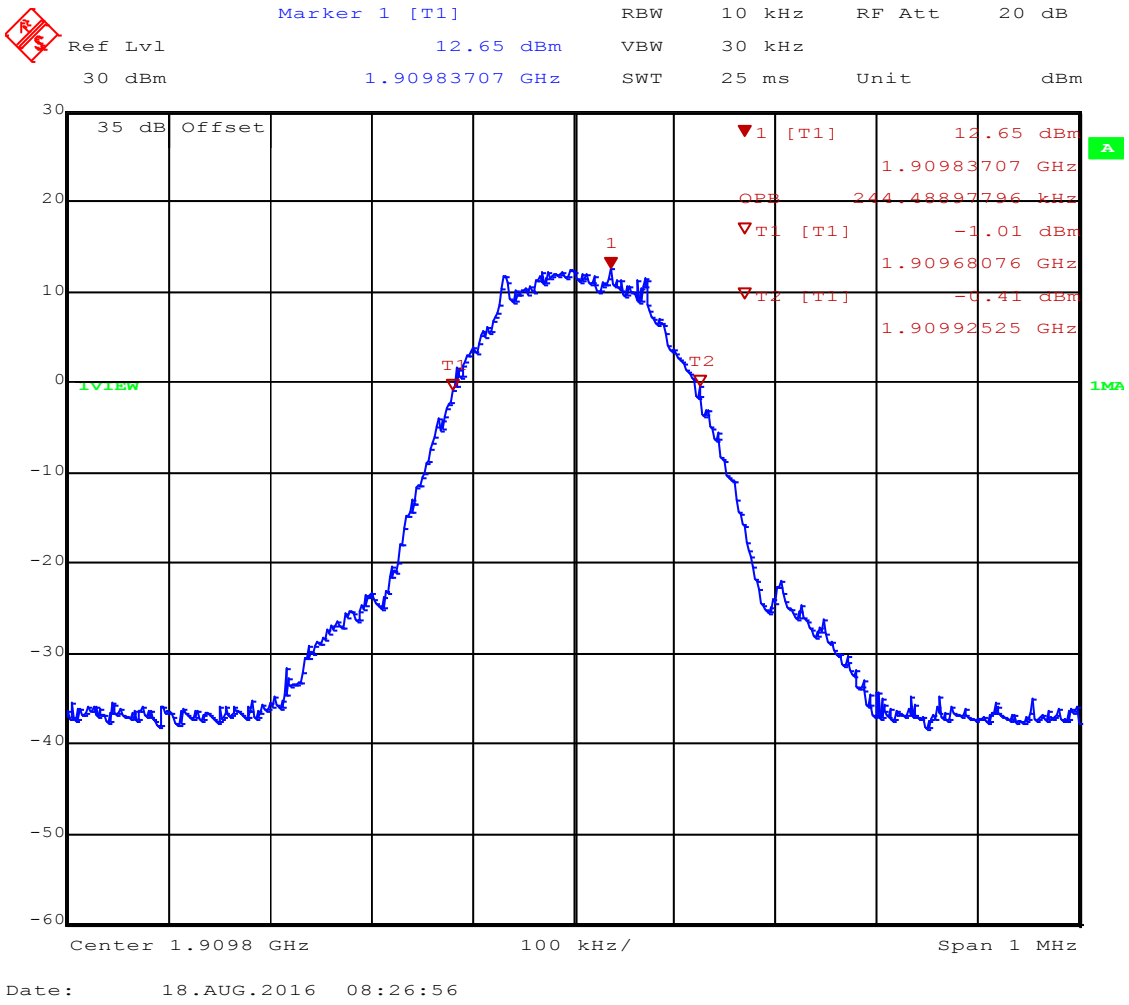


Occupied Bandwidth – GSM1900 F_{HIGH}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1603-5477

Applicant:	Owlet GmbH
EUT Name:	Luminaire Controller
Model:	LUCO P7 CM
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:	2016-08-18
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 244.5 kHz

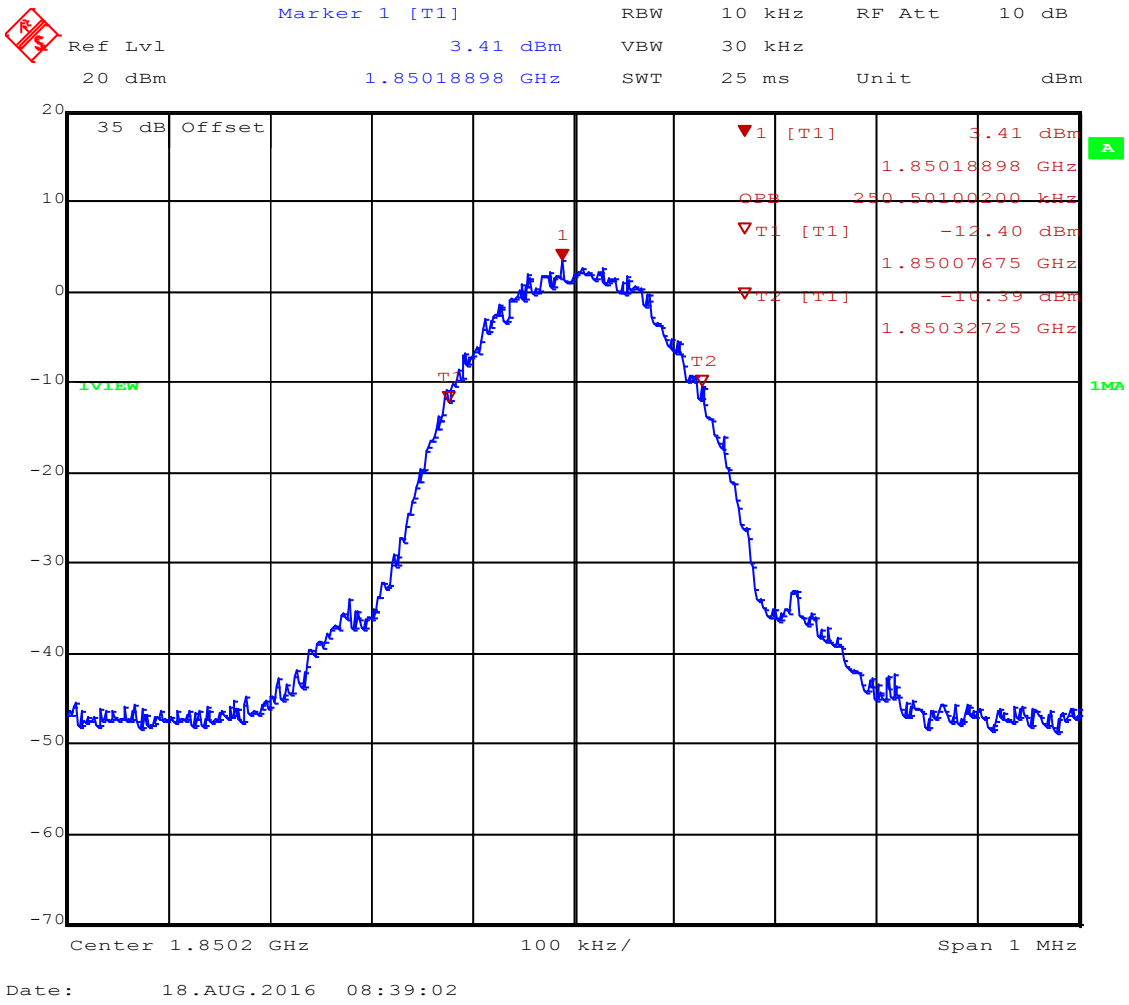


Occupied Bandwidth – EGPRS1900 F_{LOW}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1603-5477

Applicant:	Owlet GmbH
EUT Name:	Luminaire Controller
Model:	LUCO P7 CM
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:	2016-08-18
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 250.5 kHz

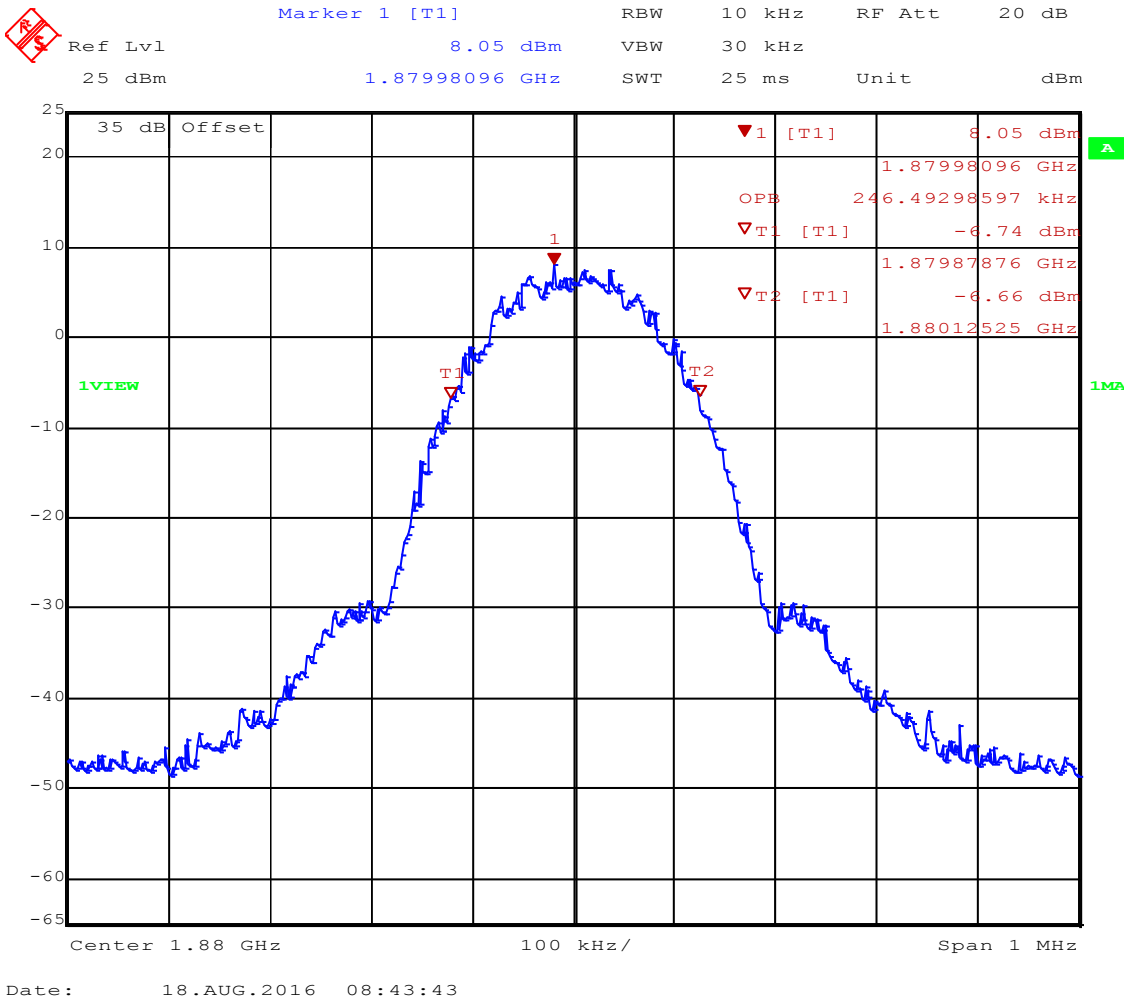


Occupied Bandwidth – EGPRS1900 F_{MID}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1603-5477

Applicant:	Owlet GmbH
EUT Name:	Luminaire Controller
Model:	LUCO P7 CM
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:	2016-08-18
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 246.5 kHz

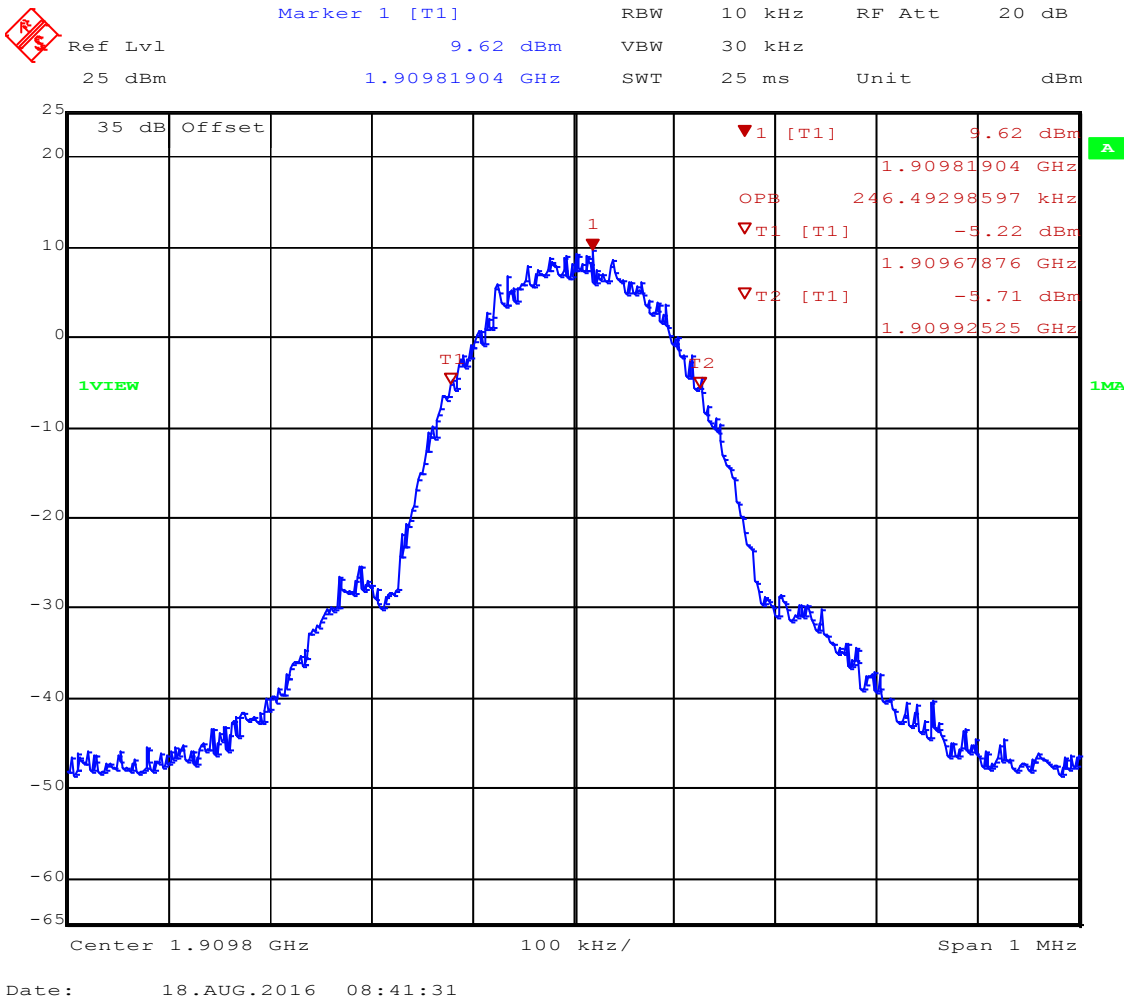


Occupied Bandwidth – EGPRS1900 F_{HIGH}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1603-5477

Applicant:	Owlet GmbH
EUT Name:	Luminaire Controller
Model:	LUCO P7 CM
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:	2016-08-18
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 246.5 kHz

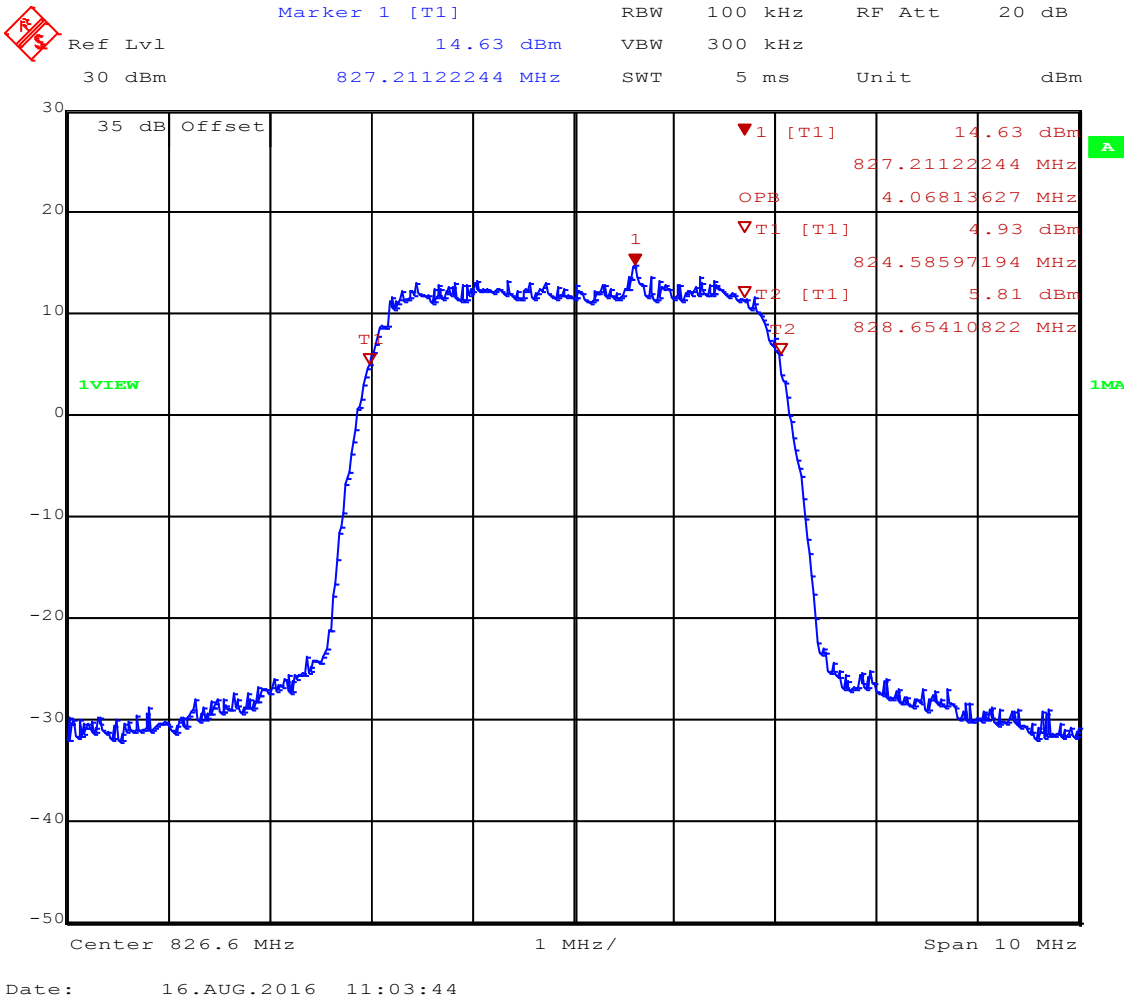


Occupied Bandwidth – FDD V F_{Low}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1603-5477

Applicant:	Owlet GmbH
EUT Name:	Luminaire Controller
Model:	LUCO P7 CM
Test Site:	Eurofins Product Service GmbH
Operator:	Burkhard Pudell
Test Conditions:	Tnom / Vnom
Mode:	UMTS FDD V / CH: 4133 / RMC
Test Date:	2016-08-16
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 4.068 MHz

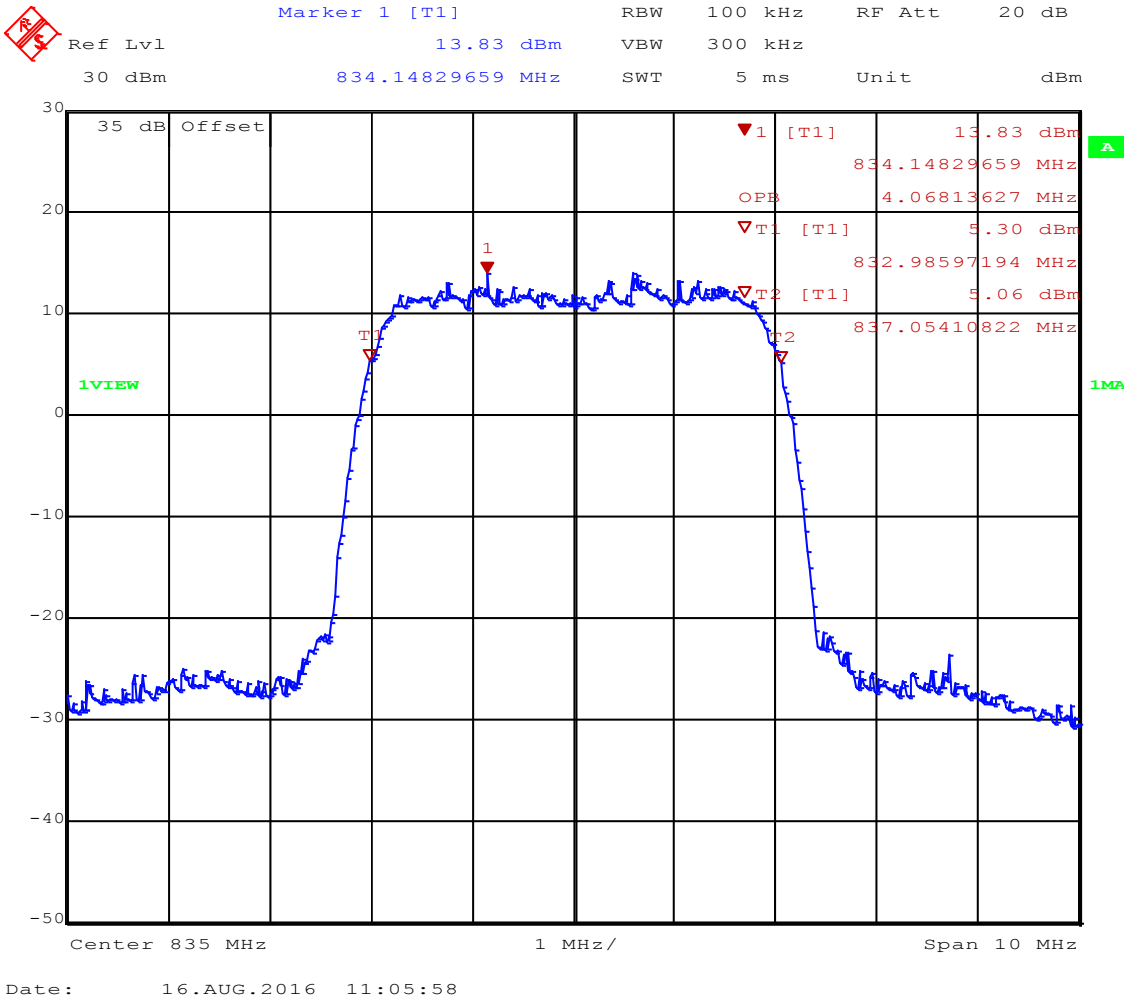


Occupied Bandwidth – FDD V F_{MID}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1603-5477

Applicant:	Owlet GmbH
EUT Name:	Luminaire Controller
Model:	LUCO P7 CM
Test Site:	Eurofins Product Service GmbH
Operator:	Burkhard Pudell
Test Conditions:	Tnom / Vnom
Mode:	UMTS FDD V / CH: 4175 / RMC
Test Date:	2016-08-16
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 4.068 MHz

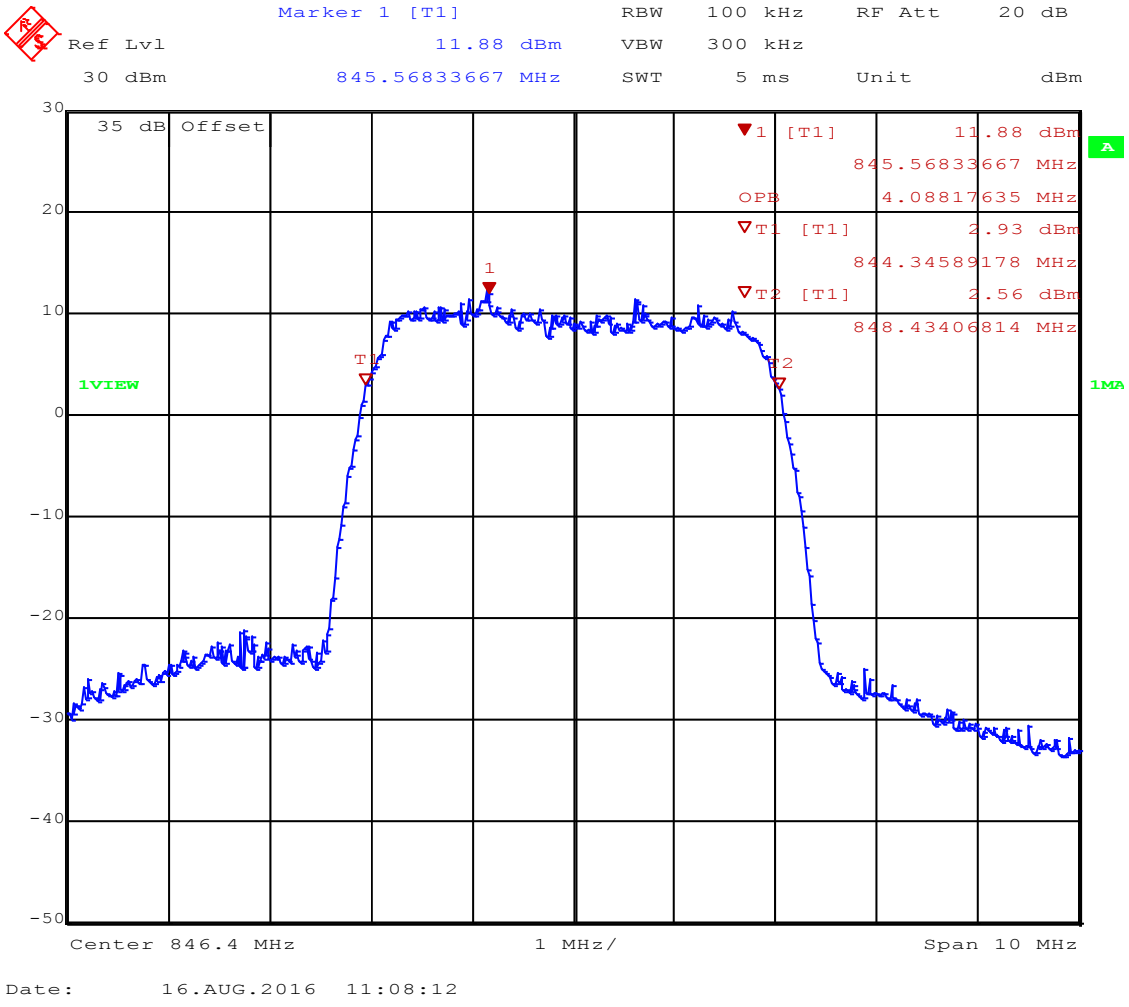


Occupied Bandwidth – FDD V F_{HIGH}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1603-5477

Applicant:	Owlet GmbH
EUT Name:	Luminaire Controller
Model:	LUCO P7 CM
Test Site:	Eurofins Product Service GmbH
Operator:	Burkhard Pudell
Test Conditions:	Tnom / Vnom
Mode:	UMTS FDD V / CH: 4232 / RMC
Test Date:	2016-08-16
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 4.088 MHz

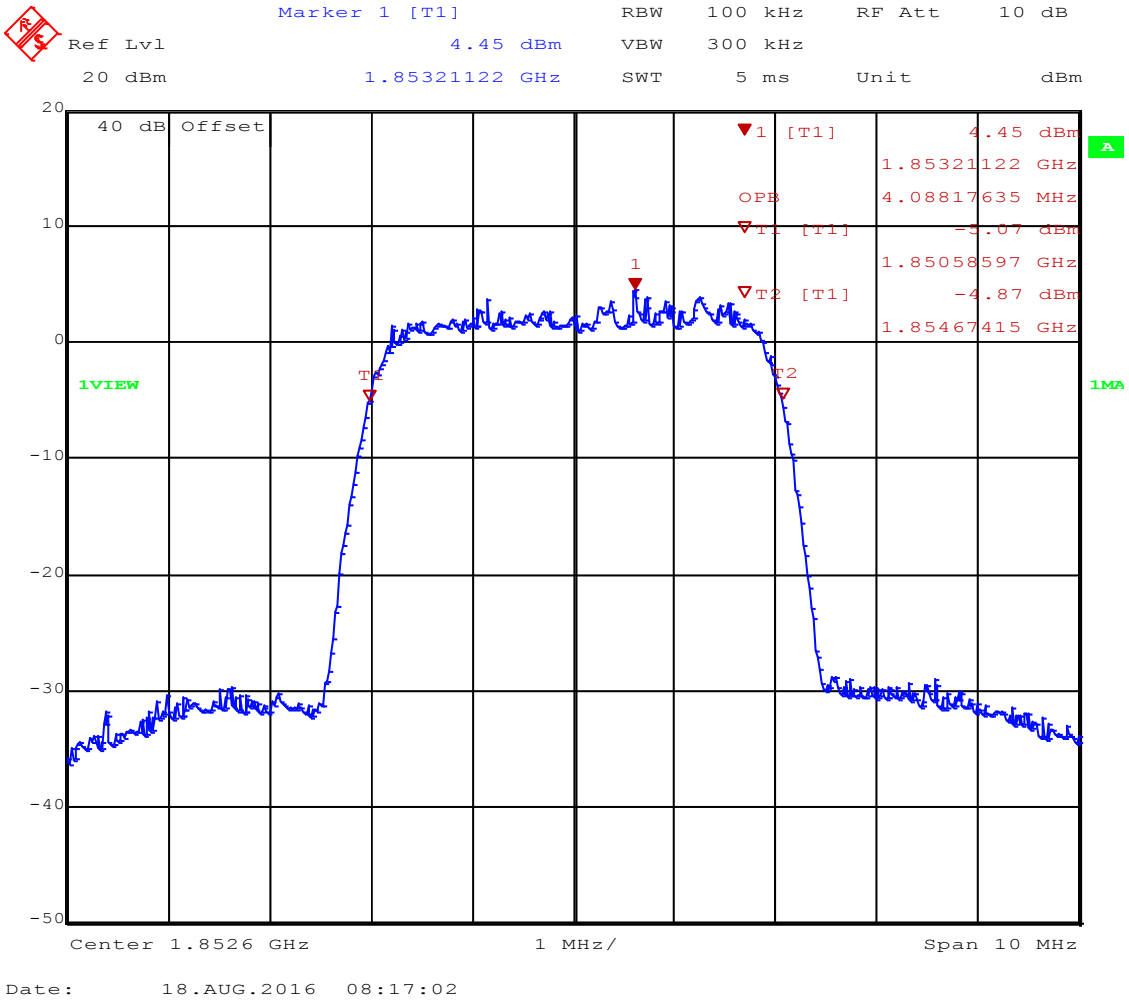


Occupied Bandwidth – FDD II F_{LOW}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1603-5477

Applicant:	Owlet GmbH
EUT Name:	Luminaire Controller
Model:	LUCO P7 CM
Test Site:	Eurofins Product Service GmbH
Operator:	Burkhard Pudell
Test Conditions:	Tnom / Vnom
Mode:	UMTS FDD II / CH: 9263 / RMC
Test Date:	2016-08-18
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 4.088 MHz

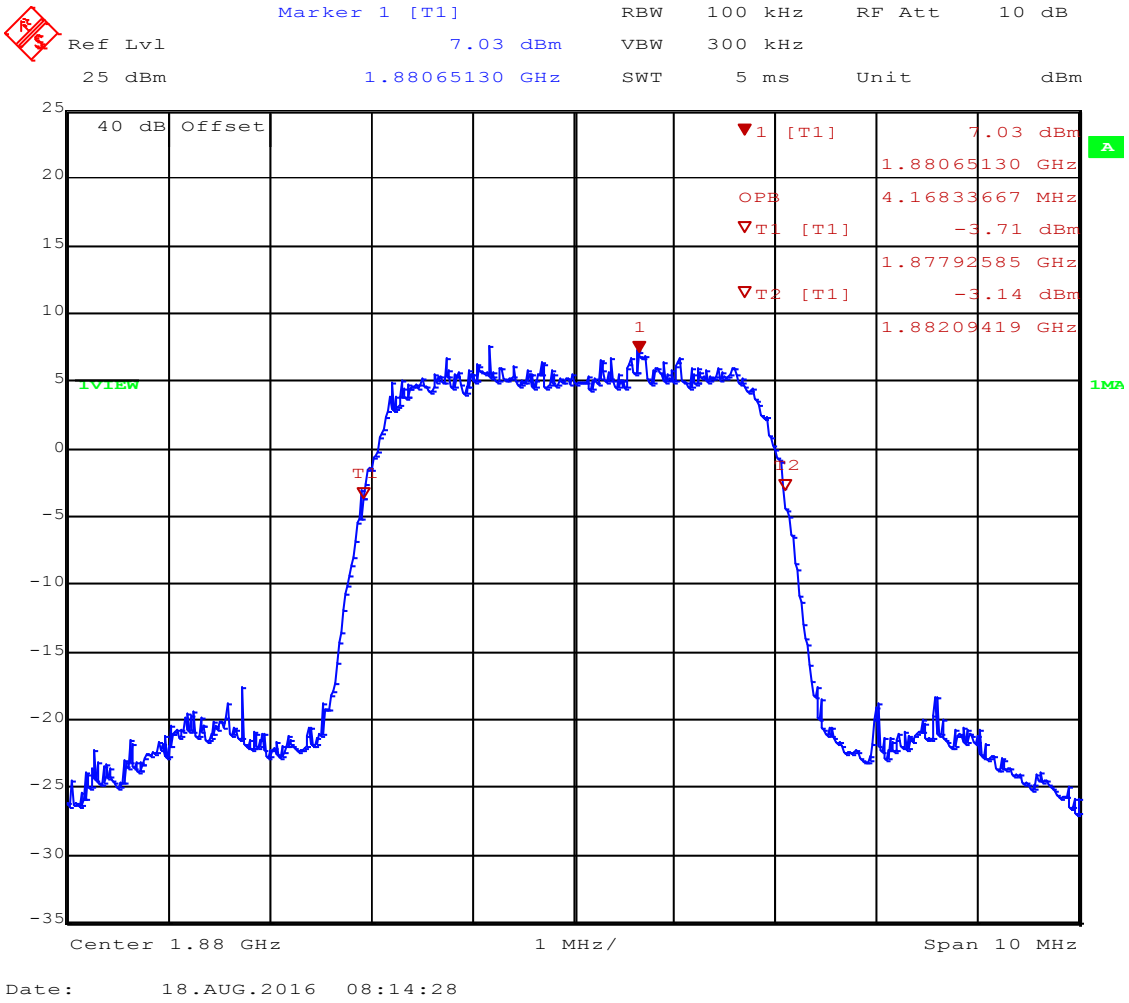


Occupied Bandwidth – FDD II F_{MID}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1603-5477

Applicant:	Owlet GmbH
EUT Name:	Luminaire Controller
Model:	LUCO P7 CM
Test Site:	Eurofins Product Service GmbH
Operator:	Burkhard Pudell
Test Conditions:	Tnom / Vnom
Mode:	UMTS FDD II / CH: 9400 / RMC
Test Date:	2016-08-18
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 4.168 MHz

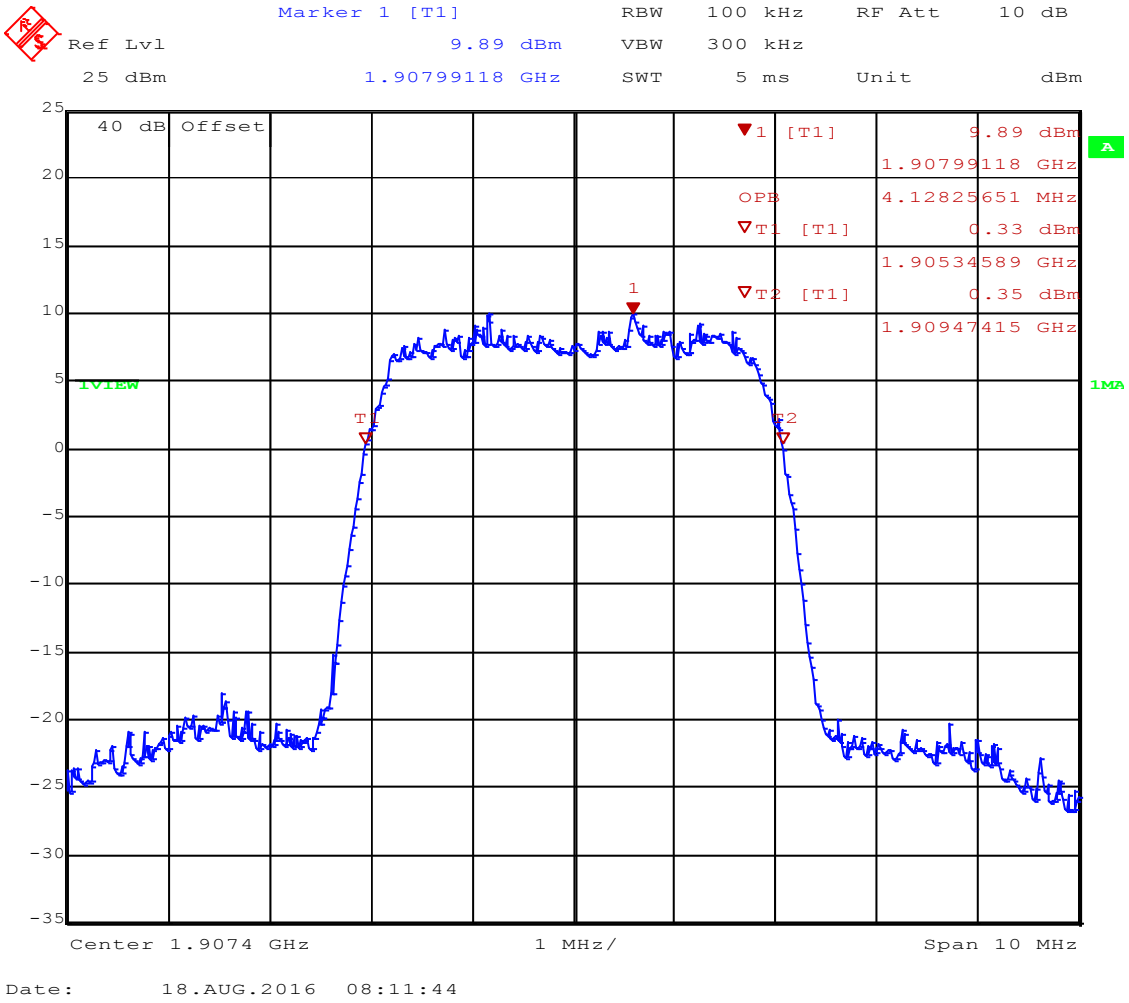


Occupied Bandwidth – FDD II F_{HIGH}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1603-5477

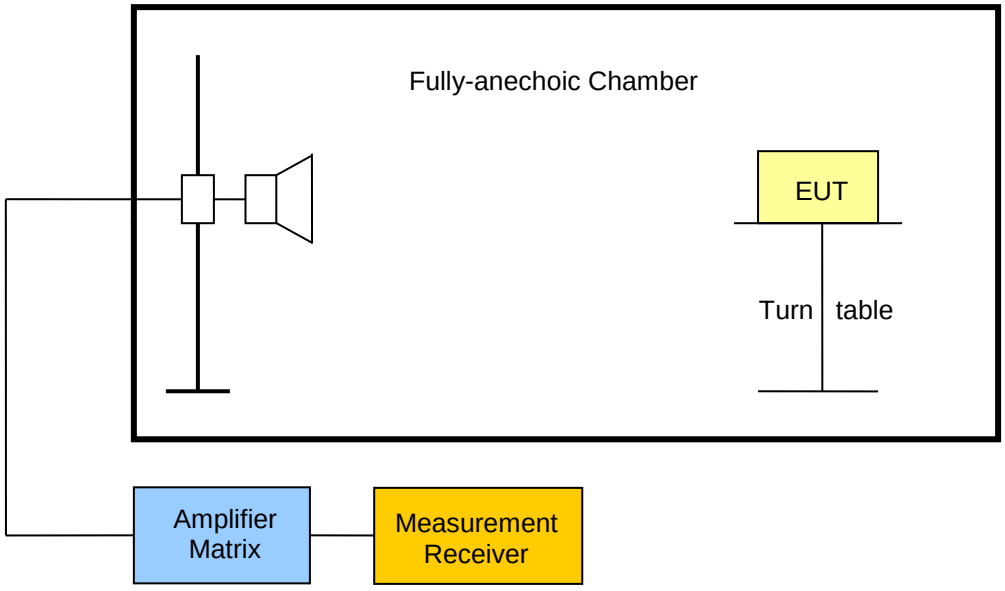
Applicant:	Owlet GmbH
EUT Name:	Luminaire Controller
Model:	LUCO P7 CM
Test Site:	Eurofins Product Service GmbH
Operator:	Burkhard Pudell
Test Conditions:	Tnom / Vnom
Mode:	UMTS FDD II / CH: 9537 / RMC
Test Date:	2016-08-18
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	OBW = 4.128 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 (40.60 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 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 – 850 MHz 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	GSM850	ver	25.7	38.45	-12.75	PASS
F_{MID}	836.2	GSM850	hor	25.9	38.45	-12.55	PASS
F_{HIGH}	848.8	GSM850	hor	25.0	38.45	-13.45	PASS
F_{LOW}	824.2	EGPRS850	ver	23.0	38.45	-15.45	PASS
F_{MID}	836.2	EGPRS850	hor	23.3	38.45	-15.15	PASS
F_{HIGH}	848.8	EGPRS850	hor	22.6	38.45	-15.85	PASS
F_{LOW}	826.6	FDD V	ver	19.3	38.45	-19.15	PASS
F_{MID}	835.0	FDD V	hor	19.3	38.45	-19.15	PASS
F_{HIGH}	846.4	FDD V	hor	18.1	38.45	-20.35	PASS
Test results – 850 MHz 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	GSM850	ver	27.85	40.6	-12.75	PASS
F_{MID}	836.2	GSM850	hor	28.05	40.6	-12.55	PASS
F_{HIGH}	848.8	GSM850	hor	27.15	40.6	-13.45	PASS
F_{LOW}	824.2	EGPRS850	ver	25.15	40.6	-15.45	PASS
F_{MID}	836.2	EGPRS850	hor	25.45	40.6	-15.15	PASS
F_{HIGH}	848.8	EGPRS850	hor	24.75	40.6	-15.85	PASS
F_{LOW}	826.6	FDD V	ver	21.45	40.6	-19.15	PASS
F_{MID}	835.0	FDD V	hor	21.45	40.6	-19.15	PASS
F_{HIGH}	846.4	FDD V	hor	20.25	40.6	-20.35	PASS
Test results – 1900 MHz 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	GSM1900	hor	20.9	33	-12.1	PASS
F_{MID}	1880	GSM1900	hor	23.0	33	-10.0	PASS
F_{HIGH}	1909.8	GSM1900	hor	25.2	33	-7.8	PASS
F_{LOW}	1850.2	EGPRS1900	hor	19.4	33	-13.6	PASS
F_{MID}	1880	EGPRS1900	hor	22.0	33	-11.0	PASS
F_{HIGH}	1909.8	EGPRS1900	hor	24.0	33	-9.0	PASS
F_{LOW}	1852.6	FDD II	hor	13.7	33	-9.3	PASS
F_{MID}	1880.0	FDD II	hor	16.6	33	-6.4	PASS
F_{HIGH}	1907.4	FDD II	hor	19.1	33	-13.9	PASS
Comments:							

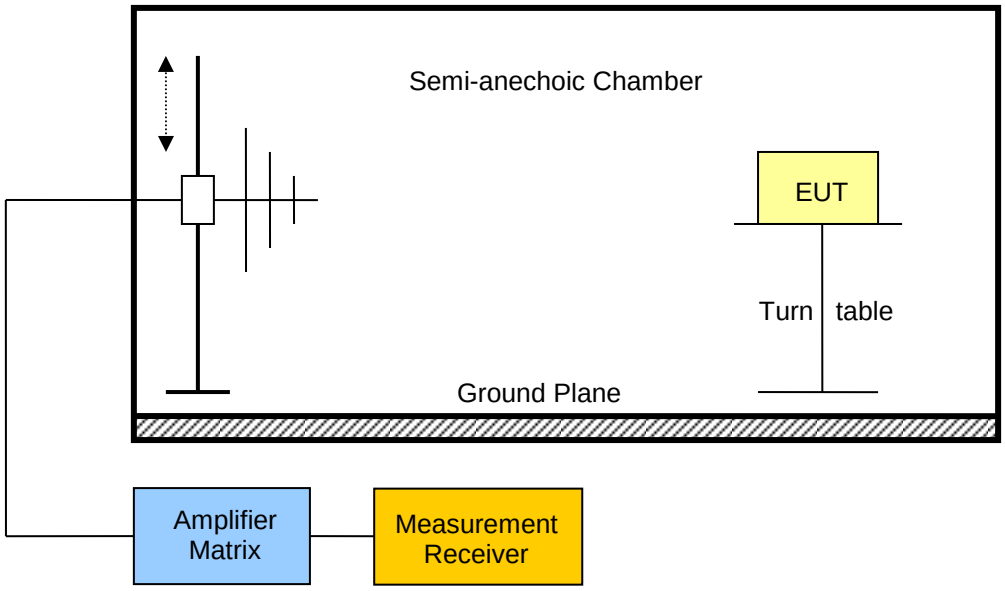
3.3 Test Conditions and Results – Transmitter radiated emissions

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 / ANSI C63.26
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, WCDMA FDDV							
Channel	Frequency [MHz]	Mode	Emission [MHz]	Level [dbm]	Pol.	Limit [dBm]	Margin [dB]
F_{LOW}	824.2	GPRS850	824	-22.46	hor	-13.00	-09.46
F_{LOW}	824.2	GPRS850	824	-20.38	ver	-13.00	-07.38
F_{LOW}	824.2	GPRS850	1648	-26.56	ver	-13.00	-13.56
F_{LOW}	824.2	GPRS850	1648	-22.40	ver	-13.00	-09.44
F_{MID}	836.2	GPRS850	1672	-27.66	ver	-13.00	-14.66
F_{MID}	836.2	GPRS850	1672	-25.70	ver	-13.00	-12.74
F_{MID}	836.2	GPRS850	1696	-30.50	ver	-13.00	-17.49
F_{HIGH}	848.8	GPRS850	849	-19.06	hor	-13.00	-06.06
F_{HIGH}	848.8	GPRS850	849	-16.18	ver	-13.00	-03.18
F_{HIGH}	848.8	GPRS850	1696	-31.36	ver	-13.00	-18.36
F_{LOW}	826.6	WCDMA FDD V	822.8	-25.17	ver	-13.00	-12.17
F_{MID}	835.0	WCDMA FDD V	no significant spurious emissions				
F_{HIGH}	846.4	WCDMA FDD V	850	-27.83	ver	-13.00	-14.83
Test results – GSM1900, WCDMA FDDII							
Channel	Frequency [MHz]	Mode	Emission [MHz]	Level [dbm]	Pol.	Limit [dBm]	Margin [dB]
F_{LOW}	1850.2	GPRS1900	no significant spurious emissions				
F_{MID}	1880	GPRS1900	no significant spurious emissions				
F_{HIGH}	1909.8	GPRS1900	1910	-23.66	hor	-13	-10.66
F_{HIGH}	1909.8	GPRS1900	1910	-24.23	ver	-13	-11.23
F_{LOW}	1852.6	WCDMA FDD II	no significant spurious emissions				
F_{MID}	1880	WCDMA FDD II	no significant spurious emissions				
F_{HIGH}	1907.4	WCDMA FDD II	1910	-21.39	hor	-13	-08.39
F_{HIGH}	1907.4	WCDMA FDD II	1910	-19.92	ver	-13	-06.92
Comments:							

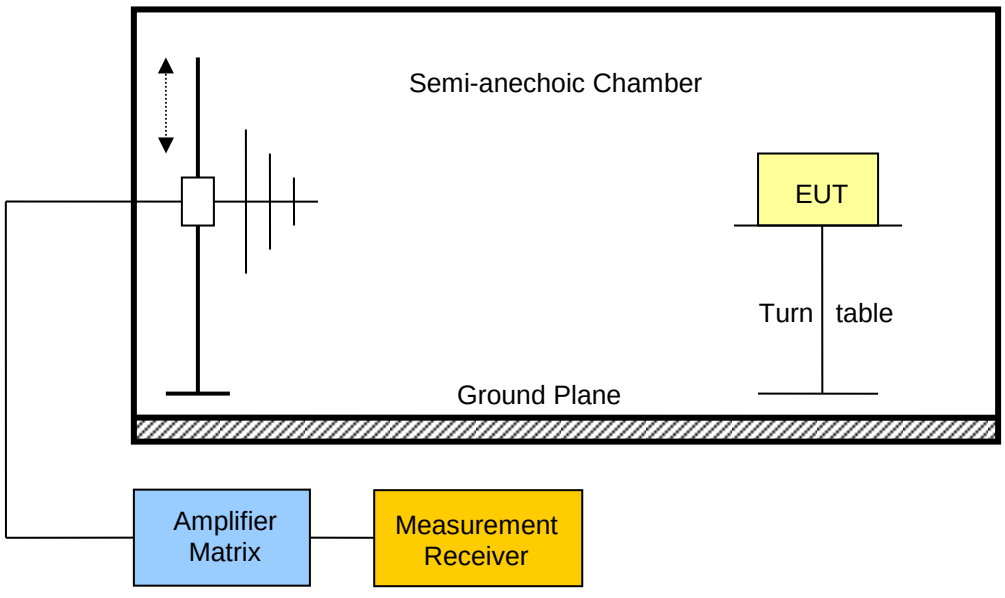
3.4 Test Conditions and Results – Receiver radiated emissions

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 GPRS / WCDMA

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

Channel	Frequency [MHz]	Emission [MHz]	Emission Level [dbµV/m]	Emission Level [µV/m]	Det.	Limit [µV/m]	Margin [µV/m]
F_{MID}	836.2	7784	52.17	329.6	pk	500	-170.4
F_{MID}	880.0	7872	50.92	247.2	pk	500	-252,8
F_{MID}	880.0	7952	51.13	259.4	pk	500	-240,6

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