RADIO REPORT

FCC 47 CFR Part 15C
ISED Canada RSS-247

Frequency hopping systems operating within the 2400 – 2483.5 MHz band

Report Reference No	G0M-1702-6295-TFC247BT-SU-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-2
Applicant	eResearchTechnology GmbH
Address	Sieboldstrasse 3 97230 Estenfeld GERMANY
Test Specification	According to FCC/ISED rules
Standard	47 CFR Part 15C RSS-247, Issue 1, 2015-05
Non-Standard Test Method	None
Test Scope	partial Radio compliance test
Equipment under Test (EUT):	
Product Description	Spirometer
Model(s)	SpiroSphere - Sensor Unit
Additional Model(s)	None
Brand Name(s)	SpiroSphere
Hardware Version(s)	06.06.00
Software Version(s)	Firmware µC: 00.12.00 / Booloader µC: 01.00.00 / BT-Script: 8
FCC-ID	2AAUFSPS002
IC	11335A-SPS002
Test Result	**PASSED**

Possibe test case verdicts:		
required by standard but not tested	N/T	
not required by standard	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	2017-03-24	
Date (s) of performance of tests	2017-04-07	
Report:		
Compiled by	Wilfried Treffke	
Tested by (+ signature) (Responsible for Test)	Wilfried Treffke	W. Treffke
Approved by (+ signature) (Head of Lab)	Christian Weber	C. Locker
Date of Issue	2017-05-12	
Total number of pages	69	
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	2017-05-12	Initial Release	

ABBREVIATIONS AND ACRONYMS

Acronyms	
Acronym	Description
BR	Bluetooth Basic Rate mode
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

REPORT INDEX

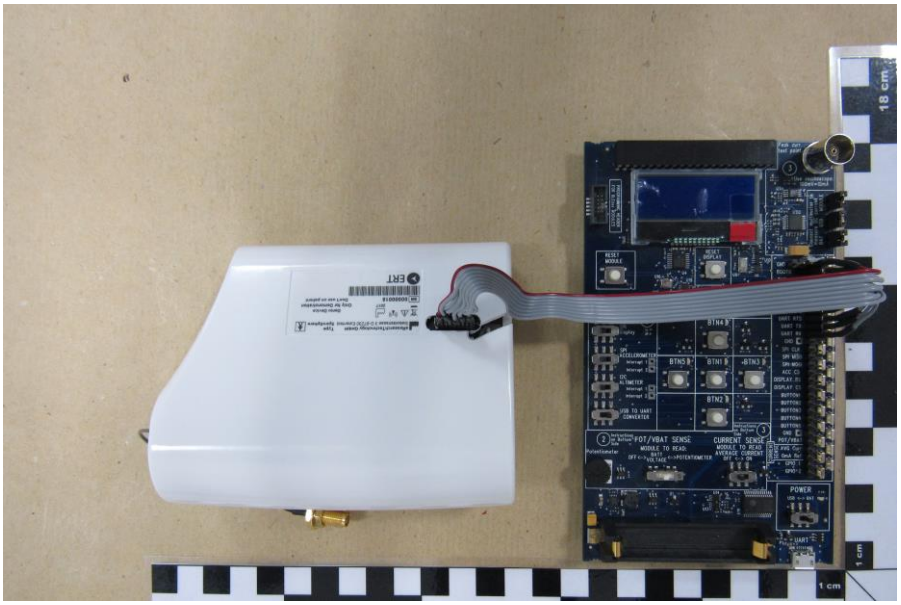
1 Equipment (Test Item) Under Test

Description	Spiro Meter	
Model	SpiroSphere - Sensor Unit	
Additional Model(s)	None	
Brand Name(s)	SpiroSphere	
Serial Number(s)	00000006	
Hardware Version(s)	06.06.00	
Software Version(s)	Firmware µC: 00.12.00 / Booloader µC: 01.00.00 / BT-Script: 8	
PMN	SpiroSphere	
HVIN	SpiroSphere Sensor	
FVIN	N/A	
HMN	N/A	
FCC-ID	2AAUFSPS002	
IC	11335A-SPS002	
Equipment type	End Product	
Radio type	Transceiver	
Assigned frequency bands	2400 - 2483.5 MHz	
Radio technology	Bluetooth	
Modulation	GFSK	
Number of antenna ports	1	
Radio Module	Type	Bluetooth / 802.15.1 Module
	Model	BT121-A-V2
	Manufacturer	BLUEGIGA
	HW Version	N/A
	SW Version	N/R
Antenna	Type	Integrated
	Model	chip antenna
	Manufacturer	N/A
	Gain	N/A
Supply Voltage	V_{NOM}	3.7 VDC
Operating Temperature	T_{NOM}	24 °C
AC/DC-Adaptor	Model	N/A
	Vendor	N/A
	Input	N/A
	Output	N/A
Manufacturer	eResearchTechnology GmbH Sieboldstrasse 3 97230 Estenfeld GERMANY	

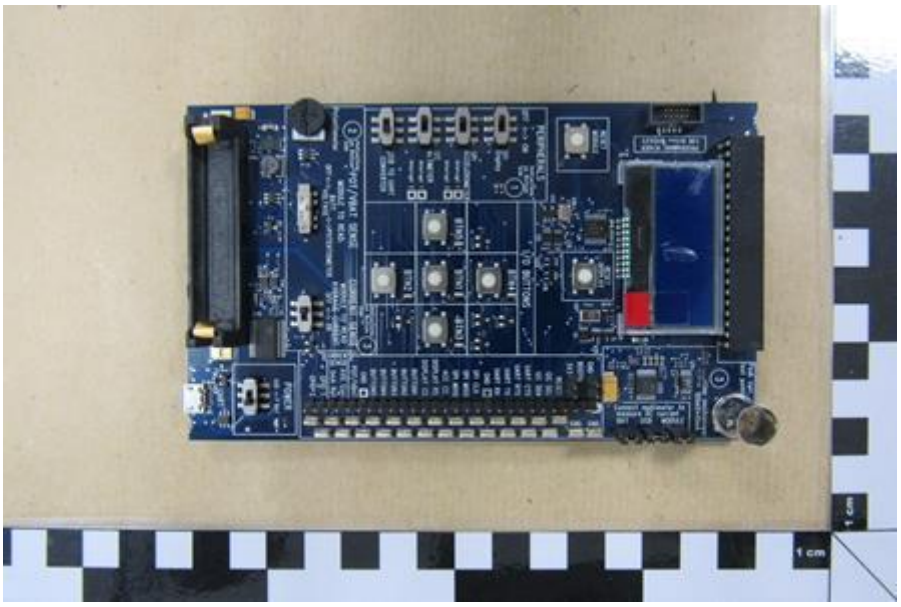
1.1 Photos – Equipment External

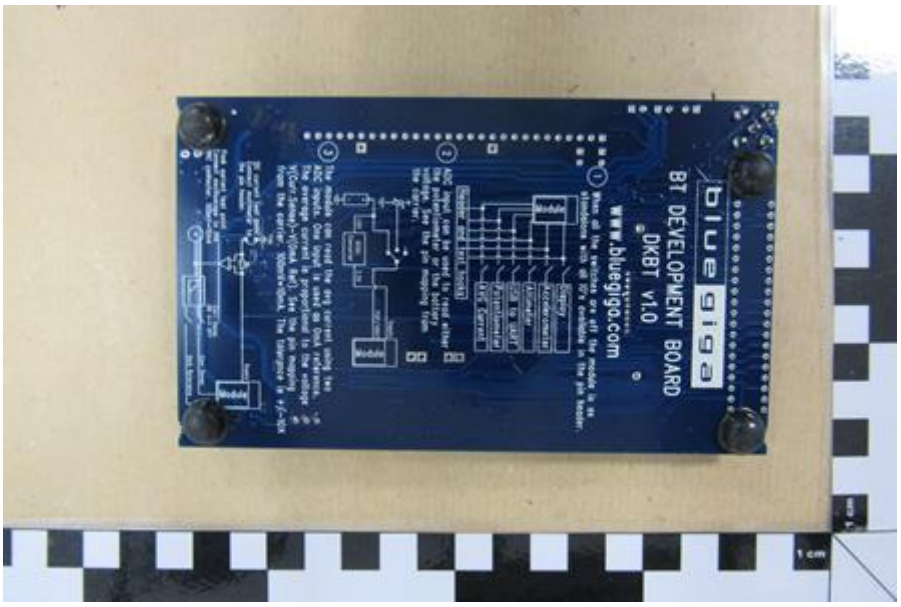
EUT Top

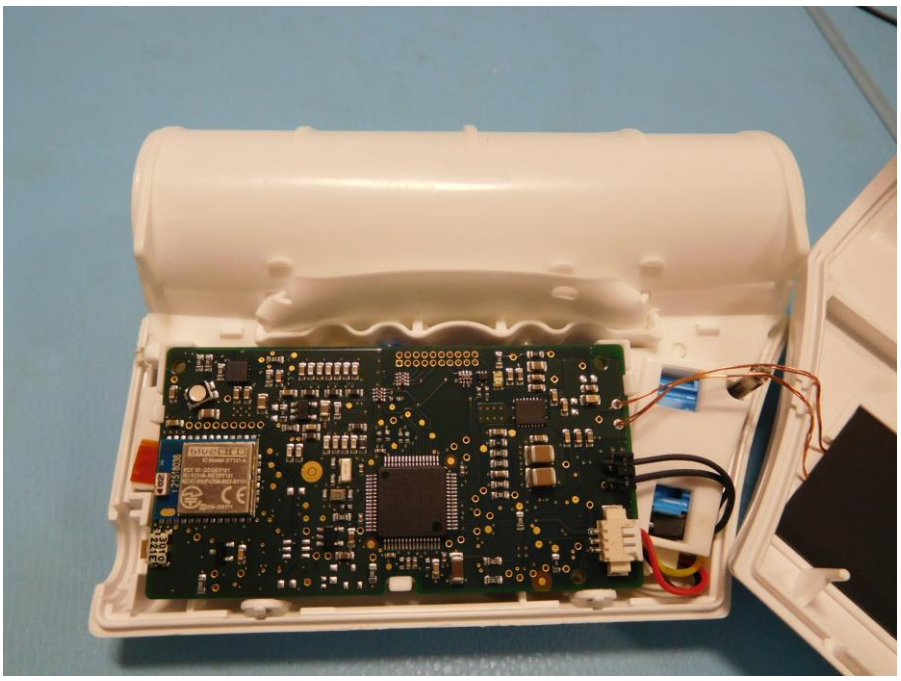

EUT Bottom


EUT with Evaluation Board


1.2 Photos – Equipment Internal

Evaluation Board Top


Evaluation Board Bottom


PCB TOP


Module


Battery


1.3 Photos – Test Setup

Setup Radiated


Setup Conducted


1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
AE	Laptop	Dell	Latitude E6420	S/N HPJ4R1
Description:				
AE	Auxillary Equipment			
SIM	Simulator			
CBL	Connecting Cable			
Comment:				

1.5 Test Modes

Mode	Description	
DH5 Single	General Conditions:	EUT powered by fully charged battery
	Radio Conditions:	Mode = Transmit Modulation = GFSK Spreading = None Packet type = DH5 Duty cycle = 100%
Receive	General Conditions:	EUT powered by fully charged battery
	Radio Conditions:	Mode = Receive (Scan)
Comment:		

1.6 Test Frequencies

Designator	Mode	Channel	Frequency [MHz]
F1	Tx / Rx	0	2402
F2	Tx / Rx	39	2441
F3	Tx / Rx	40	2442
F4	Tx / Rx	78	2480

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 15C, ISED RSS-210				
Product Standard Reference	**Requirement**	**Reference Method**	**Result**	**Remarks**
RSS-Gen 6.6	Occupied Bandwidth	ANSI C63.10	N/R	Informational only
FCC § 15.247(a)(1) ISED RSS-247 § 5.1	20 dB Bandwidth	ANSI C63.10	N/T	
FCC § 15.247(a)(1)(iii) ISED RSS-247 § 5.1	Number of hopping frequencies	ANSI C63.10	N/T	
FCC § 15.247(a)(1) ISED RSS-247 § 5.1	Frequency hopping channel separation	ANSI C63.10	N/T	
FCC § 15.247(a)(1)(iii) ISED RSS-247 § 5.1	Time of occupancy (Dwell time)	ANSI C63.10	N/T	
FCC § 15.247(b)(1) ISED RSS-247 § 5.4	Maximum peak conducted power	ANSI C63.10	N/T	
FCC § 15.207 ISED RSS-247 § 3.1	AC power line conducted emissions	ANSI C63.10	N/T	
FCC § 15.247(d) ISED RSS-247 § 5.5	Band edge compliance	ANSI C63.10	N/T	
FCC § 15.247(d) ISED RSS-247 § 5.5	Conducted spurious emissions	ANSI C63.10	N/T	
FCC § 15.247(d) FCC § 15.209 ISED RSS-GEN § 8.9	Transmitter radiated spurious emissions	ANSI C63.10	PASS	
ISED RSS-247 § 3.1	Receiver radiated spurious emissions	ANSI C63.10	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

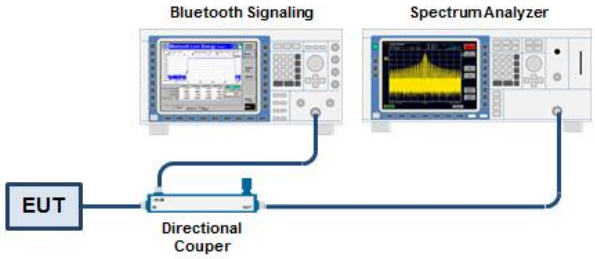
Test Information	
Reference	ISED RSS-Gen 6.6
Measurement Method	ANSI C63.10 6.9.3

3.1.2 Limits

Limits
None (Informational only)

3.1.3 Setup

Test Setup



3.1.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 3	EF00241	2016-04	2018-04

3.1.5 Procedure

Test Procedure

1. EUT transmitter is activated in test mode under normal conditions
2. The spectrum analyzer is set to peak detection and maximum hold with a span twice the emission spectrum
3. The resolution bandwidth is set to 1 % of the bandwidth
4. The occupied bandwidth is measured with the build-in analyzer function

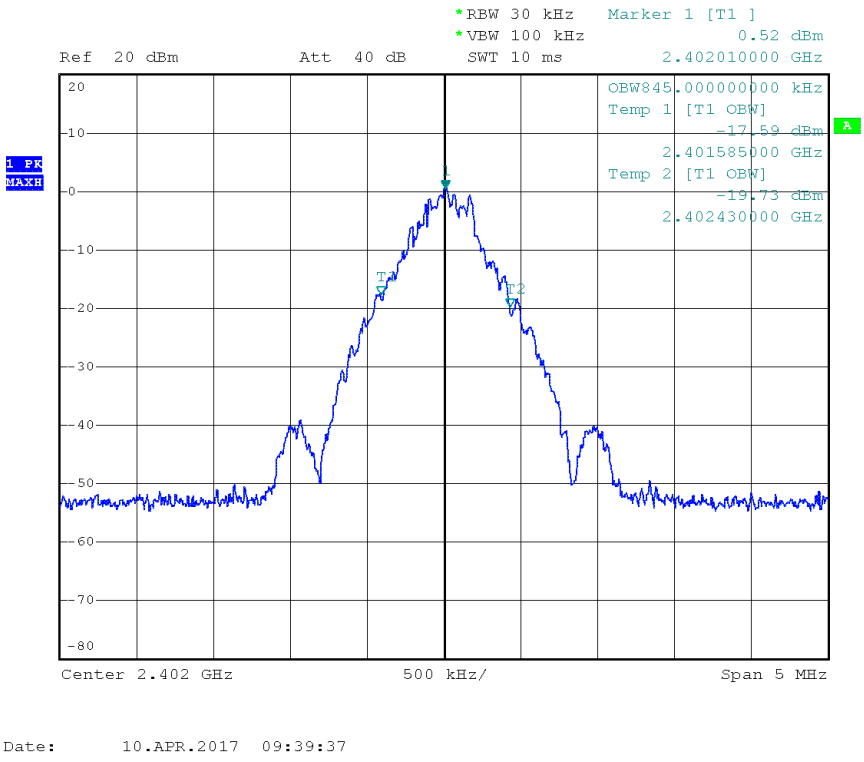
3.1.6 Results

Test Results		
Mode	Frequency [MHz]	Bandwidth [MHz]
DH5	2402	0.850
DH5	2441	0.850
DH5	2480	0.850

Occupied bandwidth – DH5 - 2402 MHz

Occupied Bandwidth

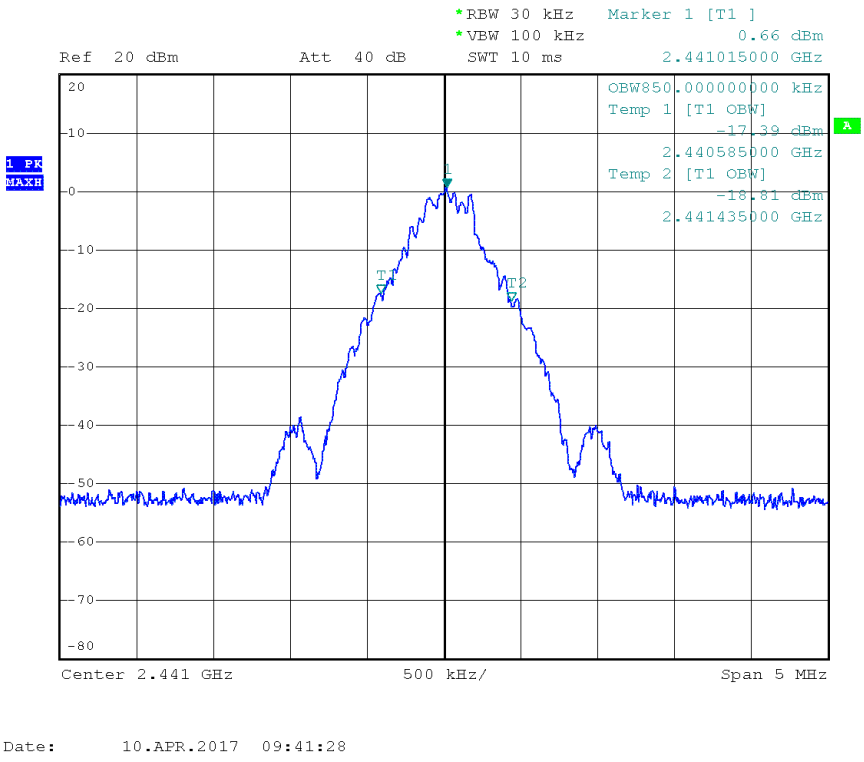
Project Number:	G0M-1702-6295
Applicant	eResearchTechnology GmbH
Model Description	Spiro Meter
Model:	SpiroSphere - Sensor Unit
Test Sample ID:	12692
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.3
Operational Mode:	DH5, Channel: 0, 2402 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-10
Occupied Bandwidth [MHz]:	0.850



Occupied bandwidth – DH5 - 2441 MHz

Occupied Bandwidth

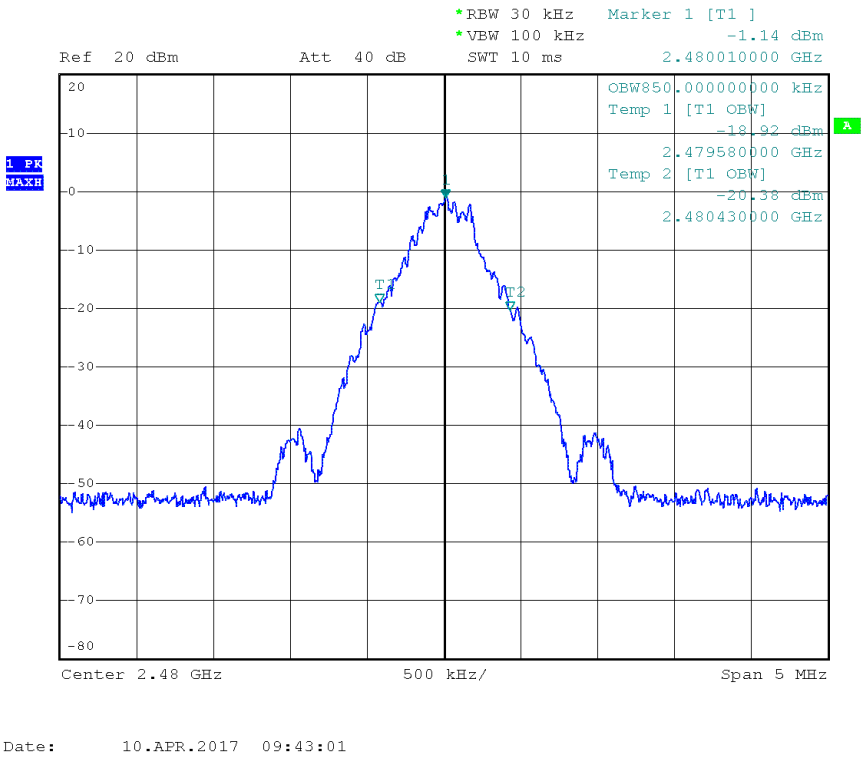
Project Number:	G0M-1702-6295
Applicant	eResearchTechnology GmbH
Model Description	Spiro Meter
Model:	SpiroSphere - Sensor Unit
Test Sample ID:	12692
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.3
Operational Mode:	DH5, Channel: 39, 2441 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-10
Occupied Bandwidth [MHz]:	0.850



Occupied bandwidth – DH5 - 2480 MHz

Occupied Bandwidth

Project Number:	G0M-1702-6295
Applicant	eResearchTechnology GmbH
Model Description	Spiro Meter
Model:	SpiroSphere - Sensor Unit
Test Sample ID:	12692
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.3
Operational Mode:	DH5, Channel: 78, 2480 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-10
Occupied Bandwidth [MHz]:	0.850



3.2 Test Conditions and Results - Transmitter radiated emissions

3.2.1 Information

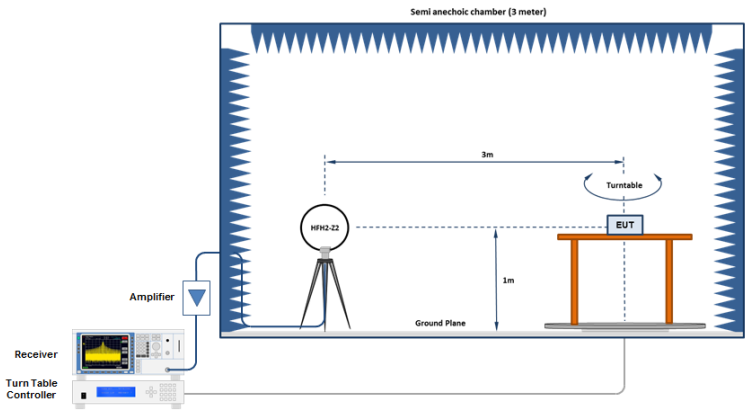
Test Information	
Reference	FCC 15.247(d) / ISED RSS-GEN 8.9
Measurement Method	ANSI C63.10 6.4, 6.5, 6.6

3.2.2 Limits

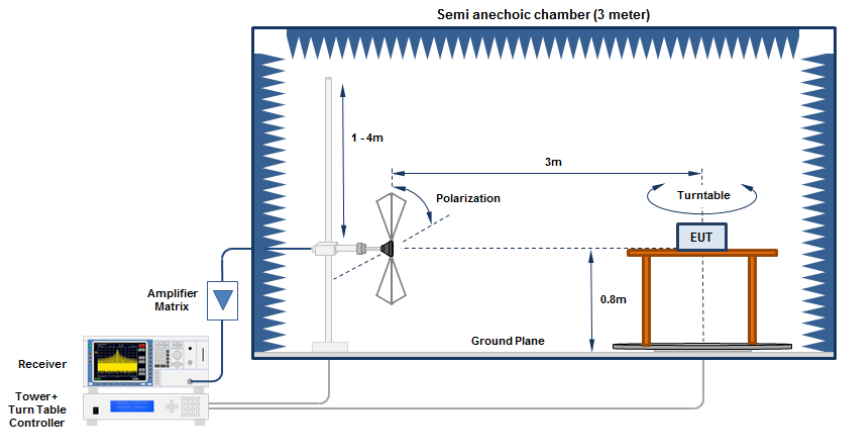
Limits			
Frequency [MHz]	Detector	Field strength [dBµV/m]	Measurement distance [m]
0.009 - 0.09	Average	2400/F[kHz]	300
0.09 - 0.110	Quasi-Peak	2400/F[kHz]	300
0.110 - 0.490	Average	2400/F[kHz]	300
0.490 - 1.705	Quasi-Peak	24000/F[kHz]	30
1.705 - 30.0	Quasi-Peak	30	30
30 - 88	Quasi-Peak	100	3
88 - 216	Quasi-Peak	150	3
216 - 960	Quasi-Peak	200	3
960 - 1000	Quasi-Peak	500	3
>1000	Average	500	3

3.2.3 Setup

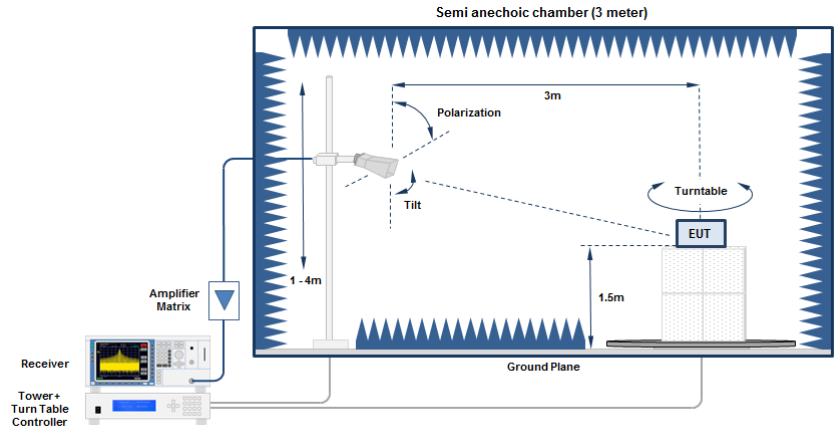
Test Setup < 30 MHz



Test Setup 30 - 1000 MHz



Test Setup > 1 GHz



3.2.4 Equipment

Test Equipment 30 - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	-	-
Measurement Receiver	R&S	ESU 26	EF00887	2017-01	2018-01
Measurement Receiver	R&S	N9038A-526/WXP	EF01070	2016-08	2017-08
Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	-	-
Measurement Receiver	R&S	ESU 26	EF00887	2017-01	2018-01

3.2.5 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

3.2.6 Results

Test Results - DH5						
Channel [MHz]	Emission [MHz]	Level [dBµV/m]	Det.	Pol.	Limit [dBµV/m]	Margin [dB]
2402	2385	38.24	RMS	ver	54.00	-15.76
2402	2385.6	37.40	RMS	hor	54.00	-16.60
2402	4800	47.14	pk	ver	74.00	-26.86
2441	2352.4	44.96	pk	hor	74.00	-29.04
2441	2352.4	51.03	pk	ver	74.00	-22.97
2441	2386	47.96	pk	hor	74.00	-26.04
2441	2386	51.62	pk	ver	74.00	-22.38
2441	2489.6	44.30	pk	hor	74.00	-29.70
2441	2489.6	49.95	pk	ver	74.00	-24.05
2480	2352	50.22	pk	hor	74.00	-23.78
2480	2352	52.43	pk	ver	74.00	-21.57
2480	2383	53.03	pk	ver	74.00	-20.97
2480	2386	51.66	pk	hor	74.00	-22.34
2480	2483.5	42.33	RMS	hor	54.00	-11.67
2480	2483.5	46.35	RMS	ver	54.00	-07.65

3.3 Test Conditions and Results - Receiver radiated emissions

3.3.1 Information

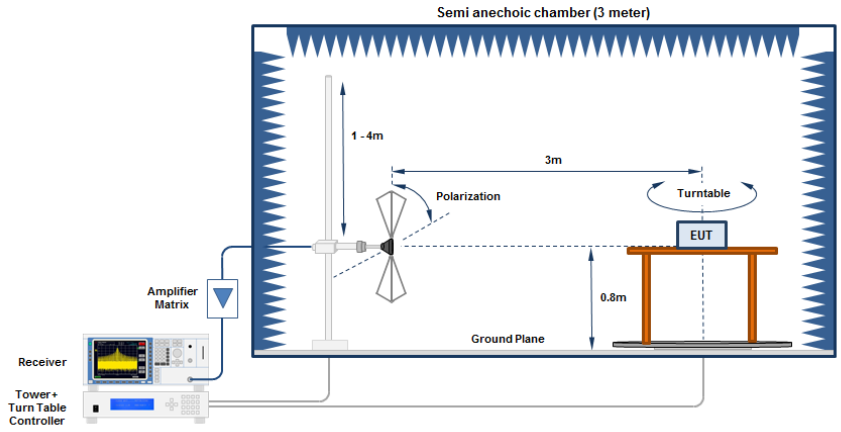
Test Information	
Reference	ISED RSS-247 3.1
Measurement Method	ANSI C63.10 6.5, 6.6

3.3.2 Limits

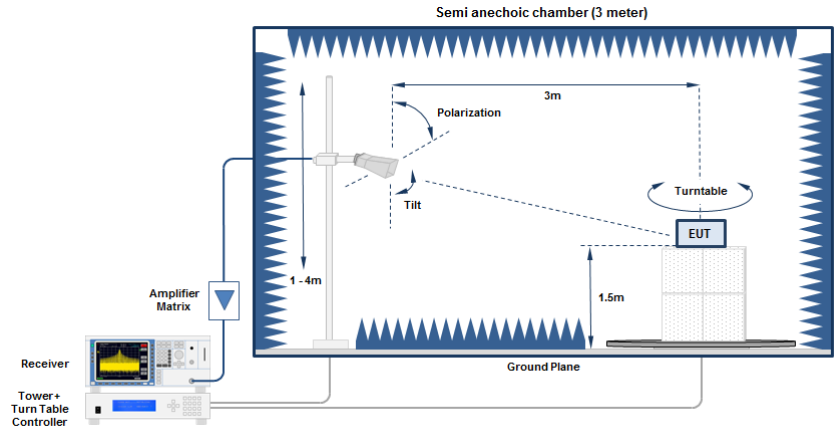
Limits			
Frequency [MHz]	Detector	Field strength [dBµV/m]	Measurement distance [m]
30 - 88	Quasi-Peak	100	3
88 - 216	Quasi-Peak	150	3
216 - 960	Quasi-Peak	200	3
960 - 1000	Quasi-Peak	500	3
>1000	Average	500	3

3.3.3 Setup

Test Setup 30 - 1000 MHz



Test Setup > 1 GHz



3.3.4 Equipment

Test Equipment 30 - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2016-01	2019-01
Measurement Receiver	R&S	ESU 26	EF00887	2017-01	2018-01
Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2016-01	2019-01
Measurement Receiver	R&S	ESU 26	EF00887	2017-01	2018-01

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						
Channel [MHz]	Emission [MHz]	Level [dBµV/m]	Det.	Pol.	Limit [dBµV/m]	Margin [dB]
2441	4880	44.04	pk	hor	53.98	-09.94
2441	4880	45.53	pk	ver	53.98	-08.45

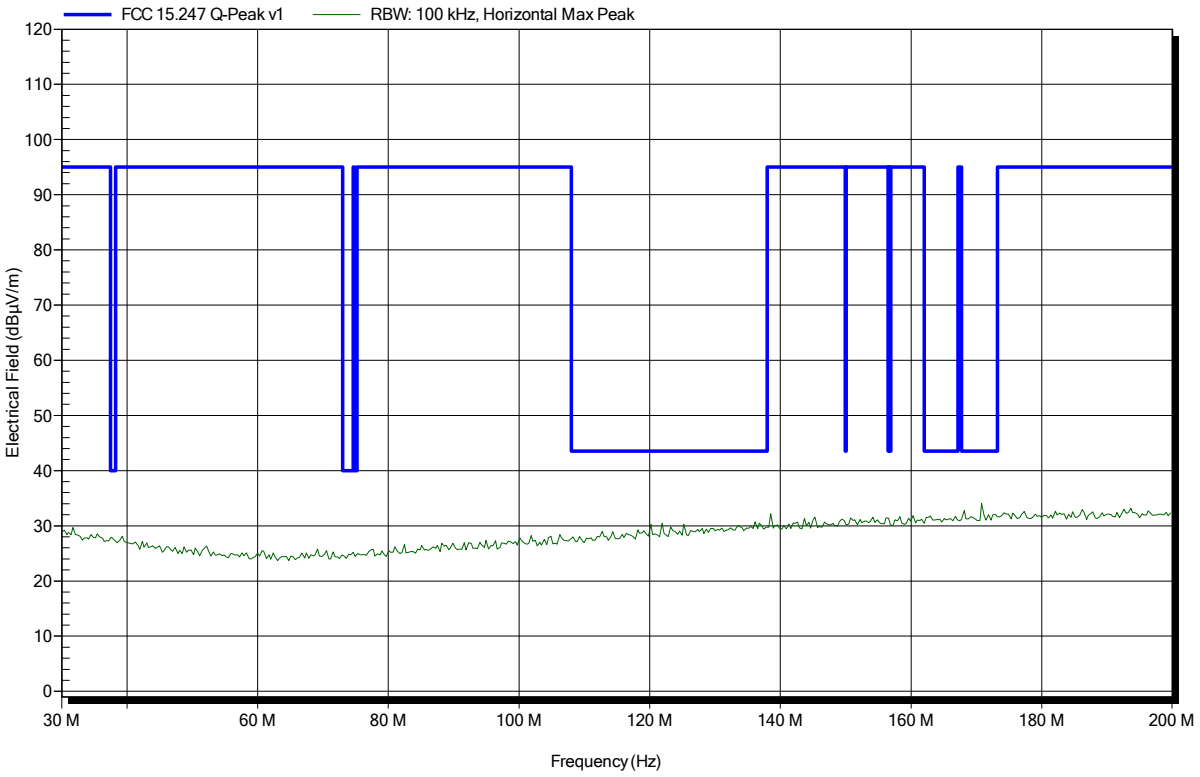
ANNEX A Transmitter sprurious emissions

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	TX; BT; DH5; 2402 MHz
Test Date:	2017-04-07
Note:	

Index 44

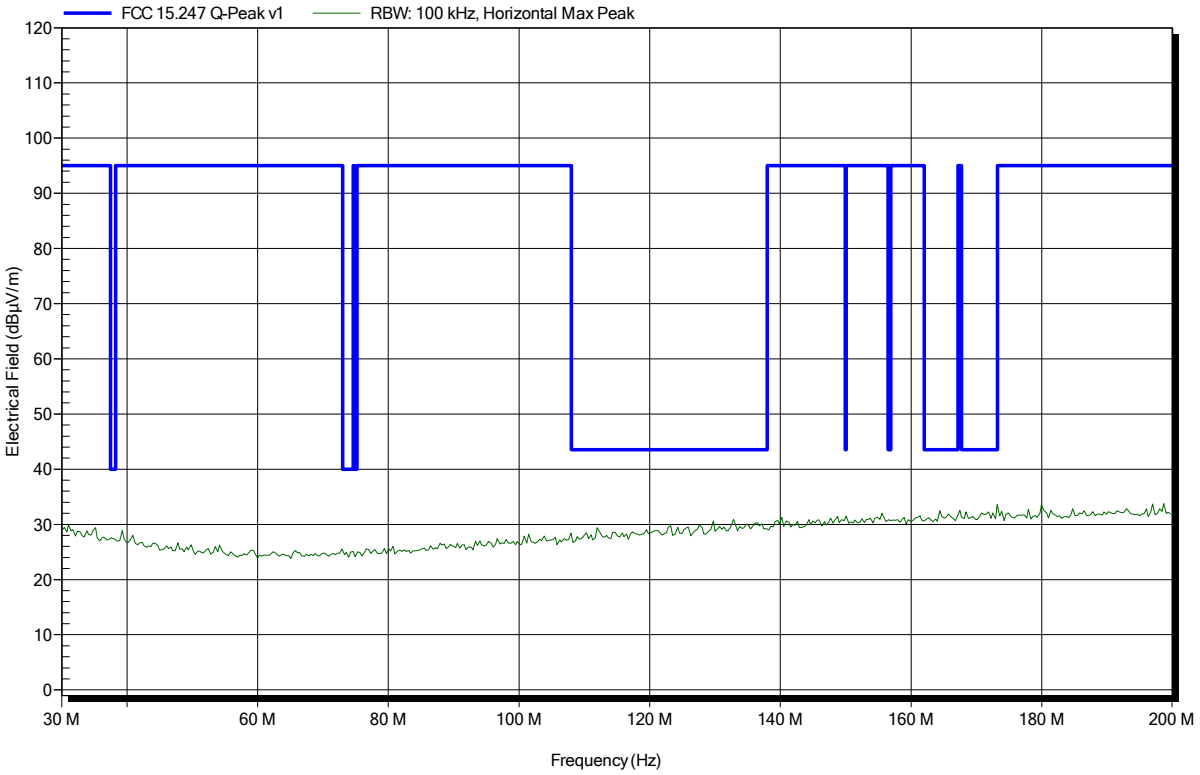


Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	TX; BT; DH5; 2402 MHz
Test Date:	2017-04-07
Note:	

Index 45

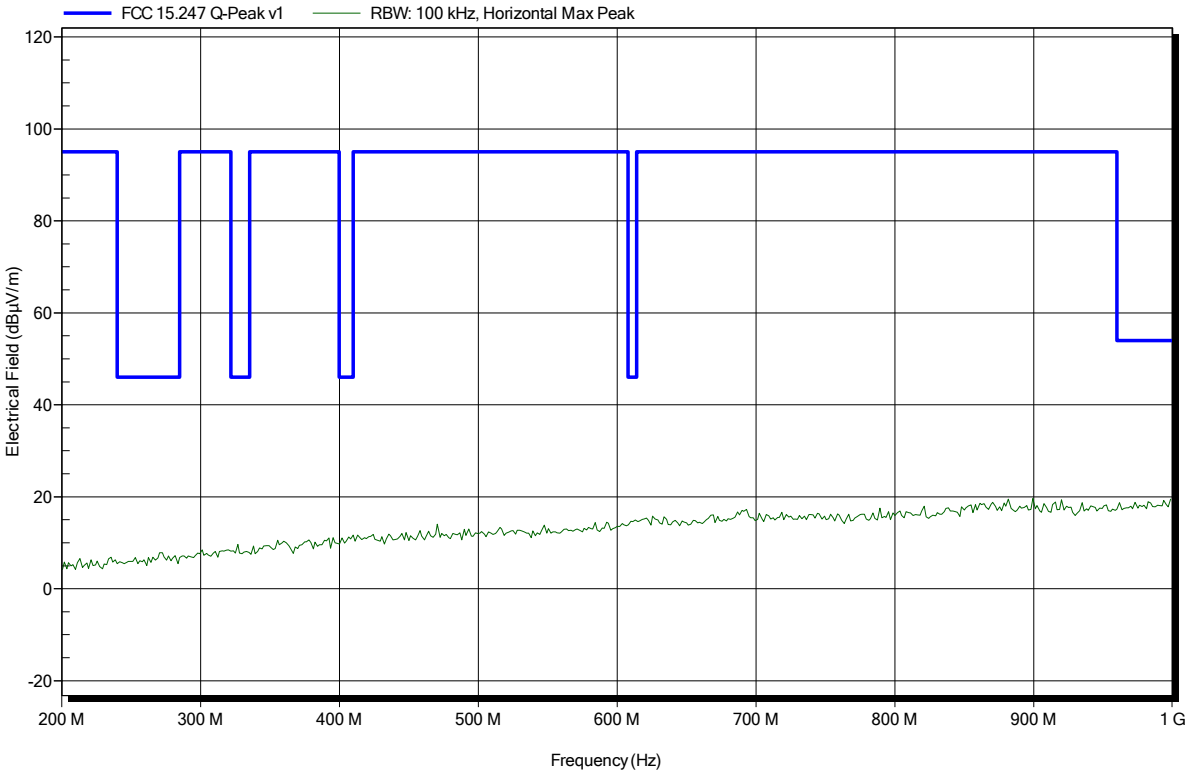


Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	TX; BT; DH5; 2402 MHz
Test Date:	2017-04-07
Note:	

Index 46

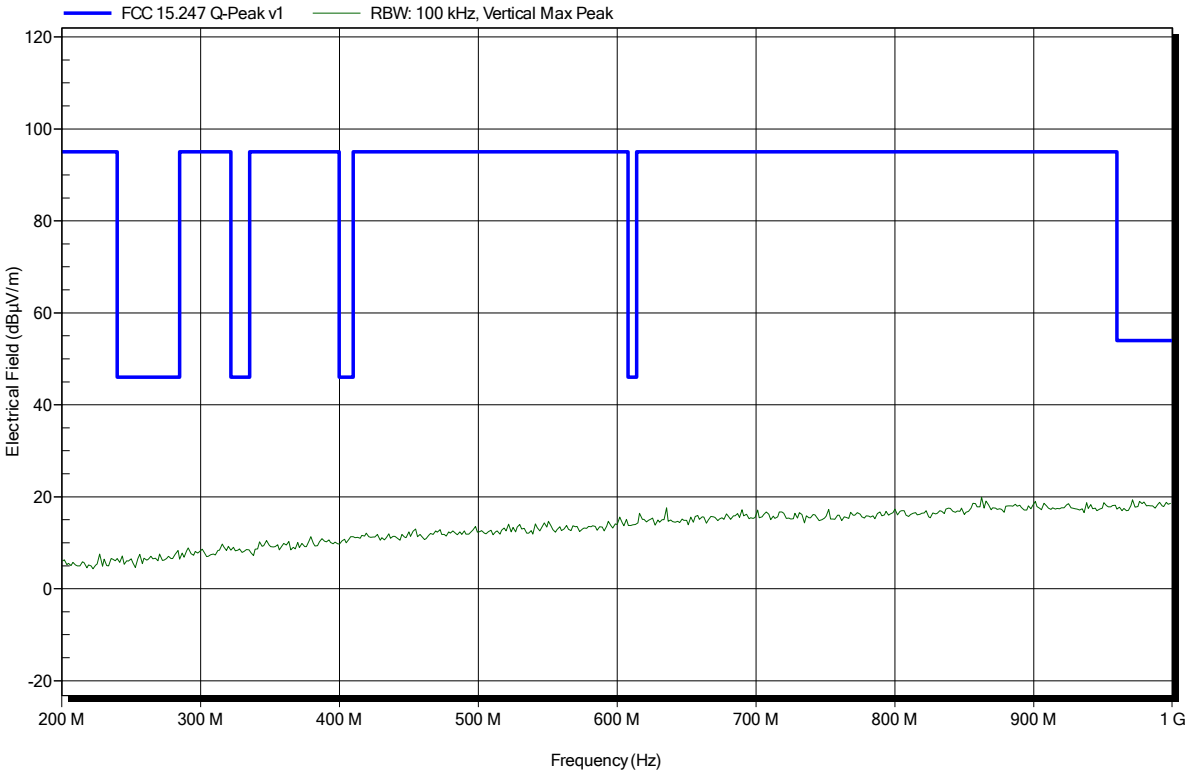


Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	TX; BT; DH5; 2402 MHz
Test Date:	2017-04-07
Note:	

Index 47

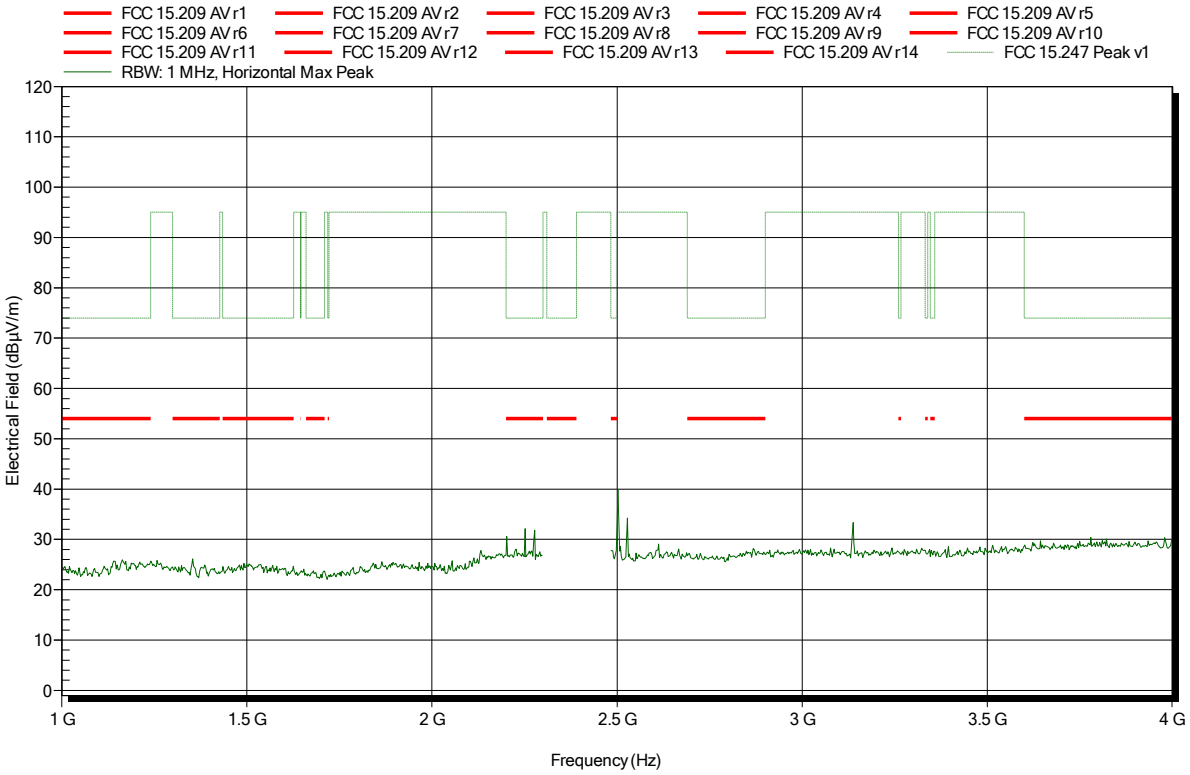


Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BT; DH5; 2402 MHz
Test Date:	2017-04-07
Note:	

Index 48

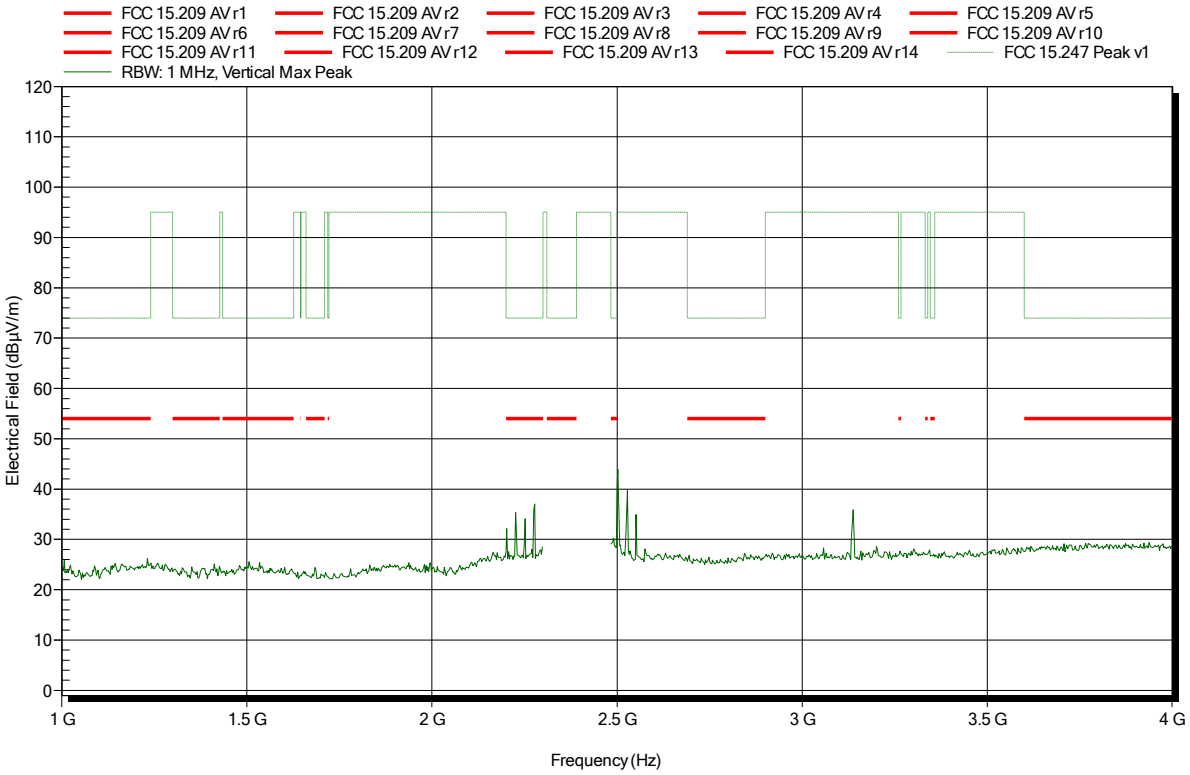


Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BT; DH5; 2402 MHz
Test Date:	2017-04-07
Note:	

Index 54

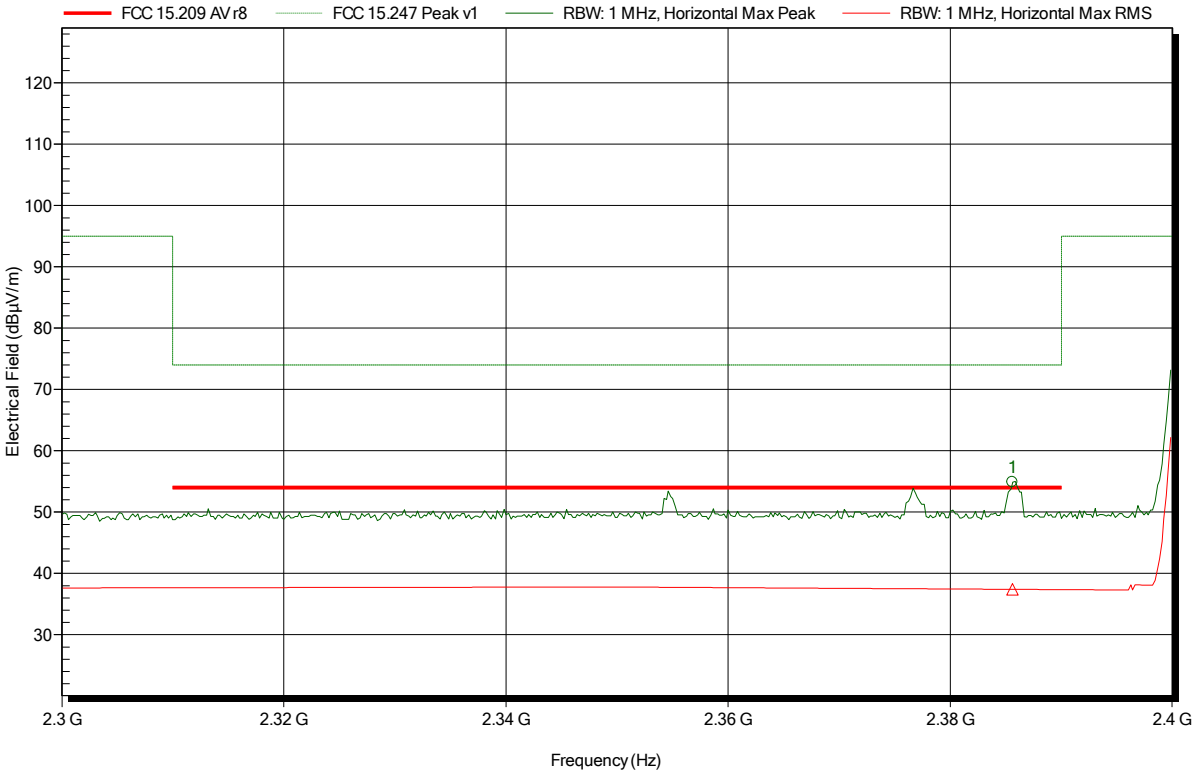


Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BT; DH5; 2402 MHz
Test Date:	2017-04-07
Note:	lower bandedge

Index 50



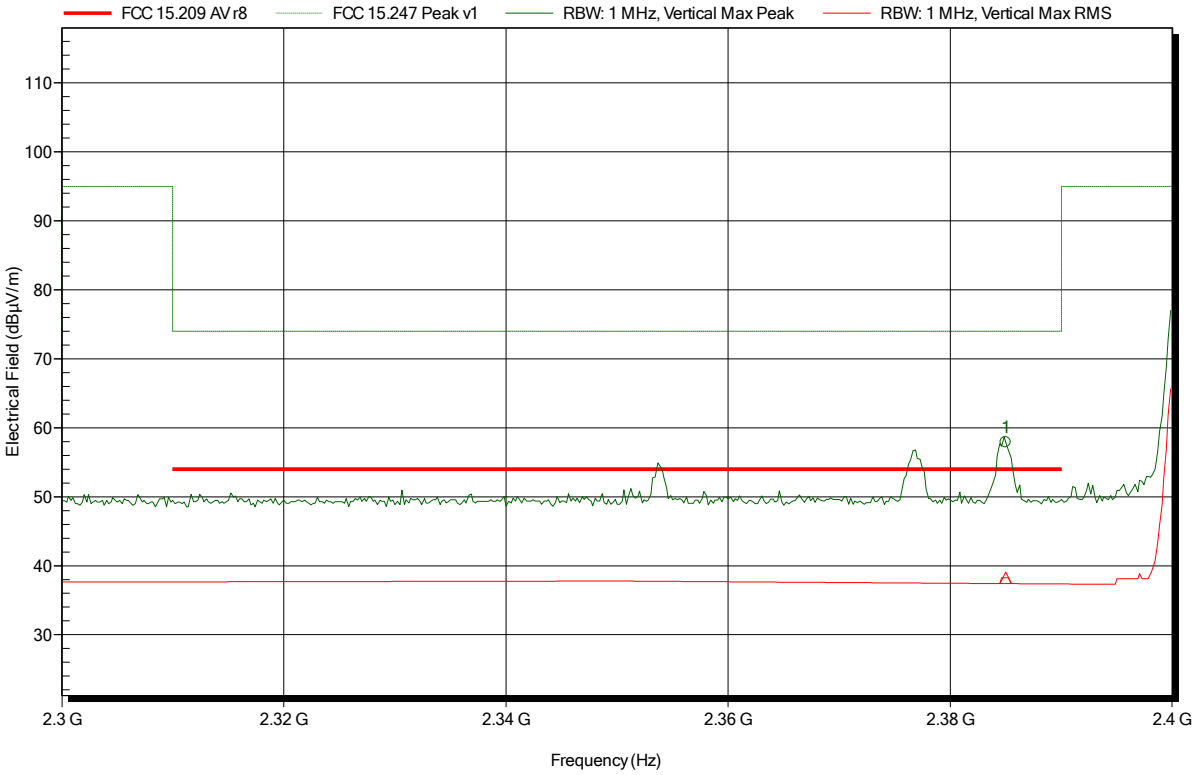
Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.3856 GHz	37.4 dBµV/m	54 dBµV/m	-16.6 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BT; DH5; 2402 MHz
Test Date:	2017-04-07
Note:	lower bandedge

Index 57



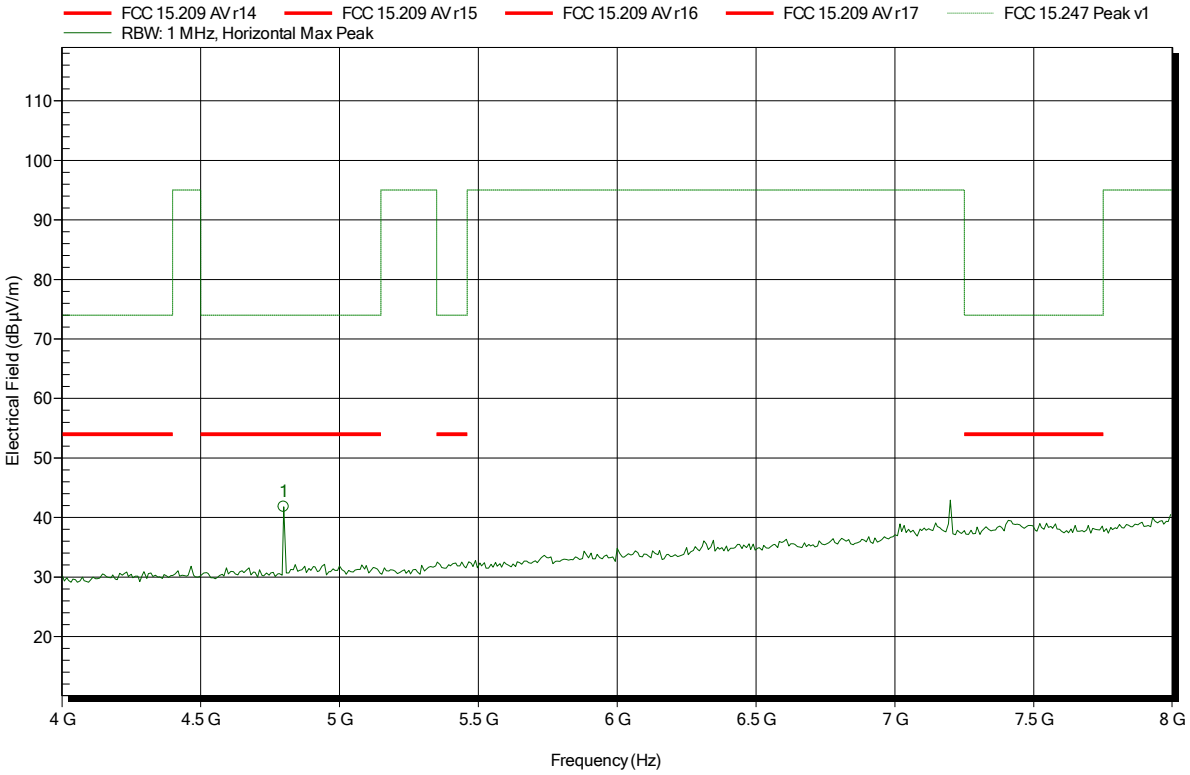
Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.385 GHz	38.24 dBµV/m	54 dBµV/m	-15.76 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BT; DH5; 2402 MHz
Test Date:	2017-04-07
Note:	

Index 51



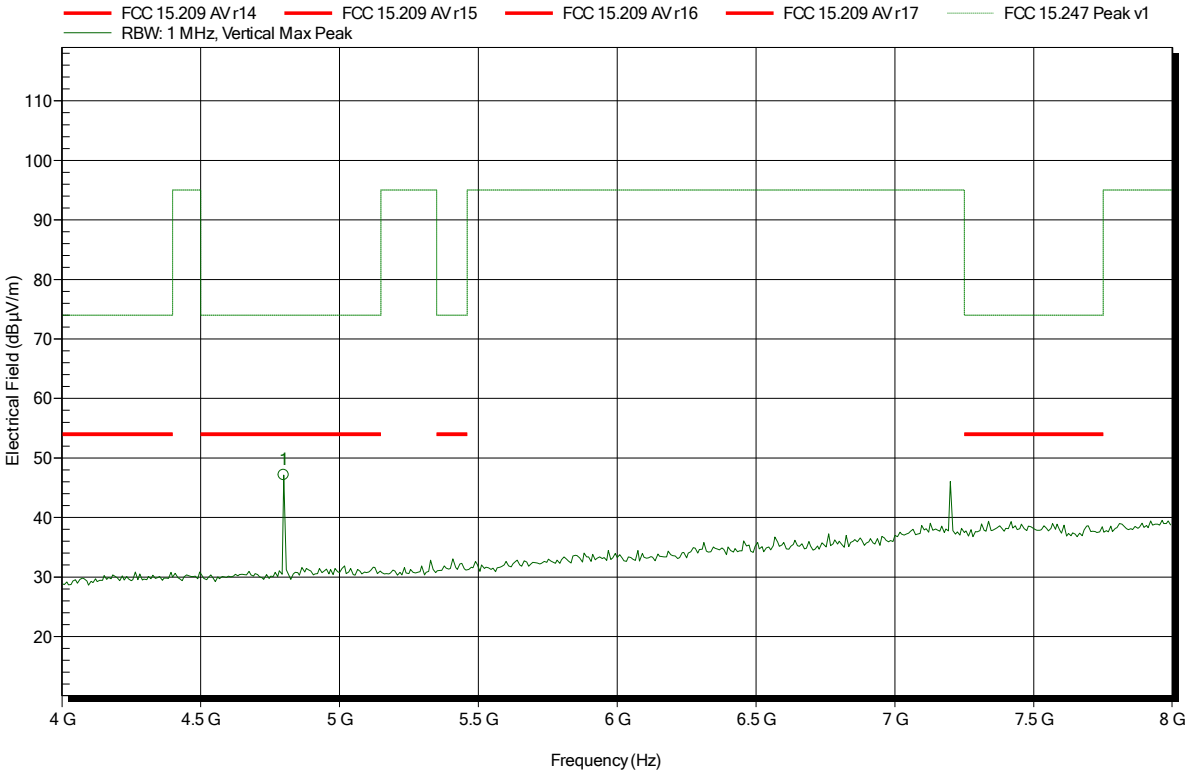
Frequency	Peak	Peak Limit	Peak Difference	Status
4.8 GHz	41.81 dBµV/m	74 dBµV/m	-32.19 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BT; DH5; 2402 MHz
Test Date:	2017-04-07
Note:	

Index 55



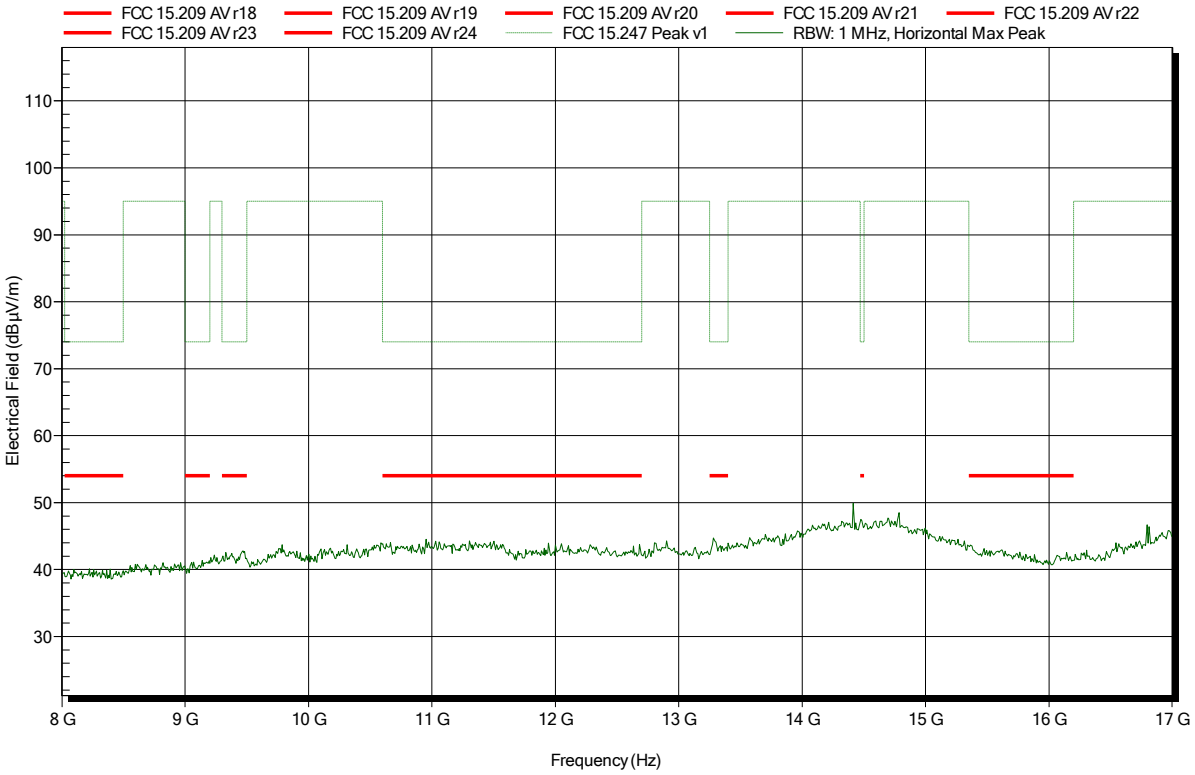
Frequency	Peak	Peak Limit	Peak Difference	Status
4.8 GHz	47.14 dBµV/m	74 dBµV/m	-26.86 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BT; DH5; 2402 MHz
Test Date:	2017-04-07
Note:	

Index 52

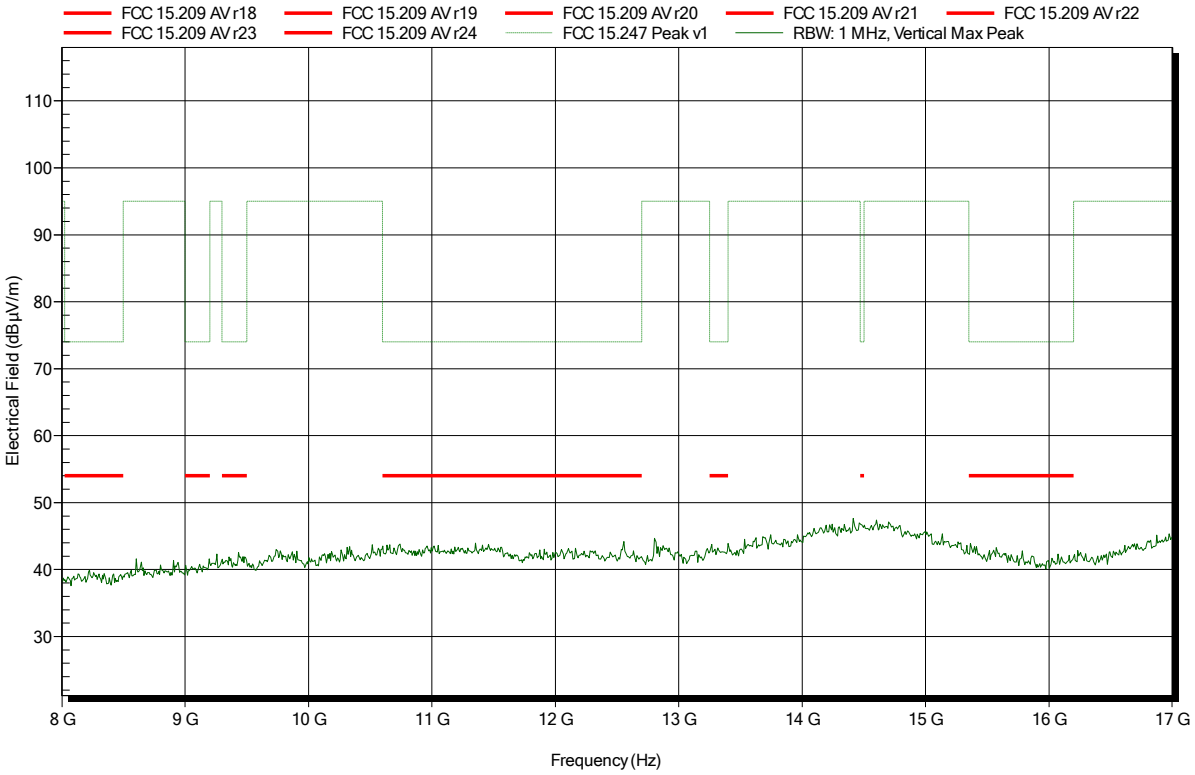


Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BT; DH5; 2402 MHz
Test Date:	2017-04-07
Note:	

Index 56

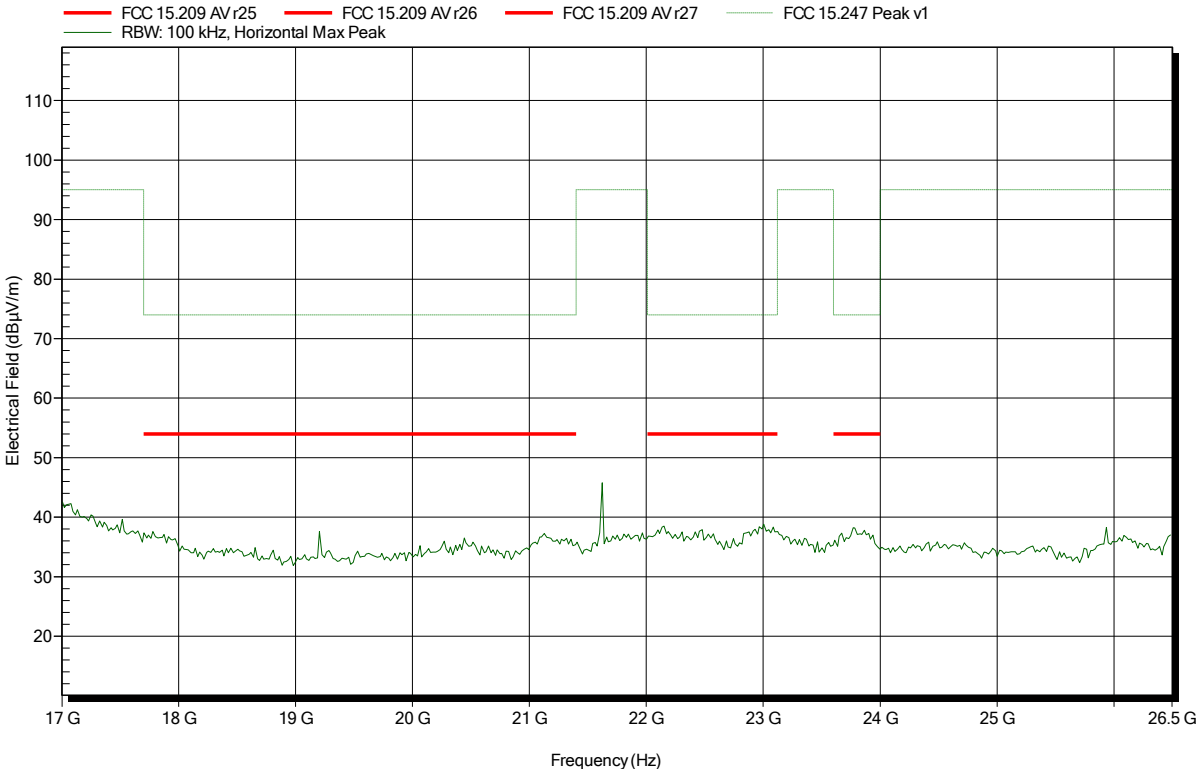


Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Amplifier Research AT 4560 (old name) / ATH18G40 (new name), Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BT; DH5; 2402 MHz
Test Date:	2017-04-07
Note:	

Index 53

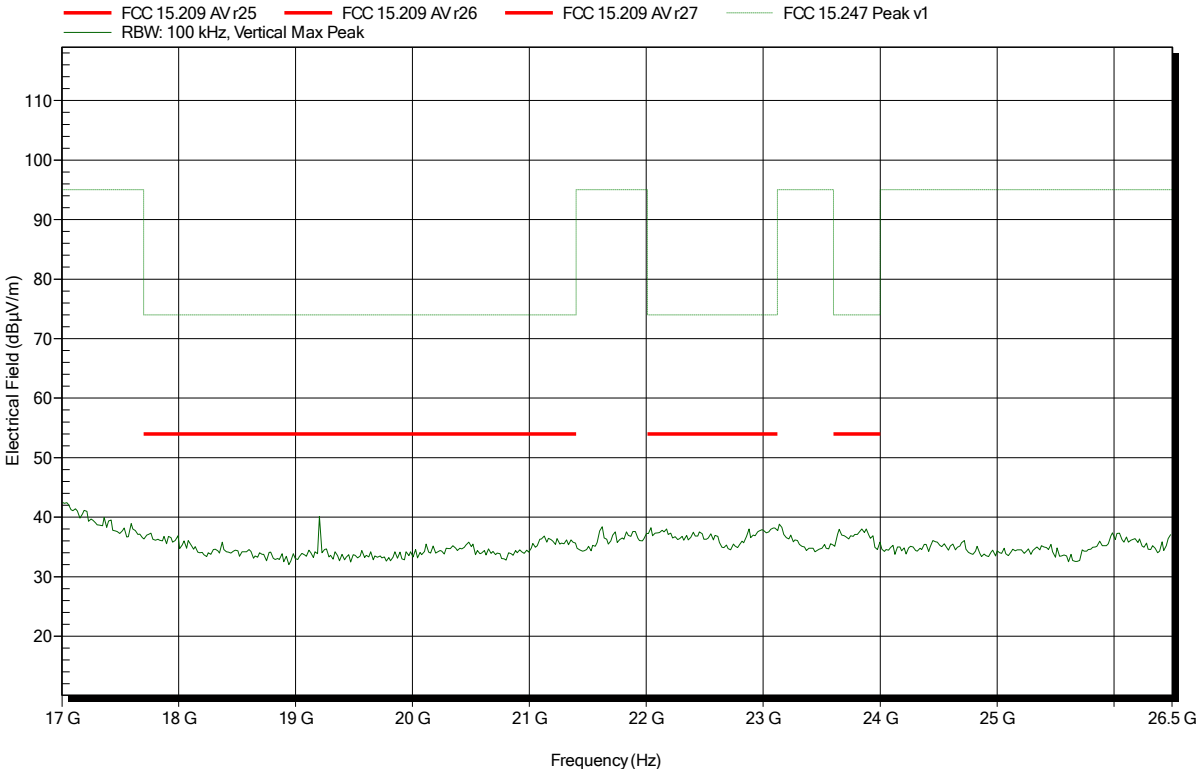


Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Amplifier Research AT 4560 (old name) / ATH18G40 (new name), Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BT; DH5; 2402 MHz
Test Date:	2017-04-07
Note:	

Index 58

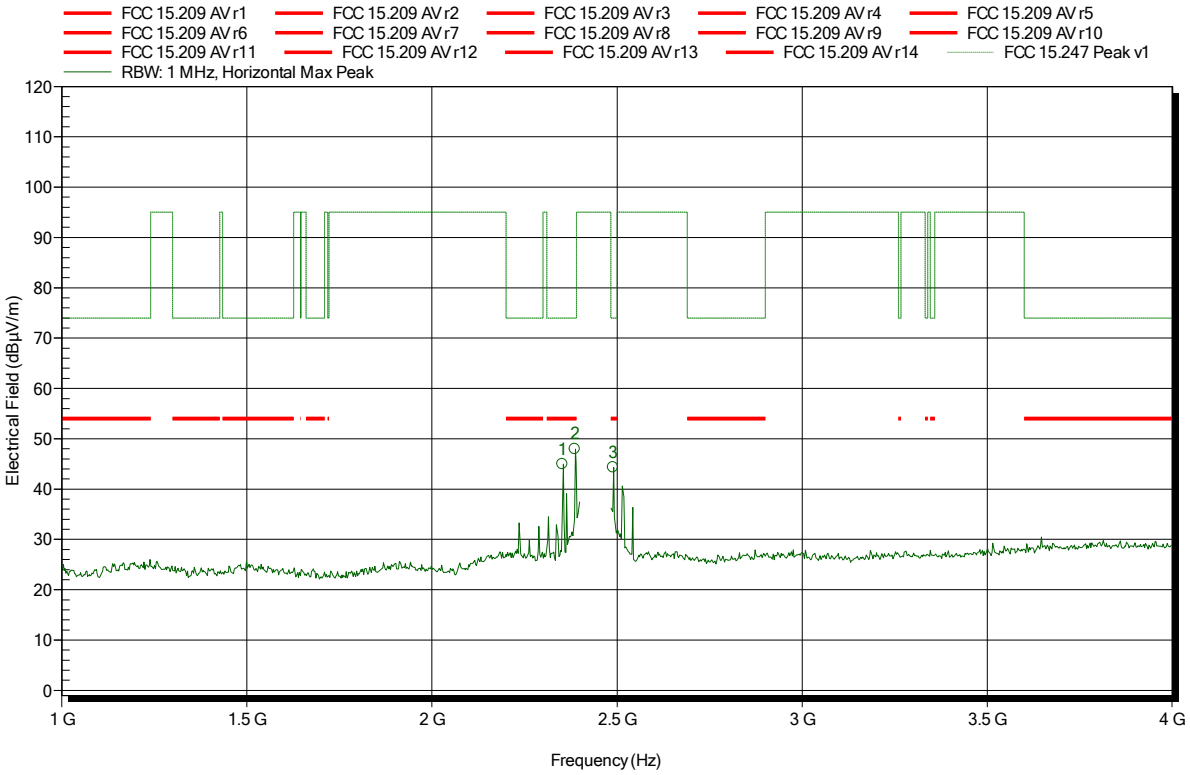


Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BT; DH5; 2441 MHz
Test Date:	2017-04-07
Note:	

Index 59



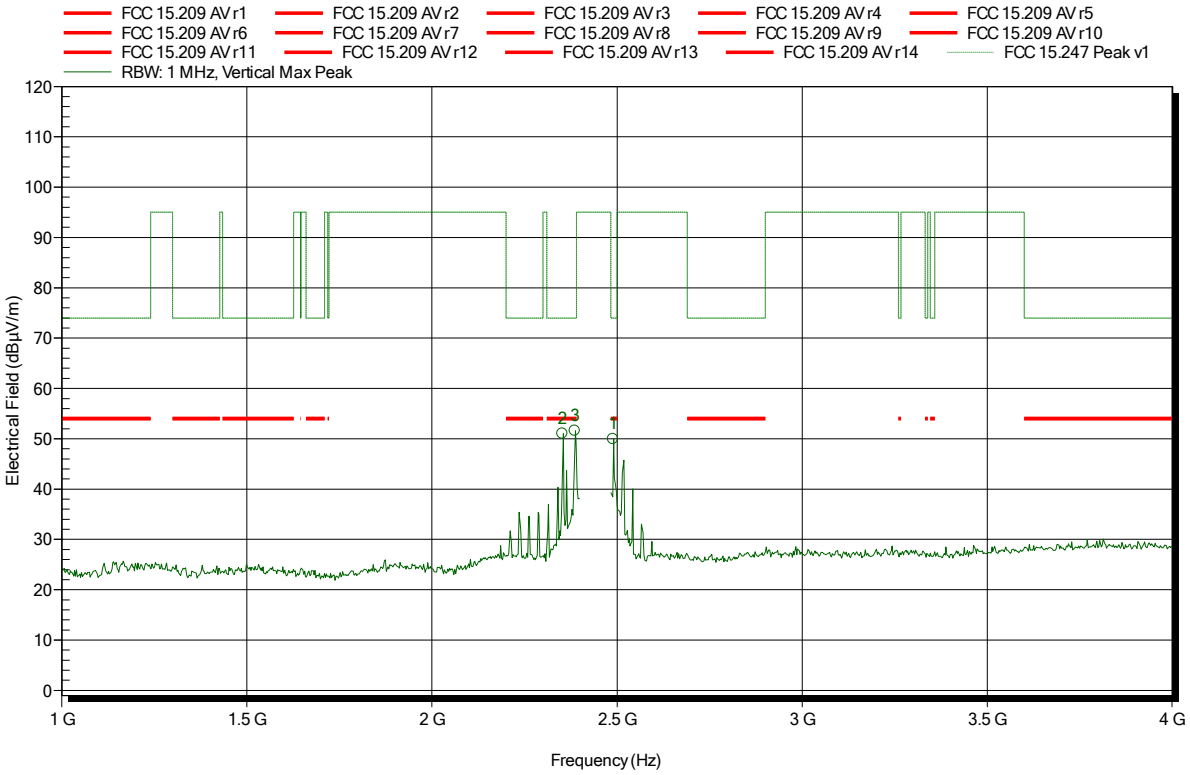
Frequency	Peak	Peak Limit	Peak Difference	Status
2.3524 GHz	44.96 dBµV/m	74 dBµV/m	-29.04 dB	Pass
2.386 GHz	47.96 dBµV/m	74 dBµV/m	-26.04 dB	Pass
2.4896 GHz	44.3 dBµV/m	74 dBµV/m	-29.7 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BT; DH5; 2441 MHz
Test Date:	2017-04-07
Note:	

Index 64



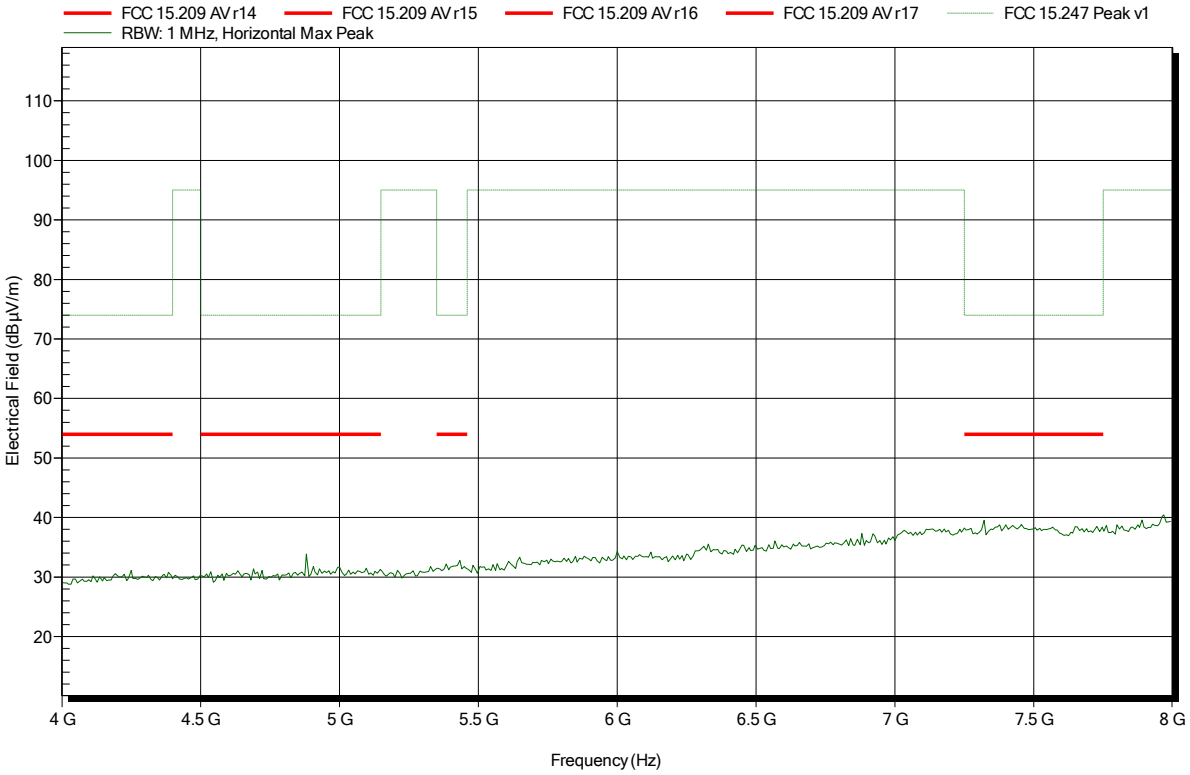
Frequency	Peak	Peak Limit	Peak Difference	Status
2.3524 GHz	51.03 dBµV/m	74 dBµV/m	-22.97 dB	Pass
2.386 GHz	51.62 dBµV/m	74 dBµV/m	-22.38 dB	Pass
2.4896 GHz	49.95 dBµV/m	74 dBµV/m	-24.05 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BT; DH5; 2441 MHz
Test Date:	2017-04-07
Note:	

Index 60

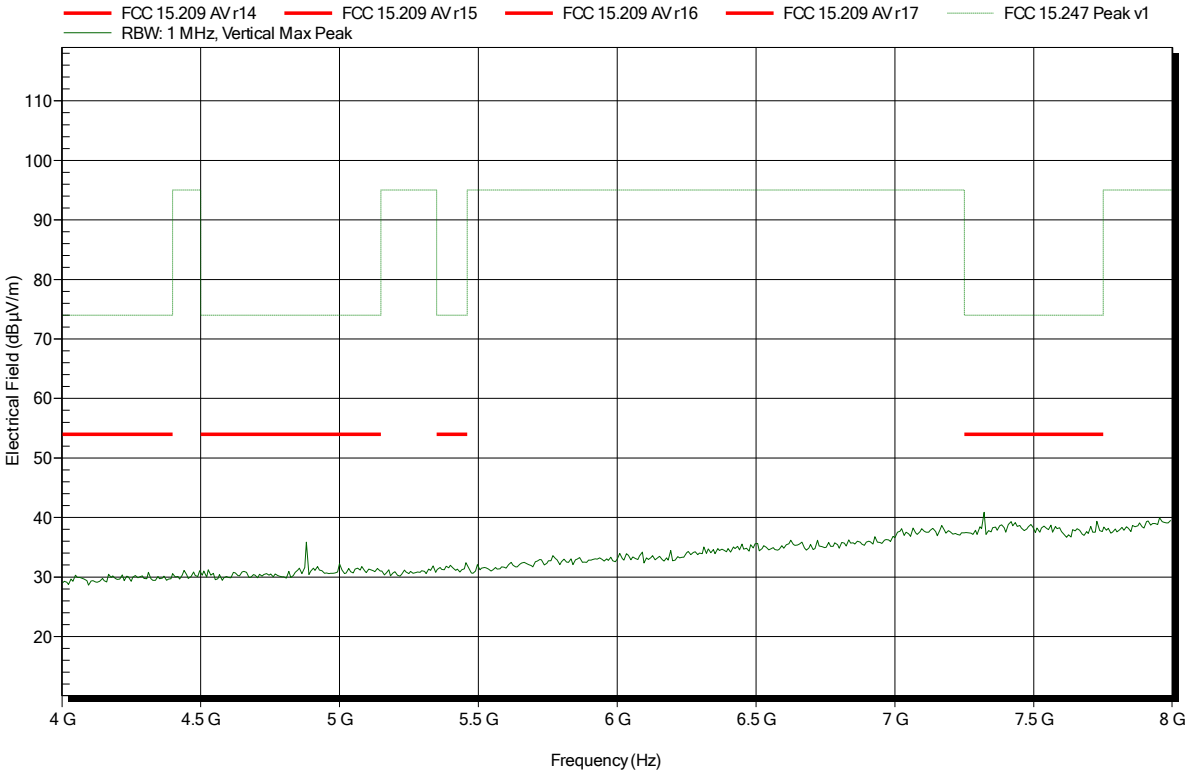


Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BT; DH5; 2441 MHz
Test Date:	2017-04-07
Note:	

Index 65

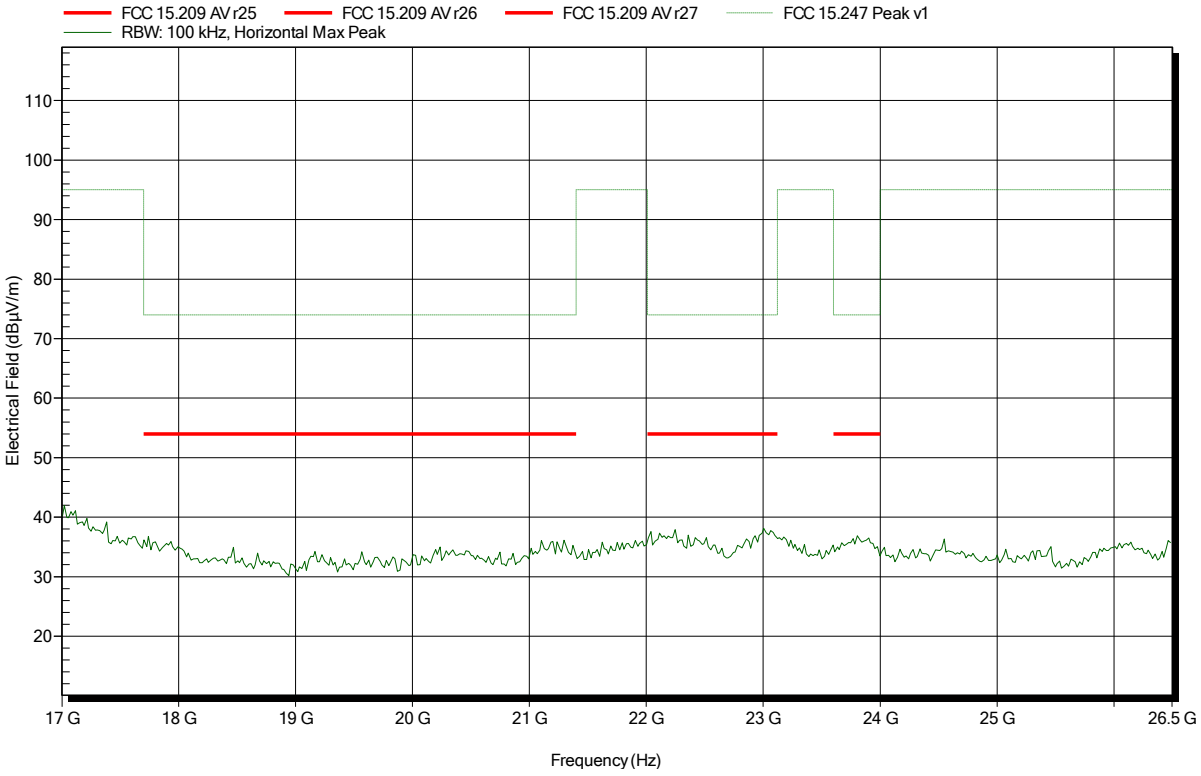


Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Amplifier Research AT 4560 (old name) / ATH18G40 (new name), Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BT; DH5; 2441 MHz
Test Date:	2017-04-07
Note:	

Index 62

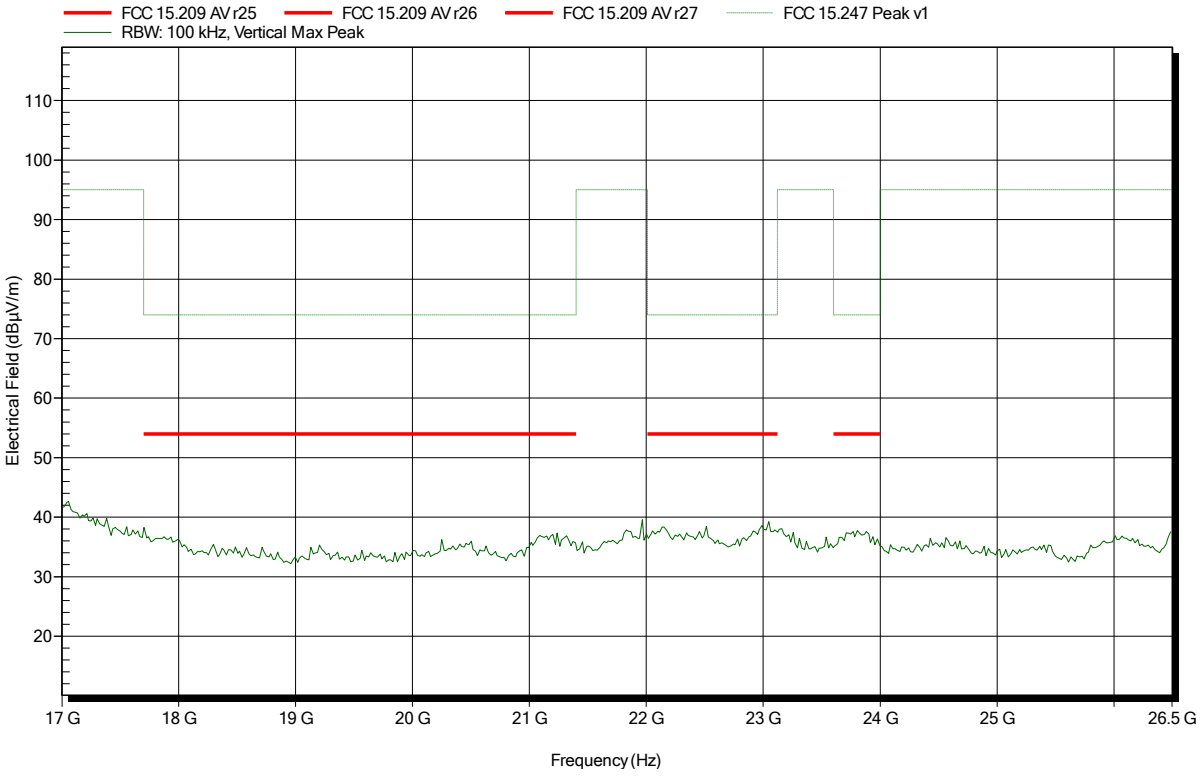


Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Amplifier Research AT 4560 (old name) / ATH18G40 (new name), Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BT; DH5; 2441 MHz
Test Date:	2017-04-07
Note:	

Index 67

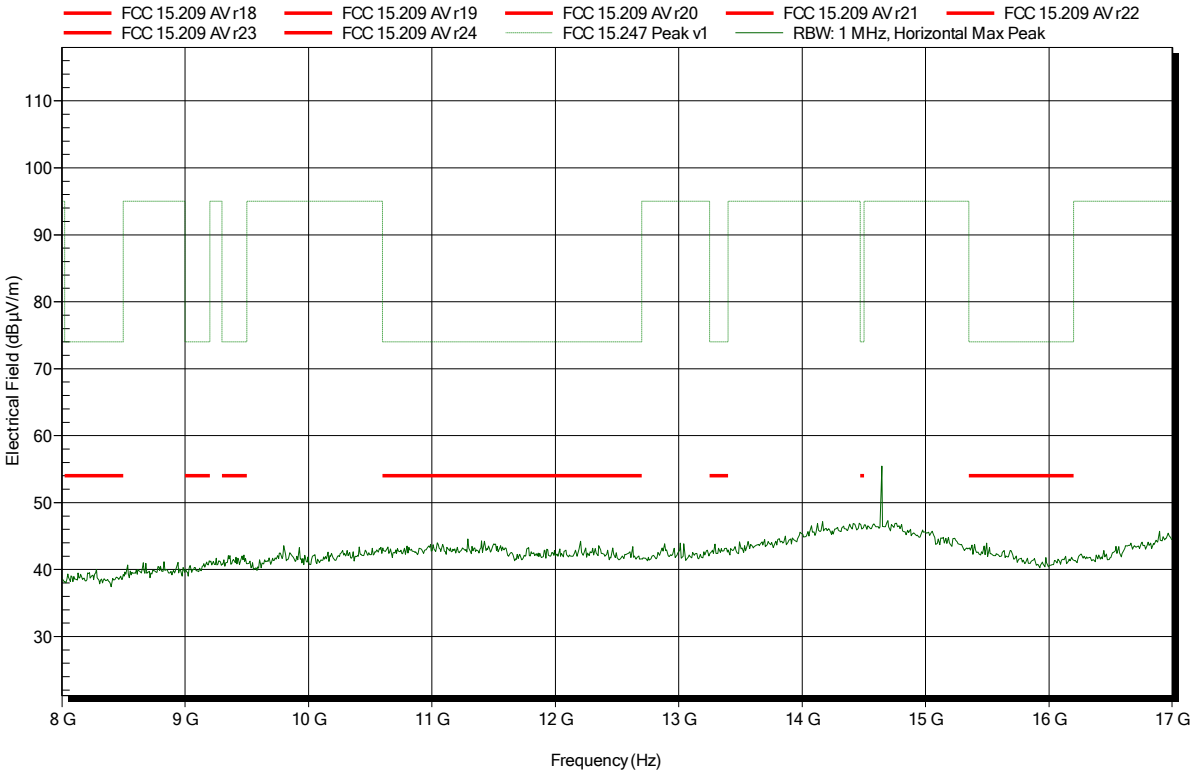


Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BT; DH5; 2441 MHz
Test Date:	2017-04-07
Note:	

Index 63

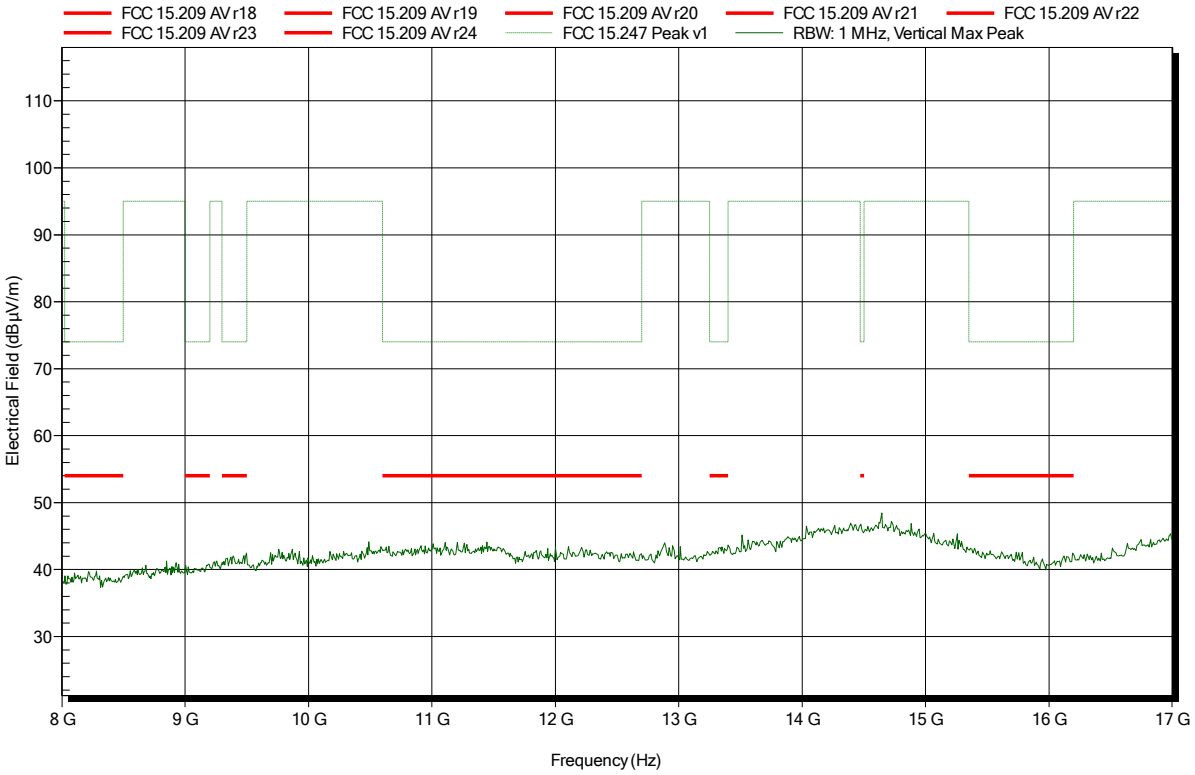


Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BT; DH5; 2441 MHz
Test Date:	2017-04-07
Note:	

Index 66

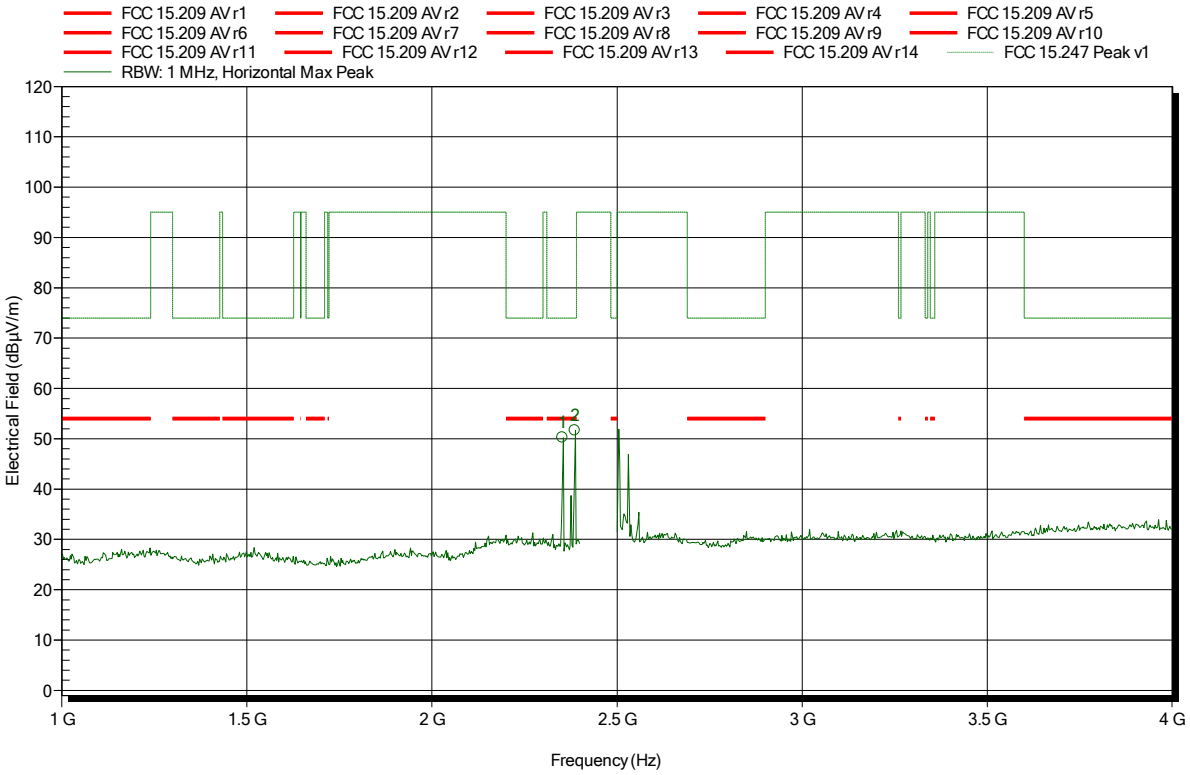


Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BT; DH5; 2480 MHz
Test Date:	2017-04-07
Note:	

Index 68



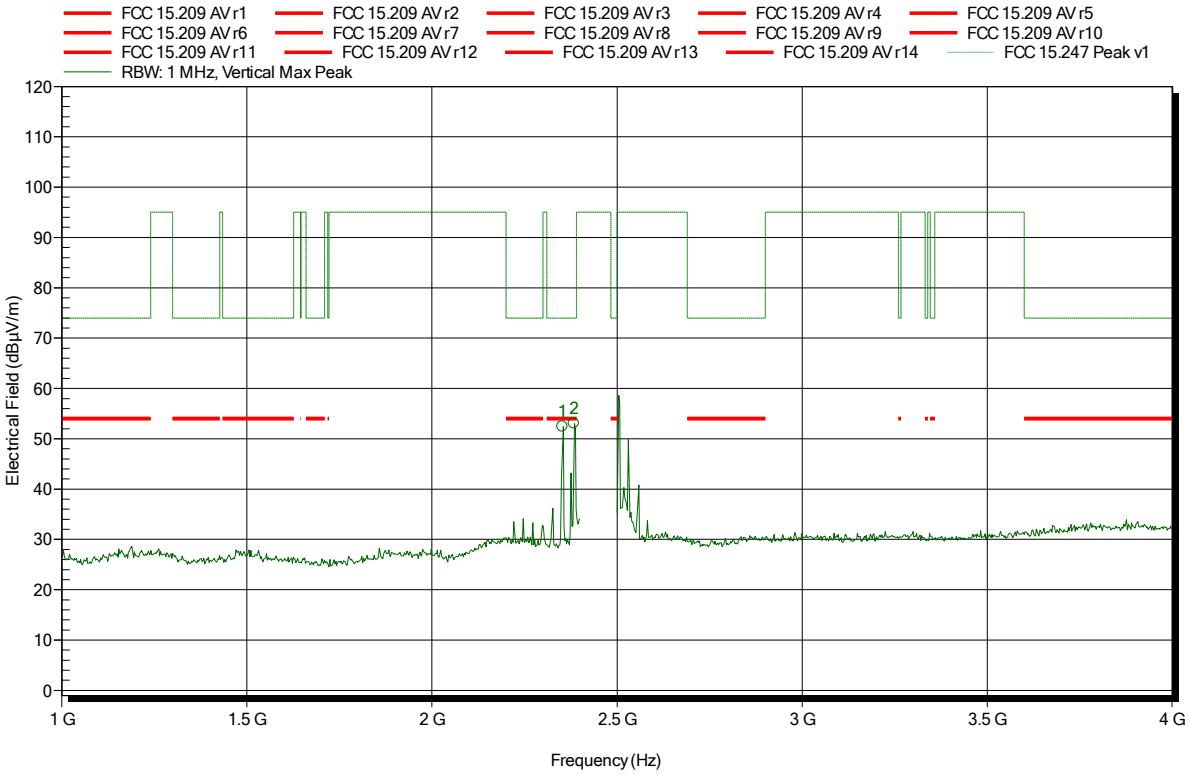
Frequency	Peak	Peak Limit	Peak Difference	Status
2.352 GHz	50.22 dBµV/m	74 dBµV/m	-23.78 dB	Pass
2.386 GHz	51.66 dBµV/m	74 dBµV/m	-22.34 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BT; DH5; 2480 MHz
Test Date:	2017-04-07
Note:	

Index 76



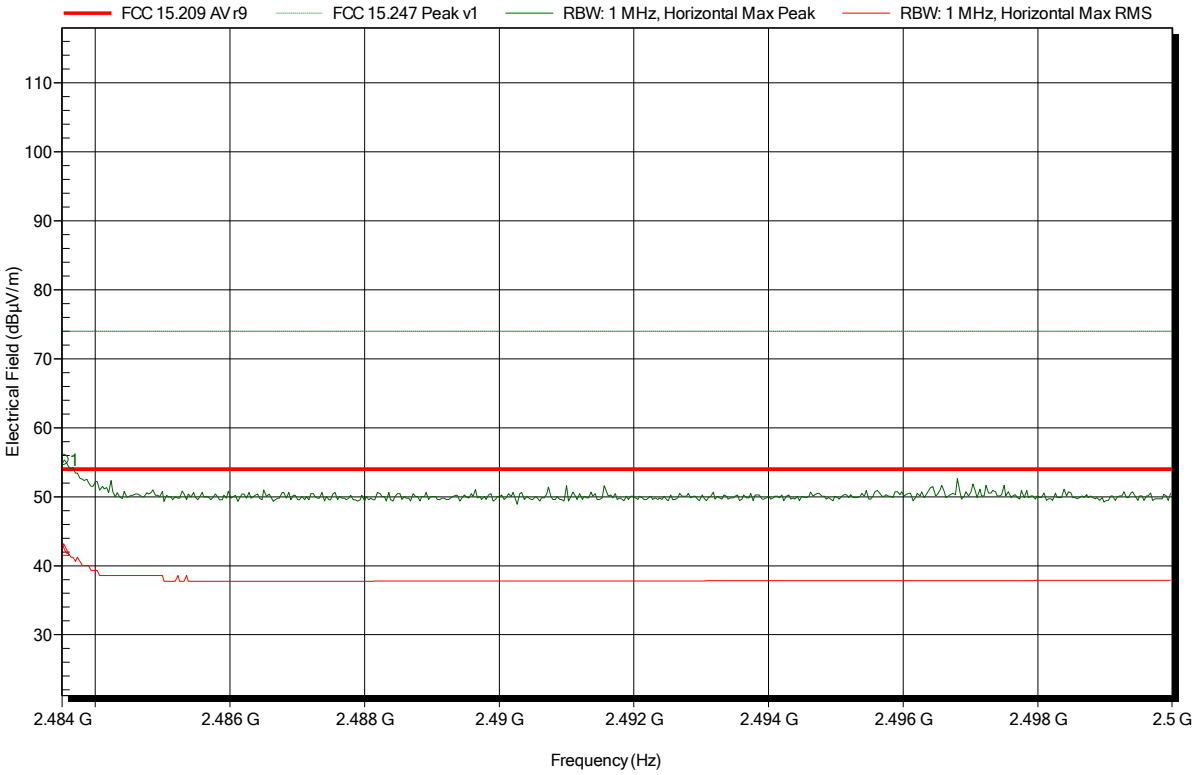
Frequency	Peak	Peak Limit	Peak Difference	Status
2.352 GHz	52.43 dBµV/m	74 dBµV/m	-21.57 dB	Pass
2.383 GHz	53.03 dBµV/m	74 dBµV/m	-20.97 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BT; DH5; 2480 MHz
Test Date:	2017-04-07
Note:	upper bandedge

Index 70



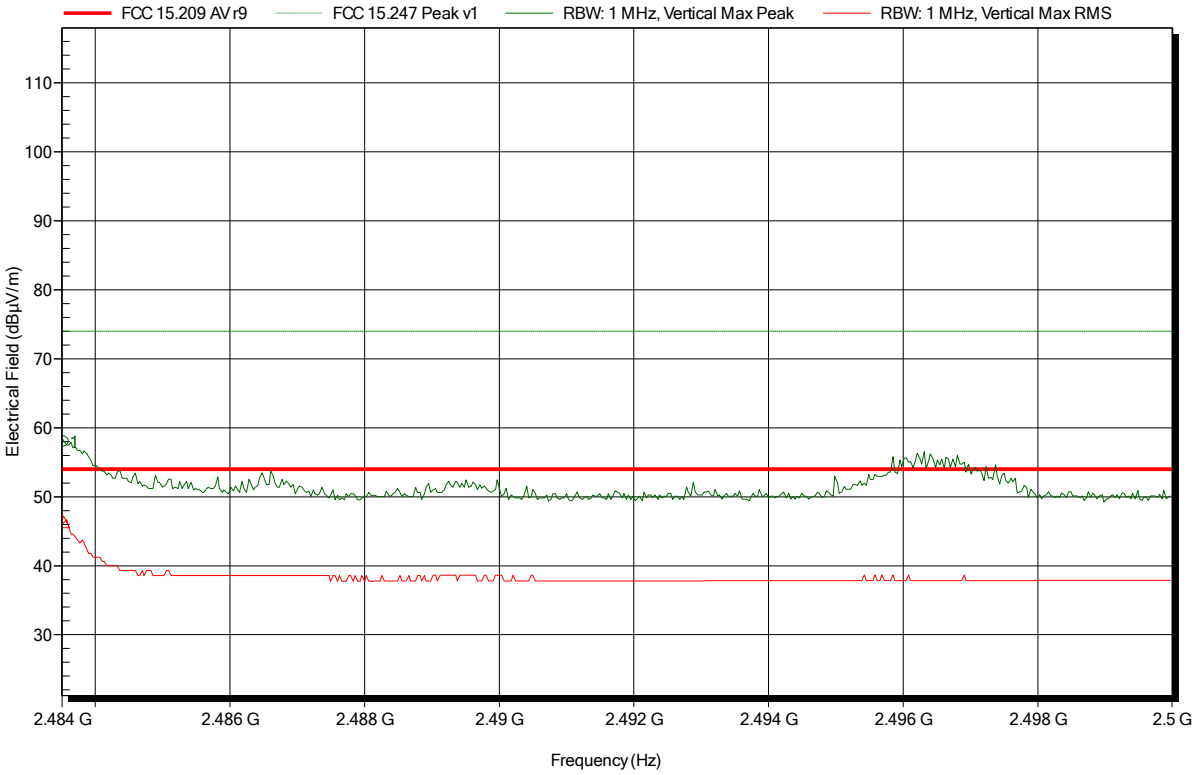
Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.4835 GHz	42.33 dBµV/m	54 dBµV/m	-11.67 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BT; DH5; 2480 MHz
Test Date:	2017-04-07
Note:	upper bandedge

Index 80



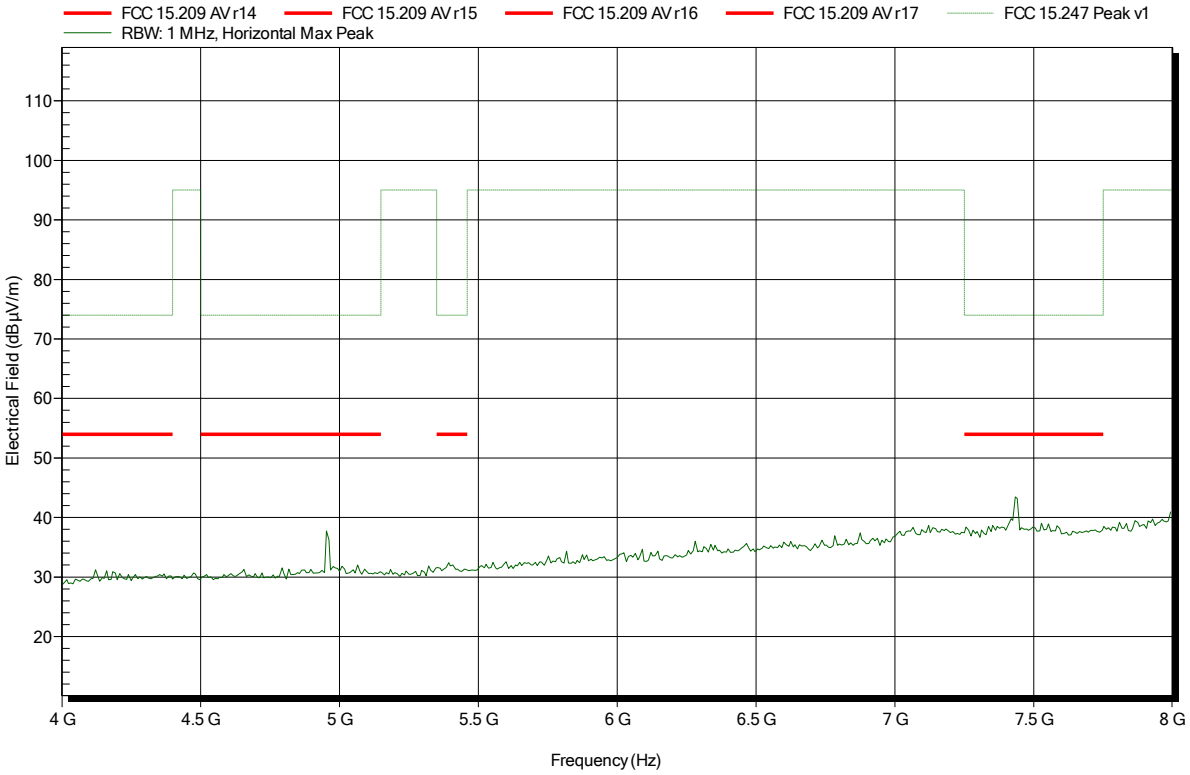
Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.4835 GHz	46.35 dBµV/m	54 dBµV/m	-7.65 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BT; DH5; 2480 MHz
Test Date:	2017-04-07
Note:	

Index 71

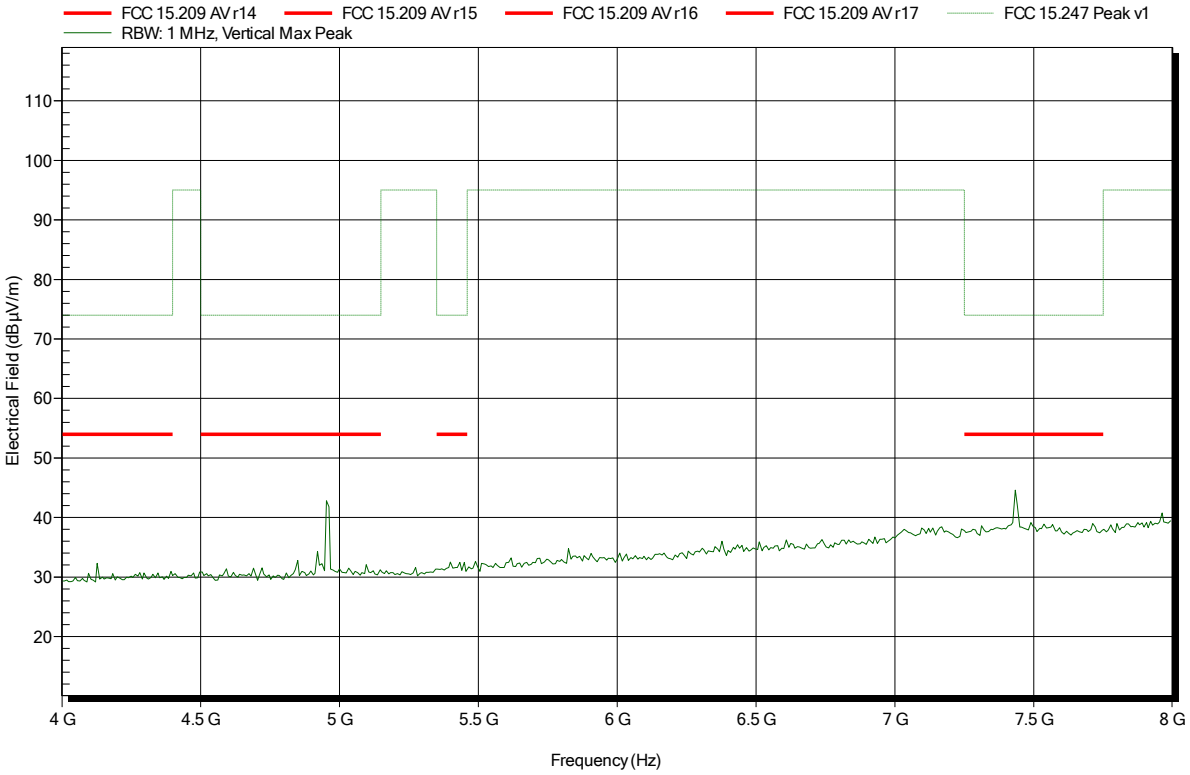


Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BT; DH5; 2480 MHz
Test Date:	2017-04-07
Note:	

Index 77

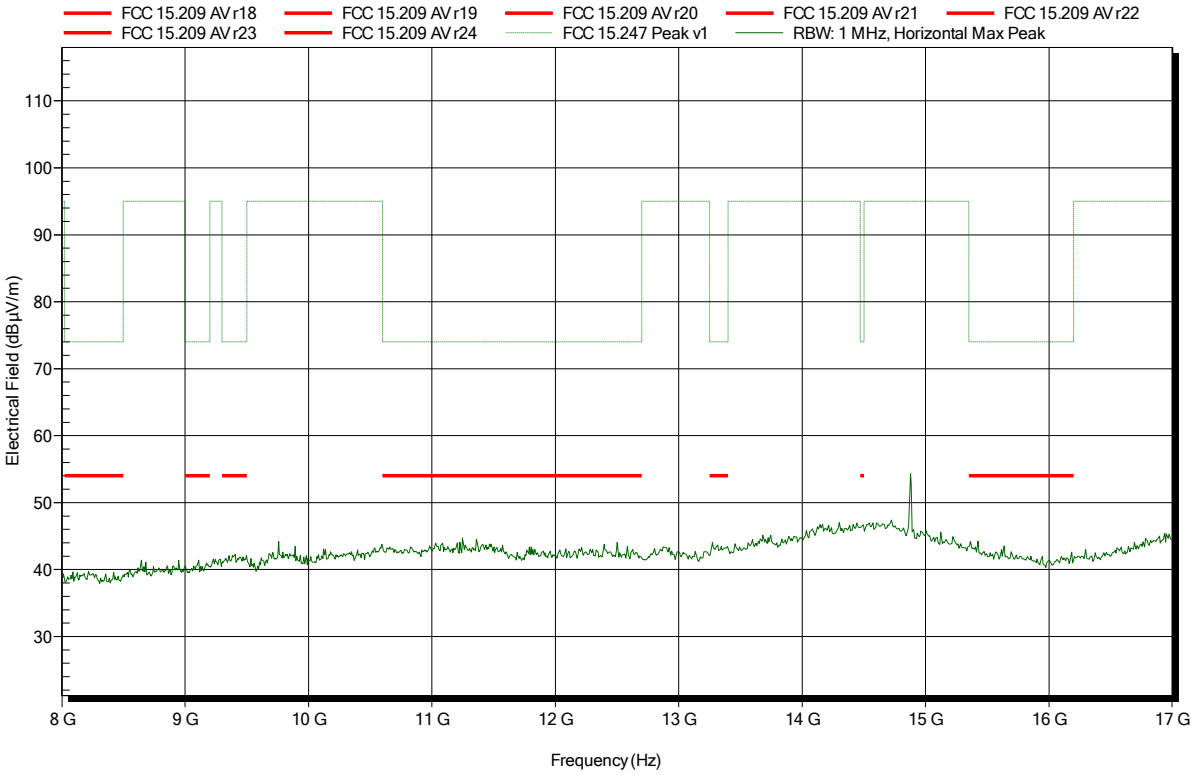


Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BT; DH5; 2480 MHz
Test Date:	2017-04-07
Note:	

Index 72

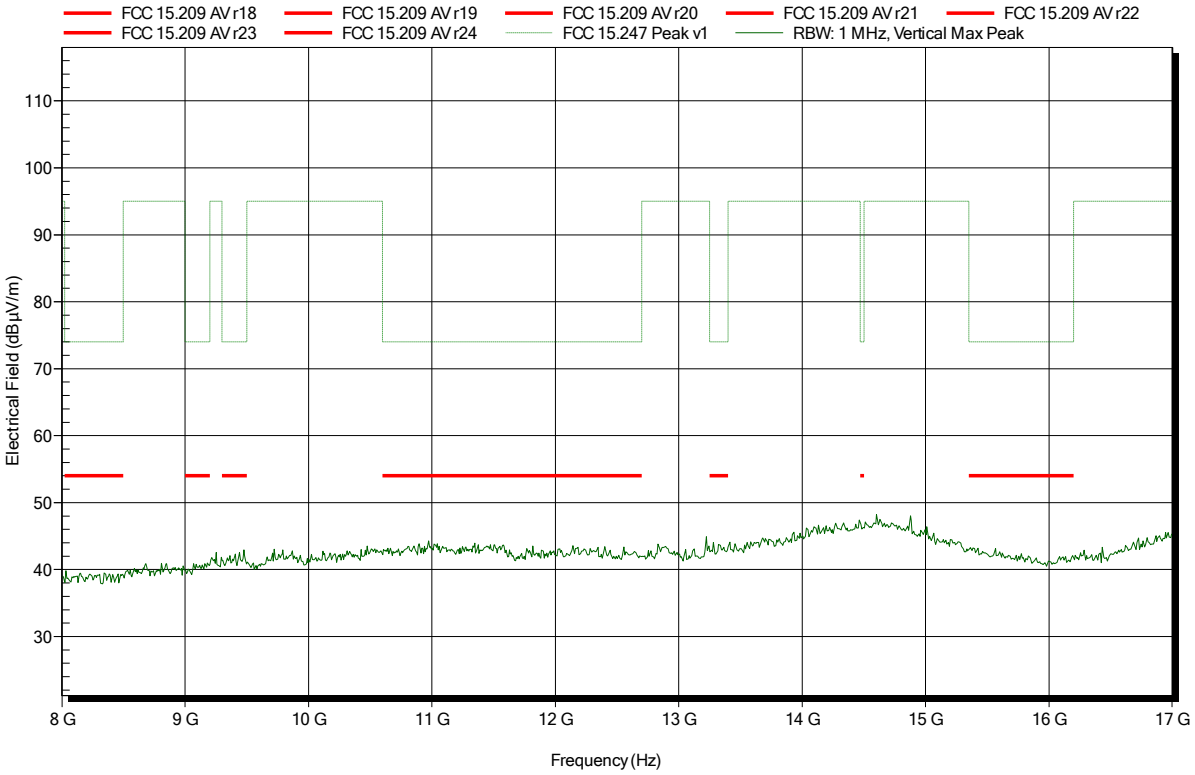


Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BT; DH5; 2480 MHz
Test Date:	2017-04-07
Note:	

Index 78

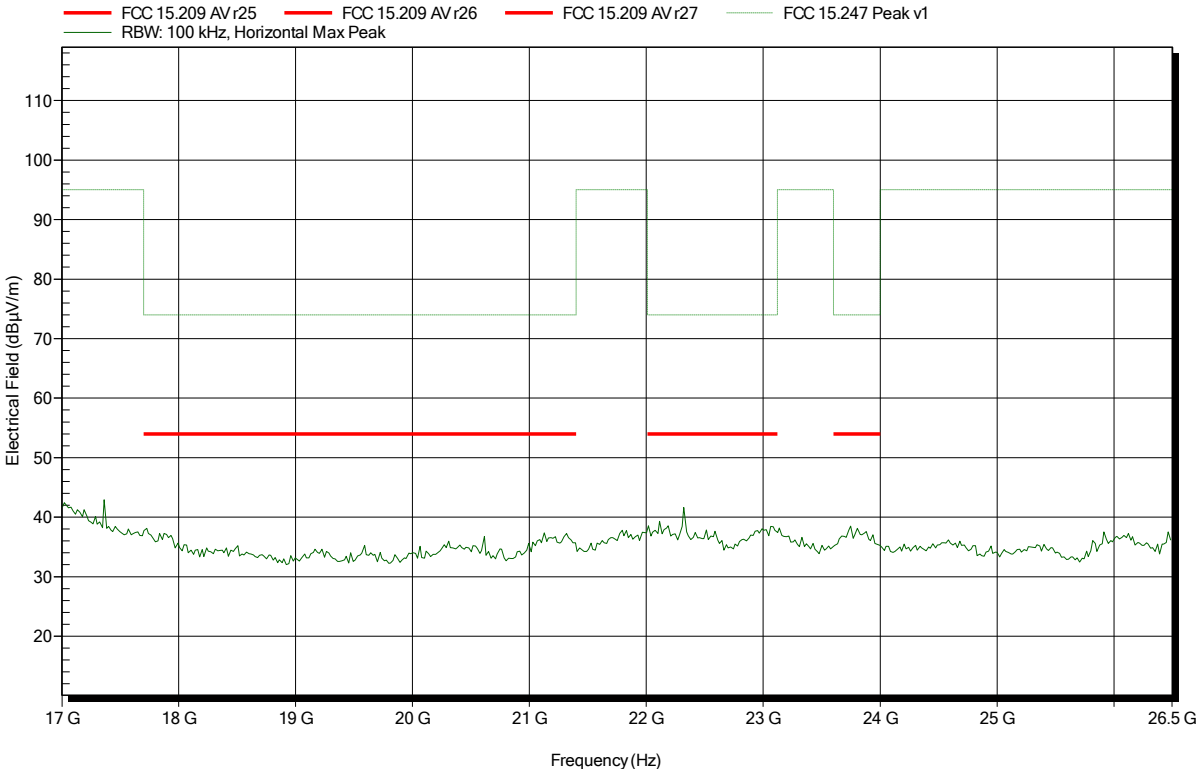


Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Amplifier Research AT 4560 (old name) / ATH18G40 (new name), Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BT; DH5; 2480 MHz
Test Date:	2017-04-07
Note:	

Index 73

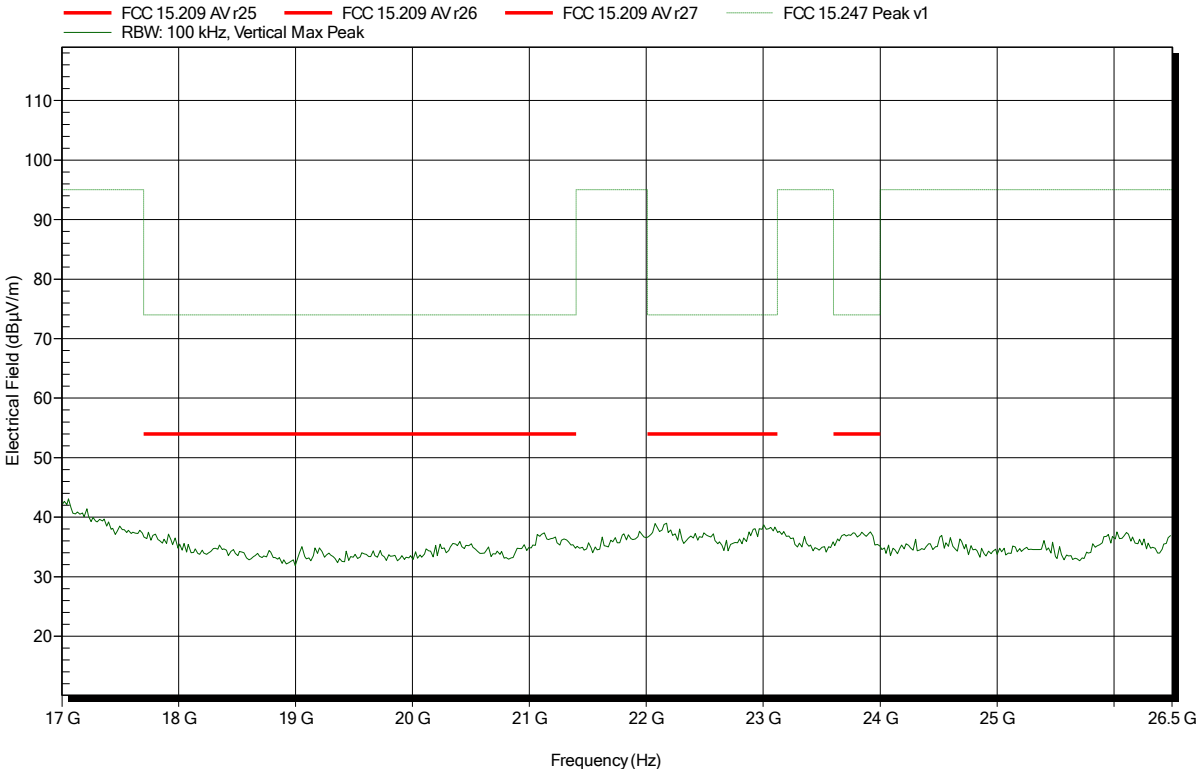


Spurious emissions according to FCC 15.247

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Amplifier Research AT 4560 (old name) / ATH18G40 (new name), Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BT; DH5; 2480 MHz
Test Date:	2017-04-07
Note:	

Index 79



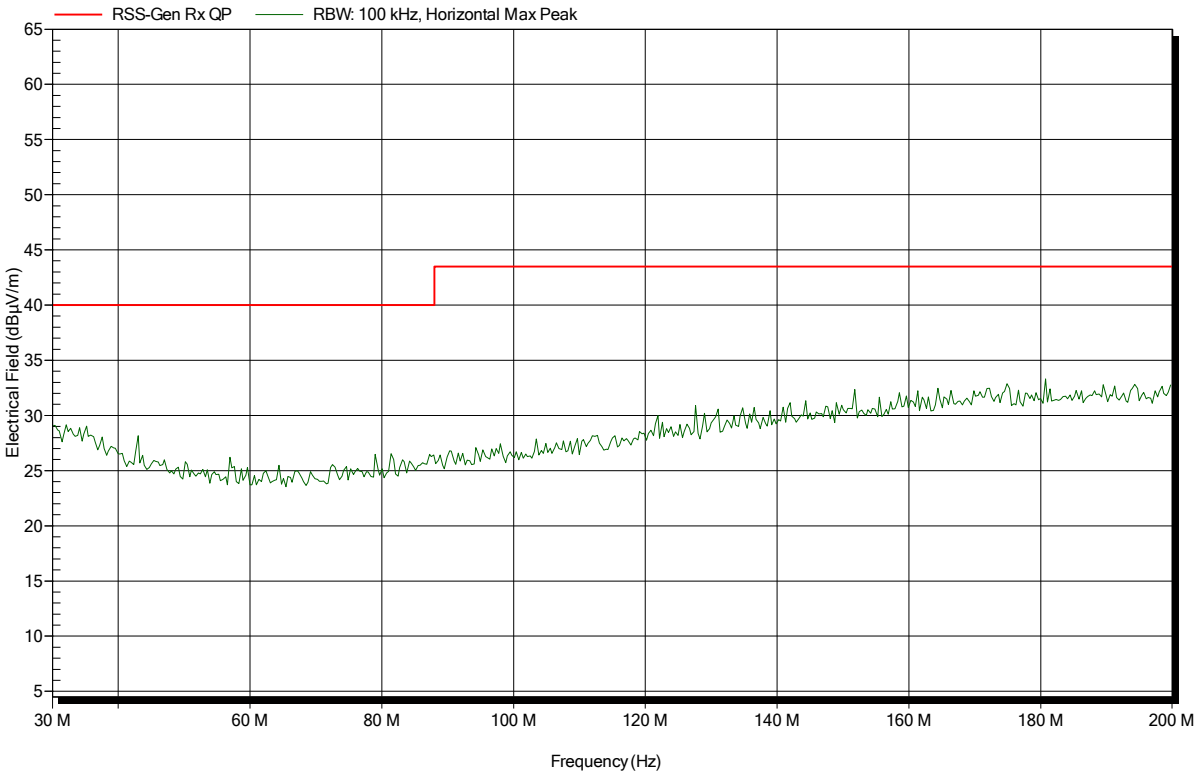
ANNEX B Receiver sprurious emissions

Spurious emissions according to RSS-Gen

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	RX; BT; 2441 MHz
Test Date:	2017-04-07
Note:	

Index 89

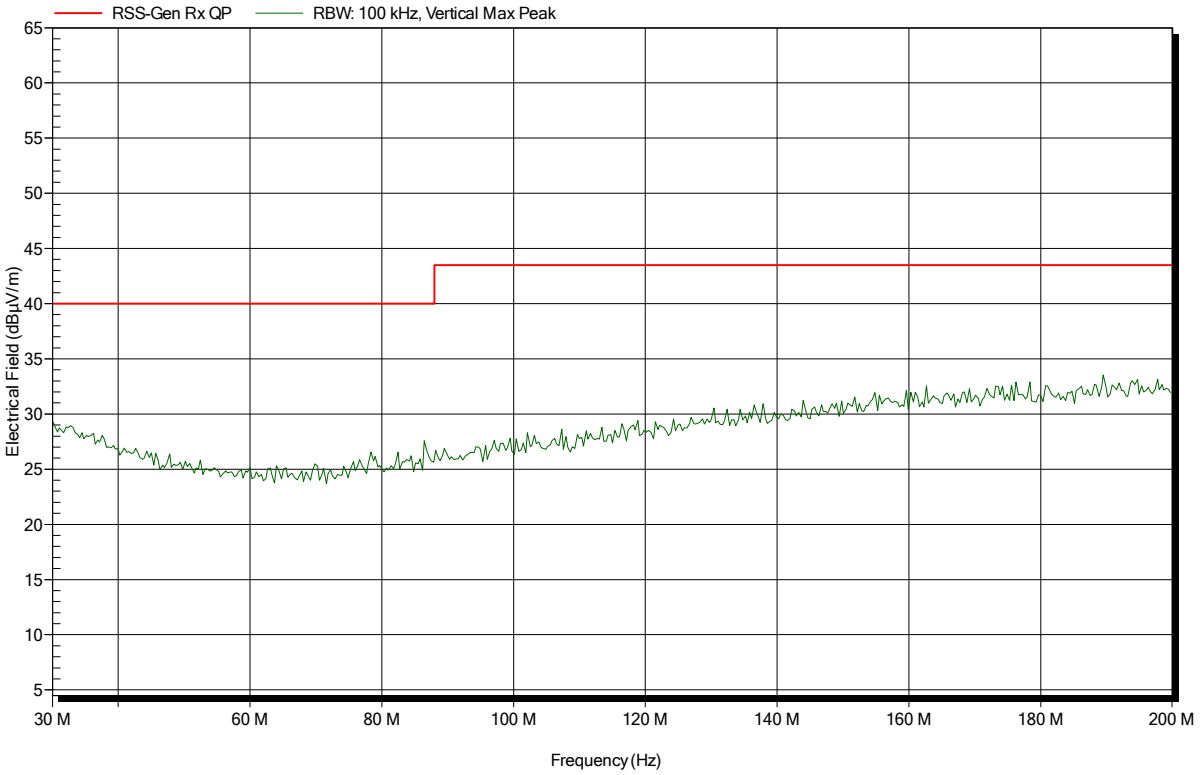


Spurious emissions according to RSS-Gen

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3 m
Mode:	RX; BT; 2441 MHz
Test Date:	2017-04-07
Note:	

Index 90

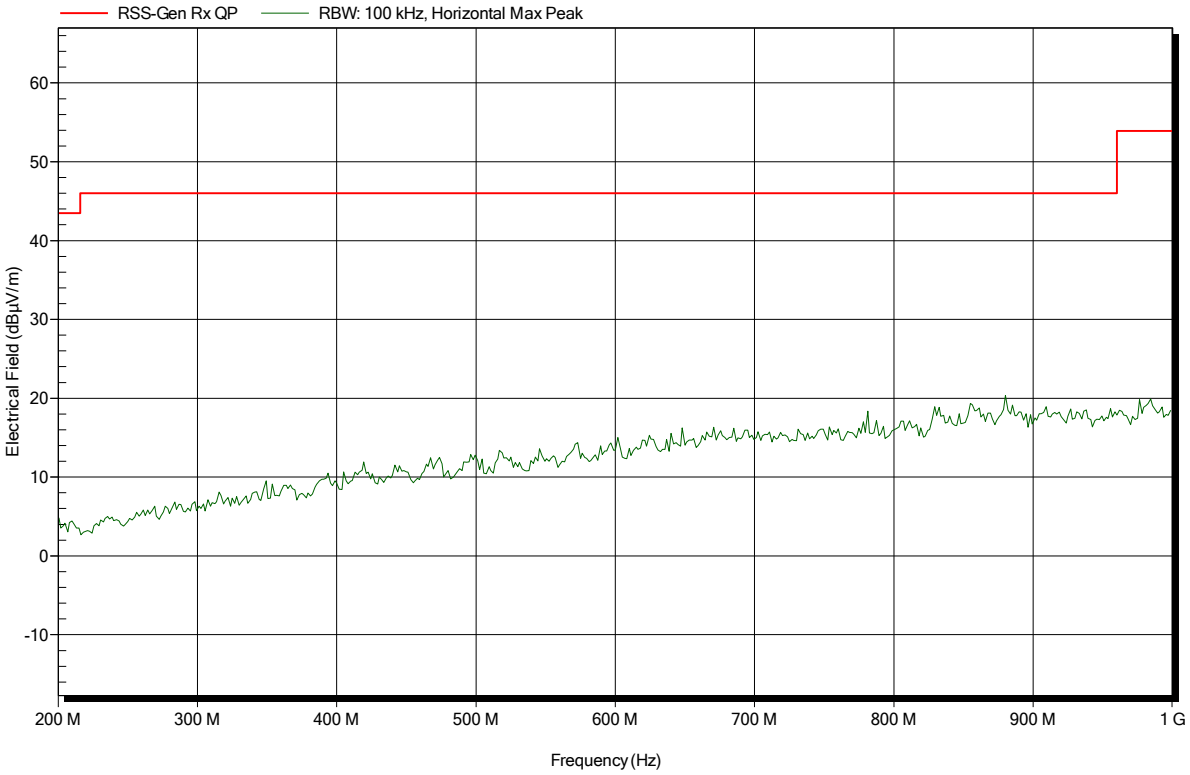


Spurious emissions according to RSS-Gen

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	RX; BT; 2441 MHz
Test Date:	2017-04-07
Note:	

Index 91

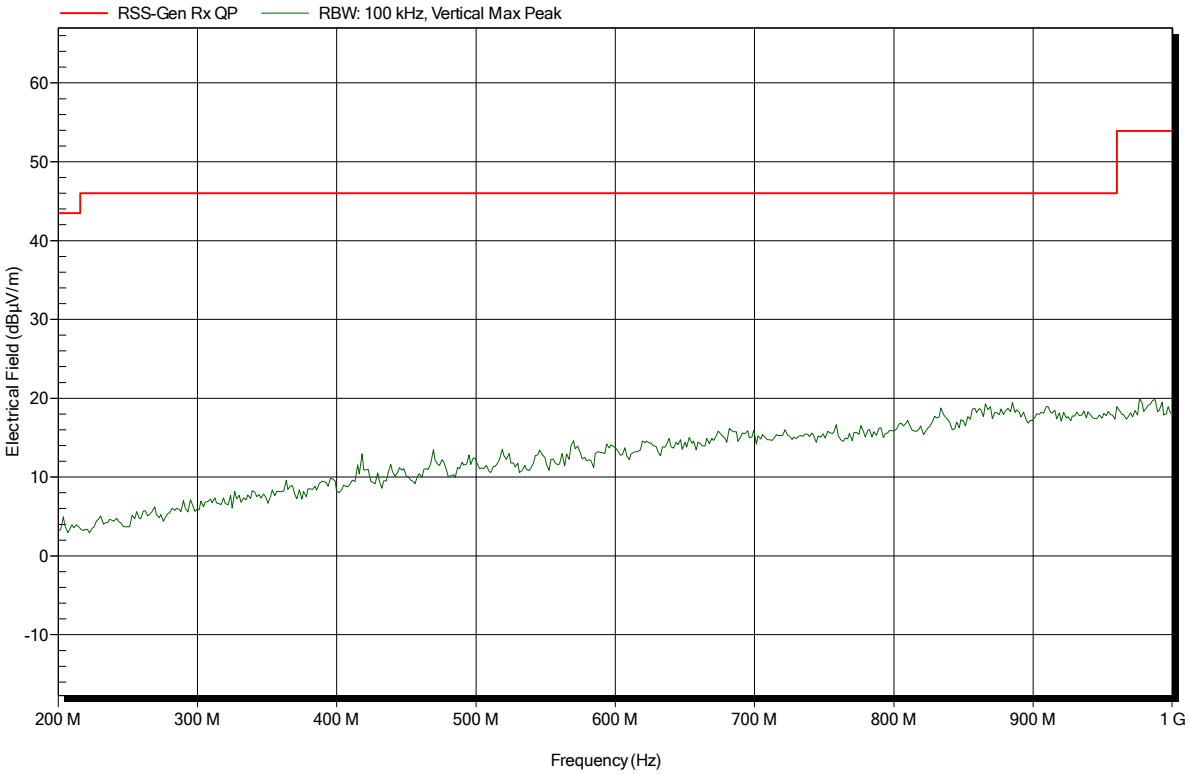


Spurious emissions according to RSS-Gen

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	RX; BT; 2441 MHz
Test Date:	2017-04-07
Note:	

Index 92

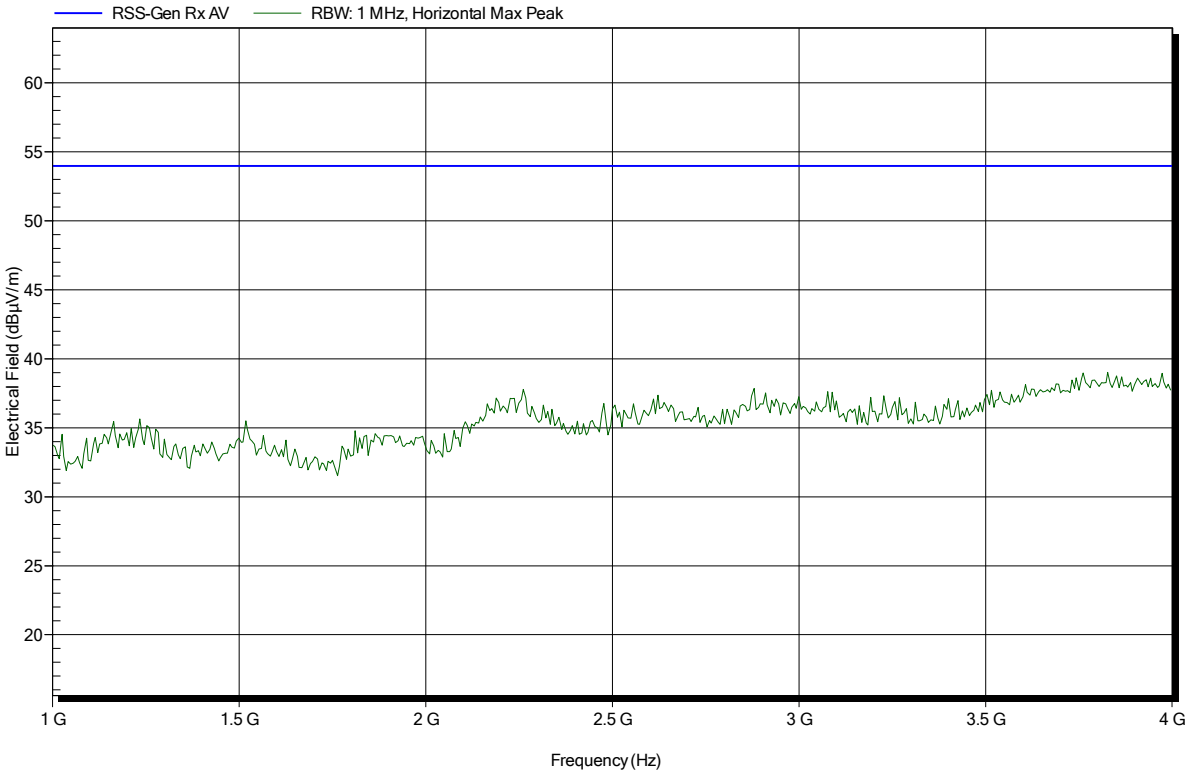


Spurious emissions according to RSS-Gen

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	RX; BT; 2441 MHz
Test Date:	2017-04-07
Note:	

Index 82

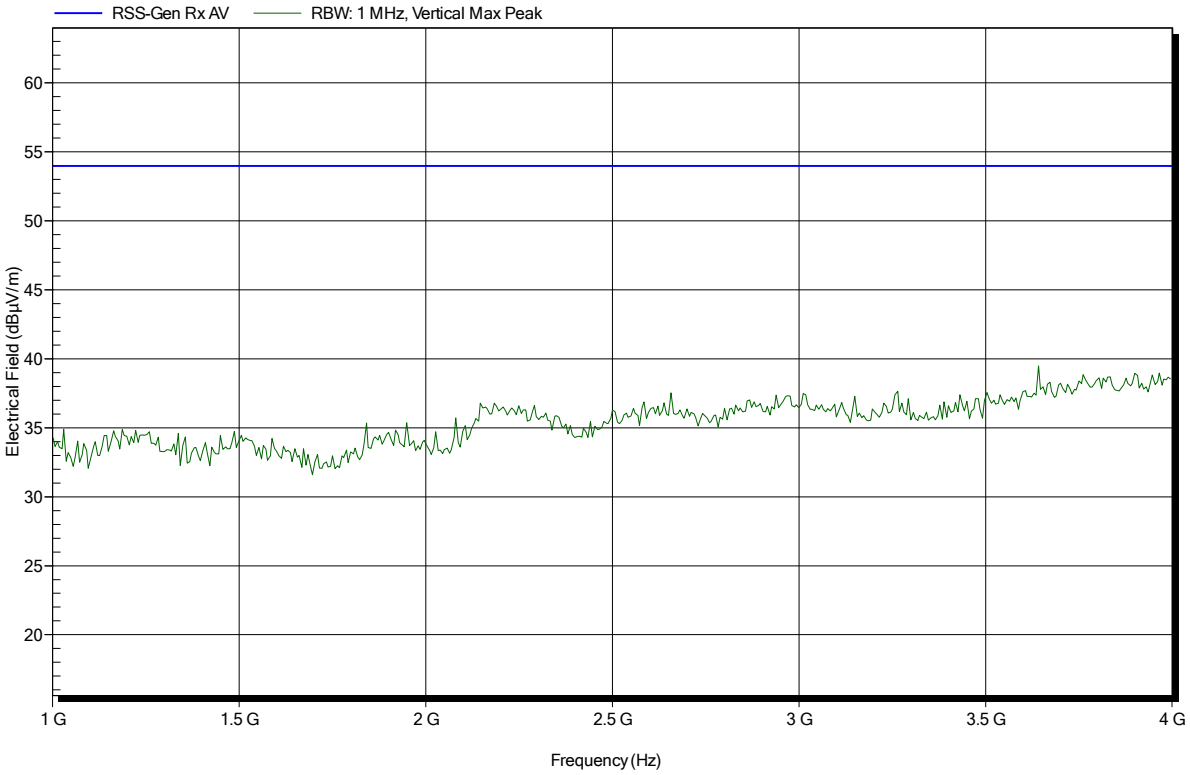


Spurious emissions according to RSS-Gen

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	RX; BT; 2441 MHz
Test Date:	2017-04-07
Note:	

Index 86

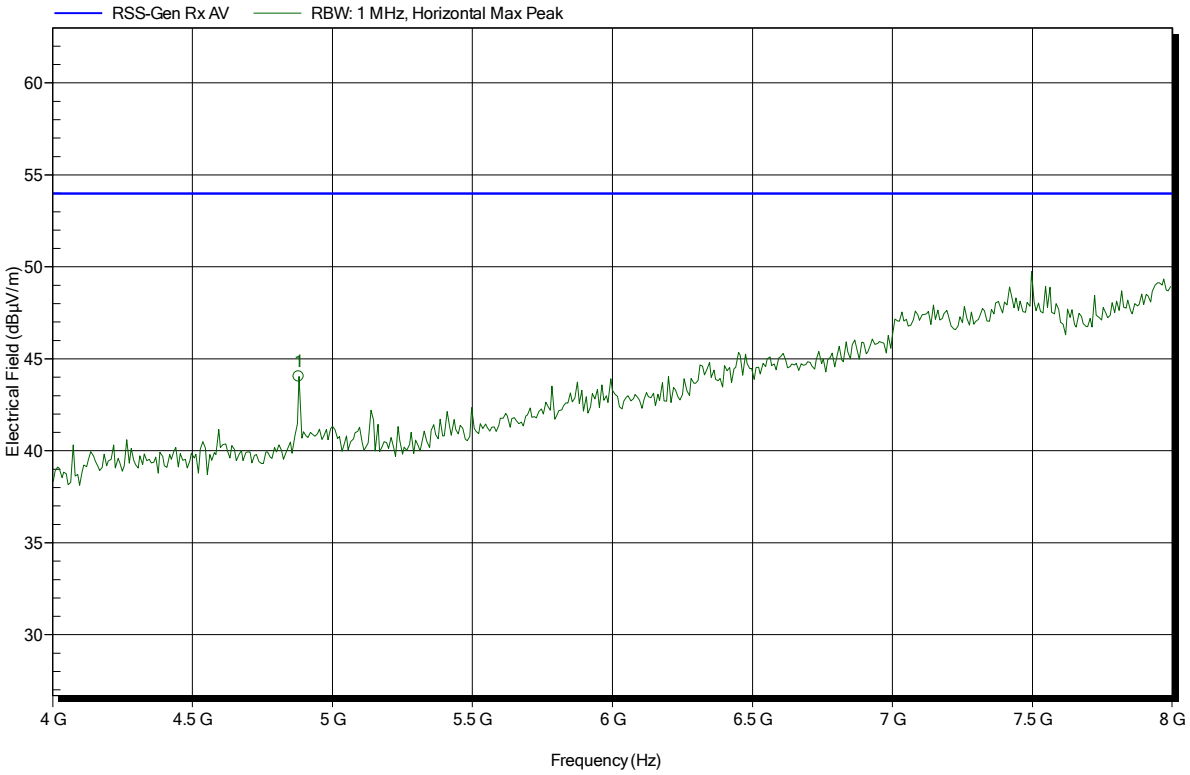


Spurious emissions according to RSS-Gen

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	RX; BT; 2441 MHz
Test Date:	2017-04-07
Note:	

Index 83



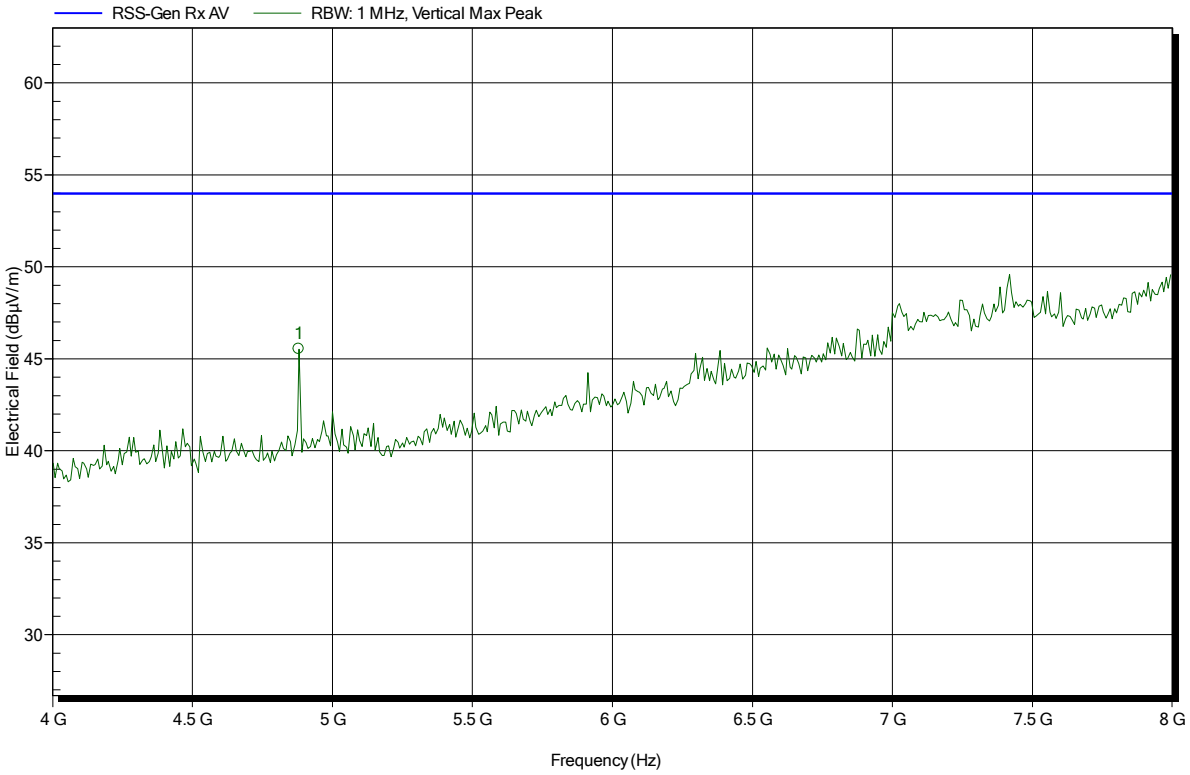
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.88 GHz	44.04 dBµV/m	53.98 dBµV/m	-9.94 dB	Pass

Spurious emissions according to RSS-Gen

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	RX; BT; 2441 MHz
Test Date:	2017-04-07
Note:	

Index 87



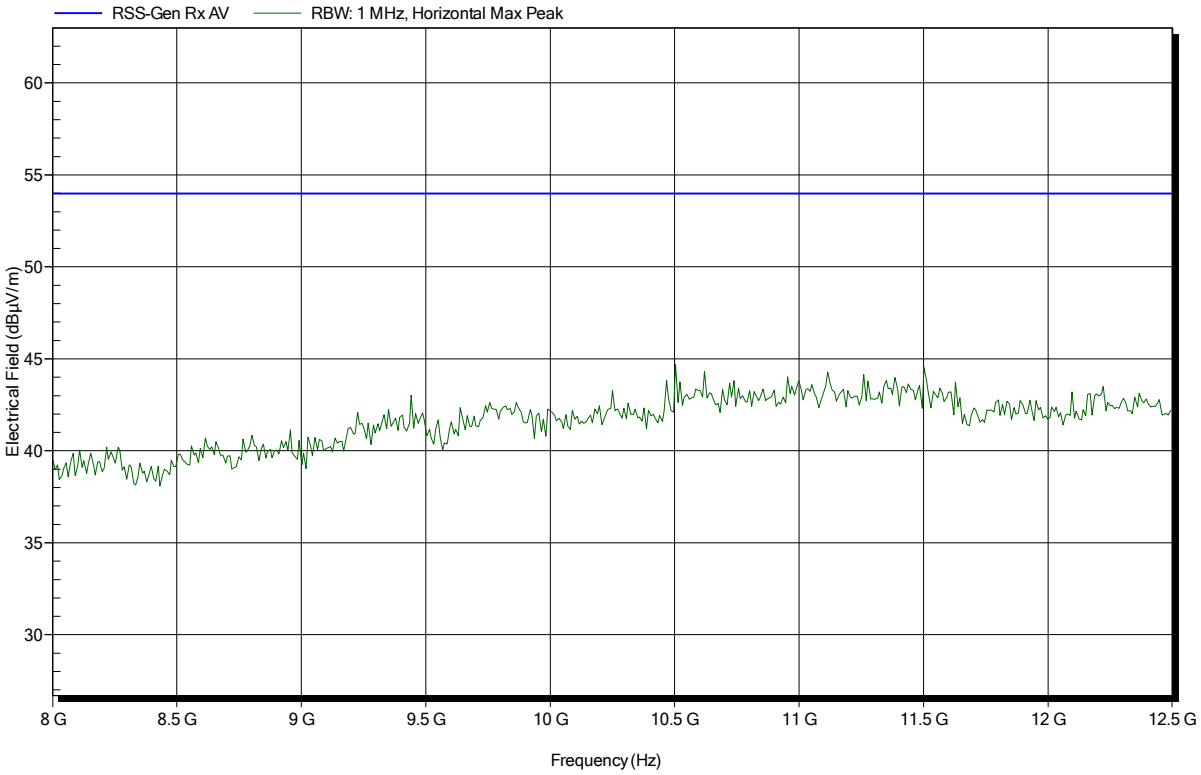
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.88 GHz	45.53 dBµV/m	53.98 dBµV/m	-8.45 dB	Pass

Spurious emissions according to RSS-Gen

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	RX; BT; 2441 MHz
Test Date:	2017-04-07
Note:	

Index 84



Spurious emissions according to RSS-Gen

Project number: G0M-1702-6295

Applicant:	eResearch Technology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Sensor Unit
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.7 V DC (Battery)
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	RX; BT; 2441 MHz
Test Date:	2017-04-07
Note:	

Index 88