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FCC TEST REPORT

FCC 47 CFR Part 15C
Industry Canada RSS-210

Digital transmission systems operating within the 2400 – 2483.5 MHz band

Report Reference No. ..... :	G0M-1211-2443-TFC247W-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 AG
Address ..... :	Rudower Chaussee 30 12489 Berlin Deutschland
Test specification:	
Standard..... :	47 CFR Part 15C KDB Publication No. 558074 RSS-210, Issue 8, 2010-12 RSS-Gen, Issue 3, 2010-12 ANSI C63.4:2009
Equipment under test (EUT):	
Product description	WLAN/Bluetooth module
Model No.	WiBear11n-SF1
Hardware version	C4
Firmware / Software version	Module does not contain software
	FCC-ID: PV7-WIBEAR11N-SF1 IC: 7738A-WB11NSF1
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:

Date of receipt of test item ..... :	2012-11-27	
Date (s) of performance of tests ..... :	2012-11-28 - 2012-12-07	
Compiled by ..... :	Antje Bartusch	
Tested by (+ signature)..... : (Testing Manager)	Wilfried Treffke	.....
Approved by (+ signature) ..... : (Test Lab Manager)	Jens Zimmermann	.....
Date of issue..... :	2013-02-13	
Total number of pages..... :	122	

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.

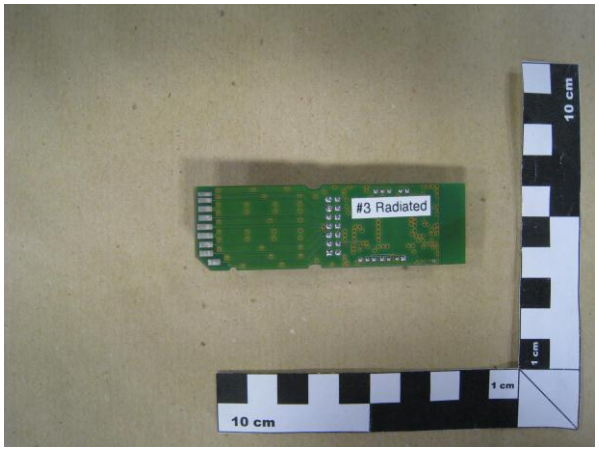
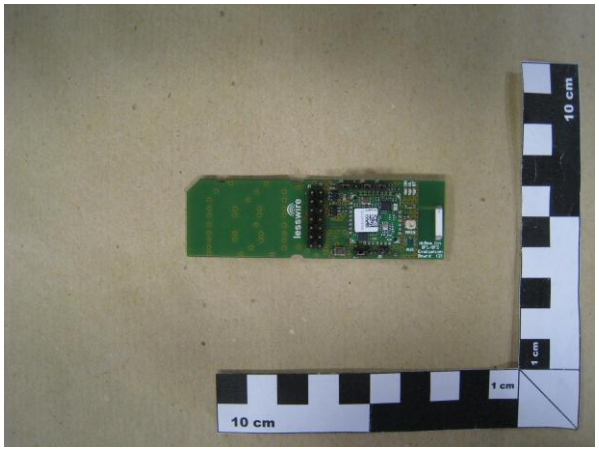
Additional comments:

REPORT INDEX

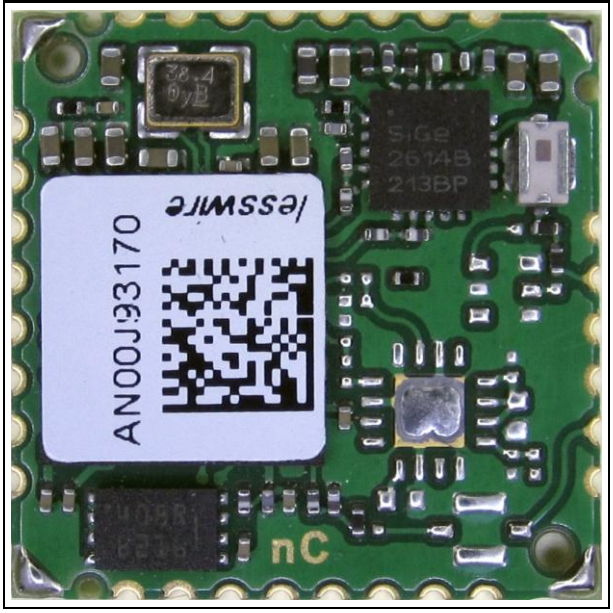
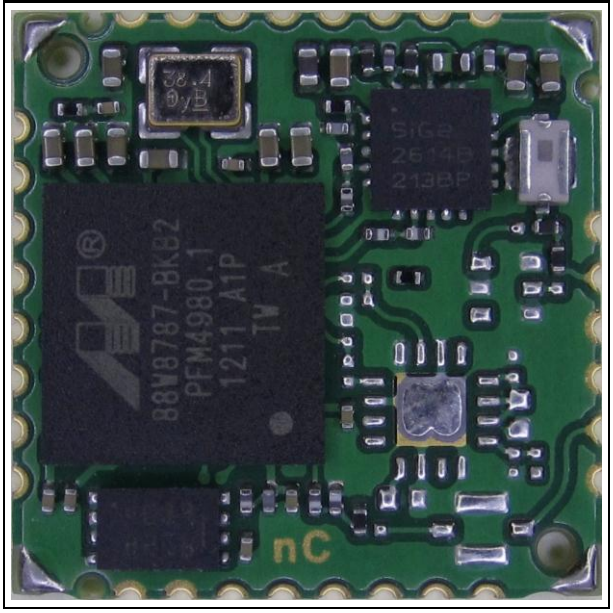
1 Equipment (Test item) Description:

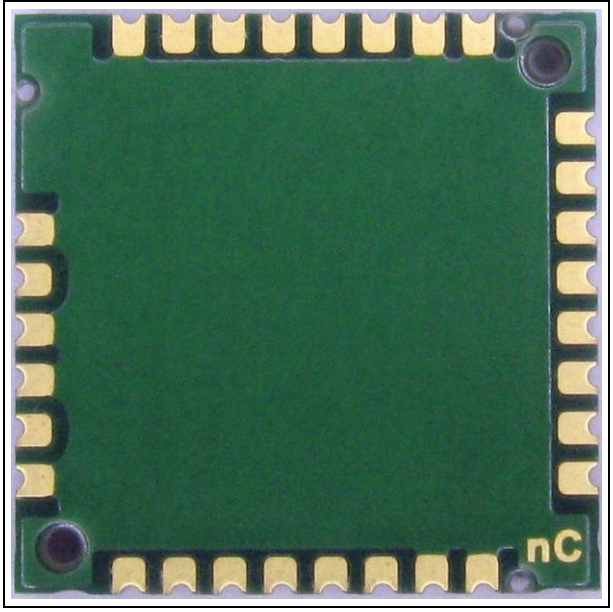
Description	WLAN/Bluetooth module		
Model	WiBear11n-SF1		
Serial number	None		
Hardware version	C4		
Software / Firmware version	Module does not contain software		
FCC-ID	PV7-WIBEAR11N-SF1		
IC	7738A-WB11NSF1		
Equipment type	Radio module		
Radio type	Transceiver		
Radio technology	IEEE 802.11b/g/n		
Operating frequency range	2412 - 2462 MHz (20 MHz) / 2422 - 2452 MHz (40 MHz)		
Assigned frequency band	2400 - 2483.5 MHz		
Main test frequencies	F_{LOW}	2412 MHz (20MHz)	2422 MHz (40MHz)
	F_{MID}	2437 MHz (20MHz)	2437 MHz (40MHz)
	F_{HIGH}	2462 MHz (20MHz)	2452 MHz (40MHz)
Spreading	CCK, DSSS, OFDM		
Modulations	BPSK, QPSK, 16-QAM, 64-QAM		
Number of channels	11		
Channel spacing	5MHz		
Number of antennas	1		
Antenna	Type	integrated	
	Model	2450AT45A100	
	Manufacturer	Johnson	
	Gain	+3.0 dBi (manufacturer declaration)	
Manufacturer	PRETTL Electronics AG Robert-Bosch-Str. 10 01424 Radeberg Germany		
Power supply	V_{NOM}	3.3 VDC	
	V_{MIN}	3.0 VDC	
	V_{MAX}	3.6 VDC	
AC/DC-Adaptor	Model	None	
	Vendor	None	
	Input	None	
	Output	None	

1.1 Photos – Equipment External

EUT ON EVALUATION BOARD TOP	EUT ON EVALUATION BOARD BOTTOM
	

1.2 Photos – Equipment internal

EUT TOP WITH LABEL	EUT TOP WITHOUT LABEL
	

EUT BOTTOM


1.3 Photos – Test setup

TESTSETUP RADIATED MEASUREMENT


TESTSETUP CONDUCTED MEASUREMENT


1.4 Supporting Equipment Used During Testing

Product Type*	Device	Manufacturer	Model No.	Comments
None				

***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	
DSSS	General conditions:	EUT powered by laboratory power supply.
	Radio conditions:	Mode = standalone transmit Spreading = Hopping stopped (single hopping channel) Modulation = BPSK Data rate = 1 Mbps Bandwidth = 20 MHz Duty cycle = 48 % Power level = Maximum (Power Level 17)
OFDM	General conditions:	EUT powered by laboratory power supply.
	Radio conditions:	Mode = standalone transmit Spreading = Hopping stopped (single hopping channel) Modulation = QPSK Data rate = 6 Mbps Bandwidth = 20 MHz Duty cycle = 41.8 % Power level = Maximum (Power Level 15)
HT20	General conditions:	EUT powered by laboratory power supply.
	Radio conditions:	Mode = standalone transmit Spreading = Hopping stopped (single hopping channel) Modulation = BPSK Data rate = 14.4MB/s Bandwidth = 20 MHz Duty cycle = 38.6 % Power level = Maximum (Power Level 15)
HT40	General conditions:	EUT powered by laboratory power supply.
	Radio conditions:	Mode = standalone transmit Spreading = Hopping stopped (single hopping channel) Modulation = QPSK Data rate = 30MB/s Bandwidth = 40 MHz Duty cycle = 18.7 % Power level = Maximum (Power Level 15)
Receive	General conditions:	EUT powered by laboratory power supply.
	Radio conditions:	Mode = standalone receive Spreading = DSSS / OFDM
AC-Powerline	General conditions:	EUT powered by laboratory power supply.
	Radio conditions:	Mode = standalone transmit Spreading = DSSS Power level = Maximum

1.6 Test Equipment Used During Testing

Occupied Bandwidth					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 3	EF00412	2012-03	2014-03

6dB Bandwidth					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 3	EF00412	2012-03	2014-03

Maximum peak conducted power					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 3	EF00412	2012-03	2014-03

Power spectral density					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 3	EF00412	2012-03	2014-03

Band edge compliance					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 3	EF00412	2012-03	2014-03

Conducted spurious emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSIQ26	EF00242	2012-05	2013-05

Radiated spurious emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Semi-anechoic chamber	Frankonia	AC 5	EF00395	-	-
Spectrum Analyzer	R&S	FSIQ26	EF00242	2012-05	2013-05
Biconical Antenna	R&S	HK 116	EF00012	2010-01	2013-01
LPD Antenna	R&S	HL 223	EF00187	2011-02	2014-02
LPD Antenna	R&S	HL 025	EF00327	2010-02	2013-02

AC powerline conducted emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
AMN	R&S	ESH2-Z5	EF00182	2012-10	2014-10
AMN	R&S	ESH3-Z5	EF00036	2012-11	2014-11
EMI Test Receiver	R&S	ESCS 30	EF00295	2012-08	2013-08

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, IC RSS-210				
Product Specific Standard Section	**Requirement – Test**	**Reference Method**	**Result**	**Remarks**
RSS-Gen 4.6.1	Occupied Bandwidth	RSS-Gen 4.6.1	N/R	Informational only
FCC § 15.247(a)(2) IC RSS-210 § A8.2	6dB Bandwidth	KDB Publication No. 558074	PASS	
FCC § 15.247(b)(3) IC RSS-210 § A8.4	Maximum peak conducted power	KDB Publication No. 558074	PASS	
FCC § 15.247(e) IC RSS-210 § A8.2	Power spectral density	KDB Publication No. 558074	PASS	
47 CFR 15.207 RSS-Gen 7.2.4	AC power line conducted emissions	KDB Publication No. 558074 / ANSI C63.4	PASS	
FCC § 15.247(d) IC RSS-210 § A8.5	Band edge compliance	KDB Publication No. 558074	PASS	
FCC § 15.247(d) IC RSS-210 § A8.5	Conducted spurious emissions	KDB Publication No. 558074	PASS	
FCC § 15.247(d) FCC § 15.209 IC RSS-210 A8.5 IC RSS-Gen 4.9 IC RSS-Gen 7.2.5	Transmitter radiated spurious emissions	KDB Publication No. 558074 / ANSI C 63.4	PASS	
IC RSS-Gen 4.10 IC RSS-Gen 6.1	Receiver radiated spurious emissions	ANSI C 63.4	PASS	
Remarks:				

3 Test Conditions and Results

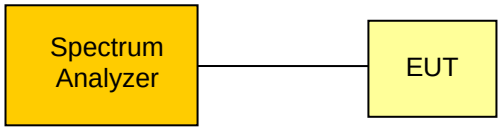
3.1 Test Conditions and Results – Occupied Bandwidth

Occupied Bandwidth acc. IC RSS-Gen	**Verdict: PASS**
Test according to measurement reference	Reference Method
	RSS-Gen 4.6.1
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

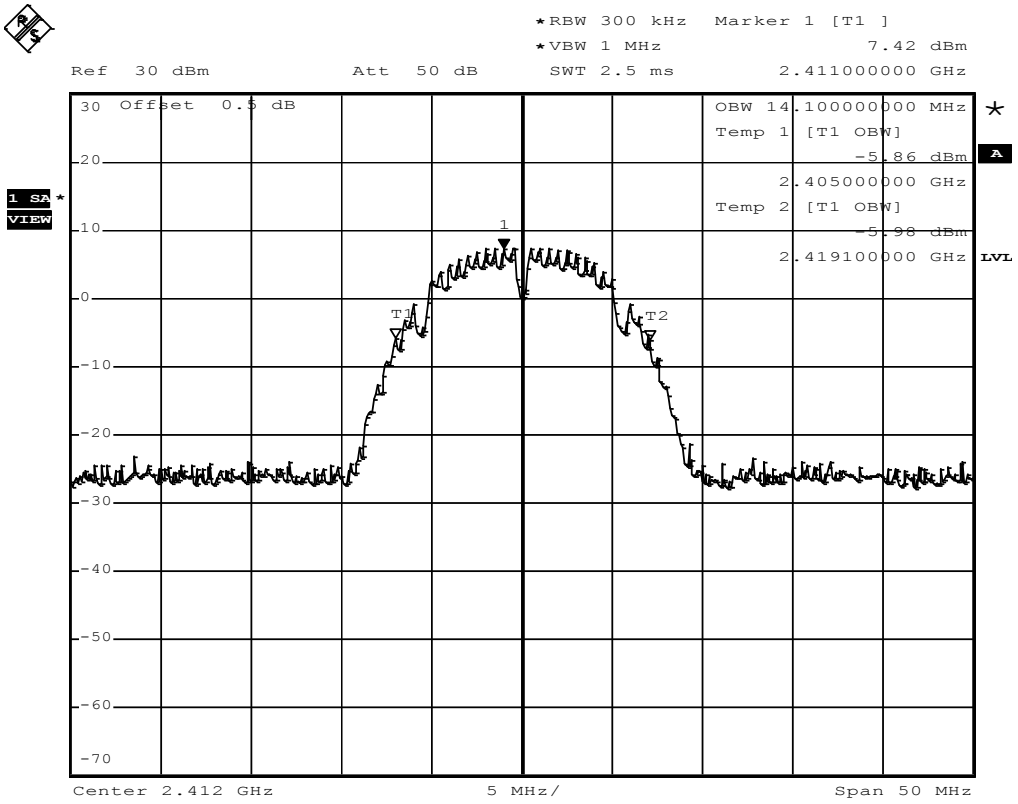
Channel	Frequency [MHz]	Mode	Occupied Bandwidth [kHz]
F_{LOW}	2412	DSSS	14.100
F_{MID}	2437	DSSS	14.100
F_{HIGH}	2462	DSSS	14.200
F_{LOW}	2412	OFDM	17.000
F_{MID}	2437	OFDM	17.000
F_{HIGH}	2462	OFDM	17.000
F_{LOW}	2412	HT20	18.100
F_{MID}	2437	HT20	17.000
F_{HIGH}	2462	HT20	17.000
F_{LOW}	2422	HT40	36.300
F_{MID}	2437	HT40	36.400
F_{HIGH}	2452	HT40	36.400

Comments:

Occupied Bandwidth – DSSS F_{LOW}

RSS Gen
Occupied Bandwidth

EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	4.4.1 Occupied Bandwidth
Comment 1	Channel.: 2412 MHz
Comment 2	A spectrum analyzer with an integrated 99% power bandwidth function is used
Comment 3	DSSS, 1 Mbit/s, power level 17

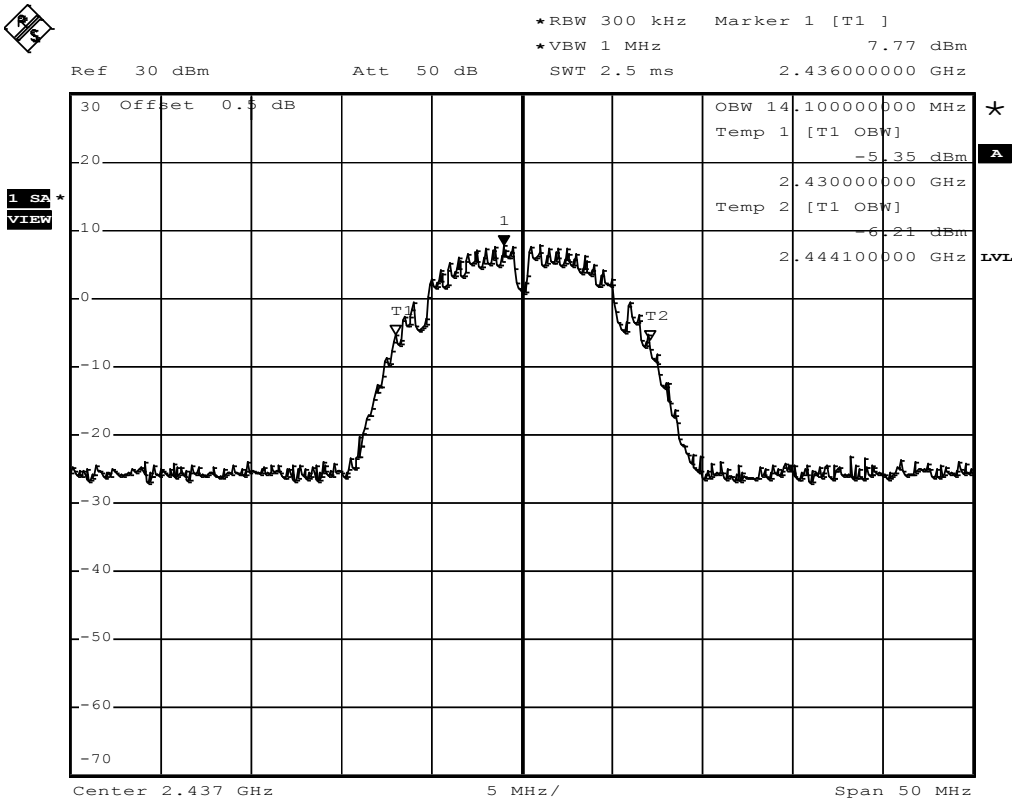


Comment: Occupied bandwidth: 14100 KHz
Date: 30.NOV.2012 11:08:28

Occupied Bandwidth – DSSS F_{MID}

RSS Gen
Occupied Bandwidth

EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	4.4.1 Occupied Bandwidth
Comment 1	Channel.: 2437 MHz
Comment 2	A spectrum analyzer with an integrated 99% power bandwidth function is used
Comment 3	DSSS, 1 Mbit/s, power level 17

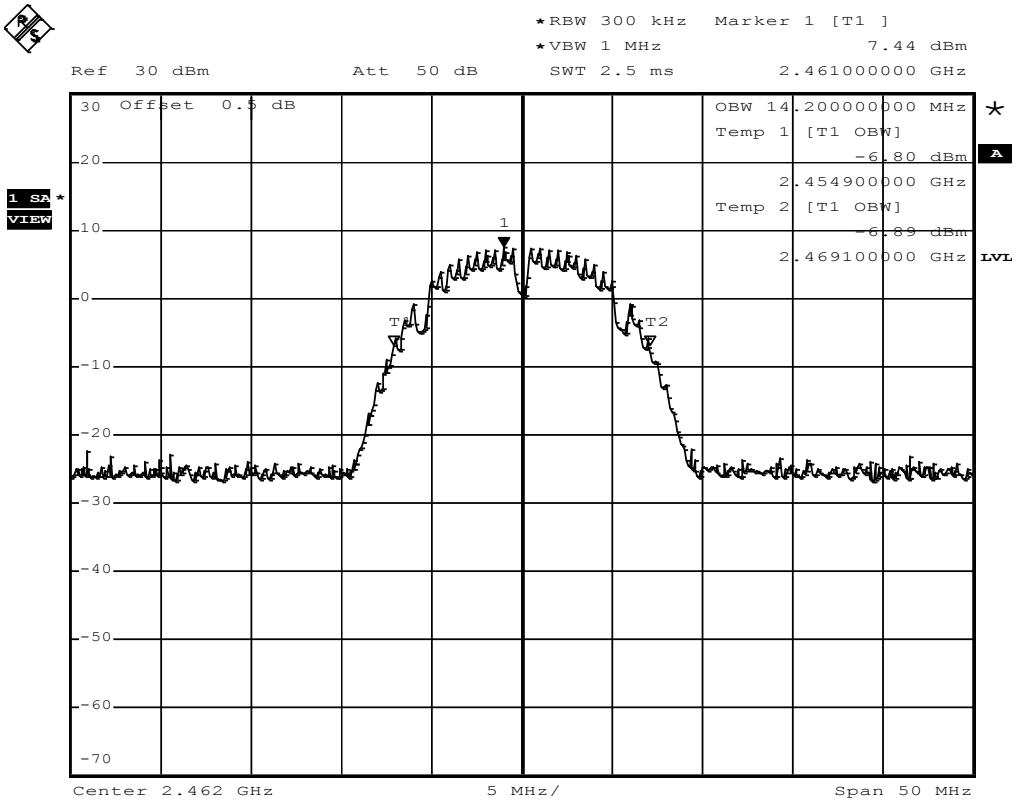


Comment: Occupied bandwidth: 14100 KHz
Date: 30.NOV.2012 11:10:56

Occupied Bandwidth – DSSS F_{HIGH}

RSS Gen
Occupied Bandwidth

EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	4.4.1 Occupied Bandwidth
Comment 1	Channel.: 2452 MHz
Comment 2	A spectrum analyzer with an integrated 99% power bandwidth function is used
Comment 3	DSSS, 1 Mbit/s, power level 17

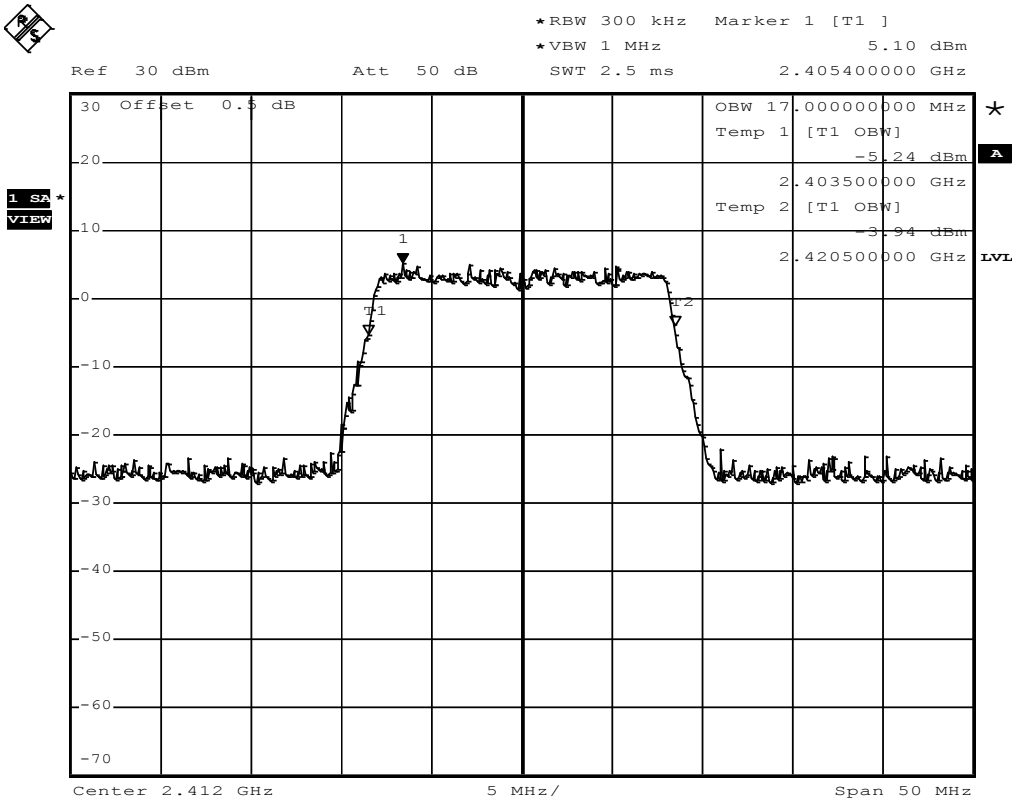


Comment: Occupied bandwidth: 14200 KHz
Date: 30.NOV.2012 11:12:40

Occupied Bandwidth – OFDM F_{LOW}

RSS Gen
Occupied Bandwidth

EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	4.4.1 Occupied Bandwidth
Comment 1	Channel.: 2412 MHz
Comment 2	A spectrum analyzer with an integrated 99% power bandwidth function is used
Comment 3	OFDM, 6 Mbit/s, power level 15

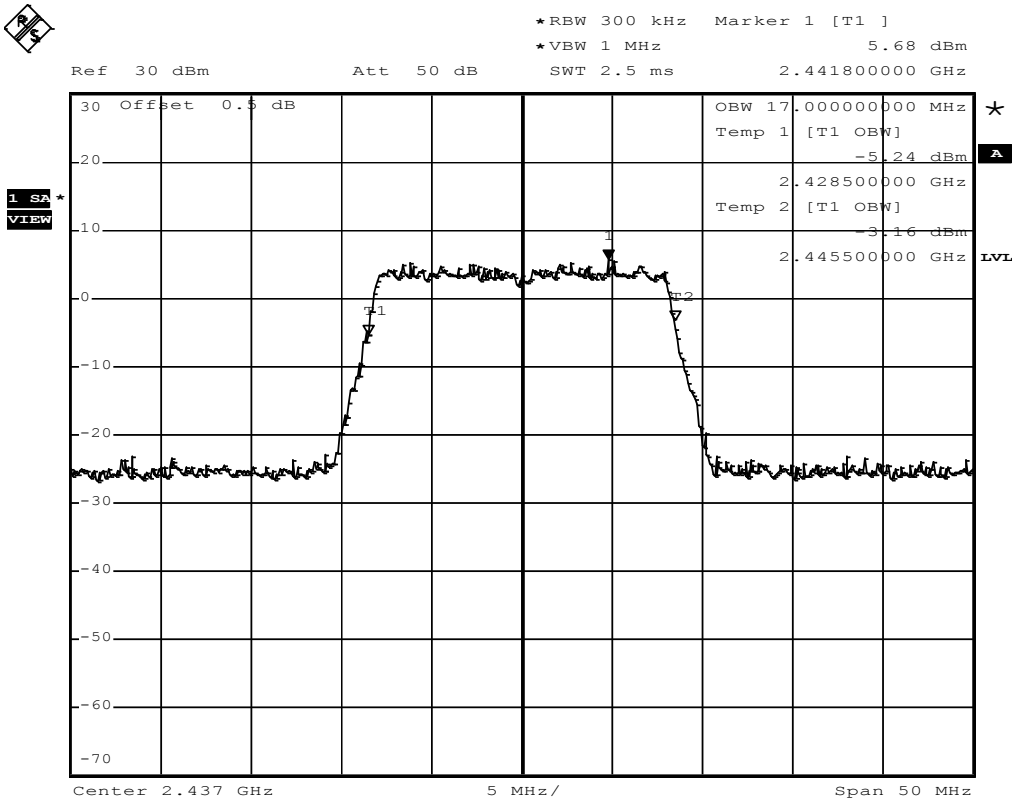


Comment: Occupied bandwidth: 17000 KHz
Date: 30.NOV.2012 11:15:31

Occupied Bandwidth – OFDM F_{MID}

RSS Gen
Occupied Bandwidth

EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	4.4.1 Occupied Bandwidth
Comment 1	Channel.: 2437 MHz
Comment 2	A spectrum analyzer with an integrated 99% power bandwidth function is used
Comment 3	OFDM, 6 Mbit/s, power level 15

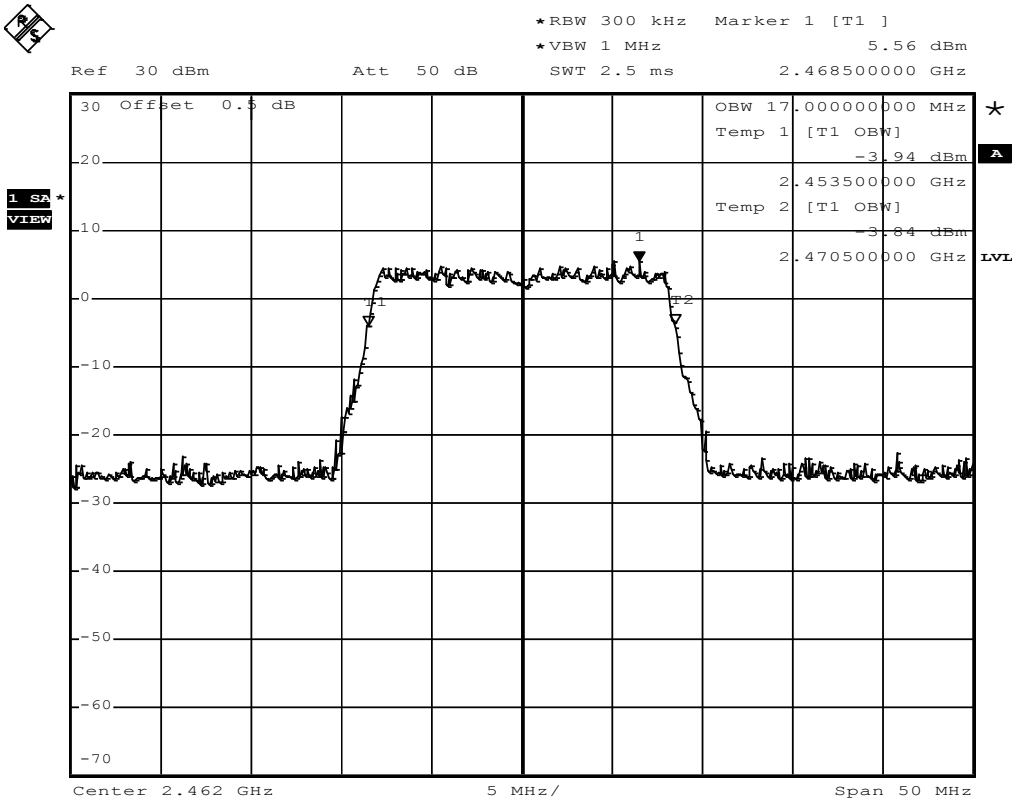


Comment: Occupied bandwidth: 17000 KHz
Date: 30.NOV.2012 11:19:34

Occupied Bandwidth – OFDM F_{HIGH}

RSS Gen
Occupied Bandwidth

EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	4.4.1 Occupied Bandwidth
Comment 1	Channel.: 2462 MHz
Comment 2	A spectrum analyzer with an integrated 99% power bandwidth function is used
Comment 3	OFDM, 6 Mbit/s, power level 15

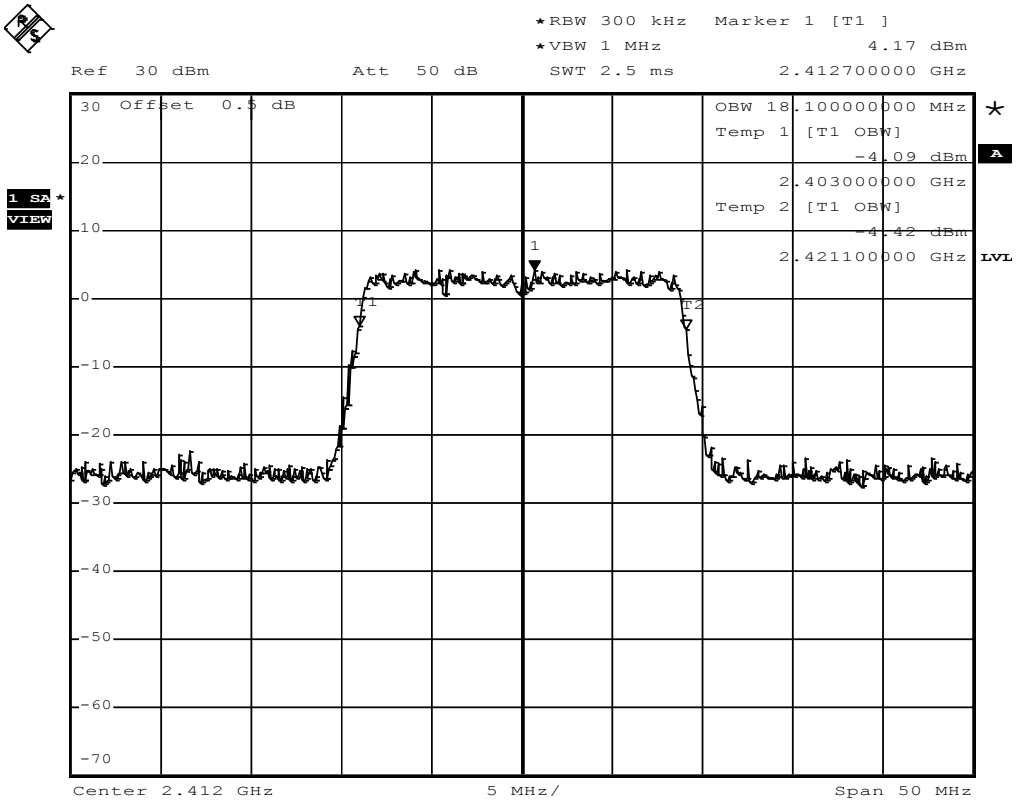


Comment: Occupied bandwidth: 17000 KHz
Date: 30.NOV.2012 11:21:49

Occupied Bandwidth – HT20 F_{LOW}

RSS Gen
Occupied Bandwidth

EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	4.4.1 Occupied Bandwidth
Comment 1	Channel.: 2412 MHz
Comment 2	A spectrum analyzer with an integrated 99% power bandwidth function is used
Comment 3	HT20, MCS0, power level 15

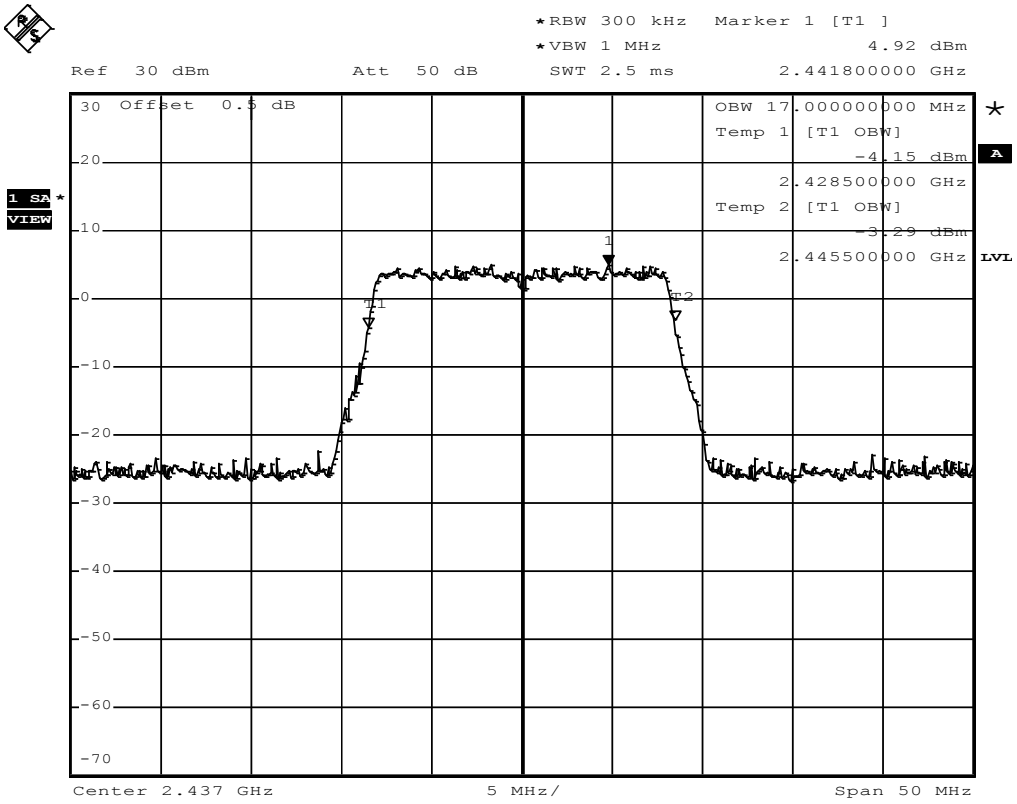


Comment: Occupied bandwidth: 18100 KHz
Date: 30.NOV.2012 11:27:34

Occupied Bandwidth – HT20 F_{MID}

RSS Gen
Occupied Bandwidth

EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	4.4.1 Occupied Bandwidth
Comment 1	Channel.: 2437 MHz
Comment 2	A spectrum analyzer with an integrated 99% power bandwidth function is used
Comment 3	HT20, MCS0, power level 15

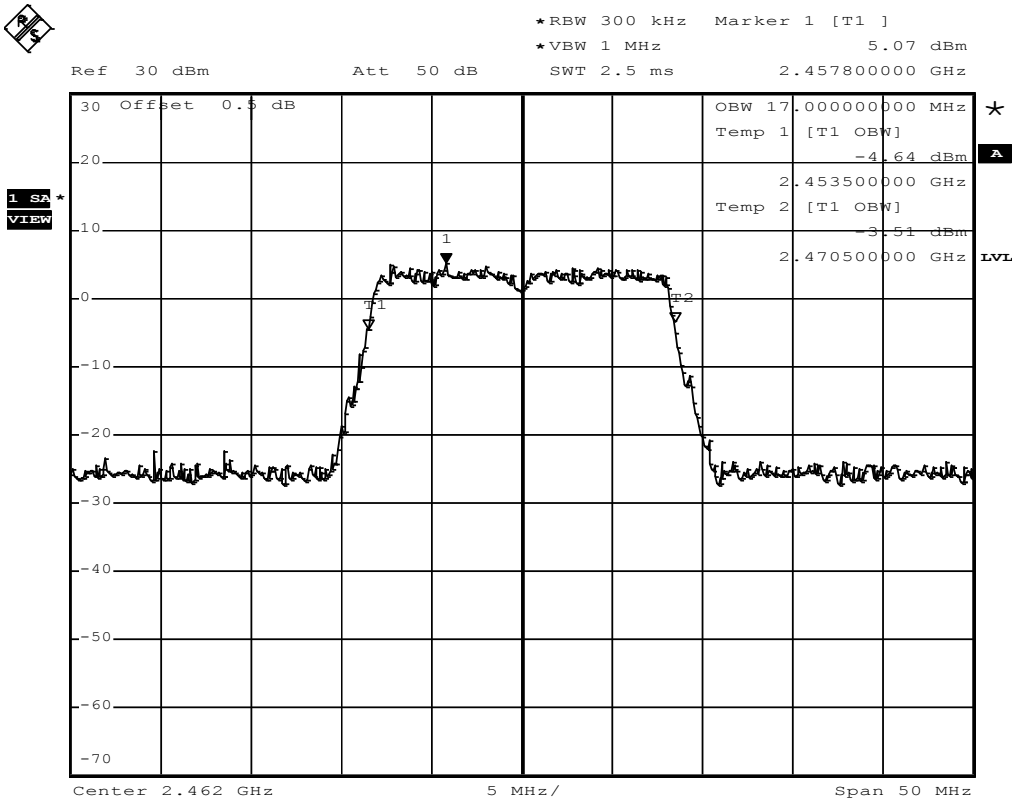


Comment: Occupied bandwidth: 17000 KHz
Date: 30.NOV.2012 11:30:40

Occupied Bandwidth – HT20 F_{High}

RSS Gen
Occupied Bandwidth

EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	4.4.1 Occupied Bandwidth
Comment 1	Channel.: 2462 MHz
Comment 2	A spectrum analyzer with an integrated 99% power bandwidth function is used
Comment 3	HT20, MCS0, power level 15

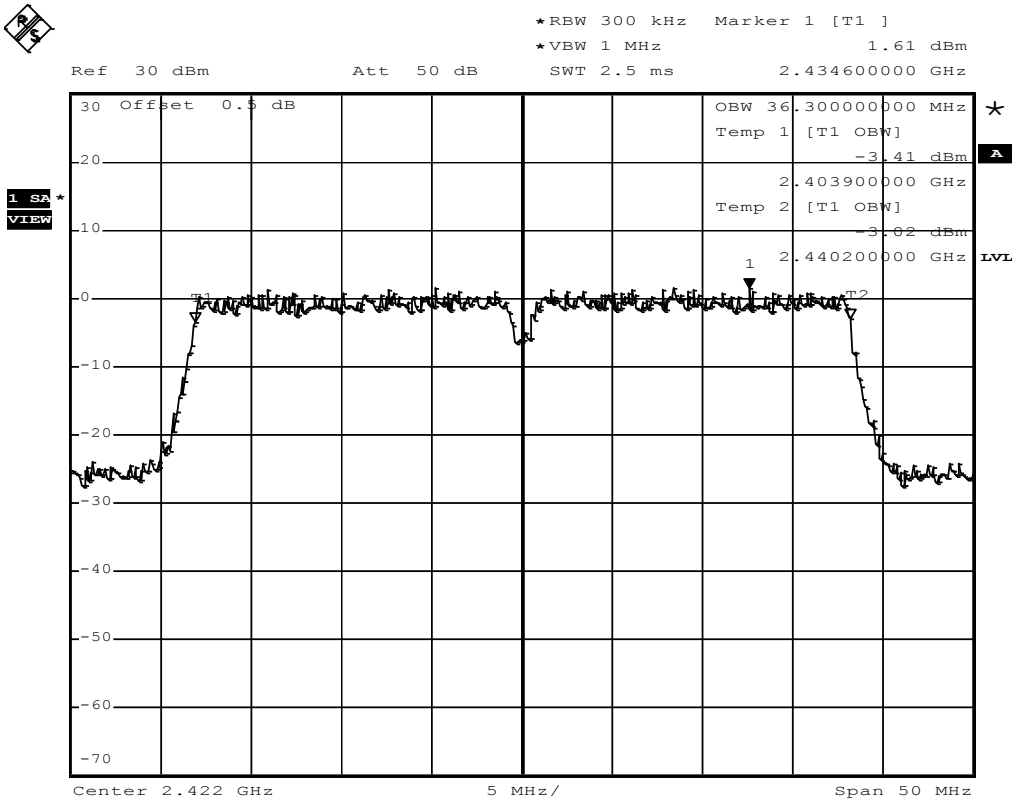


Comment: Occupied bandwidth: 17000 KHz
Date: 30.NOV.2012 11:32:38

Occupied Bandwidth – HT40 F_{LOW}

RSS Gen
Occupied Bandwidth

EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	4.4.1 Occupied Bandwidth
Comment 1	Channel.: 2422 MHz
Comment 2	A spectrum analyzer with an integrated 99% power bandwidth function is used
Comment 3	HT40, MCS0, power level 15

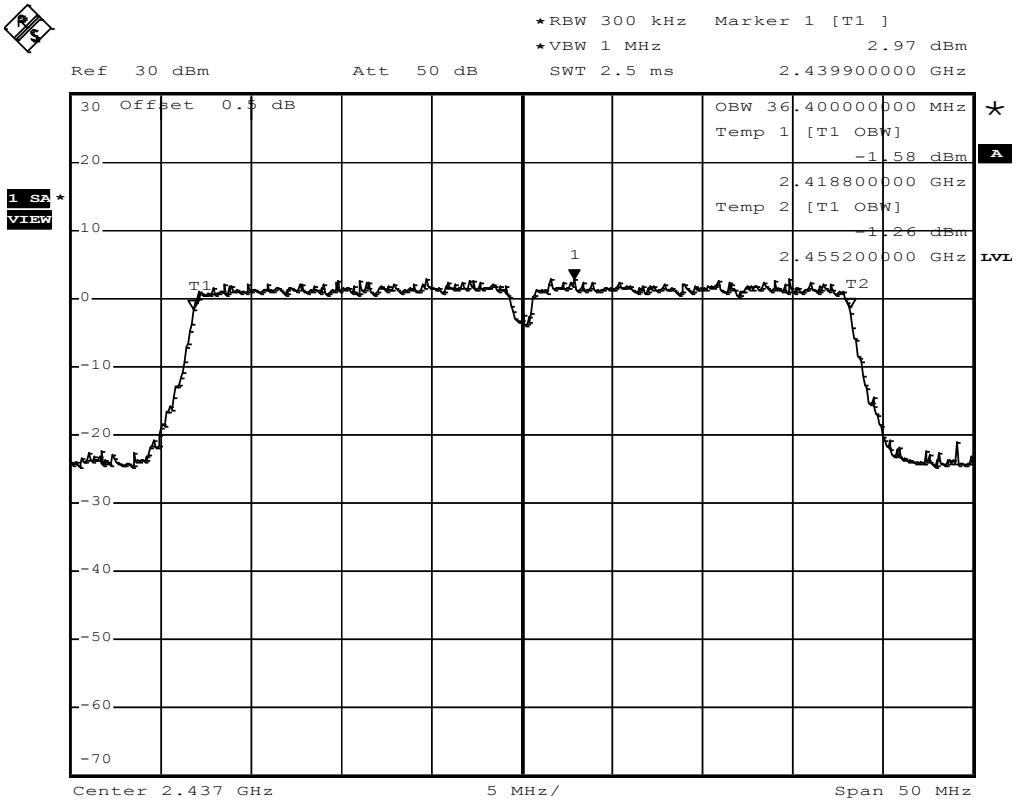


Comment: Occupied bandwidth: 36300 KHz
Date: 30.NOV.2012 11:36:11

Occupied Bandwidth – HT40 F_{MID}

RSS Gen
Occupied Bandwidth

EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	4.4.1 Occupied Bandwidth
Comment 1	Channel.: 2437 MHz
Comment 2	A spectrum analyzer with an integrated 99% power bandwidth function is used
Comment 3	HT40, MCS0, power level 15

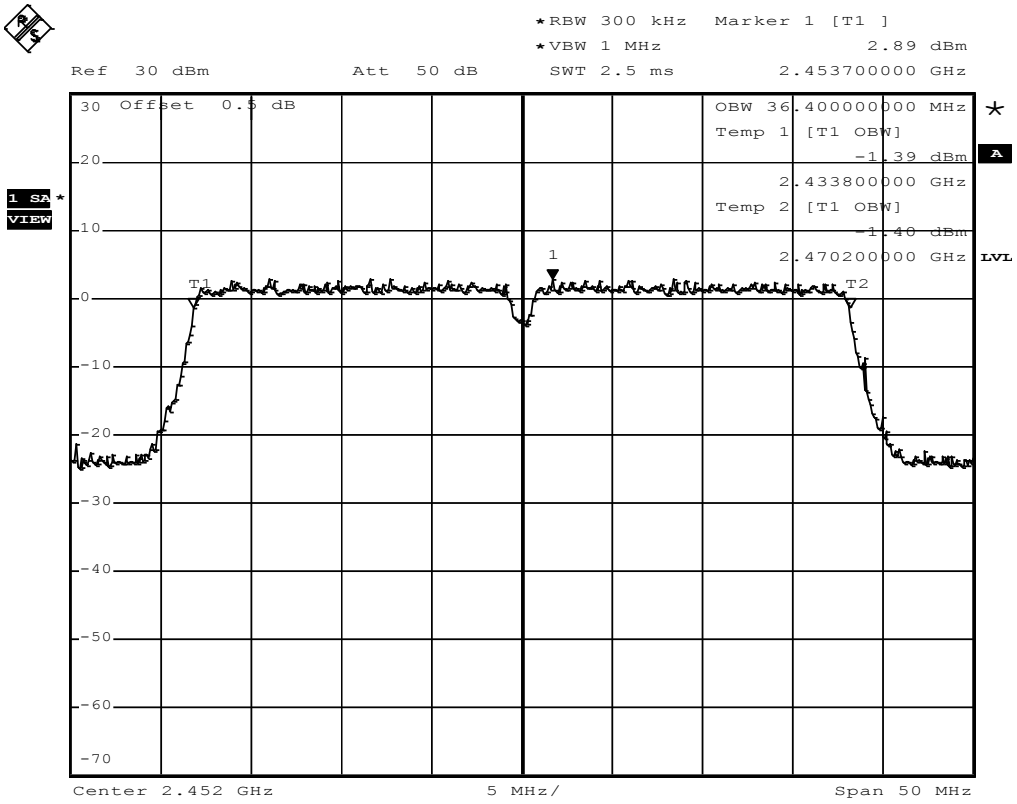


Comment: Occupied bandwidth: 36400 KHz
Date: 30.NOV.2012 12:17:39

Occupied Bandwidth – HT40 F_{High}

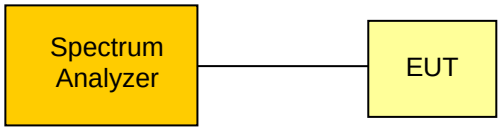
RSS Gen
Occupied Bandwidth

EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	4.4.1 Occupied Bandwidth
Comment 1	Channel.: 2452 MHz
Comment 2	A spectrum analyzer with an integrated 99% power bandwidth function is used
Comment 3	HT40, MCS0, power level 15



Comment: Occupied bandwidth: 36400 KHz
Date: 30.NOV.2012 12:23:42

3.2 Test Conditions and Results – 6 dB Bandwidth

6dB Bandwidth acc. FCC 15.247 / IC RSS-210	**Verdict: PASS**
EUT requirement rule parts and clause	Reference
	FCC 15.247(a)(2) / IC RSS-210 A8.2
Test according to measurement reference	Reference Method
	FCC KDB Publication No. 558074
Test frequency range	Tested frequencies
	F_{LOW} / F_{MID} / F_{HIGH}
Limits	
Limit	
≥ 500kHz	
Test setup	
	
Test procedure	

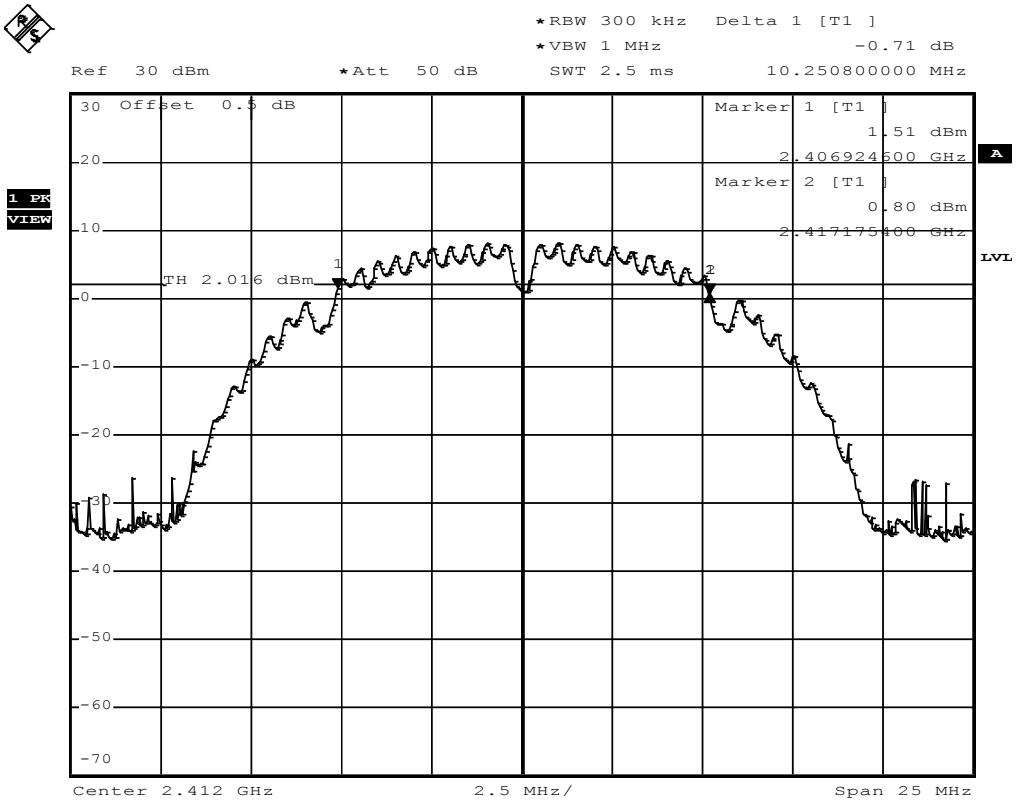
1. EUT set to test mode
2. Span set to at least twice the emission spectrum
3. Detector set to peak and max hold and RBW is set to 100 kHz
4. Envelope peak value of emission spectrum is selected
5. Marker on envelope of spectrum is set to level of -6 dB to the left of the peak
6. Marker on envelope of spectrum is set to level of -6 dB to the right of the peak
7. 6 dB Bandwidth is determined by marker frequency separation

Test results					
Channel	Frequency [MHz]	Mode	6 dB Bandwidth [kHz]	Limit [kHz]	Result
F_{LOW}	2412	DSSS	10251	500	PASS
F_{MID}	2437	DSSS	10253	500	PASS
F_{HIGH}	2462	DSSS	10351	500	PASS
F_{LOW}	2412	OFDM	16603	500	PASS
F_{MID}	2437	OFDM	16750	500	PASS
F_{HIGH}	2462	OFDM	16700	500	PASS
F_{LOW}	2422	HT20	17900	500	PASS
F_{MID}	2437	HT20	17900	500	PASS
F_{HIGH}	2452	HT20	17950	500	PASS
F_{LOW}	2422	HT40	36450	500	PASS
F_{MID}	2437	HT40	36650	500	PASS
F_{HIGH}	2452	HT40	36750	500	PASS
Comments:					

6 dB Bandwidth – DSSS F_{LOW}

FCC part 15.247 (a)2
Minimum 6 dB Bandwidth

EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15.247 (a)2
Comment 1	Minimum 6 dB Bandwidth
Comment 2	Channel : 2412 MHz
Comment 3	DSSS, 1Mbit/s, power level 17

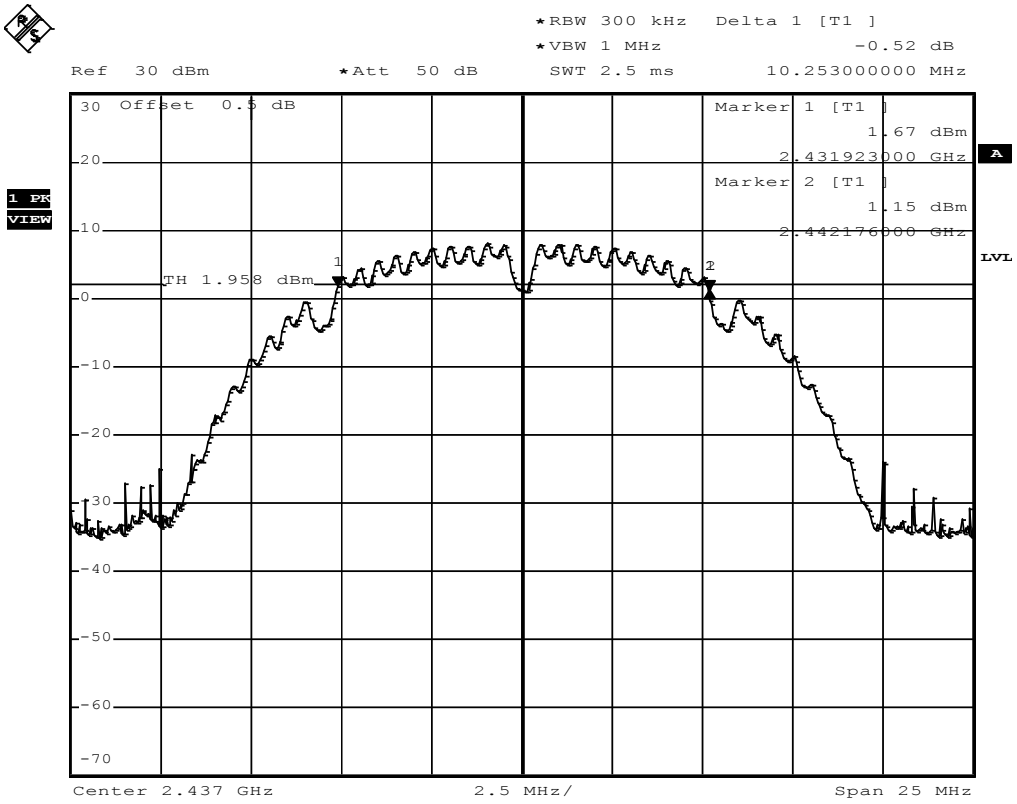


Comment: 6 dB bandwidth: 10250.8 KHz > 500 KHz; verdict: PASS
Date: 30.NOV.2012 09:52:19

6 dB Bandwidth – DSSS F_{MID}

FCC part 15.247 (a)2
Minimum 6 dB Bandwidth

EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15.247 (a)2
Comment 1	Minimum 6 dB Bandwidth
Comment 2	Channel : 2437 MHz
Comment 3	DSSS, 1Mbit/s, power level 17

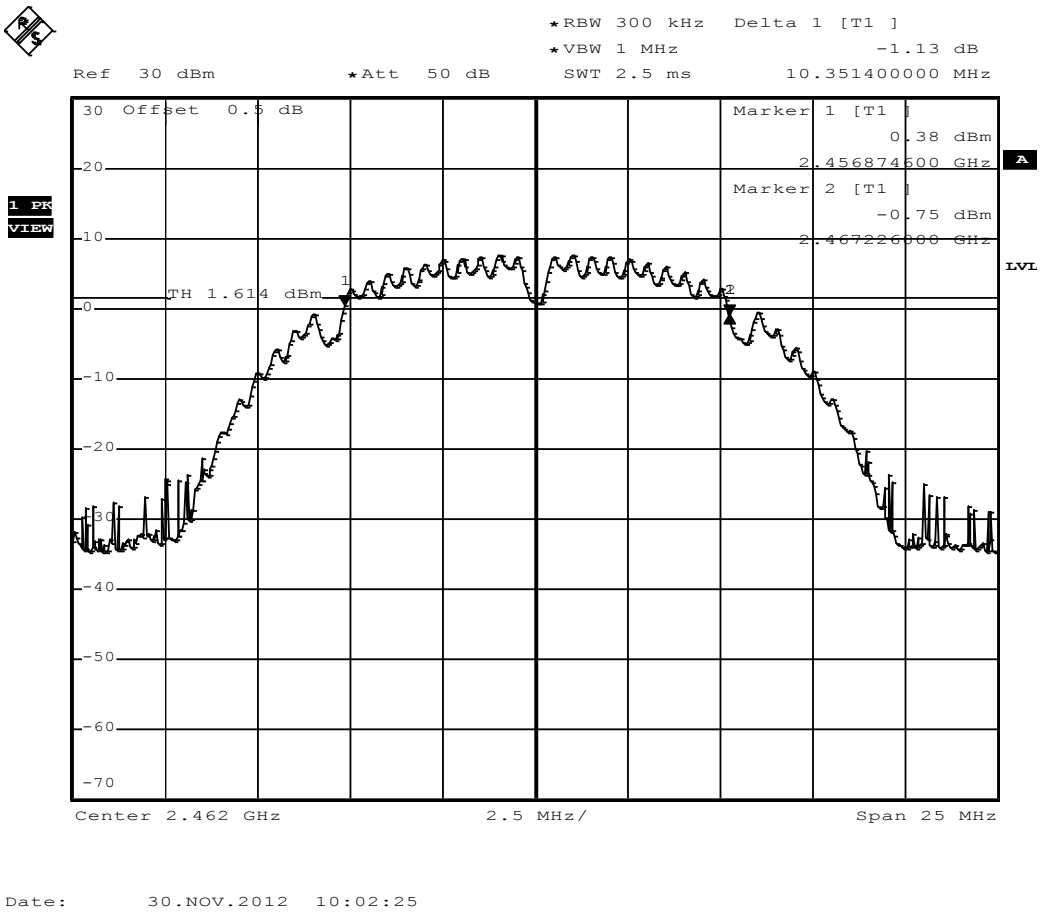


Comment: 6 dB bandwidth: 10253 KHz > 500 KHz; verdict: PASS
Date: 30.NOV.2012 09:55:13

6 dB Bandwidth – DSSS F_{HIGH}

FCC part 15.247 (a)2
Minimum 6 dB Bandwidth

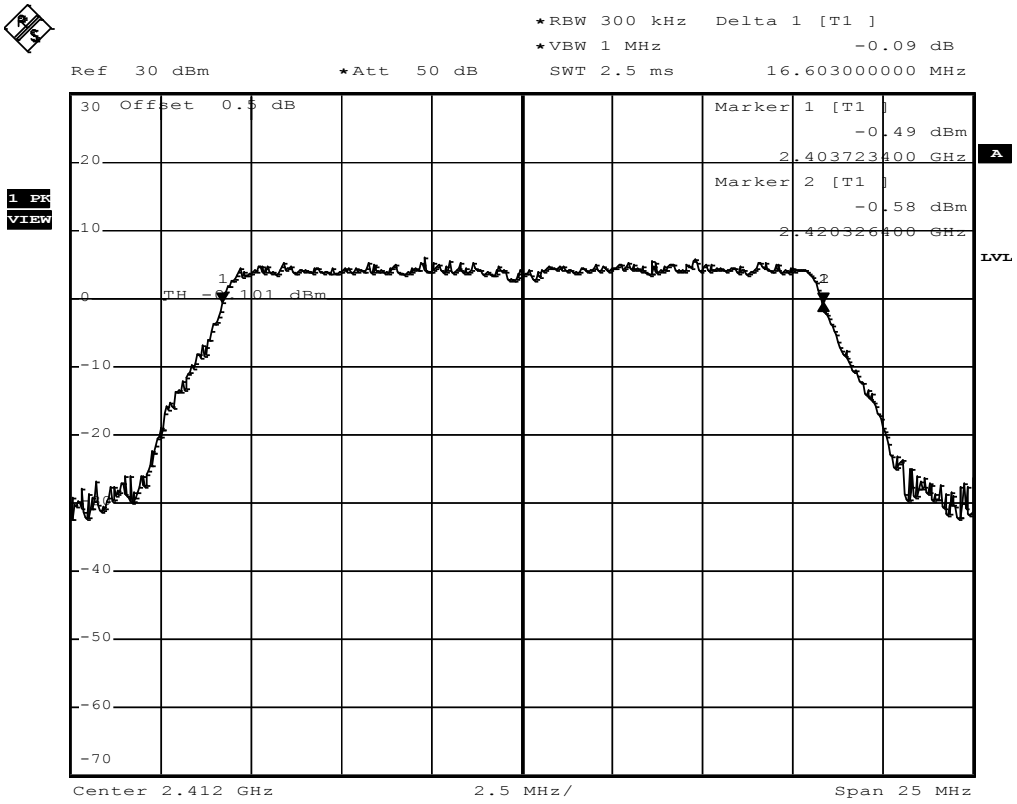
EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15.247 (a)2
Comment 1	Minimum 6 dB Bandwidth
Comment 2	Channel : 2462 MHz
Comment 3	DSSS, 1Mbit/s, power level 17



6 dB Bandwidth – OFDM F_{LOW}

FCC part 15.247 (a)2
Minimum 6 dB Bandwidth

EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15.247 (a)2
Comment 1	Minimum 6 dB Bandwidth
Comment 2	Channel : 2412 MHz
Comment 3	OFDM, 6Mbit/s, power level 15

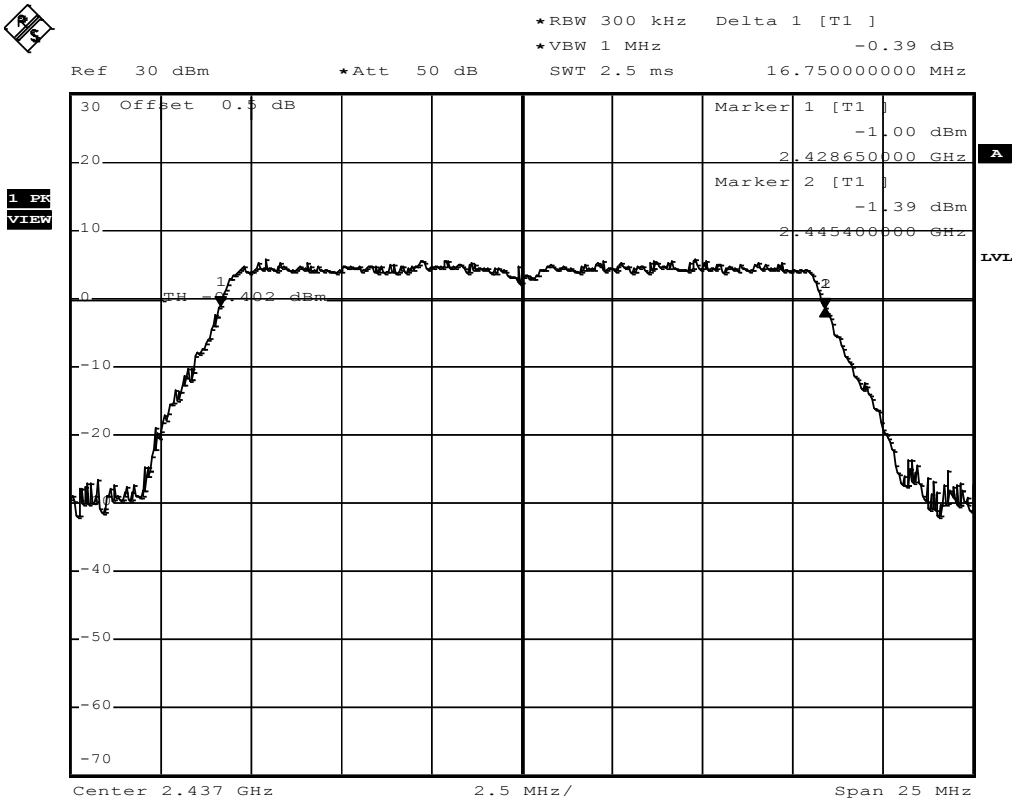


Comment: 6 dB bandwidth: 16603 KHz > 500 KHz; verdict: PASS
Date: 30.NOV.2012 10:06:26

6 dB Bandwidth – OFDM F_{MID}

FCC part 15.247 (a)2
Minimum 6 dB Bandwidth

EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15.247 (a)2
Comment 1	Minimum 6 dB Bandwidth
Comment 2	Channel : 2437 MHz
Comment 3	OFDM, 6Mbit/s, power level 15

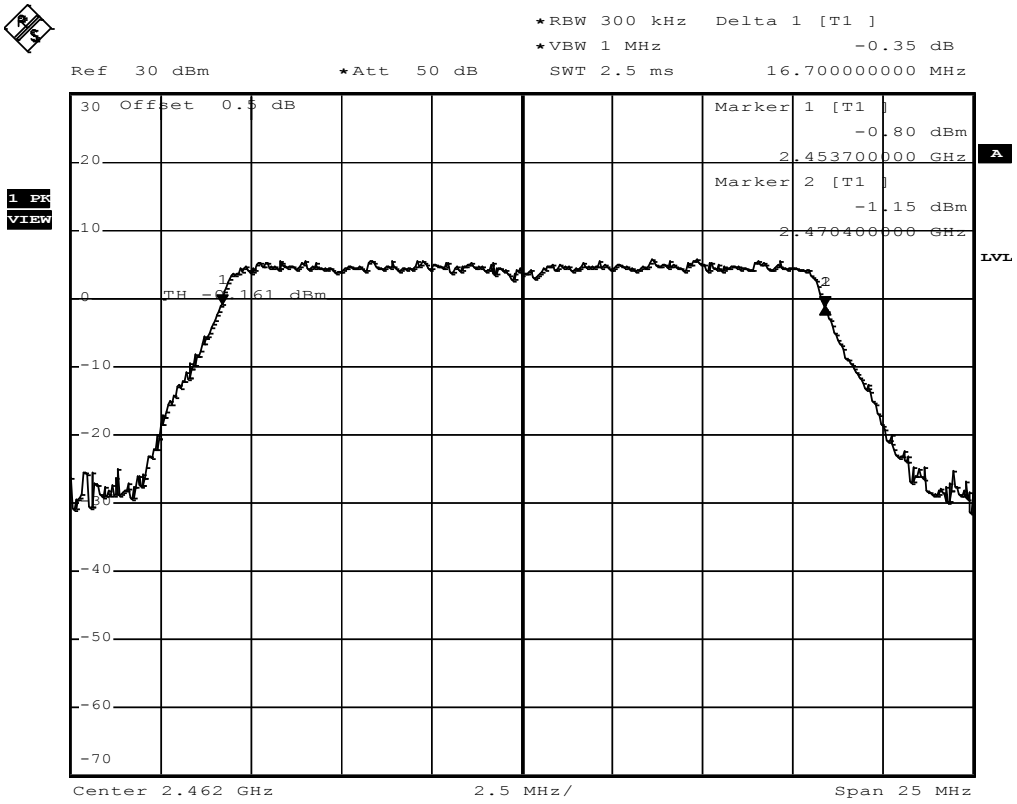


Comment: 6 dB bandwidth: 16750 KHz > 500 KHz; verdict: PASS
Date: 30.NOV.2012 10:13:41

6 dB Bandwidth – OFDM F_{HIGH}

FCC part 15.247 (a)2
Minimum 6 dB Bandwidth

EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15.247 (a)2
Comment 1	Minimum 6 dB Bandwidth
Comment 2	Channel : 2462 MHz
Comment 3	OFDM, 6Mbit/s, power level 15

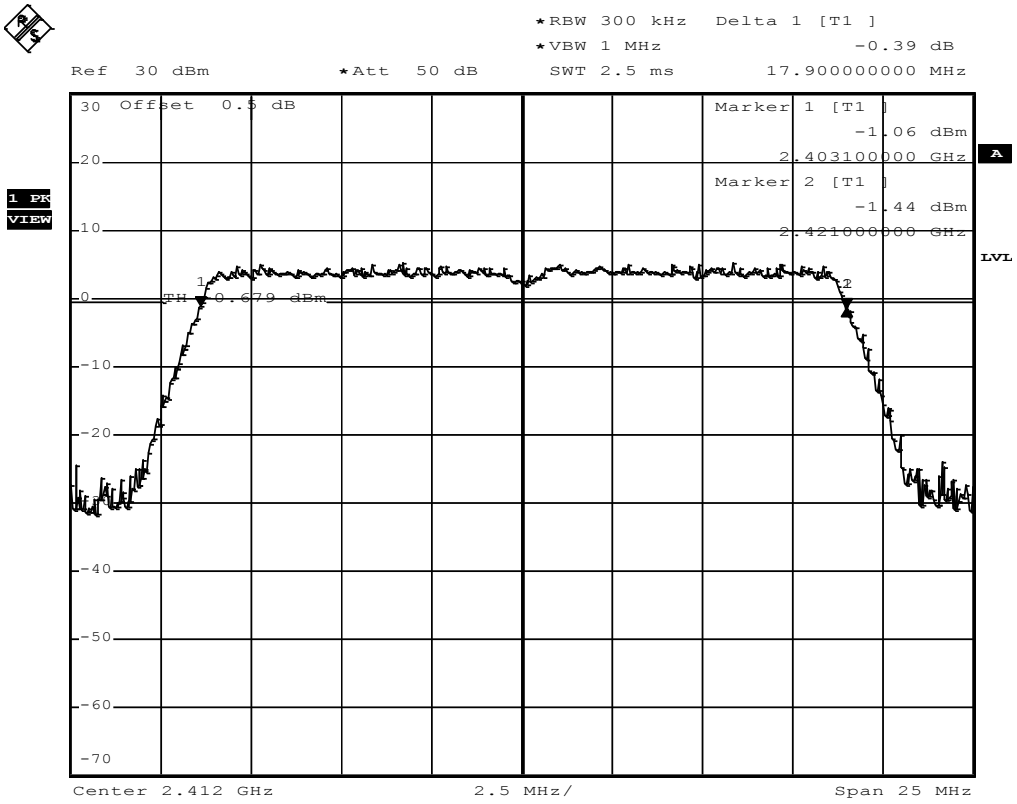


Comment: 6 dB bandwidth: 16700 KHz > 500 KHz; verdict: PASS
Date: 30.NOV.2012 10:16:10

6 dB Bandwidth – HT20 F_{LOW}

FCC part 15.247 (a)2
Minimum 6 dB Bandwidth

EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15.247 (a)2
Comment 1	Minimum 6 dB Bandwidth
Comment 2	Channel : 2412 MHz
Comment 3	HT20, MCS0, power level 15

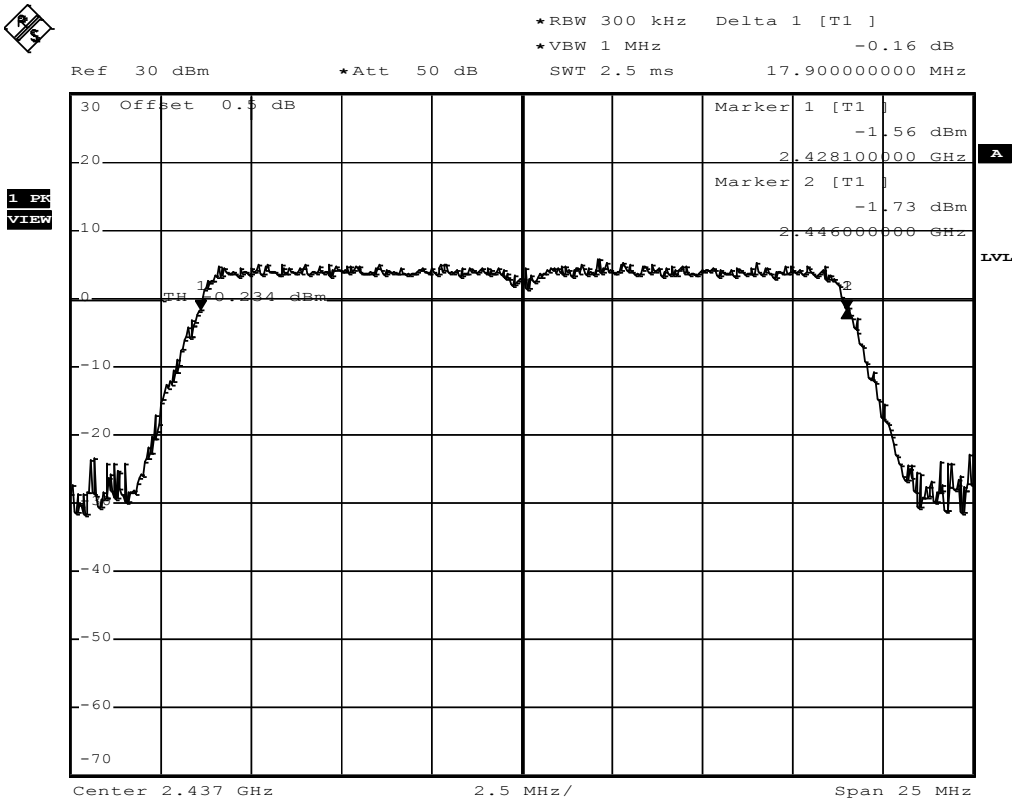


Comment: 6 dB bandwidth: 17900 KHz > 500 KHz; verdict: PASS
Date: 30.NOV.2012 10:19:48

6 dB Bandwidth – HT20 F_{MID}

FCC part 15.247 (a)2
Minimum 6 dB Bandwidth

EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15.247 (a)2
Comment 1	Minimum 6 dB Bandwidth
Comment 2	Channel : 2437 MHz
Comment 3	HT20, MCS0, power level 15

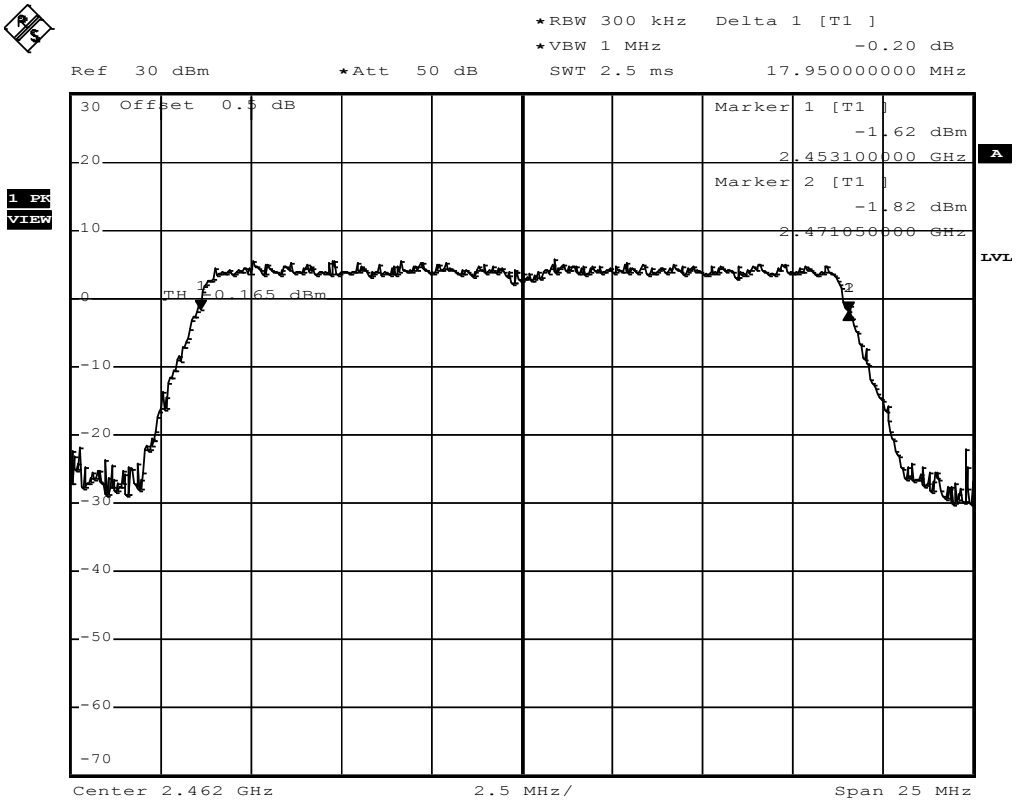


Comment: 6 dB bandwidth: 17900 KHz > 500 KHz; verdict: PASS
Date: 30.NOV.2012 10:32:24

6 dB Bandwidth – HT20 F_{HIGH}

FCC part 15.247 (a)2
Minimum 6 dB Bandwidth

EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15.247 (a)2
Comment 1	Minimum 6 dB Bandwidth
Comment 2	Channel : 2462 MHz
Comment 3	HT20, MCS0, power level 15

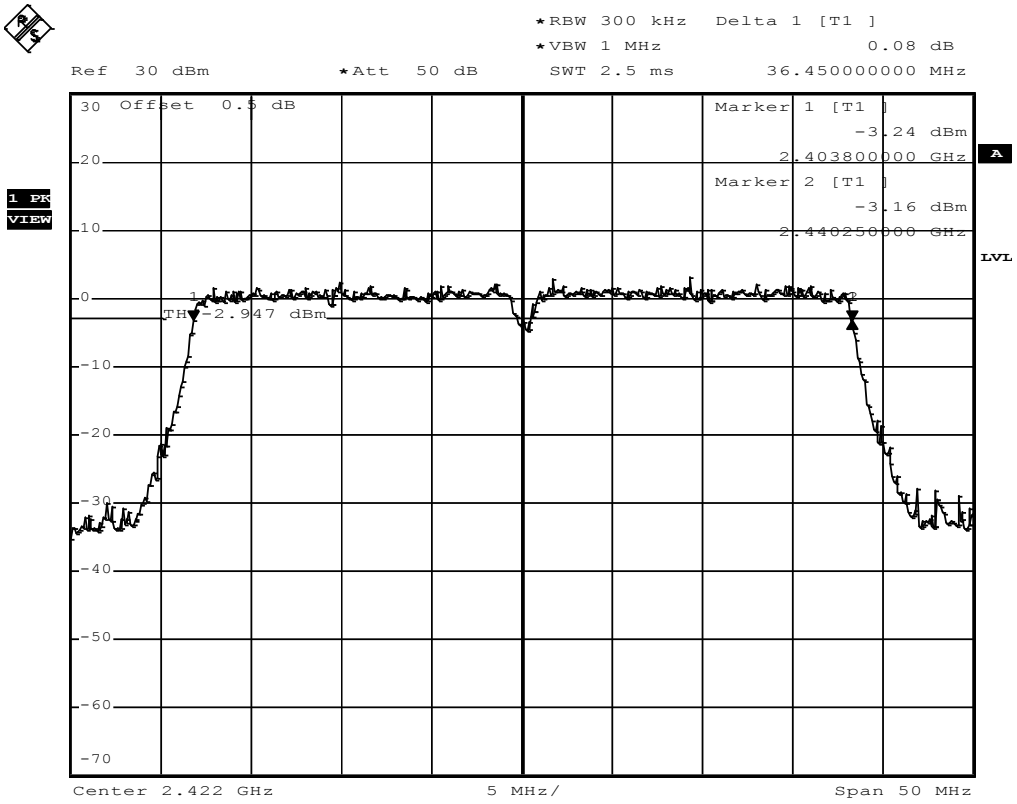


Comment: 6 dB bandwidth: 17950 KHz > 500 KHz; verdict: PASS
Date: 30.NOV.2012 10:36:45

6 dB Bandwidth – HT40 F_{LOW}

FCC part 15.247 (a)2
Minimum 6 dB Bandwidth

EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15.247 (a)2
Comment 1	Minimum 6 dB Bandwidth
Comment 2	Channel : 2422 MHz
Comment 3	HT40, MCS0, power level 15

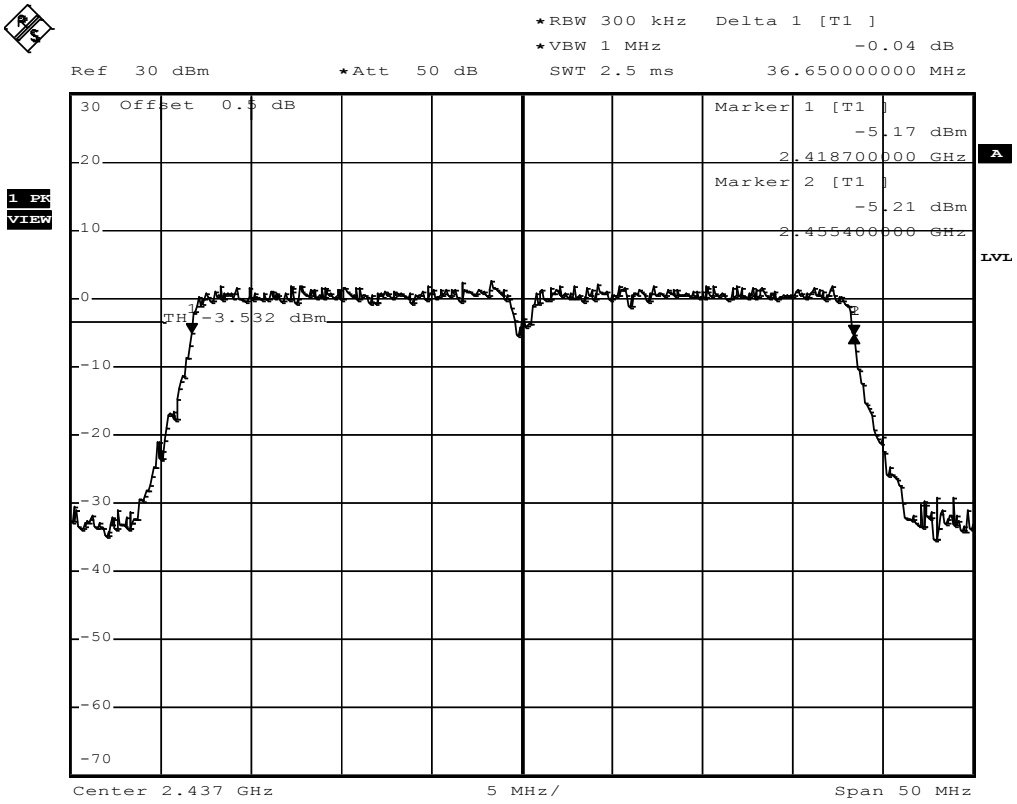


Comment: 6 dB bandwidth: 36450 KHz > 500 KHz; verdict: PASS
Date: 30.NOV.2012 10:44:19

6 dB Bandwidth – HT40 F_{MID}

FCC part 15.247 (a)2
Minimum 6 dB Bandwidth

EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15.247 (a)2
Comment 1	Minimum 6 dB Bandwidth
Comment 2	Channel : 2437 MHz
Comment 3	HT40, MCS0, power level 15

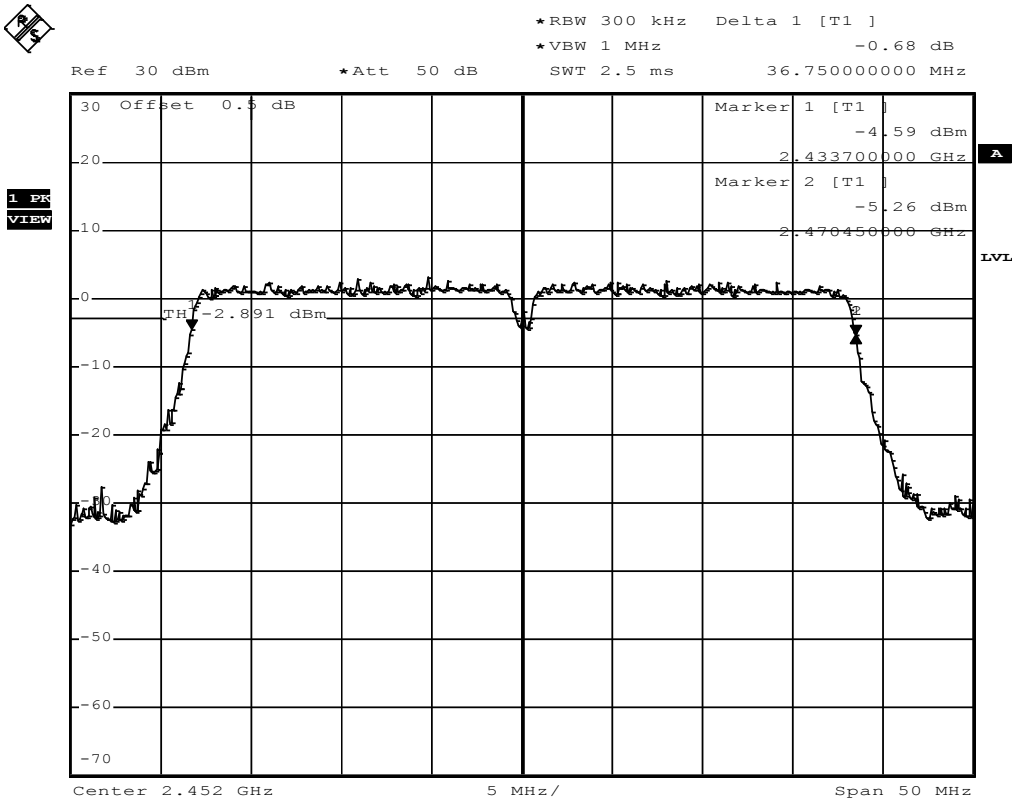


Comment: 6 dB bandwidth: 36650 KHz > 500 KHz; verdict: PASS
Date: 30.NOV.2012 10:50:12

6 dB Bandwidth – HT40 F_{HIGH}

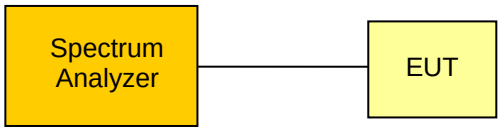
FCC part 15.247 (a)2
Minimum 6 dB Bandwidth

EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15.247 (a)2
Comment 1	Minimum 6 dB Bandwidth
Comment 2	Channel : 2452 MHz
Comment 3	HT40, MCS0, power level 15



Comment: 6 dB bandwidth: 36750 KHz > 500 KHz; verdict: PASS
Date: 30.NOV.2012 10:52:26

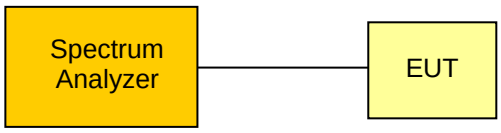
3.3 Test Conditions and Results – Maximum peak conducted power

Maximum peak conducted power acc. FCC 15.247 / IC RSS-210	**Verdict: PASS**
EUT requirement rule parts and clause	Reference
	FCC 15.247(b)(3) / IC RSS-210 A8.4
Test according to measurement reference	Reference Method
	FCC KDB Publication No. 558074
Test frequency range	Tested frequencies
	F_{LOW} / F_{MID} / F_{HIGH}
Measurement mode	Peak
Maximum antenna gain	3 dBi ⇒ Limit correction = 0 dB
Limits	
Limit	
1 W (30 dBm)	
The conducted output power limit specified above is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in the table, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.	
Test setup	
	
Test procedure	
1. EUT set to test mode (Communication tester is used if needed) 2. Center frequency set to test channel center frequency 3. Span set to twice the 20 dB bandwidth and detector to peak and max hold 4. Resolution bandwidth is set to 3 MHz 5. Peak conducted power is determined from peak of spectrum envelope	

Test results							
Channel	Frequency [MHz]	Voltage	Mode	Peak power [dbm]	Peak power [W]	Limit [dBm]	Margin [dB]
F_{LOW}	2412	3.3 VDC	DSSS	18.6	0.072	30	-11.40
F_{LOW}	2412	3.0 VDC	DSSS	19.7	0.093	30	-10.30
F_{LOW}	2412	3.6 VDC	DSSS	17.4	0.055	30	-12.60
F_{MID}	2437	3.3 VDC	DSSS	19.2	0.083	30	-10.80
F_{MID}	2437	3.0 VDC	DSSS	20.0	0.100	30	-10.00
F_{MID}	2437	3.6 VDC	DSSS	17.8	0.060	30	-12.20
F_{HIGH}	2462	3.3 VDC	DSSS	18.4	0.069	30	-11.60
F_{HIGH}	2462	3.3 VDC	DSSS	19.7	0.093	30	-10.30
F_{HIGH}	2462	3.6 VDC	DSSS	17.1	0.051	30	-12.90
F_{LOW}	2412	3.3 VDC	OFDM	22.5	0.178	30	-07.50
F_{LOW}	2412	3.0 VDC	OFDM	23.5	0.224	30	-06.50
F_{LOW}	2412	3.6 VDC	OFDM	21.2	0.132	30	-08.80
F_{MID}	2437	3.3 VDC	OFDM	22.5	0.178	30	-07.50
F_{MID}	2437	3.0 VDC	OFDM	23.6	0.229	30	-06.40
F_{MID}	2437	3.6 VDC	OFDM	21.4	0.138	30	-08.60
F_{HIGH}	2462	3.3 VDC	OFDM	22.7	0.186	30	-07.30
F_{HIGH}	2462	3.3 VDC	OFDM	23.6	0.229	30	-06.40
F_{HIGH}	2462	3.6 VDC	OFDM	21.3	0.135	30	-08.70
F_{LOW}	2412	3.3 VDC	HT20	22.8	0.191	30	-07.20
F_{LOW}	2412	3.0 VDC	HT20	23.5	0.224	30	-06.50
F_{LOW}	2412	3.6 VDC	HT20	21.4	0.138	30	-08.60
F_{MID}	2437	3.3 VDC	HT20	23.0	0.200	30	-07.00
F_{MID}	2437	3.0 VDC	HT20	23.6	0.229	30	-06.40
F_{MID}	2437	3.6 VDC	HT20	21.6	0.145	30	-08.40
F_{HIGH}	2462	3.3 VDC	HT20	23.0	0.200	30	-07.00
F_{HIGH}	2462	3.3 VDC	HT20	23.4	0.219	30	-06.60
F_{HIGH}	2462	3.6 VDC	HT20	21.4	0.138	30	-08.60
F_{LOW}	2412	3.3 VDC	HT40	23.5	0.224	30	-06.50
F_{LOW}	2412	3.0 VDC	HT40	24.4	0.275	30	-05.60
F_{LOW}	2412	3.6 VDC	HT40	22.0	0.158	30	-08.00
F_{MID}	2437	3.3 VDC	HT40	23.4	0.219	30	-06.60
F_{MID}	2437	3.0 VDC	HT40	24.1	0.257	30	-05.90
F_{MID}	2437	3.6 VDC	HT40	22.1	0.162	30	-07.90

F_{HIGH}	2462	3.3 VDC	HT40	23.5	0.224	30	-06.50
F_{HIGH}	2462	3.3 VDC	HT40	24.3	0.269	30	-05.70
F_{HIGH}	2462	3.6 VDC	HT40	22.4	0.174	30	-07.60
Comments:							

3.4 Test Conditions and Results – Power spectral density

Power spectral density acc. FCC 15.247 / IC RSS-210	**Verdict: PASS**
EUT requirement rule parts and clause	Reference
	FCC 15.247(e) / IC RSS-210 A8.2
Test according to measurement reference	Reference Method
	FCC KDB Publication No. 558074
Test frequency range	Tested frequencies
	F_{LOW} / F_{MID} / F_{HIGH}
Measurement mode	Peak
Limits	
8 dBm / 3 kHz	
Test setup	
	
Test procedure	
1. EUT set to test mode (Communication tester is used if needed) 2. Center frequency set to test channel center frequency 3. Span is set large enough to capture maximum emissions in passband, RBW is set to 3kHz 4. Peak power density is determined from peak emission of envelope	

Test results						
Channel	Frequency [MHz]	Test mode	Peak frequency [MHz]	Peak power density [dBm]	Limit [dBm/3kHz]	Margin [dB]
F_{LOW}	2412	DSSS	2413.380	-3.4	8.0	-11.40
F_{MID}	2437	DSSS	2438.440	-3.5	8.0	-11.50
F_{HIGH}	2462	DSSS	2463.440	-3.9	8.0	-11.90
F_{LOW}	2412	OFDM	2410.260	-3.9	8.0	-11.90
F_{MID}	2437	OFDM	2432.740	-3.6	8.0	-11.60
F_{HIGH}	2462	OFDM	2460.200	-3.7	8.0	-11.70
F_{LOW}	2412	HT20	2411.760	-4.2	8.0	-12.20
F_{MID}	2437	HT20	2439.400	-4.0	8.0	-12.00
F_{HIGH}	2462	HT20	2461.820	-3.9	8.0	-11.90
F_{LOW}	2422	HT40	2415.100	-6.28	8.0	-14.28
F_{MID}	2437	HT40	2428.500	-6.4	8.0	-14.40
F_{HIGH}	2452	HT40	2445.600	-6.6	8.0	-14.60
Comments:						

3.5 Test Conditions and Results – AC power line conducted emissions

Power line conducted emissions acc. FCC 47 CFR 15.207 / IC RSS-Gen				**Verdict: PASS**
Test according referenced standards	Reference Method			
	ANSI C63.4			
Fully configured sample scanned over the following frequency range	Frequency range			
	0.15 MHz to 30 MHz			
Points of Application	Application Interface			
AC Mains	LISN			
EUT test mode	AC-Powerline			
Limits and results				
Frequency [MHz]	Quasi-Peak [dBµV]	Result	Average [dBµV]	Result
0.15 to 5	66 to 56*	PASS	56 to 46*	PASS
0.5 to 5	56	PASS	46	PASS
5 to 30	60	PASS	50	PASS
Comments: * Limit decreases linearly with the logarithm of the frequency.				

Conducted Emissions

EMI voltage test in the ac-mains according to FCC part 15B

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN/Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Handrik
Test Conditions:	Tnom: 22°C, Unom: 3,3 V DC
LISN:	ESH2-Z5 L
Mode:	WLAN 2.4GHz active
Test Date:	2012-12-07
Note:	

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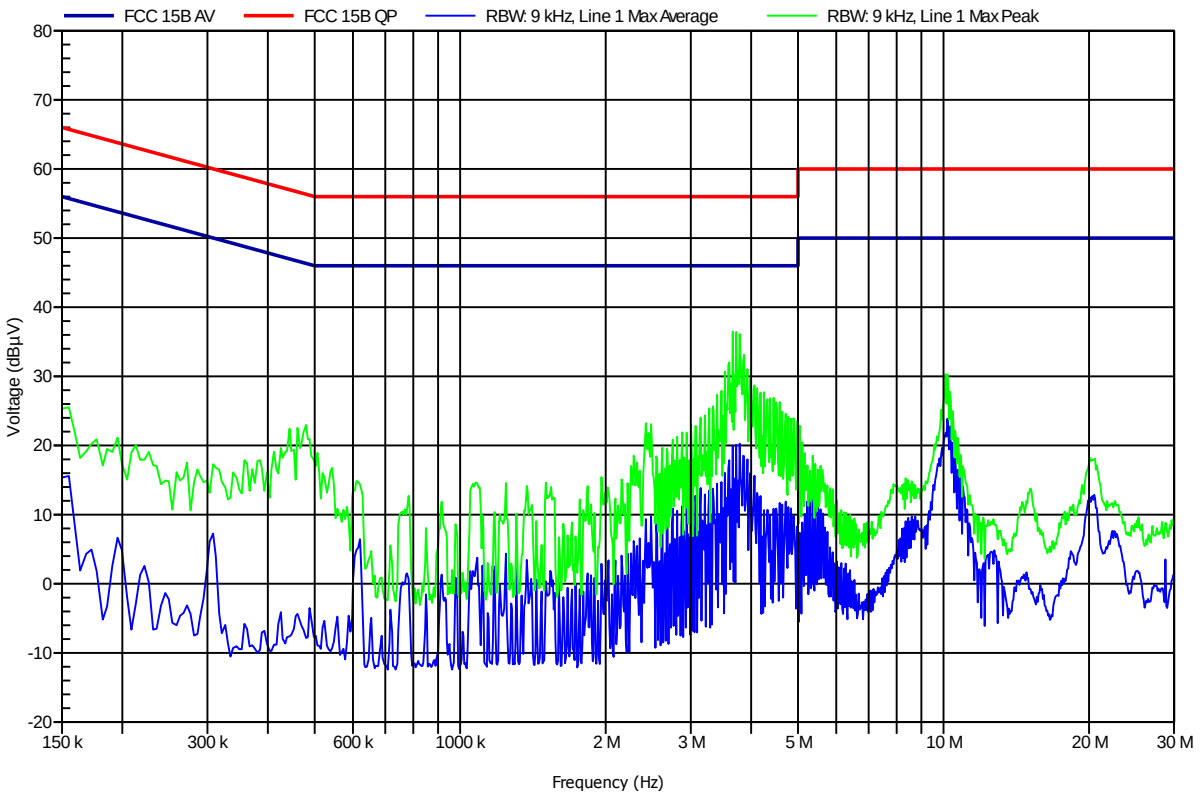

Conducted Emissions

EMI voltage test in the ac-mains according to FCC part 15B

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN/Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Handrik
Test Conditions:	Tnom: 22°C, Unom: 3,3 V DC
LISN:	ESH2-Z5 N
Mode:	WLAN 2.4GHz active
Test Date:	2012-12-07
Note:	

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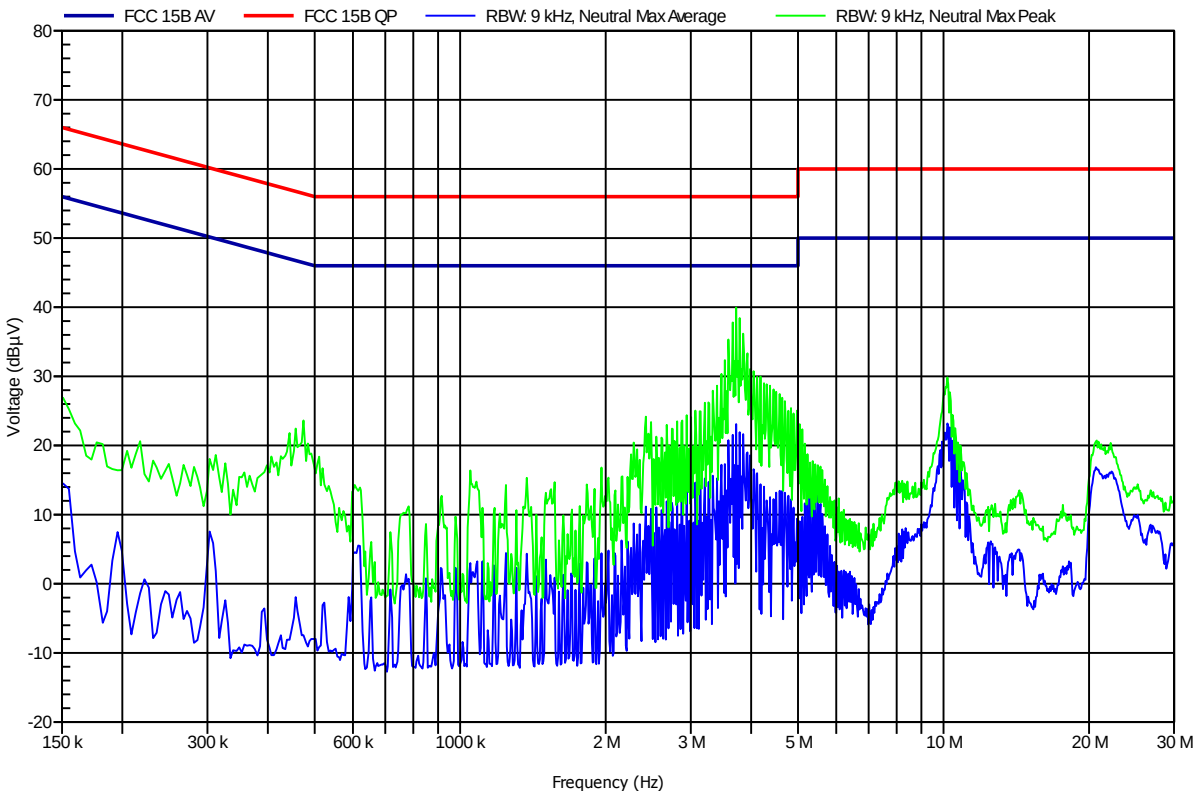


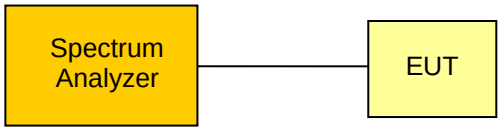
3.6 Test Conditions and Results – Band edge compliance

Band-edge compliance acc. FCC 15.247 / IC RSS-210	**Verdict: PASS**
EUT requirement rule parts and clause	Reference
	FCC 15.247(d) / IC RSS-210 A8.5
Test according to measurement reference	Reference Method
	FCC KDB Publication No. 558074
Test frequency range	Tested frequencies
	F_{LOW} / F_{HIGH}
Measurement mode	Peak

Limits

Limit	Condition
≤ -20 dB / 100 kHz	Peak power measurement detector = Peak
≤ -30 dB / 100 kHz	Peak power measurement detector = RMS

Test setup



Test procedure

1. EUT set to test mode (Communication tester is used if needed)
2. Span set around lower band edge and detector is set to peak and max hold
3. Resolution bandwidth is set to 100 kHz
4. Markers are set to peak emission levels within frequency band and outside frequency band
5. Band edge attenuation is determined from level difference

Test results

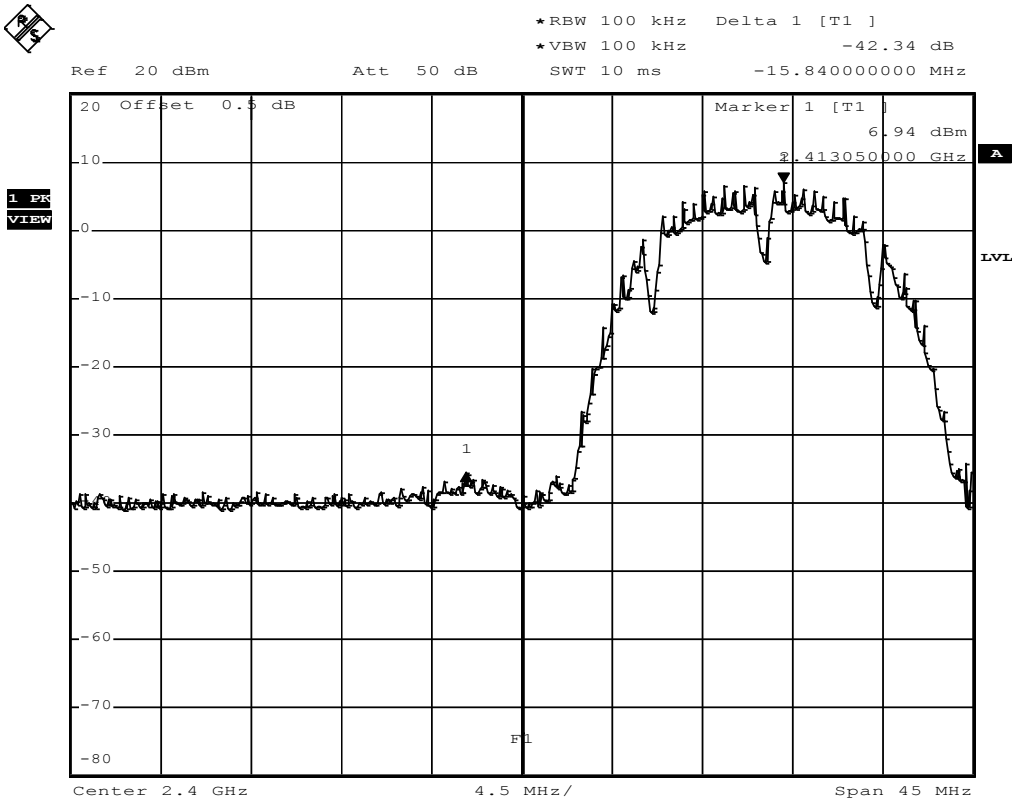
Channel	Frequency [MHz]	Mode	Level [dBc]	Limit [dBc]	Margin [dB]
F_{LOW}	2412	DSSS	-42.34	-20	-22.34
F_{HIGH}	2462	DSSS	-45.44	-20	-25.44
F_{LOW}	2412	OFDM	-36.30	-20	-16.30
F_{HIGH}	2462	OFDM	-40.31	-20	-20.31
F_{LOW}	2412	HT20	-33.41	-20	-13.41
F_{HIGH}	2462	HT20	-40.12	-20	-20.12
F_{LOW}	2422	HT40	-34.37	-20	-14.37
F_{HIGH}	2452	HT40	-35.50	-20	-15.50

Comments:

Band-edge compliance – DSSS F_{LOW}

FCC part 15.247
Band-edge compliance of RF conducted emissions

EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15 section 247(c)
Comment 1	Band-edge compliance
Comment 2	Channel.: 2412 MHz
Comment 3	DSSS, 1Mbit/s, power level 17

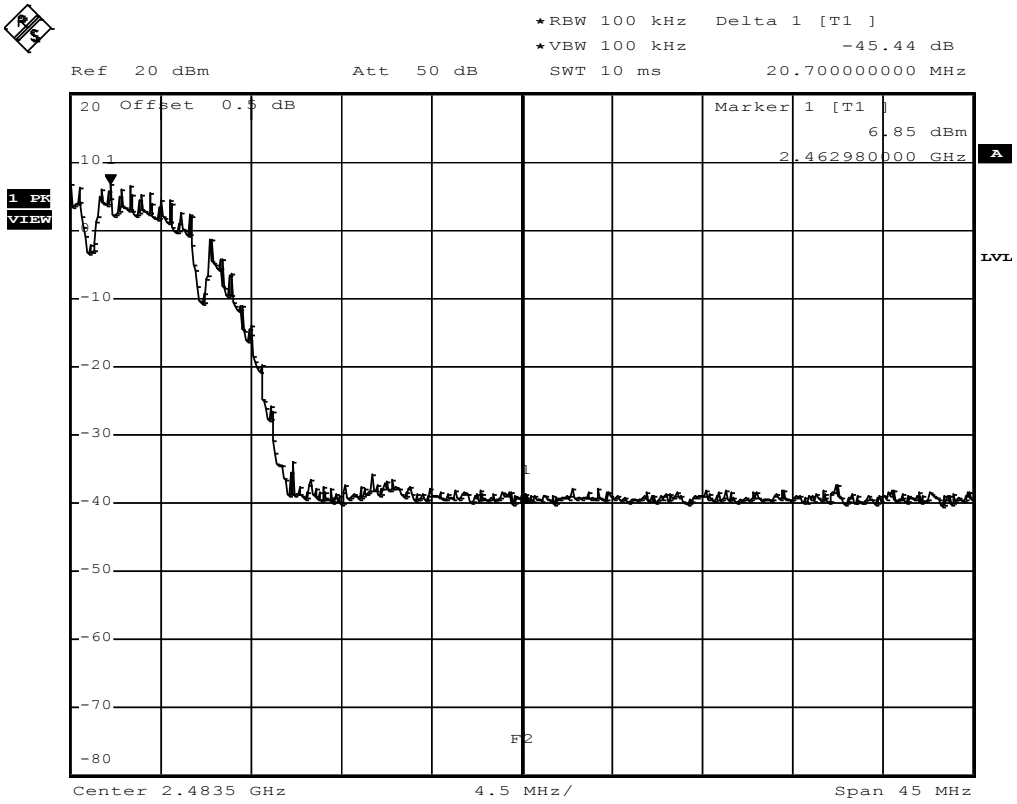


Comment: Limit: Marker Delta value >20 dB; Result: PASS
Date: 30.NOV.2012 14:32:13

Band-edge compliance – DSSS F_{HIGH}

FCC part 15.247
Band-edge compliance of RF conducted emissions

EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15 section 247(c)
Comment 1	Band-edge compliance
Comment 2	Channel.: 2462 MHz
Comment 3	DSSS, 1Mbit/s, power level 17

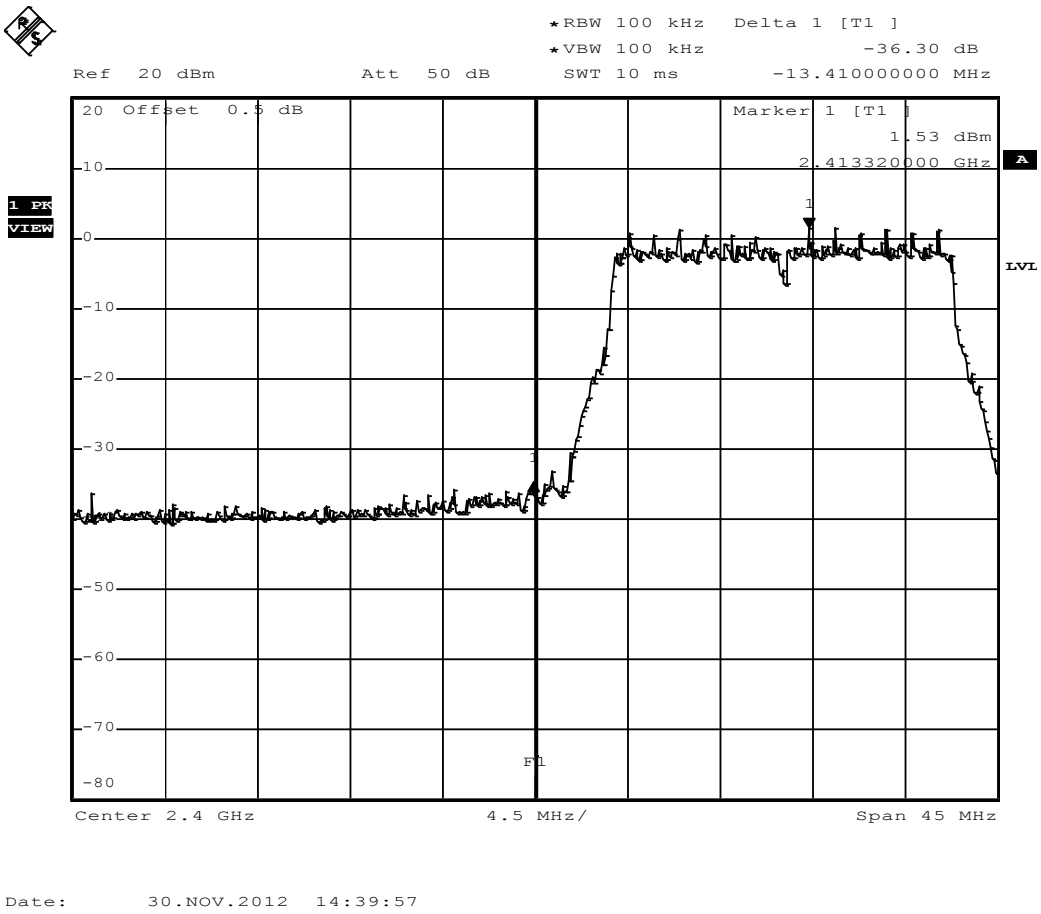


Comment: Limit: Marker Delta value >20 dB; Result: PASS
Date: 30.NOV.2012 14:36:33

Band-edge compliance – OFDM F_{LOW}

FCC part 15.247
Band-edge compliance of RF conducted emissions

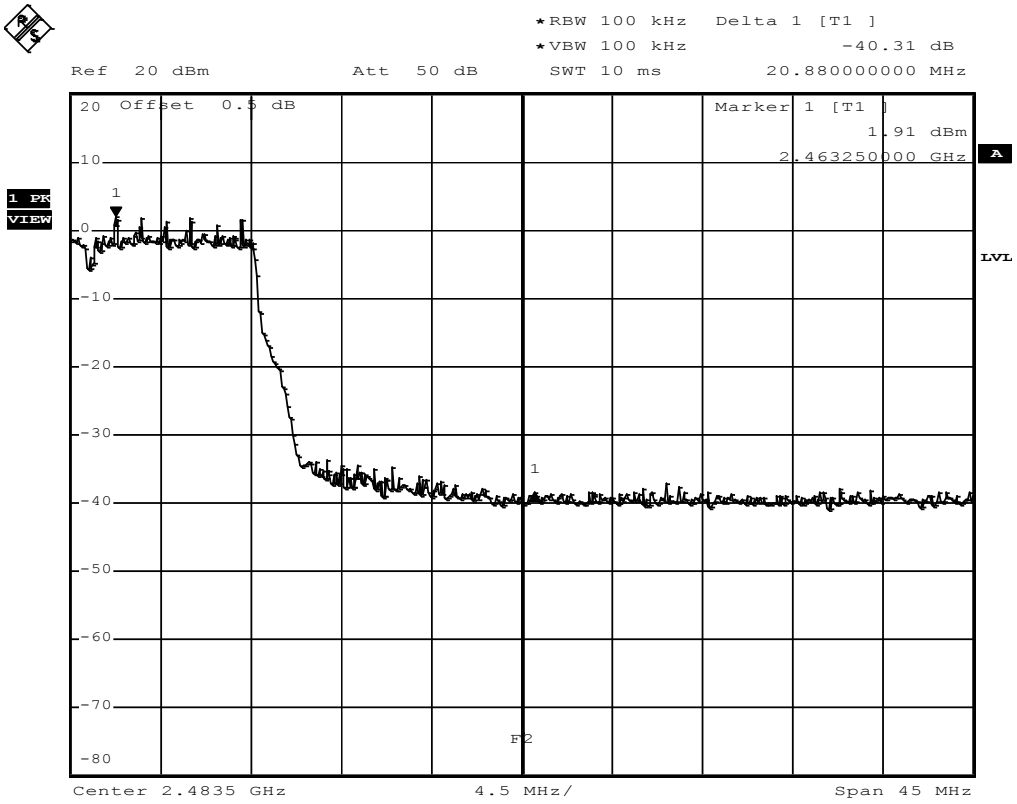
EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15 section 247(c)
Comment 1	Band-edge compliance
Comment 2	Channel.: 2412 MHz
Comment 3	OFDM, 6Mbit/s, power level 15



Band-edge compliance – OFDM F_{HIGH}

FCC part 15.247
Band-edge compliance of RF conducted emissions

EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15 section 247(c)
Comment 1	Band-edge compliance
Comment 2	Channel.: 2462 MHz
Comment 3	OFDM, 6Mbit/s, power level 15

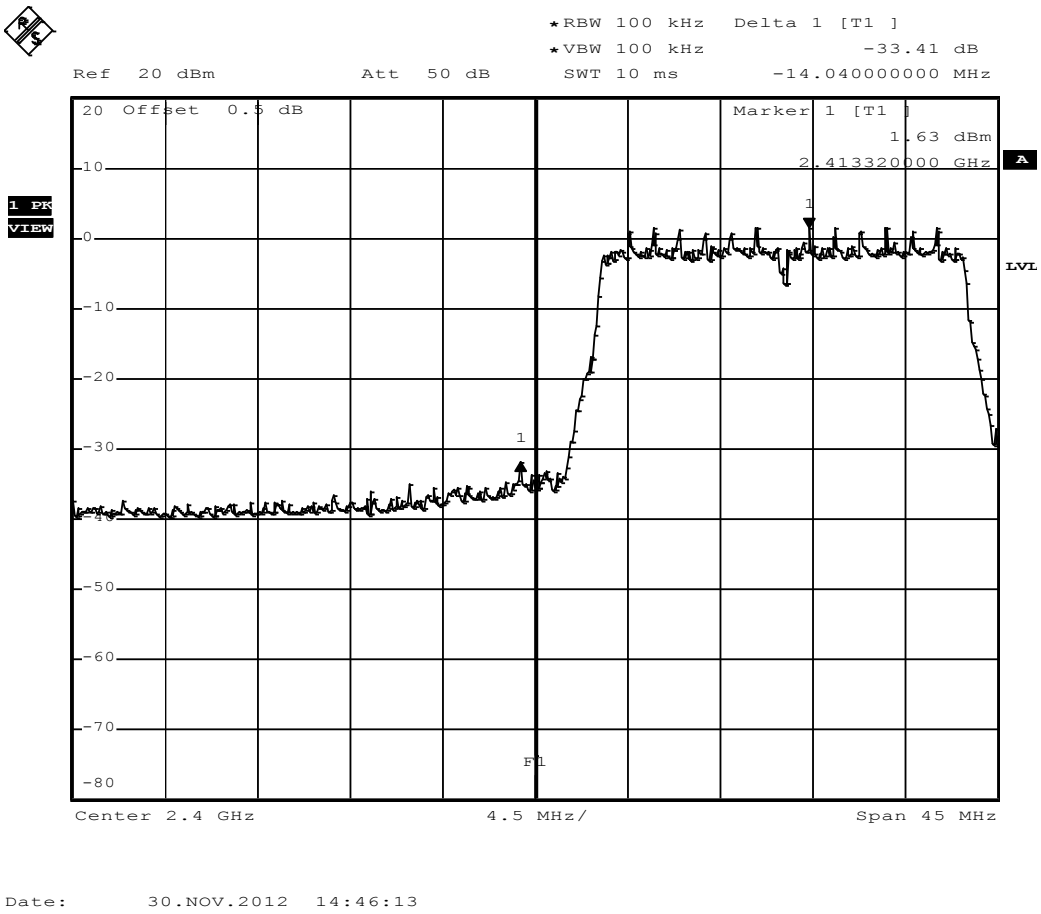


Comment: Limit: Marker Delta value >20 dB; Result: PASS
Date: 30.NOV.2012 14:42:25

Band-edge compliance – HT20 F_{LOW}

FCC part 15.247
Band-edge compliance of RF conducted emissions

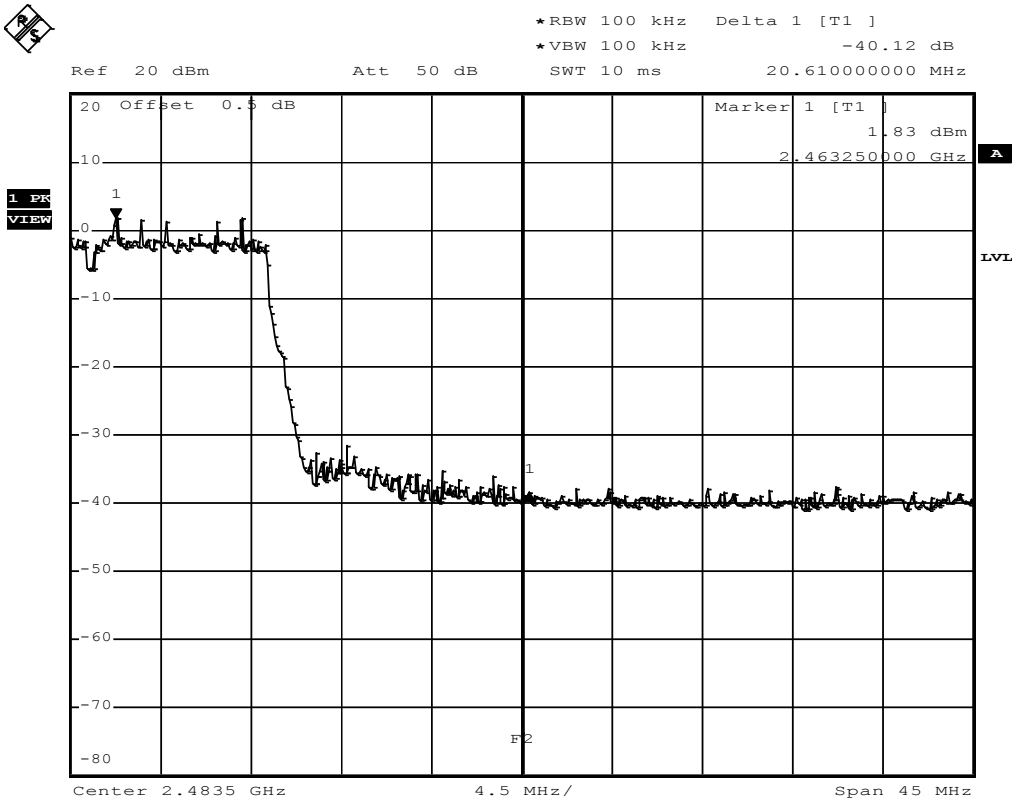
EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15 section 247(c)
Comment 1	Band-edge compliance
Comment 2	Channel.: 2412 MHz
Comment 3	HT20, MCS0, power level 15



Band-edge compliance – HT20 F_{HIGH}

FCC part 15.247
Band-edge compliance of RF conducted emissions

EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15 section 247(c)
Comment 1	Band-edge compliance
Comment 2	Channel.: 2462 MHz
Comment 3	HT20, MCS0, power level 15

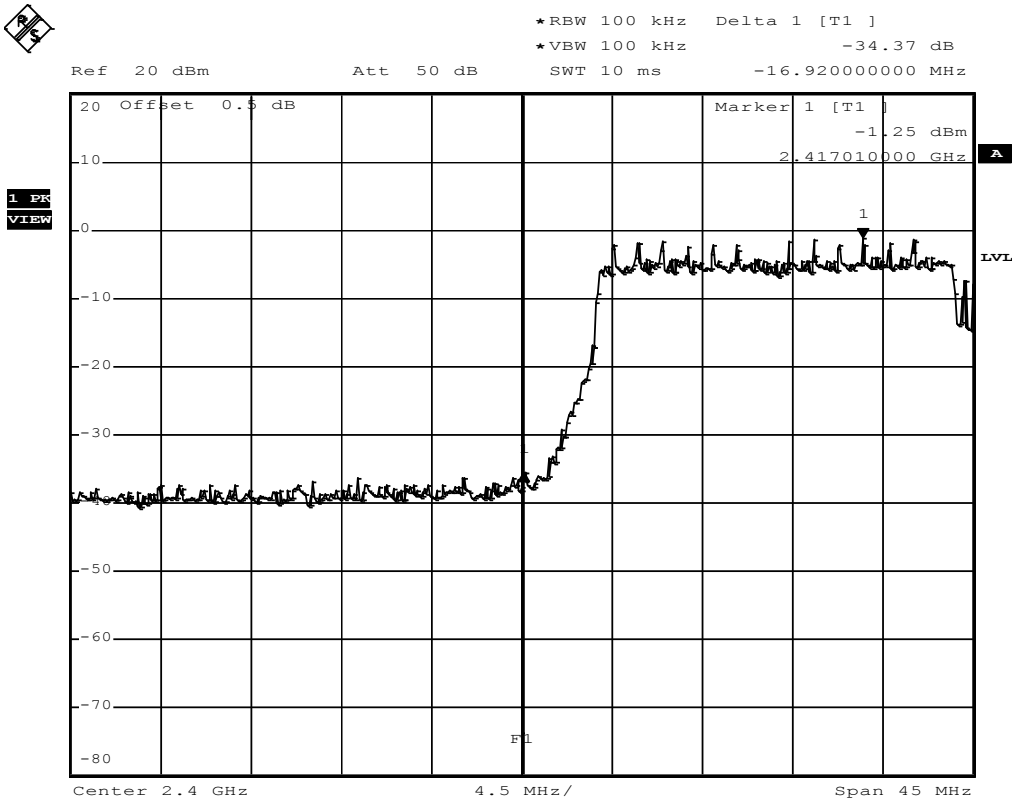


Comment: Limit: Marker Delta value >20 dB; Result: PASS
Date: 30.NOV.2012 14:48:29

Band-edge compliance – HT40 F_{LOW}

FCC part 15.247
Band-edge compliance of RF conducted emissions

EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15 section 247(c)
Comment 1	Band-edge compliance
Comment 2	Channel.: 2422 MHz
Comment 3	HT40, MCS0, power level 15

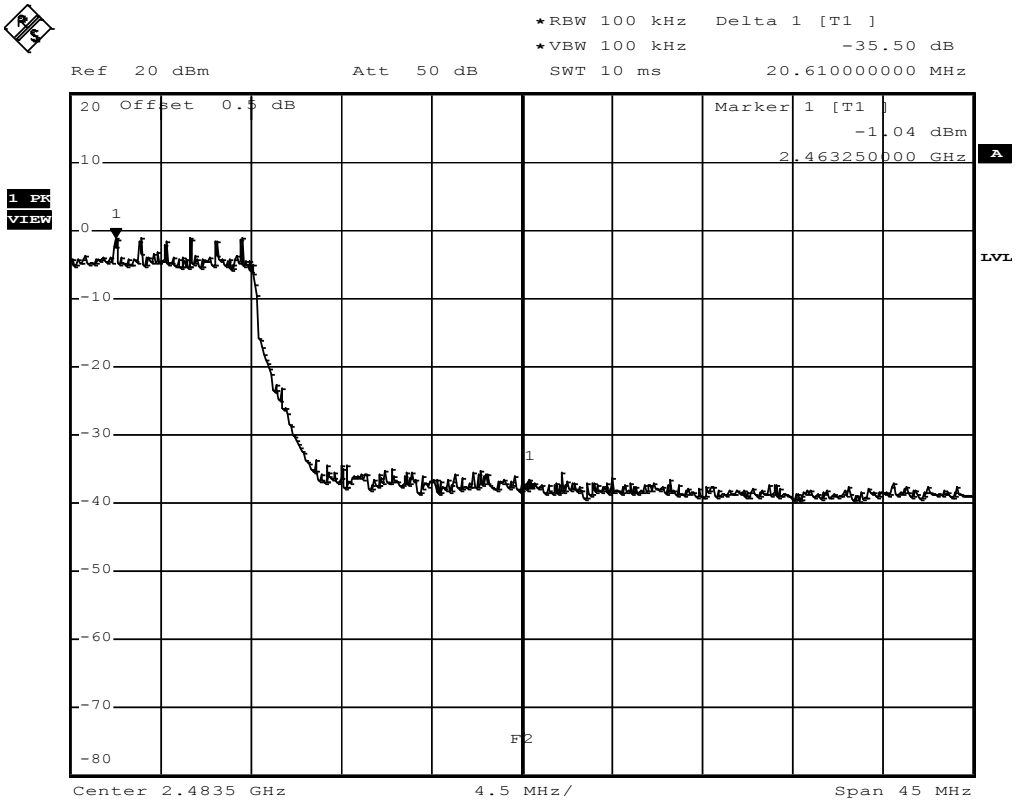


Comment: Limit: Marker Delta value >20 dB; Result: PASS
Date: 30.NOV.2012 14:51:09

Band-edge compliance – HT40 F_{HIGH}

FCC part 15.247
Band-edge compliance of RF conducted emissions

EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15 section 247(c)
Comment 1	Band-edge compliance
Comment 2	Channel.: 2452 MHz
Comment 3	HT40, MCS0, power level 15



Comment: Limit: Marker Delta value >20 dB; Result: PASS
Date: 30.NOV.2012 15:00:14

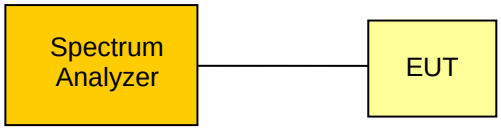
3.7 Test Conditions and Results – Conducted spurious emissions

Conducted spurious emissions acc. FCC 15.247 / IC RSS-210	**Verdict: PASS**
EUT requirement rule parts and clause	Reference
	FCC 15.247(d) / IC RSS-210 A8.5
Test according to measurement reference	Reference Method
	FCC KDB Publication No. 558074
Test frequency range	Tested frequencies
	10 MHz – 10th Harmonic
Measurement mode	Peak

Limits

Limit	Condition
≤ -20 dB / 100 kHz	Peak power measurement detector = Peak
≤ -30 dB /100 kHz	Peak power measurement detector = RMS

Test setup



Test procedure

1. EUT set to test mode (Communication tester is used if needed)
2. Span it set according to measurement range
3. Resolution bandwidth is set to 100 kHz and detector to peak and max hold
4. Markers are set to peak emission levels within frequency band
5. Emission level is determined by second marker on emission peak
6. Attenuation is determined from level difference

Test results

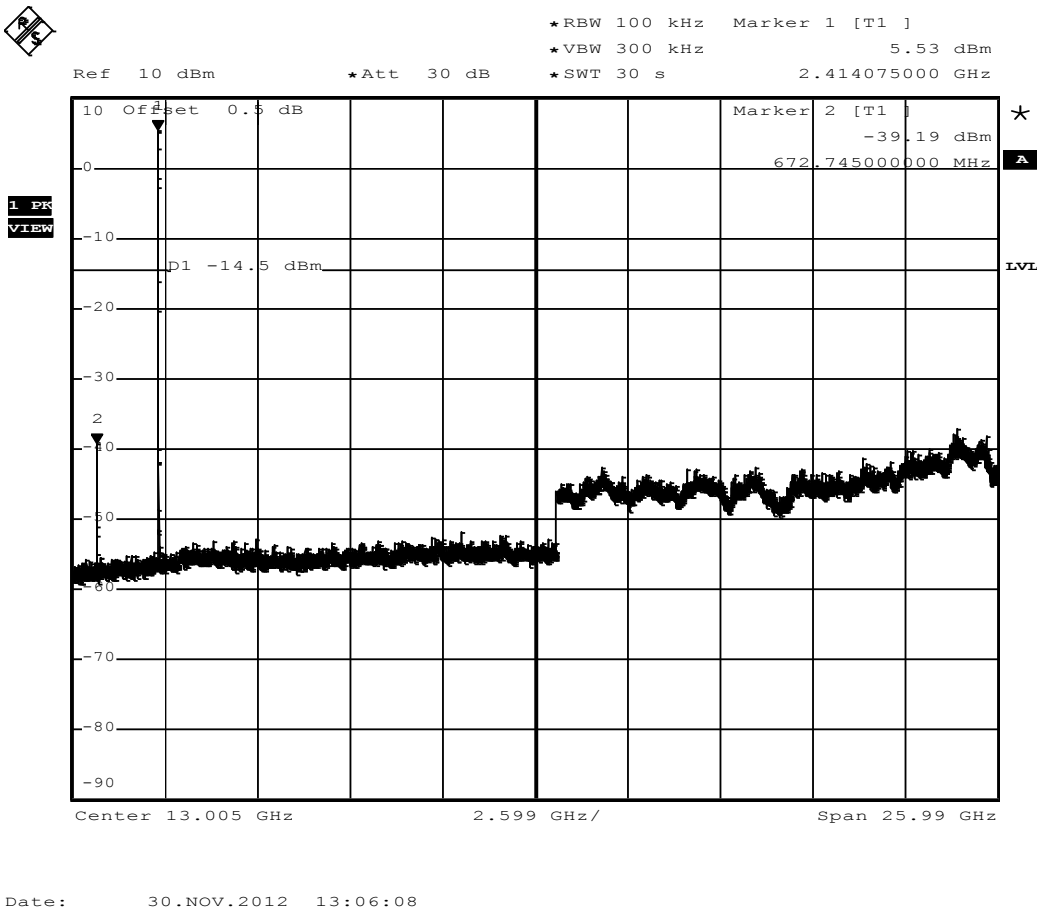
Channel	Frequency [MHz]	Mode	Emission [MHz]	Emission Level [dbm]	Peak power [dBm]	Limit [dBm]	Margin [dB]
F_{LOW}	2412	DSSS	672.745	-39.19	5.53	-14.50	-24.69
F_{MID}	2437	DSSS	698.735	-38.77	5.34	-14.7	-24.07
F_{HIGH}	2462	DSSS	721.476	-39.54	6.8	-13.2	-26.34
OFDM no significant conducted spurious emissions							
HT20 no significant conducted spurious emissions							
HT40 no significant conducted spurious emissions							

Comments:

Conducted spurious emissions – DSSS F_{LOW}

FCC part 15.247 (d)
Spurious Emissions

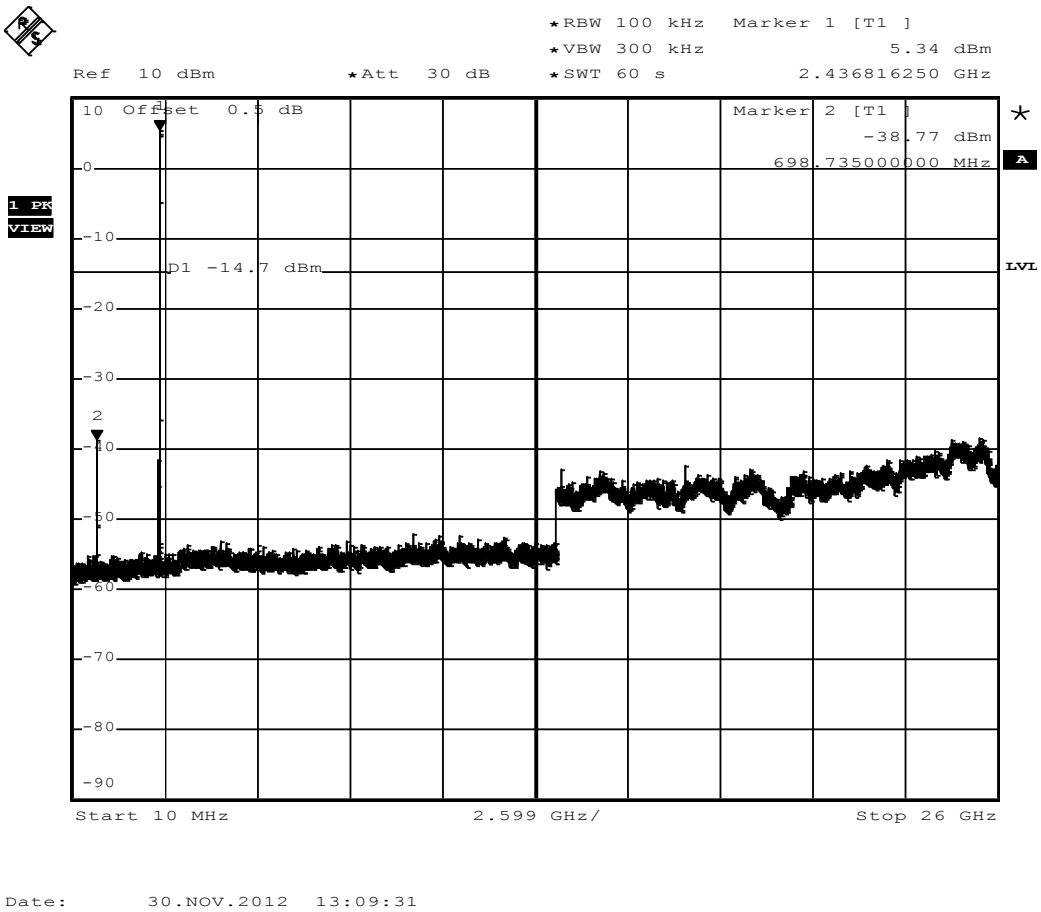
EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15.247 (d)
Comment 1	Spurious Emissions conducted
Comment 2	Channel : 2412 MHz
Comment 3	DSSS / 1 MBit/s / power level 17



Conducted spurious emissions – DSSS F_{MID}

FCC part 15.247 (d)
Spurious Emissions

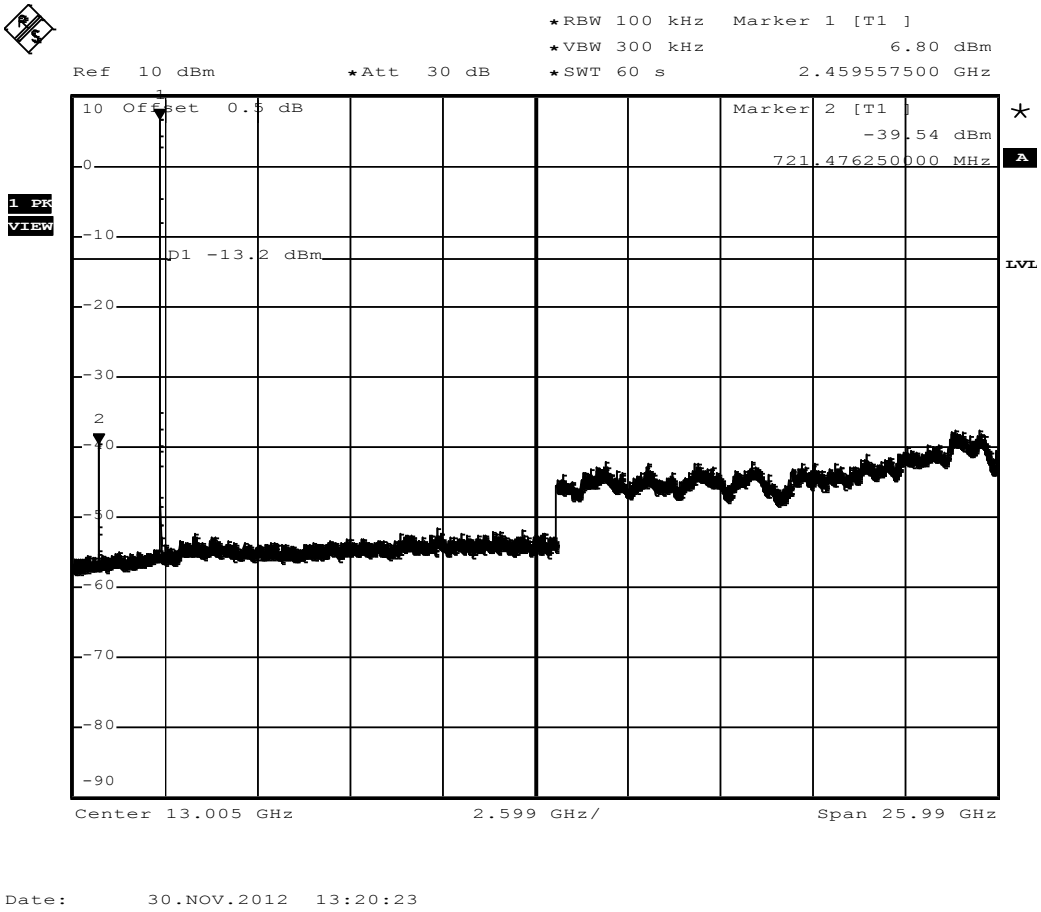
EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15.247 (d)
Comment 1	Spurious Emissions conducted
Comment 2	Channel : 2437 MHz
Comment 3	DSSS / 1 MBit/s / power level 17



Conducted spurious emissions – DSSS F_{HIGH}

FCC part 15.247 (d)
Spurious Emissions

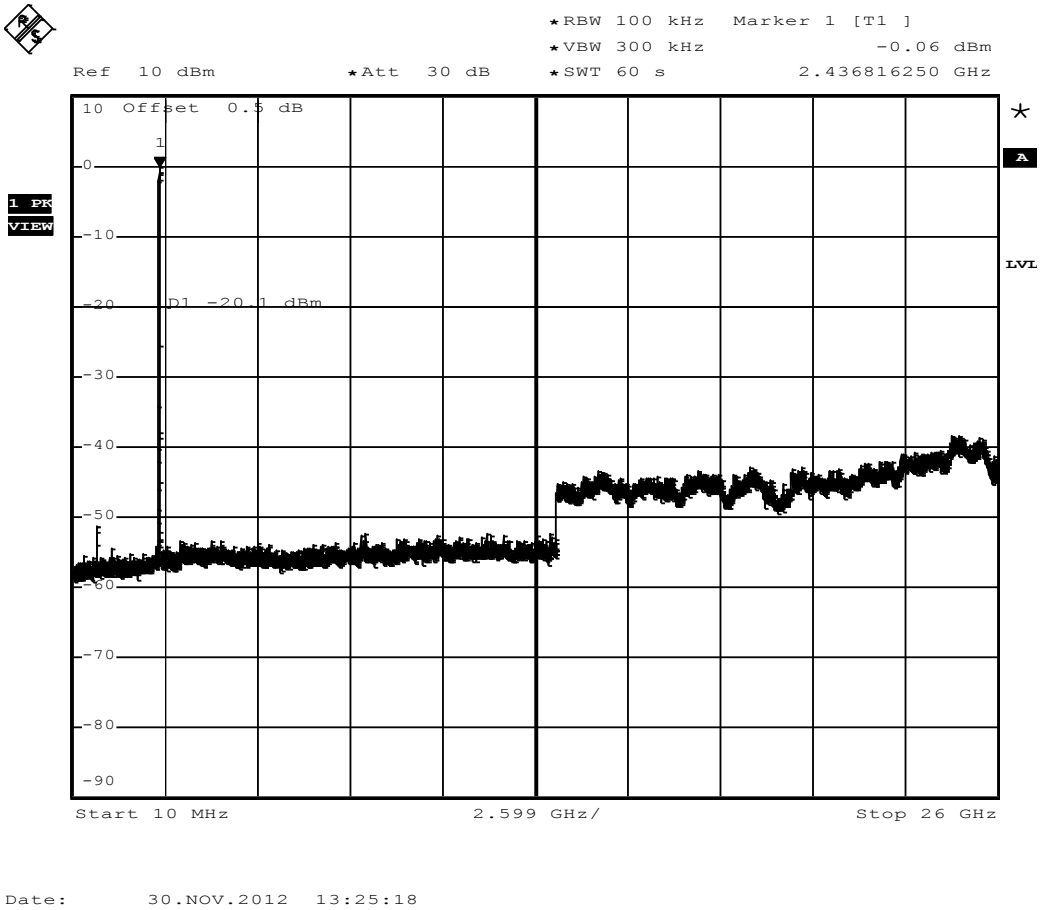
EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15.247 (d)
Comment 1	Spurious Emissions conducted
Comment 2	Channel : 2462 MHz
Comment 3	DSSS / 1 MBit/s / power level 17



Conducted spurious emissions – OFDM F_{LOW}

FCC part 15.247 (d)
Spurious Emissions

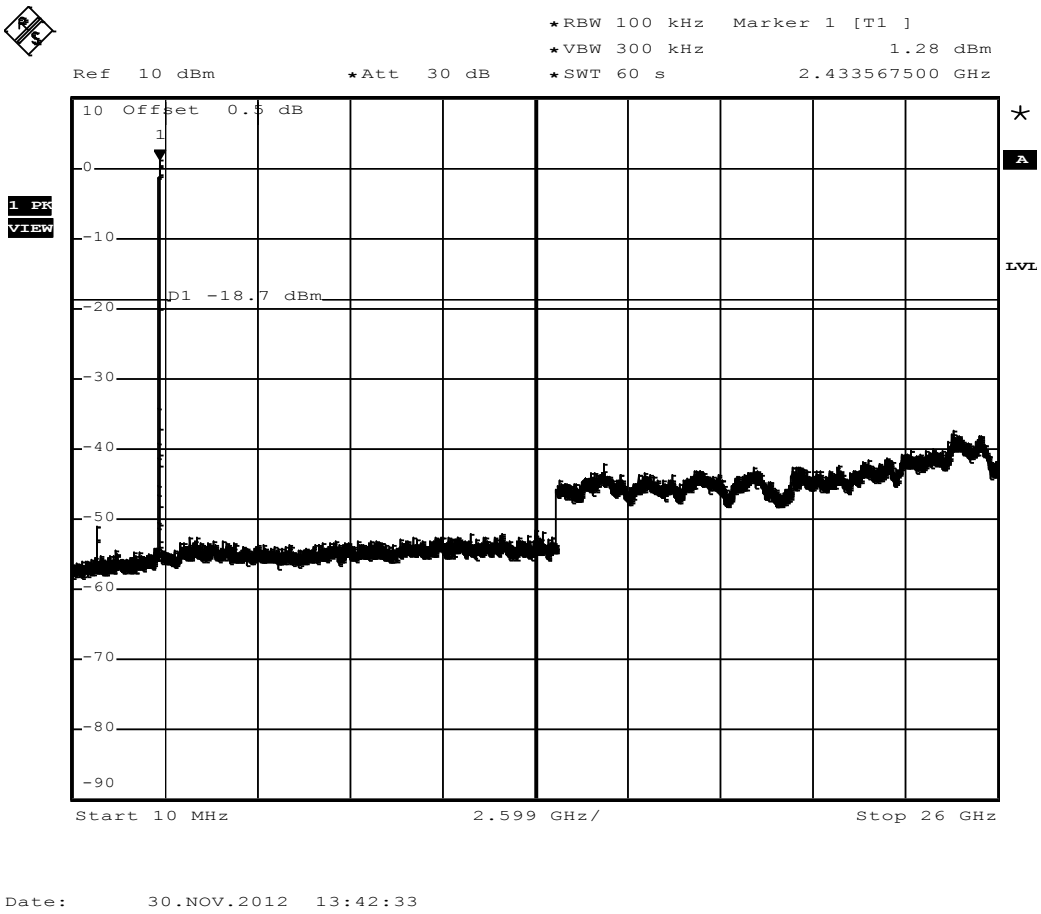
EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15.247 (d)
Comment 1	Spurious Emissions conducted
Comment 2	Channel : 2412 MHz
Comment 3	OFDM / 6 MBit/s / power level 15



Conducted spurious emissions – OFDM F_{MID}

FCC part 15.247 (d)
Spurious Emissions

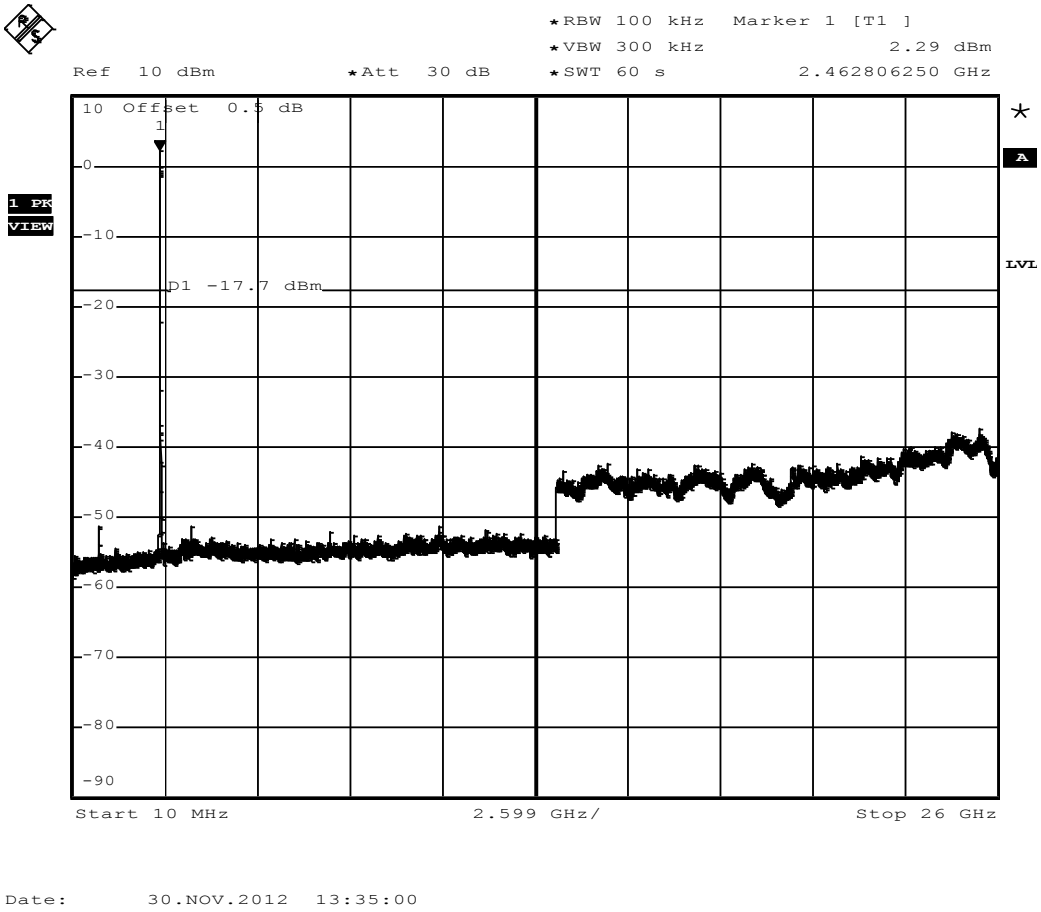
EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15.247 (d)
Comment 1	Spurious Emissions conducted
Comment 2	Channel : 2437 MHz
Comment 3	OFDM / 6 MBit/s / power level 15



Conducted spurious emissions – OFDM F_{HIGH}

FCC part 15.247 (d)
Spurious Emissions

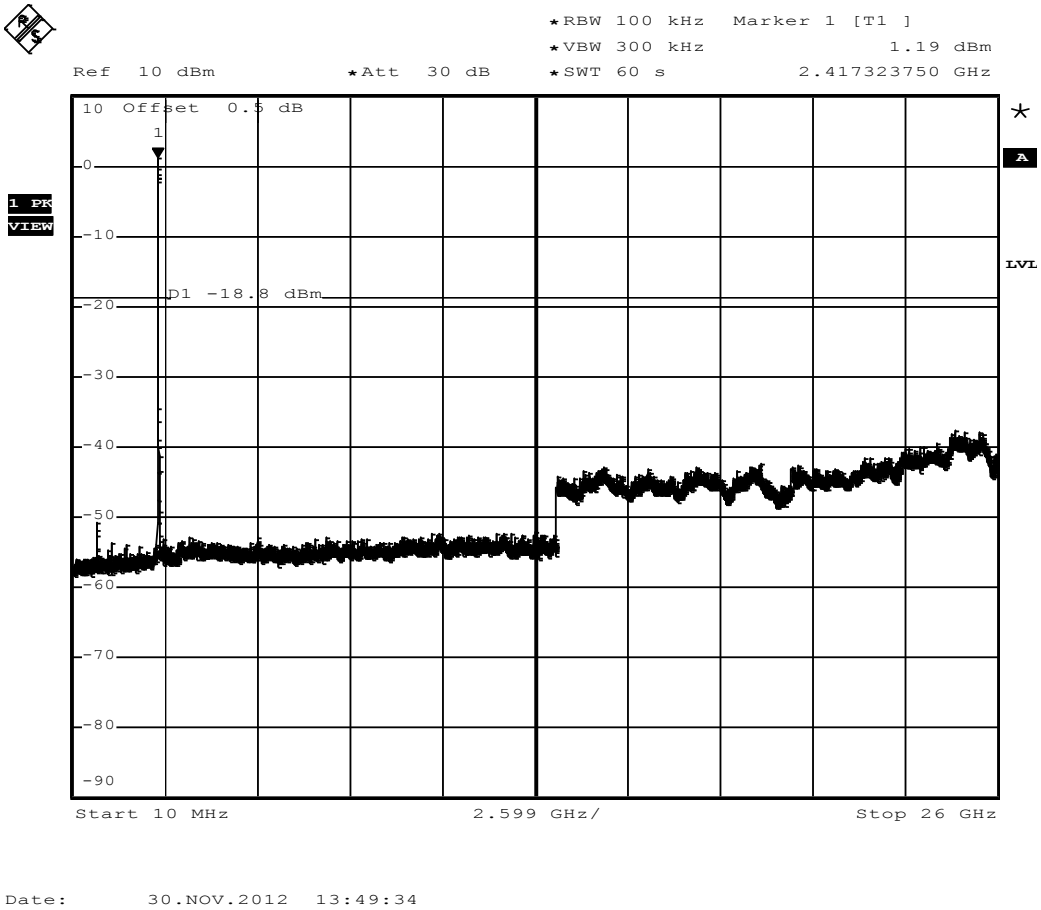
EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15.247 (d)
Comment 1	Spurious Emissions conducted
Comment 2	Channel : 2462 MHz
Comment 3	OFDM / 6 MBit/s / power level 15



Conducted spurious emissions – HT20 F_{LOW}

FCC part 15.247 (d)
Spurious Emissions

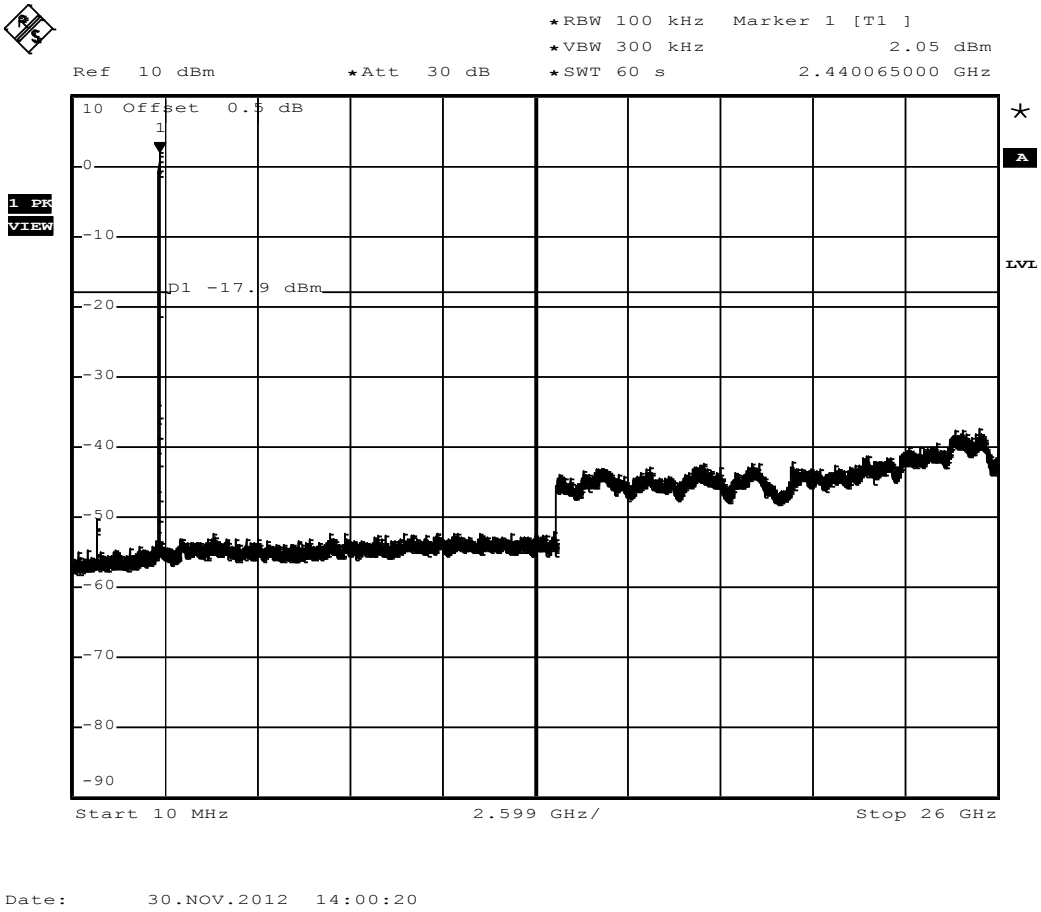
EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15.247 (d)
Comment 1	Spurious Emissions conducted
Comment 2	Channel : 2412 MHz
Comment 3	HT20 / MCS0 / power level 15



Conducted spurious emissions – HT20 F_{MID}

FCC part 15.247 (d)
Spurious Emissions

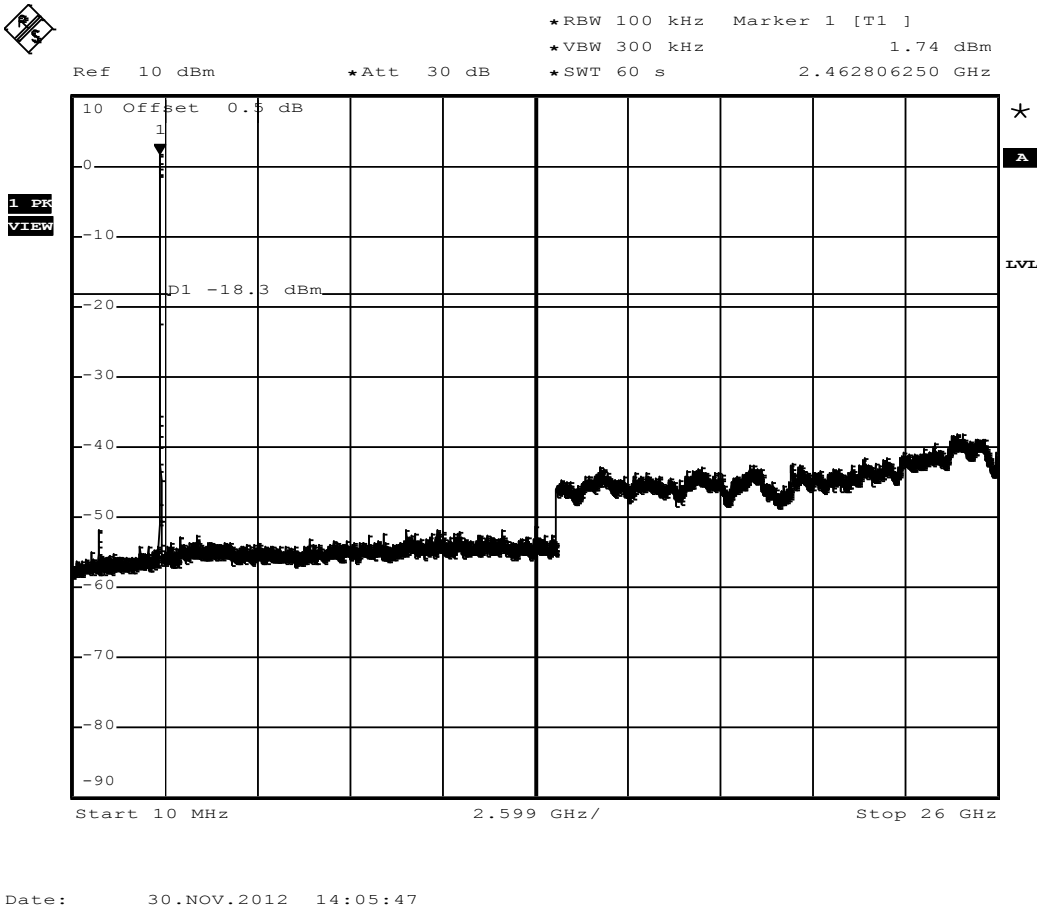
EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15.247 (d)
Comment 1	Spurious Emissions conducted
Comment 2	Channel : 2437 MHz
Comment 3	HT20 / MCS0 / power level 15



Conducted spurious emissions – HT20 F_{HIGH}

FCC part 15.247 (d)
Spurious Emissions

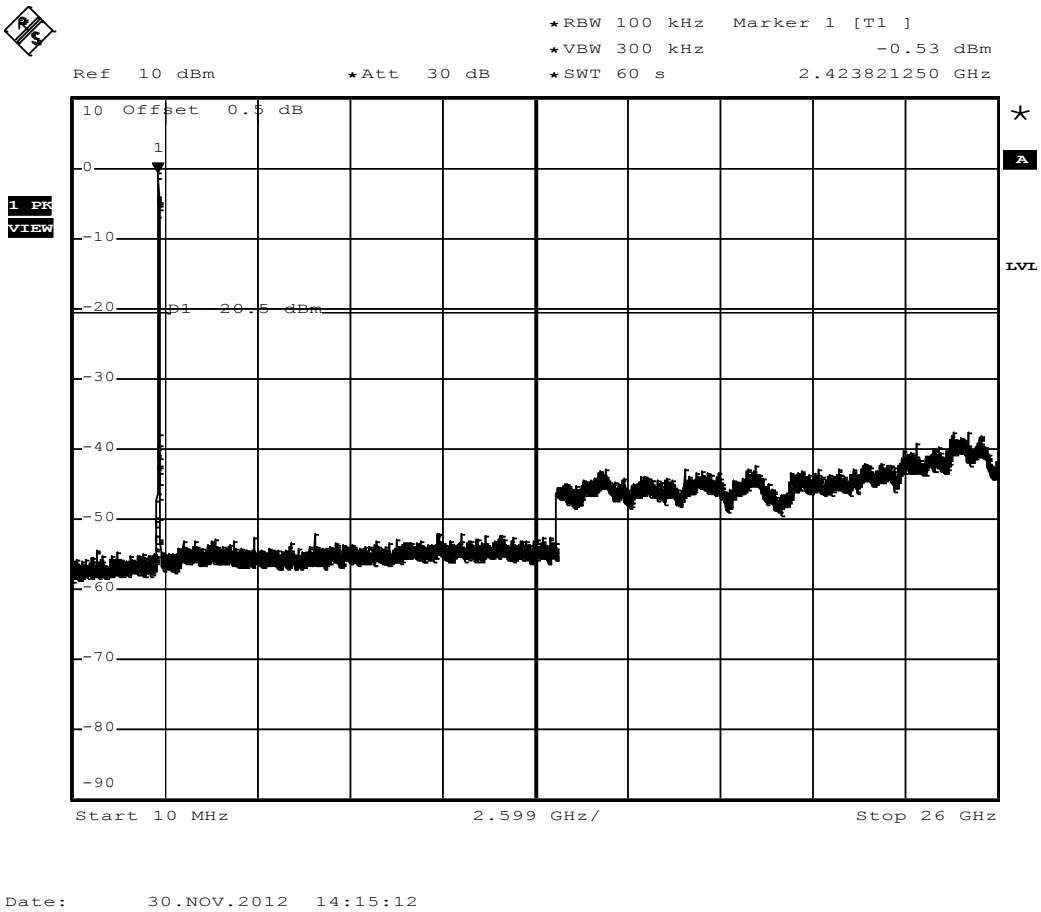
EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15.247 (d)
Comment 1	Spurious Emissions conducted
Comment 2	Channel : 2462 MHz
Comment 3	HT20 / MCS0 / power level 15



Conducted spurious emissions – HT40 F_{LOW}

FCC part 15.247 (d)
Spurious Emissions

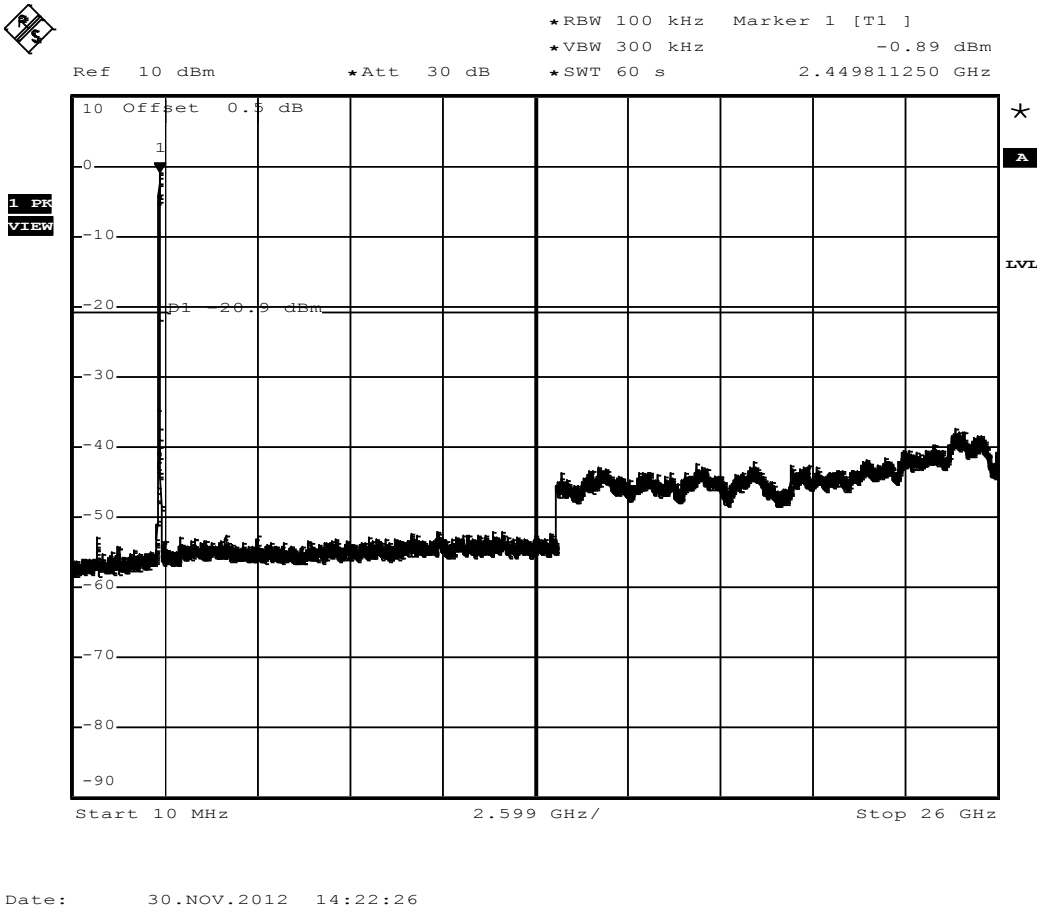
EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15.247 (d)
Comment 1	Spurious Emissions conducted
Comment 2	Channel : 2422 MHz
Comment 3	HT40 / MCS0 / power level 15



Conducted spurious emissions – HT40 F_{MID}

FCC part 15.247 (d)
Spurious Emissions

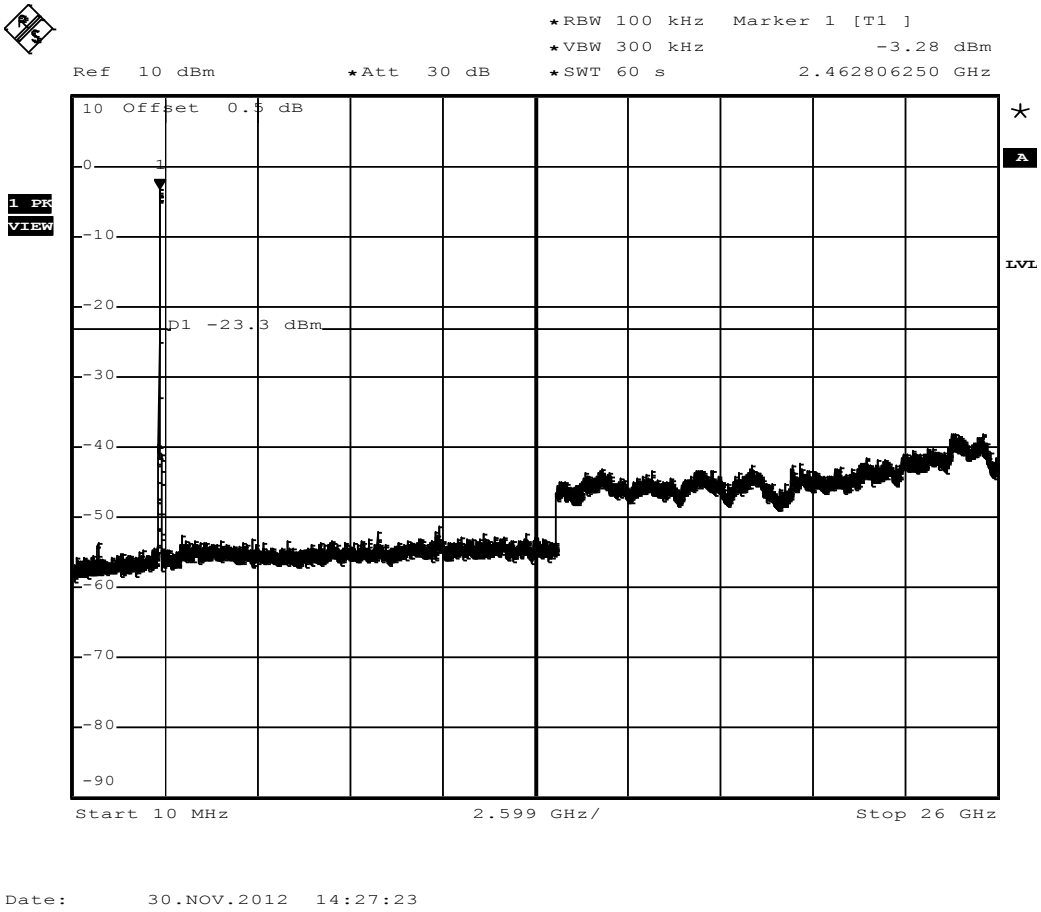
EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15.247 (d)
Comment 1	Spurious Emissions conducted
Comment 2	Channel : 2437 MHz
Comment 3	HT40 / MCS0 / power level 15



Conducted spurious emissions – HT40 F_{HIGH}

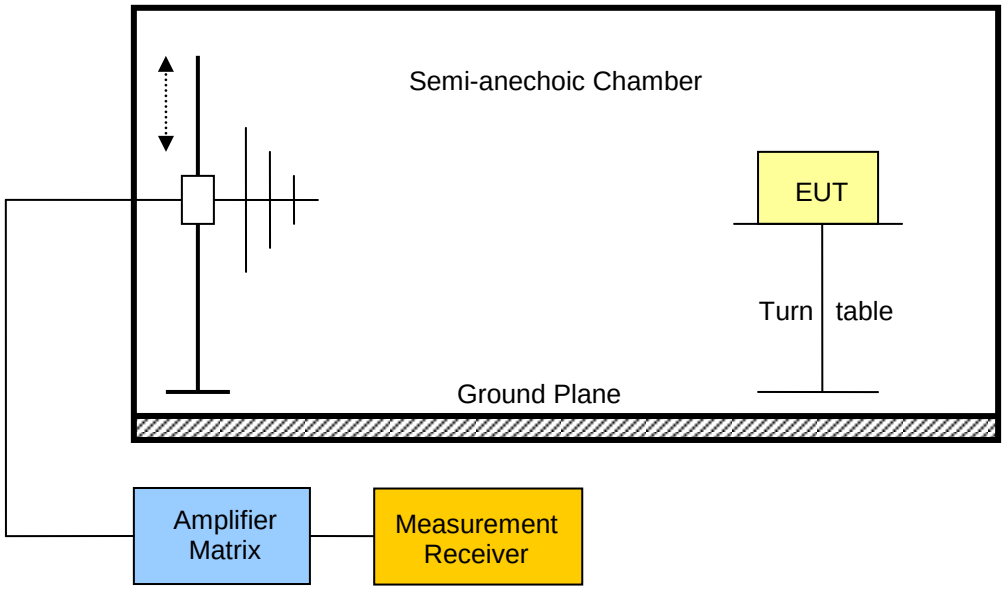
FCC part 15.247 (d)
Spurious Emissions

EUT	WLAN / Bluetooth module
Model	WiBear11n-SF1
Approval Holder	lesswire AG / Ord.: G0M-1211-2443
Temperature / Voltage	25°C, Vnom
Test Site / Operator	Eurofins Product Service GmbH, Mr. Treffke
Test Specification	FCC part 15.247 (d)
Comment 1	Spurious Emissions conducted
Comment 2	Channel : 2452 MHz
Comment 3	HT40 / MCS0 / power level 15



3.8 Test Conditions and Results – Transmitter radiated emissions

Transmitter radiated emissions acc. FCC 47 CFR 15.247 / IC RSS-210				**Verdict: PASS**
Test according referenced standards		Reference Method		
		FCC 15.247(d) / IC RSS-210 A8.5		
Test according to measurement reference		Reference Method		
		FCC KDB Publication No. 558074 / ANSI C63.4		
Test frequency range		Tested frequencies		
		30 MHz – 10th Harmonic		
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
Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)). When average radiated emission measurements are specified, including average emission measurements below 1000 MHz, there also is a limit on the peak level of the radio frequency emissions. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test.				
Test setup				



Test procedure
1. EUT set to test mode (Communication tester is used if needed) 2. Span it set according to measurement range 3. Resolution bandwidth below 1 GHz is set according to CISPR 16 with peak/quasi-peak detector and RBW of 1 MHz with peak/average detector is used above 1 GHz 4. Markers are set to peak emission levels within restricted bands

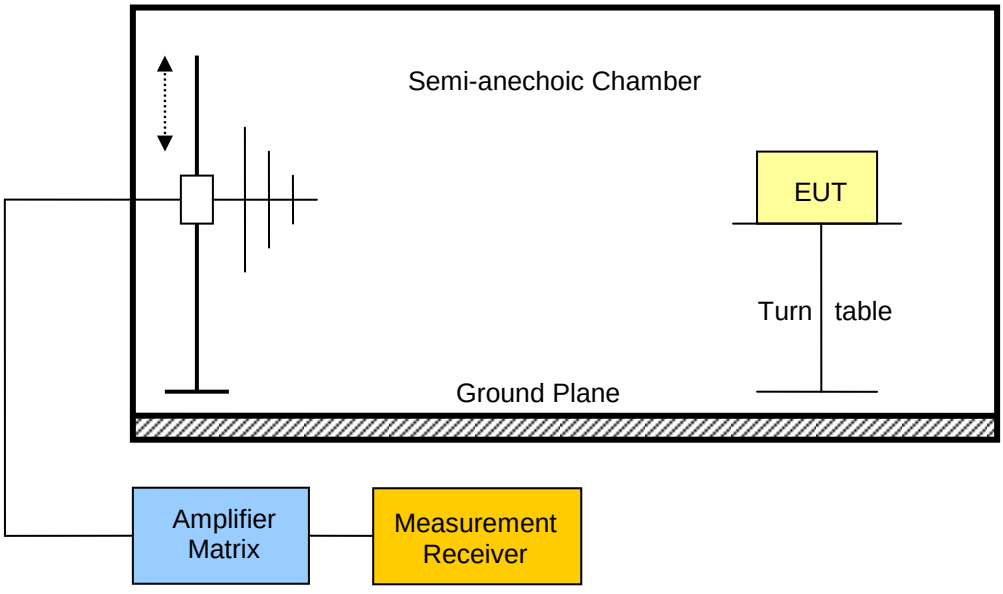
Test results – Internal Antenna

Channel	Frequency [MHz]	Mode	Emission [MHz]	Level [dbµV/m]	Det.	Pol.	Limit [dbµV/m]	Limit dist. [m]*	Margin [dB]
F_{LOW}	2412	DSSS	2387	51.96	pk	hor	74	3	-22.04
F_{LOW}	2412	DSSS	2387	42.90	avg	ver	54	3	-11.10
F_{LOW}	2412	HT20	2388	62.85	pk	hor	74	3	-11.15
F_{LOW}	2412	HT20	2388	38.84	avg	hor	54	3	-15.16
F_{LOW}	2412	HT20	2389	55.30	pk	ver	74.	3	-18.70
F_{LOW}	2412	HT20	2389	31.72	avg	ver	54	3	-22.28
F_{HIGH}	2462	HT20	2484	57.14	pk	hor	74	3	-16.86
F_{HIGH}	2462	HT20	2484	30.34	avg	hor	54	3	-23.66
F_{LOW}	2422	HT40	2383	63.00	pk	ver	74	3	-11.00
F_{LOW}	2422	HT40	2383	34.52	avg	ver	54	3	-19.48
F_{LOW}	2422	HT40	2387	70.96	pk	hor	74	3	-03.04
F_{LOW}	2422	HT40	2387	41.84	avg	hor	54	3	-12.16
F_{MID}	2441	HT40	2388	52.36	pk	ver	74	3	-21.64
F_{MID}	2441	HT40	2388	28.10	avg	ver	54	3	-25.90
F_{MID}	2441	HT40	2389	60.71	pk	hor	74	3	-13.29
F_{MID}	2441	HT40	2389	34.53	avg	hor	54	3	-19.47
F_{MID}	2441	HT40	2486	62.00	pk	hor	74	3	-12.00
F_{MID}	2441	HT40	2486	32.43	avg	hor	54	3	-21.57
F_{HIGH}	2452	HT40	2383	54.08	pk	hor	74	3	-19.92
F_{HIGH}	2452	HT40	2383	29.68	avg	hor	54	3	-24.32
F_{HIGH}	2452	HT40	2485	71.37	pk	hor	74	3	-02.63
F_{HIGH}	2452	HT40	2485	38.11	avg	hor	54	3	-15.89
F_{HIGH}	2452	HT40	2485	58.18	pk	ver	74	3	-15.82
F_{HIGH}	2452	HT40	2485	28.56	avg	ver	54	3	-25.44

Comments: * Physical distance between EUT and measurement antenna.

3.9 Test Conditions and Results – Receiver radiated emissions

Receiver radiated emissions acc. IC RSS-210				**Verdict: PASS**
Test according referenced standards	Reference Method			
	IC RSS-210 A8.5			
Test according to measurement reference	Reference Method			
	ANSI C63.4			
Test frequency range	Tested frequencies			
	30 MHz – 3th 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 1 GHz is set according to CISPR 16 with peak/quasi-peak detector and RBW of 1 MHz with peak/average detector is used above 1 GHz 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}	2437	33.054	35.48	59.43	pk	100	-40.57
F_{MID}	2437	33.054	34.85	55.27	pk	100	-44.73
F_{MID}	2437	596.008	26.26	20.56	pk	200	-179.44

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

ANNEX A Transmitter radiated spurious emissions

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	TX; DSSS, 1Mbit/s, ch.1
Test Date:	2012-11-29
Note:	

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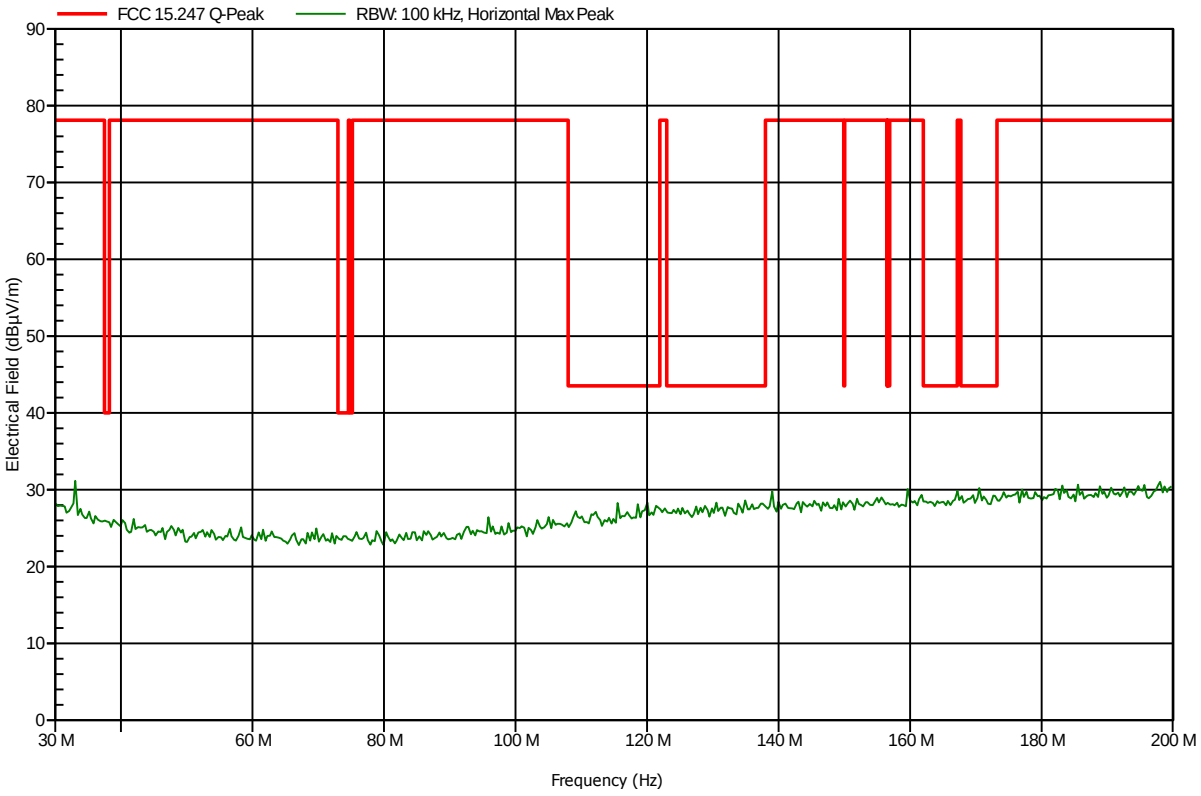

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3 m
Mode:	TX; DSSS, 1Mbit/s, ch.1
Test Date:	2012-11-29
Note:	worst case

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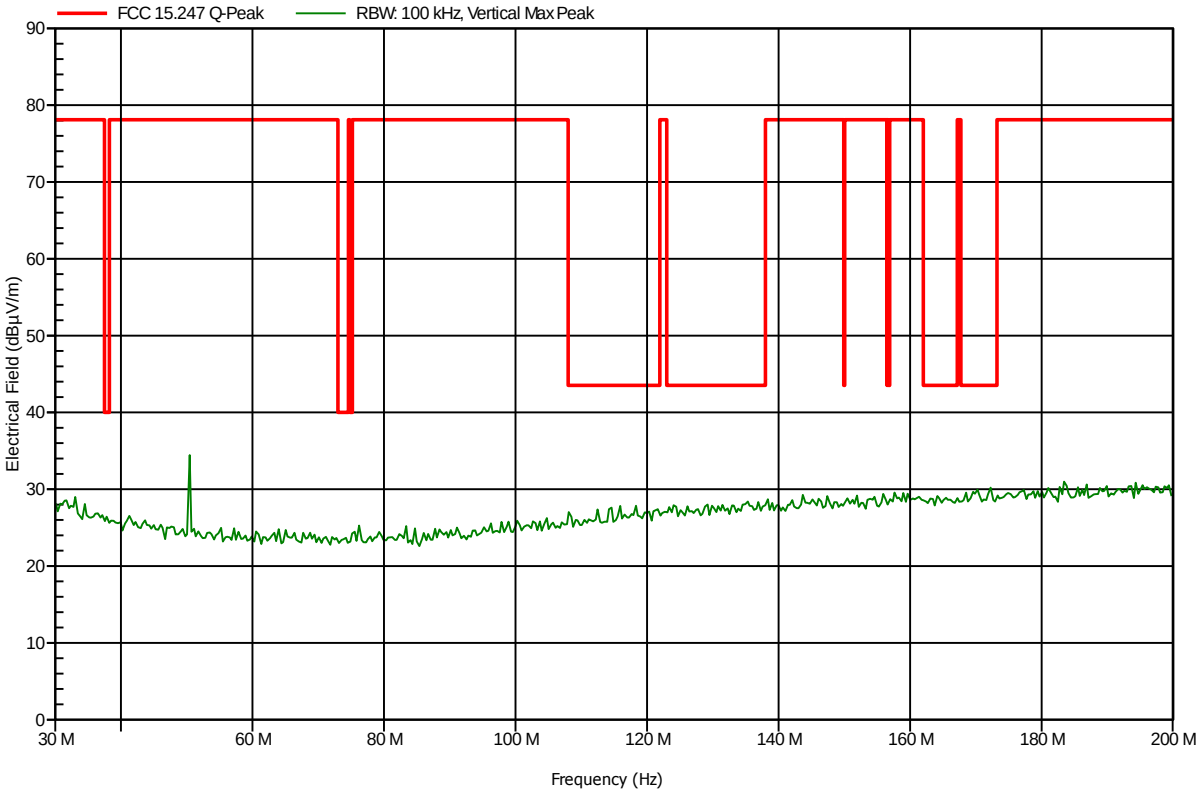

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	TX; DSSS, 1Mbit/s, ch.1
Test Date:	2012-11-29
Note:	

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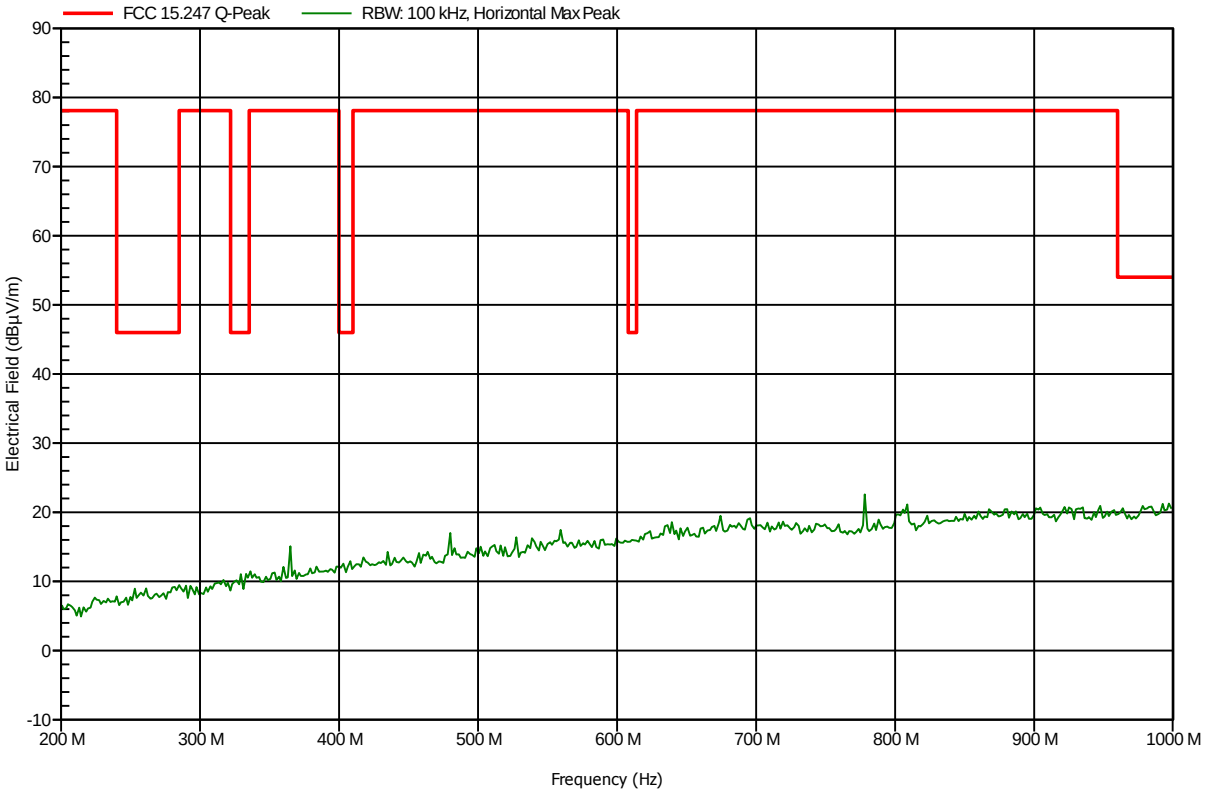

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	TX; DSSS, 1Mbit/s, ch.1
Test Date:	2012-11-29
Note:	

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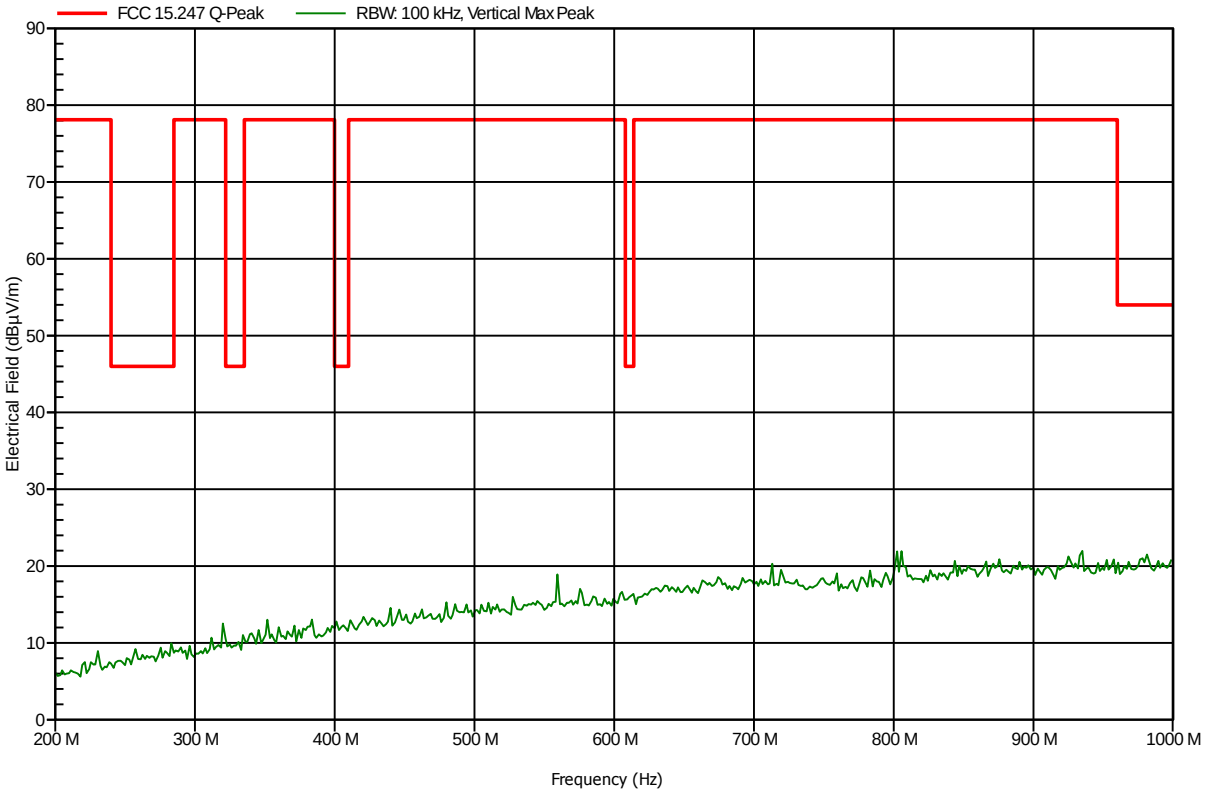

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	TX; DSSS, 1Mbit/s, ch.1
Test Date:	2012-11-29
Note:	

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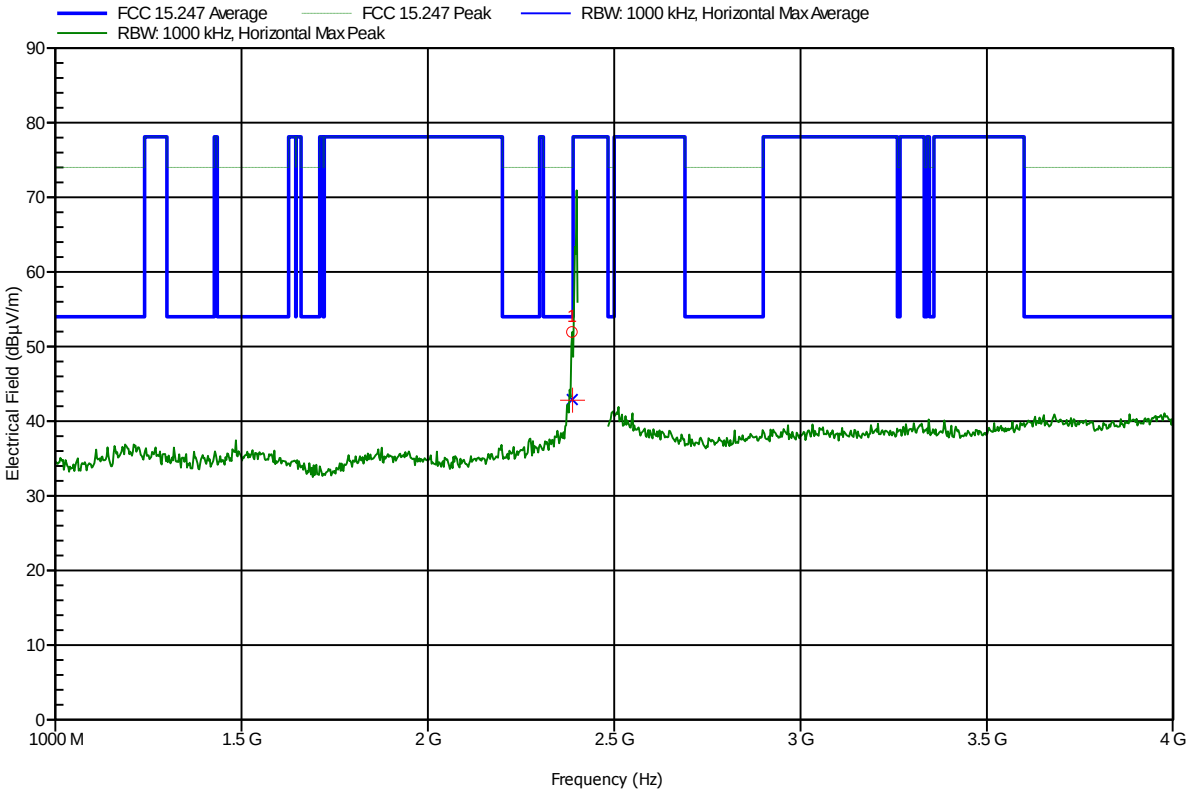

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.387 GHz	51.96 dBµV/m	74 dBµV/m	-22.04 dB	Pass

Frequency	Average	Average Limit	Average Difference	Average Status
2.387 GHz	42.9 dBµV/m	54 dBµV/m	-11.1 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	TX; DSSS, 1Mbit/s, ch.1
Test Date:	2012-11-29
Note:	

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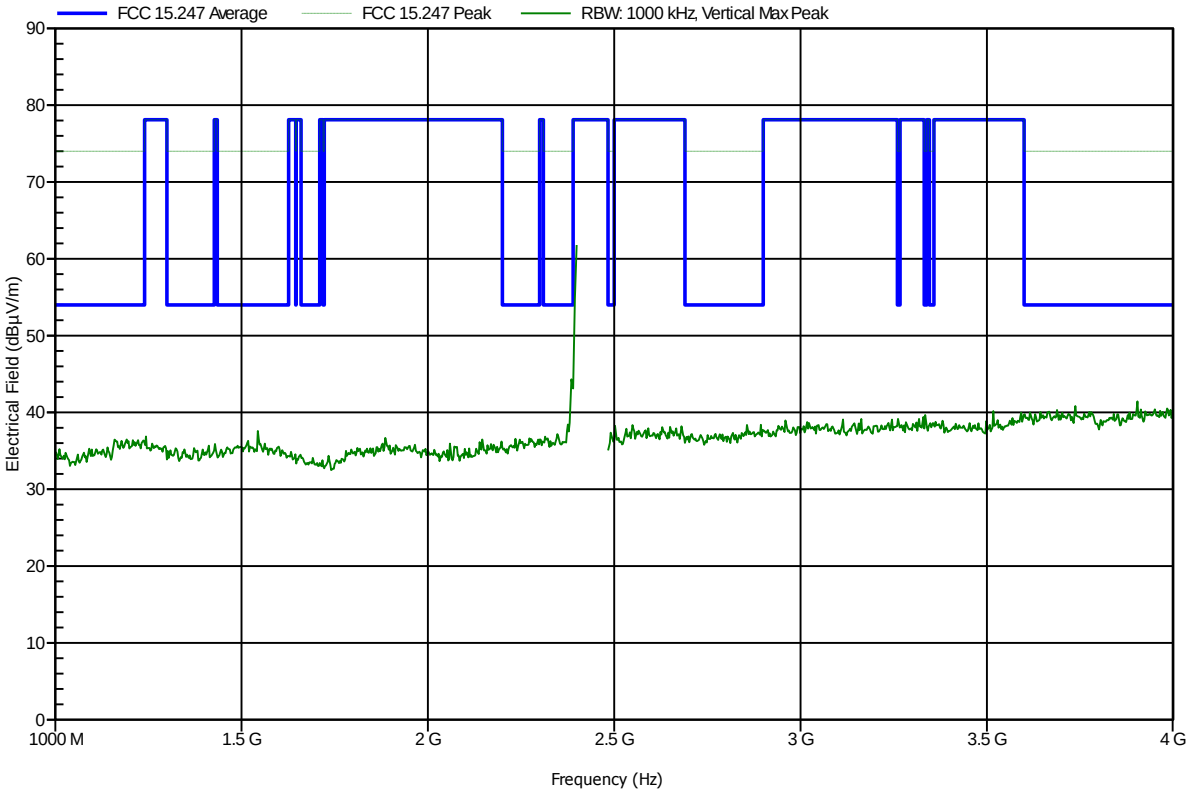

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	TX; DSSS, 1Mbit/s, ch.6
Test Date:	2012-11-29
Note:	

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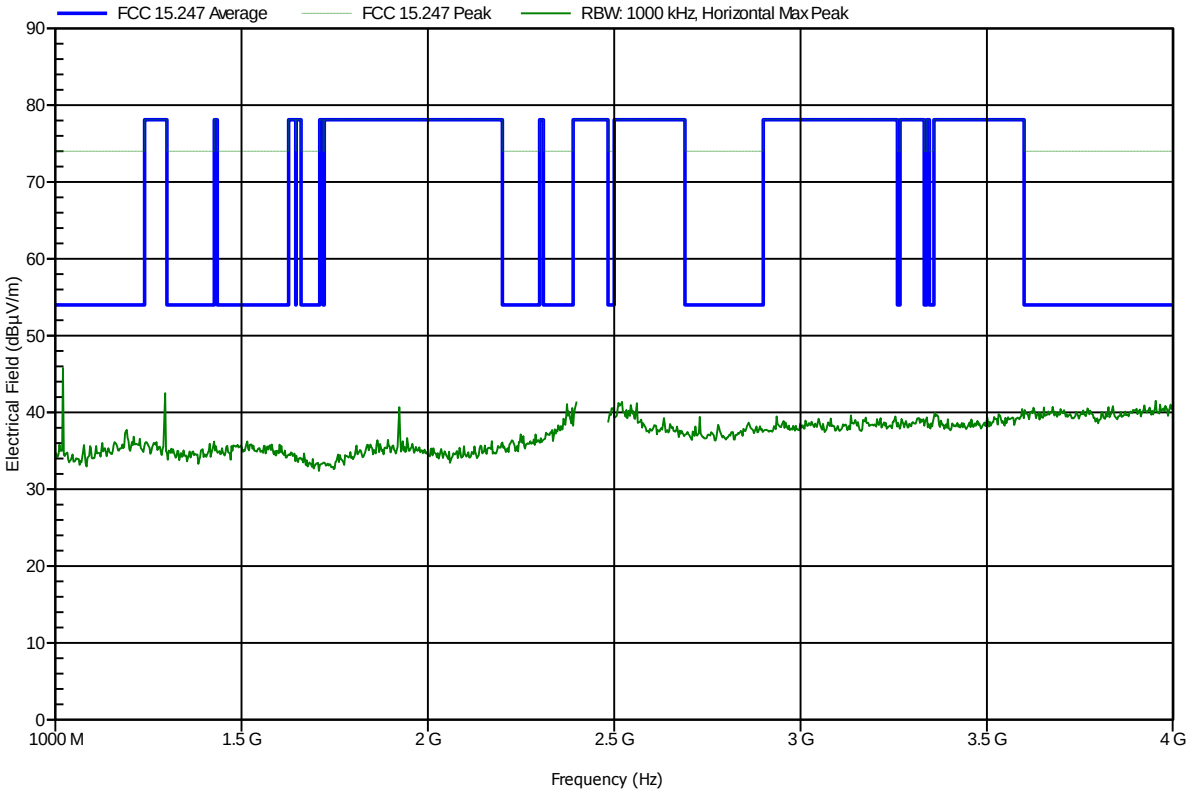

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	TX; DSSS, 1Mbit/s, ch.6
Test Date:	2012-11-29
Note:	

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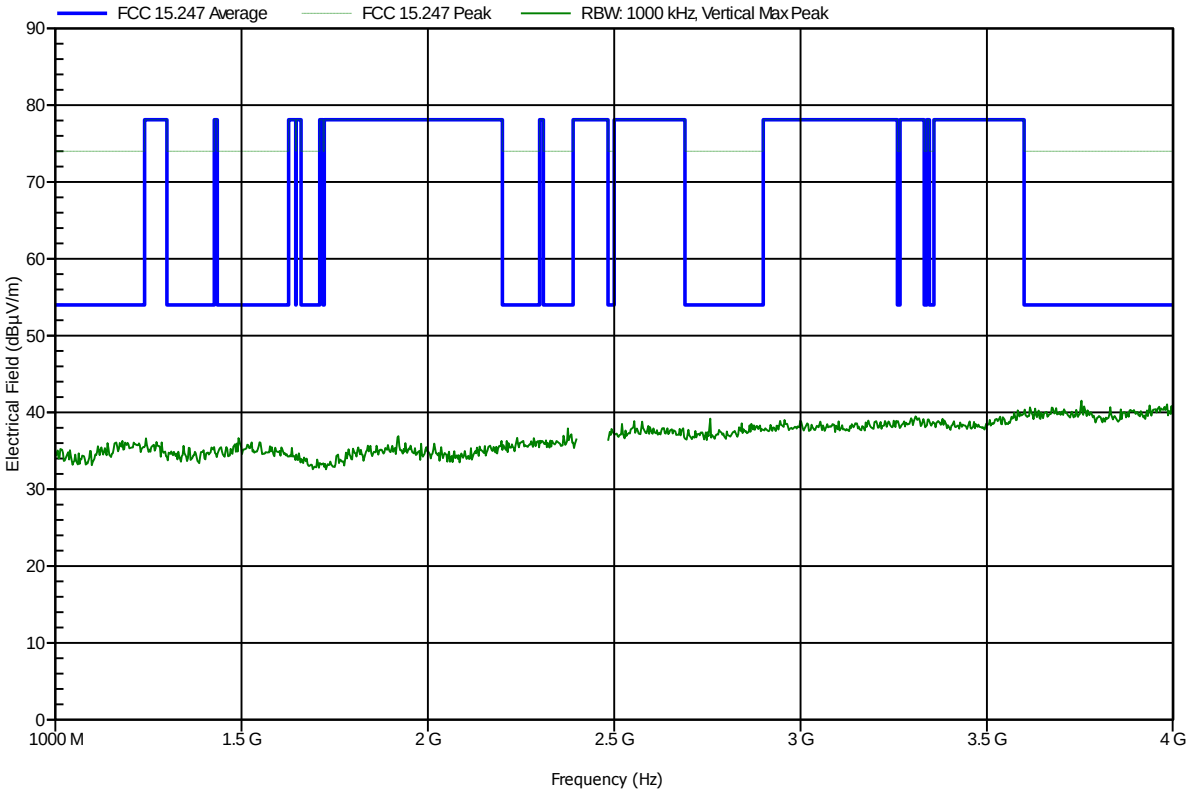

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	TX; DSSS, 1Mbit/s, ch.11
Test Date:	2012-11-29
Note:	

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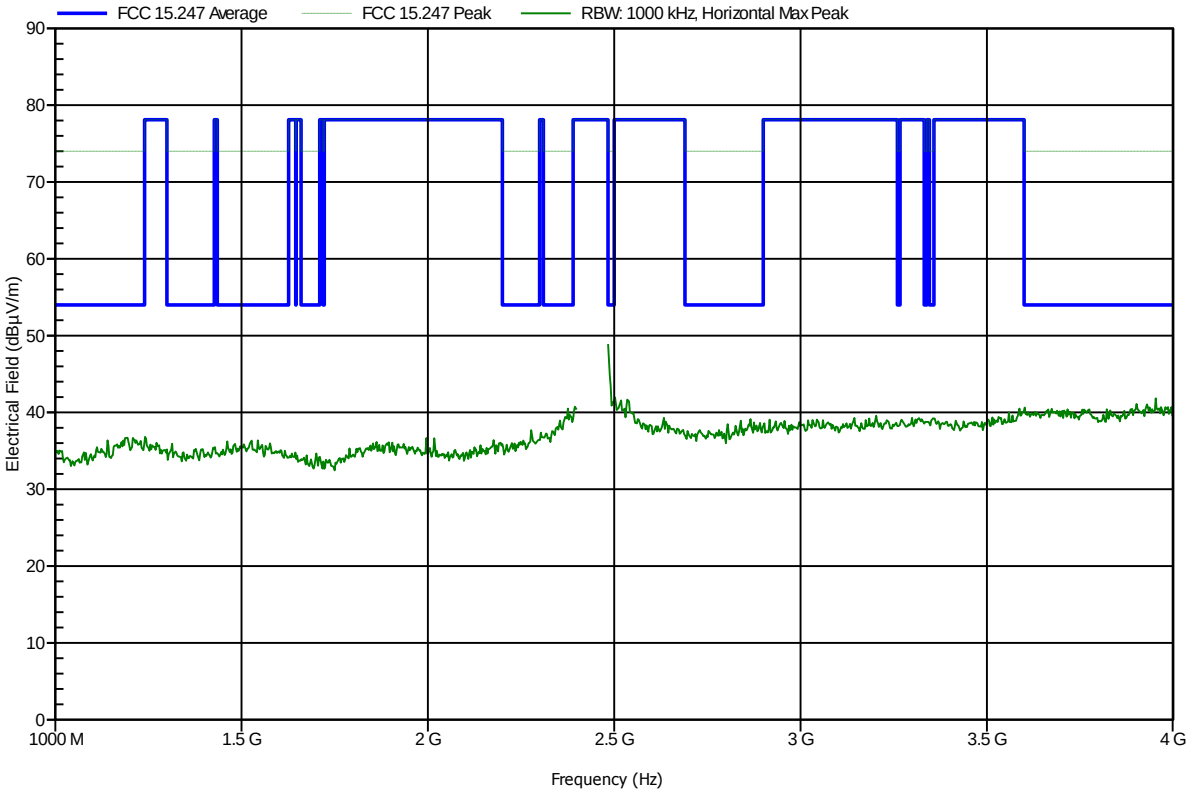

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	TX; DSSS, 1Mbit/s, ch.11
Test Date:	2012-11-29
Note:	

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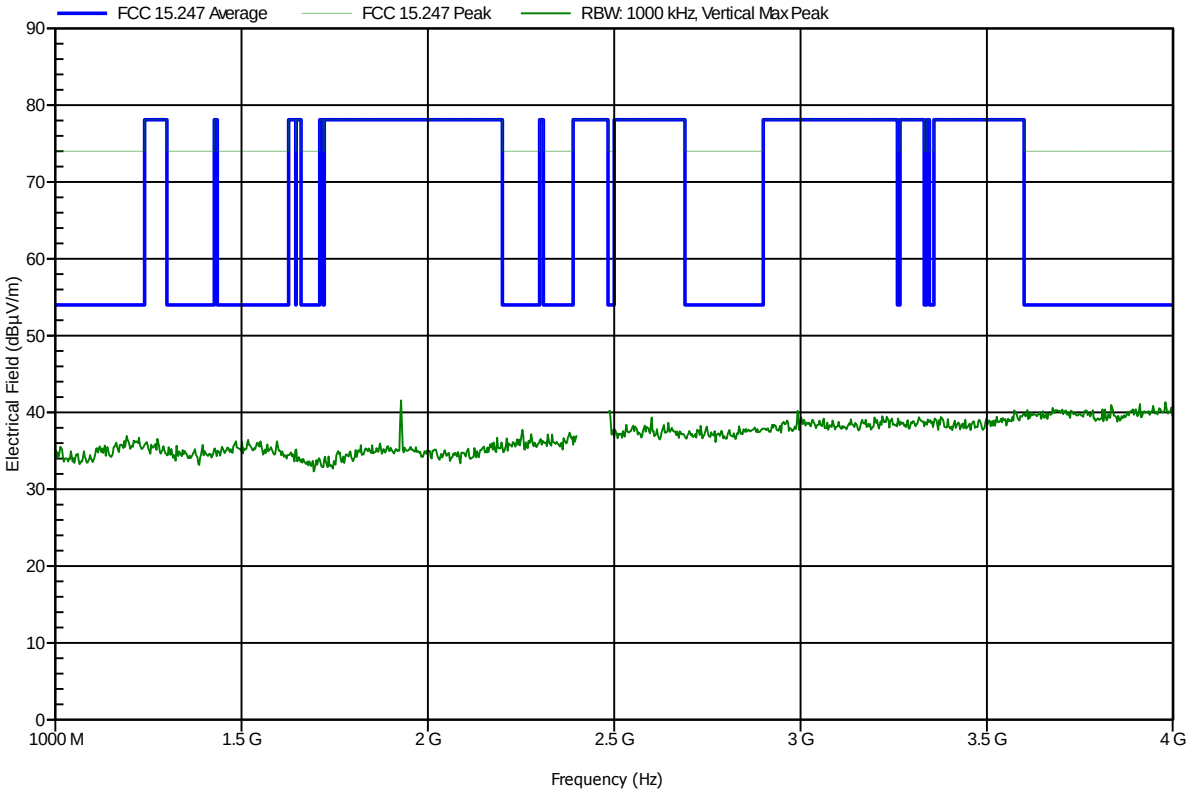

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	TX; DSSS, 1Mbit/s, ch.1
Test Date:	2012-11-29
Note:	

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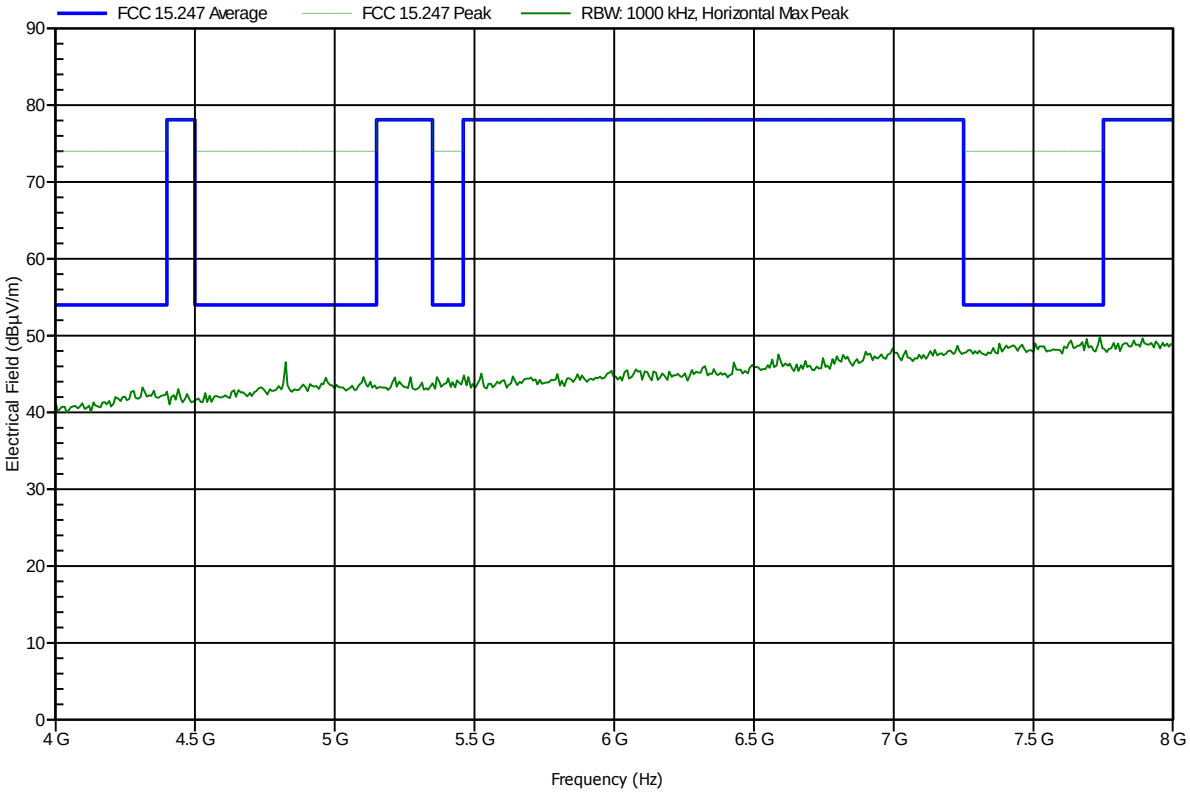

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	TX; DSSS, 1Mbit/s, ch.1
Test Date:	2012-11-29
Note:	

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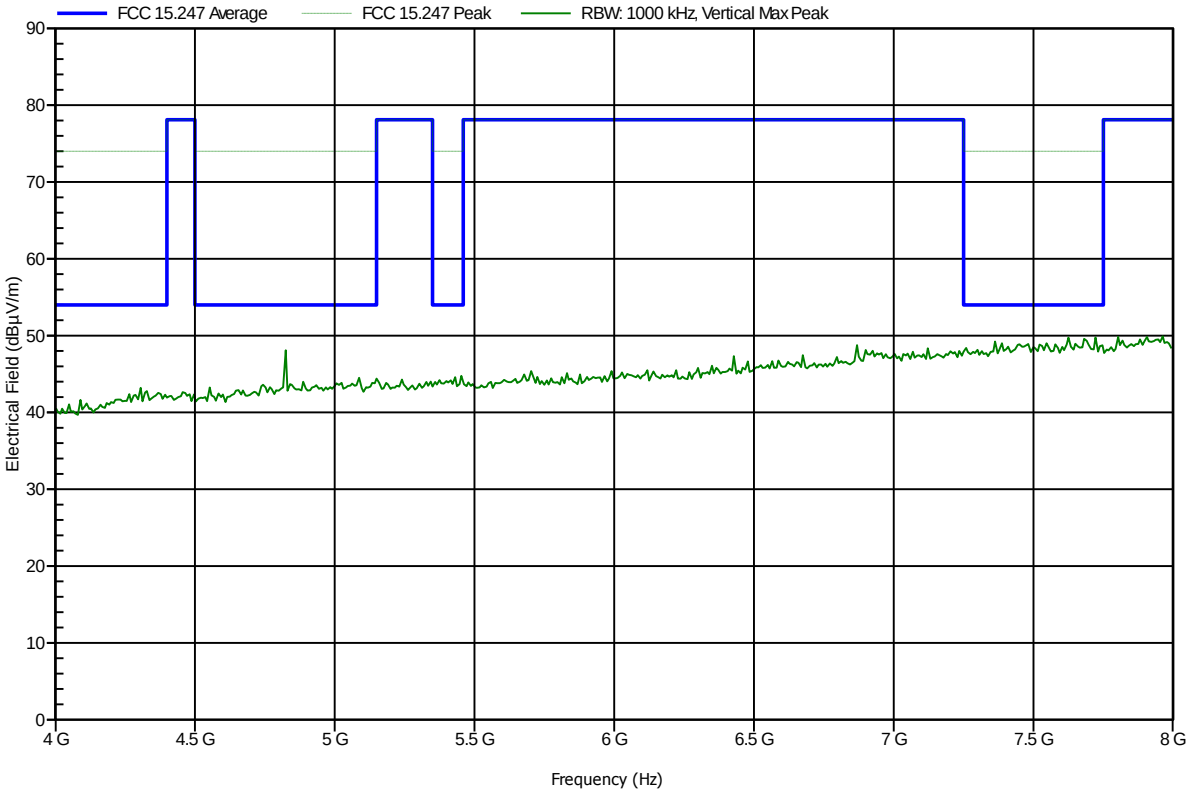

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	TX; DSSS, 1Mbit/s, ch.6
Test Date:	2012-11-29
Note:	

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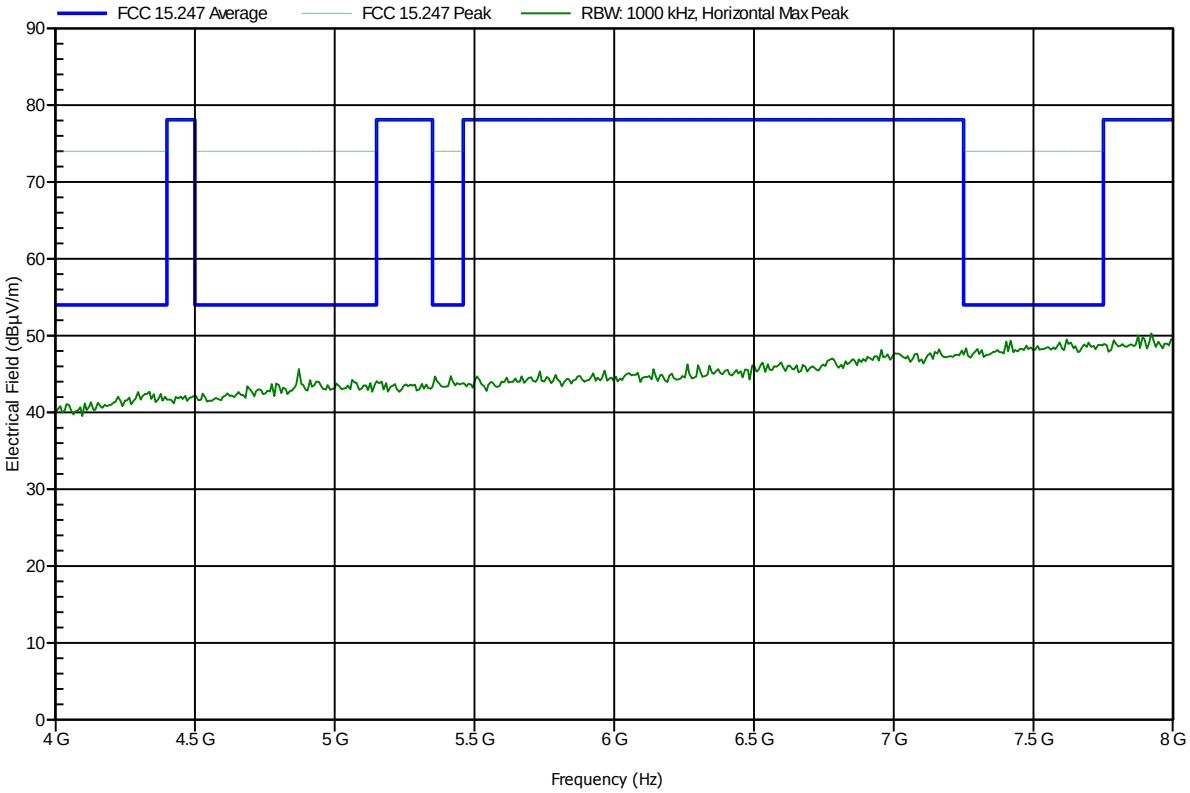

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	TX; DSSS, 1Mbit/s, ch.6
Test Date:	2012-11-29
Note:	

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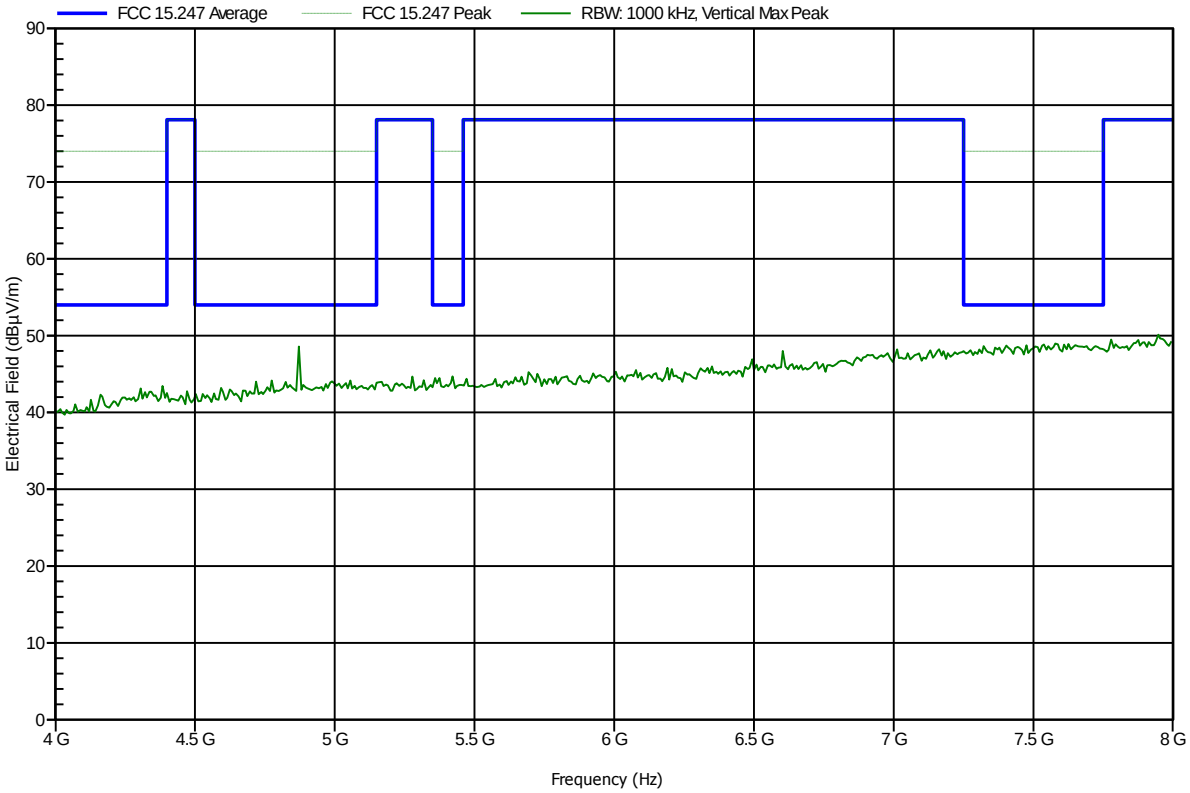

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	TX; DSSS, 1Mbit/s, ch.11
Test Date:	2012-11-29
Note:	

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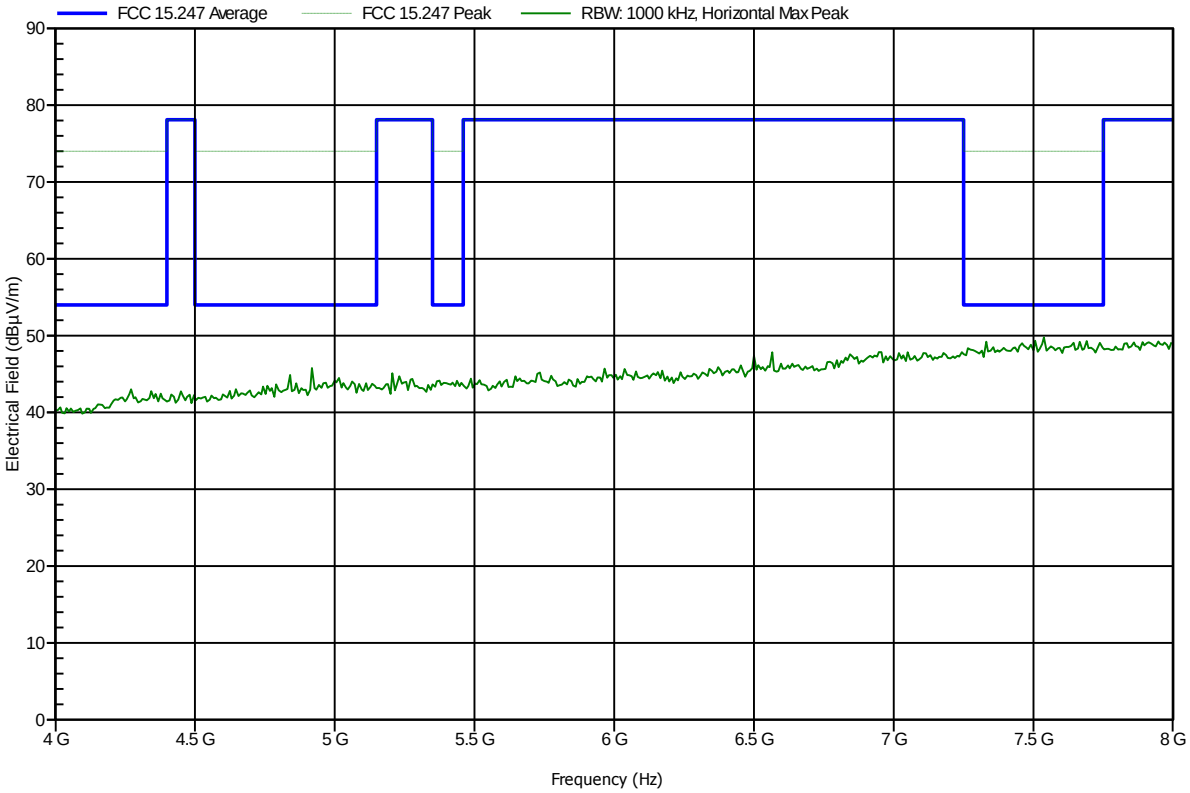

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	TX; DSSS, 1Mbit/s, ch.11
Test Date:	2012-11-29
Note:	

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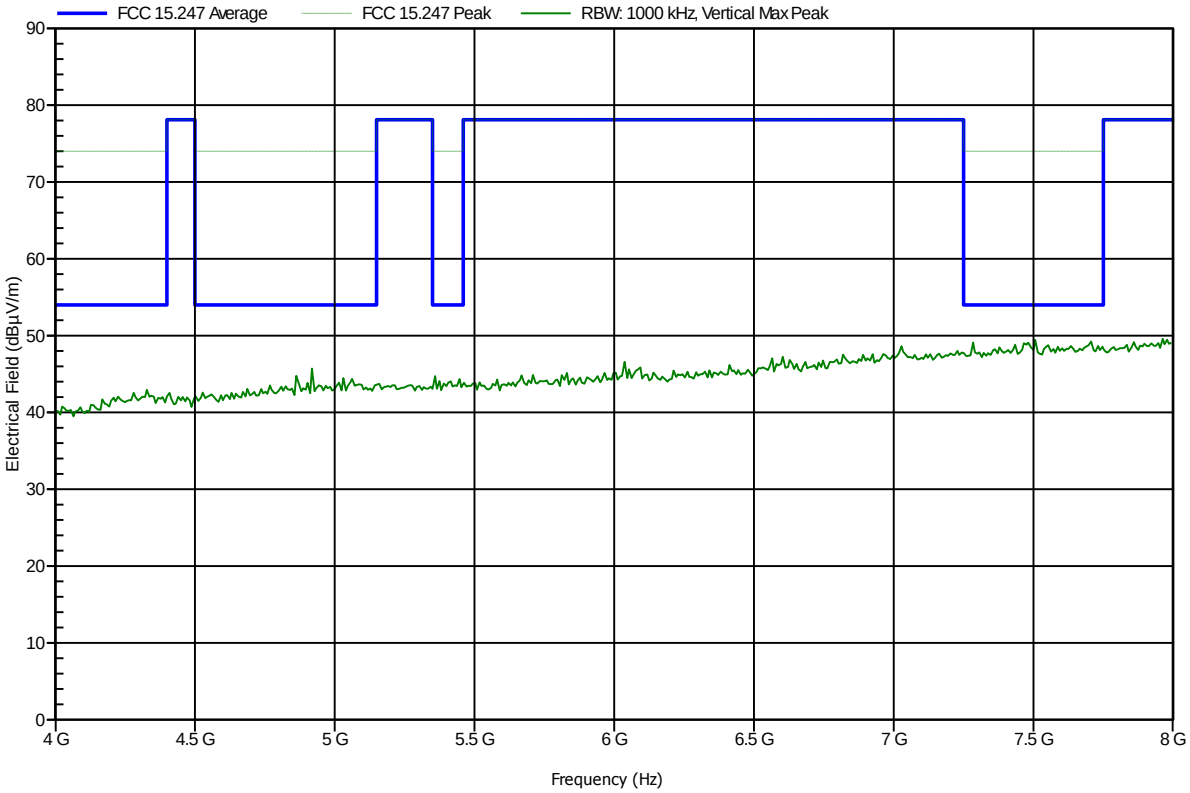

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	TX; HT20, MCS0, ch.1
Test Date:	2012-11-29
Note:	

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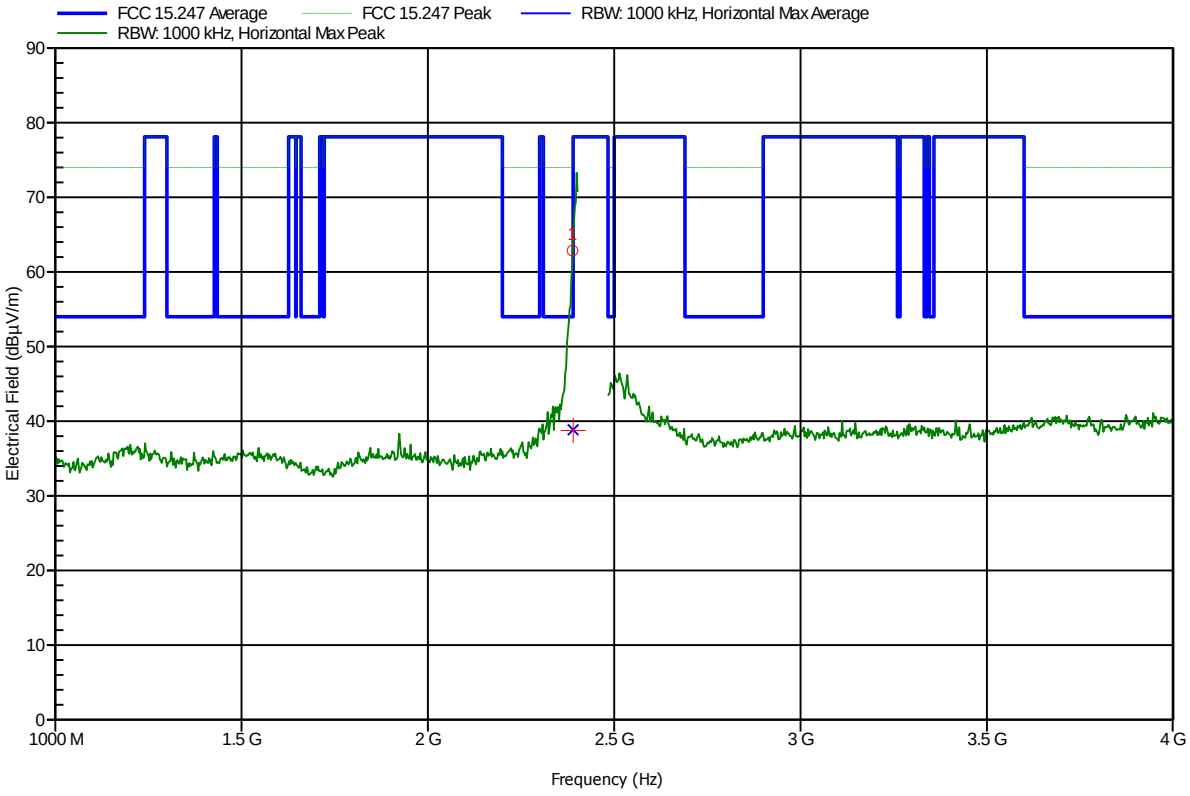

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.388 GHz	62.85 dBµV/m	74 dBµV/m	-11.15 dB	Pass

Frequency	Average	Average Limit	Average Difference	Average Status
2.388 GHz	38.84 dBµV/m	54 dBµV/m	-15.16 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	TX; HT20, MCS0, ch.1
Test Date:	2012-11-29
Note:	

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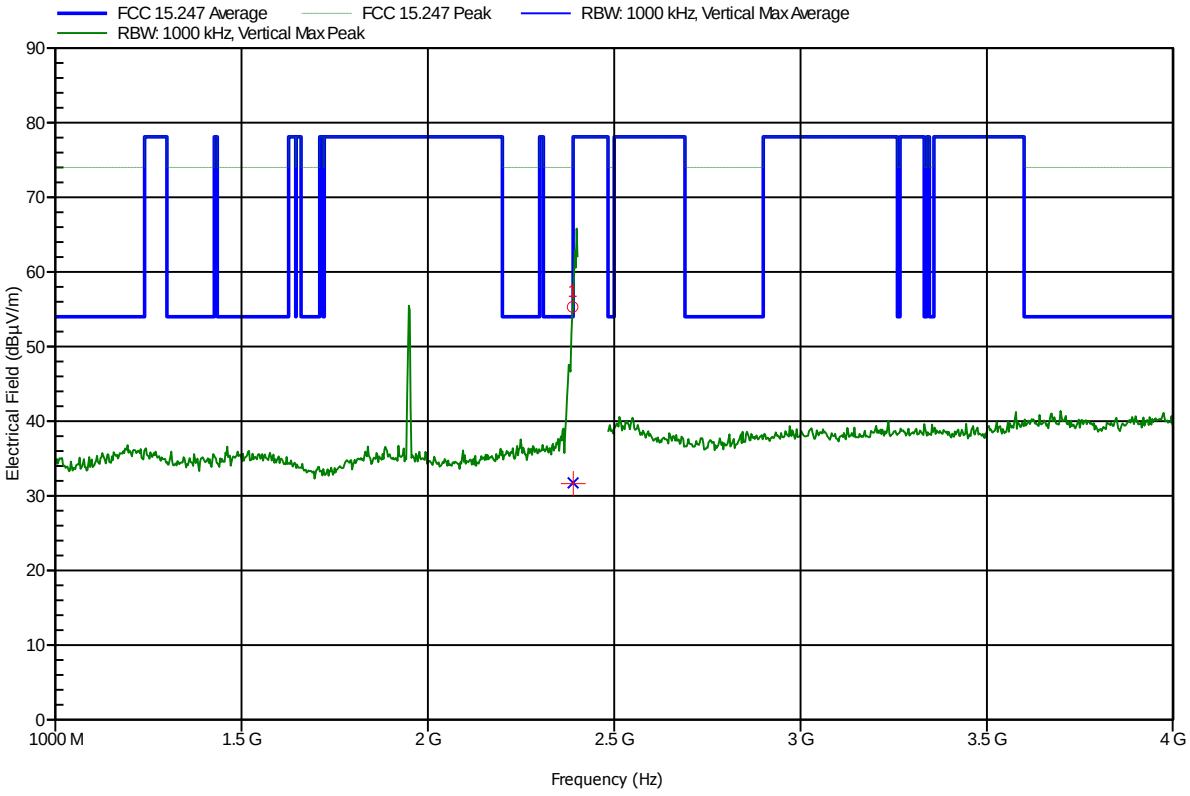

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.389 GHz	55.3 dBµV/m	74 dBµV/m	-18.7 dB	Pass

Frequency	Average	Average Limit	Average Difference	Average Status
2.389 GHz	31.72 dBµV/m	54 dBµV/m	-22.28 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	TX; HT20, MCS0, ch.6
Test Date:	2012-11-29
Note:	

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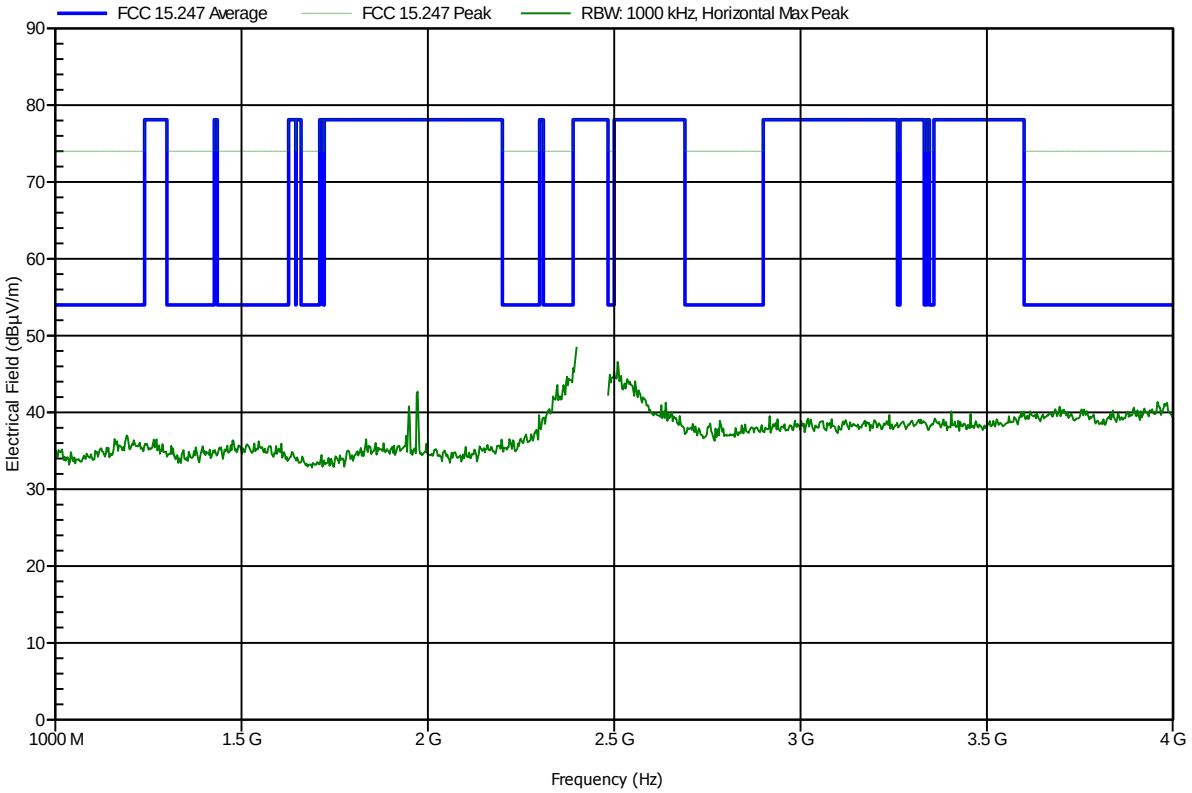

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	TX; HT20, MCS0, ch.6
Test Date:	2012-11-29
Note:	

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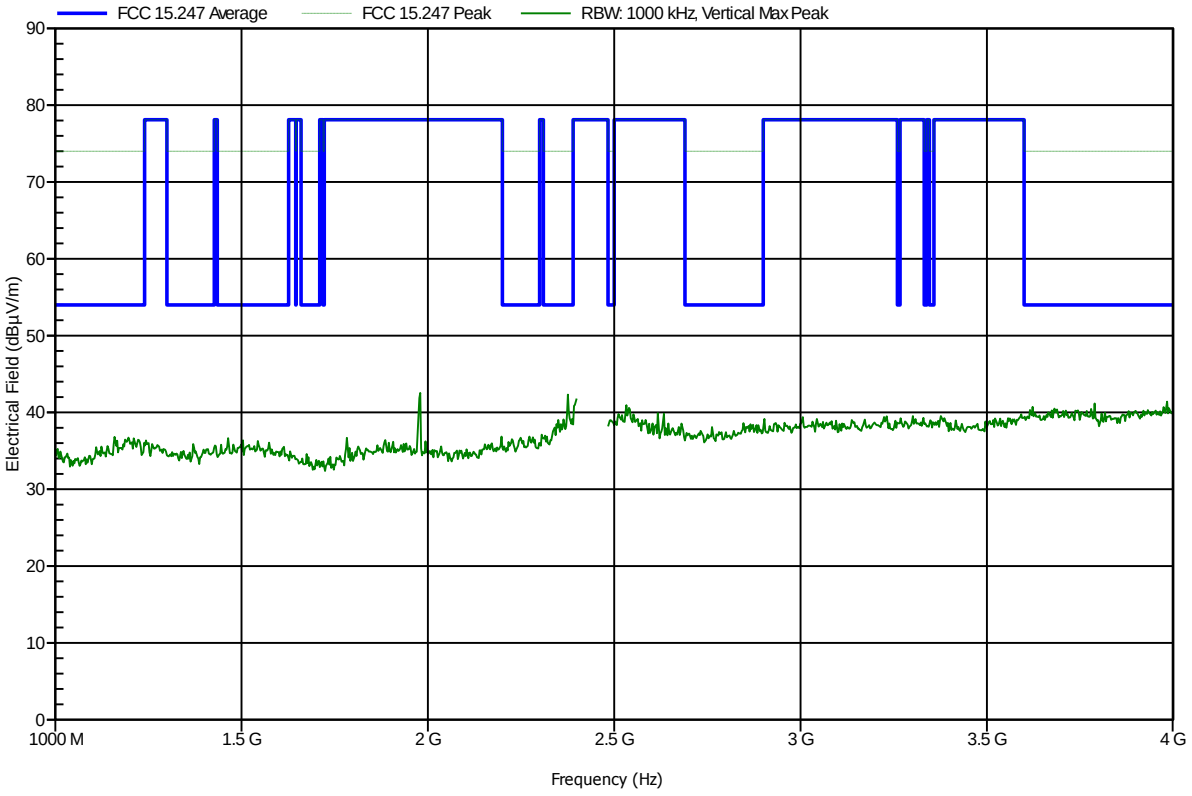

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	TX; HT20, MCS0, ch.11
Test Date:	2012-11-29
Note:	

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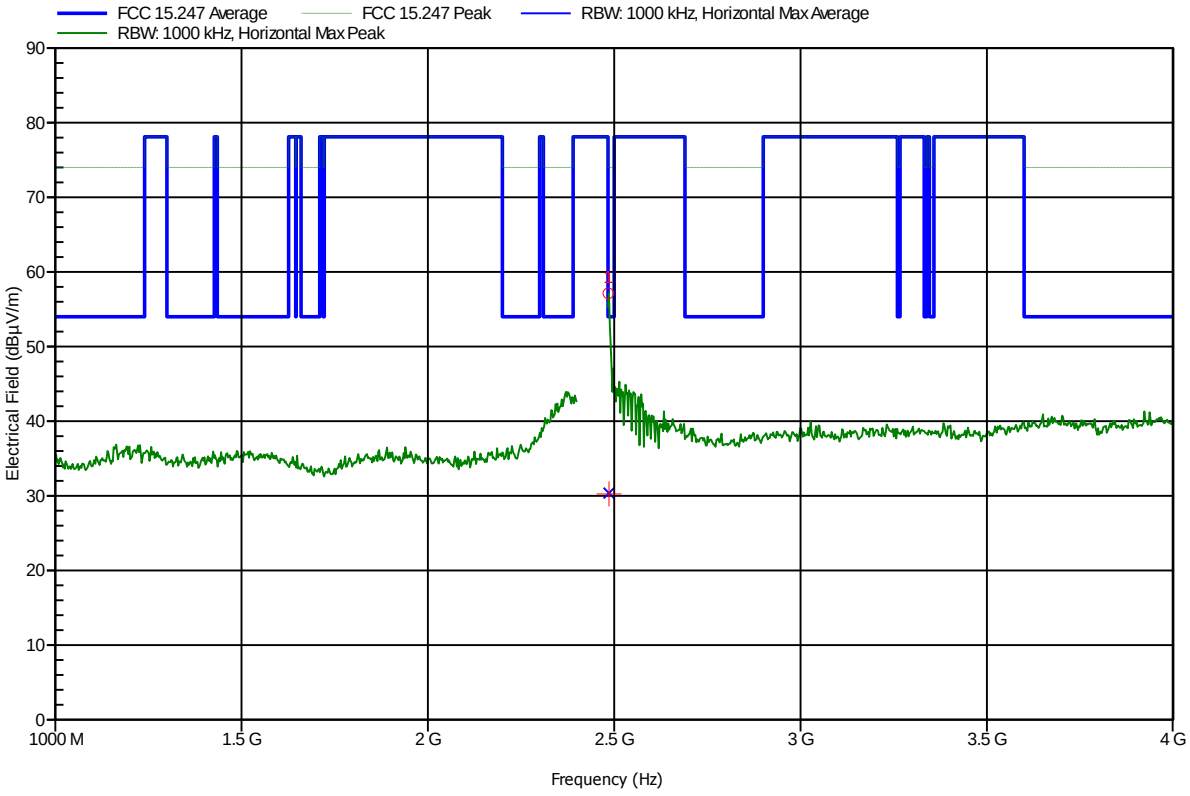

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.484 GHz	57.14 dBµV/m	74 dBµV/m	-16.86 dB	Pass

Frequency	Average	Average Limit	Average Difference	Average Status
2.484 GHz	30.34 dBµV/m	54 dBµV/m	-23.66 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	TX; HT20, MCS0, ch.11
Test Date:	2012-11-29
Note:	

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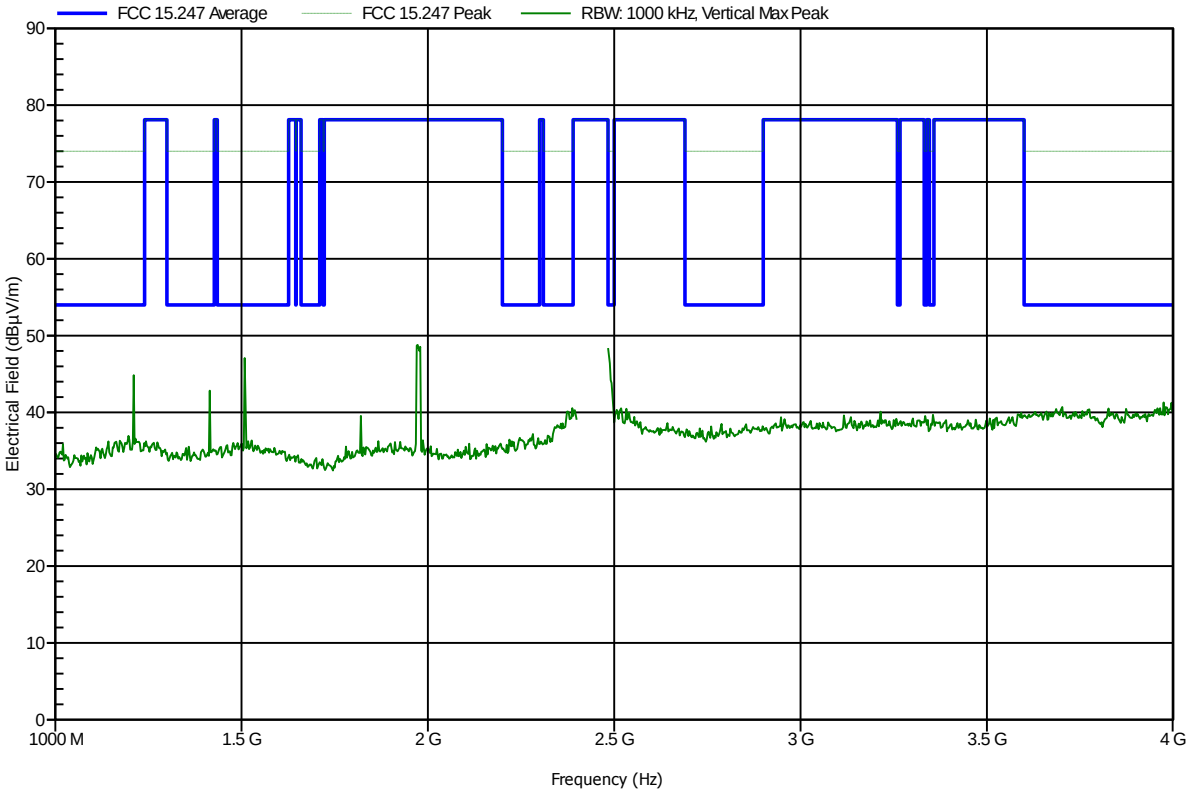

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	TX; HT20, MCS0, ch.1
Test Date:	2012-11-29
Note:	

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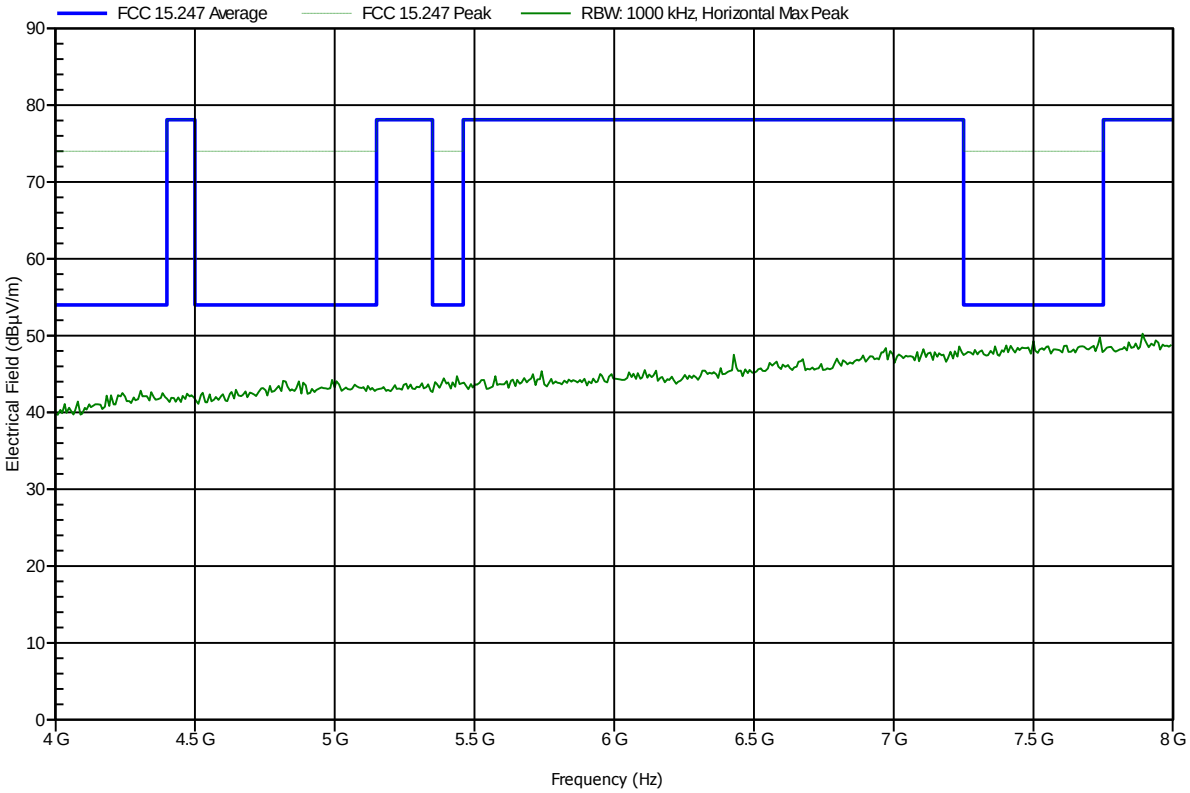

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	TX; HT20, MCS0, ch.1
Test Date:	2012-11-29
Note:	

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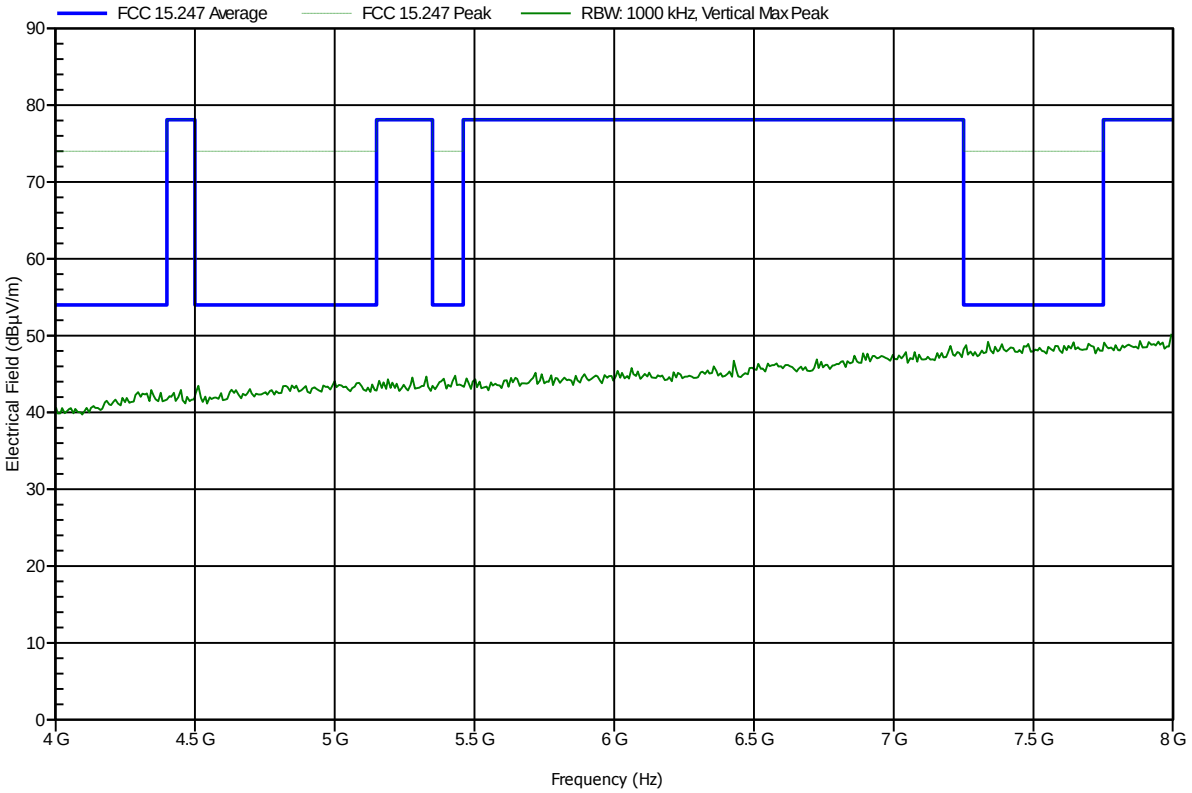

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	TX; HT20, MCS0, ch.6
Test Date:	2012-11-29
Note:	

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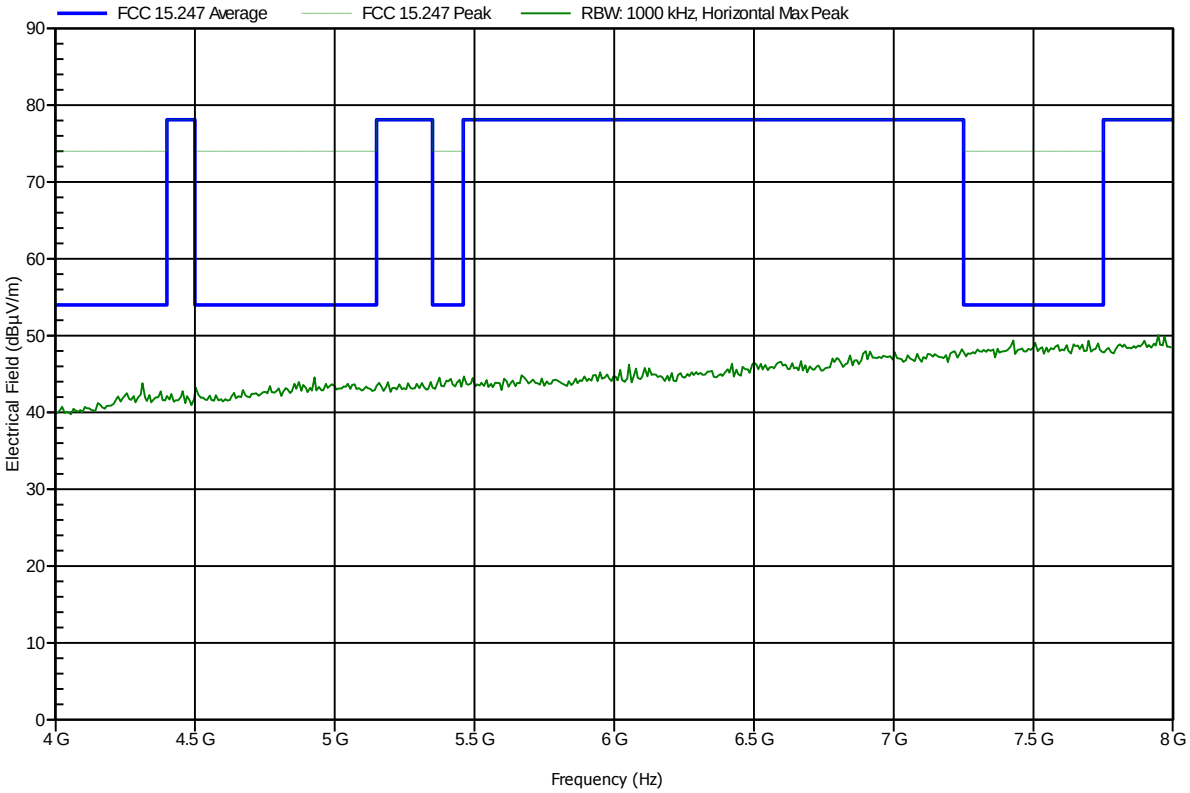

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	TX; HT20, MCS0, ch.6
Test Date:	2012-11-29
Note:	

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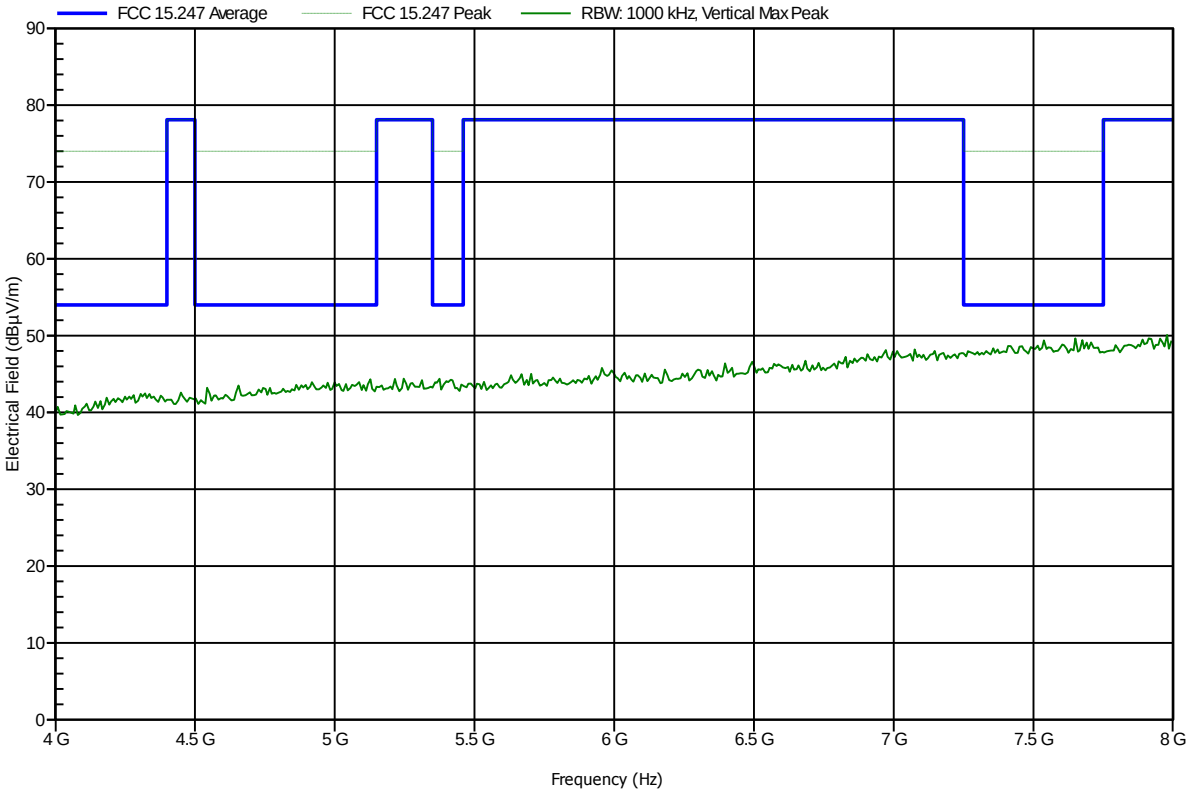

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	TX; HT20, MCS0, ch.11
Test Date:	2012-11-29
Note:	

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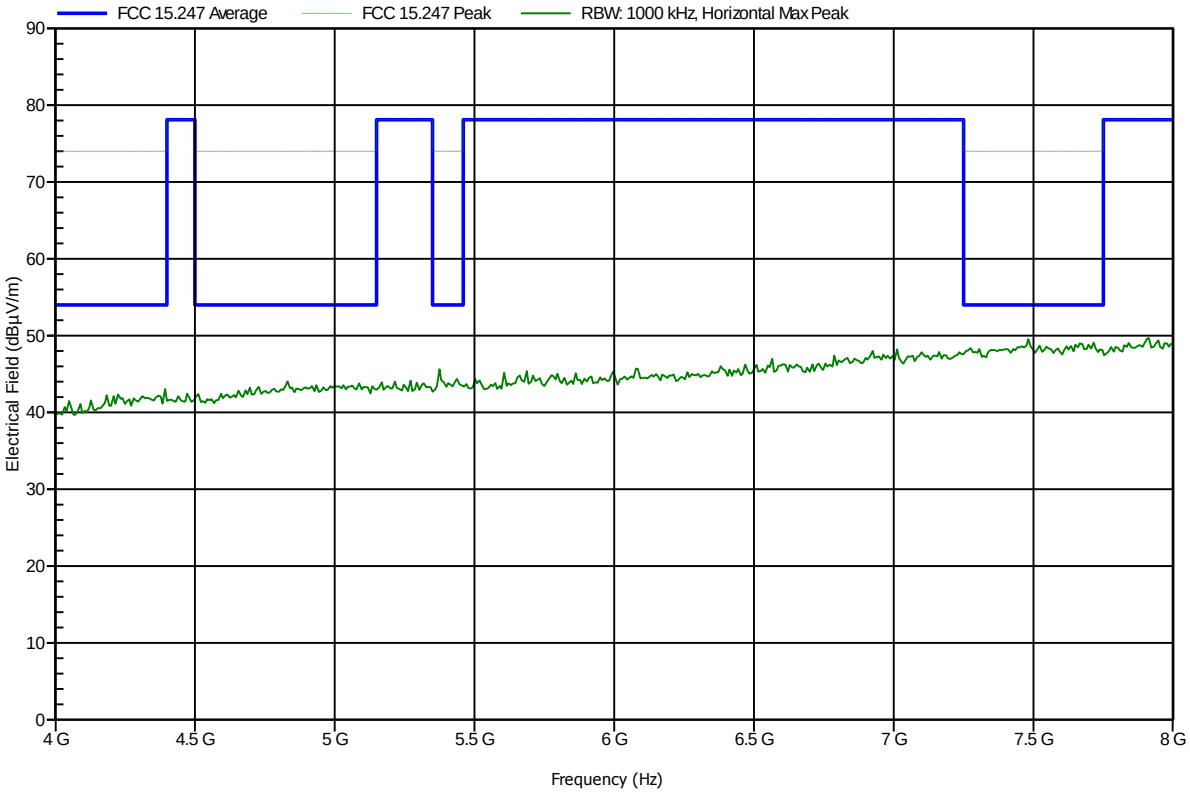

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	TX; HT20, MCS0, ch.11
Test Date:	2012-11-29
Note:	

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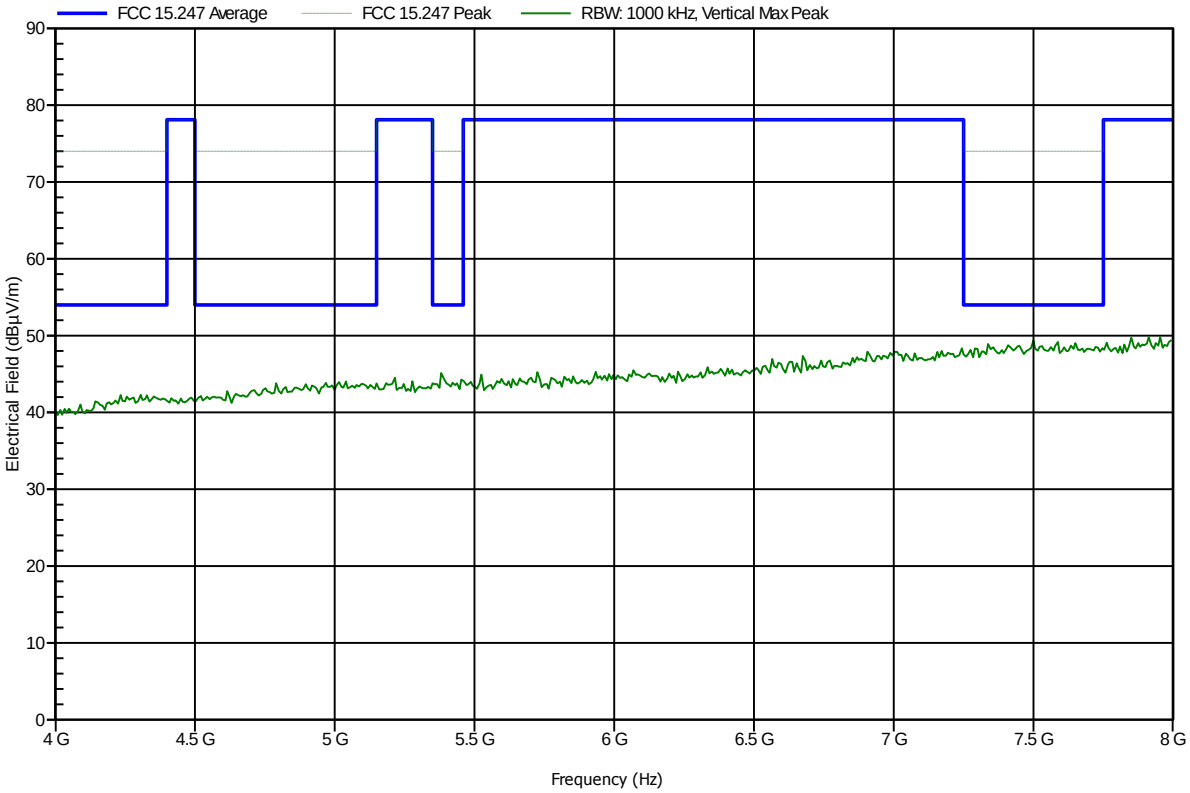

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	TX; HT40,MCS0, ch.1-5
Test Date:	2012-11-29
Note:	

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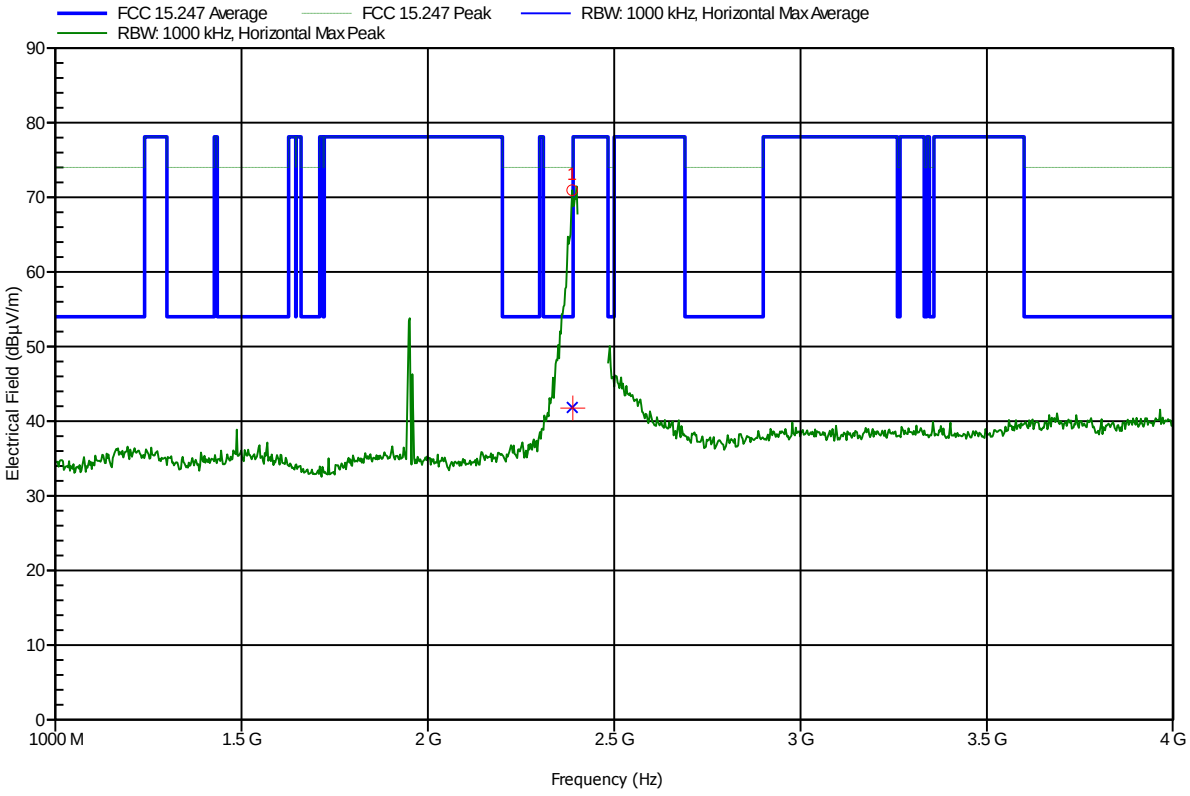

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.387 GHz	70.96 dBµV/m	74 dBµV/m	-3.04 dB	Pass

Frequency	Average	Average Limit	Average Difference	Average Status
2.387 GHz	41.84 dBµV/m	54 dBµV/m	-12.16 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	TX; HT40,MCS0, ch.1-5
Test Date:	2012-11-29
Note:	

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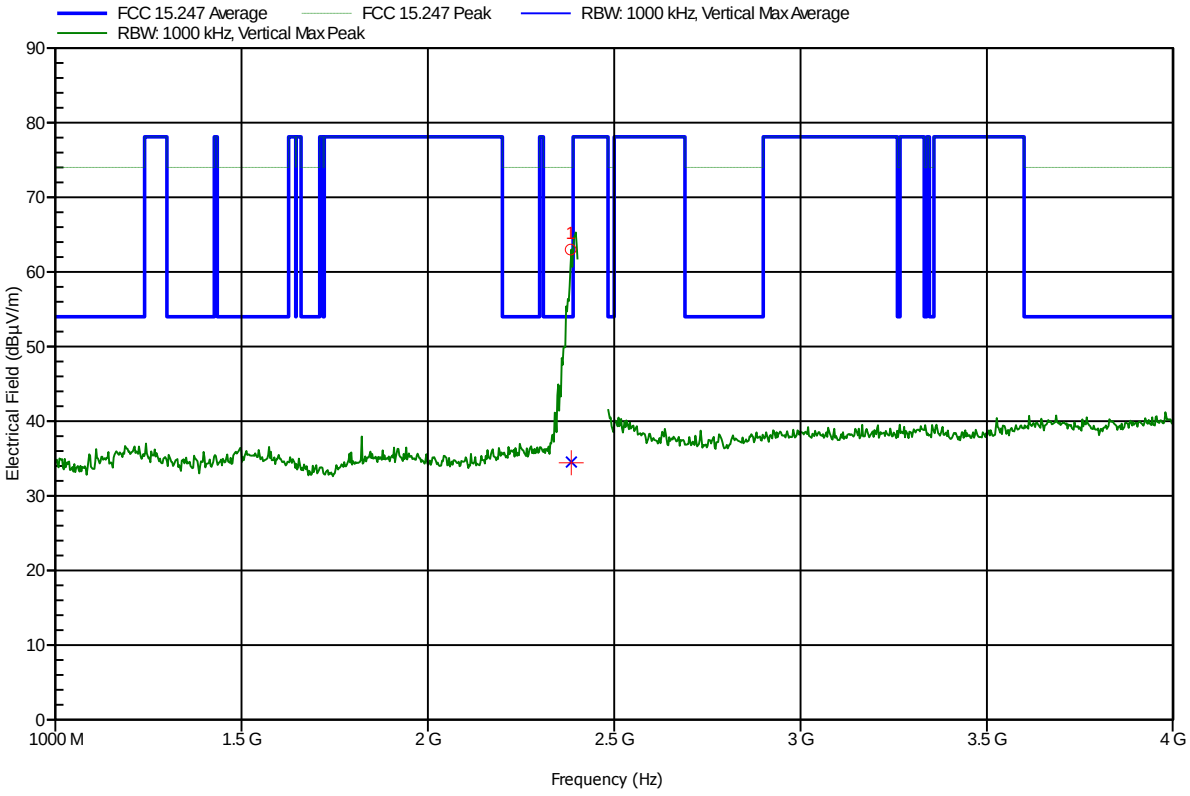

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.383 GHz	63 dBµV/m	74 dBµV/m	-11 dB	Pass

Frequency	Average	Average Limit	Average Difference	Average Status
2.383 GHz	34.52 dBµV/m	54 dBµV/m	-19.48 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	TX; HT40,MCS0, ch.4-8
Test Date:	2012-11-29
Note:	

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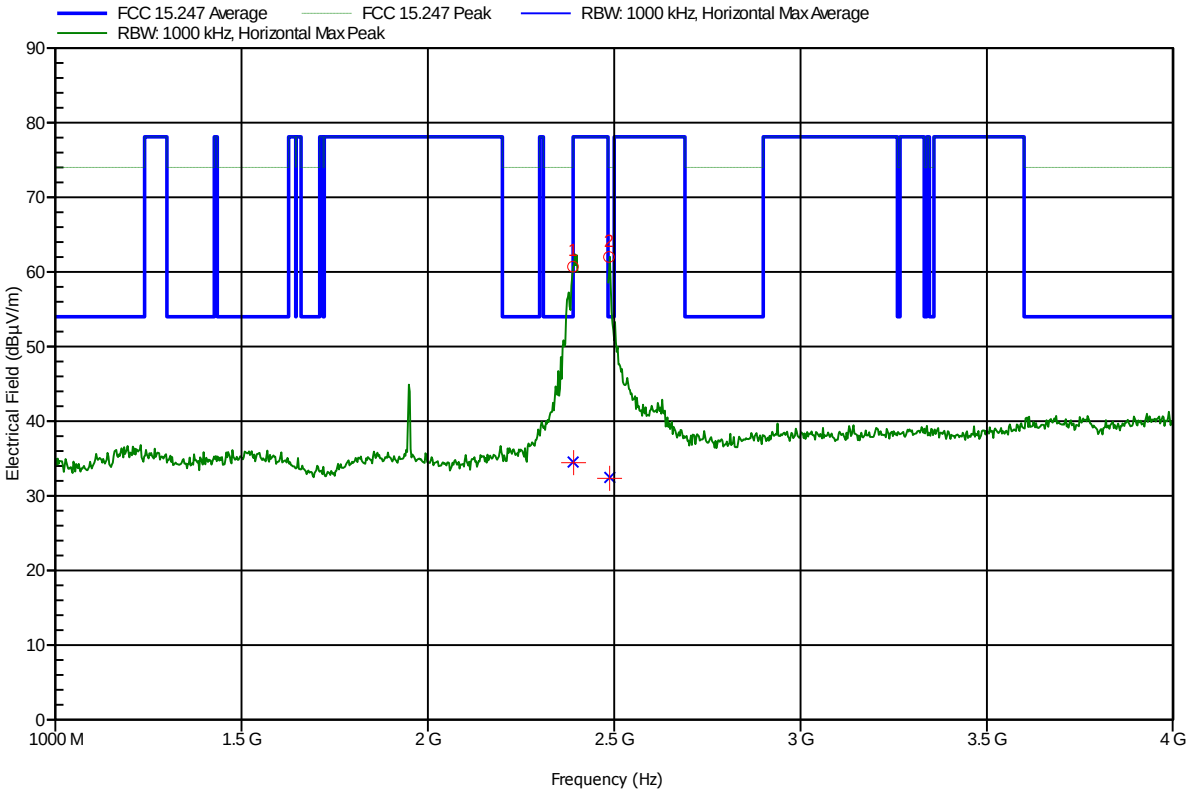

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.389 GHz	60.71 dBµV/m	74 dBµV/m	-13.29 dB	Pass
2.486 GHz	62 dBµV/m	74 dBµV/m	-12 dB	Pass

Frequency	Average	Average Limit	Average Difference	Average Status
2.389 GHz	34.53 dBµV/m	54 dBµV/m	-19.47 dB	Pass
2.486 GHz	32.43 dBµV/m	54 dBµV/m	-21.57 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	TX; HT40,MCS0, ch.4-8
Test Date:	2012-11-29
Note:	

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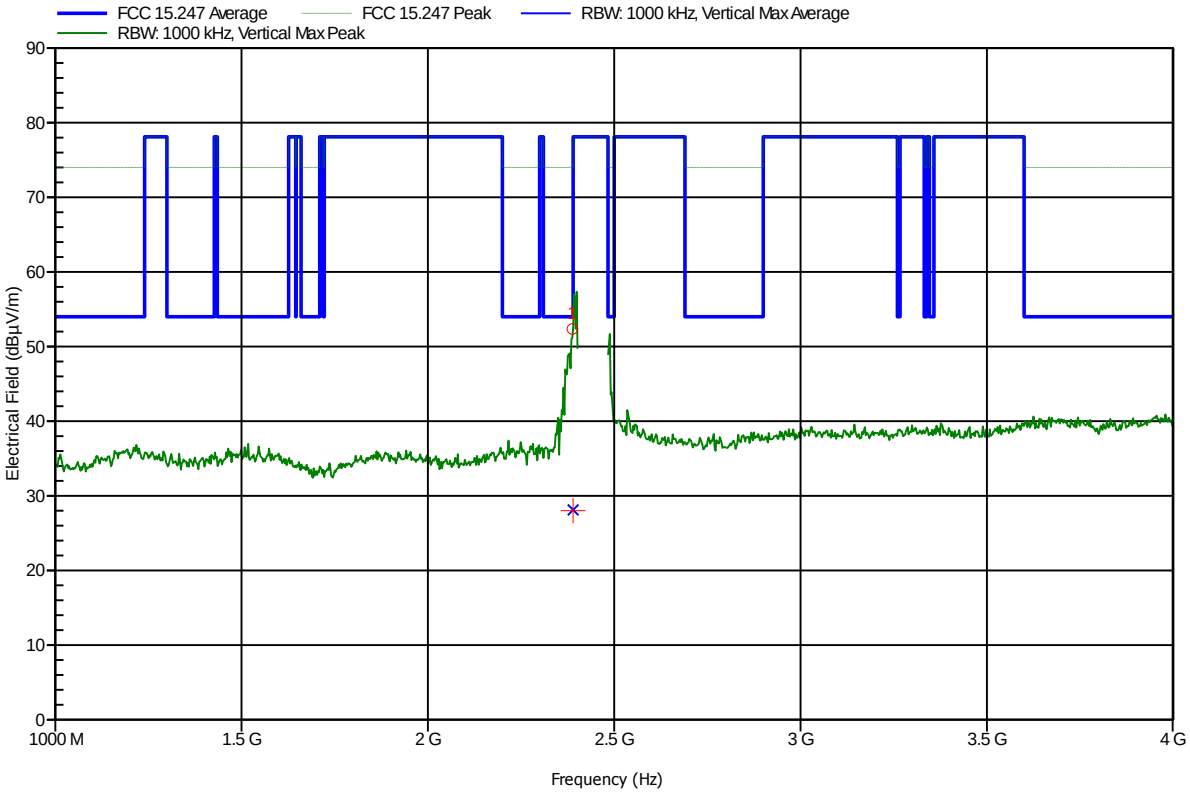

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.388 GHz	52.36 dBµV/m	74 dBµV/m	-21.64 dB	Pass

Frequency	Average	Average Limit	Average Difference	Average Status
2.388 GHz	28.1 dBµV/m	54 dBµV/m	-25.9 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	TX; HT40,MCS0, ch.7-11
Test Date:	2012-11-29
Note:	

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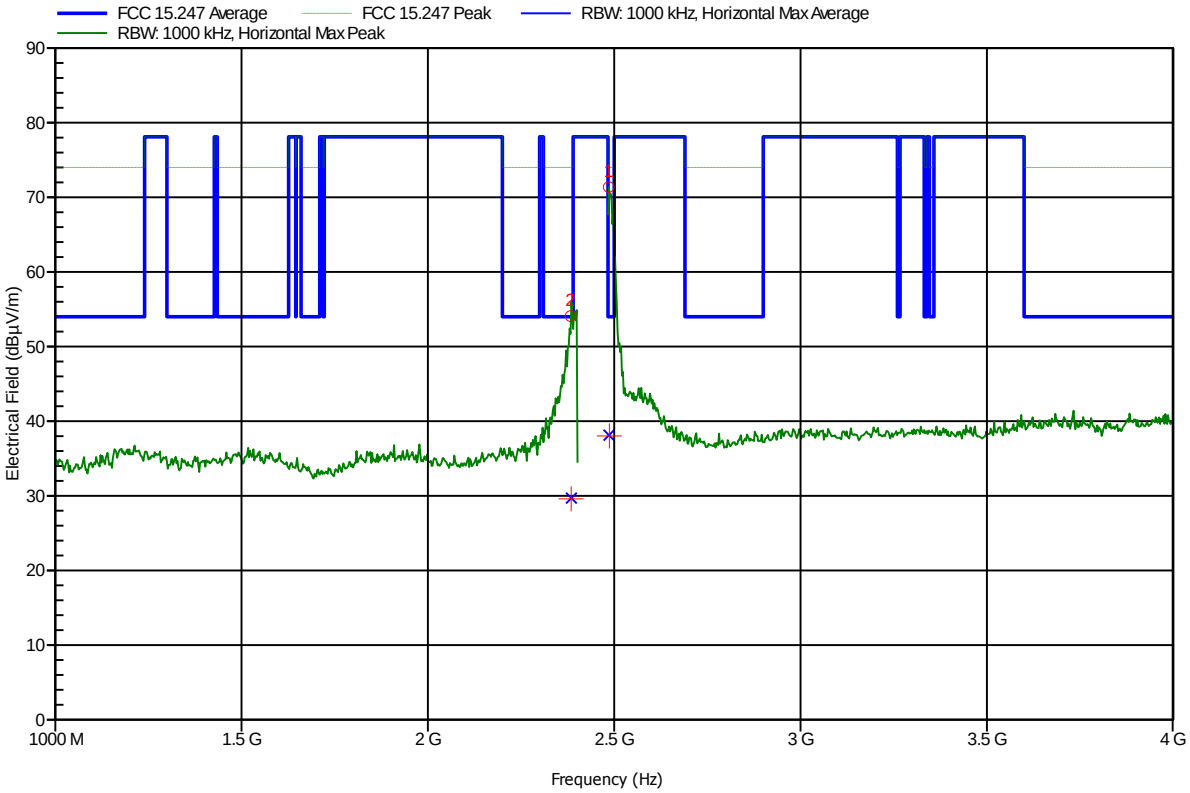

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.383 GHz	54.08 dBµV/m	74 dBµV/m	-19.92 dB	Pass
2.485 GHz	71.37 dBµV/m	74 dBµV/m	-2.63 dB	Pass

Frequency	Average	Average Limit	Average Difference	Average Status
2.383 GHz	29.68 dBµV/m	54 dBµV/m	-24.32 dB	Pass
2.485 GHz	38.11 dBµV/m	54 dBµV/m	-15.89 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	TX; HT40,MCS0, ch.7-11
Test Date:	2012-11-29
Note:	

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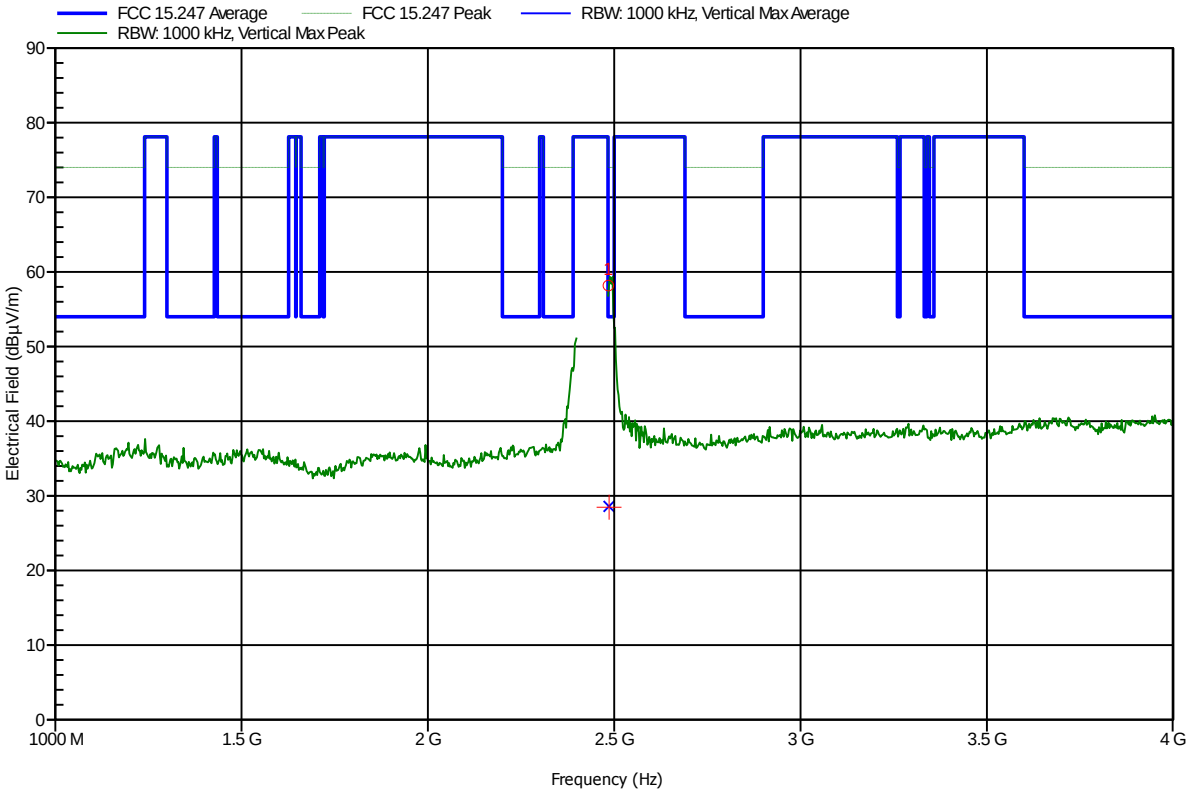

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.485 GHz	58.18 dBµV/m	74 dBµV/m	-15.82 dB	Pass

Frequency	Average	Average Limit	Average Difference	Average Status
2.485 GHz	28.56 dBµV/m	54 dBµV/m	-25.44 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	TX; HT40, MCS0, ch.1-5
Test Date:	2012-11-29
Note:	

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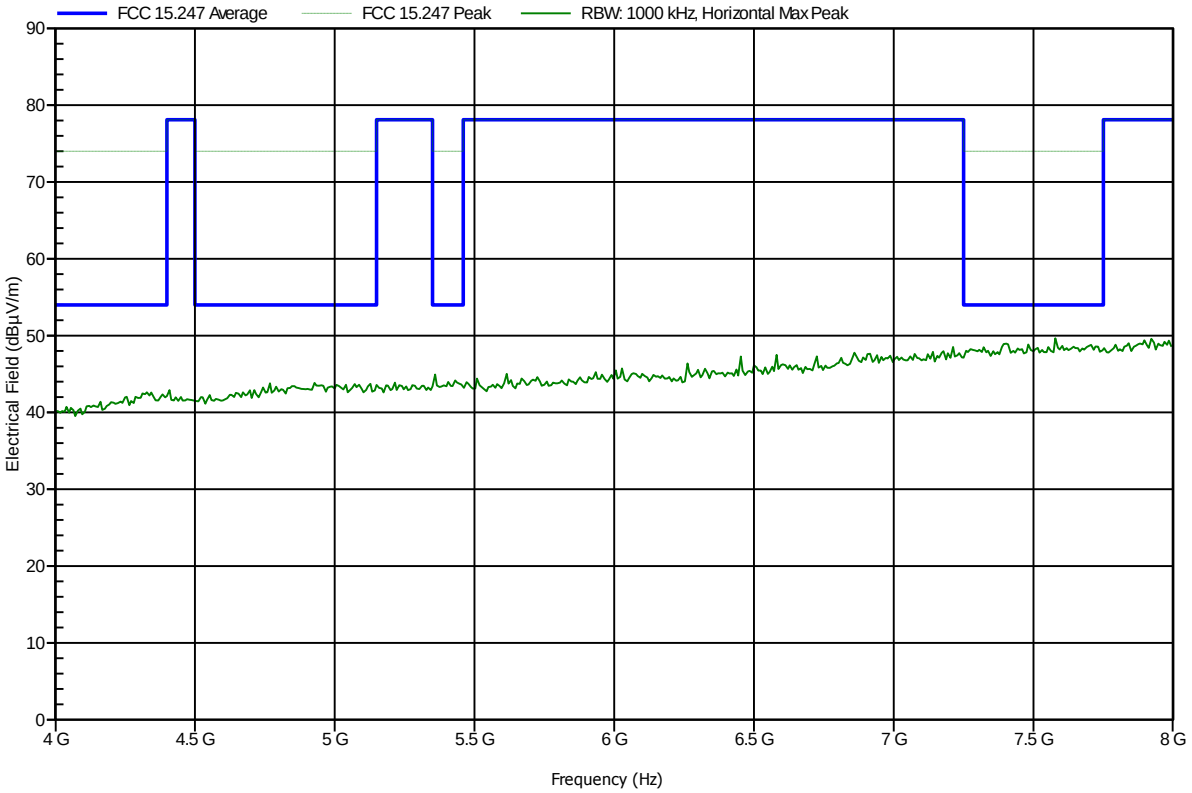

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	TX; HT40, MCS0, ch.1-5
Test Date:	2012-11-29
Note:	

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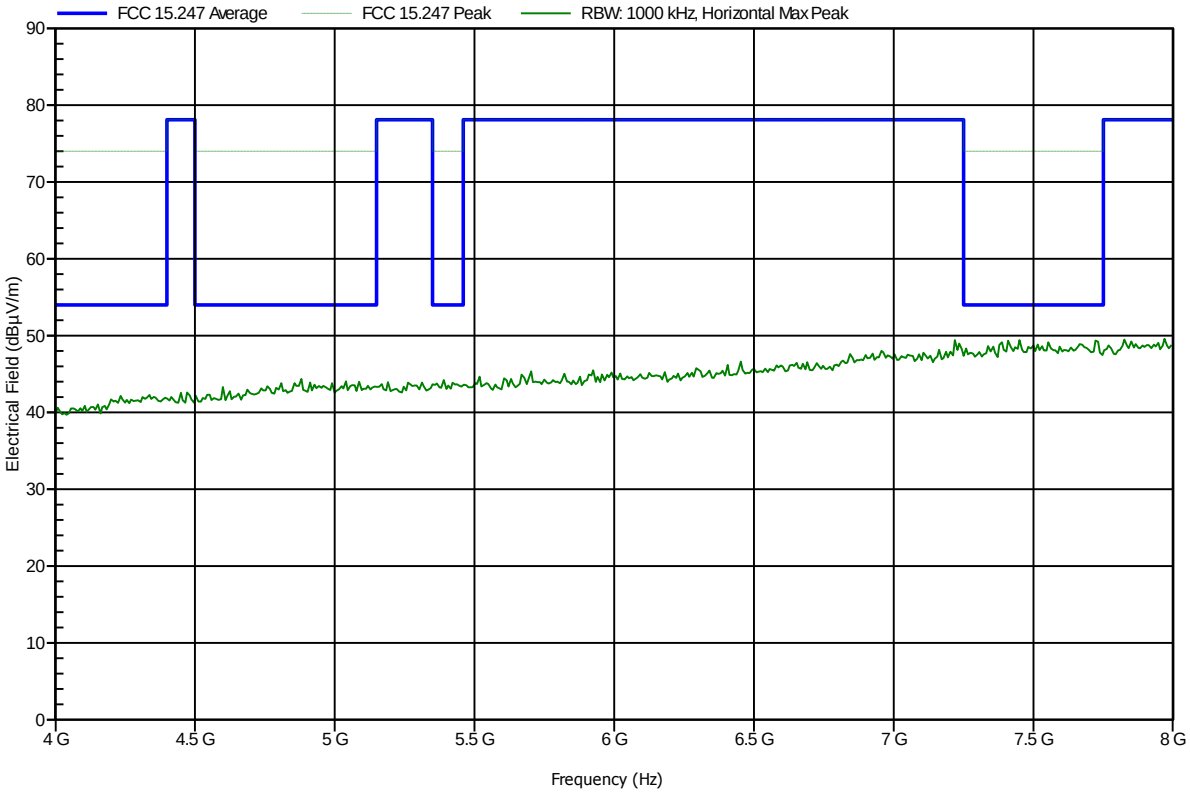

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	TX; HT40, MCS0, ch.4-8
Test Date:	2012-11-29
Note:	

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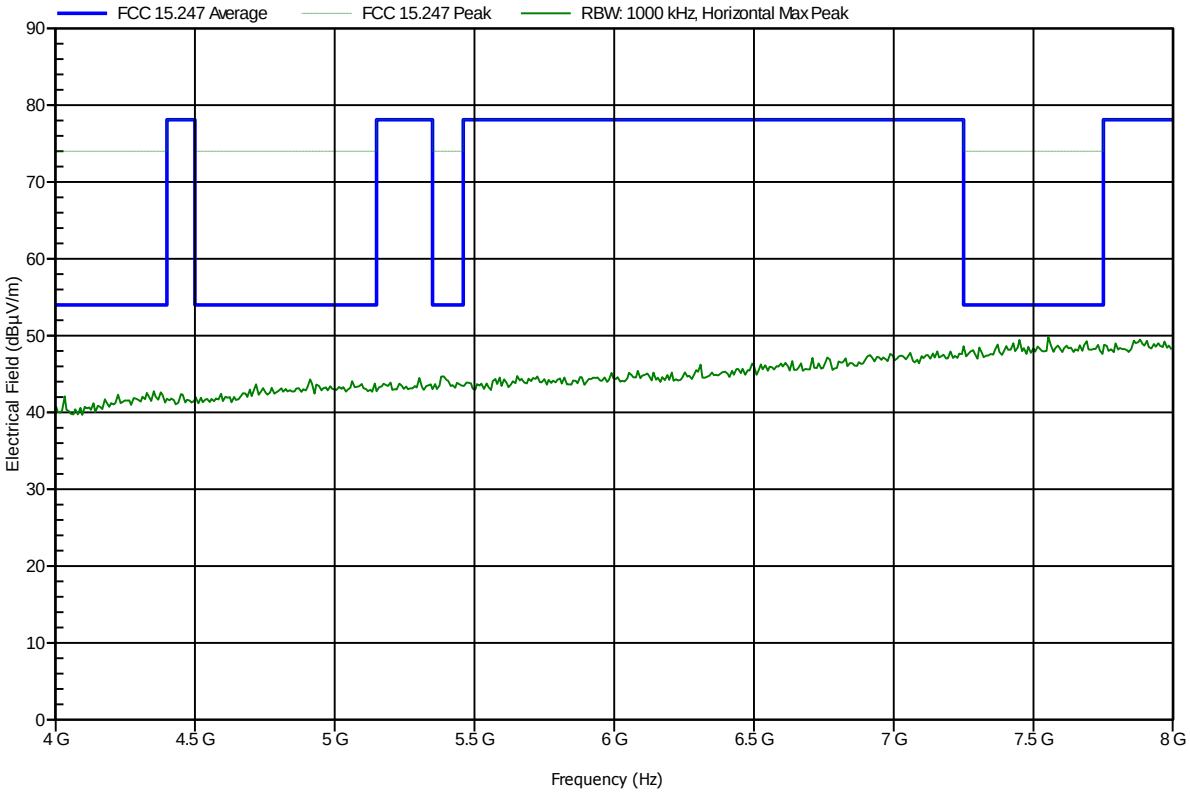

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	TX; HT40, MCS0, ch.4-8
Test Date:	2012-11-29
Note:	

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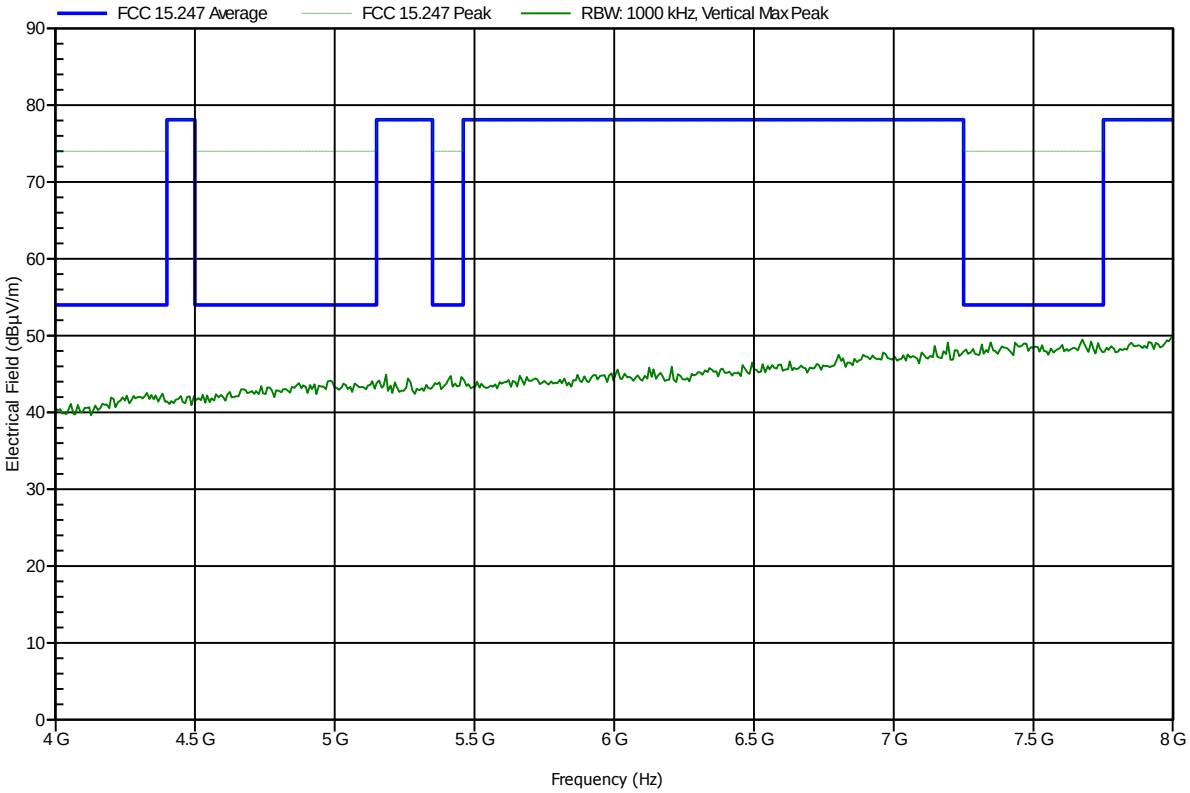

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	TX; HT40, MCS0, ch.7-10
Test Date:	2012-11-29
Note:	

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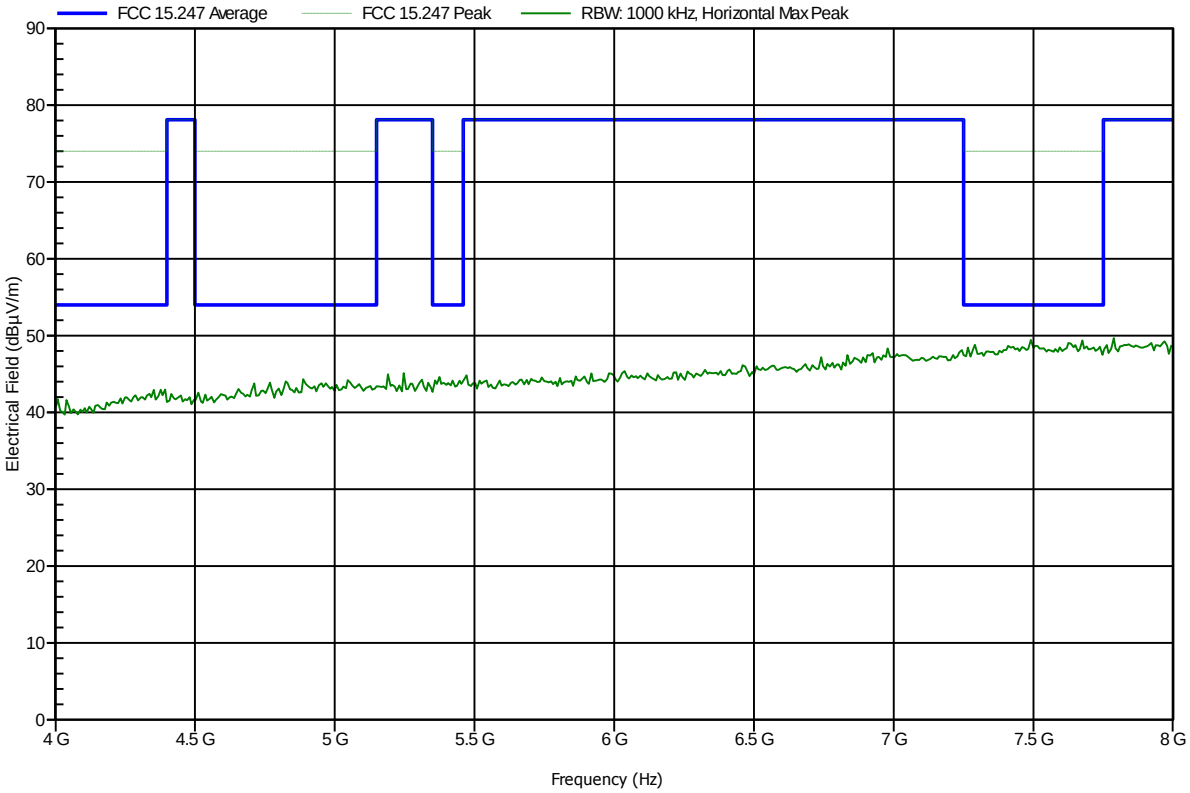

Spurious emissions according to FCC 15.247

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	TX; HT40, MCS0, ch.7-10
Test Date:	2012-11-29
Note:	

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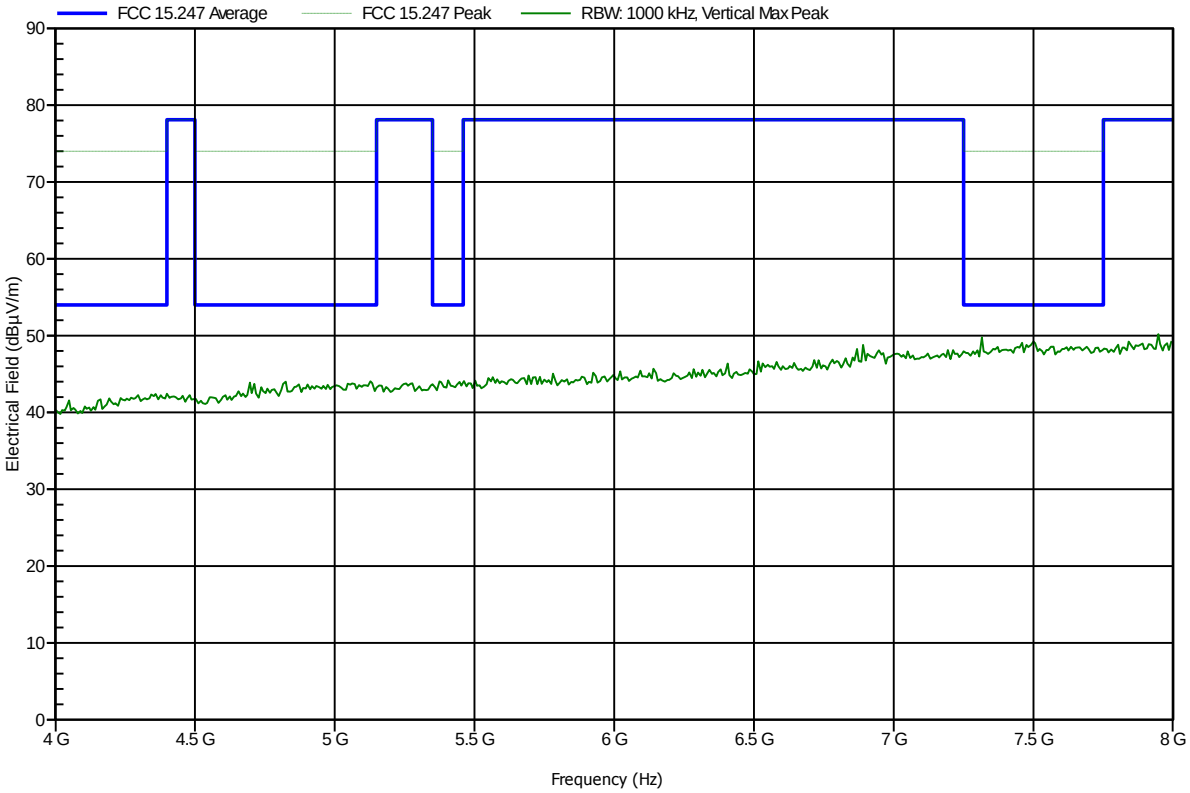

ANNEX B Receiver radiated spurious emissions

Spurious emissions according to RSS-GEN

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	RX; ch.6
Test Date:	2012-11-29
Note:	

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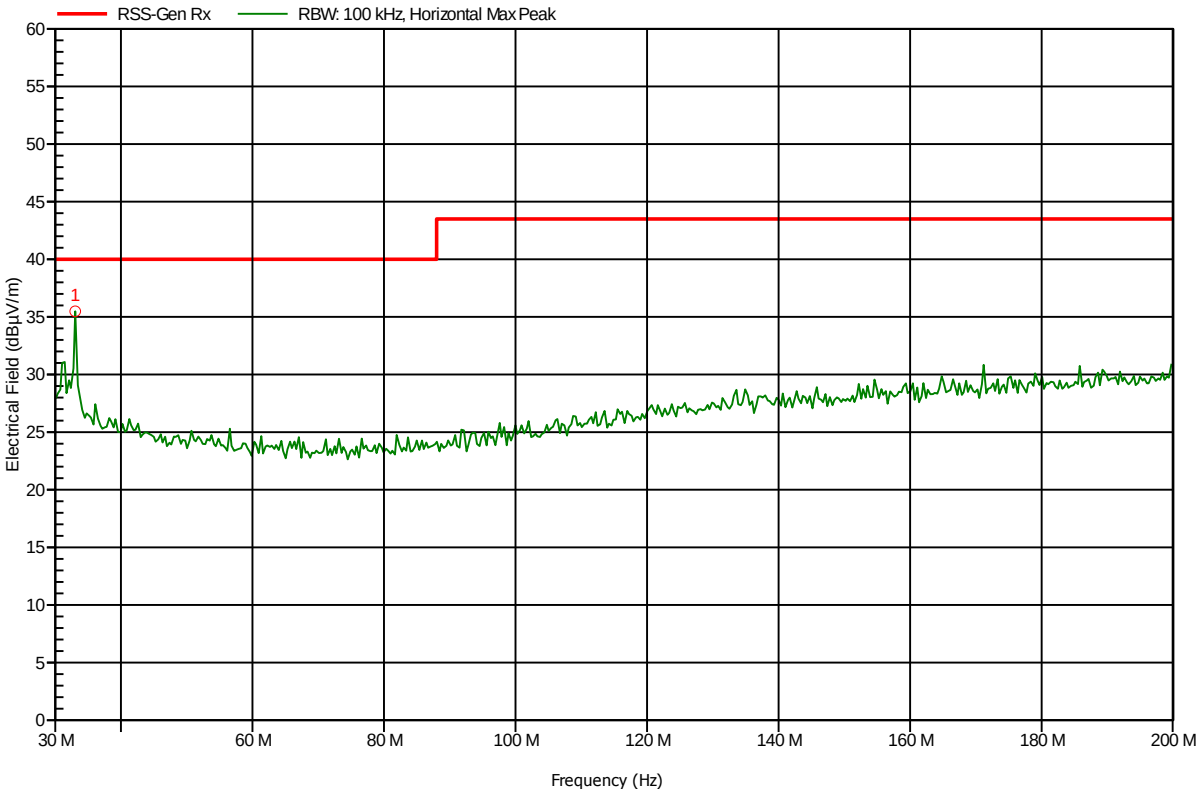

Frequency	Peak	Peak Limit	Peak Difference	Status
33.054 MHz	35.48 dBµV/m	40 dBµV/m	-4.52 dB	Pass

Spurious emissions according to RSS-GEN

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3 m
Mode:	RX; ch.6
Test Date:	2012-11-29
Note:	

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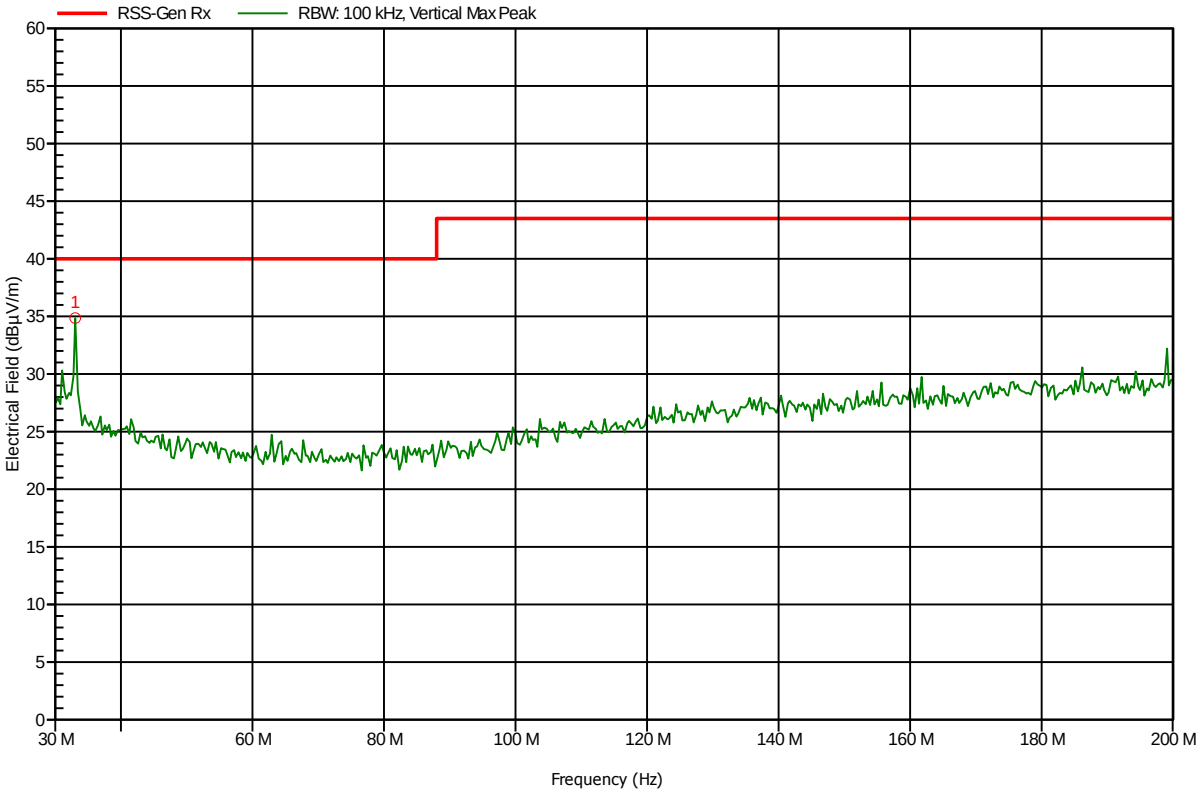

Frequency	Peak	Peak Limit	Peak Difference	Status
33.054 MHz	34.85 dBµV/m	40 dBµV/m	-5.15 dB	Pass

Spurious emissions according to RSS-GEN

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	RX; ch.6
Test Date:	2012-11-29
Note:	

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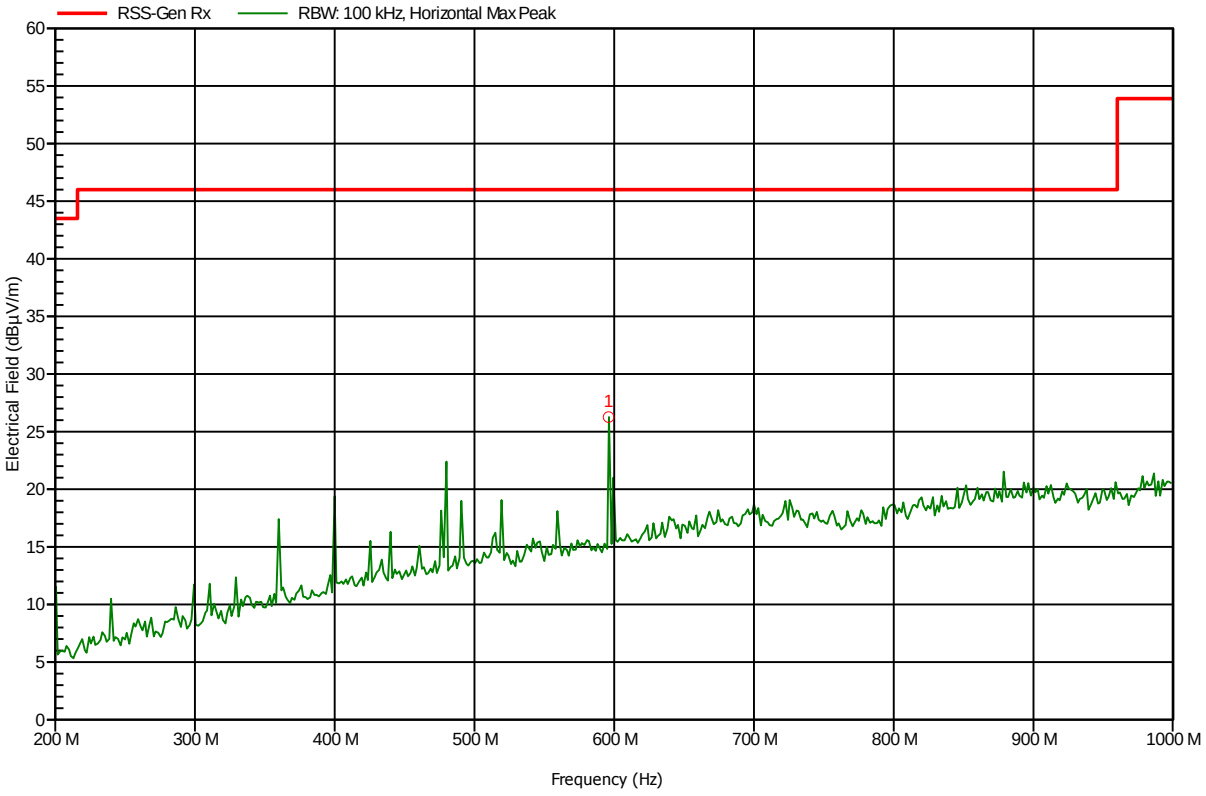

Frequency	Peak	Peak Limit	Peak Difference	Status
596.008 MHz	26.26 dBµV/m	46 dBµV/m	-19.74 dB	Pass

Spurious emissions according to RSS-GEN

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	RX; ch.6
Test Date:	2012-11-29
Note:	

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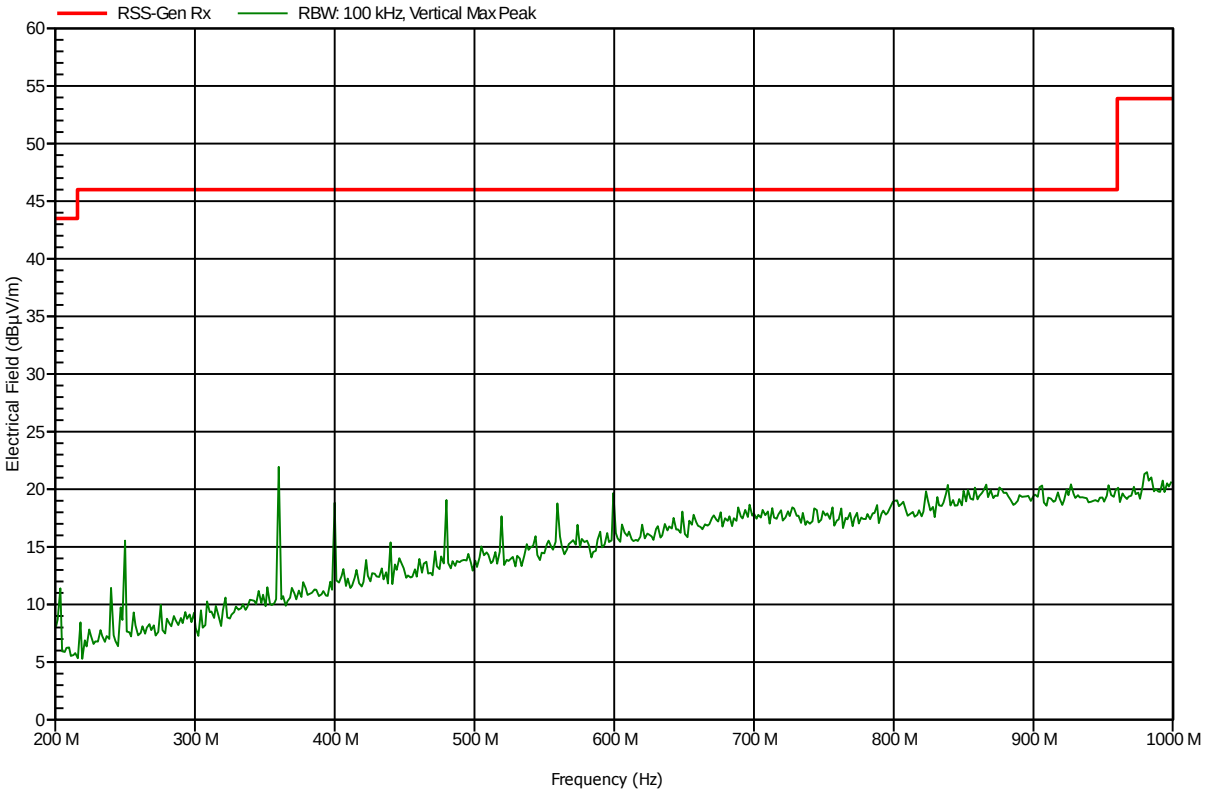

Spurious emissions according to RSS-GEN

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	RX; ch.6
Test Date:	2012-11-29
Note:	

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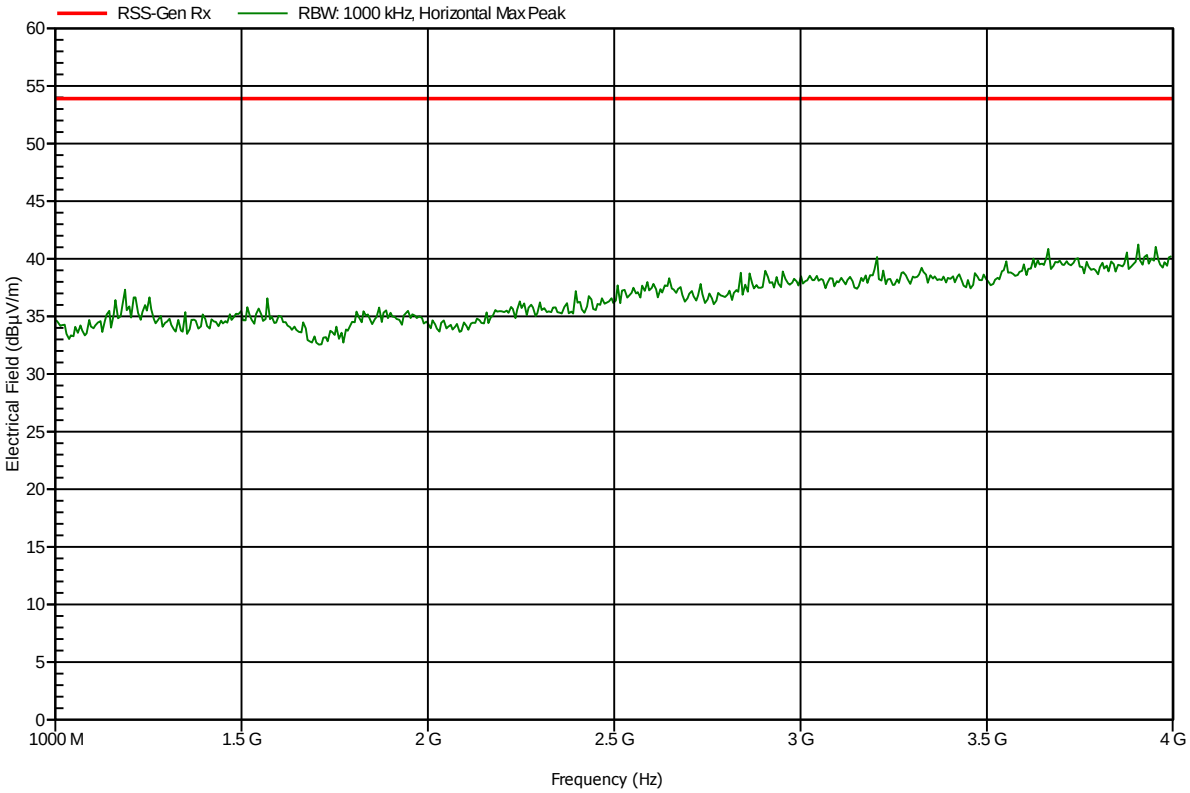

Spurious emissions according to RSS-GEN

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	RX; ch.6
Test Date:	2012-11-29
Note:	

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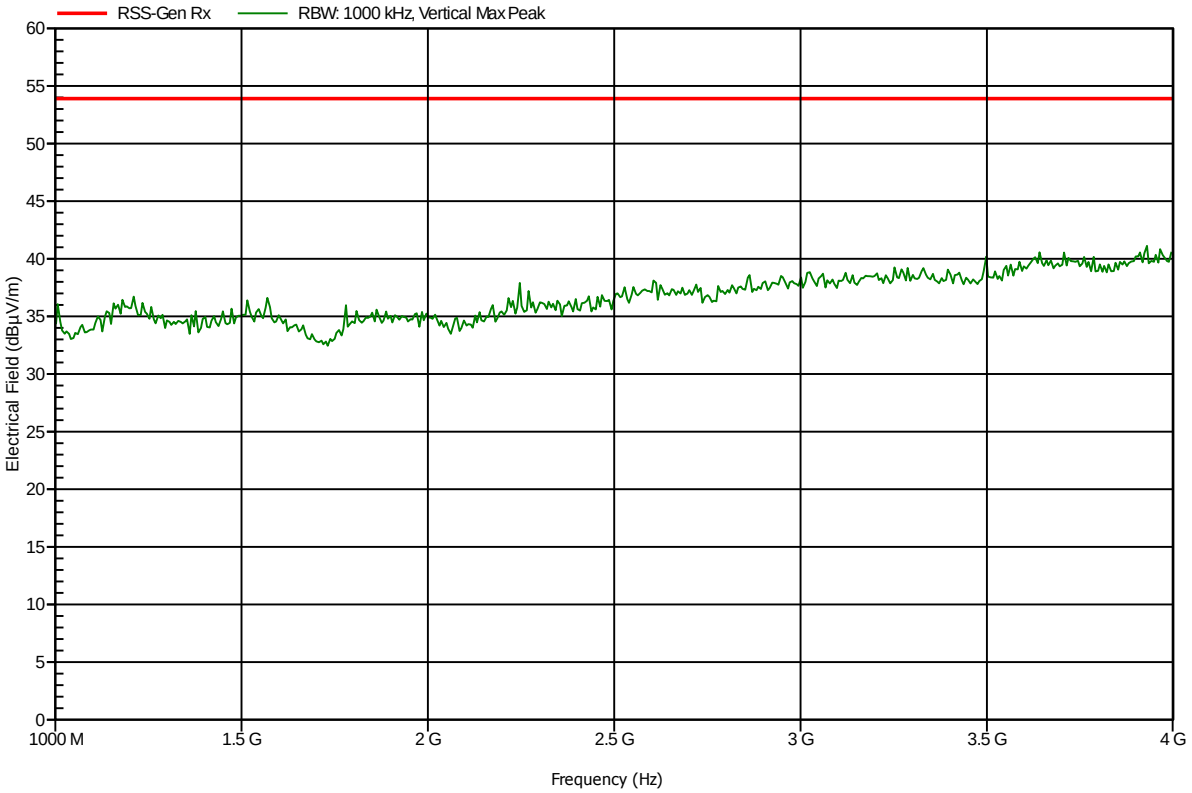

Spurious emissions according to RSS-GEN

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	RX; ch.6
Test Date:	2012-11-29
Note:	

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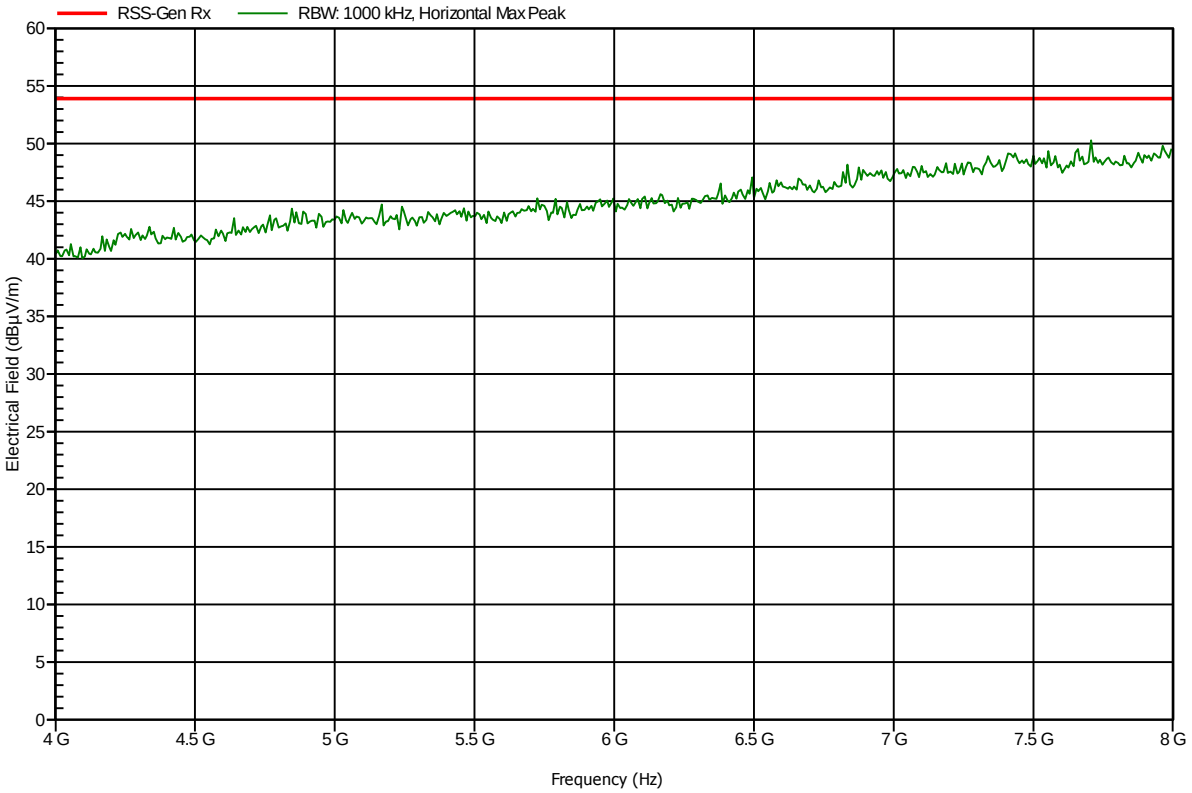

Spurious emissions according to RSS-GEN

Project number: G0M-1211-2443

Manufacturer:	lesswire AG
EUT Name:	WLAN / Bluetooth module
Model:	WiBear11n-SF1
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	RX; ch.6
Test Date:	2012-11-29
Note:	

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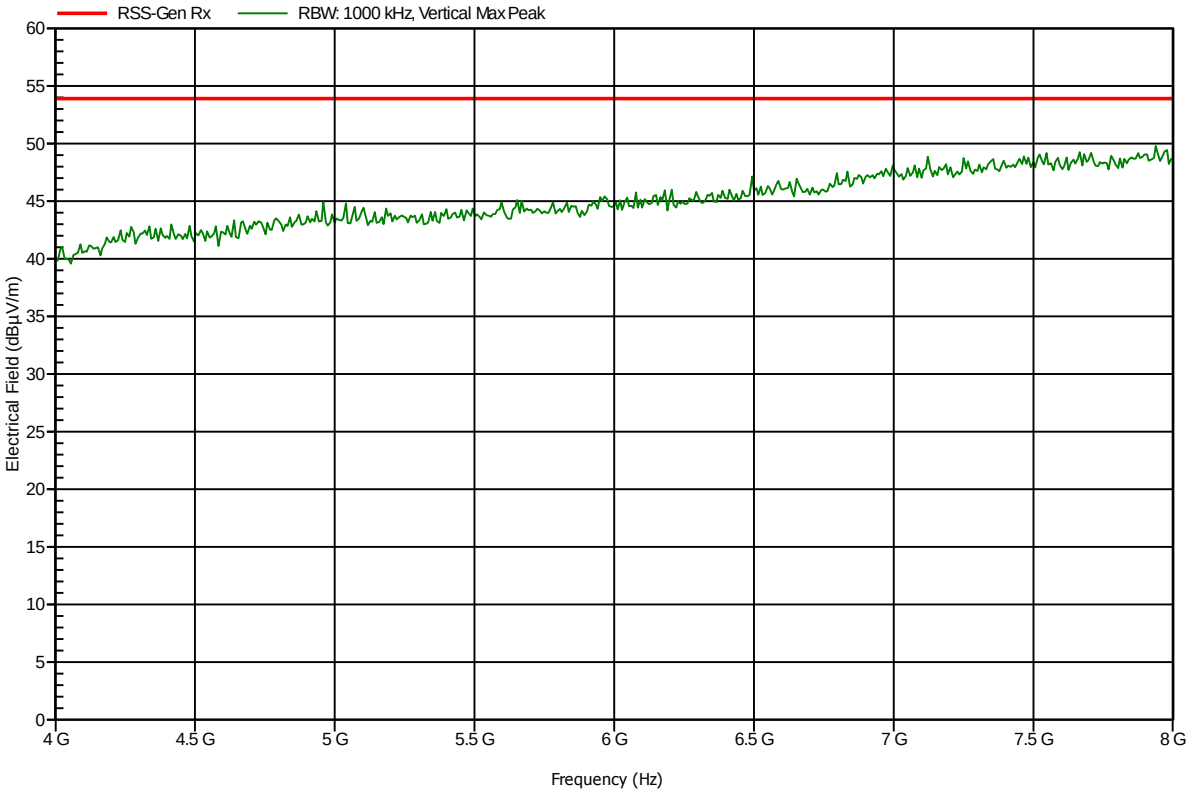

Version History

Version	Issue Date	Remarks		Revised by
01	2013-01-22	Initial Release		
02	2013-02-13	Replaced document: Replaced by: Reason: • Page 1 & 4: FCC-ID corrected	G0M-1211-2443-TFC247W-V01 G0M-1211-2443-TFC247W-V02	C. Weber