



EUROFINS PRODUCT SERVICE GMBH



Testing Cert #1983.01

RADIO TEST- REPORT

Compliance Test Report

**FCC PART 15 SUBPART C
IC RSS 210 ISSUE 7**

FCC ID: PV7-WIBEAR-SF-STA

WLAN/Bluetooth Module

AN00K73534

Wireless LAN Radio Part

TEST REPORT NUMBER: G0M21007-3443-C-1



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1 General Information

1.1 Notes


The results of this test report relate exclusively to the item tested as specified in chapter "Description of test item" and are not transferable to any other test items.

Eurofins Product Service GmbH is not responsible for any generalisations and conclusions drawn from this report. Any modification of the test item can lead to invalidity of test results and this test report may therefore be not applicable to the modified test item.

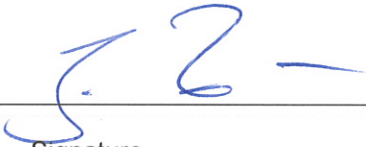
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Operator:

21.09.2010		W. Treffke	
Date	Eurofins-Lab.	Name	Signature

Technical responsibility for area of testing:

21.09.2010		J. Zimmermann	
Date	Eurofins	Name	Signature

1.2 Testing laboratory

EUROFINS PRODUCT SERVICE GMBH
Storkower Strasse 38c
D-15526 Reichenwalde b. Berlin
Germany
Telefon : +49 33631 888 00
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DAR ACCREDITED TESTING LABORATORY
DAR-REGISTRATION NUMBER: DAT-P-268/08

RECOGNIZED NOTIFIED BODY EMC
REGISTRATION NUMBER: BNetzA-bS EMV-07/61

RECOGNIZED NOTIFIED BODY R&TTE
REGISTRATION NUMBER: BNetzA-bS-02/51-53

FCC FILED TEST LABORATORY
REG.-No. 96970

A2LA ACCREDITED TESTING LABORATORY
CERTIFICATE No. 1983.01

BLUETOOTH QUALIFICATION TEST FACILITY (BQTF)
ACCREDITED BY BLUETOOTH QUALIFICATION REVIEW BOARD

INDUSTRY CANADA FILED TEST LABORATORY
REG. NO. IC 3470

Test location, where different:

Name	: ./.
Street	: ./.
Town	: ./.
Country	: ./.
Telephone	: ./.
Fax	: ./.

1.3 Details of approval holder

Name : lesswire AG
Street : Im Technologiepark 1
Town : 15236 Frankfurt/Oder
Country : Germany
Telephone : 030 6392 8130
Fax : 030 6392 8287

Contact : Frau Angelika Seifert
Telephone : 030 6392 8130

1.4 Application details

Date of receipt of application : 08.07.2010
Date of receipt of test item : 08.07.2010
Date of test : 12. – 13.07.2010

1.5 Test item

Description of test item : WLAN/Bluetooth Module
Type identification : AN00K73534
Brand Name : WiBear-SF1
Serial number : None
Hardware version : 2A
Software version : None
Equipment type : Radio module

Technical data

Frequency range : 2400 - 2483.5MHz
Tested frequencies : F₁ 2412MHz
Tested frequencies : F₂ 2437MHz
Tested frequencies : F₃ 2462MHz
Antenna type : external
Antenna model : Rubber antenna 2.4GHz, SMA, Order number : 17010.0
WiMo Antennen und Elektronik GmbH
Number of antennas : 1
Antenna gain : 2.1dBi (Declared by approval holder)
Power supply : 3.3VDC
Duty cycle : CCK, DSSS : 90%, OFDM : 54%
Operating mode : semi duplex
Spreading technique : CCK, DSSS, OFDM

Modulations : DBPSK, DQPSK

Device classification : Mobile Device (Human Body distance > 20 cm)

Additional information : The results in this test report cover only the wireless lan radio part of the EUT. The results for the bluetooth radio part are given in test-report G0M21007-3443-P-15.

Manufacturer:
(if applicable)

Name : PRETTL Electronics AG
 Street : Robert Bosch Straße 10
 Town : 01454 Radeberg
 Country : Germany

1.6 Test standards

Technical standard : **FCC PART 15 SUBPART C**
 IC RSS 210 ISSUE 7

1.7 Acronyms and abbreviations

EUT : Equipment under Test
 TX : Transmission
 RX : Reception
 RBW : Measurement Resolution Bandwidth
 Pol : Measurement Polarization
 e.i.r.p. : Equivalent isotropic radiated power
 FHSS : Frequency hopping spread spectrum
 DSSS : Direct Sequence Spread Spectrum
 OFDM : Orthogonal frequency division multiplexing
 CCK : Complementary code keying
 GFSK : Gaussian frequency shift keying
 DBPSK : Differential binary phase shift keying
 DQPSK : Differential quadrature phase shift keying
 PSK : Phase shift keying
 T_{nom} : Nominal Temperature
 T_{min} : Minimum Temperature
 T_{max} : Maximum Temperature
 V_{nom} : Nominal Supply Voltage
 V_{min} : Minimum Supply Voltage
 V_{max} : Maximum Supply Voltage
 VDC : DC voltage
 N/A : Not applicable
 IC : Industry Canada

2 Technical test

2.1 Summary of test results

No deviations from the technical specification(s) were ascertained in the course of the tests performed.

or

The deviations as specified in 2.4 were ascertained in the course of the tests performed.

2.2 Test environment

Temperature : 22 ... 26°C

Relative humidity content : 20 ... 75%

Air pressure : 86 ... 103kPa

Extreme conditions parameters:

V_{nom} : 3.3VDC

$V_{min} (V_{nom}-15\%)$: -

$V_{max} (V_{nom}+15\%)$: -

T_{nom} : 25°C

Other parameter: None

2.3 Test equipment utilized

Measurement Equipment List					
No.	Measurement device:	Type:	Manufacturer:	Last Cal.	Next Cal.
ETS 0086	Semi-anechoic chamber	AC1	Frankonia	12.03.2010	12.03.2011
ETS 0271	Spectrum Analyzer	FSEK30	Rohde & Schwarz	19.03.2009	19.03.2010
ETS 0012	Biconical Antenna	HK 116	Rohde & Schwarz	29.01.2010	29.01.2011
ETS 0336	LPD Antenna	HL 223	Rohde & Schwarz	28.01.2010	28.01.2011
ETS 0018	Horn Antenna	BBHA 9120D	Schwarzbeck	26.08.2009	26.08.2010
ETS 0432	Amplifier-Matrix			02.06.2010	02.06.2012
ETS 0259	Power Meter	NRVD	Rohde & Schwarz	26.03.2010	26.03.2011
ETS 0278	Power Sensor	NRV-Z31	Rohde & Schwarz	01.08.2008	01.08.2010
ETS 0496	Spectrum Analyzer	FSP30	Rohde & Schwarz	26.08.2009	26.08.2010
ETS 0086	Semi-anechoic chamber	AC1	Frankonia	12.03.2010	12.03.2011

2.4 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 dB μ V. Any external preamplifiers used are taken into account through internal analyzer settings.

A.F.:

This is the antenna factor for the receiving antenna. It is a conversion factor, which converts electric fields strengths to voltages, which can be measured directly on the spectrum analyzer. It is treated as a loss in dB. Cable losses have been included with the A.F. to simplify the calculations. The antenna factor is used in calculations as follows:

$$\text{Reading on Analyzer (dB}\mu\text{V)} + \text{A.F. (dB)} = \text{Net field strength (dB}\mu\text{V/m)}$$

Net:

This is the net field strength measurement (as shown above).

Limit:

This is the FCC Class B radiated emission limit (in units of dB μ V/m). The FCC limits are given in units of μ V/m. The following formula is used to convert the units of μ V/m to dB μ V/m:

$$\text{Limit (dB}\mu\text{V/m)} = 20 \cdot \log(\mu\text{V/m})$$

Margin:

This is the margin of compliance below the FCC limit. The units are given in dB. A negative margin indicates the emission was below the limit. A positive margin indicates that the emission exceeds the limit.

Example only:

$$\begin{array}{rclcl} \text{Reading} & + & \text{AF} & = & \text{Net Reading} & : & \text{Net reading} - \text{FCC limit} = \text{Margin} \\ 21.5 \text{ dB}\mu\text{V} & + & 26 \text{ dB} & = & 47.5 \text{ dB}\mu\text{V/m} & : & 47.5 \text{ dB}\mu\text{V/m} - 57.0 \text{ dB}\mu\text{V/m} = -9.5 \text{ dB} \end{array}$$

2.5 Test results

 1st test

 test after modification

 production test

Test case	Clause	Required	Result	Remarks
INFORMATIONAL TRANSMITTER PARAMETERS				
Occupied Bandwidth	IC RSS-Gen. 4.6.1	<input type="checkbox"/>	N/A	IC only
TRANSMITTER PARAMETERS				
6dB Bandwidth	FCC § 15.247(a)(2) IC RSS-210 § A8.2	<input checked="" type="checkbox"/>	PASS	
Spectral Density	FCC § 15.247(e) IC RSS-210 § A8.2	<input checked="" type="checkbox"/>	PASS	
Maximum peak conducted output power	FCC § 15.247(b) IC RSS-210 § A8.4	<input checked="" type="checkbox"/>	PASS	
Band-edge Compliance	FCC § 15.247(d) IC RSS-210 § A8.5	<input checked="" type="checkbox"/>	PASS	
Conducted spurious emissions	FCC § 15.247(d) IC RSS-210 § A8.5	<input checked="" type="checkbox"/>	PASS	
Radiated spurious emissions	FCC § 15.209 IC RSS-Gen § 4.9	<input checked="" type="checkbox"/>	PASS	
RECEIVER PARAMETERS				
Radiated spurious emissions	FCC § 15.109 IC RSS-Gen § 4.10 IC RSS-Gen § 7.2.3	<input type="checkbox"/>	N/A	IC only
POWER LINE PARAMETERS				
AC power line conducted emissions	FCC § 15.207 IC RSS-Gen. 7.2.2	<input checked="" type="checkbox"/>	PASS	

3 Informational Transmitter parameters

3.1 Transmitter Modes for conformance testing

The following transmission modes are elected for compliance testing.

TEST MODE DSSS	
Conditions	
Spread Spectrum :	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Spreading Technique :	DSSS
Modulation :	DBPSK
Bandwidth :	20MHz
Data rate :	1Mbps
Duty Cycle :	90%
Power level :	Maximum : 16 (Firmware setting)

TEST MODE OFDM	
Conditions	
Spread Spectrum :	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Spreading Technique :	OFDM
Modulation :	DBPSK
Bandwidth :	20MHz
Data rate :	6Mbps
Duty Cycle :	55%
Power level :	Maximum : 15 (Firmware setting)

4 Transmitter parameters

4.1 6dB Bandwidth

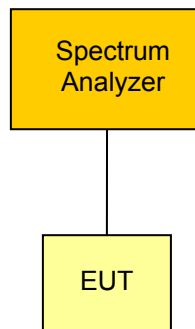
According FCC rules 47 CFR 15.247(a)(2) and RSS-210 Section A8.2 the minimum 6dB Bandwidth has to be validated.

4.1.1 Limits

According FCC and IC rules the minimum 6dB bandwidth shall be at least 500 kHz.

6dB bandwidth limit
$\geq 500\text{kHz}$

4.1.2 Measurement procedure



The eut is connected to a spectrum analyzer and set to transmission mode with maximum power under normal test conditions. The resolution bandwidth is set to 100kHz (VBW \geq RBW). The center frequency is set to the channel center frequency. The span of the analyzer is set to 2 -3 times the 6dB bandwidth. The bandwidth is determined using markers with peak detector and max hold.

4.1.3 Results

Transmitter 6dB bandwidth			
Channel [MHz]	Lower edge frequency [MHz]	Upper edge frequency [MHz]	6dB Bandwidth [MHz]
Test mode DSSS			
2412	-	-	10.12
2437	-	-	10.07
2462	-	-	10.12
Test mode OFDM			
2412	-	-	16.45
2437	-	-	16.45
2462	-	-	16.45
See attached diagram in Annex			
Verdict			PASS

4.2 Power spectral density

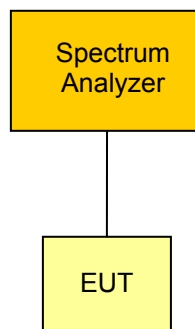
According FCC rules 47 CFR 15.247(e) and RSS-210 Section A8.2 the maximum pwer density in any 3kHz bandwidth is limited and has to be validated.

4.2.1 Limits

According FCC and IC rules the transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission or over 1.0 second if the transmission exceeds 1.0-second duration.

Spectral density limit
≤ 8dBm/3kHz

4.2.2 Measurement procedure



The eut is connected to a spectrum analyzer and set to transmission mode with maximum power under normal test conditions. The resolution bandwidth is set to 3kHz (VBW≥RBW). The center frequency is set to the channel center frequency. The span of the analyzer is set to 1.5MHz. The sweep time is set to SPAN/RBW. The spectral density is determined using peak detector and max hold.

According to 47 CFR 15.31 battery power equipment is measured using new batteries and equipment using external power supply is measured with 85%, 100% and 115% of the nominal rated supply voltage.

4.2.3 Results

Power spectral density		
Channel [MHz]	Max. emission frequency [MHz]	Spectral density [dBm/3kHz]
Test mode DSSS		
2412	2412.997	-4.34
2437	2438.999	-0.93
2462	2461.132	-5.45
Test mode OFDM		
2412	2417.006	-12.47
2437	2430.736	-9.93
2462	2456.348	-10.66
See attached diagram in Annex		
Verdict		PASS

4.3 Maximum peak conducted output power

According FCC rules 47 CFR 15.247(b)(3) and RSS-210 Section A8.4 the maximum peak conducted output power is limited and has been verified.

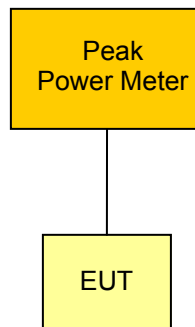
4.3.1 Limits

For systems employing digital modulation techniques operating in the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz, the maximum peak conducted output power shall not exceed 1 W.

Maximum peak conducted power limit
1W / 30dBm

*) 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.

4.3.2 Measurement procedure



The eut is connected to a peak power sensor of a power meter and activated with the maximum power level. The peak power is measured and recorded.

According to 47 CFR 15.31(e) battery power equipment is measured using new batteries and equipment using external power supply is measured with 85%, 100% and 115% of the nominal rated supply voltage.

4.3.3 Results

Maximum peak conducted output power		
Measurement Conditions		
Antenna gain :	2.1dBi	
Power correction :	0dB	
Channel [MHz]	Conducted output power [dBm]	Power Limit [dBm]
Test mode DSSS		
2412	17.9	≤ 30
2437	17.6	≤ 30
2462	18.4	≤ 30
Test mode OFDM		
2412	19.8	≤ 30
2437	20.1	≤ 30
2462	19.9	≤ 30
See attached diagrams in Annex		
Measurement uncertainty		4.22dB
Verdict		PASS

4.4 Transmitter band-edge compliance

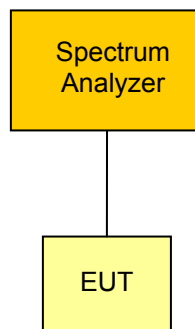
According FCC rules 47 CFR 15.209, 15.247(d) and RSS-210 Section A8.5 the emission level of out-of-band emissions are limited and has to be validated.

4.4.1 Limits

The emission limit of out of band emission in any 100kHz bandwidth outside the frequency band in which the spread spectrum device is operating, the radio frequency power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits (see "Transmitter spurious emissions"-measurement) is not required.

Transmitter band-edge emission limits	
TX-Power Detector	Out of band attenuation
Peak	-20dBc/100kHz
RMS	-30dBc/100kHz

4.4.2 Measurement procedure



The eut is connected to a spectrum analyzer and set to transmission mode without hopping with maximum power under normal test conditions. The span of the analyzer is set large enough to capture the maximum emission within the emission band as well as any modulation product which fall outside the authorized band of operation. The resolution bandwidth is set to 1% of the span ($VBW \geq RBW$). The

A marker is set on the emission at the bandedge, or on the highest modulation product outside of the band, if this level is greater than that at the bandedge. Using the delta-marker function the highest peak of of the in-band emission is measured.

4.4.3 Results

Transmitter band-edge emissions		
Measurement Conditions		
Power mode :	Peak	
Test mode	Lower edge emission [dBc]	Upper edge emission [dBc]
DSSS	-43.49	-43.83
OFDM	-33.04	-41.19
See attached diagram in Annex		
Verdict	PASS	

4.5 Transmitter conducted spurious emissions

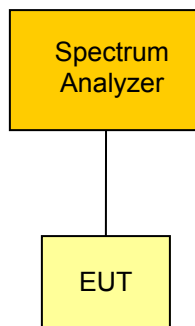
According FCC rules 47 CFR 15.247(d) and RSS-210 Section A8.5 unwanted emissions in the spurious domain are power limited and has to be validated.

4.5.1 Limits

The emission limit of out of band emission in any 100kHz bandwidth outside the frequency band in which the spread spectrum device is operating, the radio frequency power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits (see “Transmitter radiated spurious emissions”-measurement) is not required.

Transmitter conducted spurious emission limits	
TX-Power Detector	Out of band attenuation
Peak	-20dBc/100kHz
RMS	-30dBc/100kHz

4.5.2 Measurement procedure



The eut is connected to a spectrum analyzer and set to transmission mode with maximum power under normal test conditions. The span of the analyzer is set large enough to capture the maximum emission within the emission band as well as any spurious emission outside the authorized band of operation. The resolution bandwidth is set to 100kHz (VBW≥RBW). The emissions are measured using peak detector and max hold.

The measurement is performed over the frequency range of 30MHz up to the tenth harmonic.

4.5.3 Results

Transmitter conducted spurious emissions					
Measurement Conditions					
Power detector :		Peak			
Modulated :		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
Channel Frequency [MHz]	Emission Frequency [MHz]	Measured Field Strength * [dBm]	Channel Power [dBm]	Limit [dBm]	Margin [dB]
Test mode DSSS					
2412	6607.2	-20.46	6.83	-13.17	-7.29
2437	6627.2	-20.87	6.81	-13.19	-7.68
2462	6707.4	-21.18	7.22	-12.78	-8.40
Test mode OFDM					
2412	10880	-43.42	1.83	-18.17	-25.25
2437	10080	-43.91	4.07	-15.93	-27.98
2462	10220	-42.07	2.51	-17.49	-24.58
See attached diagrams in Annex					
Verdict				PASS	

4.6 Transmitter radiated spurious emissions

According FCC rules 47 CFR 15.209 unwanted emissions in the spurious domain are power limited and has to be validated.

4.6.1 Limits

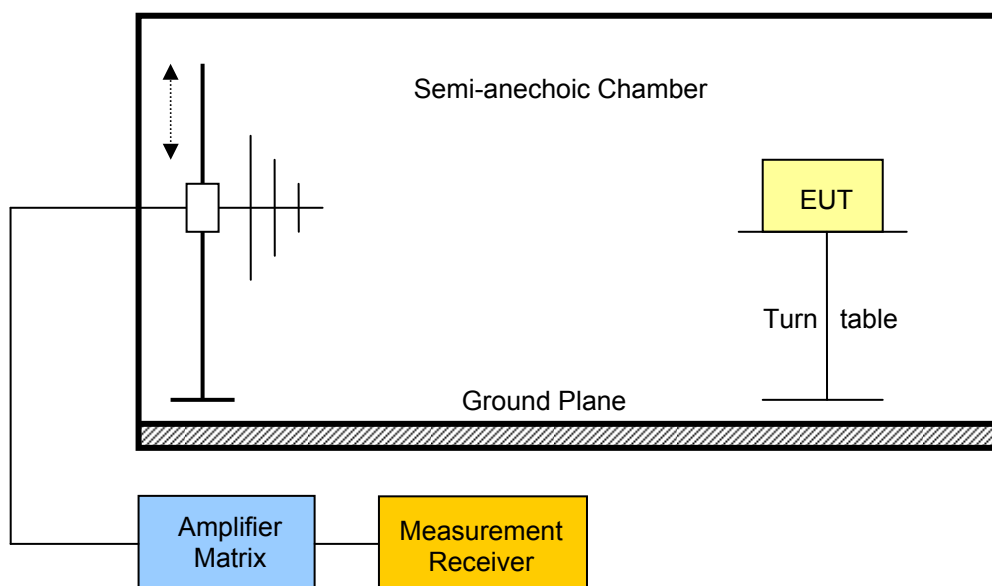
Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Tranmitter restricted band spurious emission limits				
Frequency range [MHz]	Detector	Limit [$\mu\text{V}/\text{m}$]	Calculated Limit 3m [dB $\mu\text{V}/\text{m}$]	Measurement 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

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.

4.6.2 Measurement procedure

The spurious emission measurement is performed on 3m a semi-anechoic test site.



The eut is placed on a non-metallic table. Any emission is received by the measurement antenna and measured via a measurement receiver connected to the antenna. To obtain the maximum emission the eut is rotated through 360°.

Due to practical reasons the spurious emission level check is first performed with a peak detector and the quasi-peak and average limits.

If any emission is detected that gets close to the emission limit the detector is changed and the quasi-peak or average detector is used. Which detector is used is determined by the emission frequency. If pulsed transmission is used, averaging over the pulse train is used.

The measurement values are also corrected to obtain the field strength values at the defined measurement distances of the emission limits.

The measurement is performed over the frequency range of 30MHz up to the tenth harmonic.

4.6.3 Results

Transmitter radiated spurious emissions - DSSS						
Measurement Conditions						
Measurement distance :		3m				
Modulated :		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				
Channel Frequency [MHz]	Emission Frequency [MHz]	Polarization	Measured Field Strength [dB μ V/m]	Limit@3m [dB μ V/m]	Detector	Margin [dB]
Test mode DSSS						
2412	2397	V	66.52	74	P	-7.48
	2390	V	41.67	54	AV	-12.33
	4826	H	53.45	74	P	-20.55
	4826	V	54.64	74	P	-19.36
	4824	V	52.02	54	AV	-1.98
2437	7311	V	51.23	74	P	-22.77
2462	2487	V	60.30	74	P	-13.70
	2488	V	42.93	54	AV	-11.07
	7391	V	51.87	74	P	-22.13
Verdict					PASS	

Transmitter radiated spurious emissions - OFDM						
Measurement Conditions						
Measurement distance :		3m				
Modulated :		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				
Channel Frequency [MHz]	Emission Frequency [MHz]	Polarization	Measured Field Strength [dBµV/m]	Limit@3m [dBµV/m]	Detector	Margin [dB]
Test mode OFDM						
2412	4826	H	53.16	74	P	-20.84
	4818	V	54.75	74	P	-19.25
	4824	V	41.83	54	AV	-12.17
2437	4874	H	55.64	74	P	-18.36
	4875	H	41.18	54	AV	-12.82
	7319	H	53.38	74	P	-20.62
	4874	V	57.67	74	P	-16.33
	4874	V	42.41	54	AV	-11.59
	7310	V	53.56	74	P	-20.44
2462	4922	H	57.09	74	P	-16.91
	4924	H	41.62	54	AV	-12.38
	4922	V	57.36	74	P	-16.64
	4924	V	43.95	54	AV	-10.05
	7383	V	54.59	74	P	-19.41
	7385	V	40.31	54	AV	-13.69
Verdict					PASS	

5 Power Line parameters

5.1 AC power line conducted emissions

According FCC rules 47 CFR 15.207 and RSS-Gen Section 7.2.2 for any intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits given below.

5.1.1 Limits

AC power line emission limits		
Frequency [MHz]	Conducted Limit [dB μ V]	
	Quasi-Peak	Average
0.15 – 0.5	66 to 56	56 to 46
0.5 - 5	56	46
5 - 30	60	50

5.1.2 Measurement procedure

The ac power line emissions are measured using a 50 μ H / 50 Ω line impedance stabilization network (LINS). The radio frequency voltage between each power line and ground at the power terminal is measured.

5.1.3 Results

AC power line emissions	
Conducted emission level	
See attached Diagram	
Verdict	PASS

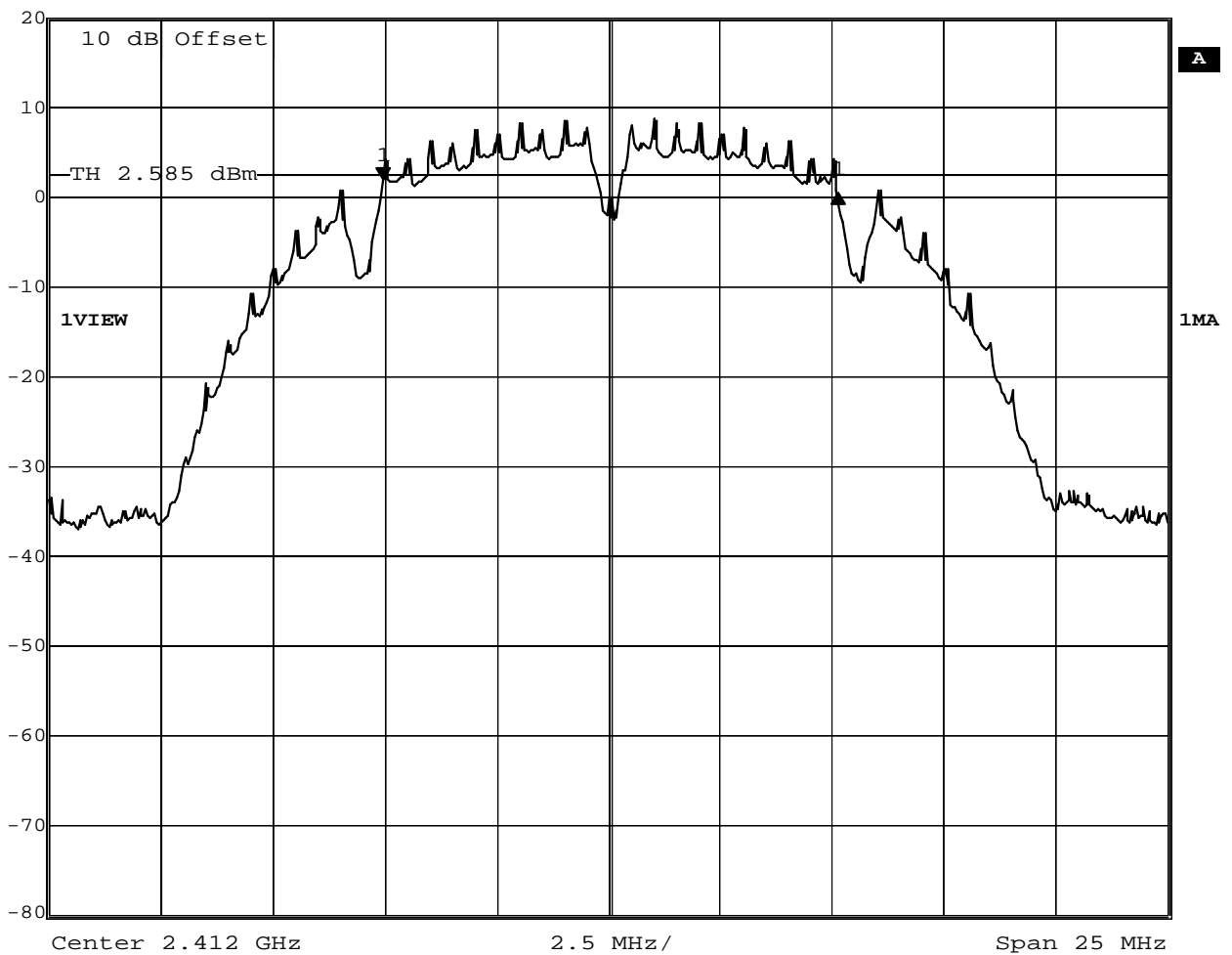
Annex B Transmitter 6dB bandwidth

FCC part 15.247 (a)2 Minimum 6 dB Bandwidth

EUT	RF module with BT and WLAN
Model	WiBear-SF1
Approval Holder	lesswire AG
Temperature / Voltage	25°C
Test Site / Operator	Eurofins Product Service GmbH
Test Specification	FCC part 15.247 (a)2
Comment 1	Minimum 6 dB Bandwidth
Comment 2	Channel : 2412 MHz
Comment 3	DSSS / 1 Mbit/s



Delta 1 [T1]	RBW	100 kHz	RF Att	40 dB
Ref Lvl	-1.55 dB	VBW	300 kHz	
20 dBm	10.12344008 MHz	SWT	6.5 ms	Unit dBm



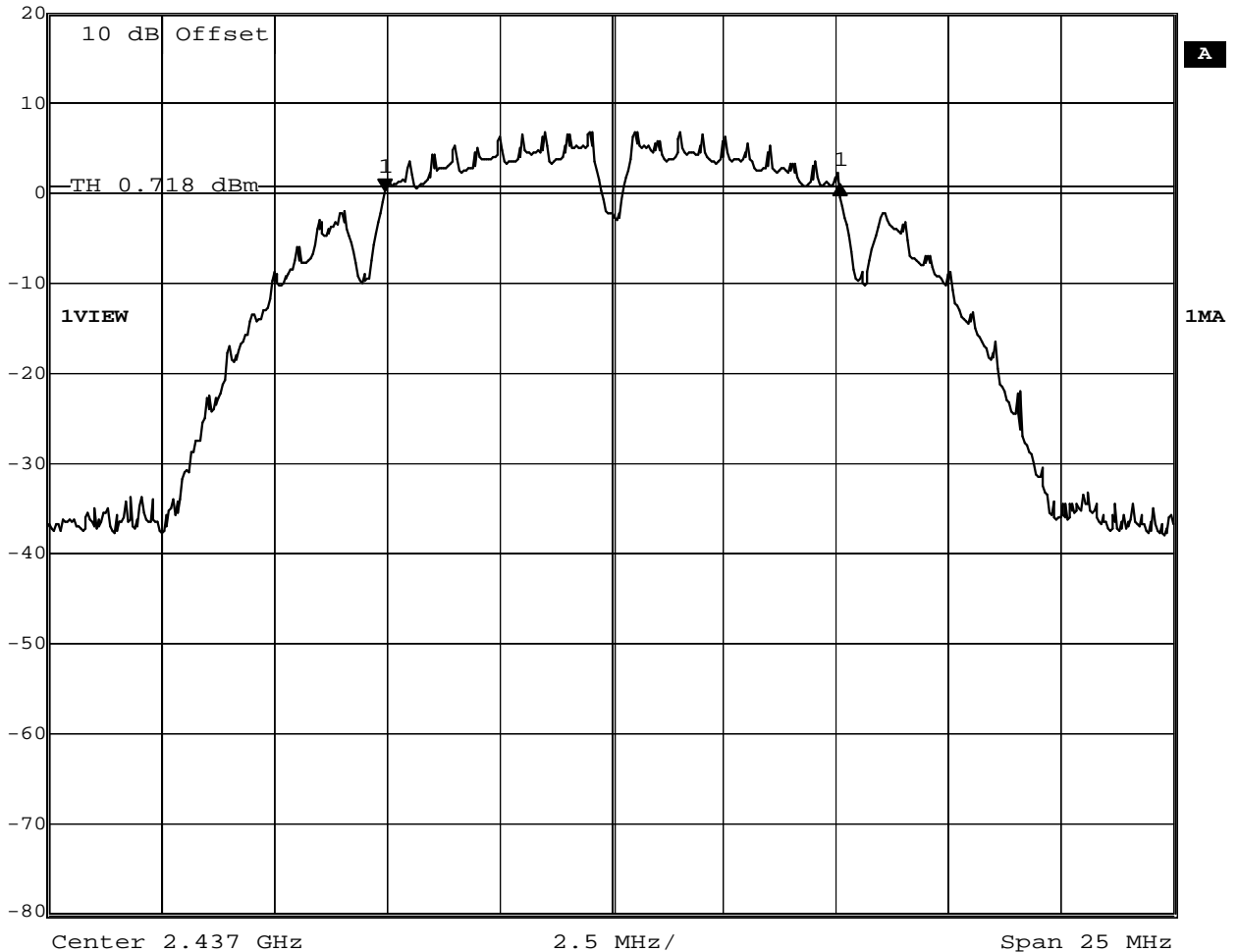
Comment A: 6 dB bandwidth: 10123.4 KHz > 500 KHz; verdict: PASS
Date: 27.AUG.2010 15:28:08

**FCC part 15.247 (a)2
Minimum 6 dB Bandwidth**

EUT	RF module with BT and WLAN
Model	WiBear-SF1
Approval Holder	lesswire AG
Temperature / Voltage	25°C
Test Site / Operator	Eurofins Product Service GmbH
Test Specification	FCC part 15.247 (a)2
Comment 1	Minimum 6 dB Bandwidth
Comment 2	Channel : 2437 MHz
Comment 3	DSSS / 1 Mbit/s



	Delta 1 [T1]	RBW	100 kHz	RF Att	40 dB
Ref Lvl	0.56 dB	VBW	300 kHz		
20 dBm	10.07333988 MHz	SWT	6.5 ms	Unit	dBm



Comment A: 6 dB bandwidth: 10073.3 KHz > 500 KHz; verdict: PASS
Date: 27.AUG.2010 15:30:40

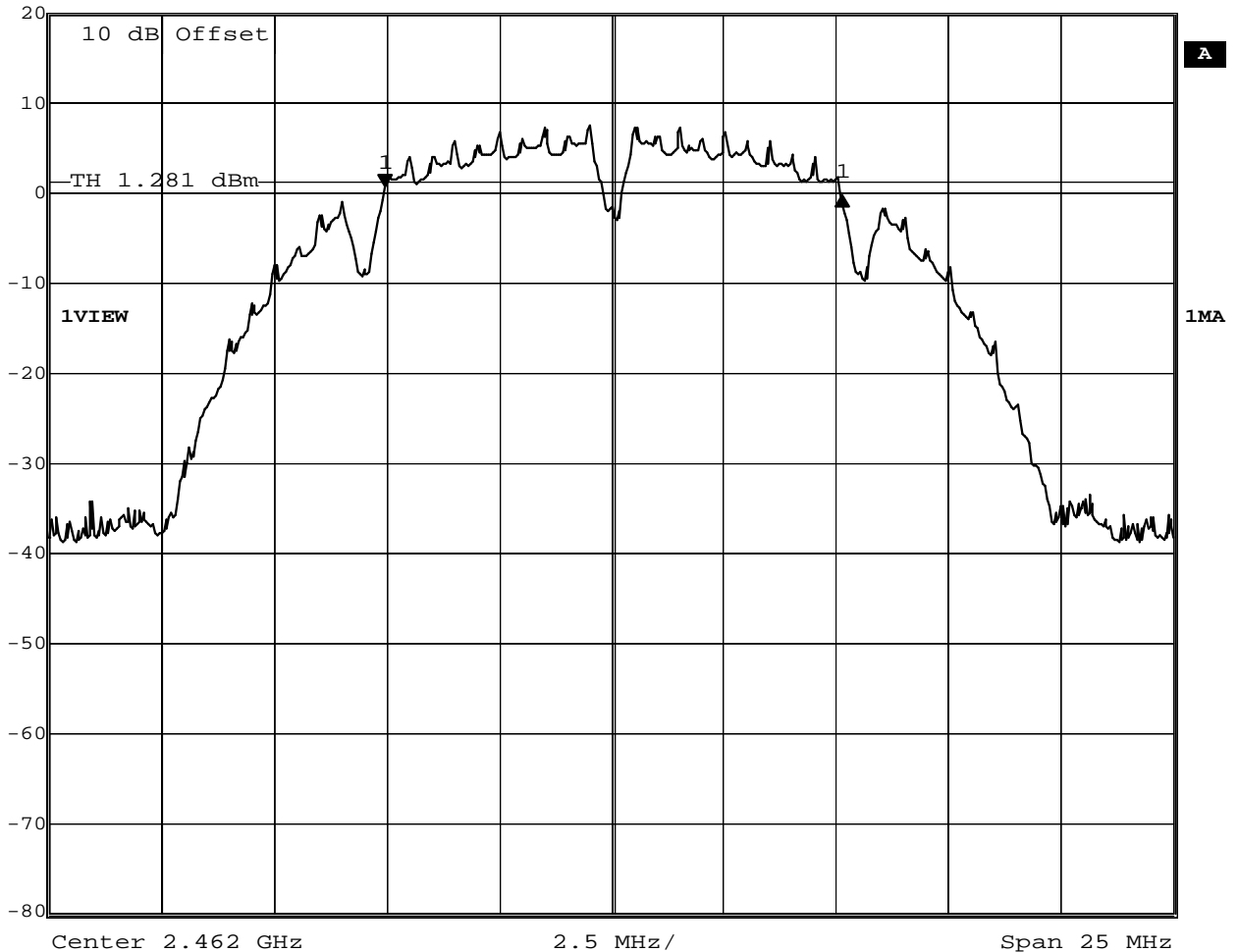
 Test Report No.: G0M21007-3443-C-1

**FCC part 15.247 (a)2
Minimum 6 dB Bandwidth**

EUT	RF module with BT and WLAN
Model	WiBear-SF1
Approval Holder	lesswire AG
Temperature / Voltage	25°C
Test Site / Operator	Eurofins Product Service GmbH
Test Specification	FCC part 15.247 (a)2
Comment 1	Minimum 6 dB Bandwidth
Comment 2	Channel : 2462 MHz
Comment 3	DSSS / 1 Mbit/s



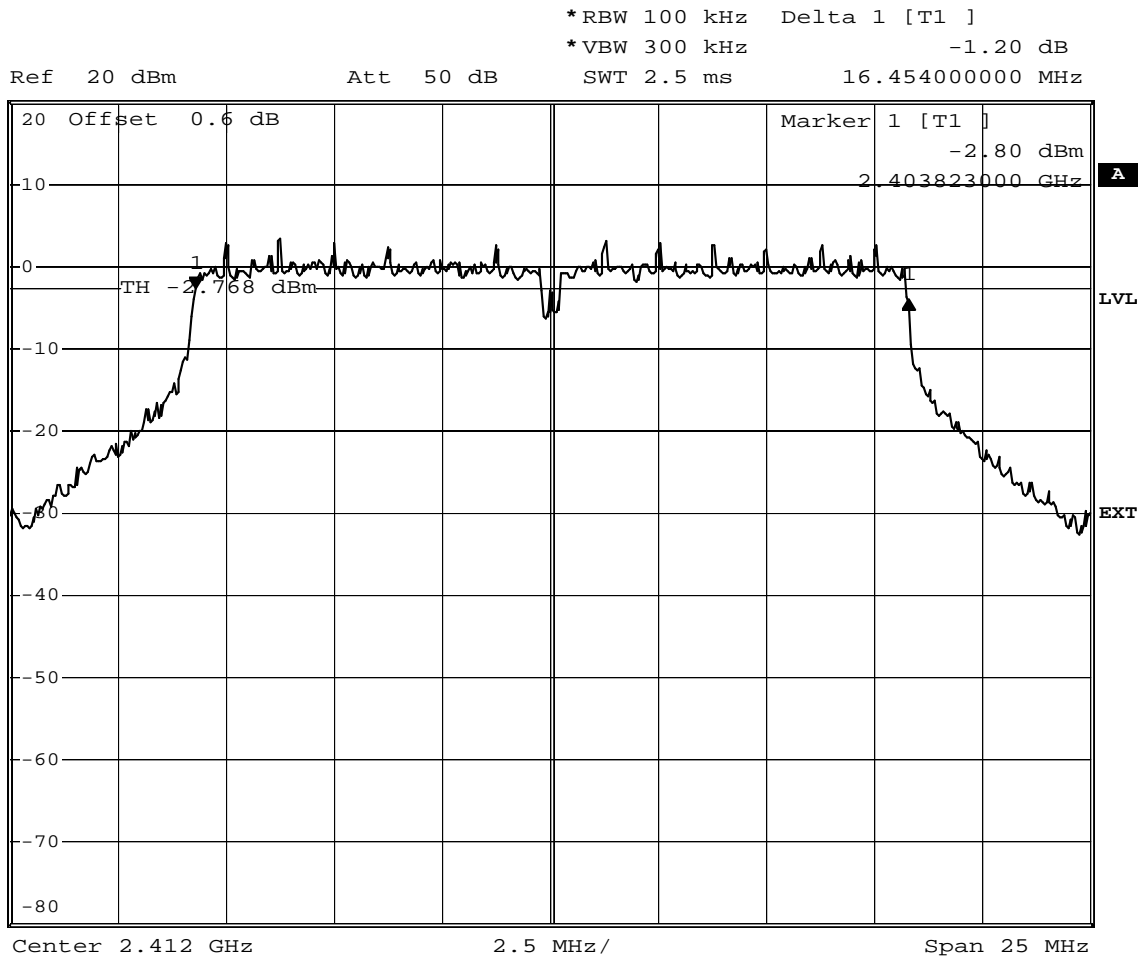
Delta 1 [T1]	RBW	100 kHz	RF Att	40 dB
Ref Lvl	-1.00 dB	VBW	300 kHz	
20 dBm	10.12173988 MHz	SWT	6.5 ms	Unit dBm



Comment A: 6 dB bandwidth: 10121.7 KHz > 500 KHz; verdict: PASS
Date: 27.AUG.2010 15:32:49

**FCC part 15.247 (a)2
Minimum 6 dB Bandwidth**

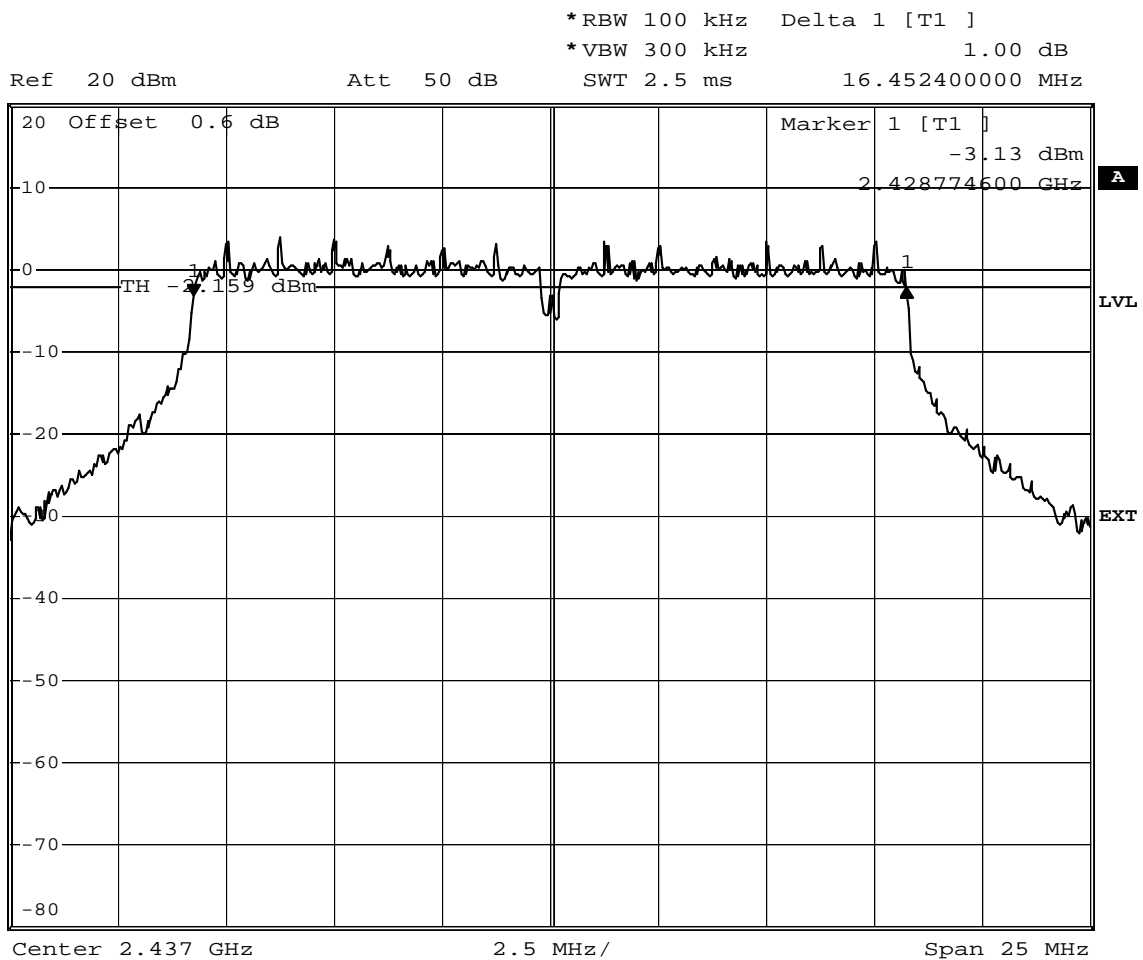
EUT	RF module with BT and WLAN
Model	WiBear-SF1
Approval Holder	lesswire AG
Temperature / Voltage	25°C
Test Site / Operator	Eurofins Product Service GmbH
Test Specification	FCC part 15.247 (a)2
Comment 1	Minimum 6 dB Bandwidth
Comment 2	Channel : 1 / 2412 MHz
Comment 3	OFDM / 6 Mbit/s



Comment: 6 dB bandwidth: 16454 KHz > 500 KHz; verdict: PASS
Date: 14.JUL.2010 13:22:19

**FCC part 15.247 (a)2
Minimum 6 dB Bandwidth**

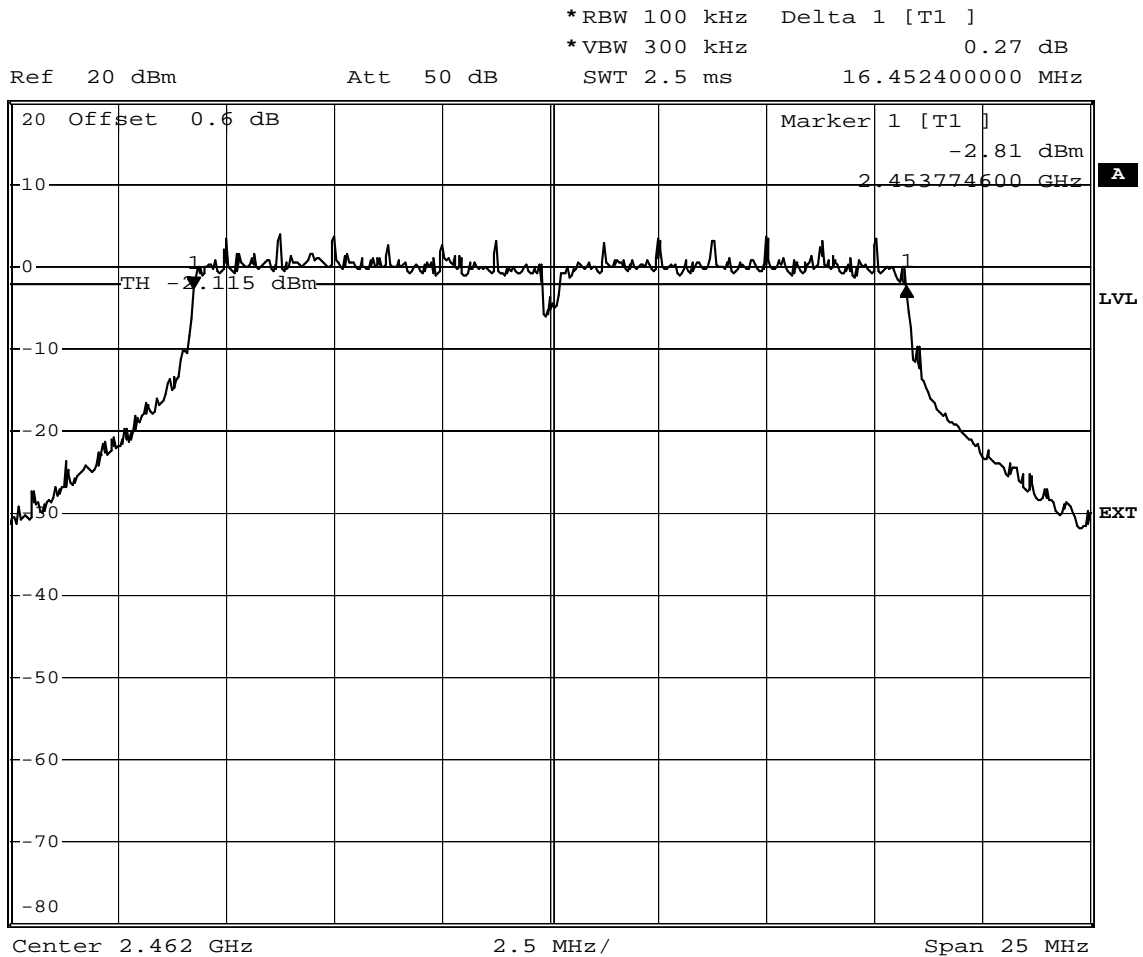
EUT	RF module with BT and WLAN
Model	WiBear-SF1
Approval Holder	lesswire AG
Temperature / Voltage	25°C
Test Site / Operator	Eurofins Product Service GmbH
Test Specification	FCC part 15.247 (a)2
Comment 1	Minimum 6 dB Bandwidth
Comment 2	Channel : 6 / 2437 MHz
Comment 3	OFDM / 6 Mbit/s



Comment: 6 dB bandwidth: 16452.4 KHz > 500 KHz; verdict: PASS
Date: 14.JUL.2010 13:20:00

FCC part 15.247 (a)2
Minimum 6 dB Bandwidth

EUT	RF module with BT and WLAN
Model	WiBear-SF1
Approval Holder	lesswire AG
Temperature / Voltage	25°C
Test Site / Operator	Eurofins Product Service GmbH
Test Specification	FCC part 15.247 (a)2
Comment 1	Minimum 6 dB Bandwidth
Comment 2	Channel : 11 / 2462 MHz
Comment 3	OFDM / 6 Mbit/s



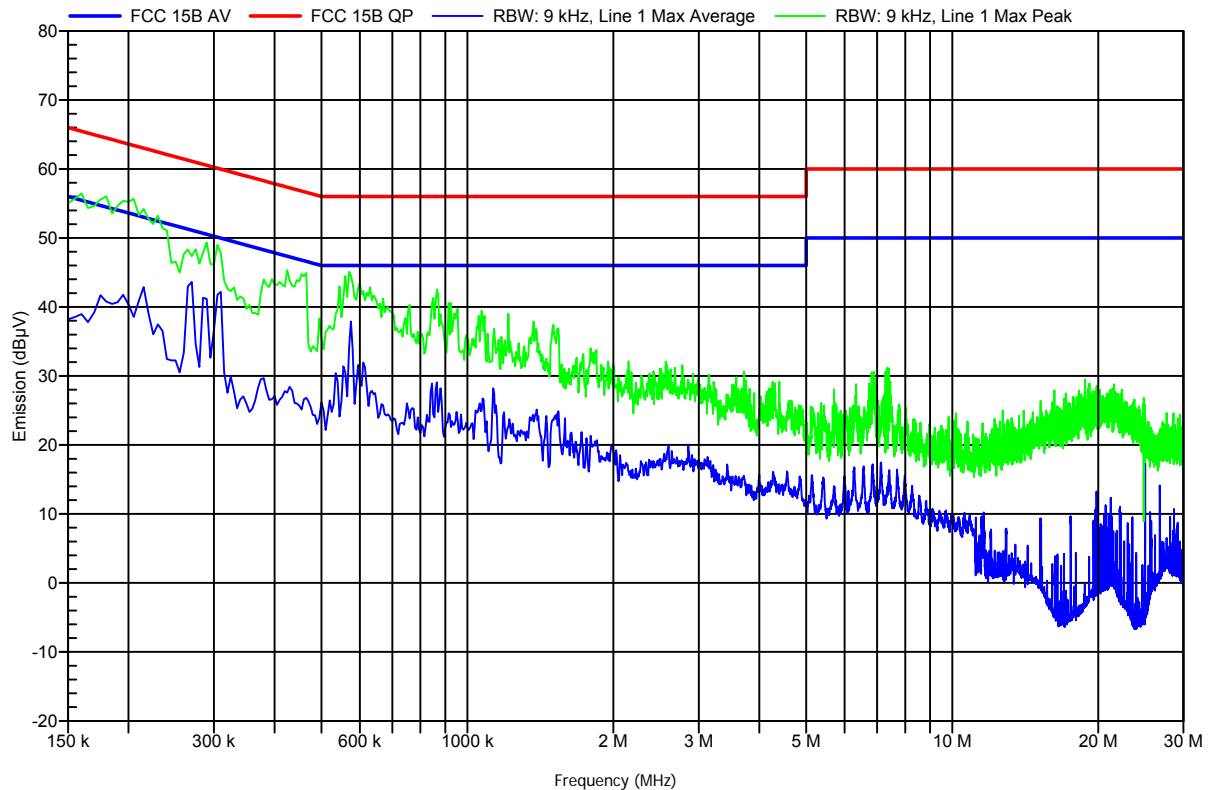
Comment: 6 dB bandwidth: 16452.4 KHz > 500 KHz; verdict: PASS
 Date: 14.JUL.2010 13:13:01

Annex C AC Powerline Conducted Emissions

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

Order number: G0M21007-3443

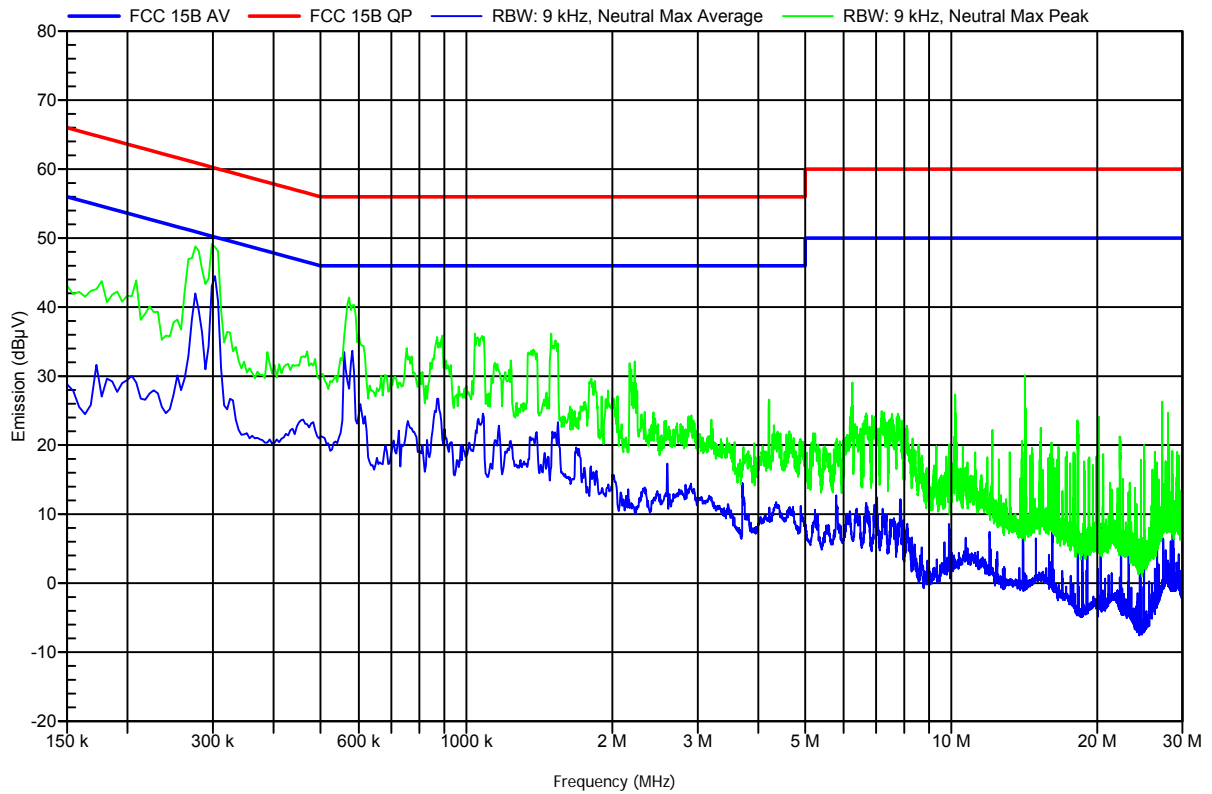
Manufacturer: lesswire AG
 EUT Name: RF module with WLAN and BT
 Model: AN00K73535
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Klein
 Test Conditions: Tnom: 23°C, Unom: 120VAC
 LISN: ESH2-Z5 L
 Mode: powered from notebook
 Test Date: 03.09.2010
 Note:



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

Order number: G0M21007-3443

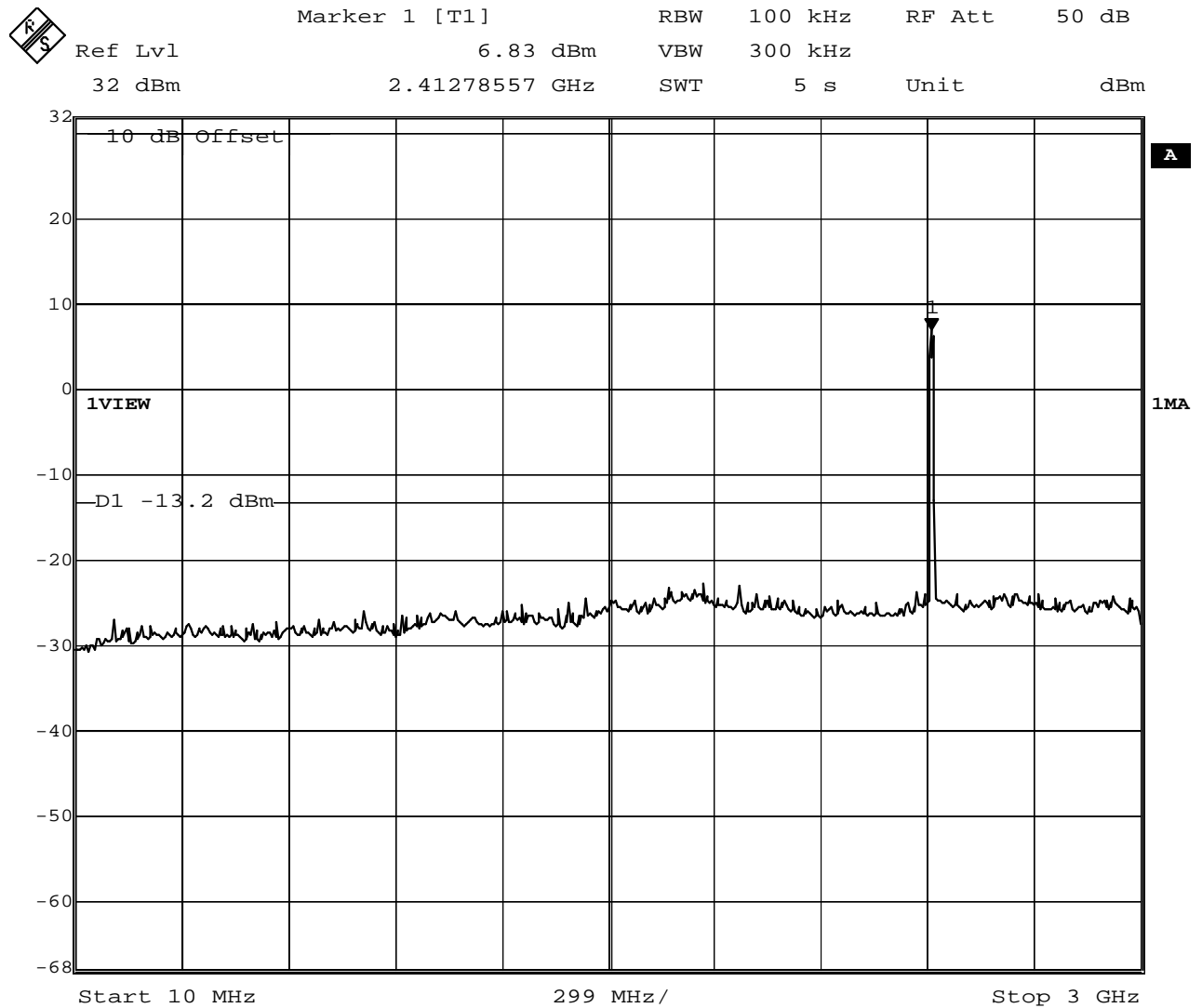
Manufacturer: lesswire AG
 EUT Name: RF module with WLAN and BT
 Model: AN00K73535
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Klein
 Test Conditions: Tnom: 23°C, Unom: 120VAC
 LISN: ESH2-Z5 N
 Mode: powered from notebook
 Test Date: 03.09.2010
 Note:



Annex D Transmitter conducted spurious emissions

FCC part 15.247 (d) Spurious Emissions

EUT	RF module with BT and WLAN
Model	WiBear-SF1
Approval Holder	lesswire AG
Temperature / Voltage	25°C
Test Site / Operator	Eurofins Product Service GmbH
Test Specification	FCC part 15.247 (d)
Comment 1	Spurious Emissions conducted
Comment 2	Channel : 2412 MHz
Comment 3	DSSS / 1 Mbit/s



Date: 27.AUG.2010 15:45:49

Test Report No.: G0M21007-3443-C-1

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

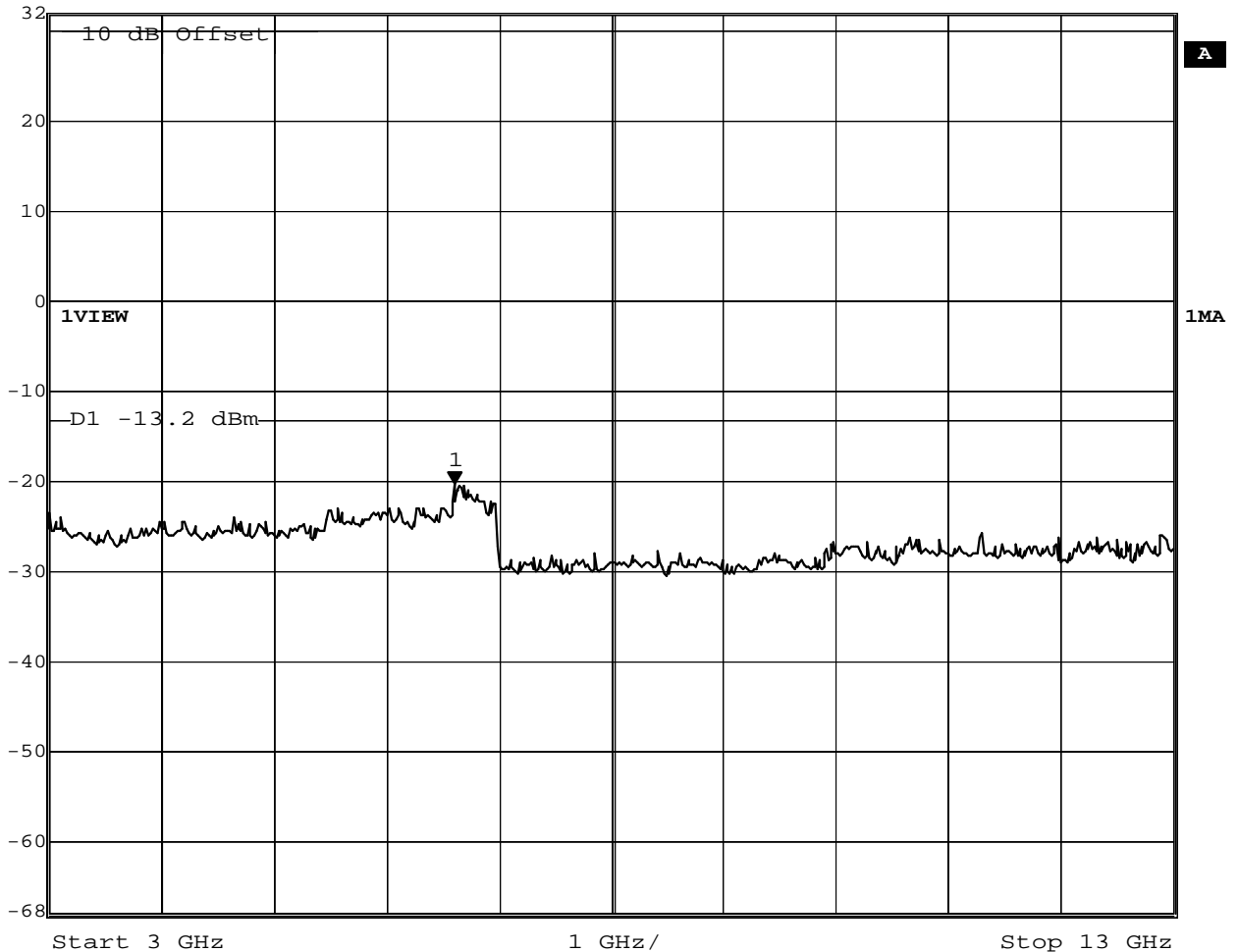
Page 40 of 61

**FCC part 15.247 (d)
Spurious Emissions**

EUT	RF module with BT and WLAN
Model	WiBear-SF1
Approval Holder	lesswire AG
Temperature / Voltage	25°C
Test Site / Operator	Eurofins Product Service GmbH
Test Specification	FCC part 15.247 (d)
Comment 1	Spurious Emissions conducted
Comment 2	Channel : 2412 MHz
Comment 3	DSSS / 1 Mbit/s



	Marker 1 [T1]	RBW	100 kHz	RF Att	50 dB
Ref Lvl	-20.46 dBm	VBW	300 kHz		
32 dBm	6.60721443 GHz	SWT	5 s	Unit	dBm



Date: 27.AUG.2010 15:48:02

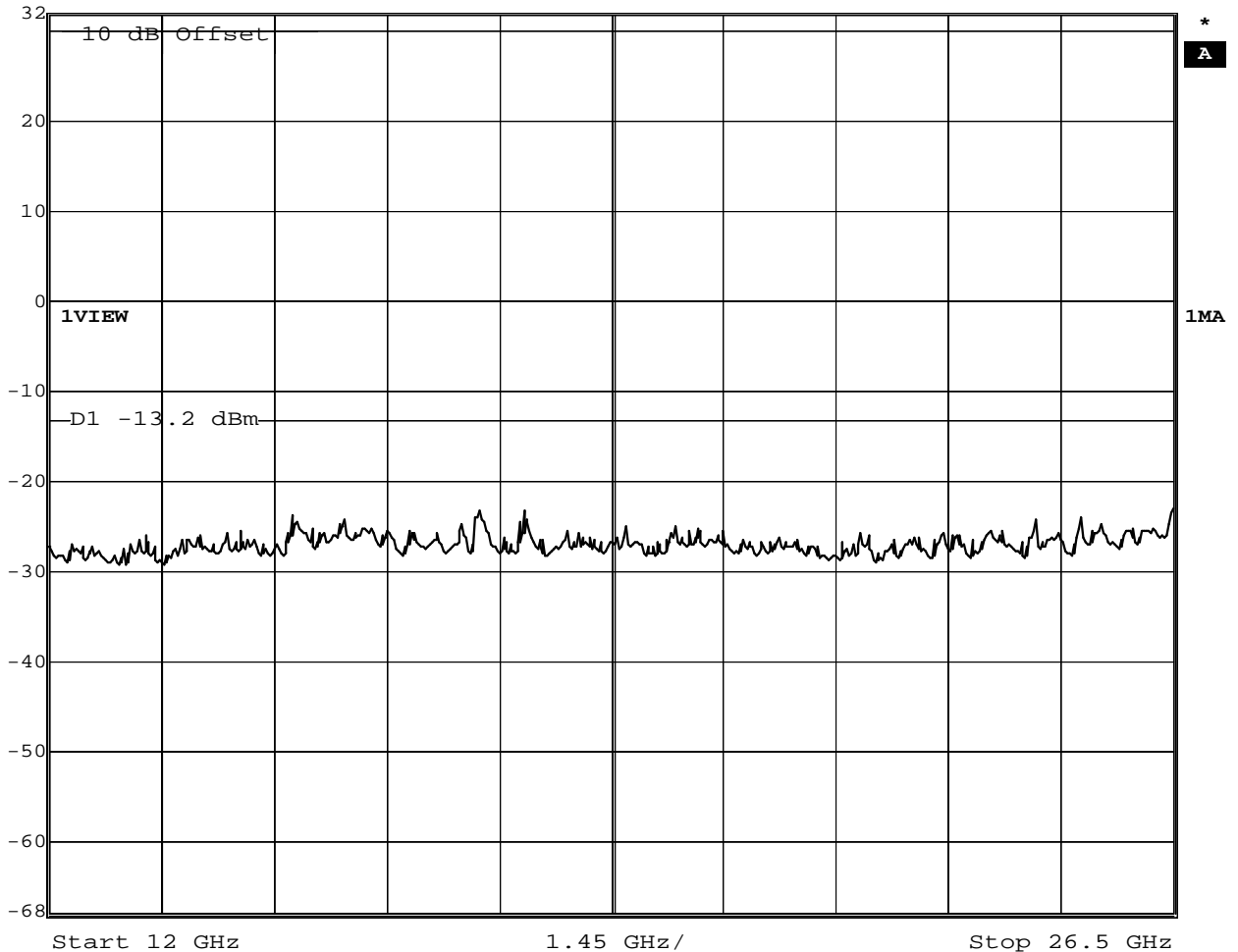
Test Report No.: G0M21007-3443-C-1

**FCC part 15.247 (d)
Spurious Emissions**

EUT	RF module with BT and WLAN
Model	WiBear-SF1
Approval Holder	lesswire AG
Temperature / Voltage	25°C
Test Site / Operator	Eurofins Product Service GmbH
Test Specification	FCC part 15.247 (d)
Comment 1	Spurious Emissions conducted
Comment 2	Channel : 2412 MHz
Comment 3	DSSS / 1 Mbit/s



Ref Lvl	RBW	100 kHz	RF Att	50 dB
32 dBm	VBW	300 kHz	Unit	dBm
	SWT	5 s		



Date: 27.AUG.2010 15:50:57

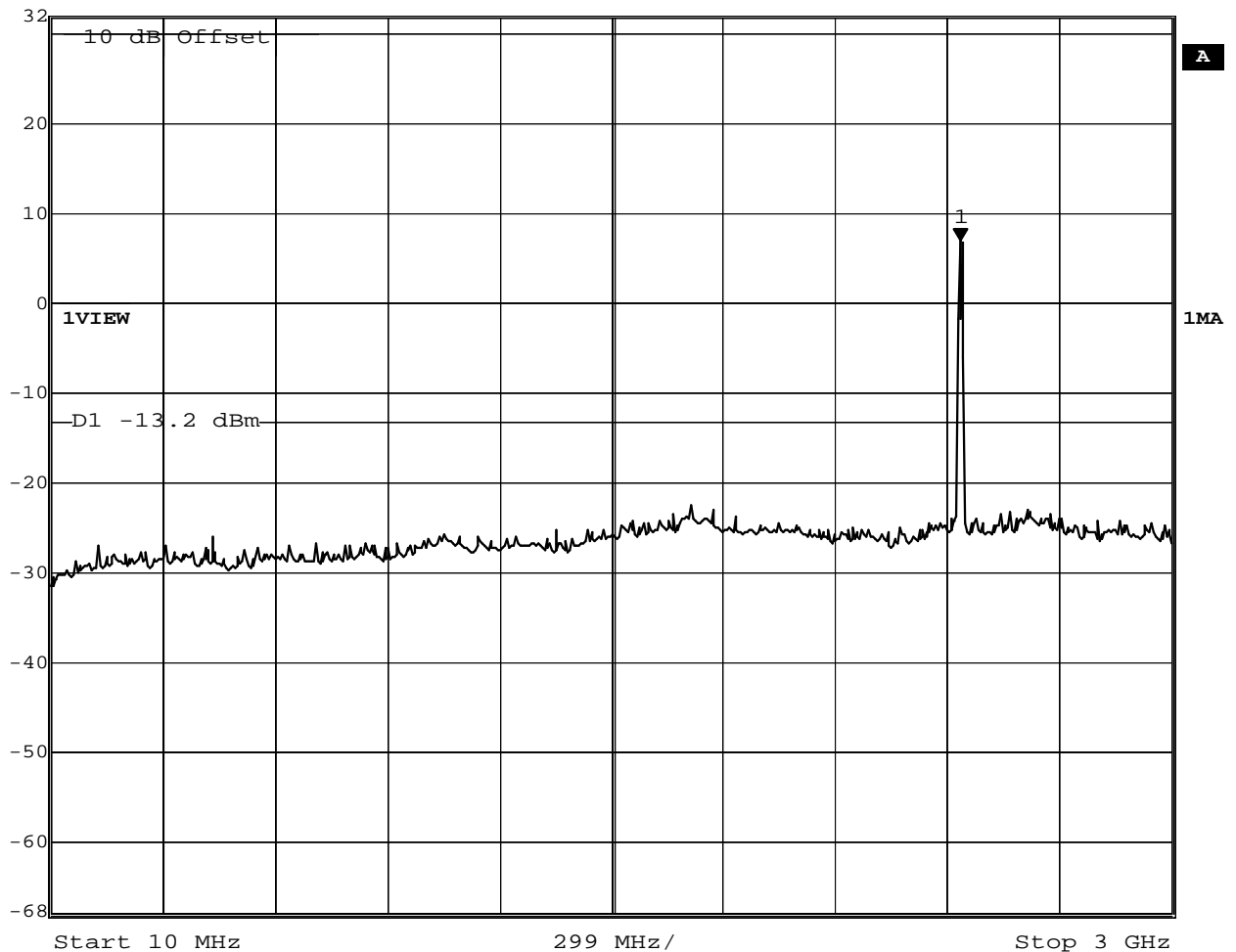
Test Report No.: G0M21007-3443-C-1

**FCC part 15.247 (d)
Spurious Emissions**

EUT	RF module with BT and WLAN
Model	WiBear-SF1
Approval Holder	lesswire AG
Temperature / Voltage	25°C
Test Site / Operator	Eurofins Product Service GmbH
Test Specification	FCC part 15.247 (d)
Comment 1	Spurious Emissions conducted
Comment 2	Channel : 2437MHz
Comment 3	DSSS / 1 Mbit/s



Marker 1 [T1]	RBW	100 kHz	RF Att	50 dB
Ref Lvl	6.81 dBm	VBW	300 kHz	
32 dBm	2.43675351 GHz	SWT	5 s	Unit dBm



Date: 27.AUG.2010 15:52:55

Test Report No.: G0M21007-3443-C-1

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

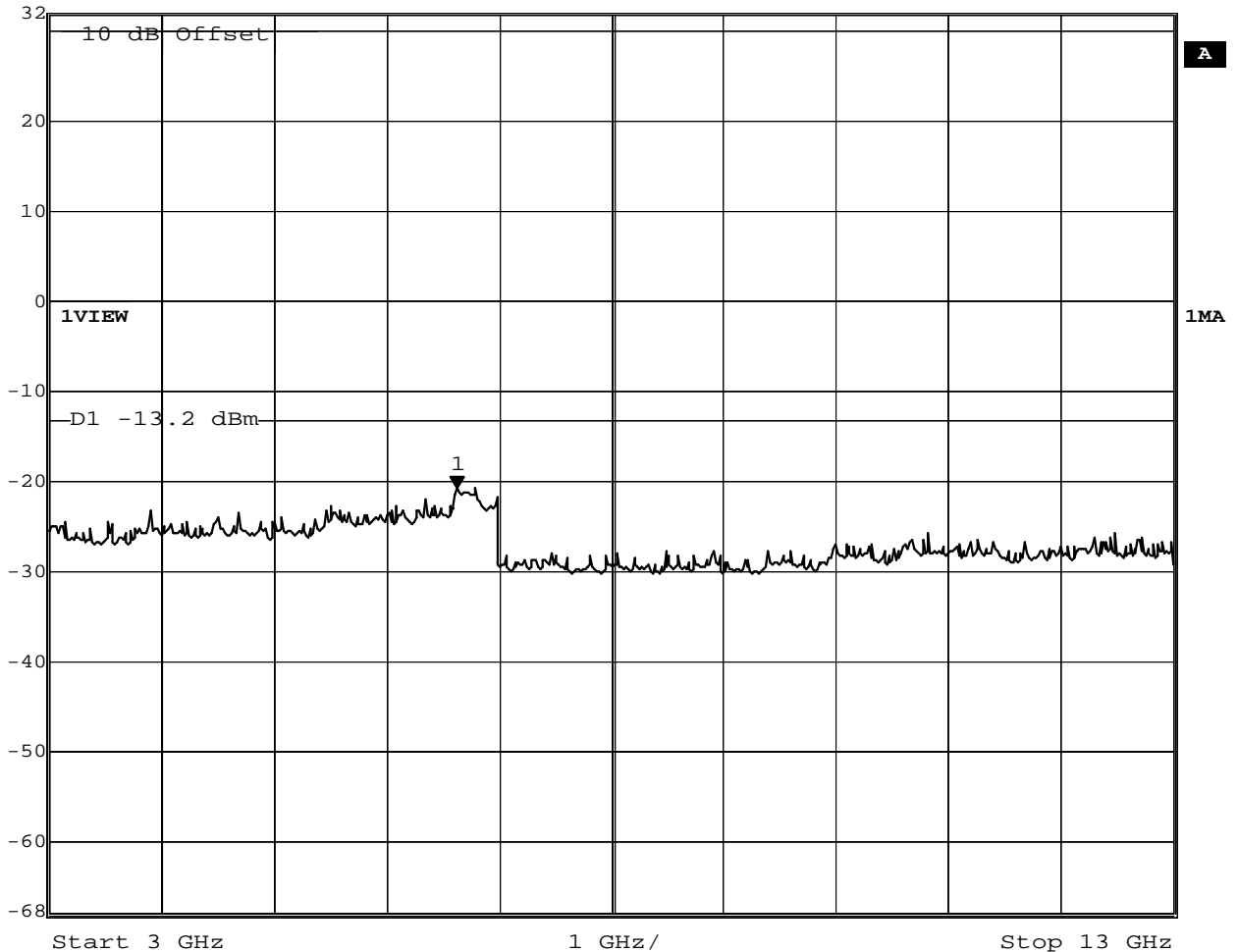
Page 43 of 61

**FCC part 15.247 (d)
Spurious Emissions**

EUT	RF module with BT and WLAN
Model	WiBear-SF1
Approval Holder	lesswire AG
Temperature / Voltage	25°C
Test Site / Operator	Eurofins Product Service GmbH
Test Specification	FCC part 15.247 (d)
Comment 1	Spurious Emissions conducted
Comment 2	Channel : 2437MHz
Comment 3	DSSS / 1 Mbit/s



	Marker 1 [T1]	RBW	100 kHz	RF Att	50 dB
Ref Lvl	-20.87 dBm	VBW	300 kHz		
32 dBm	6.62725451 GHz	SWT	5 s	Unit	dBm



Date: 27.AUG.2010 15:54:25

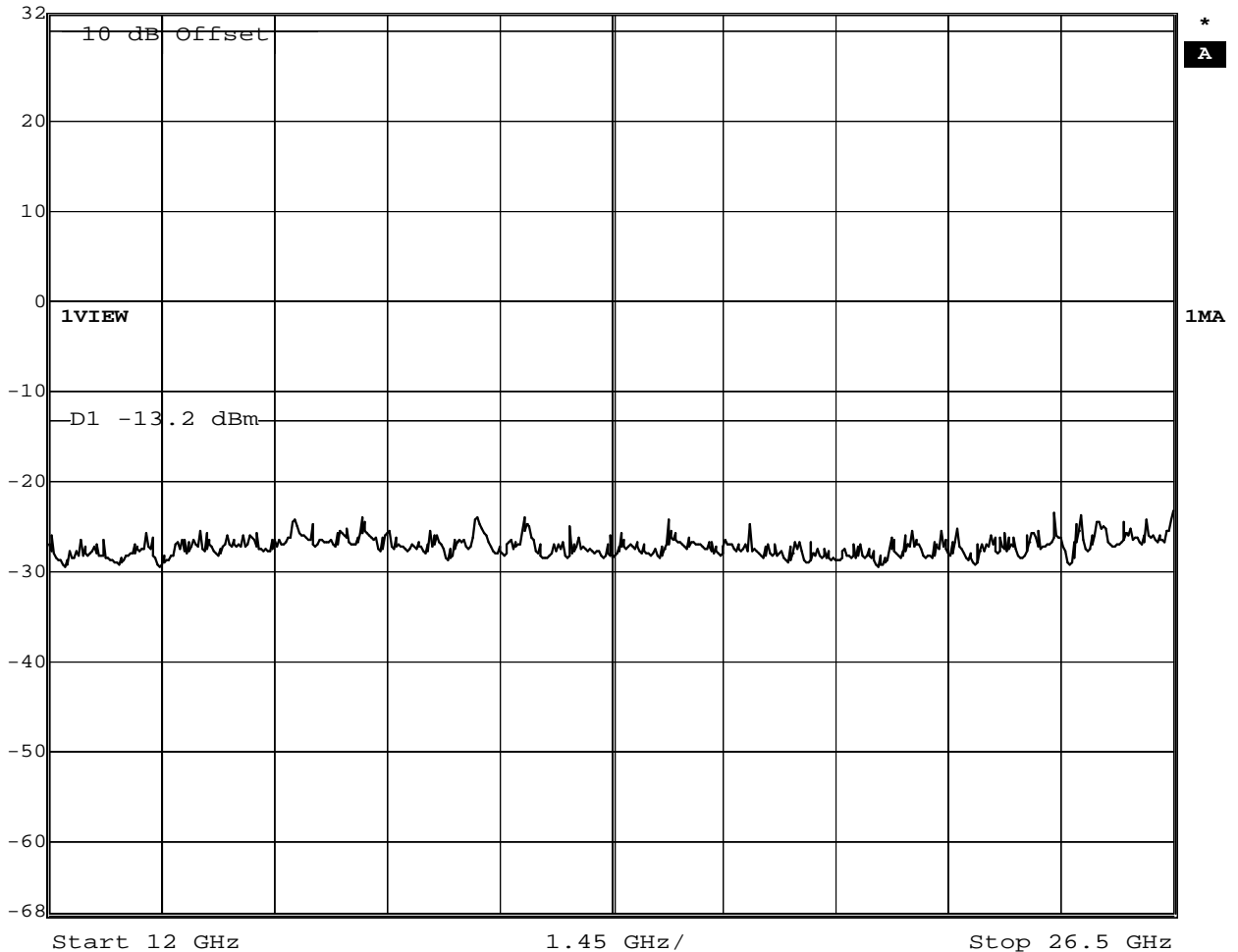
Test Report No.: G0M21007-3443-C-1

**FCC part 15.247 (d)
Spurious Emissions**

EUT	RF module with BT and WLAN
Model	WiBear-SF1
Approval Holder	lesswire AG
Temperature / Voltage	25°C
Test Site / Operator	Eurofins Product Service GmbH
Test Specification	FCC part 15.247 (d)
Comment 1	Spurious Emissions conducted
Comment 2	Channel : 2437MHz
Comment 3	DSSS / 1 Mbit/s



Ref Lvl	RBW	100 kHz	RF Att	50 dB
32 dBm	VBW	300 kHz	Unit	dBm
	SWT	5 s		



Date: 27.AUG.2010 15:56:50

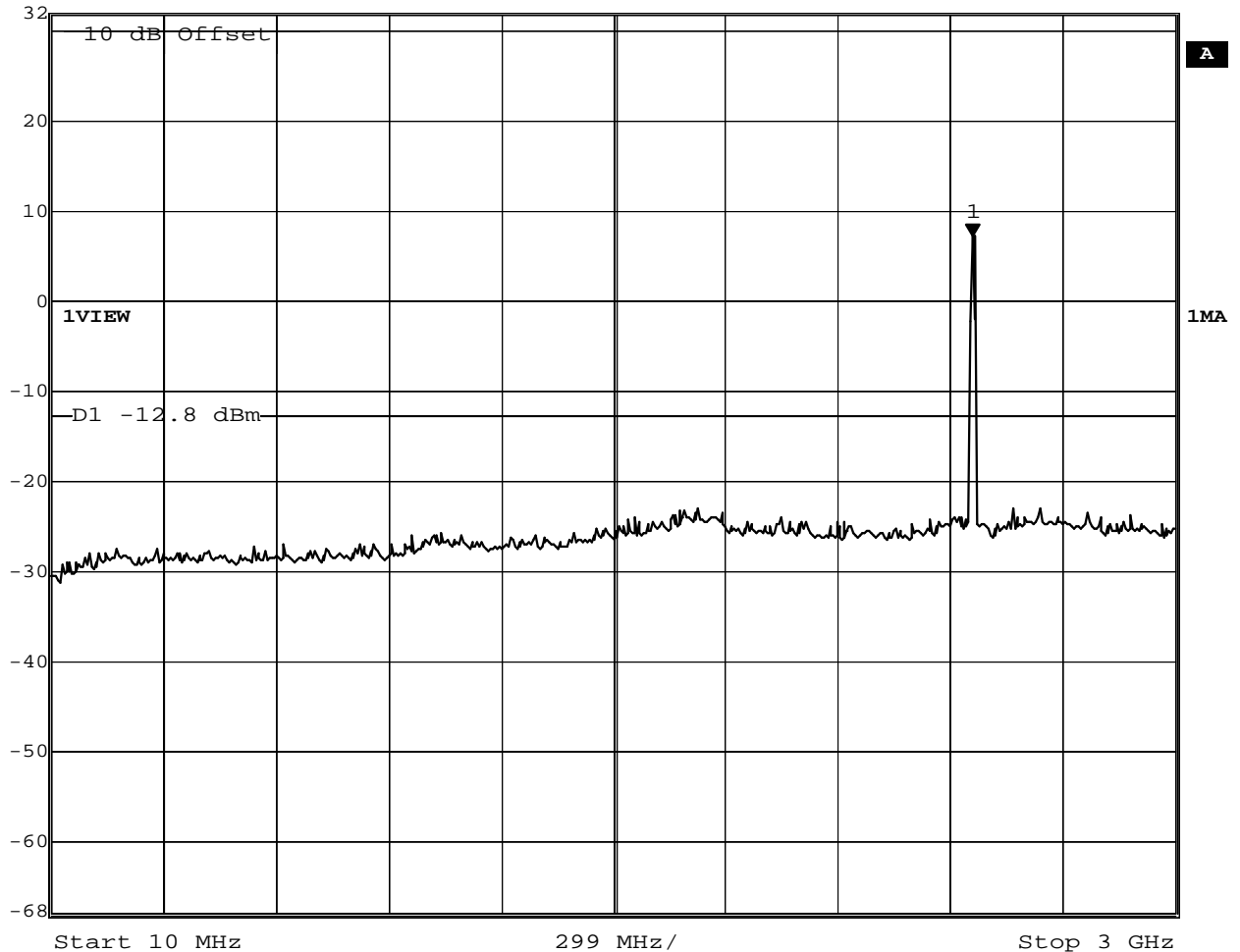
Test Report No.: G0M21007-3443-C-1

**FCC part 15.247 (d)
Spurious Emissions**

EUT	RF module with BT and WLAN
Model	WiBear-SF1
Approval Holder	lesswire AG
Temperature / Voltage	25°C
Test Site / Operator	Eurofins Product Service GmbH
Test Specification	FCC part 15.247 (d)
Comment 1	Spurious Emissions conducted
Comment 2	Channel : 2462MHz
Comment 3	DSSS / 1 Mbit/s



Marker 1 [T1]	RBW	100 kHz	RF Att	50 dB
Ref Lvl	7.22 dBm	VBW	300 kHz	
32 dBm	2.46072144 GHz	SWT	5 s	Unit dBm



Date: 27.AUG.2010 15:58:25

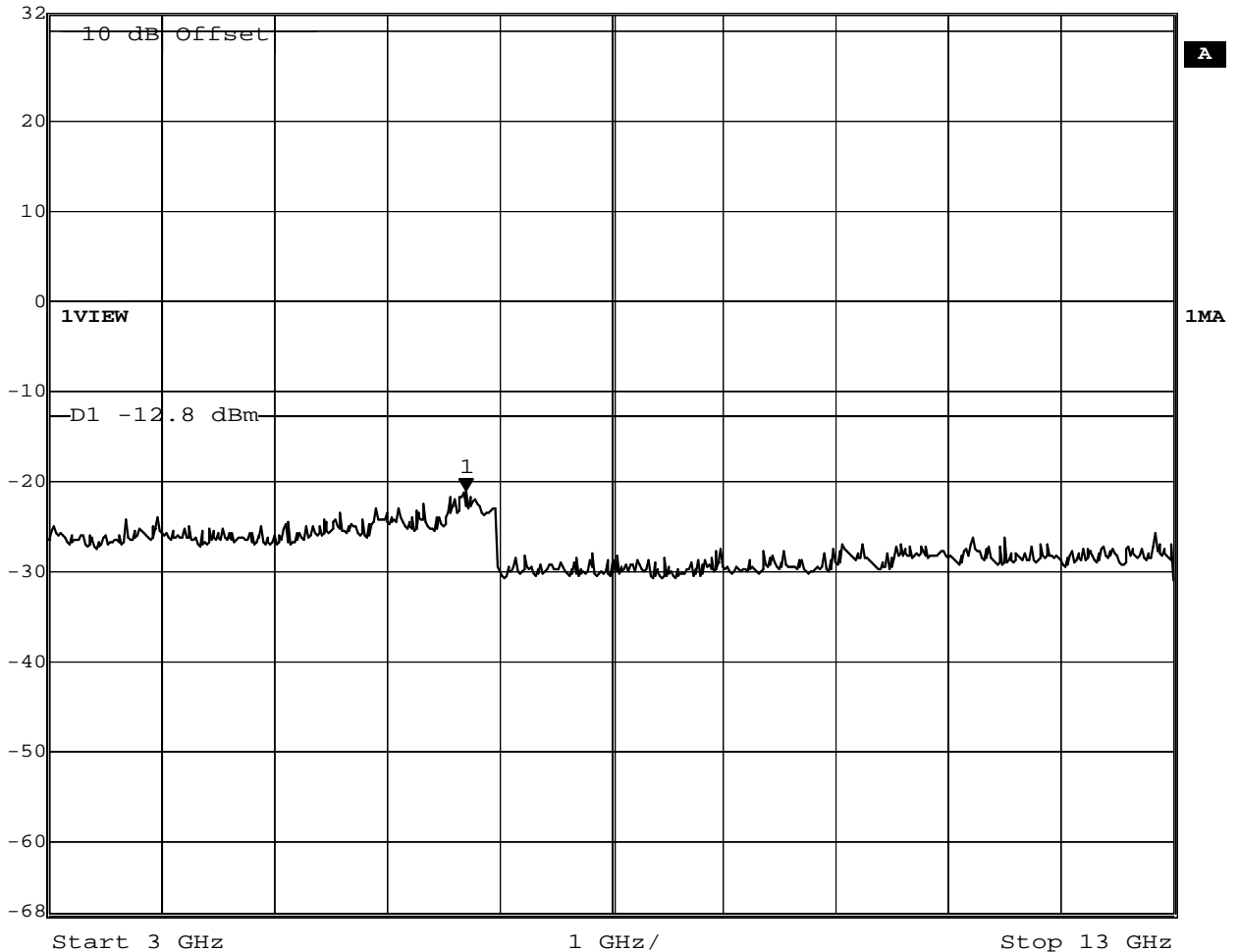
Test Report No.: G0M21007-3443-C-1

**FCC part 15.247 (d)
Spurious Emissions**

EUT	RF module with BT and WLAN
Model	WiBear-SF1
Approval Holder	lesswire AG
Temperature / Voltage	25°C
Test Site / Operator	Eurofins Product Service GmbH
Test Specification	FCC part 15.247 (d)
Comment 1	Spurious Emissions conducted
Comment 2	Channel : 2462MHz
Comment 3	DSSS / 1 Mbit/s



	Marker 1 [T1]	RBW	100 kHz	RF Att	50 dB
Ref Lvl	-21.18 dBm	VBW	300 kHz		
32 dBm	6.70741483 GHz	SWT	5 s	Unit	dBm



Date: 27.AUG.2010 15:59:32

Test Report No.: G0M21007-3443-C-1

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

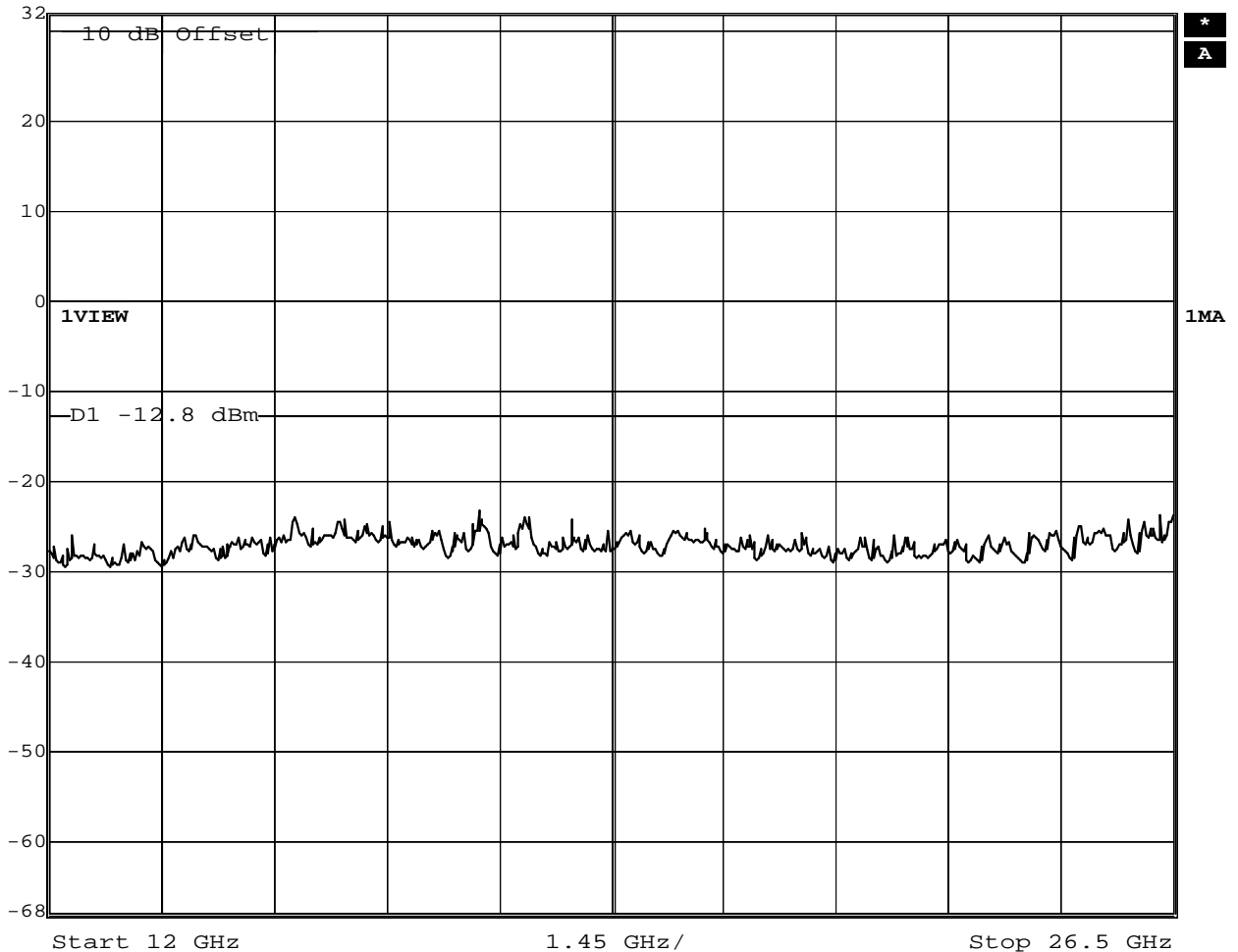
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**FCC part 15.247 (d)
Spurious Emissions**

EUT	RF module with BT and WLAN
Model	WiBear-SF1
Approval Holder	lesswire AG
Temperature / Voltage	25°C
Test Site / Operator	Eurofins Product Service GmbH
Test Specification	FCC part 15.247 (d)
Comment 1	Spurious Emissions conducted
Comment 2	Channel : 2462MHz
Comment 3	DSSS / 1 Mbit/s



Ref Lvl	RBW	100 kHz	RF Att	50 dB
32 dBm	VBW	300 kHz	Unit	dBm
	SWT	5 s		

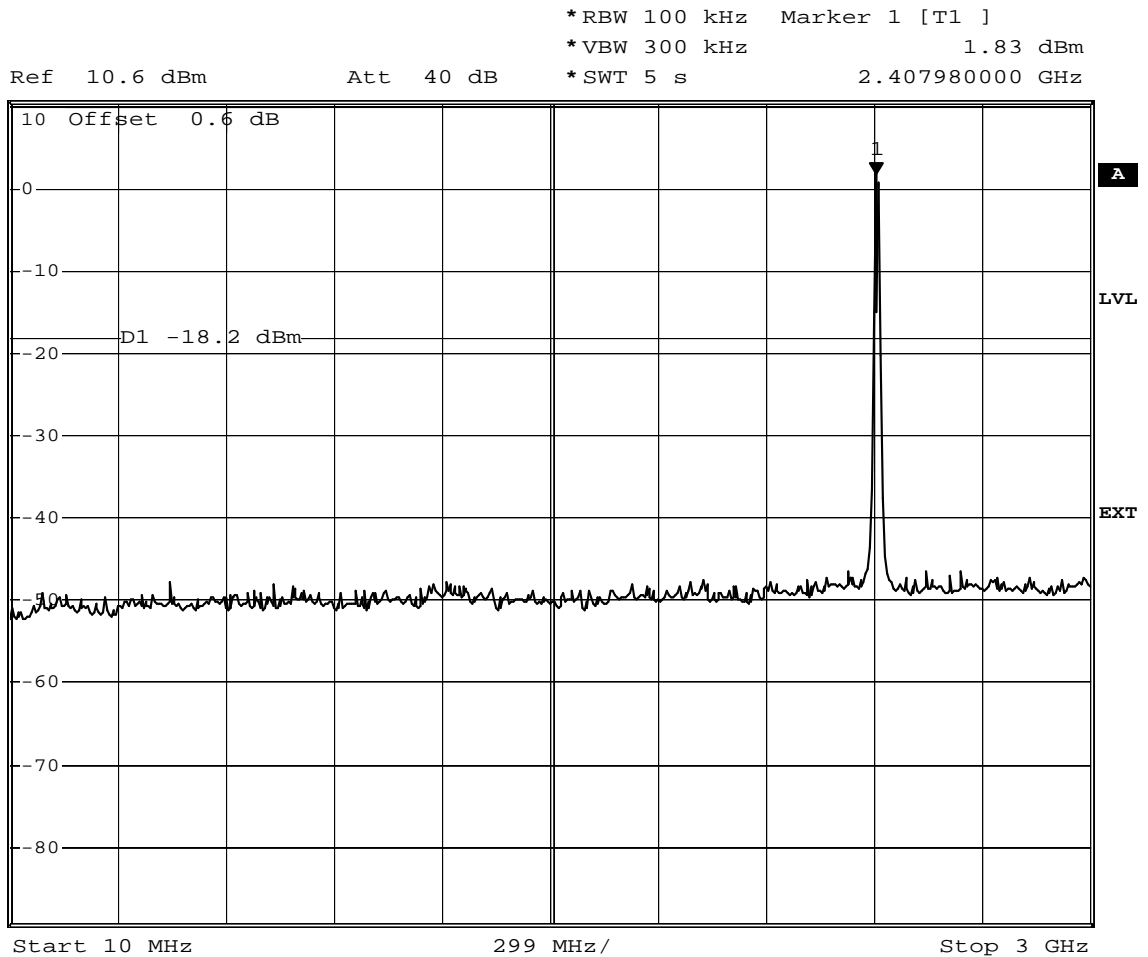


Date: 27.AUG.2010 16:00:25

Test Report No.: G0M21007-3443-C-1

**FCC part 15.247 (d)
Spurious Emissions**

EUT	RF module with BT and WLAN
Model	WiBear-SF1
Approval Holder	lesswire AG
Temperature / Voltage	25°C
Test Site / Operator	Eurofins Product Service GmbH
Test Specification	FCC part 15.247 (d)
Comment 1	Spurious Emissions conducted
Comment 2	Channel : 1 / 2412 MHz
Comment 3	OFDM / 6 Mbit/s



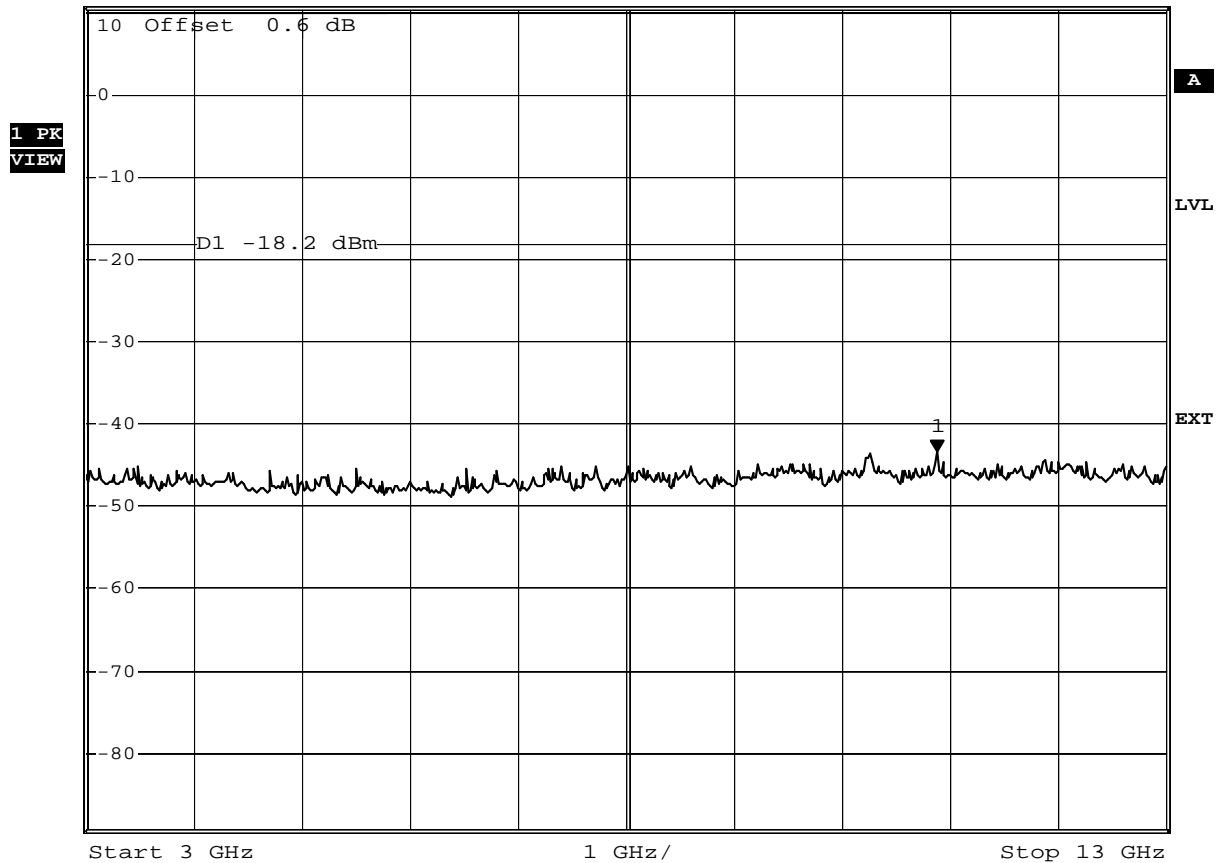
Date: 14.JUL.2010 13:48:13

**FCC part 15.247 (d)
Spurious Emissions**

EUT	RF module with BT and WLAN
Model	WiBear-SF1
Approval Holder	lesswire AG
Temperature / Voltage	25°C
Test Site / Operator	Eurofins Product Service GmbH
Test Specification	FCC part 15.247 (d)
Comment 1	Spurious Emissions conducted
Comment 2	Channel : 1 / 2412 MHz
Comment 3	OFDM / 6 Mbit/s



Ref	10.6 dBm	Att	40 dB	*RBW	100 kHz	Marker 1 [T1]	
				*VBW	300 kHz		-43.42 dBm
				*SWT	5 s		10.880000000 GHz



Date: 14.JUL.2010 13:49:03

**FCC part 15.247 (d)
Spurious Emissions**

EUT	RF module with BT and WLAN
Model	WiBear-SF1
Approval Holder	lesswire AG
Temperature / Voltage	25°C
Test Site / Operator	Eurofins Product Service GmbH
Test Specification	FCC part 15.247 (d)
Comment 1	Spurious Emissions conducted
Comment 2	Channel : 1 / 2412 MHz
Comment 3	OFDM / 6 Mbit/s

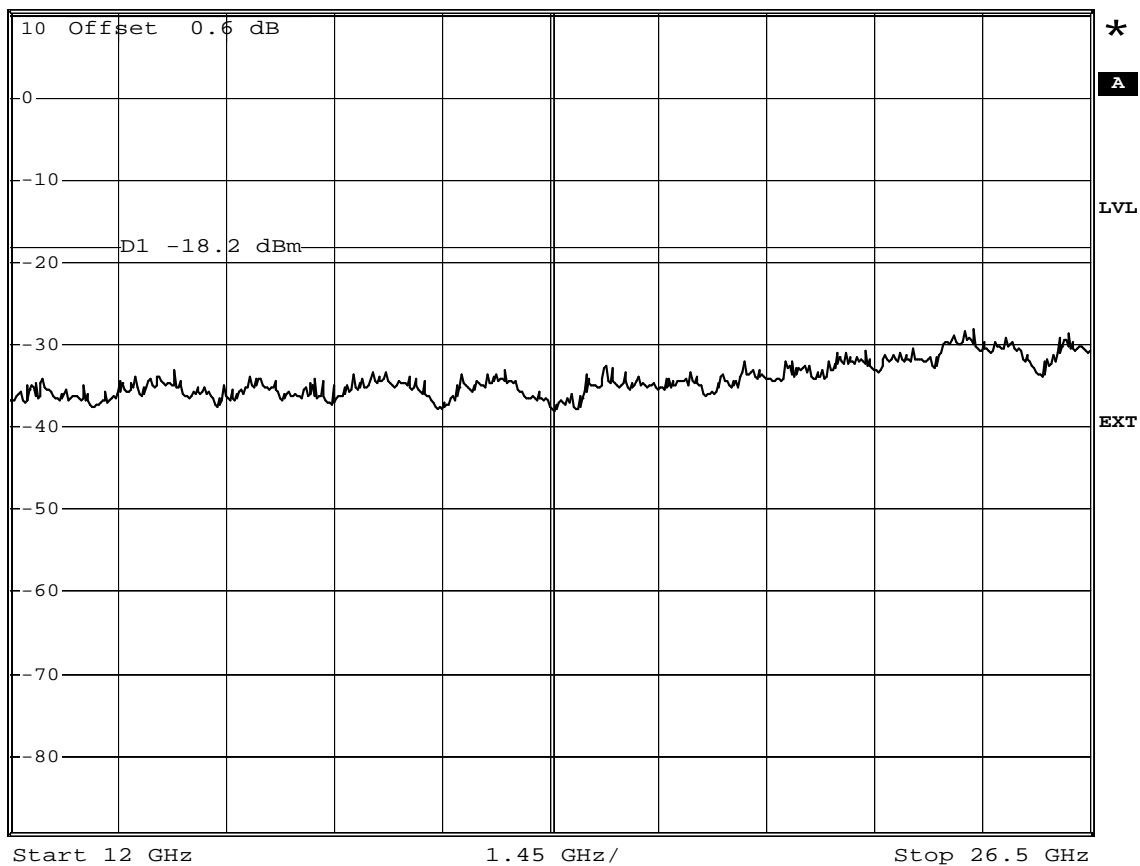


*RBW 100 kHz
 *VBW 300 kHz
 *SWT 5 s

Ref 10.6 dBm

Att 40 dB

1 PK
VIEW



Date: 14.JUL.2010 13:50:01

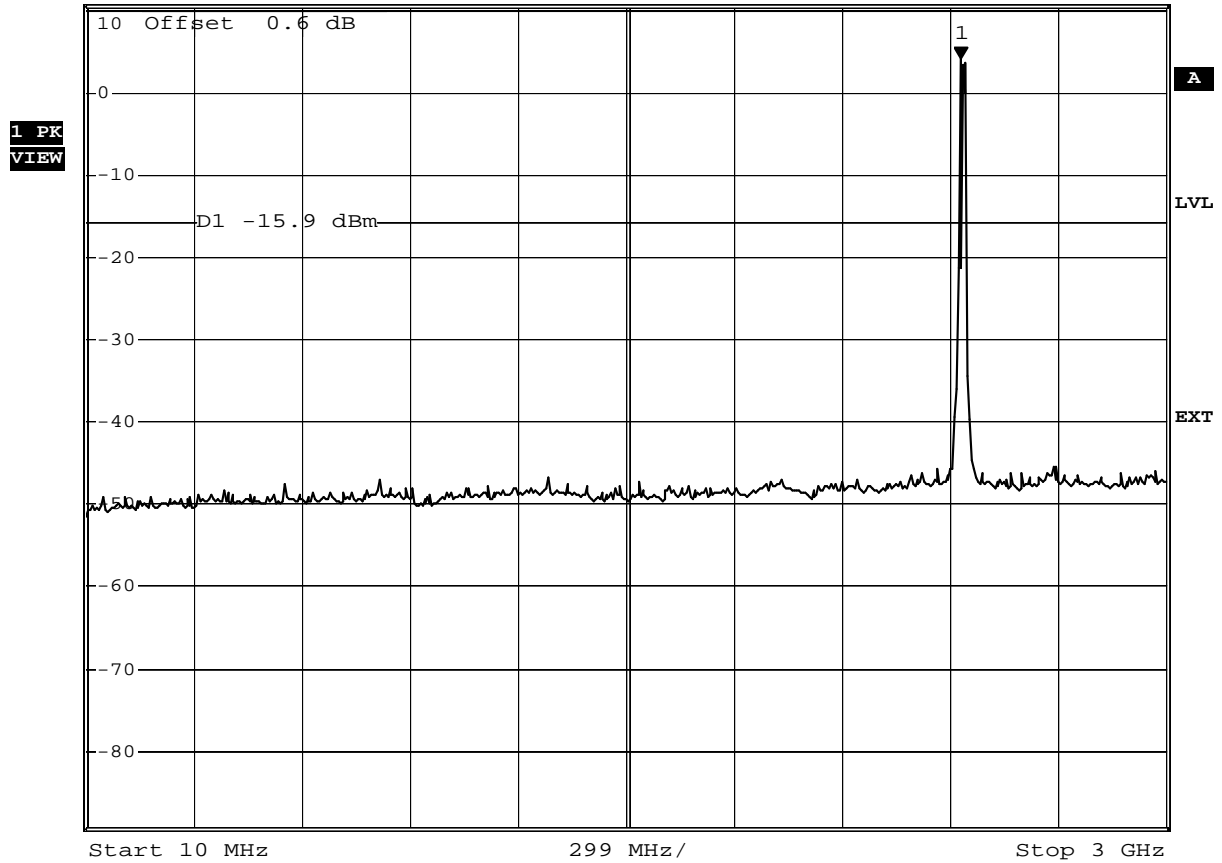
FCC part 15.247 (d)
Spurious Emissions

EUT	RF module with BT and WLAN
Model	WiBear-SF1
Approval Holder	lesswire AG
Temperature / Voltage	25°C
Test Site / Operator	Eurofins Product Service GmbH
Test Specification	FCC part 15.247 (d)
Comment 1	Spurious Emissions conducted
Comment 2	Channel : 6 / 2437 MHz
Comment 3	OFDM / 6 Mbit/s



*RBW 100 kHz Marker 1 [T1]
*VBW 300 kHz 4.07 dBm
*SWT 5 s 2.431900000 GHz

Ref 10.6 dBm Att 40 dB



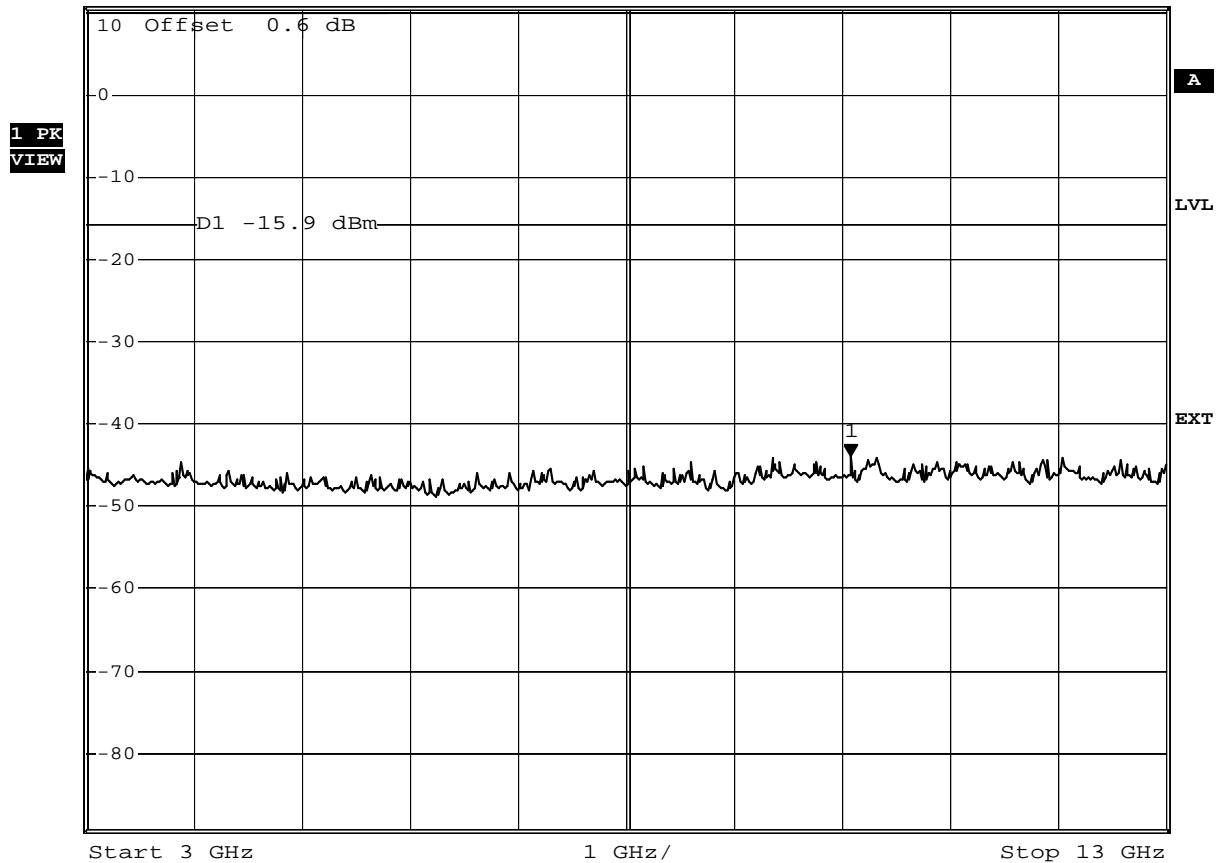
Date: 14.JUL.2010 13:44:26

**FCC part 15.247 (d)
Spurious Emissions**

EUT	RF module with BT and WLAN
Model	WiBear-SF1
Approval Holder	lesswire AG
Temperature / Voltage	25°C
Test Site / Operator	Eurofins Product Service GmbH
Test Specification	FCC part 15.247 (d)
Comment 1	Spurious Emissions conducted
Comment 2	Channel : 6 / 2437 MHz
Comment 3	OFDM / 6 Mbit/s



Ref	10.6 dBm	Att	40 dB	*RBW 100 kHz	Marker 1 [T1]
				*VBW 300 kHz	-43.91 dBm
				*SWT 5 s	10.08000000 GHz



Date: 14.JUL.2010 13:45:20

**FCC part 15.247 (d)
Spurious Emissions**

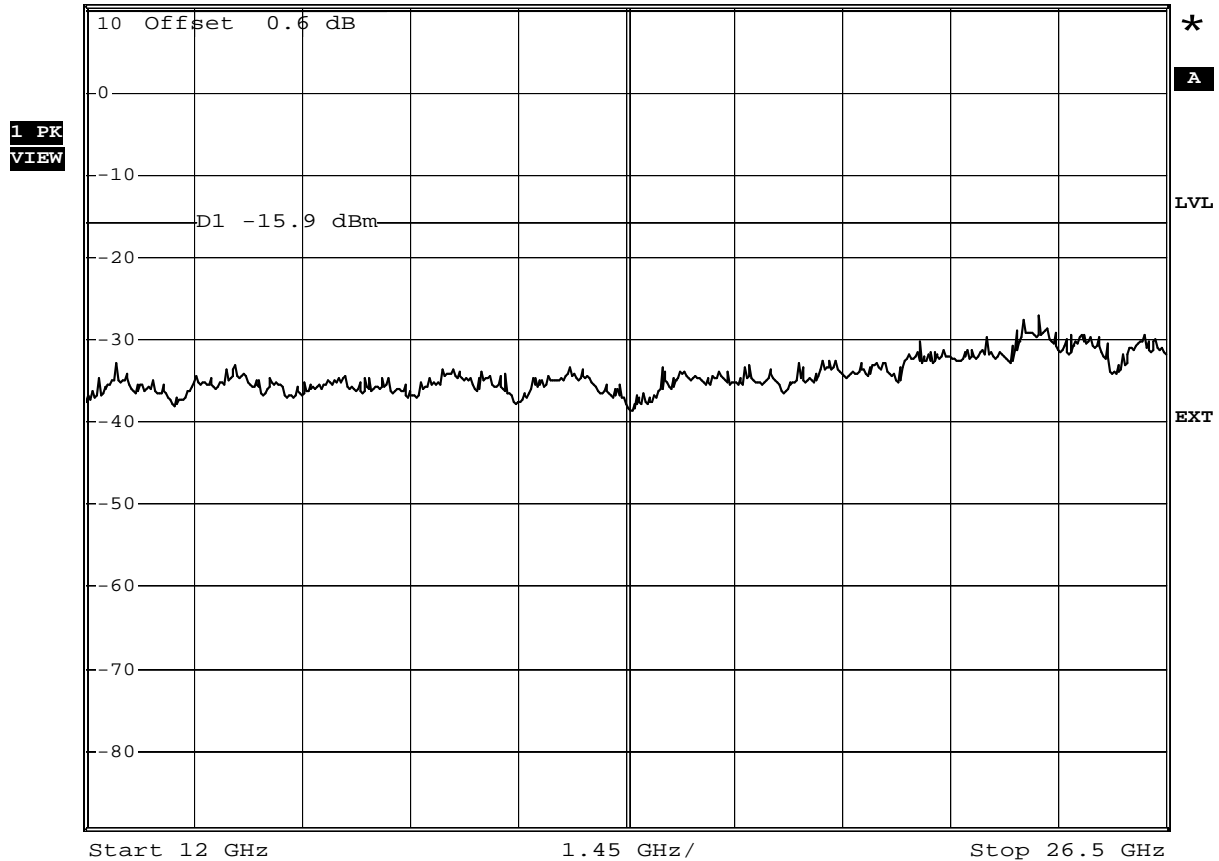
EUT	RF module with BT and WLAN
Model	WiBear-SF1
Approval Holder	lesswire AG
Temperature / Voltage	25°C
Test Site / Operator	Eurofins Product Service GmbH
Test Specification	FCC part 15.247 (d)
Comment 1	Spurious Emissions conducted
Comment 2	Channel : 6 / 2437 MHz
Comment 3	OFDM / 6 Mbit/s



*RBW 100 kHz
*VBW 300 kHz
*SWT 5 s

Ref 10.6 dBm

Att 40 dB



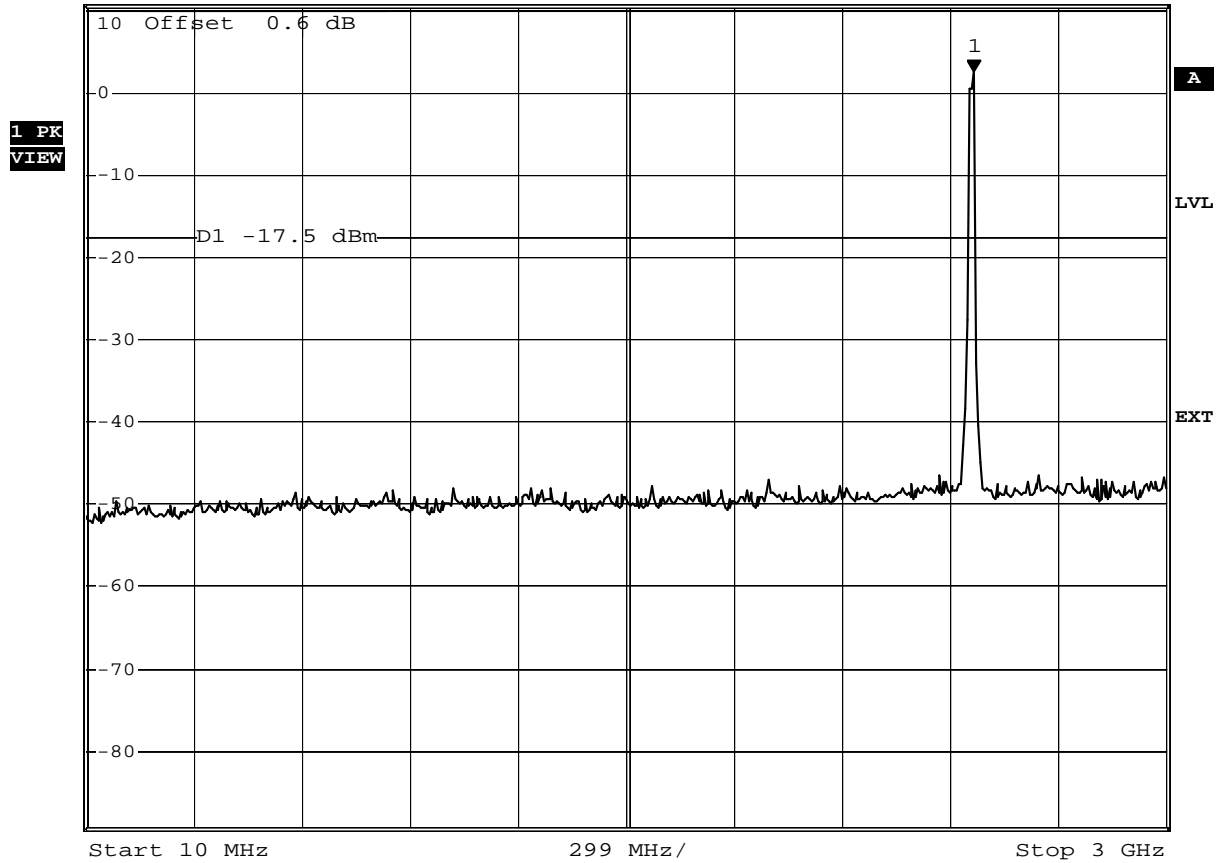
Date: 14.JUL.2010 13:46:16

**FCC part 15.247 (d)
Spurious Emissions**

EUT	RF module with BT and WLAN
Model	WiBear-SF1
Approval Holder	lesswire AG
Temperature / Voltage	25°C
Test Site / Operator	Eurofins Product Service GmbH
Test Specification	FCC part 15.247 (d)
Comment 1	Spurious Emissions conducted
Comment 2	Channel : 11 / 2462 MHz
Comment 3	OFDM / 6 Mbit/s



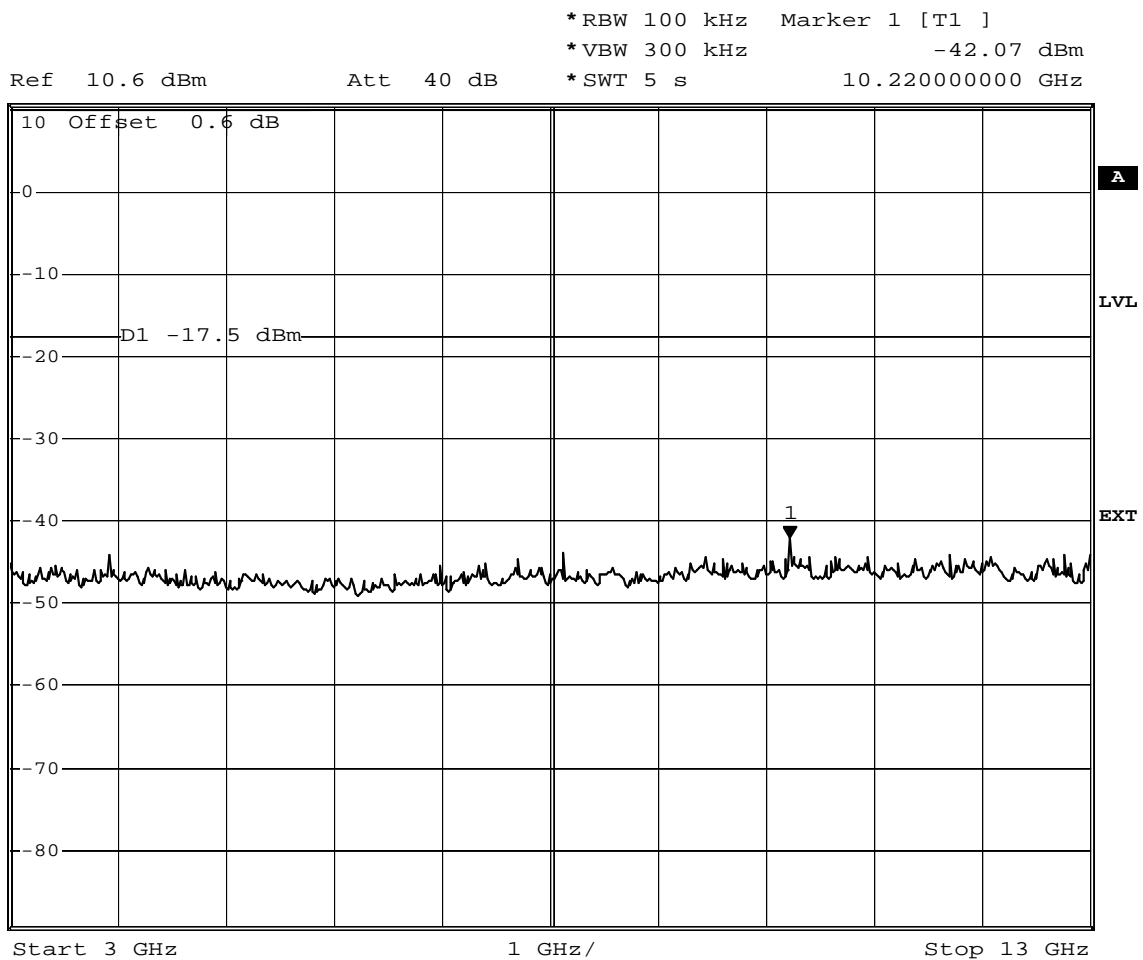
Ref 10.6 dBm Att 40 dB *RBW 100 kHz Marker 1 [T1]
 *VBW 300 kHz 2.51 dBm
 *SWT 5 s 2.467780000 GHz



Date: 14.JUL.2010 13:36:28

**FCC part 15.247 (d)
Spurious Emissions**

EUT	RF module with BT and WLAN
Model	WiBear-SF1
Approval Holder	lesswire AG
Temperature / Voltage	25°C
Test Site / Operator	Eurofins Product Service GmbH
Test Specification	FCC part 15.247 (d)
Comment 1	Spurious Emissions conducted
Comment 2	Channel : 11 / 2462 MHz
Comment 3	OFDM / 6 Mbit/s



Date: 14.JUL.2010 13:38:29

**FCC part 15.247 (d)
Spurious Emissions**

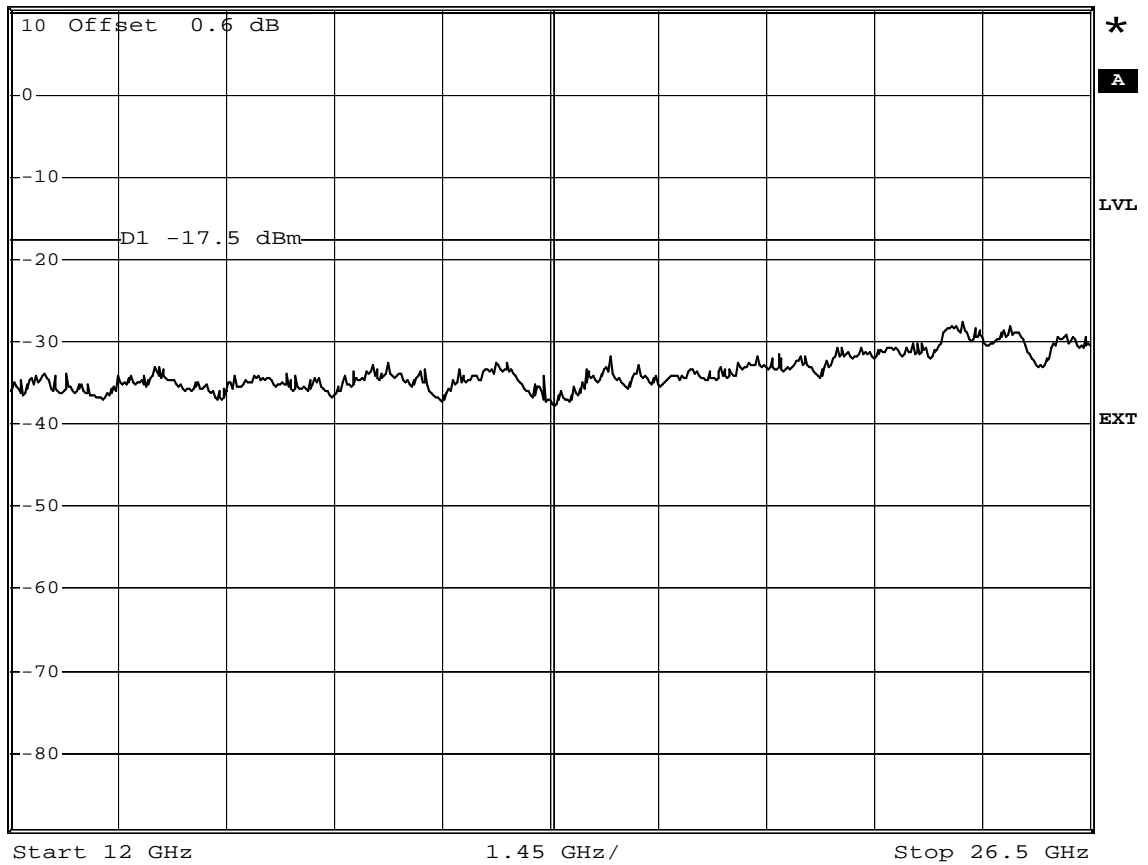
EUT	RF module with BT and WLAN
Model	WiBear-SF1
Approval Holder	lesswire AG
Temperature / Voltage	25°C
Test Site / Operator	Eurofins Product Service GmbH
Test Specification	FCC part 15.247 (d)
Comment 1	Spurious Emissions conducted
Comment 2	Channel : 11 / 2462 MHz
Comment 3	OFDM / 6 Mbit/s



* RBW 100 kHz
* VBW 300 kHz
* SWT 5 s

Ref 10.6 dBm

Att 40 dB

**1 PK
VIEW**


Date: 14.JUL.2010 13:40:03

Test Report No.: G0M21007-3443-C-1

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

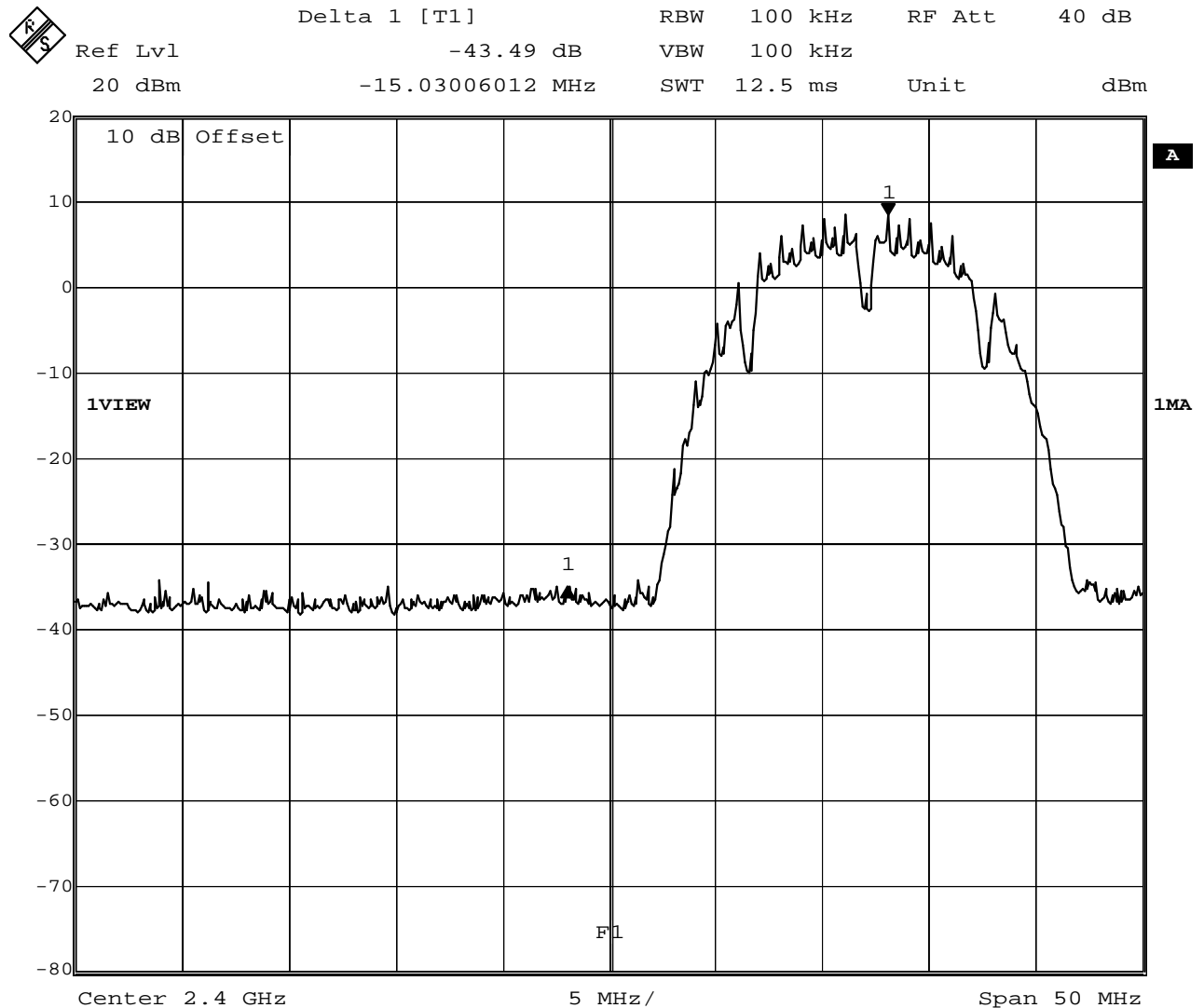
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Annex E Band edge compliance

FCC part 15.247

Band-edge compliance of RF conducted emissions

EUT	RF module with BT and WLAN
Model	WiBear-SF1
Approval Holder	lesswire AG
Temperature / Voltage	25°C
Test Site / Operator	Eurofins Product Service GmbH
Test Specification	FCC part 15 section 247(c)
Comment 1	Band-edge compliance
Comment 2	Channel.: 2412 MHz
Comment 3	DSSS / 1Mbit/s



Comment A: Limit: Marker Delta value >20 dB; Result: PASS

Date: 27.AUG.2010 16:14:59

Test Report No.: G0M21007-3443-C-1

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

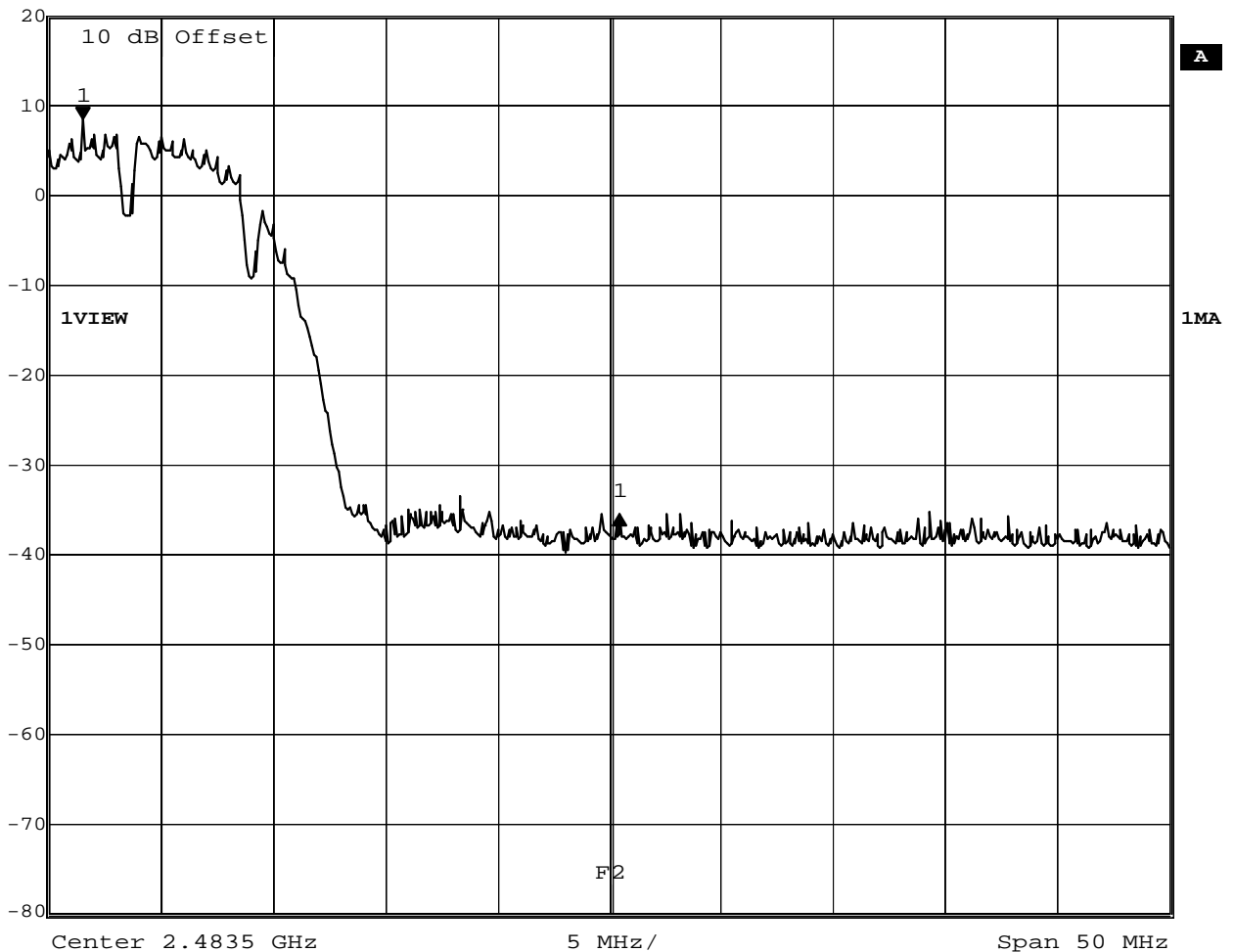
Page 58 of 61

FCC part 15.247
Band-edge compliance of RF conducted emissions

EUT	RF module with BT and WLAN
Model	WiBear-SF1
Approval Holder	lesswire AG
Temperature / Voltage	25°C
Test Site / Operator	Eurofins Product Service GmbH
Test Specification	FCC part 15 section 247(c)
Comment 1	Band-edge compliance
Comment 2	Channel.: 2462 MHz
Comment 3	DSSS / 1Mbit/s



Delta 1 [T1]	RBW	100 kHz	RF Att	40 dB
Ref Lvl	-43.83 dB	VBW	100 kHz	
20 dBm	23.94789579 MHz	SWT	12.5 ms	Unit dBm

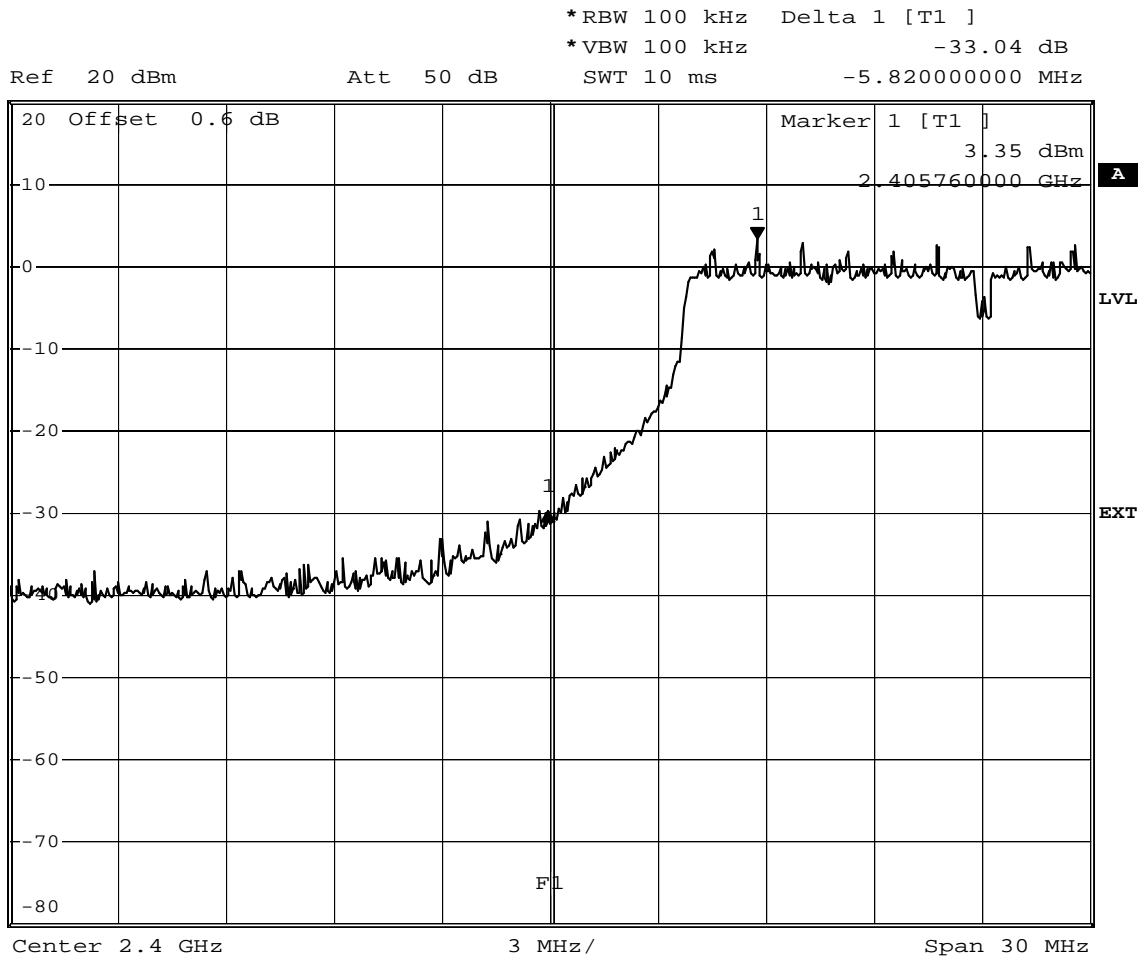


Comment A: Limit: Marker Delta value >20 dB; Result: PASS

Date: 27.AUG.2010 16:11:24

FCC part 15.247
Band-edge compliance of RF conducted emissions

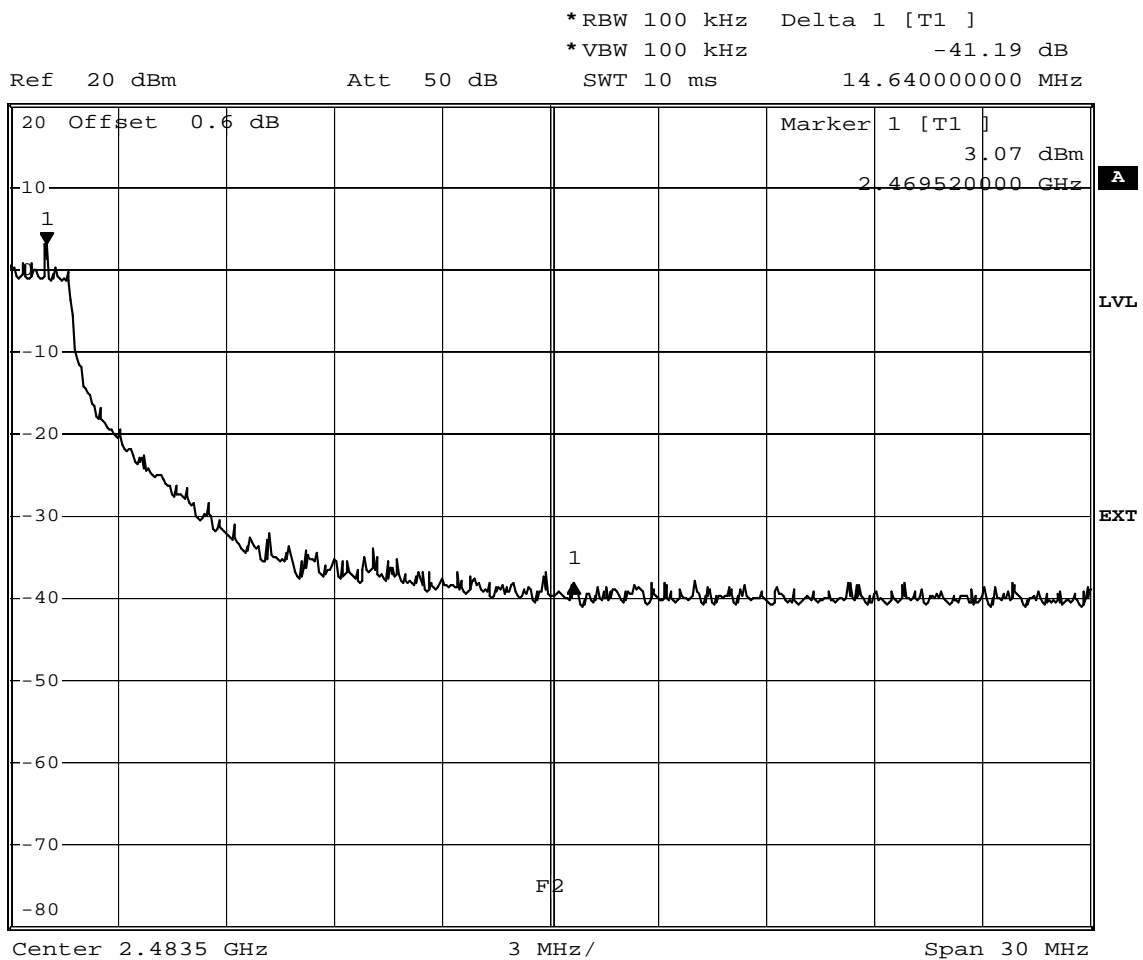
EUT	RF module with BT and WLAN
Model	WiBear-SF1
Approval Holder	lesswire AG
Temperature / Voltage	25°C
Test Site / Operator	Eurofins Product Service GmbH
Test Specification	FCC part 15 section 247(c)
Comment 1	Band-edge compliance
Comment 2	Channel : 1 / 2412 MHz
Comment 3	OFDM / 6Mbit/s



Comment: Limit: Marker Delta value >20 dB; Result: PASS
 Date: 14.JUL.2010 14:04:09

FCC part 15.247
Band-edge compliance of RF conducted emissions

EUT	RF module with BT and WLAN
Model	WiBear-SF1
Approval Holder	lesswire AG
Temperature / Voltage	25°C
Test Site / Operator	Eurofins Product Service GmbH
Test Specification	FCC part 15 section 247(c)
Comment 1	Band-edge compliance
Comment 2	Channel : 11 / 2462 MHz
Comment 3	OFDM / 6Mbit/s



Comment: Limit: Marker Delta value >20 dB; Result: PASS
 Date: 14.JUL.2010 14:01:09