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FCC TEST REPORT

FCC 47 CFR Part 15C
Industry Canada RSS-247
Digital transmission systems operating within the 2400 – 2483.5 MHz band

Report Reference No. ..... :	G0M-1510-5172-TFC247WF-161-V01
Testing Laboratory ..... :	Eurofins Product Service GmbH
Address ..... :	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation ..... :	A2LA Accredited Testing Laboratory, Certificate No.: 1983.01 FCC Filed Test Laboratory, Reg.-No.: 96970 IC OATS Filing assigned code: 3470A
Applicant's name ..... :	u-blox Berlin GmbH
Address ..... :	Rudower Chaussee 9 12489 Berlin GERMANY
Test specification:	
Standard..... :	47 CFR Part 15C RSS-247, Issue 1, 2015-05 RSS-Gen, Issue 4, 2014-11 ANSI C63.10:2013 ANSI C63.4:2014
Test scope…….. ..... :	partial radio compliance test according to customer request
Equipment under test (EUT):	
Product description	WLAN/Bluetooth multi-radio host-based module
Model No.	ELLA-W1
Additional Model(s)	None
Brand Name(s)	None
Hardware version	G8, mounted on eval board version 1.01
Firmware / Software version	MFG firmware
	FCC-ID: none IC: none
Test result	**Passed**

Possible test case verdicts:

- neither assessed nor tested ..... :	N/N
- required by standard but not appl. to test object ..... :	N/A
- required by standard but not tested ..... :	N/T
- not required by standard for the test object ..... :	N/R
- test object does meet the requirement ..... :	P (Pass)
- test object does not meet the requirement ..... :	F (Fail)

Testing:

Test Lab Temperature ..... :	20 – 23 °C	
Test Lab Humidity ..... :	32 – 38 %	
Date of receipt of test item ..... :	2015-11-02	
Date (s) of performance of tests ..... :	2015-11-02 - 2015-11-16	
Compiled by ..... :	Toralf Jahn	
Tested by (+ signature) ..... : (Responsible for Test)	Toralf Jahn	T. J .....
Approved by (+ signature) ..... : (Head of Lab)	Christian Weber	C. Weber .....
Date of issue ..... :	2015-12-23	
Total number of pages ..... :	73	

General remarks:

The test results presented in this report relate only to the object tested.
The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.

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

Additional comments:

This test report is for the versions ELLA-W161-A and ELLA-W161.

Version History

Version	Issue Date	Remarks	Revised by
01	2015-12-23	Initial Release	

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

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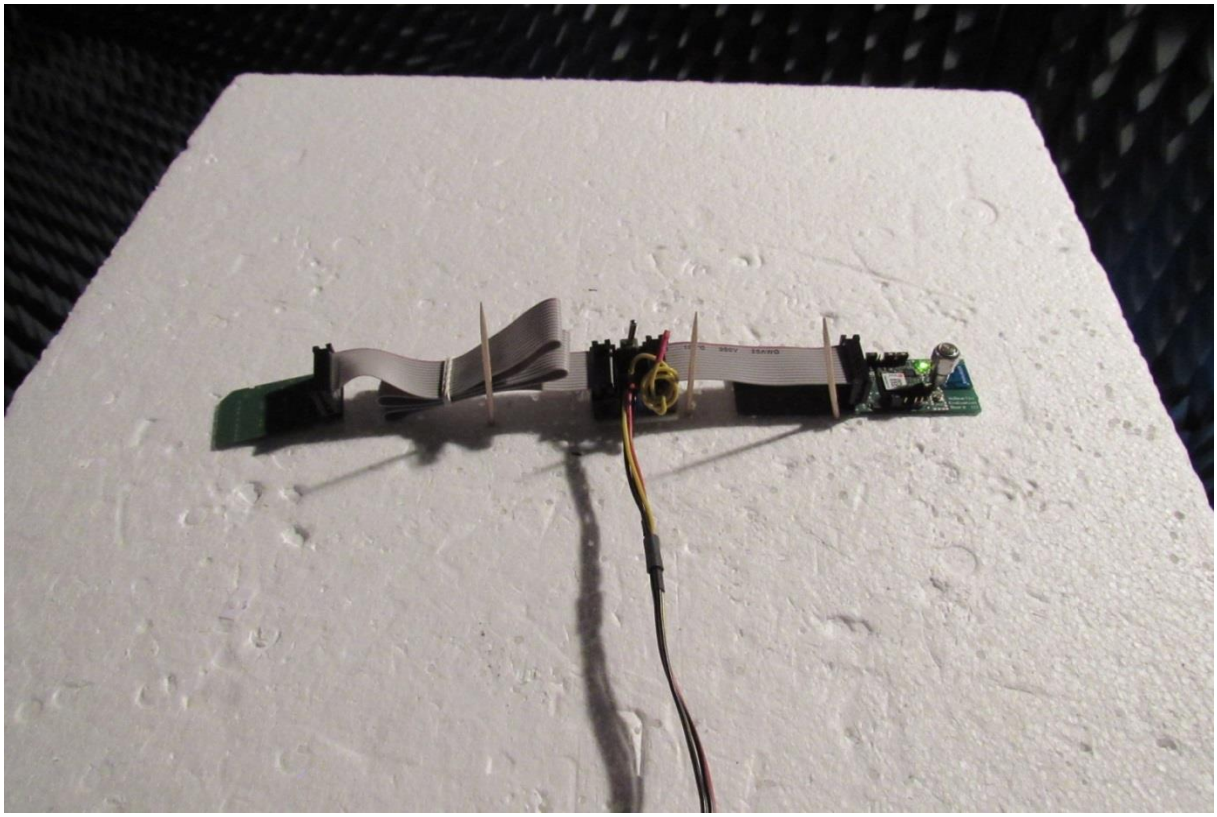
1 Equipment (Test item) Description

Description	WLAN/Bluetooth multi-radio host-based module			
Model	ELLA-W1			
Additional Model(s)	None			
Brand Name(s)	None			
Serial number	None			
Hardware version	G8, mounted on eval board version 1.01			
Software / Firmware version	MFG firmware			
FCC-ID	none			
IC	none			
Equipment type	Radio module			
Radio type	Transceiver			
Radio technology	IEEE 802.11 b/g/n			
Operating frequency range	2412 - 2462 MHz			
Assigned frequency band	2400 - 2483.5 MHz			
Main test frequencies	F_{LOW20}	2412 MHz	F_{LOW40}	2422 MHz
	F_{MID20}	2437 MHz	F_{MID40}	2437 MHz
	F_{HIGH20}	2462 MHz	F_{HIGH40}	2452 MHz
Spreading	CCK, DSSS, OFDM			
Modulations	BPSK, QPSK, 16-QAM, 64-QAM			
Number of channels	11			
Channel spacing	5 MHz			
Number of antennas	none			
Antenna	Type	N/A		
	Model	N/A		
	Manufacturer	N/A		
	Gain	N/A		
Manufacturer	u-blox Berlin GmbH Rudower Chaussee 9 12489 Berlin GERMANY			
Power supply	V_{NOM}	3.3 VDC		
	V_{MIN}	3.0 VDC		
	V_{MAX}	3.6 VDC		
AC/DC-Adaptor	Model	N/A		
	Vendor	N/A		
	Input	N/A		
	Output	N/A		

1.1 Photos – Test setup



1.2 Supporting Equipment Used During Testing

Product Type*	Device	Manufacturer	Model No.	Comments
AE	Development board	lesswire AG	WiBear11n-SF1-EK	Mounting of EUT
CABL	Flat ribbon cable	unspecific	unspecific	SDIO connection to control PC
AE	Interface card	DeLock	91481	SDIO interface on PC
AE	power supply	Statron	2224.7	

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

AE : Auxiliary/Associated Equipment, or

SIM : Simulator (Not Subjected to Test)

CABL : Connecting cables

1.3 Test Modes

Mode #	Description	
DSSS	General conditions:	EUT powered by laboratory power supply.
	Radio conditions:	Mode = standalone transmit Spreading = DSSS Modulation = BPSK Data rate = 1 Mbps Bandwidth = 20 MHz Duty cycle = 100 % Power level = 18 dBm (Test mode setting)
OFDM	General conditions:	EUT powered by laboratory power supply.
	Radio conditions:	Mode = standalone transmit Spreading = OFDM Modulation = BPSK Data rate = 6 Mbps Bandwidth = 20 MHz Duty cycle = 100 % Power level = 15 dBm (Test mode setting)
HT20	General conditions:	EUT powered by laboratory power supply.
	Radio conditions:	Mode = standalone transmit Spreading = OFDM Modulation = BPSK Data rate = MCS0 Bandwidth = 20 MHz Duty cycle = 100 % Power level = 15 dBm (Test mode setting)
HT40	General conditions:	EUT powered by laboratory power supply.
	Radio conditions:	Mode = standalone transmit Spreading = OFDM Modulation = BPSK Data rate = MCS0 Bandwidth = 40 MHz Duty cycle = 100 % Power level = 15 dBm (Test mode setting)

1.4 Test Equipment Used During Testing

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

Conducted spurious emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	R&S	FSW43	EF00896	2015-03	2016-03

Radiated spurious emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Semi-anechoic chamber	Frankonia	AC 1	EF00062	-	-
Spectrum Analyzer	R&S	FSIQ26	EF00242	2015-04	2016-04
Biconical Antenna	R&S	HK 116	EF00012	2013-02	2016-02
LPD Antenna	R&S	HL 223	EF00187	2014-03	2017-03
LPD Antenna	R&S	HL 025	EF00327	2015-10	2018-10

1.5 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:

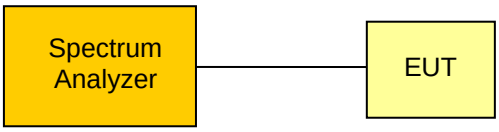
Reading	+	AF	=	Net Reading	:	Net reading - FCC limit = Margin
21.5 dBµV	+	26 dB	=	47.5 dBµV/m	:	47.5 dBµV/m - 57.0 dBµV/m = -9.5 dB

2 Result Summary

FCC 47 CFR Part 15C, IC RSS-210				
Product Specific Standard Section	**Requirement – Test**	**Reference Method**	**Result**	**Remarks**
RSS-Gen 6.6	Occupied Bandwidth	ANSI C63.10	N/T	Informational only
FCC § 15.247(a)(2) IC RSS-247 § 5.2	6dB Bandwidth	ANSI C63.10	N/T	Customer specific test plan
FCC § 15.247(b)(3) IC RSS-247 § 5.4	Maximum peak conducted power	ANSI C63.10	N/T	Customer specific test plan
FCC § 15.247(e) IC RSS-247 § 5.2	Power spectral density	ANSI C63.10	N/T	Customer specific test plan
47 CFR 15.207 IC RSS-247 § 3.1	AC power line conducted emissions	ANSI C63.4	N/T	Customer specific test plan
FCC § 15.247(d) IC RSS-247 § 5.5	Band edge compliance	ANSI C63.10	N/T	Customer specific test plan
FCC § 15.247(d) IC RSS-247 § 5.5	Conducted spurious emissions	ANSI C63.10	PASS	
FCC § 15.247(d) FCC § 15.209 IC RSS-247 § 5.5	Transmitter radiated spurious emissions	ANSI C63.10	PASS	Customer specific test plan. Measurements only between 1 and 12.5 GHz. Antenna ports terminated with 50 Ohms.
IC RSS-247 § 3.1	Receiver radiated spurious emissions	ANSI C63.10	N/T	customer specific test plan
Remarks:				

3 Test Conditions and Results

3.1 Test Conditions and Results – Conducted spurious emissions

Conducted spurious emissions acc. to FCC 15.247 / IC RSS-247		**Verdict: PASS**
EUT requirement rule parts and clause	Reference	
	FCC 15.247(d) / IC RSS-247 5.5	
Test according to measurement reference	Reference Method	
	ANSI C63.10	
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		

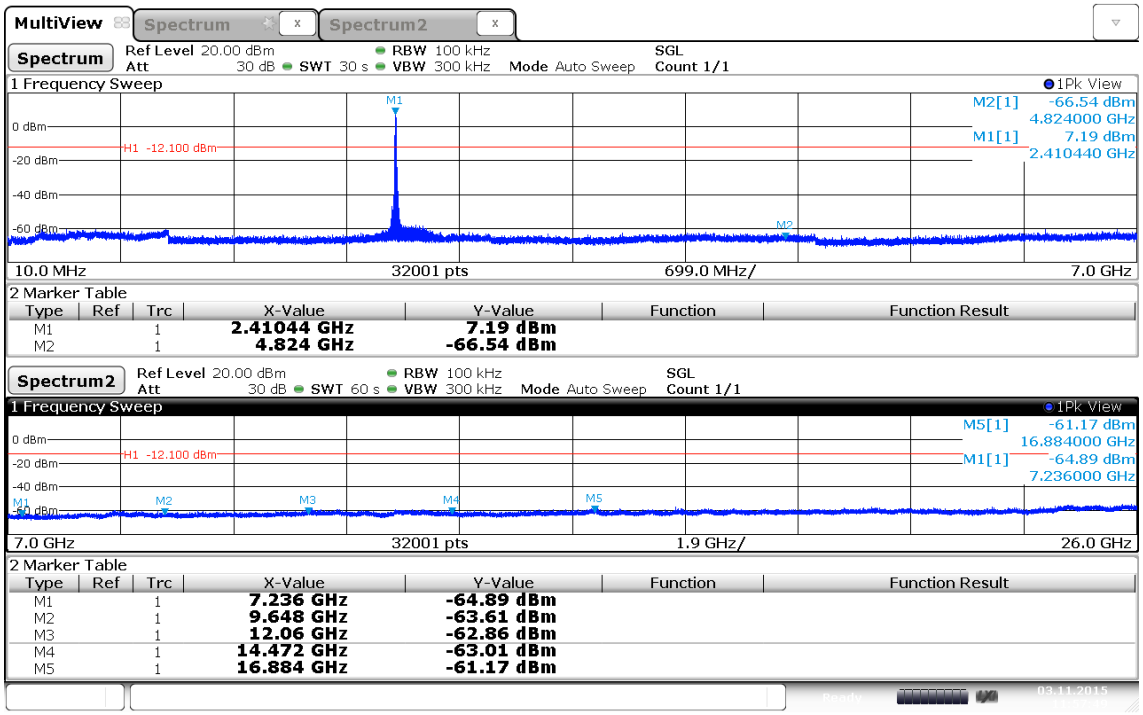
Test overview				
Channel	Frequency [MHz]	Mode	Model	Result
F_{LOW}	2412	DSSS	ELLA-W161-A	Pass
F_{LOW}	2412	OFDM	ELLA-W161-A	Pass
F_{HIGH}	2462	DSSS	ELLA-W161-A	Pass
F_{HIGH}	2462	OFDM	ELLA-W161-A	Pass
F_{LOW}	2412	DSSS	ELLA-W161	Pass
F_{LOW}	2412	OFDM	ELLA-W161	Pass
F_{HIGH}	2462	DSSS	ELLA-W161	Pass
F_{HIGH}	2462	OFDM	ELLA-W161	Pass
Comments: The Low Channel was measured for ELLA-W131-A with DSSS, OFDM, HT20 and HT40. OFDM was determined as the worst case out of OFDM, HT20 and HT40. Subsequent measurements for ELLA-W161-A and for ELLA-W161 were only performed with DSSS and OFDM.				

ELLA-W161-A Conducted spurious emissions – DSSS F_{LOW}

Spurious Emissions acc. to FCC 15.247

Project Number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161-A
Model:	Test Sample #5
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 b, 2412 MHz, 1 Mbps, Power 18 dBm
Test Date:	2015-11-03
Verdict:	PASS
Note 1:	Spurious in non-restricted frequency bands (ANSI C63.10)
Note 2:	conducted measurement

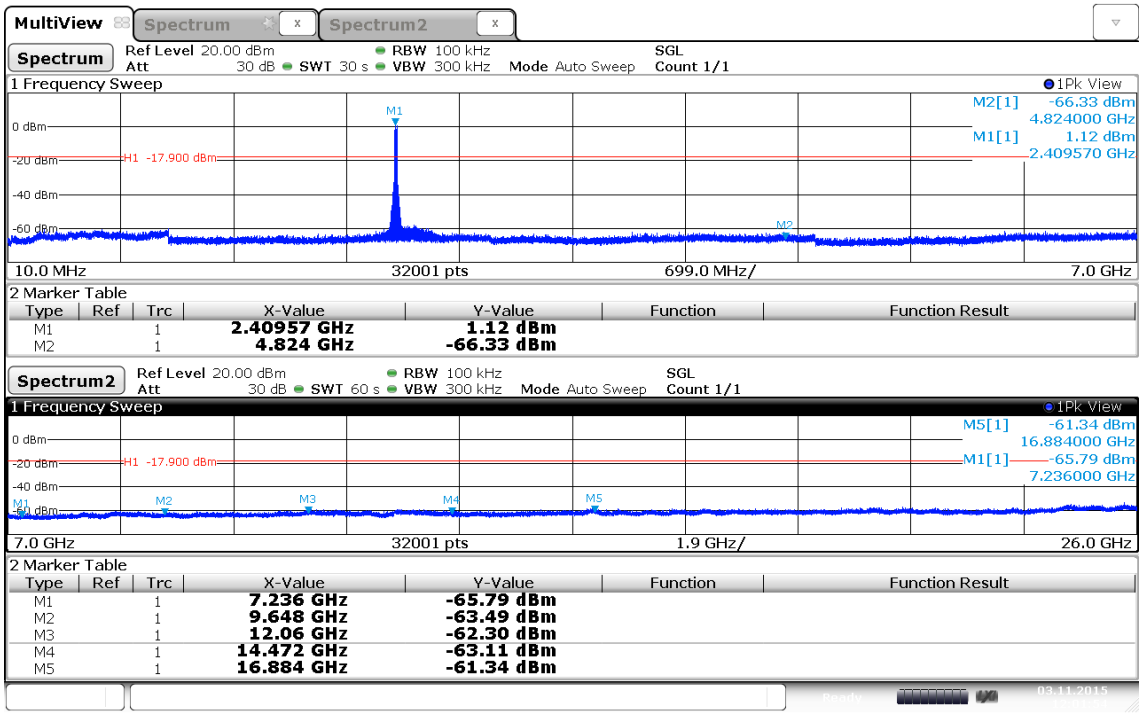


ELLA-W161-A Conducted spurious emissions – OFDM F_{LOW}

Spurious Emissions acc. to FCC 15.247

Project Number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161-A
Model:	Test Sample #5
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 g, 2412 MHz, 6 Mbps, Power 15 dBm
Test Date:	2015-11-03
Verdict:	PASS
Note 1:	Spurious in non-restricted frequency bands (ANSI C63.10)
Note 2:	conducted measurement



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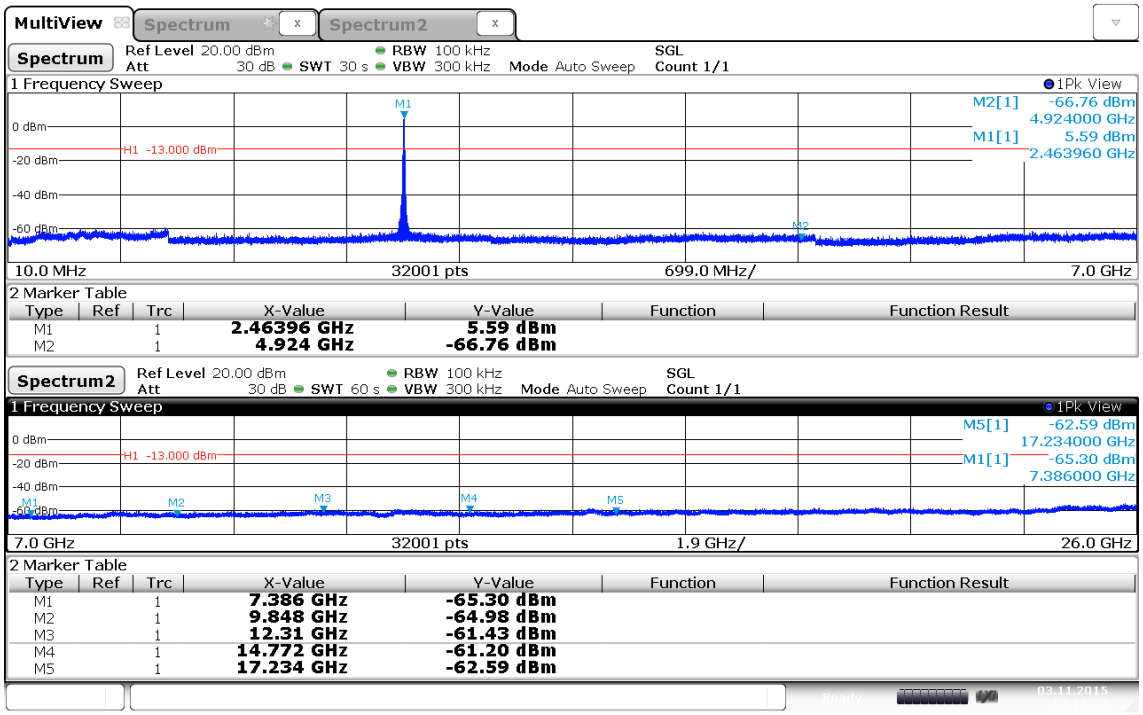
ELLA-W161-A Conducted spurious emissions – DSSS F_{HIGH}

Spurious Emissions acc. to FCC 15.247

Project Number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161-A
Model:	Test Sample #5
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 b, 2462 MHz, 1 Mbps, Power 18 dBm
Test Date:	2015-11-03
Verdict:	PASS
Note 1:	Spurious in non-restricted frequency bands (ANSI C63.10)
Note 2:	conducted measurement



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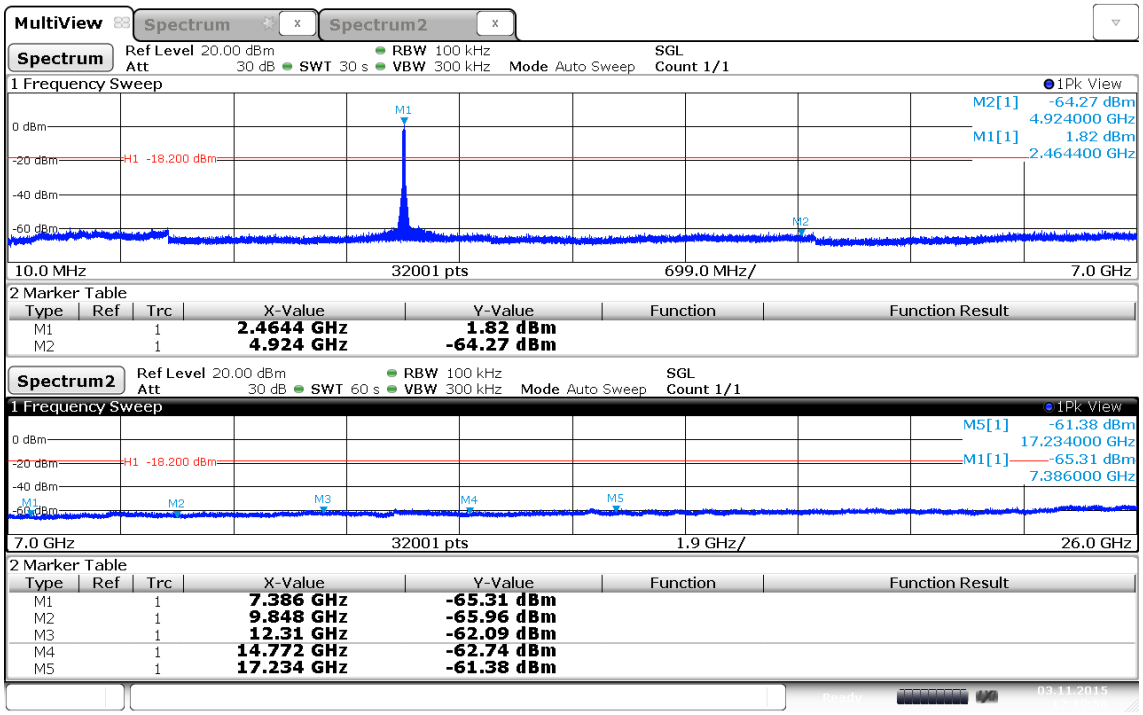
ELLA-W161-A Conducted spurious emissions – OFDM F_{HIGH}

Spurious Emissions acc. to FCC 15.247

Project Number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161-A
Model:	Test Sample #5
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 g, 2462 MHz, 6 Mbps, Power 15 dBm
Test Date:	2015-11-03
Verdict:	PASS
Note 1:	Spurious in non-restricted frequency bands (ANSI C63.10)
Note 2:	conducted measurement



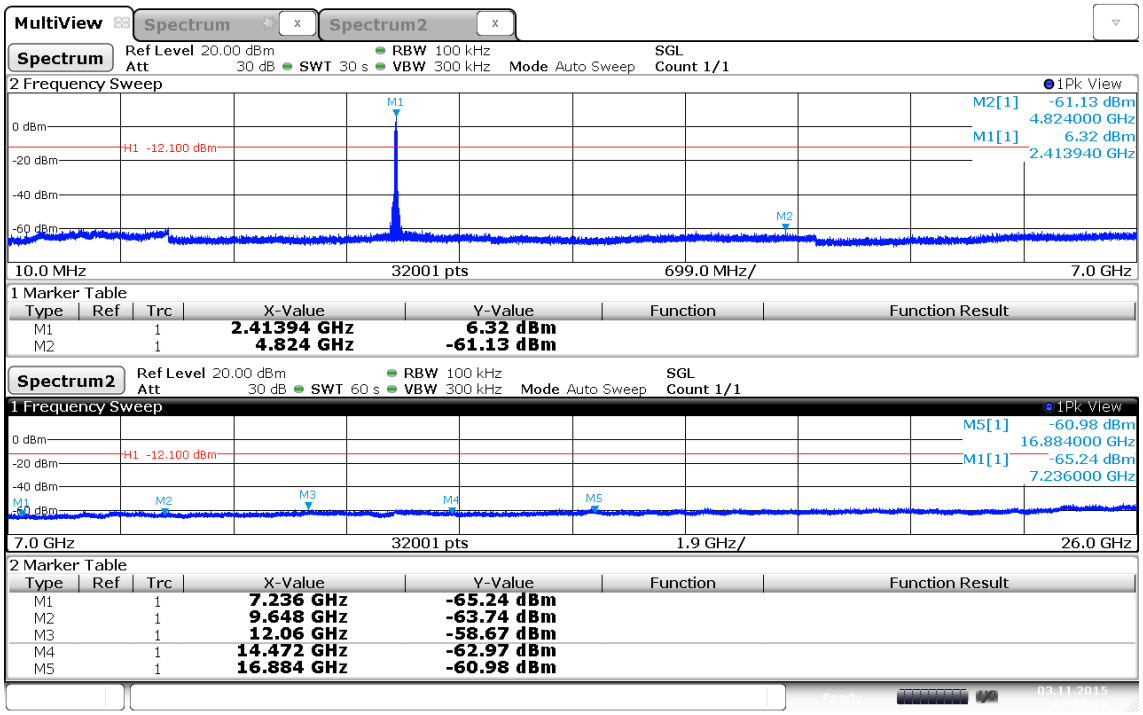
Date: 3.NOV.2015 12:19:56

ELLA-W161 Conducted spurious emissions – DSSS F_{LOW}

Spurious Emissions acc. to FCC 15.247

Project Number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161
Model:	Test Sample #6
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 b, 2412 MHz, 1 Mbps, Power 18 dBm
Test Date:	2015-11-03
Verdict:	PASS
Note 1:	Spurious in non-restricted frequency bands (ANSI C63.10)
Note 2:	conducted measurement

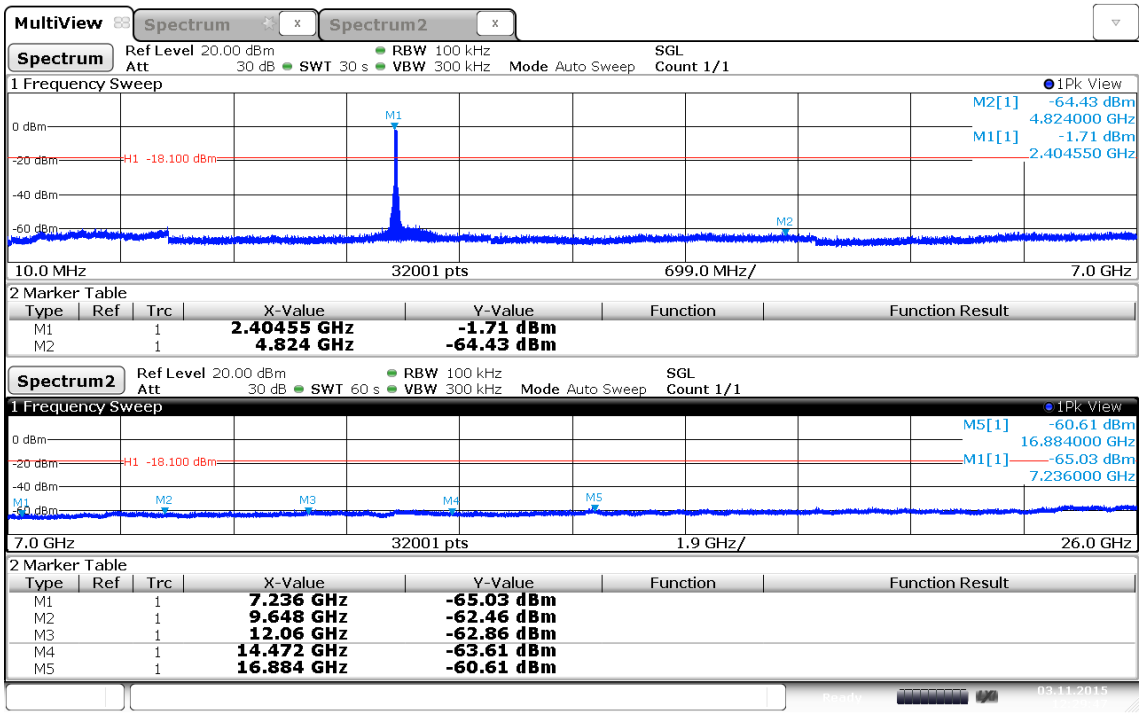


ELLA-W161 Conducted spurious emissions – OFDM F_{LOW}

Spurious Emissions acc. to FCC 15.247

Project Number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161
Model:	Test Sample #6
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 g, 2412 MHz, 6 Mbps, Power 15 dBm
Test Date:	2015-11-03
Verdict:	PASS
Note 1:	Spurious in non-restricted frequency bands (ANSI C63.10)
Note 2:	conducted measurement



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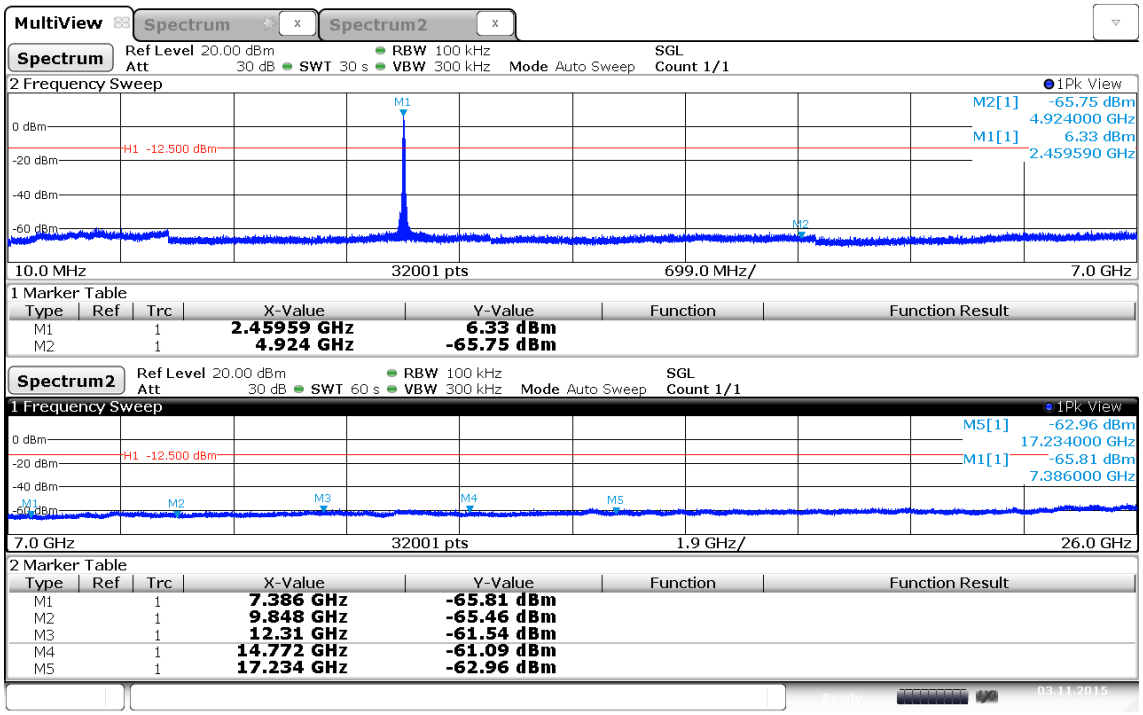
ELLA-W161 Conducted spurious emissions – DSSS F_{HIGH}

Spurious Emissions acc. to FCC 15.247

Project Number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161
Model:	Test Sample #6
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 b, 2462 MHz, 1 Mbps, Power 18 dBm
Test Date:	2015-11-03
Verdict:	PASS
Note 1:	Spurious in non-restricted frequency bands (ANSI C63.10)
Note 2:	conducted measurement



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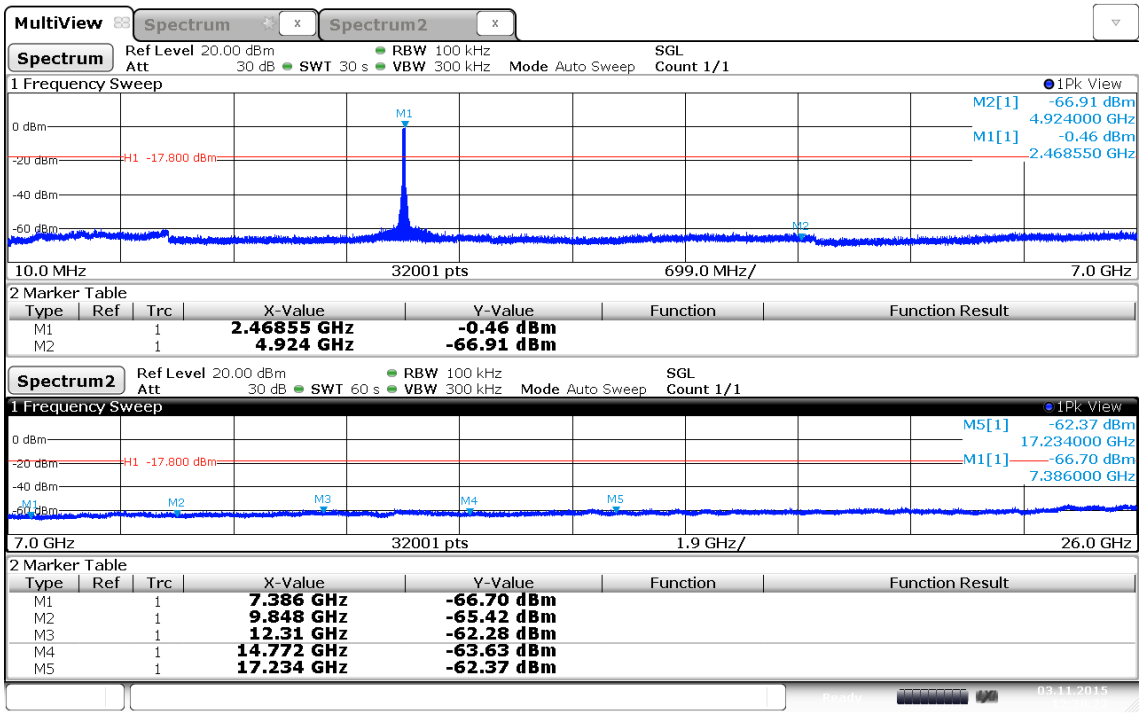
ELLA-W161 Conducted spurious emissions – OFDM F_{HIGH}

Spurious Emissions acc. to FCC 15.247

Project Number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161
Model:	Test Sample #6
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 g, 2462 MHz, 6 Mbps, Power 15 dBm
Test Date:	2015-11-03
Verdict:	PASS
Note 1:	Spurious in non-restricted frequency bands (ANSI C63.10)
Note 2:	conducted measurement



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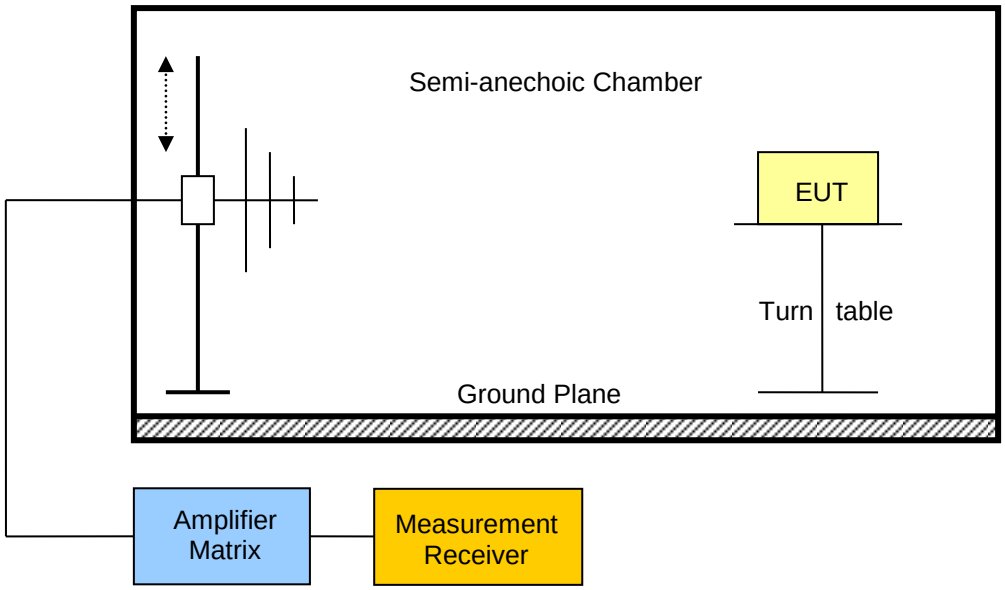
3.2 Test Conditions and Results – Transmitter radiated emissions

Transmitter radiated emissions acc. to FCC 47 CFR 15.247 / IC RSS-247				**Verdict: PASS**
Test according referenced standards		Reference Method		
		FCC 15.247(d) / IC RSS-247 5.5		
Test according to measurement reference		Reference Method		
		ANSI C63.10		
Test frequency range		Tested frequencies		
		According to customer test plan		
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 ELLA-W161-A

Channel	Frequency [MHz]	Mode	Emission [MHz]	Level [dbµV/m]	Det.	Pol.	Limit [dbµV/m]	Limit dist. [m]*	Margin [dB]
F_{LOW}	2412	DSSS	4824	34.80	pk	hor	74.00	3	-39.20
F_{LOW}	2412	DSSS	4824	35.27	pk	ver	74.00	3	-38.73
F_{LOW}	2412	DSSS	6432	39.77	pk	hor	95.00	3	-55.23
F_{LOW}	2412	DSSS	6432	39.19	pk	ver	95.00	3	-55.81
F_{LOW}	2412	DSSS	7232	42.06	pk	ver	95.00	3	-52.94
F_{LOW}	2412	DSSS	9640	45.97	pk	hor	95.00	3	-49.03
F_{LOW}	2412	DSSS	9640	48.15	pk	ver	95.00	3	-46.85
F_{LOW}	2412	DSSS	14472	49.53	pk	ver	74.00	3	-24.47
F_{LOW}	2422	HT40	6456	39.26	pk	hor	95.00	3	-55.74
F_{LOW}	2422	HT40	6456	39.16	pk	ver	95.00	3	-55.84
F_{HIGH}	2462	DSSS	4920	36.95	pk	hor	74.00	3	-37.05
F_{HIGH}	2462	DSSS	4920	35.94	pk	ver	74.00	3	-38.06
F_{HIGH}	2462	DSSS	6560	38.59	pk	hor	95.00	3	-56.41
F_{HIGH}	2462	DSSS	6560	39.40	pk	ver	95.00	3	-55.60
F_{HIGH}	2462	DSSS	7384	40.63	pk	hor	74.00	3	-33.37
F_{HIGH}	2462	DSSS	7384	44.43	pk	ver	74.00	3	-29.57
F_{HIGH}	2462	DSSS	9840	46.01	pk	hor	95.00	3	-48.99
F_{HIGH}	2462	DSSS	9848	47.70	pk	ver	95.00	3	-47.30
F_{HIGH}	2462	DSSS	12240	43.63	pk	hor	74.00	3	-30.37
F_{HIGH}	2452	HT40	6536	39.02	pk	hor	95.00	3	-55.98
F_{HIGH}	2452	HT40	6536	39.12	pk	ver	95.00	3	-55.88

Test results ELLA-W161									
Channel	Frequency [MHz]	Mode	Emission [MHz]	Level [dbµV/m]	Det.	Pol.	Limit [dbµV/m]	Limit dist. [m]*	Margin [dB]
F_{LOW}	2412	DSSS	4816	36.47	pk	hor	74.00	3	-37.53
F_{LOW}	2412	DSSS	4816	38.34	pk	ver	74.00	3	-35.66
F_{LOW}	2412	DSSS	4816	36.47	pk	hor	74.00	3	-37.53
F_{LOW}	2412	DSSS	4816	38.34	pk	ver	74.00	3	-35.66
F_{LOW}	2412	DSSS	6424	38.89	pk	hor	95.00	3	-56.11
F_{LOW}	2412	DSSS	6424	38.89	pk	hor	95.00	3	-56.11
F_{LOW}	2412	DSSS	6432	39.62	pk	ver	95.00	3	-55.38
F_{LOW}	2412	DSSS	6432	39.62	pk	ver	95.00	3	-55.38
F_{LOW}	2412	DSSS	7232	40.10	pk	hor	95.00	3	-54.90
F_{LOW}	2412	DSSS	7232	40.48	pk	ver	95.00	3	-54.52
F_{LOW}	2412	DSSS	7232	40.10	pk	hor	95.00	3	-54.90
F_{LOW}	2412	DSSS	7232	40.48	pk	ver	95.00	3	-54.52
F_{LOW}	2412	DSSS	9640	51.46	pk	ver	95.00	3	-43.54
F_{LOW}	2412	DSSS	9640	51.46	pk	ver	95.00	3	-43.54
F_{LOW}	2412	DSSS	9648	50.20	pk	hor	95.00	3	-44.80
F_{LOW}	2412	DSSS	9648	50.20	pk	hor	95.00	3	-44.80
F_{LOW}	2412	DSSS	12048	47.74	pk	ver	74.00	3	-26.26
F_{LOW}	2412	DSSS	12048	47.74	pk	ver	74.00	3	-26.26
F_{LOW}	2412	DSSS	14460	51.06	pk	ver	95.00	3	-43.94
F_{LOW}	2412	DSSS	14460	51.06	pk	ver	95.00	3	-43.94
F_{LOW}	2422	HT40	6456	38.88	pk	hor	95.00	3	-56.12
F_{LOW}	2422	HT40	6456	40.43	pk	ver	95.00	3	-54.57
F_{HIGH}	2462	DSSS	4920	38.21	pk	hor	74.00	3	-35.79
F_{HIGH}	2462	DSSS	4920	40.80	pk	ver	74.00	3	-33.20
F_{HIGH}	2462	DSSS	6560	37.84	pk	hor	95.00	3	-57.16
F_{HIGH}	2462	DSSS	6560	38.86	pk	ver	95.00	3	-56.14
F_{HIGH}	2462	DSSS	7384	40.80	pk	hor	74.00	3	-33.20
F_{HIGH}	2462	DSSS	7384	42.91	pk	ver	74.00	3	-31.09
F_{HIGH}	2462	DSSS	9848	48.70	pk	hor	95.00	3	-46.30
F_{HIGH}	2462	DSSS	9848	49.69	pk	ver	95.00	3	-45.31
F_{HIGH}	2462	DSSS	12300	46.28	pk	ver	74.00	3	-27.72
F_{HIGH}	2462	DSSS	14772	46.60	pk	ver	95.00	3	-48.40
F_{HIGH}	2452	HT40	4904	35.65	pk	ver	74.00	3	-38.35
F_{HIGH}	2452	HT40	6536	38.21	pk	hor	95.00	3	-56.79

F_{HIGH}	2452	HT40	6536	39.63	pk	ver	95.00	3	-55.37
F_{HIGH}	2452	HT40	7368	41.19	pk	ver	74.00	3	-32.81

Comments:

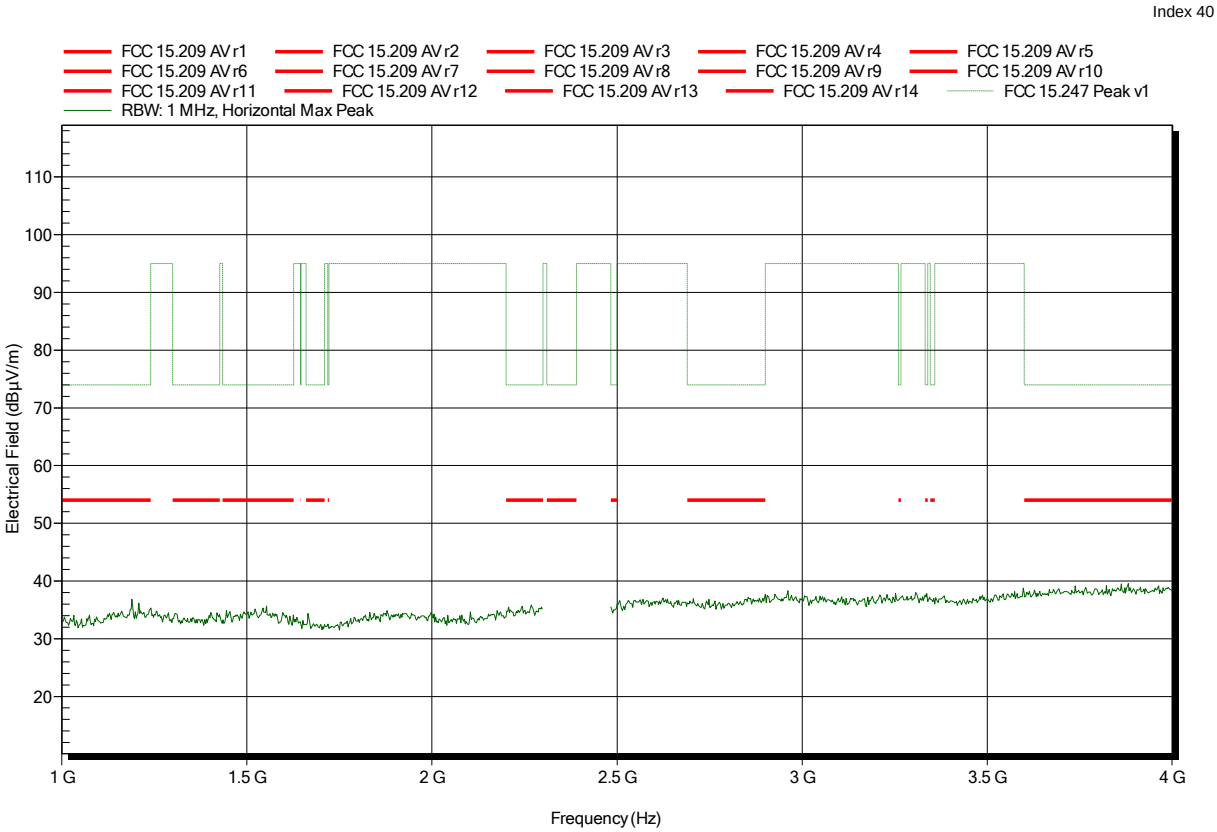
- * Physical distance between EUT and measurement antenna.
- Customer specific test plan.Measurements only between 1 and 12.5 GHz. Antenna ports terminated with 50 Ohms.
- The Low Channel was measured for ELLA-W131-A with DSSS, OFDM, HT20 and HT40. HT40 was determined as the worst case out of OFDM, HT20 and HT40. Subsequent measurements for ELLA-W161-A and ELLA-W161 were only performed with DSSS and HT40.

ANNEX A Transmitter radiated spurious emissions

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161-A
Model:	Test Sample #5
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	TX; 2.4GHz, Ch1, 802.11b, 1Mbps, 18dBm
Test Date:	2015-11-09
Note:	



Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161-A
Model:	Test Sample #5
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	TX; 2.4GHz, Ch1, 802.11b, 1Mbps, 18dBm
Test Date:	2015-11-09
Note:	

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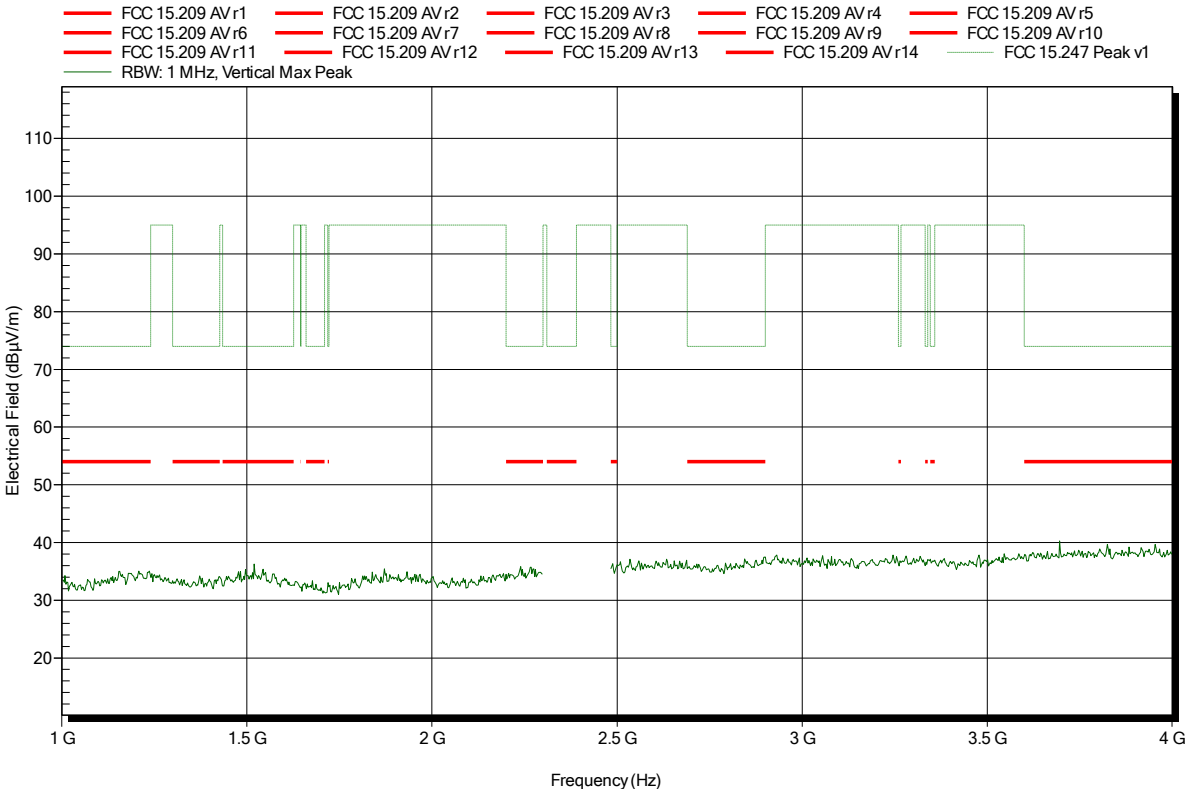

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161-A
Model:	Test Sample #5
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch1, 802.11b, 1Mbps, 18dBm
Test Date:	2015-11-09
Note:	

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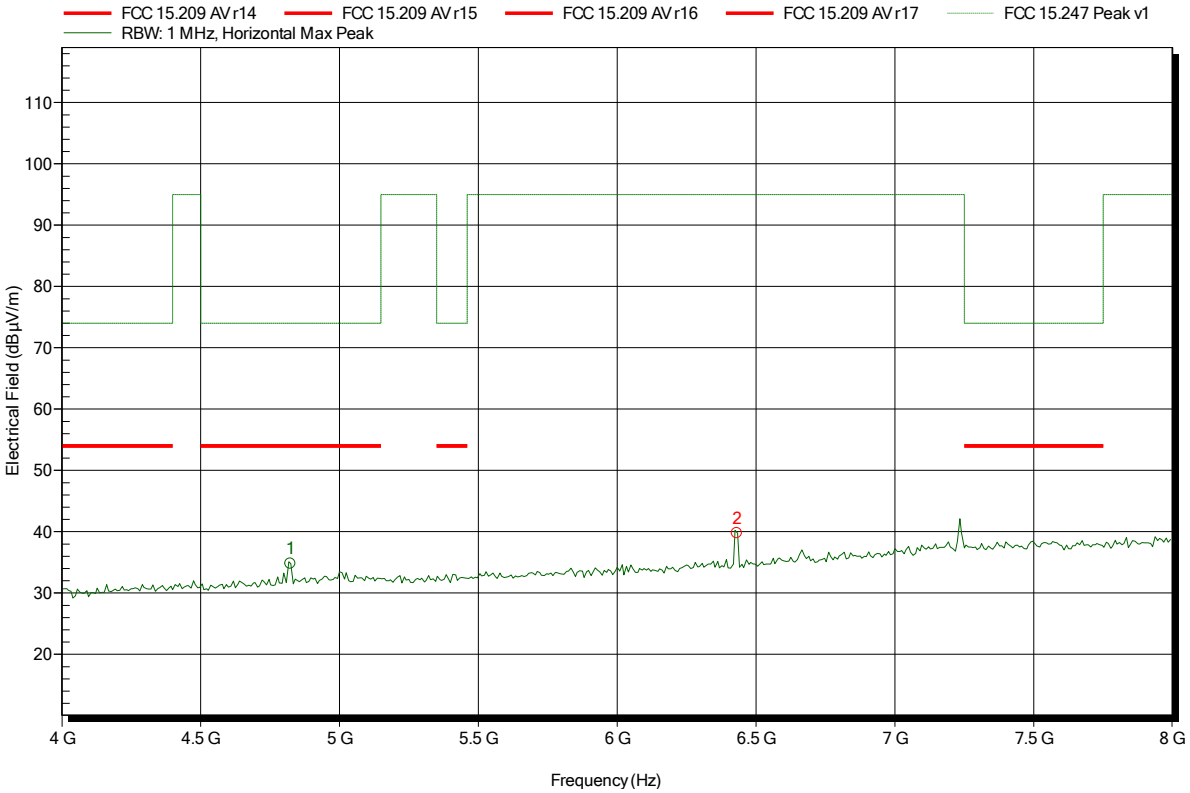

Frequency	Peak	Peak Limit	Peak Difference	Status
4.824 GHz	34.8 dBµV/m	74 dBµV/m	-39.2 dB	Pass
6.432 GHz	39.77 dBµV/m	95 dBµV/m	-55.23 dB	Pass

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161-A
Model:	Test Sample #5
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch1, 802.11b, 1Mbps, 18dBm
Test Date:	2015-11-09
Note:	

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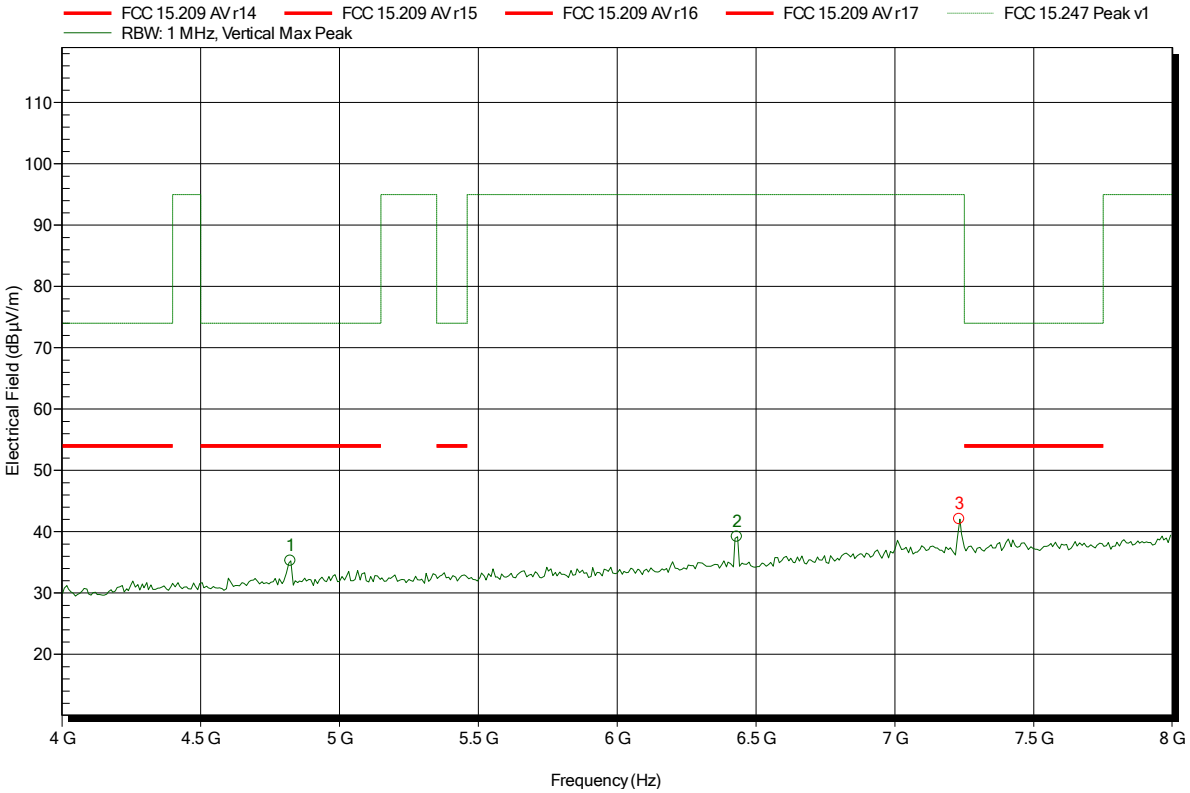

Frequency	Peak	Peak Limit	Peak Difference	Status
4.824 GHz	35.27 dBµV/m	74 dBµV/m	-38.73 dB	Pass
6.432 GHz	39.19 dBµV/m	95 dBµV/m	-55.81 dB	Pass
7.232 GHz	42.06 dBµV/m	95 dBµV/m	-52.94 dB	Pass

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161-A
Model:	Test Sample #5
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch1, 802.11b, 1Mbps, 18dBm
Test Date:	2015-11-09
Note:	

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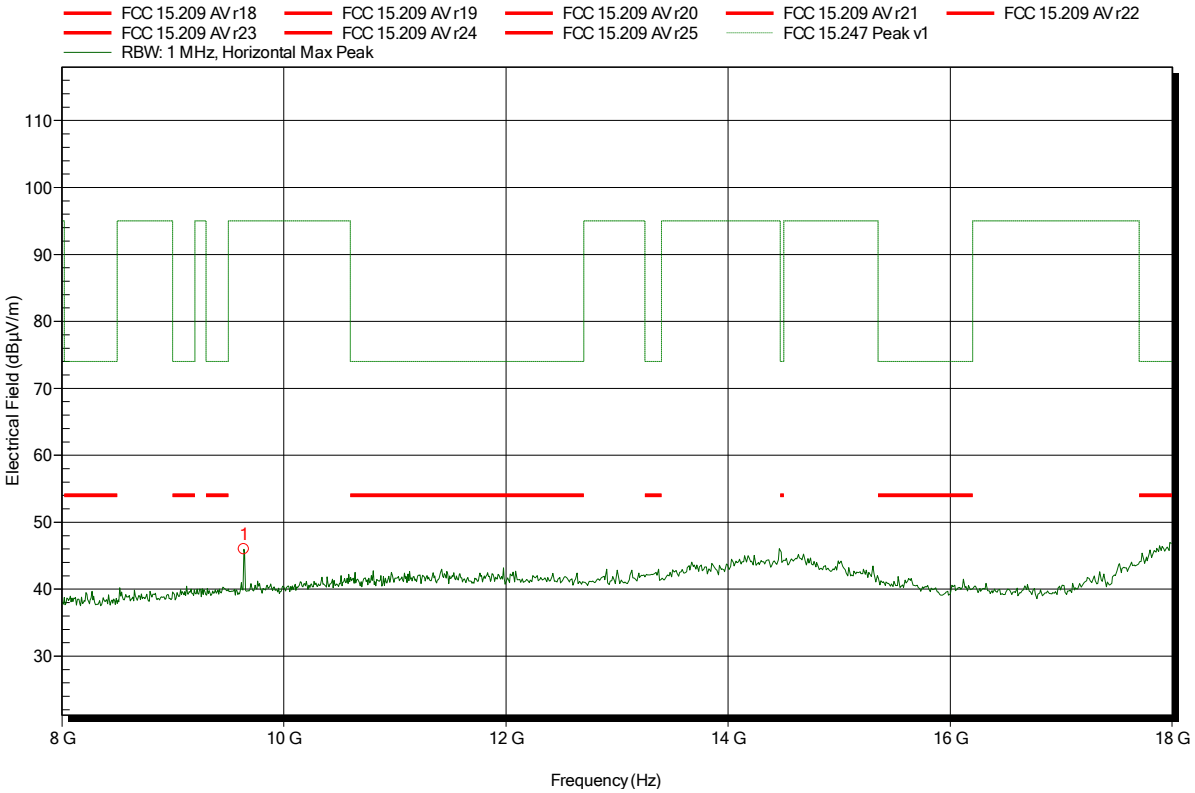
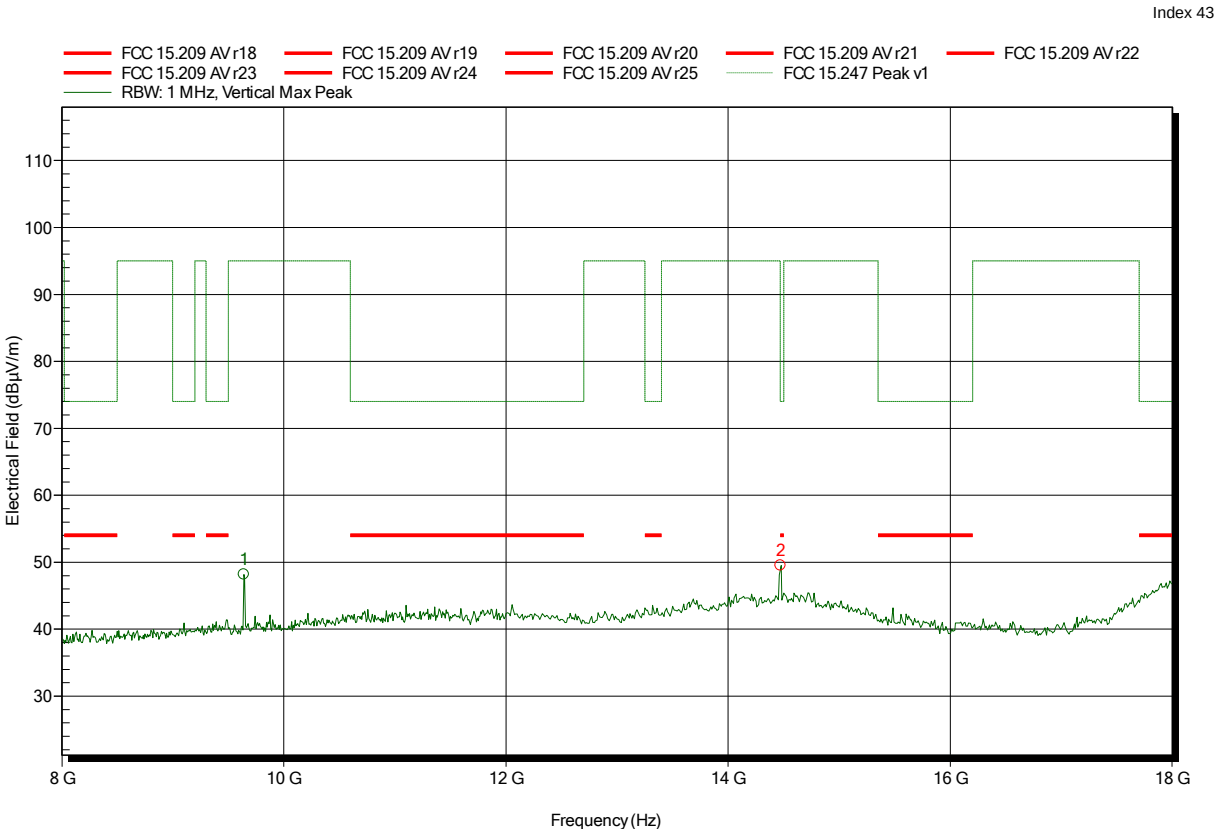


Frequency	Peak	Peak Limit	Peak Difference	Status
9.64 GHz	45.97 dBµV/m	95 dBµV/m	-49.03 dB	Pass

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161-A
Model:	Test Sample #5
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch1, 802.11b, 1Mbps, 18dBm
Test Date:	2015-11-09
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Status
9.64 GHz	48.15 dBµV/m	95 dBµV/m	-46.85 dB	Pass
14.472 GHz	49.53 dBµV/m	74 dBµV/m	-24.47 dB	Pass

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161-A
Model:	Test Sample #5
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	TX; 2.4GHz, Ch3, 802.11n(40), MCS0, 15dBm
Test Date:	2015-11-09
Note:	

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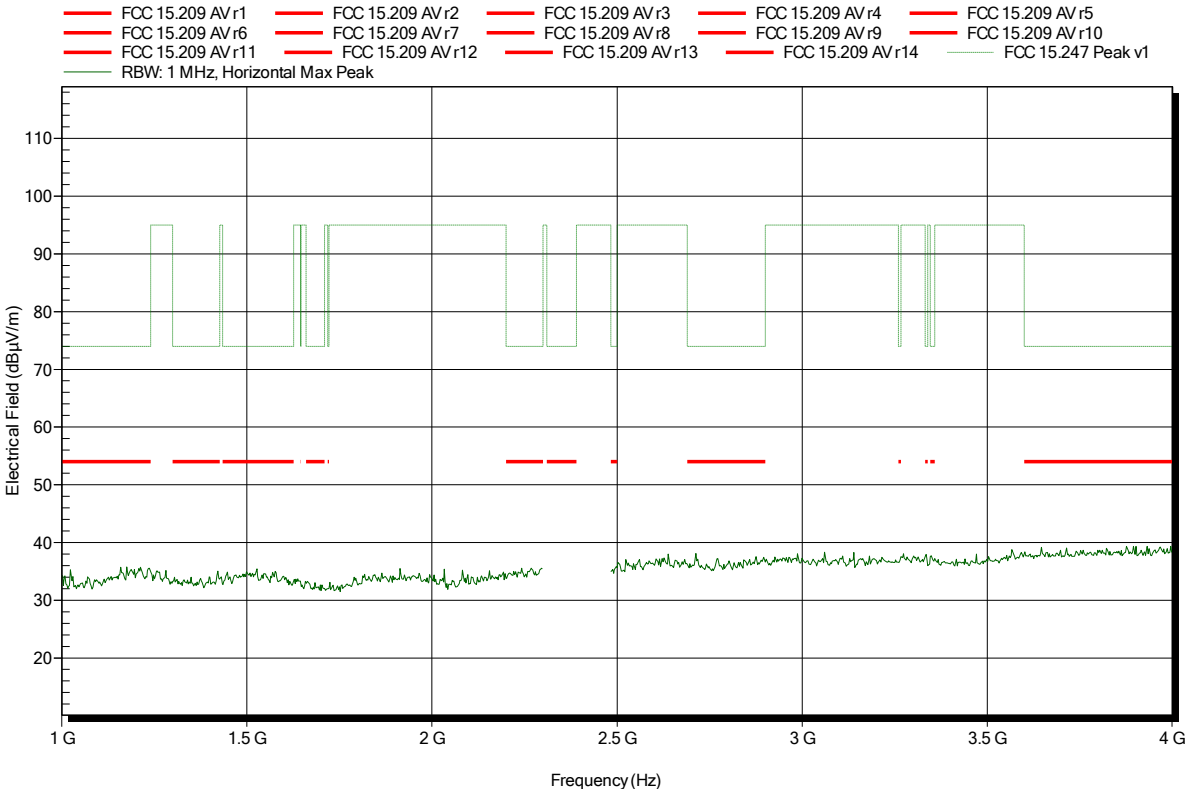

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161-A
Model:	Test Sample #5
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	TX; 2.4GHz, Ch3, 802.11n(40), MCS0, 15dBm
Test Date:	2015-11-09
Note:	

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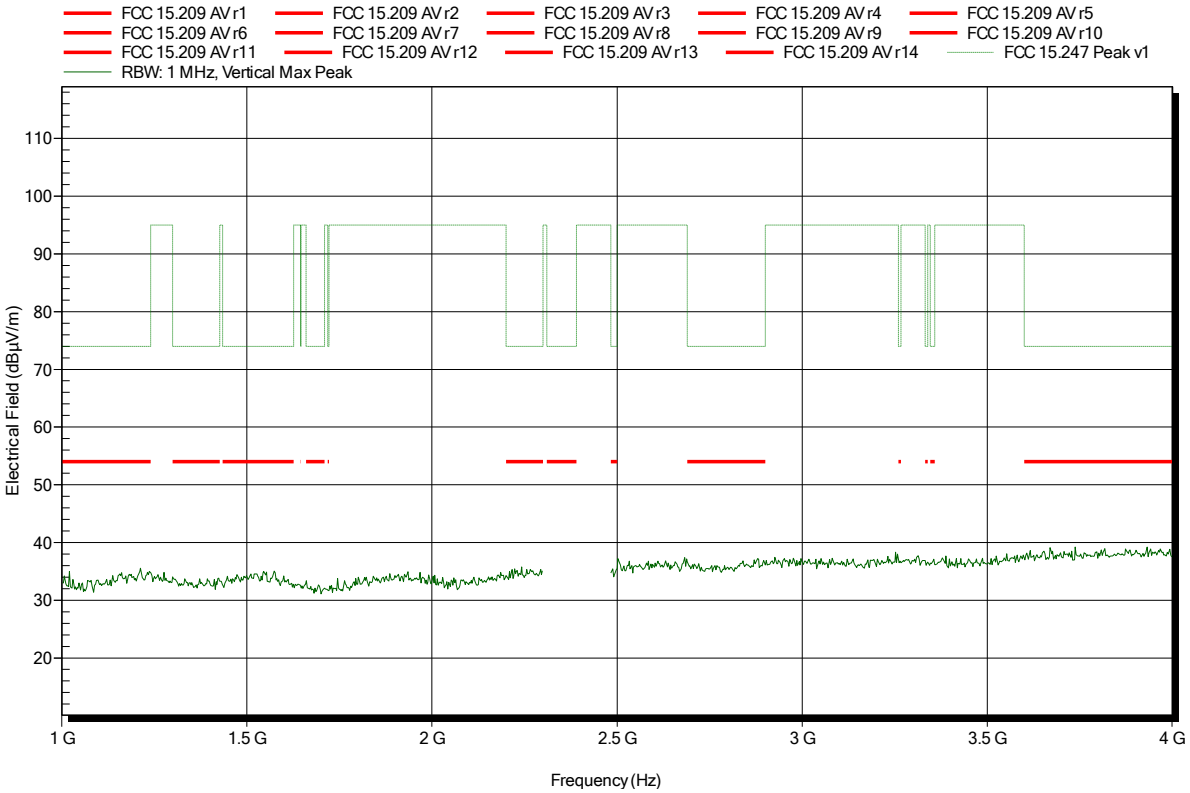

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161-A
Model:	Test Sample #5
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch3, 802.11n(40), MCS0, 15dBm
Test Date:	2015-11-09
Note:	

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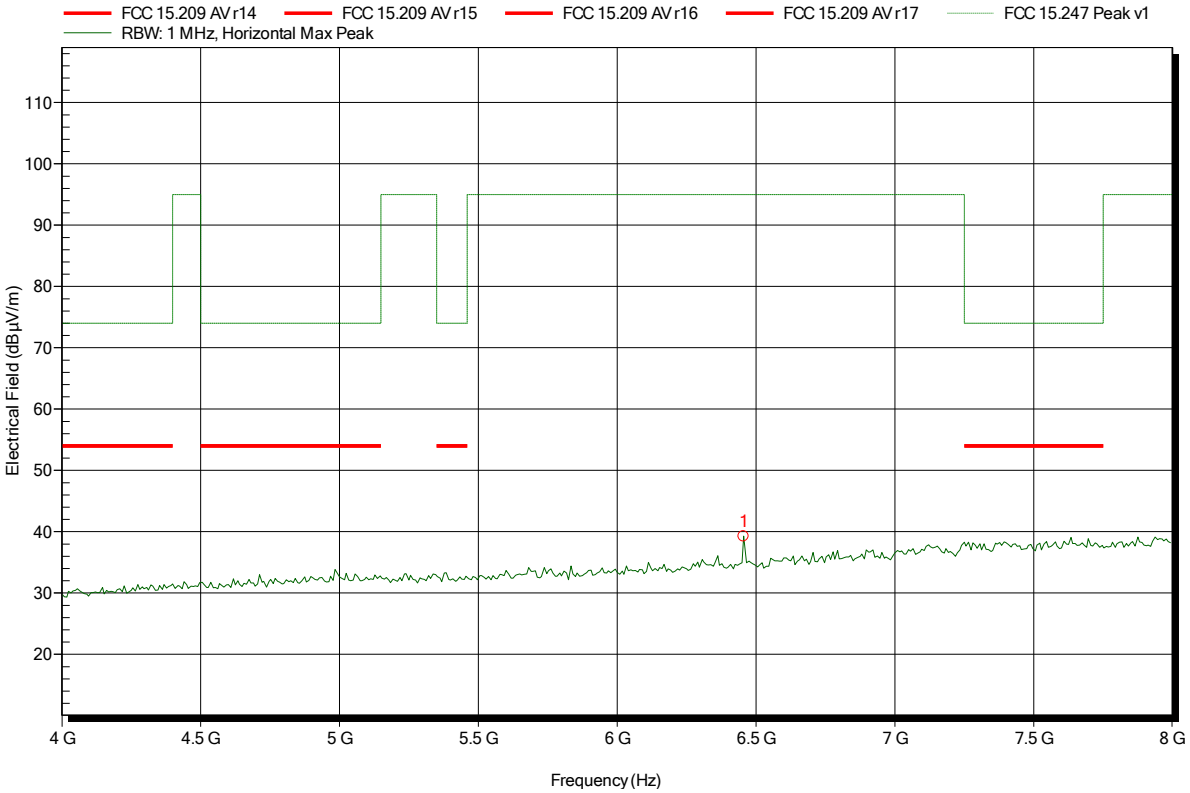

Frequency	Peak	Peak Limit	Peak Difference	Status
6.456 GHz	39.26 dBµV/m	95 dBµV/m	-55.74 dB	Pass

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161-A
Model:	Test Sample #5
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch3, 802.11n(40), MCS0, 15dBm
Test Date:	2015-11-09
Note:	

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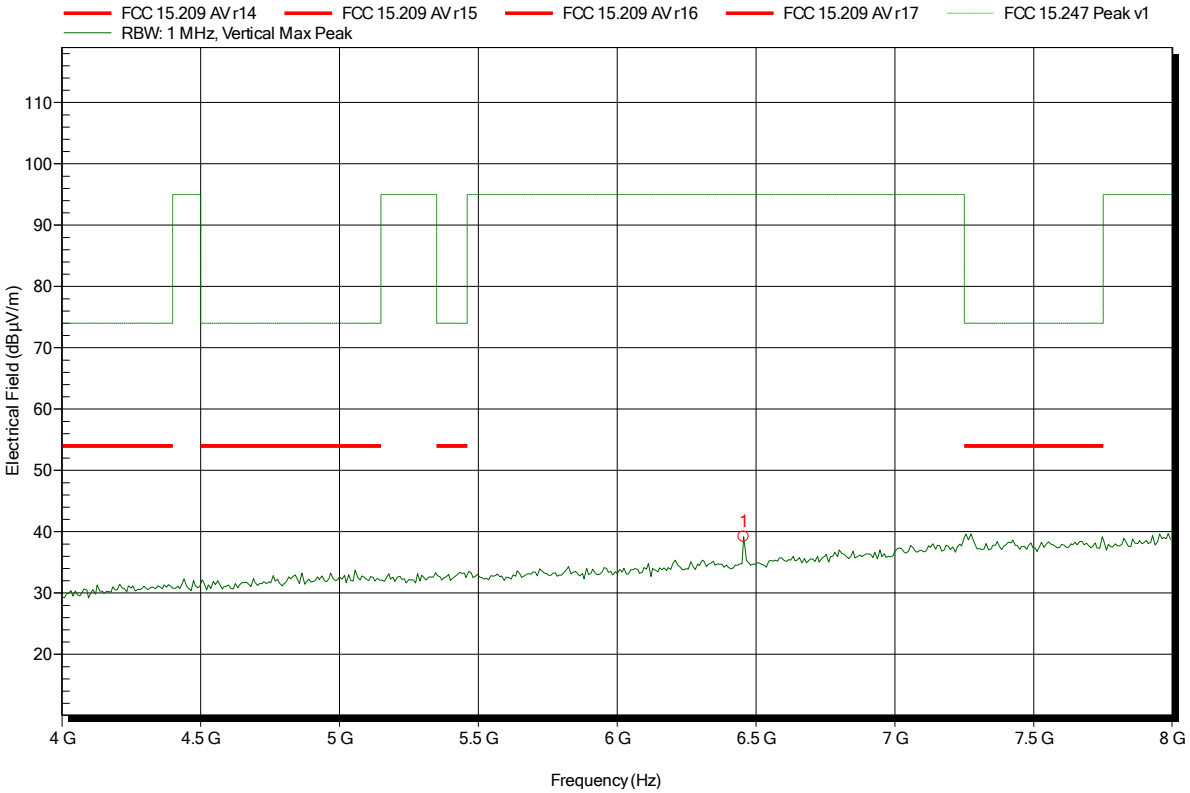

Frequency	Peak	Peak Limit	Peak Difference	Status
6.456 GHz	39.16 dBµV/m	95 dBµV/m	-55.84 dB	Pass

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161-A
Model:	Test Sample #5
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch3, 802.11n(40), MCS0, 15dBm
Test Date:	2015-11-09
Note:	

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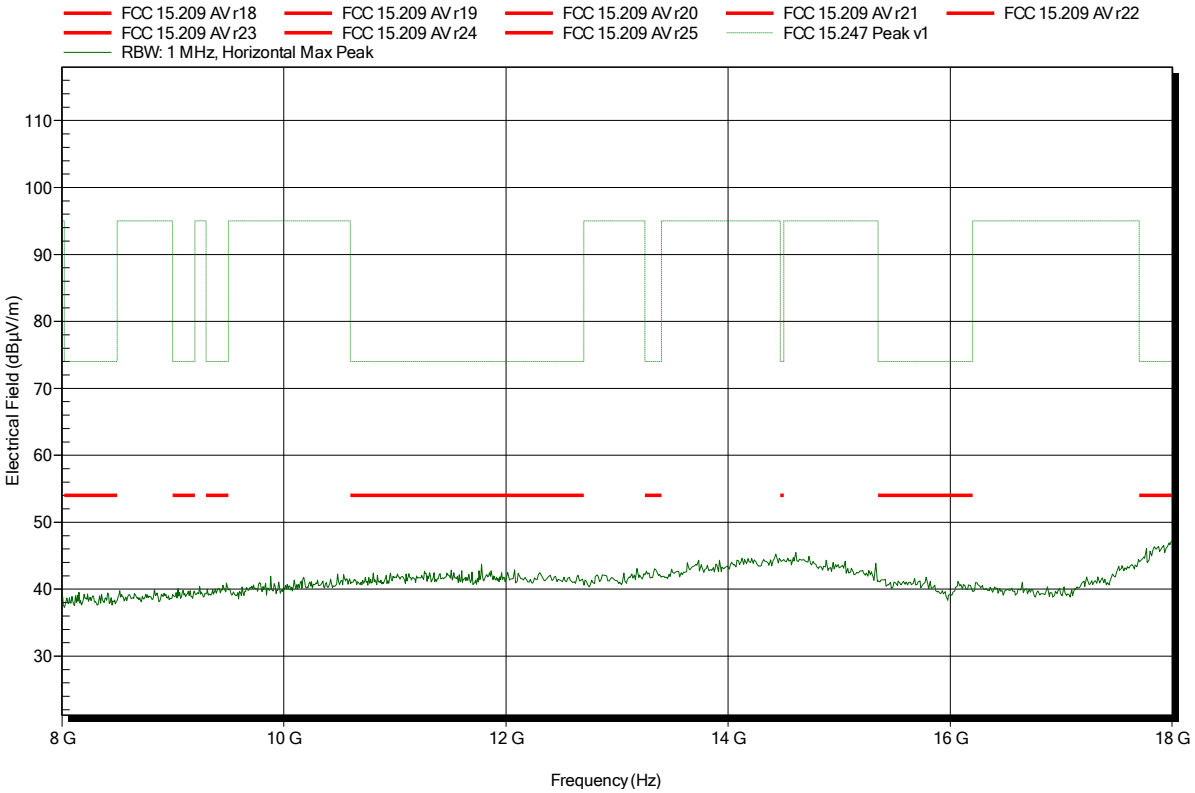

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161-A
Model:	Test Sample #5
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch3, 802.11n(40), MCS0, 15dBm
Test Date:	2015-11-09
Note:	

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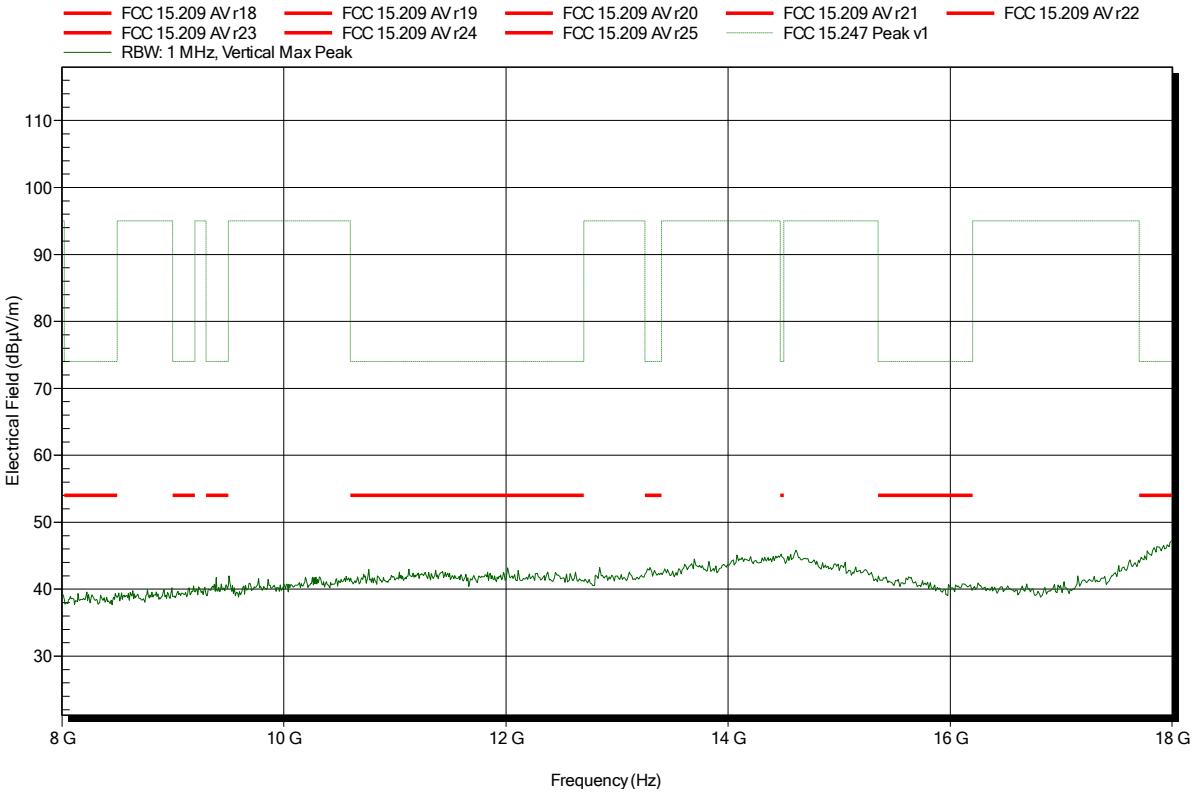

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161-A
Model:	Test Sample #5
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	TX; 2.4GHz, Ch11, 802.11b, 1Mbps, 18dBm
Test Date:	2015-11-10
Note:	

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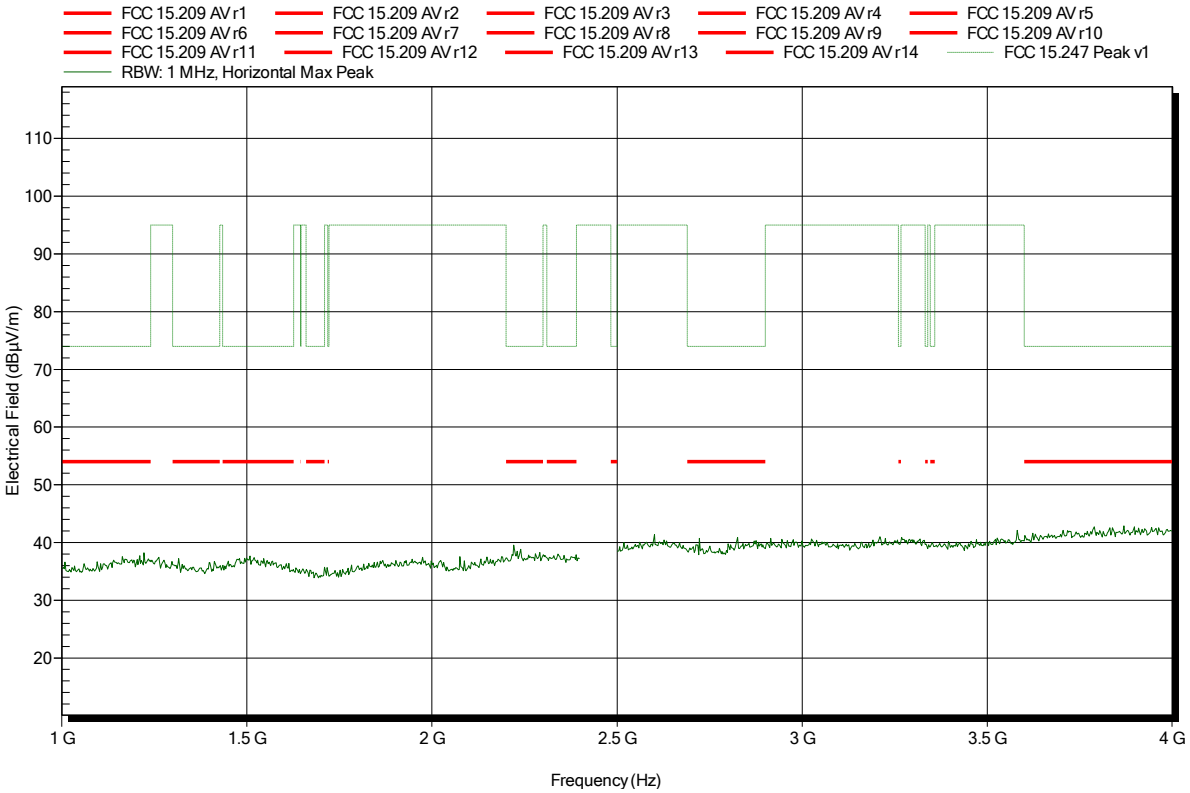

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161-A
Model:	Test Sample #5
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	TX; 2.4GHz, Ch11, 802.11b, 1Mbps, 18dBm
Test Date:	2015-11-10
Note:	

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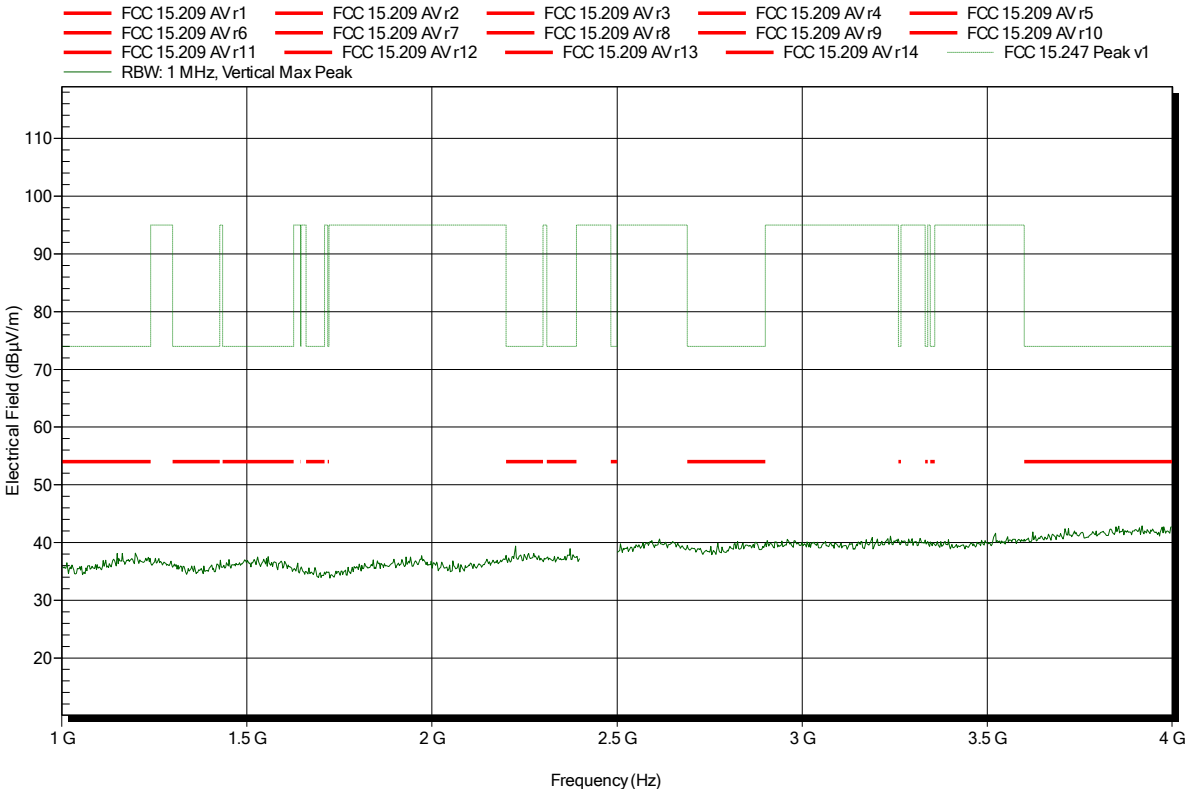
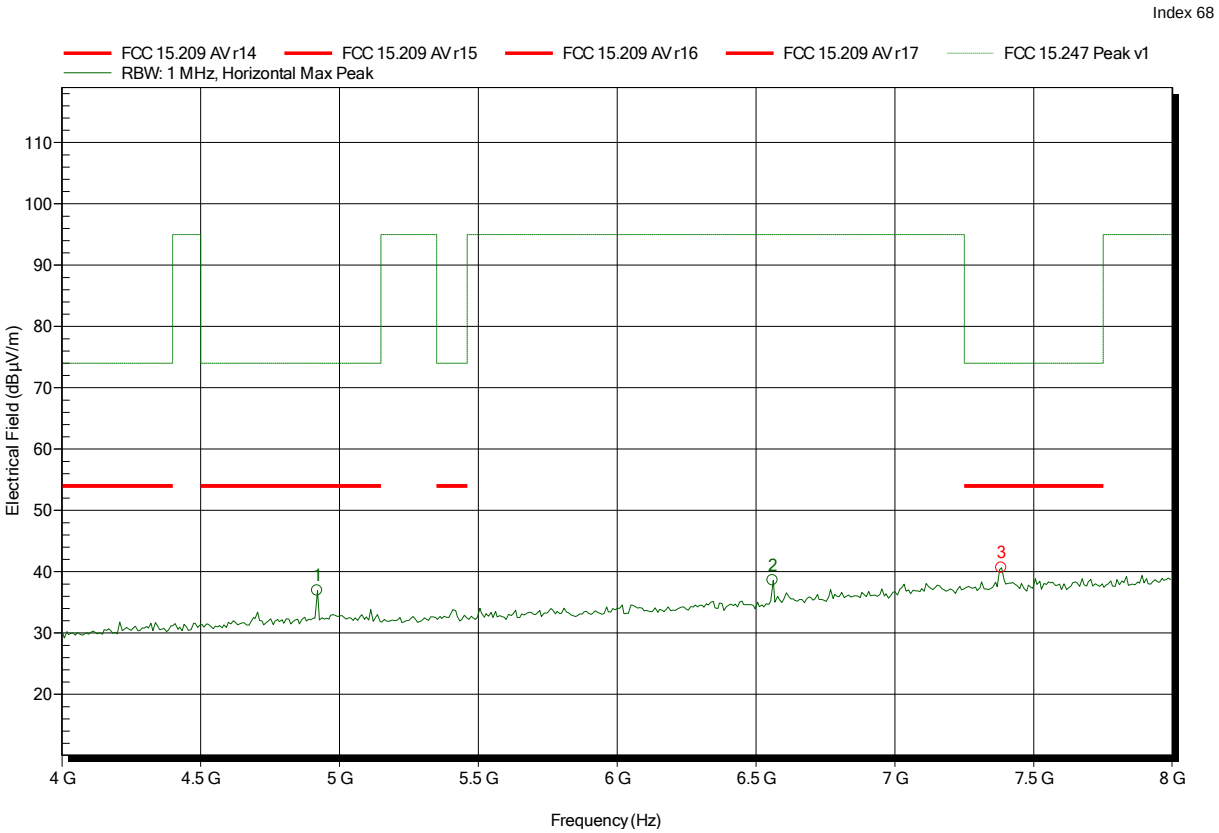


Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161-A
Model:	Test Sample #5
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch11, 802.11b, 1Mbps, 18dBm
Test Date:	2015-11-10
Note:	

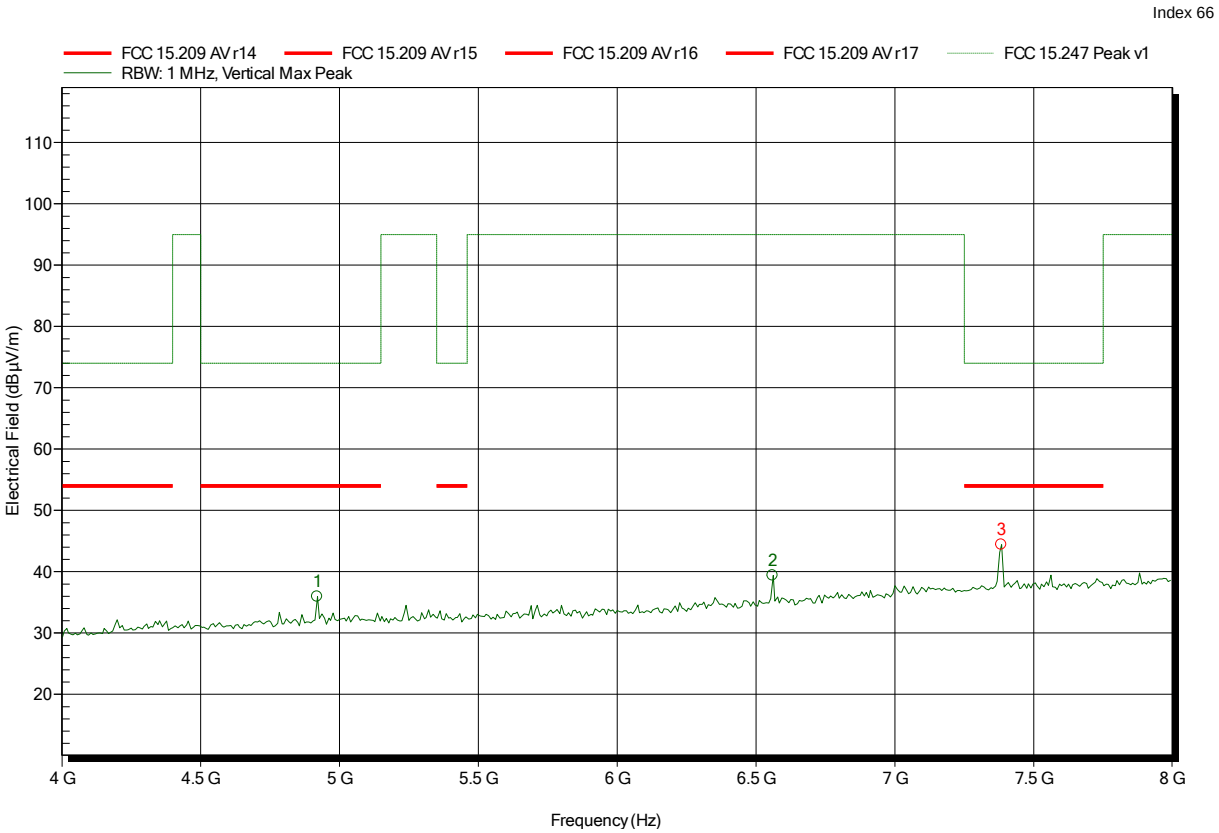


Frequency	Peak	Peak Limit	Peak Difference	Status
4.92 GHz	36.95 dBµV/m	74 dBµV/m	-37.05 dB	Pass
6.56 GHz	38.59 dBµV/m	95 dBµV/m	-56.41 dB	Pass
7.384 GHz	40.63 dBµV/m	74 dBµV/m	-33.37 dB	Pass

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161-A
Model:	Test Sample #5
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch11, 802.11b, 1Mbps, 18dBm
Test Date:	2015-11-10
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Status
4.92 GHz	35.94 dBµV/m	74 dBµV/m	-38.06 dB	Pass
6.56 GHz	39.4 dBµV/m	95 dBµV/m	-55.6 dB	Pass
7.384 GHz	44.43 dBµV/m	74 dBµV/m	-29.57 dB	Pass

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161-A
Model:	Test Sample #5
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch11, 802.11b, 1Mbps, 18dBm
Test Date:	2015-11-10
Note:	

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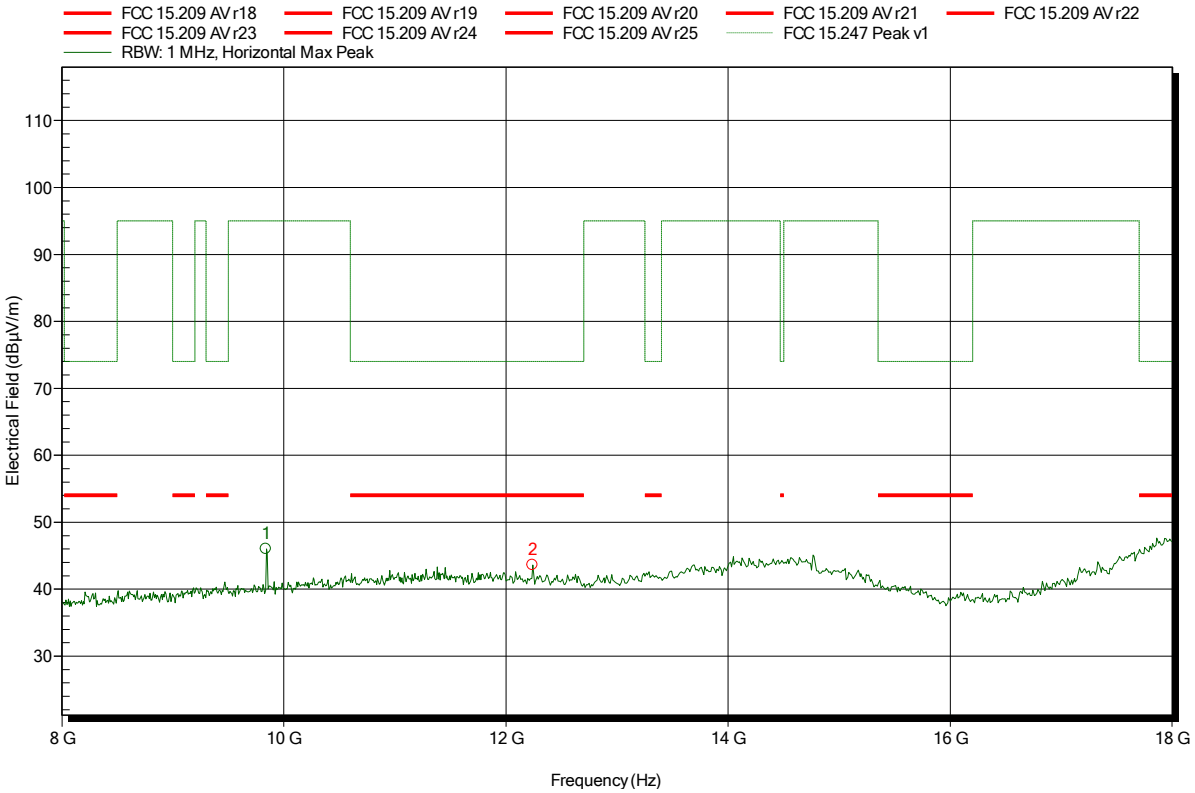

Frequency	Peak	Peak Limit	Peak Difference	Status
9.84 GHz	46.01 dBµV/m	95 dBµV/m	-48.99 dB	Pass
12.24 GHz	43.63 dBµV/m	74 dBµV/m	-30.37 dB	Pass

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161-A
Model:	Test Sample #5
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch11, 802.11b, 1Mbps, 18dBm
Test Date:	2015-11-10
Note:	

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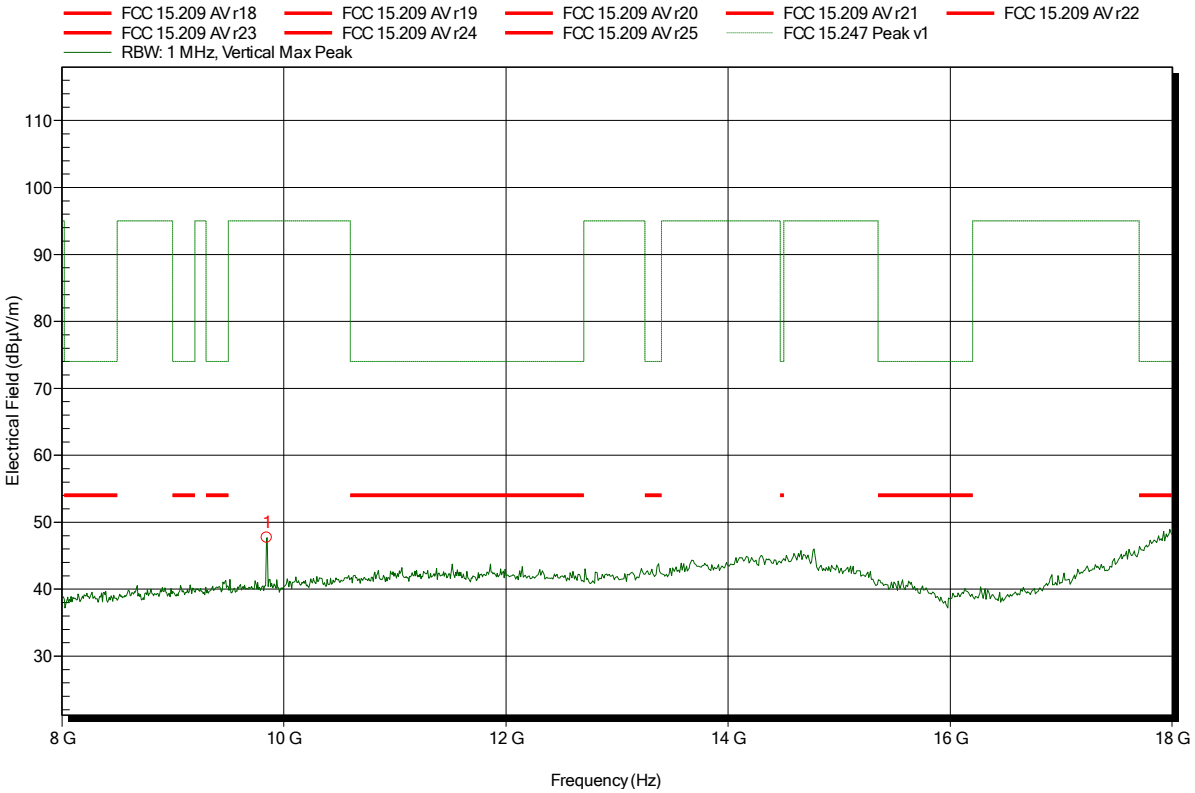

Frequency	Peak	Peak Limit	Peak Difference	Status
9.848 GHz	47.7 dBµV/m	95 dBµV/m	-47.3 dB	Pass

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161-A
Model:	Test Sample #5
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	TX; 2.4GHz, Ch9, 802.11n(40), MCS0, 15dBm
Test Date:	2015-11-10
Note:	

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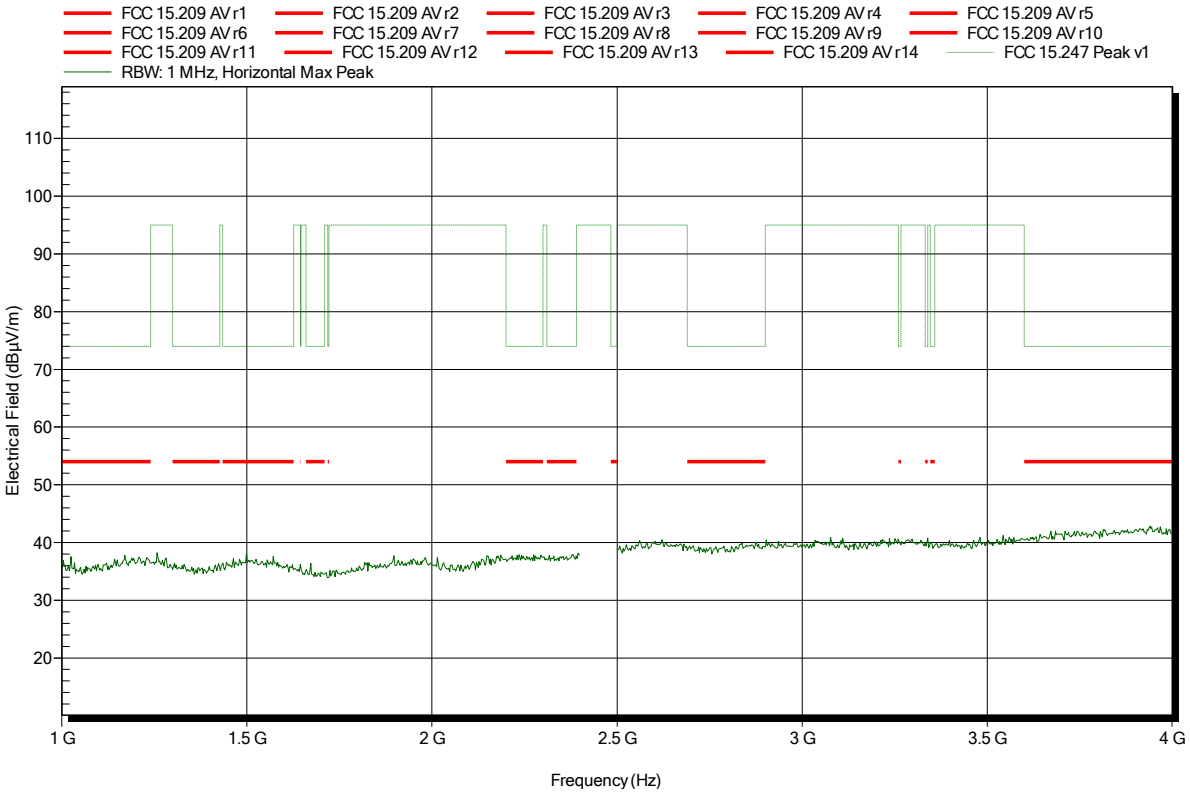

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161-A
Model:	Test Sample #5
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	TX; 2.4GHz, Ch9, 802.11n(40), MCS0, 15dBm
Test Date:	2015-11-10
Note:	

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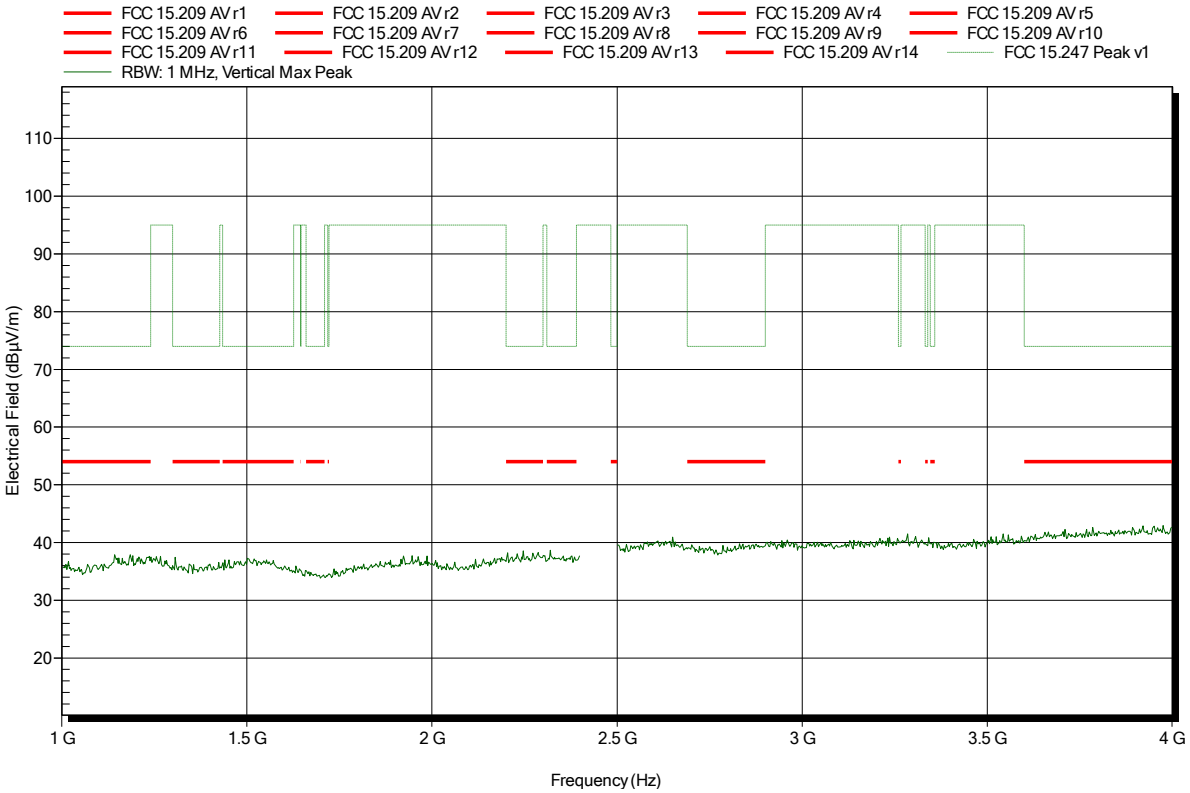

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161-A
Model:	Test Sample #5
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch9, 802.11n(40), MCS0, 15dBm
Test Date:	2015-11-10
Note:	

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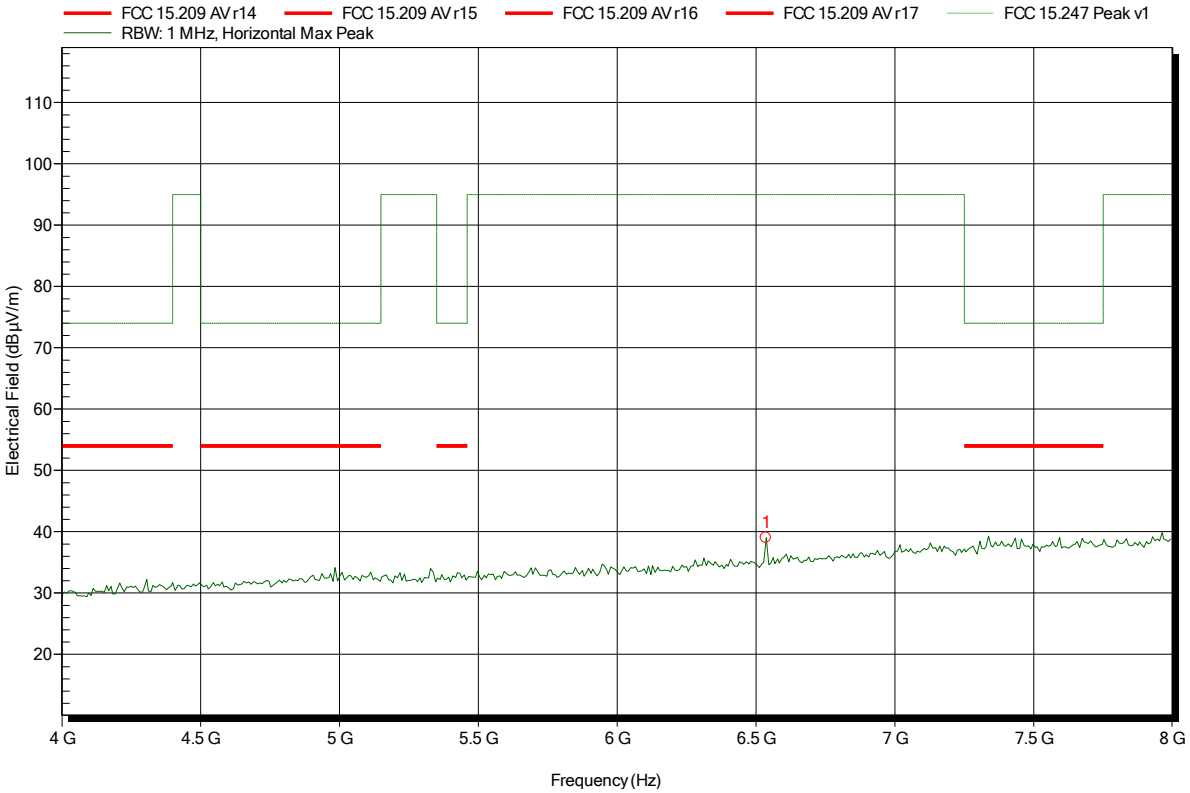

Frequency	Peak	Peak Limit	Peak Difference	Status
6.536 GHz	39.02 dBµV/m	95 dBµV/m	-55.98 dB	Pass

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161-A
Model:	Test Sample #5
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch9, 802.11n(40), MCS0, 15dBm
Test Date:	2015-11-10
Note:	

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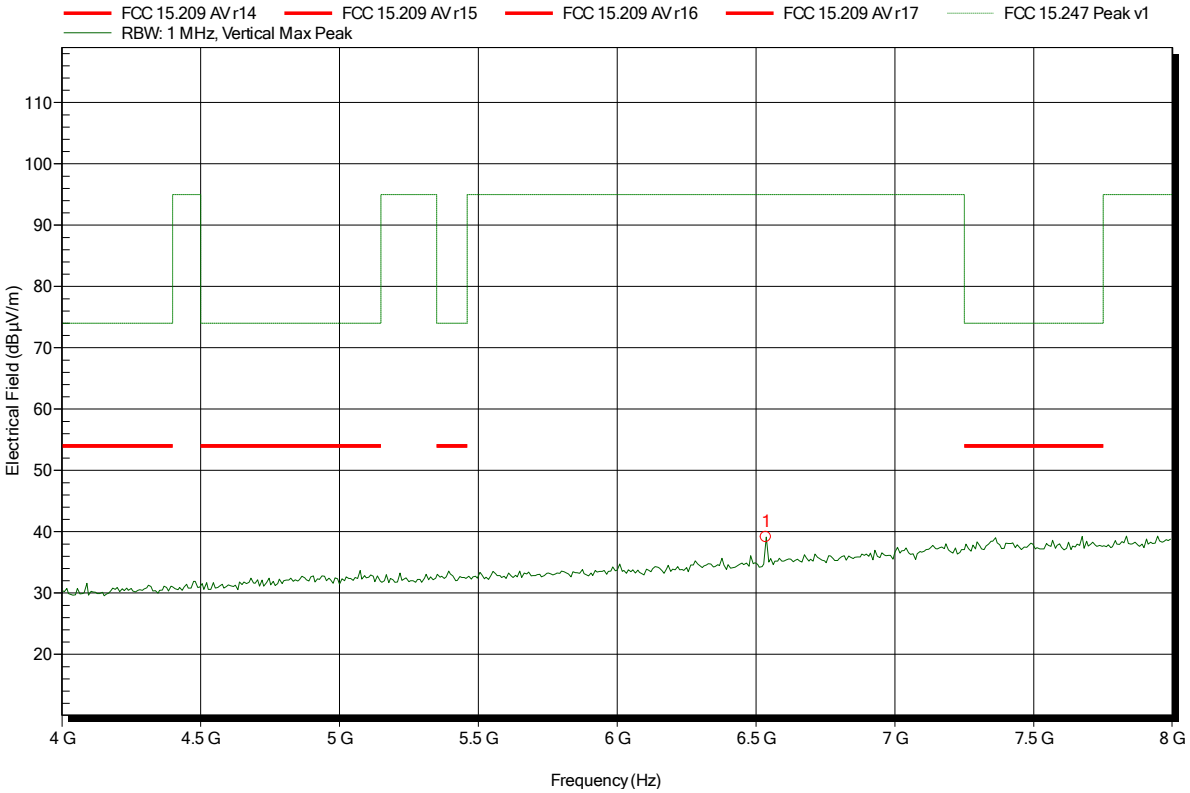

Frequency	Peak	Peak Limit	Peak Difference	Status
6.536 GHz	39.12 dBµV/m	95 dBµV/m	-55.88 dB	Pass

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161-A
Model:	Test Sample #5
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch9, 802.11n(40), MCS0, 15dBm
Test Date:	2015-11-10
Note:	

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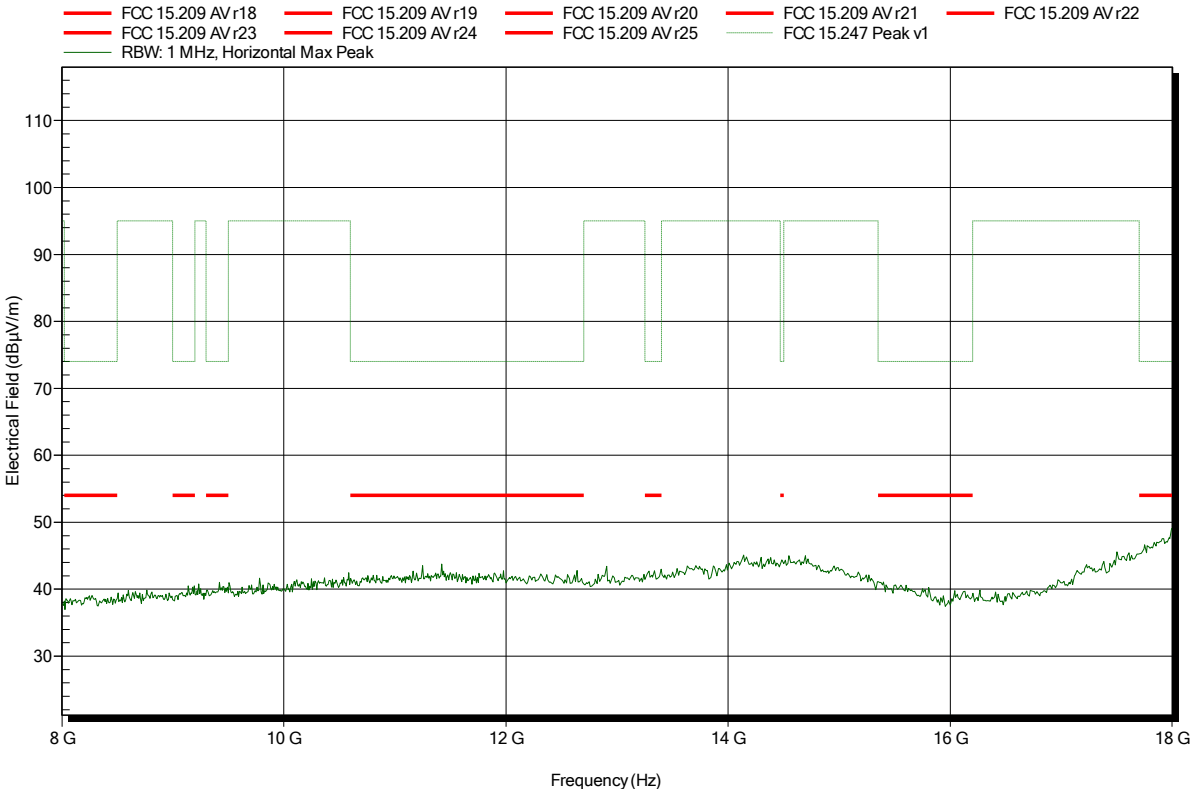

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161-A
Model:	Test Sample #5
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch9, 802.11n(40), MCS0, 15dBm
Test Date:	2015-11-10
Note:	

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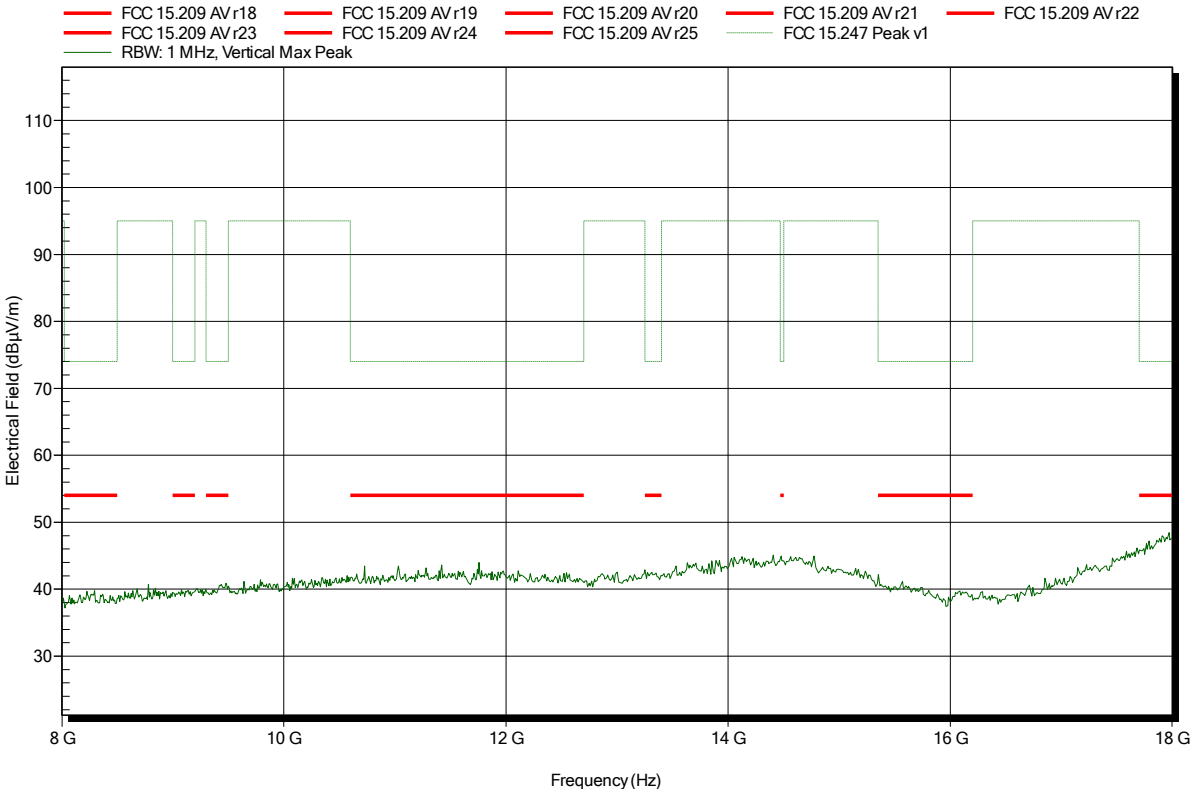

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161
Model:	Test Sample #6
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	TX; 2.4GHz, Ch1, 802.11b, 1Mbps, 18dBm
Test Date:	2015-11-10
Note:	

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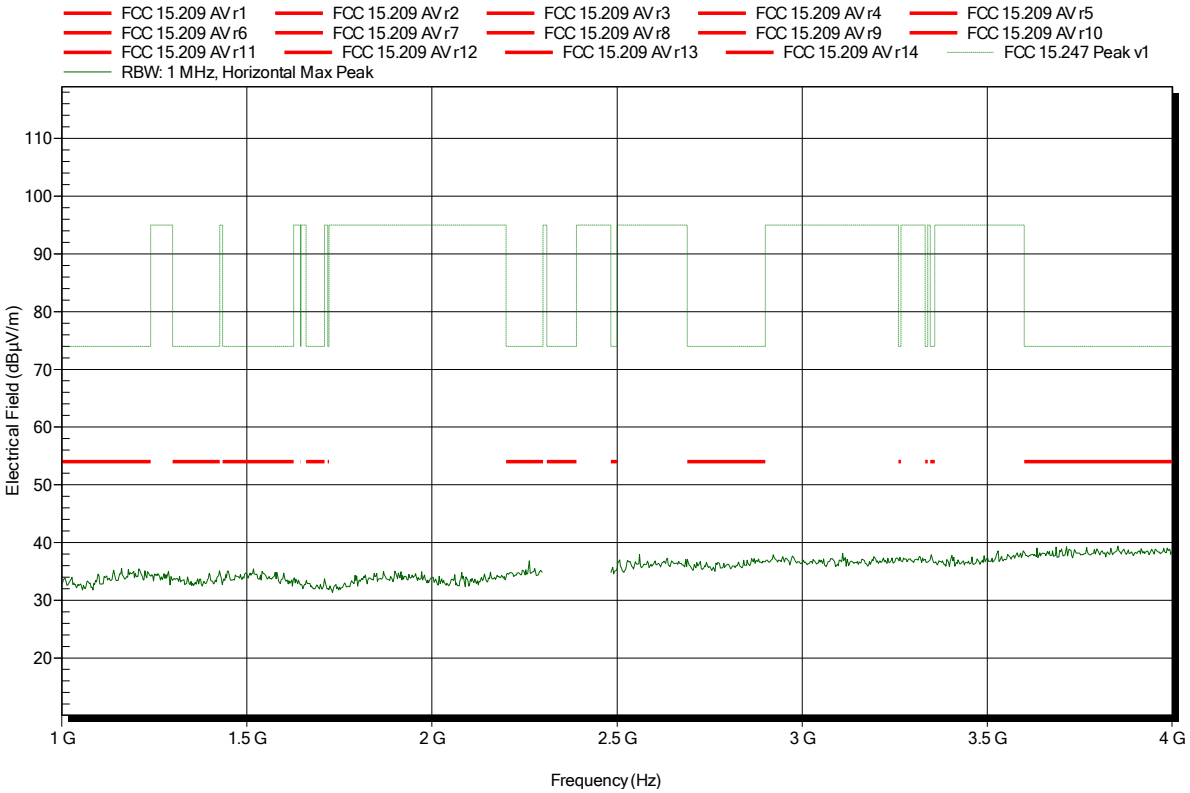

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161
Model:	Test Sample #6
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	TX; 2.4GHz, Ch1, 802.11b, 1Mbps, 18dBm
Test Date:	2015-11-10
Note:	

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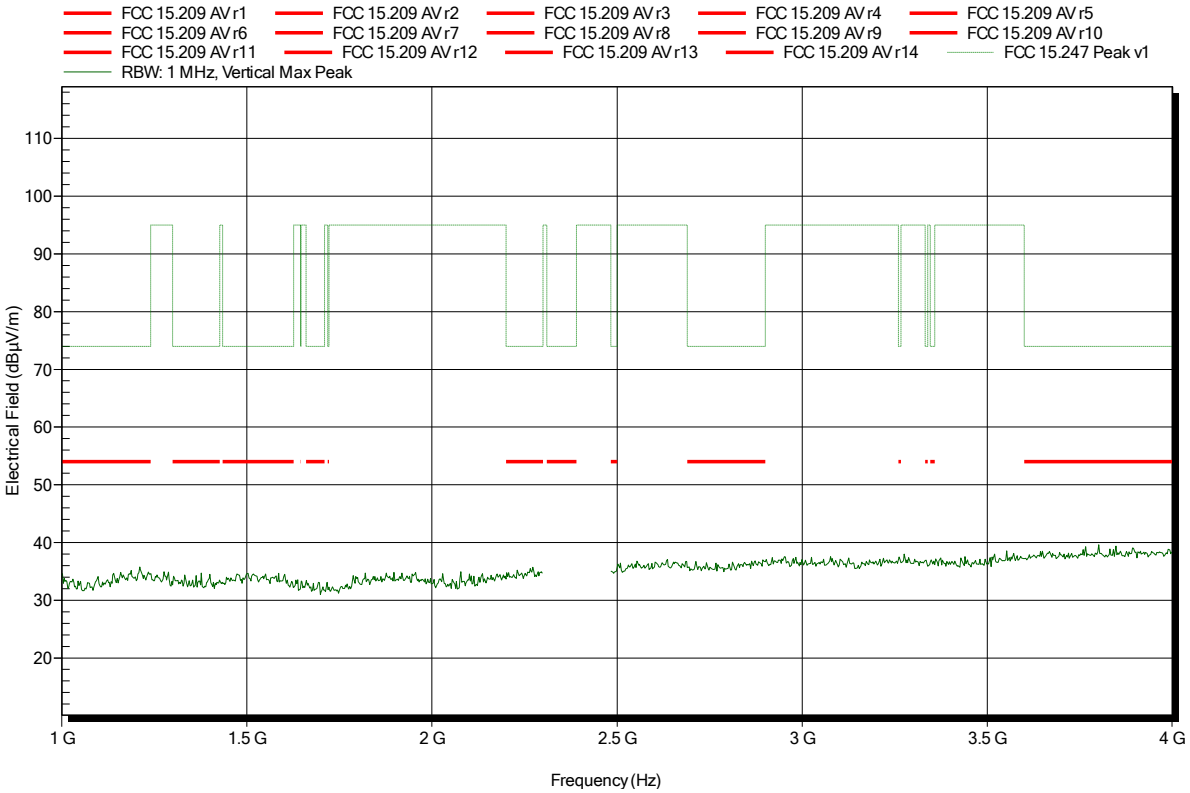
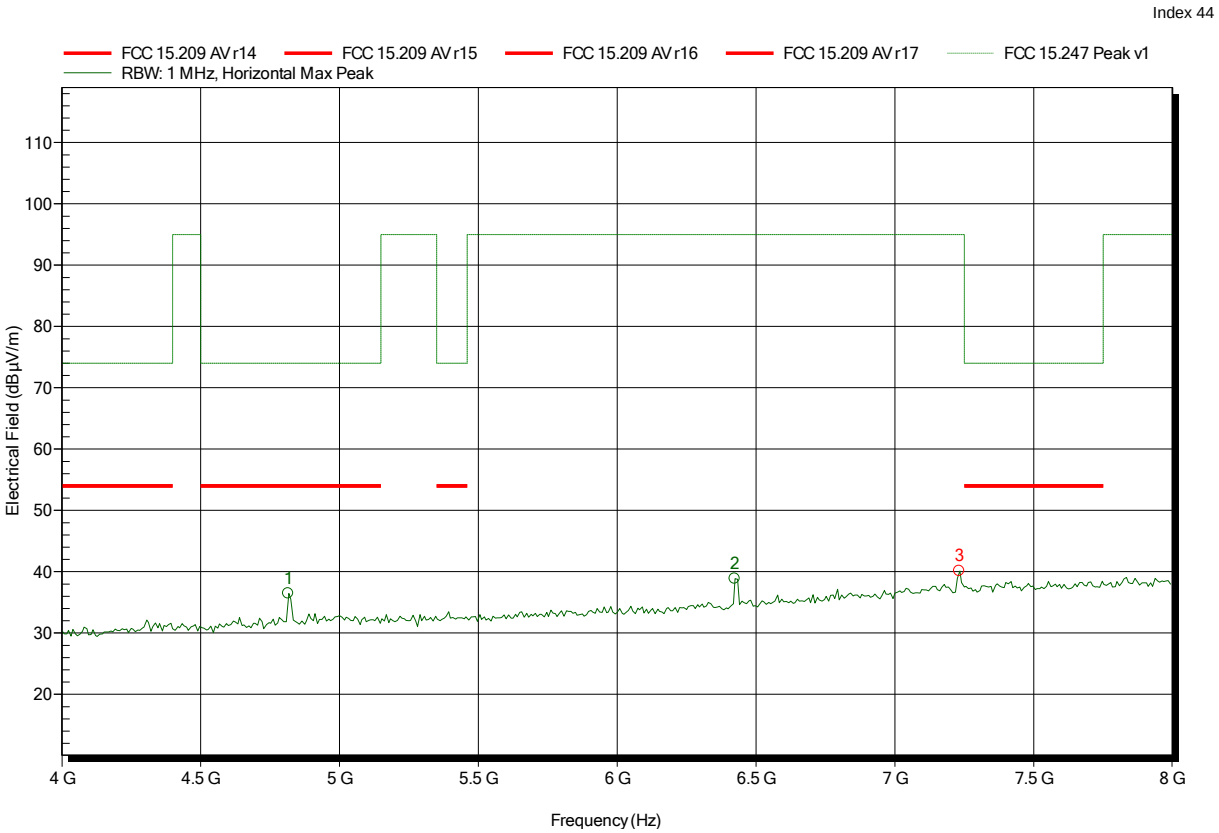


Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161
Model:	Test Sample #6
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch1, 802.11b, 1Mbps, 18dBm
Test Date:	2015-11-10
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Status
4.816 GHz	36.47 dBµV/m	74 dBµV/m	-37.53 dB	Pass
6.424 GHz	38.89 dBµV/m	95 dBµV/m	-56.11 dB	Pass
7.232 GHz	40.1 dBµV/m	95 dBµV/m	-54.9 dB	Pass

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161
Model:	Test Sample #6
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch1, 802.11b, 1Mbps, 18dBm
Test Date:	2015-11-10
Note:	

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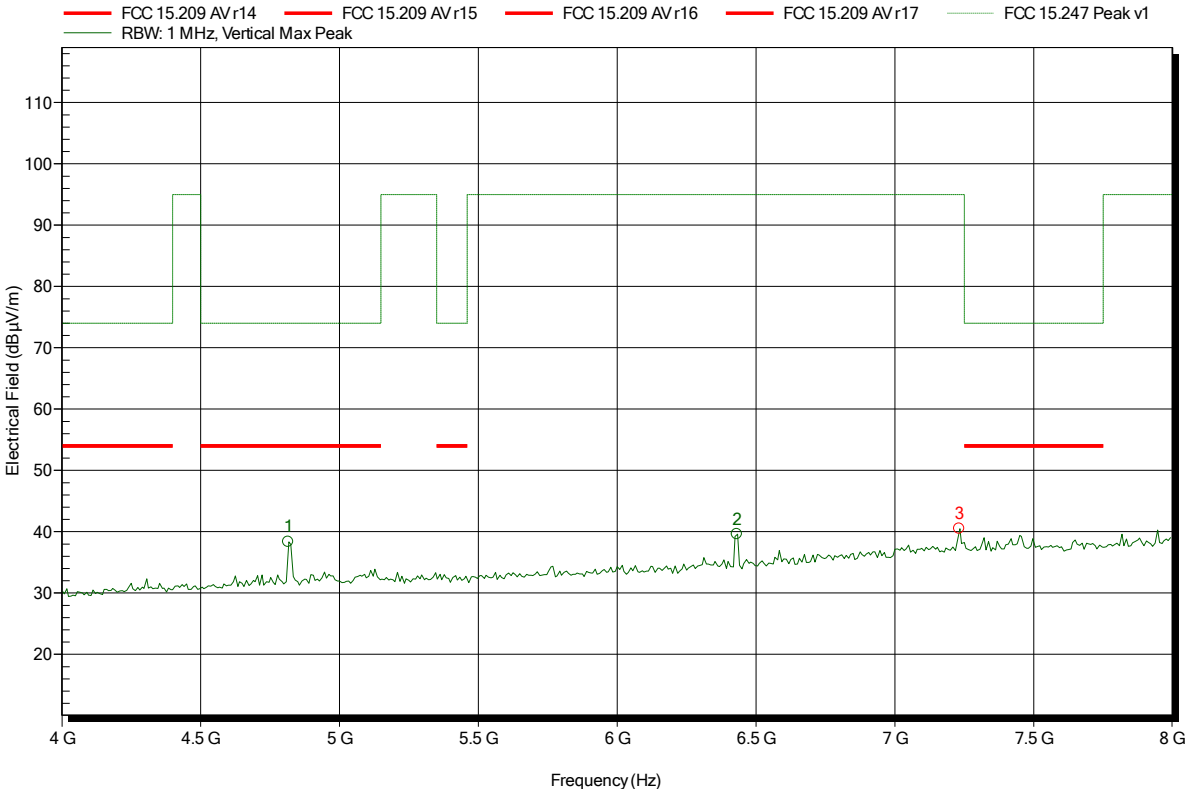

Frequency	Peak	Peak Limit	Peak Difference	Status
4.816 GHz	38.34 dBµV/m	74 dBµV/m	-35.66 dB	Pass
6.432 GHz	39.62 dBµV/m	95 dBµV/m	-55.38 dB	Pass
7.232 GHz	40.48 dBµV/m	95 dBµV/m	-54.52 dB	Pass

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161
Model:	Test Sample #6
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch1, 802.11b, 1Mbps, 18dBm
Test Date:	2015-11-10
Note:	

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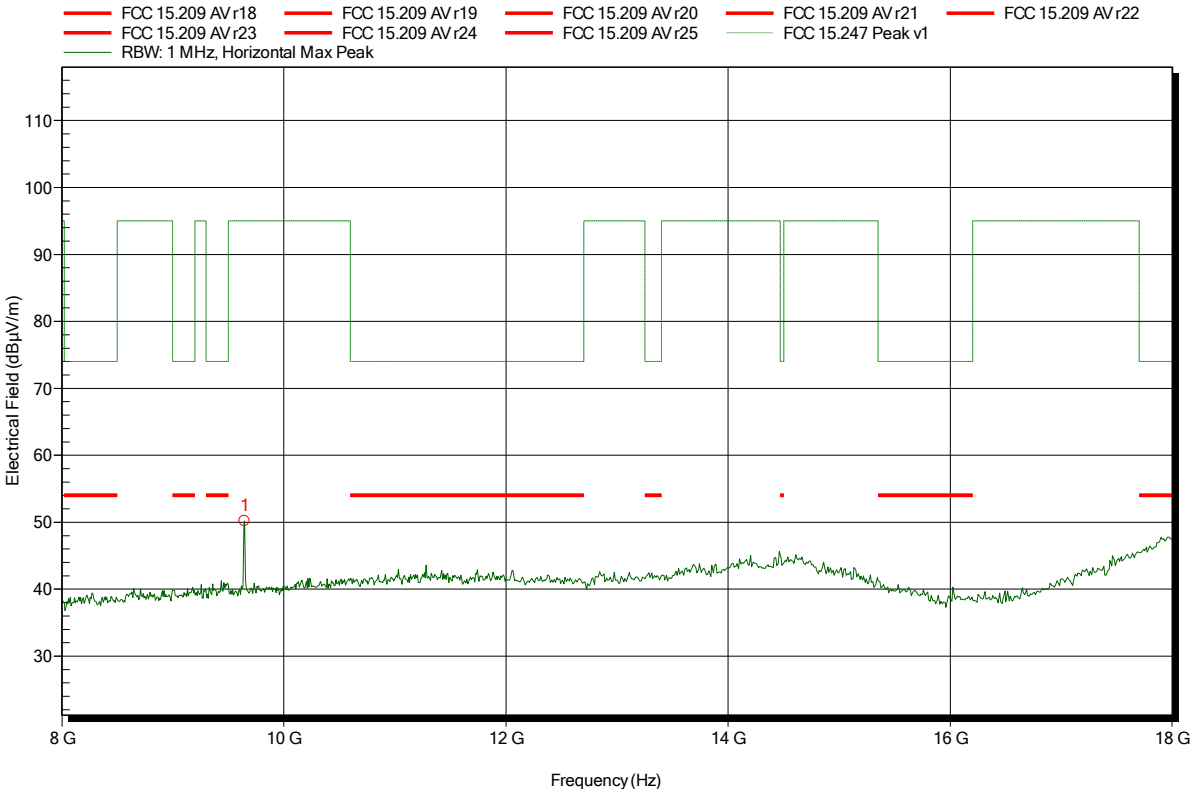

Frequency	Peak	Peak Limit	Peak Difference	Status
9.648 GHz	50.2 dBµV/m	95 dBµV/m	-44.8 dB	Pass

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161
Model:	Test Sample #6
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch1, 802.11b, 1Mbps, 18dBm
Test Date:	2015-11-10
Note:	

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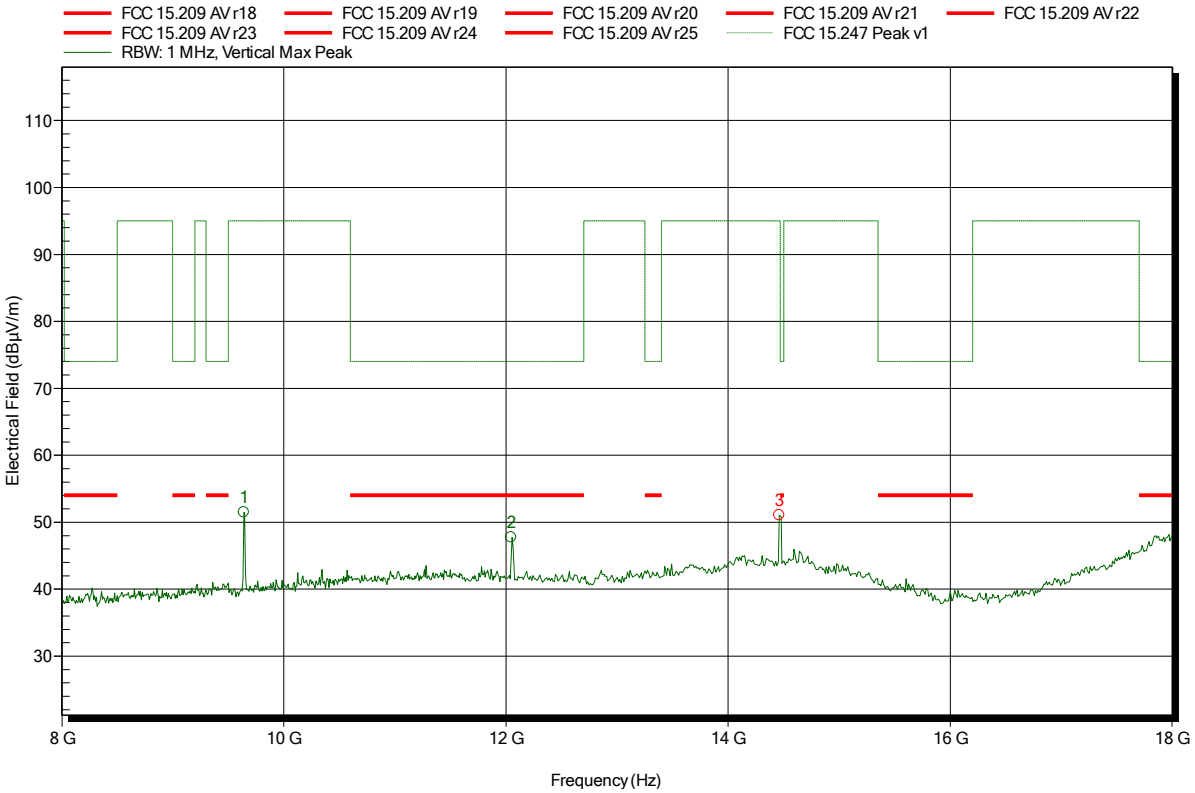

Frequency	Peak	Peak Limit	Peak Difference	Status
9.64 GHz	51.46 dBµV/m	95 dBµV/m	-43.54 dB	Pass
12.048 GHz	47.74 dBµV/m	74 dBµV/m	-26.26 dB	Pass
14.46 GHz	51.06 dBµV/m	95 dBµV/m	-43.94 dB	Pass

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161
Model:	Test Sample #6
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	TX; 2.4GHz, Ch3, 802.11n(40), MCS0, 15dBm
Test Date:	2015-11-10
Note:	

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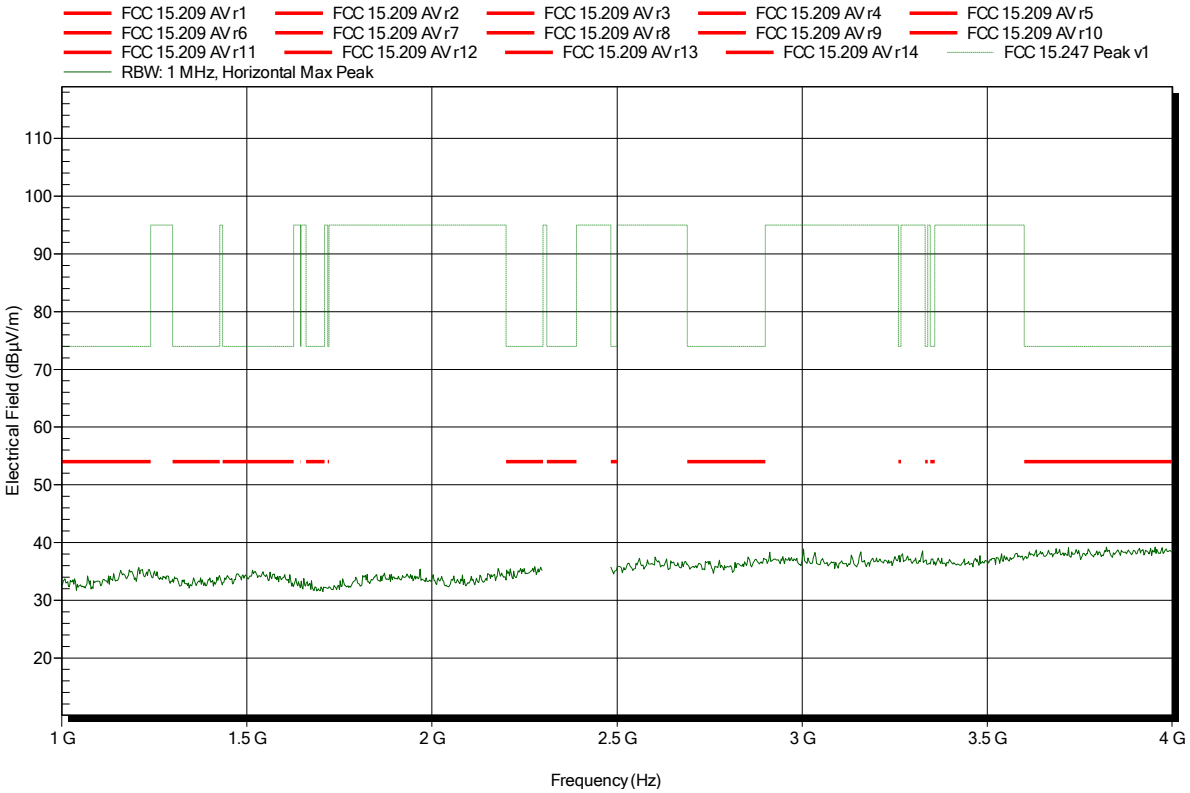

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161
Model:	Test Sample #6
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	TX; 2.4GHz, Ch3, 802.11n(40), MCS0, 15dBm
Test Date:	2015-11-10
Note:	

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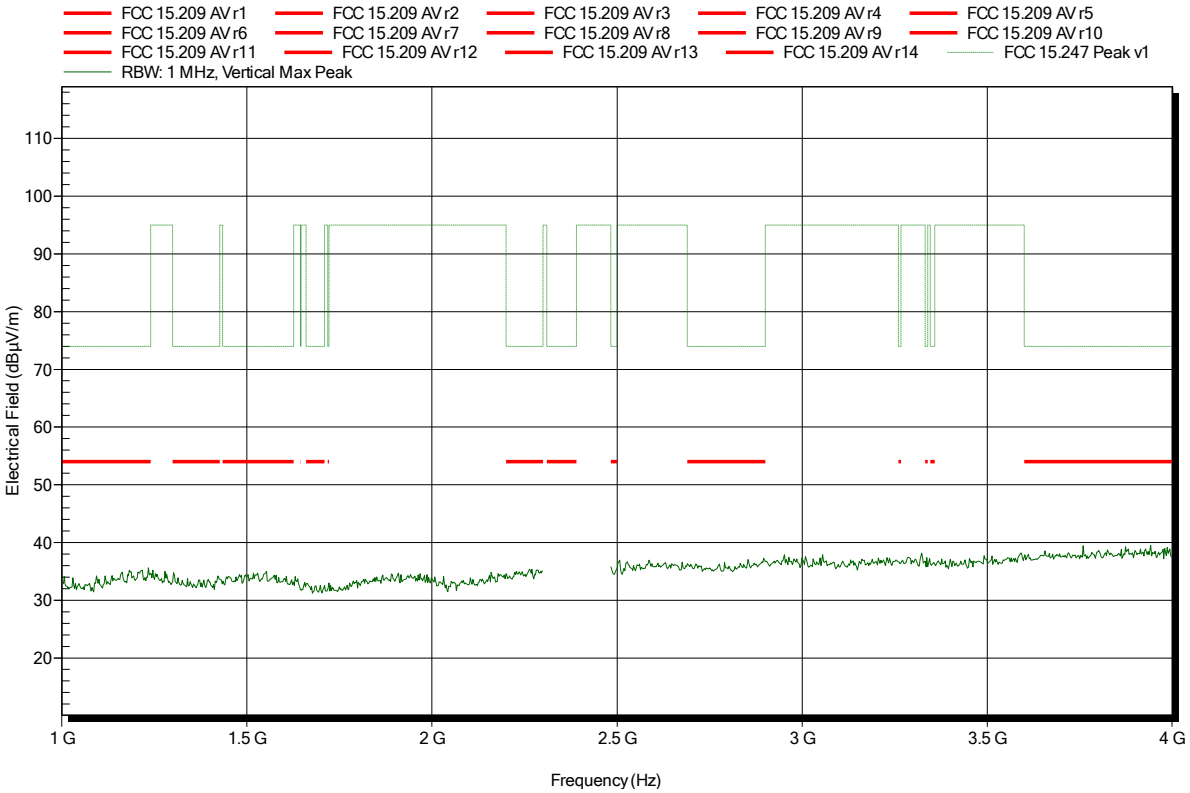

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161
Model:	Test Sample #6
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch3, 802.11n(40), MCS0, 15dBm
Test Date:	2015-11-10
Note:	

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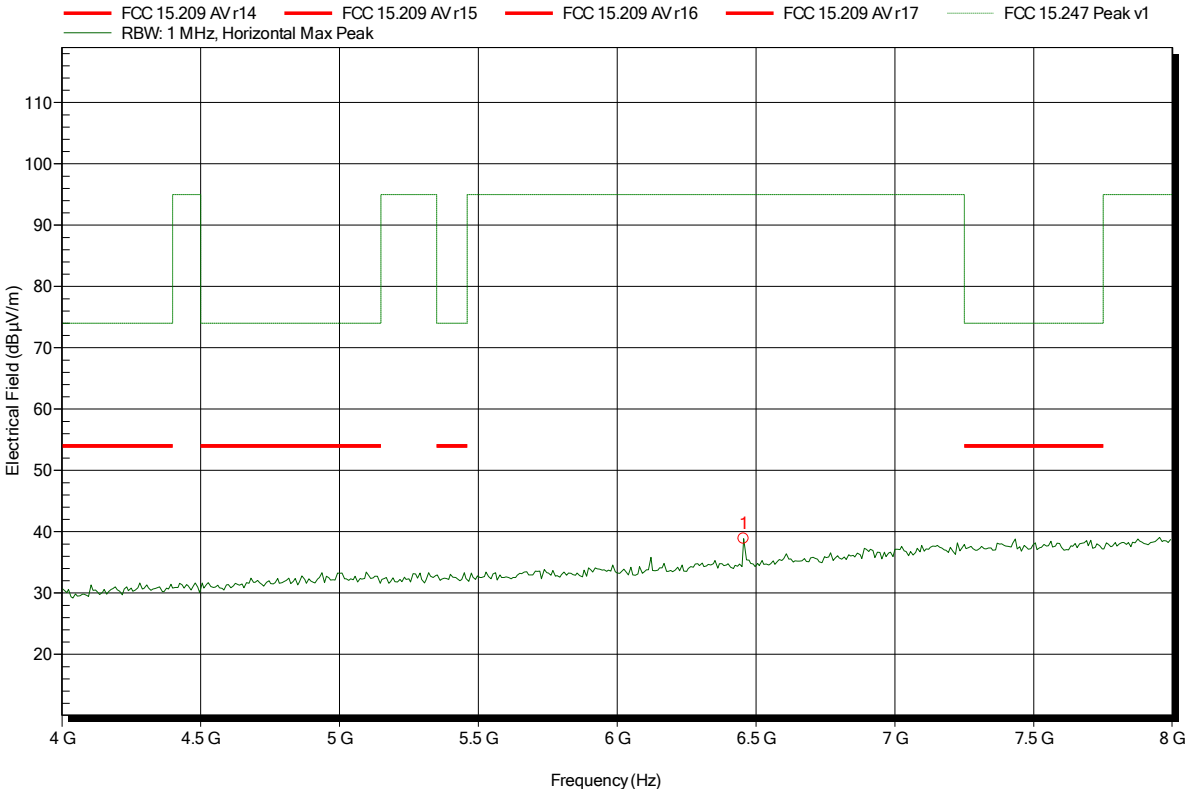

Frequency	Peak	Peak Limit	Peak Difference	Status
6.456 GHz	38.88 dBµV/m	95 dBµV/m	-56.12 dB	Pass

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161
Model:	Test Sample #6
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch3, 802.11n(40), MCS0, 15dBm
Test Date:	2015-11-10
Note:	

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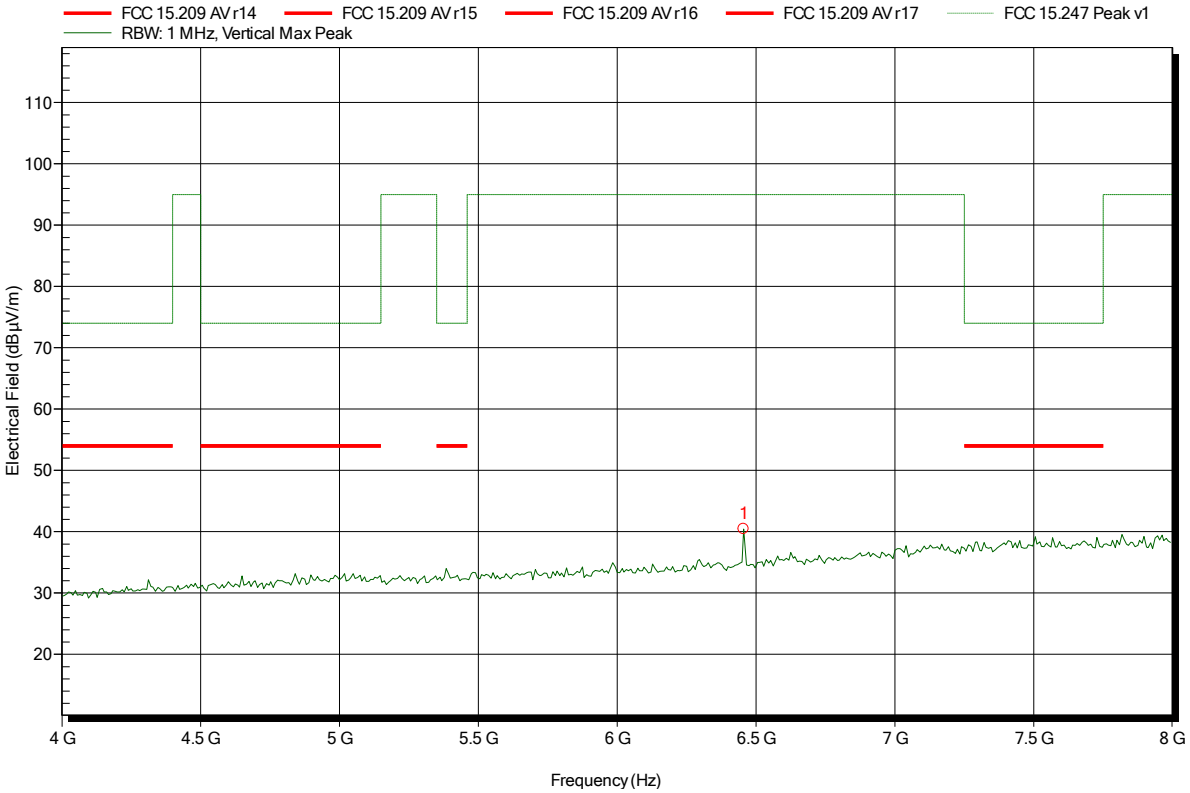

Frequency	Peak	Peak Limit	Peak Difference	Status
6.456 GHz	40.43 dBµV/m	95 dBµV/m	-54.57 dB	Pass

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161
Model:	Test Sample #6
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch3, 802.11n(40), MCS0, 15dBm
Test Date:	2015-11-10
Note:	

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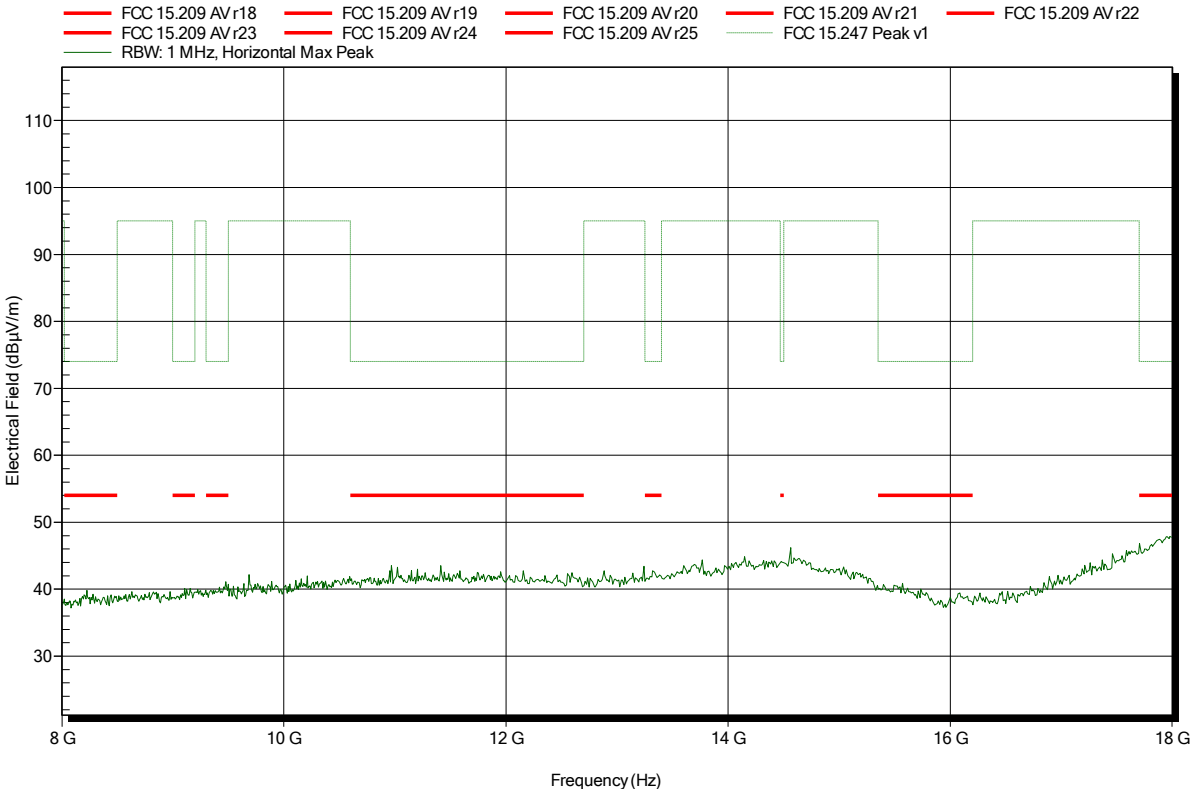

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161
Model:	Test Sample #6
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch3, 802.11n(40), MCS0, 15dBm
Test Date:	2015-11-10
Note:	

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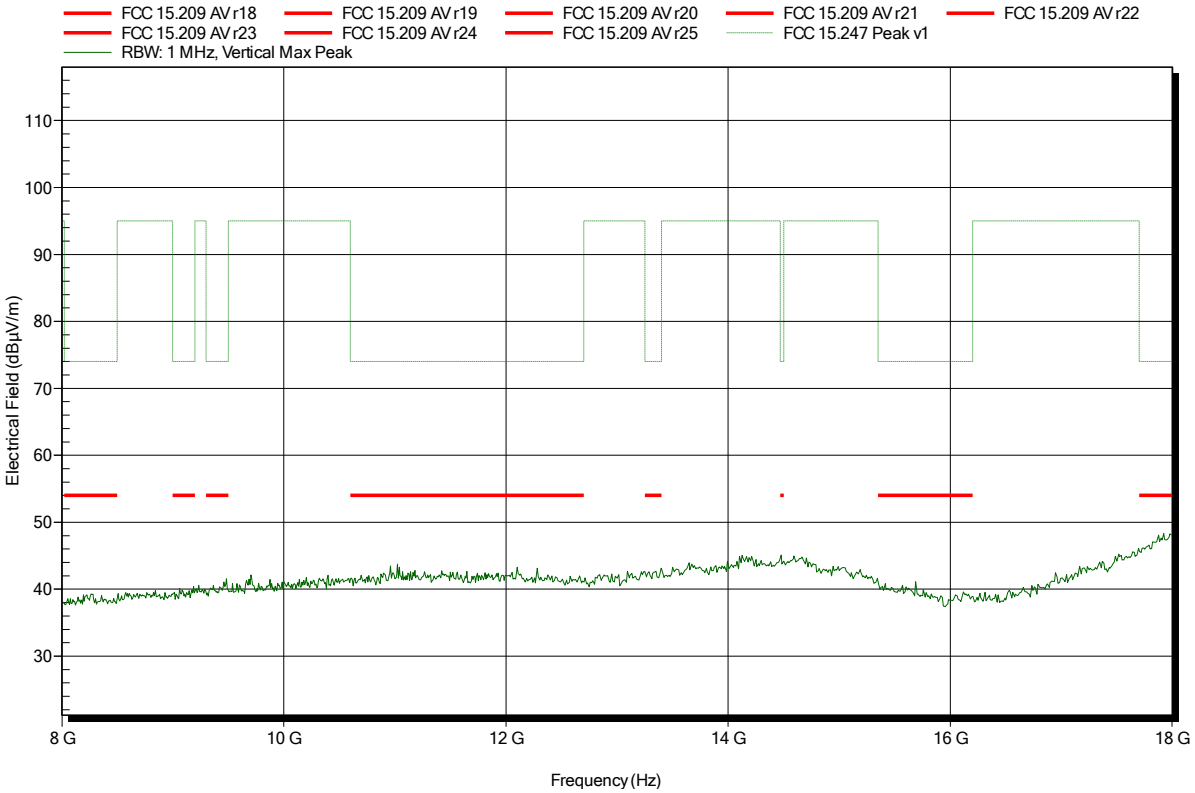

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161
Model:	Test Sample #6
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	TX; 2.4GHz, Ch11, 802.11b, 1Mbps, 18dBm
Test Date:	2015-11-10
Note:	

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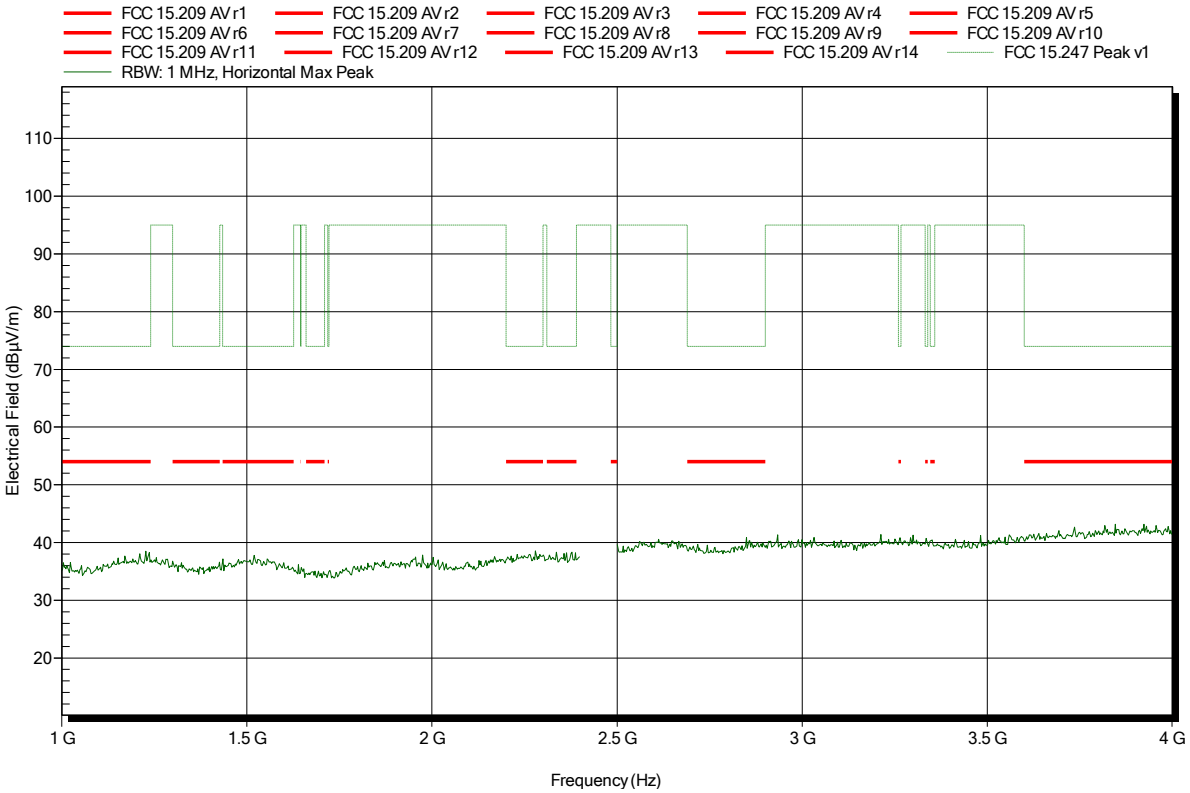

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161
Model:	Test Sample #6
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	TX; 2.4GHz, Ch11, 802.11b, 1Mbps, 18dBm
Test Date:	2015-11-10
Note:	

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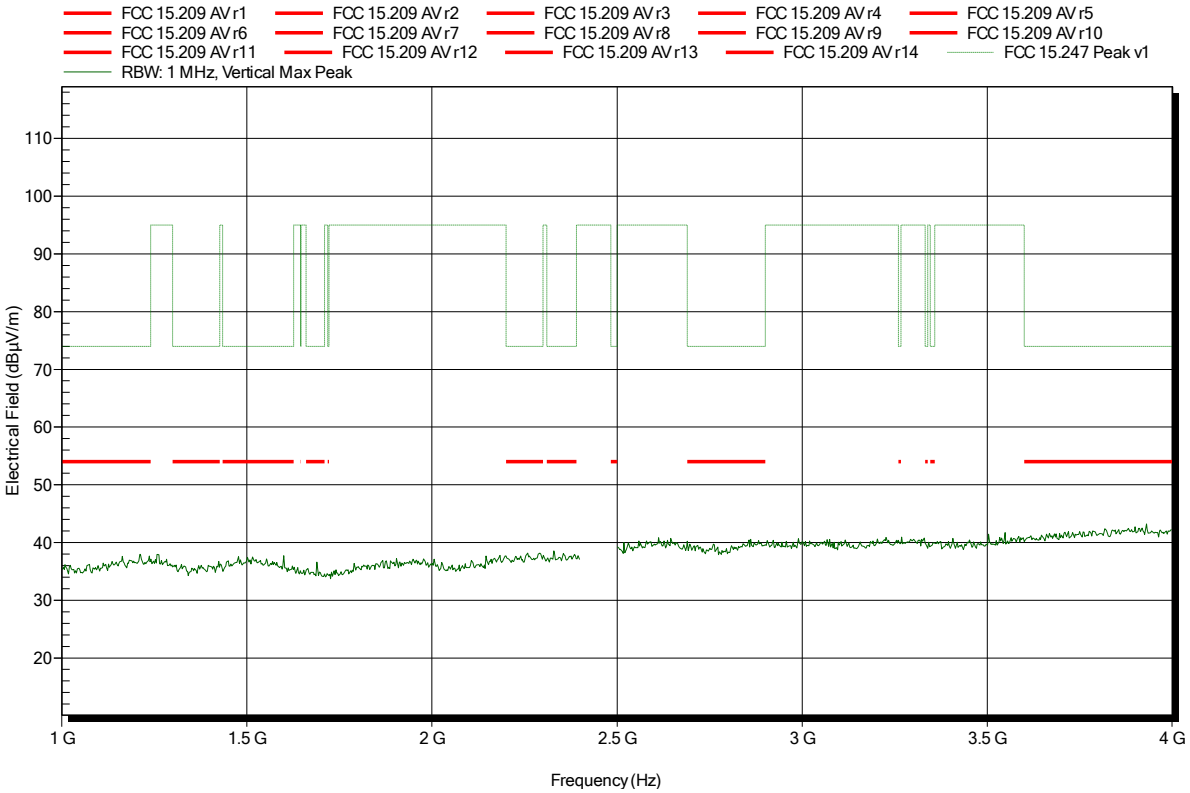

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161
Model:	Test Sample #6
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch11, 802.11b, 1Mbps, 18dBm
Test Date:	2015-11-10
Note:	

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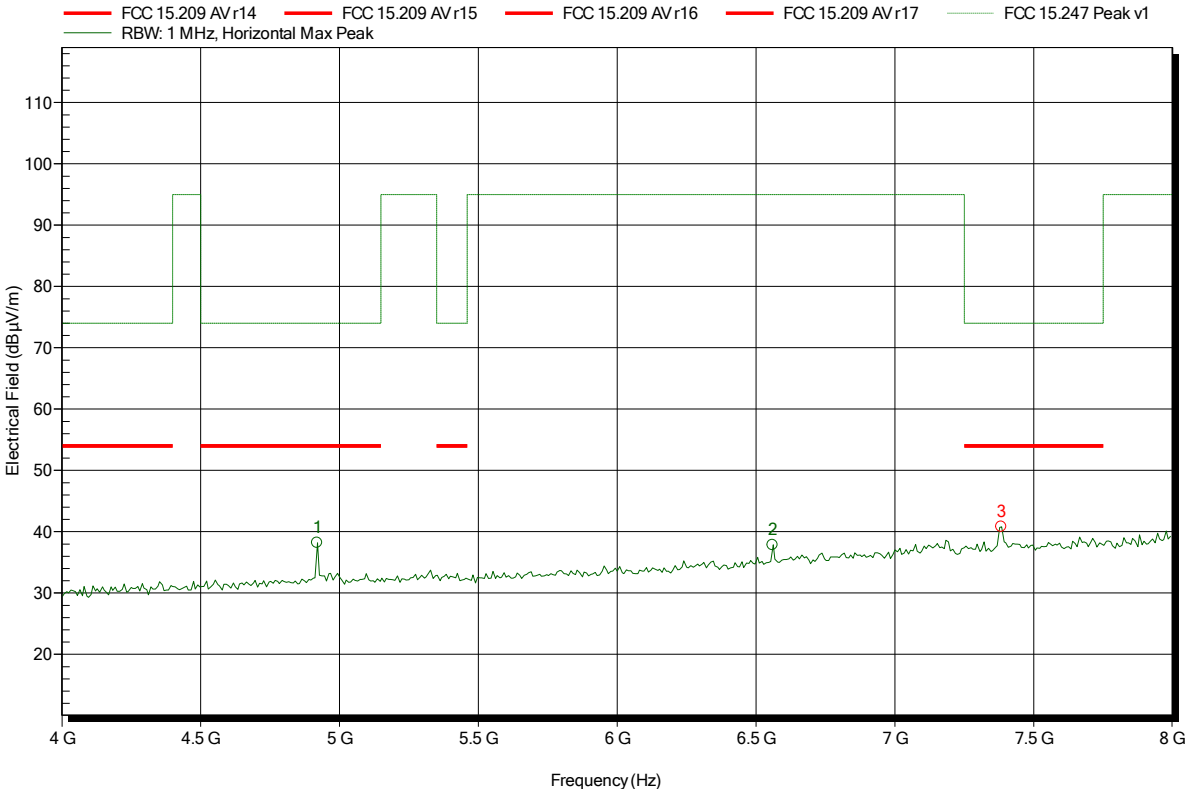
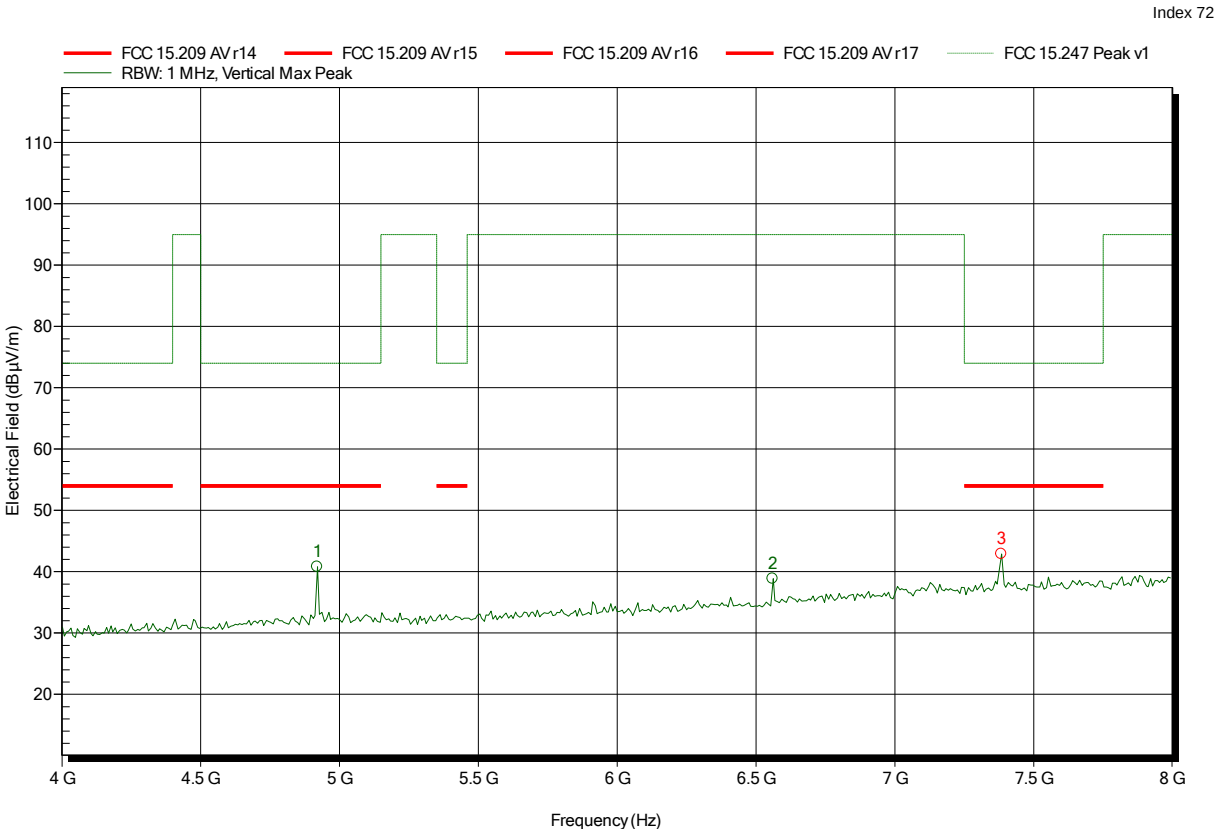


Frequency	Peak	Peak Limit	Peak Difference	Status
4.92 GHz	38.21 dBµV/m	74 dBµV/m	-35.79 dB	Pass
6.56 GHz	37.84 dBµV/m	95 dBµV/m	-57.16 dB	Pass
7.384 GHz	40.8 dBµV/m	74 dBµV/m	-33.2 dB	Pass

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161
Model:	Test Sample #6
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch11, 802.11b, 1Mbps, 18dBm
Test Date:	2015-11-10
Note:	

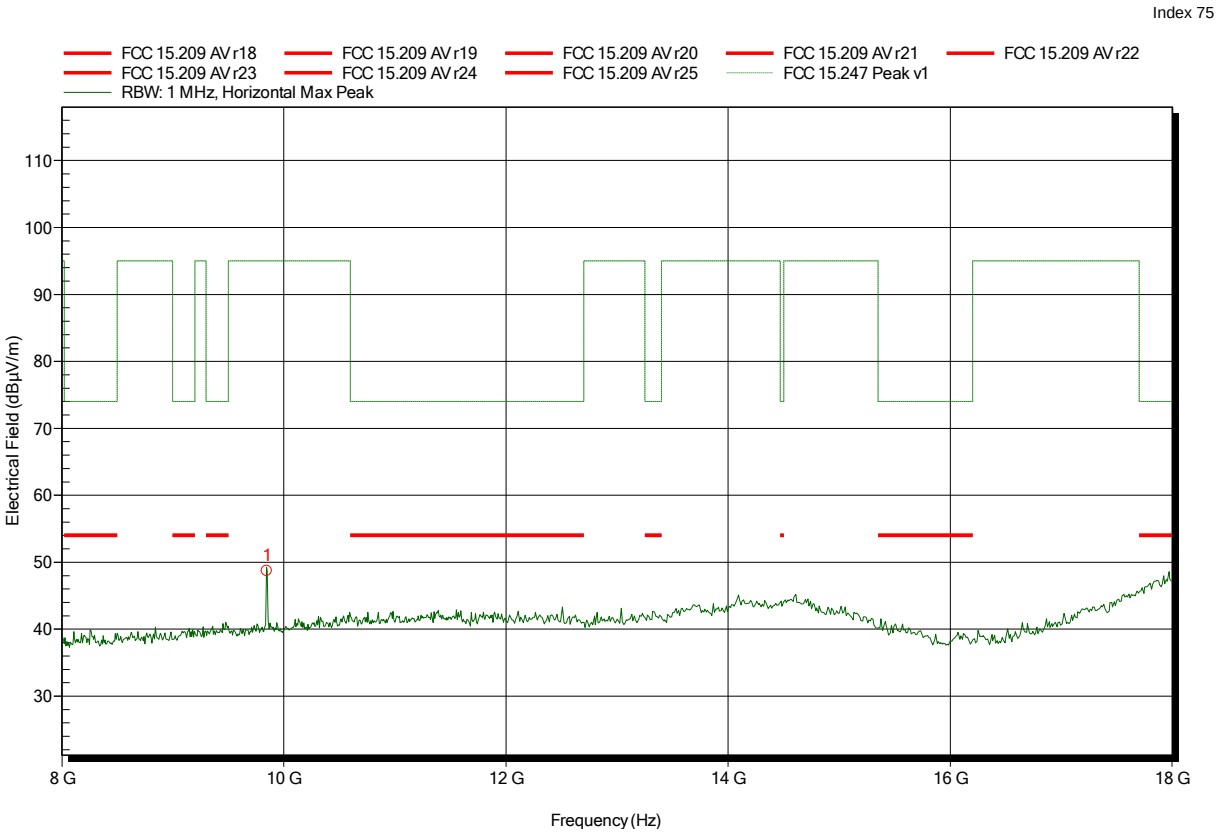


Frequency	Peak	Peak Limit	Peak Difference	Status
4.92 GHz	40.8 dBµV/m	74 dBµV/m	-33.2 dB	Pass
6.56 GHz	38.86 dBµV/m	95 dBµV/m	-56.14 dB	Pass
7.384 GHz	42.91 dBµV/m	74 dBµV/m	-31.09 dB	Pass

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161
Model:	Test Sample #6
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch11, 802.11b, 1Mbps, 18dBm
Test Date:	2015-11-10
Note:	



Frequency	Peak	Peak Limit	Peak Difference	Status
9.848 GHz	48.7 dBµV/m	95 dBµV/m	-46.3 dB	Pass

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161
Model:	Test Sample #6
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch11, 802.11b, 1Mbps, 18dBm
Test Date:	2015-11-10
Note:	

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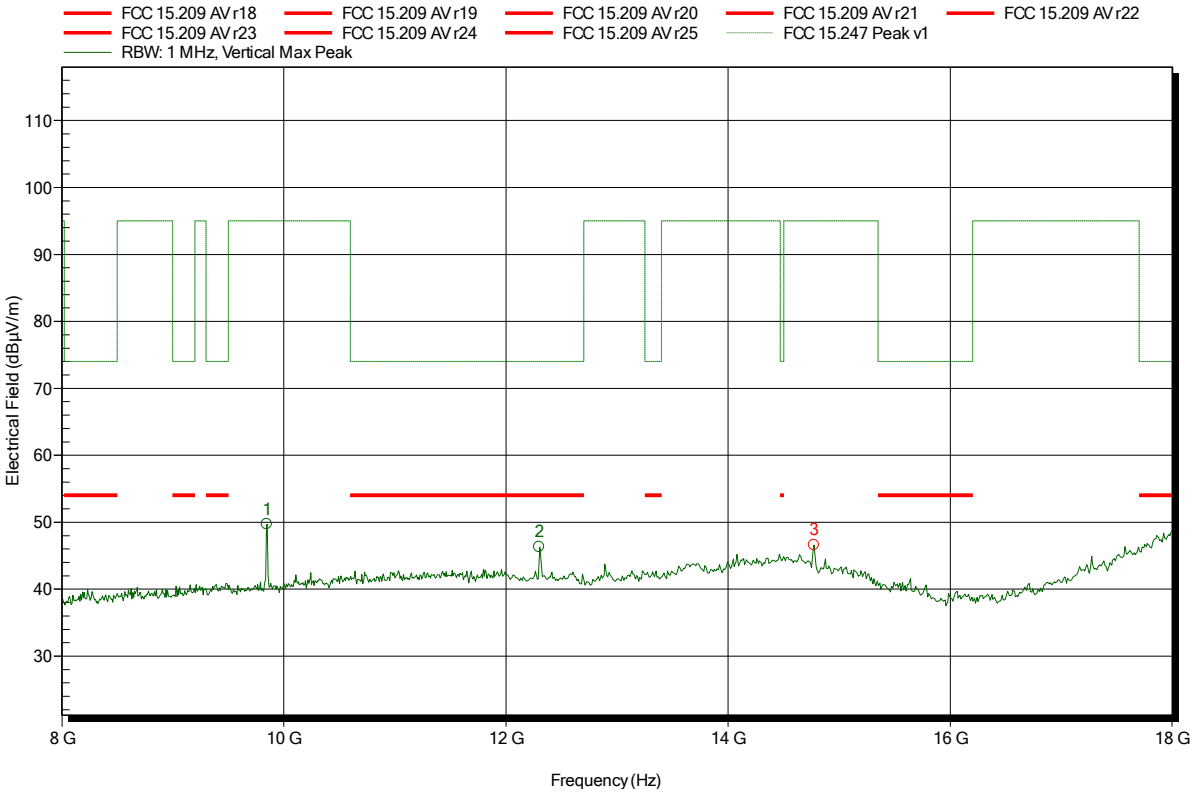

Frequency	Peak	Peak Limit	Peak Difference	Status
9.848 GHz	49.69 dBµV/m	95 dBµV/m	-45.31 dB	Pass
12.3 GHz	46.28 dBµV/m	74 dBµV/m	-27.72 dB	Pass
14.772 GHz	46.6 dBµV/m	95 dBµV/m	-48.4 dB	Pass

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161
Model:	Test Sample #6
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	TX; 2.4GHz, Ch9, 802.11n(40), MCS0, 15dBm
Test Date:	2015-11-11
Note:	

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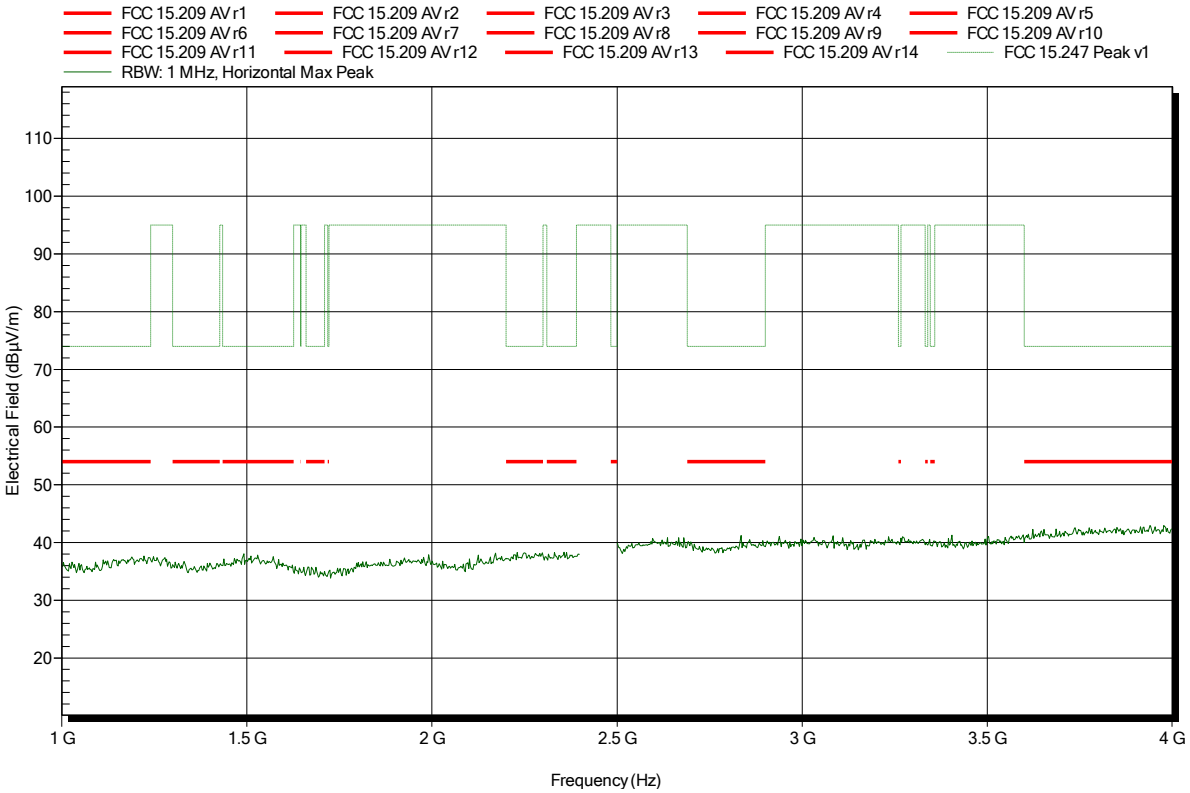

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161
Model:	Test Sample #6
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	TX; 2.4GHz, Ch9, 802.11n(40), MCS0, 15dBm
Test Date:	2015-11-11
Note:	

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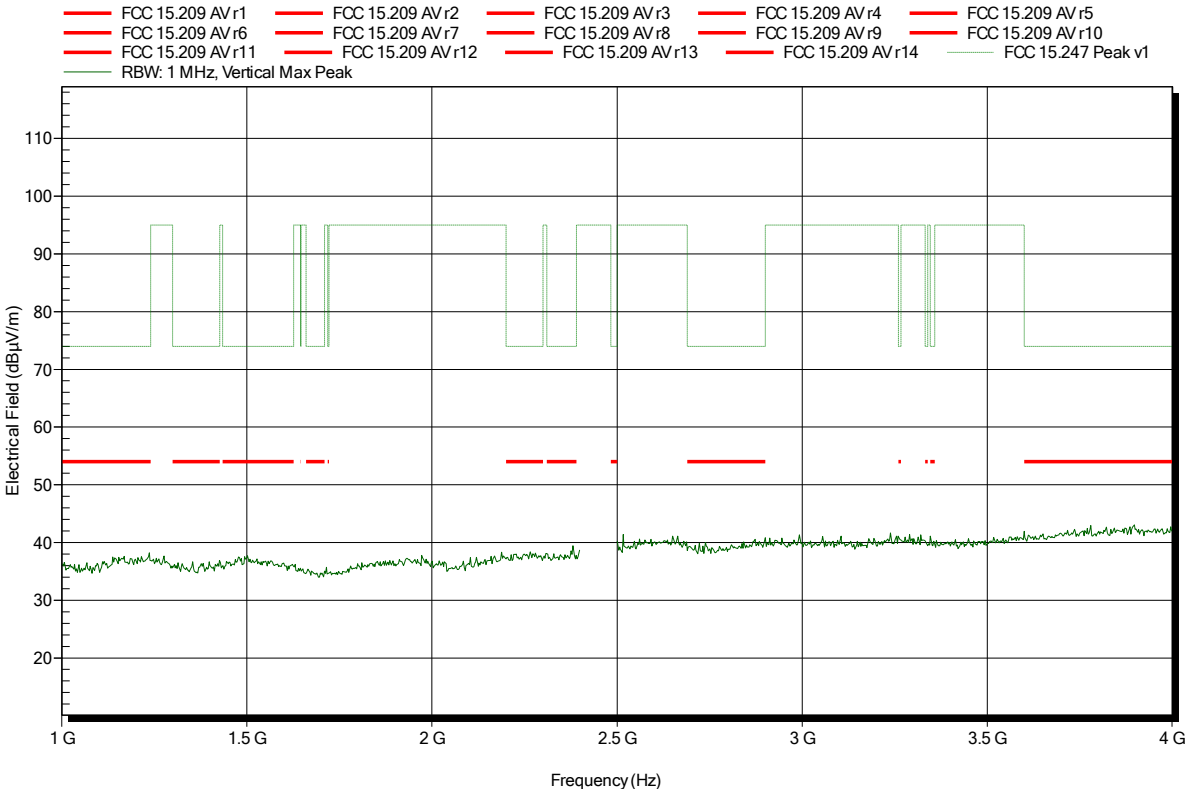

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161
Model:	Test Sample #6
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch9, 802.11n(40), MCS0, 15dBm
Test Date:	2015-11-11
Note:	

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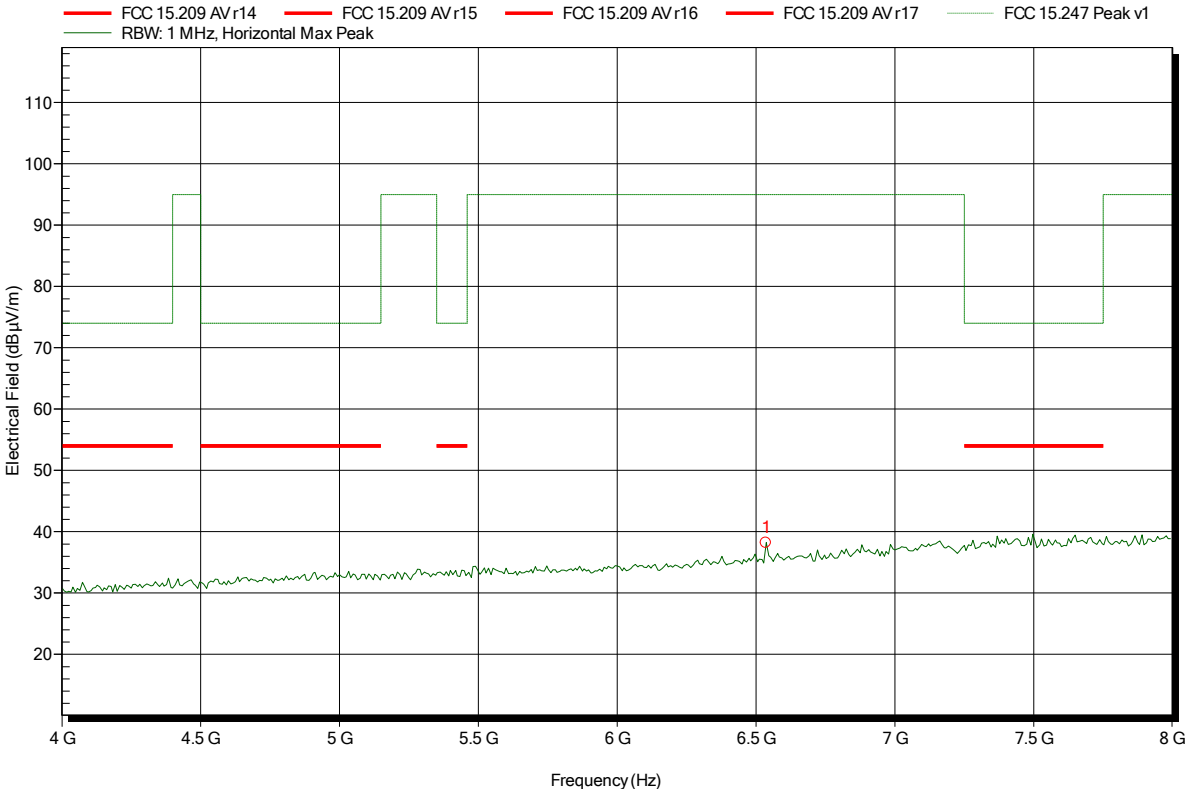

Frequency	Peak	Peak Limit	Peak Difference	Status
6.536 GHz	38.21 dBµV/m	95 dBµV/m	-56.79 dB	Pass

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161
Model:	Test Sample #6
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch9, 802.11n(40), MCS0, 15dBm
Test Date:	2015-11-11
Note:	

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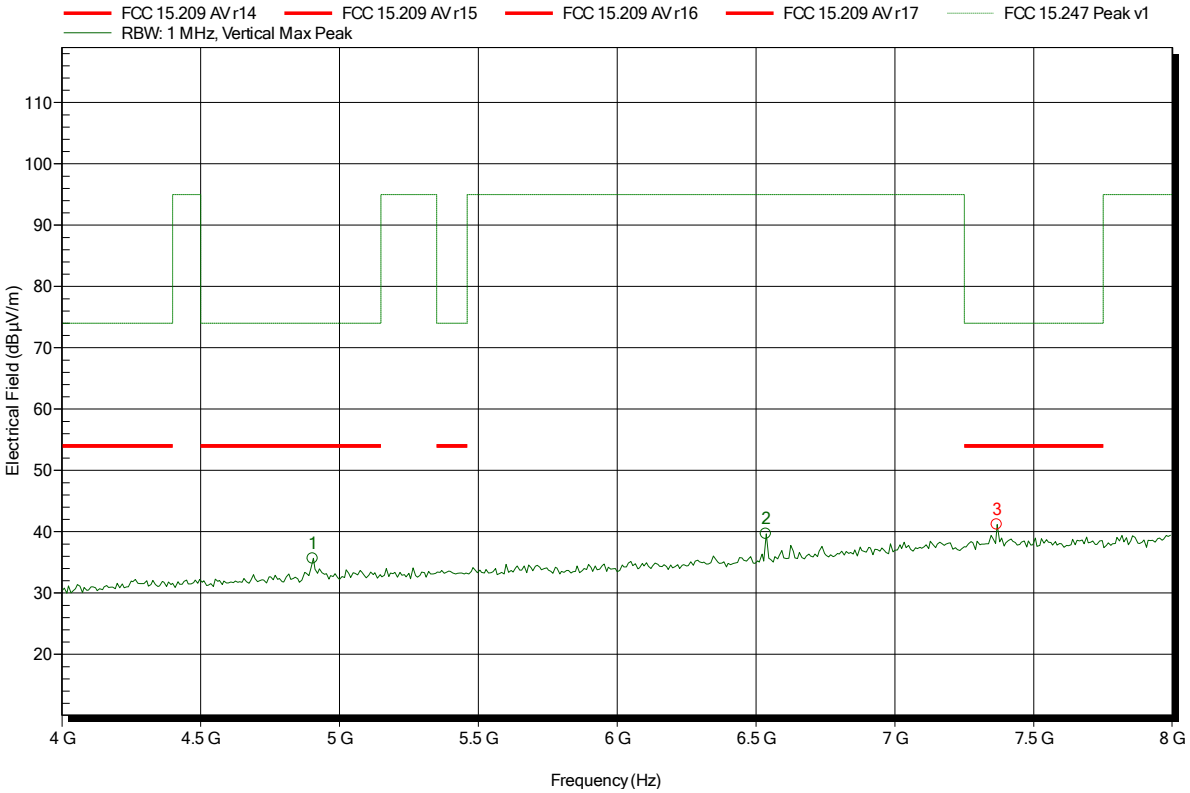

Frequency	Peak	Peak Limit	Peak Difference	Status
4.904 GHz	35.65 dBµV/m	74 dBµV/m	-38.35 dB	Pass
6.536 GHz	39.63 dBµV/m	95 dBµV/m	-55.37 dB	Pass
7.368 GHz	41.19 dBµV/m	74 dBµV/m	-32.81 dB	Pass

Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161
Model:	Test Sample #6
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch9, 802.11n(40), MCS0, 15dBm
Test Date:	2015-11-11
Note:	

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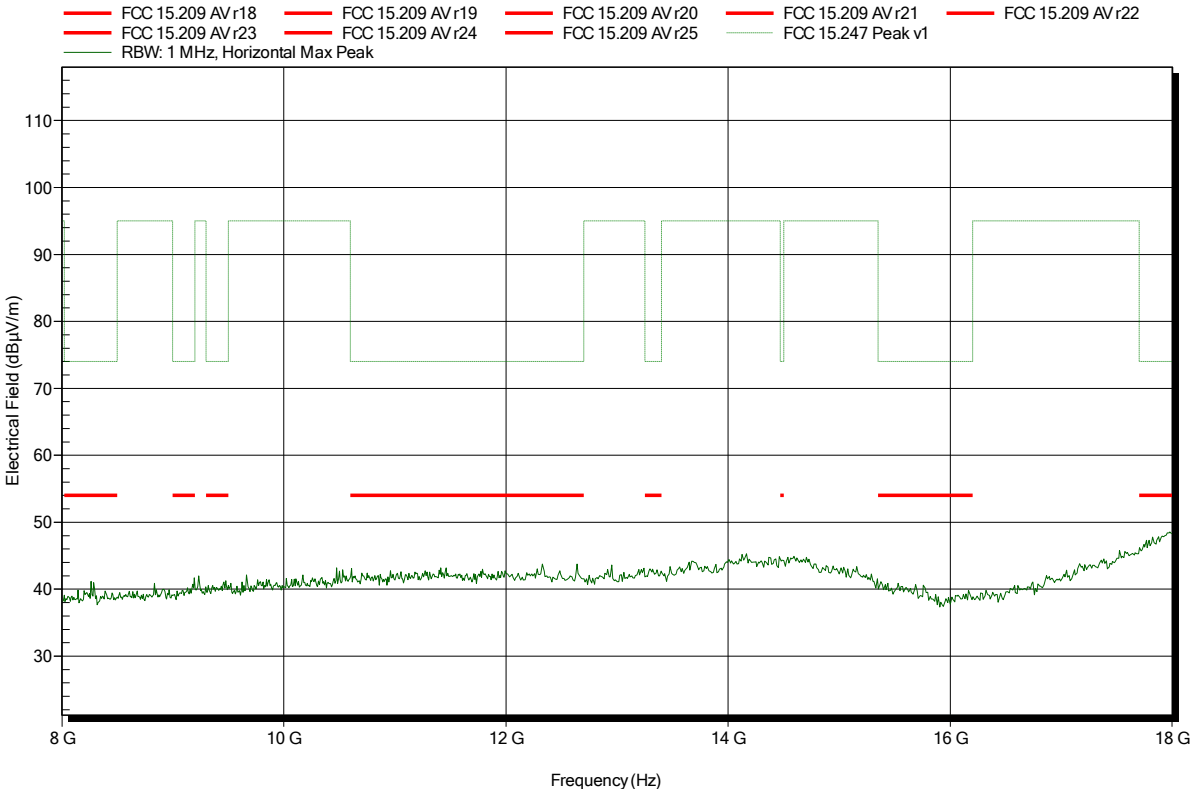
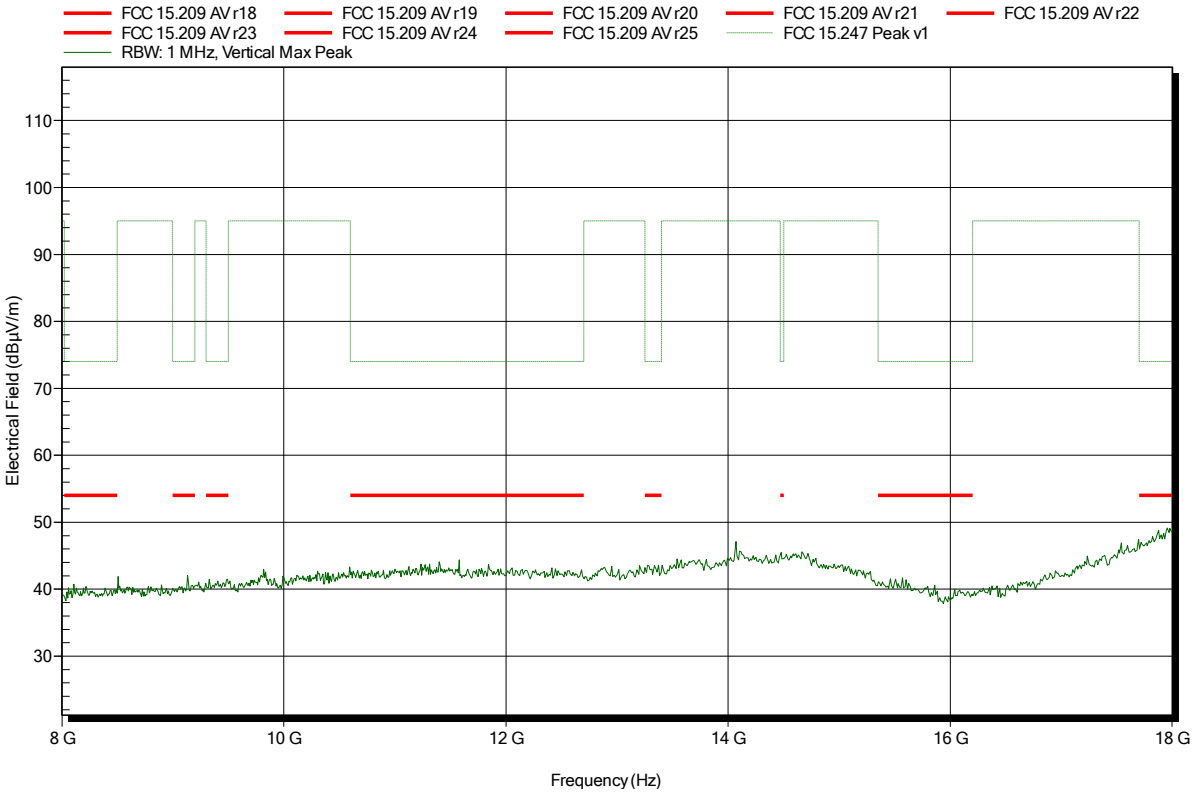


Spurious emissions according to FCC part 15 Subpart C § 15.247

Project number: G0M-1510-5172

Applicant:	u-blox Berlin GmbH
EUT Name:	ELLA-W161
Model:	Test Sample #6
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Jahn
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; 2.4GHz, Ch9, 802.11n(40), MCS0, 15dBm
Test Date:	2015-11-11
Note:	

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