

FCC TEST REPORT FCC 47 CFR Part 15C Industry Canada RSS-210 Frequency hopping systems operating within the 2400 – 2483.5 MHz band	
Report Reference No.	G0M-1410-4214-TFC247BT-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	Leica Geosystems AG
Address	Heinrich Wild Strasse 9435 Heerbrugg SWITZERLAND
Test specification:	
Standard	47 CFR Part 15C RSS-210, Issue 8, 2010-12 RSS-Gen, Issue 4, 2014-11 ANSI C63.4:2009
Test scope	complete Radio compliance test
Equipment under test (EUT):	
Product description	Bluetooth, WLAN and BLE Modul
Model No.	TiWi-BLE
Additional Model(s)	None
Brand Name(s)	Leica Geosystems
Hardware version	1.0
Firmware / Software version	4.0
	FCC-ID: RFD-BTWCO IC: 3177A-BTWCO
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: 2015-01-13

Date (s) of performance of tests: 2015-01-26 – 2015-03-17

Compiled by: Wilfried Treffke

Tested by (+ signature).....: Wilfried Treffke *W. Treffke*

(Responsible for Test)

Approved by (+ signature): Christian Weber *C. Weber*

Date of issue: 2015-05-12

Total number of pages: 171

General remarks:

The test results presented in this report relate only to the object tested.

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

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

Additional comments:

Version History

Version	Issue Date	Remarks	Revised by
01	2015-05-12	Initial Release	

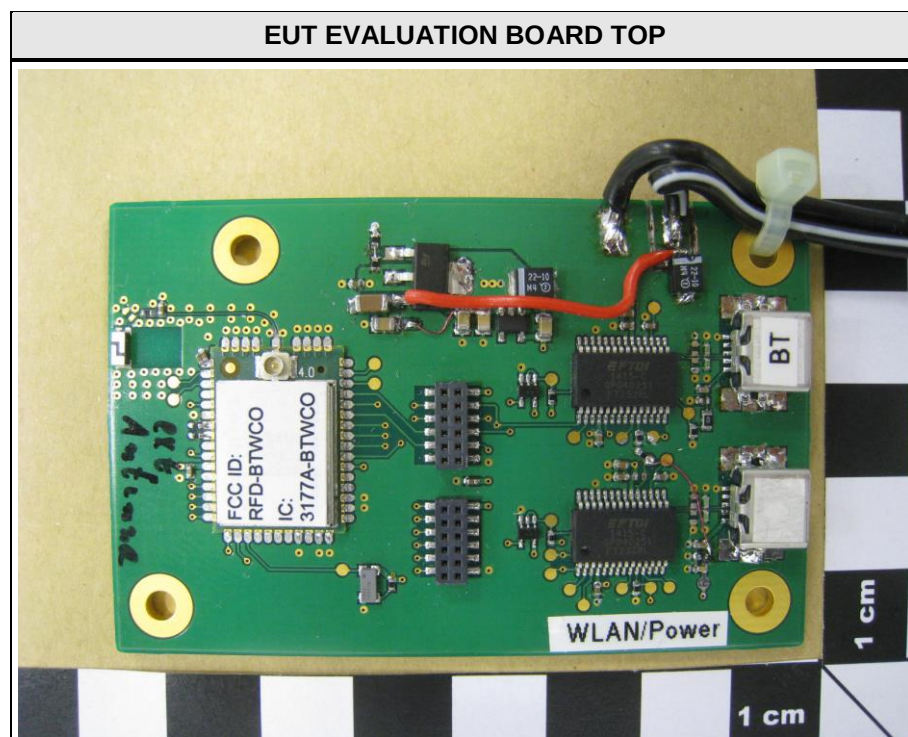
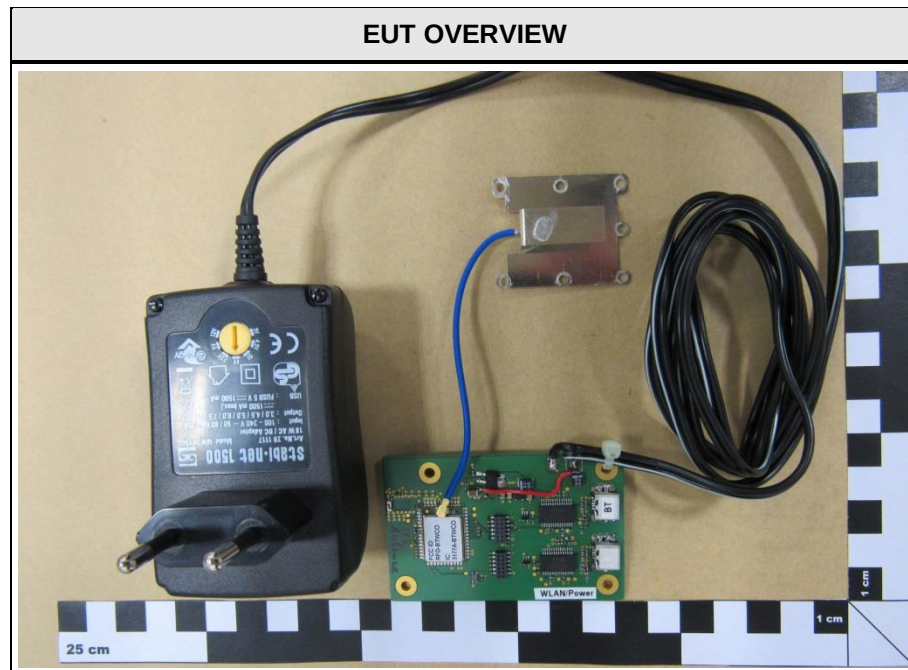
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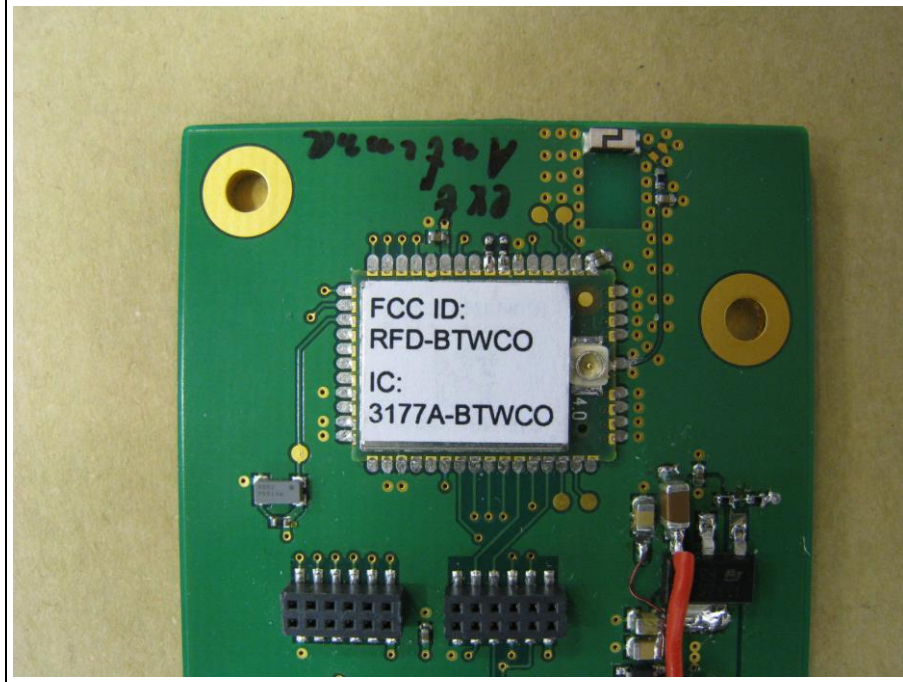
1 Equipment (Test item) Description

Description	Bluetooth, WLAN and BLE Modul	
Model	TiWi-BLE	
Additional Model(s)	None	
Brand Name(s)	Leica Geosystems	
Serial number	None	
Hardware version	1.0	
Software / Firmware version	4.0	
FCC-ID	RFD-BTWCO	
IC	3177A-BTWCO	
Equipment type	Radio module	
Radio type	Transceiver	
Radio technology	Bluetooth BR+EDR	
Operating frequency range	2402 - 2480 MHz	
Assigned frequency band	2400 - 2483.5 MHz	
Main test frequencies	F _{LOW}	2402 MHz
	F _{MID}	2441 MHz
	F _{HIGH}	2480 MHz
Spreading	FHSS	
Modulations	GFSK, PI/4-DQPSK, 8-PSK	
Number of channels	79 hopping channels at all	
Channel spacing	1 MHz	
Number of antennas	1	
Antenna	Type	inverted - F antenna
	Model	BTFA-2450
	Manufacturer	INWAVE
	Gain	2.0 dBi (customer declaration)
Manufacturer	Leica Geosystems AG Heinrich Wild Strasse 9435 Heerbrugg SWITZERLAND	
Power supply	V _{NOM}	3.6 VDC
AC/DC-Adaptor	Model	MW 3R15GS
	Vendor	Stabi-Net
	Input	100-240 V / 50-60 Hz / 0.35A
	Output	6 VDC

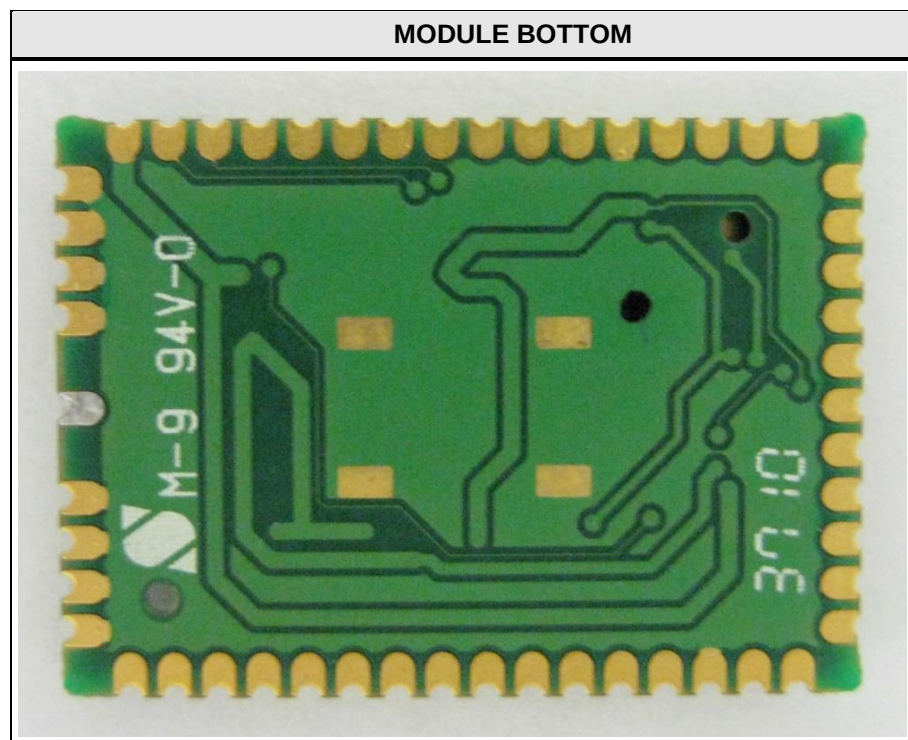
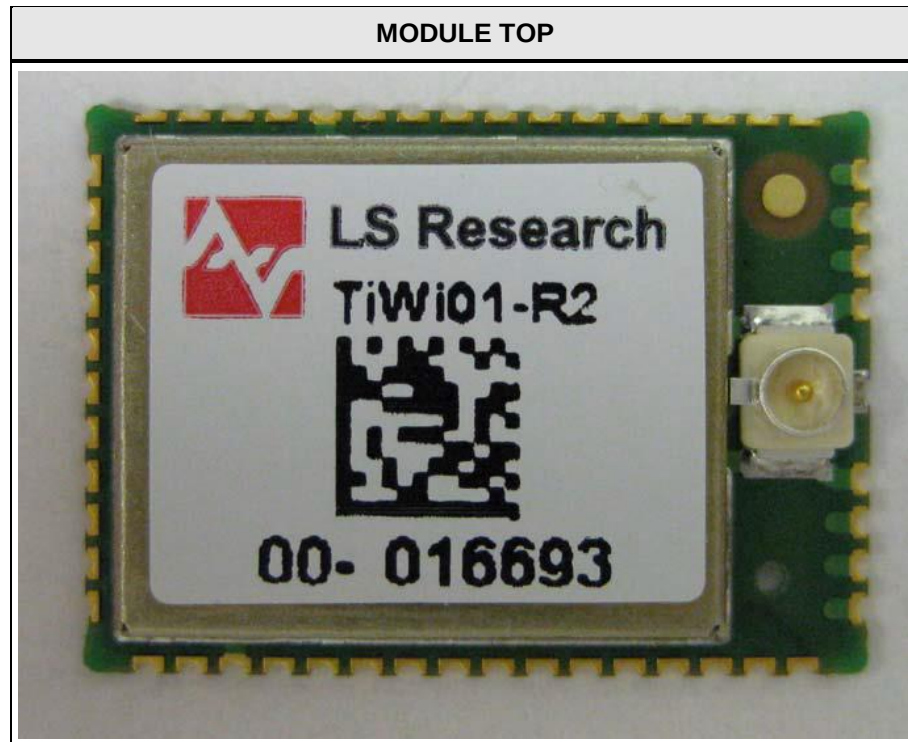
1.1 Photos – Equipment External



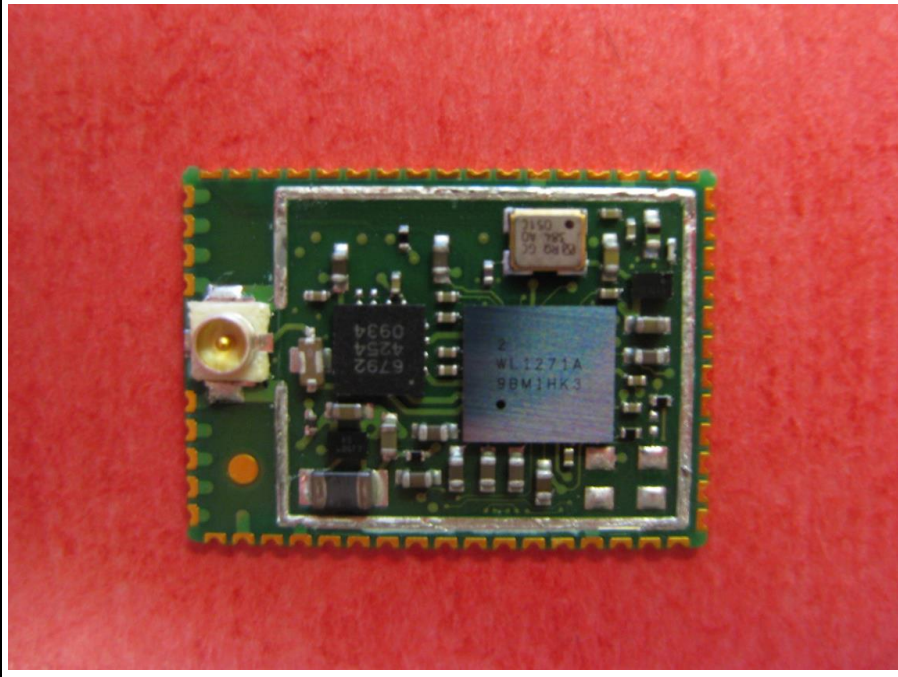
EUT LABEL



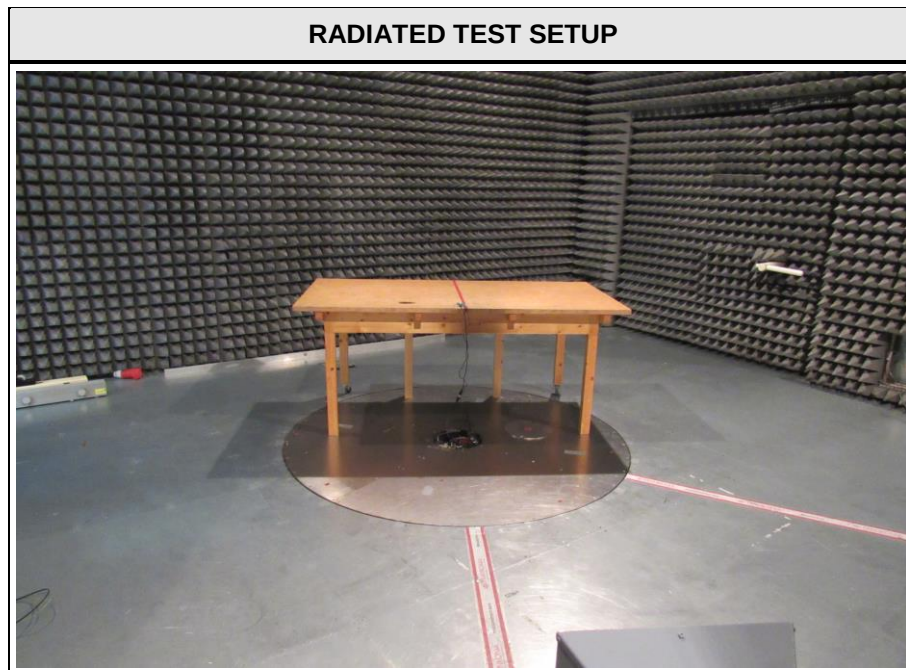
1.2 Photos – Equipment internal



MODULE SHIELD REMOVED



1.3 Photos – Test setup



CONDUCTED TEST SETUP



1.4 Supporting Equipment Used During Testing

Product Type*	Device	Manufacturer	Model No.	Comments
AE	Laptop	Lenovo	T540p	Test mode software
SIM	Communication tester	R&S	CBT	Bluetooth signaling

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

AE : Auxiliary/Associated Equipment, or

SIM : Simulator (Not Subjected to Test)

CABL : Connecting cables

1.5 Test Modes

Mode #	Description	
DH5-Sngl	General conditions:	EUT powered by laboratory power supply.
	Radio conditions:	Mode = standalone transmit Spreading = Hopping stopped (single hopping channel) Modulation = GFSK Packet type = DH5 Data rate = 1 Mbps Duty cycle = 77 % Power level = Maximum
2DH5-Sngl	General conditions:	EUT powered by laboratory power supply.
	Radio conditions:	Mode = standalone transmit Spreading = Hopping stopped (single hopping channel) Modulation = $\pi/4$ -DQPSK Packet type = 2DH5 Data rate = 2 Mbps Duty cycle = 77 % Power level = Maximum
3DH5-Sngl	General conditions:	EUT powered by laboratory power supply.
	Radio conditions:	Mode = standalone transmit Spreading = Hopping stopped (single hopping channel) Modulation = 8-DPSK Packet type = 3DH5 Data rate = 3 Mbps Duty cycle = 77 % Power level = Maximum
DH5-Hop	General conditions:	EUT powered by laboratory power supply.
	Radio conditions:	Mode = standalone transmit Spreading = Hopping Modulation = GFSK Packet type = DH5 Data rate = 1 Mbps Duty cycle = 77 % Power level = Maximum

Receive	General conditions:	EUT powered by laboratory power supply.
	Radio conditions:	Mode = standalone receive Spreading = Hopping
AC-Powerline	General conditions:	EUT powered by commercial AC/DC-adaptor
	Radio conditions:	Mode = standalone transmit Spreading = Hopping Power level = Maximum

1.6 Test Equipment Used During Testing

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

20dB Bandwidth					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSP 30	EF00312	2014-02	2015-02

Number of hopping frequencies					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSP 30	EF00312	2014-02	2015-02

Time of occupancy					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSP 30	EF00312	2014-02	2015-02

Maximum peak conducted power					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSP 30	EF00312	2014-02	2015-02

Band edge compliance					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSP 30	EF00312	2014-02	2015-02

Conducted spurious emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSP 30	EF00312	2014-02	2015-02

Radiated spurious emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Semi-anechoic chamber	Frankonia	AC 1	EF00062	-	-
Spectrum Analyzer	R&S	FSIQ26	EF00242	2014-03	2015-03
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	2013-02	2016-02

AC powerline conducted emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
AMN	R&S	ESH2-Z5	EF00182	2014-11	2016-11
EMI Test Receiver	R&S	ESCS 30	EF00295	2014-10	2015-10

1.7 Sample emission level calculation

The following is a description of terms and a sample calculation, as appears in the radiated emissions data table. The numbers used in the calculation are for example only. There is no direct correlation to the specific data taken for the product described in this document:

Reading:

This is the reading obtained on the spectrum analyzer in dBμV. Any external preamplifiers used are taken into account through internal analyzer settings.

A.F.:

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

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

Net:

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

Limit:

This is the FCC Class B radiated emission limit (in units of 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:

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

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:

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

2 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	RSS-Gen 6.6	N/R	Informational only
FCC § 15.247(a)(1) IC RSS-210 § A8.1	20 dB Bandwidth	Public notice DA 00-705	PASS	
FCC § 15.247(a)(1)(iii) IC RSS-210 § A8.1	Number of hopping frequencies	Public notice DA 00-705	PASS	
FCC § 15.247(a)(1) IC RSS-210 § A8.1	Frequency hopping channel separation	Public notice DA 00-705	PASS	
FCC § 15.247(a)(1)(iii) IC RSS-210 § A8.1	Time of occupancy (Dwell time)	Public notice DA 00-705	PASS	
FCC § 15.247(b)(1) IC RSS-210 § A8.4	Maximum peak conducted power	Public notice DA 00-705	PASS	
47 CFR 15.207 RSS-Gen 8.8	AC power line conducted emissions	ANSI C63.4	PASS	
FCC § 15.247(d) IC RSS-210 § A8.5	Band edge compliance	Public notice DA 00-705	PASS	
FCC § 15.247(d) IC RSS-210 § A8.5	Conducted spurious emissions	Public notice DA 00-705	PASS	
FCC § 15.247(d) FCC § 15.209 IC RSS-210 A8.5 IC RSS-Gen 4.9 IC RSS-Gen 7.2.5	Transmitter radiated spurious emissions	Public notice DA 00-705 / ANSI C 63.4	PASS	
IC RSS-Gen 7.1	Receiver radiated spurious emissions	ANSI C 63.4	PASS	
Remarks:				

3 Test Conditions and Results

3.1 Test Conditions and Results – Occupied Bandwidth

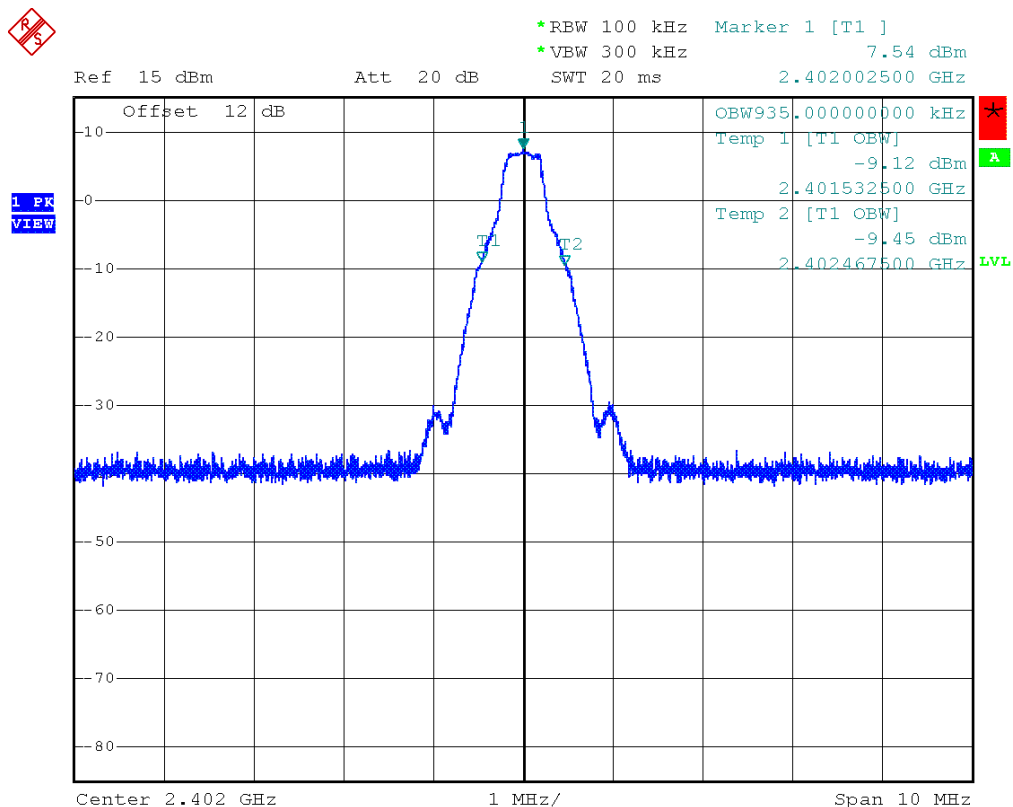
Occupied Bandwidth acc. to IC RSS-Gen			Verdict: PASS
Test according to measurement reference	Reference Method		
	RSS-Gen 6.6		
Test frequency range	Tested frequencies		
	F _{LOW} / F _{MID} / F _{HIGH}		
Limits			
None (Informational only)			
Test setup			
Spectrum Analyzer EUT			
Test procedure			
1. EUT set to test mode (Communication tester is used if needed) 2. Span set to at least twice the emission spectrum 3. Resolution bandwidth set to 1 % of span 4. Occupied Bandwidth (99 %) measurement with spectrum analyzer built in measurement function			
Test results			
Channel	Frequency [MHz]	Mode	Occupied Bandwidth [kHz]
F _{LOW}	2402	DH5-Sngl	935.0
F _{MID}	2441	DH5-Sngl	932.5
F _{HIGH}	2480	DH5-Sngl	935.0
F _{LOW}	2402	2DH5-Sngl	1240.0
F _{MID}	2441	2DH5-Sngl	1247.5
F _{HIGH}	2480	2DH5-Sngl	1252.5
F _{LOW}	2402	3DH5-Sngl	1255.0
F _{MID}	2441	3DH5-Sngl	1255.0
F _{HIGH}	2480	3DH5-Sngl	1257.5
Comments:			

Occupied Bandwidth – DH5-Sngl F_{Low}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
EUT Name: Bluetooth, WLAN and BLE Module
Model: TiWi-BLE
Test Site: Eurofins Product Service GmbH
Operator: Christian Weber
Test Conditions: Tnom / Vnom
Mode: Tx, DH5, 2402 MHz, modulated
Test Date: 2015-01-26
Verdict: NONE (INFORMATION ONLY)
Note 1: A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2: conducted measurement



Comment: Occupied bandwidth: 935 KHz
Date: 26.JAN.2015 09:11:08

Test Report No.: G0M-1410-4214-TFC247BT-V01

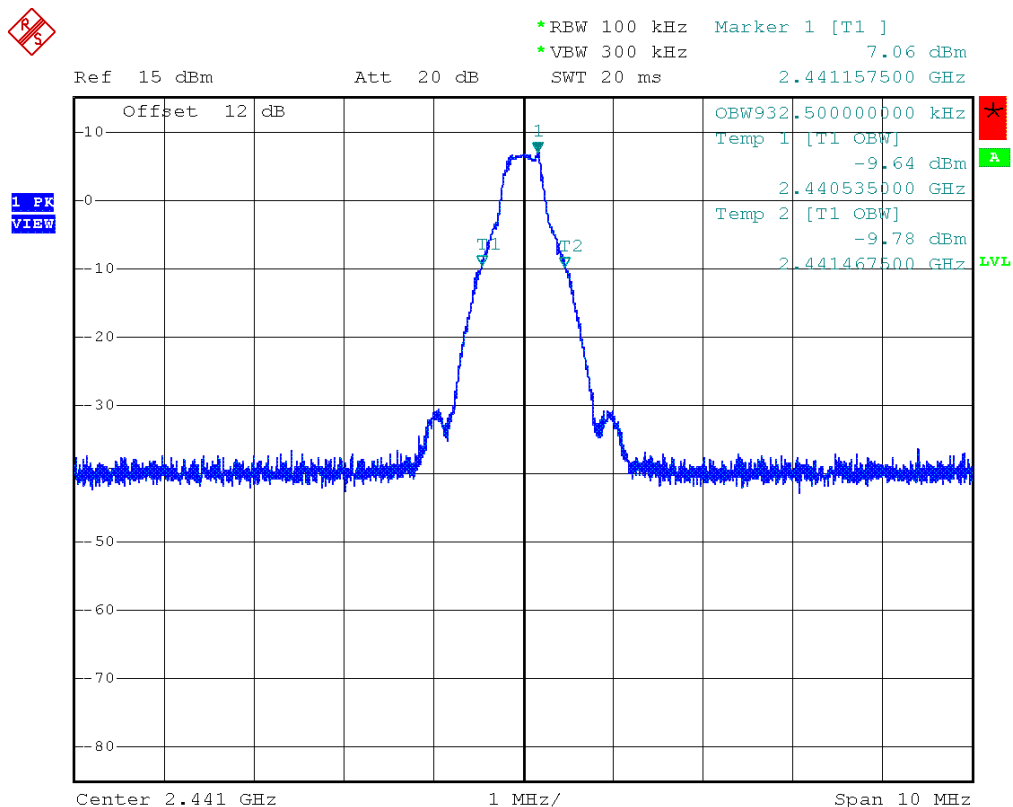
Eurofins Product Service GmbH
Storkower Str. 38c, D-15526 Reichenwalde, Germany

Occupied Bandwidth – DH5-Sngl F_{MID}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
EUT Name: Bluetooth, WLAN and BLE Module
Model: TiWi-BLE
Test Site: Eurofins Product Service GmbH
Operator: Christian Weber
Test Conditions: Tnom / Vnom
Mode: Tx, DH5, 2441 MHz, modulated
Test Date: 2015-01-26
Verdict: NONE (INFORMATION ONLY)
Note 1: A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2: conducted measurement



Comment: Occupied bandwidth: 932.5 KHz
Date: 26.JAN.2015 09:12:21

Test Report No.: G0M-1410-4214-TFC247BT-V01

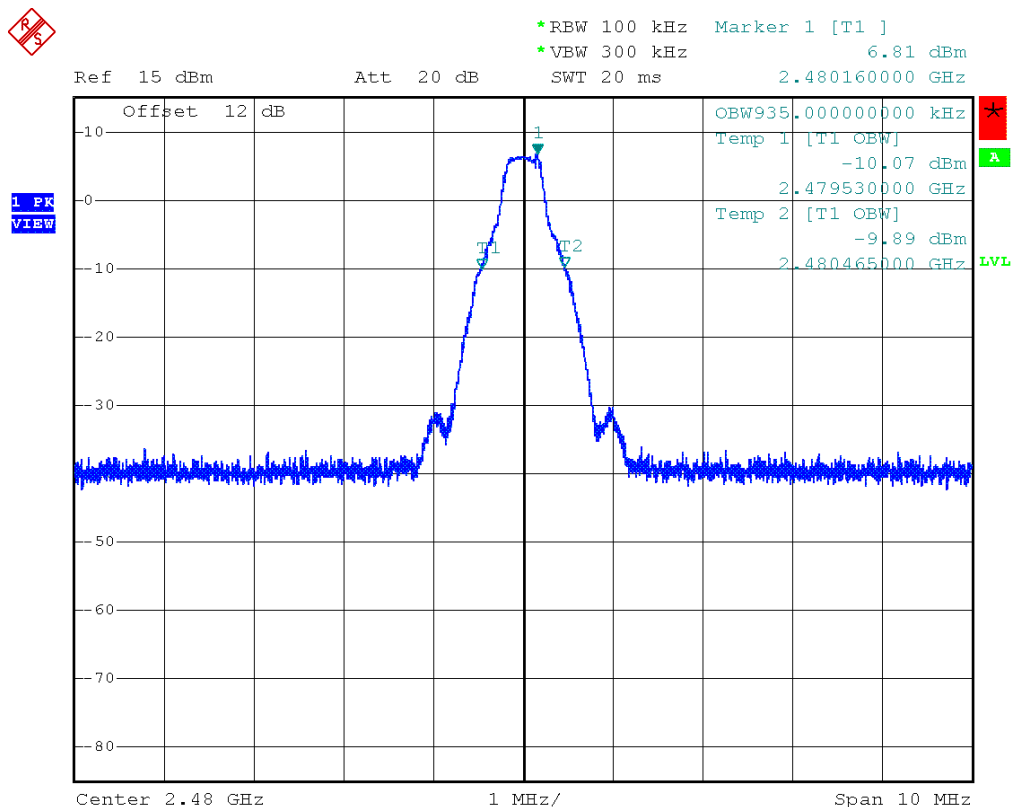
Eurofins Product Service GmbH
Storkower Str. 38c, D-15526 Reichenwalde, Germany

Occupied Bandwidth – DH5-Sngl F_{HIGH}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
EUT Name: Bluetooth, WLAN and BLE Module
Model: TiWi-BLE
Test Site: Eurofins Product Service GmbH
Operator: Christian Weber
Test Conditions: Tnom / Vnom
Mode: Tx, DH5, 2480 MHz, modulated
Test Date: 2015-01-26
Verdict: NONE (INFORMATION ONLY)
Note 1: A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2: conducted measurement



Comment: Occupied bandwidth: 935 KHz
Date: 26.JAN.2015 09:13:41

Test Report No.: G0M-1410-4214-TFC247BT-V01

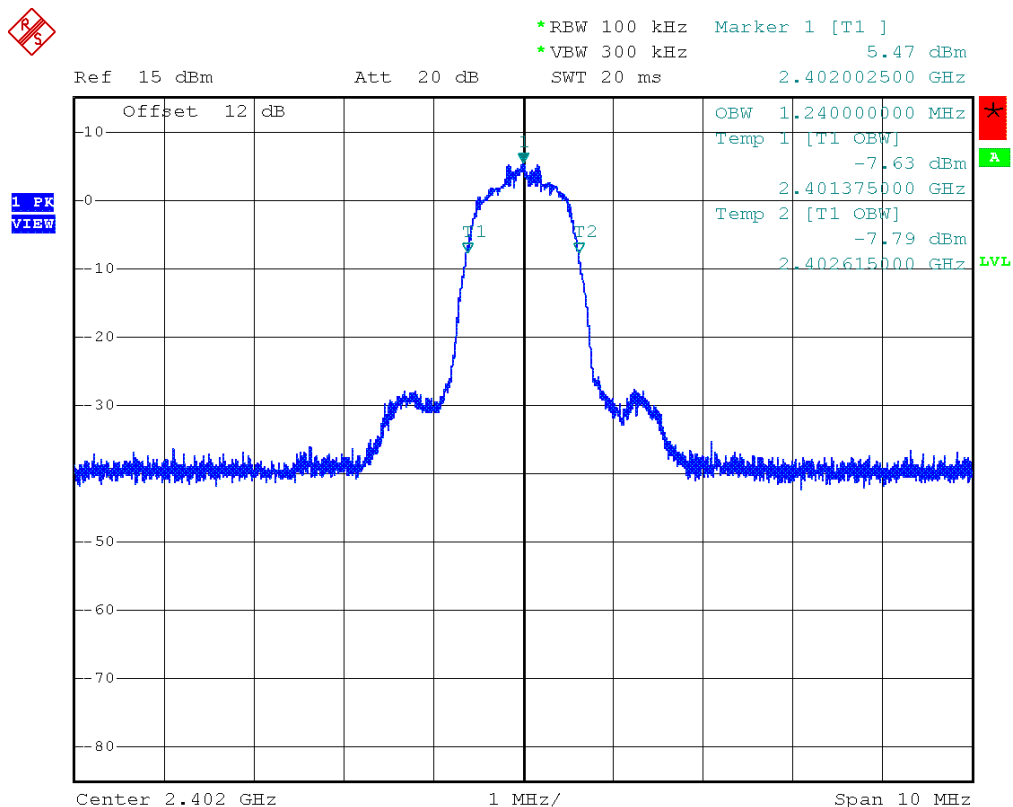
Eurofins Product Service GmbH
Storkower Str. 38c, D-15526 Reichenwalde, Germany

Occupied Bandwidth – 2-DH5-Sngl F_{Low}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
EUT Name: Bluetooth, WLAN and BLE Module
Model: TiWi-BLE
Test Site: Eurofins Product Service GmbH
Operator: Christian Weber
Test Conditions: Tnom / Vnom
Mode: Tx, 2-DH5, 2402 MHz, modulated
Test Date: 2015-01-26
Verdict: NONE (INFORMATION ONLY)
Note 1: A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2: conducted measurement



Comment: Occupied bandwidth: 1240 KHz
Date: 26.JAN.2015 09:15:46

Test Report No.: G0M-1410-4214-TFC247BT-V01

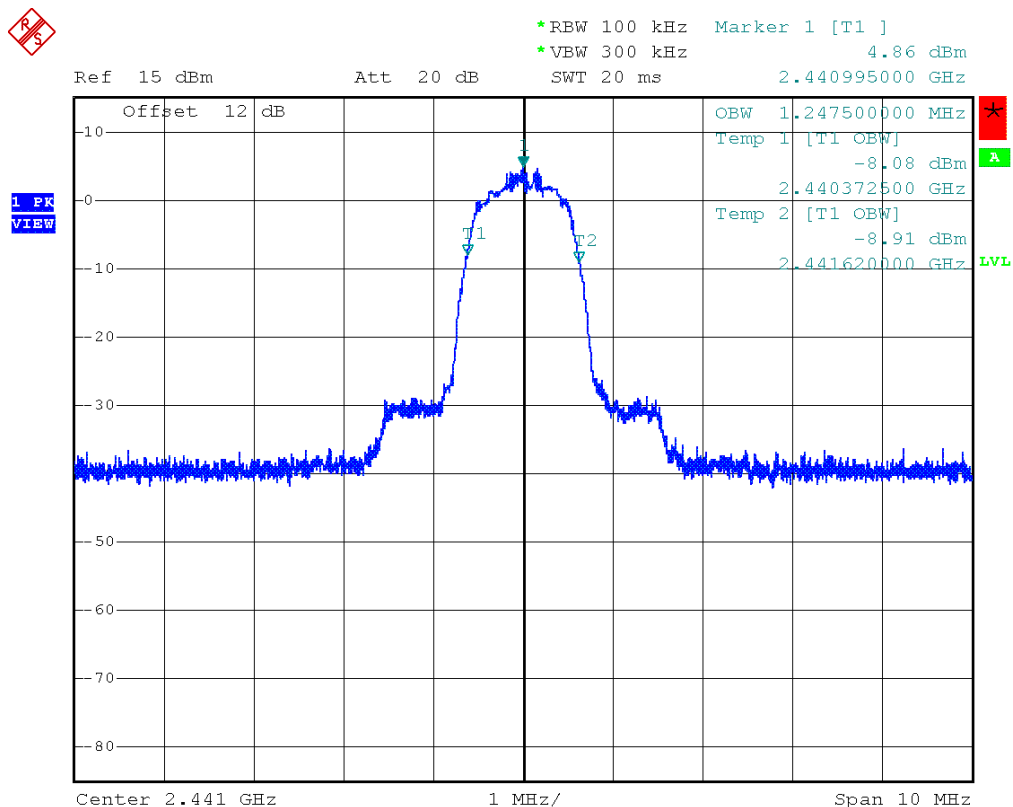
Eurofins Product Service GmbH
Storkower Str. 38c, D-15526 Reichenwalde, Germany

Occupied Bandwidth – 2-DH5-Sngl F_{MID}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
EUT Name: Bluetooth, WLAN and BLE Module
Model: TiWi-BLE
Test Site: Eurofins Product Service GmbH
Operator: Christian Weber
Test Conditions: Tnom / Vnom
Mode: Tx, 2-DH5, 2441 MHz, modulated
Test Date: 2015-01-26
Verdict: NONE (INFORMATION ONLY)
Note 1: A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2: conducted measurement



Comment: Occupied bandwidth: 1247.5 KHz
Date: 26.JAN.2015 09:17:16

Test Report No.: G0M-1410-4214-TFC247BT-V01

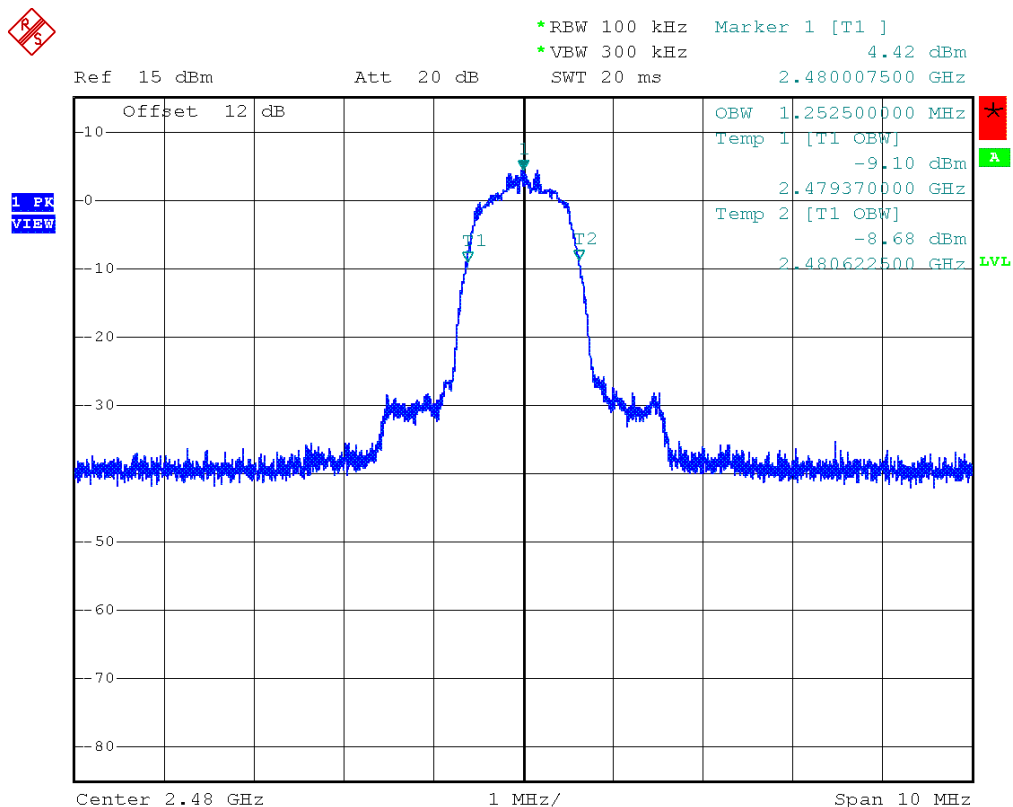
Eurofins Product Service GmbH
Storkower Str. 38c, D-15526 Reichenwalde, Germany

Occupied Bandwidth – 2-DH5-Sngl F_{HIGH}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
EUT Name: Bluetooth, WLAN and BLE Module
Model: TiWi-BLE
Test Site: Eurofins Product Service GmbH
Operator: Christian Weber
Test Conditions: Tnom / Vnom
Mode: Tx, 2-DH5, 2480 MHz, modulated
Test Date: 2015-01-26
Verdict: NONE (INFORMATION ONLY)
Note 1: A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2: conducted measurement



Comment: Occupied bandwidth: 1252.5 KHz
Date: 26.JAN.2015 09:18:22

Test Report No.: G0M-1410-4214-TFC247BT-V01

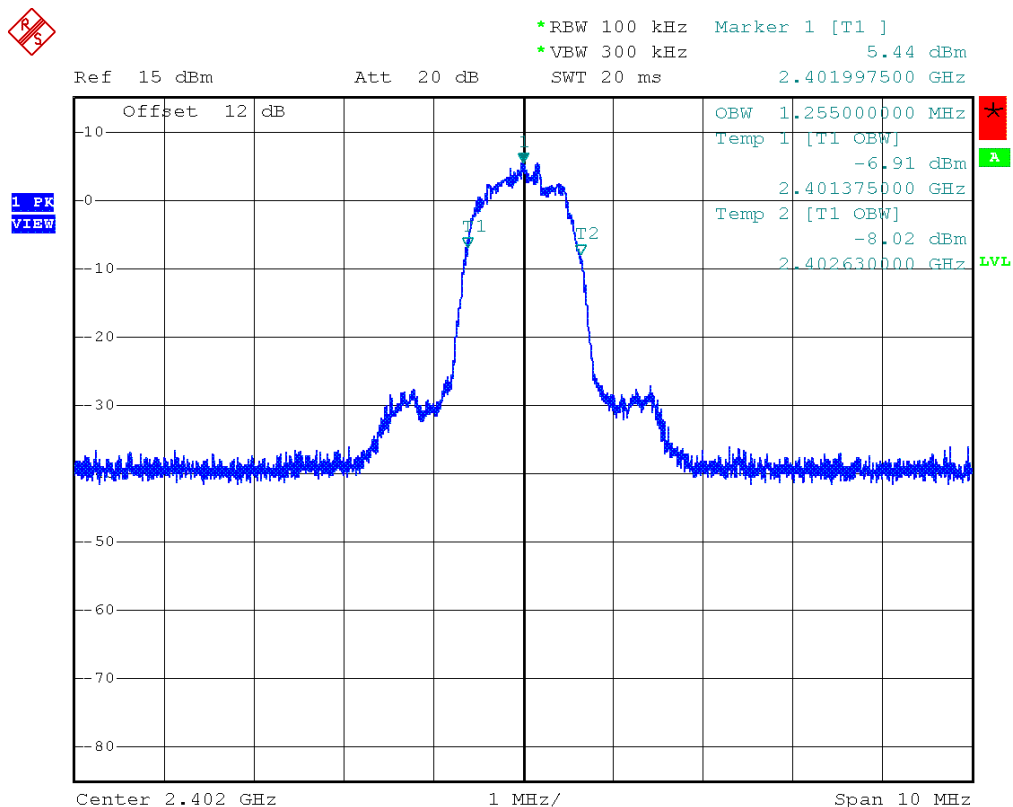
Eurofins Product Service GmbH
Storkower Str. 38c, D-15526 Reichenwalde, Germany

Occupied Bandwidth – 3-DH5-Sngl F_{Low}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
EUT Name: Bluetooth, WLAN and BLE Module
Model: TiWi-BLE
Test Site: Eurofins Product Service GmbH
Operator: Christian Weber
Test Conditions: Tnom / Vnom
Mode: Tx, 3-DH5, 2402 MHz, modulated
Test Date: 2015-01-26
Verdict: NONE (INFORMATION ONLY)
Note 1: A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2: conducted measurement



Comment: Occupied bandwidth: 1255 KHz
Date: 26.JAN.2015 09:19:43

Test Report No.: G0M-1410-4214-TFC247BT-V01

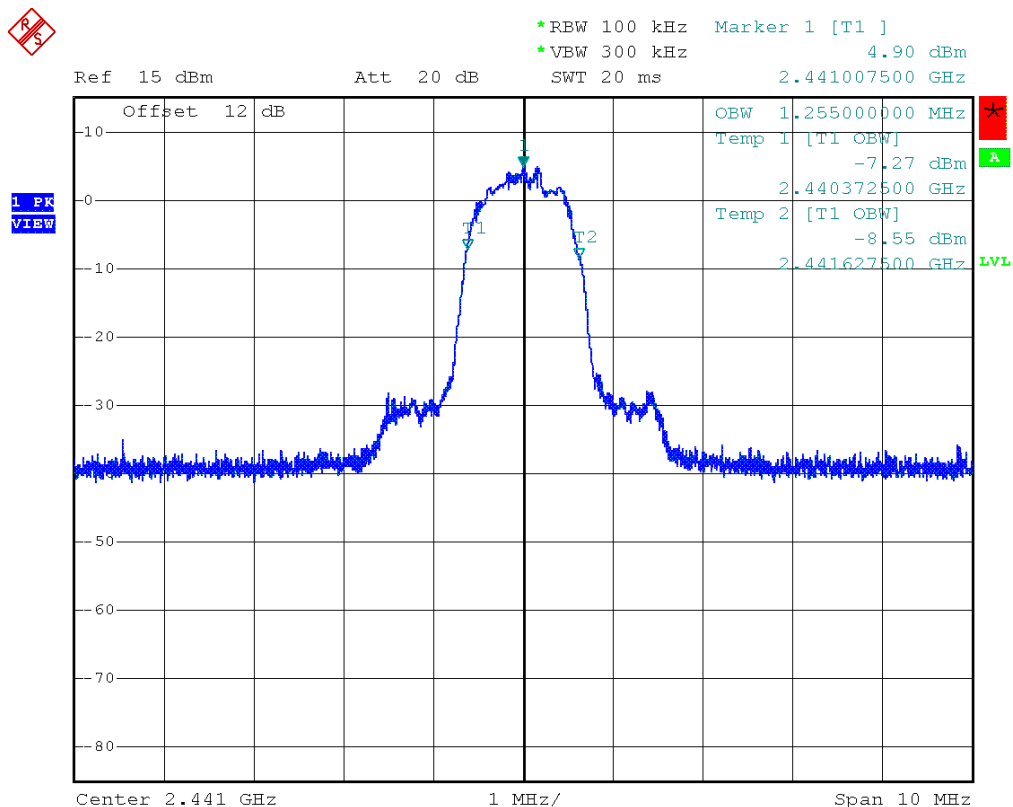
Eurofins Product Service GmbH
Storkower Str. 38c, D-15526 Reichenwalde, Germany

Occupied Bandwidth – 3-DH5-Sngl F_{MID}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
EUT Name: Bluetooth, WLAN and BLE Module
Model: TiWi-BLE
Test Site: Eurofins Product Service GmbH
Operator: Christian Weber
Test Conditions: Tnom / Vnom
Mode: Tx, 3-DH5, 2441 MHz, modulated
Test Date: 2015-01-26
Verdict: NONE (INFORMATION ONLY)
Note 1: A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2: conducted measurement



Comment: Occupied bandwidth: 1255 KHz
Date: 26.JAN.2015 09:21:08

Test Report No.: G0M-1410-4214-TFC247BT-V01

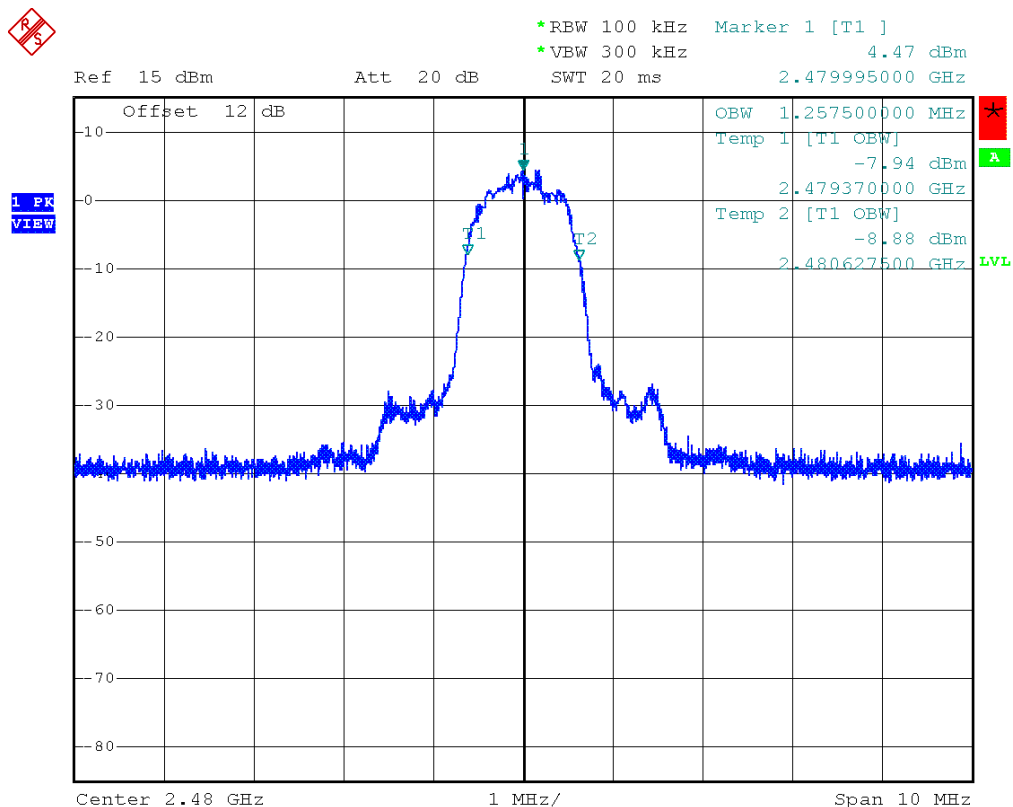
Eurofins Product Service GmbH
Storkower Str. 38c, D-15526 Reichenwalde, Germany

Occupied Bandwidth – 3-DH5-Sngl F_{HIGH}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
EUT Name: Bluetooth, WLAN and BLE Module
Model: TiWi-BLE
Test Site: Eurofins Product Service GmbH
Operator: Christian Weber
Test Conditions: Tnom / Vnom
Mode: Tx, 3-DH5, 2480 MHz, modulated
Test Date: 2015-01-26
Verdict: NONE (INFORMATION ONLY)
Note 1: A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2: conducted measurement



Comment: Occupied bandwidth: 1257.5 KHz
Date: 26.JAN.2015 09:22:26

Test Report No.: G0M-1410-4214-TFC247BT-V01

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

3.2 Test Conditions and Results – 20 dB Bandwidth

20 dB Bandwidth acc. to FCC 15.247 / IC RSS-210				Verdict: PASS	
EUT requirement rule parts and clause	Reference				
	FCC 15.247(a)(1) / IC RSS-210 A8.1				
Test according to measurement reference	Reference Method				
	FCC Public Notice DA 00-705				
Test frequency range	Tested frequencies				
	F _{LOW} / F _{MID} / F _{HIGH}				
Limits					
Limit		Condition			
1.5 · Carrier spacing		Output power ≤ 125 mW / 21 dBm			
1.0 · Carrier spacing		125 mW / 21 dBm < Output power ≤ 1 W / 30 dBm			
Test setup					
Spectrum Analyzer EUT					
Test procedure					
1. EUT set to test mode (Communication tester is used if needed) 2. Span set to at least twice the emission spectrum 3. Detector set to peak and max hold 4. Envelope peak value of emission spectrum is selected 5. Marker on envelope of spectrum is set to level of -20 dB to the left of the peak 6. Marker on envelope of spectrum is set to level of -20 dB to the right of the peak 7. 20dB Bandwidth is determined by marker frequency separation					
Test results					
Channel	Frequency [MHz]	Mode	20 dB Bandwidth [MHz]	Limit [MHz]	Result
F _{LOW}	2402	DH5-Sngl	0.9262	1.5	PASS
F _{MID}	2441	DH5-Sngl	0.9262	1.5	PASS
F _{HIGH}	2480	DH5-Sngl	0.9262	1.5	PASS
F _{LOW}	2402	2DH5-Sngl	1322.2	1.5	PASS
F _{MID}	2441	2DH5-Sngl	1326.6	1.5	PASS
F _{HIGH}	2480	2DH5-Sngl	1322.2	1.5	PASS
F _{LOW}	2402	3DH5-Sngl	1322.2	1.5	PASS
F _{MID}	2441	3DH5-Sngl	1326.6	1.5	PASS
F _{HIGH}	2480	3DH5-Sngl	1326.6	1.5	PASS
Comments:					

Test Report No.: G0M-1410-4214-TFC247BT-V01

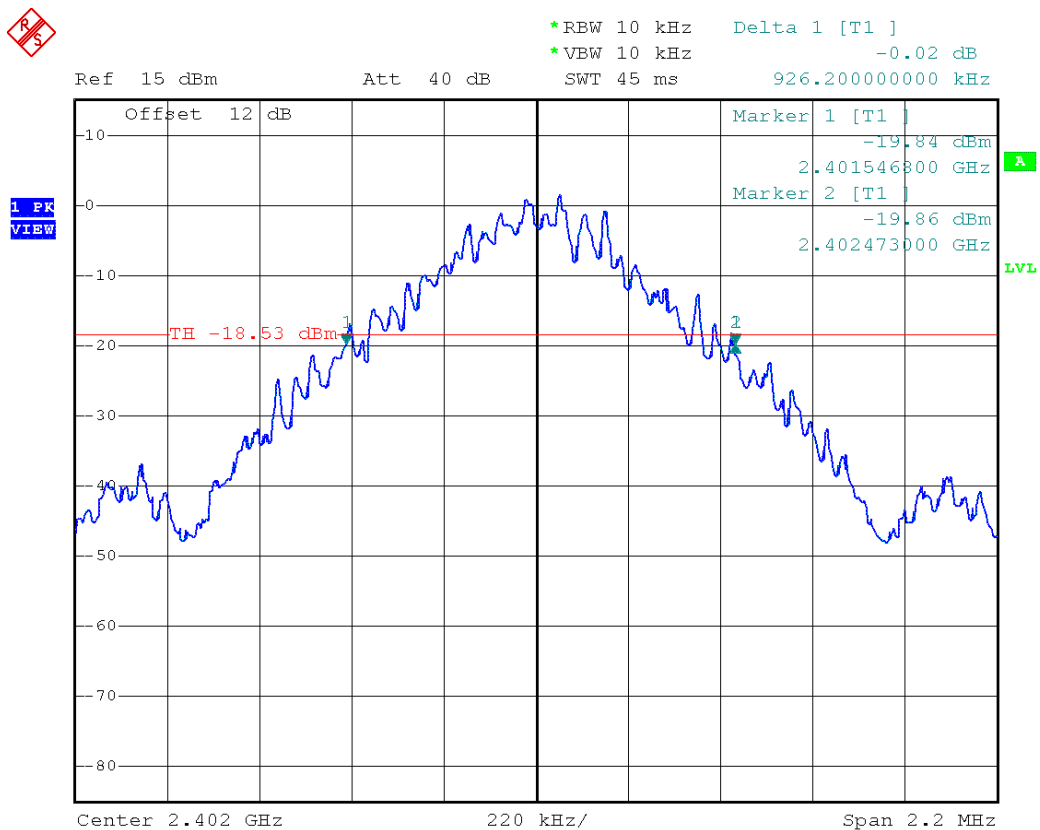
Eurofins Product Service GmbH
Storkower Str. 38c, D-15526 Reichenwalde, Germany

20 dB Bandwidth – DH5-Sngl F_{LOW}

20 dB Bandwidth acc. to FCC 15.247

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
 EUT Name: Bluetooth, WLAN and BLE Module
 Model: TiWi-BLE
 Test Site: Eurofins Product Service GmbH
 Operator: Christian Weber
 Test Conditions: Tnom / Vnom
 Mode: Tx, BT, DH5, 2402 MHz, modulated
 Test Date: 2015-01-26
 Verdict: NONE (INFORMATION ONLY)
 Note 1: FCC part 15 section 247 (a)



Date: 26.JAN.2015 09:24:53

Test Report No.: G0M-1410-4214-TFC247BT-V01

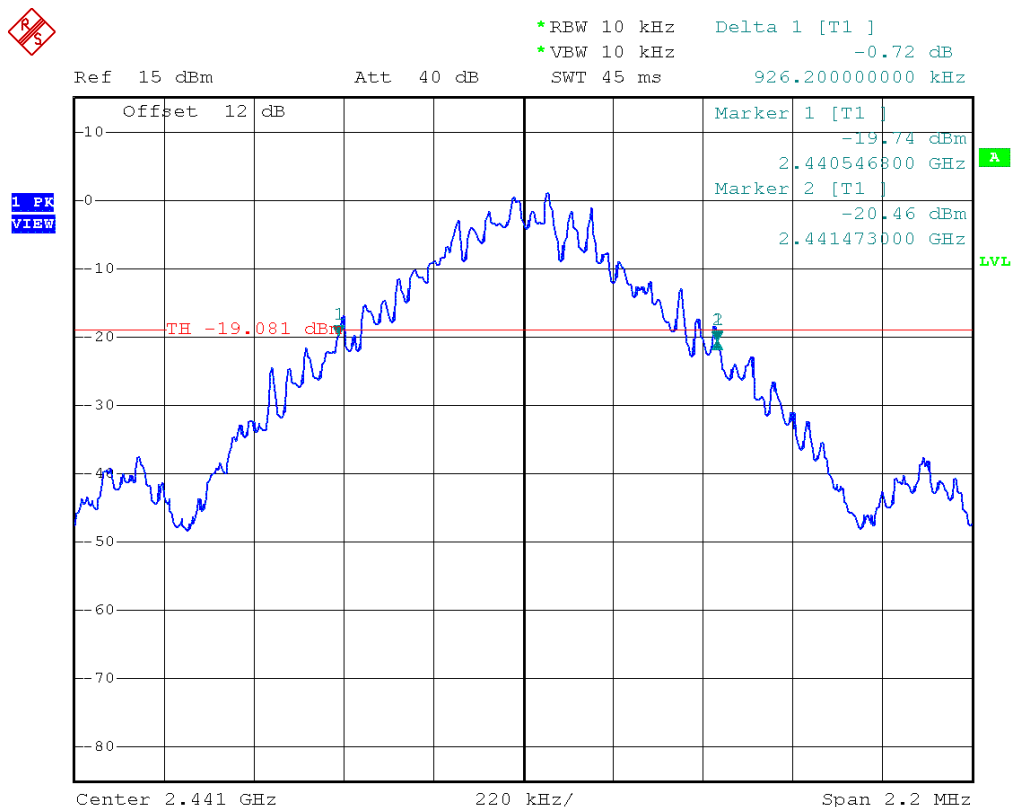
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

20 dB Bandwidth – DH5-Sngl F_{MID}

20 dB Bandwidth acc. to FCC 15.247

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
EUT Name: Bluetooth, WLAN and BLE Module
Model: TiWi-BLE
Test Site: Eurofins Product Service GmbH
Operator: Christian Weber
Test Conditions: Tnom / Vnom
Mode: Tx, BT, DH5, 2441 MHz, modulated
Test Date: 2015-01-26
Verdict: NONE (INFORMATION ONLY)
Note 1: FCC part 15 section 247 (a)



Comment: 20 dB bandwidth: 926.2 KHz
Date: 26.JAN.2015 09:26:23

Test Report No.: G0M-1410-4214-TFC247BT-V01

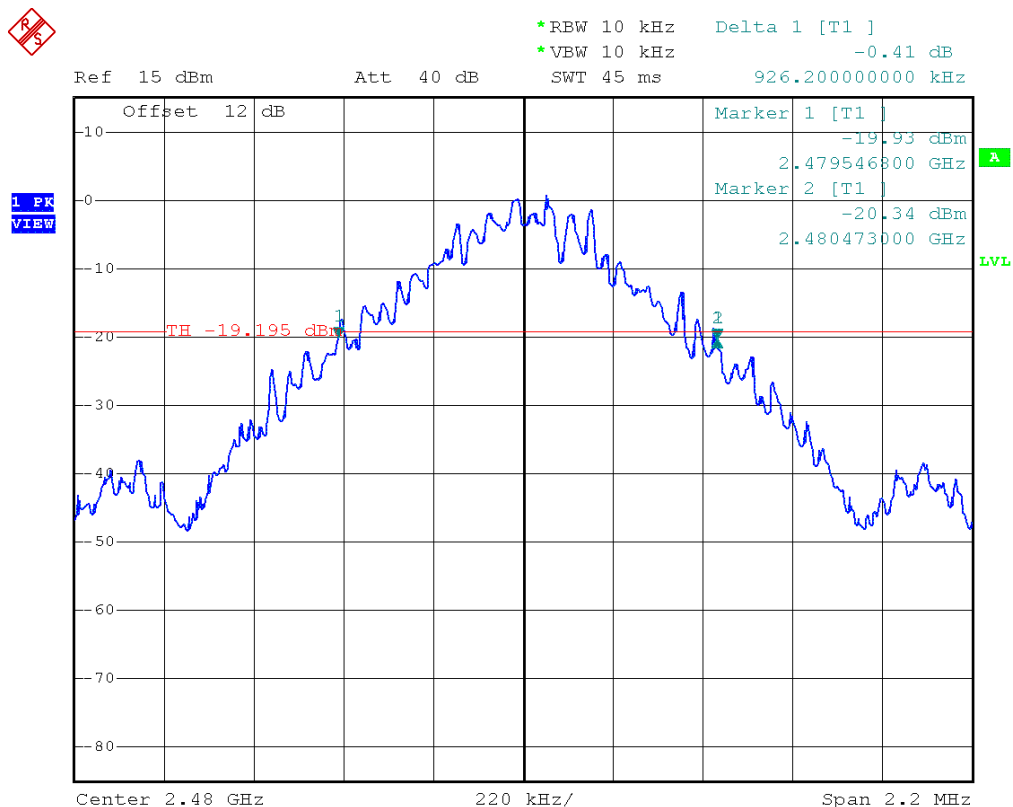
Eurofins Product Service GmbH
Storkower Str. 38c, D-15526 Reichenwalde, Germany

20 dB Bandwidth – DH5-Sngl F_{HIGH}

20 dB Bandwidth acc. to FCC 15.247

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
 EUT Name: Bluetooth, WLAN and BLE Module
 Model: TiWi-BLE
 Test Site: Eurofins Product Service GmbH
 Operator: Christian Weber
 Test Conditions: Tnom / Vnom
 Mode: Tx, BT, DH5, 2480 MHz, modulated
 Test Date: 2015-01-26
 Verdict: NONE (INFORMATION ONLY)
 Note 1: FCC part 15 section 247 (a)



Comment: 20 dB bandwidth: 926.2 KHz
 Date: 26.JAN.2015 09:27:26

Test Report No.: G0M-1410-4214-TFC247BT-V01

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

20 dB Bandwidth – 2-DH5-Sngl F_{Low}

20 dB Bandwidth acc. to FCC 15.247

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
EUT Name: Bluetooth, WLAN and BLE Module
Model: TiWi-BLE
Test Site: Eurofins Product Service GmbH
Operator: Christian Weber
Test Conditions: Tnom / Vnom
Mode: Tx, BT, 2-DH5, 2402 MHz, modulated
Test Date: 2015-01-26
Verdict: NONE (INFORMATION ONLY)
Note 1: FCC part 15 section 247 (a)



Comment: 20 dB bandwidth: 1322.2 KHz
Date: 26.JAN.2015 09:28:48

Test Report No.: G0M-1410-4214-TFC247BT-V01

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

20 dB Bandwidth – 2-DH5-Sngl F_{MID}

20 dB Bandwidth acc. to FCC 15.247

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
 EUT Name: Bluetooth, WLAN and BLE Module
 Model: TiWi-BLE
 Test Site: Eurofins Product Service GmbH
 Operator: Christian Weber
 Test Conditions: Tnom / Vnom
 Mode: Tx, BT, 2-DH5, 2441 MHz, modulated
 Test Date: 2015-01-26
 Verdict: NONE (INFORMATION ONLY)
 Note 1: FCC part 15 section 247 (a)



Comment: 20 dB bandwidth: 1326.6 KHz
 Date: 26.JAN.2015 09:29:56

Test Report No.: G0M-1410-4214-TFC247BT-V01

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

20 dB Bandwidth – 2-DH5-Sngl F_{HIGH}

20 dB Bandwidth acc. to FCC 15.247

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
 EUT Name: Bluetooth, WLAN and BLE Module
 Model: TiWi-BLE
 Test Site: Eurofins Product Service GmbH
 Operator: Christian Weber
 Test Conditions: Tnom / Vnom
 Mode: Tx, BT, 2-DH5, 2480 MHz, modulated
 Test Date: 2015-01-26
 Verdict: NONE (INFORMATION ONLY)
 Note 1: FCC part 15 section 247 (a)



Comment: 20 dB bandwidth: 1322.2 KHz
 Date: 26.JAN.2015 09:31:12

Test Report No.: G0M-1410-4214-TFC247BT-V01

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

20 dB Bandwidth – 3-DH5-Sngl F_{Low}

20 dB Bandwidth acc. to FCC 15.247

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
EUT Name: Bluetooth, WLAN and BLE Module
Model: TiWi-BLE
Test Site: Eurofins Product Service GmbH
Operator: Christian Weber
Test Conditions: Tnom / Vnom
Mode: Tx, BT, 3-DH5, 2402 MHz, modulated
Test Date: 2015-01-26
Verdict: NONE (INFORMATION ONLY)
Note 1: FCC part 15 section 247 (a)



Comment: 20 dB bandwidth: 1322.2 KHz
Date: 26.JAN.2015 09:32:33

Test Report No.: G0M-1410-4214-TFC247BT-V01

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

20 dB Bandwidth – 3-DH5-Sngl F_{MID}

20 dB Bandwidth acc. to FCC 15.247

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
 EUT Name: Bluetooth, WLAN and BLE Module
 Model: TiWi-BLE
 Test Site: Eurofins Product Service GmbH
 Operator: Christian Weber
 Test Conditions: Tnom / Vnom
 Mode: Tx, BT, 3-DH5, 2441 MHz, modulated
 Test Date: 2015-01-26
 Verdict: NONE (INFORMATION ONLY)
 Note 1: FCC part 15 section 247 (a)



Comment: 20 dB bandwidth: 1326.6 KHz
 Date: 26.JAN.2015 09:33:37

Test Report No.: G0M-1410-4214-TFC247BT-V01

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

20 dB Bandwidth – 3-DH5-Sngl F_{HIGH}

20 dB Bandwidth acc. to FCC 15.247

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
 EUT Name: Bluetooth, WLAN and BLE Module
 Model: TiWi-BLE
 Test Site: Eurofins Product Service GmbH
 Operator: Christian Weber
 Test Conditions: Tnom / Vnom
 Mode: Tx, BT, 3-DH5, 2480 MHz, modulated
 Test Date: 2015-01-26
 Verdict: NONE (INFORMATION ONLY)
 Note 1: FCC part 15 section 247 (a)



Comment: 20 dB bandwidth: 1326.6 KHz
 Date: 26.JAN.2015 09:34:54

Test Report No.: G0M-1410-4214-TFC247BT-V01

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

3.3 Test Conditions and Results – Number of hopping frequencies

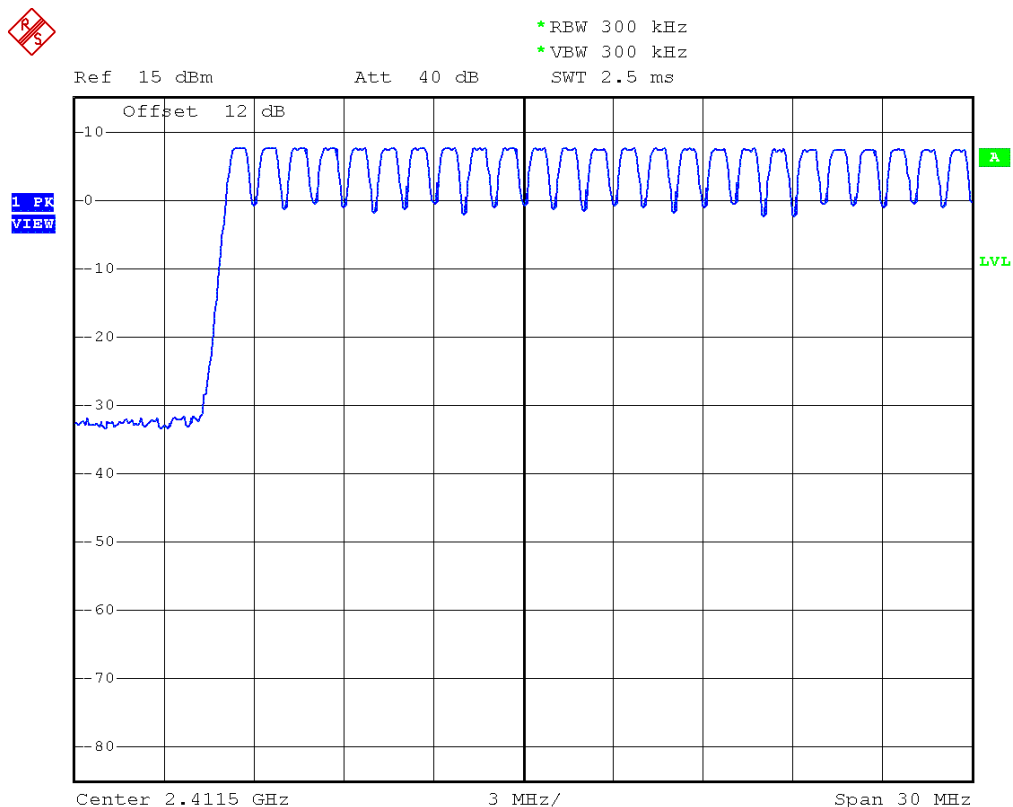
Number of hopping frequencies acc. to FCC 15.247 / IC RSS-210		Verdict: PASS
EUT requirement rule parts and clause	Reference	
	FCC 15.247(a)(1)(iii) / IC RSS-210 A8.1	
Test according to measurement reference	Reference Method	
	FCC Public Notice DA 00-705	
Test frequency range	Tested frequencies	
	F _{LOW} - F _{HIGH}	
EUT test mode	DH5-Hop	
Limits		
Limit	Condition	
Number of hopping channels ≥ 15	Output power ≤ 125 mW / 21 dBm	
Number of hopping channels ≥ 75	125 mW / 21 dBm < Output power ≤ 1 W / 30 dBm	
Test setup		
Spectrum Analyzer EUT		
Test procedure		
1. EUT set to test mode (Communication tester is used if needed) 2. Span set to measurement frequency range 3. Detector set to peak and max hold 4. Resolution bandwidth is set small enough to resolve hopping channel emission spectra 5. The number of peaks is counted to determine number of hopping frequencies		
Test results		
Number of hopping frequencies	Limit	Result
79	≥ 15	PASS
Comments:		

Number of hopping frequencies - Range A

Number of Hopping Frequencies acc. to FCC 15.247

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
 EUT Name: Bluetooth, WLAN and BLE Module
 Model: TiWi-BLE
 Test Site: Eurofins Product Service GmbH
 Operator: Christian Weber
 Test Conditions: Tnom / Vnom
 Mode: Tx, DH5, hopping mode
 Test Date: 2015-01-26
 Verdict: NONE (INFORMATION ONLY)
 Note 1: Number of Hopping Frequencies (DA 00-705 Meas Guidance)
 Note 2: conducted measurement, channel 0-24



Comment: Number of hopping frequencies
 Date: 26.JAN.2015 09:41:18

Test Report No.: G0M-1410-4214-TFC247BT-V01

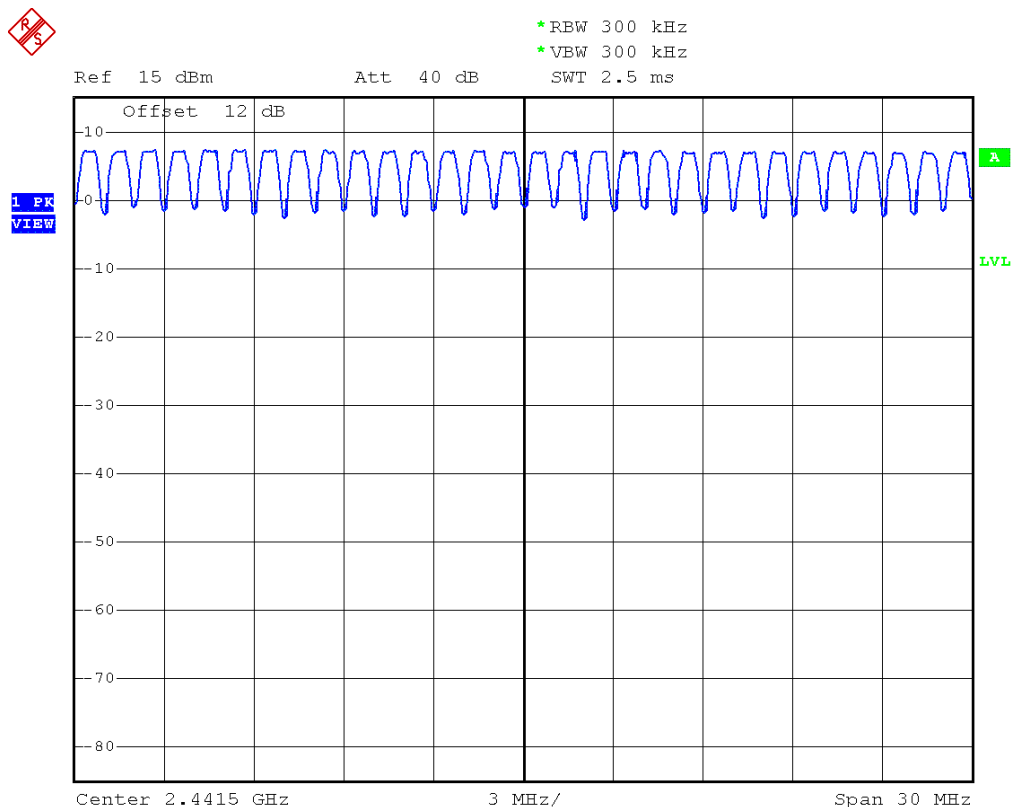
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Number of hopping frequencies - Range B

Number of Hopping Frequencies acc. to FCC 15.247

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
 EUT Name: Bluetooth, WLAN and BLE Module
 Model: TiWi-BLE
 Test Site: Eurofins Product Service GmbH
 Operator: Christian Weber
 Test Conditions: Tnom / Vnom
 Mode: Tx, DH5, hopping mode
 Test Date: 2015-01-26
 Verdict: NONE (INFORMATION ONLY)
 Note 1: Number of Hopping Frequencies (DA 00-705 Meas Guidance)
 Note 2: conducted measurement, channel 25-53



Comment: Number of hopping frequencies
 Date: 26.JAN.2015 09:43:09

Test Report No.: G0M-1410-4214-TFC247BT-V01

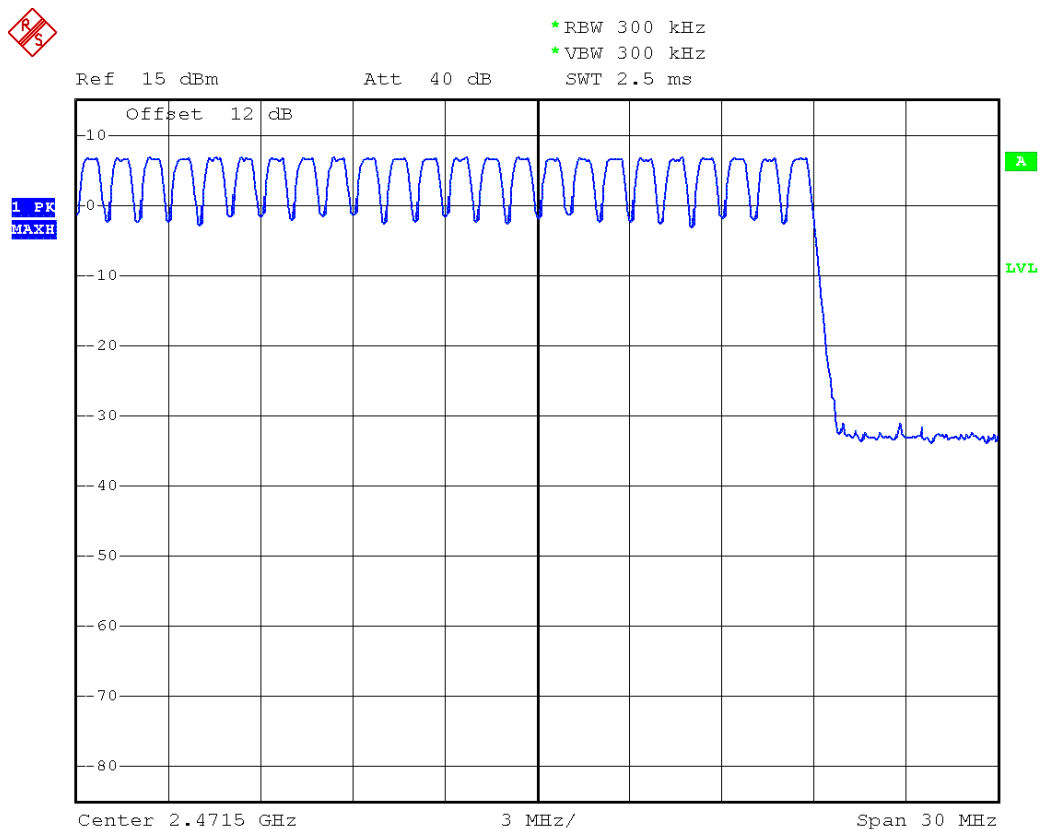
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Number of hopping frequencies - Range C

Number of Hopping Frequencies acc. to FCC 15.247

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
 EUT Name: Bluetooth, WLAN and BLE Module
 Model: TiWi-BLE
 Test Site: Eurofins Product Service GmbH
 Operator: Christian Weber
 Test Conditions: Tnom / Vnom
 Mode: Tx, DH5, hopping mode
 Test Date: 2015-01-26
 Verdict: NONE (INFORMATION ONLY)
 Note 1: Number of Hopping Frequencies (DA 00-705 Meas Guidance)
 Note 2: conducted measurement, channel 55-78



Date: 26.JAN.2015 14:44:11

Test Report No.: G0M-1410-4214-TFC247BT-V01

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

3.4 Test Conditions and Results – Frequency hopping channel separation

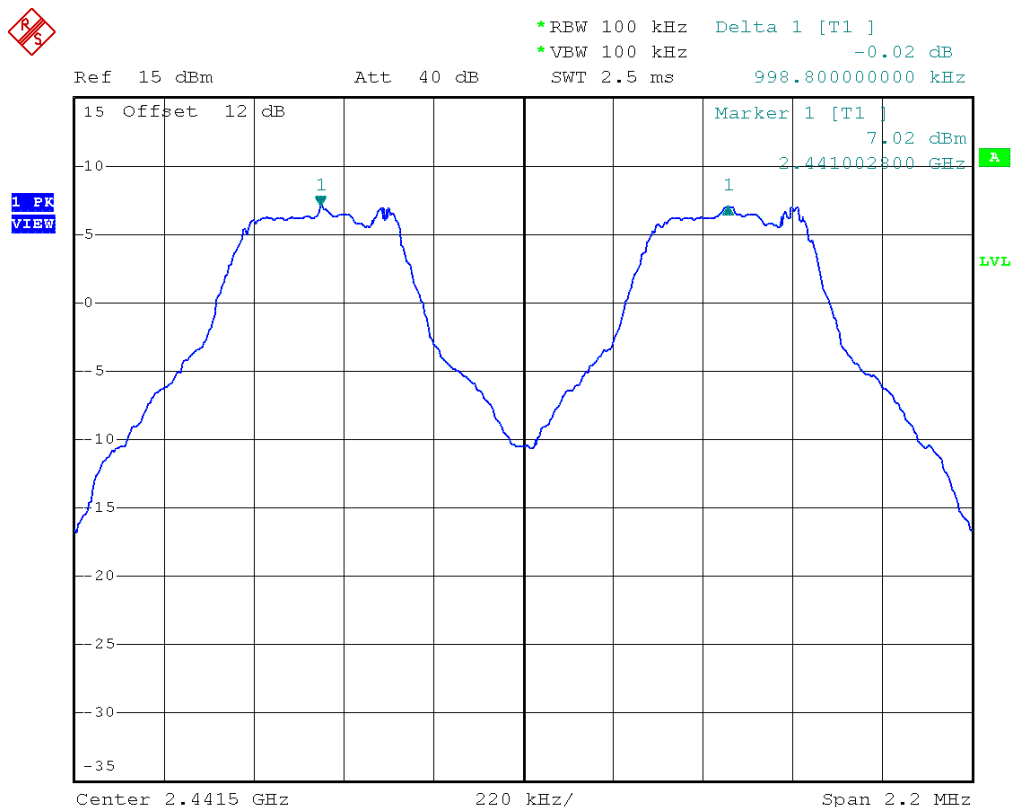
Frequency hopping channel separation acc. to FCC 15.247 / IC RSS-210		Verdict: PASS
EUT requirement rule parts and clause	Reference	
	FCC 15.247(a)(1) / IC RSS-210 A8.1	
Test according to measurement reference	Reference Method	
	FCC Public Notice DA 00-705	
Test frequency range	Tested frequencies	
	2441 & 2442 MHz	
EUT test mode	DH5-Hop	
Limits		
Limit	Condition	
≥ 25 kHz or ⅔ of 20 dB bandwidth	Output power ≤ 125 mW / 21 dBm	
≥ 25 kHz or 20 dB bandwidth	125 mW / 21 dBm < Output power ≤ 1 W / 30 dBm	
Test setup		
Spectrum Analyzer EUT		
Test procedure		
1. EUT set to test mode (Communication tester is used if needed) 2. Span set to measurement frequency range 3. Detector set to peak and max hold 4. Resolution bandwidth is set small enough to resolve hopping channel emission spectra 5. The two adjacent channel peaks are marked 6. Channel separation is determined from frequency separation of markers		
Test results		
Channel separation [kHz]	Limit [kHz]	Result
998.0	≥ ⅔ · 926.6 = 617.73	PASS
Comments:		

Frequency hopping channel separation

Carrier Frequency Separation acc. to FCC 15.247

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
EUT Name: Bluetooth, WLAN and BLE Module
Model: TiWi-BLE
Test Site: Eurofins Product Service GmbH
Operator: Christian Weber
Test Conditions: Tnom / Vnom
Mode: Tx, DH5, hopping mode
Test Date: 2015-01-26
Verdict: NONE (INFORMATION ONLY)
Note 1: Carrier Frequency Separation (DA 00-705 Meas Guidance)
Note 2: conducted measurement



Comment: Limit: > two-thirds of the 20 dB bandwidth ; Result: Pass
Date: 26.JAN.2015 10:08:14

Test Report No.: G0M-1410-4214-TFC247BT-V01

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

3.5 Test Conditions and Results – Time of occupancy (Dwell Time)

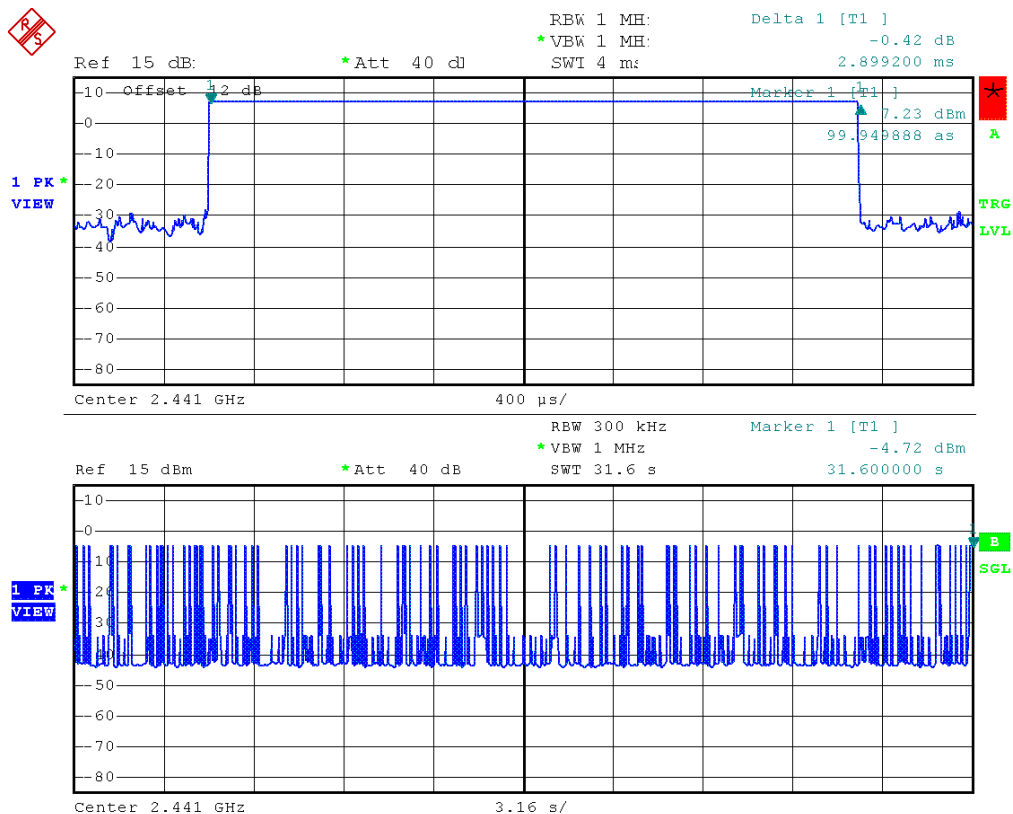
Time of occupancy (Dwell time) acc. to FCC 15.247 / IC RSS-210				Verdict: PASS	
EUT requirement rule parts and clause		Reference			
		FCC 15.247(a)(1)(iii) / IC RSS-210 A8.1			
Test according to measurement reference		Reference Method			
		FCC Public Notice DA 00-705			
Test frequency range		Tested frequencies			
		2441 MHz			
EUT test mode		DH5-Hop			
Limits					
Limit					
Time of occupancy ≤ 0.4 s within 0.4 s · Number of hopping channels					
Test setup					
Spectrum Analyzer EUT					
Test procedure					
1. EUT set to test mode (Communication tester is used if needed) 2. Center frequency set to test channel center frequency 3. Span set to zero span and detector to peak and max hold 4. Resolution bandwidth is set to 100kHz and sweep time to observation period 5. Time of occupancy determined from number of peaks multiplied by single hop dwell time					
Test results					
Observation period [s]	No. of hops	Dwell time/hop [s]	Time of occupancy [s]	Limit [s]	Result
31.6	91	0.0028992	93.9	≤ 0.4	PASS
Comments:					

Time of occupancy

Time of Occupancy acc. to FCC 15.247

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
 EUT Name: Bluetooth, WLAN and BLE Module
 Model: TiWi-BLE
 Test Site: Eurofins Product Service GmbH
 Operator: Christian Weber
 Test Conditions: Tnom / Vnom
 Mode: Tx, DH5, channel 2442MHz, hopping mode
 Test Date: 2015-01-26
 Verdict: NONE (INFORMATION ONLY)
 Note 1: 91 events * 2.8992 ms; Result: 93.9 ms Limit < 0.4 s
 Note 2: conducted measurement, (DA 00-705 Meas Guidance)



Comment: Burst length=2.8992 ms
 Date: 26.JAN.2015 10:05:20

Test Report No.: G0M-1410-4214-TFC247BT-V01

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

3.6 Test Conditions and Results – Maximum peak conducted power

Maximum peak conducted power acc. to FCC 15.247 / IC RSS-210		Verdict: PASS
EUT requirement rule parts and clause	Reference	
	FCC 15.247(b)(1) / IC RSS-210 A8.4	
Test according to measurement reference	Reference Method	
	FCC Public Notice DA 00-705	
Test frequency range	Tested frequencies	
	F _{LOW} / F _{MID} / F _{HIGH}	
Measurement mode	Peak	
Maximum antenna gain	2.2 dBi ⇒ Limit correction = 0 dB	
Limits		
Limit	Condition	
1 W (30 dBm)	Number of hopping channels ≥ 75	
0.125 W (21 dBm)	75 > Number of hopping channels ≥ 15	
The conducted output power limit specified above is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in the table, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.		
Test setup		
Spectrum Analyzer EUT		
Test procedure		
1. EUT set to test mode (Communication tester is used if needed) 2. Center frequency set to test channel center frequency 3. Span set to twice the 20 dB bandwidth and detector to peak and max hold 4. Resolution bandwidth is set to 3 MHz 5. Peak conducted power is determined from peak of spectrum envelope		

Test results								
Channel	Frequency [MHz]	Voltage	Mode	Peak power [dbm]	Peak power [W]	Limit [dBm]	Margin [dB]	Result
F _{LOW}	2402	3.6 VDC	DH5-Sngl	7.5	0.01	30	-22.50	PASS
F _{MID}	2441	3.6 VDC	DH5-Sngl	7.2	0.01	30	-22.80	PASS
F _{HIGH}	2480	3.6 VDC	DH5-Sngl	7.0	0.01	30	-23.00	PASS
F _{LOW}	2402	3.6 VDC	2DH5-Sngl	7.7	0.01	30	-22.30	PASS
F _{MID}	2441	3.6 VDC	2DH5-Sngl	7.4	0.01	30	-22.60	PASS
F _{HIGH}	2480	3.6 VDC	2DH5-Sngl	7.3	0.01	30	-22.70	PASS
F _{LOW}	2402	3.6 VDC	3DH5-Sngl	8.2	0.01	30	-21.80	PASS
F _{MID}	2441	3.6 VDC	3DH5-Sngl	7.9	0.01	30	-22.10	PASS
F _{HIGH}	2480	3.6 VDC	3DH5-Sngl	7.8	0.01	30	-22.20	PASS
Comments:								

3.7 Test Conditions and Results – AC power line conducted emissions

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

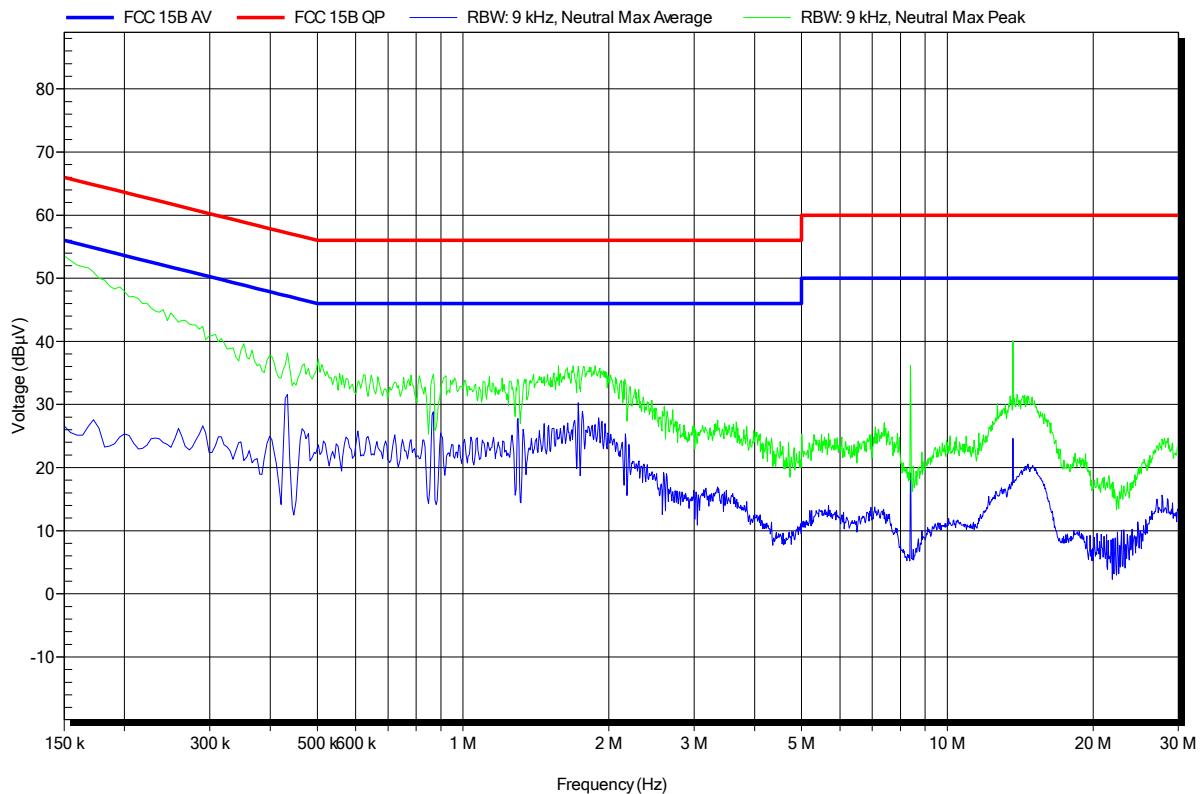
Conducted Emissions

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

Project number: G0M-1410-4214

Manufacturer: Leica Geosystems AG
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Klein
 Test Conditions: Tnom: 23°C, Unom: 3.6VDC via AC/DC-adaptor
 LISN: ESH2-Z5 N
 Mode: constant TX
 Test Date: 2015-03-17
 Note:

Index 2

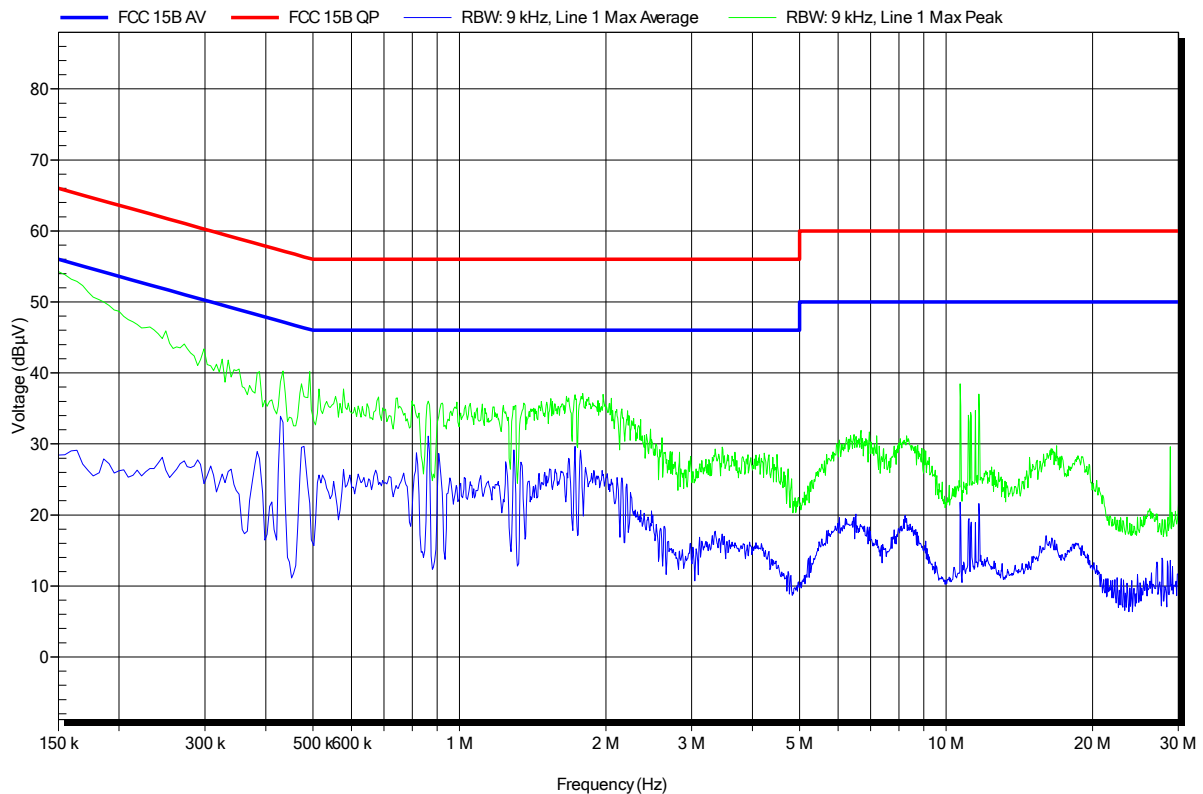


Conducted Emissions
EMI voltage test in the ac-mains according to FCC 15B

Project number: G0M-1410-4214

Manufacturer: Leica Geosystems AG
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Klein
 Test Conditions: Tnom: 23°C, Unom: 3.6VDC via AC/DC-adaptor
 LISN: ESH2-Z5 L
 Mode: constant TX
 Test Date: 2015-03-17
 Note:

Index 1



3.8 Test Conditions and Results – Band edge compliance

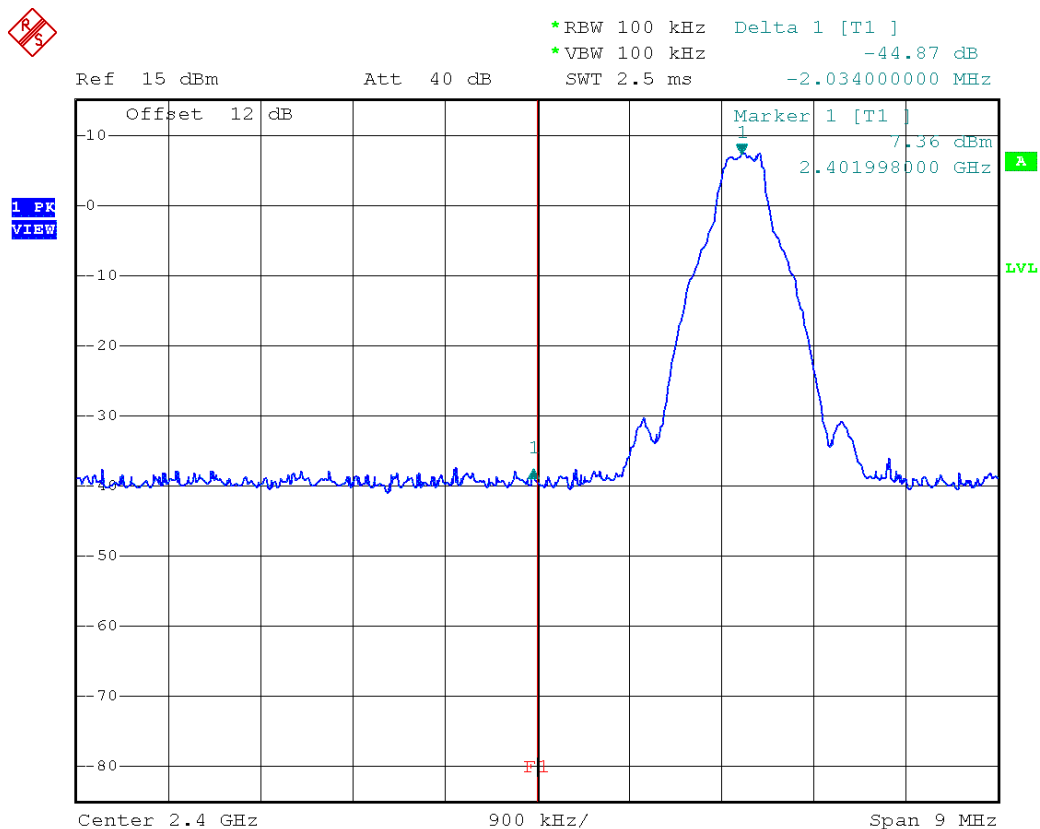
Band-edge compliance acc. to FCC 15.247 / IC RSS-210					Verdict: PASS	
EUT requirement rule parts and clause		Reference				
		FCC 15.247(d) / IC RSS-210 A8.5				
Test according to measurement reference		Reference Method				
		FCC Public Notice DA 00-705				
Test frequency range		Tested frequencies				
		F _{LOW} / F _{HIGH}				
Measurement mode		Peak				
Limits						
Limit			Condition			
≤ -20 dB/100 kHz			Peak power measurement detector = Peak			
≤ -30 dB/100 kHz			Peak power measurement detector = RMS			
Test setup						
Spectrum Analyzer EUT						
Test procedure						
1. EUT set to test mode (Communication tester is used if needed) 2. Span set around lower band edge and detector is set to peak and max hold 3. Resolution bandwidth is set to 100 kHz 4. Markers are set to peak emission levels within frequency band and outside frequency band 5. Band edge attenuation is determined from level difference						
Test results						
Channel	Frequency [MHz]	Mode	Level [dBc]	Limit [dBc]	Margin [dB]	Result
F _{LOW}	2402	DH5-Sngl	-44.87	-20	-24.87	PASS
F _{HIGH}	2480	DH5-Sngl	-44.73	-20	-24.73	PASS
F _{LOW}	2402	DH5-Hop	-43.80	-20	-23.80	PASS
F _{HIGH}	2480	DH5-Hop	-42.62	-20	-22.62	PASS
F _{LOW}	2402	2DH5-Sngl	-42.58	-20	-22.58	PASS
F _{HIGH}	2480	2DH5-Sngl	-40.54	-20	-20.54	PASS
F _{LOW}	2402	2DH5-Hop	-42.04	-20	-22.04	PASS
F _{HIGH}	2480	2DH5-Hop	-41.41	-20	-21.41	PASS

F _{LOW}	2402	3DH5-Sngl	-42.70	-20	-22.70	PASS
F _{HIGH}	2480	3DH5-Sngl	-41.36	-20	-21.36	PASS
F _{LOW}	2402	3DH5-Hop	-40.90	-20	-20.90	PASS
F _{HIGH}	2480	3DH5-Hop	-39.80	-20	-19.80	PASS
Comments:						

Band-edge compliance – DH5-Sngl F_{Low}
Band-edge compliance acc. to FCC 15.247

Project Number: GOM-1410-4214

Applicant: Leica Geosystems AG
 EUT Name: Bluetooth, WLAN and BLE Module
 Model: TiWi-BLE
 Test Site: Eurofins Product Service GmbH
 Operator: Christian Weber
 Test Conditions: Tnom / Vnom
 Mode: Tx, DH5, 2402 MHz, single frequency
 Test Date: 2015-01-26
 Verdict: NONE (INFORMATION ONLY)
 Note 1: 20 dB down method (DA 00-705 Meas Guidance)
 Note 2: lower Band-edge, conducted measurement



Date: 26.JAN.2015 10:20:39

Test Report No.: GOM-1410-4214-TFC247BT-V01

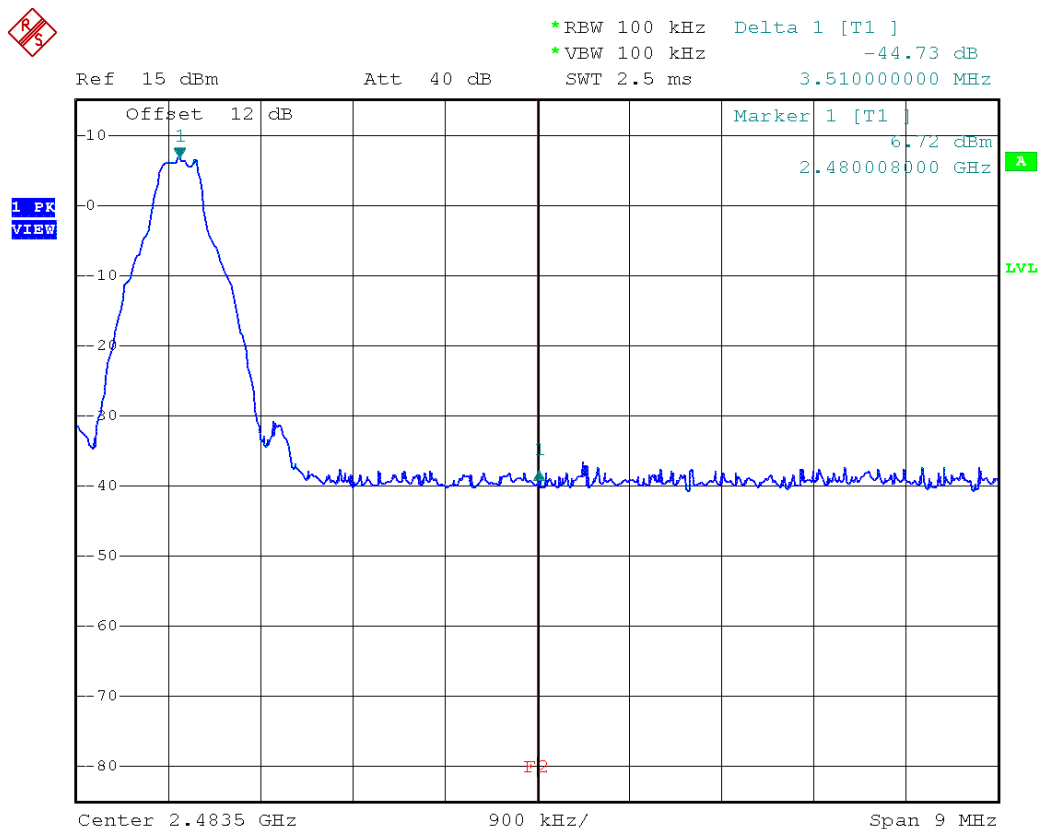
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Band-edge compliance – DH5-Sngl F_{HIGH}

Band-edge compliance acc. to FCC 15.247

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
EUT Name: Bluetooth, WLAN and BLE Module
Model: TiWi-BLE
Test Site: Eurofins Product Service GmbH
Operator: Christian Weber
Test Conditions: Tnom / Vnom
Mode: Tx, DH5, 2480 MHz, single frequency
Test Date: 2015-01-26
Verdict: NONE (INFORMATION ONLY)
Note 1: 20 dB down method (DA 00-705 Meas Guidance)
Note 2: upper Band-edge, conducted measurement



Date: 26.JAN.2015 10:22:28

Test Report No.: G0M-1410-4214-TFC247BT-V01

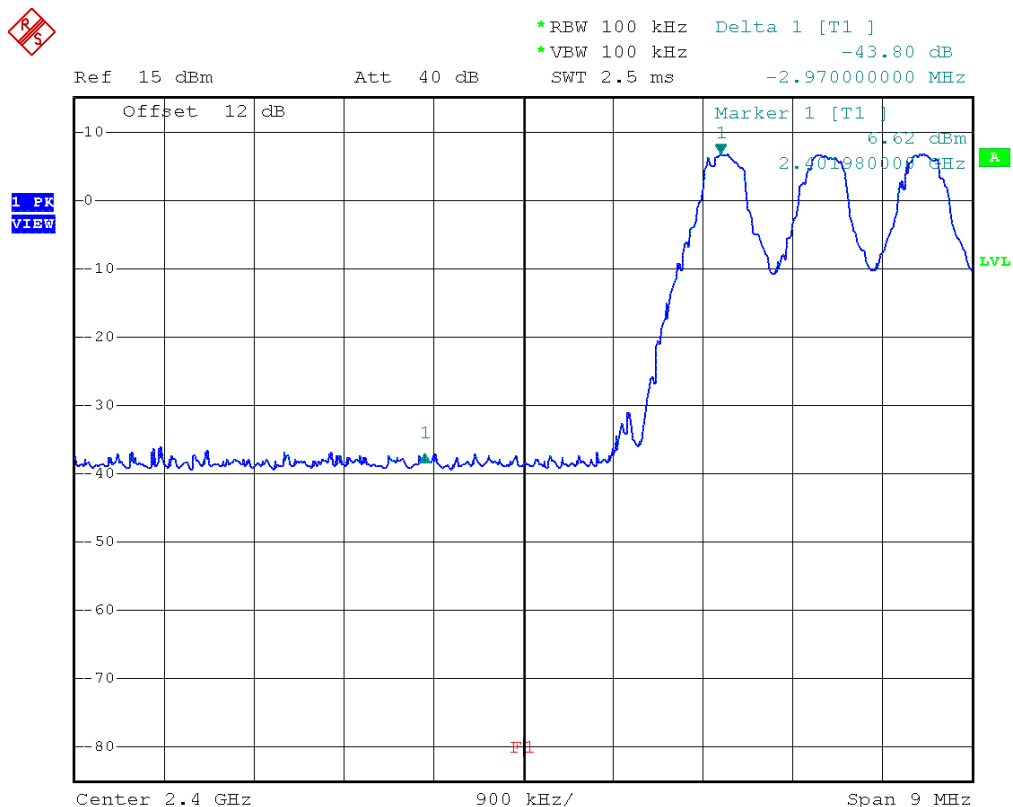
Eurofins Product Service GmbH
Storkower Str. 38c, D-15526 Reichenwalde, Germany

Band-edge compliance – DH5-Hop F_{LOW}

Band-edge compliance acc. to FCC 15.247

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
EUT Name: Bluetooth, WLAN and BLE Module
Model: TiWi-BLE
Test Site: Eurofins Product Service GmbH
Operator: Christian Weber
Test Conditions: Tnom / Vnom
Mode: Tx, DH5, hopping mode
Test Date: 2015-01-26
Verdict: NONE (INFORMATION ONLY)
Note 1: 20 dB down method (DA 00-705 Meas Guidance)
Note 2: lower Band-edge, conducted measurement



Comment: Limit: Marker Delta value >20 dB; Result: PASS
Date: 26.JAN.2015 10:33:32

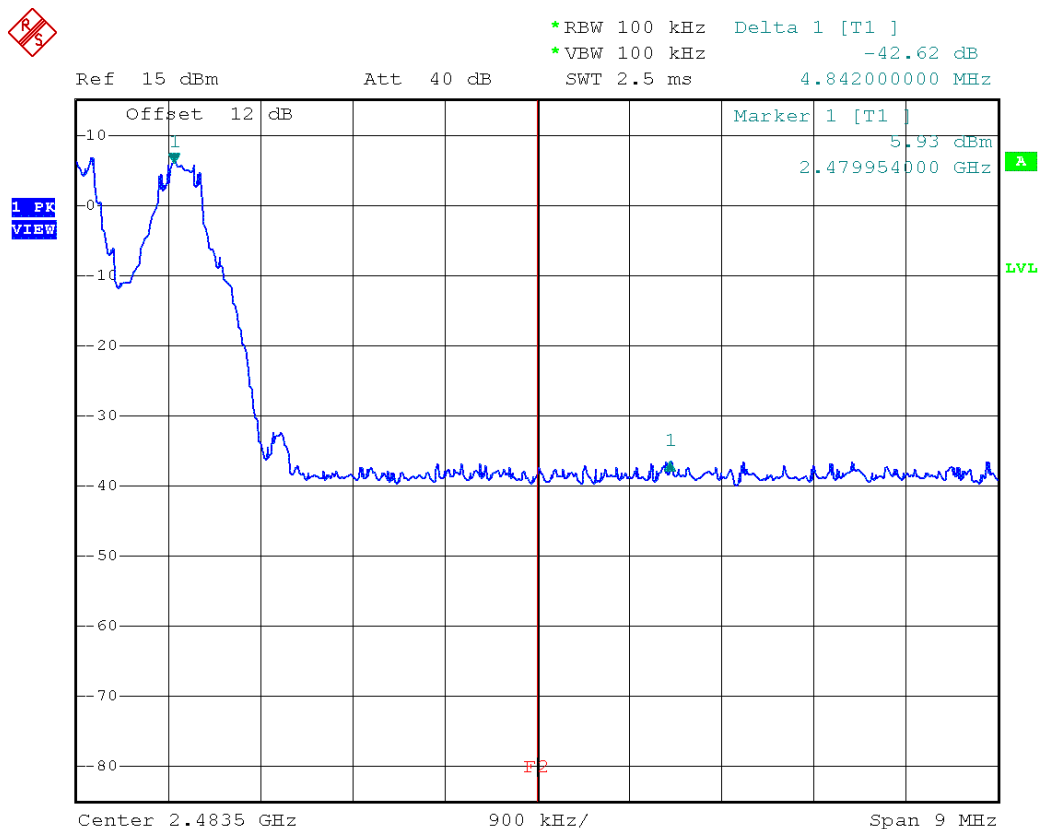
Test Report No.: G0M-1410-4214-TFC247BT-V01

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

Band-edge compliance – DH5-Hop F_{HIGH}
Band-edge compliance acc. to FCC 15.247

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
 EUT Name: Bluetooth, WLAN and BLE Module
 Model: TiWi-BLE
 Test Site: Eurofins Product Service GmbH
 Operator: Christian Weber
 Test Conditions: Tnom / Vnom
 Mode: Tx, DH5, hopping mode
 Test Date: 2015-01-26
 Verdict: NONE (INFORMATION ONLY)
 Note 1: 20 dB down method (DA 00-705 Meas Guidance)
 Note 2: upper Band-edge, conducted measurement



Date: 26.JAN.2015 10:35:24

Test Report No.: G0M-1410-4214-TFC247BT-V01

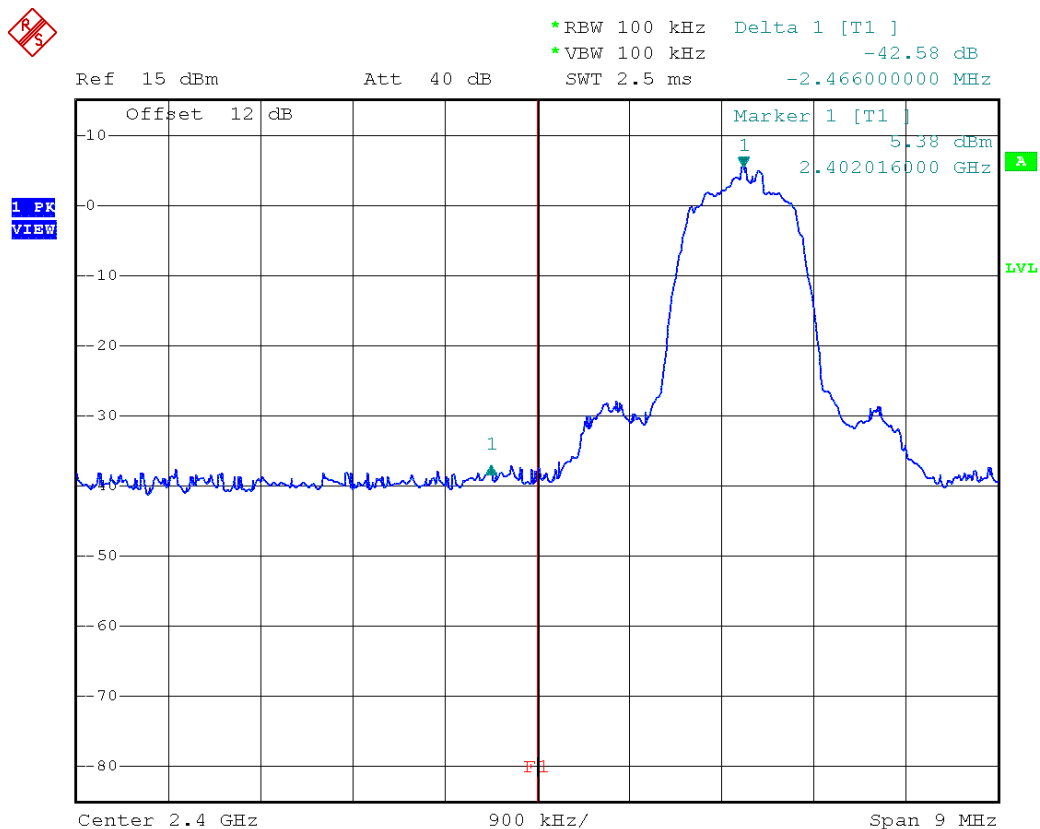
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Band-edge compliance – 2-DH5-Sngl F_{LOW}

Band-edge compliance acc. to FCC 15.247

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
 EUT Name: Bluetooth, WLAN and BLE Module
 Model: TiWi-BLE
 Test Site: Eurofins Product Service GmbH
 Operator: Christian Weber
 Test Conditions: Tnom / Vnom
 Mode: Tx, 2-DH5, 2402 MHz, single frequency
 Test Date: 2015-01-26
 Verdict: NONE (INFORMATION ONLY)
 Note 1: 20 dB down method (DA 00-705 Meas Guidance)
 Note 2: lower Band-edge, conducted measurement



Date: 26.JAN.2015 10:24:19

Test Report No.: G0M-1410-4214-TFC247BT-V01

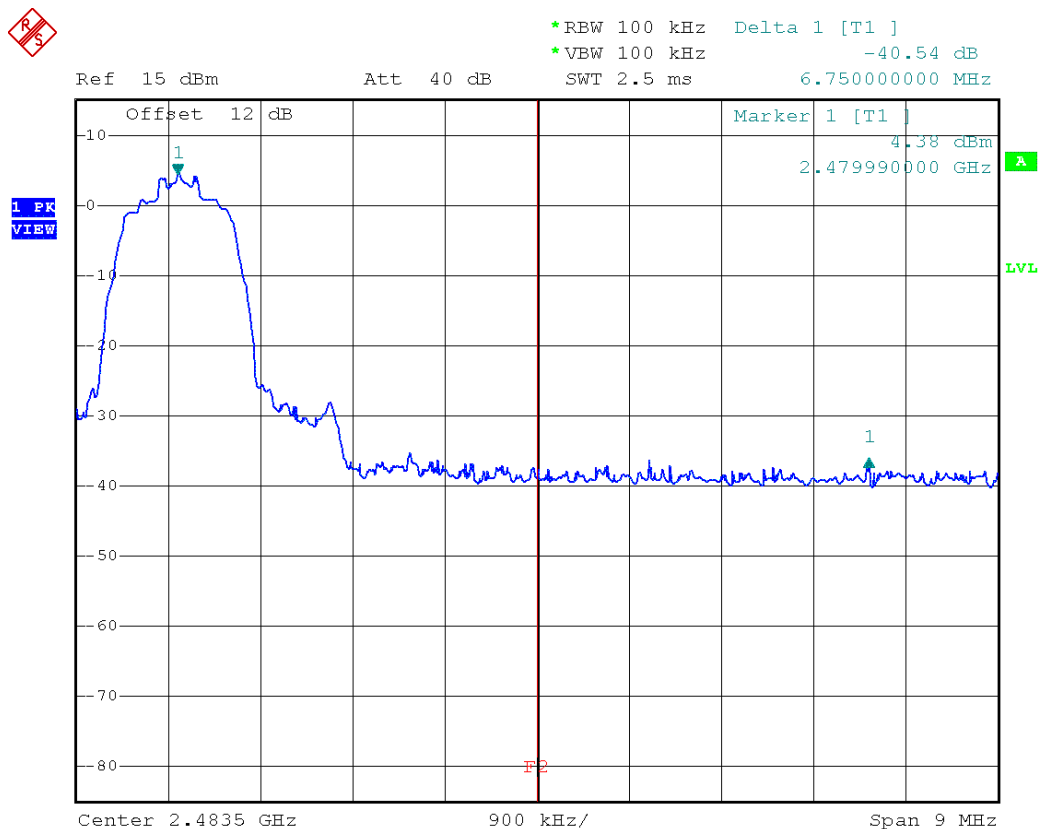
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Band-edge compliance – 2-DH5-Sngl F_{HIGH}

Band-edge compliance acc. to FCC 15.247

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
 EUT Name: Bluetooth, WLAN and BLE Module
 Model: TiWi-BLE
 Test Site: Eurofins Product Service GmbH
 Operator: Christian Weber
 Test Conditions: Tnom / Vnom
 Mode: Tx, 2-DH5, 2480 MHz, single frequency
 Test Date: 2015-01-26
 Verdict: NONE (INFORMATION ONLY)
 Note 1: 20 dB down method (DA 00-705 Meas Guidance)
 Note 2: upper Band-edge, conducted measurement



Date: 26.JAN.2015 10:26:04

Test Report No.: G0M-1410-4214-TFC247BT-V01

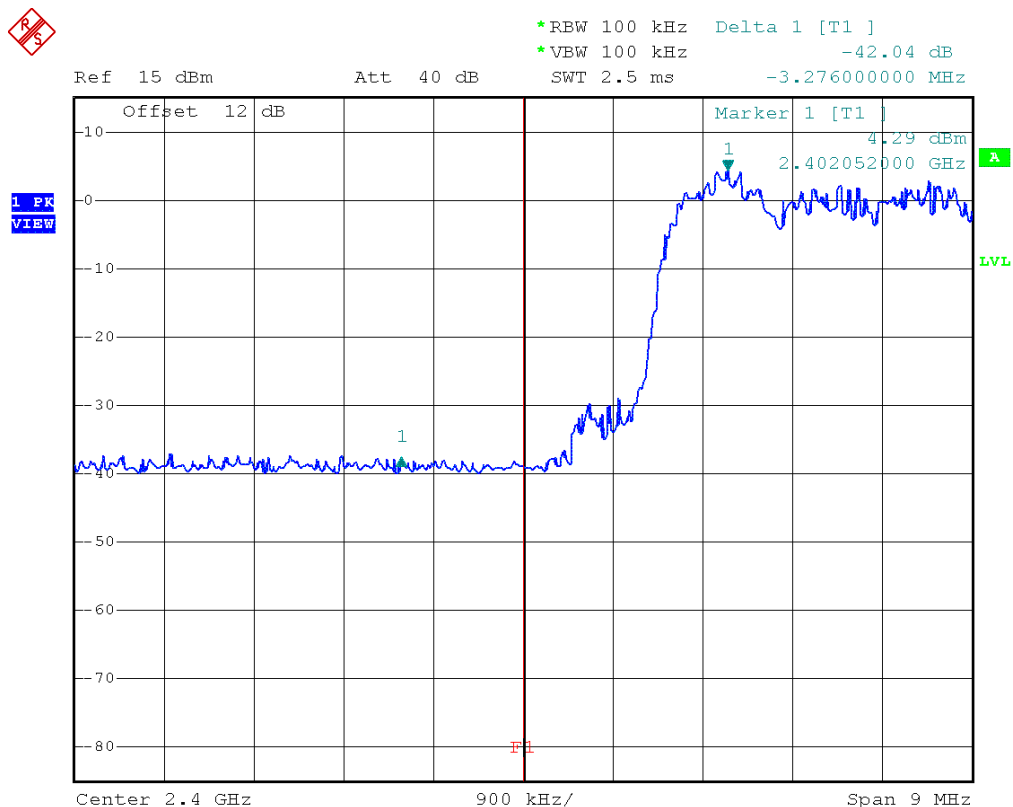
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Band-edge compliance – 2-DH5-Hop F_{LOW}

Band-edge compliance acc. to FCC 15.247

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
EUT Name: Bluetooth, WLAN and BLE Module
Model: TiWi-BLE
Test Site: Eurofins Product Service GmbH
Operator: Christian Weber
Test Conditions: Tnom / Vnom
Mode: Tx, 2-DH5, hopping mode
Test Date: 2015-01-26
Verdict: NONE (INFORMATION ONLY)
Note 1: 20 dB down method (DA 00-705 Meas Guidance)
Note 2: lower Band-edge, conducted measurement



Comment: Limit: Marker Delta value >20 dB; Result: PASS
Date: 26.JAN.2015 10:46:42

Test Report No.: G0M-1410-4214-TFC247BT-V01

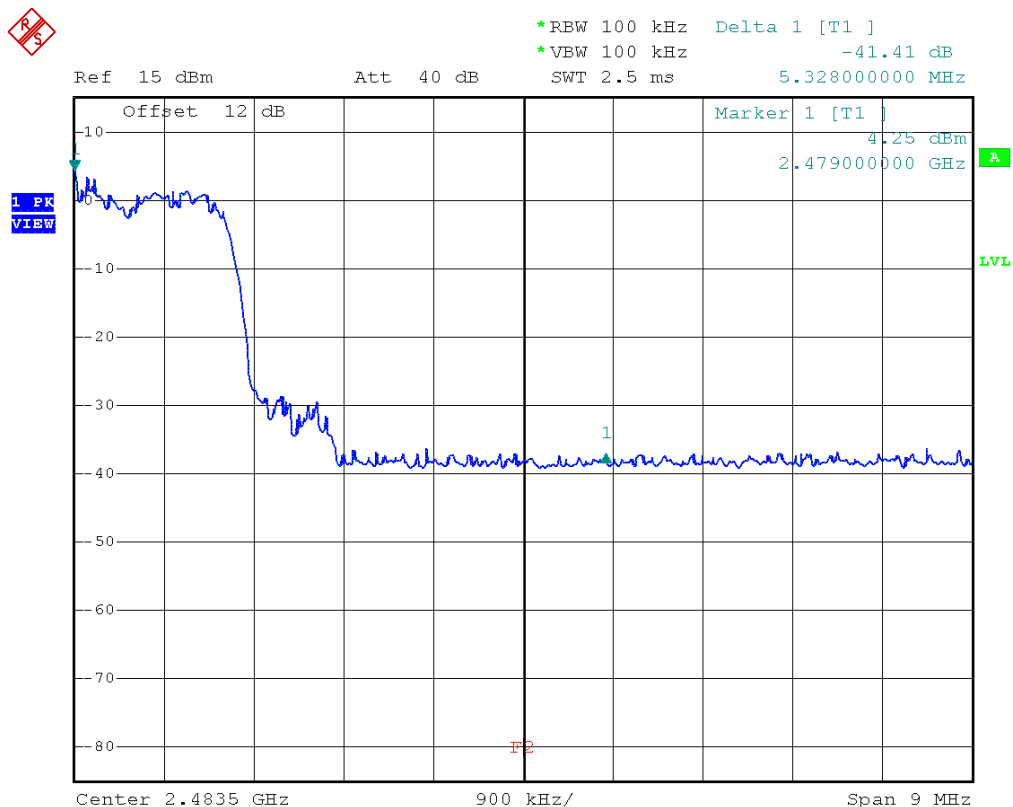
Eurofins Product Service GmbH
Storkower Str. 38c, D-15526 Reichenwalde, Germany

Band-edge compliance – 2-DH5-Hop F_{HIGH}

Band-edge compliance acc. to FCC 15.247

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
EUT Name: Bluetooth, WLAN and BLE Module
Model: TiWi-BLE
Test Site: Eurofins Product Service GmbH
Operator: Christian Weber
Test Conditions: Tnom / Vnom
Mode: Tx, 2-DH5, hopping mode
Test Date: 2015-01-26
Verdict: NONE (INFORMATION ONLY)
Note 1: 20 dB down method (DA 00-705 Meas Guidance)
Note 2: upper Band-edge, conducted measurement



Comment: Limit: Marker Delta value >20 dB; Result: PASS
Date: 26.JAN.2015 10:49:00

Test Report No.: G0M-1410-4214-TFC247BT-V01

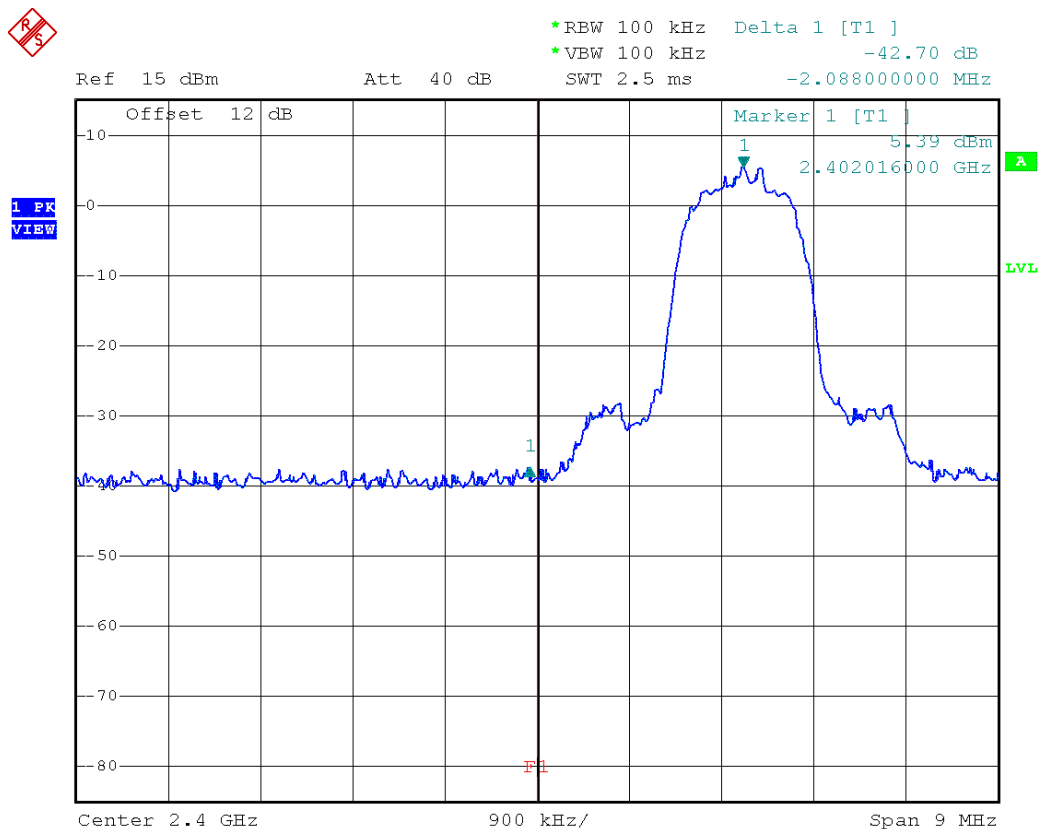
Eurofins Product Service GmbH
Storkower Str. 38c, D-15526 Reichenwalde, Germany

Band-edge compliance – 3-DH5-Sngl F_{LOW}

Band-edge compliance acc. to FCC 15.247

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
 EUT Name: Bluetooth, WLAN and BLE Module
 Model: TiWi-BLE
 Test Site: Eurofins Product Service GmbH
 Operator: Christian Weber
 Test Conditions: Tnom / Vnom
 Mode: Tx, 3-DH5, 2402 MHz, single frequency
 Test Date: 2015-01-26
 Verdict: NONE (INFORMATION ONLY)
 Note 1: 20 dB down method (DA 00-705 Meas Guidance)
 Note 2: lower Band-edge, conducted measurement

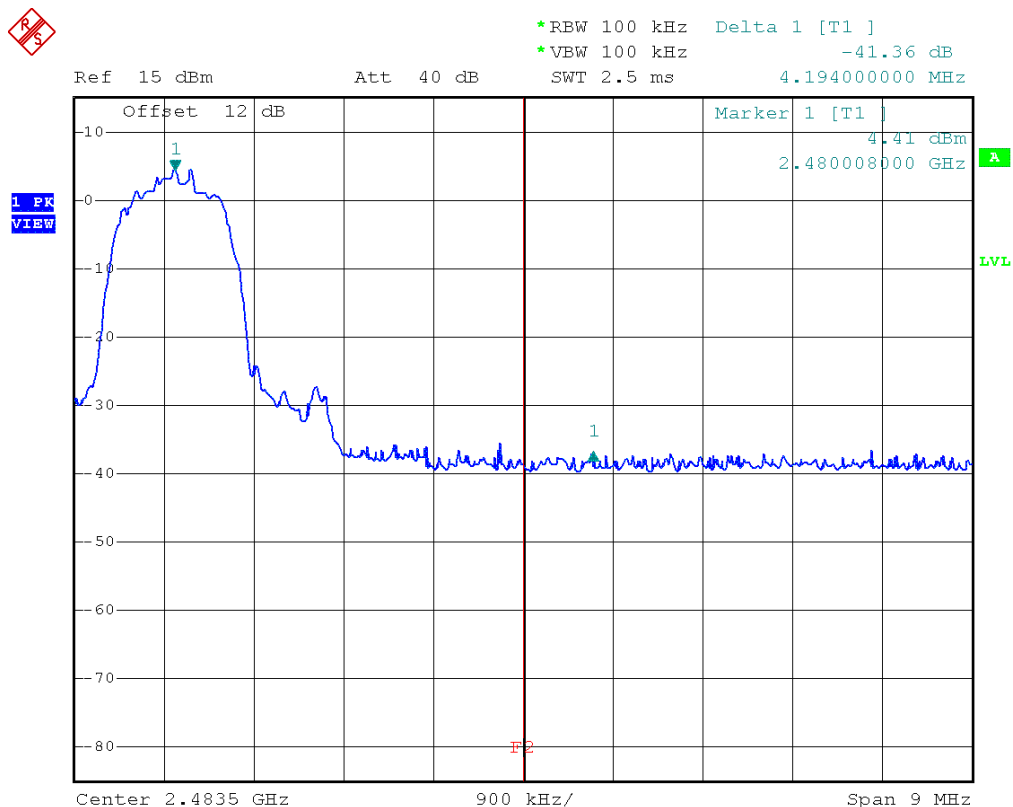


Band-edge compliance – 3-DH5-Sngl F_{HIGH}

Band-edge compliance acc. to FCC 15.247

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
EUT Name: Bluetooth, WLAN and BLE Module
Model: TiWi-BLE
Test Site: Eurofins Product Service GmbH
Operator: Christian Weber
Test Conditions: Tnom / Vnom
Mode: Tx, 3-DH5, 2480 MHz, single frequency
Test Date: 2015-01-26
Verdict: NONE (INFORMATION ONLY)
Note 1: 20 dB down method (DA 00-705 Meas Guidance)
Note 2: upper Band-edge, conducted measurement



Comment: Limit: Marker Delta value >20 dB; Result: PASS
Date: 26.JAN.2015 10:30:15

Test Report No.: G0M-1410-4214-TFC247BT-V01

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

Band-edge compliance – 3-DH5-Hop F_{LOW}

Band-edge compliance acc. to FCC 15.247

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
 EUT Name: Bluetooth, WLAN and BLE Module
 Model: TiWi-BLE
 Test Site: Eurofins Product Service GmbH
 Operator: Christian Weber
 Test Conditions: Tnom / Vnom
 Mode: Tx, 3-DH5, hopping mode
 Test Date: 2015-01-26
 Verdict: NONE (INFORMATION ONLY)
 Note 1: 20 dB down method (DA 00-705 Meas Guidance)
 Note 2: lower Band-edge, conducted measurement



Date: 26.JAN.2015 10:51:33

Test Report No.: G0M-1410-4214-TFC247BT-V01

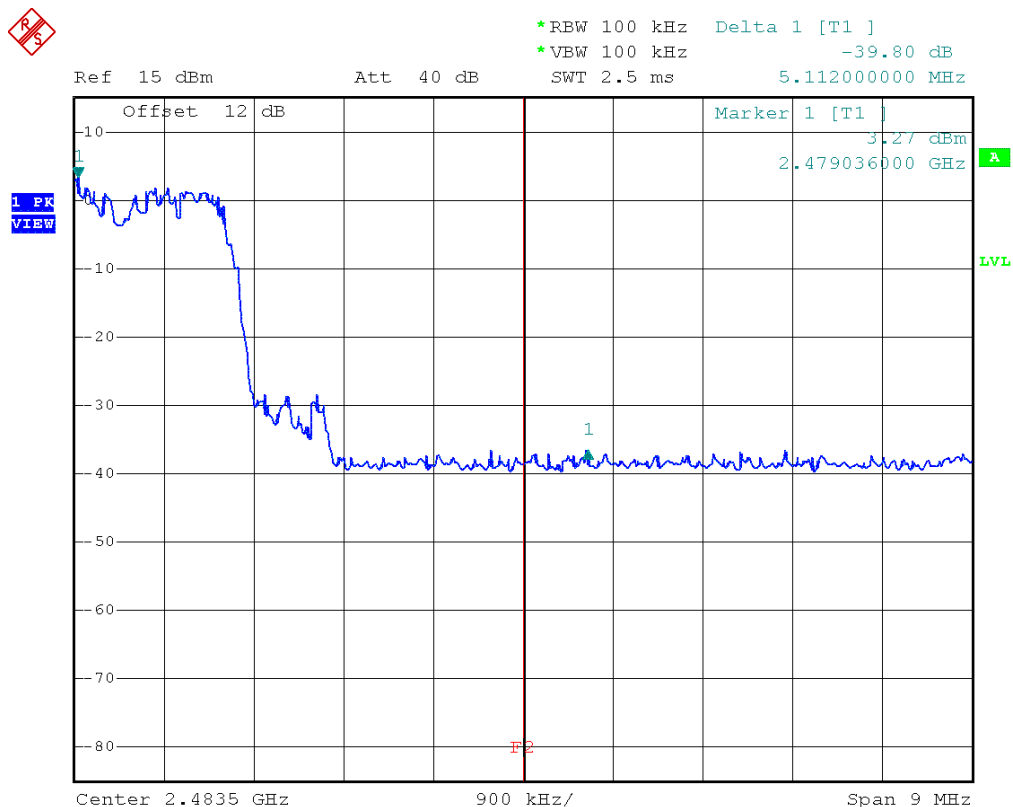
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Band-edge compliance – 3-DH5-Hop F_{HIGH}

Band-edge compliance acc. to FCC 15.247

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
 EUT Name: Bluetooth, WLAN and BLE Module
 Model: TiWi-BLE
 Test Site: Eurofins Product Service GmbH
 Operator: Christian Weber
 Test Conditions: Tnom / Vnom
 Mode: Tx, 3-DH5, hopping mode
 Test Date: 2015-01-26
 Verdict: NONE (INFORMATION ONLY)
 Note 1: 20 dB down method (DA 00-705 Meas Guidance)
 Note 2: upper Band-edge, conducted measurement



Comment: Limit: Marker Delta value >20 dB; Result: PASS
 Date: 26.JAN.2015 10:53:27

Test Report No.: G0M-1410-4214-TFC247BT-V01

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

3.9 Test Conditions and Results – Conducted spurious emissions

Conducted spurious emissions acc. to FCC 15.247 / IC RSS-210							Verdict: PASS	
EUT requirement rule parts and clause			Reference					
			FCC 15.247(d) / IC RSS-210 A8.5					
Test according to measurement reference			Reference Method					
			FCC Public Notice DA 00-705					
Test frequency range			Tested frequencies					
			10 MHz – 10 th 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								
Spectrum Analyzer EUT								
Test procedure								
1. EUT set to test mode (Communication tester is used if needed) 2. Span it set according to measurement range 3. Resolution bandwidth is set to 100 kHz and detector to peak and max hold 4. Markers are set to peak emission levels within frequency band 5. Emission level is determined by second marker on emission peak 6. Attenuation is determined from level difference								
Test results								
Channel	Frequency [MHz]	Mode	Emission [MHz]	Emission Level [dbm]	Peak power [dBm]	Limit [dBm]	Margin [dB]	Result
F _{LOW}	2402	DH5-Sngl	4805	-40.32	6.6	-13.4	-26.92	PASS
F _{MID}	2441	DH5-Sngl	4889	-40.08	6.3	-13.7	-26.38	PASS
F _{HIGH}	2480	DH5-Sngl	4959	-40.33	6.2	-13.8	-26.53	PASS
F _{LOW}	2402	2DH5-Sngl	2303	-39.40	2.5	-17.5	-21.90	PASS
F _{MID}	2441	2DH5-Sngl	2303	-39.91	1.5	-18.5	-21.41	PASS
F _{HIGH}	2480	2DH5-Sngl	2303	-41.17	3.8	-16.2	-24.97	PASS
F _{LOW}	2402	3DH5-Sngl	4358	-42.86	3.0	-17.0	-25.86	PASS
F _{MID}	2441	3DH5-Sngl	2303	-39.88	2.6	-17.4	-22.48	PASS
F _{HIGH}	2480	3DH5-Sngl	4959	-41.35	1.8	-18.2	-23.15	PASS
Comments:								

Test Report No.: G0M-1410-4214-TFC247BT-V01

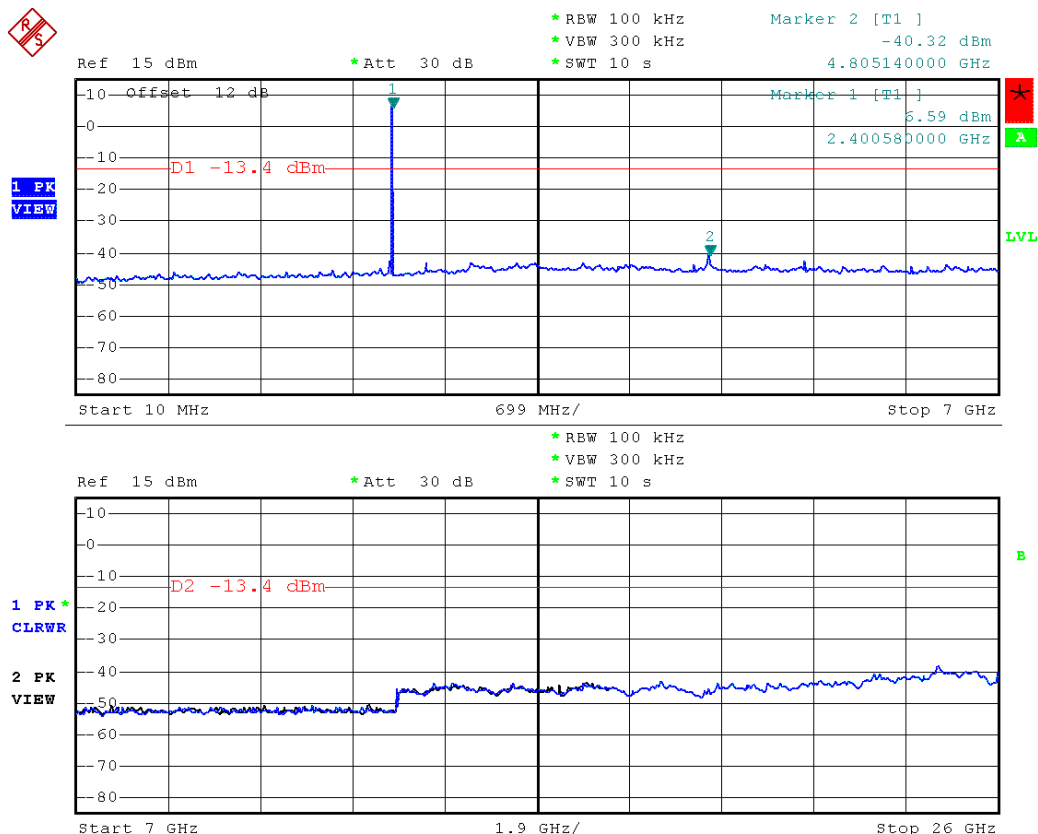
Eurofins Product Service GmbH
Storkower Str. 38c, D-15526 Reichenwalde, Germany

Conducted spurious emissions – DH5-Sngl F_{Low}

Spurious Emissions acc. to FCC 15.247

Project Number: GOM-1410-4214

Applicant: Leica Geosystems AG
 EUT Name: Bluetooth, WLAN and BLE Module
 Model: TiWi-BLE
 Test Site: Eurofins Product Service GmbH
 Operator: Christian Weber
 Test Conditions: Tnom / Vnom
 Mode: Tx, BT, DH5 2402 MHz, modulated
 Test Date: 2015-01-26
 Verdict: NONE (INFORMATION ONLY)
 Note 1: Spurious in non-restricted frequency bands (DA 00-705 Meas Guidance)
 Note 2: conducted measurement



Date: 26.JAN.2015 10:57:13

Test Report No.: GOM-1410-4214-TFC247BT-V01

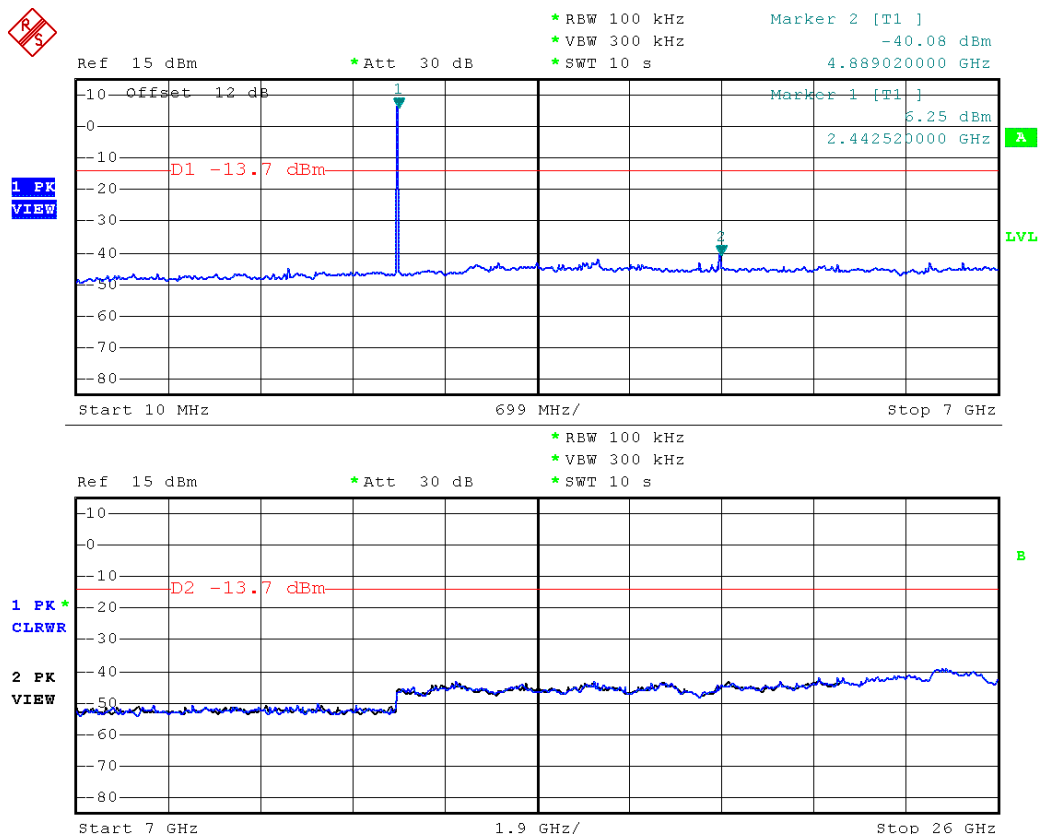
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Conducted spurious emissions – DH5-Sngl F_{MID}

Spurious Emissions acc. to FCC 15.247

Project Number: GOM-1410-4214

Applicant: Leica Geosystems AG
 EUT Name: Bluetooth, WLAN and BLE Module
 Model: TiWi-BLE
 Test Site: Eurofins Product Service GmbH
 Operator: Christian Weber
 Test Conditions: Tnom / Vnom
 Mode: Tx, BT, DH5 2441 MHz, modulated
 Test Date: 2015-01-26
 Verdict: NONE (INFORMATION ONLY)
 Note 1: Spurious in non-restricted frequency bands (DA 00-705 Meas Guidance)
 Note 2: conducted measurement



Date: 26.JAN.2015 10:59:47

Test Report No.: GOM-1410-4214-TFC247BT-V01

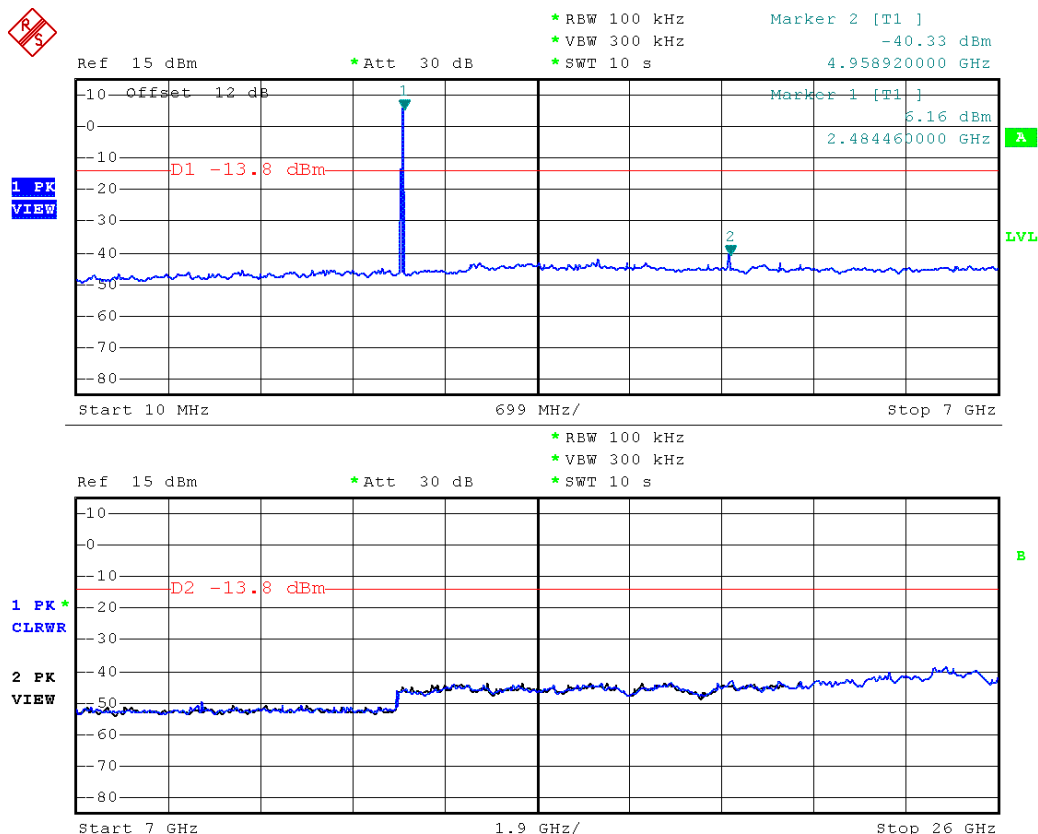
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Conducted spurious emissions – DH5-Sngl F_{HIGH}

Spurious Emissions acc. to FCC 15.247

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
 EUT Name: Bluetooth, WLAN and BLE Module
 Model: TiWi-BLE
 Test Site: Eurofins Product Service GmbH
 Operator: Christian Weber
 Test Conditions: Tnom / Vnom
 Mode: Tx, BT, DH5 2480 MHz, modulated
 Test Date: 2015-01-26
 Verdict: NONE (INFORMATION ONLY)
 Note 1: Spurious in non-restricted frequency bands (DA 00-705 Meas Guidance)
 Note 2: conducted measurement



Date: 26.JAN.2015 11:01:53

Test Report No.: G0M-1410-4214-TFC247BT-V01

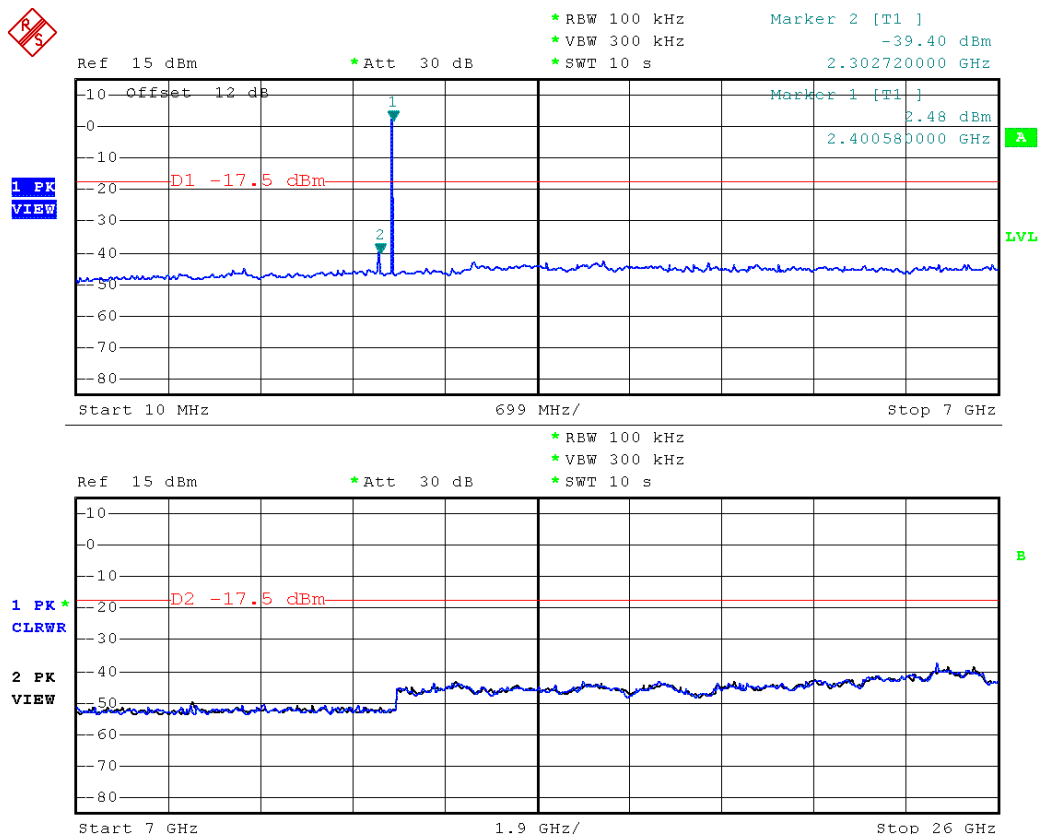
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Conducted spurious emissions – 2-DH5-Sngl F_{Low}

Spurious Emissions acc. to FCC 15.247

Project Number: GOM-1410-4214

Applicant: Leica Geosystems AG
 EUT Name: Bluetooth, WLAN and BLE Module
 Model: TiWi-BLE
 Test Site: Eurofins Product Service GmbH
 Operator: Christian Weber
 Test Conditions: Tnom / Vnom
 Mode: Tx, BT, 2-DH5 2402 MHz, modulated
 Test Date: 2015-01-26
 Verdict: NONE (INFORMATION ONLY)
 Note 1: Spurious in non-restricted frequency bands (DA 00-705 Meas Guidance)
 Note 2: conducted measurement



Date: 26.JAN.2015 11:04:29

Test Report No.: GOM-1410-4214-TFC247BT-V01

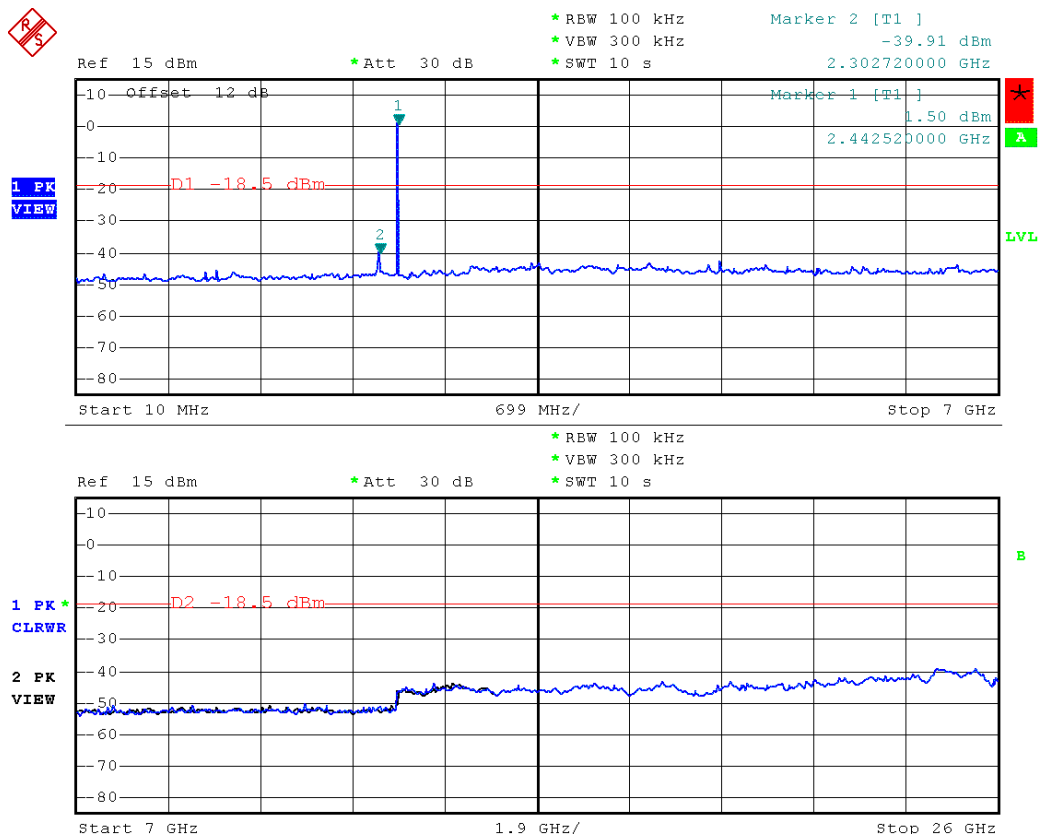
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Conducted spurious emissions – 2-DH5-Sngl F_{MD}

Spurious Emissions acc. to FCC 15.247

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
 EUT Name: Bluetooth, WLAN and BLE Module
 Model: TiWi-BLE
 Test Site: Eurofins Product Service GmbH
 Operator: Christian Weber
 Test Conditions: Tnom / Vnom
 Mode: Tx, BT, 2-DH5 2441 MHz, modulated
 Test Date: 2015-01-26
 Verdict: NONE (INFORMATION ONLY)
 Note 1: Spurious in non-restricted frequency bands (DA 00-705 Meas Guidance)
 Note 2: conducted measurement

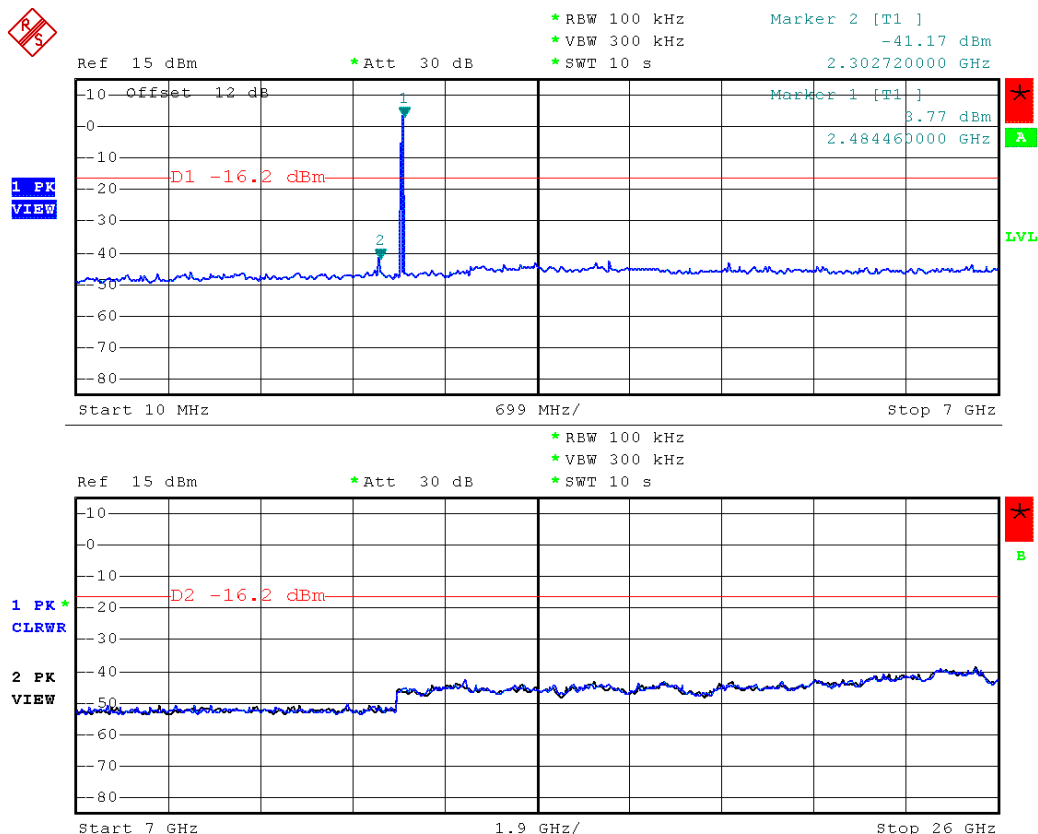


Conducted spurious emissions – 2-DH5-Sngl F_{HIGH}

Spurious Emissions acc. to FCC 15.247

Project Number: G0M-1410-4214

Applicant: Leica Geosystems AG
 EUT Name: Bluetooth, WLAN and BLE Module
 Model: TiWi-BLE
 Test Site: Eurofins Product Service GmbH
 Operator: Christian Weber
 Test Conditions: Tnom / Vnom
 Mode: Tx, BT, 2-DH5 2480 MHz, modulated
 Test Date: 2015-01-26
 Verdict: NONE (INFORMATION ONLY)
 Note 1: Spurious in non-restricted frequency bands (DA 00-705 Meas Guidance)
 Note 2: conducted measurement



Date: 26.JAN.2015 11:11:26

Test Report No.: G0M-1410-4214-TFC247BT-V01

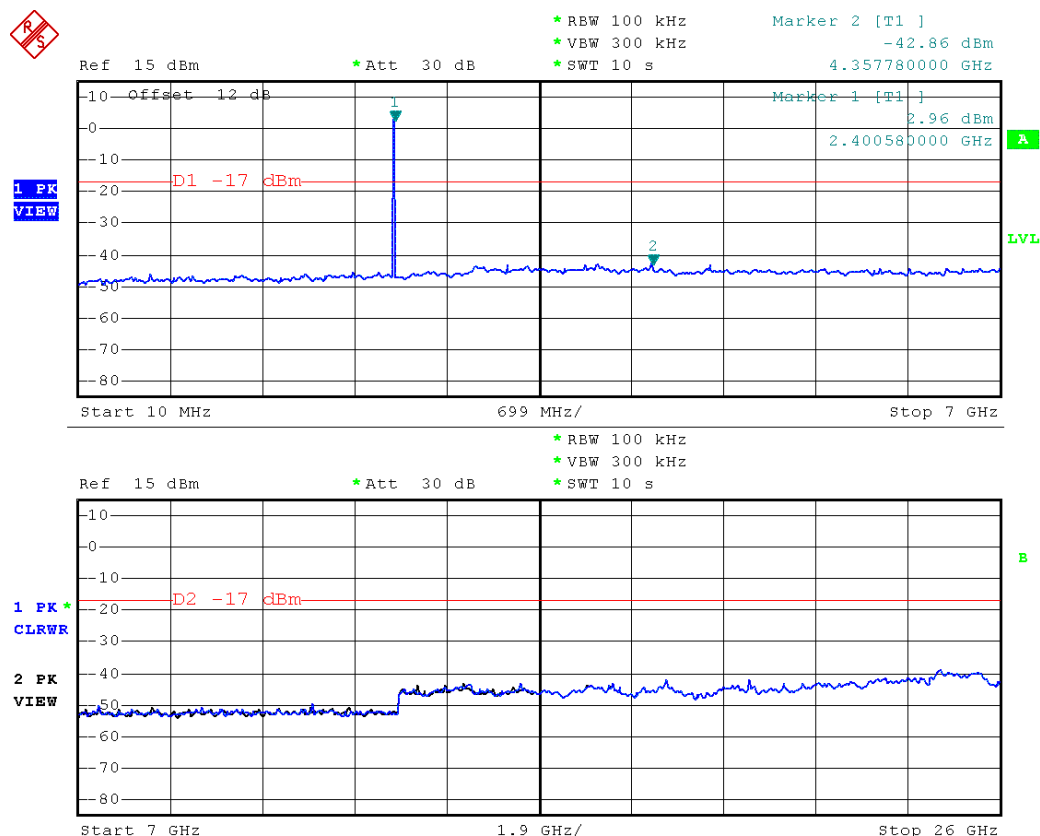
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Conducted spurious emissions – 3-DH5-Sngl F_{LOW}

Spurious Emissions acc. to FCC 15.247

Project Number: G0M-1410-4214

Applicant:	Leica Geosystems AG
EUT Name:	Bluetooth, WLAN and BLE Module
Model:	TiWi-BLE
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, BT, 3-DH5 2402 MHz, modulated
Test Date:	2015-01-26
Verdict:	NONE (INFORMATION ONLY)
Note 1:	Spurious in non-restricted frequency bands (DA 00-705 Meas Guidance)
Note 2:	conducted measurement



Date: 26.JAN.2015 11:13:56

Test Report No.: G0M-1410-4214-TFC247BT-V01

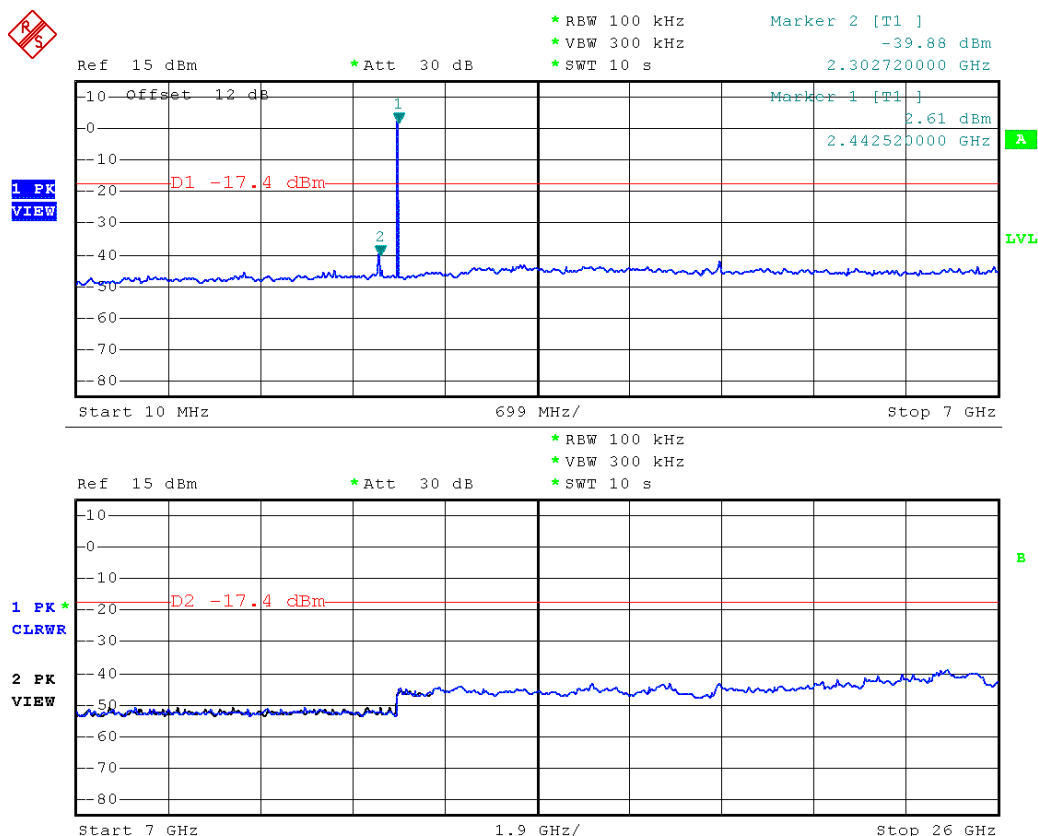
Eurofins Product Service GmbH
Storkower Str. 38c, D-15526 Reichenwalde, Germany

Conducted spurious emissions – 3-DH5-Sngl F_{MD}

Spurious Emissions acc. to FCC 15.247

Project Number: GOM-1410-4214

Applicant: Leica Geosystems AG
 EUT Name: Bluetooth, WLAN and BLE Module
 Model: TiWi-BLE
 Test Site: Eurofins Product Service GmbH
 Operator: Christian Weber
 Test Conditions: Tnom / Vnom
 Mode: Tx, BT, 3-DH5 2441 MHz, modulated
 Test Date: 2015-01-26
 Verdict: NONE (INFORMATION ONLY)
 Note 1: Spurious in non-restricted frequency bands (DA 00-705 Meas Guidance)
 Note 2: conducted measurement

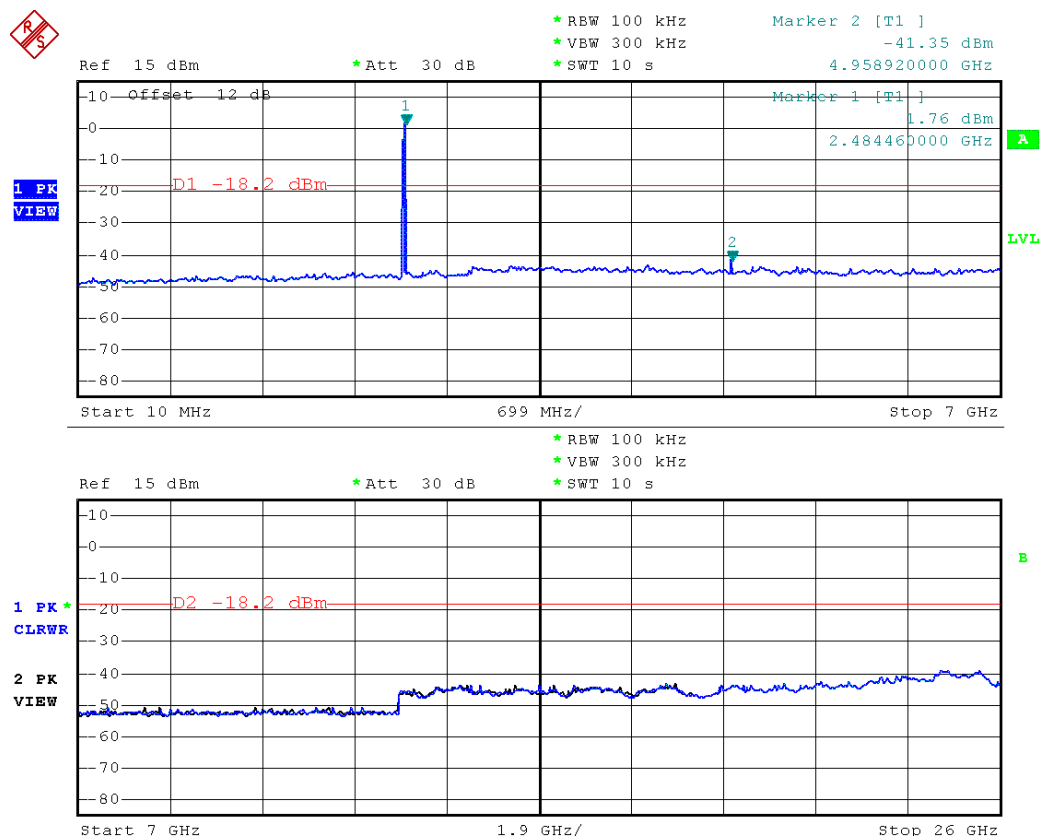


Conducted spurious emissions – 3-DH5-Sngl F_{HIGH}

Spurious Emissions acc. to FCC 15.247

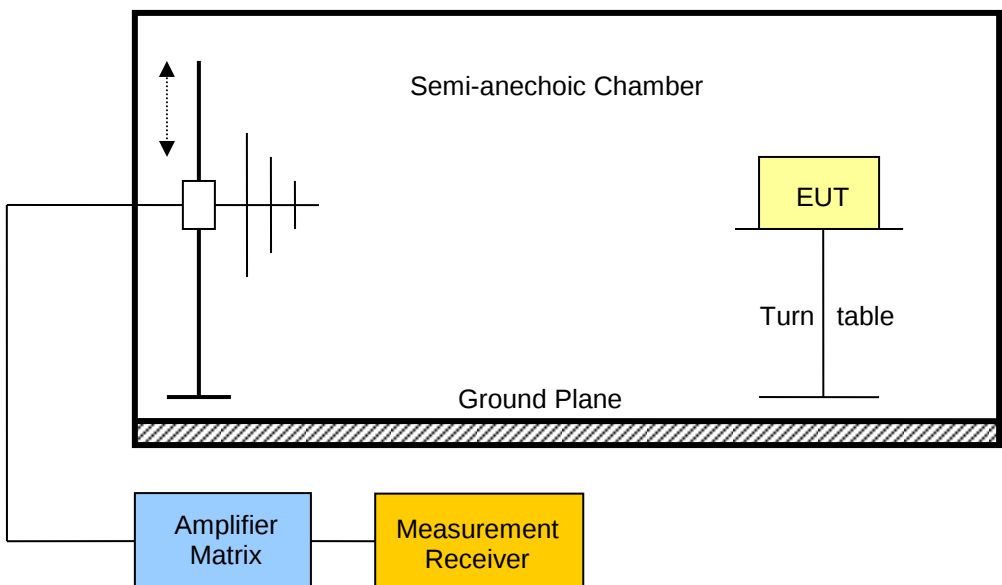
Project Number: G0M-1410-4214

Applicant:	Leica Geosystems AG
EUT Name:	Bluetooth, WLAN and BLE Module
Model:	TiWi-BLE
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, BT, 3-DH5 2480 MHz, modulated
Test Date:	2015-01-26
Verdict:	NONE (INFORMATION ONLY)
Note 1:	Spurious in non-restricted frequency bands (DA 00-705 Meas Guidance)
Note 2:	conducted measurement



Date: 26.JAN.2015 11:18:50

3.10 Test Conditions and Results – Transmitter radiated emissions

Transmitter radiated emissions acc. FCC 47 CFR 15.247 / IC RSS-210				Verdict: PASS
Test according referenced standards	Reference Method			
	FCC 15.247(d) / IC RSS-210 A8.5			
Test according to measurement reference	Reference Method			
	FCC Public Notice DA 00-705 / ANSI C63.4			
Test frequency range	Tested frequencies			
	30 MHz – 10 th Harmonic			
Limits				
Frequency range [MHz]	Detector	Limit [μV/m]	Limit [dBμV/m]	Limit Distance [m]
30 – 88	Quasi-Peak	100	40	3
88 – 216	Quasi-Peak	150	43.5	3
216 – 960	Quasi-Peak	200	46	3
960 – 1000	Quasi-Peak	500	54	3
> 1000	Average	500	54	3
Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)). When average radiated emission measurements are specified, including average emission measurements below 1000 MHz, there also is a limit on the peak level of the radio frequency emissions. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test.				
Test setup				
				

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

Test results – BT basic rate									
Channel	Frequency [MHz]	Mode	Emission [MHz]	Level [dbμV/m]	Det.	Pol.	Limit [dbμV/m]	Limit dist. [m]*	Margin [dB]
F _{MID}	2441	DH5-Sngl	2307.6	54.61	pk	ver	95.00	3	-40.39
F _{MID}	2441	DH5-Sngl	2379.6	57.48	pk	hor	74.00	3	-16.52
F _{MID}	2441	DH5-Sngl	2379.6	27.15	avg	hor	54.00	3	-26.85
F _{MID}	2441	DH5-Sngl	2379.9	55.14	pk	ver	74.00	3	-18.86
F _{MID}	2441	DH5-Sngl	2379.9	30.96	avg	ver	54.00	3	-23.04
F _{MID}	2441	DH5-Sngl	4880	49.31	pk	hor	74.00	3	-24.69
F _{MID}	2441	DH5-Sngl	4882	54.80	pk	ver	74.00	3	-19.20
F _{MID}	2441	DH5-Sngl	4882	52.92	avg	ver	54.00	3	-01.08
F _{HIGH}	2480	DH5-Sngl	2308	54.88	pk	hor	95.00	3	-40.12
F _{HIGH}	2480	DH5-Sngl	2380	56.06	pk	ver	74.00	3	-17.94
F _{HIGH}	2480	DH5-Sngl	2380	26.80	avg	ver	54.00	3	-27.20
F _{HIGH}	2480	DH5-Sngl	2380	56.74	pk	hor	74.00	3	-17.26
F _{HIGH}	2480	DH5-Sngl	2380	26.98	avg	hor	54.00	3	-27.02
F _{HIGH}	2480	DH5-Sngl	2483.5	56.16	pk	ver	74.00	3	-17.84
F _{HIGH}	2480	DH5-Sngl	2483.5	49.92	RMS	ver	54.00	3	-04.08
F _{HIGH}	2480	DH5-Sngl	2483.5	59.44	pk	hor	74.00	3	-14.56
F _{HIGH}	2480	DH5-Sngl	2483.5	53.45	RMS	hor	54.00	3	-00.55
F _{HIGH}	2480	DH5-Sngl	2486.4	46.67	pk	ver	74.00	3	-27.33
F _{HIGH}	2480	DH5-Sngl	2486.4	32.39	RMS	ver	54.00	3	-21.61
F _{HIGH}	2480	DH5-Sngl	2489.4	47.71	pk	ver	74.00	3	-26.29
F _{HIGH}	2480	DH5-Sngl	2489.4	31.60	RMS	ver	54.00	3	-22.40
F _{HIGH}	2480	DH5-Sngl	2489.4	49.45	pk	hor	74.00	3	-24.55
F _{HIGH}	2480	DH5-Sngl	2489.4	33.60	RMS	hor	54.00	3	-20.40
F _{HIGH}	2480	DH5-Sngl	2492.9	45.32	pk	ver	74.00	3	-28.68
F _{HIGH}	2480	DH5-Sngl	2492.9	30.95	RMS	ver	54.00	3	-23.05
F _{HIGH}	2480	DH5-Sngl	2492.9	44.48	pk	hor	74.00	3	-29.52
F _{HIGH}	2480	DH5-Sngl	2492.9	28.55	RMS	hor	54.00	3	-25.45
F _{HIGH}	2480	DH5-Sngl	2495.9	44.77	pk	ver	74.00	3	-29.23
F _{HIGH}	2480	DH5-Sngl	2495.9	30.46	RMS	ver	54.00	3	-23.54
F _{HIGH}	2480	DH5-Sngl	2495.9	44.91	pk	hor	74.00	3	-29.09
F _{HIGH}	2480	DH5-Sngl	2495.9	28.94	RMS	hor	54.00	3	-25.06
F _{HIGH}	2480	DH5-Sngl	2499.6	42.87	pk	hor	74.00	3	-31.13
F _{HIGH}	2480	DH5-Sngl	2499.6	28.47	RMS	hor	54.00	3	-25.53

F _{HIGH}	2480	DH5-Sngl	2503	57.00	pk	hor	95.00	3	-38.00
F _{HIGH}	2480	DH5-Sngl	4960	55.47	pk	ver	74.00	3	-18.53
F _{HIGH}	2480	DH5-Sngl	4960	53.62	avg	ver	54.00	3	-00.38
F _{HIGH}	2480	DH5-Sngl	4960	52.97	pk	hor	74.00	3	-21.03
Comments: * Physical distance between EUT and measurement antenna.									

Test results – BT EDR									
Channel	Frequency [MHz]	Mode	Emission [MHz]	Level [dBμV/m]	Det.	Pol.	Limit [dBμV/m]	Limit dist. [m]*	Margin [dB]
F _{LOW}	2402	3DH5-Sngl	2309	61.35	pk	ver	95.00	3	-33.65
F _{LOW}	2402	3DH5-Sngl	2309	56.63	pk	hor	95.00	3	-38.37
F _{LOW}	2402	3DH5-Sngl	2327	48.56	pk	ver	74.00	3	-25.44
F _{LOW}	2402	3DH5-Sngl	2327	28.41	RMS	ver	54.00	3	-25.59
F _{LOW}	2402	3DH5-Sngl	2327	46.11	pk	hor	74.00	3	-27.89
F _{LOW}	2402	3DH5-Sngl	2327	26.68	RMS	hor	54.00	3	-27.32
F _{LOW}	2402	3DH5-Sngl	2338	45.10	pk	ver	74.00	3	-28.90
F _{LOW}	2402	3DH5-Sngl	2338	27.96	RMS	ver	54.00	3	-26.04
F _{LOW}	2402	3DH5-Sngl	2352	49.78	pk	ver	74.00	3	-24.22
F _{LOW}	2402	3DH5-Sngl	2352	29.44	RMS	ver	54.00	3	-24.56
F _{LOW}	2402	3DH5-Sngl	2352	50.99	pk	hor	74.00	3	-23.01
F _{LOW}	2402	3DH5-Sngl	2352	29.43	RMS	hor	54.00	3	-24.57
F _{LOW}	2402	3DH5-Sngl	2364	46.45	pk	hor	74.00	3	-27.55
F _{LOW}	2402	3DH5-Sngl	2364	35.83	RMS	hor	54.00	3	-18.17
F _{LOW}	2402	3DH5-Sngl	2377	54.82	pk	ver	74.00	3	-19.18
F _{LOW}	2402	3DH5-Sngl	2377	32.21	RMS	ver	54.00	3	-21.79
F _{LOW}	2402	3DH5-Sngl	2377	57.51	pk	hor	74.00	3	-16.49
F _{LOW}	2402	3DH5-Sngl	2377	34.44	RMS	hor	54.00	3	-19.56
F _{LOW}	2402	3DH5-Sngl	2381	55.28	pk	ver	74.00	3	-18.72
F _{LOW}	2402	3DH5-Sngl	2381	31.43	RMS	ver	54.00	3	-22.57
F _{LOW}	2402	3DH5-Sngl	2381	58.71	pk	hor	74.00	3	-15.29
F _{LOW}	2402	3DH5-Sngl	2381	34.08	RMS	hor	54.00	3	-19.92
F _{LOW}	2402	3DH5-Sngl	2390	55.72	pk	ver	74.00	3	-18.28
F _{LOW}	2402	3DH5-Sngl	2390	35.08	RMS	ver	54.00	3	-18.92
F _{LOW}	2402	3DH5-Sngl	2390	57.06	pk	hor	74.00	3	-16.94
F _{LOW}	2402	3DH5-Sngl	2390	36.30	RMS	hor	54.00	3	-17.70
F _{LOW}	2402	3DH5-Sngl	4800	48.82	pk	ver	74.00	3	-25.18
F _{LOW}	2402	3DH5-Sngl	4800	44.10	pk	hor	74.00	3	-29.90
F _{LOW}	2402	3DH5-Sngl	17988	48.35	pk	ver	74.00	3	-25.65
F _{LOW}	2402	3DH5-Sngl	17988	48.85	pk	hor	74.00	3	-25.15
F _{LOW}	2402	3DH5-Sngl	22114	43.12	pk	hor	74.00	3	-30.88
F _{LOW}	2402	3DH5-Sngl	22964	43.84	pk	ver	74.00	3	-30.16
F _{MID}	2441	3DH5-Sngl	2307.6	56.66	pk	ver	95.00	3	-38.34

Test Report No.: G0M-1410-4214-TFC247BT-V01

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

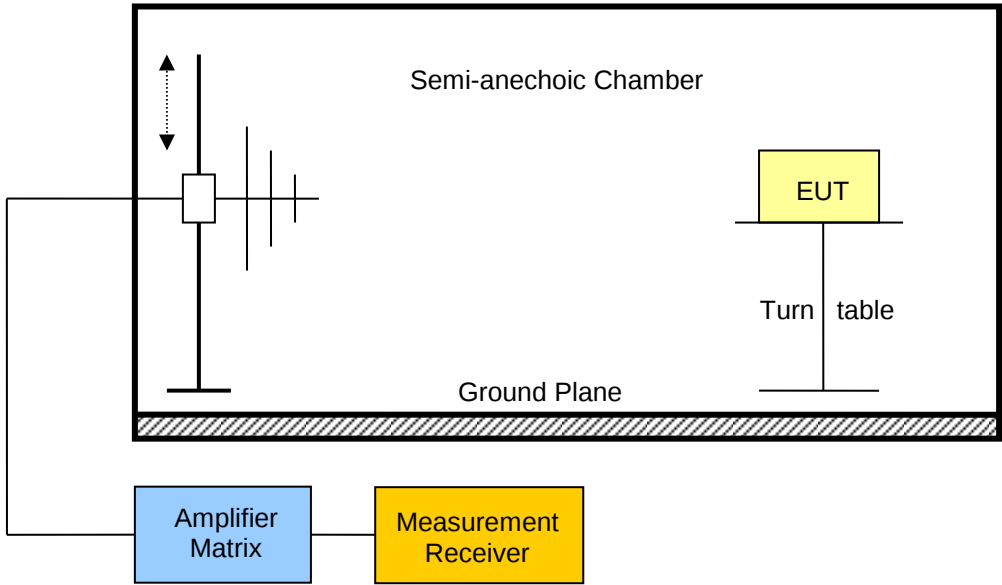
F _{MID}	2441	3DH5-Sngl	2307.6	56.56	pk	hor	95.00	3	-38.44
F _{MID}	2441	3DH5-Sngl	2380.8	58.15	pk	hor	74.00	3	-15.85
F _{MID}	2441	3DH5-Sngl	2380.8	26.95	avg	hor	54.00	3	-27.05
F _{MID}	2441	3DH5-Sngl	2381	54.77	pk	ver	74.00	3	-19.23
F _{MID}	2441	3DH5-Sngl	2381	30.00	avg	ver	54.00	3	-24.00
F _{MID}	2441	3DH5-Sngl	4880	49.13	pk	hor	74.00	3	-24.87
F _{MID}	2441	3DH5-Sngl	4882	54.66	pk	ver	74.00	3	-19.34
F _{MID}	2441	3DH5-Sngl	4882	47.51	avg	ver	54.00	3	-06.49
F _{MID}	2441	3DH5-Sngl	17952	48.93	pk	hor	74.00	3	-25.07
F _{MID}	2441	3DH5-Sngl	22964	43.04	pk	ver	74.00	3	-30.96
F _{MID}	2441	3DH5-Sngl	23712	43.23	pk	hor	74.00	3	-30.77
F _{HIGH}	2480	3DH5-Sngl	2308	58.97	pk	ver	95.00	3	-36.03
F _{HIGH}	2480	3DH5-Sngl	2308	56.78	pk	hor	95.00	3	-38.22
F _{HIGH}	2480	3DH5-Sngl	2381	56.03	pk	ver	74.00	3	-17.97
F _{HIGH}	2480	3DH5-Sngl	2381	26.64	avg	ver	54.00	3	-27.36
F _{HIGH}	2480	3DH5-Sngl	2381	57.79	pk	hor	74.00	3	-16.21
F _{HIGH}	2480	3DH5-Sngl	2381	27.00	avg	hor	54.00	3	-27.00
F _{HIGH}	2480	3DH5-Sngl	2483.5	60.91	pk	ver	74.00	3	-13.09
F _{HIGH}	2480	3DH5-Sngl	2483.5	49.61	RMS	ver	54.00	3	-04.39
F _{HIGH}	2480	3DH5-Sngl	2483.5	63.92	pk	hor	74.00	3	-10.08
F _{HIGH}	2480	3DH5-Sngl	2483.5	52.94	RMS	hor	54.00	3	-01.06
F _{HIGH}	2480	3DH5-Sngl	2495.6	49.27	pk	hor	74.00	3	-24.73
F _{HIGH}	2480	3DH5-Sngl	2495.6	29.57	RMS	hor	54.00	3	-24.43
F _{HIGH}	2480	3DH5-Sngl	2495.8	45.35	pk	ver	74.00	3	-28.65
F _{HIGH}	2480	3DH5-Sngl	2495.8	28.88	RMS	ver	54.00	3	-25.12
F _{HIGH}	2480	3DH5-Sngl	2498.7	48.60	pk	hor	74.00	3	-25.40
F _{HIGH}	2480	3DH5-Sngl	2498.7	28.46	RMS	hor	54.00	3	-25.54
F _{HIGH}	2480	3DH5-Sngl	2499.8	44.30	pk	ver	74.00	3	-29.70
F _{HIGH}	2480	3DH5-Sngl	2499.8	28.80	RMS	ver	54.00	3	-25.20
F _{HIGH}	2480	3DH5-Sngl	4800	45.50	pk	hor	74.00	3	-28.50
F _{HIGH}	2480	3DH5-Sngl	4960	58.72	pk	ver	74.00	3	-15.28
F _{HIGH}	2480	3DH5-Sngl	4960	53.55	avg	ver	54.00	3	-00.45
F _{HIGH}	2480	3DH5-Sngl	17964	49.30	pk	ver	74.00	3	-24.70
F _{HIGH}	2480	3DH5-Sngl	17976	49.44	pk	hor	74.00	3	-24.56
F _{HIGH}	2480	3DH5-Sngl	23083	42.83	pk	ver	74.00	3	-31.17

Comments: * Physical distance between EUT and measurement antenna.

Test Report No.: G0M-1410-4214-TFC247BT-V01

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

3.11 Test Conditions and Results – Receiver radiated emissions

Receiver radiated emissions acc. to IC RSS-210				Verdict: PASS
Test according referenced standards	Reference Method			
	IC RSS-210 A8.5			
Test according to measurement reference	Reference Method			
	ANSI C63.4			
Test frequency range	Tested frequencies			
	30 MHz – 3 th Harmonic			
EUT test mode	Receive			
Limits				
Frequency range [MHz]	Detector	Limit [μV/m]	Limit [dBμV/m]	Limit Distance [m]
30 – 88	Quasi-Peak	100	40	3
88 – 216	Quasi-Peak	150	43.5	3
216 – 960	Quasi-Peak	200	46	3
960 – 1000	Quasi-Peak	500	54	3
> 1000	Average	500	54	3
Test setup				
				

Test procedure							
1. EUT set to receive mode (Communication tester is used if needed) 2. Span it set according to measurement range 3. Resolution bandwidth below 1 GHz is set according to CISPR 16 with peak/quasi-peak detector and RBW of 1 MHz with peak/average detector is used above 1 GHz 4. Markers are set to peak emission levels							
Test results							
Channel	Frequency [MHz]	Emission [MHz]	Emission Level [dBμV/m]	Pol.	Det.	Limit [dBμV/m]	Margin [dBμV/m]
F _{MID}	2441	1588	42.88	ver	pk	53.98	-11.1 dB
F _{MID}	2441	1594	46.55	ver	pk	53.98	-7.43 dB
F _{MID}	2441	1786	43.65	ver	pk	53.98	-10.33 dB
F _{MID}	2441	1990	45.52	ver	pk	53.98	-8.46 dB
F _{MID}	2441	2392	44.11	ver	pk	53.98	-9.87 dB
Comments:							

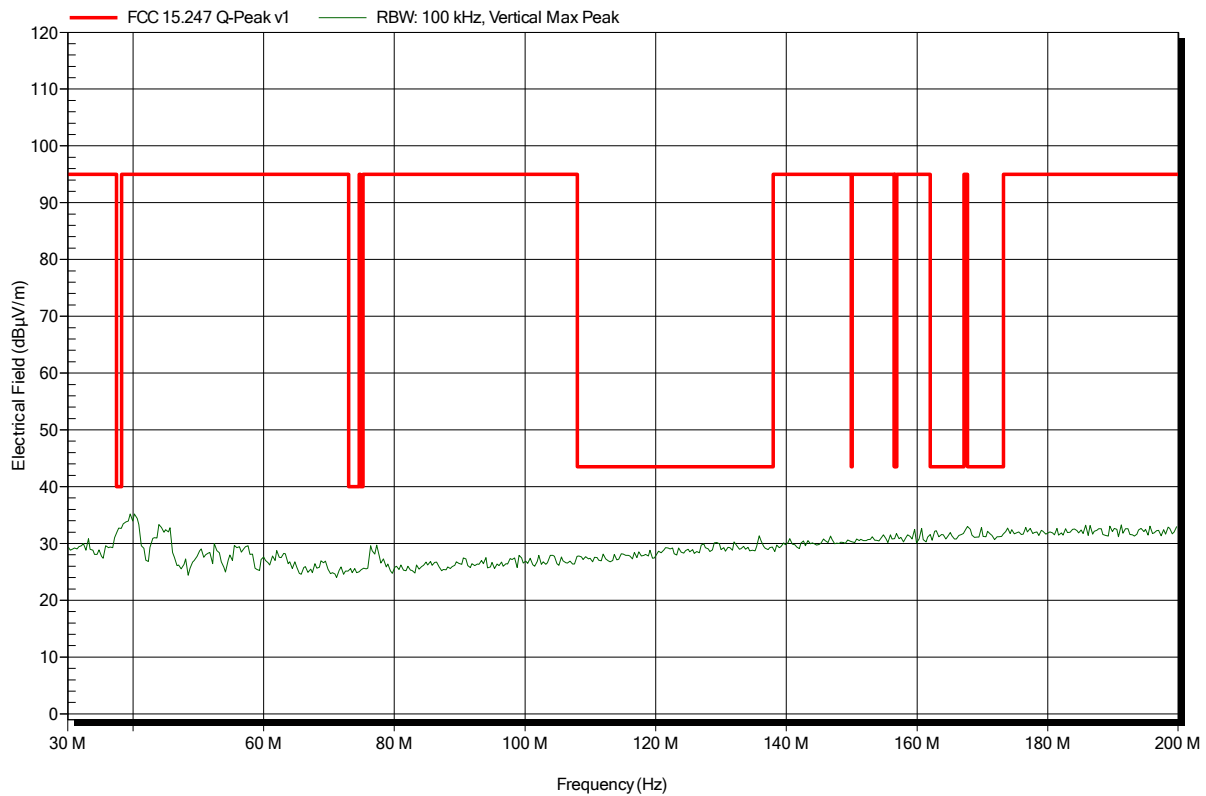
ANNEX A Transmitter radiated spurious emissions

Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant:	Leica Geosystems GmbH
EUT Name:	Bluetooth, WLAN and BLE Modul
Model:	TiWi-BLE (Inwave BTFA-2450)
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Handrik
Test Conditions:	Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3 m
Mode:	TX; DUT mode: 2402MHz, DH5, Pmax
Test Date:	2015-03-06
Note:	

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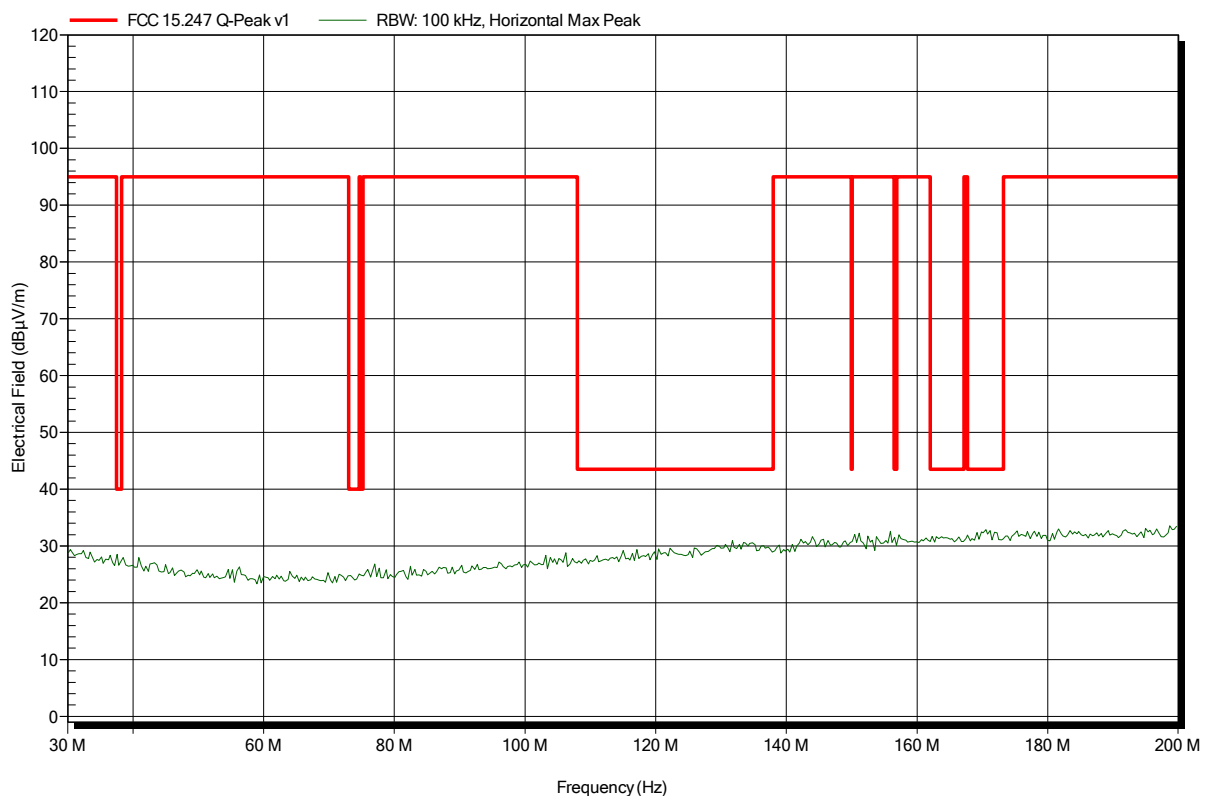


Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: TX; DUT mode: 2402MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note:

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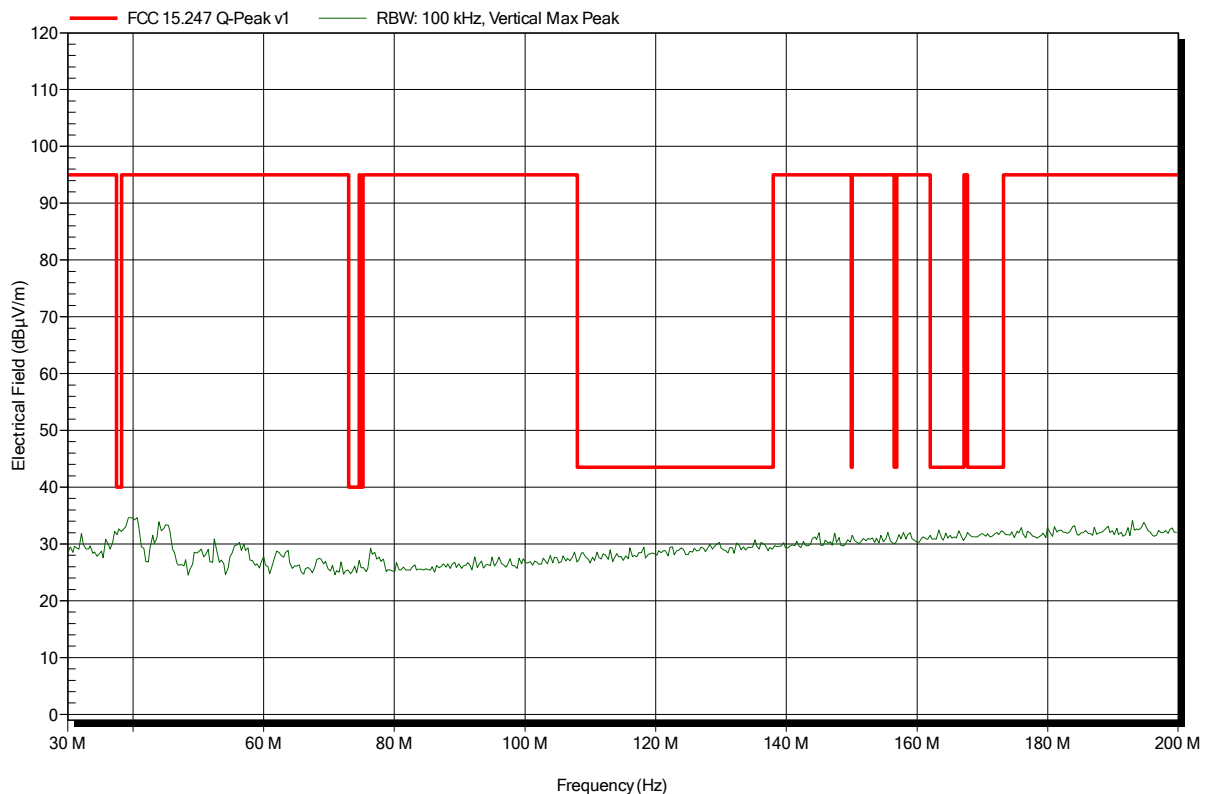


Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: TX; DUT mode: 2441MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note:

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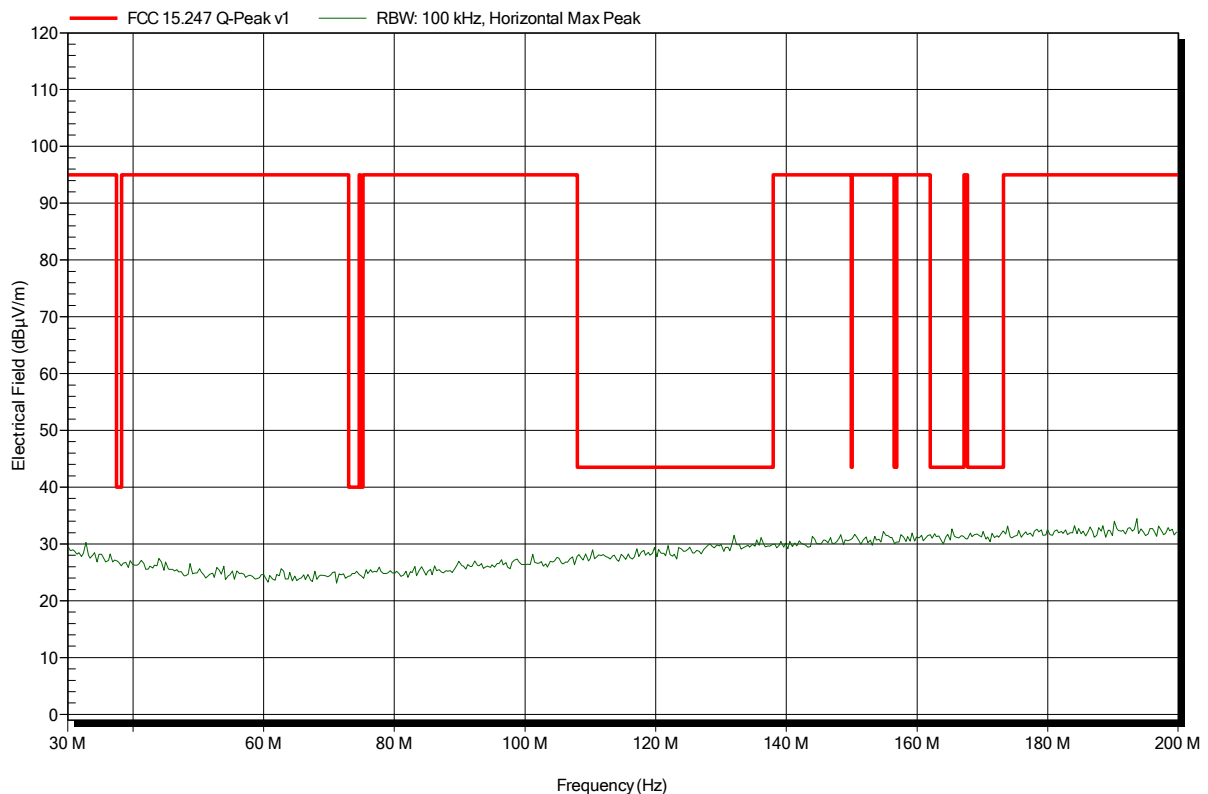


Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant:	Leica Geosystems GmbH
EUT Name:	Bluetooth, WLAN and BLE Modul
Model:	TiWi-BLE (Inwave BTFA-2450)
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Handrik
Test Conditions:	Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	TX; DUT mode: 2441MHz, DH5, Pmax
Test Date:	2015-03-06
Note:	

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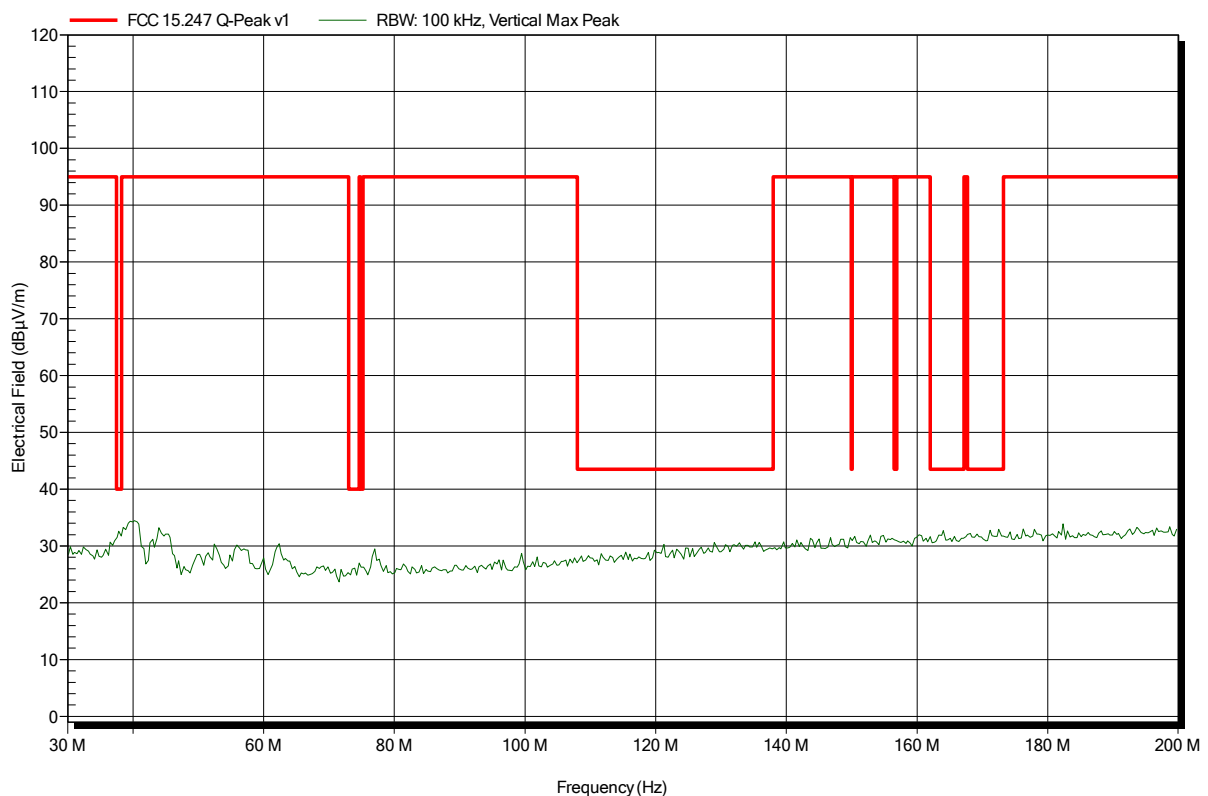


Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: TX; DUT mode: 2480MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note:

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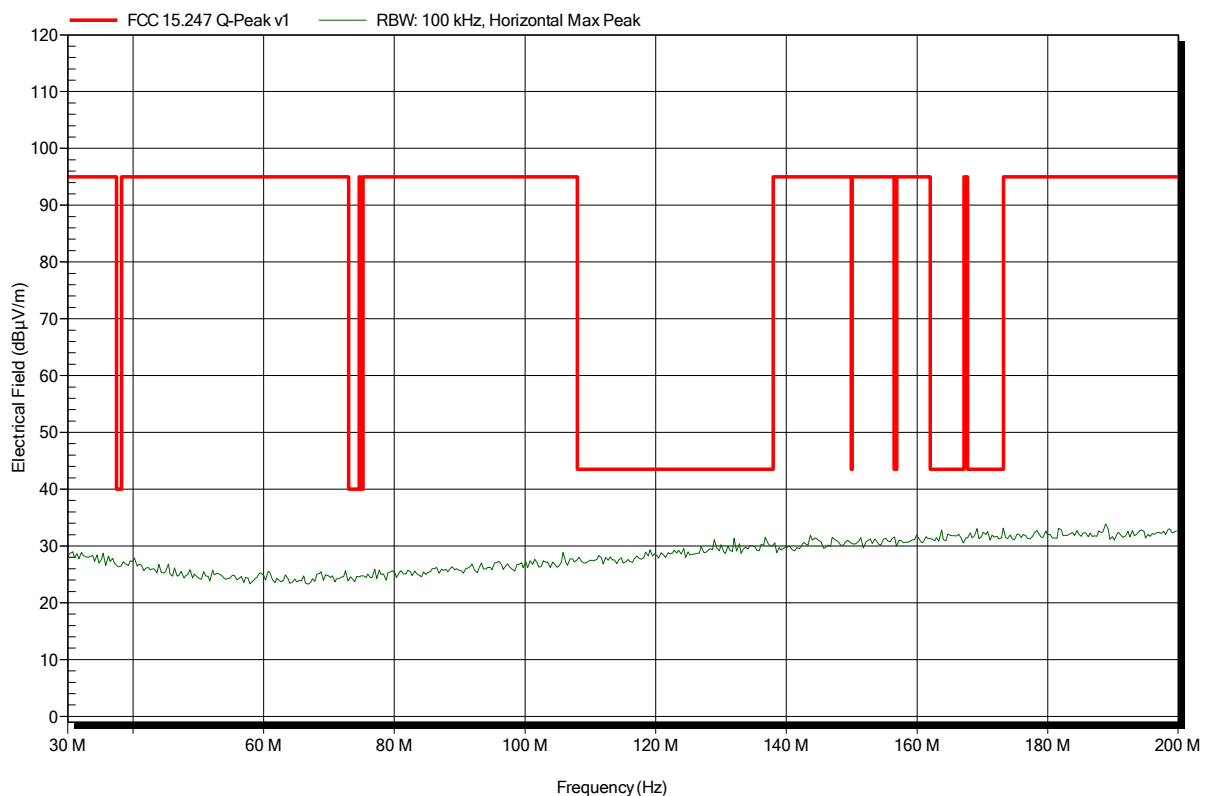


Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant:	Leica Geosystems GmbH
EUT Name:	Bluetooth, WLAN and BLE Modul
Model:	TiWi-BLE (Inwave BTFA-2450)
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Handrik
Test Conditions:	Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	TX; DUT mode: 2480MHz, DH5, Pmax
Test Date:	2015-03-06
Note:	

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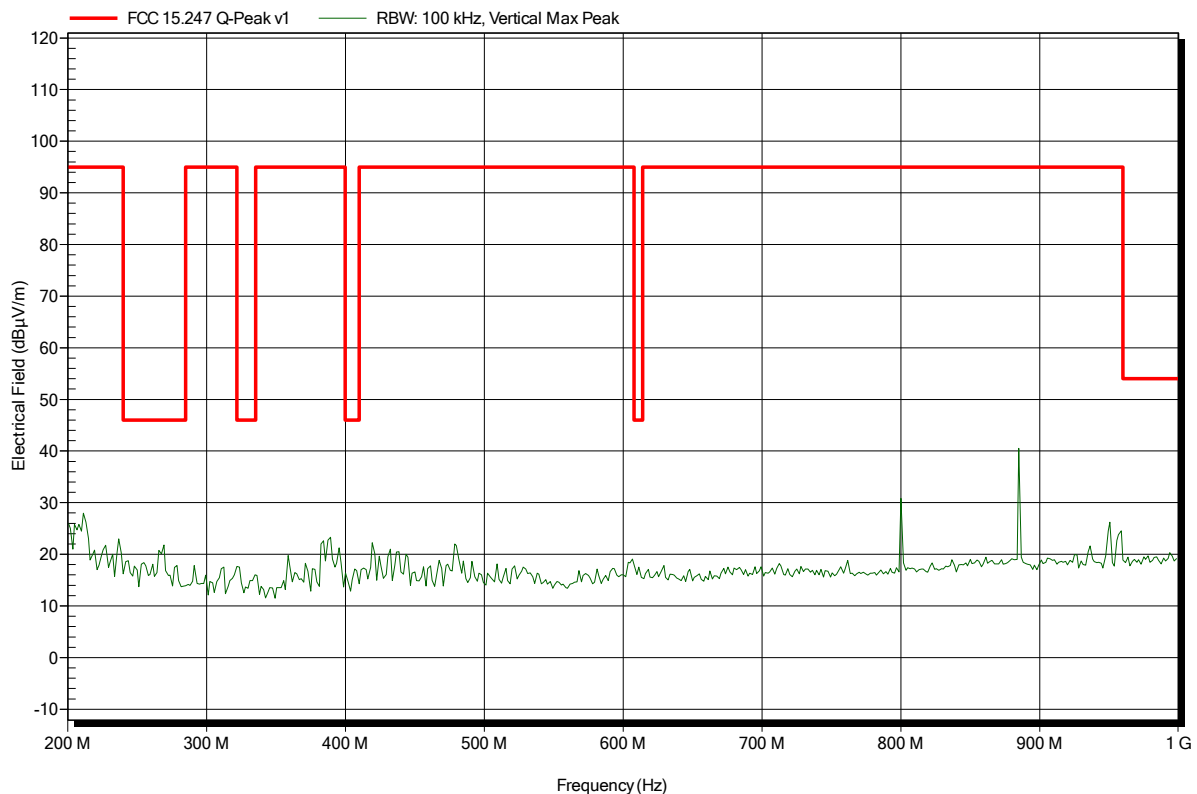


Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant:	Leica Geosystems GmbH
EUT Name:	Bluetooth, WLAN and BLE Modul
Model:	TiWi-BLE (Inwave BTFA-2450)
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Handrik
Test Conditions:	Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	TX; DUT mode: 2402MHz, DH5, Pmax
Test Date:	2015-03-06
Note:	

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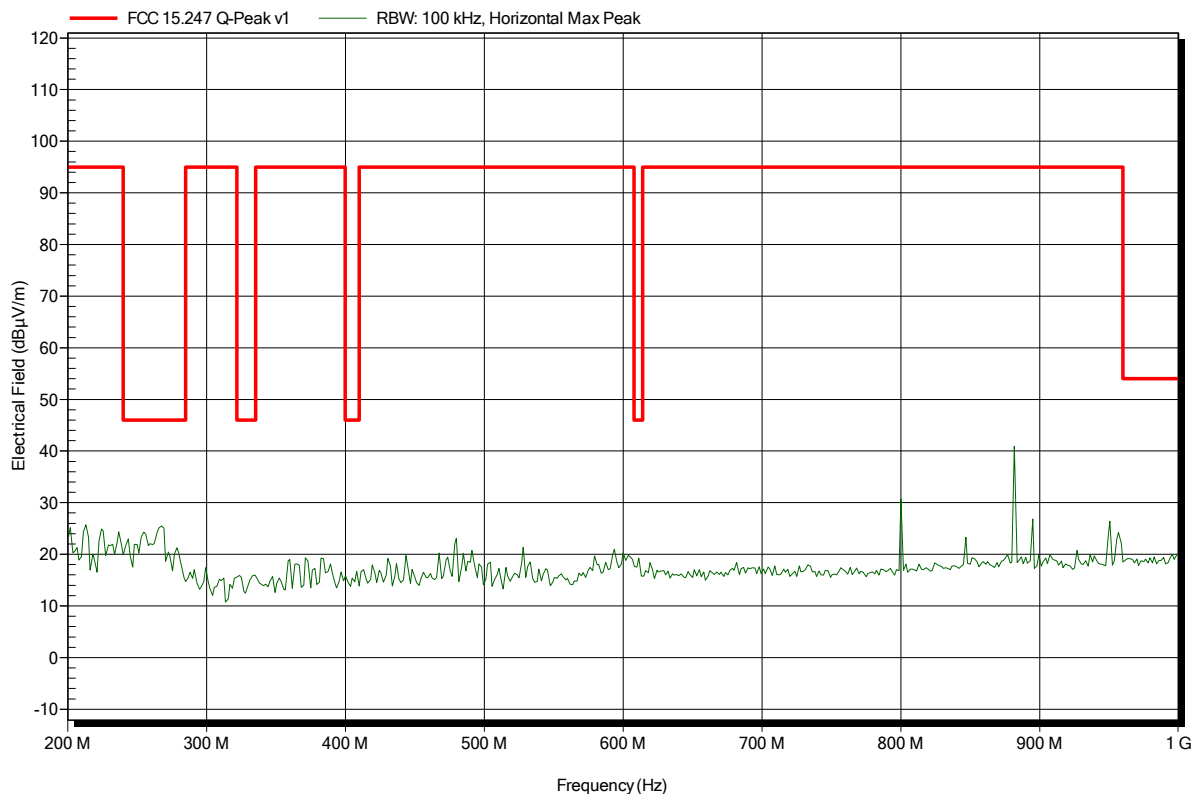


Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant:	Leica Geosystems GmbH
EUT Name:	Bluetooth, WLAN and BLE Modul
Model:	TiWi-BLE (Inwave BTFA-2450)
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Handrik
Test Conditions:	Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	TX; DUT mode: 2402MHz, DH5, Pmax
Test Date:	2015-03-06
Note:	

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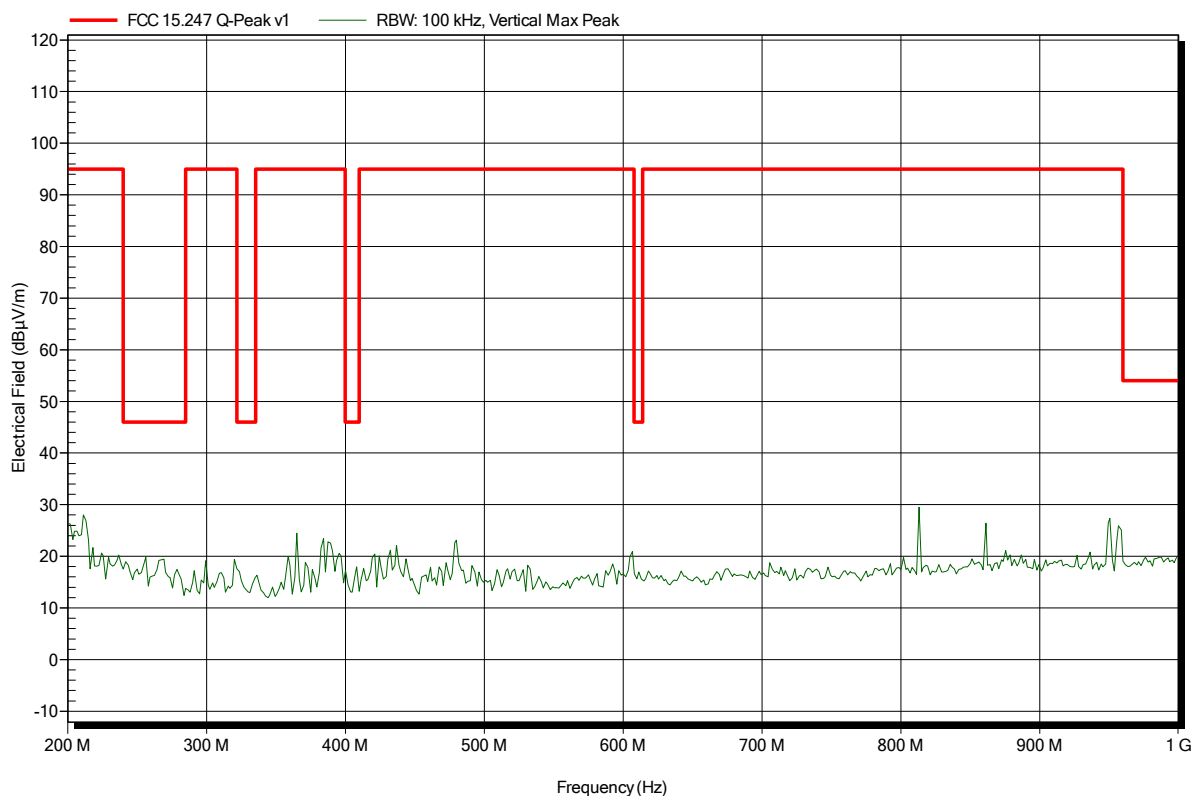


Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: TX; DUT mode: 2441MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note:

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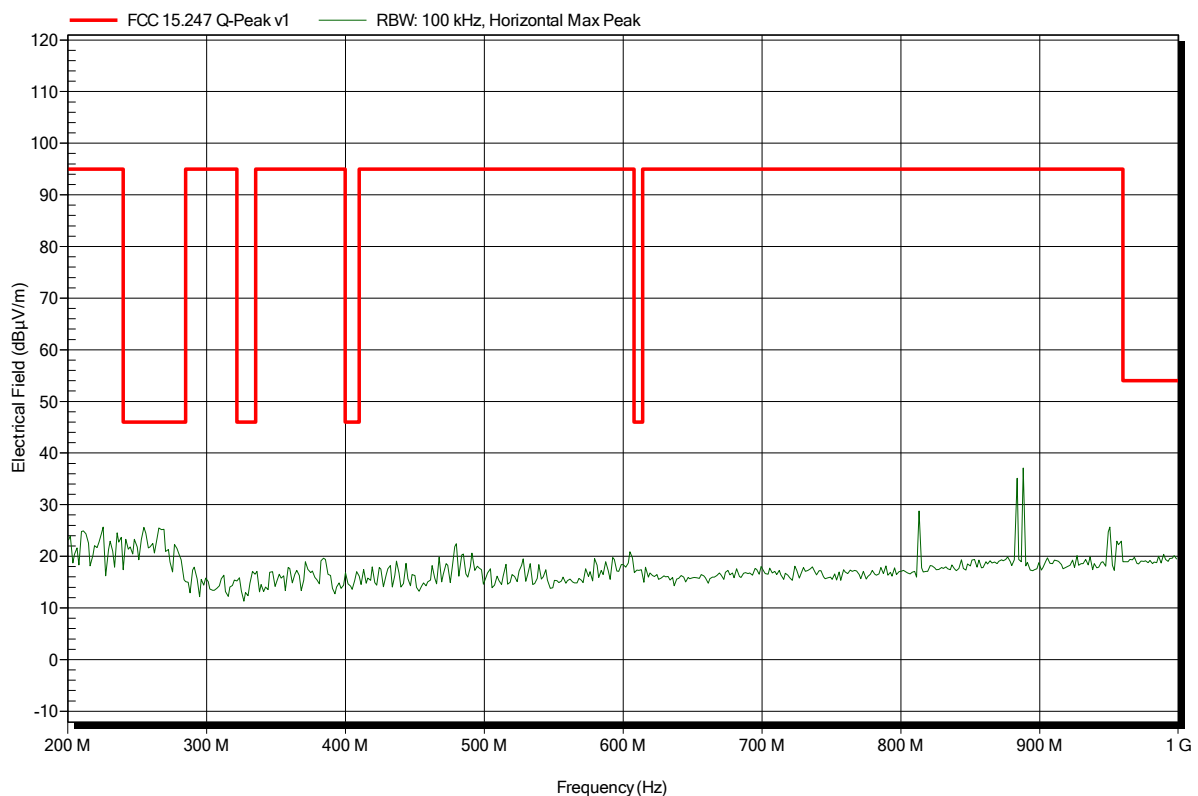


Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant:	Leica Geosystems GmbH
EUT Name:	Bluetooth, WLAN and BLE Modul
Model:	TiWi-BLE (Inwave BTFA-2450)
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Handrik
Test Conditions:	Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	TX; DUT mode: 2441MHz, DH5, Pmax
Test Date:	2015-03-06
Note:	

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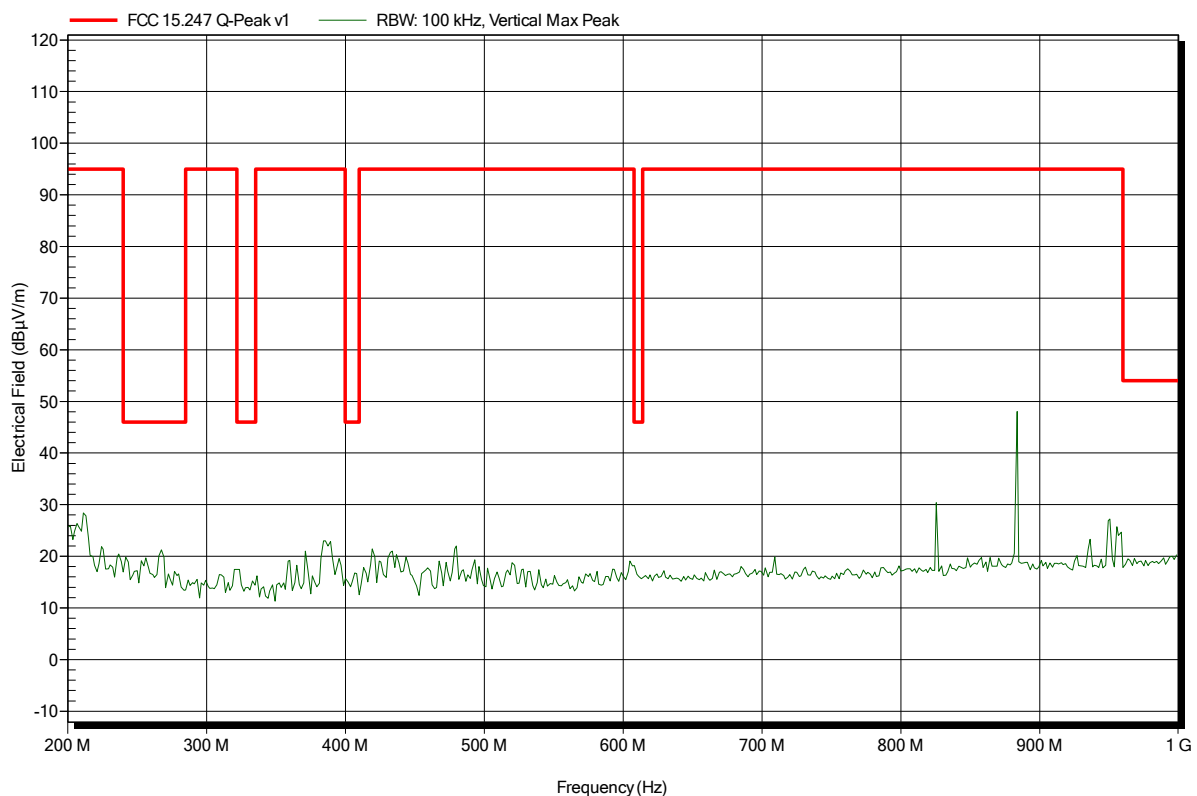


Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant:	Leica Geosystems GmbH
EUT Name:	Bluetooth, WLAN and BLE Modul
Model:	TiWi-BLE (Inwave BTFA-2450)
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Handrik
Test Conditions:	Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	TX; DUT mode: 2480MHz, DH5, Pmax
Test Date:	2015-03-06
Note:	

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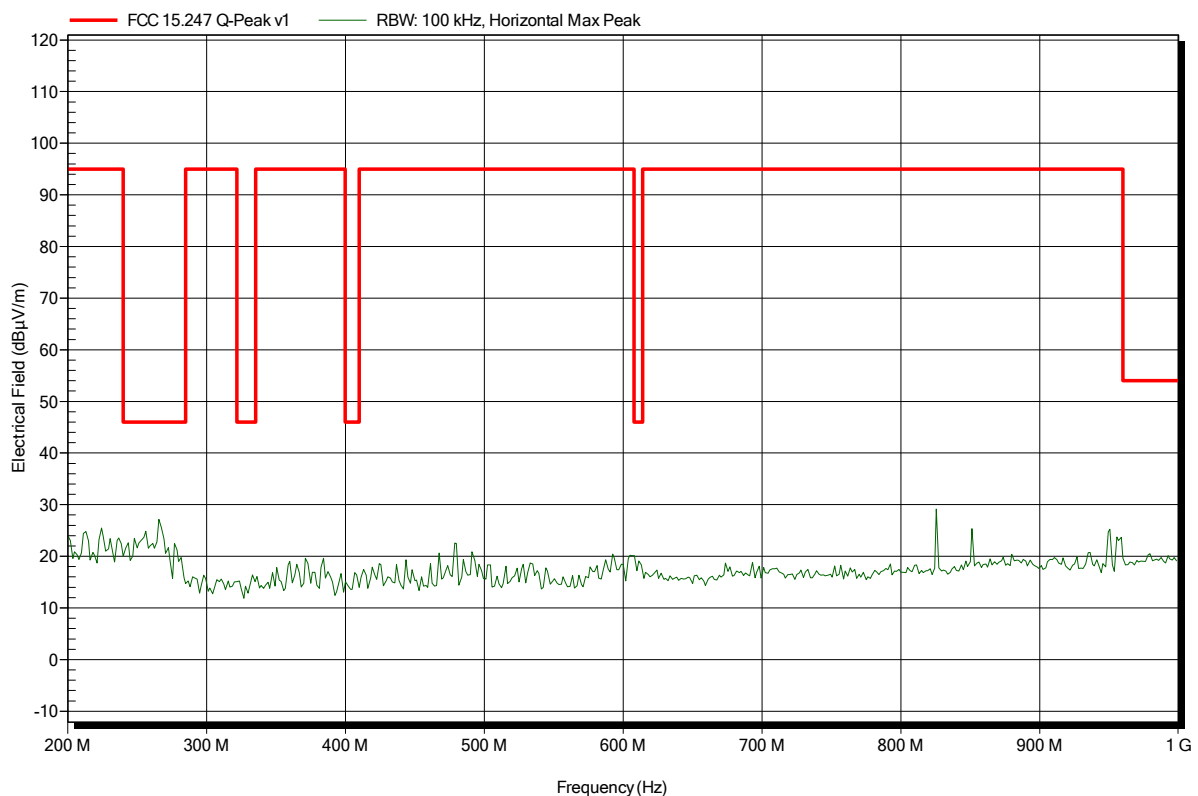


Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: TX; DUT mode: 2480MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note:

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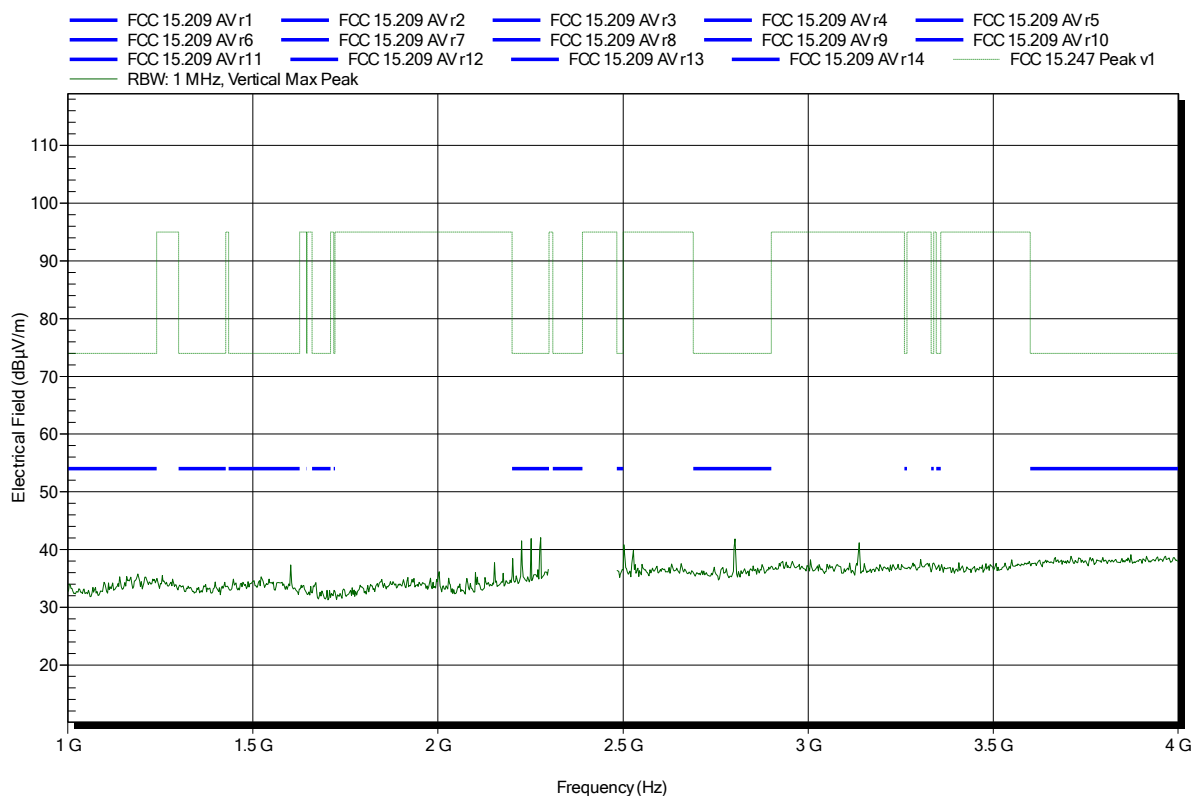


Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; DUT mode: 2402MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note:

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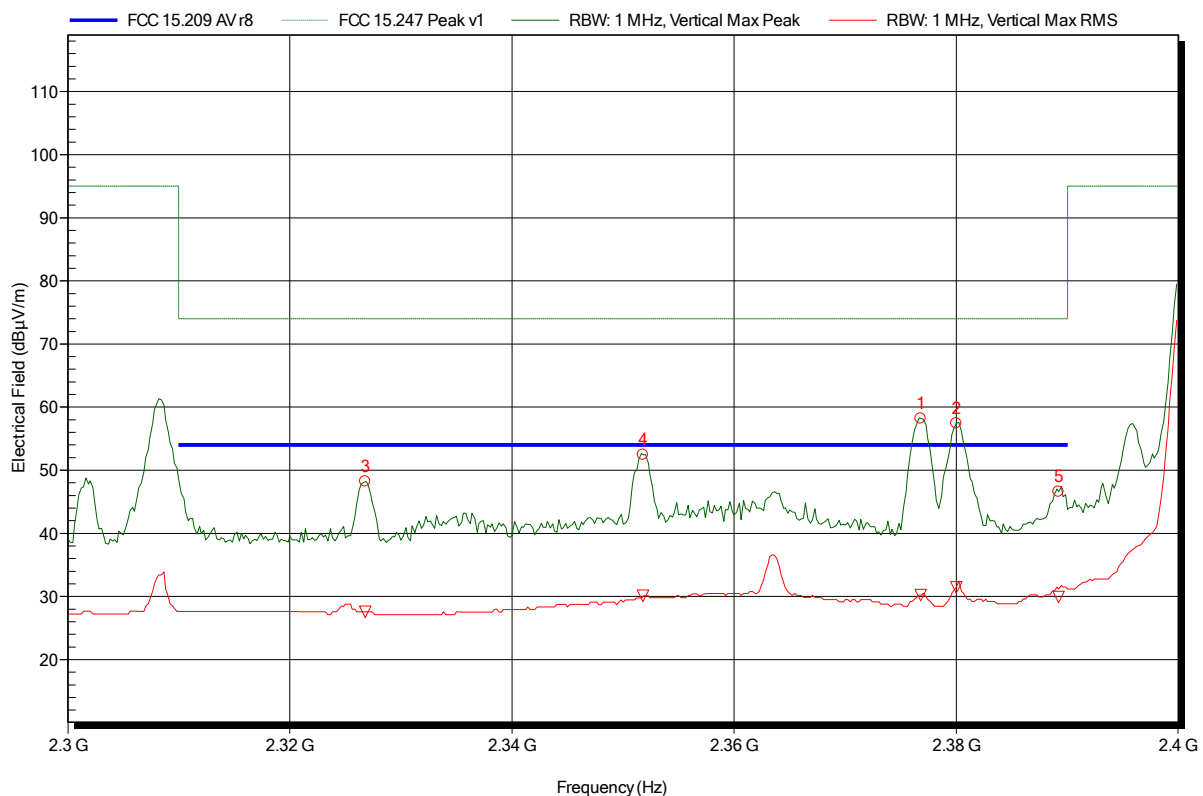


Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; DUT mode: 2402MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note: lower bandedge

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Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.327 GHz	48.25 dBµV/m	74 dBµV/m	-25.75 dB	Pass
2.352 GHz	52.46 dBµV/m	74 dBµV/m	-21.54 dB	Pass
2.377 GHz	58.2 dBµV/m	74 dBµV/m	-15.8 dB	Pass
2.38 GHz	57.45 dBµV/m	74 dBµV/m	-16.55 dB	Pass
2.389 GHz	46.6 dBµV/m	74 dBµV/m	-27.4 dB	Pass

Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.327 GHz	27.58 dBµV/m	54 dBµV/m	-26.42 dB	Pass
2.352 GHz	30.11 dBµV/m	54 dBµV/m	-23.89 dB	Pass
2.377 GHz	30.21 dBµV/m	54 dBµV/m	-23.79 dB	Pass
2.38 GHz	31.43 dBµV/m	54 dBµV/m	-22.57 dB	Pass
2.389 GHz	29.94 dBµV/m	54 dBµV/m	-24.06 dB	Pass

Test Report No.: GOM-1410-4214-TFC247BT-V01

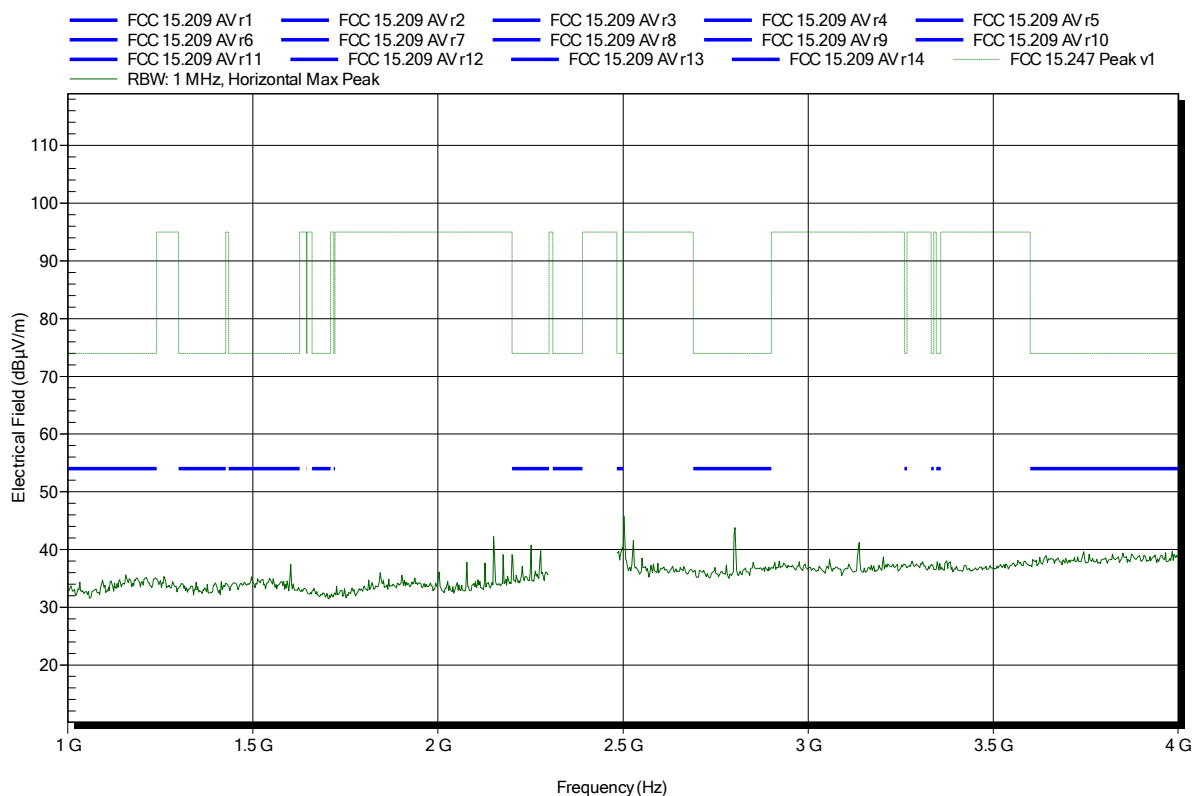
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; DUT mode: 2402MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note:

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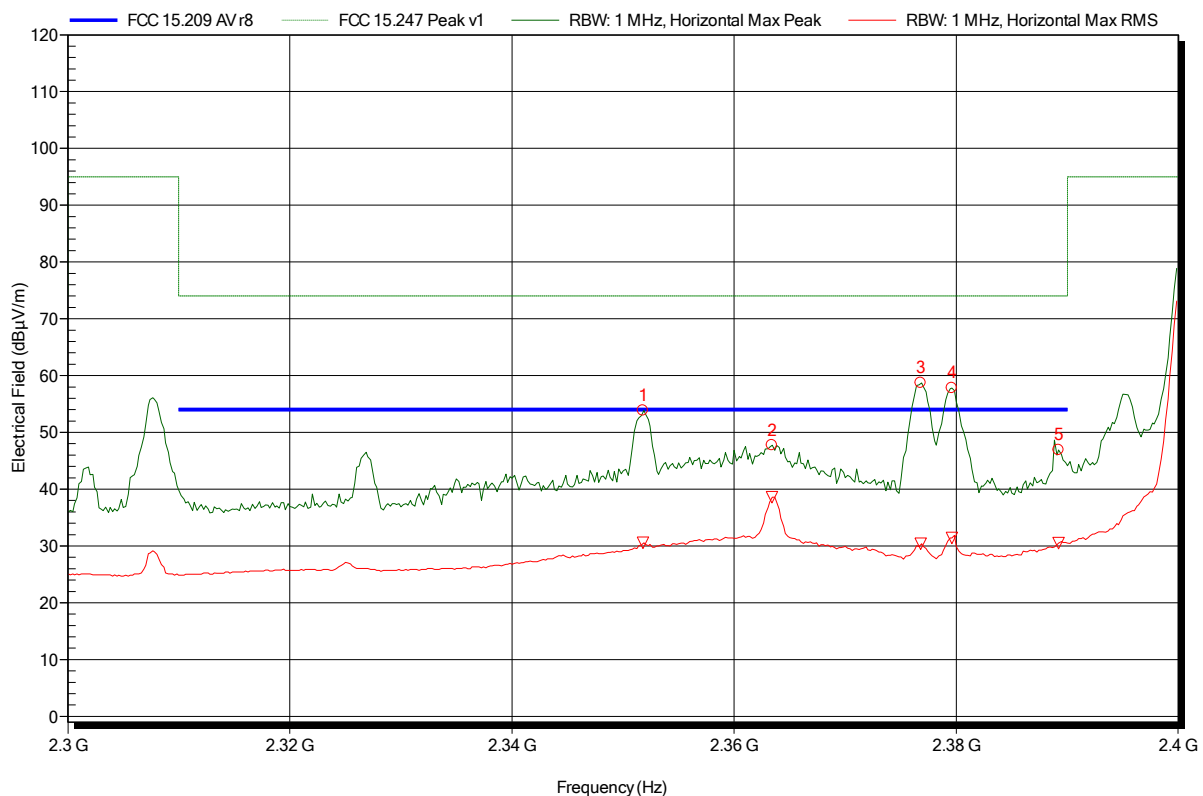


Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; DUT mode: 2402MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note: lower bandedge

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Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.352 GHz	53.83 dBμV/m	74 dBμV/m	-20.17 dB	Pass
2.363 GHz	47.75 dBμV/m	74 dBμV/m	-26.25 dB	Pass
2.377 GHz	58.68 dBμV/m	74 dBμV/m	-15.32 dB	Pass
2.38 GHz	57.81 dBμV/m	74 dBμV/m	-16.19 dB	Pass
2.389 GHz	46.88 dBμV/m	74 dBμV/m	-27.12 dB	Pass

Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.352 GHz	30.56 dBμV/m	54 dBμV/m	-23.44 dB	Pass
2.363 GHz	38.61 dBμV/m	54 dBμV/m	-15.39 dB	Pass
2.377 GHz	30.37 dBμV/m	54 dBμV/m	-23.63 dB	Pass
2.38 GHz	31.42 dBμV/m	54 dBμV/m	-22.58 dB	Pass
2.389 GHz	30.53 dBμV/m	54 dBμV/m	-23.47 dB	Pass

Test Report No.: GOM-1410-4214-TFC247BT-V01

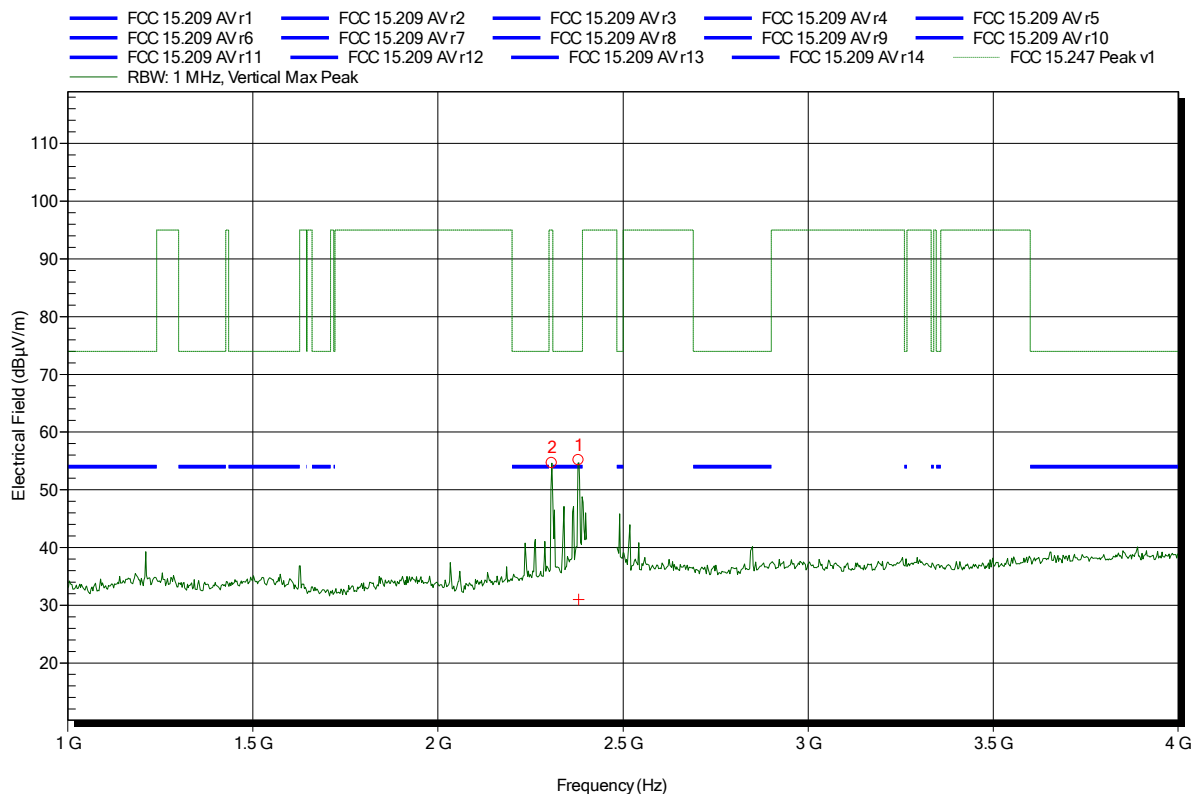
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; DUT mode: 2441MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note:

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Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.3076 GHz	54.61 dBμV/m	95 dBμV/m	-40.39 dB	Pass
2.3799 GHz	55.14 dBμV/m	74 dBμV/m	-18.86 dB	Pass
Frequency	Average	Average Limit	Average Difference	Average Status
2.3799 GHz	30.96 dBμV/m	54 dBμV/m	-23.04 dB	Pass

Test Report No.: GOM-1410-4214-TFC247BT-V01

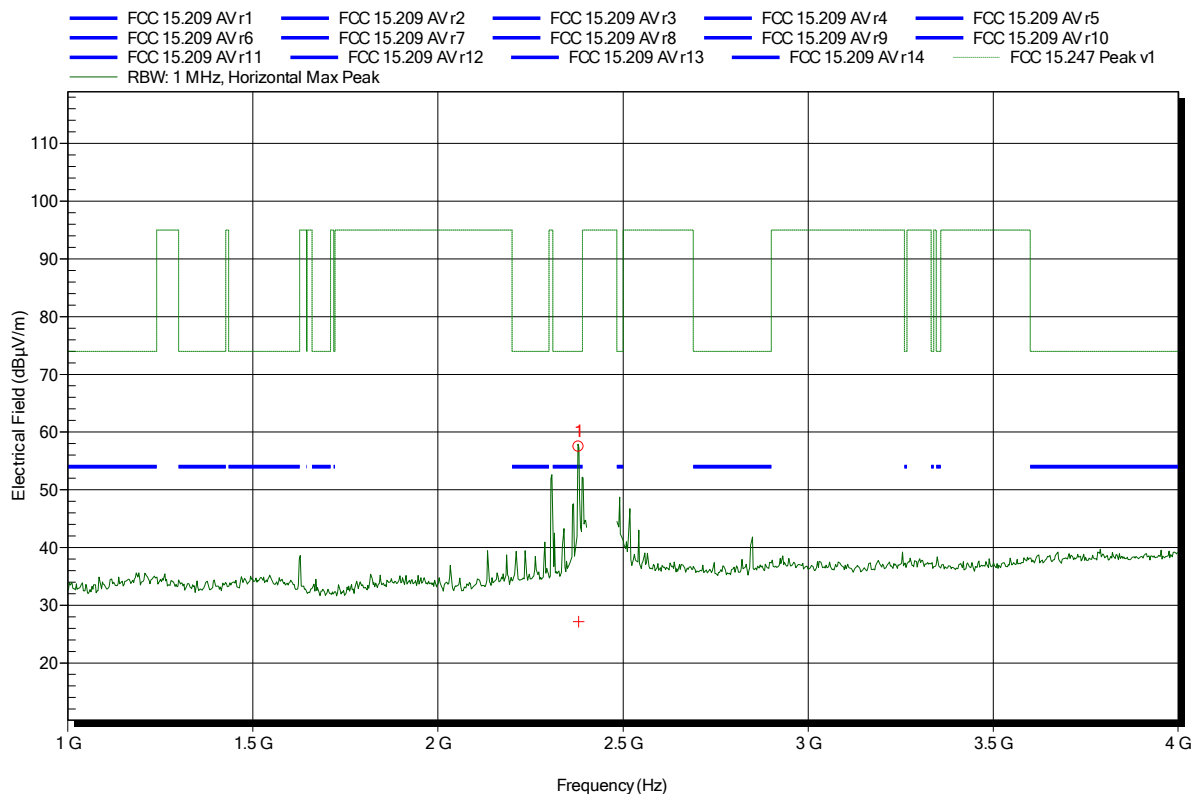
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; DUT mode: 2441MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note:

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Frequency 2.3796 GHz	Peak 57.48 dBµV/m	Peak Limit 74 dBµV/m	Peak Difference -16.52 dB	Peak Status Pass
Frequency 2.3796 GHz	Average 27.15 dBµV/m	Average Limit 54 dBµV/m	Average Difference -26.85 dB	Average Status Pass

Test Report No.: GOM-1410-4214-TFC247BT-V01

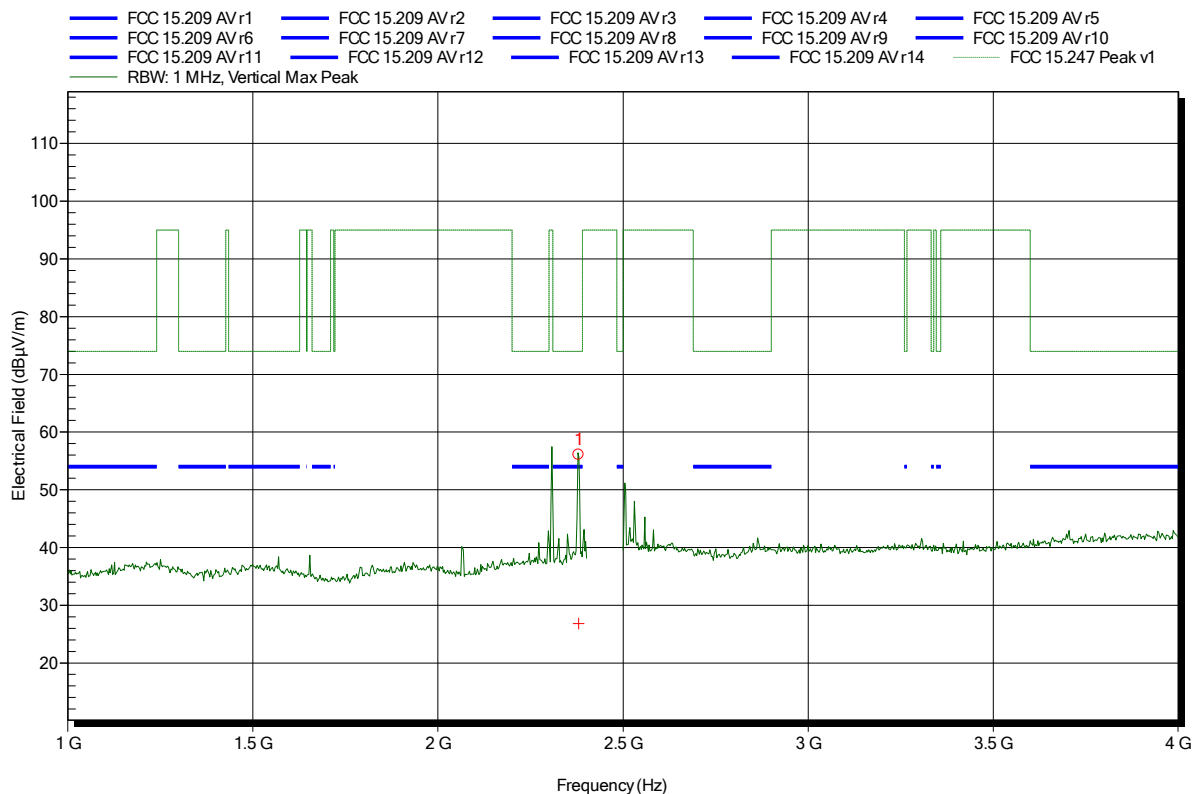
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; DUT mode: 2480MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note:

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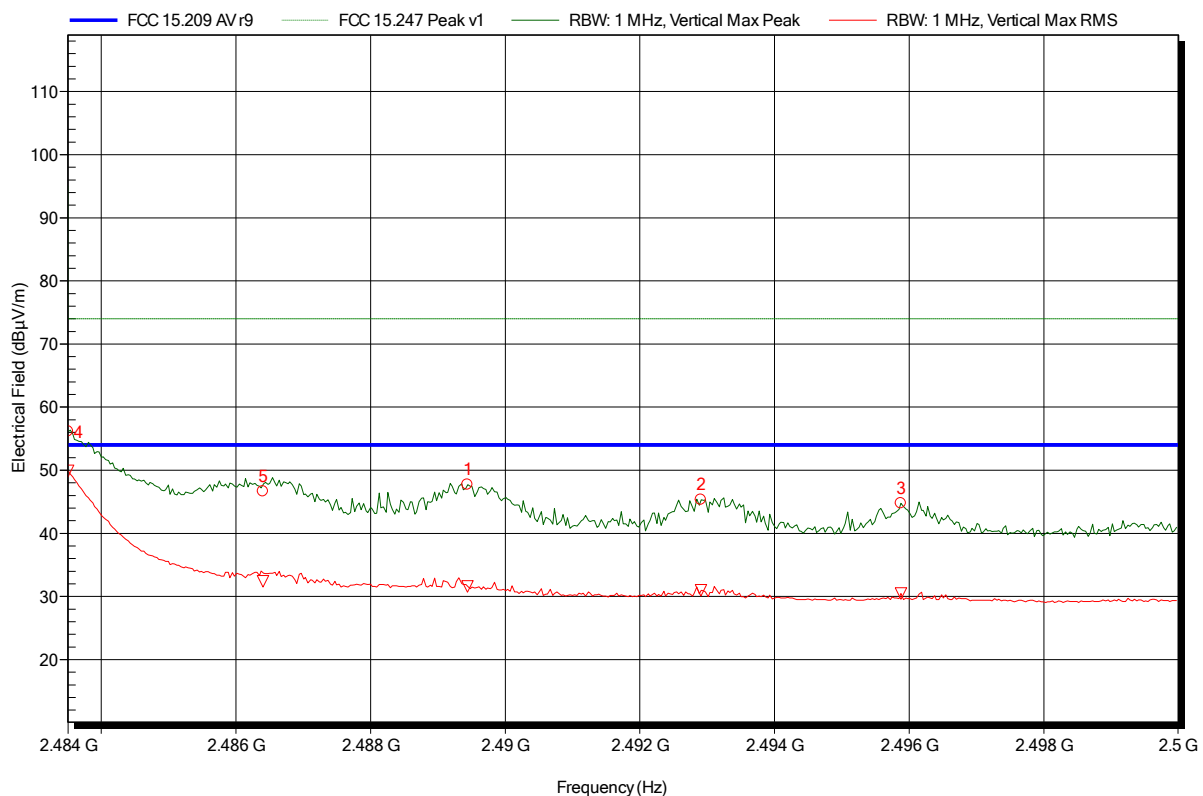
Frequency 2.38 GHz	Peak 56.06 dBµV/m	Peak Limit 74 dBµV/m	Peak Difference -17.94 dB	Peak Status Pass
Frequency 2.38 GHz	Average 26.8 dBµV/m	Average Limit 54 dBµV/m	Average Difference -27.2 dB	Average Status Pass

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; DUT mode: 2480MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note: upper bandedge

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Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.4835 GHz	56.16 dBµV/m	74 dBµV/m	-17.84 dB	Pass
2.4864 GHz	46.67 dBµV/m	74 dBµV/m	-27.33 dB	Pass
2.4894 GHz	47.71 dBµV/m	74 dBµV/m	-26.29 dB	Pass
2.4929 GHz	45.32 dBµV/m	74 dBµV/m	-28.68 dB	Pass
2.4959 GHz	44.77 dBµV/m	74 dBµV/m	-29.23 dB	Pass

Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.4835 GHz	49.92 dBµV/m	54 dBµV/m	-4.08 dB	Pass
2.4864 GHz	32.39 dBµV/m	54 dBµV/m	-21.61 dB	Pass
2.4894 GHz	31.6 dBµV/m	54 dBµV/m	-22.4 dB	Pass
2.4929 GHz	30.95 dBµV/m	54 dBµV/m	-23.05 dB	Pass
2.4959 GHz	30.46 dBµV/m	54 dBµV/m	-23.54 dB	Pass

Test Report No.: GOM-1410-4214-TFC247BT-V01

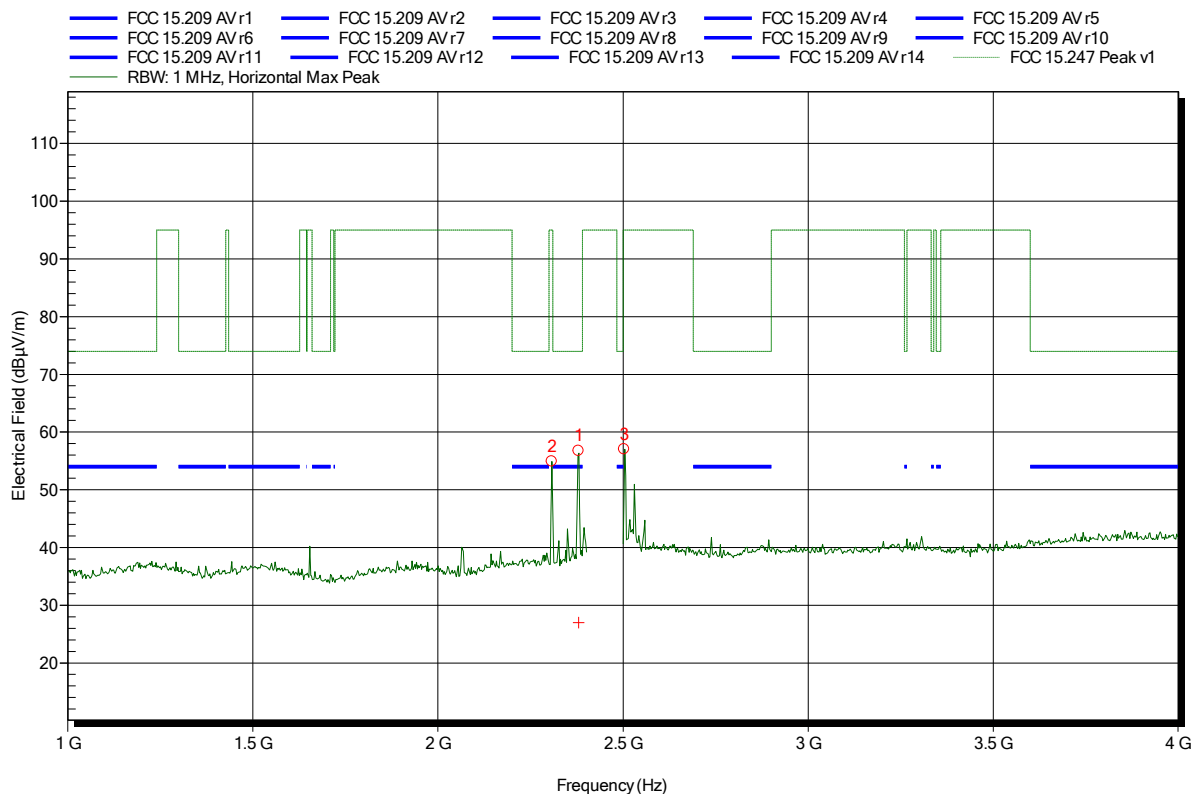
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; DUT mode: 2480MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note:

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Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.308 GHz	54.88 dBµV/m	95 dBµV/m	-40.12 dB	Pass
2.38 GHz	56.74 dBµV/m	74 dBµV/m	-17.26 dB	Pass
2.503 GHz	57 dBµV/m	95 dBµV/m	-38 dB	Pass

Frequency	Average	Average Limit	Average Difference	Average Status
2.38 GHz	26.98 dBµV/m	54 dBµV/m	-27.02 dB	Pass

Test Report No.: GOM-1410-4214-TFC247BT-V01

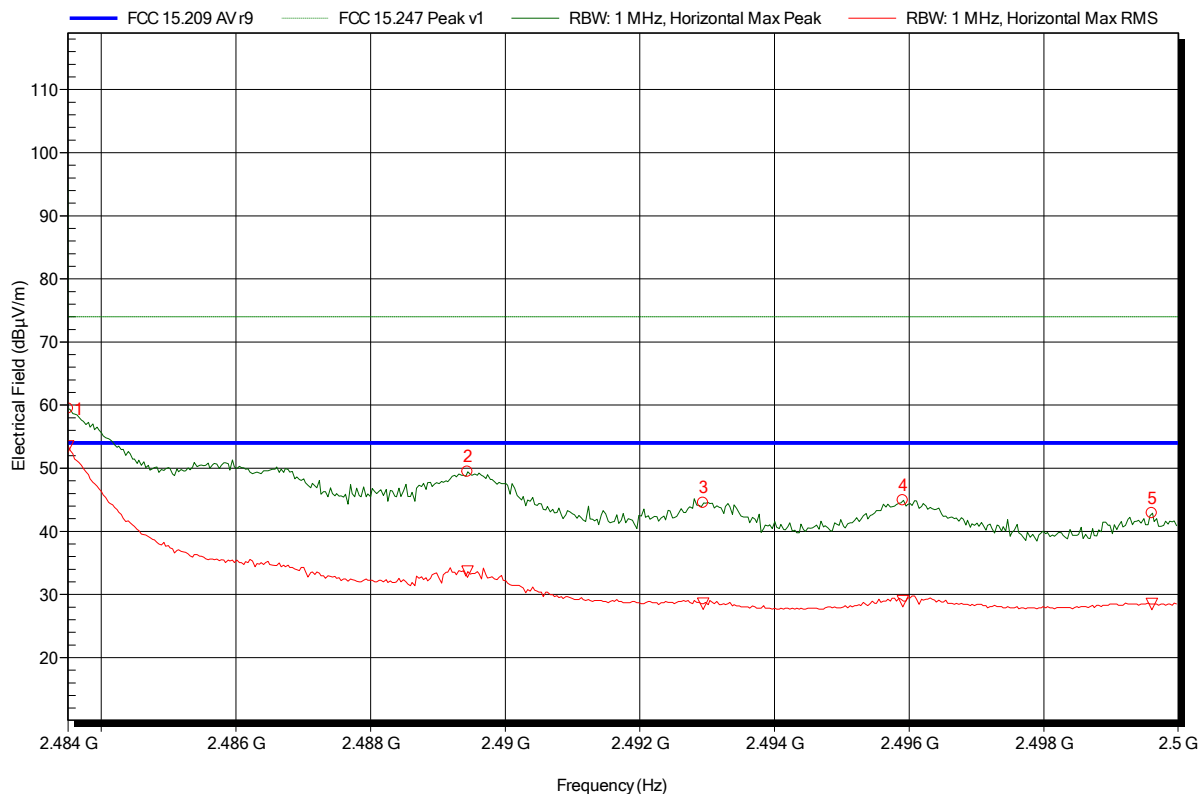
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; DUT mode: 2480MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note: upper bandedge

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Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.4835 GHz	59.44 dBµV/m	74 dBµV/m	-14.56 dB	Pass
2.4894 GHz	49.45 dBµV/m	74 dBµV/m	-24.55 dB	Pass
2.4929 GHz	44.48 dBµV/m	74 dBµV/m	-29.52 dB	Pass
2.4959 GHz	44.91 dBµV/m	74 dBµV/m	-29.09 dB	Pass
2.4996 GHz	42.87 dBµV/m	74 dBµV/m	-31.13 dB	Pass

Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.4835 GHz	53.45 dBµV/m	54 dBµV/m	-0.55 dB	Pass
2.4894 GHz	33.6 dBµV/m	54 dBµV/m	-20.4 dB	Pass
2.4929 GHz	28.55 dBµV/m	54 dBµV/m	-25.45 dB	Pass
2.4959 GHz	28.94 dBµV/m	54 dBµV/m	-25.06 dB	Pass
2.4996 GHz	28.47 dBµV/m	54 dBµV/m	-25.53 dB	Pass

Test Report No.: GOM-1410-4214-TFC247BT-V01

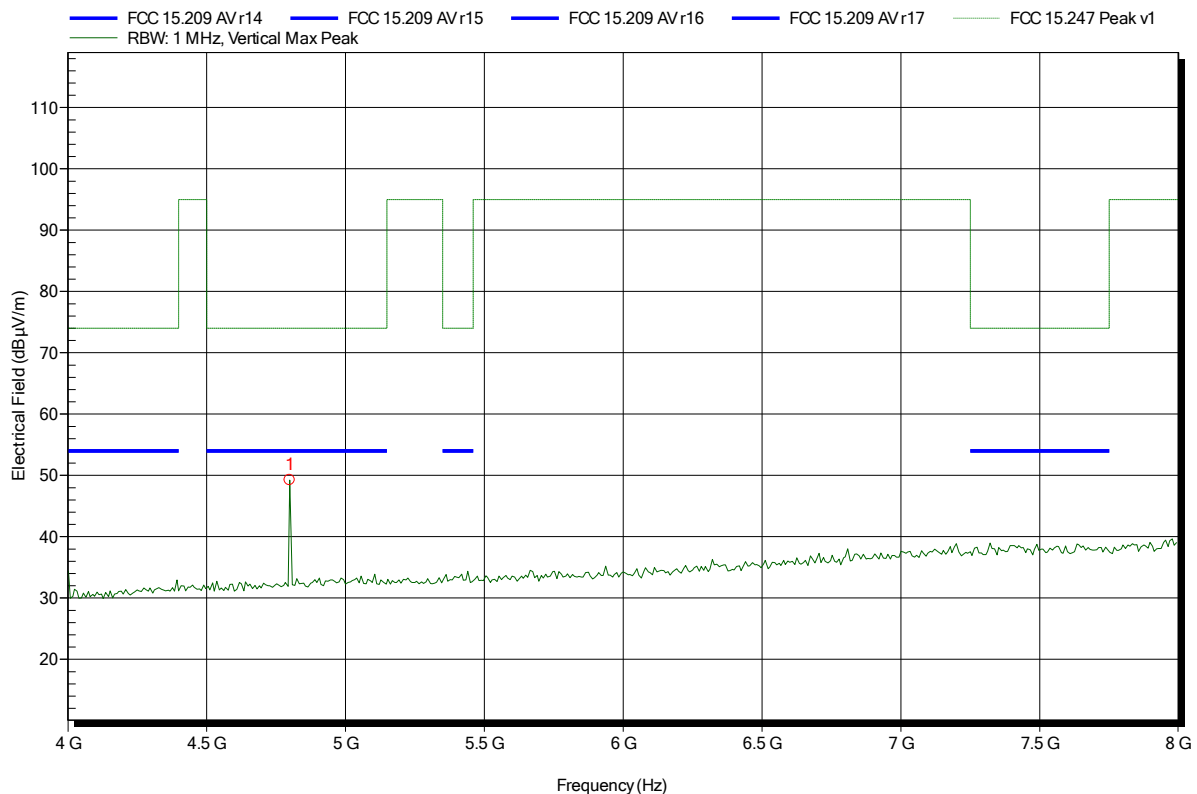
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2402MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note: EUT horizontal

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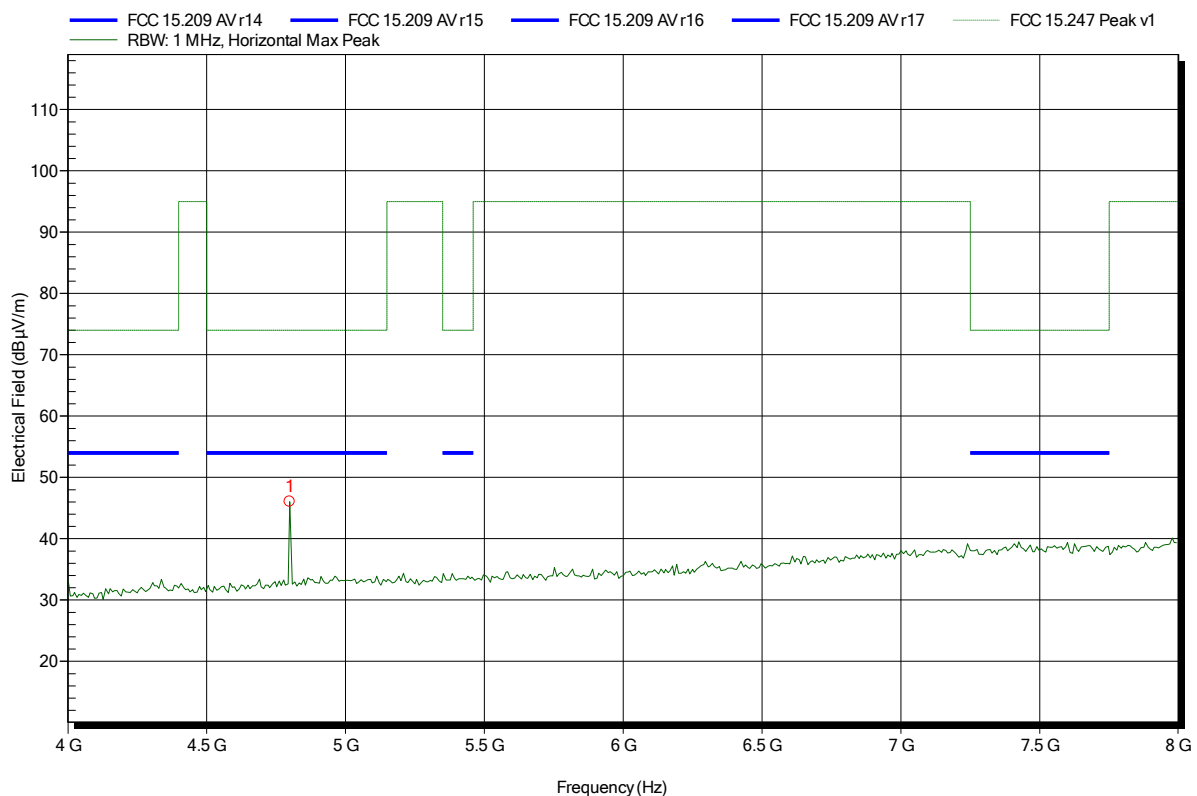
Frequency	Peak	Peak Limit	Peak Difference	Status
4.8 GHz	49.24 dBµV/m	74 dBµV/m	-24.76 dB	Pass

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2402MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note: EUT horizontal

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Frequency	Peak	Peak Limit	Peak Difference	Status
4.8 GHz	46.05 dBµV/m	74 dBµV/m	-27.95 dB	Pass

Test Report No.: GOM-1410-4214-TFC247BT-V01

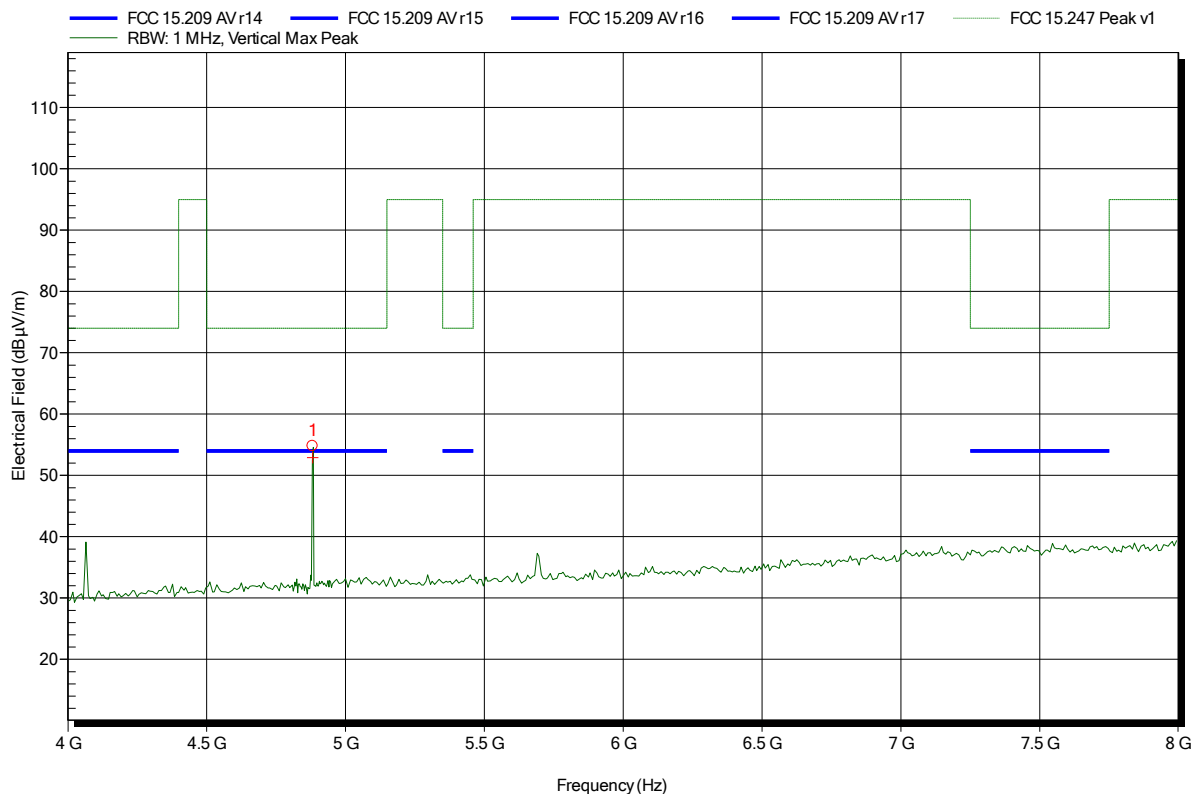
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2441MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note: EUT horizontal

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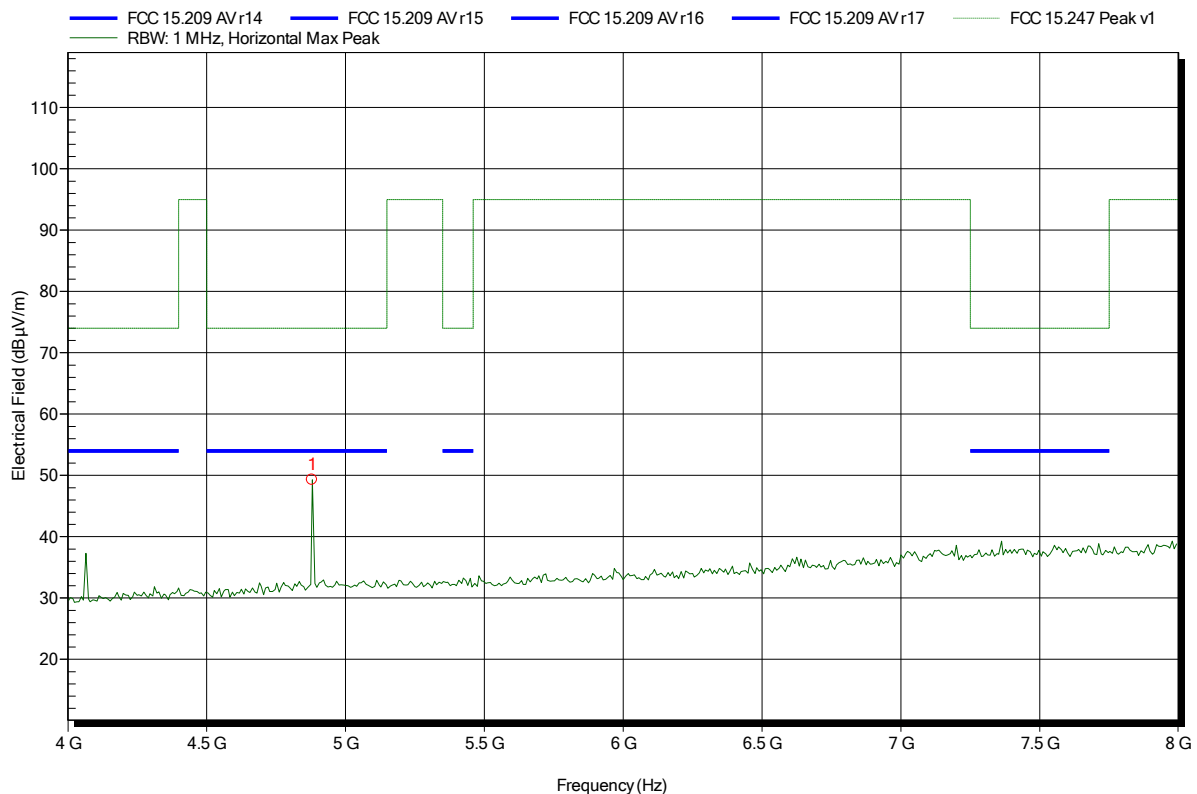
Frequency 4.882 GHz	Peak 54.8 dBµV/m	Peak Limit 74 dBµV/m	Peak Difference -19.2 dB	Status Pass
Frequency 4.882 GHz	Average 52.92 dBµV/m	Average Limit 54 dBµV/m	Average Difference -1.08 dB	Average Status Pass

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2441MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note:

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Frequency	Peak	Peak Limit	Peak Difference	Status
4.88 GHz	49.31 dBµV/m	74 dBµV/m	-24.69 dB	Pass

Test Report No.: GOM-1410-4214-TFC247BT-V01

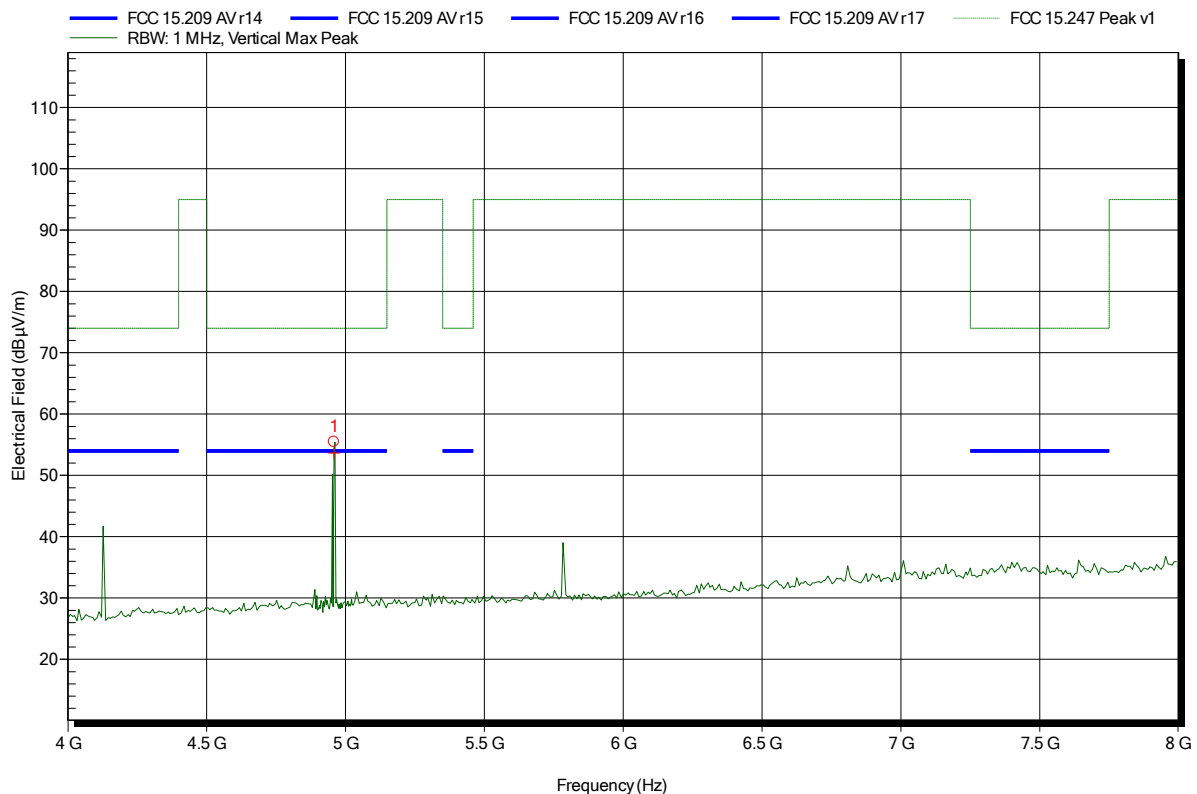
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2480MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note: EUT horizontal

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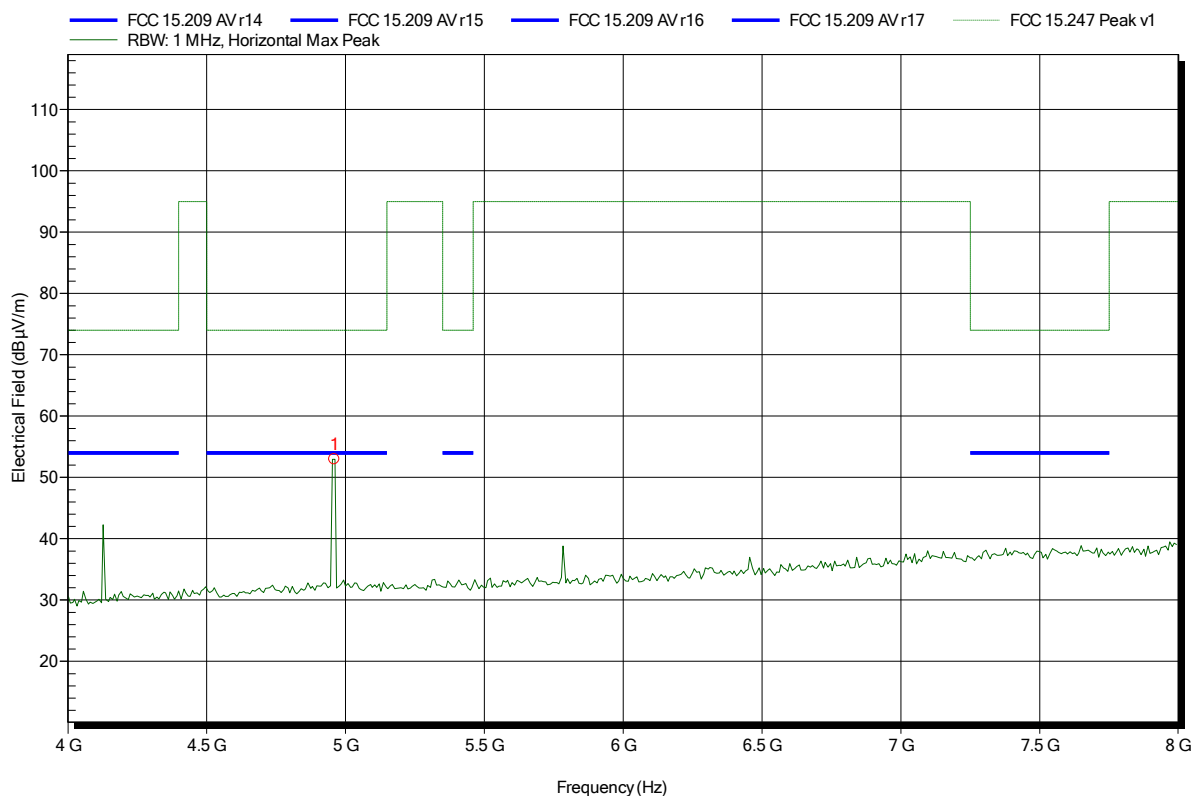
Frequency 4.96 GHz	Peak 55.47 dBµV/m	Peak Limit 74 dBµV/m	Peak Difference -18.53 dB	Status Pass
Frequency 4.96 GHz	Average 53.62 dBµV/m	Average Limit 54 dBµV/m	Average Difference -0.38 dB	Average Status Pass

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2480MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note:

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Frequency	Peak	Peak Limit	Peak Difference	Status
4.96 GHz	52.97 dBµV/m	74 dBµV/m	-21.03 dB	Pass

Test Report No.: GOM-1410-4214-TFC247BT-V01

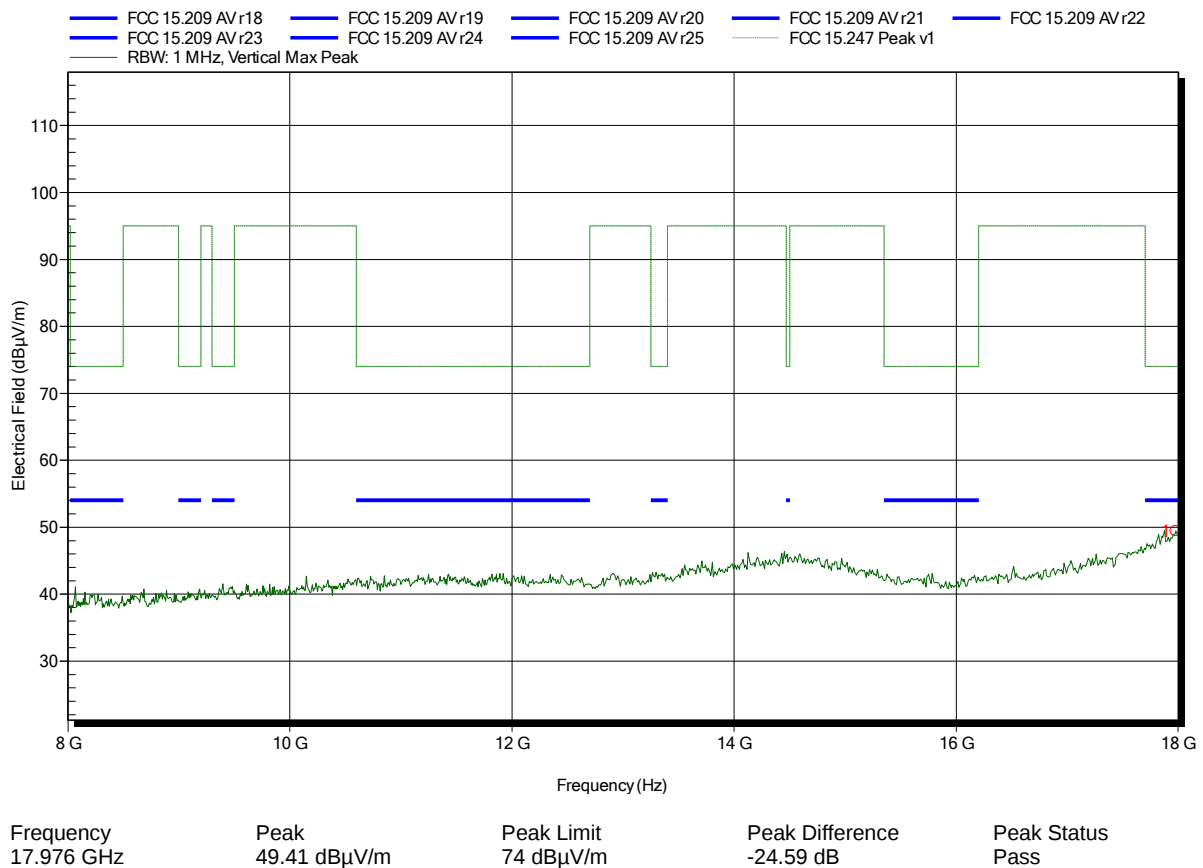
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2402MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note: EUT horizontal

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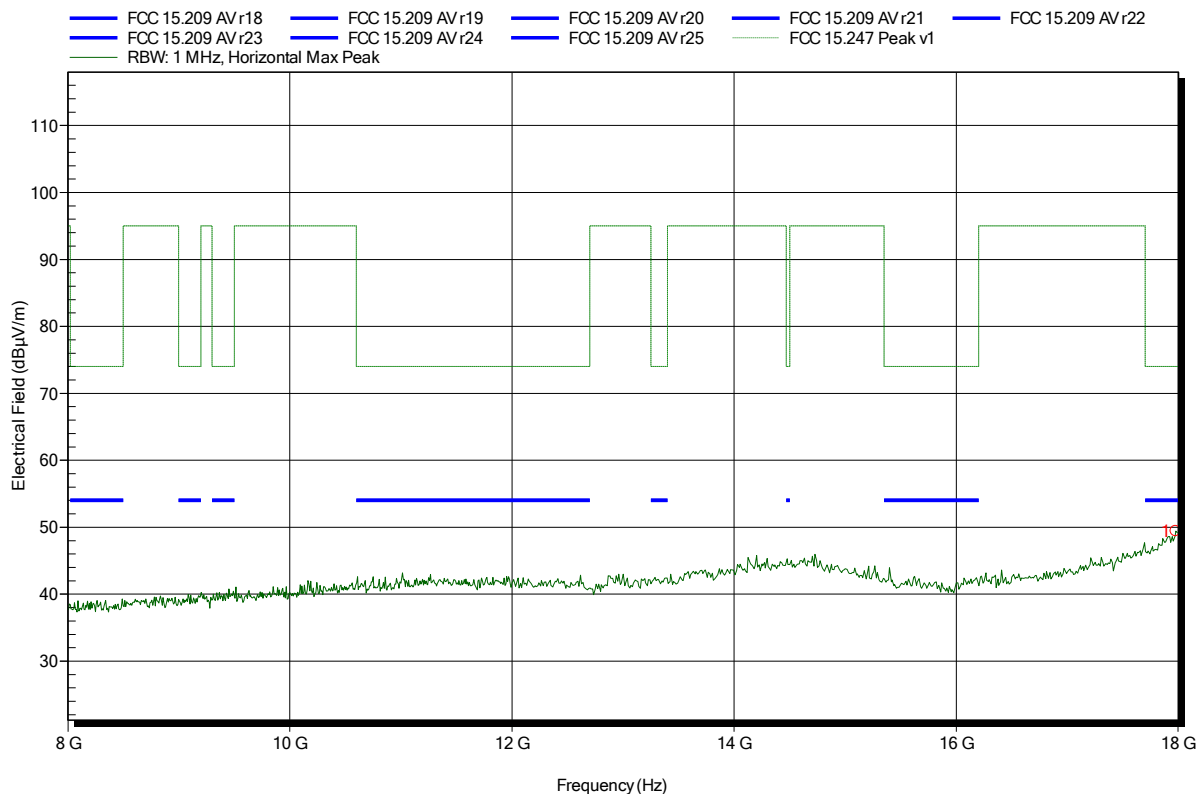


Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2402MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note:

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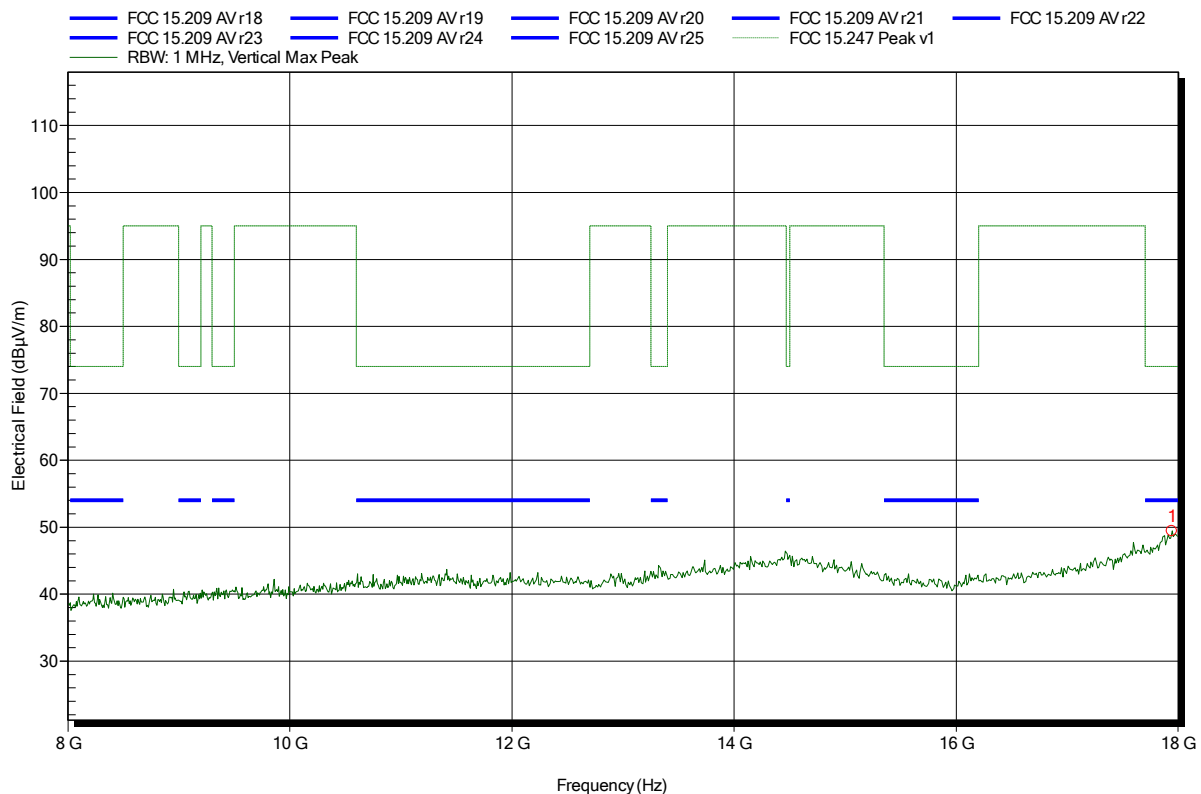
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
17.976 GHz	49.43 dBµV/m	74 dBµV/m	-24.57 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2441MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note: EUT horizontal

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Frequency	Peak	Peak Limit	Peak Difference	Peak Status
17.94 GHz	49.43 dBµV/m	74 dBµV/m	-24.57 dB	Pass

Test Report No.: G0M-1410-4214-TFC247BT-V01

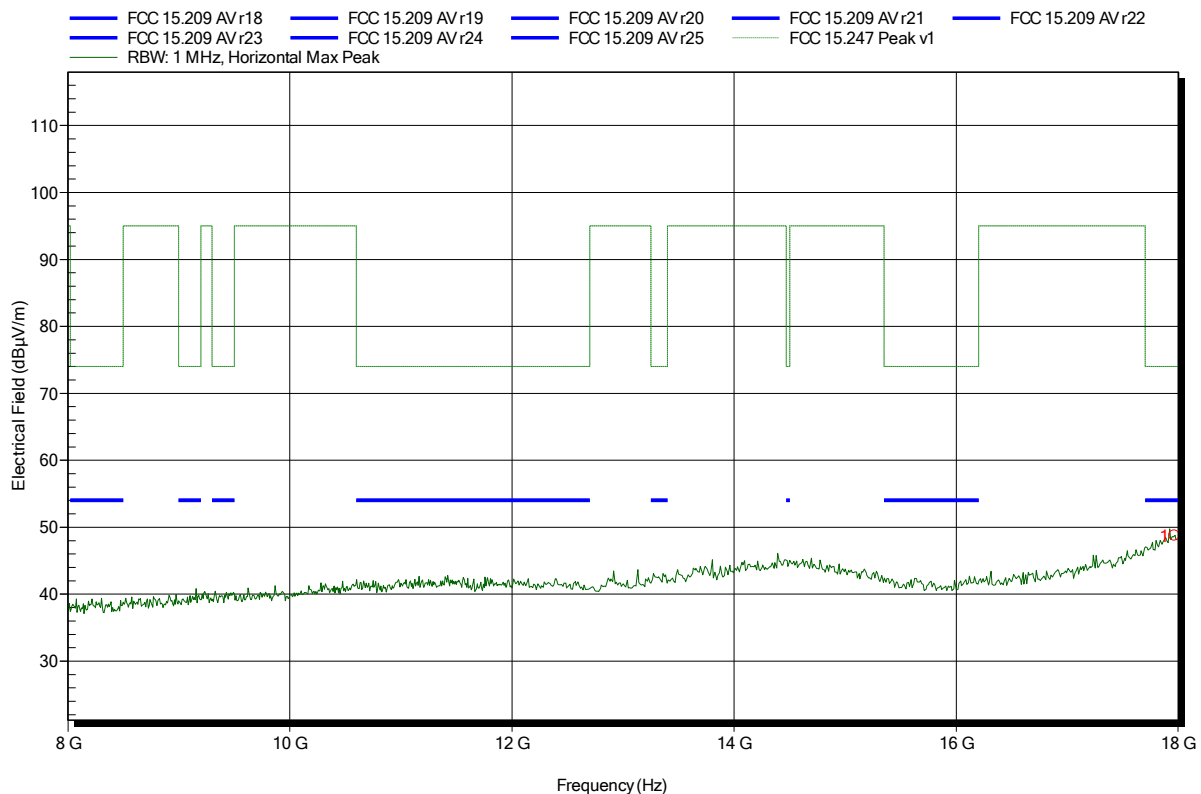
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2441MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note:

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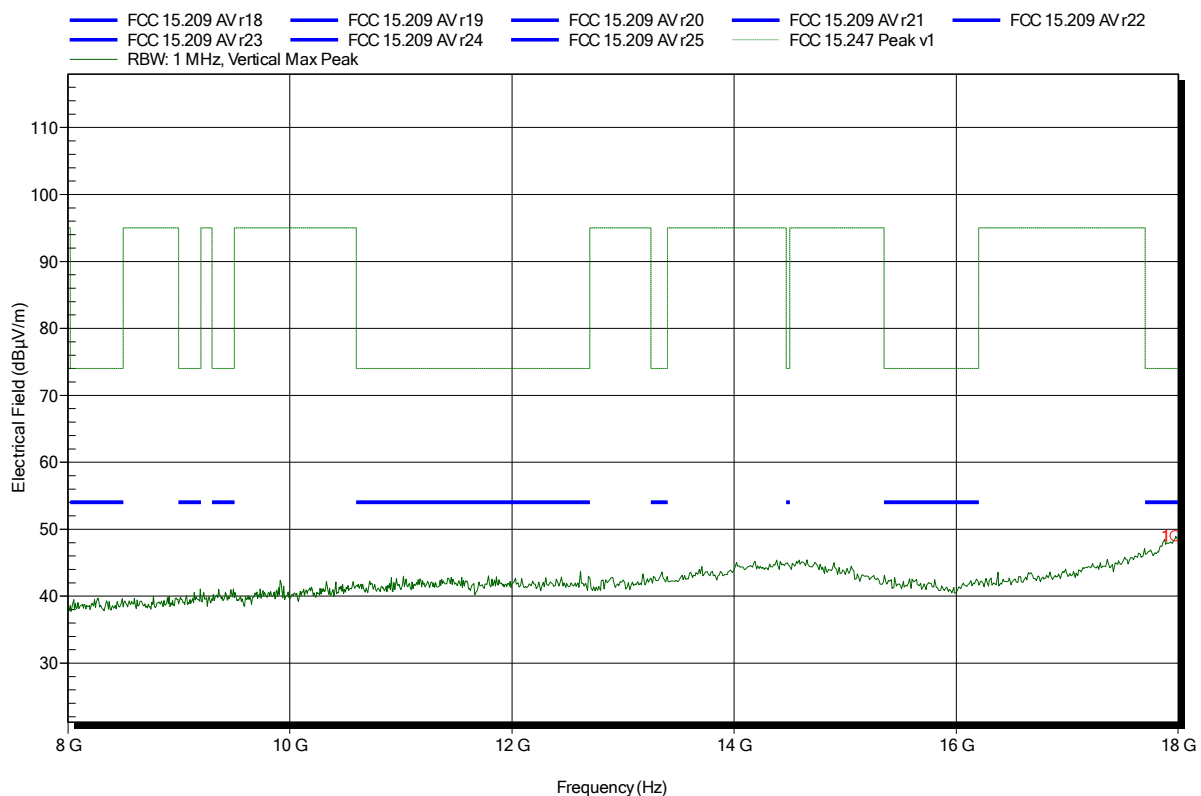
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
17.964 GHz	48.76 dBµV/m	74 dBµV/m	-25.24 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2480MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note: EUT horizontal

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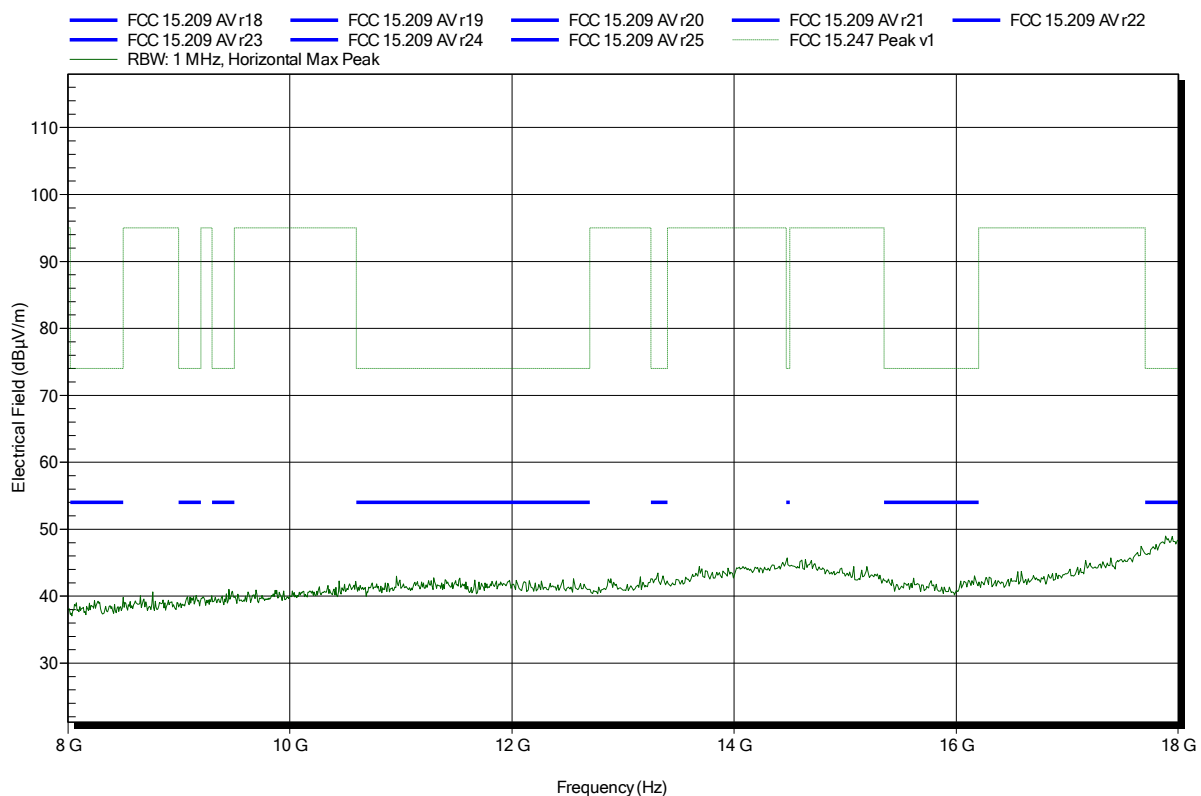
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
17.976 GHz	48.94 dBµV/m	74 dBµV/m	-25.06 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2480MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note:

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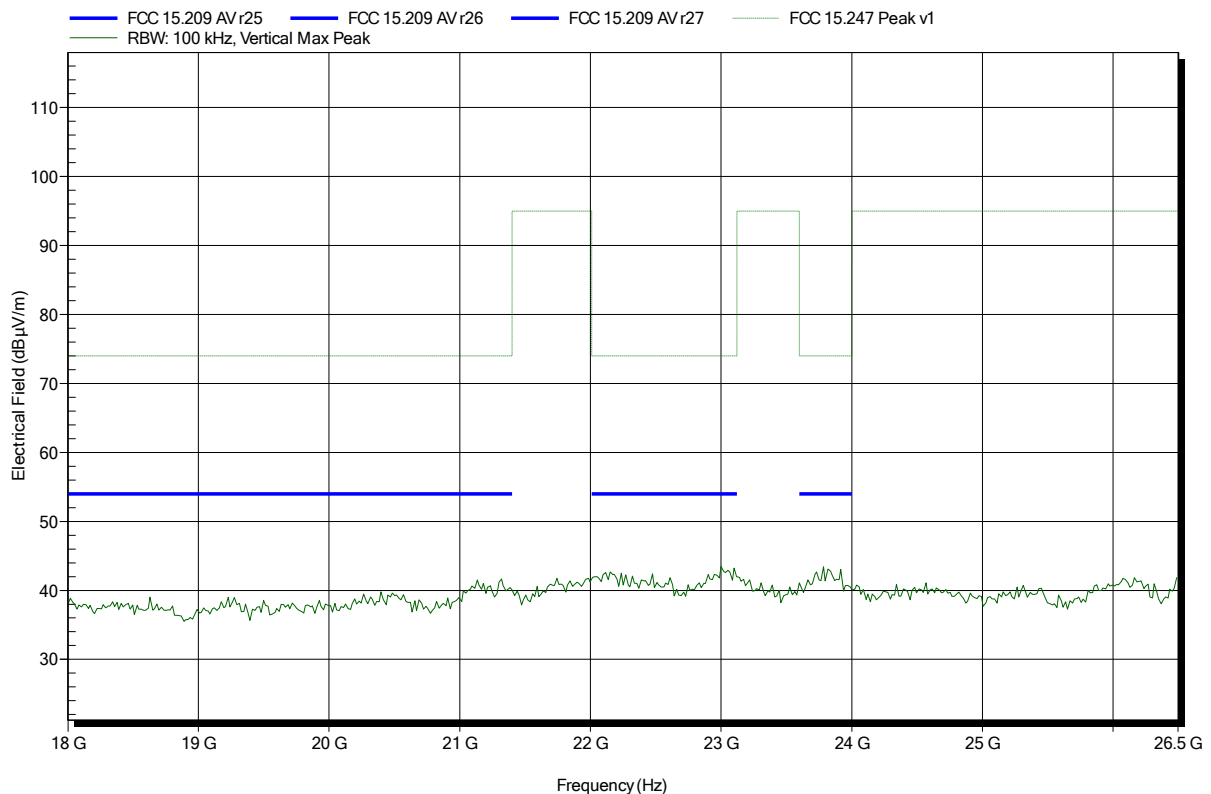


Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant:	Leica Geosystems GmbH
EUT Name:	Bluetooth, WLAN and BLE Modul
Model:	TiWi-BLE (Inwave BTFA-2450)
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Handrik
Test Conditions:	Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
Antenna:	Rohde & Schwarz HL 025, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; DUT mode: 2402MHz, DH5, Pmax
Test Date:	2015-03-06
Note:	EUT horizontal

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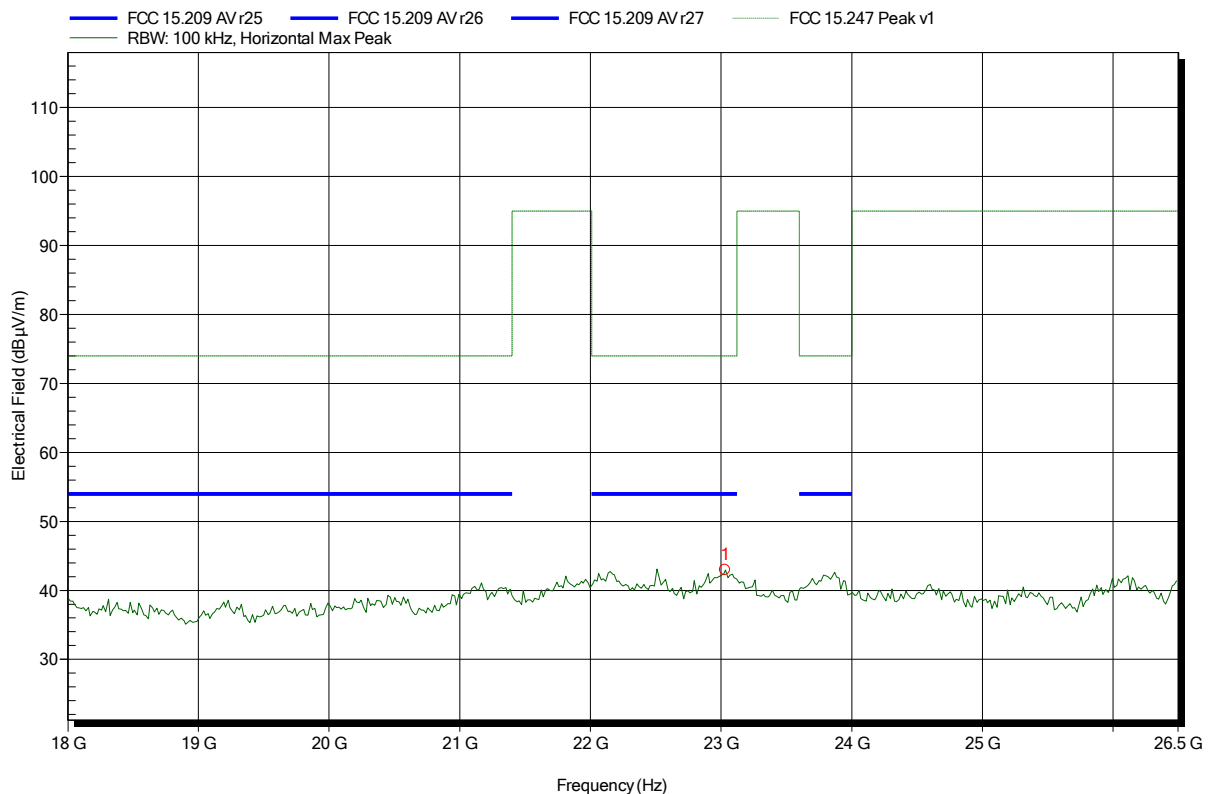


Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Rohde & Schwarz HL 025, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2402MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note:

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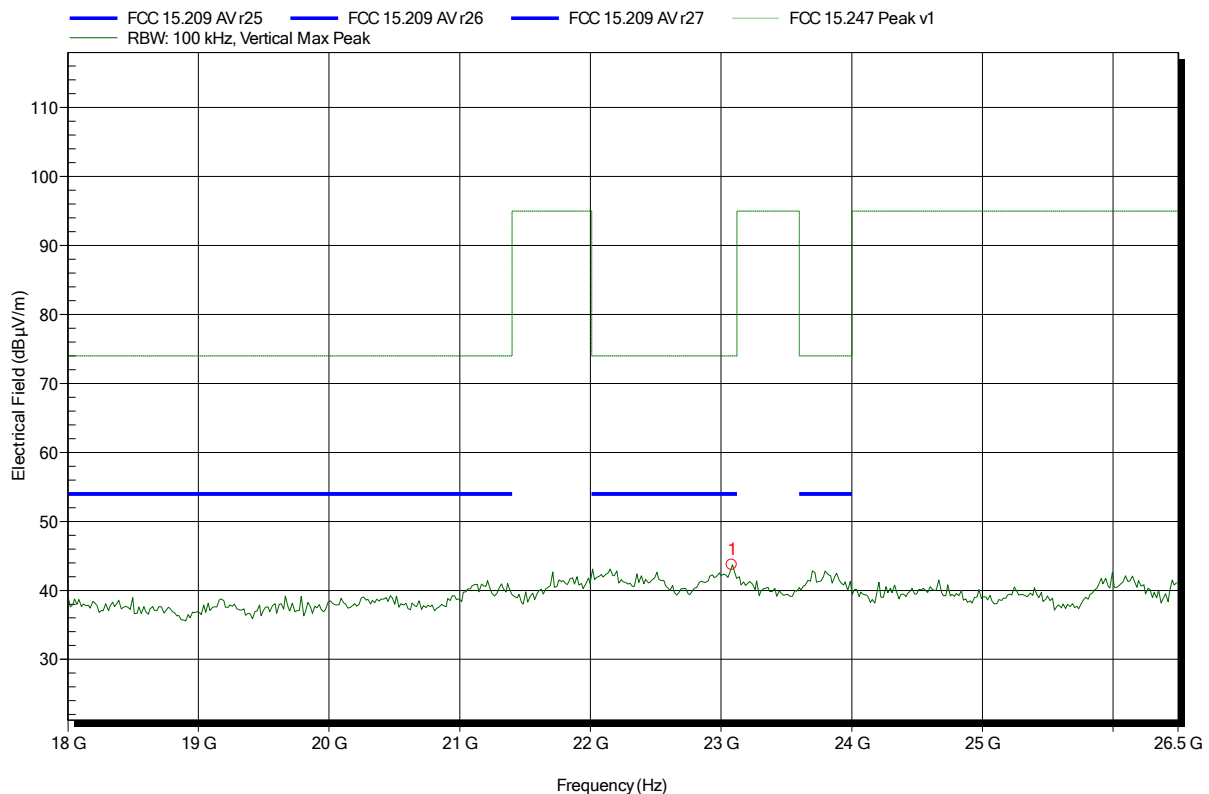
Frequency	Peak	Peak Limit	Peak Difference	Status
23.032 GHz	42.96 dBµV/m	74 dBµV/m	-31.04 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Rohde & Schwarz HL 025, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2441MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note: EUT horizontal

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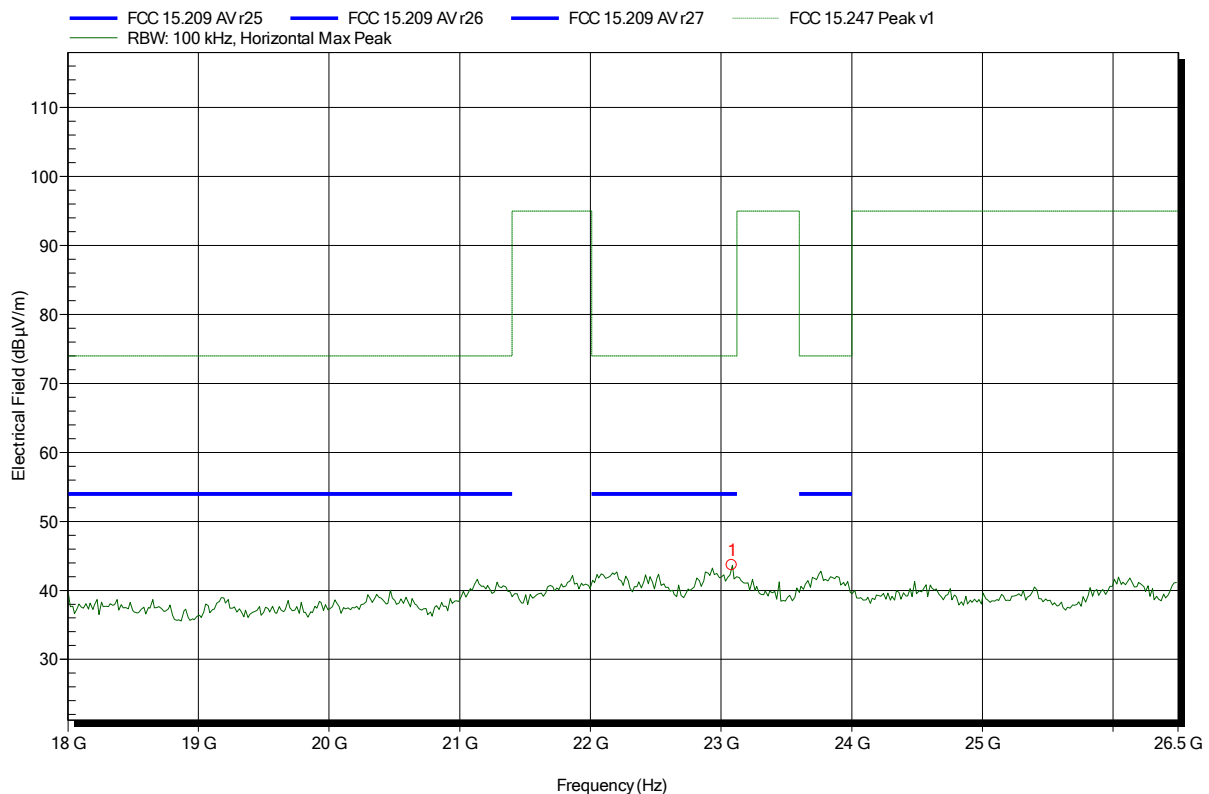
Frequency	Peak	Peak Limit	Peak Difference	Status
23.083 GHz	43.69 dBµV/m	74 dBµV/m	-30.31 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Rohde & Schwarz HL 025, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2441MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note:

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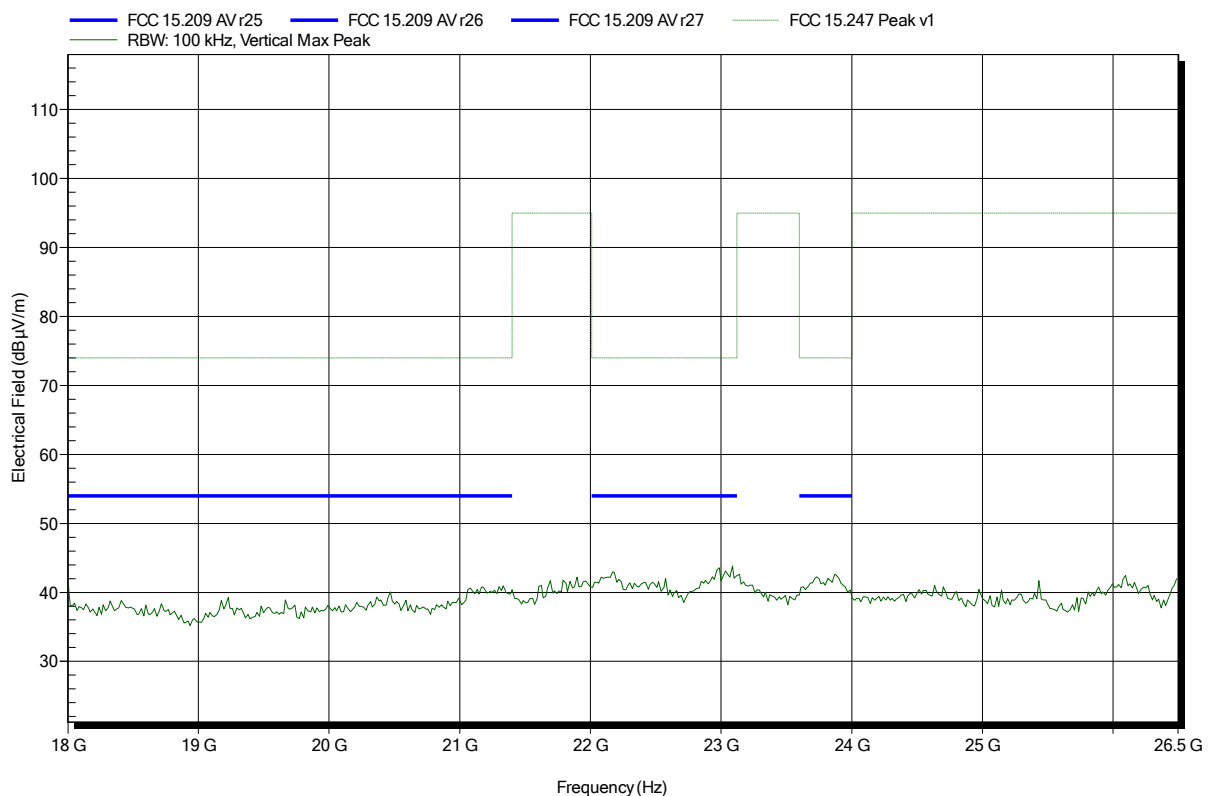
Frequency	Peak	Peak Limit	Peak Difference	Status
23.083 GHz	43.65 dBµV/m	74 dBµV/m	-30.35 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Rohde & Schwarz HL 025, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2480MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note: EUT horizontal

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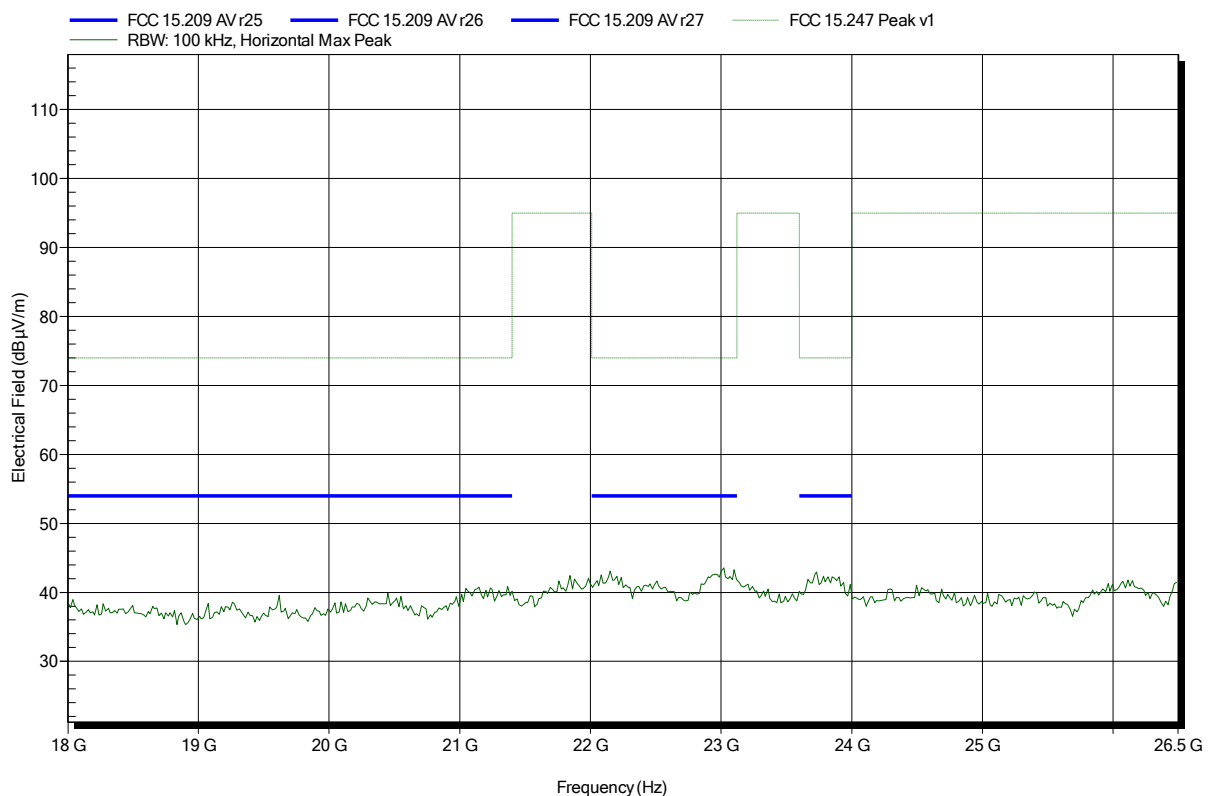


Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Rohde & Schwarz HL 025, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2480MHz, DH5, Pmax
 Test Date: 2015-03-06
 Note:

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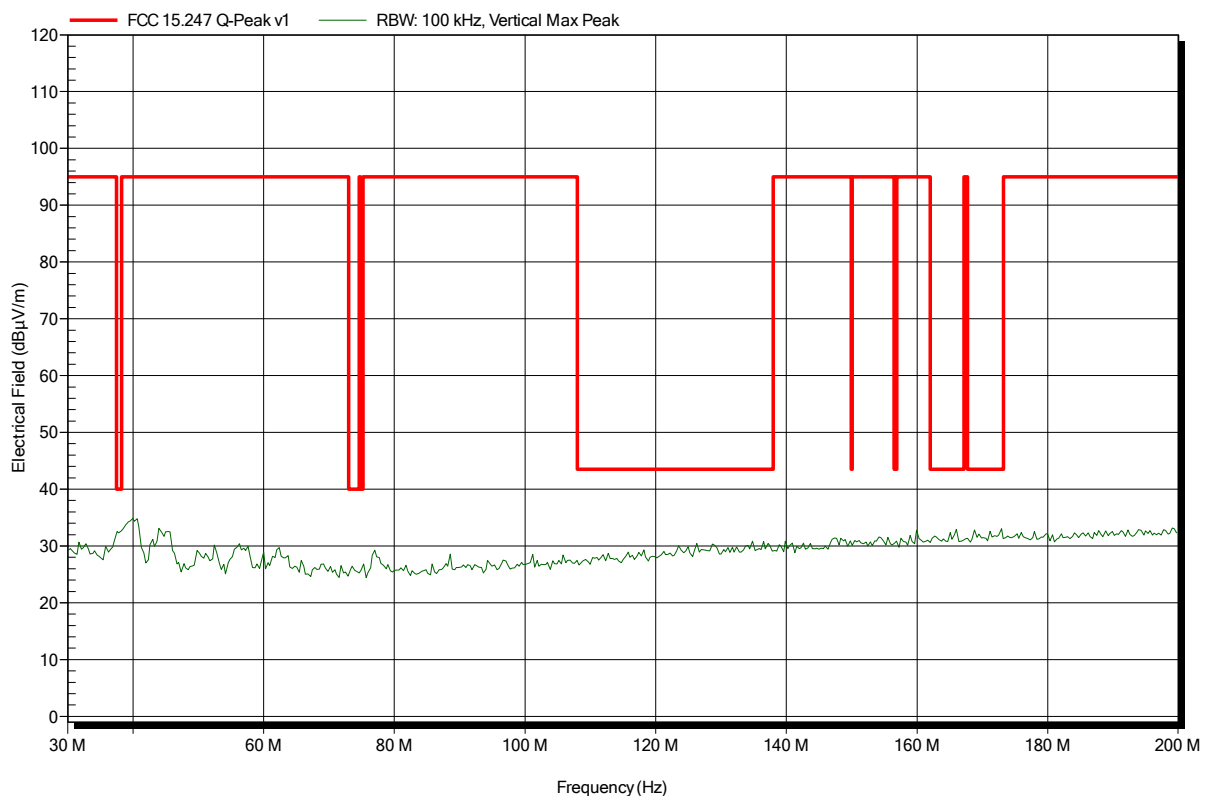


Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: TX; DUT mode: 2402MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note:

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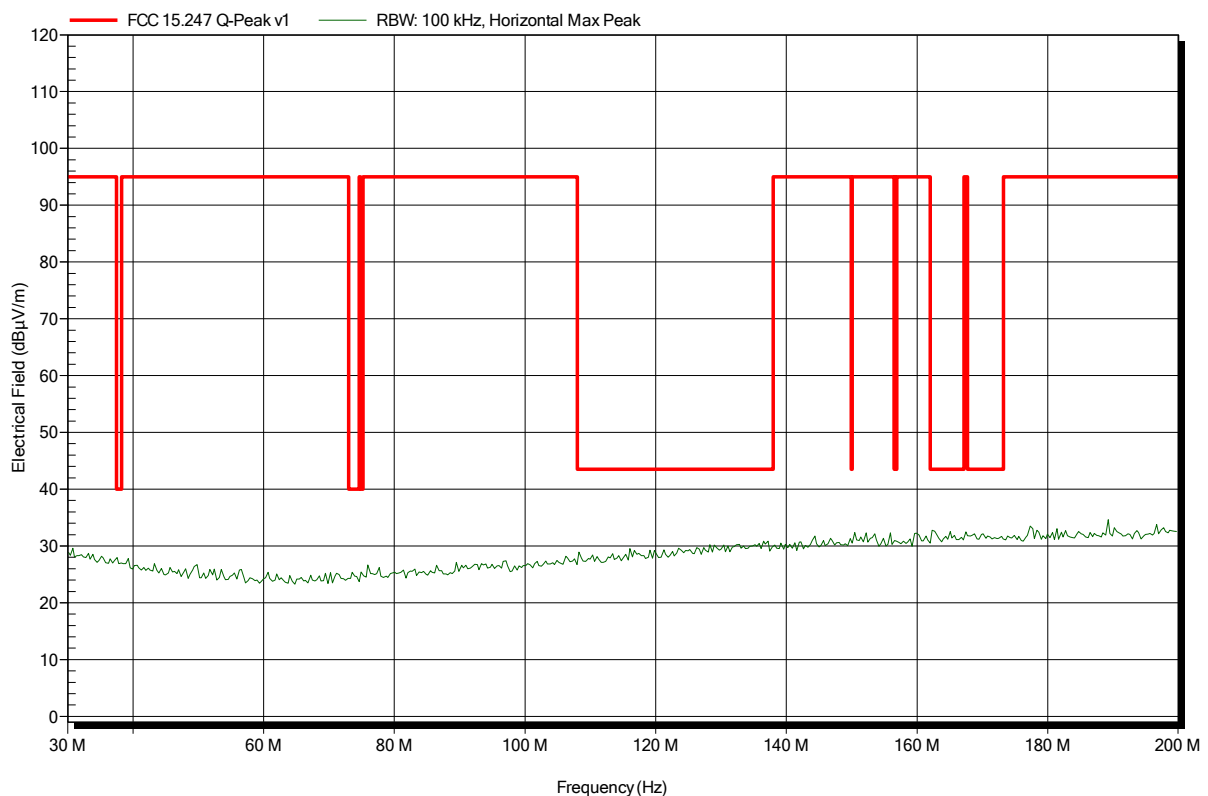


Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant:	Leica Geosystems GmbH
EUT Name:	Bluetooth, WLAN and BLE Modul
Model:	TiWi-BLE (Inwave BTFA-2450)
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Handrik
Test Conditions:	Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	TX; DUT mode: 2402MHz, 3-DH5, Pmax
Test Date:	2015-03-06
Note:	

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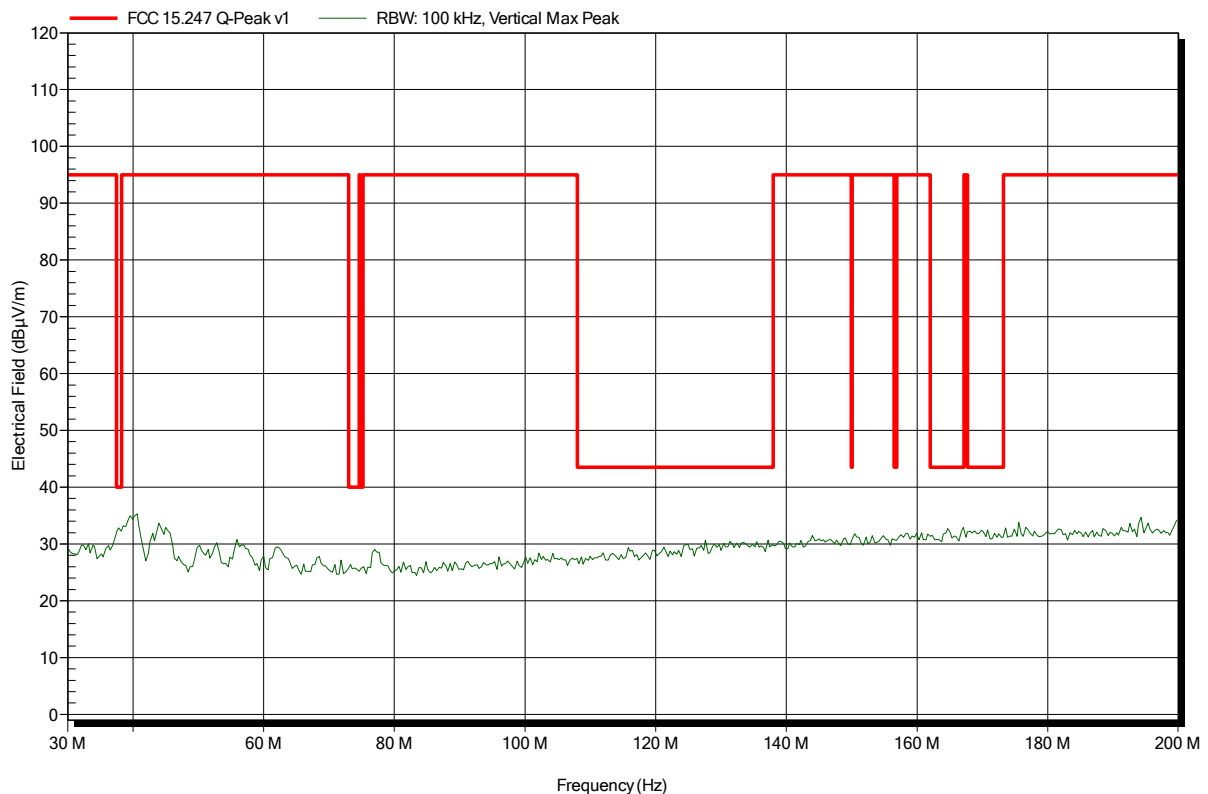


Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: TX; DUT mode: 2441MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note:

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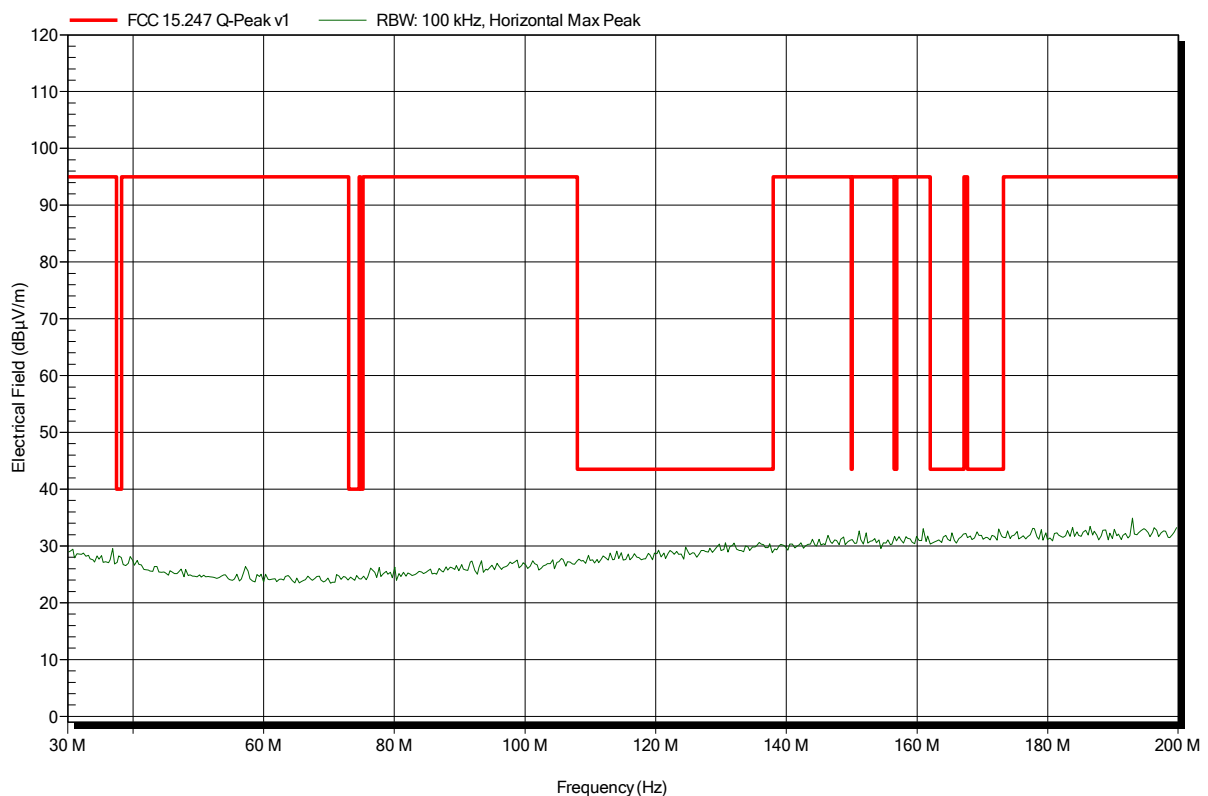


Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant:	Leica Geosystems GmbH
EUT Name:	Bluetooth, WLAN and BLE Modul
Model:	TiWi-BLE (Inwave BTFA-2450)
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Handrik
Test Conditions:	Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	TX; DUT mode: 2441MHz, 3-DH5, Pmax
Test Date:	2015-03-06
Note:	

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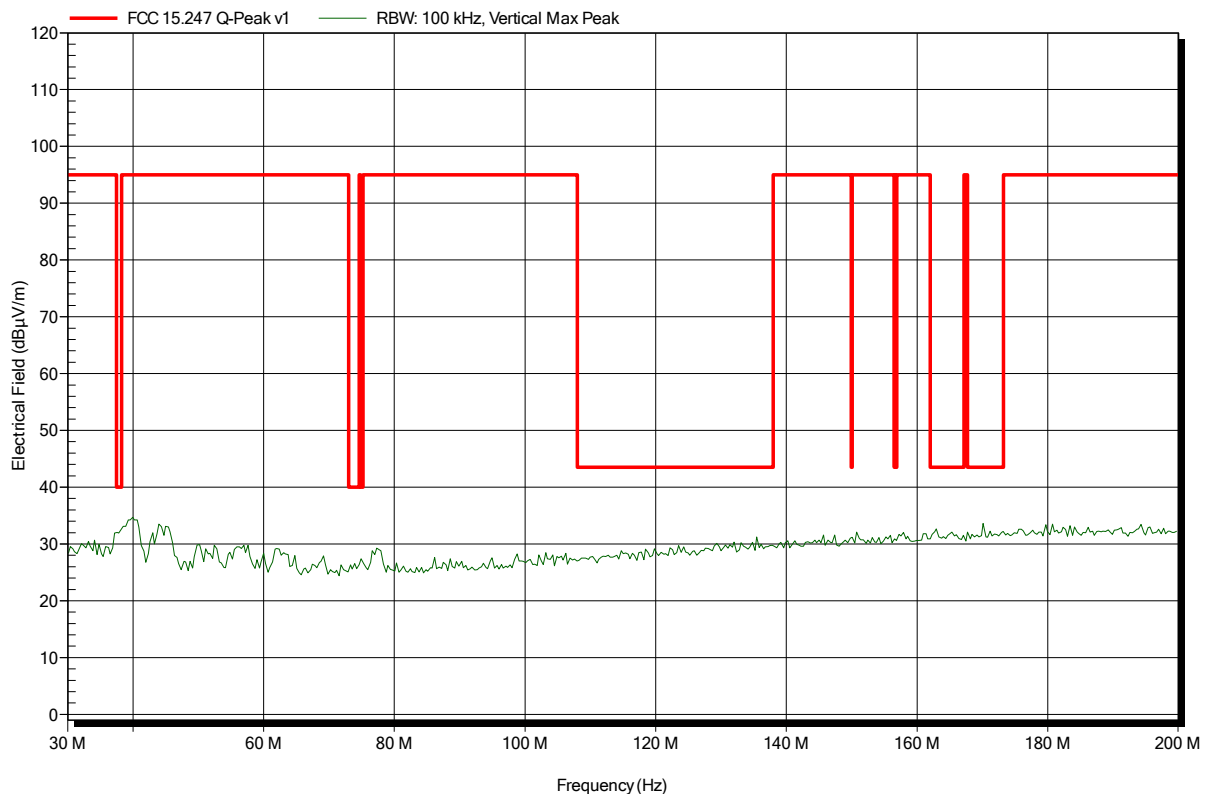


Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant:	Leica Geosystems GmbH
EUT Name:	Bluetooth, WLAN and BLE Modul
Model:	TiWi-BLE (Inwave BTFA-2450)
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Handrik
Test Conditions:	Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3 m
Mode:	TX; DUT mode: 2480MHz, 3-DH5, Pmax
Test Date:	2015-03-06
Note:	

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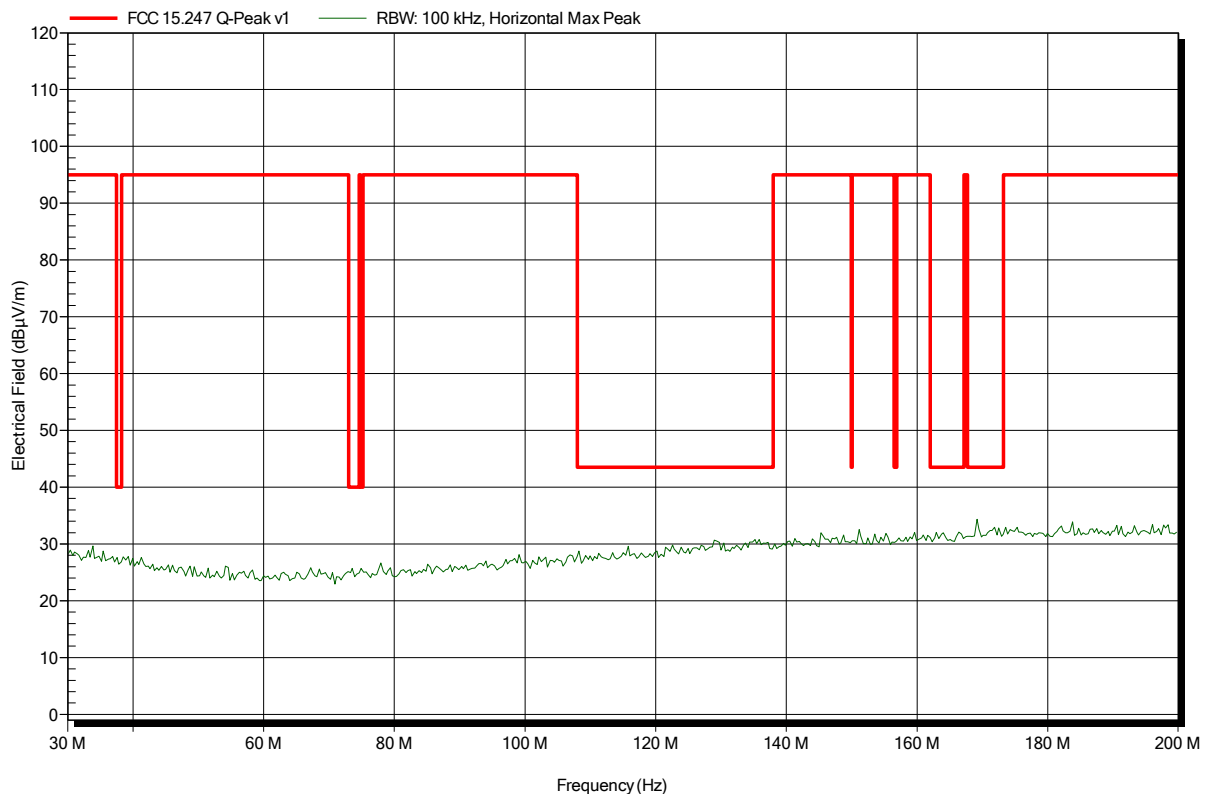


Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant:	Leica Geosystems GmbH
EUT Name:	Bluetooth, WLAN and BLE Modul
Model:	TiWi-BLE (Inwave BTFA-2450)
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Handrik
Test Conditions:	Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	TX; DUT mode: 2480MHz, 3-DH5, Pmax
Test Date:	2015-03-06
Note:	

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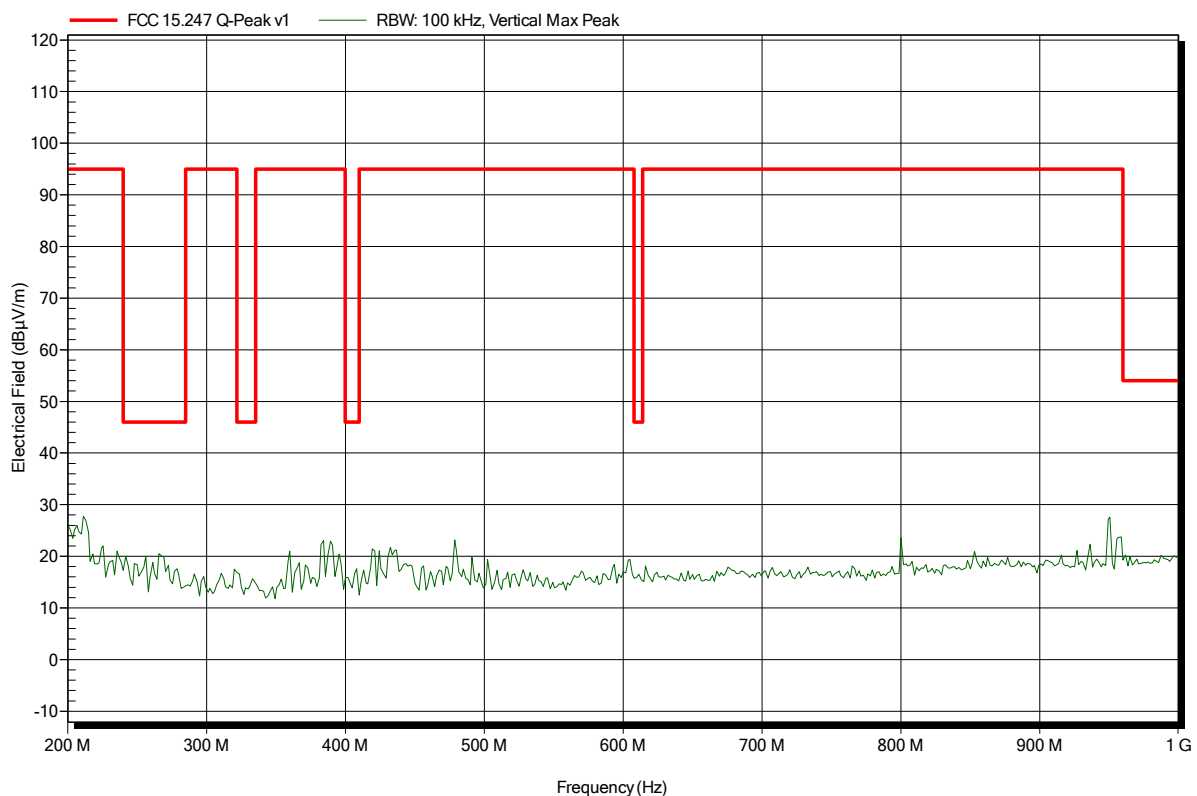


Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: TX; DUT mode: 2402MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note:

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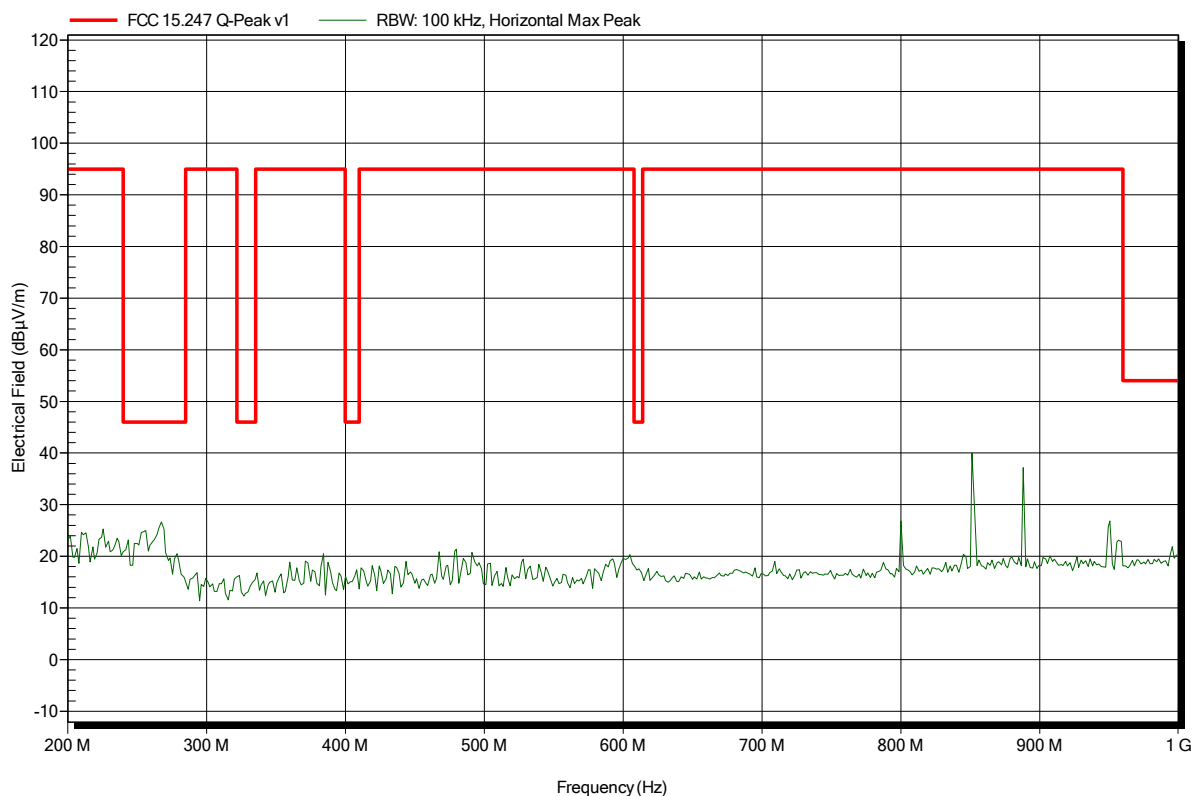


Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant:	Leica Geosystems GmbH
EUT Name:	Bluetooth, WLAN and BLE Modul
Model:	TiWi-BLE (Inwave BTFA-2450)
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Handrik
Test Conditions:	Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	TX; DUT mode: 2402MHz, 3-DH5, Pmax
Test Date:	2015-03-06
Note:	

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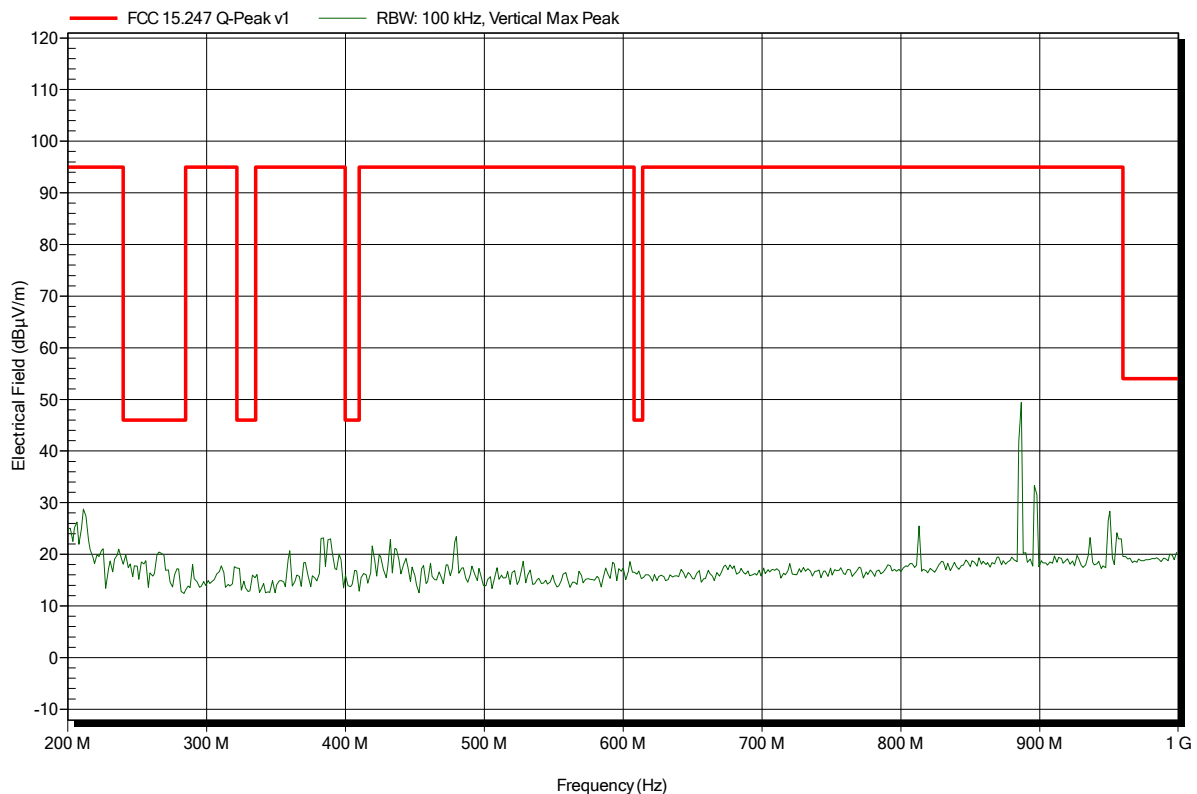


Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant:	Leica Geosystems GmbH
EUT Name:	Bluetooth, WLAN and BLE Modul
Model:	TiWi-BLE (Inwave BTFA-2450)
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Handrik
Test Conditions:	Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	TX; DUT mode: 2441MHz, 3-DH5, Pmax
Test Date:	2015-03-06
Note:	

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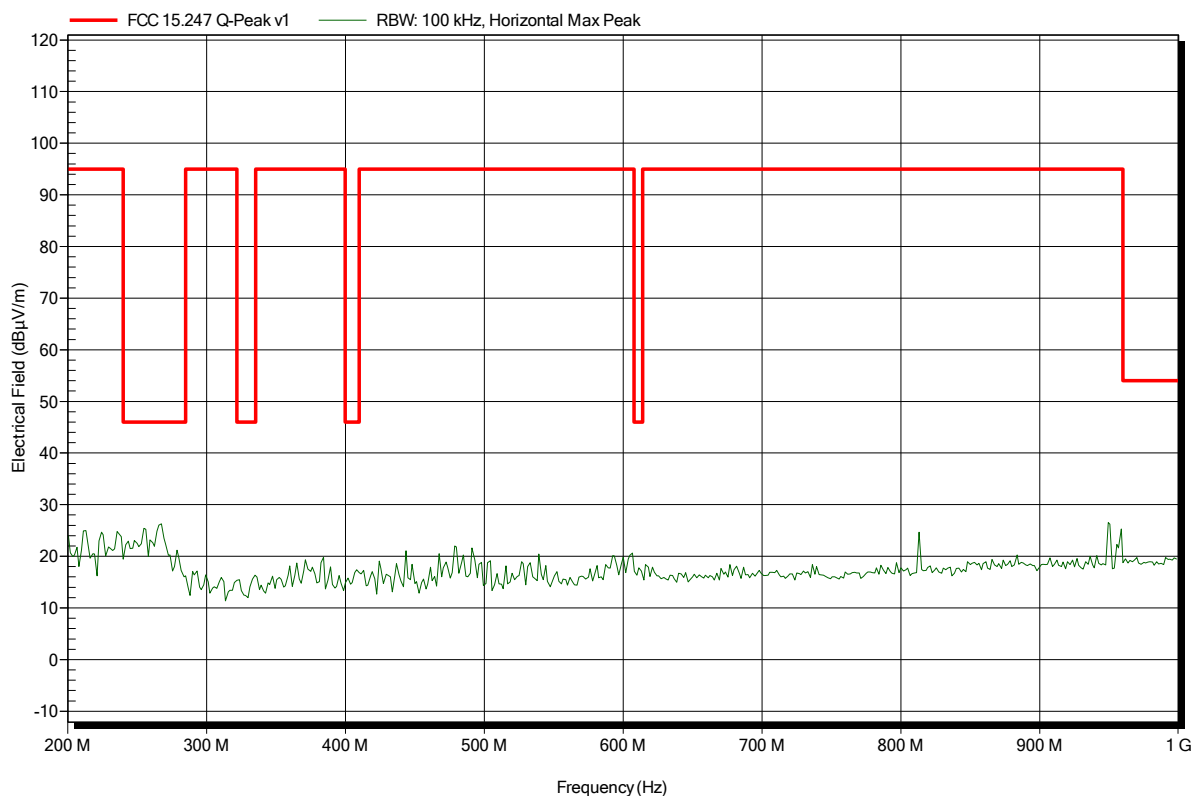


Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: TX; DUT mode: 2441MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note:

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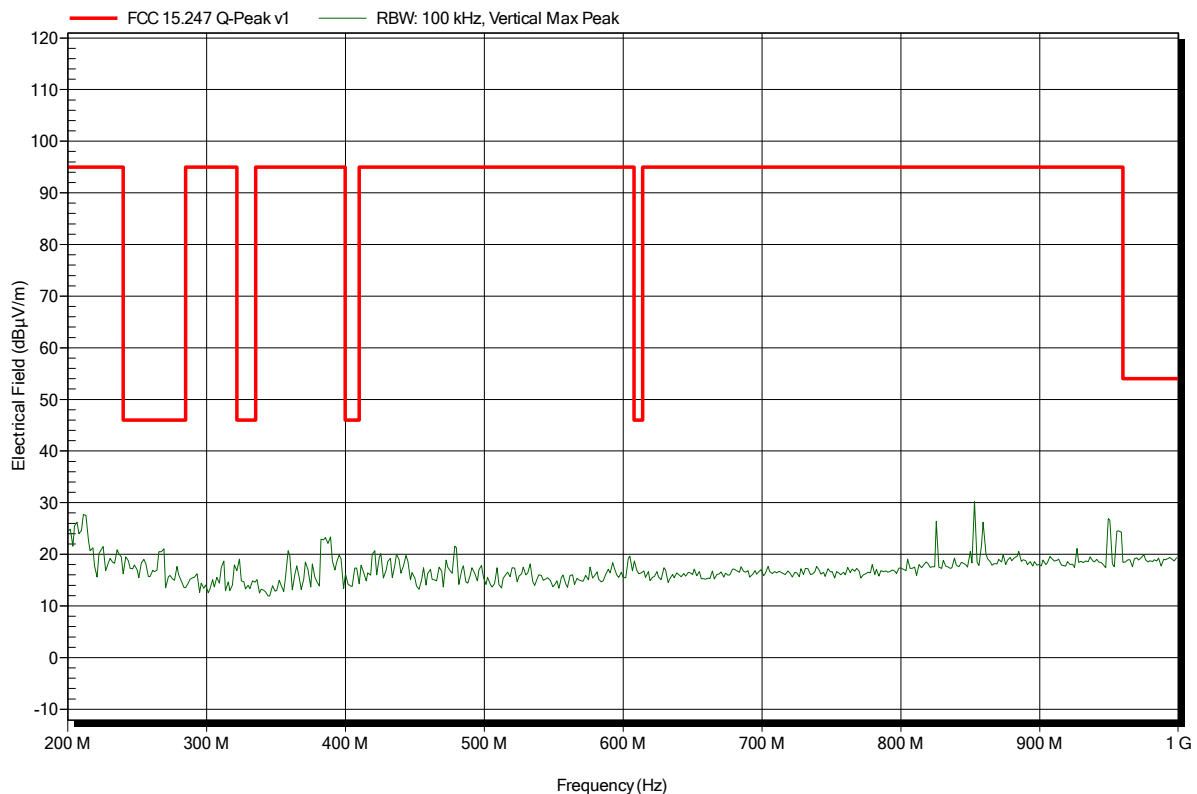


Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant:	Leica Geosystems GmbH
EUT Name:	Bluetooth, WLAN and BLE Modul
Model:	TiWi-BLE (Inwave BTFA-2450)
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Handrik
Test Conditions:	Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	TX; DUT mode: 2480MHz, 3-DH5, Pmax
Test Date:	2015-03-06
Note:	

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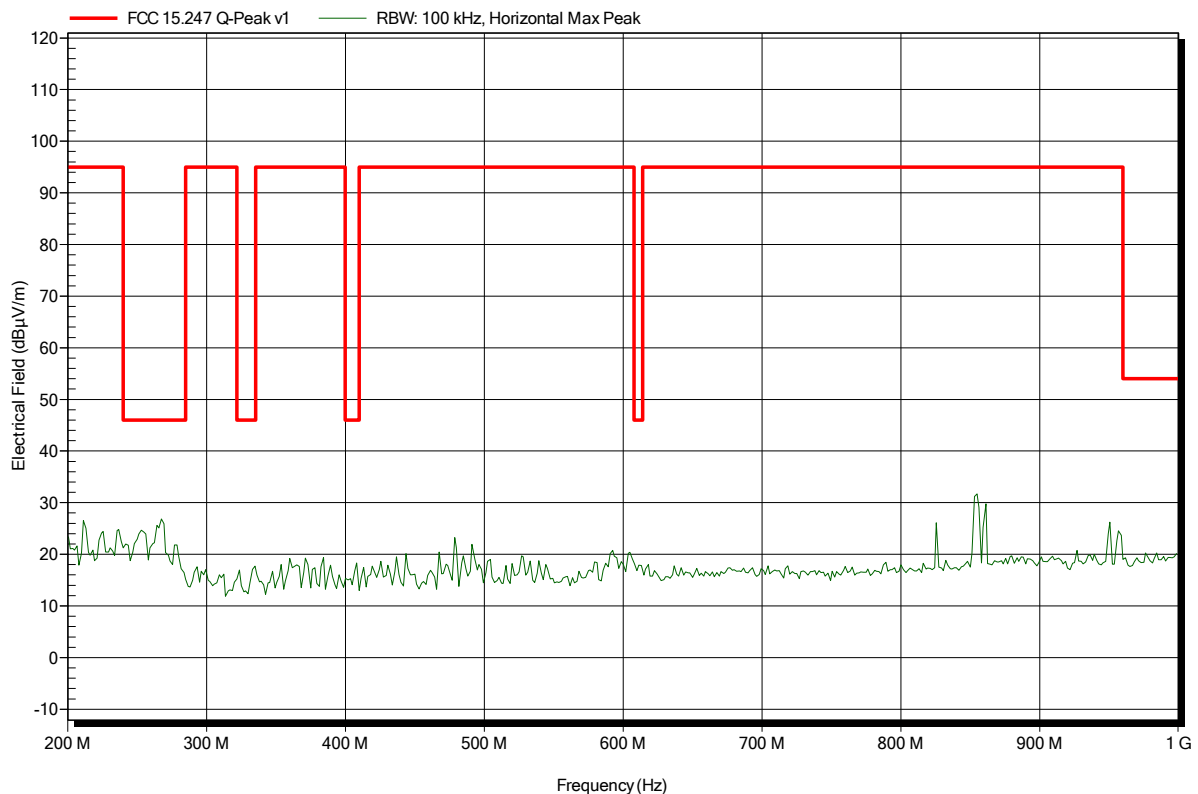


Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant:	Leica Geosystems GmbH
EUT Name:	Bluetooth, WLAN and BLE Modul
Model:	TiWi-BLE (Inwave BTFA-2450)
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Handrik
Test Conditions:	Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	TX; DUT mode: 2480MHz, 3-DH5, Pmax
Test Date:	2015-03-06
Note:	

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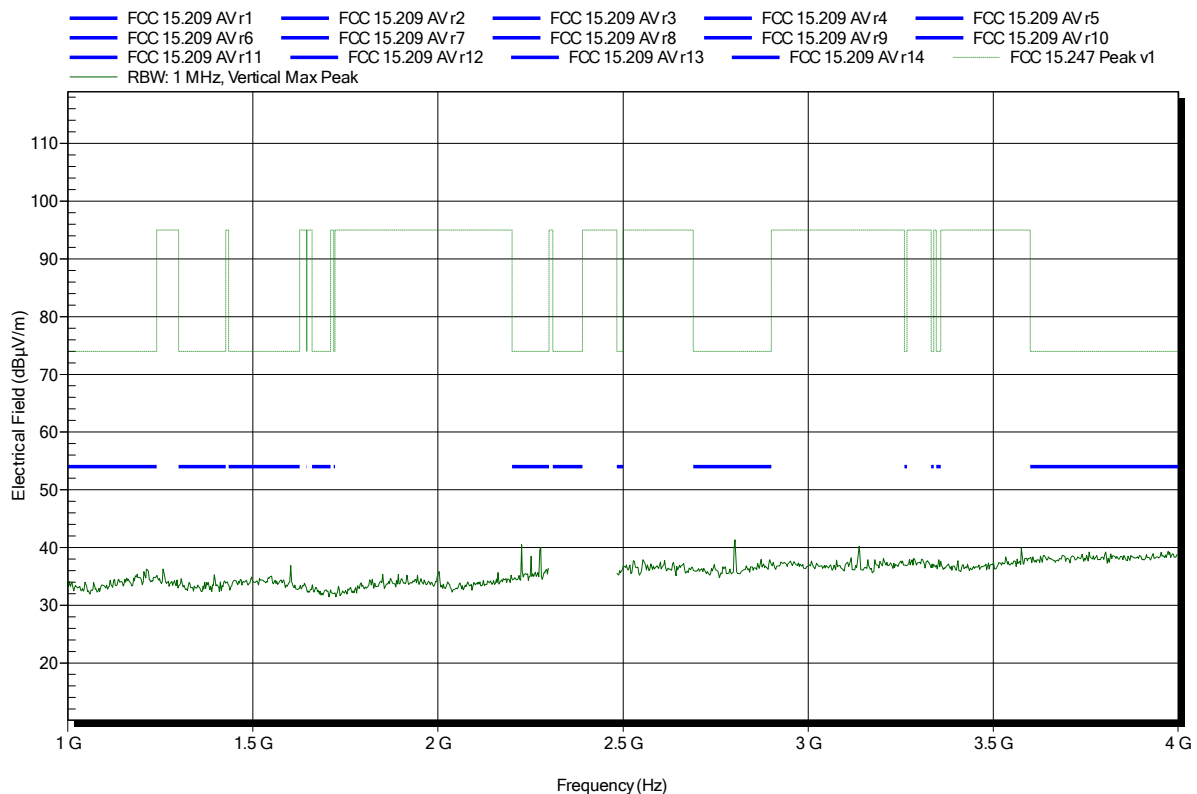


Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; DUT mode: 2402MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note:

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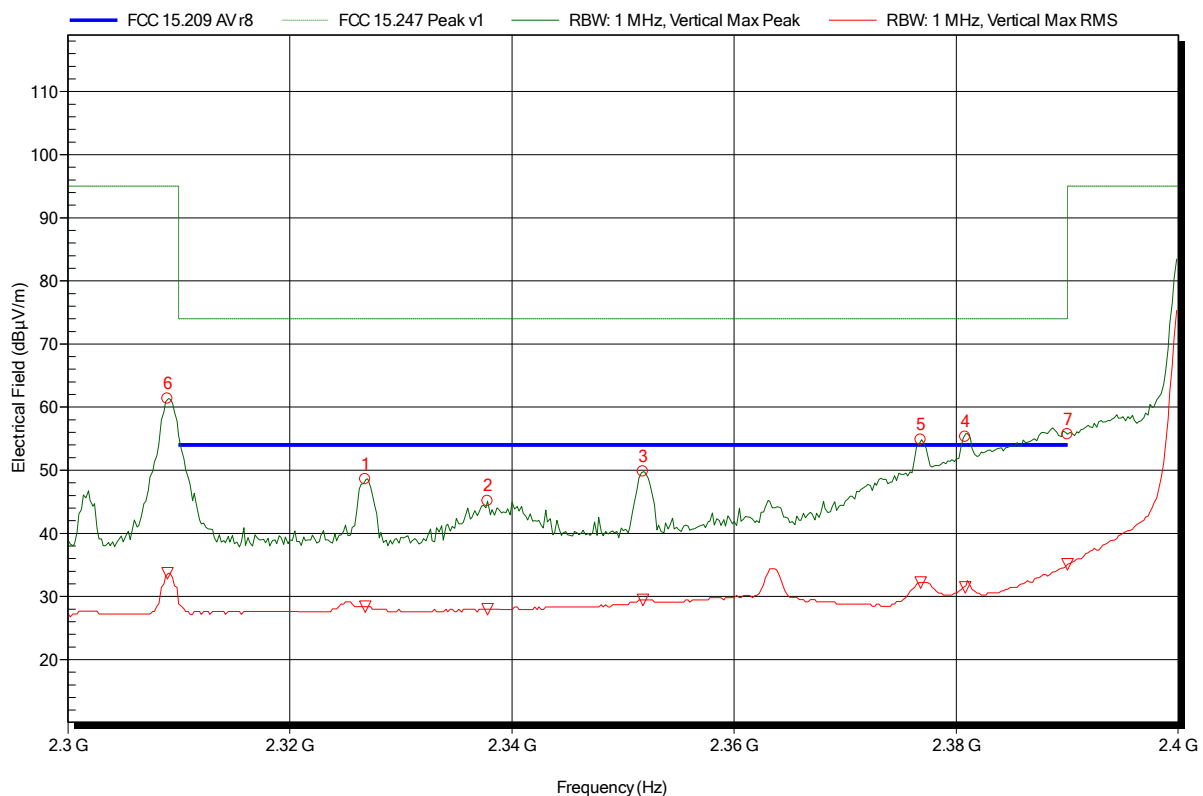


Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; DUT mode: 2402MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note: lower bandedge

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Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.327 GHz	48.56 dBµV/m	74 dBµV/m	-25.44 dB	Pass
2.338 GHz	45.1 dBµV/m	74 dBµV/m	-28.9 dB	Pass
2.352 GHz	49.78 dBµV/m	74 dBµV/m	-24.22 dB	Pass
2.377 GHz	54.82 dBµV/m	74 dBµV/m	-19.18 dB	Pass
2.381 GHz	55.28 dBµV/m	74 dBµV/m	-18.72 dB	Pass
2.39 GHz	55.72 dBµV/m	74 dBµV/m	-18.28 dB	Pass
Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.327 GHz	28.41 dBµV/m	54 dBµV/m	-25.59 dB	Pass
2.338 GHz	27.96 dBµV/m	54 dBµV/m	-26.04 dB	Pass
2.352 GHz	29.44 dBµV/m	54 dBµV/m	-24.56 dB	Pass
2.377 GHz	32.21 dBµV/m	54 dBµV/m	-21.79 dB	Pass
2.381 GHz	31.43 dBµV/m	54 dBµV/m	-22.57 dB	Pass
2.39 GHz	35.08 dBµV/m	54 dBµV/m	-18.92 dB	Pass

Test Report No.: GOM-1410-4214-TFC247BT-V01

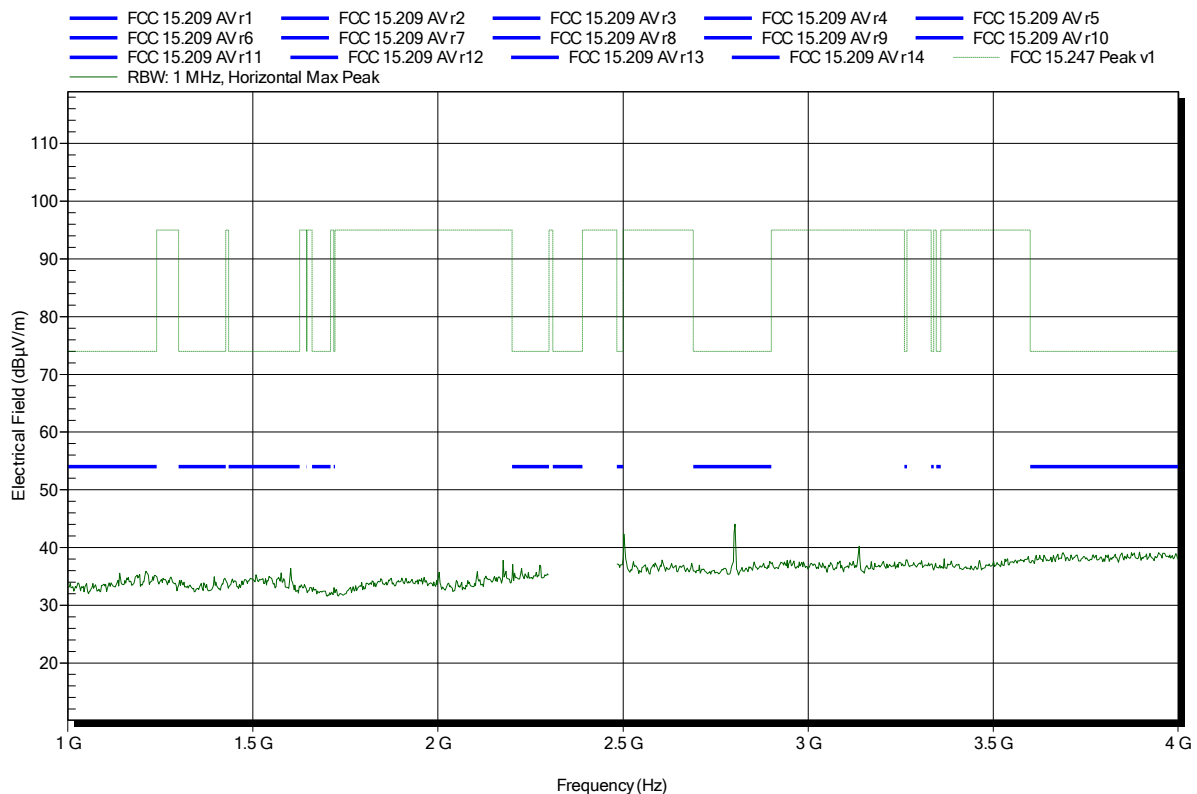
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; DUT mode: 2402MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note:

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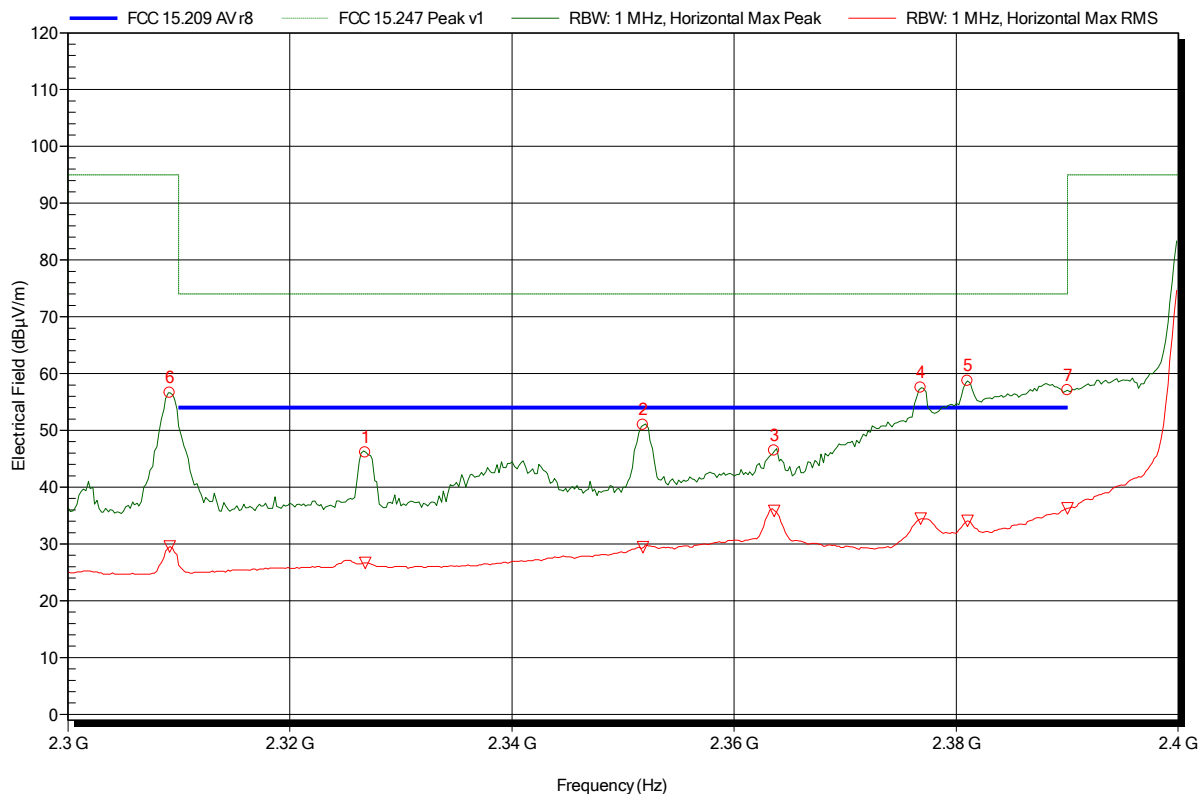


Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; DUT mode: 2402MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note: lower bandedge

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Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.352 GHz	50.99 dBµV/m	74 dBµV/m	-23.01 dB	Pass
2.364 GHz	46.45 dBµV/m	74 dBµV/m	-27.55 dB	Pass
2.377 GHz	57.51 dBµV/m	74 dBµV/m	-16.49 dB	Pass
2.381 GHz	58.71 dBµV/m	74 dBµV/m	-15.29 dB	Pass
2.39 GHz	57.06 dBµV/m	74 dBµV/m	-16.94 dB	Pass

Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.327 GHz	26.68 dBµV/m	54 dBµV/m	-27.32 dB	Pass
2.352 GHz	29.43 dBµV/m	54 dBµV/m	-24.57 dB	Pass
2.364 GHz	35.83 dBµV/m	54 dBµV/m	-18.17 dB	Pass
2.377 GHz	34.44 dBµV/m	54 dBµV/m	-19.56 dB	Pass
2.381 GHz	34.08 dBµV/m	54 dBµV/m	-19.92 dB	Pass
2.39 GHz	36.3 dBµV/m	54 dBµV/m	-17.7 dB	Pass

Test Report No.: GOM-1410-4214-TFC247BT-V01

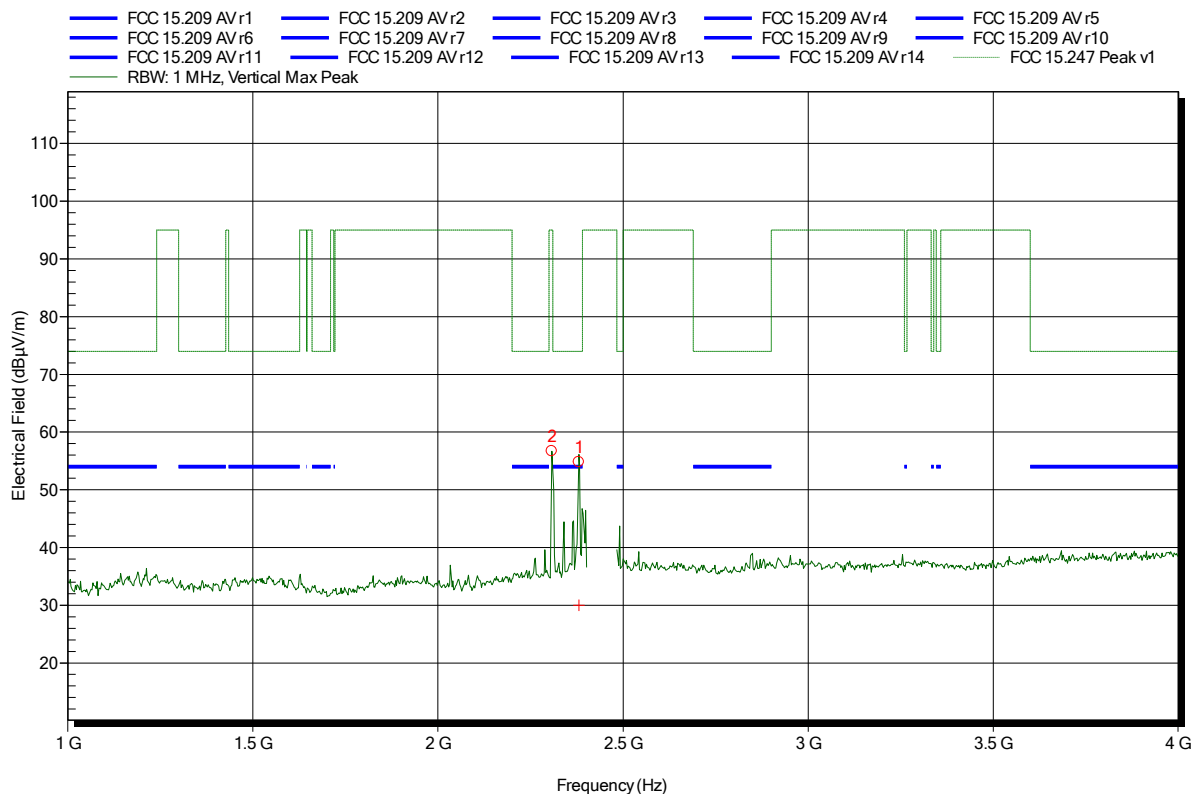
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; DUT mode: 2441MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note:

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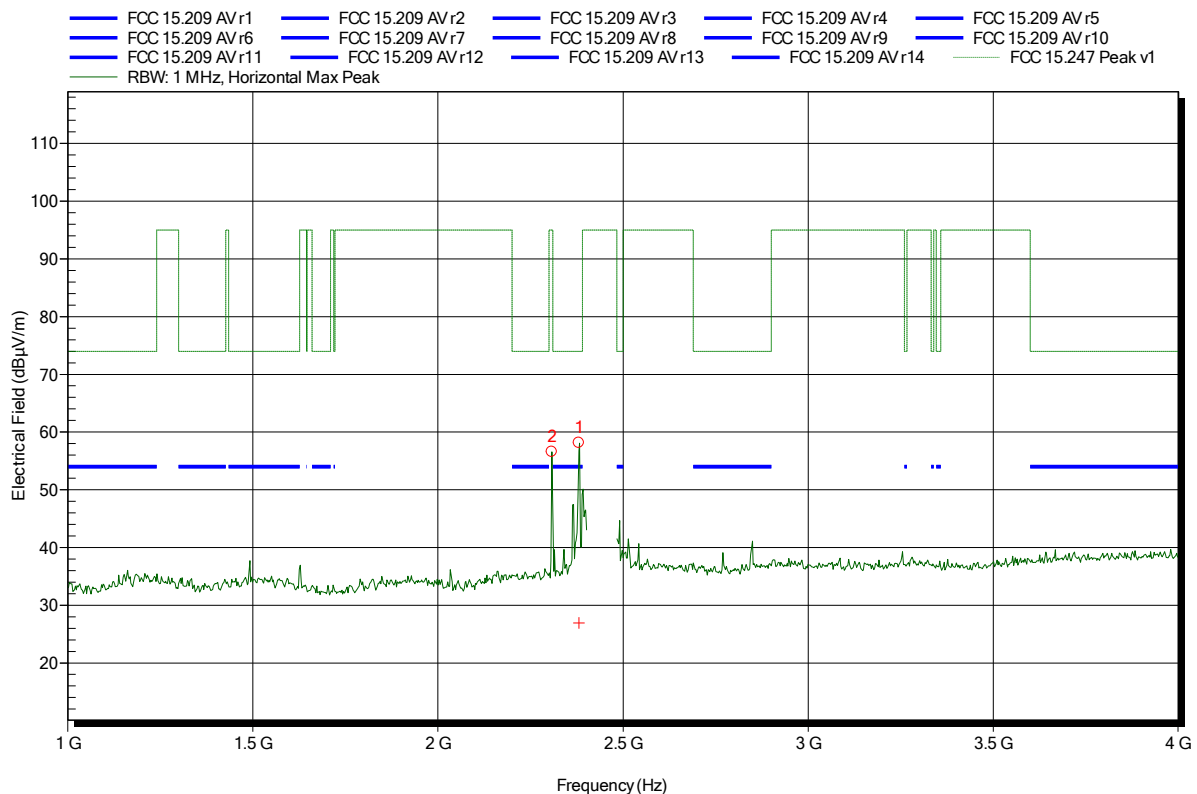
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.3076 GHz	56.66 dBμV/m	95 dBμV/m	-38.34 dB	Pass
2.381 GHz	54.77 dBμV/m	74 dBμV/m	-19.23 dB	Pass
Frequency	Average	Average Limit	Average Difference	Average Status
2.381 GHz	30 dBμV/m	54 dBμV/m	-24 dB	Pass

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; DUT mode: 2441MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note:

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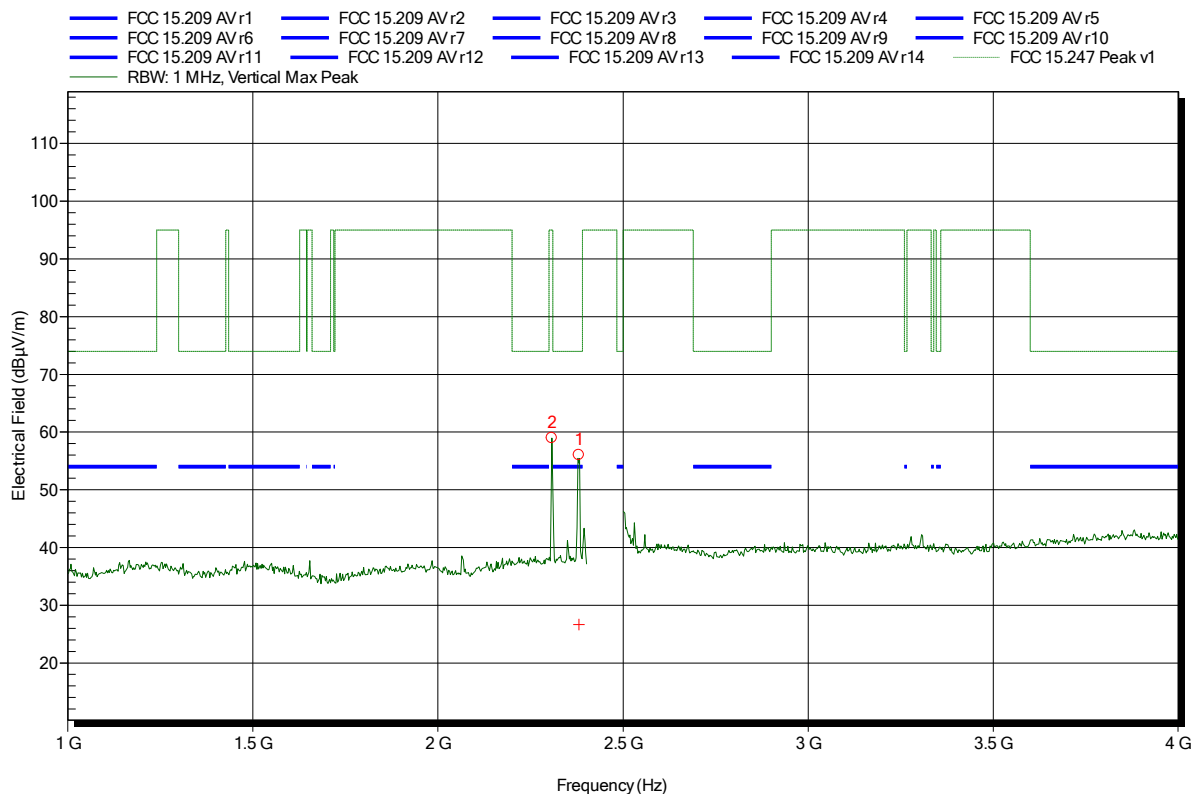
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.3076 GHz	56.56 dBμV/m	95 dBμV/m	-38.44 dB	Pass
2.3808 GHz	58.15 dBμV/m	74 dBμV/m	-15.85 dB	Pass
Frequency	Average	Average Limit	Average Difference	Average Status
2.3808 GHz	26.95 dBμV/m	54 dBμV/m	-27.05 dB	Pass

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; DUT mode: 2480MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note:

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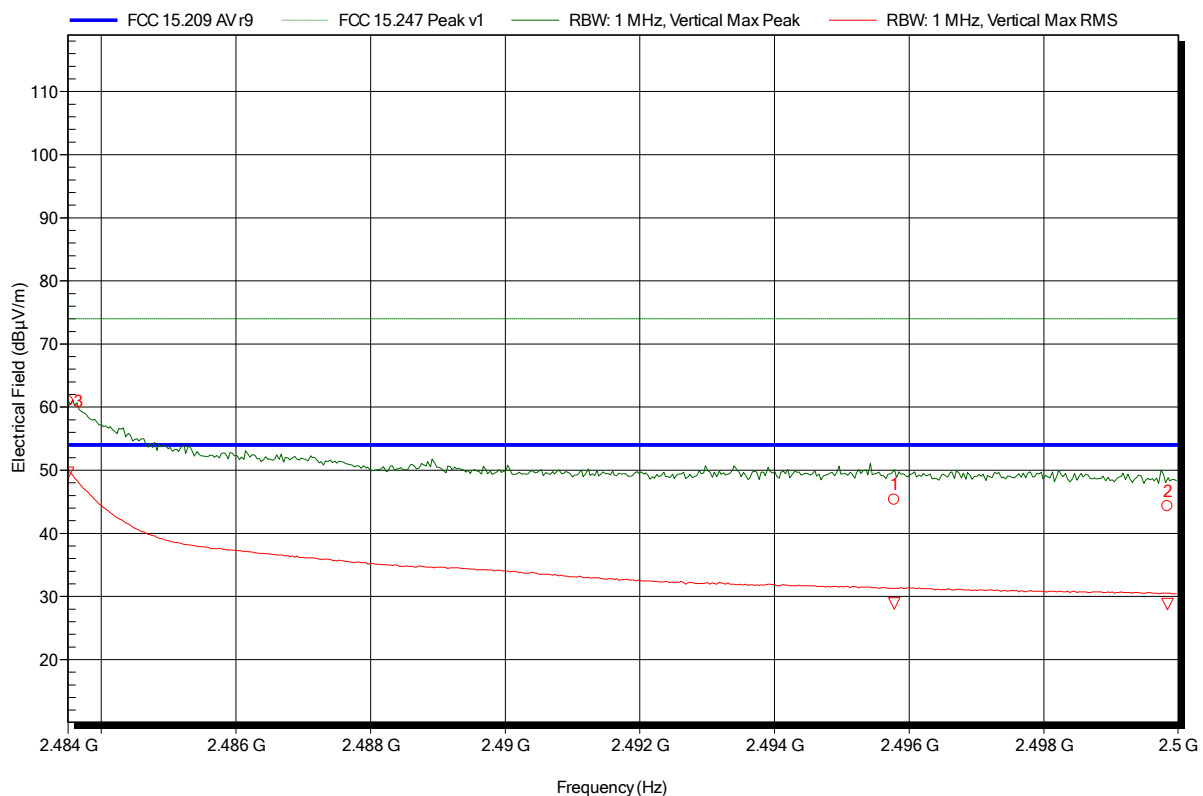
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.308 GHz	58.97 dBµV/m	95 dBµV/m	-36.03 dB	Pass
2.381 GHz	56.03 dBµV/m	74 dBµV/m	-17.97 dB	Pass
Frequency	Average	Average Limit	Average Difference	Average Status
2.381 GHz	26.64 dBµV/m	54 dBµV/m	-27.36 dB	Pass

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; DUT mode: 2480MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note: upper bandedge

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Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.4835 GHz	60.91 dBµV/m	74 dBµV/m	-13.09 dB	Pass
2.4958 GHz	45.35 dBµV/m	74 dBµV/m	-28.65 dB	Pass
2.4998 GHz	44.3 dBµV/m	74 dBµV/m	-29.7 dB	Pass

Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.4835 GHz	49.61 dBµV/m	54 dBµV/m	-4.39 dB	Pass
2.4958 GHz	28.88 dBµV/m	54 dBµV/m	-25.12 dB	Pass
2.4998 GHz	28.8 dBµV/m	54 dBµV/m	-25.2 dB	Pass

Test Report No.: GOM-1410-4214-TFC247BT-V01

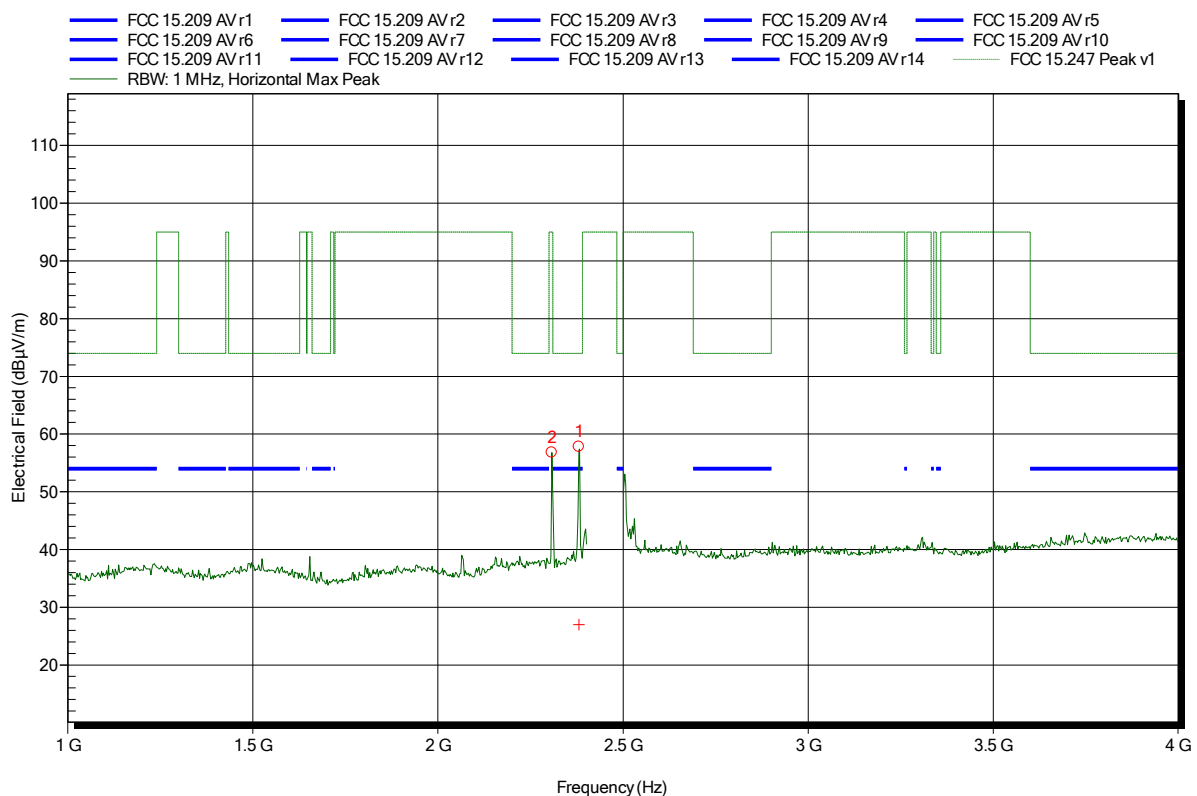
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; DUT mode: 2480MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note:

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Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.308 GHz	56.78 dBµV/m	95 dBµV/m	-38.22 dB	Pass
2.381 GHz	57.79 dBµV/m	74 dBµV/m	-16.21 dB	Pass
Frequency	Average	Average Limit	Average Difference	Average Status
2.381 GHz	27 dBµV/m	54 dBµV/m	-27 dB	Pass

Test Report No.: GOM-1410-4214-TFC247BT-V01

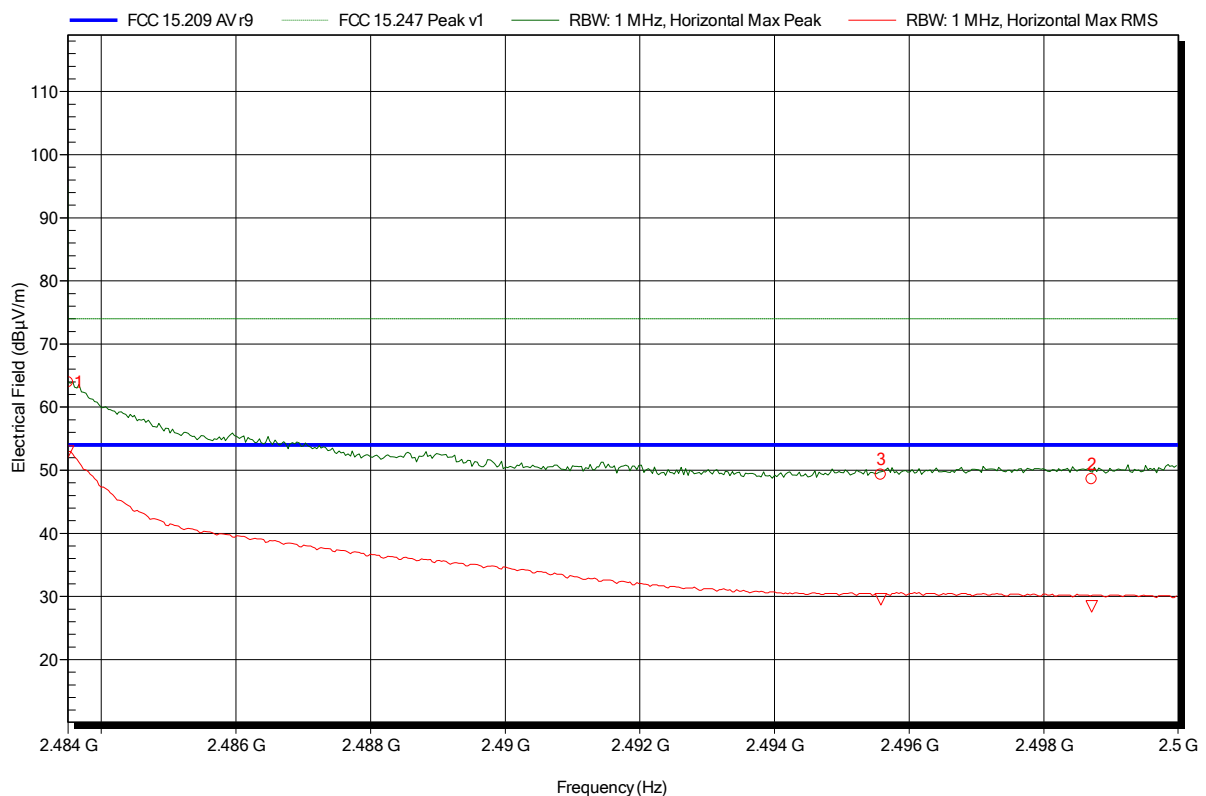
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; DUT mode: 2480MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note: upper bandedge

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Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.4835 GHz	63.92 dBµV/m	74 dBµV/m	-10.08 dB	Pass
2.4956 GHz	49.27 dBµV/m	74 dBµV/m	-24.73 dB	Pass
2.4987 GHz	48.6 dBµV/m	74 dBµV/m	-25.4 dB	Pass

Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.4835 GHz	52.94 dBµV/m	54 dBµV/m	-1.06 dB	Pass
2.4956 GHz	29.57 dBµV/m	54 dBµV/m	-24.43 dB	Pass
2.4987 GHz	28.46 dBµV/m	54 dBµV/m	-25.54 dB	Pass

Test Report No.: GOM-1410-4214-TFC247BT-V01

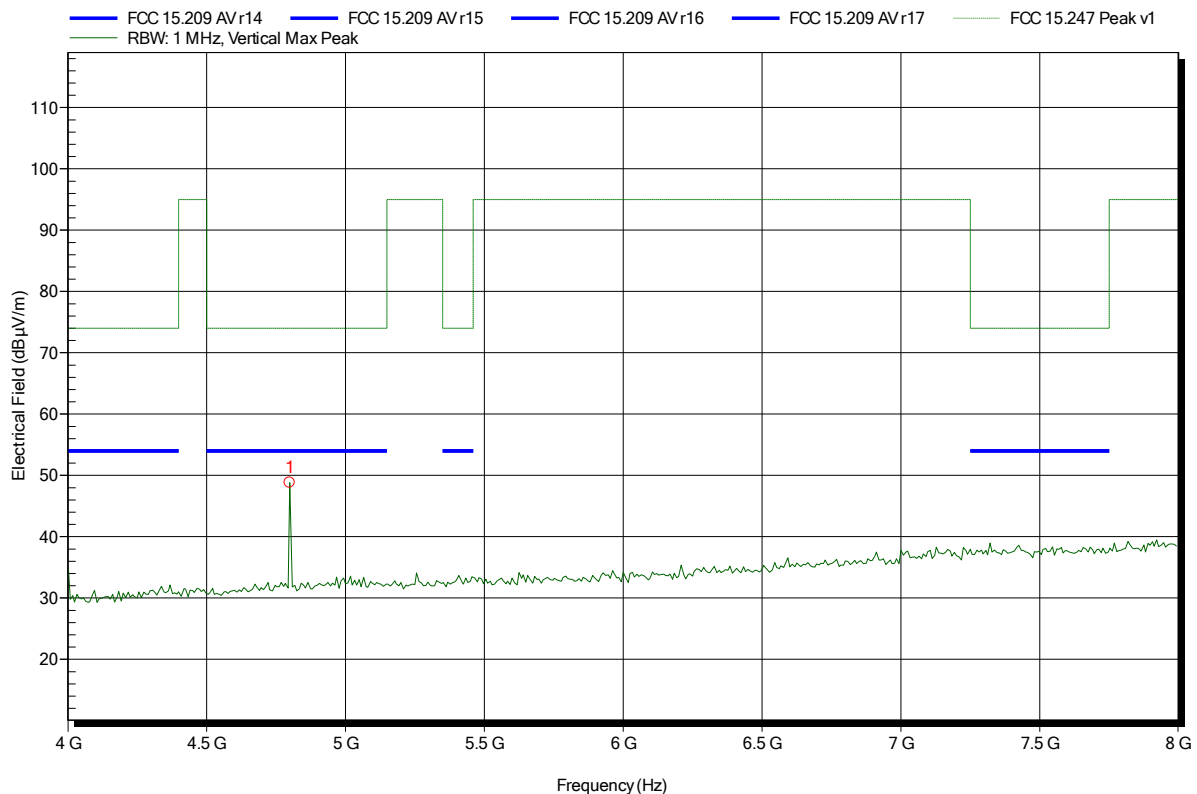
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2402MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note: EUT horizontal

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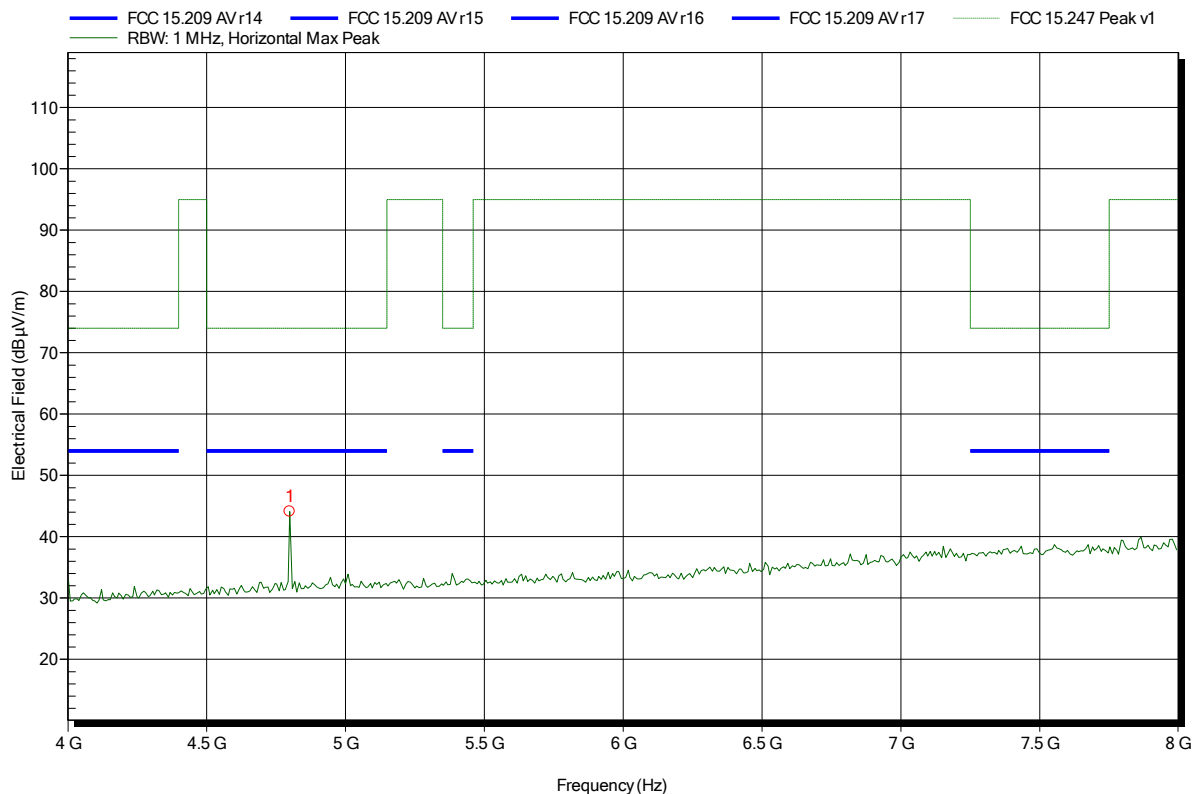
Frequency	Peak	Peak Limit	Peak Difference	Status
4.8 GHz	48.82 dBµV/m	74 dBµV/m	-25.18 dB	Pass

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2402MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note:

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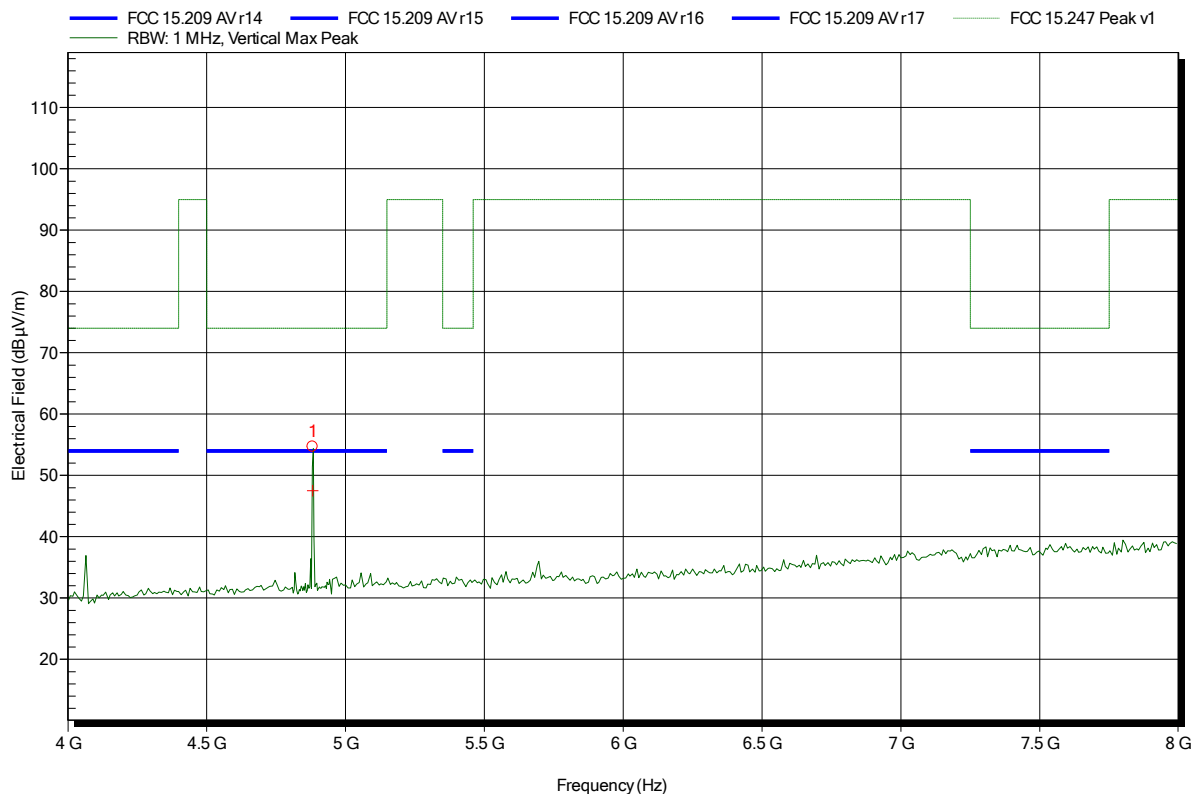
Frequency	Peak	Peak Limit	Peak Difference	Status
4.8 GHz	44.1 dBµV/m	74 dBµV/m	-29.9 dB	Pass

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2441MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note: EUT horizontal

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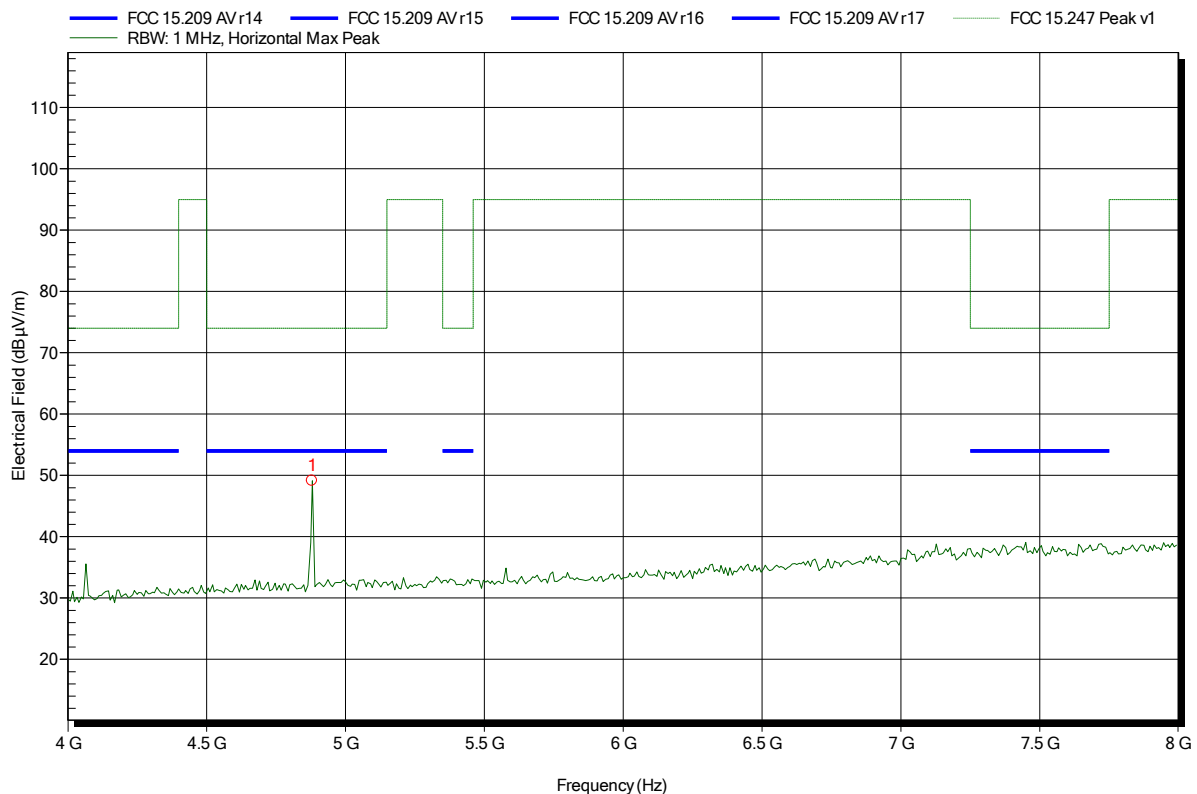
Frequency 4.882 GHz	Peak 54.66 dBµV/m	Peak Limit 74 dBµV/m	Peak Difference -19.34 dB	Status Pass
Frequency 4.882 GHz	Average 47.51 dBµV/m	Average Limit 54 dBµV/m	Average Difference -6.49 dB	Average Status Pass

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2441MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note:

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Frequency	Peak	Peak Limit	Peak Difference	Status
4.88 GHz	49.13 dBµV/m	74 dBµV/m	-24.87 dB	Pass

Test Report No.: GOM-1410-4214-TFC247BT-V01

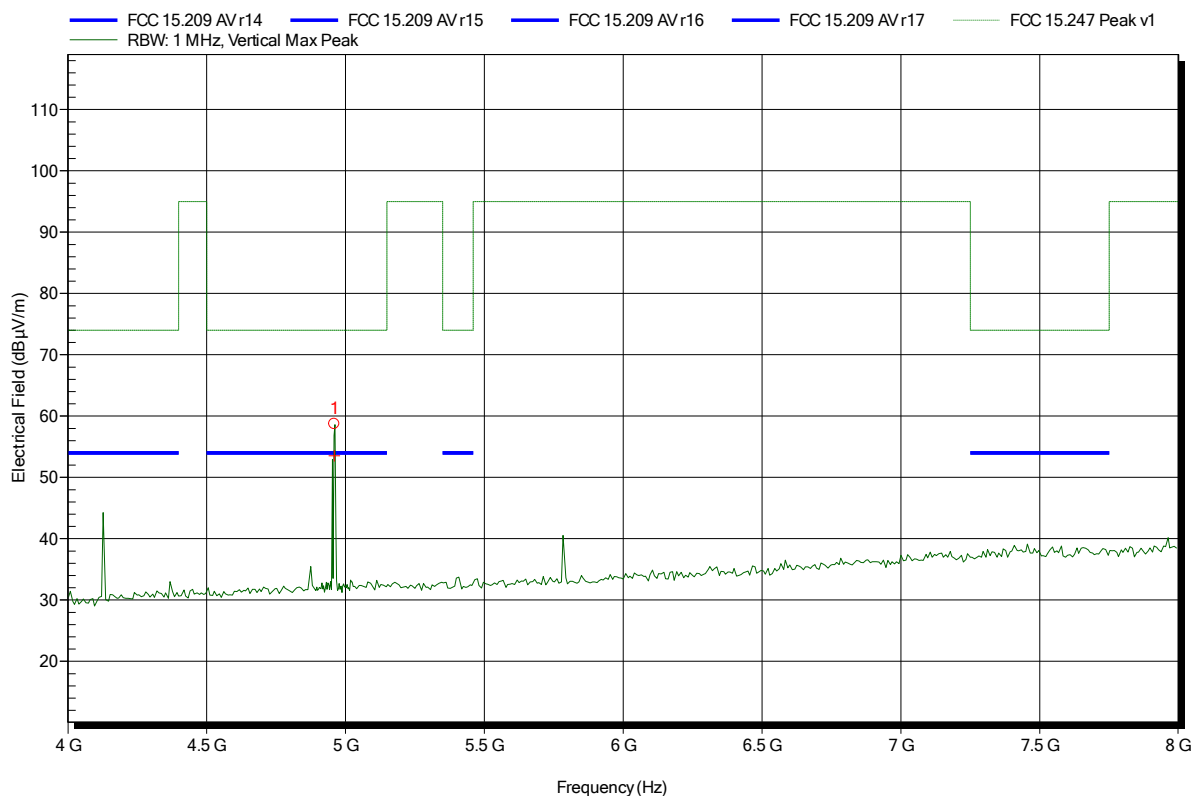
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2480MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note: EUT horizontal

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Frequency 4.96 GHz	Peak 58.72 dBµV/m	Peak Limit 74 dBµV/m	Peak Difference -15.28 dB	Status Pass
Frequency 4.96 GHz	Average 53.55 dBµV/m	Average Limit 54 dBµV/m	Average Difference -0.45 dB	Average Status Pass

Test Report No.: GOM-1410-4214-TFC247BT-V01

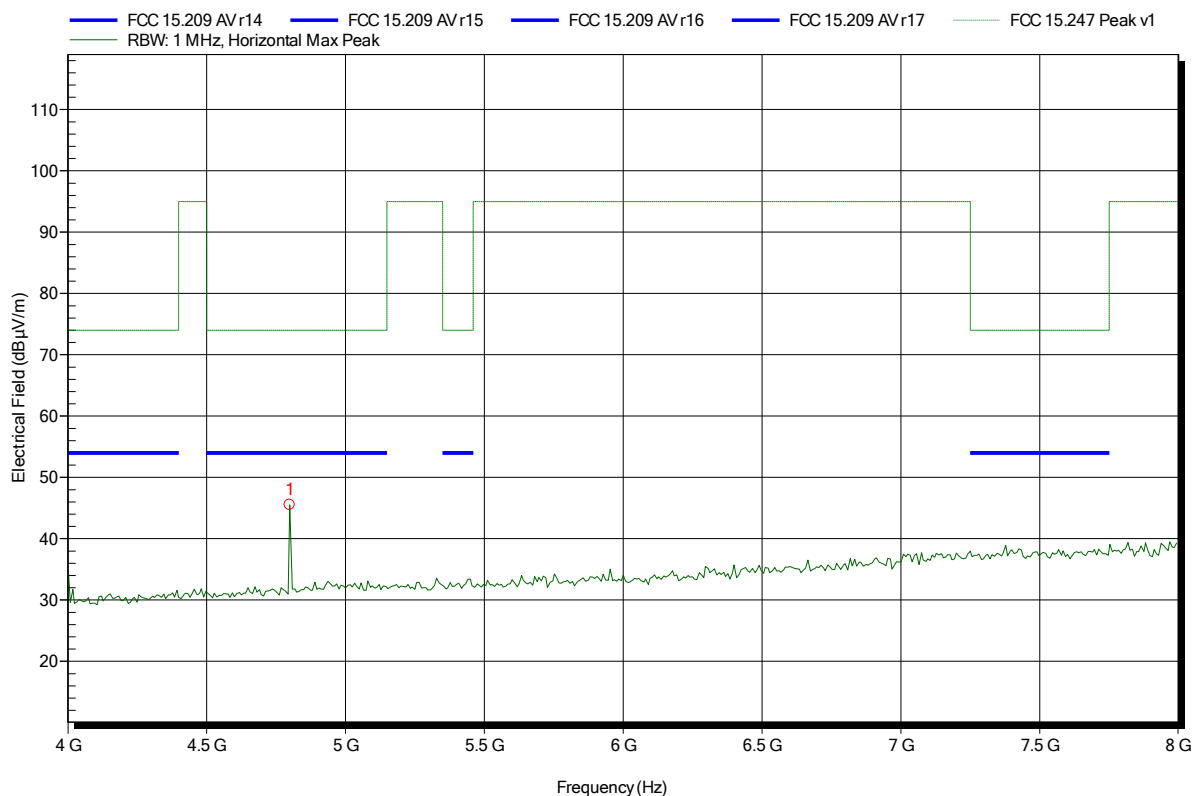
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2480MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note:

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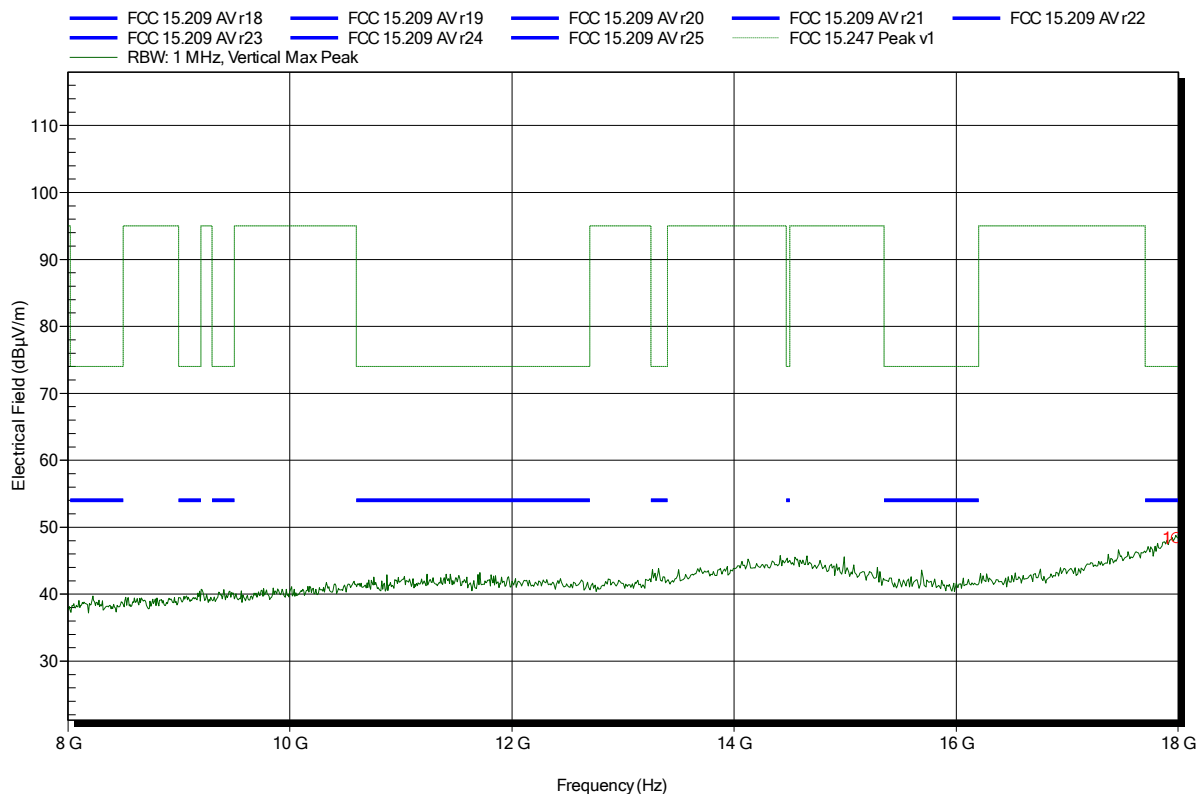
Frequency	Peak	Peak Limit	Peak Difference	Status
4.8 GHz	45.5 dBµV/m	74 dBµV/m	-28.5 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2402MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note: EUT horizontal

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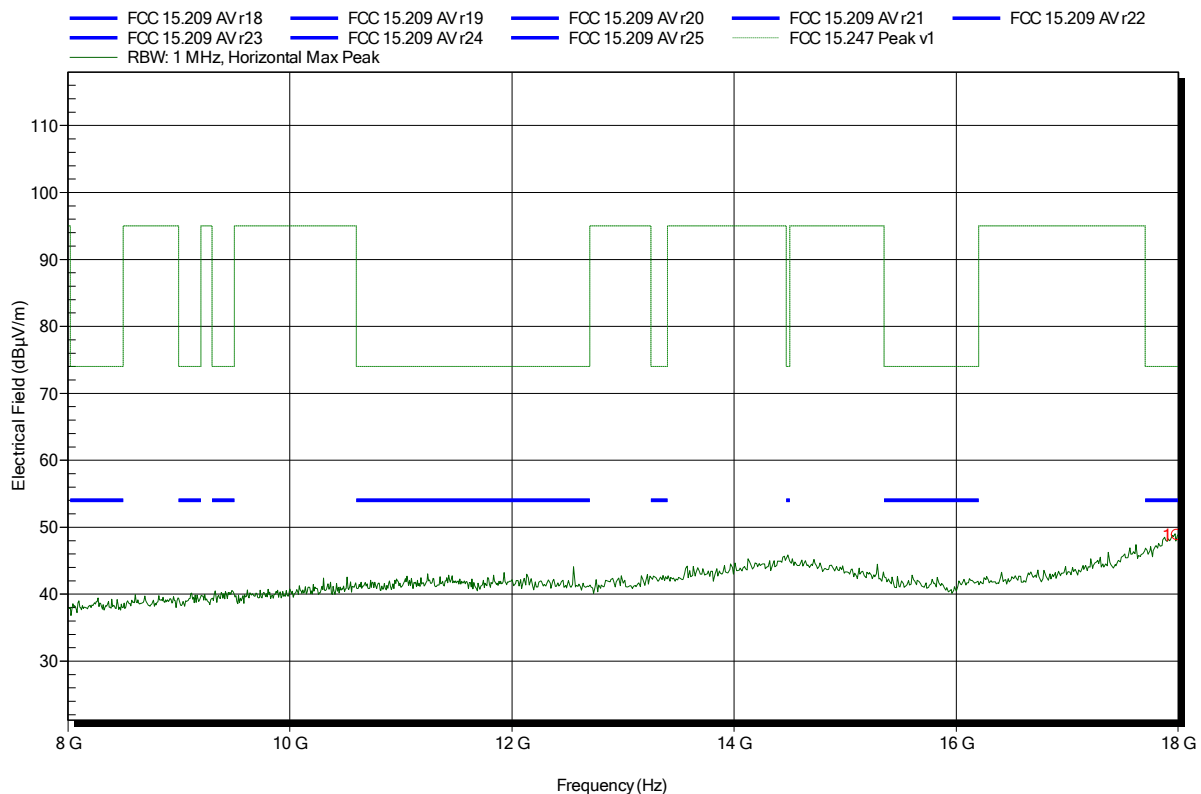
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
17.988 GHz	48.35 dBµV/m	74 dBµV/m	-25.65 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2402MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note:

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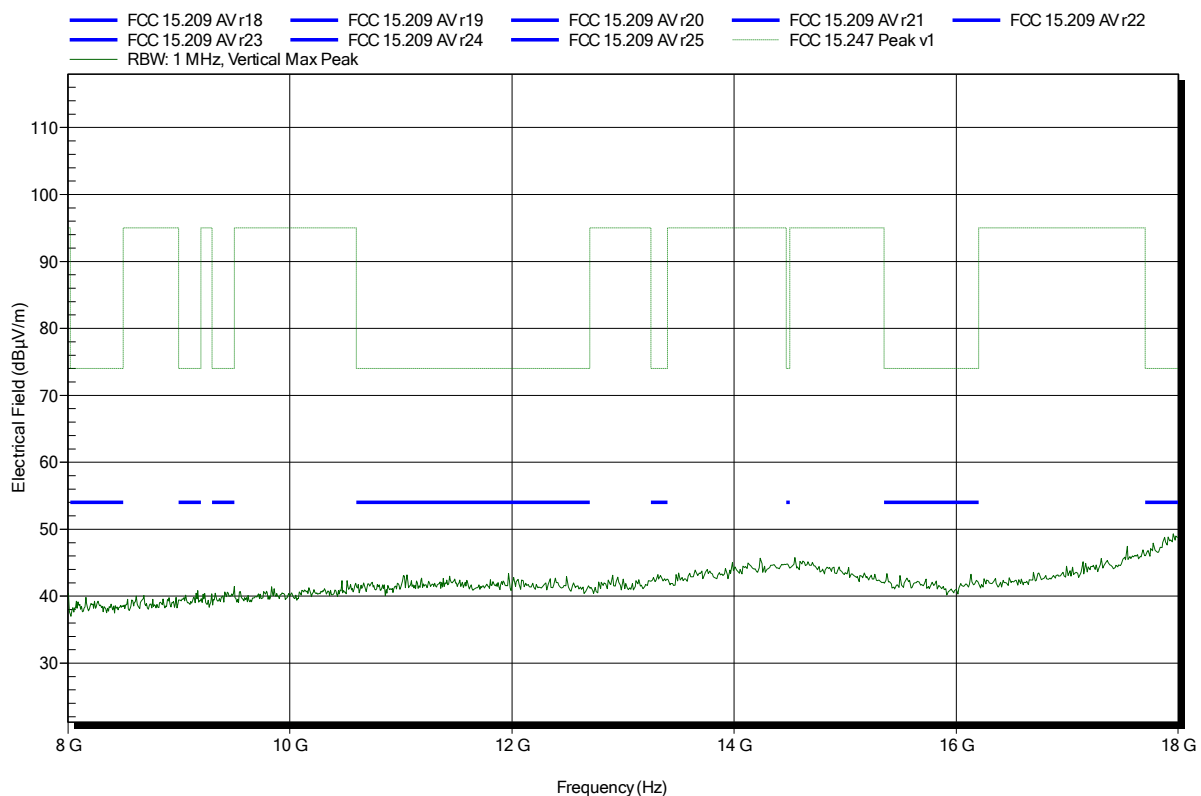
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
17.988 GHz	48.85 dBµV/m	74 dBµV/m	-25.15 dB	Pass

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2441MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note: EUT horizontal

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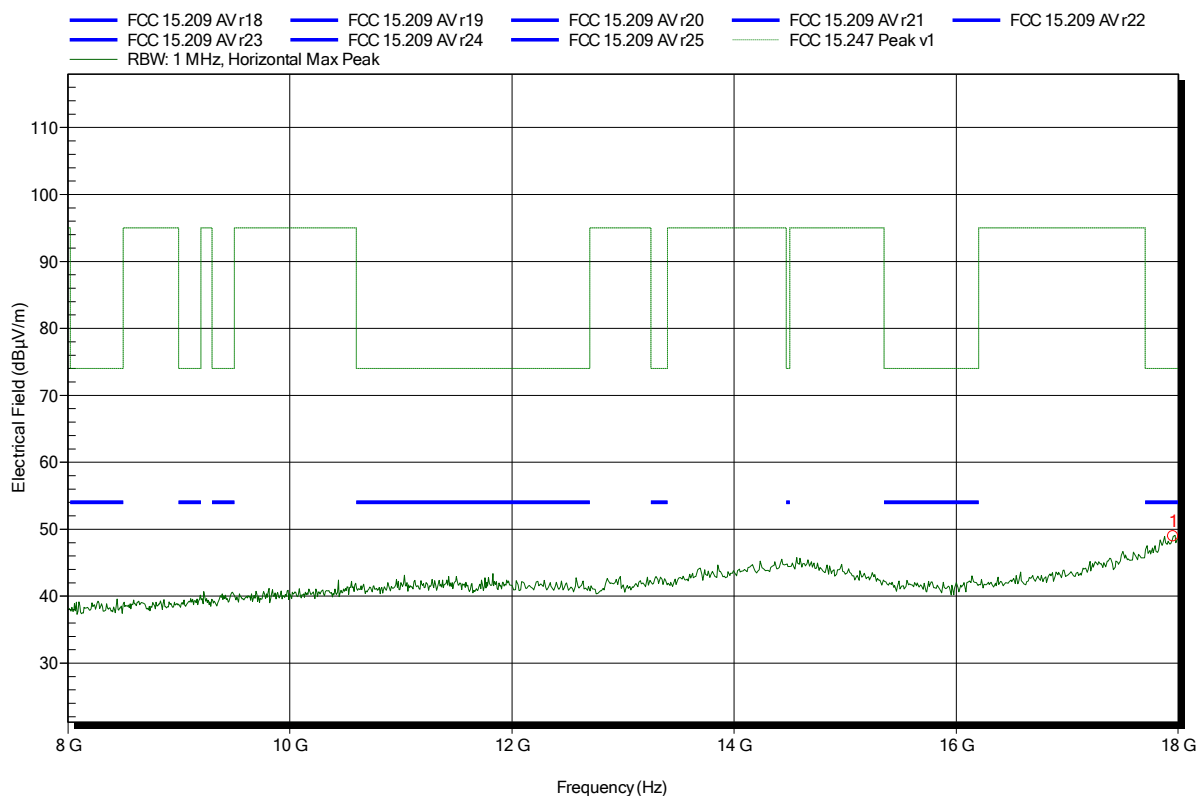


Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2441MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note:

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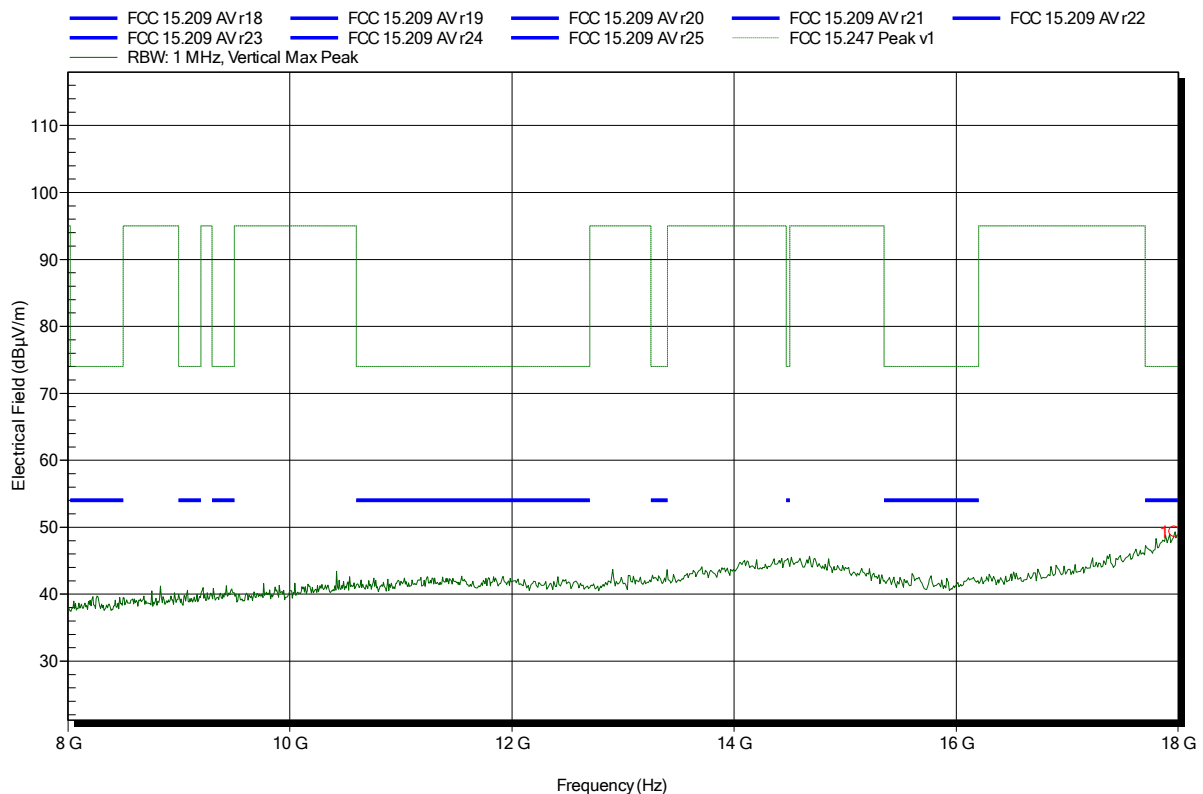
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
17.952 GHz	48.93 dBµV/m	74 dBµV/m	-25.07 dB	Pass

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2480MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note: EUT horizontal

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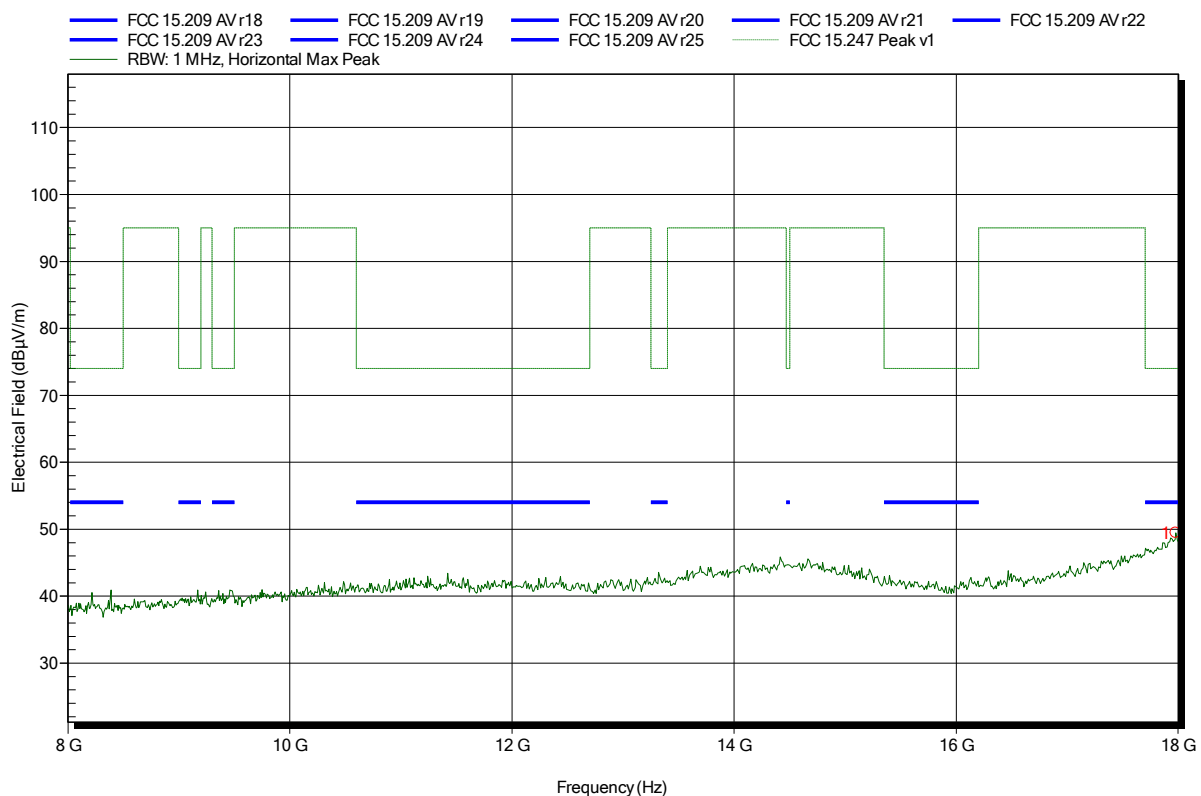
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
17.964 GHz	49.3 dBµV/m	74 dBµV/m	-24.7 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2480MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note:

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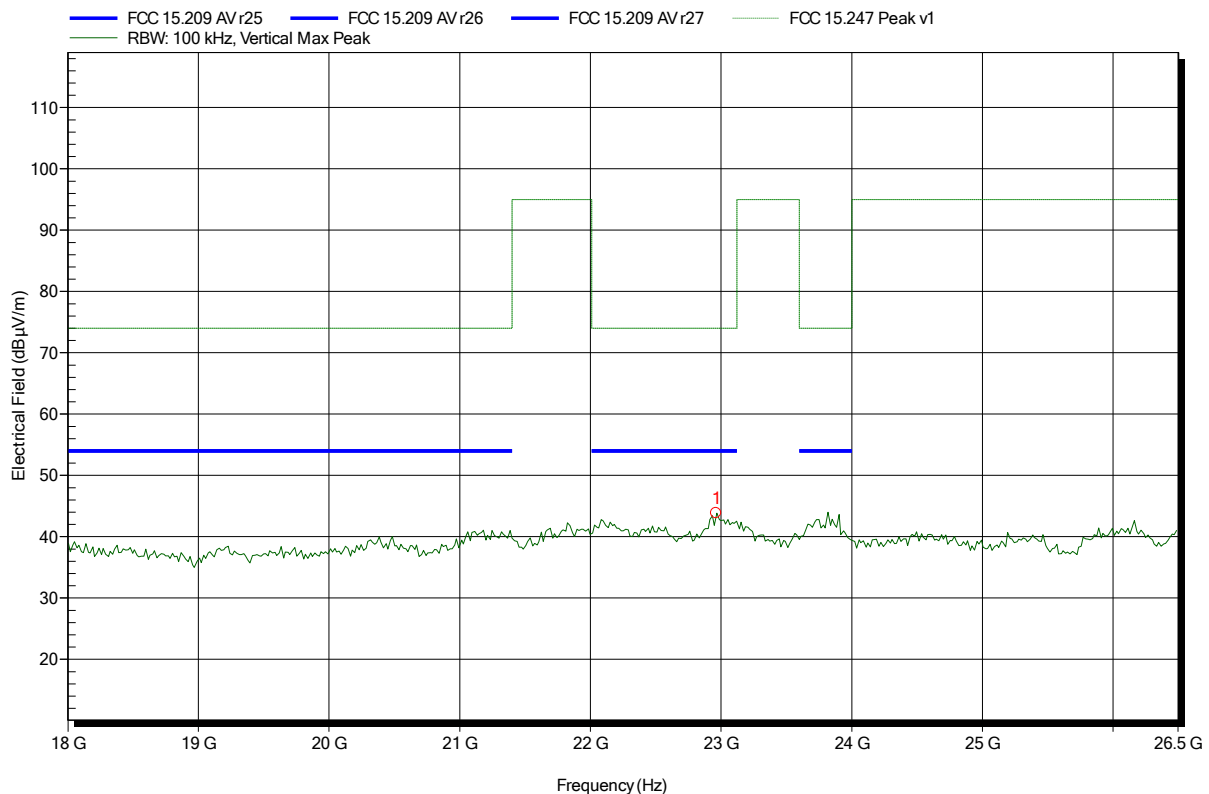
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
17.976 GHz	49.44 dBµV/m	74 dBµV/m	-24.56 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Rohde & Schwarz HL 025, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2402MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note: EUT horizontal

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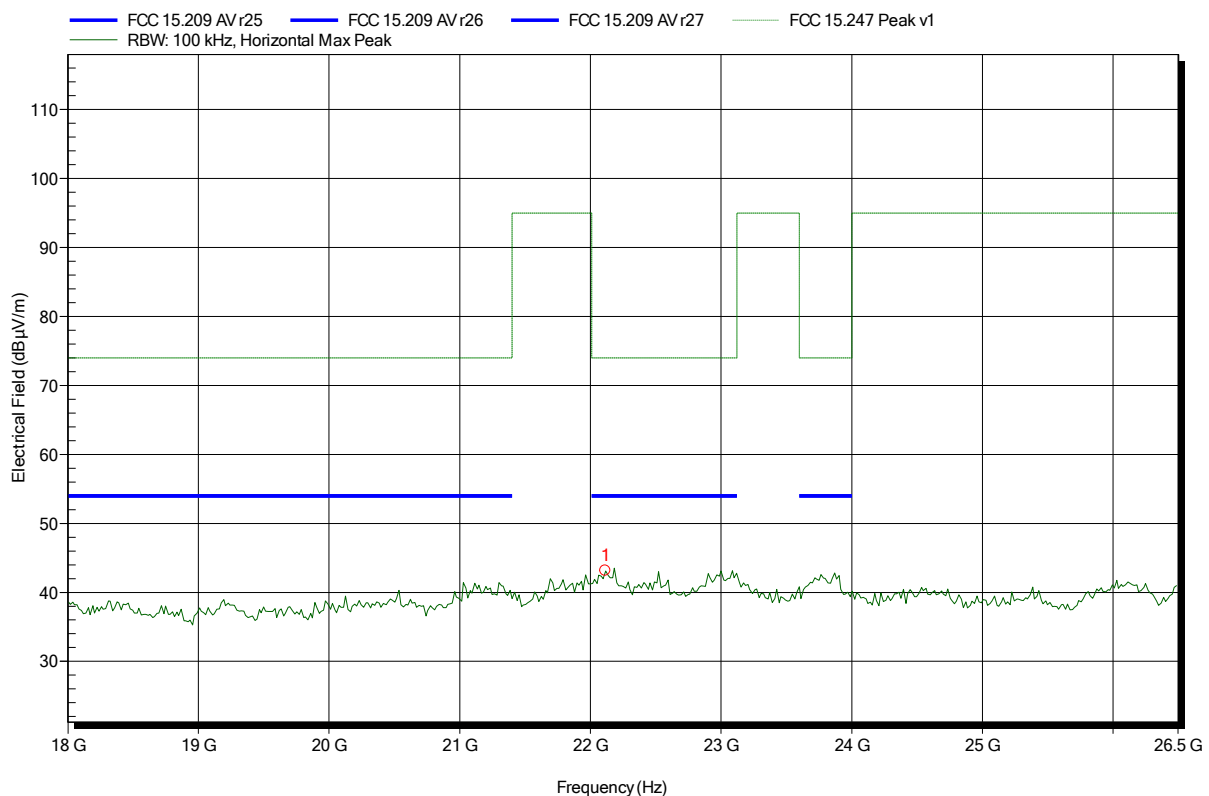
Frequency	Peak	Peak Limit	Peak Difference	Status
22.964 GHz	43.84 dBµV/m	74 dBµV/m	-30.16 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Rohde & Schwarz HL 025, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2402MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note:

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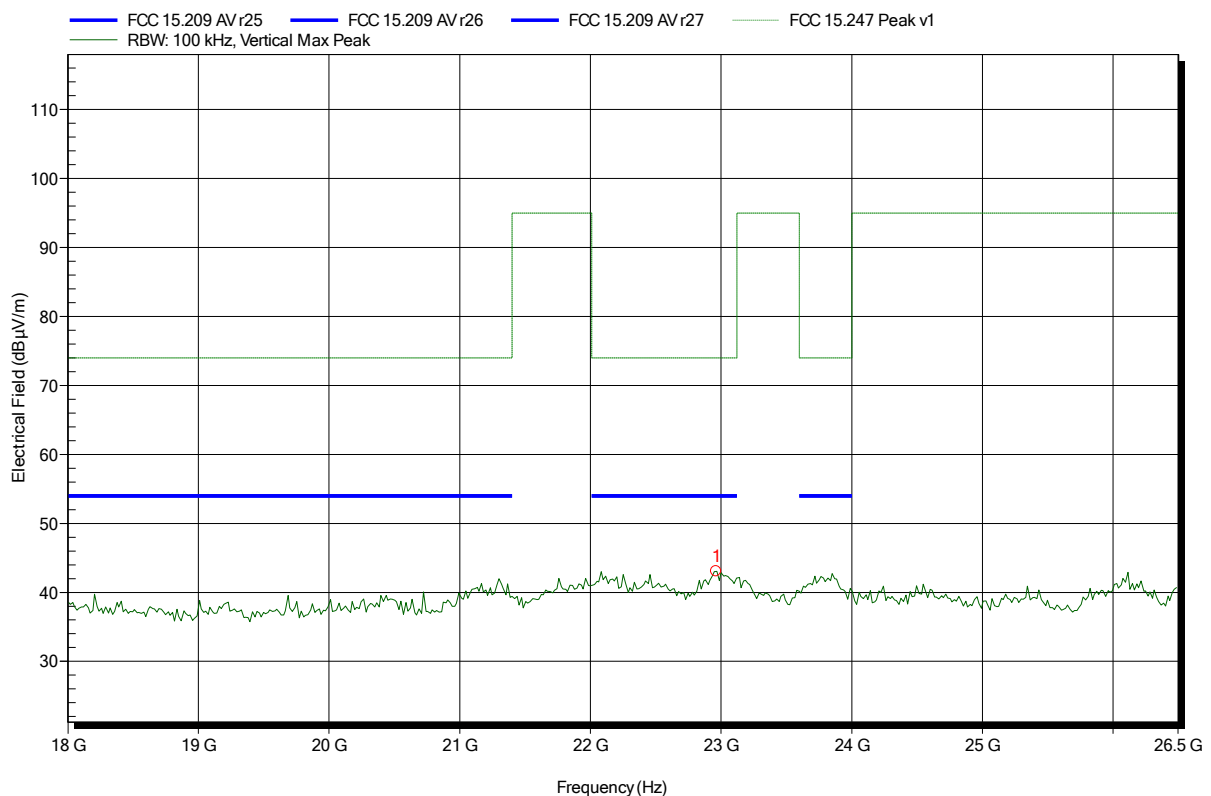
Frequency	Peak	Peak Limit	Peak Difference	Status
22.114 GHz	43.12 dBµV/m	74 dBµV/m	-30.88 dB	Pass

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Rohde & Schwarz HL 025, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2441MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note: EUT horizontal

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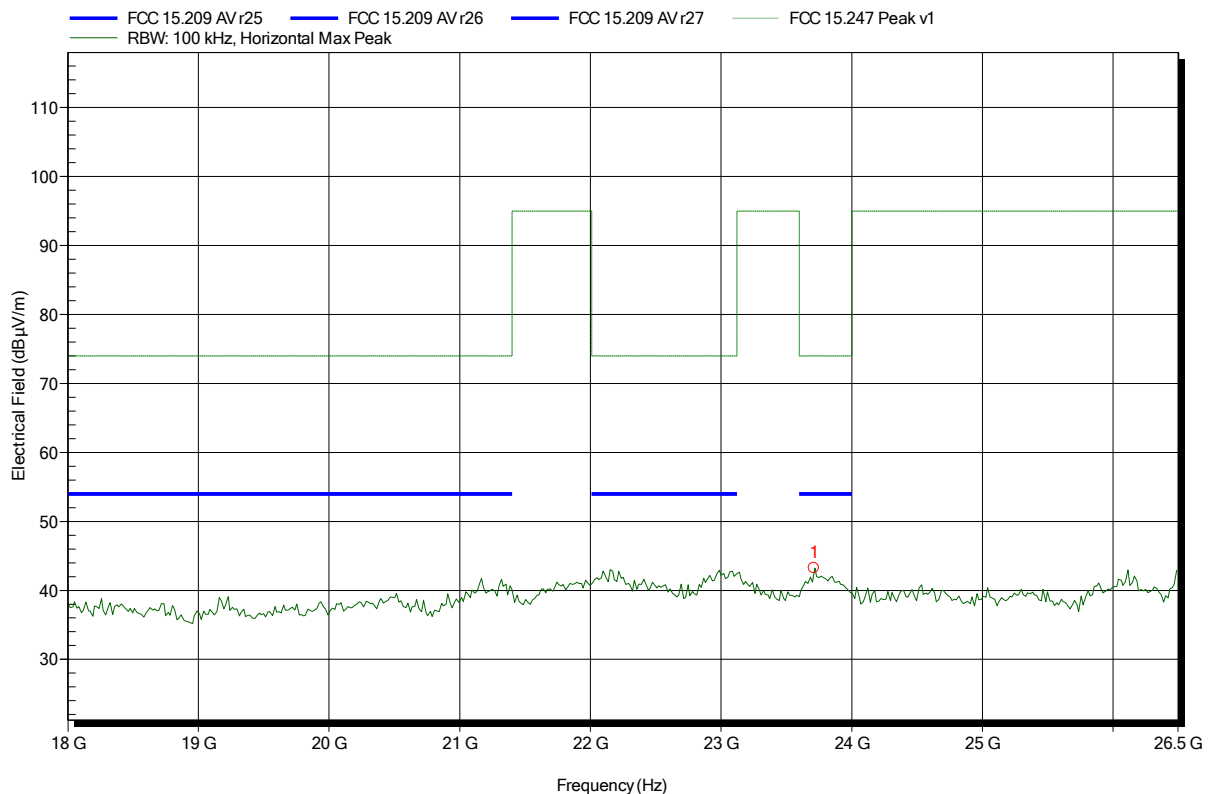
Frequency	Peak	Peak Limit	Peak Difference	Status
22.964 GHz	43.04 dBµV/m	74 dBµV/m	-30.96 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Rohde & Schwarz HL 025, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2441MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note:

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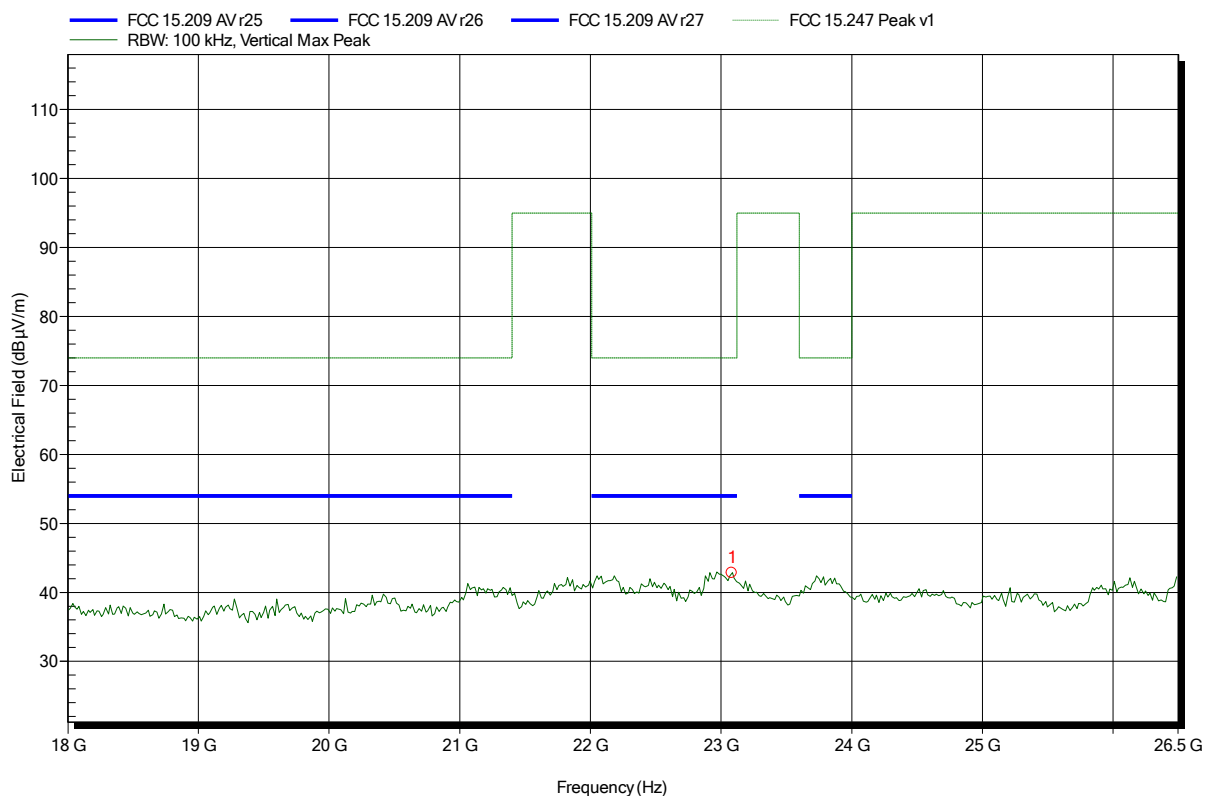
Frequency	Peak	Peak Limit	Peak Difference	Status
23.712 GHz	43.23 dBµV/m	74 dBµV/m	-30.77 dB	Pass

Spurious emissions according to FCC 15.247

Project number: GOM-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Rohde & Schwarz HL 025, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2480MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note: EUT horizontal

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Frequency	Peak	Peak Limit	Peak Difference	Status
23.083 GHz	42.83 dBµV/m	74 dBµV/m	-31.17 dB	Pass

Test Report No.: GOM-1410-4214-TFC247BT-V01

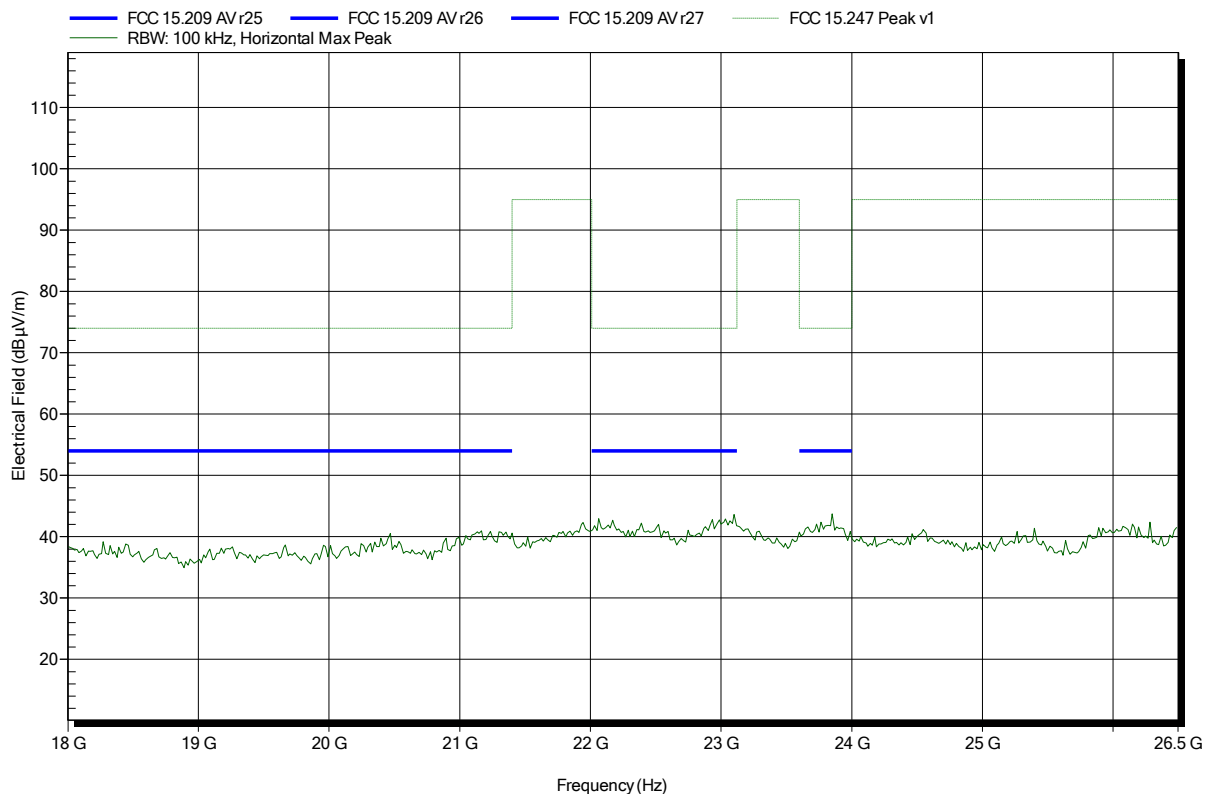
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions according to FCC 15.247

Project number: G0M-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 100°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Rohde & Schwarz HL 025, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; DUT mode: 2480MHz, 3-DH5, Pmax
 Test Date: 2015-03-06
 Note:

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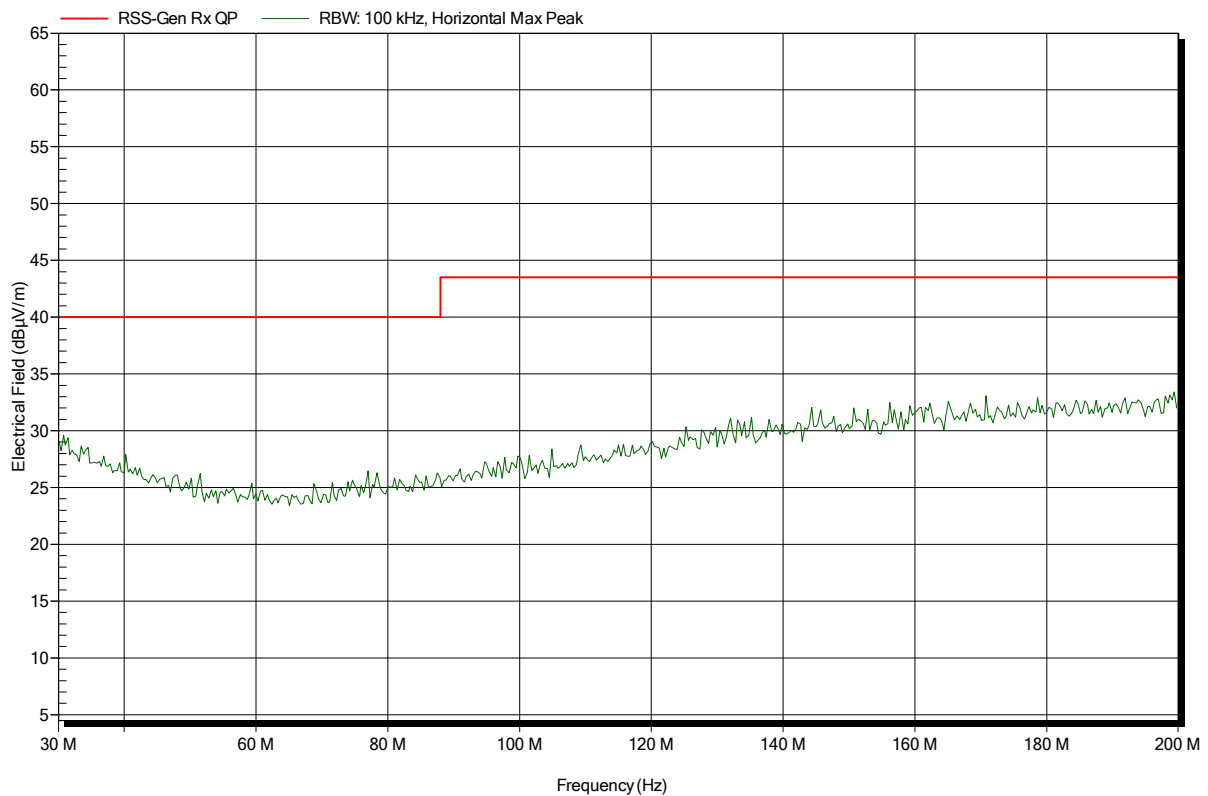
Receiver radiated spurious emissions

Spurious emissions according to RSS-GEN

Project number: G0M-1410-4214

Applicant:	Leica Geosystems GmbH
EUT Name:	Bluetooth, WLAN and BLE Modul
Model:	TiWi-BLE (Inwave BTFA-2450)
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Handrik
Test Conditions:	Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	RX; scan mode
Test Date:	2015-03-06
Note:	

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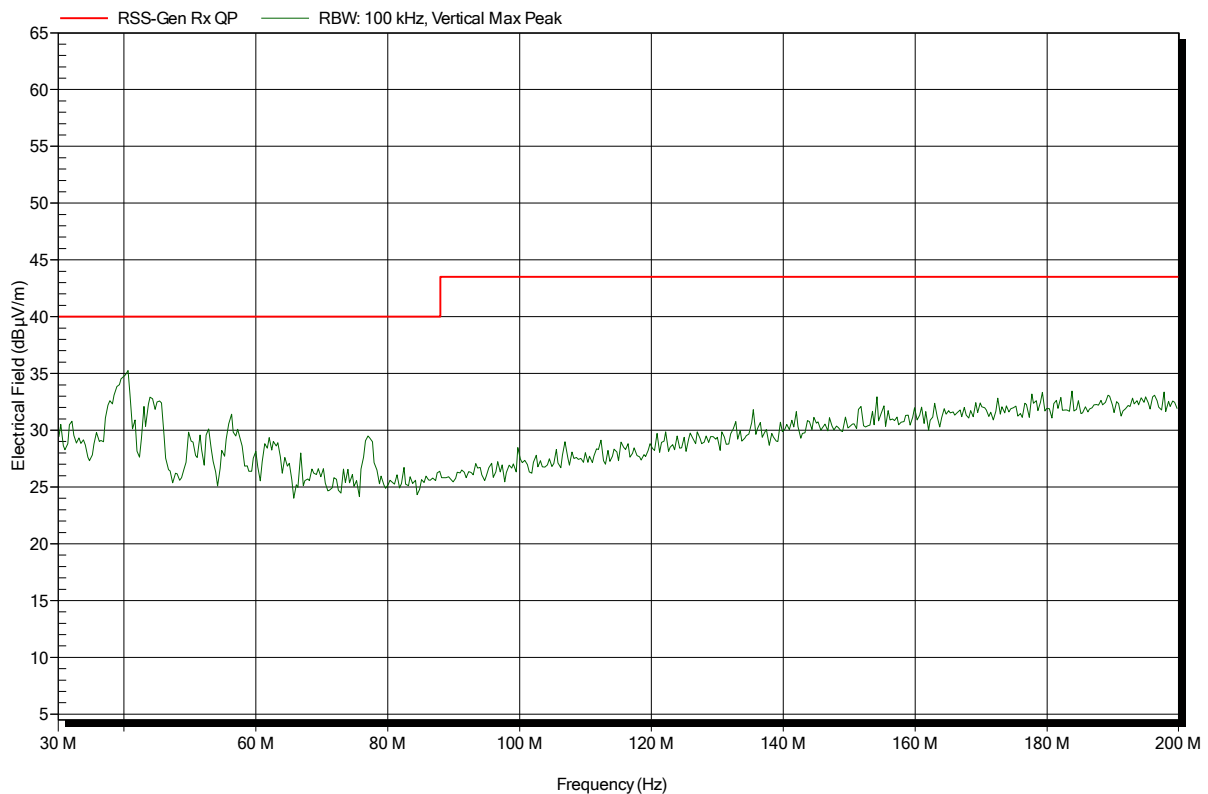


Spurious emissions according to RSS-GEN

Project number: G0M-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: RX; scan mode
 Test Date: 2015-03-06
 Note:

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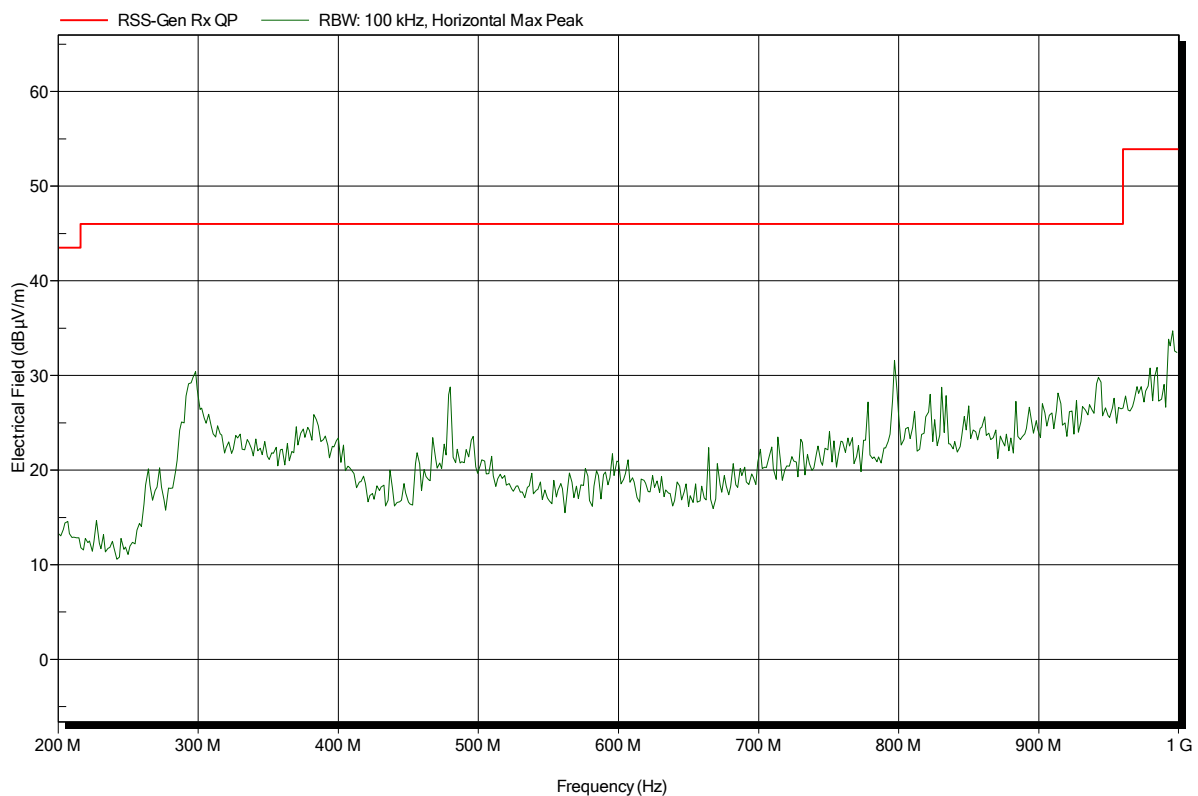


Spurious emissions according to RSS-GEN

Project number: G0M-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: RX; scan mode
 Test Date: 2015-03-06
 Note:

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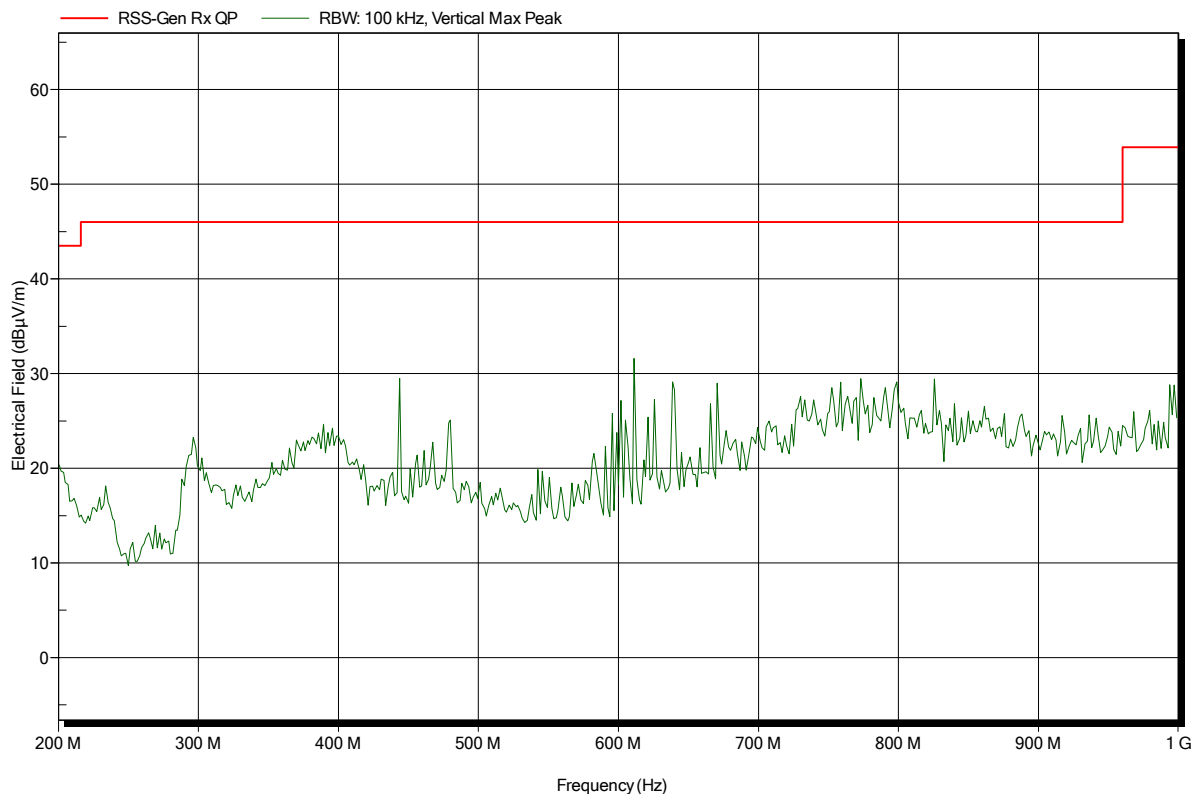


Spurious emissions according to RSS-GEN

Project number: G0M-1410-4214

Applicant:	Leica Geosystems GmbH
EUT Name:	Bluetooth, WLAN and BLE Modul
Model:	TiWi-BLE (Inwave BTFA-2450)
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Handrik
Test Conditions:	Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	RX; scan mode
Test Date:	2015-03-06
Note:	

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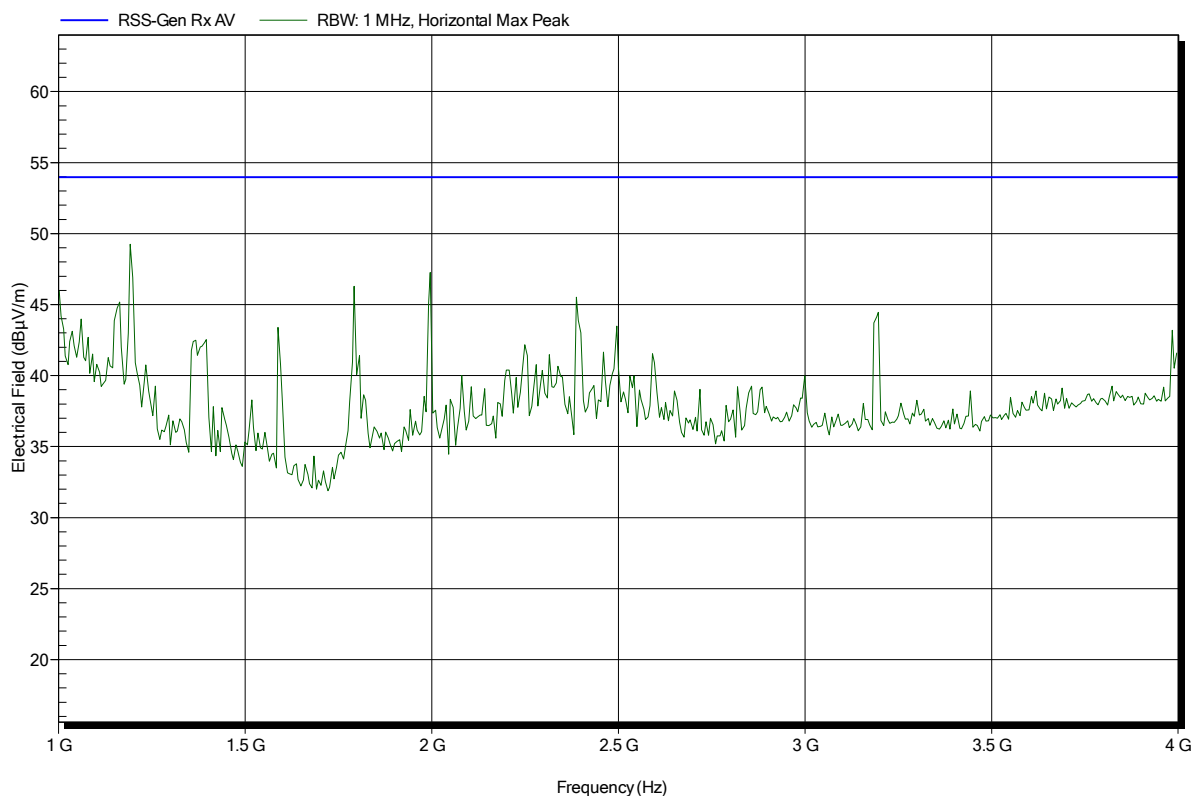


Spurious emissions according to RSS-GEN

Project number: G0M-1410-4214

Applicant:	Leica Geosystems GmbH
EUT Name:	Bluetooth, WLAN and BLE Modul
Model:	TiWi-BLE (Inwave BTFA-2450)
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Handrik
Test Conditions:	Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	RX; scan mode
Test Date:	2015-03-06
Note:	

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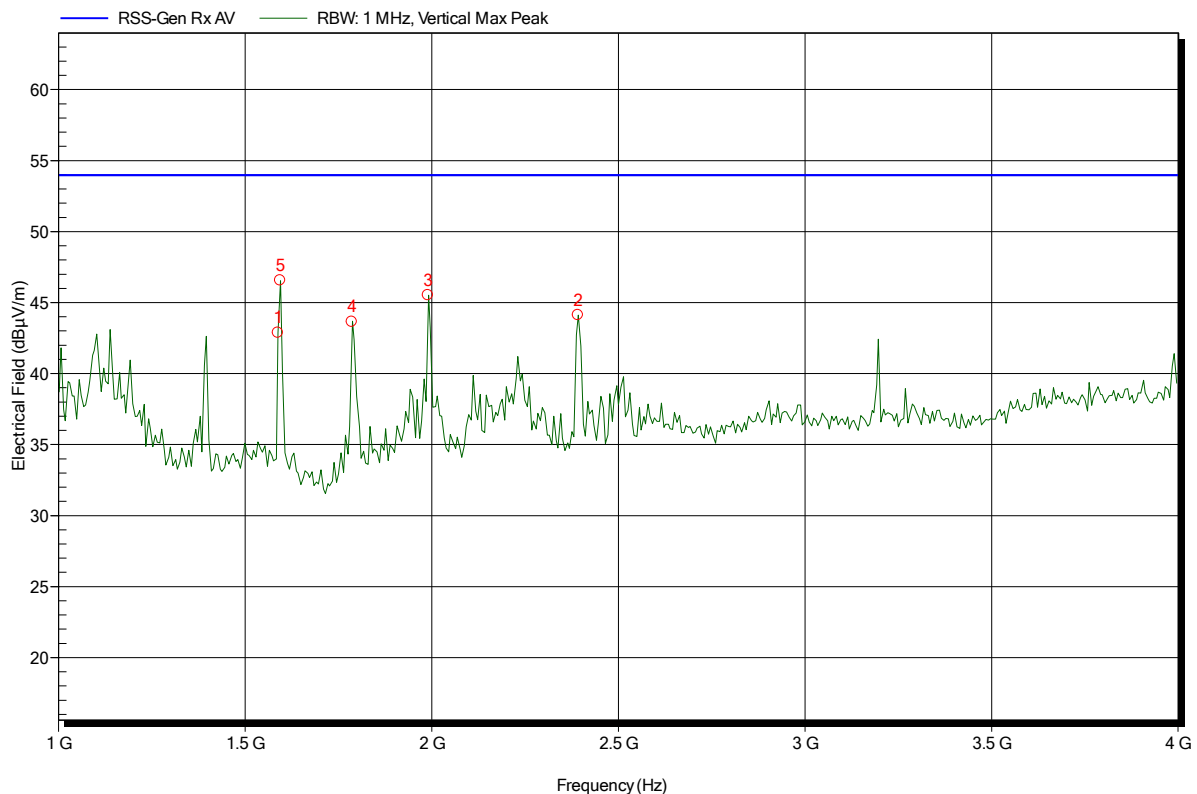


Spurious emissions according to RSS-GEN

Project number: G0M-1410-4214

Applicant: Leica Geosystems GmbH
 EUT Name: Bluetooth, WLAN and BLE Modul
 Model: TiWi-BLE (Inwave BTFA-2450)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Handrik
 Test Conditions: Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: RX; scan mode
 Test Date: 2015-03-06
 Note:

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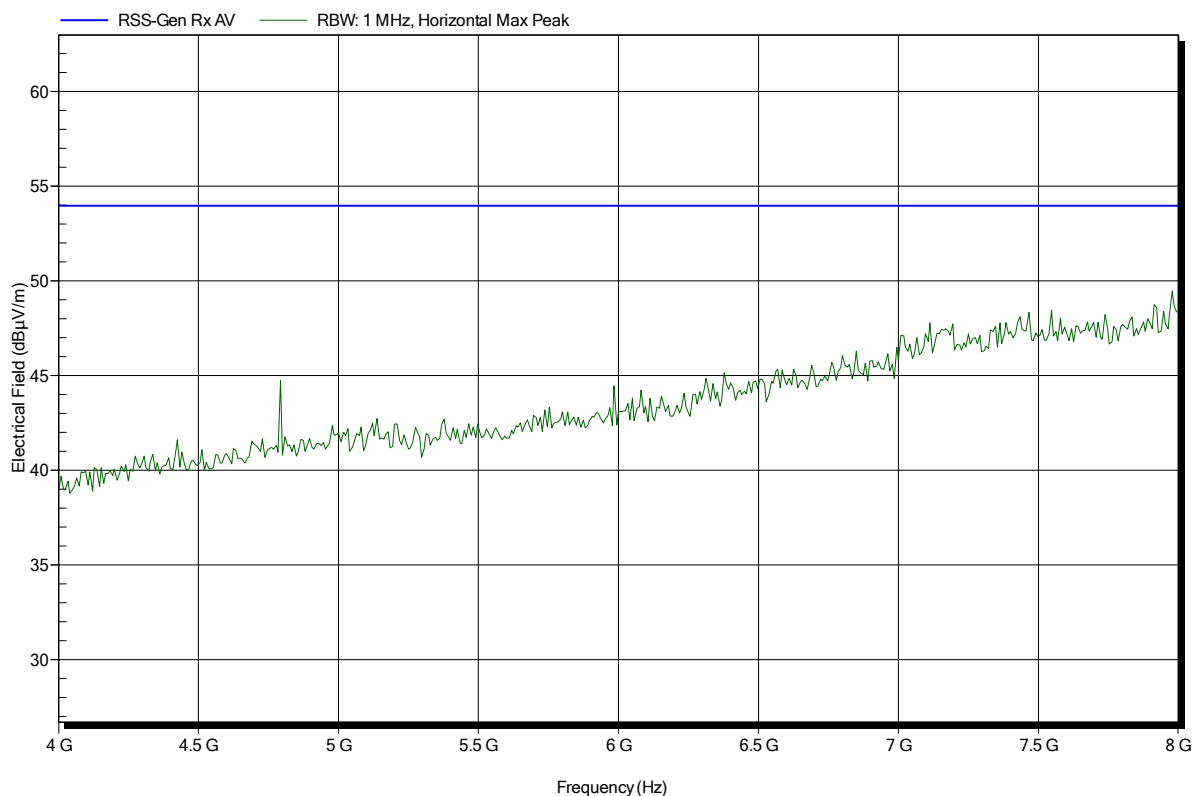
Frequency	Peak	Peak Limit	Peak Difference	Status
1.588 GHz	42.88 dBµV/m	53.98 dBµV/m	-11.1 dB	Pass
1.594 GHz	46.55 dBµV/m	53.98 dBµV/m	-7.43 dB	Pass
1.786 GHz	43.65 dBµV/m	53.98 dBµV/m	-10.33 dB	Pass
1.99 GHz	45.52 dBµV/m	53.98 dBµV/m	-8.46 dB	Pass
2.392 GHz	44.11 dBµV/m	53.98 dBµV/m	-9.87 dB	Pass

Spurious emissions according to RSS-GEN

Project number: GOM-1410-4214

Applicant:	Leica Geosystems GmbH
EUT Name:	Bluetooth, WLAN and BLE Modul
Model:	TiWi-BLE (Inwave BTFA-2450)
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Handrik
Test Conditions:	Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	RX; scan mode
Test Date:	2015-03-06
Note:	

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Spurious emissions according to RSS-GEN

Project number: GOM-1410-4214

Applicant:	Leica Geosystems GmbH
EUT Name:	Bluetooth, WLAN and BLE Modul
Model:	TiWi-BLE (Inwave BTFA-2450)
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Handrik
Test Conditions:	Tnom: 22°C, Vnom: 120V AC (AC/DC adaptor)
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	RX; scan mode
Test Date:	2015-03-06
Note:	

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