

EMC TEST REPORT

FCC 47 CFR Part 15B
Industry Canada RSS-Gen

Electromagnetic compatibility - Unintentional radiators

Report Reference No. : G0M-1406-3917-EF0115B-V03

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 15 Subpart B
RSS-Gen, Issue 3, 2010-12
ANSI C63.4:2009

Equipment under test (EUT):

Product description	Field Controller Win EC7	
Model No.	CS20 3.75G	
Additional Models	CS20 3.75G GNSS, CS20 3.75G Disto, CS20 3.75G Disto GNSS	
Hardware version	V5.0	
Firmware / Software version	1.0	
FCC-ID / IC-ID	FCC-ID: RFD-CSNGF	IC: 3177A-CSNGF
Test result	Passed	

Test Report No.: G0M-1406-3917-EF0115B-V03

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

Possible test case verdicts:

- not applicable to test object: N/A
- test object does meet the requirement.....: P (Pass)
- test object does not meet the requirement.....: F (Fail)

Testing:

Date of receipt of test item: 2014-07-14

Date (s) of performance of tests: 2014-08-05 - 2014-09-18

Compiled by: Steffen Zunke

Tested by (+ signature).....: Steffen Zunke 

Approved by (+ signature): Marcus Klein 

Date of issue.....: 2015-04-27

Total number of pages.....: 70

General remarks:

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

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

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

Additional comments: This report contains the following different models					
Type		Variante		Article number	
CS20		CS20 3.75G		808009	
CS20		CS20 3.75G GNSS		808010	
CS20		CS20 3.75G Disto		808011	
CS20		CS20 3.75G Disto GNSS		808012	
The different between the following models is the different mounting with the following moduls. Bluetooth/WLAN modul GSM/ UMTS module GNSS module (internal GPS module) Longrange Bluetooth module Disto module (internal laser measurement module)					
Variante	Bluetooth/WLAN	GSM/UMTS	GNSS	LR-BT	Disto
CS20 3.75G	X	X		X	
CS20 3.75G GNSS	X	X	X	X	
CS20 3.75G Disto	X	X		X	X
CS20 3.75G Disto GNSS	X	X	X	X	X

Version History

Version	Issue Date	Remarks	Revised by
V01	2014-09-29	Initial Release	
V02	2014-09-30	FCC-ID and IC-ID changed	Steffen Zunke
V03	2015-04-27	Product description changed and additional models added.	Steffen Zunke

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1 Equipment (Test item) Description

Description	Field Controller Win EC7	
Model	CS20 3.75G	
Additional Models	CS20 3.75G GNSS, CS20 3.75G Disto, CS20 3.75G Disto GNSS	
Serial number	None	
Hardware version	V5.0	
Software / Firmware version	1.0	
FCC-ID	RFD-CSNGF	
IC-ID	3177A-CSNGF	
Power supply	10.8VDC via rechargeable battery or via AC/DC adapter	
AC/DC-Adaptor	Model : AEL40US15 Manufacturer : XP Power Input : 100-240VAC / 50-60Hz Output : 15VDC / 2.66A	
Radio module	Type	Bluetooth / WLAN Module
	Model	TIWI-BLE
	Manufacturer	LS Research
	HW Version	-
	SW Version	-
	FCC-ID	TFB-TIWI1-01
	IC	5969A-TIWI101
Radio module	Type	Bluetooth Module
	Model	cB-OBS421x-c1
	Manufacturer	connectBlue 7 u-Blox
	HW Version	B
	SW Version	5.0
	FCC-ID	PVH0946
	IC	5325A-0946

Radio module	Type	GSM / UMTS Module
	Model	PHS8-P
	Manufacturer	Gemalto
	HW Version	3
	SW Version	-
	FCC-ID	QIPPHS8-P
	IC	7830A-PHS8P
Manufacturer	Leica Geosystems AG Heinrich Wild Strasse 9435 Heerbrugg SWITZERLAND	
Highest emission frequency	> 1000 MHz (up to 5th Harm)	
Device classification	Class B	
Equipment type	Tabletop	
Number of tested samples	1	

1.4 Supporting Equipment Used During Testing

Product Type*	Device	Manufacturer	Model No.	Comments
SIM	Communication tester	Rohde & Schwarz	CMU 200	-
AE	GPS Antenna	Leica	GS14	-
AE	Total Station	Leica	TS15	-
AE	WLAN Access Point	Siemens	-	-
AE	Laptop	DELL	E6400	-
AE	AC/DC Adapter	XP Power	AEL40US15	-

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

AE : Auxiliary/Associated Equipment, or

SIM : Simulator (Not Subjected to Test)

CABL : Connecting cables

1.5 Operating Modes

Mode #	Description
1	CS20 3.75G Disto GNSS powered from internal Battery, Bluetooth link to a Laptop, Bluetooth-LR link to TS15 with RH16, WLAN link to WLAN Access Point, GSM 900 link to CMU and GPS connection
2	CS20 3.75G Disto GNSS charging via AC/DC adapter, Bluetooth link to a Laptop, Bluetooth-LR link to TS15 with RH16, WLAN link to WLAN Access Point, GSM 900 link to CMU and GPS connection
3	CS20 3.75G charging via AC/DC adapter, Bluetooth link to GPS Antenna, Bluetooth-LR link to TS15 with RH16, WLAN link to WLAN Access Point, GSM 900 link to CMU
4	CS20 3.75G GNSS charging via AC/DC adapter, Bluetooth link to a Laptop, Bluetooth-LR link to TS15 with RH16, WLAN link to WLAN Access Point, GSM 900 link to CMU and GPS connection
5	CS20 3.75G Disto charging via AC/DC adapter, Bluetooth link to GPS Antenna, Bluetooth-LR link to TS15 with RH16, WLAN link to WLAN Access Point, GSM 900 link to CMU
6	CS20 3.75G Disto GNSS powered from internal Battery, Bluetooth link to a Laptop, Bluetooth-LR link to TS15 with RH16, WLAN link to WLAN Access Point, UMTS link to CMU and GPS connection
7	CS20 3.75G Disto GNSS charging via AC/DC adapter, Bluetooth link to a Laptop, Bluetooth-LR link to TS15 with RH16, WLAN link to WLAN Access Point, GSM 900 link to CMU and GPS connection

1.6 Test Equipment Used During Testing

Radiated emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Biconical Antenna	R&S	HK 116	EF00012	2013-02	2016-02
LPD-Antenne	R&S	HL 223	EF00187	2014-03	2017-03
LPD-Antenna	R&S	HL 025	EF00327	2013-02	2016-02
EMI Test Receiver	R&S	ESU8	EF00379	2014-03	2015-03
EMI Test Receiver	R&S	ESCS30	EF00295	2013-10	2014-10

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

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

A.F.:

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

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

Net:

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

Limit:

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

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

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:

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

2 Result Summary

FCC 47 CFR Part 15B, Industry Canada RSS-Gen				
Product Specific Standard	Requirement – Test	Reference Method	Result	Remarks
47 CFR 15.109 RSS-Gen 4.9 & 4.10	Radiated emissions	ANSI C 63.4	PASS	-
47 CFR 15.107 RSS-Gen 7.2.4	AC power line conducted emissions	ANSI C63.4	PASS	-
Remarks:				

3 Test Conditions and Results

3.1 Test Conditions and Results – Radiated emissions

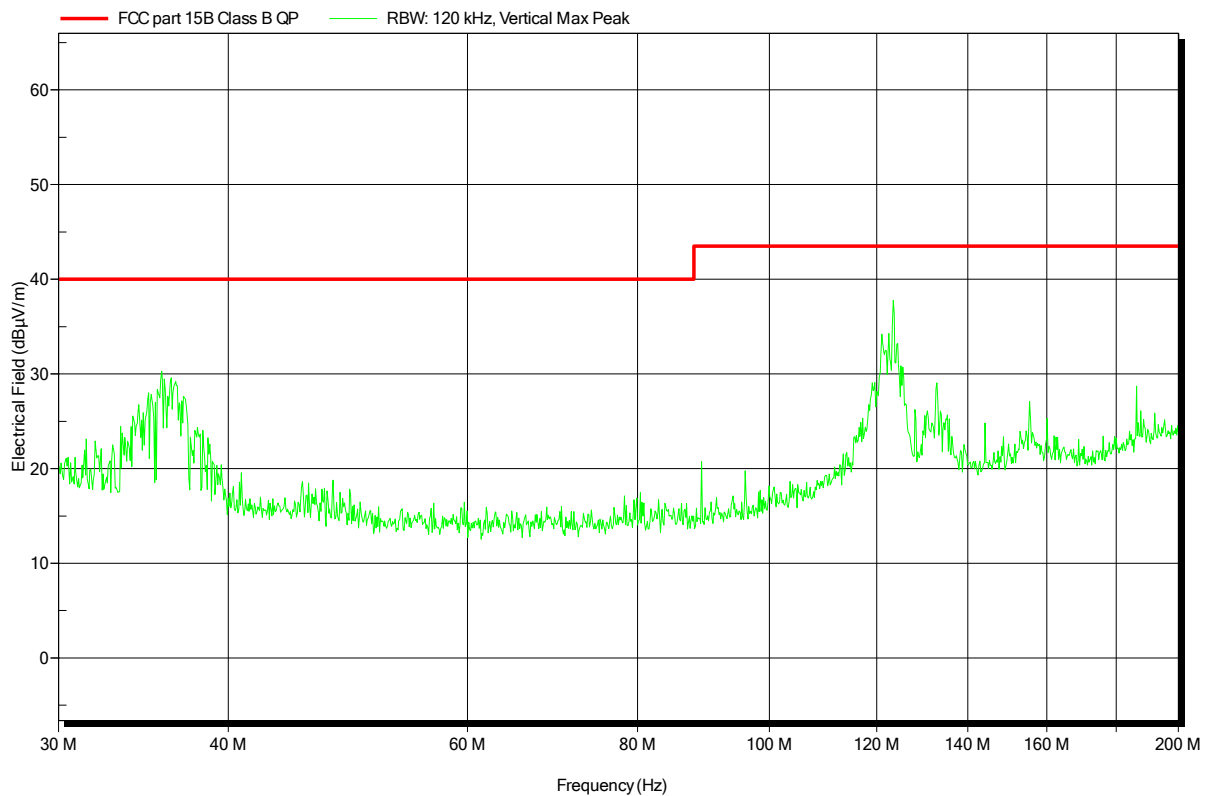
Radiated emissions acc. FCC 47 CFR 15.109 / IC RSS-Gen					Verdict: PASS	
Laboratory Parameters:		Required prior to the test		During the test		
Ambient Temperature		15 to 35 °C		24°C		
Relative Humidity		30 to 60 %		48%		
Test according referenced standards		Reference Method				
		ANSI C63.4				
Sample is tested with respect to the requirements of the equipment class		Equipment class				
		Class B				
Test frequency range determined from highest emission frequency		Highest emission frequency				
		> 1000 MHz (up to 5th Harm)				
Fully configured sample scanned over the following frequency range		Frequency range				
		30 MHz to 5 GHz				
Operating mode		1 / 2 / 3 / 4 / 5 / 6 / 7				
Limits and results Class B						
Frequency [MHz]	Quasi-Peak [dBµV/m]	Result	Average [dBµV/m]	Result	Peak [dBµV/m]	Result
30 – 88	40	PASS	-		-	-
88 – 216	43.5	PASS	-		-	-
216 – 960	46	PASS	-		-	-
960 – 1000	54	PASS	-		-	-
> 1000	-	-	54	PASS	74	PASS
Comments: Measurements were performed up to 5GHz, above 5 GHz no relevant emission were determined.						

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer:	Leica Geosystems AG
EUT Name:	Feld Controller
Model:	CS20 3.75G Disto GNSS
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Zunke
Test Conditions:	Tnom: 25°C, Unom: 10.8VDC via Battery
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3m
Mode:	CS20 3.75G Disto GNSS, with battery, WLAN link to AP, BT link to Laptop, GSM900 link to CMU, LR-BT link to TS15 with RH16
Test Date:	2014-08-06
Note:	

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Test Report No.: G0M-1406-3917-EF0115B-V03

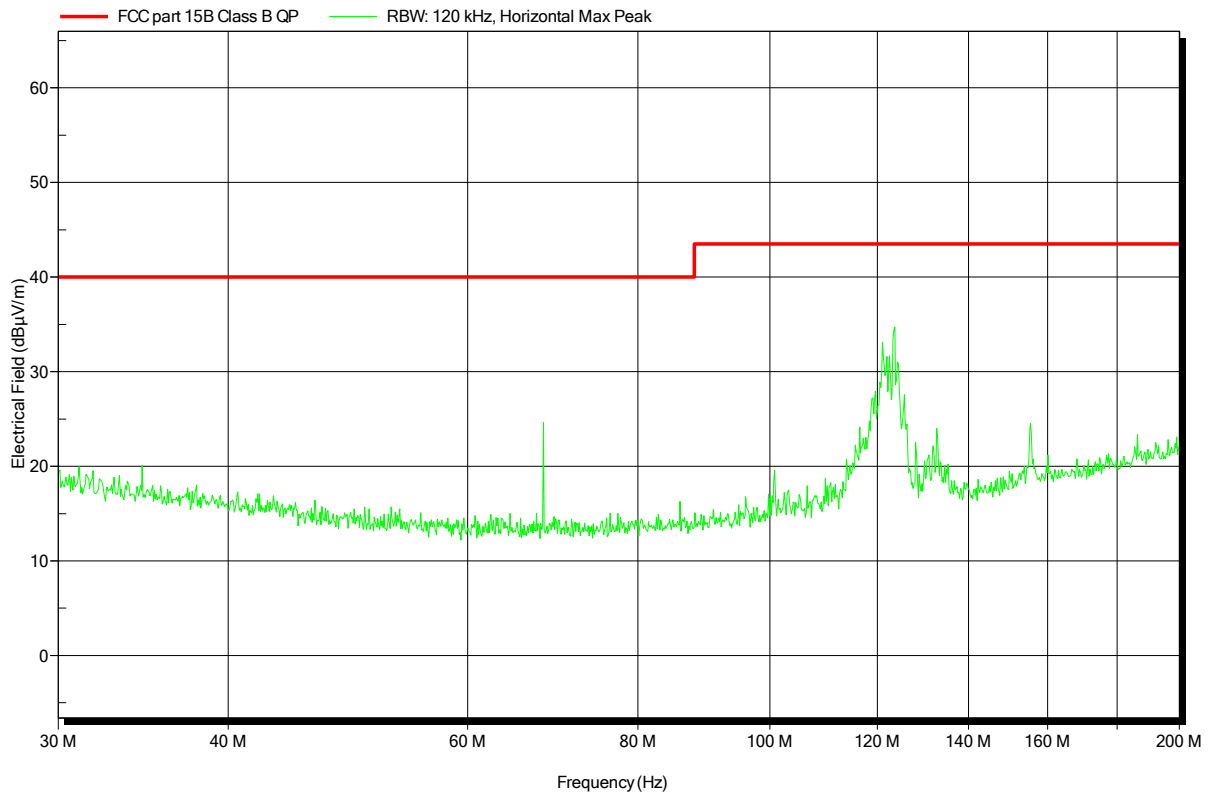
Eurofins Product Service GmbH
Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G Disto GNSS
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via Battery
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3m
 Mode: CS20 3.75G Disto GNSS, with battery, WLAN link to AP, BT link to Laptop, GSM900 link to CMU, LR-BT link to TS15 with RH16
 Test Date: 2014-08-06
 Note:

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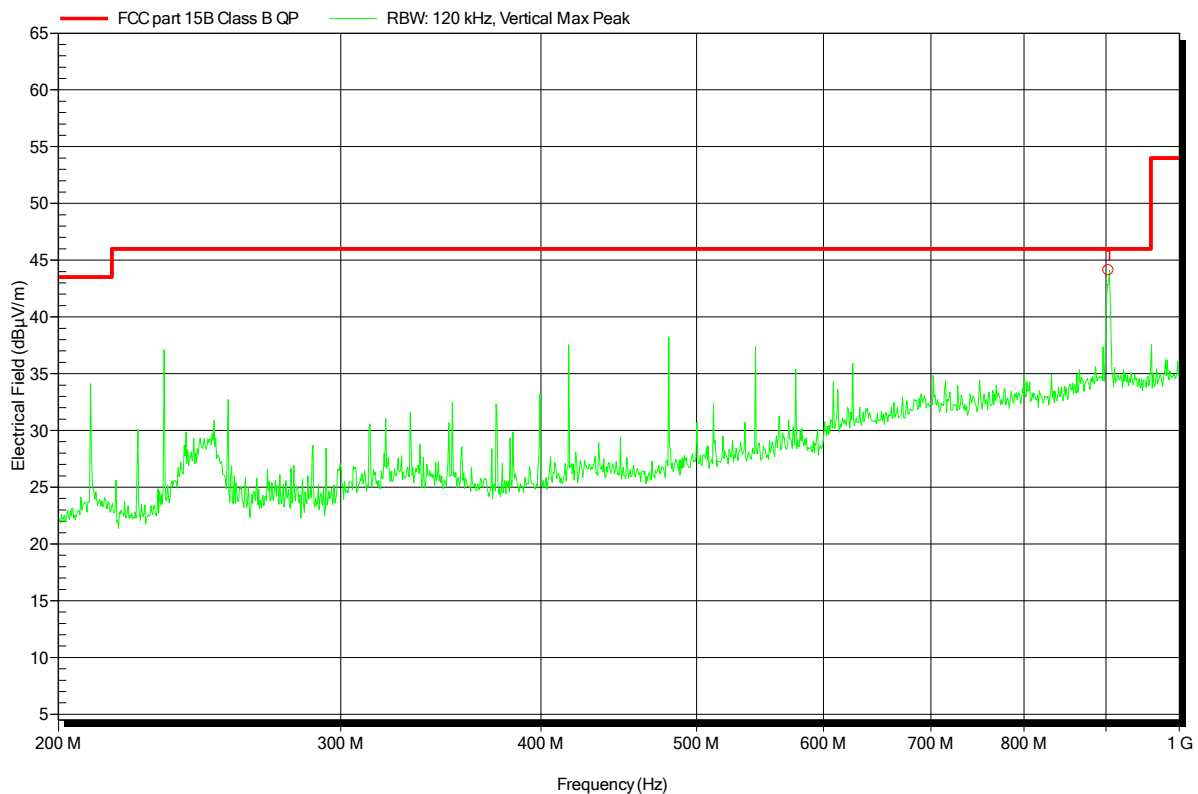


Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G Disto GNSS
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via Battery
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3m
 Mode: CS20 3.75G Disto GNSS, with battery, WLAN link to AP, BT link to Laptop, GSM900 link to CMU, LR-BT link to TS15 with RH16
 Test Date: 2014-08-06
 Note:

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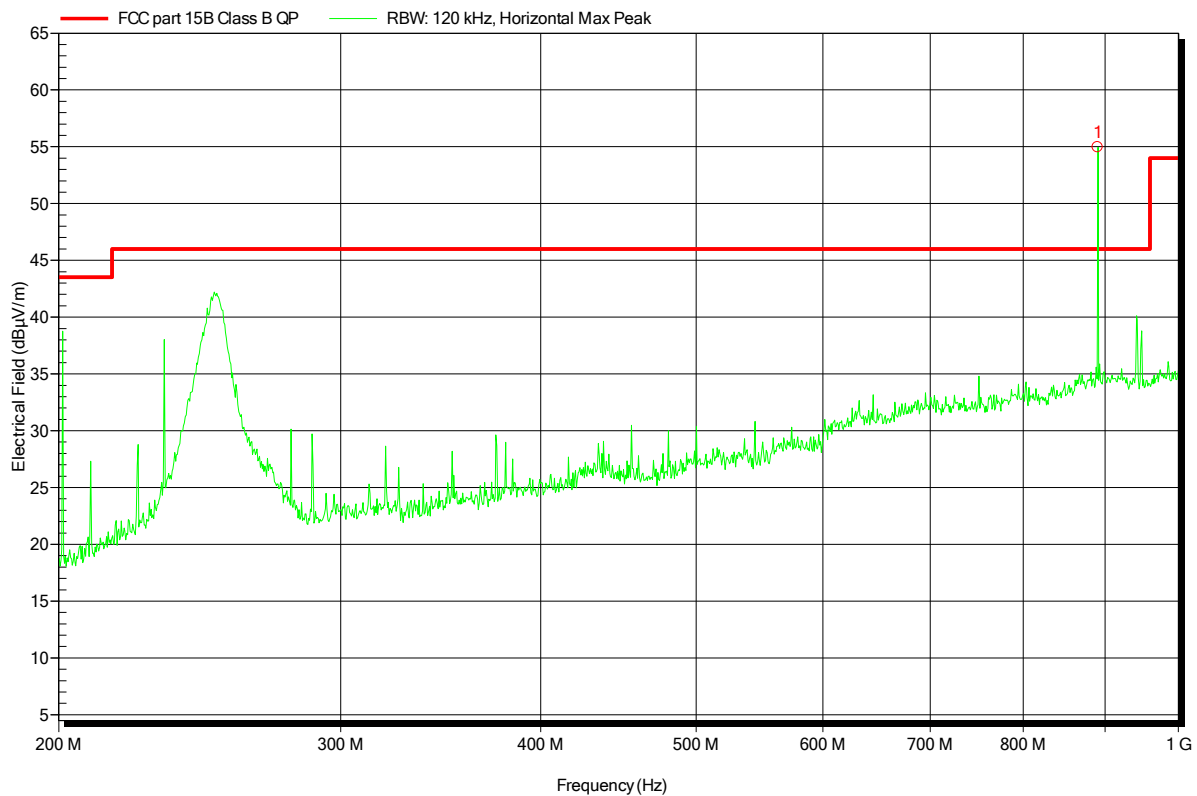
Frequency
 903.26 MHz GSM carrier

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G Disto GNSS
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via Battery
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3m
 Mode: CS20 3.75G Disto GNSS, with battery, WLAN link to AP, BT link to Laptop, GSM900 link to CMU, LR-BT link to TS15 with RH16
 Test Date: 2014-08-06
 Note:

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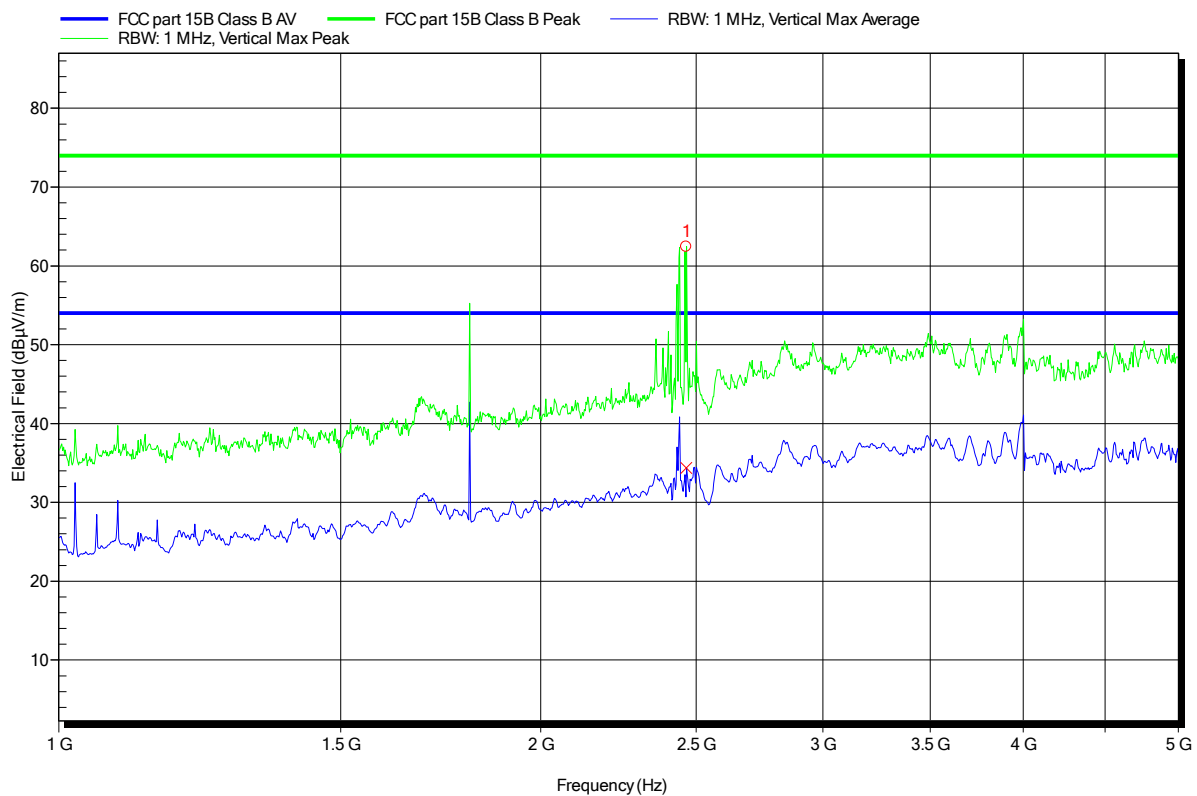
Frequency
 890.65 MHz GSM carrier

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G Disto GNSS
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via Battery
 Antenna: Rohde & Schwarz HL 025, Vertical
 Measurement distance: 3m
 Mode: CS20 3.75G Disto GNSS, with battery, WLAN link to AP, BT link to Laptop, GSM900 link to CMU, LR-BT link to TS15 with RH16
 Test Date: 2014-08-06
 Note:

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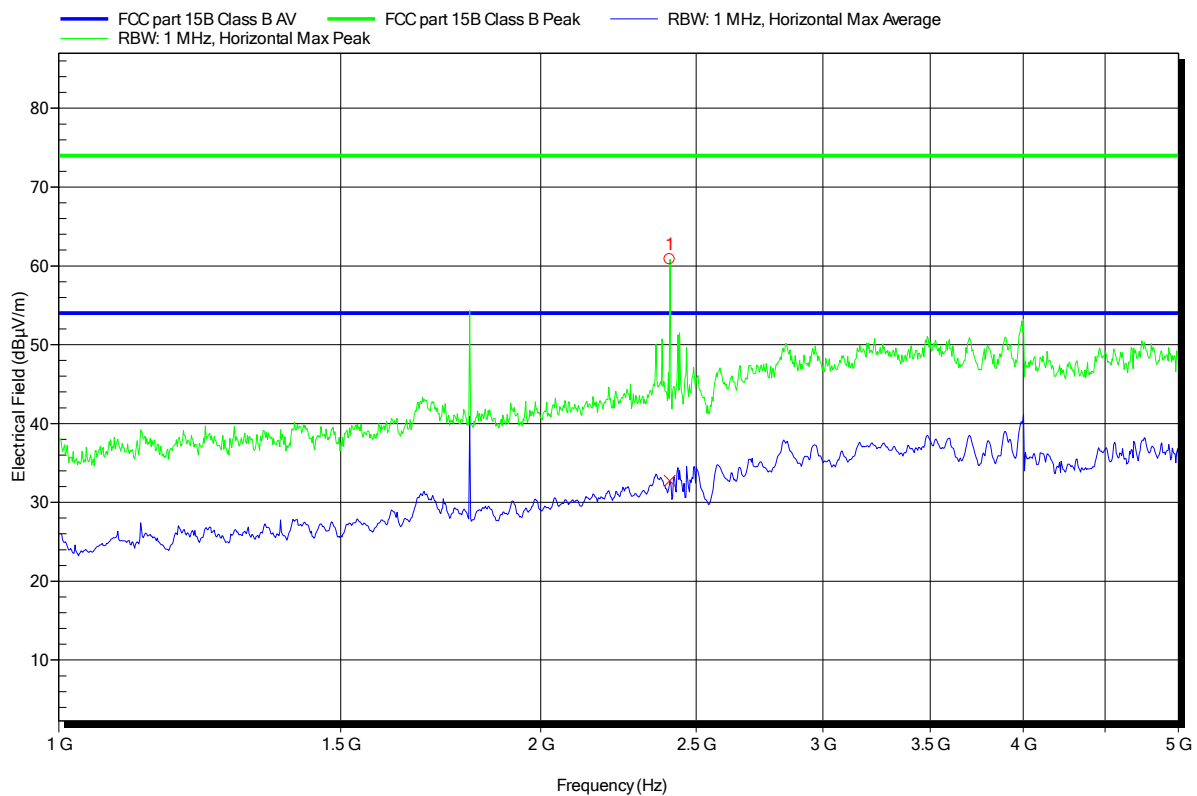
Frequency
 2.465 GHz WLAN carrier

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G Disto GNSS
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via Battery
 Antenna: Rohde & Schwarz HL 025, Horizontal
 Measurement distance: 3m
 Mode: CS20 3.75G Disto GNSS, with battery, WLAN link to AP, BT link to Laptop, GSM900 link to CMU, LR-BT link to TS15 with RH16
 Test Date: 2014-08-06
 Note:

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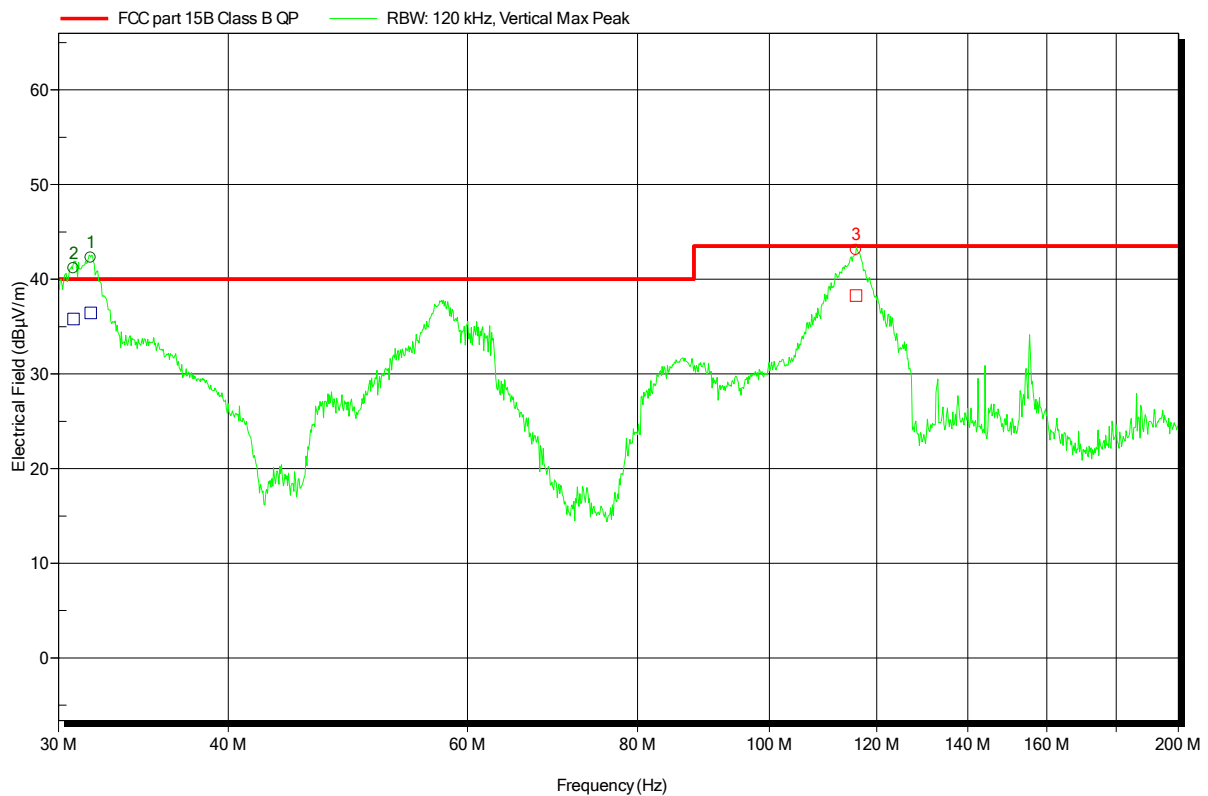
Frequency
 2.407 GHz WLAN carrier

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G Disto GNSS
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3m
 Mode: CS20 3.75G Disto GNSS, charging, WLAN link to AP, BT link to Laptop, GSM900 link to CMU, LR-BT link to TS15 with RH16
 Test Date: 2014-08-06
 Note:

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Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
30.78 MHz	35.82 dBμV/m	40 dBμV/m	-4.18 dB	Pass
31.68 MHz	36.45 dBμV/m	40 dBμV/m	-3.55 dB	Pass
115.86 MHz	38.26 dBμV/m	43.5 dBμV/m	-5.24 dB	Pass

Test Report No.: G0M-1406-3917-EF0115B-V03

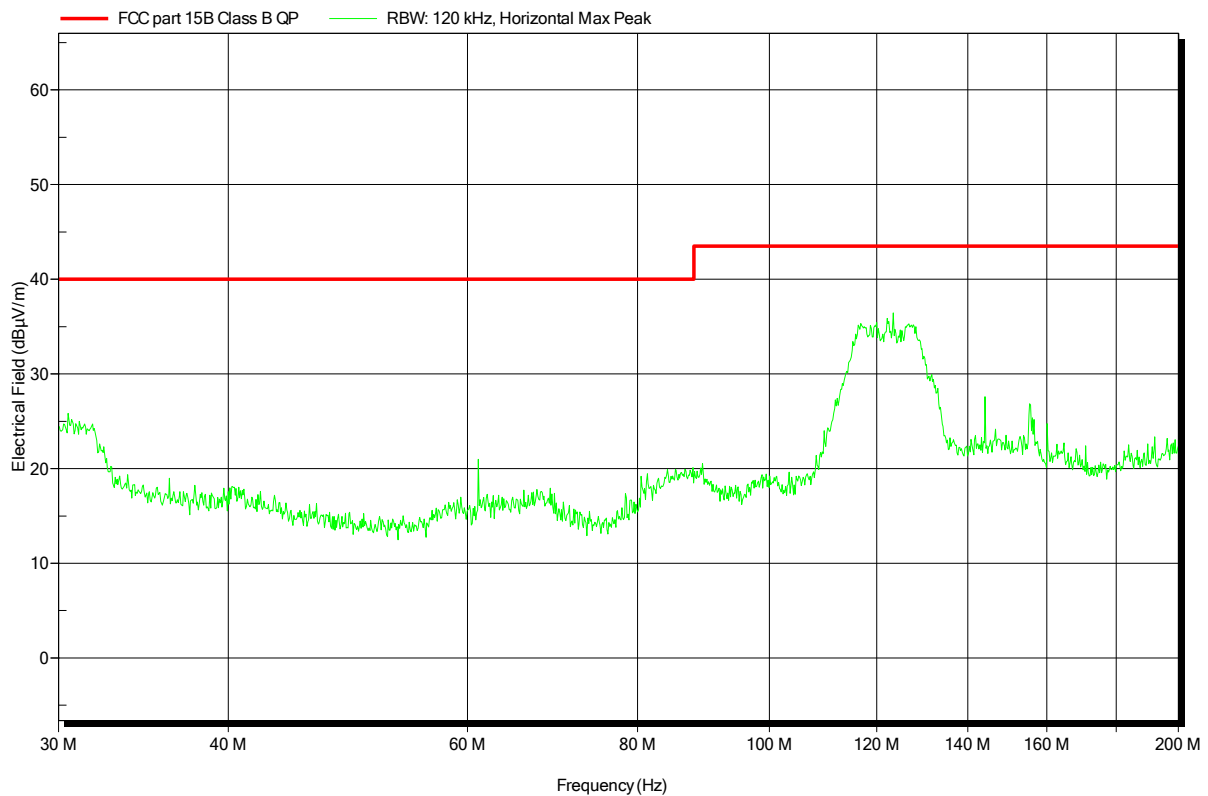
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions under normal conditions according to FCC Part 15b

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Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G Disto GNSS
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3m
 Mode: CS20 3.75G Disto GNSS, charging, WLAN link to AP, BT link to Laptop, GSM900 link to CMU, LR-BT link to TS15 with RH16
 Test Date: 2014-08-06
 Note:

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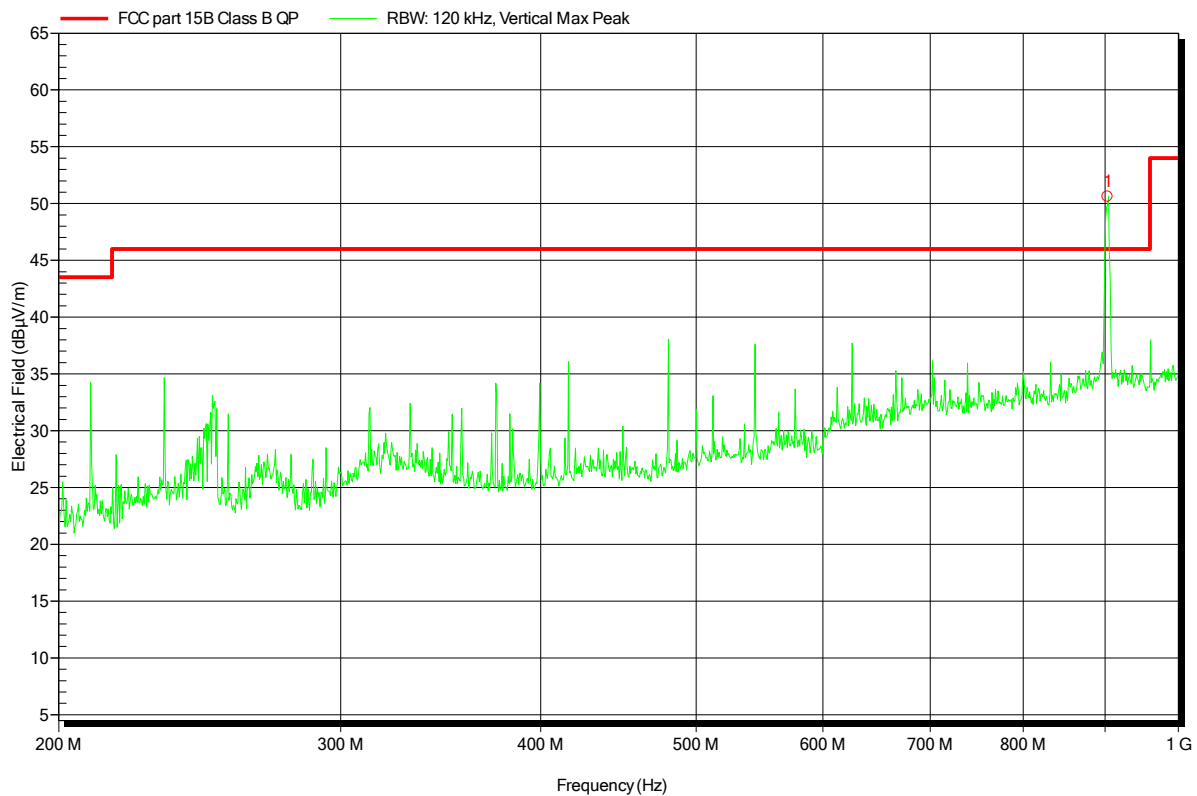


Spurious emissions under normal conditions according to FCC Part 15b

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 EUT Name: Feld Controller
 Model: CS20 3.75G Disto GNSS
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3m
 Mode: CS20 3.75G Disto GNSS, charging, WLAN link to AP, BT link to Laptop, GSM900 link to CMU, LR-BT link to TS15 with RH16
 Test Date: 2014-08-06
 Note:

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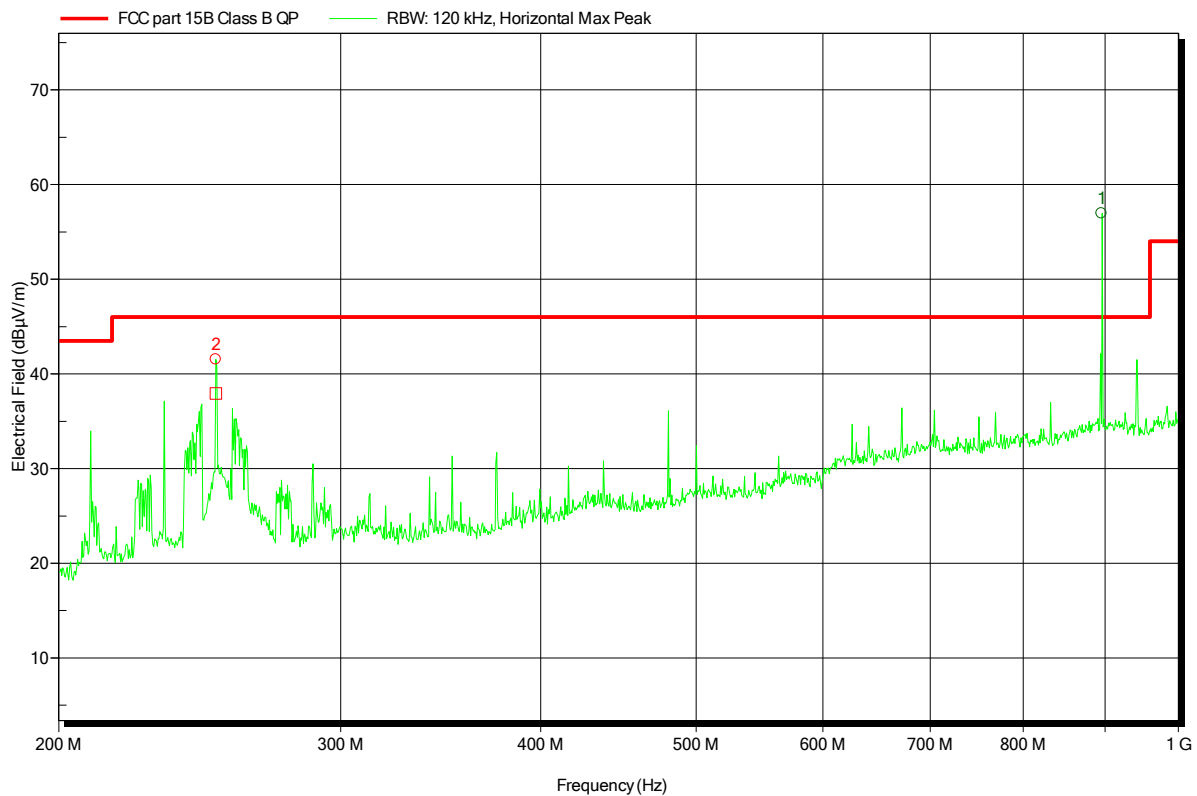
Frequency
 903.26 MHz GSM carrier

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

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 EUT Name: Feld Controller
 Model: CS20 3.75G Disto GNSS
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 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3m
 Mode: CS20 3.75G Disto GNSS, charging, WLAN link to AP, BT link to Laptop, GSM900 link to CMU, LR-BT link to TS15 with RH16
 Test Date: 2014-08-06
 Note:

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Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
250.795 MHz	37.95 dBµV/m	46 dBµV/m	-8.05 dB	Pass
895.5 MHz GSM carrier				

Test Report No.: G0M-1406-3917-EF0115B-V03

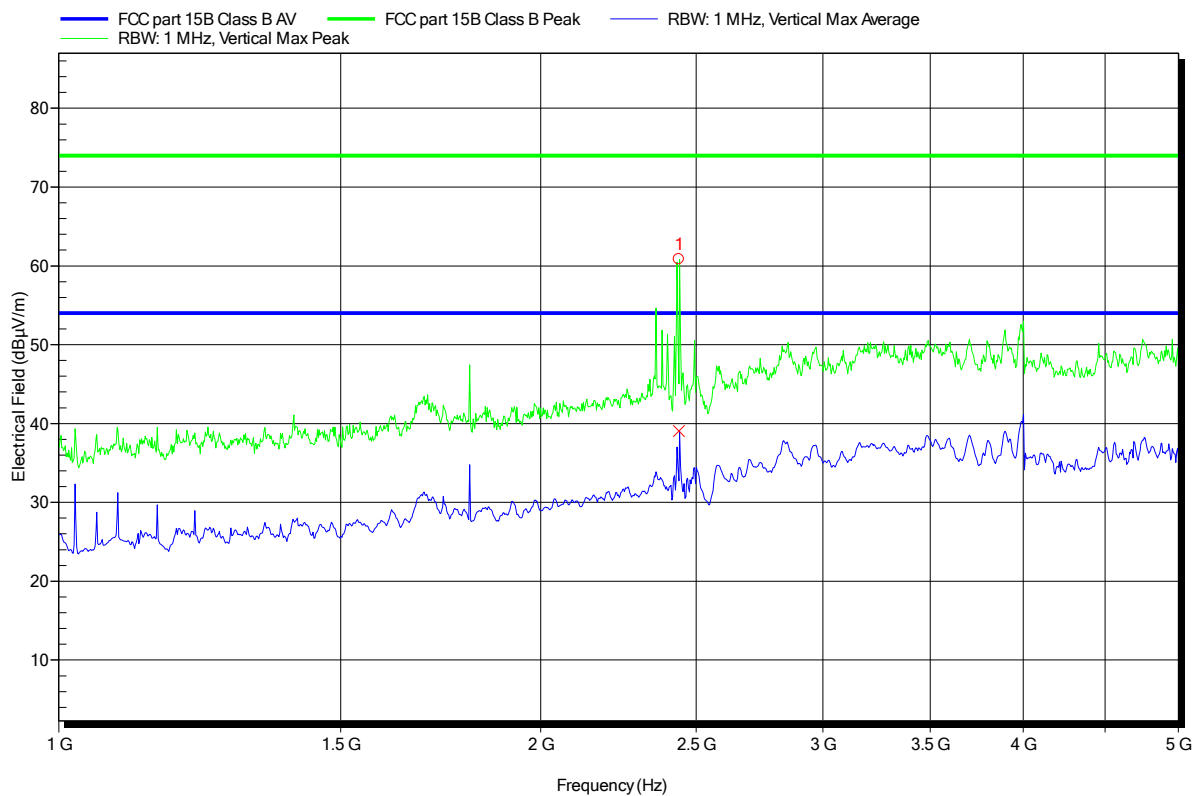
Eurofins Product Service GmbH
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 Antenna: Rohde & Schwarz HL 025, Vertical
 Measurement distance: 3m
 Mode: CS20 3.75G Disto GNSS, charging, WLAN link to AP, BT link to Laptop, GSM900 link to CMU, LR-BT link to TS15 with RH16
 Test Date: 2014-08-06
 Note:

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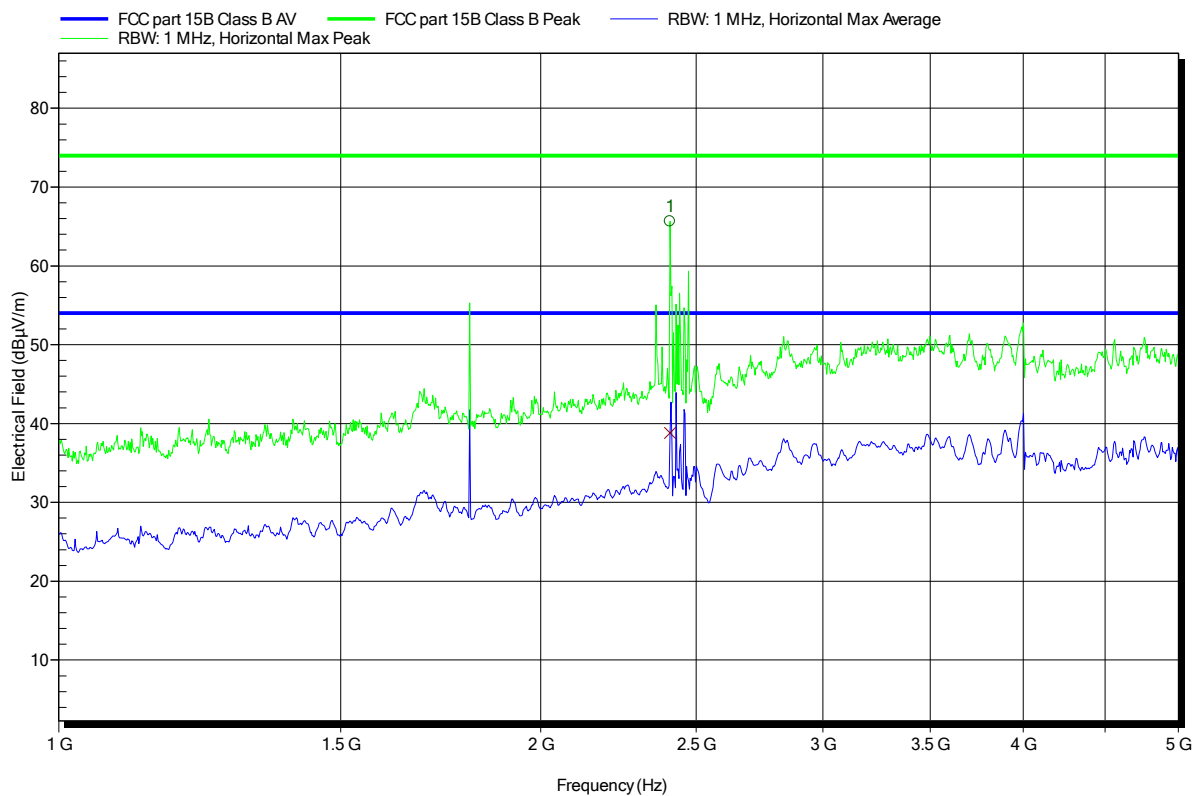
Frequency
 2.439 GHz WLAN carrier

Spurious emissions under normal conditions according to FCC Part 15b

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 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
 Antenna: Rohde & Schwarz HL 025, Horizontal
 Measurement distance: 3m
 Mode: CS20 3.75G Disto GNSS, charging, WLAN link to AP, BT link to Laptop, GSM900 link to CMU, LR-BT link to TS15 with RH16
 Test Date: 2014-08-06
 Note:

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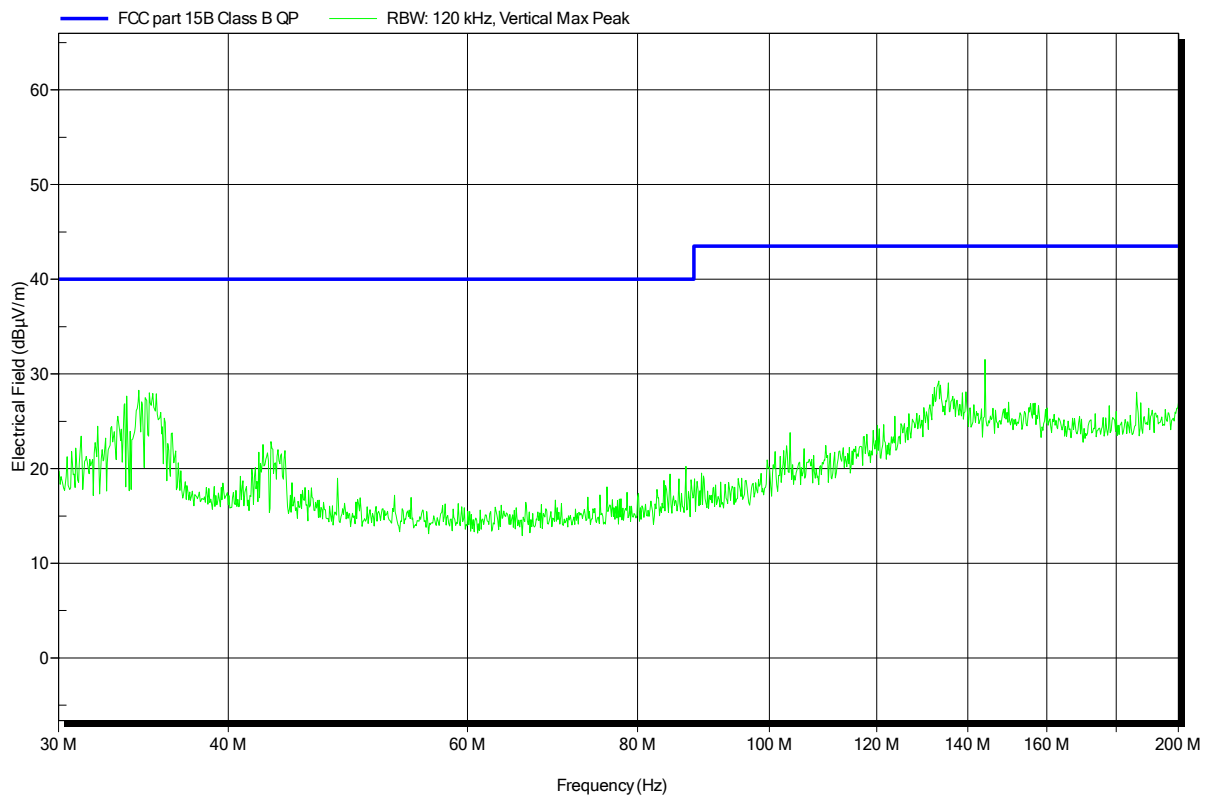
Frequency
 2.408 GHz WLAN carrier

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

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 EUT Name: Feld Controller
 Model: CS20 3.75G Disto GNSS
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via Battery
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3m
 Mode: CS20 3.75G Disto GNSS, battery powered, WLAN link to AP, BT link to Laptop, UMTS link to CMU, LRBT link to TS15 with RH16
 Test Date: 2014-09-18
 Note:

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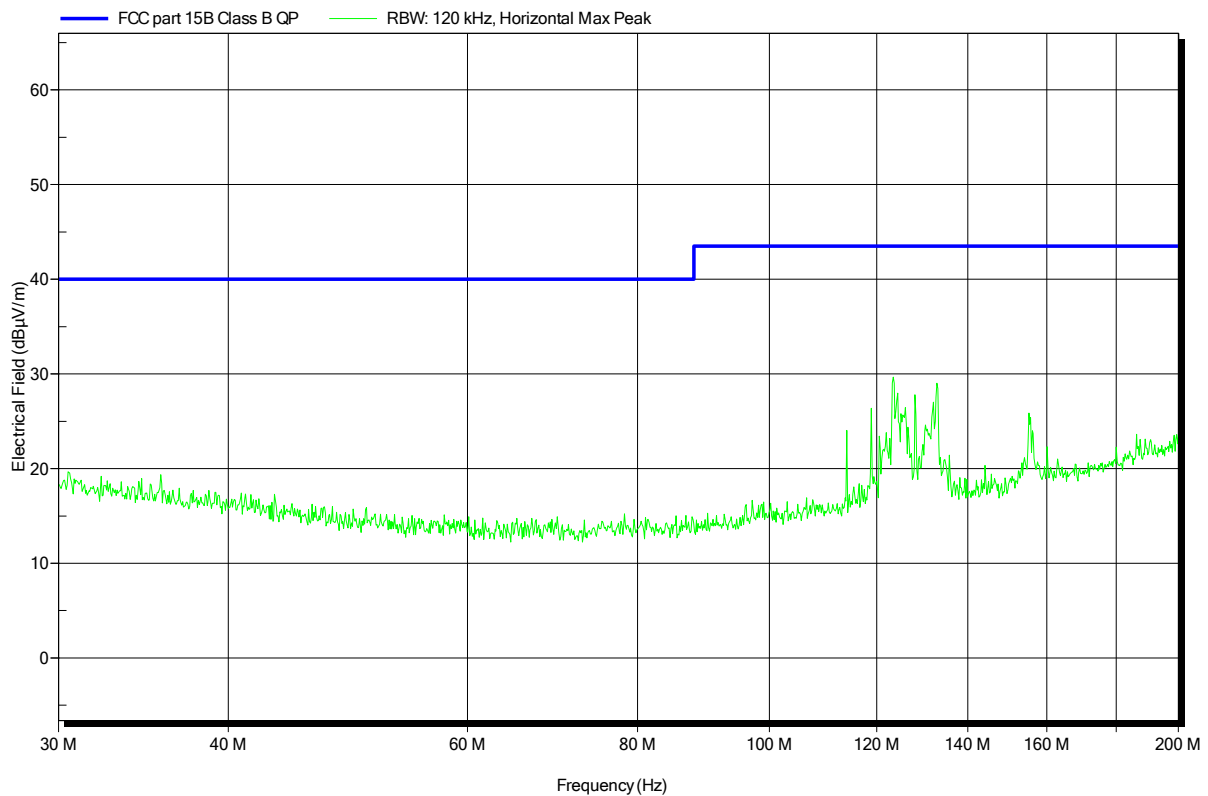


Spurious emissions under normal conditions according to FCC Part 15b

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 Test Date: 2014-09-18
 Note:

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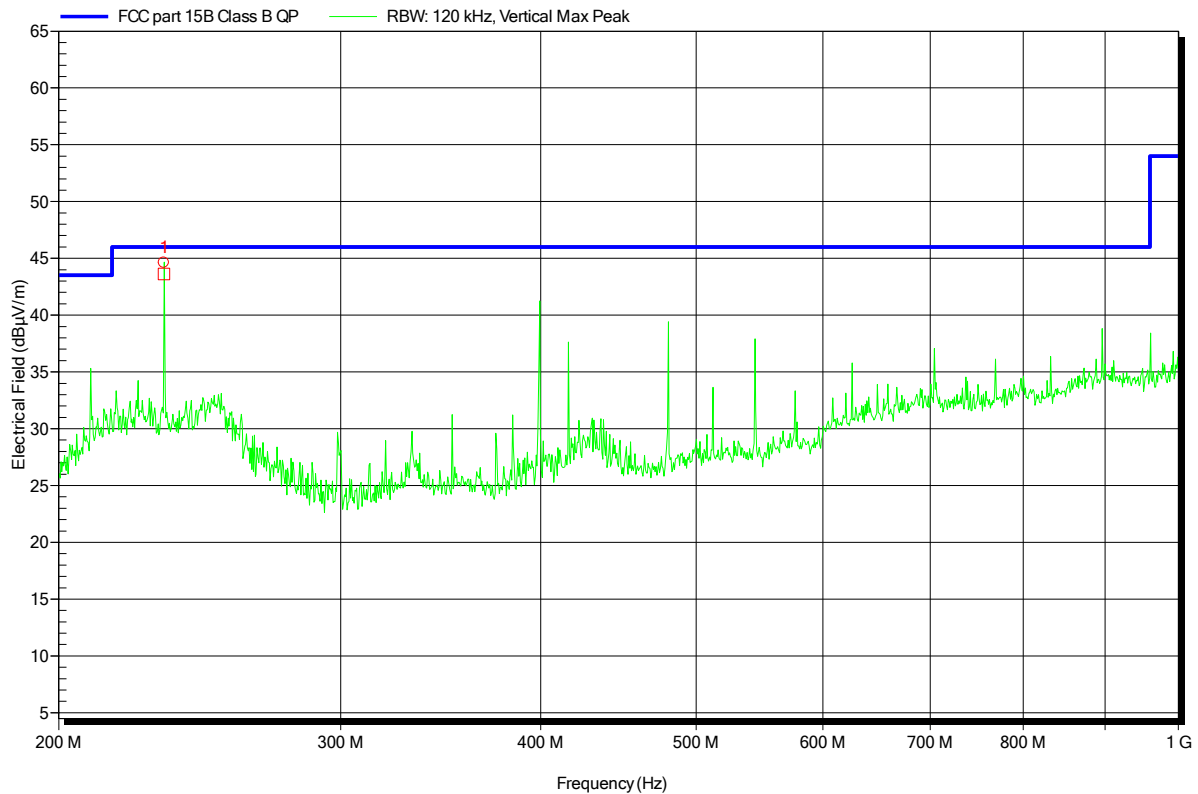


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 Note:

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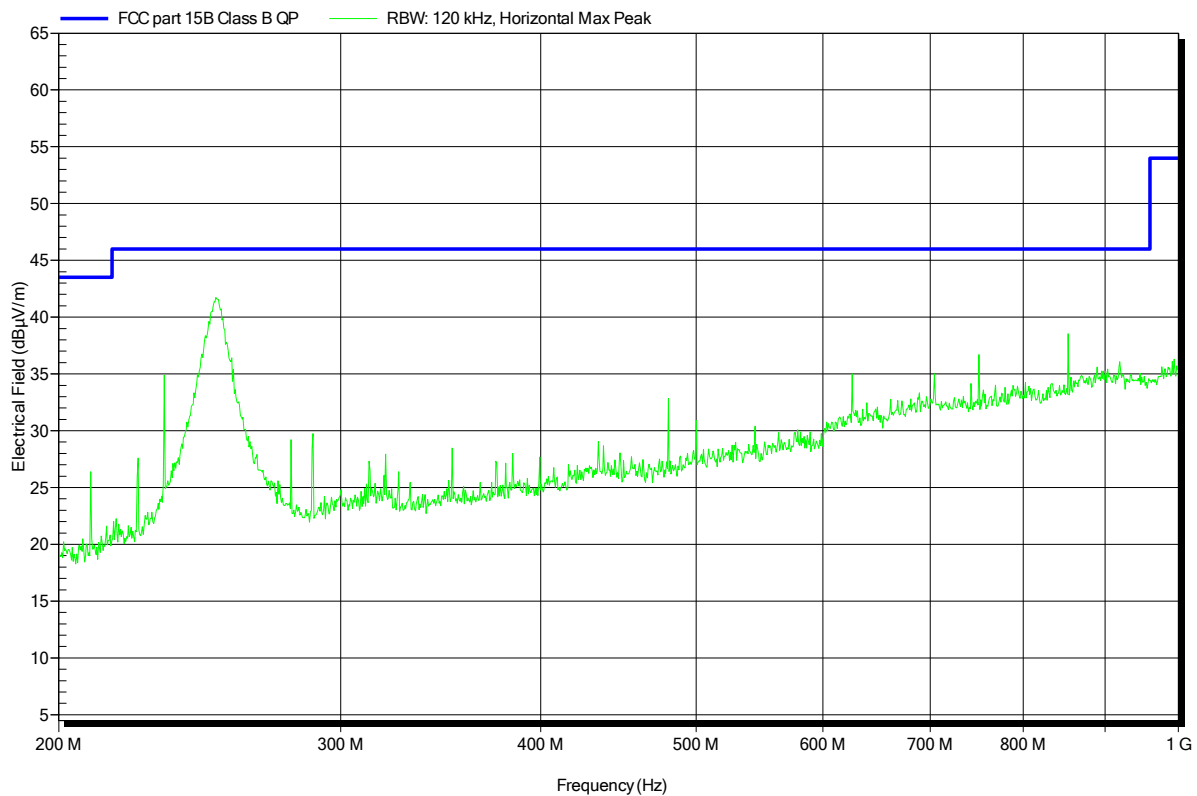
Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
232.724 MHz	43.62 dBµV/m	46 dBµV/m	-2.38 dB	Pass

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G Disto GNSS
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via Battery
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3m
 Mode: CS20 3.75G Disto GNSS, battery powered, WLAN link to AP, BT link to Laptop, UMTS link to CMU, LRBT link to TS15 with RH16
 Test Date: 2014-09-18
 Note:

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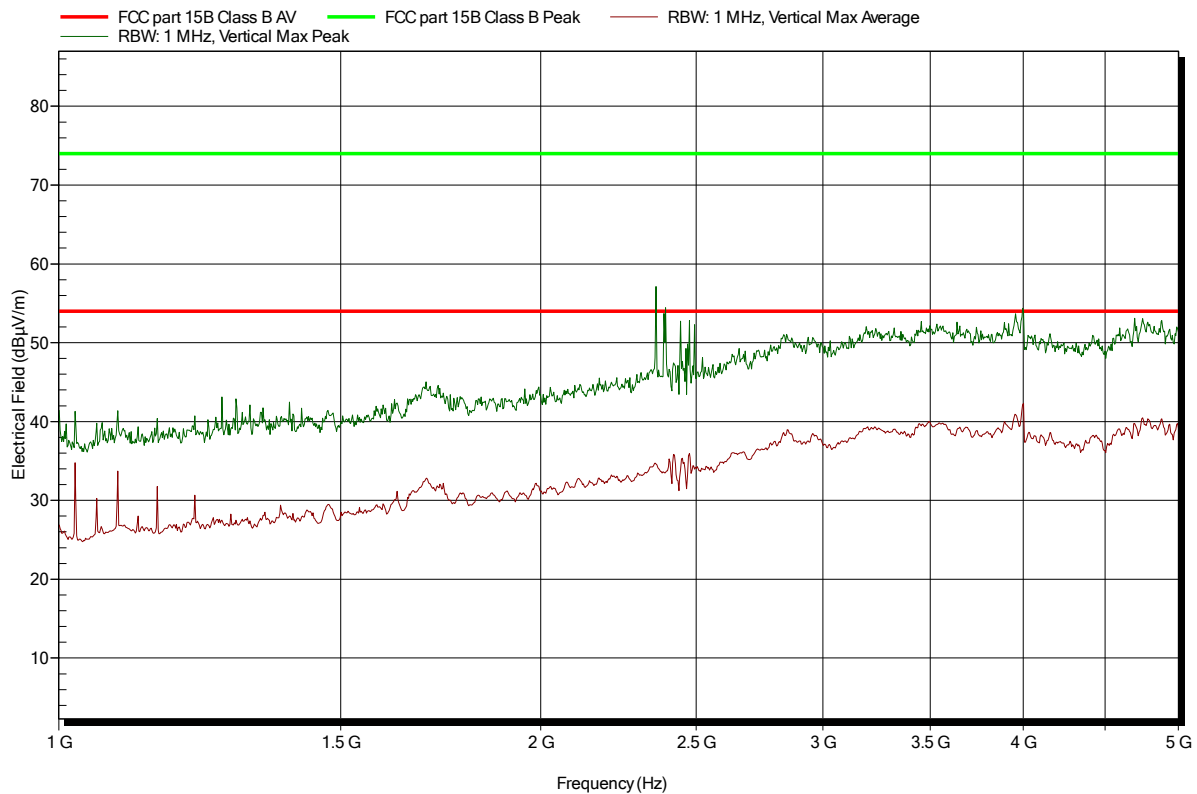


Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G Disto GNSS
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via Battery
 Antenna: Rohde & Schwarz HL 025, Vertical
 Measurement distance: 3m
 Mode: CS20 3.75G Disto GNSS, battery powered, WLAN link to AP, BT link to Laptop, UMTS link to CMU, LRB T link to TS15 with RH16
 Test Date: 2014-09-18
 Note:

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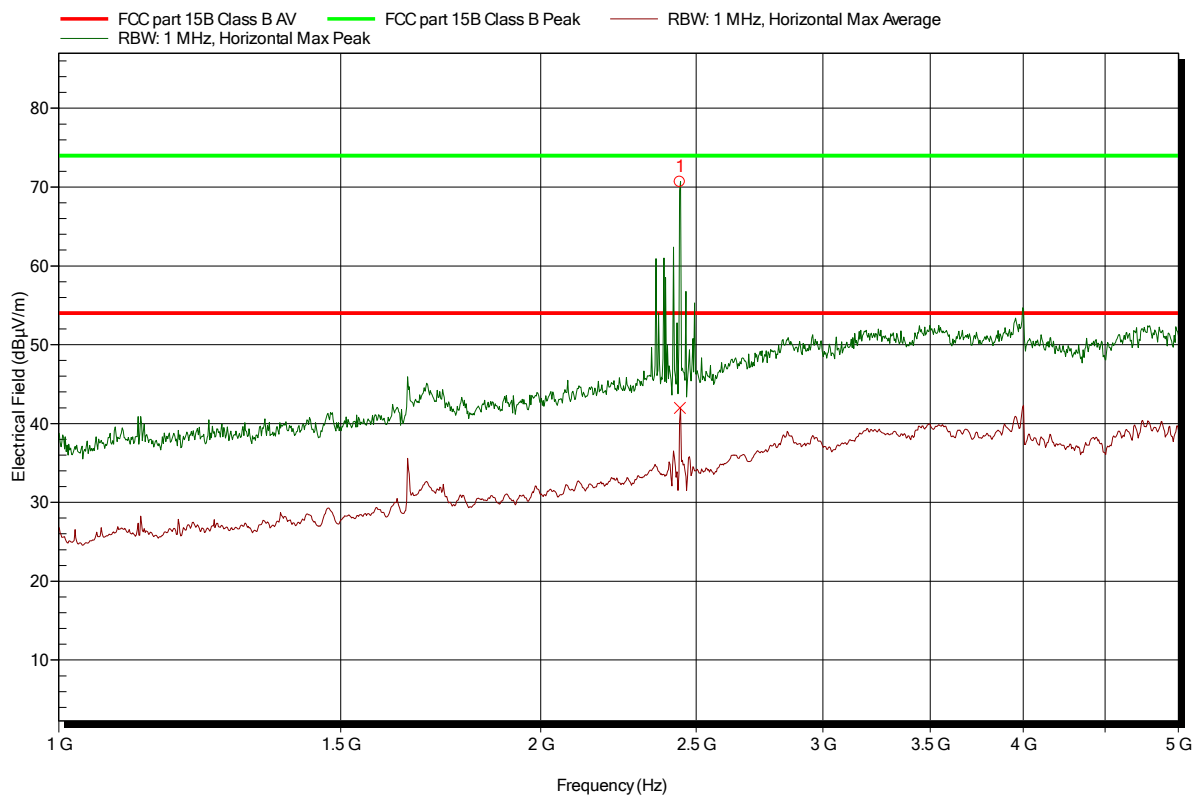


Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G Disto GNSS
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via Battery
 Antenna: Rohde & Schwarz HL 025, Horizontal
 Measurement distance: 3m
 Mode: CS20 3.75G Disto GNSS, battery powered, WLAN link to AP, BT link to Laptop, UMTS link to CMU, LRBT link to TS15 with RH16
 Test Date: 2014-09-18
 Note:

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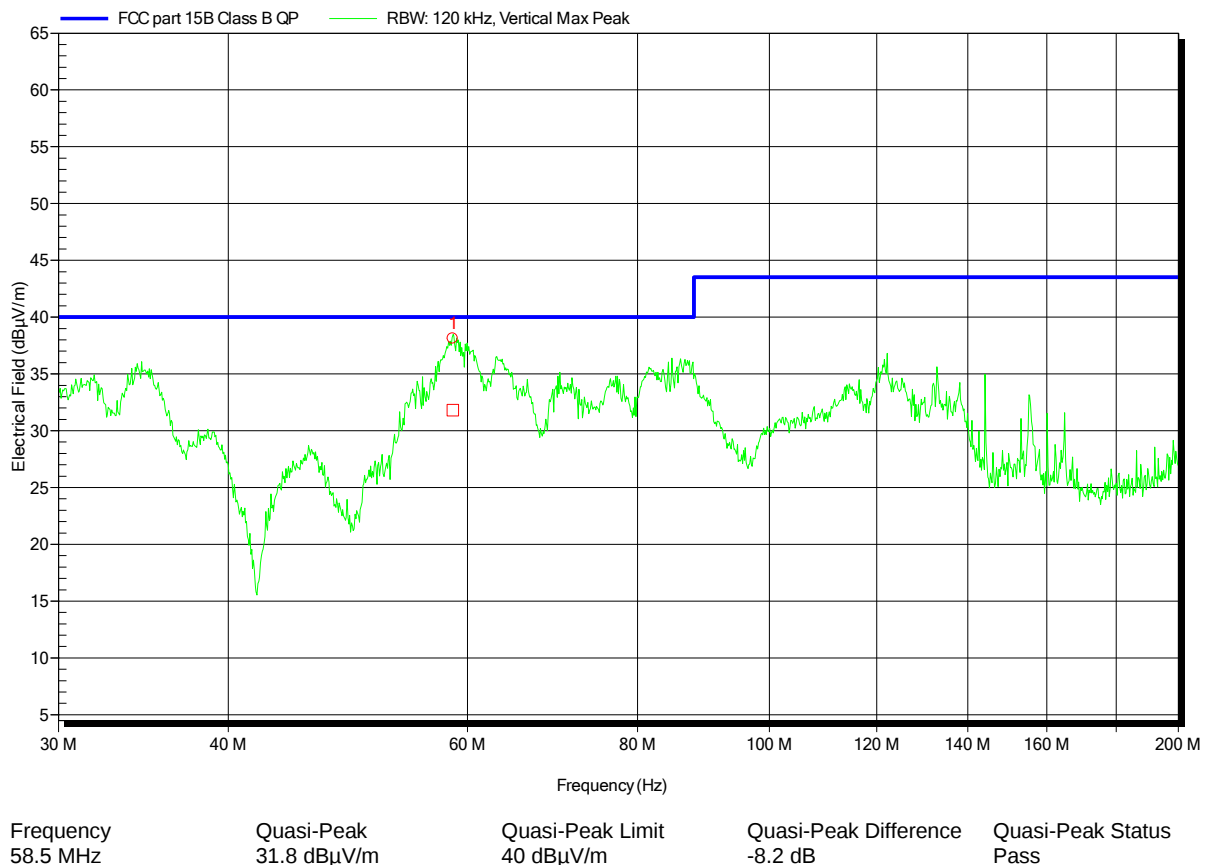
Frequency
 2.442 GHz WLAN carrier

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G Disto GNSS
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via Battery
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3m
 Mode: CS20 3.75G Disto GNSS, charging, WLAN link to AP, BT link to Laptop, UMTS link to CMU, LRBT link to TS15 with RH16
 Test Date: 2014-09-18
 Note:

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Test Report No.: G0M-1406-3917-EF0115B-V03

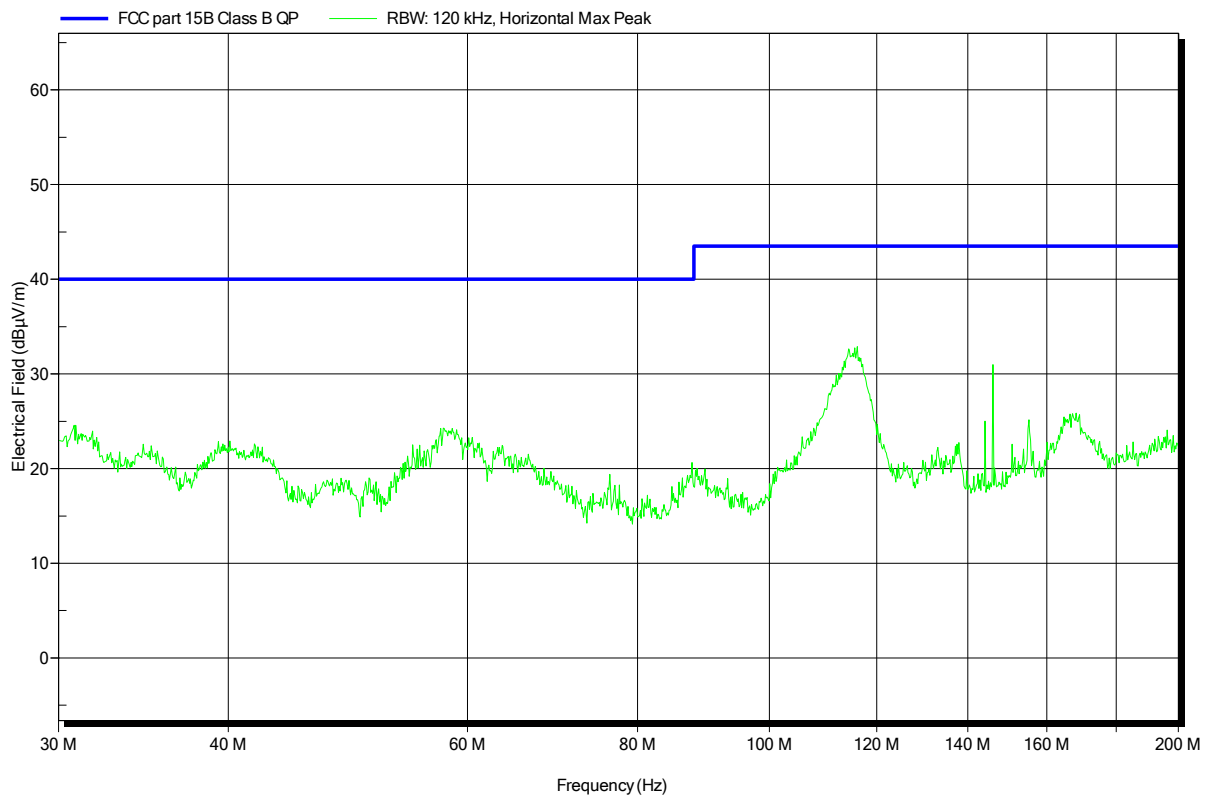
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer:	Leica Geosystems AG
EUT Name:	Feld Controller
Model:	CS20 3.75G Disto GNSS
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Zunke
Test Conditions:	Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3m
Mode:	CS20 3.75G Disto GNSS, charging, WLAN link to AP, BT link to Laptop, UMTS link to CMU, LRBT link to TS15 with RH16
Test Date:	2014-09-18
Note:	

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Test Report No.: G0M-1406-3917-EF0115B-V03

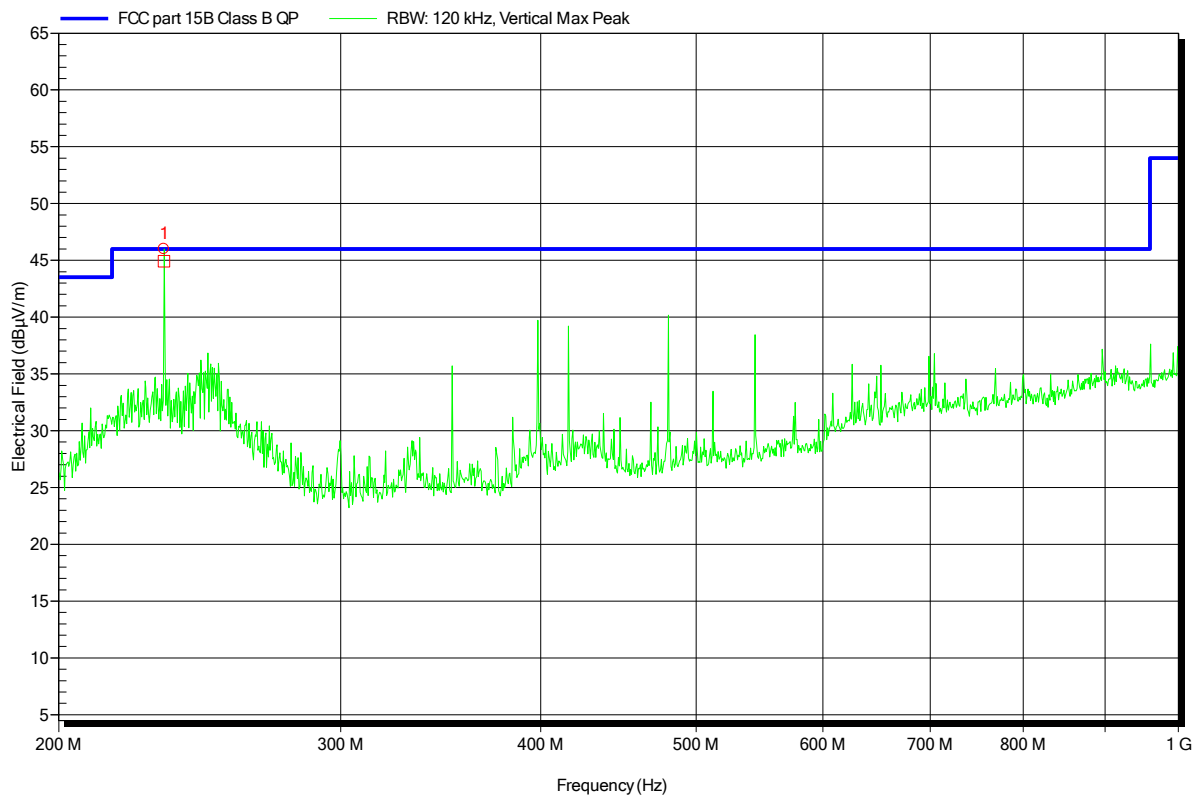
Eurofins Product Service GmbH
Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G Disto GNSS
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3m
 Mode: CS20 3.75G Disto GNSS, charging, WLAN link to AP, BT link to Laptop, UMTS link to CMU, LRBT link to TS15 with RH16
 Test Date: 2014-09-18
 Note:

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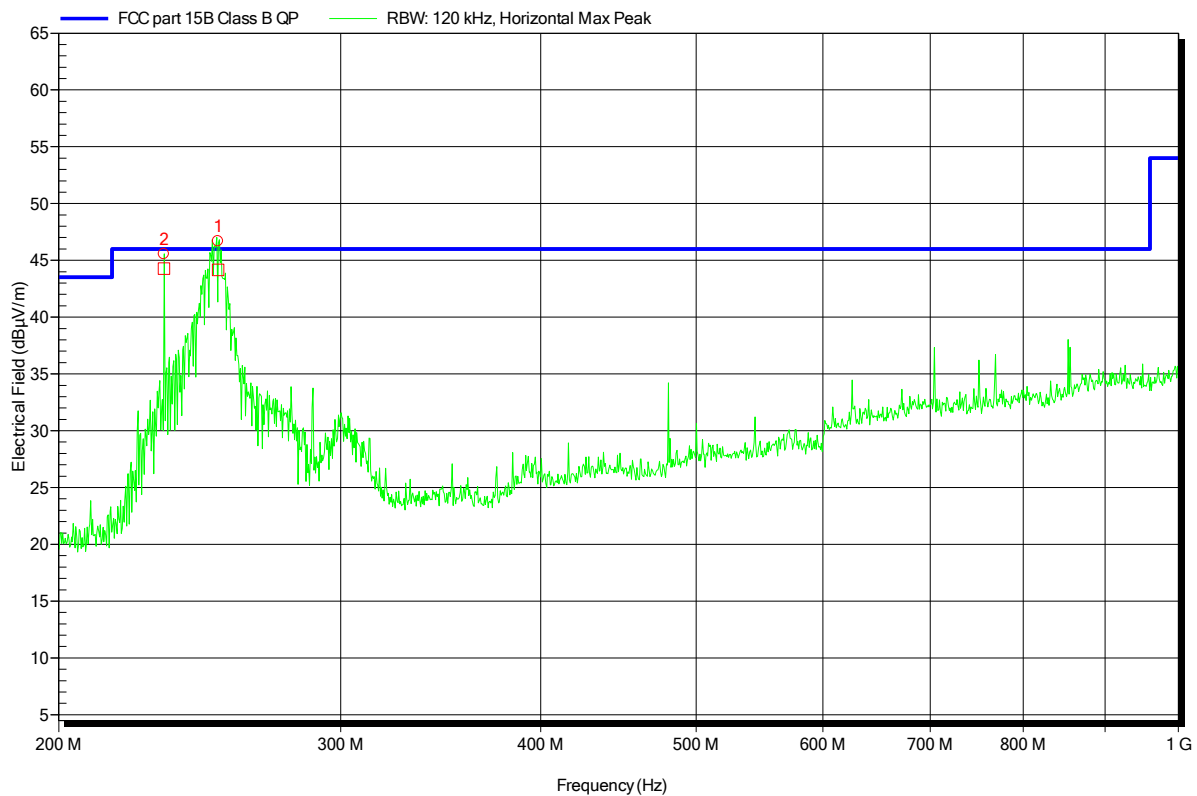
Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
232.73 MHz	44.94 dBµV/m	46 dBµV/m	-1.06 dB	Pass

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G Disto GNSS
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3m
 Mode: CS20 3.75G Disto GNSS, charging, WLAN link to AP, BT link to Laptop, UMTS link to CMU, LRBT link to TS15 with RH16
 Test Date: 2014-09-18
 Note:

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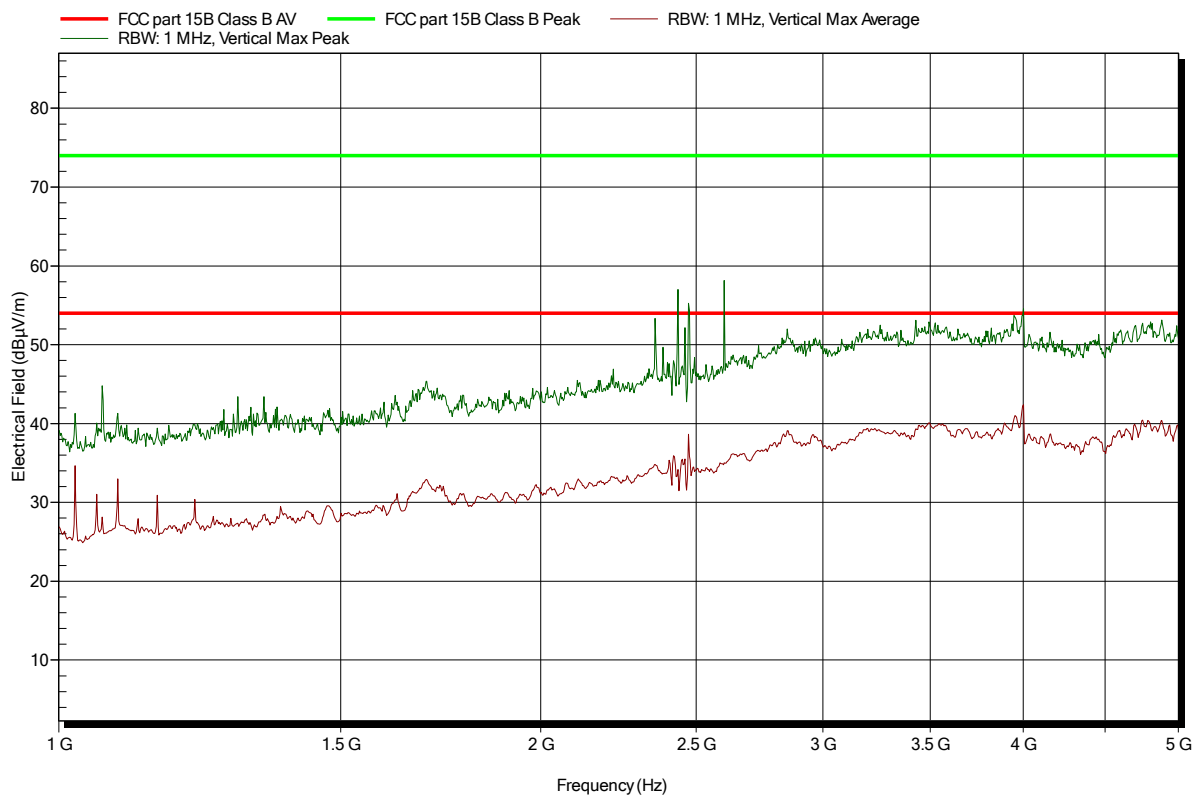
Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
232.72 MHz	44.28 dBμV/m	46 dBμV/m	-1.72 dB	Pass
251.65 MHz	44.15 dBμV/m	46 dBμV/m	-1.85 dB	Pass

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G Disto GNSS
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
 Antenna: Rohde & Schwarz HL 025, Vertical
 Measurement distance: 3m
 Mode: CS20 3.75G Disto GNSS, charging, WLAN link to AP, BT link to Laptop, UMTS link to CMU, LRBT link to TS15 with RH16
 Test Date: 2014-09-18
 Note:

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Test Report No.: G0M-1406-3917-EF0115B-V03

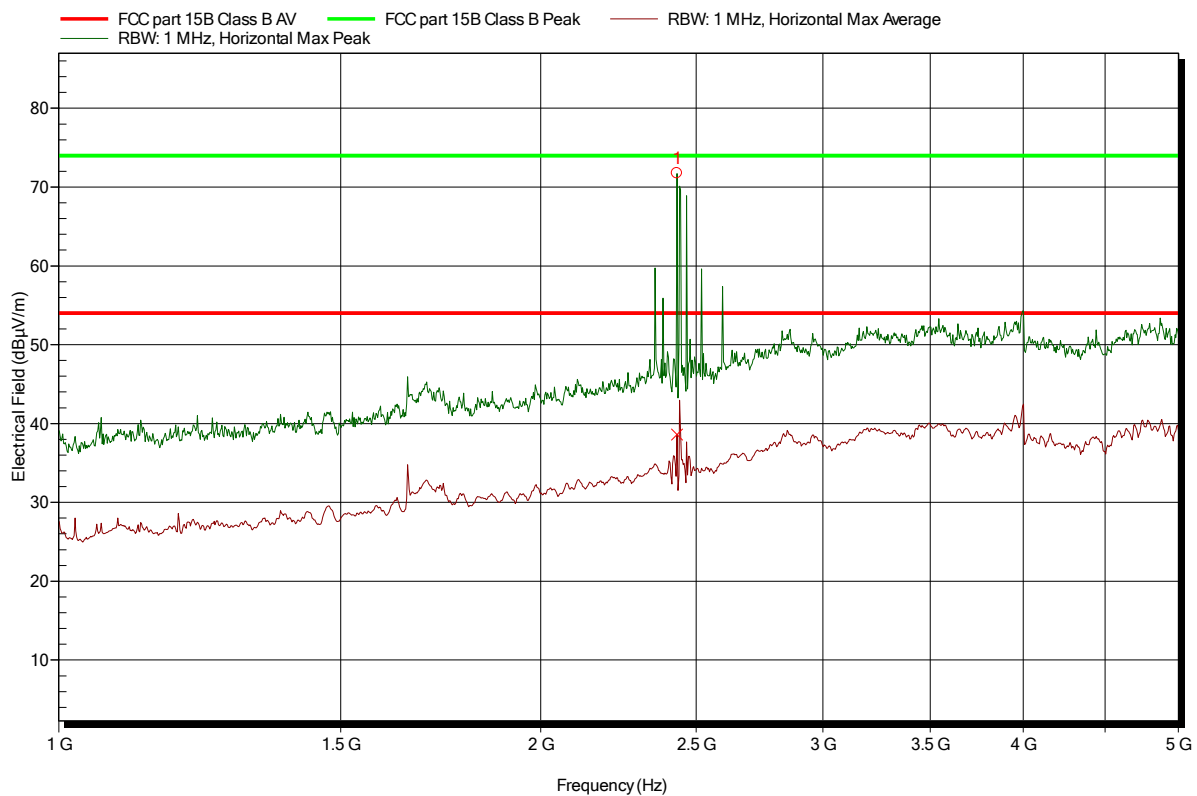
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G Disto GNSS
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
 Antenna: Rohde & Schwarz HL 025, Horizontal
 Measurement distance: 3m
 Mode: CS20 3.75G Disto GNSS, charging, WLAN link to AP, BT link to Laptop, UMTS link to CMU, LRBT link to TS15 with RH16
 Test Date: 2014-09-18
 Note:

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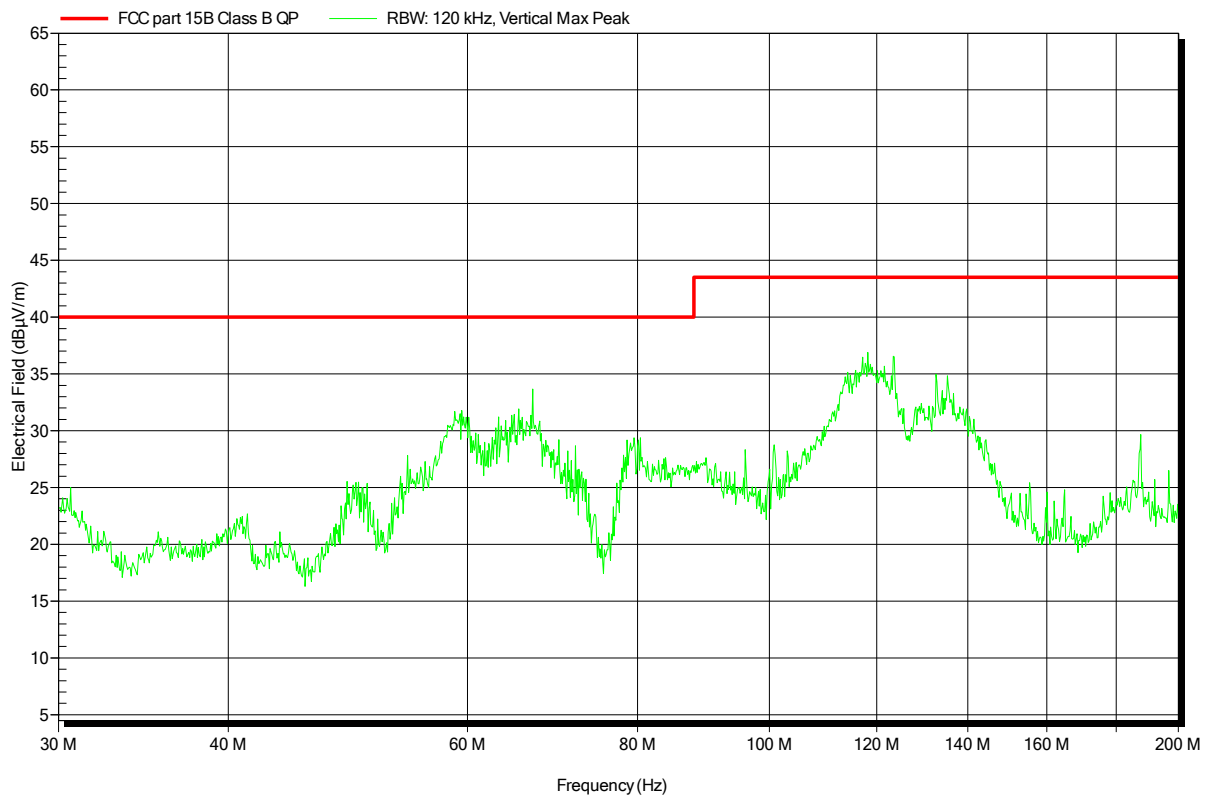
Frequency
 2.432 GHz WLAN carrier

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3m
 Mode: CS20 3.75G, charging, GSM900 link to CMU, WLAN link to AP, BT link to GPS Antenna, BT-LR link to TS15 with RH16
 Test Date: 2014-08-05
 Note:

Index 2

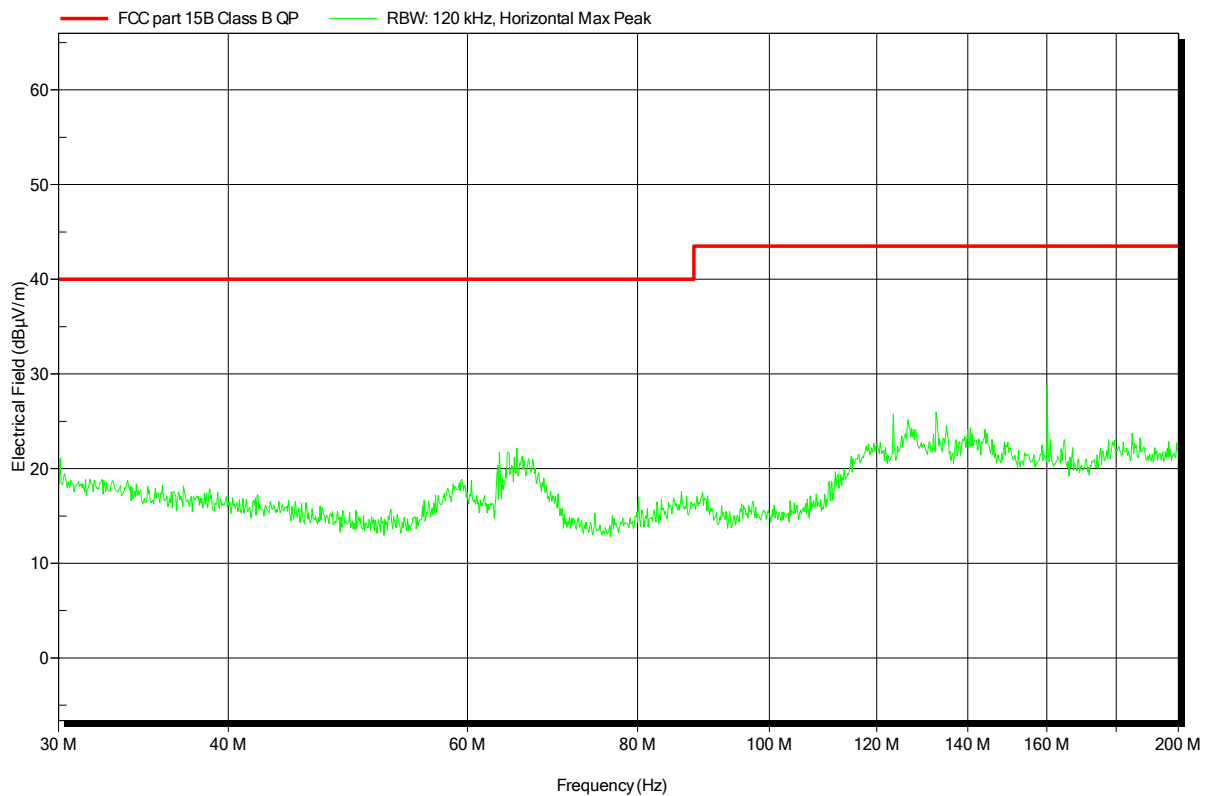


Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3m
 Mode: CS20 3.75G, charging, GSM900 link to CMU, WLAN link to AP, BT link to GPS Antenna, BT-LR link to TS15 with RH16
 Test Date: 2014-08-05
 Note:

Index 1

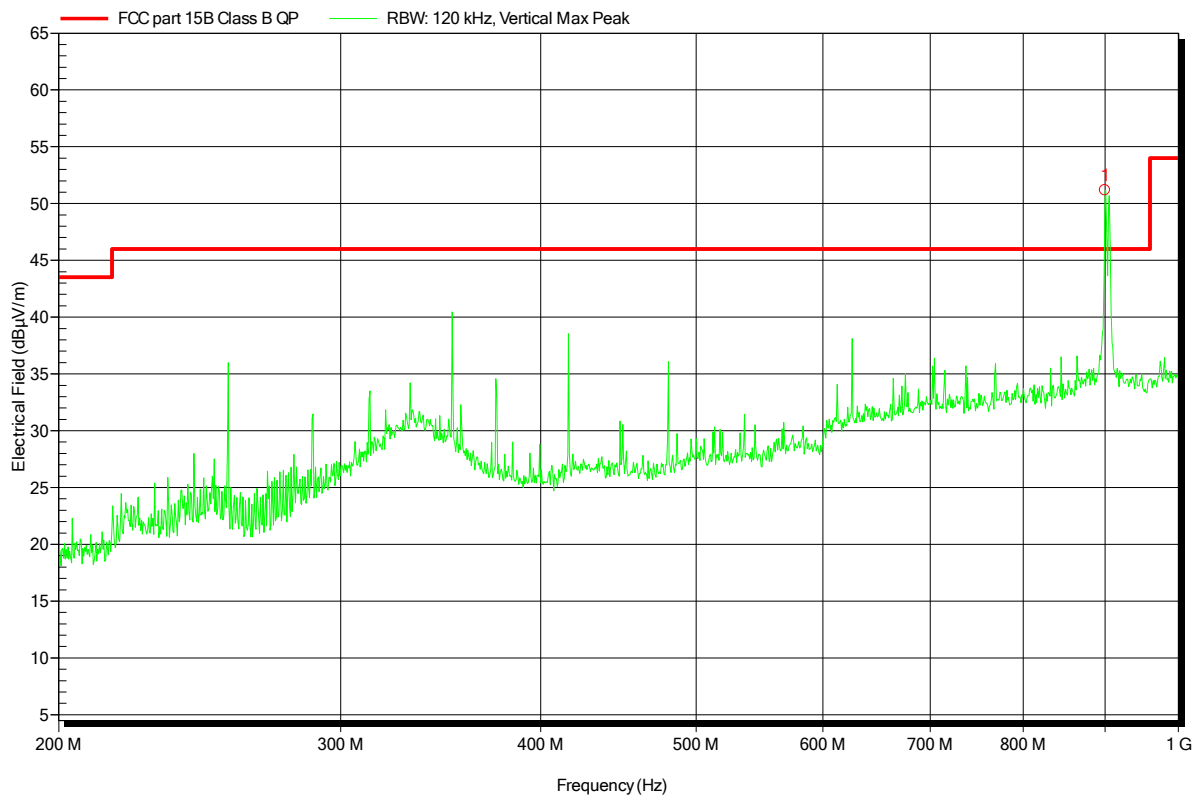


Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3m
 Mode: CS20 3.75G, charging, GSM900 link to CMU, WLAN link to AP, BT link to GPS Antenna, BT-LR link to TS15 with RH16
 Test Date: 2014-08-05
 Note:

Index 3



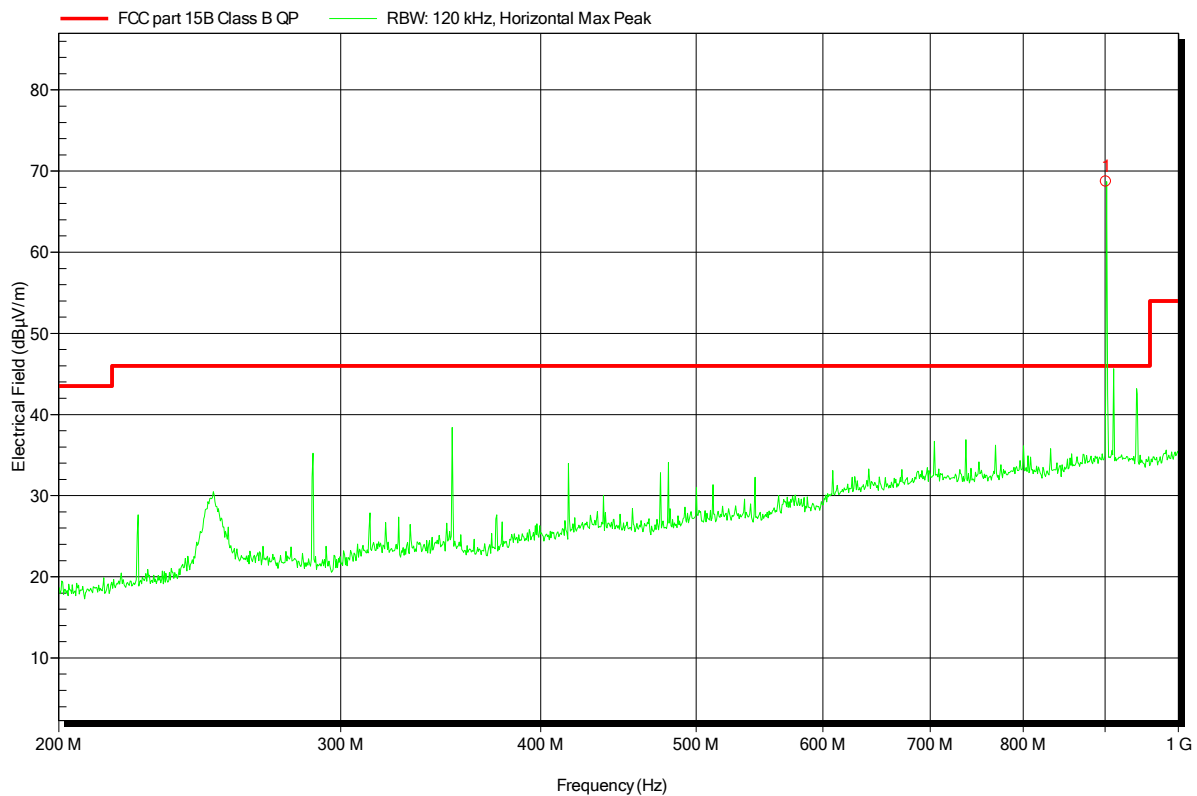
Frequency
 899.96 MHz GSM carrier

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer:	Leica Geosystems AG
EUT Name:	Feld Controller
Model:	CS20 3.75G
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Zunke
Test Conditions:	Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3m
Mode:	CS20 3.75G, charging, GSM900 link to CMU, WLAN link to AP, BT link to GPS Antenna, BT-LR link to TS15 with RH16
Test Date:	2014-08-05
Note:	

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Frequency
901.15 MHz carrier

Test Report No.: G0M-1406-3917-EF0115B-V03

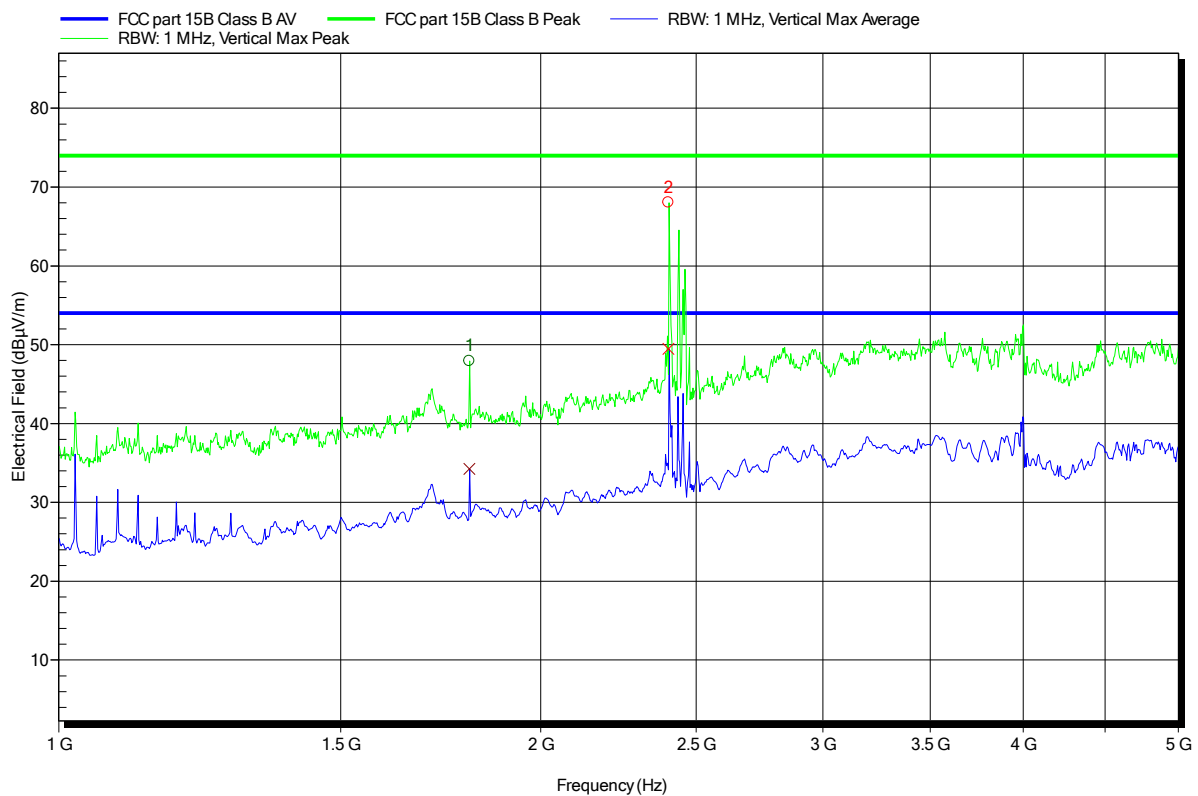
Eurofins Product Service GmbH
Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
 Antenna: Rohde & Schwarz HL 025, Vertical
 Measurement distance: 3m
 Mode: CS20 3.75G, charging, GSM900 link to CMU, WLAN link to AP, BT link to GPS Antenna, BT-LR link to TS15 with RH16
 Test Date: 2014-08-05
 Note:

Index 6



Frequency
 1.805 GHz Harmonics from GSM
 2.403 GHz WLAN carrier

Test Report No.: G0M-1406-3917-EF0115B-V03

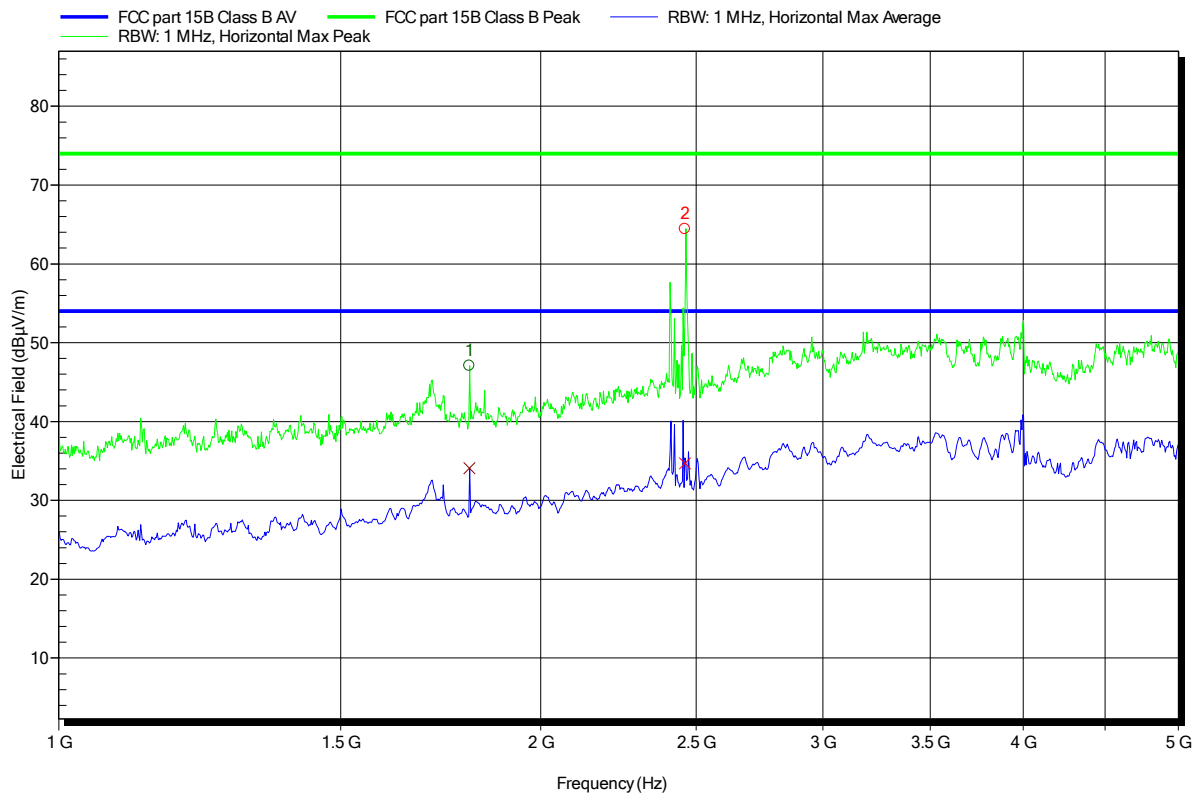
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
 Antenna: Rohde & Schwarz HL 025, Horizontal
 Measurement distance: 3m
 Mode: CS20 3.75G, charging, GSM900 link to CMU, WLAN link to AP, BT link to GPS Antenna, BT-LR link to TS15 with RH16
 Test Date: 2014-08-05
 Note:

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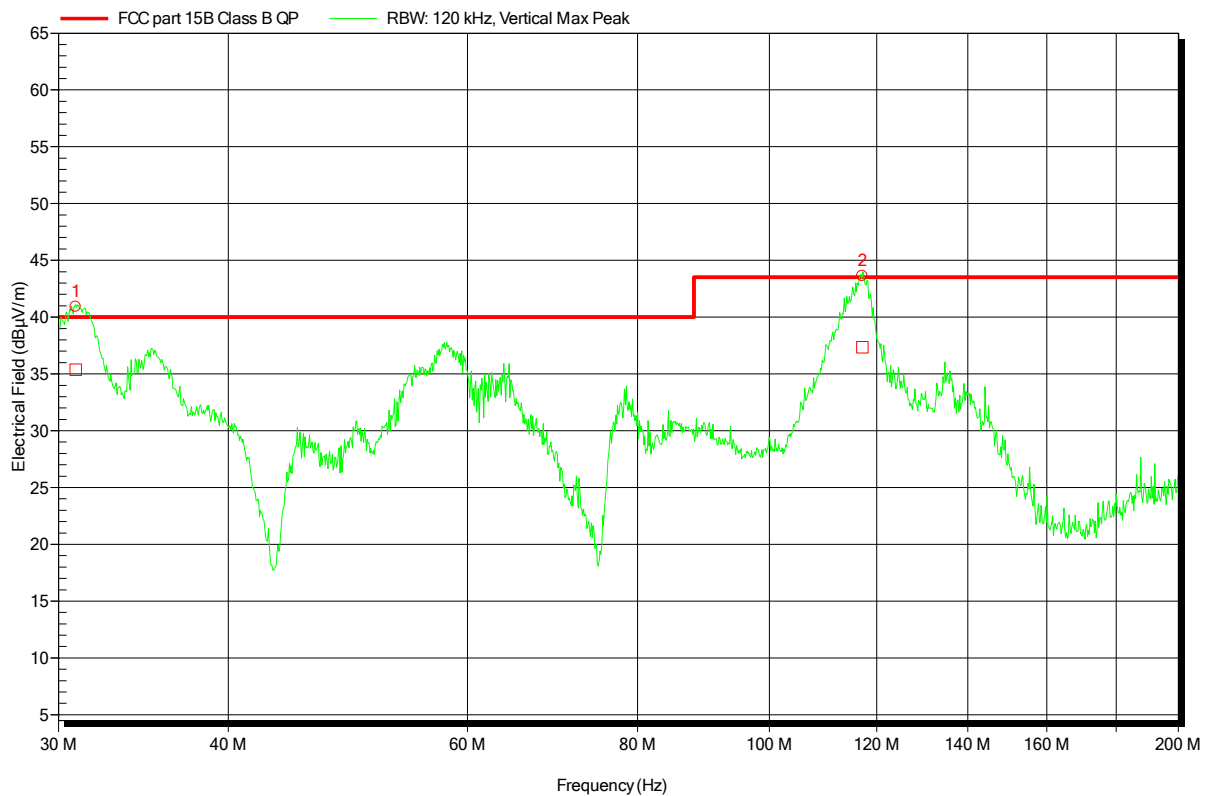
Frequency
 1.805 GHz Harmonics from GSM
 2.461 GHz GSM carrier

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G GNSS
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3m
 Mode: CS20 3.75G GNSS, charging, WLAN link to AP, BT link to Laptop, GSM900 link to CMU, LRBT link to TS15 with RH16
 Test Date: 2014-08-06
 Note:

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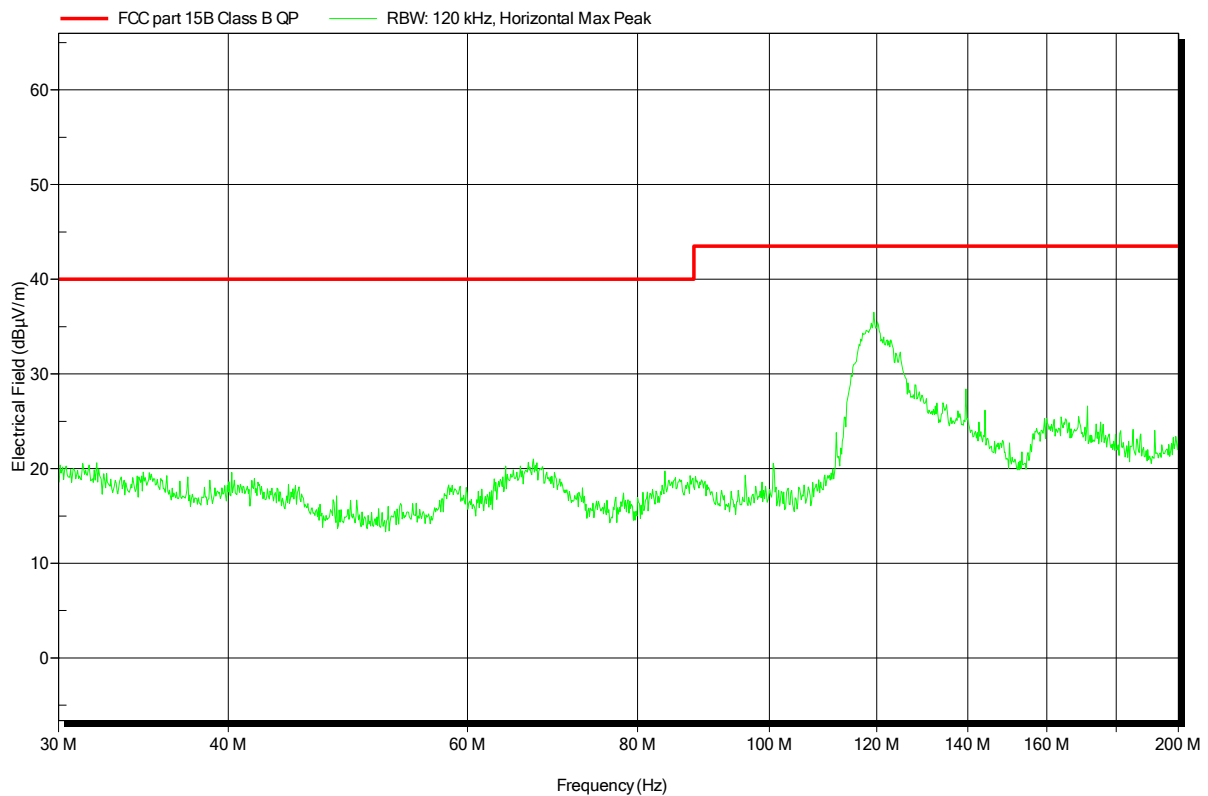
Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
30.9 MHz	35.36 dBµV/m	40 dBµV/m	-4.64 dB	Pass
117.12 MHz	37.35 dBµV/m	43.5 dBµV/m	-6.15 dB	Pass

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G GNSS
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3m
 Mode: CS20 3.75G GNSS, charging, WLAN link to AP, BT link to Laptop, GSM900 link to CMU, LRBT link to TS15 with RH16
 Test Date: 2014-08-06
 Note:

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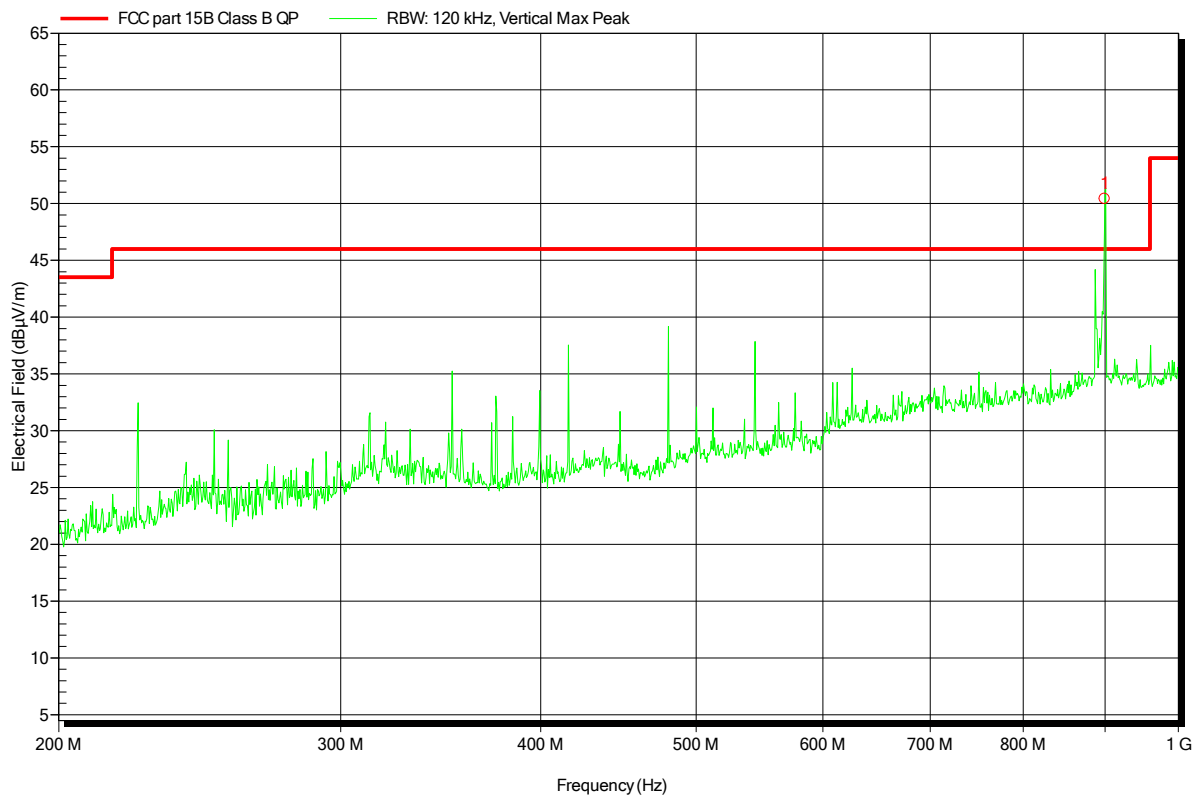


Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G GNSS
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3m
 Mode: CS20 3.75G GNSS, charging, WLAN link to AP, BT link to Laptop, GSM900 link to CMU, LRBT link to TS15 with RH16
 Test Date: 2014-08-06
 Note:

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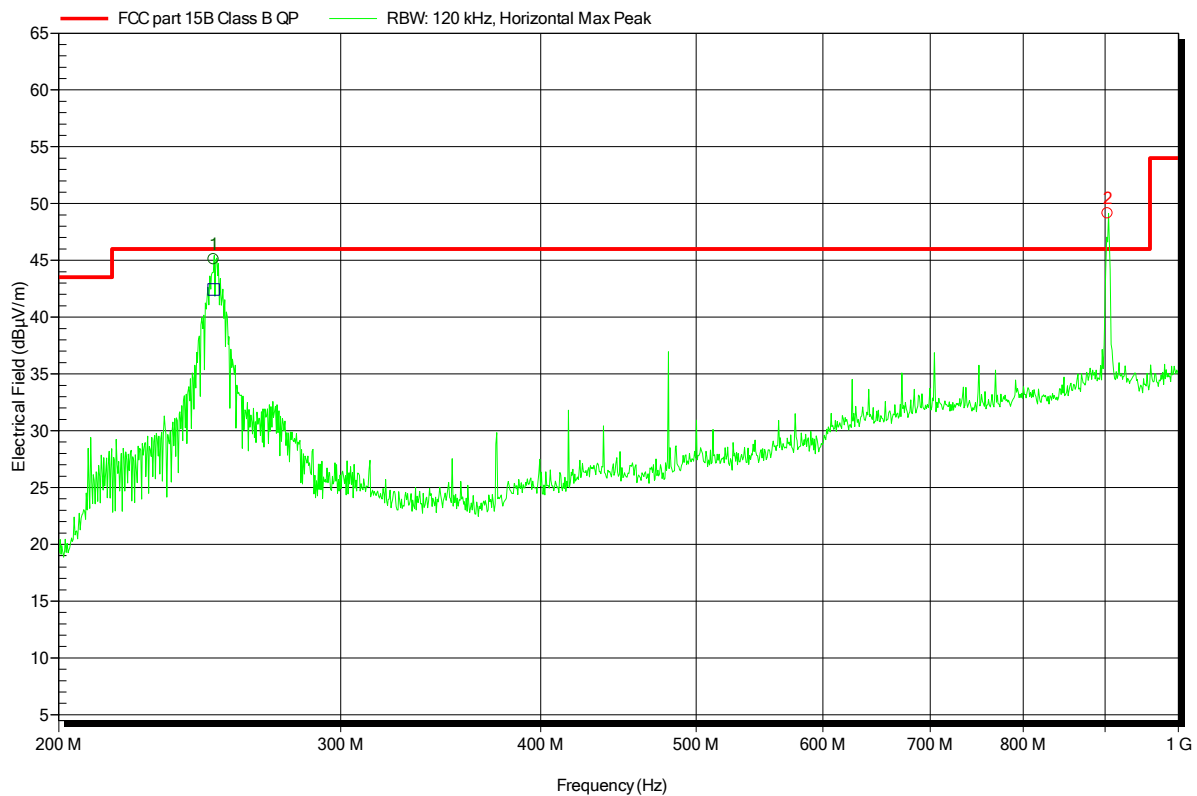
Frequency
 899.54 MHz GSM carrier

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G GNSS
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3m
 Mode: CS20 3.75G GNSS, charging, WLAN link to AP, BT link to Laptop, GSM900 link to CMU, LRBT link to TS15 with RH16
 Test Date: 2014-08-06
 Note:

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Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
250 MHz	42.44 dBµV/m	46 dBµV/m	-3.56 dB	Pass
903.25 MHz GSM carrier				

Test Report No.: G0M-1406-3917-EF0115B-V03

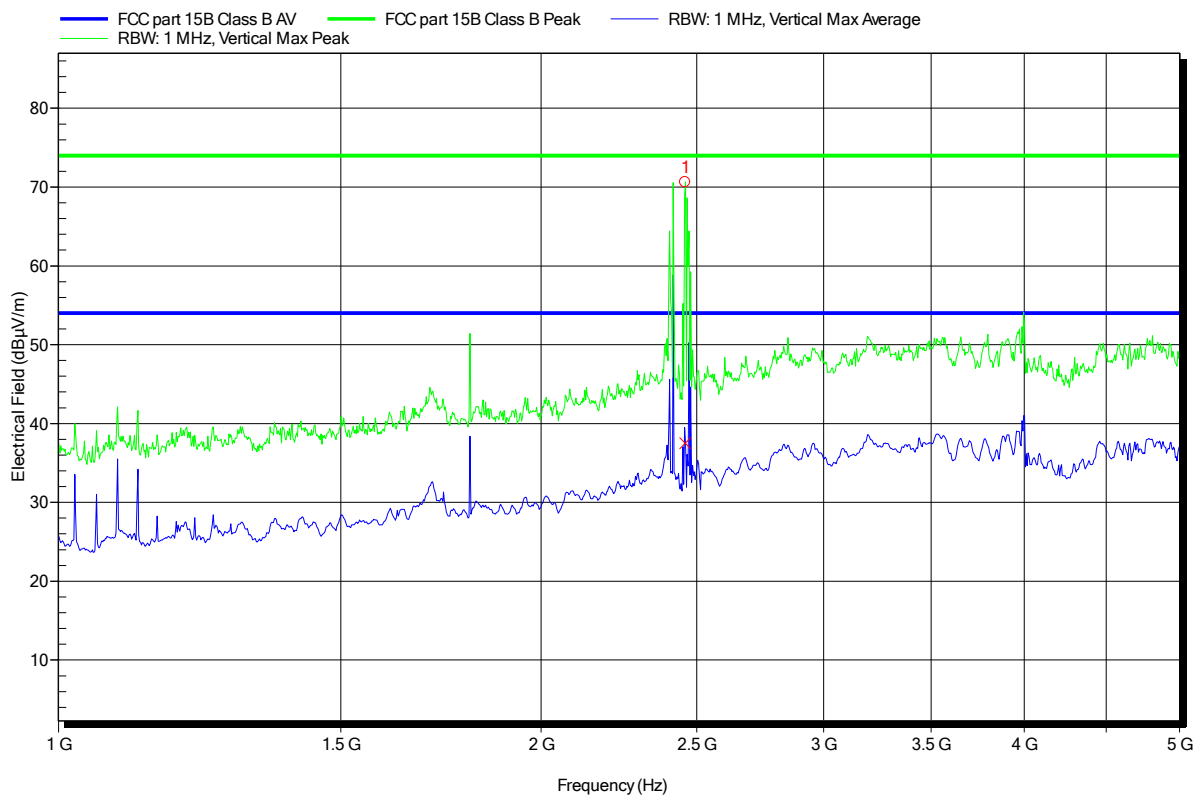
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G GNSS
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
 Antenna: Rohde & Schwarz HL 025, Vertical
 Measurement distance: 3m
 Mode: CS20 3.75G GNSS, charging, WLAN link to AP, BT link to Laptop, GSM900 link to CMU, LRBT link to TS15 with RH16
 Test Date: 2014-08-06
 Note:

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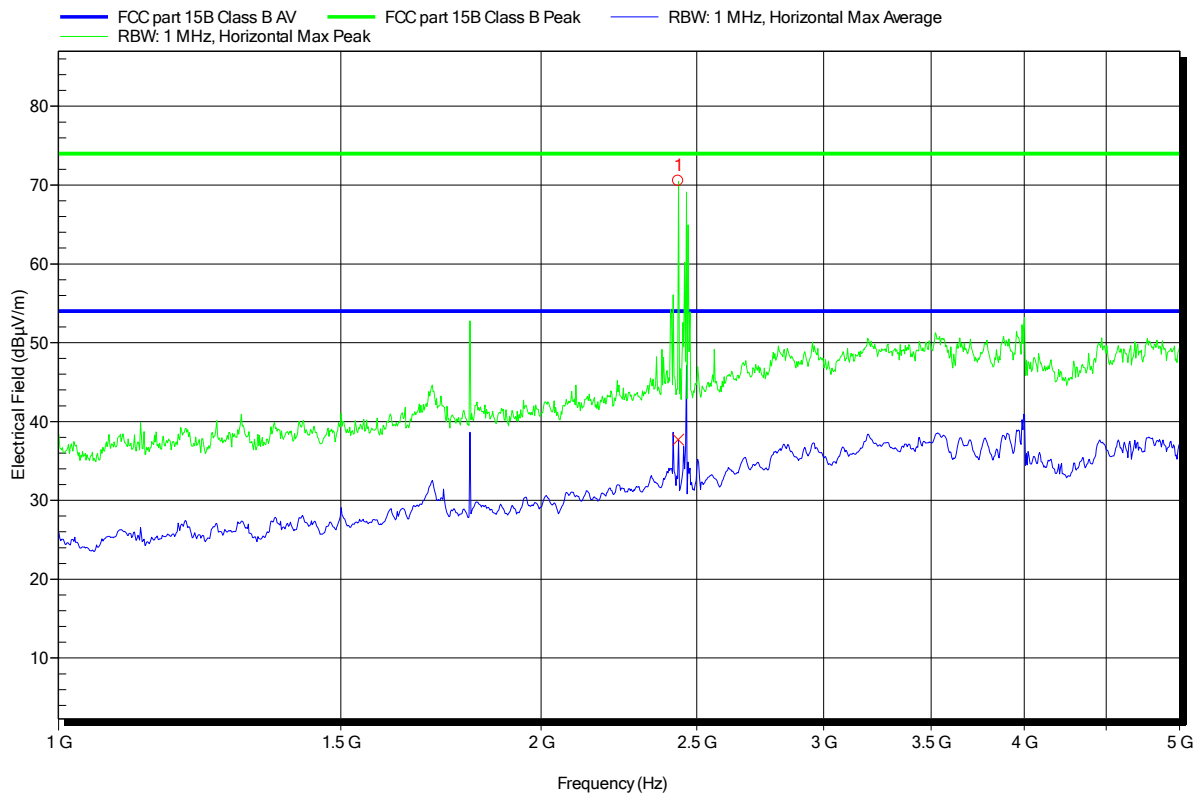
Frequency
 2.42 GHz WLAN carrier

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G GNSS
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
 Antenna: Rohde & Schwarz HL 025, Horizontal
 Measurement distance: 3m
 Mode: CS20 3.75G GNSS, charging, WLAN link to AP, BT link to Laptop, GSM900 link to CMU, LRBT link to TS15 with RH16
 Test Date: 2014-08-06
 Note:

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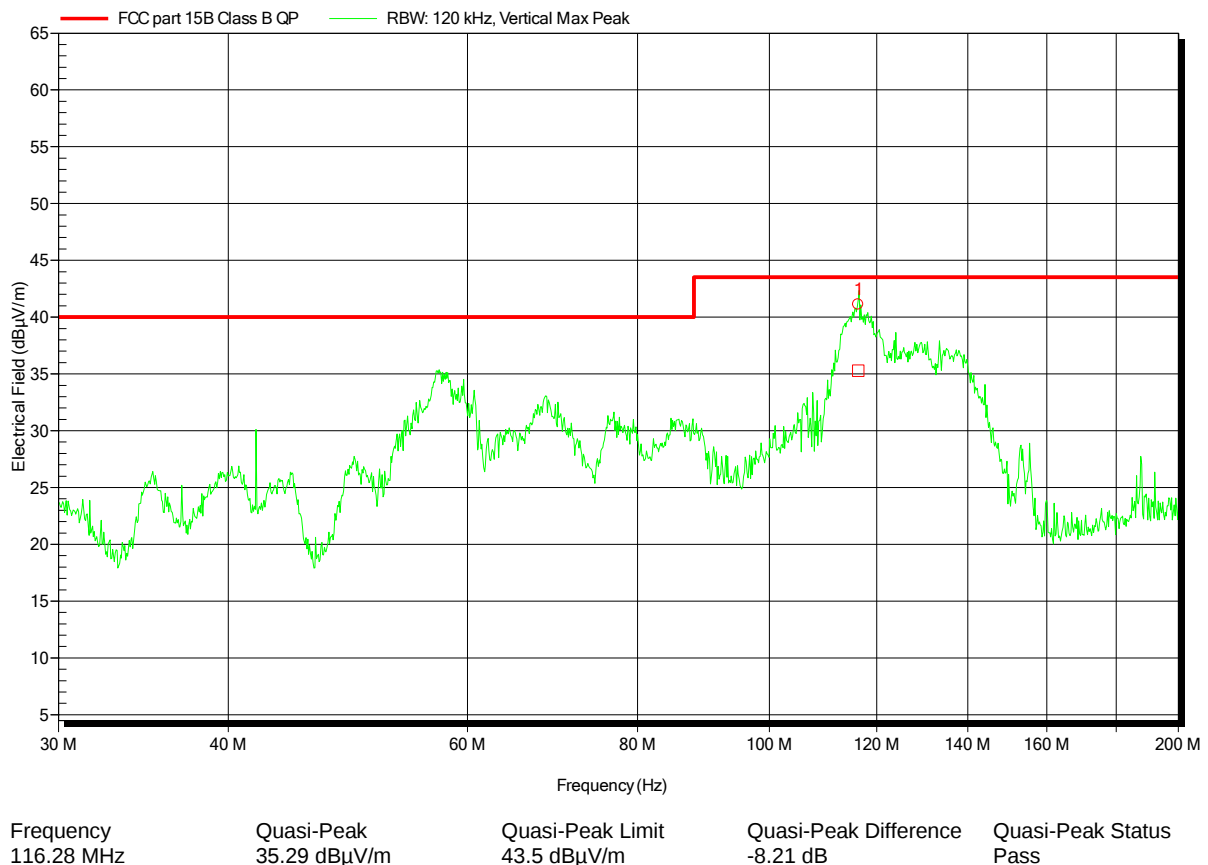
Frequency
 2.464 GHz WLAN carrier

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G Disto
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3m
 Mode: CS20 3.75G Disto, charging, GSM900 link to CMU, WLAN link to AP, BT link to GPS Antenna, BT-LR link to TS15 with RH16
 Test Date: 2014-08-05
 Note:

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Test Report No.: G0M-1406-3917-EF0115B-V03

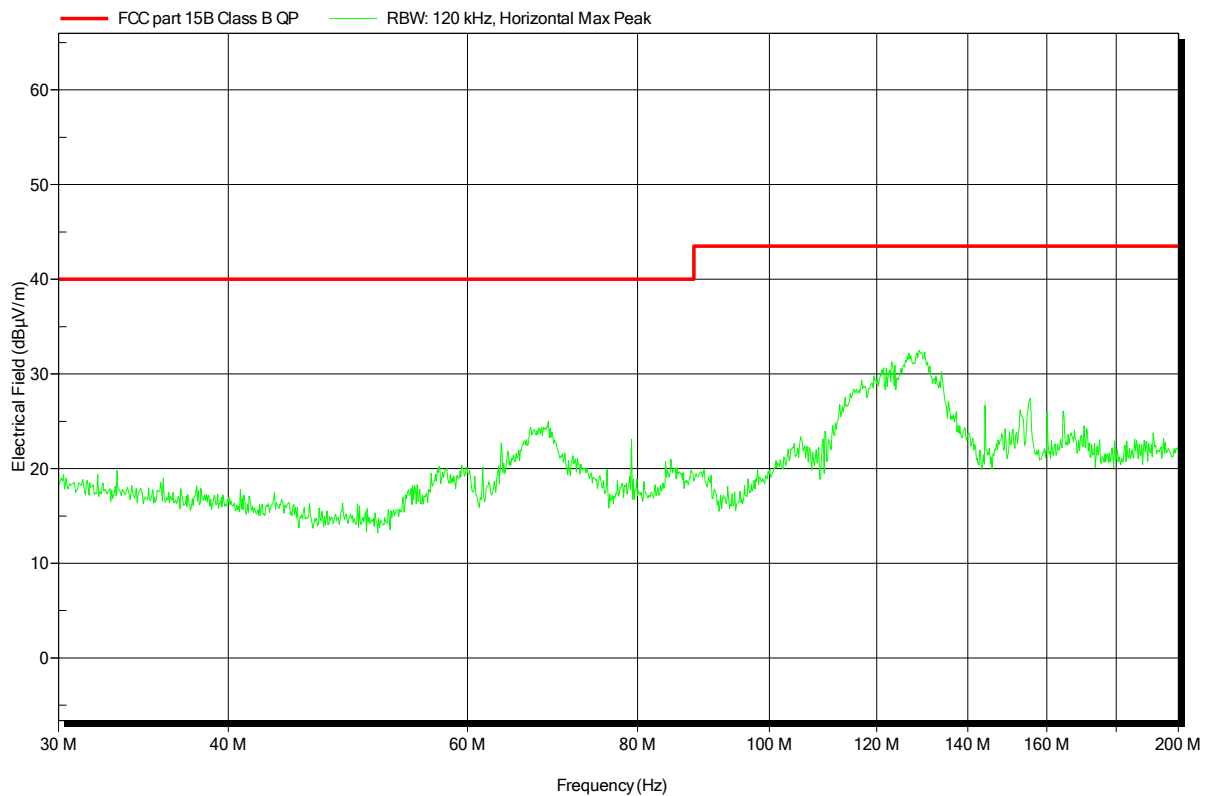
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G Disto
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3m
 Mode: CS20 3.75G Disto, charging, GSM900 link to CMU, WLAN link to AP, BT link to GPS Antenna, BT-LR link to TS15 with RH16
 Test Date: 2014-08-05
 Note:

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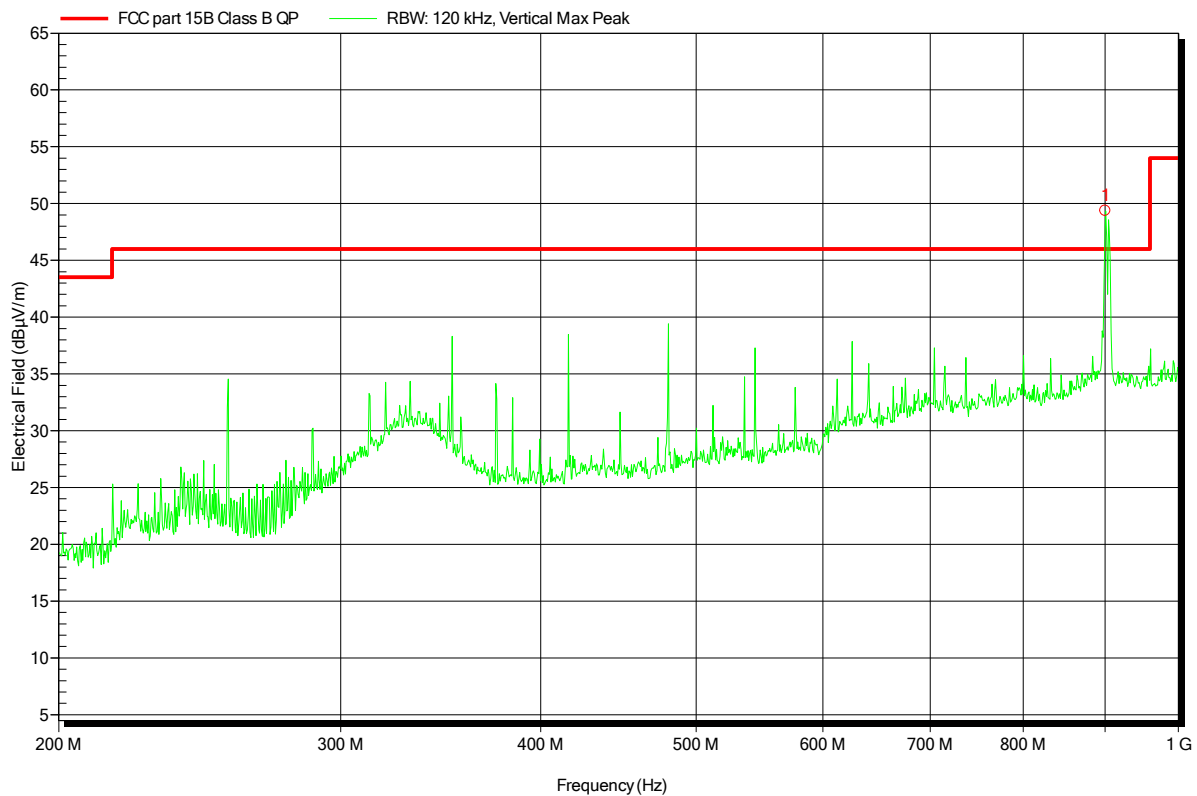


Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G Disto
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3m
 Mode: CS20 3.75G Disto, charging, GSM900 link to CMU, WLAN link to AP, BT link to GPS Antenna, BT-LR link to TS15 with RH16
 Test Date: 2014-08-05
 Note:

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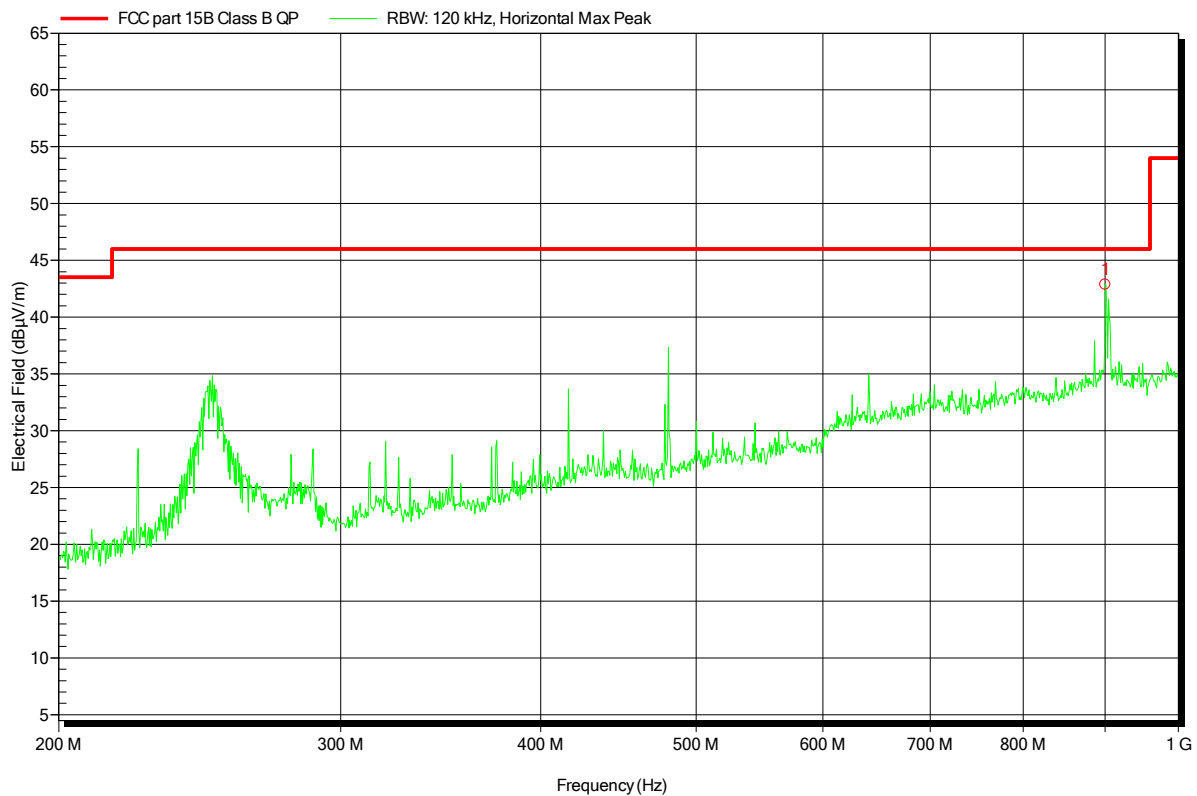
Frequency
 900.5 MHz GSM carrier

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G Disto
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3m
 Mode: CS20 3.75G Disto, charging, GSM900 link to CMU, WLAN link to AP, BT link to GPS Antenna, BT-LR link to TS15 with RH16
 Test Date: 2014-08-05
 Note:

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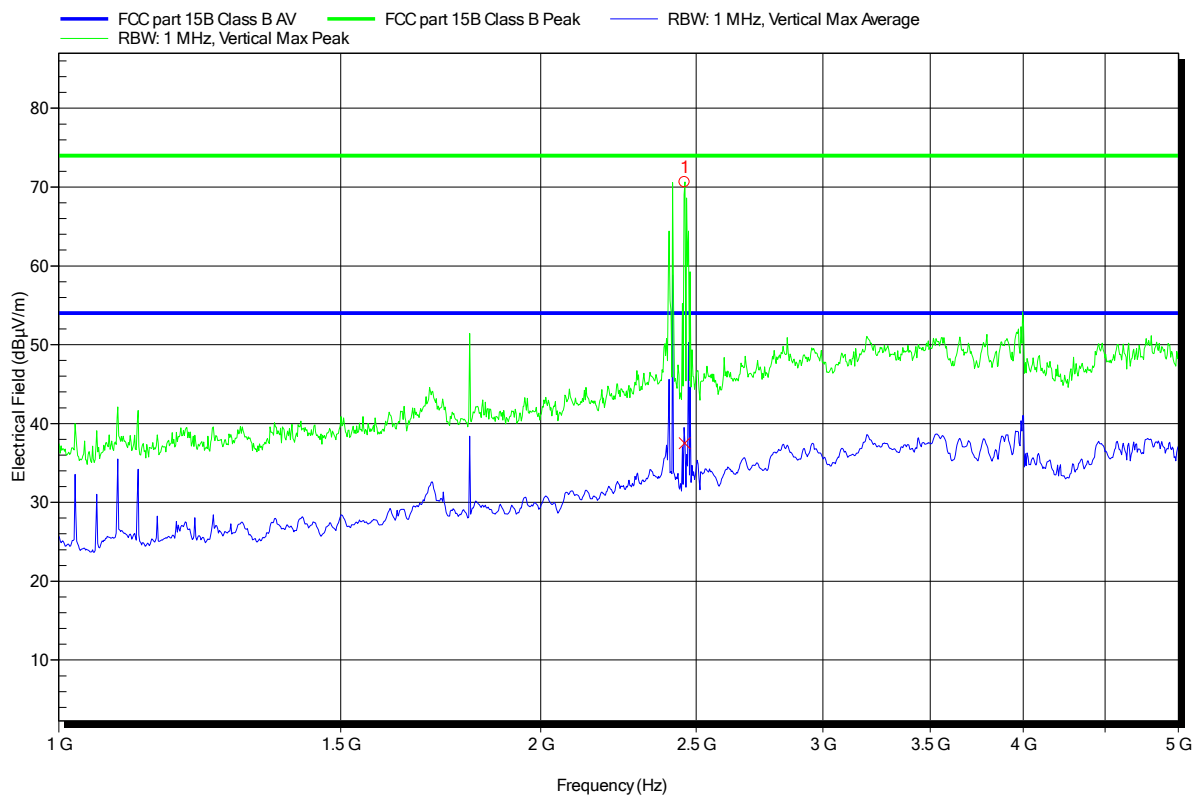
Frequency
 900.5 MHz GSM carrier

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G Disto
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
 Antenna: Rohde & Schwarz HL 025, Vertical
 Measurement distance: 3m
 Mode: CS20 3.75G Disto, charging, GSM900 link to CMU, WLAN link to AP, BT link to GPS Antenna, BT-LR link to TS15 with RH16
 Test Date: 2014-08-05
 Note:

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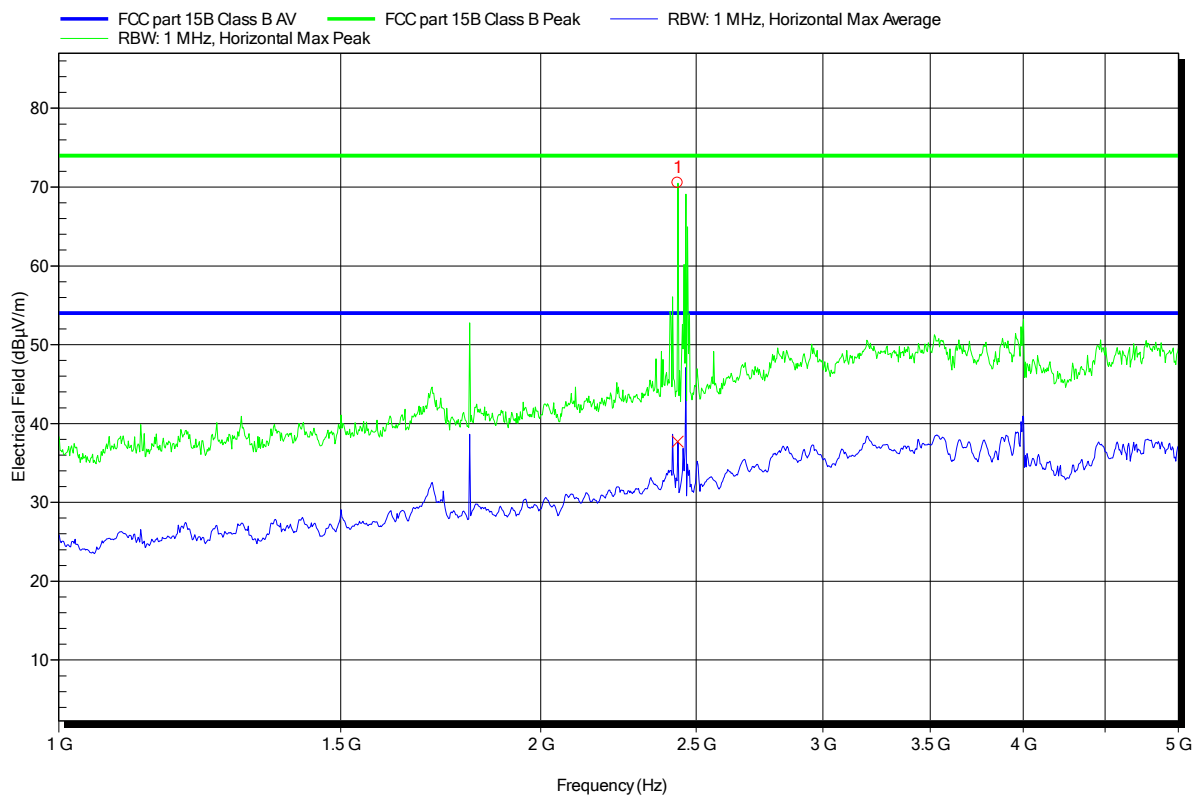
Frequency
 2.46 GHz WLAN carrier

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G Disto
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
 Antenna: Rohde & Schwarz HL 025, Horizontal
 Measurement distance: 3m
 Mode: CS20 3.75G Disto, charging, GSM900 link to CMU, WLAN link to AP, BT link to GPS Antenna, BT-LR link to TS15 with RH16
 Test Date: 2014-08-05
 Note:

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Frequency
 2.435 GHz WLAN carrier

3.2 Test Conditions and Results – AC power line conducted emissions

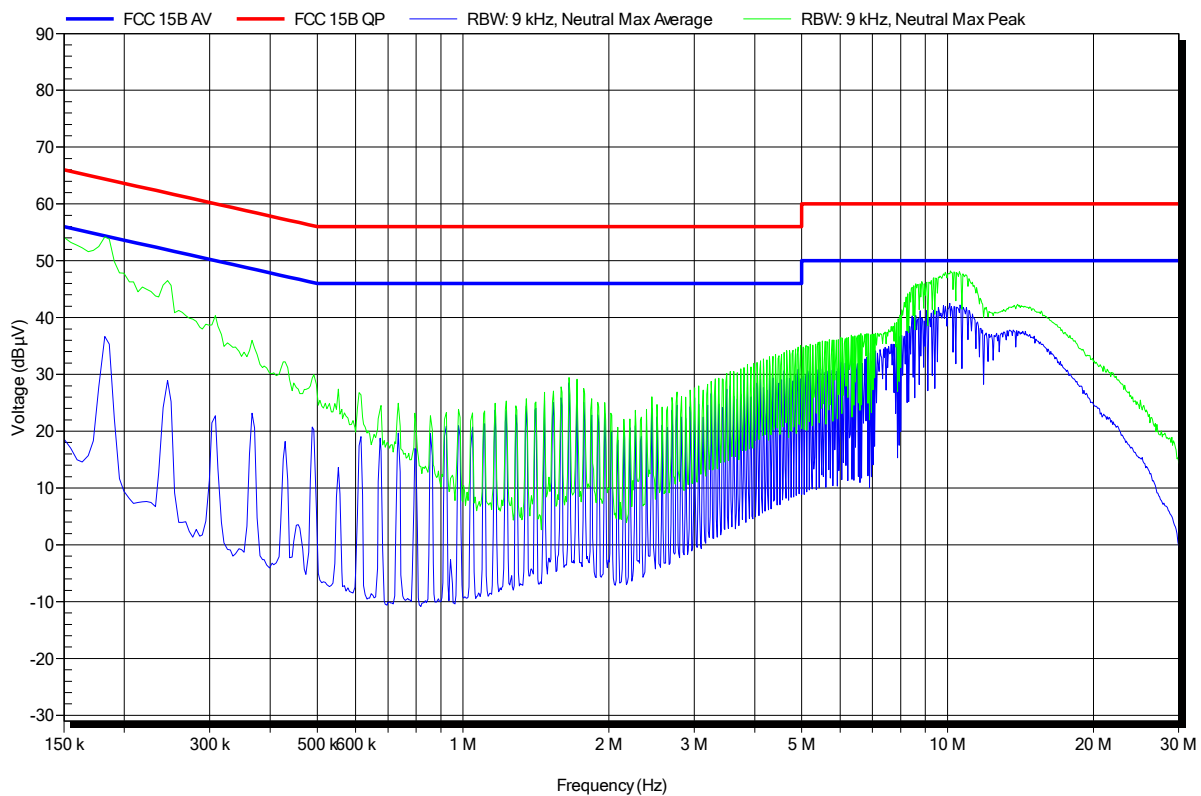
Conducted emissions acc. FCC 47 CFR 15.107 / IC RSS-Gen			Verdict: PASS	
Laboratory Parameters:		Required prior to the test		During the test
Ambient Temperature		15 to 35 °C		24°C
Relative Humidity		30 to 60 %		48%
Test according referenced standards		Reference Method		
		ANSI C63.4		
Fully configured sample scanned over the following frequency range		Frequency range		
		0.15 MHz to 30 MHz		
Sample is tested with respect to the requirements of the equipment class		Equipment class		
		Class B		
Points of Application		Application Interface		
AC Mains		LISN		
Operating mode		2		
Limits and results Class B				
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: For the conducted emission test the CS20 3.75G Disto GNSS was dedicated as worst case. * Limit decreases linearly with the logarithm of the frequency.				

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

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G Disto GNSS
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
 LISN: ESH2-Z5 N
 Mode: CS20 3.75G Disto GNSS, charging, WLAN link to AP, BT link to Laptop, GSM900 link to CMU, LR-BT link to TS15 with RH16
 Test Date: 2014-08-07
 Note:

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Test Report No.: G0M-1406-3917-EF0115B-V03

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

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

Project number: G0M-1406-3917

Manufacturer: Leica Geosystems AG
 EUT Name: Feld Controller
 Model: CS20 3.75G Disto GNSS
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Zunke
 Test Conditions: Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
 LISN: ESH2-Z5 L
 Mode: CS20 3.75G Disto GNSS, charging, WLAN link to AP, BT link to Laptop, GSM900 link to CMU, LR-BT link to TS15 with RH16
 Test Date: 2014-08-07
 Note:

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