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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**

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.
Bluetoot/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 dBµV. Any external preamplifiers used are taken into account through internal analyzer settings.

A.F.:

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

Reading on Analyzer (dBµV) + A.F. (dB) = Net field strength (dBµV/m)

Net:

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

Limit:

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

Limit (dBµV/m) = 20*log (µV/m)

Margin:

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

Example only:

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

2 Result Summary

FCC 47 CFR Part 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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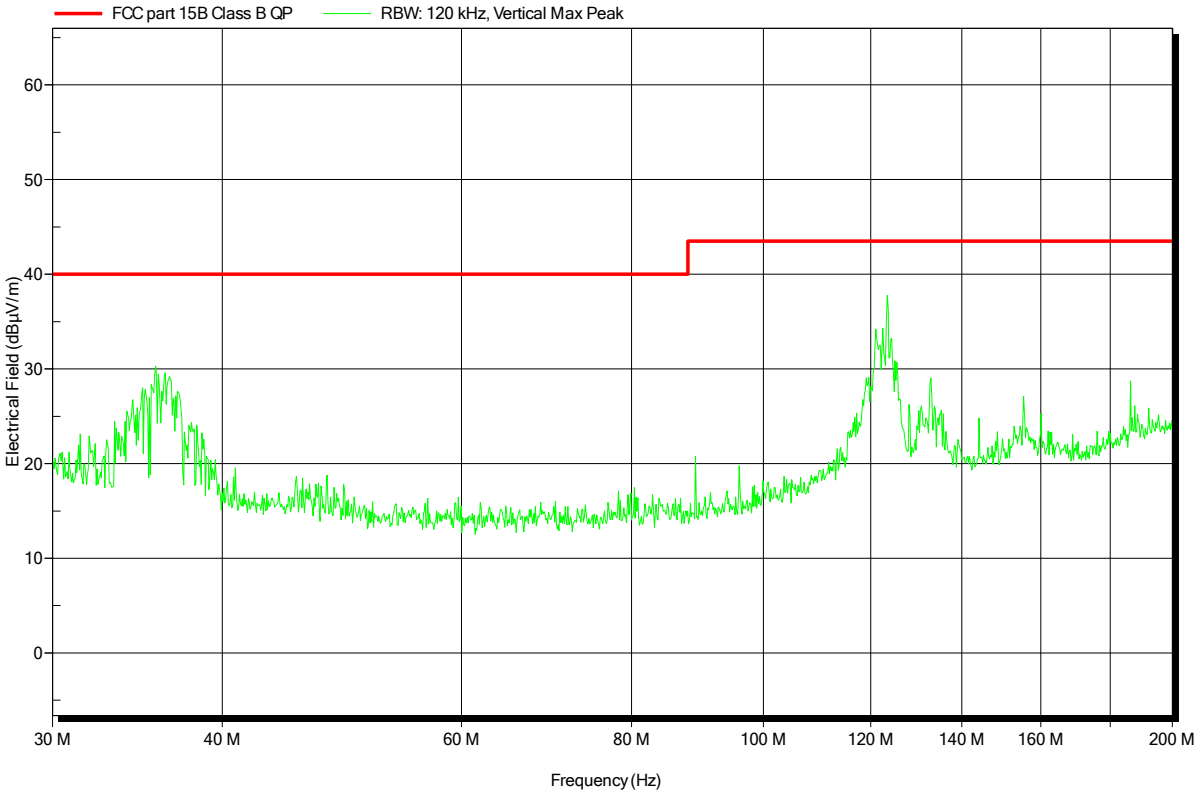

Spurious emissions under normal conditions according to FCC Part 15b

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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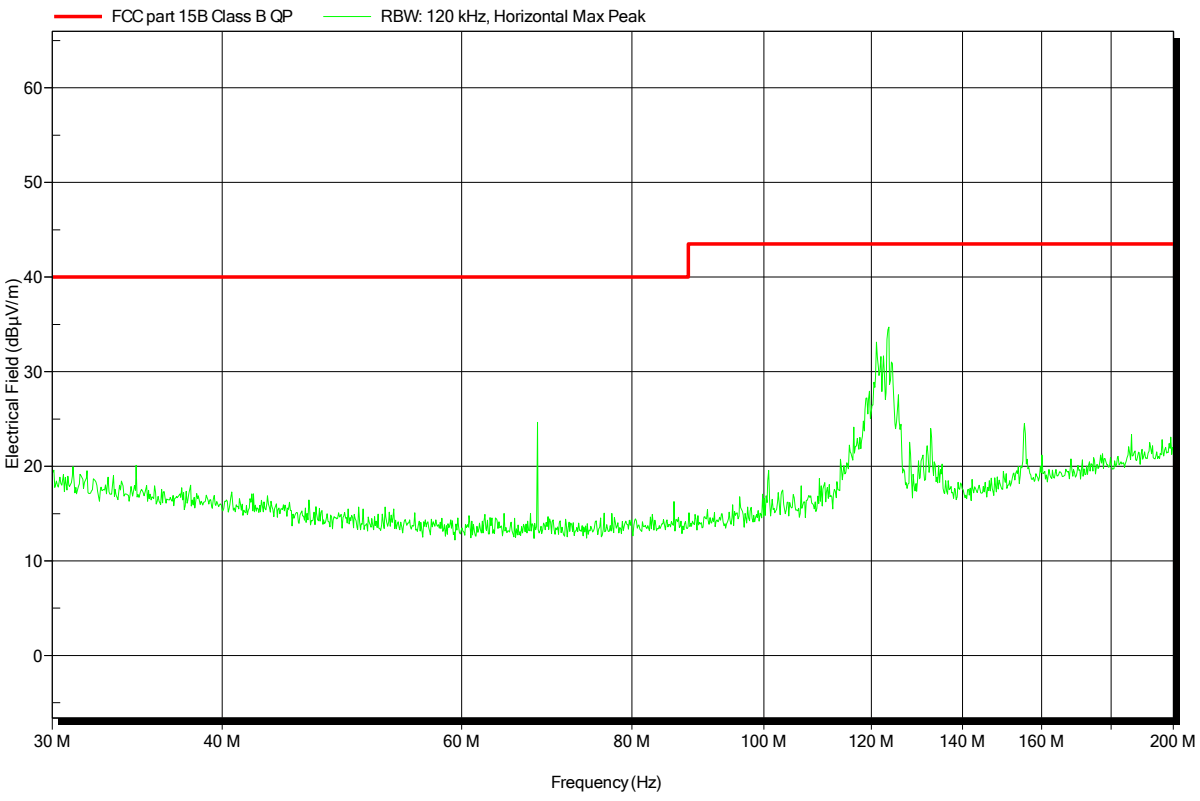

Spurious emissions under normal conditions according to FCC Part 15b

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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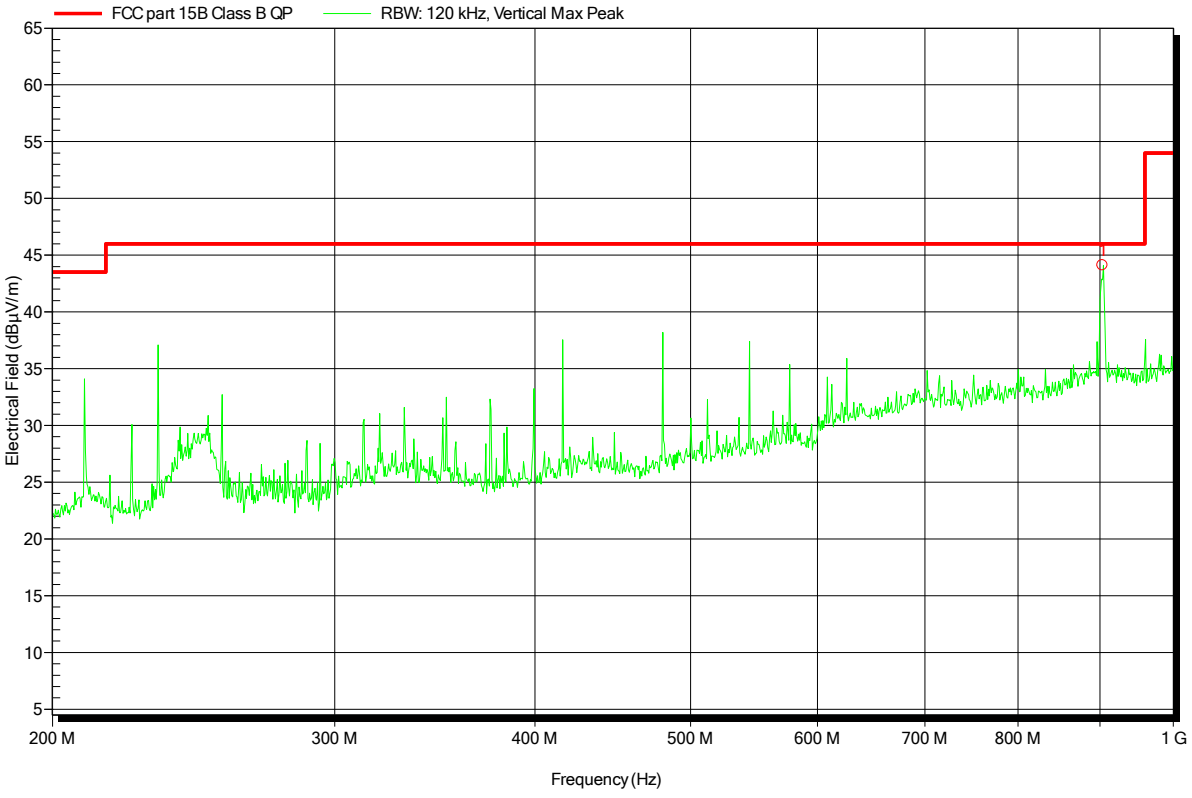

Frequency
903.26 MHz GSM carrier

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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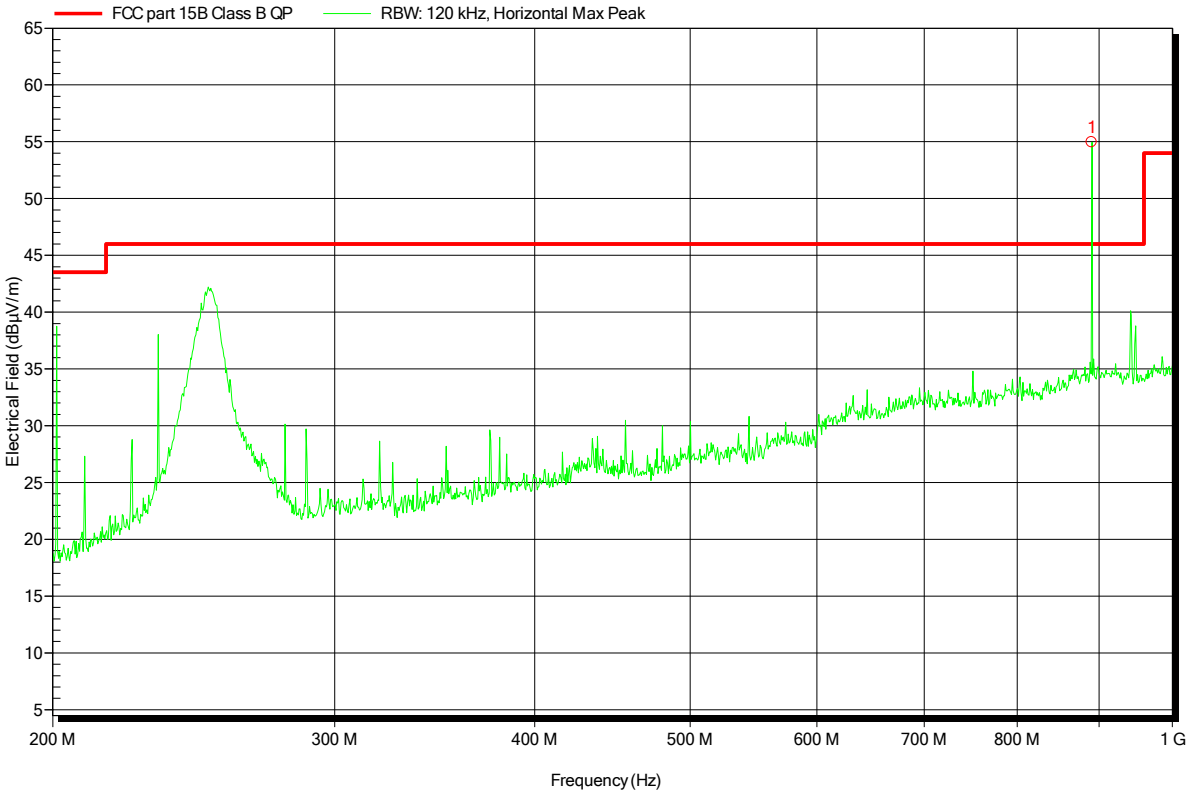

Frequency
890.65 MHz GSM carrier

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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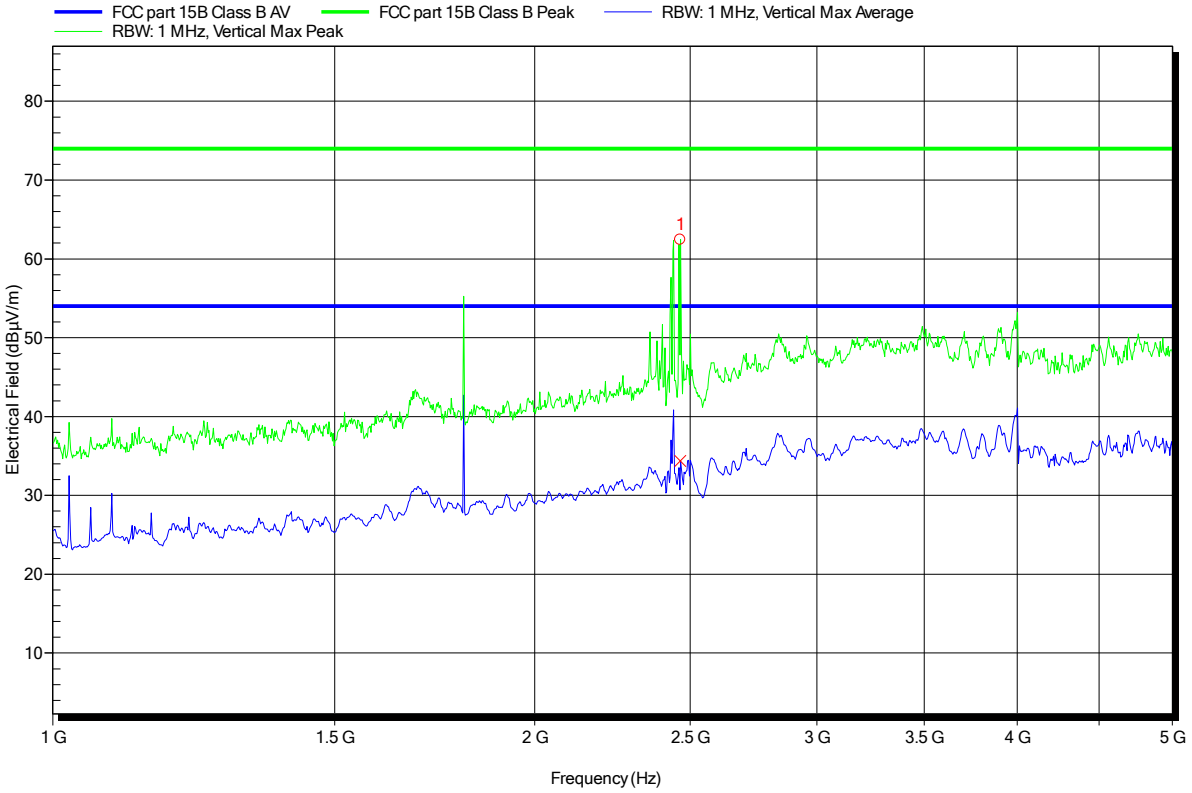

Frequency
2.465 GHz WLAN carrier

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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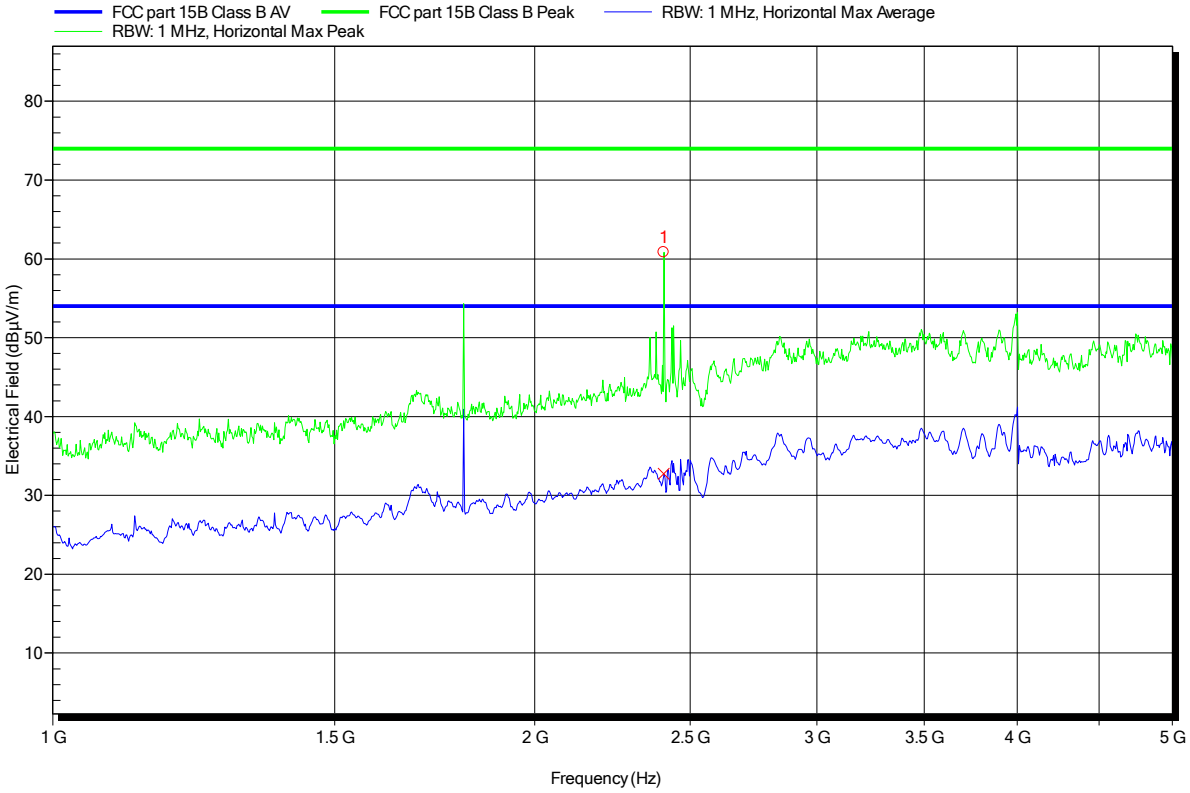

Frequency
2.407 GHz WLAN carrier

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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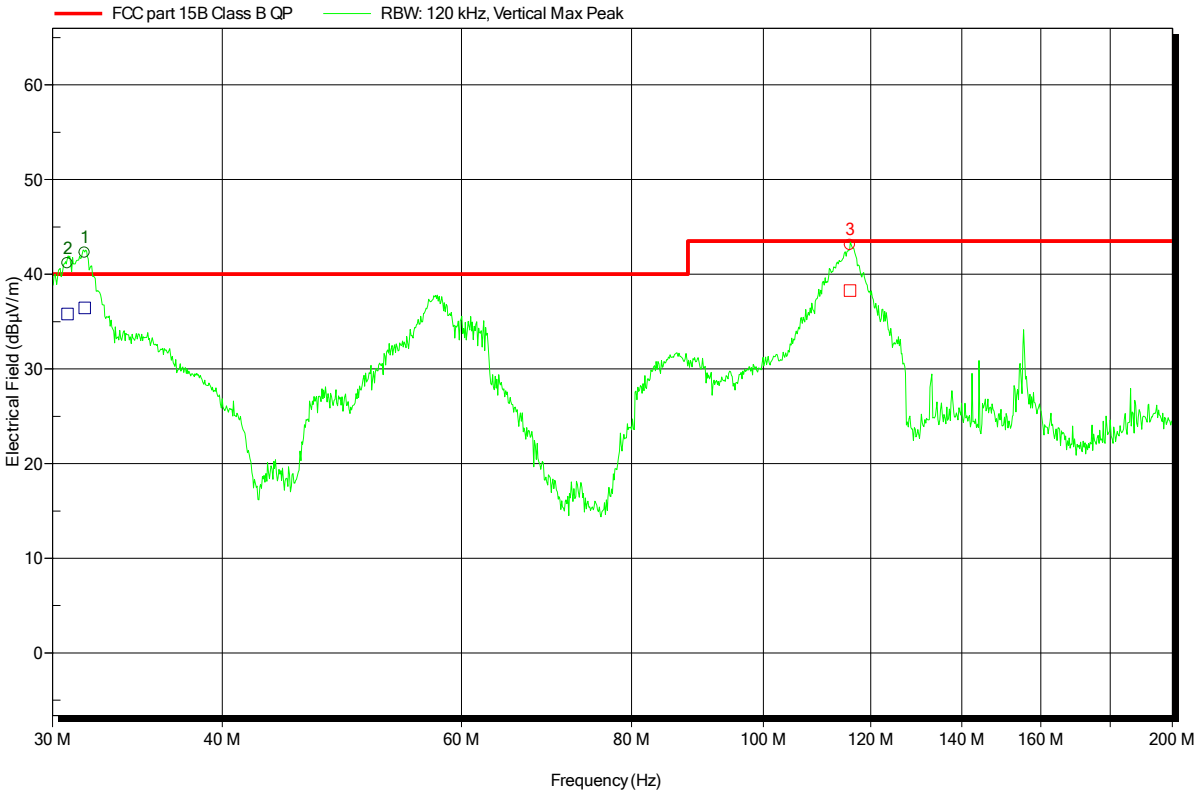

Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
30.78 MHz	35.82 dBµV/m	40 dBµV/m	-4.18 dB	Pass
31.68 MHz	36.45 dBµV/m	40 dBµV/m	-3.55 dB	Pass
115.86 MHz	38.26 dBµV/m	43.5 dBµV/m	-5.24 dB	Pass

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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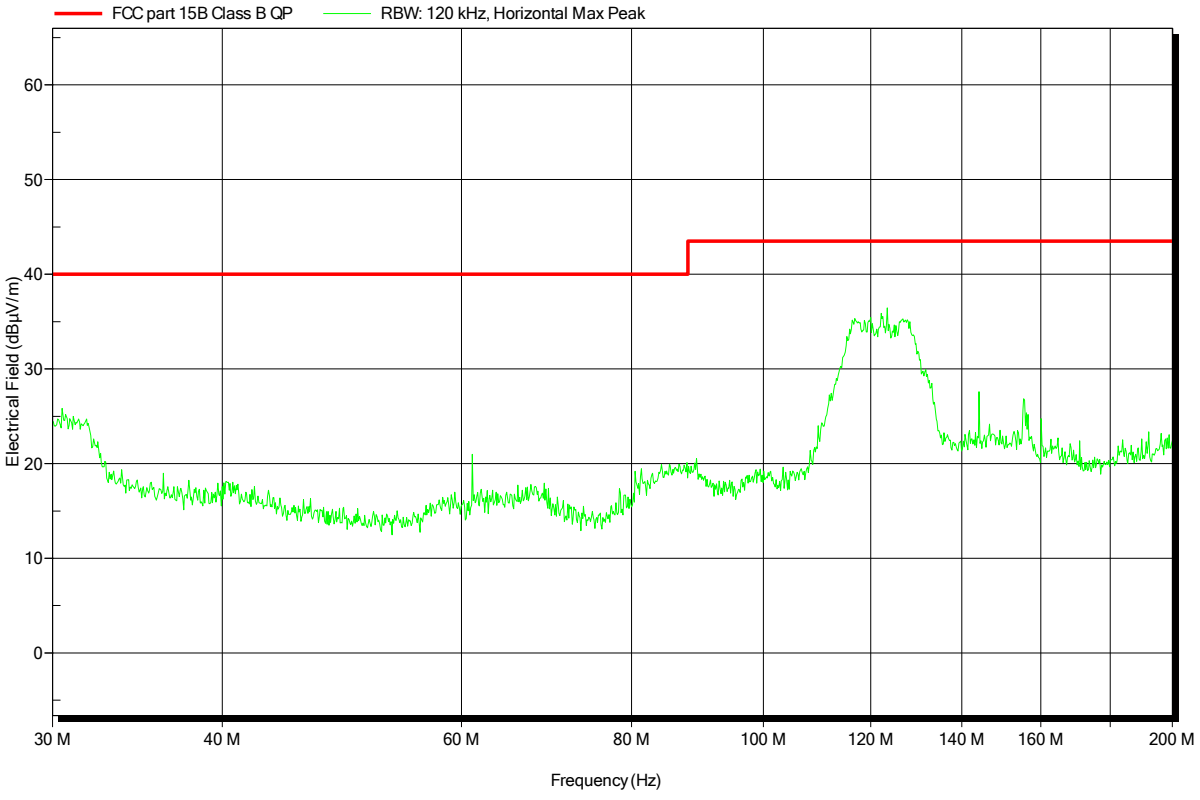

Spurious emissions under normal conditions according to FCC Part 15b

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, GSM900 link to CMU, LR-BT link to TS15 with RH16
Test Date:	2014-08-06
Note:	

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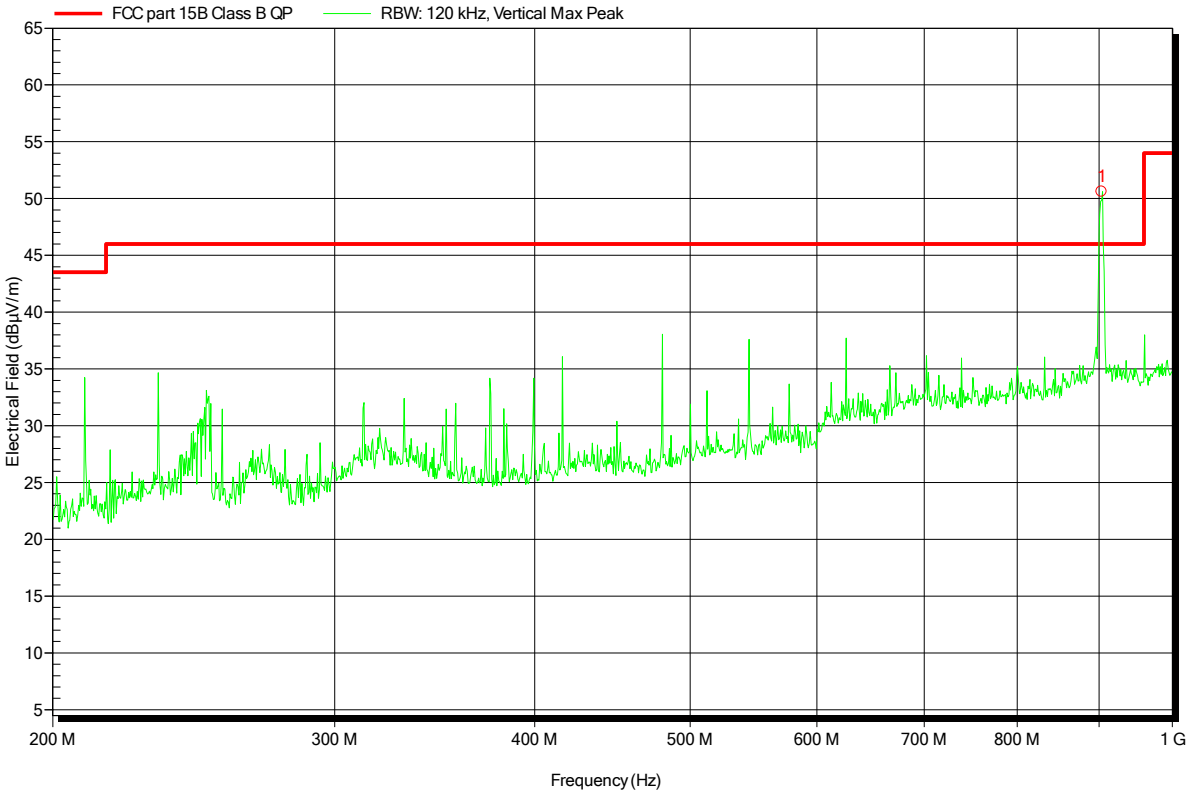

Frequency
903.26 MHz GSM carrier

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
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, GSM900 link to CMU, LR-BT link to TS15 with RH16
Test Date:	2014-08-06
Note:	

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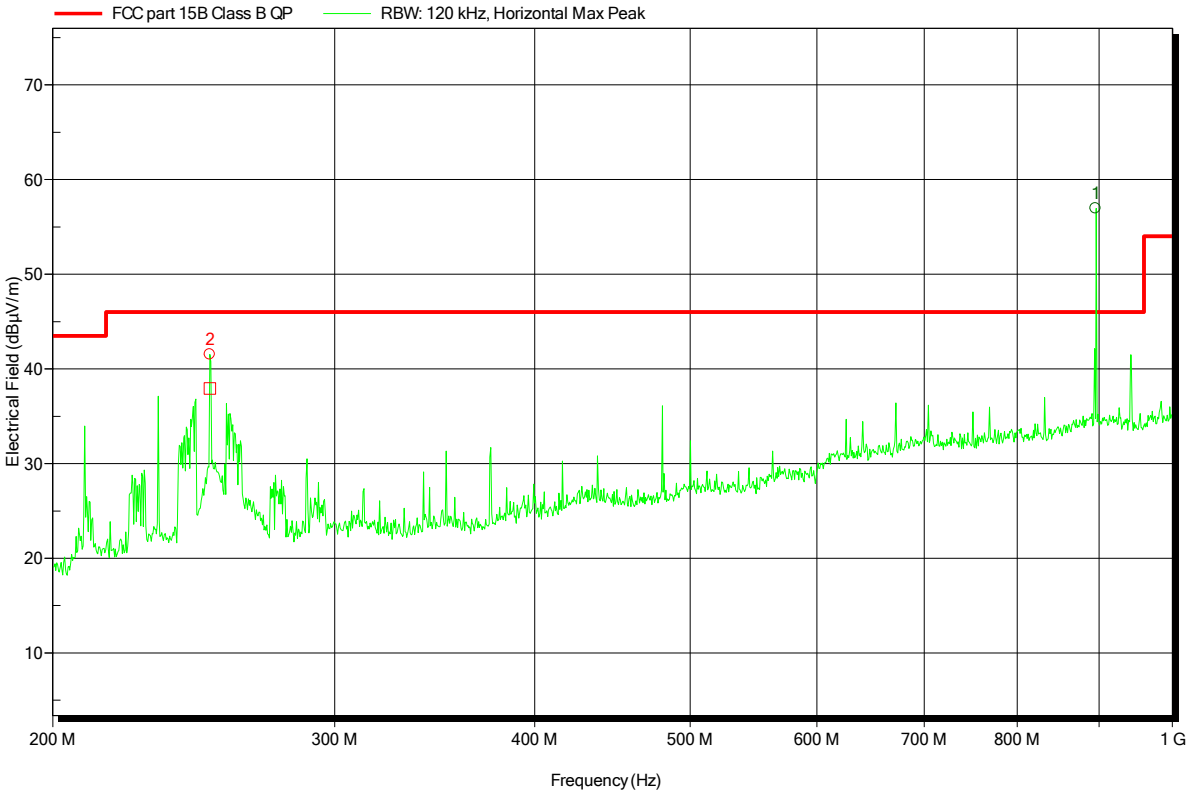

Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
250.795 MHz 895.5 MHz GSM carrier	37.95 dBµV/m	46 dBµV/m	-8.05 dB	Pass

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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, GSM900 link to CMU, LR-BT link to TS15 with RH16
Test Date:	2014-08-06
Note:	

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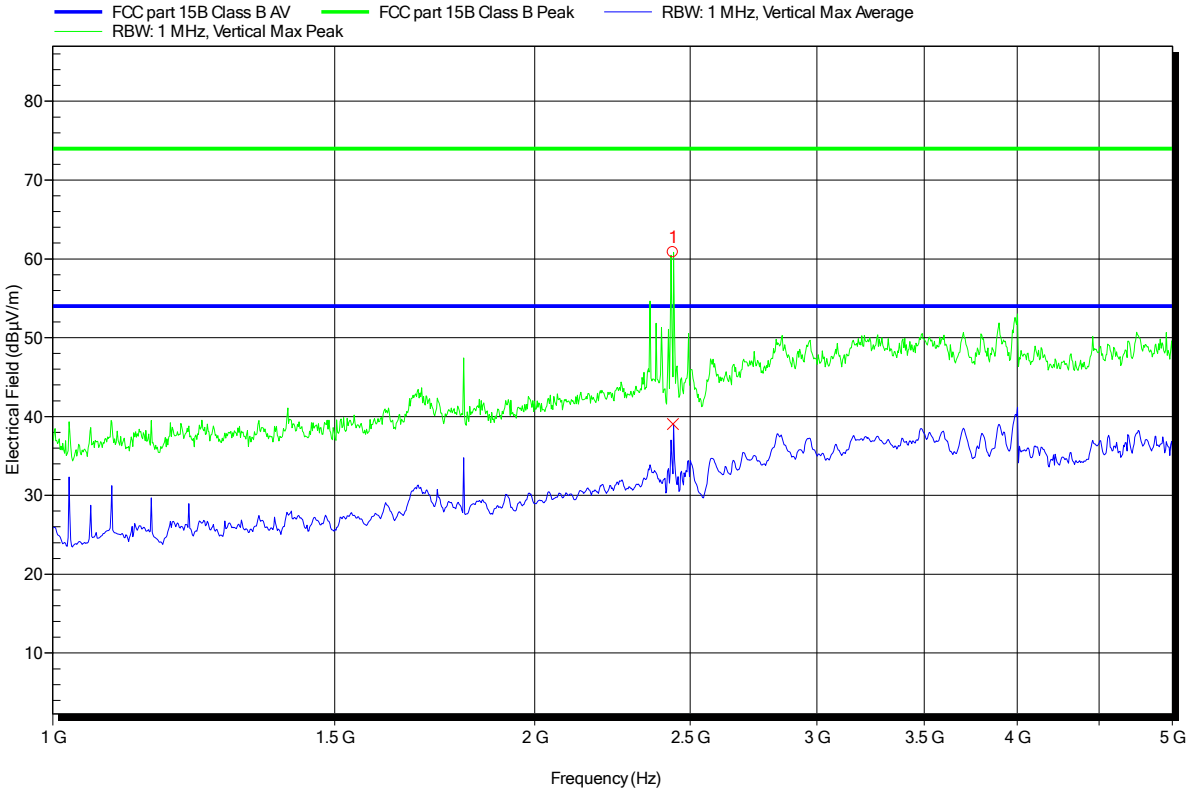

Frequency
2.439 GHz WLAN carrier

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

Manufacturer:	Leica Geosystems AG
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 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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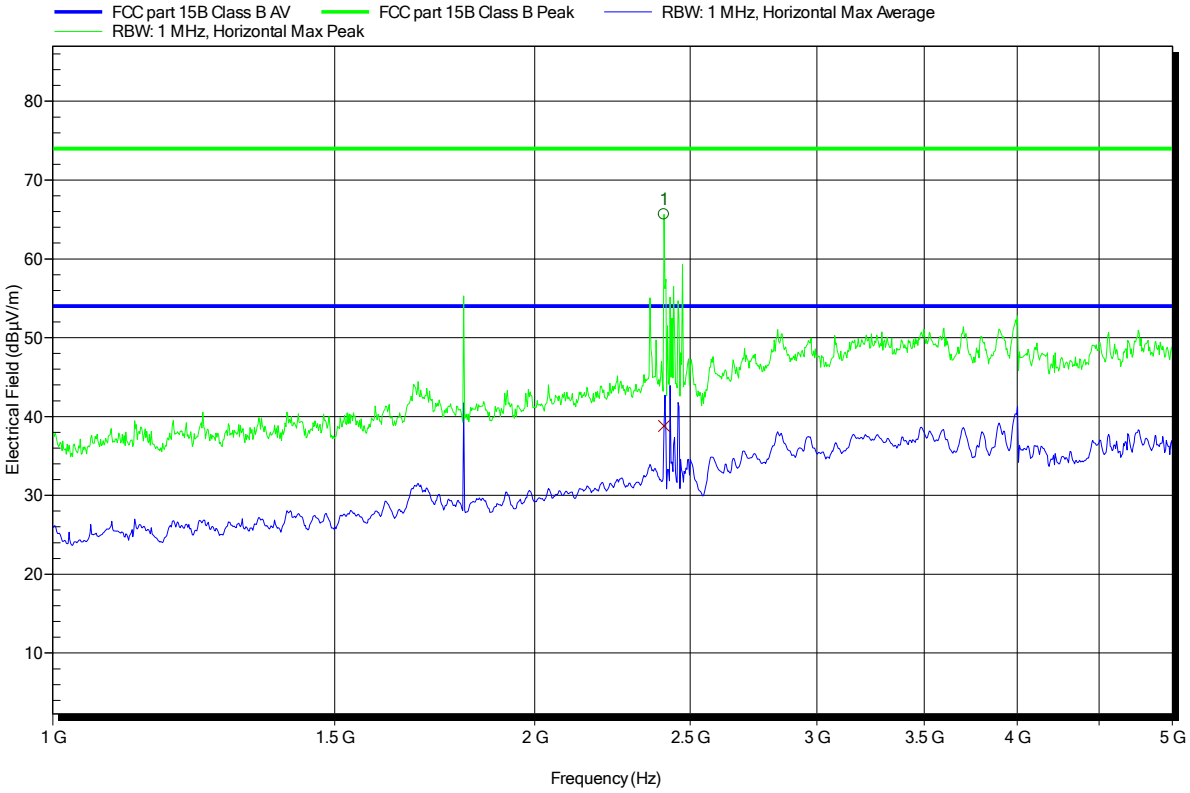

Frequency
2.408 GHz WLAN carrier

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

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, 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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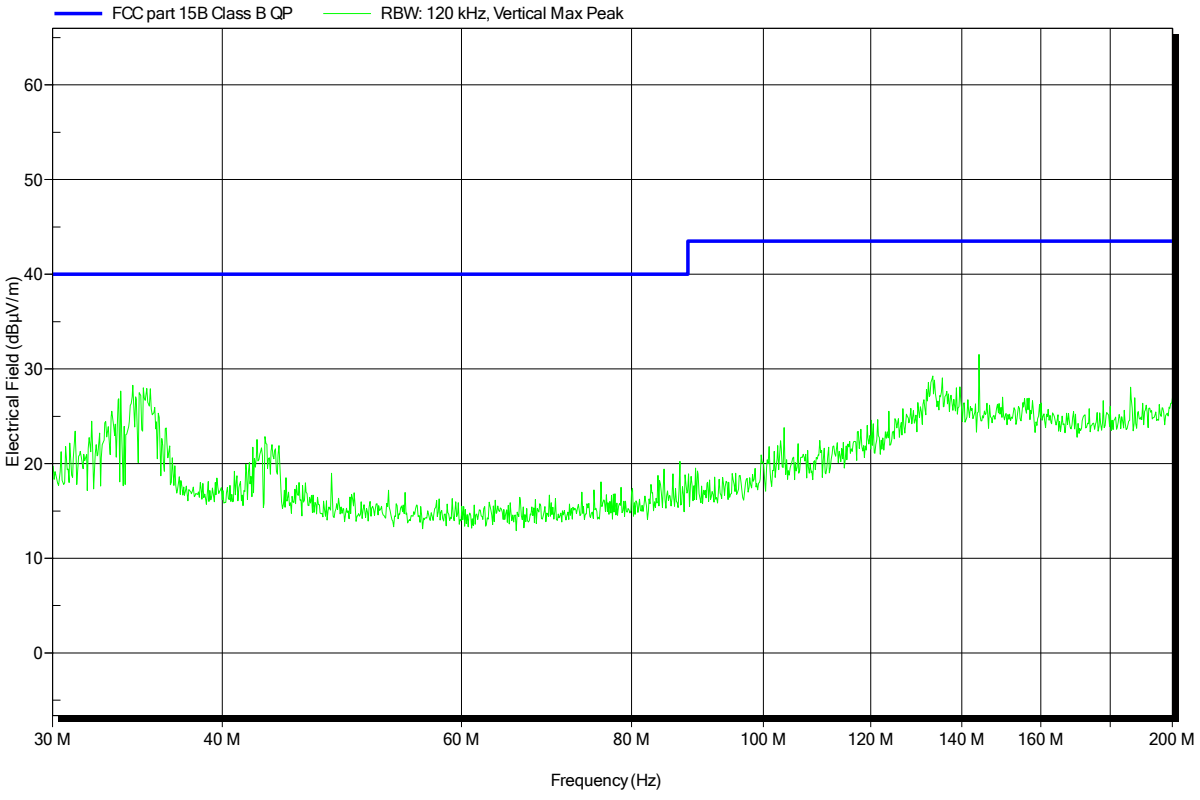

Spurious emissions under normal conditions according to FCC Part 15b

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 HK 116, 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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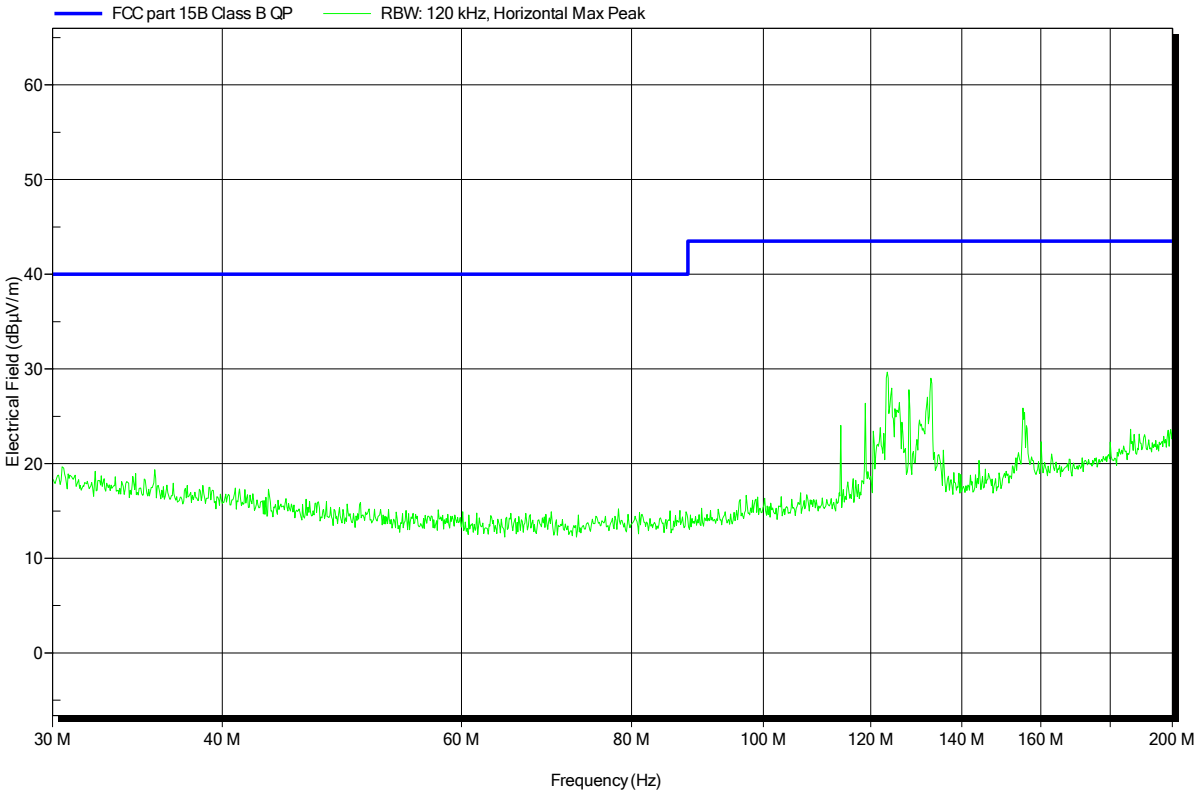

Spurious emissions under normal conditions according to FCC Part 15b

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 223, 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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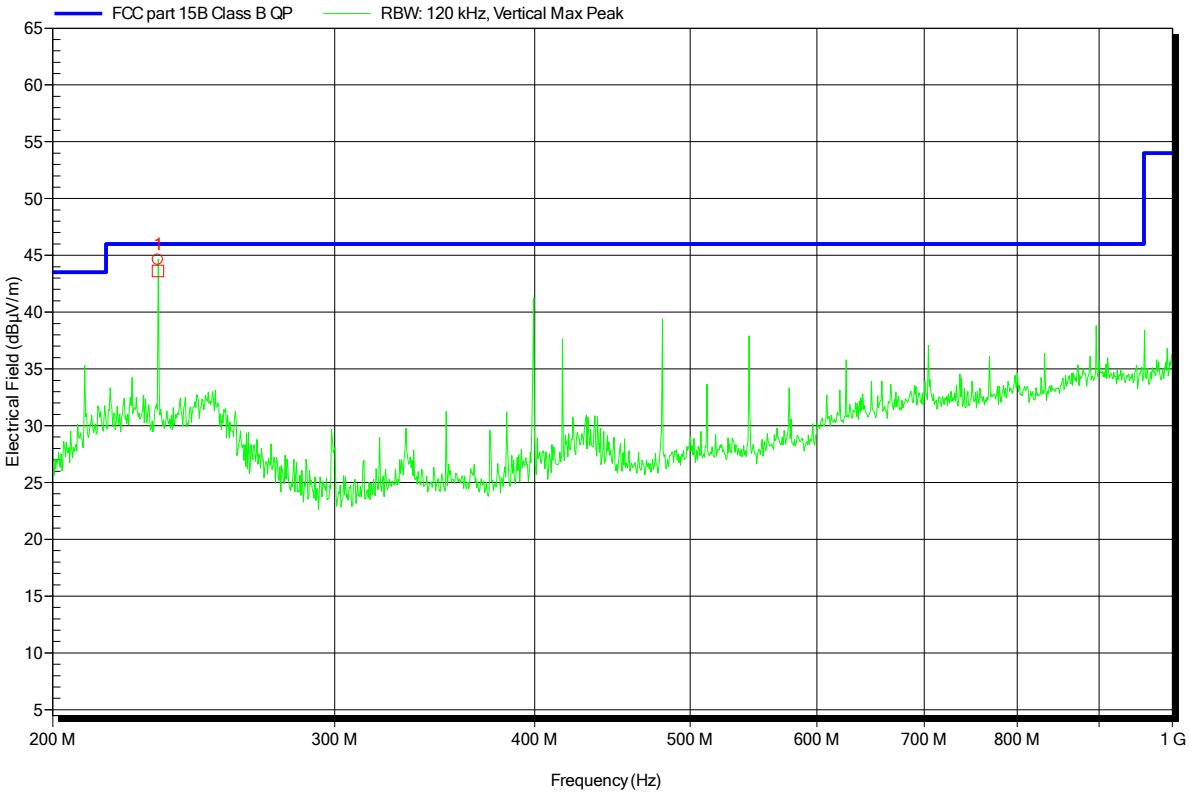

Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
232.724 MHz	43.62 dBµV/m	46 dBµV/m	-2.38 dB	Pass

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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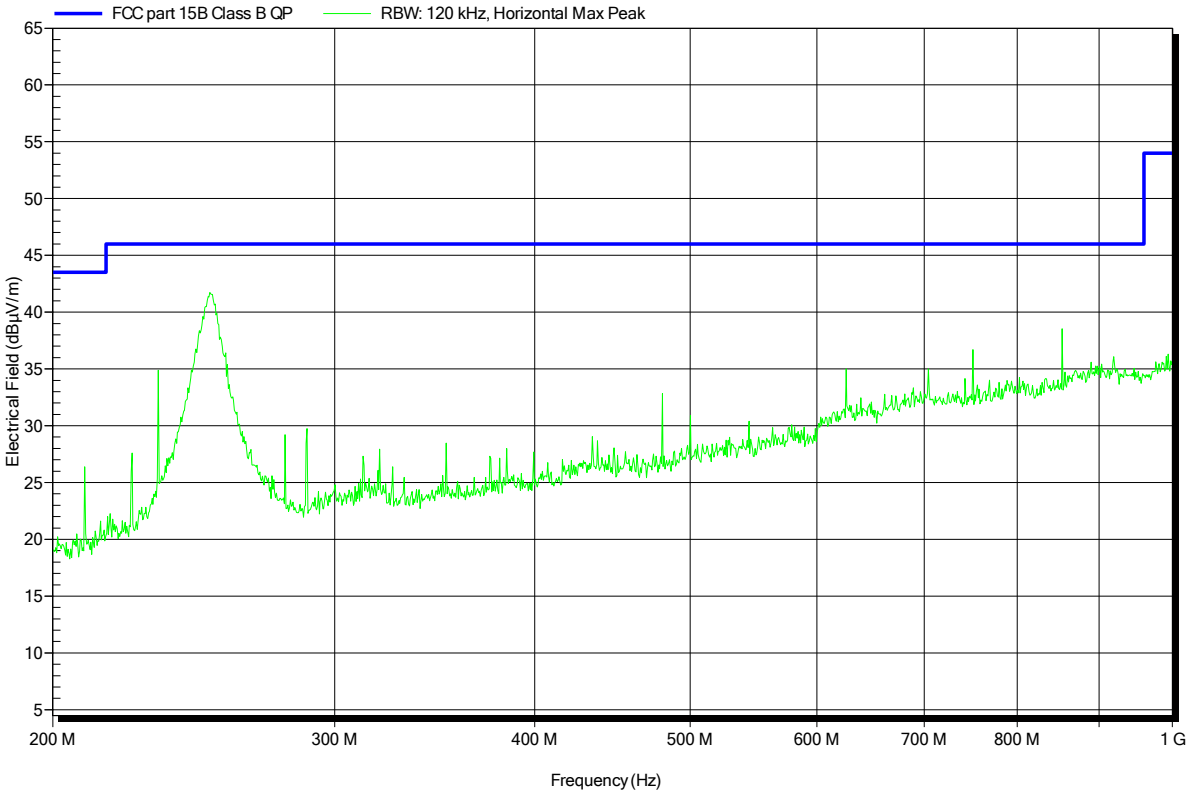

Spurious emissions under normal conditions according to FCC Part 15b

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, LRBT link to TS15 with RH16
Test Date:	2014-09-18
Note:	

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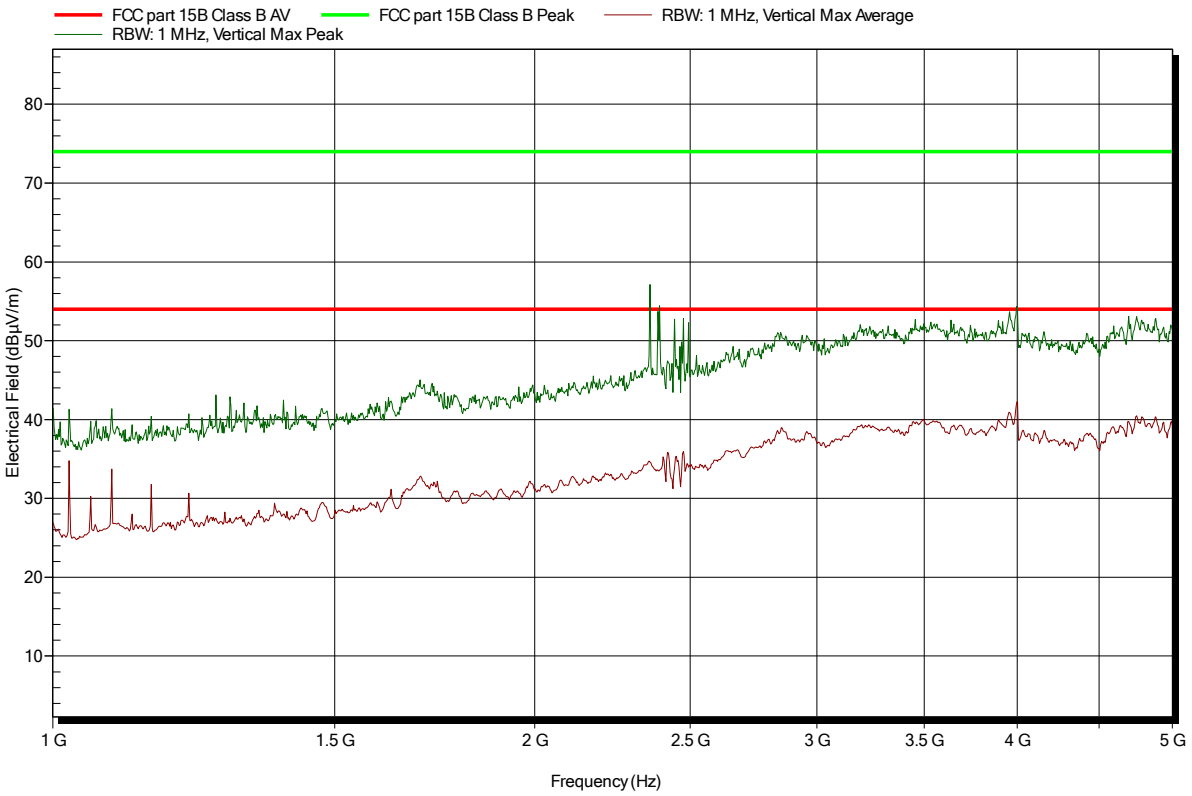

Spurious emissions under normal conditions according to FCC Part 15b

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, 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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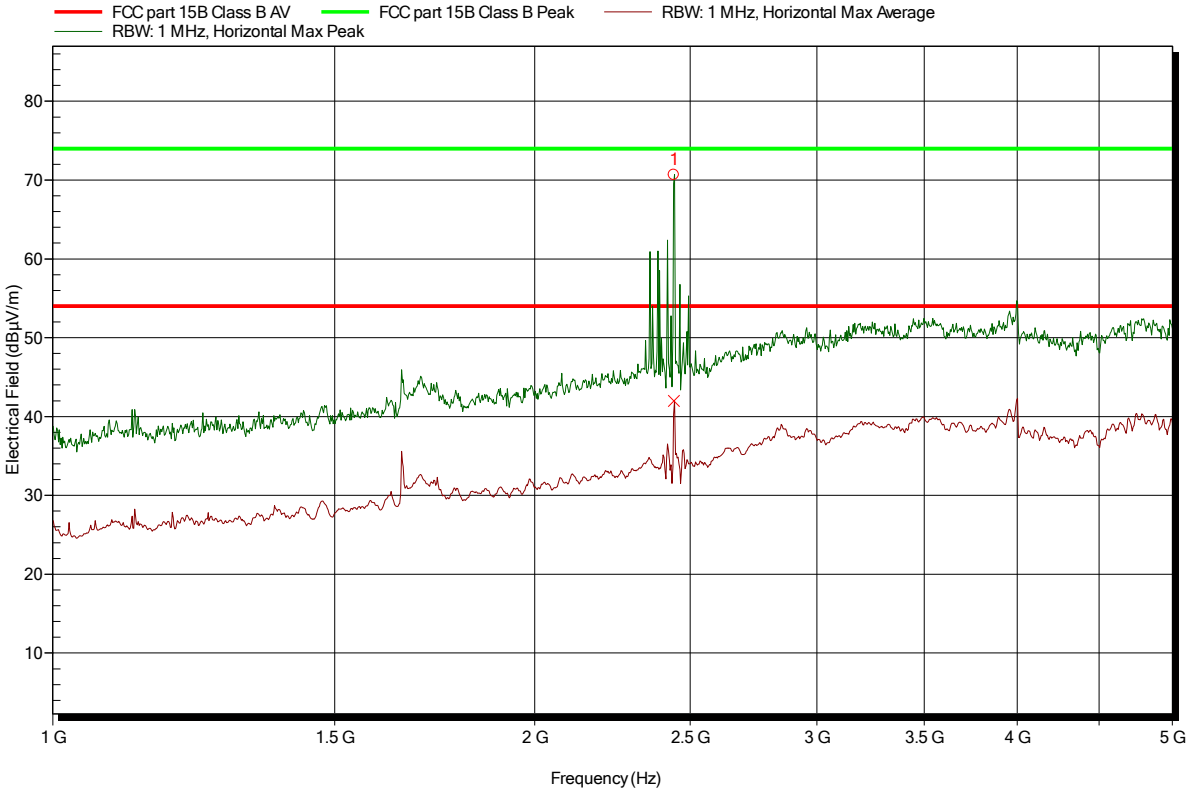

Frequency
2.442 GHz WLAN carrier

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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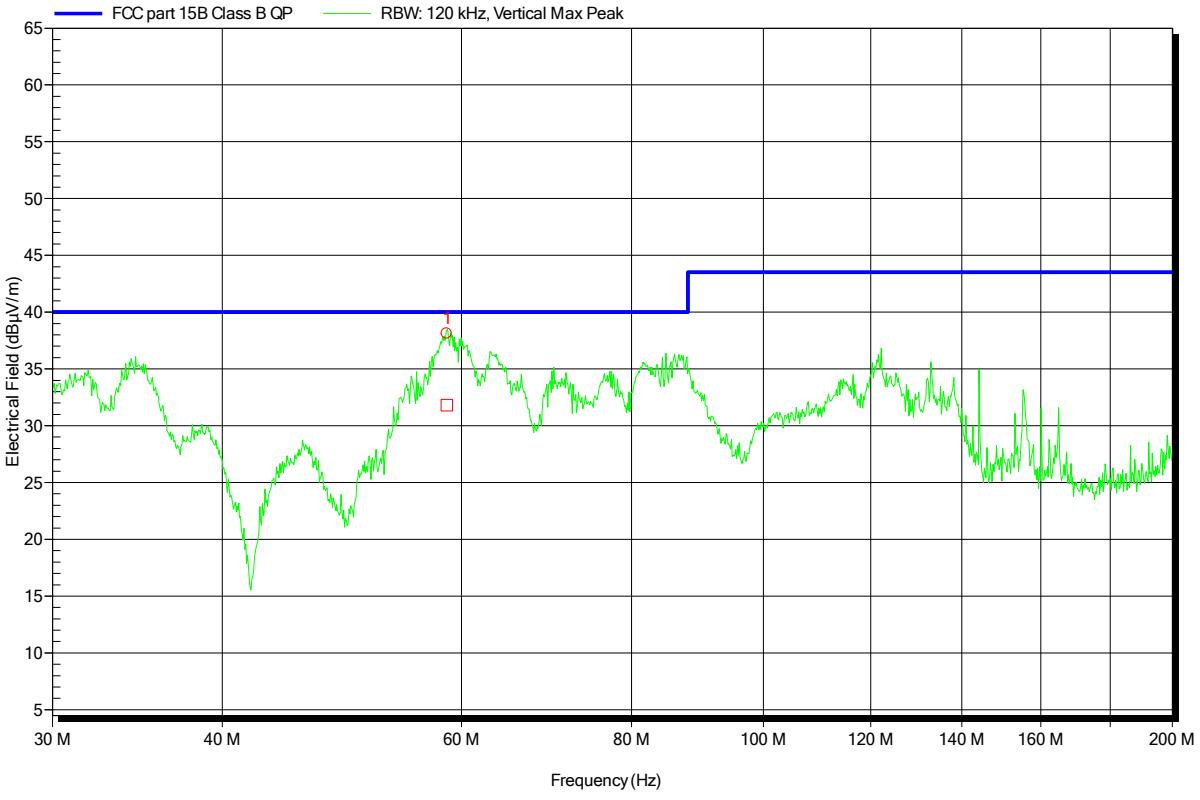

Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
58.5 MHz	31.8 dBµV/m	40 dBµV/m	-8.2 dB	Pass

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 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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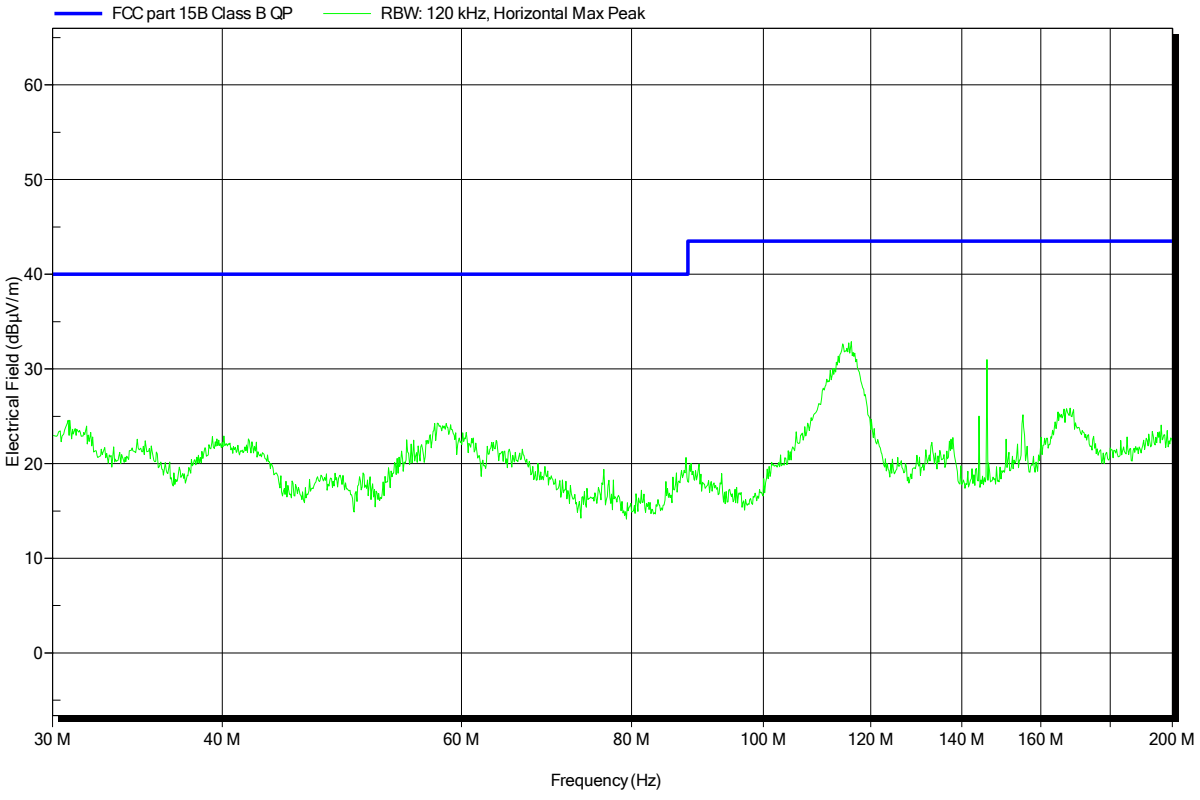

Spurious emissions under normal conditions according to FCC Part 15b

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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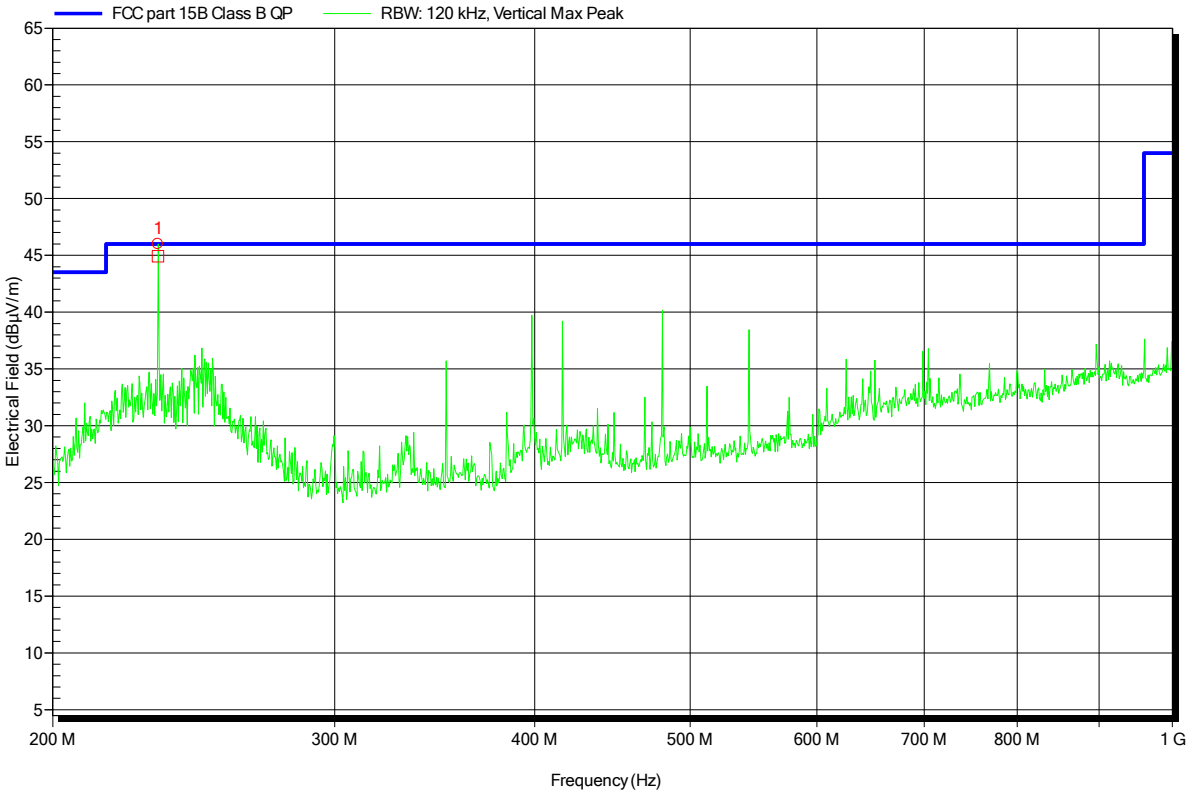

Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
232.73 MHz	44.94 dBµV/m	46 dBµV/m	-1.06 dB	Pass

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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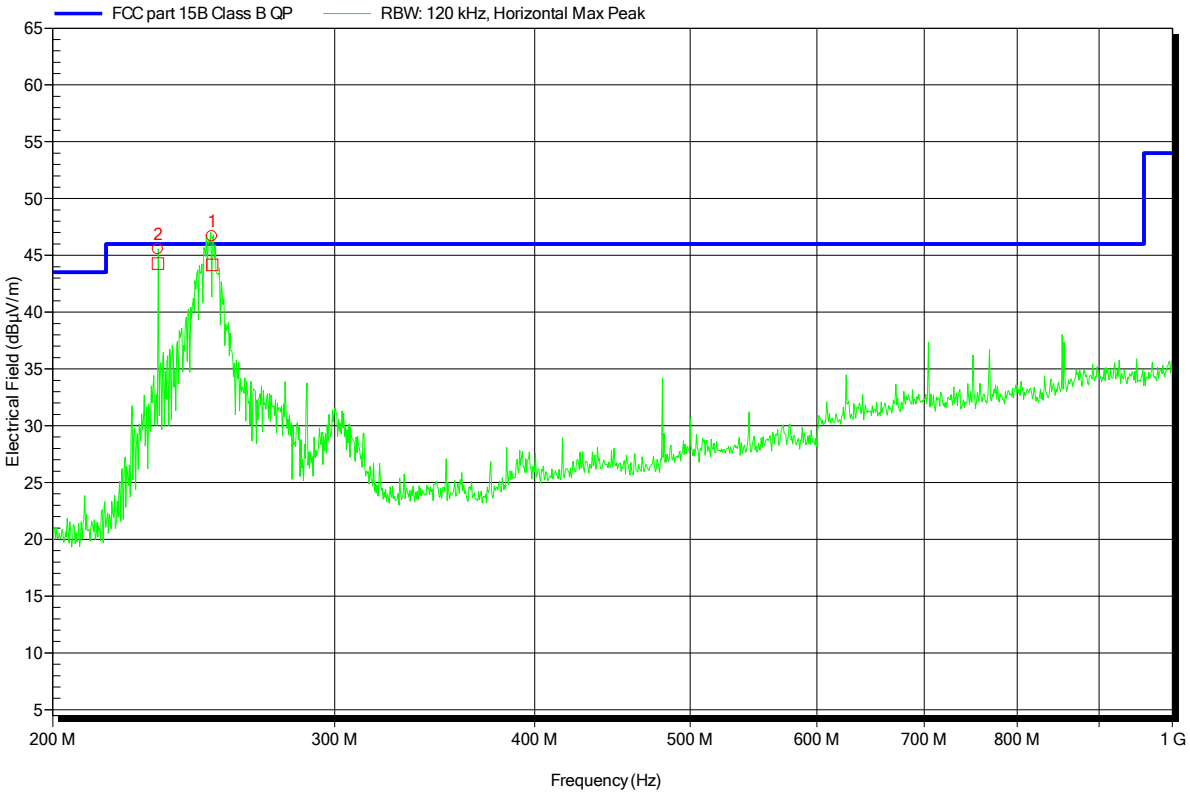

Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
232.72 MHz	44.28 dBµV/m	46 dBµV/m	-1.72 dB	Pass
251.65 MHz	44.15 dBµV/m	46 dBµV/m	-1.85 dB	Pass

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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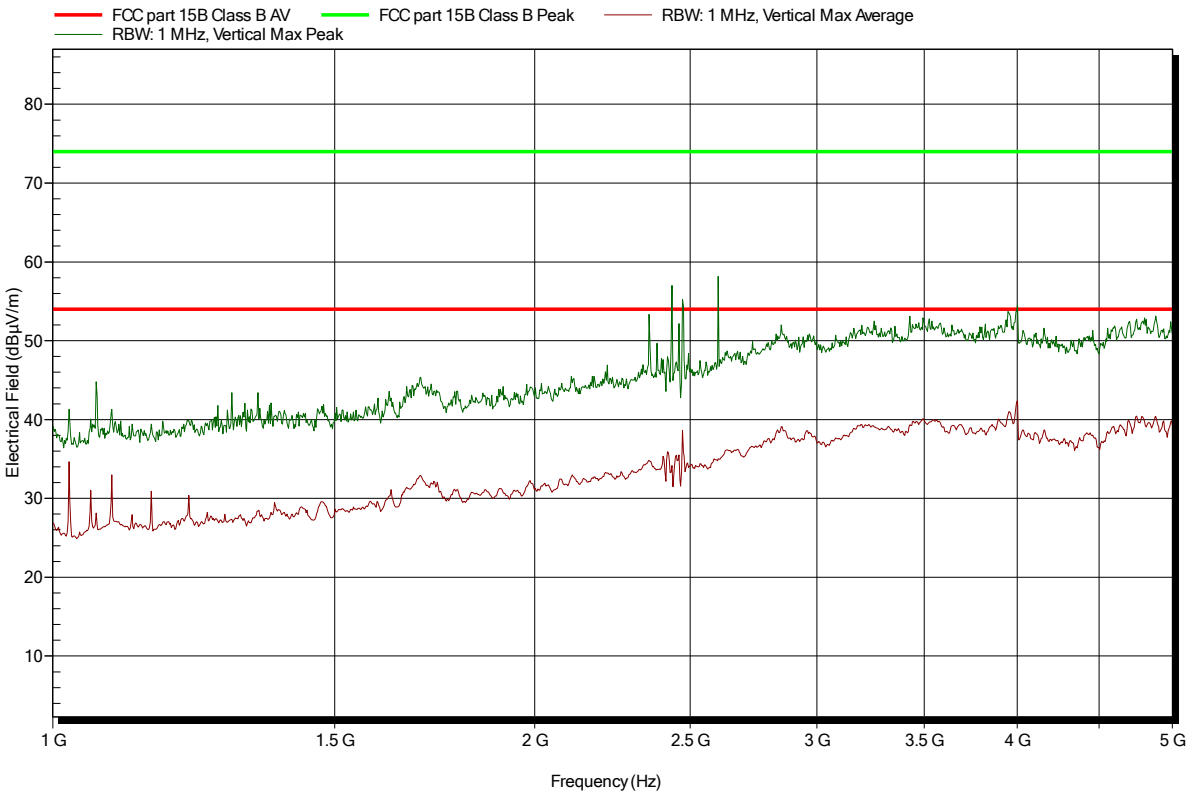

Spurious emissions under normal conditions according to FCC Part 15b

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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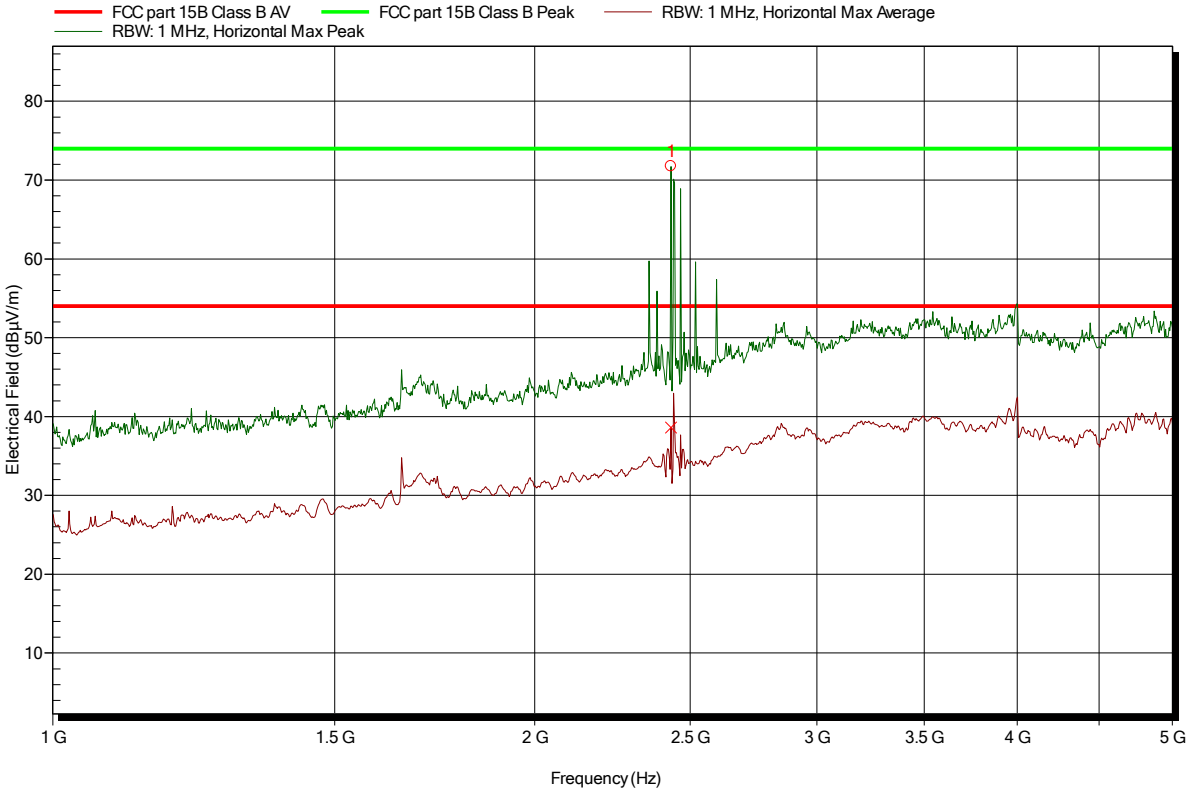
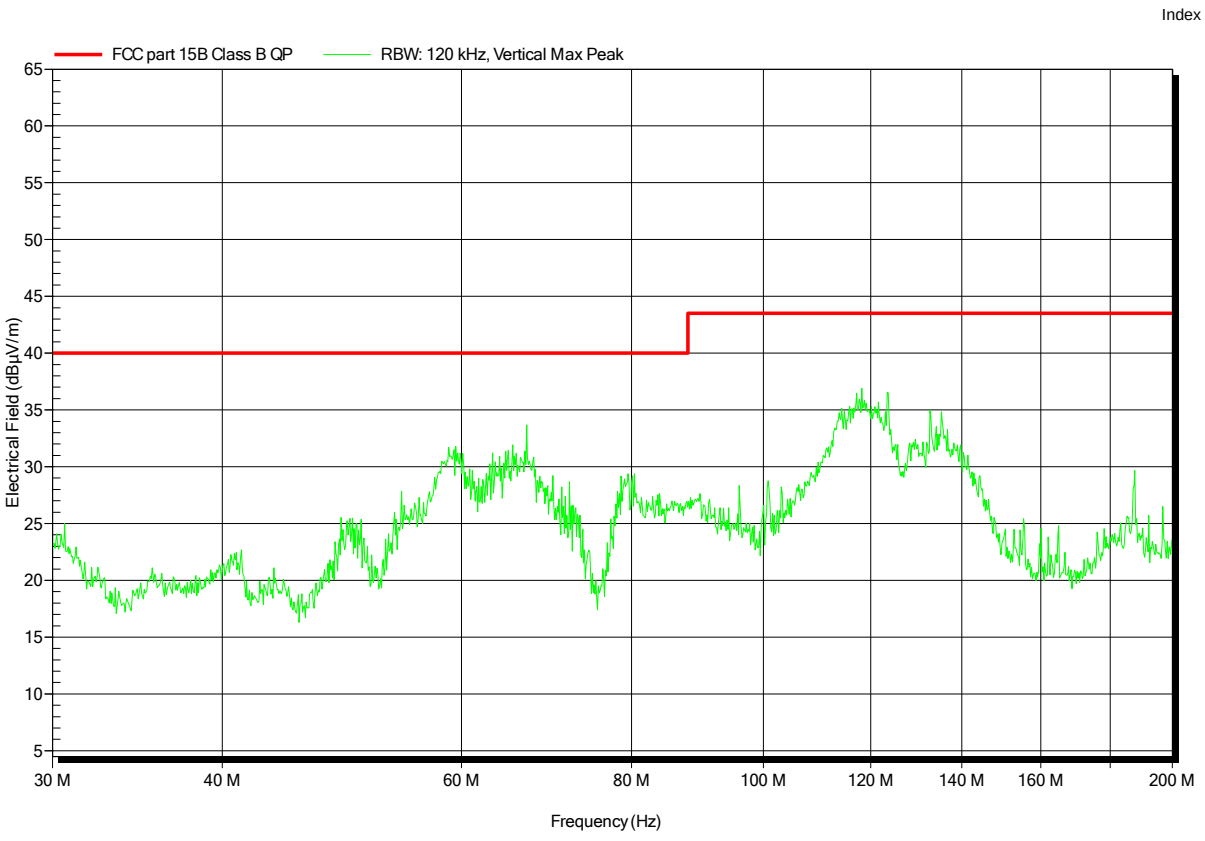


Frequency
2.432 GHz WLAN carrier

Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

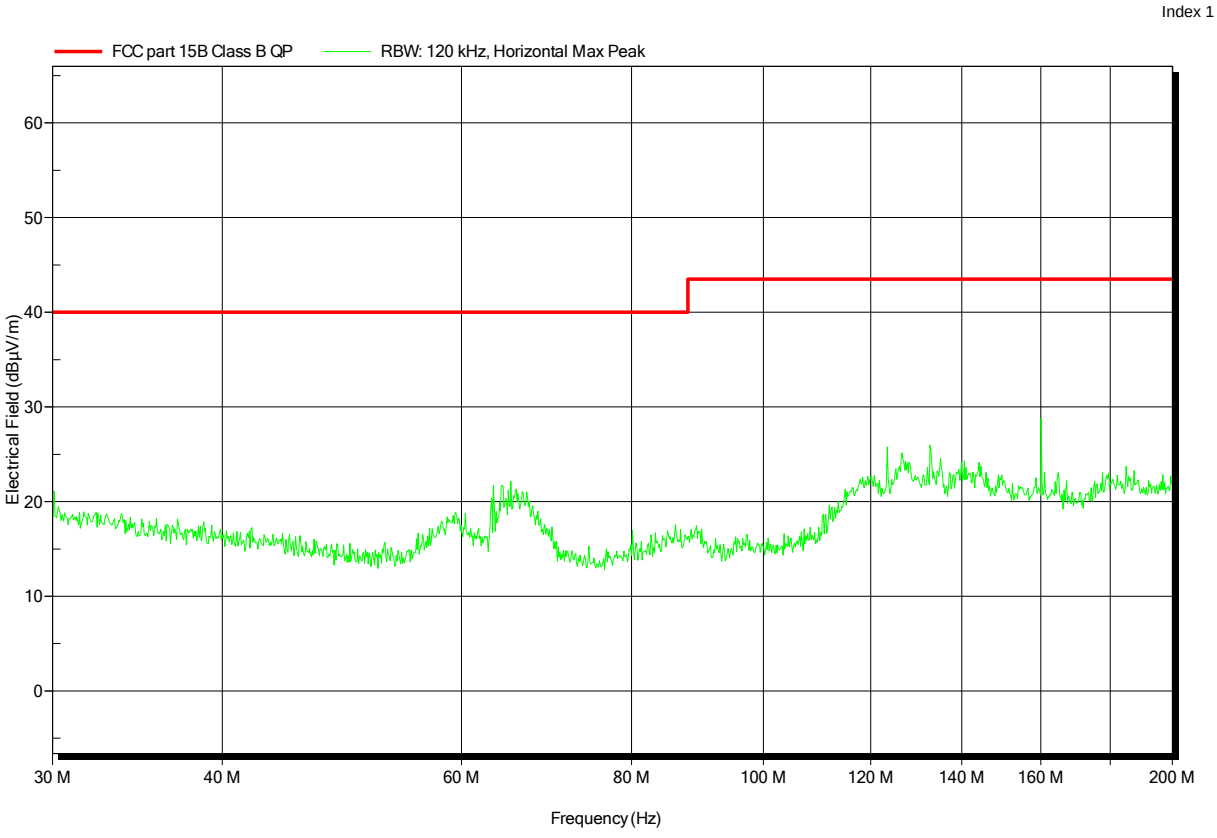
Manufacturer:	Leica Geosystems AG
EUT Name:	Feld Controller
Model:	CS20 3.75G
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Zunke
Test Conditions:	Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3m
Mode:	CS20 3.75G, charging, GSM900 link to CMU, WLAN link to AP, BT link to GPS Antenna, BT-LR link toTS15 with RH16
Test Date:	2014-08-05
Note:	



Spurious emissions under normal conditions according to FCC Part 15b

Project number: G0M-1406-3917

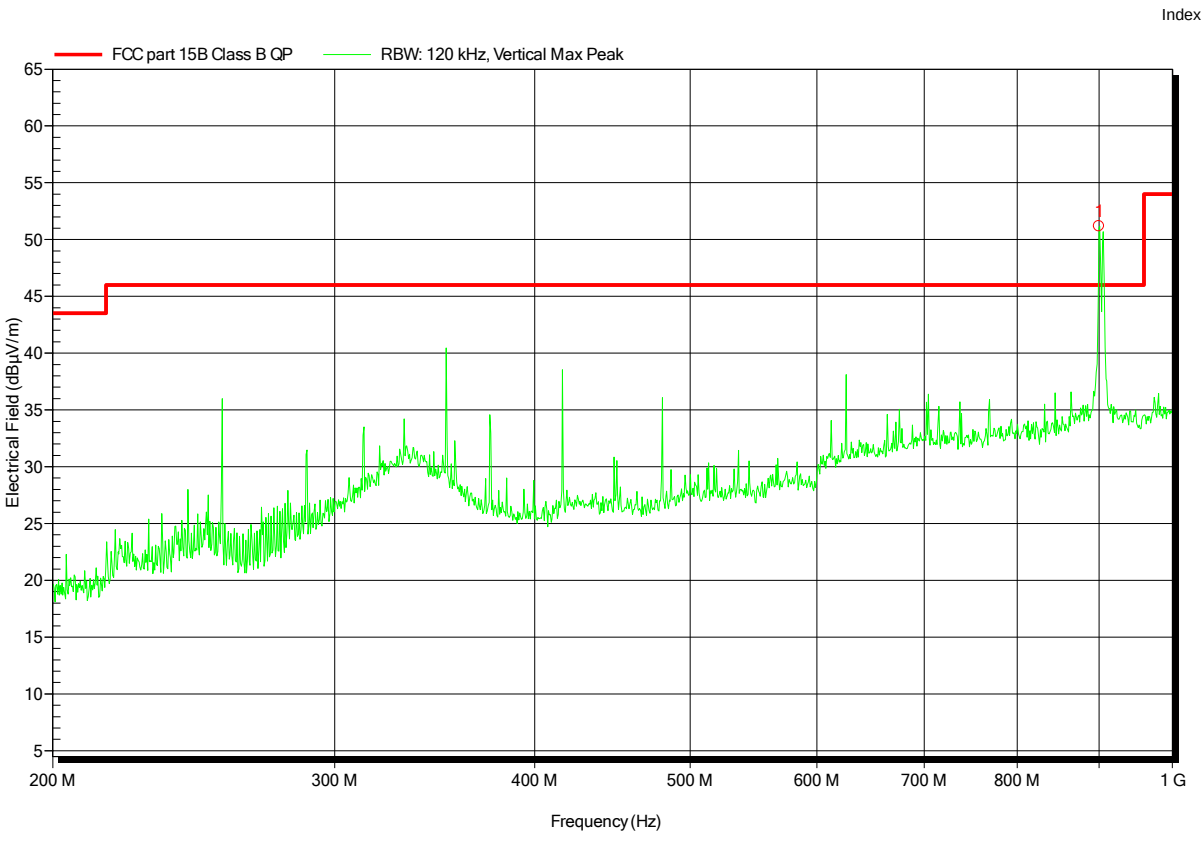
Manufacturer:	Leica Geosystems AG
EUT Name:	Feld Controller
Model:	CS20 3.75G
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Zunke
Test Conditions:	Tnom: 25°C, Unom: 10.8VDC via AC/DC Adapter
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3m
Mode:	CS20 3.75G, charging, GSM900 link to CMU, WLAN link to AP, BT link to GPS Antenna, BT-LR link toTS15 with RH16
Test Date:	2014-08-05
Note:	



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 toTS15 with RH16
Test Date:	2014-08-05
Note:	

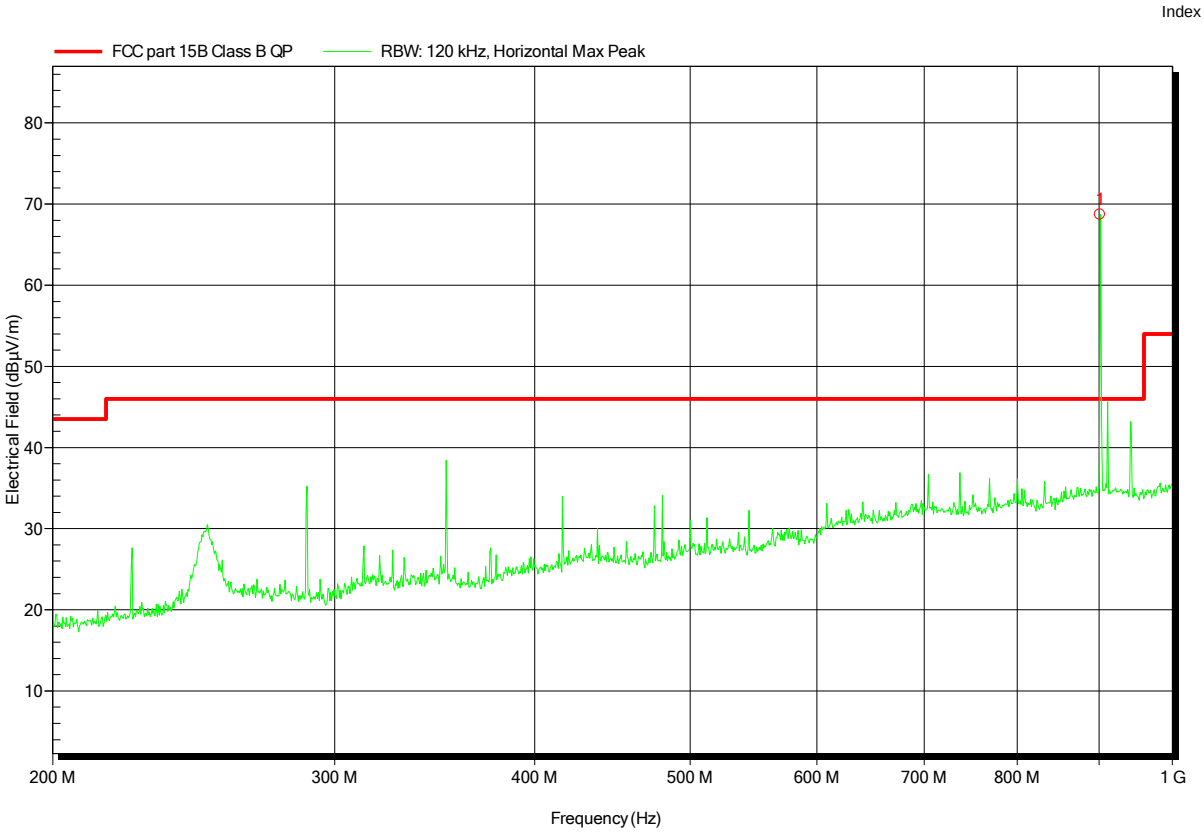


Frequency
899.96 MHz GSM carrier

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 toTS15 with RH16
Test Date:	2014-08-05
Note:	



Frequency
901.15 MHz 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 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 toTS15 with RH16
Test Date:	2014-08-05
Note:	

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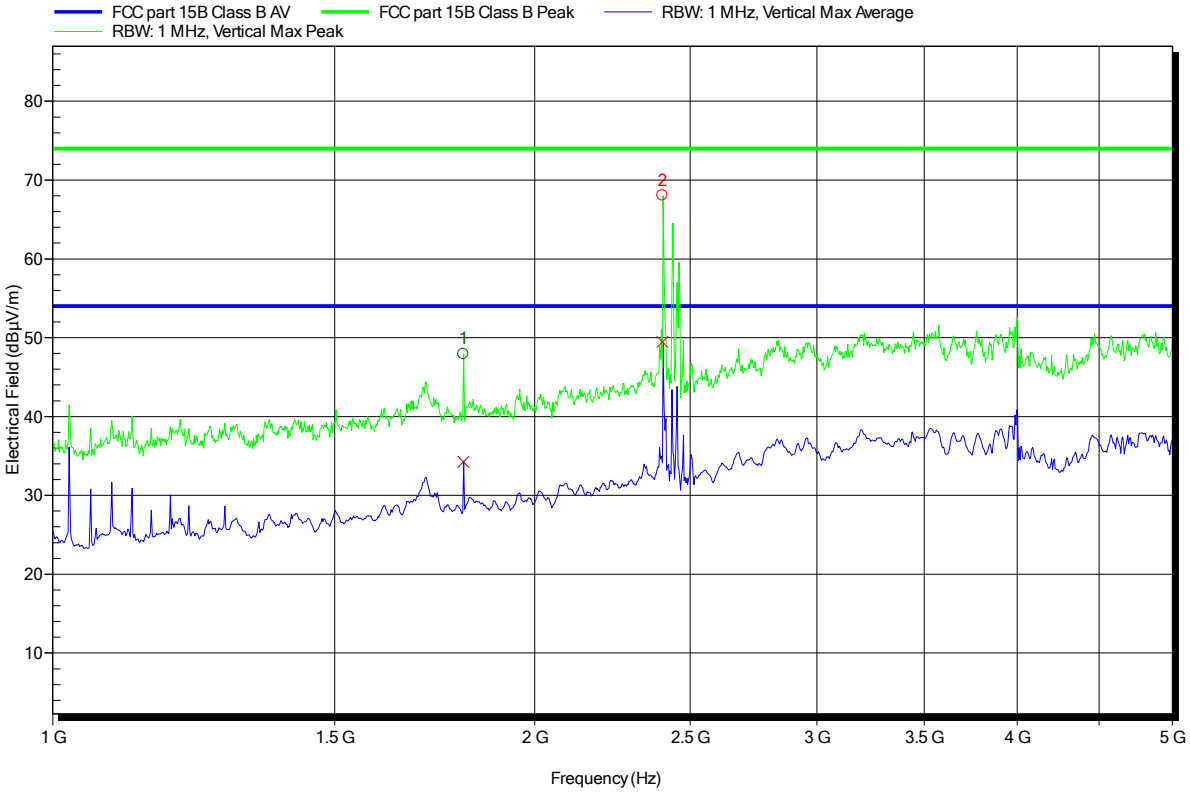

Frequency
1.805 GHz Harmonics from GSM
2.403 GHz WLAN carrier

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 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 toTS15 with RH16
Test Date:	2014-08-05
Note:	

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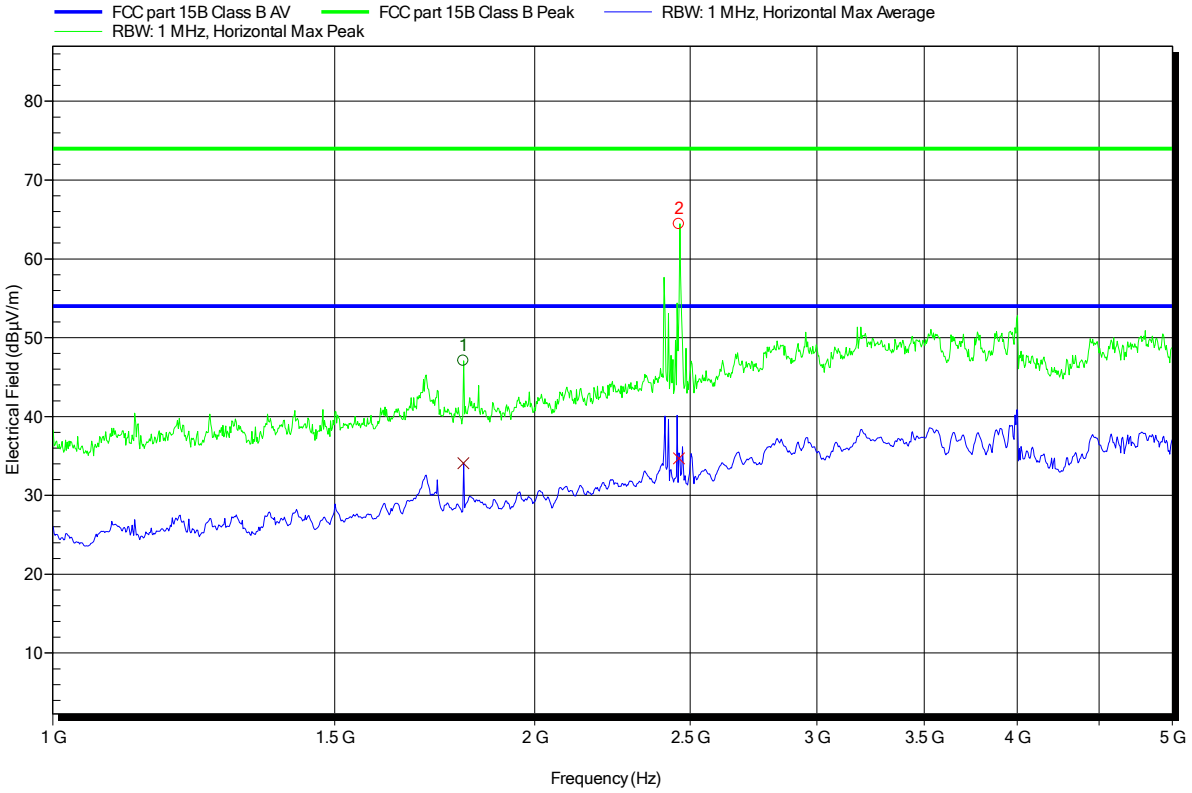

Frequency
1.805 GHz Harmonics from GSM
2.461 GHz GSM carrier

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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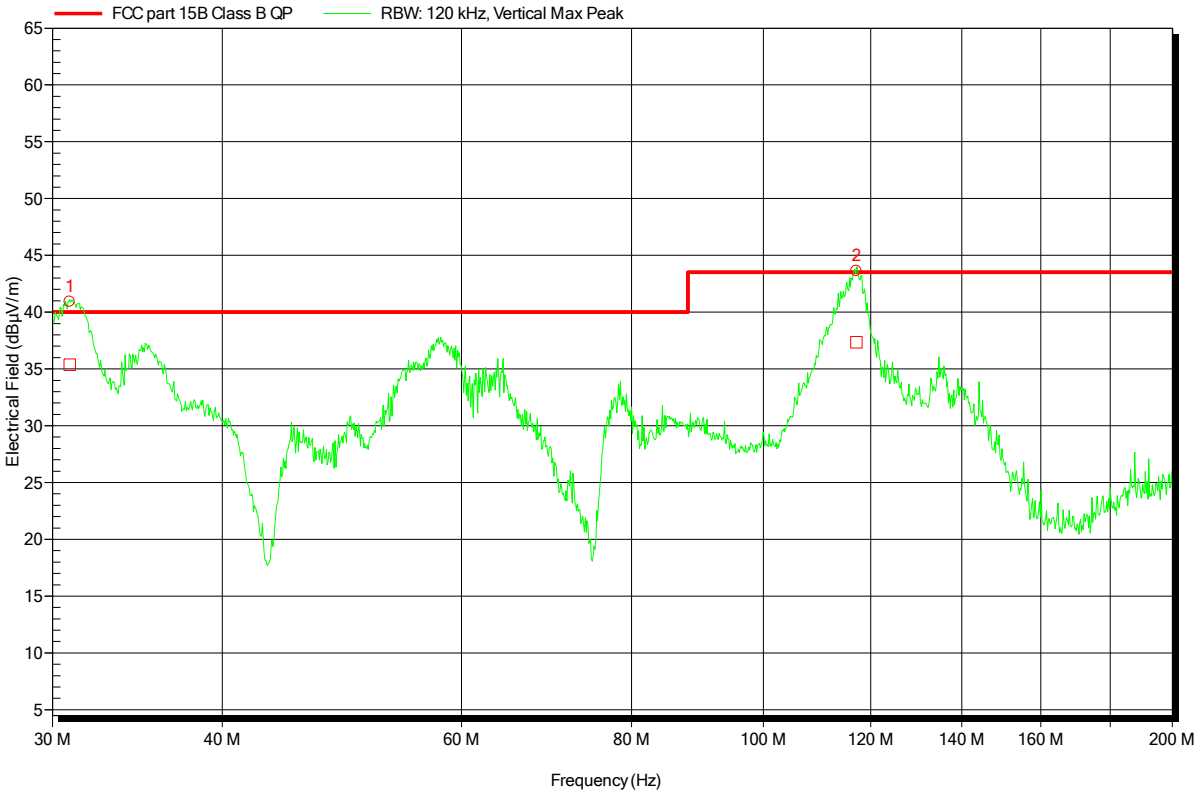

Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
30.9 MHz	35.36 dBµV/m	40 dBµV/m	-4.64 dB	Pass
117.12 MHz	37.35 dBµV/m	43.5 dBµV/m	-6.15 dB	Pass

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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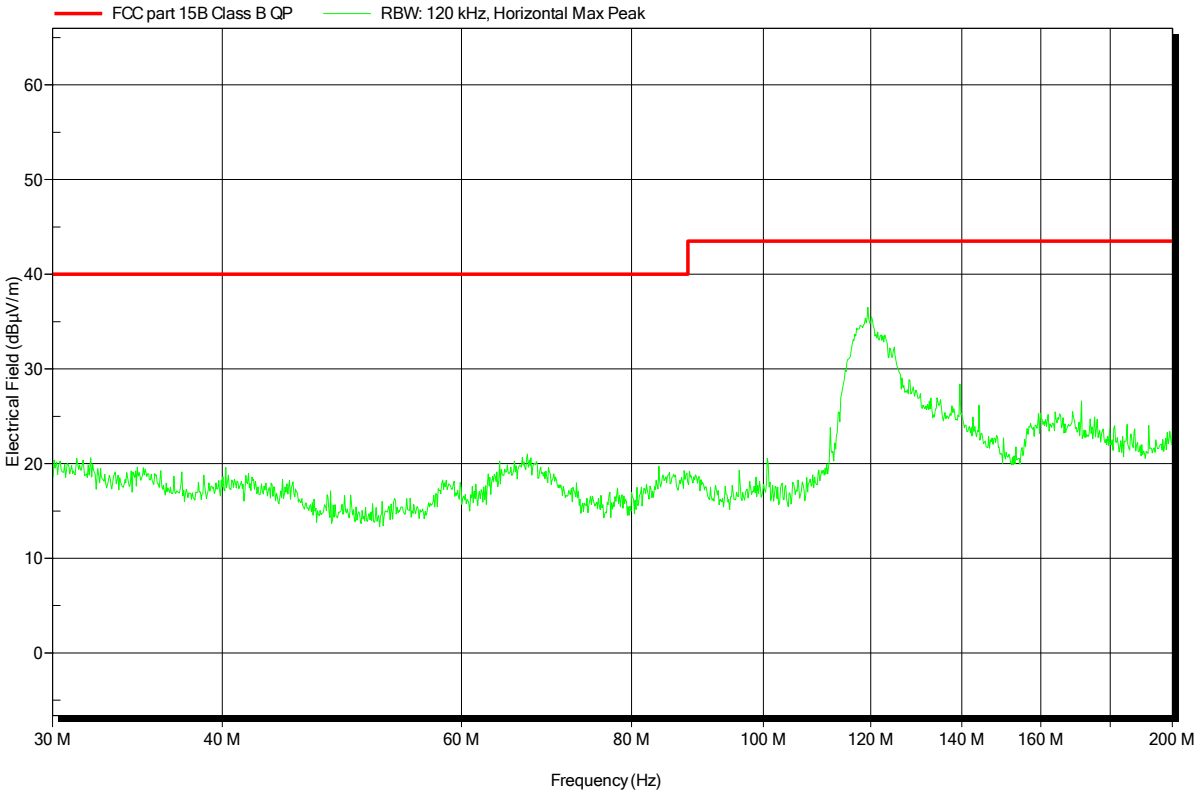

Spurious emissions under normal conditions according to FCC Part 15b

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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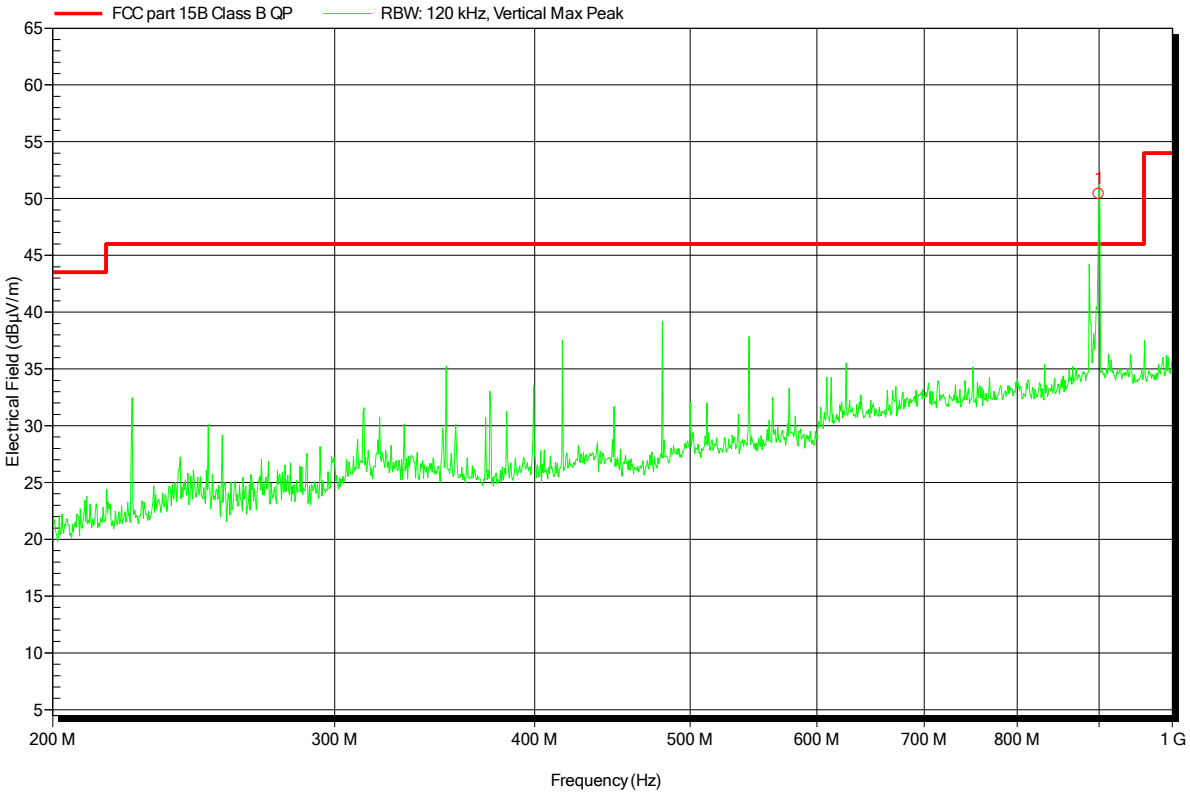

Frequency
899.54 MHz GSM carrier

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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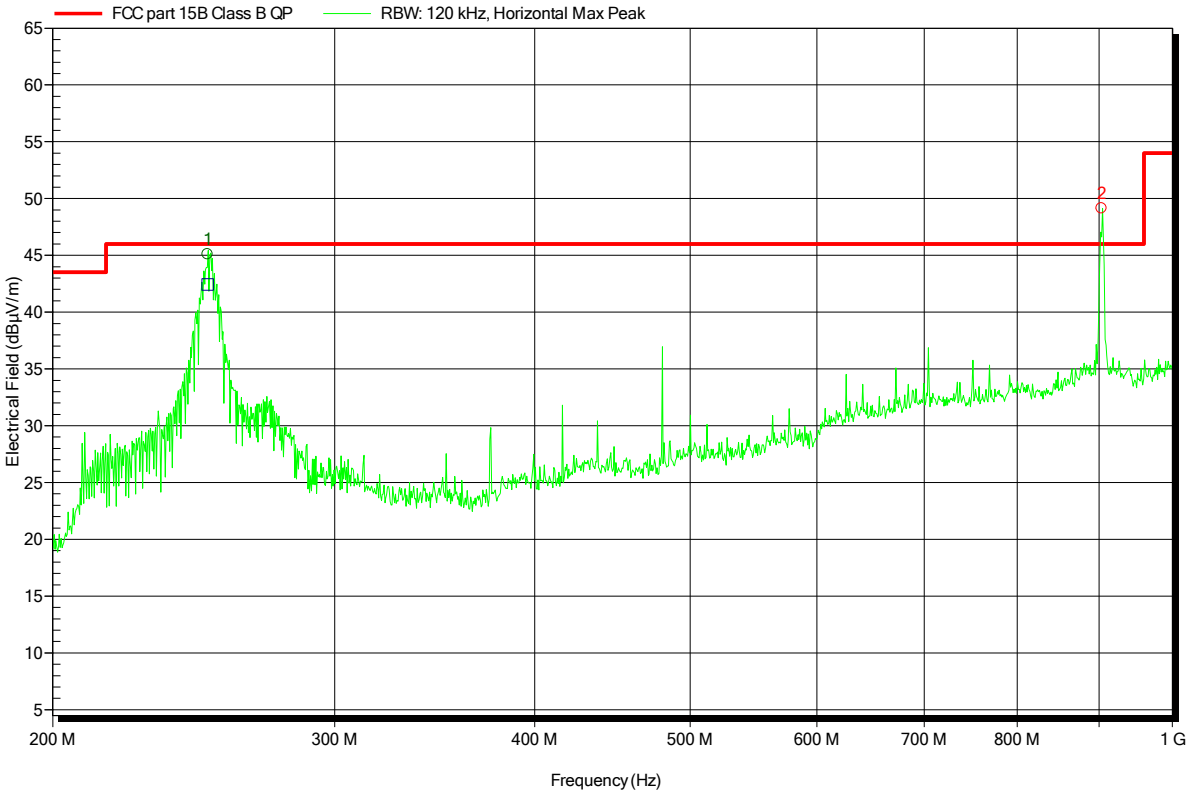

Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
250 MHz 903.25 MHz GSM carrier	42.44 dBµV/m	46 dBµV/m	-3.56 dB	Pass

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 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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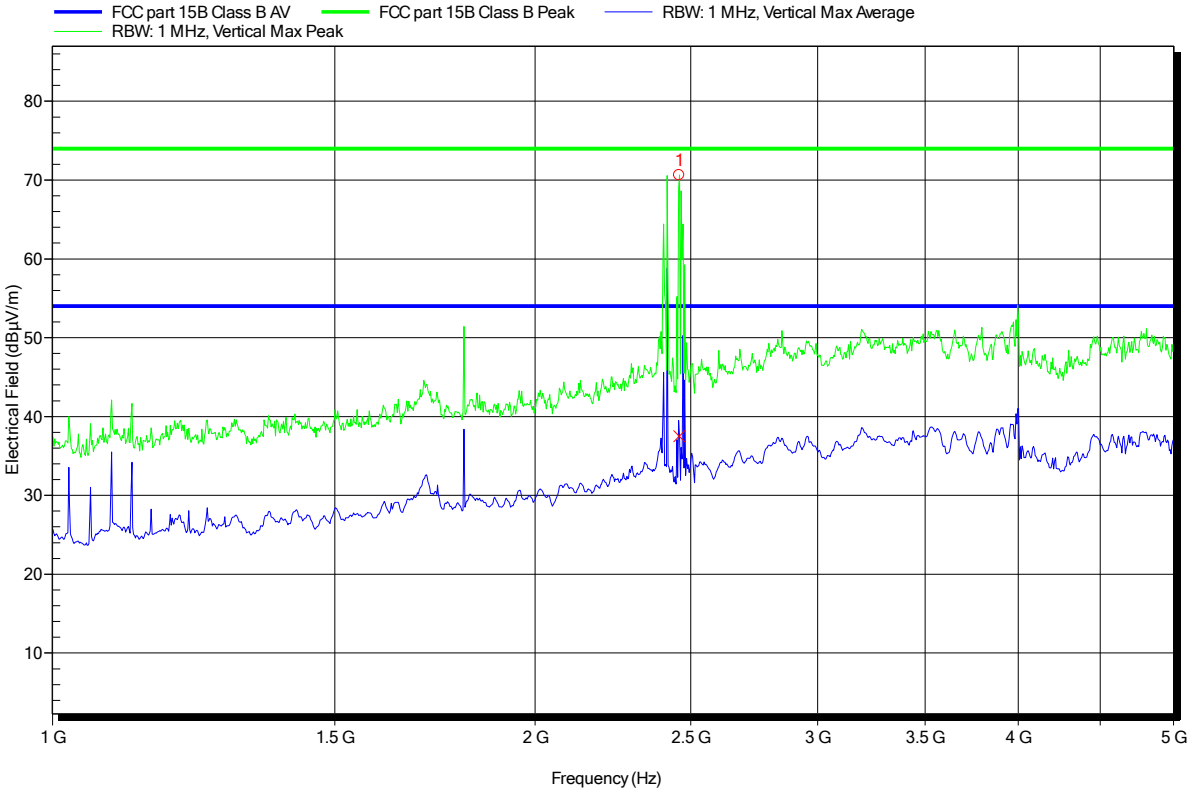

Frequency
2.42 GHz WLAN carrier

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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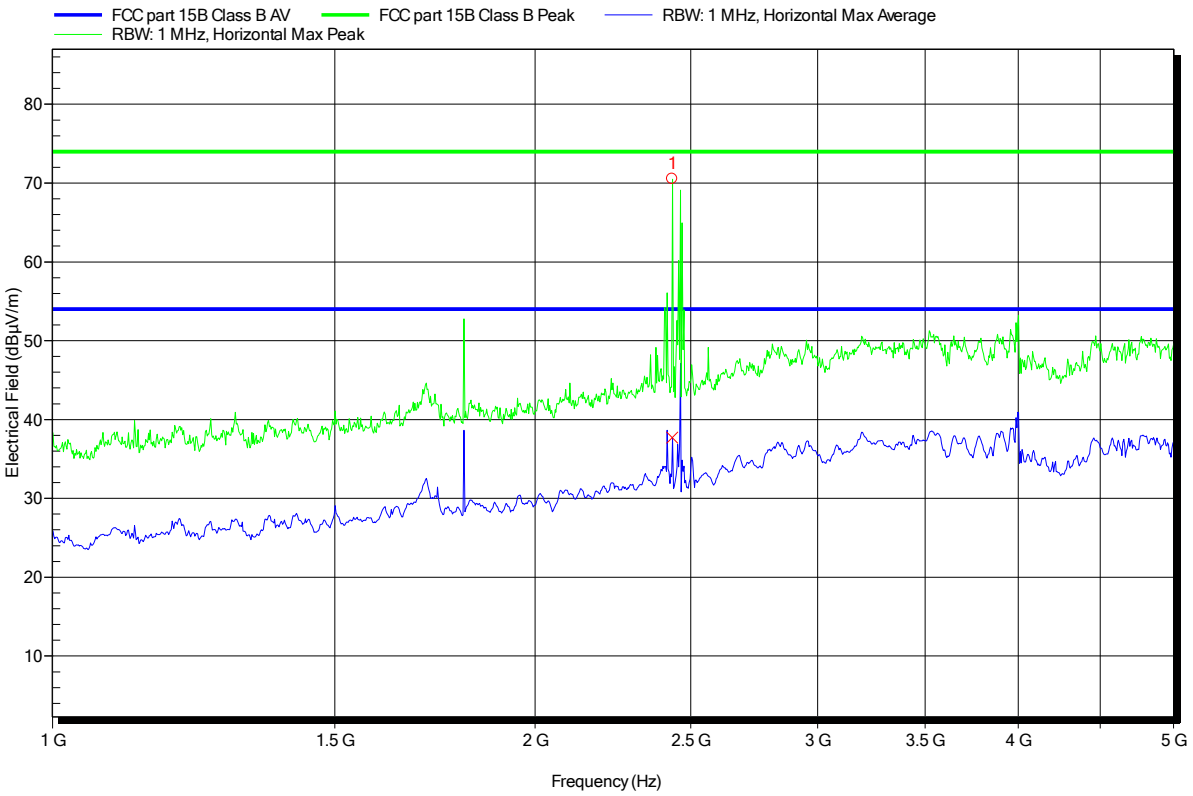

Frequency
2.464 GHz WLAN carrier

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 toTS15 with RH16
Test Date:	2014-08-05
Note:	

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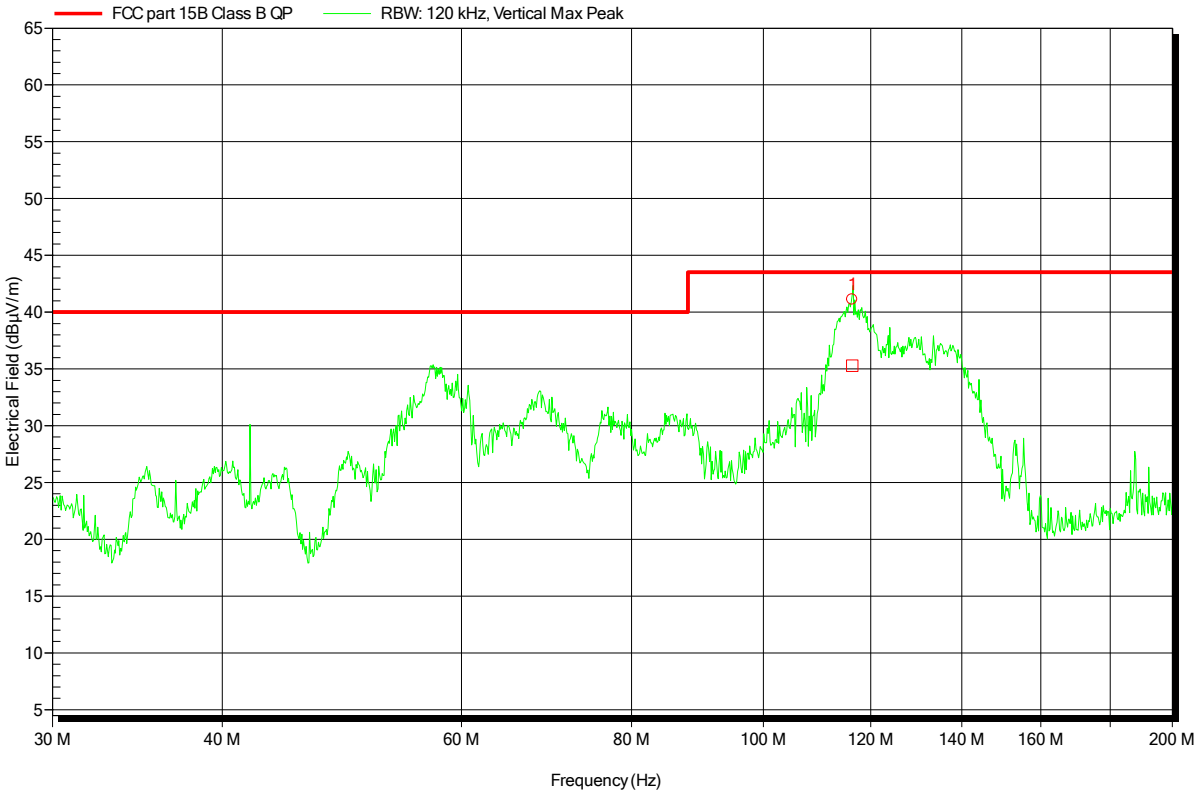

Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
116.28 MHz	35.29 dBµV/m	43.5 dBµV/m	-8.21 dB	Pass

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
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 toTS15 with RH16
Test Date:	2014-08-05
Note:	

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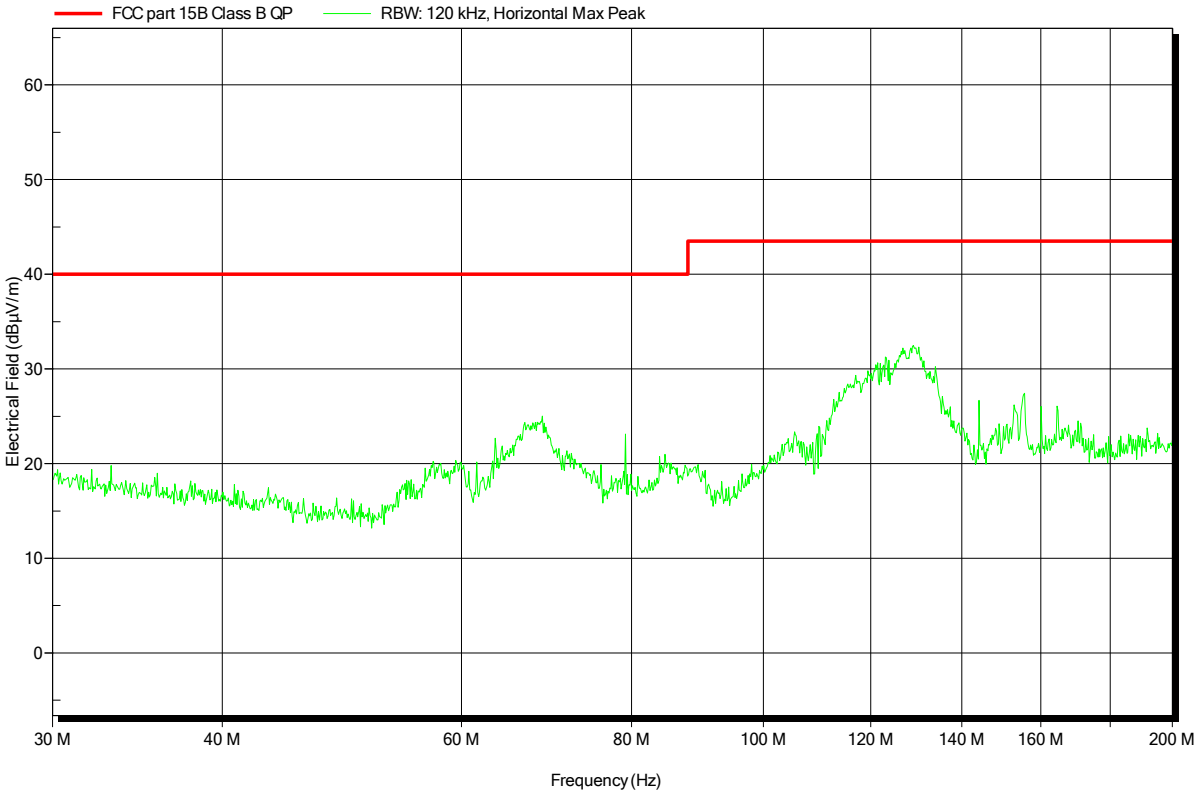

Spurious emissions under normal conditions according to FCC Part 15b

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 toTS15 with RH16
Test Date:	2014-08-05
Note:	

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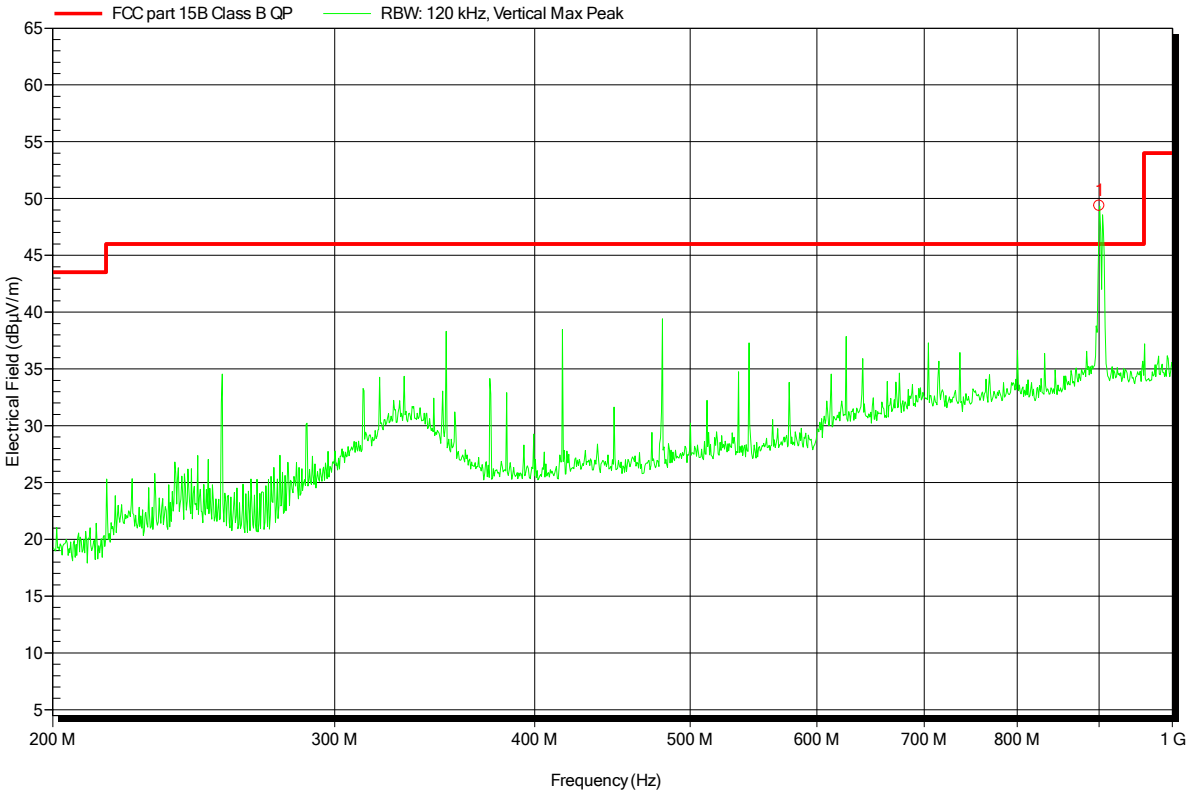
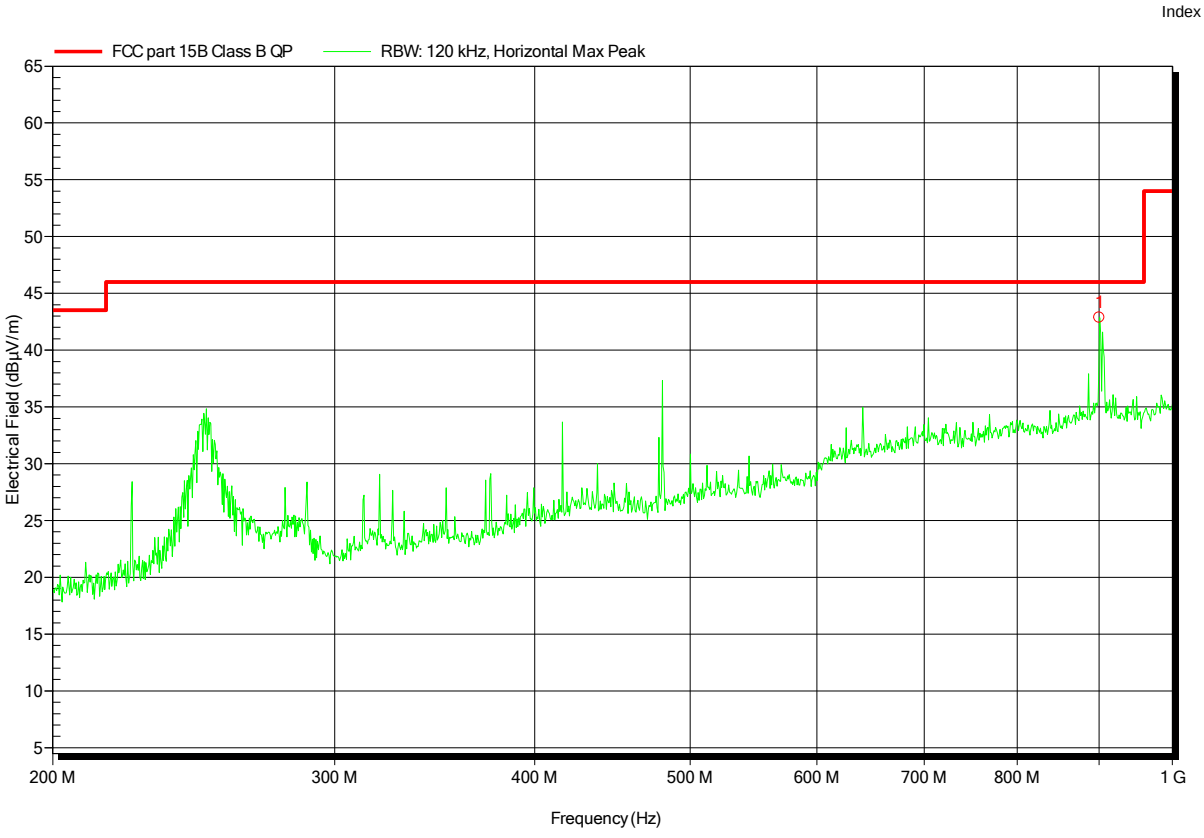


Frequency
900.5 MHz GSM carrier

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 toTS15 with RH16
Test Date:	2014-08-05
Note:	



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 toTS15 with RH16
Test Date:	2014-08-05
Note:	

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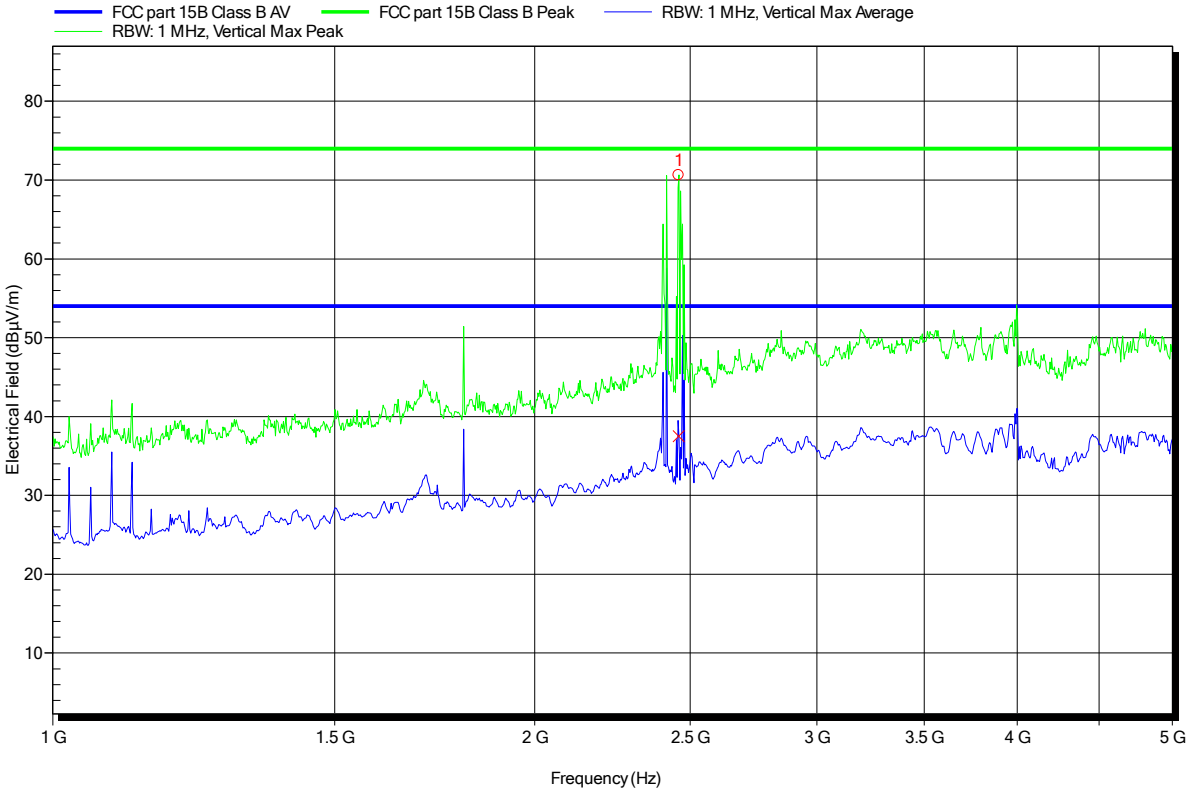

Frequency
2.46 GHz WLAN carrier

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 toTS15 with RH16
Test Date:	2014-08-05
Note:	

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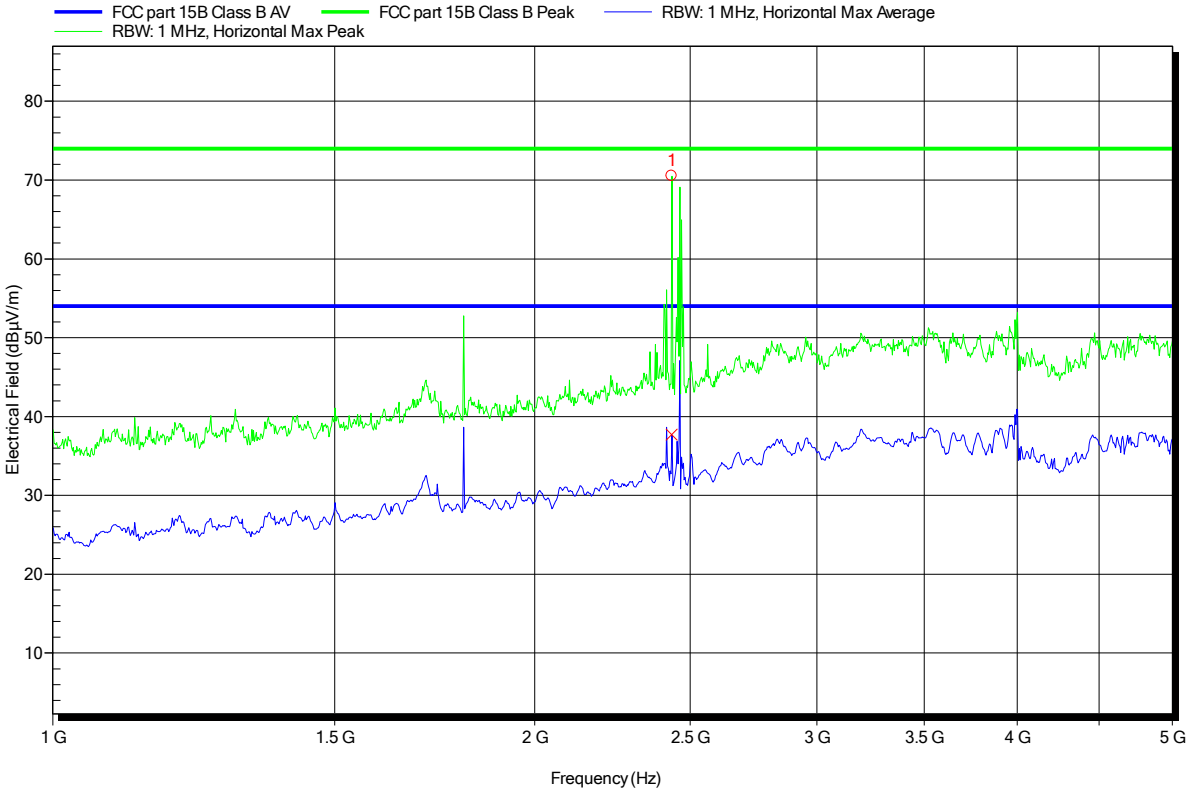

Frequency
2.435 GHz WLAN carrier

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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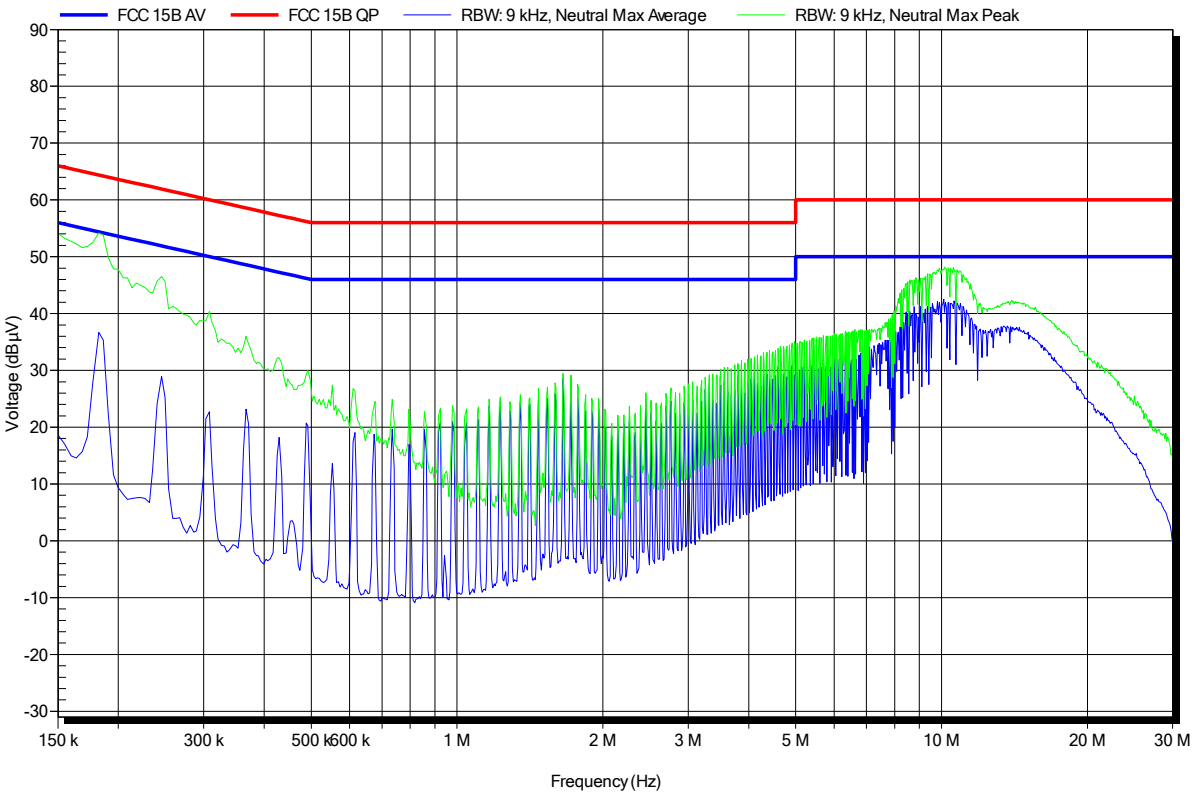
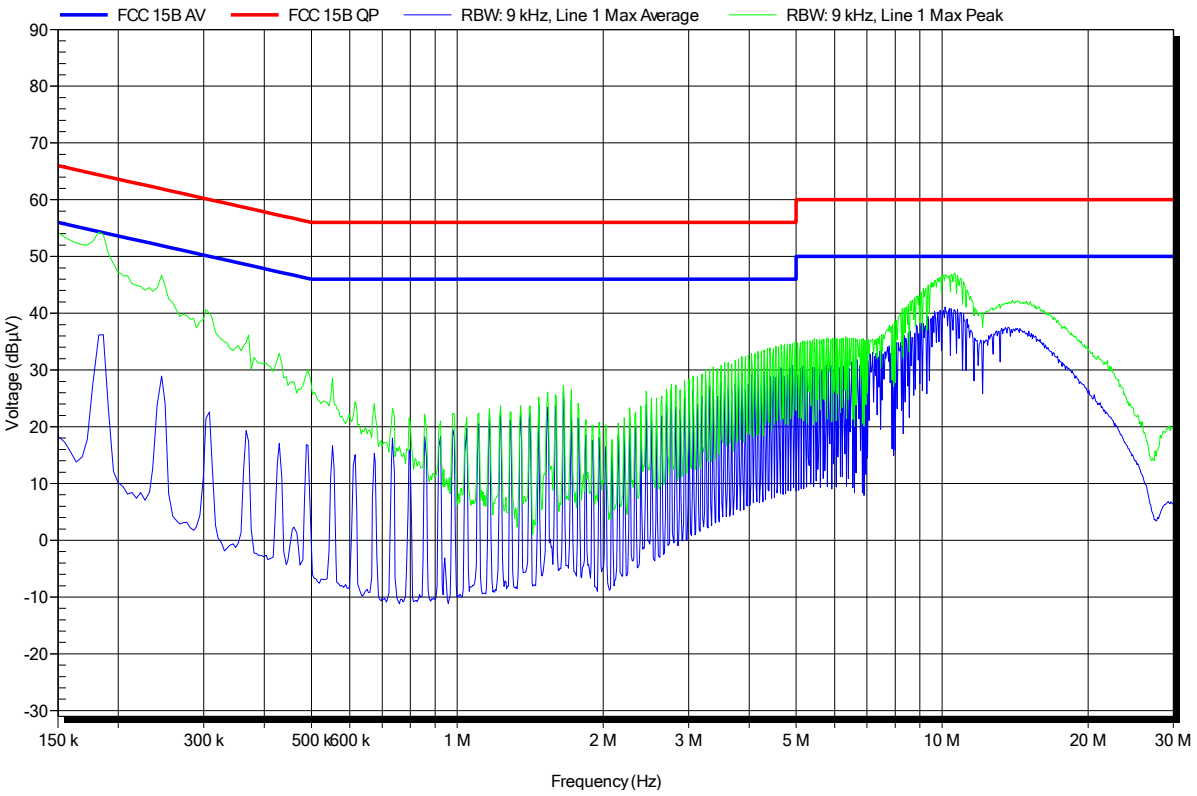


EMI voltage test in the ac-mains according to FCC Part 15b

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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