eurofins | Product Service

EMC TEST REPORT

FCC 47 CFR Part 15B
Industry Canada ICES-003

Electromagnetic compatibility - Unintentional radiators

Report Reference No. ..... :	G0M-1508-4987-EF0115B-V01
Testing Laboratory ..... :	Eurofins Product Service GmbH
Address ..... :	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation ..... :	 A2LA Accredited Testing Laboratory, Certificate No.: 1983.01 FCC Filed Test Laboratory, Reg.-No.: 96970 IC OATS Filing assigned code: 3470A
Applicant's name ..... :	TomTom Telematics B.V.
Address ..... :	De Ruijterkade 154 1011 AC Amsterdam NETHERLANDS
Test specification:	
Standard..... :	47 CFR Part 15 Subpart B ICES-003, Issue 5:2012 ANSI C63.4:2014
Equipment under test (EUT):	
Product description	Telematic Device with GPRS+WCDMA/BT/GPS
Model No.	L0530
Additional Models	None
Hardware version	drs_2_6b_pcb24/2015
Firmware / Software version	11_55_4640
	FCC-ID: 2AGPAL0530 IC: 20911-L0530
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 ..... :	2015-11-23
Date (s) of performance of tests ..... :	2015-12-03 – 2015-12-18
Compiled by..... :	Jens Marquardt
Tested by (+ signature)..... :	Jens Marquardt .....
Approved by (+ signature) ..... : Head of Lab	Marcus Klein .....
Date of issue..... :	2016-01-04
Total number of pages..... :	34
General remarks:	
The test results presented in this report relate only to the object tested. **The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.**	
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.	
Additional comments:	

Version History

Version	Issue Date	Remarks	Revised by
V01	2016-01-04	Initial Release	

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

REPORT INDEX

1 Equipment (Test item) Description

Description	Telematic Device with GPRS+WCDMA/BT/GPS	
Model	L0530	
Additional Models	None	
Serial number	None	
Hardware version	drs_2_6b_pcb24/2015	
Software / Firmware version	11_55_4640	
Contains FCC-ID	QIPEHS6	
Contains IC	7830A-EHS6	
Power supply	12/24 VDC	
AC/DC-Adaptor	None	
Radio module	Type	GSM/WCDMA
	Model	EHS6
	Manufacturer	Cinterion
	HW Version	B2 (rev.3)
	SW Version	Rev. 02.000
	SVN	08
	FCC-ID	QIPEHS6
	IC	7830A-EHS6
Manufacturer	Quanta Computer Inc. No.211, Wen Hwa 2nd Road., Kuei Shan Hsiang 33377 Tao Yuan Shien Taiwan (ROC)	
Highest emission frequency	Fmax [MHz] = 2440	
Device classification	Class B	
Equipment type	Tabletop	
Number of tested samples	1	

1.1 Photos – Equipment external

EUT TOP


EUT BACK

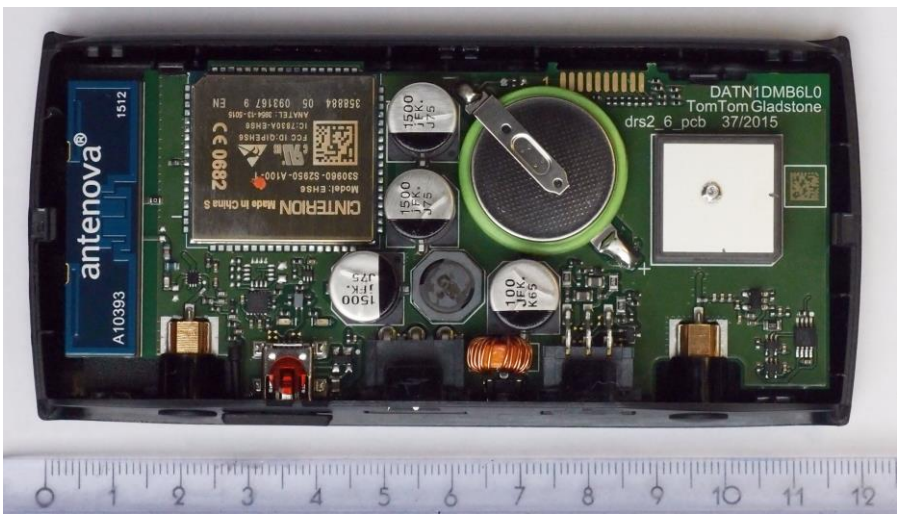

EUT FRONT


ANTENNA GPS

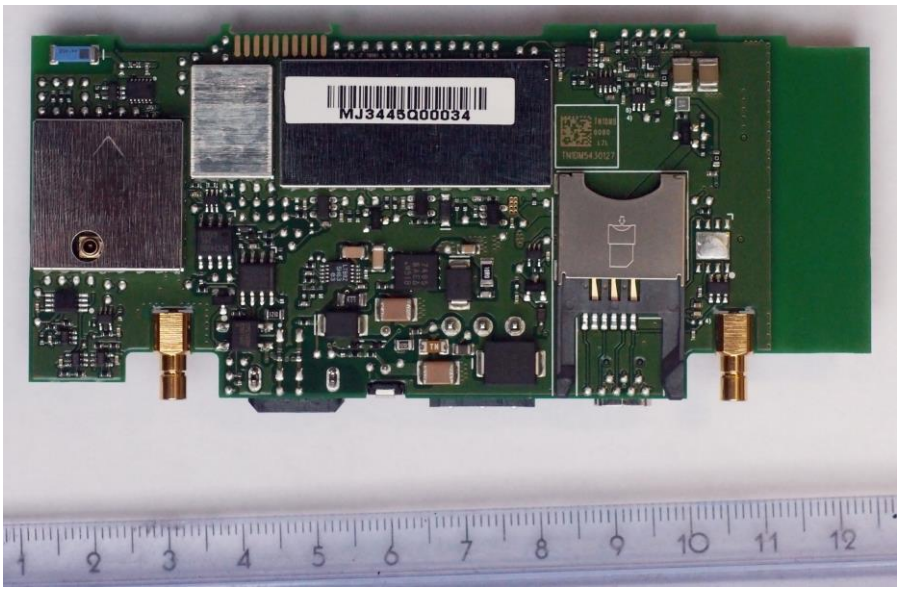

ANTENNA GSM-UMTS

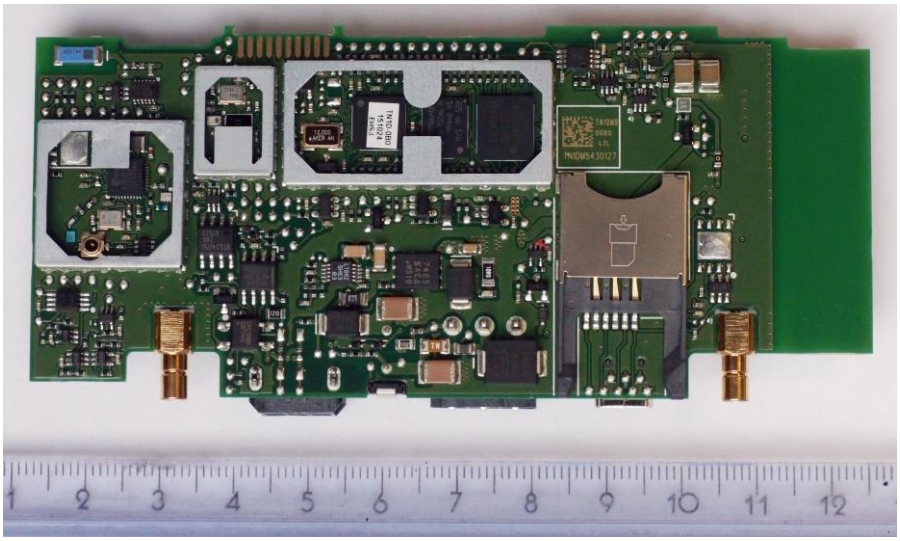

1.2 Photos – Equipment internal

EUT PCB TOP

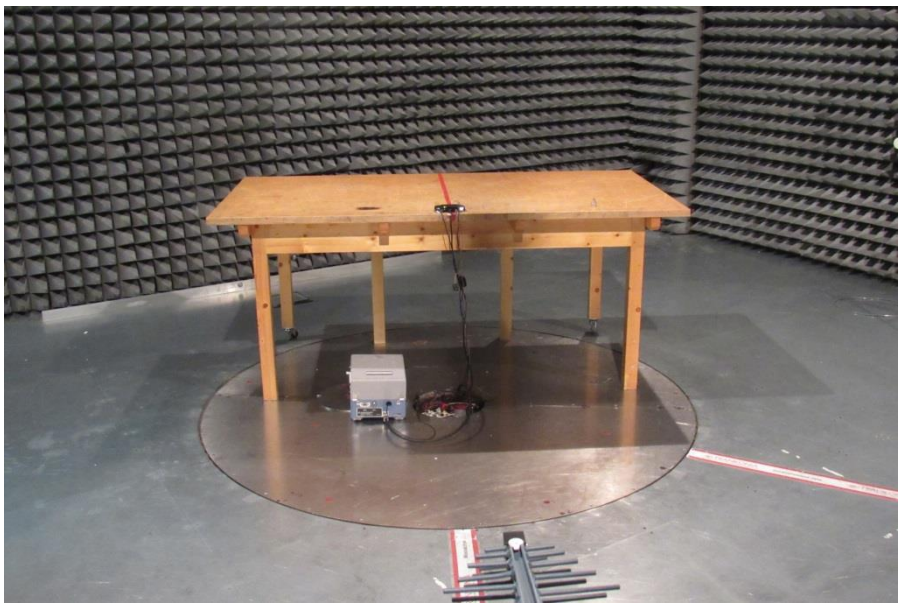


EUT PCB BACK



EUT PCB BACK without shielding


1.3 Photos – Test setup

Test Setup : Radiated Emissions


1.4 Supporting Equipment Used During Testing

Product Type*	Device	Manufacturer	Model No.	Comments (e.g. serial no.)
AE	Laptop	Dell	Latitude E6430	Service Tag HLQQJX1
SIM	Communication tester	Rohde & Schwarz	CMU 200	

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

AE : Auxiliary/Associated Equipment, or

SIM : Simulator (Not Subjected to Test)

CABL : Connecting cables

1.5 Input / Output Ports

Port #	Name	Type*	Max. Cable Length	Cable Shielded	Comments (e.g. Cat. of Cable)
1	DC Power	DC	1.5m	no	
2	CAN	I/O	5	no	
3	GPIO	I/O	3	no	
4	USB 2.0	I/O	-	yes	service only
5	ext. GPS Antenna	I/O	>3m	yes	
6	ext. GSM Antenna	I/O	>3m	yes	

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

AC : AC power port

DC : DC power port

N/E : Non electrical

I/O : Signal input or output port

TP : Telecommunication port

1.6 Operating Modes and Configurations

Mode #	Description
1	GSM 850 PCL 5, BT, GPS, CAN
2	UMTS Band V, BT, GPS, CAN

Configuration #	EUT Configuration
1	EUT fully equipped with external GSP and GSM antenna, powered with 13.5 VDC

1.7 Test Equipment Used During Testing

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

Radiated emissions – 3m Chamber					
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
Horn antenna	Schwarzbeck	BBHA 9120D	EF00018	2013-09	2016-09
EMI Test Receiver	R&S	ESU26	EF00887	2015-01	2016-01
RF Cable			-	System Cal.	System Cal
RF Cable			-	System Cal.	System Cal

1.8 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 ICES-003				
Product Specific Standard	**Requirement – Test**	**Reference Method**	**Result**	**Remarks**
47 CFR 15.109 ICES-003 Item 6.2	Radiated emissions	ANSI C 63.4	PASS	
47 CFR 15.107 ICES-003 Item 6.1	AC power line conducted emissions	ANSI C63.4	N/A	
Remarks:				

3 Test Conditions and Results

3.1 Test Conditions and Results – Radiated emissions

Radiated emissions acc. FCC 47 CFR 15.109 / ICES-003		**Verdict: PASS**
Laboratory Parameters:	Required prior to the test	During the test
Ambient Temperature	15 to 35 °C	23°C
Relative Humidity	30 to 60 %	38%
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	
	Fmax [MHz] = 244040	
Fully configured sample scanned over the following frequency range	Frequency range	
	30 MHz to 13 GHz	
Operating mode	1 + 2	
Configuration	1	

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 with a supply voltage of 13.5 VDC represents the worst case

Test Procedure:

The test site is in accordance with ANSI C63-4:2014 requirements and is listed by FCC.
The measurement procedure is as follows:

Exploratory measurement:

- The EUT was placed on a non-conductive table at a height of 0.8m.
- The EUT and support equipment, if needed, were set up to simulate typical usage.
- Cables, of type and length specified by the manufacturer, were connected to at least one port of each type and were terminated by a device or simulating load of actual usage.
- The antenna was placed at a distance of 3 or 10 m.
- The received signal was monitored at the measurement receiver.
    - Cables not bundled were manipulated within the range of likely arrangements to produce the highest emission amplitude
    - To maximize the suspected emissions the EUT is rotated 360 degrees. If the signal exceeds the previous amplitude, go back to the corresponding azimuth and manipulate the cables again for maximizing the emissions if possible.
    - Move the antenna from 1 to 4m to maximize the suspected highest amplitude signal.
- This procedure has to be performed in both antenna polarizations, horizontal and vertical.
- The arrangement of the equipment with the maximum emission level is shown on the setup picture at item 1.3.

Final measurement:

- The EUT was placed on a 0.8 m non-conductive table at a 3 m distance from the receive antenna. The antenna output was connected to the measurement receiver
- A biconical antenna was used for the frequency range 30 – 200 MHz, a logarithmic periodical antenna was used for the frequency range from 200 – 1000 MHz. Above one 1 GHz a Double Ridged Broadband Horn antenna was used. The antenna was placed on an adjustable height antenna mast
- The EUT and cable arrangement were based on the exploratory measurement results
- Emissions were maximized at each frequency by rotating the EUT and adjusting the receive antenna height and polarization. The maximum values were recorded.
- The test data of the worst-case conditions were recorded and shown on the next pages.

Spurious emissions under normal conditions according to FCC 15B

Project number: G0M-1508-4987

Applicant:	TomTom Telematics B.V.
EUT Name:	Telematic Device with GPRS+WCDMA/BT/GPS
Model:	L0530
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Marquardt
Test Conditions:	Tnom: 23°C, Unom: 13.5 VDC
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3m
Mode:	GSM 850 PCL 5, BT, GPS, CAN
Test Date:	2015-12-03
Note:	

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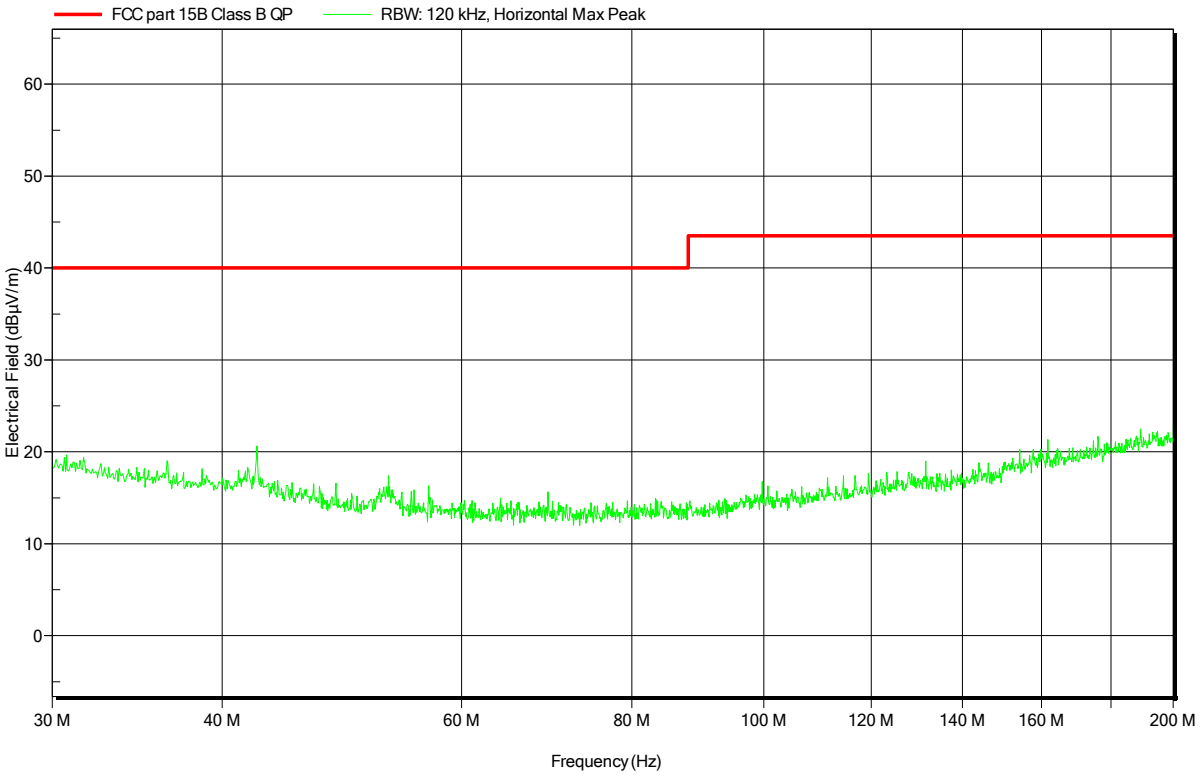

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Measurement distance:	3m
Mode:	GSM 850 PCL 5, BT, GPS, CAN
Test Date:	2015-12-03
Note:	

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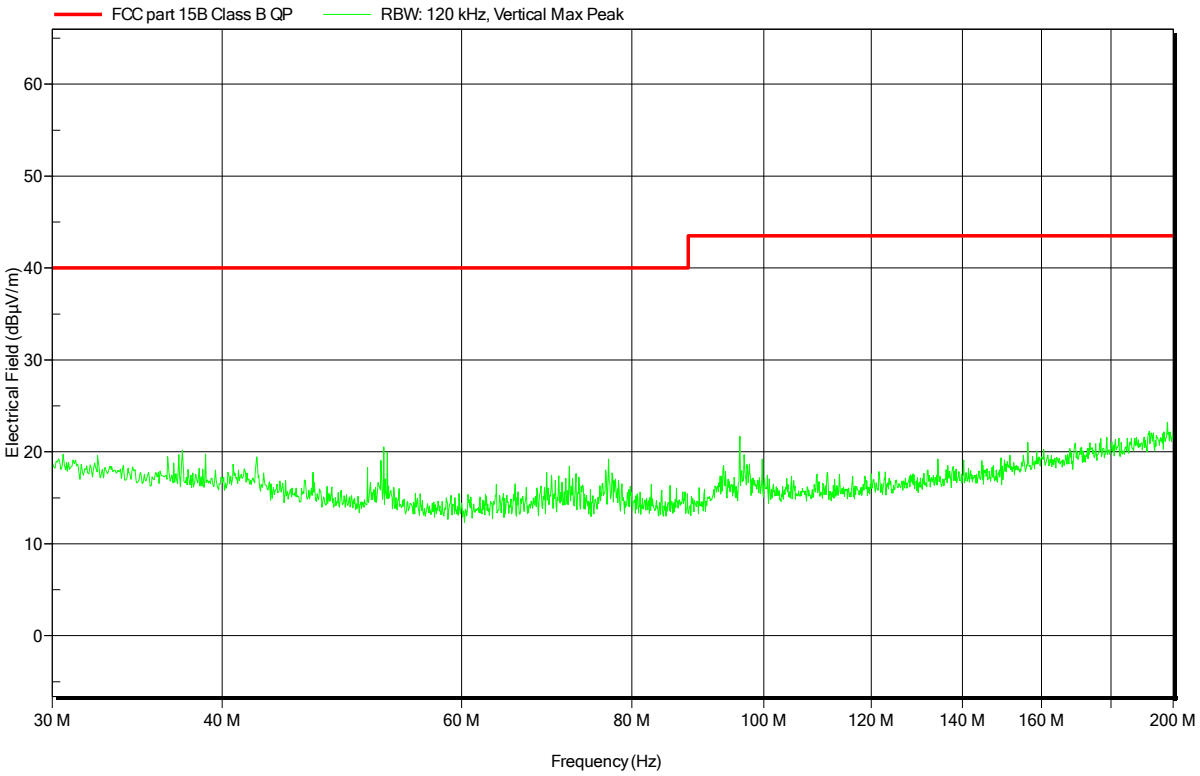

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Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3m
Mode:	GSM 850 PCL 5, BT, GPS, CAN
Test Date:	2015-12-03
Note:	

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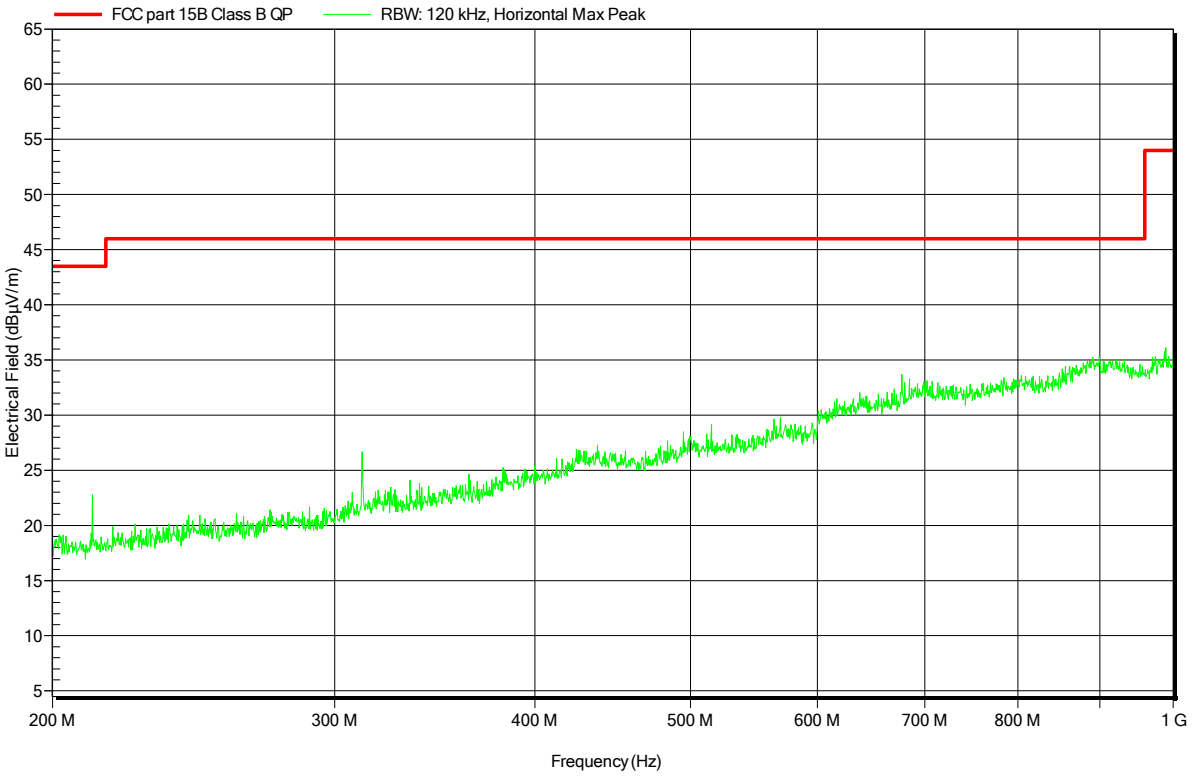

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Mode:	GSM 850 PCL 5, BT, GPS, CAN
Test Date:	2015-12-03
Note:	

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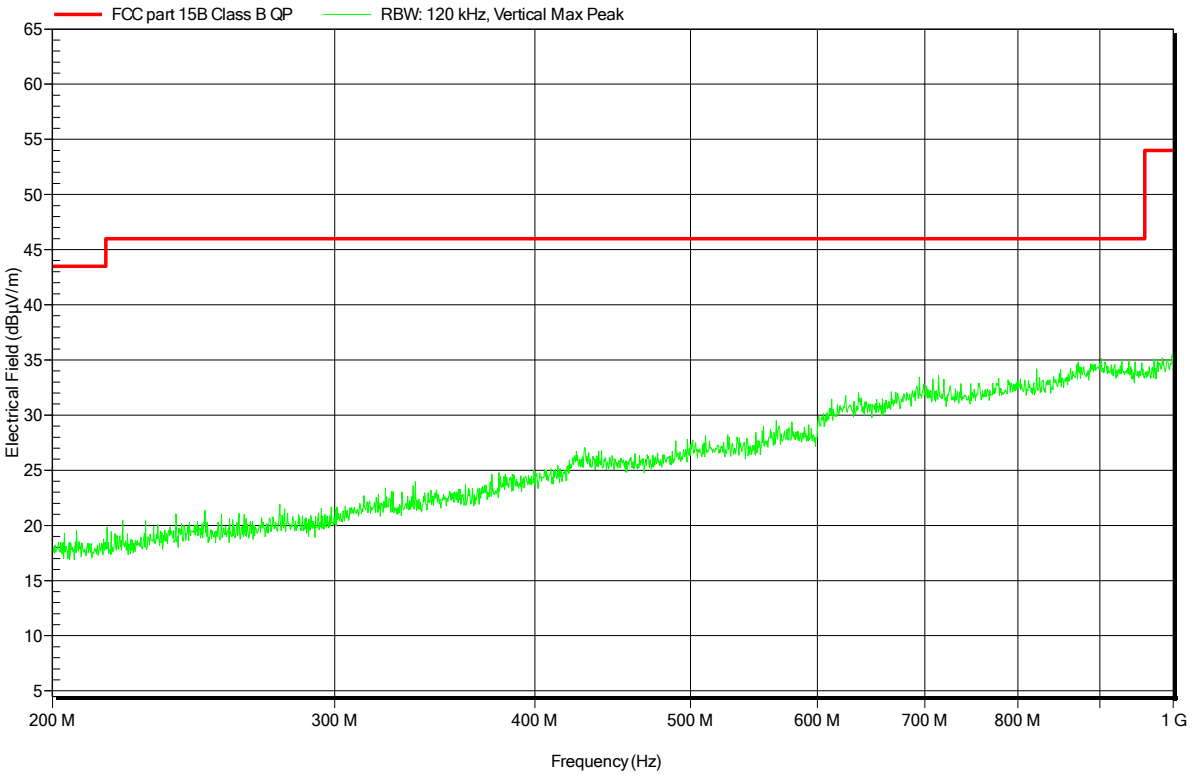

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Model:	L0530
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Marquardt
Test Conditions:	Tnom: 23°C, Unom: 13.5 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3m
Mode:	GSM 850 PCL 5, BT, GPS, CAN
Test Date:	2015-12-03
Note:	

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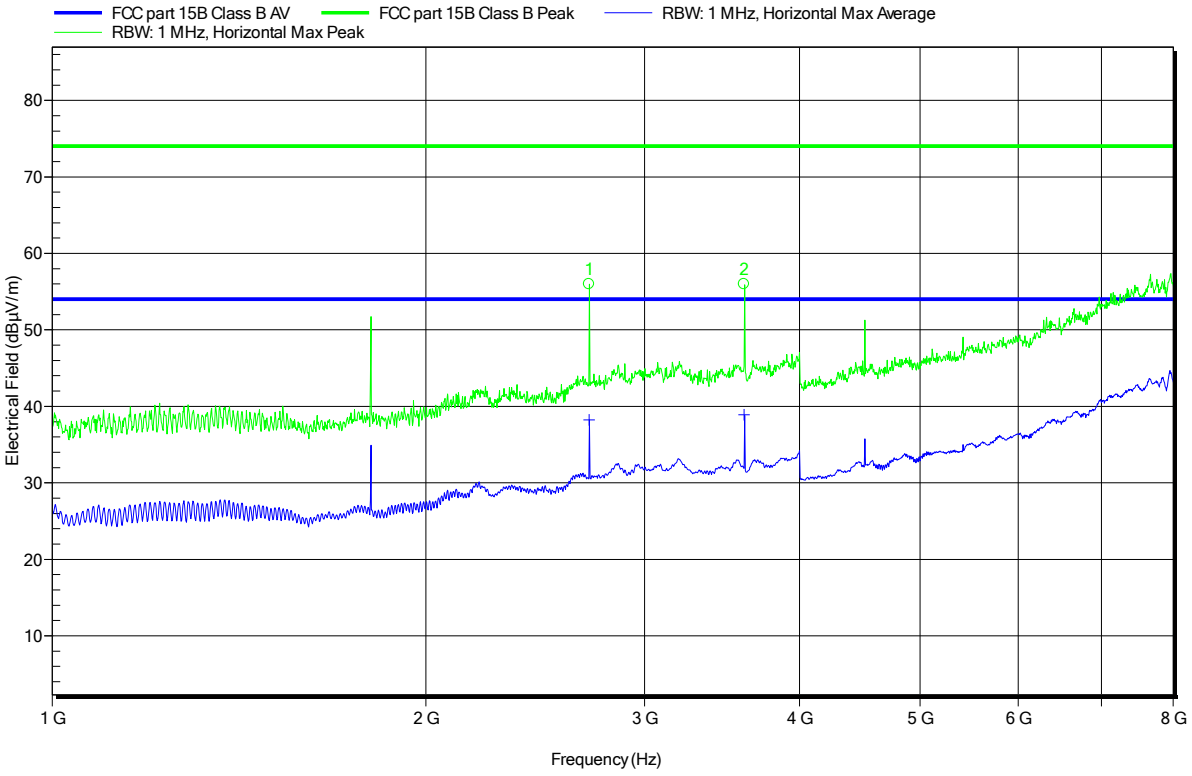

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height
1	2.707 GHz	38.24 dBµV/m	54 dBµV/m	-15.76 dB	Pass	180 Degree	1 m
2	3.61 GHz	38.91 dBµV/m	54 dBµV/m	-15.09 dB	Pass	180 Degree	1 m

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Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3m
Mode:	GSM 850 PCL 5, BT, GPS, CAN
Test Date:	2015-12-03
Note:	

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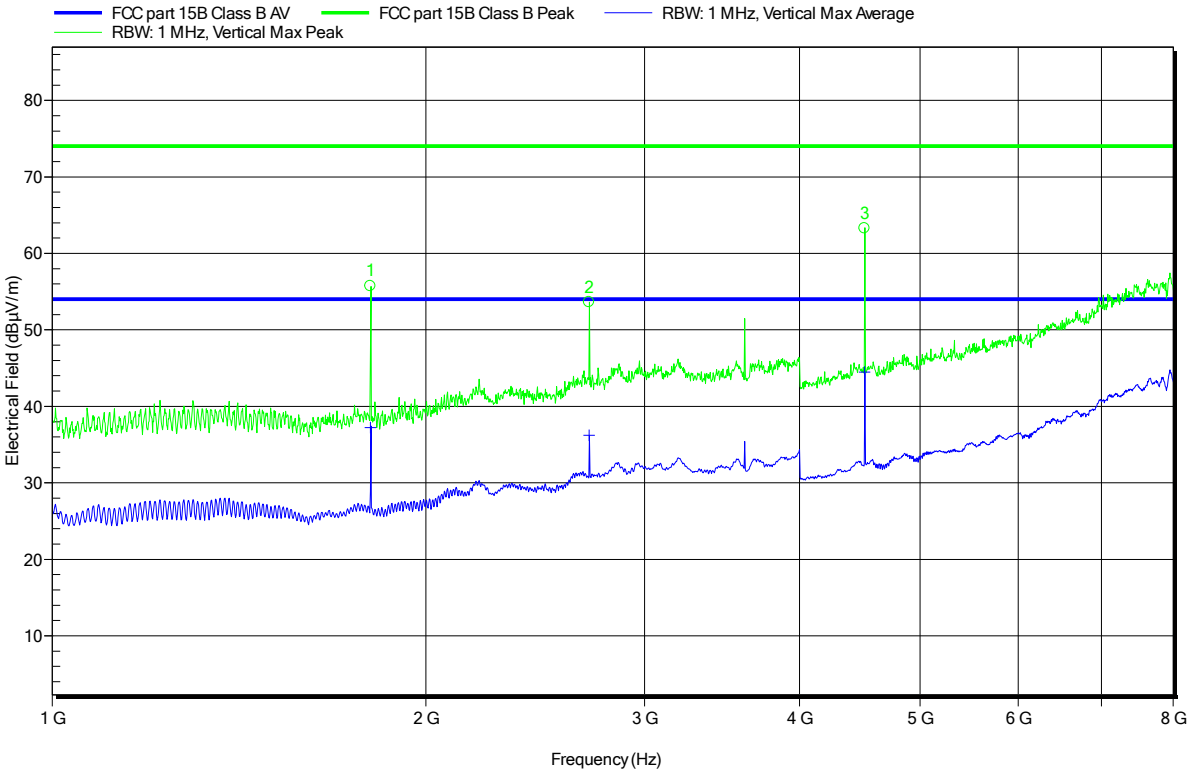

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height
1	1.805 GHz	37.24 dBµV/m	54 dBµV/m	-16.76 dB	Pass	180 Degree	1 m
2	2.707 GHz	36.23 dBµV/m	54 dBµV/m	-17.77 dB	Pass	180 Degree	1 m
3	4.512 GHz	44.47 dBµV/m	54 dBµV/m	-9.53 dB	Pass	180 Degree	1 m

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Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3m
Mode:	GSM 850 PCL 5, BT, GPS, CAN
Test Date:	2015-12-18
Note:	

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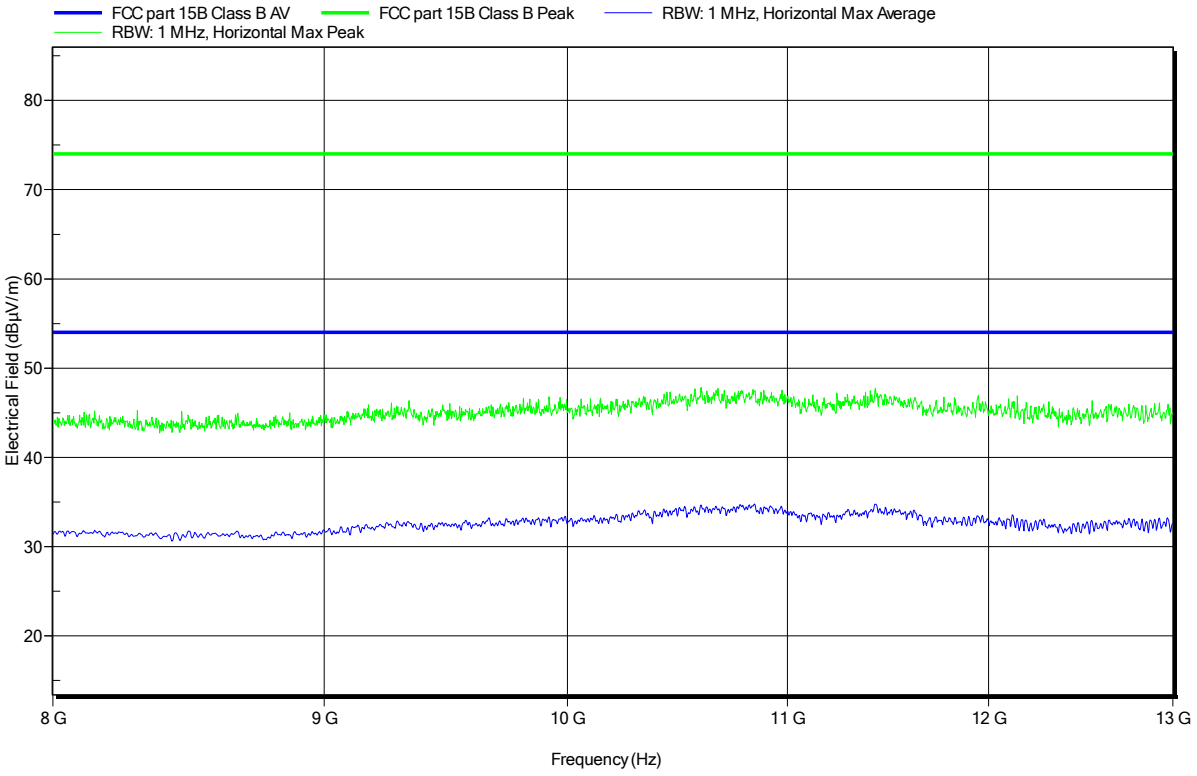

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Note:	

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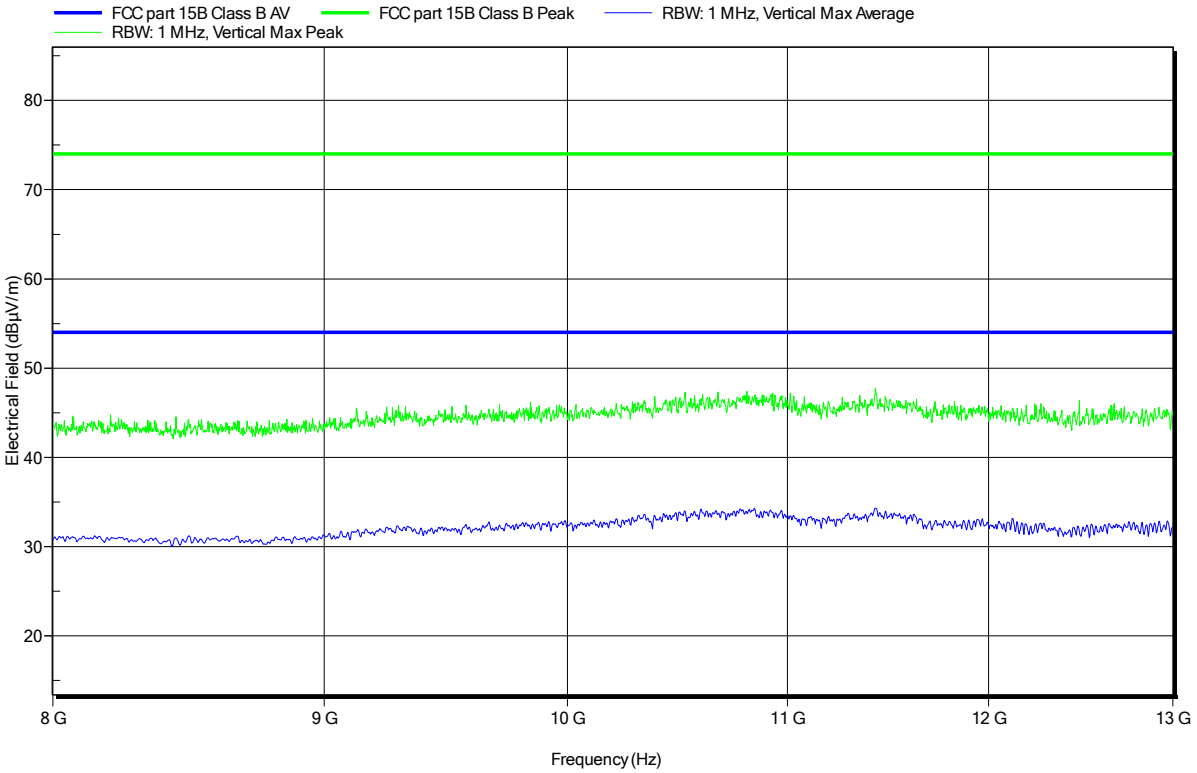

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Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3m
Mode:	UMTS Band V, BT, GPS, CAN
Test Date:	2015-12-18
Note:	

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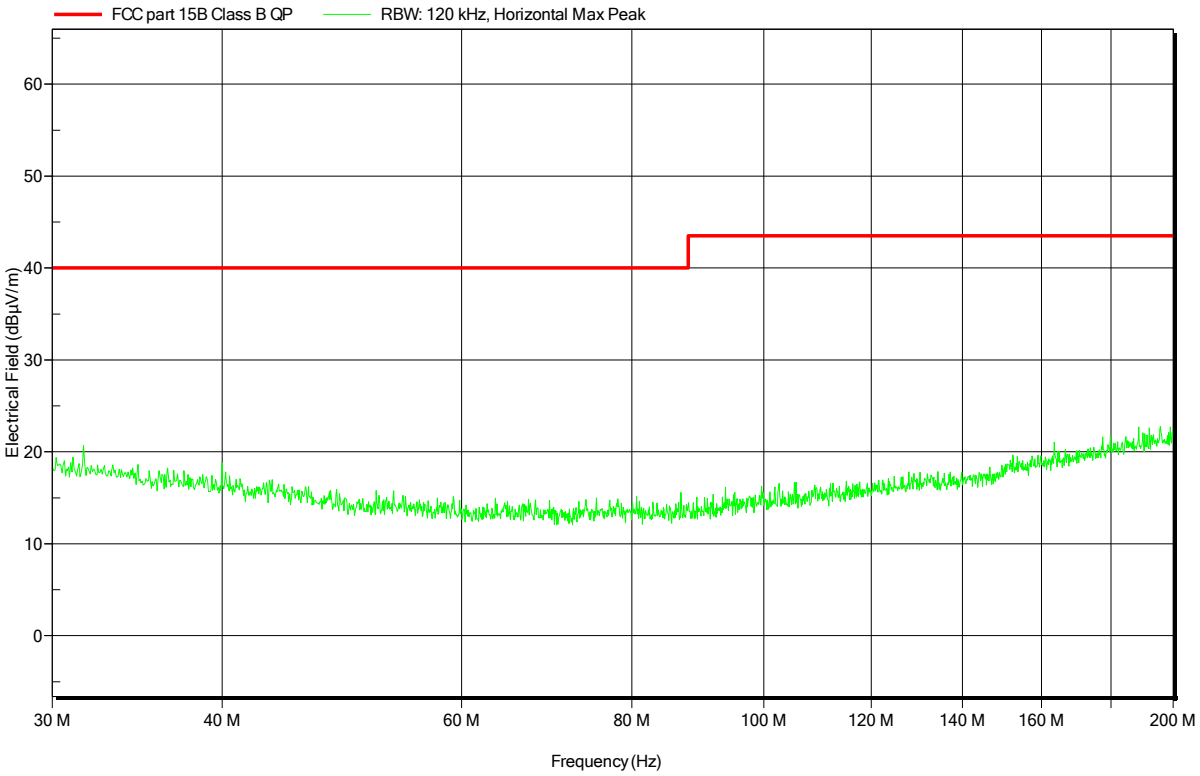

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Note:	

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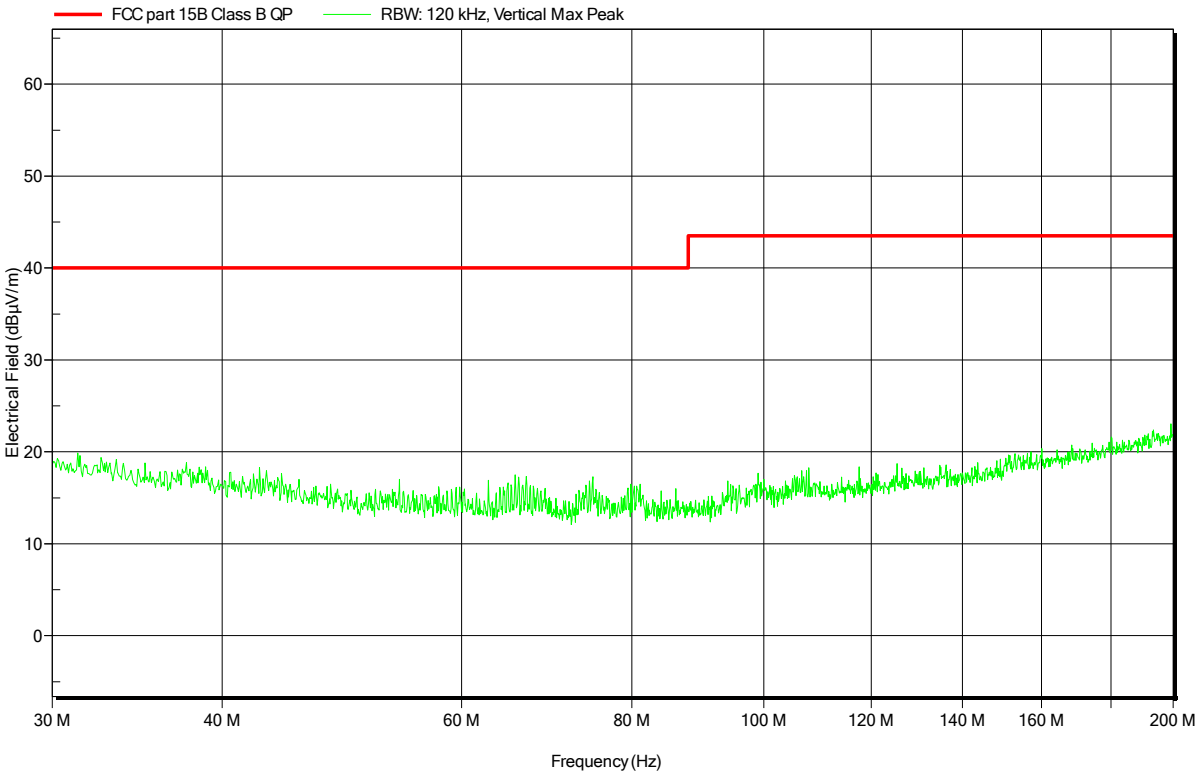

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Mode:	UMTS Band V, BT, GPS, CAN
Test Date:	2015-12-18
Note:	Peak 1: UMTS carrier

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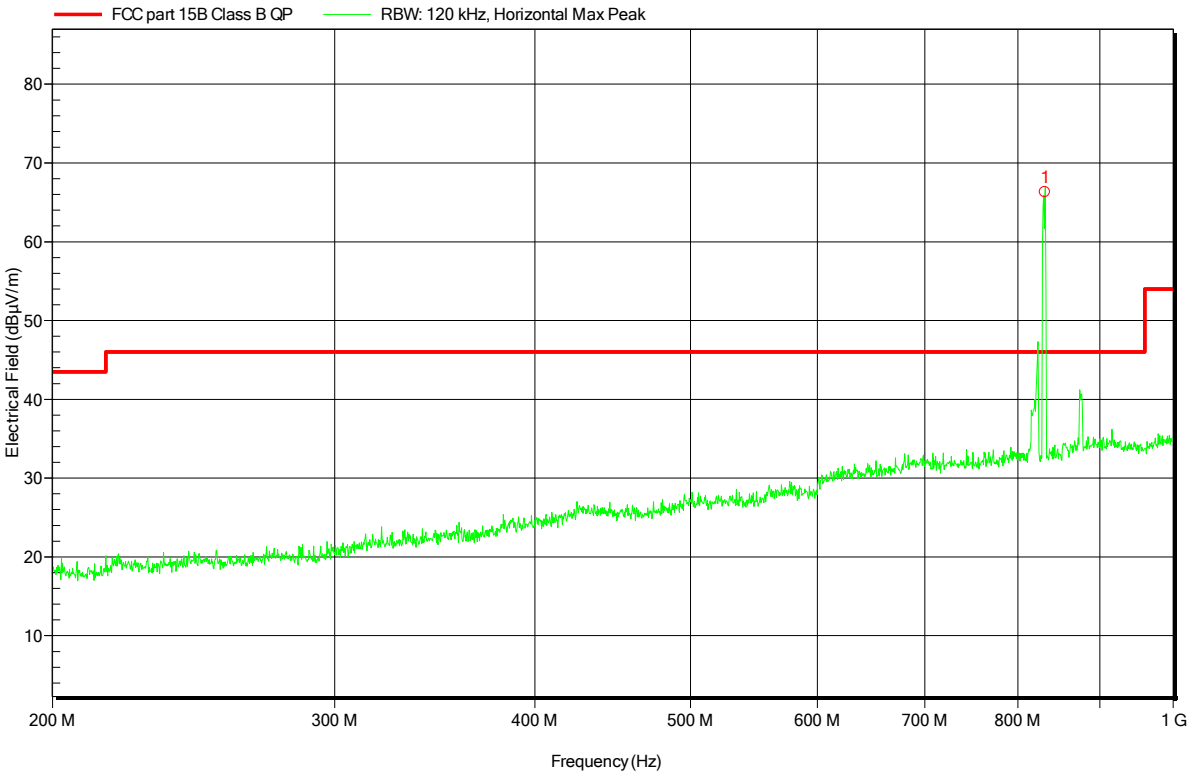

Peak Number	Frequency	
1	831.68 MHz	UMTS Carrier

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Measurement distance:	3m
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Test Date:	2015-12-18
Note:	Peak 1: UMTS Carrier

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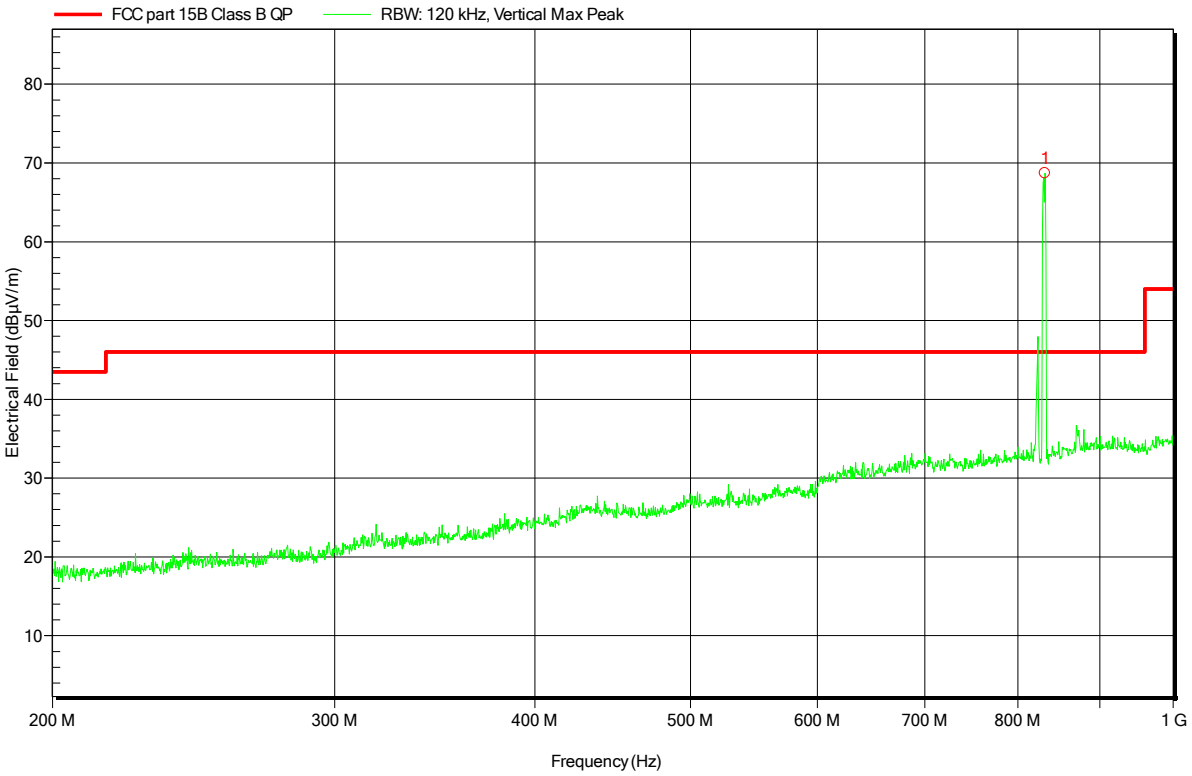

Peak Number	Frequency	
1	831.59 MHz	UMTS Carrier

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Note:	

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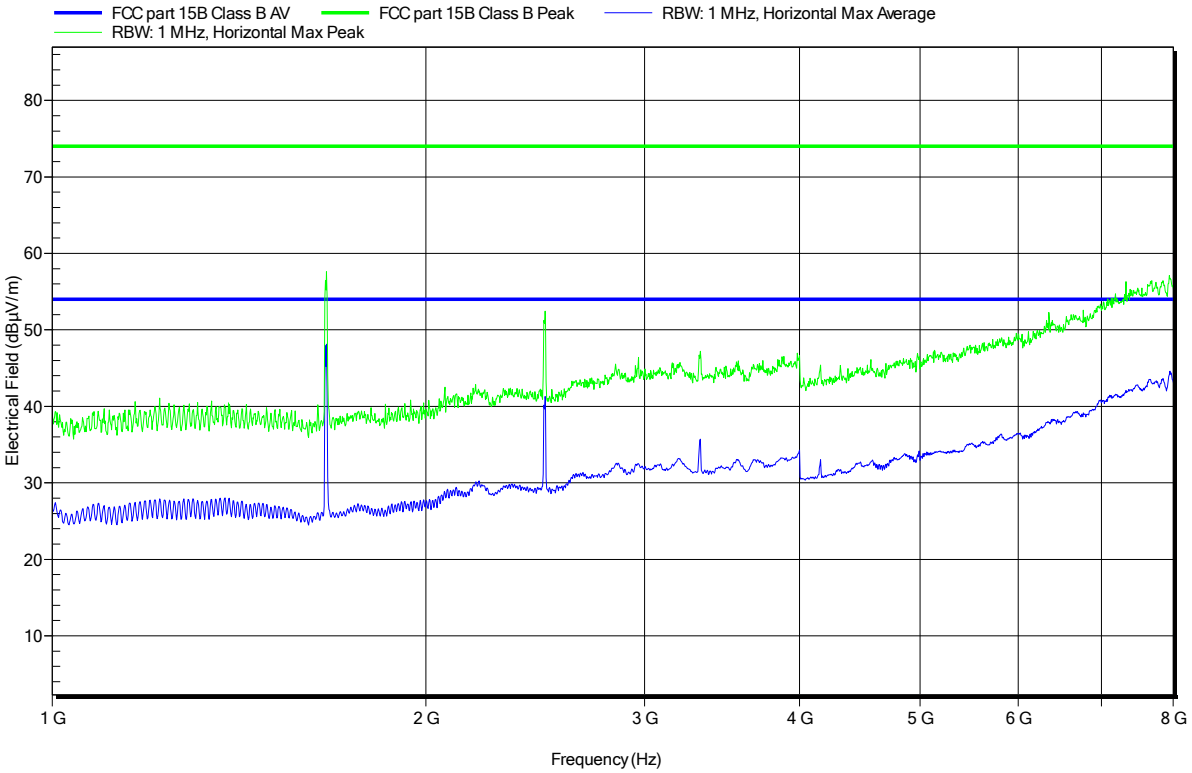

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Note:	Peak 1: UMTS 2nd harmonic

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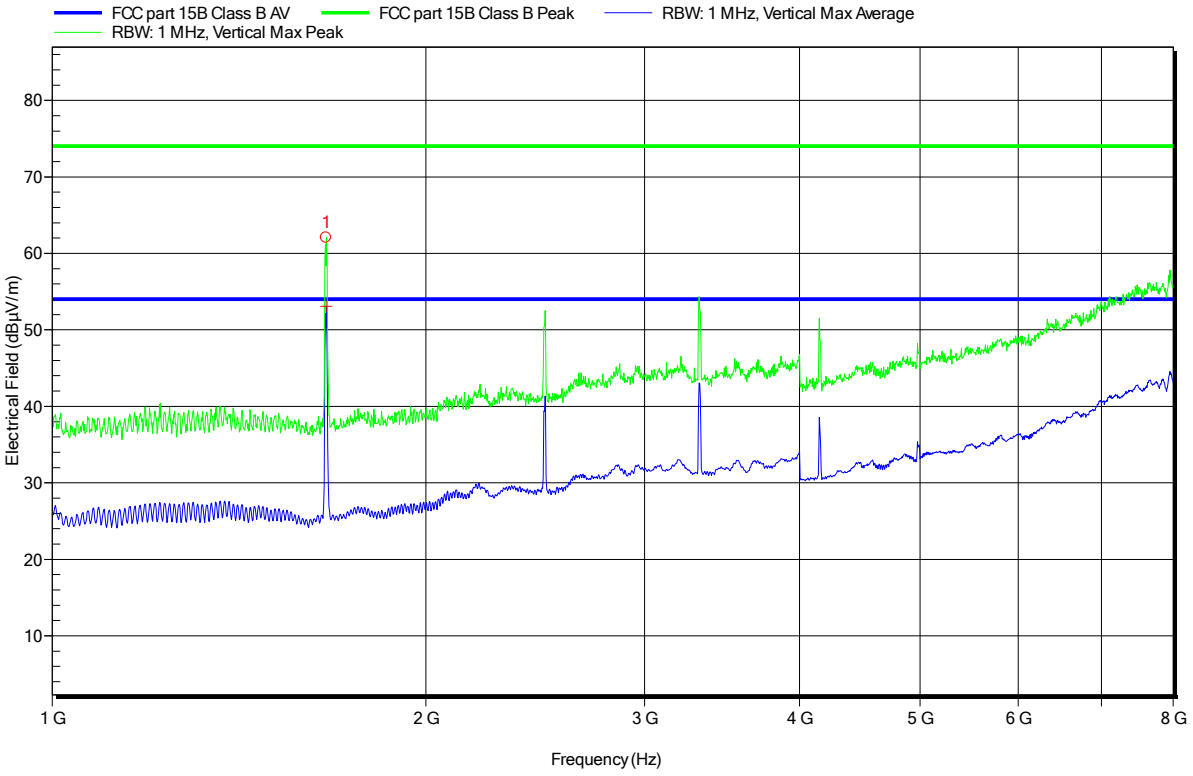

Peak Number	Frequency	
1	1.663 GHz	UMTS Harmonic

Spurious emissions under normal conditions according to FCC 15B

Project number: G0M-1508-4987

Applicant:	TomTom Telematics B.V.
EUT Name:	Telematic Device with GPRS+WCDMA/BT/GPS
Model:	L0530
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Marquardt
Test Conditions:	Tnom: 23°C, Unom: 13.5 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3m
Mode:	UMTS Band V, BT, GPS, CAN
Test Date:	2015-12-18
Note:	

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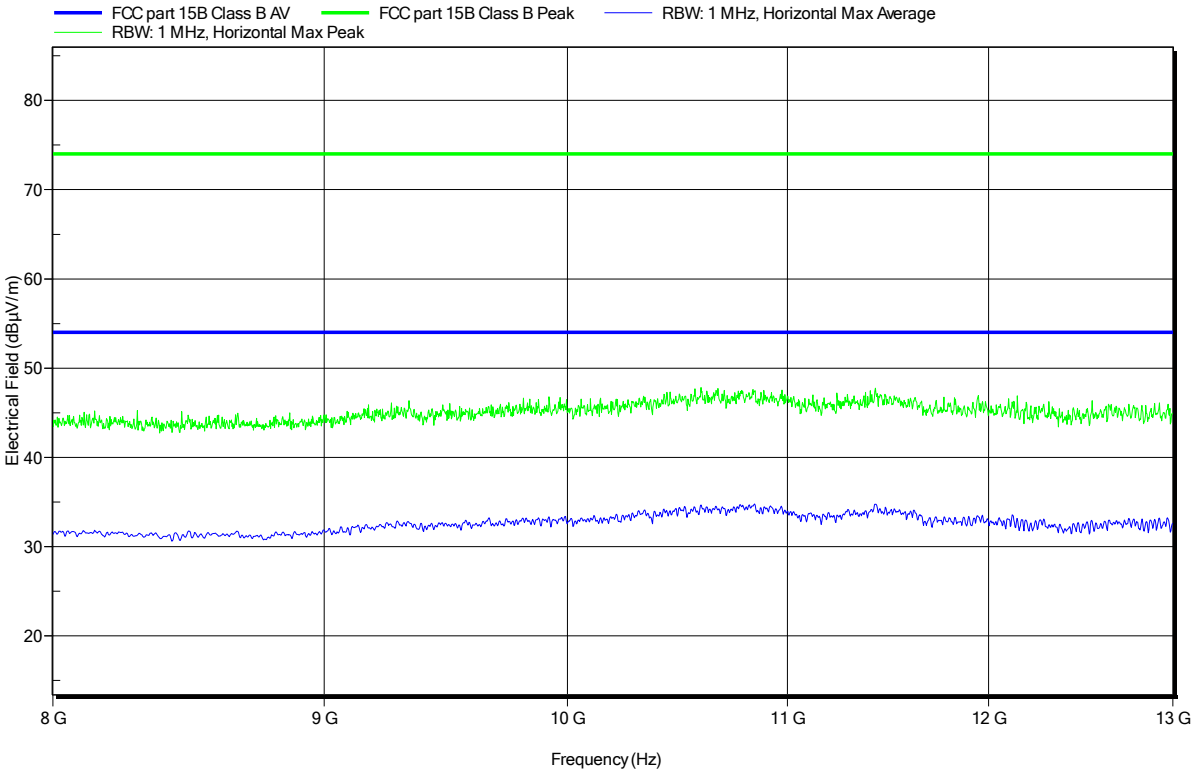

Spurious emissions under normal conditions according to FCC 15B

Project number: G0M-1508-4987

Applicant:	TomTom Telematics B.V.
EUT Name:	Telematic Device with GPRS+WCDMA/BT/GPS
Model:	L0530
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Operator:	Mr. Marquardt
Test Conditions:	Tnom: 23°C, Unom: 13.5 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3m
Mode:	UMTS Band V, BT, GPS, CAN
Test Date:	2015-12-18
Note:	

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