EMC TEST REPORT

FCC 47 CFR Part 15B
Industry Canada RSS-Gen

Electromagnetic compatibility - Unintentional radiators

Report Reference No. ..... :	G0M-1302-2617-EF01-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 ..... :	Agilion GmbH
Address ..... :	Blankenauer Str. 74 09113 Chemnitz GERMANY
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	WIRELESS THR GATEWAY / WRILESS THR ANCHOR
Model No.	6021105 / 6021203
Additional Models	None
Hardware version	1.0
Firmware / Software version	2.0
	FCC-ID: SCF6021112
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 ..... :	2013-02-21
Date (s) of performance of tests ..... :	2013-02-22
Compiled by..... :	Christian Weber
Tested by (+ signature)..... :	Marcus Klein
Approved by (+ signature) ..... :	Toralf Jahn
Date of issue ..... :	2013-04-09
Total number of pages..... :	24

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:

REPORT INDEX

1 Equipment (Test item) Description

Description	WIRELESS THR GATEWAY / WRILESS THR ANCHOR	
Model	6021105 / 6021203	
Additional Models	None	
Serial number	None	
Hardware version	1.0	
Software / Firmware version	2.0	
FCC-ID	SCF6021112	
Power supply	12 VDC	
AC/DC-Adaptor	Commercial AC/DC Adaptor	
Radio module	Type	CHIRP Spread Spectrum
	Model	nanoPAN 5375
	Manufacturer	Nanotron Technologies GmbH
	HW Version	unspecified
	SW Version	unspecified
	FCC-ID	SIFNANOPAN5375V1
Manufacturer	Agilion GmbH Blankenauer Str. 74 09113 Chemnitz GERMANY	
Highest emission frequency	Fmax [MHz] = 64	
Device classification	Class B	
Equipment type	Tabletop	
Number of tested samples	1	

1.1 Photos – Equipment external

EUT (ANCHOR) TOP


EUT (ANCHOR) SIDE VIEW


EUT (ANCHOR) ID

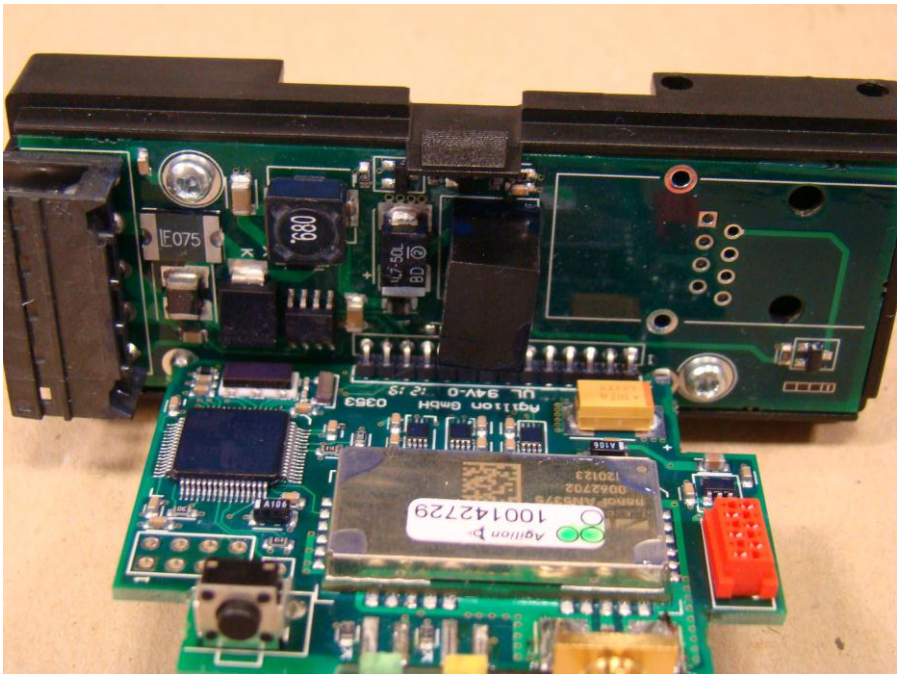

EUT (GATEWAY) TOP


EUT (GATEWAY) SIDE VIEW

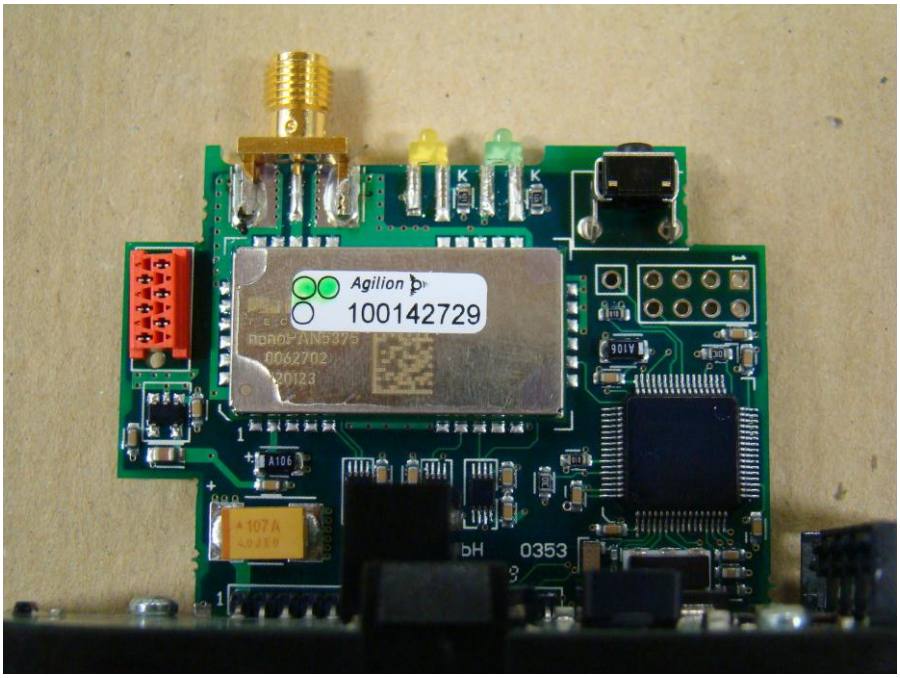
EUT (GATEWAY) ID

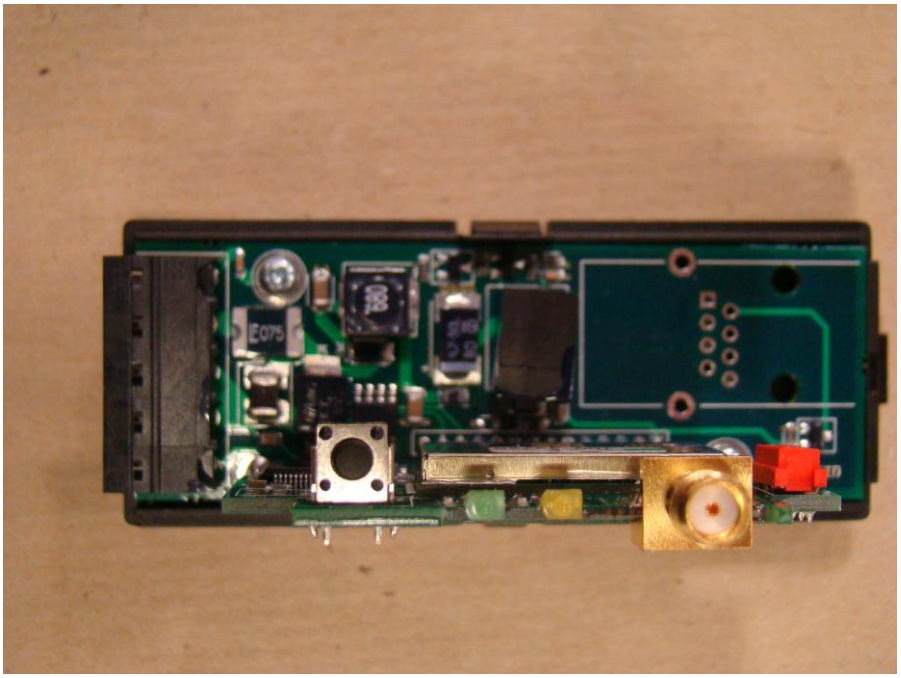
1.2 Photos – Equipment internal

EUT (ANCHOR) OPEN

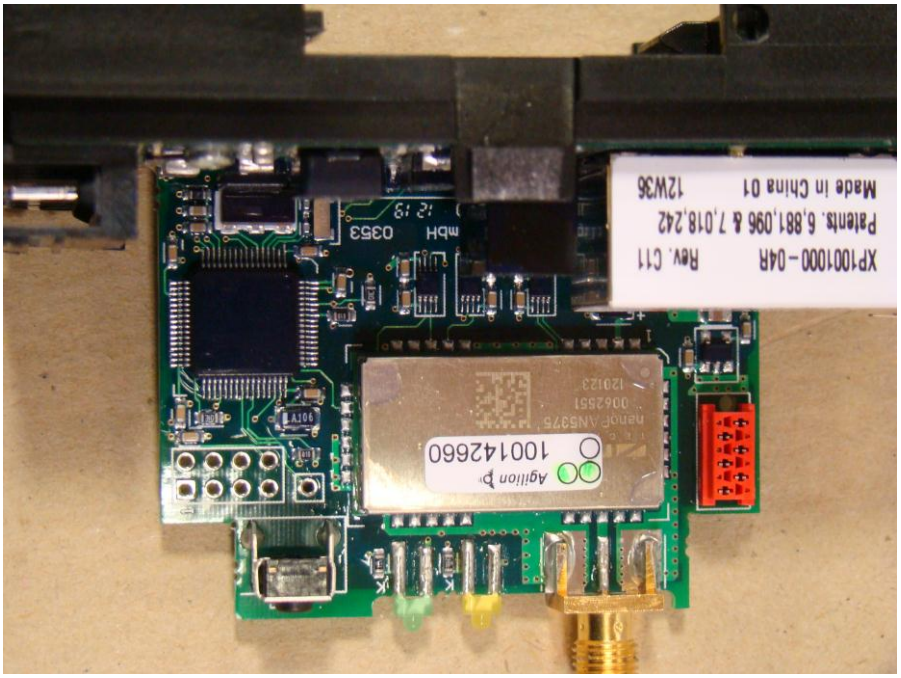


EUT (ANCHOR) PCB



EUT (ANCHOR) PCB


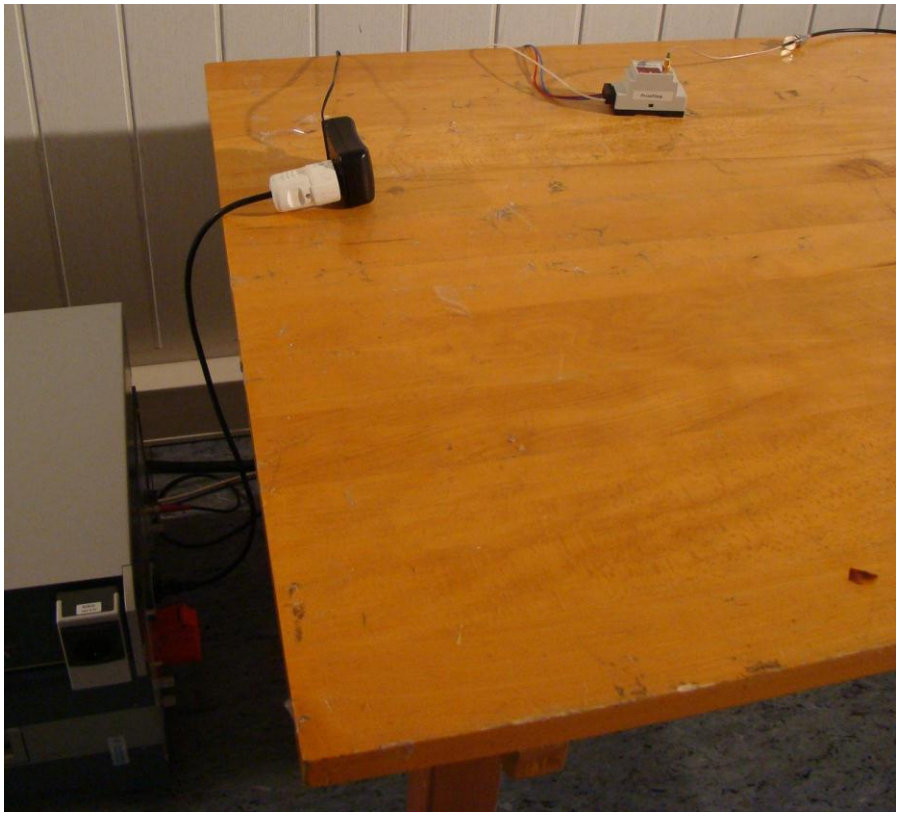
EUT (GATEWAY) OPEN


EUT (GATEWAY) PCB


EUT (GATEWAY) PCB


1.3 Photos – Test setup

Test Setup : Radiated Emissions


Test Setup : Conducted Emissions


1.4 Supporting Equipment Used During Testing

Product Type*	Device	Manufacturer	Model No.	Comments
AE	Companion Device	Agilion	Gateway Tester	
AE	Notebook	HP		

***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	Ethernet link to notebook; 2.4 GHz Wireless Link to Gateway Tester (Companion Device)

1.6 Test Equipment Used During Testing

Radiated emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Biconical Antenna	R&S	HK 116	EF00030	2011-02	2014-02
LPD-Antenne	R&S	HL 223	EF00187	2011-02	2014-02
LPD-Antenna	R&S	HL 025	EF00327	2013-02	2016-02
EMI Test Receiver	R&S	ESCS30	EF00295	2012-08	2013-08

Conducted emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
AMN	R&S	ESH3-Z5	EF00036	2012-11	2014-11
EMI Test Receiver	R&S	ESCS 30	EF00295	2012-08	2013-08

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 C63.4	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	23 °C
Relative Humidity	30 to 60 %	35 %
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] = 64	
Fully configured sample scanned over the following frequency range	Frequency range	
	30 MHz to 1 GHz	
Operating mode	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	-		-	-

Comments:

Spurious emissions under normal conditions according to FCC Part 15B

Project number: G0M-1302-2617

Manufacturer:	Agilion GmbH
EUT Name:	Wireless Gateway
Model:	6021203
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Klein
Test Conditions:	Tnom: 23°C, Unom: 27 VDC
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3m
Mode:	Ethernet link to notebook, wireless link to companion device
Test Date:	2013-02-22
Note:	Gateway as worst case for Gateway and Anchor

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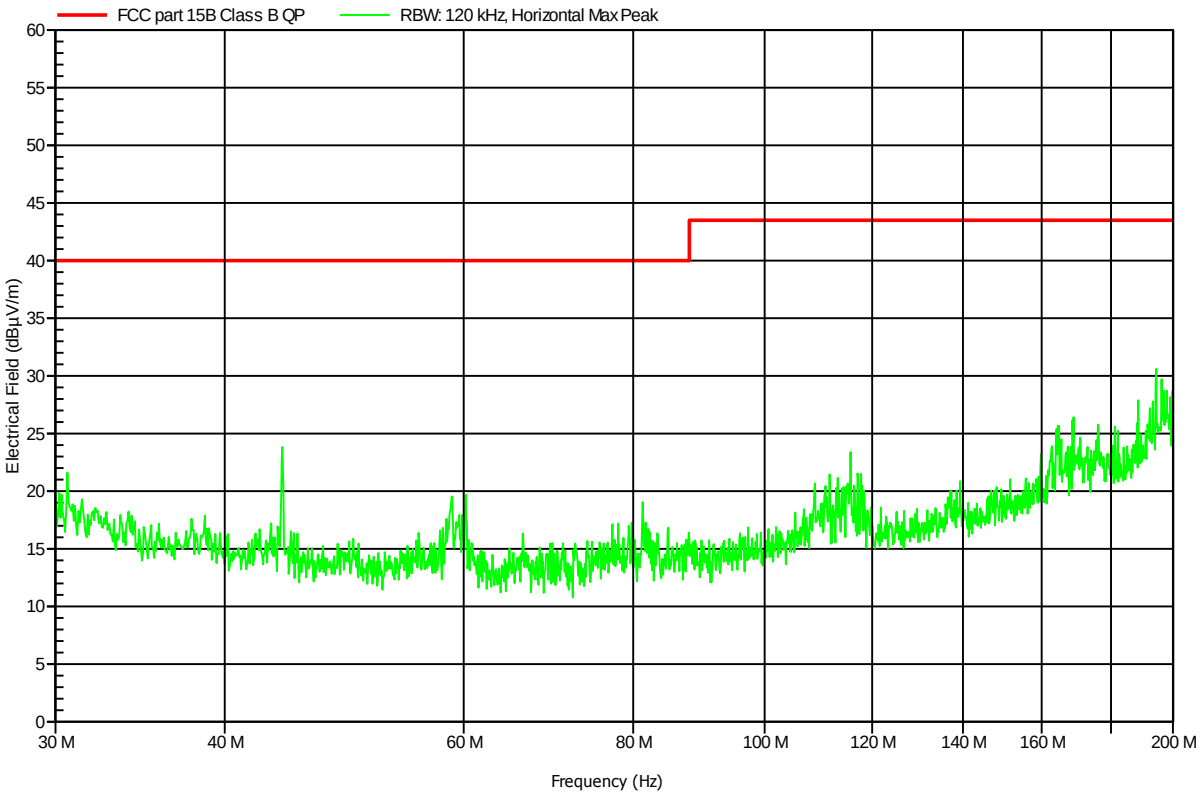
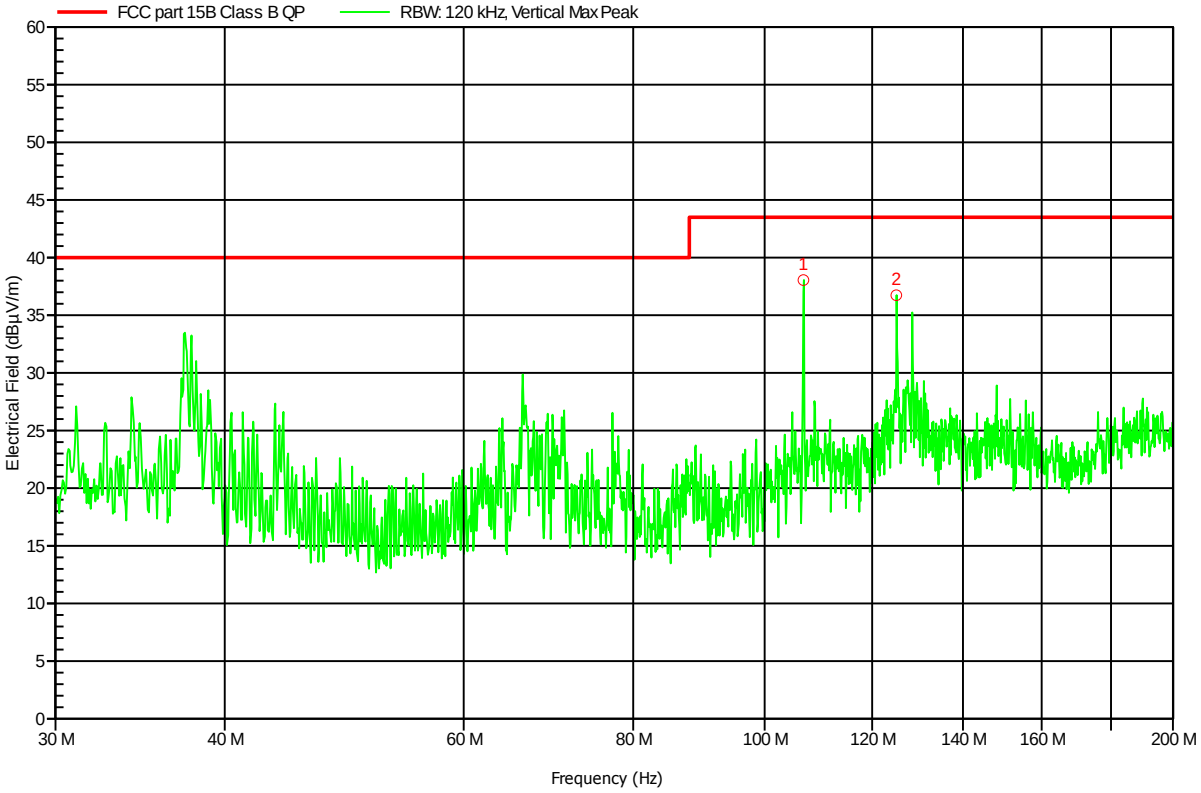


Spurious emissions under normal conditions according to FCC Part 15B

Project number: G0M-1302-2617

Manufacturer:	Agilion GmbH
EUT Name:	Wireless Gateway
Model:	6021203
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Klein
Test Conditions:	Tnom: 23°C, Unom: 27 VDC
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3m
Mode:	Ethernet link to notebook, wireless link to companion device
Test Date:	2013-02-22
Note:	Gateway as worst case for Gateway and Anchor

Index 3



Frequency
106.8 MHz
125.04 MHz

Spurious emissions under normal conditions according to FCC Part 15B

Project number: G0M-1302-2617

Manufacturer:	Agilion GmbH
EUT Name:	Wireless Gateway
Model:	6021203
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Klein
Test Conditions:	Tnom: 23°C, Unom: 27 VDC
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3m
Mode:	Ethernet link to notebook, wireless link to companion device
Test Date:	2013-02-22
Note:	Gateway as worst case for Gateway and Anchor

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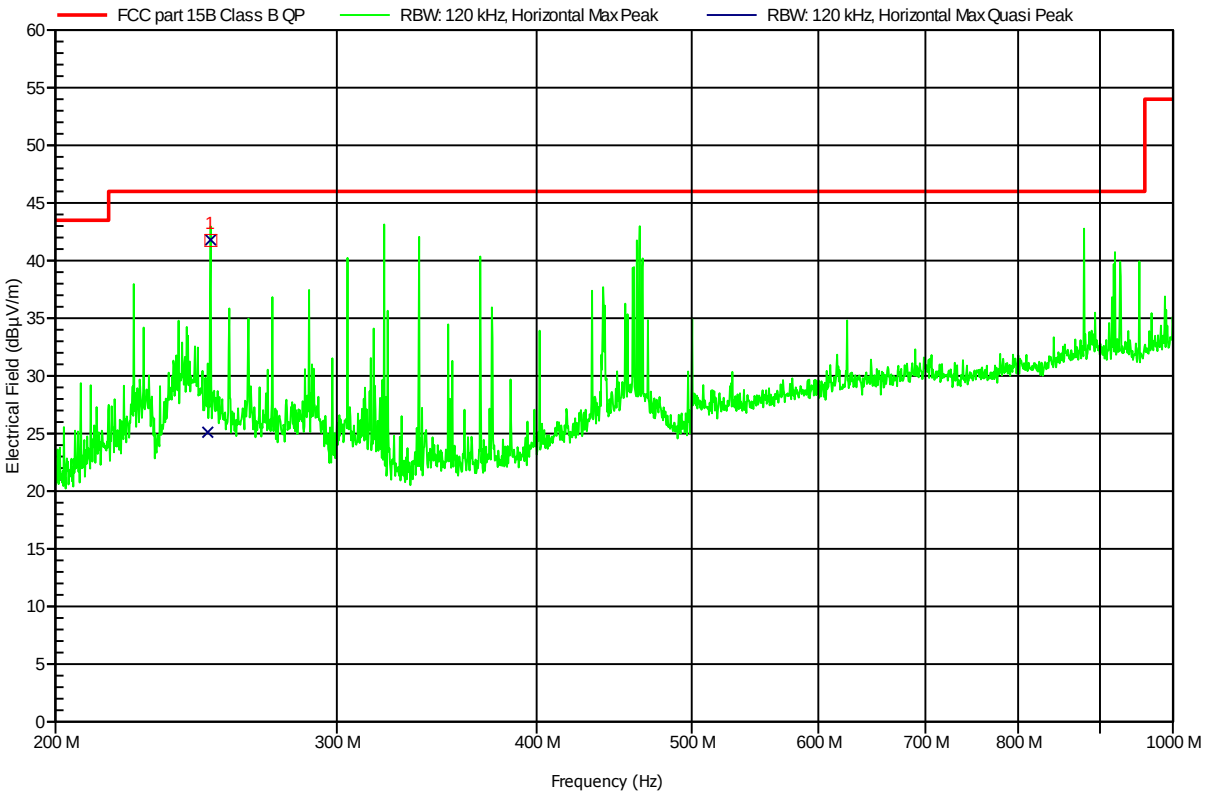
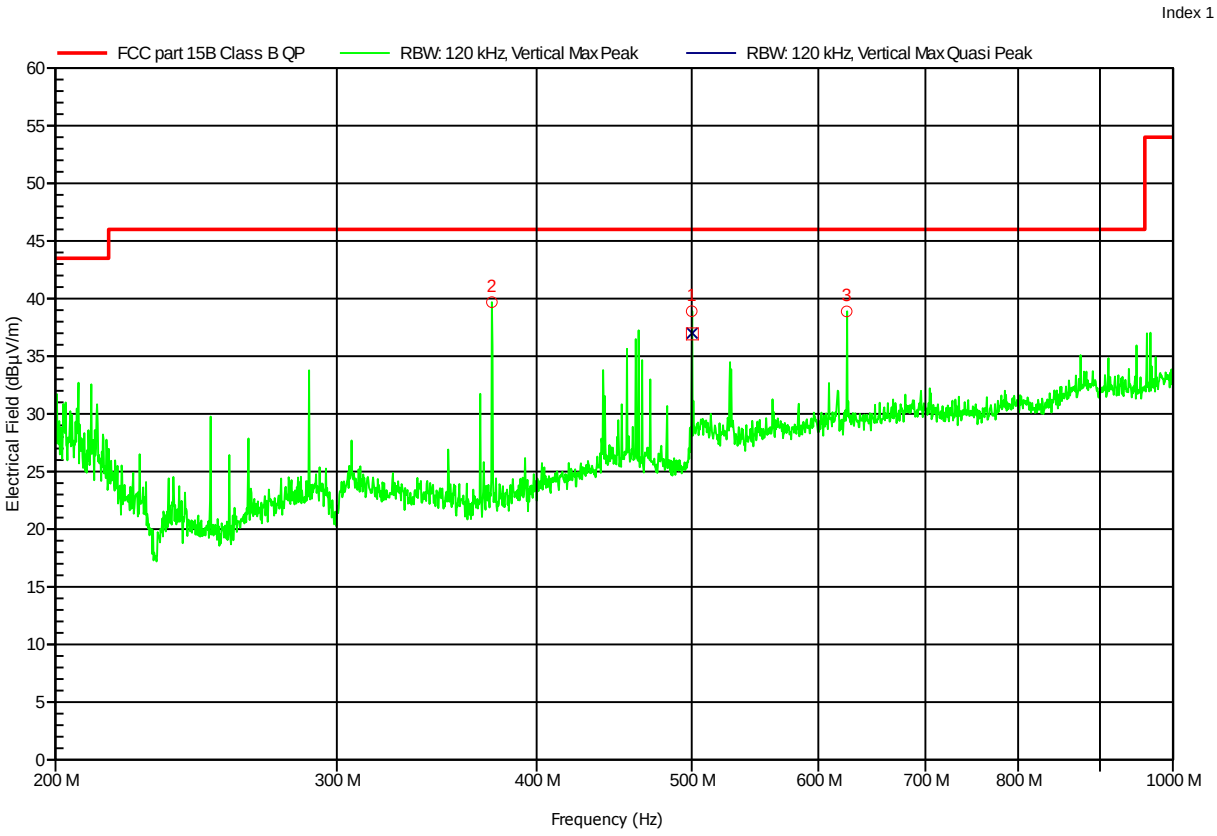


Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
250.016 MHz	41.81 dBµV/m	46 dBµV/m	-4.19 dB	Pass

Spurious emissions under normal conditions according to FCC Part 15B

Project number: G0M-1302-2617

Manufacturer:	Agilion GmbH
EUT Name:	Wireless Gateway
Model:	6021203
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Klein
Test Conditions:	Tnom: 23°C, Unom: 27 VDC
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3m
Mode:	Ethernet link to notebook, wireless link to companion device
Test Date:	2013-02-22
Note:	Gateway as worst case for Gateway and Anchor



Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
375.02 MHz				
500.012 MHz	37 dBµV/m	46 dBµV/m	-9 dB	Pass
625.04 MHz				

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	23 °C		
Relative Humidity	30 to 60 %	35 %		
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	1			

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:
* Limit decreases linearly with the logarithm of the frequency.

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

Project number: G0M-1302-2617

Manufacturer:	Agilion GmbH
EUT Name:	Wireless Gateway
Model:	6021203
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Klein
Test Conditions:	Tnom: 23°C, Unom: 120 VAC
LISN:	ESH2-Z5 N
Mode:	Ethernet link to notebook, wireless link to companion device
Test Date:	2013-02-22
Note:	Gateway as worst case for Gateway and Anchor

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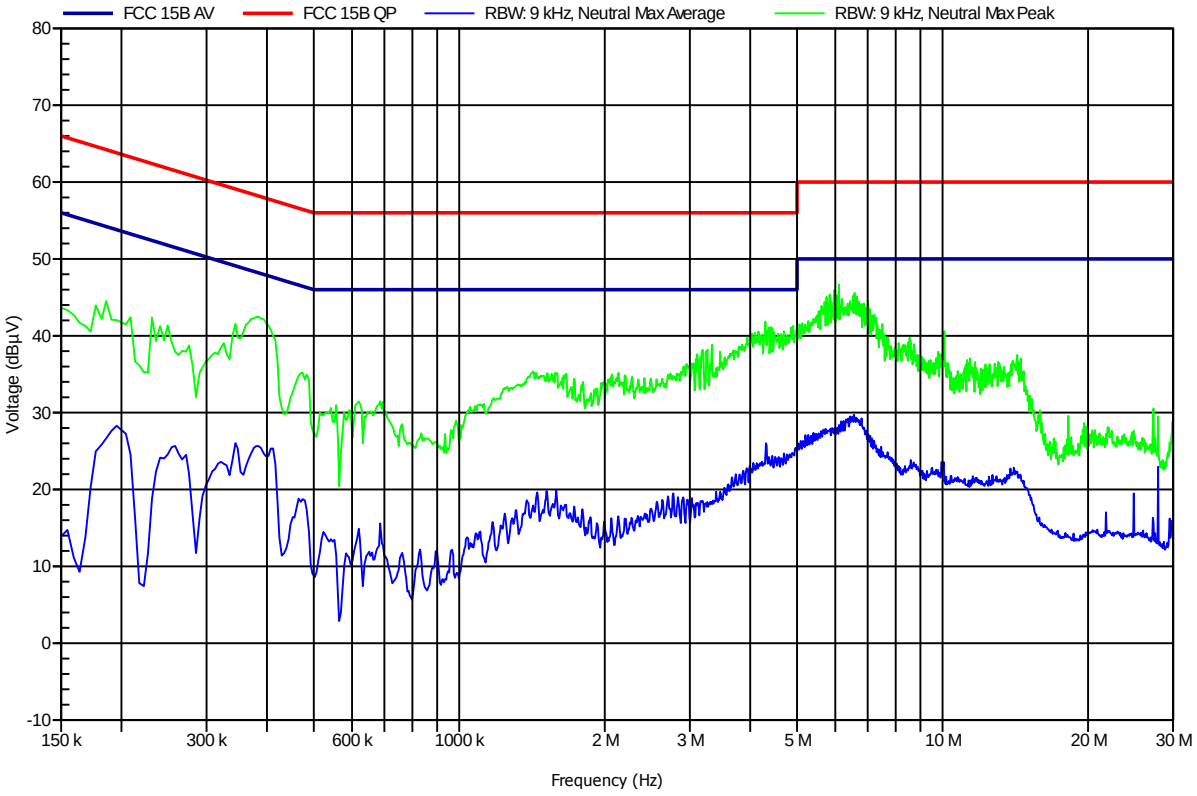

EMI voltage test in the ac-mains according to FCC Part 15B

Project number: G0M-1302-2617

Manufacturer:	Agilion GmbH
EUT Name:	Wireless Gateway
Model:	6021203
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Klein
Test Conditions:	Tnom: 23°C, Unom: 120 VAC
LISN:	ESH2-Z5 L
Mode:	Ethernet link to notebook, wireless link to companion device
Test Date:	2013-02-22
Note:	Gateway as worst case for Gateway and Anchor

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