

FCC TEST REPORT FCC 47 CFR Part 15C Industry Canada RSS-210 Frequency hopping systems operating within the 2400 – 2483.5 MHz band	
Report Reference No.	G0M-1311-3395-TFC247BT-V01
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	  A2LA Accredited Testing Laboratory, Certificate No.: 1983.01 FCC Filed Test Laboratory, Reg.-No.: 96970 IC OATS Filing assigned code: 3470A
Applicant's name	Panasonic Industrial Devices Europe GmbH
Address	Zeppelinstr. 19 21337 Lüneburg GERMANY
Test specification:	
Standard	47 CFR Part 15C RSS-210, Issue 8, 2010-12 RSS-Gen, Issue 3, 2010-12 ANSI C63.4:2009
Equipment under test (EUT):	
Product description	Bluetooth Module BT2.1
Model No.	PAN1322
Additional Model(s)	None
Brand Name(s)	None
Hardware version	02
Firmware / Software version	03
	FCC-ID: T7VEBMU IC: N/A
Test result	Passed

 Test Report No.: G0M-1311-3395-TFC247BT-V01

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

Possible test case verdicts:

- neither assessed nor tested: N/N
- required by standard but not appl. to test object.....: N/A
- required by standard but not tested.....: N/T
- not required by standard for the test object: N/R
- test object does meet the requirement.....: P (Pass)
- test object does not meet the requirement.....: F (Fail)

Testing:

Test Lab Temperature.....: 20 – 23 °C

Test Lab Humidity: 32 – 38 %

Date of receipt of test item: 2014-03-24

Date (s) of performance of tests: 2014-03-24 - 2014-03-27

Compiled by: Christian Weber

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

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

Date of issue: 2014-03-31

Total number of pages: 53

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:

Partial test for Class II Permissive change according to permissive change letter.

Version History

Version	Issue Date	Remarks	Revised by
01	2014-03-31	Initial Release	

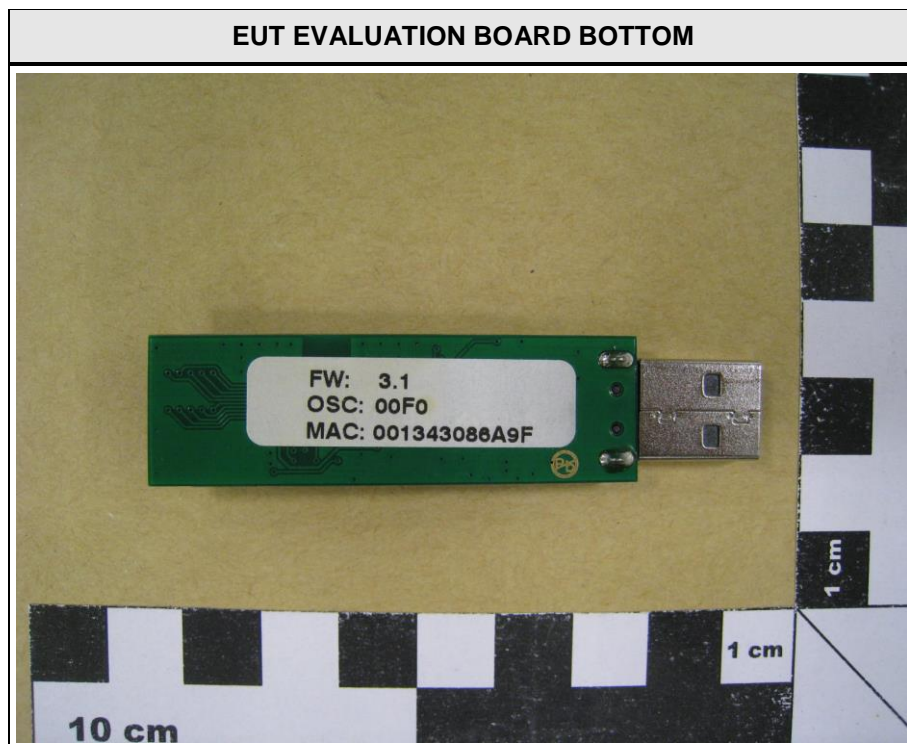
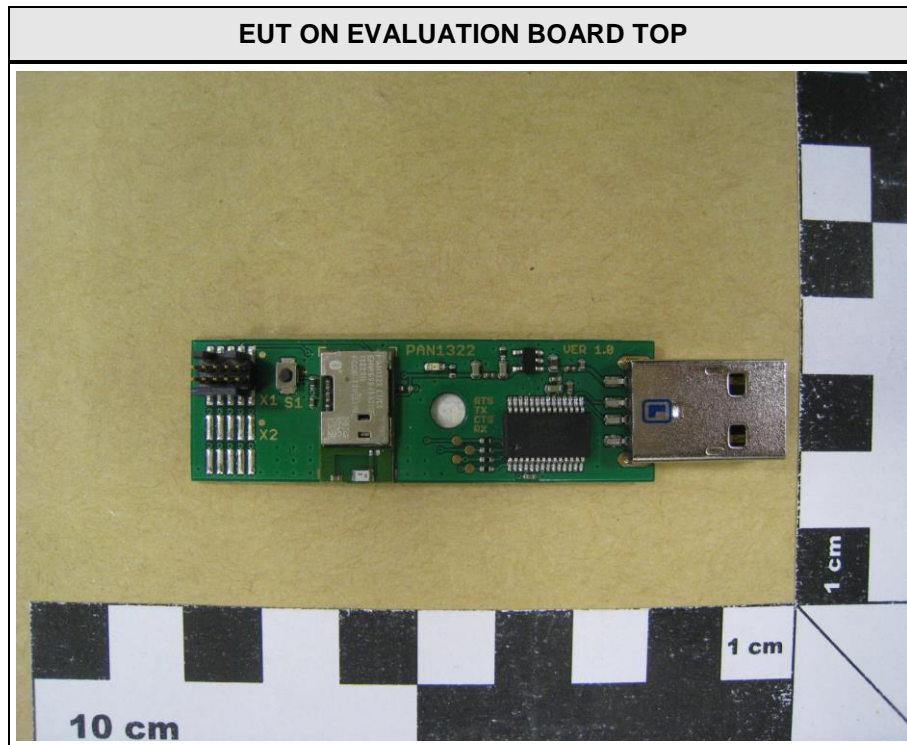
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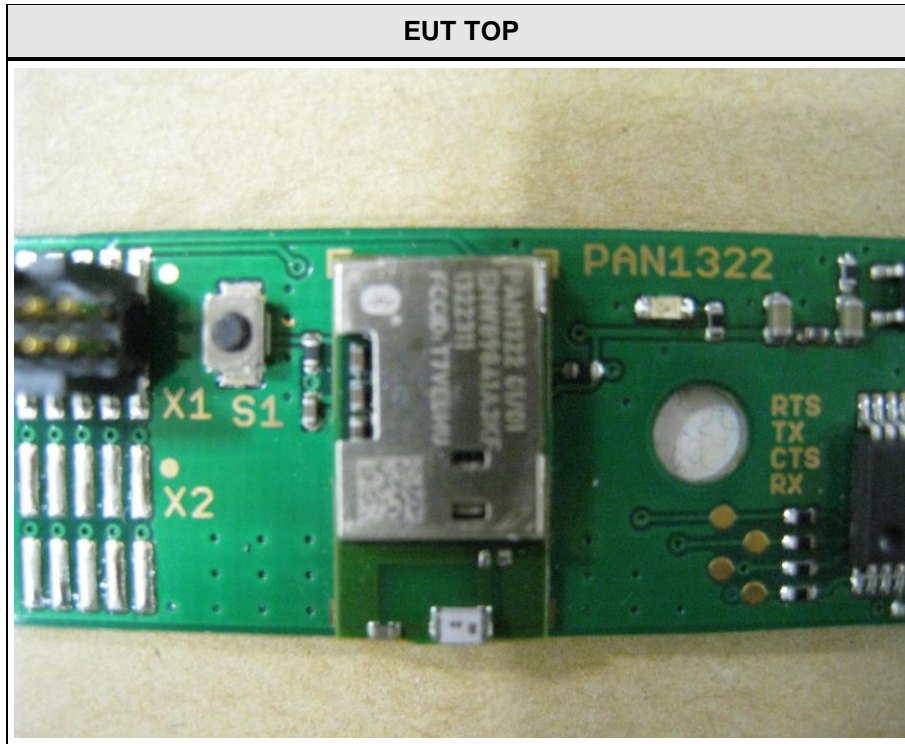
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1 Equipment (Test item) Description

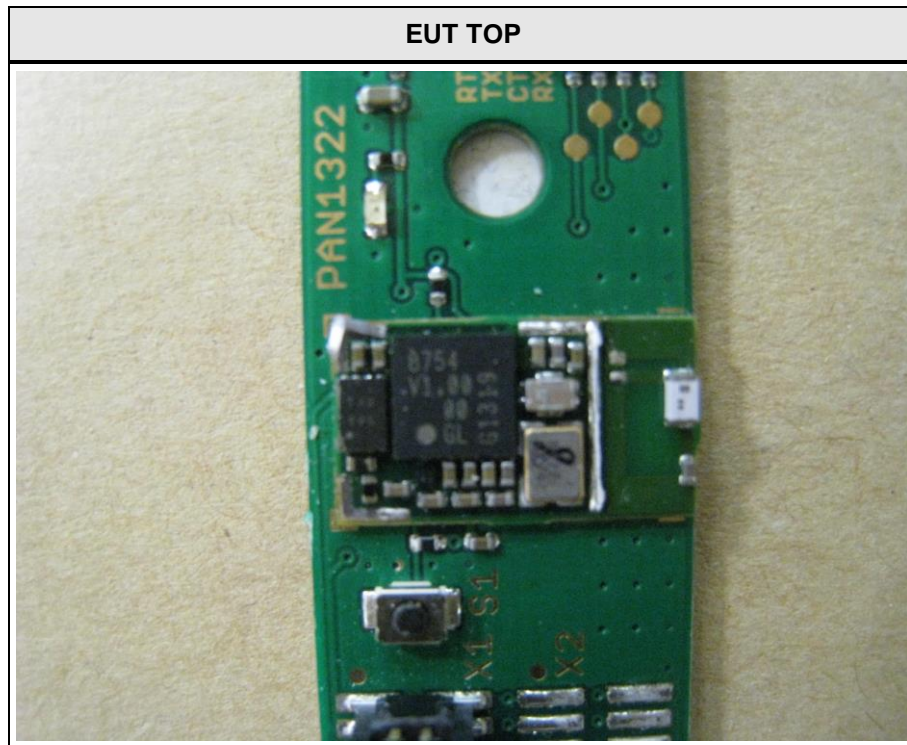
Description	Bluetooth Module BT2.1	
Model	PAN1322	
Additional Model(s)	None	
Brand Name(s)	None	
Serial number	None	
Hardware version	02	
Software / Firmware version	03	
FCC-ID	T7VEBMU	
IC	N/A	
Equipment type	Radio module	
Radio type	Transceiver	
Radio technology	Bluetooth	
Operating frequency range	2402 - 2480 MHz	
Assigned frequency band	2400 - 2483.5 MHz	
Main test frequencies	F _{LOW}	2402 MHz
	F _{MID}	2441 MHz
	F _{HIGH}	2480 MHz
Spreading	FHSS	
Modulations	GFSK, PI/4-DQPSK, 8-PSK	
Number of channels	79 hopping channels at all	
Channel spacing	1 MHz	
Number of antennas	1	
Antenna	Type	integrated
	Model	LDA21K
	Manufacturer	Murata
	Gain	0.9
Manufacturer	Panasonic Industrial Devices Slovakia s.r.o Tovarenská 13 06401 Stará L'ubovna Slovakia	
Power supply	V _{NOM}	3.3 VDC
	V _{MIN}	2.9 VDC
	V _{MIN}	4.1 VDC
AC/DC-Adaptor	Model	N/A
	Vendor	N/A
	Input	N/A
	Output	N/A

1.1 Photos – Equipment External

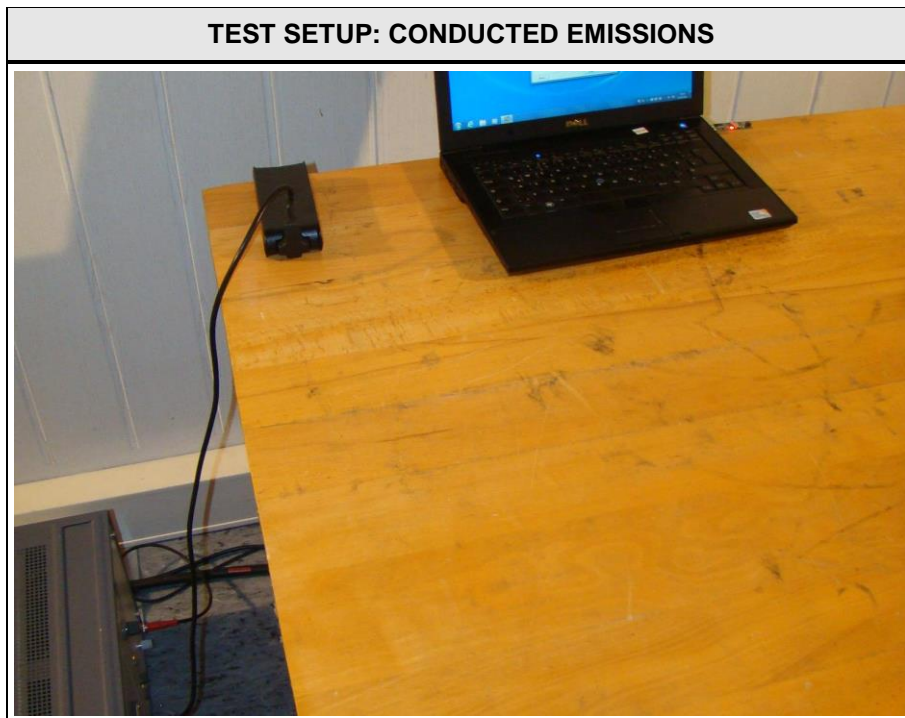
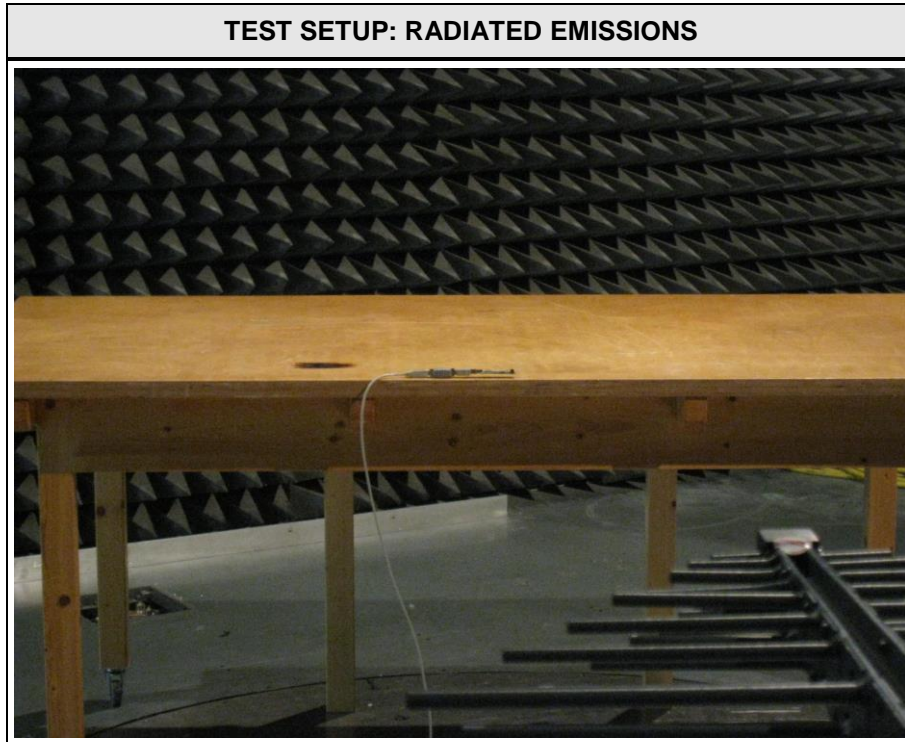




1.2 Photos – Equipment internal



1.3 Photos – Test setup



1.4 Supporting Equipment Used During Testing

Product Type*	Device	Manufacturer	Model No.	Comments
None				
<p>*Note: Use the following abbreviations:</p> <p style="padding-left: 40px;">AE : Auxiliary/Associated Equipment, or</p> <p style="padding-left: 40px;">SIM : Simulator (Not Subjected to Test)</p> <p style="padding-left: 40px;">CABL : Connecting cables</p>				

1.5 Test Modes

Mode #	Description	
DH5-Sngl	General conditions:	EUT powered by laboratory power supply.
	Radio conditions:	Mode = standalone transmit Spreading = Hopping stopped (single hopping channel) Modulation = GFSK Packet type = DH5 Data rate = 1 Mbps Duty cycle = 78 % Power level = Maximum
2DH5-Sngl	General conditions:	EUT powered by laboratory power supply.
	Radio conditions:	Mode = standalone transmit Spreading = Hopping stopped (single hopping channel) Modulation = $\pi/4$ -DQPSK Packet type = 2DH5 Data rate = 2 Mbps Duty cycle = 78 % Power level = Maximum
3DH5-Sngl	General conditions:	EUT powered by laboratory power supply.
	Radio conditions:	Mode = standalone transmit Spreading = Hopping stopped (single hopping channel) Modulation = 8-DPSK Packet type = 3DH5 Data rate = 3 Mbps Duty cycle = 78 % Power level = Maximum
AC-Powerline	General conditions:	EUT powered by commercial AC/DC-Adapter
	Radio conditions:	Mode = standalone transmit Spreading = Hopping Power level = Maximum

1.6 Test Equipment Used During Testing

Measurement Software			
Description	Manufacturer	Name	Version
EMC Test Software	Dare Instruments	Radimation	5.8.37

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

Radiated spurious emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Semi-anechoic chamber	Frankonia	AC 5	EF00395	-	-
Spectrum Analyzer	R&S	FSIQ26	EF00242	2013-06	2014-06
Biconical Antenna	R&S	HK 116	EF00012	2013-02	2016-02
LPD antenna	R&S	HL 223	EF00212	2013-02	2016-02
LPD Antenna	R&S	HL 025	EF00327	2013-02	2016-02

AC powerline conducted emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
AMN	R&S	ESH2-Z5	EF00182	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:

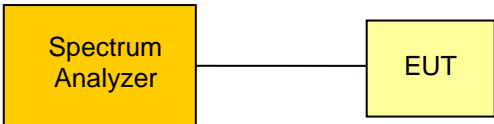
$$\begin{array}{rclcl} \text{Reading} & + & \text{AF} & = & \text{Net Reading} & : & \text{Net reading - FCC limit} & = & \text{Margin} \\ 21.5 \text{ dB}\mu\text{V} & + & 26 \text{ dB} & = & 47.5 \text{ dB}\mu\text{V/m} & : & 47.5 \text{ dB}\mu\text{V/m} - 57.0 \text{ dB}\mu\text{V/m} & = & -9.5 \text{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

2 Result Summary

FCC 47 CFR Part 15C, IC RSS-210				
Product Specific Standard Section	Requirement – Test	Reference Method	Result	Remarks
RSS-Gen 4.6.1	Occupied Bandwidth	RSS-Gen 4.6.1	N/N	Informational only
FCC § 15.247(a)(1) IC RSS-210 § A8.1	20 dB Bandwidth	Public notice DA 00-705	N/N	
FCC § 15.247(a)(1)(iii) IC RSS-210 § A8.1	Number of hopping frequencies	Public notice DA 00-705	N/N	
FCC § 15.247(a)(1) IC RSS-210 § A8.1	Frequency hopping channel separation	Public notice DA 00-705	N/N	
FCC § 15.247(a)(1)(iii) IC RSS-210 § A8.1	Time of occupancy (Dwell time)	Public notice DA 00-705	N/N	
FCC § 15.247(b)(1) IC RSS-210 § A8.4	Maximum peak conducted power	Public notice DA 00-705	PASS	
47 CFR 15.207 RSS-Gen 7.2.4	AC power line conducted emissions	ANSI C63.4	PASS	
FCC § 15.247(d) IC RSS-210 § A8.5	Band edge compliance	Public notice DA 00-705	N/N	
FCC § 15.247(d) IC RSS-210 § A8.5	Conducted spurious emissions	Public notice DA 00-705	N/N	
FCC § 15.247(d) FCC § 15.209 IC RSS-210 A8.5 IC RSS-Gen 4.9 IC RSS-Gen 7.2.5	Transmitter radiated spurious emissions	Public notice DA 00-705 / ANSI C 63.4	PASS	
IC RSS-Gen 4.10 IC RSS-Gen 6.1	Receiver radiated spurious emissions	ANSI C 63.4	N/N	
Remarks:				

3 Test Conditions and Results

3.1 Test Conditions and Results – Maximum peak conducted power

Maximum peak conducted power acc. FCC 15.247 / IC RSS-210		Verdict: PASS
EUT requirement rule parts and clause	Reference	
	FCC 15.247(b)(1) / IC RSS-210 A8.4	
Test according to measurement reference	Reference Method	
	FCC Public Notice DA 00-705	
Test frequency range	Tested frequencies	
	$F_{\text{LOW}} / F_{\text{MID}} / F_{\text{HIGH}}$	
Measurement mode	Peak	
Maximum antenna gain	0.9 dBi \Rightarrow Limit correction = 0 dB	
Limits		
Limit	Condition	
1 W (30 dBm)	Number of hopping channels \geq 75	
0.125 W (21 dBm)	75 > Number of hopping channels \geq 15	
<p>The conducted output power limit specified above is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in the table, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.</p>		
Test setup		
		
Test procedure		
<ol style="list-style-type: none"> 1. EUT set to test mode (Communication tester is used if needed) 2. Center frequency set to test channel center frequency 3. Span set to twice the 20 dB bandwidth and detector to peak and max hold 4. Resolution bandwidth is set to 3 MHz 5. Peak conducted power is determined from peak of spectrum envelope 		

Test results								
Channel	Frequency [MHz]	Voltage	Mode	Peak power [dbm]	Peak power [W]	Limit [dBm]	Margin [dB]	Result
F _{LOW}	2402	3.3 VDC	DH5-Sngl	0.05	0.0010	30	-29.95	PASS
F _{MID}	2441	3.3 VDC	DH5-Sngl	-0.28	0.0009	30	-30.28	PASS
F _{HIGH}	2480	3.3 VDC	DH5-Sngl	-1.39	0.0007	30	-31.39	PASS
F _{LOW}	2402	3.3 VDC	2DH5-Sngl	-0.08	0.0010	30	-30.08	PASS
F _{MID}	2441	3.3 VDC	2DH5-Sngl	-1.01	0.0008	30	-31.01	PASS
F _{HIGH}	2480	3.3 VDC	2DH5-Sngl	-2.09	0.0006	30	-32.09	PASS
F _{LOW}	2402	3.3 VDC	3DH5-Sngl	-0.25	0.0009	30	-30.25	PASS
F _{MID}	2441	3.3 VDC	3DH5-Sngl	-0.63	0.0009	30	-30.63	PASS
F _{HIGH}	2480	3.3 VDC	3DH5-Sngl	-1.71	0.0007	30	-31.71	PASS
Comments:								

3.2 Test Conditions and Results – AC power line conducted emissions

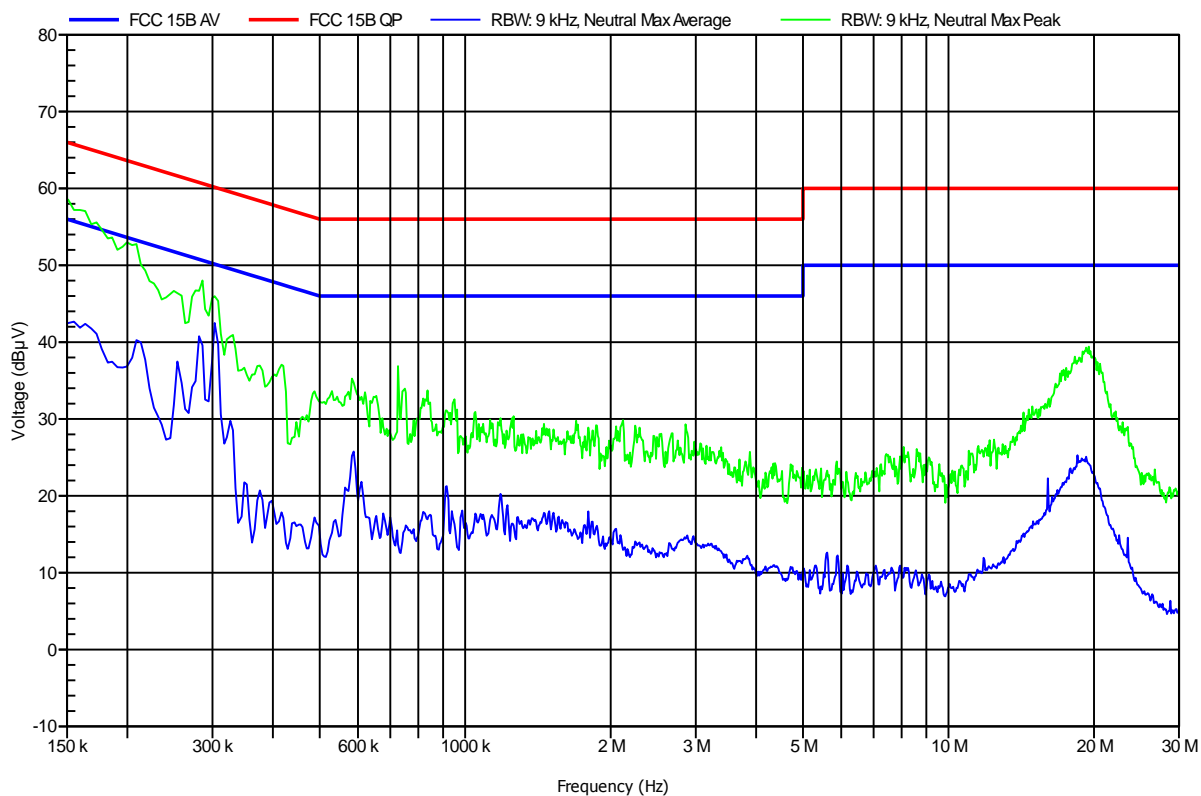
Power line conducted emissions acc. FCC 47 CFR 15.207 / IC RSS-Gen		Verdict: PASS		
Test according referenced standards	Reference Method			
	ANSI C63.4			
Fully configured sample scanned over the following frequency range	Frequency range			
	0.15 MHz to 30 MHz			
Points of Application	Application Interface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

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

Project number: G0M-1311-3395

Manufacturer: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth modul
 Model: PAN1322
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Pflug
 Test Conditions: Tnom: 23°C, Unom: 120 VAC(AC/DC-adapter)
 LISN: ESH2-Z5 N
 Mode: BT-link
 Test Date: 2014-03-27
 Note:

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Test Report No.: G0M-1311-3395-TFC247BT-V01

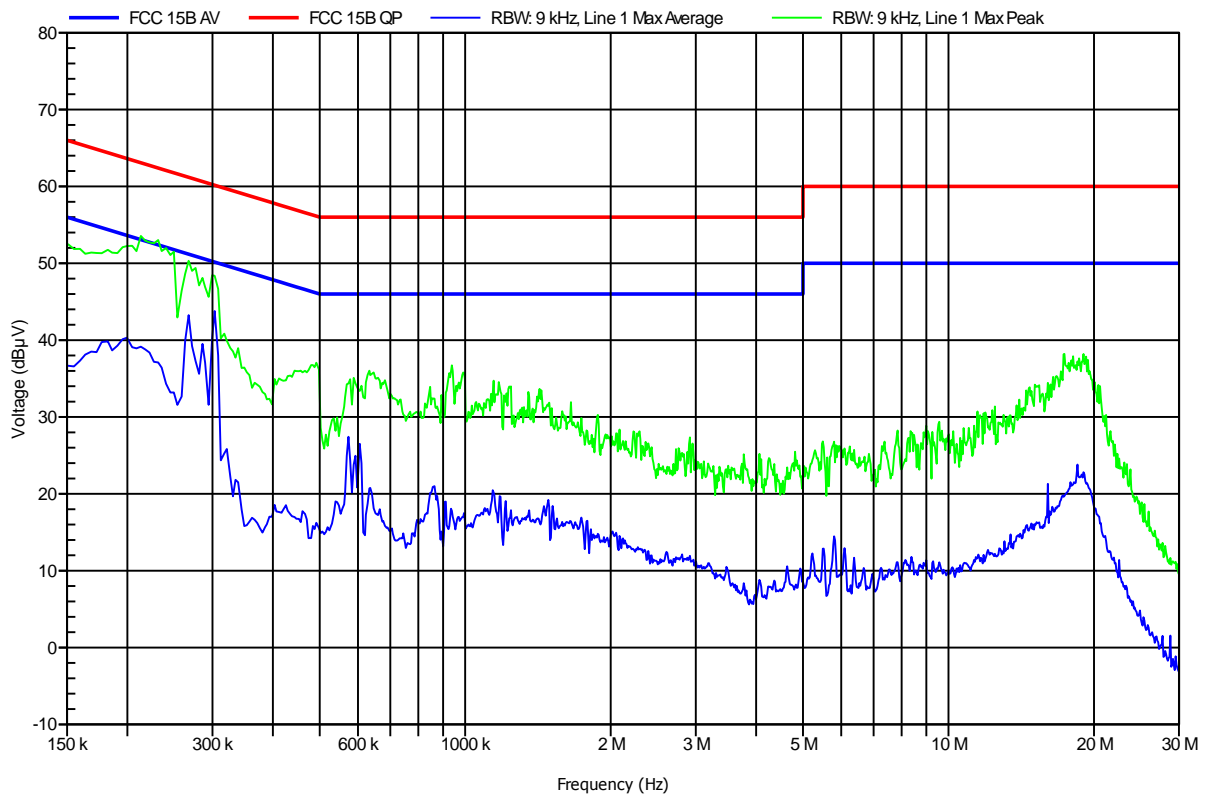
 Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

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

Project number: G0M-1311-3395

Manufacturer:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth modul
Model:	PAN1322
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Pflug
Test Conditions:	Tnom: 23°C, Unom: 120 VAC(AC/DC-adapter)
LISN:	ESH2-Z5 L
Mode:	BT-link
Test Date:	2014-03-27
Note:	

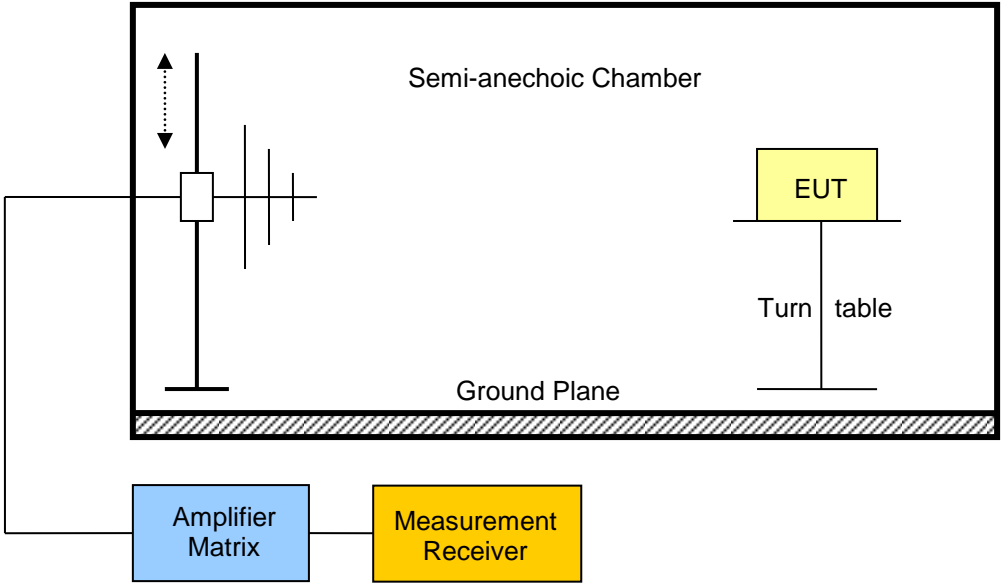
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Test Report No.: G0M-1311-3395-TFC247BT-V01

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

3.3 Test Conditions and Results – Transmitter radiated emissions

Transmitter radiated emissions acc. FCC 47 CFR 15.247 / IC RSS-210				Verdict: PASS	
Test according referenced standards	Reference Method				
	FCC 15.247(d) / IC RSS-210 A8.5				
Test according to measurement reference	Reference Method				
	FCC Public Notice DA 00-705 / ANSI C63.4				
Test frequency range	Tested frequencies				
	30 MHz – 10 th Harmonic				
Limits					
Frequency range [MHz]	Detector	Limit [μ V/m]	Limit [dB μ V/m]	Limit Distance [m]	
30 – 88	Quasi-Peak	100	40	3	
88 – 216	Quasi-Peak	150	43.5	3	
216 – 960	Quasi-Peak	200	46	3	
960 – 1000	Quasi-Peak	500	54	3	
> 1000	Average	500	54	3	
<p>Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).</p> <p>When average radiated emission measurements are specified, including average emission measurements below 1000 MHz, there also is a limit on the peak level of the radio frequency emissions. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test.</p>					
Test setup					
 <p>The diagram illustrates the test setup within a Semi-anechoic Chamber. A Ground Plane is located at the bottom. The Equipment Under Test (EUT) is placed on a Turn table. A probe is positioned to measure the emissions from the EUT. The probe is connected to an Amplifier Matrix, which is then connected to a Measurement Receiver.</p>					

Test procedure

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

Test results – Internal Antenna

Channel	Frequency [MHz]	Mode	Emission [MHz]	Level [dB μ V/m]	Det.	Pol.	Limit [dB μ V/m]	Limit dist. [m]*	Margin [dB]
0	2402	DH5-Sngl	2376	41.54	pk	hor	74.00	3	-32.46
0	2402	DH5-Sngl	2376	30.37	RMS	hor	54.00	3	-23.63
0	2402	DH5-Sngl	2390	45.44	pk	ver	74.00	3	-28.56
0	2402	DH5-Sngl	2390	24.18	RMS	ver	54.00	3	-29.82
79	2480	DH5-Sngl	2483.5	52.00	pk	hor	74.00	3	-22.00
79	2480	DH5-Sngl	2483.5	46.59	RMS	hor	54.00	3	-07.41
79	2480	DH5-Sngl	2483.6	51.96	pk	ver	74.00	3	-22.04
0	2402	2DH5-Sngl	2376	39.29	pk	hor	74.00	3	-34.71
0	2402	2DH5-Sngl	2376	27.60	RMS	hor	54.00	3	-26.40
0	2402	2DH5-Sngl	2390	44.52	pk	ver	74.00	3	-29.48
0	2402	2DH5-Sngl	2390	24.12	RMS	ver	54.00	3	-29.88
79	2480	2DH5-Sngl	2483.5	52.30	pk	hor	74.00	3	-21.70
79	2480	2DH5-Sngl	2483.5	48.71	RMS	hor	54.00	3	-05.29
79	2480	2DH5-Sngl	2483.6	52.74	pk	ver	74.00	3	-21.26
79	2480	2DH5-Sngl	2483.6	40.30	RMS	ver	54.00	3	-13.70
0	2402	3DH5-Sngl	2376	41.16	pk	hor	74.00	3	-32.84
0	2402	3DH5-Sngl	2376	28.70	RMS	hor	54.00	3	-25.30
0	2402	3DH5-Sngl	2390	44.88	pk	ver	74.00	3	-29.12
0	2402	3DH5-Sngl	2390	24.12	RMS	ver	54.00	3	-29.88
79	2480	3DH5-Sngl	2483.5	51.62	pk	hor	74.00	3	-22.38
79	2480	3DH5-Sngl	2483.5	45.69	RMS	hor	54.00	3	-08.31
79	2480	3DH5-Sngl	2483.6	52.79	pk	ver	74.00	3	-21.21
79	2480	3DH5-Sngl	2483.6	38.15	RMS	ver	54.00	3	-15.85

Comments: * Physical distance between EUT and measurement antenna.

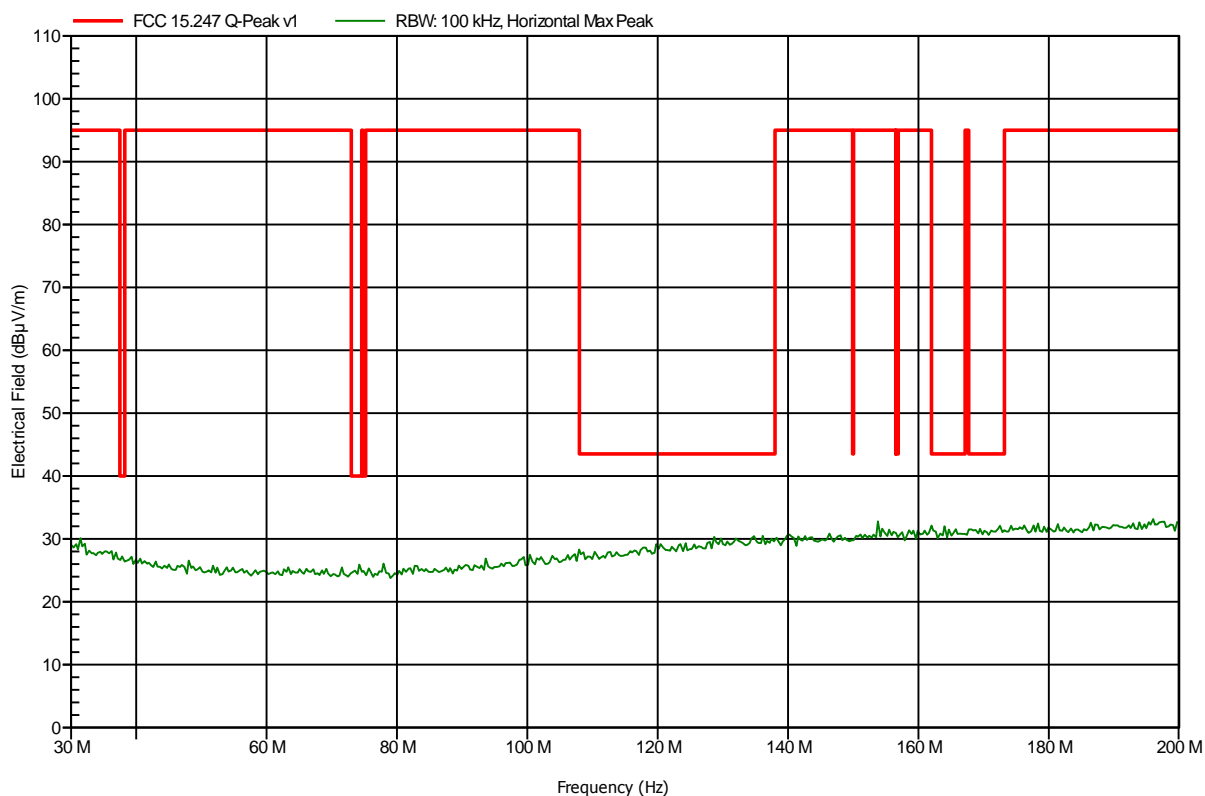
ANNEX A Transmitter radiated spurious emissions

Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Module BT2.1
Model:	PAN1322
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	TX; basic, DH5; 2402 MHz
Test Date:	2014-03-24
Note:	worst case

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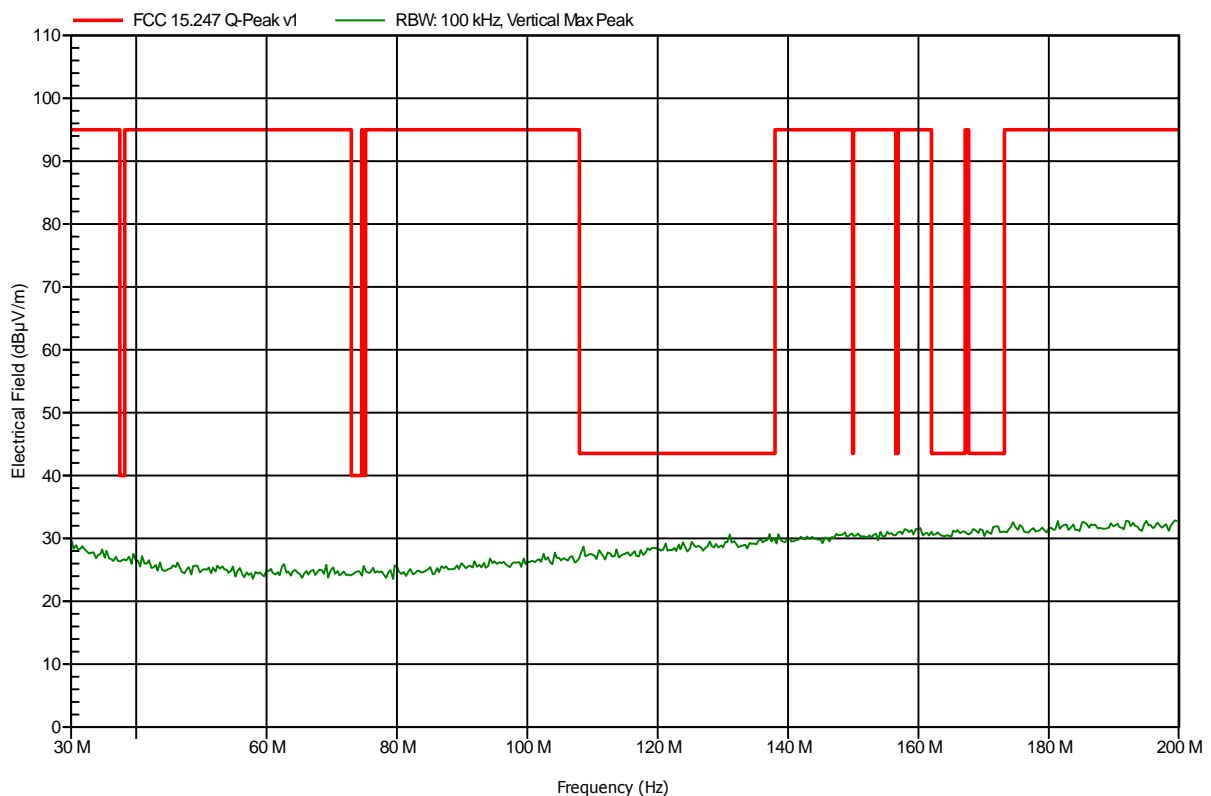


Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Module BT2.1
Model:	PAN1322
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3 m
Mode:	TX; basic, DH5; 2402 MHz
Test Date:	2014-03-24
Note:	worst case

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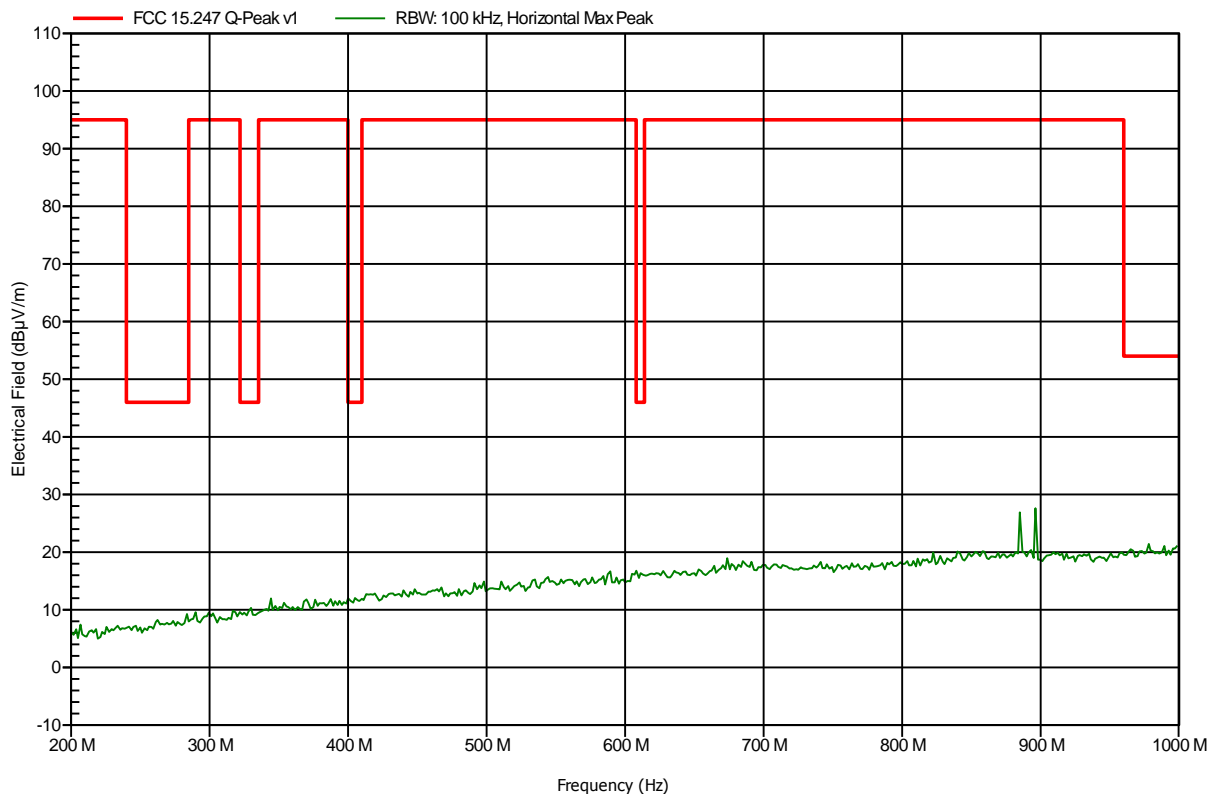


Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Module BT2.1
Model:	PAN1322
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	TX; basic, DH5; 2402 MHz
Test Date:	2014-03-24
Note:	worst case

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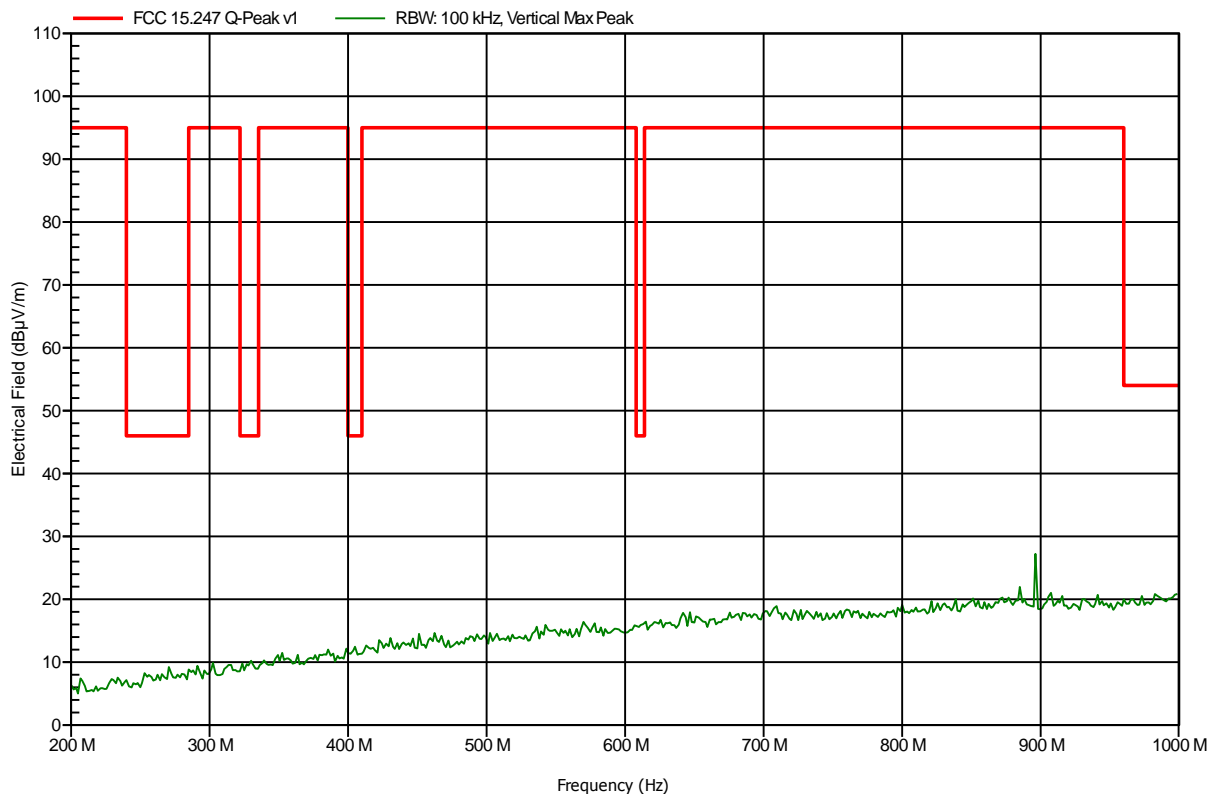


Spurious emissions according to FCC 15.247

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Manufacturer:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Module BT2.1
Model:	PAN1322
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	TX; basic, DH5; 2402 MHz
Test Date:	2014-03-24
Note:	worst case

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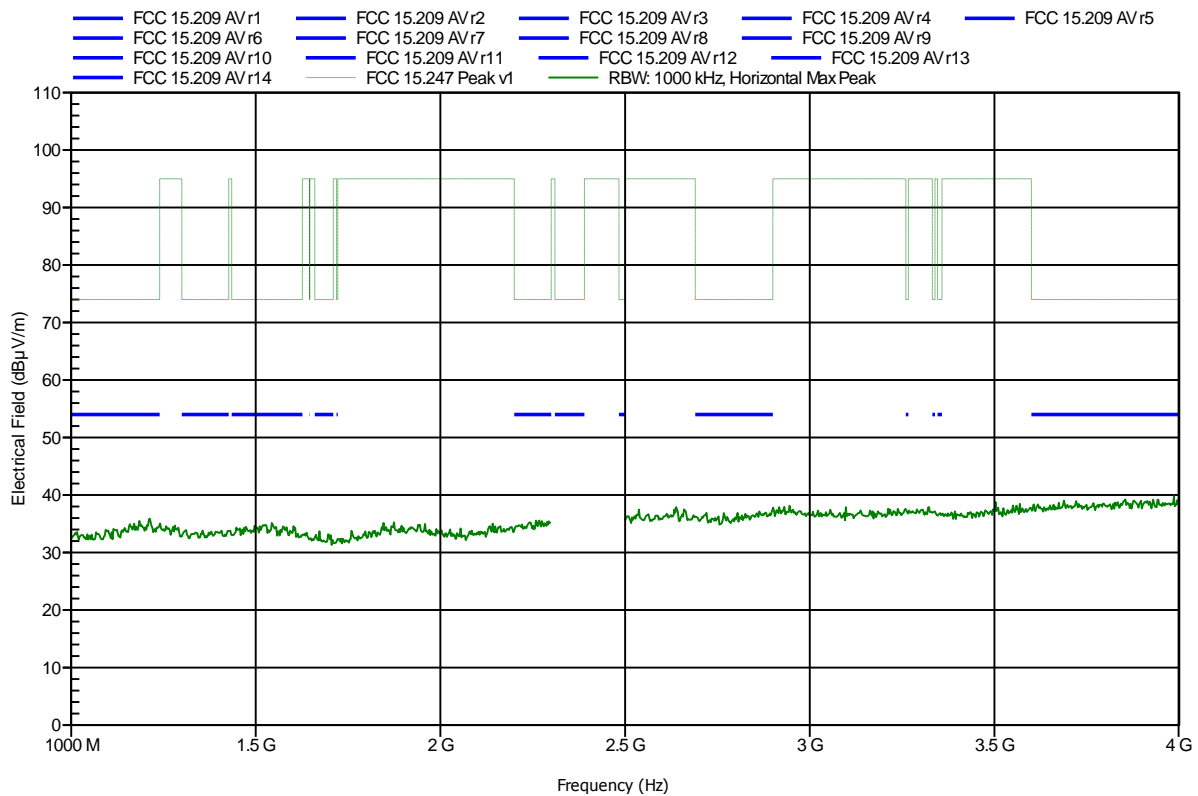


Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Module BT2.1
 Model: PAN1322
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; basic, DH5; 2402 MHz
 Test Date: 2014-03-24
 Note:

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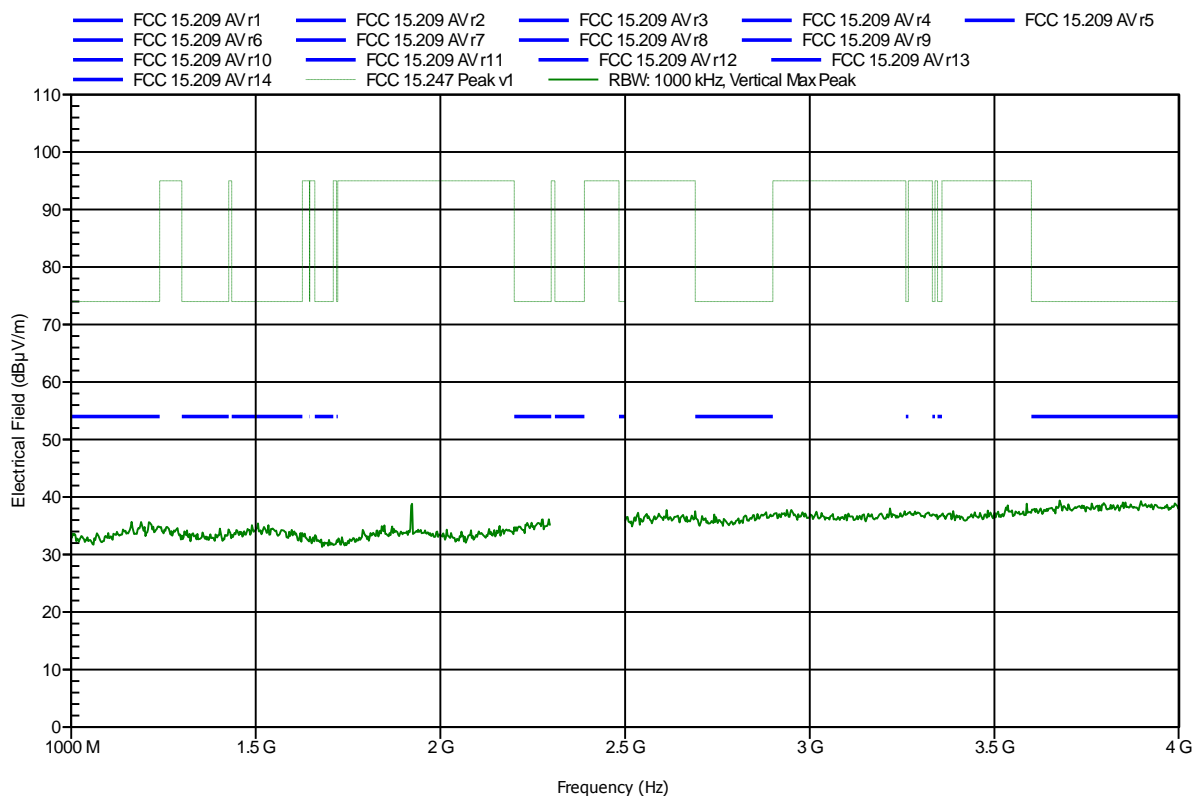


Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Module BT2.1
 Model: PAN1322
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; basic, DH5; 2402 MHz
 Test Date: 2014-03-24
 Note:

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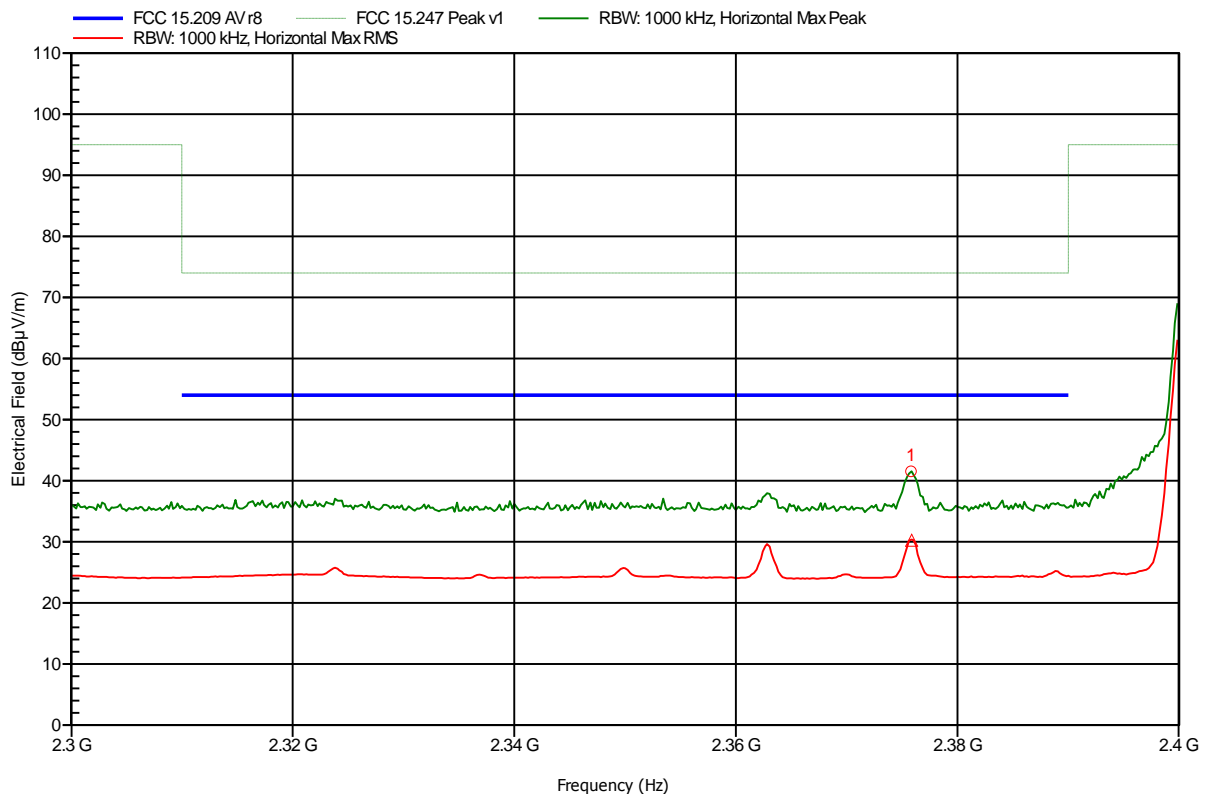


Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Module BT2.1
 Model: PAN1322
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; basic, DH5; 2402 MHz
 Test Date: 2014-03-24
 Note: lower bandedge

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Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.376 GHz	41.54 dBµV/m	74 dBµV/m	-32.46 dB	Pass
Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.376 GHz	30.37 dBµV/m	54 dBµV/m	-23.63 dB	Pass

Test Report No.: G0M-1311-3395-TFC247BT-V01

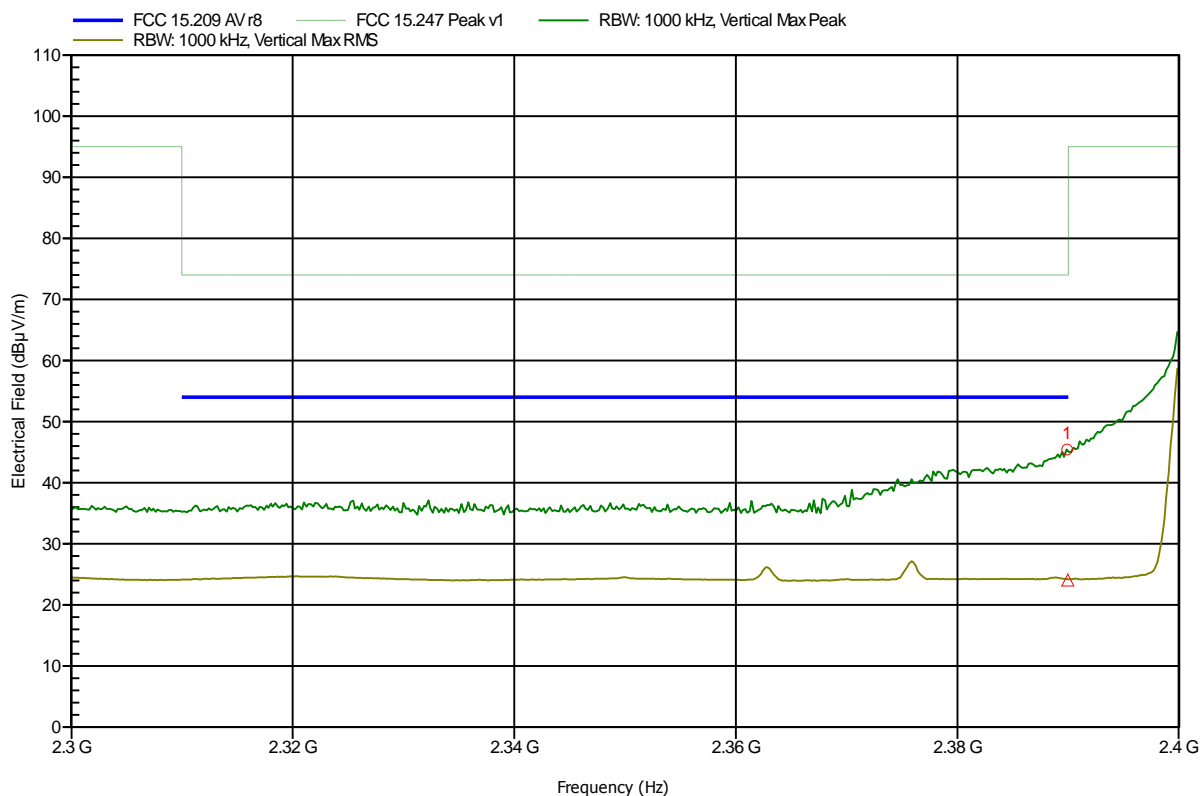
 Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Module BT2.1
 Model: PAN1322
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; basic, DH5; 2402 MHz
 Test Date: 2014-03-24
 Note: lower bandedge

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Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.39 GHz	45.44 dBµV/m	74 dBµV/m	-28.56 dB	Pass
Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.39 GHz	24.18 dBµV/m	54 dBµV/m	-29.82 dB	Pass

Test Report No.: G0M-1311-3395-TFC247BT-V01

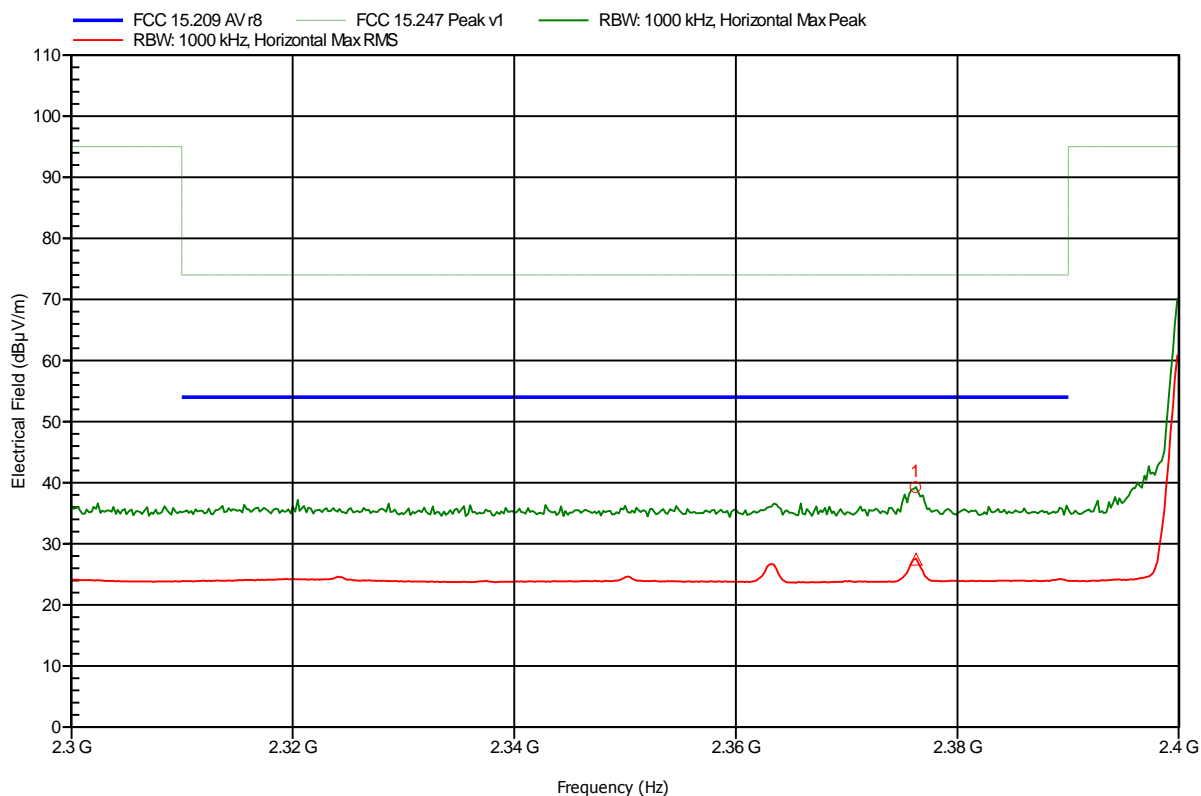
 Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Module BT2.1
 Model: PAN1322
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; EDR, 2DH5; 2402 MHz
 Test Date: 2014-03-24
 Note: lower bandedge

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Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.376 GHz	39.29 dBµV/m	74 dBµV/m	-34.71 dB	Pass
Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.376 GHz	27.6 dBµV/m	54 dBµV/m	-26.4 dB	Pass

Test Report No.: G0M-1311-3395-TFC247BT-V01

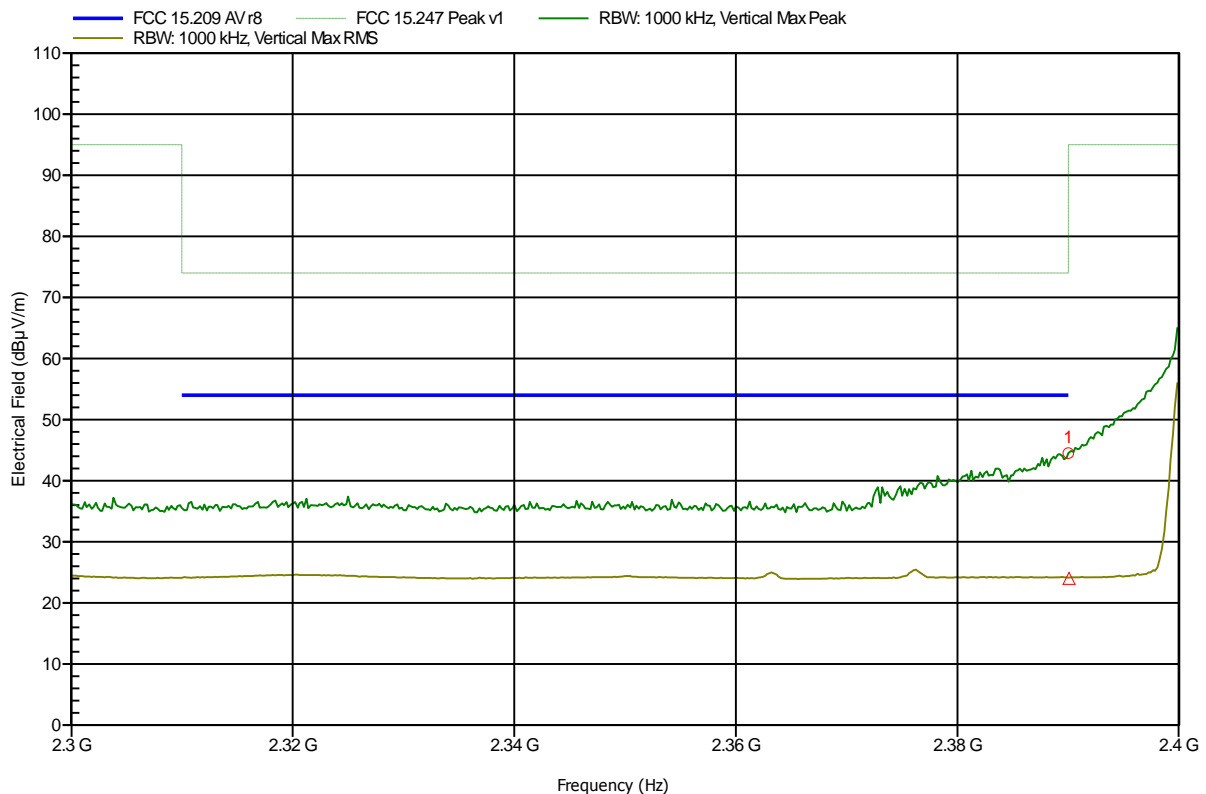
 Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Module BT2.1
 Model: PAN1322
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; EDR, 2DH5; 2402 MHz
 Test Date: 2014-03-24
 Note: lower bandedge

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Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.39 GHz	44.52 dBµV/m	74 dBµV/m	-29.48 dB	Pass
Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.39 GHz	24.12 dBµV/m	54 dBµV/m	-29.88 dB	Pass

Test Report No.: G0M-1311-3395-TFC247BT-V01

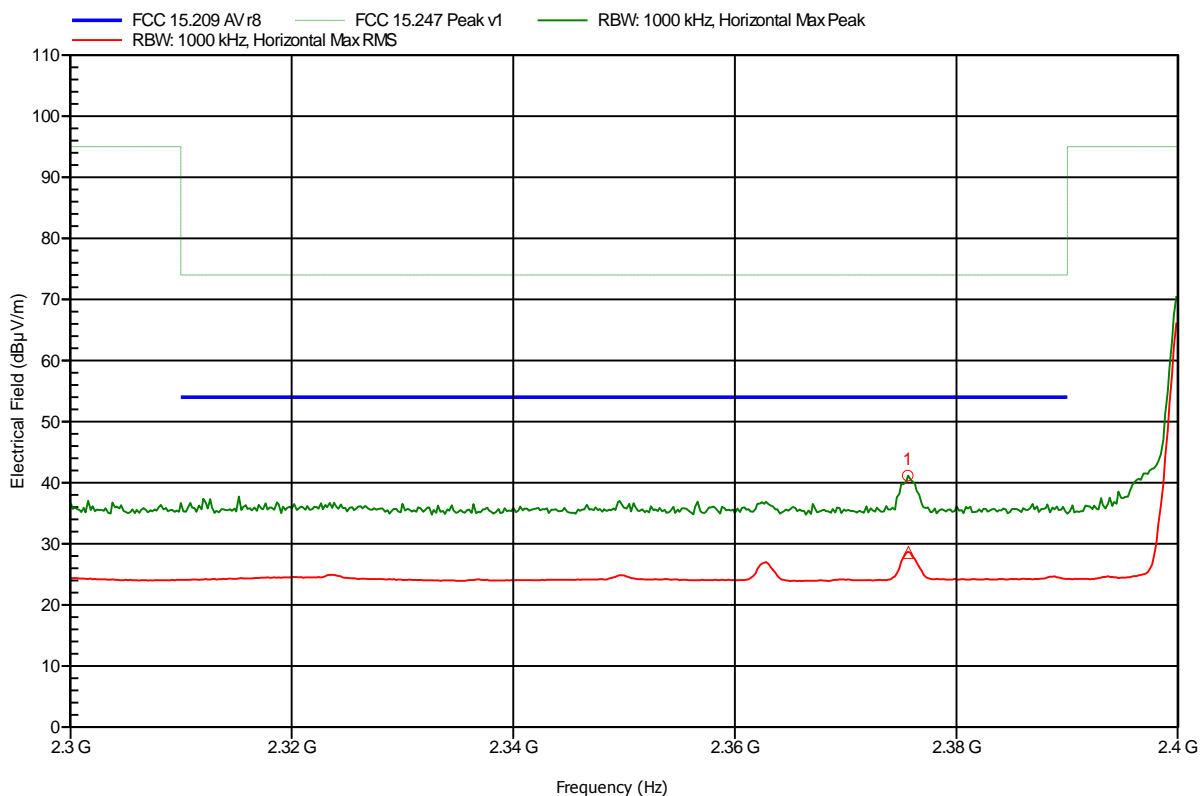
 Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Module BT2.1
 Model: PAN1322
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; EDR, 3DH5; 2402 MHz
 Test Date: 2014-03-24
 Note: lower bandedge

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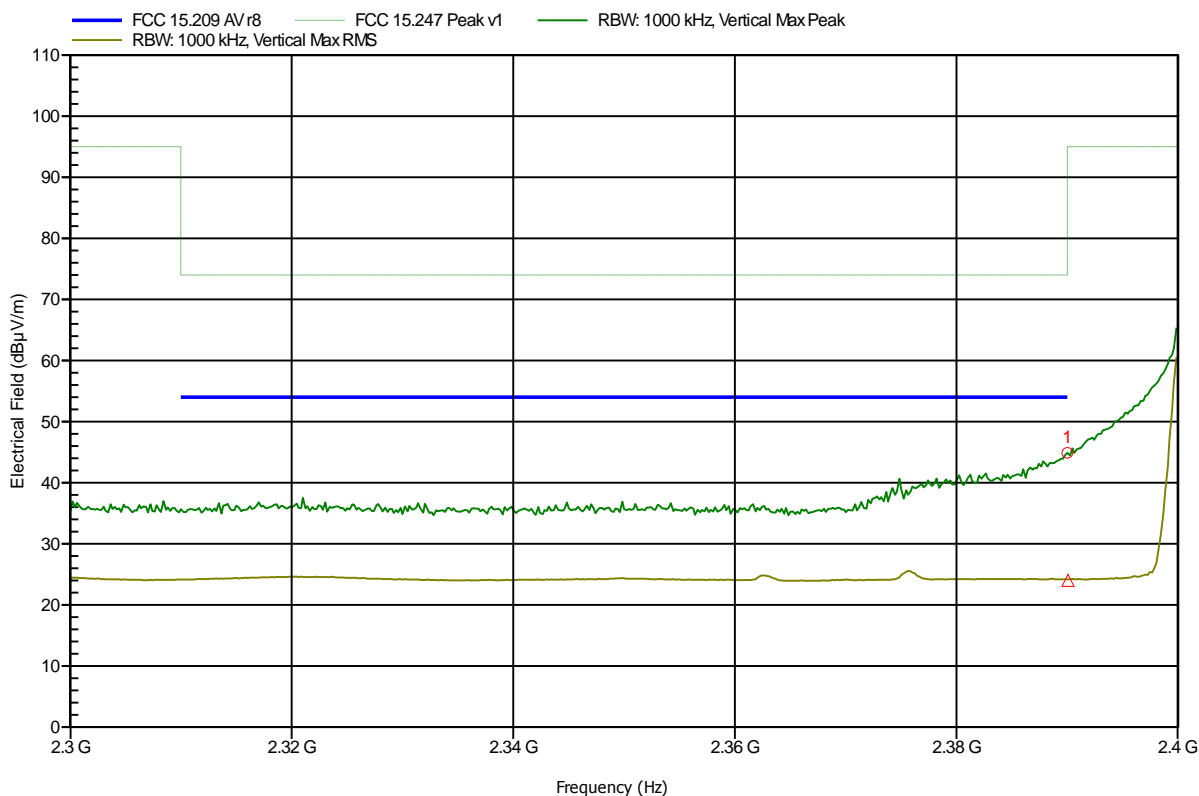
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.376 GHz	41.16 dBµV/m	74 dBµV/m	-32.84 dB	Pass
Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.376 GHz	28.7 dBµV/m	54 dBµV/m	-25.3 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Module BT2.1
 Model: PAN1322
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; EDR, 3DH5; 2402 MHz
 Test Date: 2014-03-24
 Note: lower bandedge

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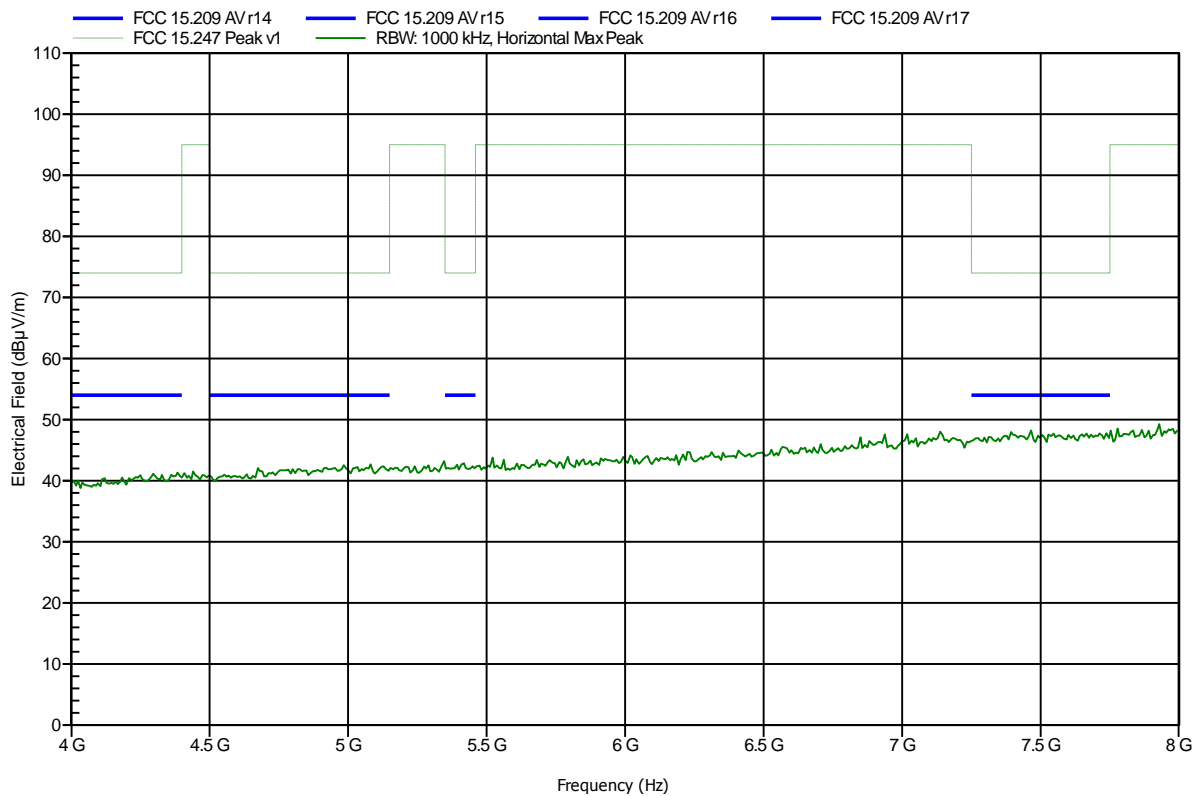
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.39 GHz	44.88 dBµV/m	74 dBµV/m	-29.12 dB	Pass
Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.39 GHz	24.12 dBµV/m	54 dBµV/m	-29.88 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Module BT2.1
 Model: PAN1322
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; basic, DH5; 2402 MHz
 Test Date: 2014-03-24
 Note:

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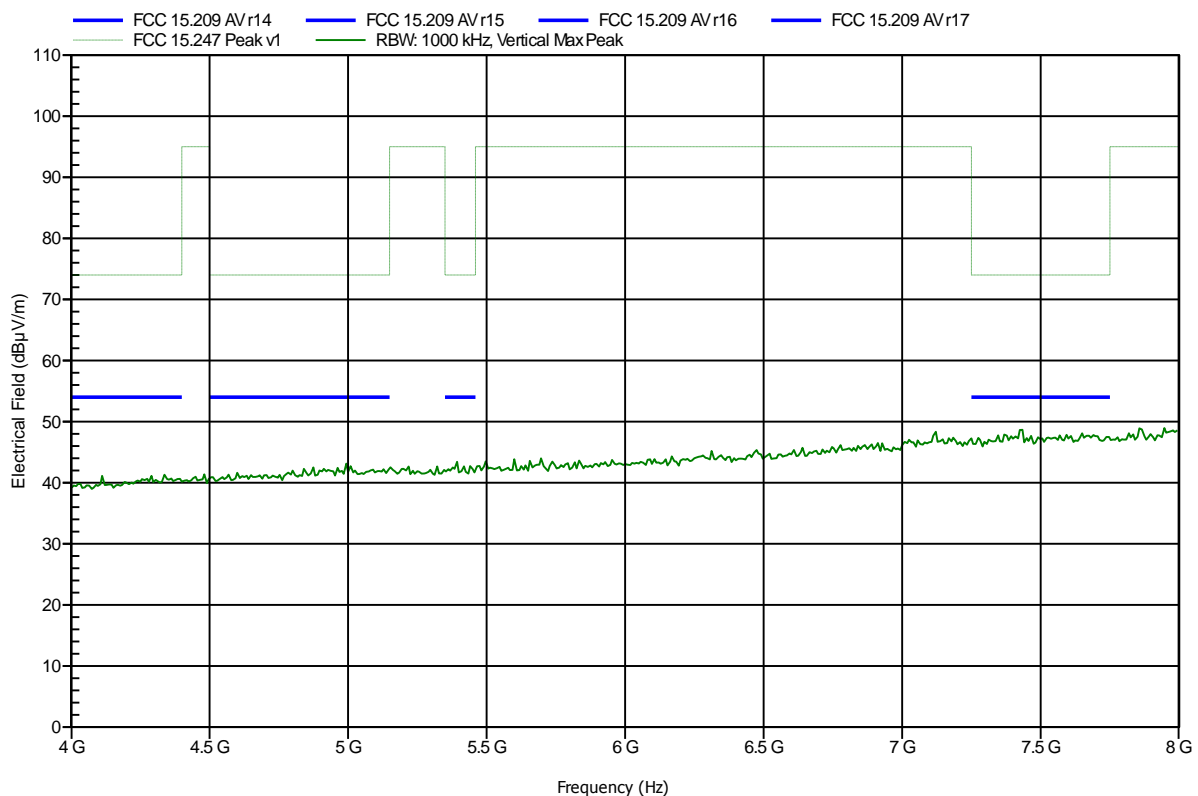


Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Module BT2.1
 Model: PAN1322
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; basic, DH5; 2402 MHz
 Test Date: 2014-03-24
 Note:

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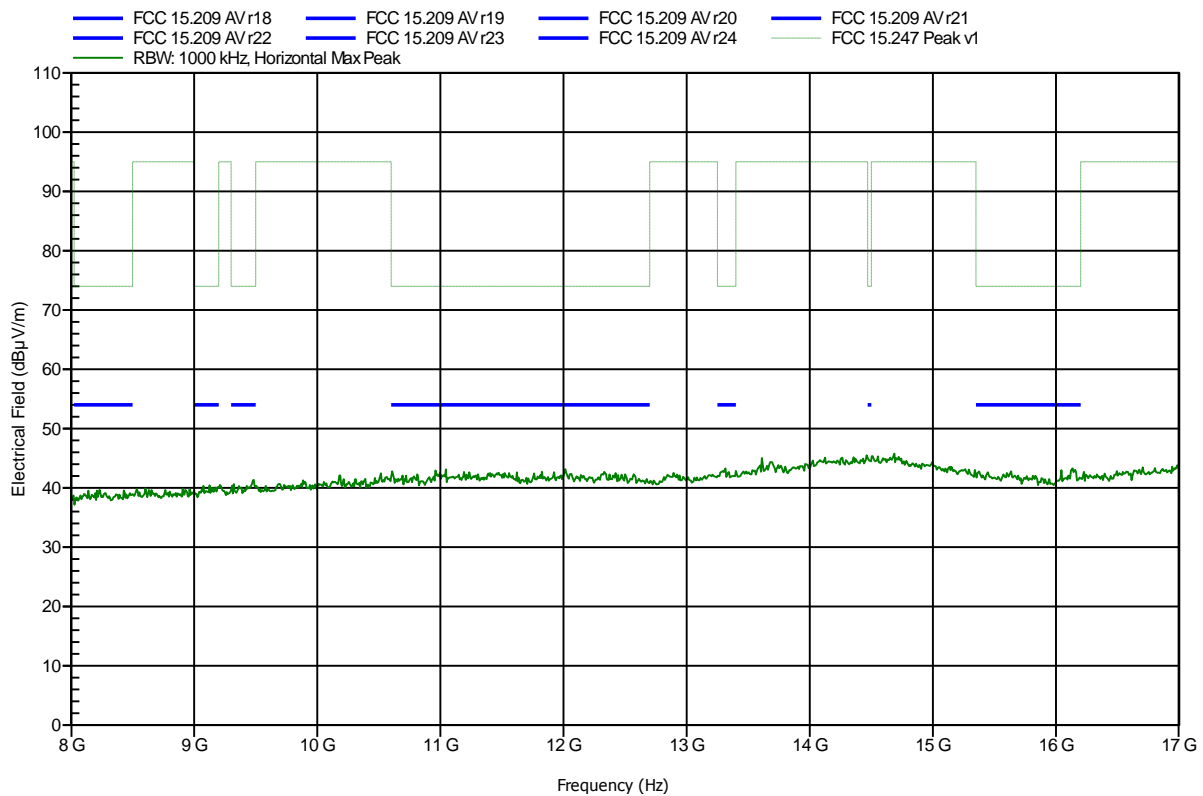


Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Module BT2.1
 Model: PAN1322
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 100 cm converted to 3m
 Mode: TX; basic, DH5; 2402 MHz
 Test Date: 2014-03-24
 Note: worst case

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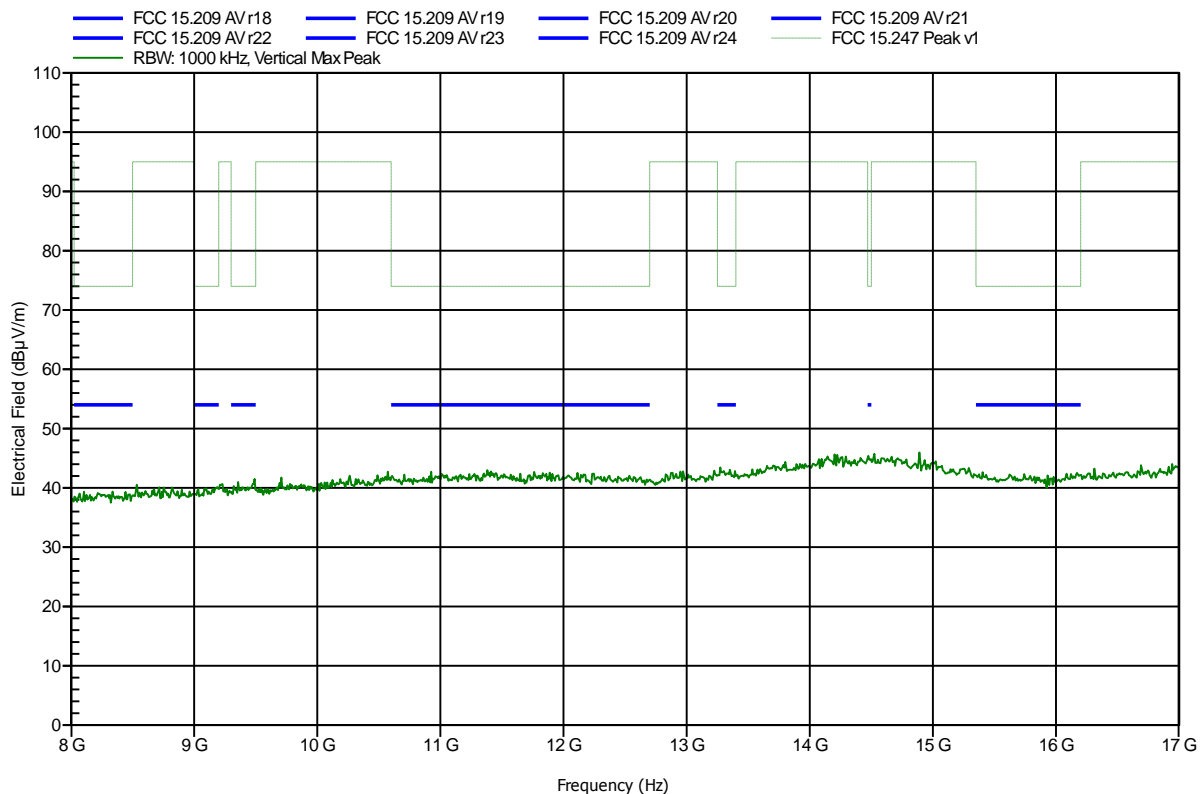


Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Module BT2.1
 Model: PAN1322
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 100 cm converted to 3m
 Mode: TX; basic, DH5; 2402 MHz
 Test Date: 2014-03-24
 Note: worst case

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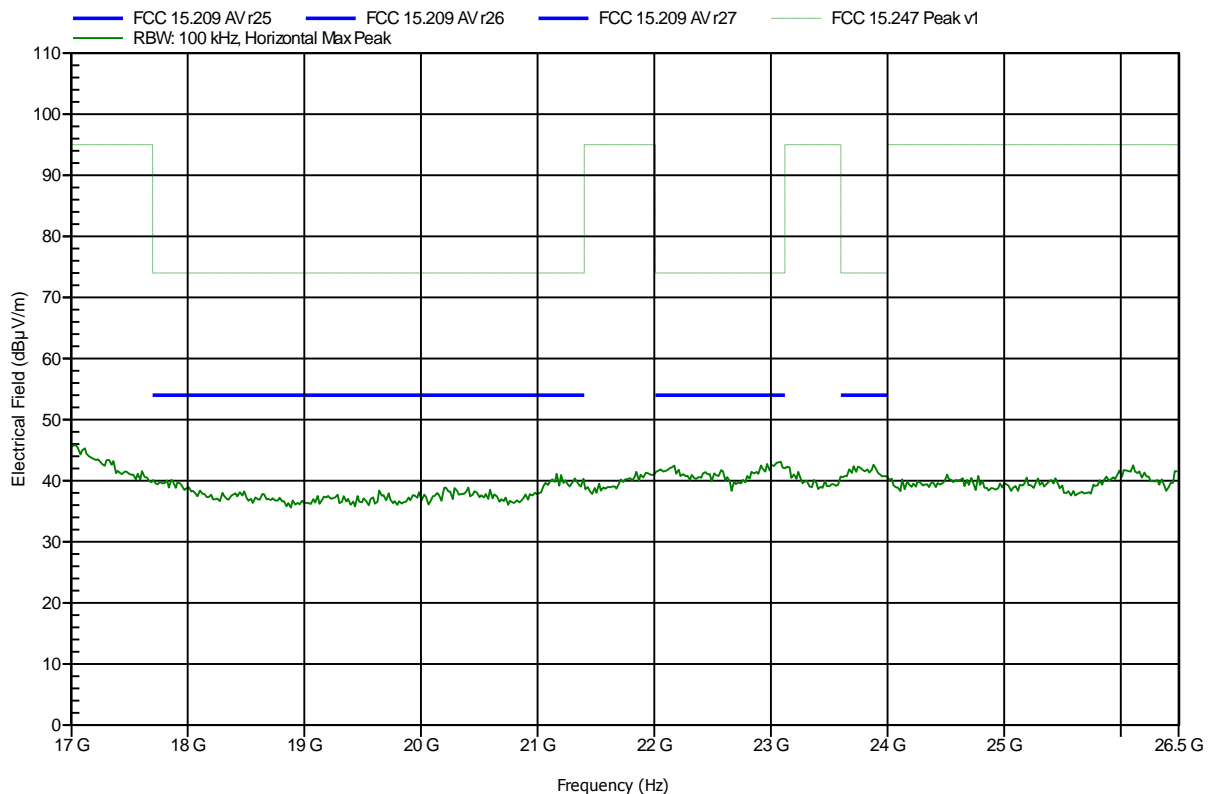


Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Module BT2.1
 Model: PAN1322
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
 Antenna: Rohde & Schwarz HL 025, Horizontal
 Measurement distance: 100 cm
 Mode: TX; basic, DH5; 2402 MHz
 Test Date: 2014-03-24
 Note: worst case

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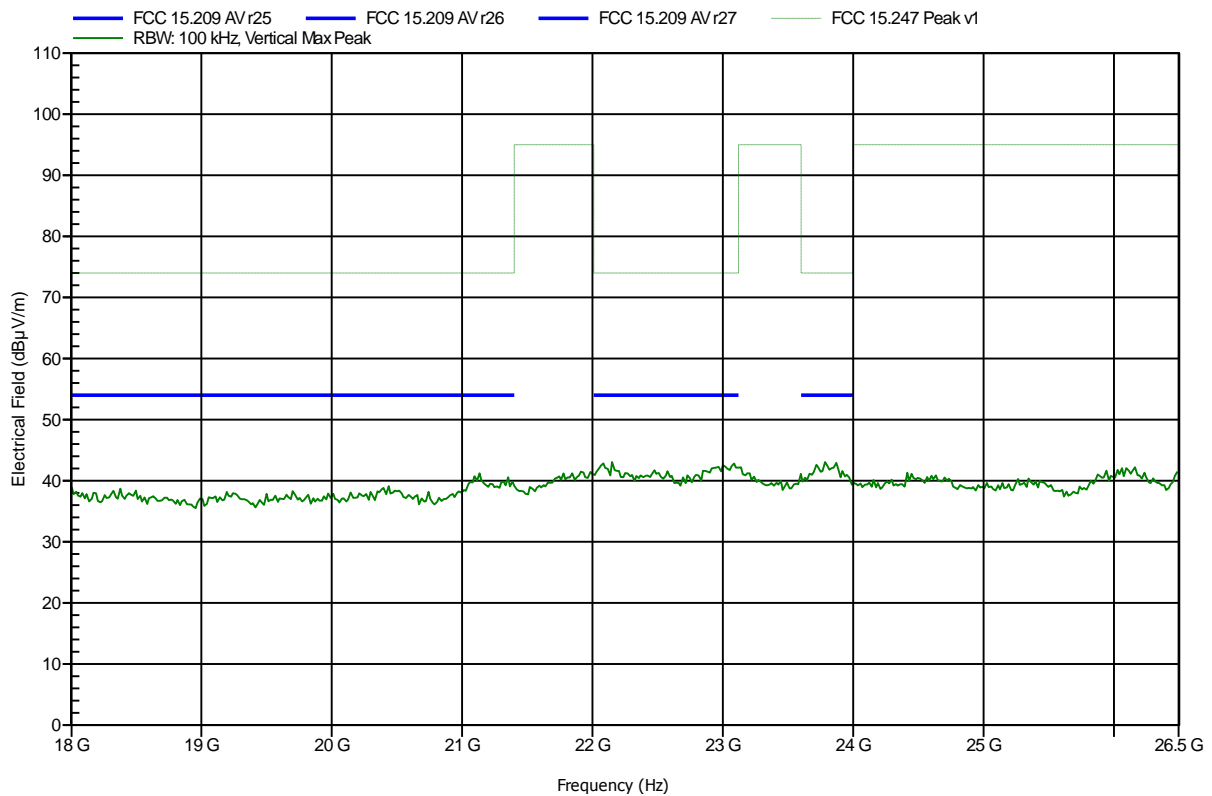


Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Module BT2.1
Model:	PAN1322
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
Antenna:	Rohde & Schwarz HL 025, Vertical
Measurement distance:	100 cm
Mode:	TX; basic, DH5; 2402 MHz
Test Date:	2014-03-24
Note:	worst case

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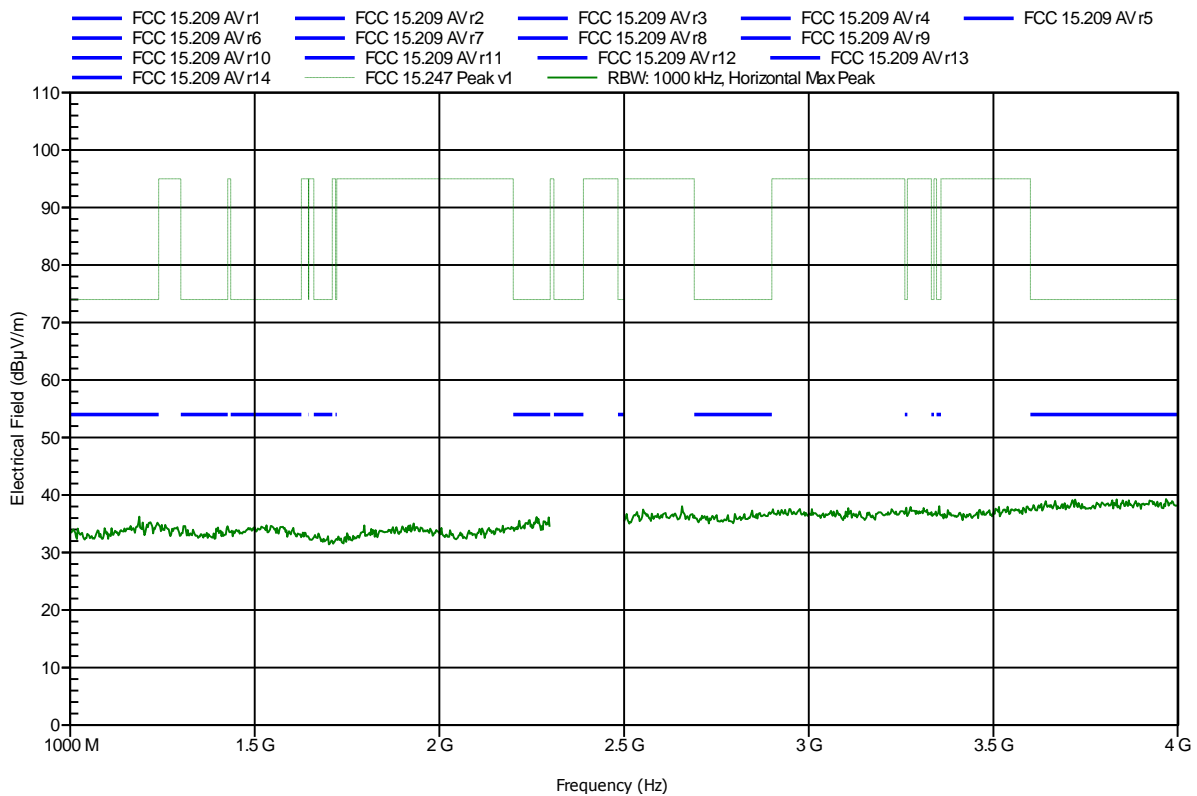


Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Module BT2.1
 Model: PAN1322
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; basic, DH5; 2441 MHz
 Test Date: 2014-03-24
 Note:

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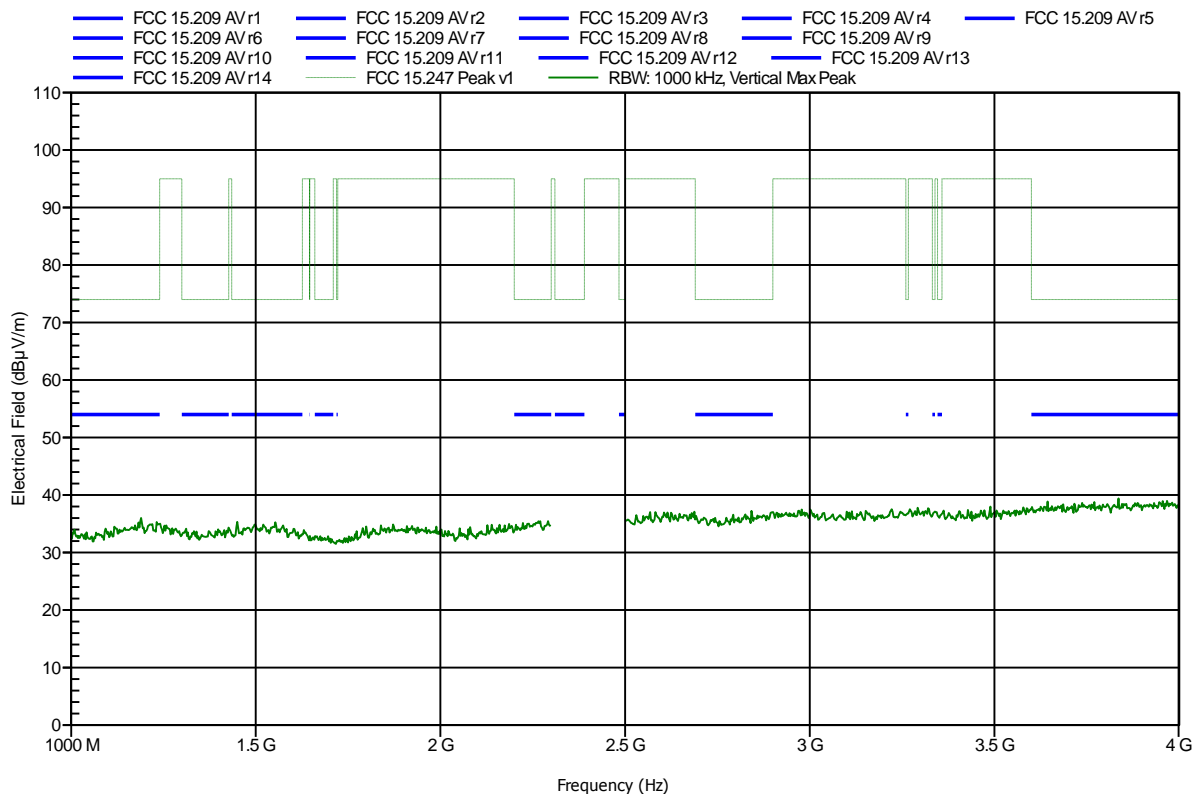


Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Module BT2.1
 Model: PAN1322
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; basic, DH5; 2441 MHz
 Test Date: 2014-03-24
 Note:

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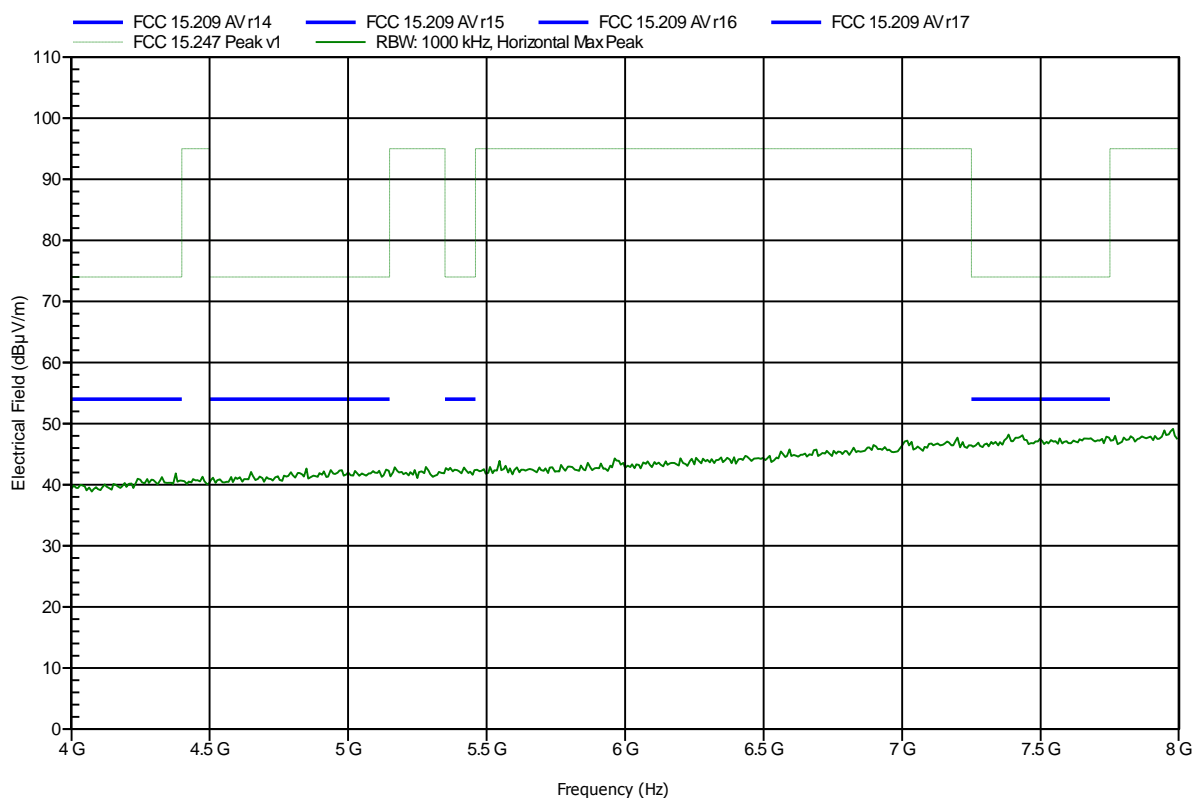


Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Module BT2.1
 Model: PAN1322
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; basic, DH5; 2441 MHz
 Test Date: 2014-03-24
 Note:

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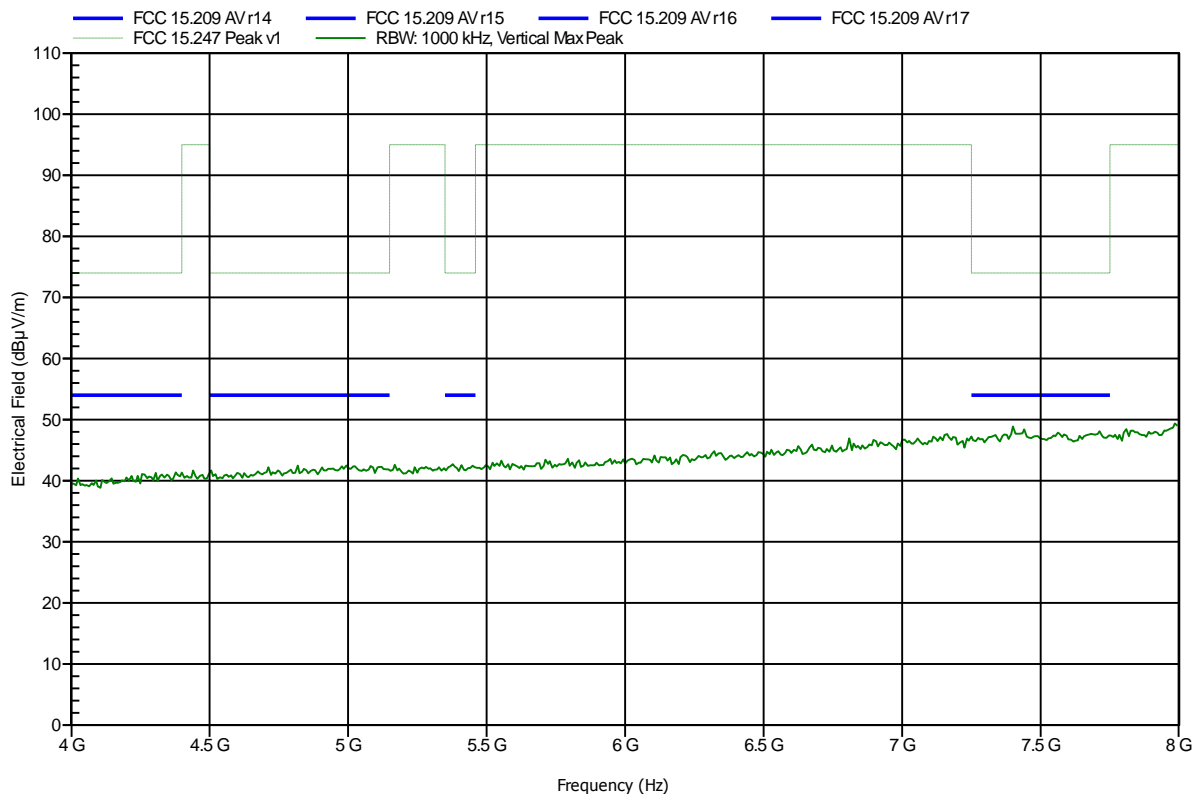


Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Module BT2.1
 Model: PAN1322
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; basic, DH5; 2441 MHz
 Test Date: 2014-03-24
 Note:

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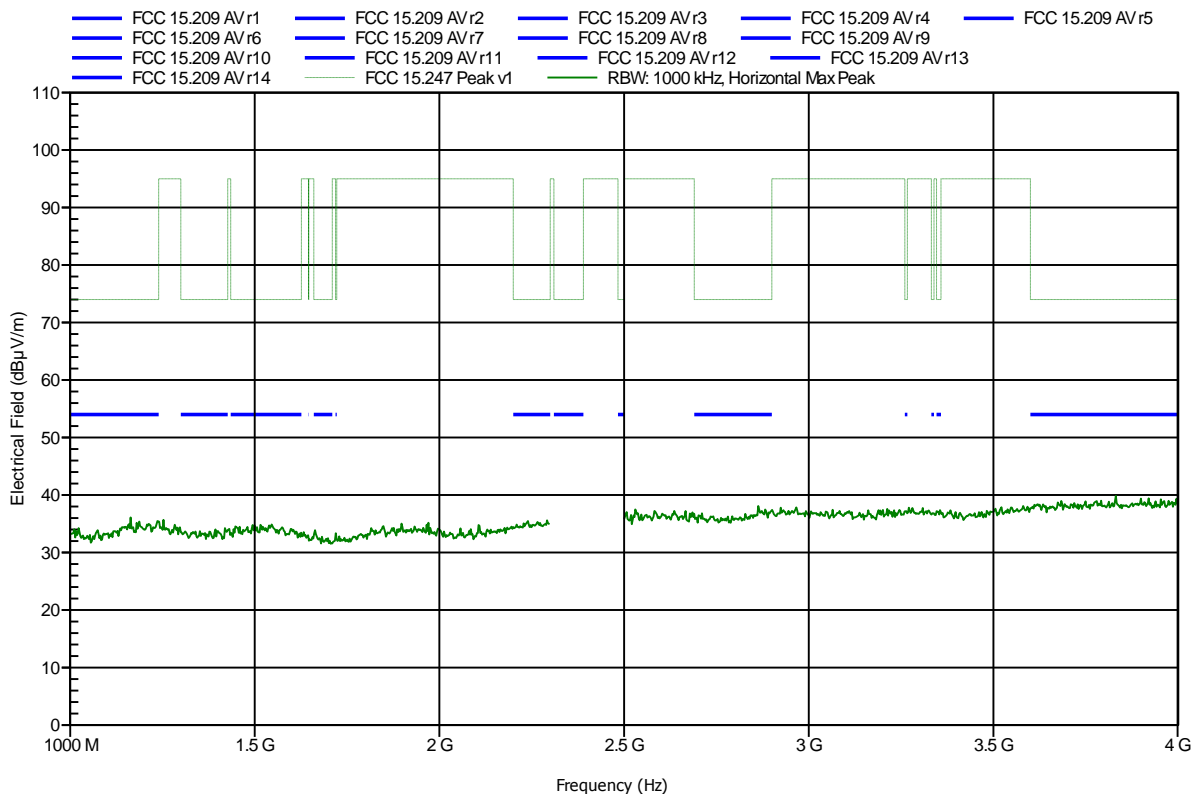


Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Module BT2.1
 Model: PAN1322
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; basic, DH5; 2480 MHz
 Test Date: 2014-03-24
 Note:

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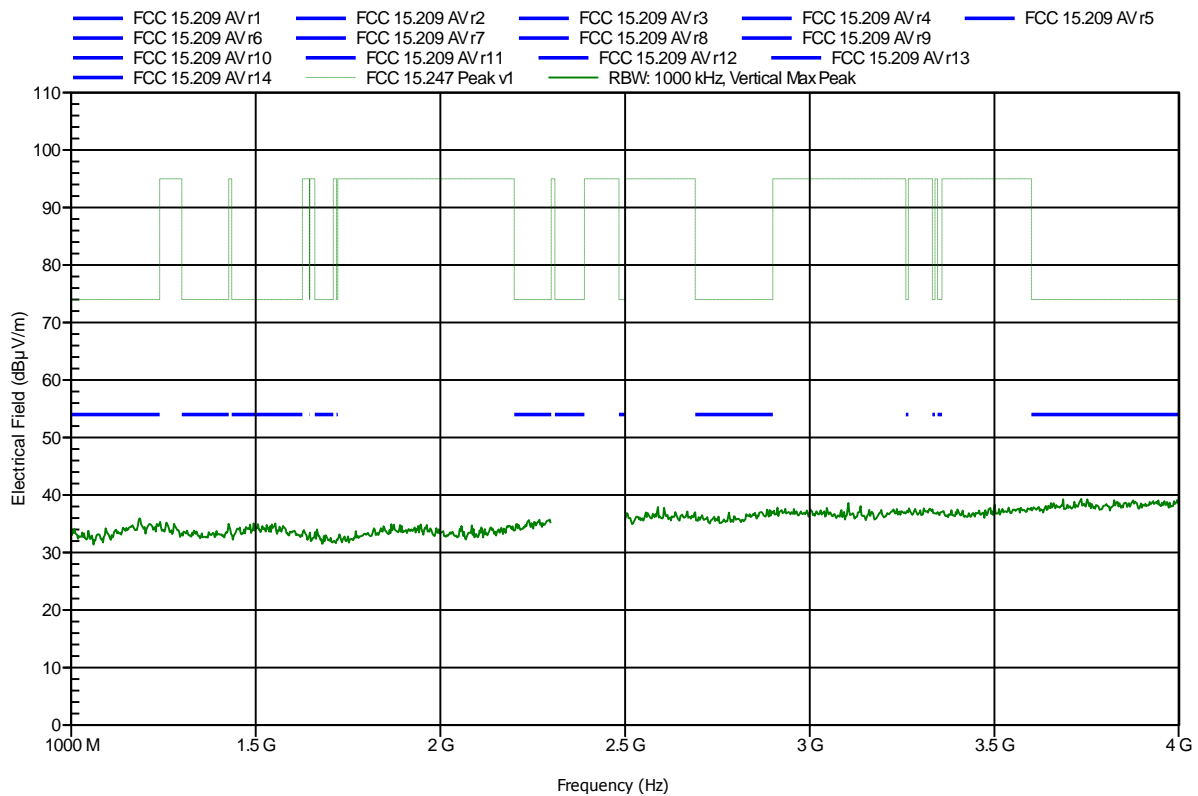


Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Module BT2.1
 Model: PAN1322
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; basic, DH5; 2480 MHz
 Test Date: 2014-03-24
 Note:

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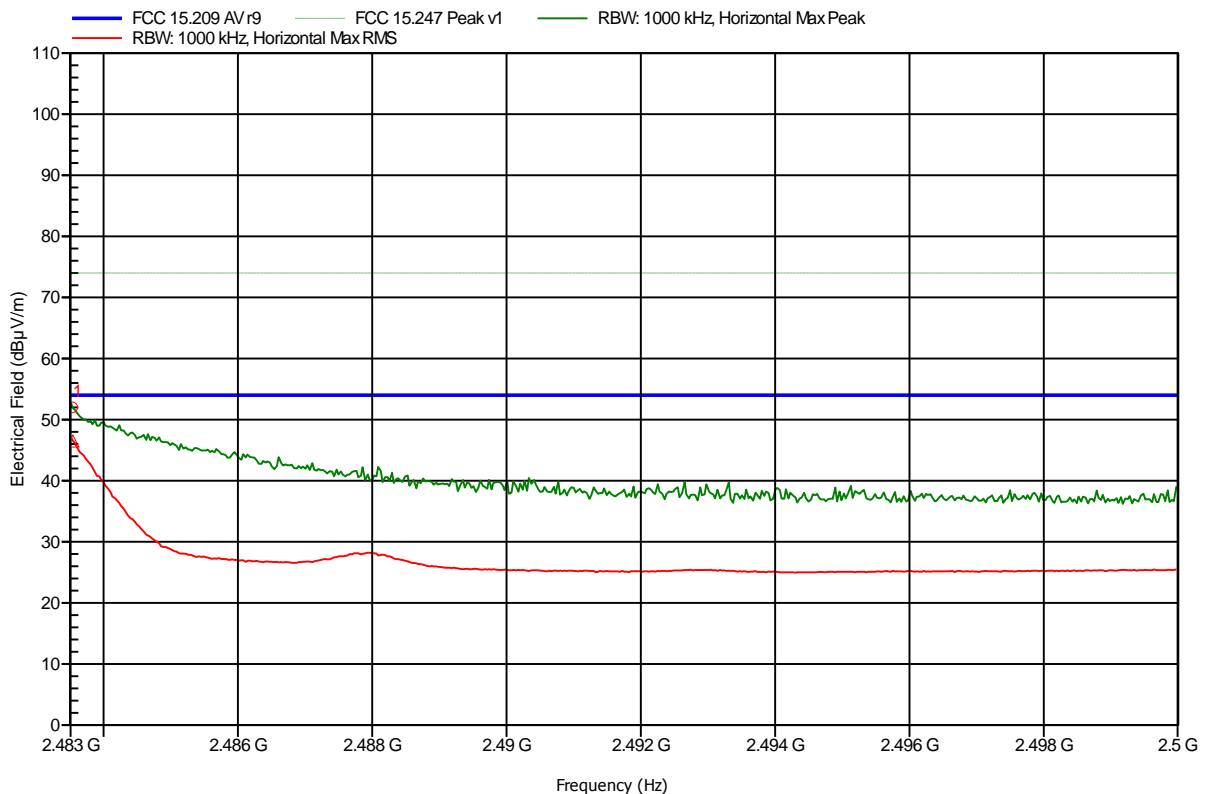


Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Module BT2.1
 Model: PAN1322
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; basic, DH5; 2480 MHz
 Test Date: 2014-03-24
 Note: upper bandedge

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Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.4835 GHz	52 dBµV/m	74 dBµV/m	-22 dB	Pass
Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.4835 GHz	46.59 dBµV/m	54 dBµV/m	-7.41 dB	Pass

Test Report No.: G0M-1311-3395-TFC247BT-V01

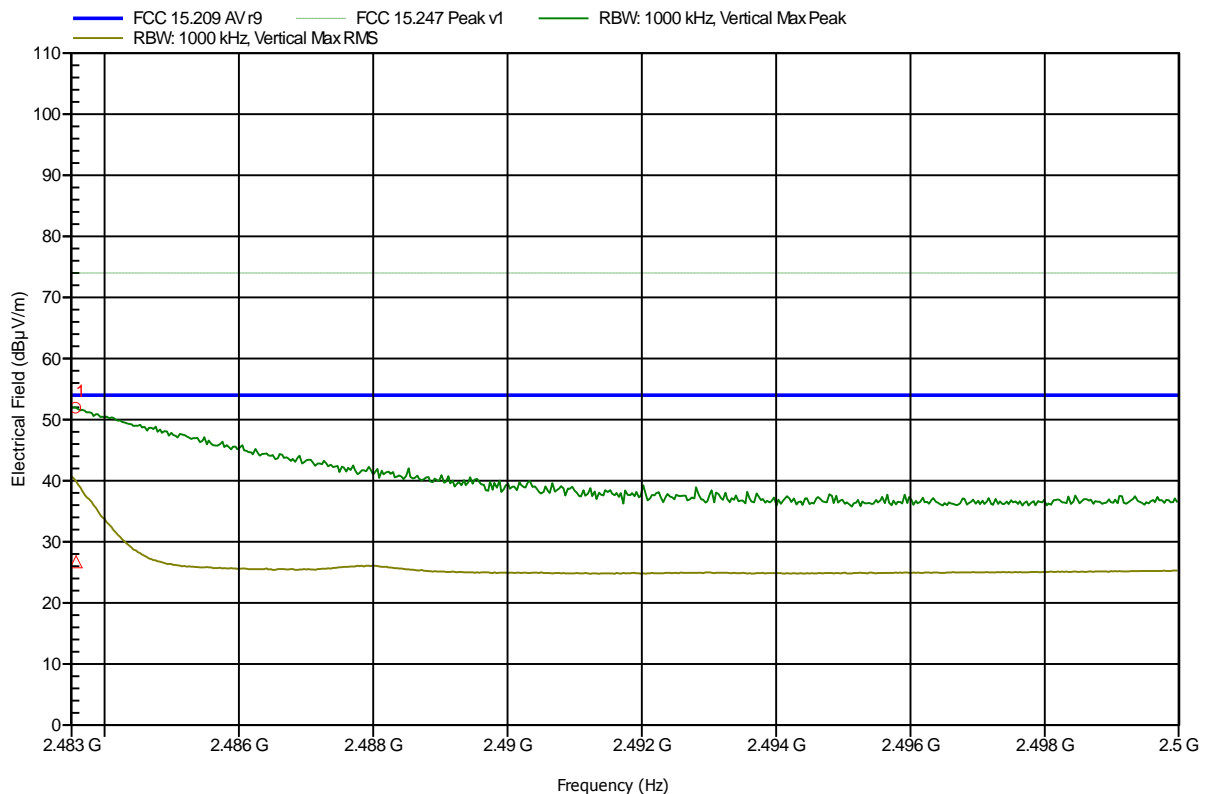
 Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Module BT2.1
 Model: PAN1322
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; basic, DH5; 2480 MHz
 Test Date: 2014-03-24
 Note: upper bandedge

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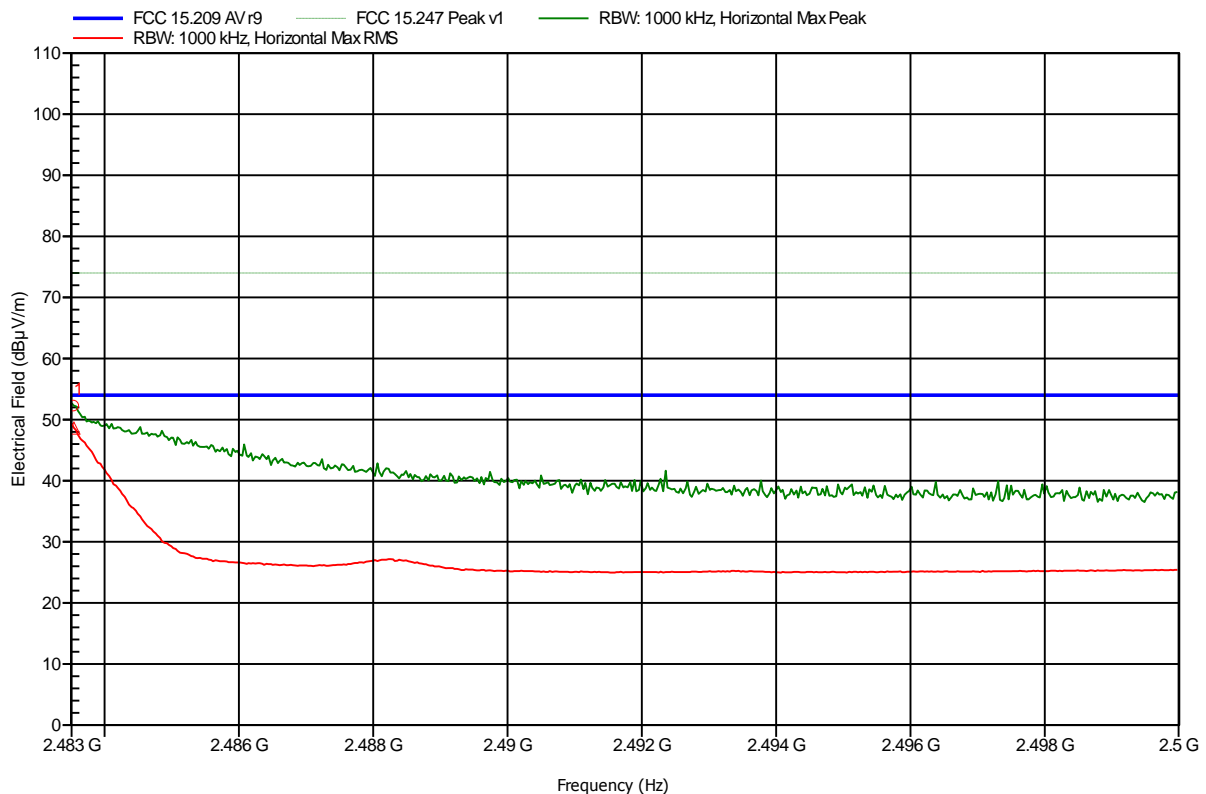
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.4836 GHz	51.96 dBµV/m	74 dBµV/m	-22.04 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Module BT2.1
 Model: PAN1322
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; EDR, 2DH5; 2480 MHz
 Test Date: 2014-03-24
 Note: upper bandedge

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Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.4835 GHz	52.3 dBµV/m	74 dBµV/m	-21.7 dB	Pass

Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.4835 GHz	48.71 dBµV/m	54 dBµV/m	-5.29 dB	Pass

Test Report No.: G0M-1311-3395-TFC247BT-V01

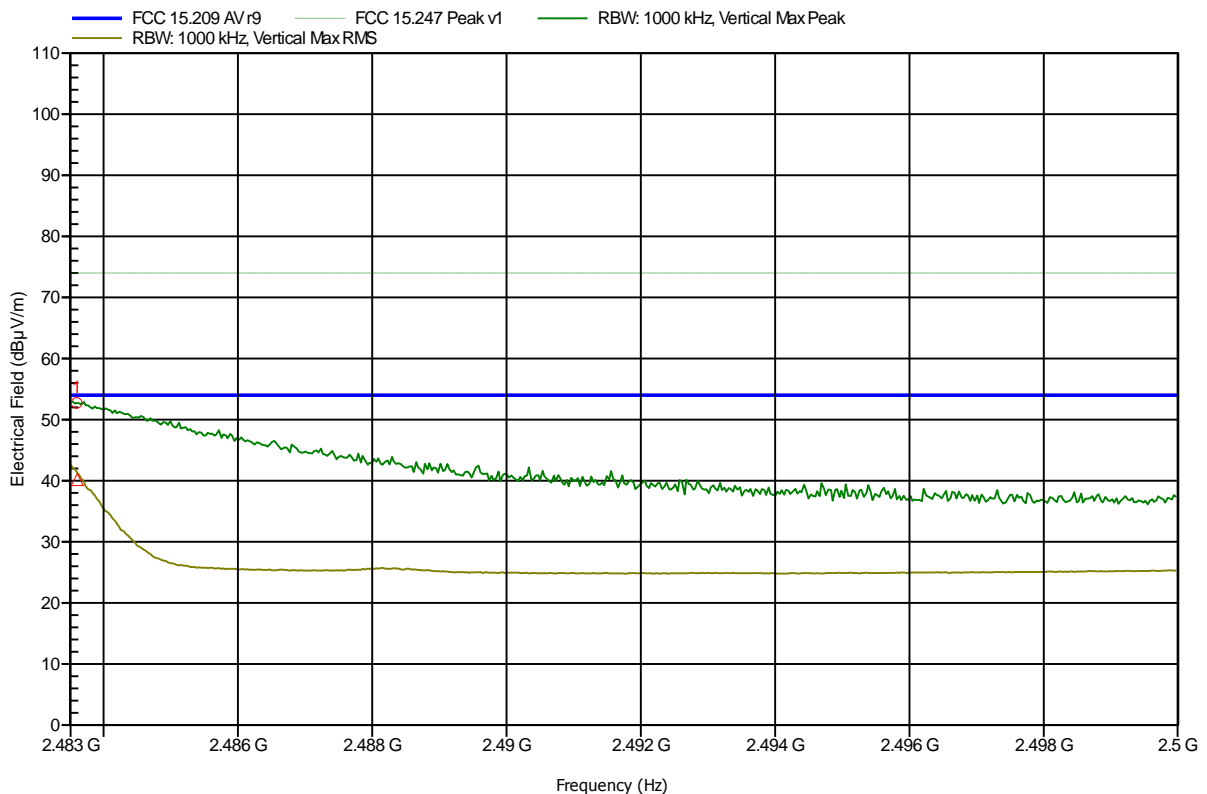
 Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Module BT2.1
 Model: PAN1322
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; EDR, 2DH5; 2480 MHz
 Test Date: 2014-03-24
 Note: upper bandedge

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Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.4836 GHz	52.74 dBµV/m	74 dBµV/m	-21.26 dB	Pass
Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.4836 GHz	40.3 dBµV/m	54 dBµV/m	-13.7 dB	Pass

Test Report No.: G0M-1311-3395-TFC247BT-V01

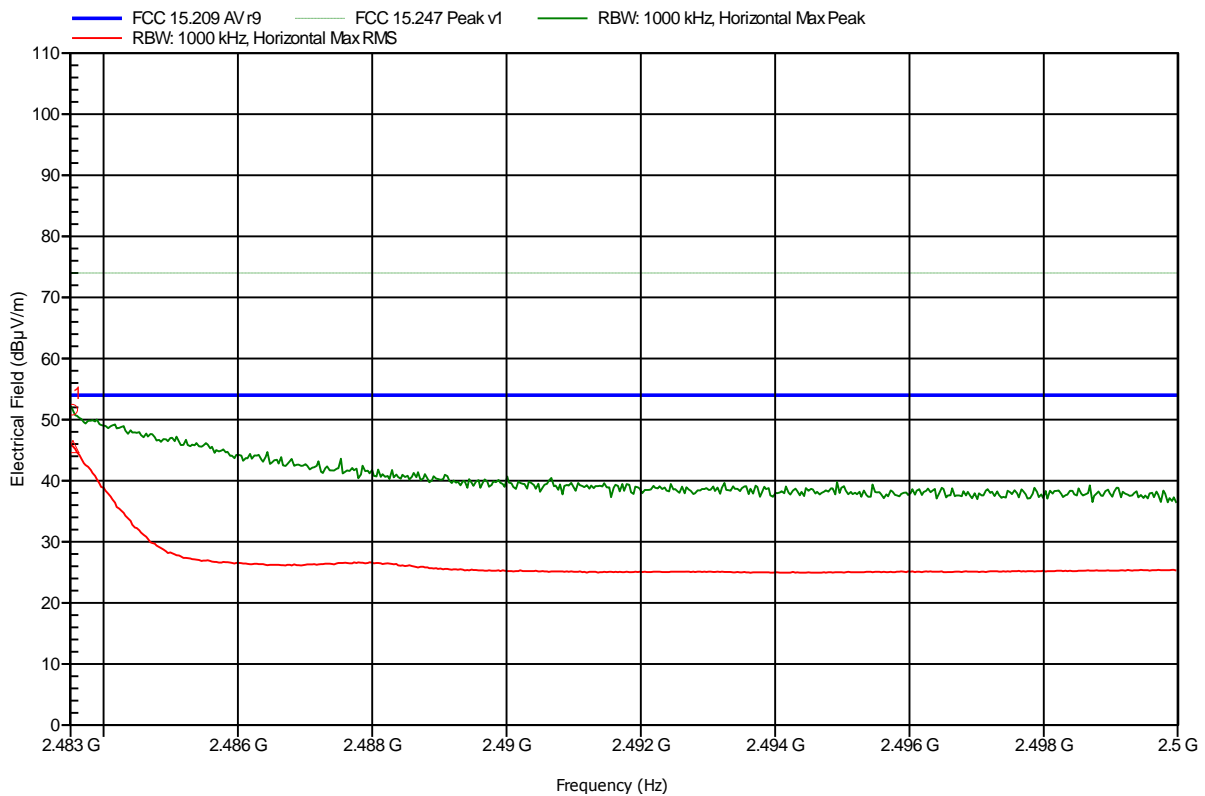
 Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Module BT2.1
 Model: PAN1322
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; EDR, 3DH5; 2480 MHz
 Test Date: 2014-03-24
 Note: upper bandedge

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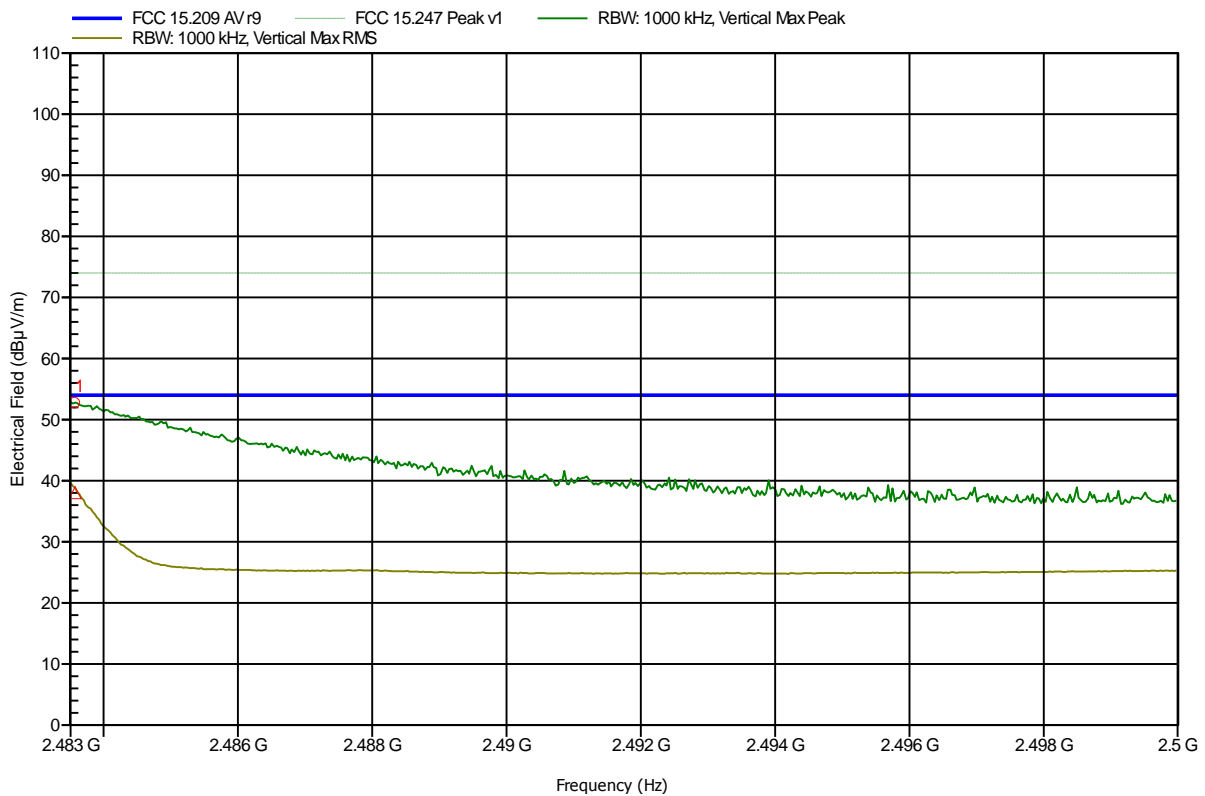
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.4835 GHz	51.62 dBµV/m	74 dBµV/m	-22.38 dB	Pass
Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.4835 GHz	45.69 dBµV/m	54 dBµV/m	-8.31 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Module BT2.1
 Model: PAN1322
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; EDR, 3DH5; 2480 MHz
 Test Date: 2014-03-24
 Note: upper bandedge

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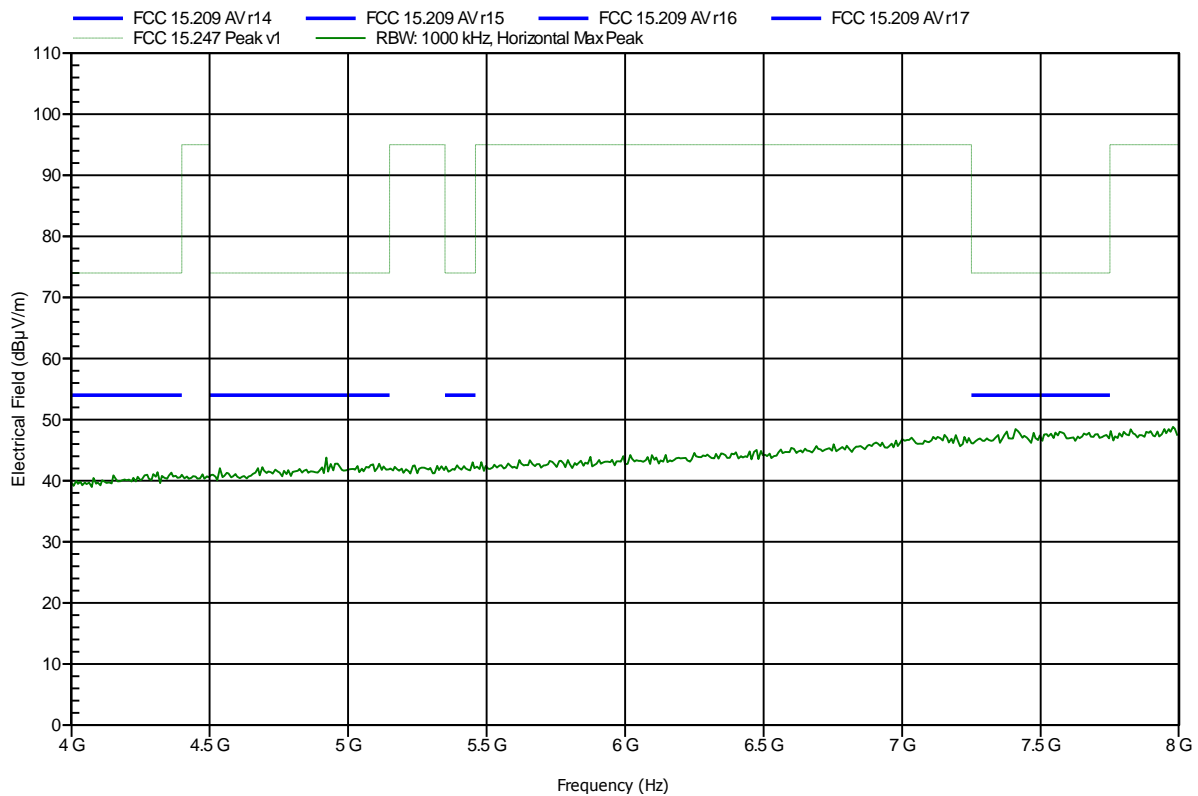
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.4836 GHz	52.79 dBµV/m	74 dBµV/m	-21.21 dB	Pass
Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.4836 GHz	38.15 dBµV/m	54 dBµV/m	-15.85 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Module BT2.1
 Model: PAN1322
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; basic, DH5; 2480 MHz
 Test Date: 2014-03-24
 Note:

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Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

Manufacturer: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Module BT2.1
 Model: PAN1322
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; basic, DH5; 2480 MHz
 Test Date: 2014-03-24
 Note:

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