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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**

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)..... : (Responsible for Test)	Wilfried Treffke	W. Treffke
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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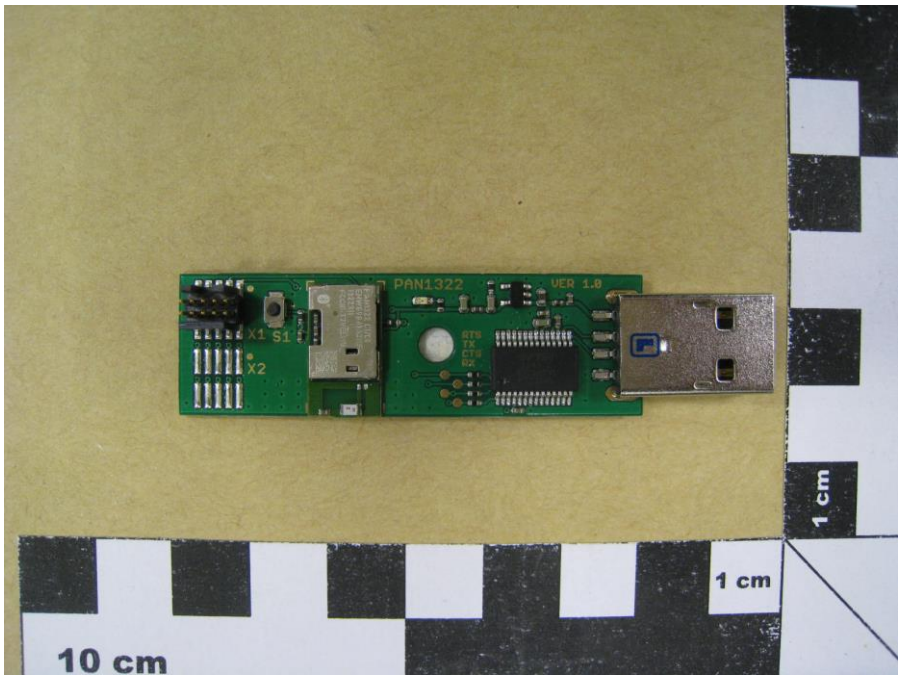
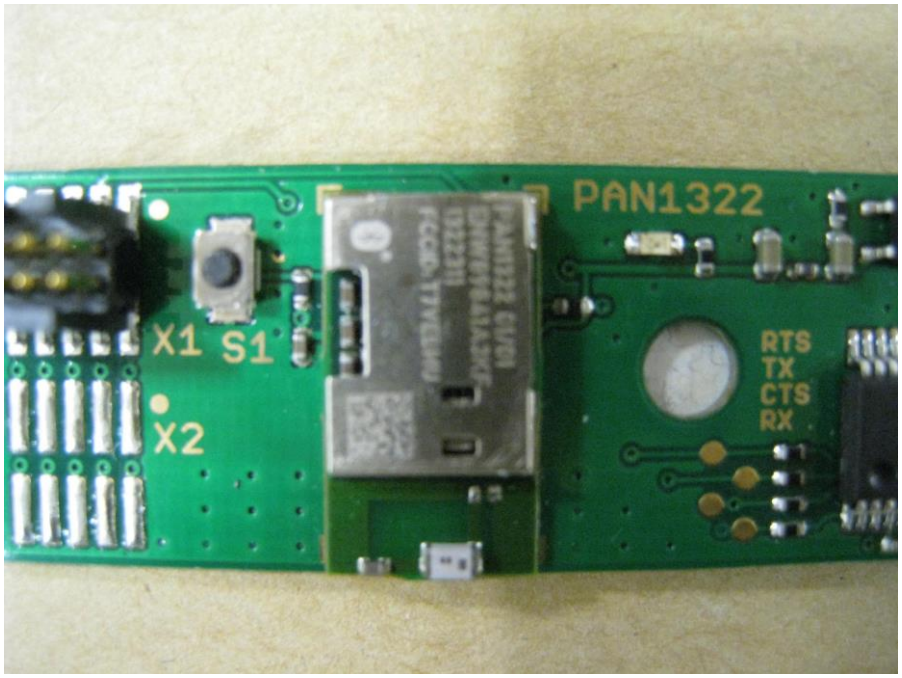
1 Equipment (Test item) Description

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

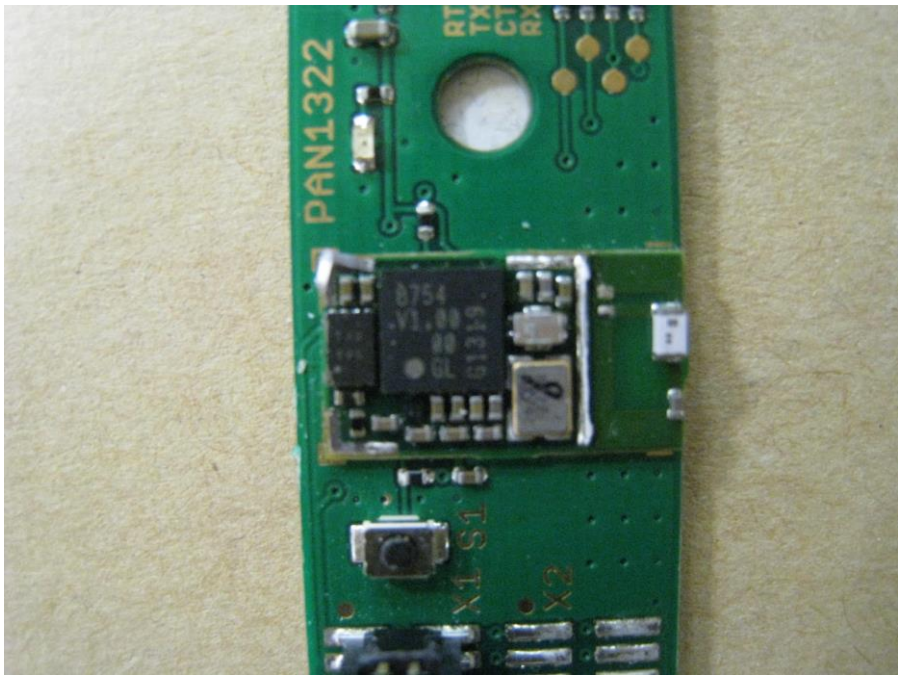
1.1 Photos – Equipment External

EUT ON EVALUATION BOARD TOP


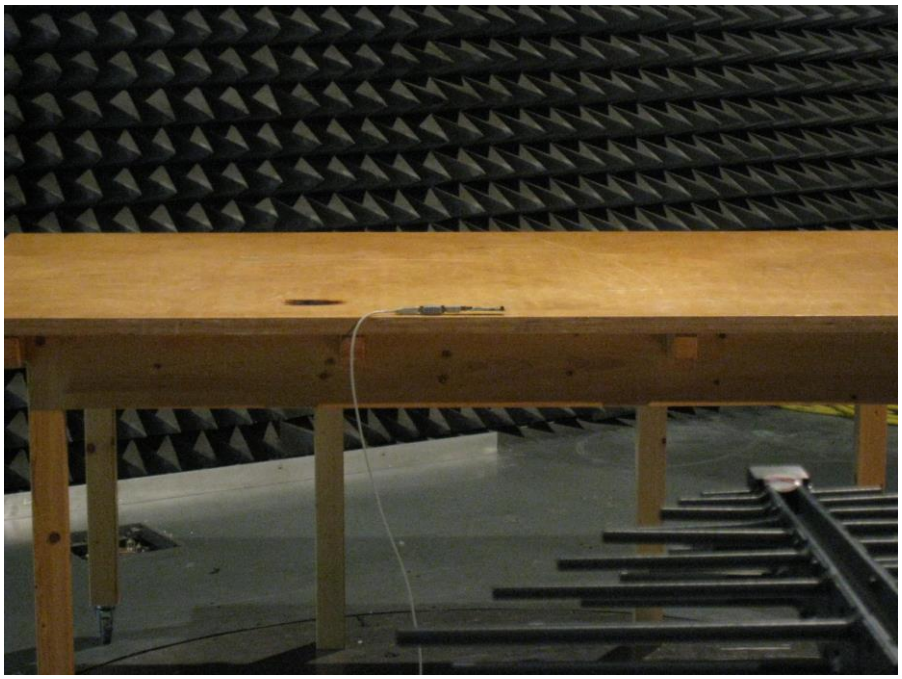
EUT EVALUATION BOARD BOTTOM

EUT TOP


1.2 Photos – Equipment internal

EUT TOP


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
None				

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

AE : Auxiliary/Associated Equipment, or

SIM : Simulator (Not Subjected to Test)

CABL : Connecting cables

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 = π/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 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 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

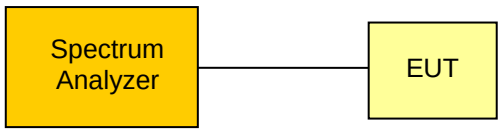
Maximum peak conducted power acc. FCC 15.247 / IC RSS-210	**Verdict: PASS**
EUT requirement rule parts and clause	Reference
	FCC 15.247(b)(1) / IC RSS-210 A8.4
Test according to measurement reference	Reference Method
	FCC Public Notice DA 00-705
Test frequency range	Tested frequencies
	F_{LOW} / F_{MID} / F_{HIGH}
Measurement mode	Peak
Maximum antenna gain	0.9 dBi ⇒ Limit correction = 0 dB

Limits

Limit	Condition
1 W (30 dBm)	Number of hopping channels ≥ 75
0.125 W (21 dBm)	75 > Number of hopping channels ≥ 15

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.

Test setup



Test procedure

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

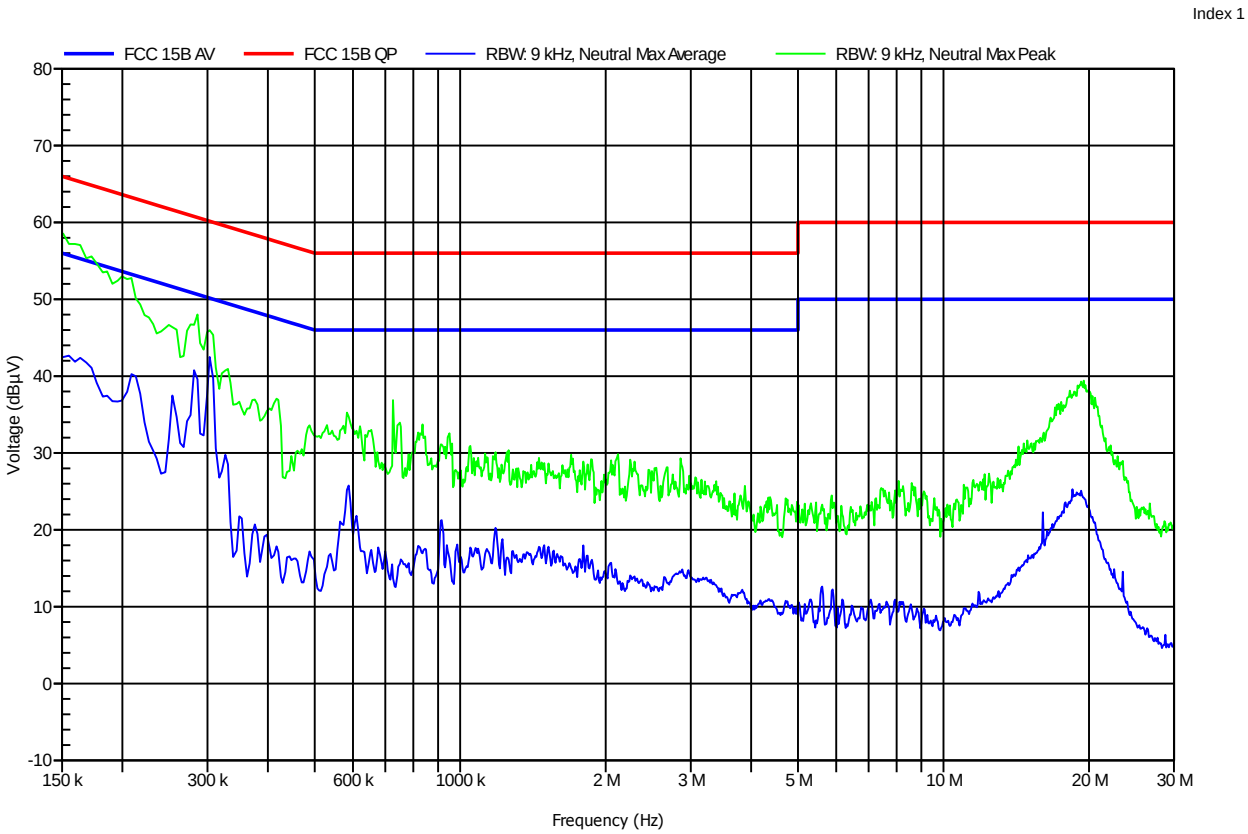
Power line conducted emissions acc. FCC 47 CFR 15.207 / IC RSS-Gen				Verdict: PASS
Test according referenced standards	Reference Method			
	ANSI C63.4			
Fully configured sample scanned over the following frequency range	Frequency range			
	0.15 MHz to 30 MHz			
Points of Application	Application Interface			
AC Mains	LISN			
EUT test mode	AC-Powerline			
Limits and results				
Frequency [MHz]	Quasi-Peak [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.				

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:	



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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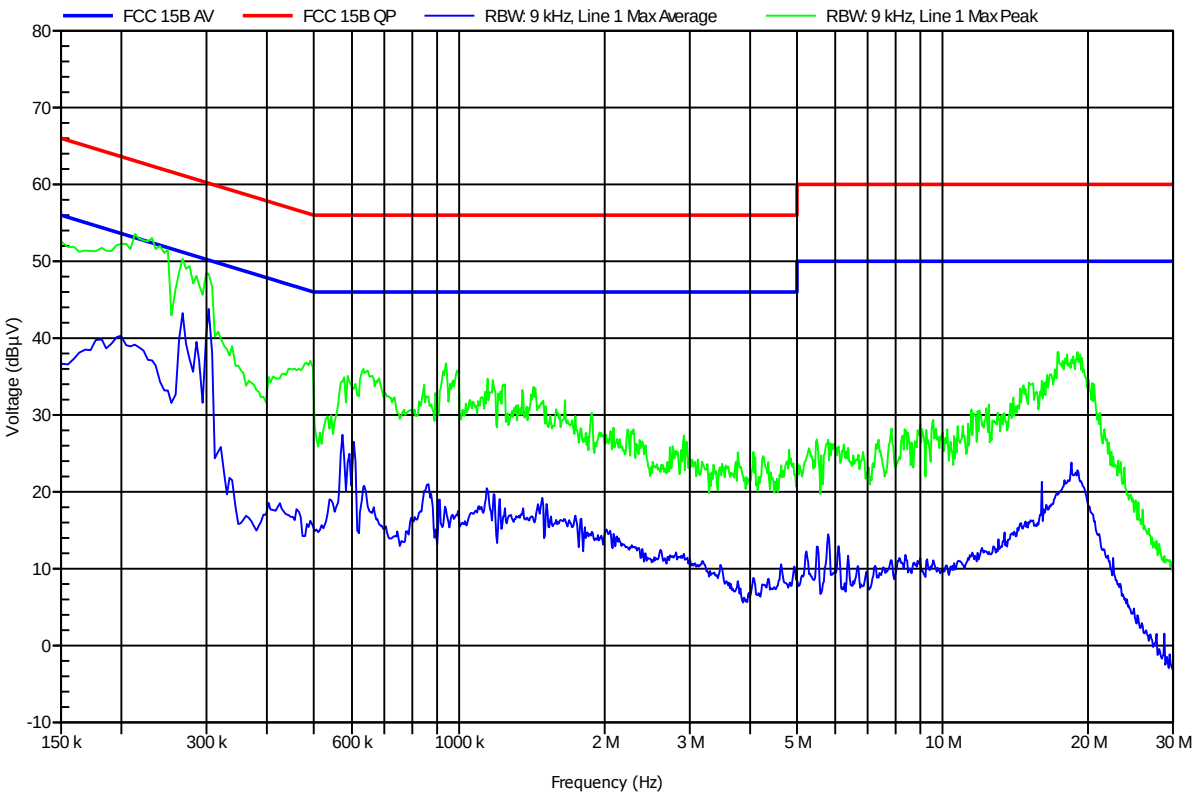
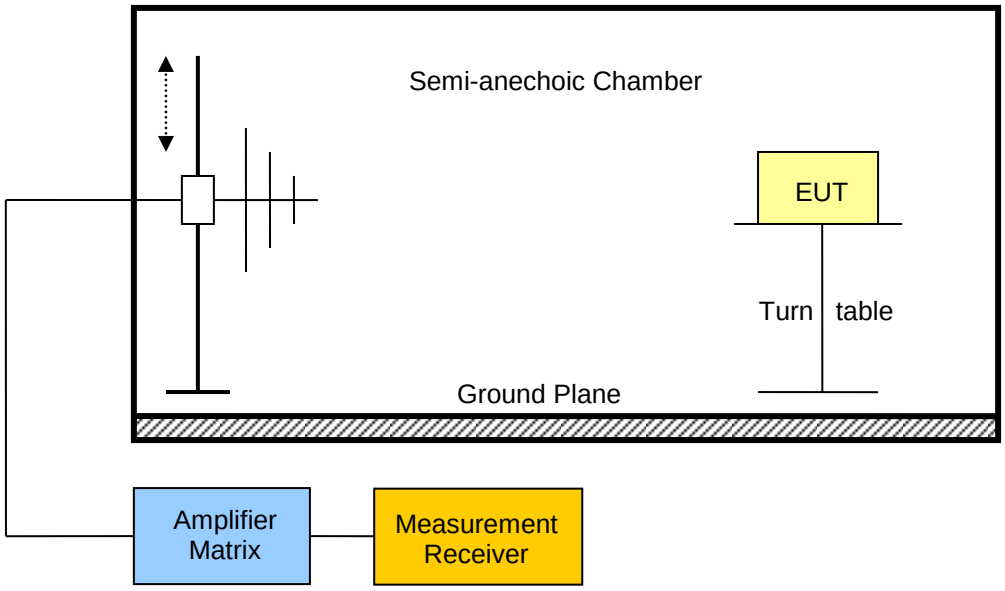


3.3 Test Conditions and Results – Transmitter radiated emissions

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 – 10th Harmonic		
Limits				
Frequency range [MHz]	Detector	Limit [µV/m]	Limit [dBµV/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
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)). 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.				
Test setup				



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 [dbµV/m]	Det.	Pol.	Limit [dbµV/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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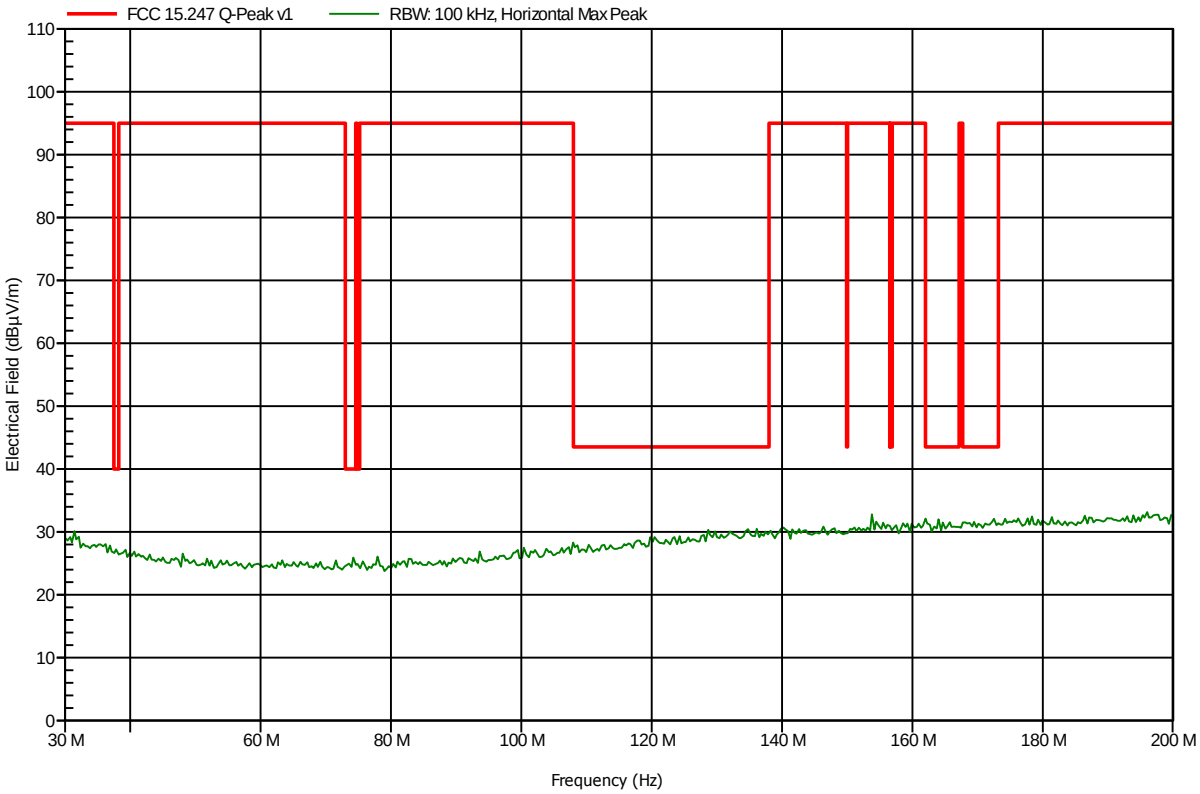

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Model:	PAN1322
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3 m
Mode:	TX; basic, DH5; 2402 MHz
Test Date: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

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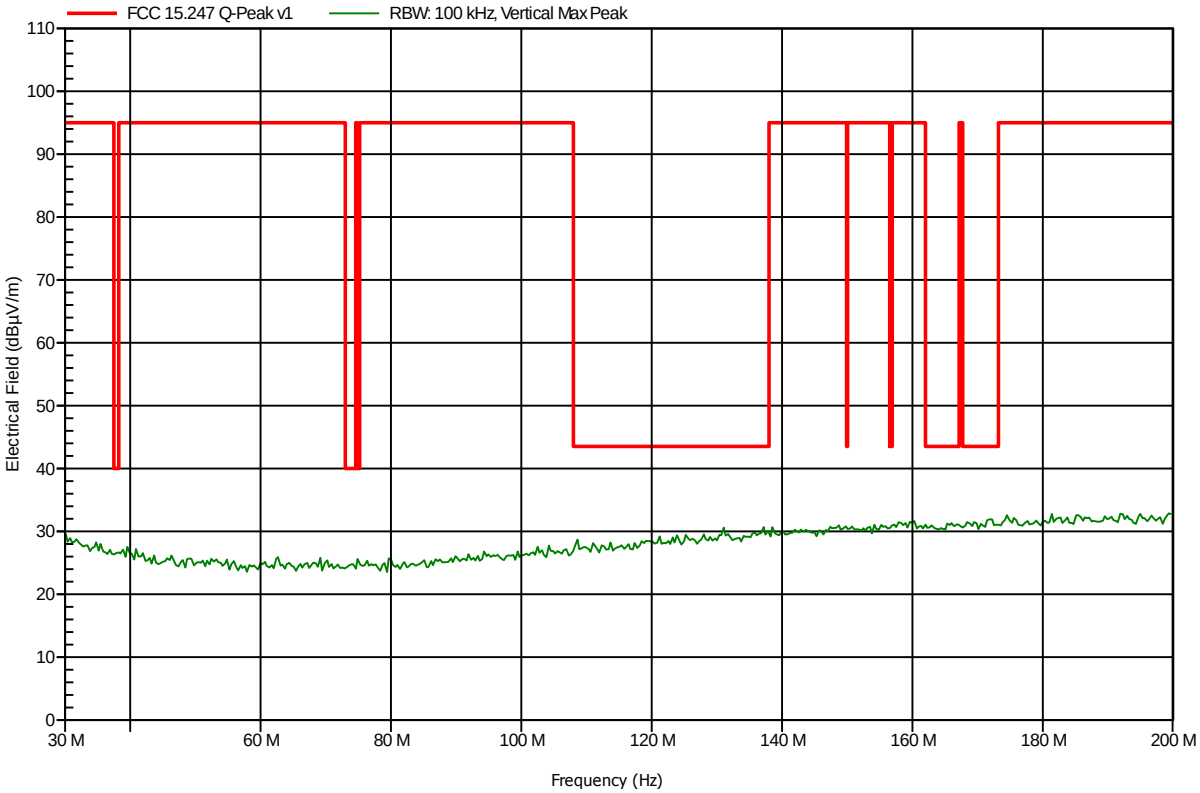

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EUT Name:	Bluetooth Module BT2.1
Model:	PAN1322
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode: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

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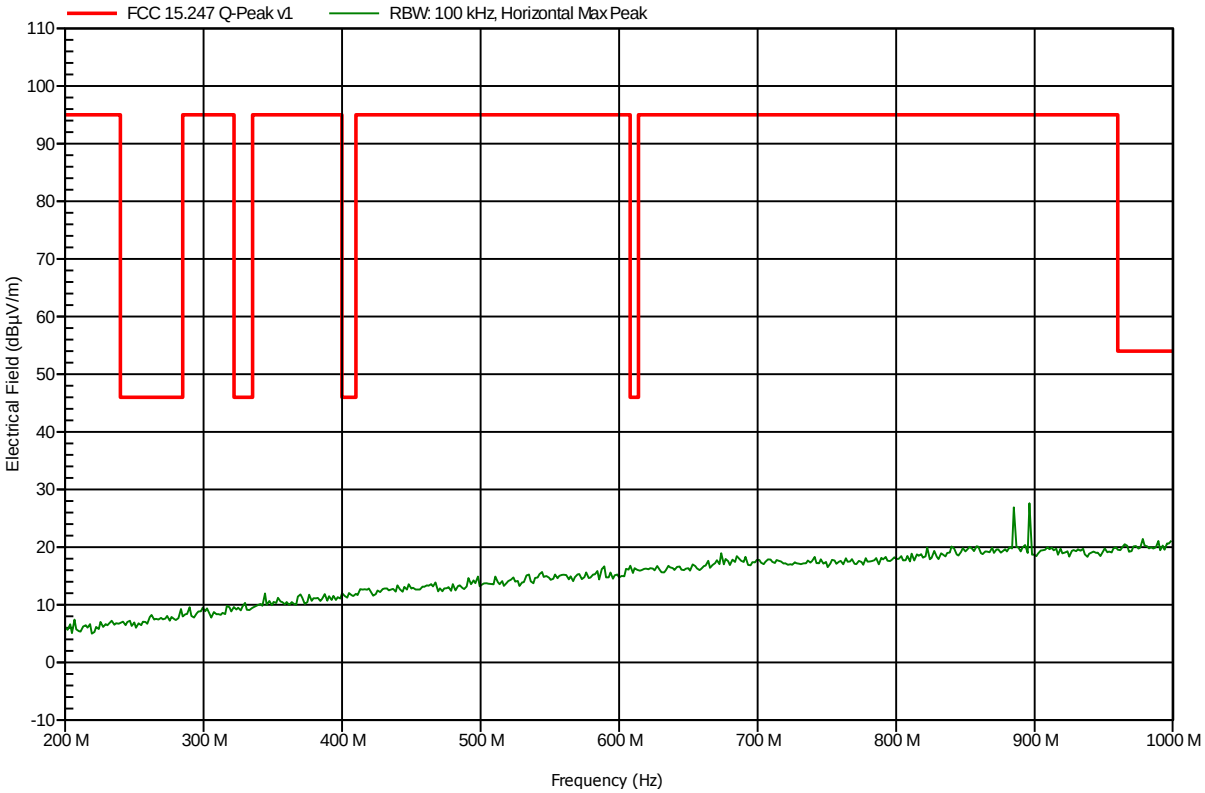

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Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	TX; basic, DH5; 2402 MHz
Test Date:	2014-03-24
Note:	worst case

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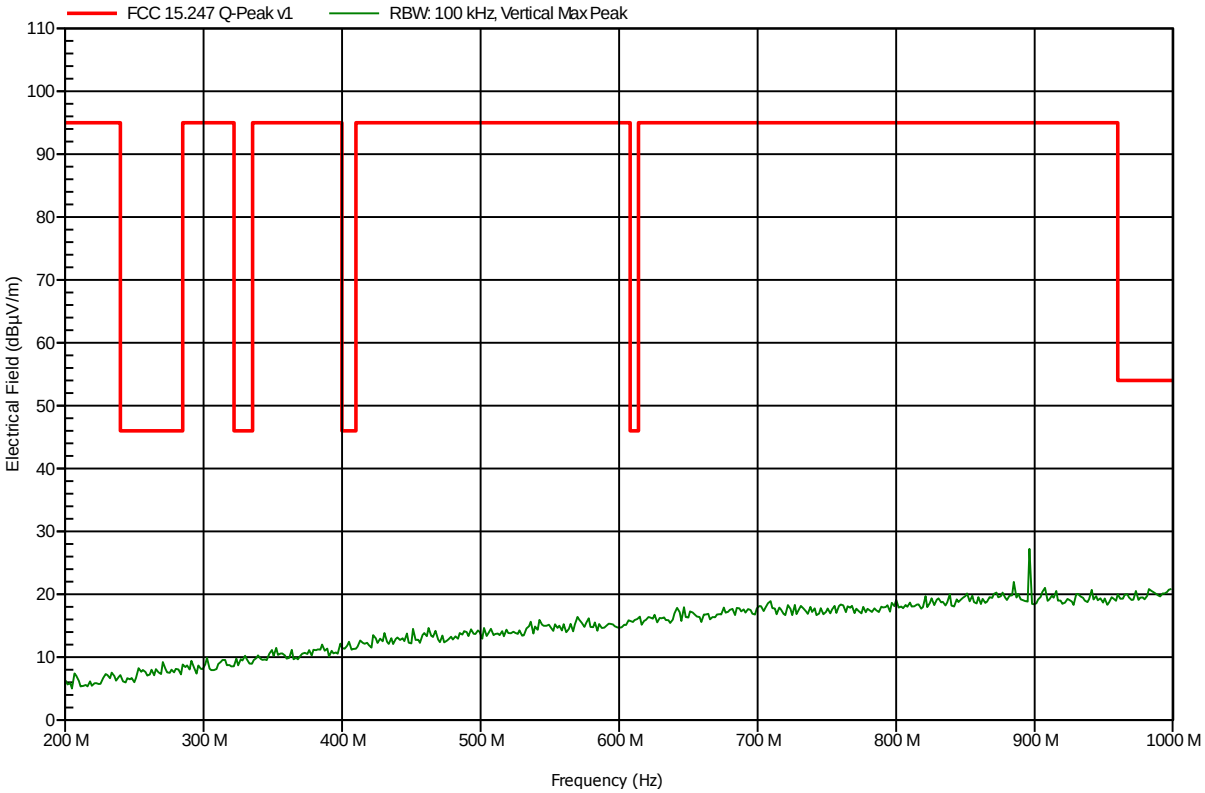

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Manufacturer:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Module BT2.1
Model:	PAN1322
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
Antenna:	Schwarzbeck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

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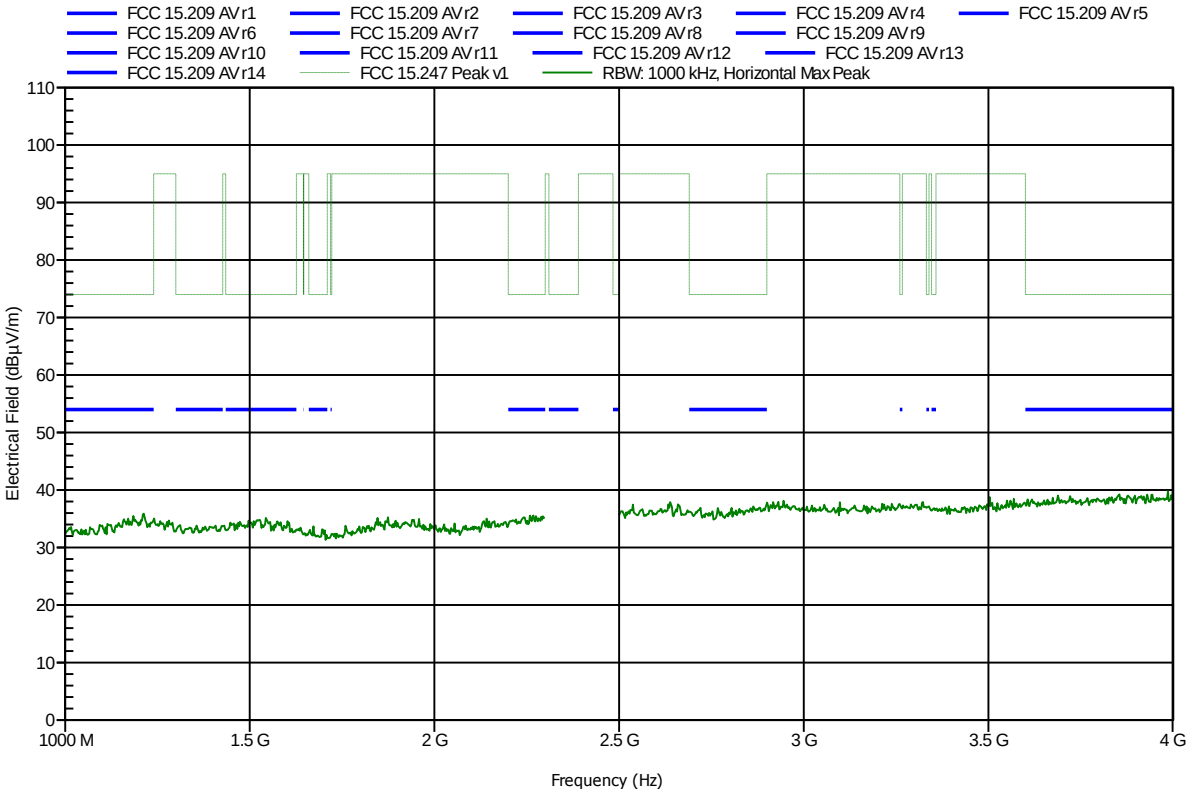
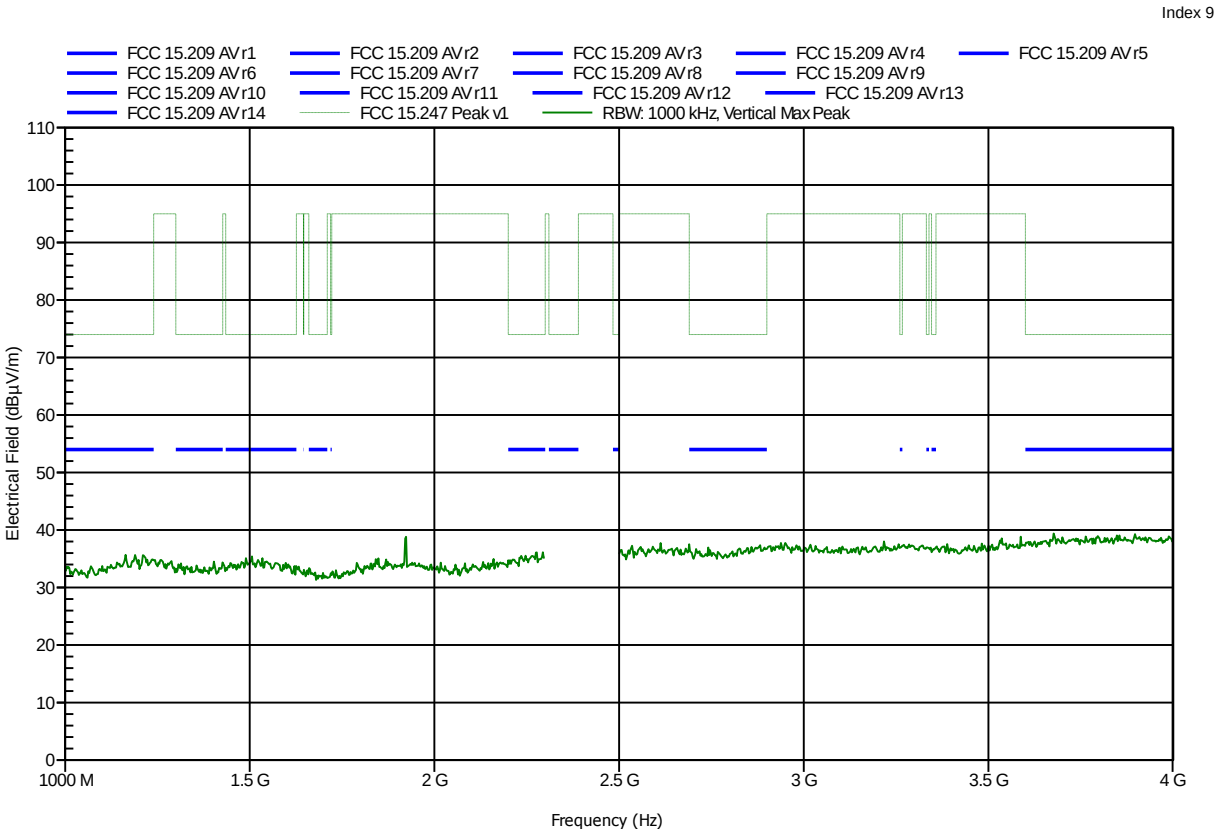


Spurious emissions according to FCC 15.247

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:	



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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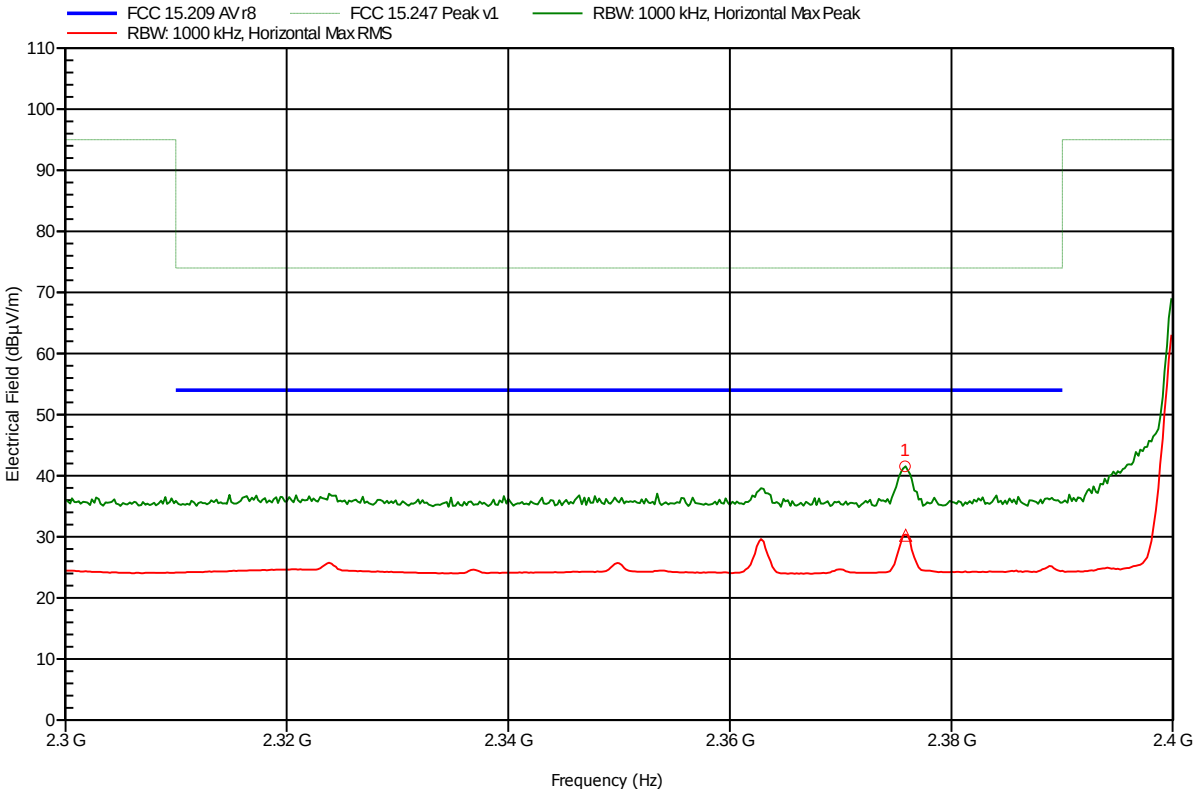

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.376 GHz	41.54 dBµV/m	74 dBµV/m	-32.46 dB	Pass

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

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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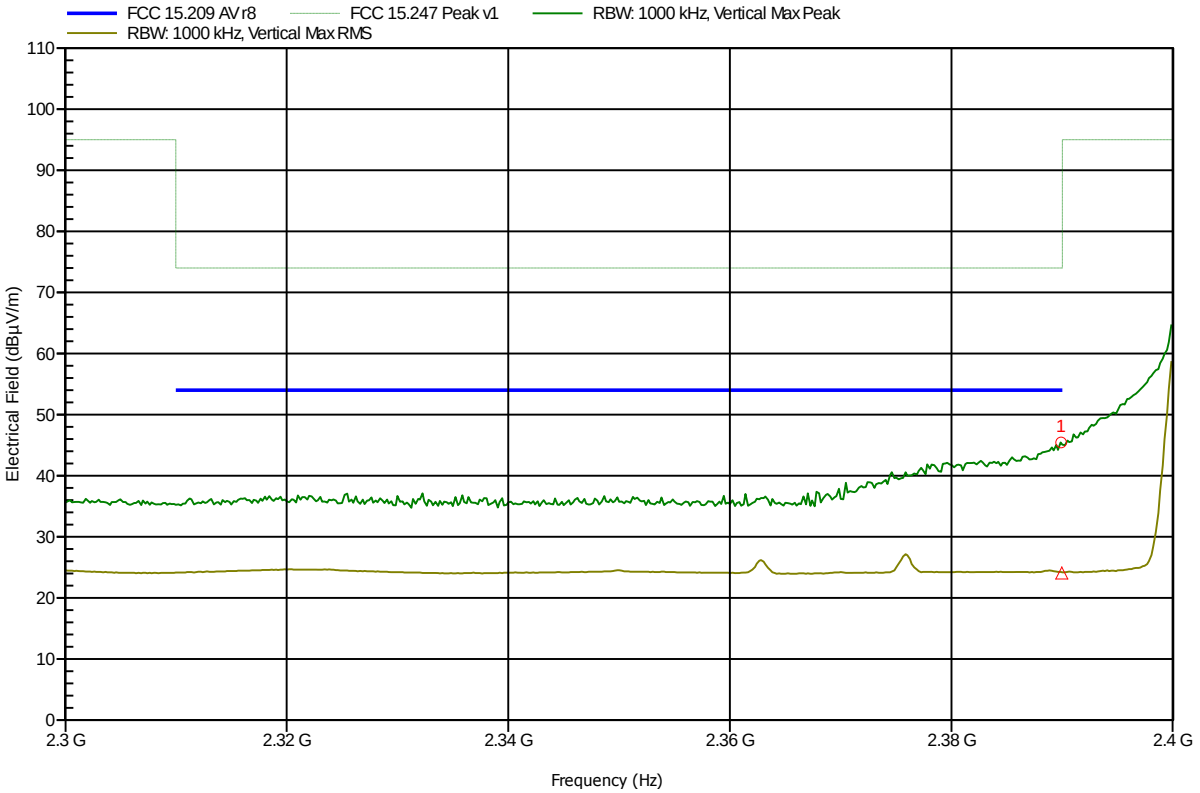

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.39 GHz	45.44 dBµV/m	74 dBµV/m	-28.56 dB	Pass

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

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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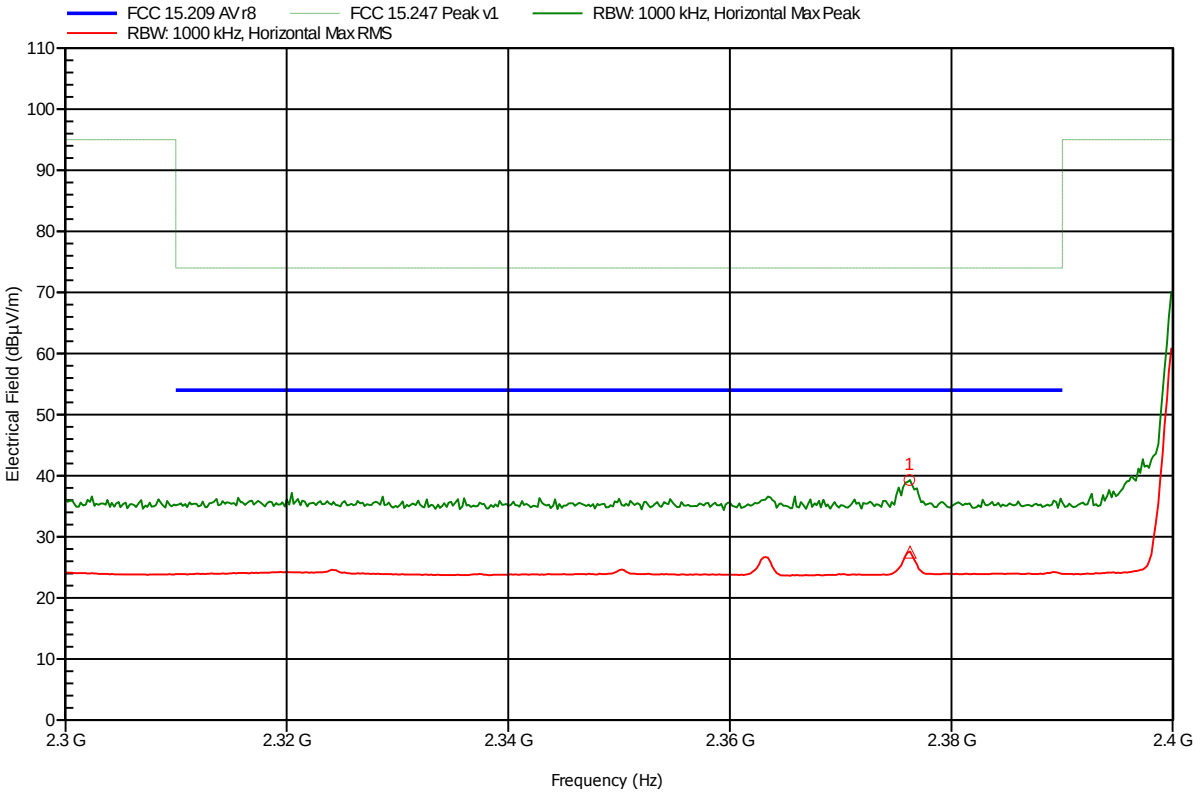

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.376 GHz	39.29 dBµV/m	74 dBµV/m	-34.71 dB	Pass

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

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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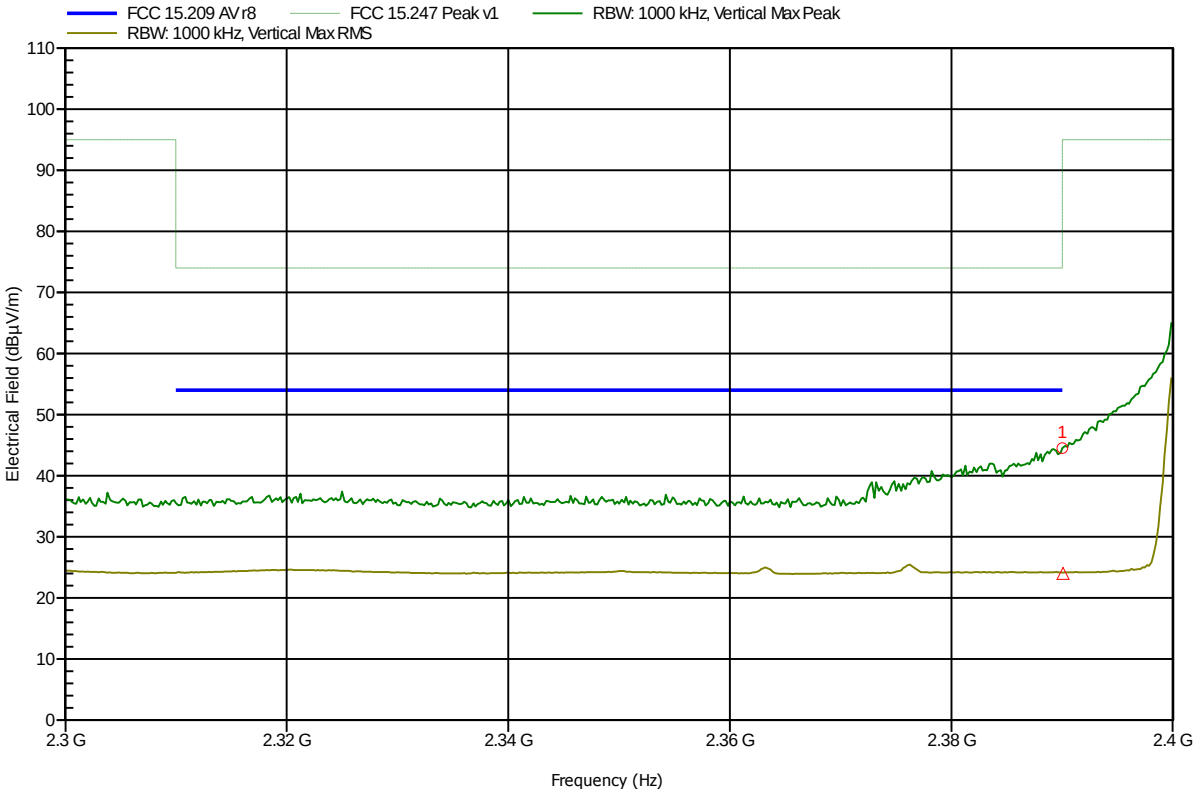

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.39 GHz	44.52 dBµV/m	74 dBµV/m	-29.48 dB	Pass

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

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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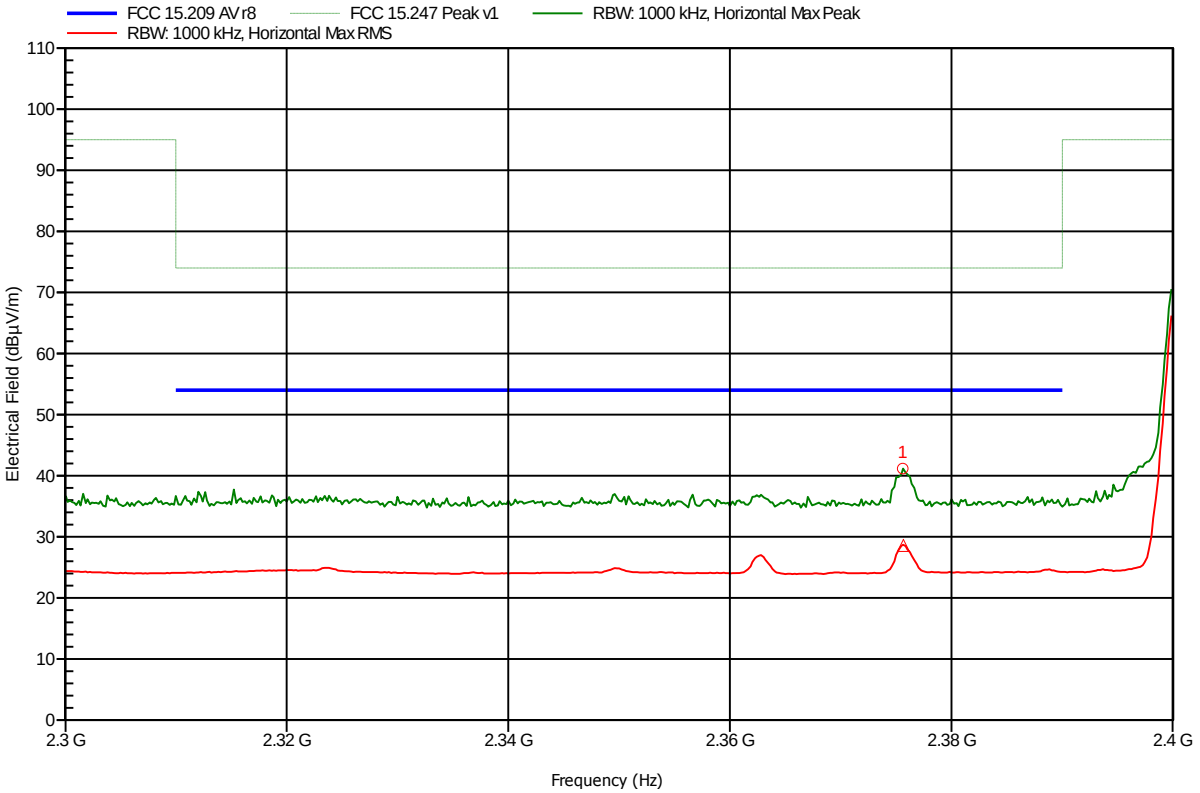

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.376 GHz	41.16 dBµV/m	74 dBµV/m	-32.84 dB	Pass

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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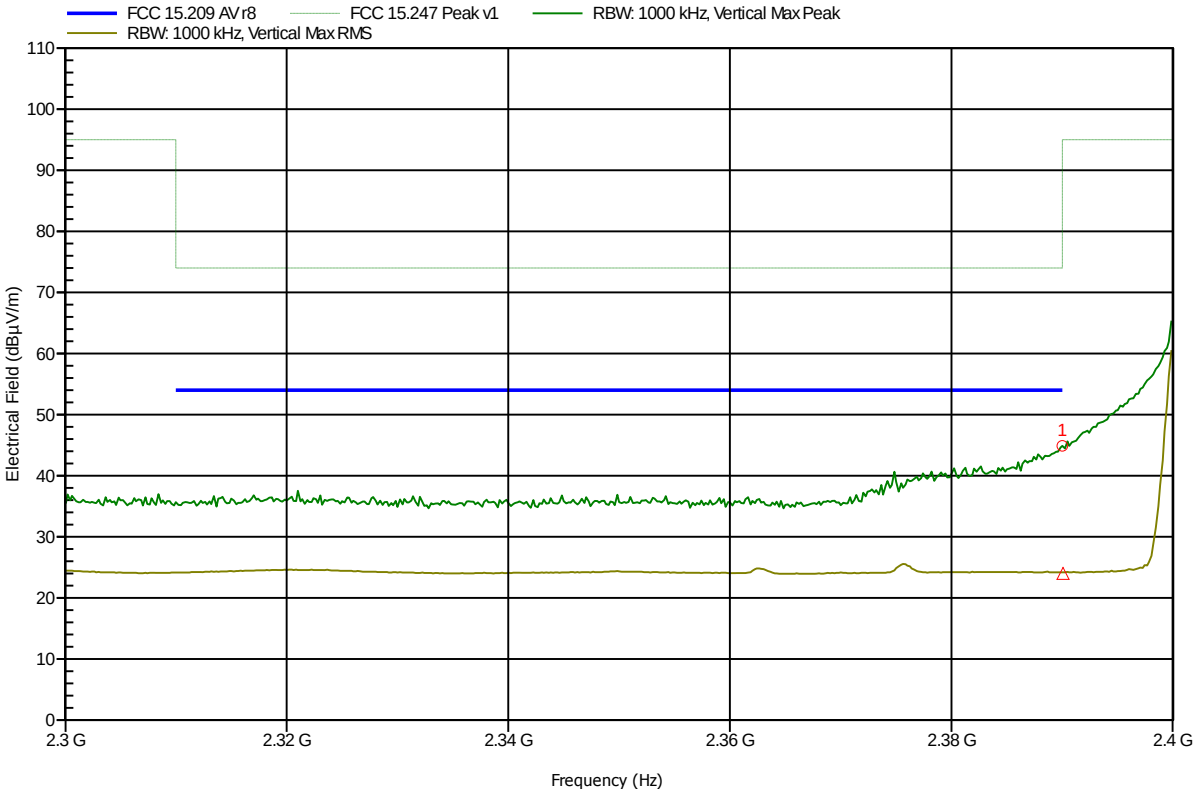

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.39 GHz	44.88 dBµV/m	74 dBµV/m	-29.12 dB	Pass

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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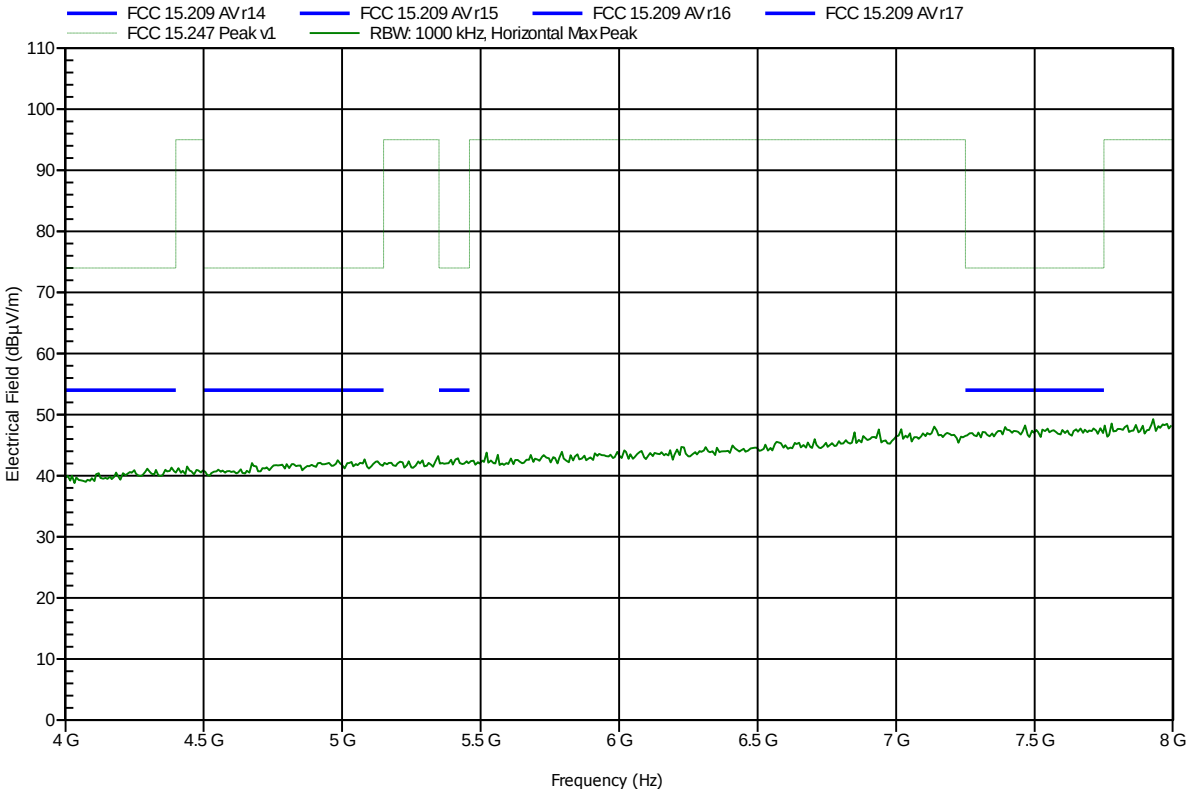

Spurious emissions according to FCC 15.247

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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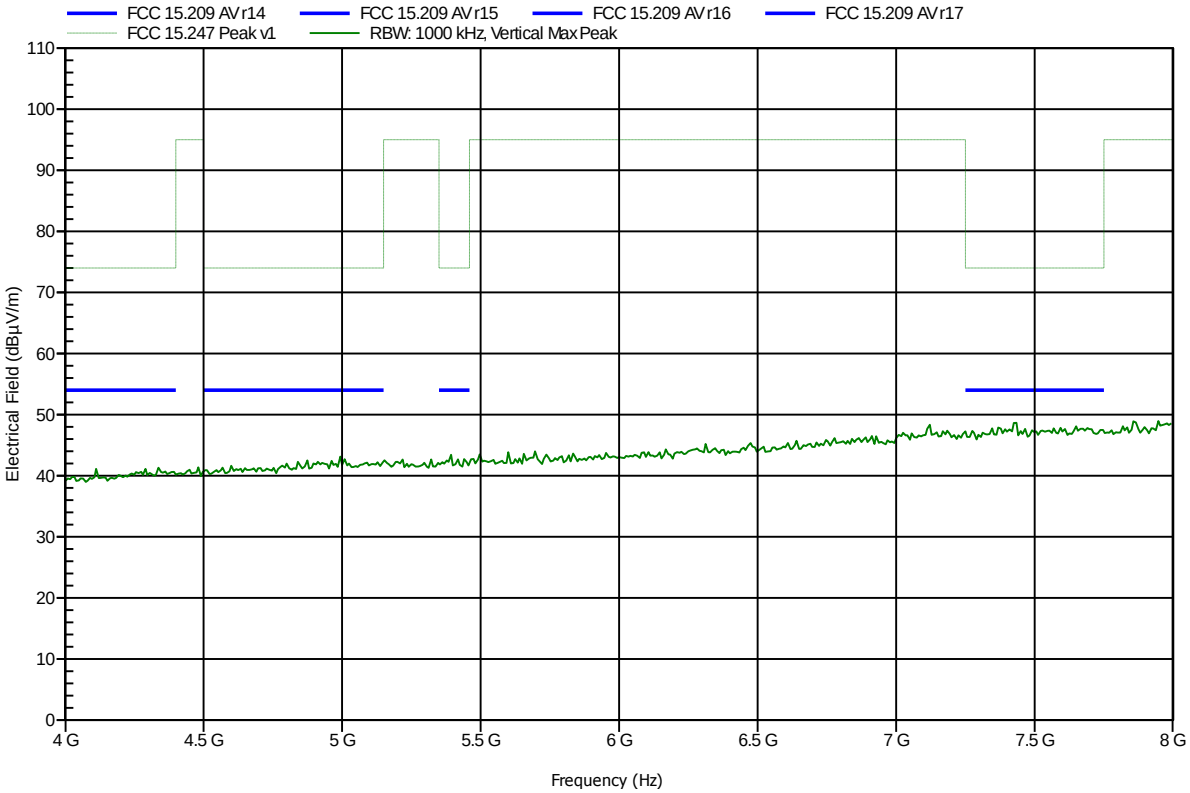

Spurious emissions according to FCC 15.247

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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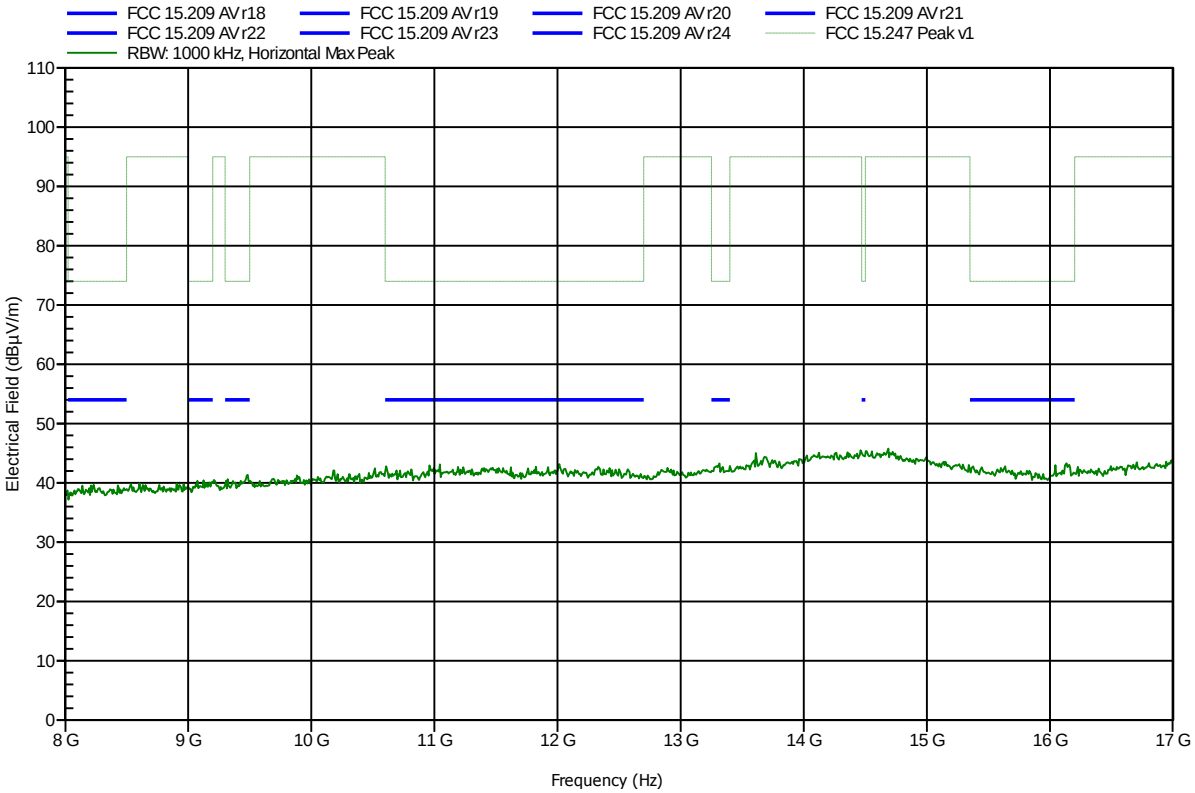

Spurious emissions according to FCC 15.247

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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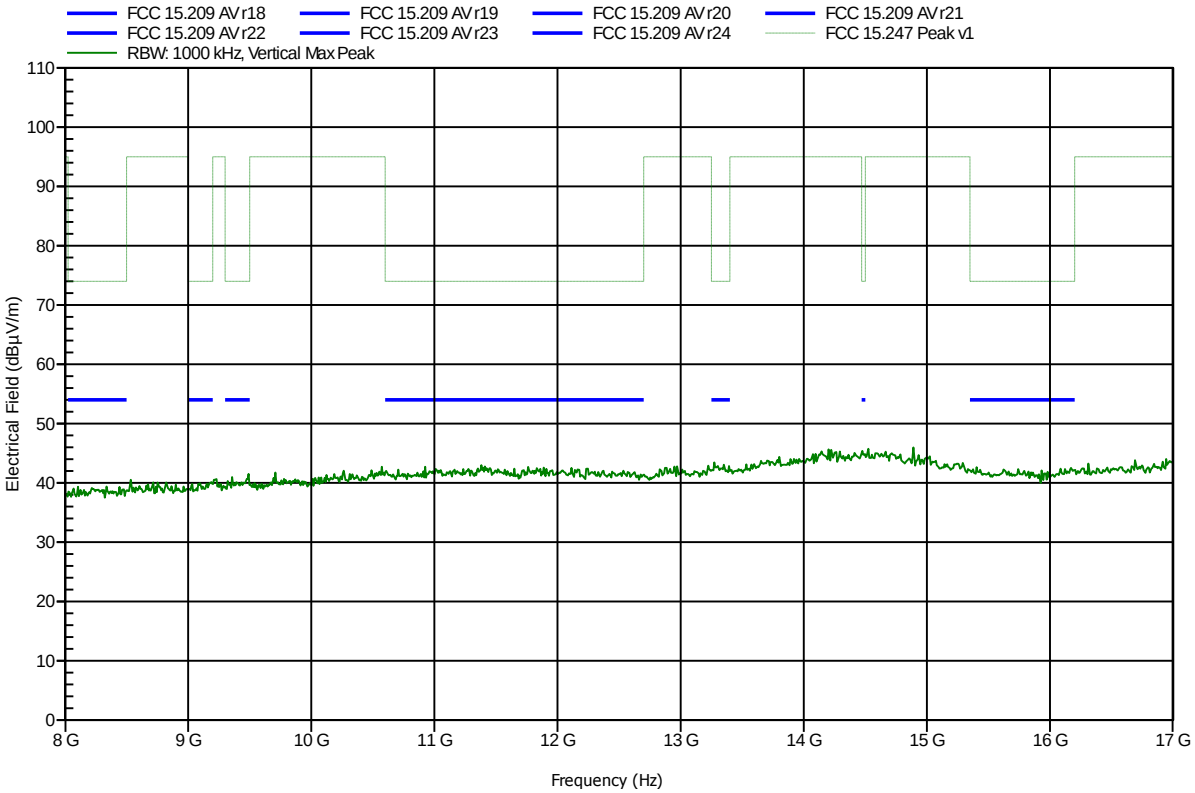

Spurious emissions according to FCC 15.247

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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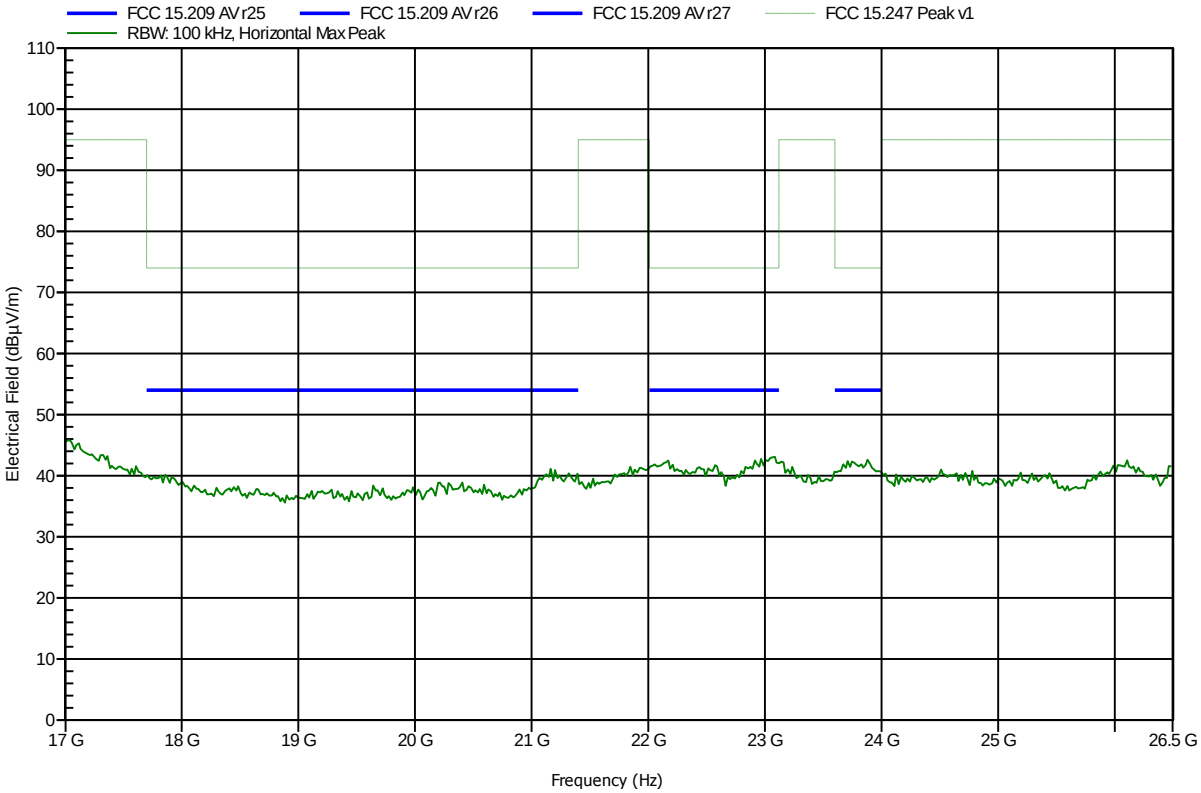

Spurious emissions according to FCC 15.247

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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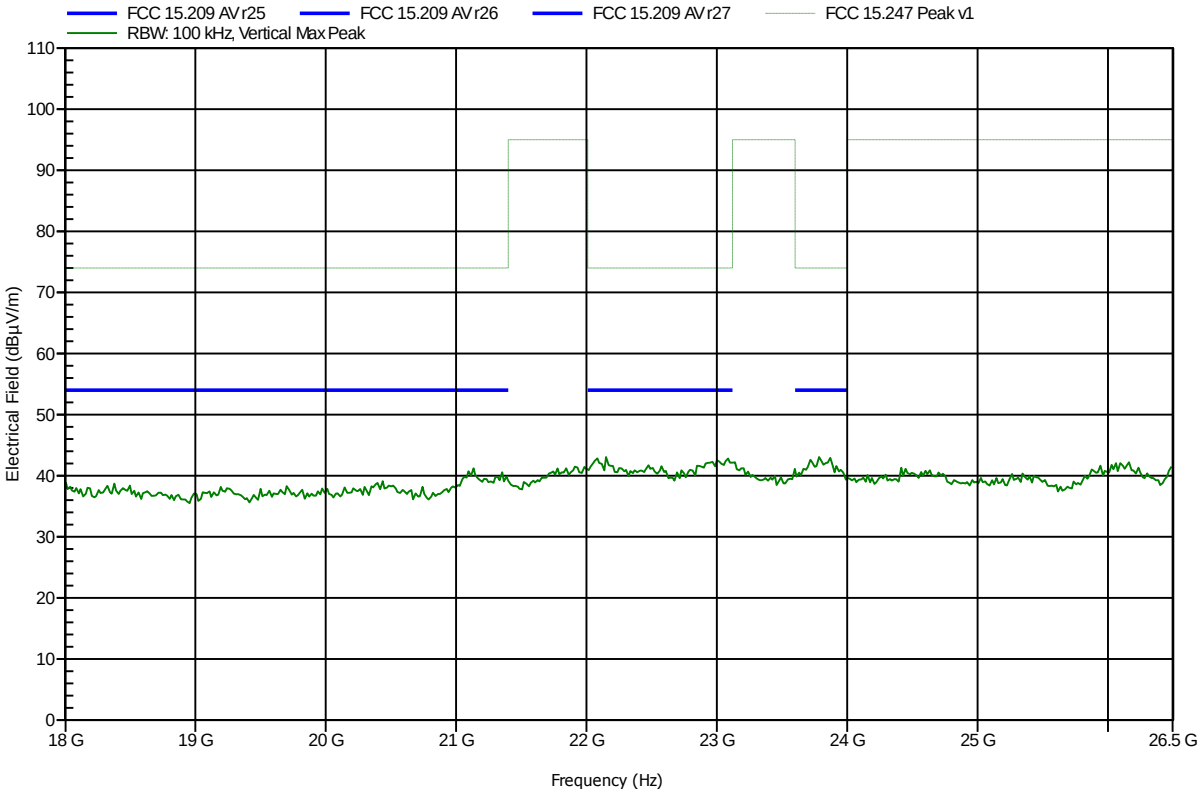
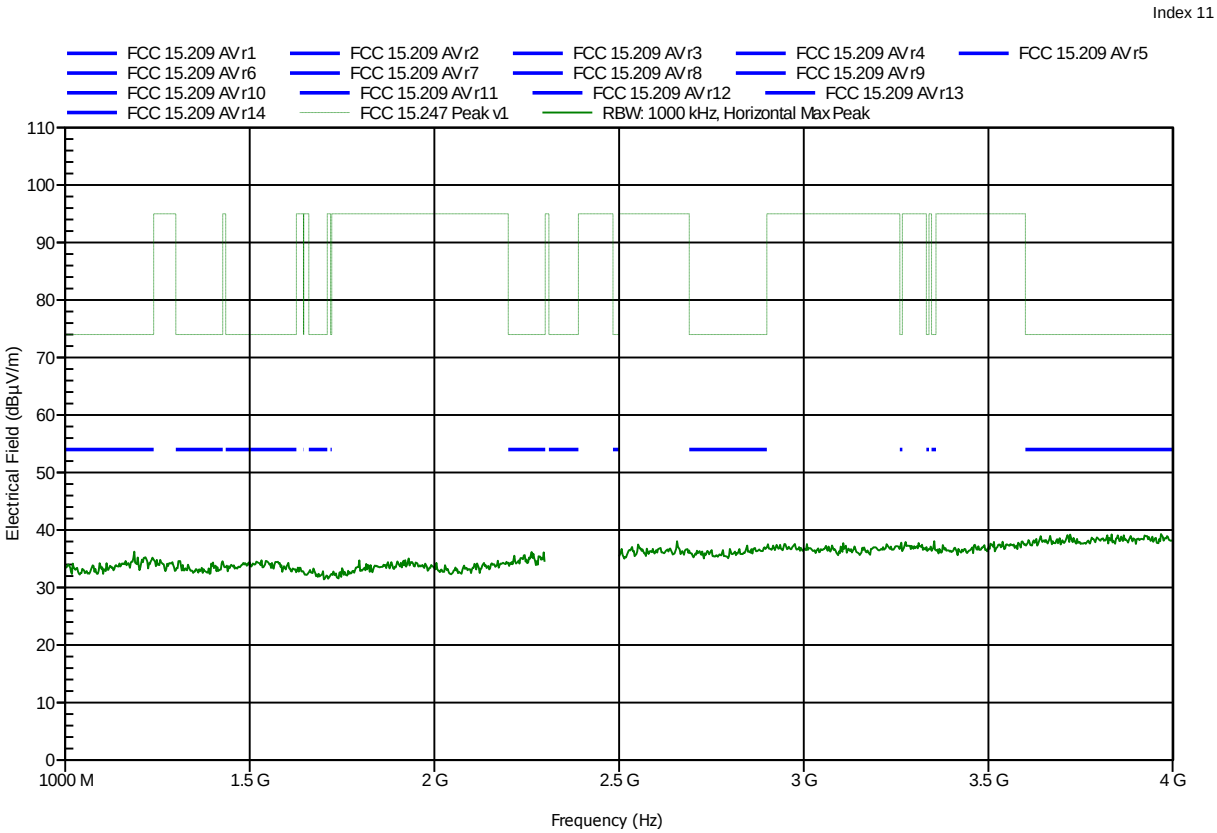


Spurious emissions according to FCC 15.247

Project number: G0M-1311-3395

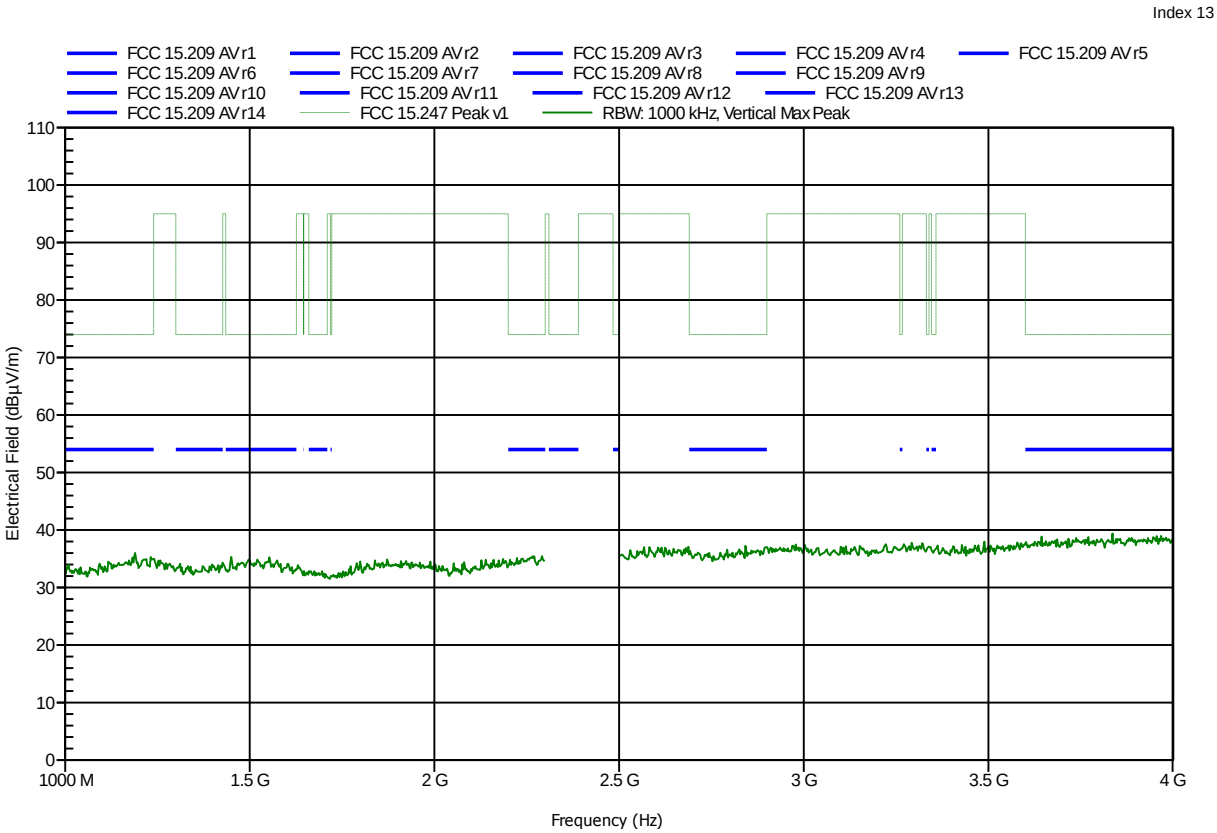
Manufacturer:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Module BT2.1
Model:	PAN1322
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 25°C, Vnom: 3.3 V DC (5 V USB powered)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode: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



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:	



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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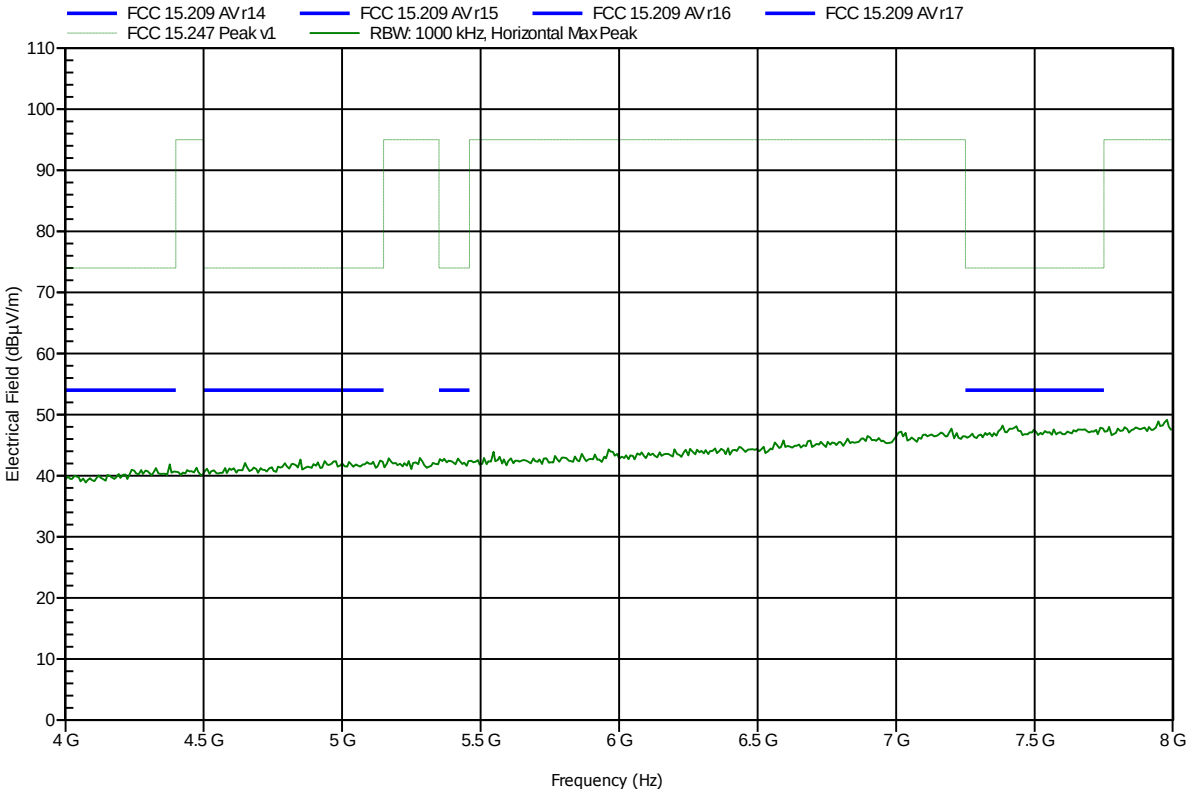

Spurious emissions according to FCC 15.247

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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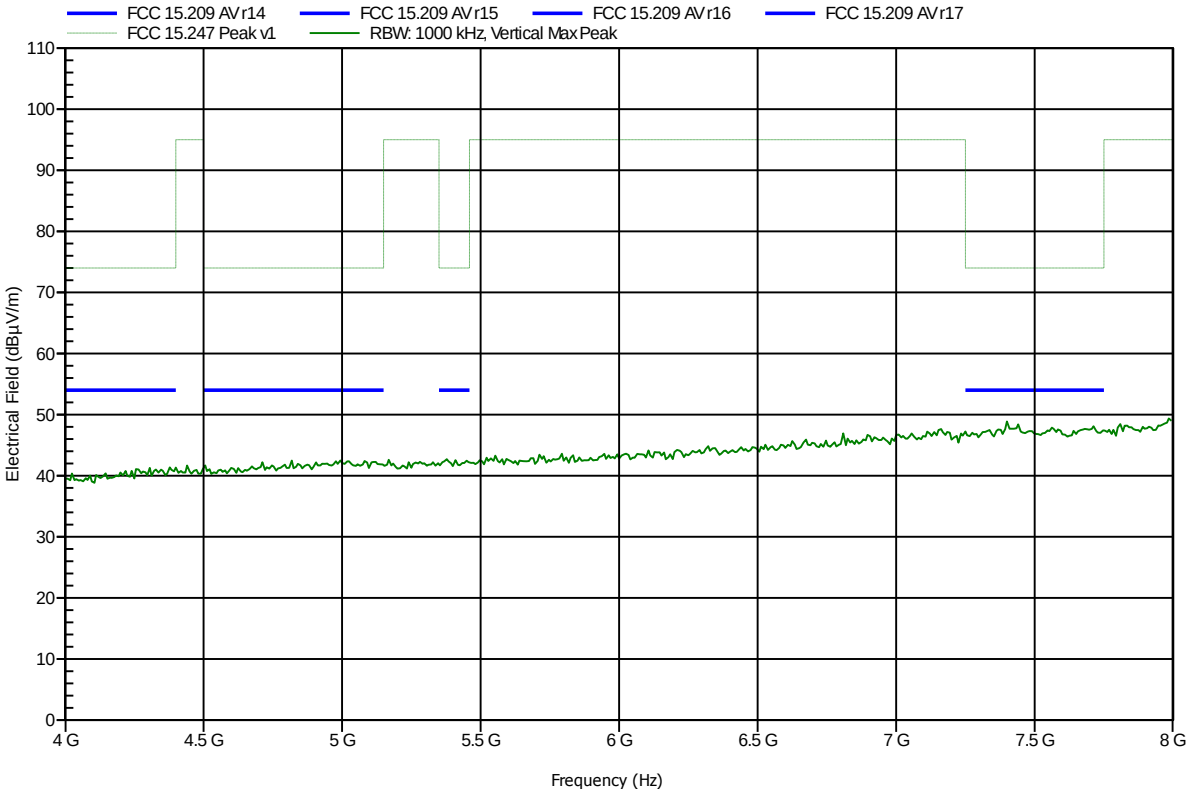

Spurious emissions according to FCC 15.247

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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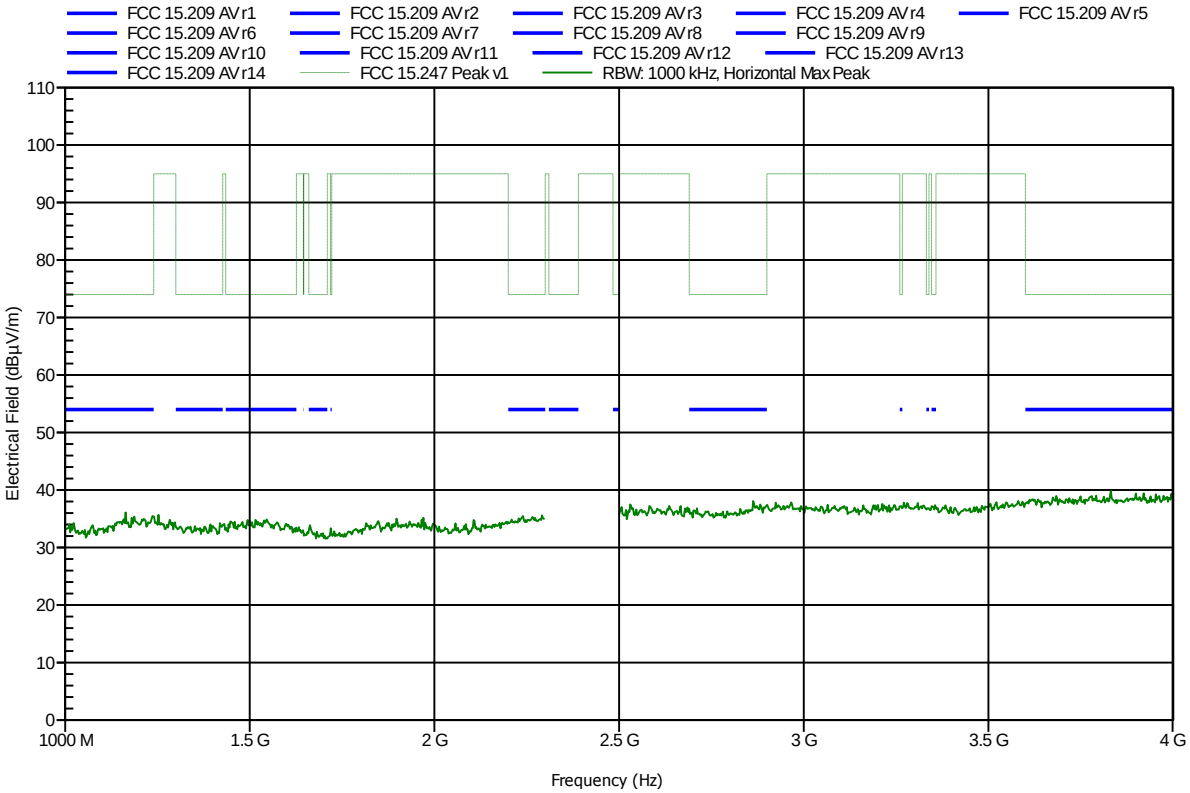
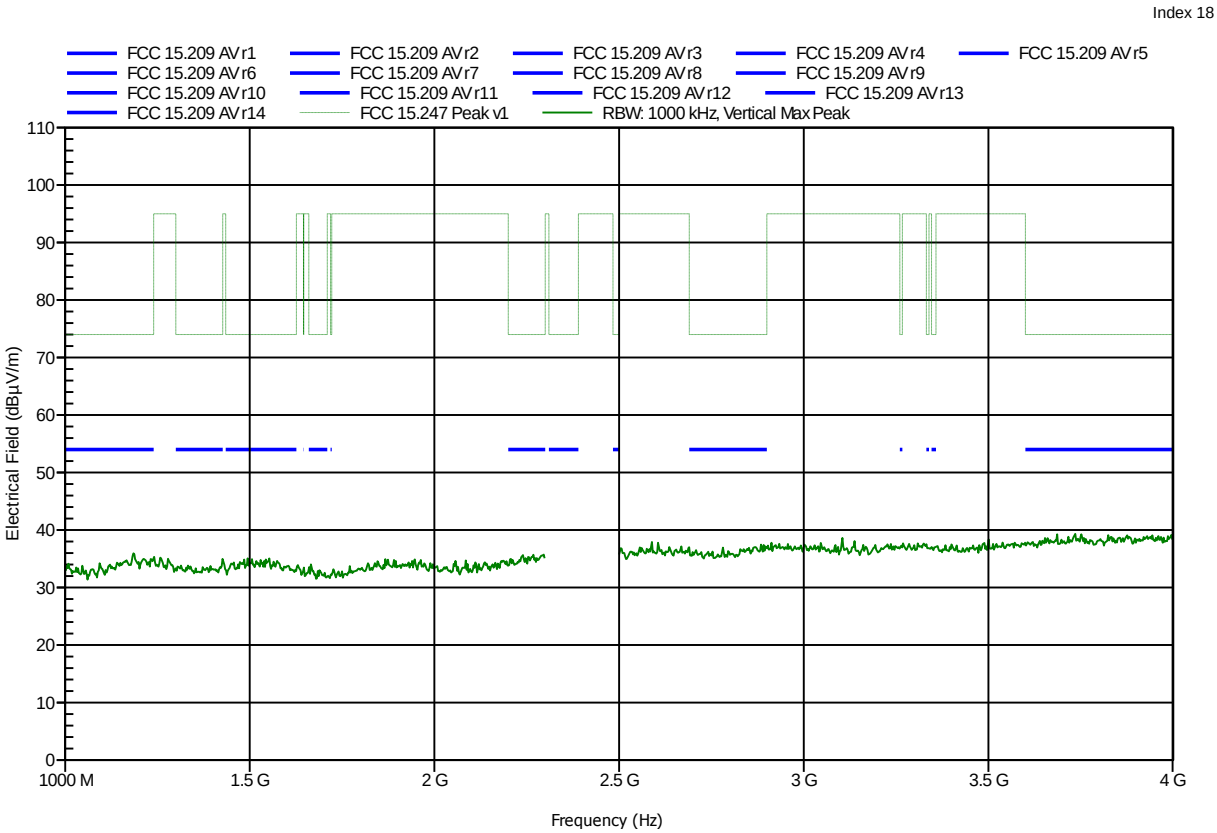


Spurious emissions according to FCC 15.247

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:	



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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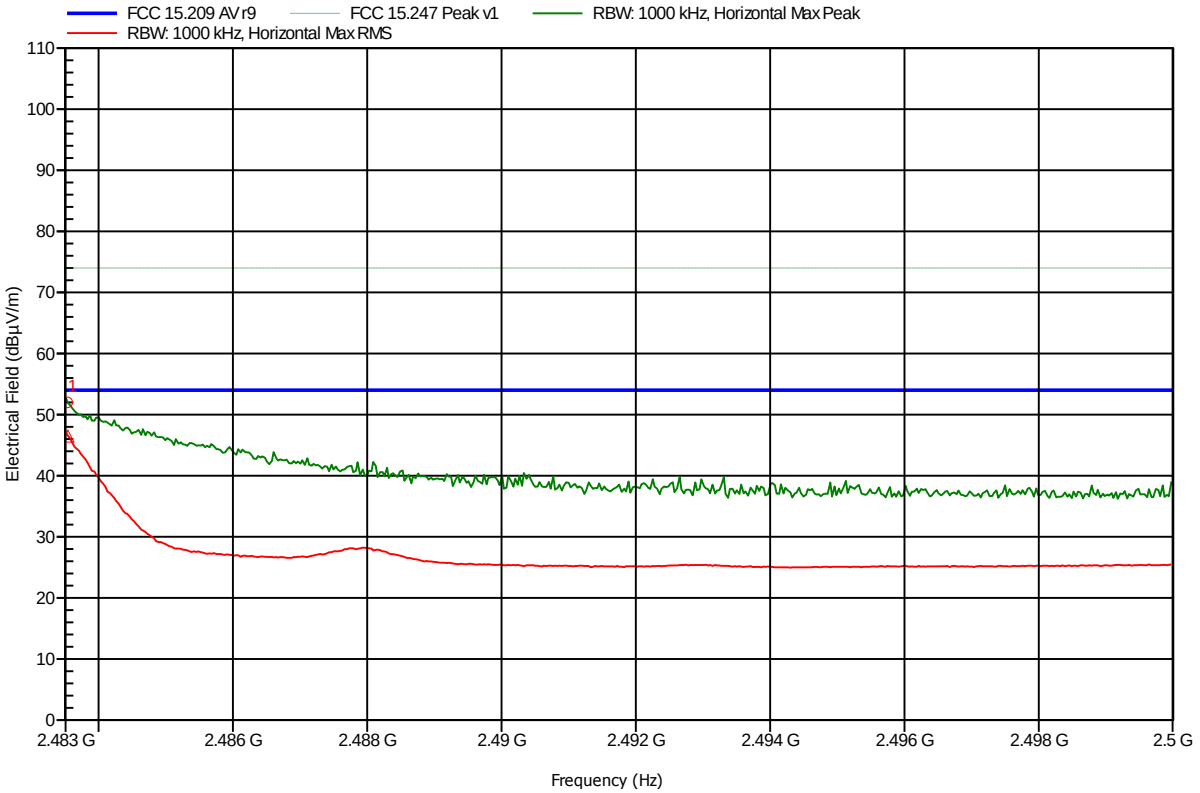

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.4835 GHz	52 dBµV/m	74 dBµV/m	-22 dB	Pass

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

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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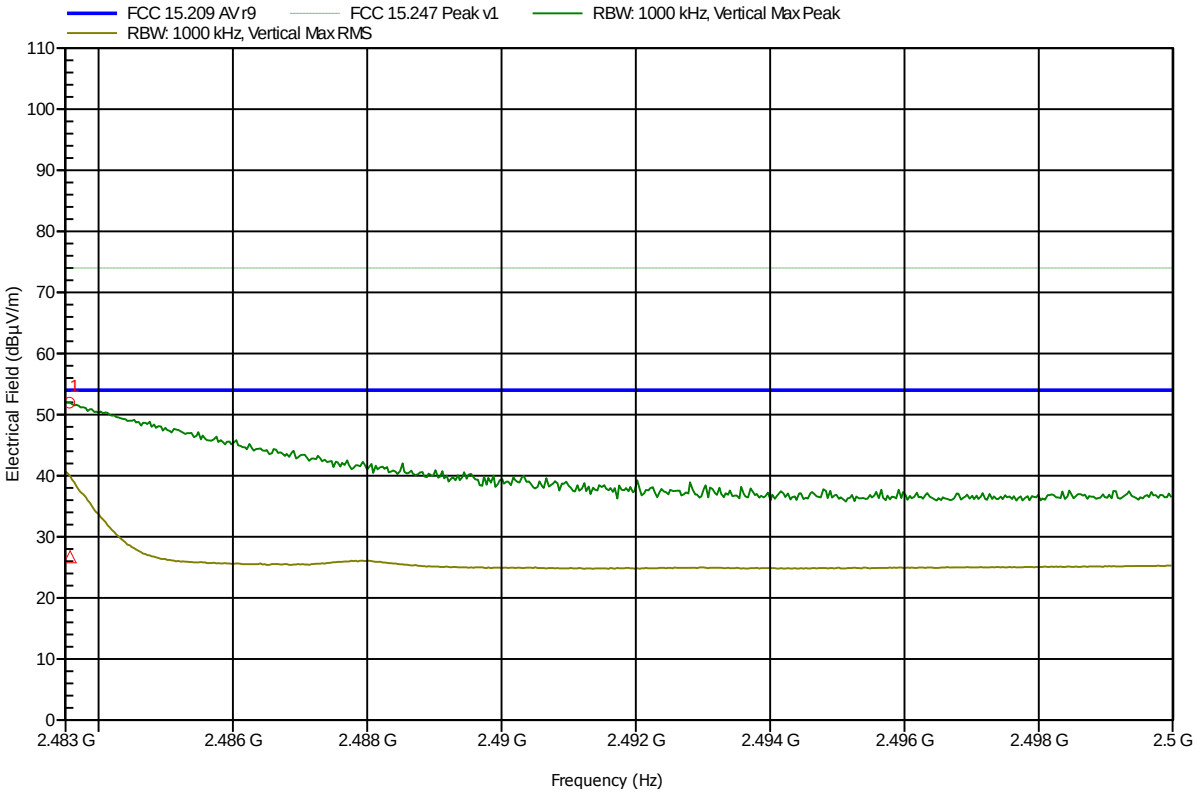

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.4836 GHz	51.96 dBµV/m	74 dBµV/m	-22.04 dB	Pass

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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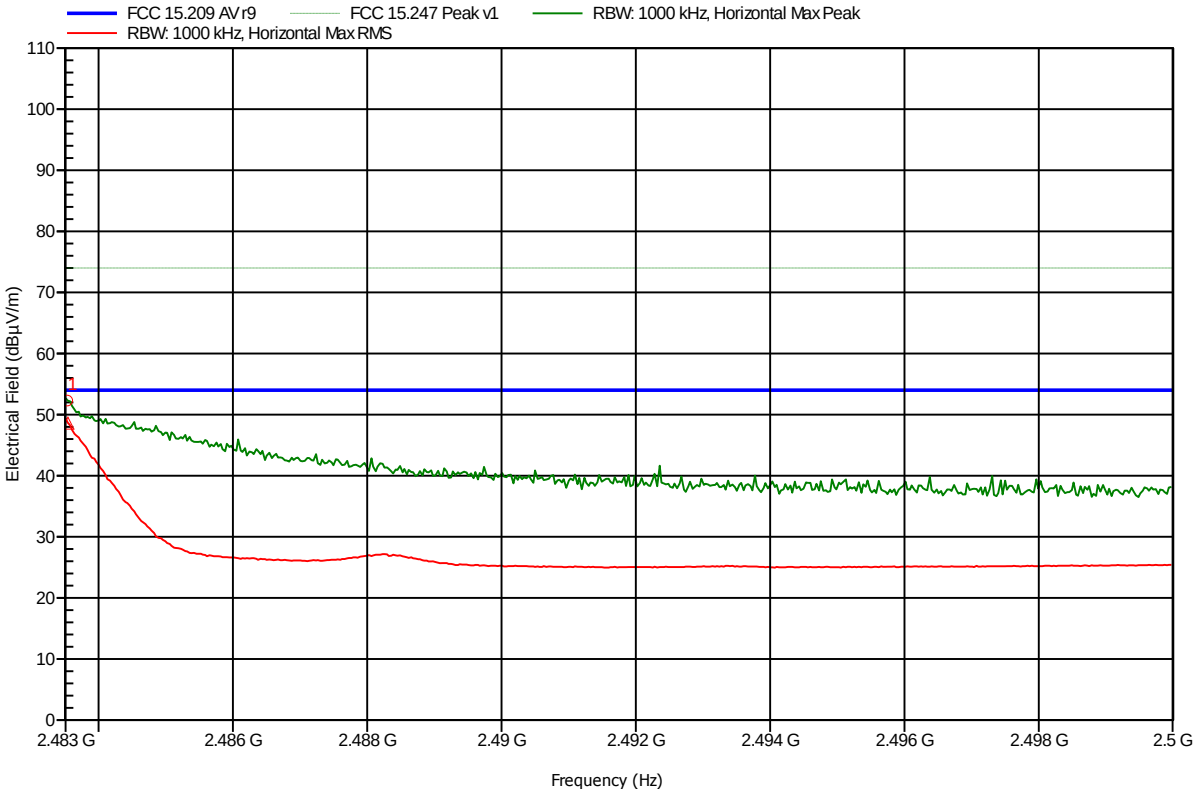

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.4835 GHz	52.3 dBµV/m	74 dBµV/m	-21.7 dB	Pass

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

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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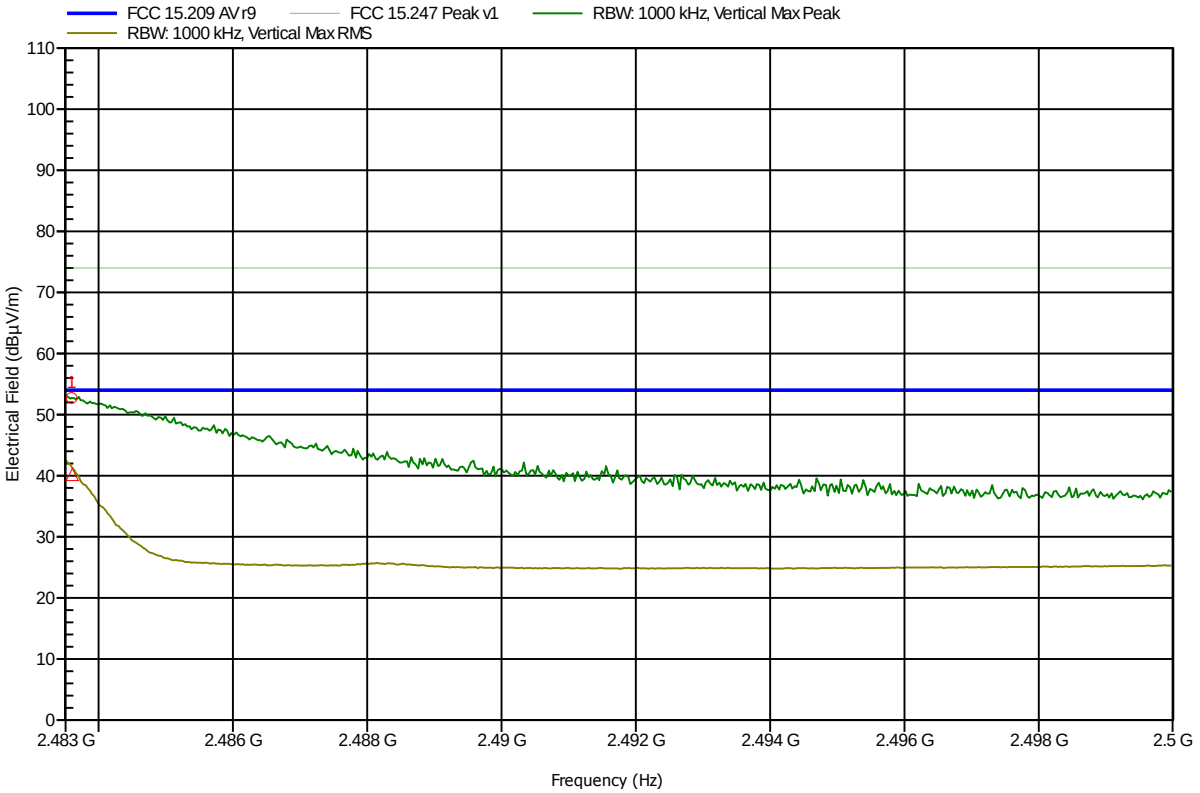

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.4836 GHz	52.74 dBµV/m	74 dBµV/m	-21.26 dB	Pass

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

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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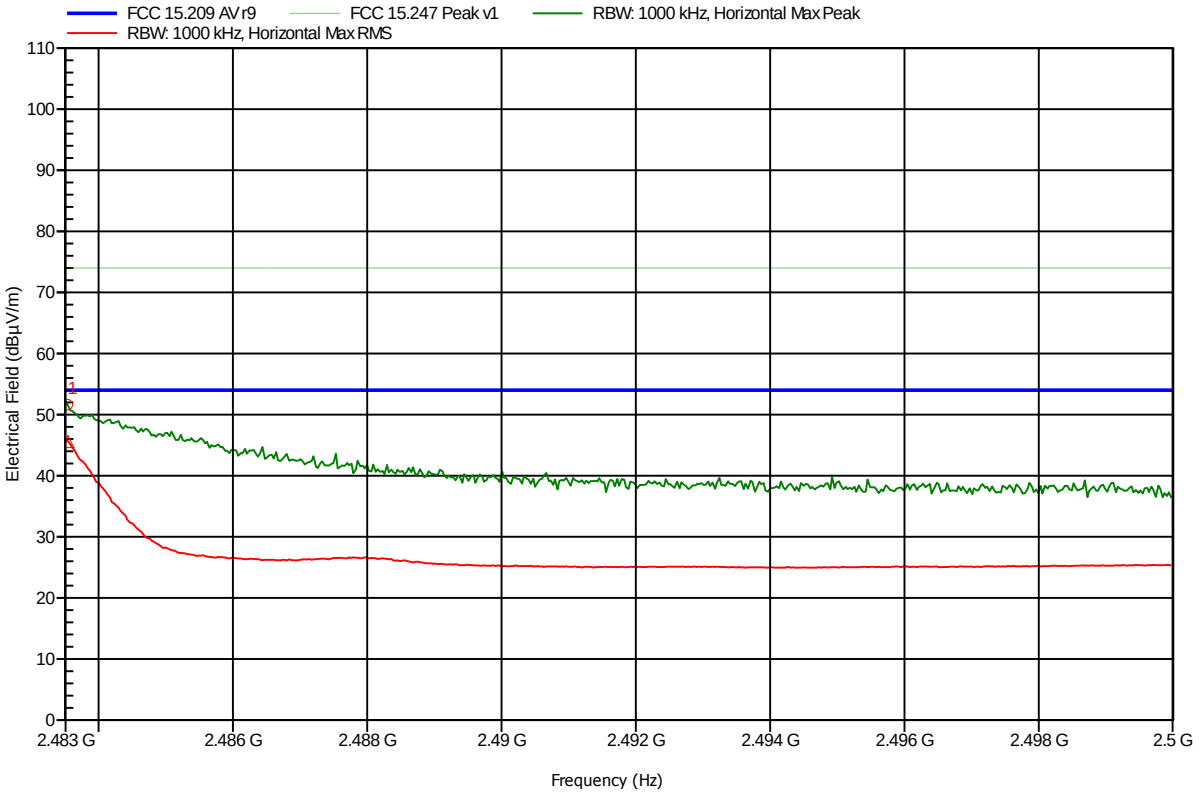

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.4835 GHz	51.62 dBµV/m	74 dBµV/m	-22.38 dB	Pass

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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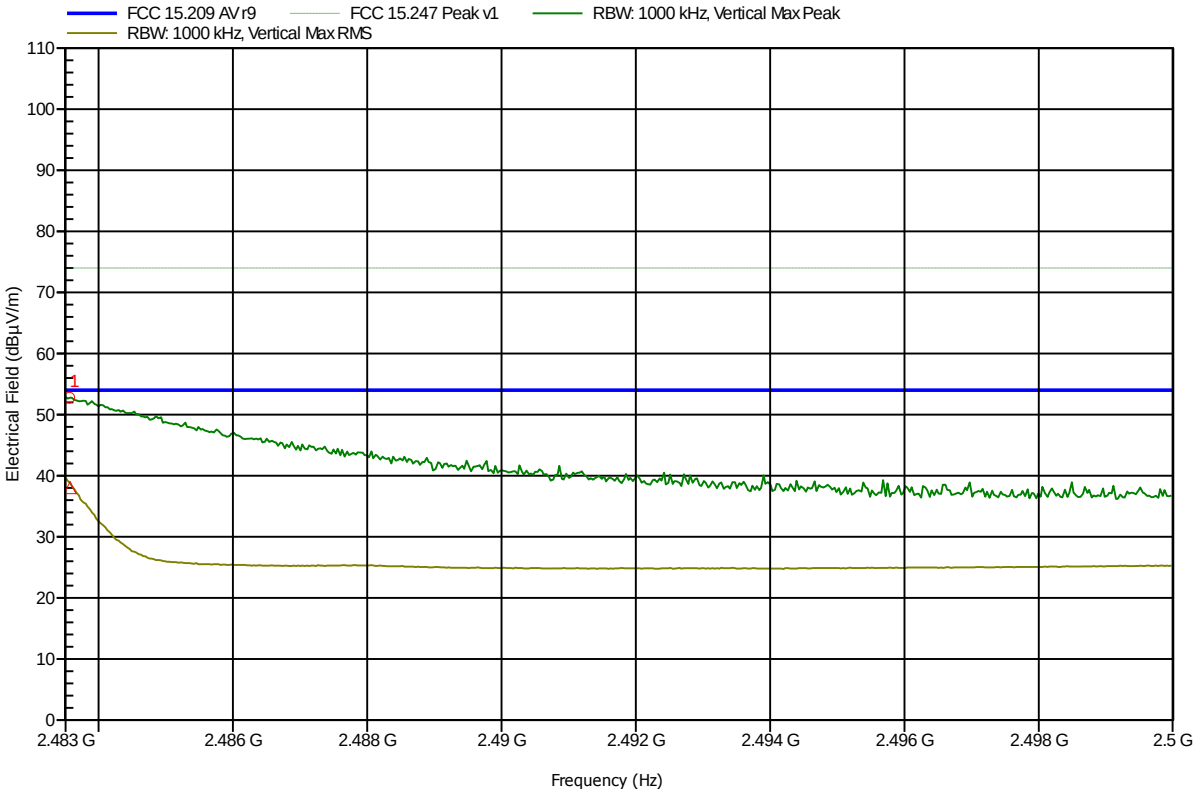

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.4836 GHz	52.79 dBµV/m	74 dBµV/m	-21.21 dB	Pass

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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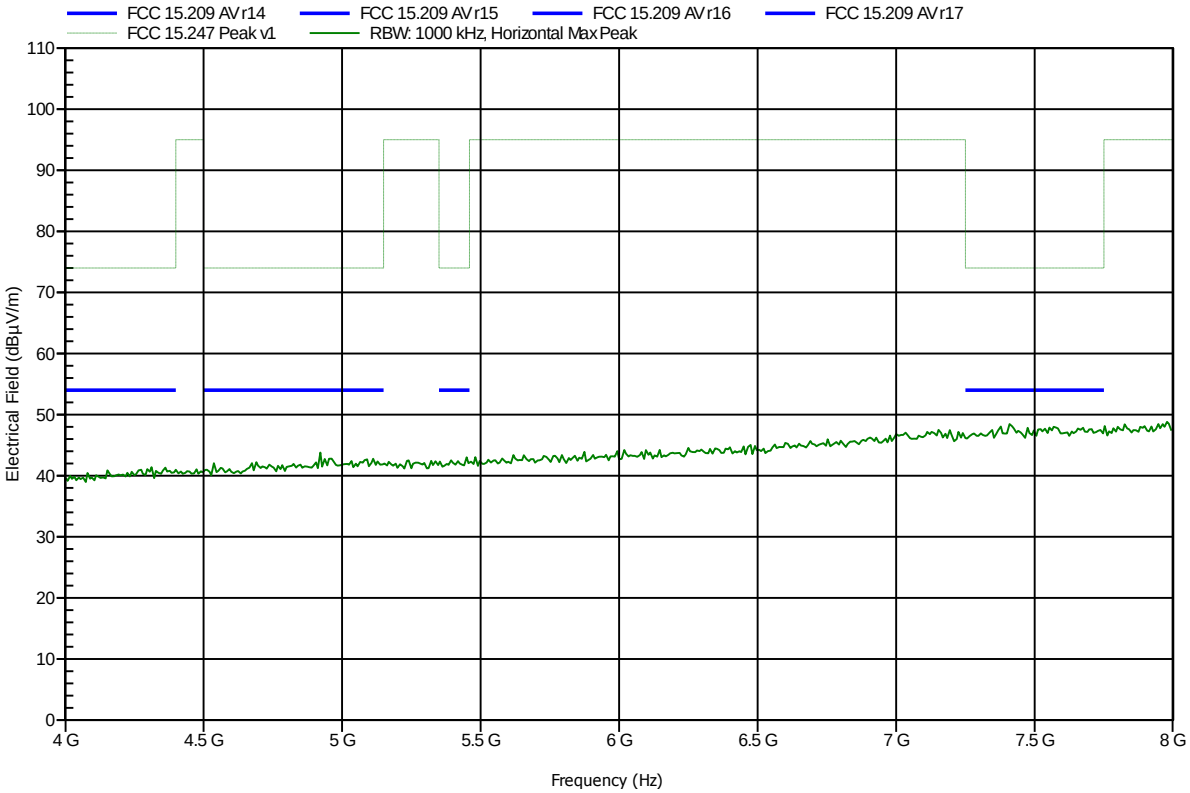
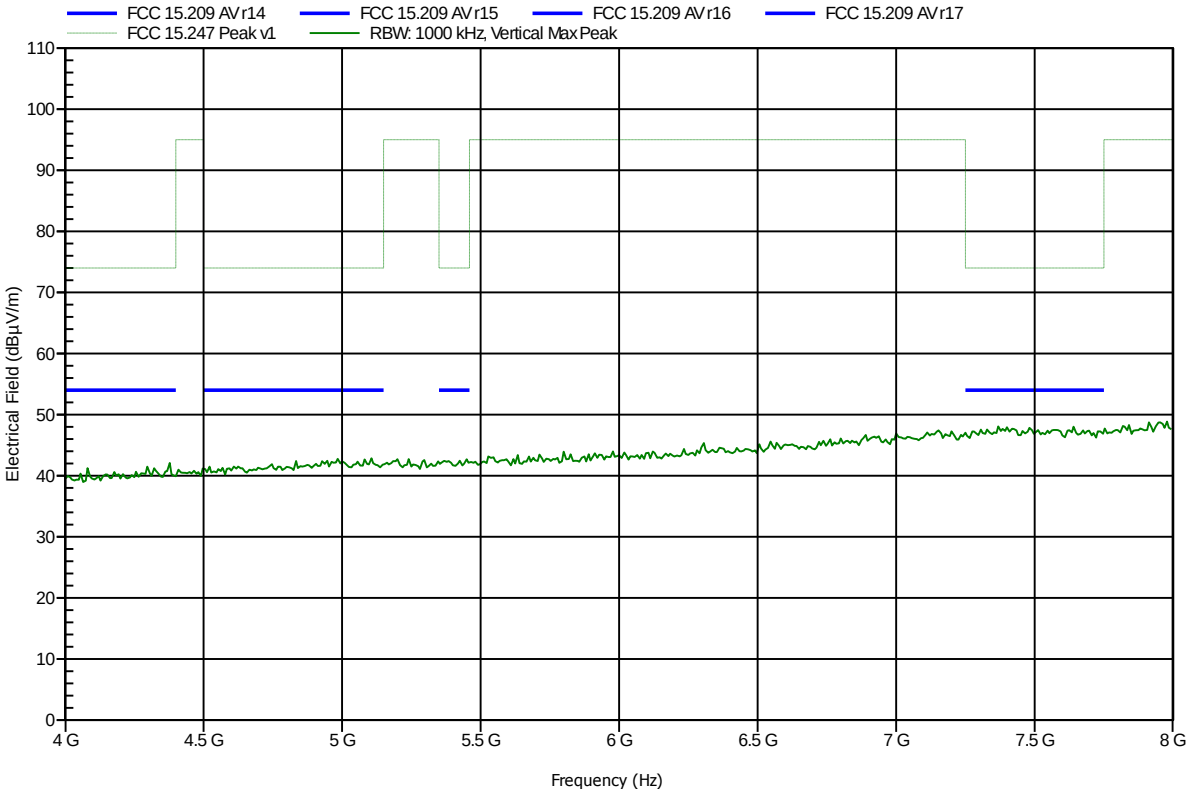


Spurious emissions according to FCC 15.247

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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