

FCC TEST REPORT	
FCC 47 CFR Part 15C Industry Canada RSS-210 Digital transmission systems operating within the 2400 – 2483.5 MHz band	
Report Reference No.....	G0M-1502-4538-TFC247BL-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 KDB Publication No. 558074 RSS-210, Issue 8, 2010-12 RSS-Gen, Issue 4, 2014-11 ANSI C63.4:2009
Test scope.....	complete Radio compliance test
Equipment under test (EUT):	
Product description	Bluetooth Smart Module
Model No.	ENW89847A1KF
Additional Model(s)	None
Brand Name(s)	PAN1760
Hardware version	01
Firmware / Software version	01
	FCC-ID: T7V1760 IC: 216Q-1760
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: 2015-02-24

Date (s) of performance of tests: 2015-03-02 – 2015-03-03

Compiled by: Wilfried Treffke

Tested by (+ signature).....: Wilfried Treffke

(Responsible for Test)

Approved by (+ signature): Christian Weber

Date of issue: 2015-05-11

Total number of pages: 78

W. Treffke

C. Weber

General remarks:

The test results presented in this report relate only to the object tested.

The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.

This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

Additional comments:

Version History

Version	Issue Date	Remarks	Revised by
01	2015-05-11	Initial Release	

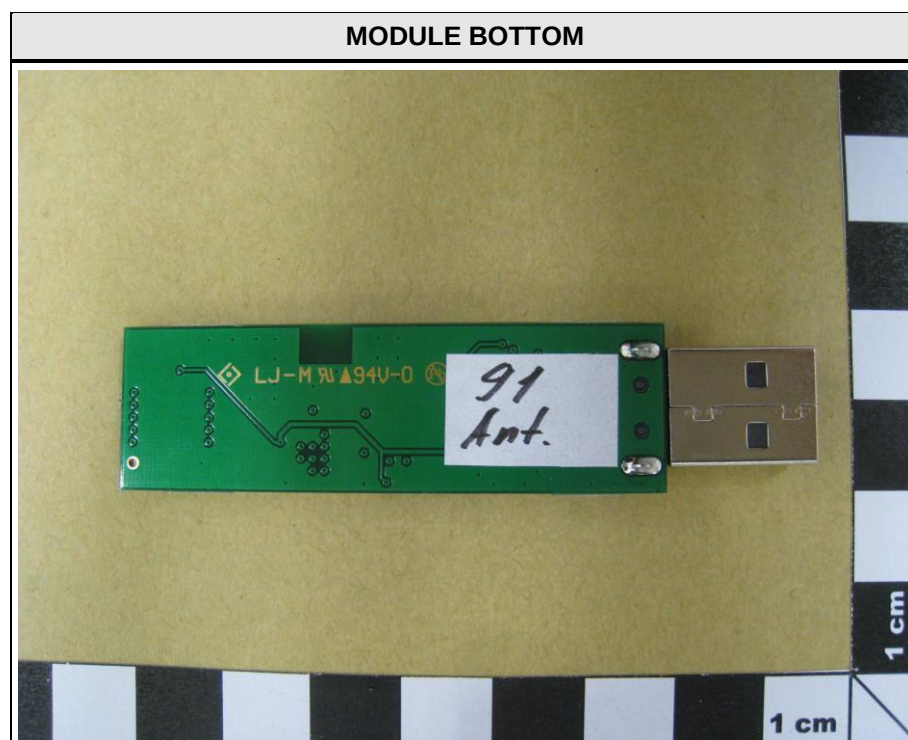
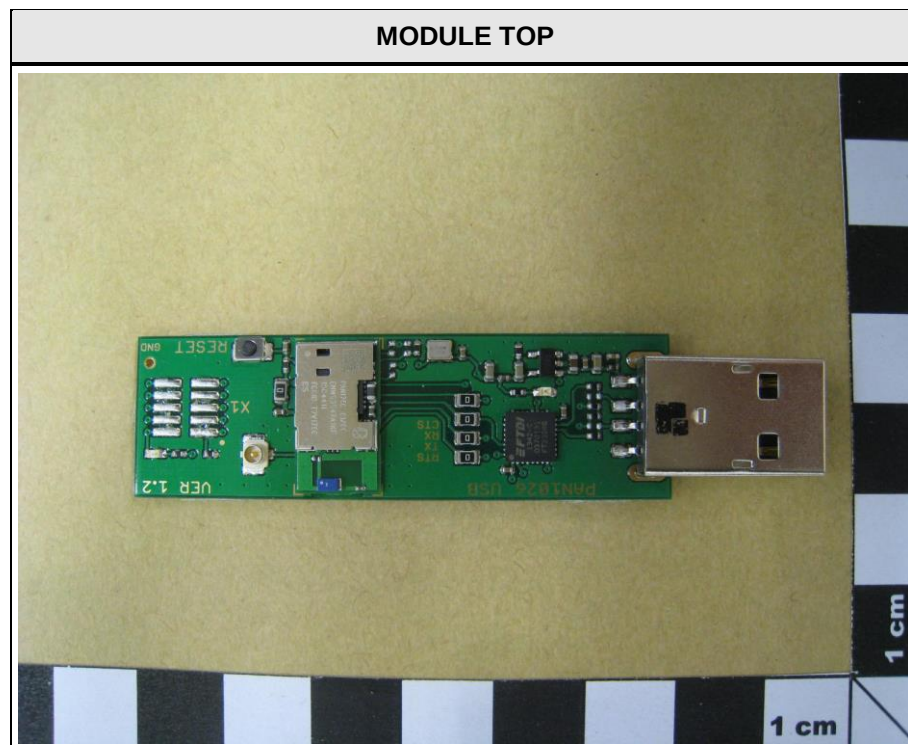
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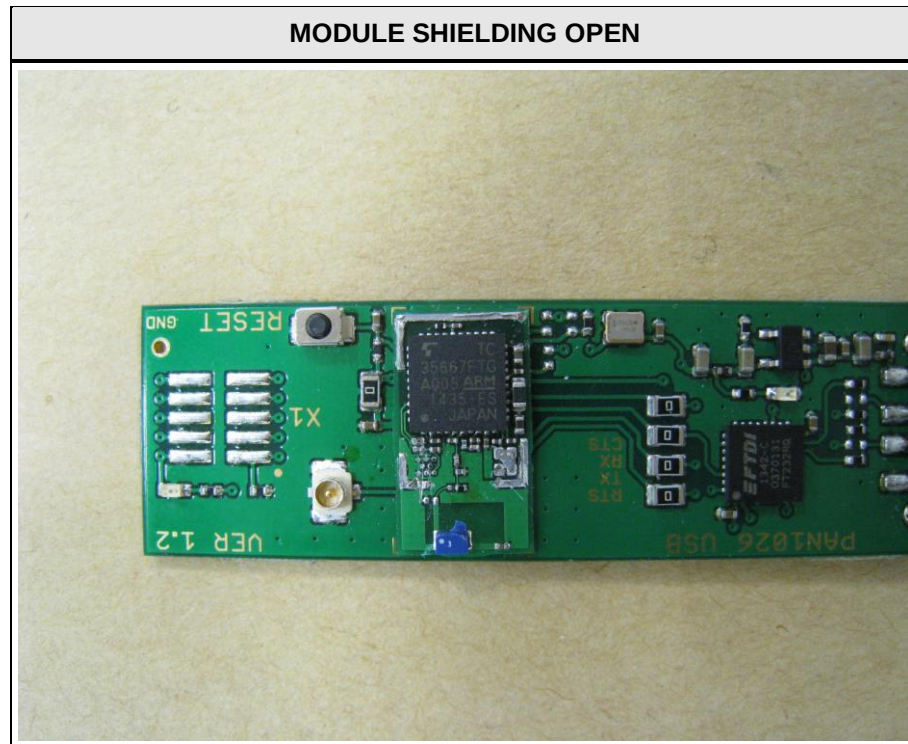
1 Equipment (Test item) Description

Description	Bluetooth Smart Module	
Model	ENW89847A1KF	
Additional Model(s)	None	
Brand Name(s)	PAN1760	
Serial number	None	
Hardware version	01	
Software / Firmware version	01	
FCC-ID	T7V1760	
IC	216Q-1760	
Equipment type	Radio module	
Radio type	Transceiver	
Radio technology	Bluetooth 4.0 Low Energy	
Operating frequency range	2402 - 2480 MHz	
Assigned frequency band	2400 - 2483.5 MHz	
Main test frequencies	F _{LOW}	2402 MHz
	F _{MID}	2440 MHz
	F _{HIGH}	2480 MHz
Spreading	Frequency Hopping	
Modulations	GFSK	
Number of channels	40	
Channel spacing	2MHz	
Number of antennas	1	
Antenna	Type	integrated
	Model	ANT2012L
	Manufacturer	Yageo
	Gain	2.7 dBi (manufacturer declaration)
Manufacturer	Panasonic Industrial Devices Europe GmbH Zeppelinstr. 19 21337 Lüneburg GERMANY	
Power supply	V _{NOM}	3.3VDC
	V _{MIN}	N/R
	V _{MAX}	N/R
AC/DC-Adaptor	none	

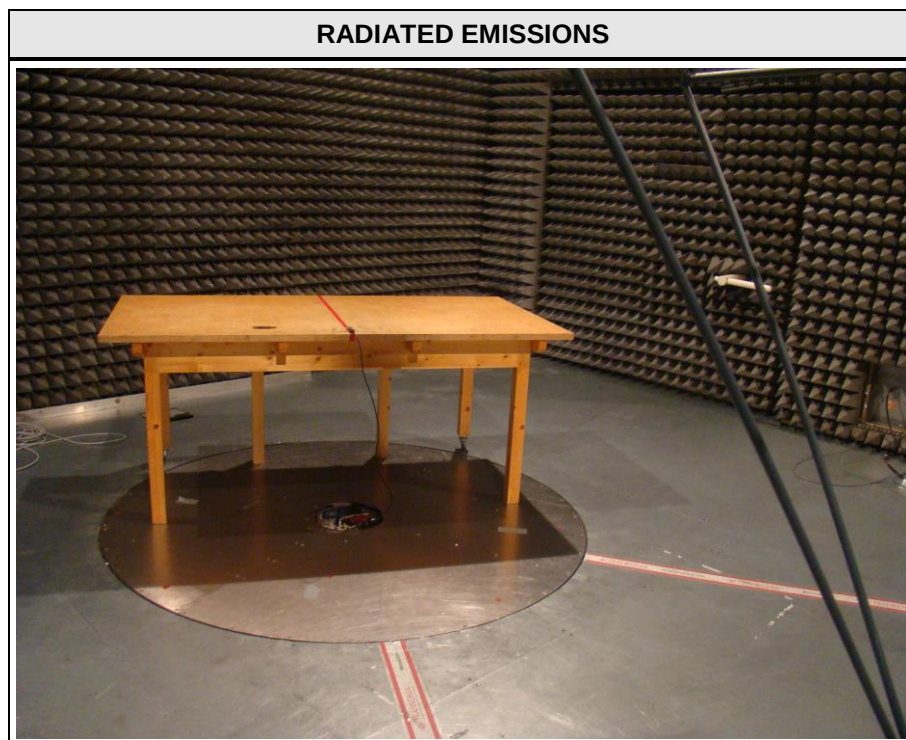
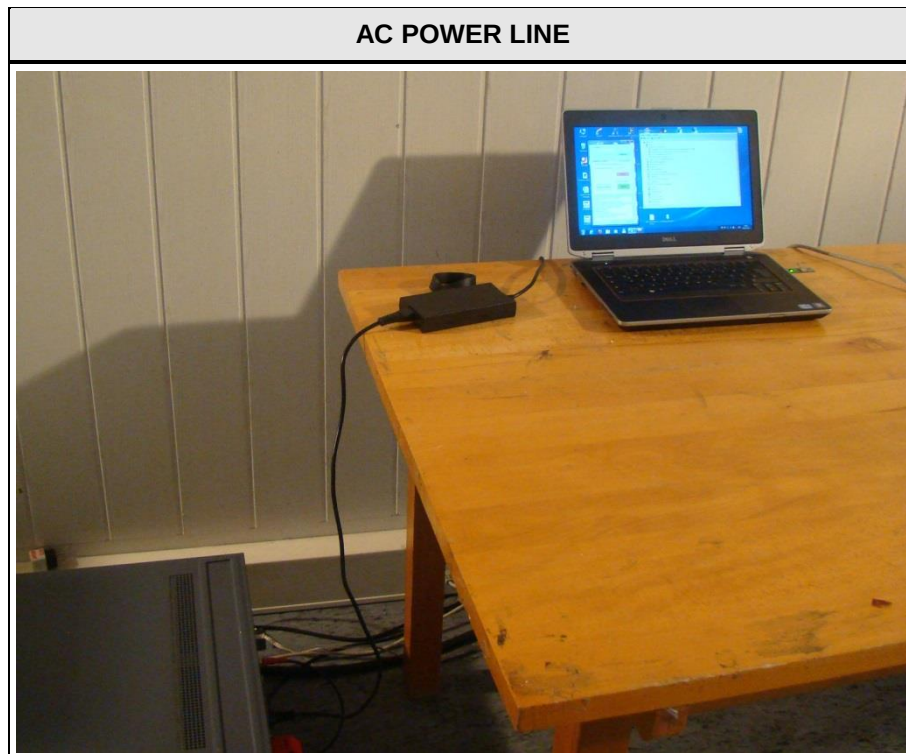
1.1 Photos – Equipment External



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				
*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	
Transmit	General conditions:	EUT powered by via USB.
	Radio conditions:	Mode = standalone transmit Spreading = Hopping stopped (single hopping channel) Modulation = GFSK Data rate = 1 Mbps Duty cycle = 100 % Power level = Maximum
Receive	General conditions:	EUT powered by via USB.
	Radio conditions:	Mode = standalone receive Spreading = On Modulation = GFSK
AC-Powerline	General conditions:	EUT powered by commercial Laptop
	Radio conditions:	Mode = Transmit Spreading = On

1.6 Test Equipment Used During Testing

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

Occupied Bandwidth					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSP 30	EF00312	2015-02	2016-02

6dB Bandwidth					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSP 30	EF00312	2015-02	2016-02

Maximum peak conducted power					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSP 30	EF00312	2015-02	2016-02

Power spectral density					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSP 30	EF00312	2015-02	2016-02

Band edge compliance					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSP 30	EF00312	2015-02	2016-02

Conducted spurious emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSP 30	EF00312	2015-02	2016-02

Radiated spurious emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Semi-anechoic chamber	Frankonia	AC 1	EF00062	-	-
Spectrum Analyzer	R&S	FSIQ26	EF00242	2014-03	2015-03
Biconical Antenna	R&S	HK 116	EF00012	2013-02	2016-02
LPD Antenna	R&S	HL 223	EF00187	2014-03	2017-03
LPD Antenna	R&S	HL 025	EF00327	2013-02	2016-02

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

AC powerline conducted emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
AMN	R&S	ESH2-Z5	EF00182	2014-11	2016-11
EMI Test Receiver	R&S	ESCS 30	EF00295	2014-10	2015-10

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:

$$\text{Reading on Analyzer (dB}\mu\text{V)} + \text{A.F. (dB)} = \text{Net field strength (dB}\mu\text{V/m)}$$

Net:

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

Limit:

This is the FCC Class B radiated emission limit (in units of 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:

$$\text{Limit (dB}\mu\text{V/m)} = 20 \cdot \log (\mu\text{V/m})$$

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:

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

2 Result Summary

FCC 47 CFR Part 15C, IC RSS-210				
Product Specific Standard Section	Requirement – Test	Reference Method	Result	Remarks
RSS-Gen 6.6	Occupied Bandwidth	RSS-Gen 6.6	N/R	Informational only
FCC § 15.247(a)(2) IC RSS-210 § A8.2	6dB Bandwidth	KDB Publication No. 558074	PASS	
FCC § 15.247(b)(3) IC RSS-210 § A8.4	Maximum peak conducted power	KDB Publication No. 558074	PASS	
FCC § 15.247(e) IC RSS-210 § A8.2	Power spectral density	KDB Publication No. 558074	PASS	
47 CFR 15.207 RSS-Gen 7.2.4	AC power line conducted emissions	KDB Publication No. 558074 / ANSI C63.4	PASS	
FCC § 15.247(d) IC RSS-210 § A8.5	Band edge compliance	KDB Publication No. 558074	PASS	
FCC § 15.247(d) IC RSS-210 § A8.5	Conducted spurious emissions	KDB Publication No. 558074	PASS	
FCC § 15.247(d) FCC § 15.209 IC RSS-210 A8.5 IC RSS-Gen 6.13	Transmitter radiated spurious emissions	KDB Publication No. 558074 / ANSI C 63.4	PASS	
IC RSS-Gen 4 7.1	Receiver radiated spurious emissions	ANSI C 63.4	PASS	
Remarks:				

3 Test Conditions and Results

3.1 Test Conditions and Results – Occupied Bandwidth

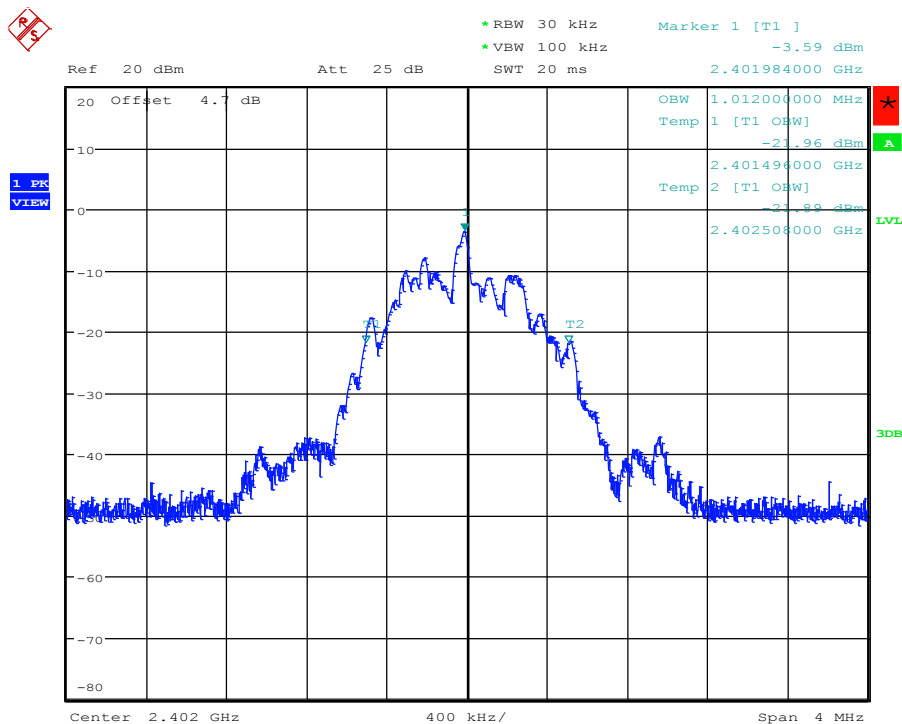
Occupied Bandwidth acc. to IC RSS-Gen				Verdict: PASS
Test according to measurement reference		Reference Method		
		RSS-Gen 6.6		
Test frequency range		Tested frequencies		
		F _{LOW} / F _{MID} / F _{HIGH}		
Limits				
None (Informational only)				
Test setup				
Spectrum Analyzer EUT				
Test procedure				
1. EUT set to test mode (Communication tester is used if needed) 2. Span set to at least twice the emission spectrum 3. Resolution bandwidth set to 1 % of span 4. Occupied Bandwidth (99 %) measurement with spectrum analyzer built in measurement function				
Test results				
Channel	Frequency [MHz]	Mode	Occupied Bandwidth [kHz]	
F _{LOW}	2402	Transmit	1012	
F _{MID}	2440	Transmit	1011	
F _{HIGH}	2480	Transmit	1017	
Comments:				

Occupied Bandwidth – F_{Low}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1502-4538

Applicant: Panasonic Industrial Devices Europe GmbH
EUT Name: Bluetooth Smart Module
Model: ENW89847A1KF
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom / Vnom
Mode: Tx, BT-LE, 2402 MHz, modulated
Test Date: 2015-03-02
Verdict: NONE (INFORMATION ONLY)
Note 1: A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2: OBW= 1.012 MHz



Occupied bandwidth: 1012 KHz

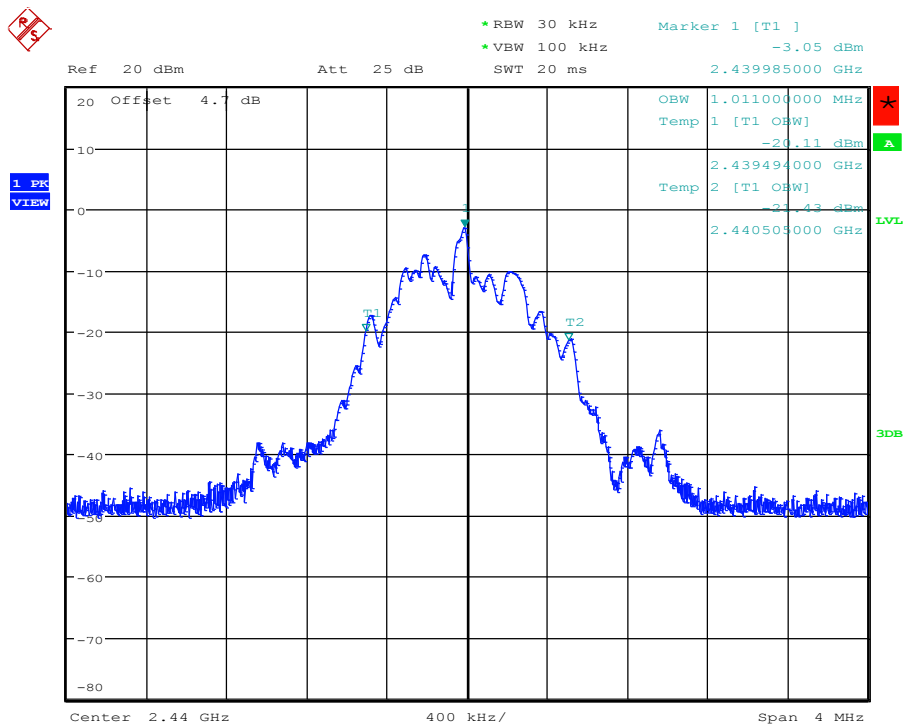
Date: 2.MAR.2015 12:28:00

Occupied Bandwidth – F_{MID}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1502-4538

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom / Vnom
 Mode: Tx, BT-LE, 2440 MHz, modulated
 Test Date: 2015-03-02
 Verdict: NONE (INFORMATION ONLY)
 Note 1: A spectrum analyzer with an integrated 99% power bandwidth function is used
 Note 2: OBW= 1.011 MHz



Occupied bandwidth: 1011 KHz

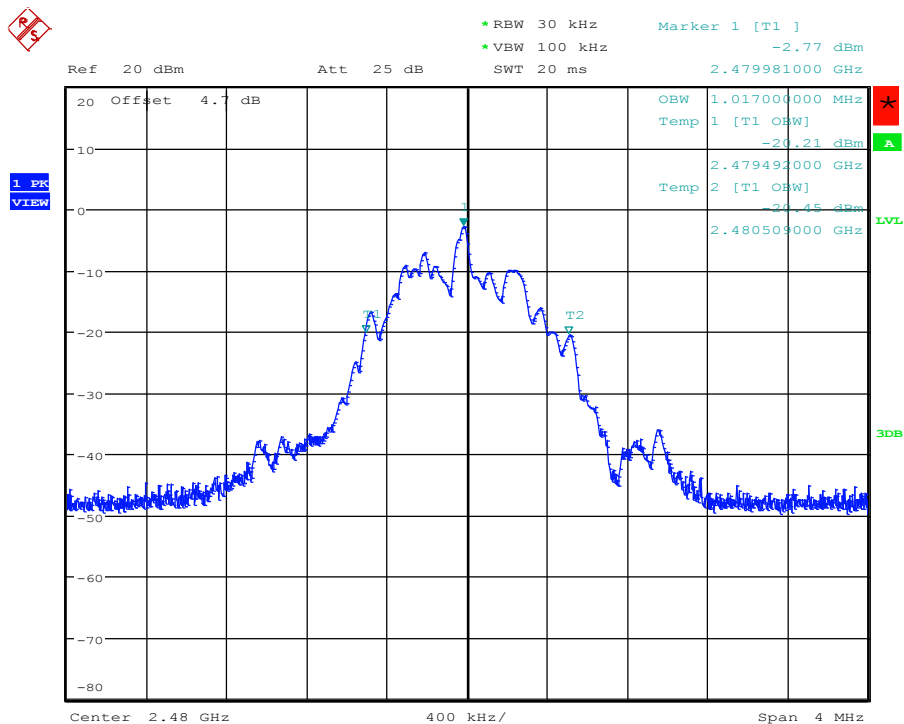
Date: 2.MAR.2015 12:32:00

Occupied Bandwidth – F_{HIGH}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1502-4538

Applicant: Panasonic Industrial Devices Europe GmbH
EUT Name: Bluetooth Smart Module
Model: ENW89847A1KF
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom / Vnom
Mode: Tx, BT-LE, 2480 MHz, modulated
Test Date: 2015-03-02
Verdict: NONE (INFORMATION ONLY)
Note 1: A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2: OBW= 1.017 MHz



Occupied bandwidth: 1017 KHz

Date: 2.MAR.2015 12:35:21

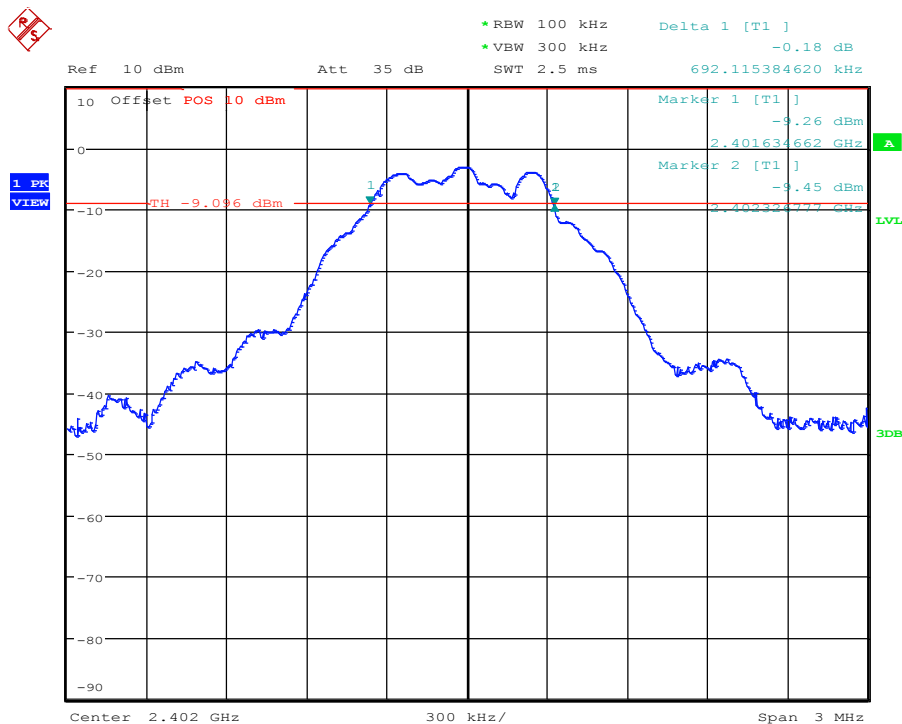
3.2 Test Conditions and Results – 6 dB Bandwidth

6dB Bandwidth acc. to FCC 15.247 / IC RSS-210				Verdict: PASS	
EUT requirement rule parts and clause		Reference			
		FCC 15.247(a)(2) / IC RSS-210 A8.2			
Test according to measurement reference		Reference Method			
		FCC KDB Publication No. 558074			
Test frequency range		Tested frequencies			
		F _{LOW} / F _{MID} / F _{HIGH}			
Limits					
≥ 500kHz					
Test setup					
Spectrum Analyzer EUT					
Test procedure					
1. EUT set to test mode 2. Span set to at least twice the emission spectrum 3. Detector set to peak and max hold and RBW is set to 100 kHz 4. Envelope peak value of emission spectrum is selected 5. Marker on envelope of spectrum is set to level of -6 dB to the left of the peak 6. Marker on envelope of spectrum is set to level of -6 dB to the right of the peak 7. 6 dB Bandwidth is determined by marker frequency separation					
Test results					
Channel	Frequency [MHz]	Mode	6 dB Bandwidth [kHz]	Limit [kHz]	Result
F _{LOW}	2402	Transmit	692.1	500	PASS
F _{MID}	2440	Transmit	668.0	500	PASS
F _{HIGH}	2480	Transmit	682.4	500	PASS
Comments:					

6 dB Bandwidth – F_{Low}
Minimum 6 dB Bandwidth acc. to FCC 15.247

Project Number: G0M-1502-4538

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom / Vnom
 Mode: Tx, BT-LE, 2402 MHz, modulated
 Test Date: 2015-03-02
 Verdict: PASS
 Note 1: Procedure 8.1 DTS (558074 D01 Meas Guidance)
 Note 2: Minimum 6 dB Bandwidth conducted

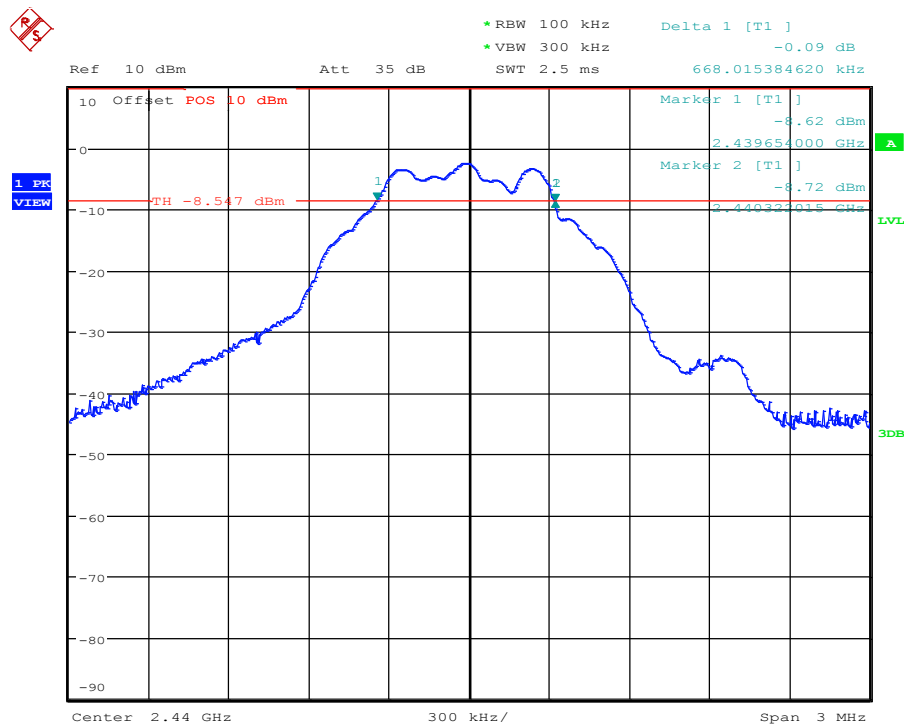


6 dB bandwidth: 692.1 KHz > 500 KHz; verdict: PASS
 Date: 2.MAR.2015 12:43:46

6 dB Bandwidth – F_{MID}
Minimum 6 dB Bandwidth acc. to FCC 15.247

Project Number: G0M-1502-4538

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom / Vnom
 Mode: Tx, BT-LE, 2440 MHz, modulated
 Test Date: 2015-03-02
 Verdict: PASS
 Note 1: Procedure 8.1 DTS (558074 D01 Meas Guidance)
 Note 2: Minimum 6 dB Bandwidth conducted

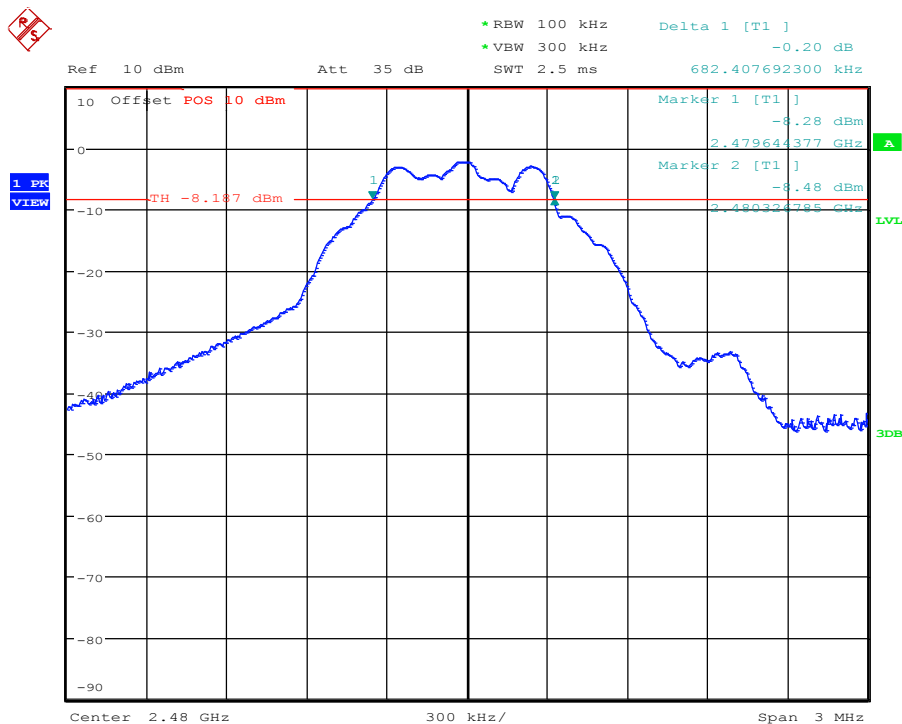


6 dB bandwidth: 668 KHz > 500 KHz; verdict: PASS
 Date: 2.MAR.2015 12:46:00

6 dB Bandwidth – F_{HIGH}
Minimum 6 dB Bandwidth acc. to FCC 15.247

Project Number: G0M-1502-4538

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom / Vnom
 Mode: Tx, BT-LE, 2480 MHz, modulated
 Test Date: 2015-03-02
 Verdict: PASS
 Note 1: Procedure 8.1 DTS (558074 D01 Meas Guidance)
 Note 2: Minimum 6 dB Bandwidth conducted



6 dB bandwidth: 682.4 KHz > 500 KHz; verdict: PASS
 Date: 2.MAR.2015 12:48:59

3.3 Test Conditions and Results – Maximum peak conducted power

Maximum peak conducted power acc. to FCC 15.247 / IC RSS-210						Verdict: PASS	
EUT requirement rule parts and clause			Reference				
			FCC 15.247(b)(3) / IC RSS-210 A8.4				
Test according to measurement reference			Reference Method				
			FCC KDB Publication No. 558074				
Test frequency range			Tested frequencies				
			F _{LOW} / F _{MID} / F _{HIGH}				
Measurement mode			Peak				
Maximum antenna gain			2.7 dBi ⇒ Limit correction = 0 dB				
Limits							
1 W (30 dBm)							
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							
Spectrum Analyzer EUT							
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 [mW]	Limit [dBm]	Margin [dB]
F _{LOW}	2402	V _{nom} = 3.3V	Transmit	-3.0	0.50	30	-33.00
F _{MID}	2440	V _{nom} = 3.3V	Transmit	-2.4	0.58	30	-32.40
F _{HIGH}	2480	V _{nom} = 3.3V	Transmit	-2.0	0.63	30	-32.00
Comment:							

3.4 Test Conditions and Results – Power spectral density

Power spectral density acc. to FCC 15.247 / IC RSS-210					Verdict: PASS	
EUT requirement rule parts and clause		Reference				
		FCC 15.247(e) / IC RSS-210 A8.2				
Test according to measurement reference		Reference Method				
		FCC KDB Publication No. 558074				
Test frequency range		Tested frequencies				
		F _{LOW} / F _{MID} / F _{HIGH}				
Measurement mode		Peak				
Limits						
8 dBm / 3 kHz						
Test setup						
Spectrum Analyzer EUT						
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 is set large enough to capture maximum emissions in passband, RBW is set to 3kHz 4. Peak power density is determined from peak emission of envelope						
Test results						
Channel	Frequency [MHz]	Test mode	Peak frequency [MHz]	Peak power density [dBm/100kHz]	Limit [dBm/3kHz]	Margin [dB]
F _{LOW}	2402	Transmit	2401.990	-3.08	8.0	-11.08
F _{MID}	2440	Transmit	2439.986	-2.52	8.0	-10.52
F _{HIGH}	2480	Transmit	2479.986	-2.18	8.0	-10.18
Comments:						

3.5 Test Conditions and Results – AC power line conducted emissions

Power line conducted emissions acc. to 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 power line			
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.					

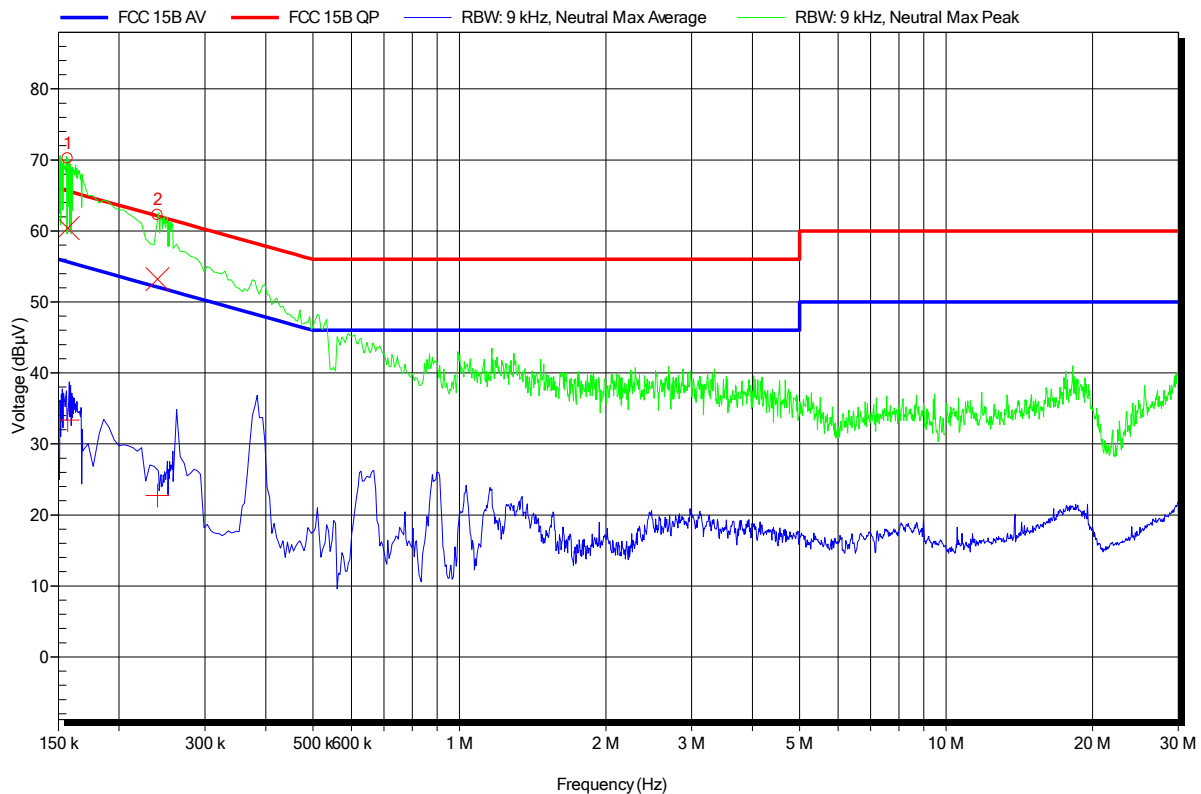
Conducted Emissions

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

Project number: G0M-1502-4538

Manufacturer: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Klein
 Test Conditions: Tnom: 23°C, Unom: 5V USB from Notebook with 120V AC/DC-Adapter
 LISN: ESH2-Z5 N
 Mode: Permanent TX @ 2419MHz
 Test Date: 2015-03-10
 Note:

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Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
156,75 kHz	60,39 dBµV	65,63 dBµV	-5,25 dB	Pass
240 kHz	53,21 dBµV	62,1 dBµV	-8,89 dB	Pass
Frequency	Average	Average Limit	Average Difference	Average Status
156,75 kHz	33,35 dBµV	55,63 dBµV	-22,29 dB	Pass
240 kHz	22,74 dBµV	52,1 dBµV	-29,36 dB	Pass

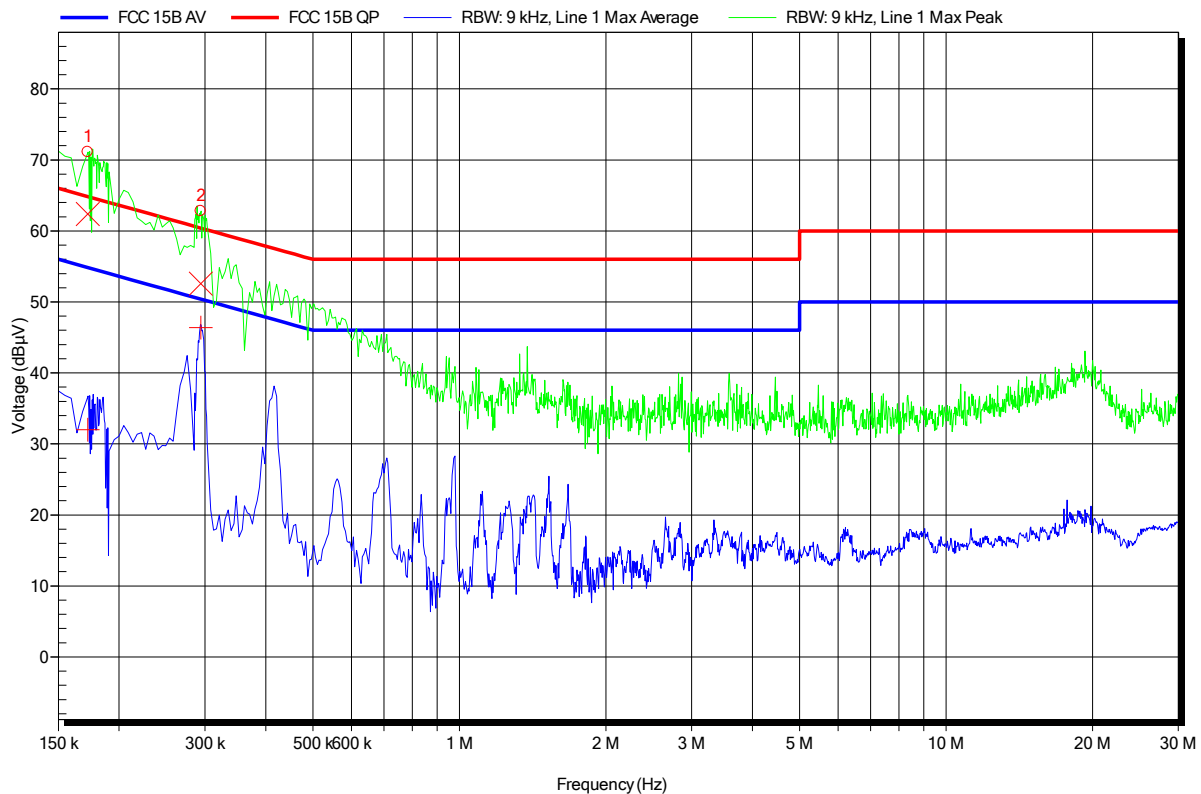
Conducted Emissions

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

Project number: GOM-1502-4538

Manufacturer: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Klein
 Test Conditions: Tnom: 23°C, Unom: 5V USB from Notebook with 120V AC/DC-Adapter
 LISN: ESH2-Z5 L
 Mode: Permanent TX @ 2419MHz
 Test Date: 2015-03-10
 Note:

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Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
172,5 kHz	62,41 dBµV	64,84 dBµV	-2,43 dB	Pass
294,45 kHz	52,58 dBµV	60,4 dBµV	-7,82 dB	Pass
Frequency	Average	Average Limit	Average Difference	Average Status
172,5 kHz	31,99 dBµV	54,84 dBµV	-22,85 dB	Pass
294,45 kHz	46,37 dBµV	50,4 dBµV	-4,03 dB	Pass

3.6 Test Conditions and Results – Band edge compliance

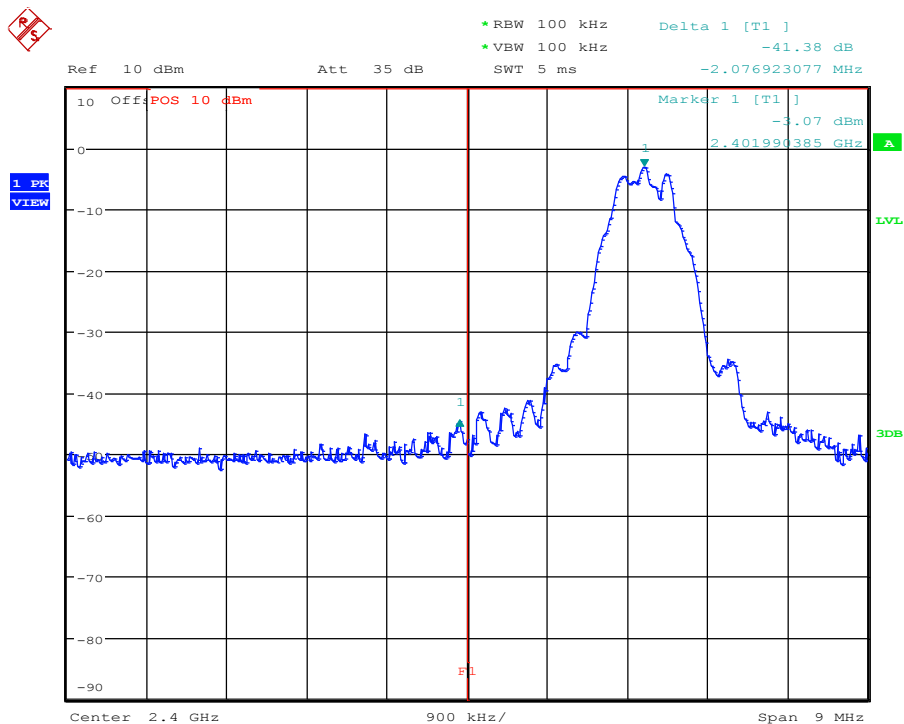
Band-edge compliance acc. to FCC 15.247 / IC RSS-210					Verdict: PASS
EUT requirement rule parts and clause		Reference			
		FCC 15.247(d) / IC RSS-210 A8.5			
Test according to measurement reference		Reference Method			
		FCC KDB Publication No. 558074			
Test frequency range		Tested frequencies			
		F _{LOW} / F _{HIGH}			
Measurement mode		Peak			
Limits					
Limit			Condition		
≤ -20 dB / 100 kHz			Peak power measurement detector = Peak		
≤ -30 dB / 100 kHz			Peak power measurement detector = RMS		
Test setup					
Spectrum Analyzer EUT					
Test procedure					
1. EUT set to test mode (Communication tester is used if needed) 2. Span set around lower band edge and detector is set to peak and max hold 3. Resolution bandwidth is set to 100 kHz 4. Markers are set to peak emission levels within frequency band and outside frequency band 5. Band edge attenuation is determined from level difference					
Test results					
Channel	Frequency [MHz]	Mode	Level [dBc]	Limit [dBc]	Margin [dB]
F _{LOW}	2402	Transmit	-41.4	-20	-21.40
F _{HIGH}	2480	Transmit	-47.8	-20	-27.80
Comments:					

Band-edge compliance F_{Low}

Band-edge compliance acc. to FCC 15.247

Project Number: G0M-1502-4538

Applicant: Panasonic Industrial Devices Europe GmbH
EUT Name: Bluetooth Smart Module
Model: ENW89847A1KF
Test Site: Eurofins Product Service GmbH
Operator: Wilfried Treffke
Test Conditions: Tnom / Vnom
Mode: Tx, BT-LE, 2402 MHz, modulated
Test Date: 2015-03-02
Verdict: PASS
Note 1: 20 dB down method (558074 D01 Meas Guidance)
Note 2: lower Band-edge, conducted measurement



Limit: Marker Delta value >20 dB; Result: PASS

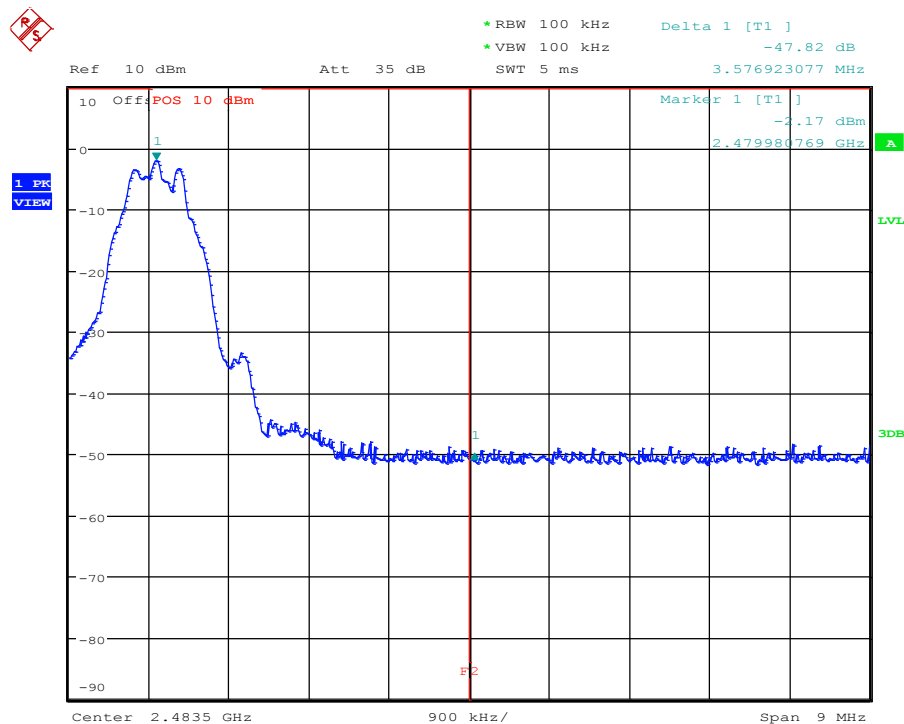
Date: 2.MAR.2015 13:30:36

Band-edge compliance F_{HIGH}

Band-edge compliance acc. to FCC 15.247

Project Number: G0M-1502-4538

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Smart Module
Model:	ENW89847A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom / Vnom
Mode:	Tx, BT-LE, 2480 MHz, modulated
Test Date:	2015-03-02
Verdict:	PASS
Note 1:	20 dB down method (558074 D01 Meas Guidance)
Note 2:	upper Band-edge, conducted measurement



Limit: Marker Delta value >20 dB; Result: PASS

Date: 2.MAR.2015 13:33:08

3.7 Test Conditions and Results – Conducted spurious emissions

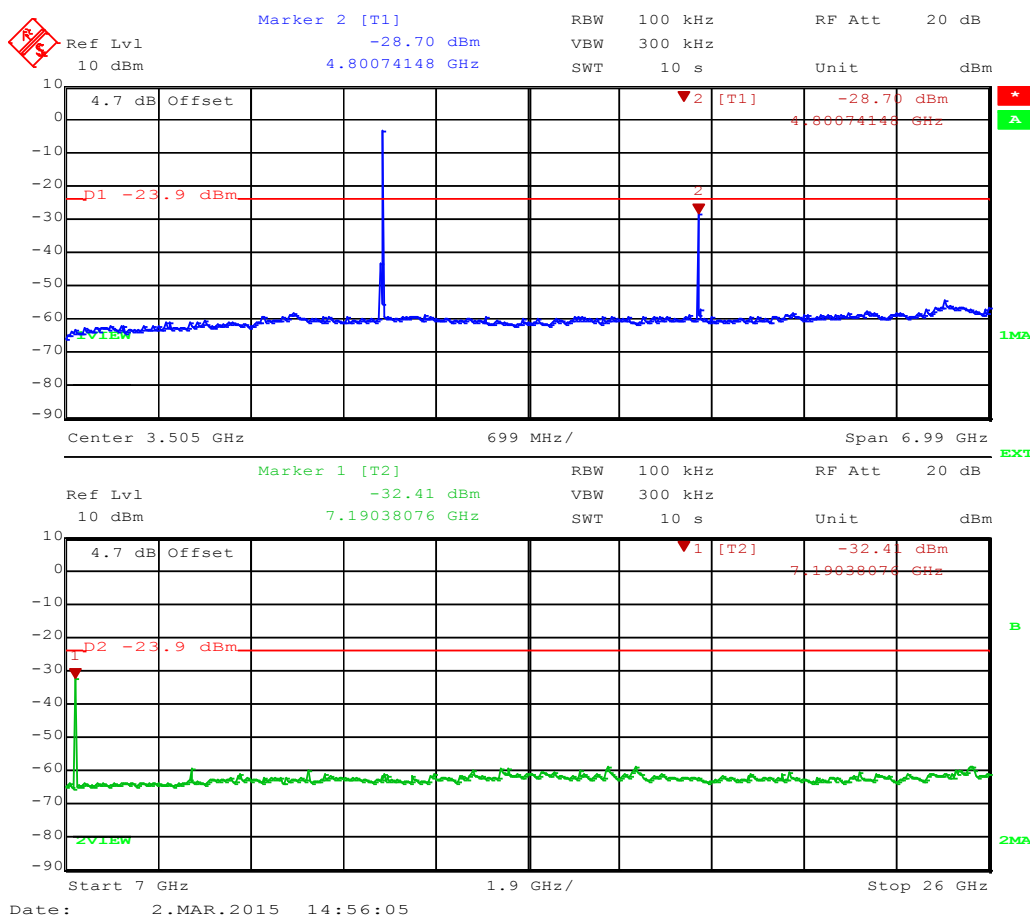
Conducted spurious emissions acc. to FCC 15.247 / IC RSS-210						Verdict: PASS	
EUT requirement rule parts and clause			Reference				
			FCC 15.247(d) / IC RSS-210 A8.5				
Test according to measurement reference			Reference Method				
			FCC KDB Publication No. 558074				
Test frequency range			Tested frequencies				
			10 MHz – 10 th Harmonic				
Measurement mode			Peak				
Limits							
Limit				Condition			
≤ -20 dB / 100 kHz				Peak power measurement detector = Peak			
≤ -30 dB /100 kHz				Peak power measurement detector = RMS			
Test setup							
Spectrum Analyzer EUT							
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 is set to 100 kHz and detector to peak and max hold 4. Markers are set to peak emission levels within frequency band 5. Emission level is determined by second marker on emission peak 6. Attenuation is determined from level difference							
Test results							
Channel	Frequency [MHz]	Mode	Emission [MHz]	Emission Level [dBm]	Peak power [dBm]	Limit [dBm]	Margin [dB]
F _{LOW}	2402	Peak	4800.7	-28.7	-3.9	-23.9	-04.80
F _{MID}	2440	Peak	4884.8	-27.1	-3.5	-23.5	-03.60
F _{HIGH}	2480	Peak	4968.8	-32.0	-2.4	-22.4	-09.60
Comments:							

Conducted spurious emissions – F_{Low}

Spurious Emissions acc. to FCC 15.247

Project Number: G0M-1502-4538

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom / Vnom
 Mode: Tx, BT-LE, 2402 MHz, modulated
 Test Date: 2015-03-02
 Verdict: PASS
 Note 1: Spurious in non-restricted frequency bands (558074 D01 Meas Guidance)
 Note 2: conducted measurement

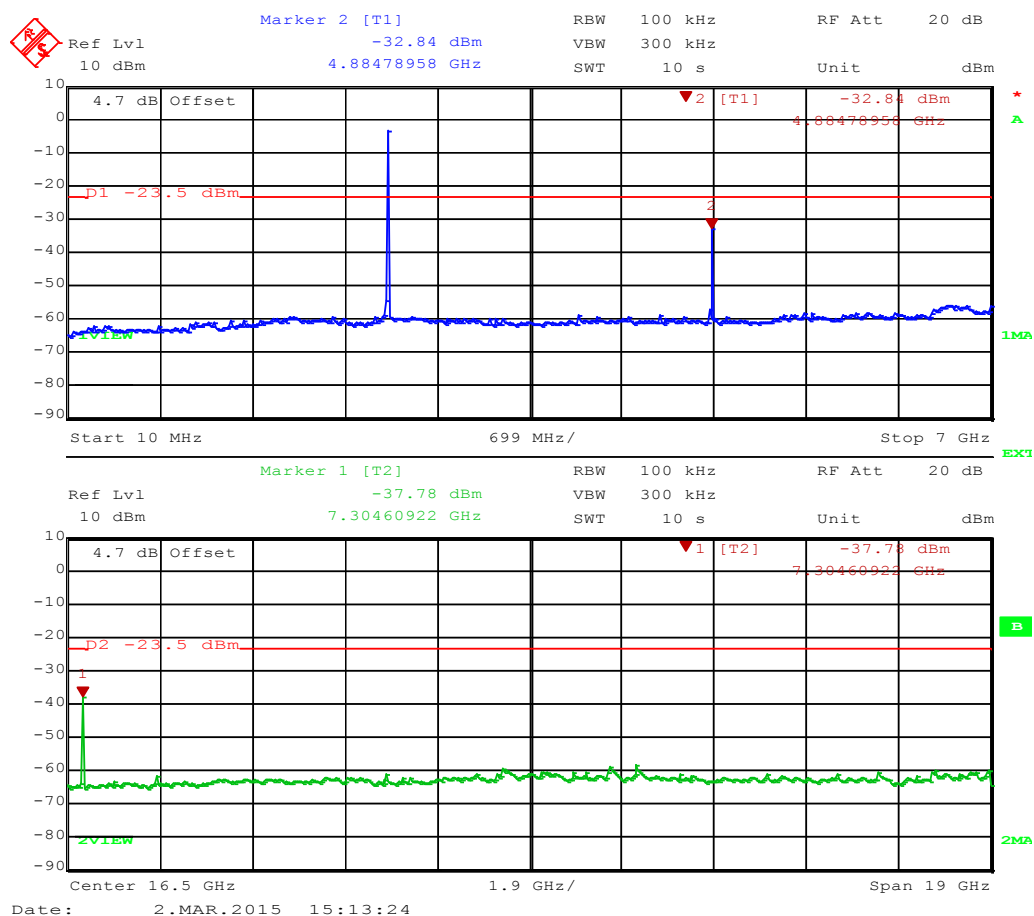


Conducted spurious emissions – F_{MID}

Spurious Emissions acc. to FCC 15.247

Project Number: G0M-1502-4538

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom / Vnom
 Mode: Tx, BT-LE, 2440 MHz, modulated
 Test Date: 2015-03-02
 Verdict: PASS
 Note 1: Spurious in non-restricted frequency bands (558074 D01 Meas Guidance)
 Note 2: conducted measurement



Test Report No.: G0M-1502-4538-TFC247BL-V01

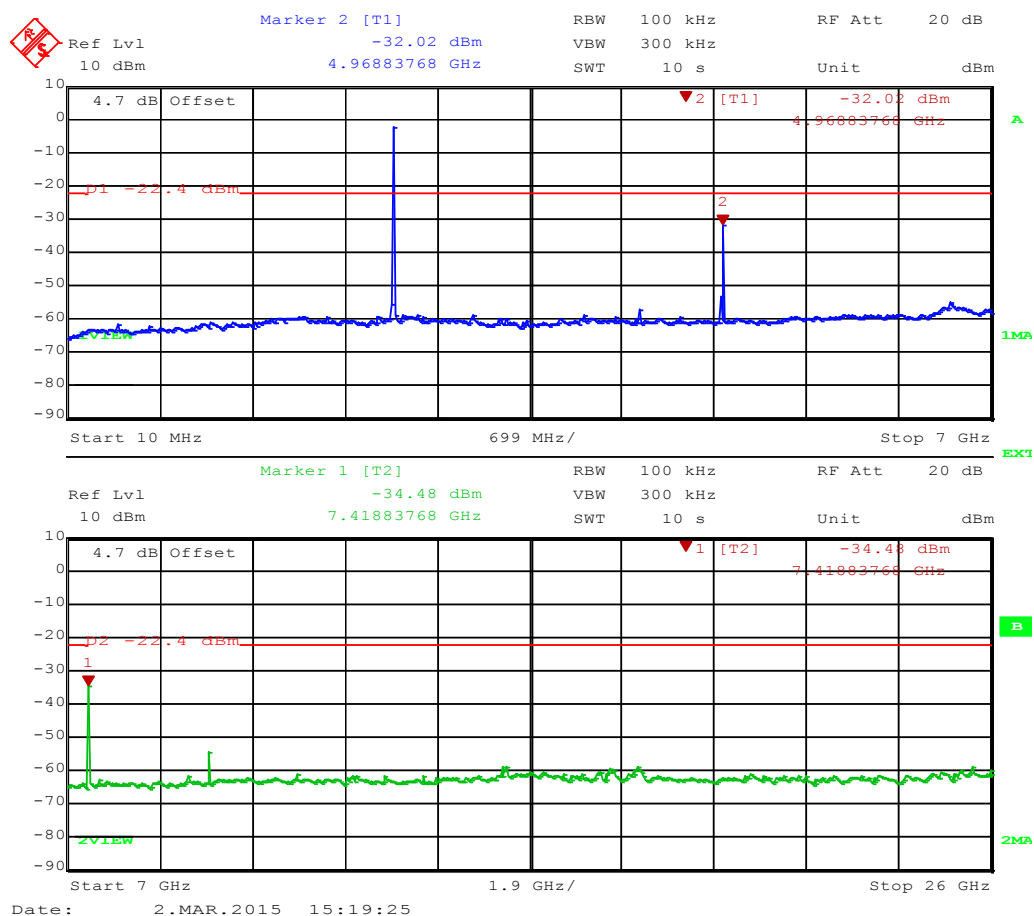
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Conducted spurious emissions – F_{HIGH}

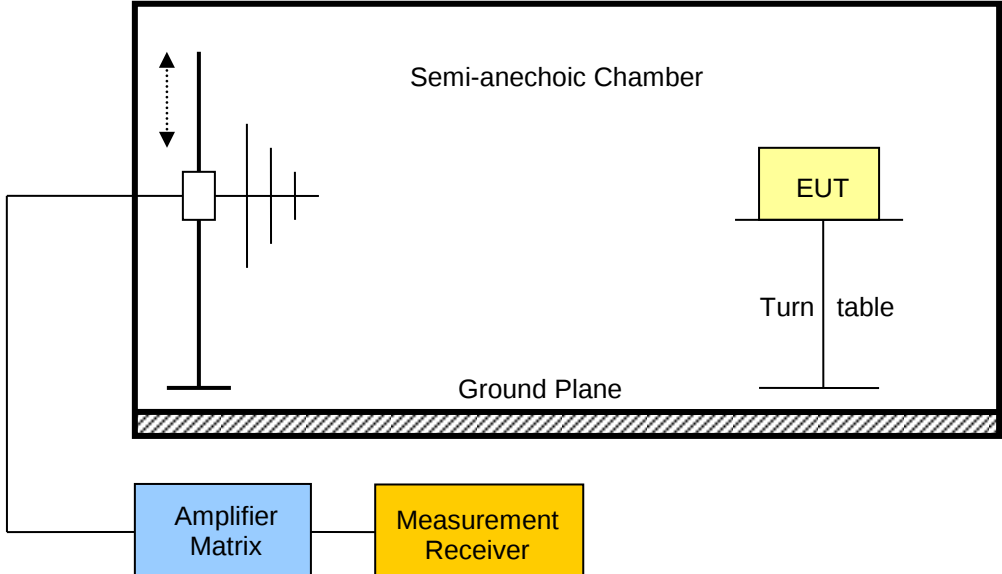
Spurious Emissions acc. to FCC 15.247

Project Number: G0M-1502-4538

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Wilfried Treffke
 Test Conditions: Tnom / Vnom
 Mode: Tx, BT-LE, 2480 MHz, modulated
 Test Date: 2015-03-02
 Verdict: PASS
 Note 1: Spurious in non-restricted frequency bands (558074 D01 Meas Guidance)
 Note 2: conducted measurement

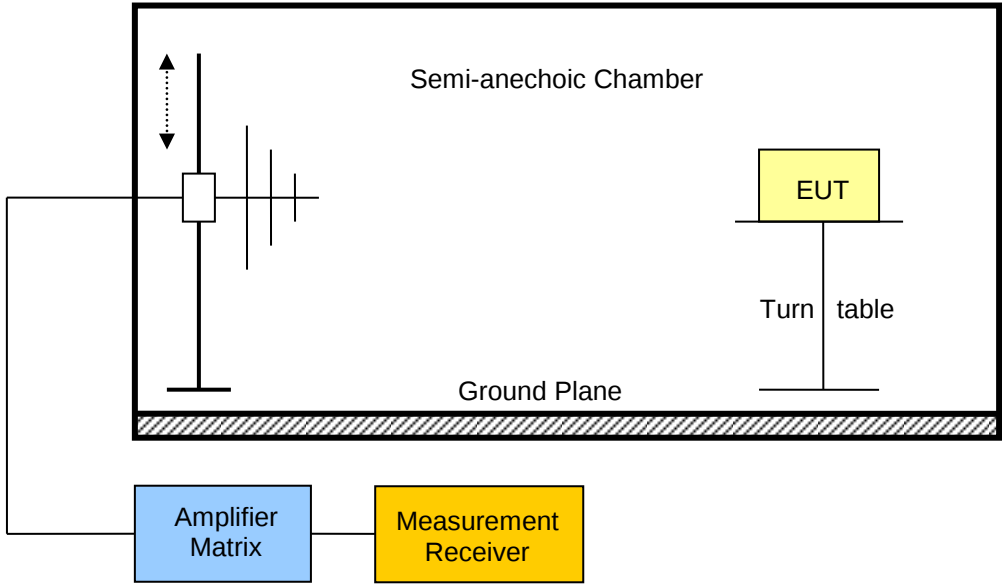


3.8 Test Conditions and Results – Transmitter radiated emissions

Transmitter radiated emissions acc. to 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 KDB Publication No. 558074 / ANSI C63.4			
Test frequency range		Tested frequencies			
		30 MHz – 10 th 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									
Channel	Frequency [MHz]	Mode	Emission [MHz]	Level [dBμV/m]	Det.	Pol.	Limit [dBμV/m]	Limit dist. [m]*	Margin [dB]
F _{LOW}	2402	Transmit	2389	51.94	pk	hor	74.00	3	-22.06
F _{LOW}	2402	Transmit	2389	27.89	RMS	hor	54.00	3	-26.11
F _{LOW}	2402	Transmit	2389	47.86	pk	ver	74.00	3	-26.14
F _{LOW}	2402	Transmit	2389	27.20	RMS	ver	54.00	3	-26.80
F _{LOW}	2402	Transmit	4803	47.83	pk	hor	74.00	3	-26.17
F _{LOW}	2402	Transmit	4803	39.59	avg	hor	54.00	3	-14.41
F _{MID}	2440	Transmit	4879	42.02	pk	ver	74.00	3	-31.98
F _{MID}	2440	Transmit	4879	34.29	avg	ver	54.00	3	-19.71
F _{MID}	2440	Transmit	4880	47.98	pk	hor	74.00	3	-26.02
F _{MID}	2440	Transmit	4880	41.42	avg	hor	54.00	3	-12.58
F _{MID}	2440	Transmit	7319	49.74	pk	hor	74.00	1	-24.26
F _{MID}	2440	Transmit	7319	40.54	avg	hor	54.00	1	-13.46
F _{MID}	2440	Transmit	7319	45.64	pk	ver	74.00	1	-28.36
F _{MID}	2440	Transmit	7319	35.75	avg	ver	54.00	1	-18.25
F _{MID}	2440	Transmit	12200	49.81	pk	hor	74.00	1	-24.19
F _{MID}	2440	Transmit	12200	38.59	avg	hor	54.00	1	-15.41
F _{HIGH}	2480	Transmit	2483.5	55.12	pk	hor	74.00	3	-18.88
F _{HIGH}	2480	Transmit	2483.5	38.07	RMS	hor	54.00	3	-15.93
F _{HIGH}	2480	Transmit	2492.5	55.55	pk	hor	74.00	3	-18.45
F _{HIGH}	2480	Transmit	2492.5	28.72	RMS	hor	54.00	3	-25.28
F _{HIGH}	2480	Transmit	2492.5	50.15	pk	ver	74.00	3	-23.85
F _{HIGH}	2480	Transmit	2492.5	28.69	RMS	ver	54.00	3	-25.31
F _{HIGH}	2480	Transmit	7439	53.55	pk	hor	74.00	1	-20.45
F _{HIGH}	2480	Transmit	7439	45.06	avg	hor	54.00	1	-08.94
F _{HIGH}	2480	Transmit	7440	53.46	pk	ver	74.00	1	-20.54
F _{HIGH}	2480	Transmit	7440	44.94	avg	ver	54.00	1	-09.06
Comments: * Physical distance between EUT and measurement antenna.									

3.9 Test Conditions and Results – Receiver radiated emissions

Receiver radiated emissions acc. to IC RSS-210				Verdict: PASS
Test according referenced standards	Reference Method			
	IC RSS-210 A8.5			
Test according to measurement reference	Reference Method			
	ANSI C63.4			
Test frequency range	Tested frequencies			
	30 MHz – 3 th Harmonic			
EUT test mode	Receive			
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
Test setup				
				

Test procedure							
1. EUT set to receive 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							
Test results							
Channel	Frequency [MHz]	Emission [MHz]	Emission Level [dBμV/m]	Pol.	Det.	Limit [dBμV/m]	Margin [dBμV/m]
F _{MID}	2442	854.4	23.35	ver	pk	46.00	-22.65 dB
F _{MID}	2442	7416	48.93	ver	pk	53.98	-05.05 dB
F _{MID}	2442	7968	49.22	hor	pk	53.98	-04.76 dB
Comments:							

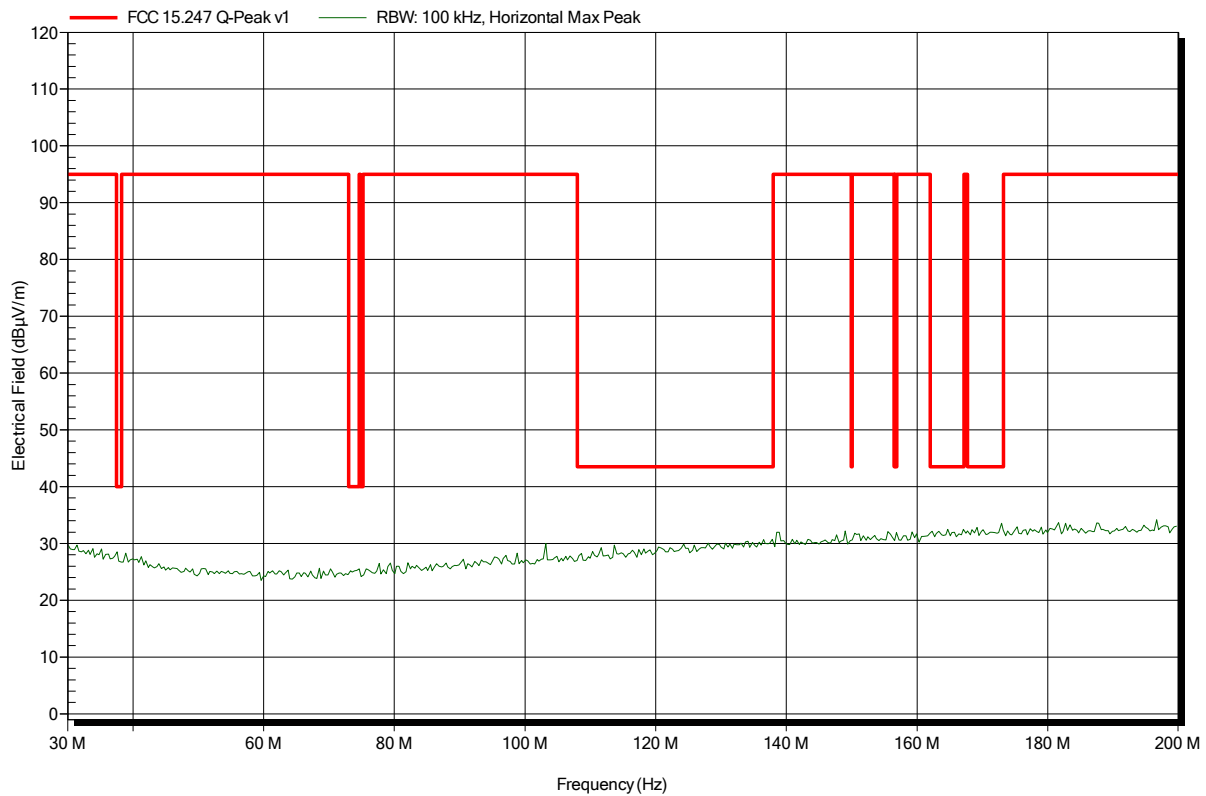
ANNEX A Transmitter radiated spurious emissions

Spurious emissions according to FCC 15.247

Project number: G0M-1502-4538

Applicant:	Panasonic Industrial Devices
EUT Name:	Bluetooth Smart Module
Model:	ENW89847A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 25°C, Vnom: 5.0 V DC
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	TX; BT-LE; 2402 MHz
Test Date:	2015-03-04
Note:	

Index 1

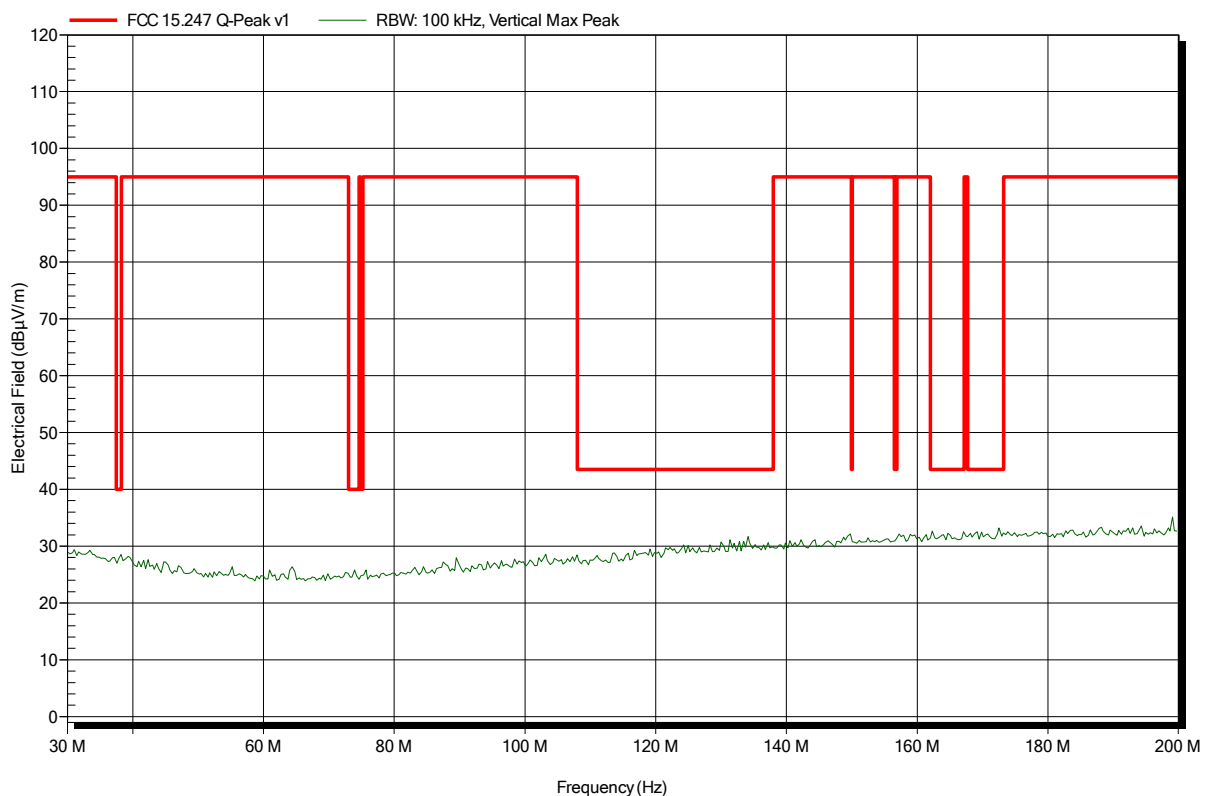


Spurious emissions according to FCC 15.247

Project number: G0M-1502-4538

Applicant:	Panasonic Industrial Devices
EUT Name:	Bluetooth Smart Module
Model:	ENW89847A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 25°C, Vnom: 5.0 V DC
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3 m
Mode:	TX; BT-LE; 2402 MHz
Test Date:	2015-03-04
Note:	

Index 2

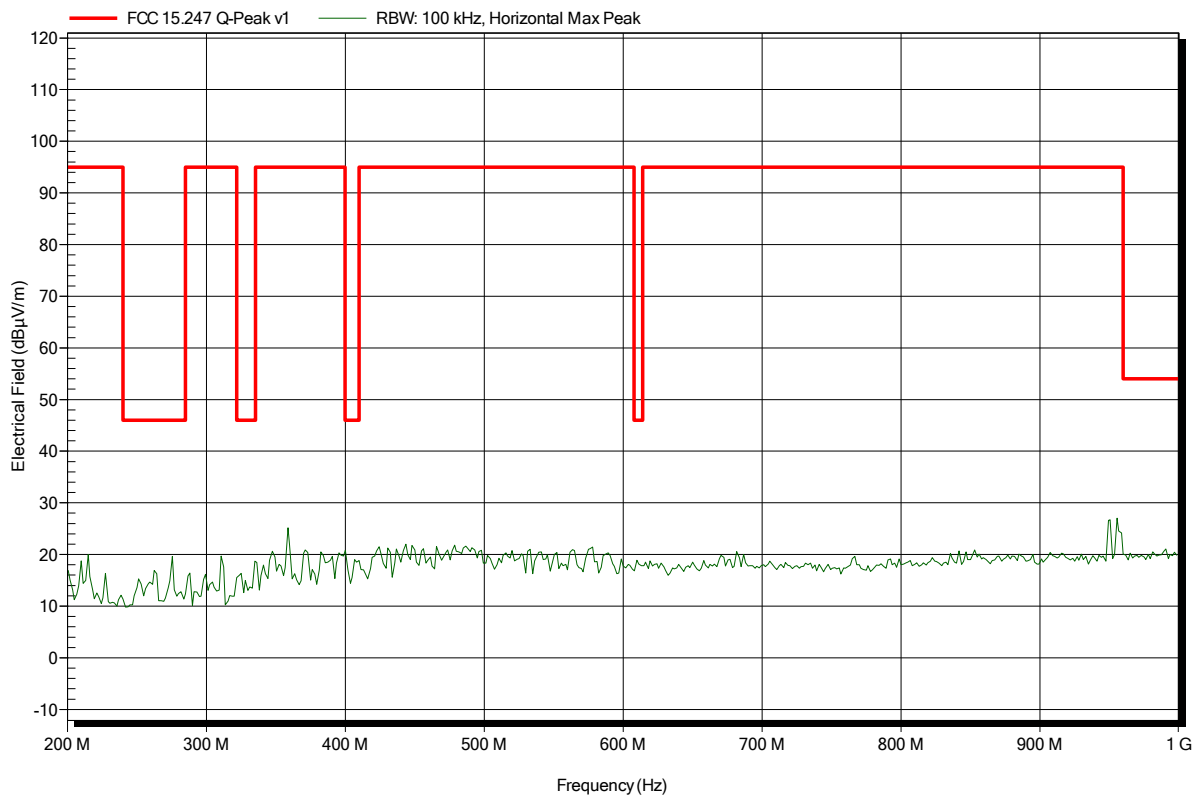


Spurious emissions according to FCC 15.247

Project number: G0M-1502-4538

Applicant:	Panasonic Industrial Devices
EUT Name:	Bluetooth Smart Module
Model:	ENW89847A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 25°C, Vnom: 5.0 V DC
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	TX; BT-LE; 2402 MHz
Test Date:	2015-03-04
Note:	

Index 3

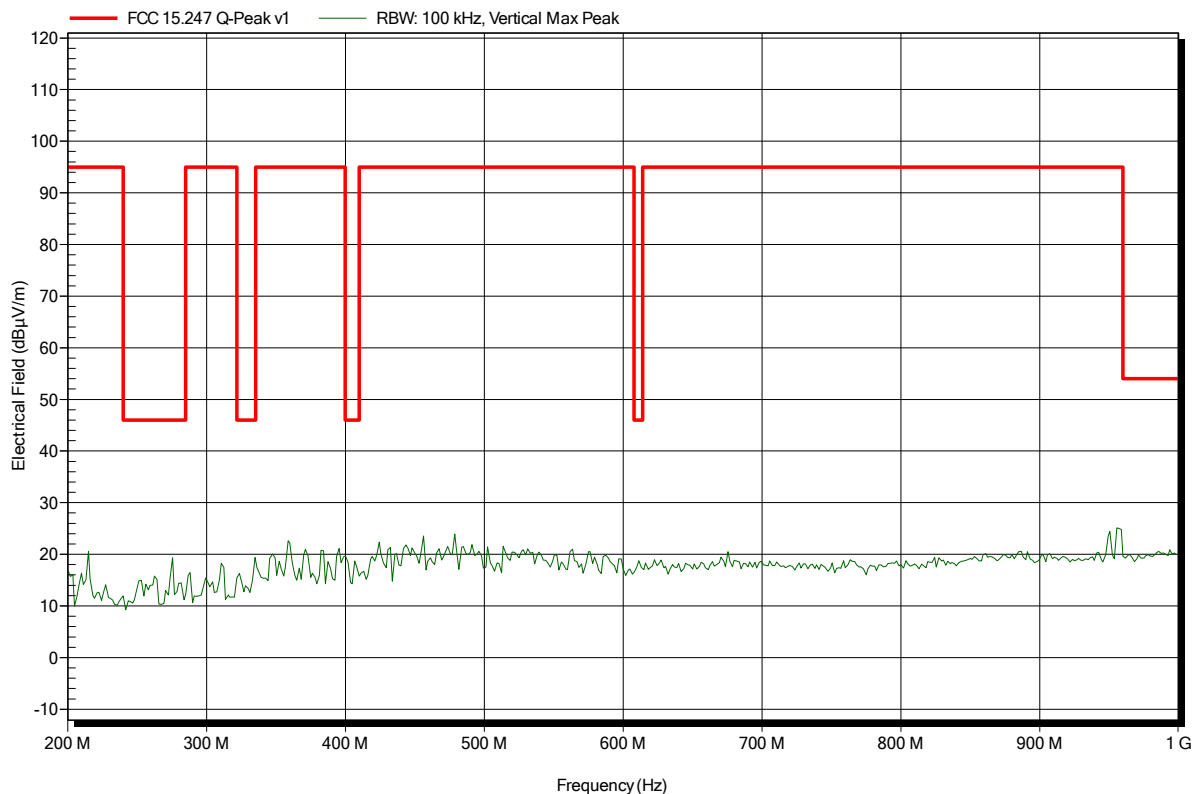


Spurious emissions according to FCC 15.247

Project number: G0M-1502-4538

Applicant:	Panasonic Industrial Devices
EUT Name:	Bluetooth Smart Module
Model:	ENW89847A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 25°C, Vnom: 5.0 V DC
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	TX; BT-LE; 2402 MHz
Test Date:	2015-03-04
Note:	

Index 4

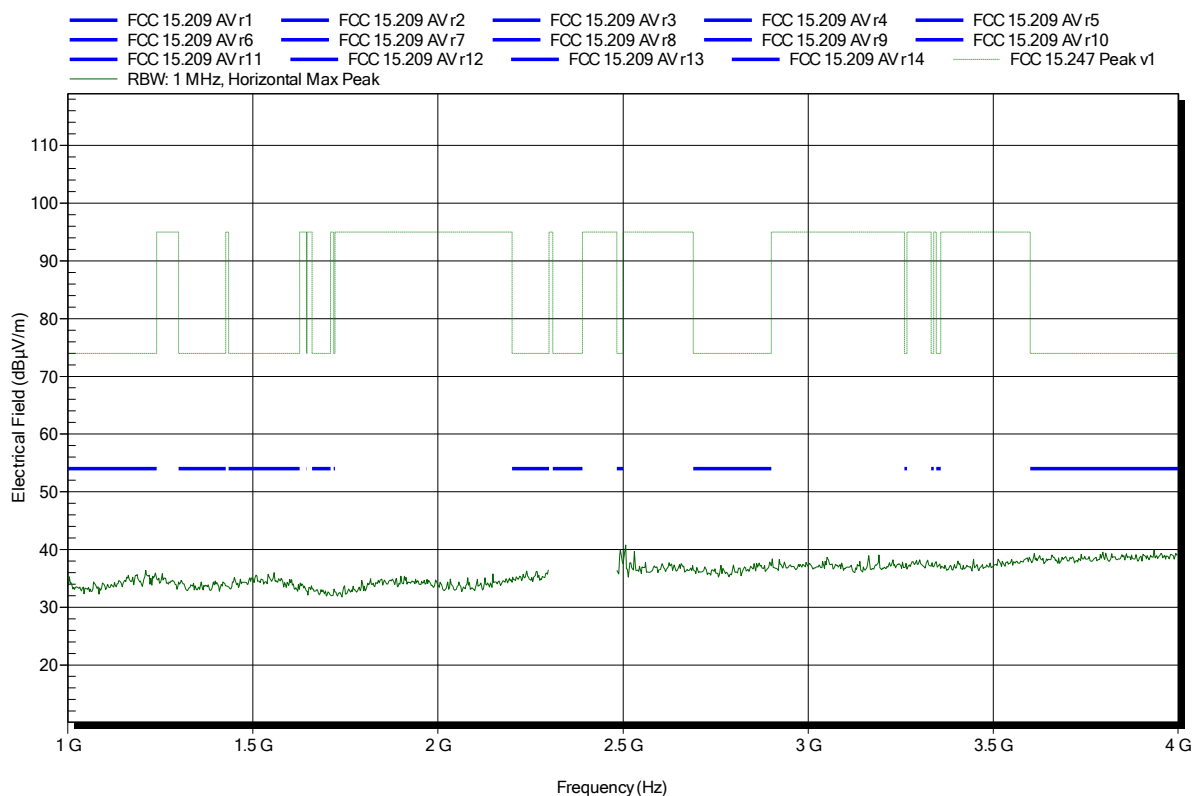


Spurious emissions according to FCC 15.247

Project number: G0M-1502-4538

Applicant: Panasonic Industrial Devices
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 5.0 V DC
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; BT-LE; 2402 MHz
 Test Date: 2015-03-04
 Note:

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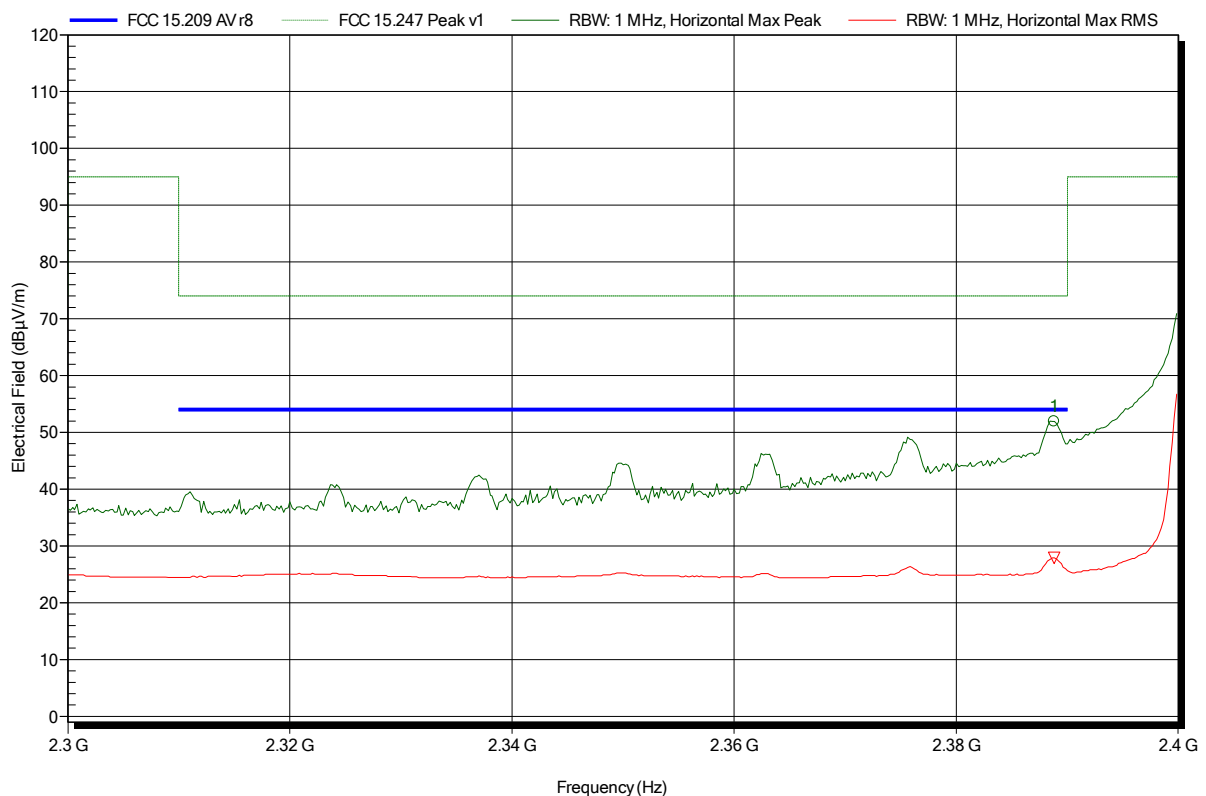


Spurious emissions according to FCC 15.247

Project number: G0M-1502-4538

Applicant: Panasonic Industrial Devices
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 5.0 V DC
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; BT-LE; 2402 MHz
 Test Date: 2015-03-04
 Note: lower bandedge

Index 6



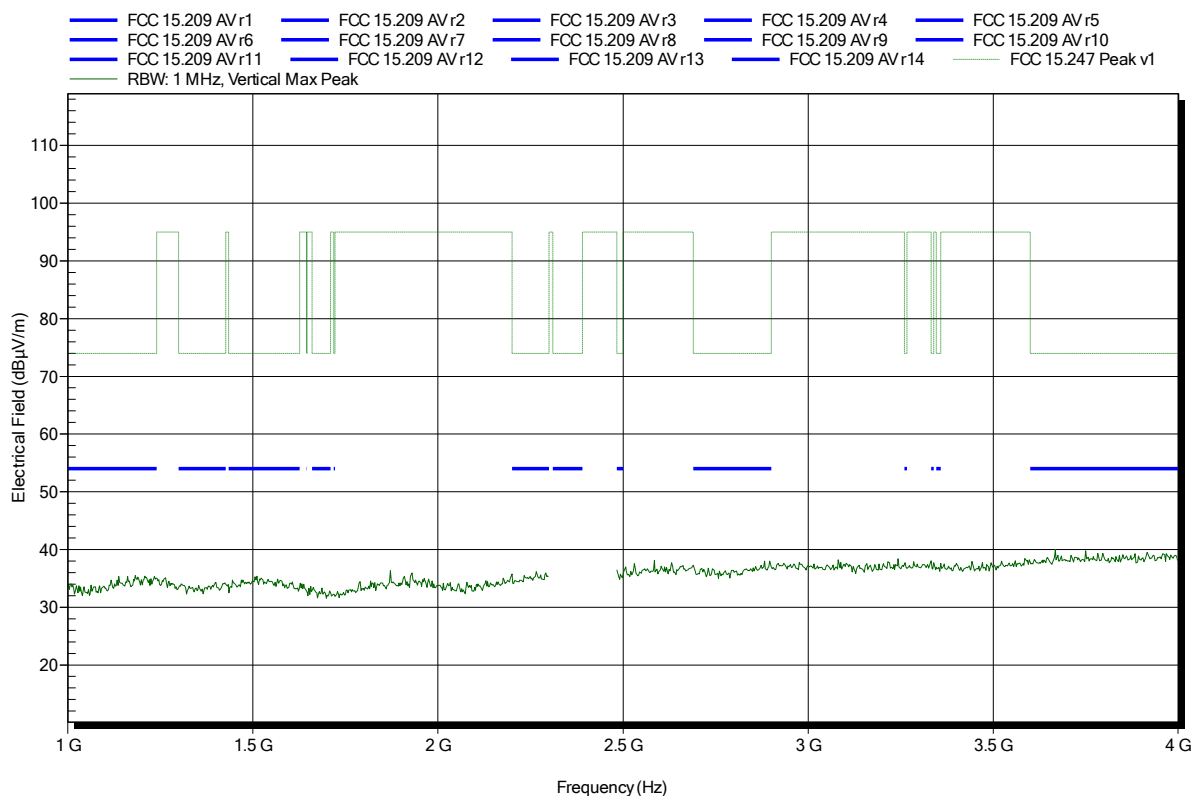
Frequency 2.389 GHz	Peak 51.94 dBµV/m	Peak Limit 74 dBµV/m	Peak Difference -22.06 dB	Peak Status Pass
Frequency 2.389 GHz	RMS 27.89 dBµV/m	RMS Limit 54 dBµV/m	RMS Difference -26.11 dB	RMS Status Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1502-4538

Applicant: Panasonic Industrial Devices
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 5.0 V DC
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; BT-LE; 2402 MHz
 Test Date: 2015-03-04
 Note:

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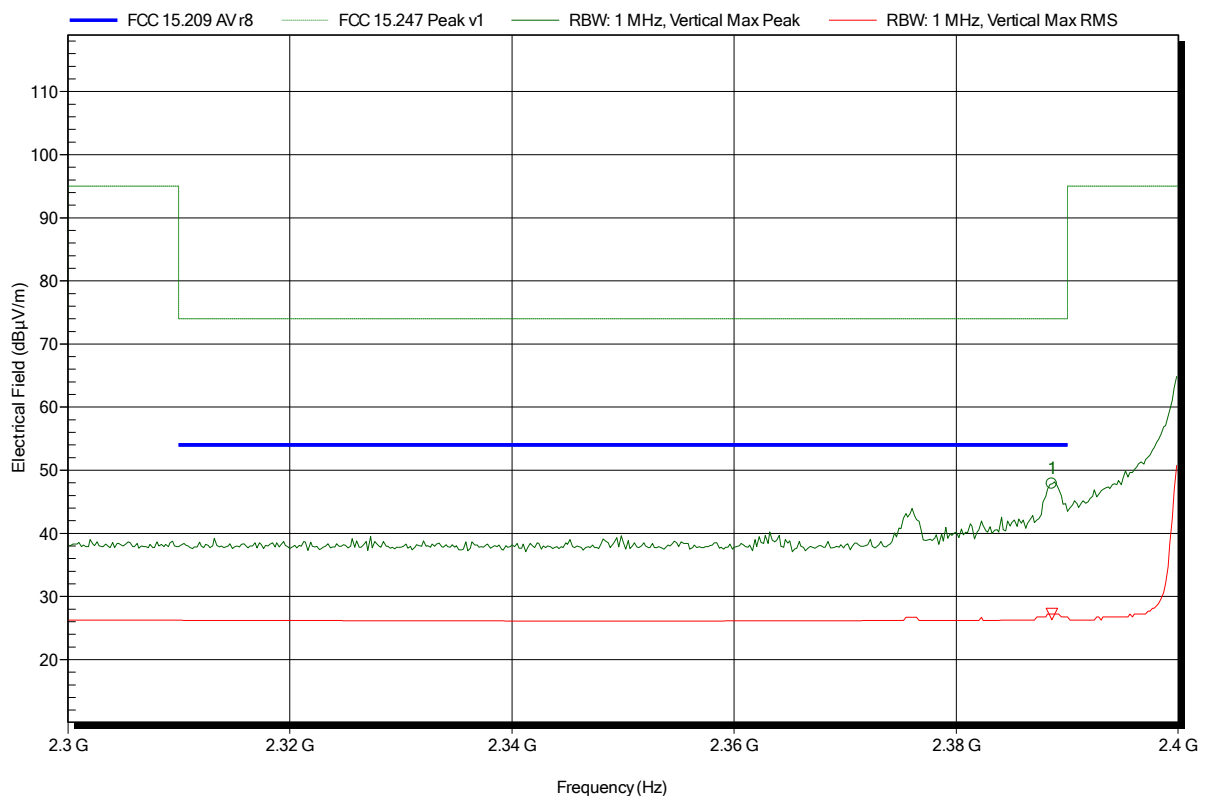


Spurious emissions according to FCC 15.247

Project number: G0M-1502-4538

Applicant: Panasonic Industrial Devices
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 5.0 V DC
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; BT-LE; 2402 MHz
 Test Date: 2015-03-04
 Note: lower bandedge

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Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.389 GHz	47.86 dBµV/m	74 dBµV/m	-26.14 dB	Pass

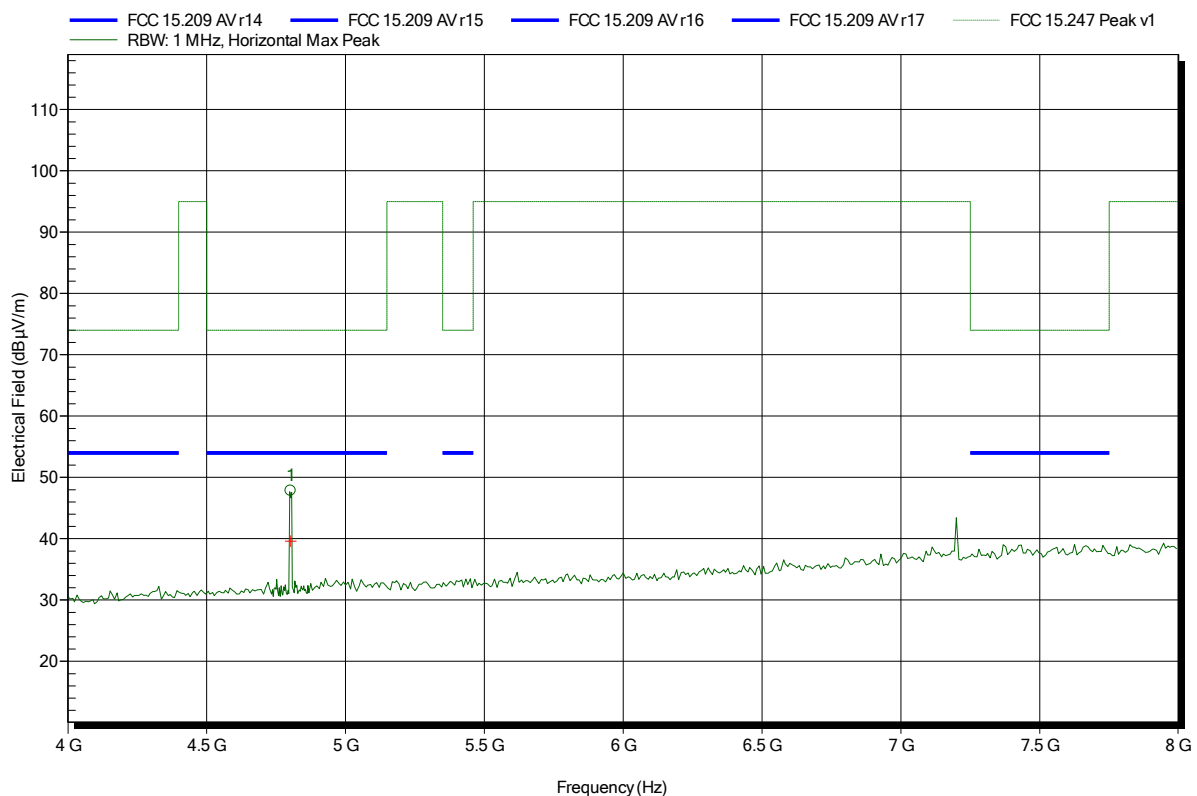
Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.389 GHz	27.2 dBµV/m	54 dBµV/m	-26.8 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1502-4538

Applicant: Panasonic Industrial Devices
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 5.0 V DC
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; BT-LE; 2402 MHz
 Test Date: 2015-03-04
 Note:

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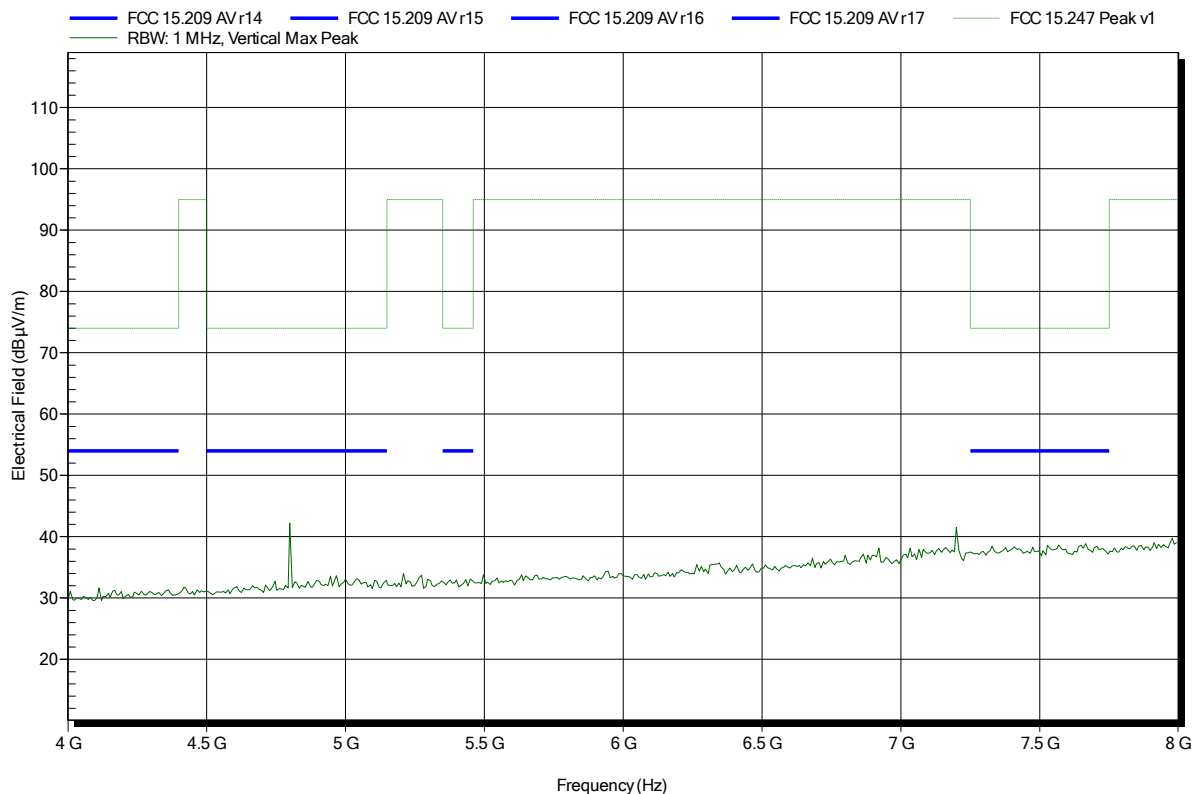
Frequency 4.803 GHz	Peak 47.83 dBµV/m	Peak Limit 74 dBµV/m	Peak Difference -26.17 dB	Status Pass
Frequency 4.803 GHz	Average 39.59 dBµV/m	Average Limit 54 dBµV/m	Average Difference -14.41 dB	Average Status Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1502-4538

Applicant: Panasonic Industrial Devices
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 5.0 V DC
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; BT-LE; 2402 MHz
 Test Date: 2015-03-04
 Note:

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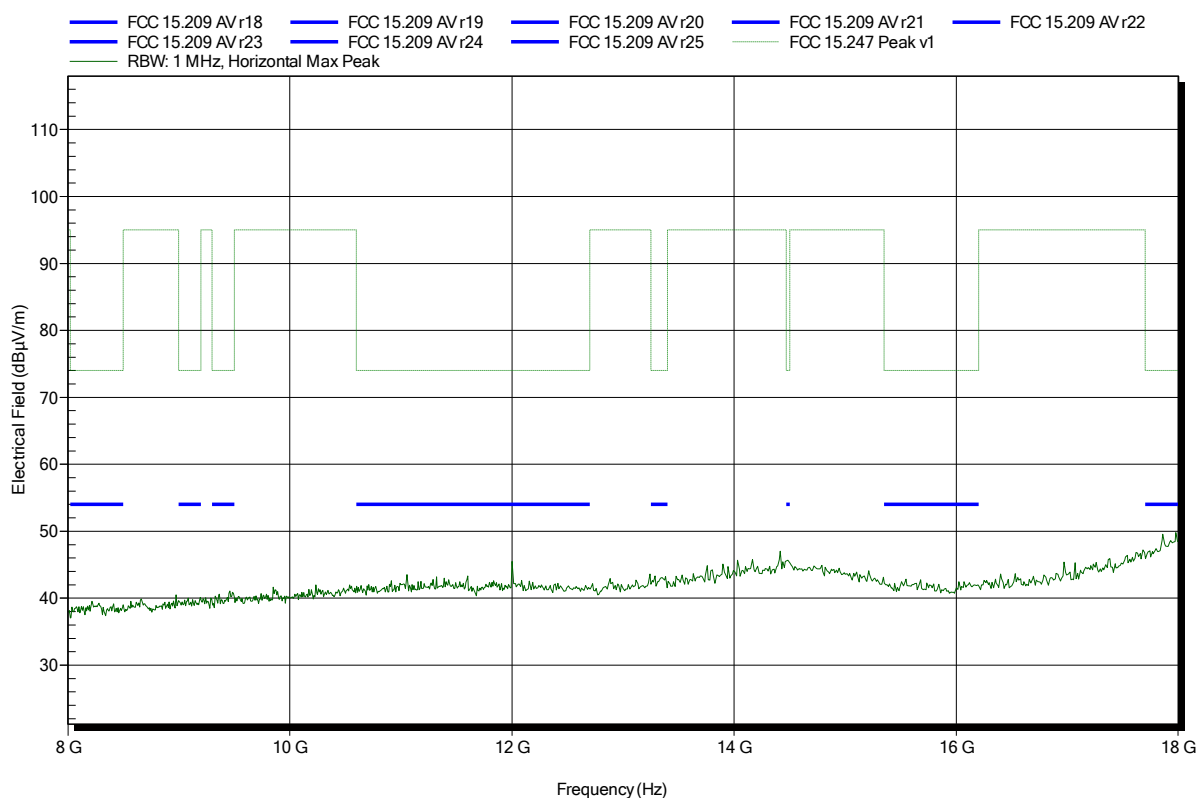


Spurious emissions according to FCC 15.247

Project number: G0M-1502-4538

Applicant: Panasonic Industrial Devices
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 5.0 V DC
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; BT-LE; 2402 MHz
 Test Date: 2015-03-04
 Note:

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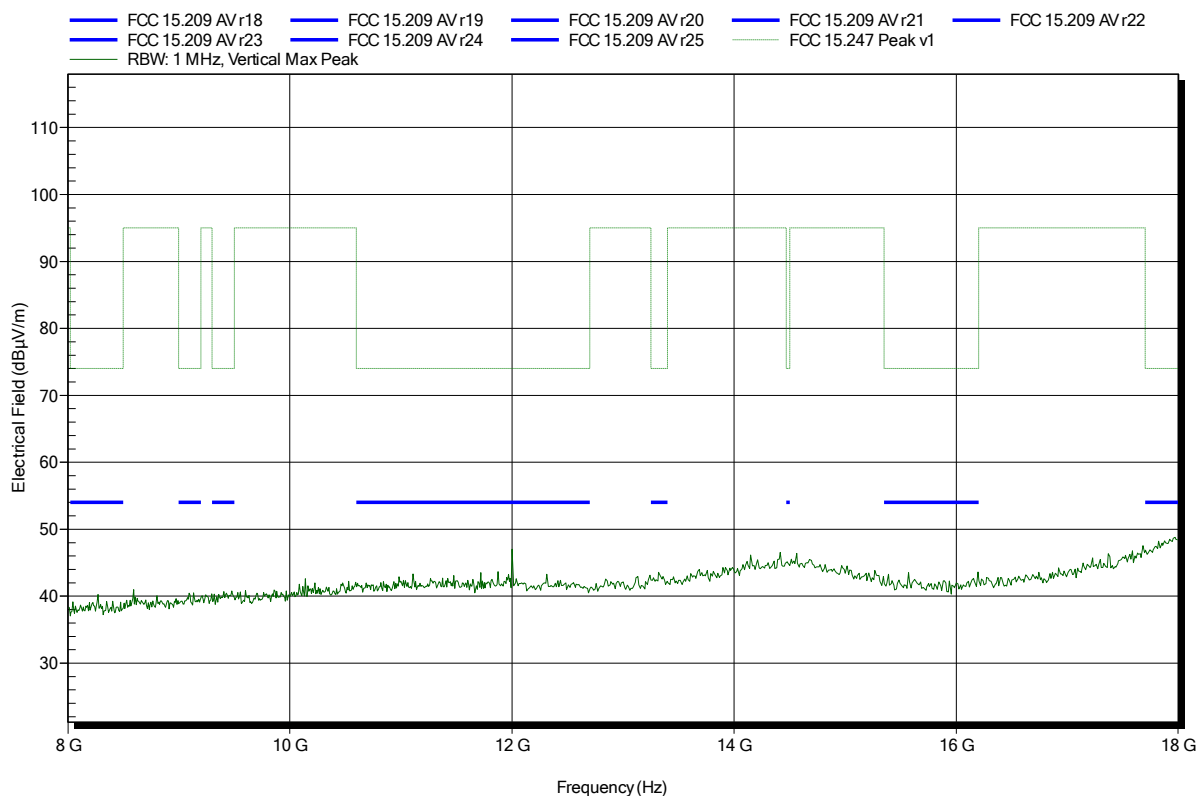


Spurious emissions according to FCC 15.247

Project number: G0M-1502-4538

Applicant: Panasonic Industrial Devices
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 5.0 V DC
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; BT-LE; 2402 MHz
 Test Date: 2015-03-04
 Note:

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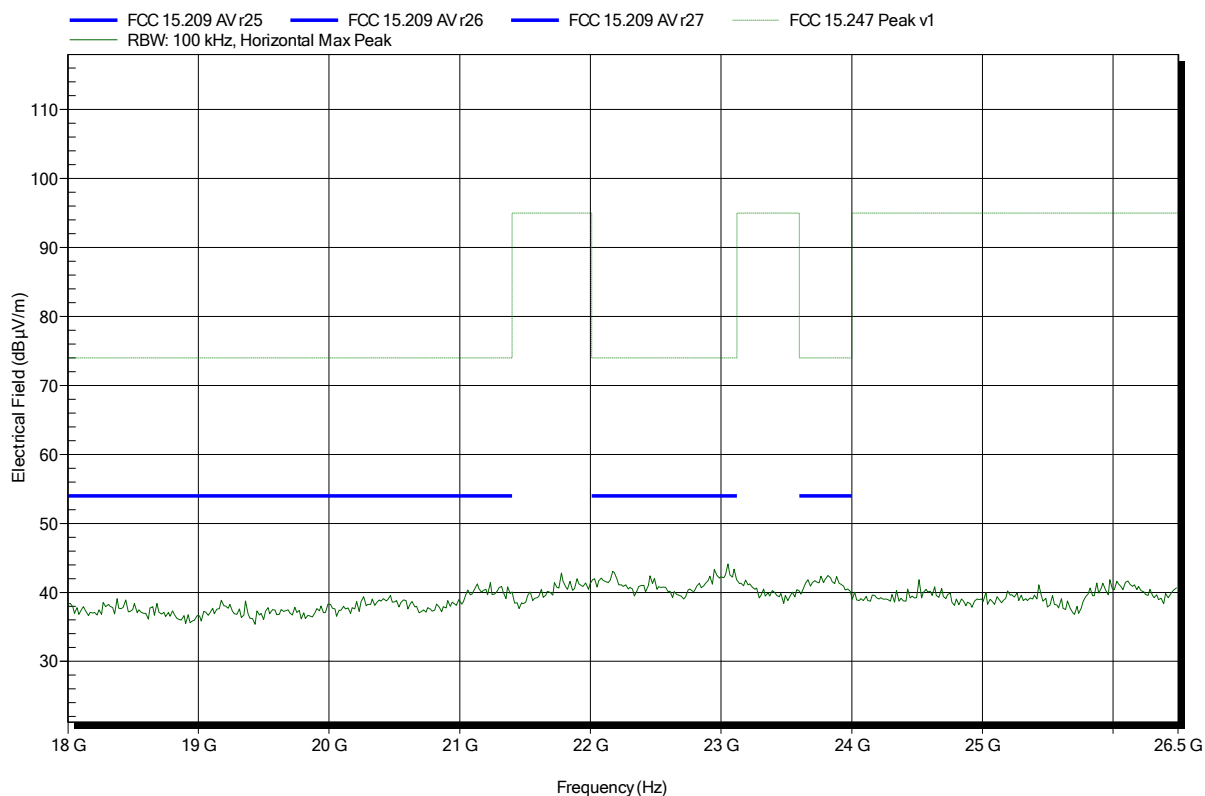


Spurious emissions according to FCC 15.247

Project number: G0M-1502-4538

Applicant: Panasonic Industrial Devices
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 5.0 V DC
 Antenna: Rohde & Schwarz HL 025, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; BT-LE; 2402 MHz
 Test Date: 2015-03-04
 Note:

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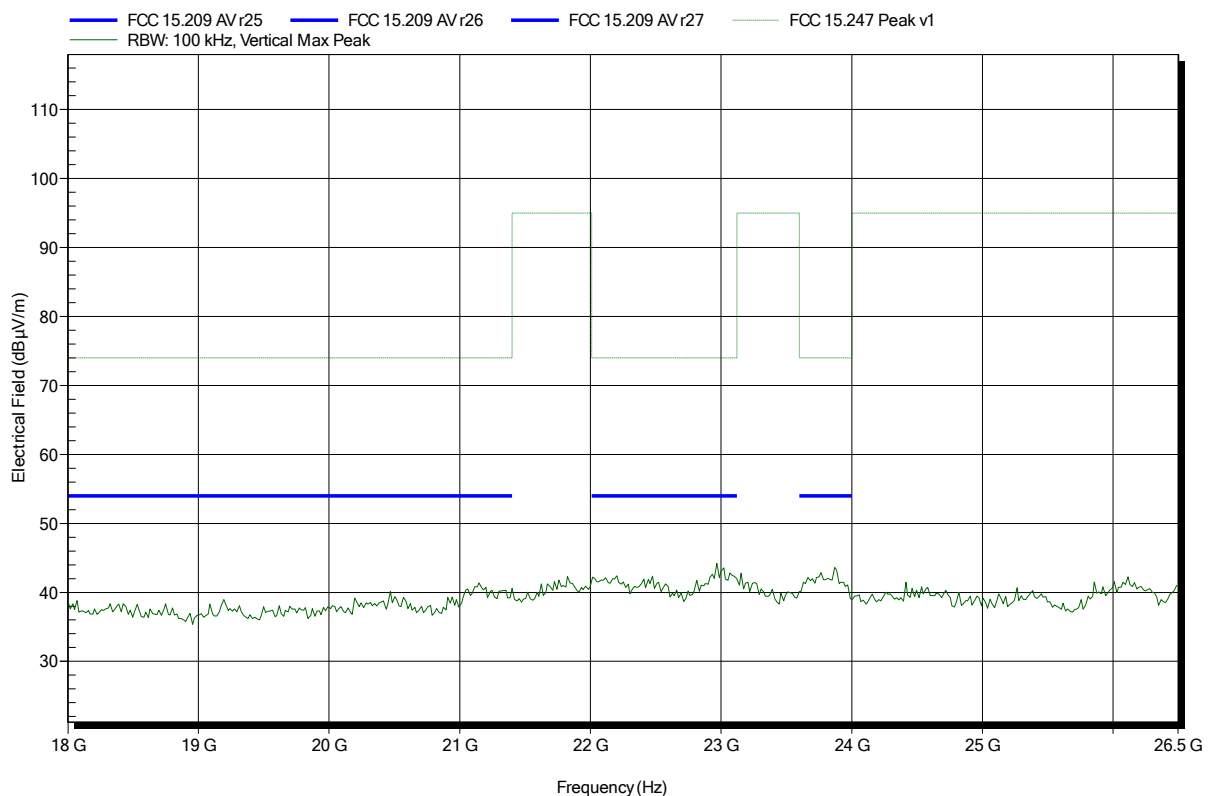


Spurious emissions according to FCC 15.247

Project number: G0M-1502-4538

Applicant:	Panasonic Industrial Devices
EUT Name:	Bluetooth Smart Module
Model:	ENW89847A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 25°C, Vnom: 5.0 V DC
Antenna:	Rohde & Schwarz HL 025, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BT-LE; 2402 MHz
Test Date:	2015-03-04
Note:	

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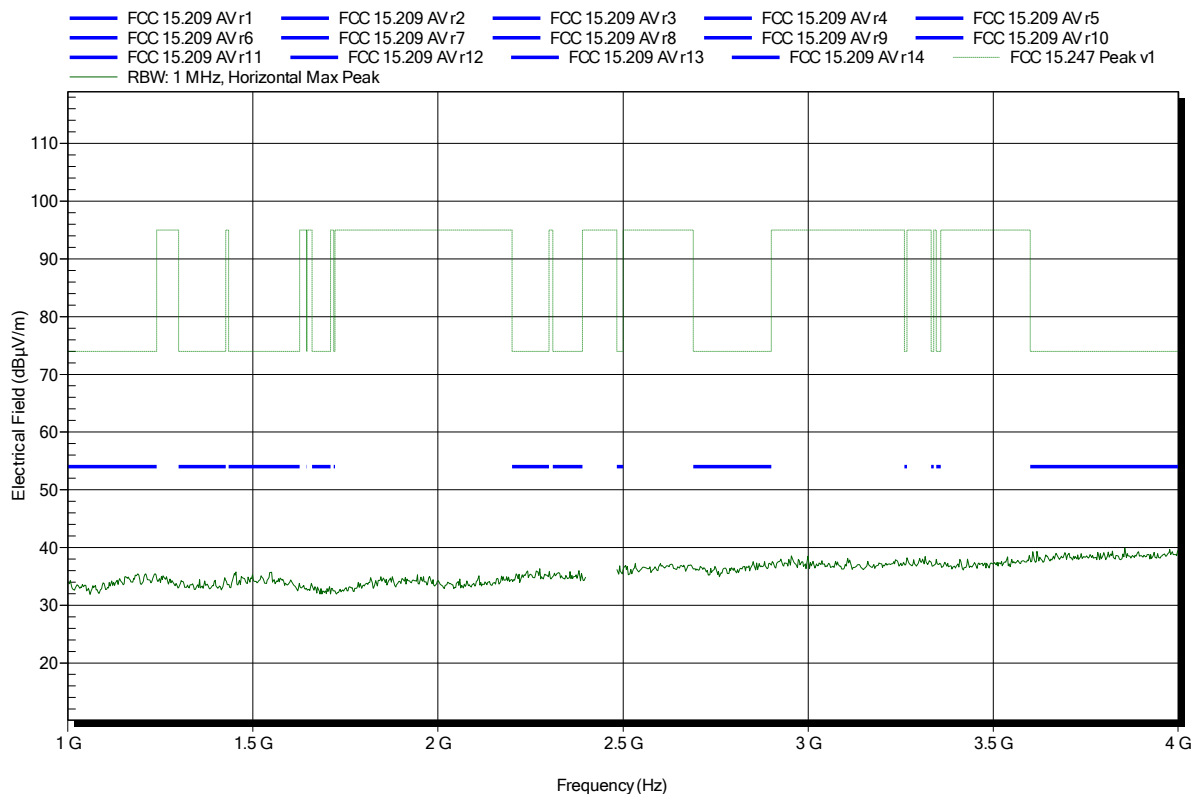


Spurious emissions according to FCC 15.247

Project number: G0M-1502-4538

Applicant: Panasonic Industrial Devices
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 5.0 V DC
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; BT-LE; 2440 MHz
 Test Date: 2015-03-04
 Note:

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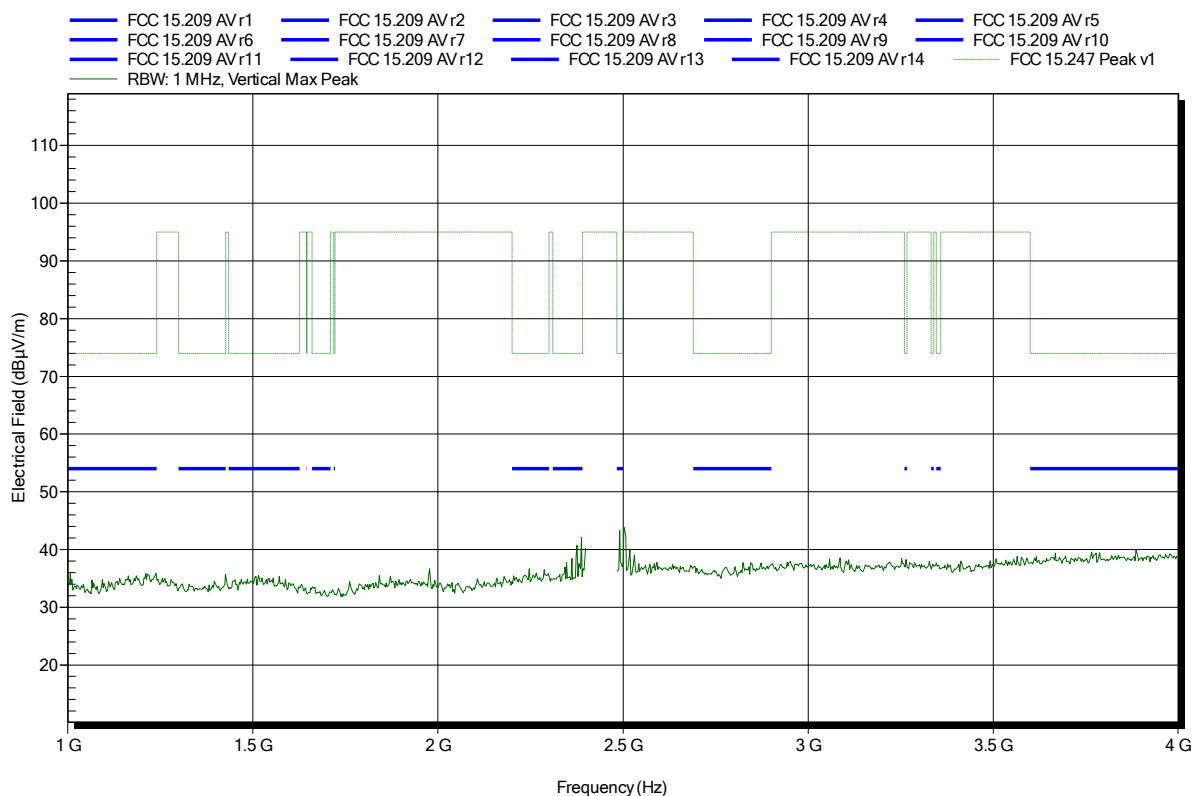


Spurious emissions according to FCC 15.247

Project number: G0M-1502-4538

Applicant: Panasonic Industrial Devices
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 5.0 V DC
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; BT-LE; 2440 MHz
 Test Date: 2015-03-04
 Note:

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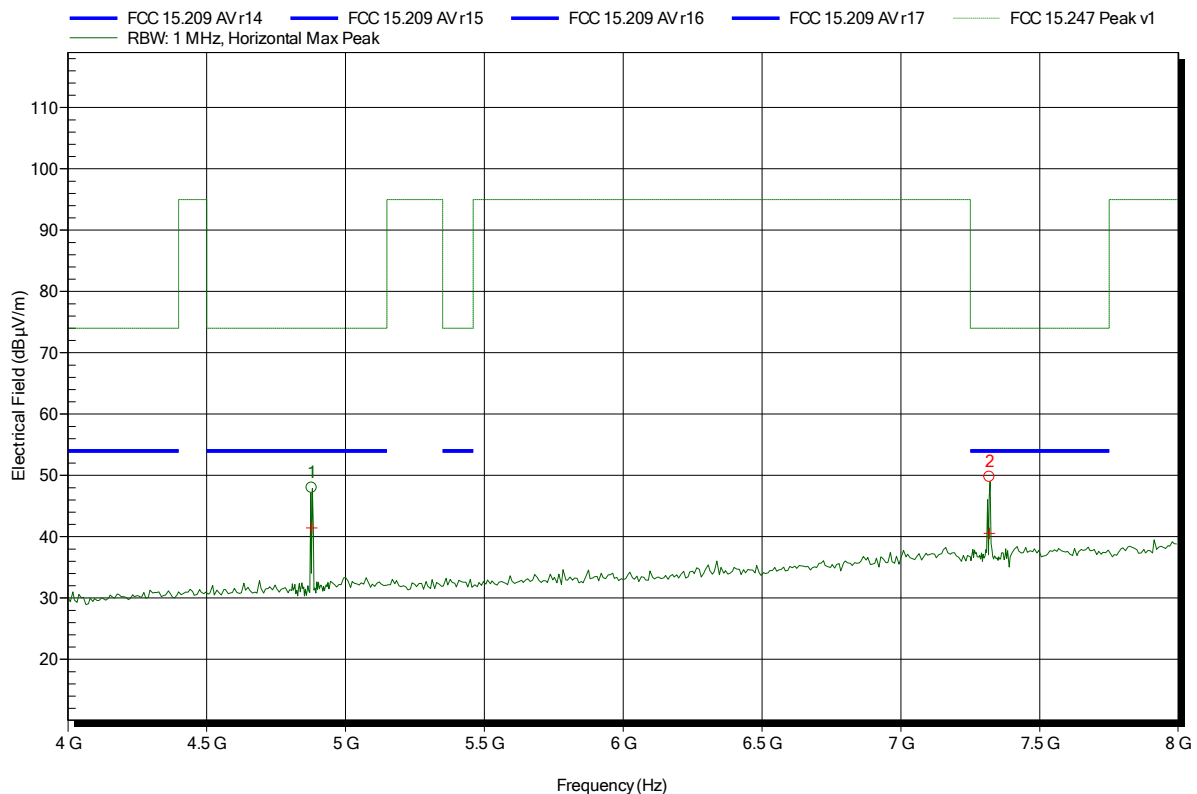


Spurious emissions according to FCC 15.247

Project number: G0M-1502-4538

Applicant: Panasonic Industrial Devices
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 5.0 V DC
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; BT-LE; 2440 MHz
 Test Date: 2015-03-04
 Note:

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Frequency	Peak	Peak Limit	Peak Difference	Status
4.88 GHz	47.98 dBµV/m	74 dBµV/m	-26.02 dB	Pass
7.319 GHz	49.74 dBµV/m	74 dBµV/m	-24.26 dB	Pass

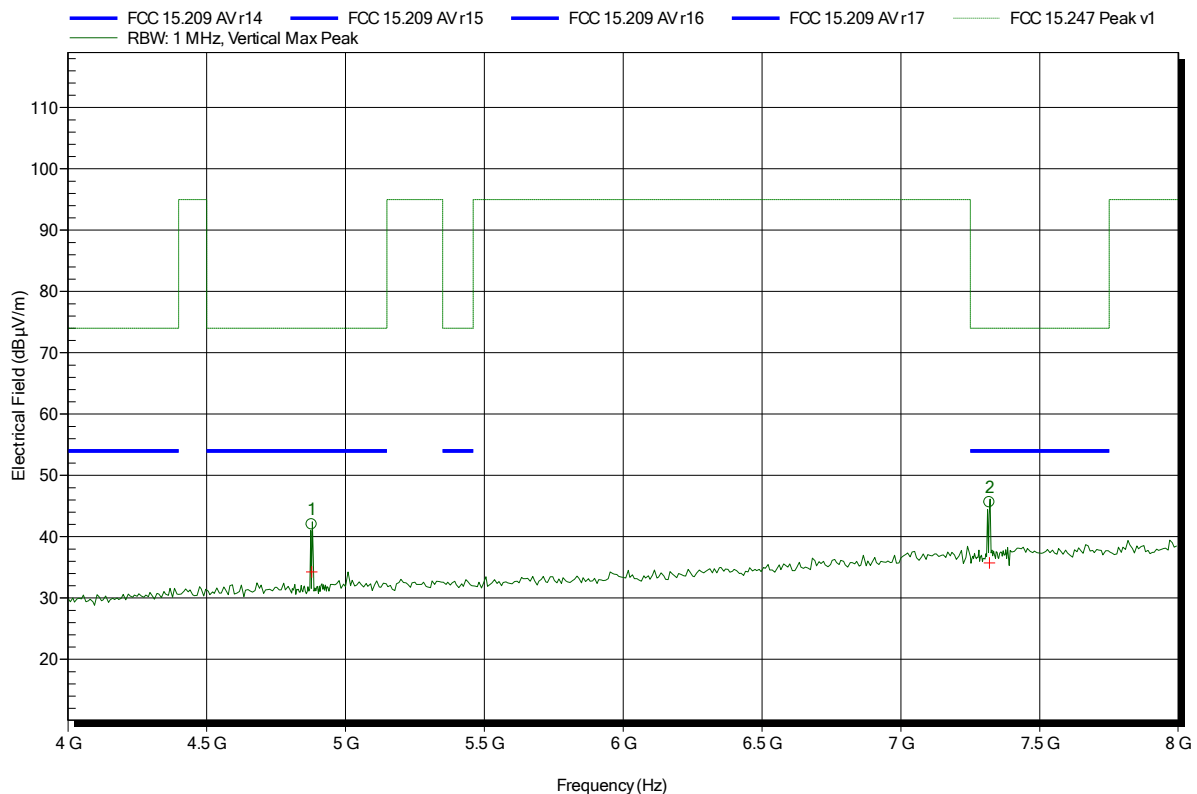
Frequency	Average	Average Limit	Average Difference	Average Status
4.88 GHz	41.42 dBµV/m	54 dBµV/m	-12.58 dB	Pass
7.319 GHz	40.54 dBµV/m	54 dBµV/m	-13.46 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1502-4538

Applicant: Panasonic Industrial Devices
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 5.0 V DC
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; BT-LE; 2440 MHz
 Test Date: 2015-03-04
 Note:

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Frequency	Peak	Peak Limit	Peak Difference	Status
4.879 GHz	42.02 dBµV/m	74 dBµV/m	-31.98 dB	Pass
7.319 GHz	45.64 dBµV/m	74 dBµV/m	-28.36 dB	Pass

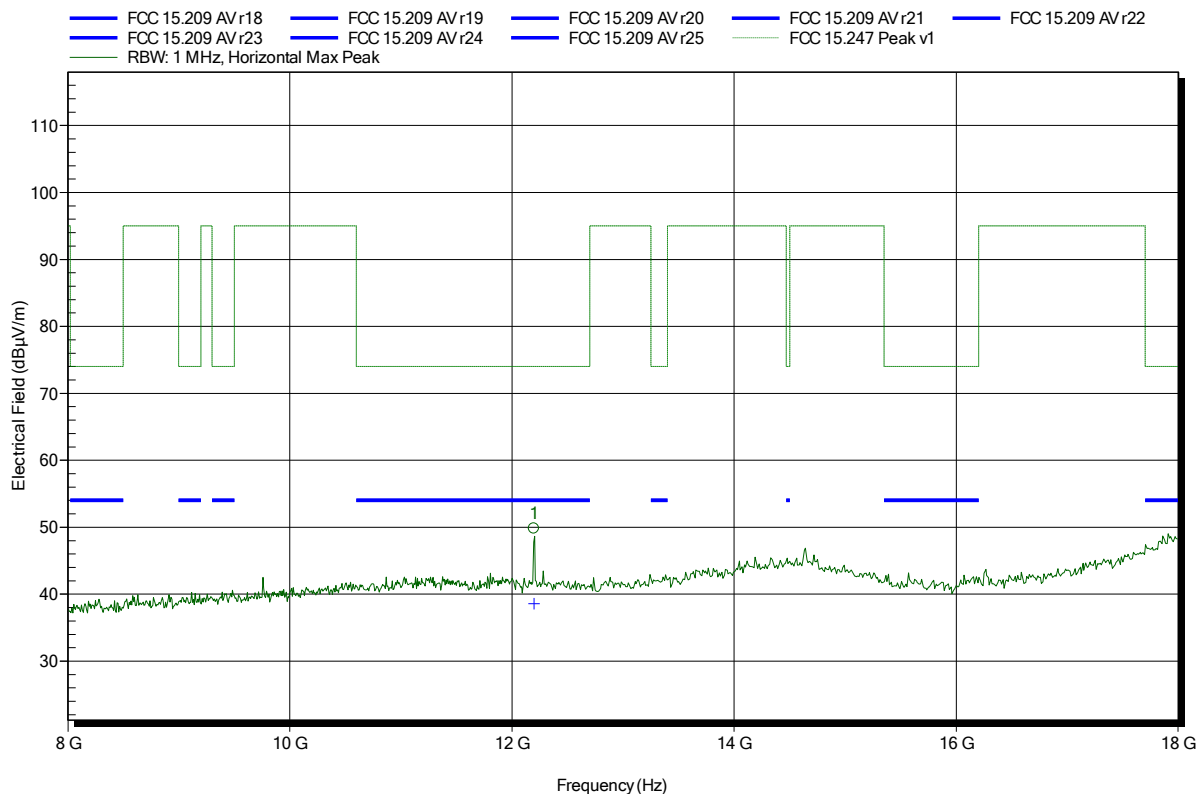
Frequency	Average	Average Limit	Average Difference	Average Status
4.879 GHz	34.29 dBµV/m	54 dBµV/m	-19.71 dB	Pass
7.319 GHz	35.75 dBµV/m	54 dBµV/m	-18.25 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1502-4538

Applicant: Panasonic Industrial Devices
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 5.0 V DC
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; BT-LE; 2440 MHz
 Test Date: 2015-03-04
 Note:

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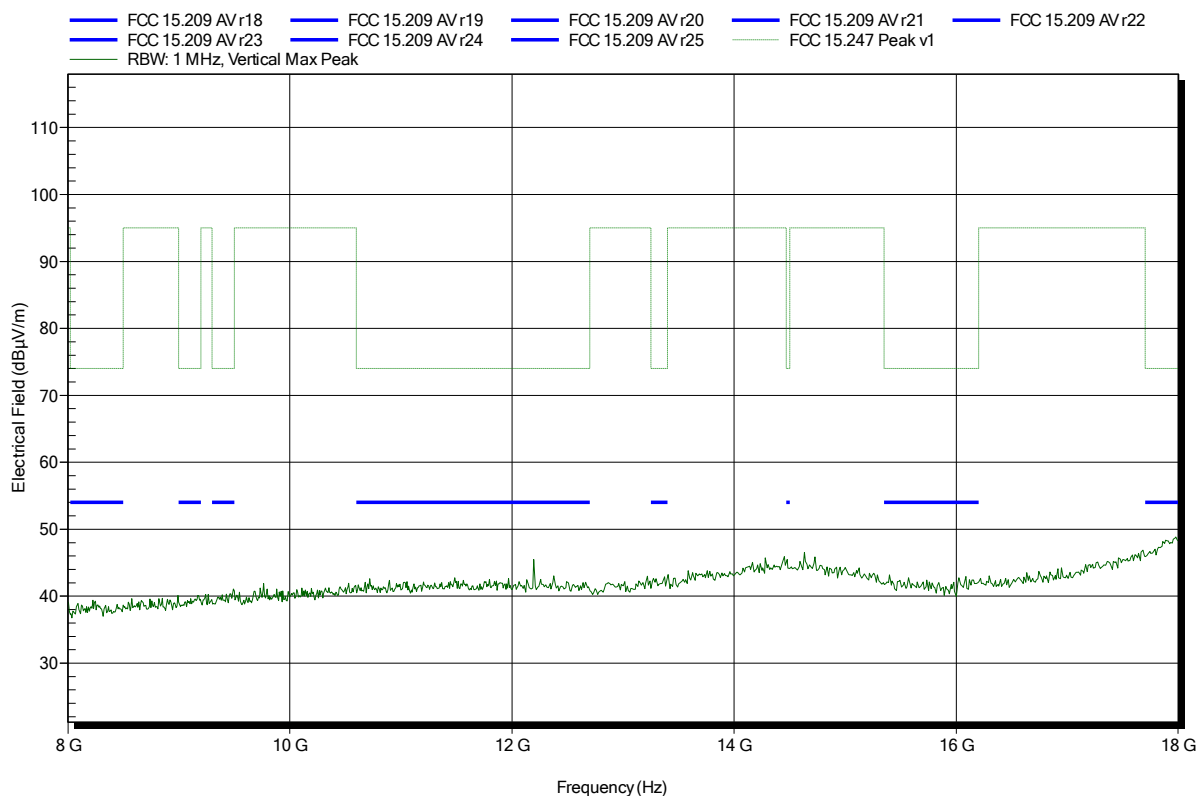
Frequency 12.2 GHz	Peak 49.81 dBµV/m	Peak Limit 74 dBµV/m	Peak Difference -24.19 dB	Peak Status Pass
Frequency 12.2 GHz	Average 38.59 dBµV/m	Average Limit 54 dBµV/m	Average Difference -15.41 dB	Average Status Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1502-4538

Applicant: Panasonic Industrial Devices
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 5.0 V DC
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; BT-LE; 2440 MHz
 Test Date: 2015-03-04
 Note:

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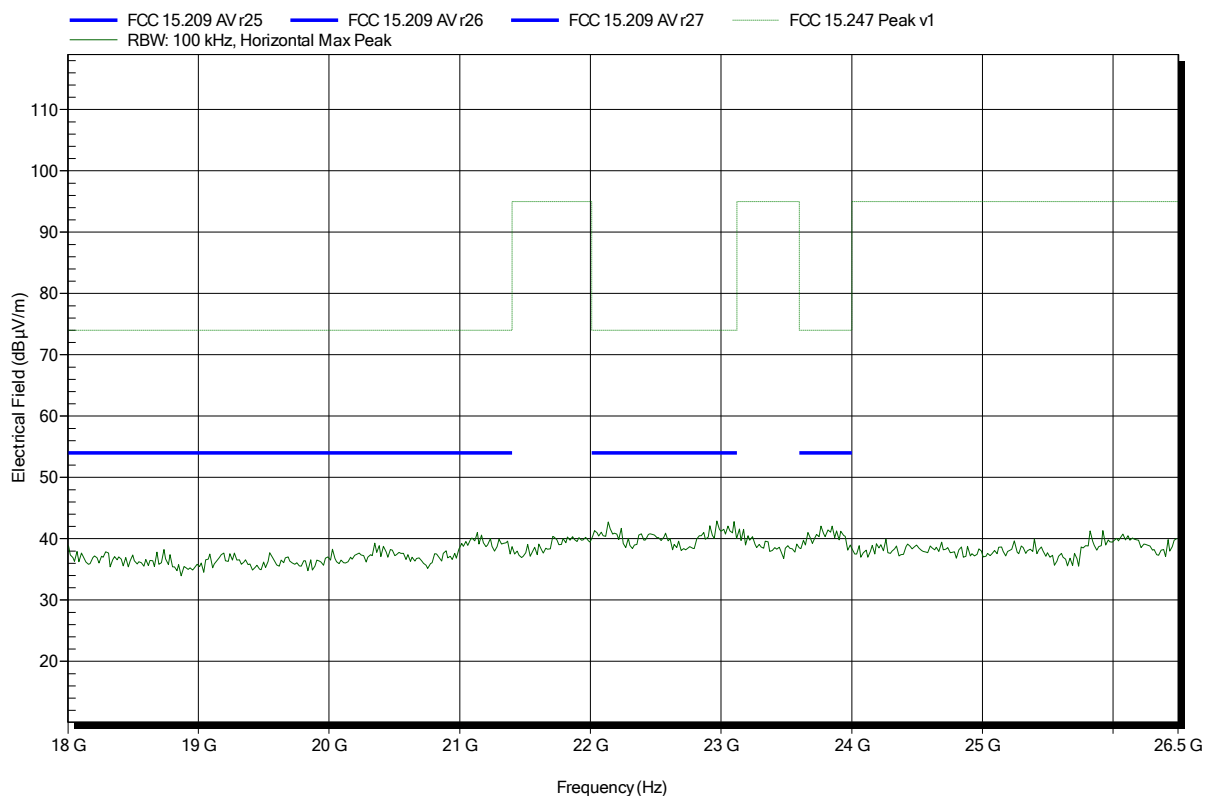


Spurious emissions according to FCC 15.247

Project number: G0M-1502-4538

Applicant: Panasonic Industrial Devices
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 5.0 V DC
 Antenna: Rohde & Schwarz HL 025, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; BT-LE; 2440 MHz
 Test Date: 2015-03-04
 Note:

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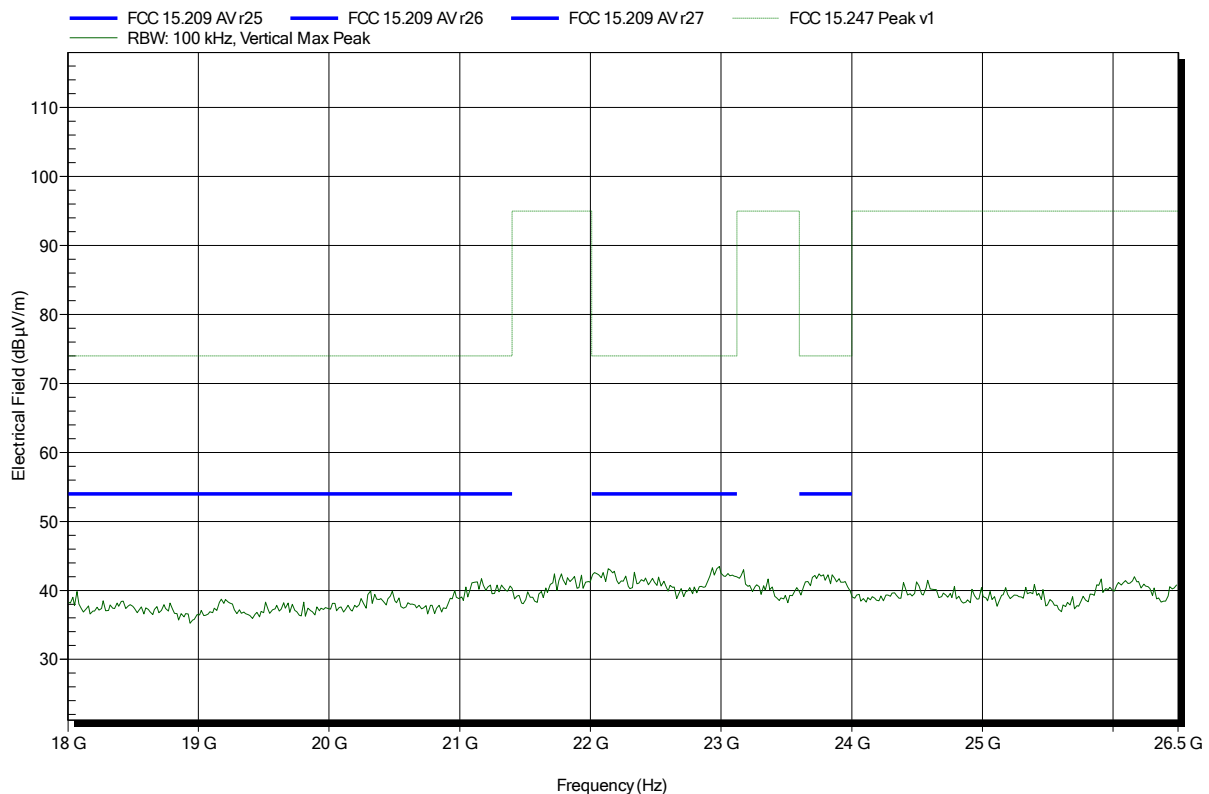


Spurious emissions according to FCC 15.247

Project number: G0M-1502-4538

Applicant: Panasonic Industrial Devices
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 5.0 V DC
 Antenna: Rohde & Schwarz HL 025, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; BT-LE; 2440 MHz
 Test Date: 2015-03-04
 Note:

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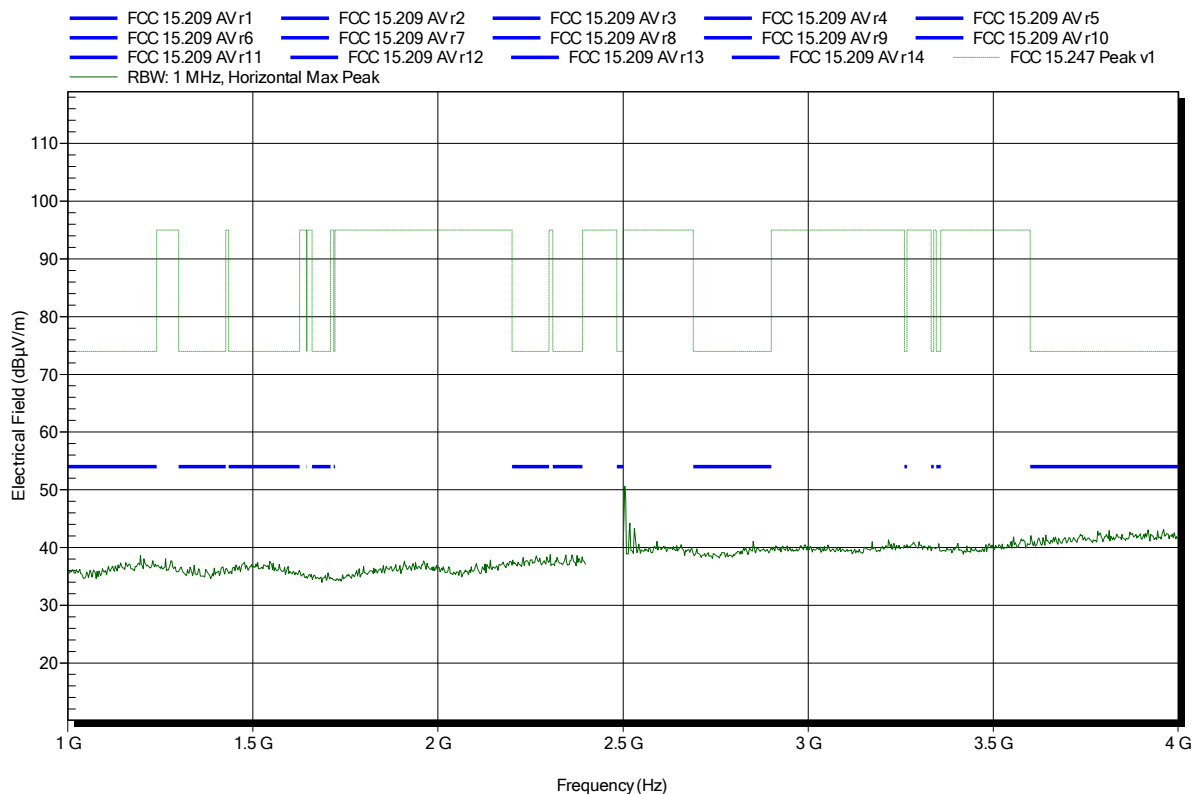


Spurious emissions according to FCC 15.247

Project number: G0M-1502-4538

Applicant: Panasonic Industrial Devices
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 5.0 V DC
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; BT-LE; 2480 MHz
 Test Date: 2015-03-04
 Note:

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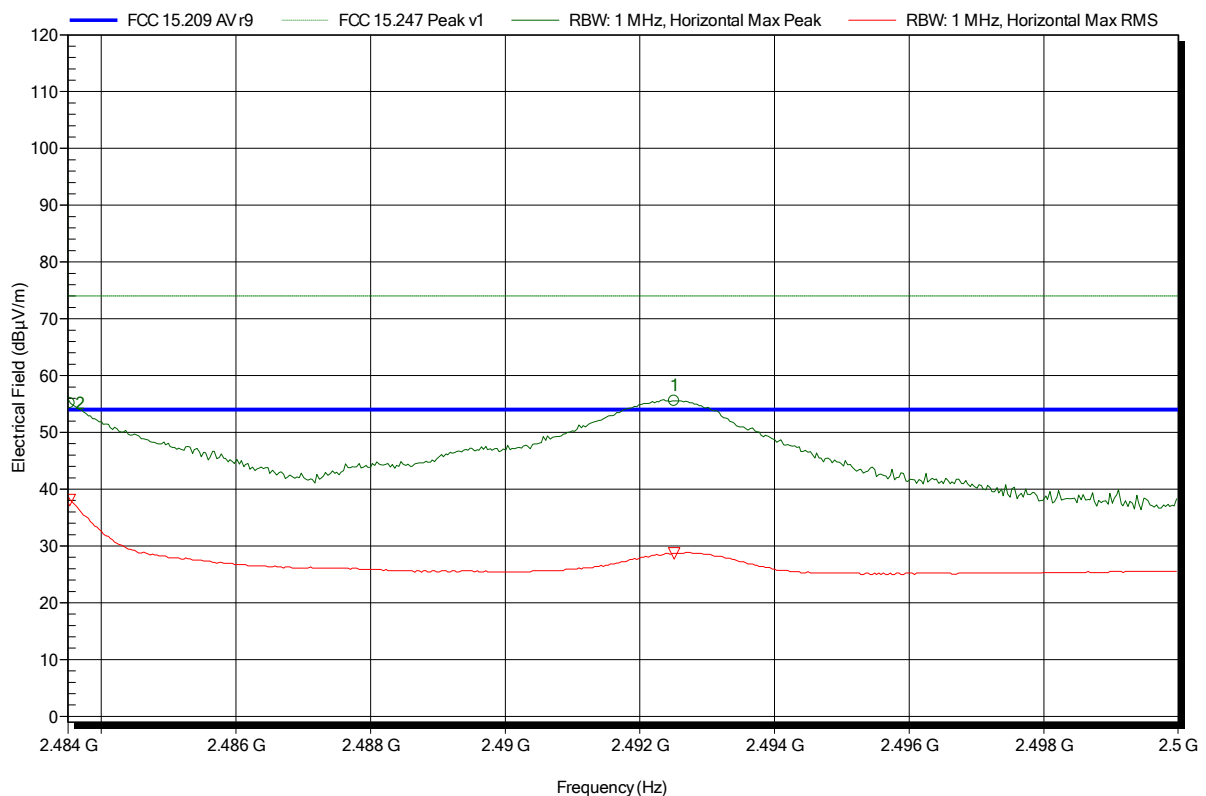


Spurious emissions according to FCC 15.247

Project number: G0M-1502-4538

Applicant: Panasonic Industrial Devices
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 5.0 V DC
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: TX; BT-LE; 2480 MHz
 Test Date: 2015-03-04
 Note: upper bandedge

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Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.4835 GHz	55.12 dBµV/m	74 dBµV/m	-18.88 dB	Pass
2.4925 GHz	55.55 dBµV/m	74 dBµV/m	-18.45 dB	Pass

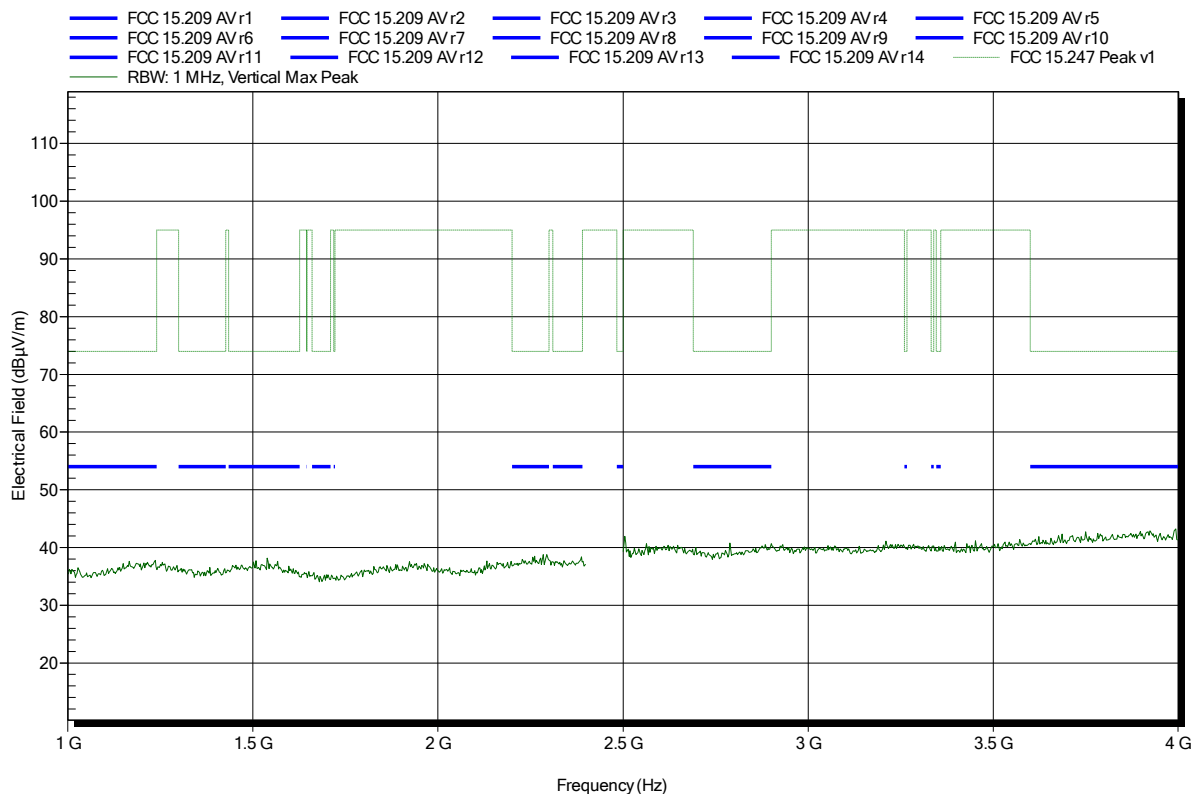
Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.4835 GHz	38.07 dBµV/m	54 dBµV/m	-15.93 dB	Pass
2.4925 GHz	28.72 dBµV/m	54 dBµV/m	-25.28 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1502-4538

Applicant: Panasonic Industrial Devices
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 5.0 V DC
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; BT-LE; 2480 MHz
 Test Date: 2015-03-04
 Note:

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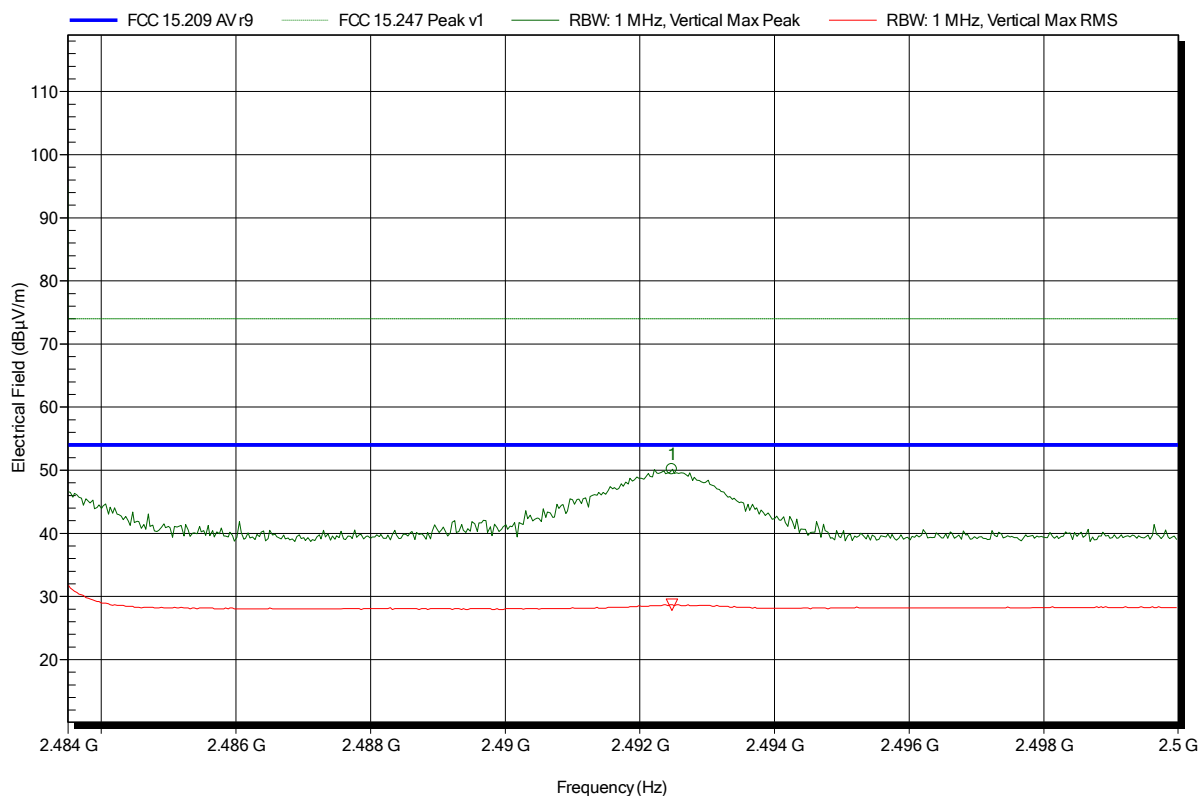


Spurious emissions according to FCC 15.247

Project number: G0M-1502-4538

Applicant: Panasonic Industrial Devices
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 5.0 V DC
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: TX; BT-LE; 2480 MHz
 Test Date: 2015-03-04
 Note: upper bandedge

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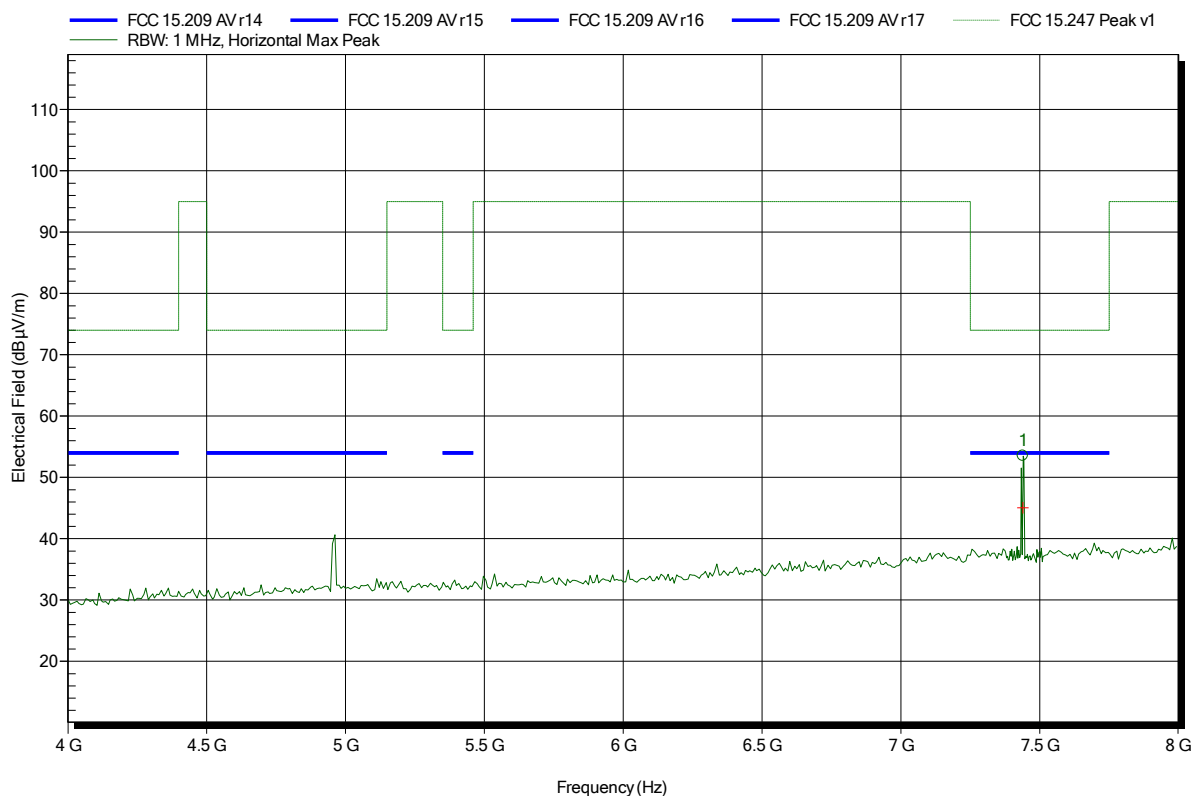
Frequency 2.4925 GHz	Peak 50.15 dBµV/m	Peak Limit 74 dBµV/m	Peak Difference -23.85 dB	Peak Status Pass
Frequency 2.4925 GHz	RMS 28.69 dBµV/m	RMS Limit 54 dBµV/m	RMS Difference -25.31 dB	RMS Status Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1502-4538

Applicant: Panasonic Industrial Devices
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 5.0 V DC
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; BT-LE; 2480 MHz
 Test Date: 2015-03-04
 Note:

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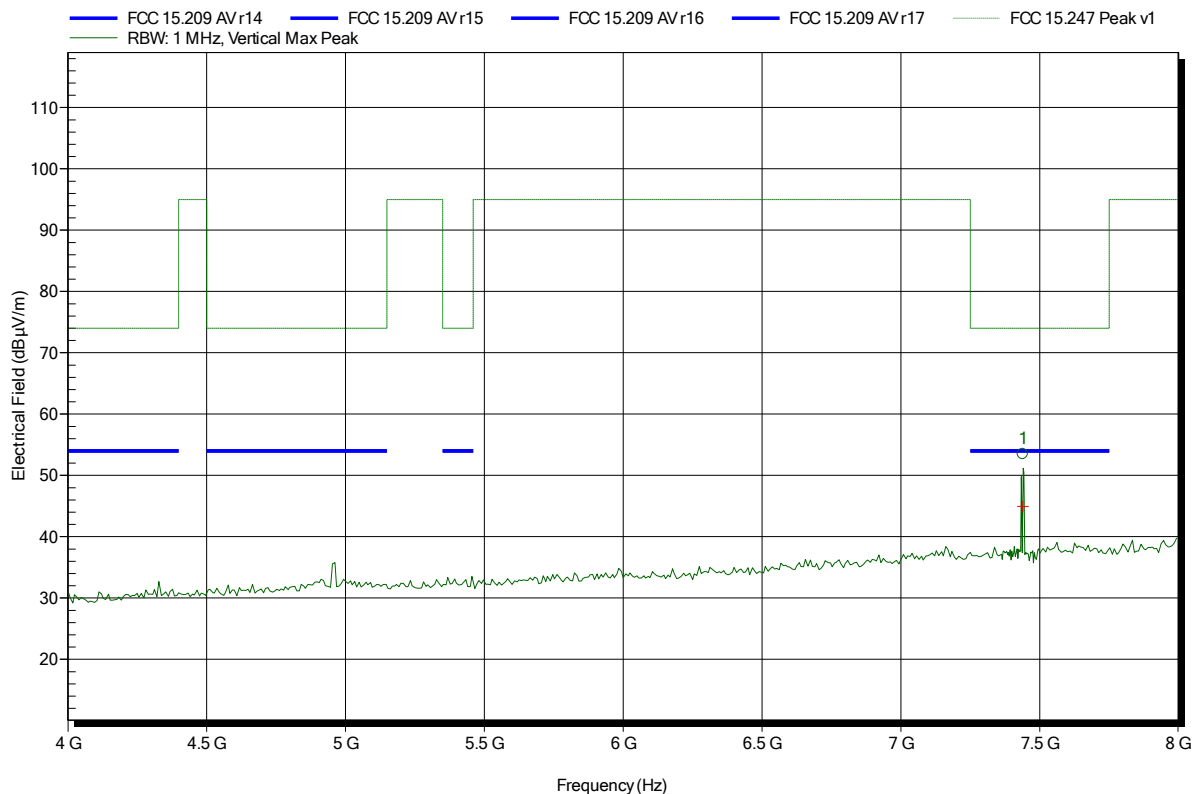
Frequency 7.439 GHz	Peak 53.55 dBµV/m	Peak Limit 74 dBµV/m	Peak Difference -20.45 dB	Status Pass
Frequency 7.439 GHz	Average 45.06 dBµV/m	Average Limit 54 dBµV/m	Average Difference -8.94 dB	Average Status Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1502-4538

Applicant: Panasonic Industrial Devices
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 5.0 V DC
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; BT-LE; 2480 MHz
 Test Date: 2015-03-04
 Note:

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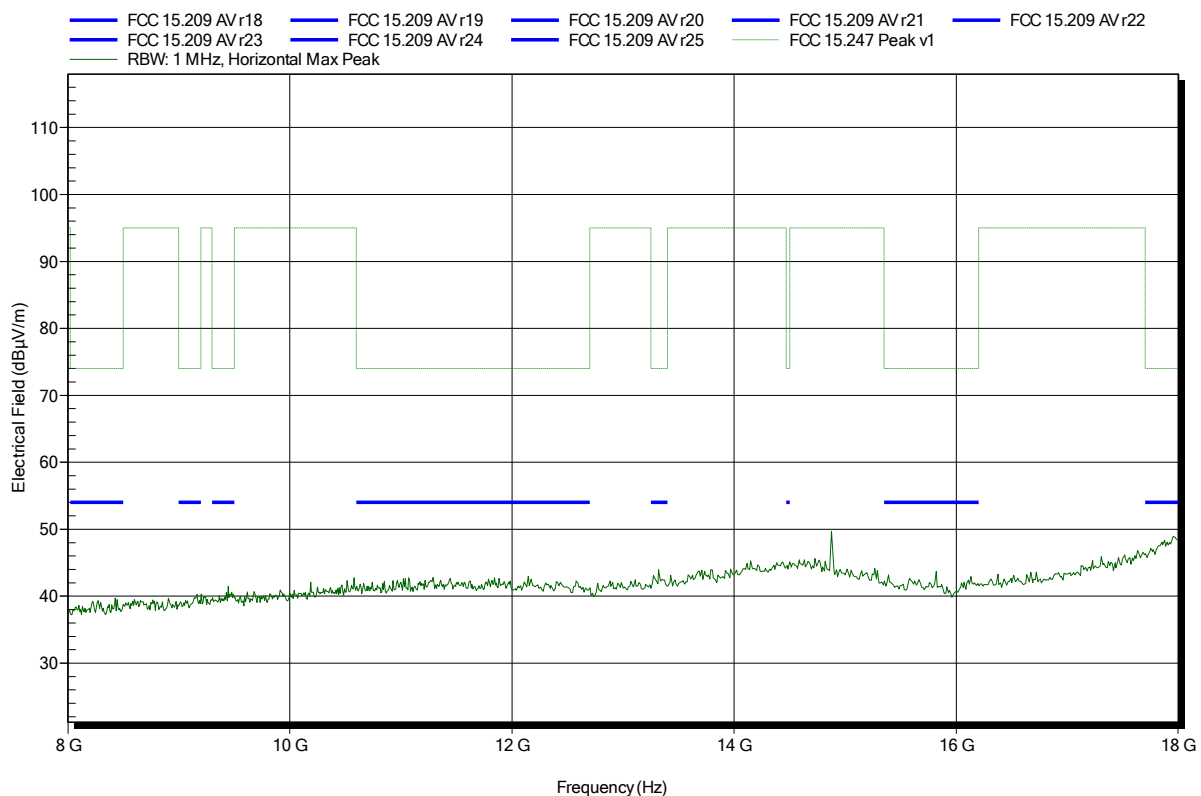
Frequency 7.44 GHz	Peak 53.46 dBµV/m	Peak Limit 74 dBµV/m	Peak Difference -20.54 dB	Status Pass
Frequency 7.44 GHz	Average 44.94 dBµV/m	Average Limit 54 dBµV/m	Average Difference -9.06 dB	Average Status Pass

Spurious emissions according to FCC 15.247

Project number: GOM-1502-4538

Applicant: Panasonic Industrial Devices
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 5.0 V DC
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; BT-LE; 2480 MHz
 Test Date: 2015-03-04
 Note:

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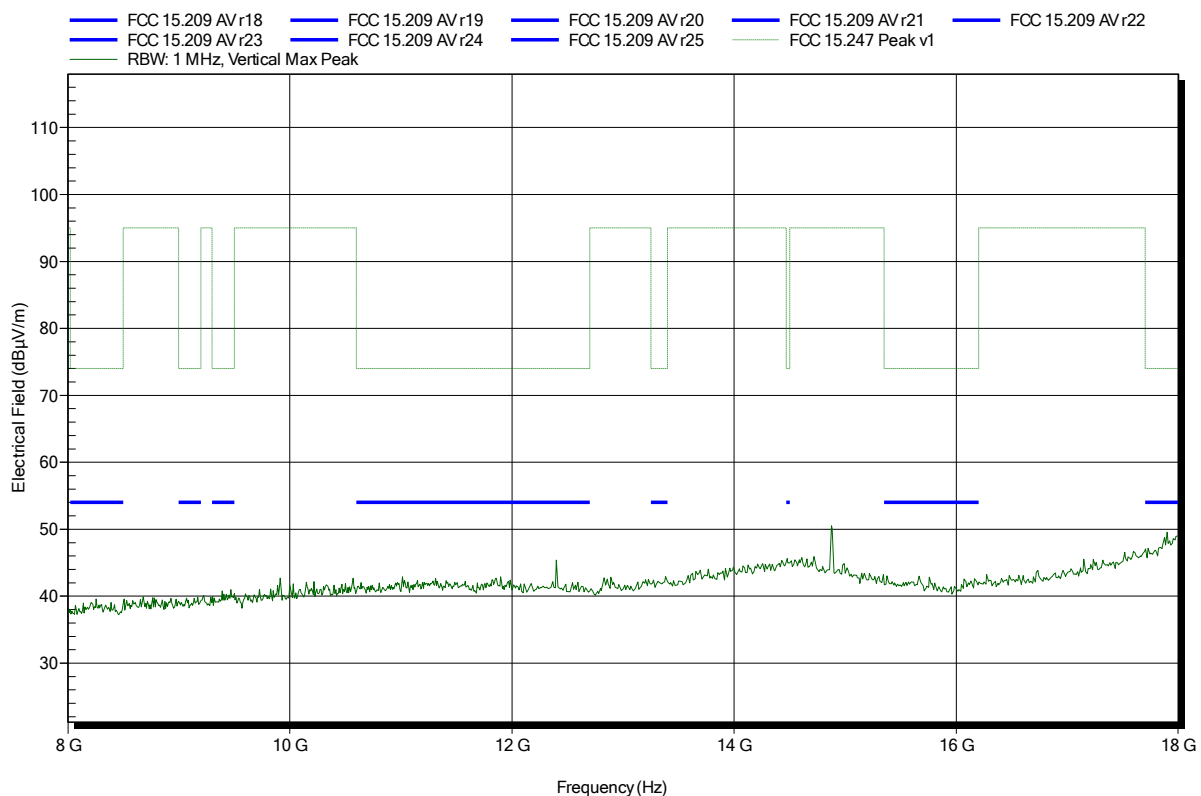


Spurious emissions according to FCC 15.247

Project number: G0M-1502-4538

Applicant: Panasonic Industrial Devices
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 5.0 V DC
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; BT-LE; 2480 MHz
 Test Date: 2015-03-04
 Note:

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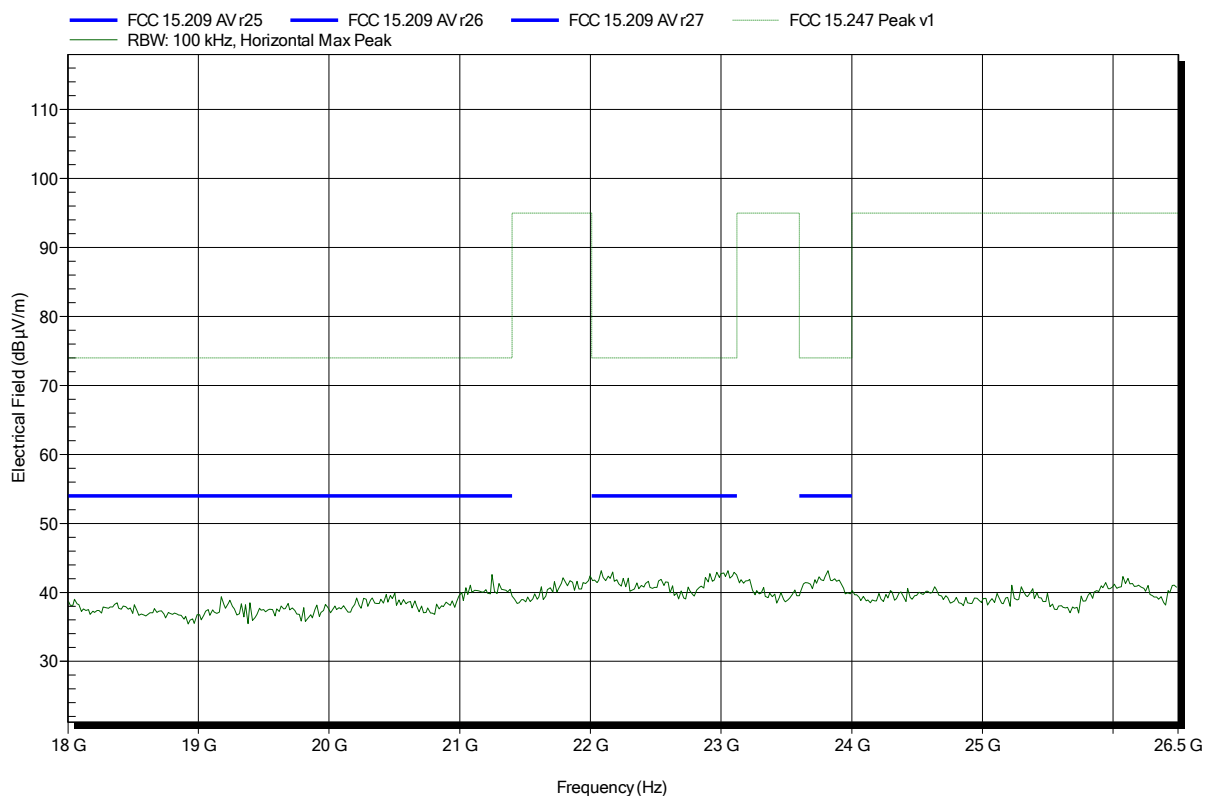


Spurious emissions according to FCC 15.247

Project number: GOM-1502-4538

Applicant:	Panasonic Industrial Devices
EUT Name:	Bluetooth Smart Module
Model:	ENW89847A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 25°C, Vnom: 5.0 V DC
Antenna:	Rohde & Schwarz HL 025, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BT-LE; 2480 MHz
Test Date:	2015-03-04
Note:	

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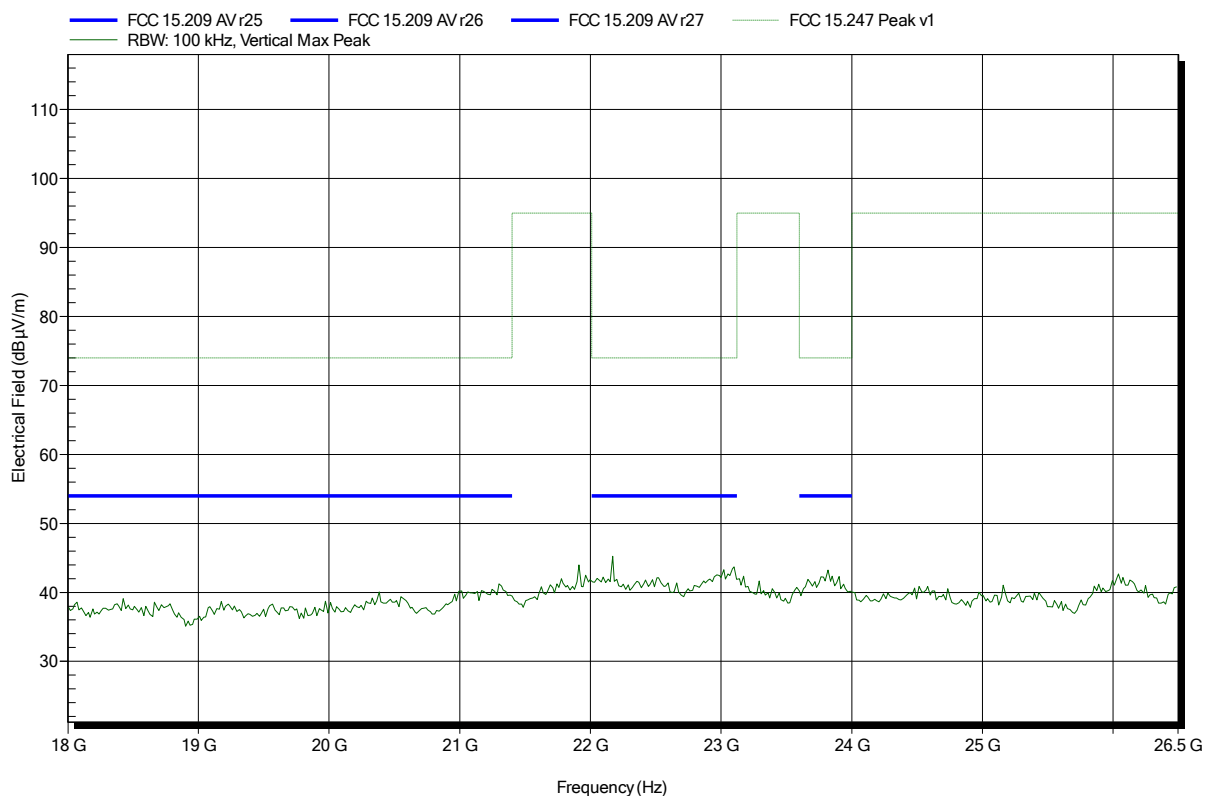


Spurious emissions according to FCC 15.247

Project number: G0M-1502-4538

Applicant: Panasonic Industrial Devices
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 5.0 V DC
 Antenna: Rohde & Schwarz HL 025, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; BT-LE; 2480 MHz
 Test Date: 2015-03-04
 Note:

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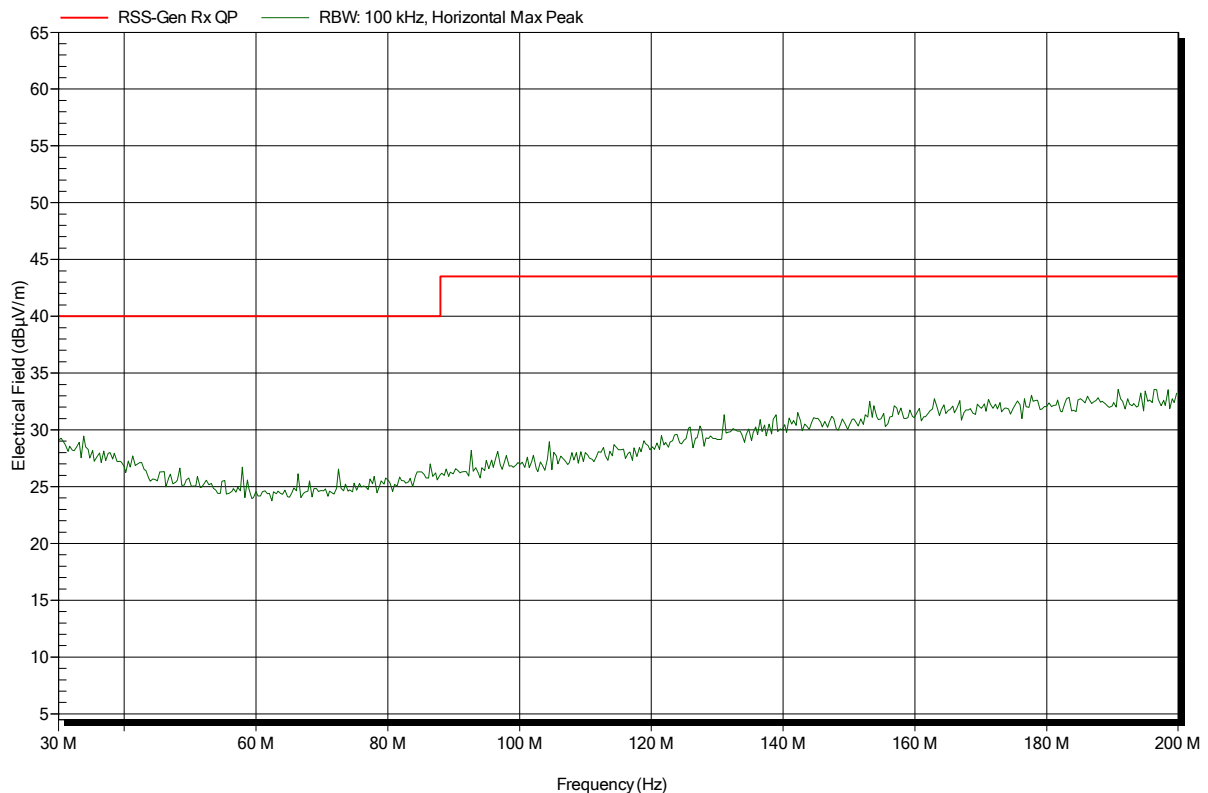
ANNEX B Receiver radiated spurious emissions

Spurious emissions according to RSS-GEN

Project number: G0M-1502-4538

Applicant:	Panasonic Industrial Devices
EUT Name:	Bluetooth Smart Module
Model:	ENW89847A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 25°C, Vnom: 5.0 V DC
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	RX; BT-LE; 2440 MHz
Test Date:	2015-03-04
Note:	

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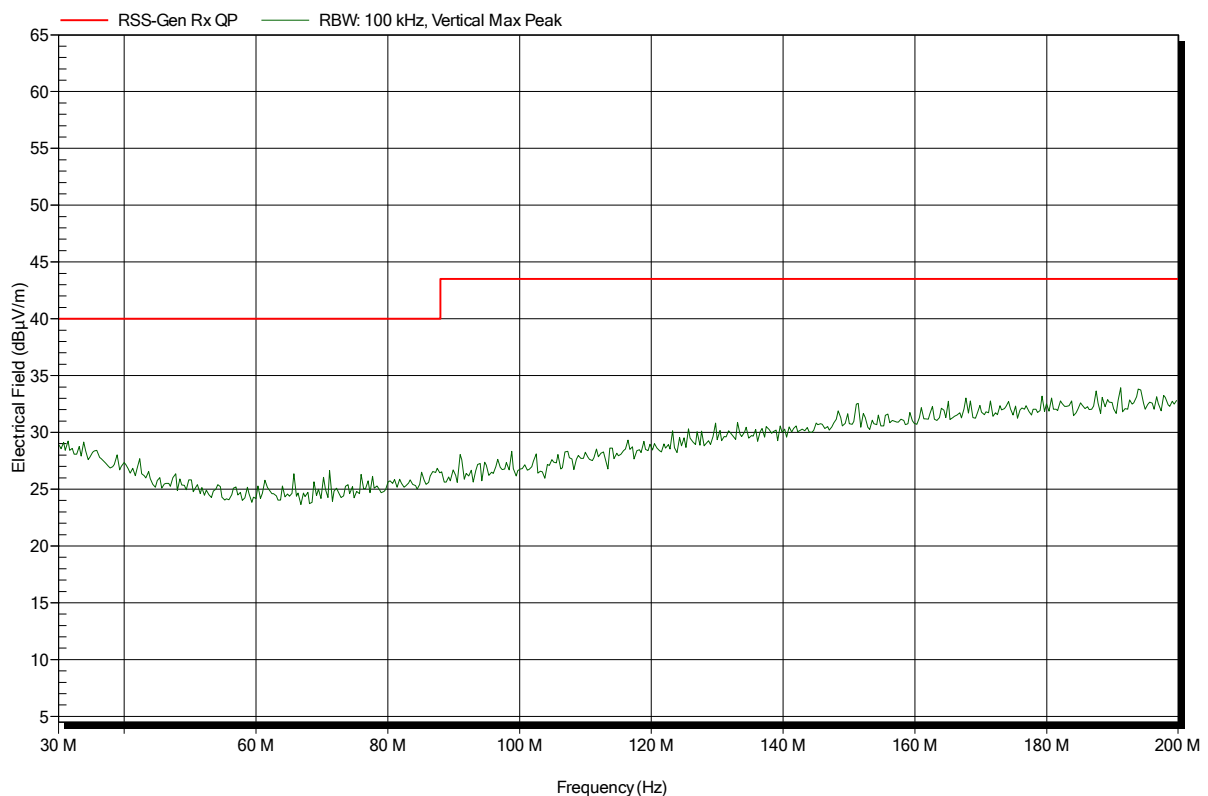


Spurious emissions according to RSS-GEN

Project number: G0M-1502-4538

Applicant:	Panasonic Industrial Devices
EUT Name:	Bluetooth Smart Module
Model:	ENW89847A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 25°C, Vnom: 5.0 V DC
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3 m
Mode:	RX; BT-LE; 2440 MHz
Test Date:	2015-03-04
Note:	

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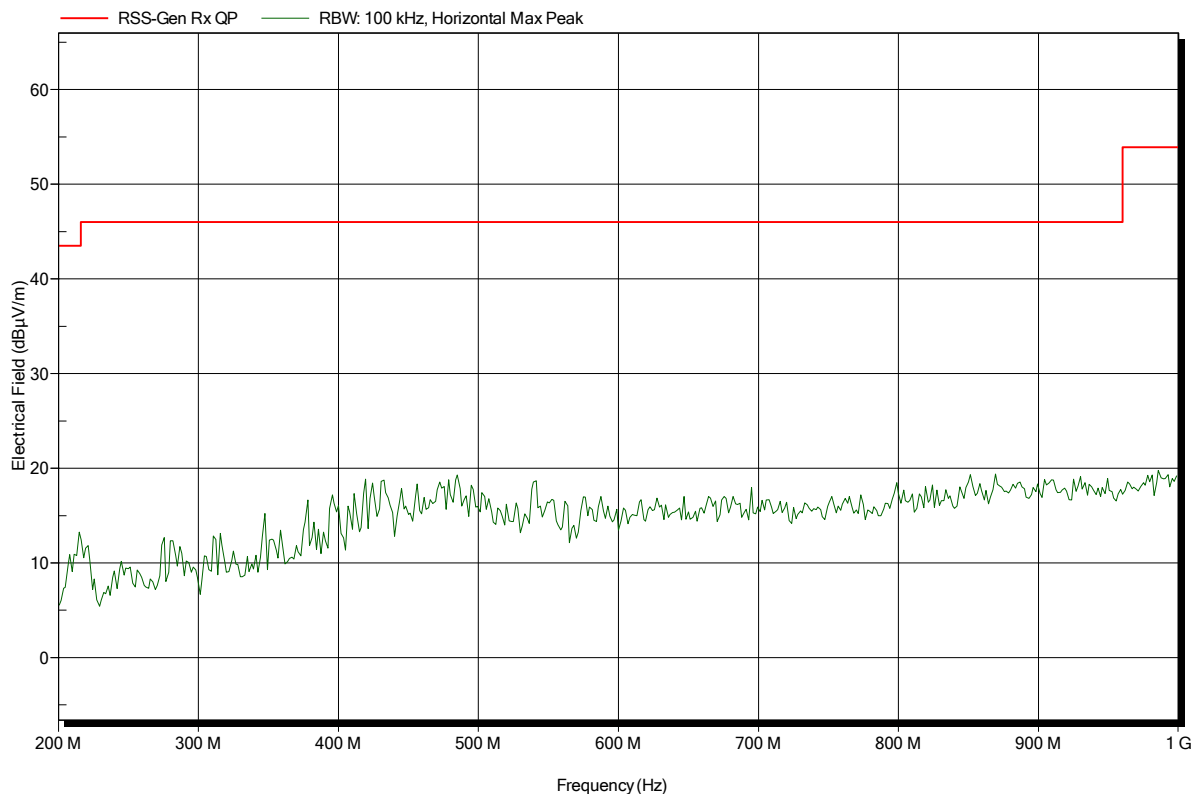


Spurious emissions according to RSS-GEN

Project number: G0M-1502-4538

Applicant:	Panasonic Industrial Devices
EUT Name:	Bluetooth Smart Module
Model:	ENW89847A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 25°C, Vnom: 5.0 V DC
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	RX; BT-LE; 2440 MHz
Test Date:	2015-03-04
Note:	

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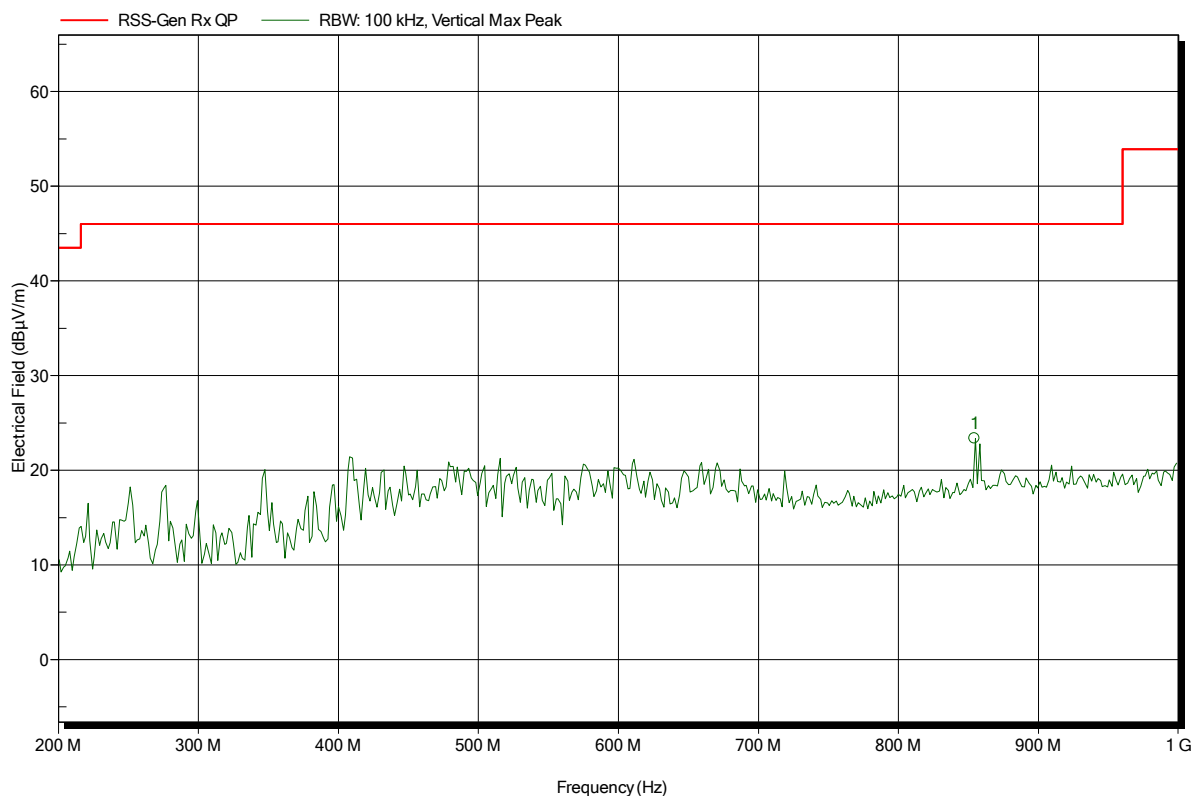


Spurious emissions according to RSS-GEN

Project number: G0M-1502-4538

Applicant: Panasonic Industrial Devices
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 5.0 V DC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: RX; BT-LE; 2440 MHz
 Test Date: 2015-03-04
 Note:

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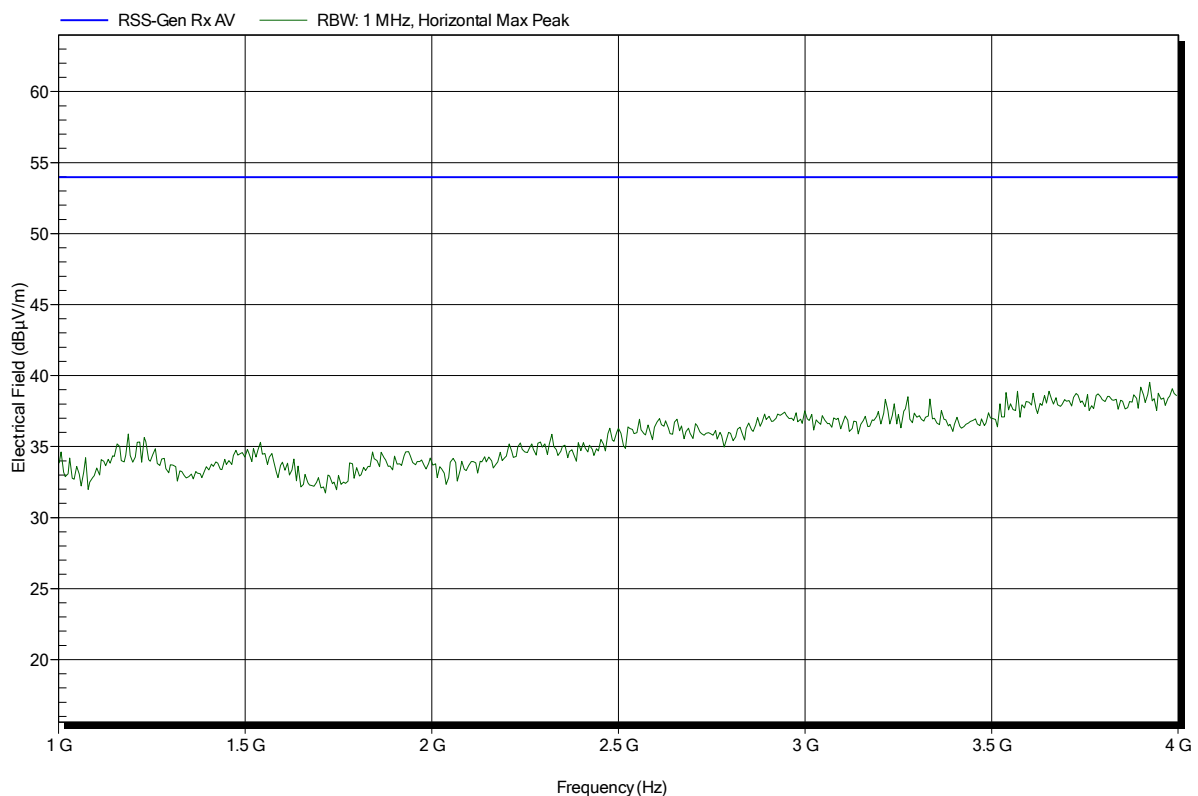
Frequency	Peak	Peak Limit	Peak Difference	Status
854.4 MHz	23.35 dBµV/m	46 dBµV/m	-22.65 dB	Pass

Spurious emissions according to RSS-GEN

Project number: G0M-1502-4538

Applicant:	Panasonic Industrial Devices
EUT Name:	Bluetooth Smart Module
Model:	ENW89847A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 25°C, Vnom: 5.0 V DC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	RX; BT-LE; 2440 MHz
Test Date:	2015-03-04
Note:	

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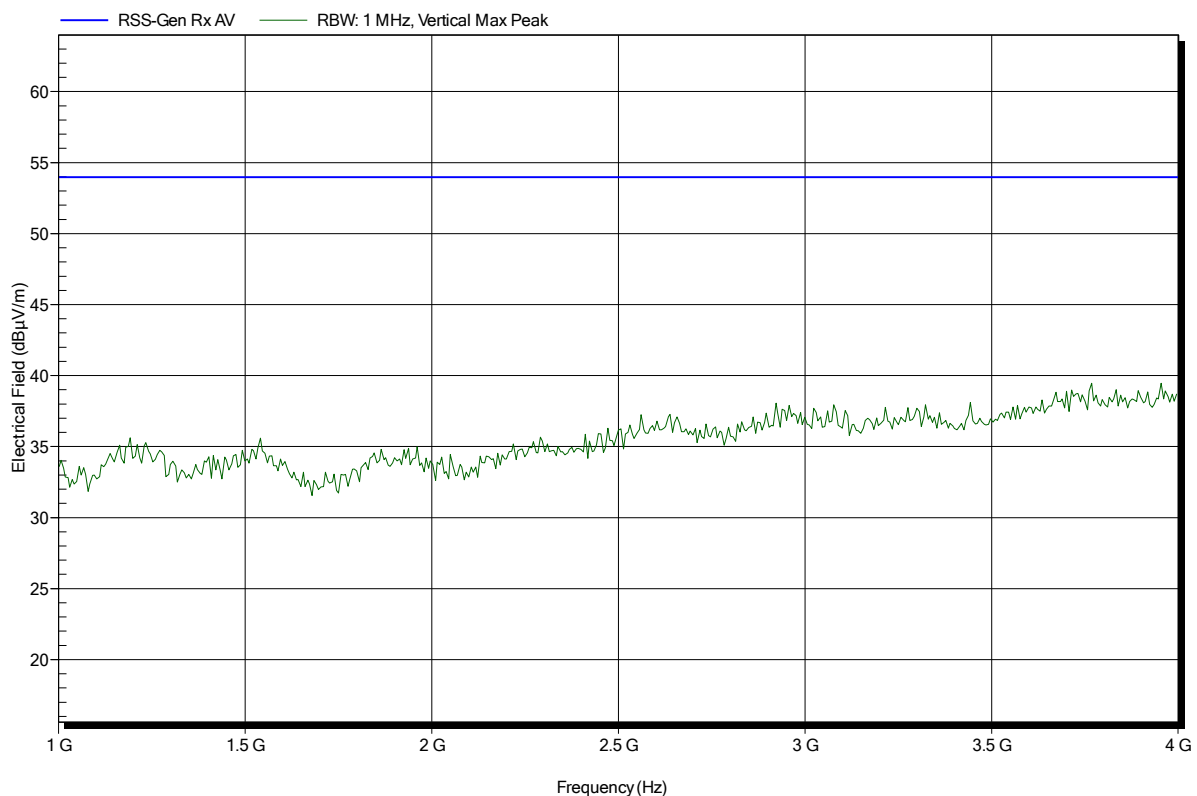


Spurious emissions according to RSS-GEN

Project number: GOM-1502-4538

Applicant:	Panasonic Industrial Devices
EUT Name:	Bluetooth Smart Module
Model:	ENW89847A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 25°C, Vnom: 5.0 V DC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	RX; BT-LE; 2440 MHz
Test Date:	2015-03-04
Note:	

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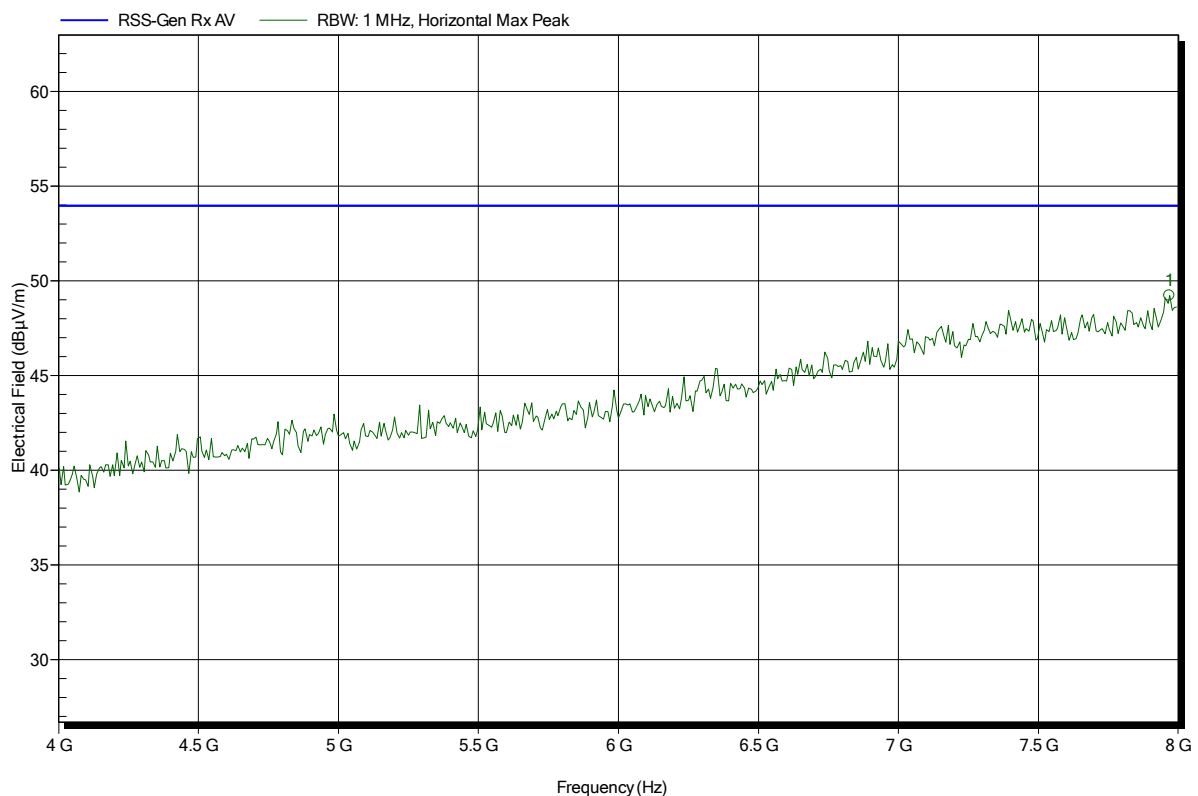


Spurious emissions according to RSS-GEN

Project number: G0M-1502-4538

Applicant: Panasonic Industrial Devices
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 5.0 V DC
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: RX; BT-LE; 2440 MHz
 Test Date: 2015-03-04
 Note:

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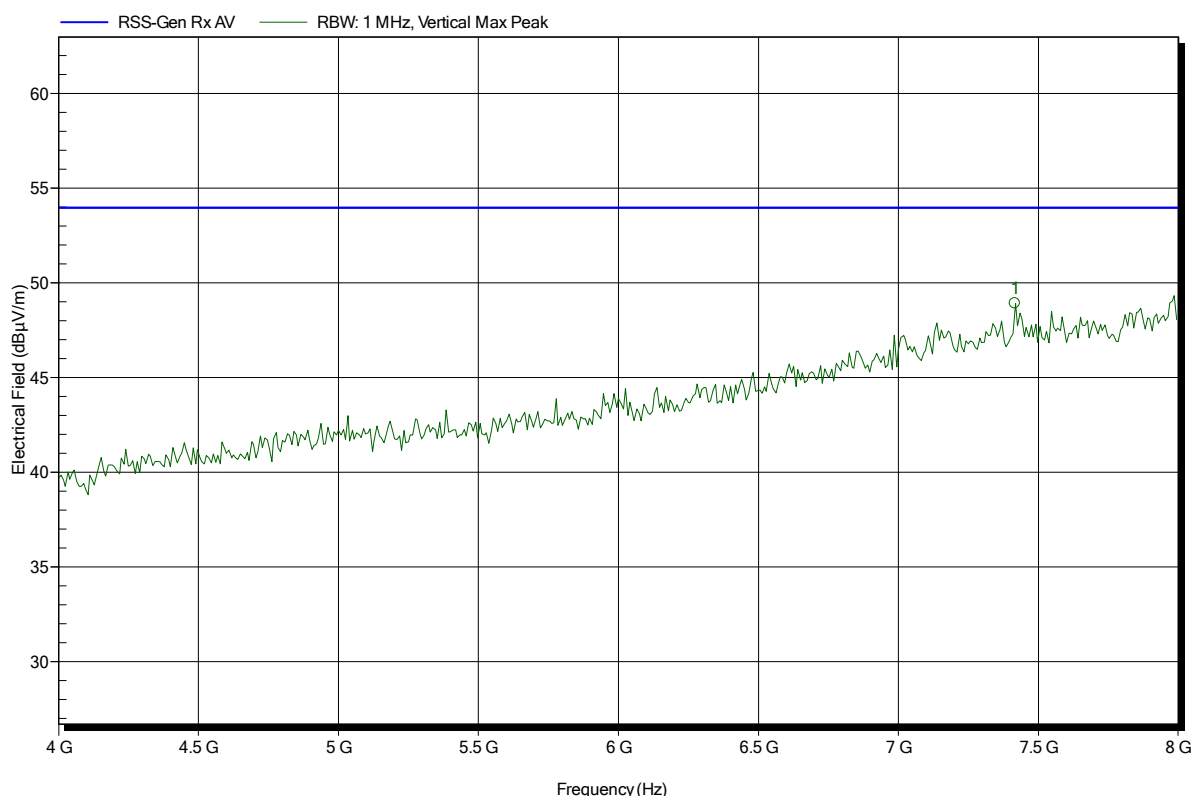
Frequency	Peak	Peak Limit	Peak Difference	Status
7.968 GHz	49.22 dBµV/m	53.98 dBµV/m	-4.76 dB	Pass

Spurious emissions according to RSS-GEN

Project number: G0M-1502-4538

Applicant: Panasonic Industrial Devices
 EUT Name: Bluetooth Smart Module
 Model: ENW89847A1KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 25°C, Vnom: 5.0 V DC
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: RX; BT-LE; 2440 MHz
 Test Date: 2015-03-04
 Note:

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Frequency	Peak	Peak Limit	Peak Difference	Status
7.416 GHz	48.93 dBµV/m	53.98 dBµV/m	-5.05 dB	Pass