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RADIO REPORT

FCC 47 CFR Part 15C
ISED Canada RSS-247

Digital transmission systems operating within the 2400 – 2483.5 MHz band

Report Reference No	G0M-1902-8045-TFC247BL-V02
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	A2LA Accredited Testing Laboratory, Certificate No.: 1983.01 FCC Test Firm Designation Number: DE0008 ISED Testing Laboratory site: 3470A-2
Applicant	Panasonic Industrial Devices Europe GmbH
Address	Zeppelinstr. 19 21337 Lüneburg GERMANY
Test Specification	According to FCC/ISED rules
Standard	47 CFR Part 15C RSS-247, Issue 2, 2017-02 RSS-Gen, Issue 5, Amendment 1, 2019-03
Non-Standard Test Method	None
Equipment under Test (EUT):	
Product Description	Bluetooth Low Energy Module
Model(s)	ENW89853A1KF
Additional Model(s)	None
Brand Name(s)	PAN1762
Hardware Version(s)	02
Software Version(s)	01
FCC-ID	T7V1762
IC	216Q-1762
Test Result	**PASSED**

Possible test case verdicts:	
required by standard but not tested	N/T
not required by standard	N/R
not applicable to EUT	N/A
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	2019-02-20
Report:	
Compiled by	Wilfried Treffke
Tested by (+ signature) (Responsible for Test)	Wilfried Treffke
Approved by (+ signature) (Head of Lab)	Christian Weber
Date of Issue	2019-05-22
Total number of pages	92
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 History			
Version	Issue Date	Remarks	Revised By
01	2019-04-24	Initial Release	
02	2019-05-22	Page 15: Result summary table corrected.	W. Treffke

ABBREVIATIONS AND ACRONYMS

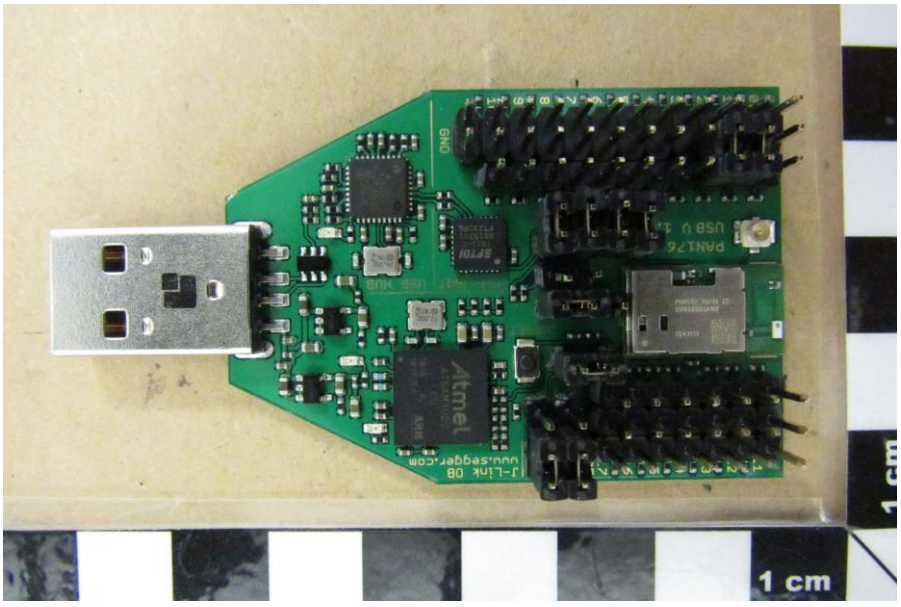
Acronyms	
Acronym	Description
EUT	Equipment Under Test
FCC	Federal Communications Commission
ISED	Innovation, Science and Economic Development Canada
RBW	Resolution bandwidth
RMS	Root mean square
VBW	Video bandwidth
V_{NOM}	Nominal supply voltage

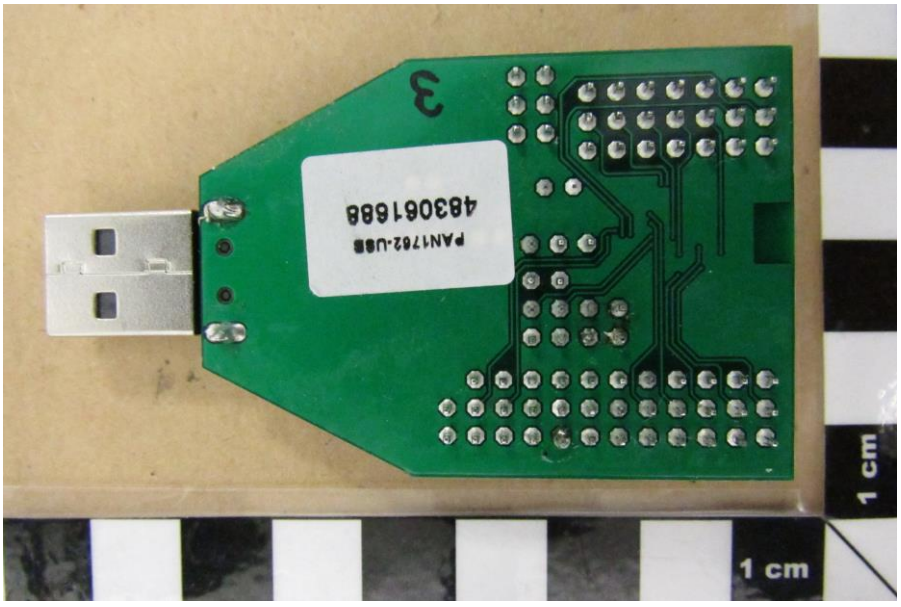
REPORT INDEX

1 Equipment (Test Item) Under Test

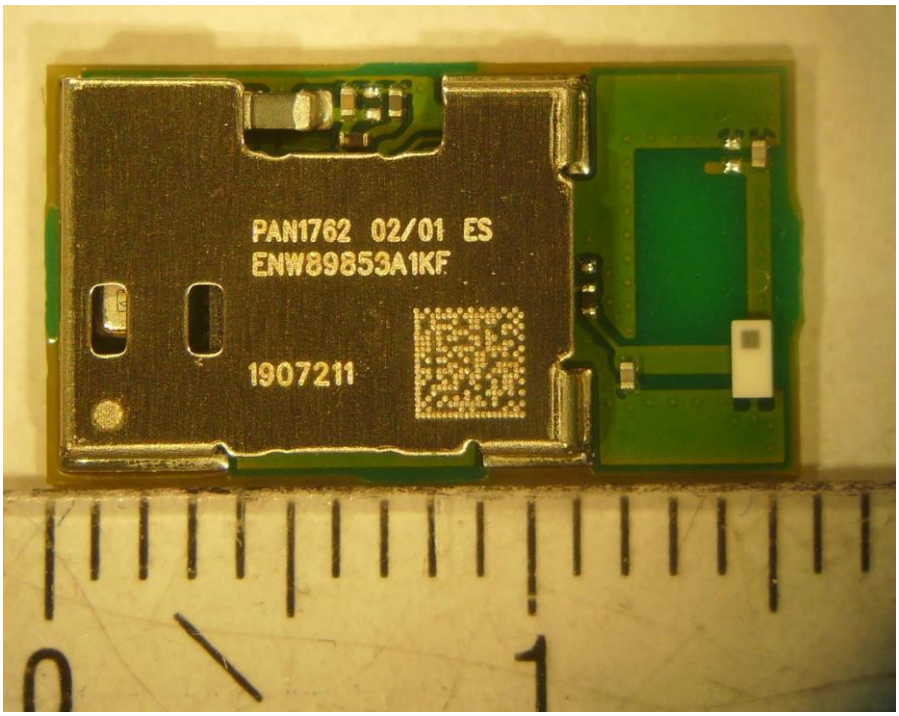
Description	Bluetooth Low Energy Module	
Model	ENW89853A1KF	
Additional Model(s)	None	
Brand Name(s)	PAN1762	
Serial Number(s)	None	
Hardware Version(s)	02	
Software Version(s)	01	
PMN	PAN1762	
HVIN	ENW89853A1KF	
FVIN	N/A	
HMN	N/A	
FCC-ID	T7V1762	
IC	216Q-1762	
Equipment type	Radio Module	
Radio type	Transceiver	
Assigned frequency bands	2400 - 2483.5 MHz	
Radio technology	Bluetooth LE	
Modulation	GFSK	
Number of antenna ports	1	
Antenna	Type	Integrated
	Model	ANT016008LCS2442MA1
	Manufacturer	TDK
	Gain	1.6 dBi (manufacturer declaration)
Supply Voltage	V_{NOM}	3.3 VDC
Operating Temperature	T_{NOM}	25 °C
AC/DC-Adaptor	Model	None
	Vendor	None
	Input	None
	Output	None
Manufacturer	Panasonic Industrial Devices Europe GmbH Zeppelinstr. 19 21337 Lüneburg GERMANY	

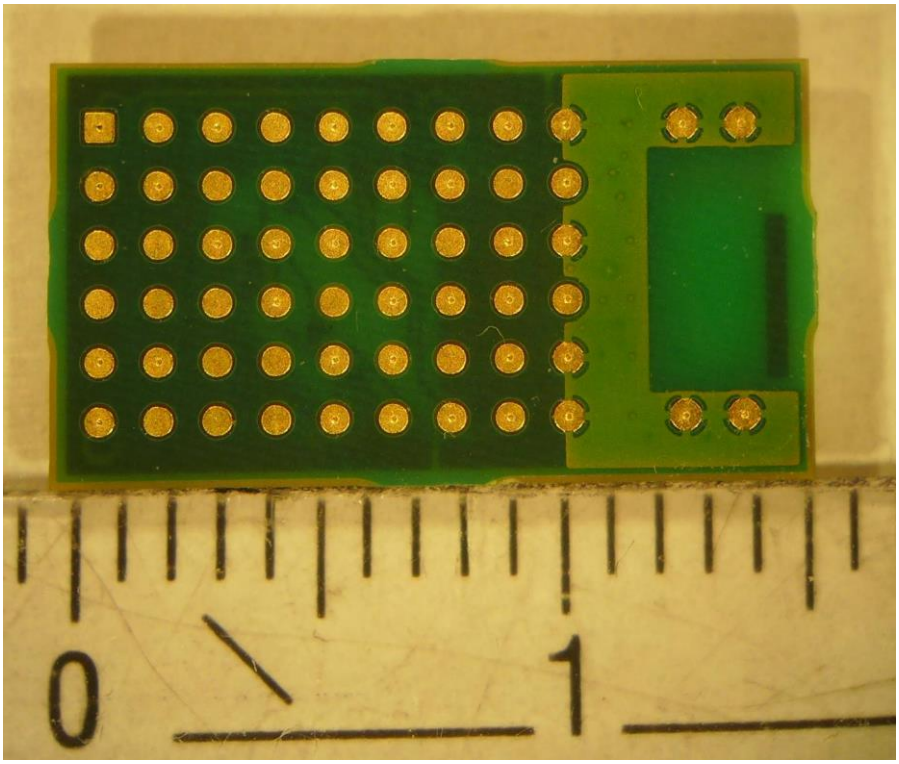
1.1 Photos – Equipment External

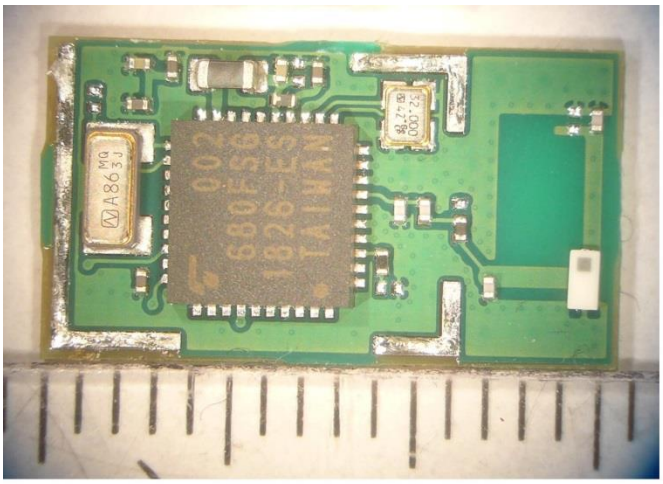
EUT Top View


EUT Bottom View


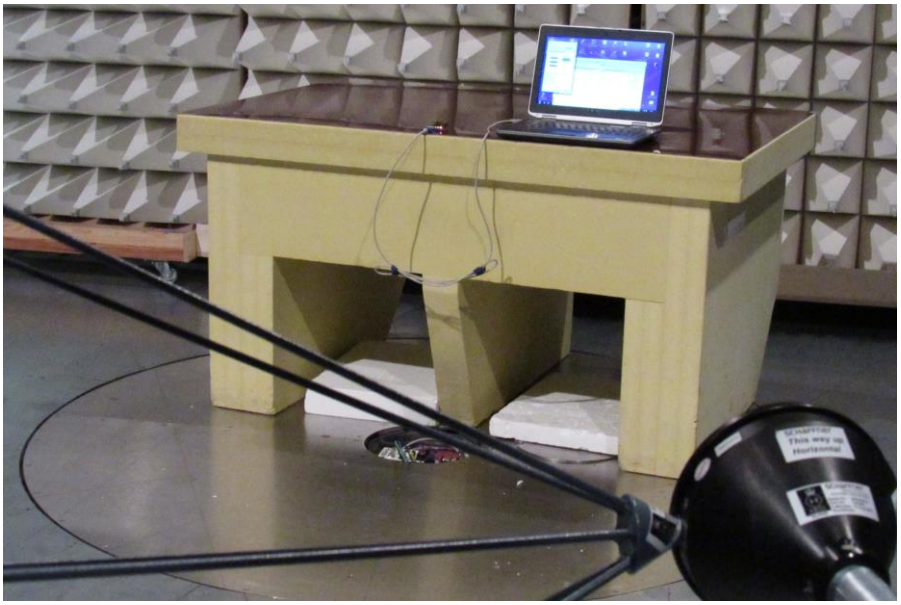
1.2 Photos – Equipment Internal

EUT Top View


EUT Bottom View


EUT Without Cover


1.3 Photos – Test Setup

Radiated test setup


Conducted test setup


1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
AE	Power Supply	Dell	FA65NE0-00	S/N RX929
AE	Laptop	Dell	Latitude E6420	S/N HPJ4R1
SIM	Communication Tester	Rohde & Schwarz	CBT	-
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
CBL	Connecting Cable			
Comment:				

1.5 Test Modes

Mode	Description
GFSK	Mode = Transmit Modulation = GFSK Spreading = None Duty cycle = 24%
Receive	Mode = Receive
Comment:	

1.6 Test Frequencies

Designator	Mode	Channel	Frequency [MHz]
F1	Tx / Rx	0	2402
F2	Tx / Rx	19	2440
F3	Tx / Rx	39	2480

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/m) = 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/m	= 47.5 dBµV/m	:	47.5 dBµV/m - 57.0 dBµV/m	= -9.5 dB

2 Result Summary

FCC 47 CFR Part 15C, ISED RSS-247				
Product Standard Reference	**Requirement**	**Reference Method**	**Result**	**Remarks**
ISED RSS-Gen, Issue 5 (section 6.6)	Occupied Bandwidth	ANSI C63.10-2013	N/R	Informational only
FCC § 15.247(a)(2) ISED RSS-247, Issue 2 (section 5.2)	6 dB Bandwidth	ANSI C63.10-2013	PASS	
FCC § 15.247(b)(1) ISED RSS-247, Issue 2 (section 5.4)	Maximum peak conducted power	ANSI C63.10-2013	PASS	
FCC § 15.247(e) ISED RSS-247, Issue 2 (section 5.2)	Power spectral density	ANSI C63.10-2013	PASS	
FCC § 15.207 ISED RSS-247, Issue 2 (section 3.1)	AC power line conducted emissions	ANSI C63.10-2013	PASS	
FCC § 15.247(d) ISED RSS-247, Issue 2 (section 5.5)	Band edge compliance	ANSI C63.10-2013	PASS	
FCC § 15.247(d) ISED RSS-247, Issue 2 (section 5.5)	Conducted spurious emissions	ANSI C63.10-2013	PASS	
FCC § 15.247(d) FCC § 15.209 ISED RSS-Gen, Issue 5 (section 6.13)	Transmitter radiated spurious emissions	ANSI C63.10-2013	PASS	
ISED RSS-247, Issue 2 (section 3.1)	Receiver radiated spurious emissions	ANSI C63.10-2013	PASS	
Comment:				

Possible Test Case Verdicts	
PASS	Test object does meet the requirements
FAIL	Test object does not meet the requirements
N/T	Required by standard but not tested
N/R	Not required by standard for the test object

3 Test Conditions and Results

3.1 Test Conditions and Results - Occupied bandwidth

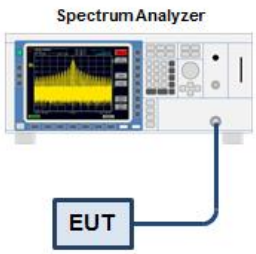
3.1.1 Information

Test Information	
Reference	ISED RSS-Gen, Issue 5 (section 6.6)
Measurement Method	ANSI C63.10 6.9.3
Operator	Wilfried Treffke
Date	2019-03-12

3.1.2 Limits

Limits
None (Informational only)

3.1.3 Setup

Test Setup


3.1.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01407	2018-12	2019-12

3.1.5 Procedure

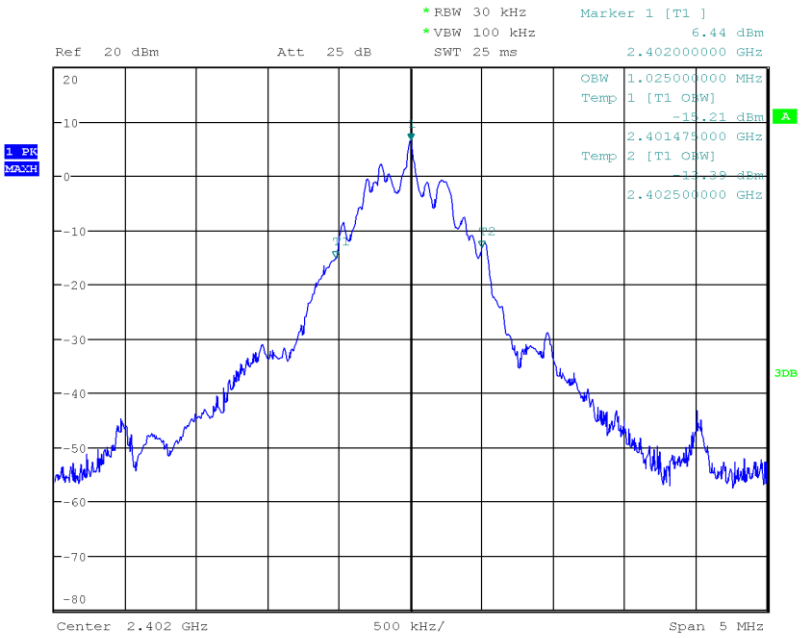
Test Procedure
1. EUT transmitter is activated in test mode under normal conditions 2. The spectrum analyzer is set to peak detection and maximum hold with a span twice the emission spectrum 3. The resolution bandwidth is set to the range of 1 % to 5 % of the occupied bandwidth 4. The occupied bandwidth is measured with the build-in analyzer function

3.1.6 Results

Test Results		
Mode	Frequency [MHz]	Bandwidth [MHz]
GFSK	2402	1.025
GFSK	2440	1.070
GFSK	2480	1.135

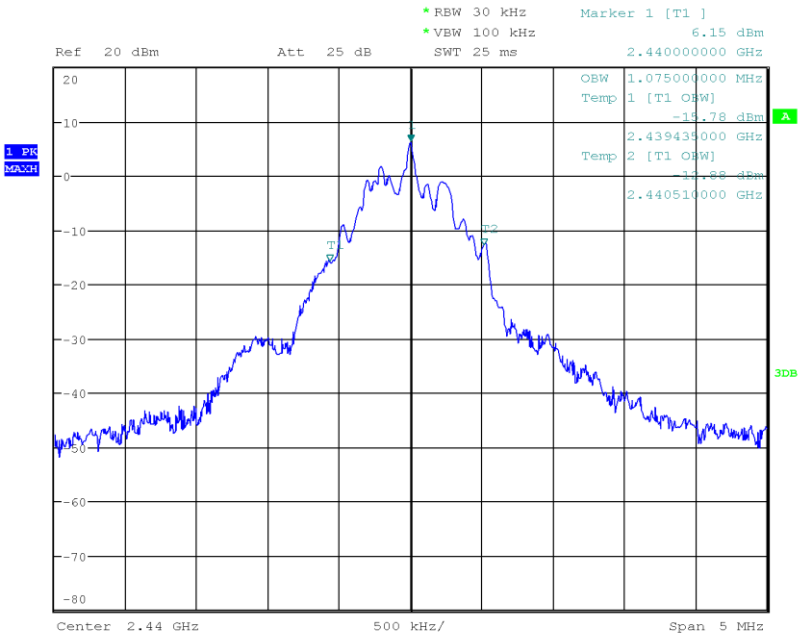
Occupied Bandwidth

Project Number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
Model Description:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Sample ID:	22986
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.3
Operational Mode:	GFSK, Channel: 0, 2402 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2019-03-12
Occupied Bandwidth [MHz]:	1.025



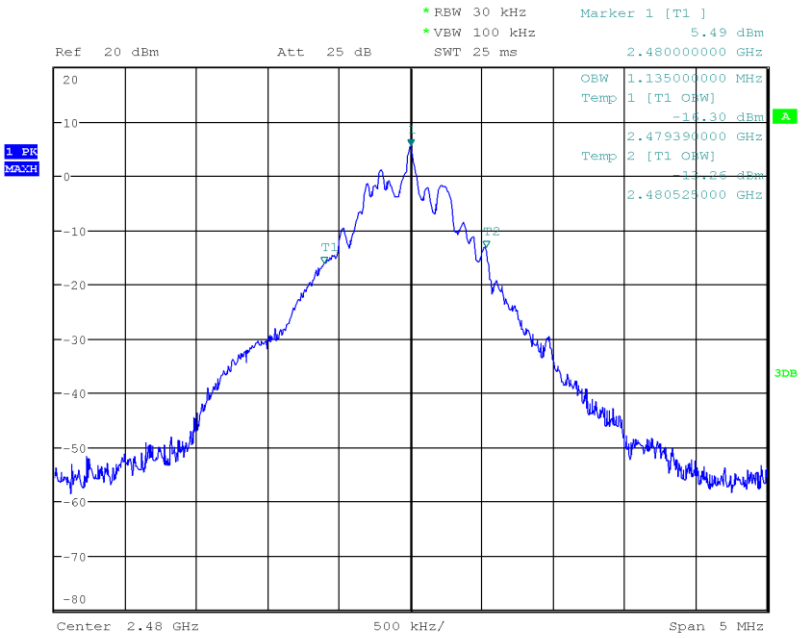
Occupied Bandwidth

Project Number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
Model Description:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Sample ID:	22986
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.3
Operational Mode:	GFSK, Channel: 19, 2440 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2019-03-12
Occupied Bandwidth [MHz]:	1.070



Occupied Bandwidth

Project Number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
Model Description:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Sample ID:	22986
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 6.9.3
Operational Mode:	GFSK, Channel: 39, 2480 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2019-03-12
Occupied Bandwidth [MHz]:	1.135



3.2 Test Conditions and Results - 6 dB bandwidth

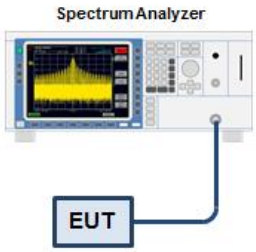
3.2.1 Information

Test Information	
Reference	FCC § 15.247(a)(2); ISED RSS-247, Issue 2 (section 5.2)
Measurement Method	ANSI C63.10 11.8
Operator	Wilfried Treffke
Date	2019-03-12

3.2.2 Limits

Limits
≥ 500kHz

3.2.3 Setup

Test Setup


3.2.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01407	2018-12	2019-12

3.2.5 Procedure

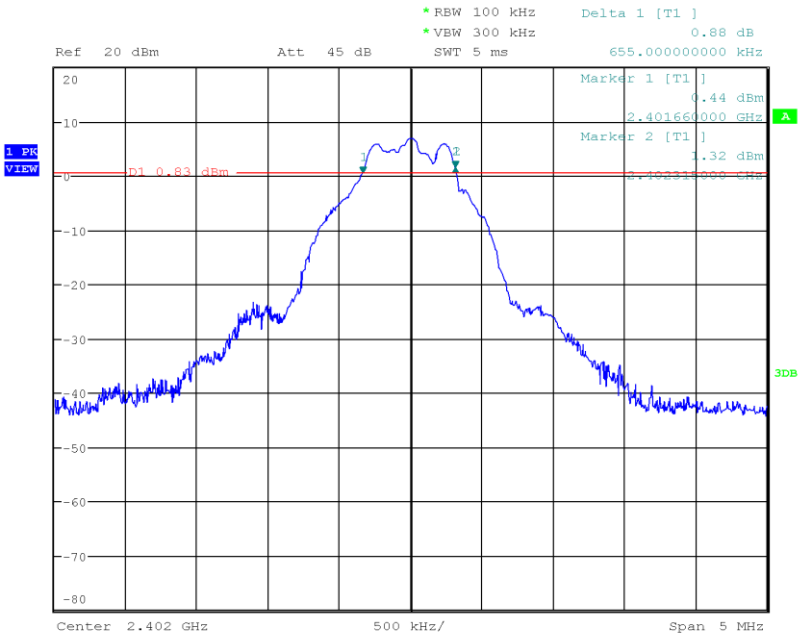
Test Procedure
1. EUT set to test mode 2. Span set to at least twice the emission spectrum 3. Detector set to peak and max hold and RBW is set to 100 kHz 4. Envelope peak value of emission spectrum is selected 5. Marker on envelope of spectrum is set to level of -6 dB to the left of the peak 6. Marker 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

3.2.6 Results

Test Results				
Mode	Frequency [MHz]	Bandwidth [kHz]	Limit [kHz]	Verdict
GFSK	2402	655	500	PASS
GFSK	2440	665	500	PASS
GFSK	2480	660	500	PASS

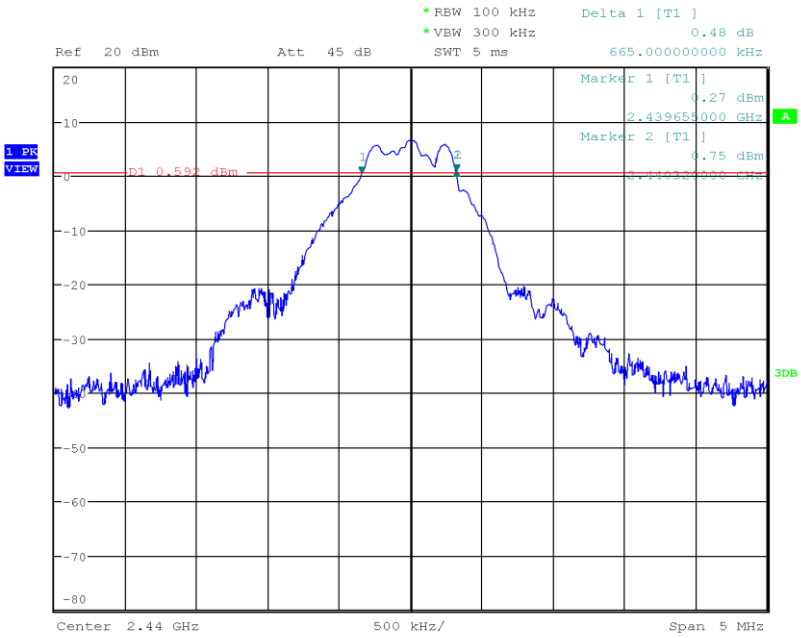
DTS (6 dB) Bandwidth

Project Number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
Model Description:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Sample ID:	22986
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.8.1 Option 1
Operational Mode:	GFSK, Channel: 0, 2402 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2019-03-12
Lower Frequency [MHz]:	2401.660
Upper Frequency [MHz]:	2402.315
6 dB Bandwidth [kHz]:	655



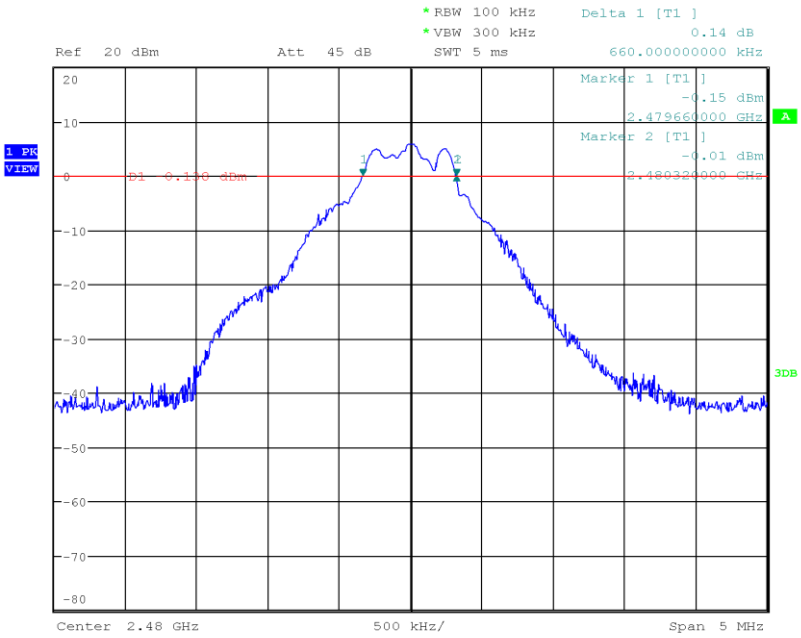
DTS (6 dB) Bandwidth

Project Number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
Model Description:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Sample ID:	22986
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.8.1 Option 1
Operational Mode:	GFSK, Channel: 19, 2440 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2019-03-12
Lower Frequency [MHz]:	2439.655
Upper Frequency [MHz]:	2440.320
6 dB Bandwidth [kHz]:	665



DTS (6 dB) Bandwidth

Project Number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
Model Description:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Sample ID:	22986
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.8.1 Option 1
Operational Mode:	GFSK, Channel: 39, 2480 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2019-03-12
Lower Frequency [MHz]:	2479.660
Upper Frequency [MHz]:	2480.320
6 dB Bandwidth [kHz]:	660



3.3 Test Conditions and Results - Maximum peak conducted output power

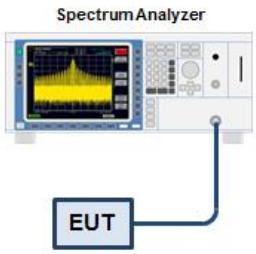
3.3.1 Information

Test Information	
Reference	FCC § 15.247(b)(1); ISED RSS-247, Issue 2 (section 5.4)
Measurement Method	ANSI C63.10 11.9.1
Operator	Wilfried Treffke
Date	2019-03-12

3.3.2 Limits

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.

3.3.3 Setup

Test Setup


3.3.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01407	2018-12	2019-12

3.3.5 Procedure

Test Procedure
1. EUT set to test hopping mode (Communication tester is used if needed) 2. Analyzer resolution bandwidth is set ≥ DTS bandwidth 3. Detector set to peak and max hold 4. Sweep time is set to auto 5. After the trace has stabilized a marker is set to peak of envelope

3.3.6 Results

Test Results				
Channel [MHz]	Power [dBm]	Power [W]	Limit [W]	Verdict
2402	7.826	0.0061	1.0	PASS
2440	7.655	0.0058	1.0	PASS
2480	6.882	0.0049	1.0	PASS

3.4 Test Conditions and Results - Power spectral density

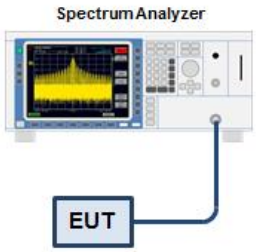
3.4.1 Information

Test Information	
Reference	FCC § 15.247(e); ISED RSS-247, Issue 2 (section 5.2)
Measurement Method	ANSI C63.10 11.10.2, 14.3.2
Operator	Wilfried Treffke
Date	2019-03-13

3.4.2 Limits

Limits
8 dBm / 3 kHz

3.4.3 Setup

Test Setup


3.4.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01407	2018-12	2019-12

3.4.5 Procedure

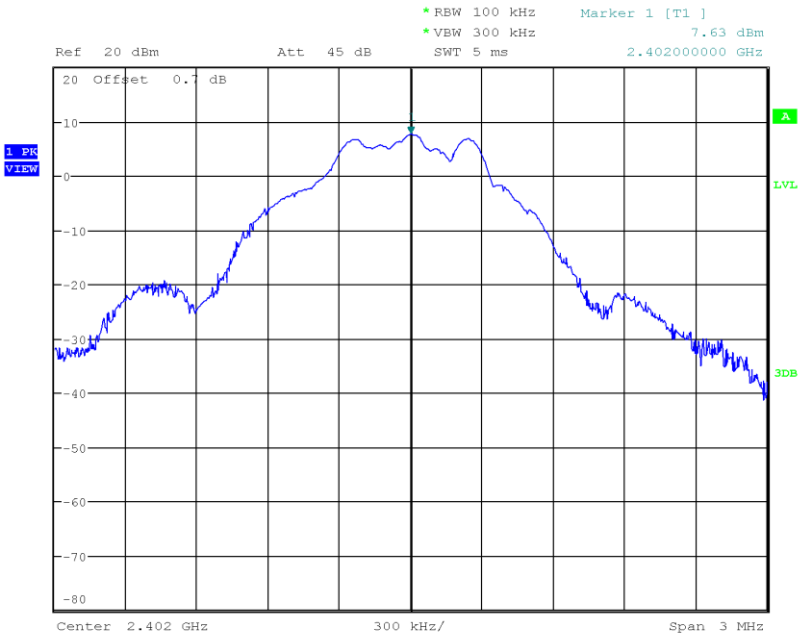
Test Procedure
1. EUT set to test mode 2. The analyzer is set to DTS channel center frequency with a span of 1.5 times the DTS bandwidth 3. The RBW is set to 100 kHz with VBW ≥ RBW and the detector is set to peak with max hold 4. After the trace has stabilized a marker is set to the envelope maximum 5. If the power spectral density is above the limit the RBW is reduced (not lower than 3 kHz) and the measurement is repeated 6. If the EUT has more than one transmit chain the procedure is repeated for each transmit chain

3.4.6 Results

Test Results			
Channel [MHz]	PSD [dBm/RBW]	Limit [dBm/3kHz]	Verdict
2402	7.625	8.0	PASS
2440	7.377	8.0	PASS
2480	6.645	8.0	PASS
RBW = 100 kHz			

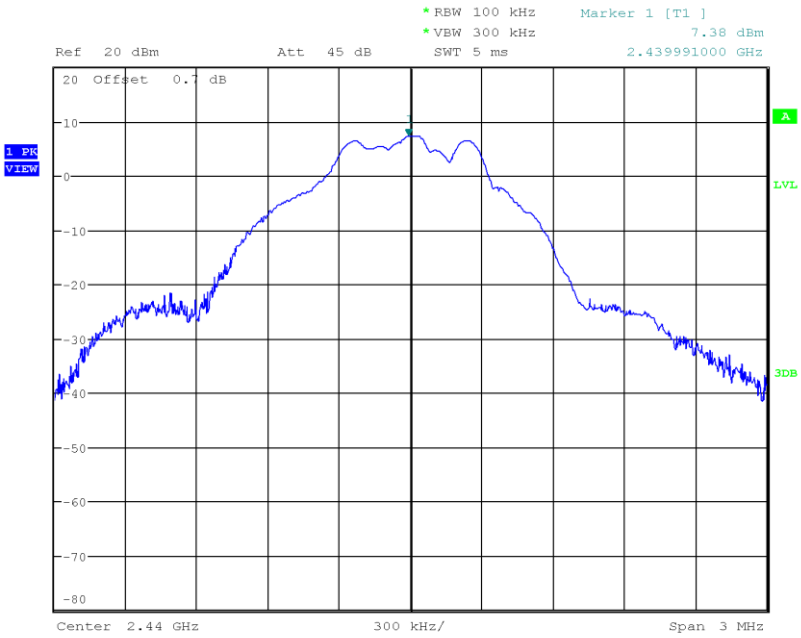
Peak Power Spectral Density

Project Number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
Model Description:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Sample ID:	22986
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.10.2
Operational Mode:	GFSK, Channel: 0, 2402 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2019-03-13
Peak Frequency [MHz]:	2402.000
Spectral Density [dBm/RBW]:	7.625
Resolution Bandwidth [kHz]:	100 kHz



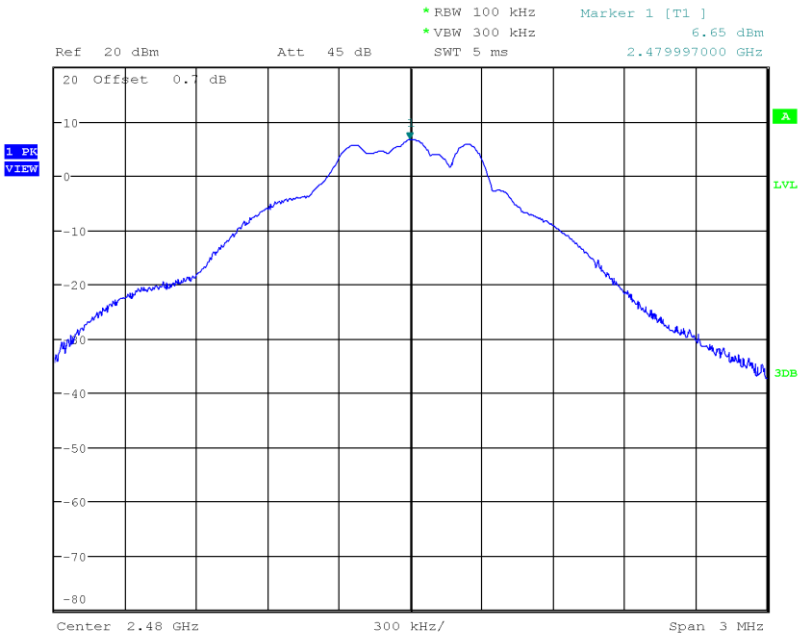
Peak Power Spectral Density

Project Number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
Model Description:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Sample ID:	22986
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.10.2
Operational Mode:	GFSK, Channel: 19, 2440 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2019-03-13
Peak Frequency [MHz]:	2439.991
Spectral Density [dBm/RBW]:	7.377
Resolution Bandwidth [kHz]:	100 kHz



Peak Power Spectral Density

Project Number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
Model Description:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Sample ID:	22986
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.10.2
Operational Mode:	GFSK, Channel: 39, 2480 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2019-03-13
Peak Frequency [MHz]:	2479.997
Spectral Density [dBm/RBW]:	6.645
Resolution Bandwidth [kHz]:	100 kHz



3.5 Test Conditions and Results - AC powerline conducted emissions

3.5.1 Information

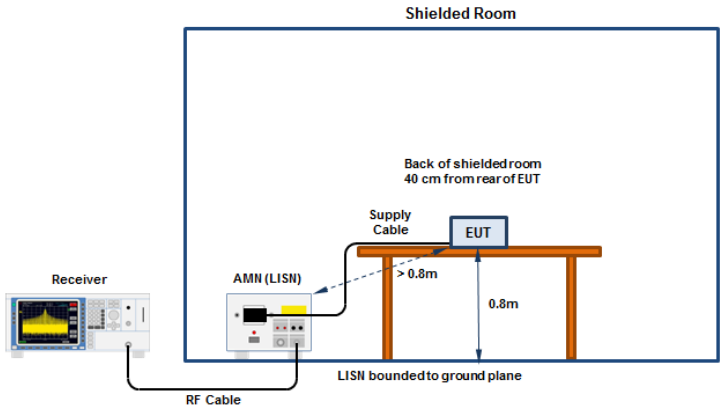
Test Information	
Reference	FCC § 15.207; ISED RSS-247, Issue 2 (section 3.1)
Measurement Method	ANSI C63.10 6.2
Operator	Wilfried Treffke
Date	2019-03-13

3.5.2 Limits

Limits		
Frequency [MHz]	Quasi-Peak [dBµV]	Average [dBµV]
0.15 - 0.5	66 - 56*	56 - 46*
0.5 - 5	56	46
5 - 30	60	50
* Limit decreases linearly with the logarithm of the frequency		

3.5.3 Setup

Test Setup



3.5.4 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMation	2016.1.10

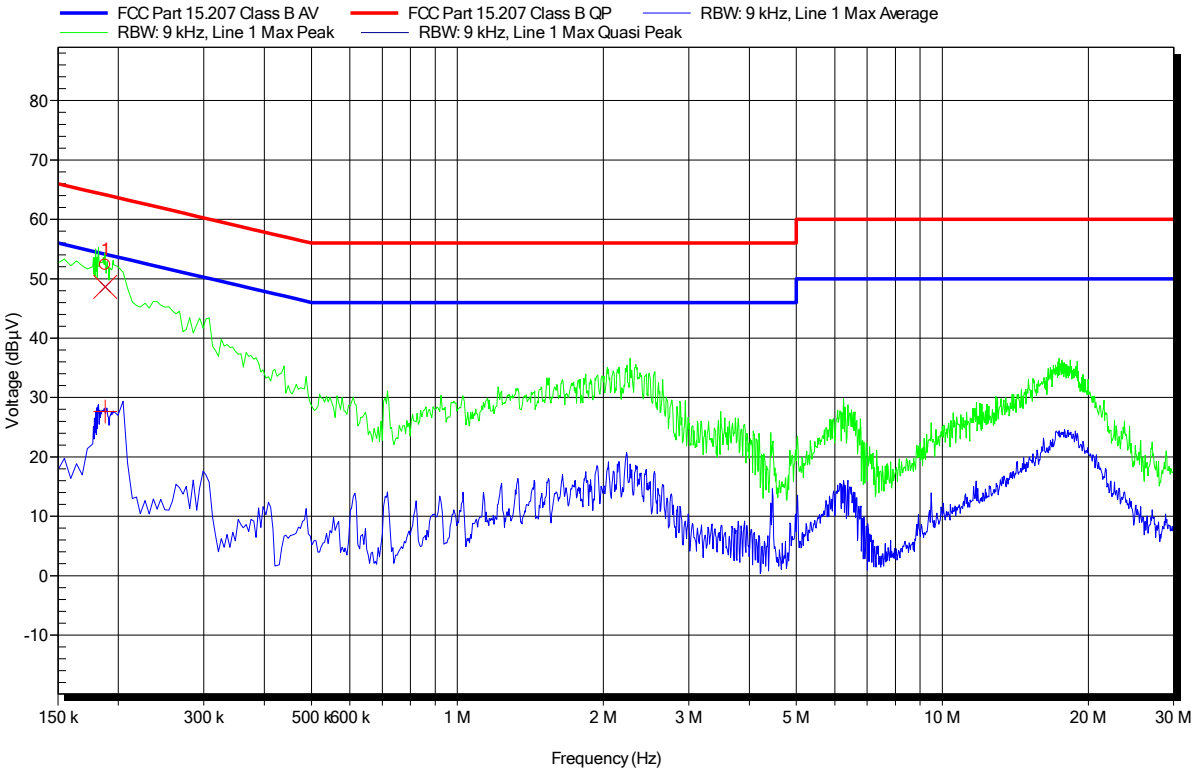
Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EMI Test Receiver	R&S	ESR7	EF00943	2018-07	2019-07
LISN	R&S	ESH3-Z5	EF00036	2017-01	2019-07

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

Project number: G0M-1902-8045

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 22°C, Unom: 120 VAC
LISN:	ESH3-Z5 (L)
Mode:	BLE Tx 2440 MHz
Test Date:	2019-03-13
Note:	

Index 2



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
1	187.8 kHz	48.62 dBµV	64.13 dBµV	-15.51 dB	Pass

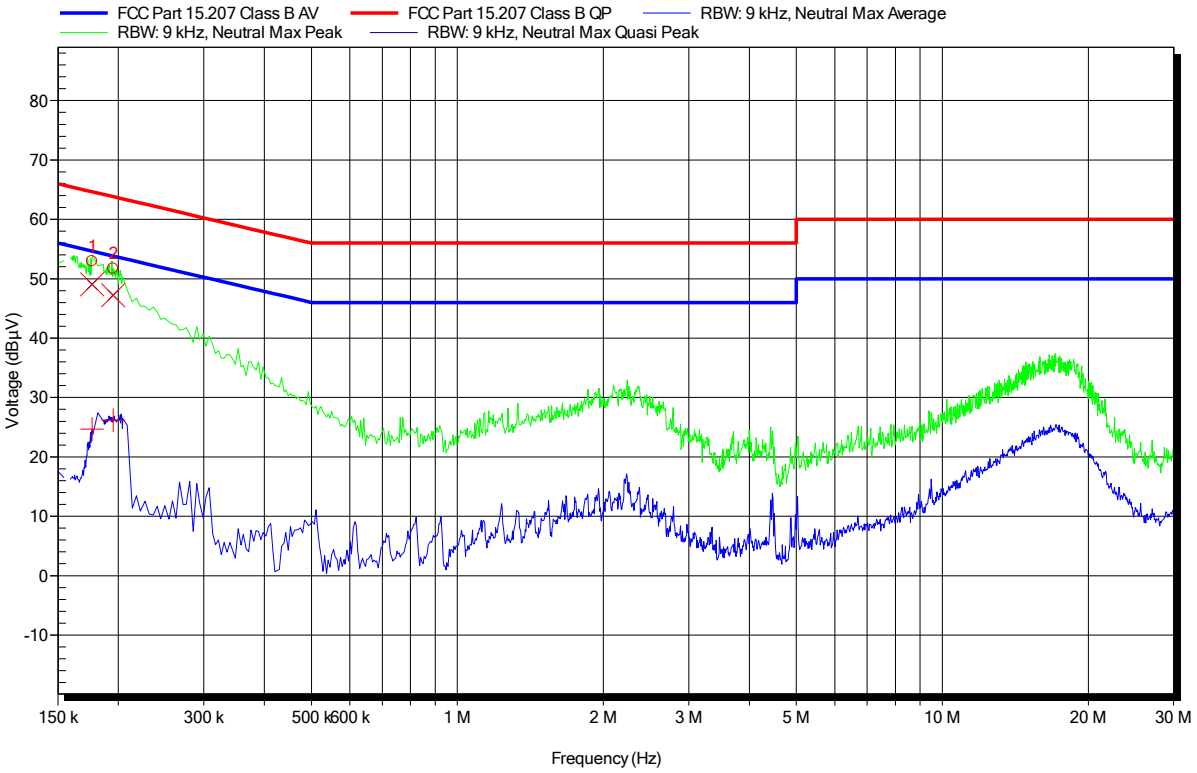
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status
1	187.8 kHz	27.65 dBµV	54.13 dBµV	-26.48 dB	Pass

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

Project number: G0M-1902-8045

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 22°C, Unom: 120 VAC
LISN:	ESH3-Z5 (N)
Mode:	BLE Tx 2440 MHz
Test Date:	2019-03-13
Note:	

Index 3



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
1	176.55 kHz	49.04 dBµV	64.65 dBµV	-15.61 dB	Pass
2	195 kHz	47.21 dBµV	63.82 dBµV	-16.61 dB	Pass

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status
1	176.55 kHz	24.7 dBµV	54.65 dBµV	-29.95 dB	Pass
2	195 kHz	26.17 dBµV	53.82 dBµV	-27.65 dB	Pass

3.6 Test Conditions and Results - Band-edge compliance

3.6.1 Information

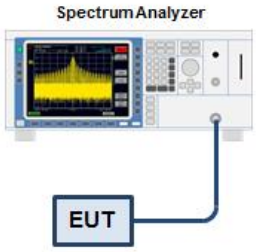
Test Information	
Reference	FCC § 15.247(d); ISED RSS-247, Issue 2 (section 5.5)
Measurement Method	ANSI C63.10 11.13
Operator	Wilfried Treffke
Date	2019-03-13

3.6.2 Limits

Limits	
Power Measurement	Out-of-band attenuation [dB]
Peak	20
RMS	30

3.6.3 Setup

Test Setup



3.6.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01407	2018-12	2019-12

3.6.5 Procedure

Test Procedure

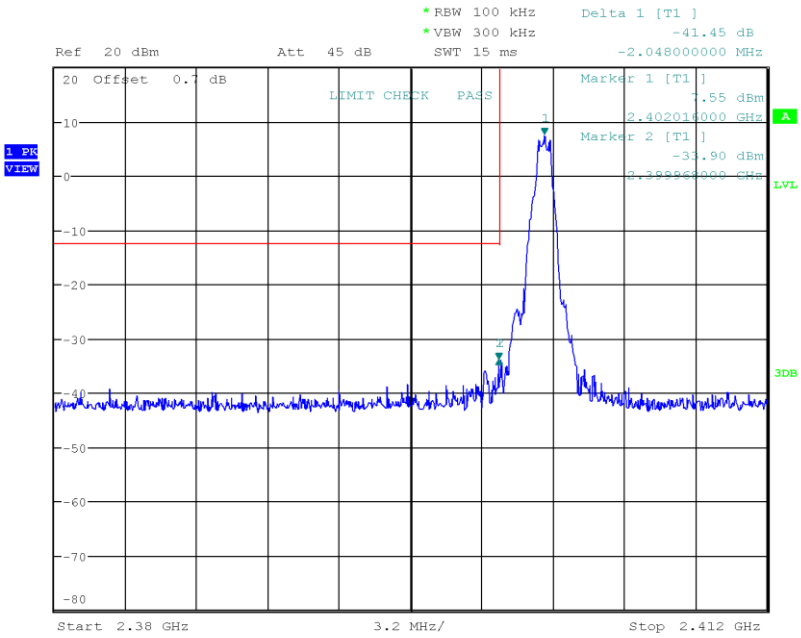
1. EUT set to test mode (Communication tester is used if needed)
2. Span set around lower band edge and detector is set to peak and max hold
3. Resolution bandwidth is set to 100 kHz
4. Markers are set to peak emission levels within frequency band and outside frequency band
5. Band edge attenuation is determined from level difference

3.6.6 Results

Test Results				
Mode	Channel [MHz]	Out-of-band Attenuation [dB]	Limit [dB]	Verdict
GFSK	2402	-41.45	-20	PASS
GFSK	2480	-45.88	-20	PASS

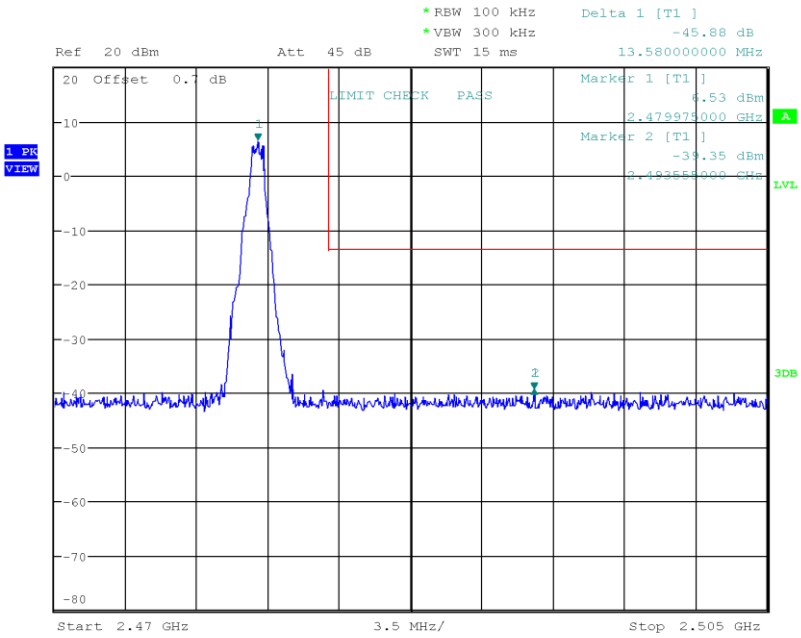
Band-edge Compliance

Project Number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
Model Description:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Sample ID:	22986
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 7.8.6, 6.10.4
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2019-03-13
Band-edge	Lower
In-band Frequency [MHz]:	2402.016
Max. in-band Level [dBm/100 kHz]:	7.554
Out-of-band Frequency [MHz]:	2399.968
Max. out-of-band Level [dBm/100 kHz]:	-33.9
Attenuation [dB]:	-41.45



Band-edge Compliance

Project Number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
Model Description:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Sample ID:	22986
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 7.8.6, 6.10.4
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2019-03-13
Band-edge	Upper
In-band Frequency [MHz]:	2479.975
Max. in-band Level [dBm/100 kHz]:	6.529
Out-of-band Frequency [MHz]:	2493.555
Max. out-of-band Level [dBm/100 kHz]:	-39.353
Attenuation [dB]:	-45.88



3.7 Test Conditions and Results - Conducted spurious emissions

3.7.1 Information

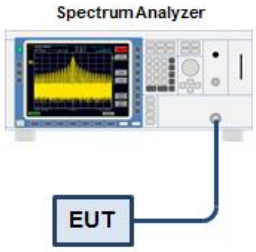
Test Information	
Reference	FCC § 15.247(d); ISED RSS-247, Issue 2 (section 5.5)
Measurement Method	ANSI C63.10 11.11
Operator	Wilfried Treffke
Date	2019-03-13

3.7.2 Limits

Limits	
Power Measurement	Out-of-band attenuation [dB]
Peak	20
RMS	30

3.7.3 Setup

Test Setup



3.7.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01407	2018-12	2019-12

3.7.5 Procedure

Test Procedure

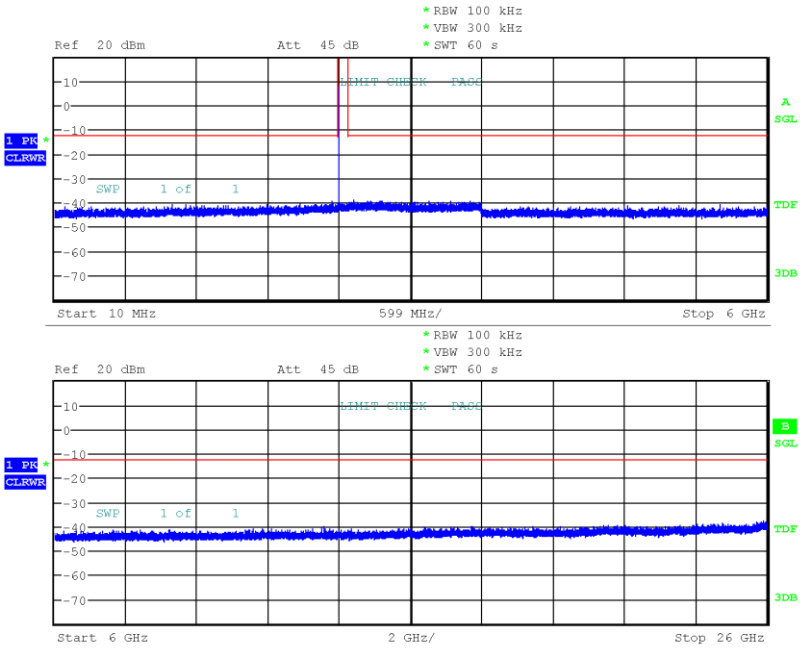
1. EUT set to test mode (Communication tester is used if needed)
2. Span set around lower band edge and detector is set to peak and max hold
3. Resolution bandwidth is set to 100 kHz
4. Markers are set to peak emission levels within frequency band and outside frequency band
5. Band edge attenuation is determined from level difference

3.7.6 Results

Test Results		
Mode	Channel [MHz]	Verdict
GFSK	2402	PASS
GFSK	2440	PASS
GFSK	2480	PASS

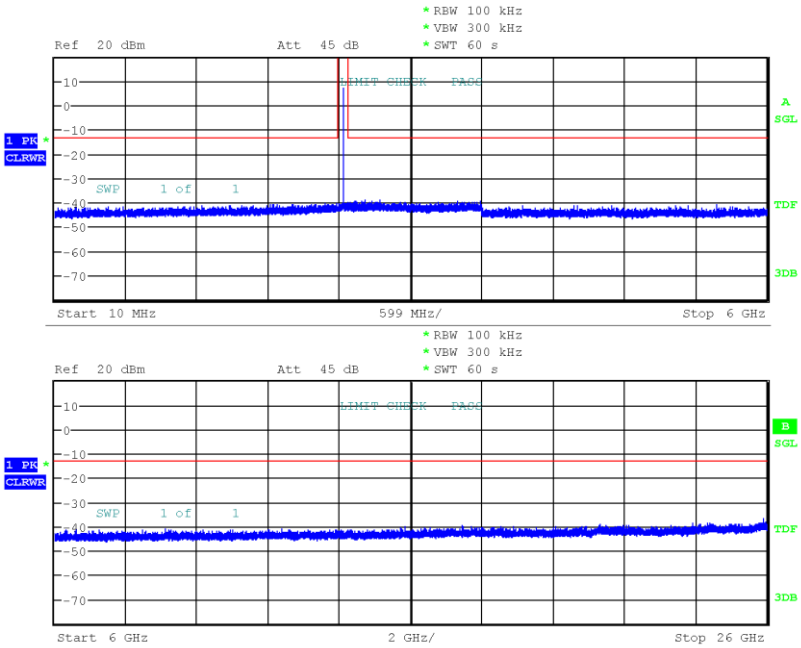
Conducted Spurious Emissions

Project Number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
Model Description:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Sample ID:	22986
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	GFSK, Channel: 0, 2402 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Christian Weber
Test Site:	Eurofins Product Service GmbH
Test Date:	2019-03-13
Max. in-band Frequency [MHz]:	2402.0
Max. in-band Level [dBm/100 kHz]:	7.4
Out-of-band Limit [dBm/100 kHz]:	-12.6



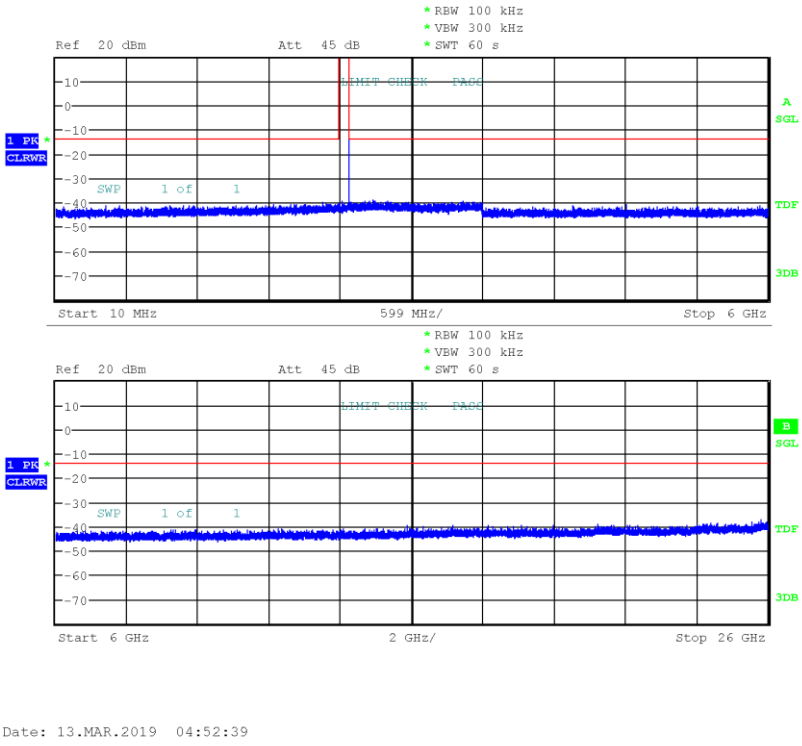
Conducted Spurious Emissions

Project Number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
Model Description:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Sample ID:	22986
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	GFSK, Channel: 19, 2440 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Christian Weber
Test Site:	Eurofins Product Service GmbH
Test Date:	2019-03-13
Max. in-band Frequency [MHz]:	2440.0
Max. in-band Level [dBm/100 kHz]:	7.2
Out-of-band Limit [dBm/100 kHz]:	-12.8



Conducted Spurious Emissions

Project Number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
Model Description:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Sample ID:	22986
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	GFSK, Channel: 39, 2480 MHz
Operating Conditions:	Tnom/Vnom
Operator:	Wilfried Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2019-03-13
Max. in-band Frequency [MHz]:	2480.0
Max. in-band Level [dBm/100 kHz]:	6.5
Out-of-band Limit [dBm/100 kHz]:	-13.5



3.8 Test Conditions and Results - Transmitter radiated emissions

3.8.1 Information

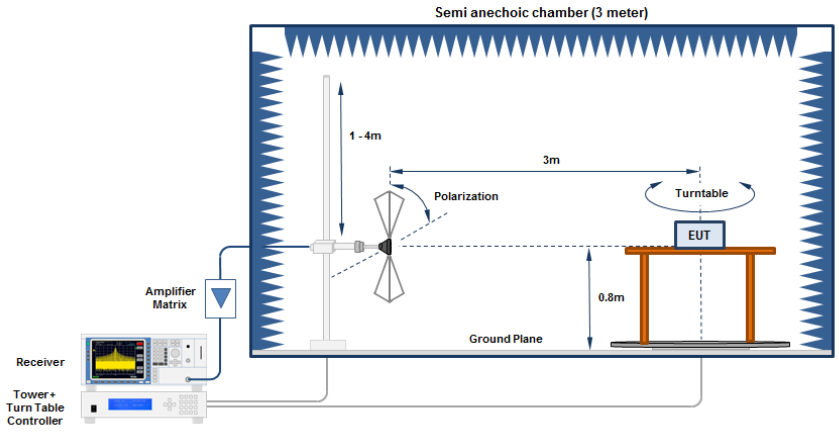
Test Information	
Reference	FCC § 15.247(d); FCC § 15.209; ISED RSS-Gen, Issue 5 (section 6.13)
Measurement Method	ANSI C63.10 6.4, 6.5, 6.6, 11.12
Operator	Wilfried Treffke
Date	2019-03-13

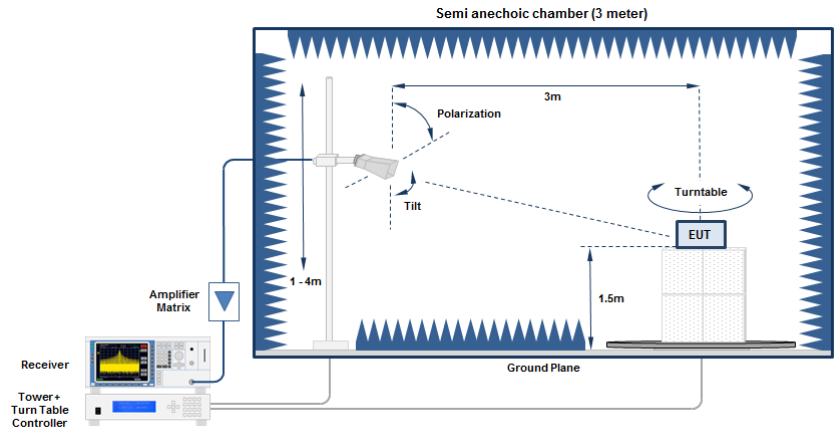
3.8.2 Limits

Limits			
Frequency [MHz]	Detector	Field strength [µV/m]	Measurement distance [m]
0.009 - 0.09	Average	2400/F[kHz]	300
0.09 - 0.110	Quasi-Peak	2400/F[kHz]	300
0.110 - 0.490	Average	2400/F[kHz]	300
0.490 - 1.705	Quasi-Peak	24000/F[kHz]	30
1.705 - 30.0	Quasi-Peak	30	30
30 - 88	Quasi-Peak	100	3
88 - 216	Quasi-Peak	150	3
216 - 960	Quasi-Peak	200	3
960 - 1000	Quasi-Peak	500	3
>1000	Average	500	3

3.8.3 Setup

Test Setup 30 - 1000 MHz



Test Setup > 1 GHz


3.8.4 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMation	2015.2.4

Test Equipment 30 - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2018-08	2019-08
Antenna	R&S	HK 116	EF00030	2016-04	2019-04
Antenna	R&S	HL 223	EF00187	2016-05	2019-05

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2018-08	2019-08
Antenna	Schwarzbeck	BBHA 9120D	EF00018	2016-09	2019-09
Antenna	Amplifier Research	AT4560	EF00302	2018-04	2019-04

3.8.5 Procedure

Test Procedure < 30 MHz
1. EUT is placed on a non conducting support at the center of a turn table 0.8 m above the ground 2. EUT set to test mode 3. The EUT is rotated through 360° 4. The emissions are measured with peak detector and max hold 5. All significant emissions are measured again using the corresponding final detector

Test Procedure 30 - 1000 MHz
1. EUT is placed on a non conducting support at the center of a turn table 0.8 m above the ground
2. EUT set to test mode
3. The receiver is set to peak detection with max hold
4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m
5. All significant emissions are measured again using the corresponding final detector

Test Procedure > 1 GHz
1. EUT is placed on a non conducting support at the center of a turn table 1.5 m above the ground
2. EUT set to test mode
3. The receiver is set to peak detection with max hold
4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m
5. All significant emissions are measured again using the corresponding final detector

3.8.6 Results

Test Results						
Channel [MHz]	Emission [MHz]	Level [dBµV/m]	Det.	Pol.	Limit [dBµV/m]	Margin [dB]
2402	2385.4	55.88	pk	hor	74.00	-18.12
2402	2385.4	38.64	RMS	hor	54.00	-15.36
2440	2389.1	45.59	pk	hor	74.00	-28.41
2440	2389.1	20.12	RMS	hor	54.00	-33.88
2440	2487.9	48.70	pk	hor	74.00	-25.30
2440	2487.9	29.40	RMS	hor	54.00	-24.60
2480	2483.5	58.55	pk	hor	74.00	-15.45
2480	2483.5	41.54	RMS	hor	54.00	-12.46
2480	2496.1	58.86	pk	hor	74.00	-15.14
2480	2496.1	40.28	RMS	hor	54.00	-13.72
2480	4960	36.17	pk	ver	74.00	-37.83

3.9 Test Conditions and Results - Receiver radiated emissions

3.9.1 Information

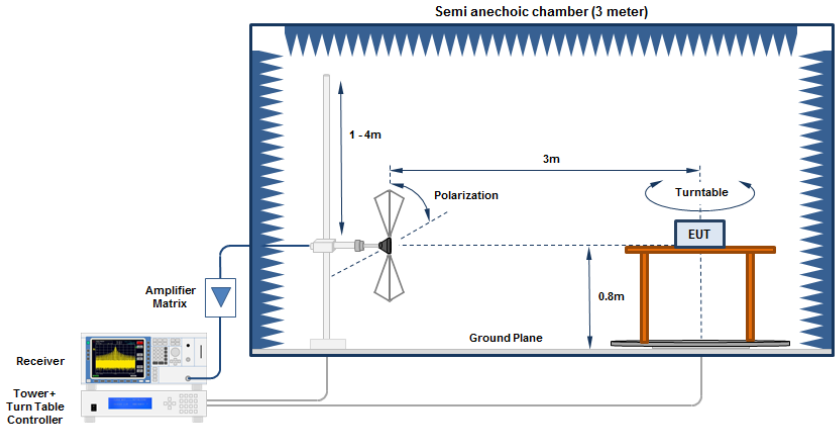
Test Information	
Reference	ISED RSS-247, Issue 2 (section 3.1)
Measurement Method	ANSI C63.10 6.5, 6.6, 11.12
Operator	Wilfried Treffke
Date	2019-03-14

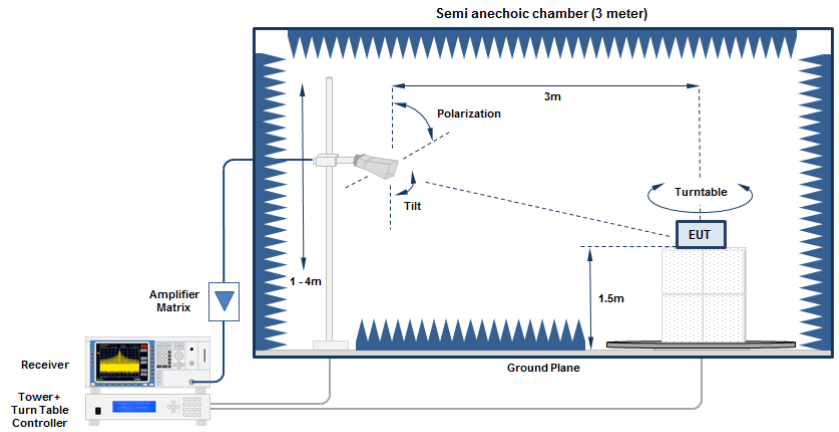
3.9.2 Limits

Limits			
Frequency [MHz]	Detector	Field strength [dBµV/m]	Measurement distance [m]
30 - 88	Quasi-Peak	100	3
88 - 216	Quasi-Peak	150	3
216 - 960	Quasi-Peak	200	3
960 - 1000	Quasi-Peak	500	3
>1000	Average	500	3

3.9.3 Setup

Test Setup 30 - 1000 MHz



Test Setup > 1 GHz


3.9.4 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMation	2015.2.4

Test Equipment 30 - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2018-08	2019-08
Antenna	R&S	HK 116	EF00030	2016-04	2019-04
Antenna	R&S	HL 223	EF00187	2016-05	2019-05

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2018-08	2019-08
Antenna	Schwarzbeck	BBHA 9120D	EF00018	2016-09	2019-09

3.9.5 Procedure

Test Procedure 30 - 1000 MHz
1. EUT is placed on a non conducting support at the center of a turn table 0.8 m above the ground 2. EUT set to test mode 3. The receiver is set to peak detection with max hold 4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m 5. All significant emissions are measured again using the corresponding final detector

Test Procedure > 1 GHz
1. EUT is placed on a non conducting support at the center of a turn table 1.5 m above the ground 2. EUT set to test mode 3. The receiver is set to peak detection with max hold 4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m 5. All significant emissions are measured again using the corresponding final detector

3.9.6 Results

Test Results						
Channel [MHz]	Emission [MHz]	Level [dBµV/m]	Det.	Pol.	Limit [dBµV/m]	Margin [dB]
2440	1677	32.99	pk	hor	53.98	-20.99
2440	2742	31.59	pk	hor	53.98	-22.39

ANNEX A Transmitter spurious emissions

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 25°C, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	TX; BLE; 2402 MHz
Test Date:	2019-03-13
Note:	

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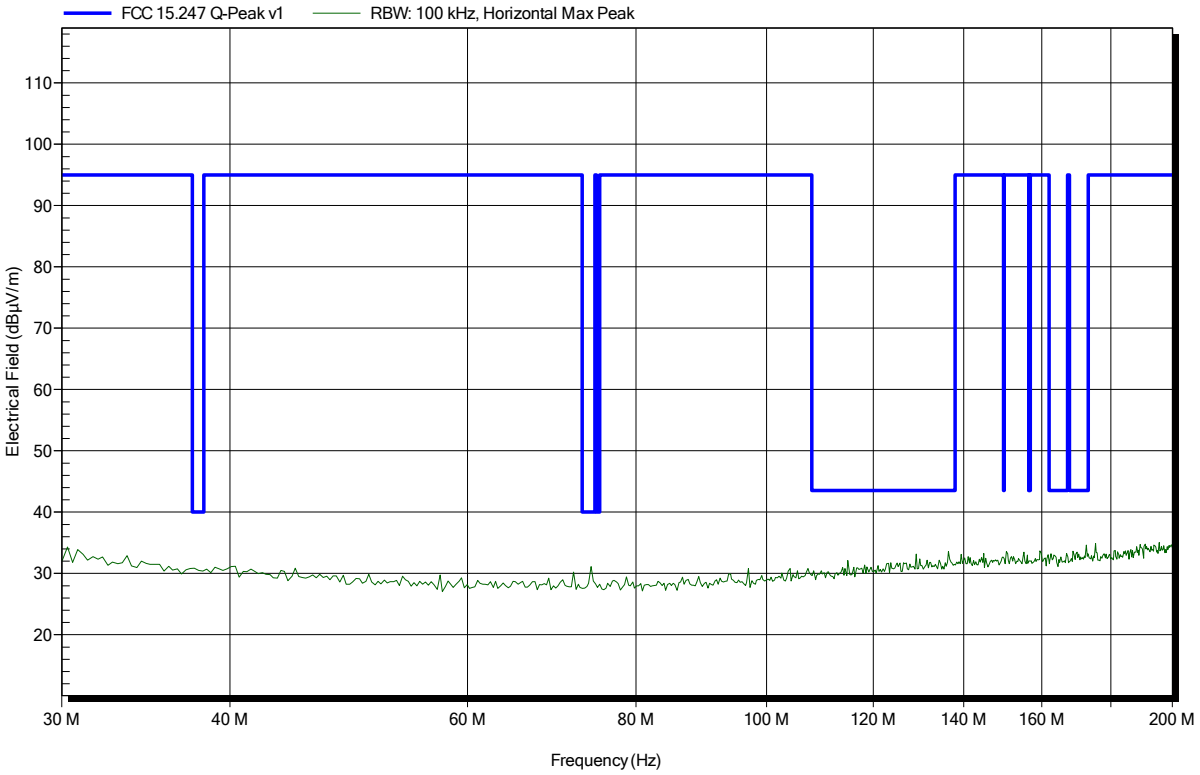

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 25°C, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3 m
Mode:	TX; BLE; 2402 MHz
Test Date:	2019-03-13
Note:	

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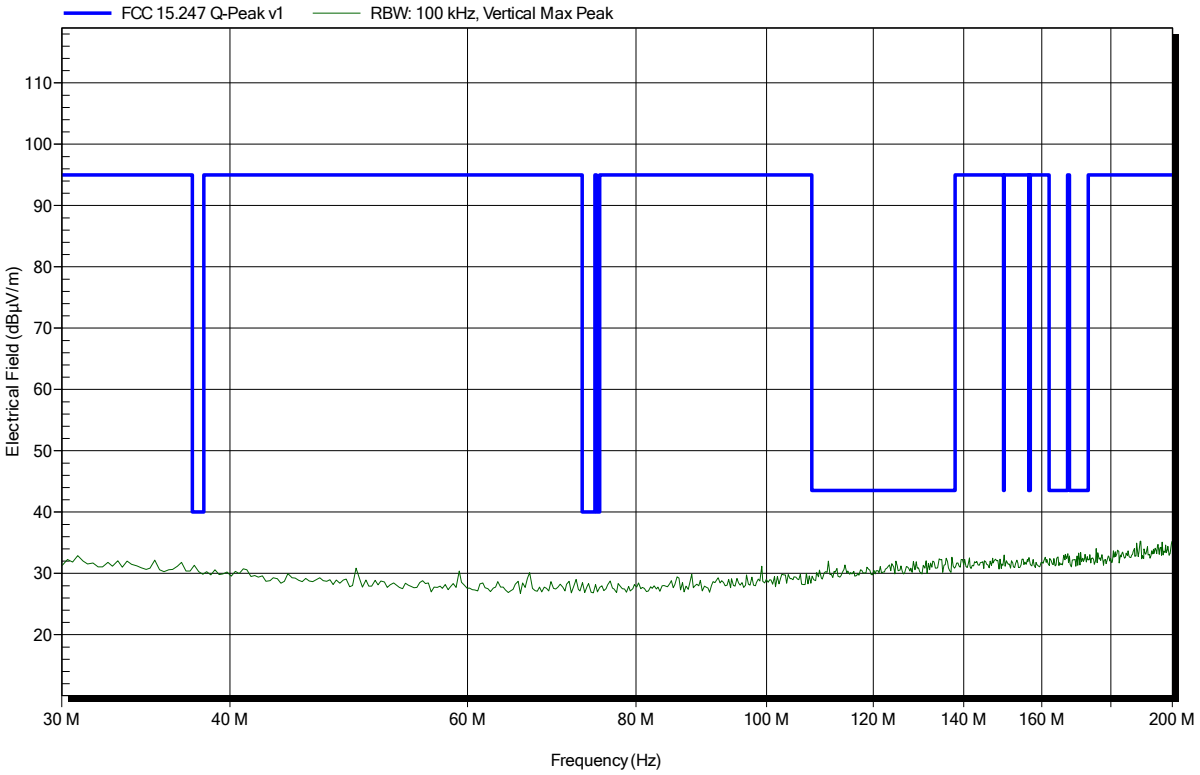

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 25°C, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	TX; BLE; 2402 MHz
Test Date:	2019-03-13
Note:	

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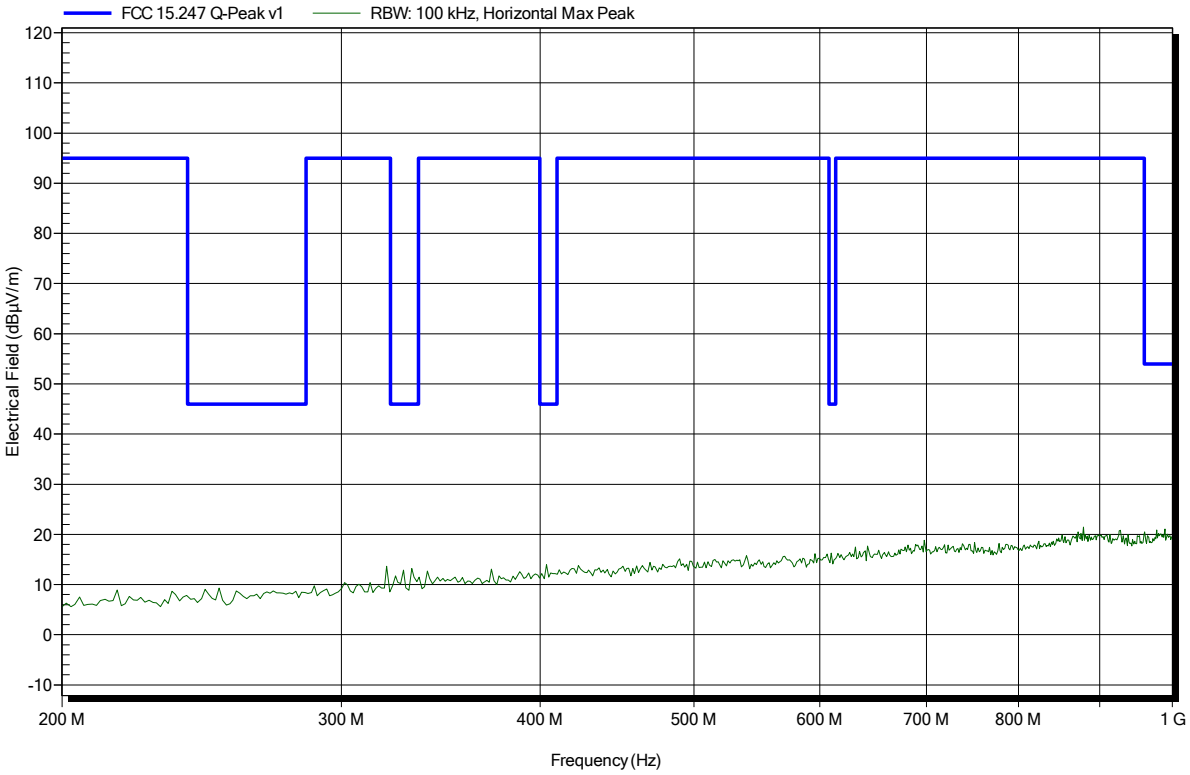

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 25°C, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	TX; BLE; 2402 MHz
Test Date:	2019-03-13
Note:	

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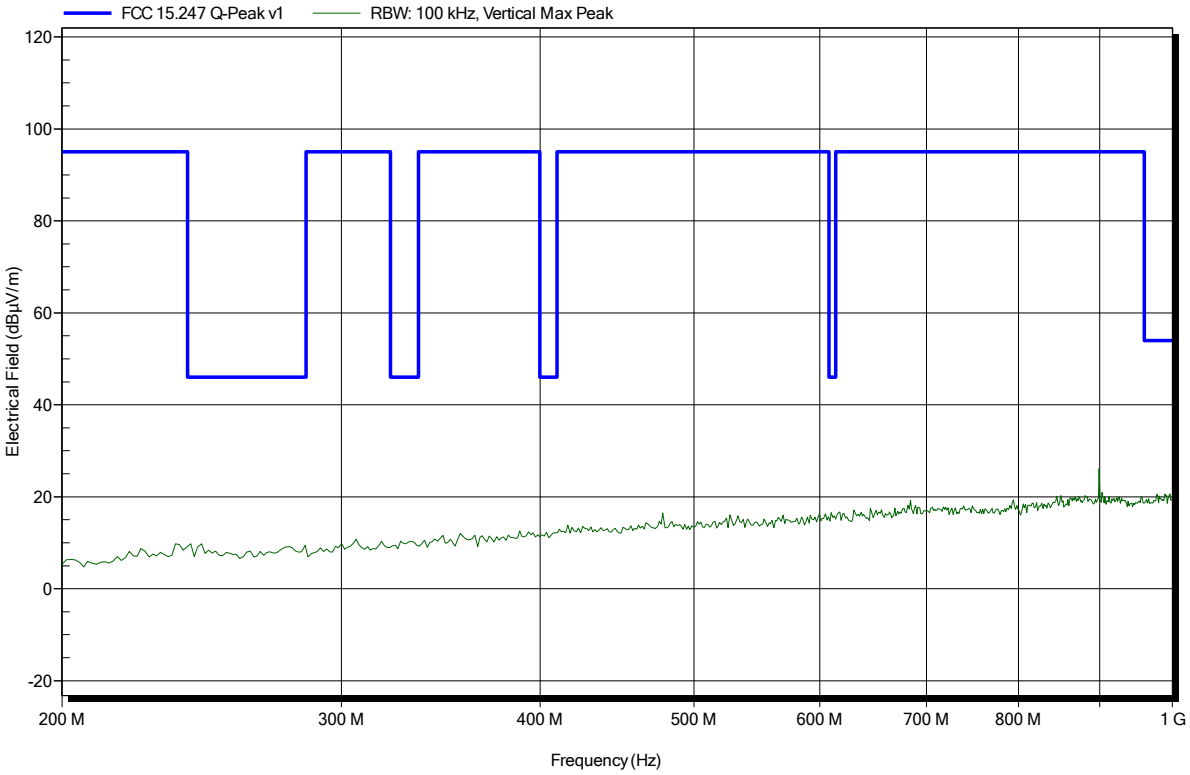

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 25°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2402 MHz
Test Date:	2019-03-13
Note:	

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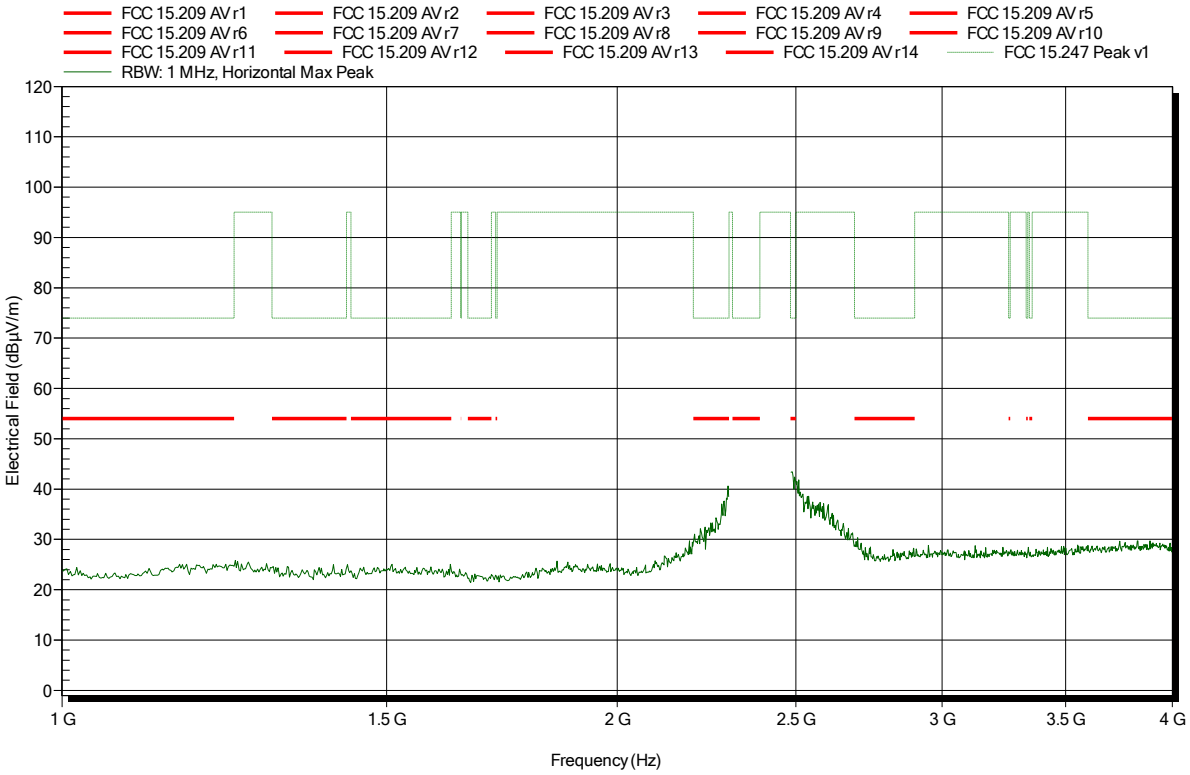

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2402 MHz
Test Date:	2019-03-13
Note:	

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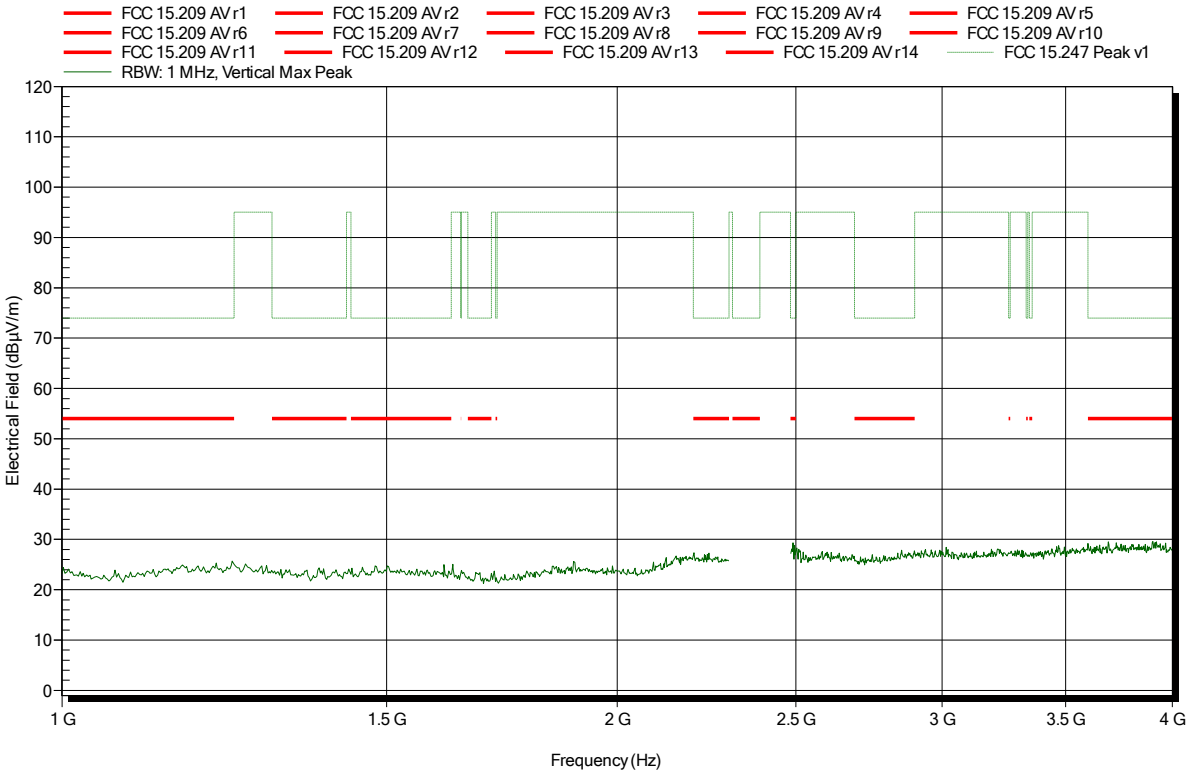

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2402 MHz
Test Date:	2019-03-13
Note:	lower bandedge

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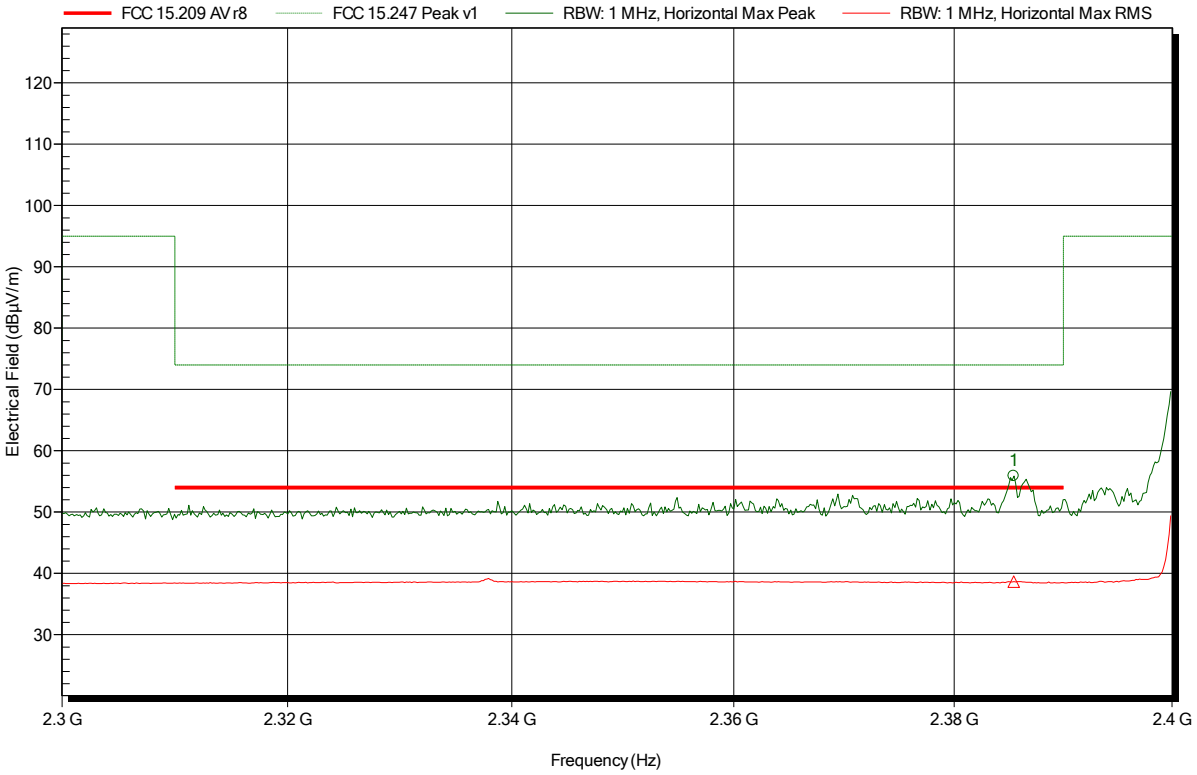

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.3854 GHz	55.88 dBµV/m	74 dBµV/m	-18.12 dB	Pass

Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.3854 GHz	38.64 dBµV/m	54 dBµV/m	-15.36 dB	Pass

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2402 MHz
Test Date:	2019-03-13
Note:	lower bandedge

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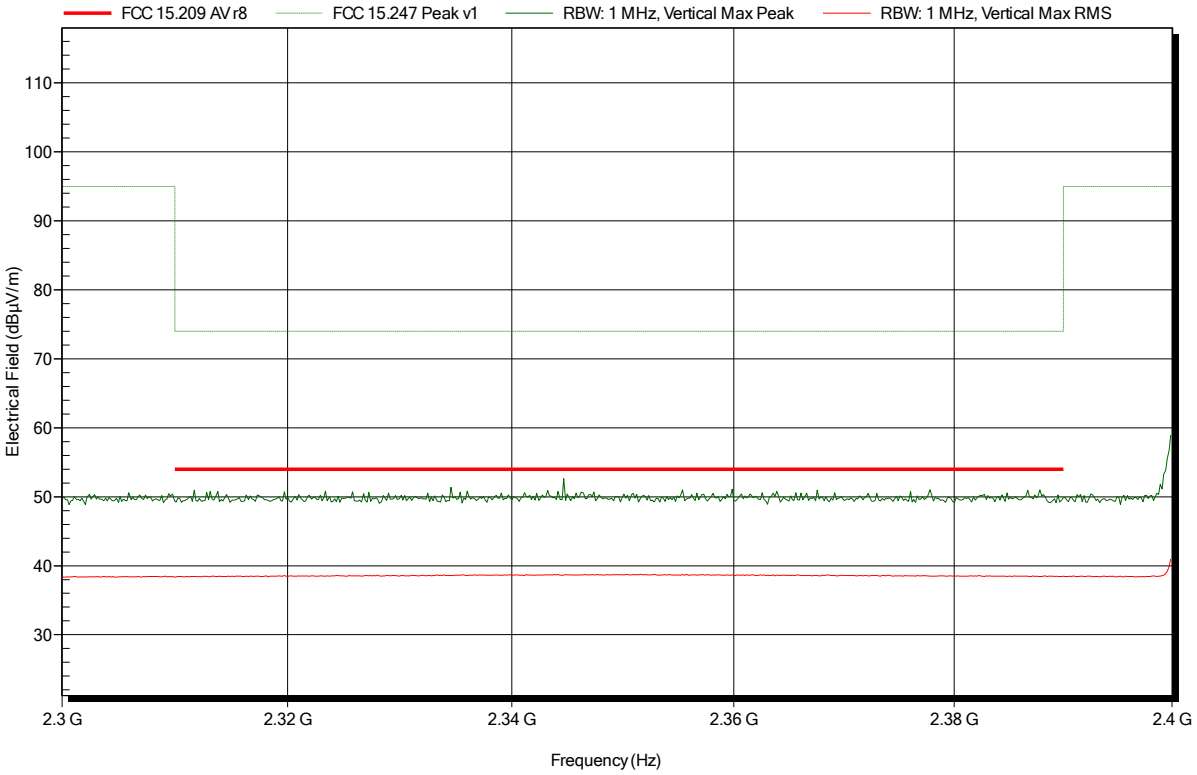

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2402 MHz
Test Date:	2019-03-13
Note:	

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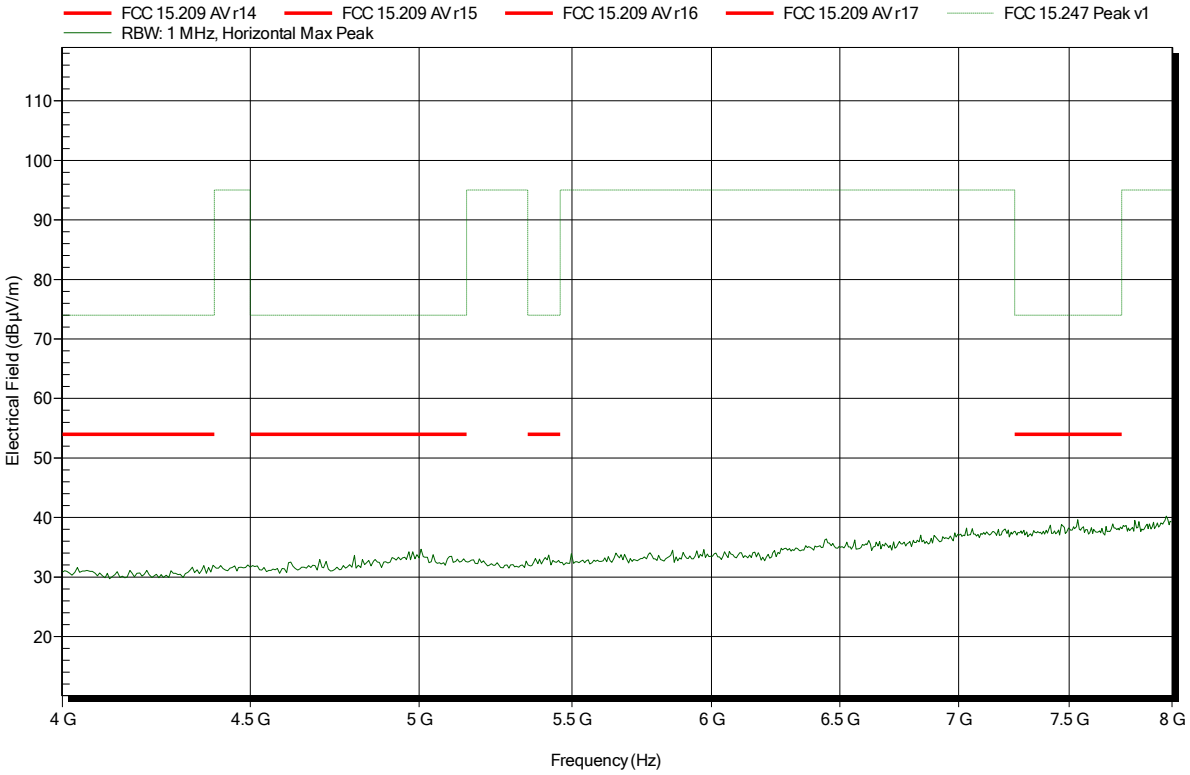

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2402 MHz
Test Date:	2019-03-13
Note:	

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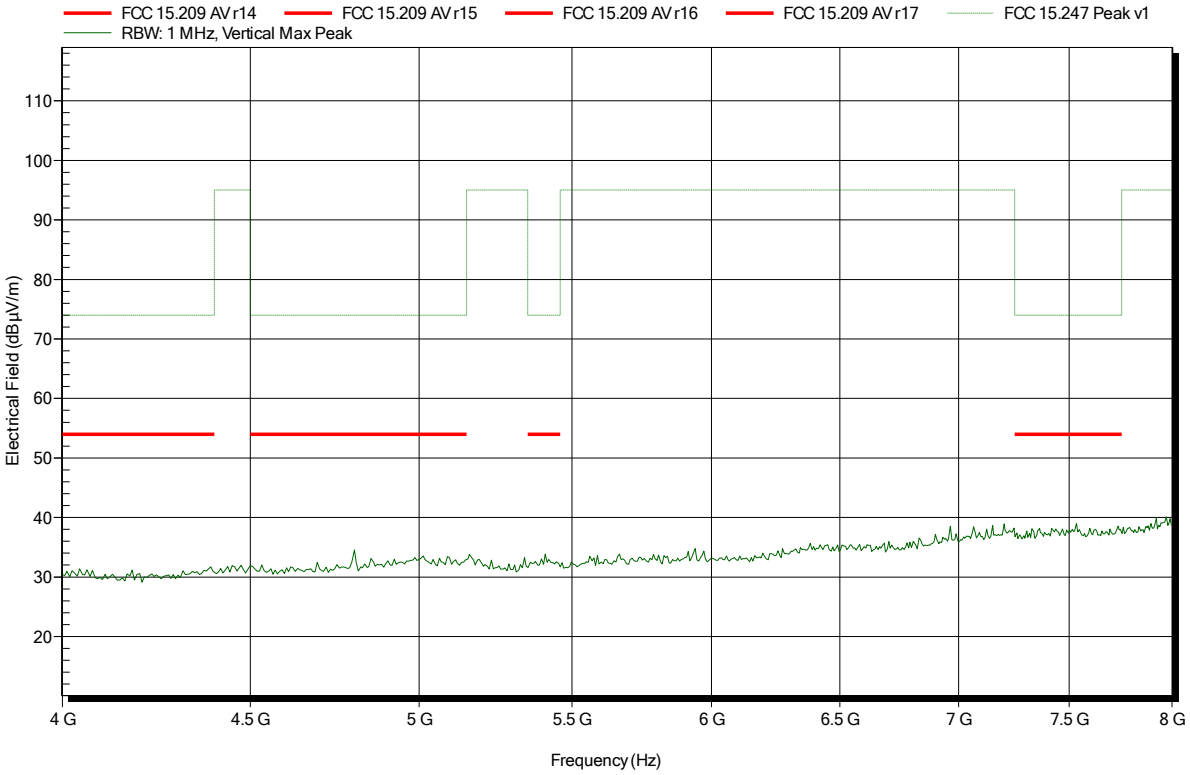

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2402 MHz
Test Date:	2019-03-13
Note:	

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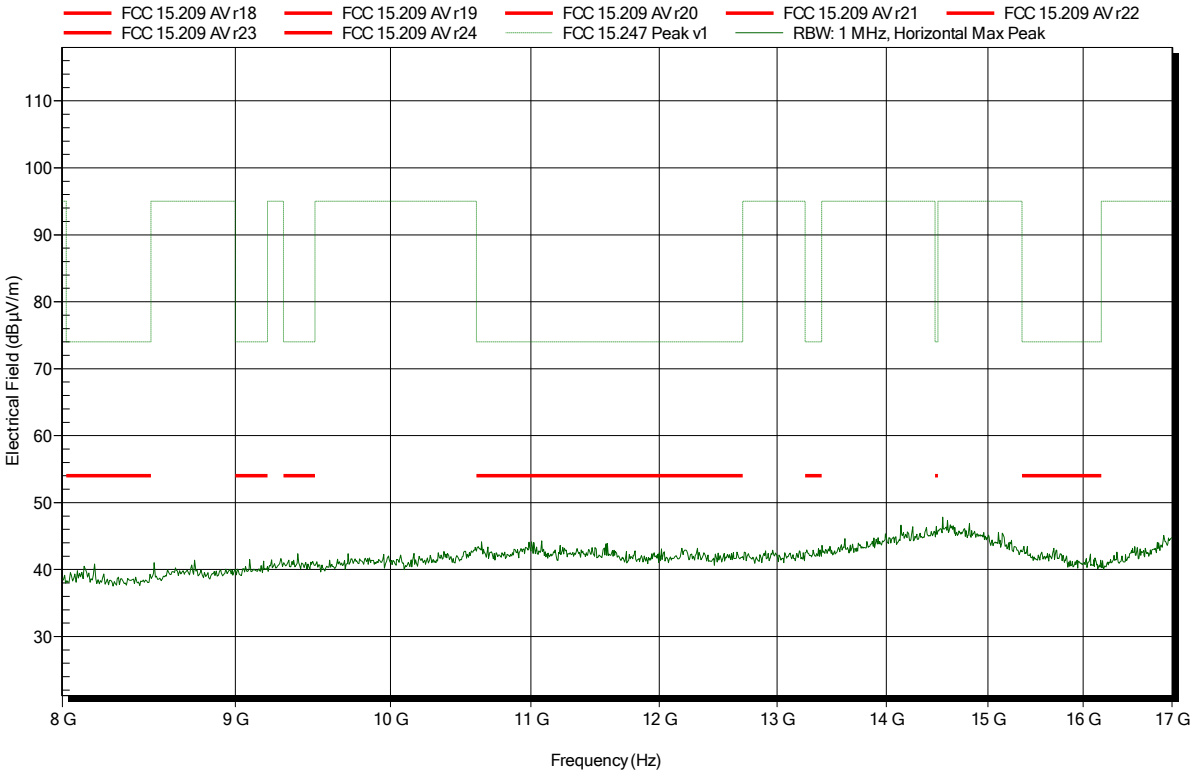

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2402 MHz
Test Date:	2019-03-13
Note:	

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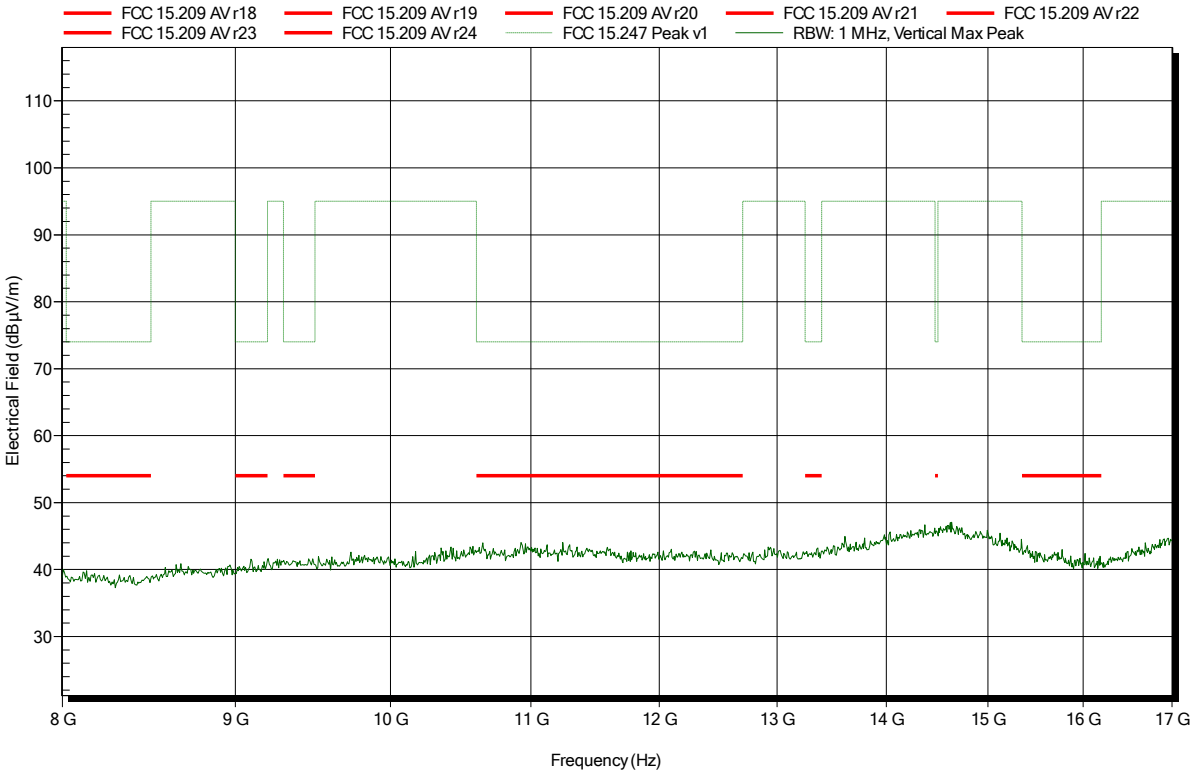

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Amplifier Research AT4560, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2402 MHz
Test Date:	2019-03-13
Note:	

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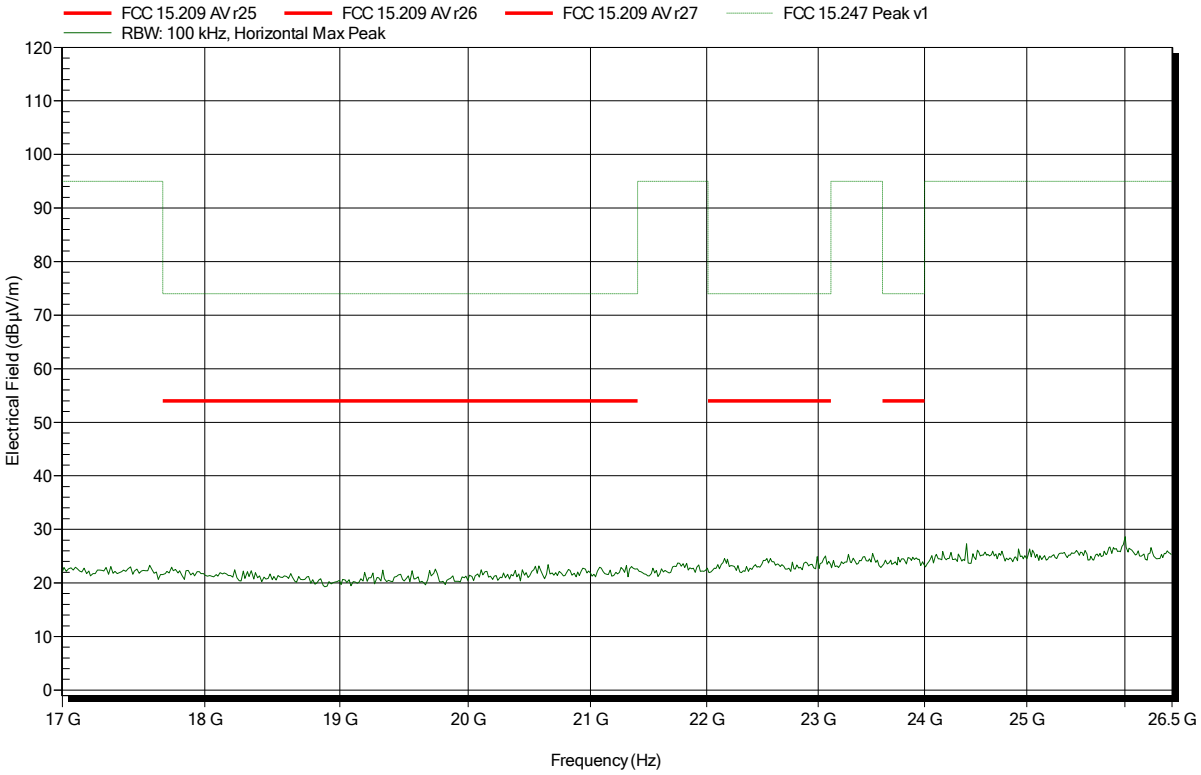

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Amplifier Research AT4560, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2402 MHz
Test Date:	2019-03-13
Note:	

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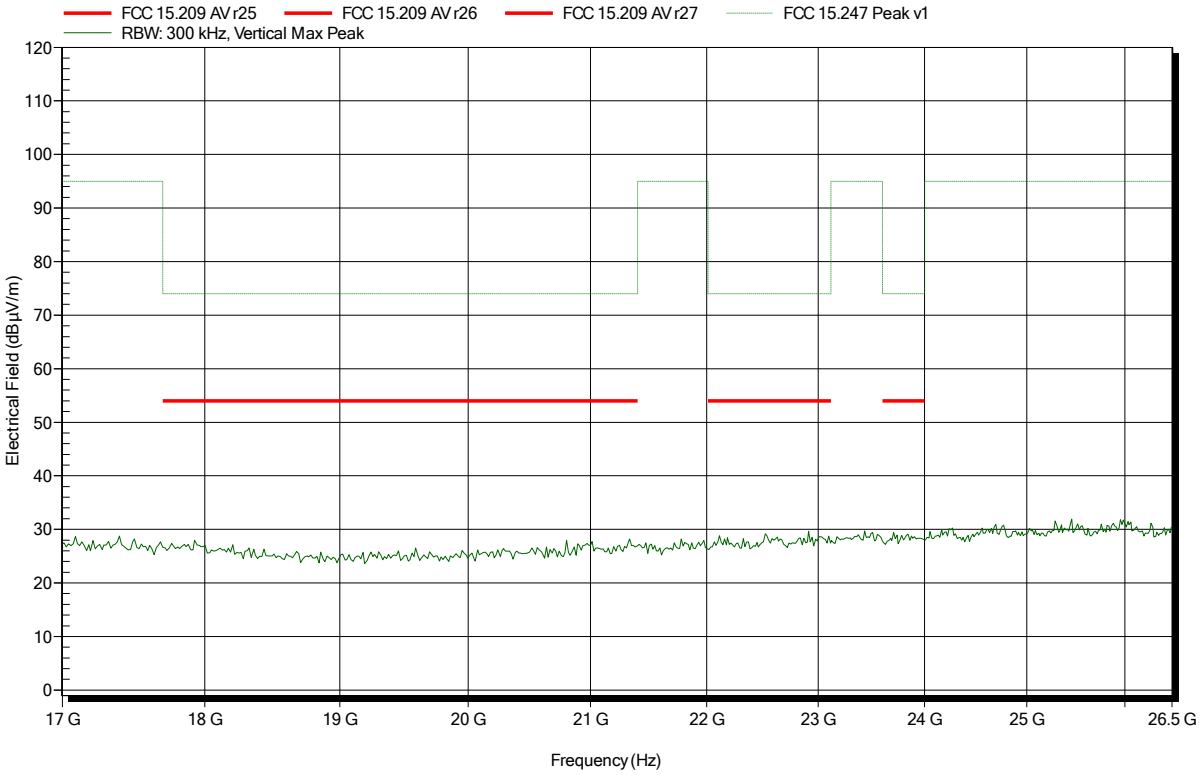

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2440 MHz
Test Date:	2019-03-13
Note:	

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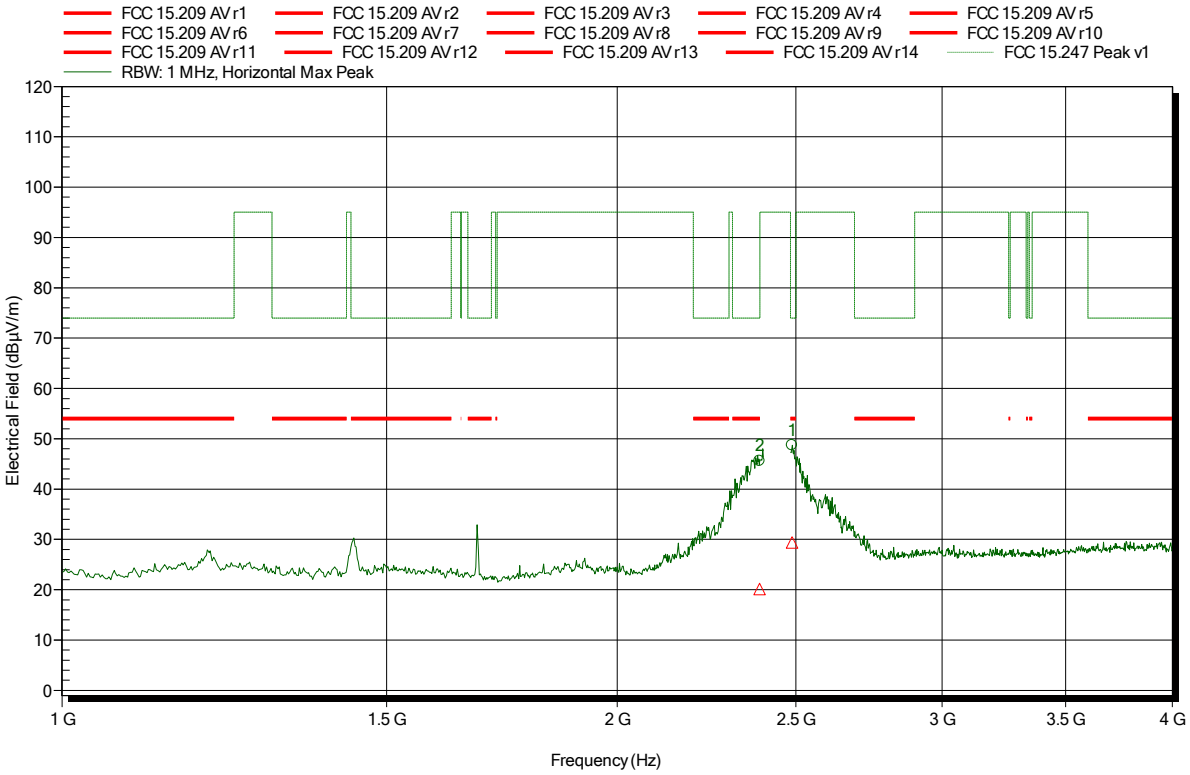

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.3891 GHz	45.59 dBµV/m	74 dBµV/m	-28.41 dB	Pass
2.4879 GHz	48.7 dBµV/m	74 dBµV/m	-25.3 dB	Pass

Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.3891 GHz	20.12 dBµV/m	54 dBµV/m	-33.88 dB	Pass
2.4879 GHz	29.4 dBµV/m	54 dBµV/m	-24.6 dB	Pass

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2440 MHz
Test Date:	2019-03-13
Note:	

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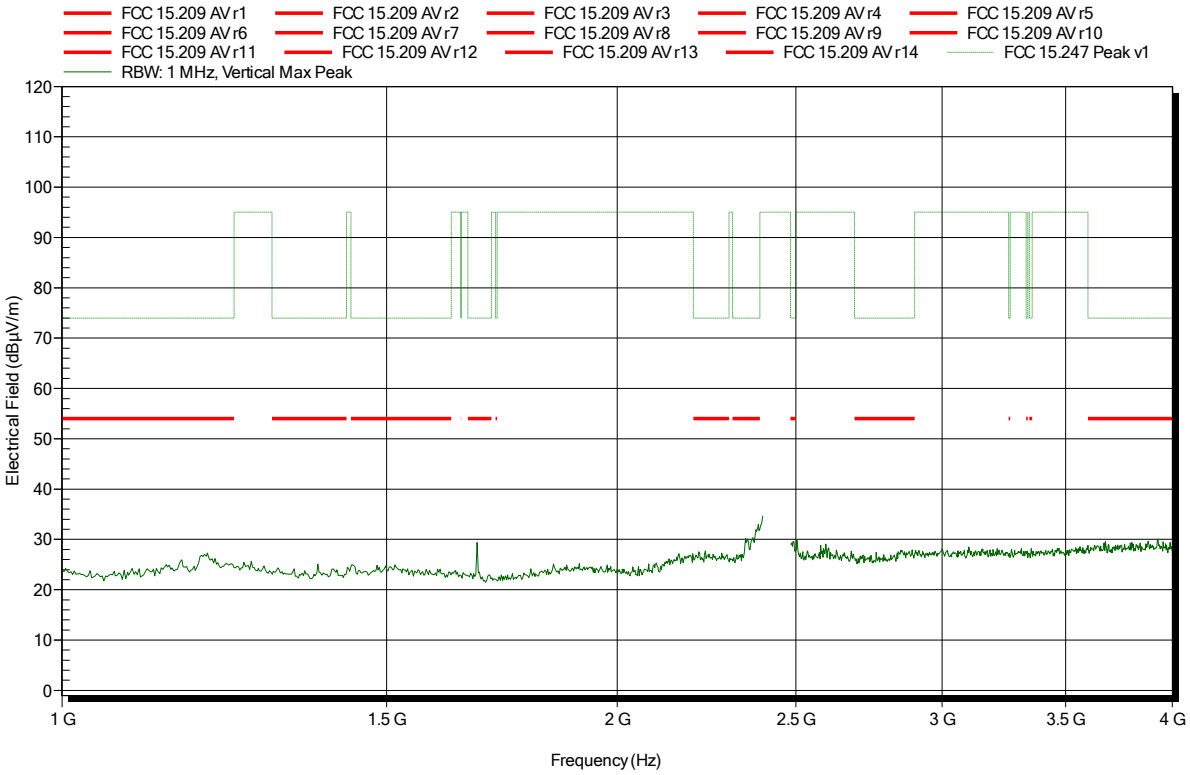

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2440 MHz
Test Date:	2019-03-13
Note:	

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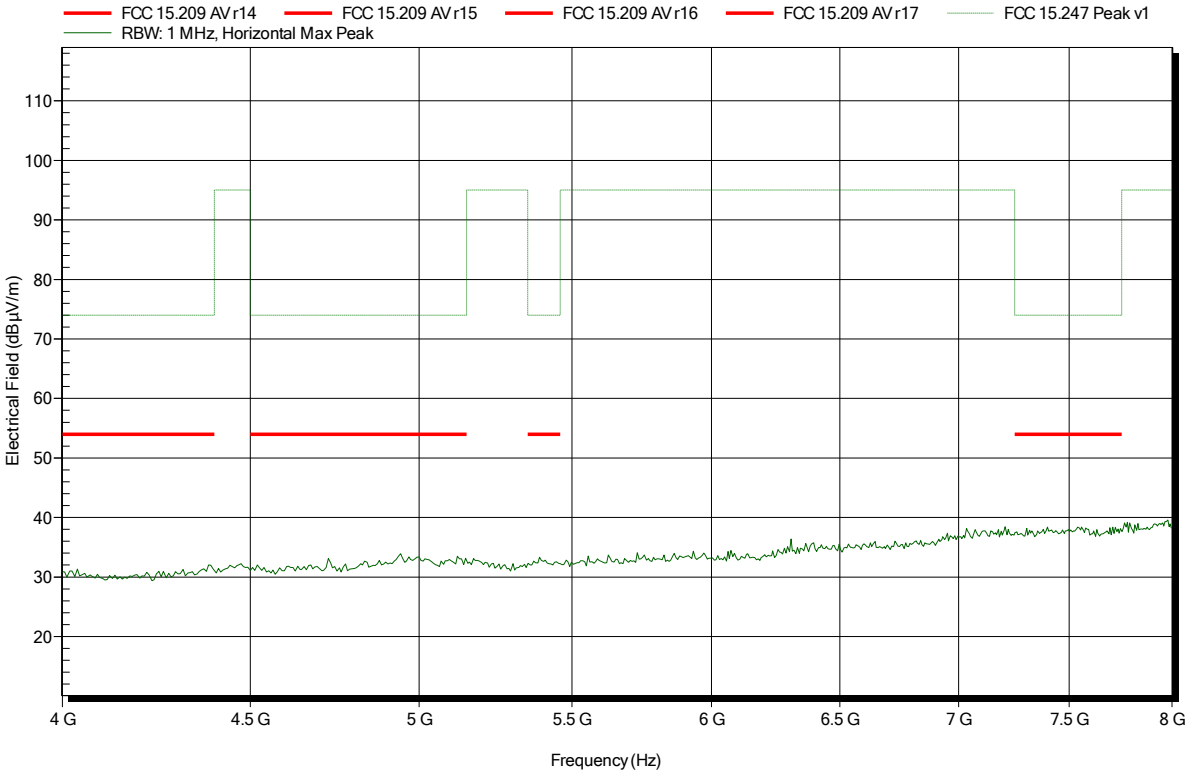

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2440 MHz
Test Date:	2019-03-13
Note:	

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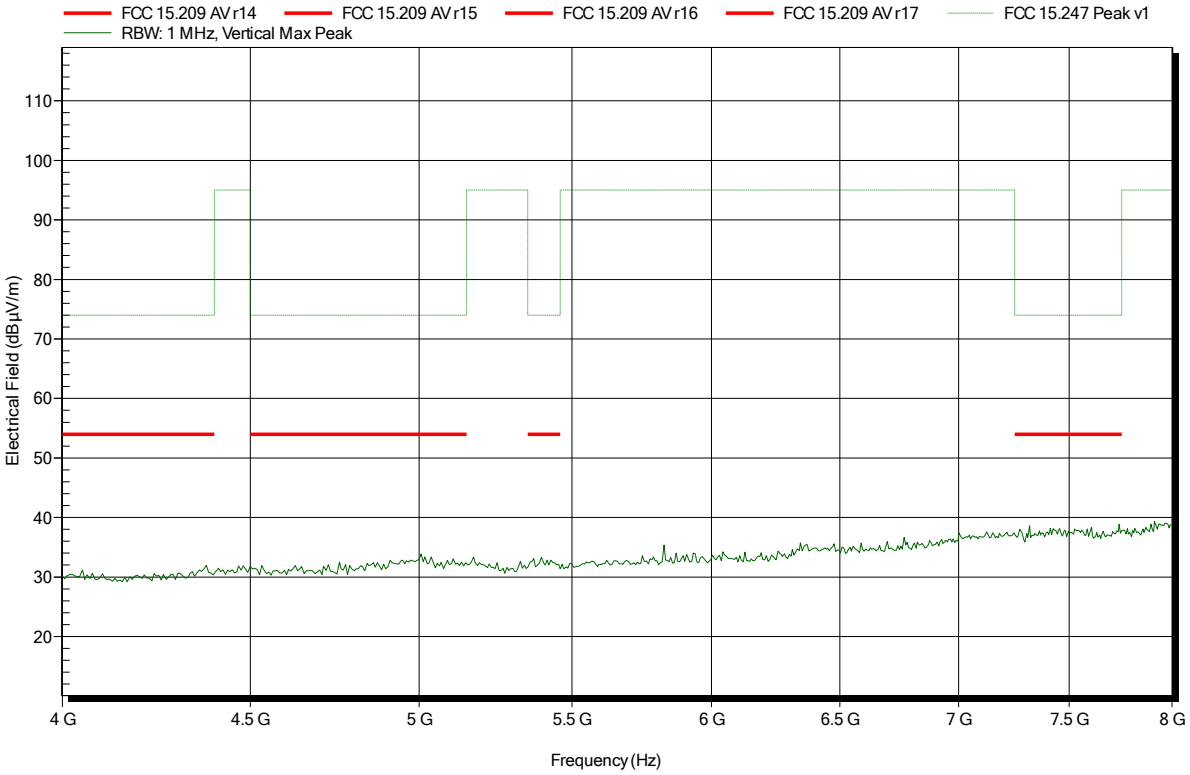

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2440 MHz
Test Date:	2019-03-13
Note:	

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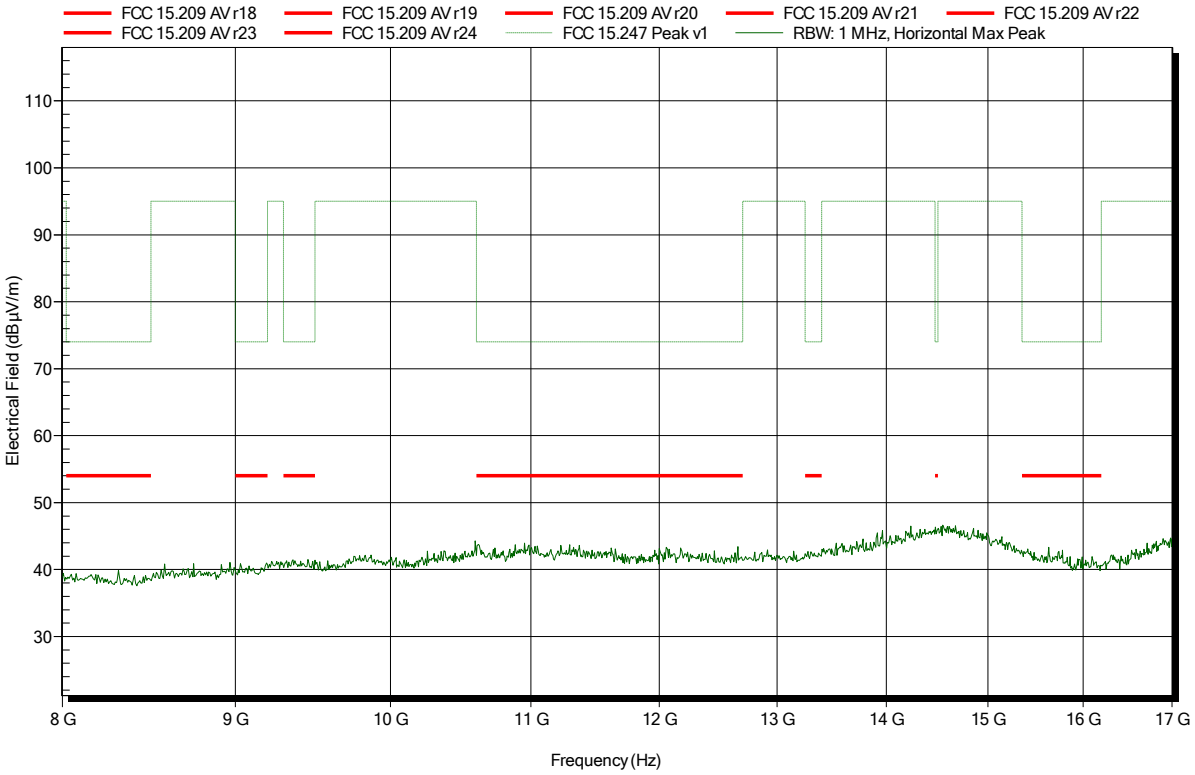

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2440 MHz
Test Date:	2019-03-13
Note:	

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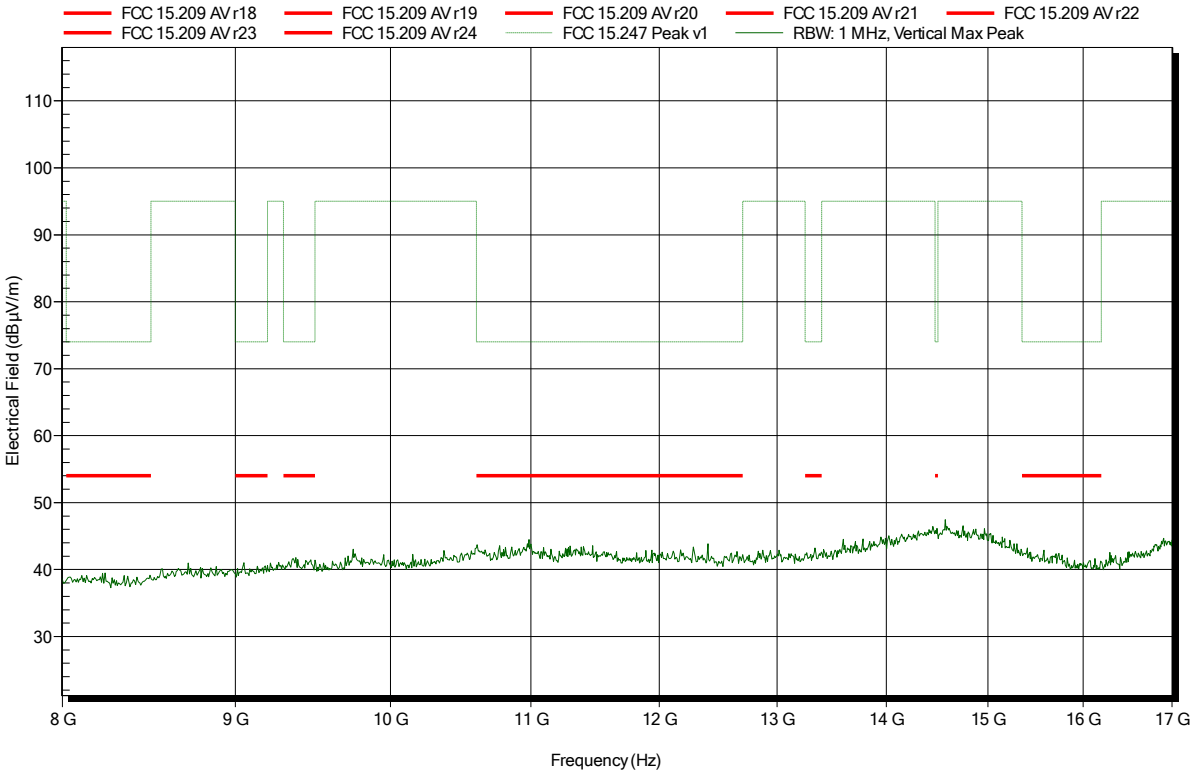

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Amplifier Research AT4560, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2440 MHz
Test Date:	2019-03-13
Note:	

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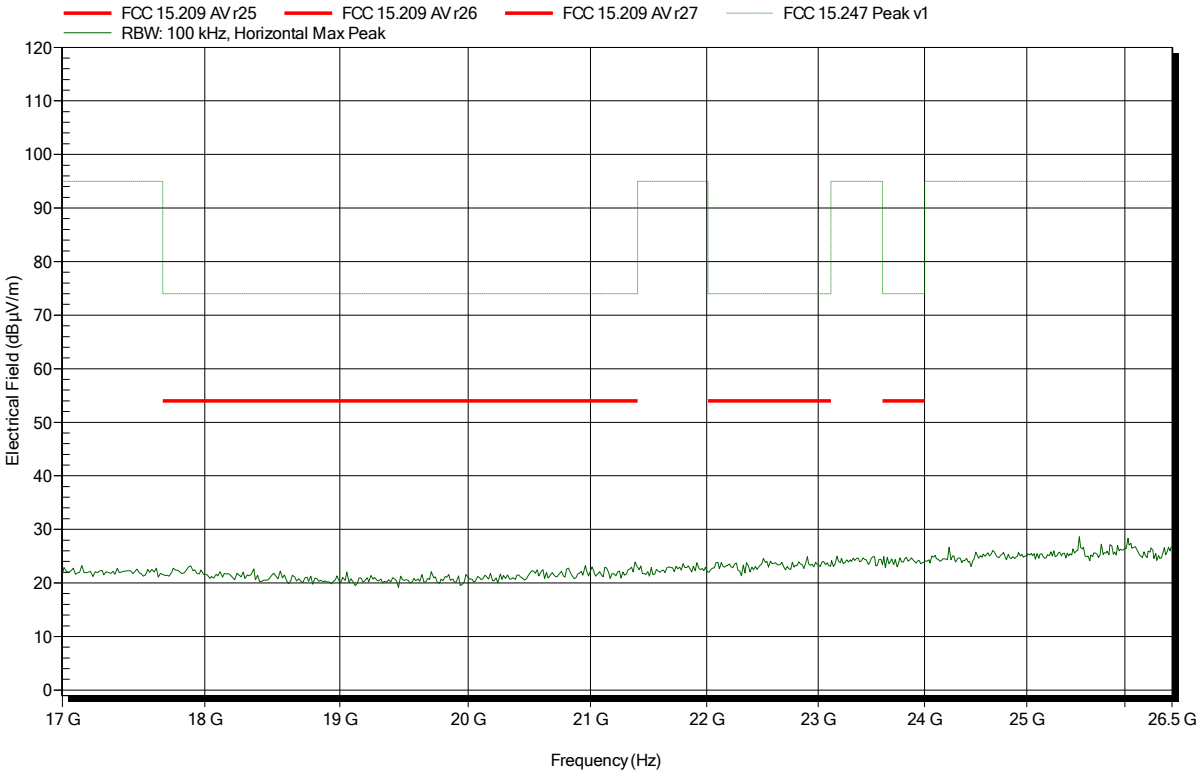

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Amplifier Research AT4560, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2440 MHz
Test Date:	2019-03-13
Note:	

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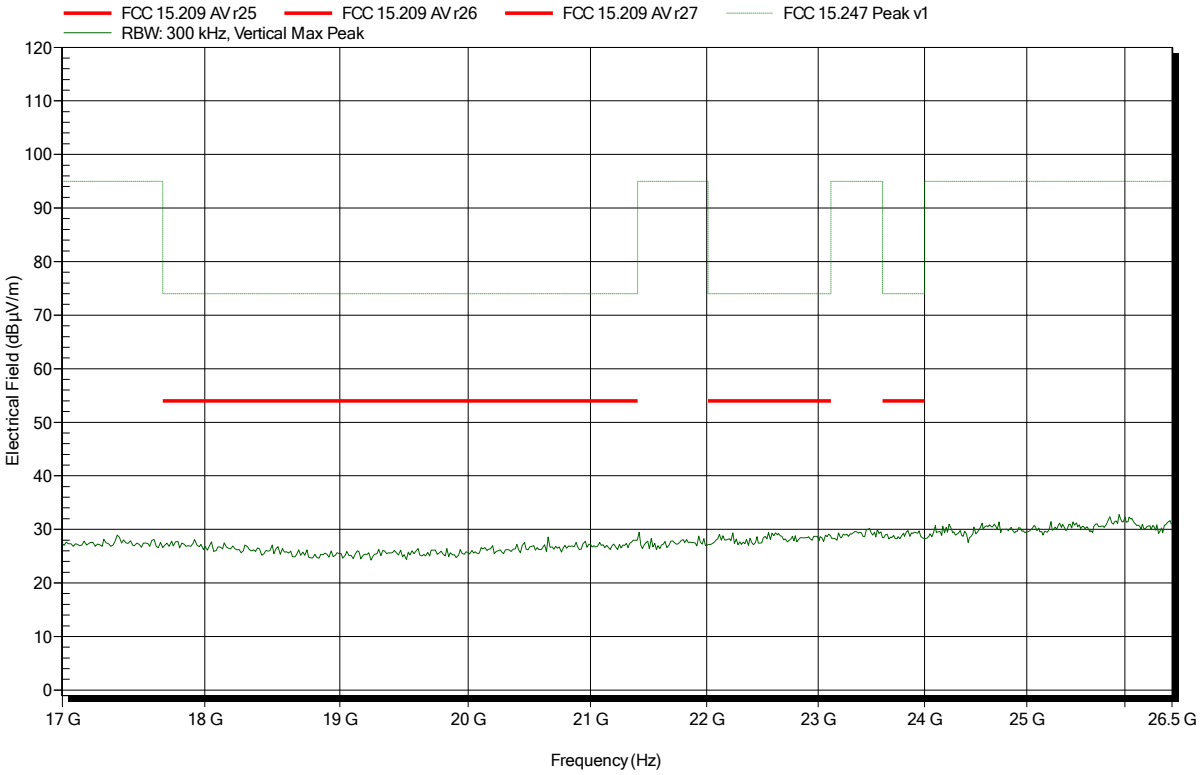

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2480 MHz
Test Date:	2019-03-13
Note:	

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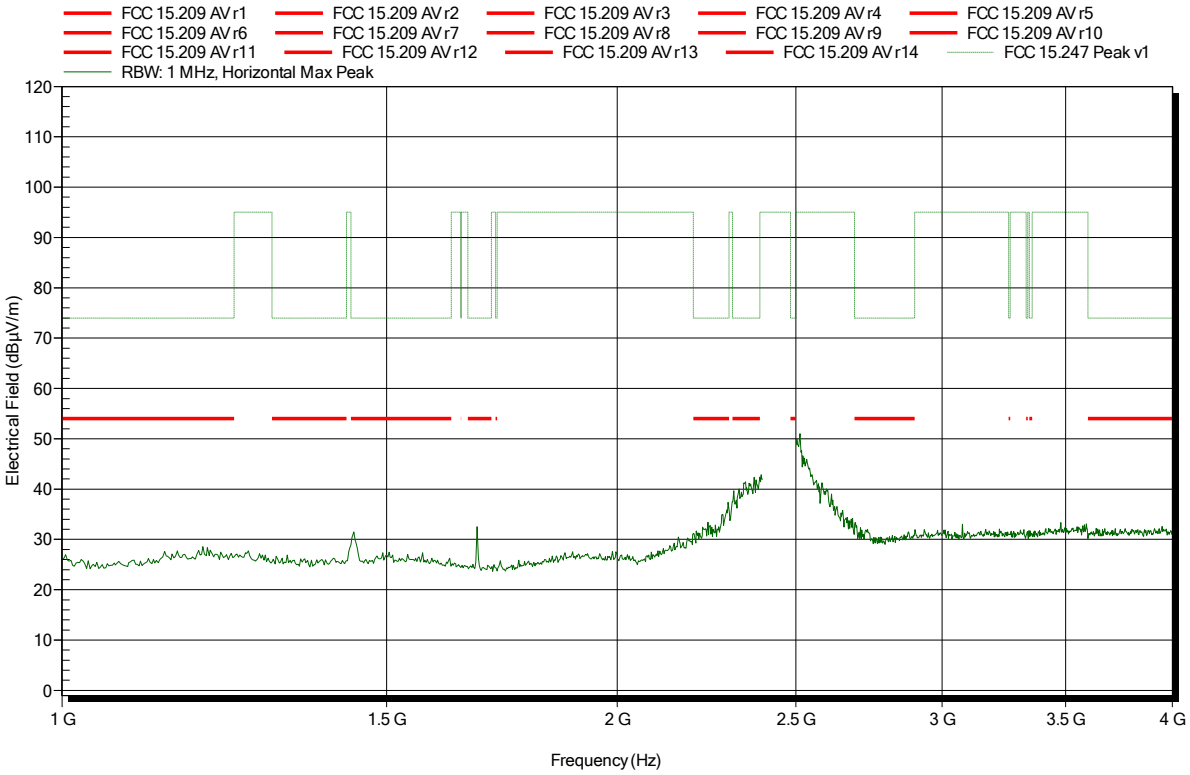

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2480 MHz
Test Date:	2019-03-13
Note:	

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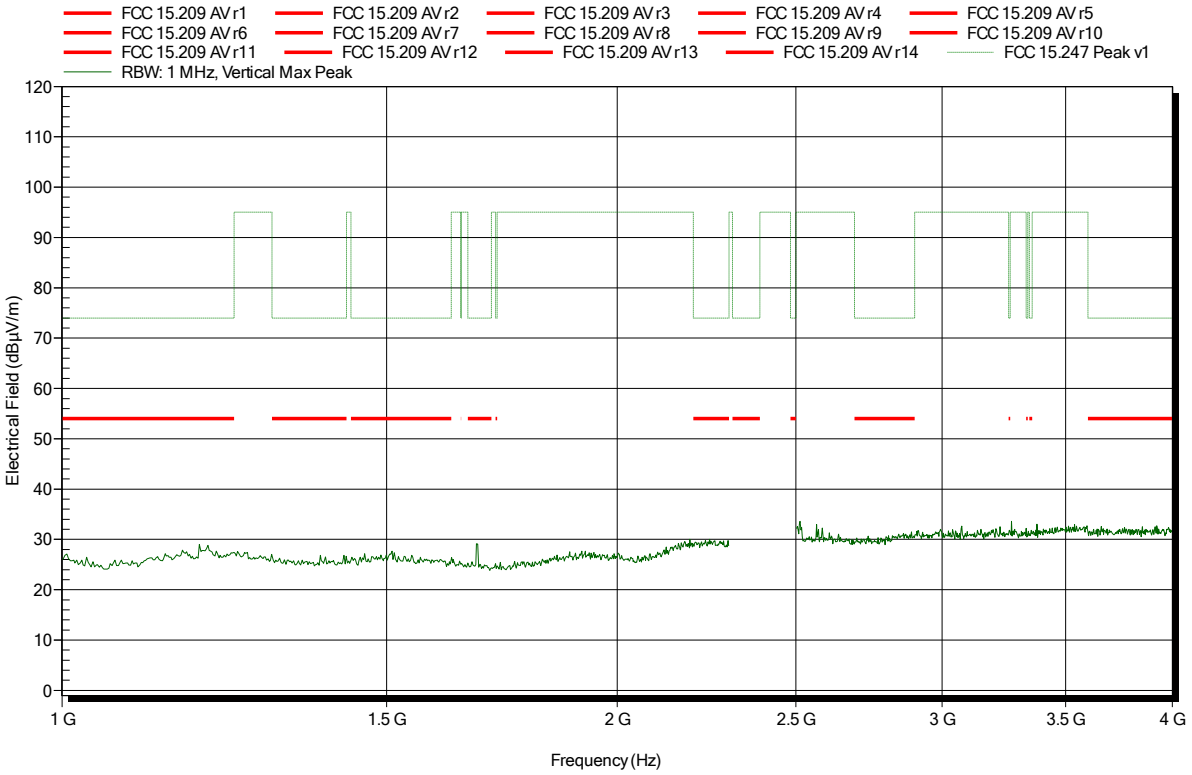

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2480 MHz
Test Date:	2019-03-13
Note:	upper bandedge

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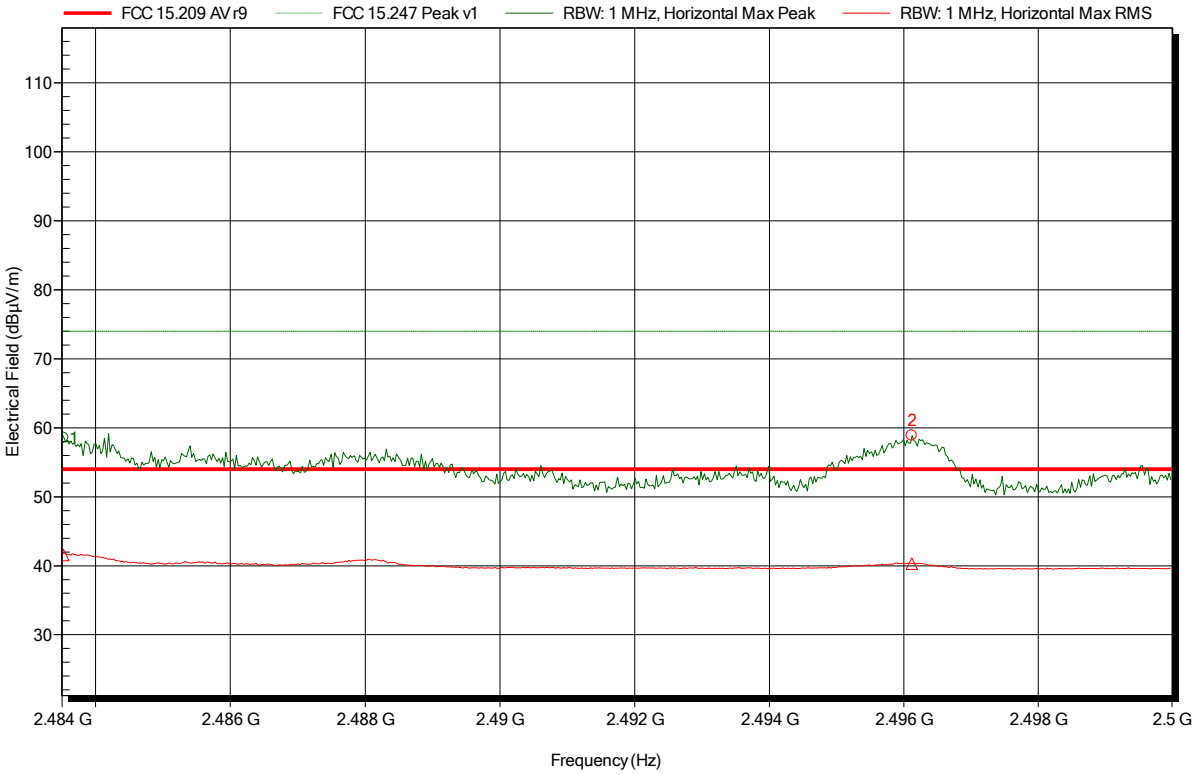

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.4835 GHz	58.55 dBµV/m	74 dBµV/m	-15.45 dB	Pass
2.4961 GHz	58.86 dBµV/m	74 dBµV/m	-15.14 dB	Pass

Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.4835 GHz	41.54 dBµV/m	54 dBµV/m	-12.46 dB	Pass
2.4961 GHz	40.28 dBµV/m	54 dBµV/m	-13.72 dB	Pass

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2480 MHz
Test Date:	2019-03-13
Note:	upper bandedge

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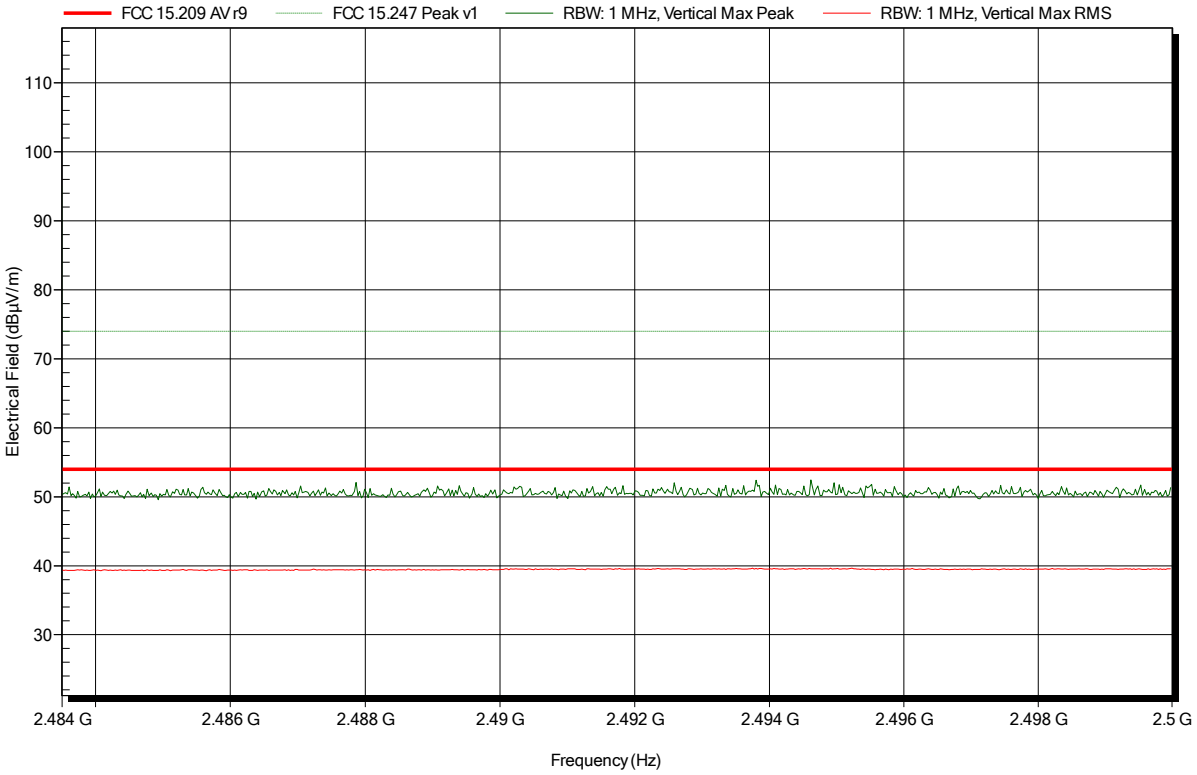

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2480 MHz
Test Date:	2019-03-13
Note:	

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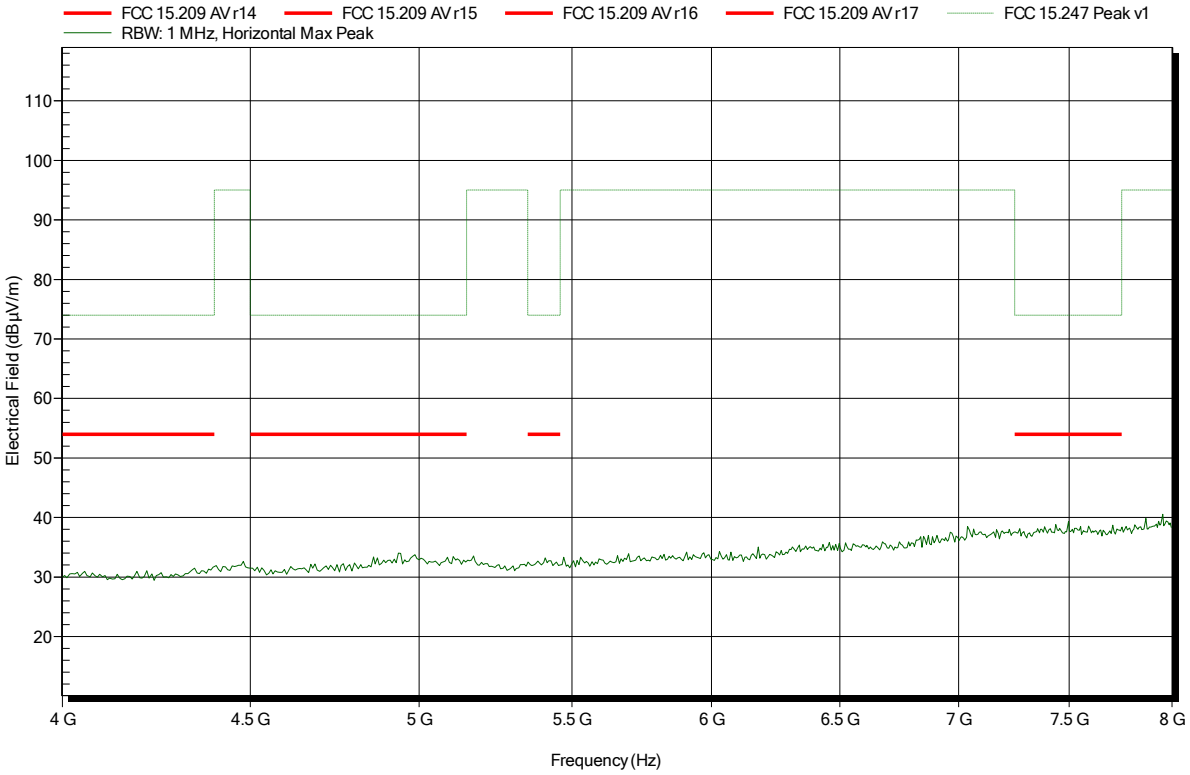

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2480 MHz
Test Date:	2019-03-13
Note:	

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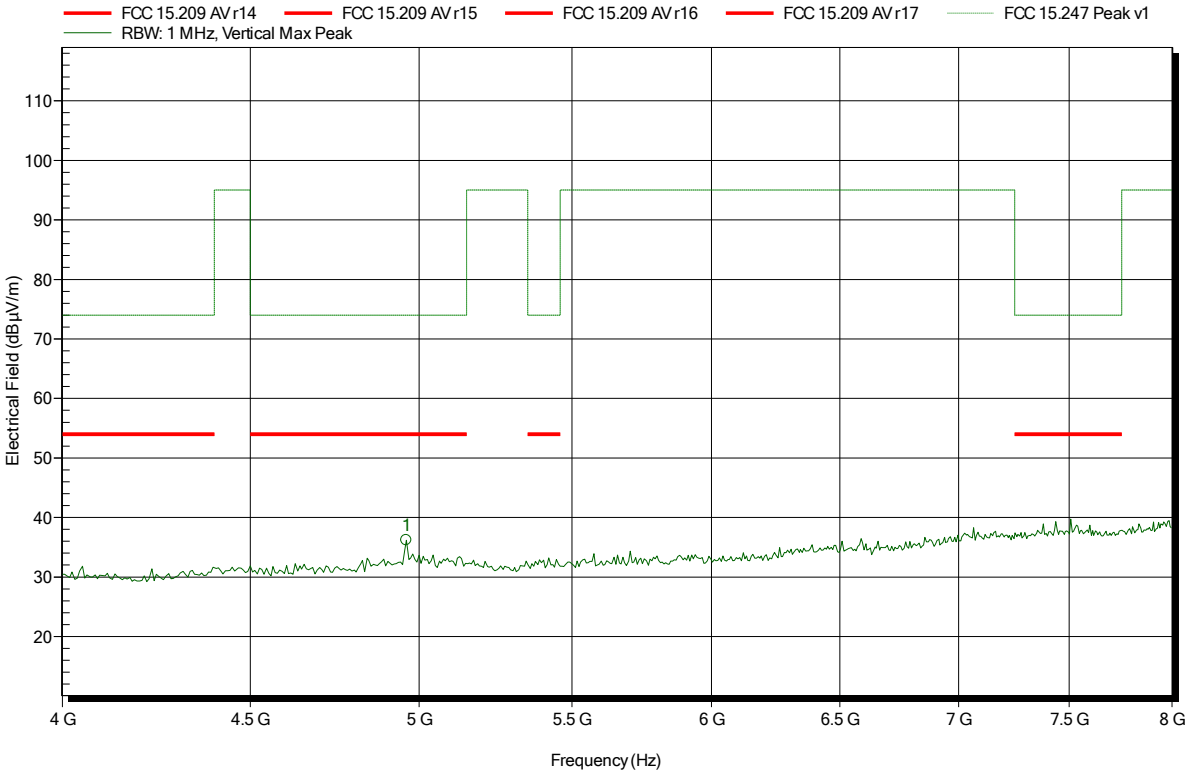

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.96 GHz	36.17 dBµV/m	74 dBµV/m	-37.83 dB	Pass

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2480 MHz
Test Date:	2019-03-13
Note:	

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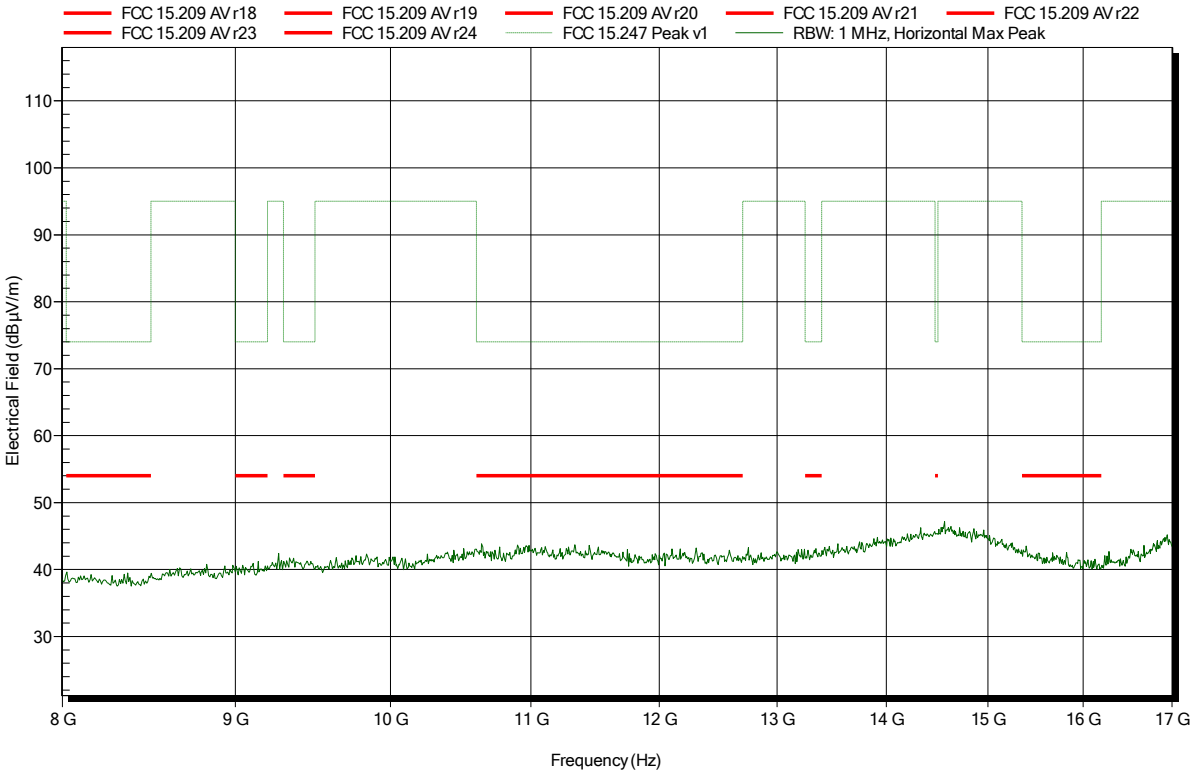

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2480 MHz
Test Date:	2019-03-13
Note:	

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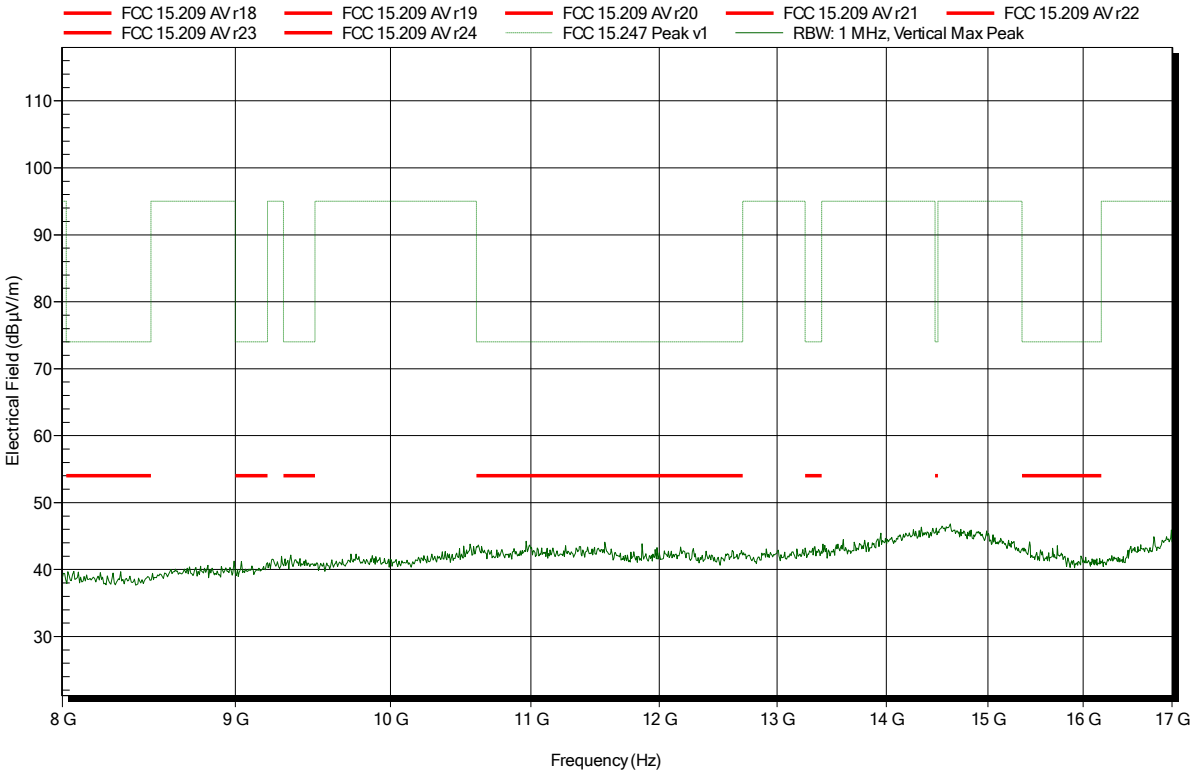

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Amplifier Research AT4560, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2480 MHz
Test Date:	2019-03-13
Note:	

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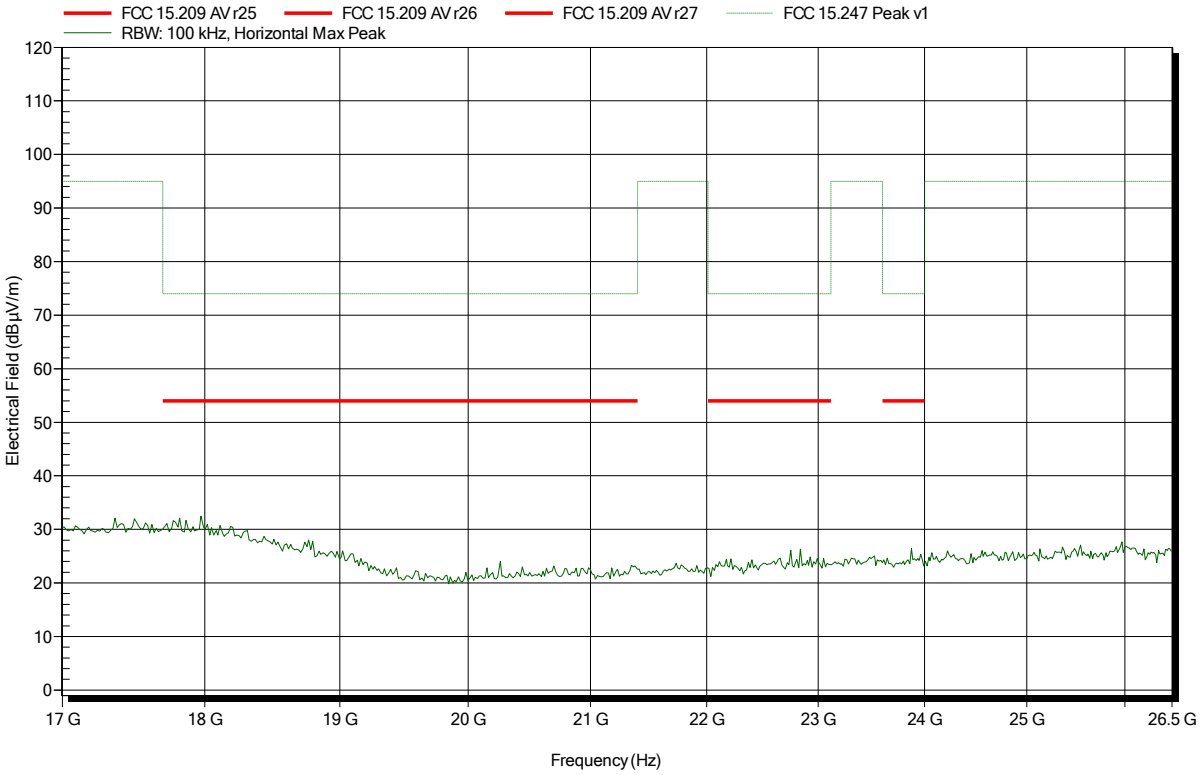

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Amplifier Research AT4560, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; BLE; 2480 MHz
Test Date:	2019-03-13
Note:	

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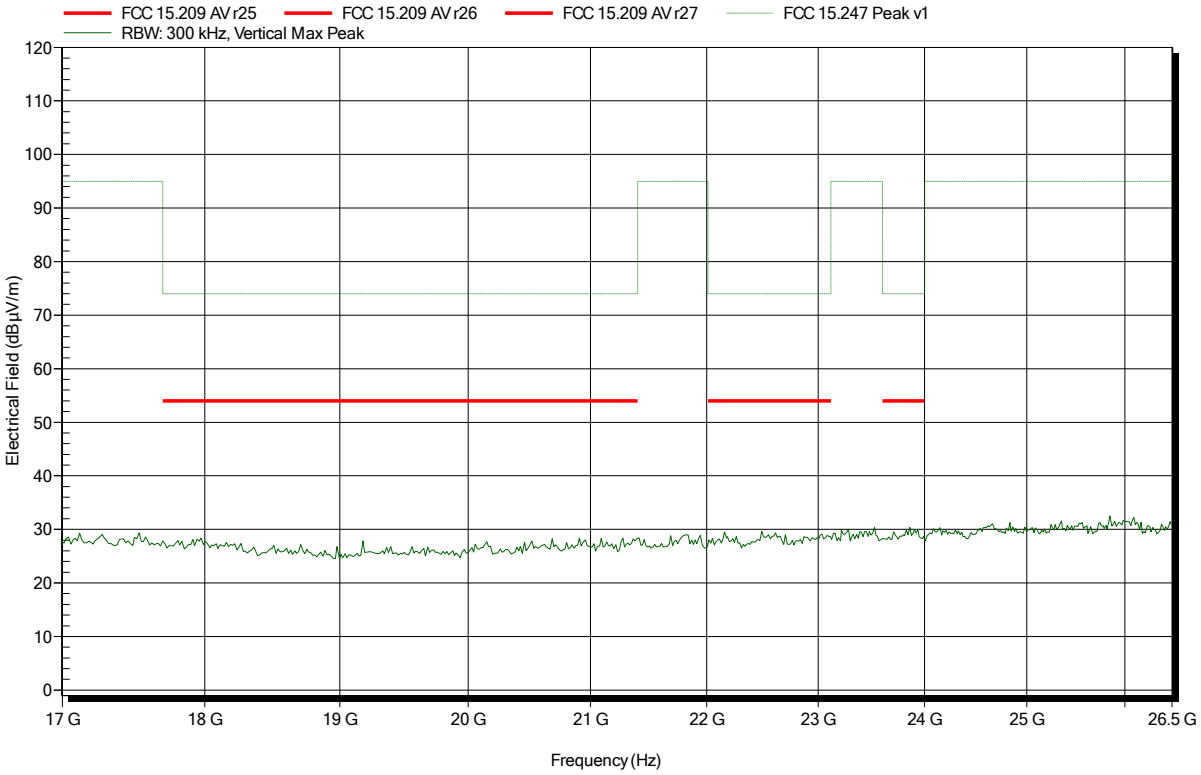

ANNEX B Receiver spurious emissions

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	RX; BLE; 2440 MHz
Test Date:	2019-03-14
Note:	

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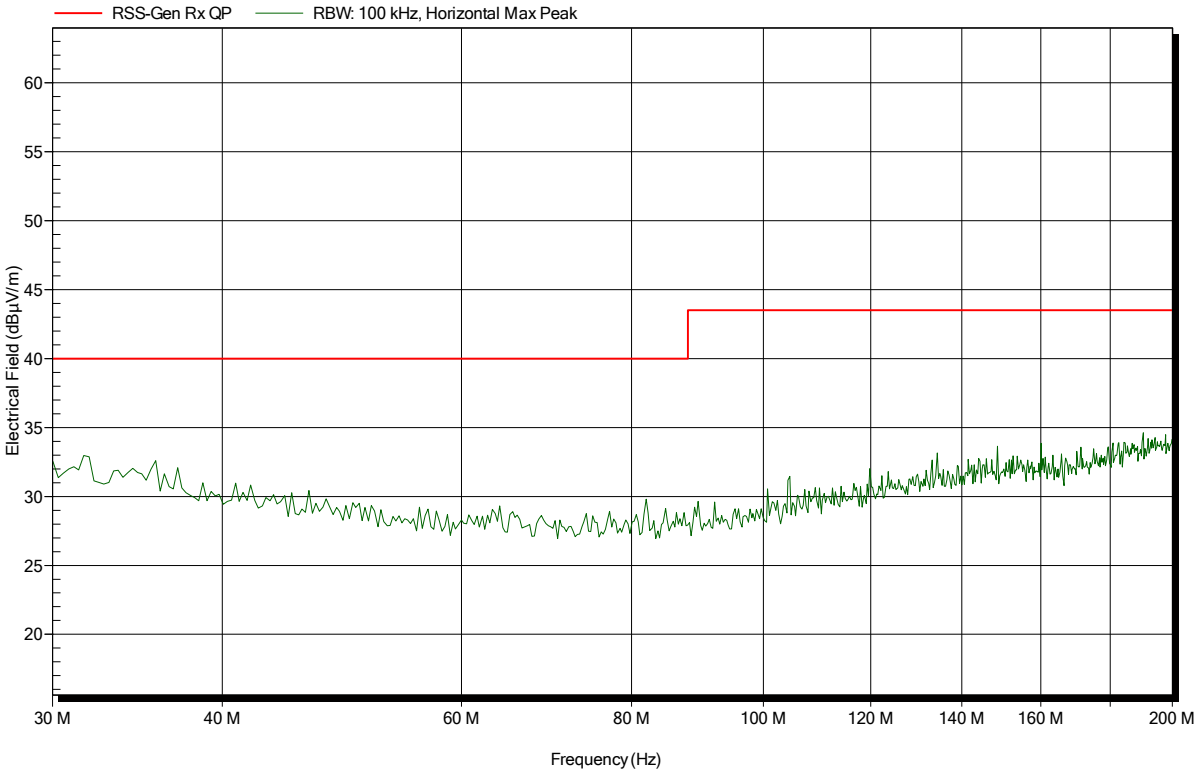

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3 m
Mode:	RX; BLE; 2440 MHz
Test Date:	2019-03-14
Note:	

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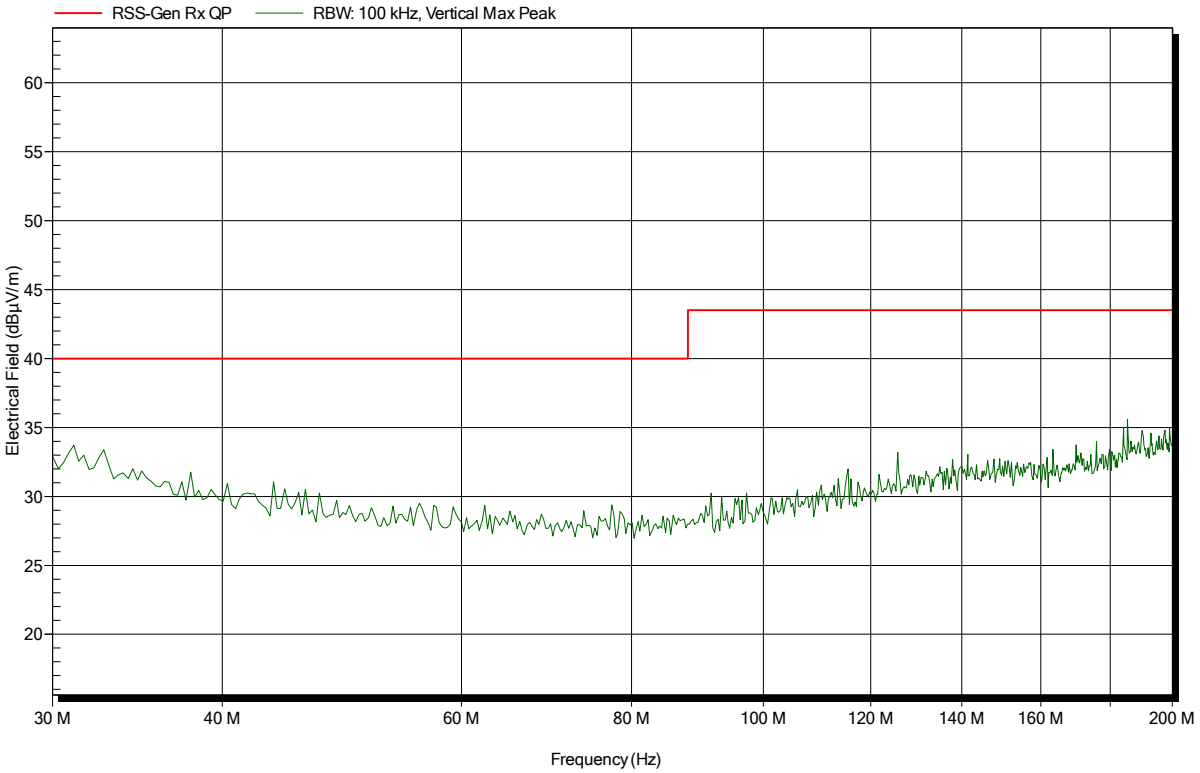

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	RX; BLE; 2440 MHz
Test Date:	2019-03-14
Note:	

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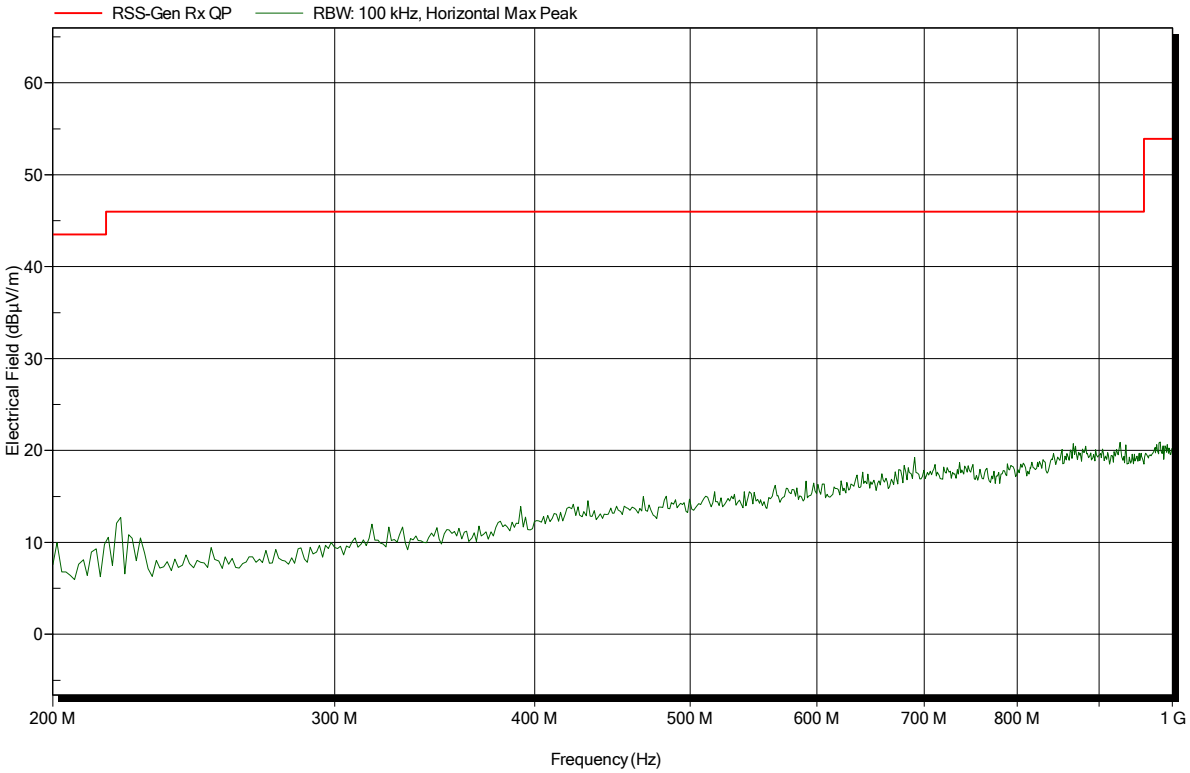

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	RX; BLE; 2440 MHz
Test Date:	2019-03-14
Note:	

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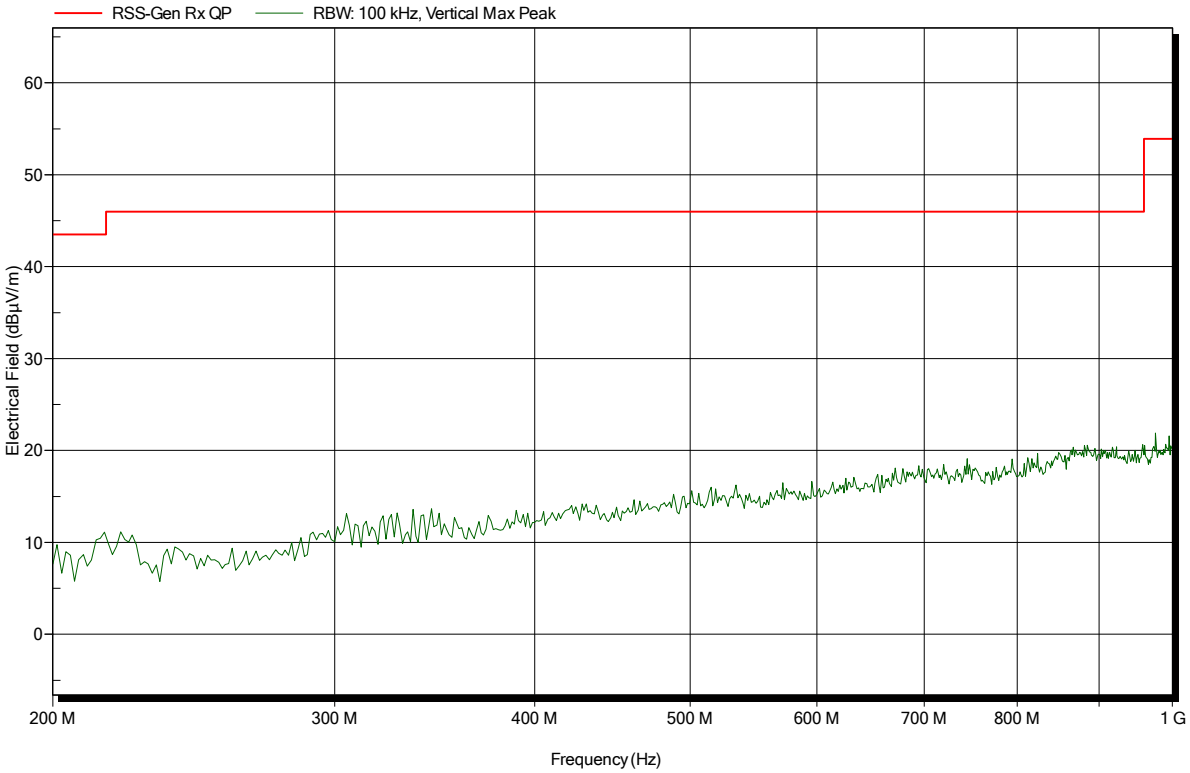

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m
Mode:	RX; BLE; 2440 MHz
Test Date:	2019-03-14
Note:	

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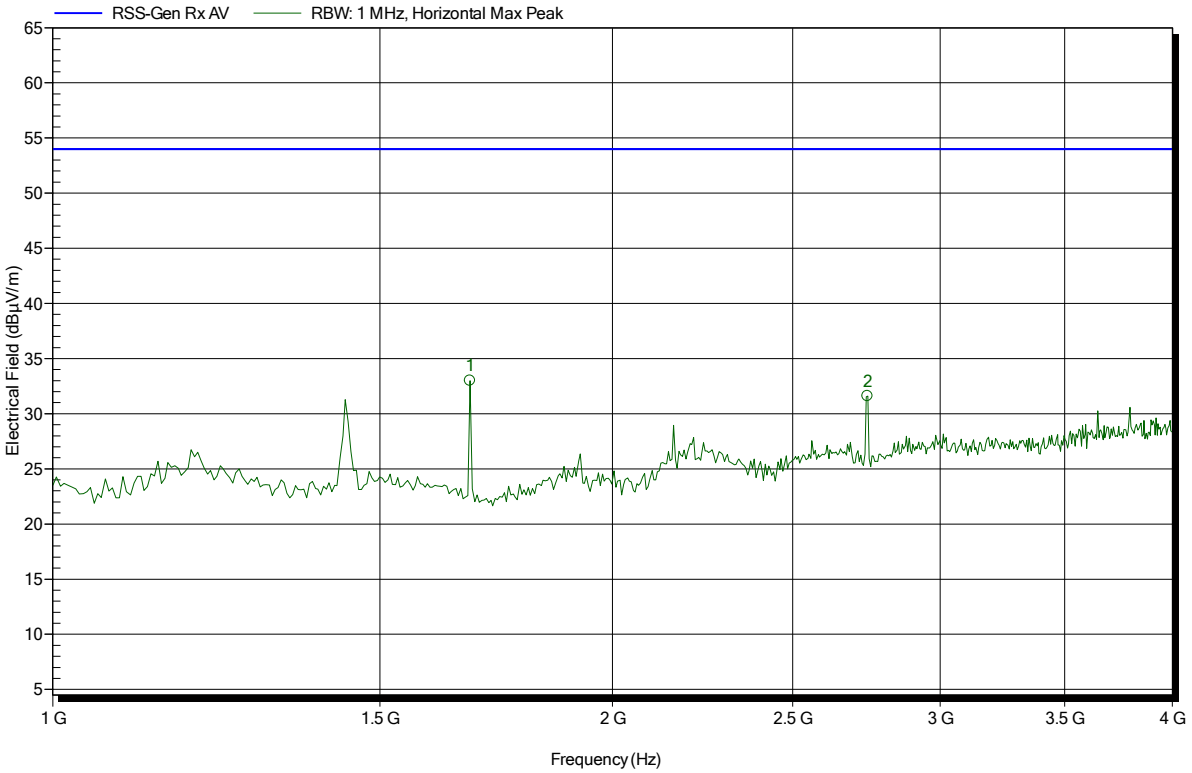

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
1.677 GHz	32.99 dBµV/m	53.98 dBµV/m	-20.99 dB	Pass
2.742 GHz	31.59 dBµV/m	53.98 dBµV/m	-22.39 dB	Pass

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m
Mode:	RX; BLE; 2440 MHz
Test Date:	2019-03-14
Note:	

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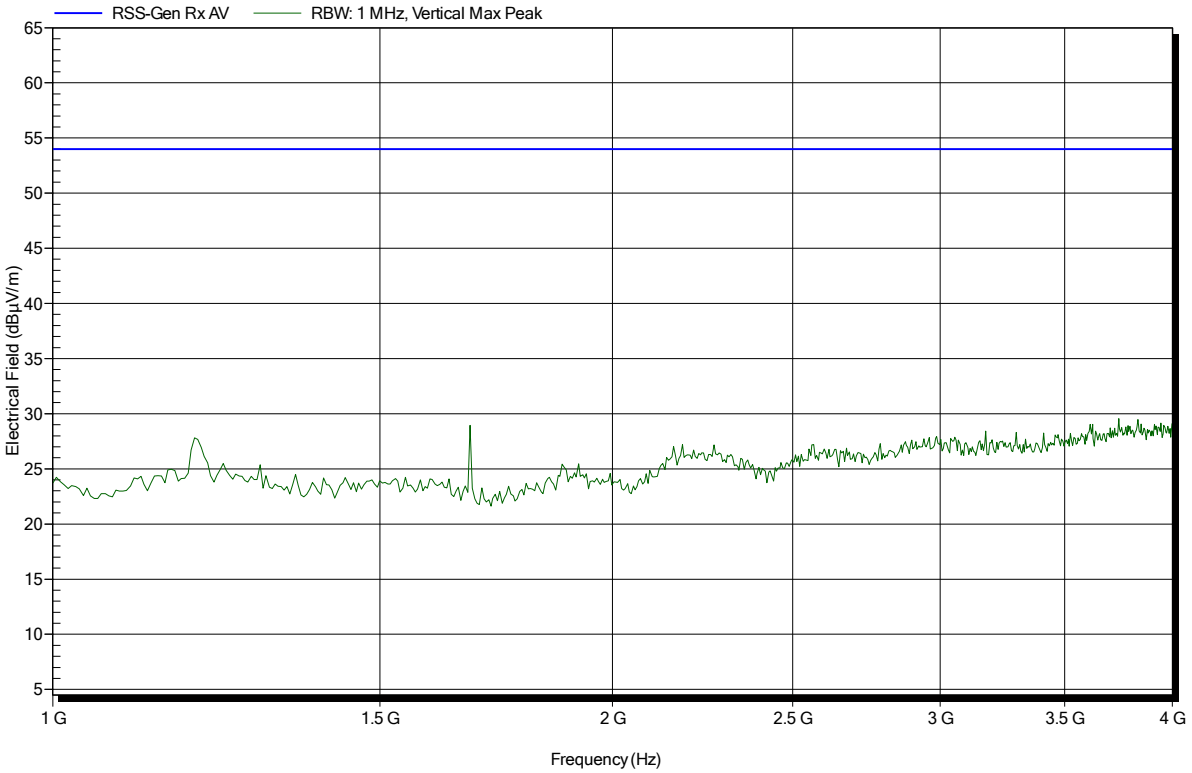

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m
Mode:	RX; BLE; 2440 MHz
Test Date:	2019-03-14
Note:	

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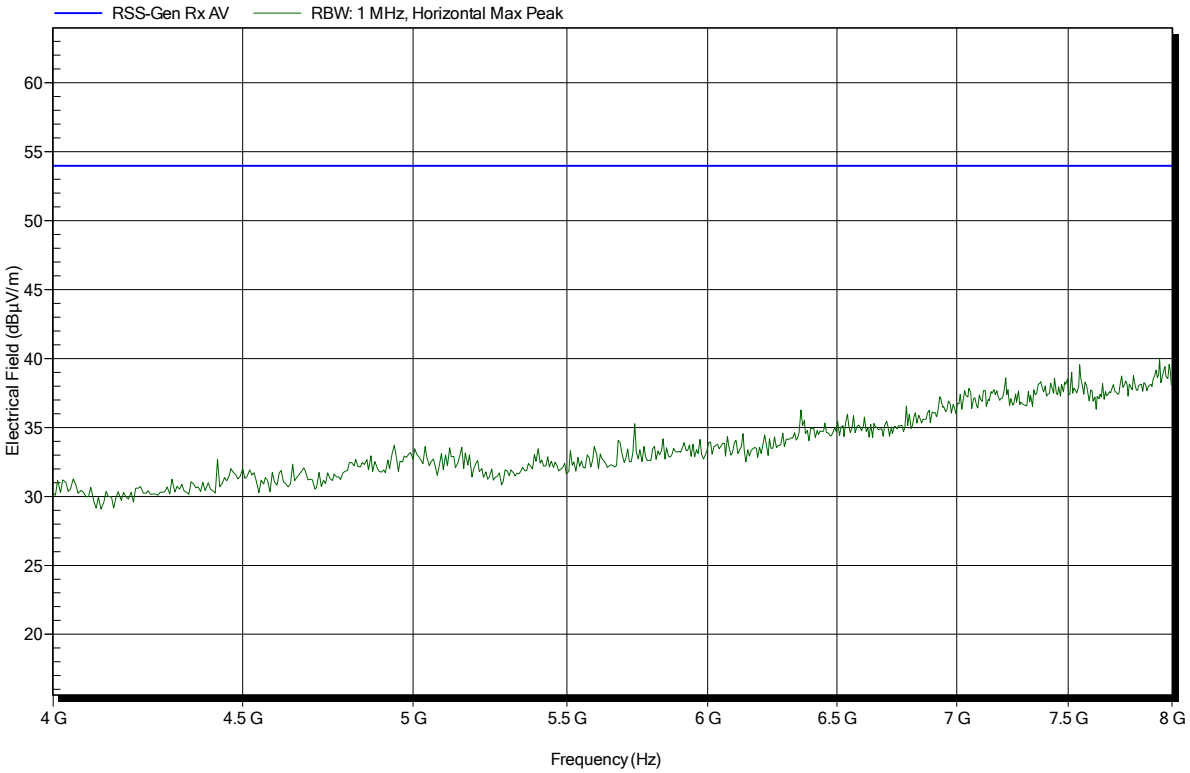

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m
Mode:	RX; BLE; 2440 MHz
Test Date:	2019-03-14
Note:	

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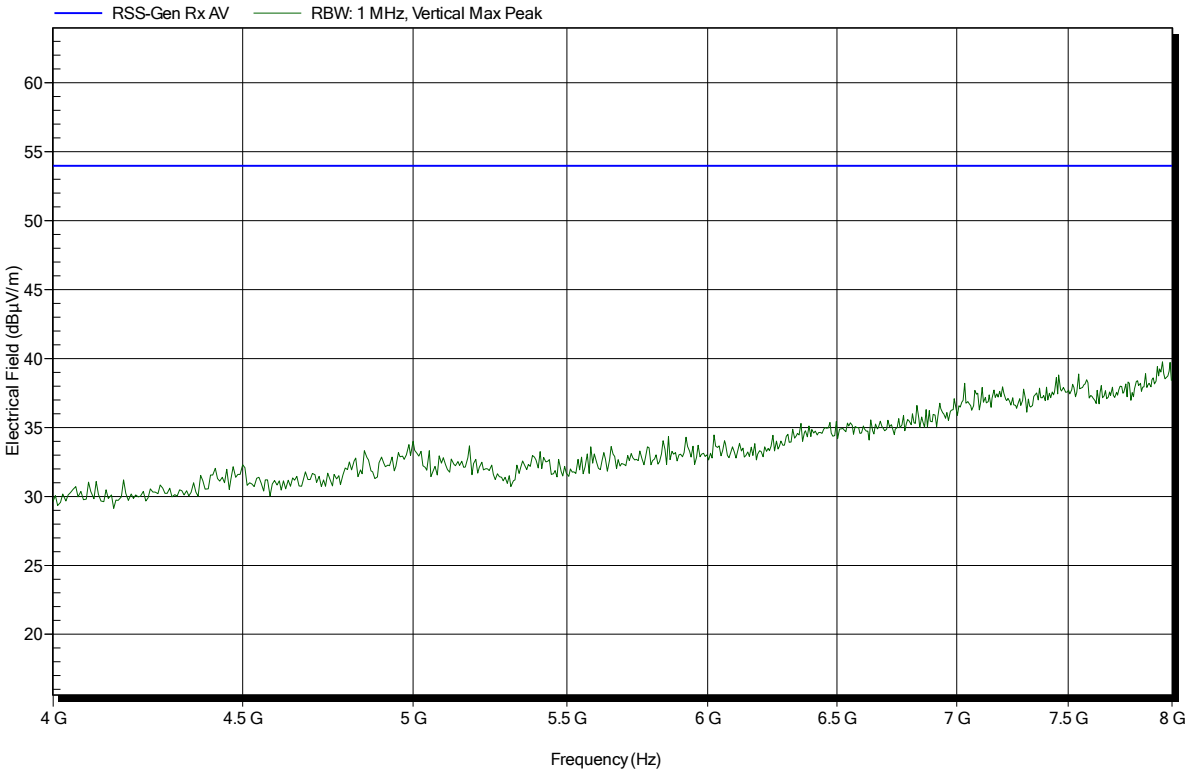

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	RX; BLE; 2440 MHz
Test Date:	2019-03-14
Note:	

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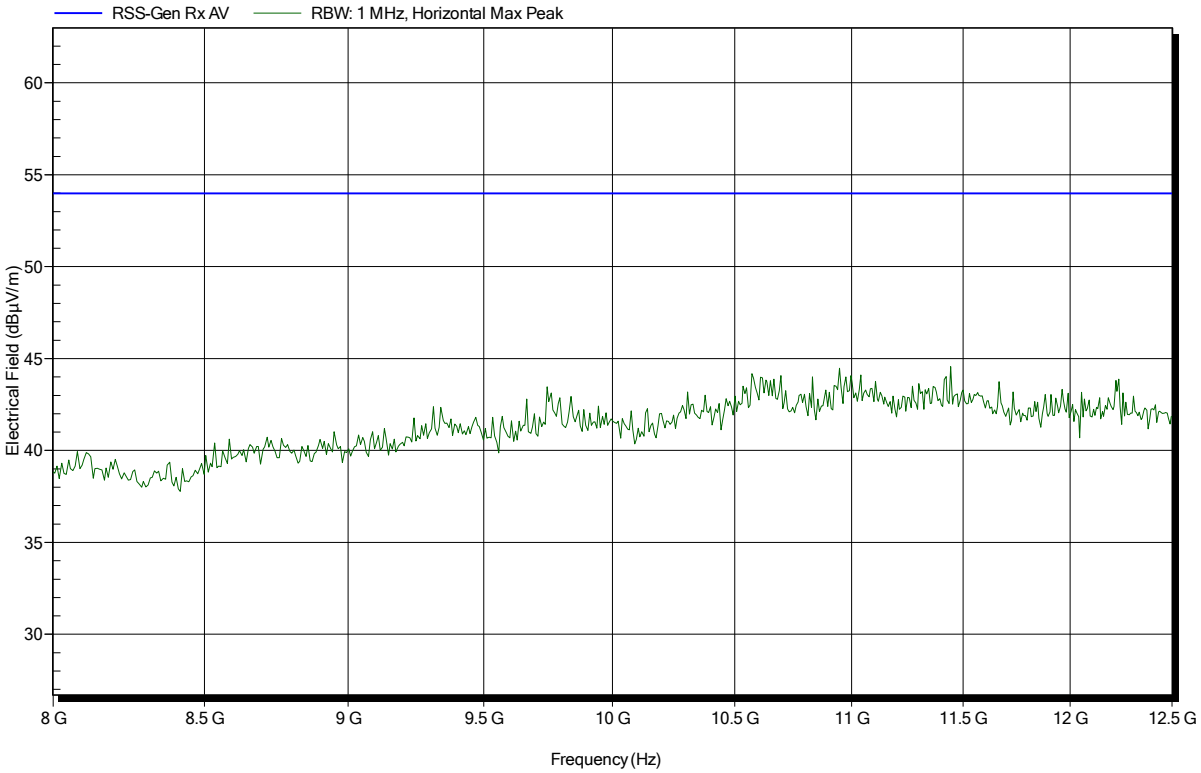

Spurious emissions according to FCC 47 e-CFR §15.247

Project number:	G0M-1902-8045
Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Bluetooth Low Energy Module
Model:	ENW89853A1KF
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 3.3 VDC
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	RX; BLE; 2440 MHz
Test Date:	2019-03-14
Note:	

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