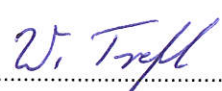



RADIO REPORT FCC 47 CFR Part 15C ISED Canada RSS-247 Digital transmission systems operating within the 2400 – 2483.5 MHz band	
Report Reference No	G0M-1707-6688-TFC247BL-V01
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	 <p>A2LA Accredited Testing Laboratory, Certificate No.: 1983.01 FCC Test Firm Designation Number: DE0008 IC Testing Laboratory site: 3470A-3</p>
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
Non-Standard Test Method	None
Test Scope	Full compliance test
Equipment under Test (EUT):	
Product Description	Bluetooth Low Energy Module
Model(s)	ENW89847A3KF
Additional Model(s)	None
Brand Name(s)	PAN1760A
Hardware Version(s)	02
Software Version(s)	01
FCC-ID	T7V1760A
IC	216Q-1760A
Test Result	PASSED

Possible test case verdicts:		
required by standard but not tested	N/T	
not required by standard	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	2017-07-20	
Report:		
Compiled by	Wilfried Treffke	
Tested by (+ signature) (Responsible for Test)	Wilfried Treffke	
Approved by (+ signature) (Head of Lab)	Christian Weber	
Date of Issue	2017-08-30	
Total number of pages	98	
General Remarks:		
<p>The test results presented in this report relate only to the object tested.</p> <p>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.</p> <p>This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.</p>		
Additional Comments:		

VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2017-08-30	Initial Release	

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

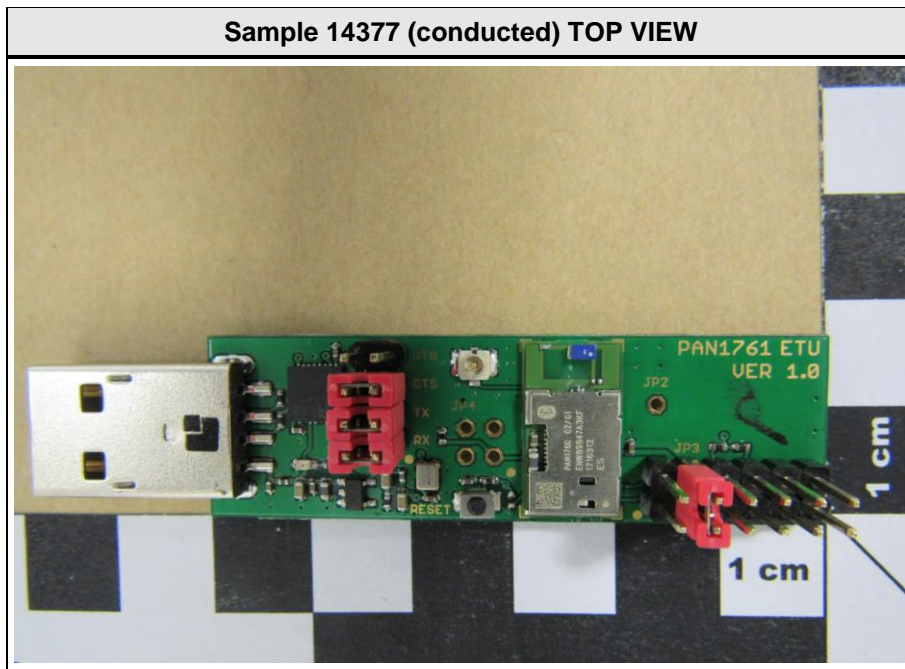
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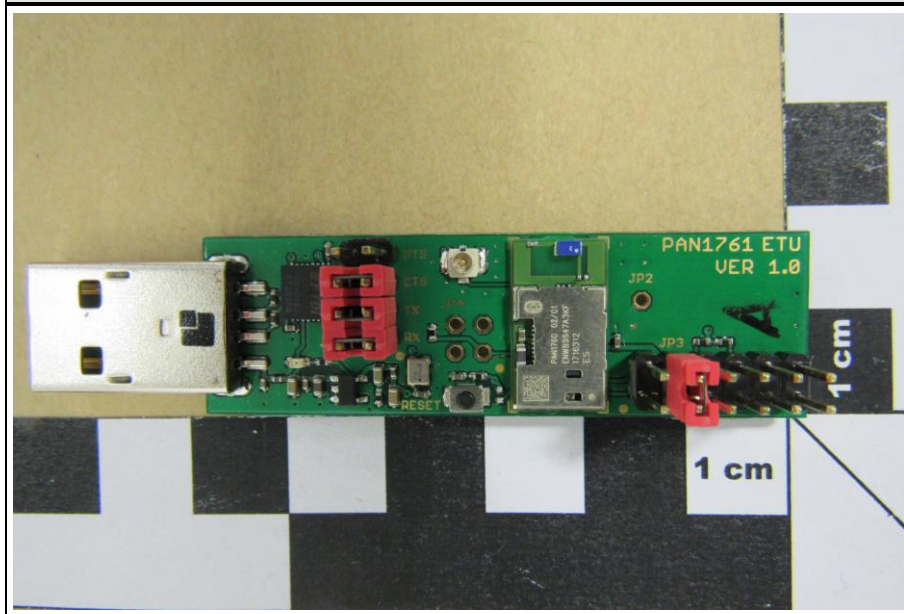
1 Equipment (Test Item) Under Test

Description	Bluetooth Low Energy Module	
Model	ENW89847A3KF	
Additional Model(s)	None	
Brand Name(s)	PAN1760A	
Serial Number(s)	None	
Hardware Version(s)	02	
Software Version(s)	01	
PMN	PAN1760A	
HVIN	ENW89847A3KF	
FVIN	N/A	
HMN	N/A	
FCC-ID	T7V1760A	
IC	216Q-1760A	
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 antenna
	Model	ANT2012L
	Manufacturer	Yageo
	Gain	2.7 dBi
Supply Voltage	V_{NOM}	3.3 VDC
Operating Temperature	T_{NOM}	24 °C
AC/DC-Adaptor	Model	None
	Vendor	None
	Input	None
	Output	None
Manufacturer	Panasonic Industrial Devices Europe GmbH Zeppelinstr. 19 21337 Lüneburg GERMANY	

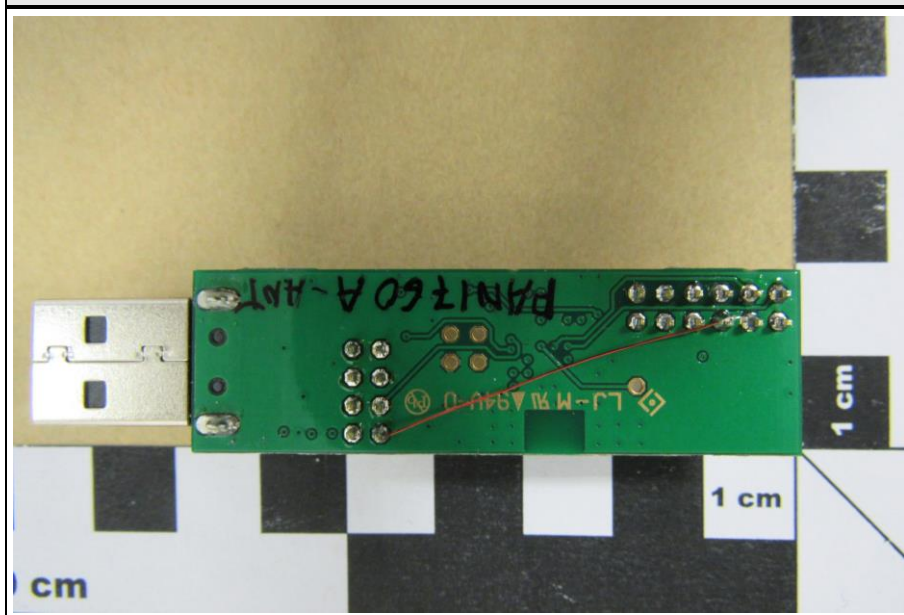
1.1 Photos – Equipment External



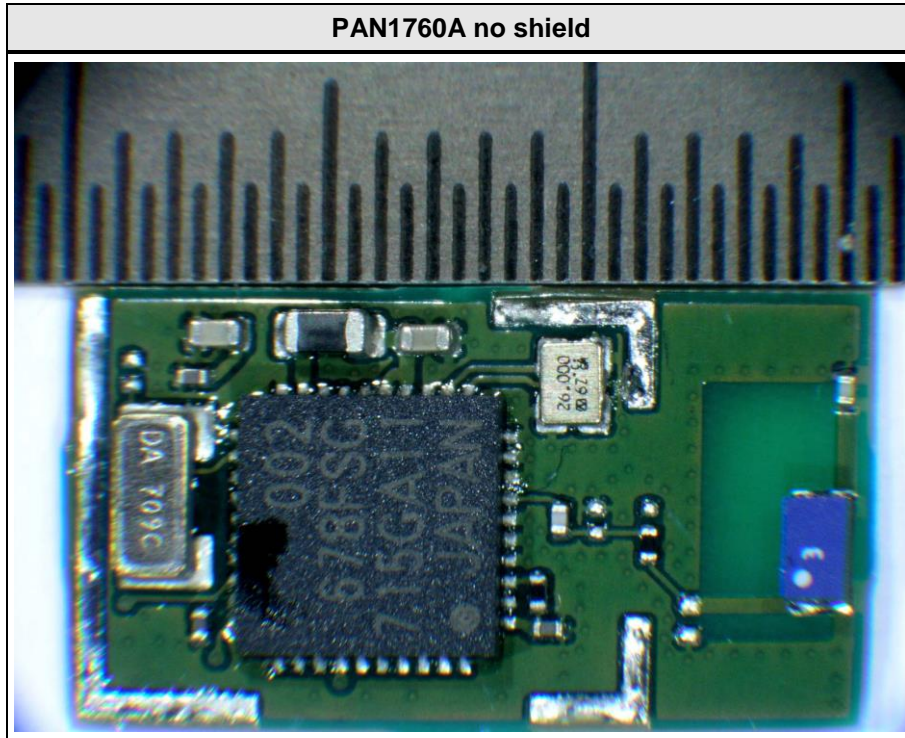
Sample 14378 (radiated) TOP VIEW



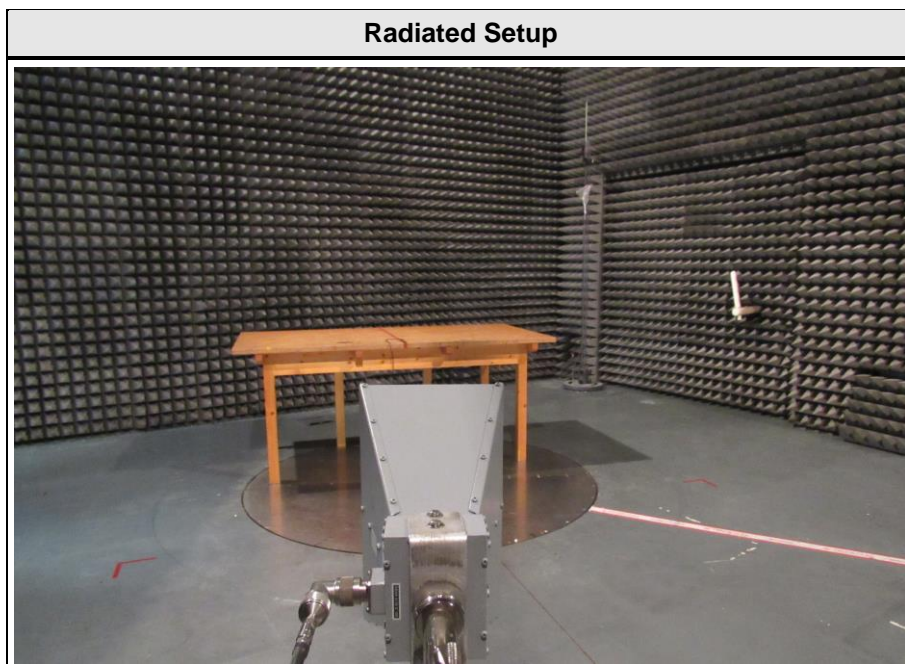
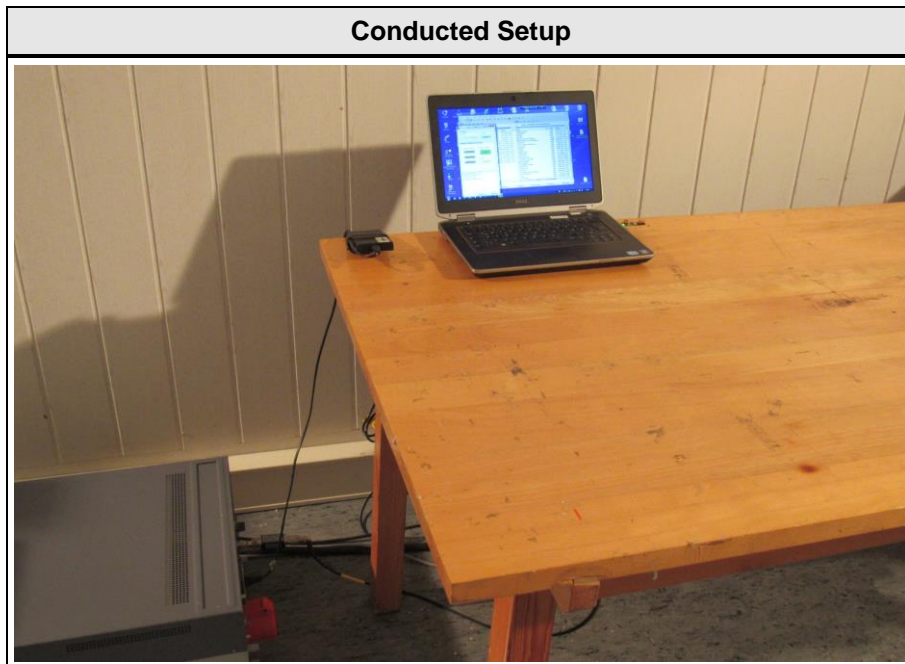
Sample 14378 (radiated) BOTTOM VIEW



1.2 Photos – Equipment Internal



1.3 Photos – Test Setup



1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
AE	Laptop	Dell	Latitude E6420	S/N HPJ4R1
AE	Power Supply	Dell	FA65NE0-00	S/N RX929
Description:				
AE	Auxillary Equipment			
SIM	Simulator			
CBL	Connecting Cable			
Comment:				

1.5 Test Modes

Mode	Description
GFSK	Mode = Transmit Modulation = GFSK Spreading = None Duty cycle = 63 %
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:

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

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:

Reading + AF	= Net Reading	:	Net reading	- FCC limit	= Margin
+21.5 dBµV	+ 26 dB = 47.5 dBµV/m	:	47.5 dBµV/m	- 57.0 dBµV/m	= -9.5 dB

2 Result Summary

FCC 47 CFR Part 15C, ISED RSS-247				
Product Standard Reference	Requirement	Reference Method	Result	Remarks
RSS-Gen 6.6	Occupied Bandwidth	ANSI C63.10	N/R	Informational only
FCC § 15.247(a)(2) ISED RSS-247 § 5.2	6 dB Bandwidth	ANSI C63.10	PASS	
FCC § 15.247(b)(3) ISED RSS-247 § 5.4	Maximum peak conducted power	ANSI C63.10	PASS	
FCC § 15.247(e) ISED RSS-247 § 5.2	Power spectral density	ANSI C63.10	PASS	
FCC § 15.207 ISED RSS-247 § 3.1	AC power line conducted emissions	ANSI C63.10	PASS	
FCC § 15.247(d) ISED RSS-247 § 5.5	Band edge compliance	ANSI C63.10	PASS	
FCC § 15.247(d) ISED RSS-247 § 5.5	Conducted spurious emissions	ANSI C63.10	PASS	
FCC § 15.247(d) FCC § 15.209 ISED RSS-GEN § 8.9	Transmitter radiated spurious emissions	ANSI C63.10	PASS	
ISED RSS-247 § 3.1	Receiver radiated spurious emissions	ANSI C63.10	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

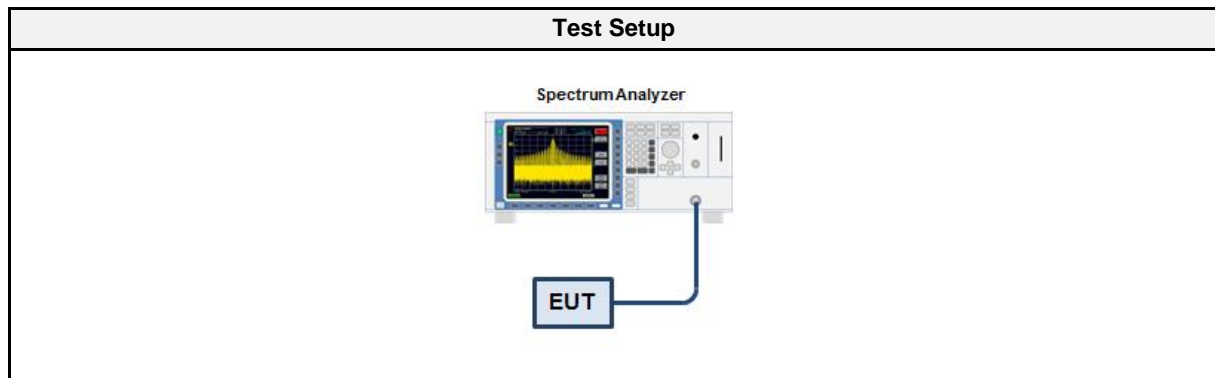
3.1.1 Information

Test Information	
Reference	I SED RSS-Gen 6.6
Measurement Method	ANSI C63.10 6.9.3
Operator	Wilfried Treffke
Date	2017-08-07

3.1.2 Limits

Limits
None (Informational only)

3.1.3 Setup



3.1.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01003	2017-04	2018-04

3.1.5 Procedure

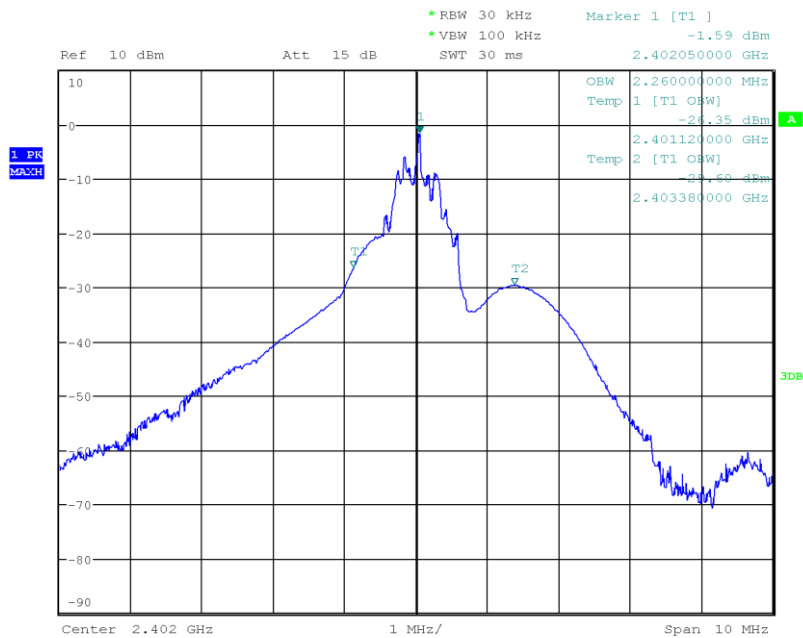
Test Procedure
<ol style="list-style-type: none"> 1. EUT transmitter is activated in test mode under normal conditions 2. The spectrum analyzer is set to peak detection and maximum hold with a span twice the emission spectrum 3. The resolution bandwidth is set to 1 % of the bandwidth 4. The occupied bandwidth is measured with the build-in analyzer function

3.1.6 Results

Test Results		
Mode	Frequency [MHz]	Bandwidth [MHz]
GFSK	2402	2.260
GFSK	2440	2.230
GFSK	2480	2.180

Occupied Bandwidth

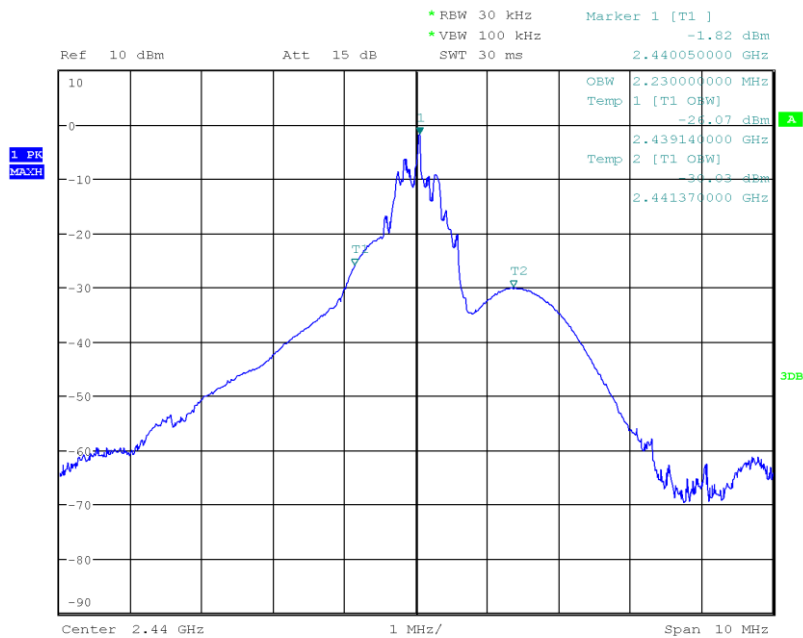
Project Number: G0M-1707-6688
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Sample ID: 14377
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 6.9.3
 Operational Mode: GFSK, Channel: 0, 2402 MHz
 Operating Conditions: Tnom/Vnom
 Operator: W. Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2017-08-07
 Occupied Bandwidth [MHz]: 2.260



Date: 7.AUG.2017 13:48:50

Occupied Bandwidth

Project Number: G0M-1707-6688
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Sample ID: 14377
 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: W. Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2017-08-07
 Occupied Bandwidth [MHz]: 2.230



Date: 7.AUG.2017 13:54:37

3.2 Test Conditions and Results - 6 dB bandwidth

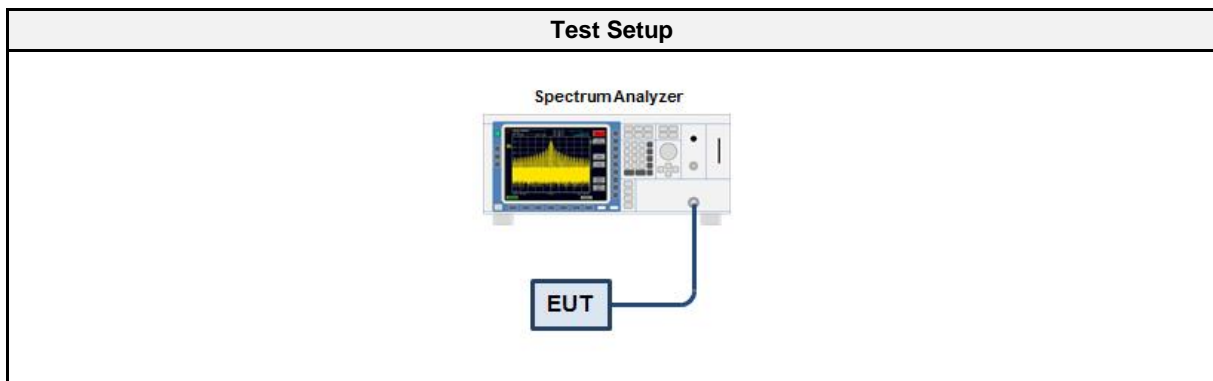
3.2.1 Information

Test Information	
Reference	FCC 15.247(a)(2) / ISED RSS-247 5.2
Measurement Method	ANSI C63.10 11.8
Operator	Wilfried Treffke
Date	2017-08-07

3.2.2 Limits

Limits
≥ 500kHz

3.2.3 Setup



3.2.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01003	2017-04	2018-04

3.2.5 Procedure

Test Procedure
<ol style="list-style-type: none"> 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	670	500	PASS
GFSK	2440	665	500	PASS
GFSK	2480	670	500	PASS

3.3 Test Conditions and Results - Maximum peak conducted output power

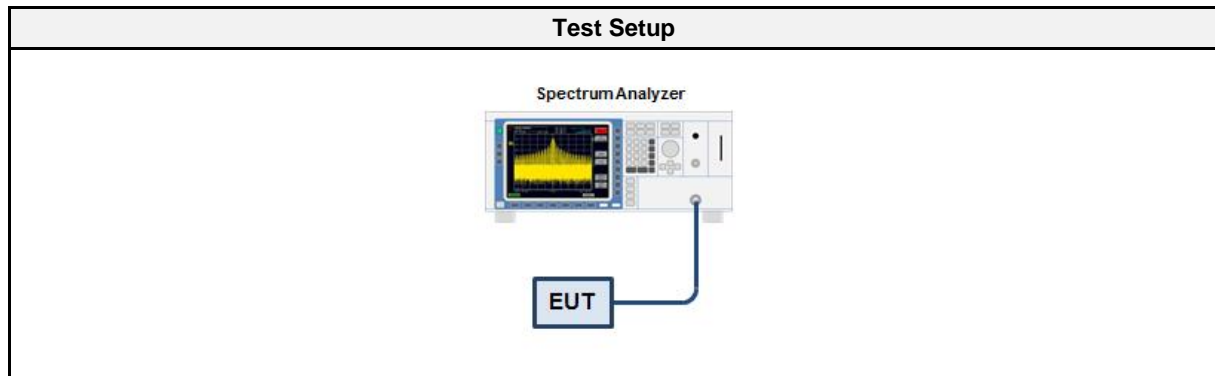
3.3.1 Information

Test Information	
Reference	FCC 15.247(b)(1) / ISED RSS-247 5.4
Measurement Method	ANSI C63.10 11.9.1
Operator	Wilfried Treffke
Date	2017-08-07

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



3.3.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01003	2017-04	2018-04

3.3.5 Procedure

Test Procedure
<ol style="list-style-type: none"> 1. EUT set to test hopping mode (Communication tester is used if needed) 2. Analyzer resolution bandwidth is set \geq 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	-0.523	0.000887	1.0	PASS
2440	-0.673	0.000856	1.0	PASS
2480	-0.925	0.000808	1.0	PASS

3.4 Test Conditions and Results - Power spectral density

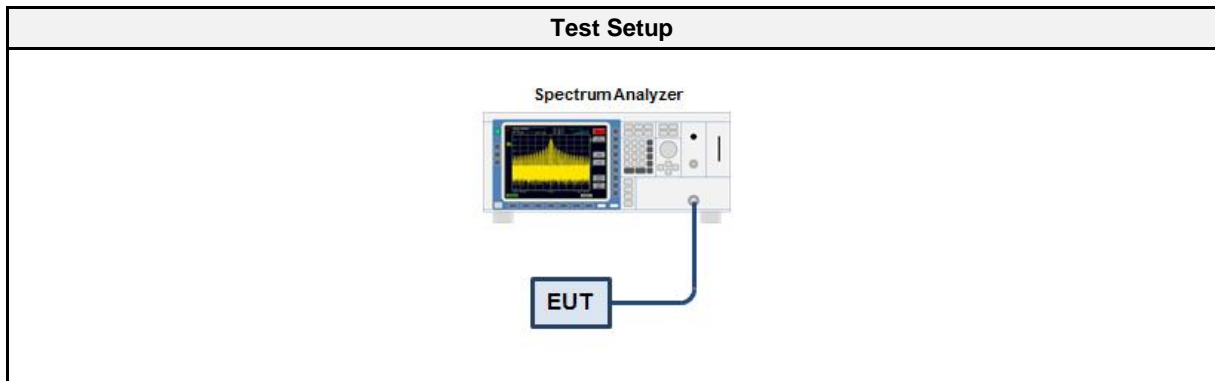
3.4.1 Information

Test Information	
Reference	FCC 15.247(e) / ISED RSS-247 5.2
Measurement Method	ANSI C63.10 11.10.2, 14.3.2
Operator	Wilfried Treffke
Date	2017-08-07

3.4.2 Limits

Limits
8 dBm / 3 kHz

3.4.3 Setup



3.4.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01003	2017-04	2018-04

3.4.5 Procedure

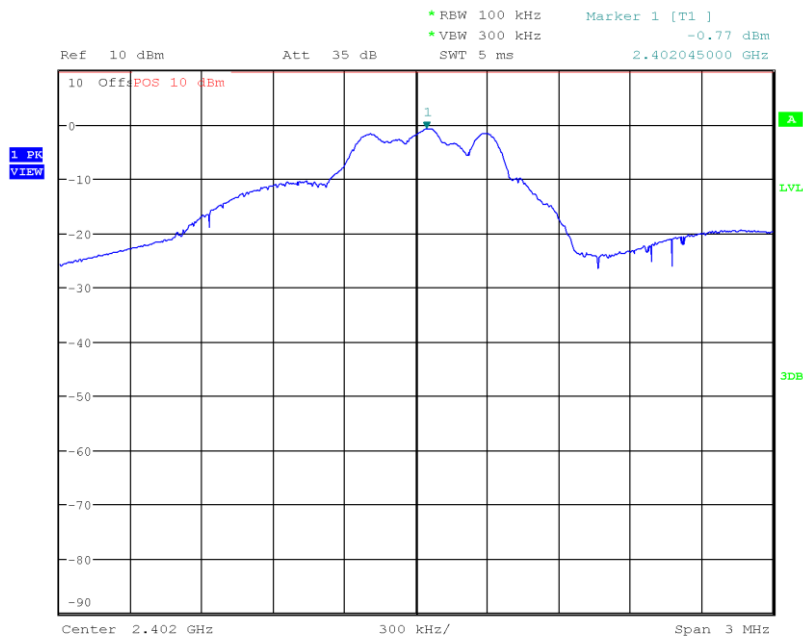
Test Procedure
<ol style="list-style-type: none"> 1. EUT set to test mode 2. The analyzer is set to DTS channel center frequency with a span of 1.5 times the DTS bandwidth 3. The RBW is set to 100 kHz with VBW \geq RBW and the detector is set to peak with max hold 4. After the trace has stabilized a 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	-0.766	8.0	PASS
2440	-0.995	8.0	PASS
2480	-1.243	8.0	PASS
RBW = 100 kHz			

Peak Power Spectral Density

Project Number: G0M-1707-6688
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Sample ID: 14377
 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: W. Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2017-08-07
 Peak Frequency [MHz]: 2402.045
 Spectral Density [dBm/RBW]: -0.766
 Resolution Bandwidth [kHz]: 100 kHz



Date: 7.AUG.2017 15:34:58

3.5 Test Conditions and Results - AC powerline conducted emissions

3.5.1 Information

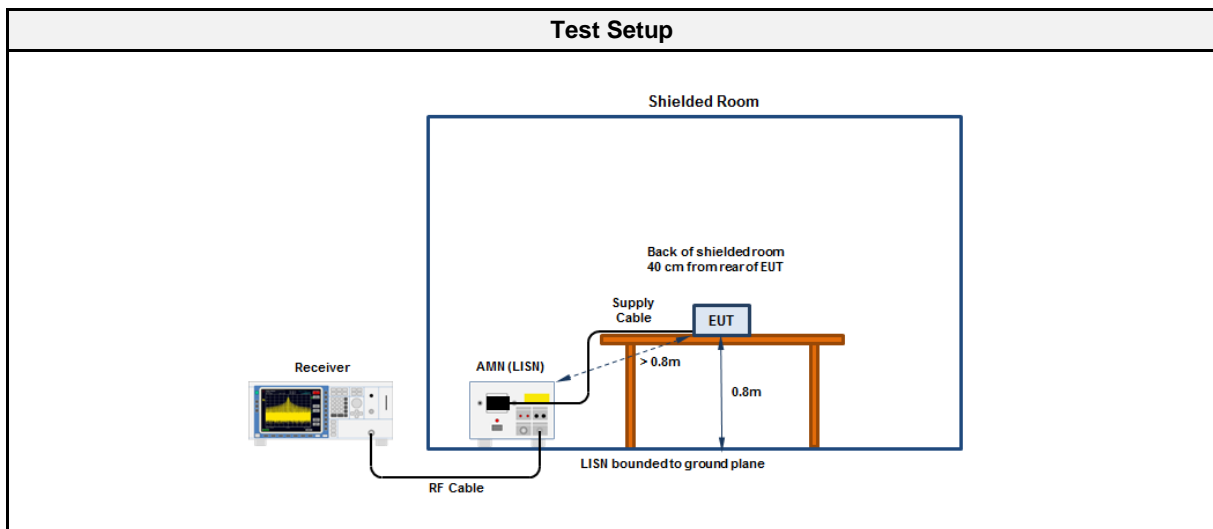
Test Information	
Reference	FCC 15.207
Measurement Method	ANSI C63.10 6.2
Operator	Wilfried Treffke
Date	2017-08-08

3.5.2 Limits

Limits		
Frequency [MHz]	Quasi-Peak [dB μ V]	Average [dB μ V]
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



3.5.4 Equipment

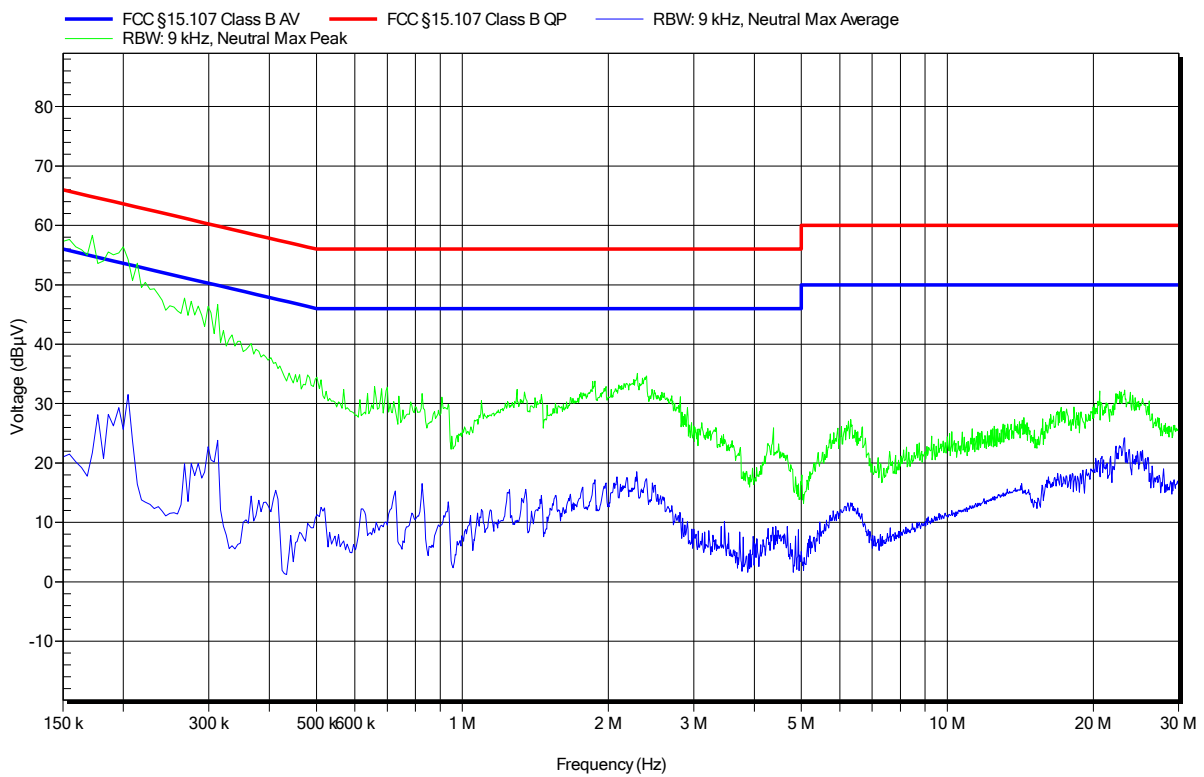
Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EMI Test Receiver	R&S	ESR7	EF00943	2016-10	2017-10
LISN	R&S	ESH2-Z5	EF00182	2017-01	2019-01

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

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 23°C, Unom:
 LISN: ESH2-Z5 N
 Mode: BLE; 2440MHz
 Test Date: 2017-08-08
 Note:

Index 1

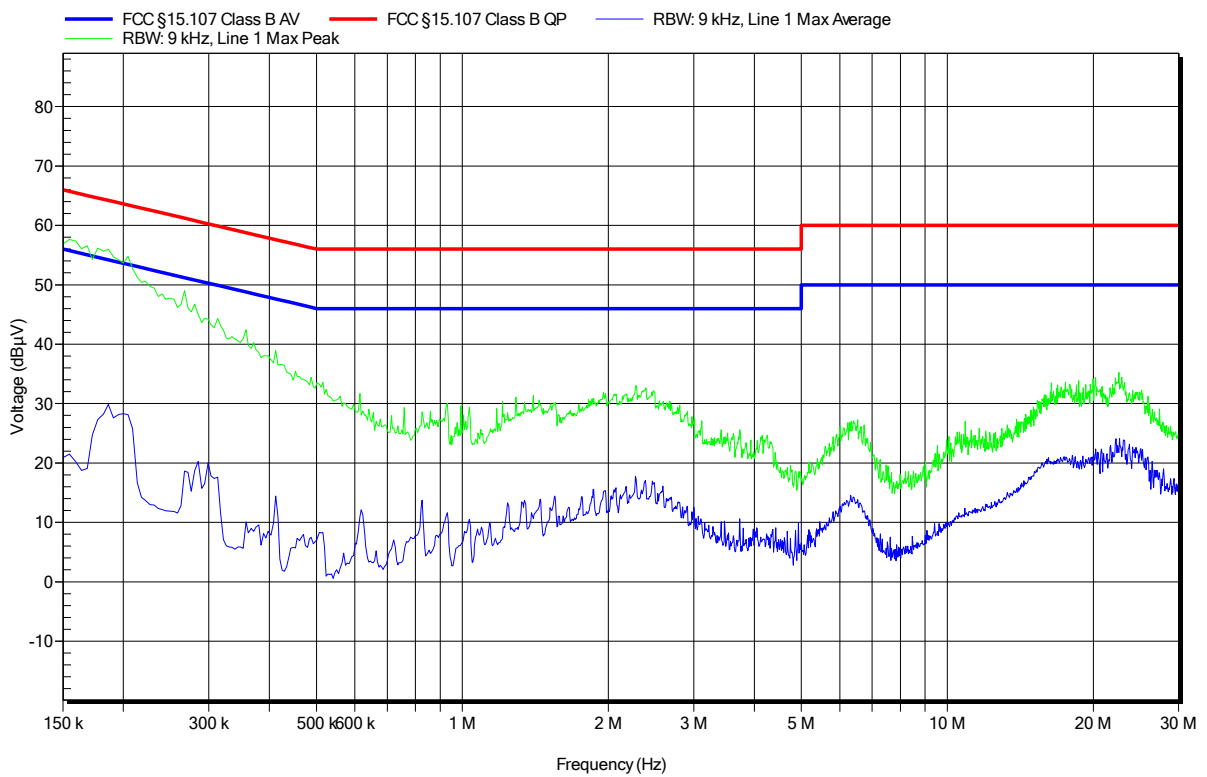


EMI voltage test in the ac-mains according to FCC 15B

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Conditions: Tnom: 23°C, Unom:
 LISN: ESH2-Z5 L
 Mode: BLE; 2440 MHz
 Test Date: 2017-08-08
 Note:

Index 2



3.6 Test Conditions and Results - Band-edge compliance

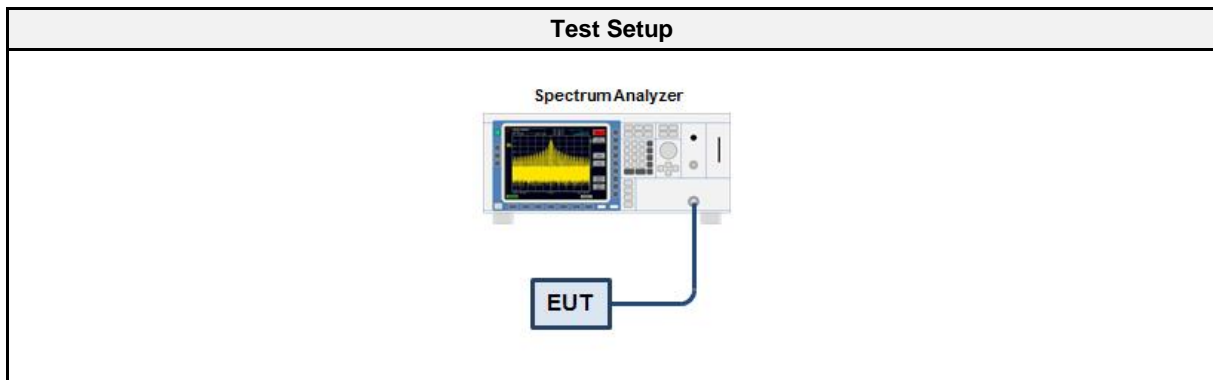
3.6.1 Information

Test Information	
Reference	FCC 15.247(d) / ISED RSS-247 5.5
Measurement Method	ANSI C63.10 11.13
Operator	Wilfried Treffke
Date	2017-08-07

3.6.2 Limits

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

3.6.3 Setup



3.6.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01003	2017-04	2018-04

3.6.5 Procedure

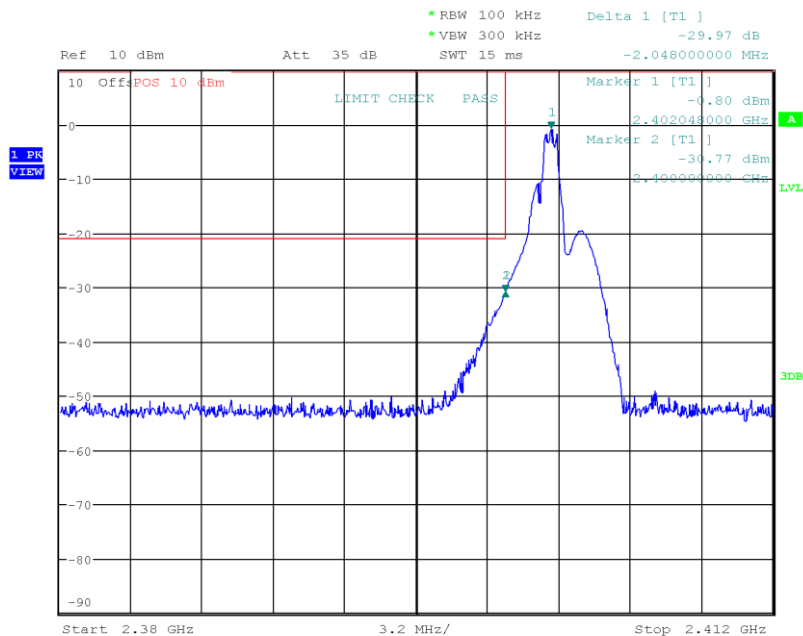
Test Procedure
<ol style="list-style-type: none"> 1. EUT set to test mode (Communication tester is used if needed) 2. Span set around lower band edge and detector is set to peak and max hold 3. Resolution bandwidth is set to 100 kHz 4. Markers are set to peak emission levels within frequency band and 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	-29.97	-20	PASS
GFSK	2480	-46.85	-20	PASS

Band-edge Compliance

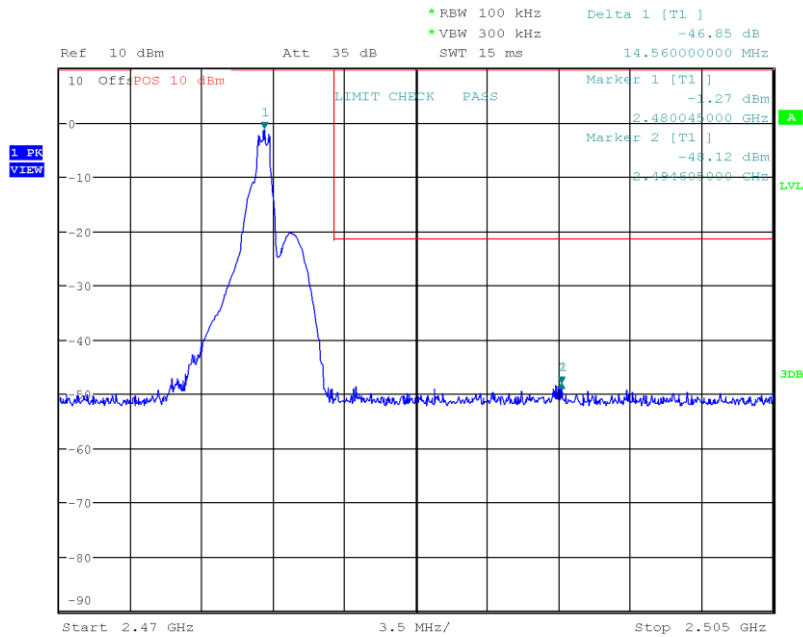
Project Number: G0M-1707-6688
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Sample ID: 14377
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.11
 Operational Mode: GFSK, Channel: 0, 2402 MHz
 Operating Conditions: Tnom/Vnom
 Operator: W. Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2017-08-07
 Band-edge: Lower
 In-band Frequency [MHz]: 2402.048
 Max. in-band Level [dBm/100 kHz]: -0.804
 Out-of-band Frequency [MHz]: 2400.0
 Max. out-of-band Level [dBm/100 kHz]: -30.775
 Attenuation [dB]: -29.97



Date: 7.AUG.2017 15:39:18

Band-edge Compliance

Project Number: G0M-1707-6688
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Sample ID: 14377
 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: W. Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2017-08-07
 Band-edge: Upper
 In-band Frequency [MHz]: 2480.045
 Max. in-band Level [dBm/100 kHz]: -1.269
 Out-of-band Frequency [MHz]: 2494.605
 Max. out-of-band Level [dBm/100 kHz]: -48.117
 Attenuation [dB]: -46.85



Date: 7.AUG.2017 15:44:50

3.7 Test Conditions and Results - Conducted spurious emissions

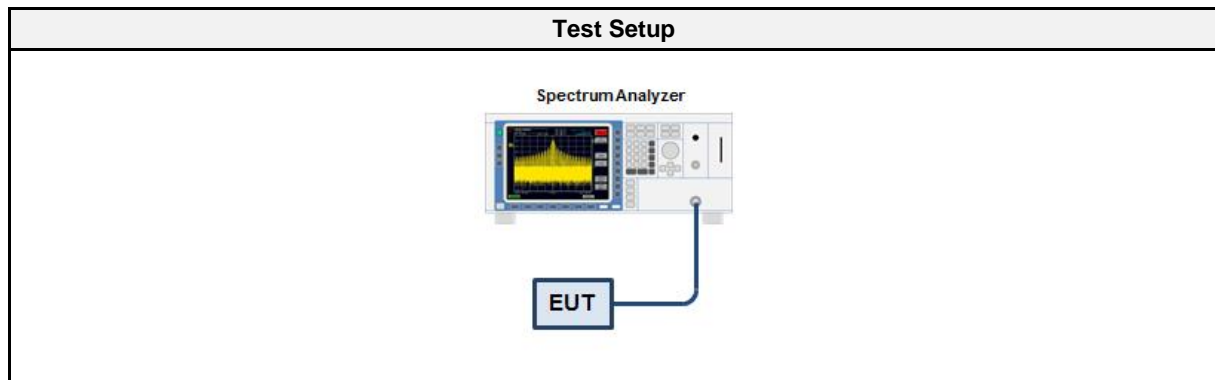
3.7.1 Information

Test Information	
Reference	FCC 15.247(d) / ISED RSS-247 5.5
Measurement Method	ANSI C63.10 11.11
Operator	Wilfried Treffke
Date	2017-08-07

3.7.2 Limits

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

3.7.3 Setup



3.7.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01003	2017-04	2018-04

3.7.5 Procedure

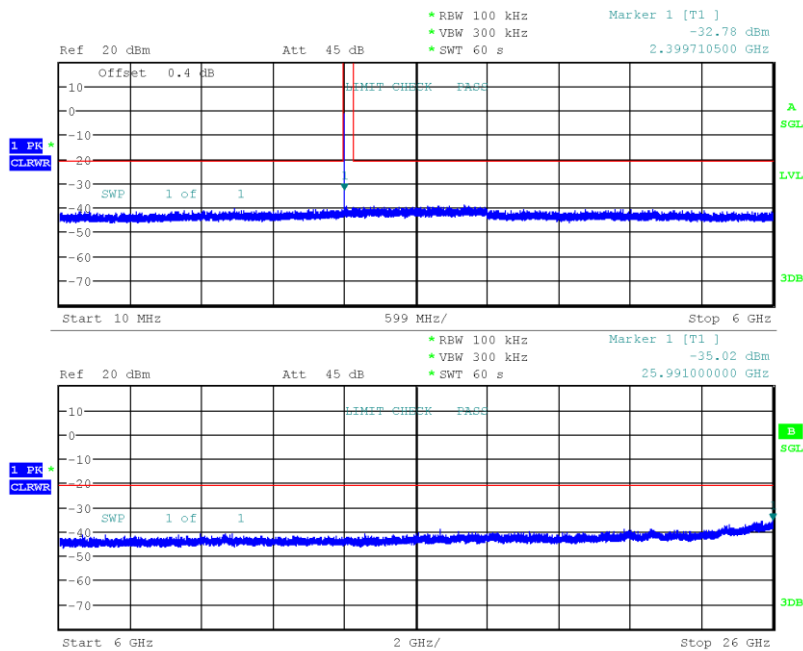
Test Procedure
<ol style="list-style-type: none"> EUT set to test mode (Communication tester is used if needed) Span set around lower band edge and detector is set to peak and max hold Resolution bandwidth is set to 100 kHz Markers are set to peak emission levels within frequency band and outside frequency band 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

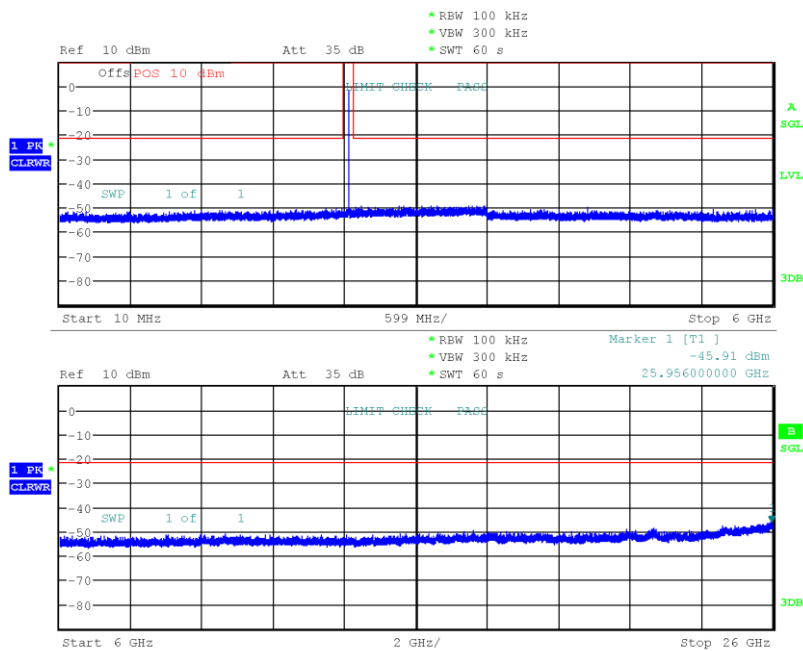
Project Number: G0M-1707-6688
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Sample ID: 14377
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.11
 Operational Mode: GFSK, Channel: 0, 2402 MHz
 Operating Conditions: Tnom/Vnom
 Operator: W. Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2017-08-07
 Max. in-band Frequency [MHz]: 2402.1
 Max. in-band Level [dBm/100 kHz]: -0.9
 Out-of-band Limit [dBm/100 kHz]: -20.9



Date: 7.AUG.2017 16:01:33

Conducted Spurious Emissions

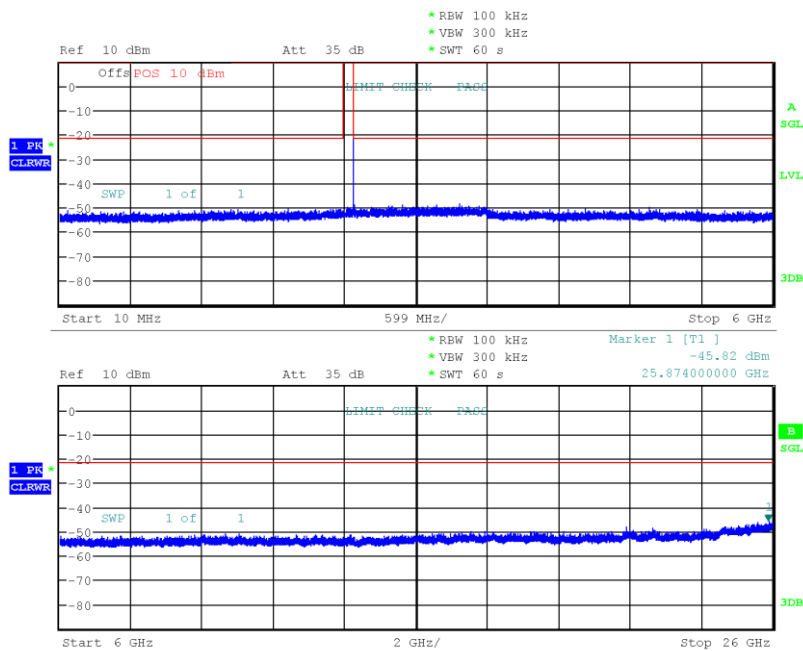
Project Number: G0M-1707-6688
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Sample ID: 14377
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.11
 Operational Mode: GFSK, Channel: 19, 2440 MHz
 Operating Conditions: Tnom/Vnom
 Operator: W. Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2017-08-07
 Max. in-band Frequency [MHz]: 2440.1
 Max. in-band Level [dBm/100 kHz]: -1.0
 Out-of-band Limit [dBm/100 kHz]: -21.0



Date: 7.AUG.2017 15:53:51

Conducted Spurious Emissions

Project Number: G0M-1707-6688
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Sample ID: 14377
 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: W. Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2017-08-07
 Max. in-band Frequency [MHz]: 2480.1
 Max. in-band Level [dBm/100 kHz]: -1.3
 Out-of-band Limit [dBm/100 kHz]: -21.3



Date: 7.AUG.2017 15:50:41

3.8 Test Conditions and Results - Transmitter radiated emissions

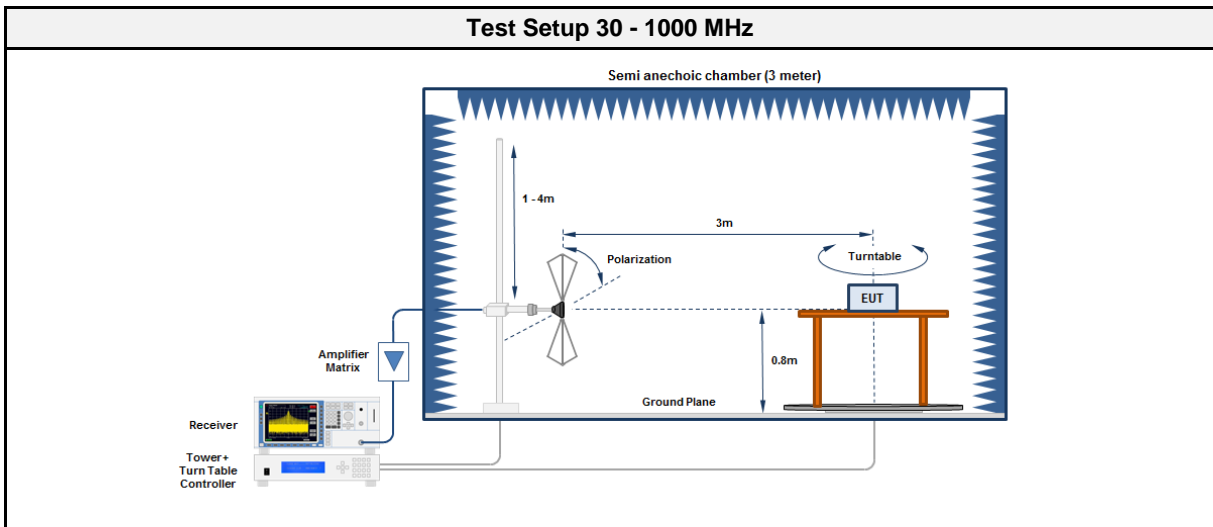
3.8.1 Information

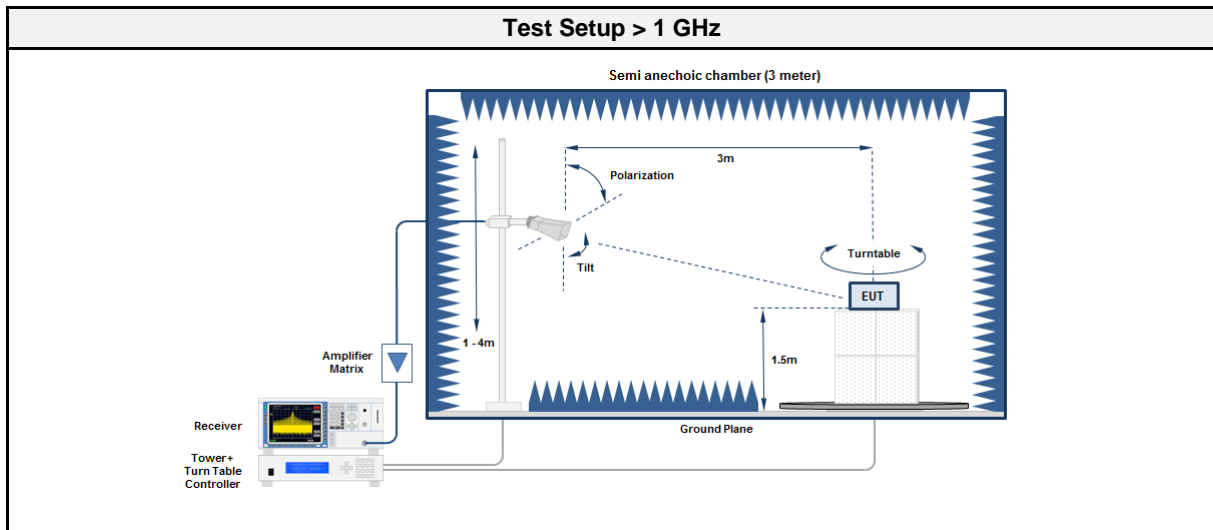
Test Information	
Reference	FCC 15.247(d) / ISED RSS-GEN 8.9
Measurement Method	ANSI C63.10 6.4, 6.5, 6.6, 11.12
Operator	Abdullah Al Jamal (supervised by Wilfried Treffke)
Date	2017-08-08

3.8.2 Limits

Limits			
Frequency [MHz]	Detector	Field strength [dB μ V/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





3.8.4 Equipment

Test Equipment 30 - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2017-02	2020-02
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2016-08	2017-08
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	2017-02	2020-02
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2016-08	2017-08
Antenna	R&S	BBHA 9120D	EF00018	2016-09	2019-09
Antenna	Amplifier Research	AT4560	EF00302	2017-03	2018-03

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 [dB μ V/m]	Det.	Pol.	Limit [dB μ V/m]	Margin [dB]
2402	2289.6	34.38	pk	ver	74.00	-39.62
2402	2292.2	40.53	pk	hor	74.00	-33.47
2402	2297.4	38.76	pk	hor	74.00	-35.24
2402	2386.8	52.51	pk	ver	74.00	-21.49
2402	2386.8	38.22	RMS	ver	54.00	-15.78
2402	2389.8	53.62	pk	ver	74.00	-20.38
2402	2389.8	38.19	RMS	ver	54.00	-15.81
2402	2483.5	45.19	pk	hor	74.00	-28.81
2402	2486.5	39.85	pk	ver	74.00	-34.15
2440	880	25.61	pk	hor	95.00	-69.39
2440	2139.6	32.10	pk	hor	95.00	-62.90
2440	2388.8	43.72	pk	hor	74.00	-30.28
2440	2397.2	43.99	pk	hor	95.00	-51.01
2440	2397.2	38.57	pk	ver	95.00	-56.43
2440	2483.5	44.22	pk	hor	74.00	-29.78
2440	2483.5	38.36	pk	ver	74.00	-35.64
2440	2504.7	44.64	pk	hor	95.00	-50.36
2480	121.12	36.41	pk	hor	43.52	-07.11
2480	880	27.28	pk	ver	95.00	-67.72
2480	899.2	24.53	pk	ver	95.00	-70.47

3.9 Test Conditions and Results - Receiver radiated emissions

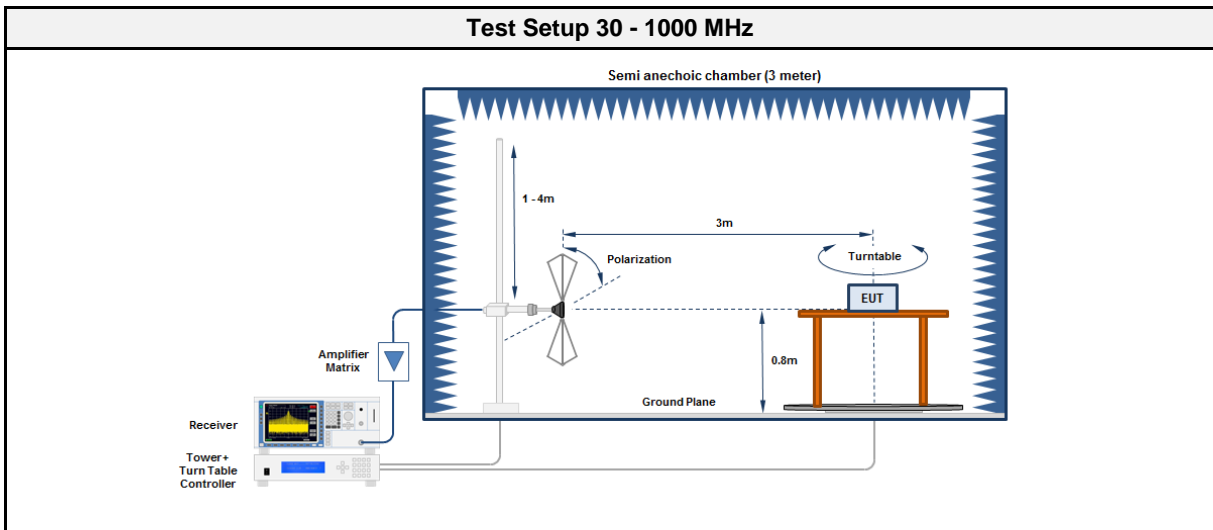
3.9.1 Information

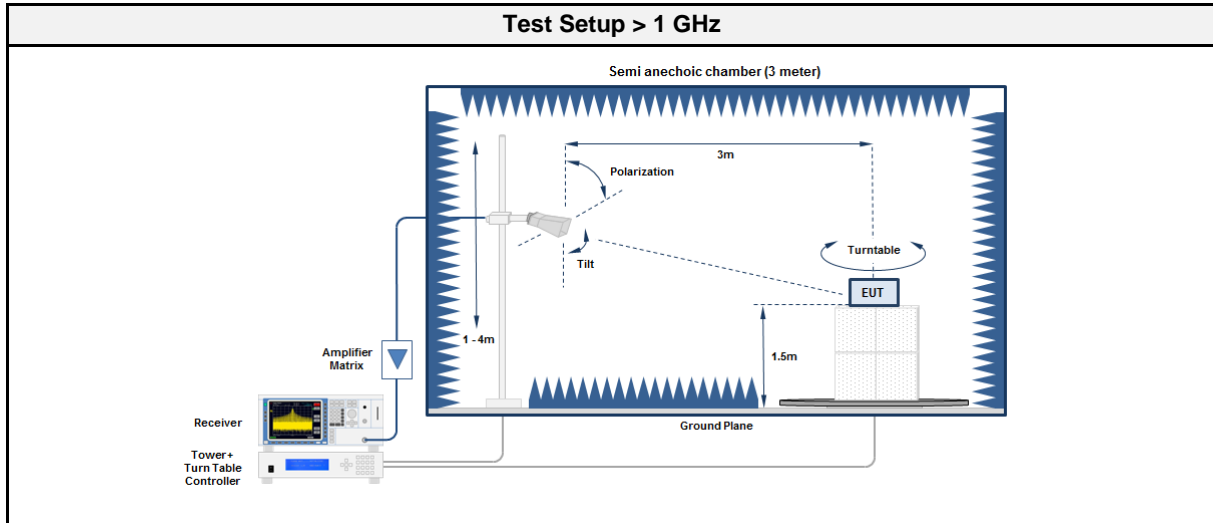
Test Information	
Reference	ISED RSS-247 3.1
Measurement Method	ANSI C63.10 6.5, 6.6, 11.12
Operator	Abdullah Al Jamal
Date	2017-08-08

3.9.2 Limits

Limits			
Frequency [MHz]	Detector	Field strength [dB μ V/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





3.9.4 Equipment

Test Equipment 30 - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2017-02	2020-02
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2016-08	2017-08
Antenna	R&S	HK 116	EF00030	2016-04	2019-04
Antenna	R&S	HL 223	EF00212	2016-04	2019-04

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2017-02	2020-02
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2016-08	2017-08
Antenna	R&S	BBHA 9120D	EF00018	2016-09	2019-09
Antenna	Amplifier Research	AT4560	EF01152	2016-09	2017-09

3.9.5 Procedure

Test Procedure 30 - 1000 MHz
<ol style="list-style-type: none"> EUT is placed on a non conducting support at the center of a turn table 0.8 m above the ground EUT set to test mode The receiver is set to peak detection with max hold The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m All significant emissions are measured again using the corresponding final detector

Test Procedure > 1 GHz
<ol style="list-style-type: none"> EUT is placed on a non conducting support at the center of a turn table 1.5 m above the ground EUT set to test mode The receiver is set to peak detection with max hold The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m All significant emissions are measured again using the corresponding final detector

3.9.6 Results

Test Results						
Channel [MHz]	Emission [MHz]	Level [dB μ V/m]	Det.	Pol.	Limit [dB μ V/m]	Margin [dB]
2440	121.46	34.00	pk	hor	43.50	-09.50
2440	121.46	34.60	pk	ver	43.50	-08.90
2440	142.54	35.20	pk	ver	43.50	-08.30
2440	243.2	12.08	pk	hor	46.00	-33.92
2440	881.6	32.52	pk	ver	46.00	-13.48
2440	2212	38.83	pk	hor	53.98	-15.15
2440	2404	39.06	pk	hor	53.98	-14.92
2440	2404	40.18	pk	ver	53.98	-13.80
2440	7936	50.45	pk	ver	53.98	-03.53
2440	7952	51.14	pk	hor	53.98	-02.84
2440	7968	50.76	pk	ver	53.98	-03.22
2440	10646	45.44	pk	hor	53.98	-08.54
2440	11420	45.81	pk	ver	53.98	-08.17
2440	14543	47.93	pk	ver	53.98	-06.05
2440	14723	48.10	pk	hor	53.98	-05.88

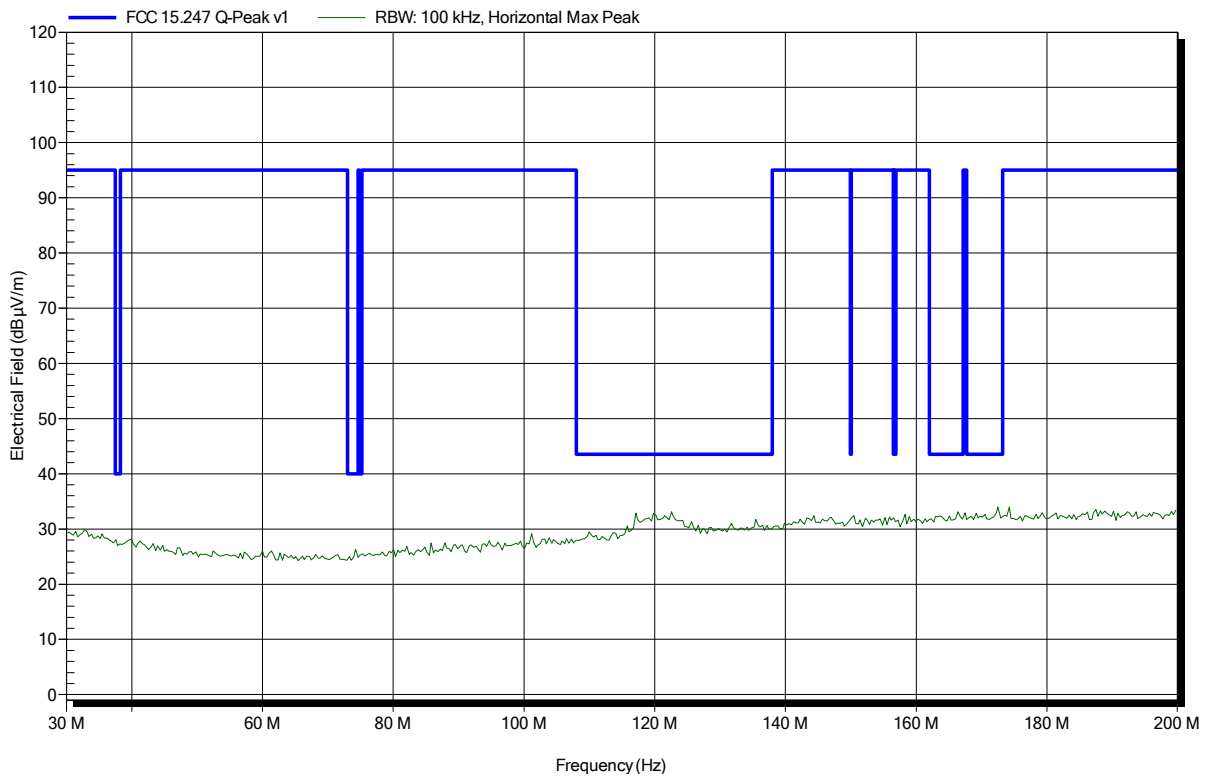
ANNEX A Transmitter spurious emissions

Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24°C, Vnom: 5.0 VDC (USB)
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: TX; BLE; 2402 MHz
 Test Date: 2017-08-08
 Note:

Index 35

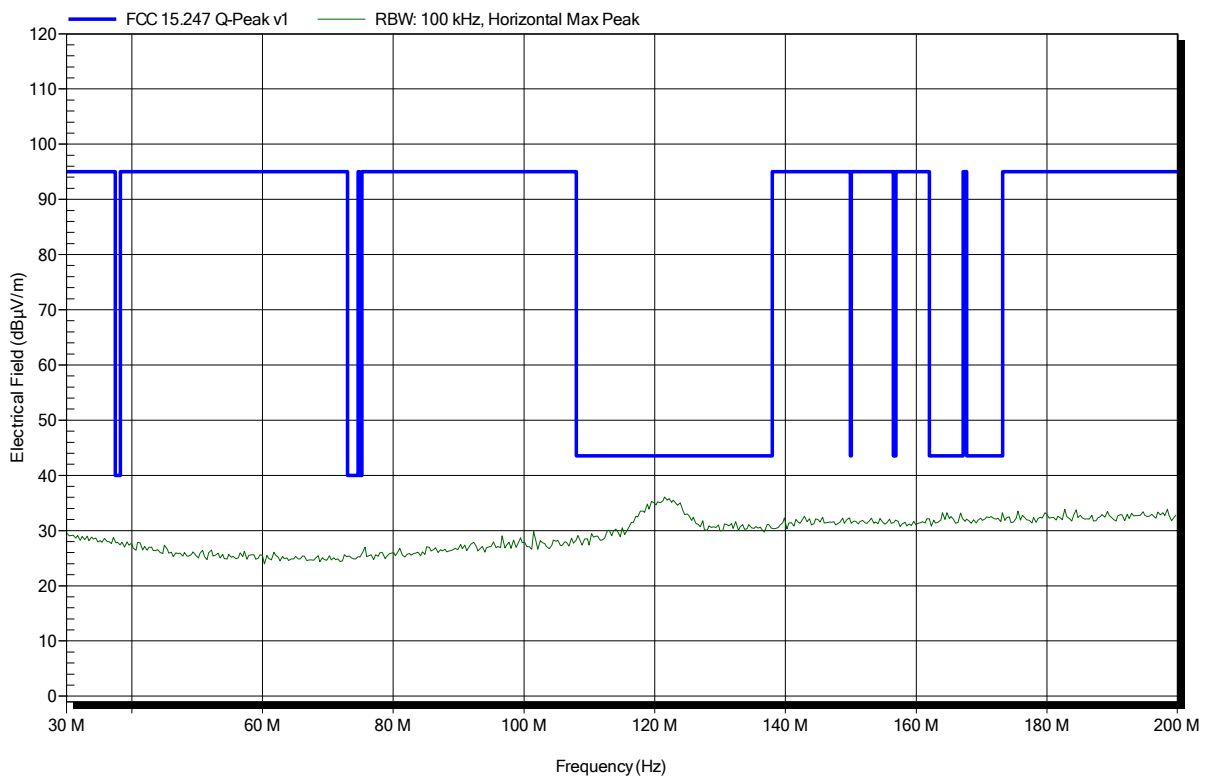


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24°C, Vnom: 5.0 VDC (USB)
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: TX; BLE; 2402 MHz
 Test Date: 2017-08-08
 Note:

Index 36

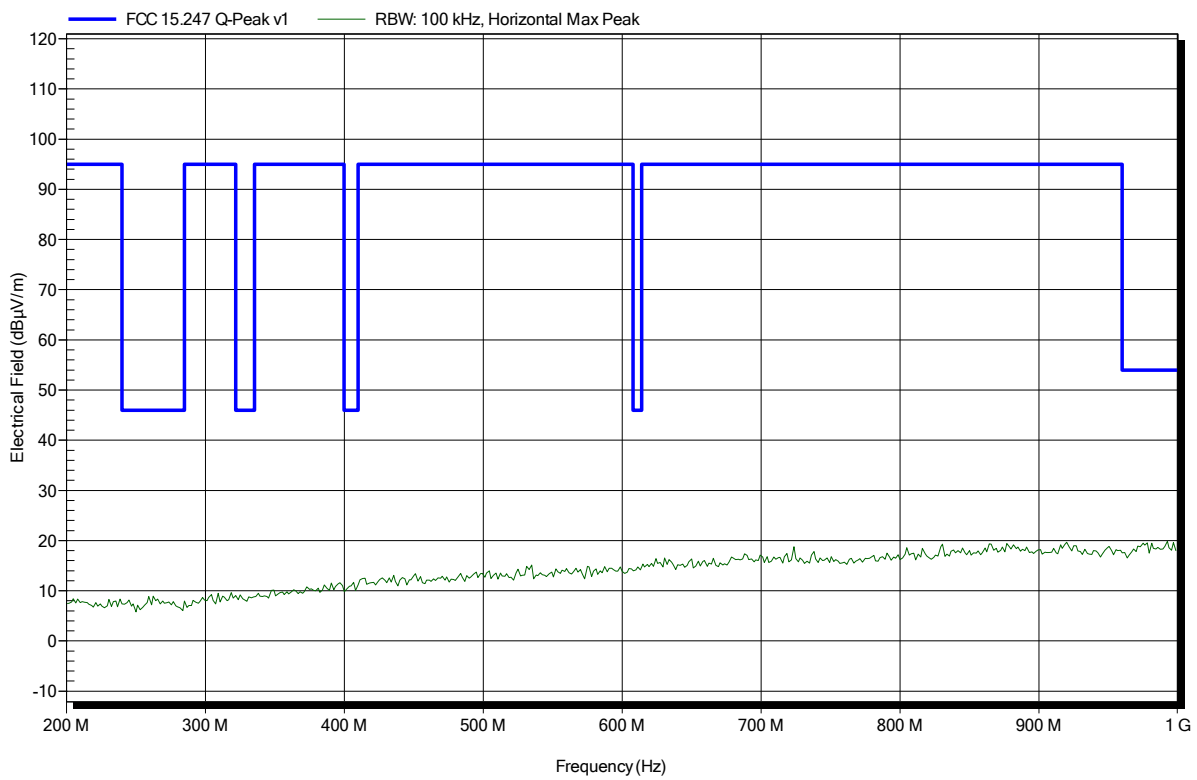


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24°C, Vnom: 5.0 VDC (USB)
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: TX; BLE; 2402 MHz
 Test Date: 2017-08-08
 Note:

Index 33

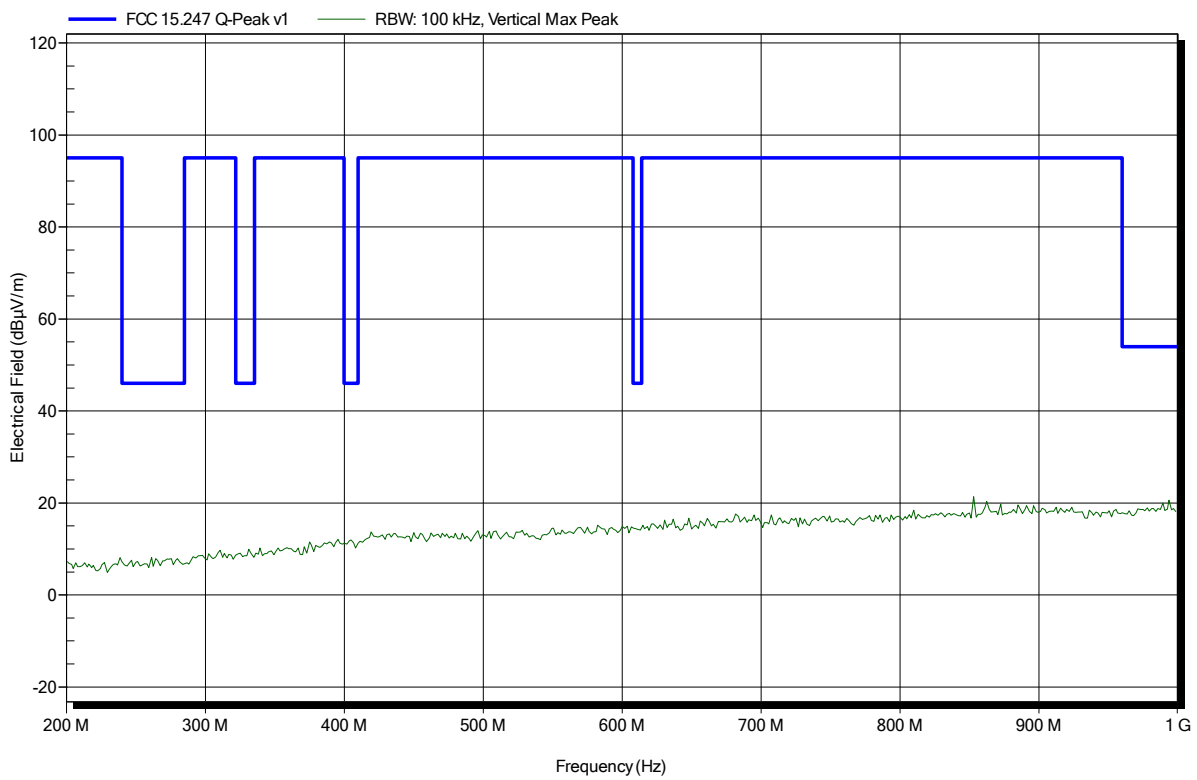


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24°C, Vnom: 5.0 VDC (USB)
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: TX; BLE; 2402 MHz
 Test Date: 2017-08-08
 Note:

Index 34

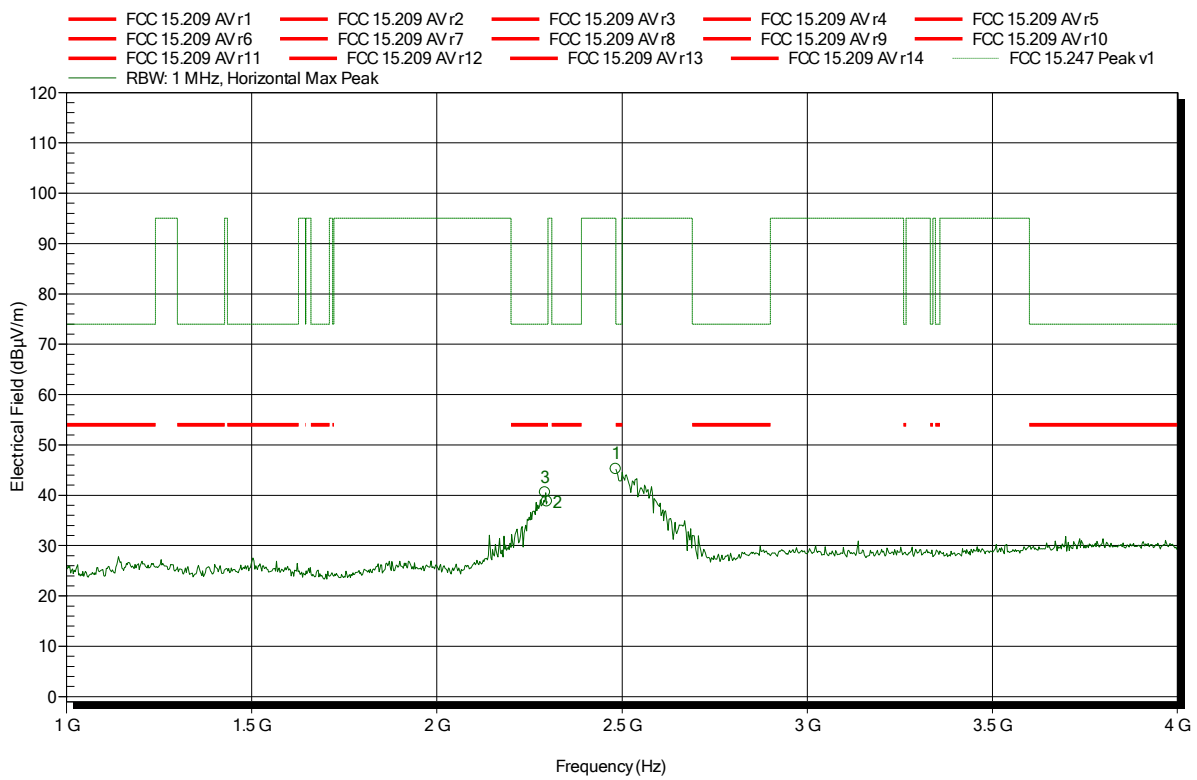


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 22.7°C, Vnom: 5.0 VDC (USB)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2402 MHz
 Test Date: 2017-08-08
 Note:

Index 1



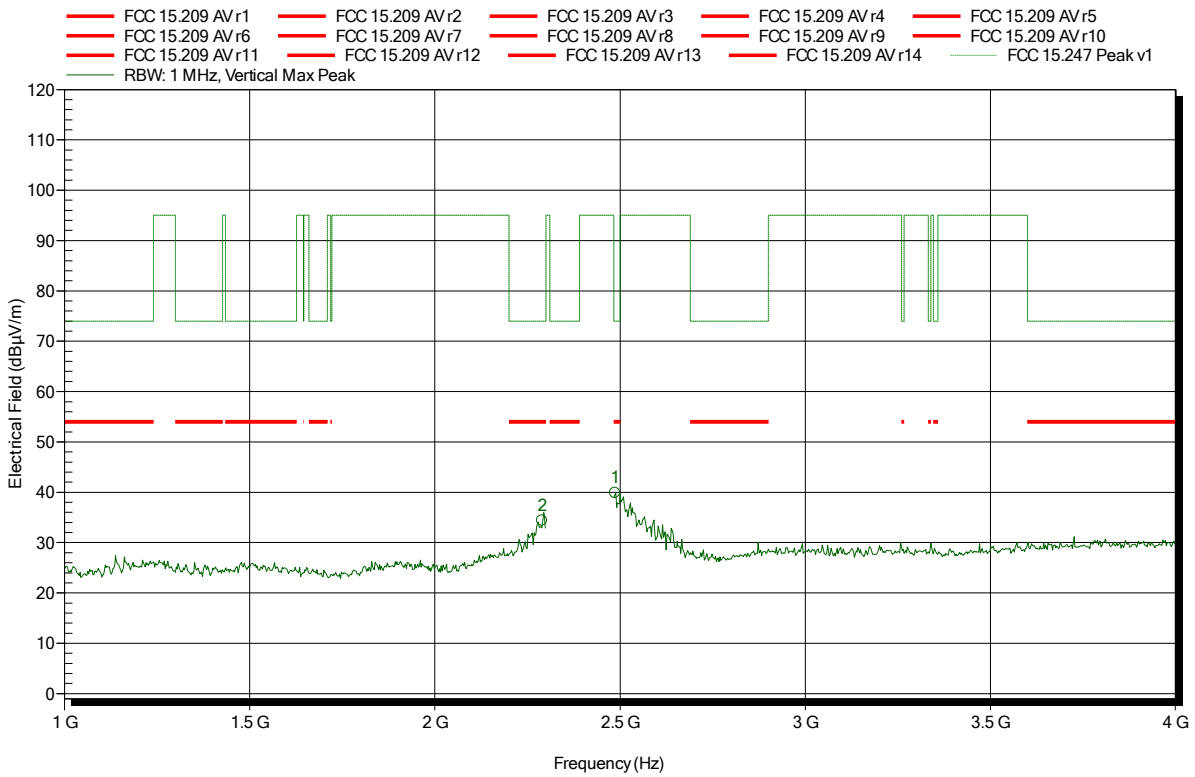
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.2922 GHz	40.53 dBµV/m	74 dBµV/m	-33.47 dB	Pass
2.2974 GHz	38.76 dBµV/m	74 dBµV/m	-35.24 dB	Pass
2.4835 GHz	45.19 dBµV/m	74 dBµV/m	-28.81 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 22.7°C, Vnom: 5.0 VDC (USB)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2402 MHz
 Test Date: 2017-08-08
 Note:

Index 8



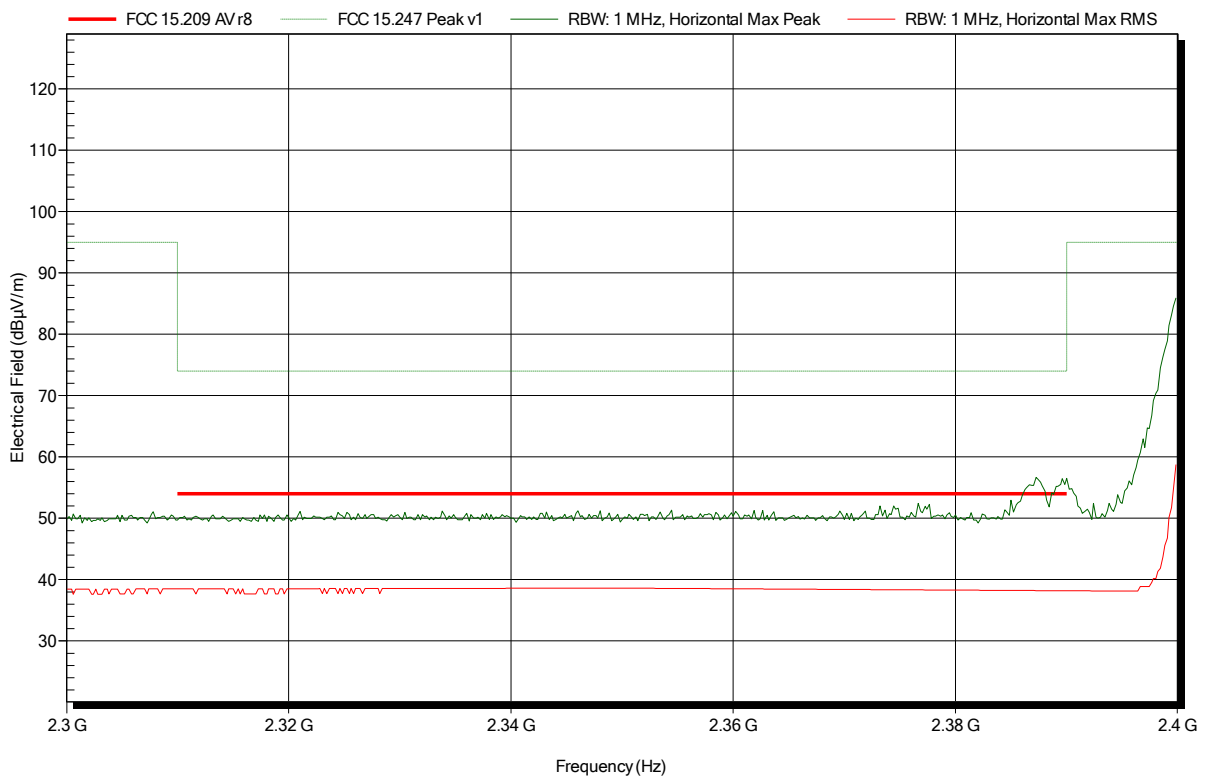
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.2896 GHz	34.38 dBµV/m	74 dBµV/m	-39.62 dB	Pass
2.4865 GHz	39.85 dBµV/m	74 dBµV/m	-34.15 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 22.7°C, Vnom: 5.0 VDC (USB)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2402 MHz
 Test Date: 2017-08-08
 Note: lower bandedge

Index 10

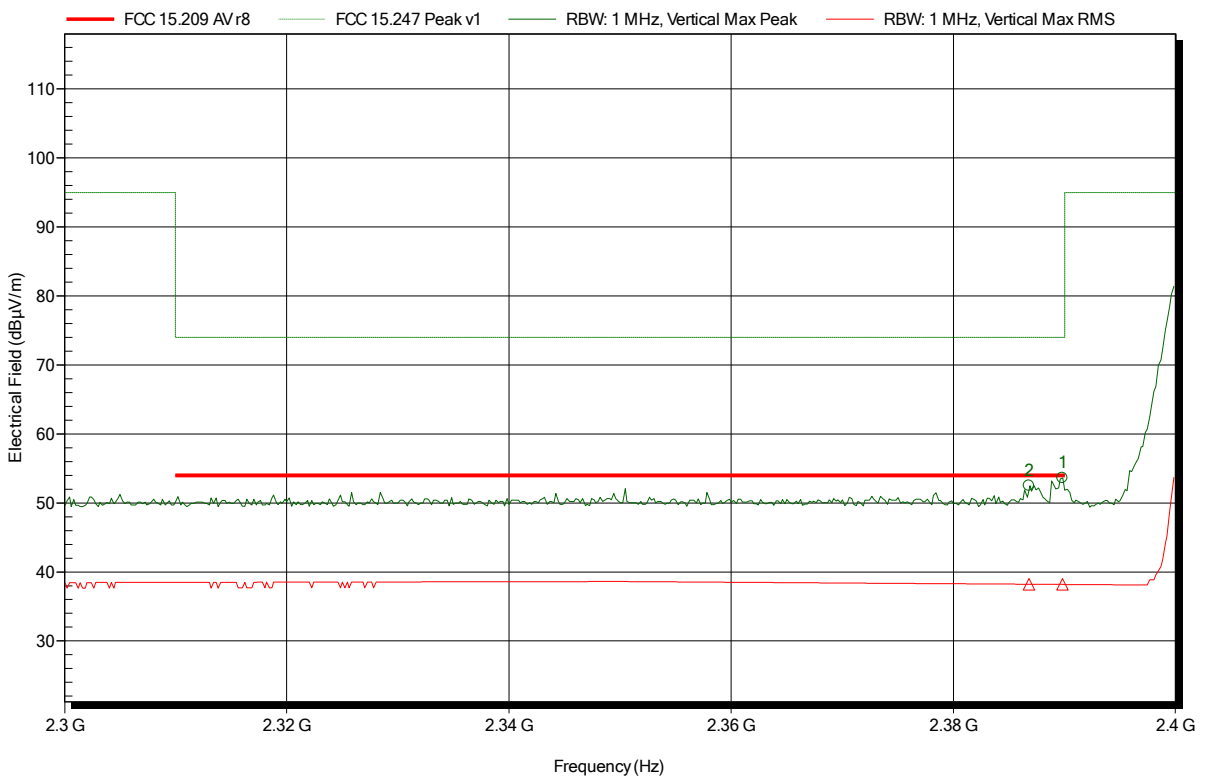


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 22.7°C, Vnom: 5.0 VDC (USB)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2402 MHz
 Test Date: 2017-08-08
 Note: lower bandedge

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Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.3868 GHz	52.51 dBµV/m	74 dBµV/m	-21.49 dB	Pass
2.3898 GHz	53.62 dBµV/m	74 dBµV/m	-20.38 dB	Pass

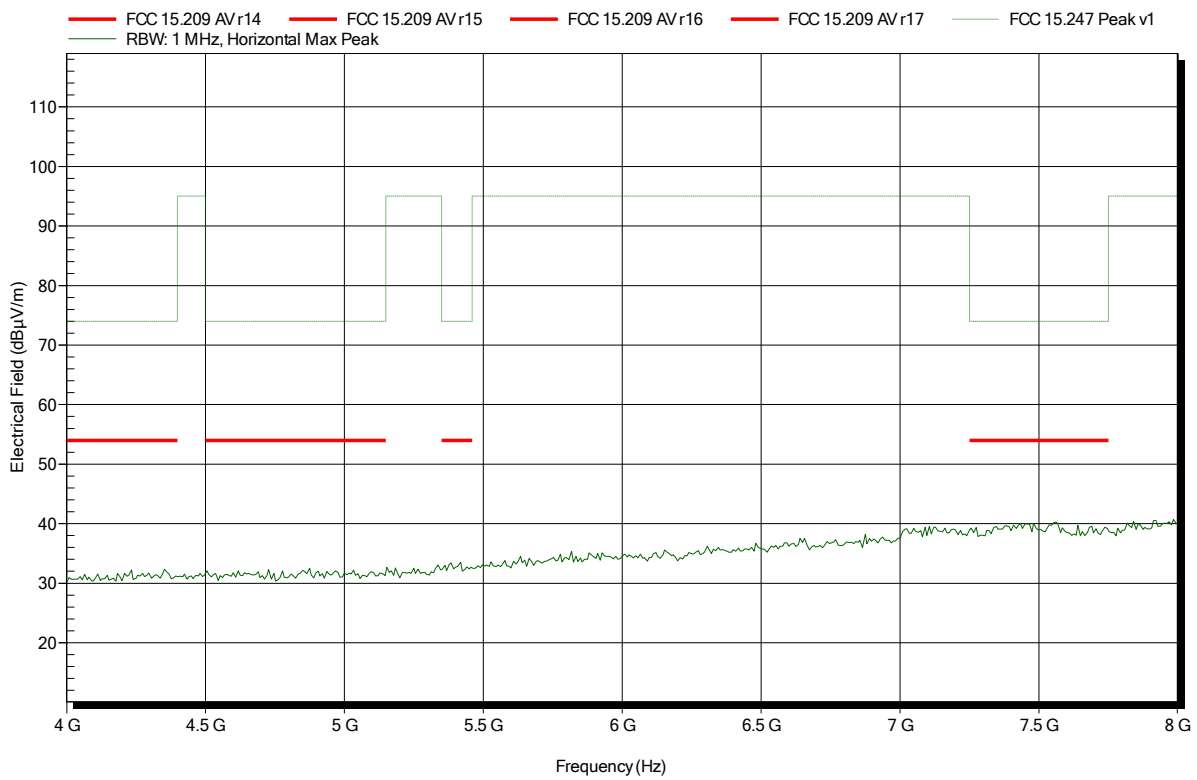
Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.3868 GHz	38.22 dBµV/m	54 dBµV/m	-15.78 dB	Pass
2.3898 GHz	38.19 dBµV/m	54 dBµV/m	-15.81 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 22.7°C, Vnom: 5.0 VDC (USB)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2402 MHz
 Test Date: 2017-08-08
 Note:

Index 2

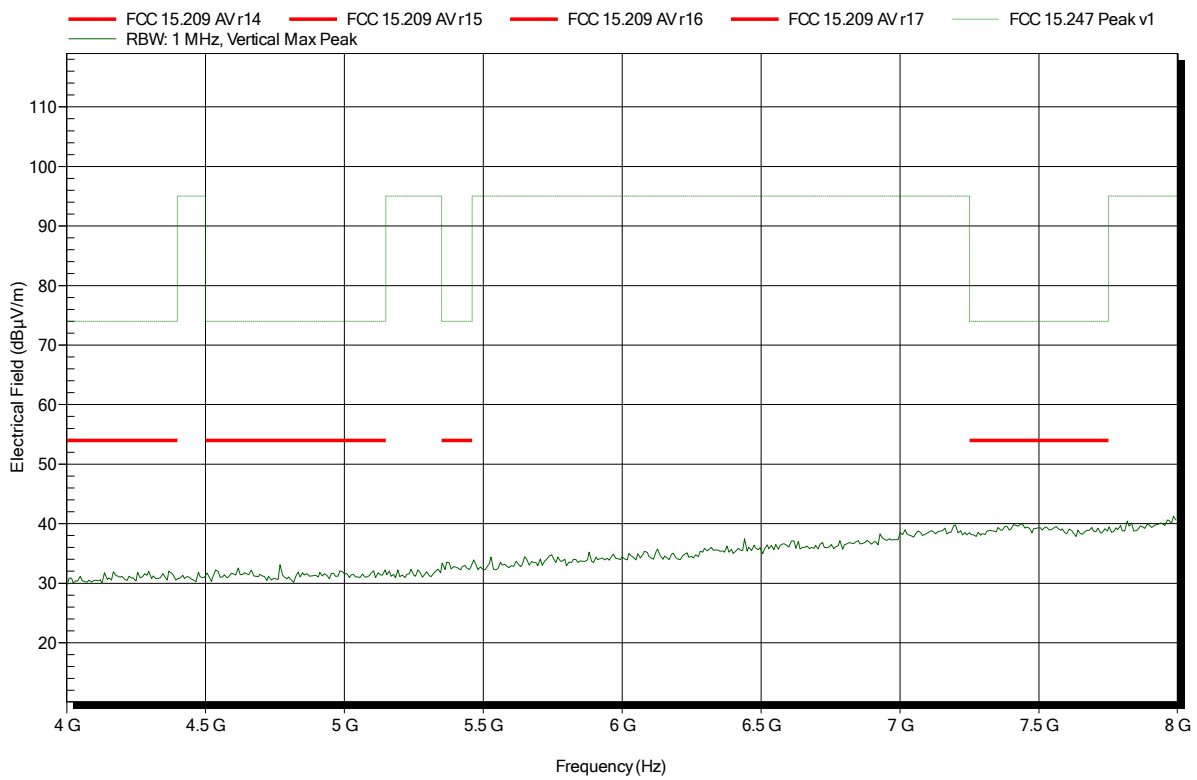


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 22.7°C, Vnom: 5.0 VDC (USB)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2402 MHz
 Test Date: 2017-08-08
 Note:

Index 7

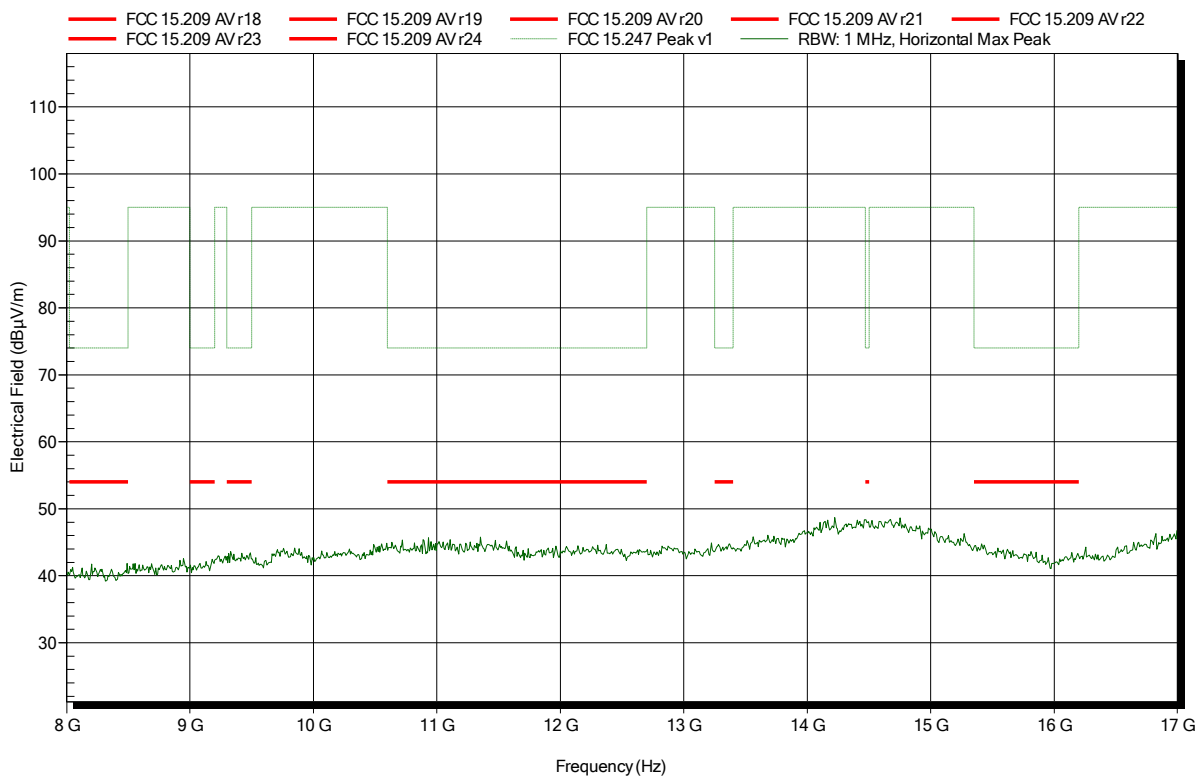


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 22.7°C, Vnom: 5.0 VDC (USB)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2402 MHz
 Test Date: 2017-08-08
 Note:

Index 3

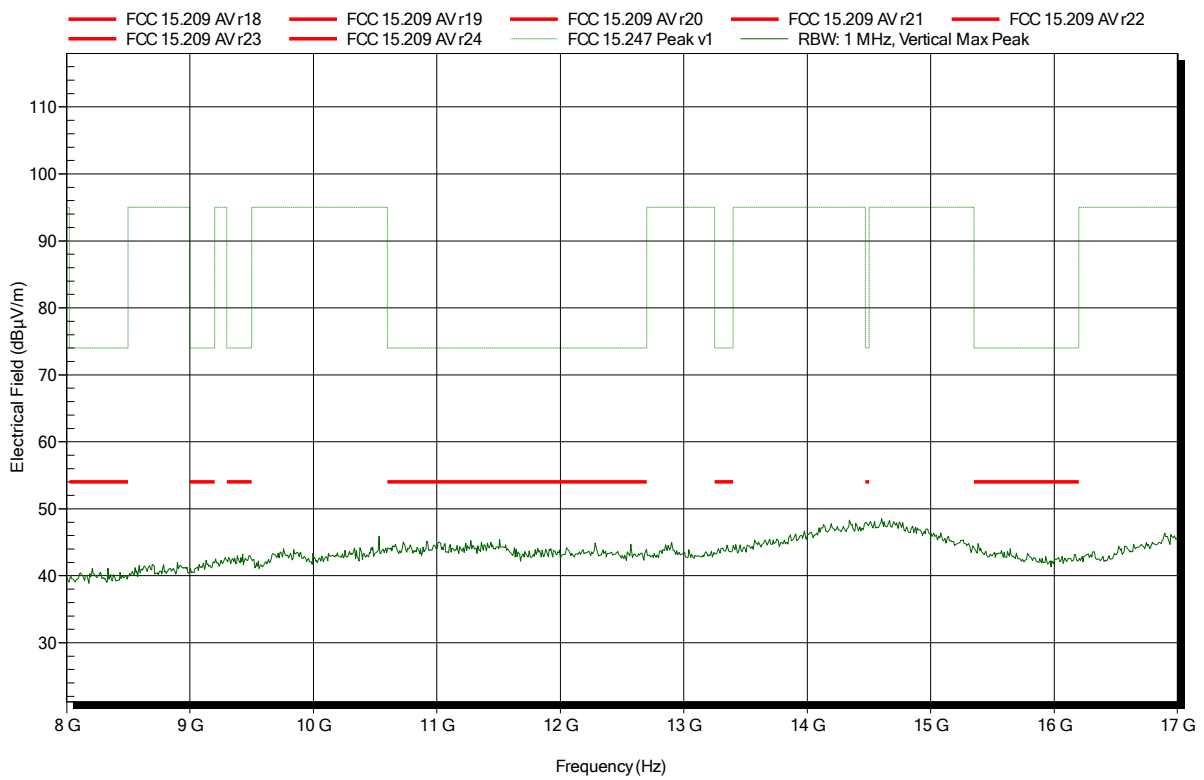


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 22.7°C, Vnom: 5.0 VDC (USB)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2402 MHz
 Test Date: 2017-08-08
 Note:

Index 6

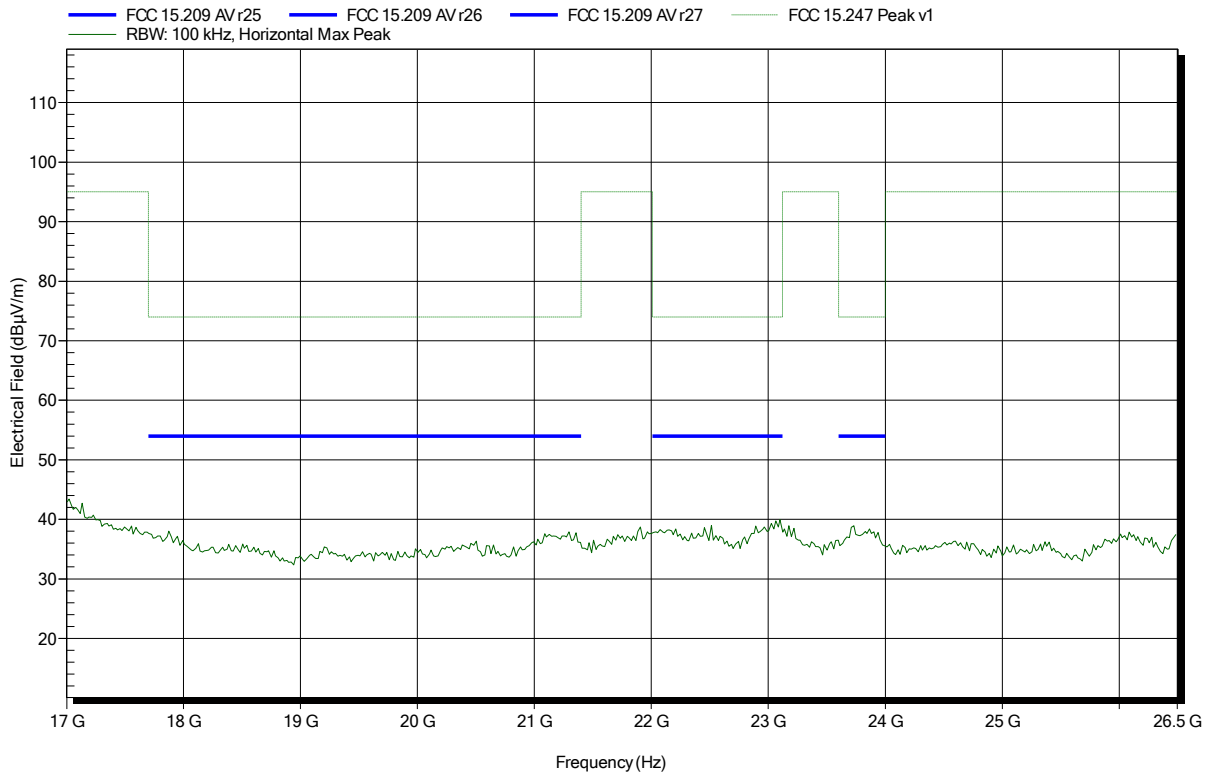


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 22.7°C, Vnom: 5.0 VDC (USB)
 Antenna: Amplifier Research AT 4560 (old name) / ATH18G40 (new name),
 Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2402 MHz
 Test Date: 2017-08-08
 Note:

Index 4

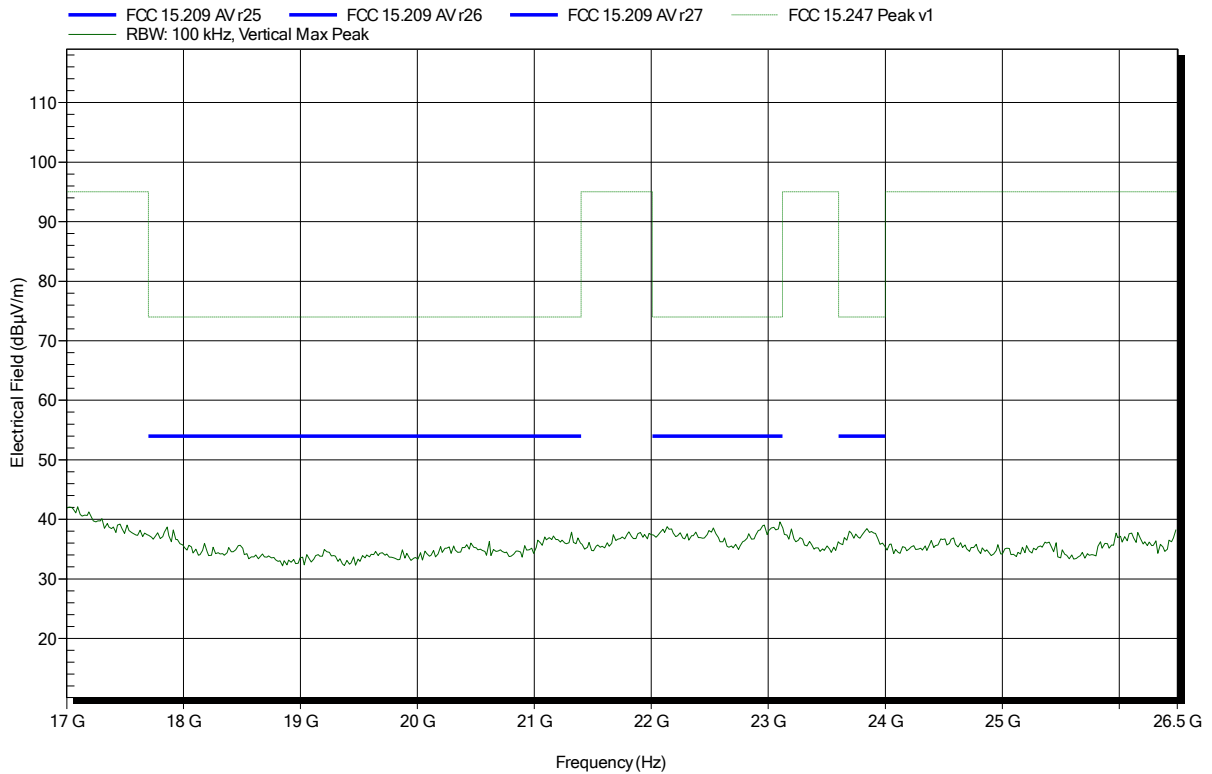


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 22.7°C, Vnom: 5.0 VDC (USB)
 Antenna: Amplifier Research AT 4560 (old name) / ATH18G40 (new name),
 Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2402 MHz
 Test Date: 2017-08-08
 Note:

Index 5

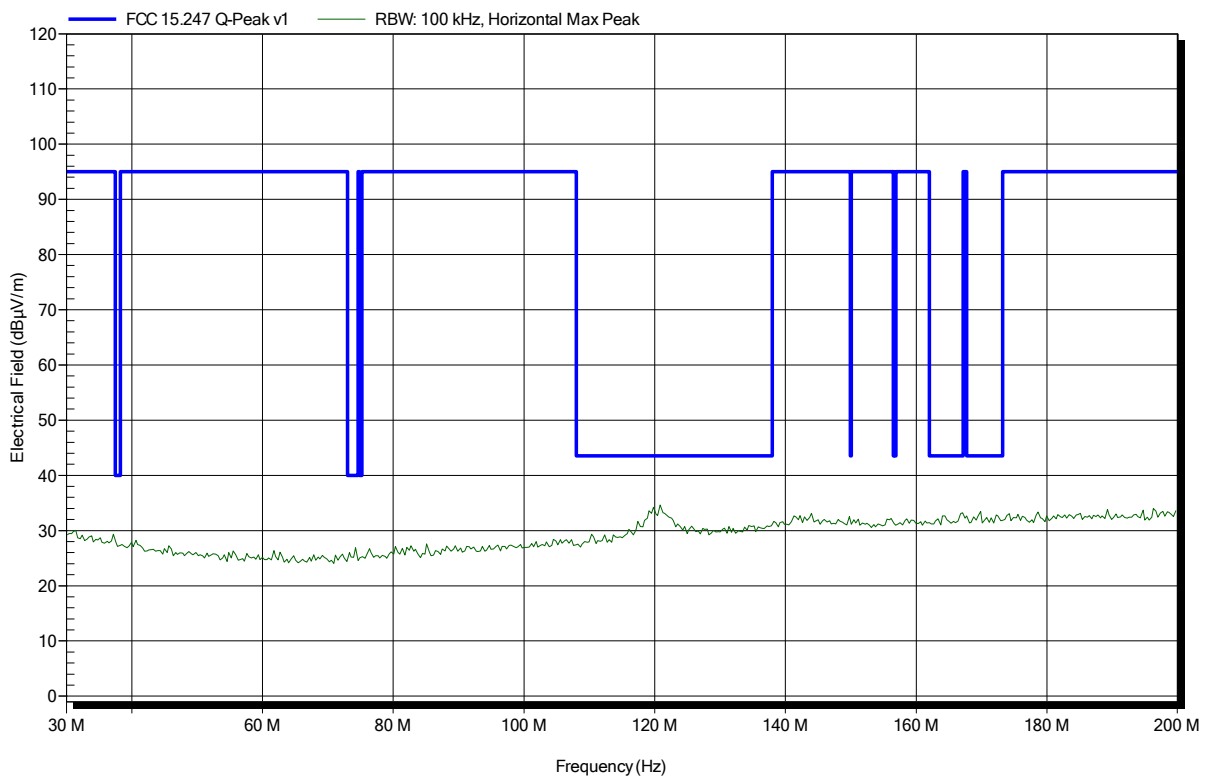


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24°C, Vnom: 5.0 VDC (USB)
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: TX; BLE; 2440 MHz
 Test Date: 2017-08-08
 Note:

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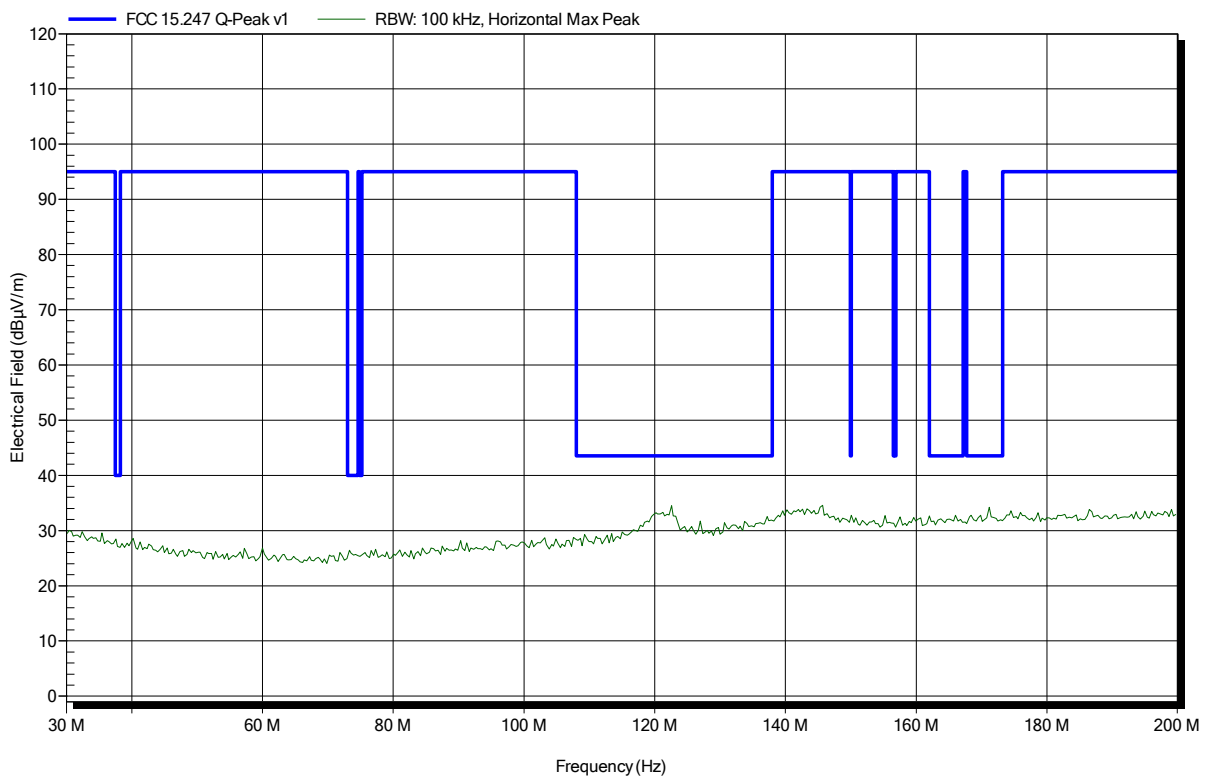


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24°C, Vnom: 5.0 VDC (USB)
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: TX; BLE; 2440 MHz
 Test Date: 2017-08-08
 Note:

Index 37

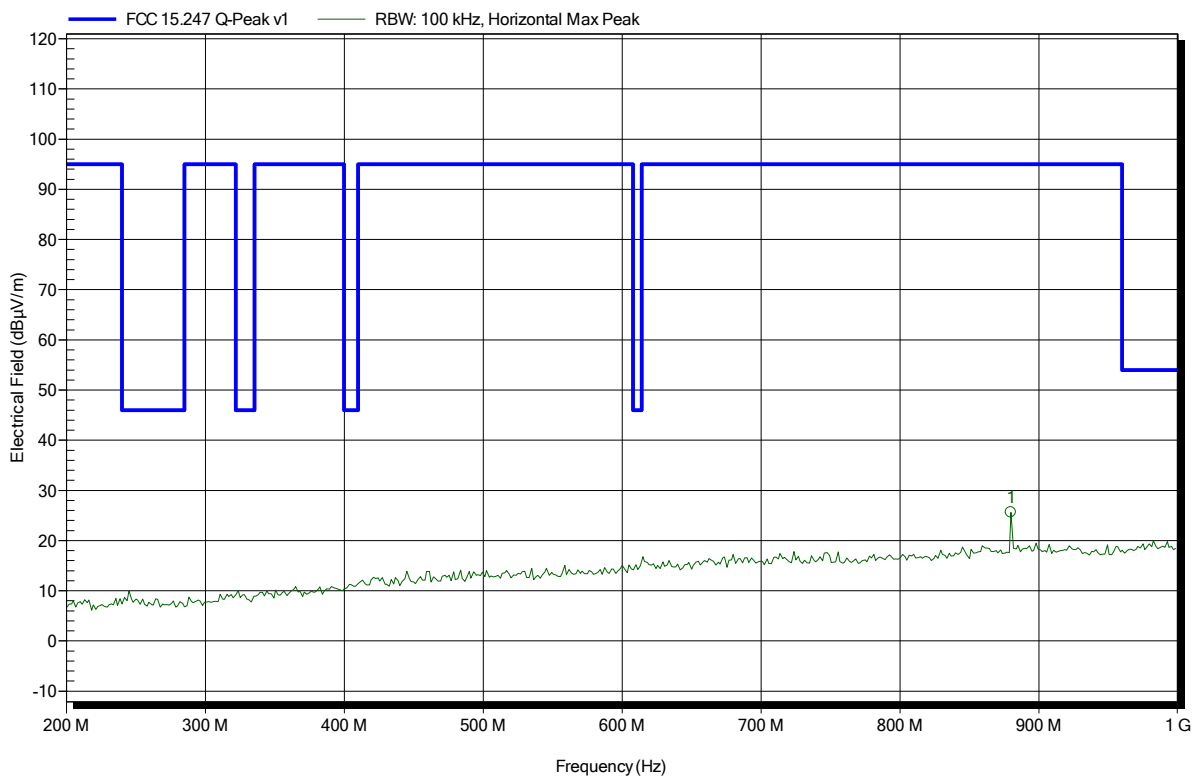


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24°C, Vnom: 5.0 VDC (USB)
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: TX; BLE; 2440 MHz
 Test Date: 2017-08-08
 Note:

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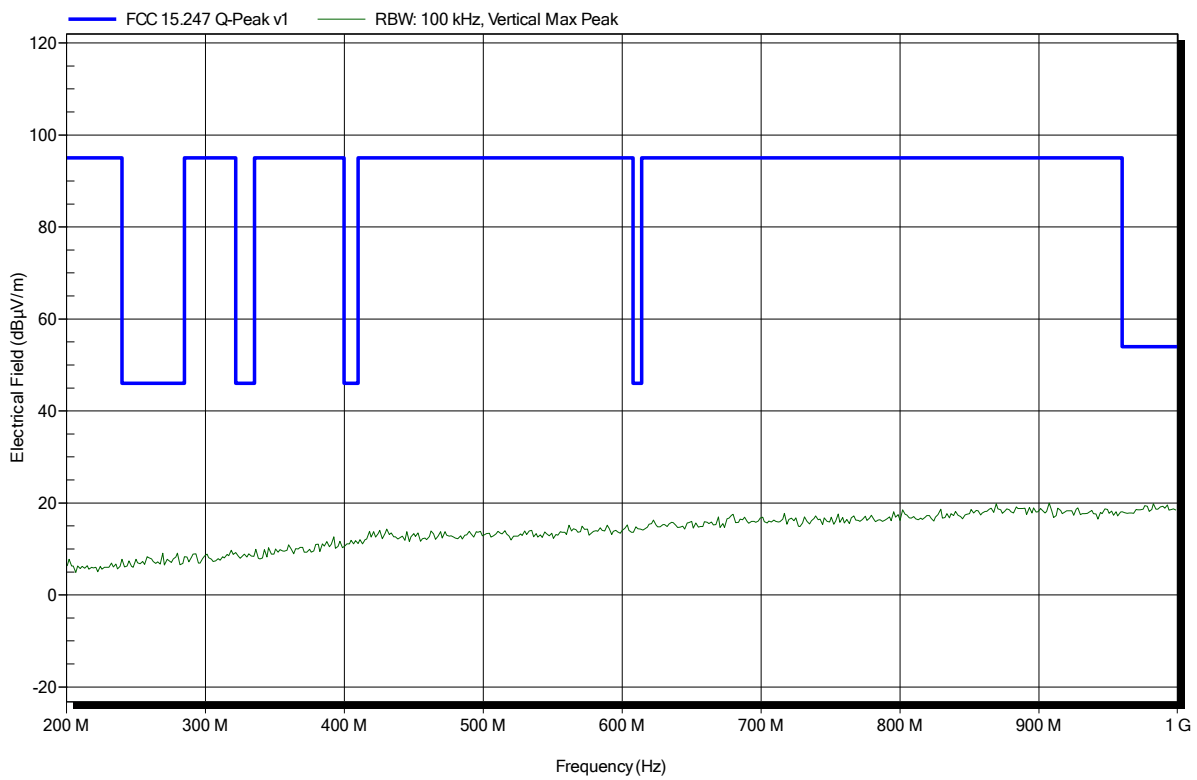
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
880 MHz	25.61 dBµV/m	95 dBµV/m	-69.39 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24°C, Vnom: 5.0 VDC (USB)
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: TX; BLE; 2440 MHz
 Test Date: 2017-08-08
 Note:

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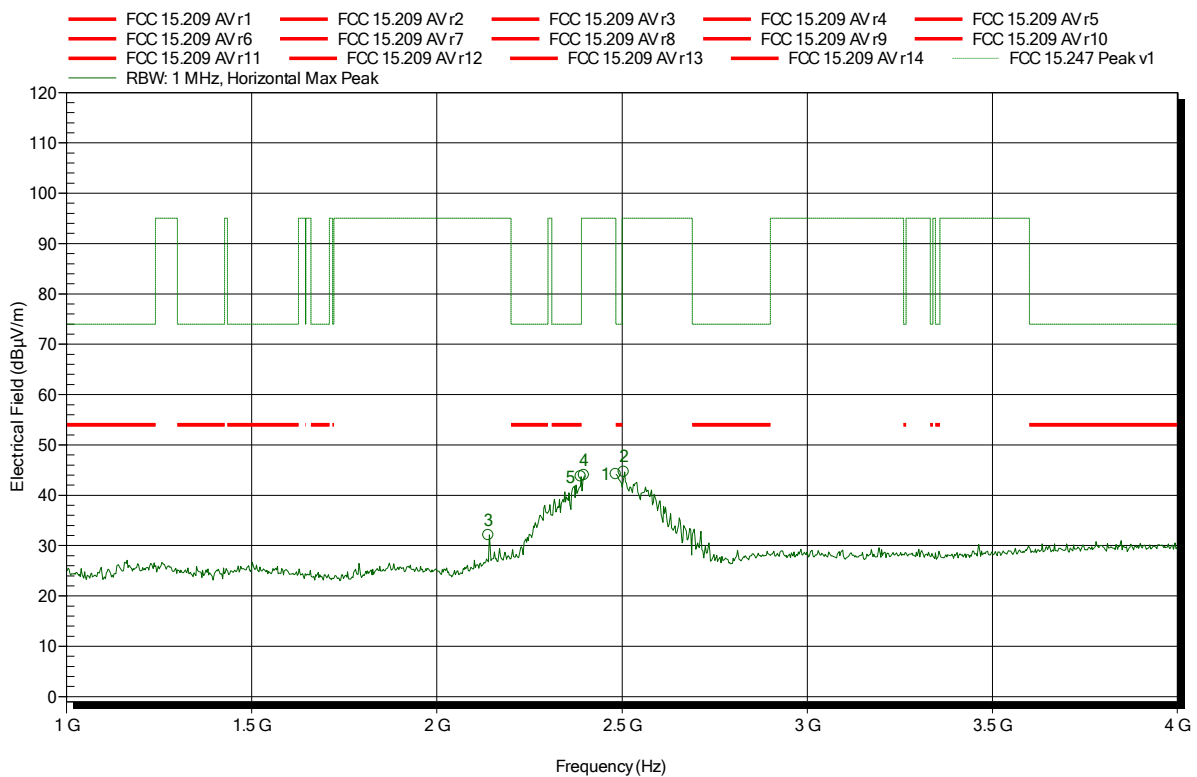


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 22.7°C, Vnom: 5.0 VDC (USB)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2440 MHz
 Test Date: 2017-08-08
 Note:

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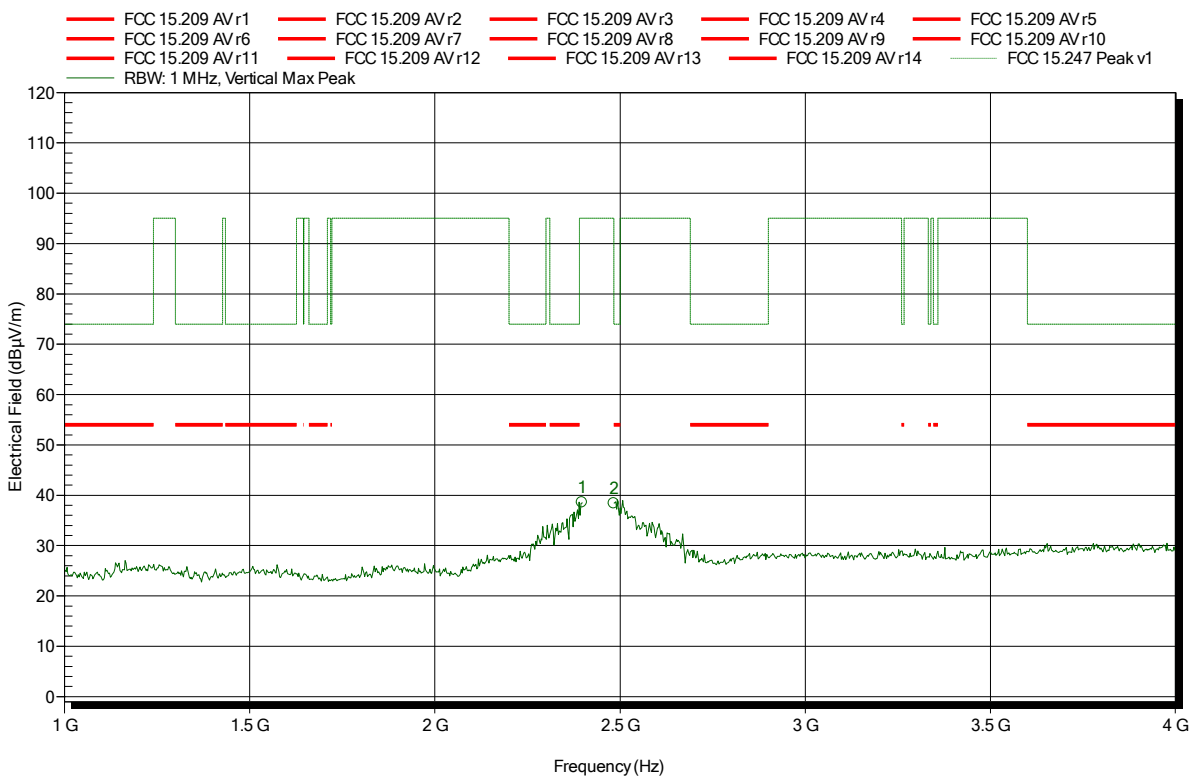
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.1396 GHz	32.1 dBµV/m	95 dBµV/m	-62.9 dB	Pass
2.3888 GHz	43.72 dBµV/m	74 dBµV/m	-30.28 dB	Pass
2.3972 GHz	43.99 dBµV/m	95 dBµV/m	-51.01 dB	Pass
2.4835 GHz	44.22 dBµV/m	74 dBµV/m	-29.78 dB	Pass
2.5047 GHz	44.64 dBµV/m	95 dBµV/m	-50.36 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24°C, Vnom: 5.0 VDC (USB)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2440 MHz
 Test Date: 2017-08-08
 Note:

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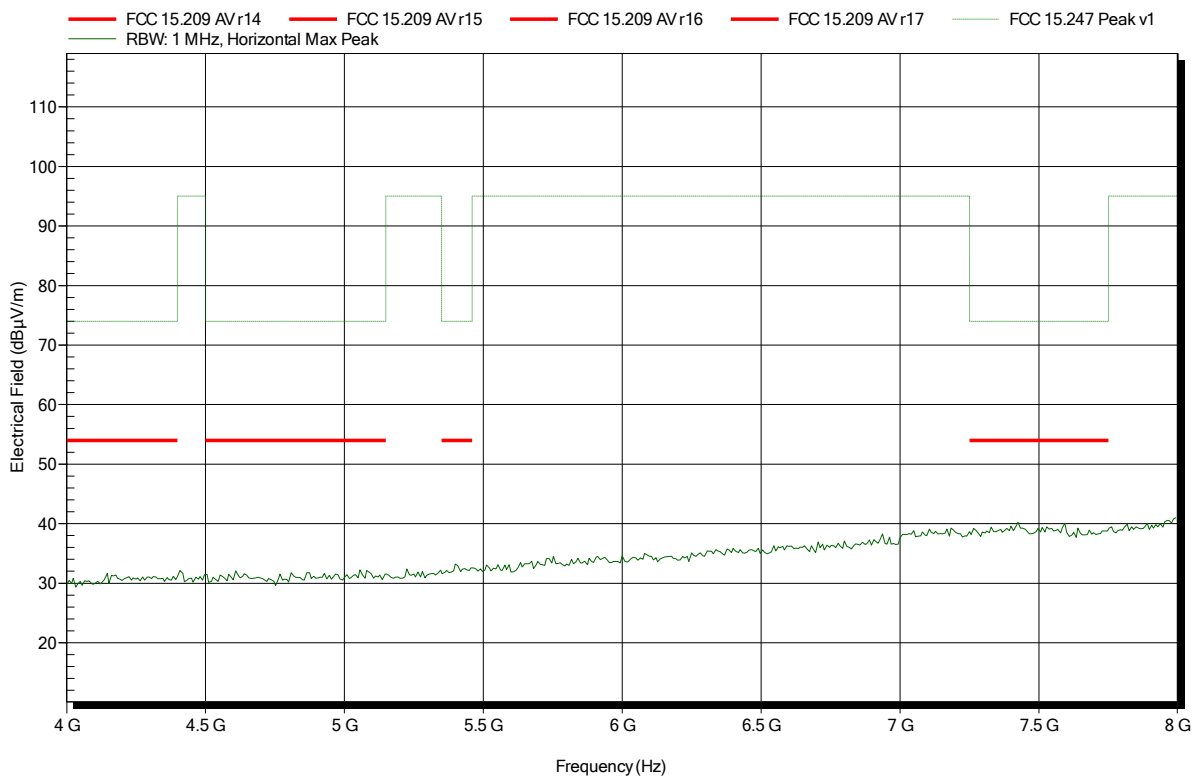
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.3972 GHz	38.57 dBµV/m	95 dBµV/m	-56.43 dB	Pass
2.4835 GHz	38.36 dBµV/m	74 dBµV/m	-35.64 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 22.7°C, Vnom: 5.0 VDC (USB)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2440 MHz
 Test Date: 2017-08-08
 Note:

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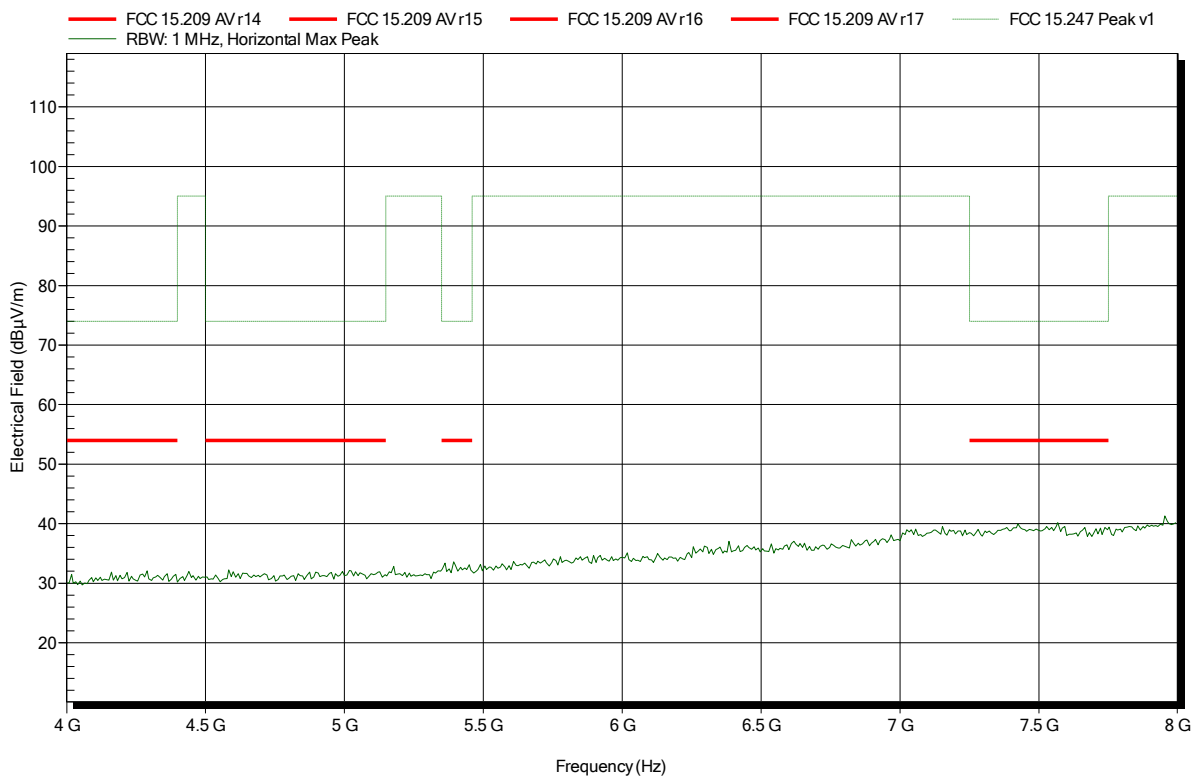


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 22.7°C, Vnom: 5.0 VDC (USB)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2440 MHz
 Test Date: 2017-08-08
 Note:

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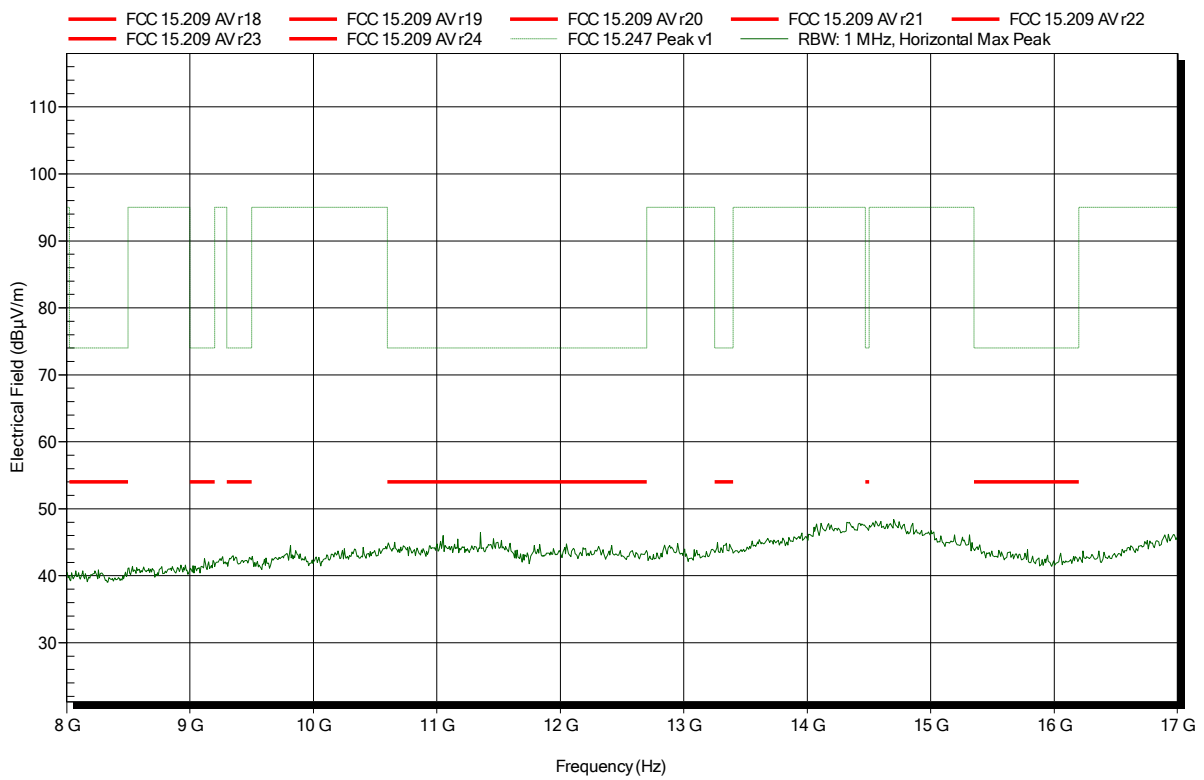


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 22.7°C, Vnom: 5.0 VDC (USB)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2440 MHz
 Test Date: 2017-08-08
 Note:

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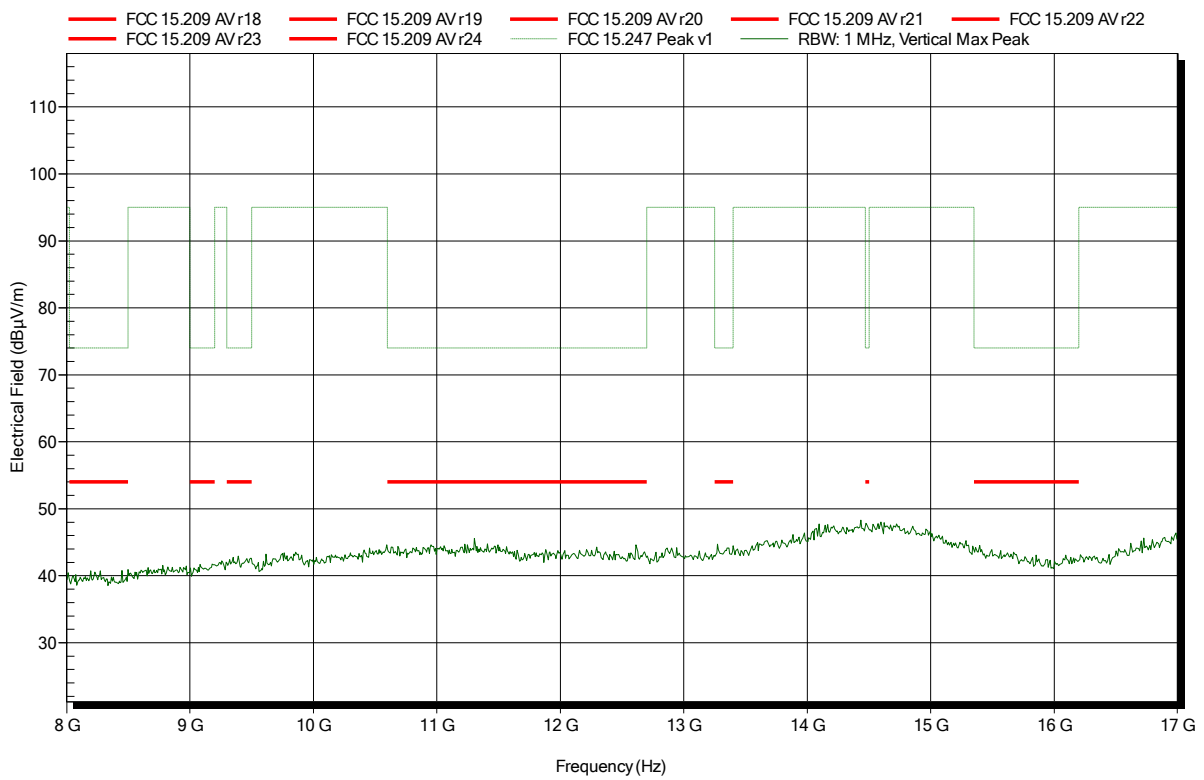


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 22.7°C, Vnom: 5.0 VDC (USB)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2440 MHz
 Test Date: 2017-08-08
 Note:

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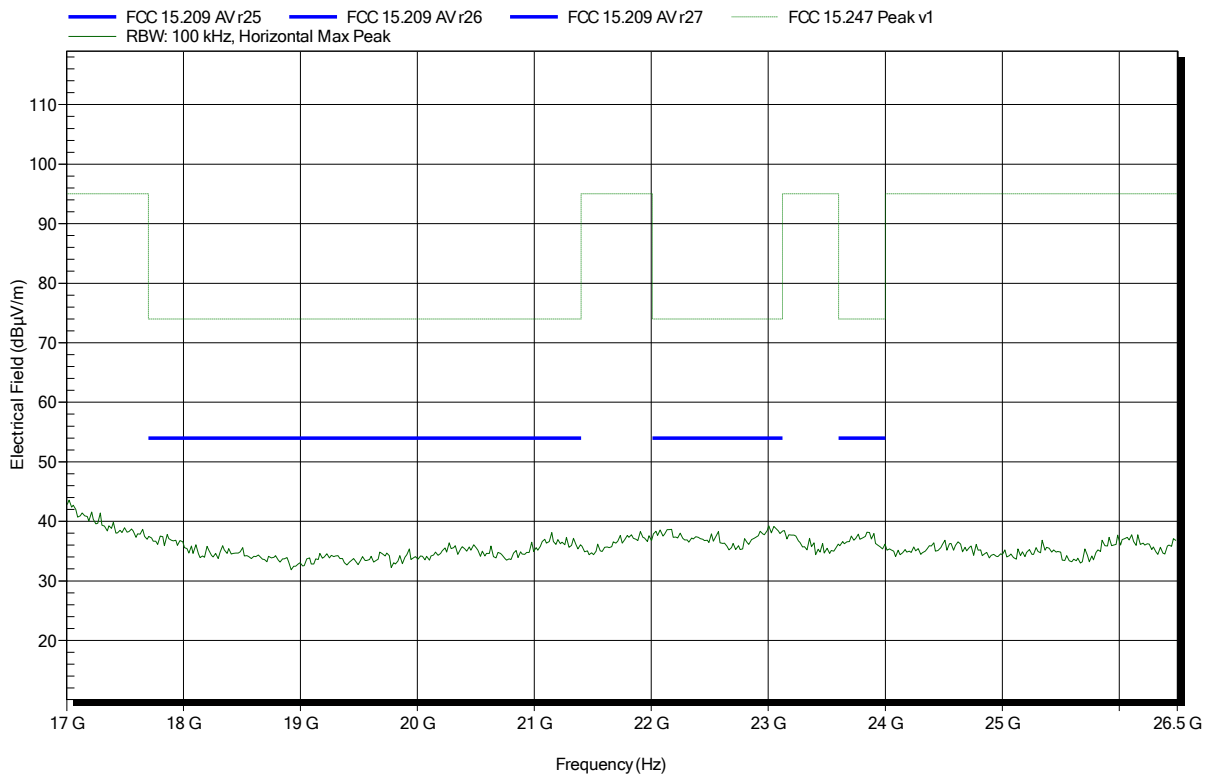


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 22.7°C, Vnom: 5.0 VDC (USB)
 Antenna: Amplifier Research AT 4560 (old name) / ATH18G40 (new name),
 Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2440 MHz
 Test Date: 2017-08-08
 Note:

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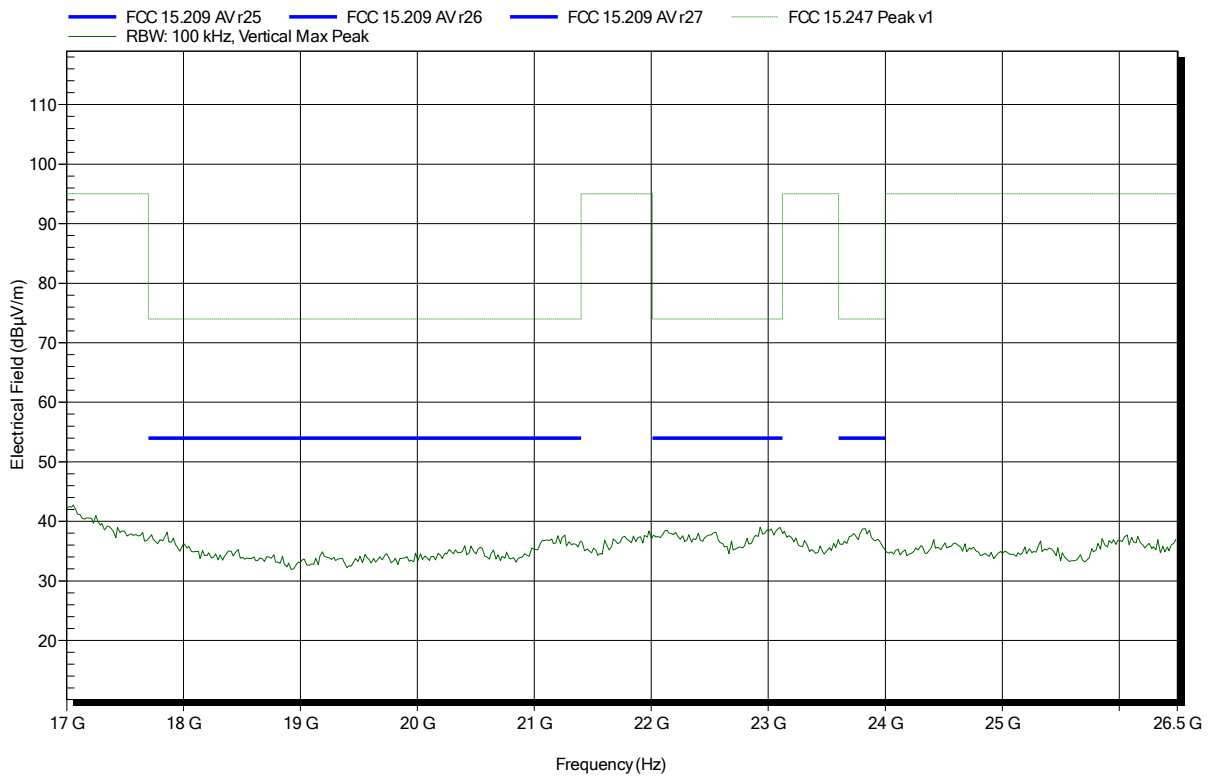


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 22.7°C, Vnom: 5.0 VDC (USB)
 Antenna: Amplifier Research AT 4560 (old name) / ATH18G40 (new name), Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2440 MHz
 Test Date: 2017-08-08
 Note:

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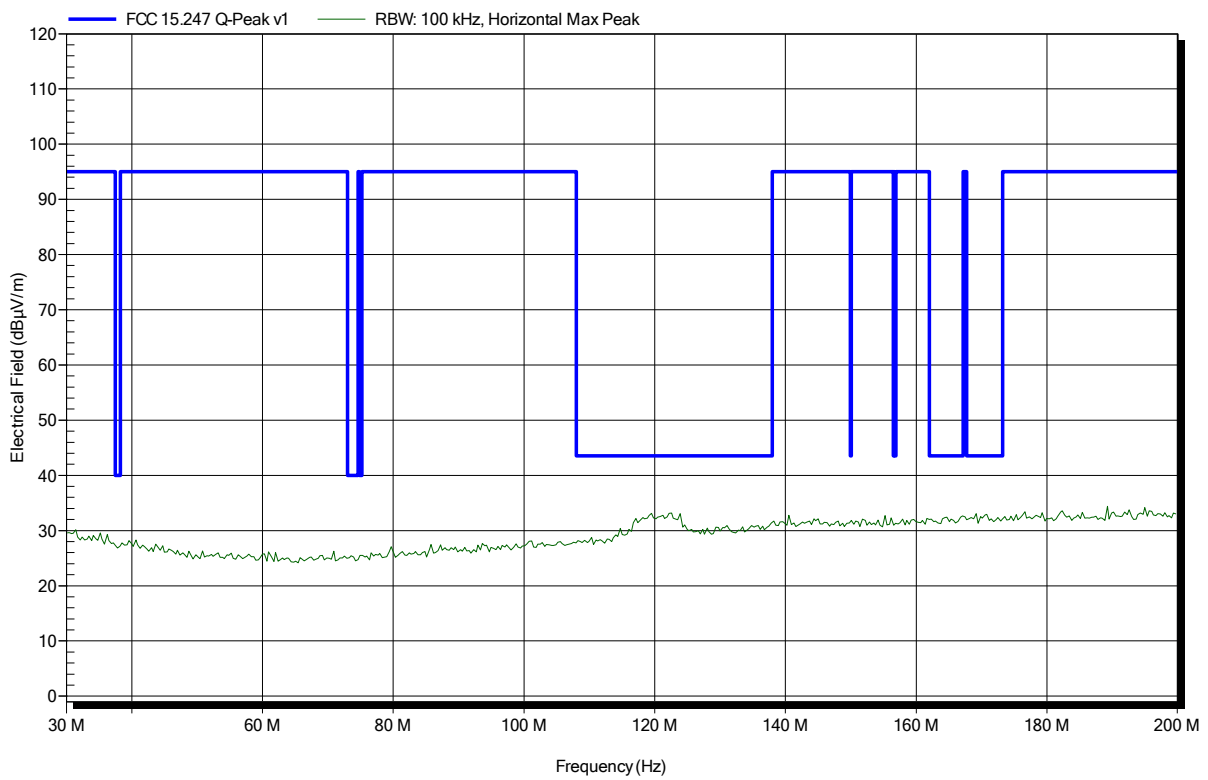


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24°C, Vnom: 5.0 VDC (USB)
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: TX; BLE; 2480 MHz
 Test Date: 2017-08-08
 Note:

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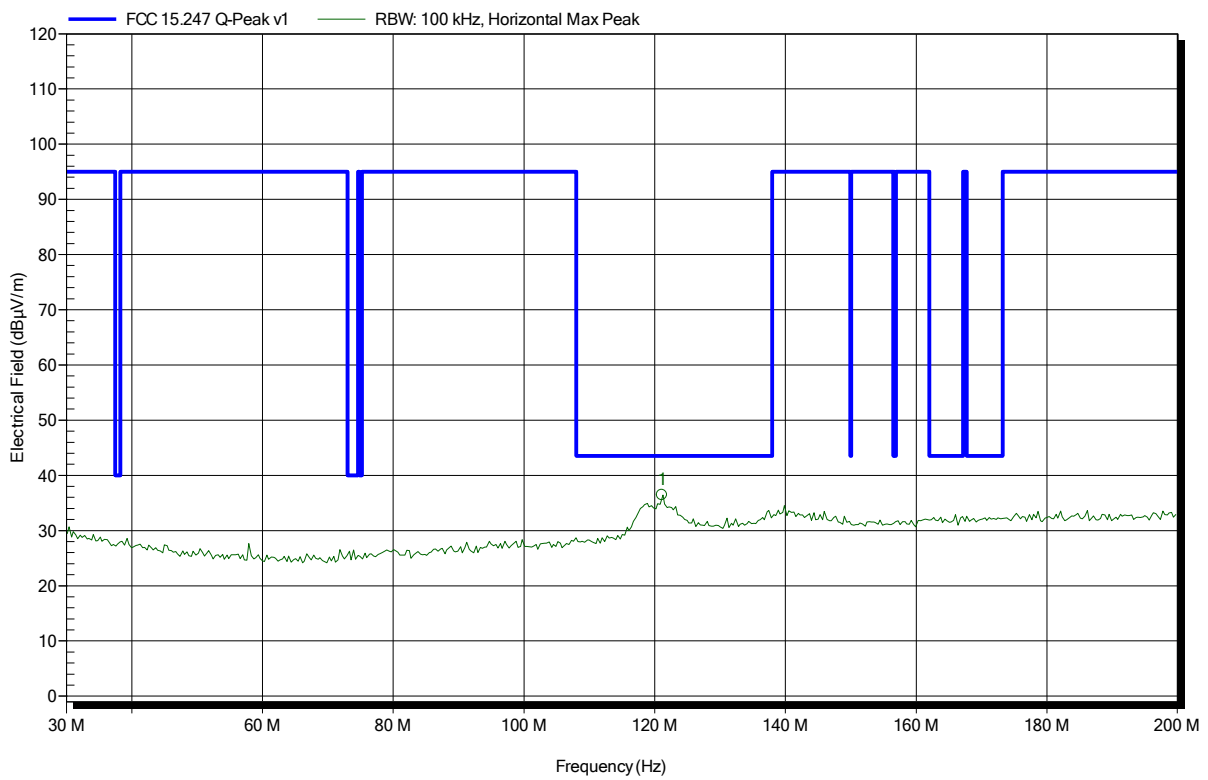


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24°C, Vnom: 5.0 VDC (USB)
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: TX; BLE; 2480 MHz
 Test Date: 2017-08-08
 Note:

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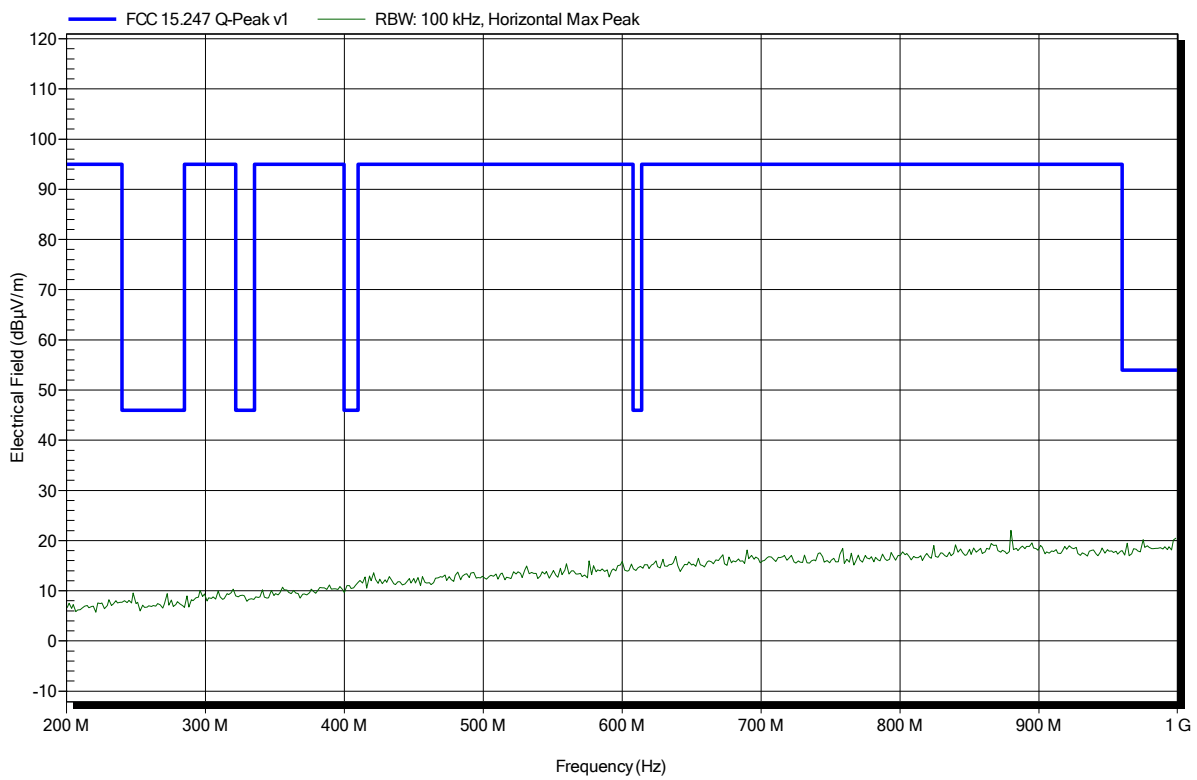
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
121.12 MHz	36.41 dBµV/m	43.52 dBµV/m	-7.11 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24°C, Vnom: 5.0 VDC (USB)
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: TX; BLE; 2480 MHz
 Test Date: 2017-08-08
 Note:

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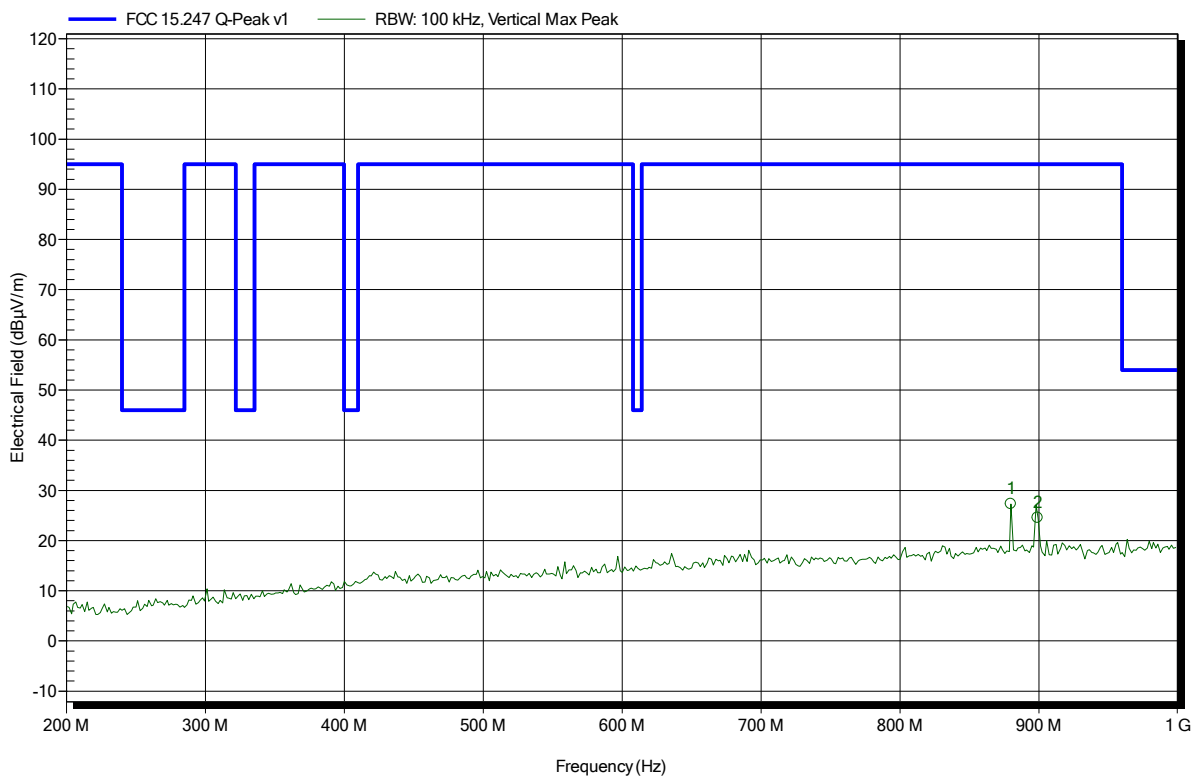


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24°C, Vnom: 5.0 VDC (USB)
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: TX; BLE; 2480 MHz
 Test Date: 2017-08-08
 Note:

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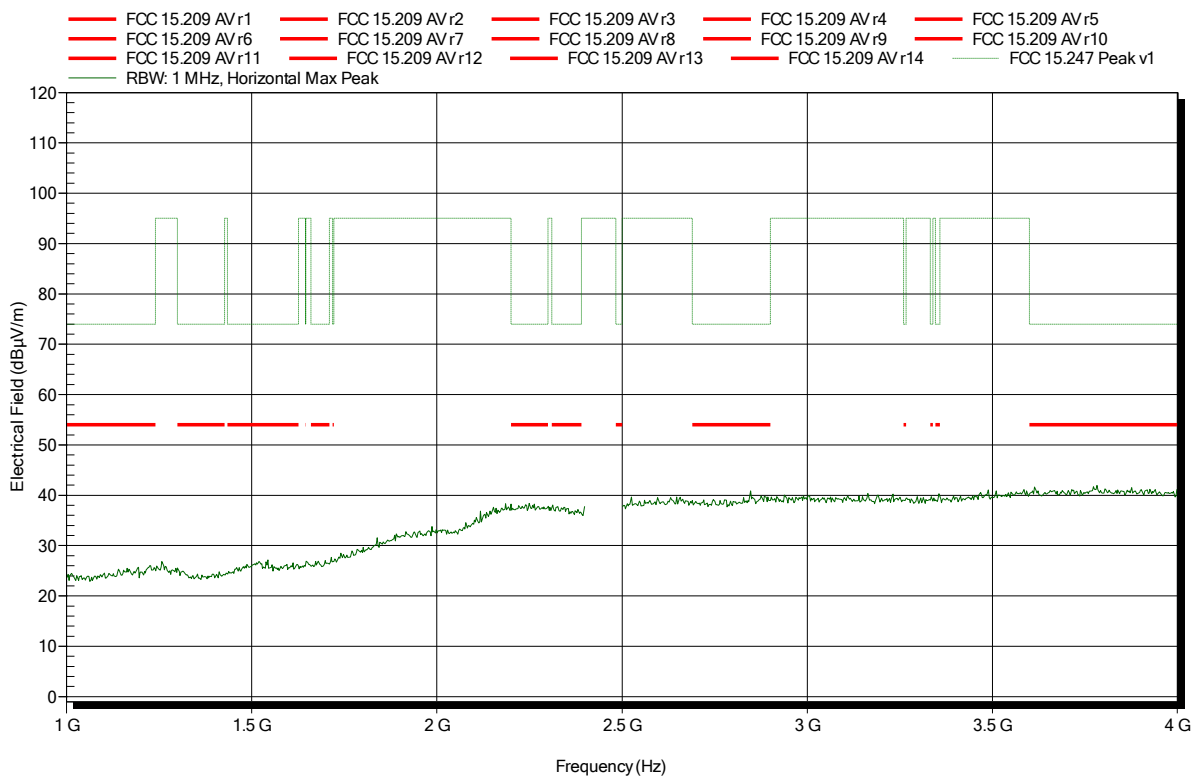
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
880 MHz	27.28 dBµV/m	95 dBµV/m	-67.72 dB	Pass
899.2 MHz	24.53 dBµV/m	95 dBµV/m	-70.47 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24°C, Vnom: 5.0 VDC (USB)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2480 MHz
 Test Date: 2017-08-08
 Note:

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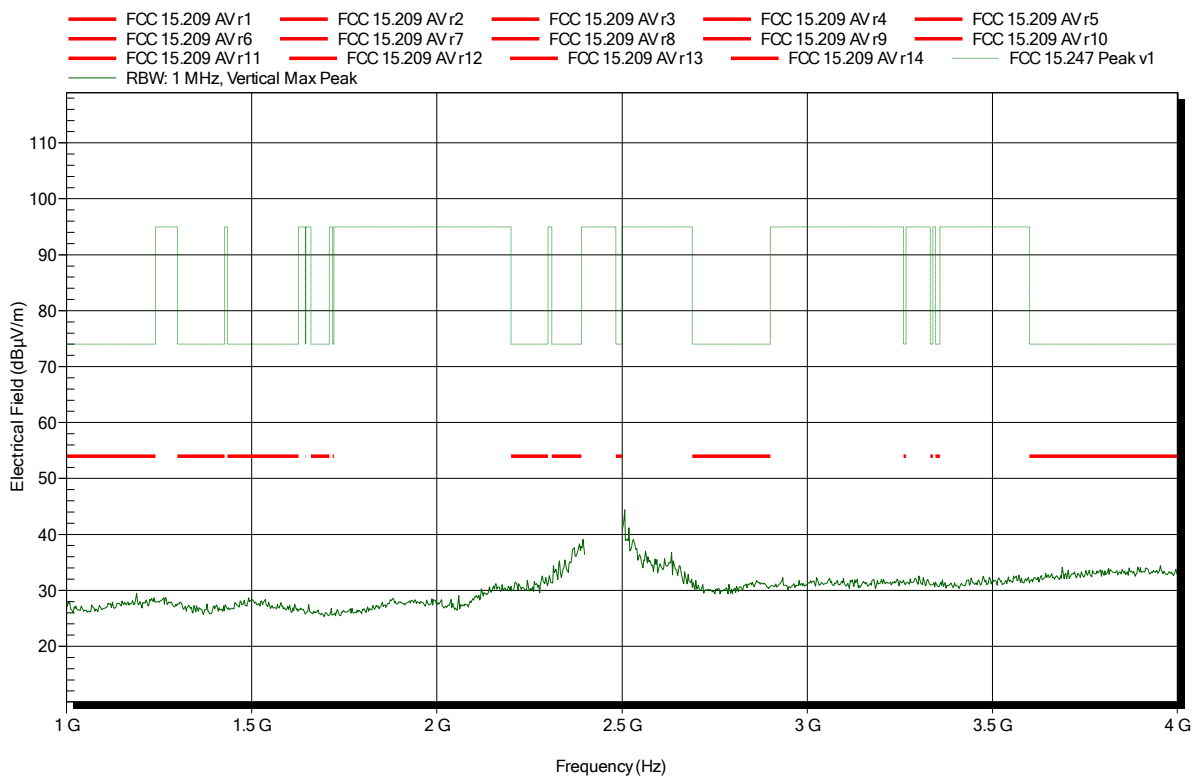


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24°C, Vnom: 5.0 VDC (USB)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2480 MHz
 Test Date: 2017-08-08
 Note:

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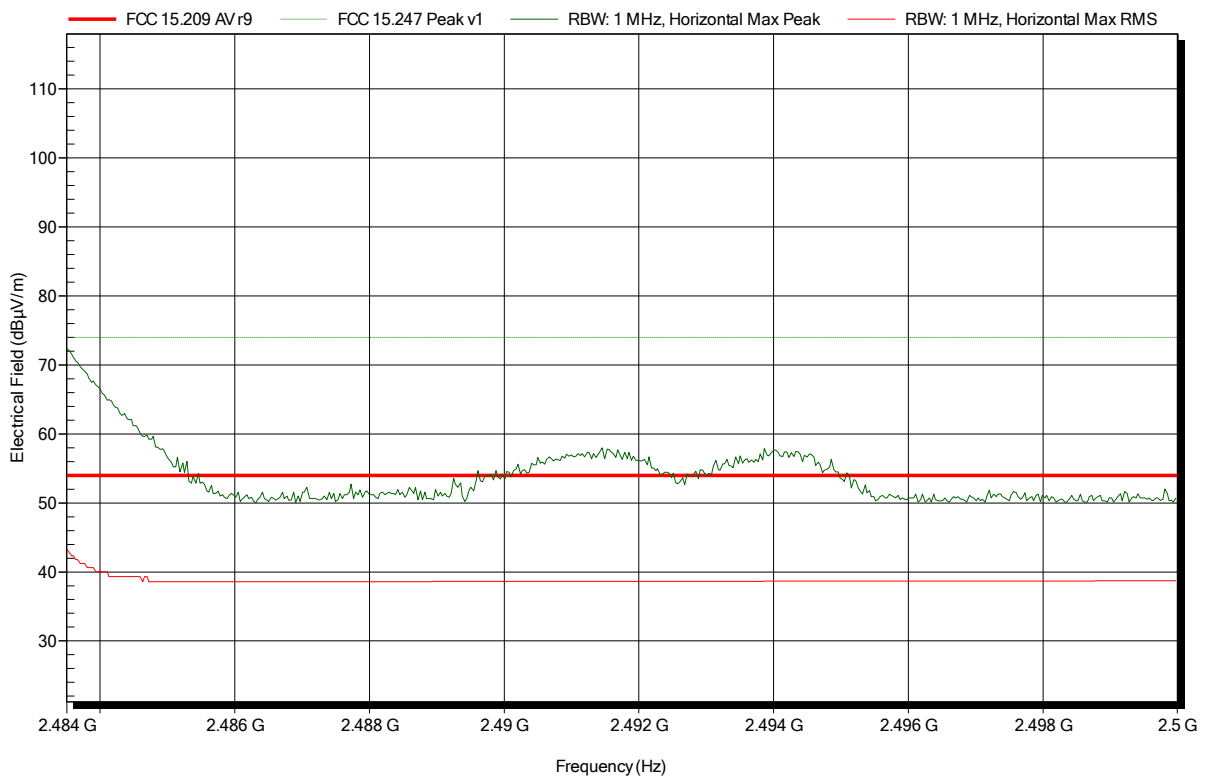


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24°C, Vnom: 5.0 VDC (USB)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2480 MHz
 Test Date: 2017-08-08
 Note: upper bandedge

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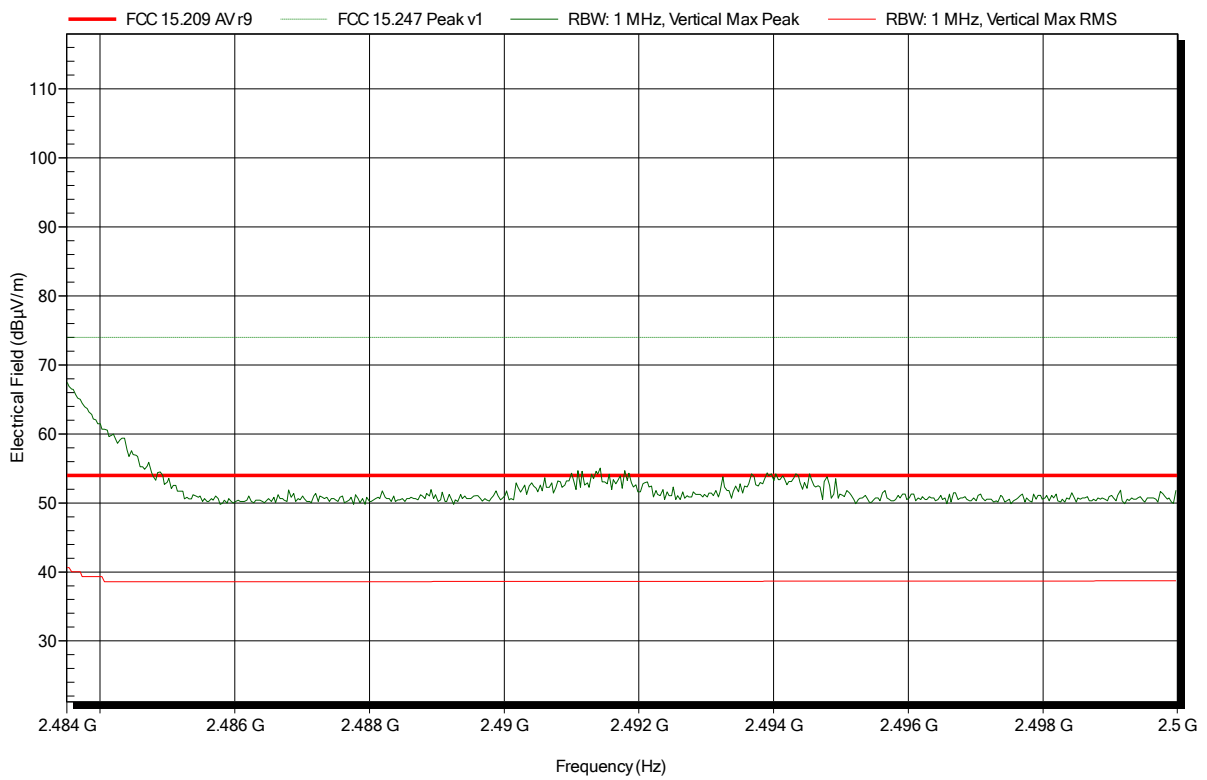


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24°C, Vnom: 5.0 VDC (USB)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2480 MHz
 Test Date: 2017-08-08
 Note: upper bandedge

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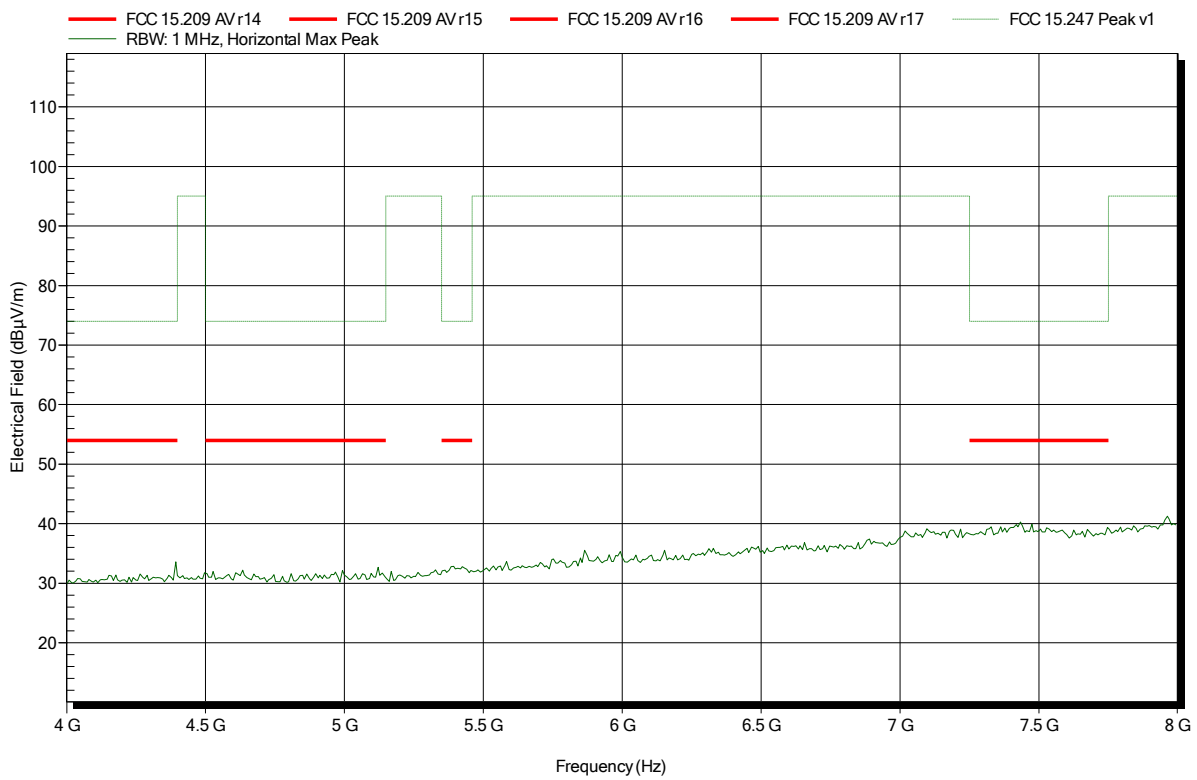


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24°C, Vnom: 5.0 VDC (USB)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2480 MHz
 Test Date: 2017-08-08
 Note:

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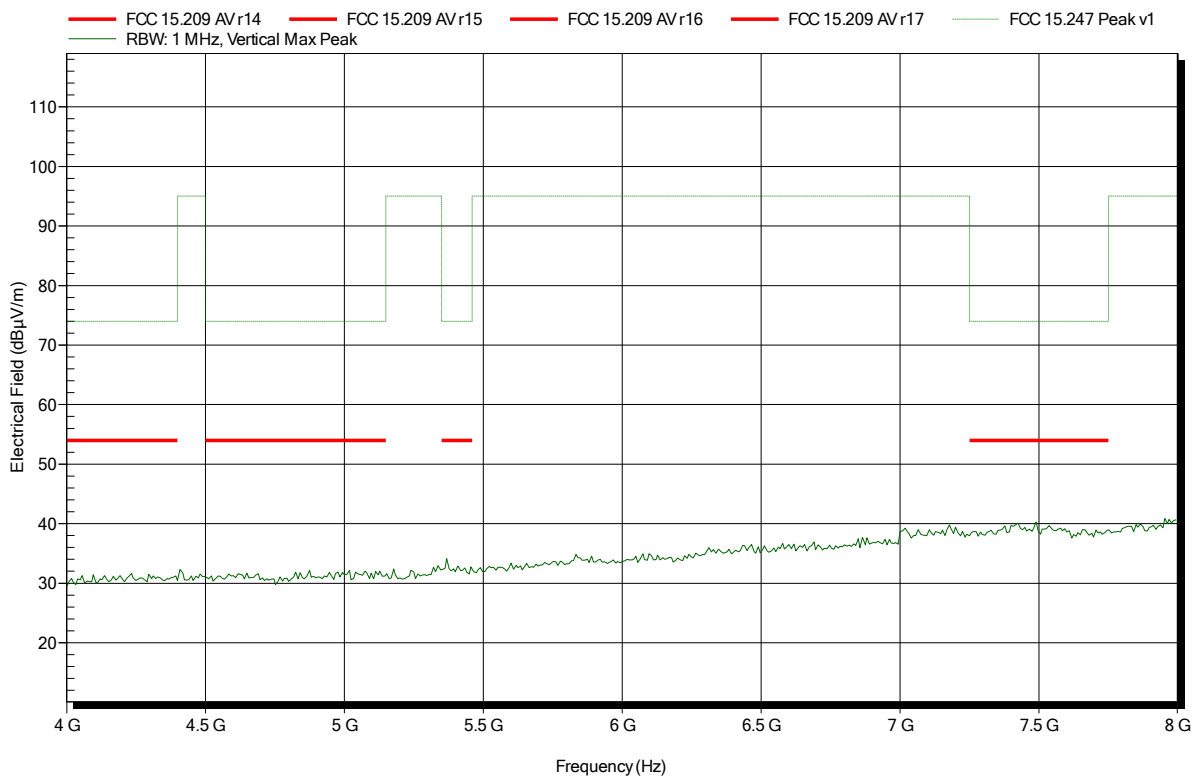


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24°C, Vnom: 5.0 VDC (USB)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2480 MHz
 Test Date: 2017-08-08
 Note:

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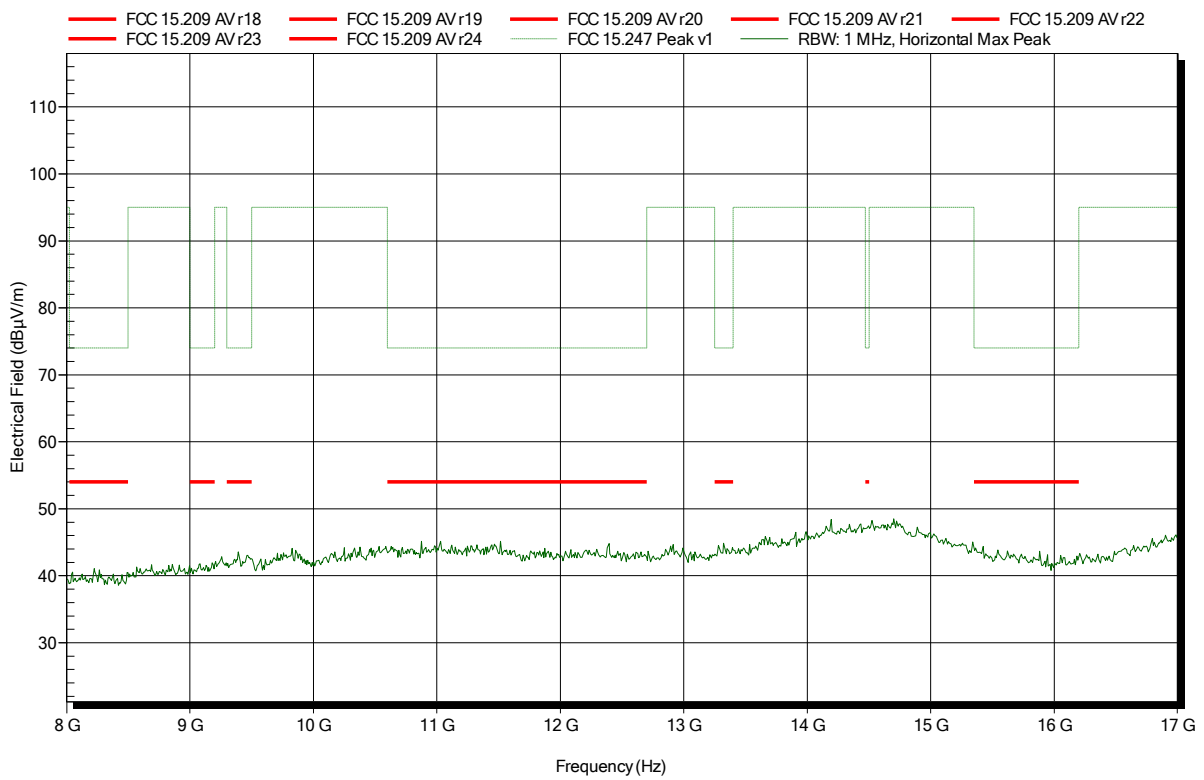


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24°C, Vnom: 5.0 VDC (USB)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2480 MHz
 Test Date: 2017-08-08
 Note:

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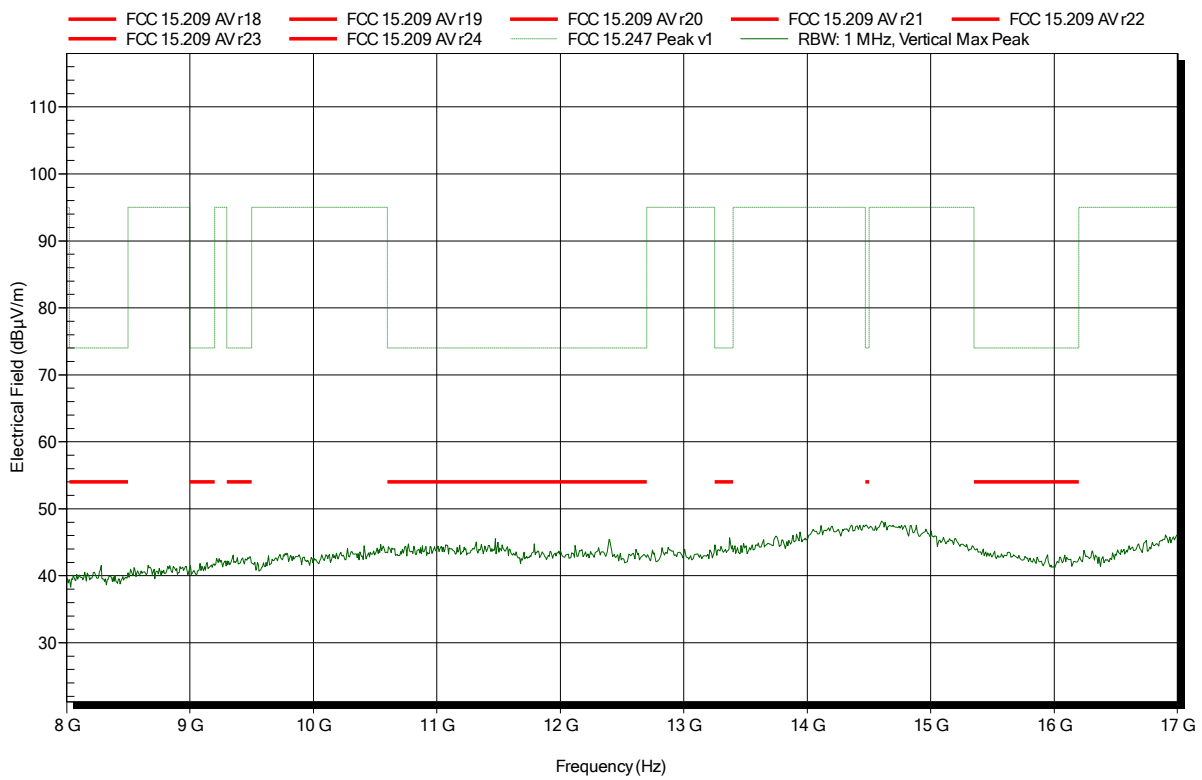


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24°C, Vnom: 5.0 VDC (USB)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2480 MHz
 Test Date: 2017-08-08
 Note:

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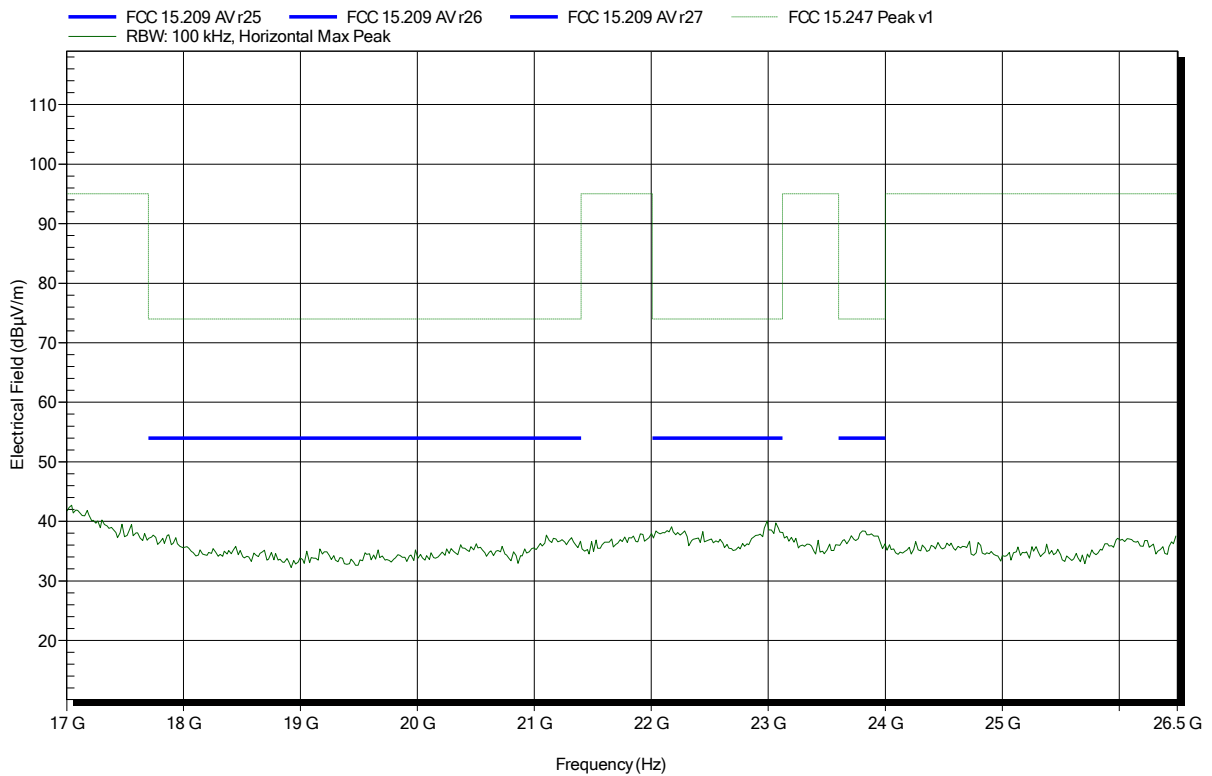


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24°C, Vnom: 5.0 VDC (USB)
 Antenna: Amplifier Research AT 4560 (old name) / ATH18G40 (new name),
 Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2480 MHz
 Test Date: 2017-08-08
 Note:

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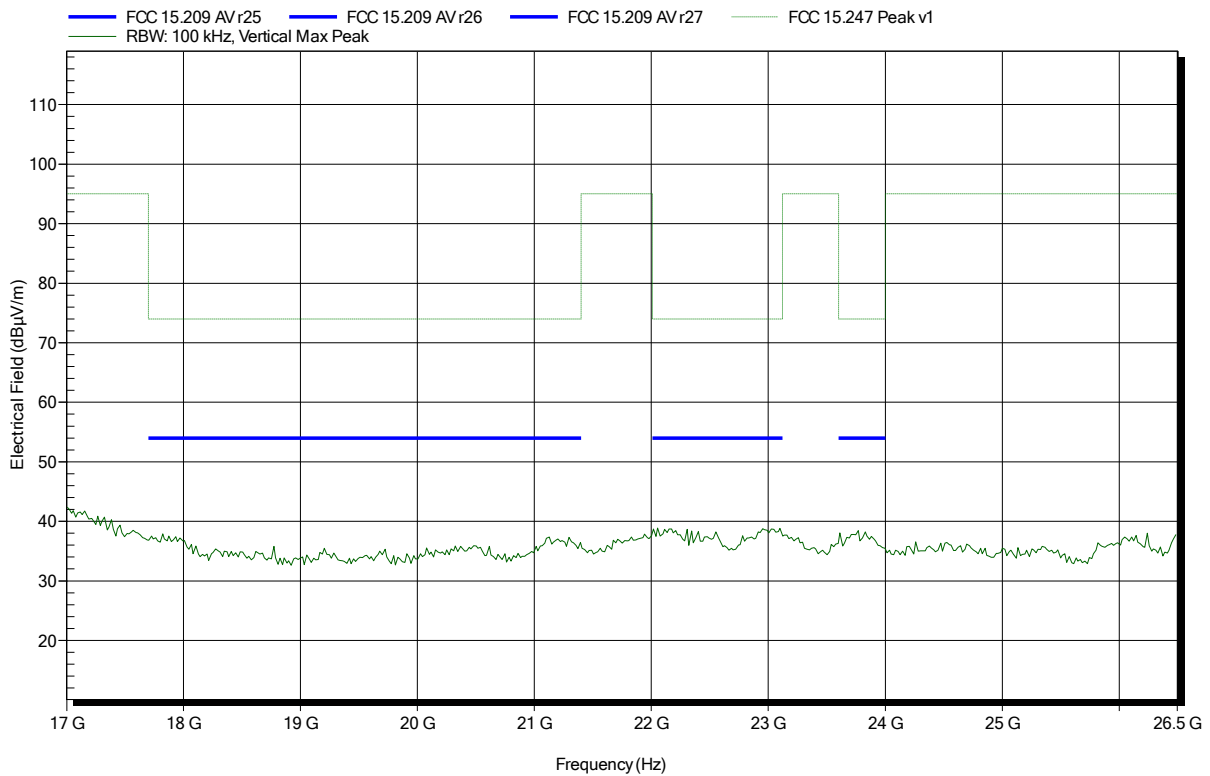


Spurious emissions according to FCC 15.247

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24°C, Vnom: 5.0 VDC (USB)
 Antenna: Amplifier Research AT 4560 (old name) / ATH18G40 (new name),
 Vertical
 Measurement distance: 1 m converted to 3m
 Mode: TX; BLE; 2480 MHz
 Test Date: 2017-08-08
 Note:

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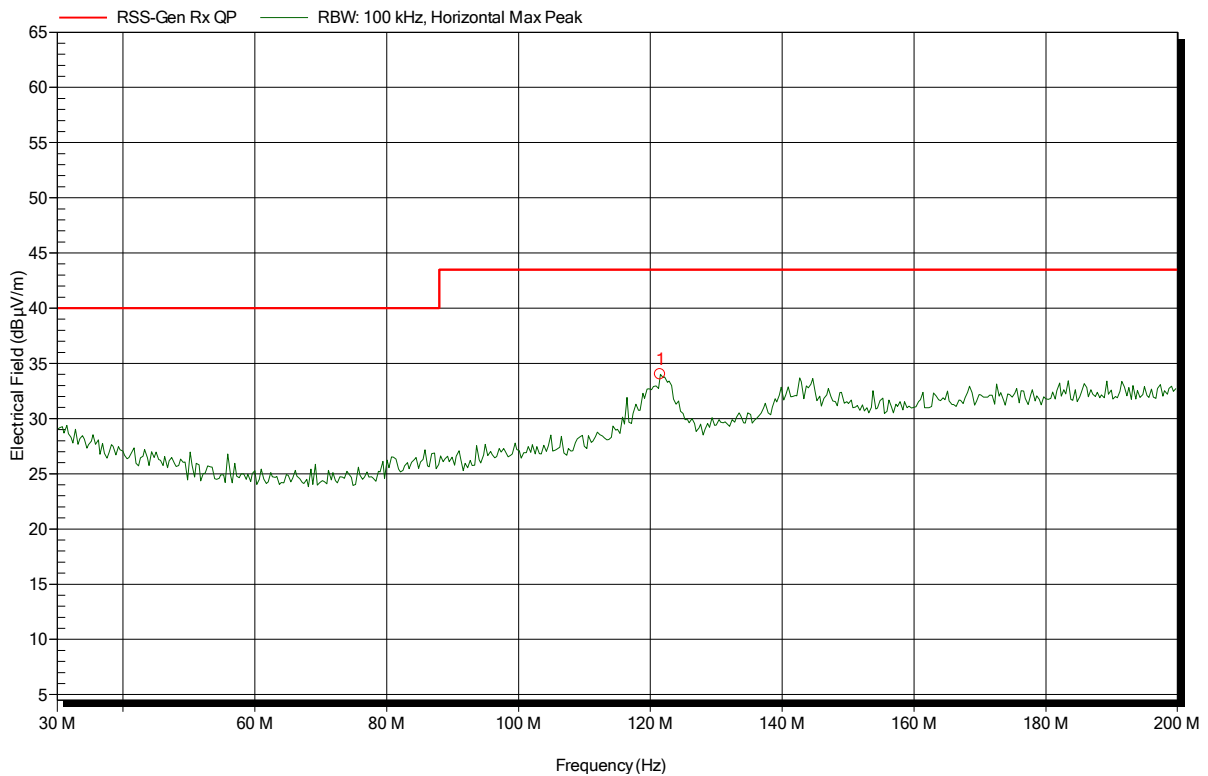
ANNEX B Receiver spurious emissions

Spurious emissions according to RSS-247 Issue 2

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24.8°C, Vnom: 5.0 VDC (USB)
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: RX; BLE; 2440 MHz
 Test Date: 2017-08-08
 Note:

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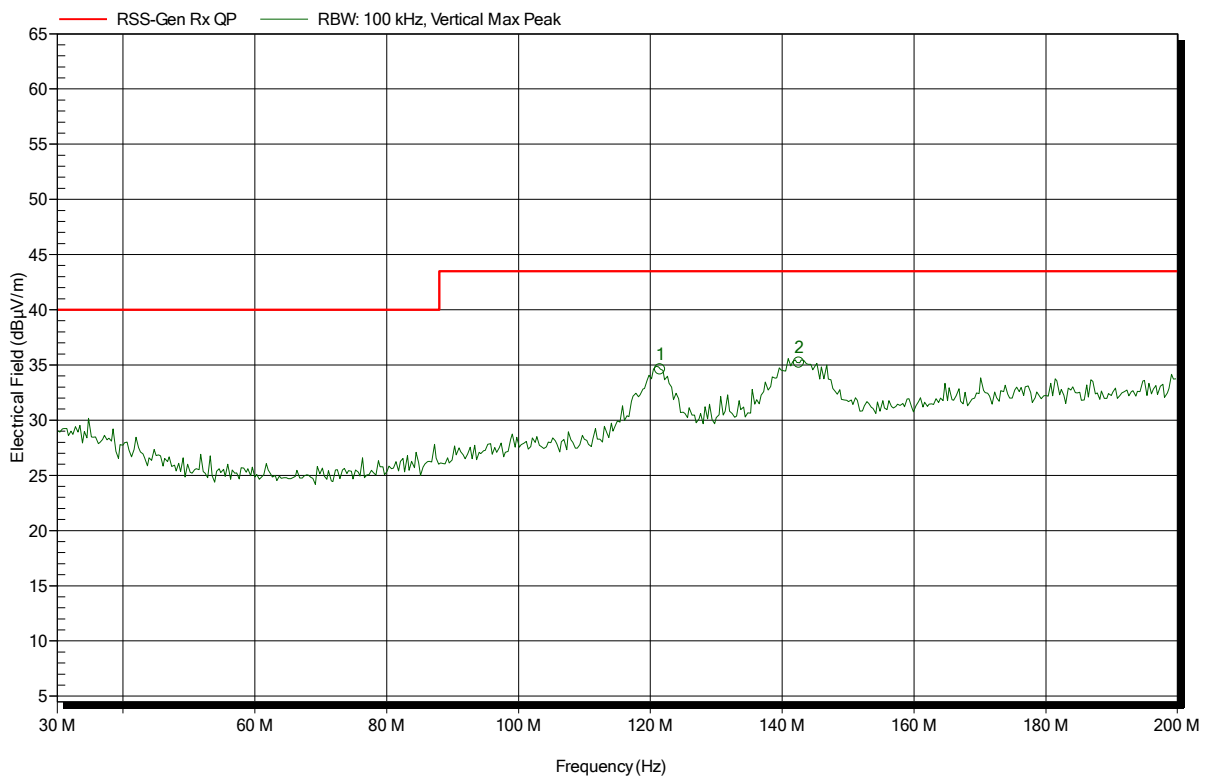
Frequency	Peak	Peak Limit	Peak Difference	Status
121.46 MHz	34 dBµV/m	43.5 dBµV/m	-9.5 dB	Pass

Spurious emissions according to RSS-247 Issue 2

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24.8°C, Vnom: 5.0 VDC (USB)
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: RX; BLE; 2440 MHz
 Test Date: 2017-08-08
 Note:

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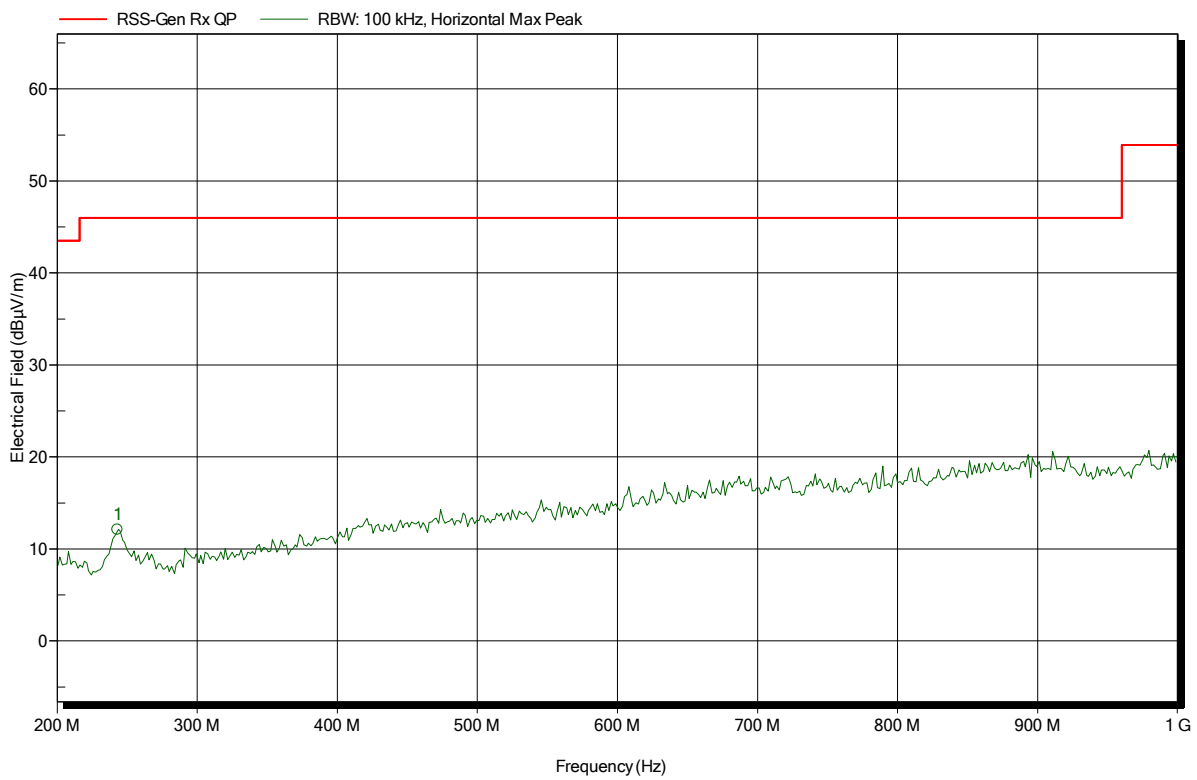
Frequency	Peak	Peak Limit	Peak Difference	Status
121.46 MHz	34.6 dBµV/m	43.5 dBµV/m	-8.9 dB	Pass
142.54 MHz	35.2 dBµV/m	43.5 dBµV/m	-8.3 dB	Pass

Spurious emissions according to RSS-247 Issue 2

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24.8°C, Vnom: 5.0 VDC (USB)
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: RX; BLE; 2440 MHz
 Test Date: 2017-08-08
 Note:

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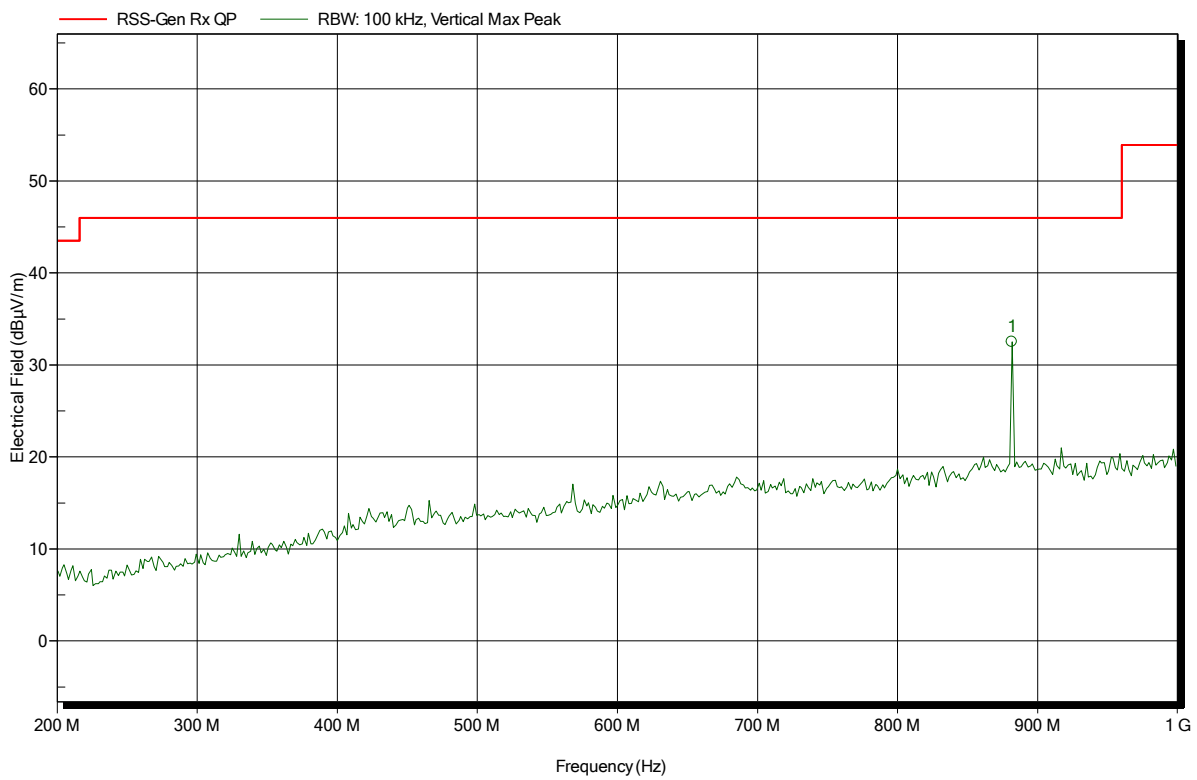
Frequency	Peak	Peak Limit	Peak Difference	Status
243.2 MHz	12.08 dBµV/m	46 dBµV/m	-33.92 dB	Pass

Spurious emissions according to RSS-247 Issue 2

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24.8°C, Vnom: 5.0 VDC (USB)
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: RX; BLE; 2440 MHz
 Test Date: 2017-08-08
 Note:

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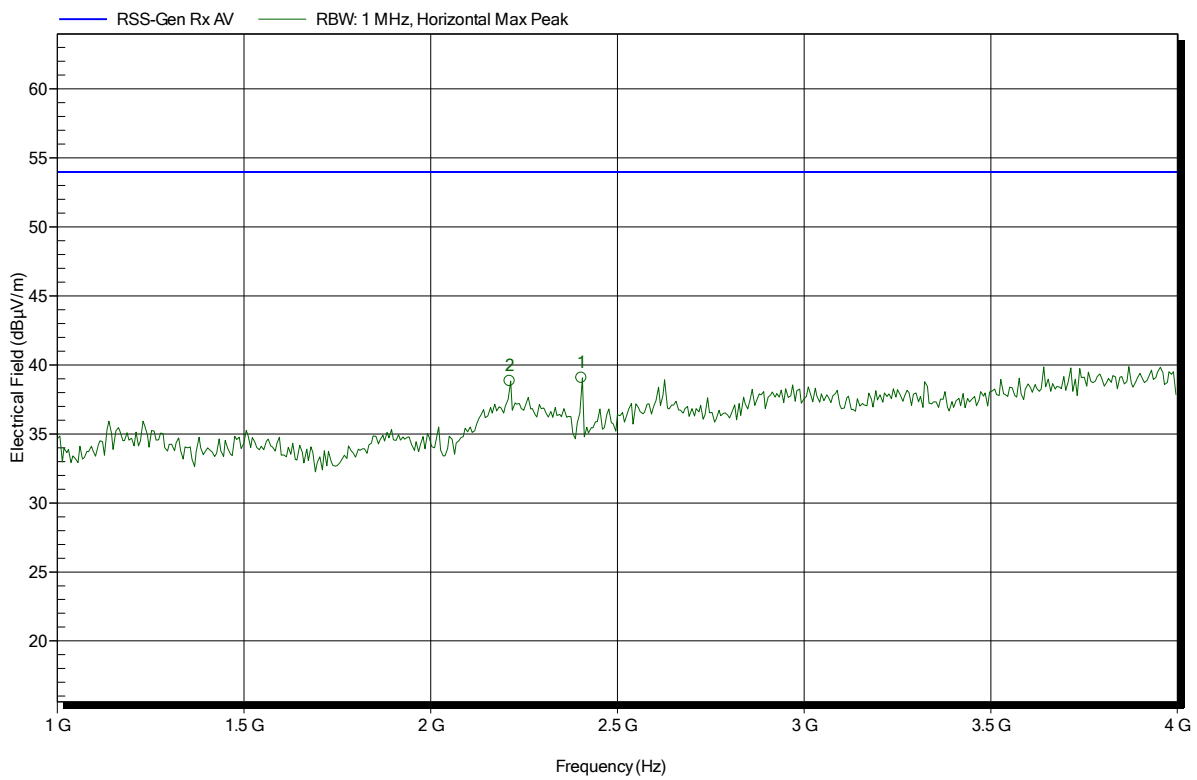
Frequency	Peak	Peak Limit	Peak Difference	Status
881.6 MHz	32.52 dBµV/m	46 dBµV/m	-13.48 dB	Pass

Spurious emissions according to RSS-247 Issue 2

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24.8°C, Vnom: 5.0 VDC (USB)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: RX; BLE; 2440 MHz
 Test Date: 2017-08-08
 Note:

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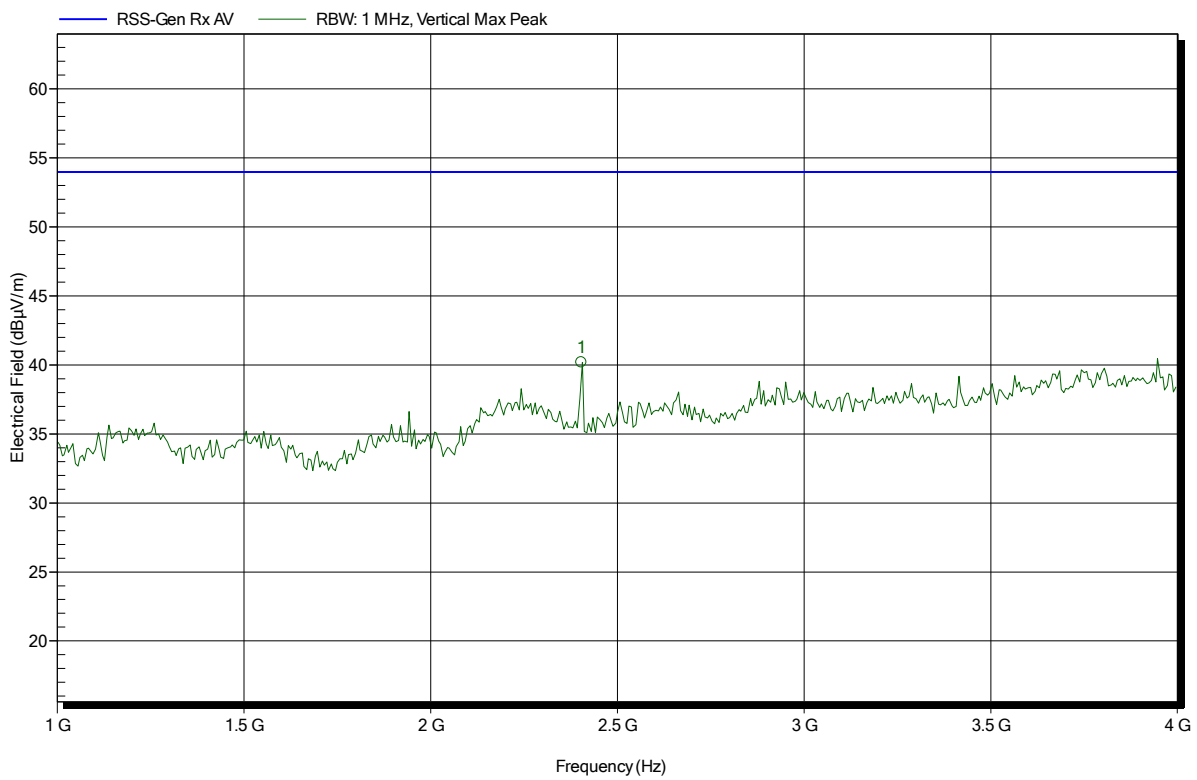
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.212 GHz	38.83 dBµV/m	53.98 dBµV/m	-15.15 dB	Pass
2.404 GHz	39.06 dBµV/m	53.98 dBµV/m	-14.92 dB	Pass

Spurious emissions according to RSS-247 Issue 2

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24.8°C, Vnom: 5.0 VDC (USB)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: RX; BLE; 2440 MHz
 Test Date: 2017-08-08
 Note:

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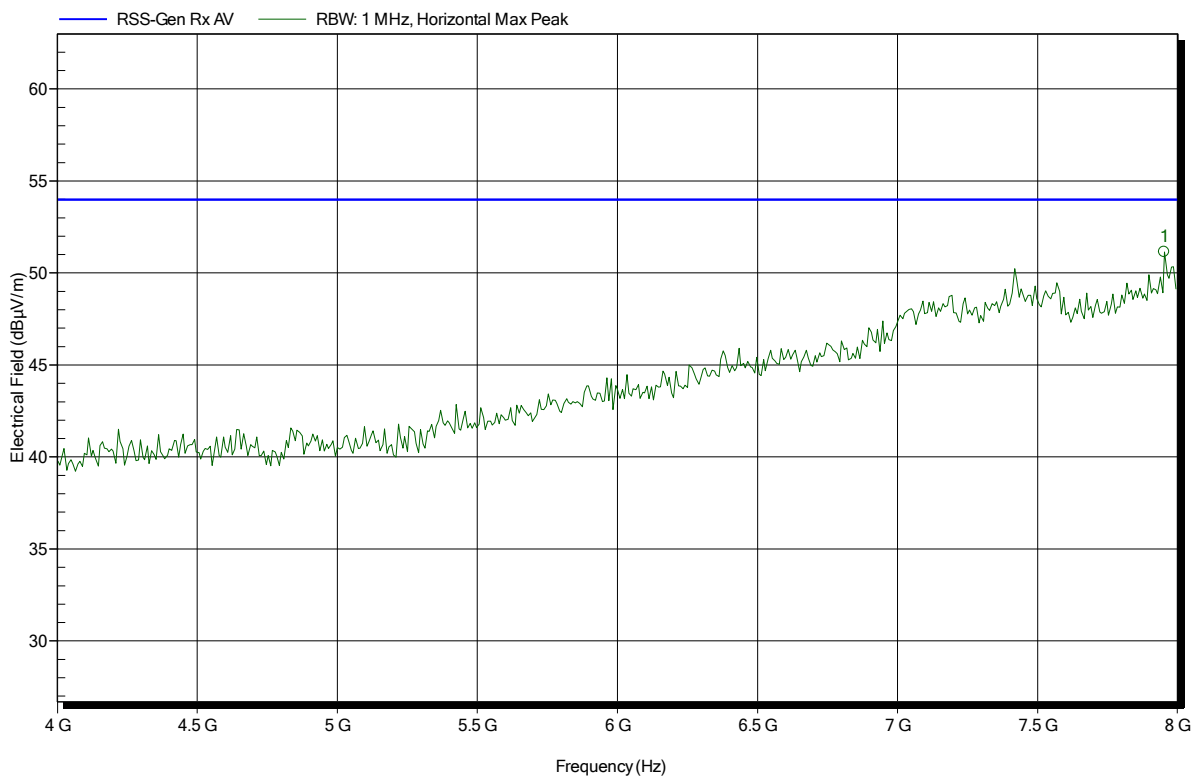
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.404 GHz	40.18 dBµV/m	53.98 dBµV/m	-13.8 dB	Pass

Spurious emissions according to RSS-247 Issue 2

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24.8°C, Vnom: 5.0 VDC (USB)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: RX; BLE; 2440 MHz
 Test Date: 2017-08-08
 Note:

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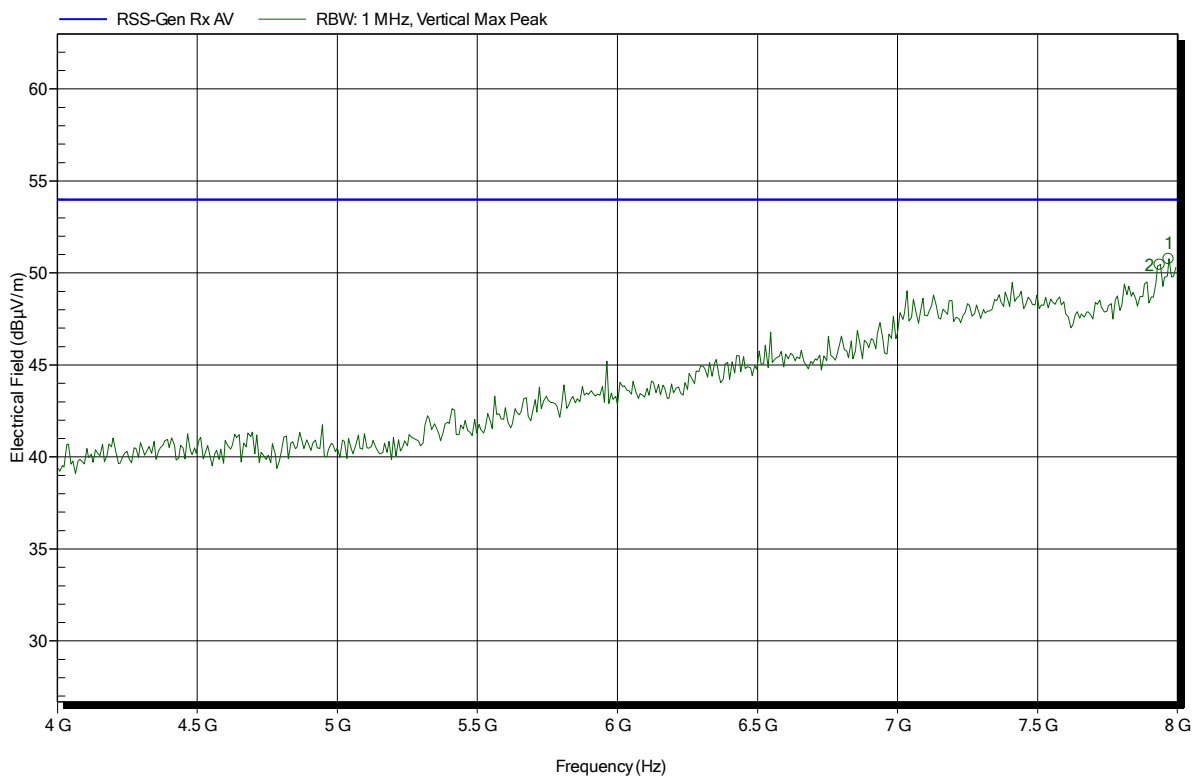
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
7.952 GHz	51.14 dBµV/m	53.98 dBµV/m	-2.84 dB	Pass

Spurious emissions according to RSS-247 Issue 2

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24.8°C, Vnom: 5.0 VDC (USB)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: RX; BLE; 2440 MHz
 Test Date: 2017-08-08
 Note:

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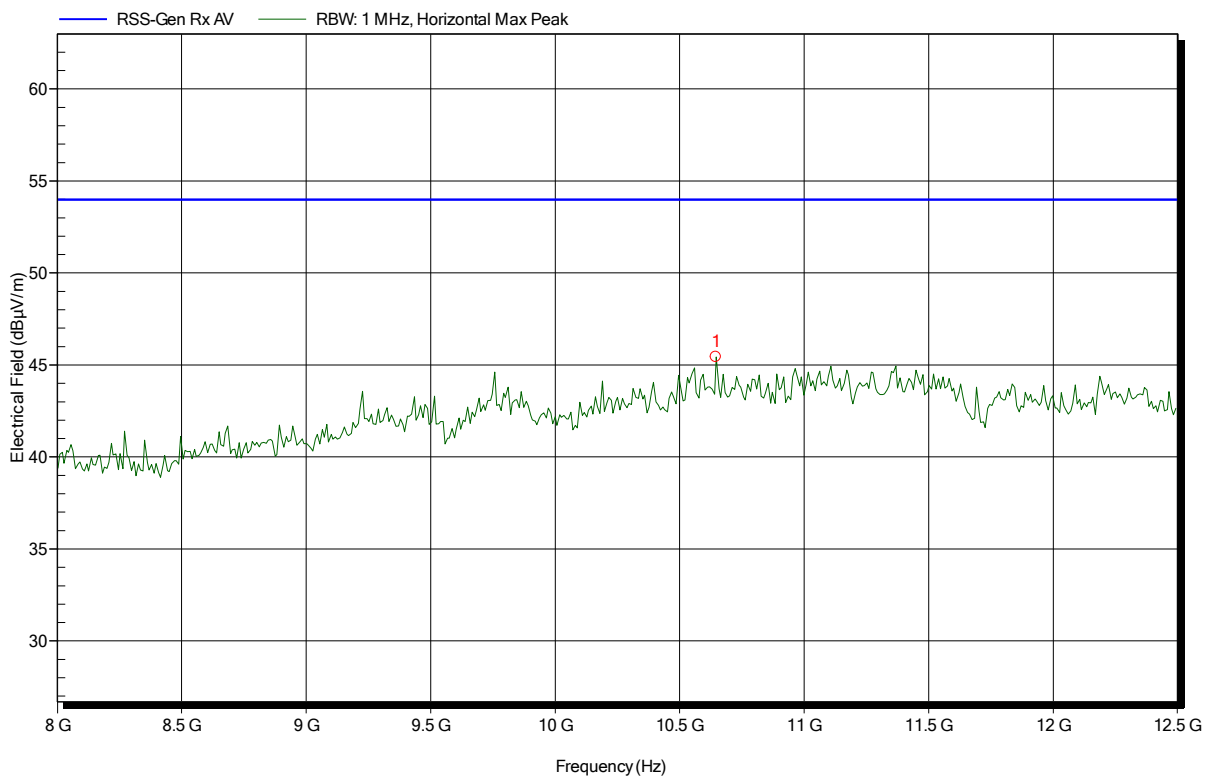
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
7.936 GHz	50.45 dBµV/m	53.98 dBµV/m	-3.53 dB	Pass
7.968 GHz	50.76 dBµV/m	53.98 dBµV/m	-3.22 dB	Pass

Spurious emissions according to RSS-247 Issue 2

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24.8°C, Vnom: 5.0 VDC (USB)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: RX; BLE; 2440 MHz
 Test Date: 2017-08-08
 Note:

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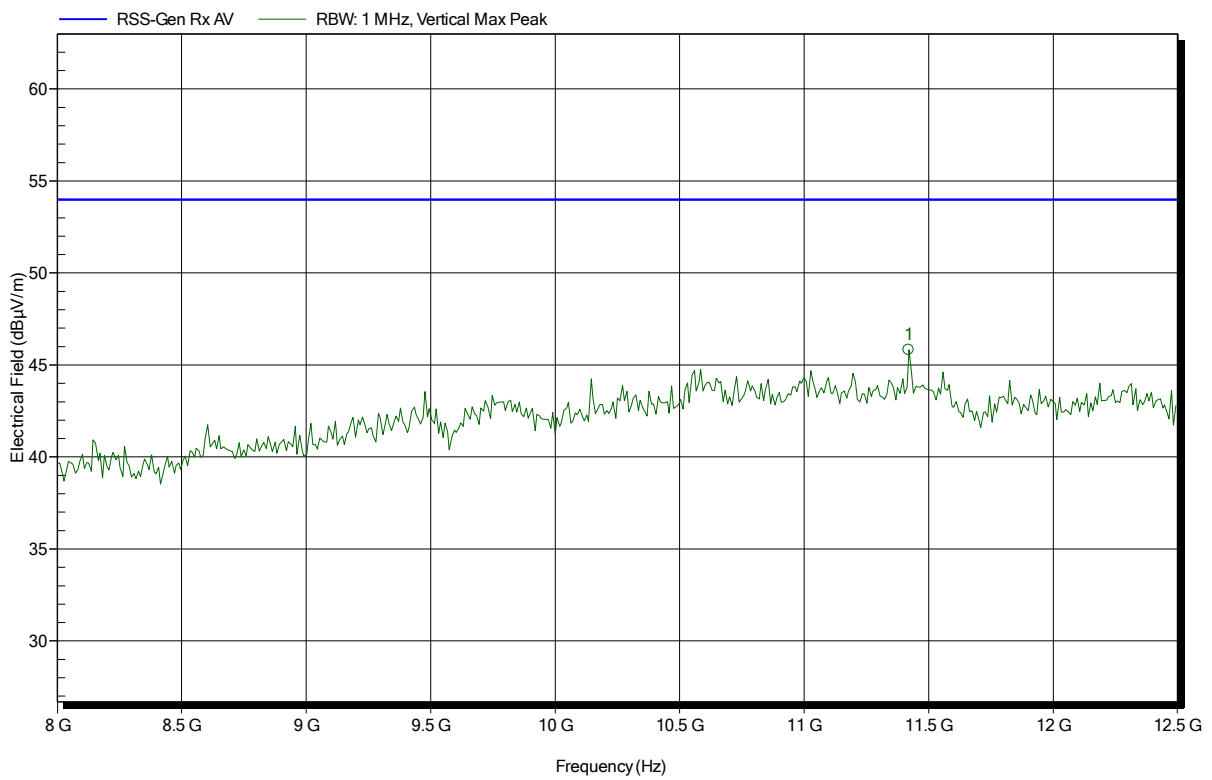
Frequency	Peak	Peak Limit	Peak Difference	Status
10.646 GHz	45.44 dBµV/m	53.98 dBµV/m	-8.54 dB	Pass

Spurious emissions according to RSS-247 Issue 2

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24.8°C, Vnom: 5.0 VDC (USB)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: RX; BLE; 2440 MHz
 Test Date: 2017-08-08
 Note:

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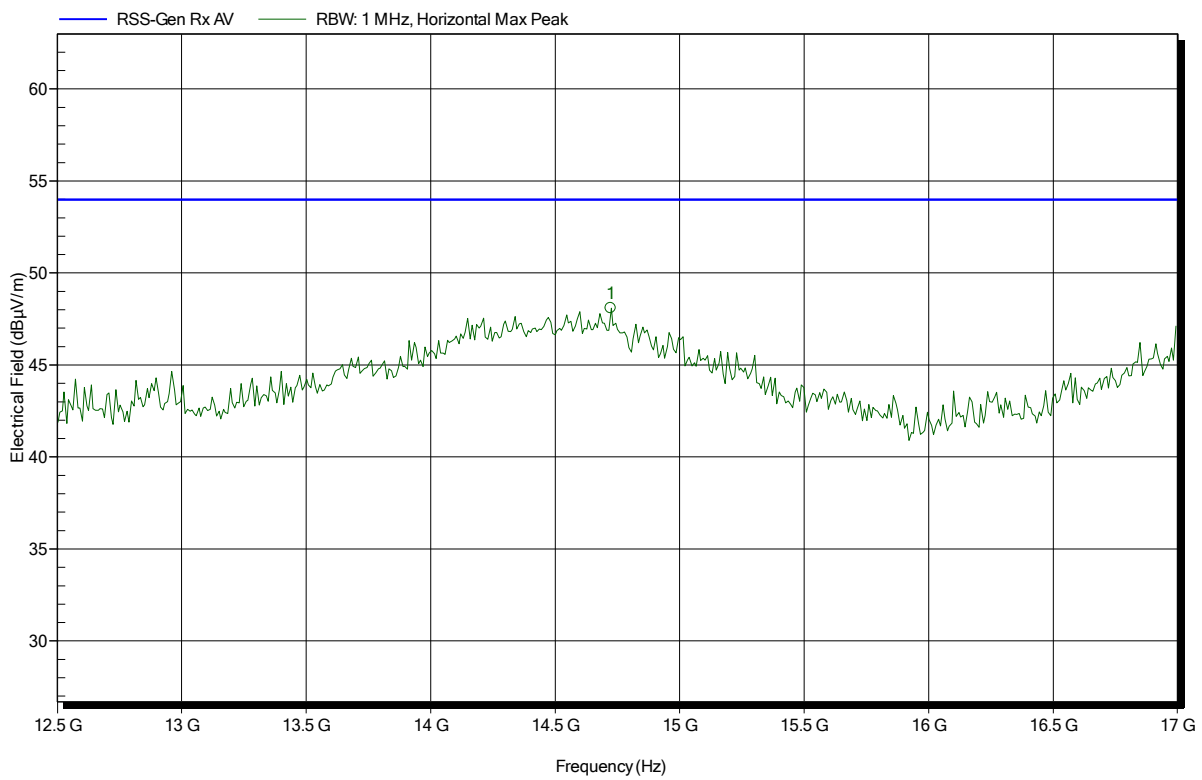
Frequency	Peak	Peak Limit	Peak Difference	Status
11.42 GHz	45.81 dBµV/m	53.98 dBµV/m	-8.17 dB	Pass

Spurious emissions according to RSS-247 Issue 2

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24.8°C, Vnom: 5.0 VDC (USB)
 Antenna: Schwarzbeck BBHA 9120D, Horizontal
 Measurement distance: 1 m converted to 3m
 Mode: RX; BLE; 2440 MHz
 Test Date: 2017-08-08
 Note:

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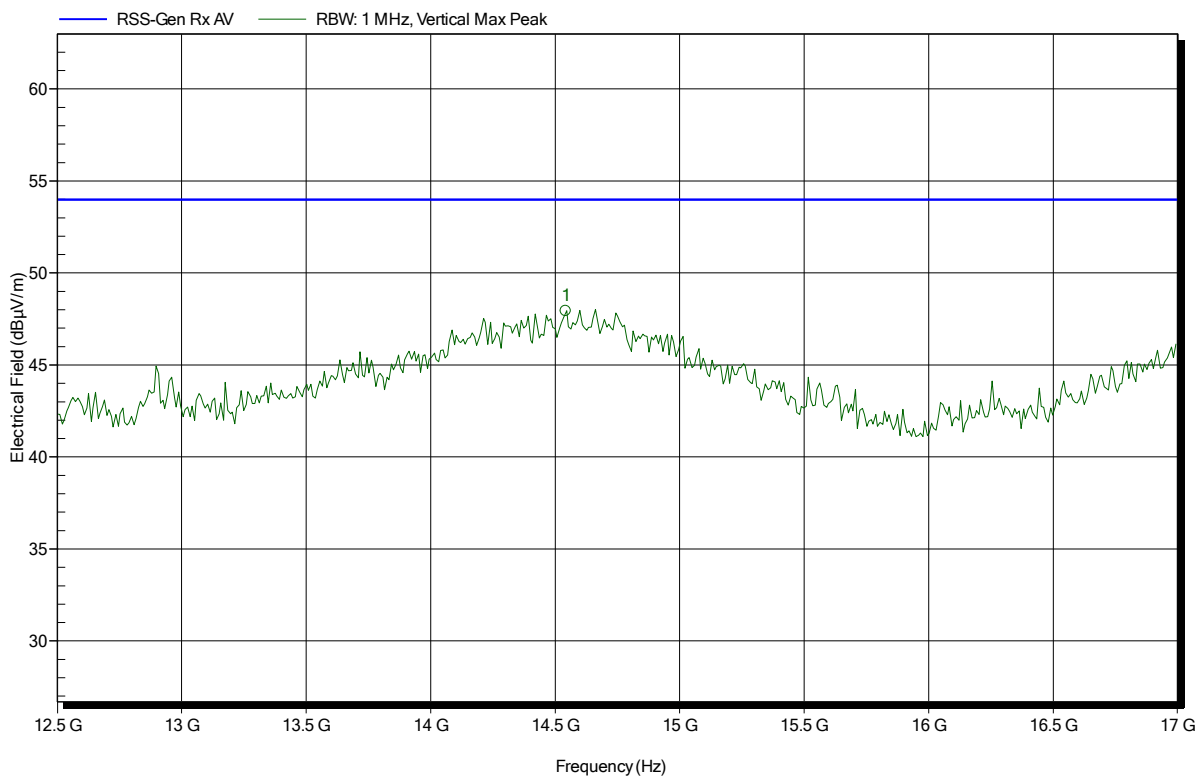
Frequency	Peak	Peak Limit	Peak Difference	Status
14.723 GHz	48.1 dBµV/m	53.98 dBµV/m	-5.88 dB	Pass

Spurious emissions according to RSS-247 Issue 2

Project number: G0M-1707-6688

Applicant: Panasonic Industrial Devices Europe GmbH
 EUT Name: Bluetooth Low Energy Module
 Model: ENW89847A3KF
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Al Jamal
 Test Conditions: Tnom: 24.8°C, Vnom: 5.0 VDC (USB)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 1 m converted to 3m
 Mode: RX; BLE; 2440 MHz
 Test Date: 2017-08-08
 Note:

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Frequency	Peak	Peak Limit	Peak Difference	Status
14.543 GHz	47.93 dBµV/m	53.98 dBµV/m	-6.05 dB	Pass