

RADIO REPORT FCC 47 CFR Part 15C ISED Canada RSS-247 Digital transmission systems operating within the 2400.0 MHz - 2483.5 MHz band	
Report Reference No	G0M-2009-9273-TFC247BL-V01
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	    DAkkS - Registration number : D-PL-12092-01-03 (ISED) ISED Testing Laboratory site: 3470A-2 DAkkS - Registration number : D-PL-12092-01-04 (FCC) FCC Filed Test Laboratory, Reg.-No.: 96970
Applicant	Panasonic Industrial Devices Europe GmbH
Address	Zeppelinstr. 19 21337 Lüneburg GERMANY
Test Specification	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)	ENW89855A1KF
Additional Model(s)	None
Brand Name(s)	PAN3011
Hardware Version(s)	01
Software Version(s)	Stack 2.1c
FCC ID	T7V301X
IC	216Q-301X
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 °C - 30 °C	
Test Lab Humidity	25 % - 55 %	
Date of receipt of test item	2021-01-21	
Report:		
Compiled by	Wilfried Treffke	
Tested by (+ signature) (Responsible for Test)	Wilfried Treffke	
Approved by (+ signature) (Deputy Head of Lab)	Toralf Jahn	
Date of Issue	2021-04-27	
Total number of pages	90	
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:		

ADDITIONAL VARIANTS

Additional Variants (not tested and not evaluated variants)		
Not-tested Variant	Description	
1	Product Type Description	Bluetooth Low Energy Module
	Model name	ENW89855A2KF
	Brand name	PAN3012
	Hardware Version	01
	Software Version	01
2	Product Type Description	Bluetooth Low Energy Module
	Model name	ENW89855A3KF
	Brand name	PAN3013
	Hardware Version	01
	Software Version	01
Comment: Those named additional variants above have not been tested. Those additional variants of the series have been declared by the manufacturer. The test report explicitly states that those variants were neither tested nor assessed nor evaluated.		

VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2021-04-27	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

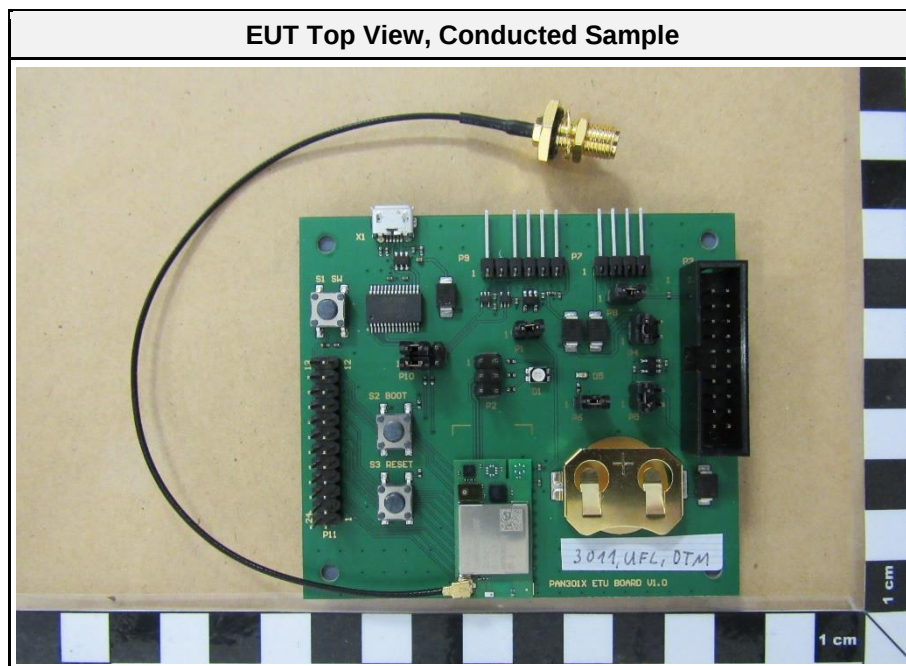
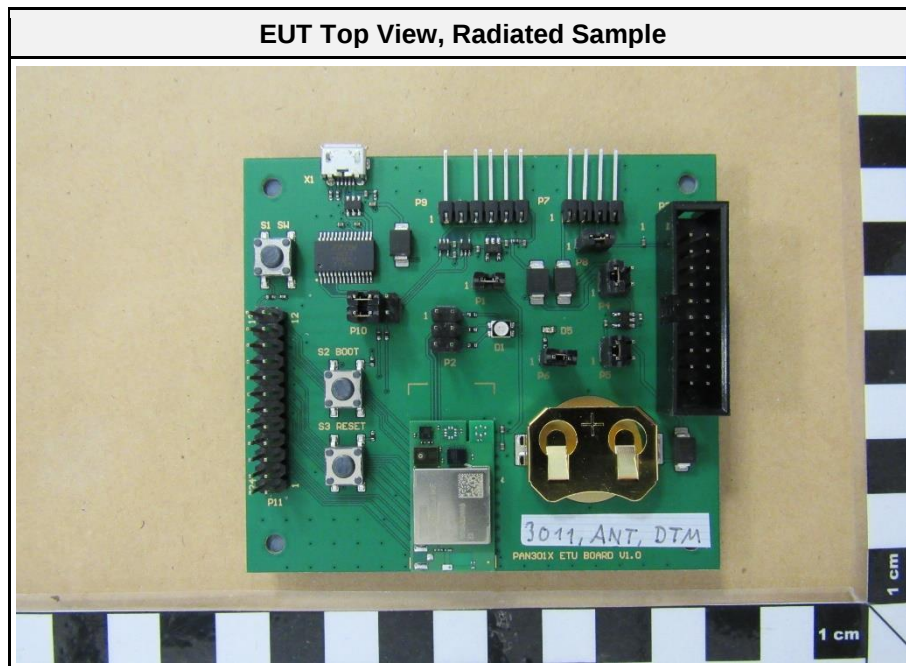
REPORT INDEX

1	Equipment (Test Item) Under Test.....	7
1.1	Photos – Equipment External	8
1.2	Photos – Equipment Internal	10
1.3	Photos – Test Setup.....	13
1.4	Support Equipment.....	16
1.5	Test Modes	17
1.6	Test Frequencies.....	18
1.7	Sample emission level calculation.....	19
2	Result Summary.....	20
3	Test Conditions and Results.....	21
3.1	Test Conditions and Results - Occupied bandwidth.....	21
3.2	Test Conditions and Results - 6 dB bandwidth.....	25
3.3	Test Conditions and Results - Maximum peak conducted output power	30
3.4	Test Conditions and Results - Power spectral density	35
3.5	Test Conditions and Results - AC powerline conducted emissions.....	40
3.6	Test Conditions and Results - Band-edge compliance.....	43
3.7	Test Conditions and Results - Conducted spurious emissions.....	47
3.8	Test Conditions and Results - Transmitter radiated emissions	52
3.9	Test Conditions and Results - Receiver radiated emissions	55
ANNEX A	Transmitter spurious emissions	57
ANNEX B	Receiver spurious emissions	83

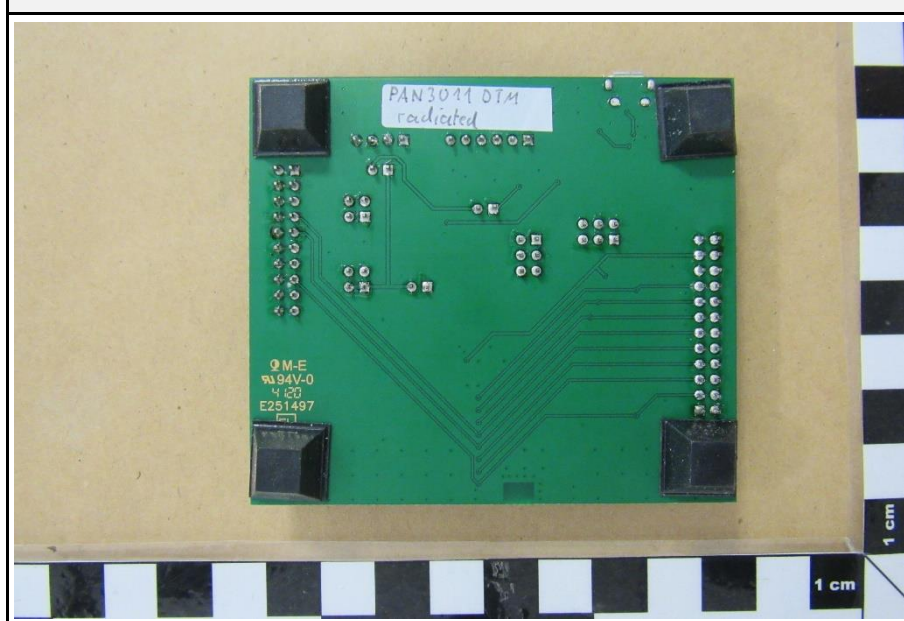
1 Equipment (Test Item) Under Test

Description	Bluetooth Low Energy Module	
Model	ENW89855A1KF	
Additional Model(s)	None	
Brand Name(s)	PAN3011	
Serial Number(s)	None	Radiated Test Sample ID 32825
	None	Conducted Test Sample ID 32830
Hardware Version(s)	01	
Software Version(s)	Stack 2.1c	
PMN	PAN3011, PAN3012, PAN3013	
HVIN	ENW89855A1KF, ENW89855A2KF, ENW89855A3KF	
FVIN	Stack 2.1c	
HMN	n/a	
FCC ID	T7V301X	
IC	216Q-301X	
Equipment type	Radio Module	
Radio type	Transceiver	
Assigned frequency bands	2400.0 MHz - 2483.5 MHz	
Radio technology	Bluetooth LE 4.2	
Bluetooth Specification	LE 1M PHY	Yes
	LE 2M PHY	No
	LE Coded PHY S=2 (500 kbit)	No
	LE Coded PHY S=8 (125 kbit)	No
	Stable Modulation Index - Transmitter	No
	Stable Modulation Index - Receiver	No
Modulation	GFSK	
Number of antenna ports	1	
Antenna	Type	Integrated, chip antenna
	Model	ANT016008LCS2442MA1
	Manufacturer	TDK
	Gain	1.6 dBi (declared by customer)
Supply Voltage	V _{NOM}	3.0 VDC (evaluation board powered by 5V USB)
Operating Temperature	T _{NOM}	25 °C
AC/DC-Adaptor	Model	None
Manufacturer	Panasonic Industrial Devices Europe GmbH Zeppelinstr. 19 21337 Lüneburg GERMANY	

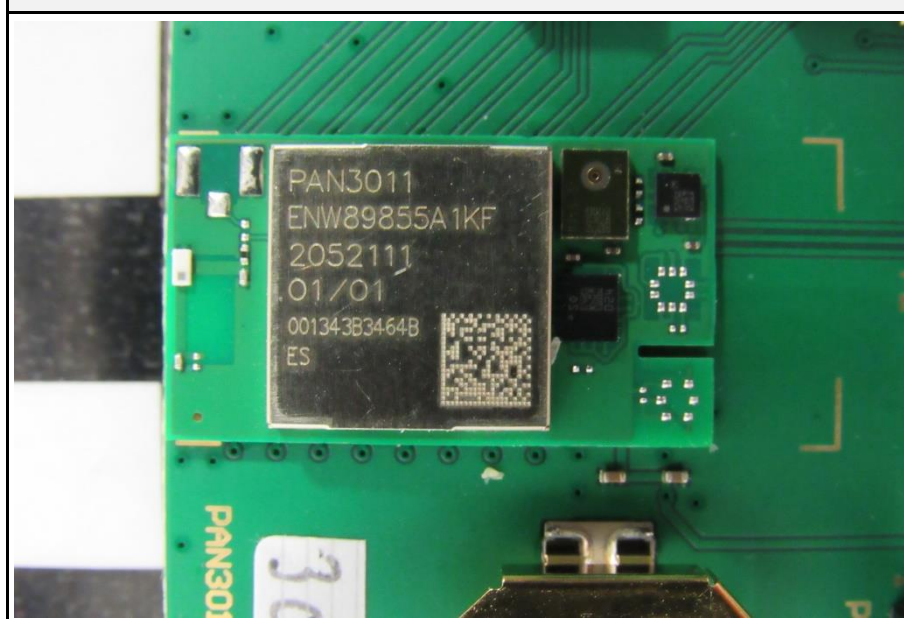
1.1 Photos – Equipment External



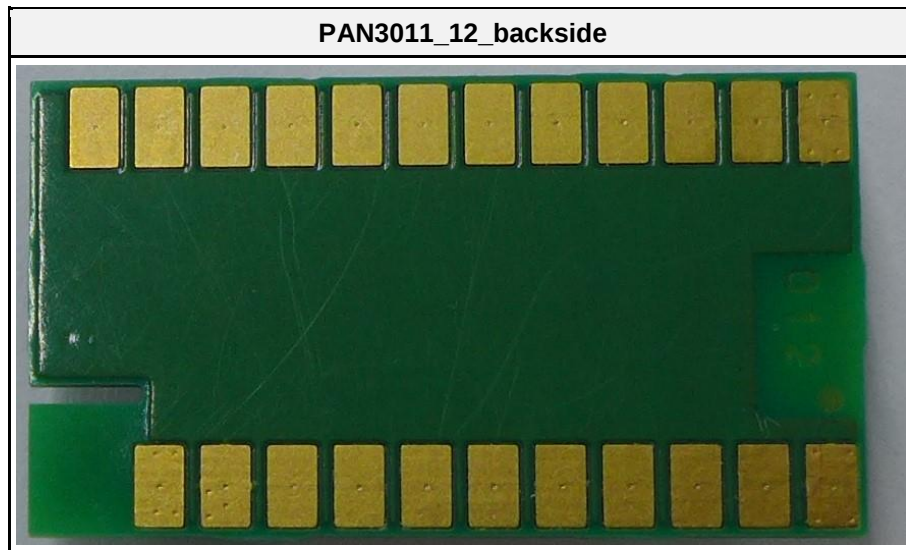
EUT Bottom View



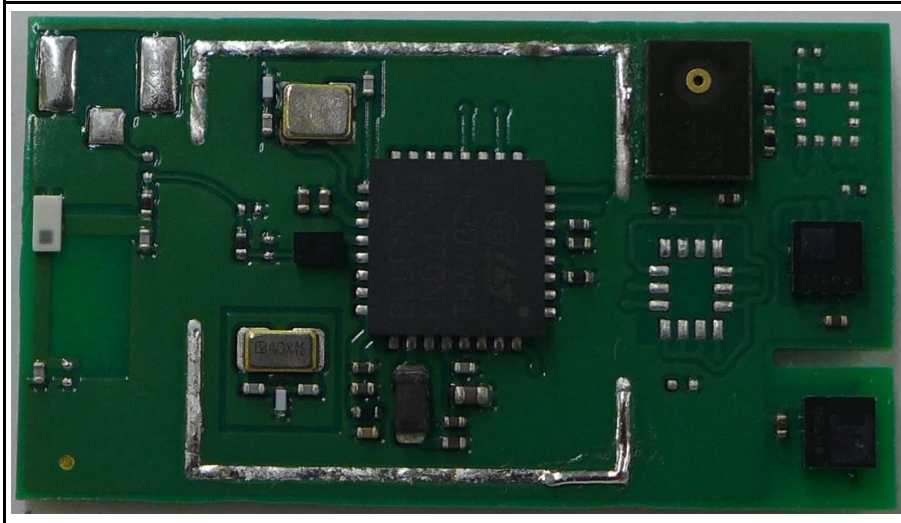
EUT BLE- Module



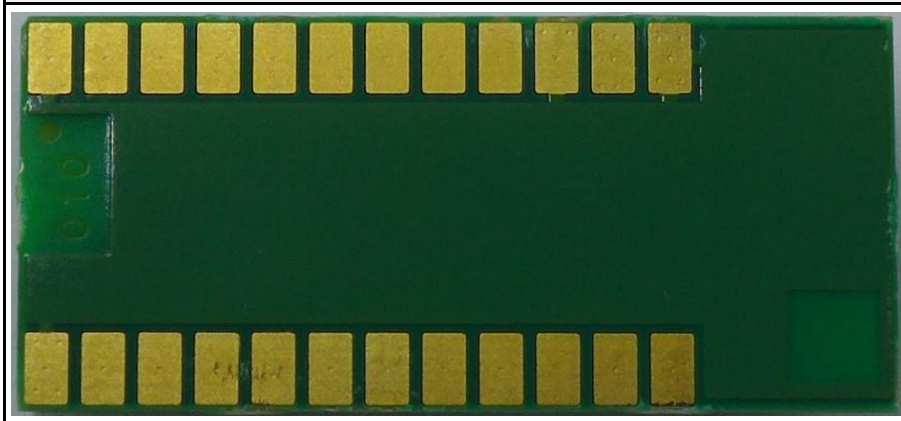
1.2 Photos – Equipment Internal



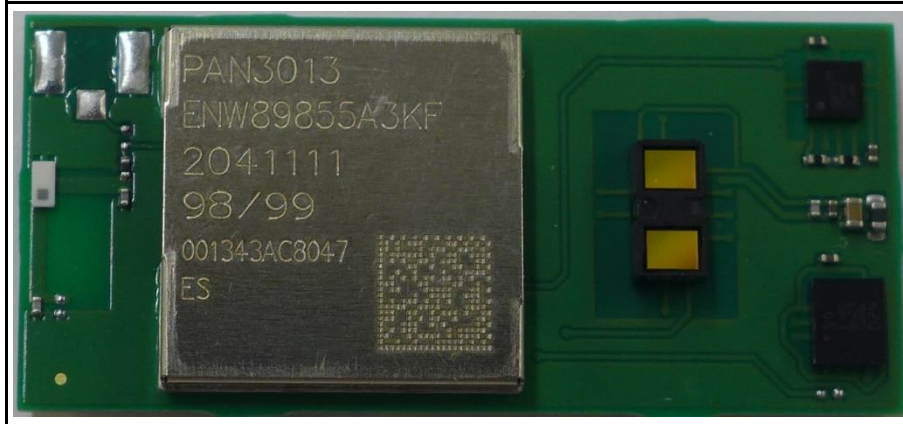
PAN3011_12_internal



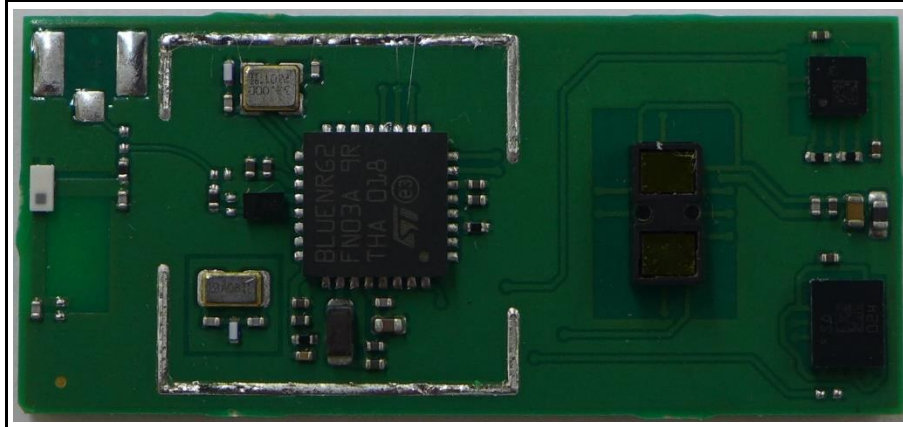
PAN3013_backside



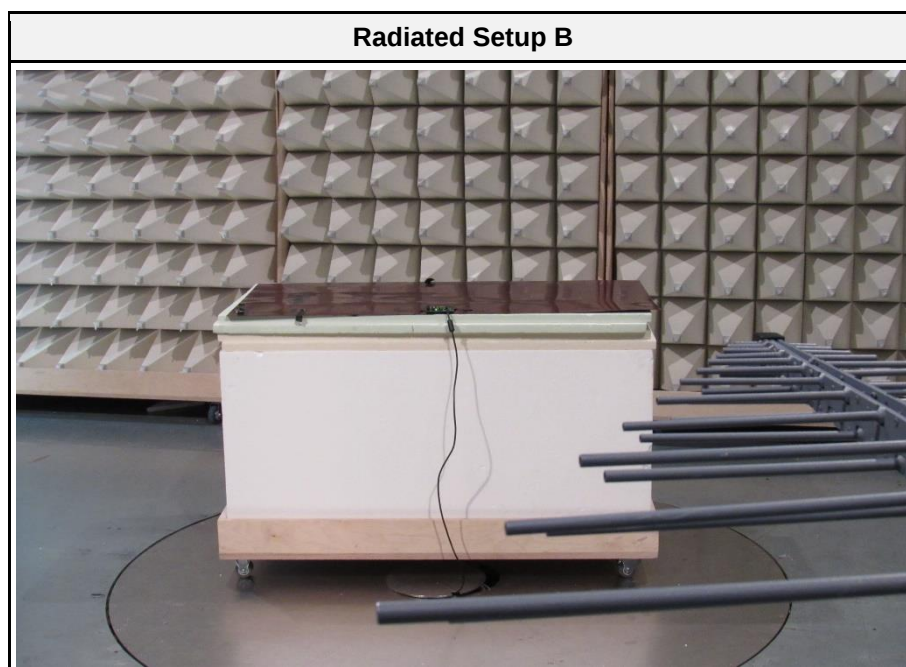
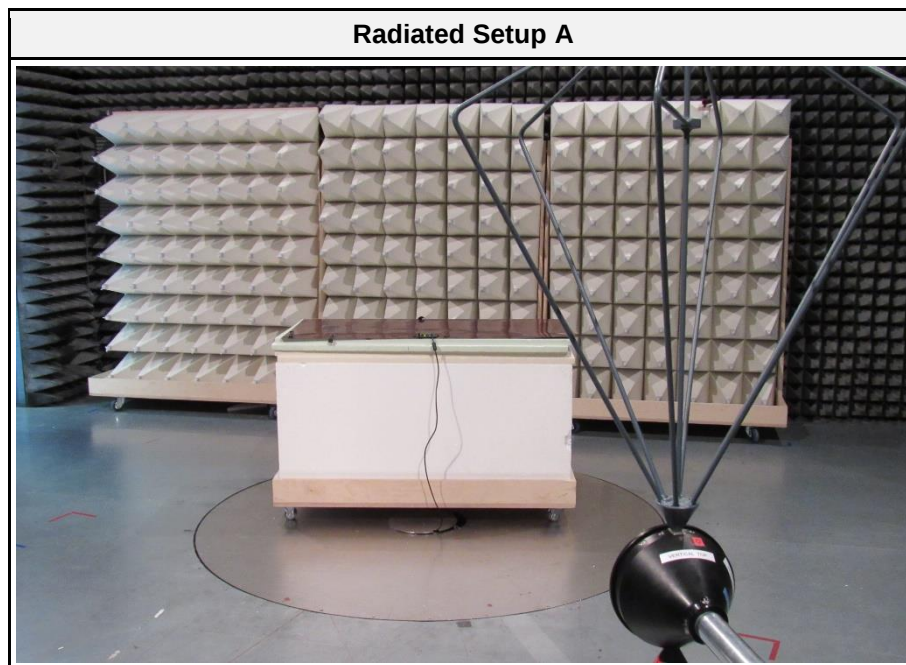
PAN3013_external



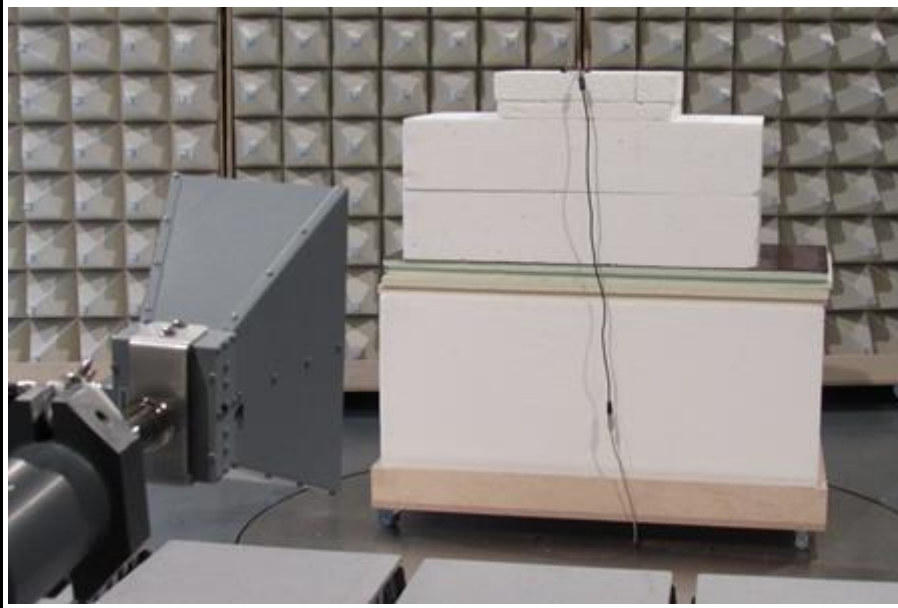
PAN3013_internal



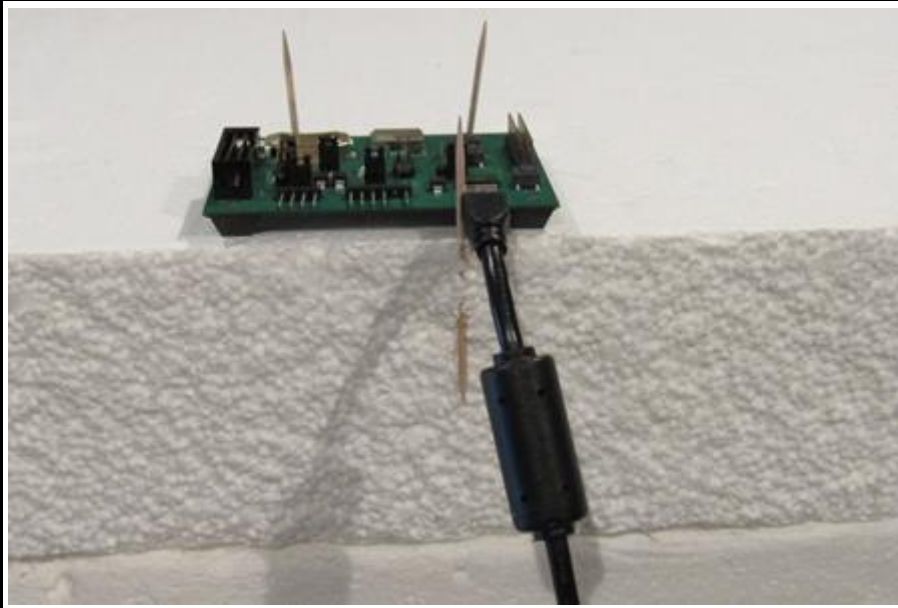
1.3 Photos – Test Setup



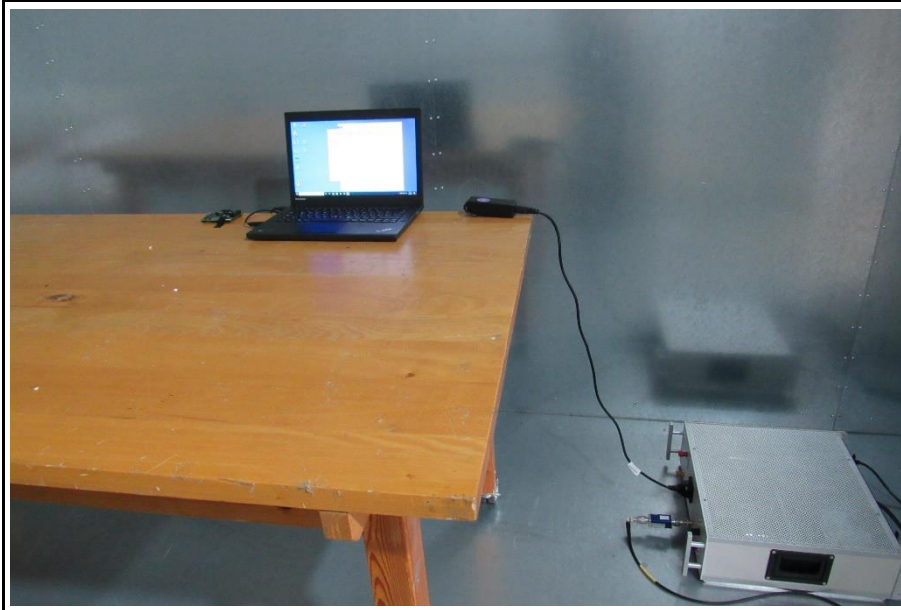
Radiated Setup C



Radiated Setup Close Up View



Conducted Setup



1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
none				
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
CBL	Connecting Cable			
SFT	Software			
Comment:				

1.5 Test Modes

Mode	Description
GFSK	Mode = Transmit Modulation = GFSK Spreading = None Duty cycle = 64%
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:

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

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/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 6.7)	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) 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

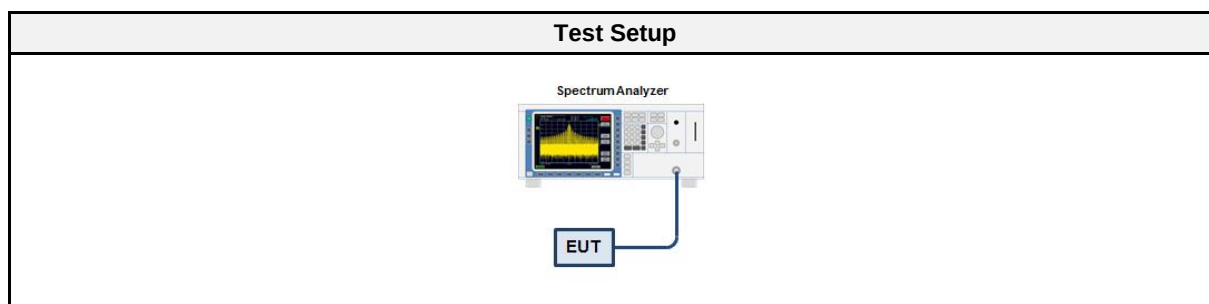
3.1.1 Information

Test Information	
Reference	ISED RSS-Gen, Issue 5 (section 6.7)
Measurement Method	ANSI C63.10 6.9.3
Measurement Uncertainty	$\pm 1.26 \%$
Test Sample ID	32830
Operator	Wilfried Treffke
Date	2021-03-17

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 Analyser	R&S	FSU 26	EF01709	2021-02	2022-02
Cable	Gigalane	SMS111B	EF00779	2020-12	2021-12

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

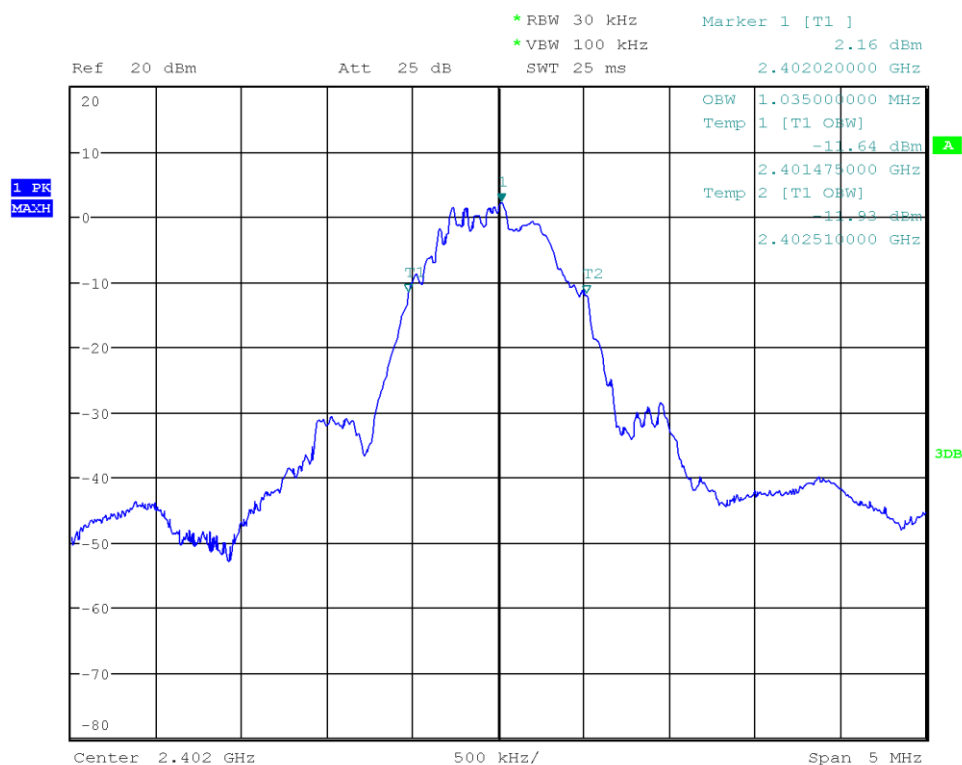
3.1.6 Results

Test Results		
Mode	Frequency [MHz]	Bandwidth [MHz]
GFSK	2402	1.035
GFSK	2440	1.030
GFSK	2480	1.035

Test Report No.: G0M-2009-9273-TFC247BL-V01

Occupied Bandwidth

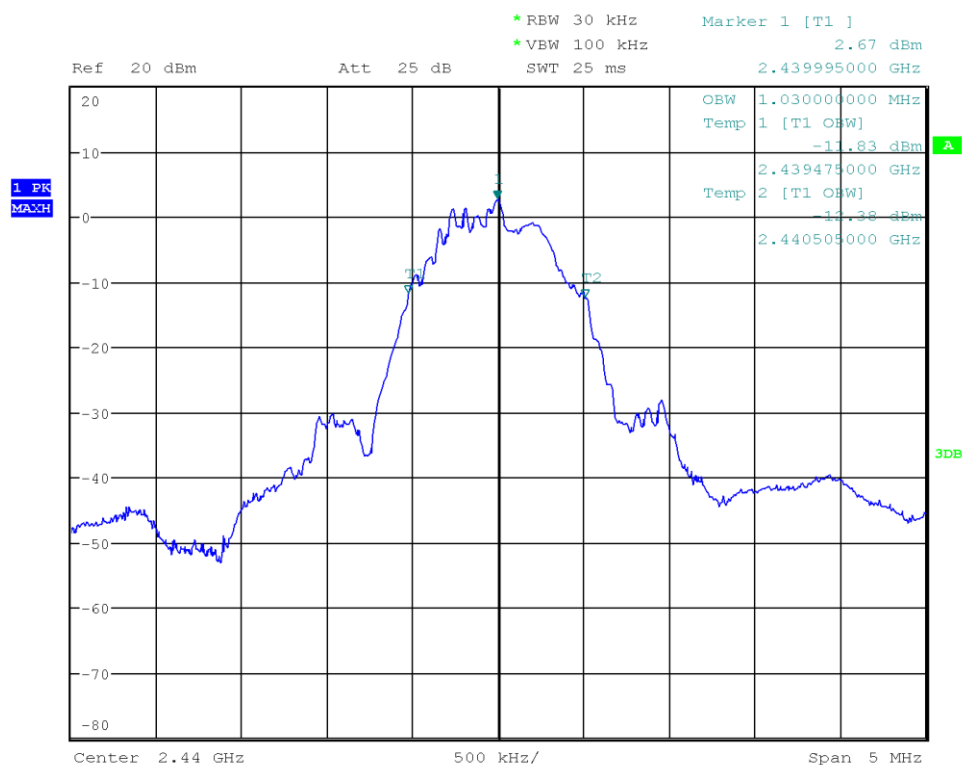
Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32830
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 6.9.3
 Operational Mode: GFSK, Channel: 0, 2402 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2021-03-17
 Occupied Bandwidth [MHz]: 1.035



Date: 17.MAR.2021 17:17:28

Occupied Bandwidth

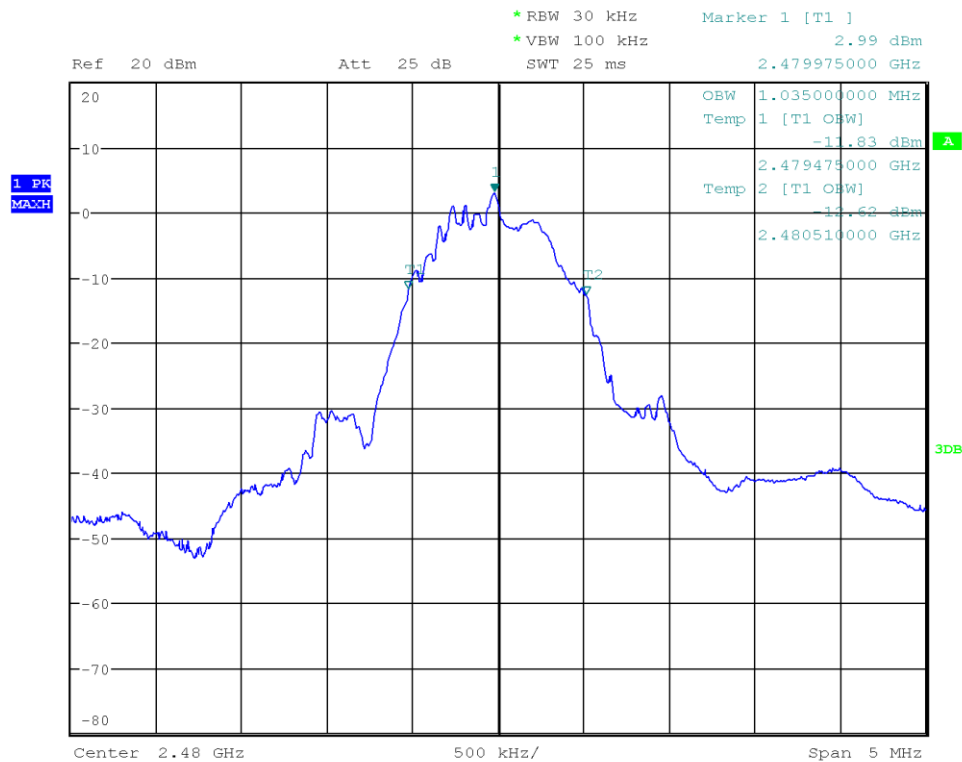
Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32830
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 6.9.3
 Operational Mode: GFSK, Channel: 19, 2440 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2021-03-17
 Occupied Bandwidth [MHz]: 1.030



Date: 17.MAR.2021 17:18:22

Occupied Bandwidth

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32830
 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: 2021-03-17
 Occupied Bandwidth [MHz]: 1.035



Date: 17.MAR.2021 17:20:38

3.2 Test Conditions and Results - 6 dB bandwidth

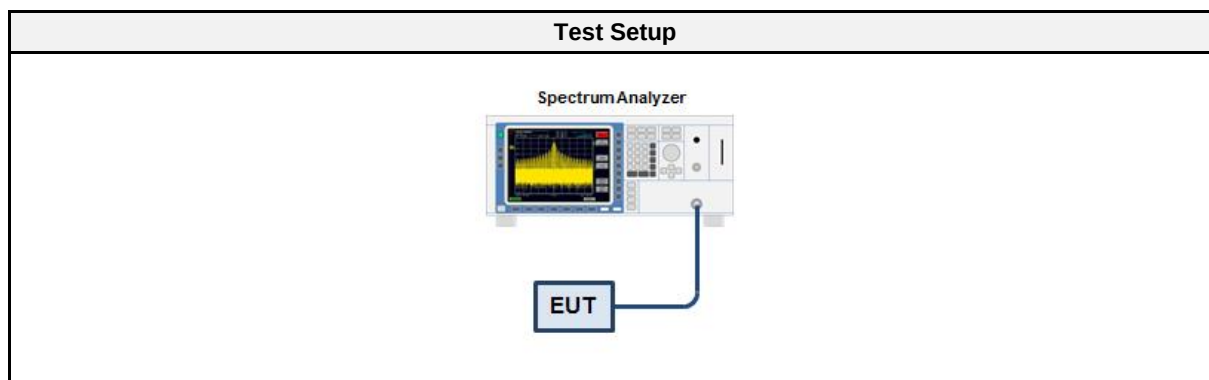
3.2.1 Information

Test Information	
Reference	FCC § 15.247(a)(2); ISSED RSS-247, Issue 2 (section 5.2)
Measurement Method	ANSI C63.10 11.8
Measurement Uncertainty	± 1.26 %
Operator	Wilfried Treffke
Date	2021-03-17

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 Analyser	R&S	FSU 26	EF01709	2021-02	2022-02
Cable	Gigalane	SMS111B	EF00779 CAAZ	2020-12	2021-12

3.2.5 Procedure

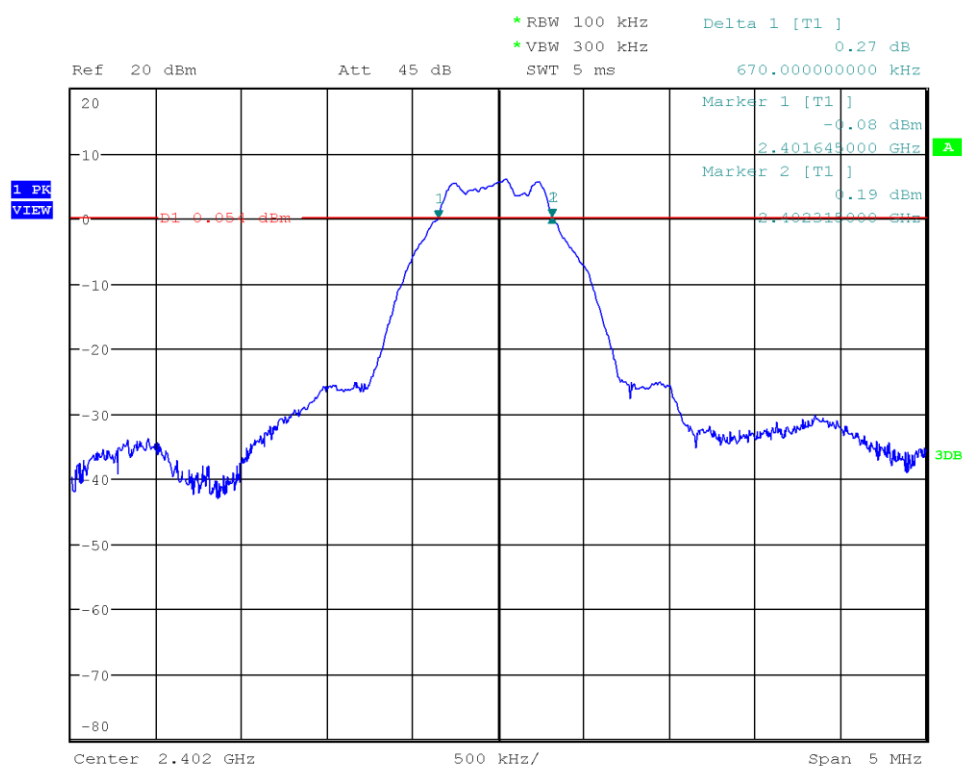
Test Procedure
1. EUT set to test mode 2. Span set to at least twice the emission spectrum 3. Detector set to peak and max hold and RBW is set to 100 kHz 4. Envelope peak value of emission spectrum is selected 5. Marker on envelope of spectrum is set to level of -6 dB to the left of the peak 6. Marker 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	670	500	PASS
GFSK	2440	665	500	PASS
GFSK	2480	670	500	PASS

DTS (6 dB) Bandwidth

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32830
 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: 2021-03-17
 Lower Frequency [MHz]: 2401.645
 Upper Frequency [MHz]: 2402.315
 6 dB Bandwidth [kHz]: 670



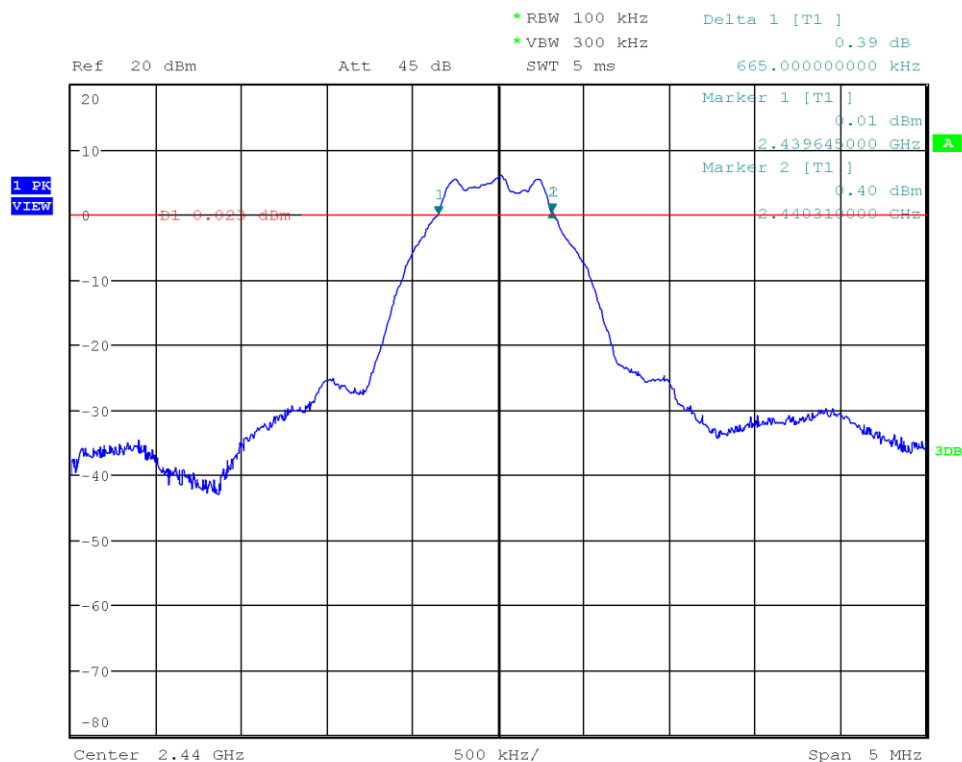
Date: 17.MAR.2021 17:22:34

Test Report No.: G0M-2009-9273-TFC247BL-V01

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

DTS (6 dB) Bandwidth

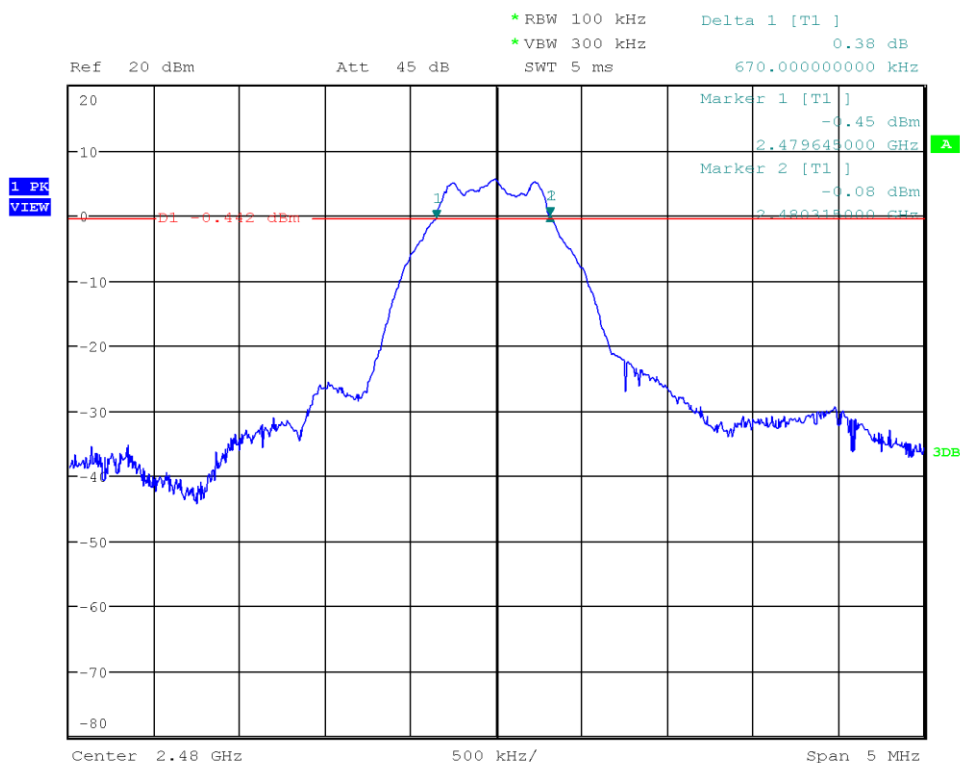
Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32830
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.8.1 Option 1
 Operational Mode: GFSK, Channel: 19, 2440 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2021-03-17
 Lower Frequency [MHz]: 2439.645
 Upper Frequency [MHz]: 2440.310
 6 dB Bandwidth [kHz]: 665



Date: 17.MAR.2021 17:24:04

DTS (6 dB) Bandwidth

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32830
 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: 2021-03-17
 Lower Frequency [MHz]: 2479.645
 Upper Frequency [MHz]: 2480.315
 6 dB Bandwidth [kHz]: 670



Date: 17.MAR.2021 17:25:05

Test Report No.: G0M-2009-9273-TFC247BL-V01

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

3.3 Test Conditions and Results - Maximum peak conducted output power

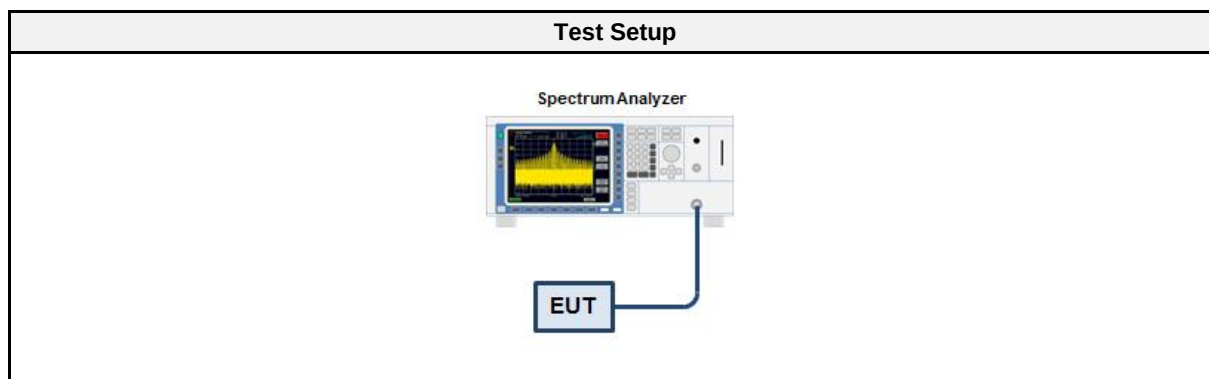
3.3.1 Information

Test Information	
Reference	FCC § 15.247(b); ISED RSS-247, Issue 2 (section 5.4)
Measurement Method	ANSI C63.10 11.9.1
Measurement Uncertainty	± 2.86 dB
Operator	Wilfried Treffke
Date	2021-03-17

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 Analyser	R&S	FSU 26	EF01709	2021-02	2022-02
Cable	Gigalane	SMS111B	EF00779 CAAZ	2020-12	2021-12

3.3.5 Procedure

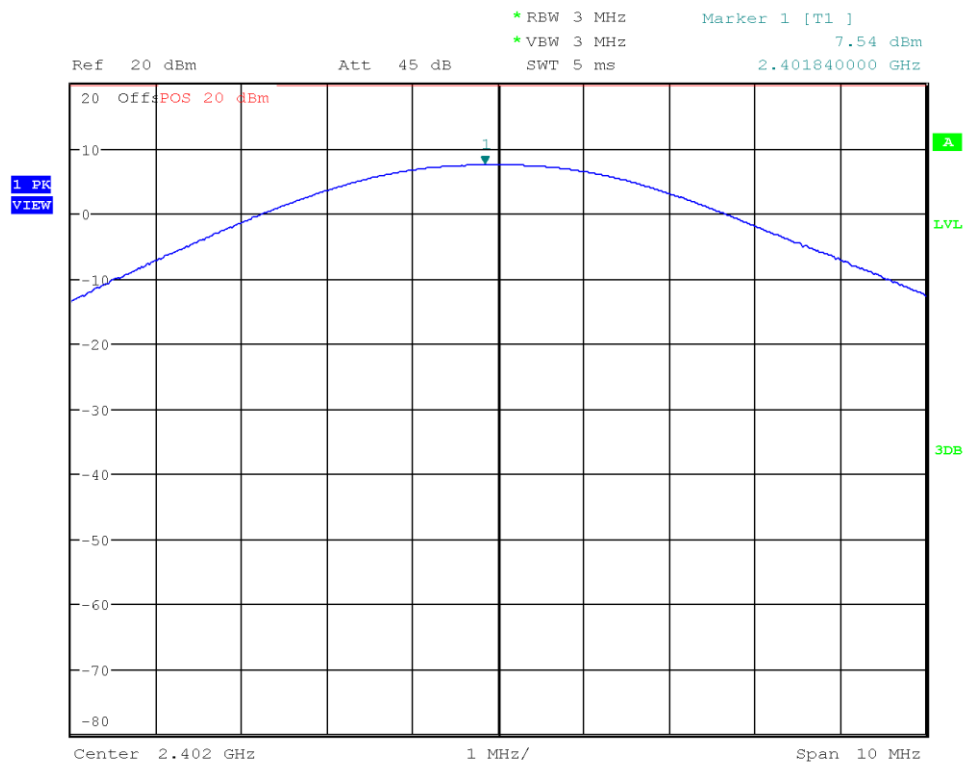
Test Procedure
1. EUT set to test mode (Communication tester is used if needed) 2. Analyzer resolution bandwidth is set $\geq$ DTS bandwidth 3. Detector set to peak and max hold 4. Sweep time is set to auto 5. After the trace has stabilized a marker is set to peak of envelope

3.3.6 Results

Test Results				
Channel [MHz]	Power [dBm]	Power [W]	Limit [W]	Verdict
2402	7.539	0.0057	1.0	PASS
2440	7.379	0.0055	1.0	PASS
2480	7.047	0.0051	1.0	PASS

Peak Conducted Output Power

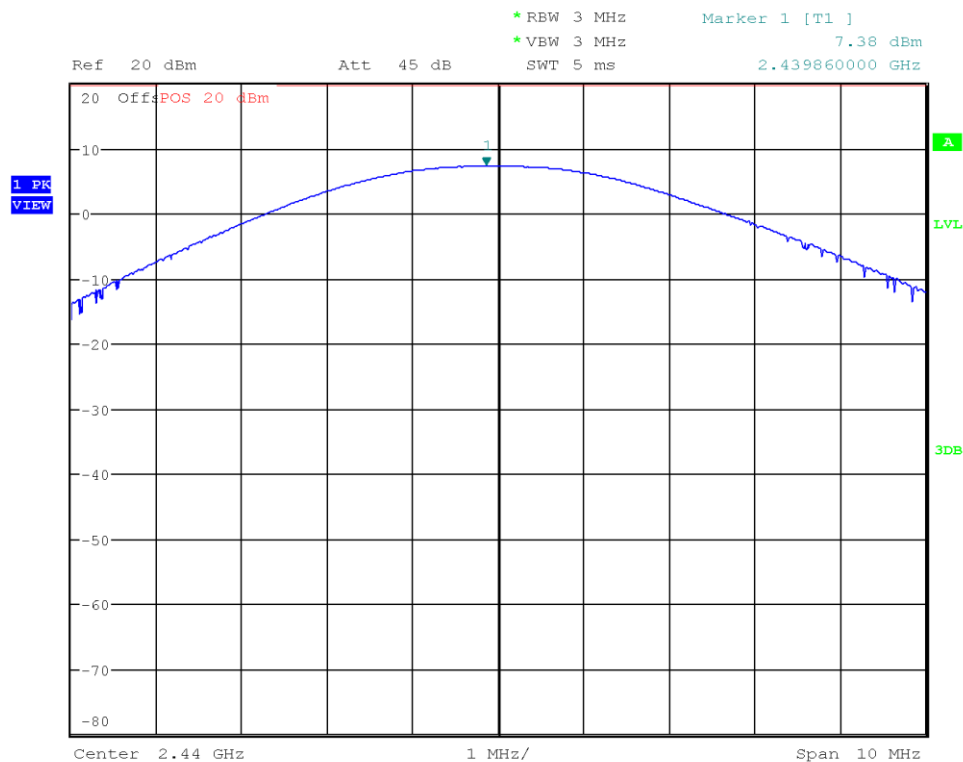
Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32830
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.9.1.1
 Operational Mode: GFSK, Channel: 0, 2402 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2021-03-17
 Peak Power [dBm]: 7.539
 Peak Power [W]: 0.0057



Date: 17.MAR.2021 17:27:14

Peak Conducted Output Power

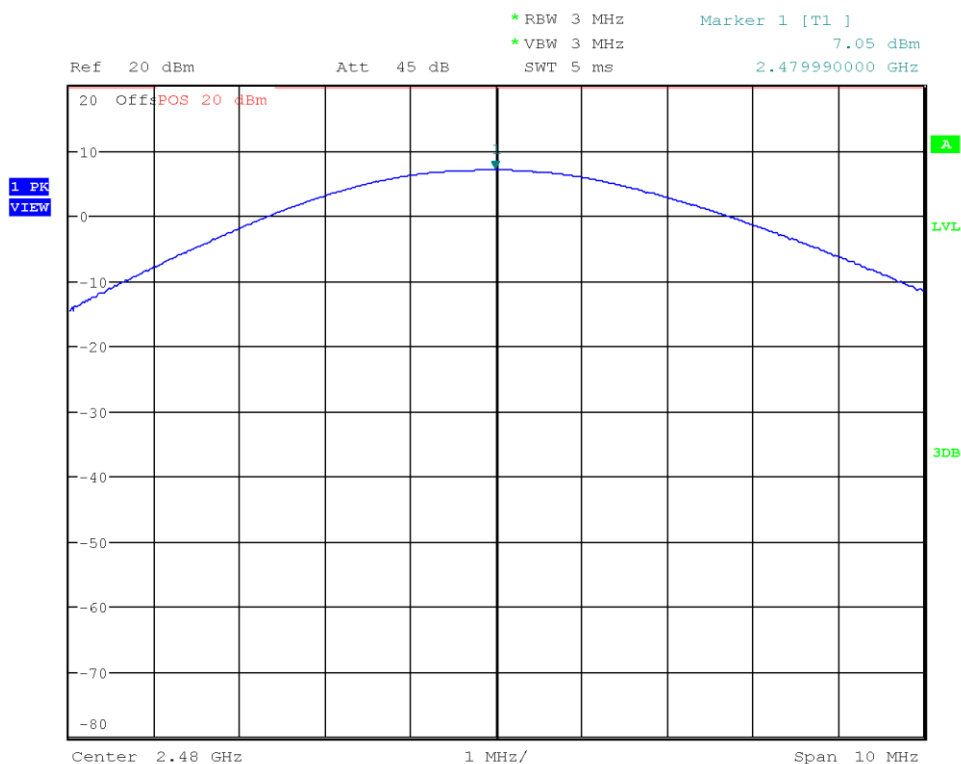
Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32830
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.9.1.1
 Operational Mode: GFSK, Channel: 19, 2440 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2021-03-17
 Peak Power [dBm]: 7.379
 Peak Power [W]: 0.0055



Date: 17.MAR.2021 17:29:31

Peak Conducted Output Power

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32830
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.9.1.1
 Operational Mode: GFSK, Channel: 39, 2480 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2021-03-17
 Peak Power [dBm]: 7.047
 Peak Power [W]: 0.0051



Date: 17.MAR.2021 17:30:43

3.4 Test Conditions and Results - Power spectral density

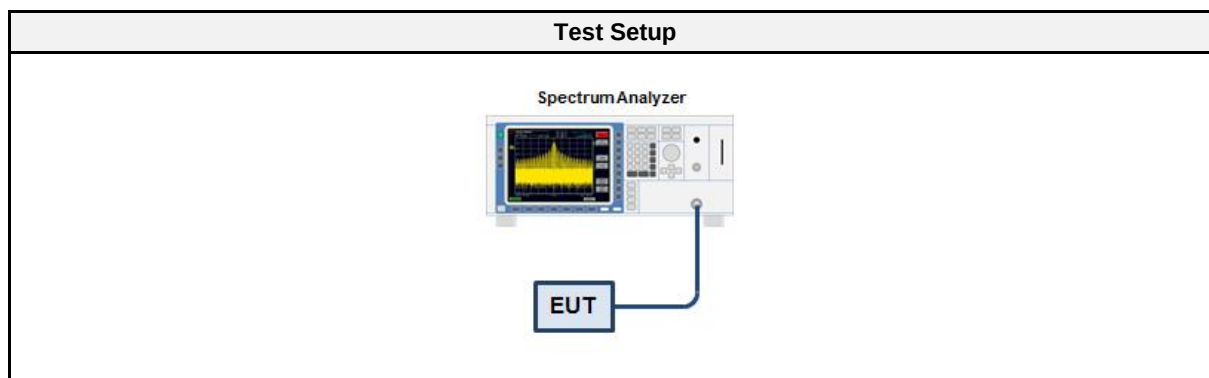
3.4.1 Information

Test Information	
Reference	FCC § 15.247(e); ISSED RSS-247, Issue 2 (section 5.2)
Measurement Method	ANSI C63.10 11.10.2, 14.3.2
Measurement Uncertainty	± 2.86 dB
Operator	Wilfried Treffke
Date	2021-03-17

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 Analyser	R&S	FSU 26	EF01709	2021-02	2022-02
Cable	Gigalane	SMS111B	EF00779 CAAZ	2020-12	2021-12

3.4.5 Procedure

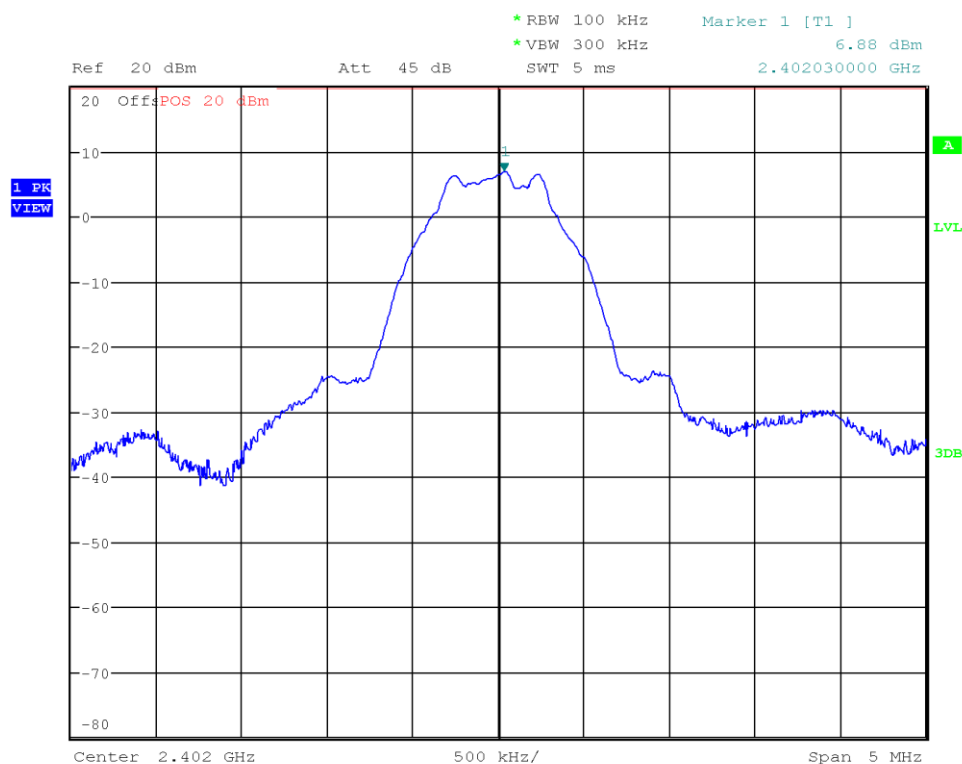
Test Procedure
1. EUT set to test mode 2. The analyzer is set to DTS channel center frequency with a span of 1.5 times the DTS bandwidth 3. The RBW is set to 100 kHz with VBW ≥ RBW and the detector is set to peak with max hold 4. After the trace has stabilized a marker is set to the envelope maximum 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	6.884	8.0	PASS
2440	6.780	8.0	PASS
2480	6.385	8.0	PASS
RBW = 100 kHz			

Peak Power Spectral Density

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32830
 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: 2021-03-17
 Peak Frequency [MHz]: 2402.030
 Spectral Density [dBm/RBW]: 6.884
 Resolution Bandwidth [kHz]: 100 kHz



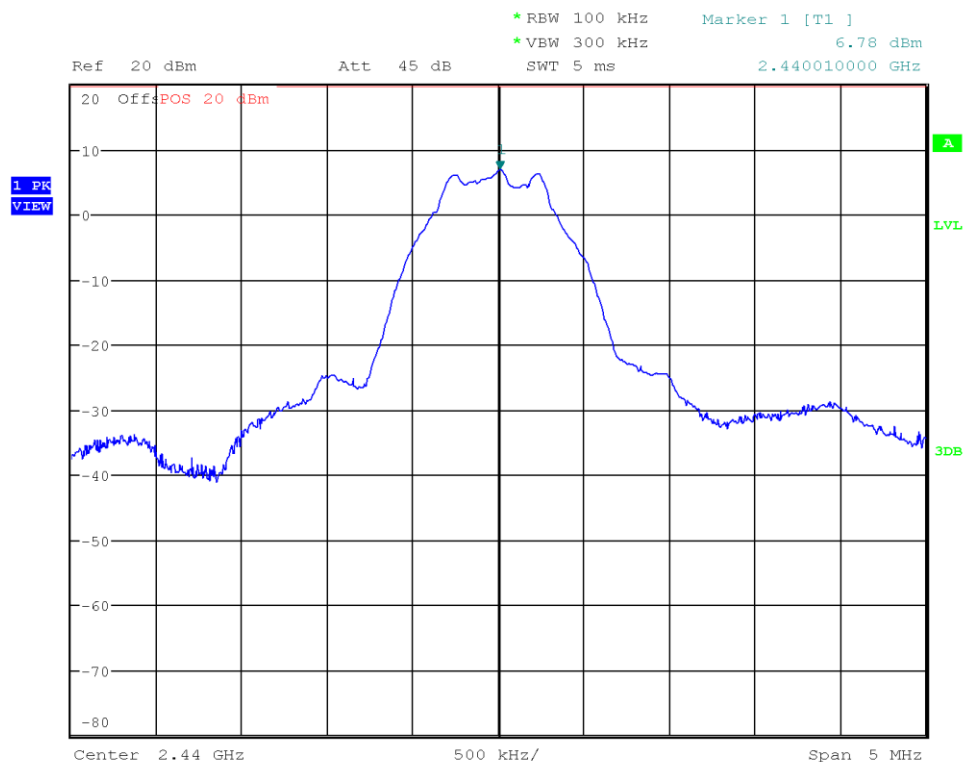
Date: 17.MAR.2021 18:34:10

Test Report No.: G0M-2009-9273-TFC247BL-V01

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

Peak Power Spectral Density

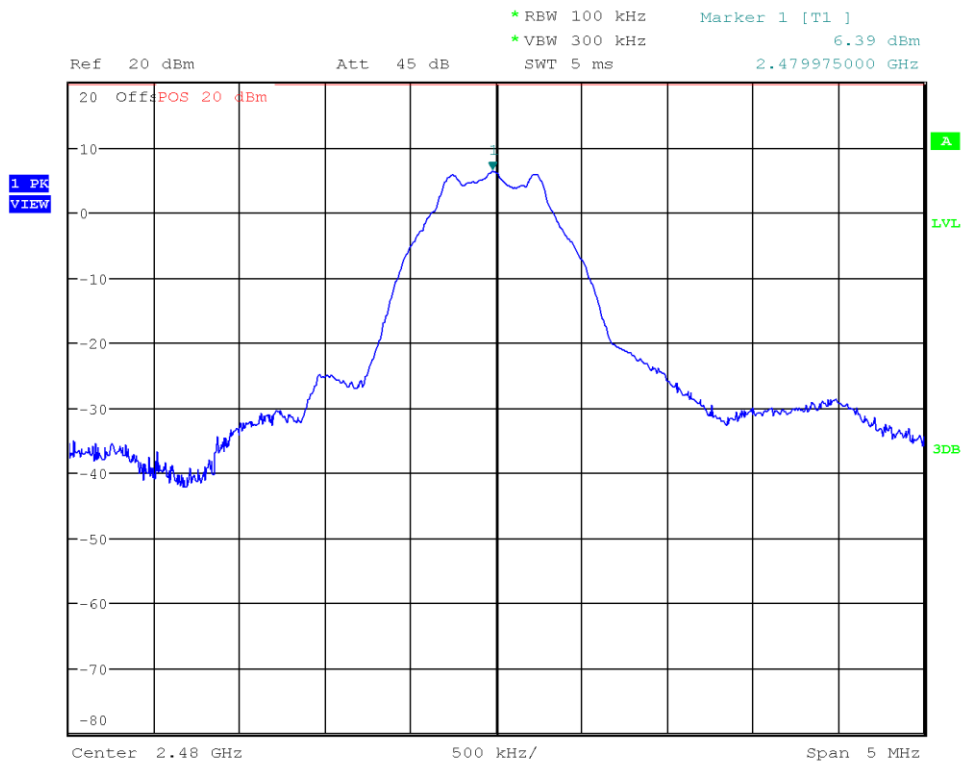
Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32830
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.10.2
 Operational Mode: GFSK, Channel: 19, 2440 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2021-03-17
 Peak Frequency [MHz]: 2440.010
 Spectral Density [dBm/RBW]: 6.780
 Resolution Bandwidth [kHz]: 100 kHz



Date: 17.MAR.2021 18:55:54

Peak Power Spectral Density

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32830
 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: 2021-03-17
 Peak Frequency [MHz]: 2479.975
 Spectral Density [dBm/RBW]: 6.385
 Resolution Bandwidth [kHz]: 100 kHz



Date: 17.MAR.2021 18:58:53

Test Report No.: G0M-2009-9273-TFC247BL-V01

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

3.5 Test Conditions and Results - AC powerline conducted emissions

3.5.1 Information

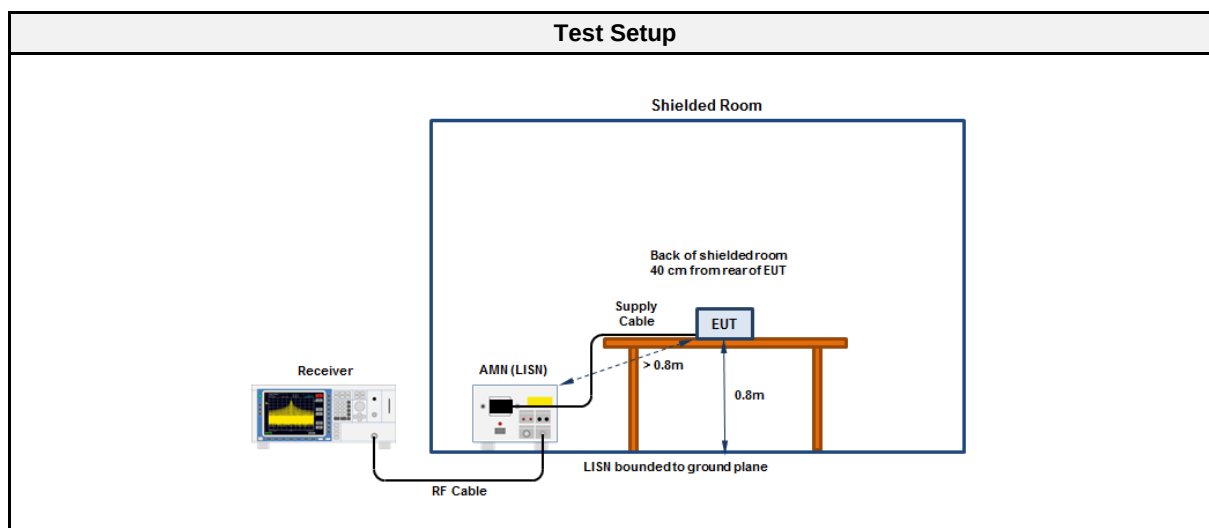
Test Information	
Reference	FCC § 15.207; ISED RSS-247, Issue 2 (section 3.1)
Measurement Method	ANSI C63.10 6.2
Measurement Uncertainty	± 3.82 dB
Operator	Wilfried Treffke
Date	2021-03-13

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



3.5.4 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMation	2020.1.8

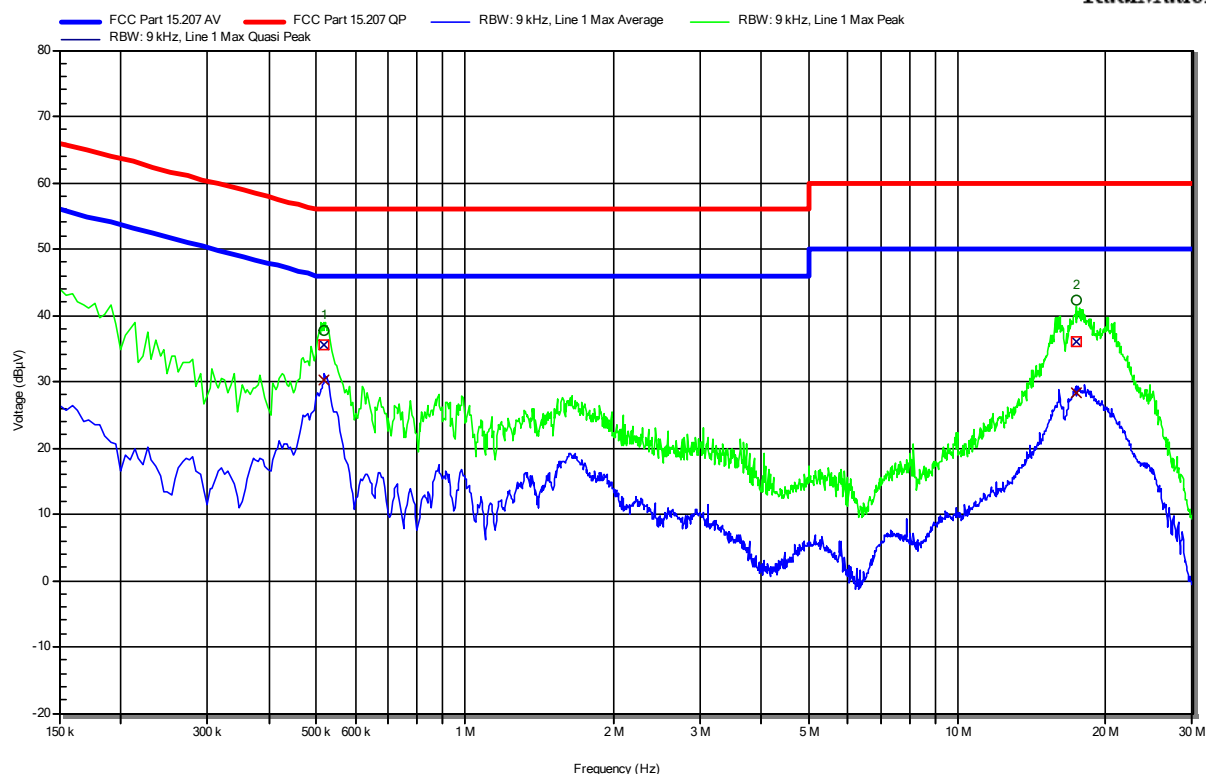
Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EMI Test Receiver	R&S	ESR7	EF00943	2020-07	2021-07
Pulse Limiter	R&S	ESH3-Z2	EF01222	2020-07	2021-07
LISN	Schwarzbeck	NSLK 8127 RC	EF01592	2020-07	2021-07

Conducted emissions at the mains power port according to FCC part 15 C

Project Number: G0M-2009-9272
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Date: 2021-03-17
 Operating Conditions: ambient temperature: 23.4 °Celsius
 power input: 120 VAC
 LISN: Schwarzbeck NSLK 8127 RC L
 Operational Mode & EUT Configuration: BLE; GFSK; 2440 MHz
 Applied to Port: AC Mains

Index 74

Radiation



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	519 kHz	35.62 dBµV	56 dBµV	-20.38 dB	Pass	Line 1
2	17.448 MHz	36.07 dBµV	60 dBµV	-23.93 dB	Pass	Line 1

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	519 kHz	30.16 dBµV	46 dBµV	-15.84 dB	Pass	Line 1
2	17.448 MHz	28.41 dBµV	50 dBµV	-21.59 dB	Pass	Line 1

Test Report No.: G0M-2009-9273-TFC247BL-V01

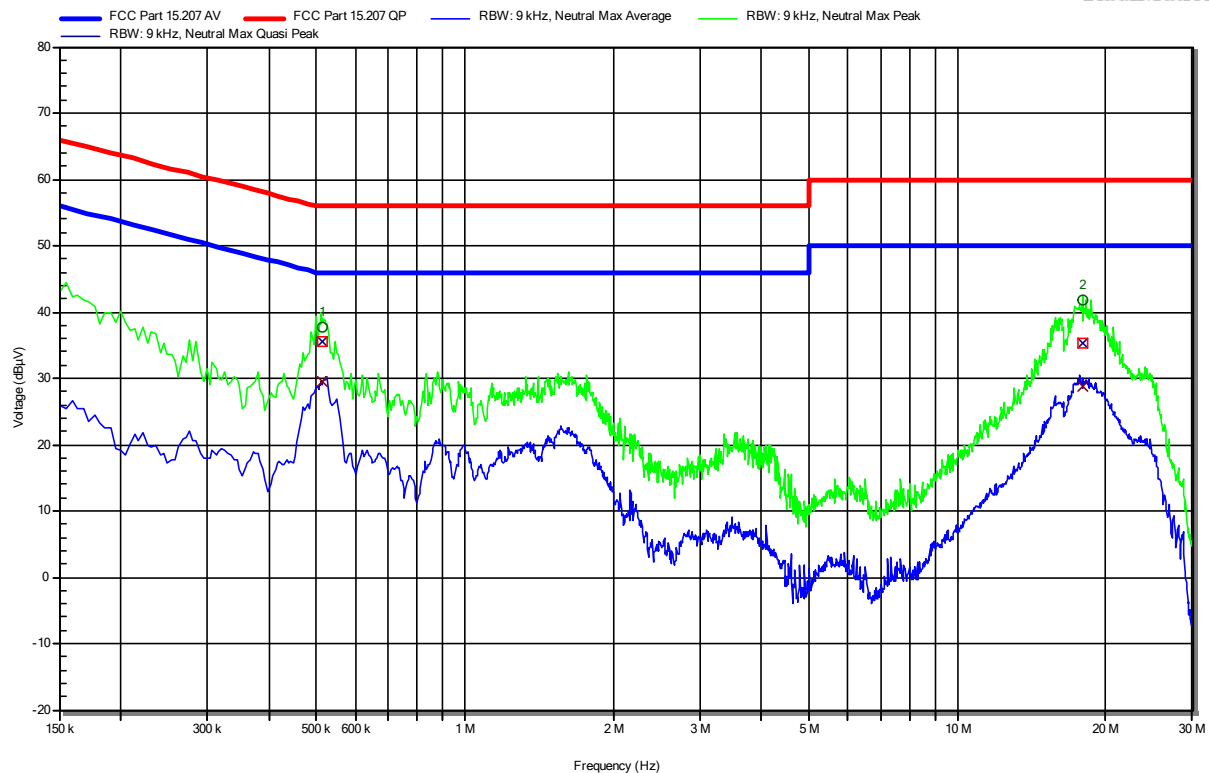
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Conducted emissions at the mains power port according to FCC part 15 C

Project Number: G0M-2009-9272
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Test Date: 2021-03-17
 Operating Conditions: ambient temperature: 23.4 °Celsius
 power input: 120 VAC
 LISN: Schwarzbeck NSLK 8127 RC N
 Operational Mode & EUT Configuration: BLE; GFSK; 2440 MHz
 Applied to Port: AC Mains

Index 75

RadiMation



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	514.5 kHz	35.53 dBµV	56 dBµV	-20.47 dB	Pass	Neutral
2	17.957 MHz	35.23 dBµV	60 dBµV	-24.77 dB	Pass	Neutral
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	514.5 kHz	29.42 dBµV	46 dBµV	-16.58 dB	Pass	Neutral
2	17.957 MHz	28.7 dBµV	50 dBµV	-21.3 dB	Pass	Neutral

Test Report No.: G0M-2009-9273-TFC247BL-V01

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

3.6 Test Conditions and Results - Band-edge compliance

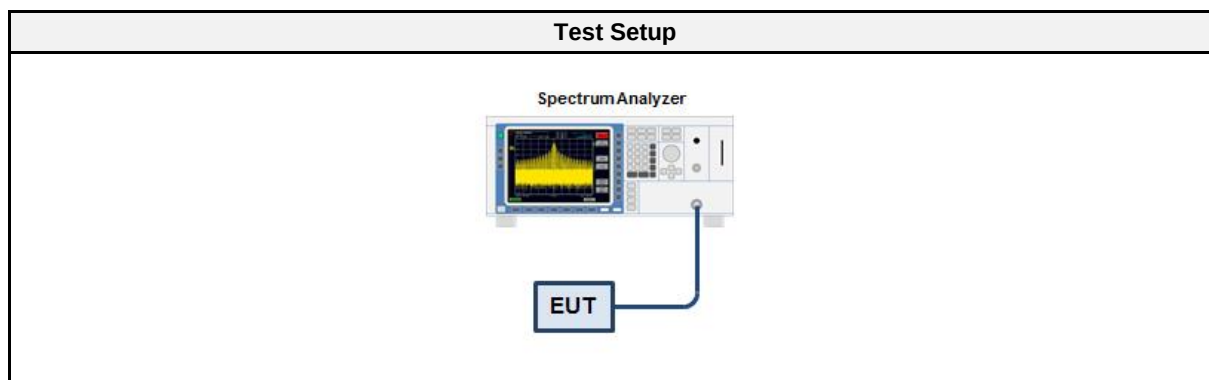
3.6.1 Information

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSU 26	EF01709	2021-02	2022-02

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 Analyser	R&S	FSU 26	EF01709	2021-02	2022-02
Cable	Gigalane	SMS111B	EF00779 CAAZ	2020-12	2021-12

3.6.5 Procedure

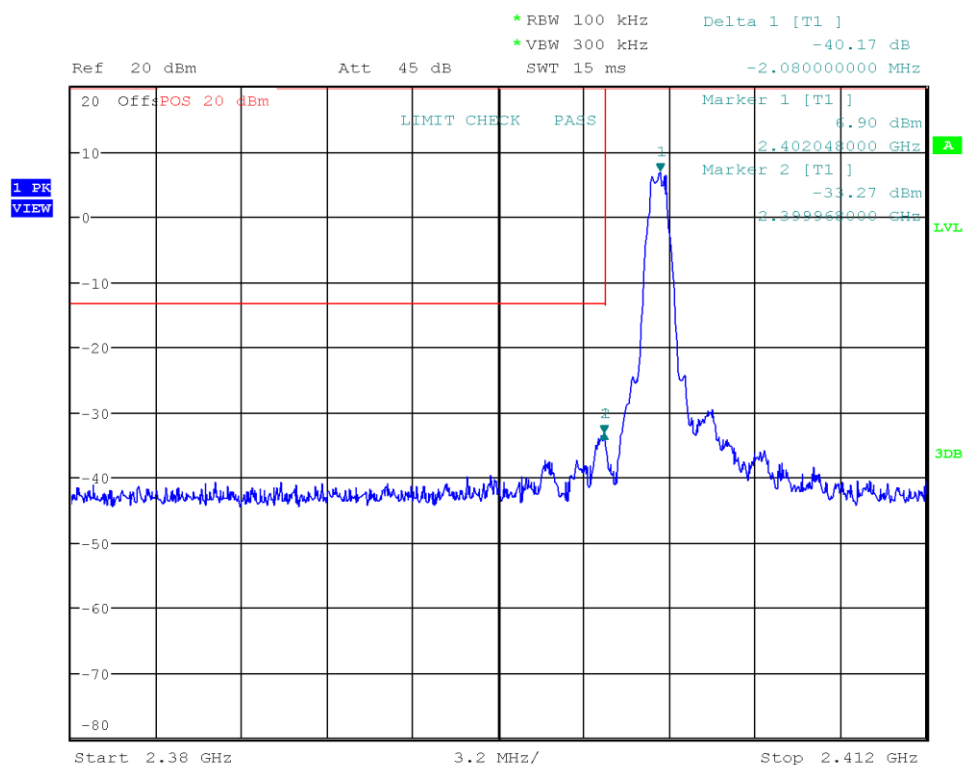
Test Procedure
1. EUT set to test mode (Communication tester is used if needed) 2. Span set around lower band edge and detector is set to peak and max hold 3. Resolution bandwidth is set to 100 kHz 4. Markers are set to peak emission levels within frequency band and outside frequency band 5. Band edge 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	-40.17	-20	PASS
GFSK	2480	-41.34	-20	PASS

Emissions in nonrestricted frequency bands at the Band-edge

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32830
 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: 2021-03-17
 Band-edge: Lower
 In-band Frequency [MHz]: 2402.048
 Max. in-band Level [dBm/100 kHz]: 6.899
 Out-of-band Frequency [MHz]: 2399.968
 Max. out-of-band Level [dBm/100 kHz]: -33.271
 Attenuation [dB]: -40.17



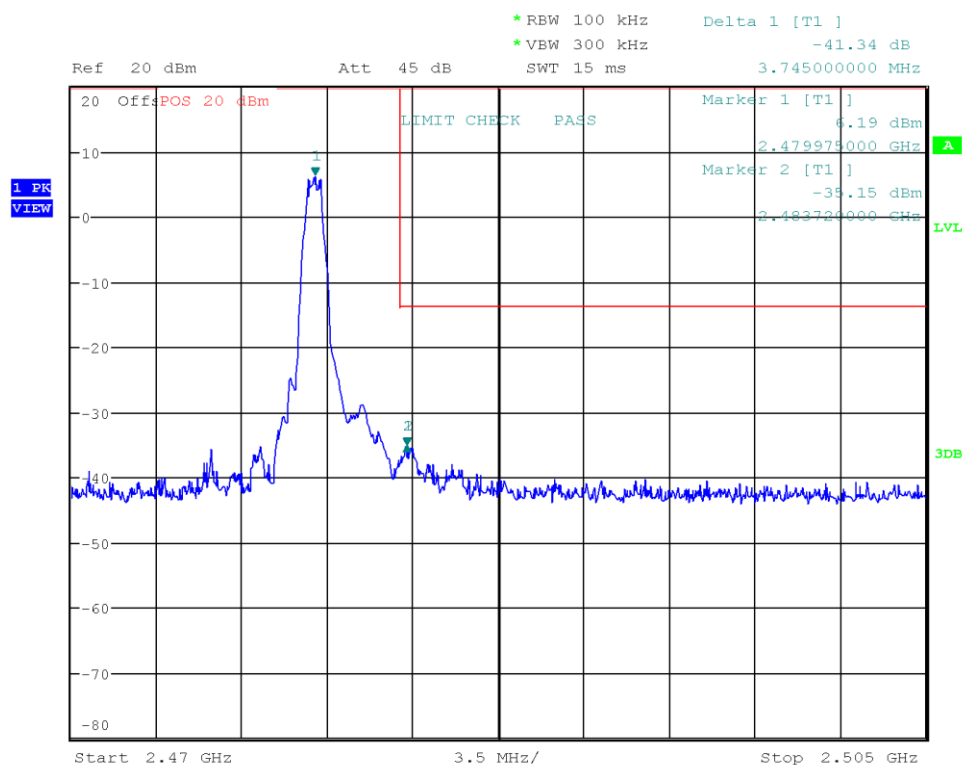
Date: 17.MAR.2021 17:51:53

Test Report No.: G0M-2009-9273-TFC247BL-V01

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

Emissions in nonrestricted frequency bands at the Band-edge

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32830
 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: 2021-03-17
 Band-edge: Upper
 In-band Frequency [MHz]: 2479.975
 Max. in-band Level [dBm/100 kHz]: 6.19
 Out-of-band Frequency [MHz]: 2483.72
 Max. out-of-band Level [dBm/100 kHz]: -35.152
 Attenuation [dB]: -41.34



Date: 17.MAR.2021 17:53:20

Test Report No.: G0M-2009-9273-TFC247BL-V01

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

3.7 Test Conditions and Results - Conducted spurious emissions

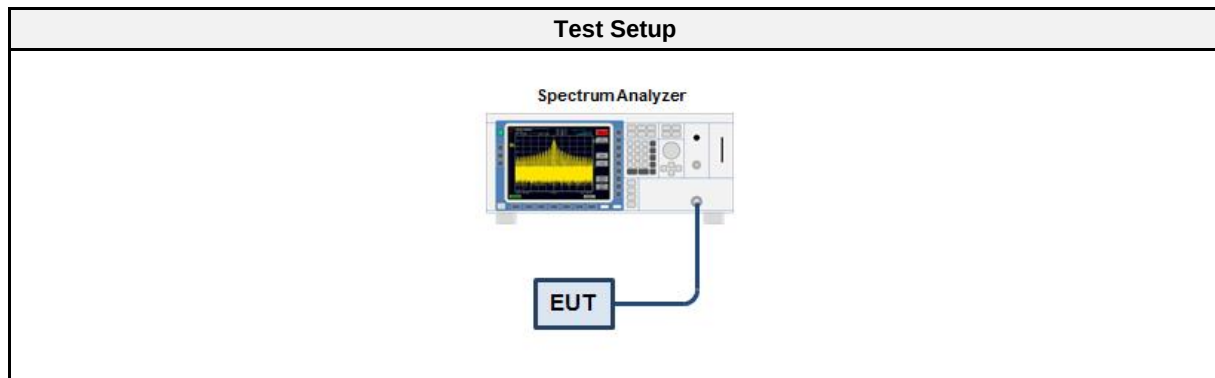
3.7.1 Information

Test Information	
Reference	FCC § 15.247(d); ISED RSS-247, Issue 2 (section 5.5)
Measurement Uncertainty	± 4.25 dB
Measurement Method	ANSI C63.10 11.11
Operator	Wilfried Treffke
Date	2021-03-13

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 Analyser	R&S	FSU 26	EF01709	2021-02	2022-02
Cable	Gigalane	SMS111B	EF00779 CAA AZ	2020-12	2021-12

3.7.5 Procedure

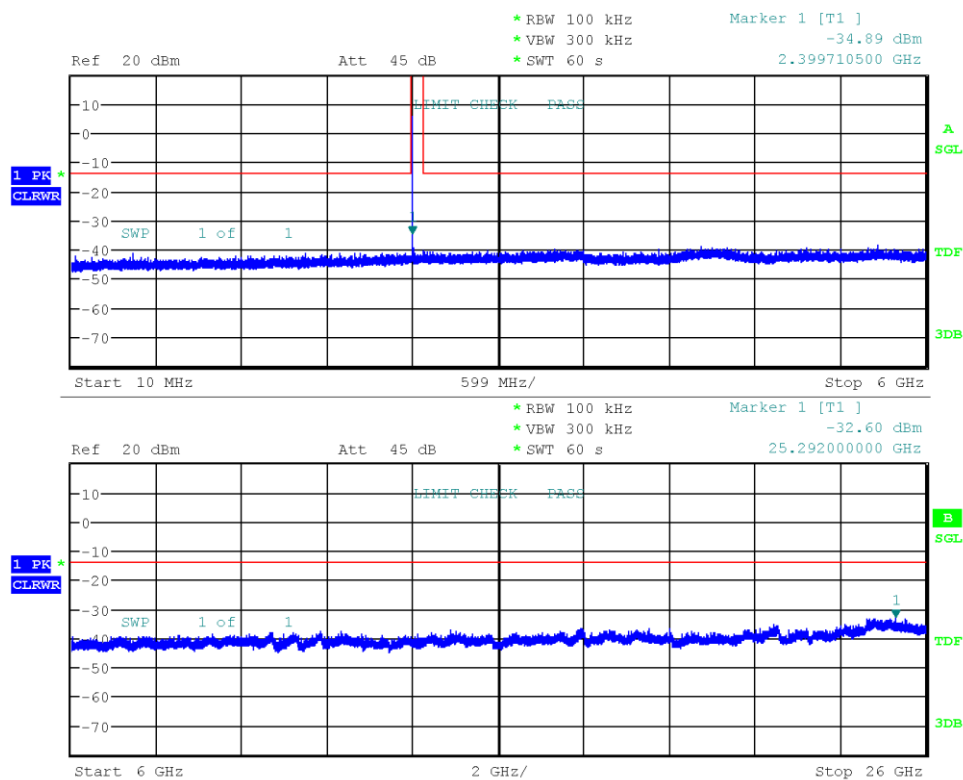
Test Procedure
1. EUT set to test mode (Communication tester is used if needed) 2. Span set around lower band edge and detector is set to peak and max hold 3. Resolution bandwidth is set to 100 kHz 4. Markers are set to peak emission levels outside frequency band

3.7.6 Results

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

Conducted Spurious Emissions

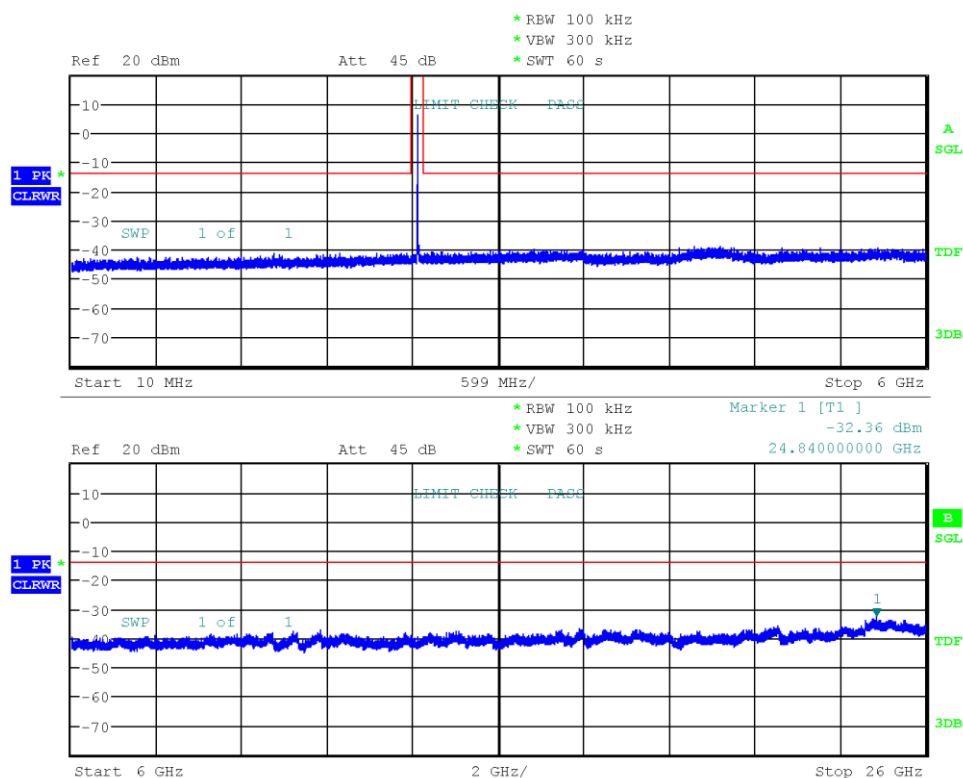
Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32830
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.11
 Operational Mode: GFSK, Channel: 0, 2402 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2021-03-17
 Max. in-band Frequency [MHz]: 2402.0
 Max. in-band Level [dBm/100 kHz]: 6.4
 Out-of-band Limit [dBm/100 kHz]: -13.6



Date: 17.MAR.2021 20:37:57

Conducted Spurious Emissions

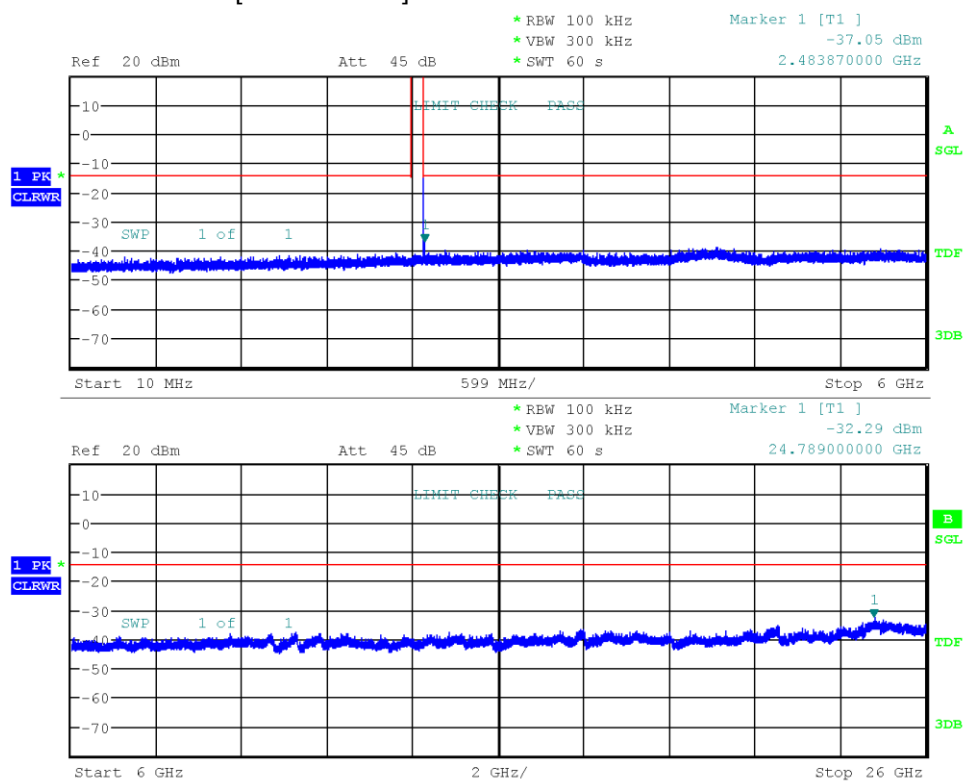
Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32830
 Reference Standards: FCC 15.247, RSS-247
 Reference Method: ANSI C63.10:2013, Section 11.11
 Operational Mode: GFSK, Channel: 19, 2440 MHz
 Operating Conditions: Tnom/Vnom
 Operator: Wilfried Treffke
 Test Site: Eurofins Product Service GmbH
 Test Date: 2021-03-17
 Max. in-band Frequency [MHz]: 2440.0
 Max. in-band Level [dBm/100 kHz]: 6.4
 Out-of-band Limit [dBm/100 kHz]: -13.6



Date: 17.MAR.2021 20:54:56

Conducted Spurious Emissions

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32830
 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: 2021-03-17
 Max. in-band Frequency [MHz]: 2480.0
 Max. in-band Level [dBm/100 kHz]: 5.9
 Out-of-band Limit [dBm/100 kHz]: -14.1



Date: 17.MAR.2021 20:59:24

3.8 Test Conditions and Results - Transmitter radiated emissions

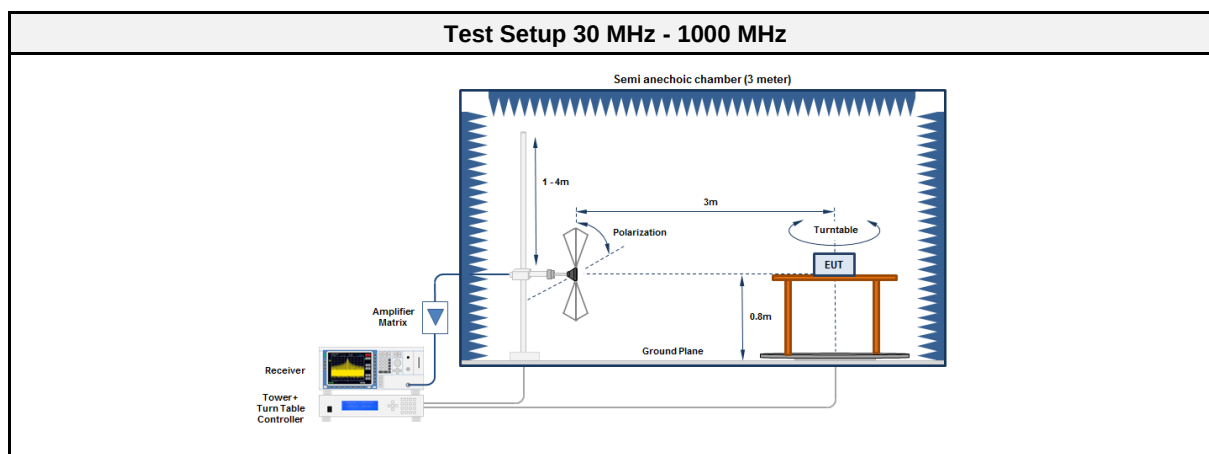
3.8.1 Information

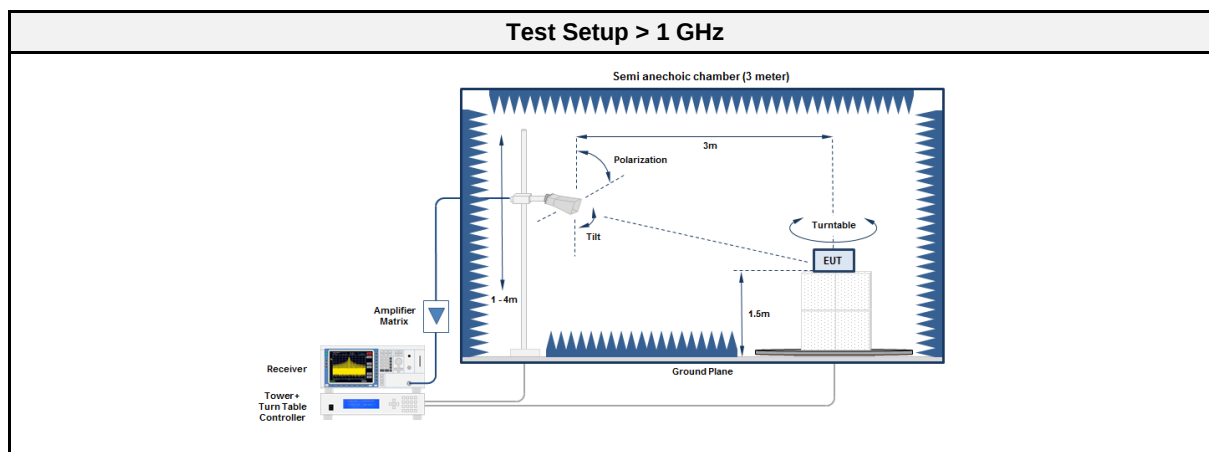
Test Information	
Reference	FCC § 15.247(d); FCC § 15.209; ISSED RSS-Gen, Issue 5 (section 6.13)
Measurement Uncertainty	± 5.95 dB
Measurement Method	ANSI C63.10 6.4, 6.5, 6.6, 11.12
Operator	Wilfried Treffke
Date	2021-03-16

3.8.2 Limits

Limits			
Frequency range [MHz]	Detector	Field strength [$\mu\text{V/m}$]	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 Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMation	2020.1.8

Test Equipment 30 MHz - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2021-02	2024-02
Measurement Receiver	R&S	ESU 26	EF00887	2020-07	2021-07
Antenna	R&S	HK 116	EF00030	2019-04	2022-04
Antenna	R&S	HL 223	EF00187	2019-05	2022-05

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2021-02	2024-02
Measurement Receiver	R&S	ESU 26	EF00887	2020-07	2021-07
Antenna	Schwarzbeck	BBHA 9120D	EF00018	2019-10	2022-10
Antenna	Amplifier Research	AT4560	EF00302	2019-05	2021-05

3.8.5 Procedure

Test Procedure 30 MHz - 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	2385.9	56.77	pk	hor	74.00	-17.23
2402	2389.4	44.24	pk	ver	74.00	-29.76
2402	2389.4	22.94	avg	ver	54.00	-31.06
2440	12199	53.55	pk	ver	74.00	-20.45
2440	12199	43.02	avg	ver	54.00	-10.98
2480	2483.8	73.41	pk	hor	74.00	-00.59
2480	2483.8	44.29	avg	hor	54.00	-09.71

3.9 Test Conditions and Results - Receiver radiated emissions

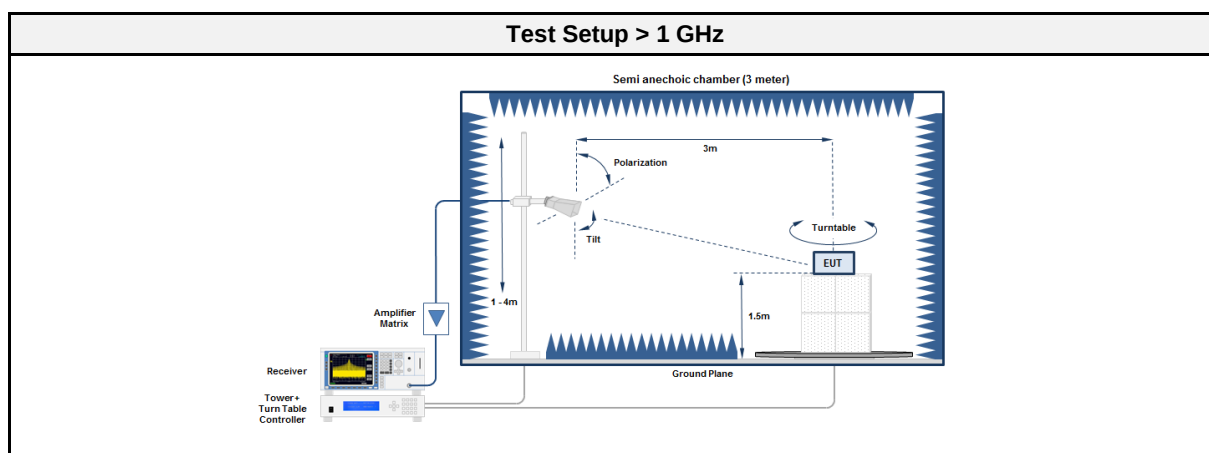
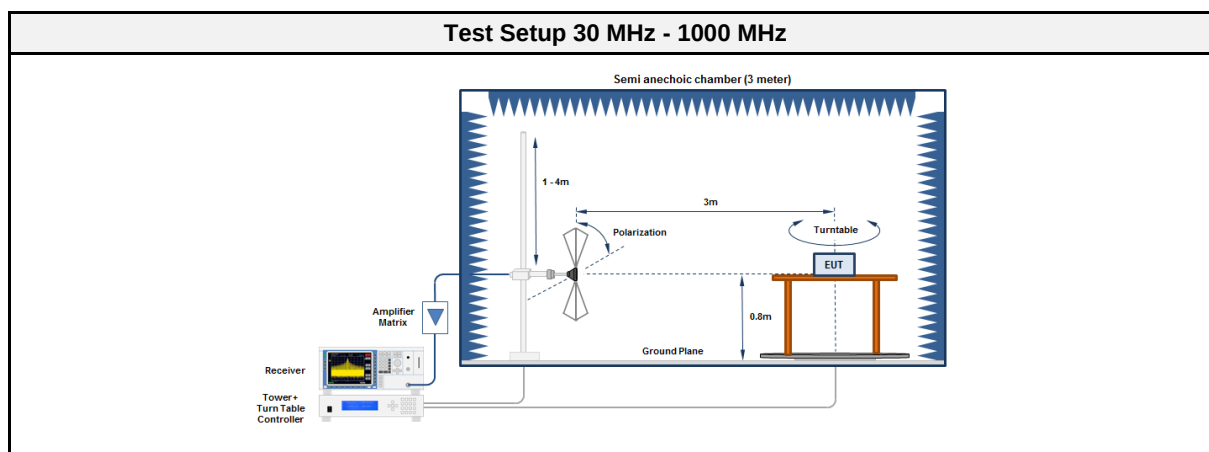
3.9.1 Information

Test Information	
Reference	ISED RSS-247, Issue 2 (section 3.1)
Measurement Uncertainty	± 5.95 dB
Measurement Method	ANSI C63.10 6.5, 6.6, 11.12
Operator	Wilfried Treffke
Date	2021-03-17

3.9.2 Limits

Limits			
Frequency range [MHz]	Detector	Field strength [$\mu\text{V/m}$]	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 Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMation	2020.1.8

Test Equipment 30 MHz - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2021-02	2024-02
Measurement Receiver	R&S	ESU 26	EF00887	2020-07	2021-07
Antenna	R&S	HK 116	EF00030	2019-04	2022-04
Antenna	R&S	HL 223	EF00187	2019-05	2022-05

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2021-02	2024-02
Measurement Receiver	R&S	ESU 26	EF00887	2020-07	2021-07
Antenna	Schwarzbeck	BBHA 9120D	EF00018	2019-10	2022-10
Antenna	Amplifier Research	AT4560	EF00302	2019-05	2021-05

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	

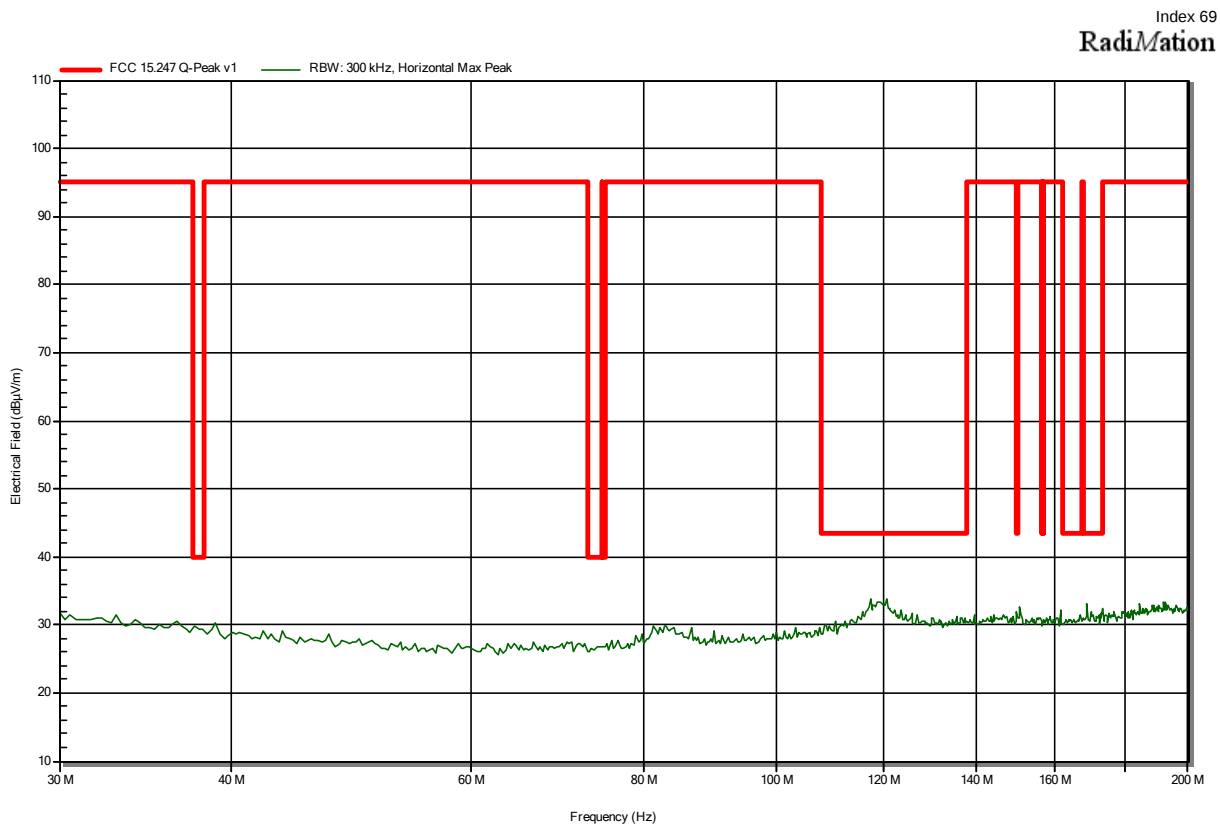
3.9.6 Results

Test Results						
Channel [MHz]	Emission [MHz]	Level [dBμV/m]	Det.	Pol.	Limit [dBμV/m]	Margin [dB]
2440	912.821	34.67	pk	hor	46.00	-11.33
2440	912.821	33.86	pk	ver	46.00	-12.14

ANNEX A Transmitter spurious emissions

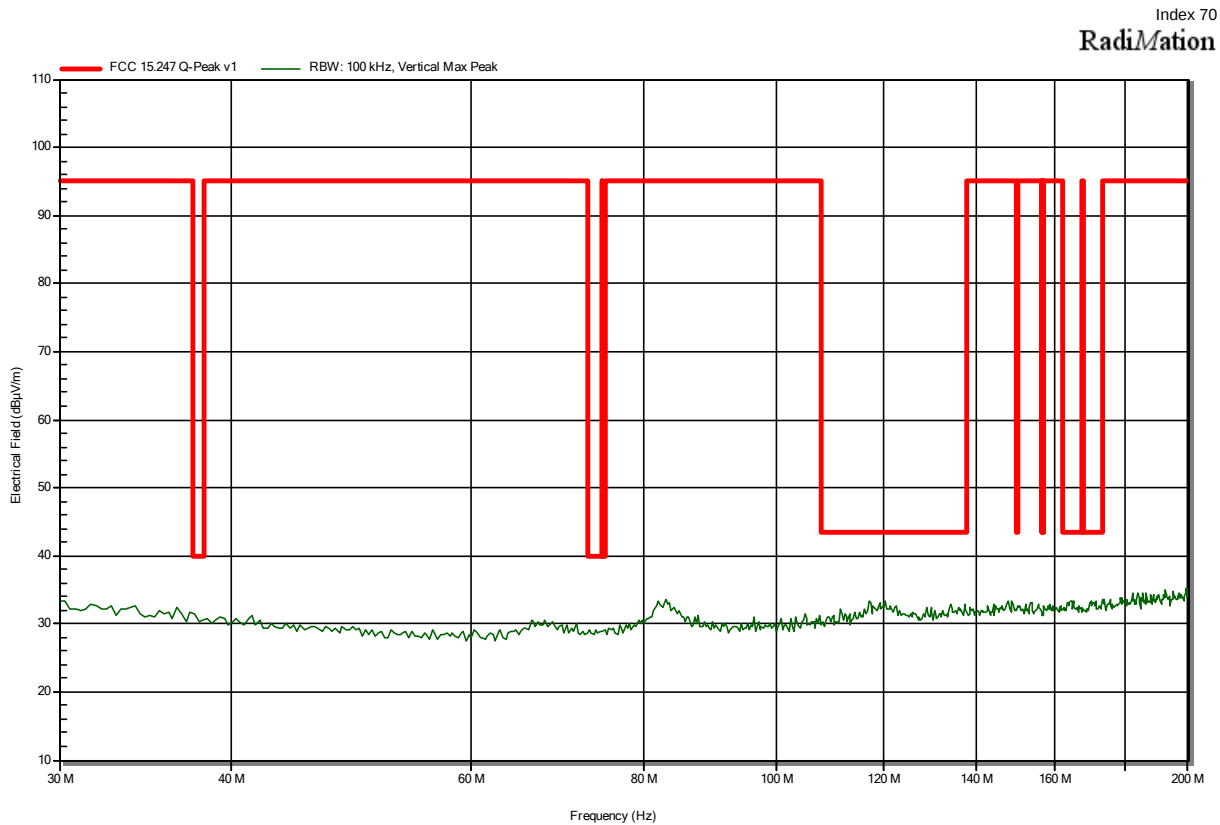
Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23.4 °Celsius, Vnom: 3.0 VDC
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: Tx; BLE; GFSK; 2402 MHz
 Test Date: 2021-03-16
 Note: EUT horizontal



Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23.4 °Celsius, Vnom: 3.0 VDC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: Tx; BLE; GFSK; 2402 MHz
 Test Date: 2021-03-16
 Note: 3.3 V Battery, EUT horizontal

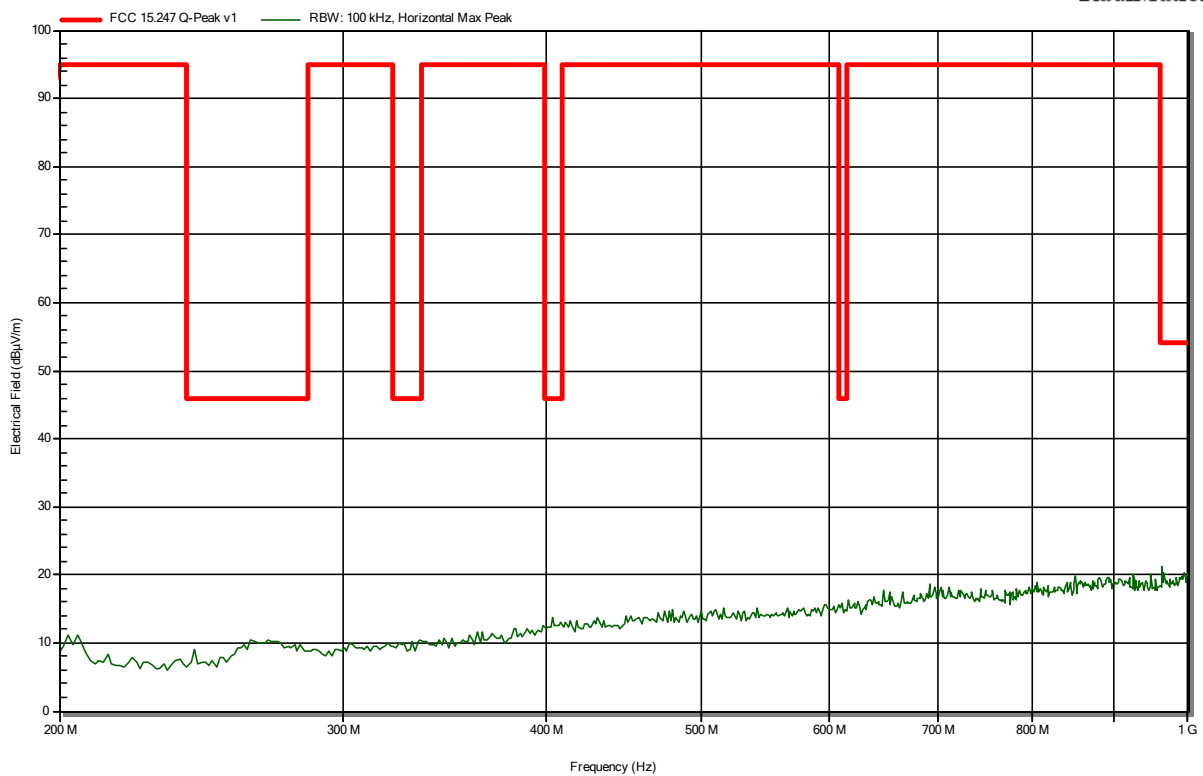


Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23.4 °Celsius, Vnom: 3.0 VDC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: Tx; BLE; GFSK; 2402 MHz
 Test Date: 2021-03-16
 Note: EUT horizontal

Index 71

RadiMation

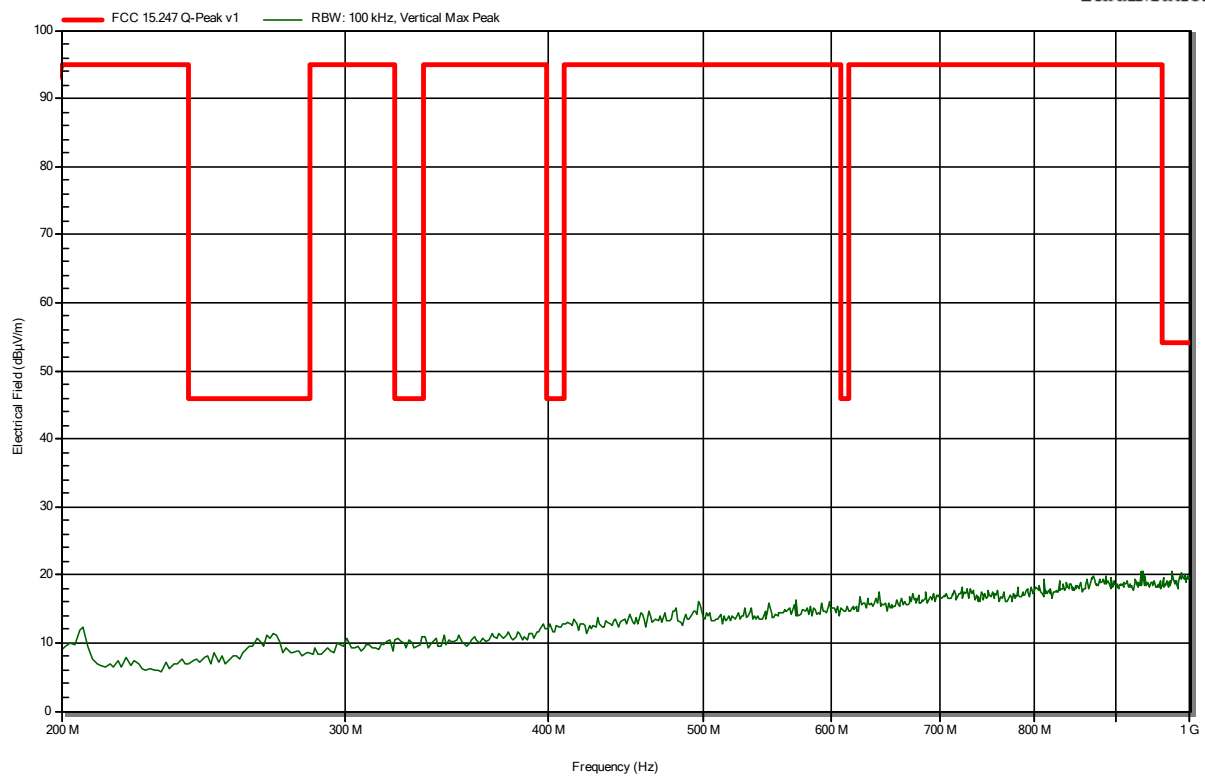


Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23.4 °Celsius, Vnom: 3.0 VDC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: Tx; BLE; GFSK; 2402 MHz
 Test Date: 2021-03-16
 Note: EUT horizontal

Index 72

RadiMation

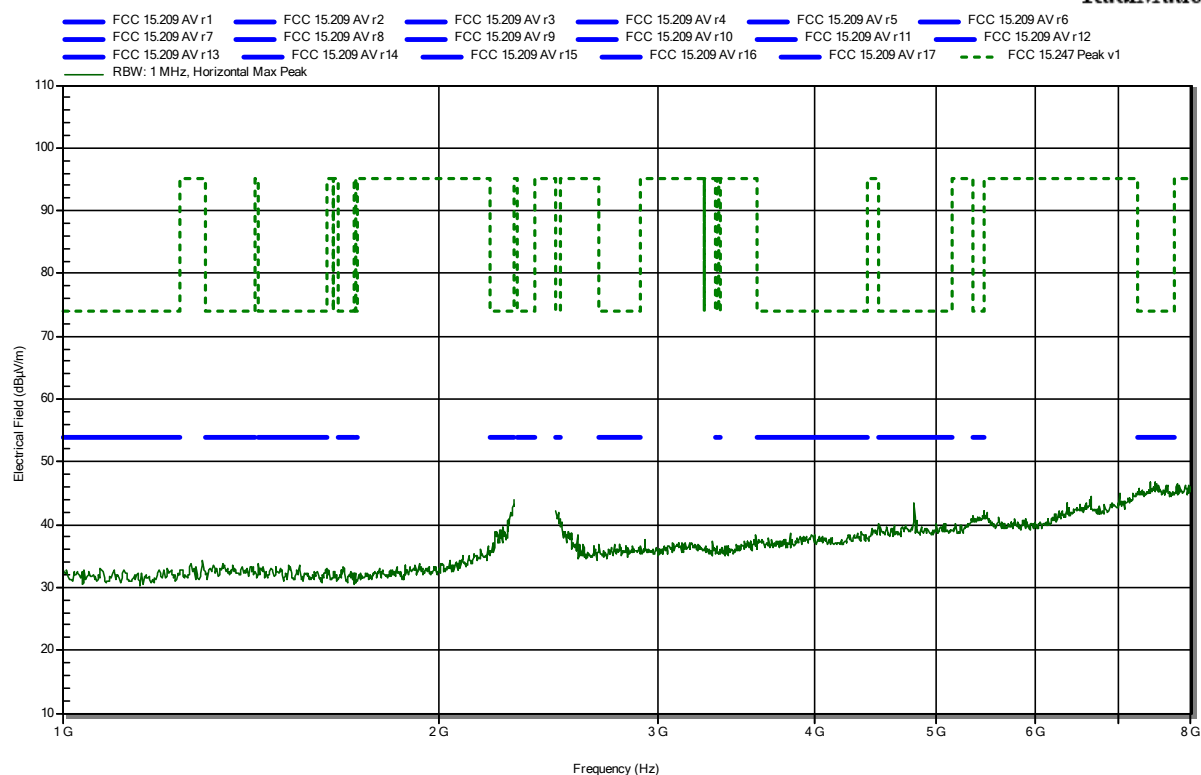


Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23.4 °Celsius, Vnom: 3.0 VDC
 Antenna: Rohde & Schwarz BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: Tx; BLE; GFSK; 2402 MHz
 Test Date: 2021-03-16
 Note: EUT horizontal

Index 44

RadiMation

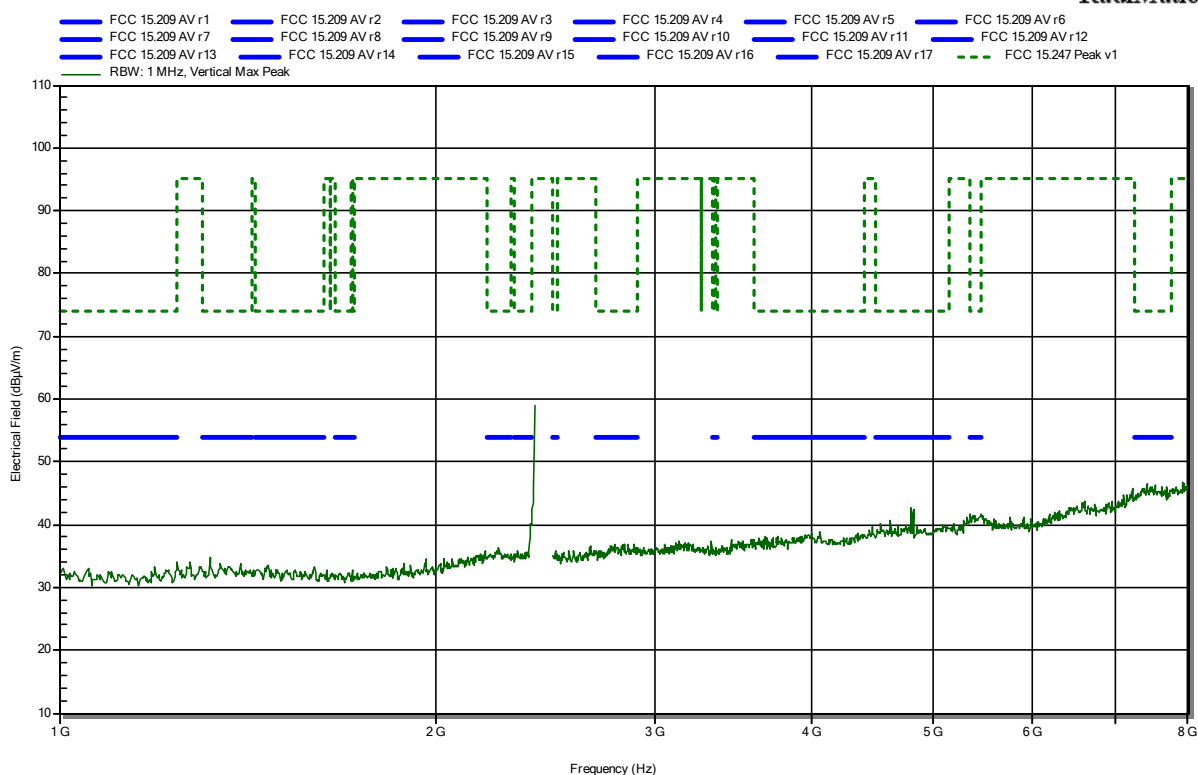


Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23.4 °Celsius, Vnom: 3.0 VDC
 Antenna: Rohde & Schwarz BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: Tx; BLE; GFSK; 2402 MHz
 Test Date: 2021-03-16
 Note: EUT horizontal

Index 45

RadiMation

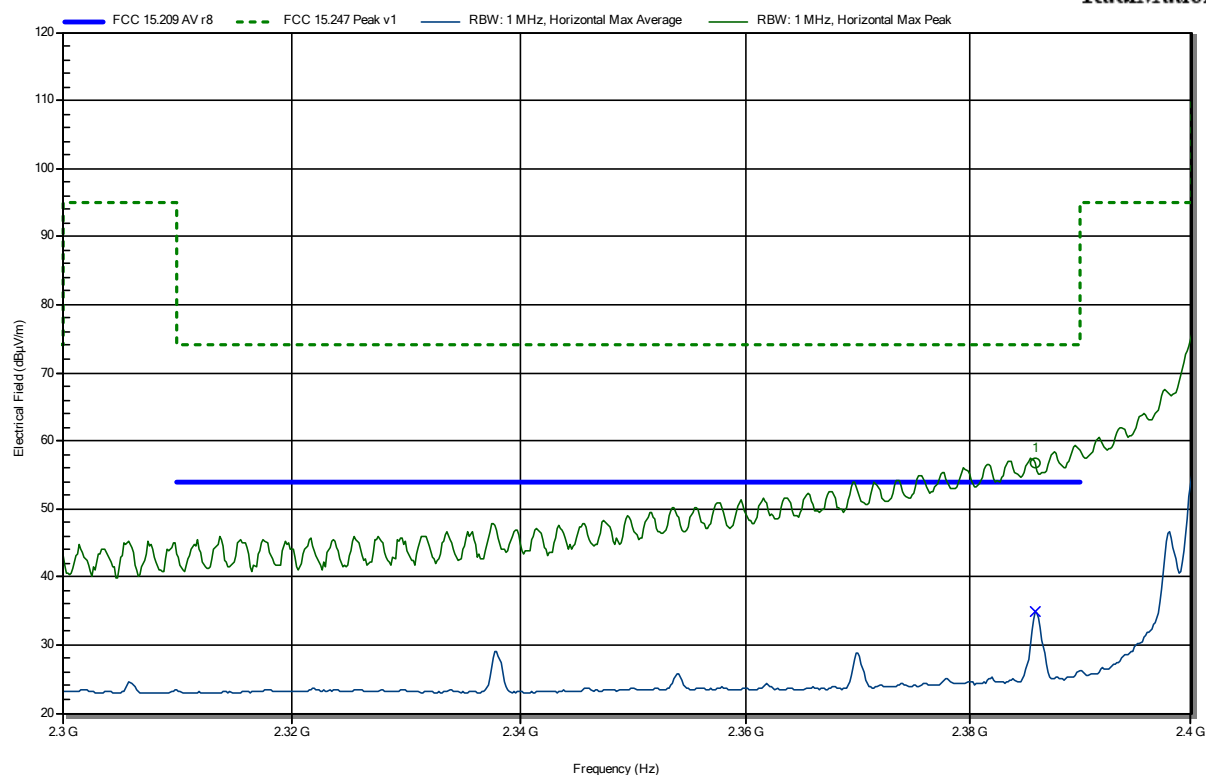


Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23.4 °Celsius, Vnom: 3.0 VDC
 Antenna: Rohde & Schwarz BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: Tx; BLE; GFSK; 2402 MHz
 Test Date: 2021-03-16
 Note: lower bandedge

Index 47

RadiMation



Frequency 2.3859 GHz	Peak 56.77 dBµV/m	Peak Limit 74 dBµV/m	Peak Difference -17.23 dB	Peak Status Pass
Frequency 2.3859 GHz	Average 34.86 dBµV/m	Average Limit 54 dBµV/m	Average Difference -19.14 dB	Average Status Pass

Test Report No.: G0M-2009-9273-TFC247BL-V01

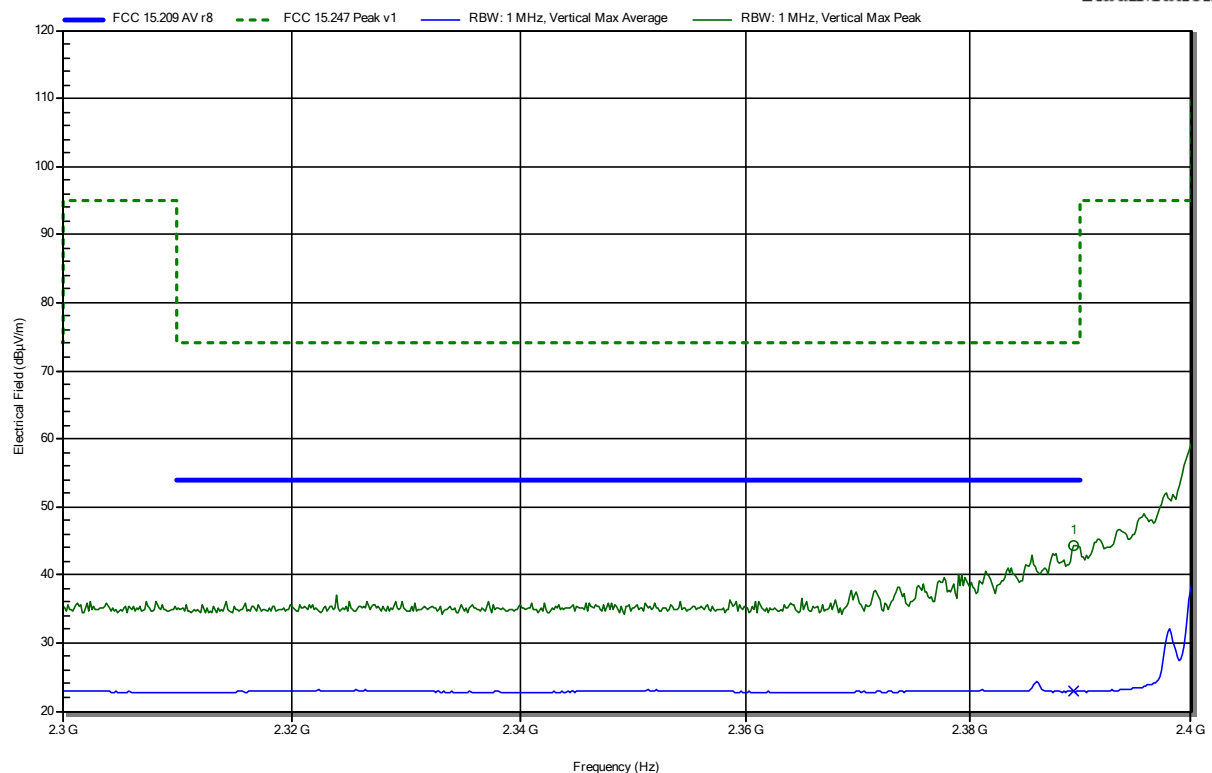
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23.4 °Celsius, Vnom: 3.0 VDC
 Antenna: Rohde & Schwarz BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: Tx; BLE; GFSK; 2402 MHz
 Test Date: 2021-03-16
 Note: lower bandedge

Index 48

RadiMation



Frequency 2.3894 GHz	Peak 44.24 dBµV/m	Peak Limit 74 dBµV/m	Peak Difference -29.76 dB	Peak Status Pass
Frequency 2.3894 GHz	Average 22.94 dBµV/m	Average Limit 54 dBµV/m	Average Difference -31.06 dB	Average Status Pass

Test Report No.: G0M-2009-9273-TFC247BL-V01

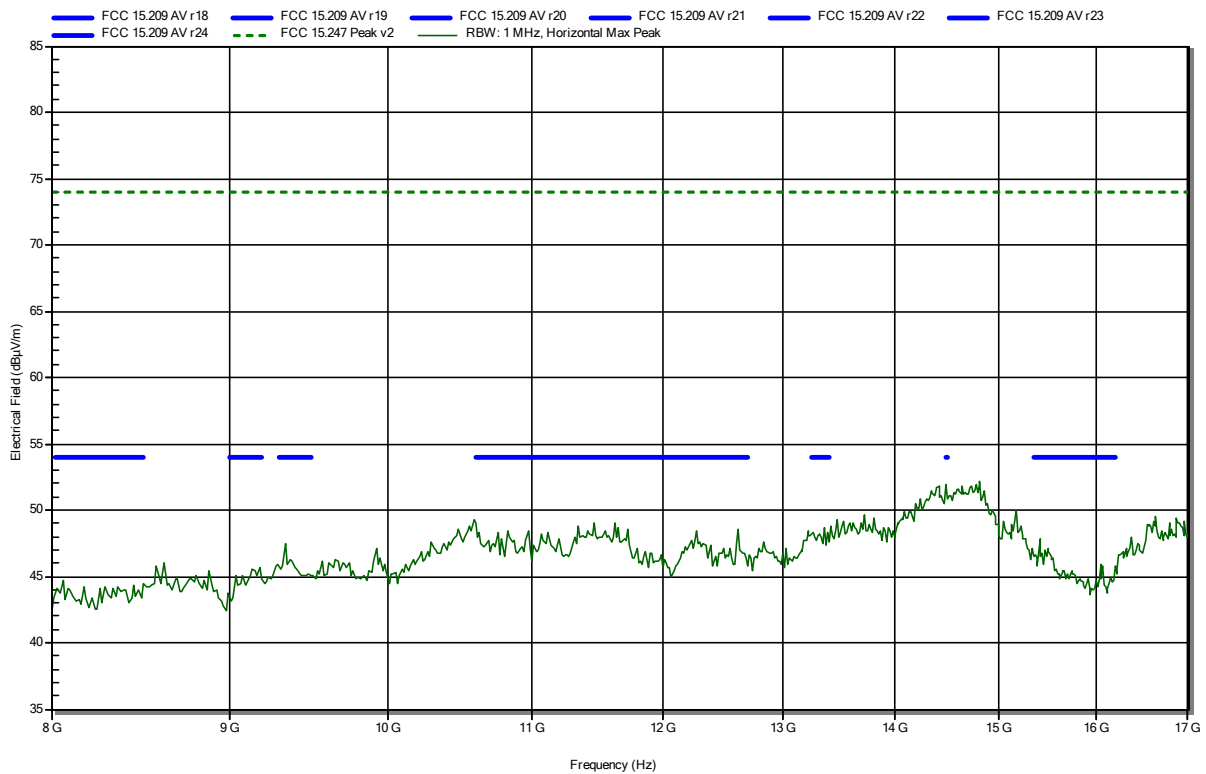
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23.4 °Celsius, Vnom: 3.0 VDC
 Antenna: Rohde & Schwarz BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: Tx; BLE; GFSK; 2402 MHz
 Test Date: 2021-03-16
 Note: EUT horizontal

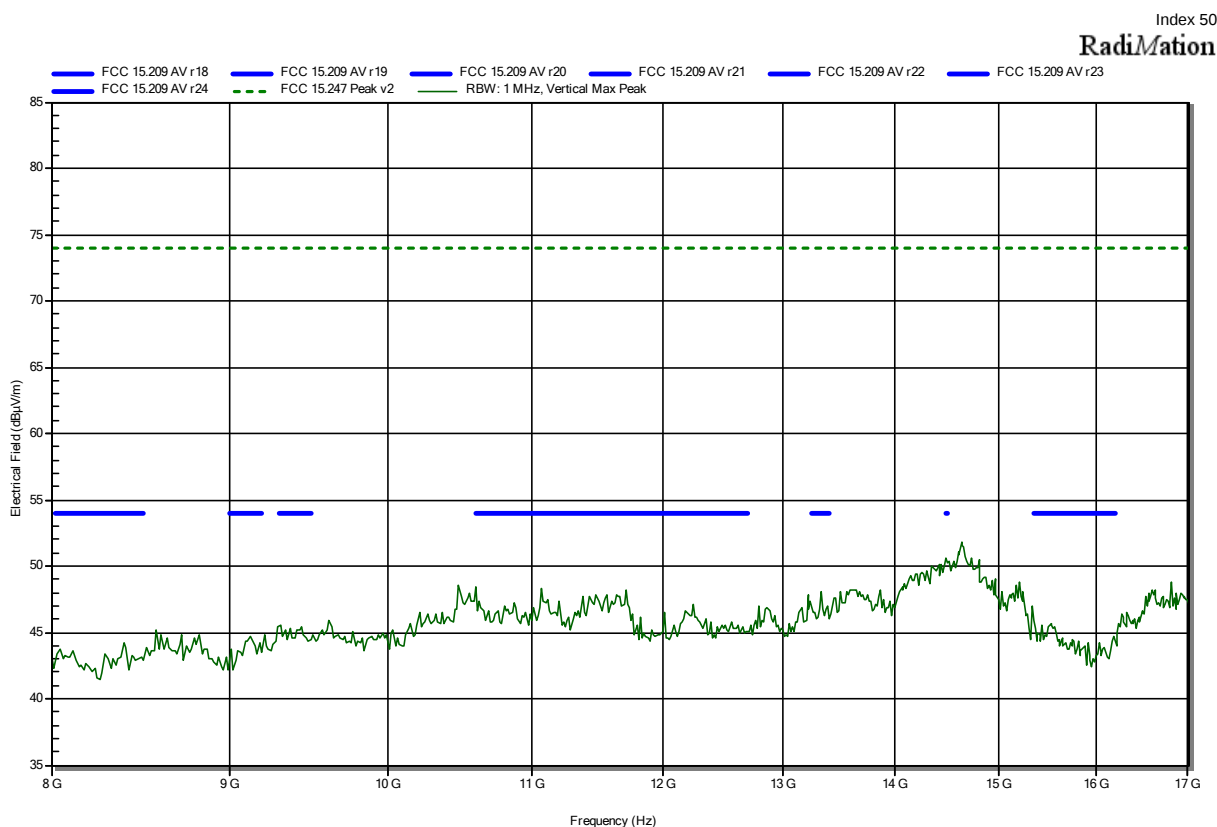
Index 49

RadiMation



Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23.4 °Celsius, Vnom: 3.0 VDC
 Antenna: Rohde & Schwarz BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: Tx; BLE; GFSK; 2402 MHz
 Test Date: 2021-03-16
 Note: EUT horizontal

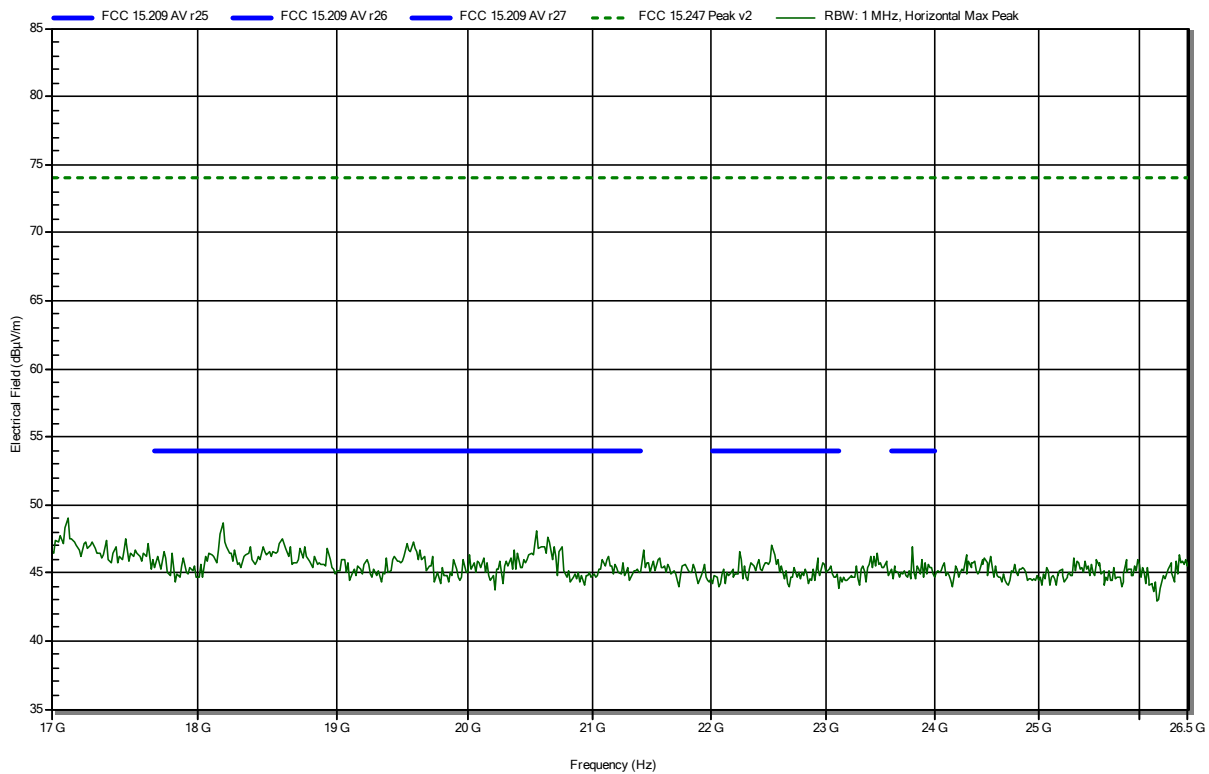


Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23.4 °Celsius, Vnom: 3.0 VDC
 Antenna: Amplifier Research AT4560, Horizontal
 Measurement distance: 3 m
 Mode: Tx; BLE; GFSK; 2402 MHz
 Test Date: 2021-03-16
 Note: EUT horizontal

Index 64

RadiMation

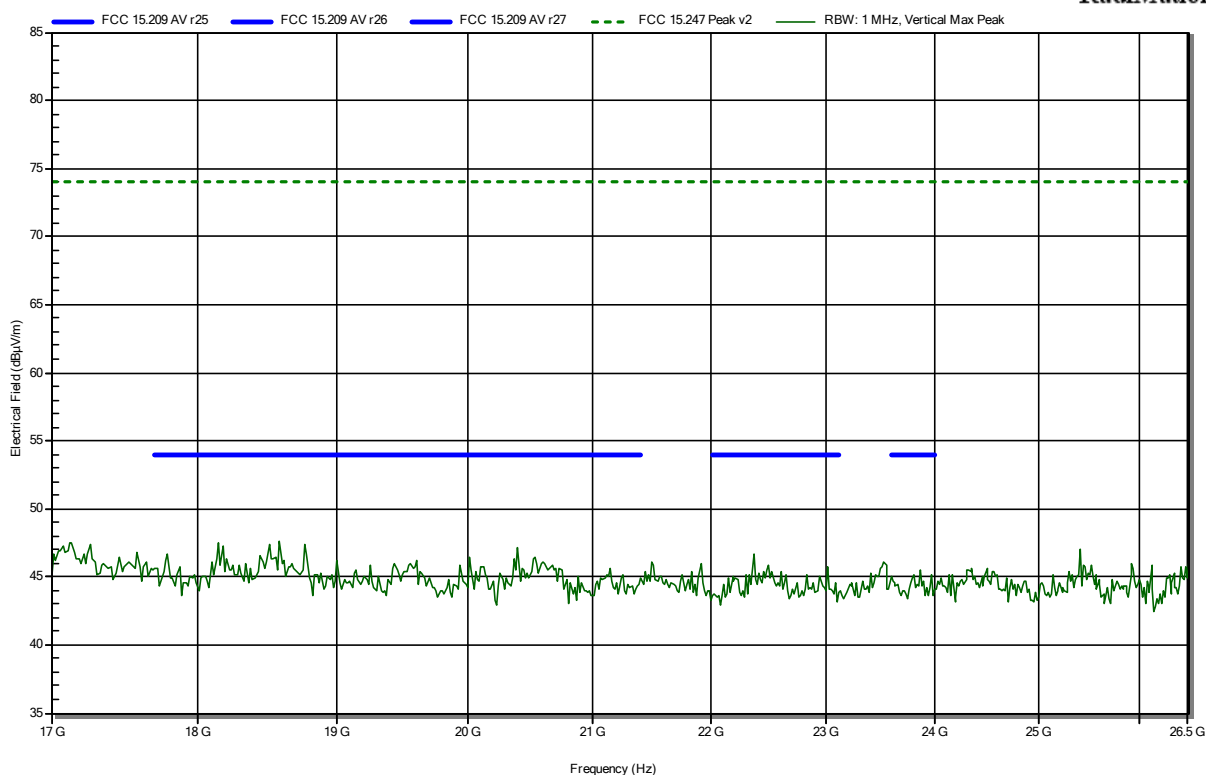


Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23.4 °Celsius, Vnom: 3.0 VDC
 Antenna: Amplifier Research AT4560, Vertical
 Measurement distance: 3 m
 Mode: Tx; BLE; GFSK; 2402 MHz
 Test Date: 2021-03-16
 Note: EUT horizontal

Index 65

RadiMation

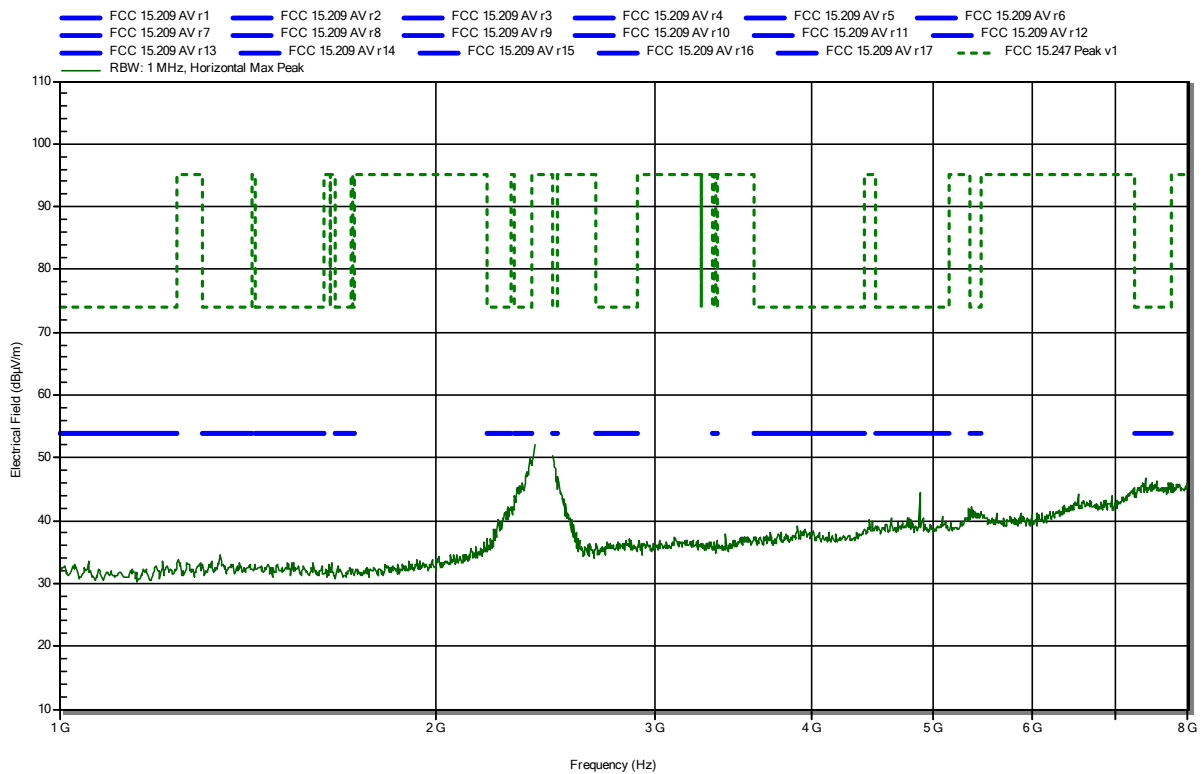


Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23.4 °Celsius, Vnom: 3.0 VDC
 Antenna: Rohde & Schwarz BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: Tx; BLE; GFSK; 2440 MHz
 Test Date: 2021-03-16
 Note: EUT horizontal

Index 57

RadiMation

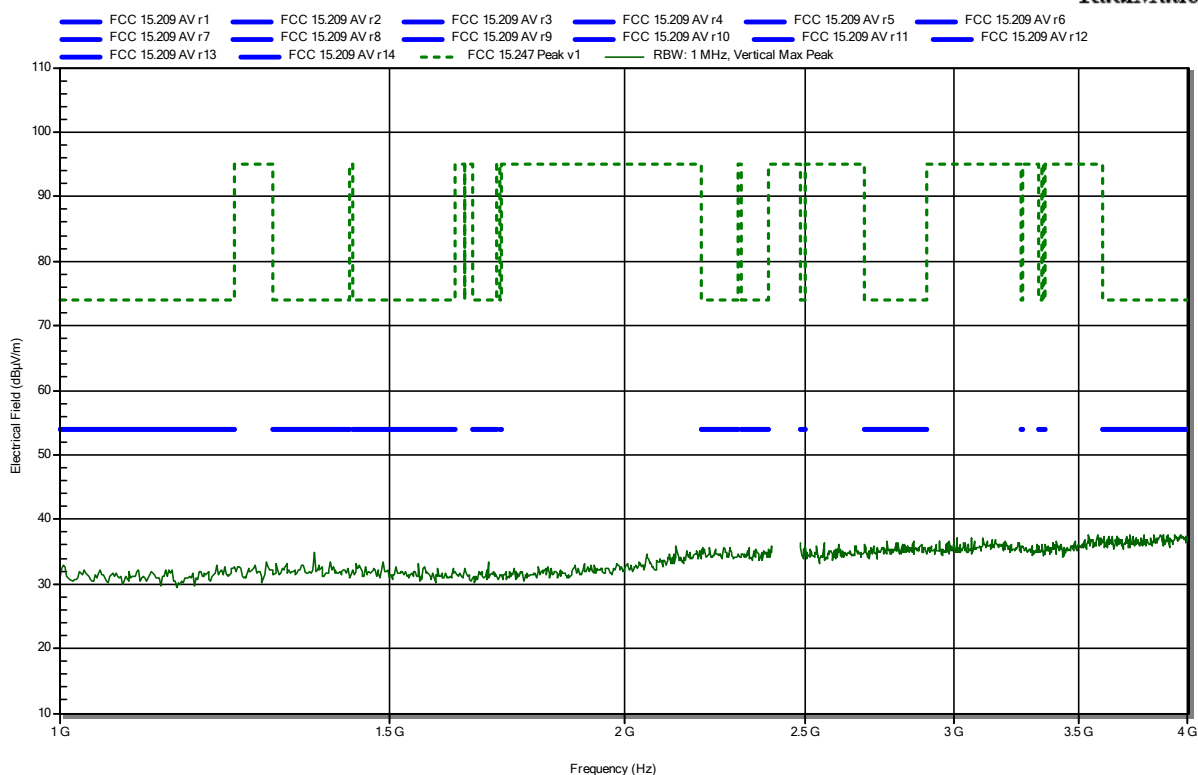


Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23.4 °Celsius, Vnom: 3.0 VDC
 Antenna: Rohde & Schwarz BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: Tx; BLE; GFSK; 2440 MHz
 Test Date: 2021-03-16
 Note: EUT horizontal

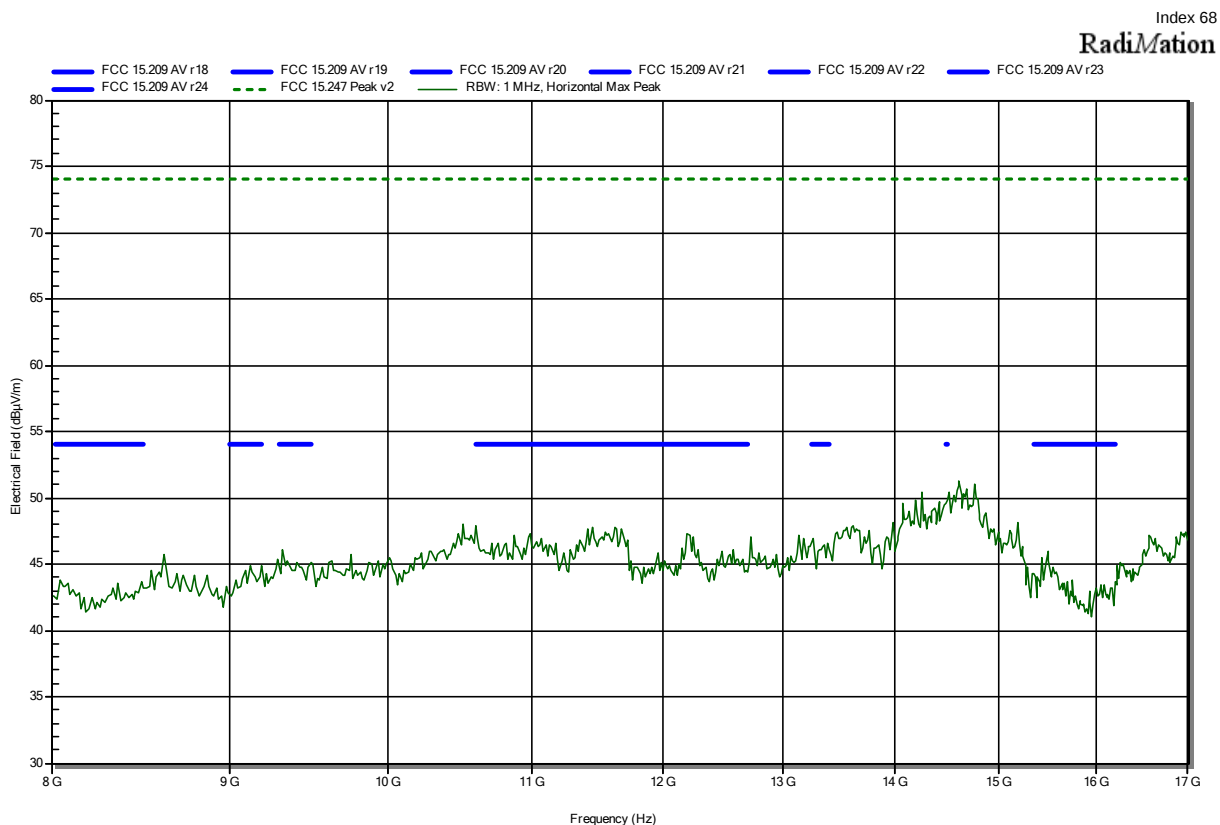
Index 58

RadiMation



Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23.4 °Celsius, Vnom: 3.0 VDC
 Antenna: Rohde & Schwarz BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: Tx; BLE; GFSK; 2440 MHz
 Test Date: 2021-03-16
 Note: EUT horizontal

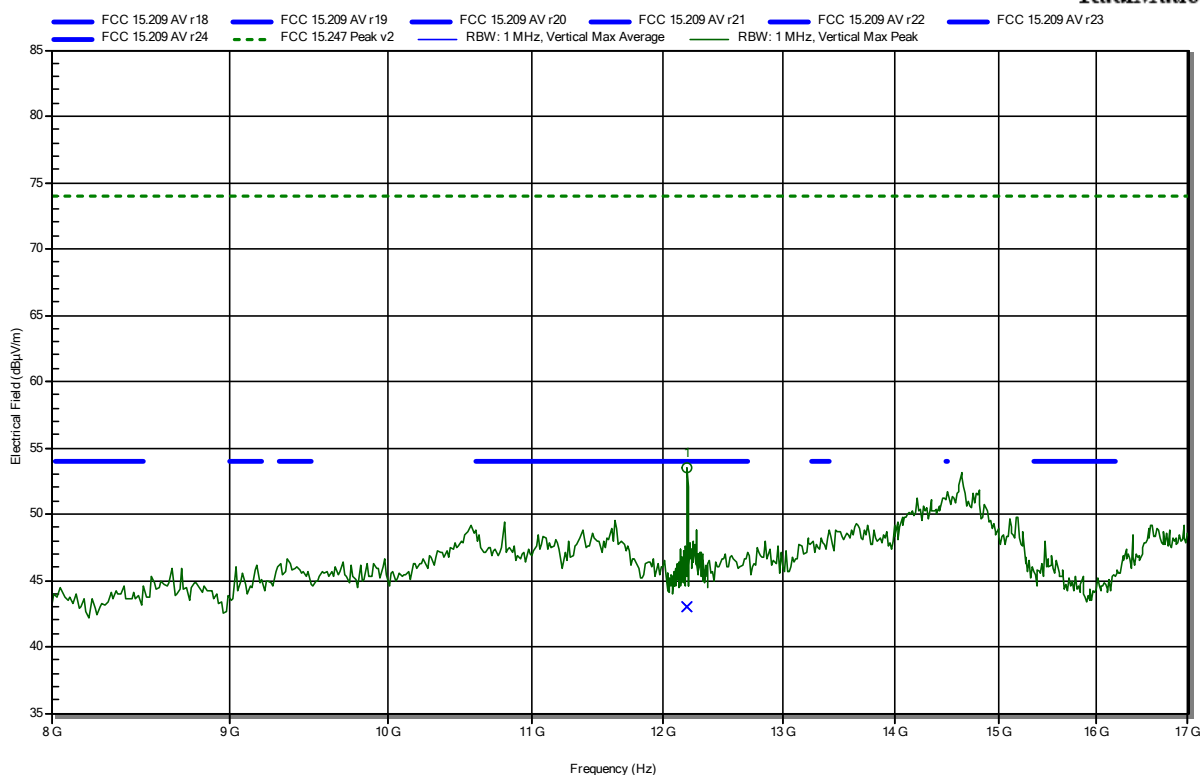


Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23.4 °Celsius, Vnom: 3.0 VDC
 Antenna: Rohde & Schwarz BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: Tx; BLE; GFSK; 2440 MHz
 Test Date: 2021-03-16
 Note: EUT horizontal

Index 59

RadiMation



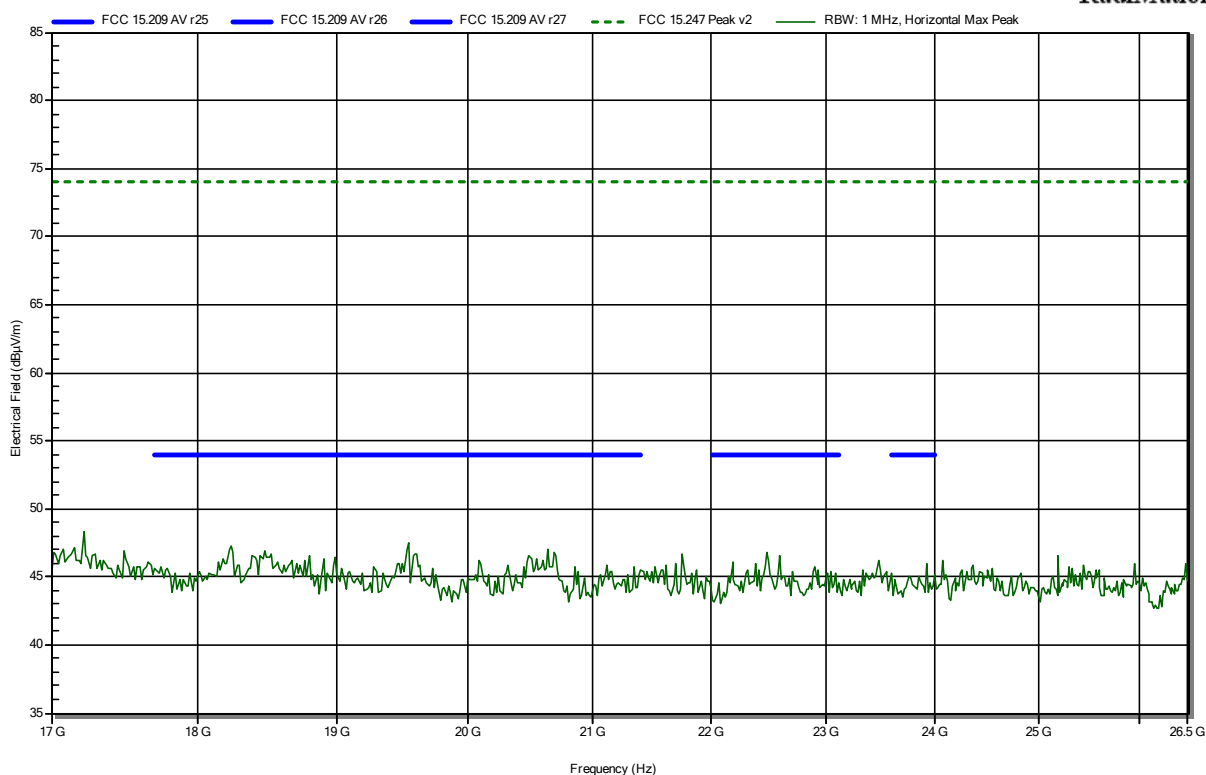
Frequency 12.199 GHz	Peak 53.55 dBμV/m	Peak Limit 74 dBμV/m	Peak Difference -20.45 dB	Peak Status Pass
Frequency 12.199 GHz	Average 43.02 dBμV/m	Average Limit 54 dBμV/m	Average Difference -10.98 dB	Average Status Pass

Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23.4 °Celsius, Vnom: 3.0 VDC
 Antenna: Amplifier Research AT4560, Horizontal
 Measurement distance: 3 m
 Mode: Tx; BLE; GFSK; 2440 MHz
 Test Date: 2021-03-16
 Note: EUT horizontal

Index 63

RadiMation

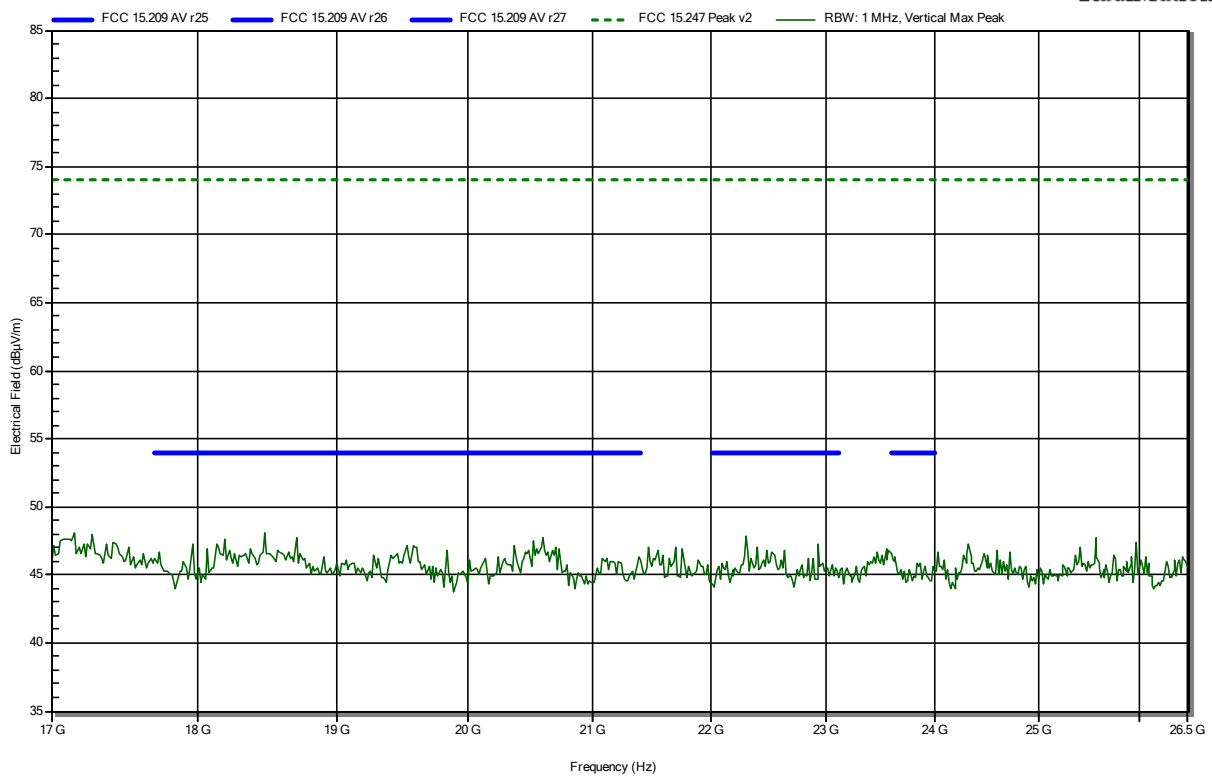


Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23.4 °Celsius, Vnom: 3.0 VDC
 Antenna: Amplifier Research AT4560, Vertical
 Measurement distance: 3 m
 Mode: Tx; BLE; GFSK; 2440 MHz
 Test Date: 2021-03-16
 Note: EUT horizontal

Index 62

RadiMation

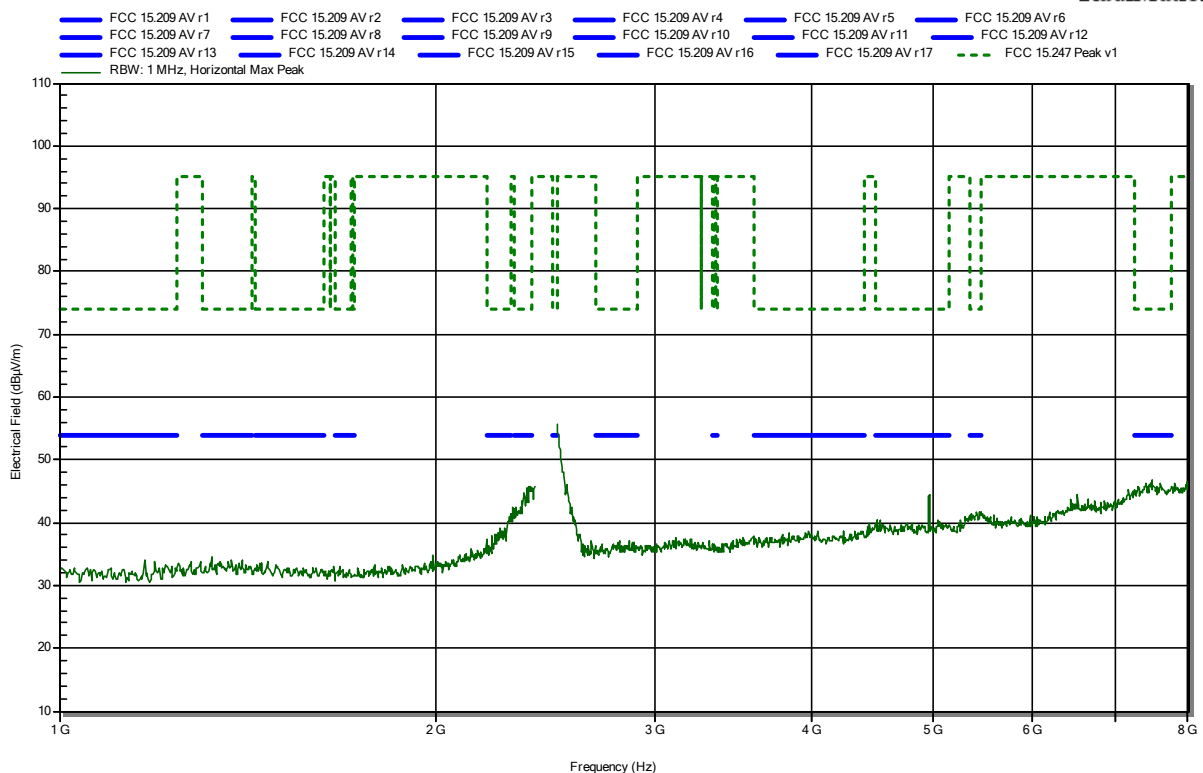


Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23.4 °Celsius, Vnom: 3.0 VDC
 Antenna: Rohde & Schwarz BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: Tx; BLE; GFSK; 2480 MHz
 Test Date: 2021-03-16
 Note: EUT horizontal

Index 51

RadiMation

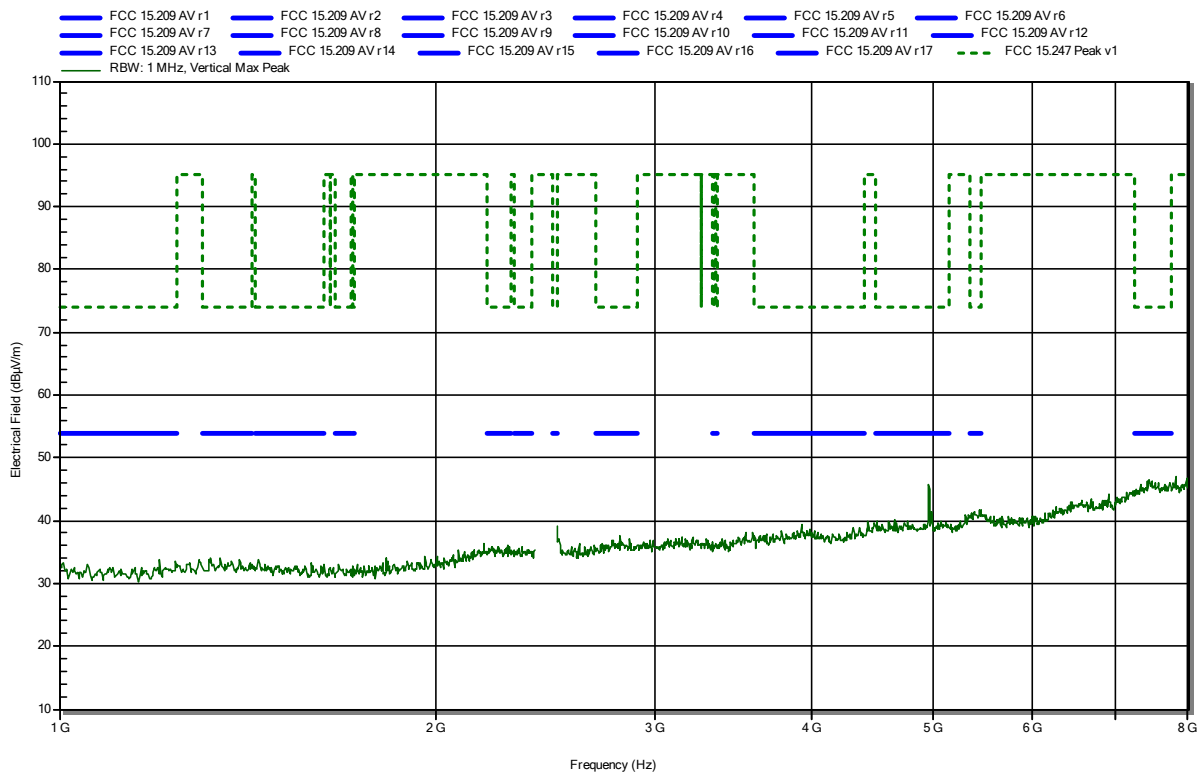


Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23.4 °Celsius, Vnom: 3.0 VDC
 Antenna: Rohde & Schwarz BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: Tx; BLE; GFSK; 2480 MHz
 Test Date: 2021-03-16
 Note: EUT horizontal

Index 52

RadiMation

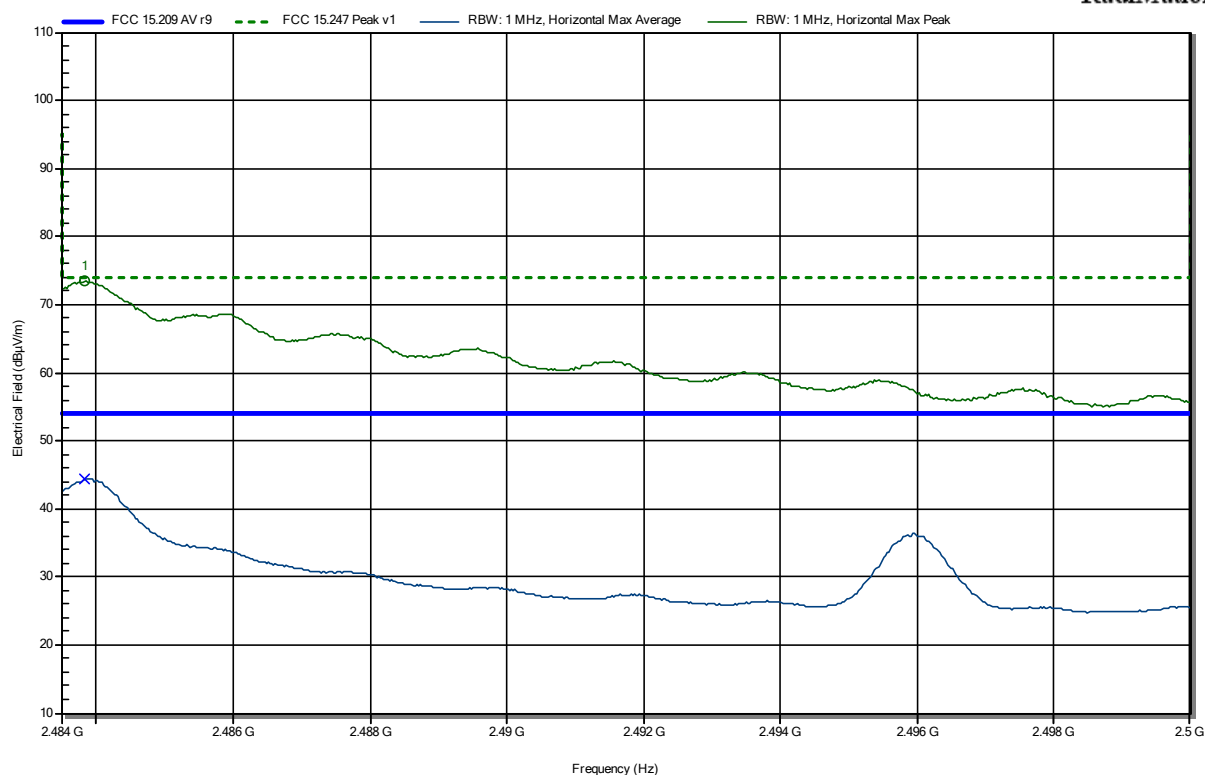


Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23.4 °Celsius, Vnom: 3.0 VDC
 Antenna: Rohde & Schwarz BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: Tx; BLE; GFSK; 2480 MHz
 Test Date: 2021-03-16
 Note: upper bandedge

Index 55

RadiMation



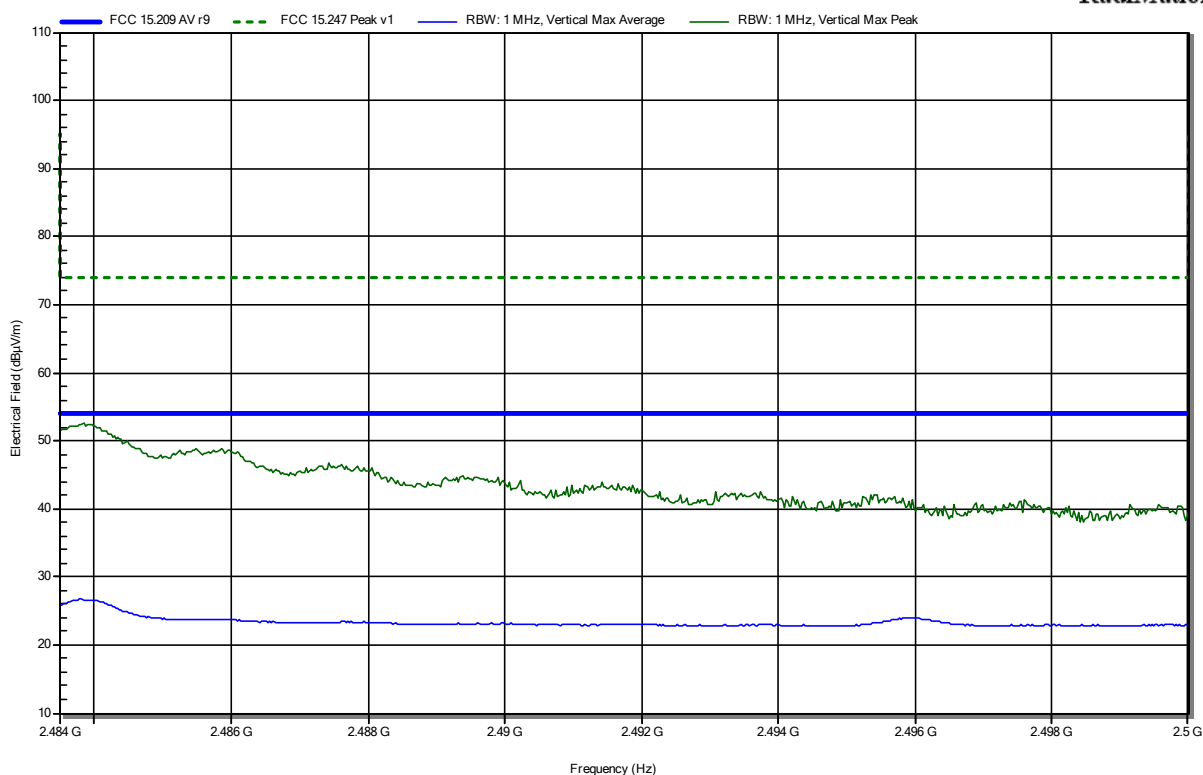
Frequency 2.4838 GHz	Peak 73.41 dBµV/m	Peak Limit 74 dBµV/m	Peak Difference -0.59 dB	Peak Status Pass
Frequency 2.4838 GHz	Average 44.29 dBµV/m	Average Limit 54 dBµV/m	Average Difference -9.71 dB	Average Status Pass

Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23.4 °Celsius, Vnom: 3.0 VDC
 Antenna: Rohde & Schwarz BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: Tx; BLE; GFSK; 2480 MHz
 Test Date: 2021-03-16
 Note: upper bandedge

Index 56

RadiMation

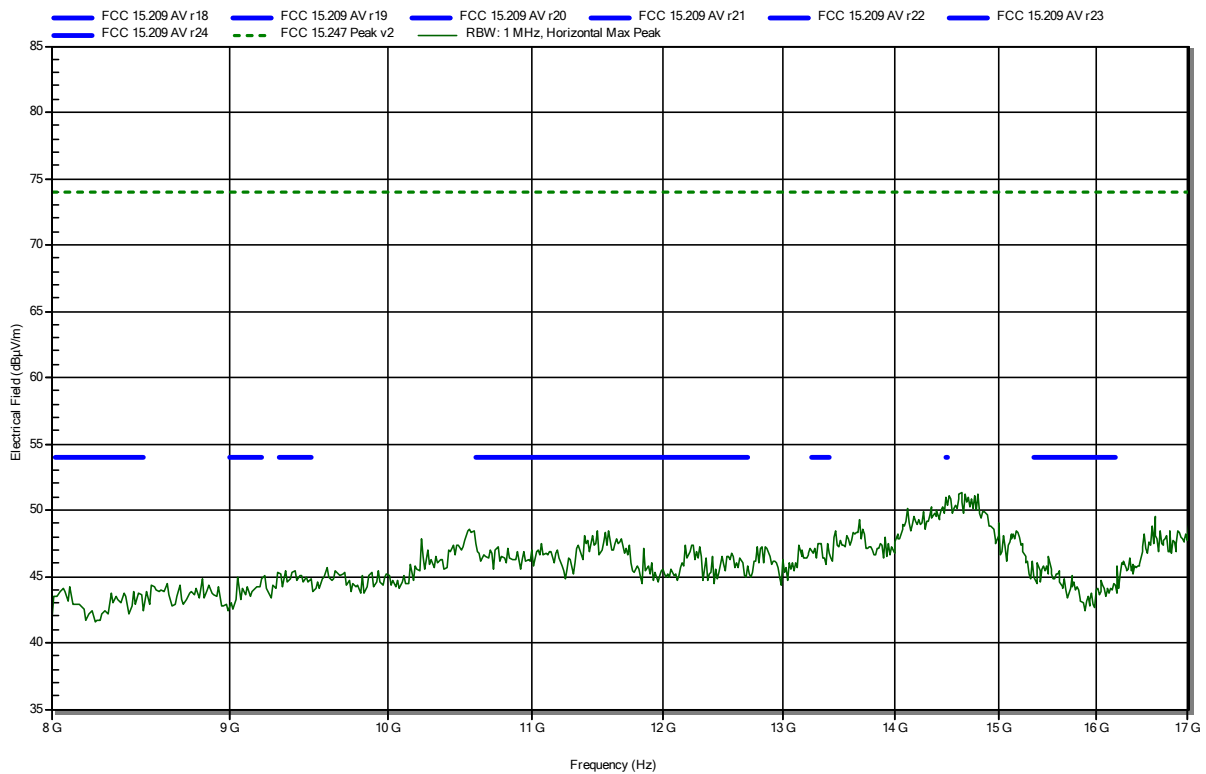


Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23.4 °Celsius, Vnom: 3.0 VDC
 Antenna: Rohde & Schwarz BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: Tx; BLE; GFSK; 2480 MHz
 Test Date: 2021-03-16
 Note: EUT horizontal

Index 53

RadiMation

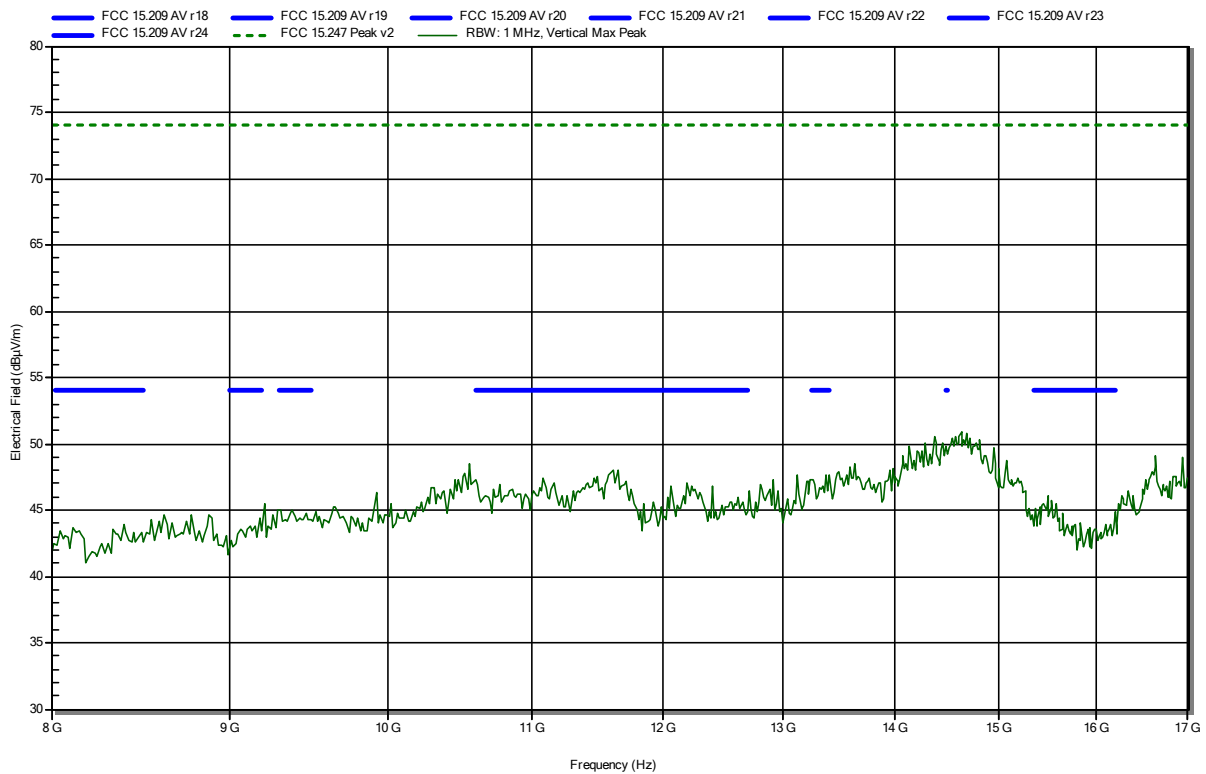


Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23.4 °Celsius, Vnom: 3.0 VDC
 Antenna: Rohde & Schwarz BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: Tx; BLE; GFSK; 2480 MHz
 Test Date: 2021-03-16
 Note: EUT horizontal

Index 54

RadiMation

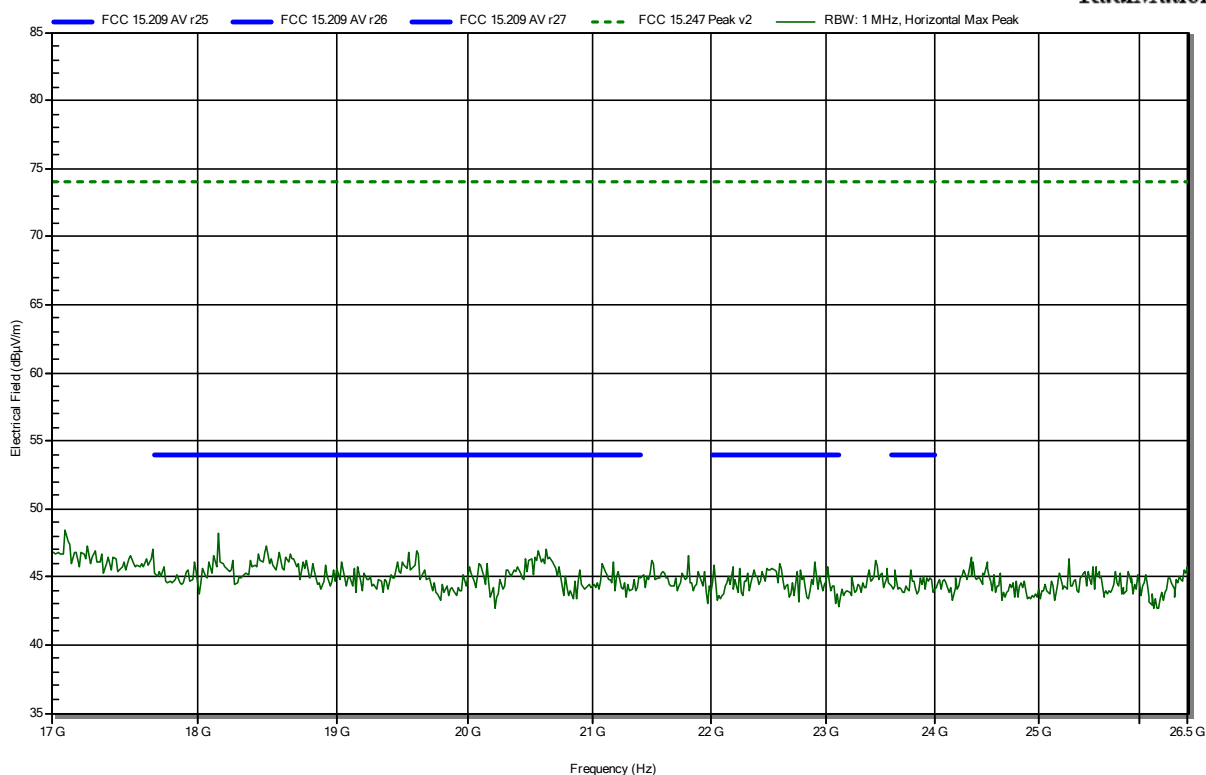


Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23.4 °Celsius, Vnom: 3.0 VDC
 Antenna: Amplifier Research AT4560, Horizontal
 Measurement distance: 3 m
 Mode: Tx; BLE; GFSK; 2480 MHz
 Test Date: 2021-03-16
 Note: EUT horizontal

Index 67

RadiMation

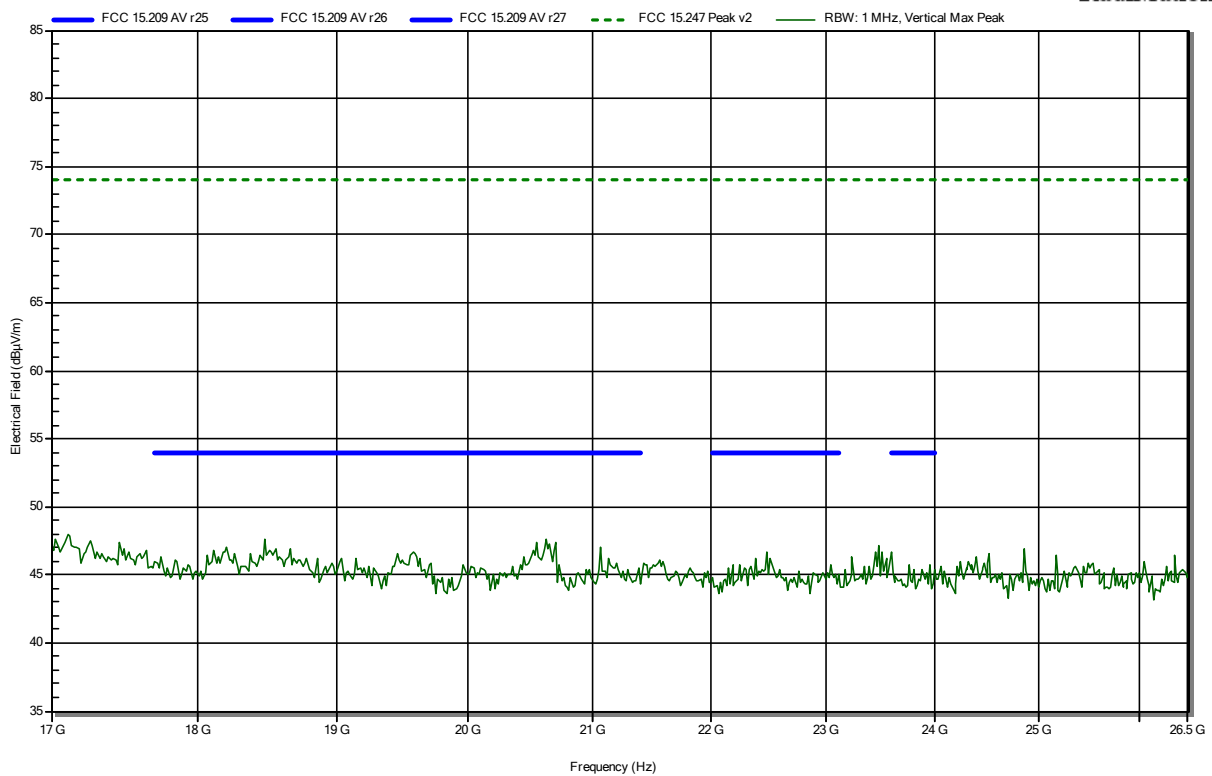


Radiated Spurious Emissions according to FCC CFR Part 15.247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23.4 °Celsius, Vnom: 3.0 VDC
 Antenna: Amplifier Research AT4560, Vertical
 Measurement distance: 3 m
 Mode: Tx; BLE; GFSK; 2480 MHz
 Test Date: 2021-03-16
 Note: EUT horizontal

Index 66

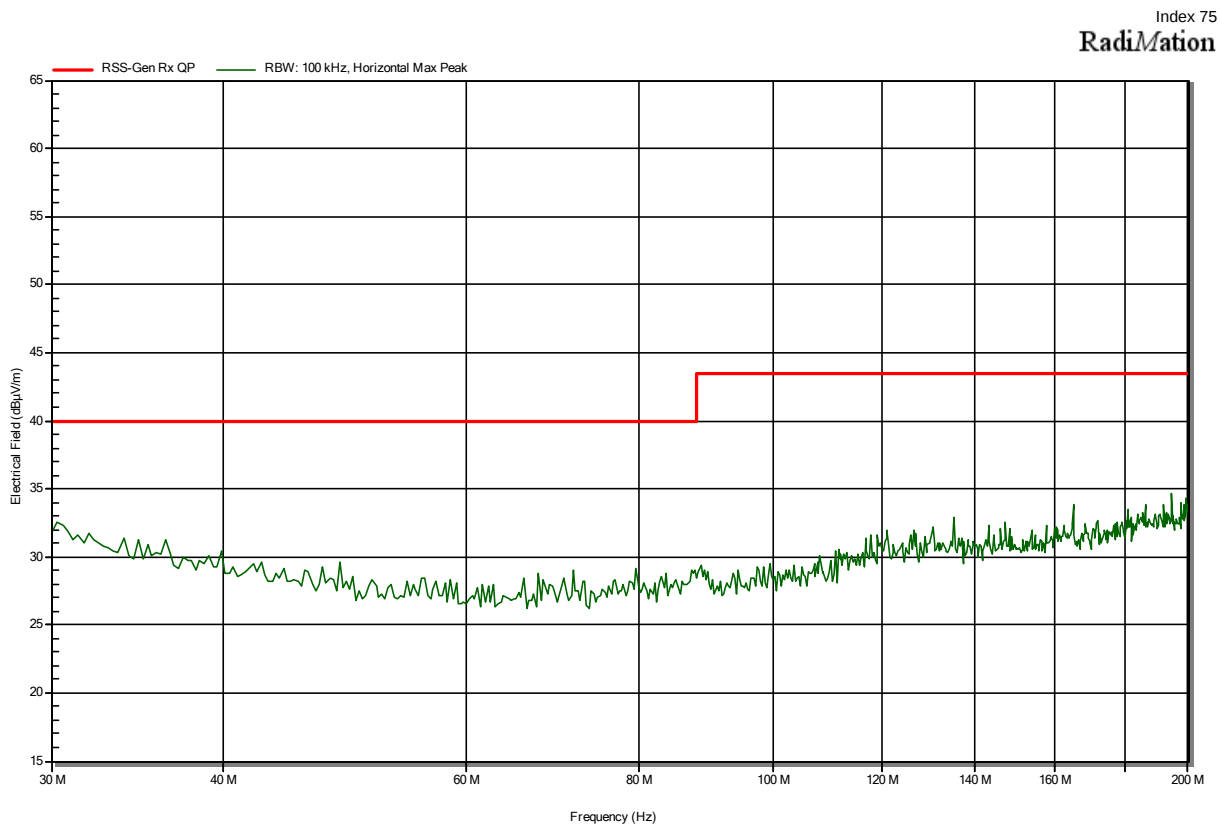
RadiMation



ANNEX B Receiver spurious emissions

Radiated Spurious Emissions according to RSS-247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 22.5 °Celsius, Vnom: 3.0 VDC
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: RX; BLE; GFSK; 2440 MHz
 Test Date: 2021-03-17
 Note: EUT horizontal

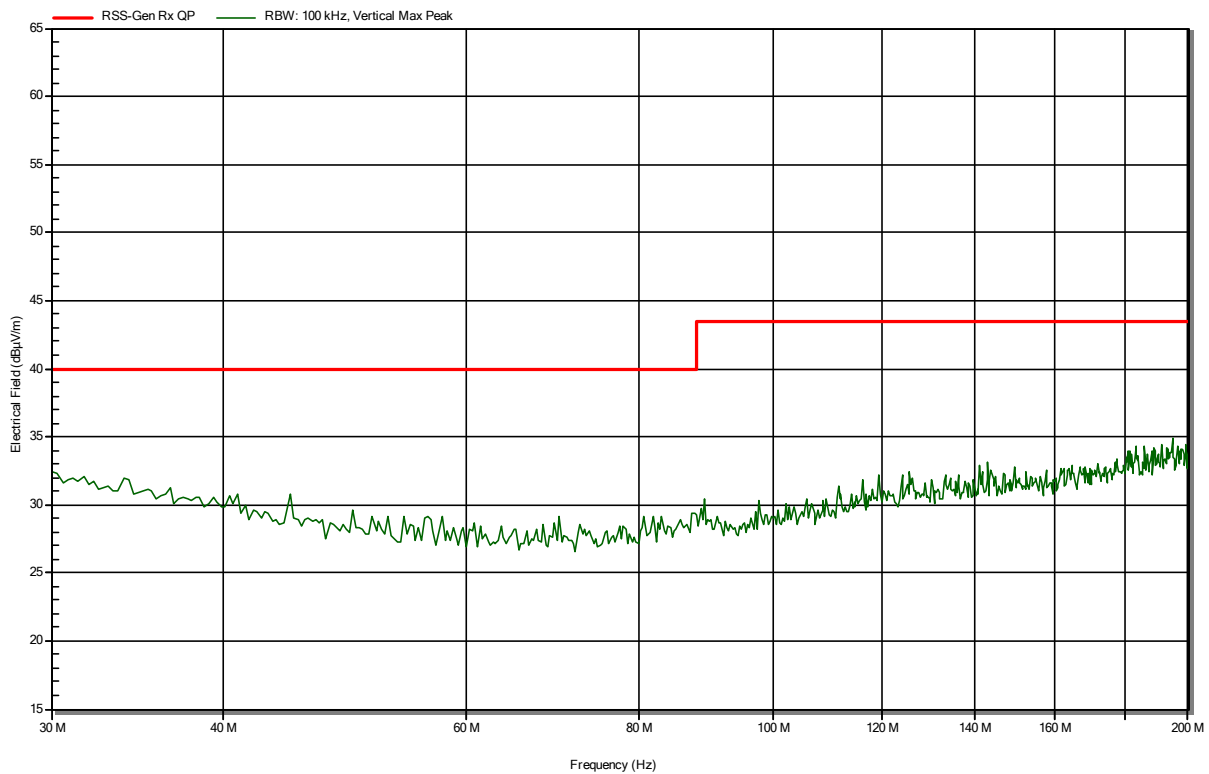


Radiated Spurious Emissions according to RSS-247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 22.5 °Celsius, Vnom: 3.0 VDC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: Rx; BLE; GFSK; 2440 MHz
 Test Date: 2021-03-17
 Note: EUT horizontal

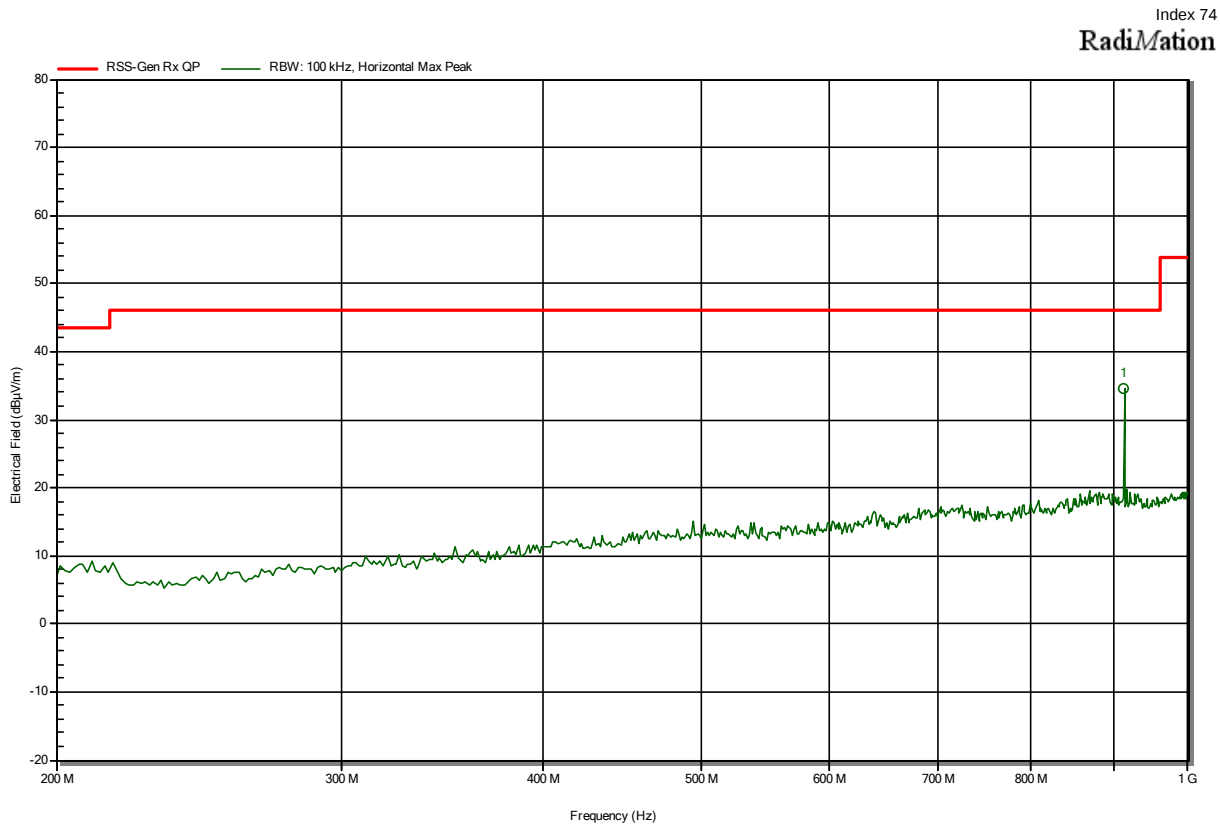
Index 76

RadiMation



Radiated Spurious Emissions according to RSS-247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 22.5 °Celsius, Vnom: 3.0 VDC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: Rx; BLE; GFSK; 2440 MHz
 Test Date: 2021-03-17
 Note: EUT horizontal

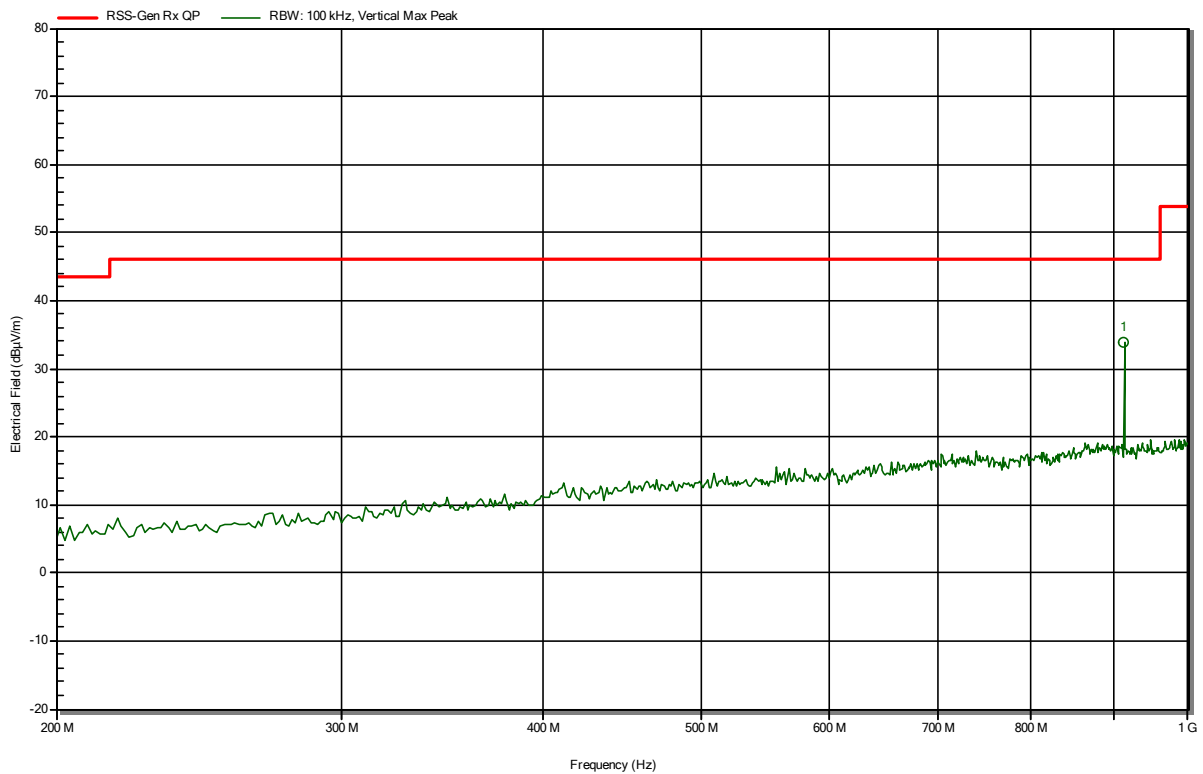


Radiated Spurious Emissions according to RSS-247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 22.5 °Celsius, Vnom: 3.0 VDC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: Rx; BLE; GFSK; 2440 MHz
 Test Date: 2021-03-17
 Note: EUT horizontal

Index 73

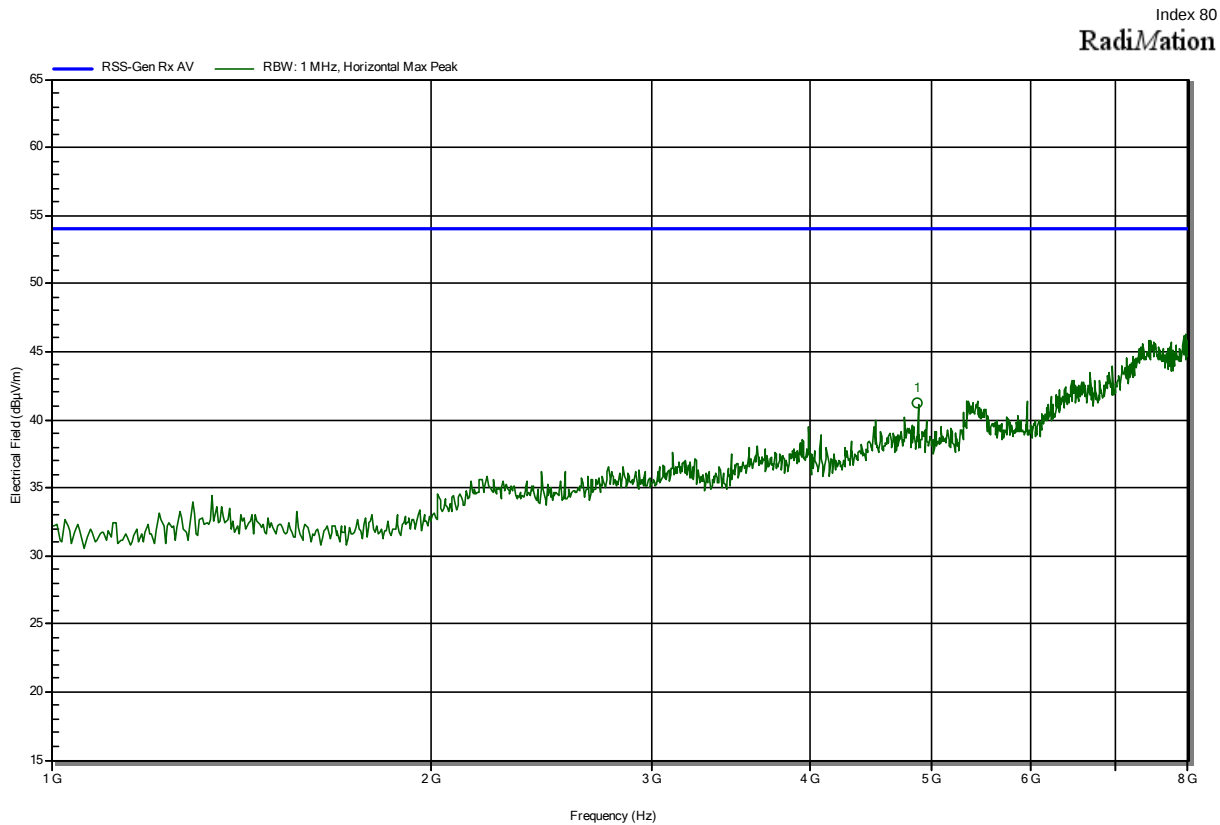
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
912.821 MHz	33.86 dBμV/m	46 dBμV/m	-12.14 dB	Pass

Radiated Spurious Emissions according to RSS-247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 22.5 °Celsius, Vnom: 3.0 VDC
 Antenna: Rohde & Schwarz BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: Rx; BLE; GFSK; 2440 MHz
 Test Date: 2021-03-17
 Note: EUT horizontal



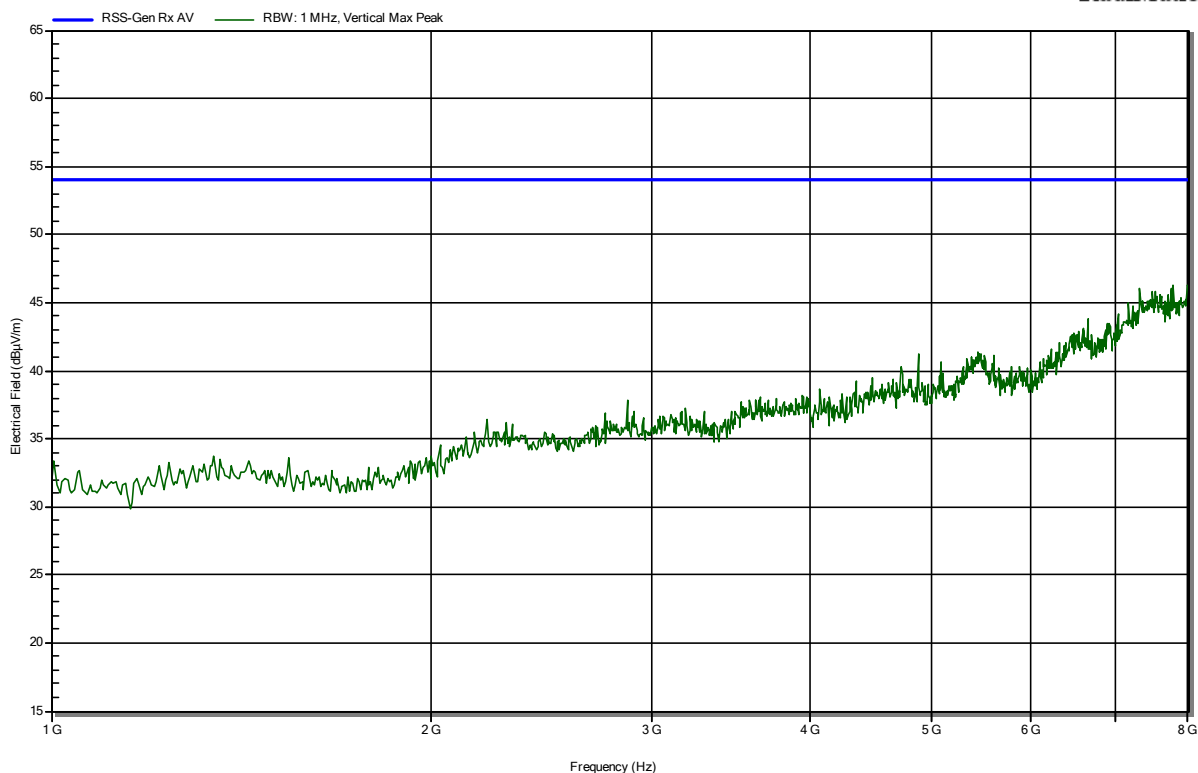
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.878 GHz	41.18 dBµV/m	53.98 dBµV/m	-12.8 dB	Pass

Radiated Spurious Emissions according to RSS-247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 22.5 °Celsius, Vnom: 3.0 VDC
 Antenna: Rohde & Schwarz BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: Rx; BLE; GFSK; 2440 MHz
 Test Date: 2021-03-17
 Note: EUT horizontal

Index 78

RadiMation

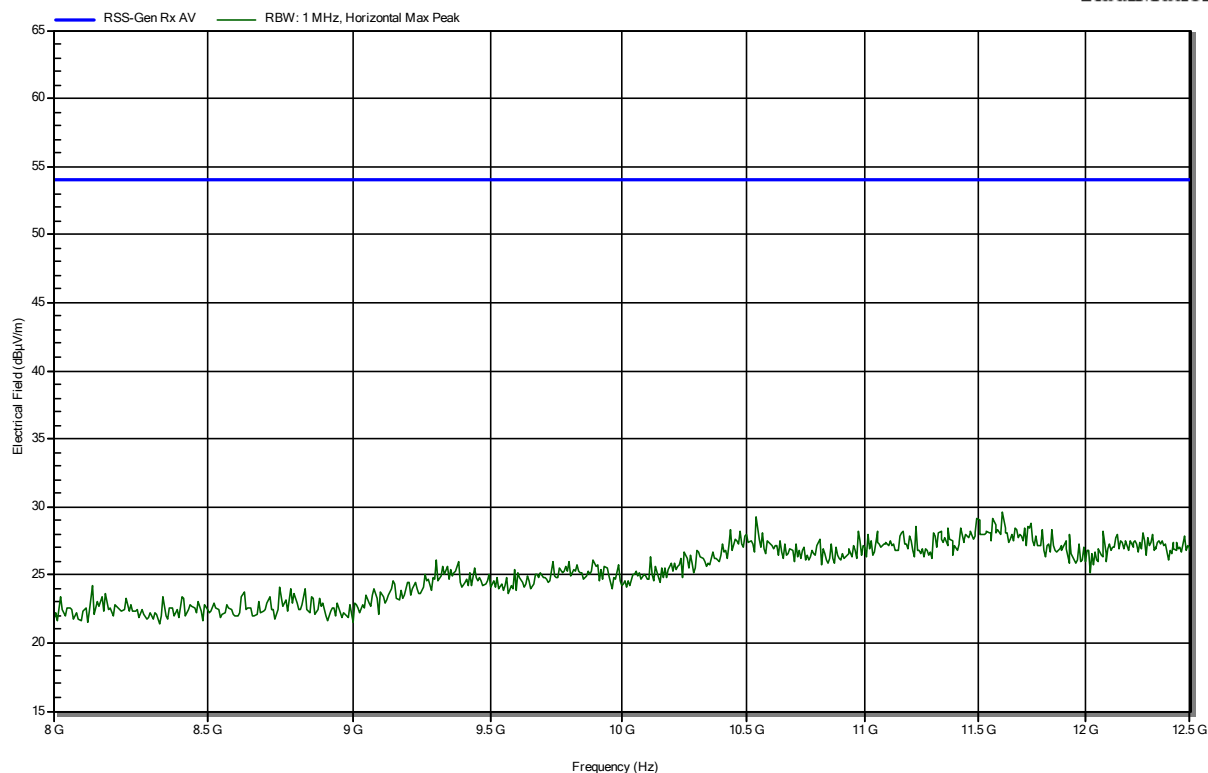


Radiated Spurious Emissions according to RSS-247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 22.5 °Celsius, Vnom: 3.0 VDC
 Antenna: Rohde & Schwarz BBHA 9120D, Horizontal
 Measurement distance: 3 m
 Mode: Rx; BLE; GFSK; 2440 MHz
 Test Date: 2021-03-17
 Note: EUT horizontal

Index 79

RadiMation

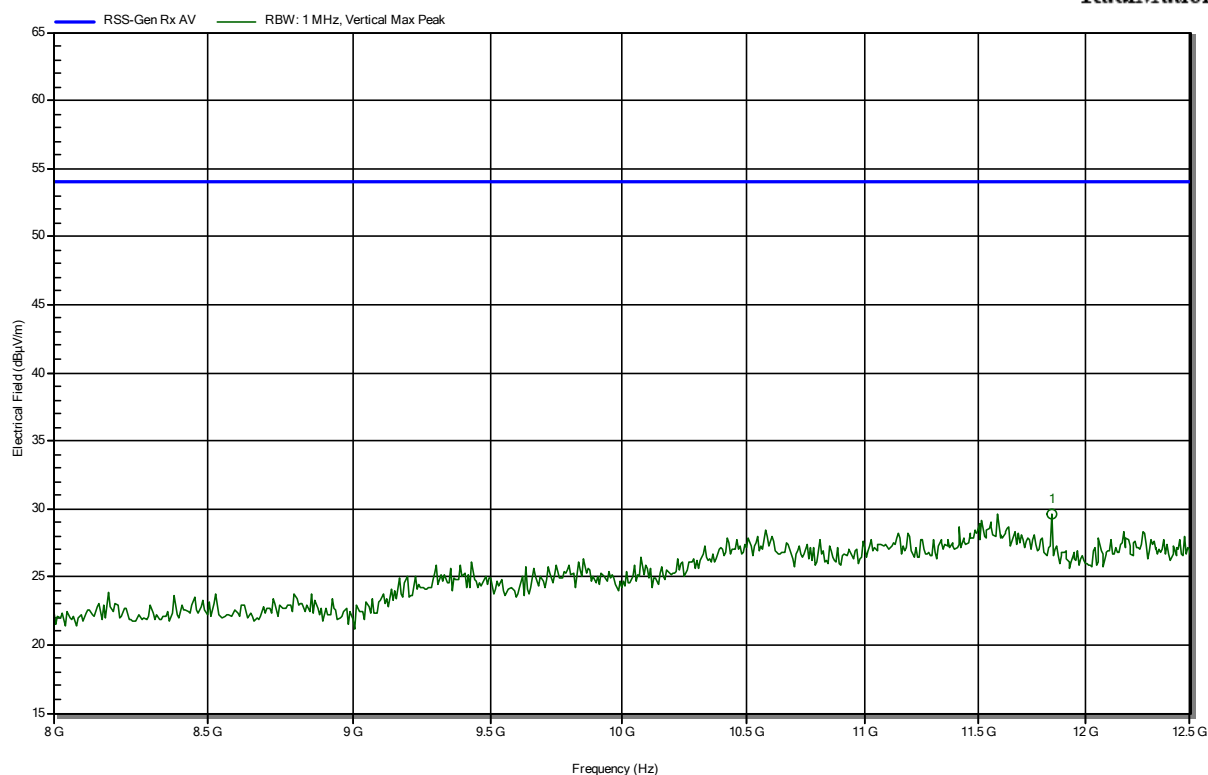


Radiated Spurious Emissions according to RSS-247

Project Number: G0M-2009-9273
 Applicant: Panasonic Industrial Devices Europe GmbH
 Model Description: Bluetooth Low Energy Module
 Model: ENW89855A1KF
 Test Sample ID: 32825
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Treffke
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 22.5 °Celsius, Vnom: 3.0 VDC
 Antenna: Rohde & Schwarz BBHA 9120D, Vertical
 Measurement distance: 3 m
 Mode: Rx; BLE; GFSK; 2440 MHz
 Test Date: 2021-03-17
 Note:

Index 81

RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
11.837 GHz	29.64 dBµV/m	53.98 dBµV/m	-24.34 dB	Pass

== END OF TEST REPORT ==

Test Report No.: G0M-2009-9273-TFC247BL-V01

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