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-1702-6281-TFC247WF-V01
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	A2LA Accredited Testing Laboratory, Certificate No.: 1983.01 FCC Filed Test Laboratory, Reg.-No.: 96970 IC OATS Filing assigned code: 3470A
Applicant	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 1, 2015-05
Non-Standard Test Method	None
Test Scope	Full compliance test
Equipment under Test (EUT):	
Product Description	Wifi Module
Model(s)	ENW49C01A3KF
Additional Model(s)	None
Brand Name(s)	PAN9420
Hardware Version(s)	02
Software Version(s)	01
FCC-ID	T7V-9420
IC	216Q-9420
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	2017-03-30	
Date (s) of performance of tests	2017-04-19 – 2017-04-20	
Report:		
Compiled by	Wilfried Treffke	
Tested by (+ signature) (Responsible for Test)	Wilfried Treffke	W. Treffke
Approved by (+ signature) (Head of Lab)	Christian Weber	C. Weber
Date of Issue	2017-07-21	
Total number of pages	123	
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:		
Test mode selection is based on pre-compliance measurement of output power of all operational modes. The operational modes with the highest output power were selected for compliance tests. The customer declares the following additional model: ENW49C02A3KF-C1 The radio parts, hard- and software versions of all models are identical; the difference is the region code. This additional model was not tested.		

VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2017-07-21	Initial Release	

ABBREVIATIONS AND ACRONYMS

Acronyms	
Acronym	Description
BPSK	Binary Phase Shift Keying
DSSS	Direct Sequence Spread Spectrum
EUT	Equipment Under Test
FCC	Federal Communications Commission
HT	High Throughput
IEEE 802.11	MAC and PHY Layer for WiFi
ISED	Innovation, Science and Economic Development Canada
OFDM	Orthogonal Frequency Division Multiple Access
QAM	Quadrature Amplitude Modulation
QPSK	Quadrature Phase Shift Keying
RBW	Resolution bandwidth
RMS	Root mean square
VBW	Video bandwidth
V_{NOM}	Nominal supply voltage

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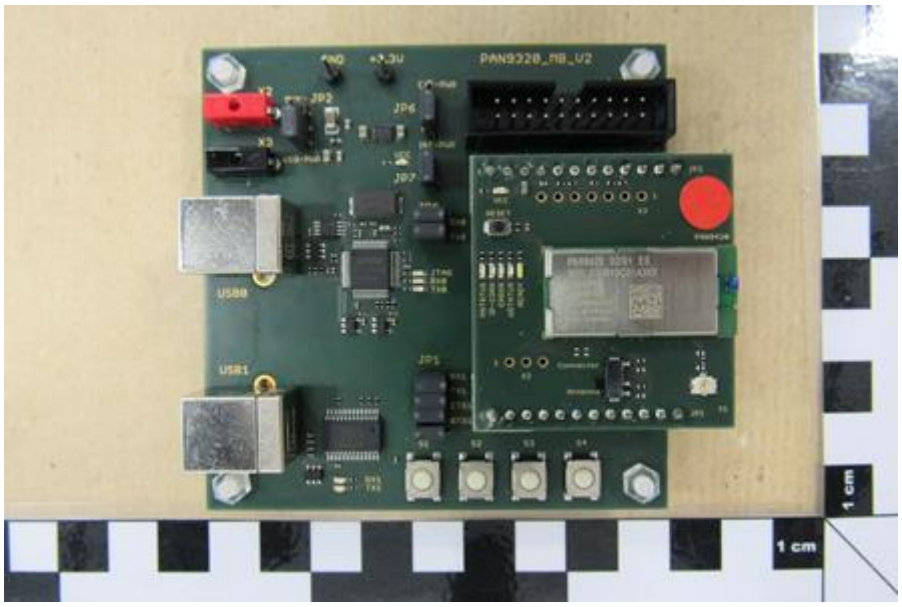
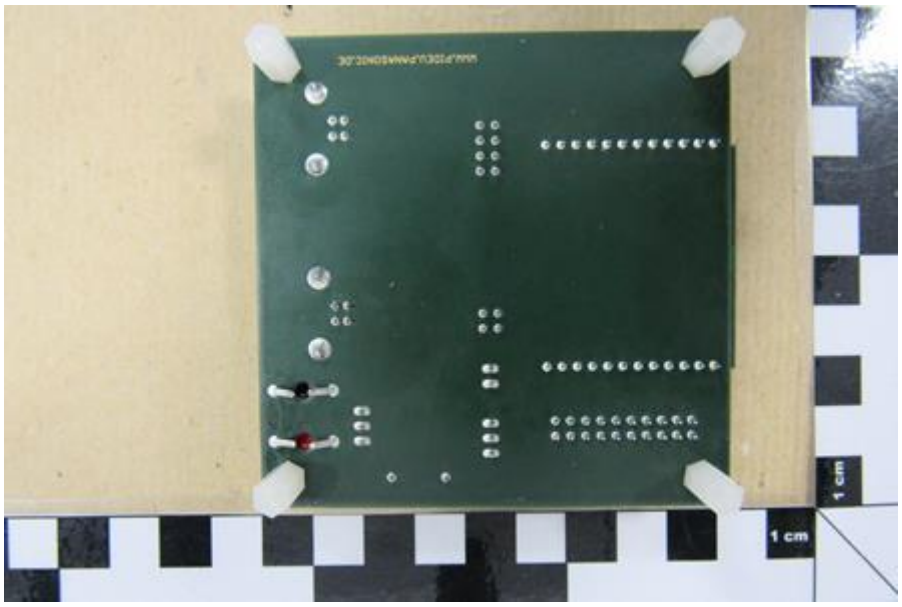
1 Equipment (Test Item) Under Test

Description	Wifi Module	
Model	ENW49C01A3KF	
Additional Model(s)	None	
Brand Name(s)	PAN9420	
Serial Number(s)	00000318	
Hardware Version(s)	02	
Software Version(s)	01	
PMN	PAN9420	
HVIN	ENW49C01A3KF	
FVIN	N/A	
HMN	N/A	
FCC-ID	T7V-9420	
IC	216Q-9420	
Equipment type	End Product	
Radio type	Transceiver	
Assigned frequency bands	2400 - 2483.5 MHz	
Radio technology	IEEE 802.11 b/g/n (HT20)	
Modulation	BPSK, QPSK, 16-QAM, 32-QAM	
Number of antenna ports	1	
Antenna	Type	Integral antenna
	Model	ANT2012LL13R2400A
	Manufacturer	Yageo
	Gain	0.8 dBi (customer declaration)
Supply Voltage	V_{NOM}	3.3 VDC
Operating Temperature	T_{NOM}	25 °C
AC/DC-Adaptor	Model	N/A
	Vendor	N/A
	Input	N/A
	Output	N/A
Manufacturer	Panasonic Industrial Devices Europe GmbH Zeppelinstr. 19 ManufacturerPOCode Lüneburg ManufacturerCountry	

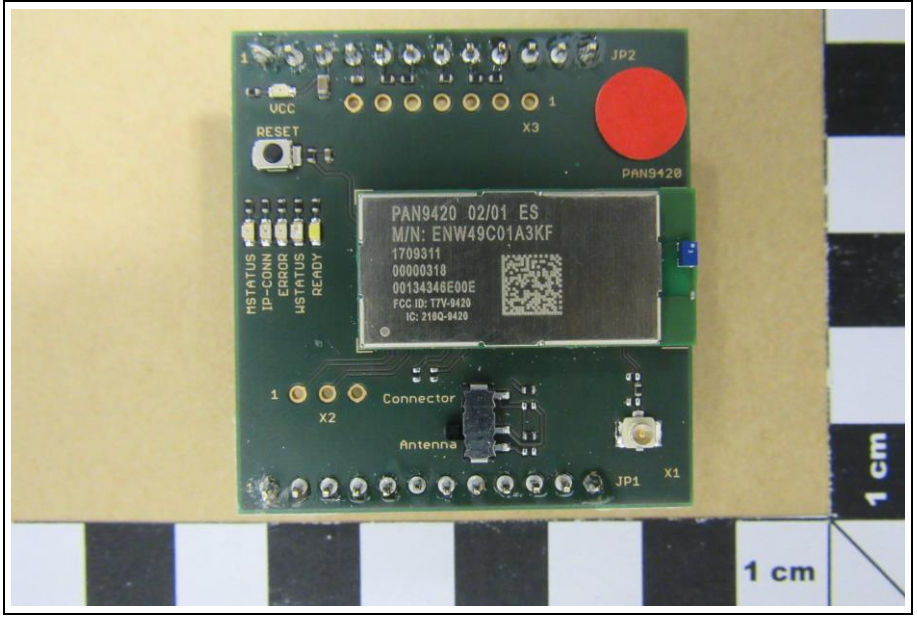
1.1 Photos – Equipment External

Evaluation Board Top


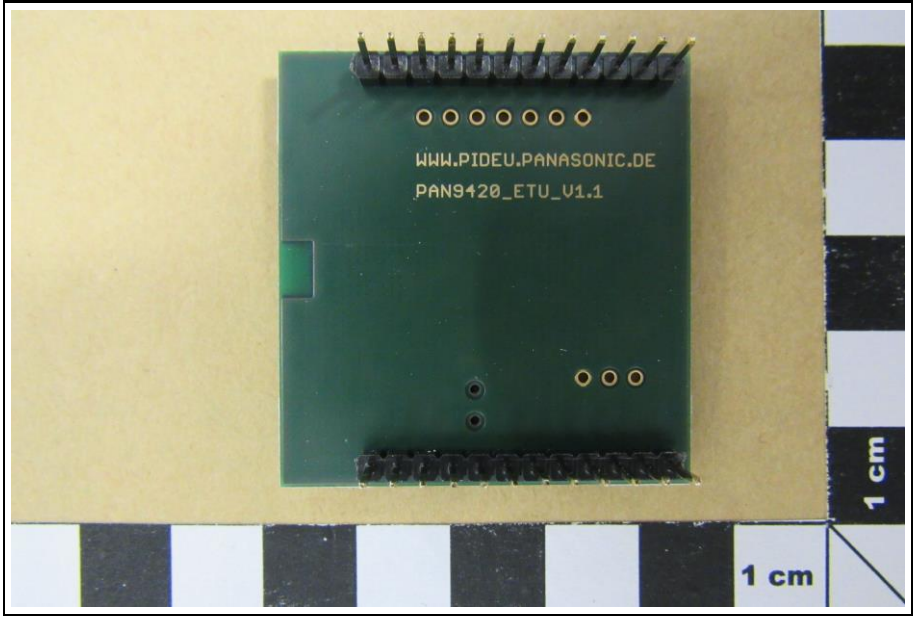
Evaluation Board Bottom


1.2 Photos – Equipment Internal

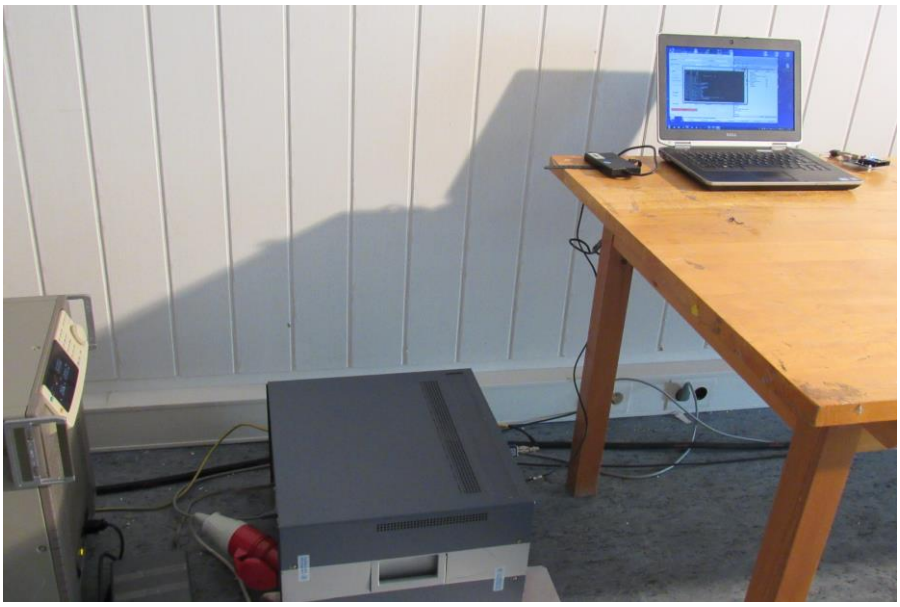
Module Top

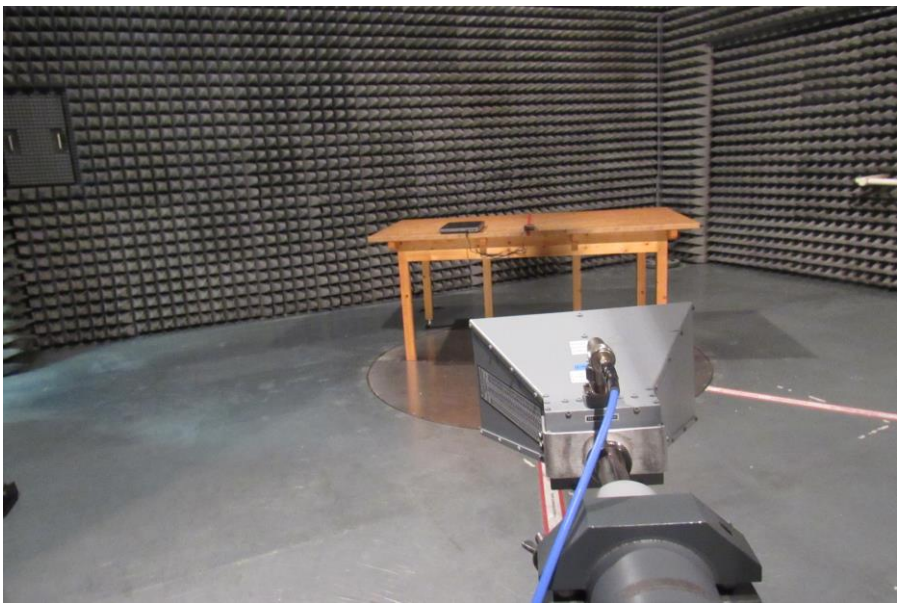


Module Bottom



1.3 Photos – Test Setup

Setup Conducted


Setup Radiated


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:				

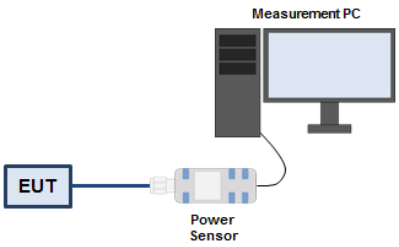
1.5 Test mode output power

1.5.1 Information

Test Information	
Measurement Method	ANSI C63.10 11.9, 14.3

1.5.2 Setup

Test Setup



1.5.3 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Power Sensor	R&S	NRP-Z81	EF00831	2016-04	2017-04

1.5.4 Procedure

Test Procedure

1. EUT set to test mode
2. The peak power is measured with the wideband power sensor
3. The power is measured for the lowest data rate on all three channels
4. For the channel with the highest power the power is also measured for all data rates
5. The data rate with the highest output power is selected for test mode

1.5.5 Results

Results - DSSS			
Data Rate [Mbps]	Power [dBm] Channel 2412 [MHz]	Power [dBm] Channel 2437 [MHz]	Power [dBm] Channel 2462 [MHz]
1	18.50	18.30	18.45
2	18.20	-	-
5.5	18.11	-	-
11	18.22	-	-

Results - OFDM			
Data Rate [Mbps]	Power [dBm] Channel 2412 [MHz]	Power [dBm] Channel 2437 [MHz]	Power [dBm] Channel 2462 [MHz]
6	**23.50**	**23.54**	**23.40**
9	23.40	-	-
12	23.30	-	-
18	23.20	-	-
24	23.40	-	-
36	23.00	-	-
48	22.95	-	-
54	22.90	-	-

Results - HT20			
MCS	Power [dBm] Channel 2412 [MHz]	Power [dBm] Channel 2437 [MHz]	Power [dBm] Channel 2462 [MHz]
0	22.95	-	-
1	22.90	-	-
2	23.20	-	-
3	23.00	-	-
4	22.70	-	-
5	21.30	-	-
6	21.60	-	-
7	21.35	-	-

1.6 Test mode duty cycle

1.6.1 Information

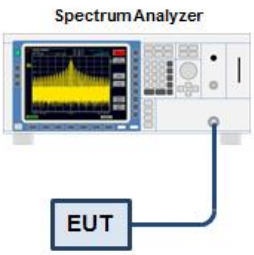
Test Information	
Measurement Method	ANSI C63.10 11.6

1.6.2 Requirements

Requirements	
Duty cycle	Duty cycle correction
≥ 98 %	No correction required
< 98 %	Correction required (10 x Log_{10}(1/DC)

1.6.3 Setup

Test Setup



1.6.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSW 43	EF00896	2017-01	2017-07

1.6.5 Procedure

Test Procedure

1. EUT set to test mode
2. Span is set to zero span
3. Detector set to peak
4. Sweep time is set long enough to capture at least 5 bursts
5. Envelope peak value of emission spectrum is selected
6. The maximum burst duration T_{ON} is measured using two markers set to the start and the end of the longest burst
7. The minimum idle duration T_{OFF} is measured using two markers set to the start and the end of the shortest idle period
8. The duty cycle is calculated by DC = T_{ON} / (T_{ON} + T_{OFF})
9. The duty cycle correction is calculated by DC = 10 x Log_{10}(T_{ON} / (T_{ON} + T_{OFF}))

1.6.6 Results

Duty Cycle Results		
Mode	Duty Cycle	Correction Factor [dB]
DSSS	99.9	0
OFDM	99.3	0
HT20	99.2	0

Test Modes

Mode	Description
DSSS (IEEE 802.11b)	Mode = Transmit Modulation = BPSK Spreading = DSSS Bandwidth = 20 MHz Duty cycle = 99.9% Power setting = 16 Data rate = 1 Mbps
OFDM (IEEE 802.11g)	Mode = Transmit Modulation = BPSK Spreading = OFDM Bandwidth = 20 MHz Duty cycle = 99.3% Power setting = 14 Data rate = 6 Mbps
HT20 (IEEE 802.11n)	Mode = Transmit Modulation = BPSK Spreading = OFDM Bandwidth = 20 MHz Duty cycle = 99.2% Power setting (1 Simultaneous Tx) = 14 Data rate (1 Simultaneous Tx) = 6.5 Mbps MCS (1 Simultaneous Tx) = 0
Receive	Mode = Receive
Comment: The above settings were found as worst case during pre-tests.	

1.7 Test Frequencies

Designator	Mode	Channel	Frequency [MHz]
F1	Tx / Rx	1	2412
F2	Tx / Rx	6	2437
F3	Tx / Rx	11	2462

1.8 Sample emission level calculation

The following is a description of terms and a sample calculation, as appears in the radiated emissions data table. The numbers used in the calculation are for example only. There is no direct correlation to the specific data taken for the product described in this document:

Reading:

This is the reading obtained on the spectrum analyzer in dBµV. Any external preamplifiers used are taken into account through internal analyzer settings.

A.F.:

This is the antenna factor for the receiving antenna. It is a conversion factor, which converts electric fields strengths to voltages, which can be measured directly on the spectrum analyzer. It is treated as a loss in dB. Cable losses have been included with the A.F. to simplify the calculations. The antenna factor is used in calculations as follows:

Reading on Analyzer (dBµV) + A.F. (dB) = Net field strength (dBµV/m)

Net:

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

Limit:

This is the FCC Class B radiated emission limit (in units of dBµV/m). The FCC limits are given in units of µV/m. The following formula is used to convert the units of µV/m to dBµV/m:

Limit (dBµV/m) = 20*log (µV/m)

Margin:

This is the margin of compliance below the FCC limit. The units are given in dB. A negative margin indicates the emission was below the limit. A positive margin indicates that the emission exceeds the limit.

Example only:

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

2 Result Summary

FCC 47 CFR Part 15C, 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

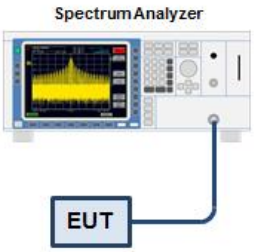
Test Information	
Reference	ISED RSS-Gen 6.6
Measurement Method	ANSI C63.10 6.9.3
Operator	Wilfried Treffke
Date	2017-04-19

3.1.2 Limits

Limits
None (Informational only)

3.1.3 Setup

Test Setup



3.1.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01003	2017-03	2018-03

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 1 % of the bandwidth
4. The occupied bandwidth is measured with the build-in analyzer function

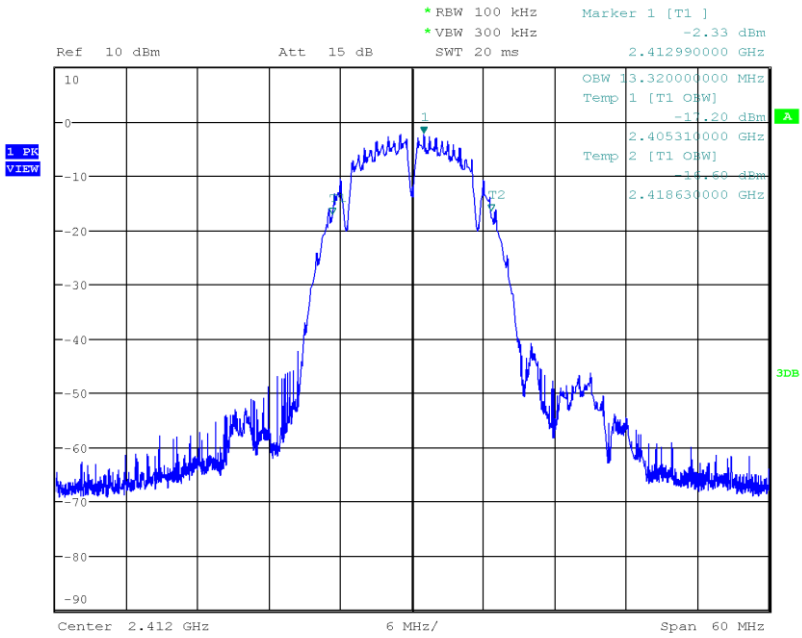
3.1.6 Results

Test Results		
Mode	Frequency [MHz]	Bandwidth [MHz]
DSSS	2412	13.320
DSSS	2437	13.395
DSSS	2462	13.425
OFDM	2412	16.440
OFDM	2437	16.440
OFDM	2462	16.440
HT20	2412	17.700
HT20	2437	17.700
HT20	2462	17.700

Occupied bandwidth – DSSS - 2412 MHz

Occupied Bandwidth

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Method:	ANSI C63.10:2013, Section 6.9.3
Operational Mode:	IEEE 802.11 b, Channel: 1, 2412
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Occupied Bandwidth [MHz]:	13.320



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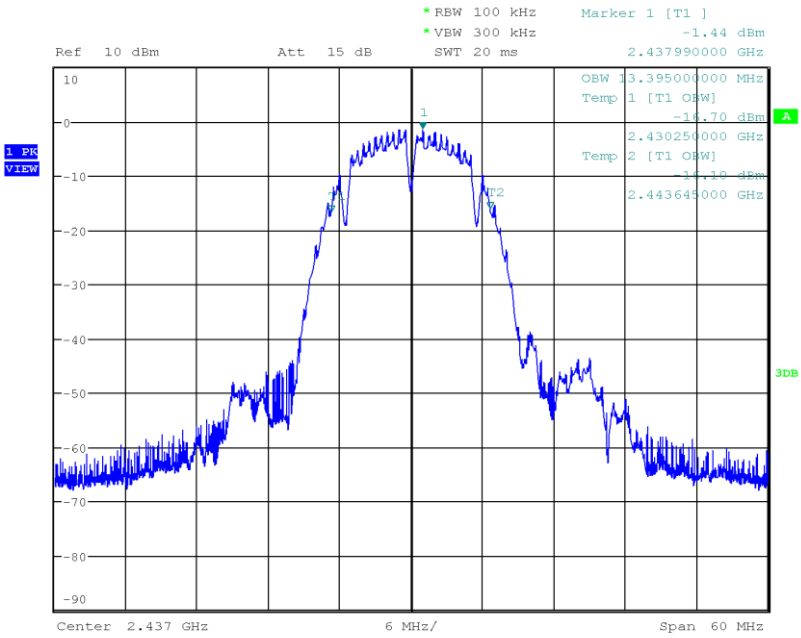
Occupied bandwidth – DSSS - 2437 MHz

Occupied Bandwidth

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Method:	ANSI C63.10:2013, Section 6.9.3
Operational Mode:	IEEE 802.11 b, Channel: 6, 2437
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Occupied Bandwidth [MHz]:	13.395



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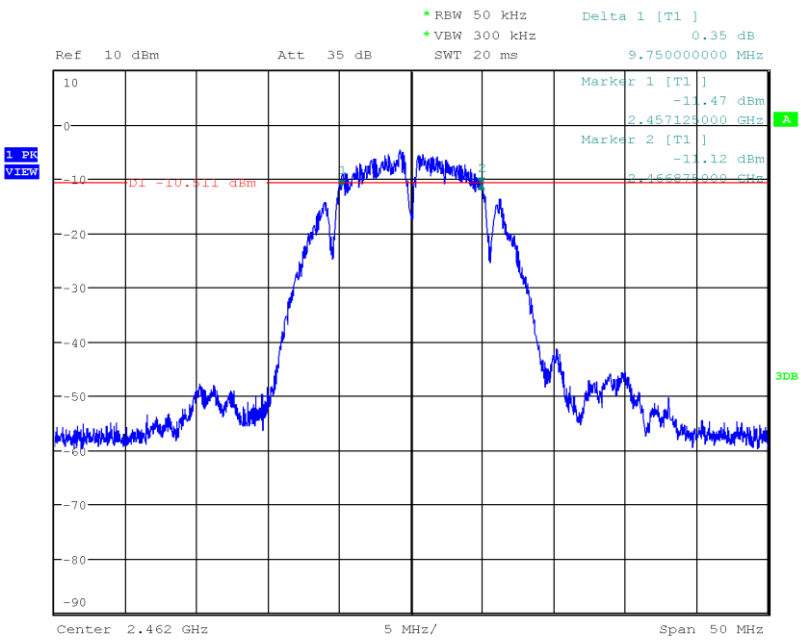
Occupied bandwidth – DSSS - 2462 MHz

DTS (6 dB) Bandwidth

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.8.1 Option 1
Operational Mode:	IEEE 802.11 b, Channel: 11, 2462 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Lower Frequency [MHz]:	2457.125
Upper Frequency [MHz]:	2466.875
6 dB Bandwidth [kHz]:	9750



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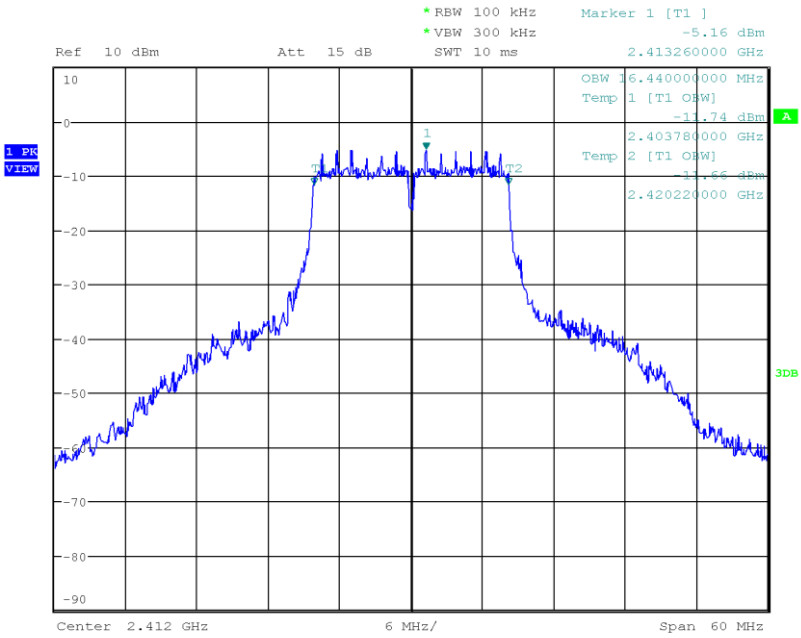
Occupied bandwidth – OFDM - 2412 MHz

Occupied Bandwidth

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Method:	ANSI C63.10:2013, Section 6.9.3
Operational Mode:	IEEE 802.11 g, Channel: 1, 2412
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Occupied Bandwidth [MHz]:	16.440

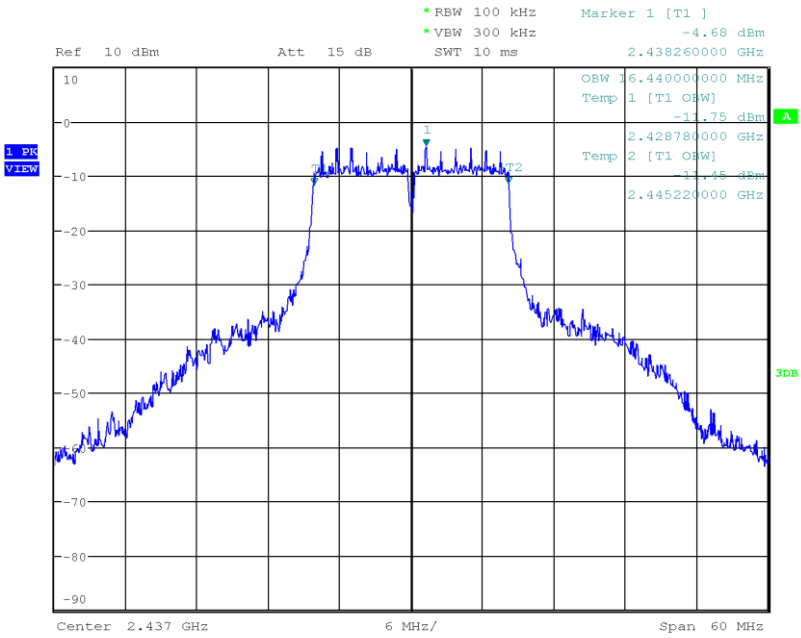


Date: 19.APR.2017 15:56:50

Occupied bandwidth – OFDM - 2437 MHz

Occupied Bandwidth

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Method:	ANSI C63.10:2013, Section 6.9.3
Operational Mode:	IEEE 802.11 g, Channel: 6, 2437
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Occupied Bandwidth [MHz]:	16.440



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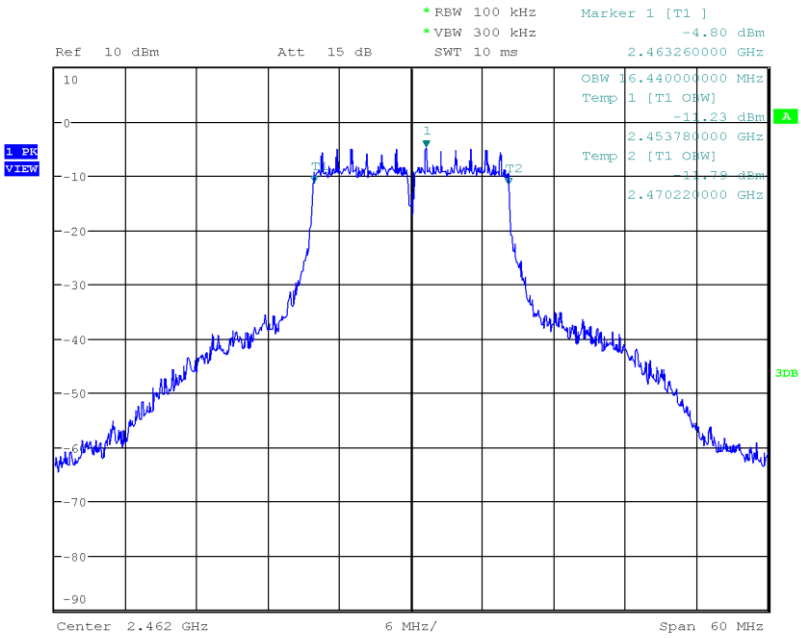
Occupied bandwidth – OFDM - 2462 MHz

Occupied Bandwidth

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Method:	ANSI C63.10:2013, Section 6.9.3
Operational Mode:	IEEE 802.11 g, Channel: 11, 2462
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Occupied Bandwidth [MHz]:	16.440



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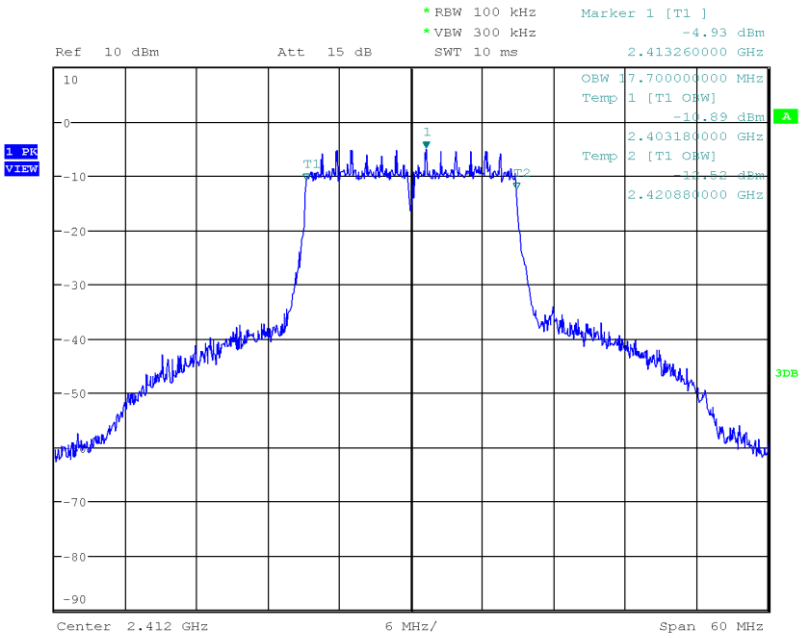
Occupied bandwidth – HT20 - 2412 MHz

Occupied Bandwidth

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Method:	ANSI C63.10:2013, Section 6.9.3
Operational Mode:	IEEE 802.11 n HT20, Channel: 1, 2412
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Occupied Bandwidth [MHz]:	17.700



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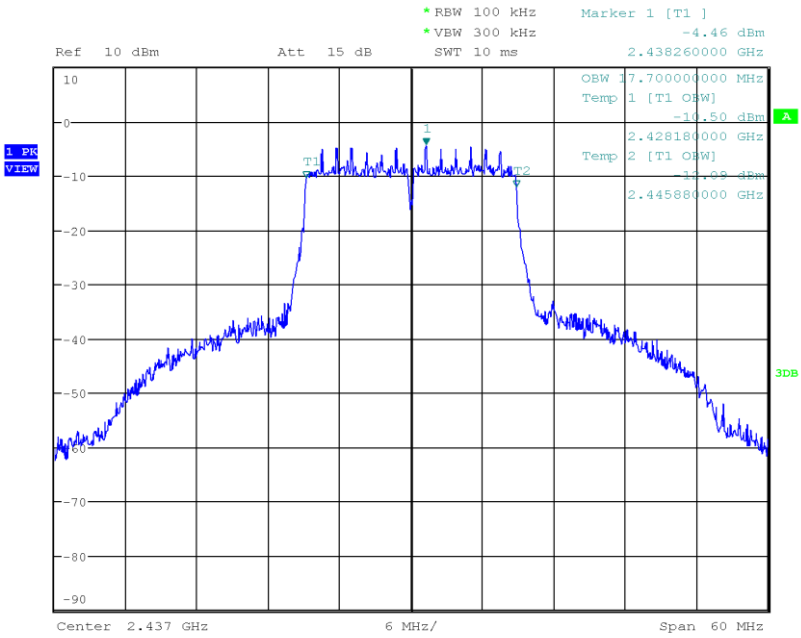
Occupied bandwidth – HT20 - 2437 MHz

Occupied Bandwidth

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Method:	ANSI C63.10:2013, Section 6.9.3
Operational Mode:	IEEE 802.11 n HT20, Channel: 6, 2437
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Occupied Bandwidth [MHz]:	17.700

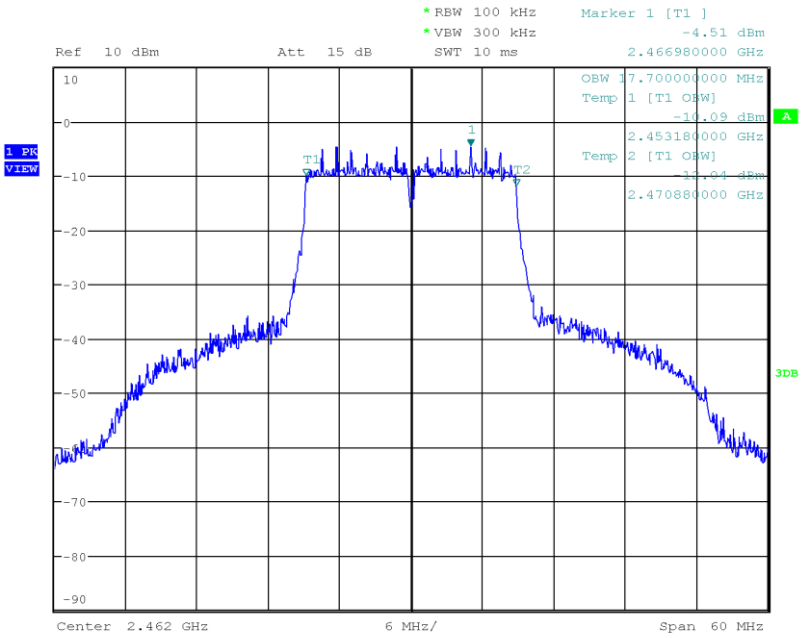


Date: 19.APR.2017 16:00:39

Occupied bandwidth – HT20 - 2462 MHz

Occupied Bandwidth

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Method:	ANSI C63.10:2013, Section 6.9.3
Operational Mode:	IEEE 802.11 n HT20, Channel: 11, 2462
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Occupied Bandwidth [MHz]:	17.700



Date: 19.APR.2017 16:02:17

3.2 Test Conditions and Results - 6 dB bandwidth

3.2.1 Information

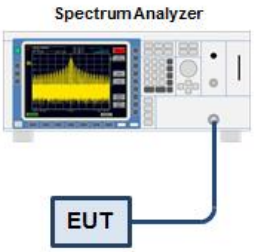
Test Information	
Reference	FCC 15.247(a)(2) / ISED RSS-247 5.2
Measurement Method	ANSI C63.10 11.8
Operator	Wilfried Treffke
Date	2017-04-19

3.2.2 Limits

Limits
≥ 500kHz

3.2.3 Setup

Test Setup



3.2.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01003	2017-03	2018-03

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

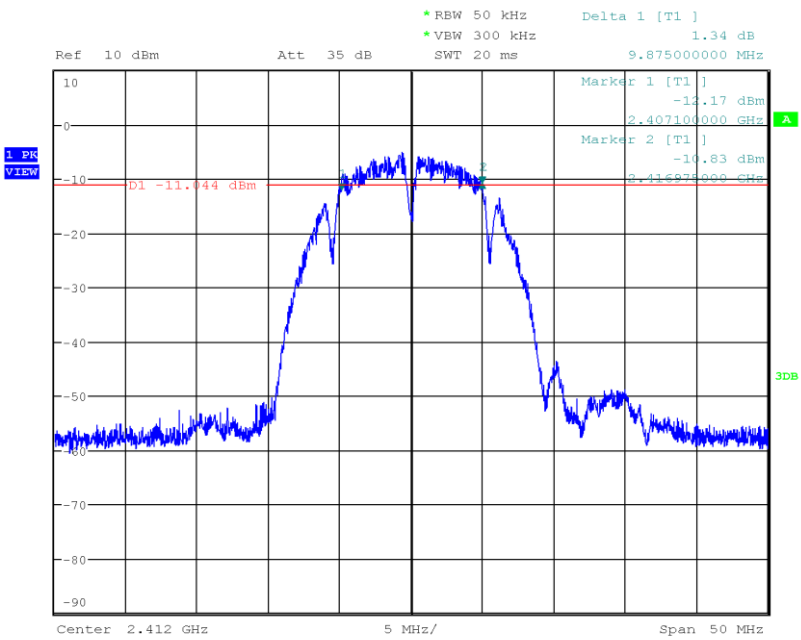
3.2.6 Results

Test Results				
Mode	Frequency [MHz]	Bandwidth [kHz]	Limit [kHz]	Verdict
DSSS	2412	9875	500	PASS
DSSS	2437	9850	500	PASS
DSSS	2462	9750	500	PASS
OFDM	2412	16463	500	PASS
OFDM	2437	16500	500	PASS
OFDM	2462	16412	500	PASS
HT20	2412	17688	500	PASS
HT20	2437	17638	500	PASS
HT20	2462	17637	500	PASS

6 dB bandwidth – DSSS - 2412 MHz

DTS (6 dB) Bandwidth

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.8.1 Option 1
Operational Mode:	IEEE 802.11 b, Channel: 1, 2412 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Lower Frequency [MHz]:	2407.100
Upper Frequency [MHz]:	2416.975
6 dB Bandwidth [kHz]:	9875

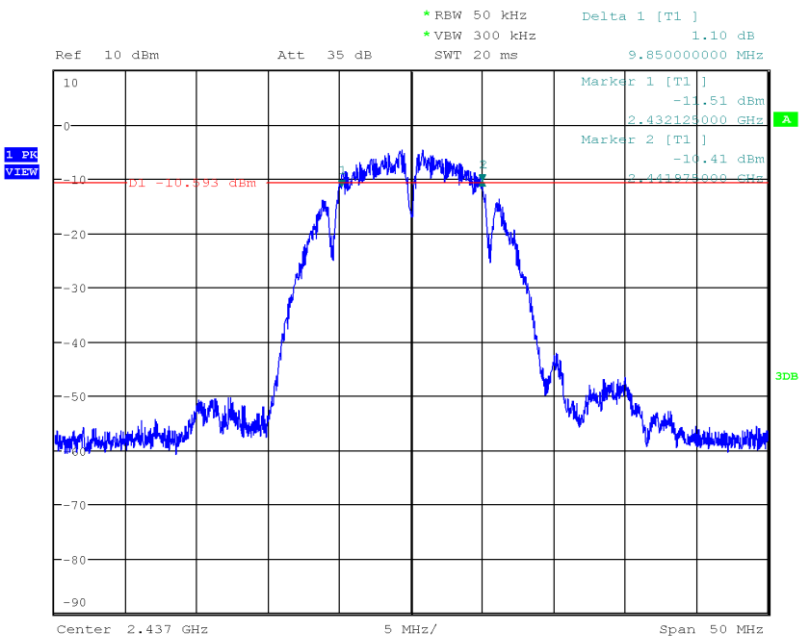


Date: 19.APR.2017 15:18:09

6 dB bandwidth – DSSS - 2437 MHz

DTS (6 dB) Bandwidth

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.8.1 Option 1
Operational Mode:	IEEE 802.11 b, Channel: 6, 2437 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Lower Frequency [MHz]:	2432.125
Upper Frequency [MHz]:	2441.975
6 dB Bandwidth [kHz]:	9850

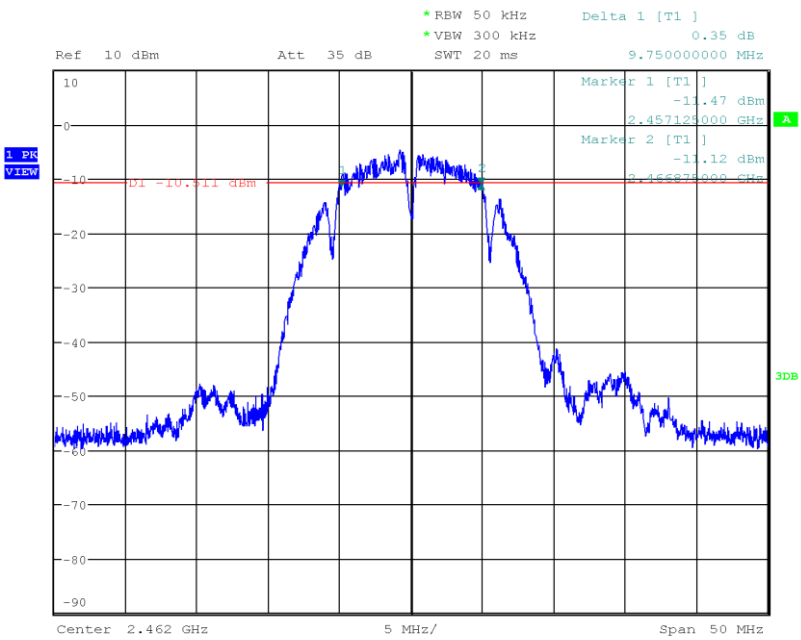


Date: 19.APR.2017 15:21:38

6 dB bandwidth – DSSS - 2462 MHz

DTS (6 dB) Bandwidth

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.8.1 Option 1
Operational Mode:	IEEE 802.11 b, Channel: 11, 2462 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Lower Frequency [MHz]:	2457.125
Upper Frequency [MHz]:	2466.875
6 dB Bandwidth [kHz]:	9750

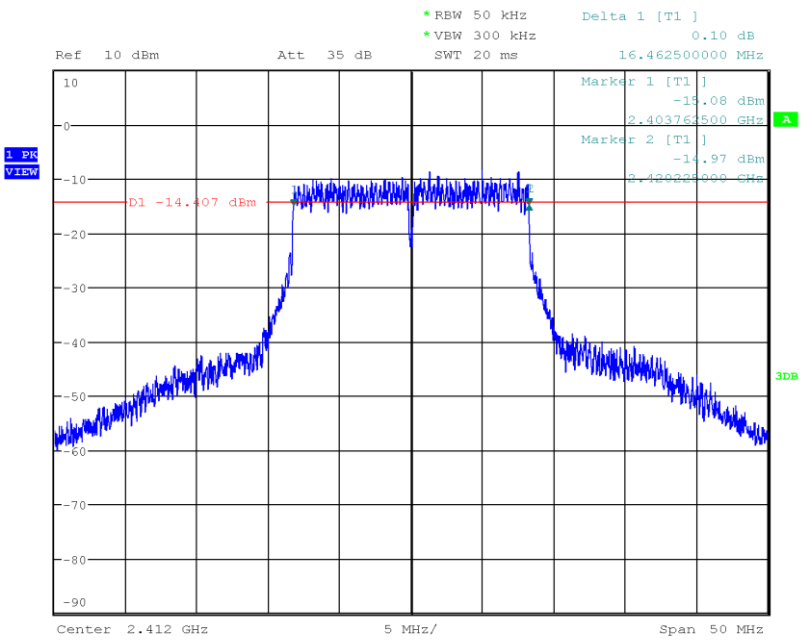


Date: 19.APR.2017 15:23:41

6 dB bandwidth – OFDM - 2412 MHz

DTS (6 dB) Bandwidth

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.8.1 Option 1
Operational Mode:	IEEE 802.11 g, Channel: 1, 2412 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Lower Frequency [MHz]:	2403.762
Upper Frequency [MHz]:	2420.225
6 dB Bandwidth [kHz]:	16463

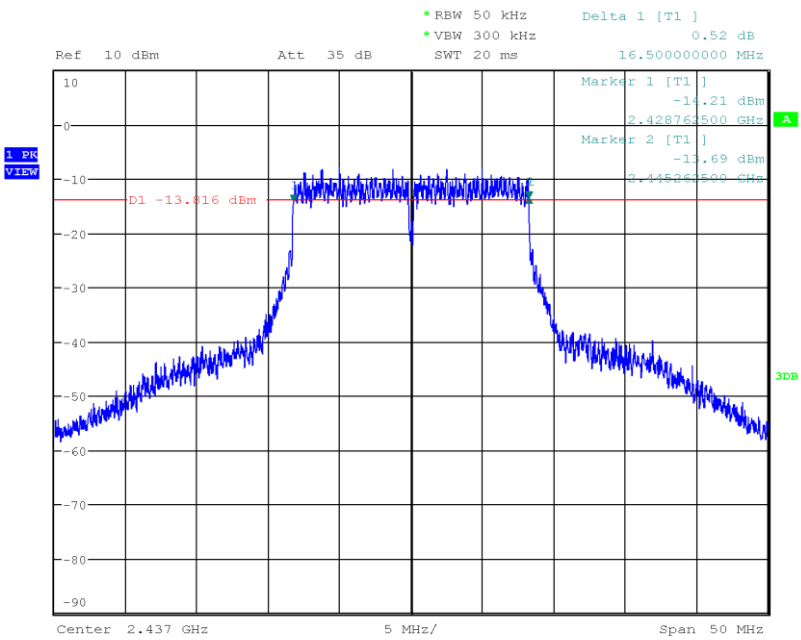


Date: 19.APR.2017 15:25:47

6 dB bandwidth – OFDM - 2437 MHz

DTS (6 dB) Bandwidth

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.8.1 Option 1
Operational Mode:	IEEE 802.11 g, Channel: 6, 2437 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Lower Frequency [MHz]:	2428.762
Upper Frequency [MHz]:	2445.262
6 dB Bandwidth [kHz]:	16500

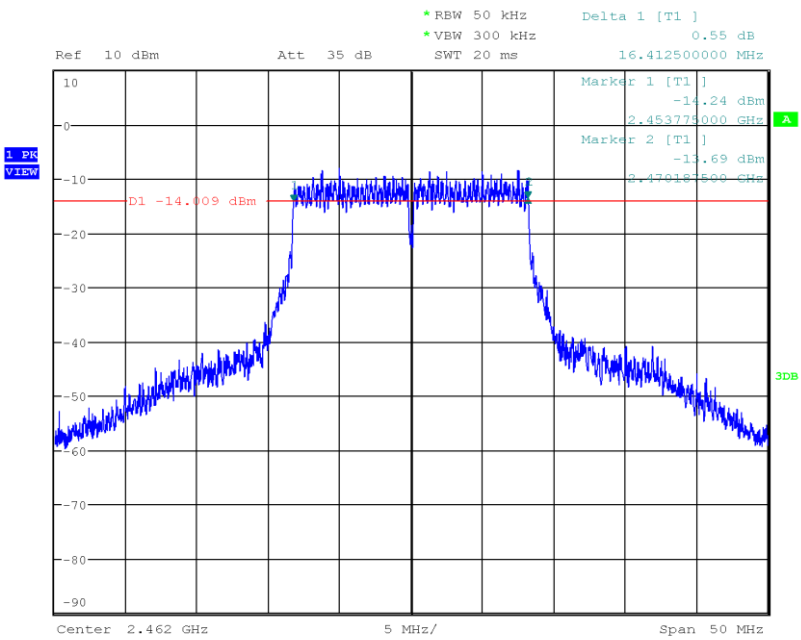


Date: 19.APR.2017 15:28:00

6 dB bandwidth – OFDM - 2462 MHz

DTS (6 dB) Bandwidth

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.8.1 Option 1
Operational Mode:	IEEE 802.11 g, Channel: 11, 2462 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Lower Frequency [MHz]:	2453.775
Upper Frequency [MHz]:	2470.188
6 dB Bandwidth [kHz]:	16412

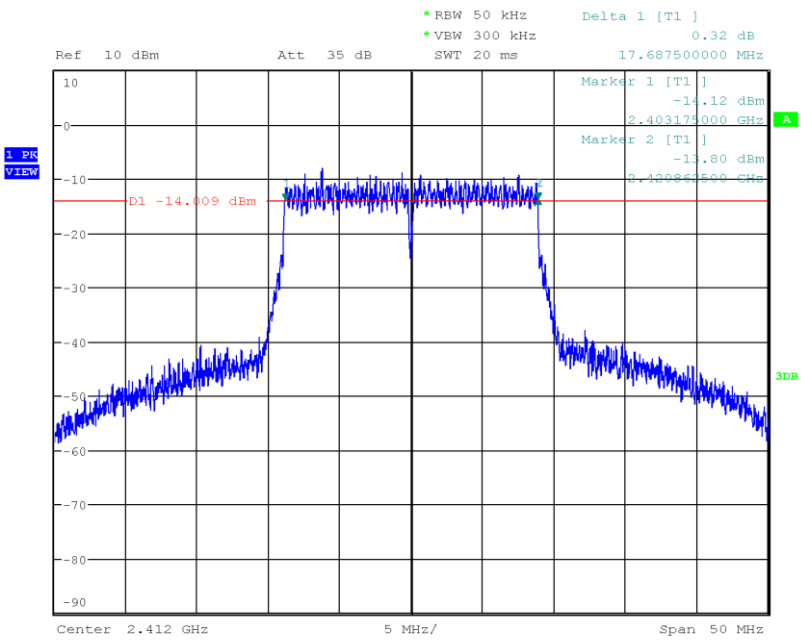


Date: 19.APR.2017 15:29:55

6 dB bandwidth – HT20 - 2412 MHz

DTS (6 dB) Bandwidth

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.8.1 Option 1
Operational Mode:	IEEE 802.11 n HT20, Channel: 1, 2412 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Lower Frequency [MHz]:	2403.175
Upper Frequency [MHz]:	2420.863
6 dB Bandwidth [kHz]:	17688

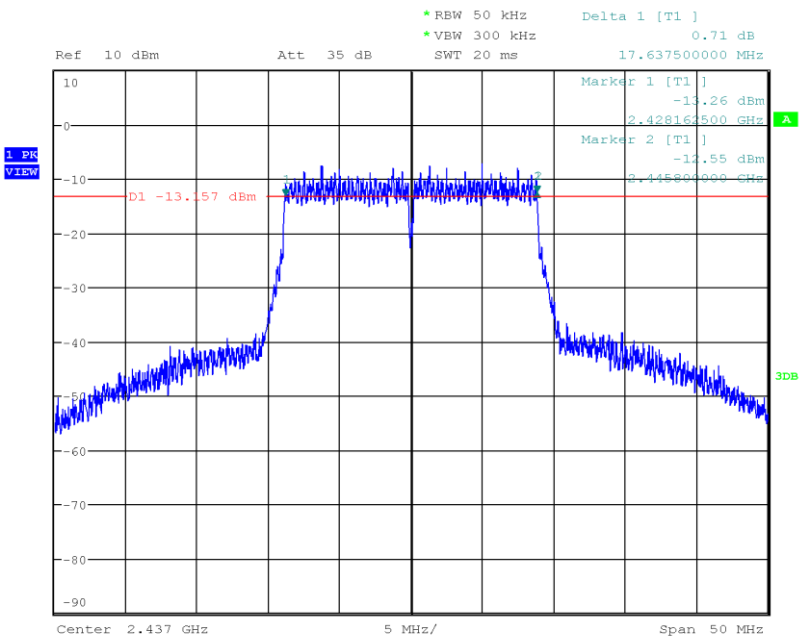


Date: 19.APR.2017 15:34:05

6 dB bandwidth – HT20 - 2437 MHz

DTS (6 dB) Bandwidth

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.8.1 Option 1
Operational Mode:	IEEE 802.11 n HT20, Channel: 6, 2437 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Lower Frequency [MHz]:	2428.162
Upper Frequency [MHz]:	2445.800
6 dB Bandwidth [kHz]:	17638

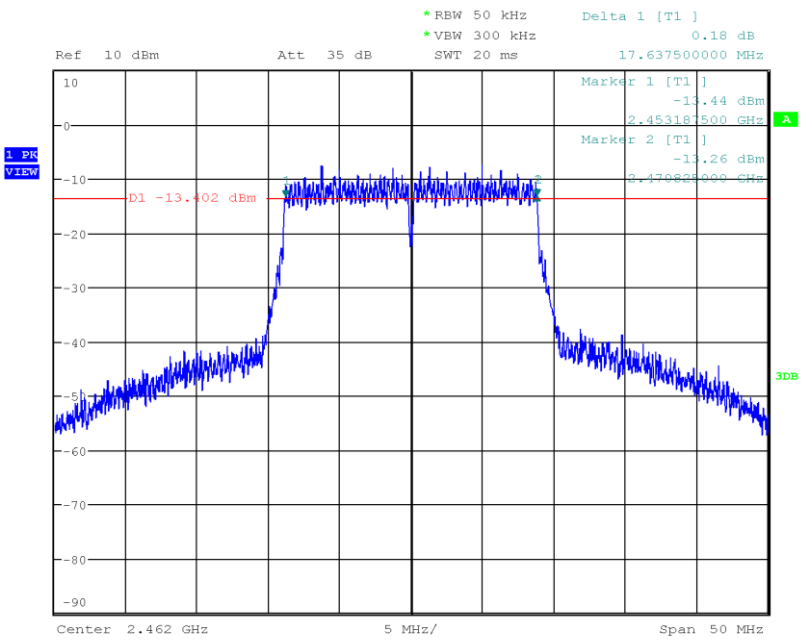


Date: 19.APR.2017 15:38:16

6 dB bandwidth – HT20 - 2462 MHz

DTS (6 dB) Bandwidth

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.8.1 Option 1
Operational Mode:	IEEE 802.11 n HT20, Channel: 11, 2462 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Lower Frequency [MHz]:	2453.188
Upper Frequency [MHz]:	2470.825
6 dB Bandwidth [kHz]:	17637



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3.3 Test Conditions and Results - Maximum peak conducted output power

3.3.1 Information

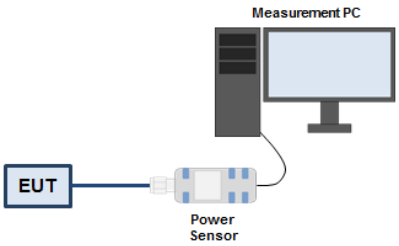
Test Information	
Reference	FCC 15.247(b)(1) / ISED RSS-247 5.4
Measurement Method	ANSI C63.10 11.9.1
Operator	Wilfried Treffke
Date	2017-04-19

3.3.2 Limits

Limits
1 W (30 dBm)
The conducted output power limit specified above is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in the table, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.3.3 Setup

Test Setup



3.3.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Power Sensor	R&S	NRP-Z81	EF00831	2016-04	2017-04

3.3.5 Procedure

Test Procedure

1. EUT set to test hopping mode (Communication tester is used if needed)
2. The EUT antenna port is connected to a wideband power sensor
3. The peak power is measured with the power sensor
4. If the EUT has more than one transmit chain the procedure is repeated for each transmit chain and the power is summed up

3.3.6 Results

Test Results - DSSS				
Channel [MHz]	Power [dBm]	Power [W]	Limit [W]	Verdict
2412	18.50	0.071	1.0	PASS
2437	18.30	0.068	1.0	PASS
2462	18.45	0.070	1.0	PASS

Test Results - OFDM				
Channel [MHz]	Power [dBm]	Power [W]	Limit [W]	Verdict
2412	23.50	0.224	1.0	PASS
2437	23.54	0.226	1.0	PASS
2462	23.40	0.219	1.0	PASS

Test Results - HT20				
Channel [MHz]	Power [dBm]	Power [W]	Limit [W]	Verdict
2412	22.95	0.197	1.0	PASS
2437	23.10	0.204	1.0	PASS
2462	22.80	0.191	1.0	PASS

3.4 Test Conditions and Results - Power spectral density

3.4.1 Information

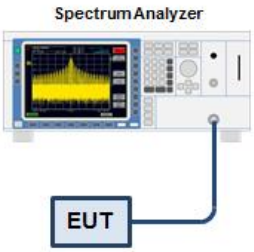
Test Information	
Reference	FCC 15.247(e) / ISED RSS-247 5.2
Measurement Method	ANSI C63.10 11.10.2, 14.3.2
Operator	Wilfried Treffke
Date	2017-04-19

3.4.2 Limits

Limits
8 dBm / 3 kHz

3.4.3 Setup

Test Setup



3.4.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01003	2017-03	2018-03

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

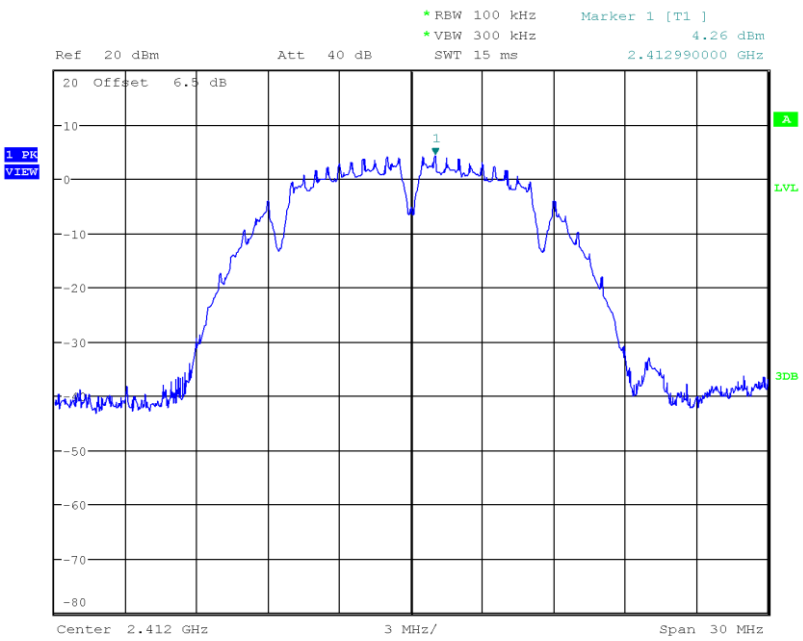
3.4.6 Results

Test Results - DSSS			
Channel [MHz]	PSD [dBm/RBW]	Limit [dBm/3kHz]	Verdict
2412	4.264	8.0	PASS
2437	4.926	8.0	PASS
2462	4.795	8.0	PASS
Test Results - OFDM			
Channel [MHz]	PSD [dBm/RBW]	Limit [dBm/3kHz]	Verdict
2412	1.340	8.0	PASS
2437	1.823	8.0	PASS
2462	1.517	8.0	PASS
Test Results - HT20			
Channel [MHz]	PSD [dBm/RBW]	Limit [dBm/3kHz]	Verdict
2412	1.391	8.0	PASS
2437	2.274	8.0	PASS
2462	2.169	8.0	PASS
RBW = 100 kHz			

PSD conducted – DSSS - 2412 MHz

Peak Power Spectral Density

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.10.2
Operational Mode:	IEEE 802.11 b, Channel: 1, 2412 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Peak Frequency [MHz]:	2412.990
Spectral Density [dBm/RBW]:	4.264
Resolution Bandwidth [kHz]:	100 kHz

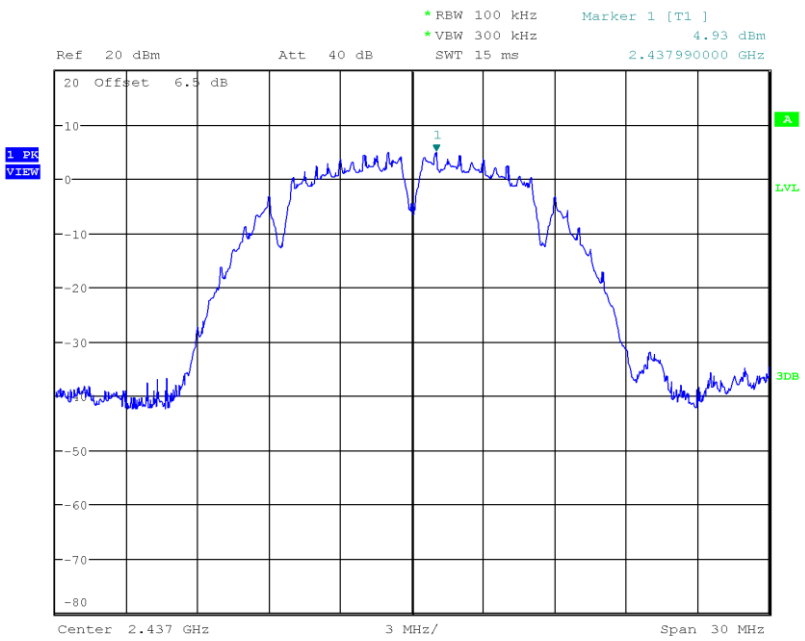


Date: 19.APR.2017 16:21:08

PSD conducted – DSSS - 2437 MHz

Peak Power Spectral Density

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.10.2
Operational Mode:	IEEE 802.11 b, Channel: 6, 2437 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Peak Frequency [MHz]:	2437.990
Spectral Density [dBm/RBW]:	4.926
Resolution Bandwidth [kHz]:	100 kHz

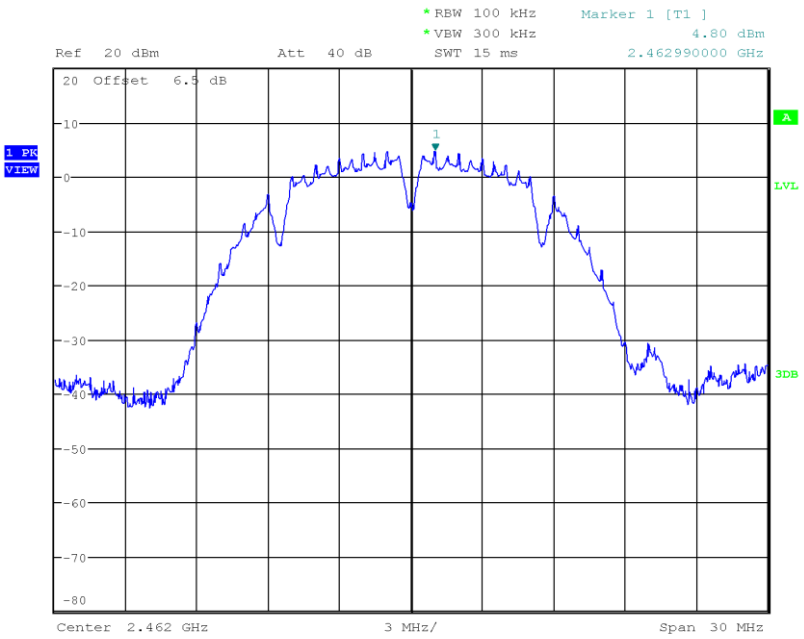


Date: 19.APR.2017 16:23:29

PSD conducted – DSSS - 2462 MHz

Peak Power Spectral Density

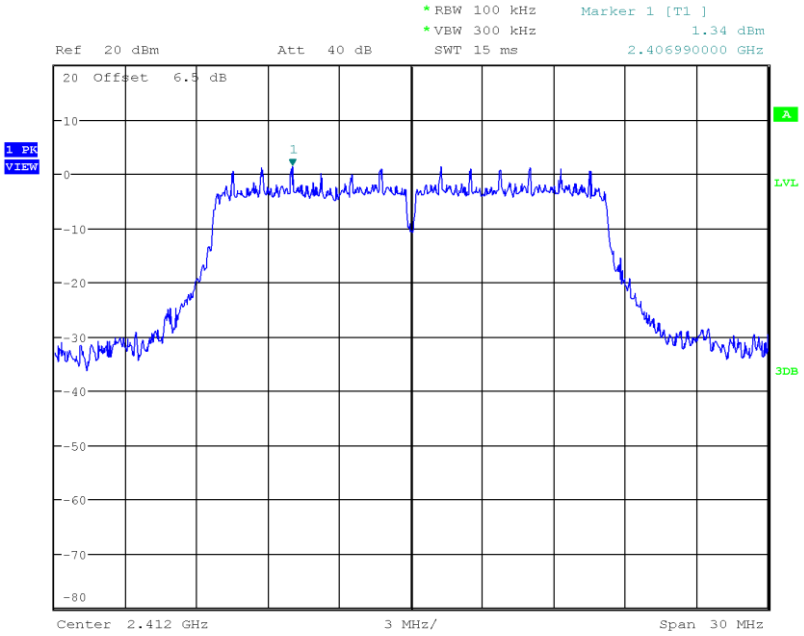
Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.10.2
Operational Mode:	IEEE 802.11 b, Channel: 11, 2462 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Peak Frequency [MHz]:	2462.990
Spectral Density [dBm/RBW]:	4.795
Resolution Bandwidth [kHz]:	100 kHz



PSD conducted – OFDM- 2412 MHz

Peak Power Spectral Density

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.10.2
Operational Mode:	IEEE 802.11 g, Channel: 1, 2412 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Peak Frequency [MHz]:	2406.990
Spectral Density [dBm/RBW]:	1.340
Resolution Bandwidth [kHz]:	100 kHz

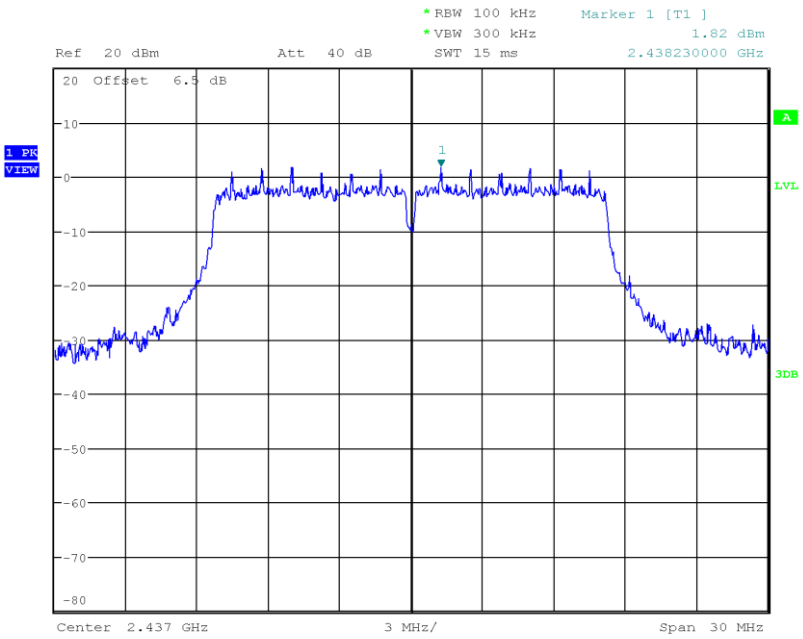


Date: 19.APR.2017 16:26:59

PSD conducted – OFDM - 2437 MHz

Peak Power Spectral Density

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.10.2
Operational Mode:	IEEE 802.11 g, Channel: 6, 2437 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Peak Frequency [MHz]:	2438.230
Spectral Density [dBm/RBW]:	1.823
Resolution Bandwidth [kHz]:	100 kHz

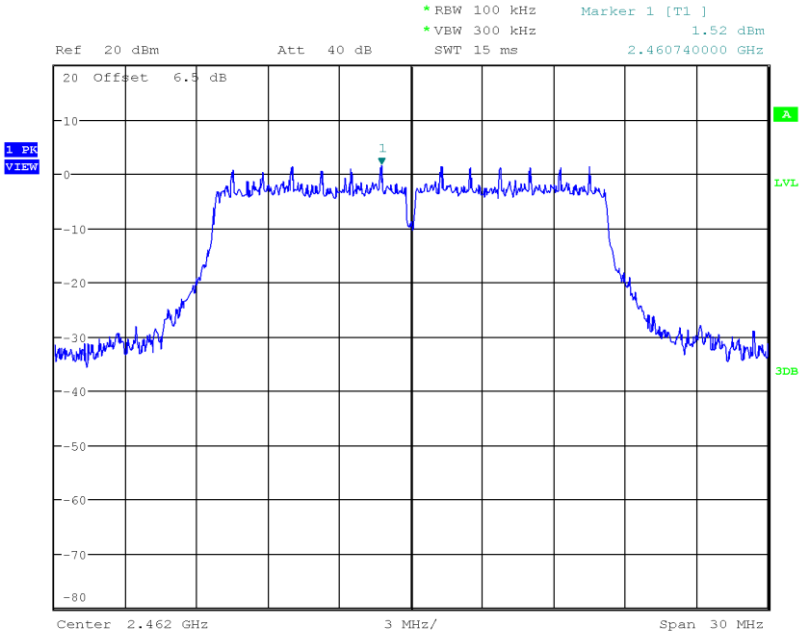


Date: 19.APR.2017 16:28:19

PSD conducted – OFDM - 2462 MHz

Peak Power Spectral Density

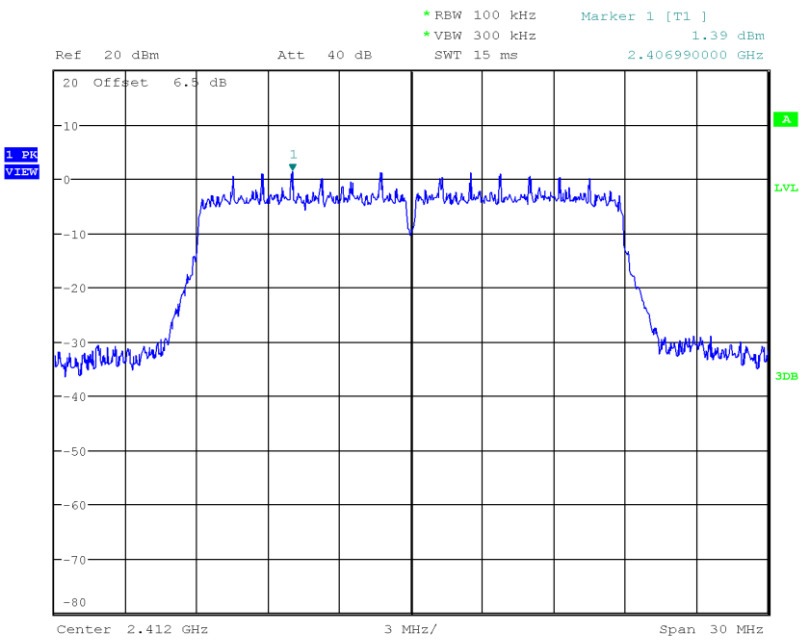
Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.10.2
Operational Mode:	IEEE 802.11 g, Channel: 11, 2462 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Peak Frequency [MHz]:	2460.740
Spectral Density [dBm/RBW]:	1.517
Resolution Bandwidth [kHz]:	100 kHz



PSD conducted – HT20 - 2412 MHz

Peak Power Spectral Density

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.10.2
Operational Mode:	IEEE 802.11 n HT20, Channel: 1, 2412 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Peak Frequency [MHz]:	2406.990
Spectral Density [dBm/RBW]:	1.391
Resolution Bandwidth [kHz]:	100 kHz

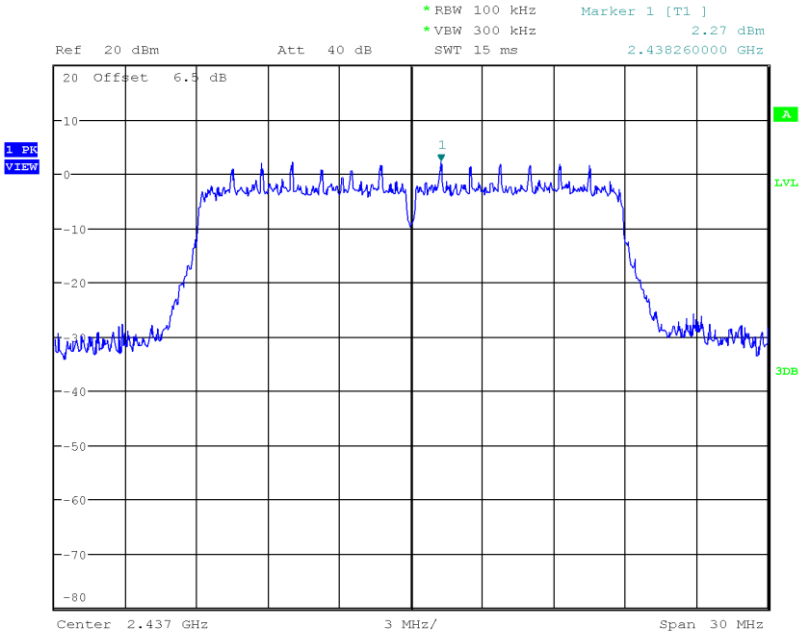


Date: 19.APR.2017 16:32:04

PSD conducted – HT20 - 2437 MHz

Peak Power Spectral Density

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.10.2
Operational Mode:	IEEE 802.11 n HT20, Channel: 6, 2437 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Peak Frequency [MHz]:	2438.260
Spectral Density [dBm/RBW]:	2.274
Resolution Bandwidth [kHz]:	100 kHz

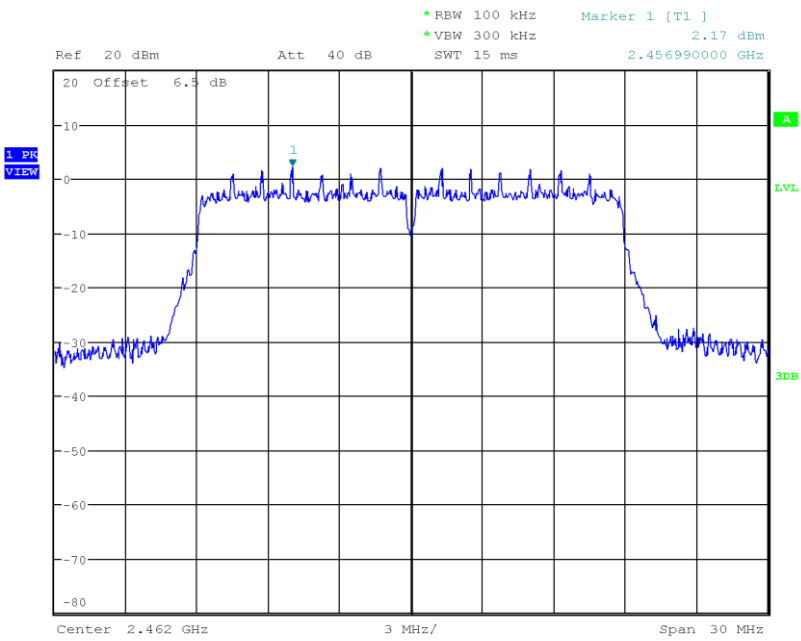


Date: 19.APR.2017 16:34:36

PSD conducted – HT20 - 2462 MHz

Peak Power Spectral Density

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.10.2
Operational Mode:	IEEE 802.11 n HT20, Channel: 11, 2462 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Peak Frequency [MHz]:	2456.990
Spectral Density [dBm/RBW]:	2.169
Resolution Bandwidth [kHz]:	100 kHz



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3.5 Test Conditions and Results - AC powerline conducted emissions

3.5.1 Information

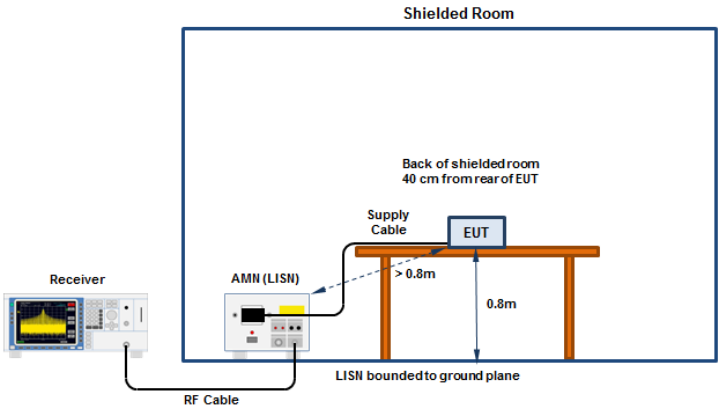
Test Information	
Reference	FCC 15.207
Measurement Method	ANSI C63.10 6.2
Operator	Wilfried Treffke
Date	2017-04-21

3.5.2 Limits

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

3.5.3 Setup

Test Setup



3.5.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EMI Receiver	R&S	ESU 26	EF00241	2016-04	2018-04
LISN	R&S	ESH2-Z5	EF00182	2017-01	2019-01

Conducted Emissions A

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

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	W. Treffke
Test Conditions:	Tnom: 24°C, Unom: 120 V AC
LISN:	ESH2-Z5 N
Mode:	IEEE802.11b, 1Mbps, 2412MHz
Test Date:	2017-04-21
Note:	

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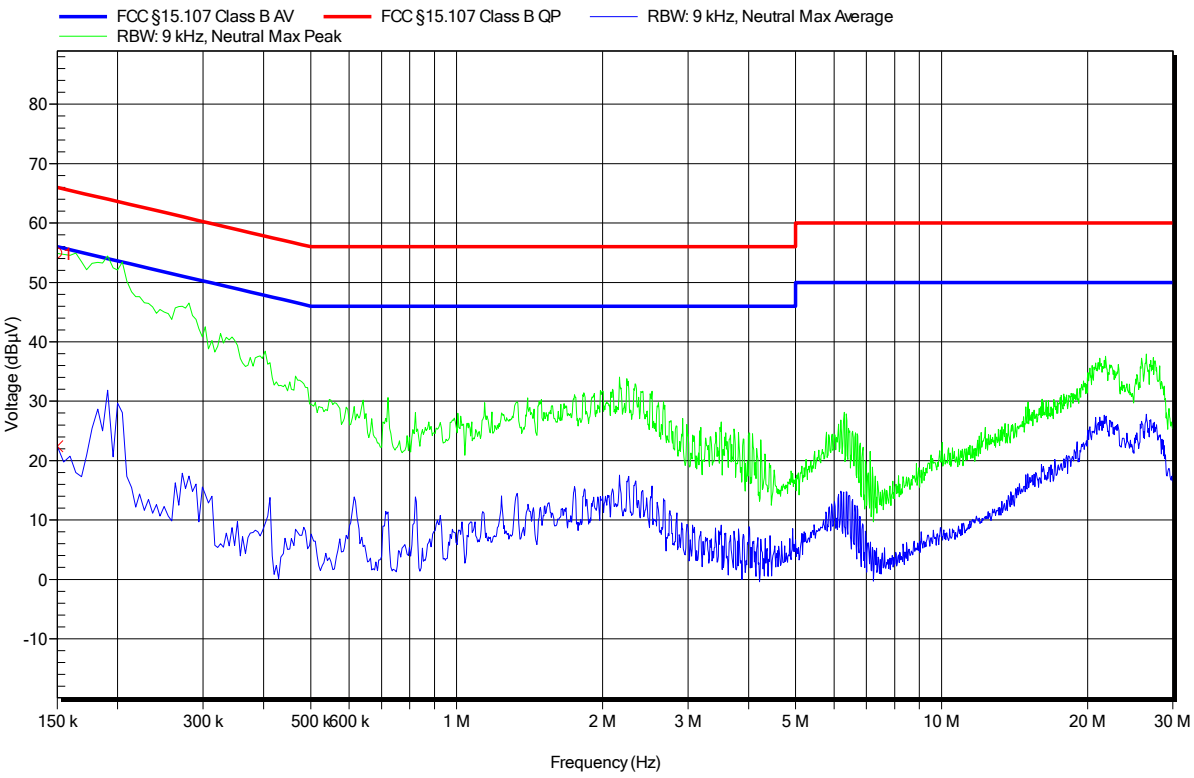

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status
1	150 kHz	22.4 dBµV	56 dBµV	-33.6 dB	Pass

Conducted Emissions B

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

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	W. Treffke
Test Conditions:	Tnom: 24°C, Unom: 120 V AC
LISN:	ESH2-Z5 L
Mode:	IEEE802.11b, 1Mbps, 2412MHz
Test Date:	2017-04-21
Note:	

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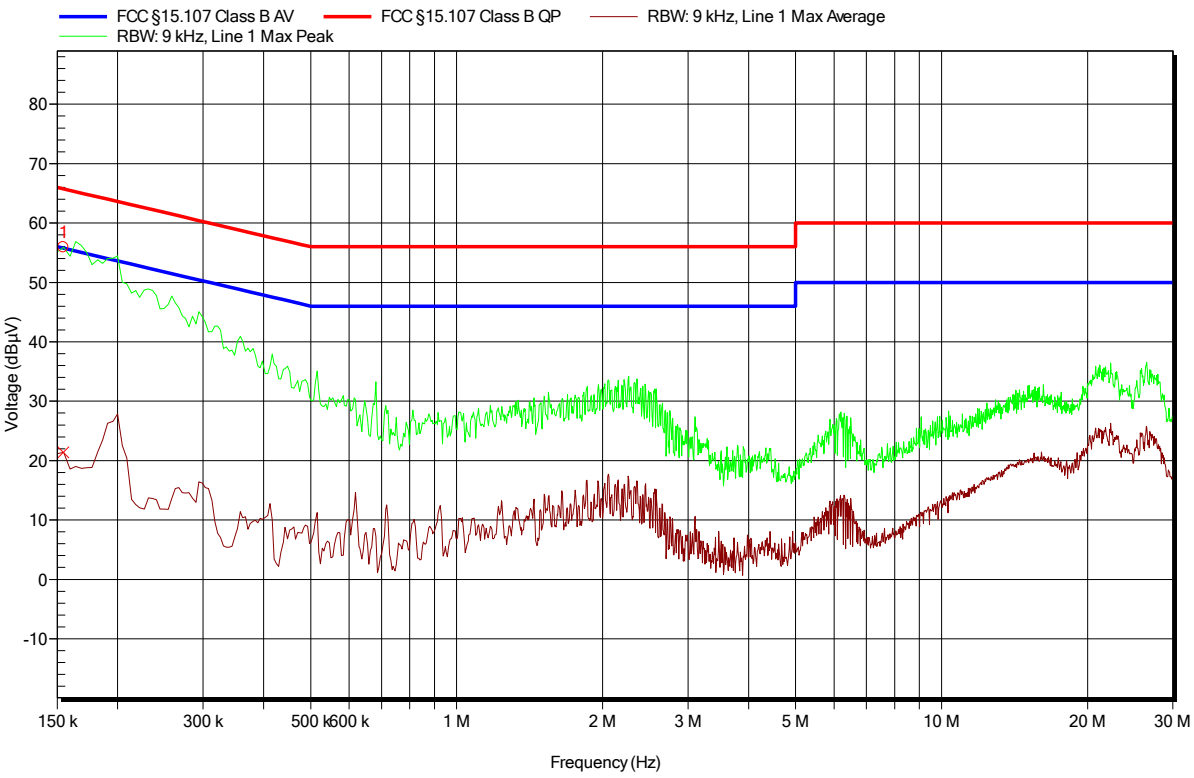


Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status
1	154.5 kHz	21.41 dBµV	55.75 dBµV	-34.35 dB	Pass

3.6 Test Conditions and Results - Band-edge compliance

3.6.1 Information

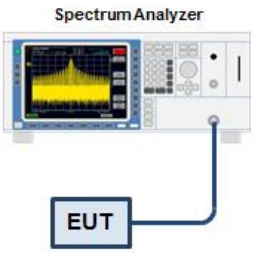
Test Information	
Reference	FCC 15.247(d) / ISED RSS-247 5.5
Measurement Method	ANSI C63.10 11.11
Operator	Wilfried Treffke
Date	2017-04-19

3.6.2 Limits

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

3.6.3 Setup

Test Setup



3.6.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01003	2017-03	2018-03

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

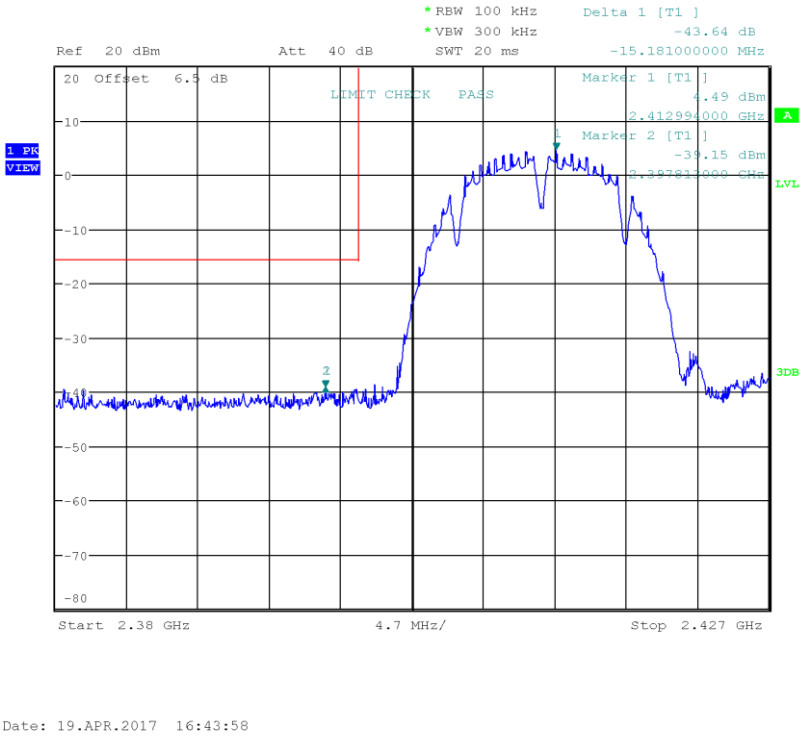
3.6.6 Results

Test Results				
Mode	Channel [MHz]	Out-of-band Attenuation [dB]	Limit [dB]	Verdict
DSSS	2412	-43.63	-20	PASS
DSSS	2462	-44.17	-20	PASS
OFDM	2412	-30.98	-20	PASS
OFDM	2462	-39.68	-20	PASS
HT20	2412	-31.57	-20	PASS
HT20	2462	-37.57	-20	PASS

Band-edge compliance - DSSS - 2412 MHz

Band-edge Compliance

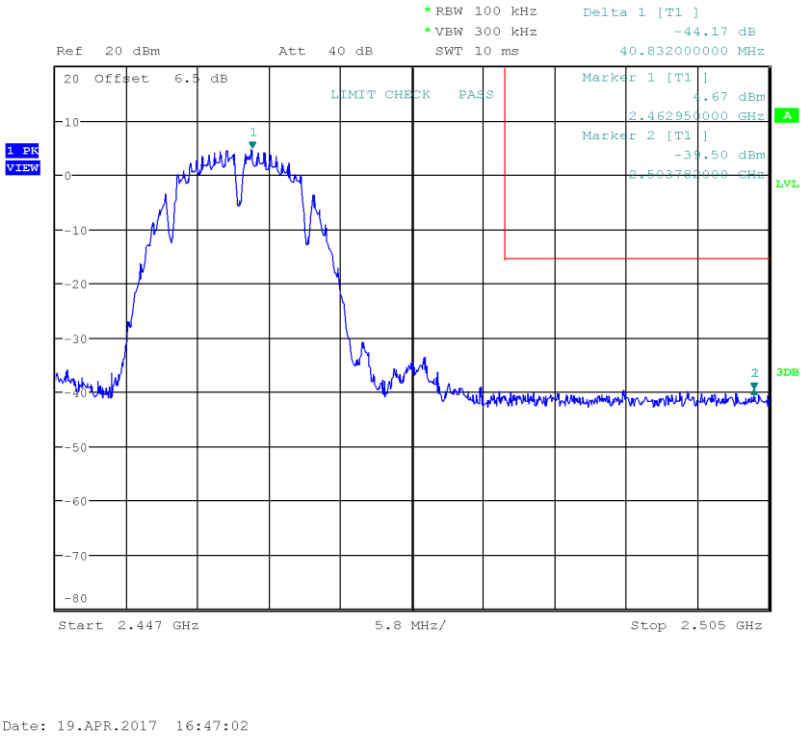
Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	IEEE 802.11 b, Channel: 1, 2412 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Band-edge	Lower
In-band Frequency [MHz]:	2412.994
Max. in-band Level [dBm/100 kHz]:	4.485
Out-of-band Frequency [MHz]:	2397.813
Max. out-of-band Level [dBm/100 kHz]:	-39.15
Attenuation [dB]:	-43.63



Band-edge compliance - DSSS - 2462 MHz

Band-edge Compliance

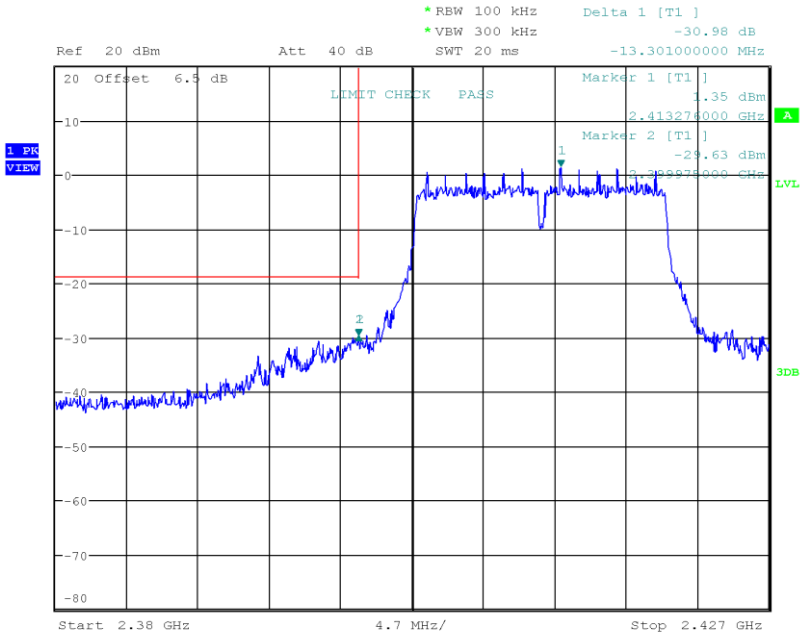
Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	IEEE 802.11 b, Channel: 11, 2462 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Band-edge	Upper
In-band Frequency [MHz]:	2462.95
Max. in-band Level [dBm/100 kHz]:	4.673
Out-of-band Frequency [MHz]:	2503.782
Max. out-of-band Level [dBm/100 kHz]:	-39.496
Attenuation [dB]:	-44.17



Band-edge compliance - OFDM - 2412 MHz

Band-edge Compliance

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	IEEE 802.11 g, Channel: 1, 2412 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Band-edge	Lower
In-band Frequency [MHz]:	2413.276
Max. in-band Level [dBm/100 kHz]:	1.348
Out-of-band Frequency [MHz]:	2399.975
Max. out-of-band Level [dBm/100 kHz]:	-29.628
Attenuation [dB]:	-30.98



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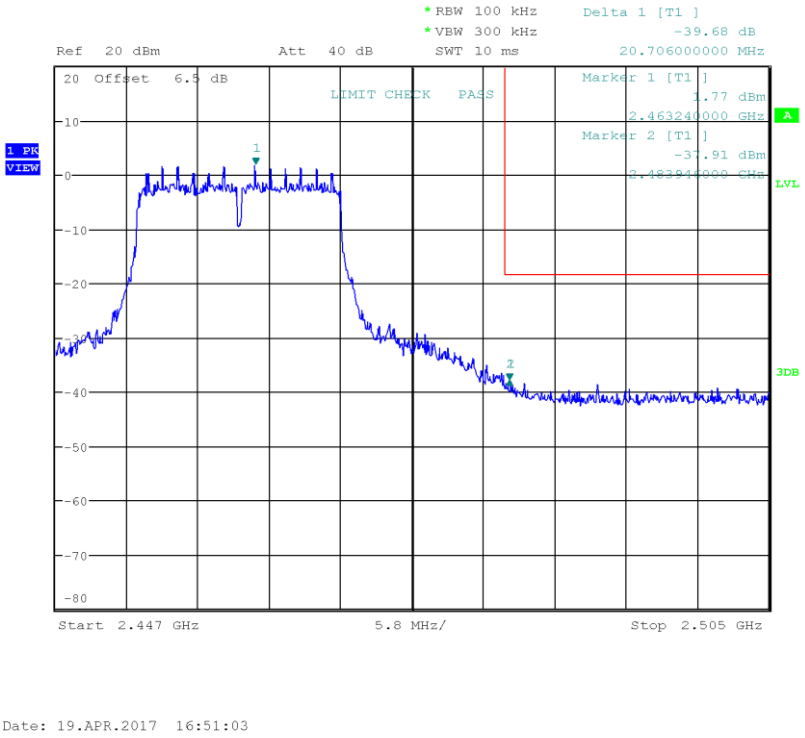
Band-edge compliance - OFDM - 2462 MHz

Band-edge Compliance

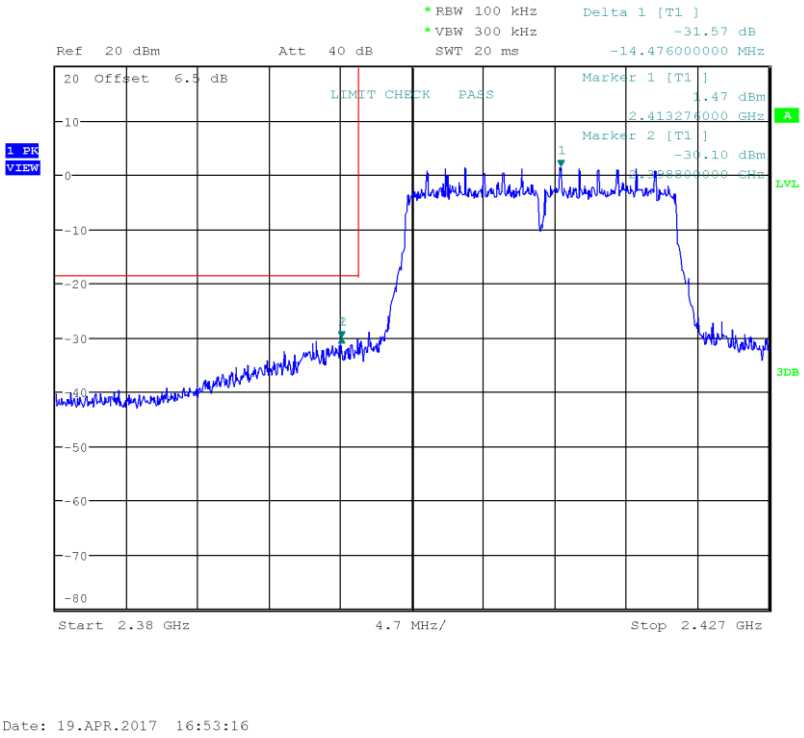
Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	IEEE 802.11 g, Channel: 11, 2462 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Band-edge	Upper
In-band Frequency [MHz]:	2463.24
Max. in-band Level [dBm/100 kHz]:	1.772
Out-of-band Frequency [MHz]:	2483.946
Max. out-of-band Level [dBm/100 kHz]:	-37.911
Attenuation [dB]:	-39.68



Band-edge compliance - HT20- 2412 MHz

Band-edge Compliance

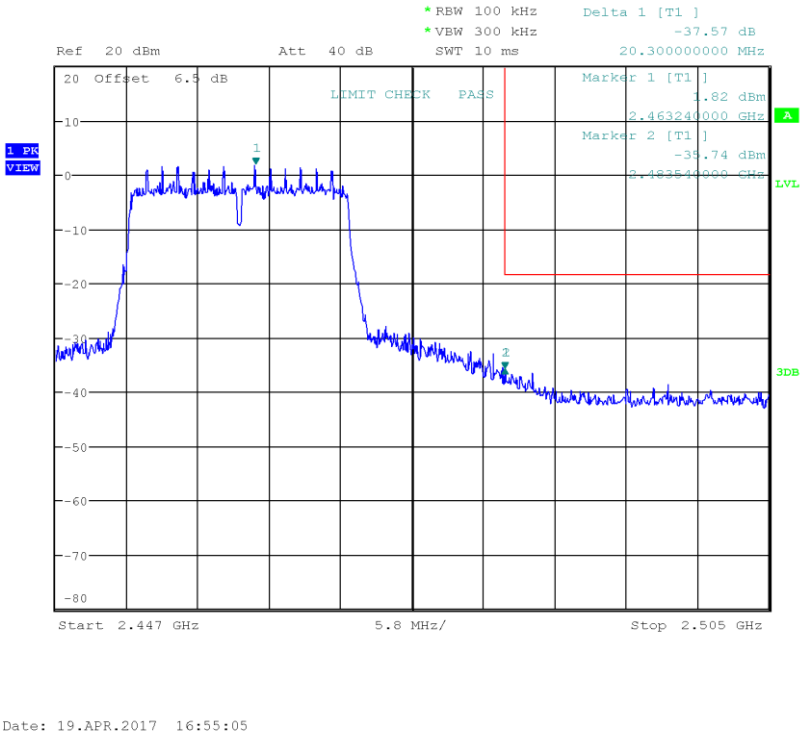
Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	IEEE 802.11 n HT20, Channel: 1, 2412 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Band-edge	Lower
In-band Frequency [MHz]:	2413.276
Max. in-band Level [dBm/100 kHz]:	1.471
Out-of-band Frequency [MHz]:	2398.8
Max. out-of-band Level [dBm/100 kHz]:	-30.099
Attenuation [dB]:	-31.57



Band-edge compliance - HT20 - 2462 MHz

Band-edge Compliance

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	IEEE 802.11 n HT20, Channel: 11, 2462 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-19
Band-edge	Upper
In-band Frequency [MHz]:	2463.24
Max. in-band Level [dBm/100 kHz]:	1.825
Out-of-band Frequency [MHz]:	2483.54
Max. out-of-band Level [dBm/100 kHz]:	-35.745
Attenuation [dB]:	-37.57



3.7 Test Conditions and Results - Conducted spurious emissions

3.7.1 Information

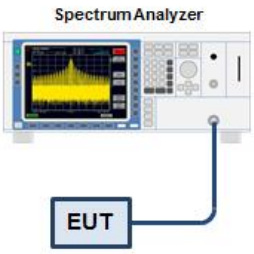
Test Information	
Reference	FCC 15.247(d) / ISED RSS-247 5.5
Measurement Method	ANSI C63.10 11.11
Operator	Wilfried Treffke
Date	2017-04-20

3.7.2 Limits

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

3.7.3 Setup

Test Setup



3.7.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSU 26	EF01003	2017-03	2018-03

3.7.5 Procedure

Test Procedure

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

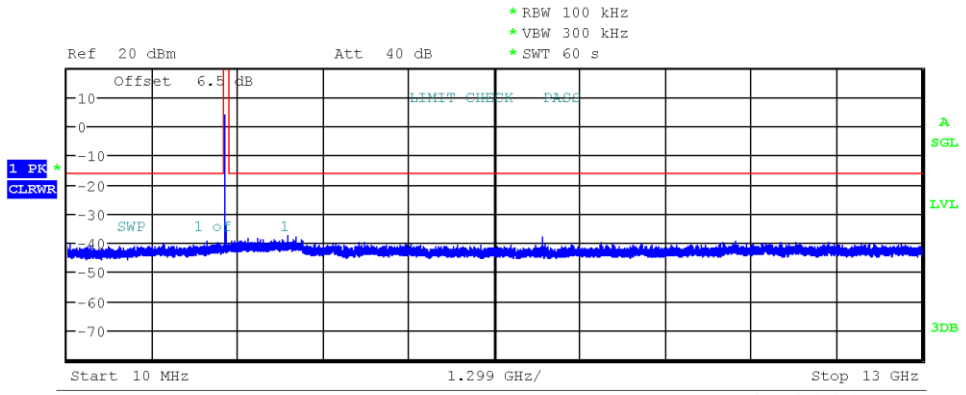
3.7.6 Results

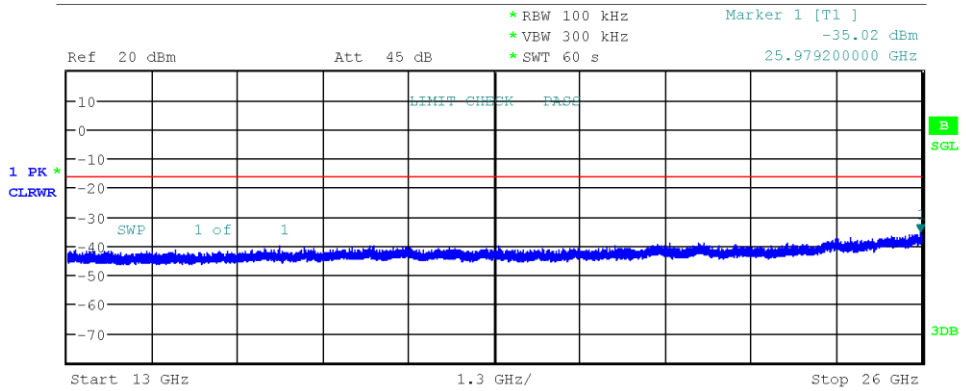
Test Results		
Mode	Channel [MHz]	Verdict
DSSS	2412	PASS
DSSS	2437	PASS
DSSS	2462	PASS
OFDM	2412	PASS
OFDM	2437	PASS
OFDM	2462	PASS
HT20	2412	PASS
HT20	2437	PASS
HT20	2462	PASS

CSE - DSSS - 2412 MHz

Conducted Spurious Emissions

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	IEEE 802.11 b, Channel: 1, 2412 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-20
Max. in-band Frequency [MHz]:	2413.0
Max. in-band Level [dBm/100 kHz]:	4.0
Out-of-band Limit [dBm/100 kHz]:	-16.0



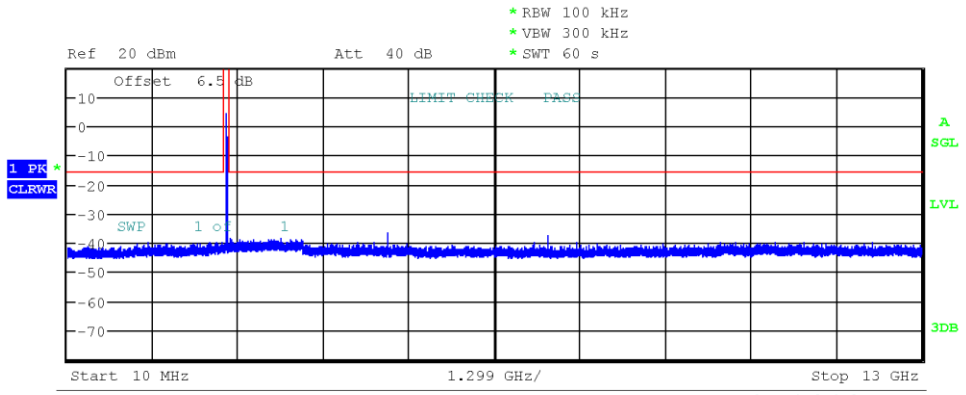


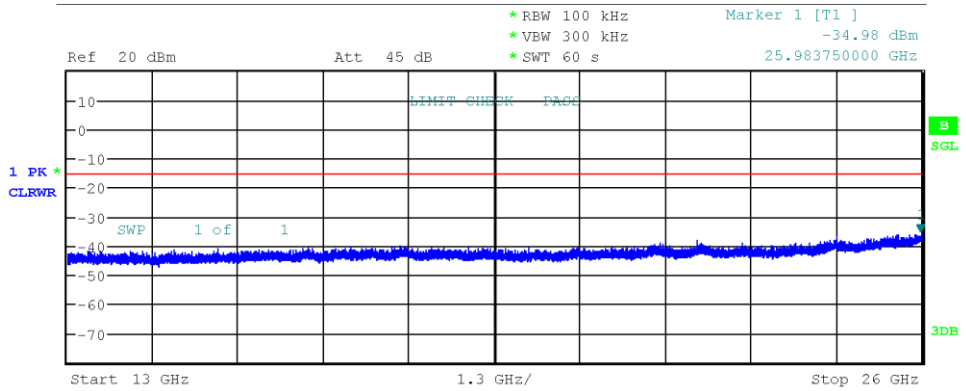
Date: 20.APR.2017 07:43:34

CSE - DSSS - 2437 MHz

Conducted Spurious Emissions

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	IEEE 802.11 b, Channel: 6, 2437 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-20
Max. in-band Frequency [MHz]:	2438.0
Max. in-band Level [dBm/100 kHz]:	4.7
Out-of-band Limit [dBm/100 kHz]:	-15.3



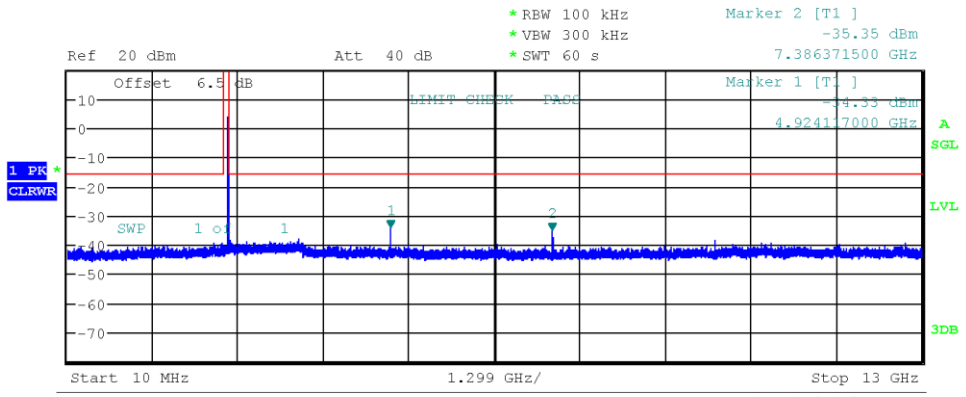


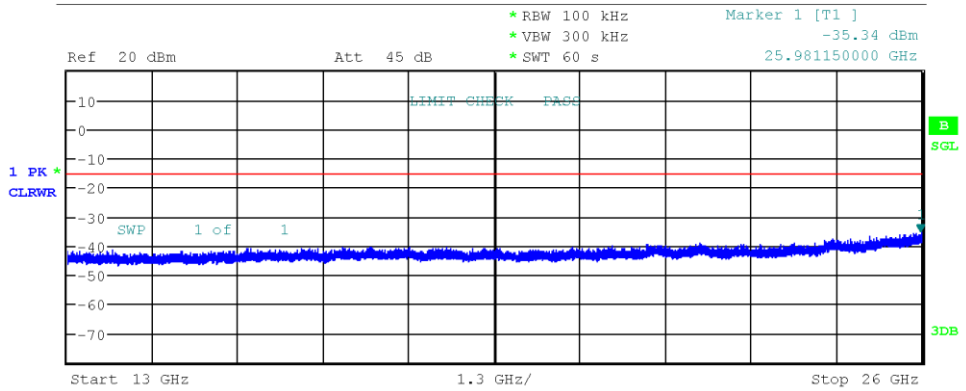
Date: 20.APR.2017 07:49:24

CSE - DSSS - 2462 MHz

Conducted Spurious Emissions

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	IEEE 802.11 b, Channel: 11, 2462 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-20
Max. in-band Frequency [MHz]:	2463.0
Max. in-band Level [dBm/100 kHz]:	4.4
Out-of-band Limit [dBm/100 kHz]:	-15.6



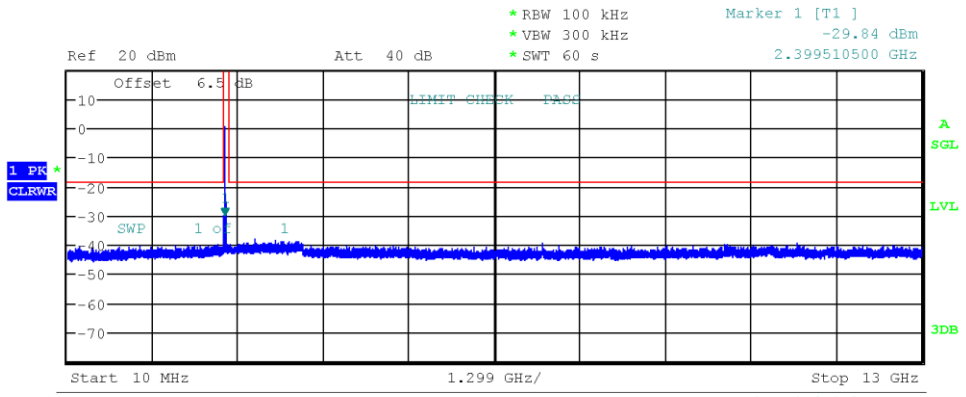


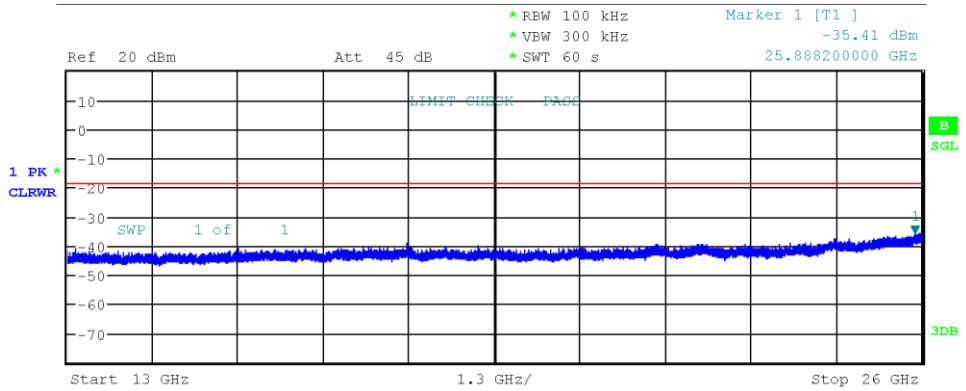
Date: 20.APR.2017 07:56:33

CSE - OFDM - 2412 MHz

Conducted Spurious Emissions

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	IEEE 802.11 g, Channel: 1, 2412 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-20
Max. in-band Frequency [MHz]:	2413.3
Max. in-band Level [dBm/100 kHz]:	1.5
Out-of-band Limit [dBm/100 kHz]:	-18.5





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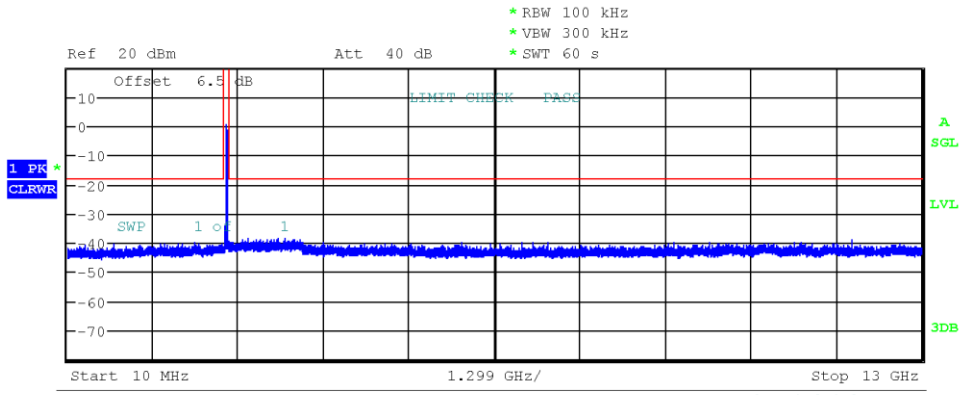
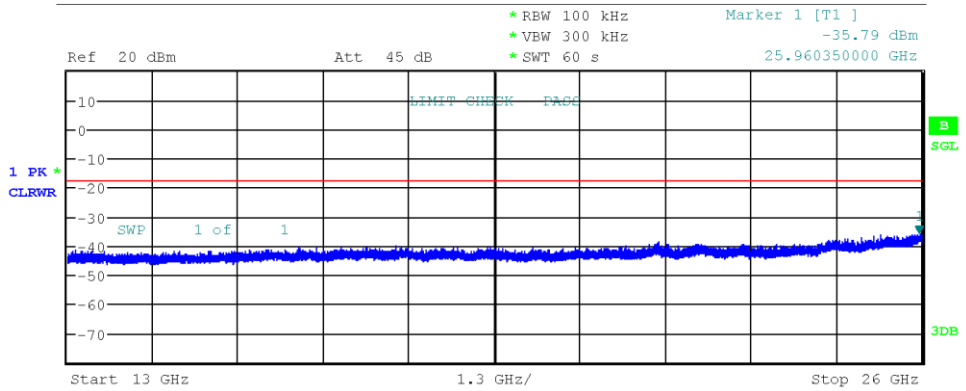
CSE - OFDM - 2437 MHz

Conducted Spurious Emissions

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	IEEE 802.11 g, Channel: 6, 2437 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-20
Max. in-band Frequency [MHz]:	2438.3
Max. in-band Level [dBm/100 kHz]:	2.0
Out-of-band Limit [dBm/100 kHz]:	-18.0



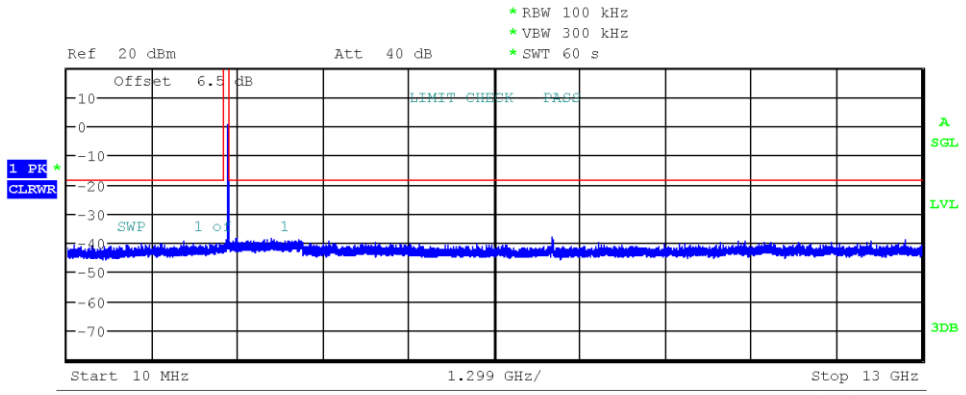


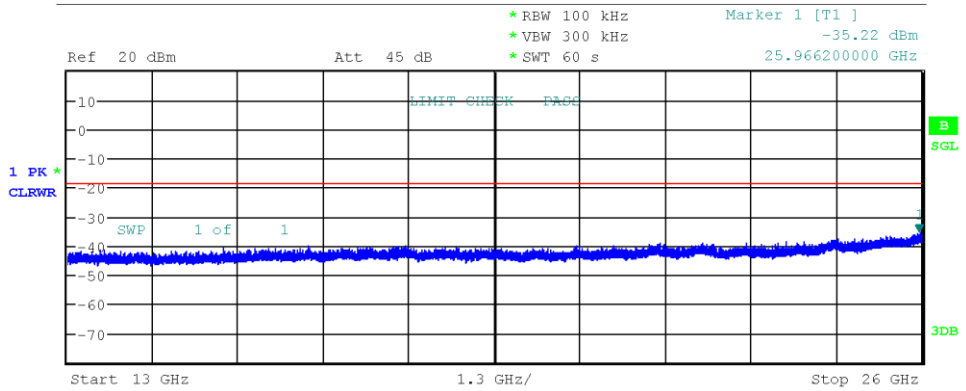
Date: 20.APR.2017 08:06:23

CSE - OFDM - 2462 MHz

Conducted Spurious Emissions

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	IEEE 802.11 g, Channel: 11, 2462 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-20
Max. in-band Frequency [MHz]:	2463.3
Max. in-band Level [dBm/100 kHz]:	1.8
Out-of-band Limit [dBm/100 kHz]:	-18.2



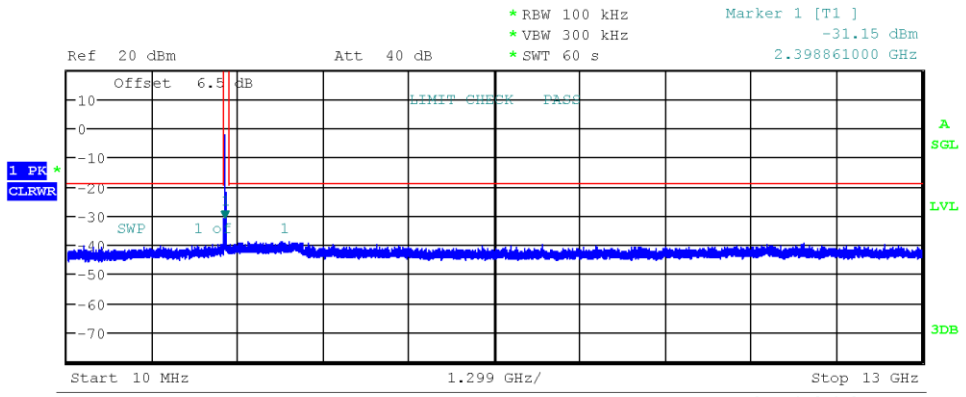


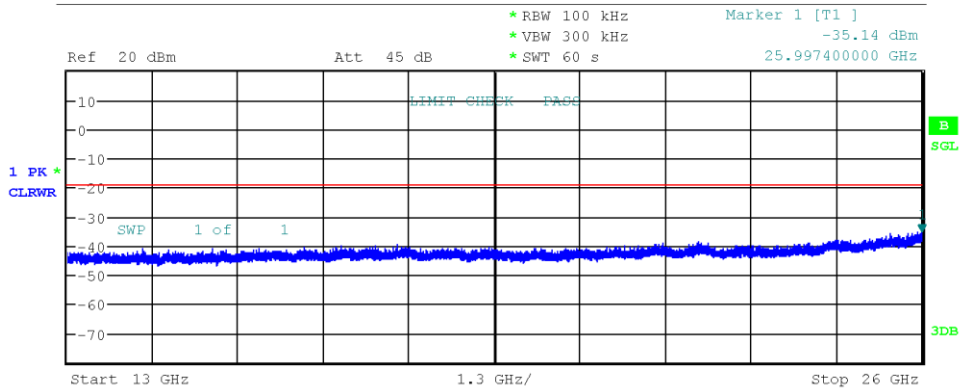
Date: 20.APR.2017 08:10:27

CSE - HT20 - 2412 MHz

Conducted Spurious Emissions

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	IEEE 802.11 n HT20, Channel: 1, 2412 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-20
Max. in-band Frequency [MHz]:	2407.0
Max. in-band Level [dBm/100 kHz]:	1.1
Out-of-band Limit [dBm/100 kHz]:	-18.9



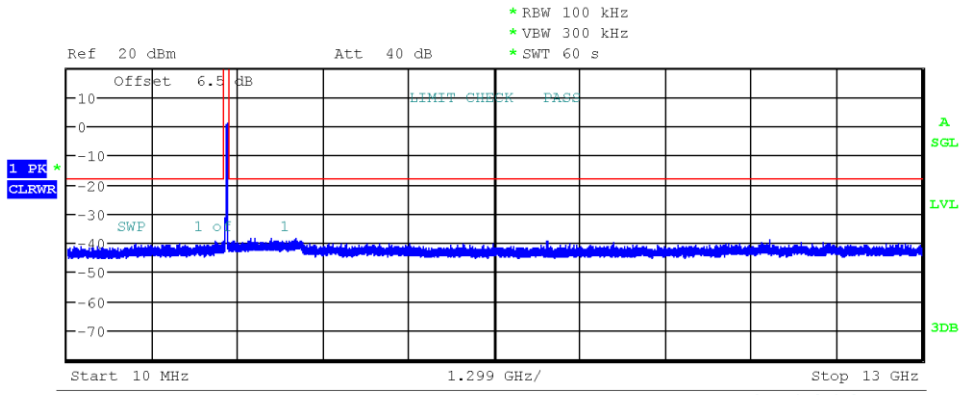


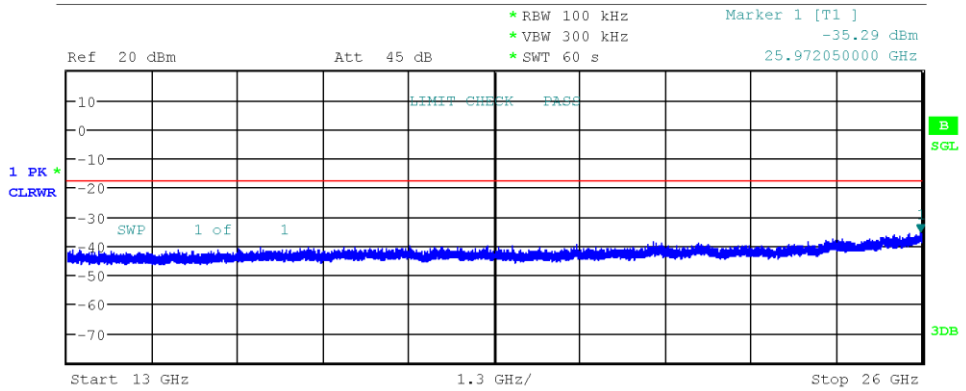
Date: 20.APR.2017 08:14:28

CSE - HT20 - 2437 MHz

Conducted Spurious Emissions

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	IEEE 802.11 n HT20, Channel: 6, 2437 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-20
Max. in-band Frequency [MHz]:	2438.3
Max. in-band Level [dBm/100 kHz]:	2.1
Out-of-band Limit [dBm/100 kHz]:	-17.9



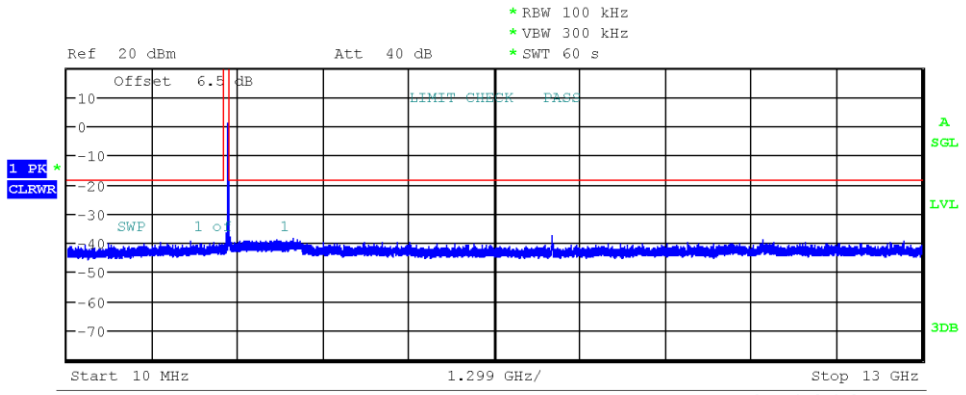


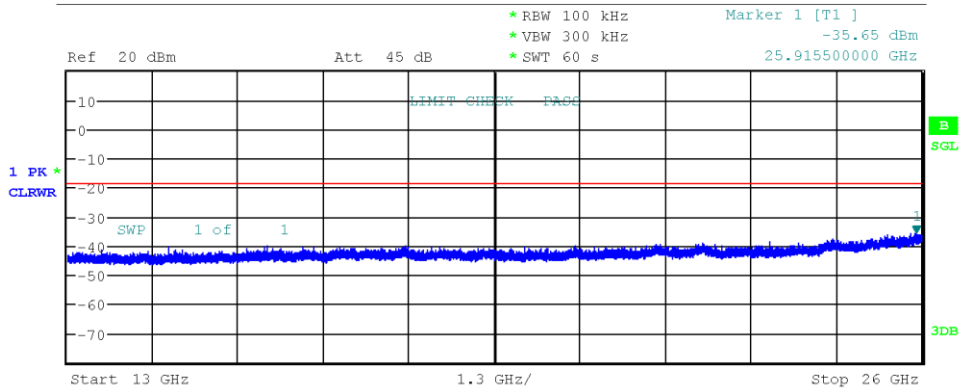
Date: 20.APR.2017 08:19:27

CSE - HT20 - 2462 MHz

Conducted Spurious Emissions

Project Number:	G0M-1702-6281
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wifi Module
Model:	ENW49C01A3KF
Test Sample ID:	12667
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	IEEE 802.11 n HT20, Channel: 11, 2462 MHz
Operating Conditions:	Tnom/Vnom
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-04-20
Max. in-band Frequency [MHz]:	2460.7
Max. in-band Level [dBm/100 kHz]:	1.8
Out-of-band Limit [dBm/100 kHz]:	-18.2





Date: 20.APR.2017 08:23:25

3.8 Test Conditions and Results - Transmitter radiated emissions

3.8.1 Information

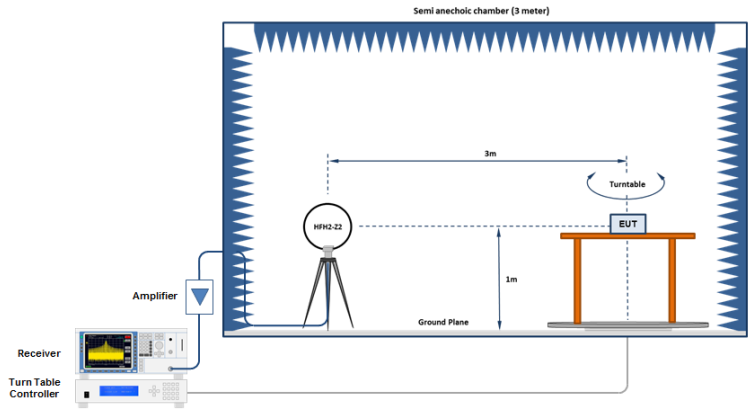
Test Information	
Reference	FCC 15.247(d) / ISED RSS-GEN 8.9
Measurement Method	ANSI C63.10 6.4, 6.5, 6.6, 11.12
Operator	Wilfried Treffke
Date	2017-04-20

3.8.2 Limits

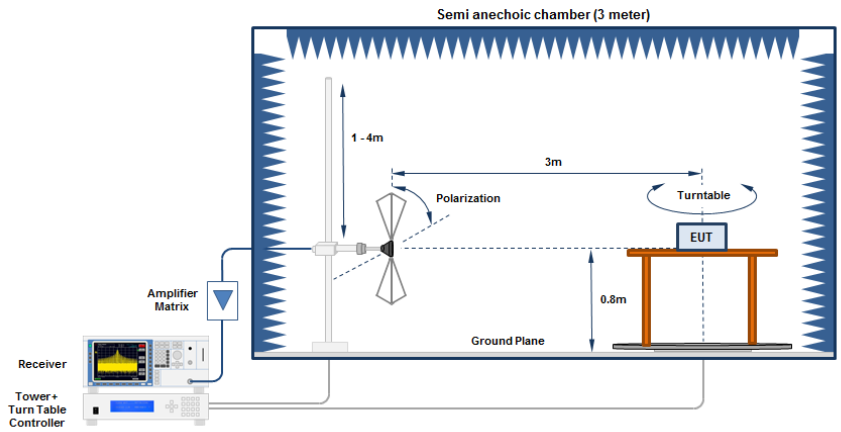
Limits			
Frequency [MHz]	Detector	Field strength [dBµV/m]	Measurement distance [m]
0.009 - 0.09	Average	2400/F[kHz]	300
0.09 - 0.110	Quasi-Peak	2400/F[kHz]	300
0.110 - 0.490	Average	2400/F[kHz]	300
0.490 - 1.705	Quasi-Peak	24000/F[kHz]	30
1.705 - 30.0	Quasi-Peak	30	30
30 - 88	Quasi-Peak	100	3
88 - 216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

3.8.3 Setup

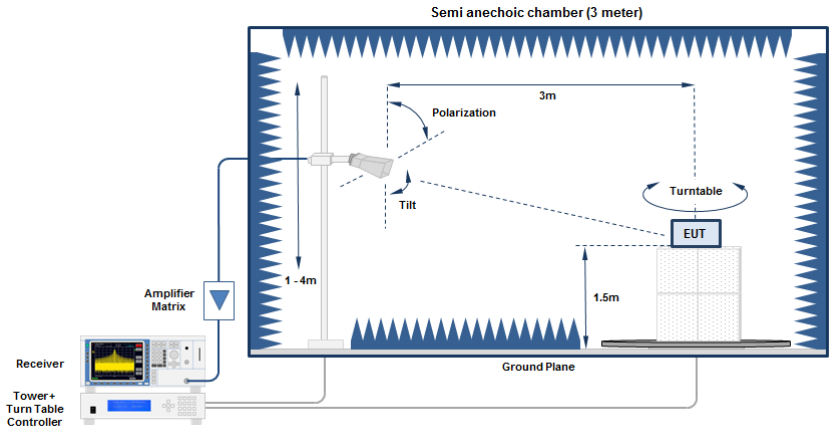
Test Setup < 30 MHz



Test Setup 30 - 1000 MHz



Test Setup > 1 GHz



3.8.4 Equipment

Test Equipment 30 - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2016-01	2019-01
Measurement Receiver	R&S	N9038A-526/WXP	EF01070	2016-08	2017-08

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2016-01	2019-01
Measurement Receiver	R&S	N9038A-526/WXP	EF01070	2016-08	2017-08

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 - DSSS						
Channel [MHz]	Emission [MHz]	Level [dBµV/m]	Det.	Pol.	Limit [dBµV/m]	Margin [dB]
2412	2388.8	53.36	pk	hor	74.00	-20.64
2412	2388.8	37.37	RMS	hor	54.00	-16.63
2412	2389.2	50.61	pk	ver	74.00	-23.39
2412	2389.2	37.36	RMS	ver	54.00	-16.64
2412	4824	39.00	pk	hor	74.00	-35.00
2412	4824	43.24	pk	ver	74.00	-30.76
2437	2484.9	49.07	pk	hor	74.00	-24.93
2437	2484.9	28.97	RMS	hor	54.00	-25.03
2437	4874	44.87	pk	hor	74.00	-29.13
2437	4874	42.63	RMS	hor	54.00	-11.37
2437	4874	47.37	pk	ver	74.00	-26.63
2437	4874	45.39	RMS	ver	54.00	-08.61
2462	2483.5	62.73	pk	hor	74.00	-11.27
2462	2483.5	45.32	RMS	hor	54.00	-08.68
2462	2483.5	62.23	pk	ver	74.00	-11.77
2462	2483.5	45.68	RMS	ver	54.00	-08.32
2462	4924	46.95	pk	hor	74.00	-27.05
2462	4924	44.68	RMS	hor	54.00	-09.32
2462	4924	46.61	pk	ver	74.00	-27.39

3.9 Test Conditions and Results - Receiver radiated emissions

3.9.1 Information

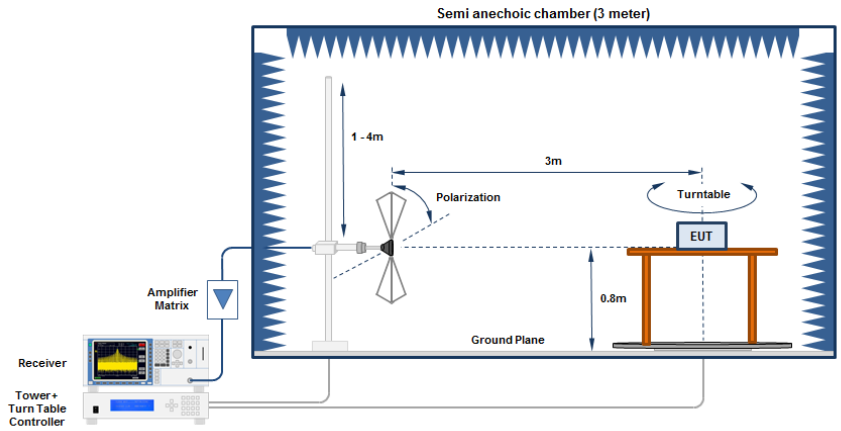
Test Information	
Reference	ISED RSS-247 3.1
Measurement Method	ANSI C63.10 6.5, 6.6, 11.12
Operator	Wilfried Treffke
Date	2017-04-20

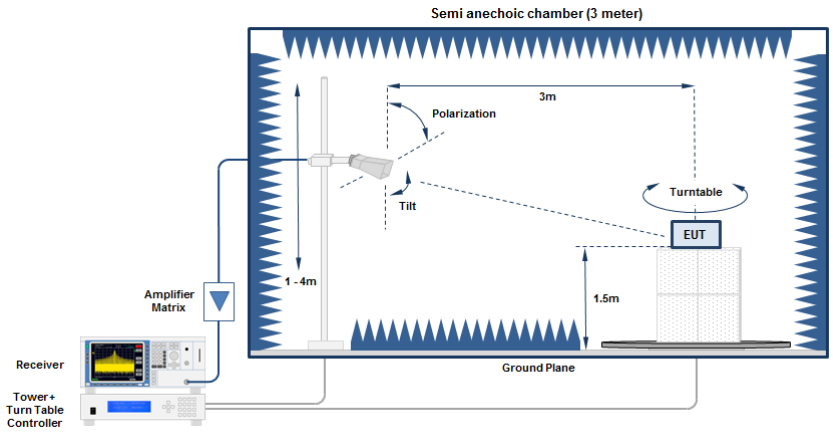
3.9.2 Limits

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

3.9.3 Setup

Test Setup 30 - 1000 MHz



Test Setup > 1 GHz


3.9.4 Equipment

Test Equipment 30 - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2016-01	2019-01
Measurement Receiver	R&S	N9038A-526/WXP	EF01070	2016-08	2017-08

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2016-01	2019-01
Measurement Receiver	R&S	N9038A-526/WXP	EF01070	2016-08	2017-08

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]
2437	316.8	25.62	pk	hor	46.00	-20.38
2437	430.4	27.11	pk	hor	46.00	-18.89
2437	1198	44.25	pk	ver	53.98	-09.73
2437	7976	50.49	pk	hor	53.98	-03.49

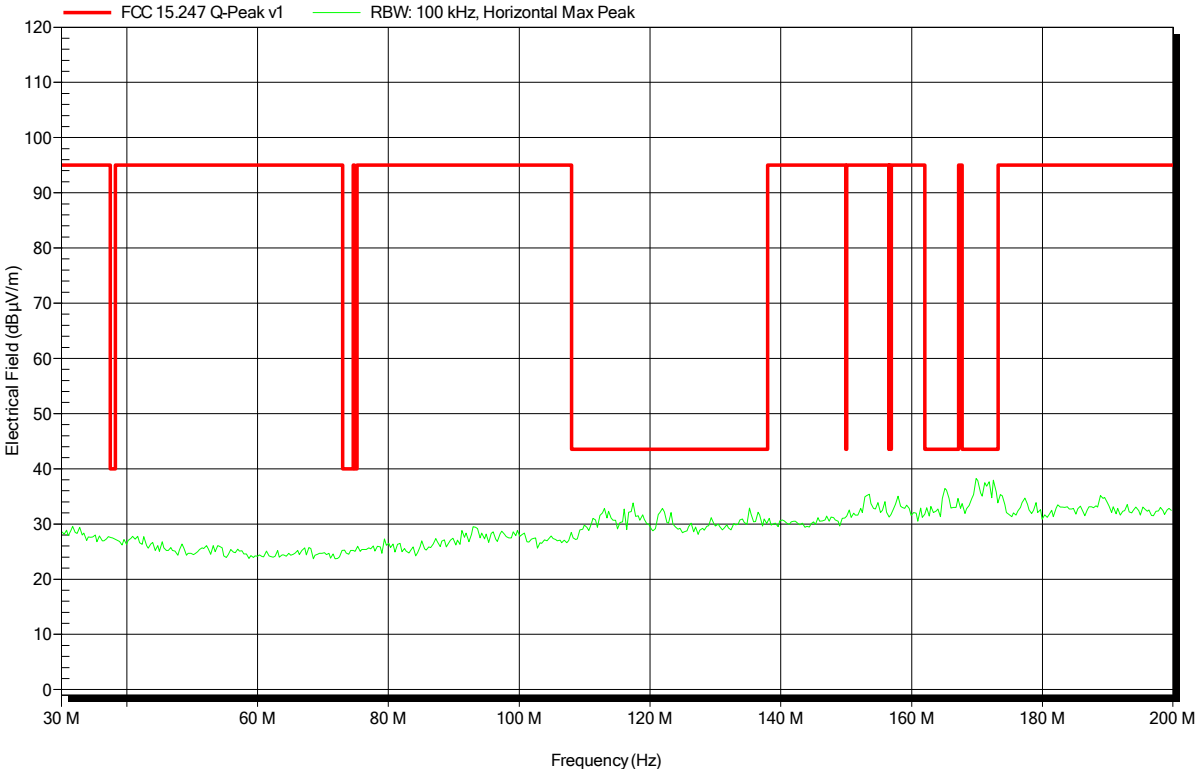
ANNEX A Transmitter sprurious emissions

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2412 MHz
Test Date:	2017-04-20
Note:	

Index 2

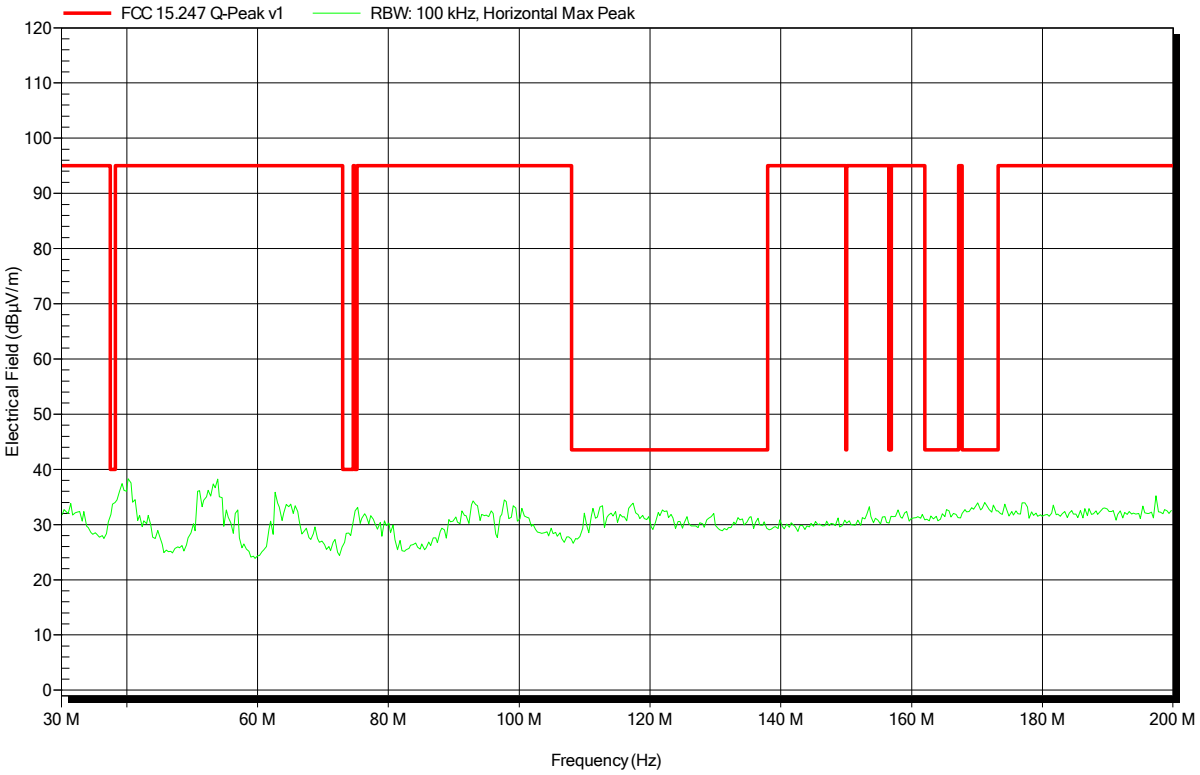


Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2412 MHz
Test Date:	2017-04-20
Note:	

Index 3

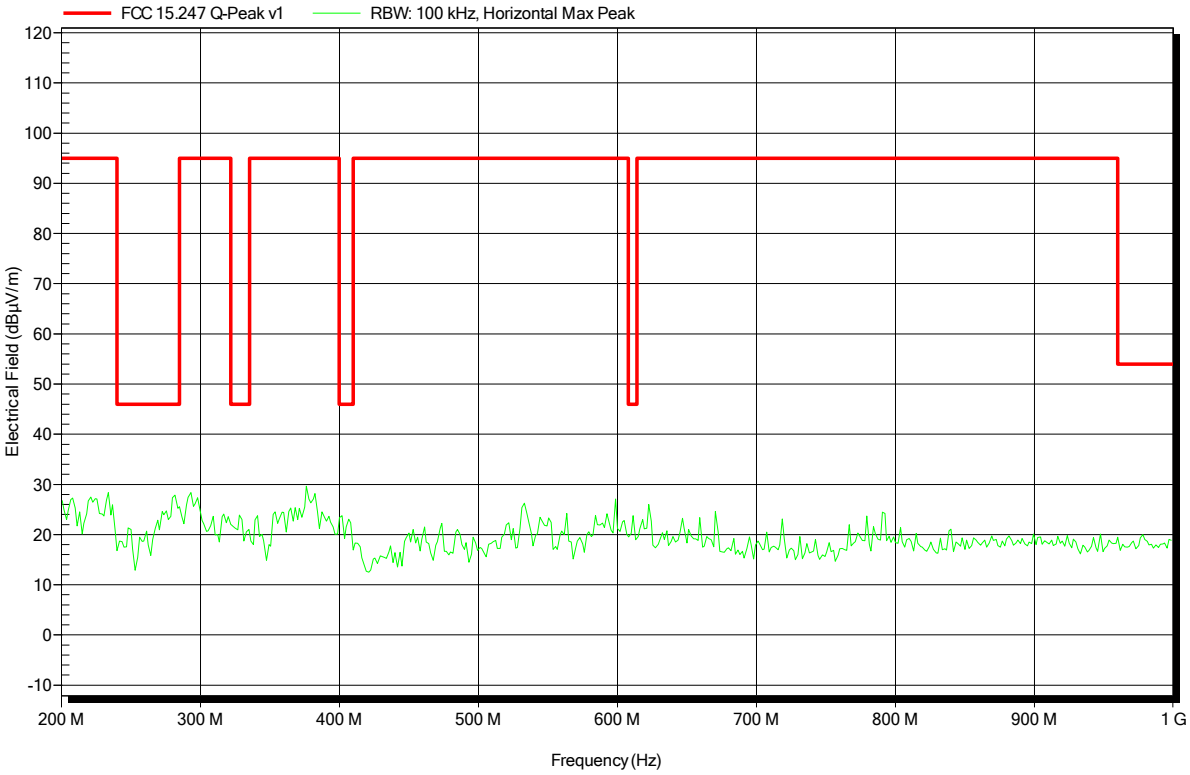


Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2412 MHz
Test Date:	2017-04-20
Note:	

Index 4

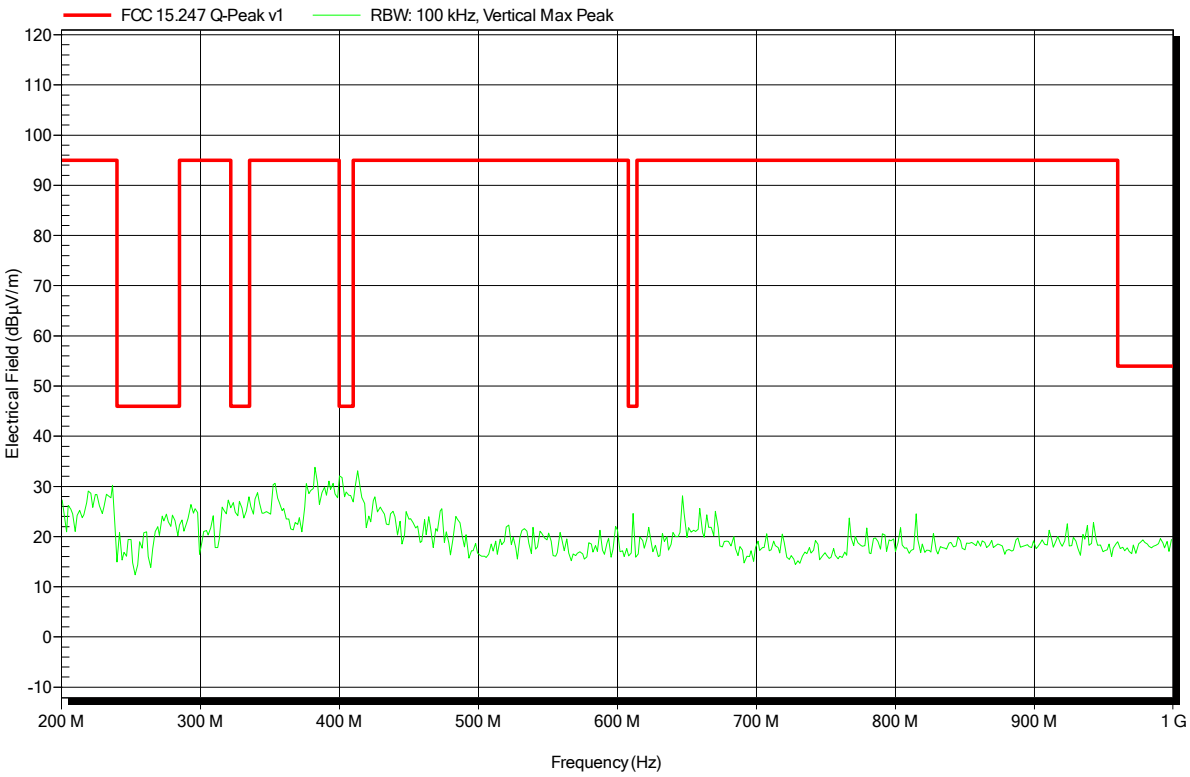


Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2412 MHz
Test Date:	2017-04-20
Note:	

Index 5

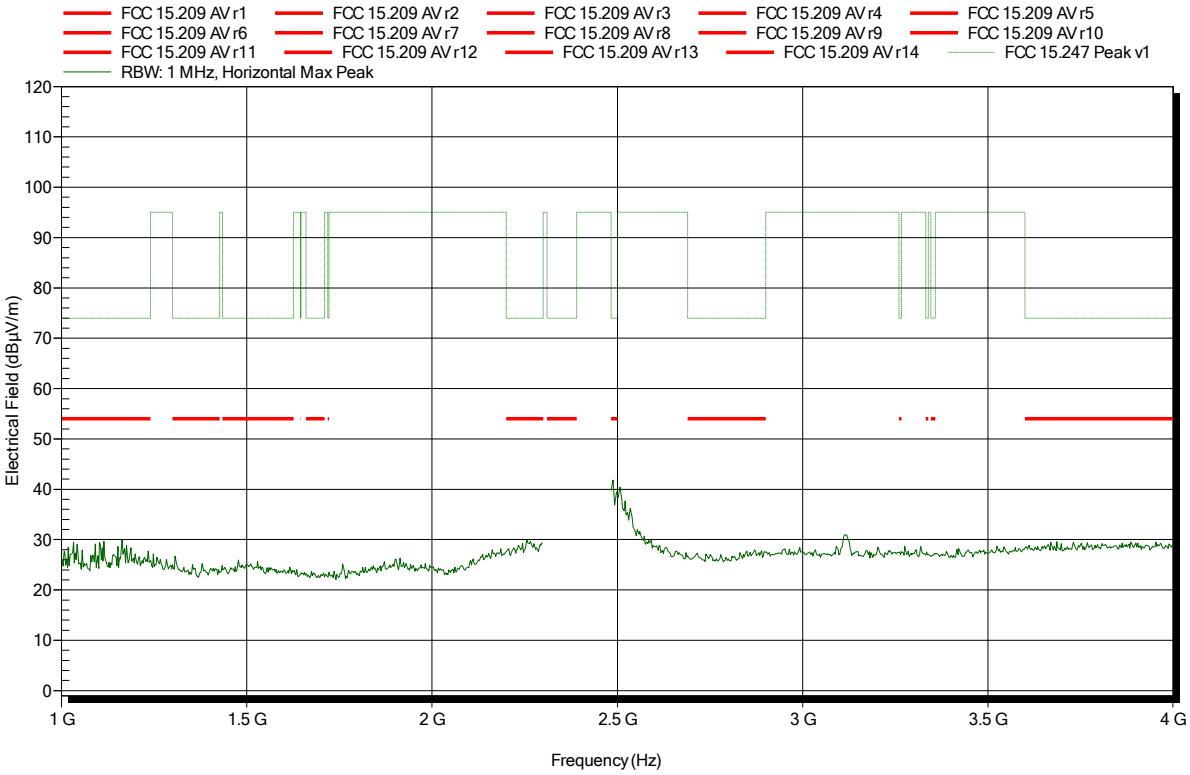


Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2412 MHz
Test Date:	2017-04-20
Note:	

Index 6

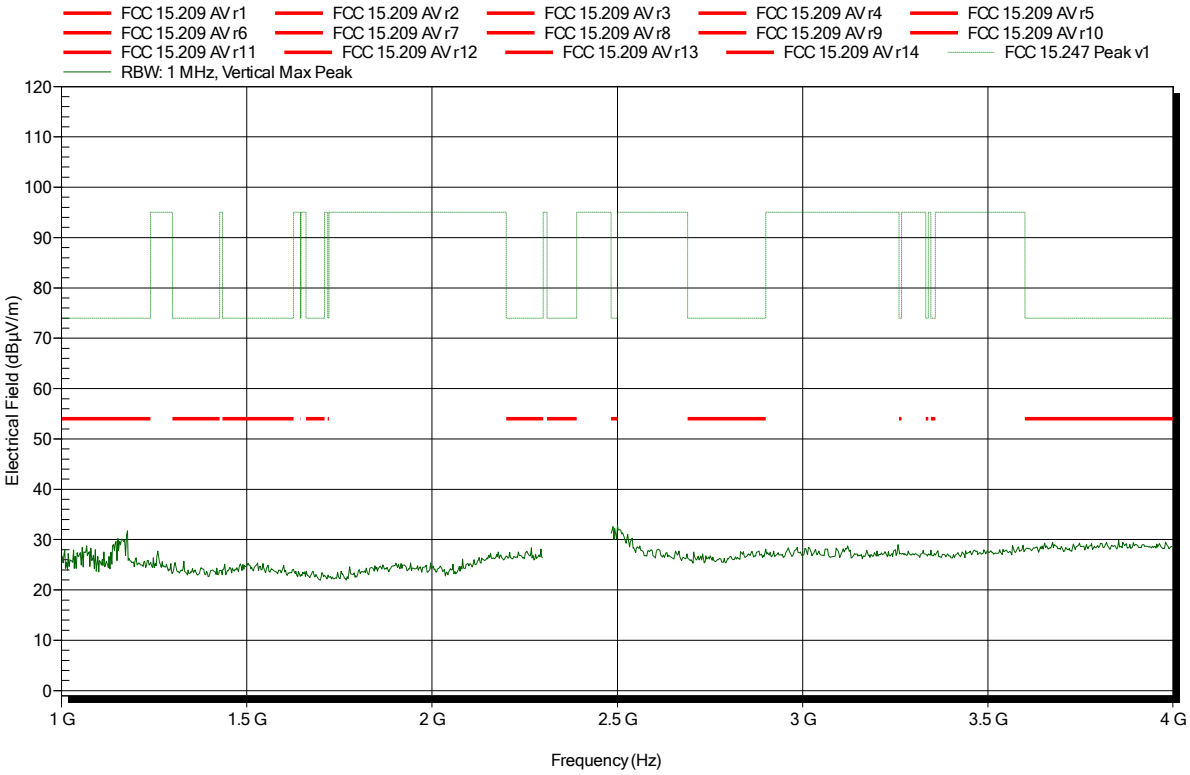


Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2412 MHz
Test Date:	2017-04-20
Note:	

Index 14



Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2412 MHz
Test Date:	2017-04-20
Note:	lower bandedge

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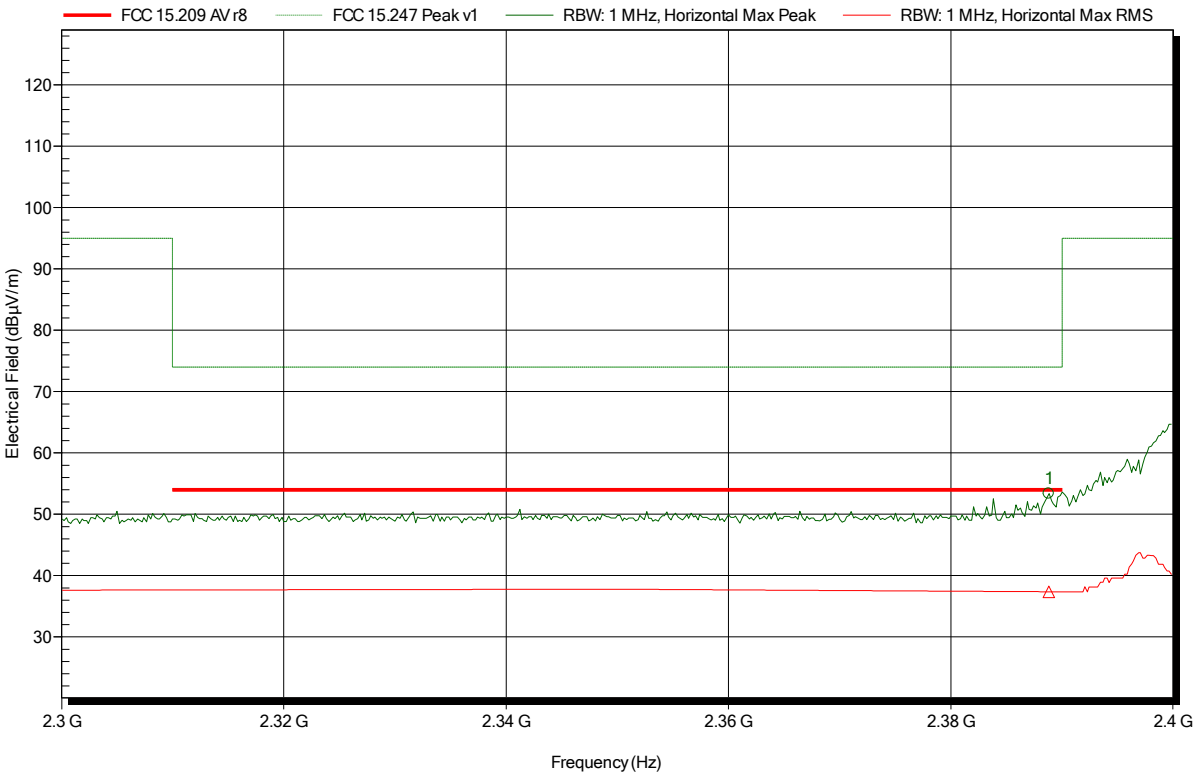


Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.3888 GHz	53.36 dBµV/m	74 dBµV/m	-20.64 dB	Pass

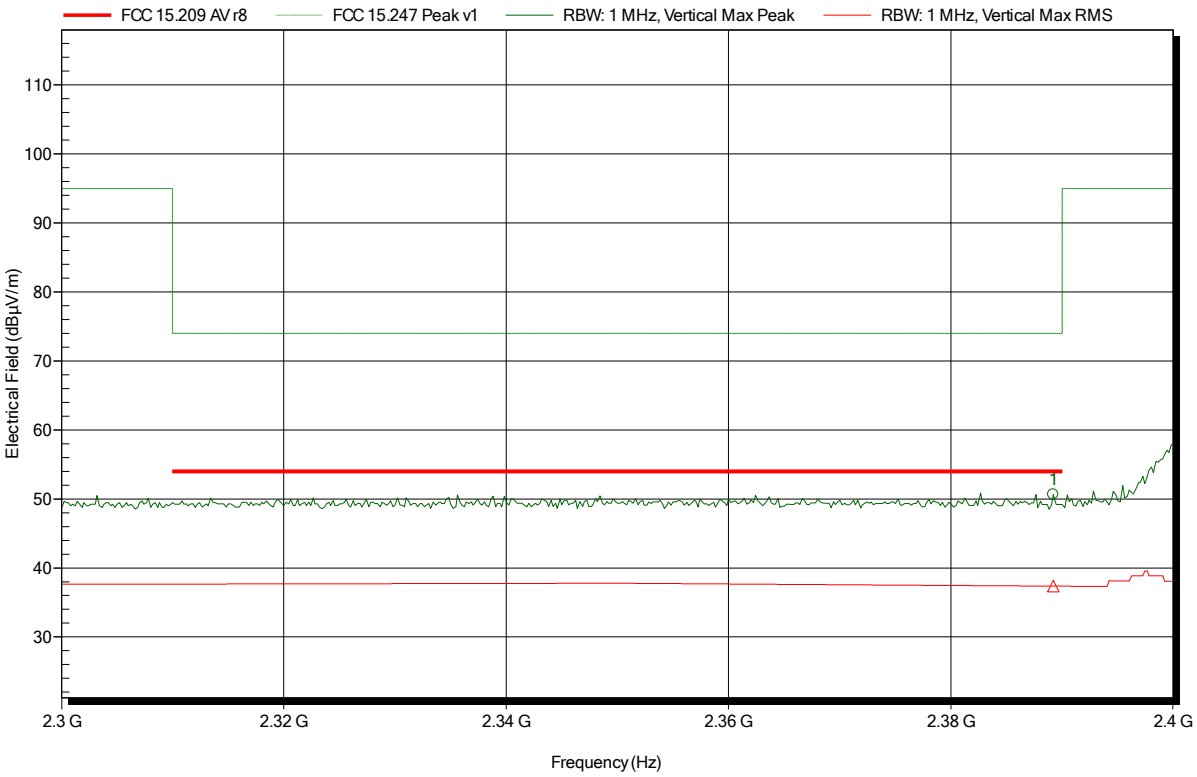
Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.3888 GHz	37.37 dBµV/m	54 dBµV/m	-16.63 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2412 MHz
Test Date:	2017-04-20
Note:	lower bandedge

Index 16



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.3892 GHz	50.61 dBµV/m	74 dBµV/m	-23.39 dB	Pass

Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.3892 GHz	37.36 dBµV/m	54 dBµV/m	-16.64 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2412 MHz
Test Date:	2017-04-20
Note:	

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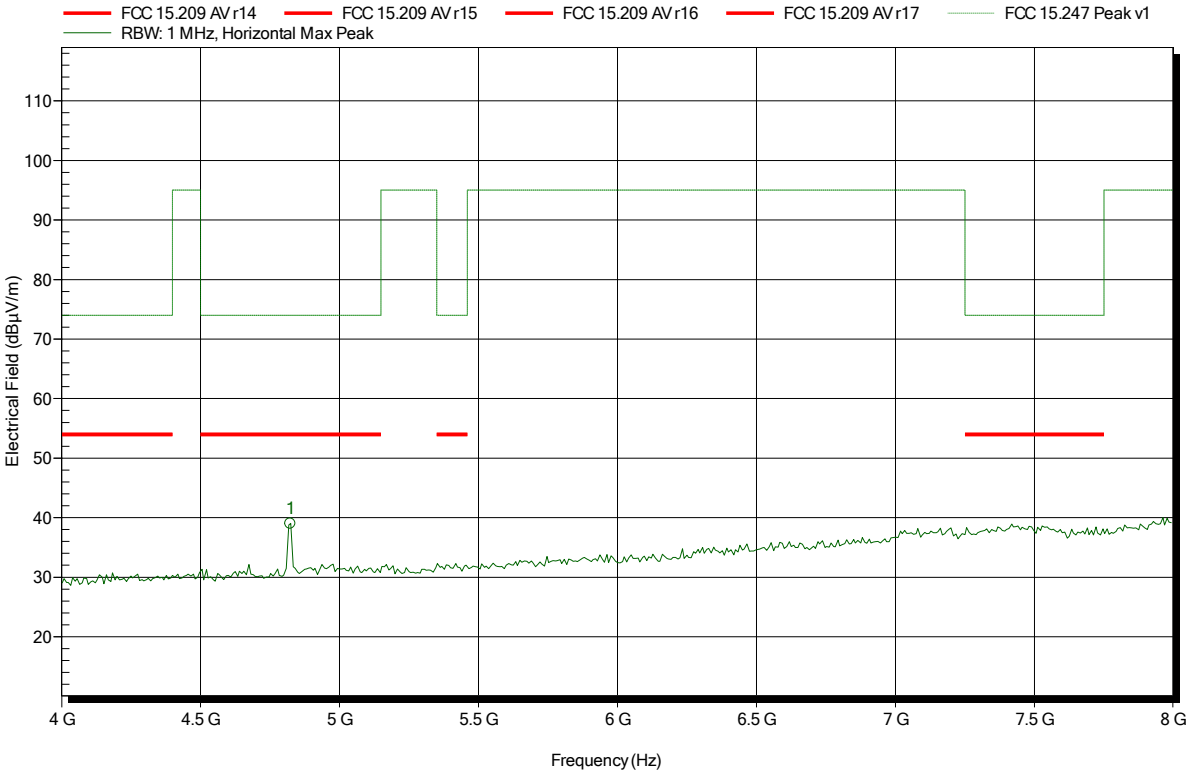

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.824 GHz	39 dBµV/m	74 dBµV/m	-35 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2412 MHz
Test Date:	2017-04-20
Note:	

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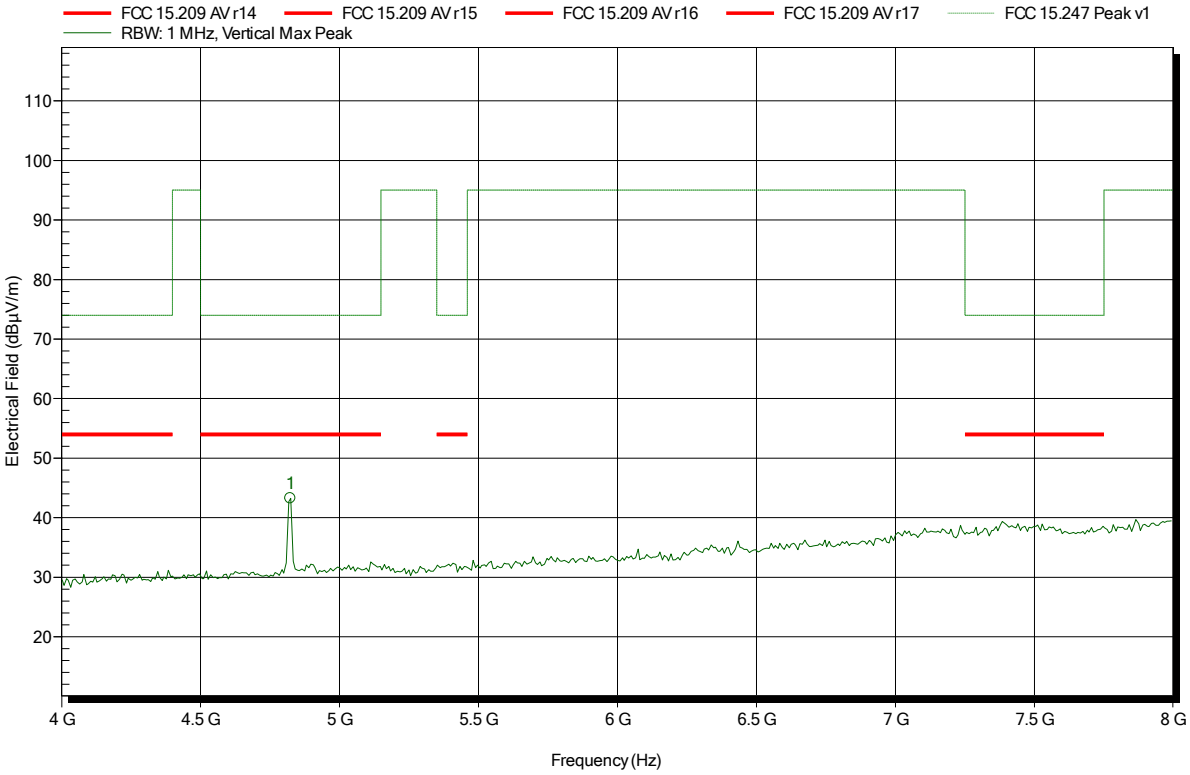

Frequency	Peak	Peak Limit	Peak Difference	Status
4.824 GHz	43.24 dBµV/m	74 dBµV/m	-30.76 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2412 MHz
Test Date:	2017-04-20
Note:	

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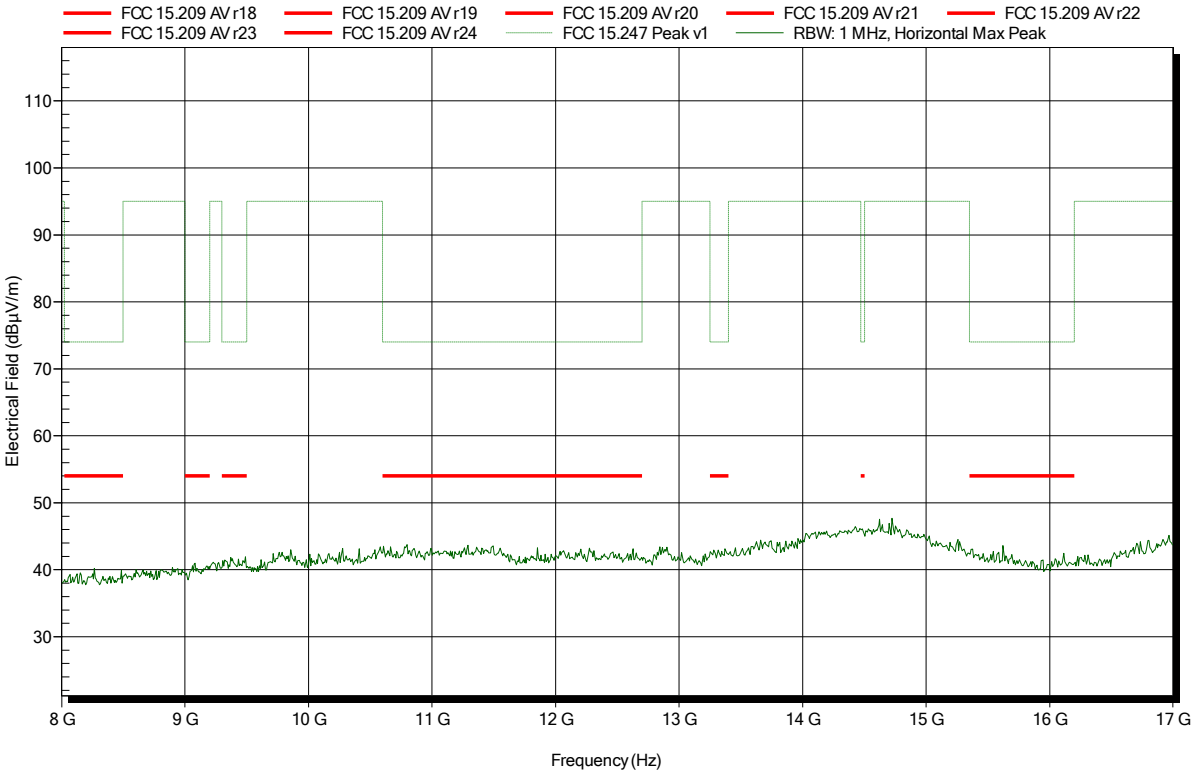

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2412 MHz
Test Date:	2017-04-20
Note:	

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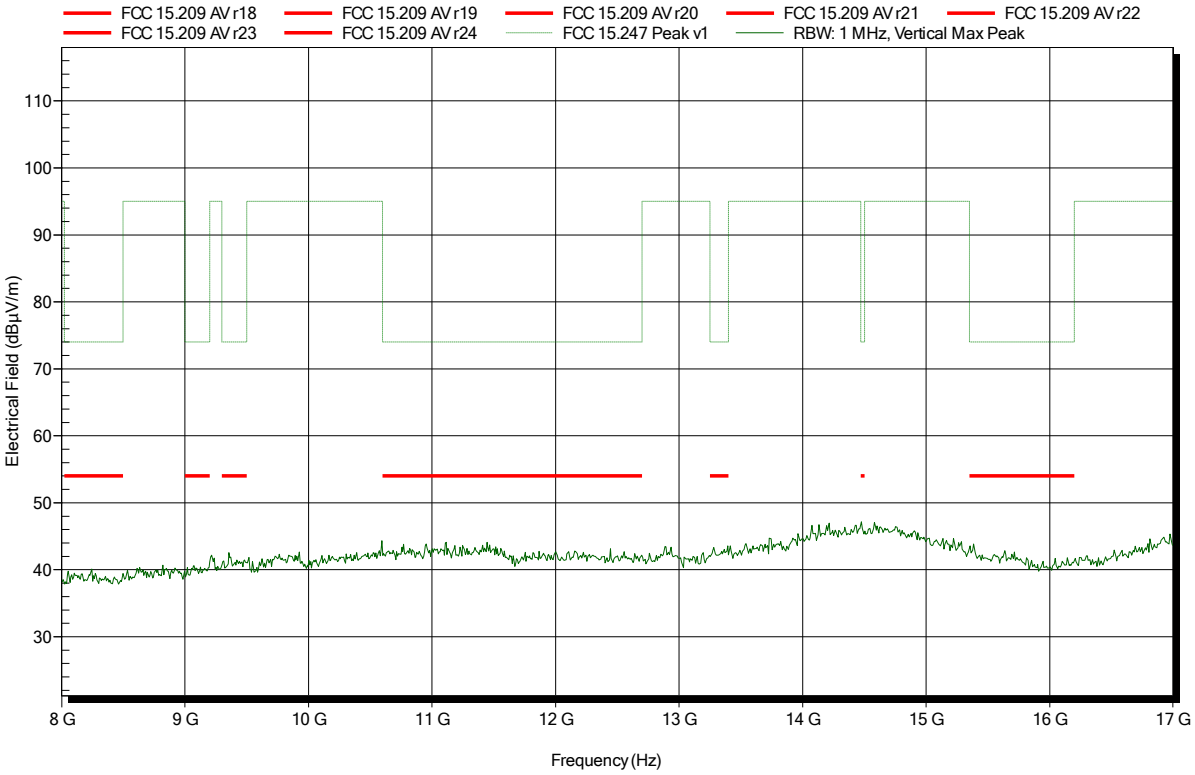

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Amplifier Research AT 4560 (old name) / ATH18G40 (new name), Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2412 MHz
Test Date:	2017-04-20
Note:	

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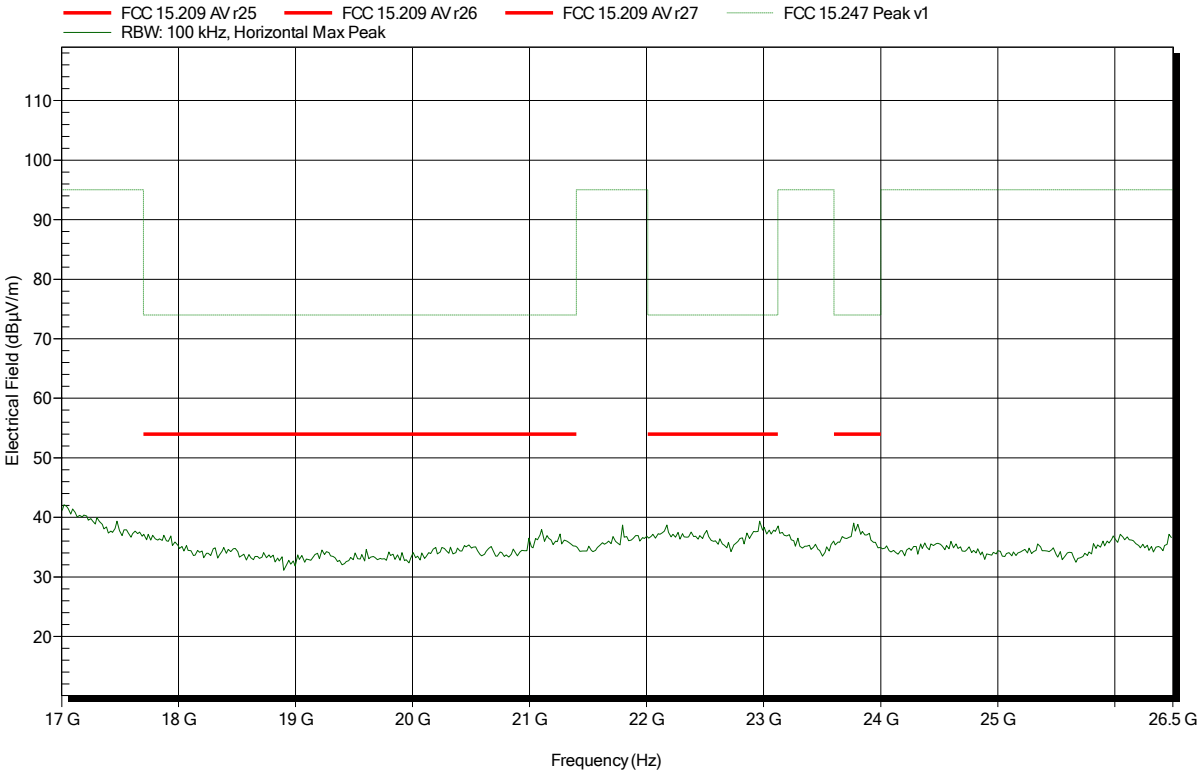

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Amplifier Research AT 4560 (old name) / ATH18G40 (new name), Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2412 MHz
Test Date:	2017-04-20
Note:	

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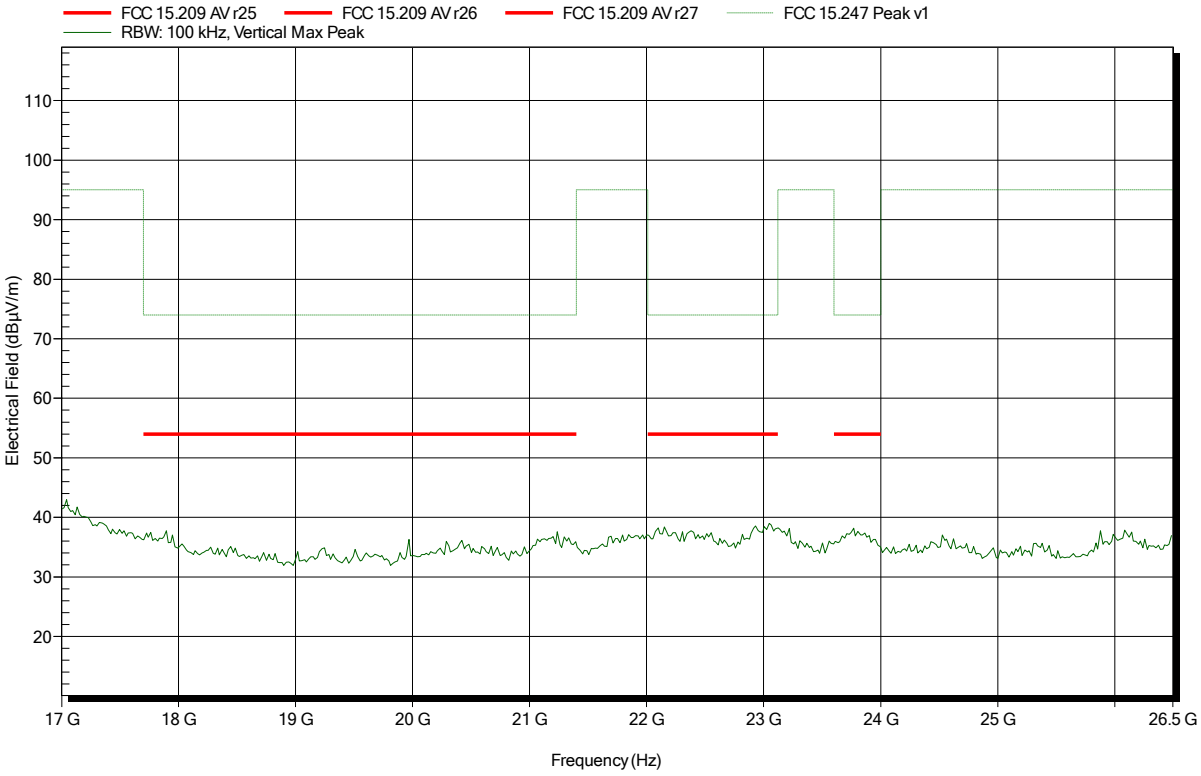

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2437 MHz
Test Date:	2017-04-20
Note:	

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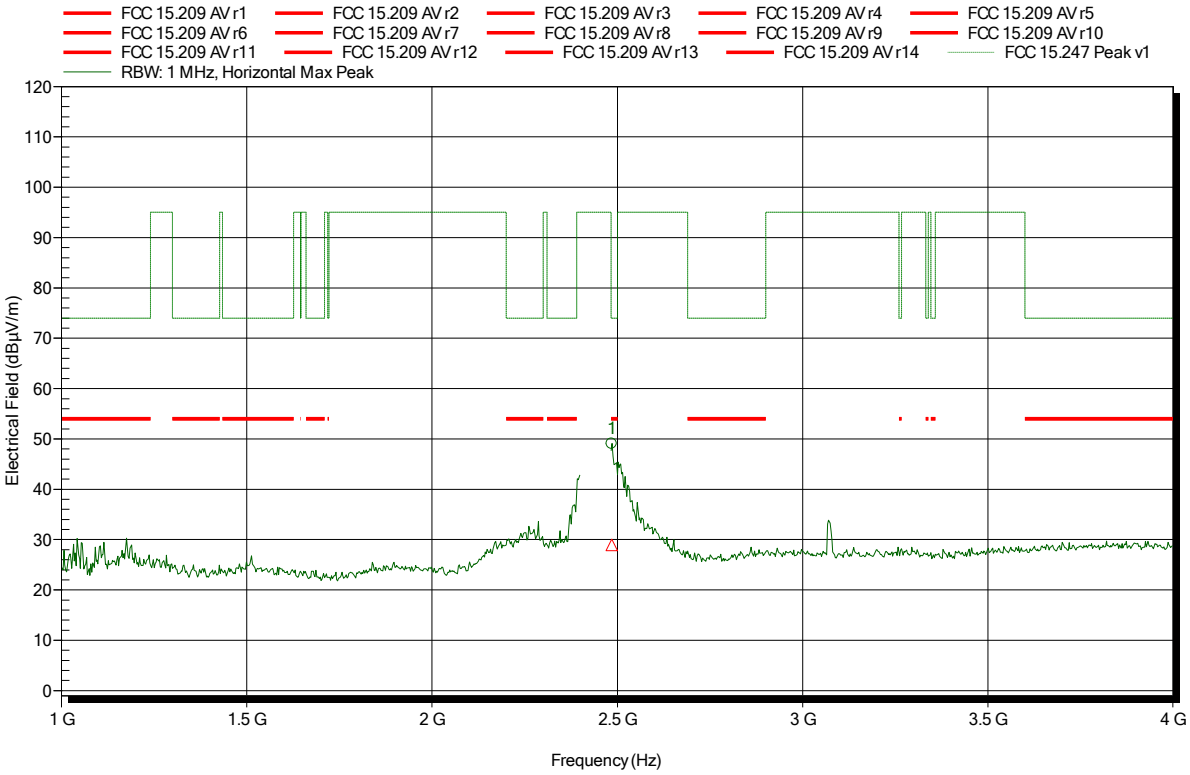

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.4849 GHz	49.07 dBµV/m	74 dBµV/m	-24.93 dB	Pass

Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.4849 GHz	28.97 dBµV/m	54 dBµV/m	-25.03 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2437 MHz
Test Date:	2017-04-20
Note:	

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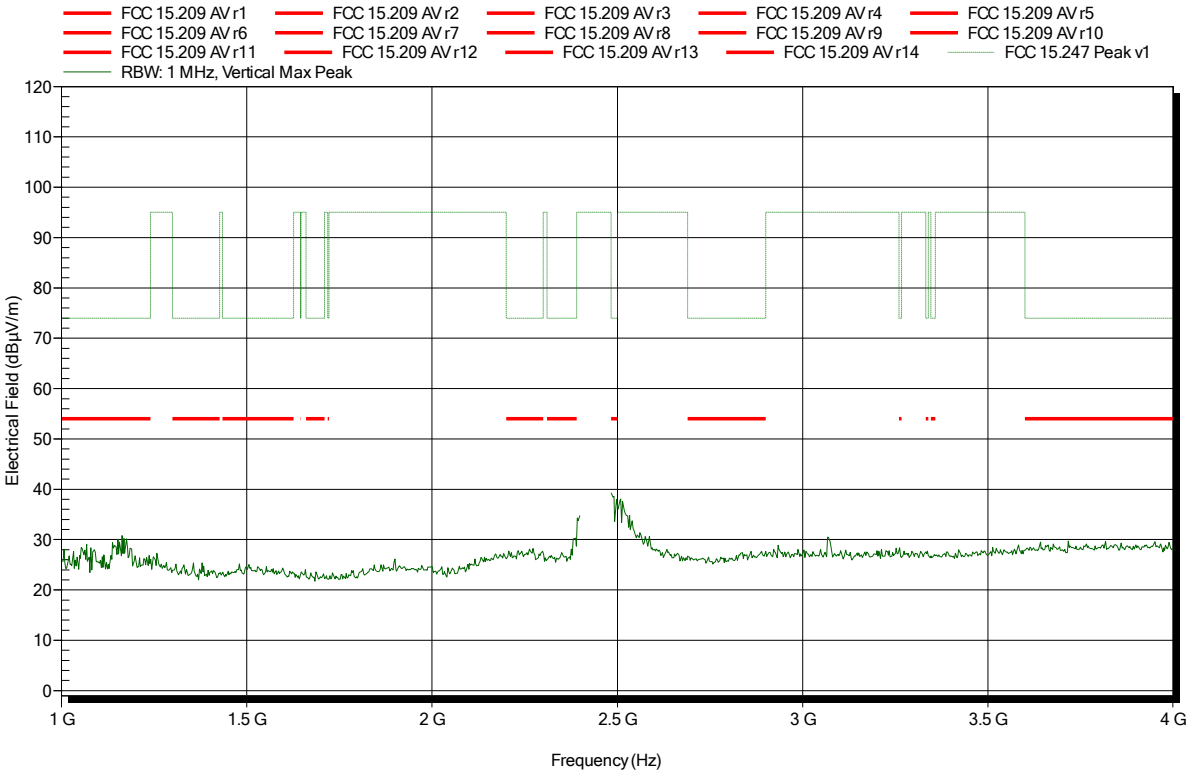

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2437 MHz
Test Date:	2017-04-20
Note:	

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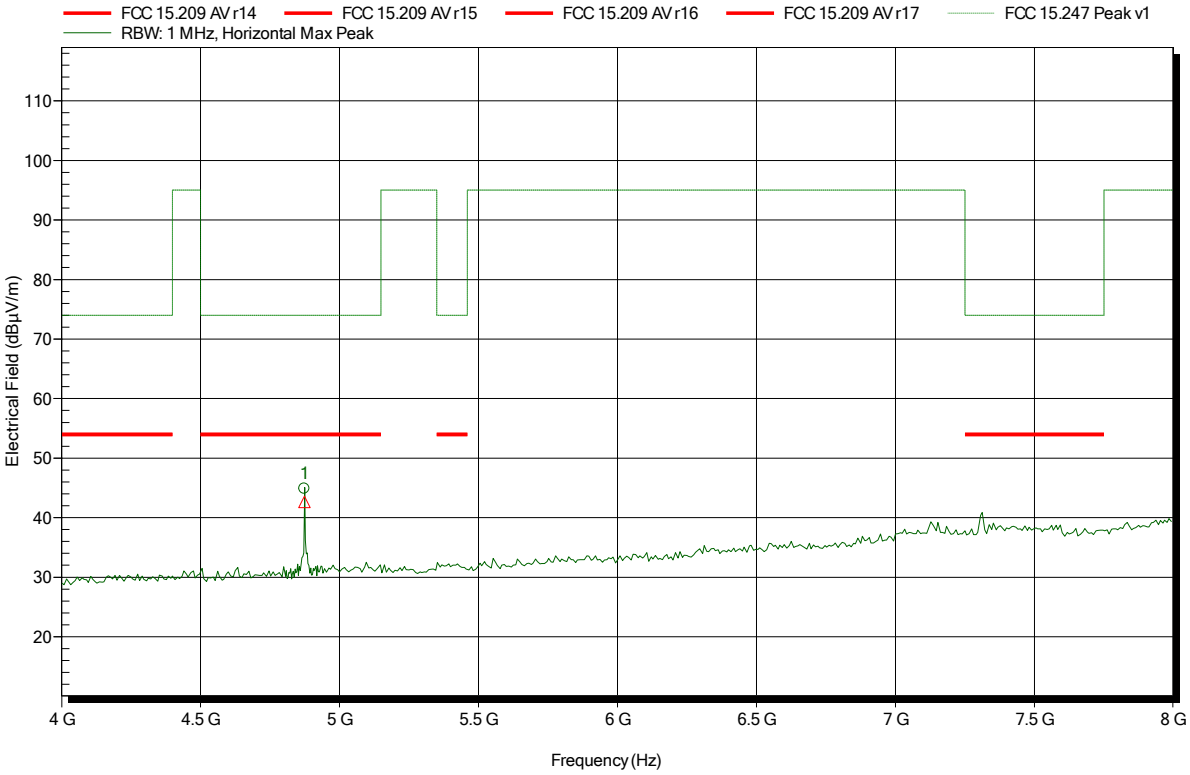

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.874 GHz	44.87 dBµV/m	74 dBµV/m	-29.13 dB	Pass

Frequency	RMS	RMS Limit	RMS Difference	RMS Status
4.874 GHz	42.63 dBµV/m	54 dBµV/m	-11.37 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2437 MHz
Test Date:	2017-04-20
Note:	

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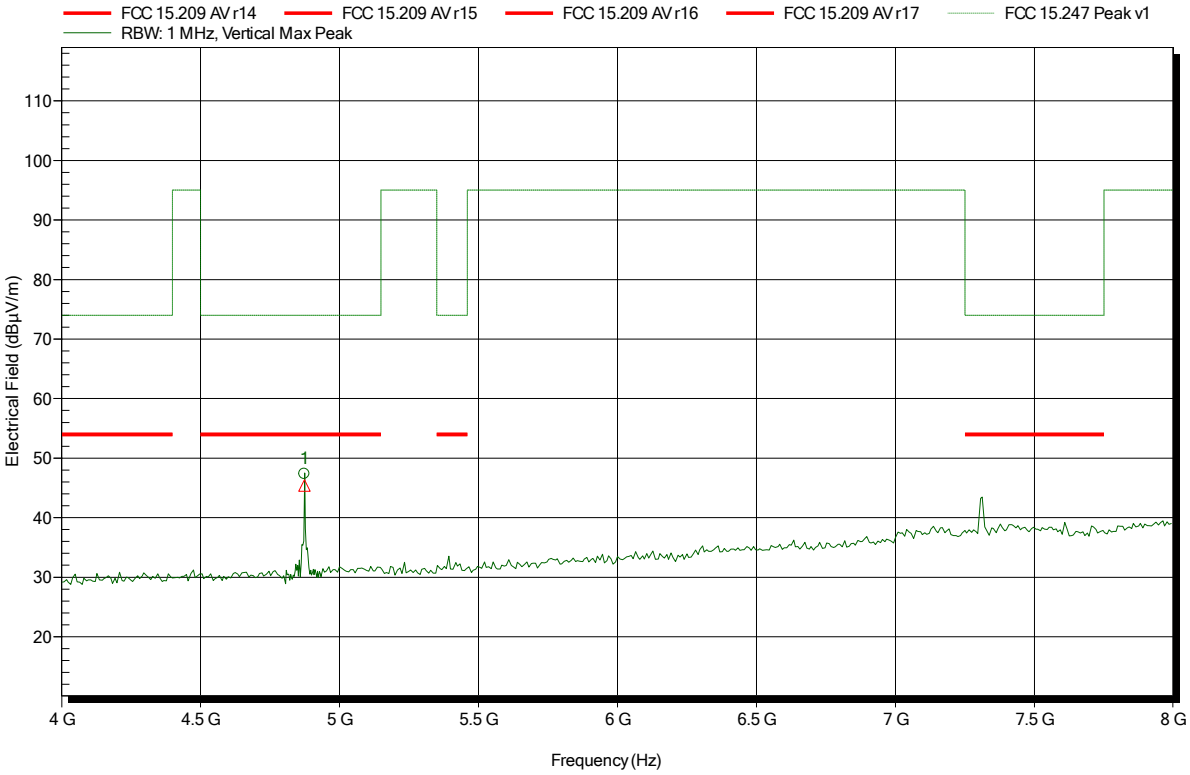

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.874 GHz	47.37 dBµV/m	74 dBµV/m	-26.63 dB	Pass

Frequency	RMS	RMS Limit	RMS Difference	RMS Status
4.874 GHz	45.39 dBµV/m	54 dBµV/m	-8.61 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2437 MHz
Test Date:	2017-04-20
Note:	

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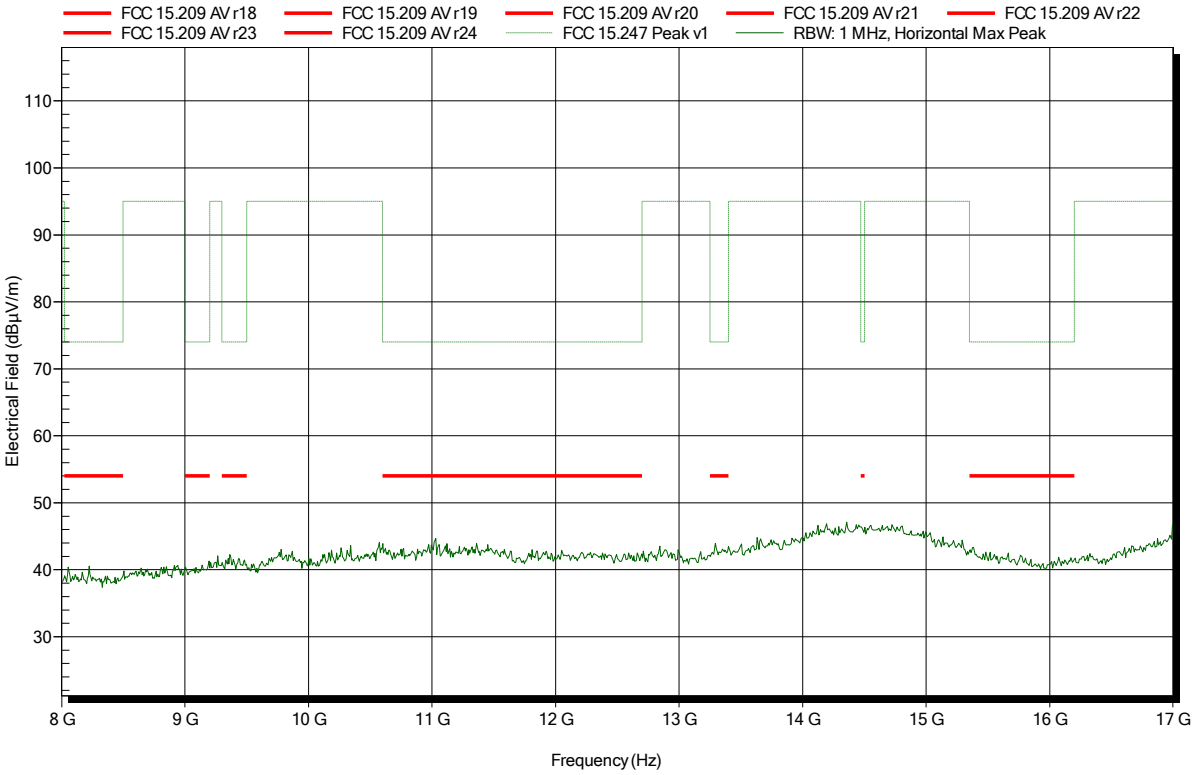

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2437 MHz
Test Date:	2017-04-20
Note:	

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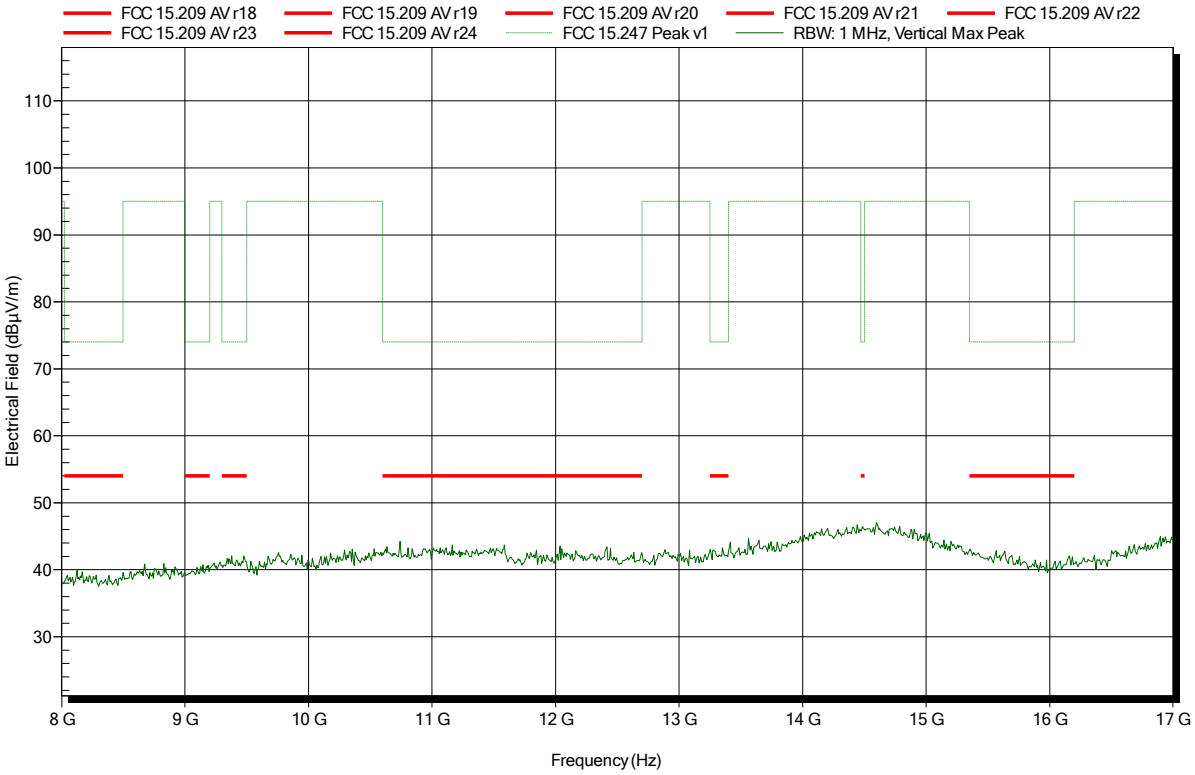

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Amplifier Research AT 4560 (old name) / ATH18G40 (new name), Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2437 MHz
Test Date:	2017-04-20
Note:	

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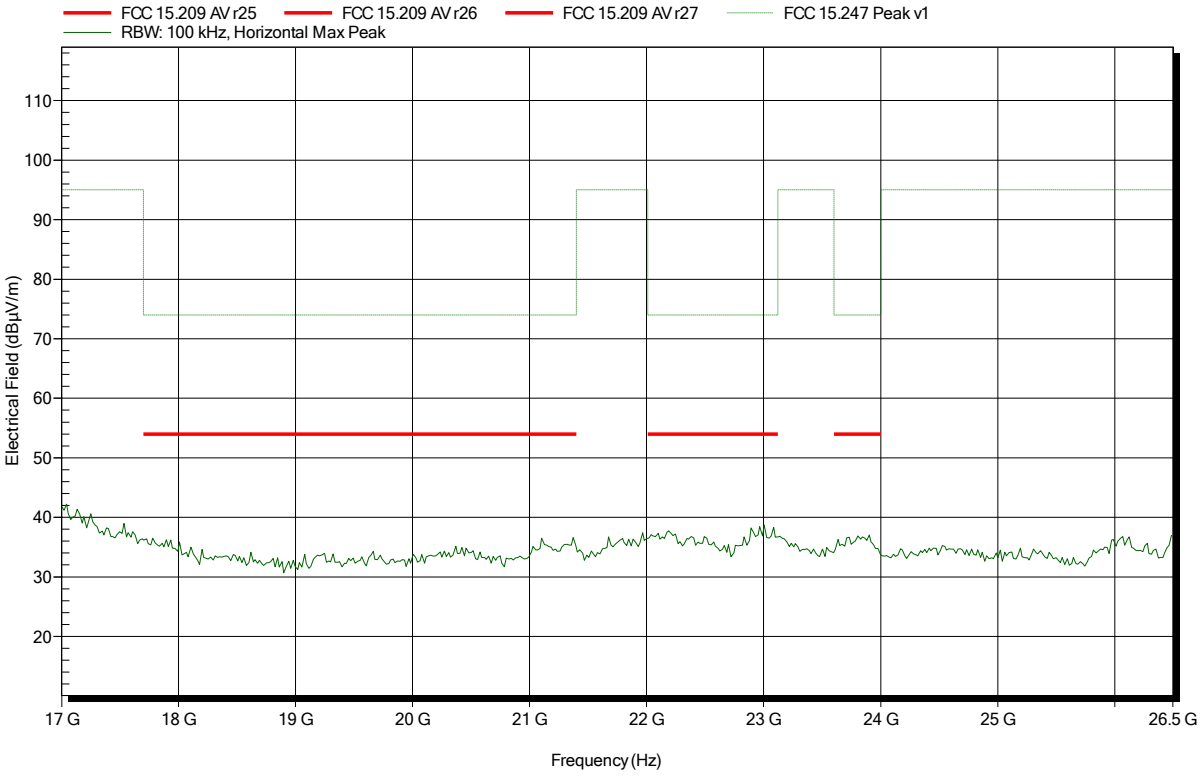

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Amplifier Research AT 4560 (old name) / ATH18G40 (new name), Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2437 MHz
Test Date:	2017-04-20
Note:	

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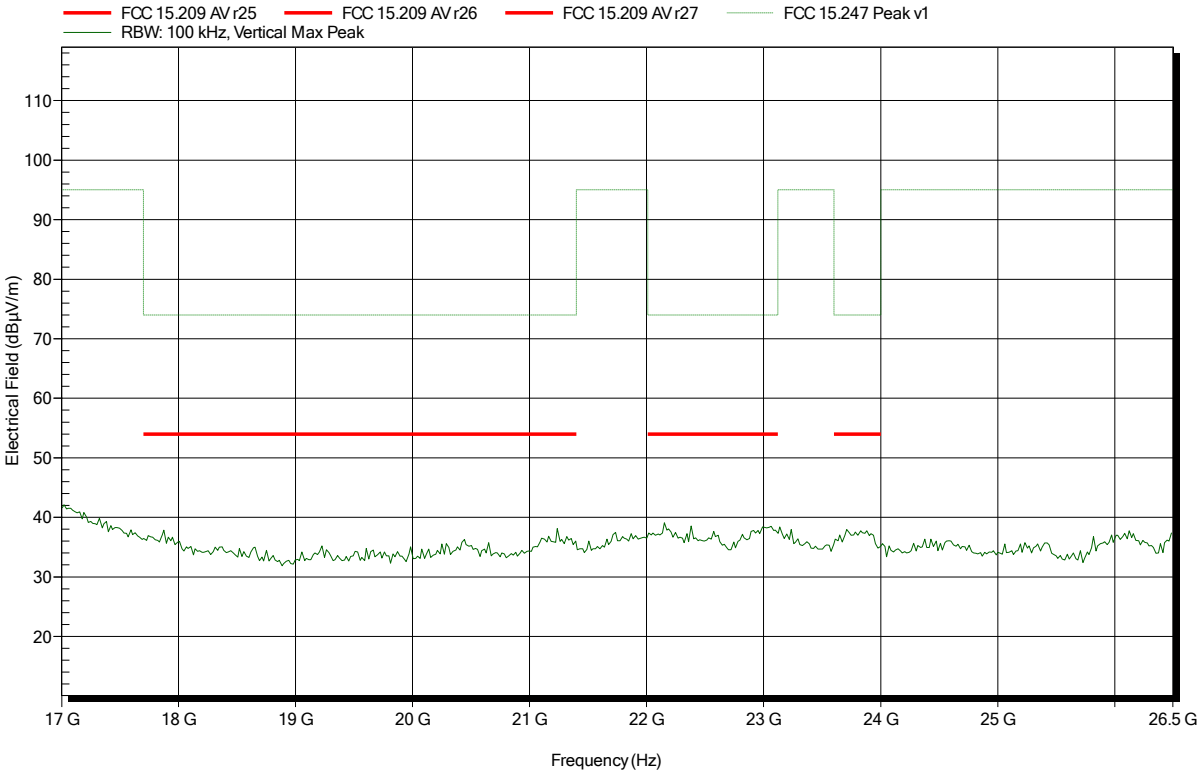

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2462 MHz
Test Date:	2017-04-20
Note:	

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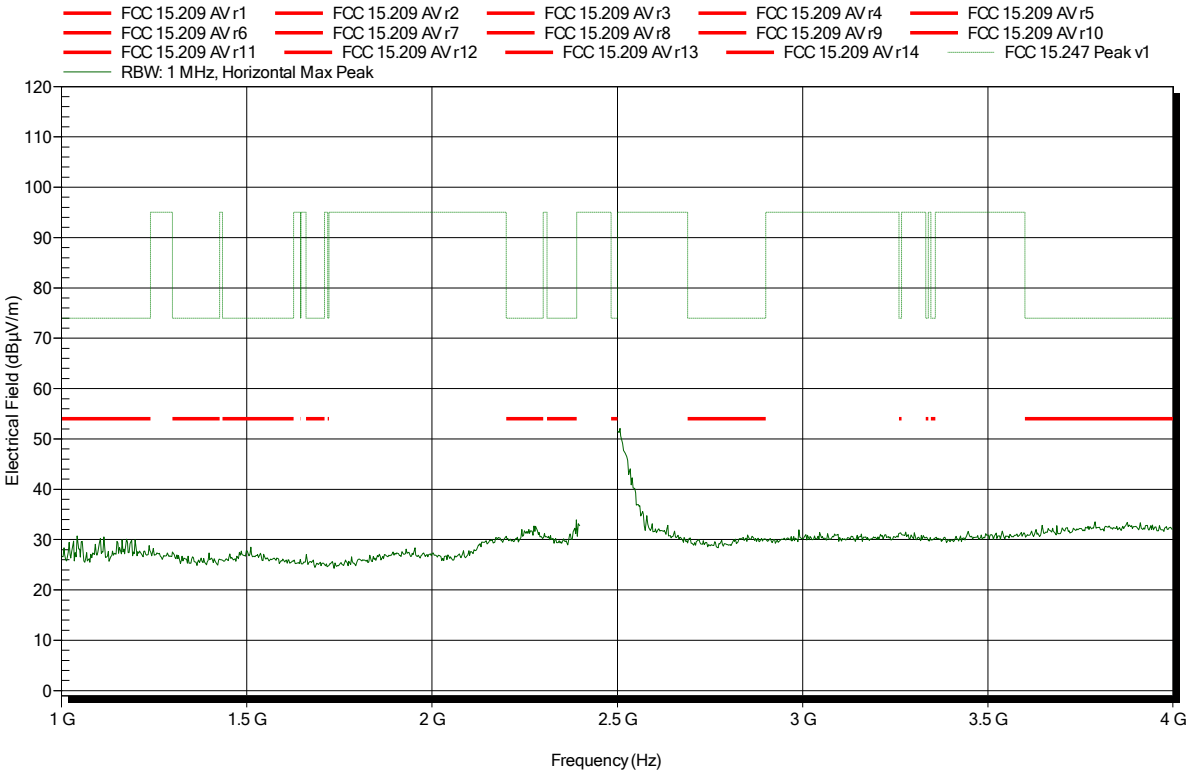

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2462 MHz
Test Date:	2017-04-20
Note:	

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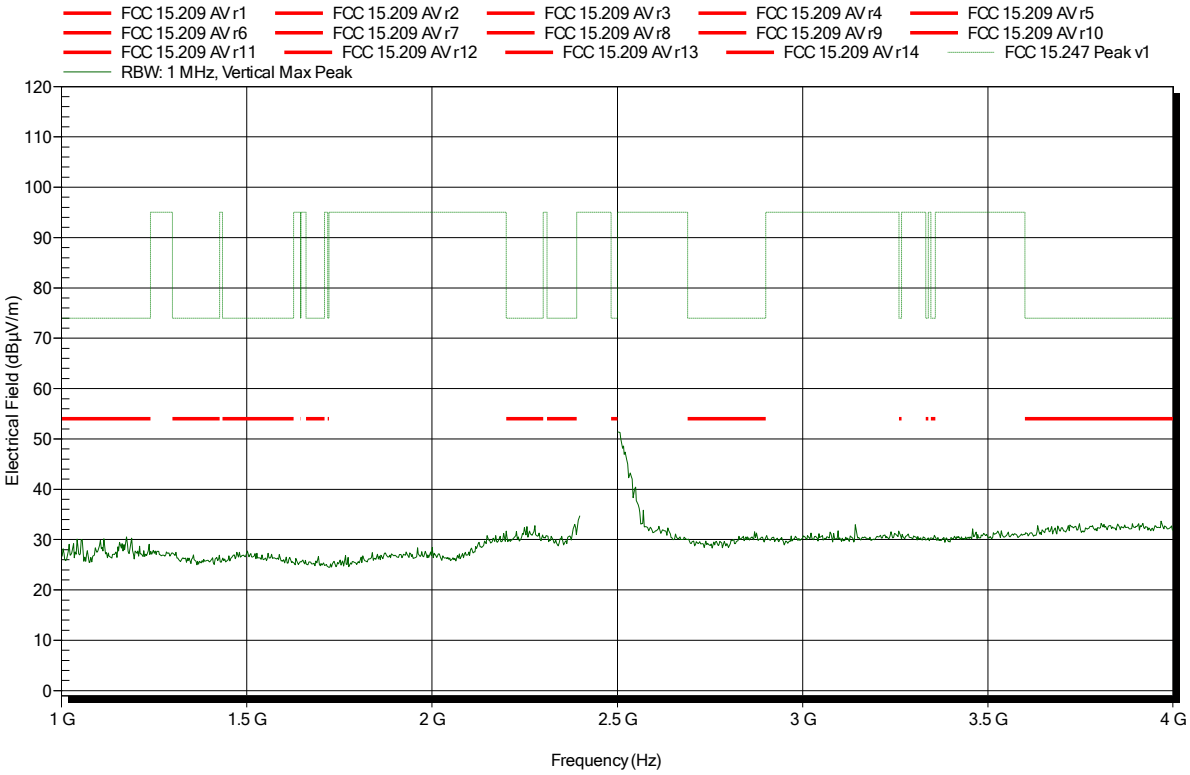

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2462 MHz
Test Date:	2017-04-20
Note:	upper bandedge

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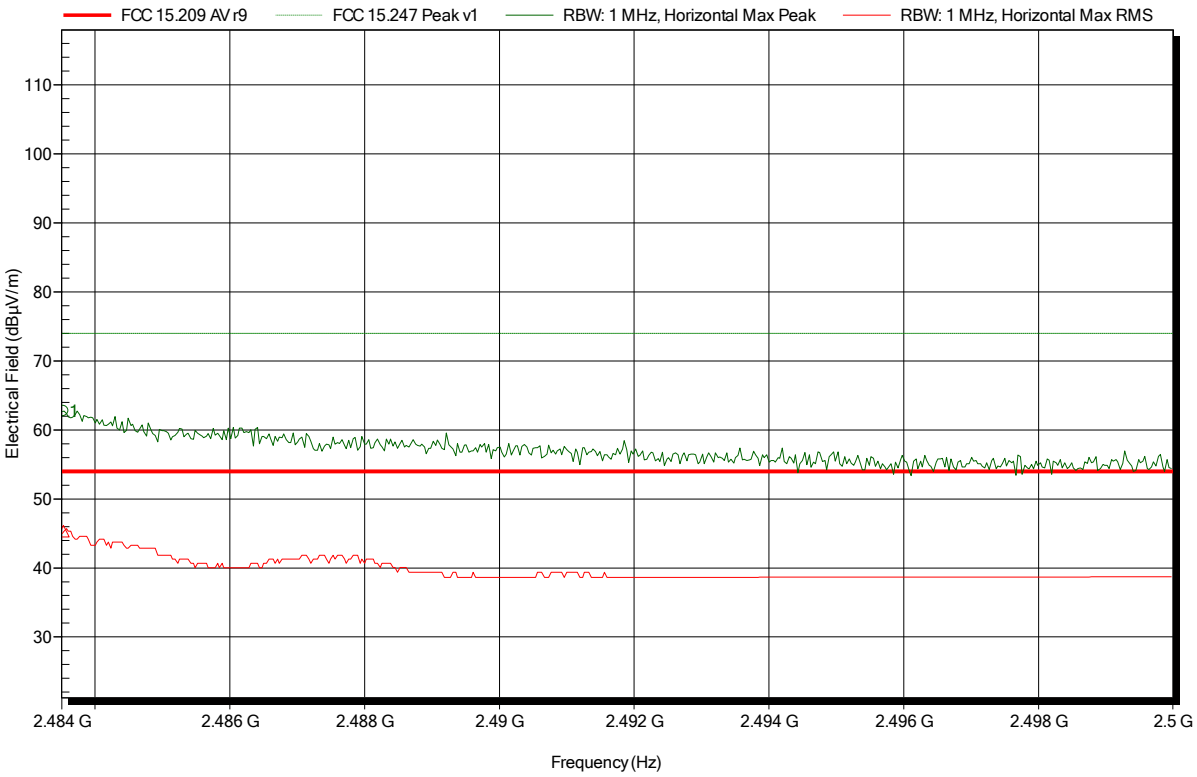

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.4835 GHz	62.73 dBµV/m	74 dBµV/m	-11.27 dB	Pass

Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.4835 GHz	45.32 dBµV/m	54 dBµV/m	-8.68 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2462 MHz
Test Date:	2017-04-20
Note:	upper bandedge

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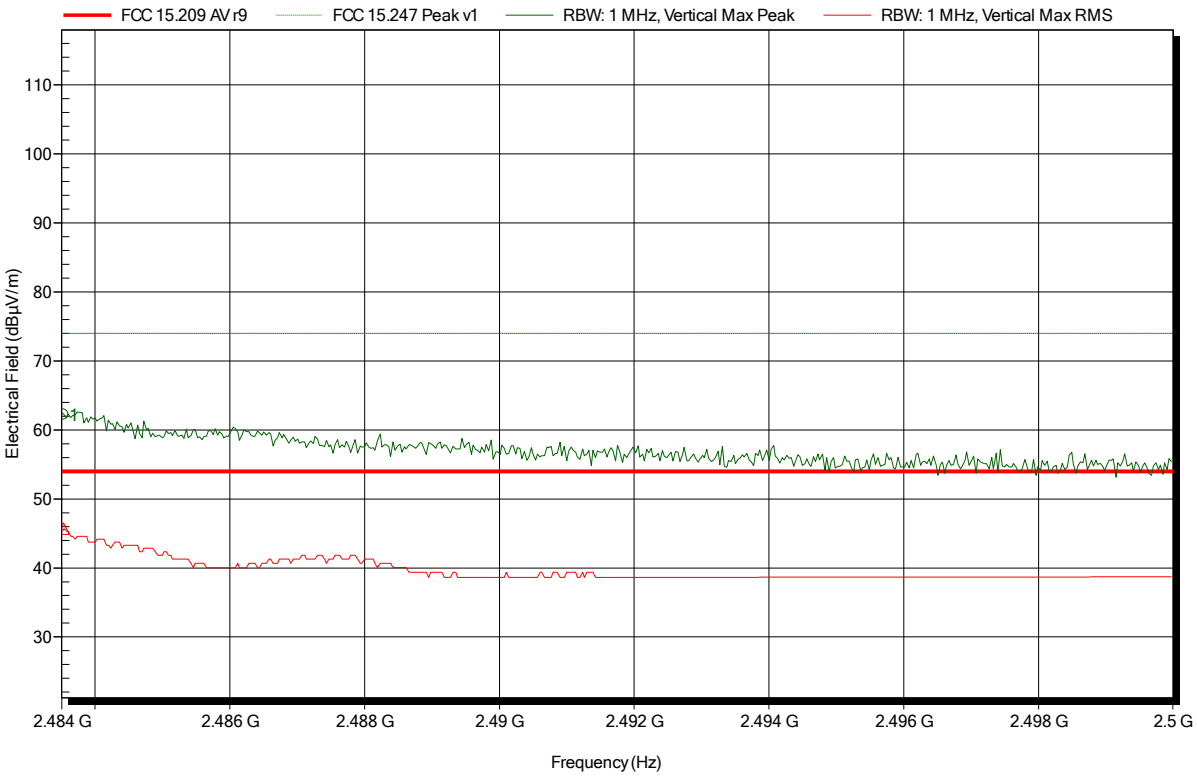

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
2.4835 GHz	62.23 dBµV/m	74 dBµV/m	-11.77 dB	Pass

Frequency	RMS	RMS Limit	RMS Difference	RMS Status
2.4835 GHz	45.68 dBµV/m	54 dBµV/m	-8.32 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2462 MHz
Test Date:	2017-04-20
Note:	

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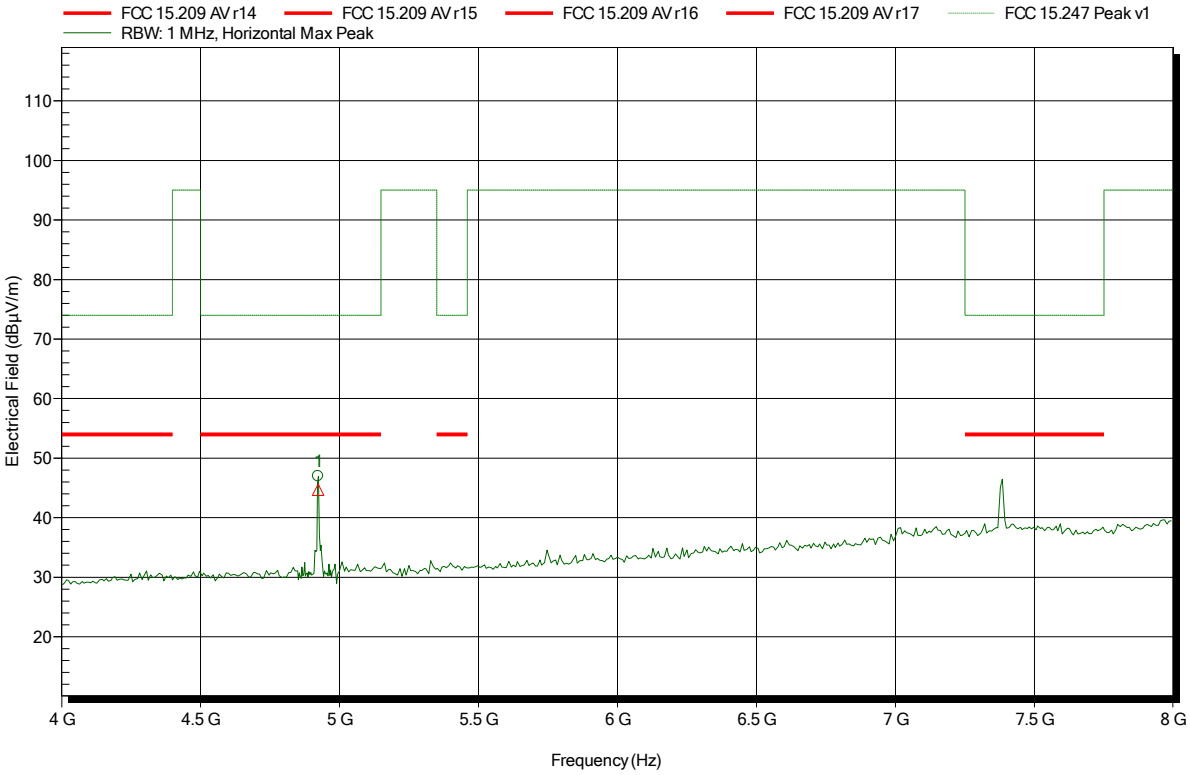

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.924 GHz	46.95 dBµV/m	74 dBµV/m	-27.05 dB	Pass

Frequency	RMS	RMS Limit	RMS Difference	RMS Status
4.924 GHz	44.68 dBµV/m	54 dBµV/m	-9.32 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2462 MHz
Test Date:	2017-04-20
Note:	

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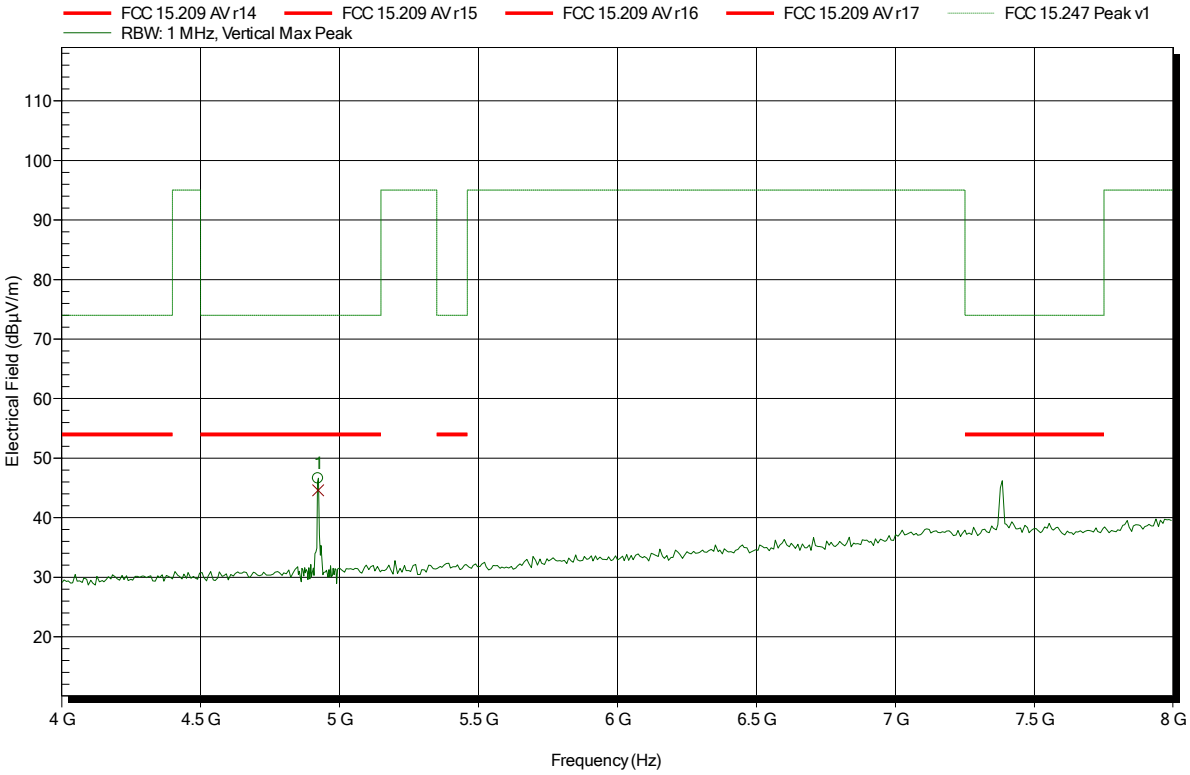

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
4.924 GHz	46.61 dBµV/m	74 dBµV/m	-27.39 dB	Pass

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2462 MHz
Test Date:	2017-04-20
Note:	

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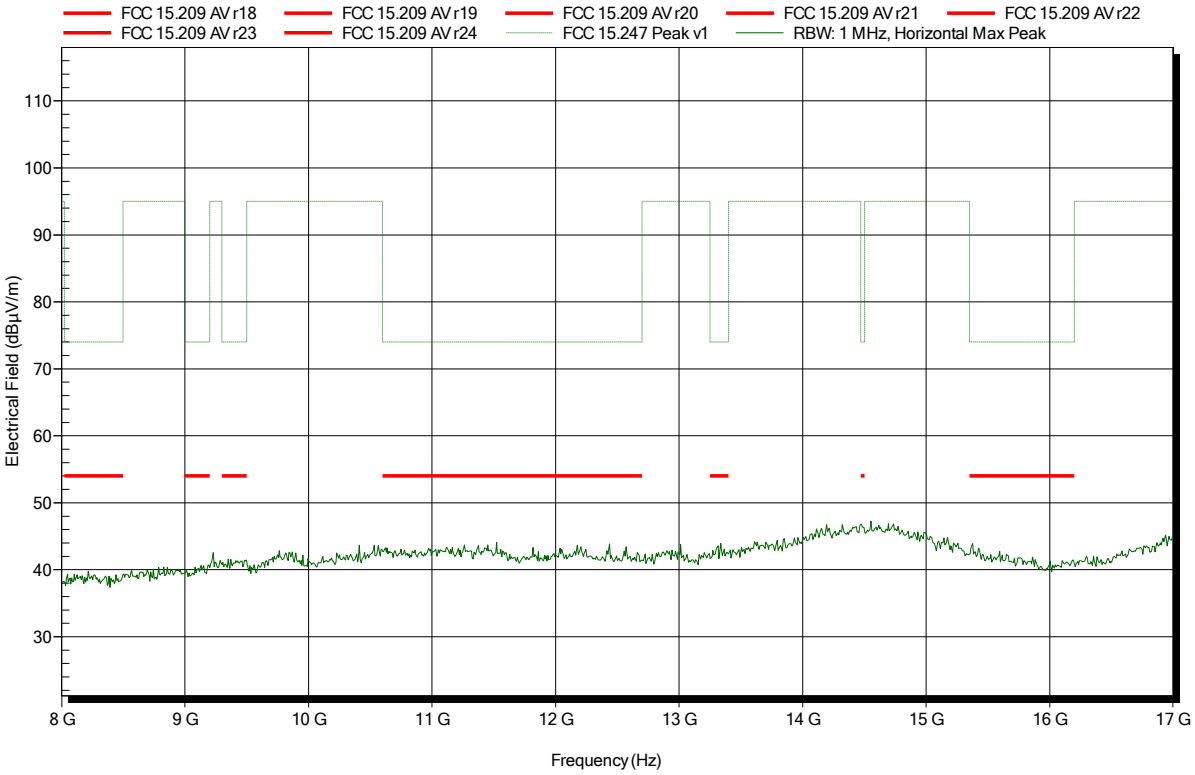

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2462 MHz
Test Date:	2017-04-20
Note:	

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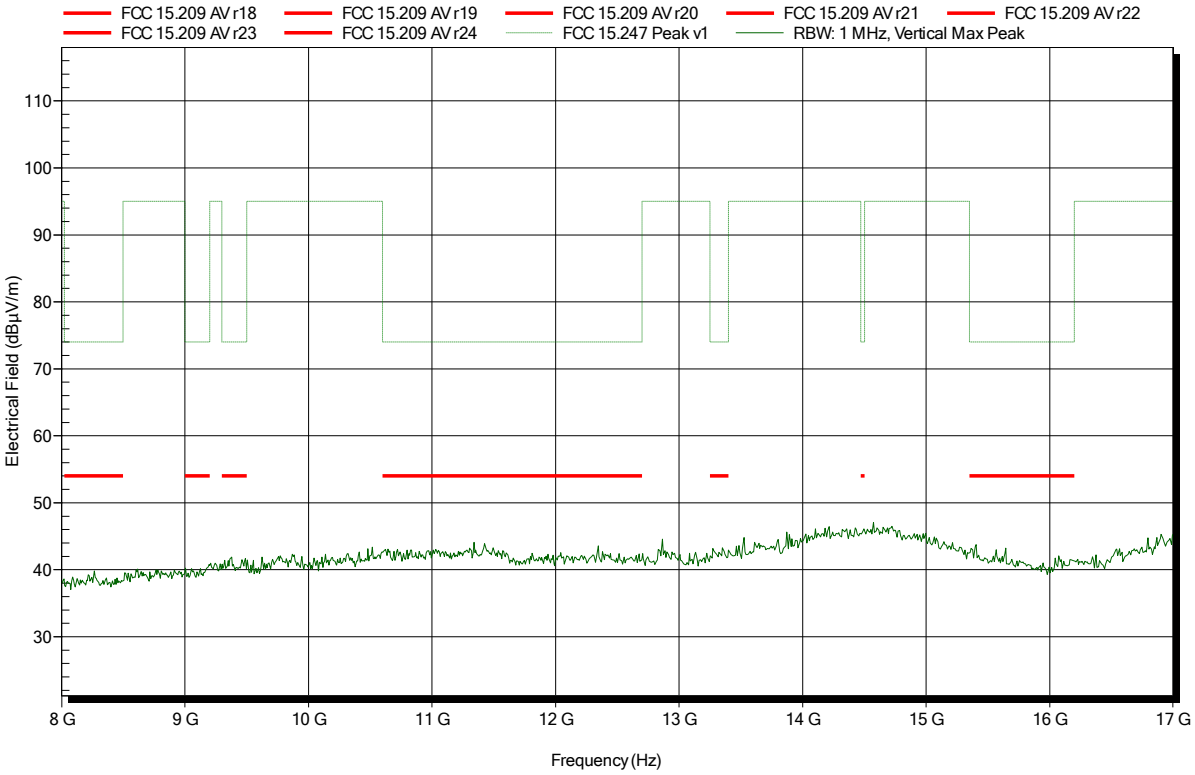

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Amplifier Research AT 4560 (old name) / ATH18G40 (new name), Horizontal
Measurement distance:	1 m converted to 3m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2462 MHz
Test Date:	2017-04-20
Note:	

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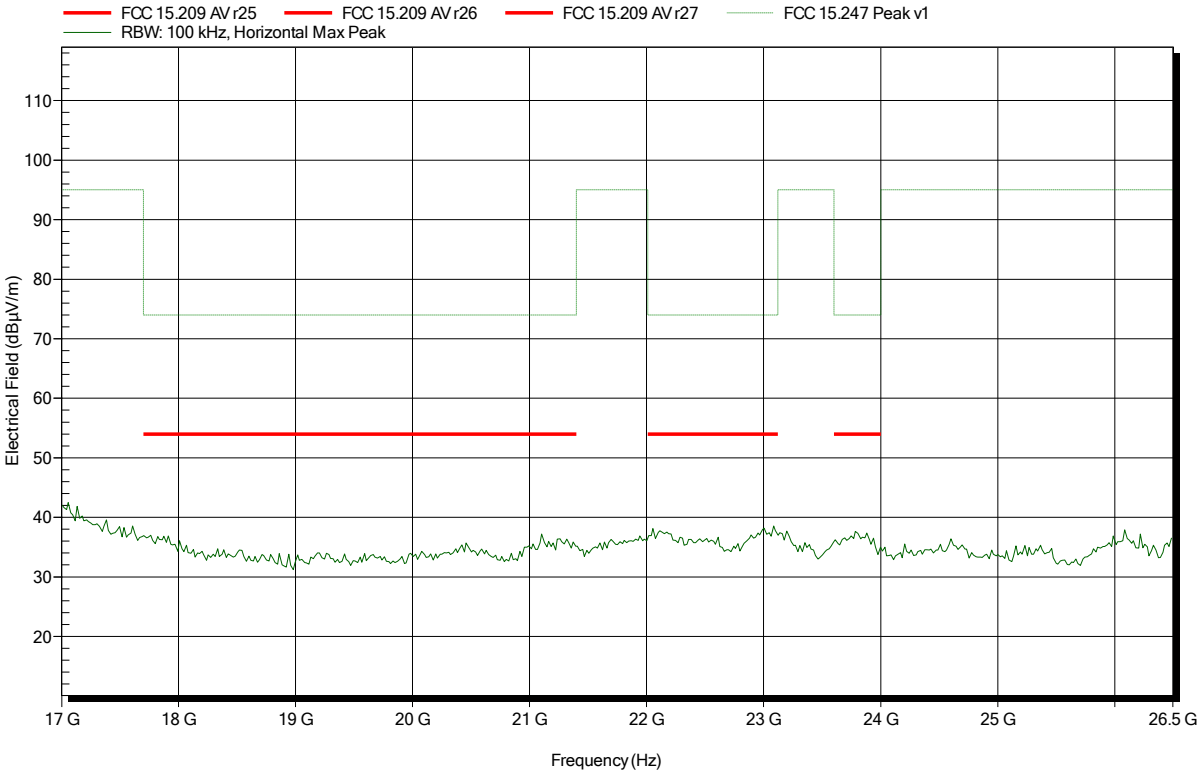

Spurious emissions according to FCC 15.247

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Amplifier Research AT 4560 (old name) / ATH18G40 (new name), Vertical
Measurement distance:	1 m converted to 3m
Mode:	TX; IEEE 802.11b, DSSS, 1Mbps, 2462 MHz
Test Date:	2017-04-20
Note:	

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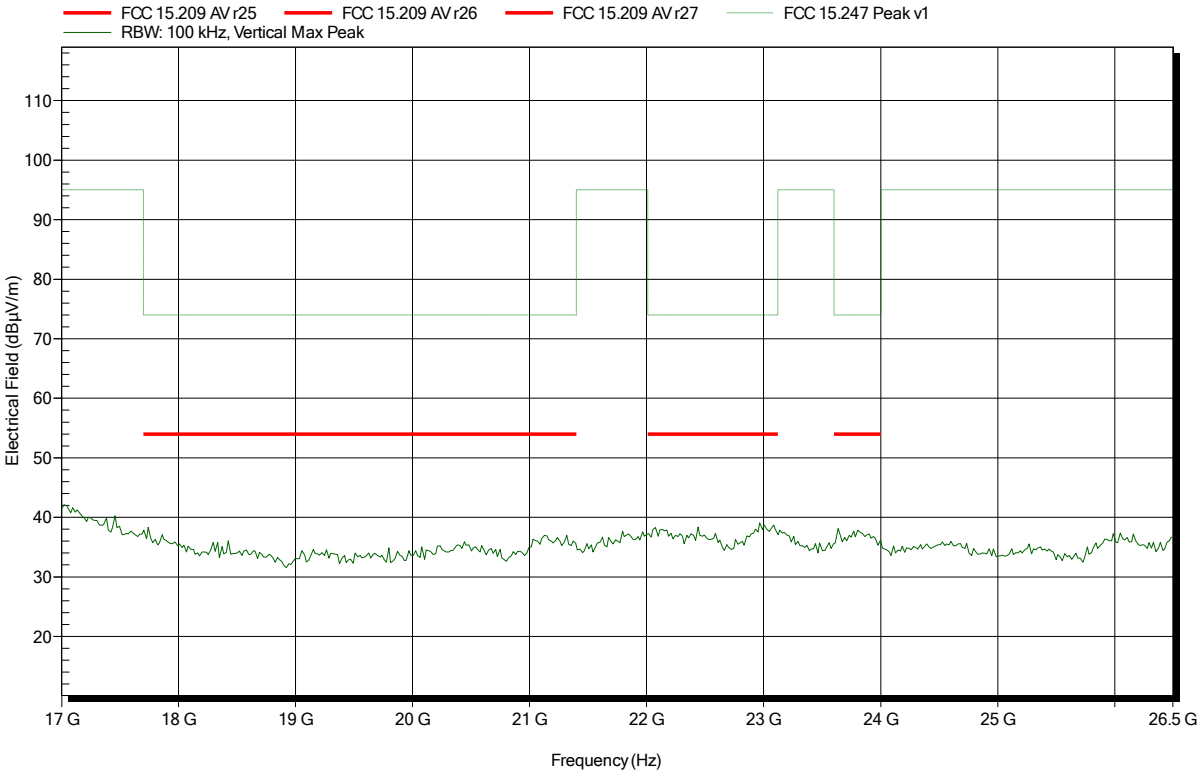

ANNEX B Receiver sprurious emissions

Spurious emissions according to RSS-Gen Issue 4

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	RX; IEEE 802.11b, 2437 MHz
Test Date:	2017-04-20
Note:	

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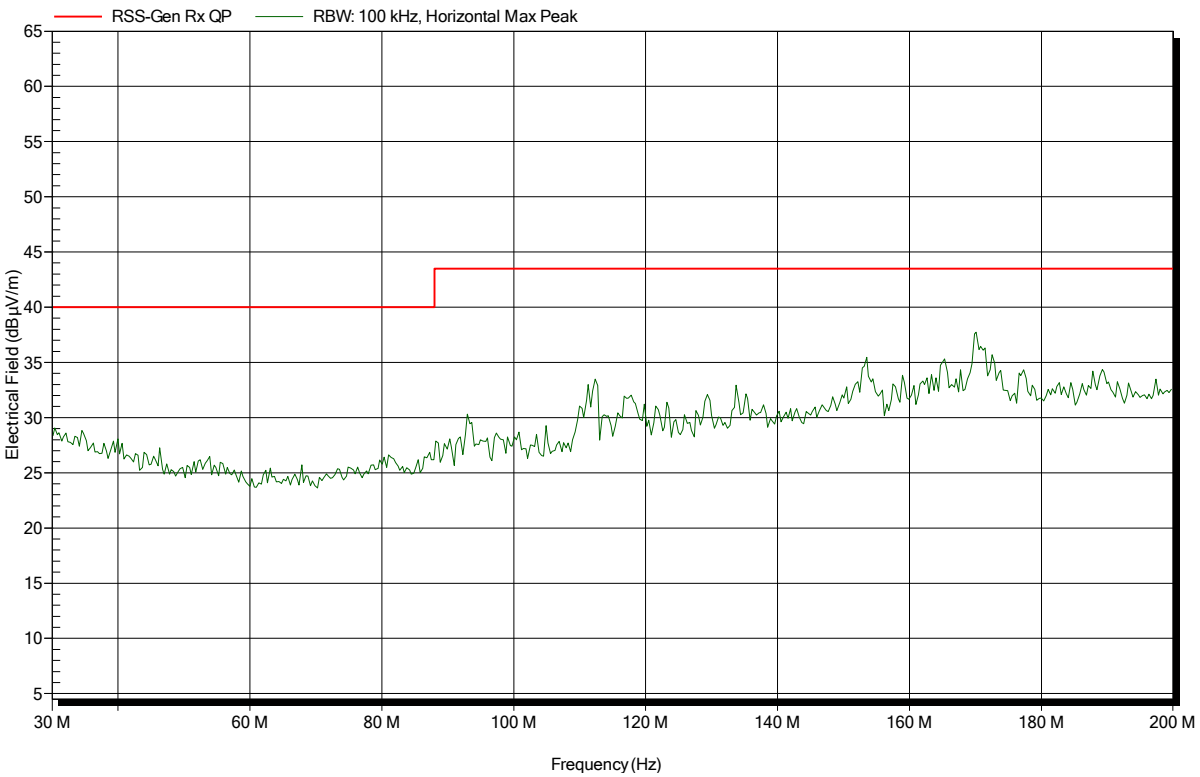

Spurious emissions according to RSS-Gen Issue 4

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3 m
Mode:	RX; IEEE 802.11b, 2437 MHz
Test Date:	2017-04-20
Note:	

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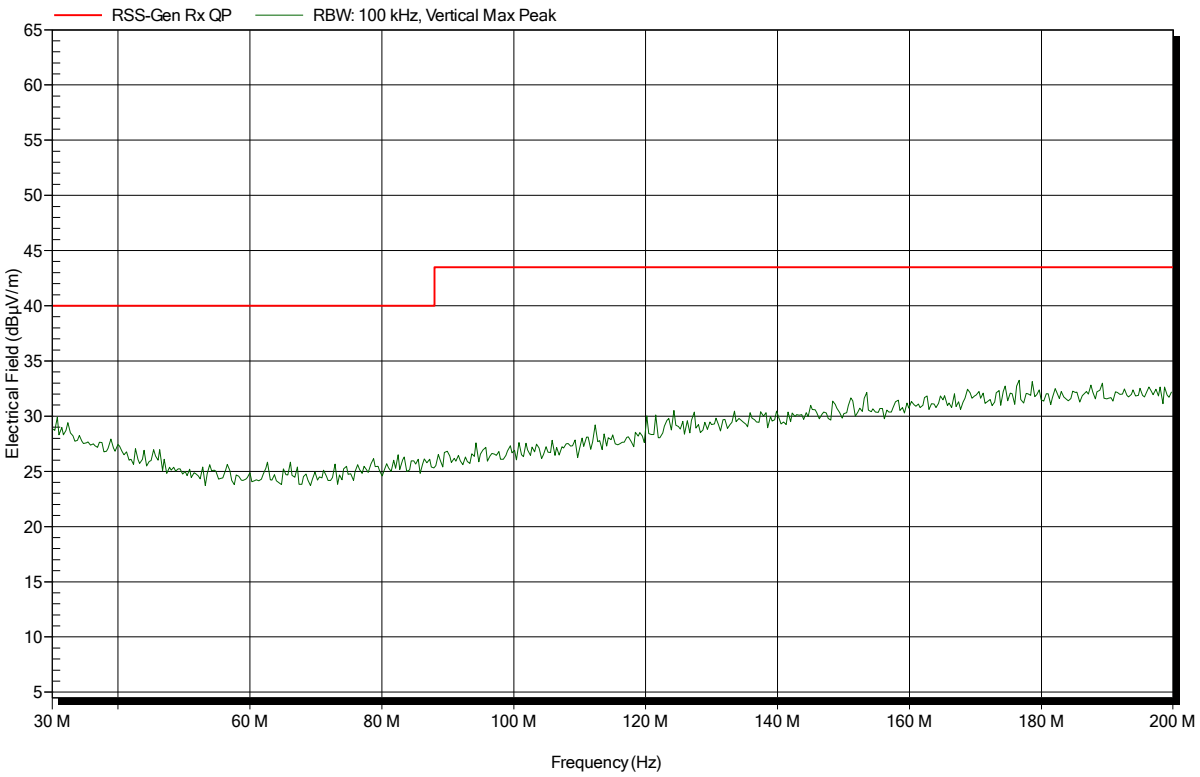

Spurious emissions according to RSS-Gen Issue 4

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Rohde & Schwarz HL 223, Horizontal
Measurement distance:	3 m
Mode:	RX; IEEE 802.11b, 2437 MHz
Test Date:	2017-04-20
Note:	

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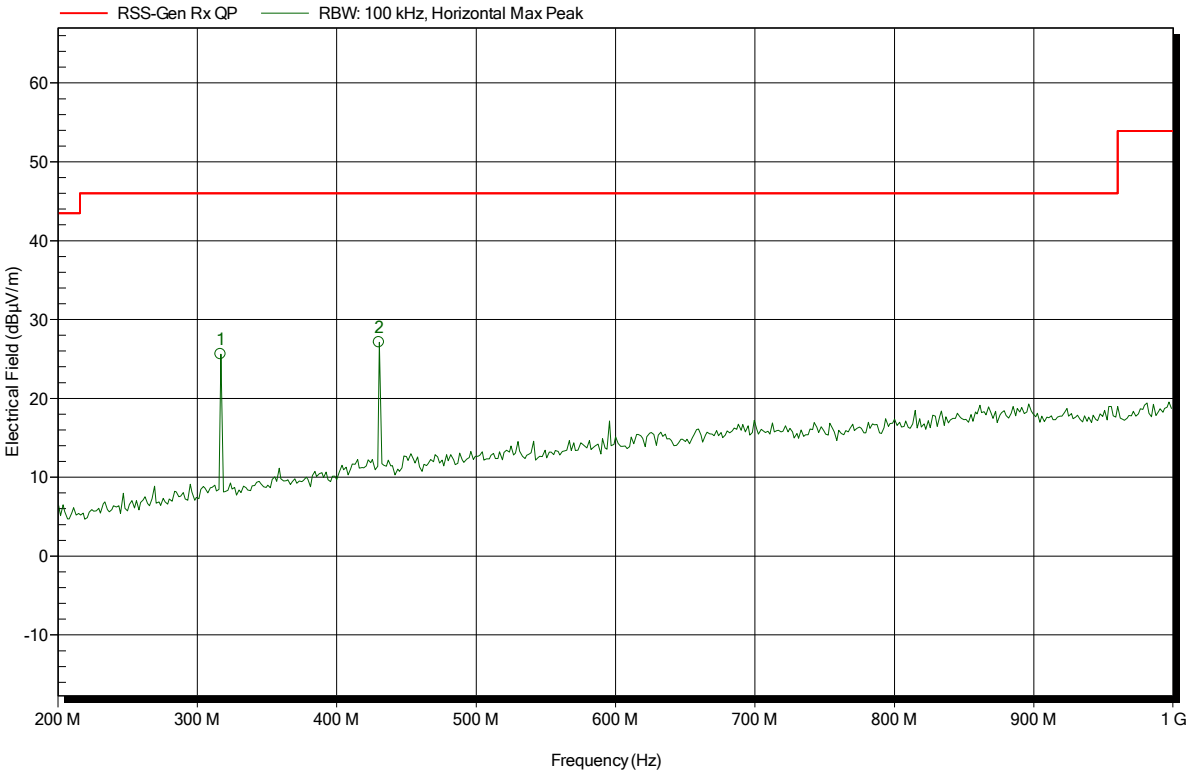

Frequency	Peak	Peak Limit	Peak Difference	Status
316.8 MHz	25.62 dBµV/m	46 dBµV/m	-20.38 dB	Pass
430.4 MHz	27.11 dBµV/m	46 dBµV/m	-18.89 dB	Pass

Spurious emissions according to RSS-Gen Issue 4

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Rohde & Schwarz HL 223, Vertical
Measurement distance:	3 m
Mode:	RX; IEEE 802.11b, 2437 MHz
Test Date:	2017-04-20
Note:	

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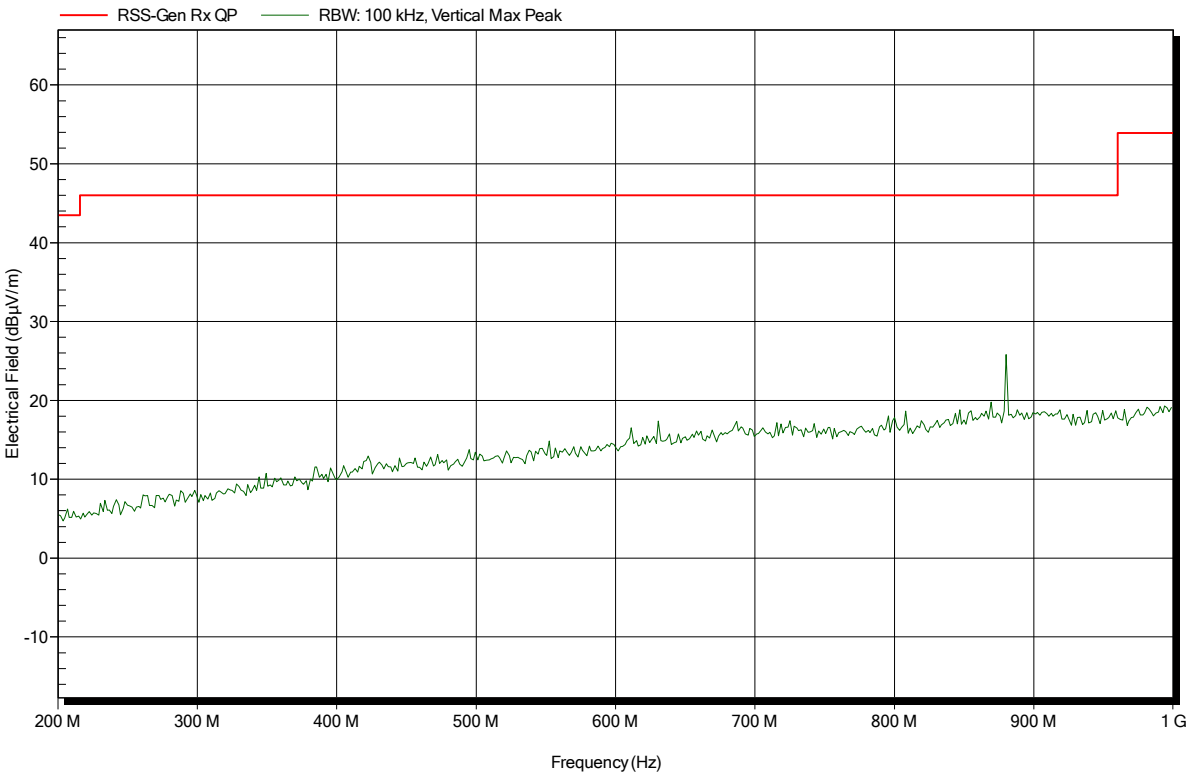

Spurious emissions according to RSS-Gen Issue 4

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	RX; IEEE 802.11b, 2437 MHz
Test Date:	2017-04-20
Note:	

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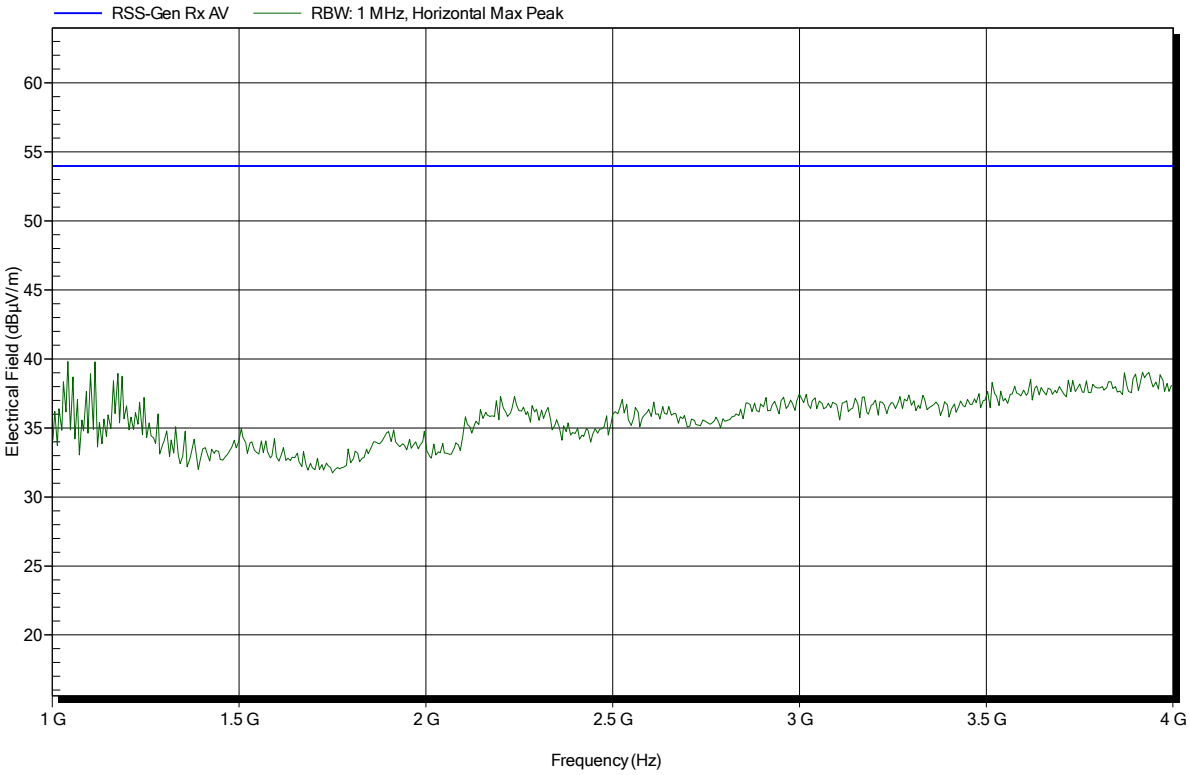

Spurious emissions according to RSS-Gen Issue 4

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	RX; IEEE 802.11b, 2437 MHz
Test Date:	2017-04-20
Note:	

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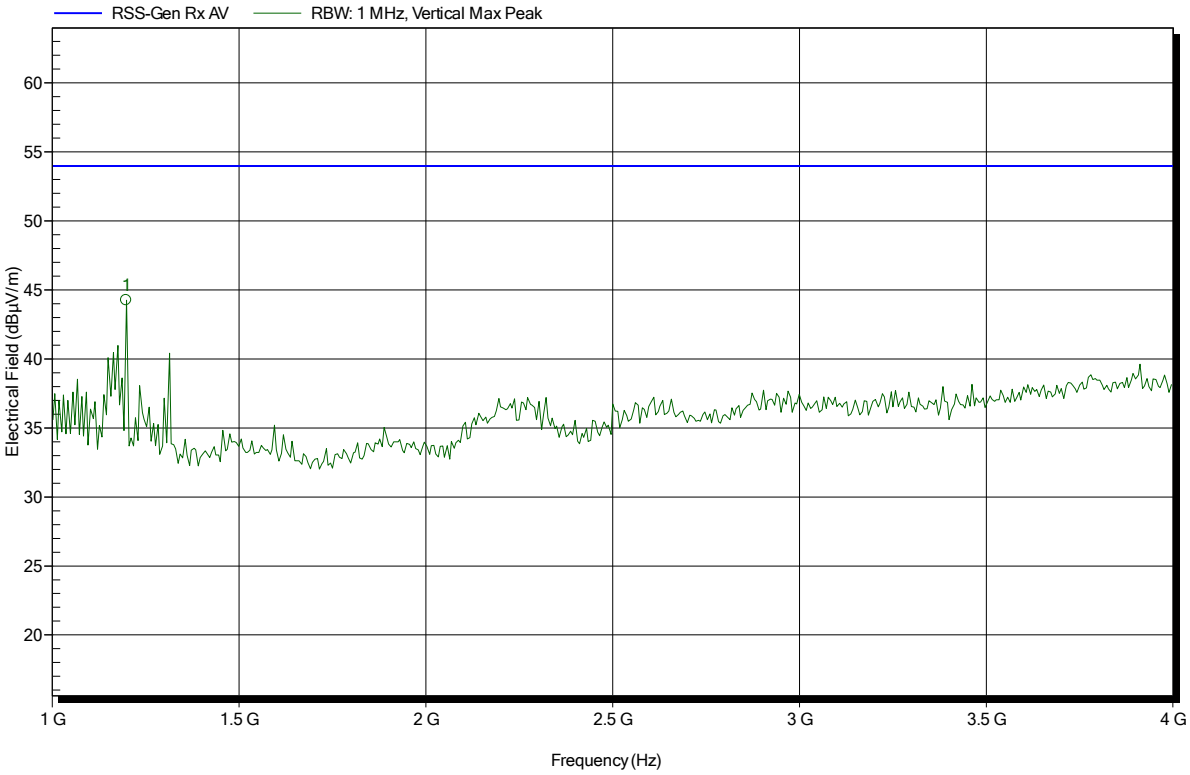

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
1.198 GHz	44.25 dBµV/m	53.98 dBµV/m	-9.73 dB	Pass

Spurious emissions according to RSS-Gen Issue 4

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	3 m
Mode:	RX; IEEE 802.11b, 2437 MHz
Test Date:	2017-04-20
Note:	

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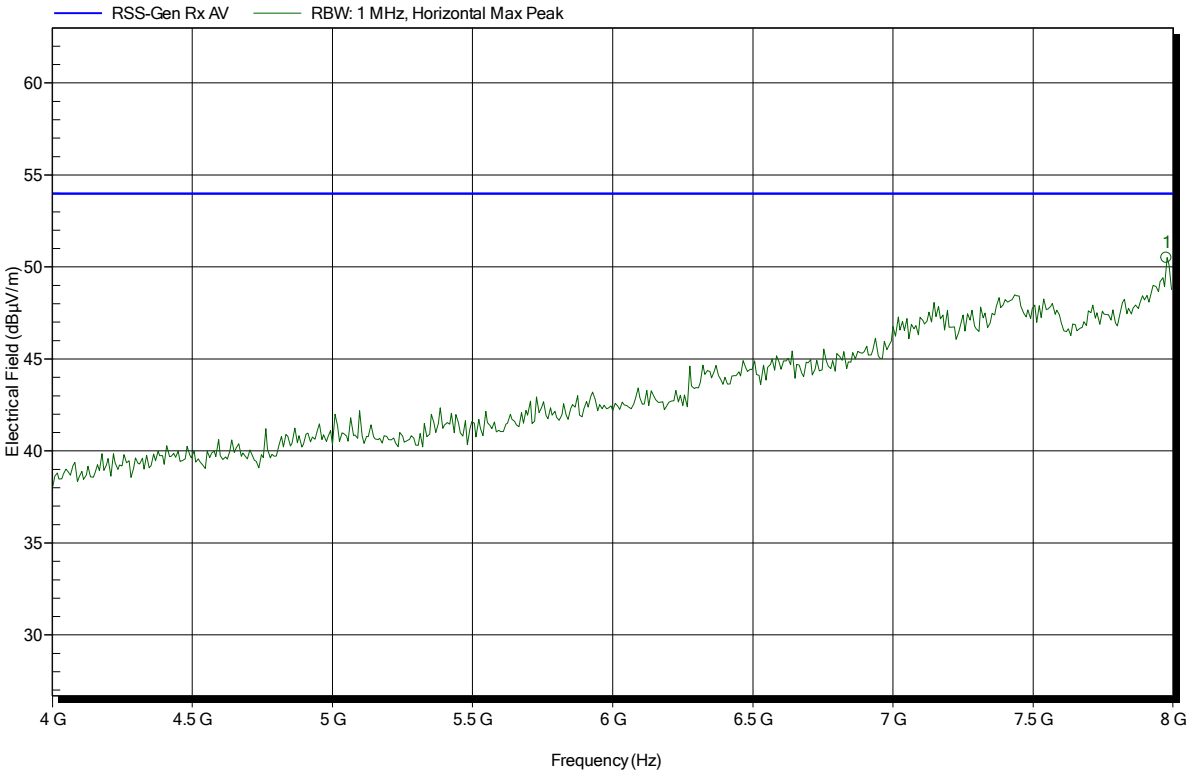

Frequency	Peak	Peak Limit	Peak Difference	Peak Status
7.976 GHz	50.49 dBµV/m	53.98 dBµV/m	-3.49 dB	Pass

Spurious emissions according to RSS-Gen Issue 4

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	3 m
Mode:	RX; IEEE 802.11b, 2437 MHz
Test Date:	2017-04-20
Note:	

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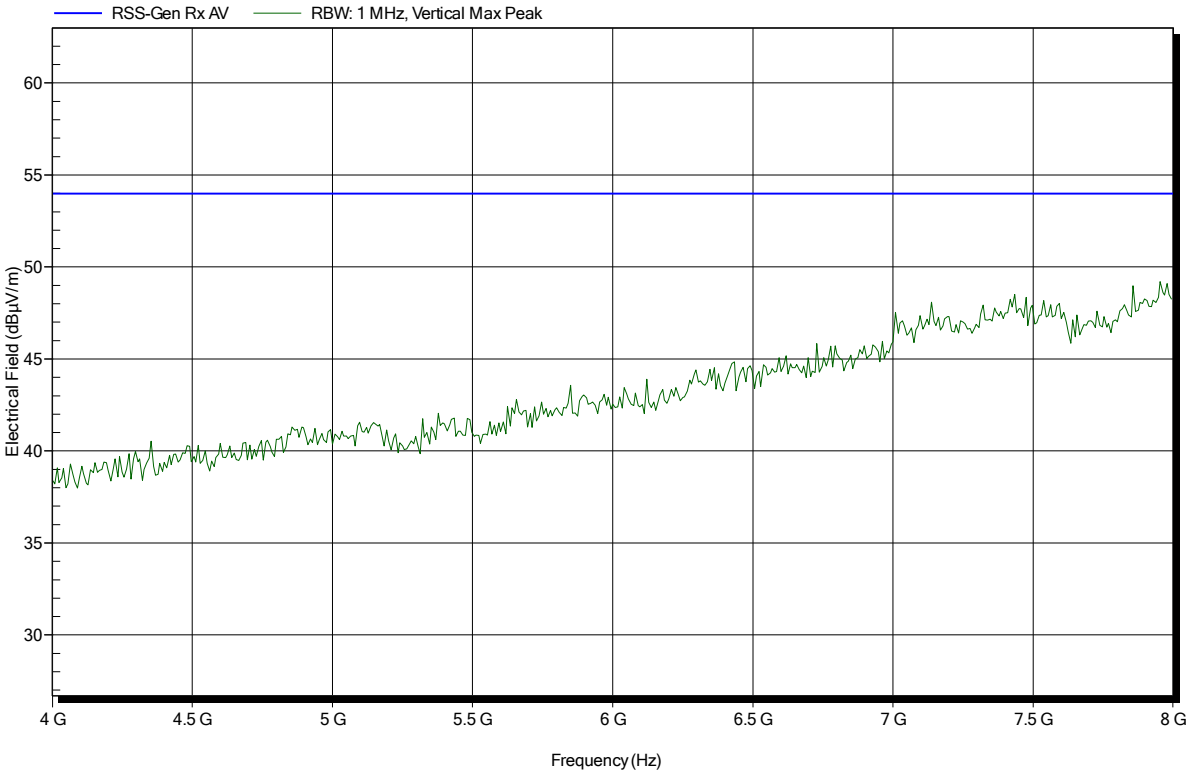

Spurious emissions according to RSS-Gen Issue 4

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement distance:	1 m converted to 3m
Mode:	RX; IEEE 802.11b, 2437 MHz
Test Date:	2017-04-20
Note:	

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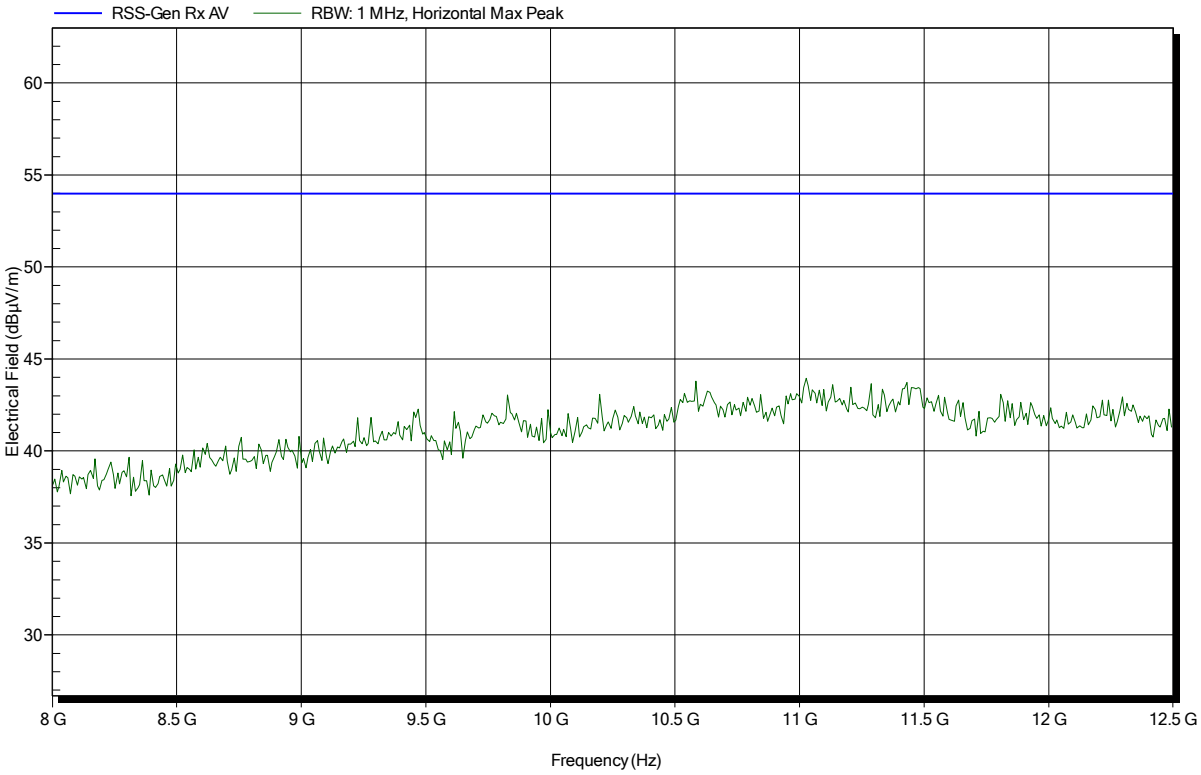
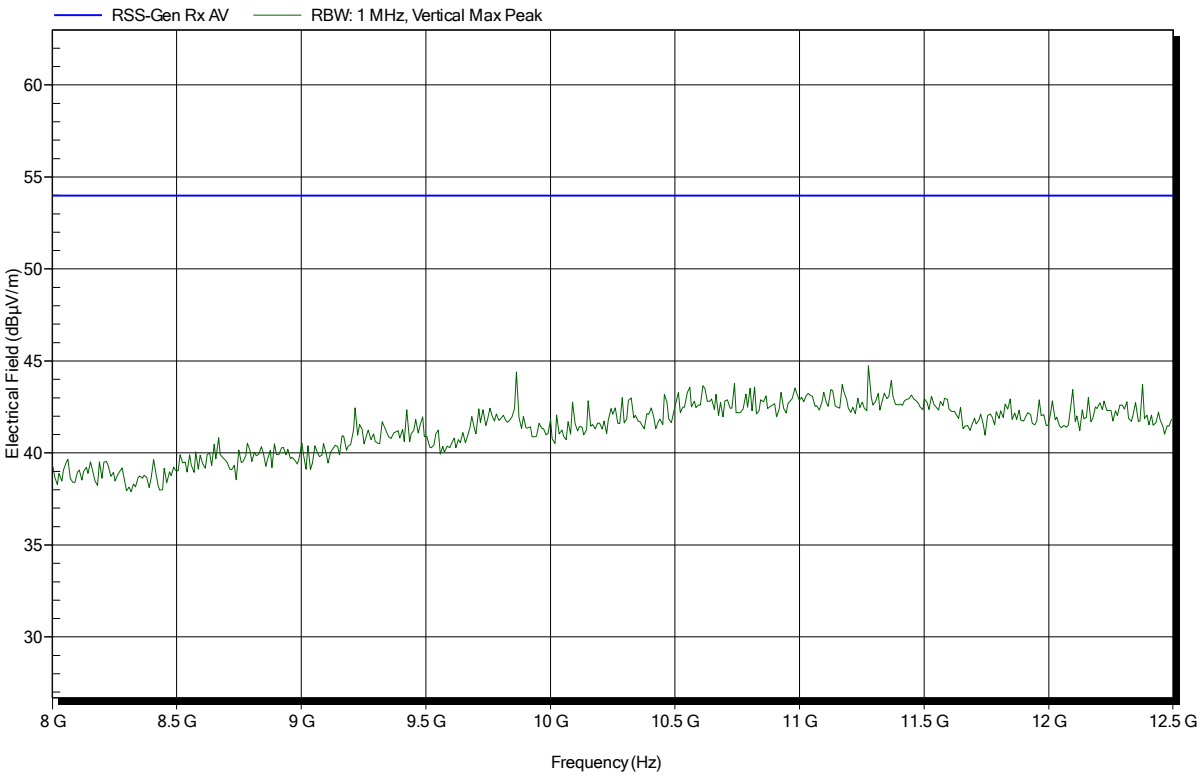


Spurious emissions according to RSS-Gen Issue 4

Project number: G0M-1702-6281

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wifi Module
Model:	ENW49C01A3KF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 24°C, Vnom: 3.3 V DC (5 V DC USB Evaluation Board)
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement distance:	1 m converted to 3m
Mode:	RX; IEEE 802.11b, 2437 MHz
Test Date:	2017-04-20
Note:	

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