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FCC TEST REPORT

FCC 47 CFR Part 15C
Industry Canada RSS-247
Digital transmission systems operating within the 2400 – 2483.5 MHz band

Report Reference No. ..... :	G0M-1503-4600-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's name ..... :	Panasonic Industrial Devices Europe GmbH
Address ..... :	Zeppelinstr. 19 21337 Lüneburg GERMANY
Test specification:	
Standard..... :	47 CFR Part 15C RSS-247, Issue 1, 2015-05 RSS-Gen, Issue 4, 2014-11 ANSI C63.10:2013 ANSI C63.4:2014
Test scope…….. ..... :	complete Radio compliance test
Equipment under test (EUT):	
Product description	Wireless LAN Embedded Module
Model No.	ENW49A01A3EF
Additional Model(s)	ENW49A01C3EF
Brand Name(s)	PAN9320
Hardware version	03
Firmware / Software version	01
	FCC-ID: T7V-9320 IC: N/A
Test result	**Passed**

Possible test case verdicts:

- neither assessed nor tested ..... : N/N
- required by standard but not appl. to test object ..... : N/A
- required by standard but not tested ..... : N/T
- not required by standard for the test object ..... : N/R
- test object does meet the requirement ..... : P (Pass)
- test object does not meet the requirement ..... : F (Fail)

Testing:

Test Lab Temperature ..... : 20 – 23 °C

Test Lab Humidity ..... : 32 – 38 %

Date of receipt of test item ..... : 2015-12-01

Date (s) of performance of tests ..... : 2015-12-08 - 2015-12-09

Compiled by ..... : Christian Weber

Tested by (+ signature) ..... : Wilfried Treffke ..... W. Treffke .....
(Responsible for Test)

Approved by (+ signature) ..... : Christian Weber ..... C. Weber .....
(Deputy Head of Lab)

Date of issue ..... : 2016-03-09

Total number of pages ..... : 82

General remarks:

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

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

Additional comments:

Version History

Version	Issue Date	Remarks	Revised by
01	2016-03-08	Initial Release	

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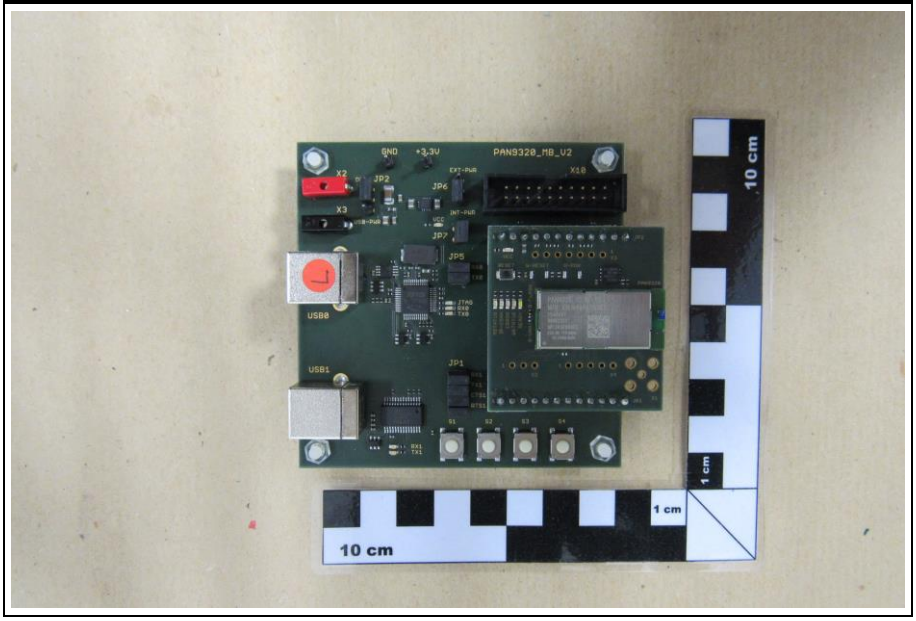
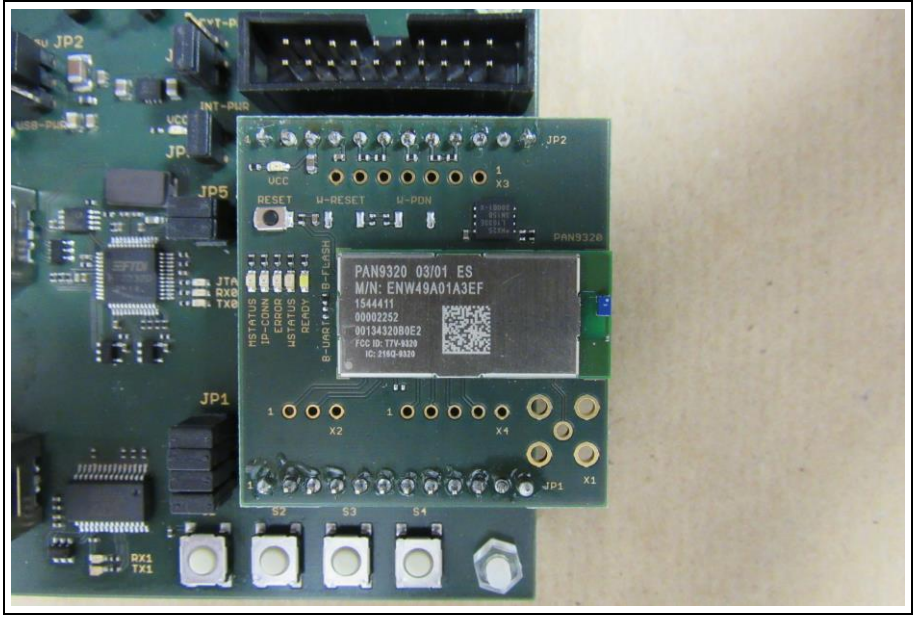
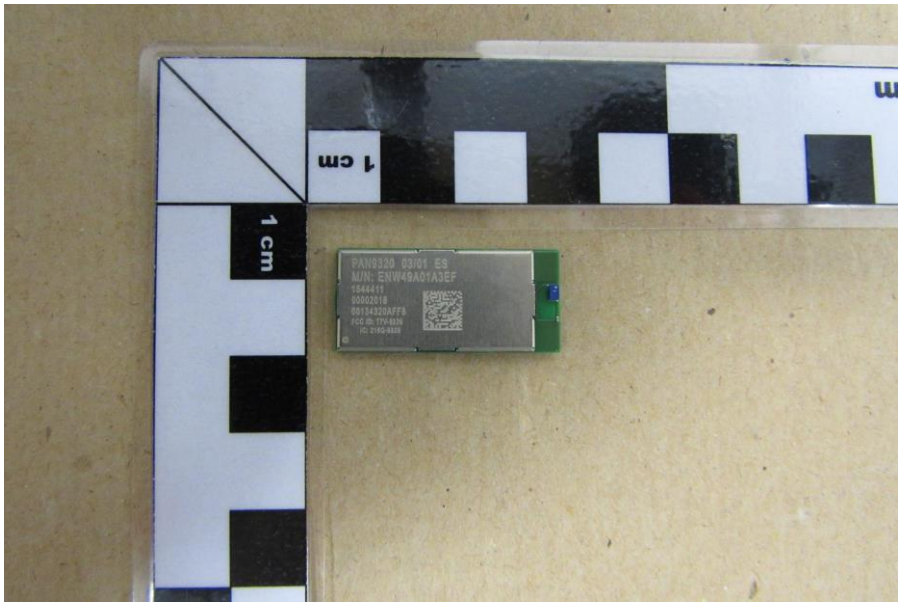
1 Equipment (Test item) Description

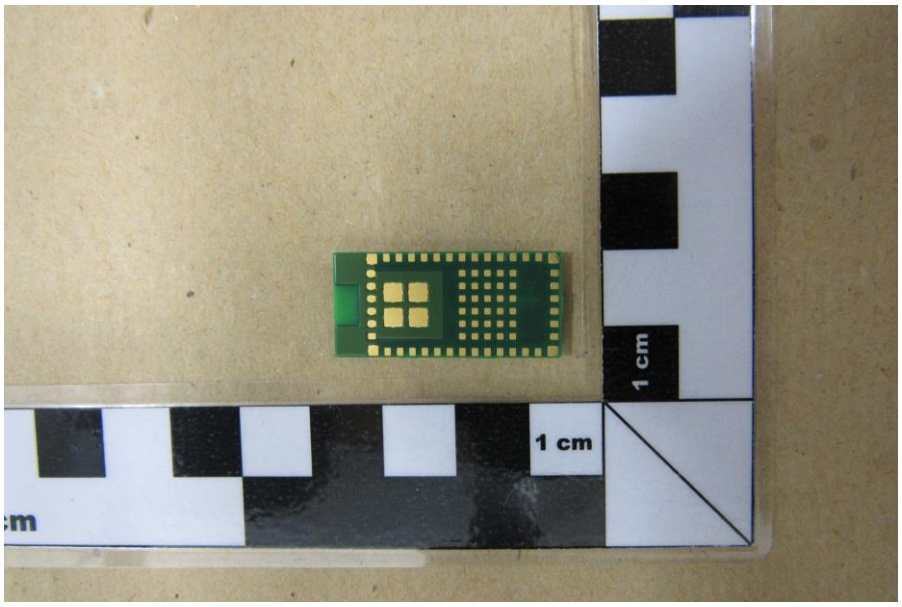
Description	Wireless LAN Embedded Module			
Model	ENW49A01A3EF			
Additional Model(s)	ENW49A01C3EF			
Brand Name(s)	PAN9320			
Serial number	None			
Hardware version	03			
Software / Firmware version	01			
FCC-ID	T7V-9320			
IC	N/A			
Equipment type	Radio module			
Radio type	Transceiver			
Radio technology	IEEE 802.11 b/g/n			
Operating frequency range	2412 - 2462 MHz			
Assigned frequency band	2400 - 2483.5 MHz			
Main test frequencies	F_{LOW20}	2412 MHz	F_{LOW40}	2422 MHz
	F_{MID20}	2437 MHz	F_{MID40}	2437 MHz
	F_{HIGH20}	2462 MHz	F_{HIGH40}	2452 MHz
Spreading	CCK, DSSS, OFDM			
Modulations	BPSK, QPSK, 16-QAM, 64-QAM			
Number of channels	11			
Channel spacing	5 MHz			
Number of antennas	1			
Antenna	Type	integrated		
	Model	ANT2012LL13R2400A		
	Manufacturer	Yageo		
	Gain	+0.8 dBi (manufacturer declaration)		
Manufacturer	Panasonic Industrial Devices Europe GmbH Zeppelinstr. 19 21337 Lüneburg GERMANY			
Power supply	V_{NOM}	3.3 VDC		
	V_{MIN}	3.0 VDC		
	V_{MAX}	3.6 VDC		
AC/DC-Adaptor	Model	N/A		
	Vendor	N/A		
	Input	N/A		
	Output	N/A		

1.1 Photos – Equipment External

ENW49A01A3EF ON EVALUATION BOARD


ENW49A01A3EF ON EVALUATION BOARD


ENW49A01A3EF MODULE TOP WITH SHIELDING


ENW49A01A3EF MODULE BOTTOM


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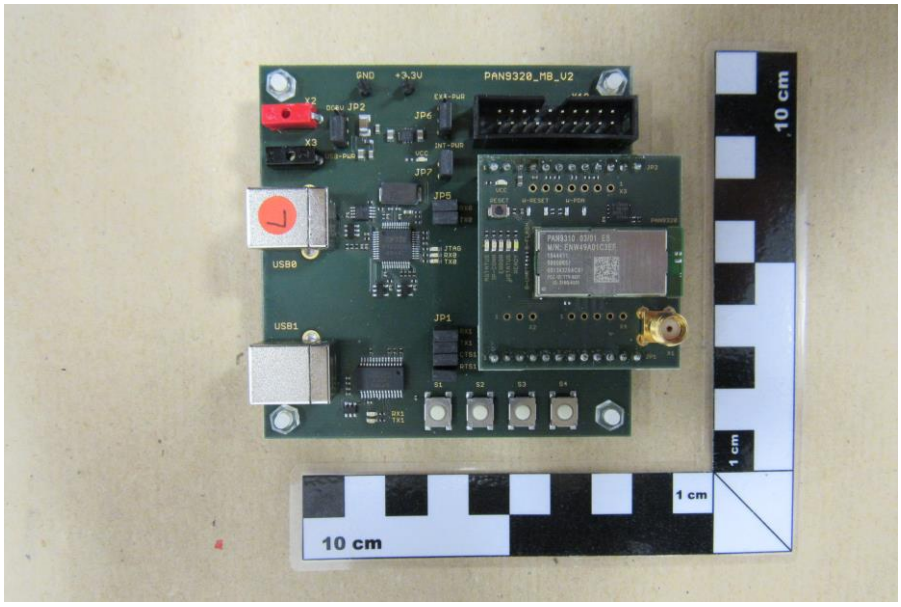
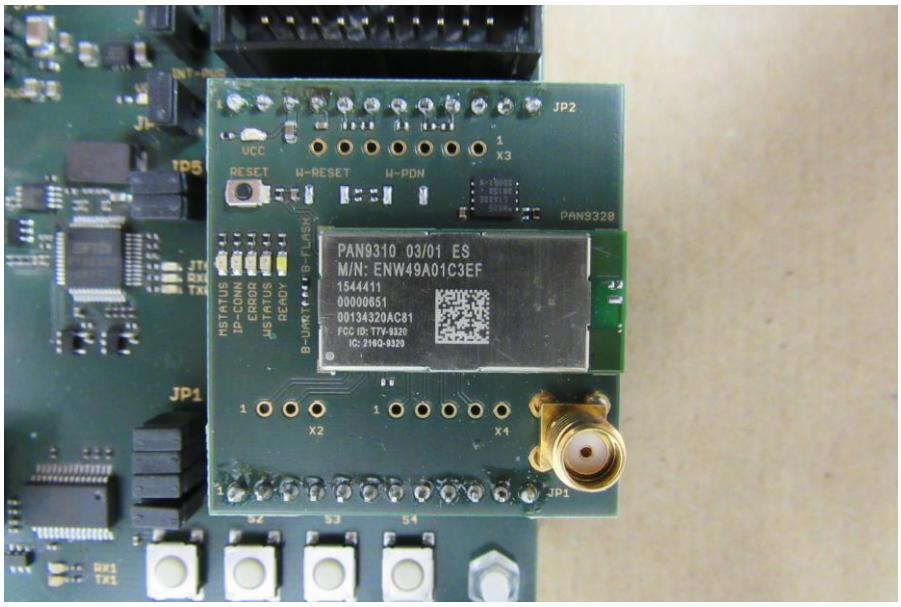
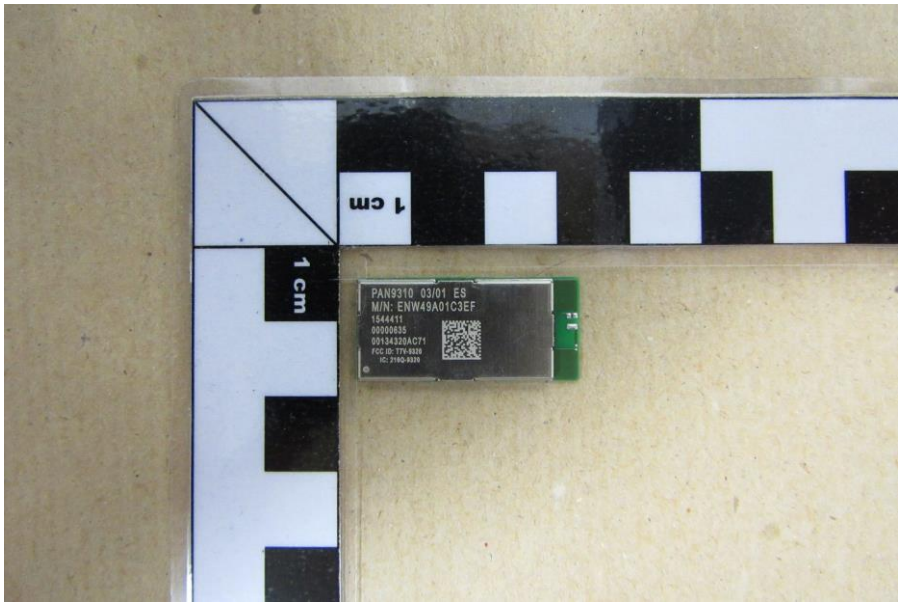
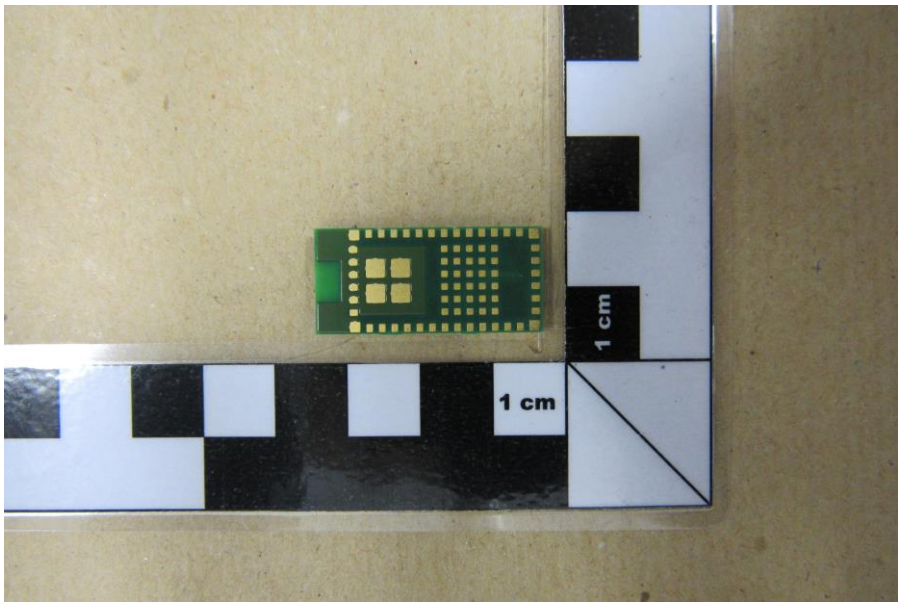


ENW49A01C3EF ON EVALUATION BOARD


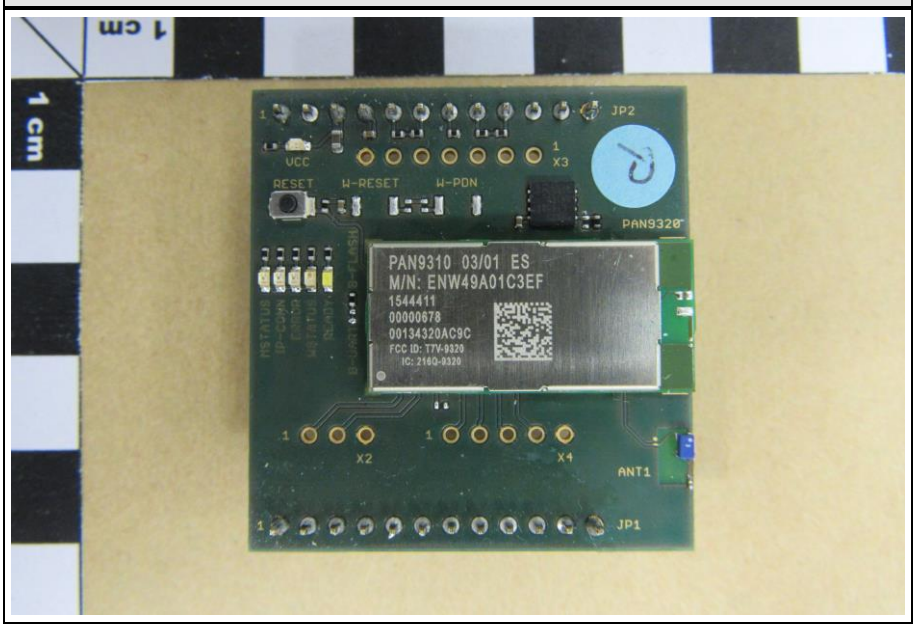
ENW49A01C3EF MODULE TOP WITH SHIELDING



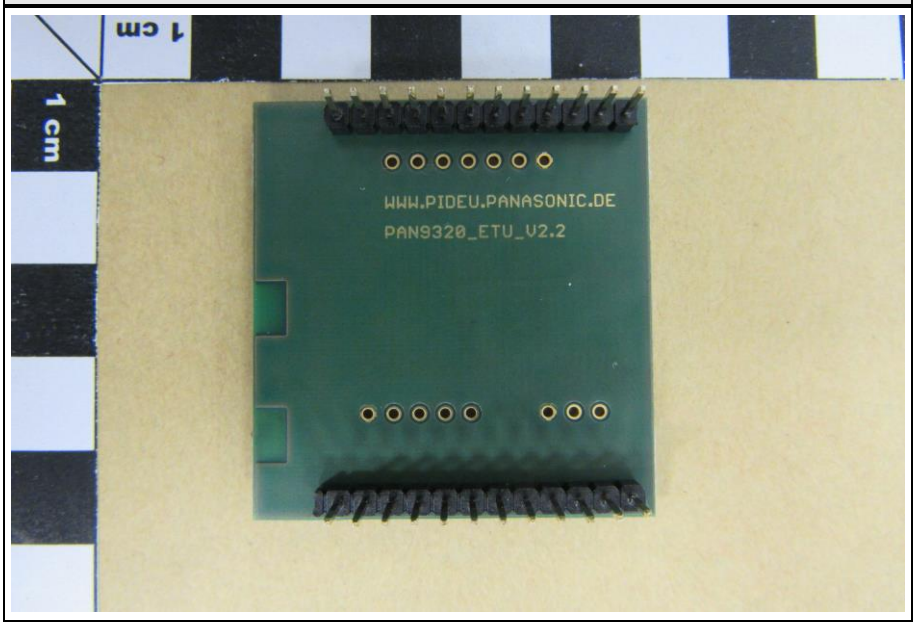
ENW49A01C3EF MODULE BOTTOM



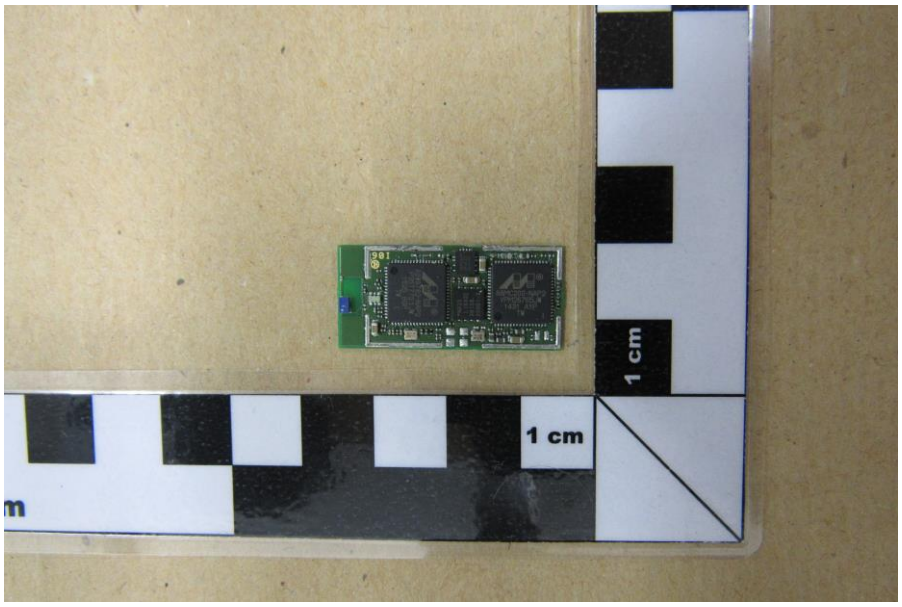
ENW49A01C3EF REFERENCE DESIGN TOP

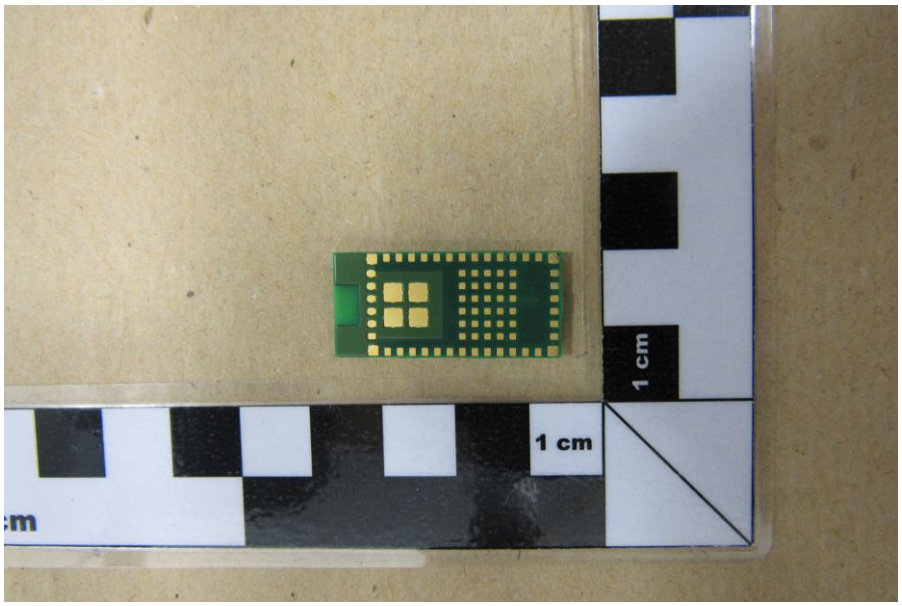


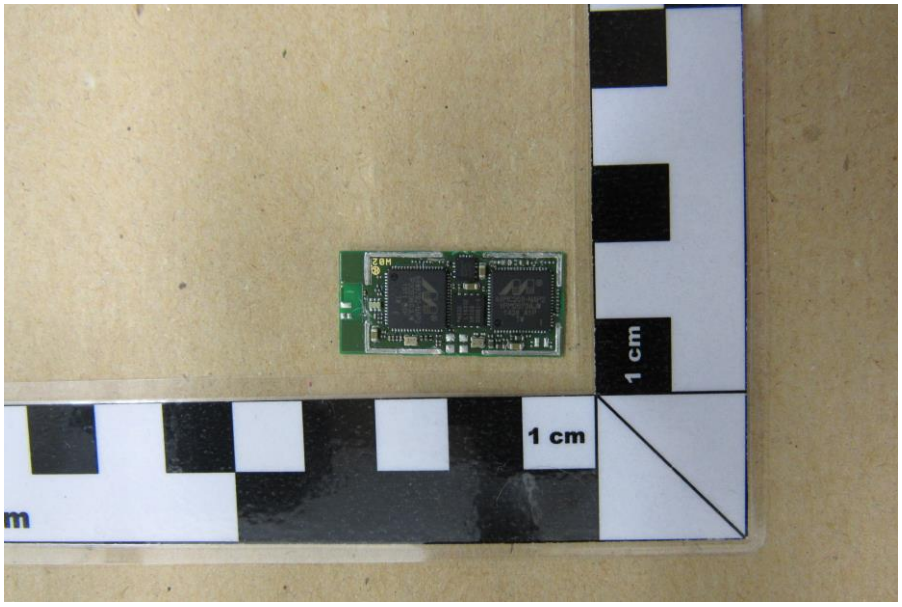
ENW49A01C3EF REFERENCE DESIGN BOTTOM

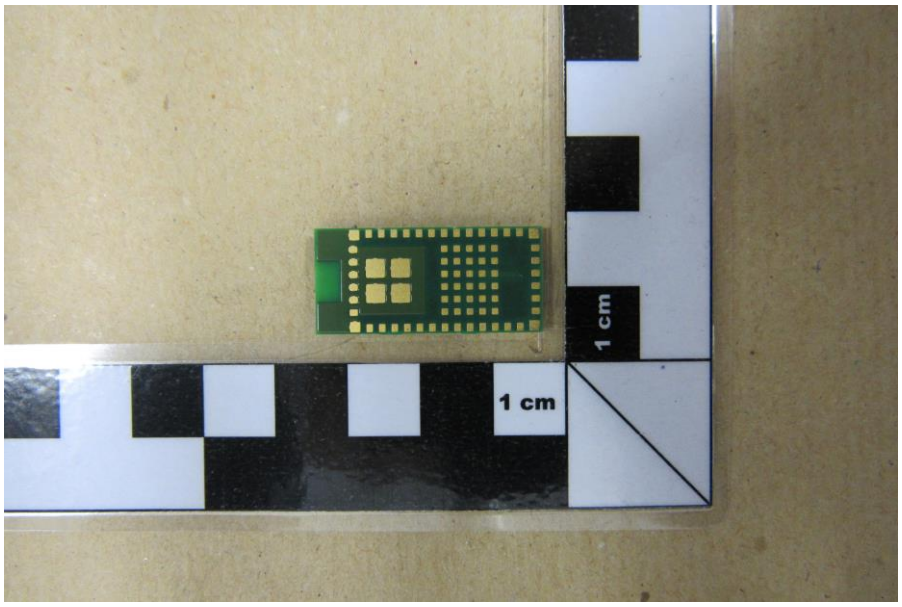


1.2 Photos – Equipment internal

ENW49A01A3EF MODULE TOP WITHOUT SHIELDING


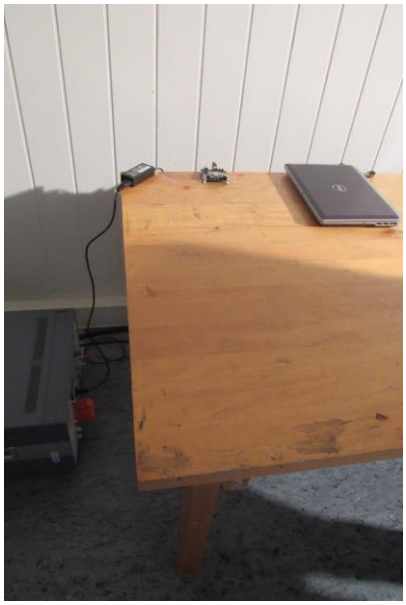
ENW49A01A3EF MODULE BOTTOM


ENW49A01C3EF MODULE TOP WITHOUT SHIELDING


ENW49A01C3EF MODULE BOTTOM


1.3 Photos – Test setup

TEST SETUP: RADIATED EMISSIONS

TEST SETUP: CONDUCTED EMISSIONS


1.4 Supporting Equipment Used During Testing

Product Type*	Device	Manufacturer	Model No.	Comments
None				

***Note:** Use the following abbreviations:

AE : Auxiliary/Associated Equipment, or

SIM : Simulator (Not Subjected to Test)

CABL : Connecting cables

1.5 Test Modes

Mode #	Description	
DSSS	General conditions:	EUT powered by laboratory power supply.
	Radio conditions:	Mode = standalone transmit Spreading = DSSS Modulation = BPSK Data rate = 1 Mbps Bandwidth = 20 MHz Duty cycle = 100 % Power level = 18 dBm (Test mode setting)
OFDM	General conditions:	EUT powered by laboratory power supply.
	Radio conditions:	Mode = standalone transmit Spreading = OFDM Modulation = BPSK Data rate = 6 Mbps Bandwidth = 20 MHz Duty cycle = 100 % Power level = 16 dBm (Test mode setting)
HT20	General conditions:	EUT powered by laboratory power supply.
	Radio conditions:	Mode = standalone transmit Spreading = OFDM Modulation = BPSK Data rate = MCS0 Bandwidth = 20 MHz Duty cycle = 100 % Power level = 15 dBm (Test mode setting)
HT40	General conditions:	EUT powered by laboratory power supply.
	Radio conditions:	Mode = standalone transmit Spreading = OFDM Modulation = BPSK Data rate = MCS0 Bandwidth = 40 MHz Duty cycle = 100 % Power level = 13 dBm (Test mode setting)
Receive	General conditions:	EUT powered by laboratory power supply.
	Radio conditions:	Mode = standalone receive Spreading = DSSS / OFDM

AC-Powerline	General conditions:	EUT powered by commercial AC/DC-Adapter
	Radio conditions:	Mode = standalone transmit Spreading = DSSS Power level = Maximum

1.6 Test Equipment Used During Testing

Measurement Software			
Description	Manufacturer	Name	Version
EMC Test Software	Dare Instruments	Radimation	2014.1.15
EMC Test Software	Dare Instruments	Radimation	2014.2.3

Occupied Bandwidth					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	R&S	FSU 26	EF01003	2015-04	2016-04

6dB Bandwidth					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	R&S	FSU 26	EF01003	2015-04	2016-04

Maximum peak conducted power					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	R&S	FSU 26	EF01003	2015-04	2016-04

Power spectral density					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	R&S	FSU 26	EF01003	2015-04	2016-04

Band edge compliance					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	R&S	FSU 26	EF01003	2015-04	2016-04

Conducted spurious emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	R&S	FSU 26	EF01003	2015-04	2016-04

Radiated spurious emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Semi-anechoic chamber	Frankonia	AC 1	EF00062	-	-
Spectrum Analyzer	R&S	FSIQ26	EF00242	2015-04	2016-04
Biconical Antenna	R&S	HK 116	EF00012	2013-02	2016-02
LPD Antenna	R&S	HL 223	EF00187	2014-03	2017-03
LPD Antenna	R&S	HL 025	EF00327	2015-10	2018-10

AC powerline conducted emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
AMN	R&S	ESH2-Z5	EF00182	2014-11	2016-11
AMN	R&S	ESH3-Z5	EF00036	2014-12	2016-12
EMI Test Receiver	R&S	ESCS 30	EF00295	2015-10	2016-10

1.7 Sample emission level calculation

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

Reading:

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

A.F.:

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

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, IC RSS-210				
Product Specific Standard Section	**Requirement – Test**	**Reference Method**	**Result**	**Remarks**
RSS-Gen 6.6	Occupied Bandwidth	ANSI C63.10	N/R	Informational only
FCC § 15.247(a)(2) IC RSS-247 § 5.2	6dB Bandwidth	ANSI C63.10	PASS	
FCC § 15.247(b)(3) IC RSS-247 § 5.4	Maximum peak conducted power	ANSI C63.10	PASS	
FCC § 15.247(e) IC RSS-247 § 5.2	Power spectral density	ANSI C63.10	PASS	
47 CFR 15.207 IC RSS-247 § 3.1	AC power line conducted emissions	ANSI C63.4	PASS	
FCC § 15.247(d) IC RSS-247 § 5.5	Band edge compliance	ANSI C63.10	PASS	
FCC § 15.247(d) IC RSS-247 § 5.5	Conducted spurious emissions	ANSI C63.10	PASS	
FCC § 15.247(d) FCC § 15.209 IC RSS-247 § 5.5	Transmitter radiated spurious emissions	ANSI C63.10	PASS	
IC RSS-247 § 3.1	Receiver radiated spurious emissions	ANSI C63.10	PASS	
Remarks:				

3 Test Conditions and Results

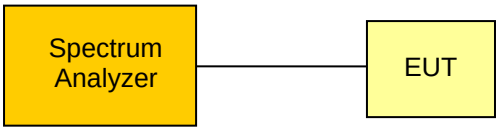
3.1 Test Conditions and Results – Occupied Bandwidth

Occupied Bandwidth acc. to IC RSS-Gen	**Verdict: N/R**
Test according to measurement reference	Reference Method
	ANSI C63.10
Test frequency range	Tested frequencies
	F_{LOW} / F_{MID} / F_{HIGH}

Limits

None (Informational only)

Test setup



Test procedure

1. EUT set to test mode (Communication tester is used if needed)
2. Span set to at least twice the emission spectrum
3. Resolution bandwidth set to 1 % of span
4. Occupied Bandwidth (99 %) measurement with spectrum analyzer built in measurement function

Test results

Channel	Frequency [MHz]	Mode	Occupied Bandwidth [MHz]
F_{LOW20}	2412	DSSS	13.702
F_{MID20}	2437	DSSS	13.774
F_{HIGH20}	2462	DSSS	13.846
F_{LOW20}	2412	OFDM	16.875
F_{MID20}	2437	OFDM	16.875
F_{HIGH20}	2462	OFDM	16.875
F_{LOW20}	2412	HT20	17.957
F_{MID20}	2437	HT20	18.029
F_{HIGH20}	2462	HT20	18.029
F_{LOW40}	2422	HT40	36.683
F_{MID40}	2437	HT40	36.514
F_{HIGH40}	2452	HT40	36.514

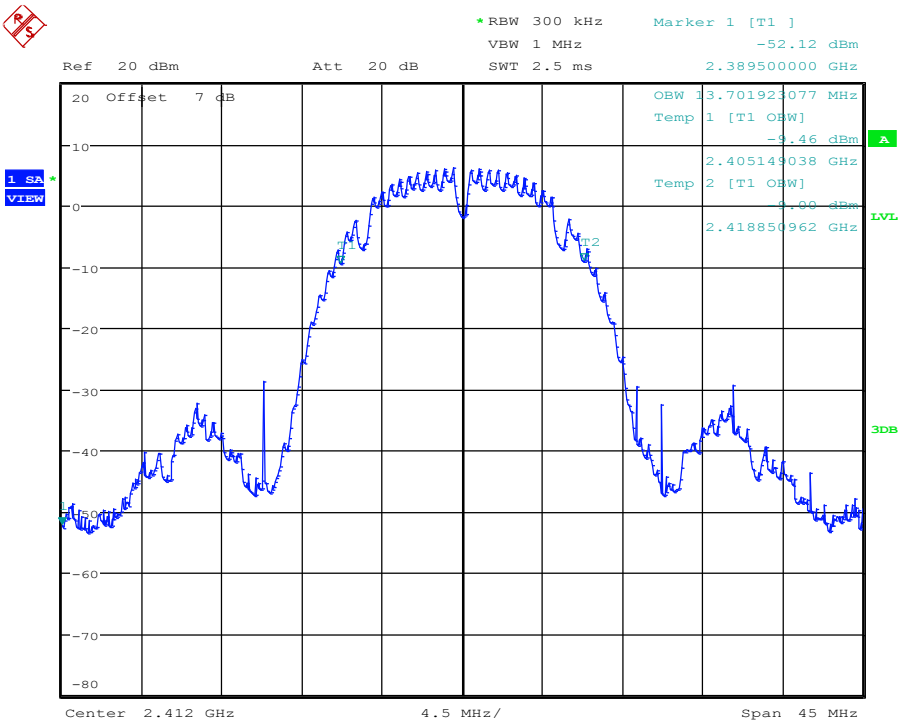
Comments:

Occupied Bandwidth – DSSS F_{LOW}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 b, 1 Mbps, 2412 MHz, modulated
Test Date:	2015-12-01
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	conducted measurement



Occupied bandwidth: 13701.9 KHz

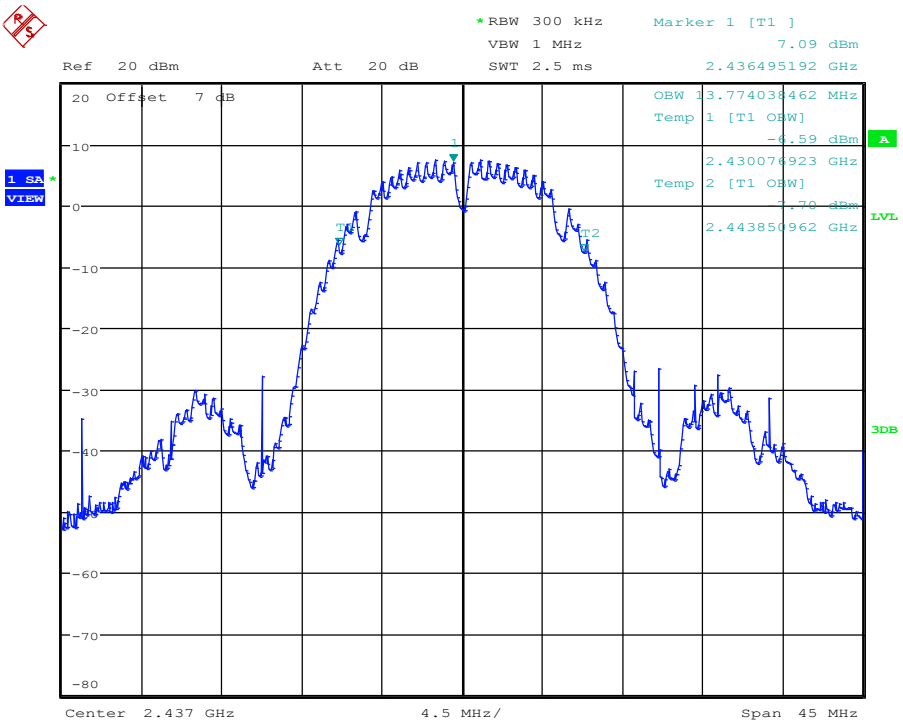
Date: 1.DEC.2015 12:34:43

Occupied Bandwidth – DSSS F_{MID}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 b, 1 Mbps, 2437 MHz, modulated
Test Date:	2015-12-01
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	conducted measurement



Occupied bandwidth: 13774 KHz

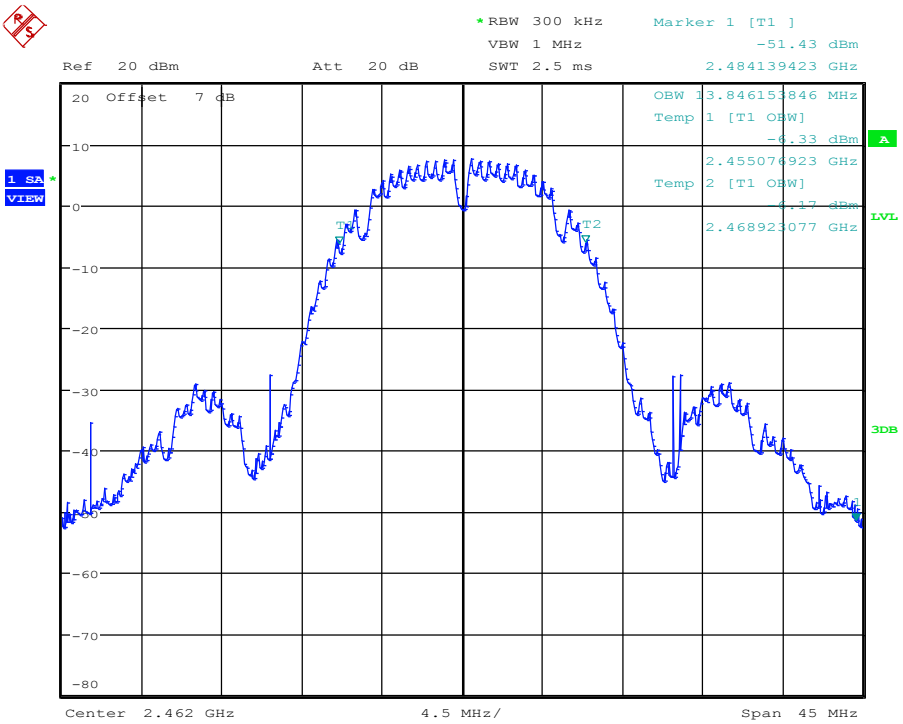
Date: 1.DEC.2015 12:32:32

Occupied Bandwidth – DSSS F_{HIGH}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 b, 1 Mbps, 2462 MHz, modulated
Test Date:	2015-12-01
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	conducted measurement



Occupied bandwidth: 13846.2 KHz

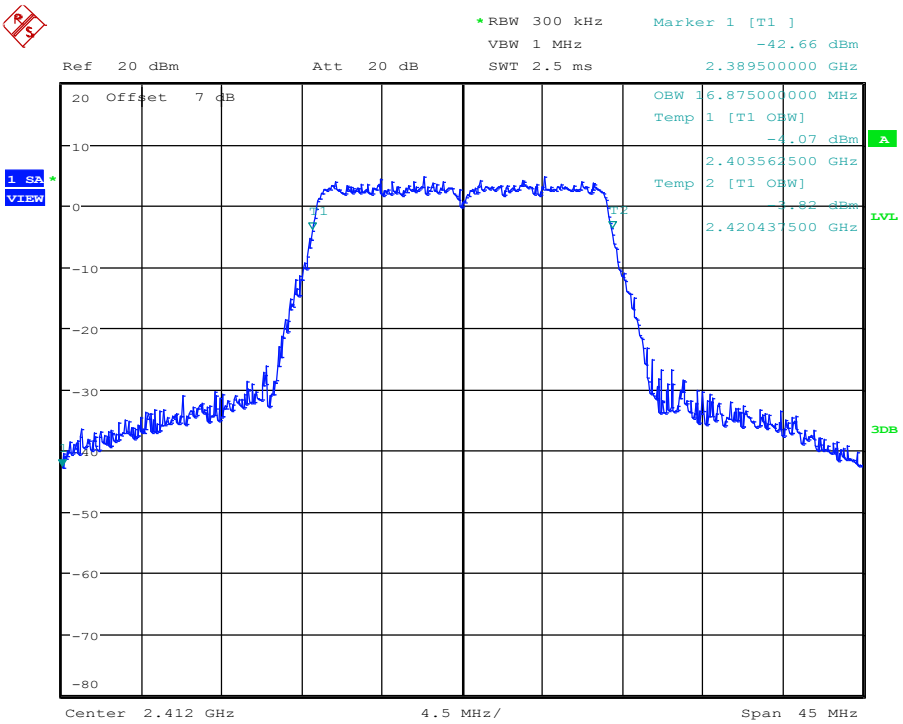
Date: 1.DEC.2015 12:36:32

Occupied Bandwidth – OFDM F_{LOW}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 g, 6 Mbps, 2412 MHz, modulated
Test Date:	2015-12-01
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	conducted measurement



Occupied bandwidth: 16875 KHz

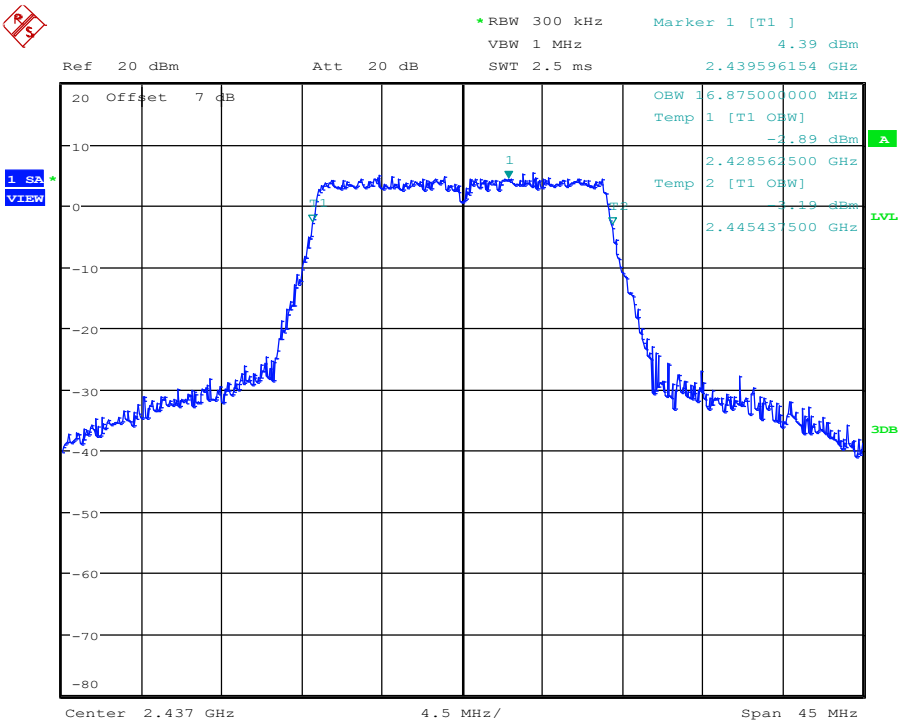
Date: 1.DEC.2015 13:18:32

Occupied Bandwidth – OFDM F_{MID}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 g, 6 Mbps, 2437 MHz, modulated
Test Date:	2015-12-01
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	conducted measurement



Occupied bandwidth: 16875 KHz

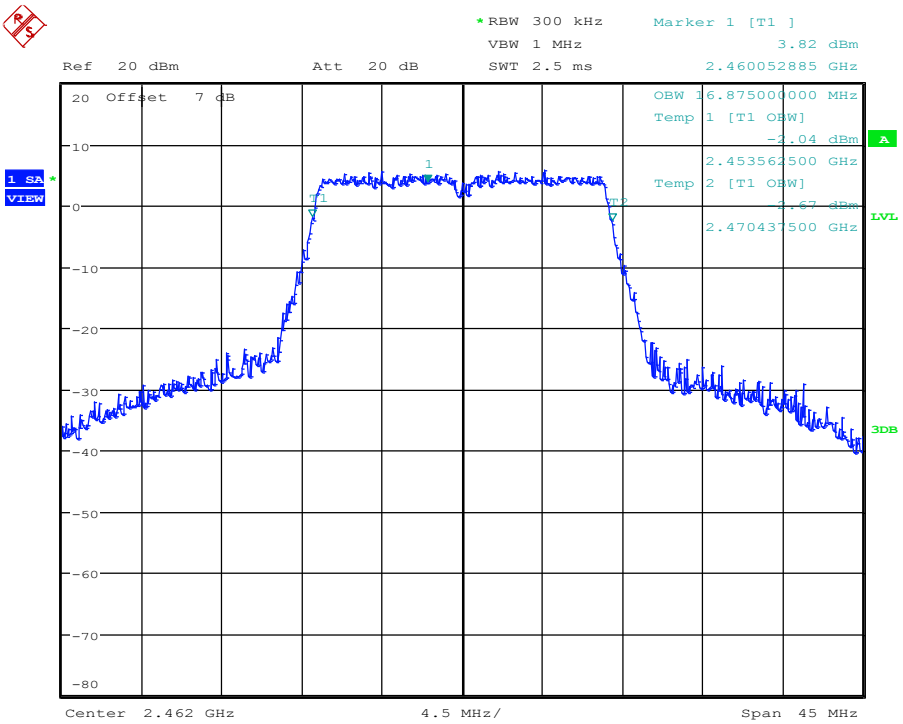
Date: 1.DEC.2015 13:21:10

Occupied Bandwidth – OFDM F_{HIGH}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 g, 6 Mbps, 2462 MHz, modulated
Test Date:	2015-12-01
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	conducted measurement



Occupied bandwidth: 16875 KHz

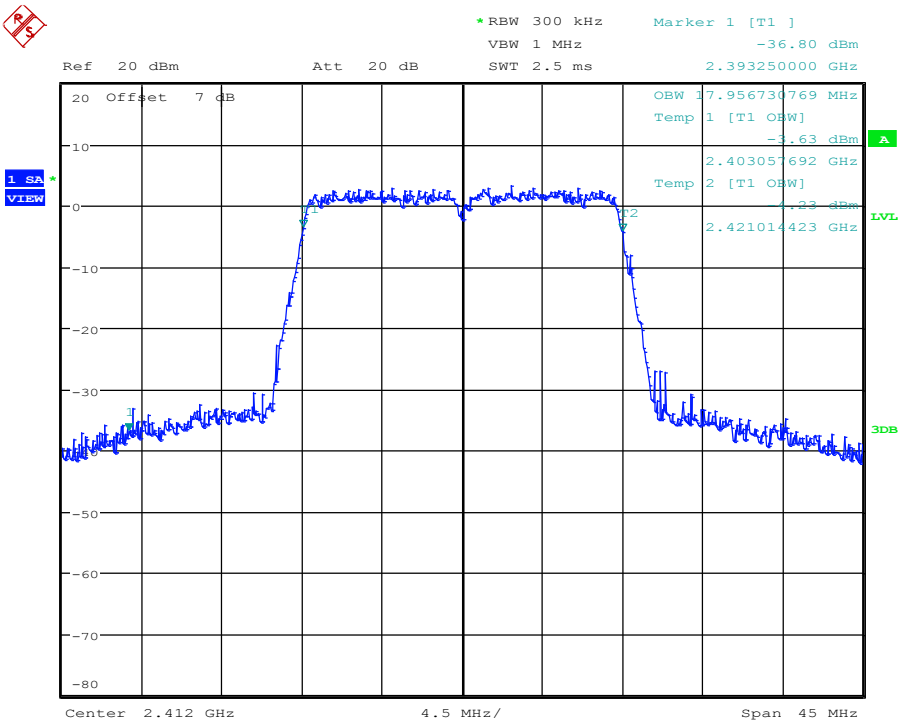
Date: 1.DEC.2015 13:22:53

Occupied Bandwidth – HT20 F_{LOW}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 n HT20, MCS0, 2412 MHz, modulated
Test Date:	2015-12-01
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	conducted measurement



Occupied bandwidth: 17956.7 KHz

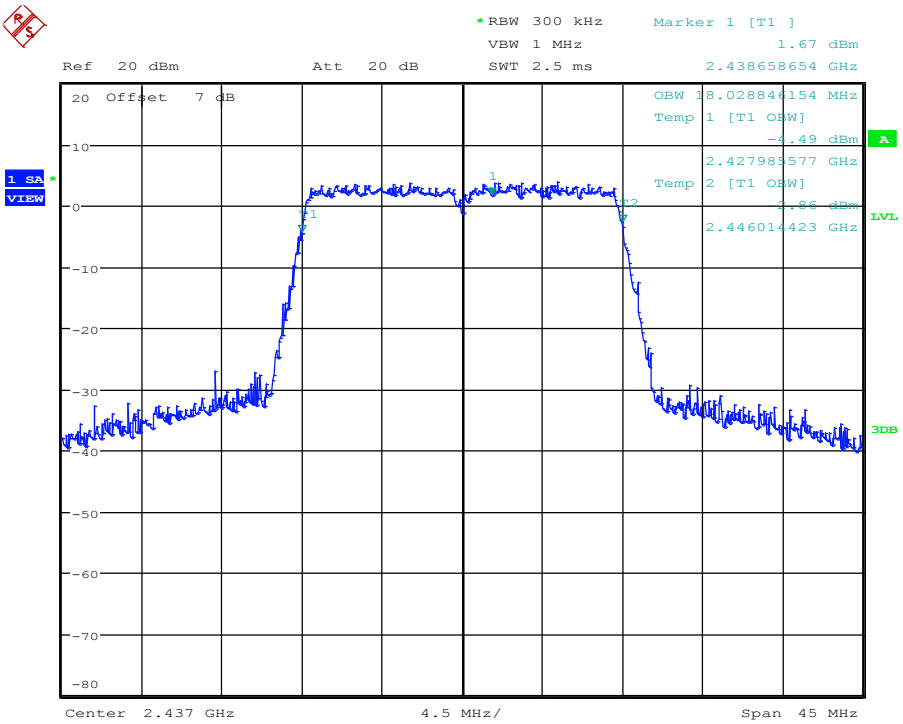
Date: 1.DEC.2015 13:25:24

Occupied Bandwidth – HT20 F_{MID}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 n HT20, MCS0, 2437 MHz, modulated
Test Date:	2015-12-01
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	conducted measurement



Occupied bandwidth: 18028.8 KHz

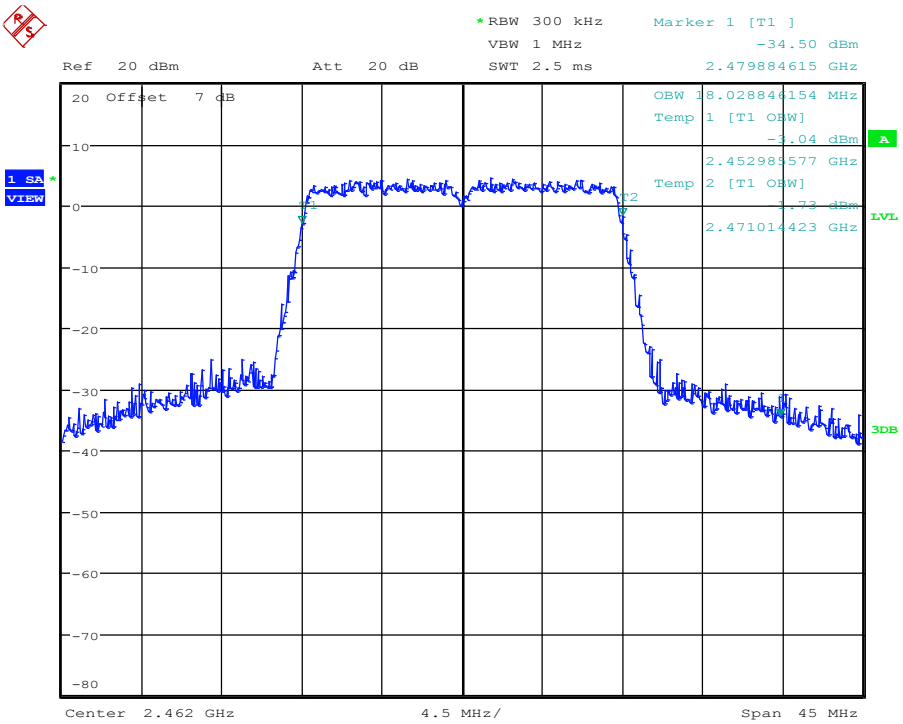
Date: 1.DEC.2015 13:27:08

Occupied Bandwidth – HT20 F_{HIGH}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 n HT20, MCS0, 2462 MHz, modulated
Test Date:	2015-12-01
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	conducted measurement



Occupied bandwidth: 18028.8 KHz

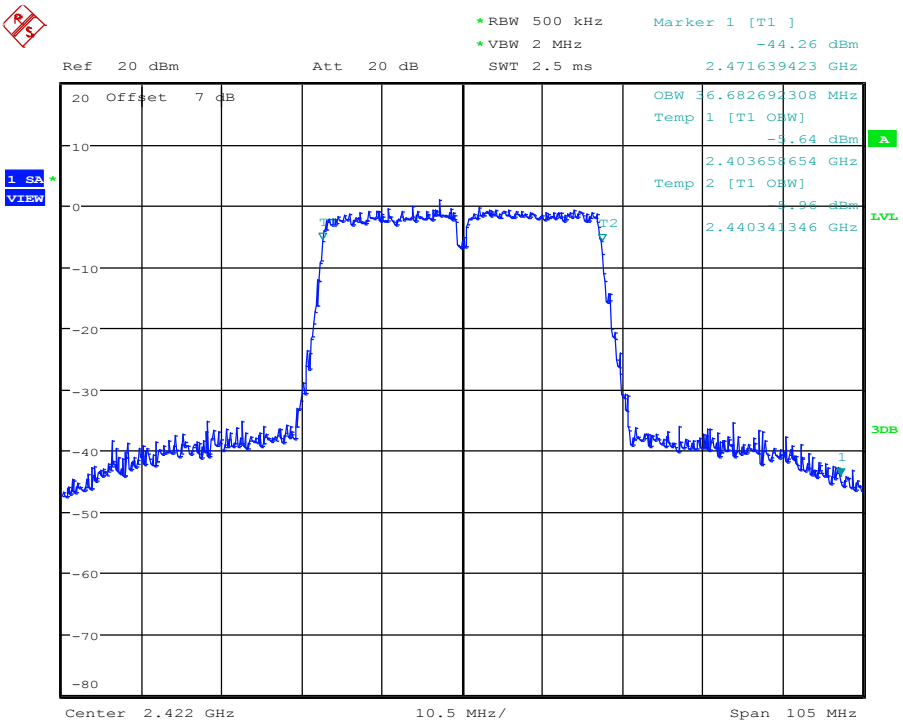
Date: 1.DEC.2015 13:28:45

Occupied Bandwidth – HT40 F_{LOW}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 n HT40, MCS0, 2422 MHz, modulated
Test Date:	2015-12-01
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	conducted measurement



Occupied bandwidth: 36682.7 KHz

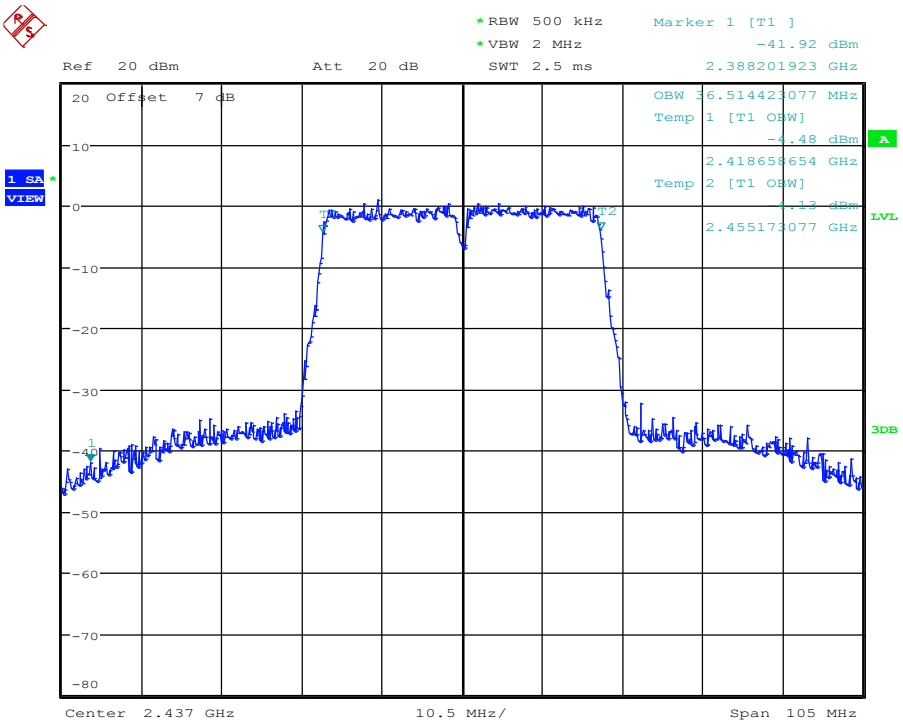
Date: 1.DEC.2015 13:33:46

Occupied Bandwidth – HT40 F_{MID}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 n HT40, MCS0, 2437 MHz, modulated
Test Date:	2015-12-01
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	conducted measurement



Occupied bandwidth: 36514.4 KHz

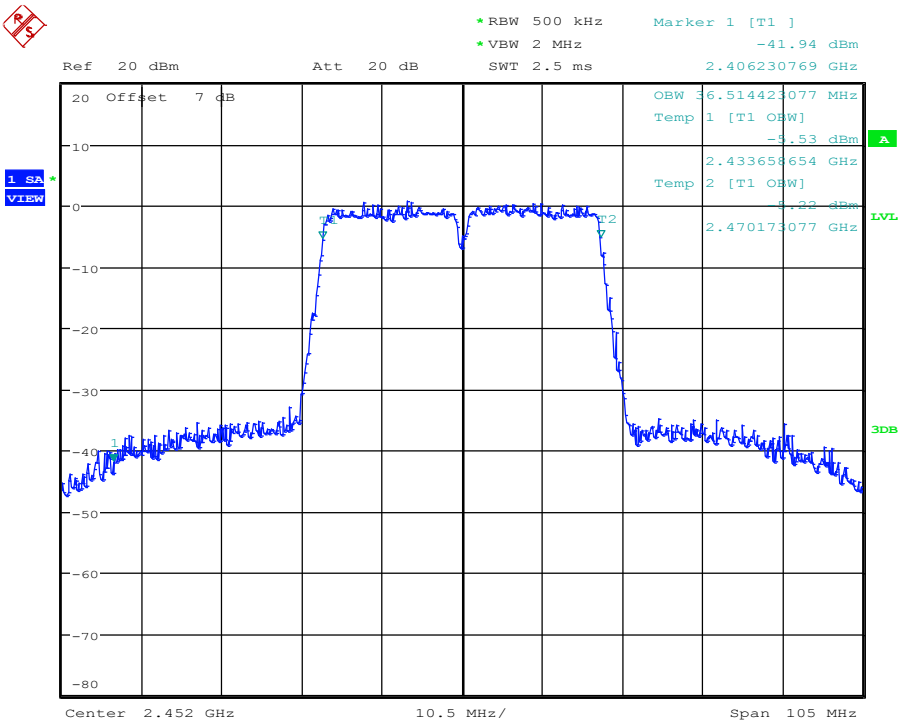
Date: 1.DEC.2015 13:35:22

Occupied Bandwidth – HT40 F_{HIGH}

Occupied Bandwidth acc. to RSS-Gen

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 n HT40, MCS0, 2452 MHz, modulated
Test Date:	2015-12-01
Verdict:	NONE (INFORMATION ONLY)
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	conducted measurement



Occupied bandwidth: 36514.4 KHz

Date: 1.DEC.2015 13:36:54

3.2 Test Conditions and Results – 6 dB Bandwidth

6dB Bandwidth acc. to FCC 15.247 / IC RSS-247	**Verdict: PASS**
EUT requirement rule parts and clause	Reference
	FCC 15.247(a)(2) / IC RSS-247 5.2
Test according to measurement reference	Reference Method
	ANSI C63.10
Test frequency range	Tested frequencies
	F_{LOW} / F_{MID} / F_{HIGH}
Limits	
Limit	
≥ 500kHz	
Test setup	
Spectrum Analyzer — EUT	
Test procedure	
1. EUT set to test mode 2. Span set to at least twice the emission spectrum 3. Detector set to peak and max hold and RBW is set to 100 kHz 4. Envelope peak value of emission spectrum is selected 5. Marker on envelope of spectrum is set to level of -6 dB to the left of the peak 6. Marker on envelope of spectrum is set to level of -6 dB to the right of the peak 7. 6 dB Bandwidth is determined by marker frequency separation	

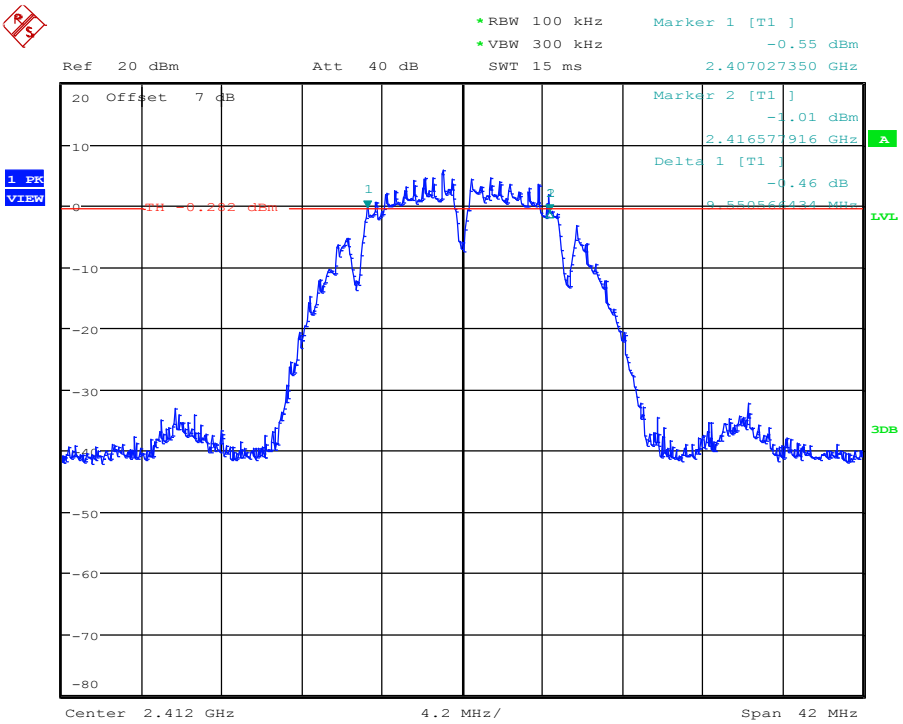
Test results					
Channel	Frequency [MHz]	Mode	6 dB Bandwidth [kHz]	Limit [kHz]	Result
F_{LOW20}	2412	DSSS	9550.6	500	PASS
F_{MID20}	2437	DSSS	9659.9	500	PASS
F_{HIGH20}	2462	DSSS	10096.6	500	PASS
F_{LOW20}	2412	OFDM	16415.9	500	PASS
F_{MID20}	2437	OFDM	16415.8	500	PASS
F_{HIGH20}	2462	OFDM	16415.9	500	PASS
F_{LOW20}	2412	HT20	17663.9	500	PASS
F_{MID20}	2437	HT20	17663.9	500	PASS
F_{HIGH20}	2462	HT20	17663.9	500	PASS
F_{LOW40}	2422	HT40	36539.8	500	PASS
F_{MID40}	2437	HT40	36539.8	500	PASS
F_{HIGH40}	2452	HT40	36539.8	500	PASS
Comments:					

6 dB Bandwidth – DSSS F_{LOW}

Minimum 6 dB Bandwidth acc. to FCC 15.247

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 b, 1 Mbps, 2412 MHz
Test Date:	2015-12-01
Verdict:	PASS
Note 1:	Procedure according to ANSI C63.10
Note 2:	Minimum 6 dB Bandwidth conducted



6 dB bandwidth: 9550.6 KHz > 500 KHz; verdict: PASS

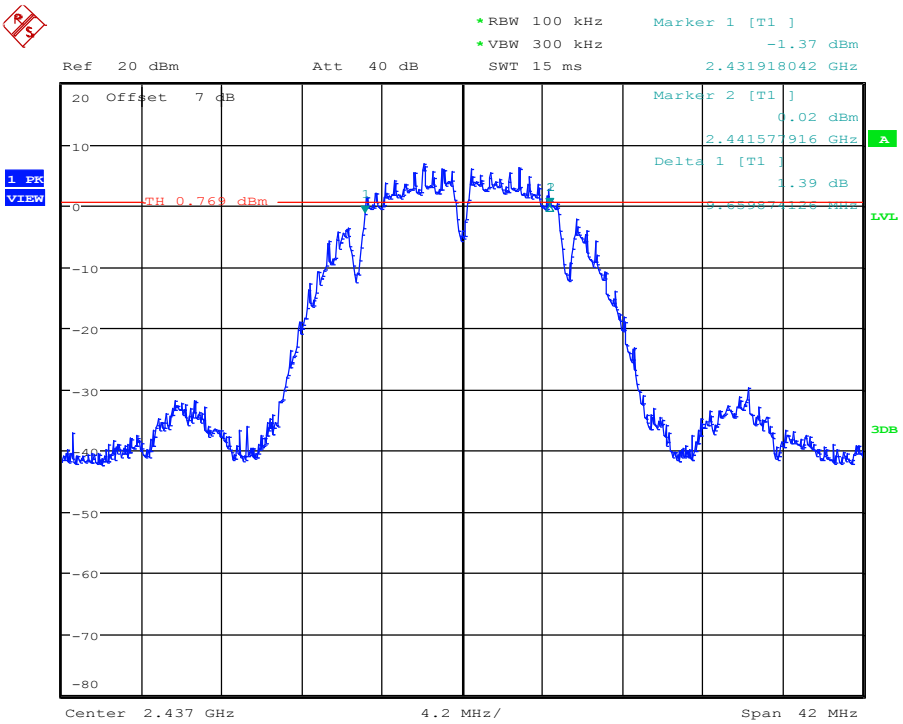
Date: 1.DEC.2015 13:40:06

6 dB Bandwidth – DSSS F_{MID}

Minimum 6 dB Bandwidth acc. to FCC 15.247

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 b, 1 Mbps, 2437 MHz
Test Date:	2015-12-01
Verdict:	PASS
Note 1:	Procedure according to ANSI C63.10
Note 2:	Minimum 6 dB Bandwidth conducted



6 dB bandwidth: 9659.9 KHz > 500 KHz; verdict: PASS

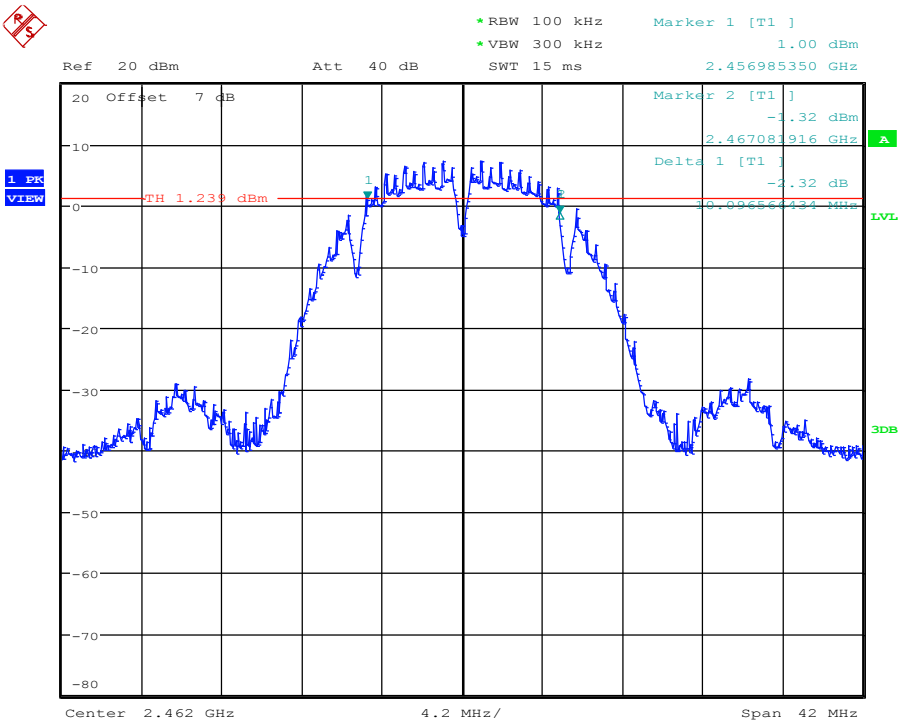
Date: 1.DEC.2015 13:41:56

6 dB Bandwidth – DSSS F_{HIGH}

Minimum 6 dB Bandwidth acc. to FCC 15.247

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 b, 1 Mbps, 2462 MHz
Test Date:	2015-12-01
Verdict:	PASS
Note 1:	Procedure according to ANSI C63.10
Note 2:	Minimum 6 dB Bandwidth conducted



6 dB bandwidth: 10096.6 KHz > 500 KHz; verdict: PASS

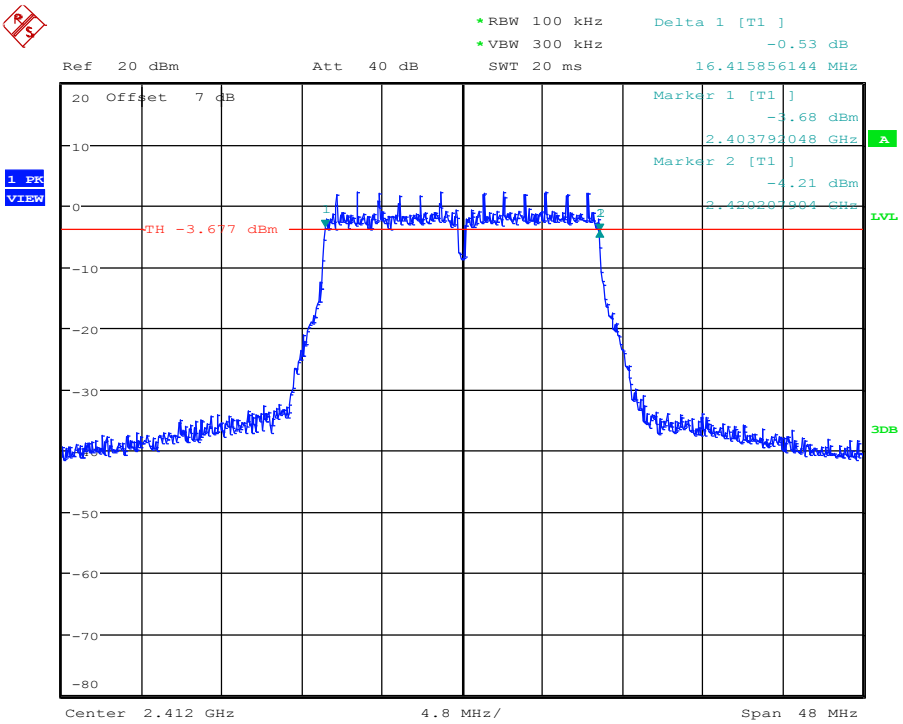
Date: 1.DEC.2015 13:45:38

6 dB Bandwidth – OFDM F_{LOW}

Minimum 6 dB Bandwidth acc. to FCC 15.247

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 g, 6 Mbps, 2412 MHz
Test Date:	2015-12-01
Verdict:	PASS
Note 1:	Procedure according to ANSI C63.10
Note 2:	Minimum 6 dB Bandwidth conducted



6 dB bandwidth: 16415.9 KHz > 500 KHz; verdict: PASS

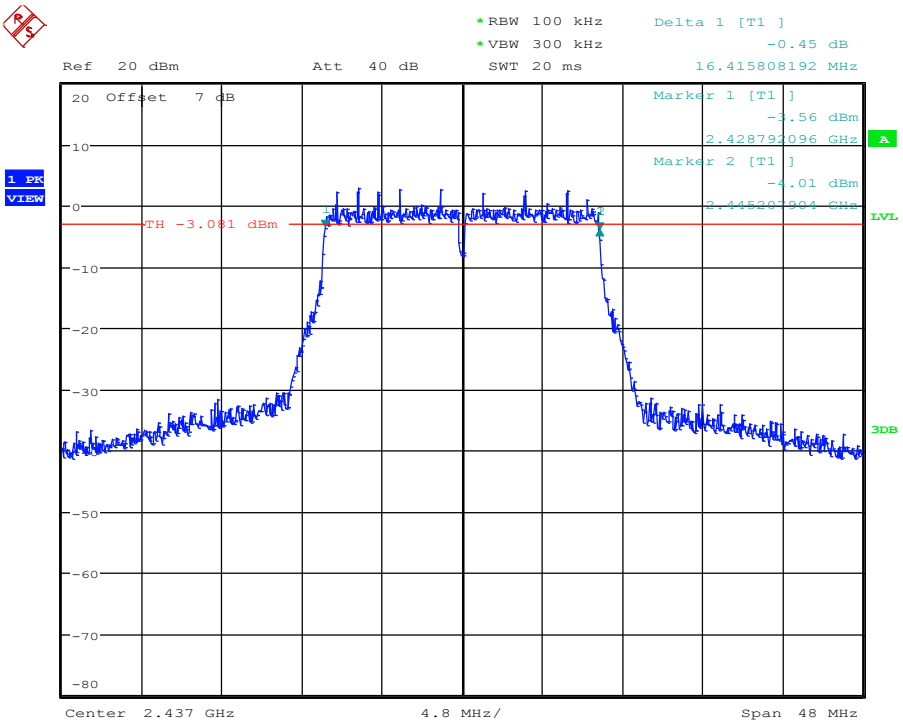
Date: 1.DEC.2015 13:47:35

6 dB Bandwidth – OFDM F_{MID}

Minimum 6 dB Bandwidth acc. to FCC 15.247

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 g, 6 Mbps, 2437 MHz
Test Date:	2015-12-01
Verdict:	PASS
Note 1:	Procedure according to ANSI C63.10
Note 2:	Minimum 6 dB Bandwidth conducted



6 dB bandwidth: 16415.8 KHz > 500 KHz; verdict: PASS

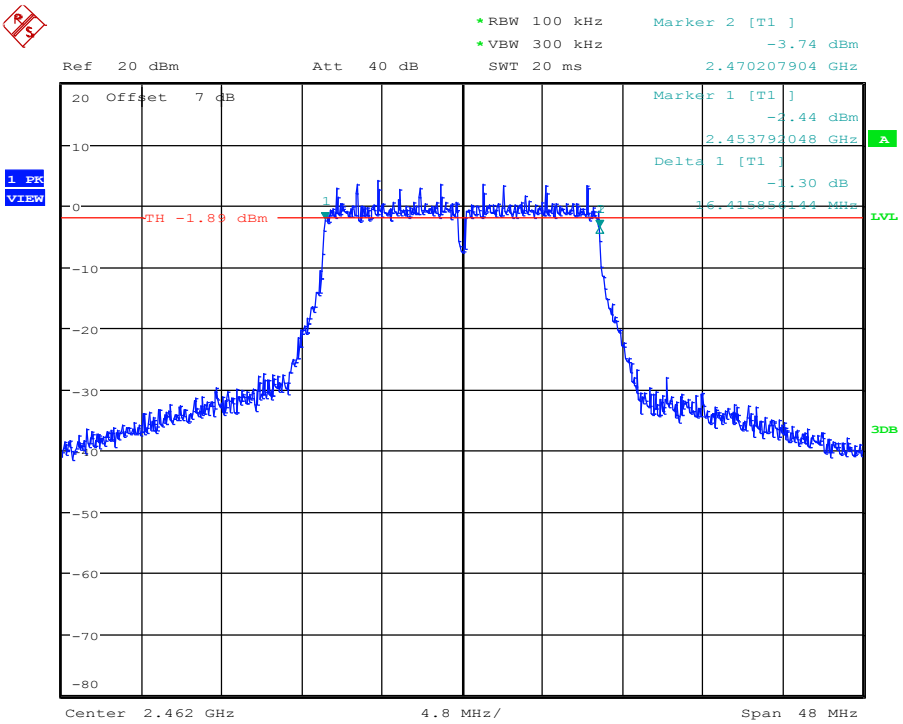
Date: 1.DEC.2015 13:49:29

6 dB Bandwidth – OFDM F_{HIGH}

Minimum 6 dB Bandwidth acc. to FCC 15.247

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 g, 6 Mbps, 2462 MHz
Test Date:	2015-12-01
Verdict:	PASS
Note 1:	Procedure according to ANSI C63.10
Note 2:	Minimum 6 dB Bandwidth conducted



6 dB bandwidth: 16415.9 KHz > 500 KHz; verdict: PASS

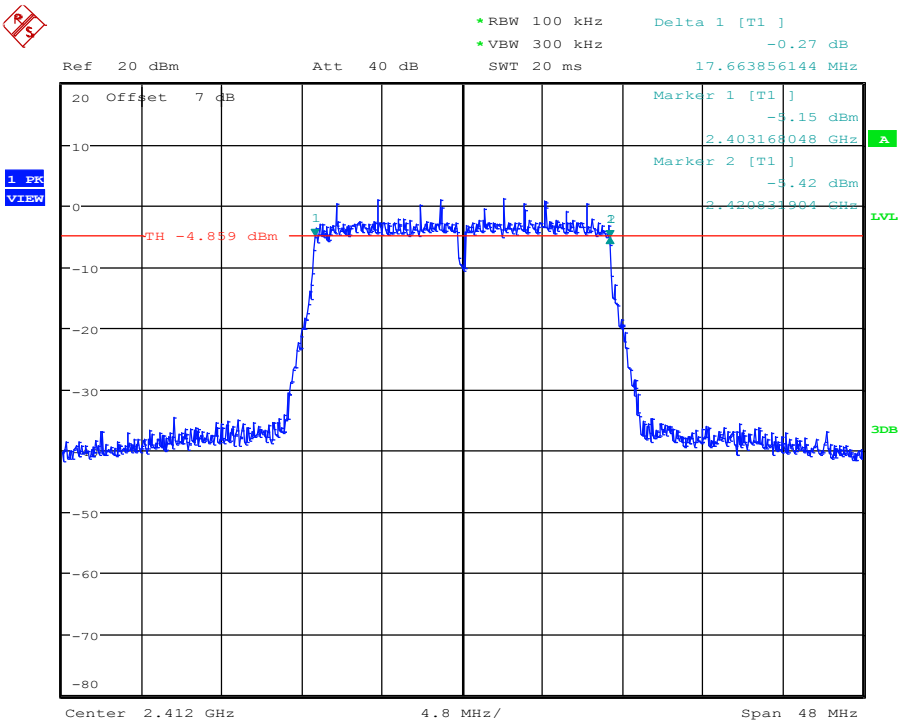
Date: 1.DEC.2015 13:51:29

6 dB Bandwidth – HT20 F_{LOW}

Minimum 6 dB Bandwidth acc. to FCC 15.247

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 n HT20, MCS0, 2412 MHz
Test Date:	2015-12-01
Verdict:	PASS
Note 1:	Procedure according to ANSI C63.10
Note 2:	Minimum 6 dB Bandwidth conducted



6 dB bandwidth: 17663.9 KHz > 500 KHz; verdict: PASS

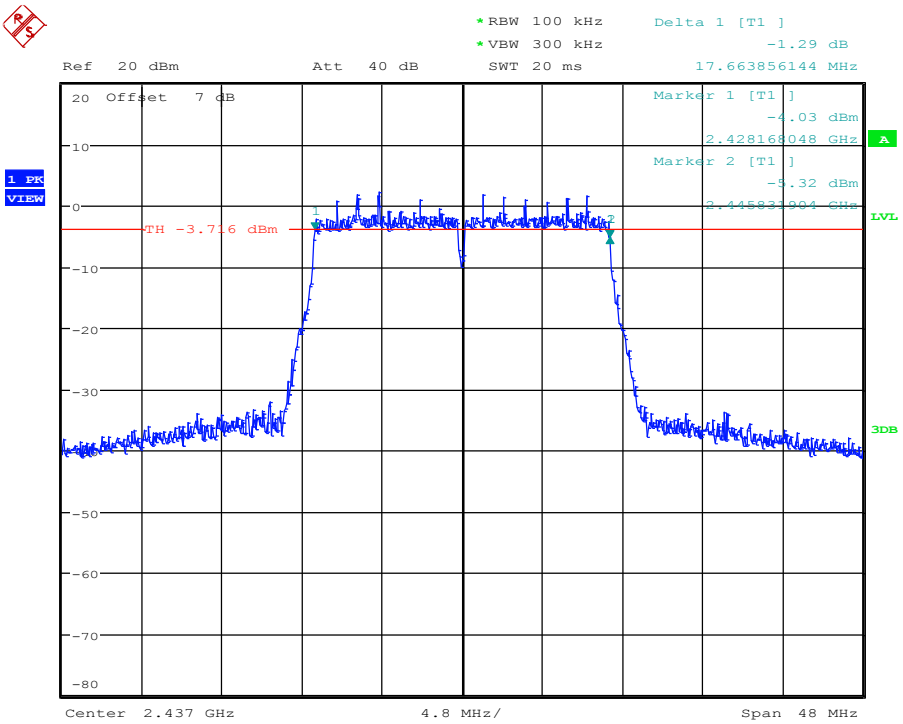
Date: 1.DEC.2015 13:53:22

6 dB Bandwidth – HT20 F_{MID}

Minimum 6 dB Bandwidth acc. to FCC 15.247

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 n HT20, MCS0, 2437 MHz
Test Date:	2015-12-01
Verdict:	PASS
Note 1:	Procedure according to ANSI C63.10
Note 2:	Minimum 6 dB Bandwidth conducted



6 dB bandwidth: 17663.9 KHz > 500 KHz; verdict: PASS

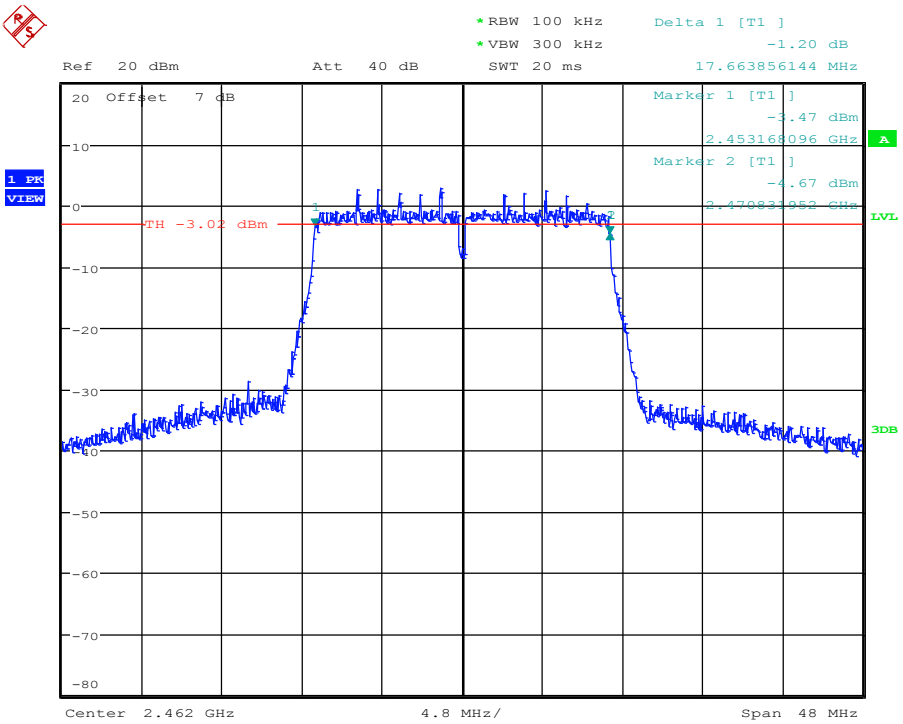
Date: 1.DEC.2015 13:55:07

6 dB Bandwidth – HT20 F_{HIGH}

Minimum 6 dB Bandwidth acc. to FCC 15.247

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 n HT20, MCS0, 2462 MHz
Test Date:	2015-12-01
Verdict:	PASS
Note 1:	Procedure according to ANSI C63.10
Note 2:	Minimum 6 dB Bandwidth conducted



6 dB bandwidth: 17663.9 KHz > 500 KHz; verdict: PASS

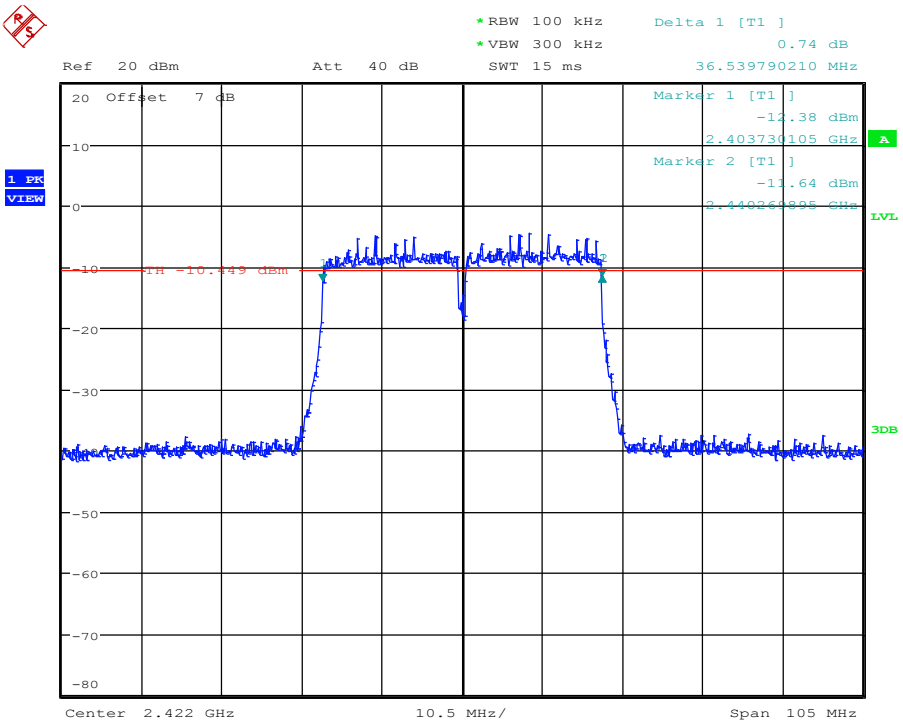
Date: 1.DEC.2015 13:57:04

6 dB Bandwidth – HT40 F_{LOW}

Minimum 6 dB Bandwidth acc. to FCC 15.247

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 n HT40, MCS0, 2422 MHz
Test Date:	2015-12-01
Verdict:	PASS
Note 1:	Procedure according to ANSI C63.10
Note 2:	Minimum 6 dB Bandwidth conducted



6 dB bandwidth: 36539.8 KHz > 500 KHz; verdict: PASS

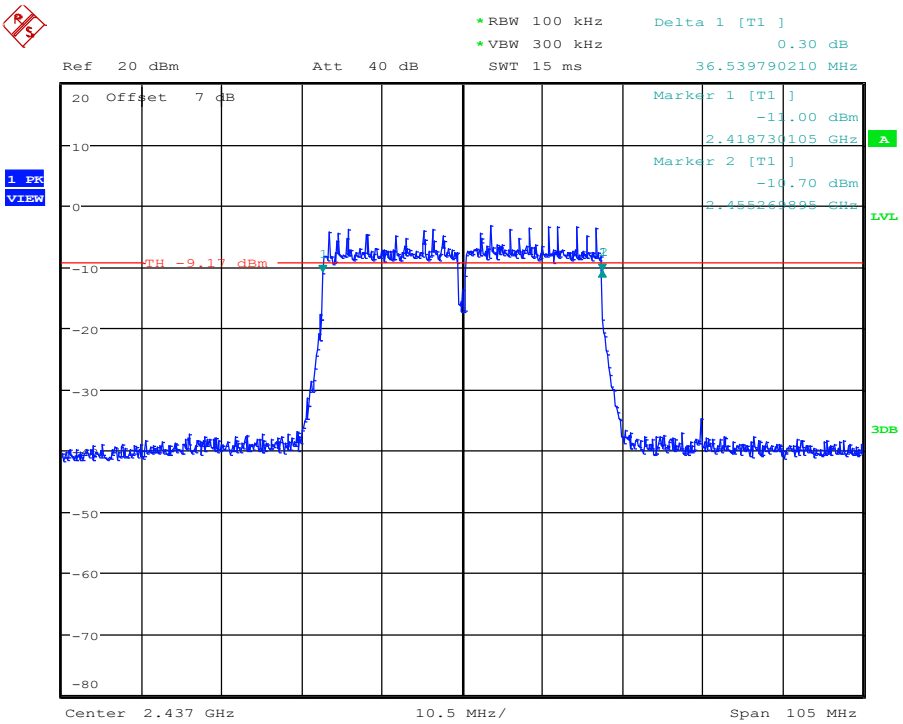
Date: 1.DEC.2015 13:58:48

6 dB Bandwidth – HT40 F_{MID}

Minimum 6 dB Bandwidth acc. to FCC 15.247

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 n HT40, MCS0, 2437 MHz
Test Date:	2015-12-01
Verdict:	PASS
Note 1:	Procedure according to ANSI C63.10
Note 2:	Minimum 6 dB Bandwidth conducted



6 dB bandwidth: 36539.8 KHz > 500 KHz; verdict: PASS

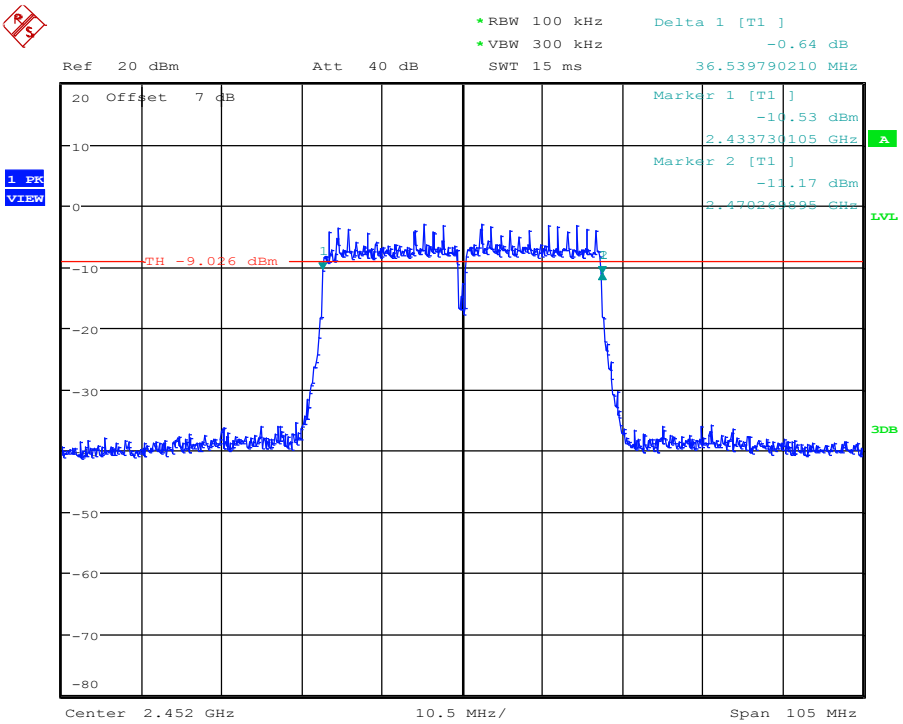
Date: 1.DEC.2015 14:00:33

6 dB Bandwidth – HT40 F_{HIGH}

Minimum 6 dB Bandwidth acc. to FCC 15.247

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 n HT40, MCS0, 2452 MHz
Test Date:	2015-12-01
Verdict:	PASS
Note 1:	Procedure according to ANSI C63.10
Note 2:	Minimum 6 dB Bandwidth conducted



6 dB bandwidth: 36539.8 KHz > 500 KHz; verdict: PASS

Date: 1.DEC.2015 14:20:41

3.3 Test Conditions and Results – Maximum peak conducted power

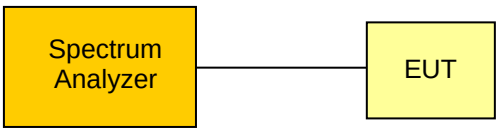
Maximum peak conducted power acc. to FCC 15.247 / IC RSS-247	**Verdict: PASS**
EUT requirement rule parts and clause	Reference
	FCC 15.247(b)(3) / IC RSS-247 5.4
Test according to measurement reference	Reference Method
	ANSI C63.10
Test frequency range	Tested frequencies
	F_{LOW} / F_{MID} / F_{HIGH}
Measurement mode	Peak
Maximum antenna gain	0.8 dBi ⇒ Limit correction = 0 dB

Limits

Limit
1 W (30 dBm)

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

Test setup

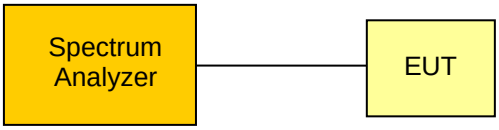


Test procedure

1. EUT set to test mode (Communication tester is used if needed)
2. Center frequency set to test channel center frequency
3. Span set to twice the 20 dB bandwidth and detector to peak and max hold
4. Resolution bandwidth is set to 3 MHz
5. Peak conducted power is determined from peak of spectrum envelope

Test results							
Channel	Frequency [MHz]	Voltage	Mode	Peak power [dbm]	Peak power [W]	Limit [dBm]	Margin [dB]
F_{LOW20}	2412	3.3 VDC	DSSS	18.68	0.07	30	-11.32
F_{MID20}	2437	3.3 VDC	DSSS	19.78	0.10	30	-10.22
F_{HIGH20}	2462	3.3 VDC	DSSS	20.04	0.10	30	-09.96
F_{LOW20}	2412	3.3 VDC	OFDM	23.95	0.25	30	-06.05
F_{MID20}	2437	3.3 VDC	OFDM	24.24	0.27	30	-05.76
F_{HIGH20}	2462	3.3 VDC	OFDM	24.40	0.28	30	-05.60
F_{LOW20}	2412	3.3 VDC	HT20	23.22	0.21	30	-06.78
F_{MID20}	2437	3.3 VDC	HT20	23.63	0.23	30	-06.37
F_{HIGH20}	2462	3.3 VDC	HT20	24.11	0.26	30	-05.89
F_{LOW40}	2422	3.3 VDC	HT40	21.39	0.14	30	-08.61
F_{MID40}	2437	3.3 VDC	HT40	23.43	0.22	30	-06.57
F_{HIGH40}	2452	3.3 VDC	HT40	22.45	0.18	30	-07.55
Comments:							

3.4 Test Conditions and Results – Power spectral density

Power spectral density acc. to FCC 15.247 / IC RSS-247	**Verdict: PASS**
EUT requirement rule parts and clause	Reference
	FCC 15.247(e) / IC RSS-247 5.2
Test according to measurement reference	Reference Method
	ANSI C63.10
Test frequency range	Tested frequencies
	F_{LOW} / F_{MID} / F_{HIGH}
Measurement mode	Peak
Limits	
8 dBm / 3 kHz	
Test setup	
	
Test procedure	
1. EUT set to test mode (Communication tester is used if needed) 2. Center frequency set to test channel center frequency 3. Span is set large enough to capture maximum emissions in passband, RBW is set to 3kHz 4. Peak power density is determined from peak emission of envelope	

Test results						
Channel	Frequency [MHz]	Test mode	Peak frequency [MHz]	Peak power density [dBm]	Limit [dBm/3kHz]	Margin [dB]
F_{LOW20}	2412	DSSS	2409.981	5.54	8.0	-02.46
F_{MID20}	2437	DSSS	2438.010	6.54	8.0	-01.46
F_{HIGH20}	2462	DSSS	2460.990	7.18	8.0	-00.82
F_{LOW20}	2412	OFDM	2416.976	2.36	8.0	-05.64
F_{MID20}	2437	OFDM	2441.976	3.12	8.0	-04.88
F_{HIGH20}	2462	OFDM	2464.524	3.73	8.0	-04.27
F_{LOW20}	2412	HT20	2419.500	1.26	8.0	-06.74
F_{MID20}	2437	HT20	2430.726	2.30	8.0	-05.70
F_{HIGH20}	2462	HT20	2456.952	2.78	8.0	-05.22
F_{LOW40}	2422	HT40	2419.476	-4.49	8.0	-12.49
F_{MID40}	2437	HT40	2448.274	-3.30	8.0	-11.30
F_{HIGH40}	2452	HT40	2464.452	-3.42	8.0	-11.42
Comments: Measurements were performed with RBW = 100 kHz						

3.5 Test Conditions and Results – AC power line conducted emissions

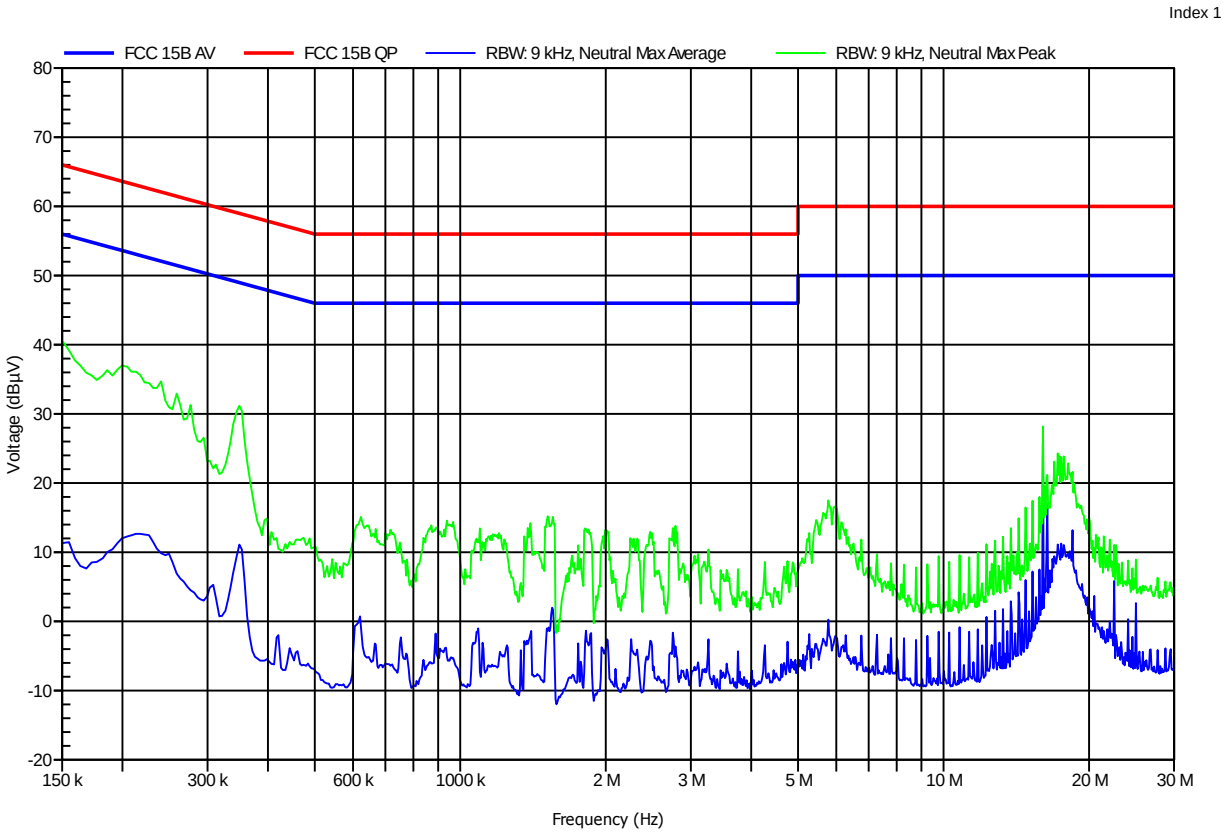
Power line conducted emissions acc. to FCC 47 CFR 15.207 / IC RSS-Gen				**Verdict: PASS**
Test according referenced standards	Reference Method			
	ANSI C63.4			
Fully configured sample scanned over the following frequency range	Frequency range			
	0.15 MHz to 30 MHz			
Points of Application	Application Interface			
AC Mains	LISN			
EUT test mode	AC-Powerline			
Limits and results				
Frequency [MHz]	Quasi-Peak [dBµV]	Result	Average [dBµV]	Result
0.15 to 5	66 to 56*	PASS	56 to 46*	PASS
0.5 to 5	56	PASS	46	PASS
5 to 30	60	PASS	50	PASS
Comments: * Limit decreases linearly with the logarithm of the frequency.				

Conducted Emissions 1

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

Project number: G0M-1503-4600

Manufacturer:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wireless LAN Embedded Module
Model:	ENW49A01A3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Marquardt
Test Conditions:	Tnom: 24°C, Unom: 120 V AC; 60 Hz
LISN:	ESH2-Z5 N
Mode:	USB at Notebook
Test Date:	2016-01-11
Note:	



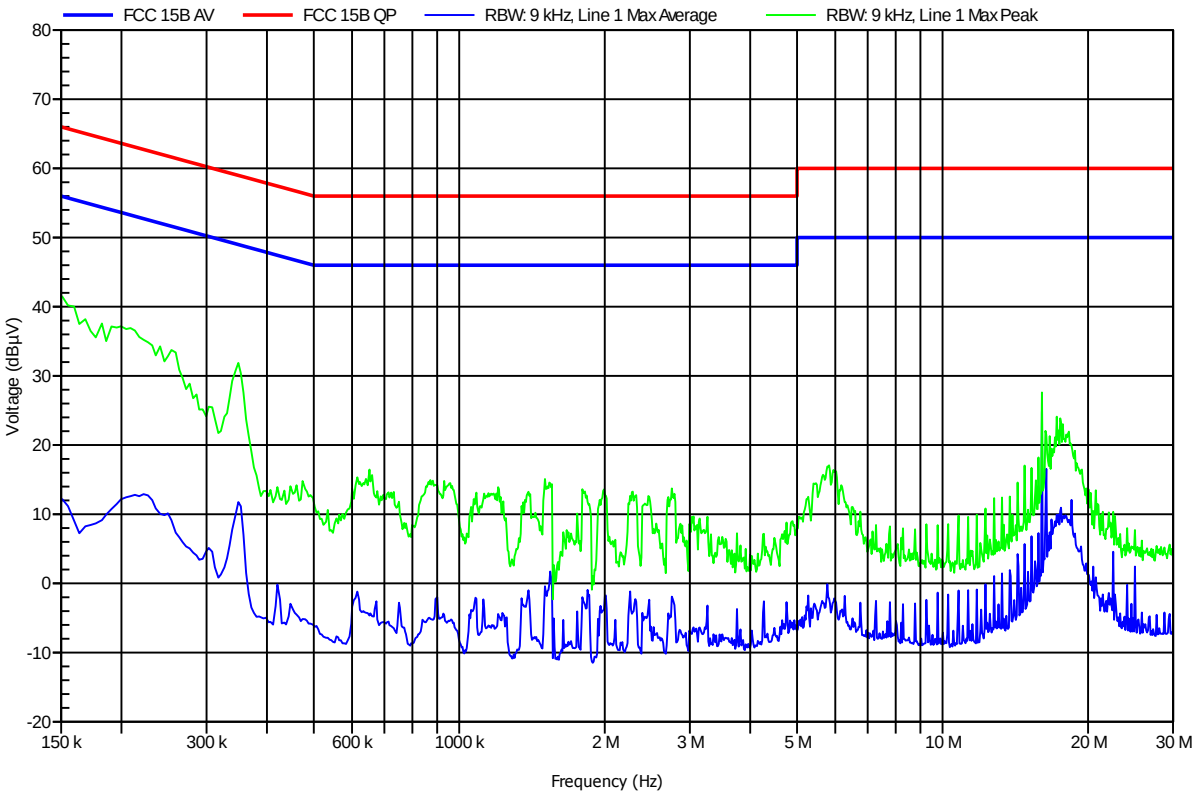
Conducted Emissions 2

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

Project number: G0M-1503-4600

Manufacturer:	Panasonic Industrial Devices Europe GmbH
EUT Name:	Wireless LAN Embedded Module
Model:	ENW49A01A3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Marquardt
Test Conditions:	Tnom: 24°C, Unom: 120 V AC; 60 Hz
LISN:	ESH2-Z5 L
Mode:	USB at Notebook
Test Date:	2016-01-11
Note:	

Index 2



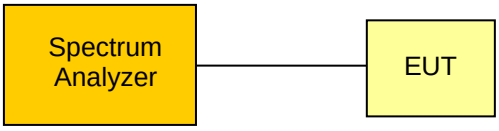
3.6 Test Conditions and Results – Band edge compliance

Band-edge compliance acc. to FCC 15.247 / IC RSS-247	**Verdict: PASS**
EUT requirement rule parts and clause	Reference
	FCC 15.247(d) / IC RSS-247 5.5
Test according to measurement reference	Reference Method
	ANSI C63.10
Test frequency range	Tested frequencies
	F_{LOW} / F_{HIGH}
Measurement mode	Peak

Limits

Limit	Condition
≤ -20 dB / 100 kHz	Peak power measurement detector = Peak
≤ -30 dB / 100 kHz	Peak power measurement detector = RMS

Test setup



Test procedure

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

Test results

Channel	Frequency [MHz]	Mode	Level [dBc]	Limit [dBc]	Margin [dB]
F_{LOW20}	2412	DSSS	-39.39	-20	-19.39
F_{HIGH20}	2462	DSSS	-44.40	-20	-24.40
F_{LOW20}	2412	OFDM	-35.33	-20	-15.33
F_{HIGH20}	2462	OFDM	-41.08	-20	-21.08
F_{LOW20}	2412	HT20	-36.15	-20	-16.15
F_{HIGH20}	2462	HT20	-40.04	-20	-20.04
F_{LOW40}	2422	HT40	-30.70	-20	-10.70
F_{HIGH40}	2452	HT40	-33.54	-20	-13.54

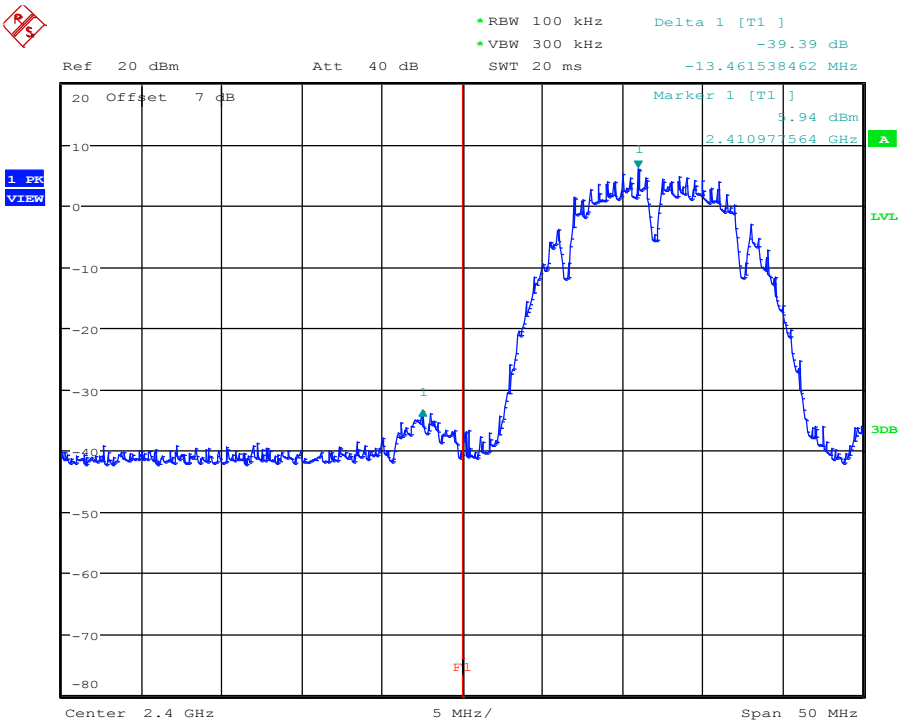
Comments:

Band-edge compliance – DSSS F_{LOW}

Band-edge compliance acc. to FCC 15.247

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 b, 1 Mbps, 2412 MHz, modulated
Test Date:	2015-12-01
Verdict:	PASS
Note 1:	Reference Method according to ANSI C63.10
Note 2:	lower Band-edge, conducted measurement



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

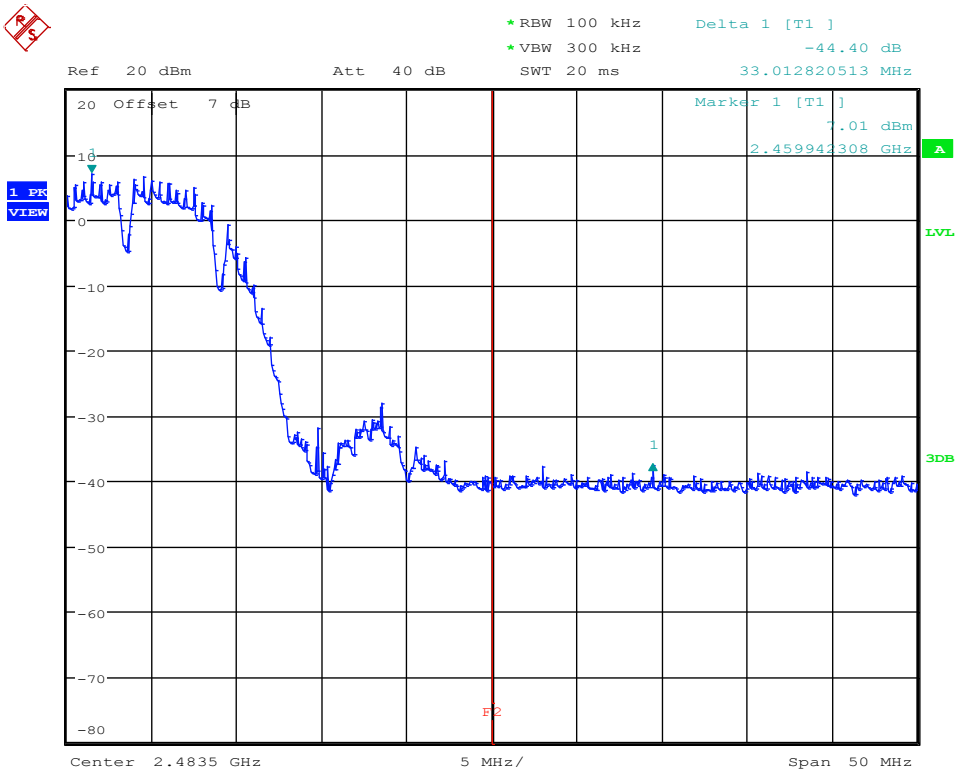
Date: 1.DEC.2015 16:12:59

Band-edge compliance – DSSS F_{HIGH}

Band-edge compliance acc. to FCC 15.247

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 b, 1 Mbps, 2462 MHz, modulated
Test Date:	2015-12-01
Verdict:	PASS
Note 1:	Reference Method according to ANSI C63.10
Note 2:	upper Band-edge, conducted measurement



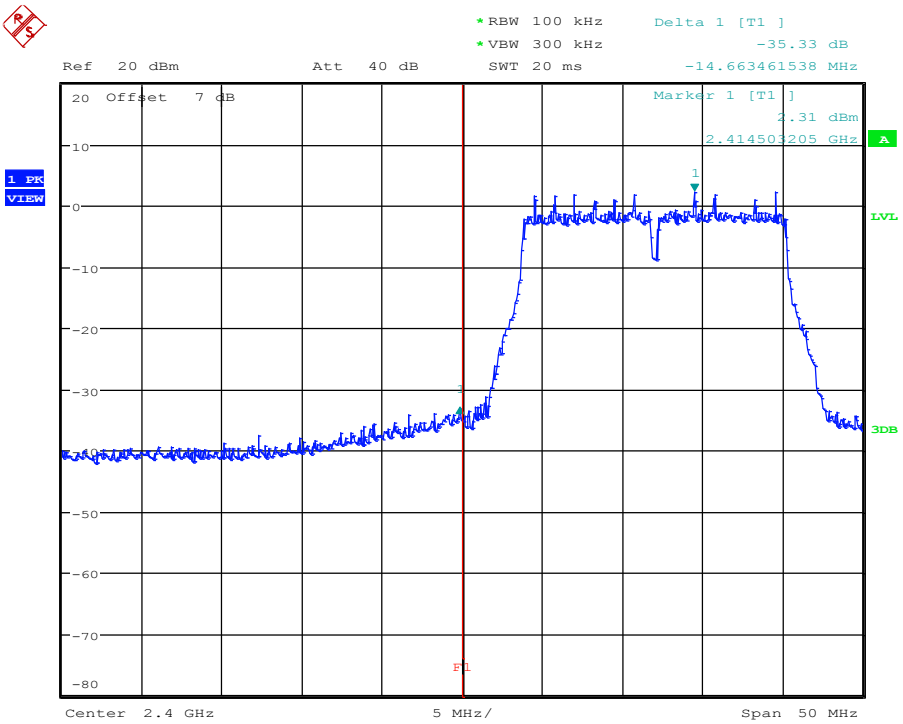
Date: 1.DEC.2015 16:14:47

Band-edge compliance – OFDM F_{LOW}

Band-edge compliance acc. to FCC 15.247

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 g, 6 Mbps, 2412 MHz, modulated
Test Date:	2015-12-01
Verdict:	PASS
Note 1:	Reference Method according to ANSI C63.10
Note 2:	lower Band-edge, conducted measurement



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

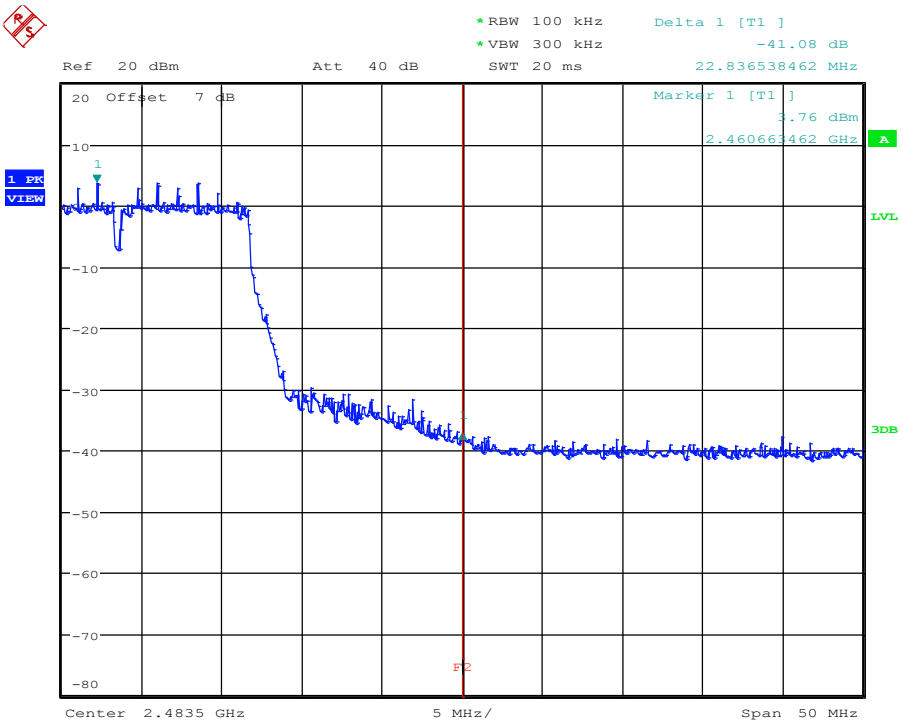
Date: 1.DEC.2015 16:24:14

Band-edge compliance – OFDM F_{HIGH}

Band-edge compliance acc. to FCC 15.247

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 g, 6 Mbps, 2462 MHz, modulated
Test Date:	2015-12-01
Verdict:	PASS
Note 1:	Reference Method according to ANSI C63.10
Note 2:	upper Band-edge, conducted measurement



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

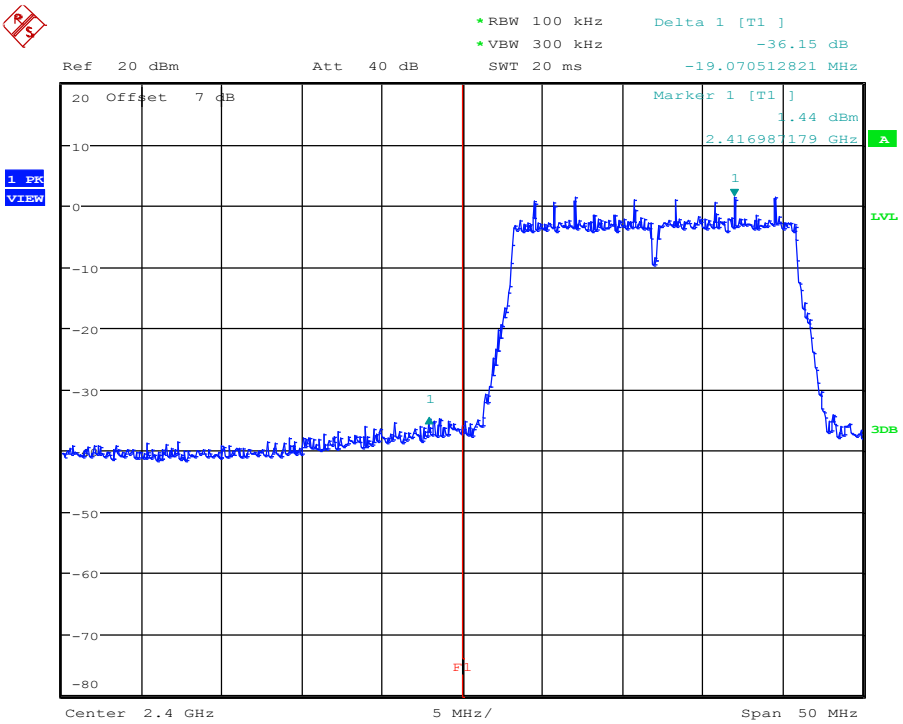
Date: 1.DEC.2015 16:26:13

Band-edge compliance – HT20 F_{LOW}

Band-edge compliance acc. to FCC 15.247

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 n HT20, MCS0, 2412 MHz, modulated
Test Date:	2015-12-01
Verdict:	PASS
Note 1:	Reference Method according to ANSI C63.10
Note 2:	lower Band-edge, conducted measurement



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

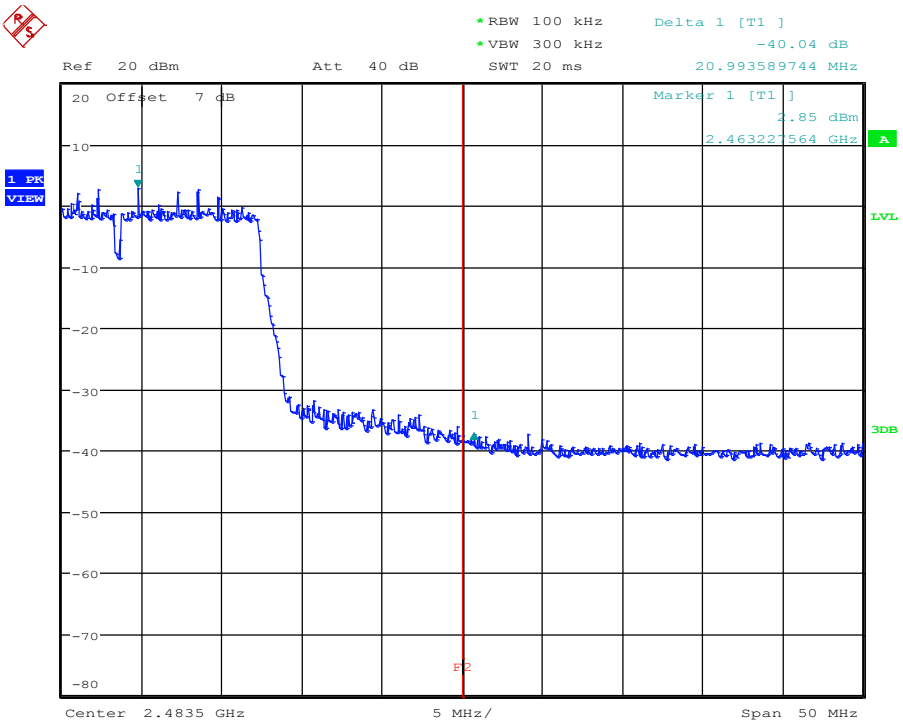
Date: 1.DEC.2015 16:29:05

Band-edge compliance – HT20 F_{HIGH}

Band-edge compliance acc. to FCC 15.247

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 n HT20, MCS0, 2462 MHz, modulated
Test Date:	2015-12-01
Verdict:	PASS
Note 1:	Reference Method according to ANSI C63.10
Note 2:	upper Band-edge, conducted measurement



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

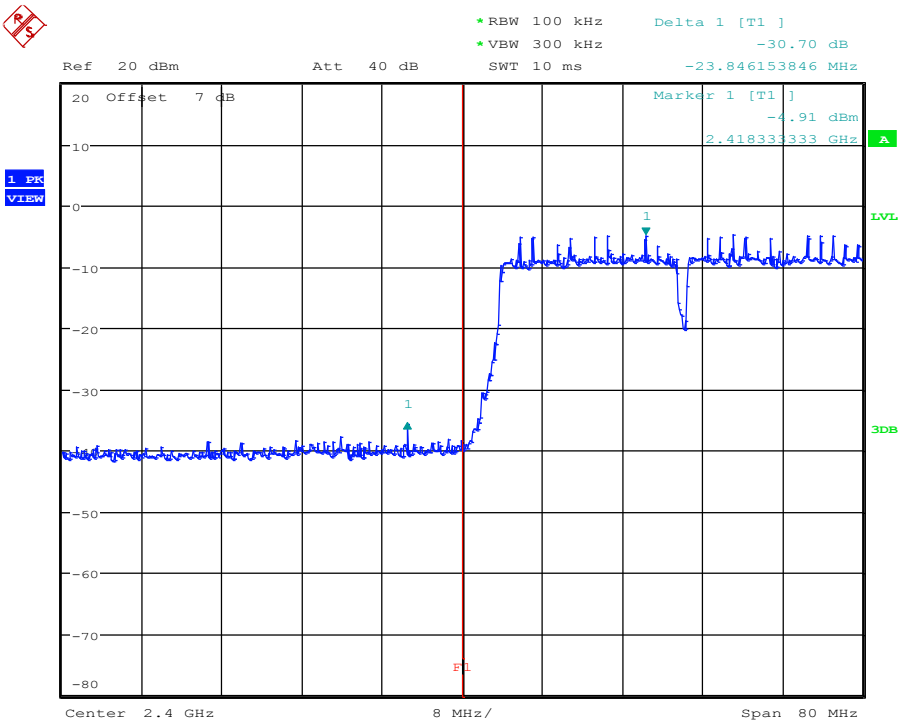
Date: 1.DEC.2015 16:31:08

Band-edge compliance – HT40 F_{LOW}

Band-edge compliance acc. to FCC 15.247

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 n HT40, MCS0, 2422 MHz, modulated
Test Date:	2015-12-01
Verdict:	PASS
Note 1:	Reference Method according to ANSI C63.10
Note 2:	lower Band-edge, conducted measurement



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

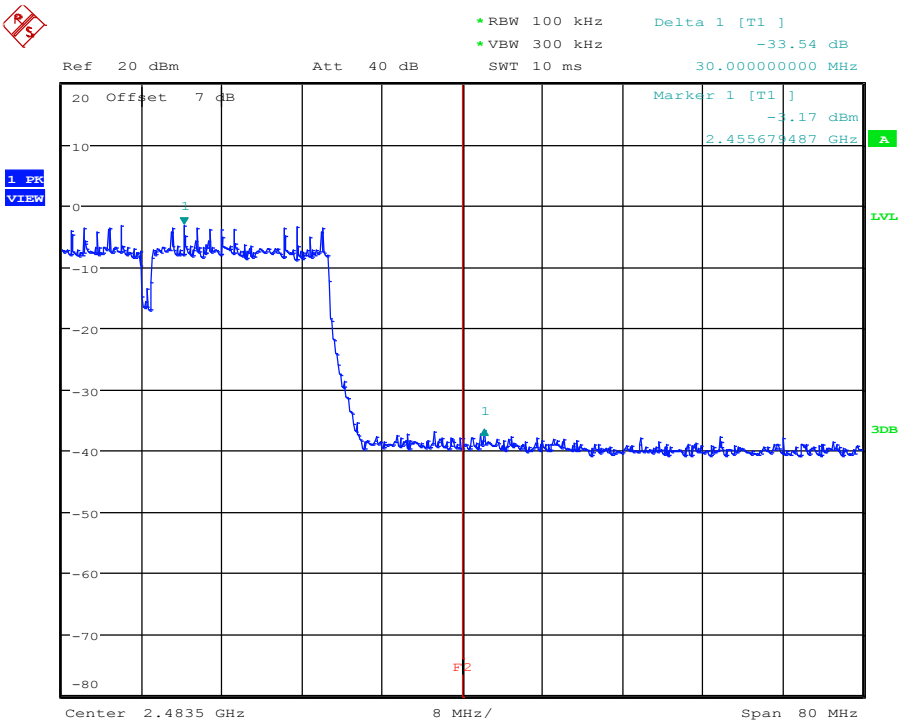
Date: 1.DEC.2015 16:33:58

Band-edge compliance – HT40 F_{HIGH}

Band-edge compliance acc. to FCC 15.247

Project Number: G0M-1503-4600

Applicant:	Panasonic Industrial Devices Europe GmbH
EUT Name:	WLAN Module
Model:	ENW49A01C3EF
Test Site:	Eurofins Product Service GmbH
Operator:	Christian Weber
Test Conditions:	Tnom / Vnom
Mode:	Tx, IEEE 802.11 n HT40, MCS0, 2452 MHz, modulated
Test Date:	2015-12-01
Verdict:	PASS
Note 1:	Reference Method according to ANSI C63.10
Note 2:	upper Band-edge, conducted measurement



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

Date: 1.DEC.2015 16:36:12

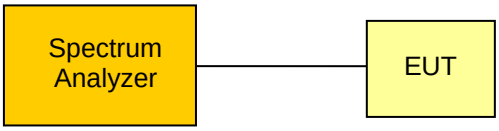
3.7 Test Conditions and Results – Conducted spurious emissions

Conducted spurious emissions acc. to FCC 15.247 / IC RSS-247	**Verdict: PASS**
EUT requirement rule parts and clause	Reference
	FCC 15.247(d) / IC RSS-247 5.5
Test according to measurement reference	Reference Method
	ANSI C63.10
Test frequency range	Tested frequencies
	10 MHz – 10th Harmonic
Measurement mode	Peak

Limits

Limit	Condition
≤ -20 dB / 100 kHz	Peak power measurement detector = Peak
≤ -30 dB /100 kHz	Peak power measurement detector = RMS

Test setup



Test procedure

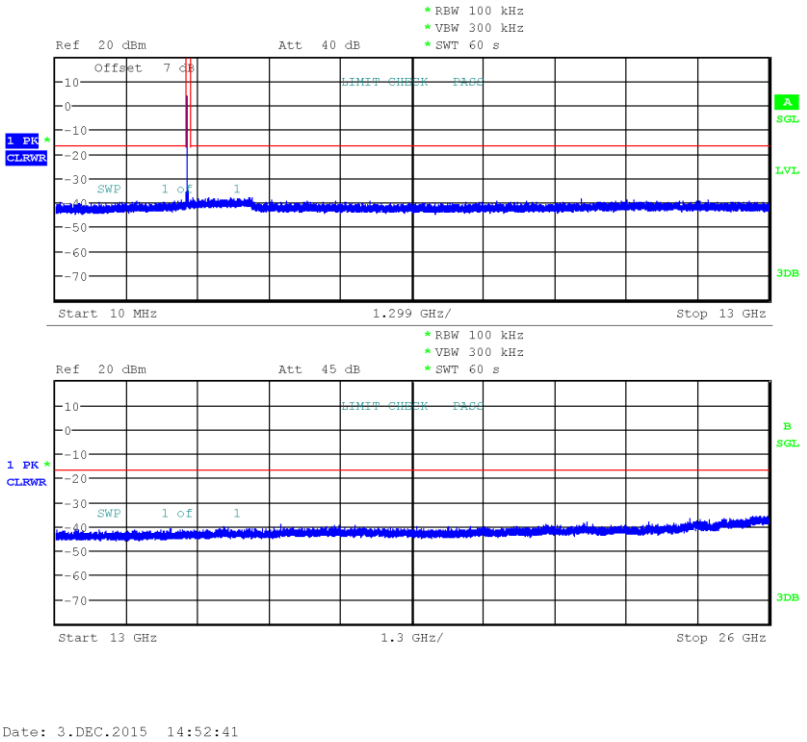
1. EUT set to test mode (Communication tester is used if needed)
2. Span it set according to measurement range
3. Resolution bandwidth is set to 100 kHz and detector to peak and max hold
4. Markers are set to peak emission levels within frequency band
5. Emission level is determined by second marker on emission peak
6. Attenuation is determined from level difference

Test results							
Channel	Frequency [MHz]	Mode	Emission [MHz]	Emission Level [dbm]	Peak power [dBm]	Limit [dBm]	Margin [dB]
F_{LOW20}	2412	DSSS	No emissions				
F_{MID20}	2437	DSSS	No emissions				
F_{HIGH20}	2462	DSSS	No emissions				
F_{LOW20}	2412	OFDM	No emissions				
F_{MID20}	2437	OFDM	No emissions				
F_{HIGH20}	2462	OFDM	No emissions				
F_{LOW20}	2412	HT20	No emissions				
F_{MID20}	2437	HT20	No emissions				
F_{HIGH20}	2462	HT20	No emissions				
F_{LOW40}	2422	HT40	No emissions				
F_{MID40}	2437	HT40	No emissions				
F_{HIGH40}	2452	HT40	No emissions				
Comments:							

Conducted spurious emissions – DSSS F_{LOW}

Conducted Spurious Emissions

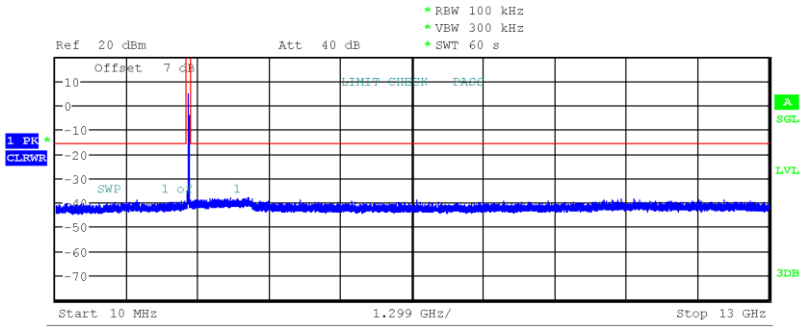
Project Number:	G0M-1503-4600
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wireless LAN Embedded Module
Model:	ENW49A01C3EF
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	IEEE 802.11 b, Channel: 1, 2412 MHz
Operating Conditions:	Tnom/Vnom
Operator:	C. Weber
Test Site:	Eurofins Product Service GmbH
Test Date:	2015-12-03
Note:	Test mode, 1 Mbps
Max. in-band Frequency [MHz]:	2411.5
Max. in-band Level [dBm/100 kHz]:	3.7
Out-of-band Limit [dBm/100 kHz]:	-16.3

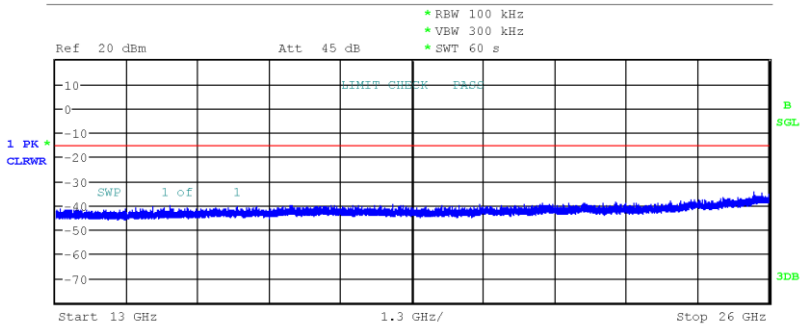


Conducted spurious emissions – DSSS F_{MID}

Conducted Spurious Emissions

Project Number:	G0M-1503-4600
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wireless LAN Embedded Module
Model:	ENW49A01C3EF
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:	C. Weber
Test Site:	Eurofins Product Service GmbH
Test Date:	2015-12-03
Note:	Test mode, 1 Mbps
Max. in-band Frequency [MHz]:	2438.5
Max. in-band Level [dBm/100 kHz]:	4.8
Out-of-band Limit [dBm/100 kHz]:	-15.2



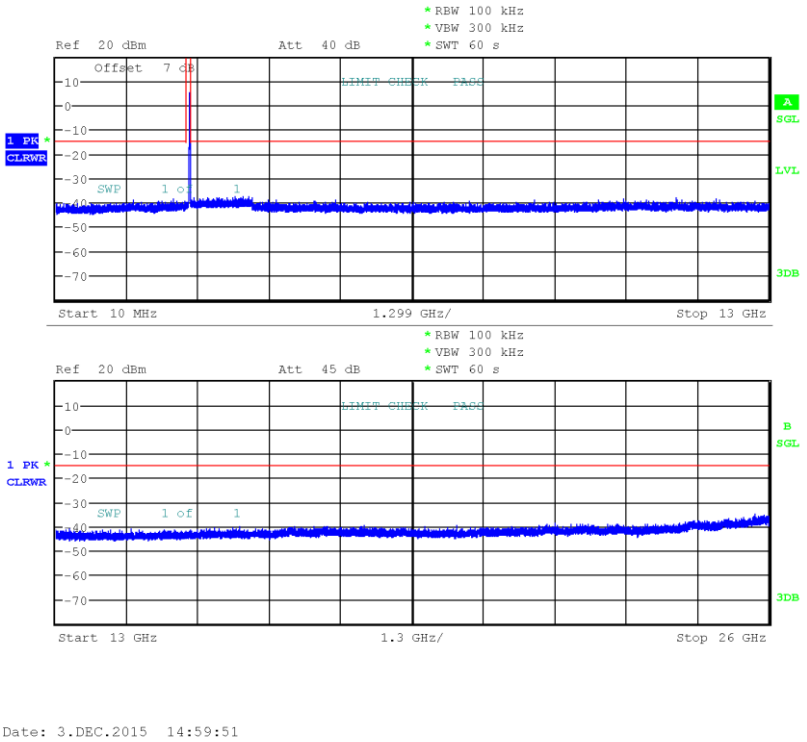


Date: 3.DEC.2015 14:56:29

Conducted spurious emissions – DSSS F_{HIGH}

Conducted Spurious Emissions

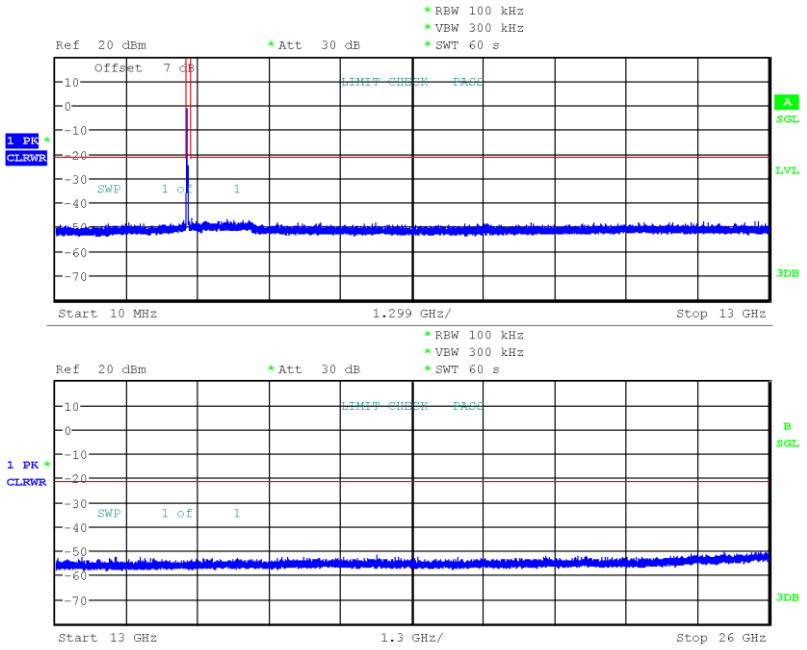
Project Number:	G0M-1503-4600
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wireless LAN Embedded Module
Model:	ENW49A01C3EF
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	IEEE 802.11 b, Channel: 11, 2462 MHz
Operating Conditions:	Tnom/Vnom
Operator:	C. Weber
Test Site:	Eurofins Product Service GmbH
Test Date:	2015-12-03
Note:	Test mode, 1 Mbps
Max. in-band Frequency [MHz]:	2463.5
Max. in-band Level [dBm/100 kHz]:	5.3
Out-of-band Limit [dBm/100 kHz]:	-14.7



Conducted spurious emissions – OFDM F_{LOW}

Conducted Spurious Emissions

Project Number:	G0M-1503-4600
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wireless LAN Embedded Module
Model:	ENW49A01C3EF
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:	C. Weber
Test Site:	Eurofins Product Service GmbH
Test Date:	2015-12-03
Note:	Test mode, 6 Mbps
Max. in-band Frequency [MHz]:	2416.1
Max. in-band Level [dBm/100 kHz]:	-1.2
Out-of-band Limit [dBm/100 kHz]:	-21.2

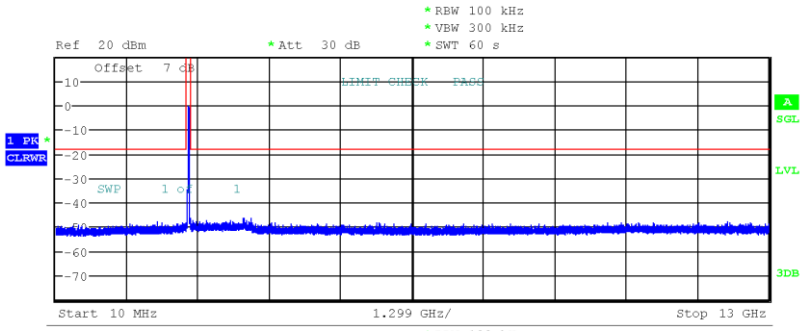


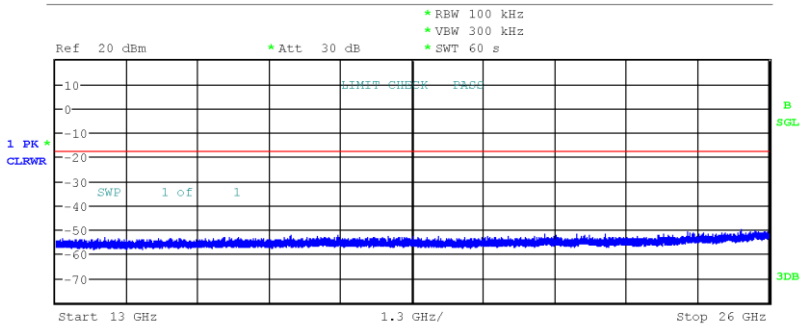
Date: 3.DEC.2015 15:03:59

Conducted spurious emissions – OFDM F_{MID}

Conducted Spurious Emissions

Project Number:	G0M-1503-4600
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wireless LAN Embedded Module
Model:	ENW49A01C3EF
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:	C. Weber
Test Site:	Eurofins Product Service GmbH
Test Date:	2015-12-03
Note:	Test mode, 6 Mbps
Max. in-band Frequency [MHz]:	2435.7
Max. in-band Level [dBm/100 kHz]:	2.3
Out-of-band Limit [dBm/100 kHz]:	-17.7



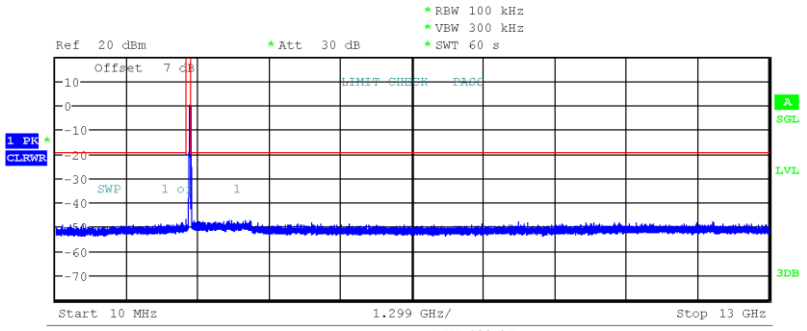


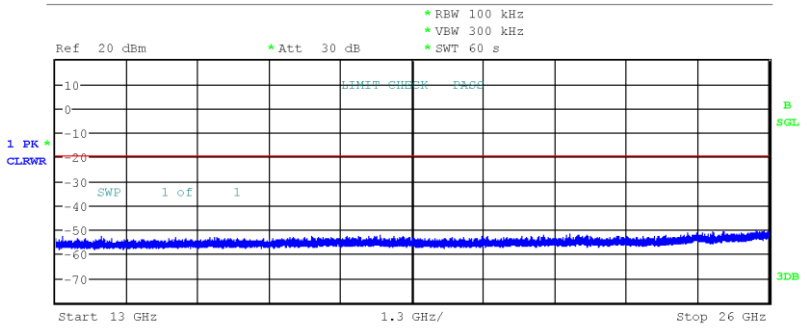
Date: 3.DEC.2015 15:07:31

Conducted spurious emissions – OFDM F_{HIGH}

Conducted Spurious Emissions

Project Number:	G0M-1503-4600
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wireless LAN Embedded Module
Model:	ENW49A01C3EF
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:	C. Weber
Test Site:	Eurofins Product Service GmbH
Test Date:	2015-12-03
Note:	Test mode, 6 Mbps
Max. in-band Frequency [MHz]:	2455.4
Max. in-band Level [dBm/100 kHz]:	0.6
Out-of-band Limit [dBm/100 kHz]:	-19.4



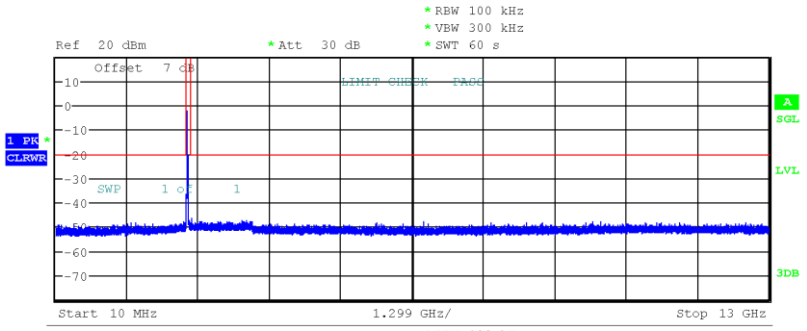


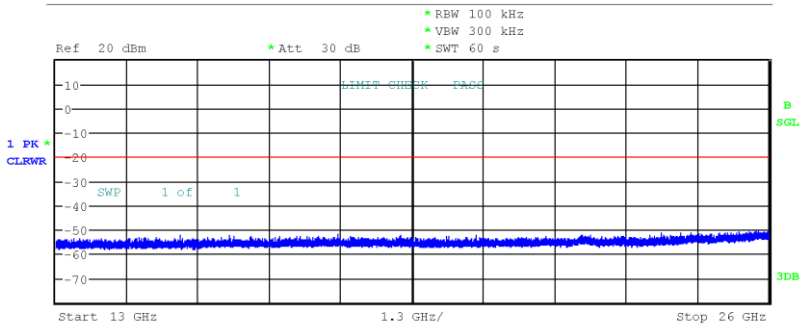
Date: 3.DEC.2015 15:10:53

Conducted spurious emissions – HT20 F_{LOW}

Conducted Spurious Emissions

Project Number:	G0M-1503-4600
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wireless LAN Embedded Module
Model:	ENW49A01C3EF
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:	C. Weber
Test Site:	Eurofins Product Service GmbH
Test Date:	2015-12-03
Note:	Test mode, MCS0
Max. in-band Frequency [MHz]:	2409.4
Max. in-band Level [dBm/100 kHz]:	-0.1
Out-of-band Limit [dBm/100 kHz]:	-20.1



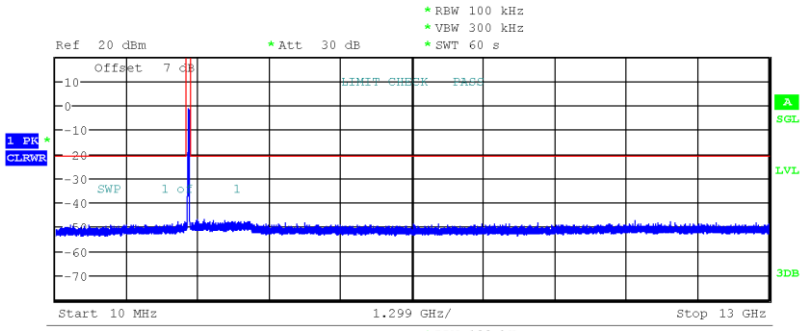


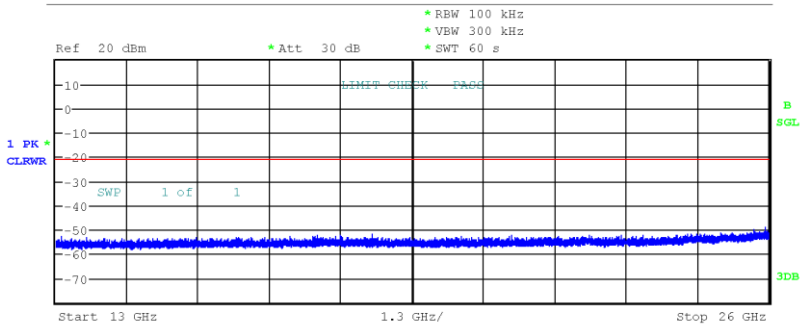
Date: 3.DEC.2015 15:15:17

Conducted spurious emissions – HT20 F_{MID}

Conducted Spurious Emissions

Project Number:	G0M-1503-4600
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wireless LAN Embedded Module
Model:	ENW49A01C3EF
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:	C. Weber
Test Site:	Eurofins Product Service GmbH
Test Date:	2015-12-03
Note:	Test mode, MCS0
Max. in-band Frequency [MHz]:	2434.1
Max. in-band Level [dBm/100 kHz]:	-0.8
Out-of-band Limit [dBm/100 kHz]:	-20.8



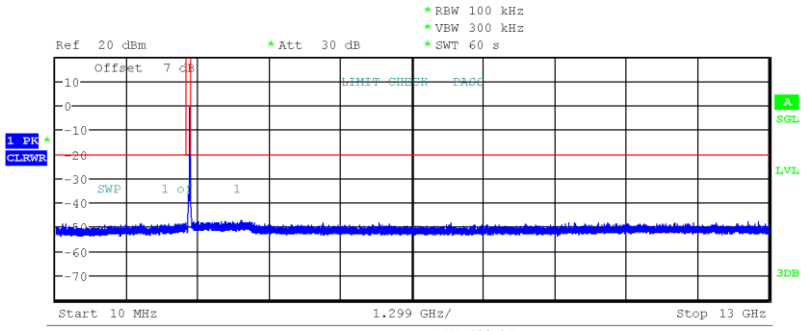


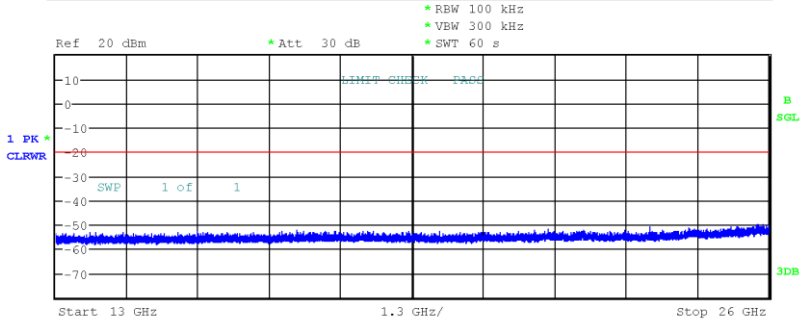
Date: 3.DEC.2015 15:20:32

Conducted spurious emissions – HT20 F_{HIGH}

Conducted Spurious Emissions

Project Number:	G0M-1503-4600
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wireless LAN Embedded Module
Model:	ENW49A01C3EF
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:	C. Weber
Test Site:	Eurofins Product Service GmbH
Test Date:	2015-12-03
Note:	Test mode, MCS0
Max. in-band Frequency [MHz]:	2459.2
Max. in-band Level [dBm/100 kHz]:	-0.3
Out-of-band Limit [dBm/100 kHz]:	-20.3



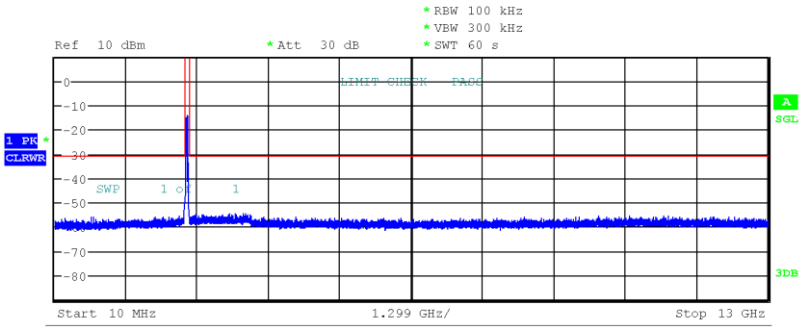


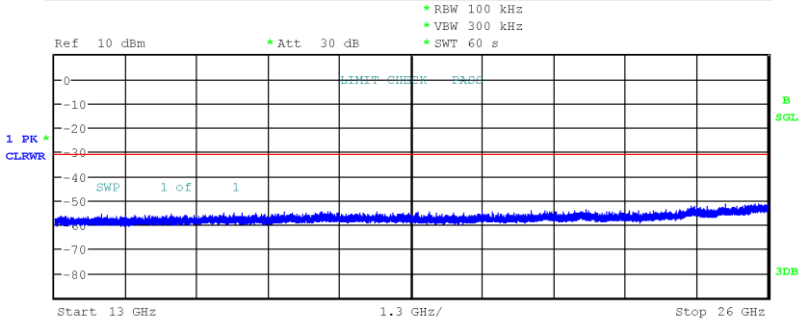
Date: 3.DEC.2015 15:24:02

Conducted spurious emissions – HT40 F_{LOW}

Conducted Spurious Emissions

Project Number:	G0M-1503-4600
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wireless LAN Embedded Module
Model:	ENW49A01C3EF
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	IEEE 802.11 n HT40, Channel: 3, 2422 MHz
Operating Conditions:	Tnom/Vnom
Operator:	C. Weber
Test Site:	Eurofins Product Service GmbH
Test Date:	2015-12-03
Max. in-band Frequency [MHz]:	2404.5
Max. in-band Level [dBm/100 kHz]:	-10.6
Out-of-band Limit [dBm/100 kHz]:	-30.6



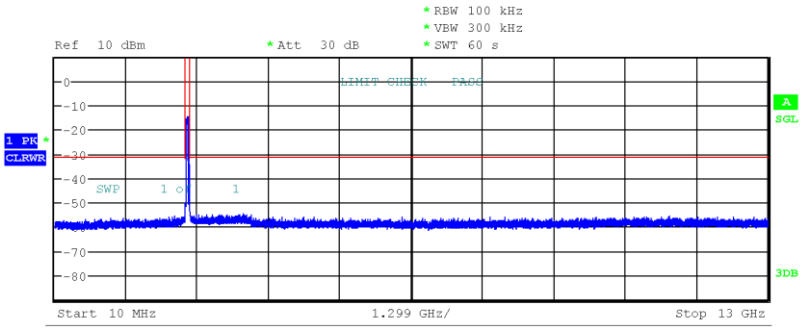


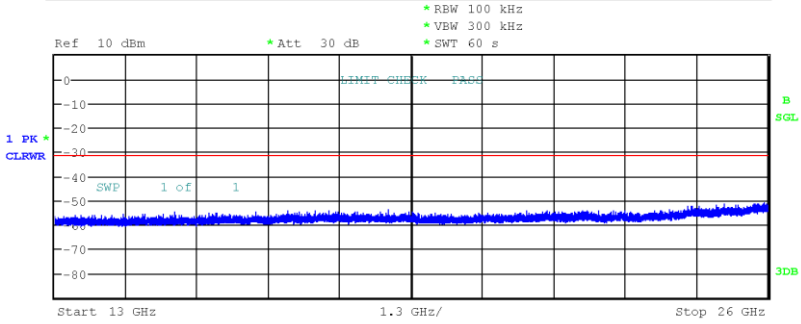
Date: 3.DEC.2015 15:29:36

Conducted spurious emissions – HT40 F_{MID}

Conducted Spurious Emissions

Project Number:	G0M-1503-4600
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wireless LAN Embedded Module
Model:	ENW49A01C3EF
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	IEEE 802.11 n HT40, Channel: 6, 2437 MHz
Operating Conditions:	Tnom/Vnom
Operator:	C. Weber
Test Site:	Eurofins Product Service GmbH
Test Date:	2015-12-03
Max. in-band Frequency [MHz]:	2454.5
Max. in-band Level [dBm/100 kHz]:	-11.0
Out-of-band Limit [dBm/100 kHz]:	-31.0



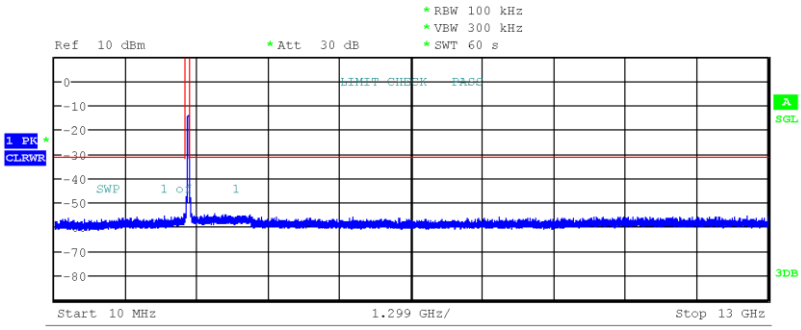


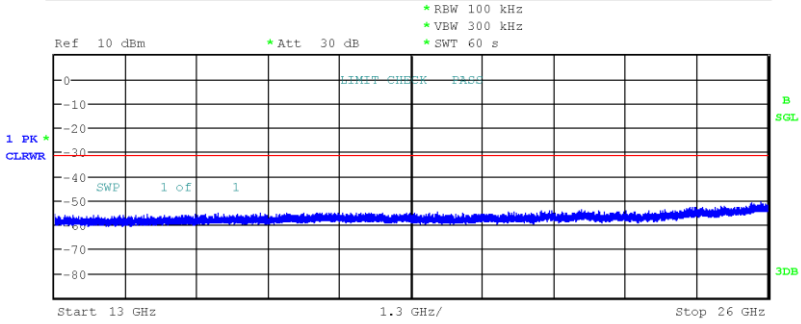
Date: 3.DEC.2015 15:33:25

Conducted spurious emissions – HT40 F_{HIGH}

Conducted Spurious Emissions

Project Number:	G0M-1503-4600
Applicant	Panasonic Industrial Devices Europe GmbH
Model Description	Wireless LAN Embedded Module
Model:	ENW49A01C3EF
Reference Standards:	FCC 15.247, RSS-247
Reference Method:	ANSI C63.10:2013, Section 11.11
Operational Mode:	IEEE 802.11 n HT40, Channel: 9, 2452 MHz
Operating Conditions:	Tnom/Vnom
Operator:	C. Weber
Test Site:	Eurofins Product Service GmbH
Test Date:	2015-12-03
Max. in-band Frequency [MHz]:	2454.5
Max. in-band Level [dBm/100 kHz]:	-11.0
Out-of-band Limit [dBm/100 kHz]:	-31.0





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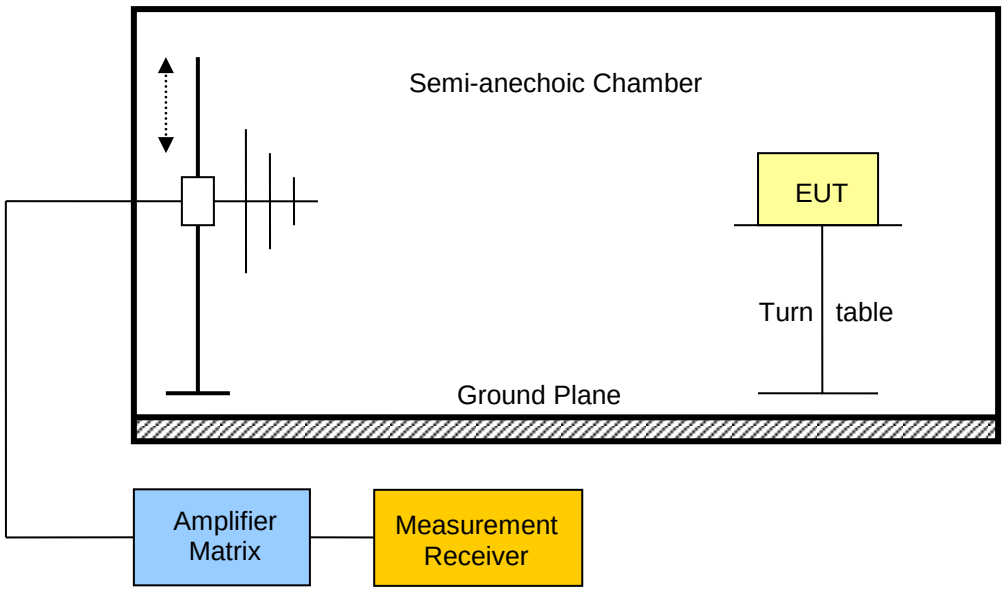
3.8 Test Conditions and Results – Transmitter radiated emissions

Transmitter radiated emissions acc. to FCC 47 CFR 15.247 / IC RSS-247				**Verdict: PASS**
Test according referenced standards		Reference Method		
		FCC 15.247(d) / IC RSS-247 5.5		
Test according to measurement reference		Reference Method		
		ANSI C63.10		
Test frequency range		Tested frequencies		
		30 MHz – 10th Harmonic		
Limits				
Frequency range [MHz]	Detector	Limit [µV/m]	Limit [dBµV/m]	Limit Distance [m]
30 – 88	Quasi-Peak	100	40	3
88 – 216	Quasi-Peak	150	43.5	3
216 – 960	Quasi-Peak	200	46	3
960 – 1000	Quasi-Peak	500	54	3
> 1000	Average	500	54	3
Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)). When average radiated emission measurements are specified, including average emission measurements below 1000 MHz, there also is a limit on the peak level of the radio frequency emissions. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test.				
Test setup				



Test procedure

1. EUT set to test mode (Communication tester is used if needed)
2. Span it set according to measurement range
3. Resolution bandwidth below 1 GHz is set according to CISPR 16 with peak/quasi-peak detector and RBW of 1 MHz with peak/average detector is used above 1 GHz
4. Markers are set to peak emission levels within restricted bands

Test results - DSSS

Channel	Frequency [MHz]	Mode	Emission [MHz]	Level [dbµV/m]	Det.	Pol.	Limit [dbµV/m]	Limit dist. [m]*	Margin [dB]
1	2412	DSSS	2390	64.66	pk	hor	74.00	3	-09.34
1	2412	DSSS	2390	38.76	RMS	hor	54.00	3	-15.24
1	2412	DSSS	2390	56.72	pk	ver	74.00	3	-17.28
1	2412	DSSS	2390	37.01	RMS	ver	54.00	3	-16.99
6	2437	DSSS	No significant emissions						
11	2462	DSSS	2483.5	64.08	pk	ver	74.00	3	-09.92
11	2462	DSSS	2483.5	44.60	RMS	ver	54.00	3	-09.40
11	2462	DSSS	2483.6	70.73	pk	hor	74.00	3	-03.27
11	2462	DSSS	2483.6	47.35	RMS	hor	54.00	3	-06.65
11	2462	DSSS	2500	50.31	pk	hor	74.00	3	-23.69

Test results - OFDM

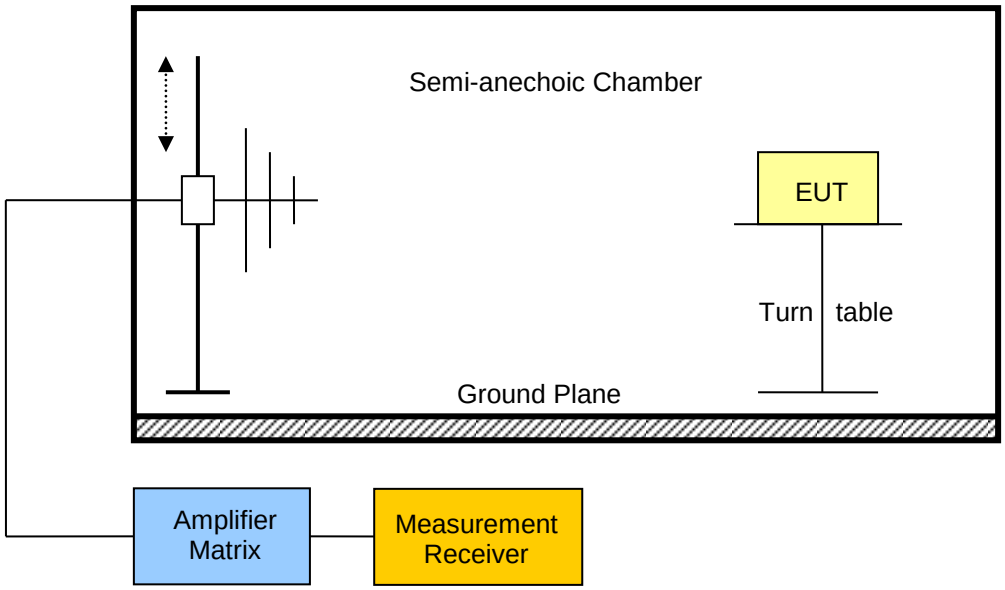
Channel	Frequency [MHz]	Mode	Emission [MHz]	Level [dbµV/m]	Det.	Pol.	Limit [dbµV/m]	Limit dist. [m]*	Margin [dB]
1	2412	OFDM	2390	60.54	pk	hor	74.00	3	-13.46
1	2412	OFDM	2390	44.37	RMS	hor	54.00	3	-09.63
1	2412	OFDM	2390	52.74	pk	ver	74.00	3	-21.26
1	2412	OFDM	2390	38.76	RMS	ver	54.00	3	-15.24
1	2412	OFDM	2483.5	43.50	pk	ver	74.00	3	-30.50
1	2412	OFDM	2484.4	52.74	pk	hor	74.00	3	-21.26
6	2437	OFDM	2483.5	49.89	pk	hor	74.00	3	-24.11
11	2462	OFDM	2483.5	71.29	pk	hor	74.00	3	-02.71
11	2462	OFDM	2483.5	52.56	RMS	hor	54.00	3	-01.44
11	2462	OFDM	2483.5	63.90	pk	ver	74.00	3	-10.10
11	2462	OFDM	2483.5	45.55	RMS	ver	54.00	3	-08.45

Comments: * Physical distance between EUT and measurement antenna.

Test results – HT20									
Channel	Frequency [MHz]	Mode	Emission [MHz]	Level [dbµV/m]	Det.	Pol.	Limit [dbµV/m]	Limit dist. [m]*	Margin [dB]
1	2412	HT20	2390	60.34	pk	hor	74.00	3	-13.66
1	2412	HT20	2390	43.50	RMS	hor	54.00	3	-10.50
1	2412	HT20	2390	53.92	pk	ver	74.00	3	-20.08
1	2412	HT20	2390	39.51	RMS	ver	54.00	3	-14.49
6	2437	HT20	No significant emissions						
11	2462	HT20	2483.5	66.01	pk	ver	74.00	3	-07.99
11	2462	HT20	2483.5	42.74	RMS	ver	54.00	3	-11.26
11	2462	HT20	2483.6	72.66	pk	hor	74.00	3	-01.34
11	2462	HT20	2483.6	49.55	RMS	hor	54.00	3	-04.45
Test results – HT40									
Channel	Frequency [MHz]	Mode	Emission [MHz]	Level [dbµV/m]	Det.	Pol.	Limit [dbµV/m]	Limit dist. [m]*	Margin [dB]
3	2422	HT40	2390	58.10	pk	hor	74.00	3	-15.90
3	2422	HT40	2390	42.01	RMS	hor	54.00	3	-11.99
3	2422	HT40	2390	58.27	pk	ver	74.00	3	-15.73
3	2422	HT40	2390	41.45	RMS	ver	54.00	3	-12.55
3	2422	HT40	2483.5	44.18	pk	hor	74.00	3	-29.82
6	2437	HT40	2389.5	54.41	pk	hor	74.00	3	-19.59
6	2437	HT40	2483.7	57.17	pk	hor	74.00	3	-16.83
9	2452	HT40	2483.8	63.23	pk	hor	74.00	3	-10.77
9	2452	HT40	2483.8	43.15	RMS	hor	54.00	3	-10.85
9	2452	HT40	2489	61.13	pk	ver	74.00	3	-12.87
9	2452	HT40	2489	40.93	RMS	ver	54.00	3	-13.07
Comments: * Physical distance between EUT and measurement antenna.									

3.9 Test Conditions and Results – Receiver radiated emissions

Receiver radiated emissions acc. to IC RSS-247				**Verdict: PASS**
Test according referenced standards	Reference Method			
	IC RSS-247 3.1			
Test according to measurement reference	Reference Method			
	ANSI C63.10			
Test frequency range	Tested frequencies			
	30 MHz – 5th Harmonic			
EUT test mode	Receive			
Limits				
Frequency range [MHz]	Detector	Limit [µV/m]	Limit [dBµV/m]	Limit Distance [m]
30 – 88	Quasi-Peak	100	40	3
88 – 216	Quasi-Peak	150	43.5	3
216 – 960	Quasi-Peak	200	46	3
960 – 1000	Quasi-Peak	500	54	3
> 1000	Average	500	54	3
Test setup				



Test procedure
1. EUT set to receive mode (Communication tester is used if needed) 2. Span it set according to measurement range 3. Resolution bandwidth below 1 GHz is set according to CISPR 16 with peak/quasi-peak detector and RBW of 1 MHz with peak/average detector is used above 1 GHz 4. Markers are set to peak emission levels

Test results

Channel	Frequency [MHz]	Emission [MHz]	Emission Level [dBµV/m]	Det.	Pol.	Limit [dBµV/m]	Margin [dBµV/m]
6	2437	348.8	22.94	pk	hor	46.00	-23.06 dB
6	2437	348.8	21.32	pk	ver	46.00	-24.68 dB
6	2437	449.6	18.28	pk	ver	46.00	-27.72 dB
6	2437	3928	39.26	pk	hor	53.98	-14.72 dB
6	2437	4696	42.54	pk	ver	53.98	-11.44 dB
6	2437	5984	45.66	pk	hor	53.98	-8.32 dB

Comments:
* Physical distance between EUT and measurement antenna.
** Emission level corresponds to ambient noise floor