




<b>RADIO REPORT</b> <b>FCC 47 CFR Part 15E</b> <b>ISED Canada RSS-247</b> <b>Unlicensed National Information Infrastructure Devices in the 5 GHz Bands</b>	
<b>Report Reference No</b>	G0M-2309-2215-TFC407WF-V01
<b>Testing Laboratory</b>	Eurofins Product Service GmbH
<b>Address</b>	Storkower Str. 38c 15526 Reichenwalde Germany
<b>Accreditation</b>	 <p>DAkkS - Registration number : D-PL-12092-01-03 (ISED)                      ISED Testing Laboratory site: 3470A                      DAkkS - Registration number : D-PL-12092-01-04 (FCC)                      FCC Filed Test Laboratory, Reg.-No.: 96970</p>
<b>Applicant</b>	Panasonic Industrial Devices Europe GmbH
<b>Address</b>	Zeppelinstr. 19 21337 Lüneburg GERMANY
<b>Test Specification</b>	47 CFR Part 15E RSS-247, Issue 3, 2023-08 RSS-Gen, Issue 5, Amendment 1, 2019-03
<b>Non-Standard Test Method</b>	None
<b>Equipment under Test (EUT):</b>	
<b>Product Description</b>	Wi-Fi 6 Dual Band 2.4 GHz/5 GHz, Bluetooth® and 802.15.4 Module
<b>Model(s)</b>	ENWF9511C1KF
<b>Additional Model(s)</b>	None
<b>Brand Name(s)</b>	PAN9019A
<b>Hardware Version(s)</b>	03
<b>Software Version(s)</b>	01
<b>FCC-ID</b>	T7V9019
<b>IC</b>	216Q-9019
<b>Test Result</b>	<b>PASSED</b>

<b>Possible test case verdicts:</b>		
required by standard but not tested	N/T	
not required by standard	N/R	
not applicable to EUT	N/A	
test object does meet the requirement	P(PASS)	
test object does not meet the requirement	F(FAIL)	
<b>Testing:</b>		
Test Lab Temperature	20 - 23 °C	
Test Lab Humidity	32 – 38 %	
Date of receipt of test item	2023-10-11	
<b>Report:</b>		
Compiled by	Azamat Ibraimov	
Tested by (+ signature) (Responsible for Test)	Azamat Ibraimov	
Approved by (+ signature) (Test Lab Engineer)	Wilfried Treffke	
Date of Issue	2024-03-18	
Total number of pages	213	
<b>General Remarks:</b>		
<p>The test results presented in this report relate only to the object tested.</p> <p>The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.</p> <p>This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.</p>		
<b>Additional Comments:</b>		
<p>This test report only includes measurement results of IEEE 802.11ax HE-TB with partial RU and HE20-SU ER modes. For measurement results of the other modes IEEE 802.11ax HE-SU and IEEE 802.11ax HE-TB with full RU, refer to the test report 3938RER003, published by Eurofins Electric &amp; Electronics Finland Oy on March 6, 2024.</p>		

**ADDITIONAL VARIANTS**

Additional Variants (not tested and not evaluated variants)		
Not-tested Variant	Description	
1	Product Type Description	Wi-Fi 6 Dual Band 2.4 GHz/5 GHz and Bluetooth® Module
	Model name	ENWF9501C1KF
	Brand name	PAN9019
	PMN	PAN9019
	HVIN	ENWF9501C1KF
	FVIN	--
	HMN	--
	Hardware Version	03
	Software Version	01
2	Product Type Description	Wi-Fi 6 Dual Band 2.4 GHz/5 GHz, Bluetooth® and 802.15.4 Module, M.2 card
	Model name	ENWF9511CMKF
	Brand name	PAN9019A-M2E-EVD
	PMN	PAN9019A-M2E-EVD
	HVIN	ENWF9511CMKF
	FVIN	--
	HMN	--
	Hardware Version	01
	Software Version	01
3	Product Type Description	Wi-Fi 6 Dual Band 2.4 GHz/5 GHz and Bluetooth® Module, M.2 card
	Model name	ENWF9501CMKF
	Brand name	PAN9019-M2E-EVD
	PMN	PAN9019-M2E-EVD
	HVIN	ENWF9501CMKF
	FVIN	--
	HMN	--
	Hardware Version	01
	Software Version	01
4	Product Type Description	Wi-Fi 6 Dual Band 2.4 GHz/5 GHz, Bluetooth® and 802.15.4 Module, M.2 card with chip antenna
	Model name	ENWF9511AMKF
	Brand name	PAN9019A-M2E-C-EVD
	PMN	PAN9019A-M2E-C-EVD
	HVIN	ENWF9511AMKF
	FVIN	--
	HMN	--
	Hardware Version	01
	Software Version	01
5	Product Type Description	Wi-Fi 6 Dual Band 2.4 GHz/5 GHz and Bluetooth®, M.2 card with chip antenna
	Model name	ENWF9501AMKF
	Brand name	PAN9019-M2E-C-EVD
	PMN	PAN9019-M2E-C-EVD
	HVIN	ENWF9501AMKF
	FVIN	--
	HMN	--
	Hardware Version	01
	Software Version	01
Comment: Those named additional variants above have not been tested. Those additional variants of the series have been declared by the manufacturer. The test report explicitly states that those variants were neither tested nor assessed nor evaluated.		

**VERSION HISTORY**

Version History			
Version	Issue Date	Remarks	Revised By
01	2024-03-18	Initial Release	--

**ABBREVIATIONS AND ACRONYMS**

Acronyms	
Acronym	Description
BPSK	Binary Phase Shift Keying
EIRP	Equivalent Isotropic Radiated Power
EUT	Equipment Under Test
FCC	Federal Communications Commission
HT	High Throughput
IEEE 802.11	MAC and PHY Layer for WiFi
OFDM	Orthogonal Frequency Division Multiplexing
QAM	Quadrature Amplitude Modulation
QPSK	Quadrature Phase Shift Keying
RBW	Resolution bandwidth
RMS	Root mean square
TPC	Transmit Power Control
VBW	Video bandwidth
VHT	Very High Throughput

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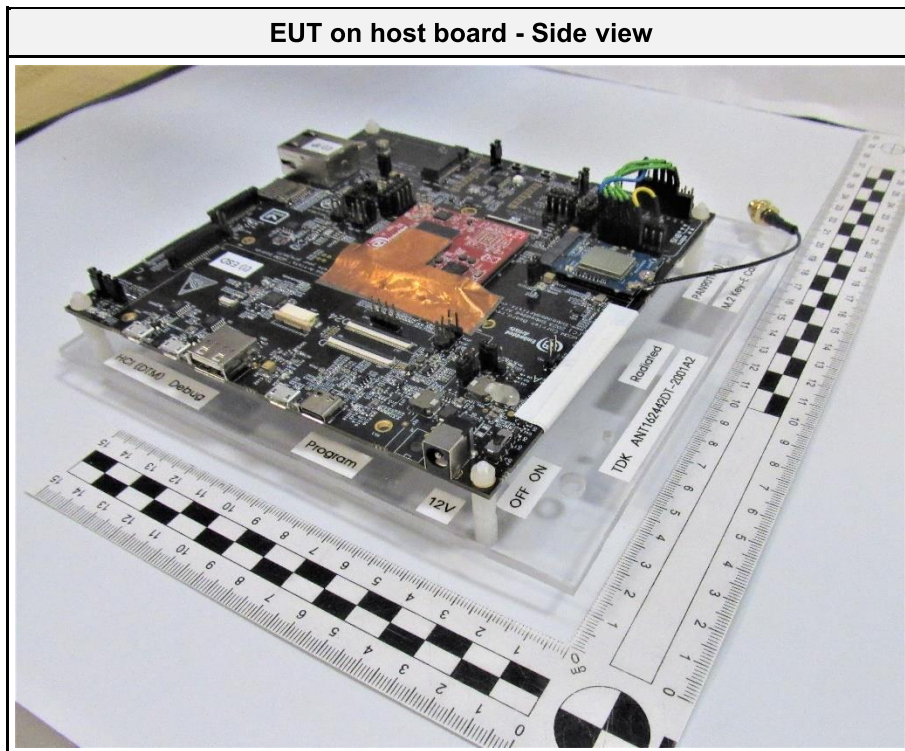
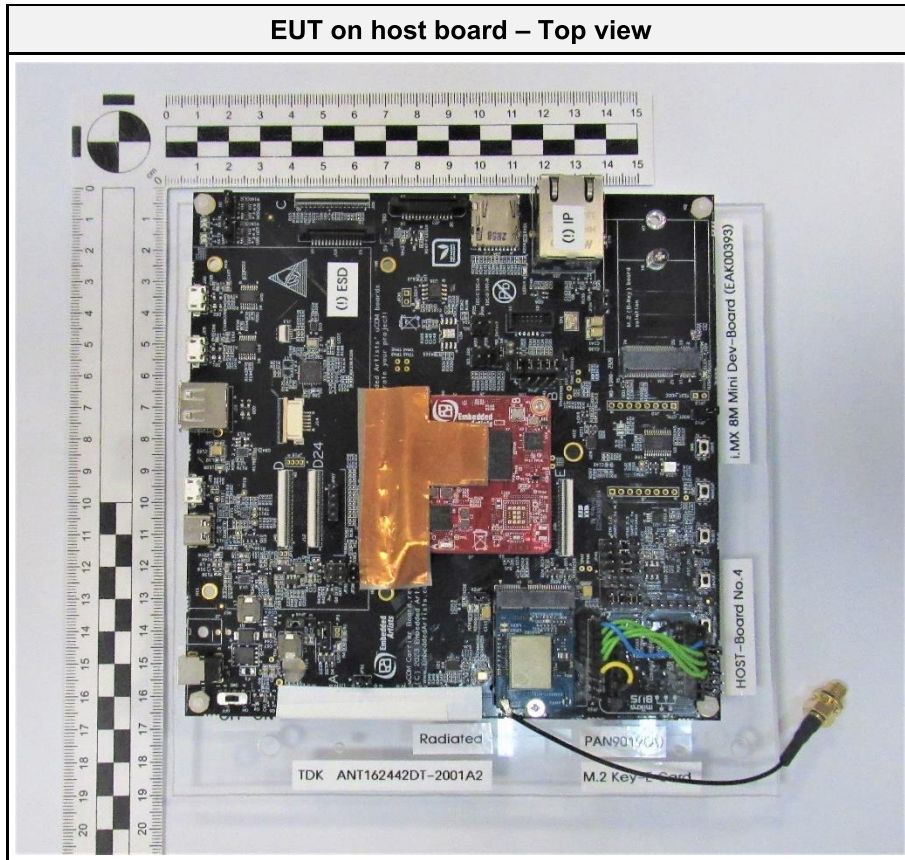
**1 Equipment (Test Item) Under Test**

Description	Wi-Fi 6 Dual Band 2.4 GHz/5 GHz, Bluetooth® and 802.15.4 Module		
Model	ENWF9511C1KF		
Additional Model(s)	None		
Brand Name(s)	PAN9019A		
Sample Identification	EUT #	Sample-ID	Serial Number
	EUT 1 (Taoglas rod antenna, conducted)	47713	00000452
	EUT 2 (2J strip antenna)	46856	00000306
	EUT 3 (TDK chip antenna)	46897	00000238
Hardware Version(s)	03		
Software Version(s)	01		
PMN	PAN9019A		
HVIN	ENWF9511C1KF		
FVIN	--		
HMN	--		
FCC-ID	T7V9019		
IC	216Q-9019		
Equipment type	Radio Module		
Device type	Access Point, Client		
Radio type	Transceiver		
Assigned frequency bands	5150 - 5250 MHz 5250 - 5350 MHz 5470 - 5725 MHz 5725 - 5850 MHz		
Radio technology	IEEE 802.11a IEEE 802.11n (HT20) IEEE 802.11n (HT40) IEEE 802.11ac (VHT20) IEEE 802.11ac (VHT40) IEEE 802.11ac (VHT80) IEEE 802.11ax (HE20) IEEE 802.11ax (HE40) IEEE 802.11ax (HE80) IEEE 802.11ax (HE20-TB) IEEE 802.11ax (HE40-TB) IEEE 802.11ax (HE80-TB) IEEE 802.11ax (HE20-SU ER)		
Modulation	BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM, 1024-QAM		
Number of antenna ports	1		
Transmit power control	Yes		
Antenna 1	Type	External antenna	
	Model	2JF1002P	
	Manufacturer	2J Antennas	
	Gain (Customer declaration)	6.6 dBi (U-NII-1) 7.3 dBi (U-NII-2A) 8.0 dBi (U-NII-2C) 6.6 dBi (U-NII-3)	

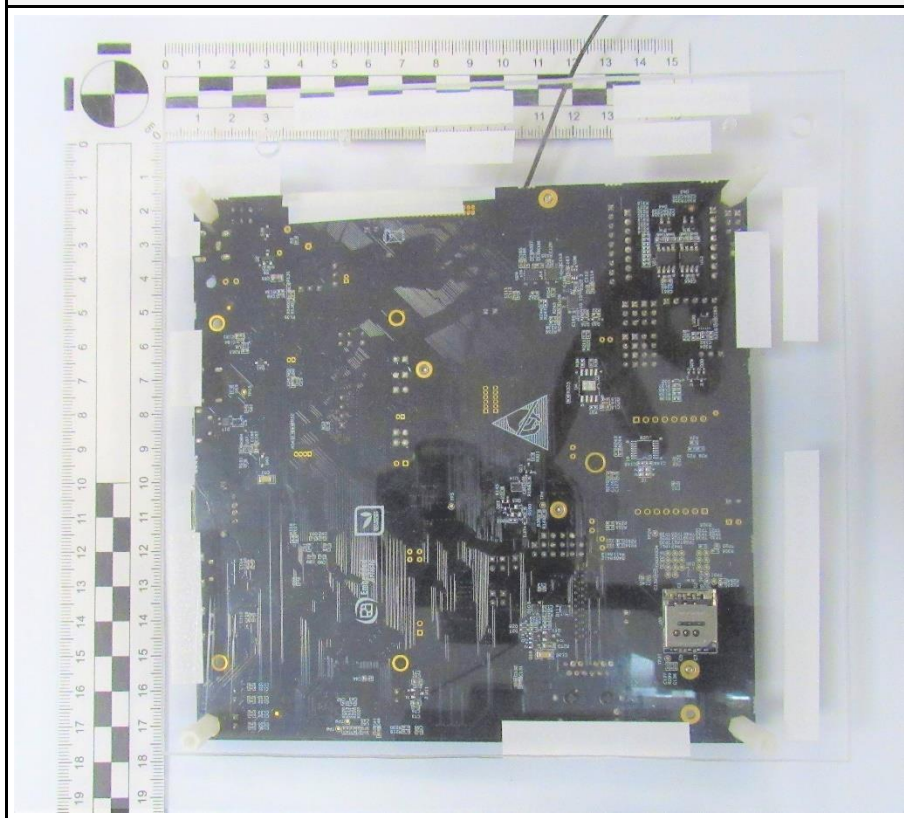
Antenna 2	Type	External antenna
	Model	GW.51.5153
	Manufacturer	Taoglas
	Gain (Customer declaration)	3.9 dBi (U-NII-1) 4.5 dBi (U-NII-2A) 5.5 dBi (U-NII-2C) 3.8 dBi (U-NII-3)
Antenna 2	Type	External antenna
	Model	ANT162442DT-2001A2
	Manufacturer	TDK
	Gain (Customer declaration)	1.0 dBi (U-NII-1) 1.1 dBi (U-NII-2A) 1.5 dBi (U-NII-2C) 2.1 dBi (U-NII-3)
Supply Voltage	V <sub>NOM</sub>	1.8/3.3 VDC
	V <sub>MIN</sub>	1.7/3.14 VDC
	V <sub>MAX</sub>	1.89/3.46 VDC
Operating Temperature	T <sub>NOM</sub>	25 °C
	T <sub>MIN</sub>	-40 °C
	T <sub>MAX</sub>	85 °C
Battery supply	None	
AC/DC-Adaptor	None	
Manufacturer	Panasonic Industrial Devices Europe GmbH Zeppelinstr. 19 21337 Lüneburg GERMANY	



1.1 Photos – Equipment External



EUT on host board – Bottom view

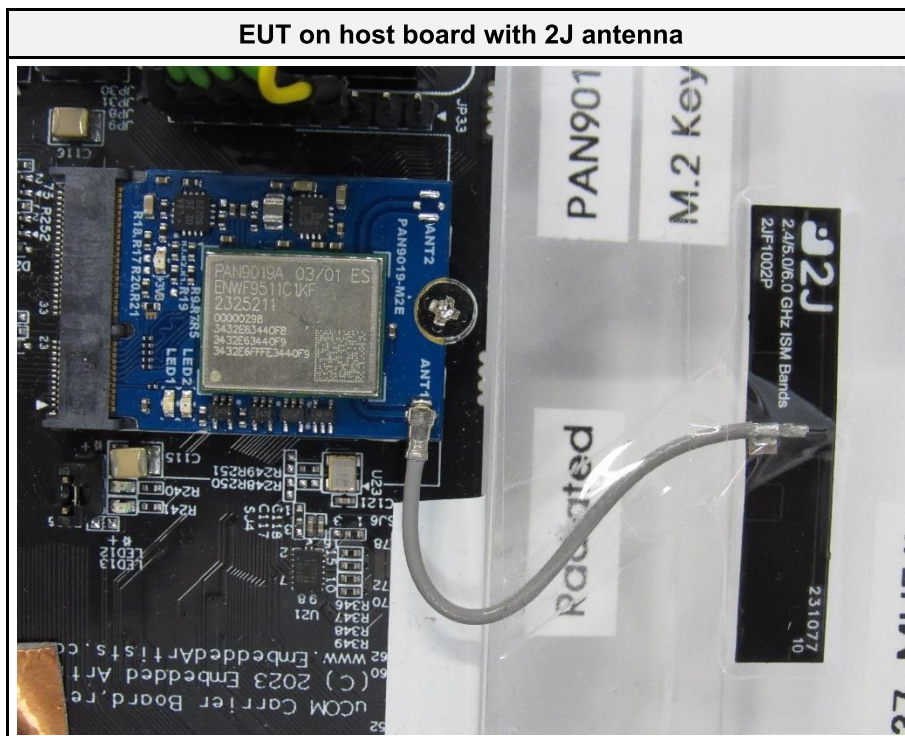
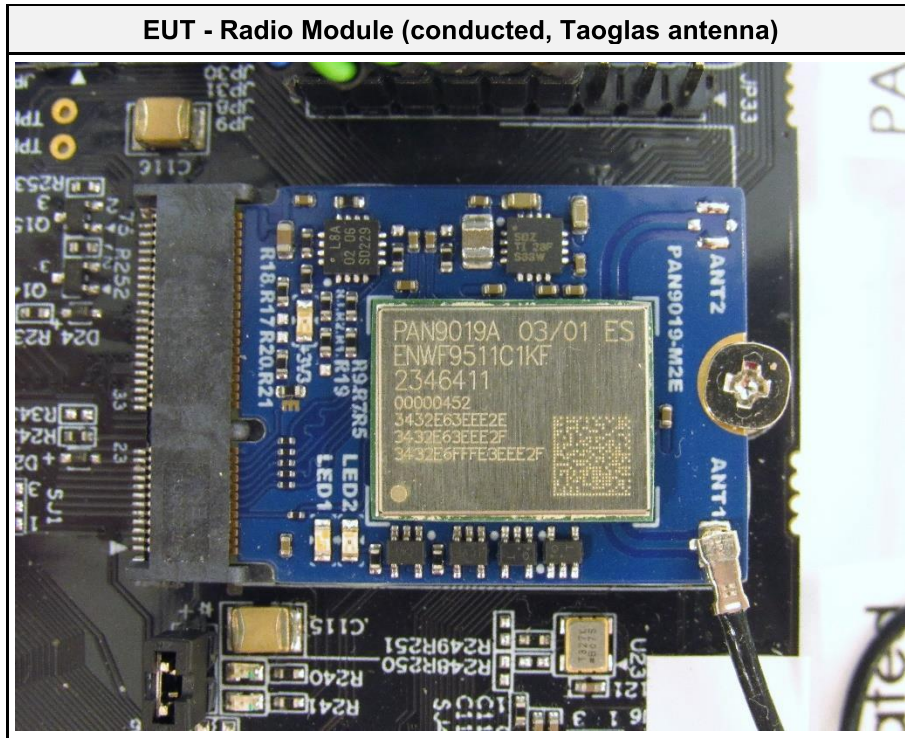


Power adapter

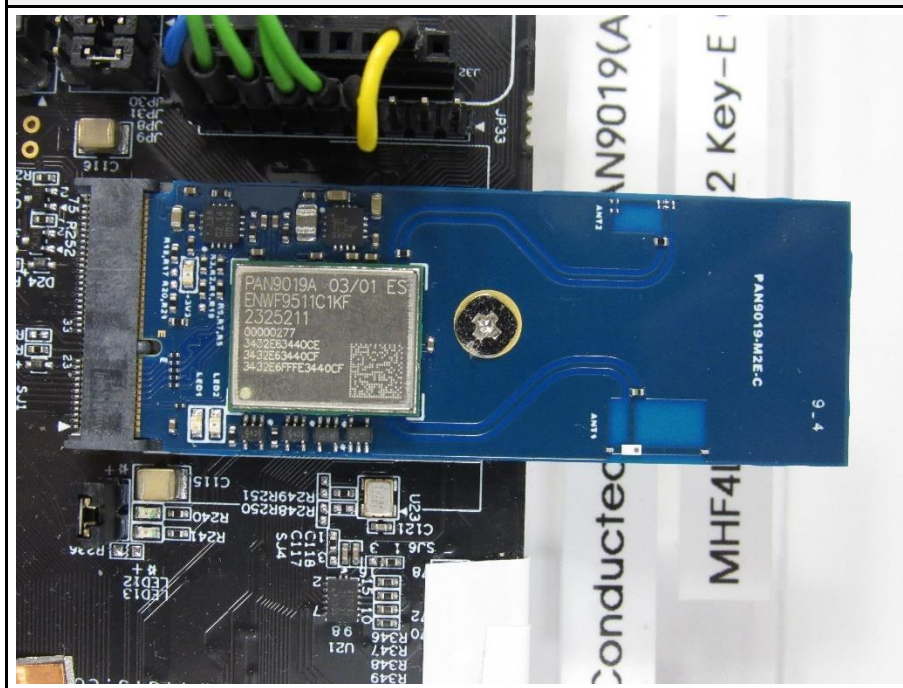




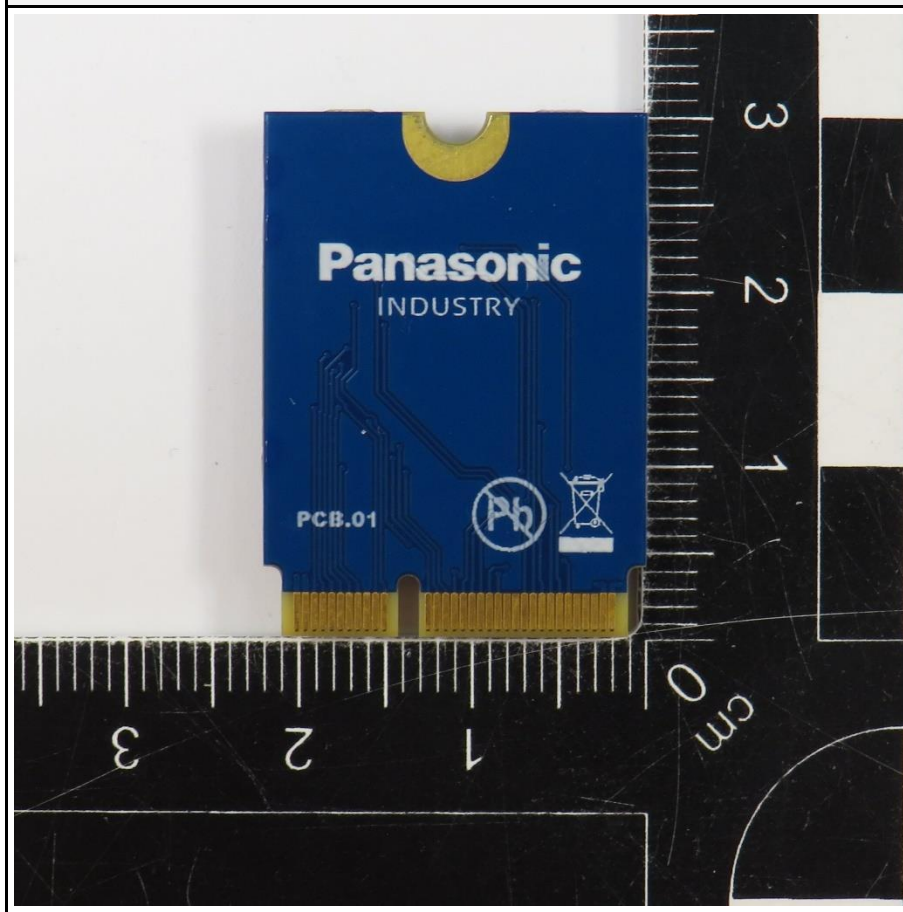
1.2 Photos – Equipment Internal



EUT on host board with TDK antenna

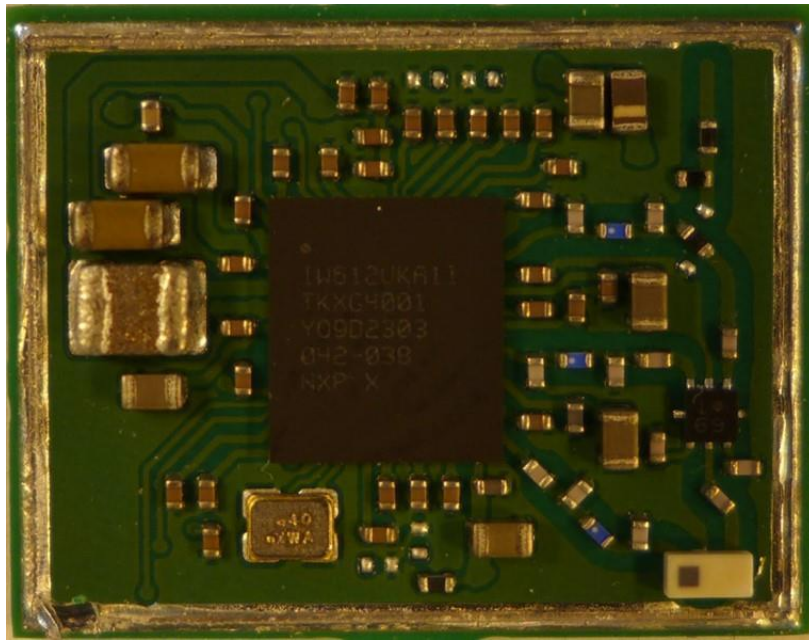


M2 card back side

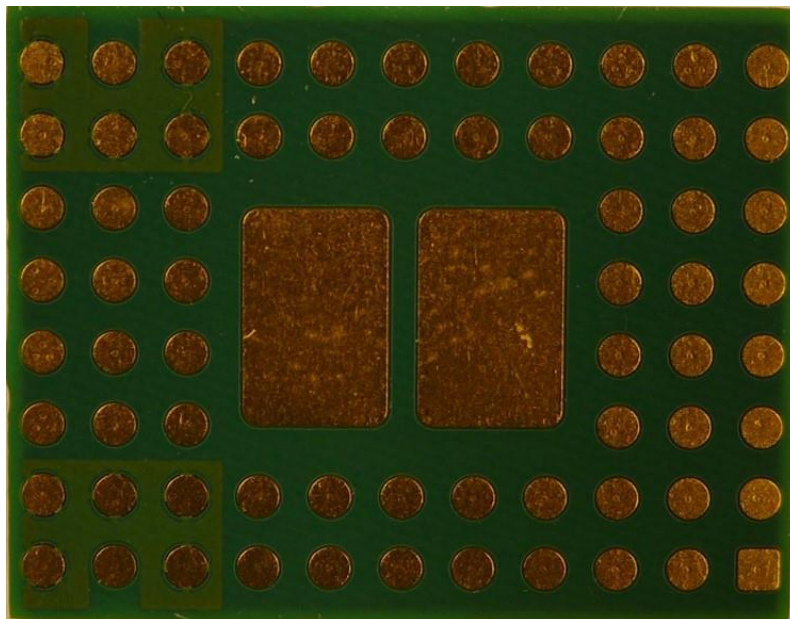




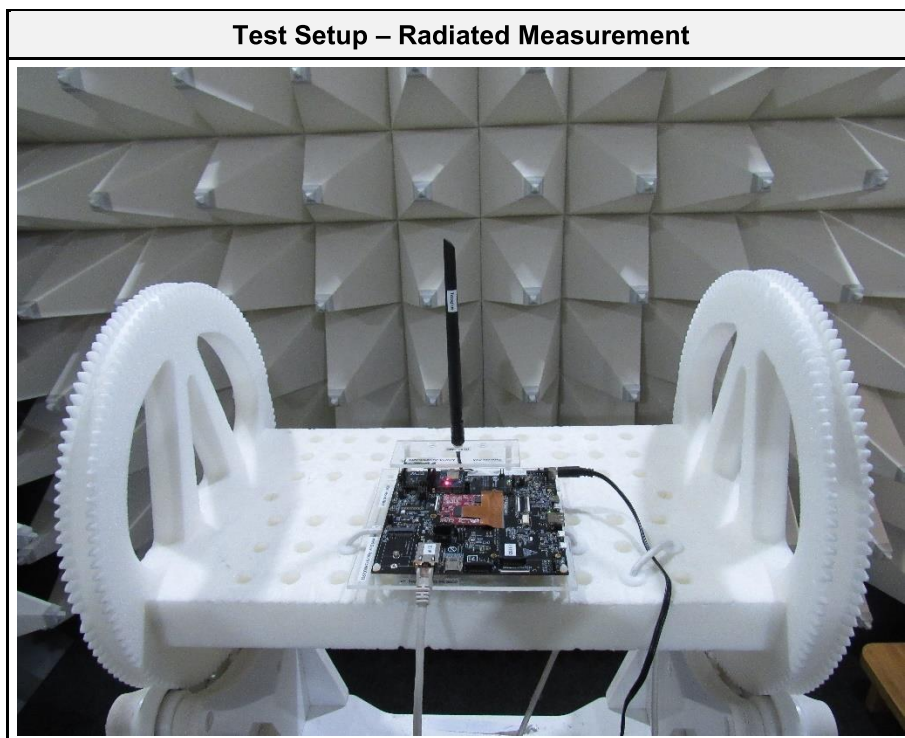
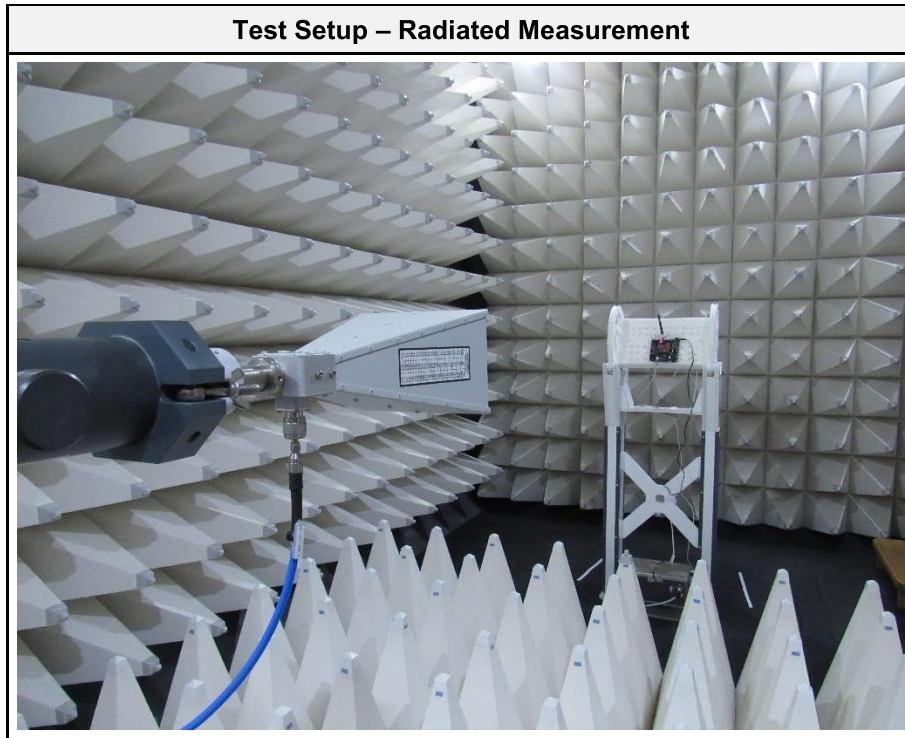
RF Module-PAN9019(A)-top without shielding



RF Module-PAN9019(A)-bottom top without shielding



1.3 Photos – Test Setup



#### 1.4 Support Equipment

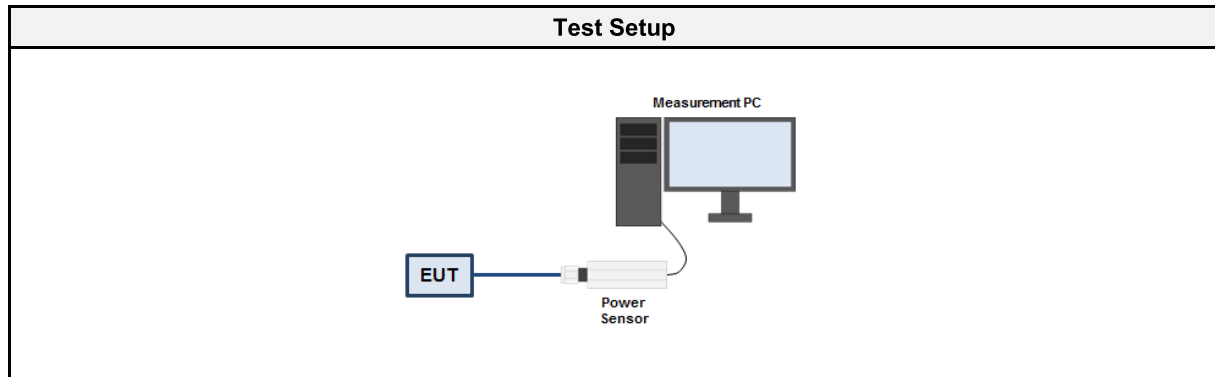
Product Type	Device	Manufacturer	Model	Comment
AE	Host-Board-iMX8M Mini Developer's Kit V3	Embedded Artists	EAK00393	--
AE	Power Adapter-Switching Power Supply	Phihong Technology Co. Ltd.	PSAA30R-120	--
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
CBL	Connecting Cable			
SFT	Software			
Comment: The Equipment Under Test used an operating system with a test firmware. The driver for the tested technology was running in a manufacturer mode.				

## 1.5 Test mode data rate evaluation

### 1.5.1 Information

Test Information	
Measurement Method	KDB 789033 E
Operator	Azamat Ibraimov
Date	2024-02-15

### 1.5.2 Setup



### 1.5.3 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Power Sensor	ETS-Lindgren	7002-006	EF00934	2023-08	2024-08

### 1.5.4 Procedure

Test Procedure
<ol style="list-style-type: none"> <li>1. EUT set to test mode on the first supported channel for each modulation and data rate</li> <li>2. The conducted power is measured with a wide band power sensor</li> <li>3. The power is measured for all data rates/modulations supported by the EUT</li> <li>4. The data rate with the highest output power for each technology is selected for test mode</li> </ol>



## 1.5.5 Results

HE20-TB 106tones - 5180 MHz											
Output Power [dBm]											
MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9	MCS10	MCS11
<b>6.6</b>	6.6	6.5	6.6	6.5	6.6	6.6	6.6	6.6	6.4	6.5	6.6

HE40-TB 106tones - 5190 MHz											
Output Power [dBm]											
MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9	MCS10	MCS11
<b>7.1</b>	7.1	7.1	7.0	7.1	7.1	7.0	7.1	6.9	7.0	7.1	7.1

HE80-TB 52tones - 5210 MHz											
Output Power [dBm]											
MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9	MCS10	MCS11
<b>-0.2</b>	-0.2	-0.2	-0.2	-0.3	-0.2	-0.2	-0.2	-0.2	-0.2	-0.3	-0.2

## 1.6 Test mode duty cycle evaluation

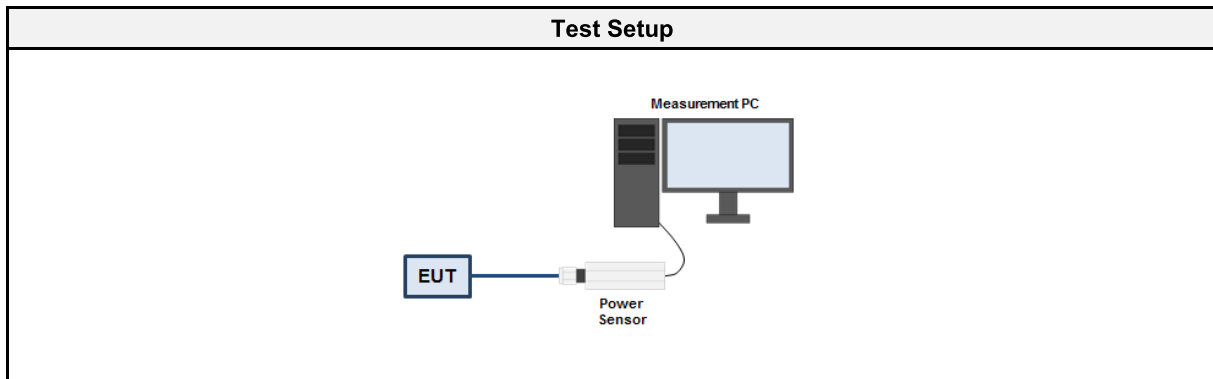
### 1.6.1 Information

Test Information	
Measurement Method	ANSI C63.10 12.2
Operator	Azamat Ibraimov
Date	2024-02-15

### 1.6.2 Requirements

Requirements	
Duty cycle	Duty cycle correction
≥ 98 %	No correction required
< 98 %	Correction required ( $10 \times \log_{10}(1/DC)$ )

### 1.6.3 Setup



### 1.6.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Power Sensor	ETS-Lindgren	7002-006	EF00934	2023-08	2024-08

### 1.6.5 Procedure

Test Procedure
<ol style="list-style-type: none"> <li>1. EUT set to test mode</li> <li>2. Sweep time is set long enough to capture at least 5 bursts</li> <li>3. The maximum burst duration <math>T_{ON}</math> is measured</li> <li>4. The minimum idle duration <math>T_{OFF}</math> is measured</li> <li>5. The duty cycle is calculated by <math>DC = T_{ON} / (T_{ON} + T_{OFF})</math></li> <li>6. The duty cycle correction is calculated by <math>DC = 10 \times \log_{10}(T_{ON} / (T_{ON} + T_{OFF}))</math></li> </ol>

## 1.6.6 Results

Duty Cycle Results				
Mode	Channel [MHz]	Data rate	Duty Cycle	Correction Factor [dB]
HE20-TB	5180	MCS 0	0.96	-0.17
HE40-TB	5190	MCS 0	0.96	-0.17
HE80-TB	5210	MCS 0	0.96	-0.17
HE20-ER	5180	MCS 0	0.97	-0.13

## 1.7 Test Modes

Mode	Description
HE20-TB partial RU (IEEE 802.11ax)	Mode = Transmit Bandwidth = 20 MHz Duty cycle = 96% Power setting = 9 Tones = 106 Data rate = MCS 0
HE40-TB partial RU (IEEE 802.11ax)	Mode = Transmit Bandwidth = 40 MHz Duty cycle = 96% Power setting = 9 Tones = 106 Data rate = MCS 0
HE80-TB partial RU (IEEE 802.11ax)	Mode = Transmit Bandwidth = 80 MHz Duty cycle = 96% Power setting = 3 (26 tones) Power setting = 5 (52 tones) Tones = 26, 52 Data rate = MCS 0
HE20-SU ER (IEEE 802.11ax)	Mode = Transmit Bandwidth = 20 MHz Duty cycle = 97% Power setting = 14 (5180 MHz, 5320 MHz, 5500 MHz) Power setting = 15 (frequencies except mentioned above) Tones = 106 Data rate = MCS 0
Comment: The above settings were found as worst-case during pre-tests for output power and PSD.	

## 1.8 Test Frequencies

Designator	Mode	Channel	Frequency [MHz]
F1	Tx / Rx	36	5180
F2	Tx / Rx	40	5200
F3	Tx / Rx	48	5240
F4	Tx / Rx	36+40	5190
F5	Tx / Rx	44+48	5230
F6	Tx / Rx	36+40+44+48	5210
F7	Tx / Rx	52	5260
F8	Tx / Rx	56	5280
F9	Tx / Rx	64	5320
F10	Tx / Rx	52+56	5270
F11	Tx / Rx	60+64	5310
F12	Tx / Rx	52+56+60+64	5290
F13	Tx / Rx	100	5500
F14	Tx / Rx	112	5560
F15	Tx / Rx	120	5600
F16	Tx / Rx	140	5700
F17	Tx / Rx	144	5720
F18	Tx / Rx	100+104	5510
F19	Tx / Rx	116+120	5630
F20	Tx / Rx	132+136	5670
F21	Tx / Rx	140+142	5710
F22	Tx / Rx	100+104+108+112	5530
F23	Tx / Rx	116+120+124+128	5610
F24	Tx / Rx	132+136+140+144	5710
F25	Tx / Rx	149	5745
F26	Tx / Rx	157	5785
F27	Tx / Rx	165	5825
F28	Tx / Rx	149+153	5755
F29	Tx / Rx	157+161	5795
F30	Tx / Rx	149+153+157+161	5775

### 1.9 Sample emission level calculation

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

Reading:

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

A.F.:

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

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

Net:

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

Limit:

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

$$\text{Limit (dB}\mu\text{V/m)} = 20 \cdot \log(\mu\text{V/m})$$

Margin:

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

Example only:

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

**1.10 Normative References**

References	
Designator	Reference
KDB 789033	KDB 789033 D02 v02r01
RSS-Gen	RSS-Gen Issue 5
RSS-247	RSS-247 Issue 3
ANSI C63.10	ANSI C63.10:2013

## 2 Result Summary

FCC 47 CFR Part 15E				
Product Standard Reference	Requirement	Reference Method	Result	Remarks
RSS-247 3.1, RSS-Gen 6.7	Occupied bandwidth	KDB 789033 D ANSI C63.10 6.9	PASS	No limit. Basis for other measurements.
FCC 15.407(e) RSS-247 6.2.4.2	6 dB bandwidth	KDB 789033 C.2 ANSI C63.10 12.4	PASS	Only required in 5725-5850 MHz band.
FCC 15.407(a)(2), (a)(5), (h)(2)	26 dB bandwidth	KDB 789033 C.1 ANSI C63.10 12.4	PASS	No limit. Basis for other measurements.
FCC 15.407(a) RSS-247 6.2.1.1, 6.2.2.1, 6.2.3.1, 6.2.4.2	Maximum output power	KDB 789033 E ANSI C63.10 12.3	PASS	--
FCC 15.407(h) RSS-247 6.2.1.1, 6.2.2.1, 6.2.3.1	Transmit power control	KDB 789033 E ANSI C63.10 12.3	N/R	Required in 5250-5350 and 5470-5725 MHz bands. Not required for EIRP < 500 mW.
FCC 15.407(a) RSS-247 6.2.1.1, 6.2.2.1, 6.2.3.1, 6.2.4.2	Power spectral density	KDB 789033 F ANSI C63.10 12.5	PASS	--
FCC 15.407(g) RSS-247 3.1 RSS-Gen 6.11	Frequency stability	ANSI C63.10 6.8	N/T	Note 1
FCC 15.207 RSS-247 3.1 RSS-Gen 7.2	AC power line conducted emissions	ANSI C63.10 6.2 ANSI C63.10 6.2	N/T	Note 1
FCC 15.407(b) RSS-247 6.2.1.2, 6.2.2.2, 6.2.3.2, 6.2.4.3	Transmitter radiated emissions	KDB 789033 G ANSI C63.10 12.7	PASS	Note 2
RSS-247 3.1 RSS-Gen 7.3	Receiver radiated emissions	ANSI C63.10 6.1-6.6	N/T	Note 1
FCC 15.407(a) RSS-247 6.2.2.3	Radiation pattern	KDB 789033 H RSS-247 Annex A	N/R	5250-5350 MHz band only with EIRP > 23 dBm
Note 1: Evaluated in the test report 3938RER003 issued by Eurofins Electric & Electronics Finland Oy. Note 2: Measured only frequency range 1 – 26 GHz. For full radiated tests refer to the report 3938RER003 issued by Eurofins Electric & Electronics Finland Oy.				
Comment: The Decision Rule is applied on the basis of ETSI TR 102 273 and ETSI TR 100 028. These standards provide guidance on how to calculate and apply measurement uncertainty whilst providing maximum uncertainties allowance. In all cases due consideration will be given to ILAC-G8:09/2019. Where a result is considered conditional in respect of its proximity to the limit line, the customer would be made aware of situation so that they can make an informed decision on how to proceed.				

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

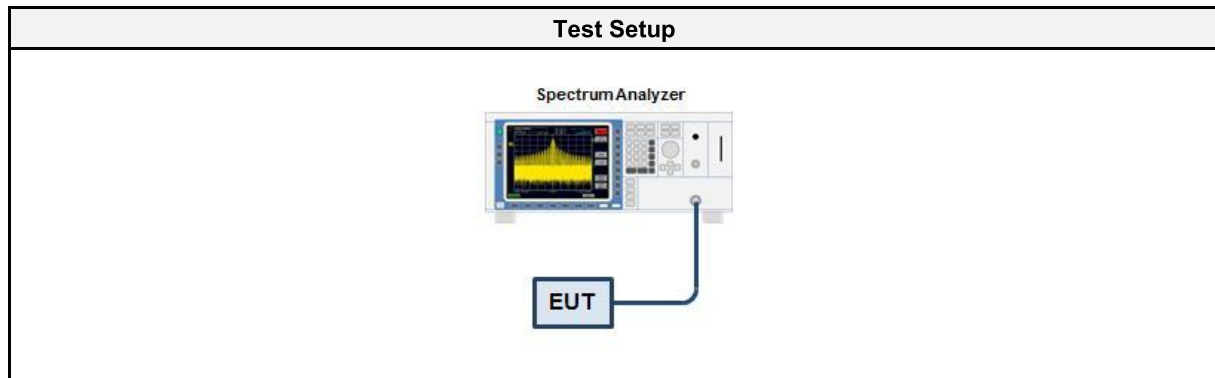
##### 3.1.1 Information

Test Information	
Reference	ISED RSS-247 6.2, RSS-Gen 6.7
Measurement Method	ANSI C63.10 6.9
Operator	Azamat Ibraimov
Date	2024-02-29
Measurement uncertainty	±1.26 %

##### 3.1.2 Limits

Limits
None (Informational only)

##### 3.1.3 Setup



##### 3.1.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	R&S	FSU43	EF01631	2023-08	2024-08
Cable(CAABC)	Gigalane	GIGALANE 1730	EF00779	2023-03	2024-03

##### 3.1.5 Procedure

Test Procedure
<ol style="list-style-type: none"> <li>EUT transmitter is activated in test mode under normal conditions</li> <li>The spectrum analyzer is set to peak detection and maximum hold with a span between 1.5 and 5 times the occupied bandwidth</li> <li>The resolution bandwidth is set to the range of 1 % to 5 % of the occupied bandwidth and video bandwidth <math>\geq 3 \times \text{RBW}</math></li> <li>The occupied bandwidth is measured with the build-in analyzer function</li> </ol>

## 3.1.6 Results

Test Results - 5150 - 5250 MHz					
Mode	Channel	Frequency [MHz]	Nominal BW [MHz]	BW Upper Edge [MHz]	BW [MHz]
HE20-TB 26T	36	5180	20	5189.180	18.900
HE20-TB 52T	40	5200	20	5208.460	18.080
HE20-TB 106T	48	5240	20	5248.460	18.000
HE40-TB 26T	36+40	5190	40	5209.240	38.760
HE40-TB 52T	44+48	5230	40	5231.880	21.280
HE80-TB 26T	36+40+44+48	5210	80	5248.640	78.480
HE20-SU ER	36	5180	20	5189.460	18.200
HE20-SU ER	40	5200	20	5209.460	18.220
HE20-SU ER	48	5240	20	5249.440	18.220

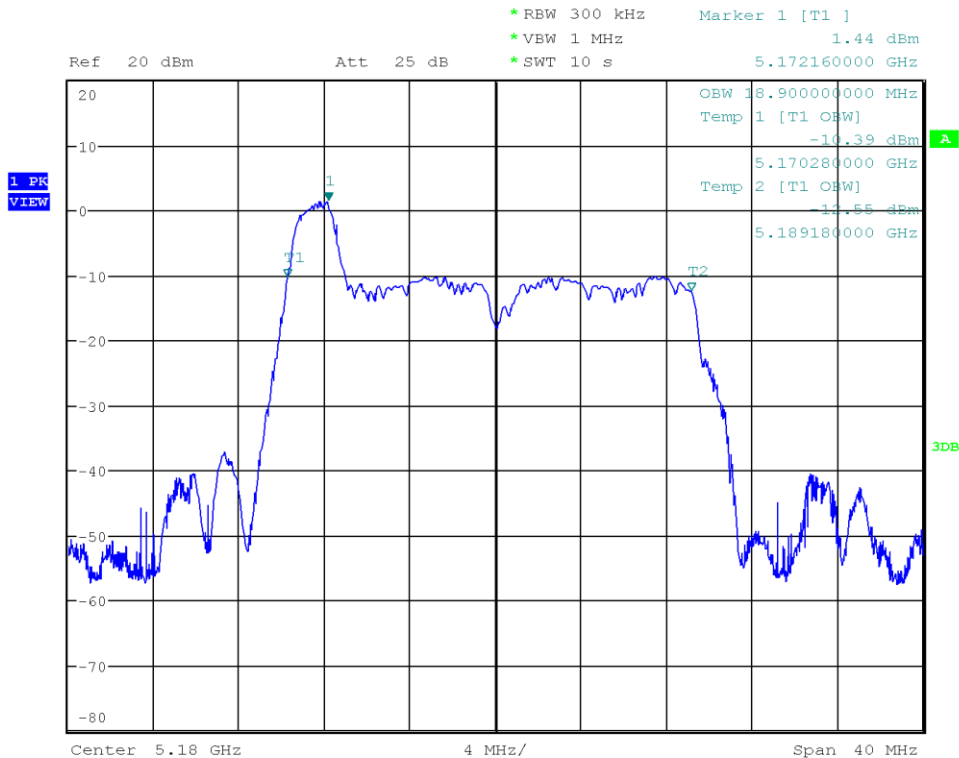
Test Results - 5250 - 5350 MHz					
Mode	Channel	Frequency [MHz]	Nominal BW [MHz]	BW Upper Edge [MHz]	BW [MHz]
HE20-TB 26T	52	5260	20	5269.160	18.900
HE20-TB 52T	56	5280	20	5289.560	18.120
HE20-TB 106T	64	5320	20	5328.440	17.980
HE40-TB 106T	52+56	5270	40	5271.680	20.840
HE40-TB 224T	60+64	5310	40	5328.920	23.080
HE80-TB 52T	52+56+60+64	5290	80	5328.400	78.160
HE20-SU ER	52	5260	20	5269.460	18.200
HE20-SU ER	56	5280	20	5289.440	18.200
HE20-SU ER	64	5320	20	5329.440	18.200

Test Results - 5470 - 5725 MHz					
Mode	Channel	Frequency [MHz]	Nominal BW [MHz]	BW Upper Edge [MHz]	BW [MHz]
HE20-TB 26T	100	5500	20	5509.220	17.940
HE20-TB 52T	120	5600	20	5608.420	16.980
HE20-TB 106T	144	5720	20	5729.460	18.080
HE40-TB 26T	100+104	5510	40	5529.600	38.360
HE40-TB 52T	116+120	5590	40	5593.840	22.240
HE40-TB 106T	140+144	5710	40	5712.680	21.120
HE80-TB 106T	100+104+108+112	5530	80	5567.920	77.440
HE80-TB 224T	116+120+124+128	5610	80	5644.560	73.920
HE80-TB 481T	132+136+140+144	5690	80	5717.680	66.880
HE20-SU ER	100	5500	20	5509.460	18.220
HE20-SU ER	112	5560	20	5569.460	18.220
HE20-SU ER	144	5720	20	5729.440	18.220

Test Results - 5725 - 5850 MHz					
Mode	Channel	Frequency [MHz]	Nominal BW [MHz]	BW Upper Edge [MHz]	BW [MHz]
HE20-TB 26T	149	5745	20	5754.680	18.300
HE20-TB 52T	157	5785	20	5794.560	18.120
HE20-TB 106T	165	5825	20	5834.480	18.120
HE40-TB 224T	149+153	5755	40	5757.400	21.400
HE40-TB 26T	157+161	5795	40	5814.480	38.200
HE80-TB 52T	149+153+157+161	5775	80	5812.120	75.920
HE20-SU ER	149	5745	20	5754.440	18.200
HE20-SU ER	157	5785	20	5794.440	18.180
HE20-SU ER	165	5825	20	5834.440	18.220

### Occupied Bandwidth

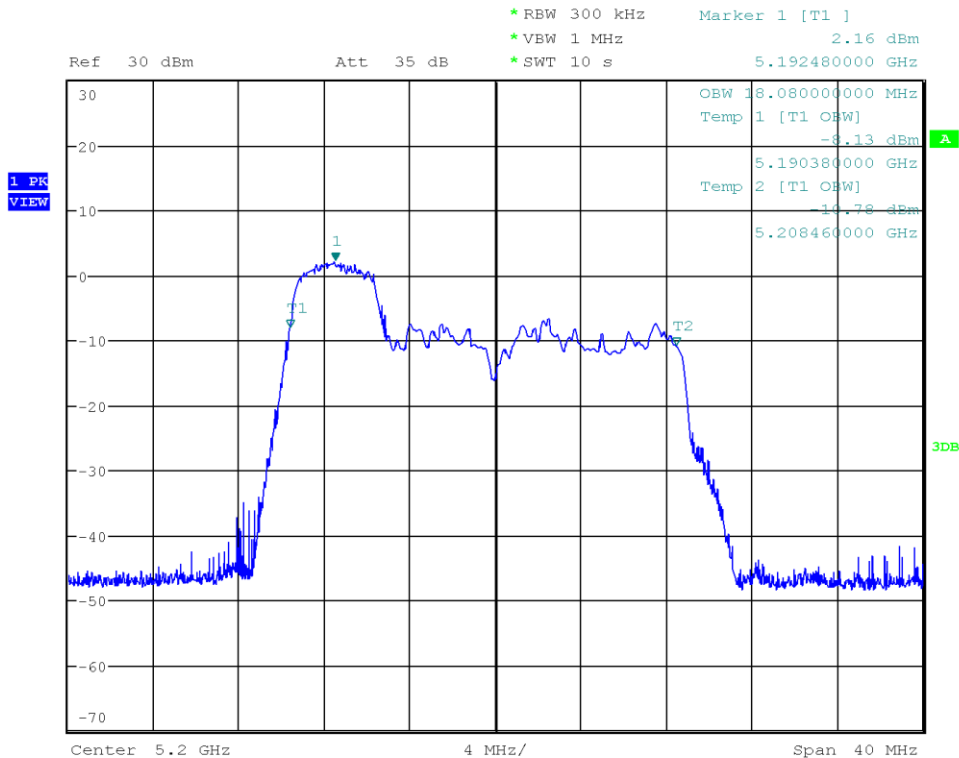
Project Number: G0M-2309-2215  
 Applicant: Panasonic Industrial Devices Europe GmbH  
 Model Description: Wi-Fi 6 Dual Band 2.4 GHz/5 GHz, Bluetooth® and 802.15.4 Module  
 Model: ENWF9511C1KF  
 Test Sample ID: 47713  
 Reference Standards: RSS-247  
 Reference Method: ANSI C63.10:2013, Section 6.9.3  
 Operational Mode: IEEE 802.11ax HE-20 TB, Channel: 36, 5180 MHz  
 Operating Conditions: Tnom/Vnom  
 Operator: Azamat Ibraimov  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-02-29  
 Note: 26 tones  
 Occ. Bandwidth Lower Edge [MHz]: 5170.280  
 Occ. Bandwidth Upper Edge [MHz]: 5189.180  
 Occupied Bandwidth [MHz]: 18.900



Date: 29.FEB.2024 10:11:54

### Occupied Bandwidth

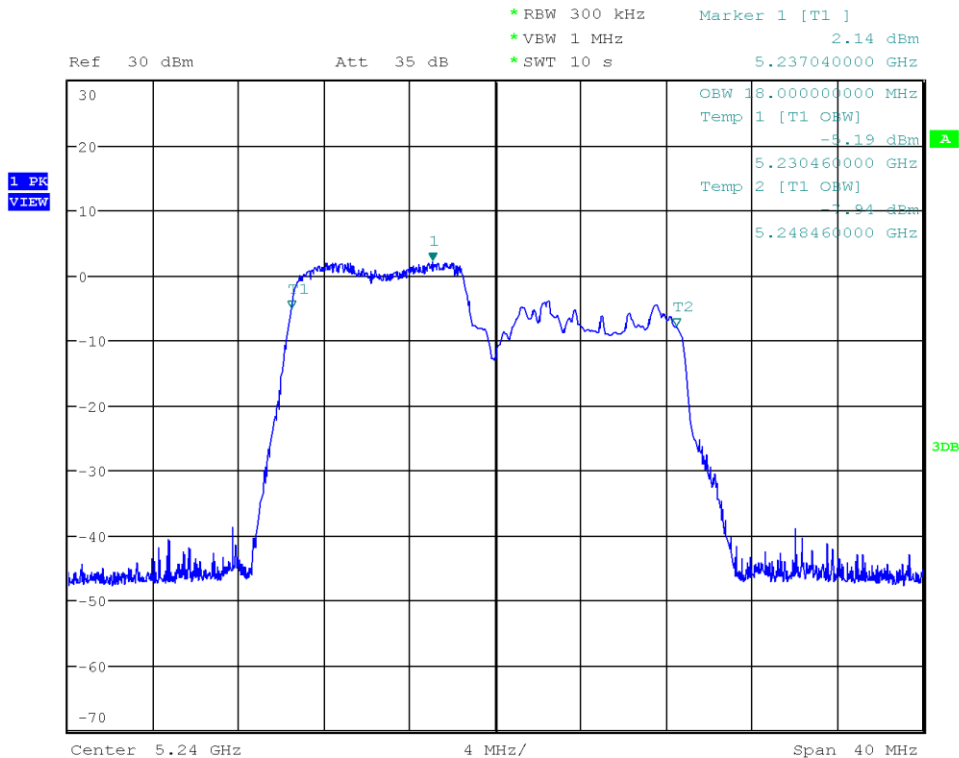
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 Applicant: Panasonic Industrial Devices Europe GmbH  
 Model Description: Wi-Fi 6 Dual Band 2.4 GHz/5 GHz, Bluetooth® and 802.15.4 Module  
 Model: ENWF9511C1KF  
 Test Sample ID: 47713  
 Reference Standards: RSS-247  
 Reference Method: ANSI C63.10:2013, Section 6.9.3  
 Operational Mode: IEEE 802.11ax HE20-TB, Channel: 40, 5200 MHz  
 Operating Conditions: Tnom/Vnom  
 Operator: Azamat Ibraimov  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-02-29  
 Note: 52 tones  
 Occ. Bandwidth Lower Edge [MHz]: 5190.380  
 Occ. Bandwidth Upper Edge [MHz]: 5208.460  
 Occupied Bandwidth [MHz]: 18.080



Date: 29.FEB.2024 10:15:18

### Occupied Bandwidth

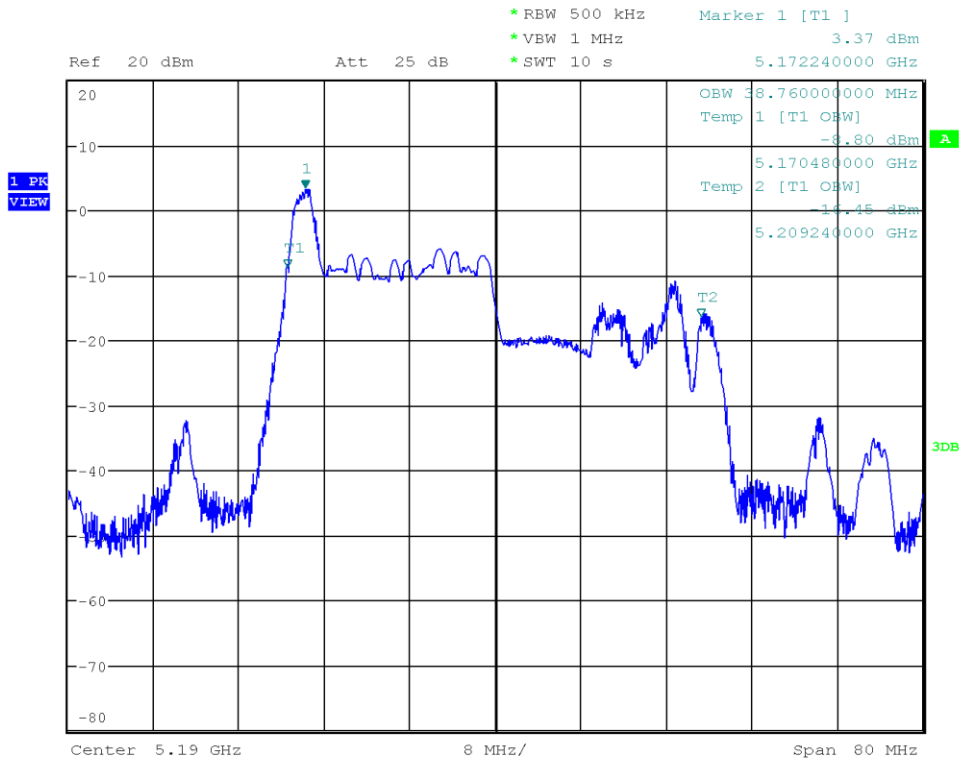
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 Applicant: Panasonic Industrial Devices Europe GmbH  
 Model Description: Wi-Fi 6 Dual Band 2.4 GHz/5 GHz, Bluetooth® and 802.15.4 Module  
 Model: ENWF9511C1KF  
 Test Sample ID: 47713  
 Reference Standards: RSS-247  
 Reference Method: ANSI C63.10:2013, Section 6.9.3  
 Operational Mode: IEEE 802.11ax HE20-TB, Channel: 48, 5240 MHz  
 Operating Conditions: Tnom/Vnom  
 Operator: Azamat Ibraimov  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-02-29  
 Note: 106 tones  
 Occ. Bandwidth Lower Edge [MHz]: 5230.460  
 Occ. Bandwidth Upper Edge [MHz]: 5248.460  
 Occupied Bandwidth [MHz]: 18.000



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### Occupied Bandwidth

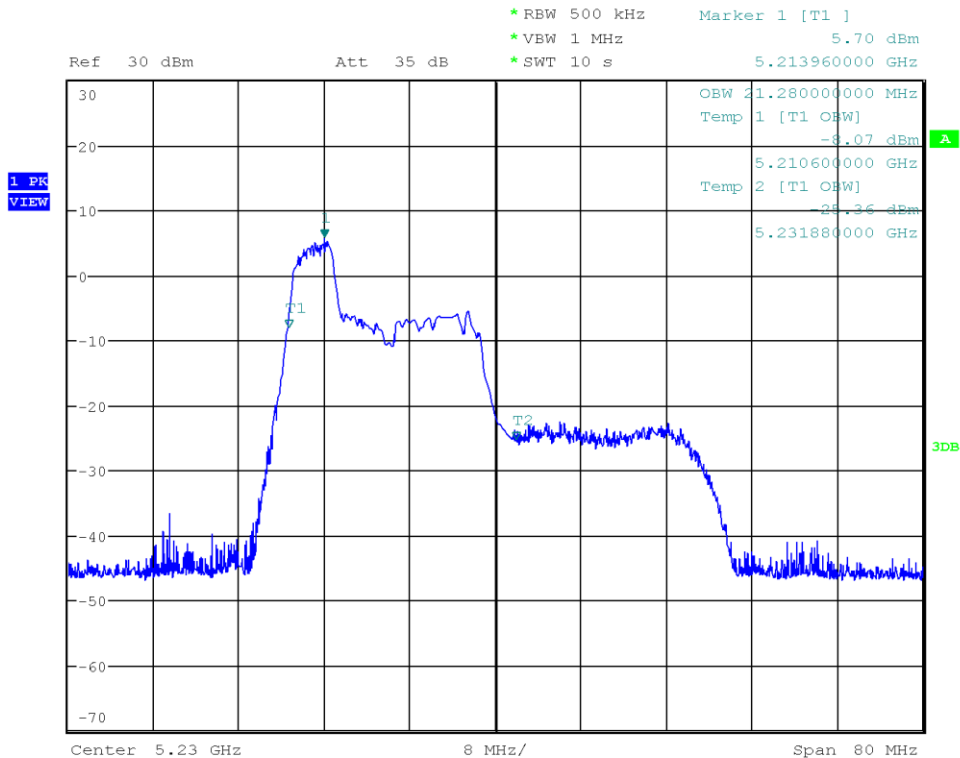
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 Applicant: Panasonic Industrial Devices Europe GmbH  
 Model Description: Wi-Fi 6 Dual Band 2.4 GHz/5 GHz, Bluetooth® and 802.15.4 Module  
 Model: ENWF9511C1KF  
 Test Sample ID: 47713  
 Reference Standards: RSS-247  
 Reference Method: ANSI C63.10:2013, Section 6.9.3  
 Operational Mode: IEEE 802.11ax (HE40-TB), Channel: 38, 5190 MHz  
 Operating Conditions: Tnom/Vnom  
 Operator: Azamat Ibraimov  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-02-29  
 Note: 26 tones  
 Occ. Bandwidth Lower Edge [MHz]: 5170.480  
 Occ. Bandwidth Upper Edge [MHz]: 5209.240  
 Occupied Bandwidth [MHz]: 38.760



Date: 29.FEB.2024 10:19:12

### Occupied Bandwidth

Project Number: G0M-2309-2215  
 Applicant: Panasonic Industrial Devices Europe GmbH  
 Model Description: Wi-Fi 6 Dual Band 2.4 GHz/5 GHz, Bluetooth® and 802.15.4 Module  
 Model: ENWF9511C1KF  
 Test Sample ID: 47713  
 Reference Standards: RSS-247  
 Reference Method: ANSI C63.10:2013, Section 6.9.3  
 Operational Mode: IEEE 802.11ax (HE40-TB), Channel: 46, 5230 MHz  
 Operating Conditions: Tnom/Vnom  
 Operator: Azamat Ibraimov  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-02-29  
 Note: 52 tones  
 Occ. Bandwidth Lower Edge [MHz]: 5210.600  
 Occ. Bandwidth Upper Edge [MHz]: 5231.880  
 Occupied Bandwidth [MHz]: 21.280

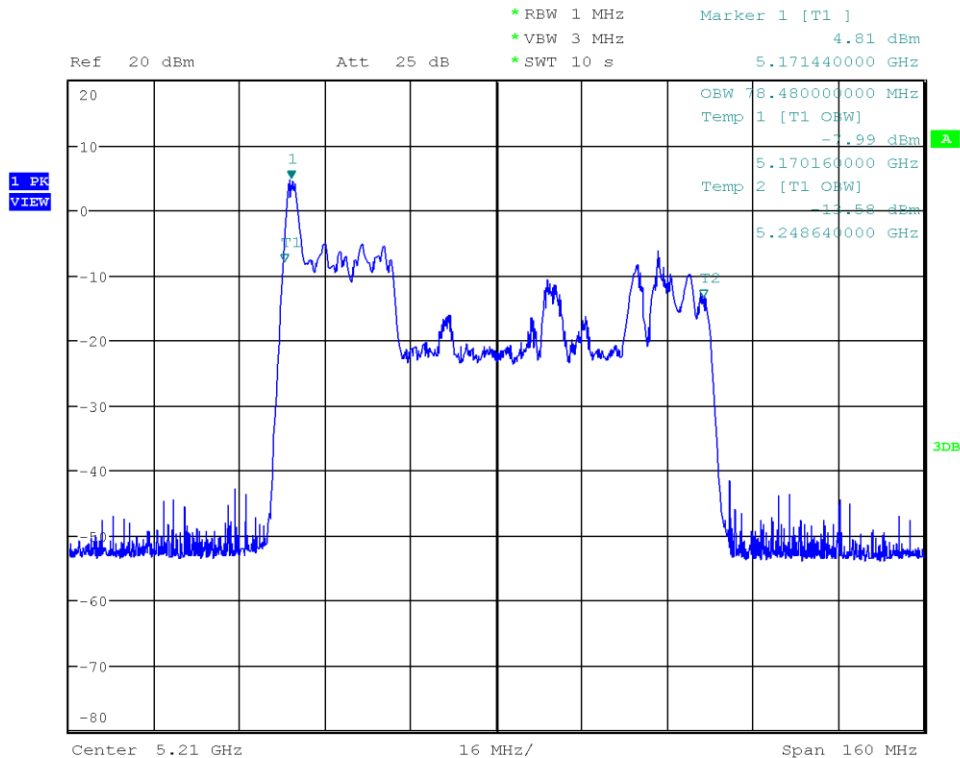


Date: 29.FEB.2024 10:20:32



### Occupied Bandwidth

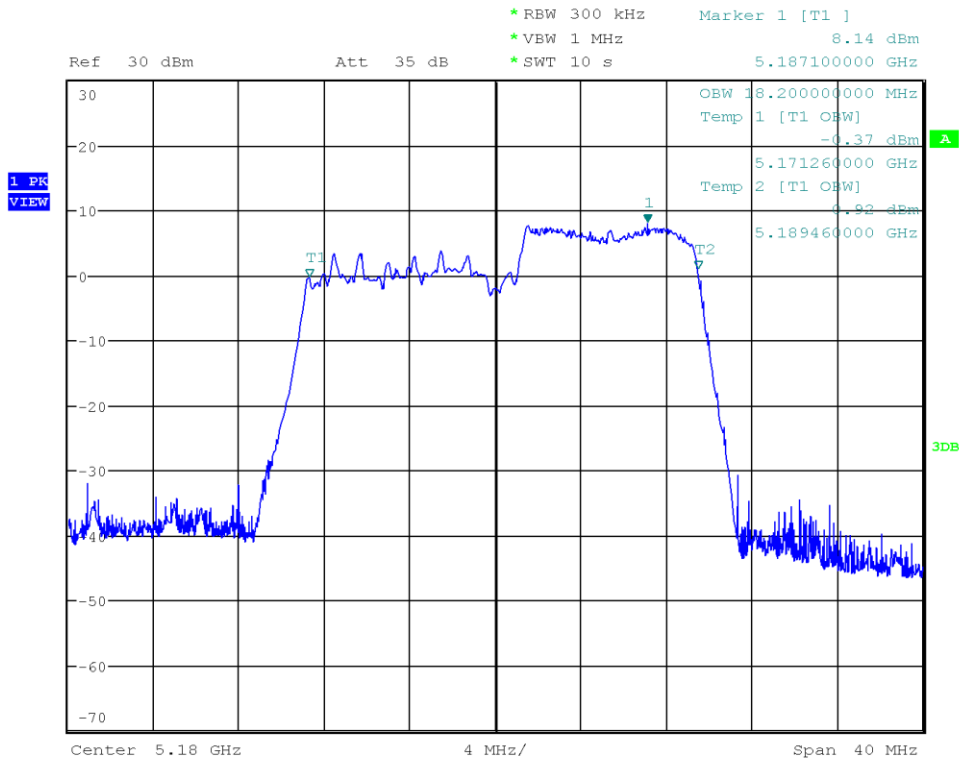
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 Applicant: Panasonic Industrial Devices Europe GmbH  
 Model Description: Wi-Fi 6 Dual Band 2.4 GHz/5 GHz, Bluetooth® and 802.15.4 Module  
 Model: ENWF9511C1KF  
 Test Sample ID: 47713  
 Reference Standards: RSS-247  
 Reference Method: ANSI C63.10:2013, Section 6.9.3  
 Operational Mode: IEEE 802.11ax (HE80-TB), Channel: 42, 5210 MHz  
 Operating Conditions: Tnom/Vnom  
 Operator: Azamat Ibraimov  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-02-29  
 Note: 26 tones  
 Occ. Bandwidth Lower Edge [MHz]: 5170.160  
 Occ. Bandwidth Upper Edge [MHz]: 5248.640  
 Occupied Bandwidth [MHz]: 78.480



Date: 29.FEB.2024 10:22:13

### Occupied Bandwidth

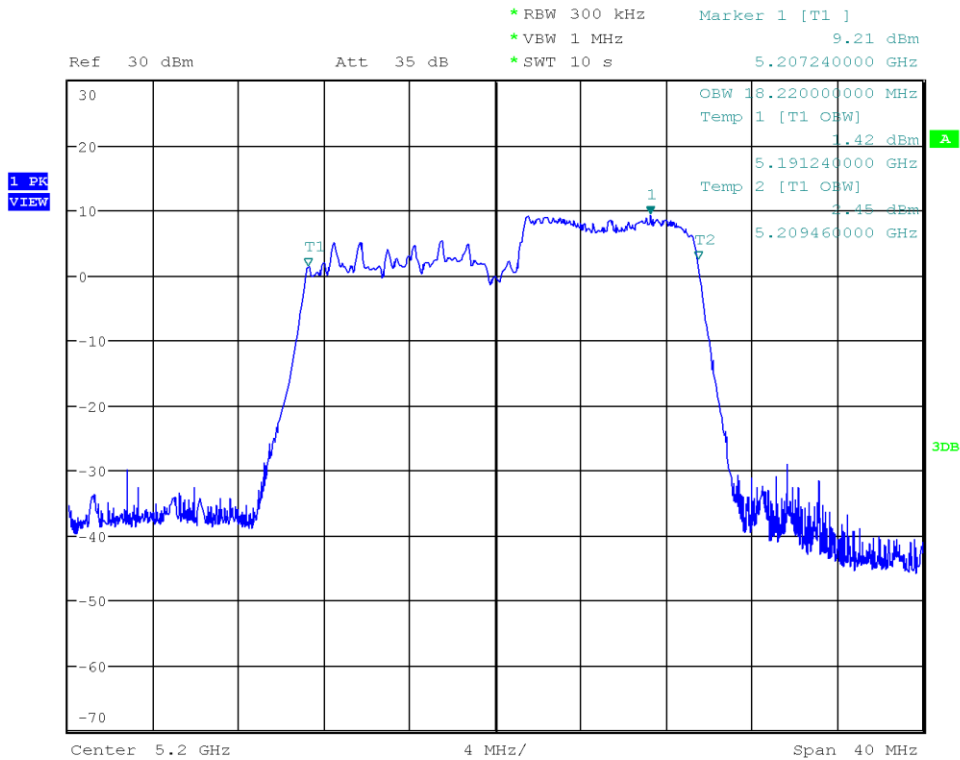
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 Applicant: Panasonic Industrial Devices Europe GmbH  
 Model Description: Wi-Fi 6 Dual Band 2.4 GHz/5 GHz, Bluetooth® and 802.15.4 Module  
 Model: ENWF9511C1KF  
 Test Sample ID: 47713  
 Reference Standards: RSS-247  
 Reference Method: ANSI C63.10:2013, Section 6.9.3  
 Operational Mode: IEEE 802.11ax (HE20-SU ER), Channel: 36, 5180 MHz  
 Operating Conditions: Tnom/Vnom  
 Operator: Azamat Ibraimov  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-02-29  
 Note: 106 tones  
 Occ. Bandwidth Lower Edge [MHz]: 5171.260  
 Occ. Bandwidth Upper Edge [MHz]: 5189.460  
 Occupied Bandwidth [MHz]: 18.200



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### Occupied Bandwidth

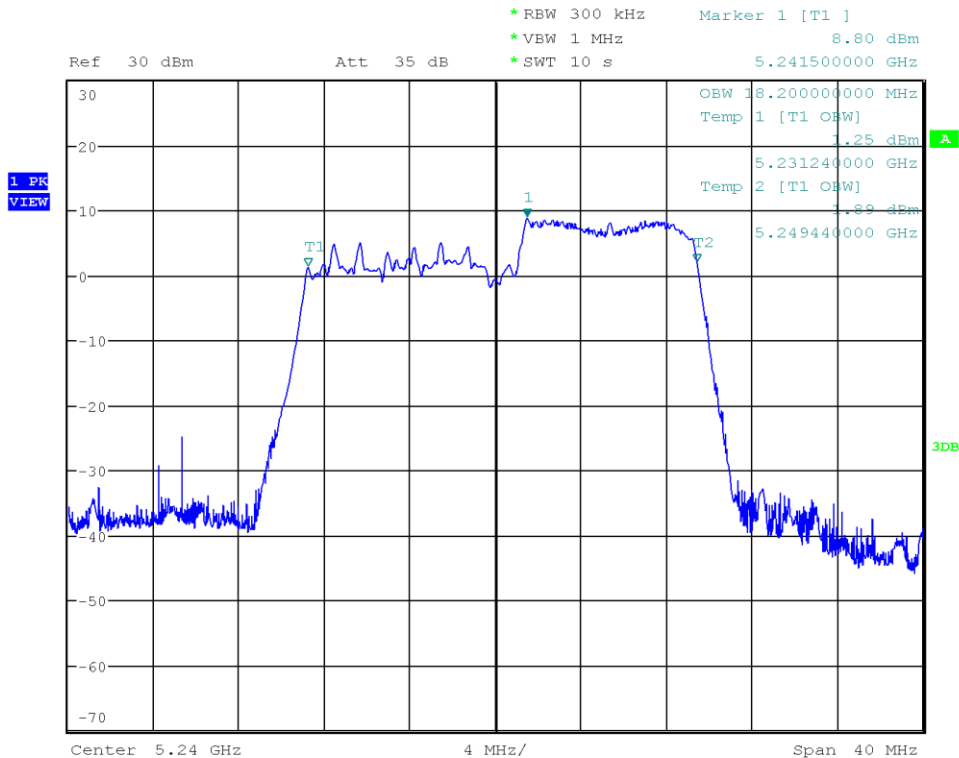
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 Applicant: Panasonic Industrial Devices Europe GmbH  
 Model Description: Wi-Fi 6 Dual Band 2.4 GHz/5 GHz, Bluetooth® and 802.15.4 Module  
 Model: ENWF9511C1KF  
 Test Sample ID: 47713  
 Reference Standards: RSS-247  
 Reference Method: ANSI C63.10:2013, Section 6.9.3  
 Operational Mode: IEEE 802.11ax (HE20-SU ER), Channel: 40, 5200 MHz  
 Operating Conditions: Tnom/Vnom  
 Operator: Azamat Ibraimov  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-02-29  
 Note: 106 tones  
 Occ. Bandwidth Lower Edge [MHz]: 5191.240  
 Occ. Bandwidth Upper Edge [MHz]: 5209.460  
 Occupied Bandwidth [MHz]: 18.220



Date: 29.FEB.2024 10:24:32

### Occupied Bandwidth

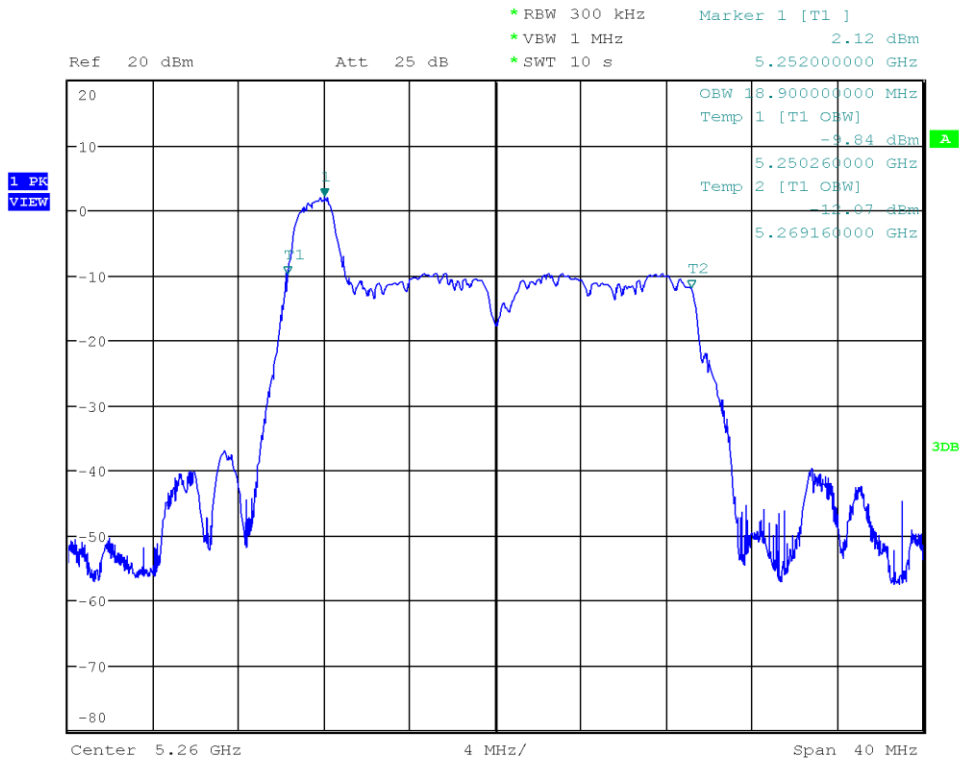
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 Applicant: Panasonic Industrial Devices Europe GmbH  
 Model Description: Wi-Fi 6 Dual Band 2.4 GHz/5 GHz, Bluetooth® and 802.15.4 Module  
 Model: ENWF9511C1KF  
 Test Sample ID: 47713  
 Reference Standards: RSS-247  
 Reference Method: ANSI C63.10:2013, Section 6.9.3  
 Operational Mode: IEEE 802.11ax (HE20-SU ER), Channel: 48, 5240 MHz  
 Operating Conditions: Tnom/Vnom  
 Operator: Azamat Ibraimov  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-02-29  
 Note: 106 tones  
 Occ. Bandwidth Lower Edge [MHz]: 5231.240  
 Occ. Bandwidth Upper Edge [MHz]: 5249.440  
 Occupied Bandwidth [MHz]: 18.200



Date: 29.FEB.2024 10:26:15

### Occupied Bandwidth

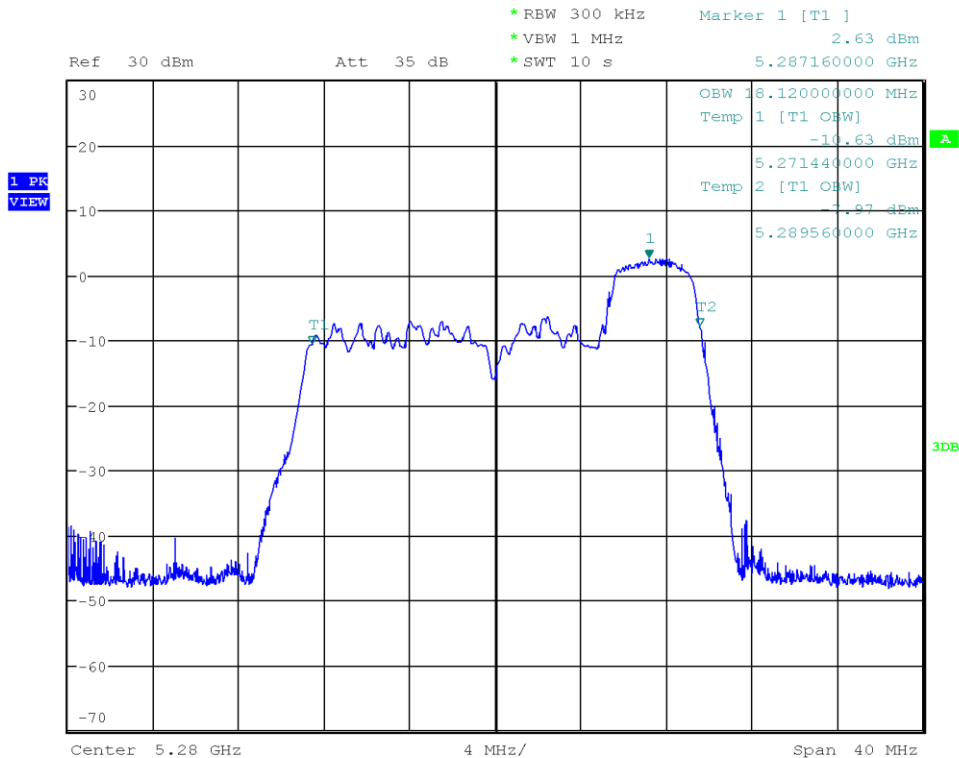
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 Applicant: Panasonic Industrial Devices Europe GmbH  
 Model Description: Wi-Fi 6 Dual Band 2.4 GHz/5 GHz, Bluetooth® and 802.15.4 Module  
 Model: ENWF9511C1KF  
 Test Sample ID: 47713  
 Reference Standards: RSS-247  
 Reference Method: ANSI C63.10:2013, Section 6.9.3  
 Operational Mode: IEEE 802.11ax (HE20-TB), Channel: 52, 5260 MHz  
 Operating Conditions: Tnom/Vnom  
 Operator: Azamat Ibraimov  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-02-29  
 Note: 26 tones  
 Occ. Bandwidth Lower Edge [MHz]: 5250.260  
 Occ. Bandwidth Upper Edge [MHz]: 5269.160  
 Occupied Bandwidth [MHz]: 18.900



Date: 29.FEB.2024 10:42:30

### Occupied Bandwidth

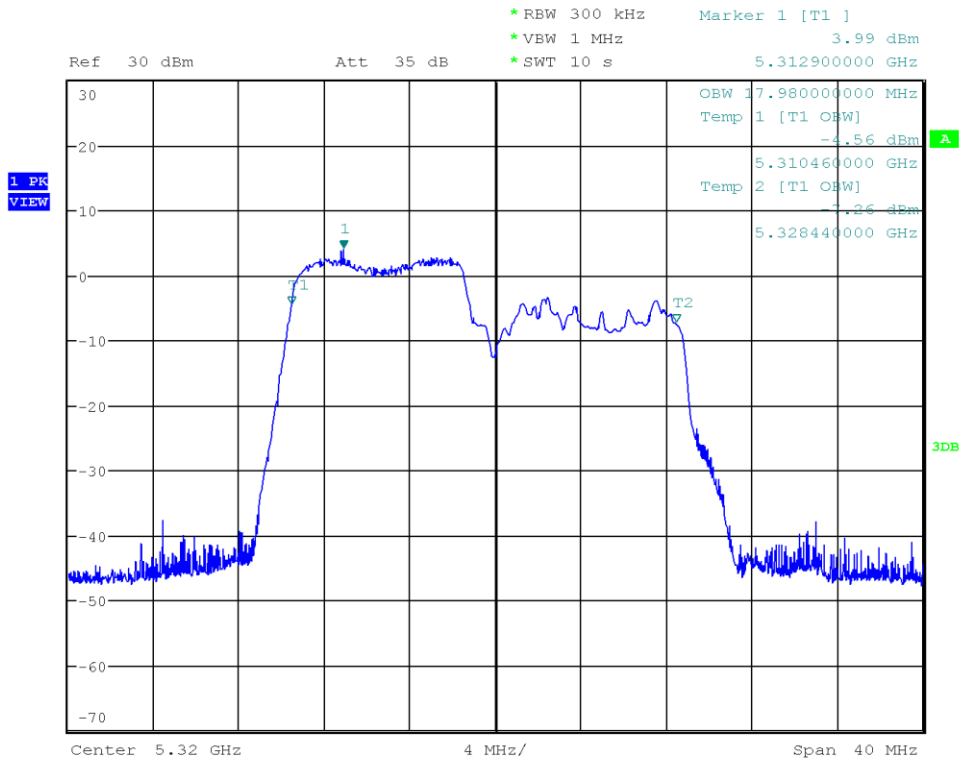
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 Applicant: Panasonic Industrial Devices Europe GmbH  
 Model Description: Wi-Fi 6 Dual Band 2.4 GHz/5 GHz, Bluetooth® and 802.15.4 Module  
 Model: ENWF9511C1KF  
 Test Sample ID: 47713  
 Reference Standards: RSS-247  
 Reference Method: ANSI C63.10:2013, Section 6.9.3  
 Operational Mode: IEEE 802.11ax (HE20-TB), Channel: 56, 5280 MHz  
 Operating Conditions: Tnom/Vnom  
 Operator: Azamat Ibraimov  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-02-29  
 Note: 52 tones  
 Occ. Bandwidth Lower Edge [MHz]: 5271.440  
 Occ. Bandwidth Upper Edge [MHz]: 5289.560  
 Occupied Bandwidth [MHz]: 18.120



Date: 29.FEB.2024 10:46:54

### Occupied Bandwidth

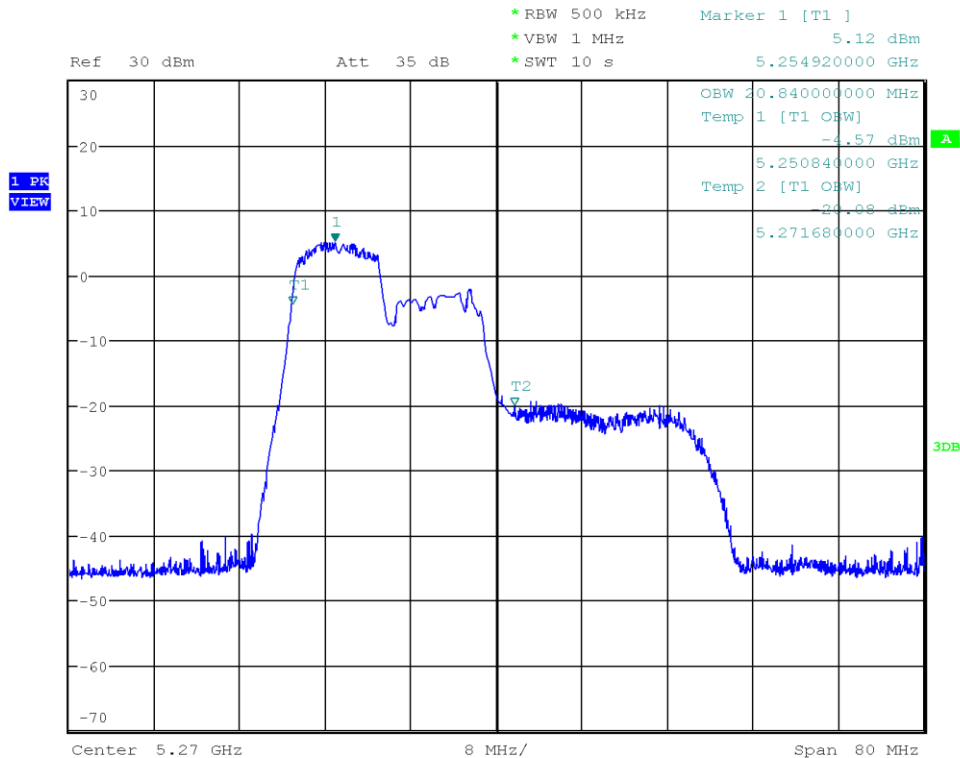
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 Applicant: Panasonic Industrial Devices Europe GmbH  
 Model Description: Wi-Fi 6 Dual Band 2.4 GHz/5 GHz, Bluetooth® and 802.15.4 Module  
 Model: ENWF9511C1KF  
 Test Sample ID: 47713  
 Reference Standards: RSS-247  
 Reference Method: ANSI C63.10:2013, Section 6.9.3  
 Operational Mode: IEEE 802.11ax (HE20-TB), Channel: 64, 5320 MHz  
 Operating Conditions: Tnom/Vnom  
 Operator: Azamat Ibraimov  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-02-29  
 Note: 106 tones  
 Occ. Bandwidth Lower Edge [MHz]: 5310.460  
 Occ. Bandwidth Upper Edge [MHz]: 5328.440  
 Occupied Bandwidth [MHz]: 17.980



Date: 29.FEB.2024 10:48:35

### Occupied Bandwidth

Project Number: G0M-2309-2215  
 Applicant: Panasonic Industrial Devices Europe GmbH  
 Model Description: Wi-Fi 6 Dual Band 2.4 GHz/5 GHz, Bluetooth® and 802.15.4 Module  
 Model: ENWF9511C1KF  
 Test Sample ID: 47713  
 Reference Standards: RSS-247  
 Reference Method: ANSI C63.10:2013, Section 6.9.3  
 Operational Mode: IEEE 802.11ax (HE40-TB), Channel: 54, 5270 MHz  
 Operating Conditions: Tnom/Vnom  
 Operator: Azamat Ibraimov  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-02-29  
 Note: 106 tones  
 Occ. Bandwidth Lower Edge [MHz]: 5250.840  
 Occ. Bandwidth Upper Edge [MHz]: 5271.680  
 Occupied Bandwidth [MHz]: 20.840

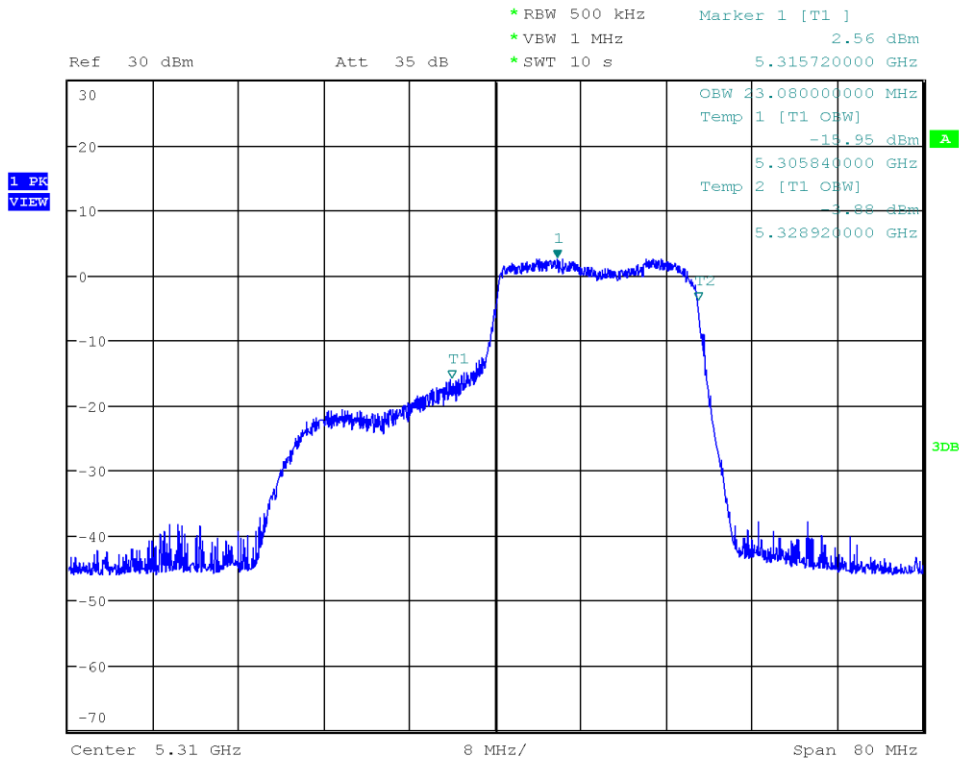


Date: 29.FEB.2024 10:50:14



### Occupied Bandwidth

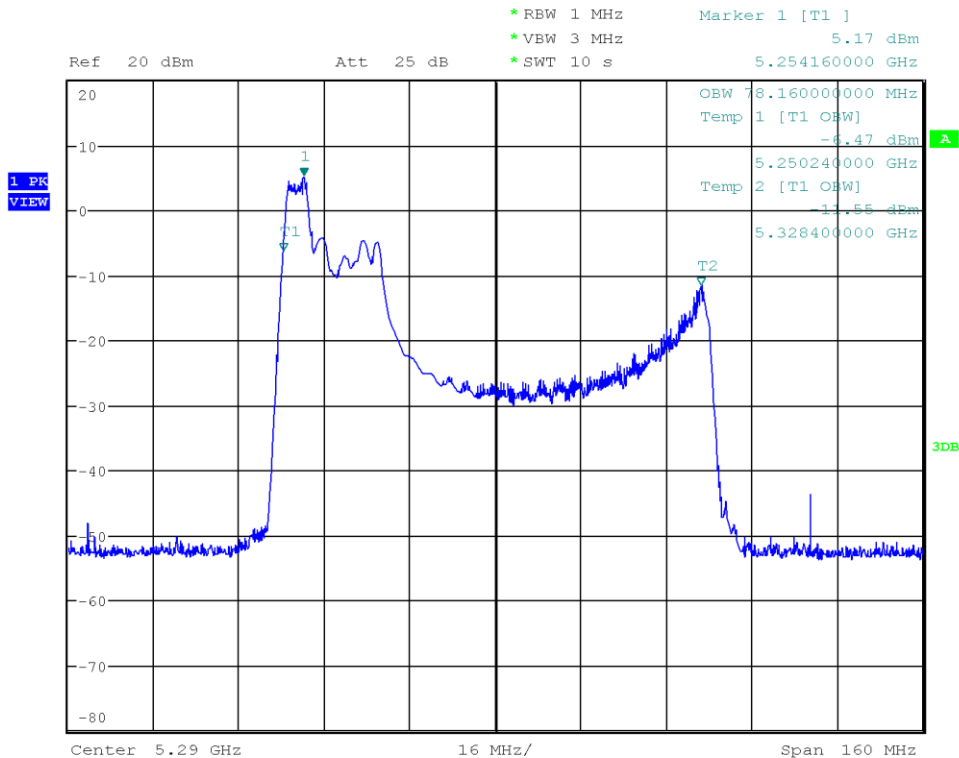
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 Applicant: Panasonic Industrial Devices Europe GmbH  
 Model Description: Wi-Fi 6 Dual Band 2.4 GHz/5 GHz, Bluetooth® and 802.15.4 Module  
 Model: ENWF9511C1KF  
 Test Sample ID: 47713  
 Reference Standards: RSS-247  
 Reference Method: ANSI C63.10:2013, Section 6.9.3  
 Operational Mode: IEEE 802.11ax (HE40-TB), Channel: 62, 5310 MHz  
 Operating Conditions: Tnom/Vnom  
 Operator: Azamat Ibraimov  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-02-29  
 Note: 224 tones  
 Occ. Bandwidth Lower Edge [MHz]: 5305.840  
 Occ. Bandwidth Upper Edge [MHz]: 5328.920  
 Occupied Bandwidth [MHz]: 23.080



Date: 29.FEB.2024 10:52:09

### Occupied Bandwidth

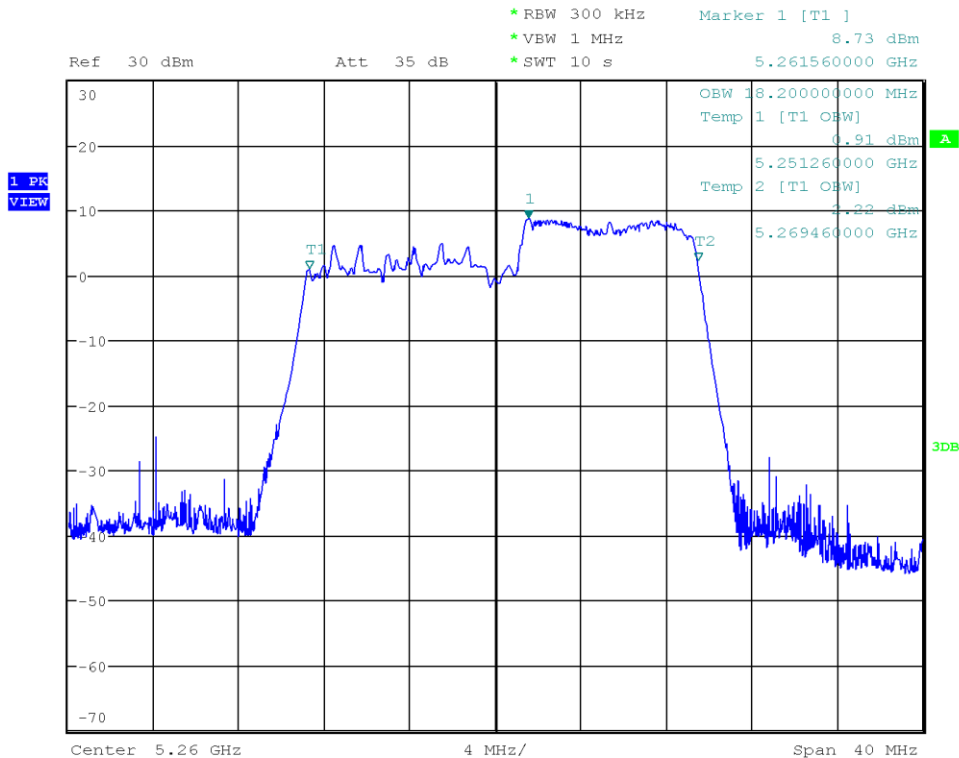
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 Applicant: Panasonic Industrial Devices Europe GmbH  
 Model Description: Wi-Fi 6 Dual Band 2.4 GHz/5 GHz, Bluetooth® and 802.15.4 Module  
 Model: ENWF9511C1KF  
 Test Sample ID: 47713  
 Reference Standards: RSS-247  
 Reference Method: ANSI C63.10:2013, Section 6.9.3  
 Operational Mode: IEEE 802.11ax (HE80-TB), Channel: 58, 5290 MHz  
 Operating Conditions: Tnom/Vnom  
 Operator: Azamat Ibraimov  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-02-29  
 Note: 52 tones  
 Occ. Bandwidth Lower Edge [MHz]: 5250.240  
 Occ. Bandwidth Upper Edge [MHz]: 5328.400  
 Occupied Bandwidth [MHz]: 78.160



Date: 29.FEB.2024 10:54:14

### Occupied Bandwidth

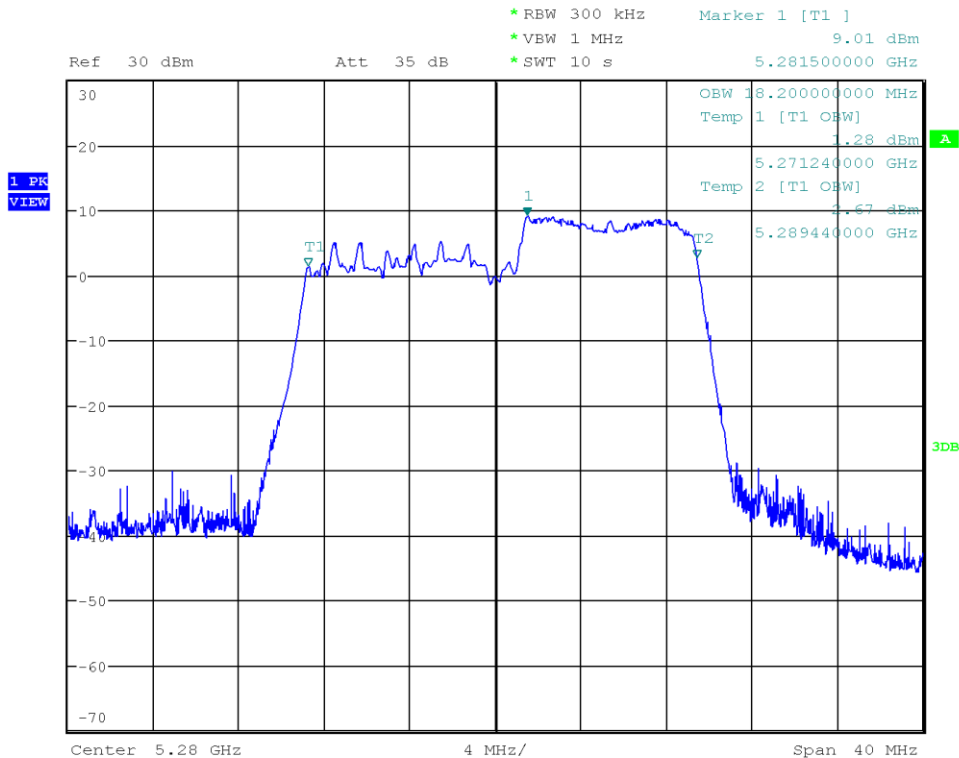
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 Applicant: Panasonic Industrial Devices Europe GmbH  
 Model Description: Wi-Fi 6 Dual Band 2.4 GHz/5 GHz, Bluetooth® and 802.15.4 Module  
 Model: ENWF9511C1KF  
 Test Sample ID: 47713  
 Reference Standards: RSS-247  
 Reference Method: ANSI C63.10:2013, Section 6.9.3  
 Operational Mode: IEEE 802.11ax (HE20-SU ER), Channel: 52, 5260 MHz  
 Operating Conditions: Tnom/Vnom  
 Operator: Azamat Ibraimov  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-02-29  
 Note: 106 tones  
 Occ. Bandwidth Lower Edge [MHz]: 5251.260  
 Occ. Bandwidth Upper Edge [MHz]: 5269.460  
 Occupied Bandwidth [MHz]: 18.200



Date: 29.FEB.2024 10:56:21

### Occupied Bandwidth

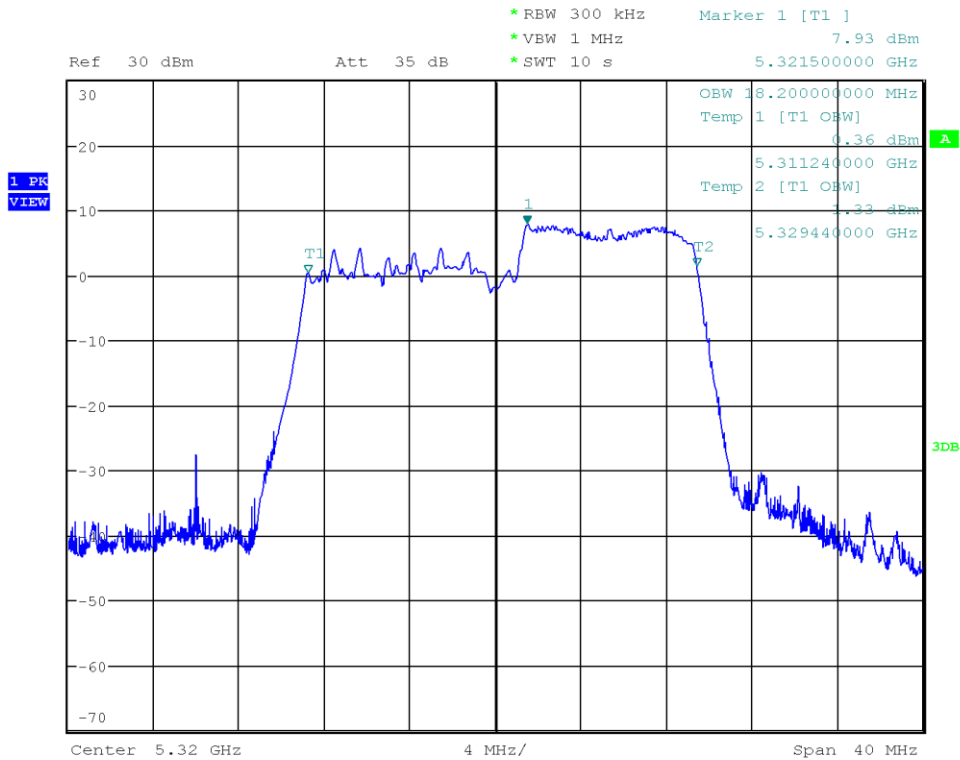
Project Number: G0M-2309-2215  
 Applicant: Panasonic Industrial Devices Europe GmbH  
 Model Description: Wi-Fi 6 Dual Band 2.4 GHz/5 GHz, Bluetooth® and 802.15.4 Module  
 Model: ENWF9511C1KF  
 Test Sample ID: 47713  
 Reference Standards: RSS-247  
 Reference Method: ANSI C63.10:2013, Section 6.9.3  
 Operational Mode: IEEE 802.11ax (HE20-SU ER), Channel: 56, 5280 MHz  
 Operating Conditions: Tnom/Vnom  
 Operator: Azamat Ibraimov  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-02-29  
 Note: 106 tones  
 Occ. Bandwidth Lower Edge [MHz]: 5271.240  
 Occ. Bandwidth Upper Edge [MHz]: 5289.440  
 Occupied Bandwidth [MHz]: 18.200



Date: 29.FEB.2024 10:57:33

### Occupied Bandwidth

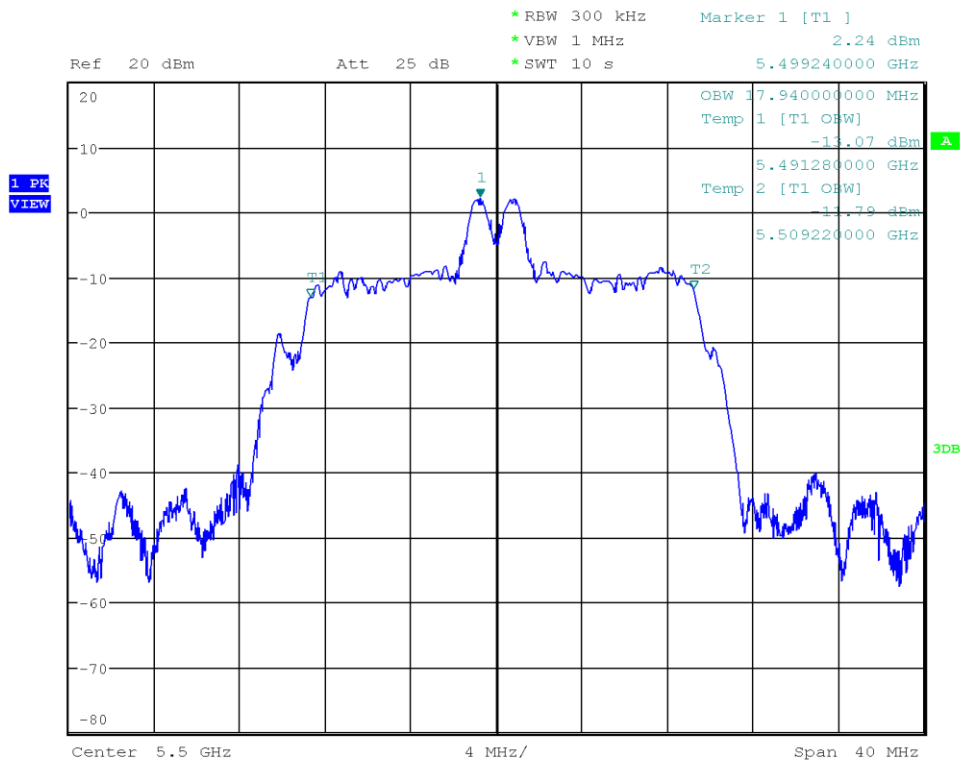
Project Number: G0M-2309-2215  
 Applicant: Panasonic Industrial Devices Europe GmbH  
 Model Description: Wi-Fi 6 Dual Band 2.4 GHz/5 GHz, Bluetooth® and 802.15.4 Module  
 Model: ENWF9511C1KF  
 Test Sample ID: 47713  
 Reference Standards: RSS-247  
 Reference Method: ANSI C63.10:2013, Section 6.9.3  
 Operational Mode: IEEE 802.11ax (HE20-SU ER), Channel: 64, 5320 MHz  
 Operating Conditions: Tnom/Vnom  
 Operator: Azamat Ibraimov  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-02-29  
 Note: 106 tones  
 Occ. Bandwidth Lower Edge [MHz]: 5311.240  
 Occ. Bandwidth Upper Edge [MHz]: 5329.440  
 Occupied Bandwidth [MHz]: 18.200



Date: 29.FEB.2024 10:58:57

### Occupied Bandwidth

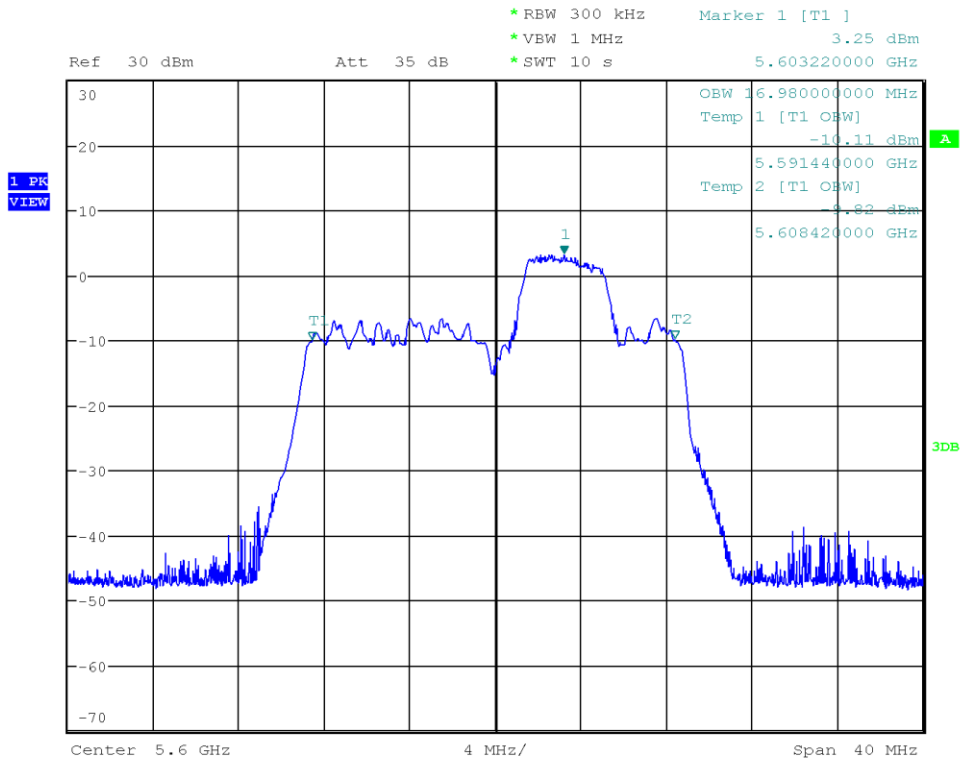
Project Number: G0M-2309-2215  
 Applicant: Panasonic Industrial Devices Europe GmbH  
 Model Description: Wi-Fi 6 Dual Band 2.4 GHz/5 GHz, Bluetooth® and 802.15.4 Module  
 Model: ENWF9511C1KF  
 Test Sample ID: 47713  
 Reference Standards: RSS-247  
 Reference Method: ANSI C63.10:2013, Section 6.9.3  
 Operational Mode: IEEE 802.11ax (HE20-TB), Channel: 100, 5500 MHz  
 Operating Conditions: Tnom/Vnom  
 Operator: Azamat Ibraimov  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-02-29  
 Note: 26 tones  
 Occ. Bandwidth Lower Edge [MHz]: 5491.280  
 Occ. Bandwidth Upper Edge [MHz]: 5509.220  
 Occupied Bandwidth [MHz]: 17.940



Date: 29.FEB.2024 11:03:34

### Occupied Bandwidth

Project Number: G0M-2309-2215  
 Applicant: Panasonic Industrial Devices Europe GmbH  
 Model Description: Wi-Fi 6 Dual Band 2.4 GHz/5 GHz, Bluetooth® and 802.15.4 Module  
 Model: ENWF9511C1KF  
 Test Sample ID: 47713  
 Reference Standards: RSS-247  
 Reference Method: ANSI C63.10:2013, Section 6.9.3  
 Operational Mode: IEEE 802.11ax (HE20-TB), Channel: 120, 5600 MHz  
 Operating Conditions: Tnom/Vnom  
 Operator: Azamat Ibraimov  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-02-29  
 Note: 52 tones  
 Occ. Bandwidth Lower Edge [MHz]: 5591.440  
 Occ. Bandwidth Upper Edge [MHz]: 5608.420  
 Occupied Bandwidth [MHz]: 16.980

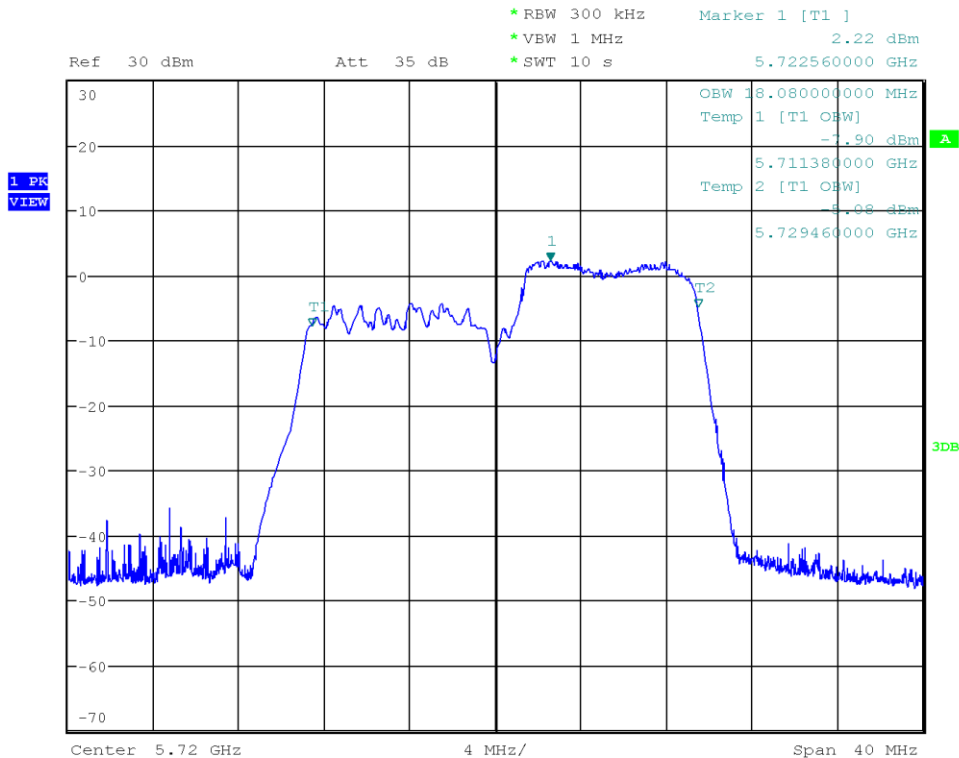


Date: 29.FEB.2024 11:05:36



### Occupied Bandwidth

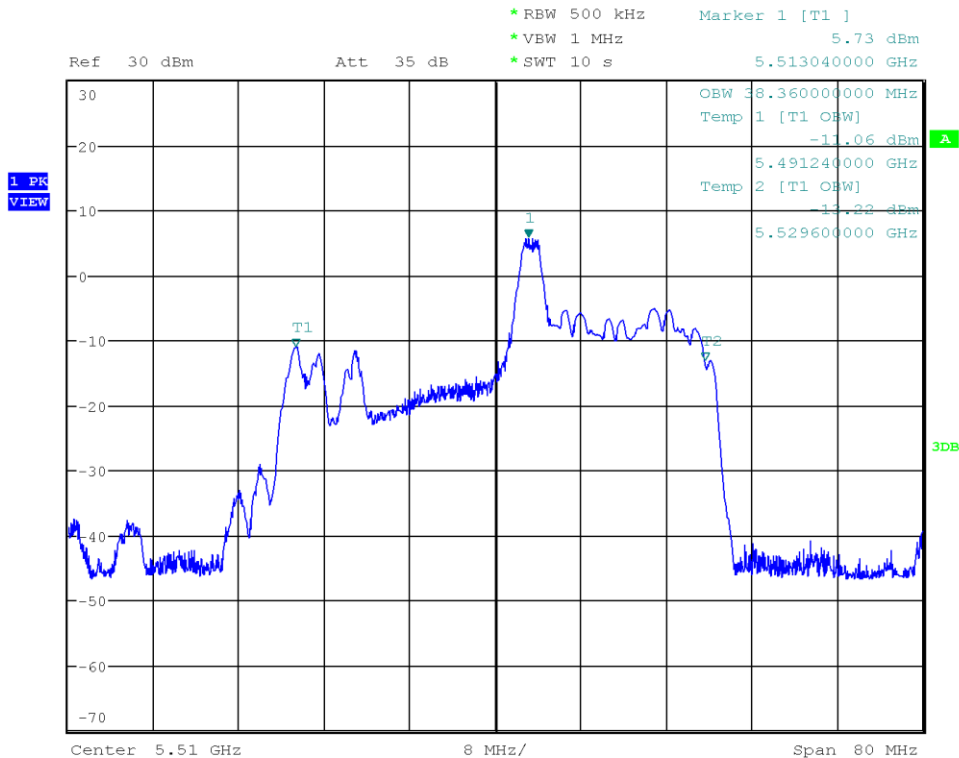
Project Number: G0M-2309-2215  
 Applicant: Panasonic Industrial Devices Europe GmbH  
 Model Description: Wi-Fi 6 Dual Band 2.4 GHz/5 GHz, Bluetooth® and 802.15.4 Module  
 Model: ENWF9511C1KF  
 Test Sample ID: 47713  
 Reference Standards: RSS-247  
 Reference Method: ANSI C63.10:2013, Section 6.9.3  
 Operational Mode: IEEE 802.11ax (HE20-TB), Channel: 144, 5720 MHz  
 Operating Conditions: Tnom/Vnom  
 Operator: Azamat Ibraimov  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-02-29  
 Note: 106 tones  
 Occ. Bandwidth Lower Edge [MHz]: 5711.380  
 Occ. Bandwidth Upper Edge [MHz]: 5729.460  
 Occupied Bandwidth [MHz]: 18.080



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### Occupied Bandwidth

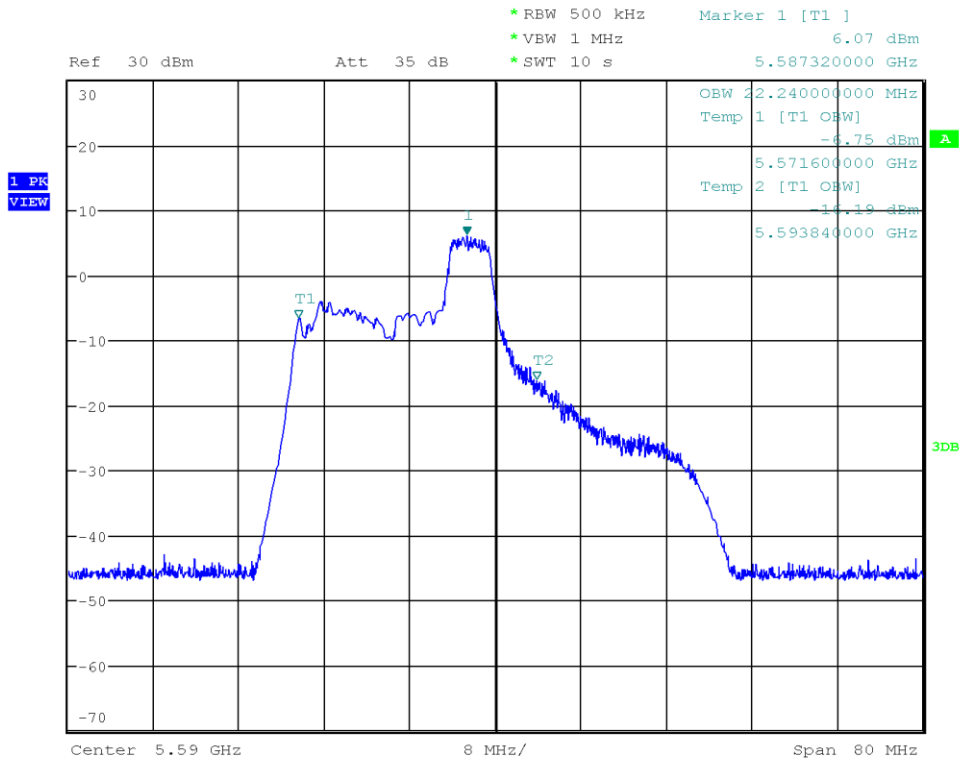
Project Number: G0M-2309-2215  
 Applicant: Panasonic Industrial Devices Europe GmbH  
 Model Description: Wi-Fi 6 Dual Band 2.4 GHz/5 GHz, Bluetooth® and 802.15.4 Module  
 Model: ENWF9511C1KF  
 Test Sample ID: 47713  
 Reference Standards: RSS-247  
 Reference Method: ANSI C63.10:2013, Section 6.9.3  
 Operational Mode: IEEE 802.11ax (HE40-TB), Channel: 102, 5510 MHz  
 Operating Conditions: Tnom/Vnom  
 Operator: Azamat Ibraimov  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-02-29  
 Note: 26 tones  
 Occ. Bandwidth Lower Edge [MHz]: 5491.240  
 Occ. Bandwidth Upper Edge [MHz]: 5529.600  
 Occupied Bandwidth [MHz]: 38.360



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### Occupied Bandwidth

Project Number: G0M-2309-2215  
 Applicant: Panasonic Industrial Devices Europe GmbH  
 Model Description: Wi-Fi 6 Dual Band 2.4 GHz/5 GHz, Bluetooth® and 802.15.4 Module  
 Model: ENWF9511C1KF  
 Test Sample ID: 47713  
 Reference Standards: RSS-247  
 Reference Method: ANSI C63.10:2013, Section 6.9.3  
 Operational Mode: IEEE 802.11ax (HE40-TB), Channel: 118, 5590 MHz  
 Operating Conditions: Tnom/Vnom  
 Operator: Azamat Ibraimov  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-02-29  
 Note: 52 tones  
 Occ. Bandwidth Lower Edge [MHz]: 5571.600  
 Occ. Bandwidth Upper Edge [MHz]: 5593.840  
 Occupied Bandwidth [MHz]: 22.240



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