

EVALUATION REPORT

EUT Description	WLAN and BT, 2x2 PCIe M.2 2230 adapter card
Brand Name	Intel® Wi-Fi 6E AX411
Model Name	AX411NGW
FCC ID	PD9AX411NG
Date of Test Start/End	2022-10-25 / 2022-10-25
Features	802.11ax, Tri Band, 2x2 Wi-Fi 6E + Bluetooth® 5.2 + CDB (Concurrent Dual Band simultaneous Wi-Fi connection (see section 3)

Applicant	Intel Mobile Communications
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Reference Standards	FCC 47 CFR 1.1310 FCC 47 CFR 2.1091 (see section 1)
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Test Report identification	220915-11.TR01
Revision Control	Rev. 01 This test report revision replaces any previous test report revision (see section 5)

Reference to accreditation shall be used only by full reproduction of test report

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Table of Contents

1. Standards, reference documents and applicable test methods	3
2. General conditions, competences and guarantees	3
3. EUT Features.....	4
4. Evaluation Verdicts summary	5
5. Document Revision History	5
A.1 RF EXPOSURE LIMIT	6
A.2 EXPOSURE FROM SOURCE WITH MULTIPLE FREQUENCIES	6
B.1 DECLARED MAXIMUM OUTPUT POWER.....	7
B.2 RF EXPOSURE EVALUATION RESULTS	7
B.2.1 U-NII-4.....	7

1. Standards, reference documents and applicable test methods

FCC	FCC 47 CFR Part §1.1310 Radiofrequency radiation exposure limits. Edition October 2020 FCC 47 CFR Part §2.1091 Radiofrequency radiation exposure evaluation: mobile devices. Edition October 2020
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2. General conditions, competences and guarantees

- ✓ Intel Corporation SAS Wireless RF Lab (Intel WRF Lab) is an ISO/IEC 17025:2017 laboratory accredited by the American Association for Laboratory Accreditation (A2LA) with the certificate number 3478.01.
- ✓ Intel Corporation SAS Wireless RF Lab (Intel WRF Lab) is an Accredited Test Firm recognized by the FCC, with Designation Number FR0011
- ✓ Intel WRF Lab only provides testing services and is committed to providing reliable, unbiased test results and interpretations.
- ✓ Intel WRF Lab is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.
- ✓ Intel WRF Lab has developed calibration and proficiency programs for its measurement equipment to ensure correlated and reliable results to its customers.
- ✓ This report is only referred to the item that has undergone the test.
- ✓ This report does not imply an approval of the product by the Certification Bodies or competent Authorities.

3. EUT Features

The herein information is provided by the customer

Intel WRF Lab declines any responsibility for the accuracy of the stated customer provided information, especially if it has any impact on the correctness of test results presented in this report.

Brand Name	Intel® Wi-Fi 6E AX411		
Model Name	AX411NGW		
Supported Radios	802.11b/g/n/ax 2.4GHz (2400.0 – 2483.5 MHz) 802.11a/n/ac/ax 5.2GHz (5150.0 – 5350.0 MHz) 5.6GHz (5470.0 – 5725.0 MHz) 5.8GHz (5725.0 – 5850.0 MHz) 5.9GHz (5850.0 – 5895.0 MHz) 6.0GHz (5925.0 – 6425.0 MHz) 802.11ax 2.4GHz (2400.0 – 2483.5 MHz) Bluetooth		
Antenna Information	5GHz Antenna:		
	Transmitter	Main/Chain A/Chain 1	Aux/Chain B/Chain 2
	Manufacturer	WEISON	WEISON
	Antenna type	Dipole antenna	Dipole antenna
	Part number	ARY121-0009-002-H0	ARY121-0009-002-H0
	Frequency Band		Peak gain w/cable loss (dBi)
	5.9 GHz (5850.0MHz-5895.0MHz)		+4.45 dBi
Simultaneous Transmission Configurations	Mode	TX Chain B	TX Chain A
	Single Band Mode 2.4GHz		
	2.4GHz MIMO	WLAN 2.4GHz	WLAN 2.4GHz
	2.4GHz SISO / Co-run	WLAN 2.4GHz	BT
	Single Band Mode 5GHz		
	5GHz MIMO	WLAN 5GHz	WLAN 5GHz
	5GHz + BT Co-run	WLAN 5GHz	BT
	5GHz MIMO + BT Co-run	WLAN 5GHz	WLAN 5GHz + BT
	CDB Mode		
	BT Co-run – CDB SISO	WLAN 2.4GHz + WLAN 5GHz	BT
	CDB only SISO	WLAN 2.4GHz + WLAN 5GHz	-
	CDB only SISO	-	WLAN 2.4GHz + WLAN 5GHz
	CDB only MIMO	WLAN 2.4GHz + WLAN 5GHz	WLAN 2.4GHz + WLAN 5GHz
	BT Co-run (CDB SISO)	WLAN 2.4GHz	WLAN 5GHz + BT

4. Evaluation Verdicts summary

Power Density Calculations

Mode	Highest Power Density @ 20cm (mW/cm ²)	Limit (mW/cm ²)	Verdict
U-NII-4	0.07	1.00	P

Collocated Power Density Calculations

Mode	$\sum \frac{\text{Power Density}}{\text{Limit}}$	Ratio Max	Verdict
WLAN + BT	0.15	1.00	P

P: Pass
 F: Fail
 NM: Not Measured
 NA: Not Applicable

5. Document Revision History

Revision #	Modified by	Revision Details
Rev. 00	A.Lounes	First Issue
Rev. 01	E.Garcia	-EUT features and antenna gain updated upon customer request

Annex A. Evaluation Description

A.1 RF Exposure Limit

According to the FCC part 1.1310:

- For operations within the frequency range of 300 kHz and 6 GHz (inclusive), the limits for maximum permissible exposure (MPE), derived from whole-body SAR limits and listed in the table below.

Limits for Maximum Permissible Exposure (MPE) (TABLE 1 TO §1.1310(E)(1))

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(ii) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	<30
1.34-30	824/f	2.19/f	*(180/f ²)	<30
30-300	27.5	0.073	0.2	<30
300-1,500	-	-	f/1500	<30
1,500-100,000	-	-	1.0	<30

f = frequency in MHz. * = Plane-wave equivalent power density.

For the purpose of this evaluation, a distance of 20cm was used to calculate the equivalent plan wave power density, to be compared with the limit described in the table above:

$$S_{eq} = \frac{P_{avg} \cdot G}{4 \cdot \pi \cdot R^2}$$

Where:

S_{eq} = Equivalent Plane Wave Power Density

P_{avg} = Average Power at antenna terminals in Watts

G = Gain of the Transmitting Antenna

R = Distance from the Transmitting Antenna in meters

A.2 Exposure from source with Multiple Frequencies

If the device is designed such that more than one antenna can functionally transmit at the same time, the RF exposure evaluation shall be conducted while all antennas are transmitting. The individual exposure level ratios shall be totaled and used for compliance purposes.:

$$\sum \frac{S_{eq_i}}{S_{Limit_i}} < 1$$

Annex B. RF Exposure Evaluation Results

B.1 Declared Maximum Output Power

According to the applicant, the maximum conducted transmit power (including the upper tolerance) for the EUT under evaluation are as follows:

Mode	Max Output Power (incl. Tolerance) (dBm)
U-NII-4	21.00

B.2 RF Exposure Evaluation Results

B.2.1 U-NII-4

Band	Avg Power [dBm]	Peak antenna Gain (dBi)	ERP/EIRP Avg [dBm]	ERP/EIRP Avg [mW]	Power density @ 20cm [mW/cm ²]	Limit [mW/cm ²]	Ratio (Power density/Limit)
U-NII-4	21.00	4.45	25.45	350.75	0.07	1.0	0.07

The maximum exposure for collocated transmitters is:

Band	Ratio (Power density/Limit)	Σ Ratio _i	Limit
U-NII-4	0.07	0.15	1.0
U-NII-4	0.07		
Bluetooth*	0.01		

*For Bluetooth value please refer to *211130-04.TR03*

End of the Report

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