CERTIFICATE #3478.01

EVALUATION REPORT

EUT Description	**WLAN and BT, 2x2 PCIe M.2 1216 SD adapter card**
Brand Name	**Intel® Wi-Fi 6E AX211**
Model Name	**AX211D2W**
FCC ID	**PD9AX211D2**
Date of Test Start/End	**2023-10-06 / 2023-10-26**
Features	**802.11ax, Dual Band, 2x2 Wi-Fi 6 + Bluetooth® 5.2** (see section 3)

Applicant	**Intel Corporation SAS**
Address	**425 Rue de Goa – Le Cargo B6 – 06600 Antibes, FRANCE**
Contact Person	**Benjamin Lavenant**
Telephone/Fax/ Email	**Benjamin.lavenant@intel.com**

Reference Standards	**FCC 47 CFR 1.1310** **FCC 47 CFR 2.1091** (see section 1)

Test Report identification	**230704-01.TR20**
Revision Control	**Rev. 01** **This test report revision replaces any previous test report revision** (see section 4)

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

Issued by

Digitally signed by Adel LOUNES
Date: 2023.10.26 17:20:28 +02'00'

Adel LOUNES
(SAR Test Lead Engineer)

Reviewed by

Digitally signed by Chei el IN
Date: 2023.10.26 18:02:52 +02'00'

Cheiel IN
(Technical Manager Deputy)

Table of Contents

1. Standards, reference documents and applicable test methods

FCC	FCC 47 CFR Part §1.1310 Radiofrequency radiation exposure limits. Edition October 2021 FCC 47 CFR Part §2.1091 Radiofrequency radiation exposure evaluation: mobile devices. Edition October 2021

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.

<table>
<tr><td>Brand Name</td><td>Intel® Wi-Fi 6E AX211</td></tr>
<tr><td>Model Name</td><td>AX211D2W</td></tr>
<tr><td>Supported Radios</td><td>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)
802.11ax 6.0GHz (5925.0 – 7125.0 MHz)
Bluetooth 2.4GHz (2400.0 – 2483.5 MHz)</td></tr>
<tr><td>Antenna Information</td><td>
For 6E bands:
<table>
<tr><th>Transmitter</th><th>Main/Chain B</th><th>Aux/Chain A</th></tr>
<tr><td>Manufacturer</td><td>Intel WRFLab</td><td>Intel WRFLab</td></tr>
<tr><td>Antenna type</td><td>PIFA</td><td>PIFA</td></tr>
<tr><td>Part number</td><td>WRF-BR-PIFA-V3.2</td><td>WRF-BR-PIFA-V3.2</td></tr>
</table>
<table>
<tr><th>Frequency Band</th><th>Peak gain w/cable loss (dBi)</th></tr>
<tr><td>6.2 GHz (5925.0MHz-6425.0MHz)</td><td>4.83</td></tr>
<tr><td>6.5 GHz (6425.0MHz-6525.0MHz)</td><td>4.30</td></tr>
<tr><td>6.7 GHz (6525.0MHz-6875.0MHz)</td><td>5.37</td></tr>
<tr><td>7.0 GHz (6875.0MHz-7125.0MHz)</td><td>5.59</td></tr>
</table>
For 2.4GHz band:
<table>
<tr><th>Transmitter</th><th>Main/Chain B</th><th>Aux/Chain A</th></tr>
<tr><td>Manufacturer</td><td>SkyCross</td><td>SkyCross</td></tr>
<tr><td>Antenna type</td><td>PIFA</td><td>PIFA</td></tr>
<tr><td>Part number</td><td>n/a</td><td>n/a</td></tr>
</table>
<table>
<tr><th>Frequency Band</th><th>Peak gain w/cable loss (dBi)</th></tr>
<tr><td>2.4 GHz (2300.0MHz-2500.0MHz)</td><td>3.54</td></tr>
</table>
</td></tr>
<tr><td>Simultaneous Transmission Configurations</td><td>WLAN 2.4GHz Main + BT Aux
WLAN 2.4GHz Main + WLAN 2.4GHz Aux
WLAN 5GHz Main + BT Aux
WLAN 5GHz Main + WLAN 5GHz Aux
WLAN 5GHz Main + WLAN 5GHz Aux + BT Aux
WLAN 6GHz Main + WLAN 6GHz Aux
WLAN 6GHz Main + WLAN 6GHz Aux + BT Aux</td></tr>
</table>

4. Document Revision History

Revision #	Modified by	Revision Details
Rev. 00	A.Lounes	First Issue
Rev. 01	A.Lounes	UNII 6GHz max power 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/f2)	<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)
UNII 6GHz	20.25
BT	10.50

B.2 RF Exposure Evaluation Results

Power Density Calculations

Mode	Highest Power Density @ 20cm (mW/cm^2)	Limit (mW/cm^2)	Verdict
UNII 6GHz	0.08	1.00	P
BT	0.01	1.00	P

Collocated Power Density Calculations

Mode	$\sum \frac{Power\ Density}{Limit}$	Ratio Max	Verdict
WLAN + BT	0.17	1.00	P

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

B.2.1 UNII 6GHz and BT

Band	Avg Power [dBm]	Peak antenna Gain (dBi)	EIRP Avg [dBm]	EIRP Avg [mW]	Power density @ 20cm [mW/cm^2]	Limit [mW/cm^2]	Ratio (Power density/Limit)
UNII 6GHz	20.25	5.59	25.84	383.70	0.08	1.00	0.08
BT	10.50	3.54	14.04	23.35	0.01	1.00	0.01

The maximum exposure for collocated transmitters is:

Band	Ratio (Power density/Limit)	∑ $Ratio_i$	Limit
UNII 6GHz	0.08	0.17	1.00
UNII 6GHz	0.08		
Bluetooth	0.01		

End of the Report

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