



TEST REPORT

EUT Description	WLAN and BT, 2x2 PCIe M.2 2230 adapter card
Brand Name	Intel® Wi-Fi 6E AX411
Model Name	AX411NGW
FCC/IC ID	FCC ID: PD9AX411NG / IC ID: 1000M-AX411NG
Date of Test Start/End	2021-07-06 / 2021-07-29
Features	802.11ax, Tri Band, 2x2 Wi-Fi 6E + Bluetooth® 5.2 + CDB (Concurrent Dual Band simultaneous Wi-Fi connection) (see section 5)

Applicant	Intel Mobile Communications
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Contact Person	Steven Hackett
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Reference Standards	FCC CFR Title 47 Part 15E RSS-247 issue 2 (see section 1)
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Test Report identification	210611-02.TR06
Revision Control	Rev. 00 This test report revision replaces any previous test report revision (see section 8)

The test results relate only to the samples tested.
Reference to accreditation shall be used only by full reproduction of test report.

Issued by _____

Reviewed by _____

Zayd Ouachicha
(Test Engineer Lead)

Cheiel In
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1. Standards, reference documents and applicable test methods

FCC	<ol style="list-style-type: none"> 1. FCC Title 47 CFR part 15 - Subpart E – Unlicensed National Information Infrastructure Devices. 2019-10-01 Edition 2. FCC OET KDB 905462 D02 v02 - UNII DFS Compliance Procedures New Rules – Compliance Measurement procedures for Unlicensed-National Information Infrastructure Devices Operating in the 5250-5350 MHz and 5470-5725 MHz Bands Incorporating Dynamic Frequency Selection. 3. ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.
ISED	<ol style="list-style-type: none"> 1. RSS-247 Issue 2 – Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSS) and License-Exempt Local Area Network (LE-LAN) Devices 2. FCC OET KDB 905462 D02 v02 - UNII DFS Compliance Procedures New Rules – Compliance Measurement procedures for Unlicensed-National Information Infrastructure Devices Operating in the 5250-5350 MHz and 5470-5725 MHz Bands Incorporating Dynamic Frequency Selection. 3. ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

2. General conditions, competences and guarantees

- ✓ Tests performed under FCC standards identified in section 1 are covered by A2LA accreditation.
- ✓ Tests performed under ISED standards identified in section 1 are covered by Cofrac accreditation.
- ✓ 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 Corporation SAS Wireless RF Lab (Intel WRF Lab) is an ISO/IEC 17025:2017 testing laboratory accredited by the French Committee for Accreditation (Cofrac) with the certificate number 1-6736.
- ✓ Intel Corporation SAS Wireless RF Lab (Intel WRF Lab) is a Registered Test Site listed by ISED, with ISED #1000Y.
- ✓ Intel WRF Lab declines any responsibility with respect to the identified information provided by the customer and that may affect the validity of results.
- ✓ 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. Environmental Conditions

- ✓ At the site where the measurements were performed the following limits were not exceeded during the tests:

Temperature	23.5°C ± 0.4 °C
Humidity	53.4% ± 2.4%

4. Test samples

Sample	Control #	Description	Model	Serial #	Date of receipt	Note
#1	210611-02.S04	WiFi 6E Module	AX411NGW	WFM: 3413E8F0B419	2021-07-01	RF Conducted
	200611-01.S12	Extender	PCB00651_01	-	2020-11-30	
	170000-01.S19	Laptop	Latitude E5450	4TXV562	2020-02-04	

5. EUT Features

The herein information is provided by the customer

Brand Name	Intel® Wi-Fi 6E AX411																											
Model Name	AX411NGW																											
Software Version	DRTU Version: 99.2100.64.0-OEM.DRTU.12485																											
Driver Version	99.0.63.5																											
Prototype / Production	Production																											
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 – 5895.0 MHz)																										
Antenna Information	802.11ax	6.0GHz (5925.0 - 7125.0MHz)																										
	Bluetooth 5.2	2.4GHz (2400.0 – 2483.5 MHz)																										
Additional information	Transmitter	Main (chain A)	Aux (chain B)																									
	Manufacturer	SkyCross	Skycross																									
	Antenna type	PIFA antenna	PIFA antenna																									
	Part number	N/A	N/A																									
	Declared antenna gain (dBi)	+5	+5																									
The EUT is a WiFi module supporting concurrent dual band (CDB) transmission modes																												
<table border="1"> <thead> <tr> <th>Mode</th> <th>TX Chain B</th> <th>TX Chain A</th> </tr> </thead> <tbody> <tr> <td colspan="3">CDB Mode + Co-run BT:</td></tr> <tr> <td rowspan="2">BT Co-run – CDB SISO</td><td>WLAN 2.4GHz + WLAN 5GHz</td><td>BT</td></tr> <tr> <td>WLAN 2.4GHz + WLAN 6GHz</td><td>BT</td></tr> <tr> <td rowspan="2">CDB only SISO</td><td>WLAN 2.4GHz + WLAN 5GHz</td><td>-</td></tr> <tr> <td>WLAN 2.4GHz + WLAN 6GHz</td><td>-</td></tr> <tr> <td rowspan="2">CDB only MIMO</td><td>-</td><td>WLAN 2.4GHz + WLAN 5GHz</td></tr> <tr> <td>-</td><td>WLAN 2.4GHz + WLAN 6GHz</td></tr> <tr> <td rowspan="2">BT Co-run (CDB SISO)</td><td>WLAN 2.4GHz</td><td>WLAN 5GHz + BT</td></tr> <tr> <td>WLAN 2.4GHz</td><td>WLAN 6GHz + BT</td></tr> </tbody> </table>			Mode	TX Chain B	TX Chain A	CDB Mode + Co-run BT:			BT Co-run – CDB SISO	WLAN 2.4GHz + WLAN 5GHz	BT	WLAN 2.4GHz + WLAN 6GHz	BT	CDB only SISO	WLAN 2.4GHz + WLAN 5GHz	-	WLAN 2.4GHz + WLAN 6GHz	-	CDB only MIMO	-	WLAN 2.4GHz + WLAN 5GHz	-	WLAN 2.4GHz + WLAN 6GHz	BT Co-run (CDB SISO)	WLAN 2.4GHz	WLAN 5GHz + BT	WLAN 2.4GHz	WLAN 6GHz + BT
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	-	WLAN 2.4GHz + WLAN 6GHz																										
BT Co-run (CDB SISO)	WLAN 2.4GHz	WLAN 5GHz + BT																										
	WLAN 2.4GHz	WLAN 6GHz + BT																										

6. Remarks and comments

1. No deviations were made from the test methods listed in section 1 of this report
2. The operating mode of the sample is client only without radar detection.
3. The maximum antenna gain is +5dBi.

7. Test Verdicts summary

The statement of conformity to applicable standards in the table below are based on the measured values, without taking into account the measurement uncertainties.

7.1. Dynamic frequency selection

FCC part	RSS part	Test name	Verdict
15.407 (h) (2)	RSS-247 part 6.3	Non Occupancy Period	P
		DFS Detection Threshold	NA
		Channel Availability Check Time	NA
		Uniform Spreading	NA
		U-NII Detection Bandwidth	NA
		Channel Closing Transmission Time	P
		Channel Move Time	P

8. Document Revision History

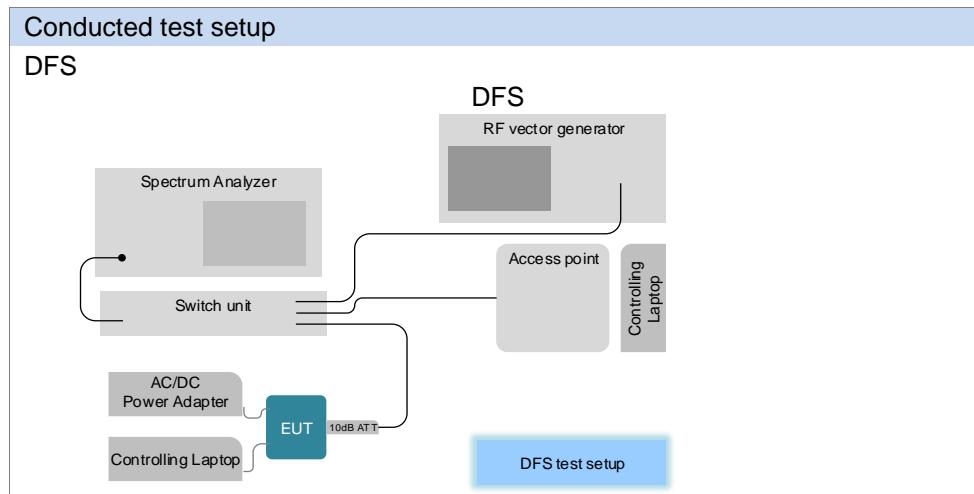
Revision #	Modified by	Revision Details
Rev. 00	G.Roustan	First Issue

Annex A. Test & System Description

A.1 Measurement System

Measurements were performed using the following setups, made in accordance to the general provisions of FCC KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02.

The EUT was installed in a test fixture and this test fixture is connected to a laptop computer and AC/DC power adapter. A second computer was used to configure the access point on the DFS channels; a channel was selected randomly by the access point. To enable channel loading, data is streamed between the EUT laptop and the second computer.



A.2 Test Equipment List

Conducted Setup

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
017-014	Vector signal generator	SMJ100A	100458	Rohde & Schwarz	2021-05-19	2023-05-19
017-015	Switch unit	OSP 120	100945	Rohde & Schwarz	2020-04-21	2022-04-21
052-000	Access point	Aironet IOS	FTX134390GV	Cisco	N/A	N/A
017-003	DC Power supply	E3640A	MY40006885	Agilent	N/A	N/A
017-002	Multimeter	34401A	US36065790	HP	2019-12-11	2021-12-11
311-000	Climatic chamber	SLT34/40	56746020930010	Secasi	2019-11-20	2021-11-20
280-000	Spectrum analyzer	FSV30	103310	Rohde & Schwarz	2020-06-03	2022-06-03
017-000	Measurement Software	WMS 32 v11.00.00	200226	Rohde & Schwarz	N/A	N/A
222-000	RF Cable 2m	PE350-200	-	Pasternack	2021-03-10	2021-09-10
223-000	RF Cable 2m	PE350-200	-	Pasternack	2021-03-10	2021-09-10
408-000	Temp & Humidity Logger	RA12E-TH1-RAS	RA12-E21FC8		2021-06-02	2023-06-02
237-000	10dB directional coupler	MC2047-10	01-062	Fairview	2021-03-10	2021-09-10
017-005	RF Cable 0.5m	PE3CA1039	-	Pasternack	2021-03-10	2021-09-10
017-006	RF Cable 1.2m	PE3C0666	-	Pasternack	2021-03-10	2021-09-10
017-007	Cable SMA Male to ML51-P	HRMP-ML51LP	DTR178-100RS	Hirose	2021-03-10	2021-09-10
017-008	Cable SMA Male to ML51-P	HRMP-ML51LP	DTR178-100RS	Hirose	2021-03-10	2021-09-10
017-011	RF Cable 2m	0900670672000PJ	1936949	Radiall	2021-03-10	2021-09-10
017-012	RF Cable 2m	0900670672000PJ	1936947	Radiall	2021-03-10	2021-09-10
017-019	10dB attenuator	-	-	Pasternack	2021-03-10	2021-09-10
017-020	10dB attenuator	-	-	Pasternack	2021-03-10	2021-09-10

N/A: Not applicable

A.3 Measurement Uncertainty Evaluation

The system uncertainty evaluation is shown in the table below with a coverage factor of $k = 2$ to indicate a 95% level of confidence:

Measurement type	Uncertainty	Unit
Timing	±1	ms

Annex B. Test Results

The herein test results were performed by:

Test case measurement	Test Personnel
DFS	Gregory Roustan

B.1 Test Conditions

The EUT power supply was provided by the Extender test board, $V_{\text{nominal}} = 3.3 \text{ V}_{\text{DC}}$.
The software PROSet/Wireless was used to set the EUT in normal operation mode.

B.2 Test results for Dynamic Frequency Selection (DFS)

Test procedure

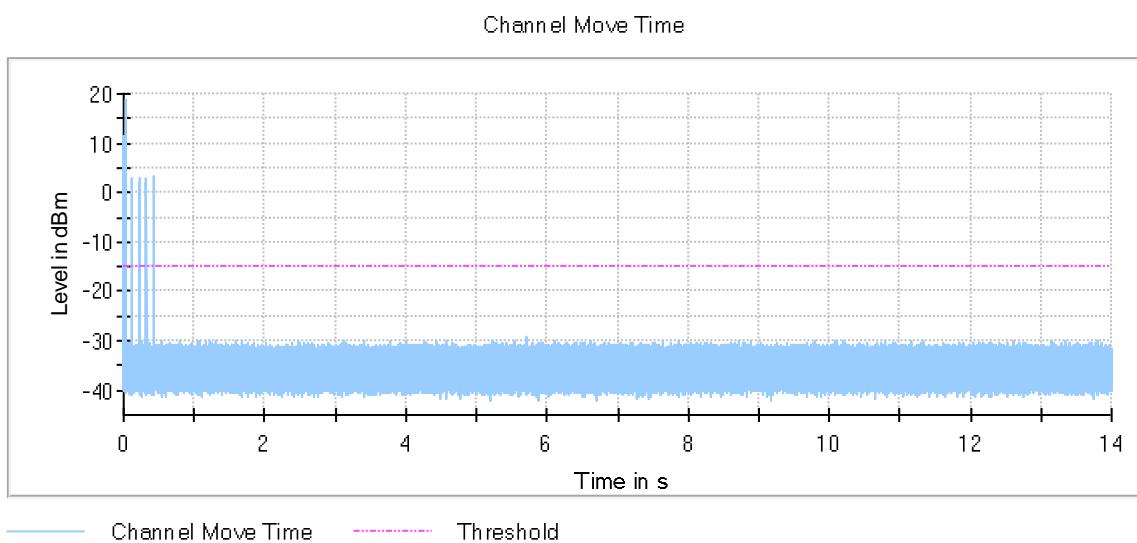
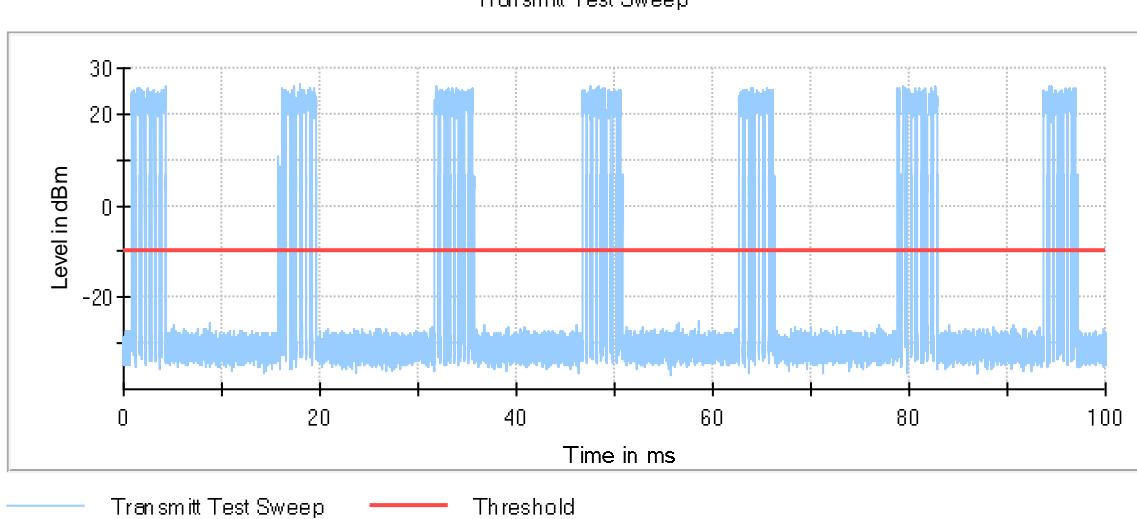
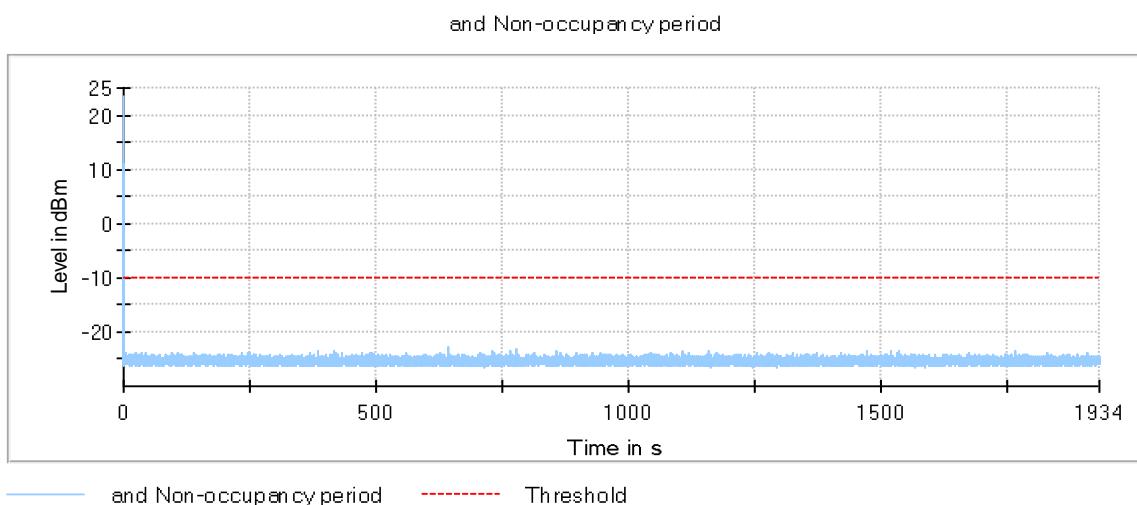
The conducted setup shown on *Section A.1* was used to measure the Channel Closing Transmission Time and Channel Move Time.

The *Client Device* (UUT) is set up to associate with the *Master Device*. Data is streamed between the *Master Device* and the *Client Device*. Radar test waveforms generated with the vector signal generator are injected into the *Master* on the operating channel above the DFS detection threshold. Observations are done on the transmissions of the UUT at the end of the radar burst on the Operating Channel for a duration greater than 10 seconds. We measured the transmissions from the UUT during the observation time, after radar detection occurs the Channel Move Time and Channel Closing Transmission Time are recorded.

Results tables

Tested Channel: 60, Frequency: 5300 MHz

Test item	Results	Limit
Transmit Test Duty Cycle	20.980%	-
Channel Closing Transmission Time	< 2.064 ms	200 ms + an aggregate of 60ms over remaining 10 seconds period.
Channel Move Time	429 ms	10 seconds
Non-Occupancy Period	32 minutes	Minimum 30 minutes

Results Screenshot**Channel move time < 10s, test PASS****No transmission of any type has occurred for 30 minutes, test PASS**