

TEST REPORT

EUT Description	Notebook Computer
Brand Name	HP
Model Name	TPN-C162
FCC ID	PD9AX211D2
ISED ID	1000M-AX211D2
Date of Test Start/End	2023-03-03 / 2023-03-06
Features	IEEE 802.11a/b/g/n/ac/ax

Applicant	Intel Mobile Communications
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Test Report identification	230214-03.TR01
Revision Control	Rev. 02 This test report replaces any previous versions of this test report (see Section 7)

The test results relate only to the samples tested.

Reviewed by _____

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Table of Contents

1. Standards, reference documents and applicable test methods	3
2. General conditions, competences and guarantees	3
3. Environmental Conditions	3
4. Test Sample	3
5. EUT Features	4
6. Remarks and comments	4
7. Test Results summary.....	4
7.1. WLAN TX POWER TABLE SUMMARY	4
8. Document Revision History	5
Annex A. Test & System description	6
A.1 TEST SETUP	6
A.2 PROCEDURE	6
A.3 TEST EQUIPMENT LIST.....	7
Annex B. Test Results	8
B.1 TRIGGER LID ANGLE DETECTION AND POWER VERIFICATION 2.4GHZ	8
B.1.1 LCD DIRECTION 0°	8
B.1.2 LCD DIRECTION 90/270°	10
B.2 TRIGGER LID ANGLE DETECTION AND POWER VERIFICATION 5GHZ	12
B.2.1 LCD DIRECTION 0°	12
B.2.2 LCD DIRECTION 90/270°	14

1. Standards, reference documents and applicable test methods

- a. KDB 388624 D02 Pre-Approval Guidance List v18, PRE-APPROVAL GUIDANCE LIST
- b. FCC Presentations TCB Workshop November 2019, RF exposure procedures.

2. General conditions, competences and guarantees

- ✓ 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	22.9°C ± 1°C
Humidity	23.9% ± 2%

4. Test Sample

Sample	ID #	Description	Model	Serial #	Note
#1	230214-03.S06	Notebook Computer	TPN-C162	7515237000022	-

5. 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	HP
Model Name	TPN-C162
Prototype / Production	Production
Host Identification	Notebook Computer

6. Remarks and comments

1. The test report is validation of the G sensor functionality

7. Test Results summary

7.1. WLAN Tx Power Table Summary

Device Mode	Lid Angle range	LCD Direction	2.4GHz-CH6 802.11b				5GHz-CH120 802.11a			
			Target Power (dBm)		Measured Power (dBm)		Target Power (dBm)		Measured Power (dBm)	
			Antenna AUX	Antenna MAIN	Antenna AUX	Antenna MAIN	Antenna AUX	Antenna MAIN	Antenna AUX	Antenna MAIN
Lid Close	0° ≤ - <35°	-	Standby	Standby	Standby	Standby	Standby	Standby	Standby	Standby
Laptop	35° ≤ - <170°	0°	20.5	20.5	20.45	19.76	20.5	20.5	20.44	20.25
Flat	171° ≤ - <180°	0°	15.5	15.5	14.94	14.84	12.5	12.5	12.11	11.90
Book	120° ≤ - <170°	90°; 270°	15.5	15.5	14.94	14.84	12.5	12.5	12.11	12.09
AIO	171° ≤ - <180 (with kickstand)	90°	20.5	20.5	20.46	19.76	20.5	20.5	20.44	20.20

8. Document Revision History

Revision #	Date	Modified by	Revision Details
Rev.00	2023-03-03	Axel. G	Initial release
Rev.01	2023-04-12	Cheiel I	Modification of EUT description to foldable PC
Rev.02	2023-04-13	Cheiel I	Modification of EUT description to Notebook Computer per customer request

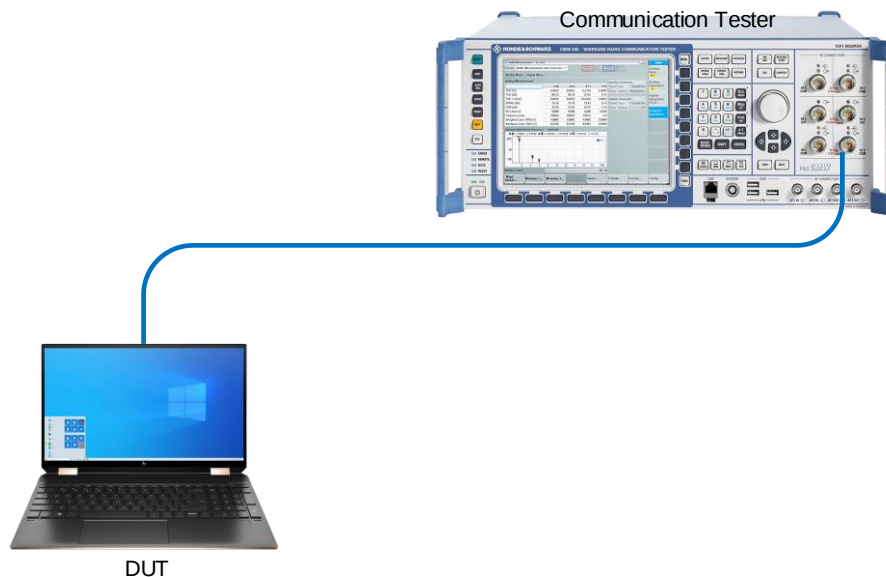
Annex A. Test & System description

A.1 Test setup

The conducted power measurement test setup is described in the following and illustrated in Figure 1.

- The DUT is Notebook Computer from *HP* model *TPN-C162*. An *AX211D2W* connectivity module is installed inside
- A control PC is used to configure the call box as an access point to manage the uplink and downlink data traffic.
- Uplink signal power is measured with the Call Box.
- Path loss in the power measurement setup from the wireless module antenna port to the Call Box.

Figure.1 – Power measurement test setup.



A.2 Procedure

The following additional guidance applies only to convertible laptops whose screen rotates around one axis, from 0 degrees to 180 degrees, in a clamshell style, i.e., from closed mode to open mode, to “tent” mode, and finally, to tablet mode. This process must be followed to determine the lid angle where a power reduction occurs, by taking power measurements at each step, as indicated in the step listed here below:

1. From the lid in closed mode (0 degrees), open the screen in 10-degree steps until laptop mode is obtained
2. Lower the screen by 5 degrees increments to verify that the “closed mode” is triggered
3. From the position of the previous step, open the screen in 1-degree increments until laptop mode is triggered again
4. Continue opening the screen in 1-degree increments until at least 5 degrees past where “laptop mode” was obtained, then continue opening the screen in 10-degree steps until the device switches to tablet mode
5. Reverse the previous procedure to go from tablet mode back down to closed mode

A.3 Test Equipment List

Equipment and accessories used for the conducted power measurement test setup are listed below. The Test Platform (DUT), test setup and associated equipment are shown in A.1.

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
125-000	Communication Tester	CMW500	129337	Rohde & Schwartz	2021-04-12	2023-04-12
022-003 022-004	RF path (RF cable + Adapters)	-	-	-	RF path loss was verified before usage	

Annex B. Test Results

B.1 Trigger lid angle detection and power verification 2.4GHz

B.1.1 LCD direction 0°

The lid is rotating from 0 to 180. The screen is vertical, LCD direction is 0 degree.

Mode	Angle	Measured power	
	(degree)	2.4GHz-Ch6(dBm)	
		AUX	MAIN
Lid close	0	Standby	Standby
	10	Standby	Standby
	20	Standby	Standby
	30	Standby	Standby
Laptop	40	20.45	19.76
Lid close	35	Standby	Standby
	36	Standby	Standby
	37	Standby	Standby
	38	Standby	Standby
	39	Standby	Standby
Laptop	40	20.45	19.76
	41	20.45	19.76
	42	20.45	19.76
	43	20.45	19.76
	44	20.45	19.76
	45	20.45	19.76
	50	20.45	19.76
	60	20.45	19.76
	70	20.45	19.76
	80	20.45	19.76
	90	20.45	19.76
	100	20.45	19.76
	110	20.45	19.76
	120	20.45	19.76
	130	20.45	19.76
	140	20.45	19.76
	150	20.45	19.76
	160	20.45	19.76
	170	20.45	19.76
Flat	180	14.94	14.84
	175	14.94	14.84
Laptop	170	20.45	19.76
Flat	171	14.94	14.84
	172	14.94	14.84
	173	14.94	14.84
	174	14.94	14.84
	175	14.94	14.84
	180	14.94	14.84

Test Report No: 230214-03.TR01

The lid is rotating from 180 degrees to 0 degree. The screen is vertical, LCD direction to 0 degree.

Mode	Angle	Measured power	
	(degree)	2.4GHz-Ch6(dBm)	
		AUX	MAIN
Flat	180	14.94	14.84
Laptop	170	20.45	19.76
Flat	175	14.94	14.84
	174	14.94	14.84
	173	14.94	14.84
	172	14.94	14.84
	171	14.94	14.84
Laptop	170	20.45	19.76
	169	20.45	19.76
	168	20.45	19.76
	167	20.45	19.76
	166	20.45	19.76
	165	20.45	19.76
	160	20.45	19.76
	150	20.45	19.76
	140	20.45	19.76
	130	20.45	19.76
	120	20.45	19.76
	110	20.45	19.76
	100	20.45	19.76
	90	20.45	19.76
	80	20.45	19.76
	70	20.45	19.76
	60	20.45	19.76
	50	20.45	19.76
	40	20.45	19.76
Lid Close	30	Standby	Standby
Laptop	35	20.45	19.76
Lid Close	34	Standby	Standby
	33	Standby	Standby
	32	Standby	Standby
	31	Standby	Standby
	30	Standby	Standby
	20	Standby	Standby
	10	Standby	Standby
	0	Standby	Standby

B.1.2 LCD direction 90/270°

The lid is rotating from 0 to 180 degrees. The screen is vertical, LCD direction to 90 or 270 degrees for book mode. AIO mode is performed in flat with kickstand. The angle is 120 degrees.

Mode	Angle	Measured power	
	(degree)	2.4GHz-Ch6 (dBm)	
		AUX	MAIN
Lid close	0	Standby	Standby
	10	Standby	Standby
	20	Standby	Standby
	30	Standby	Standby
Book	40	14.94	14.84
Lid close	35	Standby	Standby
	36	Standby	Standby
	37	Standby	Standby
	38	Standby	Standby
	39	Standby	Standby
Book	40	14.94	14.84
	41	14.94	14.84
	42	14.94	14.84
	43	14.94	14.84
	44	14.94	14.84
	45	14.94	14.84
	50	14.94	14.84
	60	14.94	14.84
	70	14.94	14.84
	80	14.94	14.84
	90	14.94	14.84
	100	14.94	14.84
	110	14.94	14.84
	120	14.94	14.84
	130	14.94	14.84
	140	14.94	14.84
	150	14.94	14.84
	160	14.94	14.84
	170	14.94	14.84
AIO with kickstand at 120°	180	20.46	19.76
	175	20.46	19.76
	174	20.46	19.76
	173	20.46	19.76
	172	20.46	19.76
	171	20.46	19.76
Book	170	14.94	14.84
AIO with kickstand at 120°	175	20.46	19.76
	176	20.46	19.76
	177	20.46	19.76
	178	20.46	19.76
	179	20.46	19.76
	180	20.46	19.76

Test Report No: 230214-03.TR01

The lid is rotating from 180 to 0 degrees. The screen is vertical, LCD direction to 90 or 270 degrees for book mode. AIO mode is performed in flat with kickstand. The angle is 120 degrees.

Mode	Angle	Measured power	
	(degree)	2.4GHz-Ch6(dBm)	
		AUX	MAIN
AIO with kickstand at 120°	180	20.46	19.76
Book	170	14.94	14.84
AIO with kickstand at 120°	175	20.46	19.76
	174	20.46	19.76
	173	20.46	19.76
	172	20.46	19.76
	171	20.46	19.76
Book	170	14.94	14.84
	169	14.94	14.84
	168	14.94	14.84
	167	14.94	14.84
	166	14.94	14.84
	165	14.94	14.84
	160	14.94	14.84
	150	14.94	14.84
	140	14.94	14.84
	130	14.94	14.84
	120	14.94	14.84
	110	14.94	14.84
	100	14.94	14.84
	90	14.94	14.84
	80	14.94	14.84
	70	14.94	14.84
	60	14.94	14.84
	50	14.94	14.84
	40	14.94	14.84
Lid Close	30	Standby	Standby
Book	35	14.94	14.84
Lid Close	34	Standby	Standby
	33	Standby	Standby
	32	Standby	Standby
	31	Standby	Standby
	30	Standby	Standby
	20	Standby	Standby
	10	Standby	Standby
	0	Standby	Standby

B.2 Trigger lid angle detection and power verification 5GHz

B.2.1 LCD direction 0°

The lid is rotating from 0 to 180. The screen is vertical, LCD direction is 0 degree.

Mode	Angle	Measured power	
	(degree)	5GHz-Ch120(dBm)	
		AUX	MAIN
Lid close	0	Standby	Standby
	10	Standby	Standby
	20	Standby	Standby
	30	Standby	Standby
Laptop	40	20.44	20.25
Lid close	35	Standby	Standby
	36	Standby	Standby
	37	Standby	Standby
	38	Standby	Standby
	39	Standby	Standby
Laptop	40	20.44	20.25
	41	20.44	20.25
	42	20.44	20.25
	43	20.44	20.25
	44	20.44	20.25
	45	20.44	20.25
	50	20.44	20.25
	60	20.44	20.25
	70	20.44	20.25
	80	20.44	20.25
	90	20.44	20.25
	100	20.44	20.25
	110	20.44	20.25
	120	20.44	20.25
	130	20.44	20.25
	140	20.44	20.25
	150	20.44	20.25
	160	20.44	20.25
	170	20.44	20.25
Flat	180	12.11	11.90
	175	12.11	11.90
	174	12.11	11.90
	173	12.11	11.90
	172	12.11	11.90
	171	12.11	11.90
Laptop	170	20.44	20.25
Flat	175	12.11	11.90
	176	12.11	11.90
	177	12.11	11.90
	178	12.11	11.90
	179	12.11	11.90
	180	12.11	11.90

Test Report No: 230214-03.TR01

The lid is rotating from 180 degrees to 0 degree. The screen is vertical, LCD direction to 0 degree.

Mode	Angle	Measured power	
	(degree)	5GHz-Ch120(dBm)	
		AUX	MAIN
Flat	180	12.11	11.90
Laptop	170	20.44	20.25
Flat	175	12.11	11.90
	174	12.11	11.90
	173	12.11	11.90
	172	12.11	11.90
	171	12.11	11.90
Laptop	170	20.44	20.25
	171	20.44	20.25
	172	20.44	20.25
	173	20.44	20.25
	174	20.44	20.25
	175	20.44	20.25
	160	20.44	20.25
	150	20.44	20.25
	140	20.44	20.25
	130	20.44	20.25
	120	20.44	20.25
	110	20.44	20.25
	100	20.44	20.25
	90	20.44	20.25
	80	20.44	20.25
	70	20.44	20.25
	60	20.44	20.25
	50	20.44	20.25
	40	20.44	20.25
Lid Close	30	Standby	Standby
Laptop	35	20.44	20.25
Lid Close	34	Standby	Standby
	33	Standby	Standby
	32	Standby	Standby
	31	Standby	Standby
	30	Standby	Standby
	20	Standby	Standby
	10	Standby	Standby
	0	Standby	Standby

B.2.2 LCD direction 90/270°

The lid is rotating from 0 to 180 degrees. The screen is vertical, LCD direction to 90 or 270 degrees for book mode. AIO mode is performed in flat with kickstand. The angle is 120 degrees.

Mode	Angle	Power measured	
	(degree)	5GHz-Ch120(dBm)	
		AUX	MAIN
Lid close	0	Standby	Standby
	10	Standby	Standby
	20	Standby	Standby
	30	Standby	Standby
Book	40	12.11	12.09
Lid close	35	Standby	Standby
	36	Standby	Standby
	37	Standby	Standby
	38	Standby	Standby
	39	Standby	Standby
Book	40	12.11	12.09
	41	12.11	12.09
	42	12.11	12.09
	43	12.11	12.09
	44	12.11	12.09
	45	12.11	12.09
	50	12.11	12.09
	60	12.11	12.09
	70	12.11	12.09
	80	12.11	12.09
	90	12.11	12.09
	100	12.11	12.09
	110	12.11	12.09
	120	12.11	12.09
	130	12.11	12.09
	140	12.11	12.09
	150	12.11	12.09
	160	12.11	12.09
	170	12.11	12.09
AIO	180	20.44	20.20
	175	20.44	20.20
	174	20.44	20.20
	173	20.44	20.20
	172	20.44	20.20
	171	20.44	20.20
Book	170	12.11	12.09
AIO	175	20.44	20.20
	176	20.44	20.20
	177	20.44	20.20
	178	20.44	20.20
	179	20.44	20.20
	180	20.44	20.20

Test Report No: 230214-03.TR01

The lid is rotating from 180 to 0 degrees. The screen is vertical, LCD direction to 90 or 270 degrees for book mode. AIO mode is performed in flat with kickstand. The angle is 120 degrees.

Mode	Angle	Power measured	
	(degree)	5GHz-Ch120(dBm)	
		AUX	MAIN
AIO	180	20.44	20.20
Book	170	12.11	12.09
AIO	175	20.44	20.20
	174	20.44	20.20
	173	20.44	20.20
	172	20.44	20.20
	171	20.44	20.20
Book	170	12.11	12.09
	169	12.11	12.09
	168	12.11	12.09
	167	12.11	12.09
	166	12.11	12.09
	165	12.11	12.09
	160	12.11	12.09
	150	12.11	12.09
	140	12.11	12.09
	130	12.11	12.09
	120	12.11	12.09
	110	12.11	12.09
	100	12.11	12.09
	90	12.11	12.09
	80	12.11	12.09
	70	12.11	12.09
	60	12.11	12.09
	50	12.11	12.09
	40	12.11	12.09
Lid Close	30	Standby	Standby
Book	35	12.11	12.09
Lid Close	34	Standby	Standby
	33	Standby	Standby
	32	Standby	Standby
	31	Standby	Standby
	30	Standby	Standby
	20	Standby	Standby
	10	Standby	Standby
	0	Standby	Standby