

TEST REPORT

EUT Description	Convertible PC
Brand Name	HP
Model Name	TPN-C154
FCC ID	PD9AX411NG
ISED ID	1000M-AX411NG
Date of Test Start/End	2022-07-07 / 2022-07-08
Features	IEEE 802.11a/b/g/n/ac/ax

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Test Report identification	220406-01.TR03
Revision Control	Rev. 01 This test report replaces any previous versions of this test report (see Section 2)

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2. Document Revision History

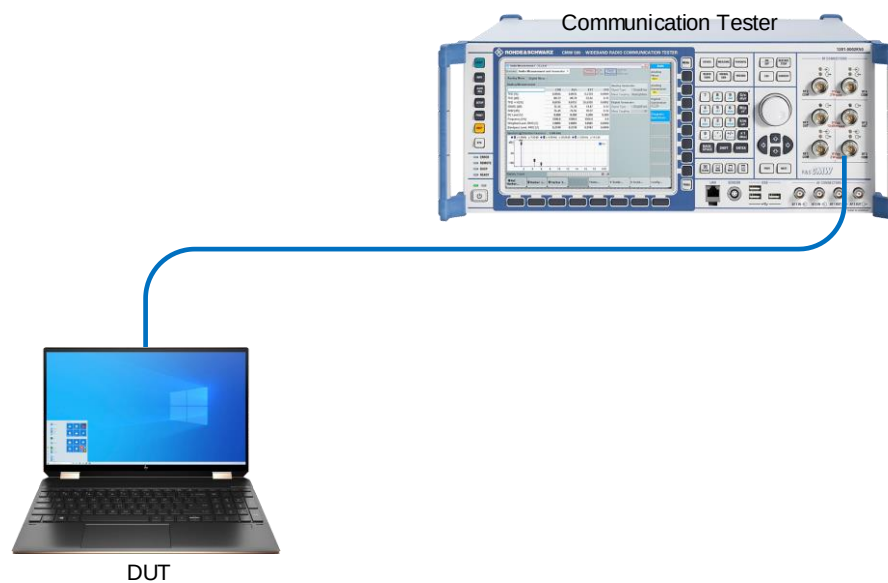
Revision #	Date	Modified by	Revision Details
Rev.00	2022-07-08	Tanguy MATHIEU	First Issue
Rev.01	2022-07-12	Cheiel IN	Test Sample description updated

3. Test Setup

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

- The DUT which AX411NGW connectivity module is installed inside convertible PC from HP model TPN-C154.
- 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 AX411NGW antenna port to the Call Box.

Figure.1 – Validation using conducted power measurement test setup.



4. Test Sample

Sample	ID #	Description	Model	Serial #	Note
#1	220406-01.S03	Convertible PC	TPN-C154	IPA6000412	-

5. 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.1.3.

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
144-000	Communication Tester	CMW500	169123	Rohde & Schwarz	2021-05-18	2023-05-18

6. Test Results

6.1. Tx Power Table Summary

Device Mode	Lid Angle	LCD Direction	2.4Ghz-Ch6				5Ghz-Ch42			
			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
Notebook	36° - 160°	0°	20.25	19.75	19.8	19.6	20.50	20.50	19.8	20.3
Tent	201° - 340°	180°	19.00	19.00	18.6	18.5	16.00	16.00	15.4	15.1
Stand	201° - 340°	0°	20.25	19.75	19.8	19.6	20.50	20.50	19.8	20.3
Tablet	341° - 360°	-	19.00	19.00	18.6	18.5	16.00	16.00	15.4	15.1
Book	36° - 200°	90°; 270°	19.00	19.00	18.6	18.5	16.00	16.00	15.4	15.1

6.2. Trigger lid angle detection and power verification 2.4GHz

6.2.1. LCD direction 0°

The lid is rotating from 0 to 360. The screen is vertical, LCD direction is 0 degree.

Mode	Angle (degrees)	Power measured 2.4Ghz-Ch6 (dBm)	
		AUX	MAIN
Lid close	0	Standby	Standby
	10	Standby	Standby
	20	Standby	Standby
	30	Standby	Standby
	35	Standby	Standby
	36	Standby	Standby
	37	Standby	Standby
	38	Standby	Standby
	39	Standby	Standby
Notebook	40	19.8	19.6
	41	19.8	19.6
	42	19.8	19.6
	43	19.8	19.6
	44	19.8	19.6
	50	19.8	19.6
	60	19.8	19.6
	70	19.8	19.6
	80	19.8	19.6
	90	19.8	19.6
	100	19.8	19.6
	110	19.8	19.6
	120	19.8	19.6
	130	19.8	19.6
	140	19.8	19.6
	150	19.8	19.6
	160	19.8	19.6
	161	19.8	19.6
	162	19.8	19.6
	163	19.8	19.6
	164	19.8	19.6
	165	18.6	18.5
	166	18.6	18.5
	167	18.6	18.5
	168	18.6	18.5
	169	18.6	18.5
	170	18.6	18.5
	180	18.6	18.5
Stand	190	18.6	18.5
	200	18.6	18.5
	201	18.6	18.5
	202	18.6	18.5
	203	18.6	18.5
	204	18.6	18.5
	205	18.6	18.5
	206	19.8	19.6
	207	19.8	19.6
	208	19.8	19.6
	209	19.8	19.6
	210	19.8	19.6
	220	19.8	19.6
	230	19.8	19.6
	240	19.8	19.6
	250	19.8	19.6
	260	19.8	19.6
	270	19.8	19.6
	280	19.8	19.6
	290	19.8	19.6
Tablet	300	19.8	19.6
	310	19.8	19.6
	320	19.8	19.6
	330	19.8	19.6
	340	19.8	19.6
	341	19.8	19.6
	342	19.8	19.6
	343	19.8	19.6
	344	19.8	19.6
	345	19.8	19.6
	346	18.6	18.5
	347	18.6	18.5
	348	18.6	18.5
	349	18.6	18.5
	350	18.6	18.5
	360	18.6	18.5

The lid is rotating from 360 degrees to 0 degree. The screen is vertical, LCD direction to 0 degree.

Mode	Angle (degrees)	Power measured 2.4Ghz-Ch6 (dBm)	
		AUX	MAIN
Tablet	360	18.6	18.5
	350	18.6	18.5
	340	18.6	18.5
	339	18.6	18.5
	338	18.6	18.5
	337	18.6	18.5
	336	18.6	18.5
Stand	335	19.8	19.6
	334	19.8	19.6
	333	19.8	19.6
	332	19.8	19.6
	331	19.8	19.6
	330	19.8	19.6
	320	19.8	19.6
	320	19.8	19.6
	310	19.8	19.6
	300	19.8	19.6
	290	19.8	19.6
	280	19.8	19.6
	270	19.8	19.6
	260	19.8	19.6
	250	19.8	19.6
	240	19.8	19.6
	230	19.8	19.6
	220	19.8	19.6
	210	19.8	19.6
	200	19.8	19.6
	199	19.8	19.6
	198	19.8	19.6
	197	19.8	19.6
	196	19.8	19.6
	195	18.6	18.5
	194	18.6	18.5
	193	18.6	18.5
	192	18.6	18.5
	191	18.6	18.5
	190	18.6	18.5
	180	18.6	18.5

Mode	Angle (degrees)	Power measured 2.4Ghz-Ch6 (dBm)	
		AUX	MAIN
	170	18.6	18.5
	160	18.6	18.5
	159	18.6	18.5
	158	18.6	18.5
	157	18.6	18.5
	156	18.6	18.5
	155	18.6	18.5
Notebook	154	19.8	19.6
	153	19.8	19.6
	152	19.8	19.6
	151	19.8	19.6
	150	19.8	19.6
	140	19.8	19.6
	130	19.8	19.6
	120	19.8	19.6
	110	19.8	19.6
	100	19.8	19.6
	90	19.8	19.6
	80	19.8	19.6
	70	19.8	19.6
	60	19.8	19.6
	50	19.8	19.6
	40	19.8	19.6
	34	19.8	19.6
	33	19.8	19.6
	32	19.8	19.6
	31	19.8	19.6
	30	19.8	19.6
Lid close	29	Standby	Standby
	28	Standby	Standby
	27	Standby	Standby
	26	Standby	Standby
	25	Standby	Standby
	20	Standby	Standby
	10	Standby	Standby
	0	Standby	Standby

6.2.2. LCD direction 90/270°

The lid is rotating from 0 to 360 degrees. The screen is vertical, LCD direction to 90 degrees.

Mode	Angle (degrees)	Power measured 2.4Ghz-Ch6 (dBm)	
		AUX	MAIN
Lid close	0	Standby	Standby
	10	Standby	Standby
	20	Standby	Standby
	30	Standby	Standby
	35	Standby	Standby
	36	Standby	Standby
	37	Standby	Standby
	38	Standby	Standby
	39	Standby	Standby
Book	40	18.6	18.5
	41	18.6	18.5
	42	18.6	18.5
	43	18.6	18.5
	44	18.6	18.5
	50	18.6	18.5
	60	18.6	18.5
	70	18.6	18.5
	80	18.6	18.5
	90	18.6	18.5
	100	18.6	18.5
	110	18.6	18.5
	120	18.6	18.5
	130	18.6	18.5
	140	18.6	18.5
	150	18.6	18.5
	160	18.6	18.5
	170	18.6	18.5

Mode	Angle (degrees)	Power measured 2.4Ghz-Ch6 (dBm)	
		AUX	MAIN
Book	180	18.6	18.5
	190	18.6	18.5
	200	18.6	18.5
	210	18.6	18.5
	220	18.6	18.5
	230	18.6	18.5
	240	18.6	18.5
	250	18.6	18.5
	260	18.6	18.5
	270	18.6	18.5
	280	18.6	18.5
	290	18.6	18.5
	300	18.6	18.5
	310	18.6	18.5
	320	18.6	18.5
	330	18.6	18.5
	340	18.6	18.5
	350	18.6	18.5
	360	18.6	18.5

The lid is rotating from 360 to 0 degree. The screen is vertical, LCD direction to 90 or 270 degrees.

Mode	Angle (degrees)	Power measured 2.4Ghz-Ch6 (dBm)	
		AUX	MAIN
	360	18.6	18.5
	350	18.6	18.5
	340	18.6	18.5
	330	18.6	18.5
	320	18.6	18.5
	310	18.6	18.5
	300	18.6	18.5
	290	18.6	18.5
	280	18.6	18.5
	270	18.6	18.5
	260	18.6	18.5
	250	18.6	18.5
	240	18.6	18.5
	230	18.6	18.5
	220	18.6	18.5
	210	18.6	18.5
	200	18.6	18.5
	190	18.6	18.5
	180	18.6	18.5

Mode	Angle (degrees)	Power measured 2.4Ghz-Ch6 (dBm)	
		AUX	MAIN
Book	170	18.6	18.5
	160	18.6	18.5
	150	18.6	18.5
	140	18.6	18.5
	130	18.6	18.5
	120	18.6	18.5
	110	18.6	18.5
	100	18.6	18.5
	90	18.6	18.5
	80	18.6	18.5
	70	18.6	18.5
	60	18.6	18.5
	50	18.6	18.5
	40	18.6	18.5
	35	18.6	18.5
	34	18.6	18.5
	33	18.6	18.5
	32	18.6	18.5
	31	18.6	18.5
	30	18.6	18.5
	29	Standby	Standby
	28	Standby	Standby
	27	Standby	Standby
	26	Standby	Standby
Lid close	25	Standby	Standby
	20	Standby	Standby
	19	Standby	Standby
	18	Standby	Standby
	17	Standby	Standby
	10	Standby	Standby
	0	Standby	Standby

6.2.3. LCD direction 180°

The lid is rotating from 360 degrees to 180 degrees. The screen is vertical, LCD direction to 180 degrees.
Note: The LCD direction switch to 0 degrees for low angle.

Mode	Angle (degrees)	Power measured 2.4Ghz-Ch6 (dBm)	
		AUX	MAIN
Tablet	360	18.6	18.5
	350	18.6	18.5
	340	18.6	18.5
	339	18.6	18.5
	338	18.6	18.5
	337	18.6	18.5
	336	18.6	18.5
Tent	335	18.6	18.5
	334	18.6	18.5
	333	18.6	18.5
	332	18.6	18.5
	331	18.6	18.5
	330	18.6	18.5
	320	18.6	18.5
	310	18.6	18.5
	300	18.6	18.5
	280	18.6	18.5
	270	18.6	18.5
	260	18.6	18.5
	240	18.6	18.5
	220	18.6	18.5
	210	18.6	18.5
	200	18.6	18.5
	199	18.6	18.5
	198	18.6	18.5
	197	18.6	18.5
	196	18.6	18.5
	195	18.6	18.5
	194	18.6	18.5
	193	18.6	18.5
	192	18.6	18.5
	191	18.6	18.5
	190	18.6	18.5
	180	18.6	18.5

The lid is rotating from 180 degrees to 360 degrees. The screen is vertical, LCD direction to 180 degrees.

Note: The LCD direction switch to 0 degrees for low angle.

Mode	Angle (degrees)	Power measured 2.4Ghz-Ch6 (dBm)	
		AUX	MAIN
	180	18.6	18.5
	190	18.6	18.5
	200	18.6	18.5
	201	18.6	18.5
	202	18.6	18.5
	203	18.6	18.5
	204	18.6	18.5
	205	18.6	18.5
Tent	206	18.6	18.5
	207	18.6	18.5
	208	18.6	18.5
	209	18.6	18.5
	210	18.6	18.5
	220	18.6	18.5
	230	18.6	18.5
	240	18.6	18.5
	250	18.6	18.5
	260	18.6	18.5
	270	18.6	18.5
	280	18.6	18.5
	290	18.6	18.5
	300	18.6	18.5
	310	18.6	18.5
	320	18.6	18.5
	330	18.6	18.5
	240	18.6	18.5
	341	18.6	18.5
	342	18.6	18.5
	343	18.6	18.5
	344	18.6	18.5
	345	18.6	18.5
Tablet	346	18.6	18.5
	347	18.6	18.5
	348	18.6	18.5
	349	18.6	18.5
	350	18.6	18.5
	360	18.6	18.5

6.3. Trigger lid angle detection and power verification 5Ghz

6.3.1. LCD direction 0°

The lid is rotating from 0 to 360. The screen is vertical, LCD direction is 0 degree.

Mode	Angle (degrees)	Power measured 5GHz -Ch42 (dBm)	
		AUX	MAIN
Lid close	0	Standby	Standby
	10	Standby	Standby
	20	Standby	Standby
	30	Standby	Standby
	36	Standby	Standby
	37	Standby	Standby
	38	Standby	Standby
	39	Standby	Standby
	40	Standby	Standby
Notebook	41	19.8	20.3
	42	19.8	20.3
	43	19.8	20.3
	44	19.8	20.3
	45	19.8	20.3
	50	19.8	20.3
	60	19.8	20.3
	70	19.8	20.3
	80	19.8	20.3
	90	19.8	20.3
	100	19.8	20.3
	110	19.8	20.3
	120	19.8	20.3
	130	19.8	20.3
	140	19.8	20.3
	150	19.8	20.3
	160	19.8	20.3
	161	19.8	20.3
	162	19.8	20.3
	163	19.8	20.3
	164	19.8	20.3
	165	15.4	15.1
	166	15.4	15.1
	167	15.4	15.1
	168	15.4	15.1
	169	15.4	15.1
	170	15.4	15.1
Mode	Angle (degrees)	Power measured 5GHz -Ch42 (dBm)	
		AUX	MAIN
	180	15.4	15.1
	190	15.4	15.1
	200	15.4	15.1
	201	15.4	15.1
	202	15.4	15.1
	203	15.4	15.1
	204	15.4	15.1
	205	15.4	15.1
Stand	206	19.8	20.3
	207	19.8	20.3
	208	19.8	20.3
	209	19.8	20.3
	210	19.8	20.3
	220	19.8	20.3
	230	19.8	20.3
	240	19.8	20.3
	250	19.8	20.3
	260	19.8	20.3
	270	19.8	20.3
	280	19.8	20.3
	290	19.8	20.3
	300	19.8	20.3
	310	19.8	20.3
	320	19.8	20.3
	330	19.8	20.3
	341	19.8	20.3
	342	19.8	20.3
	343	19.8	20.3
	344	19.8	20.3
	345	19.8	20.3
Tablet	346	15.4	15.1
	347	15.4	15.1
	348	15.4	15.1
	349	15.4	15.1
	350	15.4	15.1
	360	15.4	15.1

The lid is rotating from 360 degrees to 0 degree. The screen is vertical, LCD direction to 0 degree.

Mode	Angle (degrees)	Power measured 5GHz -Ch42 (dBm)	
		AUX	MAIN
Tablet	360	15.4	15.1
	350	15.4	15.1
	340	15.4	15.1
	339	15.4	15.1
	338	15.4	15.1
	337	15.4	15.1
	336	15.4	15.1
Stand	335	19.8	20.3
	334	19.8	20.3
	333	19.8	20.3
	332	19.8	20.3
	331	19.8	20.3
	330	19.8	20.3
	320	19.8	20.3
	320	19.8	20.3
	310	19.8	20.3
	300	19.8	20.3
	290	19.8	20.3
	280	19.8	20.3
	270	19.8	20.3
	260	19.8	20.3
	250	19.8	20.3
	240	19.8	20.3
	230	19.8	20.3
	220	19.8	20.3
	210	19.8	20.3
	200	19.8	20.3
	199	19.8	20.3
	198	19.8	20.3
	197	19.8	20.3
	196	19.8	20.3
	195	15.4	15.1
	194	15.4	15.1
	193	15.4	15.1
	192	15.4	15.1
	191	15.4	15.1
	190	15.4	15.1
Notebook	180	15.4	15.1
	170	15.4	15.1
	160	15.4	15.1
	159	15.4	15.1
	158	15.4	15.1
	157	15.4	15.1
	156	15.4	15.1
	155	15.4	15.1
	154	19.8	20.3
	153	19.8	20.3
	152	19.8	20.3
	151	19.8	20.3
	150	19.8	20.3
	140	19.8	20.3
	130	19.8	20.3
	120	19.8	20.3
	110	19.8	20.3
	100	19.8	20.3
	90	19.8	20.3
	80	19.8	20.3
Lid close	70	19.8	20.3
	60	19.8	20.3
	50	19.8	20.3
	40	19.8	20.3
	34	19.8	20.3
	33	19.8	20.3
	32	19.8	20.3
	31	19.8	20.3
	30	19.8	20.3
	29	Standby	Standby
	28	Standby	Standby
	27	Standby	Standby
	26	Standby	Standby
	25	Standby	Standby
	20	Standby	Standby
	10	Standby	Standby
	0	Standby	Standby

6.3.2. LCD direction 90/270°

The lid is rotating from 0 to 360 degrees. The screen is vertical, LCD direction to 90 degrees.

Mode	Angle (degrees)	Power measured 5GHz-Ch42 (dBm)	
		AUX	MAIN
Lid close	0	Standby	Standby
	10	Standby	Standby
	20	Standby	Standby
	30	Standby	Standby
	36	Standby	Standby
	37	Standby	Standby
	38	Standby	Standby
	39	Standby	Standby
	40	Standby	Standby
	41	15.4	15.1
Book	42	15.4	15.1
	43	15.4	15.1
	44	15.4	15.1
	45	15.4	15.1
	50	15.4	15.1
	60	15.4	15.1
	70	15.4	15.1
	80	15.4	15.1
	90	15.4	15.1
	100	15.4	15.1
	110	15.4	15.1
	120	15.4	15.1
	130	15.4	15.1
	140	15.4	15.1
	150	15.4	15.1
	160	15.4	15.1
	170	15.4	15.1
	180	15.4	15.1

Mode	Angle (degrees)	Power measured 5GHz-Ch42 (dBm)	
		AUX	MAIN
Book	190	15.4	15.1
	200	15.4	15.1
	210	15.4	15.1
	220	15.4	15.1
	230	15.4	15.1
	240	15.4	15.1
	250	15.4	15.1
	260	15.4	15.1
	270	15.4	15.1
	280	15.4	15.1
	290	15.4	15.1
	300	15.4	15.1
	310	15.4	15.1
	320	15.4	15.1
	330	15.4	15.1
	340	15.4	15.1
	350	15.4	15.1
	360	15.4	15.1

The lid is rotating from 360 to 0 degree. The screen is vertical, LCD direction to 90 or 270 degrees.

Mode	Angle (degrees)	Power measured 5GHz-Ch42 (dBm)	
		AUX	MAIN
	360	15.4	15.1
	350	15.4	15.1
	340	15.4	15.1
	330	15.4	15.1
	320	15.4	15.1
	310	15.4	15.1
	300	15.4	15.1
	290	15.4	15.1
	280	15.4	15.1
	270	15.4	15.1
	260	15.4	15.1
	250	15.4	15.1
	240	15.4	15.1
	230	15.4	15.1
	220	15.4	15.1
	210	15.4	15.1
Book	200	15.4	15.1
	190	15.4	15.1
	180	15.4	15.1

Mode	Angle (degrees)	Power measured 5GHz-Ch42 (dBm)	
		AUX	MAIN
Book	170	15.4	15.1
	160	15.4	15.1
	150	15.4	15.1
	140	15.4	15.1
	130	15.4	15.1
	120	15.4	15.1
	110	15.4	15.1
	100	15.4	15.1
	90	15.4	15.1
	80	15.4	15.1
	70	15.4	15.1
	60	15.4	15.1
	50	15.4	15.1
	40	15.4	15.1
	34	15.4	15.1
	33	15.4	15.1
	32	15.4	15.1
	31	15.4	15.1
	30	15.4	15.1
Lid close	29	Standby	Standby
	28	Standby	Standby
	27	Standby	Standby
	26	Standby	Standby
	25	Standby	Standby
	20	Standby	Standby
	10	Standby	Standby
	0	Standby	Standby

6.3.3. LCD direction 180°

The lid is rotating from 360 degrees to 180 degrees. The screen is vertical, LCD direction to 180 degrees.
Note: The LCD direction switch to 0 degrees for low angle.

Mode	Angle (degrees)	Power measured 5GHz -Ch42 (dBm)	
		AUX	MAIN
Tablet	360	15.4	15.1
	350	15.4	15.1
	340	15.4	15.1
	339	15.4	15.1
	338	15.4	15.1
	337	15.4	15.1
	336	15.4	15.1
Tent	335	15.4	15.1
	334	15.4	15.1
	333	15.4	15.1
	332	15.4	15.1
	331	15.4	15.1
	330	15.4	15.1
	320	15.4	15.1
	310	15.4	15.1
	300	15.4	15.1
	280	15.4	15.1
	270	15.4	15.1
	260	15.4	15.1
	240	15.4	15.1
	220	15.4	15.1
	210	15.4	15.1
	200	15.4	15.1
	199	15.4	15.1
	198	15.4	15.1
	197	15.4	15.1
	196	15.4	15.1
	195	15.4	15.1
	194	15.4	15.1
	193	15.4	15.1
	192	15.4	15.1
	191	15.4	15.1
	190	15.4	15.1
	180	15.4	15.1
	170	15.4	15.1

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The lid is rotating from 180 degrees to 360 degrees. The screen is vertical, LCD direction to 180 degrees.

Note: The LCD direction switch to 0 degrees for low angle.

Mode	Angle (degrees)	Power measured 5GHz -Ch42 (dBm)	
		AUX	MAIN
	170	15.4	15.1
	180	15.4	15.1
	190	15.4	15.1
	200	15.4	15.1
	201	15.4	15.1
	202	15.4	15.1
	203	15.4	15.1
	204	15.4	15.1
	205	15.4	15.1
Tent	206	15.4	15.1
	207	15.4	15.1
	208	15.4	15.1
	209	15.4	15.1
	210	15.4	15.1
	220	15.4	15.1
	230	15.4	15.1
	240	15.4	15.1
	250	15.4	15.1
	260	15.4	15.1
	270	15.4	15.1
	280	15.4	15.1
	290	15.4	15.1
	300	15.4	15.1
	310	15.4	15.1
	320	15.4	15.1
	330	15.4	15.1
	340	15.4	15.1
	341	15.4	15.1
	342	15.4	15.1
Tablet	343	15.4	15.1
	344	15.4	15.1
	345	15.4	15.1
	346	15.4	15.1
	347	15.4	15.1
	348	15.4	15.1
	349	15.4	15.1
	350	15.4	15.1
	360	15.4	15.1