

FCC SAR TEST REPORT

FCC ID : B94-MT7921S
Equipment : 2TX 11ax (WiFi6) + BLE Combo Card
Brand Name : HP Inc.
Model Name : MT7921
Applicant : HP Inc.
1501 Page Mill Road, Palo Alto CA, 94304, USA
Standard : FCC 47 CFR Part 2 (2.1093)

The product was installed into Notebook PC (Brand Name: HP, Model Name: TPN-Q295) during test.

The product was received on Aug. 16, 2023 and testing was started from Sep. 01, 2023 and completed on Sep. 04, 2023. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample provide by manufacturer and the test data has been evaluated in accordance with the test procedures given in 47 CFR Part 2.1093 and FCC KDB and has been pass the FCC requirement.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. Laboratory, the test report shall not be reproduced except in full.


Approved by: Cona Huang / Deputy Manager



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History of this test report

Report No.	Version	Description	Issued Date
FA381527	01	Initial issue of report	Sep. 22, 2023



1. Equipment Under Test (EUT) Information

1.1 General Information

Product Feature & Specification	
Equipment Name	2TX 11ax (WiFi6) + BLE Combo Card
Brand Name	HP Inc.
Model Name	MT7921
FCC ID	B94-MT7921S
Wireless Technology and Frequency Range	WLAN 2.4 GHz Band: 2400 MHz ~ 2483.5 MHz WLAN 5.2 GHz Band: 5150 MHz ~ 5250 MHz WLAN 5.3 GHz Band: 5250 MHz ~ 5350 MHz WLAN 5.6 GHz Band: 5470 MHz ~ 5725 MHz WLAN 5.8 GHz Band: 5725 MHz ~ 5850 MHz Bluetooth: 2400 MHz ~ 2483.5 MHz
Mode	WLAN: 802.11a/b/g/n/ac/ax HT20/HT40/VHT20/VHT40/VHT80/HE20/HE40/HE80 Bluetooth BR/EDR/LE

Host Information	
Equipment Name	Notebook PC
Brand Name	HP
Model Name	TPN-Q295
EUT Stage	Production Unit

WLAN Antenna Information										
Vendor 1	Ant. Type	PIFA	connector	50 ohm Coaxial	Vendor 2	Ant. Type	PIFA	connector	50 ohm Coaxial	
	Model No.	Ant1: DQ6615G0200 (81EAB615.G02) Ant2: DQ6615G0200 (81EAB615.G02)				Model No.	Ant1: DQ6WAPLEL35 (WA-P-LELE-01-005) Ant2: DQ6WAPLEL35 (WA-P-LELE-01-005)			
	Peak Gain (dBi)					Peak Gain (dBi)				
	2400~2483.5MHz	Ant1:1.44 Ant2:2.66	5725~5850MHz	Ant1:1.21 Ant2:0.96		2400~2483.5MHz	Ant1:1.58 Ant2:1.14	5725~5850MHz	Ant1:1.34 Ant2:0.91	
	5150~5250MHz	Ant1:2.8 Ant2:2.63	5850~5925MHz	Ant1:0.86 Ant2:0.34		5150~5250MHz	Ant1:0.67 Ant2:2.04	5850~5925MHz	Ant1:1.64 Ant2:1.71	
	5250~5350MHz	Ant1:2.8 Ant2:2.63	5925~6425MHz	Ant1:1.81 Ant2:0.74		5250~5350MHz	Ant1:0.12 Ant2:1.5	5925~6425MHz	Ant1:1.97 Ant2:1.54	
	5470~5725MHz	Ant1:2.1 Ant2:1.61	5925~7125MHz	Ant1:2.05 Ant2:1.67		5470~5725MHz	Ant1:1.66 Ant2:0.56	5925~7125MHz	Ant1:2.62 Ant2:2.24	

Reviewed by: Jason Wang
Report Producer: Paula Chen

2. Guidance Applied

The Specific Absorption Rate (SAR) testing specification, method, and procedure for this device is in accordance with the following standards, the below KDB standard may not including in the TAF code without accreditation.

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2013
- FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
- FCC KDB 865664 D02 SAR Reporting v01r02
- FCC KDB 447498 D01 General RF Exposure Guidance v06
- FCC KDB 616217 D04 SAR for laptop and tablets v01r02

3. WiFi/Bluetooth Output Power (Unit: dBm)

	Mode	Channel	Frequency (MHz)	Ant 1	Ant 2	Ant 1+2
				Tune-Up Limit	Tune-Up Limit	Tune-Up Limit
2.4GHz WLAN	802.11b 1Mbps	1	2412	19.00	19.00	22.0
		6	2437	19.00	19.00	22.0
		11	2462	19.00	19.00	22.0
		12	2467	15.50	15.50	18.5
		13	2472	9.00	9.00	12.0
	802.11g 6Mbps	1	2412	17.00	17.00	20.0
		6	2437	18.00	18.00	21.0
		11	2462	16.50	16.50	19.5
		12	2467	10.50	10.50	13.5
		13	2472	6.00	6.00	9.0
	802.11n-HT20 MCS0	1	2412	17.00	17.00	20.0
		6	2437	18.00	18.00	21.0
		11	2462	16.50	16.50	19.5
		12	2467	10.50	10.50	13.5
		13	2472	6.00	6.00	9.0
	802.11n-HT40 MCS0	3	2422	15.00	15.00	18.0
		6	2437	16.00	16.00	19.0
		9	2452	15.00	15.00	18.0
		10	2457	8.50	8.50	11.5
		11	2462	6.50	6.50	9.5
	802.11ac-VHT20 MCS0	1	2412	17.00	17.00	20.0
		6	2437	18.00	18.00	21.0
		11	2462	16.50	16.50	19.5
		12	2467	10.50	10.50	13.5
		13	2472	6.00	6.00	9.0
	802.11ac-VHT40 MCS0	3	2422	15.00	15.00	18.0
		6	2437	16.00	16.00	19.0
		9	2452	15.00	15.00	18.0
		10	2457	8.50	8.50	11.5
		11	2462	6.50	6.50	9.5
	802.11ax-HE20 MCS0	1	2412	17.00	17.00	20.0
		6	2437	18.00	18.00	21.0
		11	2462	16.50	16.50	19.5
		12	2467	10.50	10.50	13.5
		13	2472	6.00	6.00	9.0
	802.11ax-HE40 MCS0	3	2422	15.00	15.00	18.0
		6	2437	16.00	16.00	19.0
		9	2452	15.00	15.00	18.0
		10	2457	8.50	8.50	11.5
		11	2462	6.50	6.50	9.5



				Ant 1	Ant 2	Ant 1+2
5.2GHz WLAN	Mode	Channel	Frequency (MHz)	Tune-Up Limit	Tune-Up Limit	Tune-Up Limit
	802.11a 6Mbps	36	5180	16.00	16.00	19.0
		40	5200	17.00	17.00	20.0
		44	5220	17.50	17.50	20.5
		48	5240	18.00	18.00	21.0
	802.11n-HT20 MCS0	36	5180	16.00	16.00	19.0
		40	5200	17.00	17.00	20.0
		44	5220	17.50	17.50	20.5
		48	5240	18.00	18.00	21.0
	802.11n-HT40 MCS0	38	5190	15.00	15.00	18.0
		46	5230	17.50	17.50	20.5
	802.11ac-VHT20 MCS0	36	5180	16.00	16.00	19.0
		40	5200	17.00	17.00	20.0
		44	5220	17.50	17.50	20.5
		48	5240	18.00	18.00	21.0
	802.11ac-VHT40 MCS0	38	5190	15.00	15.00	18.0
		46	5230	17.50	17.50	20.5
	802.11ac-VHT80 MCS0	42	5210	14.00	14.00	17.0
	802.11ax-HE20 MCS0	36	5180	16.00	16.00	19.0
		40	5200	17.00	17.00	20.0
		44	5220	17.50	17.50	20.5
		48	5240	18.00	18.00	21.0
	802.11ax-HE40 MCS0	38	5190	15.00	15.00	18.0
		46	5230	17.50	17.50	20.5
	802.11ax-HE80 MCS0	42	5210	14.00	14.00	17.0

				Ant 1	Ant 2	Ant 1+2
5.3GHz WLAN	Mode	Channel	Frequency (MHz)	Tune-Up Limit	Tune-Up Limit	Tune-Up Limit
	802.11a 6Mbps	52	5260	18.50	18.50	21.5
		56	5280	18.00	18.00	21.0
		60	5300	18.00	18.00	21.0
		64	5320	15.50	15.50	18.5
	802.11n-HT20 MCS0	52	5260	18.50	18.50	21.5
		56	5280	18.00	18.00	21.0
		60	5300	18.00	18.00	21.0
		64	5320	15.50	15.50	18.5
	802.11n-HT40 MCS0	54	5270	17.50	17.50	20.5
		62	5310	15.00	15.00	18.0
	802.11ac-VHT20 MCS0	52	5260	18.50	18.50	21.5
		56	5280	18.00	18.00	21.0
		60	5300	18.00	18.00	21.0
		64	5320	15.50	15.50	18.5
	802.11ac-VHT40 MCS0	54	5270	17.50	17.50	20.5
		62	5310	15.00	15.00	18.0
	802.11ac-VHT80 MCS0	58	5290	14.00	14.00	17.0
	802.11ax-HE20 MCS0	52	5260	18.50	18.50	21.5
		56	5280	18.00	18.00	21.0
		60	5300	18.00	18.00	21.0
		64	5320	15.50	15.50	18.5
	802.11ax-HE40 MCS0	54	5270	17.50	17.50	20.5
		62	5310	15.00	15.00	18.0
	802.11ax-HE80 MCS0	58	5290	14.00	14.00	17.0



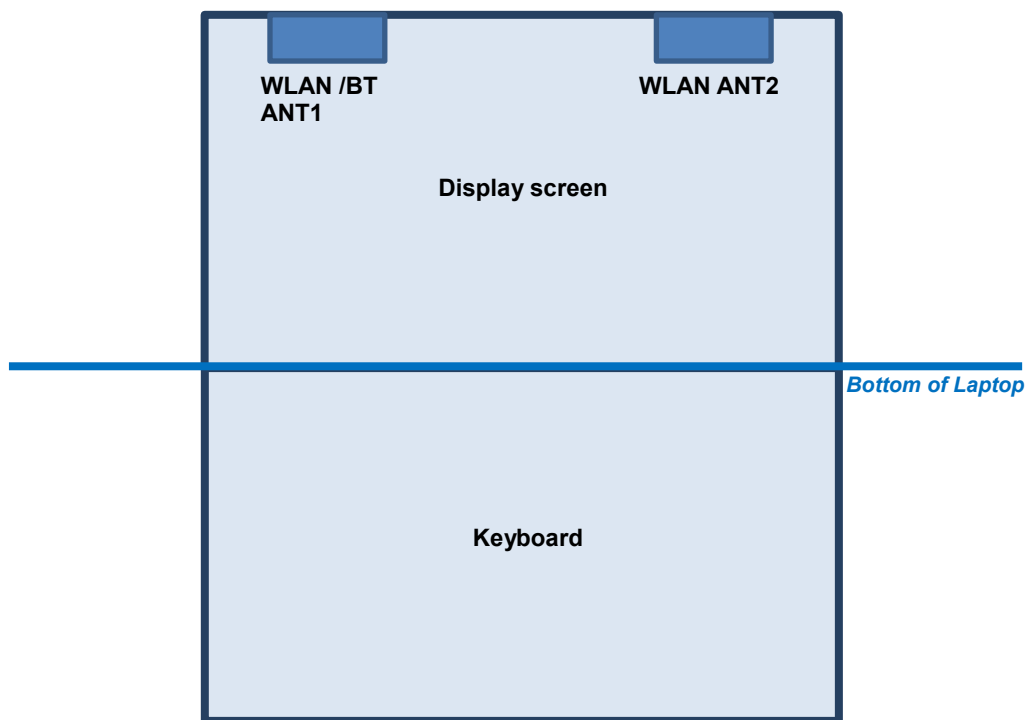
				Ant 1	Ant 2	Ant 1+2
5.5GHz WLAN	Mode	Channel	Frequency (MHz)	Tune-Up Limit	Tune-Up Limit	Tune-Up Limit
	802.11a 6Mbps	100	5500	16.50	16.50	19.5
		116	5580	18.50	18.50	21.5
		124	5620	18.50	18.50	21.5
		132	5660	18.50	18.50	21.5
		144	5720	18.50	18.50	21.5
	802.11n-HT20 MCS0	100	5500	16.50	16.50	19.5
		116	5580	18.50	18.50	21.5
		124	5620	18.50	18.50	21.5
		132	5660	18.50	18.50	21.5
		144	5720	18.50	18.50	21.5
	802.11n-HT40 MCS0	102	5510	16.50	16.50	19.5
		110	5550	17.50	17.50	20.5
		126	5630	17.50	17.50	20.5
		134	5670	17.50	17.50	20.5
		142	5710	17.50	17.50	20.5
	802.11ac-VHT20 MCS0	100	5500	16.50	16.50	19.5
		116	5580	18.50	18.50	21.5
		124	5620	18.50	18.50	21.5
		132	5660	18.50	18.50	21.5
		144	5720	18.50	18.50	21.5
	802.11ac-VHT40 MCS0	102	5510	16.50	16.50	19.5
		110	5550	17.50	17.50	20.5
		126	5630	17.50	17.50	20.5
		134	5670	17.50	17.50	20.5
		142	5710	17.50	17.50	20.5
	802.11ac-VHT80 MCS0	106	5530	14.50	14.50	17.5
		122	5610	16.50	16.50	19.5
		138	5690	16.50	16.50	19.5
	802.11ax-HE20 MCS0	100	5500	16.50	16.50	19.5
		116	5580	18.50	18.50	21.5
		124	5620	18.50	18.50	21.5
		132	5660	18.50	18.50	21.5
		144	5720	18.50	18.50	21.5
	802.11ax-HE40 MCS0	102	5510	16.50	16.50	19.5
		110	5550	17.50	17.50	20.5
		126	5630	17.50	17.50	20.5
		134	5670	17.50	17.50	20.5
		142	5710	17.50	17.50	20.5
	802.11ax-HE80 MCS0	106	5530	14.50	14.50	17.5
		122	5610	16.50	16.50	19.5
		138	5690	16.50	16.50	19.5

	Mode	Channel	Frequency (MHz)	Ant 1	Ant 2	Ant 1+2
				Tune-Up Limit	Tune-Up Limit	Tune-Up Limit
5.8GHz WLAN	802.11a 6Mbps	149	5745	18.50	18.50	21.5
		157	5785	18.50	18.50	21.5
		165	5825	18.50	18.50	21.5
	802.11n-HT20 MCS0	149	5745	18.50	18.50	21.5
		157	5785	18.50	18.50	21.5
		165	5825	18.50	18.50	21.5
	802.11n-HT40 MCS0	151	5755	17.50	17.50	20.5
		159	5795	17.50	17.50	20.5
	802.11ac-VHT20 MCS0	149	5745	18.50	18.50	21.5
		157	5785	18.50	18.50	21.5
		165	5825	18.50	18.50	21.5
	802.11ac-VHT40 MCS0	151	5755	17.50	17.50	20.5
		159	5795	17.50	17.50	20.5
	802.11ac-VHT80 MCS0	155	5775	16.50	16.50	19.5
	802.11ax-HE20 MCS0	149	5745	18.50	18.50	21.5
		157	5785	18.50	18.50	21.5
		165	5825	18.50	18.50	21.5
	802.11ax-HE40 MCS0	151	5755	17.50	17.50	20.5
		159	5795	17.50	17.50	20.5
	802.11ax-HE80 MCS0	155	5775	16.50	16.50	19.5

<2.4GHz Bluetooth>

	Mode	Channel	Frequency (MHz)	Ant 1
				Tune-Up Limit
Bluetooth	BR / EDR 1Mbps	0	2402	11.50
		39	2441	11.50
		78	2480	11.50
	BR / EDR 2Mbps	0	2402	8.50
		39	2441	8.50
		78	2480	8.50
	BR / EDR 3Mbps	0	2402	8.50
		39	2441	8.50
		78	2480	8.50
	LE 1Mbps	0	2402	11.50
		19	2440	11.50
		39	2480	11.50
	LE 2Mbps	0	2402	11.50
		19	2440	11.50
		39	2480	11.50

4. Antenna Location



The separation distance for antenna to edge :

Antenna	To Bottom of Laptop (mm)
WLAN/BT Antenna 1	179.57
WLAN Antenna 2	179.57

<SAR test exclusion table>
General Note:

1. The below table, when the distance is < 50 mm exclusion threshold is "Ratio", when the distance is > 50 mm exclusion threshold is "mW"
2. Maximum power is the source-based time-average power and represents the maximum RF output power among production units
3. Per KDB 447498 D01v06, for larger devices, the test separation distance of adjacent edge configuration is determined by the closest separation between the antenna and the user.
4. Per KDB 447498 D01v06, standalone SAR test exclusion threshold is applied; If the test separation distance is < 5mm, 5mm is used to determine SAR exclusion threshold.
5. Per KDB 447498 D01v06, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR}$$
 - f(GHz) is the RF channel transmit frequency in GHz
 - Power and distance are rounded to the nearest mW and mm before calculation
 - The result is rounded to one decimal place for comparison
6. Per KDB 447498 D01v06, at 100 MHz to 6 GHz and for *test separation distances* > 50 mm, the SAR test exclusion threshold is determined according to the following
 - a) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm) · (f(MHz)/150)] mW, at 100 MHz to 1500 MHz
 - b) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm) · 10] mW at > 1500 MHz and ≤ 6 GHz

Exposure Position	Wireless Interface	BT ANT 1	2.4GHz WLAN ANT 1	2.4GHz WLAN ANT 2	5GHz WLAN ANT 1	5GHz WLAN ANT 2
	Calculated Frequency (MHz)	2480	2472	2472	5825	5825
	Maximum power (dBm)	11.5	19.0	19.0	18.5	18.5
	Maximum rated power(mW)	14.13	79.43	79.43	70.79	70.79
Bottom of Laptop	Separation distance(mm)	179.57	179.57	179.57	179.57	179.57
	exclusion threshold	1391.0	1391.0	1391.0	1358.0	1358.0
	Testing required?	No	No	No	No	No

5. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Body
1.	WLAN2.4GHz Ant 1+2 + Bluetooth Ant 1	Yes
2.	WLAN5GHz Ant 1+2 + Bluetooth Ant 1	Yes

1. The Scaled SAR summation is calculated based on the same configuration and test position.
2. Per KDB 447498 D01v06, simultaneous transmission SAR is compliant if,
 - i) Scalar SAR summation < 1.6W/kg.
 - ii) $SPLSR = (SAR1 + SAR2)^{1.5} / (\min. \text{ separation distance, mm})$, and the peak separation distance is determined from the square root of $[(x1-x2)^2 + (y1-y2)^2 + (z1-z2)^2]$, where (x1, y1, z1) and (x2, y2, z2) are the coordinates of the extrapolated peak SAR locations in the zoom scan.
 - iii) If $SPLSR \leq 0.04$, simultaneously transmission SAR measurement is not necessary.
 - iv) Simultaneously transmission SAR measurement, and the reported multi-band SAR < 1.6W/kg.
3. For simultaneous transmission analysis, Bluetooth SAR is estimated per KDB 447498 D01v06 based on the formula below.
 - i) $(\max. \text{ power of channel, including tune-up tolerance, mW}) / (\min. \text{ test separation distance, mm}) \cdot [\sqrt{f(\text{GHz})} / x] \text{ W/kg}$ for test separation distances $\leq 50 \text{ mm}$; where $x = 7.5$ for 1-g SAR, and $x = 18.75$ for 10-g SAR.
 - ii) When the minimum separation distance is < 5mm, the distance is used 5mm to determine SAR test exclusion.
 - iii) 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distances is > 50 mm.

5.1 Body Exposure Conditions

Exposure Position	1	2	3	4	5	1+2+5 Summed 1g SAR (W/kg)	3+4+5 Summed 1g SAR (W/kg)
	WLAN2.4GHz Ant 1	WLAN2.4GHz Ant 2	WLAN5GHz Ant 1	WLAN5GHz Ant 2	Bluetooth Ant 1		
	Estimated 1g SAR (W/kg)	Estimated 1g SAR (W/kg)	Estimated 1g SAR (W/kg)	Estimated 1g SAR (W/kg)	Estimated 1g SAR (W/kg)		
Bottom of Laptop at 0mm	0.400	0.400	0.400	0.400	0.400	1.200	1.200

6. References

- [1] FCC 47 CFR Part 2 "Frequency Allocations and Radio Treaty Matters; General Rules and Regulations"
- [2] ANSI/IEEE Std. C95.1-1992, "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz", September 1992
- [3] IEEE Std. 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", Sep 2013
- [4] SPEAG DASY System Handbook
- [5] FCC KDB 248227 D01 v02r02, "SAR Guidance for IEEE 802.11 (WiFi) Transmitters", Oct 2015.
- [6] FCC KDB 447498 D01 v06, "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies", Oct 2015
- [7] FCC KDB 616217 D04 v01r02, "SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers", Oct 2015
- [8] FCC KDB 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.
- [9] FCC KDB 865664 D02 v01r02, "RF Exposure Compliance Reporting and Documentation Considerations" Oct 2015.