

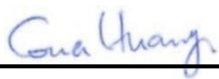
FCC SAR TEST REPORT

FCC ID : PU5-TP00132A
Equipment : Notebook Computer
Brand Name : Lenovo
Model Name : TP00132A
Applicant : Wistron Corporation
21F, No. 88, Sec. 1, Hsin Tai Wu Rd., Hsichih
Dist, New Taipei City 221,Taiwan
Manufacturer : Wistron Corporation
21F, No. 88, Sec. 1, Hsin Tai Wu Rd., Hsichih
Dist, New Taipei City 221,Taiwan
Standard : FCC 47 CFR Part 2 (2.1093)

Equipment: Foxconn T99W175 tested inside of Lenovo Notebook Computer

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. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.



Approved by: Cona Huang / Deputy Manager



Sporton International Inc. EMC & Wireless Communications Laboratory



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Appendix A. Antenna Location	

History of this test report

Report No.	Version	Description	Issued Date
FA150417-04	01	Initial issue of report	Aug. 25, 2021
FA150417-04	02	Added note in section 4	Sep. 09, 2021

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for Wistron Corporation, Notebook Computer, TP00132A as documented in FCC ID PU5-TP00132A, granted on 08/19/2021 are as follows.

Equipment Class	Frequency Band		Highest SAR Summary	Highest Simultaneous Transmission 1g SAR (W/kg)
			Body (Separation 0mm)	
			1g SAR (W/kg)	
Licensed	WCDMA	WCDMA II	1.14	1.39
		WCDMA IV	0.95	
		WCDMA V	0.81	
	LTE	LTE Band 2	0.70	
		LTE Band 7	1.15	
		LTE Band 12 / 17	0.92	
		LTE Band 13	0.91	
		LTE Band 14	0.90	
		LTE Band 25	1.06	
		LTE Band 5 / 26	0.84	
		LTE Band 30	1.03	
		LTE Band 38 / 41	1.14	
		LTE Band 42/48	0.69	
		LTE Band 4 / 66	1.17	
		LTE Band 71	0.79	
	FR1	FR1 n2	0.70	
		FR1 n5	0.59	
		FR1 n7	0.70	
		FR1 n12	0.63	
		FR1 n41	0.67	
		FR1 n66	0.70	
		FR1 n71	0.60	

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 1190) and the FCC designation No. TW1190 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC test. This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg for Partial-Body 1g SAR) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013 and FCC KDB publications.

Reviewed by: Jason Wang
Report Producer: Carlie Tsai



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 248227 D01 802.11 Wi-Fi SAR v02r02
- FCC KDB 616217 D04 SAR for laptop and tablets v01r02
- FCC KDB 941225 D01 3G SAR Procedures v03r01
- FCC KDB 941225 D05 SAR for LTE Devices v02r05
- FCC KDB 941225 D05A Rel.10 LTE SAR Test Guidance v01r02

3. Equipment Under Test (EUT) Information

3.1 General Information

Product Feature & Specification	
Equipment Name	Notebook Computer
Brand Name	Lenovo
Model Name	TP00132A
FCC ID	PU5-TP00132A
S/N	1S4810NL010050000026 for AVX 1S4810NL010044000020 for ICT
Integrated WWAN Module	Brand Name: Foxconn Model Name: T99W175
Wireless Technology and Frequency Range	WCDMA Band II: 1850 MHz ~ 1910 MHz WCDMA Band IV: 1710 MHz ~ 1755 MHz WCDMA Band V: 824 MHz ~ 849 MHz LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz LTE Band 14: 788 MHz ~ 798 MHz LTE Band 17: 704 MHz ~ 716 MHz LTE Band 25: 1850 MHz ~ 1915 MHz LTE Band 26: 814 MHz ~ 849 MHz LTE Band 30: 2305 MHz ~ 2315 MHz LTE Band 38: 2570 MHz ~ 2620 MHz LTE Band 41: 2496 MHz ~ 2690 MHz LTE Band 42: 3550 MHz ~ 3600 MHz LTE Band 48: 3550 MHz ~ 3700 MHz LTE Band 66: 1710 MHz ~ 1780 MHz LTE Band 71: 663 MHz ~ 698 MHz 5G NR n2 : 1850 MHz ~ 1910 MHz 5G NR n5 : 824 MHz ~ 849 MHz 5G NR n7 : 2500 MHz ~ 2570 MHz 5G NR n12 : 699 MHz ~ 716 MHz 5G NR n41 : 2496 MHz ~ 2690 MHz 5G NR n66 : 1710 MHz ~ 1780 MHz 5G NR n71 : 663 MHz ~ 698 MHz
Mode	RMC 12.2Kbps HSDPA HSUPA DC-HSDPA LTE: QPSK, 16QAM, 64QAM, 256QAM 5G NR: DFT-s-OFDM/CP-OFDM, Pi/2 BPSK/QPSK/16QAM/64QAM/256QAM
EUT Stage	Production Unit
Remark:	
1. Below Intel AX210D2W (FCC ID: PD9AX210D2, Report No.:200611-04.TR50) WLAN/BT module is also integrated into Lenovo TP00132A host.	
2. In this report was based on FCC ID: PU5-TP00132A grant date: 08/19/201, SAR report no.: FA150417 to add WiFi6E Sim-Tx analysis with WWAN operation to show compliance, the BT/DTS/NII bands simultaneous exposure conditions have addressed in the original grant and the highest Sim-Tx SAR 1.39W/kg also addressed in the original grant.	

WWAN Antenna Information					
Antenna 1	Manufacturer	AVX/ Ethertronics		Peak gain (dbi)	1.93
	Part number	Main Antenna:	025.901TF.0001	Type	PIFA
		Auxiliary Antenna:	025.901TG.0001 (Rx only)		
		MIMO1 Antenna	025.901TF.0001 (Rx only)		
		MIMO2 Antenna	025.901TG.0001		
Antenna 2	Manufacturer	LUXSHARE-ICT		Peak gain (dbi)	1.9
	Part number	Main Antenna:	025.901TK.0001	Type	PIFA
		Auxiliary Antenna:	025.901TL.0001 (Rx only)		
		MIMO1 Antenna	025.901TK.0001 (Rx only)		
		MIMO2 Antenna	025.901TL.0001		

WLAN Module Information	
FCC ID	PD9AX210D2
Integrated WLAN Module	Brand Name: Intel® Wi-Fi 6E AX210 Model Name: AX210D2W
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2400 MHz ~ 2483.5 MHz WLAN 5.2GHz Band: 5150 MHz ~ 5250 MHz WLAN 5.3GHz Band: 5250 MHz ~ 5350 MHz WLAN 5.6GHz Band: 5470 MHz ~ 5725 MHz WLAN 5.8GHz Band: 5725 MHz ~ 5850 MHz WLAN 6E: 5925 MHz ~ 6425 MHz, 6425 MHz ~ 6525 MHz, 6525 MHz ~ 6875 MHz, 6875 MHz ~ 7125 MHz Bluetooth: 2400 MHz ~ 2483.5 MHz
Mode	WLAN: 802.11a/b/g/n/ac/ax HT20/HT40/VHT20/VHT40/VHT80/VHT160/HE20/HE40/HE80/HE160 Bluetooth BR/EDR/LE

4. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Body
1.	WWAN + 6GHz WLAN Ant 1 + 6GHz WLAN Ant 2 + Bluetooth Ant 2 + FR1	Yes

General Note:

- Intel AX210D2W (FCC ID: PD9AX210D2, Report No.:200611-04.TR50) WLAN/BT module is also integrated into Lenovo TP00132A host.
- In this report was based on FCC ID: PU5-TP00132A grant date: 08/19/201, SAR report no.: FA150417 to add WiFi6E Sim-Tx analysis with WWAN operation to show compliance, the BT/DTS/NII bands simultaneous exposure conditions have addressed in the original grant and the highest Sim-Tx SAR 1.39W/kg also addressed in the original grant.
- Referenced from FCC ID: PD9AX210D2, Report No.:200611 -04.TR50, WLAN modular SAR tested at 8mm separation does not exceed 0.8 W/kg and integration into this host is qualified according to KDB 616217. WiFi/BT SAR of 1.6 W/kg was used conservatively for the purpose of simultaneous transmission analysis
- The Scaled SAR summation is calculated based on the same configuration and test position.
- Per KDB 447498 D01v06, simultaneous transmission SAR is compliant if,
 - Scalar SAR summation < 1.6W/kg.
 - $SPLSR = (SAR1 + SAR2)^{1.5} / (\text{min. separation distance, mm})$, 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.
 - If $SPLSR \leq 0.04$, simultaneously transmission SAR measurement is not necessary.
 - Simultaneously transmission SAR measurement, and the reported multi-band SAR < 1.6W/kg.
 - The SPLSR calculated results please refer to section 4.3.

4.1 General Sim-Tx analysis

Exposure Position	1	2	3	4	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)	1+4 Summed 1g SAR (W/kg)	SPLSR	Case No
	Maximum Main Ant LTE B66 1g SAR (W/kg)	6GHz WLAN Ant 1 1g SAR (W/kg)	6GHz WLAN/BT Ant 2 1g SAR (W/kg)	6GHz WLAN+BT Ant 1+2 1g SAR (W/kg)					
Bottom of Laptop at 0mm	1.168	1.600	1.600	1.600	2.768	2.768	2.768	0.02	Case 1

Exposure Position	1	2	3	4	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)	1+4 Summed 1g SAR (W/kg)	SPLSR	Case No
	Maximum MIMO2 Ant LTE B2 1g SAR (W/kg)	6GHz WLAN Ant 1 1g SAR (W/kg)	6GHz WLAN/BT Ant 2 1g SAR (W/kg)	6GHz WLAN+BT Ant 1+2 1g SAR (W/kg)					
Bottom of Laptop at 0mm	0.702	1.600	1.600	1.600	2.302	2.302	2.302	0.02	Case 1

4.2 EN-DC Sim-Tx analysis

General Note:

- When the EN-DC is active the LTE anchors band will limit different output power according above table in this device.
- Below test result is based on the maximum standalone SAR result. When the EN-DC active the LTE Anchors Band output power is equal or less than the standalone output power for each frequency bands, therefore, LTE Anchors Band power and SAR was estimated based on standalone results to performed sim-Tx analysis with 5G NR and WiFi and Bluetooth.
- The Sim-Tx analysis for EN-DC active is choose the worst case SAR from the WWAN main and MIMO2 antenna within the exposure positions, regardless of whether the EN-DC combinations which the single uplink 1g SAR values for each LTE Anchors Bands and 5G NR are both less than 0.8W/kg as below table and the algebraic summation of the 1g SAR value are less than 1.45W/kg, additional measurements are not required according to TCBC workshop guidance, the detail sim-Tx analysis as following

<EN-DC Combination>

EN-DC Combination	
LTE Anchor Bands for n2	LTE B5/12/13/48
LTE Anchor Bands for n5	LTE B2/7/48/66
LTE Anchor Bands for n7	LTE B5/12
LTE Anchor Bands for n12	LTE B2/66
LTE Anchor Bands for n41	LTE B2/25/26/66
LTE Anchor Bands for n66	LTE B5/12/13/48/71
LTE Anchor Bands for n71	LTE B2/7/66

<EN-DC Maximum output>

Band		Ant	UMTS/LTE Standalone Maximum Power (dBm)	UMTS/LTE Standalone 1g SAR (W/kg)	EN-DC LTE Anchors Band Maximum Power (dBm)	EN-DC LTE Anchors Band Estimated 1g SAR (W/kg)	5G NR Maximum Power (dBm)	5G NR Standalone 1g SAR (W/kg)	Maximum LTE + Maximum NR Summed 1g SAR (W/kg)
WCDMA	2	Main	20.5	1.144					1.437
	4	Main	22.0	0.954					
	5	Main	24.5	0.805					
LTE	2	Main	20.0	1.062	18.0	0.670			
	2	MIMO2	20.5	0.702	20.5	0.702			
	4	Main	22.0	1.168					
	5	Main	24.5	0.843	23.5	0.670			
	7	Main	18.5	1.152	16.5	0.727			
	7	MIMO2	19.0	0.623	19.0	0.623			
	12	Main	24.5	0.918	23.5	0.729			
	13	Main	24.5	0.907	23.5	0.720			
	14	Main	24.5	0.896					
	17	Main	24.5	0.918					
	25	Main	20.0	1.062	18.0	0.670			
	26	Main	24.5	0.843	23.5	0.670			
	30	Main	18.5	1.029					
	66	Main	22.0	1.168	20.0	0.737			
	66	MIMO2	19.5	0.646	19.5	0.646			
	71	Main	24.5	0.788	24.0	0.702			
	38	Main	20.0	0.917					
	41	Main	20.0	0.917					
	41_HPUE	Main	23.0	1.135					
	42	MIMO2	22.0	0.694					
	48	MIMO2	22.0	0.694	20.0	0.438			
FR1	n2	Main					17.5	0.700	
	n2	MIMO2					19.0	0.678	
	n5	Main					23.0	0.589	
	n7	MIMO2					18.5	0.697	
	n12	Main					22.0	0.629	
	n66	Main					19.0	0.695	
	n66	MIMO2					21.0	0.635	
	n71	Main					22.0	0.604	
	n41	Main					18.0	0.665	

Exposure Position	1	2	3	4	5	1+2+3 Summed 1g SAR (W/kg)	1+2+4 Summed 1g SAR (W/kg)	1+2+5 Summed 1g SAR (W/kg)	SPLSR	Case No
	Maximum EN-DC Main Ant LTE B66	Maximum MIMO2 Ant FR1 n7	6GHz WLAN+BT Ant 1	6GHz WLAN/BT Ant 2	6GHz WLAN+BT Ant 1+2					
	Estimated 1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)					
Bottom of Laptop at 0mm	0.737	0.697	1.600	1.600	1.600	3.034	3.034	3.034	0.02	Case 1

Exposure Position	1	2	3	4	5	1+2+3 Summed 1g SAR (W/kg)	1+2+4 Summed 1g SAR (W/kg)	1+2+5 Summed 1g SAR (W/kg)	SPLSR	Case No
	Maximum MIMO2 Ant LTE B2	Maximum Main Ant FR1 n2	6GHz WLAN Ant 1	6GHz WLAN/BT Ant 2	6GHz WLAN+BT Ant 1+2					
	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)					
Bottom of Laptop at 0mm	0.702	0.700	1.600	1.600	1.600	3.002	3.002	3.002	0.01	Case 1

4.3 SPLSR Evaluation and Analysis

General Note:

1. For SPLSR analysis is selected highest standalone SAR from each WWAN transmit antenna to be evaluated and it is conservative.
2. According to the antenna location of appendix A, the minimum distance between each WWAN/WLAN transmitter antennas are used for SPLSR analysis.
3. $SPLSR = (SAR_1 + SAR_2)^{1.5} / (min. \text{ separation distance, mm})$. If $SPLSR \leq 0.04$, simultaneously transmission SAR measurement is not necessary.

	Band	Position	SAR (W/kg)	Gap	Minimum distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				(mm)				
Case 1	Maximum WWAN Main	Bottom of Laptop	1.168	0	179.89	1.87	0.01	Not required
	Maximum WWAN MIMO 2		0.702	0				
	Maximum WWAN Main	Bottom of Laptop	1.168	0	207.97	2.77	0.02	Not required
	WLAN6GHz Ant 1		1.600	0				
	Maximum WWAN MIMO 2	Bottom of Laptop	0.702	0	194.59	2.30	0.02	Not required
	WLAN6GHz Ant 2		1.600	0				
	Maximum WWAN Main	Bottom of Laptop	1.168	0	207.97	2.77	0.02	Not required
	WLAN6GHz Ant 1+2 + BT		1.600	0				
	Maximum WWAN MIMO 2	Bottom of Laptop	0.702	0	194.59	2.30	0.02	Not required
	WLAN6GHz Ant 1+2 + BT		1.600	0				

5. 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 941225 D01 v03r01, "3G SAR MEAUREMENT PROCEDURES", Oct 2015
- [8] FCC KDB 941225 D05 v02r05, "SAR Evaluation Considerations for LTE Devices", Dec 2015
- [9] FCC KDB 941225 D05A v01r02, "Rel. 10 LTE SAR Test Guidance and KDB Inquiries", Oct 2015
- [10] FCC KDB 616217 D04 v01r02, "SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers", Oct 2015
- [11] FCC KDB 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.
- [12] FCC KDB 865664 D02 v01r02, "RF Exposure Compliance Reporting and Documentation Considerations" Oct 2015.