



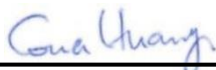
FCC SAR TEST REPORT

FCC ID : PU5-TP00107A
Equipment : Notebook Computer
Brand Name : Lenovo
Model Name : TP00107A
Applicant : Wistron Corporation
21F, No. 88, Sec. 1, Hsin Tai Wu Rd., Hsichih
Dist, New Taipei City 221, Taiwan R.O.C.
Manufacturer : Wistron Corporation
21F, No. 88, Sec. 1, Hsin Tai Wu Rd., Hsichih
Dist, New Taipei City 221, Taiwan R.O.C.
Standard : FCC 47 CFR Part 2 (2.1093)
ANSI/IEEE C95.1-1992

Equipment: Fibocom L850-GL and Intel AX200D2WL inside of Lenovo Notebook Computer

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

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Approved by: Cona Huang / Deputy Manager

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Table of Contents

1. Statement of Compliance 4

2. Guidance Applied..... 4

3. Equipment Under Test (EUT) Information 5

 3.1 General Information 5

4. RF Exposure Limits..... 6

 4.1 Uncontrolled Environment..... 6

 4.2 Controlled Environment..... 6

5. Simultaneous Transmission Analysis..... 7

 5.1 Body Exposure Conditions..... 7

 5.2 SPLSR Evaluation and Analysis 9

6. References.....10



History of this test report

Report No.	Version	Description	Issued Date
FA910213-06	01	Initial issue of report	May 20, 2019



1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for Wistron Corporation, Notebook Computer, TP00107A, are as follows.

Table with 4 columns: Equipment Class, Frequency Band, Highest SAR Summary (Body, 1g SAR (W/kg)), and Highest Simultaneous Transmission 1g SAR (W/kg). Rows include WCDMA II, IV, V, and various LTE Bands.

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) 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: Wan Liu

2. Guidance Applied

The Specific Absorption Rate (SAR) testing specification, method, and procedure for this device is in accordance with the following standards:

- FCC 47 CFR Part 2 (2.1093)
ANSI/IEEE C95.1-1992
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



3. Equipment Under Test (EUT) Information

3.1 General Information

Product Feature & Specification	
Equipment Name	Notebook Computer
Brand Name	Lenovo
Model Name	TP00107A
FCC ID	PU5-TP00107A
Integrated WWAN module	Brand Name: Fibocom Model Name: L850-GL
Integrated WLAN module	Brand Name: Intel Model Name: AX200D2WL
Wireless Technology and Frequency Range	WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz WCDMA Band IV: 1712.4 MHz ~ 1752.6 MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz LTE Band 2: 1850.7 MHz ~ 1909.3 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 7: 2502.5 MHz ~ 2567.5 MHz LTE Band 12: 699.7 MHz ~ 715.3 MHz LTE Band 13: 779.5 MHz ~ 784.5 MHz LTE Band 17: 706.5 MHz ~ 713.5 MHz LTE Band 26: 814.7 MHz ~ 848.3 MHz LTE Band 30: 2307.5 MHz ~ 2312.5 MHz LTE Band 41: 2498.5 MHz ~ 2687.5 MHz LTE Band 66: 1710.7 MHz ~ 1779.3 MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5700 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz NFC : 13.56 MHz
Mode	RMC 12.2Kbps HSDPA HSUPA DC-HSDPA LTE: QPSK, 16QAM WLAN: 802.11a/b/g/n/ac HT20 / HT40 / VHT20 / VHT40 / VHT80 / VHT160 / HE20 / HE40 / HE80 / HE160 Bluetooth BR/EDR/LE NFC:ASK
EUT Stage	Production Unit
Remark:	
<ol style="list-style-type: none"> In this report is based on original report FCC ID: PU5-TP00107A, Sporton Report No.: FA910213 to additional simultaneous transmission analysis with new Intel AX200D2WL. No additional WWAN SAR is necessary. The Intel AX200D2WL WLAN / Bluetooth module is also integrated into this host, WLAN/Bluetooth SAR testing results which can be referred to RF Exposure Lab SAR Evaluation Report, Report No.: SAR.20190415 (FCC ID: PD9AX200D2L) and also used for simultaneous transmission analysis. 	



4. RF Exposure Limits

4.1 Uncontrolled Environment

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

4.2 Controlled Environment

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. The exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Limits for Occupational/Controlled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.4	8.0	20.0

Limits for General Population/Uncontrolled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.08	1.6	4.0

1. Whole-Body SAR is averaged over the entire body, partial-body SAR is averaged over any 1gram of tissue defined as a tissue volume in the shape of a cube. SAR for hands, wrists, feet and ankles is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.



5. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Body
1.	WWAN + WLAN2.4GHz ANT1 + WLAN2.4GHz ANT2	Yes
2.	WWAN + WLAN2.4GHz ANT1 + Bluetooth ANT2	Yes
3.	WWAN + WLAN5GHz ANT1 + WLAN5GHz ANT2	Yes
4.	WWAN + WLAN5GHz ANT1 + Bluetooth ANT2	Yes
5.	WWAN + WLAN5GHz ANT1 + WLAN5GHz ANT2 + Bluetooth ANT2	Yes

General Note:

- 2.4GHz WLAN and Bluetooth share the same antenna 2, and cannot transmit simultaneously.
- EUT wilScalar SAR summation < 1.6W/kg. I choose either WLAN 2.4GHz or WLAN 5GHz according to the network signal condition; therefore, 2.4GHz WLAN and 5GHz WLAN will not operate simultaneously at any moment.
- The Scaled SAR summation is calculated based on the same configuration and test position.
- Per KDB 447498 D01v06, simultaneous transmission SAR is compliant if,
 - SPLSR = (SAR1 + SAR2)^1.5 / (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 ≤ 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 5.2.

5.1 Body Exposure Conditions

WWAN Band	Exposure Position	1	2	3	4	5	6	1+2+3	1+4+5	1+2+6	1+4+6	1+4+5+6	SPLSR	Case No		
		WWAN 1g SAR (W/kg)	2.4GHz WLAN Ant 1 1g SAR (W/kg)	2.4GHz WLAN Ant 2 1g SAR (W/kg)	5GHz WLAN Ant 1 1g SAR (W/kg)	5GHz WLAN Ant 2 1g SAR (W/kg)	Bluetooth Ant 2 1g SAR (W/kg)	Summed 1g SAR (W/kg)	Summed 1g SAR (W/kg)	Summed 1g SAR (W/kg)	Summed 1g SAR (W/kg)	Summed 1g SAR (W/kg)				
WCDMA	WCDMA II	Bottom Face at 0mm	0.371	0.140	0.170	0.320	0.330	0.020	0.681	1.021	0.531	0.711	1.041			
		Bottom Face at 1mm	1.173	0.140	0.170	0.320	0.330	0.020	1.483	1.823	1.333	1.513	1.843	0.01	Case 1	
		Edge 1 at 0mm	0.973							0.973	0.973	0.973	0.973	0.973		
		Edge 1 at 16mm	0.360							0.360	0.360	0.360	0.360	0.360		
		Edge 2 at 0mm	0.227							0.227	0.227	0.227	0.227	0.227		
	WCDMA IV	Bottom Face at 0mm	0.407	0.140	0.170	0.320	0.330	0.020	0.717	1.057	0.567	0.747	1.077			
		Bottom Face at 1mm	1.114	0.140	0.170	0.320	0.330	0.020	1.424	1.764	1.274	1.454	1.784	0.01	Case 2	
		Edge 1 at 0mm	0.959							0.959	0.959	0.959	0.959	0.959		
		Edge 1 at 16mm	0.333							0.333	0.333	0.333	0.333	0.333		
		Edge 2 at 0mm	0.223							0.223	0.223	0.223	0.223	0.223		
	WCDMA V	Bottom Face at 0mm	0.509	0.140	0.170	0.320	0.330	0.020	0.819	1.159	0.669	0.849	1.179			
		Bottom Face at 1mm	0.819	0.140	0.170	0.320	0.330	0.020	1.129	1.469	0.979	1.159	1.489	0.01	Case 3	
		Edge 1 at 0mm	1.190							1.190	1.190	1.190	1.190	1.190		
		Edge 1 at 16mm	0.449							0.449	0.449	0.449	0.449	0.449		
		Edge 2 at 0mm	0.396							0.396	0.396	0.396	0.396	0.396		



WWAN Band	Exposure Position	1	2	3	4	5	6	1+2+3 Summed 1g SAR (W/kg)	1+4+5 Summed 1g SAR (W/kg)	1+2+6 Summed 1g SAR (W/kg)	1+4+6 Summed 1g SAR (W/kg)	1+4+5+6 Summed 1g SAR (W/kg)	SPLSR	Case No		
		WWAN	2.4GHz WLAN Ant 1	2.4GHz WLAN Ant 2	5GHz WLAN Ant 1	5GHz WLAN Ant 2	Bluetooth Ant 2									
		1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)									
LTE	LTE Band 2	Bottom Face at 0mm	0.548	0.140	0.170	0.320	0.330	0.020	0.858	1.198	0.708	0.888	1.218			
		Bottom Face at 1mm	1.093	0.140	0.170	0.320	0.330	0.020	1.403	1.743	1.253	1.433	1.763	0.01	Case 4	
		Edge 1 at 0mm	1.168							1.168	1.168	1.168	1.168	1.168		
		Edge 1 at 16mm	0.293							0.293	0.293	0.293	0.293	0.293		
		Edge 2 at 0mm	0.229							0.229	0.229	0.229	0.229	0.229		
	LTE Band 7	Bottom Face at 0mm	0.501	0.140	0.170	0.320	0.330	0.020	0.811	1.151	0.661	0.841	1.171			
		Bottom Face at 1mm	0.721	0.140	0.170	0.320	0.330	0.020	1.031	1.371	0.881	1.061	1.391			
		Edge 1 at 0mm	1.018							1.018	1.018	1.018	1.018	1.018		
		Edge 1 at 16mm	0.590							0.590	0.590	0.590	0.590	0.590		
		Edge 2 at 0mm	0.398							0.398	0.398	0.398	0.398	0.398		
	LTE Band 12	Bottom Face at 0mm	0.570	0.140	0.170	0.320	0.330	0.020	0.880	1.220	0.730	0.910	1.240			
		Bottom Face at 1mm	0.551	0.140	0.170	0.320	0.330	0.020	0.861	1.201	0.711	0.891	1.221			
		Edge 1 at 0mm	1.189							1.189	1.189	1.189	1.189	1.189		
		Edge 1 at 16mm	0.336							0.336	0.336	0.336	0.336	0.336		
		Edge 2 at 0mm	0.205							0.205	0.205	0.205	0.205	0.205		
	LTE Band 13	Bottom Face at 0mm	0.565	0.140	0.170	0.320	0.330	0.020	0.875	1.215	0.725	0.905	1.235			
		Bottom Face at 1mm	0.603	0.140	0.170	0.320	0.330	0.020	0.913	1.253	0.763	0.943	1.273			
		Edge 1 at 0mm	1.180							1.180	1.180	1.180	1.180	1.180		
		Edge 1 at 16mm	0.427							0.427	0.427	0.427	0.427	0.427		
		Edge 2 at 0mm	0.212							0.212	0.212	0.212	0.212	0.212		
	LTE Band 26	Bottom Face at 0mm	0.550	0.140	0.170	0.320	0.330	0.020	0.860	1.200	0.710	0.890	1.220			
		Bottom Face at 1mm	0.615	0.140	0.170	0.320	0.330	0.020	0.925	1.265	0.775	0.955	1.285			
		Edge 1 at 0mm	1.023							1.023	1.023	1.023	1.023	1.023		
		Edge 1 at 16mm	0.277							0.277	0.277	0.277	0.277	0.277		
		Edge 2 at 0mm	0.174							0.174	0.174	0.174	0.174	0.174		
	LTE Band 30	Bottom Face at 0mm	0.668	0.140	0.170	0.320	0.330	0.020	0.978	1.318	0.828	1.008	1.338			
		Bottom Face at 1mm	0.932	0.140	0.170	0.320	0.330	0.020	1.242	1.582	1.092	1.272	1.602	0.01	Case 5	
		Edge 1 at 0mm	1.069							1.069	1.069	1.069	1.069	1.069		
		Edge 1 at 16mm	0.430							0.430	0.430	0.430	0.430	0.430		
		Edge 2 at 0mm	0.235							0.235	0.235	0.235	0.235	0.235		
LTE Band 41	Bottom Face at 0mm	0.488	0.140	0.170	0.320	0.330	0.020	0.798	1.138	0.648	0.828	1.158				
	Bottom Face at 1mm	0.508	0.140	0.170	0.320	0.330	0.020	0.818	1.158	0.668	0.848	1.178				
	Edge 1 at 0mm	1.188							1.188	1.188	1.188	1.188	1.188			
	Edge 1 at 16mm	0.288							0.288	0.288	0.288	0.288	0.288			
	Edge 2 at 0mm	0.168							0.168	0.168	0.168	0.168	0.168			
LTE Band 66	Bottom Face at 0mm	0.458	0.140	0.170	0.320	0.330	0.020	0.768	1.108	0.618	0.798	1.128				
	Bottom Face at 1mm	1.024	0.140	0.170	0.320	0.330	0.020	1.334	1.674	1.184	1.364	1.694	0.01	Case 6		
	Edge 1 at 0mm	1.161							1.161	1.161	1.161	1.161	1.161			
	Edge 1 at 16mm	0.255							0.255	0.255	0.255	0.255	0.255			
	Edge 2 at 0mm	0.285							0.285	0.285	0.285	0.285	0.285			



5.2 SPLSR Evaluation and Analysis

General Note:

1. According to appendix D antenna location of original report FCC ID: PU5-TP00107A, Sporton Report No.: FA910213, the minimum distance between each transmit antenna if used for SPLSR analysis, $SPLSR = (SAR1 + SAR2)1.5 / (\text{min. separation distance, mm})$. If $SPLSR \leq 0.04$, simultaneously transmission SAR measurement is not necessary
2. Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneously transmitting antenna. When the sum of 1-g or 10-g SAR of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit, SAR test exclusion applies to that simultaneous transmission configuration. Therefore, the adjacent transmit antennas will be summed first, and then the SPLSR calculation will be evaluated with the farther transmitted antennas.
3. For each band and each position configuration, the worst summed SAR results and the minimum distance is using for SPLSR calculated, due to it is the worst case.

Case	Band	Position	SAR (W/kg)	Gap	Minimum distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
				(mm)				
Case 1	WCDMA II	Bottom Face	1.173	1mm	194.67	1.49	0.01	Not required
	WLAN5G Ant 1		0.32	0mm				
	WCDMA II	Bottom Face	1.173	1mm	229.84	1.52	0.01	Not required
	WLAN5G Ant 2 + BT Ant 2		0.35	0mm				
	WLAN5G Ant 1	Bottom Face	0.32	0mm	106.40	0.67	0.01	Not required
	WLAN5G Ant 2 + BT Ant 2		0.35	0mm				
Case 2	WCDMA IV	Bottom Face	1.114	1mm	194.67	1.43	0.01	Not required
	WLAN5G Ant 1		0.32	0mm				
	WCDMA IV	Bottom Face	1.114	1mm	229.84	1.46	0.01	Not required
	WLAN5G Ant 2 + BT Ant 2		0.35	0mm				
	WLAN5G Ant 1	Bottom Face	0.32	0mm	106.40	0.67	0.01	Not required
	WLAN5G Ant 2 + BT Ant 2		0.35	0mm				
Case 3	WCDMA V	Bottom Face	0.819	1mm	194.67	1.14	0.01	Not required
	WLAN5G Ant 1		0.32	0mm				
	WCDMA V	Bottom Face	0.819	1mm	229.84	1.17	0.01	Not required
	WLAN5G Ant 2 + BT Ant 2		0.35	0mm				
	WLAN5G Ant 1	Bottom Face	0.32	0mm	106.40	0.67	0.01	Not required
	WLAN5G Ant 2 + BT Ant 2		0.35	0mm				
Case 4	LTE 2	Bottom Face	1.093	1mm	194.67	1.41	0.01	Not required
	WLAN5G Ant 1		0.32	0mm				
	LTE 2	Bottom Face	1.093	1mm	229.84	1.44	0.01	Not required
	WLAN5G Ant 2 + BT Ant 2		0.35	0mm				
	WLAN5G Ant 1	Bottom Face	0.32	0mm	106.40	0.67	0.01	Not required
	WLAN5G Ant 2 + BT Ant 2		0.35	0mm				
Case 5	LTE 30	Bottom Face	0.932	1mm	194.67	1.25	0.01	Not required
	WLAN5G Ant 1		0.32	0mm				
	LTE 30	Bottom Face	0.932	1mm	229.84	1.28	0.01	Not required
	WLAN5G Ant 2 + BT Ant 2		0.35	0mm				
	WLAN5G Ant 1	Bottom Face	0.32	0mm	106.40	0.67	0.01	Not required
	WLAN5G Ant 2 + BT Ant 2		0.35	0mm				
Case 6	LTE 66	Bottom Face	1.024	1mm	194.67	1.34	0.01	Not required
	WLAN5G Ant 1		0.32	0mm				
	LTE 66	Bottom Face	1.024	1mm	229.84	1.37	0.01	Not required
	WLAN5G Ant 2 + BT Ant 2		0.35	0mm				
	WLAN5G Ant 1	Bottom Face	0.32	0mm	106.40	0.67	0.01	Not required
	WLAN5G Ant 2 + BT Ant 2		0.35	0mm				



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] FCC KDB 447498 D01 v06, "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies", Oct 2015
- [4] FCC KDB 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.
- [5] FCC KDB 865664 D02 v01r02, "RF Exposure Compliance Reporting and Documentation Considerations" Oct 2015.