



FCC SAR REPORT

FCC ID : ZMOL850GL
Equipment : LTE module
Brand Name : Fibocom
Model Name : L850-GL
Applicant : Fibocom Wireless Inc.
5/F, Tower A, Technology Building II. 1057#
Nanhai Blvd, Shenzhen, 518067 China
Standard : FCC 47 CFR Part 2 (2.1093)

The product was installed into Notebook Computer (Brand Name HP, Model Name: HSN-I43C) during evaluation.

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

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History of this test report

Report No.	Version	Description	Issued Date
FA0N0702-01B	01	Initial issue of report	Dec. 16, 2020

1. Equipment Under Test (EUT) Information

1.1 General Information

Product Feature & Specification	
Equipment Name	LTE module
Brand Name	Fibocom
Model Name	L850-GL
FCC ID	ZMOL850GL
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 17: 704 MHz ~ 716 MHz LTE Band 26: 824 MHz ~ 849 MHz LTE Band 30: 2305 MHz ~ 2315 MHz LTE Band 38: 2570 MHz ~ 2620 MHz LTE Band 41: 2500 MHz ~ 2690 MHz LTE Band 66: 1710 MHz ~ 1780 MHz
Mode	RMC 12.2Kbps HSDPA HSUPA DC-HSDPA LTE: QPSK, 16QAM
Remark: 1. For Realtek RTL8822CE, the 2.4GHz/5 GHz WLAN and Bluetooth SAR results are referenced from SAR report, report number: FA0N0702-03 (FCC ID: TX2-RTL8822CE) and these SAR results are also used to perform simultaneous transmission analysis.	



Host Information	
Equipment Name	Notebook Computer
Brand Name	HP
Model Name	HSN-I43C
Integrated WLAN Module	
Brand Name	Realtek
Model Name	RTL8822CE
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 ~ 5825 MHz Bluetooth: 2400 MHz ~ 2483.5 MHz
Mode	WLAN: 802.11a/b/g/n/ac HT20/HT40/VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE
EUT Stage	Production Unit



WWAN Antenna Information												
Vendor	AWAN											
Mode	NB Mode											
Antenna	PIFA											
Part Number	6036B0255901 (AUP6Y-100025) (Main)(Tx5)(Tx1/Rx1)											
Frequency	B2 1850-1910MHz	B4 1710-1755MHz	B5 824-849MHz	B7 2500-2570MHz	B12 699-716MHz	B13 777-787MHz	B17 704-716MHz	B26 814-849MHz	B30 2305-2315MHz	B38 2570-2620MHz	B41 2496-2690MHz	B66 1710-1780MHz
Gain (dBi)	1.68	-1.27	-3.75	0.74	-1.02	2.5	-3.51	-3.75	1.88	-0.38	0.74	-1.27
Vendor	HONG-BO											
Mode	NB Mode											
Antenna	PIFA											
Part Number	6036B0257701 (260-27365) (Main)(Tx5)(Tx1/Rx1)											
Frequency	B2 1850-1910MHz	B4 1710-1755MHz	B5 824-849MHz	B7 2500-2570MHz	B12 699-716MHz	B13 777-787MHz	B17 704-716MHz	B26 814-849MHz	B30 2305-2315MHz	B38 2570-2620MHz	B41 2496-2690MHz	B66 1710-1780MHz
Gain (dBi)	-0.81	-2.26	-0.78	0.22	-1.20	-2.13	-1.20	-0.78	0.53	0.03	0.22	-2.26
Vendor	WNC											
Mode	NB Mode											
Antenna	PIFA											
Part Number	6036B0253201 (81EABB15.G35) (Main)(Tx5)(Tx1/Rx1)											
Frequency	B2 1850-1910MHz	B4 1710-1755MHz	B5 824-849MHz	B7 2500-2570MHz	B12 699-716MHz	B13 777-787MHz	B17 704-716MHz	B26 814-849MHz	B30 2305-2315MHz	B38 2570-2620MHz	B41 2496-2690MHz	B66 1710-1780MHz
Gain (dBi)	0.22	-1.11	0.08	-0.19	-1.73	-1.47	-1.73	0.08	3.45	-1.30	0.19	-1.11

WLAN Antenna Information								
Vendor	AWAN							
Mode	NB Mode							
Antenna	(Tx1) (PIFA)				(Tx2) (PIFA)			
Part Number	6036B0281301 (AUP6Y-100068)				6036B0281401 (AUP6Y-100069)			
Frequency	2400-2500MHz	5150-5350MHz	5470-5725MHz	5725-5850MHz	2400-2500MHz	5150-5350MHz	5470-5725MHz	5725-5850MHz
Gain (dBi)	-2.983	0.187	-0.296	-1.789	-4.246	-1.046	-0.545	-2.304
Vendor	HONG-BO							
Mode	NB Mode							
Antenna	(Tx1) (PIFA)				(Tx2) (PIFA)			
Part Number	6036B0278501 (260-27439)				6036B0278601 (260-27438)			
Frequency	2400-2500MHz	5150-5350MHz	5470-5725MHz	5725-5850MHz	2400-2500MHz	5150-5350MHz	5470-5725MHz	5725-5850MHz
Gain (dBi)	-1.58	-2.57	-4.43	-4.51	-2.46	-0.81	-5	-4.6
Vendor	WNC							
Mode	NB Mode							
Antenna	(Tx1) (PIFA)				(Tx2) (PIFA)			
Part Number	6036B0277701 (81EABD15.G03)				6036B0277801 (81EABD15.G02)			
Frequency	2400-2500MHz	5150-5350MHz	5470-5725MHz	5725-5850MHz	2400-2500MHz	5150-5350MHz	5470-5725MHz	5725-5850MHz
Gain (dBi)	-1.66	-2.02	-0.84	-0.84	-2.5	-1.14	-2.32	-1.16

Reviewed by: Jason Wang
Report Producer: Daisy Peng

2. Guidance Applied

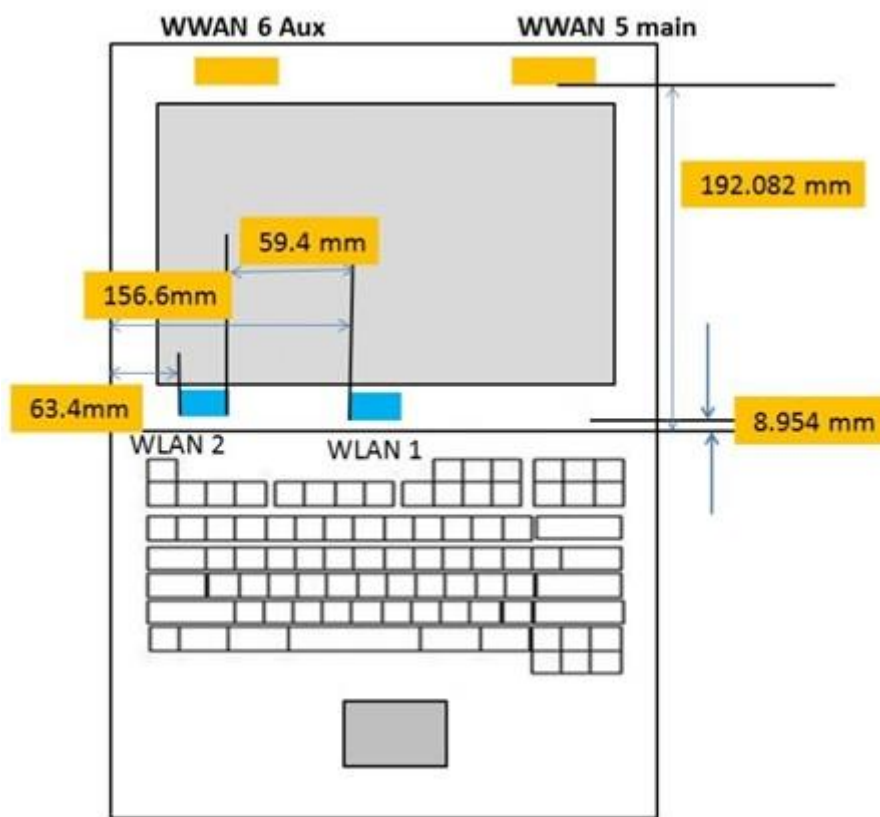
The Specific Absorption Rate (SAR) testing specification, method, and procedure for this device is in accordance with the following standards, the below KDB standard may not including in the TAF code without accreditation.

- 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. Maximum Tune-up Limit (Unit: dBm)

Mode		Maximum Average power(dBm)
WCDMA	Band II	24.5
	Band IV	24.5
	Band V	24.5
LTE	Band 2	24
	Band 4	24
	Band 5	24
	Band 7	24
	Band 12	24
	Band 13	24
	Band 17	24
	Band 26	24
	Band 30	24
	Band 66	24

4. SAR test exclusion table



The separation distance for antenna to edge:

Antenna	To Bottom of Laptop (mm)
WWAN Antenna	192.082
WLAN/BT Antenna 1	8.954
WLAN Antenna 2	8.954



<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	WCDMA Band V	WCDMA Band IV	WCDMA Band II	LTE Band 12	LTE Band 17	LTE Band 13	LTE Band 5	LTE Band 26	LTE Band 4	LTE Band 66	LTE Band 2	LTE Band 30	LTE Band 7	LTE Band 38	LTE Band 41
	Calculated Frequency	846MHz	1750MHz	1907MHz	715MHz	713MHz	784MHz	848MHz	848MHz	1754MHz	1779MHz	1909MHz	2312MHz	2567MHz	2617MHz	2687MHz
	Maximum power (dBm)	24.5	24.5	24.5	24	24	24	24	24	24	24	24	24	24	24	24
	Maximum rated power(mW)	282.0	282.0	282.0	251.0	251.0	251.0	251.0	251.0	251.0	251.0	251.0	251.0	251.0	251.0	251.0
Bottom of Laptop	Separation distance(mm)	192.1														
	exclusion threshold	964.0	1534.0	1529.0	855.0	853.0	912.0	966.0	966.0	1534.0	1533.0	1529.0	1519.0	1514.0	1514.0	1512.0
	Testing required?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

5. Simultaneous Transmission Analysis

<Realtek_RTL8822CE>

NO.	Simultaneous Transmission Configurations	Body
1.	WWAN + 2.4GHz WLAN 1+ 2.4GHz WLAN 2	Yes
2.	WWAN + 5GHz WLAN 1+ 5GHz WLAN 2	Yes
3.	WWAN + 2.4GHz WLAN 2 + Bluetooth 1	Yes
4.	WWAN + 5GHz WLAN 2 + Bluetooth 1	Yes

General Note:

- For Realtek RTL8822CE, the 2.4GHz/5 GHz WLAN and Bluetooth SAR results are referenced from SAR report, report number: FA0N0702-03 (FCC ID: TX2-RTL8822CE) and these SAR results are also used to perform simultaneous transmission analysis.
- EUT will 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,
 - 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 5.2

5.1 Body Exposure Conditions

<Realtek_RTL8822CE>

Exposure Position	0	1	2	3	4	5	0+1+2 Summed 1g SAR (W/kg)	0+3+4 Summed 1g SAR (W/kg)	0+2+5 Summed 1g SAR (W/kg)	0+4+5 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 1						
	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	Estimated 1g SAR (W/kg)						
Bottom of Laptop at 0mm		0.804	0.674	1.074	1.085	0.149	1.478	2.159	0.823	1.234	0.03	Case 1

5.2 SPLSR Evaluation and Analysis

General Note:

1. $SPLSR = (SAR_1 + SAR_2)^{1.5} / (min. \text{ separation distance, mm})$. If $SPLSR \leq 0.04$, simultaneously transmission SAR measurement is not necessary
2. the minimum distance between each transmitter antenna refer to section4

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Case 1	Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (cm)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
					X	Y	Z				
	WLAN5GHz Ant 1	Bottom of Laptop	1.074	0	95.81	20.01	-3.52	98.1	2.16	0.03	Not required
	WLAN5GHz Ant 2		1.085	0	100.83	-78	-3.54				

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 447498 D01 v06, "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies", Oct 2015
- [6] FCC KDB 616217 D04 v01r02, "SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers", Oct 2015
- [7] FCC KDB 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.
- [8] FCC KDB 865664 D02 v01r02, "RF Exposure Compliance Reporting and Documentation Considerations" Oct 2015.