



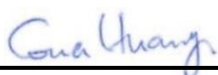
# FCC SAR REPORT

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   |
|--------------|---------|-------------------------|---------------|
| FA0N0702-01A | 01      | Initial issue of report | Dec. 16, 2020 |
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## **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<br>WCDMA Band IV: 1710 MHz ~ 1755 MHz<br>WCDMA Band V: 824 MHz ~ 849 MHz<br>LTE Band 2: 1850 MHz ~ 1910 MHz<br>LTE Band 4: 1710 MHz ~ 1755 MHz<br>LTE Band 5: 824 MHz ~ 849 MHz<br>LTE Band 7: 2500 MHz ~ 2570 MHz<br>LTE Band 12: 699 MHz ~ 716 MHz<br>LTE Band 13: 777 MHz ~ 787 MHz<br>LTE Band 17: 704 MHz ~ 716 MHz<br>LTE Band 26: 824 MHz ~ 849 MHz<br>LTE Band 30: 2305 MHz ~ 2315 MHz<br>LTE Band 38: 2570 MHz ~ 2620 MHz<br>LTE Band 41: 2500 MHz ~ 2690 MHz<br>LTE Band 66: 1710 MHz ~ 1780 MHz |
| Mode                                                                                                                                                                                                                                                           | RMC 12.2Kbps<br>HSDPA<br>HSUPA<br>DC-HSDPA<br>LTE: QPSK, 16QAM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Remark:</b><br>1. For Intel AX200NGW, the 2.4GHz/5 GHz WLAN and Bluetooth SAR results are referenced from SAR report, report number: FA0N0702-02 (FCC ID: B94-AX200NGWP) 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                              | Intel                                                                                                                                                                                                                                           |
| Model Name                              | AX200NGW                                                                                                                                                                                                                                        |
| Wireless Technology and Frequency Range | WLAN 2.4GHz Band: 2400 MHz ~ 2483.5 MHz<br>WLAN 5.2GHz Band: 5150 MHz ~ 5250 MHz<br>WLAN 5.3GHz Band: 5250 MHz ~ 5350 MHz<br>WLAN 5.6GHz Band: 5470 MHz ~ 5725 MHz<br>WLAN 5.8GHz Band: 5725 MHz ~ 5825 MHz<br>Bluetooth: 2400 MHz ~ 2483.5 MHz |
| Mode                                    | WLAN: 802.11a/b/g/n/ac/ax<br>HT20/HT40/VHT20/VHT40/VHT80/VHT160/HE20/HE40/HE80/HE160<br>Bluetooth BR/EDR/LE                                                                                                                                     |



| WWAN Antenna Information |                                                        |                    |                  |                    |                   |                   |                   |                   |                     |                     |                     |                     |
|--------------------------|--------------------------------------------------------|--------------------|------------------|--------------------|-------------------|-------------------|-------------------|-------------------|---------------------|---------------------|---------------------|---------------------|
| Vendor                   | AWAN                                                   |                    |                  |                    |                   |                   |                   |                   |                     |                     |                     |                     |
| Mode                     | NB Mode                                                |                    |                  |                    |                   |                   |                   |                   |                     |                     |                     |                     |
| Antenna                  | PIFA                                                   |                    |                  |                    |                   |                   |                   |                   |                     |                     |                     |                     |
| Part Number              | 6036B0255901<br>(AUP6Y-100025)<br>(Main)(Tx5)(Tx1/Rx1) |                    |                  |                    |                   |                   |                   |                   |                     |                     |                     |                     |
| Frequency                | B2<br>1850-1910MHz                                     | B4<br>1710-1755MHz | B5<br>824-849MHz | B7<br>2500-2570MHz | B12<br>699-716MHz | B13<br>777-787MHz | B17<br>704-716MHz | B26<br>814-849MHz | B30<br>2305-2315MHz | B38<br>2570-2620MHz | B41<br>2496-2690MHz | B66<br>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<br>(260-27365)<br>(Main)(Tx5)(Tx1/Rx1)    |                    |                  |                    |                   |                   |                   |                   |                     |                     |                     |                     |
| Frequency                | B2<br>1850-1910MHz                                     | B4<br>1710-1755MHz | B5<br>824-849MHz | B7<br>2500-2570MHz | B12<br>699-716MHz | B13<br>777-787MHz | B17<br>704-716MHz | B26<br>814-849MHz | B30<br>2305-2315MHz | B38<br>2570-2620MHz | B41<br>2496-2690MHz | B66<br>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<br>(81EABB15.G35)<br>(Main)(Tx5)(Tx1/Rx1) |                    |                  |                    |                   |                   |                   |                   |                     |                     |                     |                     |
| Frequency                | B2<br>1850-1910MHz                                     | B4<br>1710-1755MHz | B5<br>824-849MHz | B7<br>2500-2570MHz | B12<br>699-716MHz | B13<br>777-787MHz | B17<br>704-716MHz | B26<br>814-849MHz | B30<br>2305-2315MHz | B38<br>2570-2620MHz | B41<br>2496-2690MHz | B66<br>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<br>(AUP6Y-100068) |              |              |              | 6036B0281401<br>(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<br>(260-27439)    |              |              |              | 6036B0278601<br>(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<br>(81EABD15.G03) |              |              |              | 6036B0277801<br>(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**

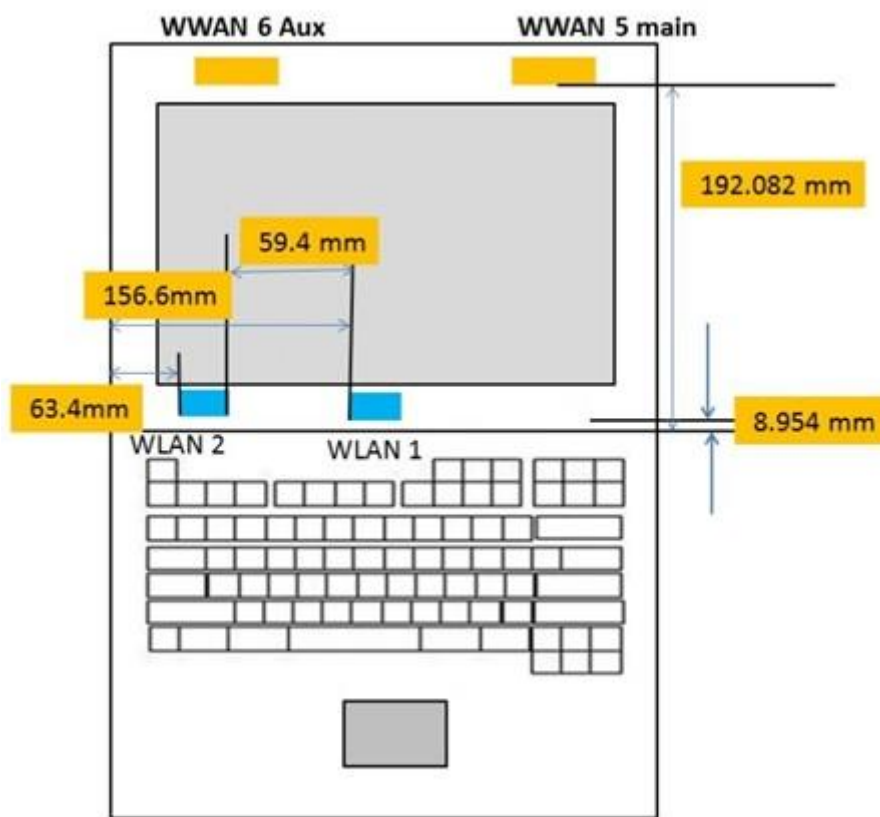
The Specific Absorption Rate (SAR) testing specification, method, and procedure for this device is in accordance with the following standards, the below KDB standard may not including in the TAF code without accreditation.

- 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

<Intel\_AX200NGW>

| NO. | Simultaneous Transmission Configurations      | Body |
|-----|-----------------------------------------------|------|
| 1.  | WWAN + 2.4GHz WLAN1 + 2.4GHz WLAN2            | Yes  |
| 2.  | WWAN + 2.4GHz WLAN 2+ Bluetooth 1             | Yes  |
| 3.  | WWAN + 5GHz WLAN 1+ 5GHz WLAN 2 + Bluetooth 1 | Yes  |

### General Note:

- For Intel AX200NGW, the 2.4GHz/5 GHz WLAN and Bluetooth SAR results are referenced from SAR report, report number: FA0N0702-02 (FCC ID: B94-AX200NGWP) 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

<Intel\_AX200NGW>

| Exposure Position       | 0                | 1                       | 2                       | 3                     | 4                     | 5                  | 0+1+2<br>Summed<br>1g SAR<br>(W/kg) | 0+2+5<br>Summed<br>1g SAR<br>(W/kg) | 0+3+4+5<br>Summed<br>1g SAR<br>(W/kg) | SPLSR | Case No |
|-------------------------|------------------|-------------------------|-------------------------|-----------------------|-----------------------|--------------------|-------------------------------------|-------------------------------------|---------------------------------------|-------|---------|
|                         | WWAN             | 2.4GHz<br>WLAN<br>Ant 1 | 2.4GHz<br>WLAN<br>Ant 2 | 5GHz<br>WLAN<br>Ant 1 | 5GHz<br>WLAN<br>Ant 2 | Bluetooth<br>Ant 1 |                                     |                                     |                                       |       |         |
|                         | 1g SAR<br>(W/kg) | 1g SAR<br>(W/kg)        | 1g SAR<br>(W/kg)        | 1g SAR<br>(W/kg)      | 1g SAR<br>(W/kg)      | 1g SAR<br>(W/kg)   |                                     |                                     |                                       |       |         |
| Bottom of Laptop at 0mm |                  | 0.755                   | 0.815                   | 1.178                 | 1.145                 | 0.056              | 1.570                               | 0.871                               | 2.379                                 | 0.04  | 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

<Intel\_AX200NGW>

| Case 1 | Band                    | Position         | SAR (W/kg) | Gap (mm) | SAR peak location (mm) |       |       | 3D distance (mm) | Summed SAR (W/kg) | SPLSR Results | Simultaneous SAR |
|--------|-------------------------|------------------|------------|----------|------------------------|-------|-------|------------------|-------------------|---------------|------------------|
|        |                         |                  |            |          | X                      | Y     | Z     |                  |                   |               |                  |
|        | WLAN 5G_Ant 1 +BT_Ant 1 | Bottom of Laptop | 1.234      | 0        | 98.64                  | 29.99 | -1.91 | 101.7            | 2.38              | 0.04          | Not required     |
|        | WLAN5G_Ant 2            |                  | 1.145      | 0        | 100.8                  | -71.6 | 2.52  |                  |                   |               |                  |

## **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.