

# RF EXPOSURE REPORT

**Product:** OBU

**Model Name:** AT41

**FCC ID:** 2AHR8-AT41BT

**Applicant:** OCTO Telematics S.p.A

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**Manufacturer:** Gosuncn Technology Group Co., Ltd.

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**Report No.:** SA180302W004

**Received Date:** Mar. 02, 2018

**Test Date:** Mar. 02, 2018 ~ Mar. 13, 2018

**Issued Date:** Mar. 27, 2018

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## RELEASE CONTROL RECORD

| ISSUE NO.    | REASON FOR CHANGE | DATE ISSUED   |
|--------------|-------------------|---------------|
| SA180302W004 | Original release  | Mar. 27, 2018 |



Test Report No.: SA180302W004

## 1 CERTIFICATION

**PRODUCT:** OBU  
**BRAND NAME:** OCTO  
**MODEL NAME:** AT41  
**APPLICANT:** OCTO Telematics S.p.A  
**TESTED:** Mar. 02, 2018 ~ Mar. 13, 2018  
**TEST SAMPLE:** Identical Prototype  
**STANDARDS:** FCC Part 2 (Section 2.1091)  
FCC OET Bulletin 65, Supplement C (01-01)  
KDB 447498 D01 General RF Exposure Guidance v06  
IEEE C95.1

The above equipment has been tested by **Bureau Veritas Shenzhen Co., Ltd. Dongguan Branch** and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**PREPARED BY :** Roger, **DATE:** Mar. 27, 2018  
(Roger Li/ Engineer)

**APPROVED BY :** Sam Tung, **DATE:** Mar. 27, 2018  
(Sam Tung / Manager)

## 2 GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

|                                    |                                                                                                                                       |                                                                                                                                                           |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>PRODUCT</b>                     | OBU                                                                                                                                   |                                                                                                                                                           |
| <b>MODEL NAME</b>                  | AT41                                                                                                                                  |                                                                                                                                                           |
| <b>NOMINAL VOLTAGE</b>             | DC 12V<br>3.7Vdc (Li-ion, battery)                                                                                                    |                                                                                                                                                           |
| <b>OPERATING TEMPERATURE RANGE</b> | -30 ~ 75°C                                                                                                                            |                                                                                                                                                           |
| <b>MODULATION TYPE</b>             | <b>GSM</b>                                                                                                                            | GMSK                                                                                                                                                      |
|                                    | <b>WCDMA</b>                                                                                                                          | BPSK/QPSK                                                                                                                                                 |
|                                    | <b>LTE</b>                                                                                                                            | QPSK/16QAM                                                                                                                                                |
| <b>OPERATING FREQUENCY</b>         | <b>GSM</b>                                                                                                                            | 824.2MHz ~ 848.8MHz (FOR GSM 850)<br>1850.2MHz ~ 1909.8MHz (FOR GSM 1900)                                                                                 |
|                                    | <b>WCDMA</b>                                                                                                                          | 1852.4MHz ~ 1907.6MHz (FOR WCDMA Band 2)<br>826.4MHz ~ 846.6MHz (FOR WCDMA Band 5)                                                                        |
|                                    | <b>LTE</b>                                                                                                                            | 1850.7MHz ~ 1909.3MHz (FOR LTE Band2)<br>1710.7MHz ~ 1754.3MHz (FOR LTE Band4)<br>824.7MHz ~ 848.3MHz (FOR LTE Band5)<br>699MHz ~ 716MHz (FOR LTE Band12) |
| <b>ANTENNA TYPE</b>                | Fixed Internal Antenna for WWAN<br>PIFA Antenna for BT                                                                                |                                                                                                                                                           |
| <b>ANTENNA GAIN</b>                | 0dBi for GSM 850/ WCDMA V/ LTE B5<br>3.1dBi for GSM 1900/ WCDMA II/ LTE B2<br>2.9dBi for LTE B4<br>-1dBi for LTE B12<br>2.5dBi for BT |                                                                                                                                                           |
| <b>HW VERSION</b>                  | AT41_MB_B                                                                                                                             |                                                                                                                                                           |
| <b>SW VERSION</b>                  | ME3631U1AV1.0B06                                                                                                                      |                                                                                                                                                           |
| <b>I/O PORTS</b>                   | Refer to user's manual                                                                                                                |                                                                                                                                                           |
| <b>CABLE SUPPLIED</b>              | N/A                                                                                                                                   |                                                                                                                                                           |

**NOTE:**

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

### 3 RF EXPOSURE

#### 3.1 LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

| FREQUENCY RANGE (MHz)                                 | ELECTRIC FIELD STRENGTH (V/m) | MAGNETIC FIELD STRENGTH (A/m) | POWER DENSITY (mW/cm <sup>2</sup> ) | AVERAGE TIME (minutes) |
|-------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|------------------------|
| LIMITS FOR GENERAL POPULATION / UNCONTROLLED EXPOSURE |                               |                               |                                     |                        |
| 300-1500                                              | ...                           | ...                           | F/1500                              | 30                     |
| 1500-100,000                                          | ...                           | ...                           | 1.0                                 | 30                     |

F = Frequency in MHz

#### 3.2 MPE CALCULATION FORMULA

$$P_d = (P_{out} * G) / (4 * \pi * r^2)$$

where

$P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = output power to antenna in mW

G = gain of antenna in linear scale

$\pi$  = 3.1416

R = distance between observation point and center of the radiator in cm

#### 3.3 CLASSIFICATION

The antenna of this product, under normal use condition, is at least 20cm away from the body of the user. So, this device is classified as **Mobile device**.

### 3.4 CONDUCTED POWER

#### Bluetooth

##### GFSK

| CHANNEL | CHANNEL<br>FREQUENCY<br>(MHz) | AVERAGE<br>POWER<br>(dBm) | PASS/FAIL |
|---------|-------------------------------|---------------------------|-----------|
| 0       | 2402                          | -0.14                     | N/A       |
| 39      | 2441                          | -0.35                     | N/A       |
| 78      | 2480                          | -0.36                     | N/A       |

##### $\pi/4$ DQPSK

| CHANNEL | CHANNEL<br>FREQUENCY<br>(MHz) | AVERAGE<br>POWER<br>(dBm) | PASS/FAIL |
|---------|-------------------------------|---------------------------|-----------|
| 0       | 2402                          | 0.08                      | N/A       |
| 39      | 2441                          | -0.11                     | N/A       |
| 78      | 2480                          | -0.28                     | N/A       |

##### 8DPSK

| CHANNEL | CHANNEL<br>FREQUENCY<br>(MHz) | AVERAGE<br>POWER<br>(dBm) | PASS/FAIL |
|---------|-------------------------------|---------------------------|-----------|
| 0       | 2402                          | 0.23                      | N/A       |
| 39      | 2441                          | 0.04                      | N/A       |
| 78      | 2480                          | -0.25                     | N/A       |

#### BT-LE (GFSK)

| CHANNEL | CHANNEL<br>FREQUENCY<br>(MHz) | AVERAGE<br>POWER<br>(dBm) | PASS/FAIL |
|---------|-------------------------------|---------------------------|-----------|
| 0       | 2402                          | -1.92                     | N/A       |
| 19      | 2440                          | -0.85                     | N/A       |
| 39      | 2480                          | -1.31                     | N/A       |

| Band            | GSM850 |       |       |
|-----------------|--------|-------|-------|
| Channel         | 128    | 189   | 251   |
| Frequency (MHz) | 824.2  | 836.4 | 848.8 |
| GPRS 8          | 33.65  | 33.54 | 32.94 |
| GPRS 10         | 33.33  | 33.22 | 32.62 |
| GPRS 11         | 33.00  | 32.89 | 32.29 |
| GPRS 12         | 32.61  | 32.50 | 31.90 |
| EDGE 8 (MCS9)   | 26.50  | 26.39 | 25.79 |
| EDGE 10 (MCS9)  | 26.28  | 26.17 | 25.57 |
| EDGE 11 (MCS9)  | 25.97  | 25.86 | 25.26 |
| EDGE 12 (MCS9)  | 25.65  | 25.54 | 24.94 |

| Band            | GSM1900 |        |        |
|-----------------|---------|--------|--------|
| Channel         | 512     | 661    | 810    |
| Frequency (MHz) | 1850.2  | 1880.0 | 1909.8 |
| GPRS 8          | 29.73   | 29.57  | 29.50  |
| GPRS 10         | 29.65   | 29.49  | 29.42  |
| GPRS 11         | 29.59   | 29.43  | 29.36  |
| GPRS 12         | 29.46   | 29.30  | 29.23  |
| EDGE 8 (MCS9)   | 25.74   | 25.58  | 25.51  |
| EDGE 10 (MCS9)  | 25.60   | 25.44  | 25.37  |
| EDGE 11 (MCS9)  | 25.48   | 25.32  | 25.25  |
| EDGE 12 (MCS9)  | 25.31   | 25.15  | 25.08  |



| Band            | WCDMA II |        |        |
|-----------------|----------|--------|--------|
| Channel         | 9262     | 9400   | 9538   |
| Frequency (MHz) | 1852.4   | 1880.0 | 1907.6 |
| RMC 12.2K       | 22.75    | 23.01  | 22.94  |
| HSPA            |          |        |        |
| HSDPA Subtest-1 | 21.86    | 22.12  | 22.05  |
| HSDPA Subtest-2 | 21.83    | 22.09  | 22.02  |
| HSDPA Subtest-3 | 21.42    | 21.68  | 21.61  |
| HSDPA Subtest-4 | 21.37    | 21.63  | 21.56  |
| HSUPA Subtest-1 | 21.80    | 22.06  | 21.99  |
| HSUPA Subtest-2 | 19.95    | 20.21  | 20.14  |
| HSUPA Subtest-3 | 20.92    | 21.18  | 21.11  |
| HSUPA Subtest-4 | 19.92    | 20.18  | 20.11  |
| HSUPA Subtest-5 | 21.92    | 22.18  | 22.11  |

| Band            | WCDMA V |       |       |
|-----------------|---------|-------|-------|
| Channel         | 4132    | 4182  | 4233  |
| Frequency (MHz) | 826.4   | 836.4 | 846.6 |
| RMC 12.2K       | 23.98   | 22.62 | 23.74 |
| HSPA            |         |       |       |
| HSDPA Subtest-1 | 23.07   | 21.71 | 22.83 |
| HSDPA Subtest-2 | 23.04   | 21.68 | 22.80 |
| HSDPA Subtest-3 | 22.65   | 21.29 | 22.41 |
| HSDPA Subtest-4 | 22.60   | 21.24 | 22.36 |
| HSUPA Subtest-1 | 23.01   | 21.65 | 22.77 |
| HSUPA Subtest-2 | 21.14   | 19.78 | 20.90 |
| HSUPA Subtest-3 | 22.08   | 20.72 | 21.84 |
| HSUPA Subtest-4 | 21.10   | 19.74 | 20.86 |
| HSUPA Subtest-5 | 23.25   | 21.89 | 23.01 |

**LTE BAND 2**

| LTE Band 2 |            |         |           |                      |                    |                      |               |
|------------|------------|---------|-----------|----------------------|--------------------|----------------------|---------------|
| BW         | Modulation | RB Size | RB Offset | Low CH 18607         | Mid CH 18900       | High CH 19193        | 3GPP MPR (dB) |
|            |            |         |           | Frequency 1850.7 MHz | Frequency 1880 MHz | Frequency 1909.3 MHz |               |
| 1.4MHz     | QPSK       | 1       | 0         | 22.17                | 22.56              | 22.60                | 0             |
|            |            | 1       | 2         | 22.07                | 22.46              | 22.50                | 0             |
|            |            | 1       | 5         | 22.04                | 22.43              | 22.47                | 0             |
|            |            | 3       | 0         | 22.16                | 22.55              | 22.59                | 0             |
|            |            | 3       | 1         | 22.06                | 22.45              | 22.49                | 0             |
|            |            | 3       | 3         | 22.03                | 22.42              | 22.46                | 0             |
|            |            | 6       | 0         | 21.01                | 21.40              | 21.44                | 1             |
|            | 16QAM      | 1       | 0         | 20.93                | 21.32              | 21.36                | 1             |
|            |            | 1       | 2         | 20.91                | 21.30              | 21.34                | 1             |
|            |            | 1       | 5         | 20.82                | 21.21              | 21.25                | 1             |
|            |            | 3       | 0         | 20.91                | 21.30              | 21.34                | 1             |
|            |            | 3       | 1         | 20.89                | 21.28              | 21.32                | 1             |
|            |            | 3       | 3         | 20.80                | 21.19              | 21.23                | 1             |
|            |            | 6       | 0         | 20.06                | 20.45              | 20.49                | 2             |
| BW         | Modulation | RB Size | RB Offset | Low CH 18615         | Mid CH 18900       | High CH 19185        | 3GPP MPR (dB) |
|            |            |         |           | Frequency 1851.5 MHz | Frequency 1880 MHz | Frequency 1908.5 MHz |               |
| 3 MHz      | QPSK       | 1       | 0         | 22.20                | 22.59              | 22.63                | 0             |
|            |            | 1       | 7         | 22.10                | 22.49              | 22.53                | 0             |
|            |            | 1       | 14        | 22.07                | 22.46              | 22.50                | 0             |
|            |            | 8       | 0         | 21.20                | 21.59              | 21.63                | 1             |
|            |            | 8       | 3         | 21.16                | 21.55              | 21.59                | 1             |
|            |            | 8       | 7         | 21.14                | 21.53              | 21.57                | 1             |
|            |            | 15      | 0         | 21.04                | 21.43              | 21.47                | 1             |
|            | 16QAM      | 1       | 0         | 20.96                | 21.35              | 21.39                | 1             |
|            |            | 1       | 7         | 20.94                | 21.33              | 21.37                | 1             |
|            |            | 1       | 14        | 20.85                | 21.24              | 21.28                | 1             |
|            |            | 8       | 0         | 20.33                | 20.72              | 20.76                | 2             |
|            |            | 8       | 3         | 20.29                | 20.68              | 20.72                | 2             |
|            |            | 8       | 7         | 20.26                | 20.65              | 20.69                | 2             |
|            |            | 15      | 0         | 20.09                | 20.48              | 20.52                | 2             |

| LTE Band 2 |            |         |           |                      |                    |                      |               |
|------------|------------|---------|-----------|----------------------|--------------------|----------------------|---------------|
| BW         | Modulation | RB Size | RB Offset | Low CH 18625         | Mid CH 18900       | High CH 19175        | 3GPP MPR (dB) |
|            |            |         |           | Frequency 1852.5 MHz | Frequency 1880 MHz | Frequency 1907.5 MHz |               |
| 5 MHz      | QPSK       | 1       | 0         | 22.23                | 22.62              | 22.66                | 0             |
|            |            | 1       | 12        | 22.13                | 22.52              | 22.56                | 0             |
|            |            | 1       | 24        | 22.10                | 22.49              | 22.53                | 0             |
|            |            | 12      | 0         | 21.23                | 21.62              | 21.66                | 1             |
|            |            | 12      | 6         | 21.19                | 21.58              | 21.62                | 1             |
|            |            | 12      | 13        | 21.17                | 21.56              | 21.60                | 1             |
|            |            | 25      | 0         | 21.07                | 21.46              | 21.50                | 1             |
|            | 16QAM      | 1       | 0         | 20.99                | 21.38              | 21.42                | 1             |
|            |            | 1       | 12        | 20.97                | 21.36              | 21.40                | 1             |
|            |            | 1       | 24        | 20.88                | 21.27              | 21.31                | 1             |
|            |            | 12      | 0         | 20.36                | 20.75              | 20.79                | 2             |
|            |            | 12      | 6         | 20.32                | 20.71              | 20.75                | 2             |
|            |            | 12      | 13        | 20.29                | 20.68              | 20.72                | 2             |
|            |            | 25      | 0         | 20.12                | 20.51              | 20.55                | 2             |
| BW         | Modulation | RB Size | RB Offset | Low CH 18650         | Mid CH 18900       | High CH 19150        | 3GPP MPR (dB) |
|            |            |         |           | Frequency 1855 MHz   | Frequency 1880 MHz | Frequency 1905 MHz   |               |
| 10 MHz     | QPSK       | 1       | 0         | 22.25                | 22.64              | 22.68                | 0             |
|            |            | 1       | 24        | 22.15                | 22.54              | 22.58                | 0             |
|            |            | 1       | 49        | 22.12                | 22.51              | 22.55                | 0             |
|            |            | 25      | 0         | 21.25                | 21.64              | 21.68                | 1             |
|            |            | 25      | 12        | 21.21                | 21.60              | 21.64                | 1             |
|            |            | 25      | 25        | 21.19                | 21.58              | 21.62                | 1             |
|            |            | 50      | 0         | 21.09                | 21.48              | 21.52                | 1             |
|            | 16QAM      | 1       | 0         | 21.01                | 21.40              | 21.44                | 1             |
|            |            | 1       | 24        | 20.99                | 21.38              | 21.42                | 1             |
|            |            | 1       | 49        | 20.90                | 21.29              | 21.33                | 1             |
|            |            | 25      | 0         | 20.38                | 20.77              | 20.81                | 2             |
|            |            | 25      | 12        | 20.34                | 20.73              | 20.77                | 2             |
|            |            | 25      | 25        | 20.31                | 20.70              | 20.74                | 2             |
|            |            | 50      | 0         | 20.14                | 20.53              | 20.57                | 2             |

| LTE Band 2 |            |         |           |                      |                    |                      |               |
|------------|------------|---------|-----------|----------------------|--------------------|----------------------|---------------|
| BW         | Modulation | RB Size | RB Offset | Low CH 18675         | Mid CH 18900       | High CH 19125        | 3GPP MPR (dB) |
|            |            |         |           | Frequency 1857.5 MHz | Frequency 1880 MHz | Frequency 1902.5 MHz |               |
| 15 MHz     | QPSK       | 1       | 0         | 22.28                | 22.67              | 22.71                | 0             |
|            |            | 1       | 37        | 22.18                | 22.57              | 22.61                | 0             |
|            |            | 1       | 74        | 22.15                | 22.54              | 22.58                | 0             |
|            |            | 36      | 0         | 21.28                | 21.67              | 21.71                | 1             |
|            |            | 36      | 19        | 21.24                | 21.63              | 21.67                | 1             |
|            |            | 36      | 39        | 21.22                | 21.61              | 21.65                | 1             |
|            |            | 75      | 0         | 21.12                | 21.51              | 21.55                | 1             |
|            | 16QAM      | 1       | 0         | 21.04                | 21.43              | 21.47                | 1             |
|            |            | 1       | 37        | 21.02                | 21.41              | 21.45                | 1             |
|            |            | 1       | 74        | 20.93                | 21.32              | 21.36                | 1             |
|            |            | 36      | 0         | 20.41                | 20.80              | 20.84                | 2             |
|            |            | 36      | 19        | 20.37                | 20.76              | 20.80                | 2             |
|            |            | 36      | 39        | 20.34                | 20.73              | 20.77                | 2             |
|            |            | 75      | 0         | 20.17                | 20.56              | 20.60                | 2             |
| BW         | Modulation | RB Size | RB Offset | Low CH 18700         | Mid CH 18900       | High CH 19100        | 3GPP MPR (dB) |
|            |            |         |           | Frequency 1860 MHz   | Frequency 1880 MHz | Frequency 1900 MHz   |               |
| 20MHz      | QPSK       | 1       | 0         | 22.33                | 22.72              | 22.76                | 0             |
|            |            | 1       | 50        | 22.23                | 22.62              | 22.66                | 0             |
|            |            | 1       | 99        | 22.20                | 22.59              | 22.63                | 0             |
|            |            | 50      | 0         | 21.33                | 21.72              | 21.76                | 1             |
|            |            | 50      | 25        | 21.29                | 21.68              | 21.72                | 1             |
|            |            | 50      | 50        | 21.27                | 21.66              | 21.70                | 1             |
|            |            | 100     | 0         | 21.17                | 21.56              | 21.60                | 1             |
|            | 16QAM      | 1       | 0         | 21.09                | 21.48              | 21.52                | 1             |
|            |            | 1       | 50        | 21.07                | 21.46              | 21.50                | 1             |
|            |            | 1       | 99        | 20.98                | 21.37              | 21.41                | 1             |
|            |            | 50      | 0         | 20.46                | 20.85              | 20.89                | 2             |
|            |            | 50      | 25        | 20.42                | 20.81              | 20.85                | 2             |
|            |            | 50      | 50        | 20.39                | 20.78              | 20.82                | 2             |
|            |            | 100     | 0         | 20.22                | 20.61              | 20.65                | 2             |

**LTE BAND 4**

| LTE Band 4 |            |         |           |                      |                      |                      |     |
|------------|------------|---------|-----------|----------------------|----------------------|----------------------|-----|
| BW         | Modulation | RB Size | RB Offset | Low CH 19957         | Mid CH 20175         | High CH 20393        | MPR |
|            |            |         |           | Frequency 1710.7 MHz | Frequency 1732.5 MHz | Frequency 1754.3 MHz |     |
| 1.4MHz     | QPSK       | 1       | 0         | 21.85                | 22.13                | 22.42                | 0   |
|            |            | 1       | 2         | 21.83                | 22.11                | 22.40                | 0   |
|            |            | 1       | 5         | 21.80                | 22.08                | 22.37                | 0   |
|            |            | 3       | 0         | 21.83                | 22.11                | 22.40                | 0   |
|            |            | 3       | 1         | 21.81                | 22.09                | 22.38                | 0   |
|            |            | 3       | 3         | 21.78                | 22.06                | 22.35                | 0   |
|            |            | 6       | 0         | 20.68                | 20.96                | 21.25                | 1   |
|            | 16QAM      | 1       | 0         | 20.61                | 20.89                | 21.18                | 1   |
|            |            | 1       | 2         | 20.60                | 20.88                | 21.17                | 1   |
|            |            | 1       | 5         | 20.41                | 20.69                | 20.98                | 1   |
|            |            | 3       | 0         | 20.60                | 20.88                | 21.17                | 1   |
|            |            | 3       | 1         | 20.59                | 20.87                | 21.16                | 1   |
|            |            | 3       | 3         | 20.40                | 20.68                | 20.97                | 1   |
|            |            | 6       | 0         | 19.76                | 20.04                | 20.33                | 2   |
| BW         | Modulation | RB Size | RB Offset | Low CH 19965         | Mid CH 20175         | High CH 20385        | MPR |
|            |            |         |           | Frequency 1711.5 MHz | Frequency 1732.5 MHz | Frequency 1753.5 MHz |     |
| 3 MHz      | QPSK       | 1       | 0         | 21.86                | 22.14                | 22.43                | 0   |
|            |            | 1       | 7         | 21.84                | 22.12                | 22.41                | 0   |
|            |            | 1       | 14        | 21.81                | 22.09                | 22.38                | 0   |
|            |            | 8       | 0         | 20.88                | 21.16                | 21.45                | 1   |
|            |            | 8       | 3         | 20.79                | 21.07                | 21.36                | 1   |
|            |            | 8       | 7         | 20.77                | 21.05                | 21.34                | 1   |
|            |            | 15      | 0         | 20.69                | 20.97                | 21.26                | 1   |
|            | 16QAM      | 1       | 0         | 20.62                | 20.90                | 21.19                | 1   |
|            |            | 1       | 7         | 20.61                | 20.89                | 21.18                | 1   |
|            |            | 1       | 14        | 20.42                | 20.70                | 20.99                | 1   |
|            |            | 8       | 0         | 19.91                | 20.19                | 20.48                | 2   |
|            |            | 8       | 3         | 19.85                | 20.13                | 20.42                | 2   |
|            |            | 8       | 7         | 19.82                | 20.10                | 20.39                | 2   |
|            |            | 15      | 0         | 19.77                | 20.05                | 20.34                | 2   |

| LTE Band 4 |            |         |           |                      |                      |                      |     |
|------------|------------|---------|-----------|----------------------|----------------------|----------------------|-----|
| BW         | Modulation | RB Size | RB Offset | Low CH 19975         | Mid CH 20175         | High CH 20375        | MPR |
|            |            |         |           | Frequency 1712.5 MHz | Frequency 1732.5 MHz | Frequency 1752.5 MHz |     |
| 5 MHz      | QPSK       | 1       | 0         | 21.89                | 22.17                | 22.46                | 0   |
|            |            | 1       | 12        | 21.87                | 22.15                | 22.44                | 0   |
|            |            | 1       | 24        | 21.84                | 22.12                | 22.41                | 0   |
|            |            | 12      | 0         | 20.91                | 21.19                | 21.48                | 1   |
|            |            | 12      | 6         | 20.82                | 21.10                | 21.39                | 1   |
|            |            | 12      | 13        | 20.80                | 21.08                | 21.37                | 1   |
|            |            | 25      | 0         | 20.72                | 21.00                | 21.29                | 1   |
|            | 16QAM      | 1       | 0         | 20.65                | 20.93                | 21.22                | 1   |
|            |            | 1       | 12        | 20.64                | 20.92                | 21.21                | 1   |
|            |            | 1       | 24        | 20.45                | 20.73                | 21.02                | 1   |
|            |            | 12      | 0         | 19.94                | 20.22                | 20.51                | 2   |
|            |            | 12      | 6         | 19.88                | 20.16                | 20.45                | 2   |
|            |            | 12      | 13        | 19.85                | 20.13                | 20.42                | 2   |
|            |            | 25      | 0         | 19.80                | 20.08                | 20.37                | 2   |
| BW         | Modulation | RB Size | RB Offset | Low CH 20000         | Mid CH 20175         | High CH 20350        | MPR |
|            |            |         |           | Frequency 1715 MHz   | Frequency 1732.5 MHz | Frequency 1750 MHz   |     |
| 10 MHz     | QPSK       | 1       | 0         | 21.93                | 22.21                | 22.50                | 0   |
|            |            | 1       | 24        | 21.91                | 22.19                | 22.48                | 0   |
|            |            | 1       | 49        | 21.88                | 22.16                | 22.45                | 0   |
|            |            | 25      | 0         | 20.95                | 21.23                | 21.52                | 1   |
|            |            | 25      | 12        | 20.86                | 21.14                | 21.43                | 1   |
|            |            | 25      | 25        | 20.84                | 21.12                | 21.41                | 1   |
|            |            | 50      | 0         | 20.76                | 21.04                | 21.33                | 1   |
|            | 16QAM      | 1       | 0         | 20.69                | 20.97                | 21.26                | 1   |
|            |            | 1       | 24        | 20.68                | 20.96                | 21.25                | 1   |
|            |            | 1       | 49        | 20.49                | 20.77                | 21.06                | 1   |
|            |            | 25      | 0         | 19.98                | 20.26                | 20.55                | 2   |
|            |            | 25      | 12        | 19.92                | 20.20                | 20.49                | 2   |
|            |            | 25      | 25        | 19.89                | 20.17                | 20.46                | 2   |
|            |            | 50      | 0         | 19.84                | 20.12                | 20.41                | 2   |

| LTE Band 4 |            |         |           |                      |                      |                      |     |
|------------|------------|---------|-----------|----------------------|----------------------|----------------------|-----|
| BW         | Modulation | RB Size | RB Offset | Low CH 20025         | Mid CH 20175         | High CH 20325        | MPR |
|            |            |         |           | Frequency 1717.5 MHz | Frequency 1732.5 MHz | Frequency 1747.5 MHz |     |
| 15 MHz     | QPSK       | 1       | 0         | 21.99                | 22.27                | 22.56                | 0   |
|            |            | 1       | 37        | 21.97                | 22.25                | 22.54                | 0   |
|            |            | 1       | 74        | 21.94                | 22.22                | 22.51                | 0   |
|            |            | 36      | 0         | 21.01                | 21.29                | 21.58                | 1   |
|            |            | 36      | 19        | 20.92                | 21.20                | 21.49                | 1   |
|            |            | 36      | 39        | 20.90                | 21.18                | 21.47                | 1   |
|            |            | 75      | 0         | 20.82                | 21.10                | 21.39                | 1   |
|            | 16QAM      | 1       | 0         | 20.75                | 21.03                | 21.32                | 1   |
|            |            | 1       | 37        | 20.74                | 21.02                | 21.31                | 1   |
|            |            | 1       | 74        | 20.55                | 20.83                | 21.12                | 1   |
|            |            | 36      | 0         | 20.04                | 20.32                | 20.61                | 2   |
|            |            | 36      | 19        | 19.98                | 20.26                | 20.55                | 2   |
|            |            | 36      | 39        | 19.95                | 20.23                | 20.52                | 2   |
|            |            | 75      | 0         | 19.90                | 20.18                | 20.47                | 2   |
| BW         | Modulation | RB Size | RB Offset | Low CH 20050         | Mid CH 20175         | High CH 20300        | MPR |
|            |            |         |           | Frequency 1720 MHz   | Frequency 1732.5 MHz | Frequency 1745 MHz   |     |
| 20MHz      | QPSK       | 1       | 0         | 22.02                | 22.30                | 22.59                | 0   |
|            |            | 1       | 50        | 22.00                | 22.28                | 22.57                | 0   |
|            |            | 1       | 99        | 21.97                | 22.25                | 22.54                | 0   |
|            |            | 50      | 0         | 21.04                | 21.32                | 21.61                | 1   |
|            |            | 50      | 25        | 20.95                | 21.23                | 21.52                | 1   |
|            |            | 50      | 50        | 20.93                | 21.21                | 21.50                | 1   |
|            |            | 100     | 0         | 20.85                | 21.13                | 21.42                | 1   |
|            | 16QAM      | 1       | 0         | 20.78                | 21.06                | 21.35                | 1   |
|            |            | 1       | 50        | 20.77                | 21.05                | 21.34                | 1   |
|            |            | 1       | 99        | 20.58                | 20.86                | 21.15                | 1   |
|            |            | 50      | 0         | 20.07                | 20.35                | 20.64                | 2   |
|            |            | 50      | 25        | 20.01                | 20.29                | 20.58                | 2   |
|            |            | 50      | 50        | 19.98                | 20.26                | 20.55                | 2   |
|            |            | 100     | 0         | 19.93                | 20.21                | 20.50                | 2   |

**LTE BAND 5**

| Band/BW | Modulation | RB Size | RB Offset | Low CH<br>20407        | Mid CH<br>20525        | High CH<br>20643       | 3GPP<br>MPR<br>(dB) |
|---------|------------|---------|-----------|------------------------|------------------------|------------------------|---------------------|
|         |            |         |           | Frequency<br>824.7 MHz | Frequency<br>836.5 MHz | Frequency<br>848.3 MHz |                     |
| 5/1.4   | QPSK       | 1       | 0         | 21.90                  | 22.73                  | 22.51                  | 0                   |
|         |            | 1       | 2         | 21.86                  | 22.69                  | 22.47                  | 0                   |
|         |            | 1       | 5         | 21.49                  | 22.32                  | 22.10                  | 0                   |
|         |            | 3       | 0         | 21.88                  | 22.71                  | 22.49                  | 0                   |
|         |            | 3       | 1         | 21.84                  | 22.67                  | 22.45                  | 0                   |
|         |            | 3       | 3         | 21.47                  | 22.30                  | 22.08                  | 0                   |
|         |            | 6       | 0         | 20.97                  | 21.80                  | 21.58                  | 1                   |
|         | 16QAM      | 1       | 0         | 20.40                  | 21.23                  | 21.01                  | 1                   |
|         |            | 1       | 2         | 20.36                  | 21.19                  | 20.97                  | 1                   |
|         |            | 1       | 5         | 19.39                  | 20.22                  | 20.00                  | 1                   |
|         |            | 3       | 0         | 20.39                  | 21.22                  | 21.00                  | 1                   |
|         |            | 3       | 1         | 20.35                  | 21.18                  | 20.96                  | 1                   |
|         |            | 3       | 3         | 19.38                  | 20.21                  | 19.99                  | 1                   |
|         |            | 6       | 0         | 20.07                  | 20.90                  | 20.68                  | 2                   |

| Band/BW | Modulation | RB Size | RB Offset | Low CH<br>20415        | Mid CH<br>20525        | High CH<br>20635       | 3GPP<br>MPR<br>(dB) |
|---------|------------|---------|-----------|------------------------|------------------------|------------------------|---------------------|
|         |            |         |           | Frequency<br>825.5 MHz | Frequency<br>836.5 MHz | Frequency<br>847.5 MHz |                     |
| 5/3     | QPSK       | 1       | 0         | 21.94                  | 22.77                  | 22.55                  | 0                   |
|         |            | 1       | 7         | 21.90                  | 22.73                  | 22.51                  | 0                   |
|         |            | 1       | 14        | 21.53                  | 22.36                  | 22.14                  | 0                   |
|         |            | 8       | 0         | 21.31                  | 22.14                  | 21.92                  | 1                   |
|         |            | 8       | 3         | 21.26                  | 22.09                  | 21.87                  | 1                   |
|         |            | 8       | 7         | 20.88                  | 21.71                  | 21.49                  | 1                   |
|         |            | 15      | 0         | 21.01                  | 21.84                  | 21.62                  | 1                   |
|         | 16QAM      | 1       | 0         | 20.44                  | 21.27                  | 21.05                  | 1                   |
|         |            | 1       | 7         | 20.40                  | 21.23                  | 21.01                  | 1                   |
|         |            | 1       | 14        | 19.43                  | 20.26                  | 20.04                  | 1                   |
|         |            | 8       | 0         | 20.38                  | 21.21                  | 20.99                  | 2                   |
|         |            | 8       | 3         | 20.37                  | 21.20                  | 20.98                  | 2                   |
|         |            | 8       | 7         | 19.76                  | 20.59                  | 20.37                  | 2                   |
|         |            | 15      | 0         | 20.11                  | 20.94                  | 20.72                  | 2                   |



| Band/BW | Modulation | RB Size | RB Offset | Low CH<br>20425        | Mid CH<br>20525        | High CH<br>20625       | 3GPP<br>MPR<br>(dB) |
|---------|------------|---------|-----------|------------------------|------------------------|------------------------|---------------------|
|         |            |         |           | Frequency<br>826.5 MHz | Frequency<br>836.5 MHz | Frequency<br>846.5 MHz |                     |
| 5/5     | QPSK       | 1       | 0         | 22.00                  | 22.83                  | 22.61                  | 0                   |
|         |            | 1       | 12        | 21.96                  | 22.79                  | 22.57                  | 0                   |
|         |            | 1       | 24        | 21.59                  | 22.42                  | 22.20                  | 0                   |
|         |            | 12      | 0         | 21.37                  | 22.20                  | 21.98                  | 1                   |
|         |            | 12      | 6         | 21.32                  | 22.15                  | 21.93                  | 1                   |
|         |            | 12      | 13        | 20.94                  | 21.77                  | 21.55                  | 1                   |
|         |            | 25      | 0         | 21.07                  | 21.90                  | 21.68                  | 1                   |
|         | 16QAM      | 1       | 0         | 20.50                  | 21.33                  | 21.11                  | 1                   |
|         |            | 1       | 12        | 20.46                  | 21.29                  | 21.07                  | 1                   |
|         |            | 1       | 24        | 19.49                  | 20.32                  | 20.10                  | 1                   |
|         |            | 12      | 0         | 20.44                  | 21.27                  | 21.05                  | 2                   |
|         |            | 12      | 6         | 20.43                  | 21.26                  | 21.04                  | 2                   |
|         |            | 12      | 13        | 19.82                  | 20.65                  | 20.43                  | 2                   |
|         |            | 25      | 0         | 20.17                  | 21.00                  | 20.78                  | 2                   |

| Band/BW | Modulation | RB Size | RB Offset | Low CH<br>20450      | Mid CH<br>20525        | High CH<br>20600     | 3GPP<br>MPR<br>(dB) |
|---------|------------|---------|-----------|----------------------|------------------------|----------------------|---------------------|
|         |            |         |           | Frequency<br>829 MHz | Frequency<br>836.5 MHz | Frequency<br>844 MHz |                     |
| 5/10    | QPSK       | 1       | 0         | 22.03                | 22.86                  | 22.64                | 0                   |
|         |            | 1       | 24        | 21.99                | 22.82                  | 22.60                | 0                   |
|         |            | 1       | 49        | 21.62                | 22.45                  | 22.23                | 0                   |
|         |            | 25      | 0         | 21.40                | 22.23                  | 22.01                | 1                   |
|         |            | 25      | 12        | 21.35                | 22.18                  | 21.96                | 1                   |
|         |            | 25      | 25        | 20.97                | 21.80                  | 21.58                | 1                   |
|         |            | 50      | 0         | 21.10                | 21.93                  | 21.71                | 1                   |
|         | 16QAM      | 1       | 0         | 20.53                | 21.36                  | 21.14                | 1                   |
|         |            | 1       | 24        | 20.49                | 21.32                  | 21.10                | 1                   |
|         |            | 1       | 49        | 19.52                | 20.35                  | 20.13                | 1                   |
|         |            | 25      | 0         | 20.47                | 21.30                  | 21.08                | 2                   |
|         |            | 25      | 12        | 20.46                | 21.29                  | 21.07                | 2                   |
|         |            | 25      | 25        | 19.85                | 20.68                  | 20.46                | 2                   |
|         |            | 50      | 0         | 20.20                | 21.03                  | 20.81                | 2                   |

**LTE BAND 12**

| LTE Band 12 |            |         |           |                     |                     |                     |     |
|-------------|------------|---------|-----------|---------------------|---------------------|---------------------|-----|
| BW          | Modulation | RB Size | RB Offset | Low CH 23017        | Mid CH 23095        | High CH 23173       | MPR |
|             |            |         |           | Frequency 699.7 MHz | Frequency 707.5 MHz | Frequency 715.3 MHz |     |
| 1.4 MHz     | QPSK       | 1       | 0         | 23.08               | 23.29               | 23.17               | 0   |
|             |            | 1       | 2         | 23.00               | 23.21               | 23.09               | 0   |
|             |            | 1       | 5         | 22.91               | 23.12               | 23.00               | 0   |
|             |            | 3       | 0         | 23.06               | 23.27               | 23.15               | 0   |
|             |            | 3       | 1         | 22.98               | 23.19               | 23.07               | 0   |
|             |            | 3       | 3         | 22.89               | 23.10               | 22.98               | 0   |
|             |            | 6       | 0         | 22.02               | 22.23               | 22.11               | 1   |
|             | 16QAM      | 1       | 0         | 21.70               | 21.91               | 21.79               | 1   |
|             |            | 1       | 2         | 21.68               | 21.89               | 21.77               | 1   |
|             |            | 1       | 5         | 21.28               | 21.49               | 21.37               | 1   |
|             |            | 3       | 0         | 21.69               | 21.90               | 21.78               | 1   |
|             |            | 3       | 1         | 21.67               | 21.88               | 21.76               | 1   |
|             |            | 3       | 3         | 21.27               | 21.48               | 21.36               | 1   |
|             |            | 6       | 0         | 21.03               | 21.24               | 21.12               | 2   |
| LTE Band 12 |            |         |           |                     |                     |                     |     |
| BW          | Modulation | RB Size | RB Offset | Low CH 23025        | Mid CH 23095        | High CH 23165       | MPR |
|             |            |         |           | Frequency 700.5 MHz | Frequency 707.5 MHz | Frequency 714.5 MHz |     |
| 3 MHz       | QPSK       | 1       | 0         | 23.12               | 23.33               | 23.21               | 0   |
|             |            | 1       | 7         | 23.04               | 23.25               | 23.13               | 0   |
|             |            | 1       | 14        | 22.95               | 23.16               | 23.04               | 0   |
|             |            | 8       | 0         | 22.16               | 22.37               | 22.25               | 1   |
|             |            | 8       | 3         | 22.13               | 22.34               | 22.22               | 1   |
|             |            | 8       | 7         | 22.10               | 22.31               | 22.19               | 1   |
|             |            | 15      | 0         | 22.06               | 22.27               | 22.15               | 1   |
|             | 16QAM      | 1       | 0         | 21.74               | 21.95               | 21.83               | 1   |
|             |            | 1       | 7         | 21.72               | 21.93               | 21.81               | 1   |
|             |            | 1       | 14        | 21.32               | 21.53               | 21.41               | 1   |
|             |            | 8       | 0         | 21.20               | 21.41               | 21.29               | 2   |
|             |            | 8       | 3         | 21.17               | 21.38               | 21.26               | 2   |
|             |            | 8       | 7         | 21.12               | 21.33               | 21.21               | 2   |
|             |            | 15      | 0         | 21.07               | 21.28               | 21.16               | 2   |

| LTE Band 12 |            |         |           |                     |                     |                     |     |
|-------------|------------|---------|-----------|---------------------|---------------------|---------------------|-----|
| BW          | Modulation | RB Size | RB Offset | Low CH 23035        | Mid CH 23095        | High CH 23155       | MPR |
|             |            |         |           | Frequency 701.5 MHz | Frequency 707.5 MHz | Frequency 713.5 MHz |     |
| 5 MHz       | QPSK       | 1       | 0         | 23.18               | 23.39               | 23.27               | 0   |
|             |            | 1       | 12        | 23.10               | 23.31               | 23.19               | 0   |
|             |            | 1       | 24        | 23.01               | 23.22               | 23.10               | 0   |
|             |            | 12      | 0         | 22.22               | 22.43               | 22.31               | 1   |
|             |            | 12      | 6         | 22.19               | 22.40               | 22.28               | 1   |
|             |            | 12      | 13        | 22.16               | 22.37               | 22.25               | 1   |
|             |            | 25      | 0         | 22.12               | 22.33               | 22.21               | 1   |
|             | 16QAM      | 1       | 0         | 21.80               | 22.01               | 21.89               | 1   |
|             |            | 1       | 12        | 21.78               | 21.99               | 21.87               | 1   |
|             |            | 1       | 24        | 21.38               | 21.59               | 21.47               | 1   |
|             |            | 12      | 0         | 21.26               | 21.47               | 21.35               | 2   |
|             |            | 12      | 6         | 21.23               | 21.44               | 21.32               | 2   |
|             |            | 12      | 13        | 21.18               | 21.39               | 21.27               | 2   |
|             |            | 25      | 0         | 21.13               | 21.34               | 21.22               | 2   |
| LTE Band 12 |            |         |           |                     |                     |                     |     |
| BW          | Modulation | RB Size | RB Offset | Low CH 23060        | Mid CH 23095        | High CH 23130       | MPR |
|             |            |         |           | Frequency 704 MHz   | Frequency 707.5 MHz | Frequency 711 MHz   |     |
| 10 MHz      | QPSK       | 1       | 0         | 23.21               | 23.42               | 23.30               | 0   |
|             |            | 1       | 24        | 23.13               | 23.34               | 23.22               | 0   |
|             |            | 1       | 49        | 23.04               | 23.25               | 23.13               | 0   |
|             |            | 25      | 0         | 22.25               | 22.46               | 22.34               | 1   |
|             |            | 25      | 12        | 22.22               | 22.43               | 22.31               | 1   |
|             |            | 25      | 25        | 22.19               | 22.40               | 22.28               | 1   |
|             |            | 50      | 0         | 22.15               | 22.36               | 22.24               | 1   |
|             | 16QAM      | 1       | 0         | 21.83               | 22.04               | 21.92               | 1   |
|             |            | 1       | 24        | 21.81               | 22.02               | 21.90               | 1   |
|             |            | 1       | 49        | 21.41               | 21.62               | 21.50               | 1   |
|             |            | 25      | 0         | 21.29               | 21.50               | 21.38               | 2   |
|             |            | 25      | 12        | 21.26               | 21.47               | 21.35               | 2   |
|             |            | 25      | 25        | 21.21               | 21.42               | 21.30               | 2   |
|             |            | 50      | 0         | 21.16               | 21.37               | 21.25               | 2   |

### 3.5 CALCULATION RESULT OF MAXIMUM CONDUCTED POWER

#### TUNE-UP POWER TABLE

| Band       | Frequency (MHz) | Operating Mode | Tune-Up Power And Tolerance (dBm) |
|------------|-----------------|----------------|-----------------------------------|
| Bluetooth  | 2402            | BT_8DPSK       | 0 ± 0.5                           |
| GSM850     | 824.2           | GPRS12         | 33.5 ± 0.5                        |
| PCS1900    | 1850.2          | GPRS12         | 29.5 ± 0.5                        |
| WCDMA II   | 1880            | RMC12.2K       | 23.0 ± 0.5                        |
| WCDMA V    | 826.4           | RMC12.2K       | 24.0 ± 0.5                        |
| LTE Band2  | 1900            | QPSK           | 22.5 ± 0.5                        |
| LTE Band4  | 1745            | QPSK           | 22.5 ± 0.5                        |
| LTE Band5  | 836.5           | QPSK           | 23.0 ± 0.5                        |
| LTE Band12 | 707.5           | QPSK           | 23.5 ± 0.5                        |

#### BT

| Band      | Frequency (MHz) | Operating Mode | Antenna Gain (dBi) | Tune-up Power (dBm) | E.I.R.P Power (mW) | Power Density (mW/cm <sup>2</sup> ) | limit (mW/cm <sup>2</sup> ) | PASS / FAIL |
|-----------|-----------------|----------------|--------------------|---------------------|--------------------|-------------------------------------|-----------------------------|-------------|
| Bluetooth | 2402            | BT_8DPSK       | 2                  | 0.5                 | 1.778              | 0.000                               | 1.00                        | PASS        |

#### GSM

| Band    | Frequency (MHz) | Operating Mode | Antenna Gain (dBi) | Tune-up Power (dBm) | E.I.R.P Power (mW)/8 | Power Density (mW/cm <sup>2</sup> ) | limit (mW/cm <sup>2</sup> ) | PASS / FAIL |
|---------|-----------------|----------------|--------------------|---------------------|----------------------|-------------------------------------|-----------------------------|-------------|
| GSM850  | 824.2           | GPRS12         | 0                  | 34.0                | 313.986              | 0.062                               | 0.55                        | PASS        |
| PCS1900 | 1850.2          | GPRS12         | 3.1                | 30.0                | 255.217              | 0.051                               | 1.00                        | PASS        |

### WCDMA

| Band     | Frequency (MHz) | Operating Mode | Antenna Gain (dBi) | Tune-up Power (dBm) | E.I.R.P Power (mW) | Power Density (mW/cm <sup>2</sup> ) | limit (mW/cm <sup>2</sup> ) | PASS / FAIL |
|----------|-----------------|----------------|--------------------|---------------------|--------------------|-------------------------------------|-----------------------------|-------------|
| WCDMA II | 1880            | RMC12.2K       | 3.1                | 23.5                | 457.088            | 0.091                               | 1.00                        | PASS        |
| WCDMA V  | 826.4           | RMC12.2K       | 0                  | 24.5                | 281.838            | 0.056                               | 0.55                        | PASS        |

### LTE

| Band   | Frequency (MHz) | Operating Mode | Antenna Gain (dBi) | Tune-up Power (dBm) | E.I.R.P Power (mW) | Power Density (mW/cm <sup>2</sup> ) | limit (mW/cm <sup>2</sup> ) | PASS / FAIL |
|--------|-----------------|----------------|--------------------|---------------------|--------------------|-------------------------------------|-----------------------------|-------------|
| Band2  | 1900            | QPSK           | 3.1                | 23.0                | 407.380            | 0.081                               | 1.00                        | PASS        |
| Band4  | 1745            | QPSK           | 2.9                | 23.0                | 389.045            | 0.077                               | 1.00                        | PASS        |
| Band5  | 836.5           | QPSK           | 0                  | 23.5                | 223.872            | 0.045                               | 0.56                        | PASS        |
| Band12 | 707.5           | QPSK           | -1                 | 24.0                | 199.526            | 0.040                               | 0.47                        | PASS        |

## 3.6 CONCLUSION OF SIMULTANEOUS TRANSMITTER

Both of the WLAN and plug-in device can transmit simultaneously, the formula of calculated the MPE is:

$$CPD1/LPD1+CPD2/LPD2+.....etc. < 1$$

CPD = Calculation power density

LPD = Limit of power density

Therefore the worst-case situation is

$0.000/1.00+0.062/0.55+0.051/1.00+0.091/1.00+0.056/0.55+0.081/1.00+0.077/1.00+0.045/0.56+0.040/0.47=0.68$ , which is less than "1", This confirmed that the device comply with FCC 1.1310 MPE limit.

--END--