



August 10, 2017

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Attention: Director of Certification

**RE: Analysis of RF Exposure for Portable and Mobile use per KDB 447498 D01 Mobile Portable RF Exposure v06 and RSS-102 Issue 5 March 2015.**

FCC ID: 2AJZL-NW1000  
IC: 22101-NW1000

## 1. Limits

Limits for General Population/Uncontrolled Exposure (Title 47 Subpart J §2.1091 and KDB 447498 D01 referring to limits under §1.1310)

| Frequency Range<br>(MHz) | Electric Field<br>Strength (E)<br>(V/m) | Electric Field<br>Strength (H)<br>(A/m) | Power Density<br>(S)<br>(mW/cm <sup>2</sup> ) | Averaging Time<br>(minutes) |
|--------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------------|-----------------------------|
| 0.3 - 1.34               | 614                                     | 1.63                                    | *(100)                                        | 30                          |
| 1.34 - 30                | 824/f                                   | 2.19/f                                  | *(180/f <sup>2</sup> )                        | 30                          |
| 30 - 300                 | 27.5                                    | 0.073                                   | 0.2                                           | 30                          |
| 300 - 1500               | -                                       | -                                       | f/1500                                        | 30                          |
| 1500 - 100,000           | -                                       | -                                       | 1.0                                           | 30                          |

*f = frequency in MHz*

*\*Plane-wave equivalent power density*



# Limits for Devices Used by the General Public (Uncontrolled Environment (RSS-102 Issue 5 March 2015))

| Frequency Range (MHz)    | Electric Field Strength (V/m rms) | Magnetic Field (A/m rms)                 | Power Density (W/m <sup>2</sup> ) | Reference Period (minutes) |
|--------------------------|-----------------------------------|------------------------------------------|-----------------------------------|----------------------------|
| 0.003 - 10 <sup>21</sup> | 83                                | 90                                       | -                                 | Instantaneous              |
| 0.1 - 10                 | -                                 | 0.73/f                                   | -                                 | 6**                        |
| 1.1 - 10                 | 87/f <sup>0.5</sup>               | -                                        | -                                 | 6**                        |
| 10 - 20                  | 27.46                             | 0.0728                                   | 2                                 | 6                          |
| 20 - 48                  | -58.07/f <sup>0.25</sup>          | 0.1540/f <sup>0.25</sup>                 | 8.944/f <sup>0.5</sup>            | 6                          |
| 48 - 300                 | 22.06                             | 0.05852                                  | 1.291                             | 6                          |
| 300 - 6000               | 3.142 f <sup>0.3417</sup>         | 0.008335 f <sup>0.3417</sup>             | 0.02619 f <sup>0.6834</sup>       | 6                          |
| 6000 - 15000             | 61.4                              | 0.163                                    | 10                                | 6                          |
| 15000 - 150000           | 61.4                              | 0.163                                    | 10                                | 616000/f <sup>1.2</sup>    |
| 150000 - 300000          | 0.158f <sup>0.5</sup>             | 4.21 x 10 <sup>-4</sup> f <sup>0.5</sup> | 6.67 x 10 <sup>-5</sup> f         | 616000/f <sup>1.2</sup>    |

*f* is frequency in MHz

\*Based on nerve stimulation (NS)

\*\* Based on specific absorption rate (SAR)

## 2. Mobile MPE Calculation Summary using a 20cm separation distance:

| Mode         | Output Power (dBm)* | Power Density (mW/cm <sup>2</sup> ) | Power Density (W/m <sup>2</sup> ) | FCC Limit (mW/cm <sup>2</sup> ) | ISED Limit (W/m <sup>2</sup> ) |
|--------------|---------------------|-------------------------------------|-----------------------------------|---------------------------------|--------------------------------|
| WCDMA Band 2 | 22.54               | 0.0584427                           | 0.584427                          | 1                               | 4.48                           |
| WCDMA Band 5 | 22.37               | 0.0561992                           | 0.561992                          | 0.551                           | 2.581                          |
| 2.4GHz WiFi  | 12.06               | 0.0080118                           | 0.080118                          | 1                               | 5.351                          |
| UWB          | -33.44              | 0.0000001                           | 0.000001                          | 1                               | 10                             |



### 3. Co-Located Transmitters transmission table:

| Transmitter type | Transmitter type that can transmit at the same time |
|------------------|-----------------------------------------------------|
| WCDMA            | 2.4G WiFi and UWB                                   |
| 2.4GHz WiFi      | WCDMA and UWB                                       |
| UWB              | WCDMA and 2.4GHz WiFi                               |

### 4. Simultaneous Transmission MPE:

| Downlink and Uplink                |                           |                                 |                              |                           |                            |
|------------------------------------|---------------------------|---------------------------------|------------------------------|---------------------------|----------------------------|
| Transmitter type                   | MPE (mw/cm <sup>2</sup> ) | FCC Limit (mW/cm <sup>2</sup> ) | IC Limit (W/m <sup>2</sup> ) | FCC MPE ratio (MPE/Limit) | ISED MPE ratio (MPE/Limit) |
| WCDMA Band 2                       | 0.0584427                 | 1                               | 4.48                         | 0.0584427                 | 0.130452455                |
| 2.4GHz WiFi                        | 0.0080118                 | 1                               | 5.351                        | 0.0080118                 | 0.014972528                |
| UWB                                | 0.0000001                 | 1                               | 10                           | 0.0000001                 | 0.0000001                  |
| Sum of the ratios (should be <1.0) |                           |                                 |                              | 0.066                     | 0.144                      |



## 5. Mobile MPE Calculation using a 20cm separation distance

Using Power Density formula:

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density

P = power input to the antenna

G = power gain of the antenna in the direction of interest relative to isotropic

R = distance to the center of radiation of the antenna

### WCDMA Band 2:

|                                                                   |           |                       |
|-------------------------------------------------------------------|-----------|-----------------------|
| Maximum peak output power at antenna input terminal:              | 22.54     | (dBm)                 |
| Maximum peak output power at antenna input terminal:              | 179.47    | (mW)                  |
| Antenna gain(typical):                                            | 2.14      | (dBi)                 |
| Maximum antenna gain:                                             | 1.637     | (numeric)             |
| Prediction distance:                                              | 20        | (cm)                  |
| Source Based Time Average Duty Cycle:                             | 100       | (%)                   |
| Prediction frequency:                                             | 1932.4    | (MHz)                 |
| FCC MPE limit for uncontrolled exposure at prediction frequency:  | 1.0       | (mW/cm <sup>2</sup> ) |
| ISED MPE limit for uncontrolled exposure at prediction frequency: | 4.48      | (W/m <sup>2</sup> )   |
| Power density at prediction frequency:                            | 0.0584427 | (mW/cm <sup>2</sup> ) |
| Power density at prediction frequency:                            | 0.584427  | (W/m <sup>2</sup> )   |
| FCC Margin of Compliance:                                         | -12.33    | (dB)                  |
| IC Margin of Compliance:                                          | -8.85     | (dB)                  |

### WCDMA Band 5:

|                                                                   |           |                       |
|-------------------------------------------------------------------|-----------|-----------------------|
| Maximum peak output power at antenna input terminal:              | 22.37     | (dBm)                 |
| Maximum peak output power at antenna input terminal:              | 172.58    | (mW)                  |
| Antenna gain(typical):                                            | 2.14      | (dBi)                 |
| Maximum antenna gain:                                             | 1.637     | (numeric)             |
| Prediction distance:                                              | 20        | (cm)                  |
| Source Based Time Average Duty Cycle:                             | 100       | (%)                   |
| Prediction frequency:                                             | 826.4     | (MHz)                 |
| FCC MPE limit for uncontrolled exposure at prediction frequency:  | 0.551     | (mW/cm <sup>2</sup> ) |
| ISED MPE limit for uncontrolled exposure at prediction frequency: | 2.581     | (W/m <sup>2</sup> )   |
| Power density at prediction frequency:                            | 0.0561992 | (mW/cm <sup>2</sup> ) |
| Power density at prediction frequency:                            | 0.561992  | (W/m <sup>2</sup> )   |
| FCC Margin of Compliance:                                         | -9.91     | (dB)                  |
| IC Margin of Compliance:                                          | -6.62     | (dB)                  |



### 2.4GHz WiFi:

|                                                                   |           |                       |
|-------------------------------------------------------------------|-----------|-----------------------|
| Maximum peak output power at antenna input terminal:              | 12.06     | (dBm)                 |
| Maximum peak output power at antenna input terminal:              | 16.07     | (mW)                  |
| Antenna gain(typical):                                            | 3.99      | (dBi)                 |
| Maximum antenna gain:                                             | 2.506     | (numeric)             |
| Prediction distance:                                              | 20        | (cm)                  |
| Source Based Time Average Duty Cycle:                             | 100       | (%)                   |
| Prediction frequency:                                             | 2402      | (MHz)                 |
| FCC MPE limit for uncontrolled exposure at prediction frequency:  | 1         | (mW/cm <sup>2</sup> ) |
| ISED MPE limit for uncontrolled exposure at prediction frequency: | 5.351     | (W/m <sup>2</sup> )   |
| Power density at prediction frequency:                            | 0.0080118 | (mW/cm <sup>2</sup> ) |
| Power density at prediction frequency:                            | 0.080118  | (W/m <sup>2</sup> )   |
| FCC Margin of Compliance:                                         | -20.96    | (dB)                  |
| IC Margin of Compliance:                                          | -18.25    | (dB)                  |

### 6.1GHz UWB:

|                                                                   |           |                       |
|-------------------------------------------------------------------|-----------|-----------------------|
| Maximum peak output power at antenna input terminal:              | -33.44    | (dBm)                 |
| Maximum peak output power at antenna input terminal:              | 0         | (mW)                  |
| Antenna gain(typical):                                            | 0         | (dBi)                 |
| Maximum antenna gain:                                             | 1         | (numeric)             |
| Prediction distance:                                              | 20        | (cm)                  |
| Source Based Time Average Duty Cycle:                             | 100       | (%)                   |
| Prediction frequency:                                             | 6058.8    | (MHz)                 |
| FCC MPE limit for uncontrolled exposure at prediction frequency:  | 1         | (mW/cm <sup>2</sup> ) |
| ISED MPE limit for uncontrolled exposure at prediction frequency: | 10        | (W/m <sup>2</sup> )   |
| Power density at prediction frequency:                            | 0.0000001 | (mW/cm <sup>2</sup> ) |
| Power density at prediction frequency:                            | 0.000001  | (W/m <sup>2</sup> )   |
| FCC Margin of Compliance:                                         | -70.45    | (dB)                  |
| IC Margin of Compliance:                                          | -70.45    | (dB)                  |

Sincerely,

  
Xiaoying Zhang



America

Name

Authorized Signatory

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