

# SGS-CSTC Standards Technical Services Co., Ltd.

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### **RF Exposure Compliance Requirement**

#### 1. Standard requirement

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2m normally can be maintained between the user and the device.

### (a) Limits for Occupational / Controlled Exposure

| Frequency Range<br>(MHz) | Electric Field<br>Strength (E)<br>(V/m) | Magnetic Field<br>Strength (H)<br>(A/m) | Power Density<br>(S)(mW/cm²) | Averaging Times<br> E  <sup>2</sup> , H  <sup>2</sup> or S<br>(minutes) |
|--------------------------|---|---|------------------------------|---|
| 0.3-3.0                  | 614                                     | 1.63                                    | (100)*                       | 6   |
| 3.0-30                   | 1842/f                                  | 4.89/f                                  | (900/f)*                     | 6   |
| 30-300                   | 61.4                                    | 0.163                                   | 1.0                          | 6   |
| 300-1500                 |   |   | F/300                        | 6   |
| 1500-100000              |   |   | 5                            | 6   |

#### (b) Limits for General Population / Uncontrolled Exposure

| Frequency Range<br>(MHz) | Electric Field<br>Strength (E)<br>(V/m) | Magnetic Field<br>Strength (H)<br>(A/m) | Power Density<br>(S)(mW/cm²) | Averaging Times<br> E  <sup>2</sup> , H  <sup>2</sup> or S<br>(minutes) |
|--------------------------|---|---|------------------------------|---|
| 0.3-1.34                 | 614                                     | 1.63                                    | (100)*                       | 30  |
| 1.34-30                  | 824/f                                   | 2.19/f                                  | (180/f)*                     | 30  |
| 30-300                   | 27.5                                    | 0.073                                   | 0.2                          | 30  |
| 300-1500                 |   |   | F/1500                       | 30  |
| 1500-100000              |   |   | 1.0                          | 30  |

Note: f=frequency in MHz; \*Plane-wave equivalent power density

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#### 2. MPE Calculation Method

 $E (V/m) = (30^{*}P^{*}G)^{0.5}/d$  Power Density:  $Pd(W/m^{2}) = E^{2}/377$ 

E=Electric Field (V/m)

P=Peak RF output Power (W)

G=EUT Antenna numeric gain (numeric)

d= Separation distance between radiator and human body (m)

The formula can be changed to

 $Pd = (30^{*}P^{*}G)/(377^{*}d^{2})$ 

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained.

#### 3. Calculated Result and Limit

(1)Classic Bluetooth:

| Frequency<br>(MHz) | Antenna<br>Gain<br>(Numeric) | Peak Output<br>Power<br>(dBm) | Peak Output<br>Power (mW) | Power Density<br>(S) (mW/cm²) | Limit of<br>Power<br>Density (S)<br>(mW/cm <sup>2</sup> ) | Test<br>Result |
|--------------------|------------------------------|-------------------------------|---------------------------|-------------------------------|---|----------------|
| 2402               | 1.000                        | 1.883                         | 1.543                     | 0.00031                       | 1   | Complies       |
| 2441               | 1.000                        | 2.093                         | 1.619                     | 0.00032                       | 1   | Complies       |
| 2480               | 1.000                        | 1.62                          | 1.452                     | 0.00029                       | 1   | Complies       |

#### (2)Bluetooth Low Energy:

| Frequency<br>(MHz) | Antenna<br>Gain<br>(Numeric) | Peak Output<br>Power<br>(dBm) | Peak Output<br>Power (mW) | Power Density<br>(S) (mW/cm <sup>2</sup> ) | Limit of<br>Power<br>Density (S)<br>(mW/cm <sup>2</sup> ) | Test<br>Result |
|--------------------|------------------------------|-------------------------------|---------------------------|--|---|----------------|
| 2402               | 1.000                        | 1.429                         | 1.390                     | 0.00028                                    | 1   | Complies       |
| 2442               | 1.000                        | 2.285                         | 1.692                     | 0.00034                                    | 1   | Complies       |
| 2480               | 1.000                        | 1.874                         | 1.540                     | 0.00031                                    | 1   | Complies       |

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| (3) 5. | .8G self-defin | ed |
|--------|----------------|----|
|--------|----------------|----|

| Frequency<br>(MHz) | Antenna<br>Gain<br>(Numeric) | Peak Output<br>Power<br>(dBm) | Peak Output<br>Power (mW) | Power Density<br>(S) (mW/cm²) | Limit of<br>Power<br>Density (S)<br>(mW/cm <sup>2</sup> ) | Test<br>Result |
|--------------------|------------------------------|-------------------------------|---------------------------|-------------------------------|---|----------------|
| 5727               | 1.000                        | -0.01                         | 0.998                     | 0.00020                       | 1   | Complies       |
| 5760               | 1.000                        | -0.09                         | 0.979                     | 0.00019                       | 1   | Complies       |
| 5800               | 1.000                        | -0.51                         | 0.889                     | 0.00018                       | 1   | Complies       |

The wireless module can't simultaneous transmitting at 2.4G and 5.8G band.

But the worst case is assumed the three modules simultaneous transmitting maximum MPE is 0.00032/1+0.00034/1+0.00020/1=0.0086<1. So the device is exclusion from SAR test.

### --End of Report-

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