# FCC ID: 2BBGY-GEN2

## RF EXPOSURE EVALUATION

**According to FCC 1.1310 ,FCC 1.1307 and KDB 447498 D04 Interim General RF Exposure Guidance v01**

1. With respect to the limits on human exposure to RF provided in § 1.1310 of this chapter, applicants to the Commission for the grant or modification of construction permits, licenses or renewals thereof, temporary authorities, equipment authorizations, or any other authorizations for radiofrequency sources must either:

   (A) Determine that they qualify for an exemption pursuant to § 1.1307(b)(3);

   (B) Prepare an evaluation of the human exposure to RF radiation pursuant to § 1.1310 and include in the application a statement confirming compliance with the limits in § 1.1310; or

   (C) Prepare an Environmental Assessment if those RF sources would cause human exposure to levels of RF radiation in excess of the limits in § 1.1310.

2. RF Exposure Information: The radiated output power of this device meets the limits of FCC/IC radio frequency exposure limits.This device should be operated with a minimum separation distance of 20cm (8 inches) between the equipment and a person's body.

§ 1.1307(b)(3)(i)(A) for RF evaluation limit:

The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A);

§ 1.1307(b)(3)(i)(b) for RF evaluation limit:

Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold $P_{th}$ (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). $P_{th}$ is given by:

$$P_{\text{th}}\ (\text{mW}) = \begin{cases} ERP_{20\ \text{cm}}(d/20\ \text{cm})^{x} & d \le 20\ \text{cm} \\ ERP_{20\ \text{cm}} & 20\ \text{cm} < d \le 40\ \text{cm} \end{cases}$$

where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\ \text{cm}}\sqrt{f}}\right)$$

$$P_{\text{th}}\ (\text{mW}) = ERP_{20\ \text{cm}}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases}$$

§ 1.1307(b)(3)(i)(C) for RF evaluation limit:

| RF Source frequency (MHz) | Threshold ERP (watts) |
|---|---|
| 0.3-1.34 | 1,920 R2. |
| 1.34-30 | 3,450 R2/f2. |
| 30-300 | 3.83 R2 |
| 300-1500 | 0.0128 R2f. |
| 1500-100000 | 19.2R*R(0.768W) |

## 3. Measurement of RF conducted Power

the available maximum time-averaged power or effective radiated power (ERP), whichever is greater:

Antenna gain: -0.48 dBi

| Mode | Tune-up AV power (dBm) | Max tune-up AV power(dBm) | Max tune-up AV Power (mw) | Max tune-up ERP Power (mw) |
|---|---|---|---|---|
| BLE | -1.98 dBm | 0 dBm | 0.63mW | 0.61 mW |
| Note: ERP = EIRP – 2.15 dB, | | | | |

Generally, the sequence to apply for single RF sources includes the following steps:

| | |
|---|---|
| Q1: | determination of 1 mW blanket exemption under § 1.1307(b)(3)(i)(A) |
| A1: | YES, It is greater than 1mw. |
| Q2: | determination of exemption under the MPE-based § 1.1307(b)(3)(i)(C) if 1) is not met |
| A2: | NO, It is less than 19.2R*R mW,so have been exemption. |
| Q3: | determination of exemption under the SAR-based § 1.1307(b)(3)(i)(B) if both 1) and 2) are not met |
| A3: | NO; The exemption has been satisfied. |
| Q4: | streamlined test reduction procedures for evaluation by the FCC Laboratory which may reference current research based on bandwidth, etc. if 1), 2), and 3) are not met |
| A4: | NO; The exemption has been satisfied. |
| Q5: | evaluation by SAR measurement or computation if 1), 2), 3), and 4) are not met |
| A5: | NO; The exemption has been satisfied. |
| Q6: | Environmental Assessment (EA) if none of the previous are met (i.e., exposure limits would be exceeded) |
| A6: | NO; The exemption has been satisfied. |

4. According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) Radiation as specified in §1.1307(b)

   Limits for Maximum Permissible Exposure (MPE)

| Frequency Range(MHz) | Electric Field Strength(V/m) | Magnetic Field Strength(A/m) | Power Density($mW/cm^2$) | Average Time |
|---|---|---|---|---|
| **(A) Limits for Occupational/Control Exposures** | | | | |
| **300-1500** | **--** | **--** | **F/300** | **6** |
| **1500-100000** | **--** | **--** | **5** | **6** |
| **(B) Limits for General Population/Uncontrol Exposures** | | | | |
| **300-1500** | **--** | **--** | **F/1500** | **6** |
| **1500-100000** | **--** | **--** | **1** | **30** |

**1.1 Friis transmission formula: Pd= (Pout*G)\ ($4*pi*R^2$)**

Where

Pd= Power density in $mW/cm^2$

Pout=output power to antenna in mW

G= Numeric gain of the antenna relative to isotropic antenna

Pi=3.1416

R= distance between observation point and center of the radiator in 20cm

Pd the limit of MPE, $1mW/cm^2$. If we know the maximum gain of the nd total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

RF Exposure Information: The radiated output power of this device meets the limits of FCC/IC radio frequency exposure limits.This device should be operated with a minimum separation distance of 20cm (8 inches) between the equipment and a person's body.

**1.2 Measurement Result**

Not Applicable

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