

5. RF EXPOSURE EVALUATION

5.1 Applicable Standard

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

| (B) Limits for General Population/Uncontrolled Exposure | | | | |
|---|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| Frequency Range (MHz) | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) | Power Density (mW/cm ²) | Averaging Time (minutes) |
| 0.3–1.34 | 614 | 1.63 | *(100) | 30 |
| 1.34–30 | 824/f | 2.19/f | *(180/f ²) | 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;

According to §1.1310 and §2.1091 RF exposure is calculated.

5.2 Calculation formula

Prediction of power density at the distance of the applicable MPE limit

$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm²);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

5.3 Calculated Data:

| Operation Mode | Frequency (MHz) | Antenna Gain (dBi) | Conducted output power including Tune-up Tolerance (dBm) | EIRP (dBm) | Evaluation Distance (cm) | Power Density (mW/cm ²) | MPE Limit (mW/cm ²) |
|----------------|-----------------|--------------------|--|------------|--------------------------|-------------------------------------|---------------------------------|
| WLAN | 2412-2462 | 1.7 | 24 | 25.70 | 20.00 | 0.0740 | 1.0 |
| BLE | 2402-2480 | -2 | 4 | 2.0 | 20.00 | 0.0003 | 1.0 |
| NFC | 13.56 | / | / | -36 | 20.00 | <0.0001 | 4.88 |

Note: the Conducted output power including Tune-up Tolerance was declared by manufacturer.
The manufacturer declared NFC EIRP power is -36dBm(=59.2dBμV/m@3m)

The NFC, WLAN and BLE can transmit simultaneously:

$$\sum_i \frac{S_i}{S_{Limit,i}}$$

$$=S_{WLAN}/S_{limit-WLAN} + S_{BLE}/S_{limit-BLE} + S_{NFC}/S_{limit-NFC}$$

$$=0.074$$

$$< 1.0$$

Result: The device meet FCC MPE at 20 cm distance

===== END OF REPORT =====