

5. RF EXPOSURE EVALUATION

5.1 Applicable Standard

According to subpart 15.247(i) and subpart §1.1310, 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 of the Commission's guidelines.

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.

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:

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

5.2 Measurement Result

| Mode | Frequency (MHz) | Antenna Gain | | Conducted output power including Tune-up Tolerance | | Evaluation Distance | Power Density | MPE Limit |
|----------|-----------------|--------------|-----------|--|--------|---------------------|---------------|-----------|
| | | (dBi) | (numeric) | (dBm) | (mW) | | | |
| WLAN | 2412-2462 | 6.04 | 4.02 | 21 | 125.89 | 20 | 0.101 | 1 |
| CSS-DSS | 902.3-927.6 | 5 | 3.16 | 11 | 12.59 | 20 | 0.008 | 0.6 |
| CSS-DTS | 903-926.9 | 5 | 3.16 | 10 | 10.00 | 20 | 0.006 | 0.6 |
| WCDMA B2 | 1850-1910 | 4.41 | 2.76 | 25 | 316.23 | 20 | 0.174 | 1 |
| WCDMA B4 | 1710-1755 | 4.41 | 2.76 | 25 | 316.23 | 20 | 0.174 | 1 |
| WCDMA B5 | 824-849 | 1.17 | 1.31 | 25 | 316.23 | 20 | 0.082 | 0.55 |
| LTE B2 | 1850-1910 | 4.41 | 2.76 | 25 | 316.23 | 20 | 0.174 | 1 |
| LTE B4 | 1710-1755 | 4.41 | 2.76 | 25 | 316.23 | 20 | 0.174 | 1 |
| LTE B5 | 824-849 | 1.17 | 1.31 | 25 | 316.23 | 20 | 0.082 | 0.55 |
| LTE B12 | 699-716 | 1.17 | 1.31 | 25 | 316.23 | 20 | 0.082 | 0.47 |
| LTE B13 | 777-787 | 1.17 | 1.31 | 25 | 316.23 | 20 | 0.082 | 0.52 |
| LTE B14 | 788-798 | 1.17 | 1.31 | 25 | 316.23 | 20 | 0.082 | 0.53 |
| LTE B66 | 1710-1780 | 4.41 | 2.76 | 25 | 316.23 | 20 | 0.174 | 1 |
| LTE B71 | 663-698 | 1.17 | 1.31 | 25 | 316.23 | 20 | 0.082 | 0.44 |

Note:

1. The device contains a certified WWAN Module, FCC ID: XMR201909EC25AFX.
2. The WWAN Conducted output power comes from the module report.

The WLAN 2.4G, CSS and WWAN can transmit simultaneously:

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

$$= S_{WLAN}/S_{limit-WLAN} + S_{WWAN}/S_{limit-WWAN} + S_{CSS}/S_{limit-CSS}$$

$$= 0.101/1 + 0.082/0.44 + 0.008/0.60$$

$$= 0.301$$

$$< 1.0$$

Result: The device meets FCC MPE at **20 cm** distance

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