FCC ID: 2AZ9PCC1020

Module evaluated for RF radiation exposure according to the provisions of FCC §2.1091, MPE guidelines identified in FCC §1.1310 and FCC KDB 447498:2015.

Limits for General Population/Uncontrolled Exposure: 47 CFR 1.1310 Table 1 (B)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm²)	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
300-1,500			f/1500	30
1,500-100,000			1.0	30

Where f is in MHz

The worst-case scenario is provided at 902.2 MHz.

The maximum power density exposure is f/1500:

S = 0.60147 mW/cm², for uncontrolled exposure

Maximized Radiated power measurements @ 3 meter distance with both antennas are reported below. The worst-case value is in bold.

For 3 meter distance (As per ANSI C63.10)

EIRP [dBm] = E [dB μ V/m] - 95.2

Where: E, Max. Radiated Field Strength

тх	Frequency (MHz)	Max. Radiated Field Strength 100% Duty Cycle (dΒμν/m)	Max. EIRP (dBm)	EIRP 100% Duty Cycle (mW)
PCB Antenna Gain: -0.5 (dBi)	902.2	73.68	-21.52	0.00705
External Antenna Gain: 3 (dBi)	902.2	91.8	-3.4	0.46

Module used in Mobile Application:

Using worst case scenario with **100% duty Cycle**, the highest measured EIRP or [P*G(numeric gain)] value for the LoRa transmitter was rounded up to **0.5 mW**.

Using the highest transmitted power at a distance of 20 cm in the equation below:

$$S = EIRP / (4 \pi R^2)$$

Where: S, power density in 'mW/cm2'

EIRP, Effective Isotropic Radiated Power in 'mW'

R, distance to the center of the radiation of the antenna in 'cm'

The RF exposure from the radio is less than the limit specified as shown below and meets the exemption criteria.

$$S (mW/cm^2) = (0.5 mW) / (4 x \pi x 20^2)$$

 $S = 0.0000995 \text{ mW/cm}^2 <<< 0.60147 \text{ mW/cm}^2 \text{ (max limit)}$

To determine the minimum safe distance

R =
$$\sqrt{\text{[EIRP / (4\pi S)]}}$$

R = $\sqrt{[0.5 / (4\pi \times 0.60147)]}$
R = 0.26 cm

Module used in Portable Application:

According to 4.1 f) of FCC KDB 447498:2015. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

Calculations:

Worse Power= 0.5 mW

Distance= 5 mm

Frequencies= .9022 GHz

 $[(0.5 \text{ mW} / 5 \text{ mm})] \times [\sqrt{(0.9022 \text{ GHz})}] \le 3.0 \text{ for 1-g SAR}, \text{ and } \le 7.5 \text{ for 10-g extremity SAR}$

0.095 < 3.0 (1-g SAR Limit) => SAR test excluded for 1g and 10g SAR tests

EUT meet SAR exception limit