The Device is a carrier grade gateway designed for IoT applications. The device is intended to be installed in vehicle only. The installation and maintenance must be performed by professional trained RF technician.

Pearl Mobile gateway is 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/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
300-1,500			f/1500	30
1,500-100,000			1.0	30
Where *f* is in MHz			*Plane-wave equivalent power density	

The worst-case scenario for **LoRa Radio at 903.65 MHz** is

S = 0.602 mW/cm^2, for General Population/Uncontrolled Exposure

S = 3.01 mW/cm^2, for Occupational/Controlled Exposure

LoRa RF conducted power measurement and antenna gain as per ETC test reports t29e23a158_mob_DTS & DSS are reported below. The maximum duty cycle of the radio in real life operation is 33%. The worst-case value is in highlighted below

TX	Frequency (MHz)	Max Conducted RF Output 100% Duty Cycle (dBm)	[1]Cable Loss BTW ANT Port & ANT (dB)	Max. antenna gain (dBi)	EIRP 100% Duty Cycle (dBm)	EIRP 100% Duty Cycle (mW)
LoRa 500 KHz DTS	903.65	21.07	0.5	5	25.57	361
	909.95	21.54	0.5	5	26.04	402
	927.5	21.16	0.5	5	25.66	368
LoRa 125 KHz FHSS	912.31	21.52	0.5	5	26.02	401
	919.51	21.79	0.5	5	26.29	426
	927.0125	21.07	0.5	5	25.57	361

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[1] As per manufacturer used manual cable loss between TX antenna and EUT antenna ports is 2 dB for dual carrier and 0.5dB for single carrier.

Conclusion

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 **430 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/cm^2'
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.

$$S (mW/cm^2) = (430 mW) / (4 \times \pi \times 20^2)$$

S = 0.085545781 mW/cm^2 <<< 0.602 mW/cm^2 (max limit)

Rounded up   **S = 0.09 mW/cm^2 <<<<<<<<<<<<<<   0.602 mW/cm^2 (max limit)**

To determine the minimum safe distance

$$R = \sqrt{[EIRP / (4\pi S)]}$$
$$R = \sqrt{[430 / (4\pi \times 0.602)]}$$
$$R = 7.539300439 \text{ cm}$$

Rounded up   R = 8.0 cm

The manufacturer manual specified a minimum safe distance of **20 cm**.