The Device is an industrial sensor designed for IoT applications. The industrial sensor is designed to be used as indoor or outdoor for industrial environment.

Kona Industrial Sensor 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

The worst-case scenario is provided at 902.3 MHz.

The maximum power density exposure is:

S = 0.60153 mW/cm^2, for uncontrolled exposure

LoRa RF conducted power measurement and antenna gain as per ETC test reports t29e19a221-FCC section 2.3 are reported below.The worst case value is in bold below

TX	Frequency (MHz)	RF Output **100%** Duty Cycle (dBm)	Max. antenna gain (dBi)	**EIRP** **100%** duty Cycle(dBm)	EIRP Duty Cycle (mW)
LoRa 500 KHz	903	18.44	2.9	21.34	136.15
	909.4	18.45	2.9	21.35	136.46
	914.9	18.41	2.9	21.31	135.21
LoRa 125 KHz	902.3	18.68	2.9	21.58	143.9
	908.5	18.47	2.9	21.37	137.1
	914.9	18.41	2.9	21.31	135.21
LoRa 500KHz / 125 KHz	**Worst Case after Tune Up (as per Tuning procedure)**				
	All Channel	**22**	**2.9**	**24.9**	**309.0295**

Using worst case scenario, the highest measured EIRP or [P*G(numeric gain)] value for the LoRa transmitter was rounded up to **309.03 mW**.

Using the highest transmitted power general equation, at a distance of 20 cm

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

Where: S, power density in 'mW/cm^2' (we use the value for the LoRa band of 0.60153 W/m^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.

$$0.0615 \text{ mW/cm}^2 = (309.03\text{mW}) / (4 \times \pi \times 20^2)$$

$S = 0.0615 \text{ mW/cm}^2$ <<< 0.60153 mW/cm^2 (max limit)

In addition, we re-arrange the above equation to determine the minimum safe distance.

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

$$6.3939\text{cm} = \sqrt{[309.03\text{mW} / (4 \times \pi \times 0.60153\text{mw/cm}^2)]}$$

R = 6.4 cm, for uncontrolled exposure (rounded up to the first decimal)

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