The Device is a carrier grade gateway designed for IoT applications. The Kona Enterprise Gateway is designed to be used as outdoor equipment for industrial use.

The device can be used either with internal antennas or external antennas, has 1 LoRa antenna port, and 1 LTE antenna port which must be used with approved antenna respecting the requirement specified in the technical documentation.

Gateway 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.

TABLE 1 TO §1.1310(E)(1)—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)
(i) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*(100)	≤6
3.0-30	1842/f	4.89/f	*($900/f^2$)	<6
30-300	61.4	0.163	1.0	<6
300-1.,500			f/300	<6
1.500-100,000			5	<6
(ii) Limits for General Population/Uncontrolled Exposure				
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 = frequency in MHz. * = Plane-wave equivalent power density.

The worst-case scenario for **LoRa Radio at 903 MHz** is

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

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

The worst-case scenario for **LTE pre-certifies Module (EM7355) at 699 MHz** is

S = 0.466 mW/cm2, for General Population/Uncontrolled Exposure

S = 2.33 mW/cm2, for Occupational/Controlled Exposure

The Avg EIRP calculations for the EM7355 are shown in the table below for each mode of operation. The worst case value is highlighted below.

Technology	Frequency (MHz)	Max. Avg Cond. (w)	Actual Antenna Gain (dBi)	Avg EIRP (mW)
WCDMA Band II LTE Band 2	**1850-1910**	**0.25**	**3.4**	**550**
WCDMA Band IV LTE Band 4	**1710-1755**	**0.25**	**3.4**	**550**
WCDMA Band V LTE Band 5	824-849	0.25	2.9	490
LTE Band 7	2500-2570	0.20	3.8	480
LTE Band 12	699-716	0.25	2.9	490
LTE Band 13	777-787	0.25	2.9	490
LTE Band 25	**1850-1915**	**0.25**	**3.4**	**550**
LTE Band 26	814-849	0.25	2.9	490
LTE Band 30	2305-2315	0.20	3.8	480
LTE Band 41	2496-2690	0.20	3.8	480

LoRa RF conducted power measurement and antenna gain as per ETC test report t29e21a157-FCC are reported below. The worst case value is highlighted below. EIRP with highest antenna gain

Technology	Frequency (MHz)	Measured Power (Conducted) (dBm)	Antenna Gain (dBi)	Measured EIRP (dBm)	Measured EIRP (mW)
LoRa	903	26.0	8	34	2512
	914.2	**27.15**	**8**	**35.15**	**3273.4**
	927.5	25.95	8	33.95	2483.1
After Tune up		27.0	8	35	3162.3

Conclusion

Total Worse Case EIRP from Two Radios = Worse LTE EIRP (mW) + Worse LoRA EIRP (mW)

= 550 mW + 3300 mW

EIRP = 3850 mW

EIRP = **3900 mW (rounded up)**

To determine the minimum safe distance, the sum of all transmitted power is used

S = EIRP / (4πR2)

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'

And then re-arrange to determine the minimum safe distance for **General Population/Uncontrolled Exposure.**

R = √ [EIRP / (4πS)]

R = √ [3900 / (4π x 0.466)]

R = 25.80681528 cm

R = rounded up to 26.0 cm distance Uncontrolled Exposure

Power Density using calculated distance

S = EIRP / (4πR2)

S = 3900 / [4π (26)2]

S = 0.459 < **0.466 mW/cm2**

To determine the minimum safe distance for Occupational/Controlled Exposure.

R = √ [EIRP / (4πS)]

R = √ [3900 / (4π x 2.33)]

R = 11.54115865cm

R = rounded up to 12.0 cm

Power Density using calculated distance

S = EIRP / (4πR2)

S = 3900 / [4π (12)2]

S = 2.16 < **2.33 mW/cm2**

R = 26 cm, for **uncontrolled exposure** (rounded up to the first decimal)

R = 12 cm, for **controlled exposure** (rounded up to the first decimal)

The device is intended to be installed in controlled area like tower or roof top building with restricted access to general public. The installation and maintenance must be performed by professional trained RF technician.