The devices are a carrier grade gateways designed for IoT applications. The Kona Enterprise Gateway and Kona Photon Gateway are designed to be used as outdoor equipment for industrial use.

The devices have 1 LoRa antenna port, and 1 LTE antenna port which must be used with approved antenna respecting the requirement specified in the technical documentation. RF exposure calculation is done using the highest gain of the LoRa radio antenna.

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 699.7 MHz** is

S = 0.4665 mW/cm2, for General Population/Uncontrolled Exposure

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

[*] **FCC ID# XMR201906EG21G**

As per Quectel Wireless Solutions Co., Ltd.* Pre-certified Module RF Exposure Evaluation Report# HR/2019/10016E-0102. The average EIRP calculations are shown in the table below for each mode of operation. The worst case value is highlighted below.

Technology	Frequency (MHz)	Max. Conducted average output power (dBm)	Antenna Gain (dBi)	Max. average EIRP(dBm)	Average EIRP (mW)
GSM850	824.2	25.81	2.29	28.1	645.6542
GSM1900	1850.2	22.81	1.59	24.40	275.4229
WCDMA B2	1852.4	25.00	1.59	26.59	456.0369
WCDMA B4	1712.4	25.00	2.00	27.0	501.1872
WCDMA B5	826.4	25.00	2.29	27.9	616.595
LTE B2	1850.7	25.00	1.59	26.59	456.0369
LTE B4	1710.7	25.00	2.00	27	501.1872
LTE B5	824.70	25.00	2.29	27.29	535.7967
LTE B7	2502.50	25.00	3.00	28.0	630.9573
LTE B12	699.70	25.00	3.26	28.26	669.8846
LTE B13	**779.50**	**25.00**	**4.45**	**29.45**	**881.05**
LTE B25	1850.7	25.00	1.59	26.59	456.0369
LTE B26(814-824)	814.7	25.00	2.53	27.53	566.2393
LTE B26(824-849)	824.7	25.00	2.53	27.53	566.2393
LTE B38	2572.5	25.00	2.06	27.06	508.1594
LTE B41	2498.5	25.00	3.00	28.0	630.9573

LoRa RF conducted power measurement as per ETC test report t29e24a242_DTS are reported below. EIRP calculated using highest gain antenna associated with LoRa Radio. The worst case value is highlighted below.

Technology	Frequency (MHz)	Measured Power (Conducted) (dBm)	Antenna Gain (dBi)	Measured EIRP (dBm)	Measured EIRP (mW)
LoRa	903	26.54	8	34.54	2844.5
	914.2	26.22	8	34.22	2642.4
	927.5	**26.75**	**8**	**34.75**	**2985.4**
After Tune up		27.0	8	35	3162.3

Conclusion

* **FCC ID # XMR201906EG21G**

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

= 881.05 mW + 3162.3 mW

EIRP = 4043.35 mW

EIRP = 4044 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 = √ [4044 / (4π x 0.4665)]

R = 26.2648435 cm

R = rounded up to 27 cm distance Uncontrolled Exposure

Power Density using calculated distance

S = EIRP / (4πR2)

S = 4044 / [4π (27)2]

S = 0441442105

S = 0.44 < **0.4665 mW/cm2**

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

R = √ [EIRP / (4πS)]

R = √ [4044 / (4π x 2.33)]

R = 12.31426776 cm

R = rounded up to 13.0 cm

Power Density using calculated distance

S = EIRP / (4πR2)

S = 4440 / [4π (13)2]

S = 2.09 < **2.33 mW/cm2**

R = 27 cm, for **uncontrolled exposure** (rounded up to the first decimal)

R = 13 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.