The Device is a carrier grade gateway designed for IoT applications. The Kona micro gateway is designed to be used as indoor equipment for home or small office.

The device has 1 antenna port, which must be used with antenna respecting the requirement specified in the technical documentation.

Kona micro indoor 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	

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 power density calculations for the EM7355 at an exposure minimum separation distance of 0.2m are shown in the table below for each mode of operation. The worst case value is highlighted below.

GSM Module Pre- Certified[1].								
Technology	Freq. (MHz)	Max. Cond. Power (W)	duty Cycle	Actual Antenna Gain (dBi)	Avg EIRP (W)	[Pd] Power density (mW/cm^2) @ 20cm	[Limit] FCC MPE Limit (mW/cm^2)	Ratio Pd/limit
LTE	1850-1910	0.3	1	3.4	0.656	0.131	1	0.131
	1710-1755	0.3	1	3.4	0.656	0.131	1	0.131
	824-849	0.3	1	2.9	0.585	0.116	0.549	0.212
	777-787	0.3	1	2.9	0.585	0.116	0.518	0.225
	704-716	0.3	1	2.9	0.585	0.116	0.469	0.248
	1850-1915	0.3	1	3.4	0.656	0.131	1	0.131
UMTS	1850-1910	0.251	1	3.4	0.549	0.109	1	0.109
	1710-1755	0.251	1	3.4	0.549	0.109	1	0.109
	824-849	0.251	1	2.9	0.489	0.097	0.549	0.177
GSM	824-849	2	0.25	2.9	0.975	0.194	0.549	0.353
	1850-1910	1	0.25	3.4	0.547	0.109	1	0.109
CDMA	824-849	0.3	1	2.9	0.585	0.116	0.549	0.212
	1850-1910	0.3	1	3.4	0.656	0.131	1	0.131
	817-824	0.3	1	2.9	0.585	0.116	0.544	0.214

[1] Sierra Wireless, MPE Evaluation for EM7355 Radio Module, February 5, 2013

LoRa and BLE RF conducted power measurement and antenna gain as per ETC test reports t29e21a285-DTS_FCC and t29e21a285-DSS_FCC section 2.3.5 are reported below. The maximum duty cycle of the radio is stated in the Operation Description exhibit to be 33%. The worst-case value is in bold below

TX	Frequency (MHz)	Conducted RF Output 100% Duty Cycle (dBm)	Max. antenna gain (dBi)	EIRP 100% duty Cycle (mW)	EIRP 33% duty Cycle (mW	[Pd] 33 % Power density (mW/cm^2) @ 20cm	[Limit] FCC MPE Limit (mW/cm^2)	Ratio Pd / limit
LoRa 500 KHz DTS	903	25.20	0.4	363	119.8	0.02483	0.602	0.04125
	914.2	26.30	0.4	468	154.4	0.03071	0.609	0.050427
	927.5	26.54	0.4	494	163.02	0.03243	0.618	0.052476
LoRa 125 KHz DSS	902.3	19.51	0.4	98	32.34	0.006434	0.601	0.01071
	914.9	20.64	0.4	127	41.91	0.008338	0.609	0.01369
	927.7	21.55	0.4	157	51.81	0.01031	0.618	0.016683
Using a worst case scenario after tuning procedure								
Tx Power		**27.5**	**0.4**	**617**	**203.61**	**0.04051**	**0.601**	**0.0674**

Conclusion

Both GSM and LoRa can transmit simultaneously. The formula to calculate the MPE is:

CPD1 / LPD1 + CPD2 / LPD2 + …. < 1

Where, CPD: Calculated Power Density

LPD: Limit of Power Density

GSM / Limit + LoRa / Limit = 0.353 + 0.0674 = 0.4204

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

Rounded up **0.42** **<<<** **1**

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