The STORK is a low-power LoRaWAN IoT sensor run on a single C-cell LTC battery and packed into a compact IP67 polycarbonate casing or external 12VDC power. Its primary purpose is to track assets indoors and outdoors using a combination of location-tracking technologies.

Stork 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)

The maximum exposure level to the public from the RF power of the EUT shall not exceed a power density, S as per the respective limits in Table 1 below, at a distance, d, of 20 cm (Mobile condition) from the EUT.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm2)	Averaging time (minutes)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	*180/f2	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	

Therefore:

MPE for Stork from 902.3 MHz – 914.9 MHz. The worst-case scenario for **LoRa Radio is at 902.3 MHz** is

S = 0.6015 mW/cm^2, for General Population/Uncontrolled Exposure

LoRa RF conducted power measurement and antenna gain as per ETC test reports t29e24a154 _DTS & DSS are reported below. The maximum duty cycle of the radio in real life operation is 28.45%. The worst-case value is in highlighted below

TX	Frequency (MHz)	Max Conducted RF Output 100% Duty Cycle (dBm)	Max. antenna gain (dBi)	EIRP 100% Duty Cycle (dBm)	EIRP 100% Duty Cycle (mW)
LoRa 500 KHz DTS	903.0	19.82	2.0	21.82	152.1
	907.8	19.70	2.0	21.7	148..0
	914.2	19.67	2.0	21.67	147.0
LoRa 125 KHz FHSS	902.3	19.60	2.0	21.6	145.0
	908.7	19.59	2.0	21.59	144.0
	914.9	19.57	2.0	21.57	143.5
BLE	2402	-3.13	1.1	-2.03	0.627
	2440	-3.34	1.1	-2.24	0.597
	2480	-3.56	1.1	-2.46	0.568
Maximum output power limitation for BLE		0	1.1	1.1	1.3
Maximum output power limitation for LoRa (As per tuning procedure)		20	2.0	22	158.5

Note: The BLE and LoRa radios will never operate simultaneously.

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 **159 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.

$$S\ (mW/cm^2) = (159\ mW) / (4 \times \pi \times 20^2)$$

$S = 0.031632044\ mW/cm^2$ <<< $0.6015\ mW/cm^2$ (max limit)

Rounded up **$S = 0.032\ mW/cm^2$ <<<<<<<<<<<<<< $0.6015\ mW/cm^2$ (max limit)**

To determine the minimum safe distance

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

$$R = \sqrt{[159 / (4\pi \times 0.6015)]}$$

$$R = 4.586441034\ cm$$

Rounded up $R = 5.0\ cm$

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