

The Device is a **mobile** Agriculture sensor for IoT applications. Agriculture sensor is suitable for commercial indoor and outdoor application.

Agriculture 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 MHz.

The maximum power density exposure is:

$$S = 0.60133 \text{ mW/cm}^2, \text{ for uncontrolled exposure}$$

LoRa RF conducted power measurement and antenna gain as per ETC test reports t29e20a151-DTS_FCC and t29e20a151-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)	Conducted EIRP 100% duty Cycle(dBm)	EIRP 100% Duty Cycle (mW)	EIRP 33% Duty Cycle (mW)
LoRa 500 KHz	903	20.04	1.6	21.64	145.88	48.1404
	907.8	19.80	1.6	21.4	138.04	45.5532
	914.2	19.61	1.6	21.21	132.13	43.6029
LoRa 125 KHz	902.3	20	1.6	21.6	144.54	47.6982
	908.5	19.58	1.6	21.18	131.22	43.3026
	914.9	19.76	1.6	21.36	136.77	45.1341
After Tuning absolute max. power		22	1.6	23.6	229.0868	75.598644

Using worst case scenario, the highest measured EIRP or $[P \cdot G(\text{numeric gain})]$ value for the LoRa transmitter was rounded up to **76.0mW**.

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

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

Where: S, power density in 'mW/cm²' (we use the value for the LoRa band of 0.60153 W/m²)
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.

$$0.015119719 \text{ mW/cm}^2 = (76 \text{ mW}) / (4 \times \pi \times 20^2)$$

$$S = 0.01512 \text{ mW/cm}^2 \lll 0.60133 \text{ mW/cm}^2 \text{ (max limit)}$$

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