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RF EXPOSURE EVALUATION

Applicant	UNION biometrics Co., Ltd.
Applicant Address	12F, Munjeong Daemyeong Valeon bldg, 127 Beobwon-ro Songpa-gu, Seoul, Republic of Korea
FCC ID	XX2-UBIOXTAG
Product Description	UBio-X Tag
Basic model	UBio-X Tag (KP)
Variant Model name	UBio-X Tag (K), UBio-X Tag (P) - Same internal RF as the base model UBio-X Tag - Removed external keypad, Same internal RF as the base model
Operating Frequency	13.56 MHz, 125kHz
Antenna type	PCB Loop Antenna, Integral Antenna
Power Source	DC 12 V(Adapter), DC 48 V(PoE) Adapter

** RF Exposure Evaluation**

Limits for FCC RF Exposure Evaluation

Determination of exemption (FCC Part 1, Subpar I, §1.1307 (b)(3))

(i) For single RF sources (*i.e.,* any single fixed RF source, mobile device, or portable device:

A single RF source is exempt if:

(A) The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A);

Calculation

$$P = \frac{P_t G_t}{4\pi r^2} = \frac{V^2}{Z_0} = \frac{E_{rms}^2}{120\pi}$$

Where P = Electrical energy in watts
V = Voltage in V
Z_0 : Impedance in free space

$$E = \frac{\sqrt{30 P_t G_t}}{r} = \frac{\sqrt{30 EIRP(W)}}{r}$$

Where P_t = transmitter output power in watts
G_t = numeric gain of the transmitting antenna (unitless)
E = electric field strength in V/m
r = measurement distance in meters (m)

20log(E) = 10log(30) + 10log(EIRP) – 20log(r)
E(dBV) = EIRP(dBW) – 20log(r) + 14.77
EIRP(dBm) = E(dBuV) + 20log(r) - 104.77

Evaluation results : SAR test is exempt as shown in the table below.

Mode	Frequency	Measured power (dBuV/m@3m)	Maximum power		FCC Exemption
			[dBm]	[mW]	
HF RFID	13.56 MHz	74.2	-21.0	0.007 94	Below 1 mW
LF RFID	125 kHz	55.5	-39.8	0.000 12	Below 1 mW

* Safety distance : 5 mm