1. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

1.1 General Information

Client Information

Applicant:	Mimiq, Inc.
Address of applicant:	555 Bryant St. #819, Palo Alto, CA 94301
Manufacturer:	Mimiq, Inc.
Address of manufacturer:	555 Bryant St. #819, Palo Alto, CA 94301

General Description of EUT:

Product Name:	Finestra Miner
Trade Name	/
Model No.:	FN280417-2
Adding Model(s):	/
Rated Voltage:	DC5V
Power Adapter:	MODEL:SWI10-5-N-I38 INPUT:100-240V~50/60Hz 0.3A OUTPUT:DC5V,2A
FCC ID:	2A3CX-FN2804172
Equipment Type:	Mobile Device

Technical Characteristics of EUT:

LoRa

Frequency Range:	903MHz-914.2MHz
RF Output Power:	20.34dBm (Conducted)
Modulation:	GFSK
Quantity of Channels:	15
Channel Separation:	800kHz
Type of Antenna:	External Antenna
Antenna Gain:	2.6dBi

LoRa (Hopping)

Frequency Range:	902.3MHz-914.9MHz
RF Output Power:	20.05dBm (Conducted)
Modulation:	GFSK
Quantity of Channels:	64
Channel Separation:	200kHz
Type of Antenna:	External Antenna
Antenna Gain:	2.6dBi

1.2 Standard Applicable

According to § 1.1307(b)(1) and KDB 447498 D01 General RF Exposure Guidance v06, system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

(a) Limits for Occupational / Controlled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Times $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	F/300	6
1500-100000	/	/	5	6

(b) Limits for General Population / Uncontrolled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Times $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-100000	/	/	1	30

Note: f = frequency in MHz: * = Plane-wave equivalents power density

1.3 MPE Calculation Method

$S = (30*P*G) / (377*R^2)$

S = power density (in appropriate units, e.g., mw/cm^2)

P = power input to the antenna (in appropriate units, e.g., mw)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor is normally numeric gain.

R = distance to the center of radiation of the antenna (in appropriate units, e.g., cm)

1.4 MPE Calculation Result

For LoRa (903MHz-914.2MHz):
Maximum Tune-Up output power: 21.0 (dBm)
Maximum peak output power at antenna input terminal: 125.89 (mW)
Prediction distance: >20(cm)
Prediction frequency: 914.2 (MHz)
Antenna gain: 2.6 (dBi)
Directional gain (numeric gain): 1.82
The worst case is power density at prediction frequency at 20cm: 0.0456 (mw/cm^2)
MPE limit for general population exposure at prediction frequency: 0.6095 (mw/cm^2)

For LoRa (Hopping, 902.3MHz-914.9MHz):
Maximum Tune-Up output power: 21.0 (dBm)
Maximum peak output power at antenna input terminal: 125.89 (mW)
Prediction distance: >20(cm)
Prediction frequency: 914.9 (MHz)
Antenna gain: 2.6 (dBi)
Directional gain (numeric gain): 1.82
The worst case is power density at prediction frequency at 20cm: 0.0456 (mw/cm^2)
MPE limit for general population exposure at prediction frequency: 0.6099 (mw/cm^2)

For Raspberry Pi 4 Model B (FCC ID: 2ABCB-RPI4B):
Bluetooth:
The worst case is power density at prediction frequency at 20cm: 0.0013 (mw/cm^2)

Wi-Fi (2.4G):
The worst case is power density at prediction frequency at 20cm: 0.0097 (mw/cm^2)

Wi-Fi (5G):
The worst case is power density at prediction frequency at 20cm: 0.0095 (mw/cm^2)

Mode for Simultaneous Multi-band Transmission
For LoRa (903MHz-914.2MHz) +Bluetooth
The worst case is power density at prediction frequency at 20cm: 0.0456/0.6095+0.0013/1 = 0.0761<1

For LoRa (Hopping, 902.3MHz-914.9MHz) +Bluetooth
The worst case is power density at prediction frequency at 20cm: 0.0456/0.6099+0.0013/1 = 0.0761<1

For LoRa (903MHz-914.2MHz) +Wi-Fi (2.4G)
The worst case is power density at prediction frequency at 20cm: 0.0456/0.6095+0.0097/1 = 0.0845<1

For LoRa (Hopping, 902.3MHz-914.9MHz) +Wi-Fi (2.4G)
The worst case is power density at prediction frequency at 20cm: 0.0456/0.6099+0.0097/1 = 0.0845<1

For LoRa (903MHz-914.2MHz) +Wi-Fi (5G)
The worst case is power density at prediction frequency at 20cm: 0.0456/0.6095+0.0095/1 = 0.0843<1

For LoRa (Hopping, 902.3MHz-914.9MHz) +Wi-Fi (5G)
The worst case is power density at prediction frequency at 20cm: 0.0456/0.6099+0.0095/1 = 0.0843<1

Result: Pass