

The Soul Play device is a wireless audio streaming/relay amplifier. It has a total of 3 radio transmitters all in the 2400MHz band. The device has up to 4 mode of operation:

- mode1: Bluetooth RX mainly, but TX for pairing and acknowledging,
- mode2: Ginseng2 RX mainly, but TX for acknowledging,
- mode3: Bluetooth RX mainly/TX acknowledging and Ginseng1 TX mainly
- mode4: Ginseng2 RX mainly, but TX for acknowledging and Ginseng1 TX mainly.

Mode 1 and 2 are single transmitter with very low duty cycle, and mode 3 Bluetooth radio has TX conducted power less than 7dBm (antenna 4.8dBi) as per report I22e18a312-FCC section 2.3.

For the reason above, the RF exposure evaluation, we will only consider the worst case scenario described in mode 4.

Per OET Bulletin 65 Edition 97-01, Appendix A Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Uncontrolled Exposure (table 1 B) Power Density 'S' (mW/cm ²)
1500-100,000	1

Ginseng Mode of operation: (Ginseng-1 & Ginseng-2 Tx)

Ginseng radio RF conducted power measurement and antenna gains as per test report I22e18a312-FCC section 2.3 are reported below. The worst-case value is in bold below

TX	Frequency (MHz)	RF Output 100% Duty Cycle (dBm)	Max. antenna gain (dBi)	EIRP 100% duty Cycle(dBm)	EIRP (mW)	Duty cycle ¹	EIRP (mW)
Ginseng-1	2403.5	15.617	5.77	21.387	138	5%	6.9
	2440.4	15.716	5.77	21.486	141	5%	7.1
	2477.3	15.376	5.77	21.146	130	5%	6.5
Ginseng-2	2403.5	15.399	4.2	19.599	91.18	0.3%	0.27
	2440.4	15.463	4.2	19.663	92.53	0.3%	0.28
	2477.3	15.171	4.2	19.371	86.52	0.3%	0.26

Using the highest transmitted power with the equation (4) from the OET bulletin 65, at a distance of 20 cm

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

Where: S, power density in 'mW/cm²'

EIRP, Effective Isotropic Radiated Power in 'mW'

R, distance to the center of the radiation of the antenna in 'cm'

The RF exposure from both radios at 20 cm is less than the limit specified as shown below and meets the exemption criteria.

$$0.00147 \text{ mW/cm}^2 = (0.28 + 7.1 \text{ mW}) / (4 \times \pi \times 20^2)$$

¹ As per Levven Operation Description, the listen Ginseng radio transmit duty cycle is 0.3% and the Ginseng relaying the audio stream is at a maximum of 5% duty cycle.

$$S = 0.00147 \text{ mW/cm}^2 \lll 1 \text{ mW/cm}^2$$

In addition, we re-arrange the above equation to determine the minimum safe distance.

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

$$0.77 \text{ cm} = \sqrt{[7.38 \text{ mW} / (4 \pi \times 1.0 \text{ mW/cm}^2)]}$$

R = 0.8 cm, for uncontrolled exposure (rounded up to the first decimal)