

SAR TEST EXCLUSION REPORT – BLE BINOCULARS

1. Introduction

This report evaluates the SAR exemption eligibility for a Bluetooth Low Energy (BLE) transmitter integrated into a binocular housing. The assessment is conducted according to FCC KDB 447498 D01 and ISSED RSS-102 Issue 6.

2. Device Specifications and Output Power

The device operates in the 2.4 GHz ISM band. The power levels listed below represent the maximum rated power, including tune-up tolerances.

Parameter	Value
Frequency Range	2402–2480 MHz
Max Conducted Output Power	7.61 dBm (5.77 mW)
Antenna Gain	3.35 dBi
Max Peak EIRP	10.96 dBm (12.47 mW)
Maximum Duty Cycle	25% (Source-based)

2.1 Time-Averaged Power Calculation

Source-based time-averaging is applied based on the firmware-limited 25% duty cycle:

- Time-Averaged Conducted Power: $5.77 \text{ mW} \times 0.25 = 1.44 \text{ mW}$
- Time-Averaged EIRP: $12.47 \text{ mW} \times 0.25 = 3.12 \text{ mW}$

3. Exposure Conditions and Separation Distances

The product is a handheld binocular. Exposure scenarios are identified as:

1. Extremity (Hands): Antenna is 5 mm from fingers during operation.
2. Body (Chest): Worst-case via neck strap (device reversed) is 8.9 mm.
3. Head (Eyes): Antenna is ~60 mm from the ocular interface.

4. FCC SAR Exemption Evaluation (KDB 447498 D01)

The SAR test exclusion threshold is: $[(\text{Power} / \text{Distance}) \times \sqrt{f(\text{GHz})}] \leq \text{Limit}$

4.1 Extremity Evaluation (10-g SAR)

- Distance: 5 mm / Limit: 7.5
- Calculation: $(1.44 / 5) \times \sqrt{2.44} = 0.45$
- Status: $0.45 \leq 7.5$ (Exempt)

4.2 Body-Worn Evaluation (1-g SAR)

- Distance: 8.9 mm / Limit: 3.0
- Calculation: $(1.44 / 8.9) \times \sqrt{2.44} = 0.2527$
- Status: $0.2527 \leq 3.0$ (Exempt)

5. ISED Canada SAR Exemption Evaluation (RSS-102 Issue 6)

ISED exemption uses the higher of the time-averaged conducted power or EIRP (3.12 mW).

Exposure Scenario	Distance	EIRP (Avg)	ISED Limit	Status
Extremity (10-g)	5 mm	3.12 mW	~10.0 mW	Exempt
Body-Worn (1-g)	8.9 mm	3.12 mW	~6.2 mW	Exempt

6. Conclusion

The BLE transmitter meets all SAR test exclusion requirements for both the FCC and ISED Canada. No further SAR testing is required.