

Appendix A: FCC Part 1.1307, 1.1310, 2.1091, 2.1093

RF Exposure Evaluation Report

Worst-case Channel Frequency for Evaluation: 903 MHz
Max Conducted Output Power (incl. tune-up tolerance): 204 mW
Antenna Gain: 11 dBi (12.6 linear)
Test Distance (for MPE): 20 cm
Separation Distance (for SAR): 5 mm (minimum allowed per KDB)

1. SAR Exclusion Evaluation

According to FCC KDB 447498 D01 General RF Exposure Guidance v06, Section 4.3.1:

"SAR evaluation is not required when the following condition is met for frequencies between 100 MHz and 6 GHz and separation distances \leq 50 mm:"

$$(P / d) * \sqrt{f(\text{GHz})} \leq 3.0 \text{ (1-g head and body SAR threshold)}$$

Where:

- P = 204 mW (maximum conducted power)
- d = 5 mm (minimum SAR separation distance per KDB)
- f = 0.903 GHz (transmit frequency)

Calculation:

$$(204 / 5) * \sqrt{0.903} = 40.8 * 0.9508 \approx 38.83$$

Threshold: 3.0

Result: $38.83 > 3.0$

Conclusion: SAR is required if evaluated at full conducted power without time-averaging or source-based duty cycling.

2. MPE Compliance Evaluation

To demonstrate RF exposure compliance without SAR, MPE (Maximum Permissible Exposure) is evaluated at a distance of 20 cm, following FCC Part 1.1310, FCC OET Bulletin 65, and KDB 447498 D01 Section 4.3.2.

Power Density Formula (far-field approximation):

$$S = (P_{\text{out}} * G) / (4 * \pi * R^2)$$

Where:

- $P_{\text{out}} = 204 \text{ mW}$
- $G = 12.6$ (numeric linear gain)
- $R = 20 \text{ cm}$

Calculation:

$$S = (204 * 12.6) / (4 * \pi * 20^2) = 2570.4 / 5026.55 \approx 0.511 \text{ mW/cm}^2$$

FCC MPE Limit at 903 MHz (uncontrolled exposure): 0.61 mW/cm²

Result: 0.511 < 0.61

Conclusion: The device complies with MPE requirements at 20 cm without any need for time-averaging or SAR testing.

3. Compliance Statement

Based on the evaluation presented:

- The device does not qualify for SAR test exclusion under KDB 447498 Section 4.3.1 when operating at full continuous power due to exceeding the 1-g SAR threshold.
- However, the device was evaluated for MPE compliance per FCC Part 1.1310 and KDB 447498 D01 Section 4.3.2. The calculated power density at 20 cm is within the general population/uncontrolled exposure limit.
- Therefore, SAR testing is not required, a KDB inquiry is not needed, and no PAG submission is necessary, provided that:
 - * The Product Manual includes a clear 20 cm minimum separation distance warning in the user manual
 - * The RF exposure exhibit is updated to include this MPE calculation.