


Client	MMB Research Inc	
Product	Lakota	
Standard(s)	RSS 247 Issue 1:2015 / FCC Part 15 Subpart 15.247:2016	

RF Exposure

Purpose

The purpose of this test is to ensure that the RF energy intentionally transmitted, in terms of power density emitted from the EUT at a stated operating distance does not exceed the limits listed below as defined in the applicable test standard, as calculated based upon readings obtained during testing. This helps protect human exposure to excessive RF fields.

Limit(s) and Method

The limits, as defined FCC 1.1310 Table 1 (B) limits for general public exposure was applied. The limits for the frequency ranges 300 MHz to 1.5 GHz and 1.5 GHz to 100 GHz was applied. The limits are $f/1500 \text{ mW/cm}^2$ and 1.0 mW/cm^2 respectively. The distance used for calculations was 20 cm, as this is the minimum distance an operator will be from the EUT during normal operation, as stated by the manufacturer.

As per FCC KDB 447498, Clause 4.3.1 b), the 1-g SAR exclusion threshold for 200 mm test distance is 1597 mW.


For RSS 102 the RF exposure exemption limit for a 2400 MHz transmitter is $1.31 \times 10^{-2} f^{0.6834} \text{ W}$ which is 2.67 W.

Results

The EUT passed the requirements. The worst case calculated power density was 0.002 mW/cm^2 , this is significantly under the 1.0 mW/cm^2 requirement.

The Maximum peak conducted power of the EUT is 10 mW and is significantly less than the SAR exclusion threshold. Therefore SAR is not applicable to the EUT.

For RSS 102, the E.I.R.P of the EUT is $9.81 \text{ dBm} + 0 \text{ dBi} = 9.81 \text{ dBm}$ (0.0096 W) which is significantly less than the 2.67W exemption limit. This is significantly less than the exemption limit.

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Calculations – Power Density

Method 1 (conducted power)

$$P_d = (P_t * G) / (4 * \pi * R^2)$$

Where $P_t = 9.81$ dBm or 9.57 mW as per Peak power conducted output

Where $G = 0$ dBi, or numerically 1

Where $R = 20$ cm

$$P_d = (9.57 \text{ mW} * 1) / (4 * \pi * 20\text{cm}^2)$$

$$P_d = 0.002 \text{ mW/cm}^2$$

Calculations – SAR Exclusion Limit

According to FCC KDB 447498, Clause 4.3.1 a) the exclusion power for up to 50 mm is

$$\text{Power @ 50 mm} = (3 * \text{distance}) / \sqrt{f(\text{GHz})}$$

$$\text{Power @ 50 mm} = (3 * 50) / \sqrt{2.4}$$

$$\text{Power @ 50 mm} = 96.8 \text{ mW}$$

According to FCC KDB 447498, Clause 4.3.1 b), the test exclusion power for above 50 mm is

$$\text{Power @ 50 mm} + (\text{dist} - 50 \text{ mm}) \times 10$$

The exclusion power for 200 mm is therefore

$$96.8 \text{ mW} + ((200 \text{ mm} - 50 \text{ mm}) * 10) = 1597 \text{ mW}$$