

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 35 mm, 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 a), the SAR exclusion threshold < 50 mm test distance is

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR, and ≤ 7.5 for 10-g extremity SAR, where

- $f(\text{GHz})$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- Power is defined as the source based time-averaged maximum conducted output power of the RF

For RSS 102 the SAR exemption limit, Section 2.5.1 Table 1, for a 2480 MHz transmitter at 35 mm is 123 mW. Power is also defined as the source based time-averaged maximum conducted output power of the RF.

Results

The EUT passed the requirements. The worst case calculated power density was 0.129 mW/cm^2 , this is significantly under the 1.0 mW/cm^2 requirement.

For FCC, the calculated SAR exclusion threshold is 0.9 which is less than 3.0 for 1-g SAR.

For RSS-102, the peak antenna gain of the EUT is 0 dBi; thus, E.I.R.P is the same as conducted power. The source based time-averaged maximum conducted output power of the EUT is

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

19.8 mW and is significantly less than the RSS SAR exclusion threshold of 123 mW. Therefore SAR is not applicable to the EUT.

Calculations – Power Density

Method 1 (conducted power)

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

Where $P_t = 3.61$ dBm or 19.85 mW as per Source base, time-average conducted output

Where $G = 0$ dBi, or numerically 1

Where $R = 3.5$ cm

$$P_d = (3.61 \text{ mW} * 1) / (4 * \pi * 3.5\text{cm}^2)$$

$$P_d = 0.129 \text{ mW/cm}^2$$

Calculations – SAR Exclusion Limit

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

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] < 3.0 \text{ for 1-g SAR}$$

$$[(20 \text{ mW}/35 \text{ mm})] / [\sqrt{(2.4)}] = 0.9$$

As per FCC KDB 447498, Clause 4.3.1, Power and distance were rounded to the nearest mW and mm, and then the result was rounded to one decimal place.