




RF Exposure Exhibit

Tiko

Client	Tiko 3D	
Product		
Standard(s)	RSS 247: Issue 1/ FCC Part 15 Subpart C 15:2015	

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.

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

For RSS 102 the RF exposure exemption limit for a 2400 MHz transmitter is $1.31 \times 10^{-2} f^{0.6834}$ W which is 2.65 W.

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.

Results

The EUT passed the requirements.

The worst case calculated power density was 0.06 mW/cm^2 , this is significantly under the 1.0 mW/cm^2 requirement.

For FCC SAR exemption, the maximum power the EUT transmits is 196 mW which is less than 1597mW; therefore, the EUT meets individual SAR testing exclusion requirements.

For RSS 102, the E.I.R.P of the EUT is $22.92 \text{ dBm} + 1.9 \text{ dBi} = 24.82 \text{ dBm}$ (0.303 W) which is significantly less than the 2.65 W RF Exposure exemption limit.


Calculations

Method 1 (conducted power)

Internal antenna

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

Where $P_t = 22.92 \text{ dBm}$ or 195.88 mW as per Peak power conducted output

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Where $G = 1.9$ dBi, or numerically 1.54

Where $R = 20$ cm

$$P_d = (195.88 \text{ mW} * 1.54) / (4 * \pi * 20\text{cm}^2)$$

$$P_d = 301.66 \text{ mW} / 5026 \text{ cm}^2$$

$$P_d = 0.06 \text{ mW/cm}^2$$

Calculations – SAR Exclusion Limit

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

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

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

$$\text{Power @ 50 mm} = 97 \text{ mW}$$

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

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

The exclusion power for 200 mm is therefore

$$97 \text{ mW} + ((200 \text{ mm} - 50 \text{ mm}) * 10) = 1597 \text{ mW}$$