



EMC, Radio and Safety Testing Services

Severn Board (EUT) RF Exposure calculation: -

FCC ID: **2A6TX-LRSB001**

IC: **28513-LAIERSB001**

The **Severn Board** is intended as a Battery powered mobile device that can be placed in inaccessible places such as wall and ceiling cavities to monitor for water leakage from pipes and similar. As such RF exposure distance can be controlled by installation. For the purposes of this exclusion calculation a distance of 200mm has been declared as the worst case, and the power used is either the maximum field strength measured from the device, or maximum conducted power measured of the device. The Device operates in the 902-928 MHz FCC band as a LoRaWan sensor, specifically transmitting in the 902.3 – 914.9MHz frequency range.

FCC Evaluation is for exposure potential against the Exclusion limits given in **KDB447498** D01 v06 section 4.3.1.

Exclusion requirements are based upon 10g SAR exclusion for extremities.

Equation of 4.3.1. part 1A Transposed is:

$$\text{Exclusion in mW} = ((\text{Threshold} / (\sqrt{F}) * D$$

where: Threshold = 7.5 for 10g SAR Extremities

F = Frequency in GHz (0.9023 GHz) or (0.9143 GHz)

D = Separation distance in mm (50mm)

Threshold in mW for 902.3MHz = 394.78 mW (power allowed at numeric threshold for 50mm)(step a) or for 914.3MHz = 392.18 mW.

Based on result above and 4.3.1. part b)1):

b1) {[Power allowed at numeric threshold for 50 mm in step a)] + [(test separation distance – 50 mm)·(f(MHz)/150)]} mW, for 100 MHz to 1500 MHz frequency range.

(using 914.3MHz and separation distance of 200mm) we have

$$= 392.18 \text{ mW} + (200\text{mm}-50\text{mm}) * (914.3 / 150)$$

Therefore exclusion for 914.3MHz and 200mm separation distance is = 1306.48mW.

exclusion for 902.3MHz and 200mm separation distance is = 1297.08 mW.

Measured maximum Radiated values for the EUT were: 112.1dBuV/m @ 3m which is +16.87 dBm (or 48.7 mW). Measured maximum Conducted power was 18.84dBm (76.6 mW) These figures are for a 100% Transmit EUT. Antenna gain is included in the field strength measurements. Actual Declared duty cycle is <0.1% and as such time averaged power would be much lower, however for the purpose of this calculation a 100% duty cycle is used. Based on the above the EUT is excluded from FCC RF Exposure / SAR testing requirements.

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With reference to **RSS-102 issue 5** section 2.5.2 Exemption limits for routine evaluation – RF Exposure evaluation.

Bullet point 4) At or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;

$$1.31 \times 10^{-2} * 902.3^{0.6834} \text{ (W)} = 1.371 \text{ W}$$

$$1.31 \times 10^{-2} * 914.3^{0.6834} \text{ (W)} = 1.383 \text{ W}$$

Measured maximum EUT Radiated power was 112.1dBuV/m @ 3m which is 48.7 mW (+16.87dBm). Antenna Gain is included in the measurement.

Therefore, the EUT meets the exemption limits from routine evaluation, even before the duty cycle of 0.1% has been taken into consideration.

This RF exclusion calculation was prepared by Daniel Sims of RN Electronics Ltd acting as Agent for this application.

20th November 2022.