



EMC, Radio and Safety Testing Services

10xRS485 RFID Reader (EUT) RF Exposure calculation:-

FCC ID: **2ALHY-000537**

IC: **22592-000537**

The **10xRS485 RFID Reader** is intended as a module, and is to be fitted inside the body of a host system, and as such RF exposure distance can be controlled by installation. For the purposes of this exclusion calculation a distance of 5mm has been assumed as the absolute worst case, and the power used is the maximum field strength measured from the bare PCB module (not in a host enclosure). The Module is a 13.56MHz RFID transmitter.

Maximum measured PK power from the module RFID device was 65.3dBuV/m @3m. This equates to 0.001 mW (-29.9dBm).

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 (0.01356 GHz)
D = Separation distance in mm (5mm)

Threshold in mW for 13.56MHz is based on equation above and 4.3.1. part b)1) (using 100MHz and 50mm distance)

$$= 1186 \text{ mW}$$

Further modified by 4.3.1. part c)1) (using 100MHz and 50mm distance)

$$= 2215 \text{ mW (at 50mm)}$$

And further modified by part 4.3.1. part c)2) (<50mm distance under 100MHz)

$$= 2215 / 2 \quad (50\text{mm exclusion value divided by } 2)$$

Therefore exclusion for 13.56MHz and 5mm separation distance is

$$= 1107.5\text{mW.}$$

As measured values for the 10xRS485 RFID READER EUT were: 65.3dBuV/m @ 3m which is -29.9 dBm (or 0.001 mW) and any antenna gain is included in the field strength measurement, the EUT is excluded from RF Exposure / SAR testing requirements.



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With reference to **RSS-102 issue 5** section 2.5.1 table 1, the exemption limit for devices operating on frequencies $\leq 300\text{MHz}$ at 5mm separation distance is 71mW. Therefore the device is exempt from routine SAR/RF exposure evaluations.

In addition to the above single module RF exposure, up to 4 units may be daisy chained and used inside a host, in this instance RF exposure below has been considered by summing the RF power of 4 units in Linear terms for comparison to the exclusion limits:

$0.001\text{mW} \times 4 = 0.004\text{mW} (-24\text{dBm})$.

This value shows that 4 units operating simultaneously in a host is still well within the limits for RF exposure exemption/exclusion.

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