

**Minimum Safe Distance Calculation for WR-5100 (MPU5) enclosed in
WR-AIR-SYS-1-02 (AWRS Kit) with RF-2150 and 2x 1.5dbi antenna and
1x 3dbi antenna.**

This memo addresses the minimum safe distance (MSD) for operation of the RF-2150 S-Band (2200MHz – 2500MHz) radio module. The applicable Maximum Permissible Exposure (MPE) limits were obtained IAW the FCC rules for radio frequency radiation exposure limits under **FCC Title 47, Chapter 1 Subpart 1 Article 1.1310**. (the “Rules”)

According to the Rules, the MPE limit for ♦occupational related exposure is 5mW/cm² for 1500-100,000MHz operating frequencies. While the MPE limit for general population exposure is 1mW/cm² for 1500-100,000MHz operating frequencies.

With that;

$$\text{MPE} = \text{EIRP} / (4 * \pi * D^2)$$

EIRP = Average Aggregate Power (dbm)+Antenna Gain(dbi) – Cable insertion loss (db). (Represented in mW)
D = Distance in cm

The highest transmit power setting for the RF-2150 module is 1.6Watts/chain. Aggregating the three channels yields 5Watts or 36.99dbm.

From the above, EIRP = 36.99dbm+3dbi-2.4db = 37.59dbm or 5.74Watts. 3dbi being the worst case antenna. Therefore;

$$\text{MPE} = 5741.16\text{mW} / (4 * \pi * D^2)$$

5mW/cm² Limit: Where D = 20cm, MPE = 1.14mW/cm²

1mW/cm² Limit: Where D = 22cm, MPE = .944 mW/cm²

So, the **MSP** for the RF-2150 operating at 5Watts is 20cm or 7.87inches for occupational environments and 22cm or 8.66inches for general population.

Sincerely,

Persistent Systems

♦Occupational/controlled exposure limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when a person is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure. The phrase *fully aware* in the context of applying these exposure limits means that an exposed person has received written and/or verbal information fully explaining the potential for RF exposure resulting from his or her employment. With the exception of *transient* persons, this phrase also means that an exposed person has received appropriate training regarding work practices relating to controlling or mitigating his or her exposure. Such training is not required for *transient* persons, but they must receive written and/or verbal information and notification (for example, using signs) concerning their exposure potential and appropriate means available to mitigate their exposure. The phrase *exercise control* means that an exposed person is allowed to and knows how to reduce or avoid exposure by administrative or engineering controls and work practices, such as use of personal protective equipment or time averaging of exposure.

