

Muehlau, 07.05.2019

1 RF Exposure Considerations for the ARU 3500

FCC ID: WJ9-ARU3560

The transmitter operation for the ARU 3500 covers the 902 – 928MHz operating band (RFID). The ARU 3500 supports one internal antenna and up to three external antennas but operates on only one antenna at a time.

The following FCC Rule Parts and procedures are applicable:

- Part 1.1310 – Radiofrequency radiation exposure limits
- Part 2.1091 – Radiofrequency radiation exposure evaluation: mobile devices
- KDB447498 D01 v06 Mobile and Portable Devices RF Exposure Procedures and Equipment Authorisation Policies

MPE CALCULATIONS

The MPE calculation to calculate the safe operating distance for the user is.

$$S = \text{EIRP} / 4 \pi R^2$$

Where

S = Power density

EIRP = Effective Isotropic Radiated Power (EIRP = P x G)

P = Conducted Transmitter Power

G = Antenna Gain (relative to an isotropic radiator)

R = distance to the centre of radiation of the antenna (safe operating distance)

ARU3500 Values:

Transmitter frequency range: 902 – 928MHz

Transmitter power:

(Ref 15.247 (b)(4) – Antennas with gains >6dBi)

- 1) For external 13dBi gain antenna use, 30dBm max. power is reduced by 7dB (13dBi – 6dB)
 $\text{EIRP}_{\text{max}} = +23\text{dBm} + 13\text{dBi antenna gain} = +36\text{dBm} (4.0\text{W})$
- 2) For external 10dBi gain antenna use, 30dBm max. power is reduced by 4dB (10dBi – 6dB)
 $\text{EIRP}_{\text{max}} = +26\text{dBm} + 10\text{dBi antenna gain} = +36\text{dBm} (4.0\text{W})$
- 3) For external 8dBi gain antenna use, 30dBm max. power is reduced by 2dB (8dBi – 6dB)

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$$\text{EIRP}_{\text{max}} = +28\text{dBm} + 8\text{dBi antenna gain} = +36\text{dBm} (4.0\text{W})$$

- 4) For internal +7dBi gain antenna use, 30dBm max. power is reduced by 1dB (7dBi – 6dB)

$$\text{EIRP}_{\text{max}} = +29\text{dBm} + 7\text{dBi antenna gain} = +36\text{dBm} (4.0\text{W})$$

- 5) For external 6dBi gain antenna use

$$\text{EIRP}_{\text{max}} = +30\text{dBm} + 6\text{dBi antenna gain} = +36\text{dBm} (4.0\text{W})$$

Power Density Requirement

From table 1 (b) - Limits for General Population/ Uncontrolled Exposure of FCC Rule Part 1.1310 for 2.4GHz

$$S_{\text{req1}} = f_{\text{MHz}}/1500 \text{ mW/cm}^2 = 902/1500 = 0.6 \text{ mW/cm}^{2\#}$$

Calculation:

$$S = \text{EIRP} / 4 \pi R^2$$

$$R = \sqrt{\text{EIRP} / 4 \pi S}$$

$$R = \sqrt{4000 / (4 \pi \times 0.6)}$$

$$R = \sqrt{4000 / (7.54)}$$

$$R = \sqrt{530.50}$$

$$R = 23\text{cm}$$

Conclusion

The safe operating distance for the ARU 3500 for General Population/ Uncontrolled Exposure limits is a minimum of 23cm using for all antennas specified to be used with the equipment.

Signature:  Date: 05/07/2019

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