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Subject: Remote powering through RF wave propagation

How to answer:

To answer to the questions, you have to put a cross (X) on the line which seems you correct.

Specifications

- The effective isotropic radiated power P_{EIRP} sent by the reader is equal to 35 dBm.
- The operating frequency is equal to the ISM frequency 866 MHz.
- The RFID system operates in air.
- The gain of the antenna of the tag is equal to 1.
- For the sake of simplicity, it is assumed that the internal impedance of the antenna corresponds to a pure radiated resistance R_{rad} equal to 50 Ohms at the operating frequency equal to 866 MHz.

- a) The distance between the reader and the tag is equal to 1 m. Justify why the RFID system operates in far field region for this particular distance.

Choice 1: the distance is higher than 0.0551 m

Choice 2: the distance is below than 2 m

- b) **Indicate what has to be the value of the input impedance of the tag** at the operating frequency so that the maximum input active power is delivered to the tag.

Choice 1: the input impedance of the tag is equal to 50 Ohms

Choice 2: the input impedance of the tag is equal to 100 Ohms

- c) **Calculate the maximum input power** which can be delivered to the tag under the above condition explained at question b) for a distance equal to 1 m between the reader and the tag.

Choice 1: $P_{\text{in}} = 2.4029 \text{ mW}$

Choice 2: $P_{\text{in}} = 4.8058 \text{ mW}$

- d) **Calculate the maximum input power** which can be delivered to the tag under the above condition explained at question b) for a distance equal to 3 m between the reader and the tag

Choice 1: $P_{\text{in}} = 0.26699 \text{ mW}$

Choice 2: $P_{\text{in}} = 0.53398 \text{ mW}$