

## **Bandwidth limitations of ultra high frequency-radio frequency identification tags**

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### **Abstract-**

**Fundamental bandwidth limitations on the design of ultra high frequency (UHF) radio frequency identification (RFID) tags are investigated. This study was conducted by considering the optimum equivalent-circuit network necessary for bandwidth broadening in single resonant UHF-RFID tags with conjugate matching. This equivalent-circuit network is simply a parallel combination of an inductor and a resistor cascaded to the UHF-RFID chip. Bandwidth optimisation of the resulting network is validated by means of the Bode criterion. According to this analysis, a broadband UHF-RFID tag prototype able to operate worldwide is designed and fabricated. In order to reduce tag size and cost, the external matching network is omitted in the reported implementation. The measured read ranges are above 5 m within the whole UHF-RFID frequency band (840-960 MHz), with a peak value of 9 m at 870 MHz.**

**Index Terms-** UHF resonators, bandwidth allocation, broadband networks, inductors, radiofrequency identification, resistors

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