

This paper presents a differential rectifier with high radio frequency (RF)-dc conversion efficiency over an extended input power range by using resistance compression network (RCN). The RCN is cascaded with a typical differential rectifier. It can reduce the variation range of rectifier input impedance, which changes with input power levels, and better impedance matching can be realized. Thus, the loss due to impedance mismatch is reduced, and high efficiency can be obtained in a wider input power range. First, the theoretical analysis of the RCN is carried out. Then, the detailed analysis of the rectifier input impedance and efficiency is derived in closed form. Based on the analytical results, a 915-MHz rectifier incorporating RCN is implemented. The measured results show that the RF-dc conversion efficiency keeps above 50% and 70% in the input power range 5.5-33.1 and 13.5-31.3 dBm, respectively. The maximum efficiency is 84.8%. Compared with the counterpart without RCN, the efficiency at lower input power levels is improved without degrading the peak efficiency.