This paper discusses the design of a batteryless wirelessly powered ultra-wideband (UWB) system-on-a-chip (SoC) tag for area-and-volume-constrained localization applications such as insect tracking. Key challenges for wirelessly powered operation at 10-m range include the design of high-sensitivity rectifiers and low-voltage high-efficiency UWB transmitters (TX). An antenna-rectifier co-design methodology is presented for sensitivity optimization under area constraints. A 300-nA power management unit (PMU) and low-voltage (0.8-V) UWB TX increases tag operating range by ensuring high rectifier sensitivity under loaded conditions and reducing required rectifier output voltage. The rectifier, PMU, and UWB TX are integrated in 65-nm CMOS, and the rectifier demonstrates state-of-the-art -30.7#x2013;dBm sensitivity for 1-V output voltage with only 1.3 cm^2 antenna area, representing a 2.3 × improvement in sensitivity over previously published work, at 2.6 × higher frequency with 9 × smaller antenna area, translating into a 50% longer range at the same frequency. The 0.8-V UWB TX consumes 64 pJ/pulse at 28-MHz pulse repetition rate and achieves 2.4 GHz -10-dB bandwidth. Wireless measurements demonstrate sub-10-cm range resolution at ranges exceeding 10 m. Tag measurements in typical office environments demonstrate 20-m-range RF-energy harvesting with 36-dBm effective-isotropic radiated power in the 2.4-GHz ISM band.