This paper introduces a relevant concept of energy harvesting for passive UHF radio frequency identification (RFID) relying on the exploitation of the power carried by the third harmonic signal generated by the RFID chip. The idea consists on the use of the sole third harmonic energy to power up an associated sensor to the RFID tag. The proposed concept is first demonstrated in simulation thanks to an equivalent model for the RF front-end of a passive UHF RFID chip. Although the proposed model is simplified, it considers the generated nonlinear signals, allowing an efficient design of the rectifier circuit, which is responsible of harvesting the third harmonic power besides ensuring the activation of the RFID chip in order to communicate with the reader. The power driving between the RFID chip, third harmonic harvester, and antenna at the fundamental and third harmonic frequencies is achieved by designing a low-loss distributed three-port impedance matching network. Simulation results confirm the operation of the matching network and the exploitation of the third harmonic signal by analyzing the power at different nodes in the circuit. Measurement results validate the proposed nonlinear chip model. A prototype of the RFID tag harmonic-harvester produces 39 μW of dc power harvested from the harmonic signal, showing good agreement with the simulation results. Finally, a sensor application exploiting the harmonic harvested power to energize a commercial temperature sensor at a distance of 80 cm from the reader is demonstrated.