

A single-stage bridgeless ac-dc PFC converter using a lossless passive snubber and valley switching is proposed. The proposed converter is based on a two-stage bridgeless boost-flyback converter. In the proposed converter, the conduction losses are reduced by removing an input full-bridge diode rectifier. The boost inductor is designed to be operated in the discontinuous-conduction mode for achieving high power factor. In the flyback module, the couple inductor that provides input-output electrical isolation for safety is designed to be operated in the critical-conduction mode for low RMS current and low turn-on switching loss by using valley-switching operation. Because of the lossless snubber circuit, the voltage spike of switch is clamped, and the leakage inductor energy is recycled. The snubber capacitor is used as a dc-bus capacitor, which is divided into two capacitors. In addition, some input power is directly conducted to the output, and the remaining power is stored in dc-bus capacitor. So, low-voltage rating capacitors can be used as the dc-bus capacitor and power transfer efficiency is improved. The presented theoretical analysis is verified on an output 48-V and 60-W experimental prototype.