

A new fourth-order buck converter exhibiting better dynamic performance (no right-half-plane zeros) and voltage gain identical to the buck converter with input filter is proposed. Converter design expressions are formulated through time-domain analysis. The proposed converter performance is compared with other buck topologies reported in literature. State-space and discrete-time analysis is established, and then small-signal models are obtained. These transfer functions reveal that there is no right half of  $s$ -plane zero in the control-to-output transfer function. A digital voltage-mode controller is designed, and then enhanced dynamic performance features of the proposed converter are brought out through analysis and then compared with other fourth-order converters reported. A 42- to 28-V 75-W converter prototype is made for simulation and experimental investigation. The distinct features of the proposed converter are demonstrated through analytical computer simulations and experimental results.