**Abstract**: This paper presents a fast dynamic response dc-dc converter for high voltage applications such as medical use X-ray generator. In the proposed dc-dc converter a zero-current switching series resonant inverter is used to drive input terminals of voltage multiplier circuit. The zero-current switching series resonant inverter operates at fixed frequency and duty ratio. A control circuit is used at the lower arm of the inverter, to control the effective input voltage across the inverter. At the turn ON, the inverter is supplied with maximum effective input voltage, which results in quick rise-up of the output voltage. As the output voltage approaches to 80% of it target voltage, the effective input voltage is reduced to a value which corresponds to the target output voltage, as a result the rise rate of the output voltage becomes slow and overshoot is avoided. The effectiveness of the proposed control scheme has been confirmed experimentally with a laboratory scale-down prototype.