

IGBT Snubber Capacitor

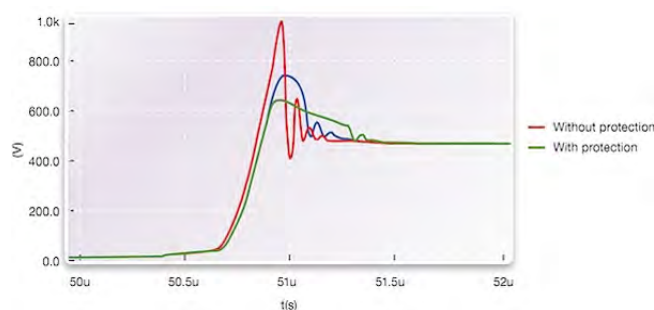
Important developments of IGBTs (Insulated Gate Bipolar Transistors) over the years have been focused on increasing power handling capability and increasing reliability including short circuit tolerance. Snubber capacitors have also undergone changes in construction enabling increased power handling and short circuit tolerance. This technical note focuses on giving the reader a brief overview on the IGBT snubber capacitor.

Power systems containing IGBTs must be designed so the transient voltage caused by the high di/dt that occurs at gate turn off is minimized. Left uncontrolled, this transient voltage can exceed the blocking voltage rating of the IGBT and cause it to fail. In order to minimize the transient voltage a wound construction polypropylene film capacitor mounted as close to the IGBT terminals as possible is usually recommended. (Refer to image below)



The acceptable amount of overshoot voltage is determined by the maximum DC voltage that an inverter power circuit is subject to and the IGBT voltage ratings. The peak current to turn off under a fault condition can be as high as 6 - 10 times the device current rating. This peak current under the fault condition will proportionally increase the overshoot voltage.

The switching capacity with shortest switching times which can be realized using IGBTs necessitates an extremely low-inductance circuit design. Even the low self-inductance of the power bus may induce dangerous voltage overshoots between collector and emitter which may result in the destruction of the valuable power semiconductors.



Construction

Dielectric: Polypropylene film

Leads: Tinned copper lugs

Seal: Plastic case with resin sealing. Flame retardant execution (UL94V-0).



Highlights

- Self-healing
- High-frequency High peak current High DV / DT
- High peak & RMS
- current capability
- Low ESR

Electrical characteristics

Working temperature: - 40° C - 85° C

Capacitance: 0.047 μ F- 5.6 μ F

Tolerance: ± 5 J, ± 10 K

Rated voltage: 700~3000V DC, 380~ 750 VAC

Test volt. T-T: 2.0 \times rated Volt. V DC for 10s/25 \pm 5° C

Test volt. T-C: 3kV AC at 50Hz, 60s

Dissipation factor: ≤ 0.0006 at 1 kHz 25° C

Insulation resistance: 3000s (not exceeding 30G), after 1minute of electrification at 100V DC (25 \pm 5° C)

Applications

IGBT snubber capacitors are used in high voltage, high current and high pulse applications such as:

- IGBT protection circuits
- Snubber network
- Protection circuits in SMPS
- Energy conversion and control in power electronics

