

SolarInnovate Energy Solutions

Igbt inverter turn-off voltage



Overview

If the voltage between the gate and the emitter is lower than the threshold voltage, the IGBT will be turned off or in the cutoff state. What is the maximum negative shutdown voltage for IGBT?

Taking AIKW40N65DH5 as an example, the maximum recommended negative shutdown voltage for IGBT is -20V, but in practice, the range of -12 to -5V is chosen. Negative turn-off voltages result in shorter turn-off times, reduced turn-off voltage spikes, and a lower likelihood of false turn-on.

Can an IGBT cause a high turn-off surge voltage?

Therefore the circuit wiring inductance to the IGBT can cause a high turn-off surge voltage ($V=L(di/dt)$). At an example, using the IGBT's waveform at turn-off we will introduce the causes and methods of their suppression, as well as illustrate a concrete example of a circuit (using an IGBT and FWD together).

How to control surge voltage in IGBT?

Control the surge voltage by adding a protection circuit (snubber circuit) to the IGBT. Use a film capacitor in the snubber circuit, place it as close as possible to the IGBT in order to bypass high frequency surge currents. Adjust the IGBT drive circuit's - VGE or RG in order to reduce the di/dt value.

How does an IGBT gate work?

The driver OUT pin voltage is abruptly pulled from 16 V to 0 V and the IGBT gate is discharged through the gate resistor. The fast turn-off of the IGBT generates a voltage spike on Vce reaching 1 kV, which is dangerously close to the IGBT absolute maximum rating (1200 V). The calculated turn-off energy reaches 19 mJ.

Why is IGBT a good power switch driver?

The IGBT is driven by for turn-on and 22Ω for turn-off thanks to the use of two gate resistors and one diode: sink and source currents can therefore be tuned

independently to help and solve EMI issues. Power switch drivers are used in very noisy environment and decoupling of the supplies should be cared.

How to reduce Avalanche voltage in IGBT?

Therefore, installing the active clamp circuits can suppress the spike voltage. Moreover, avalanche current generated by breakdown of Zenner diode, charge the gate capacitance so as to turn-on the IGBT. As the result, di/dt at turn-off become lower than that before adding the clamp circuit (Refer to Fig.5-6).

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