MITSUBISHI ELECTRIC
Changes for the Better

Comparison of Planar-Gate and Trench-Gate Structures in SiC MOSFET Chips and Selection Guidelines

MITSUBISHI ELECTRIC CORPORATION

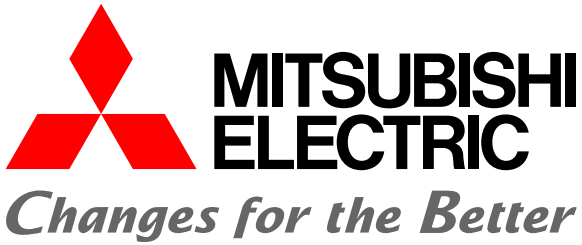
PA7-G-260809-*-007

Comparison of Planar-Gate and Trench-Gate Structures

- The table below summarizes the key characteristics and evaluation items for device selection, using the trench-gate structure as the reference, and highlights the features of each structure.
- By understanding the advantages of each structure, users can select the optimum chip according to their application needs and performance requirements.

Item	Planar Gate	Trench Gate	Background and Impact of Characteristic Differences (Trench-Gate Structure as Reference)
Specific On-Resistance (Ron·A)	○	◎	Higher cell density reduces specific on-resistance.
Switching loss	○	○	Although gate charge (Qg) tends to increase with higher cell density, the impact on switching loss can be reduced through appropriate gate resistance design. Furthermore, since this impact depends on the switching frequency, it is important to select the device according to the application requirements.
Short-Circuit Withstand Time (SCWT)	◎	○	Higher cell density tends to increase heat concentration during short-circuit events, making proper short-circuit protection important.
dV/dt Immunity & False Turn-On Immunity	◎	○	Increased cell density tends to increase the Miller charge (Qgd). Optimizing negative gate bias and gate resistance is effective in mitigating this effect.
Gate Oxide Reliability	◎	◎	Proprietary electric-field relaxation technology achieves gate oxide reliability equivalent to that of the planar-gate structure.
Gate Charge (Qg) & Driver Load	◎	○	Increased cell density tends to increase gate charge; therefore, verification of driver capability is recommended.

© Mitsubishi Electric Corporation


MITSUBISHI
ELECTRIC
Changes for the Better