

Improvement in Electrical and 2DEG Properties of $\text{Al}_{0.26}\text{Ga}_{0.74}\text{N|GaN|Si}$ HEMTs

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Improving material quality is essential for obtaining a high-power device. Surface trapping effects have been present in all HEMT devices, and have significantly impacted the problem of drain-current collapse. In this paper, performance of intentionally non-doped AlGaIn|GaN|Si (HEMTs) before and after passivation with $\text{SiO}_2|\text{SiN}$ is investigated. Capacitance-voltage at various temperatures ($C-V-T$), a drain current-voltage at various gate voltages ($I_{ds}-V_{ds}-V_{gs}$), the gate leakage current with various temperatures ($I_{gs}-V_{gs}-T$), and the maximum extrinsic transconductance G_{max} are measured; all of these measurements show the impact of $\text{SiO}_2|\text{SiN}$ passivation on the performances of AlGaIn|GaN|Si HEMTs.

Keywords: AlGaIn|GaN|Si HEMTs, passivation by $\text{SiO}_2|\text{SiN}$, $C-V-T$, $I_{ds}-V_{ds}-V_{gs}$, $I_{gs}-V_{gs}-T$, G_{max} .

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