Electronic Supplementary Information

Field-plate engineering for high breakdown voltage $\beta$-Ga$_2$O$_3$ nanolayer field-effect transistors

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Figure S1 DC output characteristics of the $\beta$-Ga$_2$O$_3$ nanoFET (a) without and (b) with the field-modulating plate
Figure S2 DC output and off-state three-terminal hard-breakdown results of the $\beta$-$\text{Ga}_2\text{O}_3$ nanoFETs with the field-modulating plate.

The materials parameters for the device simulation are below.

- Dielectric constant for $\beta$-$\text{Ga}_2\text{O}_3$ : 10
- Carrier concentration : $3.7 \times 10^{17}/\text{cm}^3$
- Electron affinity : 4.0
- Energy gap @ 300 K : 4.9
- Conduction band density : $3.72 \times 10^{18}/\text{cm}^3$
- Valance band density : $3.72 \times 10^{18}/\text{cm}^3$
- Electron mobility : 118 $\text{cm}^2/\text{V} \cdot \text{s}$

Impact ionization coefficient model: $\alpha_n = 0.79 \times 10^6 \text{cm}^{-1} \exp\left(-\frac{2.92 \times 10^7 \text{V/cm}}{E}\right)$