

POWDEC soon to realize breakthrough GaN power transistor

-- POWDEC fabricated 600V 10A transistors on silicon substrates --

POWDEC K.K. established polarization-super-junction (PSJ) GaN (Gallium Nitride) power transistors on 150mm-silicon substrates, and demonstrated high-voltage and high-current operations, and has been confident of prospect of its practical use. This marks a significant milestone for GaN devices. The Company will soon deliver the sample devices, and continue improving its performances. In 2015, POWDEC plans to commercialize GaN-based products of a breakdown voltage of 1,200V.

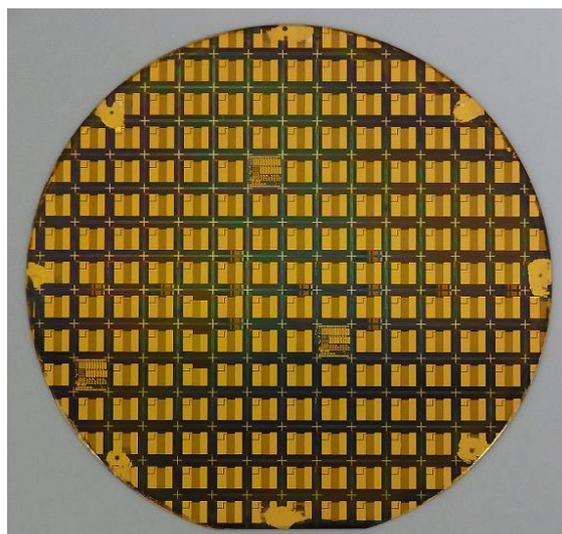


Fig1. Prototype of GaN power transistor (Industry standard TO220 package) Fig2. GaN power transistors on Si substrate

The PSJ structure (Note 1) is of a superb technology to suppress current collapse (Note 2) without field plates essential for the conventional GaN-based high-voltage devices (Note 3). POWDEC proposed a PSJ technology as a new structure of GaN transistors in collaboration with the University of Sheffield and prepared a device on a sapphire substrate, and proved its operation as a transistor in 2011. For commercialization, the Company has developed on a silicon substrate, less expensive than sapphire, with excellent characteristics of heat dissipation since 2012.

In the meanwhile, POWDEC developed device and process technology, which included high-quality GaN epitaxial growth on a large-scale silicon-substrate, optimization of charge balance between electrons and holes in the PSJ area and optimization of p-type GaN gate formation process. These achievements of devices fabricated on a 150mm silicon-substrate leads to obtaining a breakdown-voltage of higher than 600V and an saturation current of higher than 10 A.

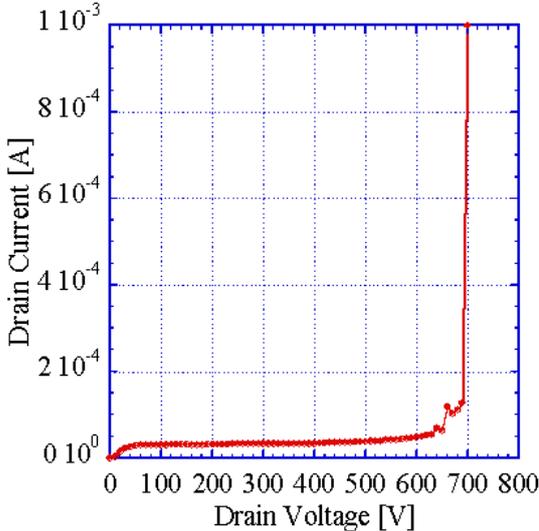


Fig3. Voltage characteristics of the prototype Broken-down around 700V

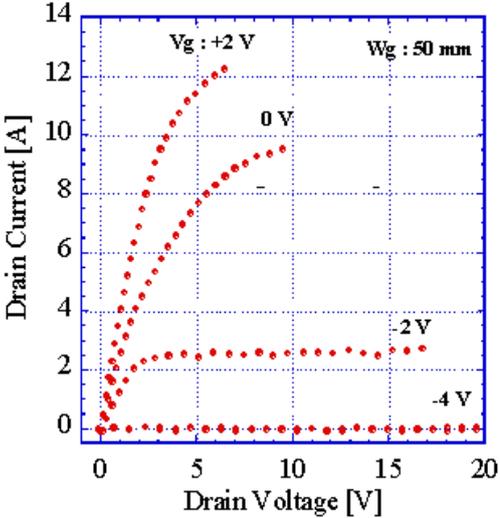


Fig4. Current characteristics

POWDEC believes these results promote the PSJ GaN power devices to high-voltage and high-current applications.

POWDEC will complete development of the volume production technology of 600V devices on 150mm silicon substrates by this fiscal year-end, and scheduled to commence to produce GaN power sample devices by outsourcing production in 2014. In the future, the Company commits further improvement of device characteristics (i.e. higher voltage, higher current, and normally-off) as well as the development of GaN epitaxial growth process technology for 200mm-silicon substrates. POWDEC aims to fabricate transistors with a breakdown voltage of 1,200 V or higher in 2015, and devices with a breakdown voltage of 3,000V and a saturation-current of 50A or higher in 2016.

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About POWDEC K.K.

POWDEC is one of the industry leaders in the development and production of high quality Gallium Nitride (GaN) semiconductor wafers and devices. POWDEC focuses on delivering next-generation semiconductor power devices to create an energy efficient, green future. POWDEC is based in Oyama City, Tochigi, Japan (45 minutes by train from Tokyo). For more information, visit www.powdec.co.jp/e/ or email us at info2@powdec.co.jp

Note 1: Polarization Super Junction structure

An epitaxial structure to moderate the electric field stress through polarization charges induced in the AlGaN layer

<http://www.powdec.co.jp/whatsnew/pdfs/Powdec-20111108.pdf>

Note 2: Current collapse

A unique phenomenon for GaN-based transistor where the drain current diminishes at high-voltage operation

Note 3: Field plate

An electrode structure spanning over the channels to relax the electric field stress at the edge of transistor electrodes