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650-V GaN HEMT Comes In a Compact TOLL Package

ROHM Semiconductor's GNP2070TD-Z is a 650-V, 70-mΩ GaN HEMT in the TO-Leadless (TOLL) package. According to the company, this device has achieved the industry's highest class FOM (R_{on} x C_{iss} and R_{on} x C_{oss}). It is a member of the EcoGaN series, which contributes to power conversion efficiency and size reduction by making the best use of low on-resistance and high-speed switching. Additionally, it has ESD protection built-in for high-reliability design.

Applications include power supplies for servers, communication base stations, industrial equipment and other end products; ac adapters (USB chargers), PV inverters, energy storage systems; and a wide range of power supply systems with 500-W to 1-kW output power.

Featuring a compact design with excellent heat dissipation, high current capacity, and superior switching performance, the TOLL package is increasingly being adopted in applications that require high power handling, particularly inside industrial equipment and automotive systems (see the figure). For this launch, package manufacturing has been outsourced to ATX Semiconductor (Weihai).

ROHM began mass production of its first-generation 650-V GaN HEMTs in April 2023, followed by the release of power stage ICs that combine a gate driver and 650-V GaN HEMT in a single package. This time, ROHM has developed the product incorporating second-generation elements in a TOLL package and added it to the existing DFN8080 package to strengthen ROHM's 650-V GaN HEMT package lineup— meeting the market demand for even smaller and more efficient high-power applications (see the table).

The new products integrate second-generation GaN-on-Si chips in a TOLL package, achieving industry-leading figures of merit for $R_{DS(ON)} \times Q_{oss}$. This contributes to further miniaturization and energy efficiency in power systems that require high voltage resistance and high-speed switching.

To achieve mass production, ROHM leveraged proprietary technology and expertise in device design, cultivated through a vertically integrated production system, to carry out design and planning. Under the collaboration announced in December 2024, front-end processes are carried out by TSMC; back-end processes are handled by ATX. In addition, ROHM plans to partner with ATX to produce automotive-grade GaN devices.

In response to the increasing adoption of GaN devices in the automotive sector, which is expected to accelerate in 2026, ROHM plans to ensure the rapid introduction of automotive-grade GaN devices by strengthening these partnerships, in addition to advancing its own development efforts. The products will be available at DigiKey, Mouser and Farnell from March, and will also be offered at other online distributors as they become available.

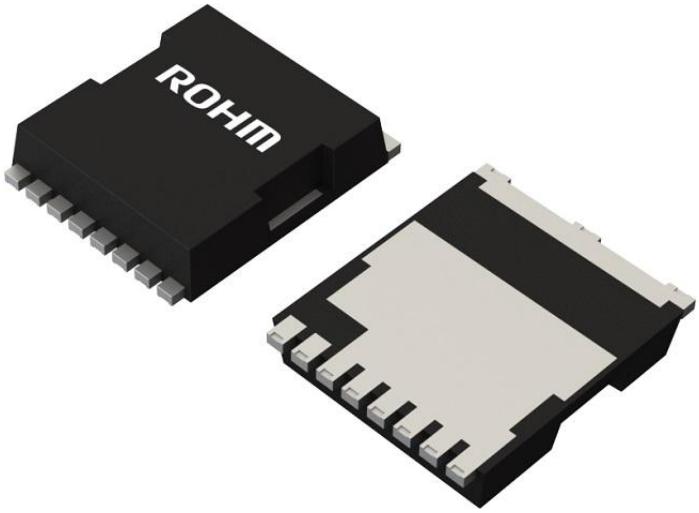

Figure. The GNP2070TD-Z 650-V enhancement-mode GaN HEMT is designed for high-performance power conversion applications. It has a typical on-resistance of 70 mΩ and a low gate charge of 5.2 nC, enabling superior efficiency and fast switching. Encased in a compact TOLL-8N package, which measures 11.68 mm × 9.9 mm × 2.4 mm, this device is well suited for high-switching-frequency and high-density converters, making it suitable for modern power systems demanding high efficiency and compact designs.

Table. The GNP2070TD-Z is the first of three GaN HEMTs to be offered by ROHM in the TOLL package. This 70-mohm transistor has very low FOMs (R_{on} x C_{iss} and R_{on} x C_{oss}).

Part No.	Drain-Source Voltage V_{DS}(Max.) [V]	Drain Current I_D[A] T_C=25°C	Drain-Source ON Resistance $R_{DS(on)}$(Typ.) [mΩ]	Total Gate Charge Qg(Typ.) [nC]	Output Charge Q_{oss}(Typ.) @400V [nC]	Reverse Recovery Charge Qrr(Typ.) [pF]	Package [mm]
New GNP2070TD-Z	650	27	70	5.2	50	0	 TOLL-8N [11.68×9.90×2.40]
☆ GNP2050TD-Z		32	50	6.7	58		
☆ GNP2025TD-Z		47	25	13.4	138		

☆: Under Development