Toshiba launches 650V 3rd generation SiC MOSFETs in compact TOLL package

New devices enhance efficiency and power density for demanding industrial applications

Düsseldorf, Germany, 2nd September 2025 – Toshiba Electronics Europe GmbH ("Toshiba") announces the release of three new 650V silicon carbide (SiC) MOSFETs, which incorporate its latest 3rd generation SiC MOSFET chips. The TW027U65C, TW048U65C, and TW083U65C are housed in a surface-mount TOLL package and are designed to reduce switching losses in industrial equipment. They are suitable for a wide range of demanding power applications, including switched-mode power supplies (SMPS) in servers, data centres and communications equipment, uninterruptible power supplies (UPS), EV charging stations, and power conditioners for photovoltaic (PV) inverters.

Compared to lead-inserted packages, such as the TO-247 and TO-247-4L(X), these new devices significantly reduce volume by more than 80%. This substantial miniaturisation directly contributes to improved equipment power density. Furthermore, the surface mounting capability of the TOLL package allows for the use of smaller parasitic impedance components, including resistors and inductors, which in turn leads to a reduction in switching losses.

The TOLL package is a 9-pin, 4-terminal package designed to facilitate the use of a Kelvin connection for its signal source terminal for the gate drive. This advanced design minimises the influence of inductance in the source wire within the package, thereby achieving high-speed switching performance. For example, the TW048U65C demonstrates a notable reduction in turn-on loss (E_{on}) of approximately 55% and turn-off loss (E_{off}) of around 25% compared to Toshiba's equivalent product that uses the TO-247 package without a Kelvin connection. This improvement directly contributes to reducing power loss in equipment.

Toshiba's 3rd generation SiC MOSFETs feature an optimised drift resistance and channel resistance ratio, leading to good temperature dependence of drain-source on-resistance ($R_{DS(on)}$) across a wide range of operating conditions. They also exhibit low $R_{DS(on)}$ x gate-drain charges (Q_{gd}), a crucial figure of merit (FOM), further enhancing their performance. All variants feature an absolute maximum drain-source voltage (V_{DSS}) of 650V and a wide gate-source voltage (V_{GSS}) range of -10V to 25V, allowing compatibility for various gate drive circuits, simplifying circuit design. The gate threshold voltage (V_{th}) for these devices typically ranges from 3.0V to 5.0V, which also helps simplify circuit design. Furthermore, the high drain current (I_D) rating ensures robust operation under demanding conditions, enhancing system reliability.

Looking forward, Toshiba is committed to the continuous expansion of its MOSFET lineup to further contribute to improved equipment efficiency and increased power capacity across various industrial sectors.

For more information on the new products, please see the following pages:
TW027U65C
TW048U65C
TW083U65C

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About Toshiba Electronics Europe
Toshiba Electronics Europe GmbH (TEE) offers European consumers and businesses a wide variety of hard disk drive (HDD) products plus semiconductor solutions for automotive, industrial, IoT, motion control, telecoms, networking, consumer and white goods applications. Next to HDDs, the company's broad portfolio encompasses power semiconductors and other discrete devices ranging from diodes to logic ICs, optical semiconductors as well as microcontrollers and application specific standard products (ASSPs) amongst others.

In addition, TEE also offers SCiB™ battery cells and modules with lithium titanium oxide (LTO) for heavy-duty applications and Silicon Nitride (SiN) ceramic substrates used in power semiconductor modules, inverters and converters for their heat dissipation characteristics and strength.

TEE has its headquarters in Düsseldorf, Germany, with branch offices in France, Italy, Spain, Sweden and the United Kingdom providing marketing, sales and logistics services.
Visit Toshiba's websites at www.toshiba.semicon-storage.com, www.scib.jp/en and www.toshiba-tmat.co.jp/en/ for further company and product information.

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News Release

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