



PMI: Hybrid SiC device



PPI: 125 mm IEGT

Power MOSFET

TOSHIBA is developing power MOSFET for the consumer, automotive and industrial market.

For Low-Voltage MOSFET ($V_{DSS} \geq 30V$ to 250V) TOSHIBA has released the "U-MOS VIII-H" and "U-MOS IX-H" series featuring improved ON-resistance and switching performance compared to conventional series. U-MOS stands for Trench MOS.

For mid- to high-voltage MOSFET ($V_{DSS} \geq 600V$ to 800V), TOSHIBA has started series production of the super junction structure using the "Single-Epitaxial (SE) process" for 600V as technology leader from 2012.

That technology is now being expanded to higher voltages like 650V, 800V and in conjunction with fast recovery body-diodes.

TOSHIBA will further improve the MOSFET performance (package and silicon) and so to contribute to high-efficiency and downsizing of various power electronics systems.

High Power Devices

Key markets for TOSHIBA's high power devices ($V_{CES} \geq 1700V$ to 4500V) are industry, railway transportation, power quality, transmission and distribution. Required features are "Energy Saving" and "High Efficiency". To respond to such challenges, TOSHIBA had released the IEGT (Injection Enhanced Gate Transistor) technology tailored to cope with high breakdown voltages and low power losses. Higher junction temperature and higher current rating products will support such customer requirements. Two main packages are currently available: PPI (Press Pack IEGT) and PMI (Plastic Module IEGT).

PPI ($V_{CES} = 3300V, 4500V$) are TOSHIBA original packages using pressure contact structures. Basic features are specifically downsizing, much higher power density, high efficiency and high reliability in the field of electricity conversion such as industrial drive systems, power quality and HVDC (High Voltage Direct Current).

TOSHIBA is also adopting new compound material like SiC (Silicon Carbide). So, new discrete devices like SiC SBD (650V, 1200V) and hybrid SiC (Silicon IEGT + SiC SBD) in 1700V and 3300V are already available in the market. SiC MOSFET (1200V) will be released soon as well. Those products are realizing much lower power losses, much higher efficiency compared to conventional silicon-based power devices.



Discrete packages for low and high voltage MOSFETs