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## A High Voltage Lateral Trench Power MOSFET with Low Specific On-Resistance

Vertical trench lateral power MOSFETs (metal-oxide-semiconductor field effect transistors) exhibit lower specific on-resistance compared to traditional lateral structures, but it has been difficult to extend their voltage ratings above 100V. Researchers at Rensselaer have developed an enhanced multi-trench design solution where the gate and drain are decoupled by placing them in separate trenches.

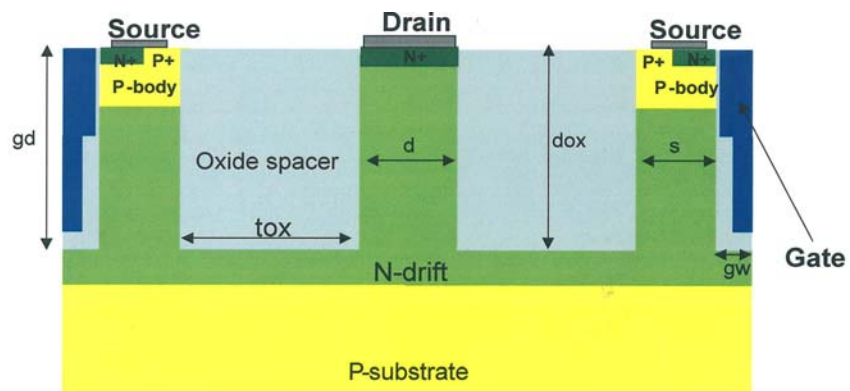
This design has now been enhanced by a planar drain structure, creating a device where the drift region “wraps around” three sides of the oxide spacer. This significantly reduces the cell pitch, reducing specific-on-resistance and chip area. The design is further improved by adding gate field plate structures, isolated from the drift region by a thick oxide layer. The field plates allow deeper trenches while helping preserve a robust breakdown voltage.

### ► Advantages

- Significant reduction in specific on-resistance at 250V
- Reduced cell pitch leads to a smaller chip area (and corresponding cost savings) for a given current rating
- Reduced gate-to-drain capacitance, compared to conventional trench lateral power MOSFETs
- Breakdown voltage can be tailored by changing oxide spacer width and trench

### ► Applications

- Can be integrated with conventional or trench CMOS technology
- Can be used to implement power IC applications such as Voltage Regulator Module for computer power supplies, etc.



### ► Publication

*“250V Integrable Silicon Lateral Trench Power MOSFETs with Superior Specific On-Resistance”, Proceedings of the 19th Int’l Symposium on Power Semiconductor Devices & ICs [1-4244-1095-9] ; 2007; pg. 233*

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