一种高性能快速关断型槽栅 MOS 器件

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摘　要：提出了一种高性能快速关断型槽栅 MOS 器件.与常规型器件相比，这种新型器件在氧化槽内引入了两个垂直场板，这不仅使得器件在漂移区内引入了两个新的电场峰值，增大了器件的击穿电压 BV，而且使得器件垂直漏场板周围形成了一层浓度更大的积累层，降低了导通电阻.故提高了器件的巴利加优值 FOM.由于这种新型器件纵向栅、漏场板之间存在的垂直场板使得影响器件开关速度的栅漏电容值部分转化为器件的栅源电容以及漏源电容.结果分析表明：氧化槽宽度为 1.7μm、漂移区浓度为 2.3×10^{15} cm^{-3} 时这个新型器件巴利加优值 FOM 提升了 84.8%，栅漏电荷 Q_{GD} 提升了 26.8%.

关键词：金属场板；巴利加优值；栅漏电容；氧化槽

A Trench Metal-Oxide-Semiconductor with High-speed Shutoff for High Performance

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Abstract：A Trench Metal-Oxide-Semiconductor (T-MOS) with high-speed shutoff for high performance is proposed. Compared with conventional device, two vertical field planes are inserted into oxide trench in this new device, which introduce two new electric field peaks in the drift region to increase breakdown voltage and form a high electron-accumulated layer around the vertical drain field plane to decrease the specific on-resistance. Therefore, Baliga's figure of merit (FOM) of this new device is improved. Furthermore, due to the vertical field plane between the gate and drain field plane in this new device, it can lead to the gate-to-drain capacitance partly transferred to gate-to-source capacitance and drain-to-source capacitance. The results show that the proposed device with t_w=1.7μm and N_d=$2.3\times10^{15}cm^{-3}$ can achieve the Baliga's figure of merit of 84.8% improvement and drain-to-source charge of 26.8% improvement.

Key words：metal field plane; baliga's figure of merit; gate-to-drain capacitance; oxide trench

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