LATERAL JUNCTION VARACTOR WITH LARGE TUNING RANGE

ABSTRACT

Large tuning range junction varactor includes first and second junction capacitors coupled in parallel between first and second varactor terminals. First and second plates of the capacitors are formed by three alternating doped regions in a substrate. The second and third doped regions are of the same type sandwiching the first doped region of the second type. A first varactor terminal is coupled to the second and third doped regions and a second varactor terminal is coupled to the first doped region. At the interfaces of the doped regions are first and second depletion regions, the widths of which can be varied by varying the voltage across the terminals from zero to full reverse bias. At zero bias condition, junction capacitance (C_{max}) is enhanced due to summation of two junction capacitances in parallel. At reverse bias condition, with the merging of the two junction depletion widths, the capacitor areas are drastically reduced, thereby reducing C_{min} significantly. Thus, tuning range C_{max}/C_{min} is significantly increased. Tuning range with this configuration can be increased infinitely by increasing the horizontal lengths of the second and third diffusion regions.

Fig. 4a