Abstract： Space charge formation and evolution, charge trap distribution, and depolarization process in linear low density polyethylene (LLDPE) samples with semiconducting electrodes subjected to dc electric stress were systematically studied using the techniques of laser induced pressure pulse and thermally stimulated discharge. Space charge distribution and evolution in the samples showed obviously the characteristics of rapid and symmetrical injection of homo-charges from the two electrodes. The interface between the semiconducting electrode and LLDPE showed approximately ohmic contact properties. The charge trap distribution in LLDPE was characterized by shallow bulk traps and deep surface layer traps. Hot-pressing conditions between the semiconducting electrode and LLDPE or contamination of the surface layer of LLDPE by the semiconducting electrode material has a remarkable effect on energy distribution of the surface layer traps, resulting in depth and density decrease of the deeper traps and density increase of the shallower traps in the surface layer. During the whole short-circuit depolarization process, the centers of positive charges and negative charges in the sample shifted to their nearer electrodes, respectively, whereas behaviors different from the short-circuit depolarization were seen in the later stage of the open-circuit depolarization, that is, the positive charges captured in the deep surface layer traps were detrapped and shifted to the rearer electrode.