Captions to the figures

Figure 1. Dark current as a function of the electron irradiation fluence and of the negative drive pulse voltage V_{ee}^{V} at T = −26°C, V_{ee}^{H} = −8.00 V. The device is JS14/026, irradiated unbiased.

Figure 2. Dependence of the dark current on the electron irradiation fluence and on the negative drive pulse voltage V_{ee}^{V} at T = −26°C, V_{ee}^{H} = −8.00 V. The device is JS8/053, irradiated under bias and clocked. Dashed line shows the increase of the interface state density after irradiation to 1.7×10^{11} electrons/cm^2 and storage at room temperature for 48 days.

Figure 3. Dark current as a function of the neutron irradiation fluence and of the negative drive pulse voltage V_{ee}^{V} at T = −26°C, V_{ee}^{H} = −8.00 V (device JS14/036).

Figure 4. Dark current in device JS14/026 as a function of the temperature and the electron irradiation fluence for MPP and normal mode of operation.

Figure 5. Temperature dependence of the DCP in device JS14/026. Measurements after irradiation to 1.7×10^{12} electrons/cm^2 were performed at $V_{ee}^{V} = -10$V and $V_{cc} = 4$V. The rest were measured at $V_{ee}^{V} = -9$V and $V_{cc} = 5$V.

Figure 6. DCP as a function of the width of the vertical shift pulse and of the temperature in device JS14/026, irradiated to 8.5×10^{11} electrons/cm^2. The values of $V_{ee}^{V} = -9$V and $V_{cc} = 6$V were used during the measurement.

Figure 7. Dependence of the DCP on the amplitude of the vertical shift pulse for device JS14/026, given for two different widths of the pulse and for an irradiation level of 1.7×10^{11} electrons/cm^2. The dependence on V_{ee}^{V} is measured at $V_{cc} = 6$V (a); the dependence on V_{cc} is for $V_{ee}^{V} = -9$V (b).

Figure 8. Band diagram showing the generation of DCP: (a) tunneling of holes to the valence band, (b) impact ionization and creation of electron-hole pairs, (c) electrons are collected in the potential well. The inset shows the actual movement of holes at the border between two phases.

Figure 9. Dark current distribution at +10°C in a S5466 CCD before irradiation (a), (b) (device JS8/053); in an electron irradiated to 1.7×10^{11} cm^{-2} CCD (c), (d) (device JS8/053); and in a neutron irradiated to 2.4×10^{8} cm^{-2} CCD (e), (f) (device JS14/036).

Figure 10. Typical clock sequence and a diagram of the consecutive transfer stages in the horizontal register of the S5466 CCD.

Figure 11. Typical clock sequence and a diagram of the consecutive transfer stages in the vertical register of the S5466 CCD.

Figure 12. Modeled HCTI and VCTI as a function of the temperature and of the background charge, with a concentration of the $V - V^{-}$ center of 5×10^{10} cm^{-3}. Widths of the clock pulses are $t_w^H = 2\mu$s and $t_w^V = 8\mu$s.

Figure 13. Modeled VCTI as a function of the temperature and of the background charge in the regions under P1 and P2 of the vertical register. Concentration of the $V - V^{-}$ center is 5×10^{10} cm^{-3}. Widths of the clock pulses are $t_w^H = 2\mu$s and $t_w^V = 8\mu$s. The curves for zero background current coincide.

Figure 14. CTI as a function of the temperature and of the electron irradiation fluence in device JS14/026 (a). Symbols are the experimental data; solid lines represent the modeled VCTI for the combination of two traps at $E_c-0.37$ eV and $E_c-0.44$ eV. The DCP as a function of the temperature was measured simultaneously with the CTI (b).

Figure 15. CTI as a function of the temperature in a neutron irradiated CCD (device JS14/036). Symbols indicate the experimental data; solid lines represent the modeled VCTI for the combination of two traps at $E_c-0.37$ eV and $E_c-0.44$ eV.