

## IV. COMMON MISUNDERSTANDING ON BUIRED PHOTODIODES

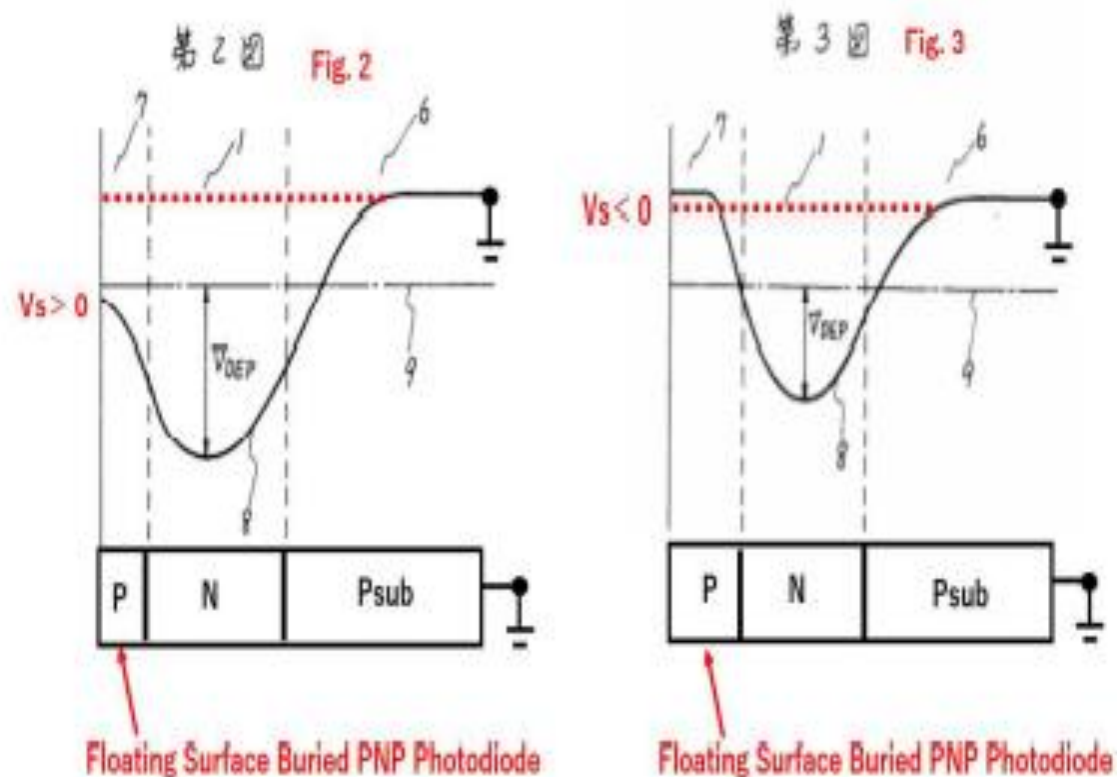


Fig. 11 NEC Patent (JPA1980-138026) on Floating Surface Photodiode

The NEC IEDM1982 paper is based on the NEC Japanese Patent Application JPA1980-138026 [2] filed in 1980 which shows a floating surface potential profiles of the double junction type Buried Photodiode. Since the surface is not pinned, the empty potential becomes floating and the complete charge transfer is not possible with the image lag problem. See Fig. 11. This is the evidence NEC photodiode was NOT Pinned Photodiode. NEC IEDM1982 reports the serious image lag problem as shown in Fig. 9 while the no-image-lag problem was already solved by 1975 in Sony, but Sony kept silent and focused for mass- production and yield-enhancement efforts. In 1984 two years later KODAK reported in IEDM1984 the pinned surface P+ photodiode and named it Pinned Photodiode [13]. See Fig.12. KODAK became the second company who recognized the importance of the pinned surface device.

[2] N. Teranishi, Y. Ishihara and H. Shiraki, JPA1980-138026 on Floating Surface Buried Photodiode with Floating Empty Potential Well

[13] B. C. Burkey, W. C. Chang, J. Littlehale, T. H. Lee, T. J. Tredwell, J. P. Lavine, E. A. Trbk, "The Pinned Photodiode for an Interline-transfer CCD Image Sensor", IEDM1984, Dig.of Tech. Papers, paper (2.3), (1984).