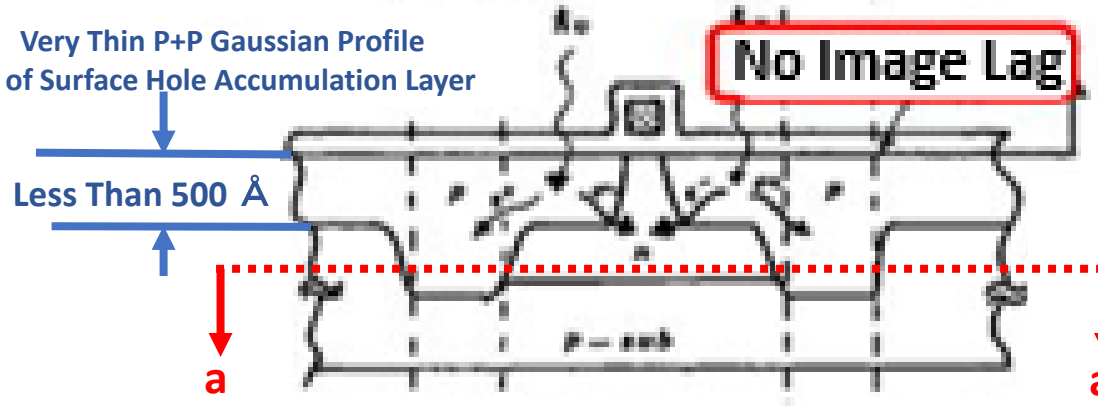
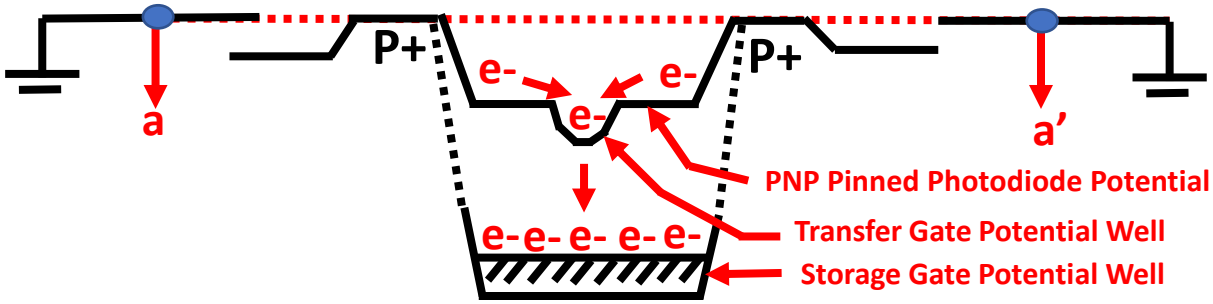
Evidence that Hagiwara developed the first Pinned Photodiode in 1978.

P+NP double junction Pinned Photodiode with adjacent P+ channel stops regions



Vertical CCD Transfer Gate Regions, being always completely depleted of photo electrons, give always the most highest short-wave photon-to-electron conversion efficiency.

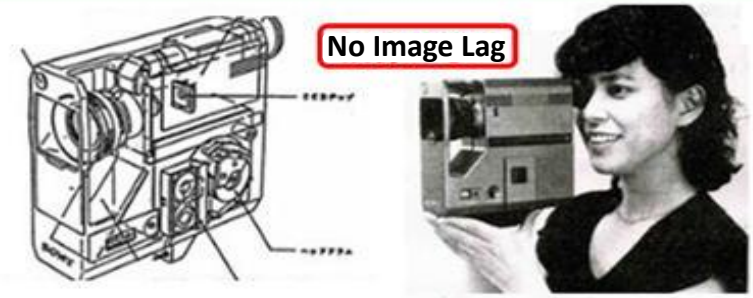


Only Vertical CCD Storage Gate Region Stores Photo Signal Electrons.

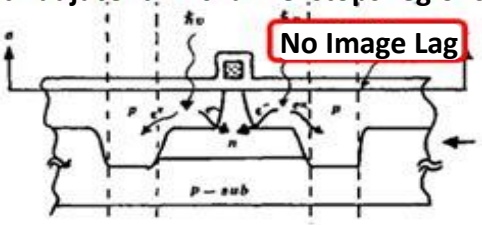
SONY HAD (Pinned Photodiode) Original Technical Publication in 1978 and the Tokyo and New York Press Conference in 1980

The original Pinned Photodiode (PPD) structure was invented by Hagiwara at Sony in 1975. The first one-chip color video camera with a FT CCD image sensor with PNP junction type Pinned Photodiode (PPD) was reported by Sony in 1980 at Tokyo Press Conference by Iwama Kazuo of Sony president, and at New York Press conference by Morita Akio of Sony chairman.

Sony original 570H x 498 V one-chip FT CCD Image Sensor with Pinned Photodiode, July 1980



P+NP double junction Pinned Photodiode with adjacent P+ channel stops regions



On July 1980, Iwama Kazuo at Sony Tokyo Press Conference and Morita Akio at New York Press Conference announced the one chip CCD video camera with the 8 mm VTR in one box.

See the Original 1978 Publication of the Pinned Photodiode Sensor

Y. Daimon-Hagiwara, M. Abe, and C. Okada, "A 380Hx488V CCD imager with narrow channel transfer gates," Proceedings of the 10th Conference on Solid State Devices, Tokyo, 1978; Japanese Journal of Appllied Physics , vol. 18, supplement 18–1, pp. 335–340, 1979

High quality picture of SONY HAD CMOS Image is also based on the Pinned Photodiode.