

CHRONOLOGY OF SILICON-BASED IMAGE SENSOR DEVELOPMENT

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The first PNP Double Junction Photodiode invented by Philips on March 9, 1975, with an image lag problem, caused by a RC delay time between the floating surface and the high-resistivity pinned back substrate.

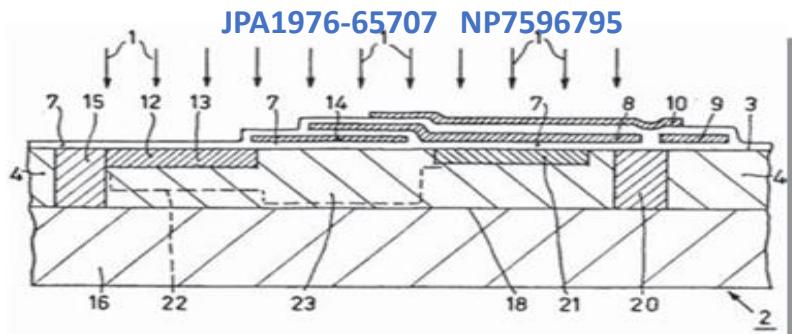


Figure 6. The double junction type buried photodiode image sensor reproduced from Netherland Patent Application NPA [6]

[6] Japanese Patent Application JPA1976-65707 (Patent No. 7596795, filed on June 9, 1975, Netherland)

[7] Y. Hagiwara, Japanese Patent Application JPA 1975-127646 on N+NP+NP-P+ Triple Junction Type Pinned Photodiode with Back Light Illumination with the CCD type MOS capacitor Buffer Memory for Global Shutter Function.

The first Pinned-surface PNP Double Junction type and the first Pinned-surface Triple Junction type Photodiodes, both invented by Sony (Hagiwara) on Oct 23, 1975, with Vertical Overflow Drain (VOD) function, Electric Shutter function and Global Shutter function with MOS-Capacitor Buffer Memory that created our new digital imaging and TV era.

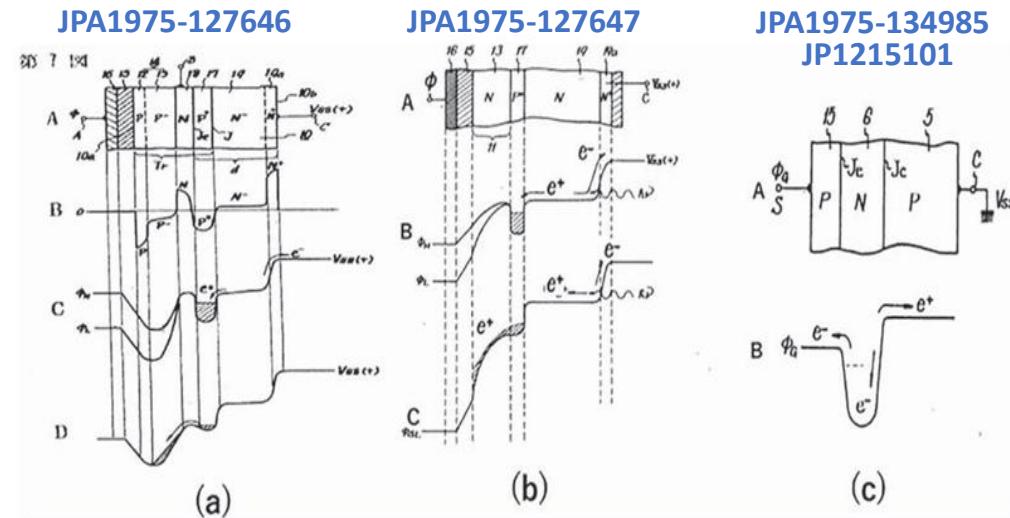


Figure 2. Reproductions from the Japanese Patent Applications of (a) the N+N-P+NP-P triple junction PPD, (b) the N+N-P+N double junction PPD, and (c) the PNP double junction PPD

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