

CHRONOLOGY OF SILICON-BASED IMAGE SENSOR DEVELOPMENT

Yoshiaki Daimon Hagiwara, IEEE Life Fellow
Sojo University, Kumamoto-city, Japan

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.

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.

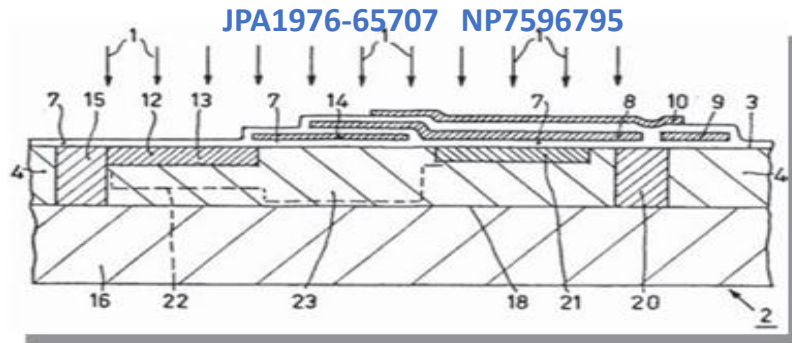


Figure 6. The double junction type buried photodiode image sensor reproduced from Netherland Patent Application NPA [6]

[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.

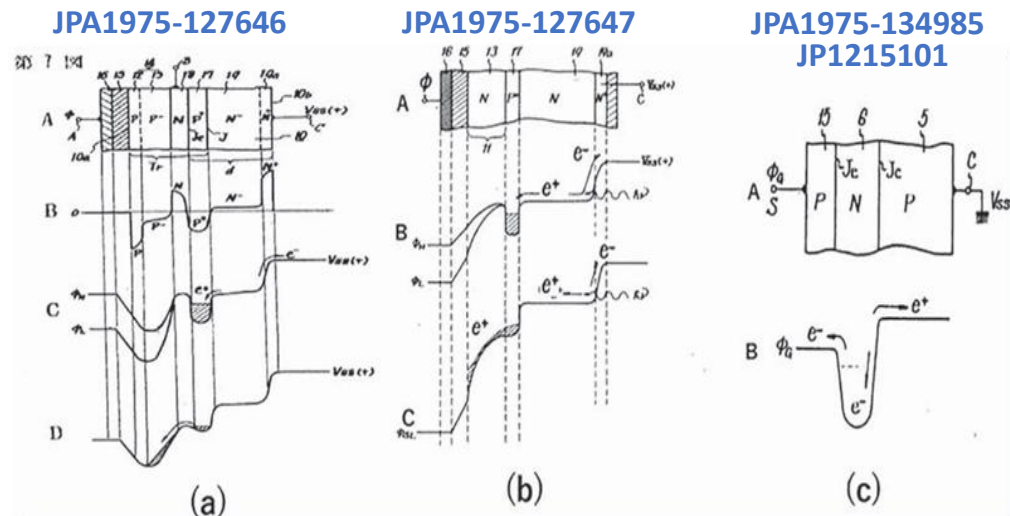


Figure 2. Reproductions from the Japanese Patent Applications of (a) the N+N-P+NP-P triple junction PPD, (b) the N+N-P+N double junction PPD, and (c) the PNP double junction PPD

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