III. Triple Junction Pinned Buried Photodiode

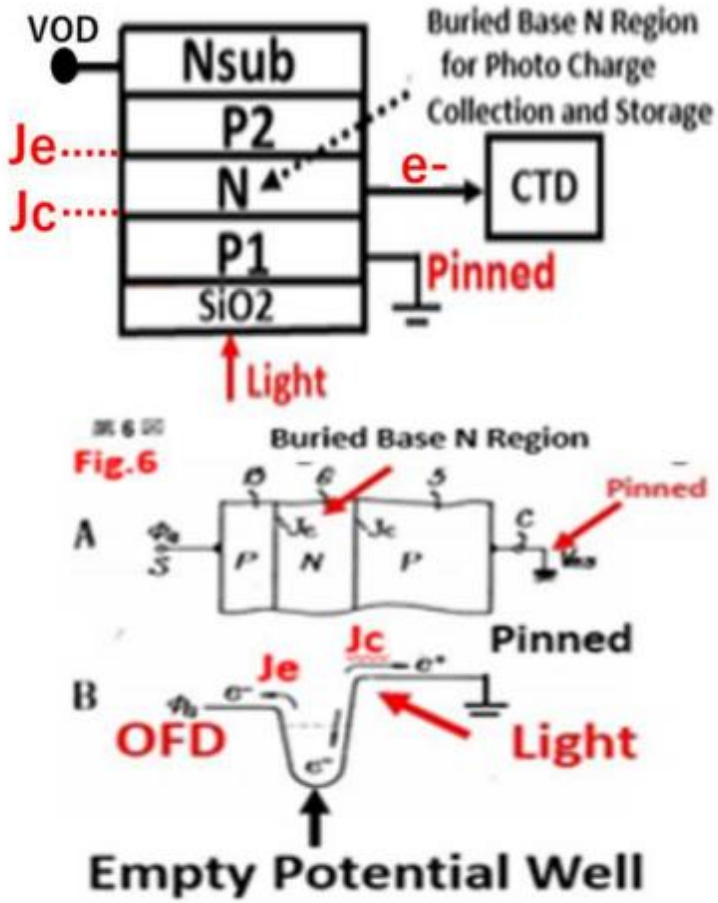

Fig 7 The patent claims in Japanese and an English translation with a reproduction of a figure drawn in Japanese patent application JPA1975-134985 which defined an PNP double junction dynamic photo transistor type Pinned Buried Photodiode with in-pixel overflow draining (VOD) capability.

.Fig.7 shows a reproduction of a PNP double junction type photodiode with an empty potential well of the buried N type storage region which is the result of complete charge transfer and draining action by the adjacent charge transfer device (CTD). Japanese Patent Application JPA1975-134985 defines a PNP double junction dynamic photo transistor structure type Pinned Photodiode in a substrate wafer, consequently forming a P+NPNsub triple junction dynamic photo thyristor type Pinned Buried Photodiode with the VOD function and the electrical function capability. English translation is given blow [4].

"In the semiconductor substrate (Nsub), the first region (P1) of the first impurity type is formed, on which the second region (N) of the second impurity type is formed. The photo charge is stored in the second region (N) and is transferred to the adjacent charge transfer device (CTD). Both are placed along the main surface of the semiconductor substrate. A rectifying (P2/N) emitter junction (Je) is formed on the second region (N) while the (N/P1) collector junction (Jc) is formed by the first region (P1) and the second region (N), forming a (P2/N/P1) photo transistor structure in the substrate (Nsub).."

[4] http://www.aiplab.com/JPA_1975_134985_on_PPD_with_VOD.html