This Patent is not valid.

The is PNP junction Buried Photodiode Patent.
The surface P layer can be depleted and not pinned.
This is NOT the P+NP junction type pinned photodiode.
See Hagiwara 1975-134985 patent (P+NPNsub type PPD)

NEC 1980-123259 Patent on Buried Photodiode
The surface can be depleted and not pinned. This is NOT a pinned photodiode patent.

NEC 1980-123259
Patent on Buried Photodiode
The surface can be depleted and not pinned. This is NOT a pinned photodiode patent.

This is merely PNP junction, NOT P+NP junction., which means that this is NOT a Pinned Photodiode. This is NOT more than a buried Photodiode.
The surface can be depleted and not pinned. This is NOT a pinned photodiode patent.

This is merely PNP junction, NOT P+NP junction., which means that this is NOT a Pinned Photodiode. This is NOT more than a buried Photodiode.