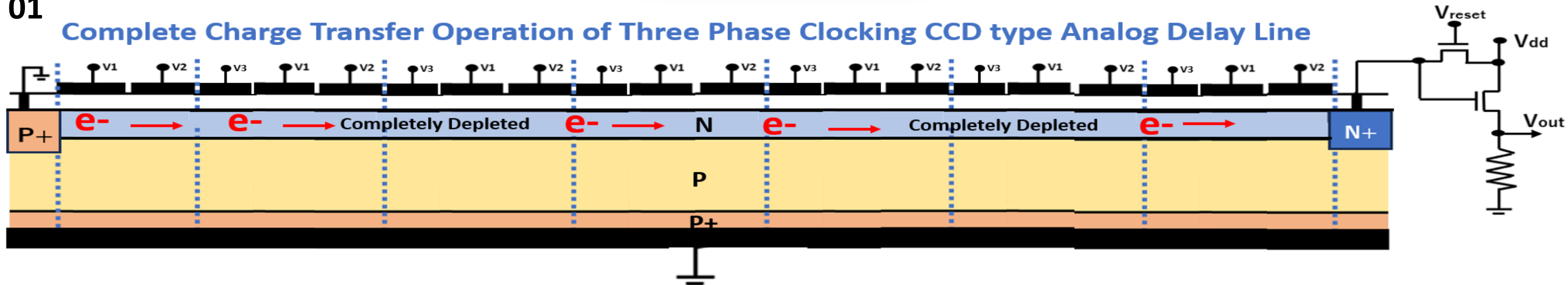


Complete Charge Transfer Operation of Three Phase Clocking CCD type Analog Delay Line

(A)

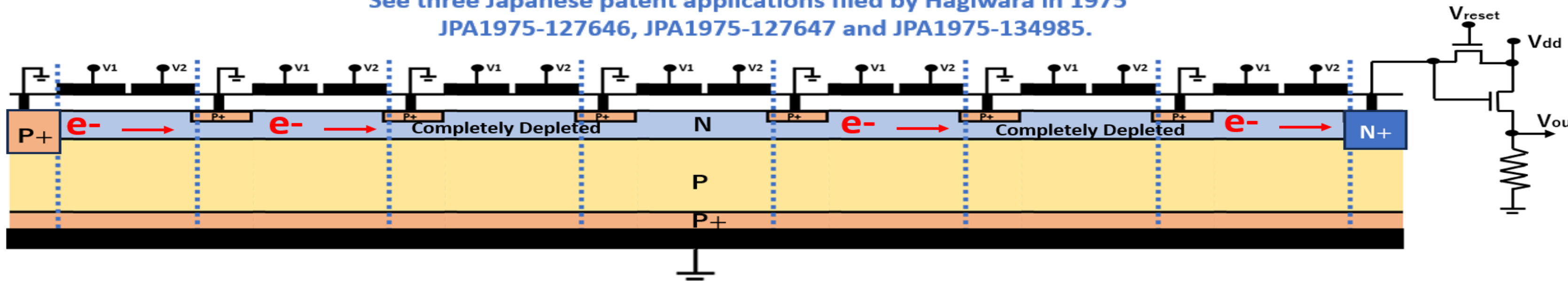


Complete Charge Transfer Operation of Two Phase Clocking Pinned Photodiode type Analog Delay Line

See three Japanese patent applications filed by Hagiwara in 1975

JPA1975-127646, JPA1975-127647 and JPA1975-134985.

(B)

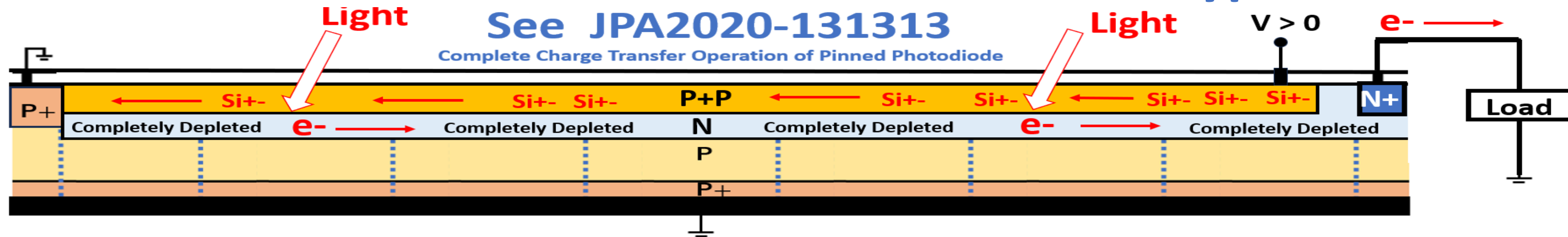


P+PNPP+ Double Junction Pinned Photodiode type Solar Cell

See JPA2020-131313

Complete Charge Transfer Operation of Pinned Photodiode

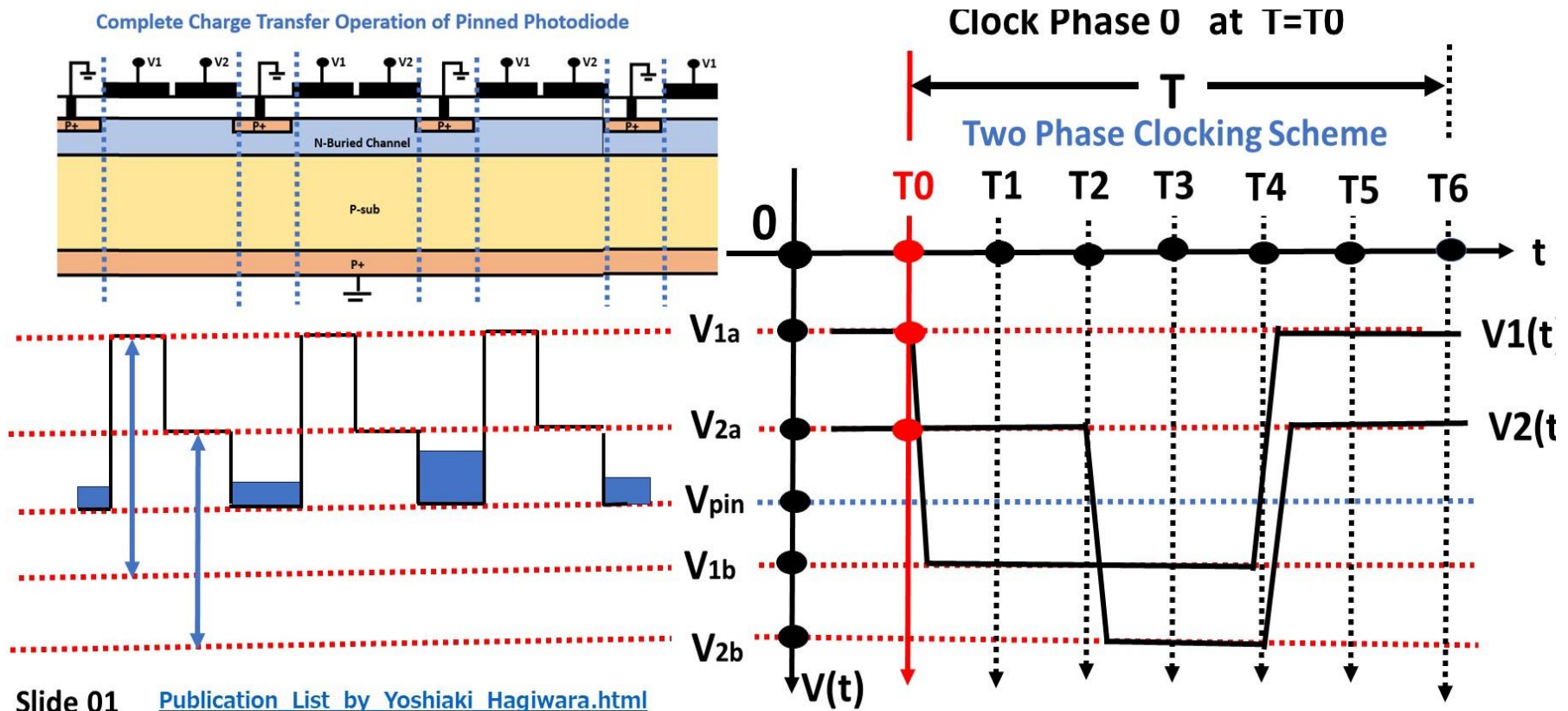
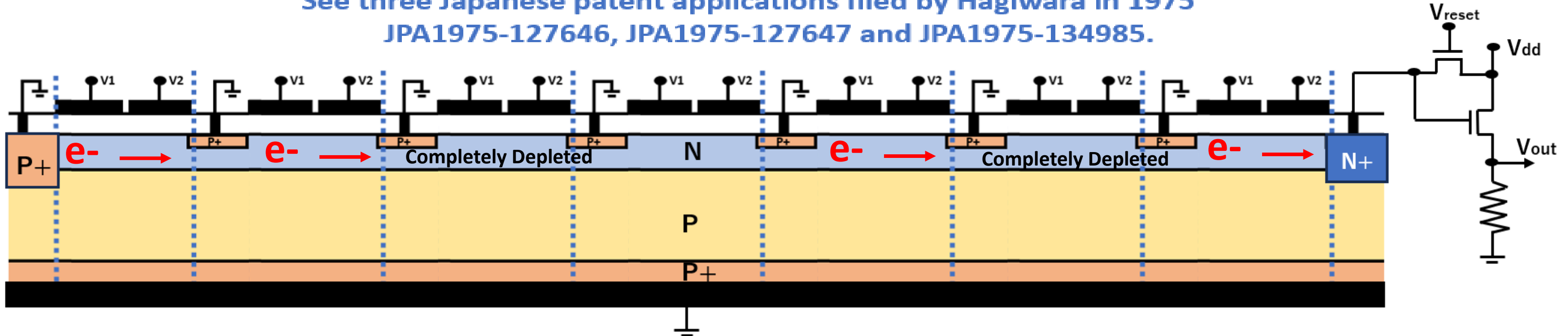
(C)



Complete Charge Transfer Operation of Pinned Photodiode

Virtual Phase Clock Operation Scheme became possible by the 1975 invention of Pinned Photodiode by Hagiwara at Sony

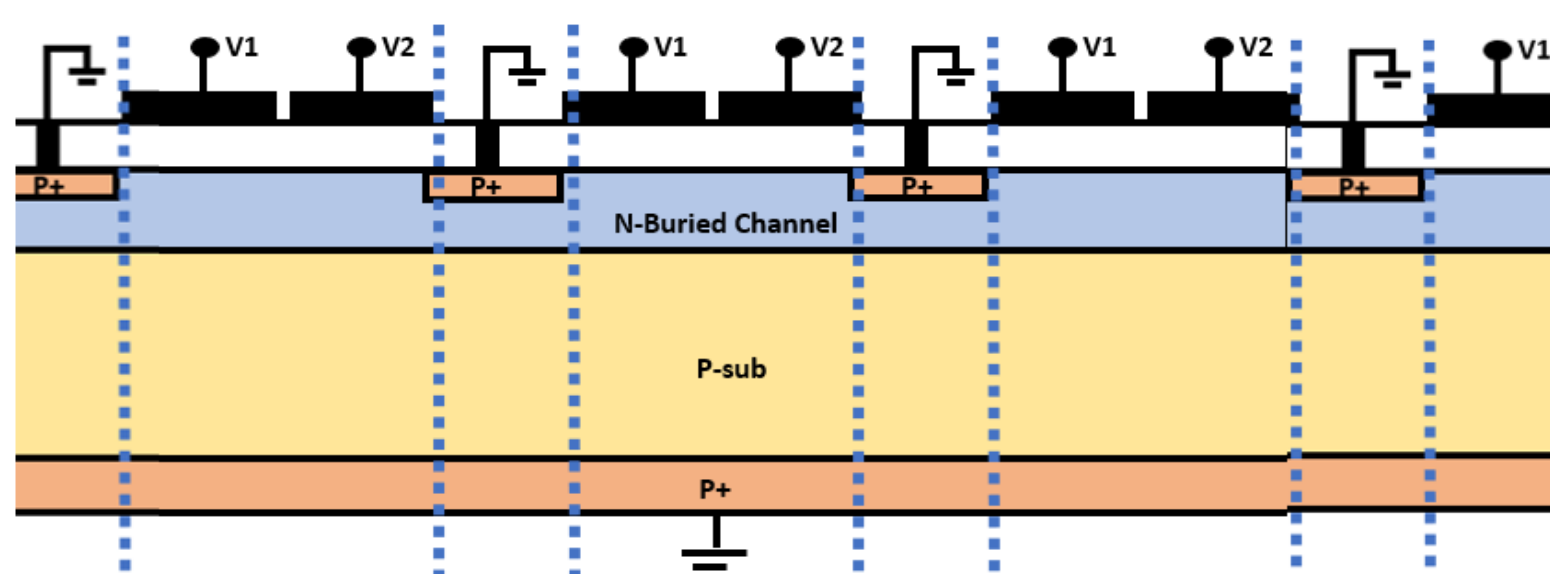
See three Japanese patent applications filed by Hagiwara in 1975
 JPA1975-127646, JPA1975-127647 and JPA1975-134985.



Complete Charge Transfer Operation of Two Phase Clocking Scheme is possible with only two electrodes and the Pinned Surface Buried N region. The impurity atom doping variation is not necessary to achieve the complete charge transfer directionality.

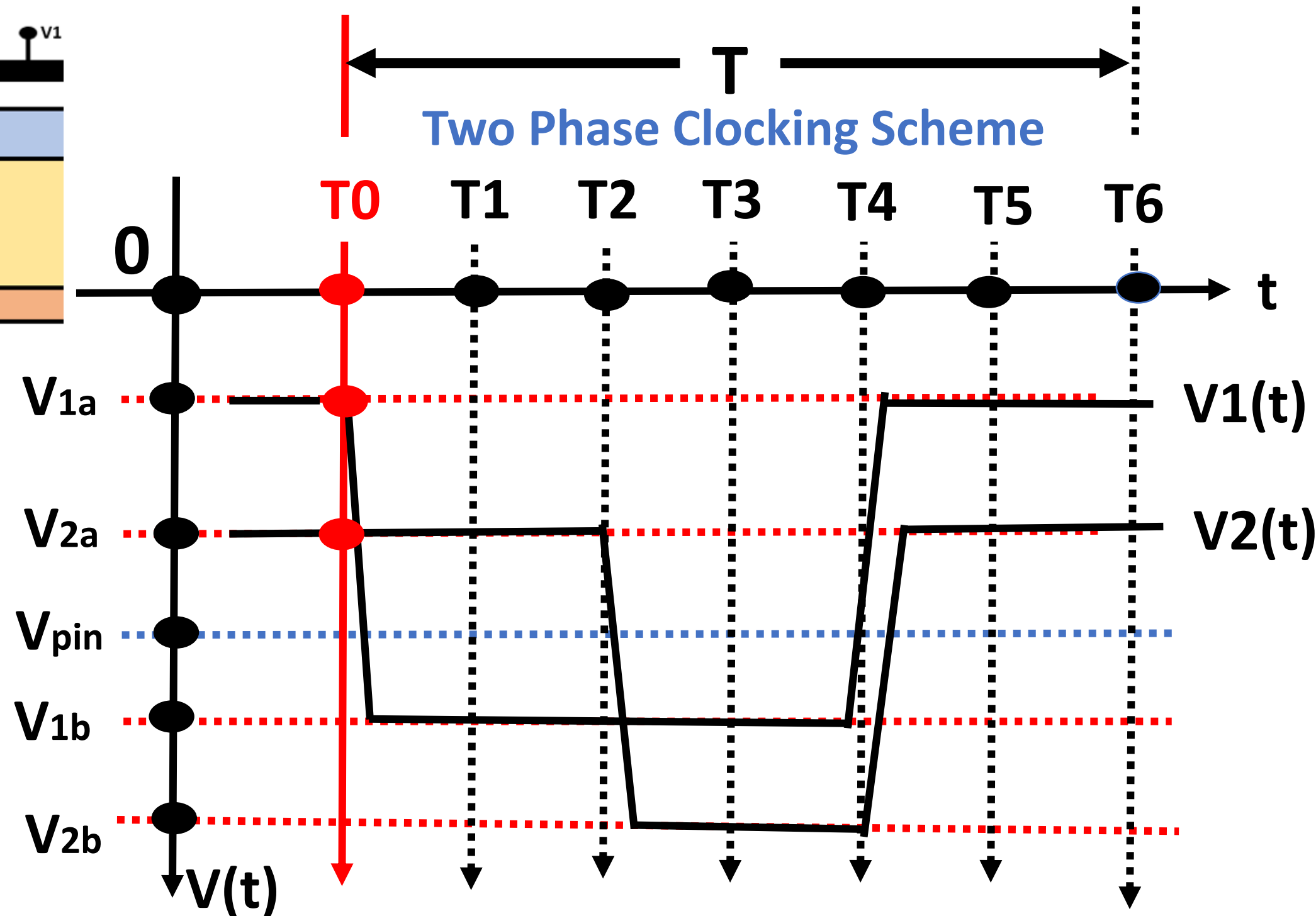
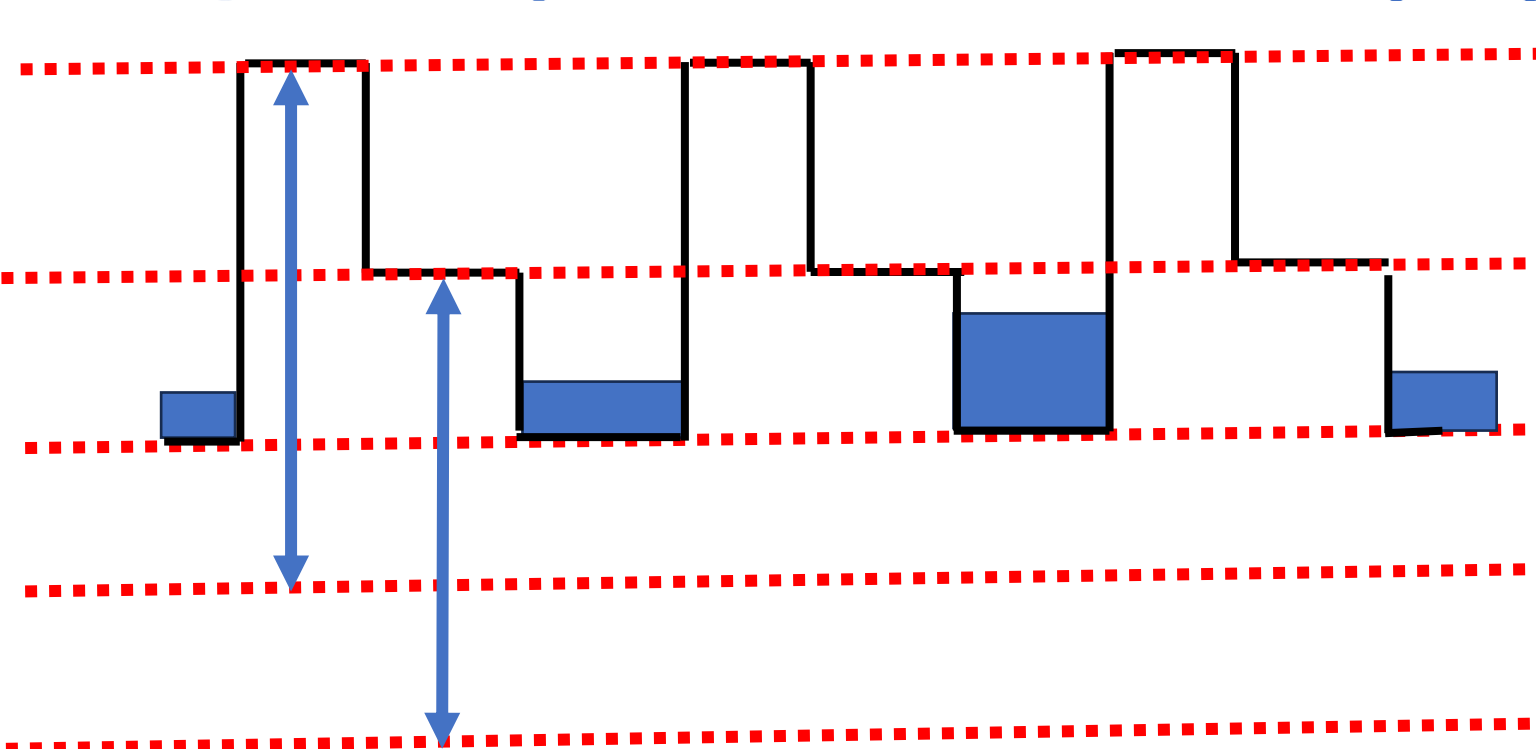
See three Japanese patent applications filed by Hagiwara in 1975
 JPA1975-127646, JPA1975-127647 and JPA1975-134985.

Complete Charge Transfer Operation of Pinned Photodiode



Clock Phase 0 at $T=T_0$

Two Phase Clocking Scheme

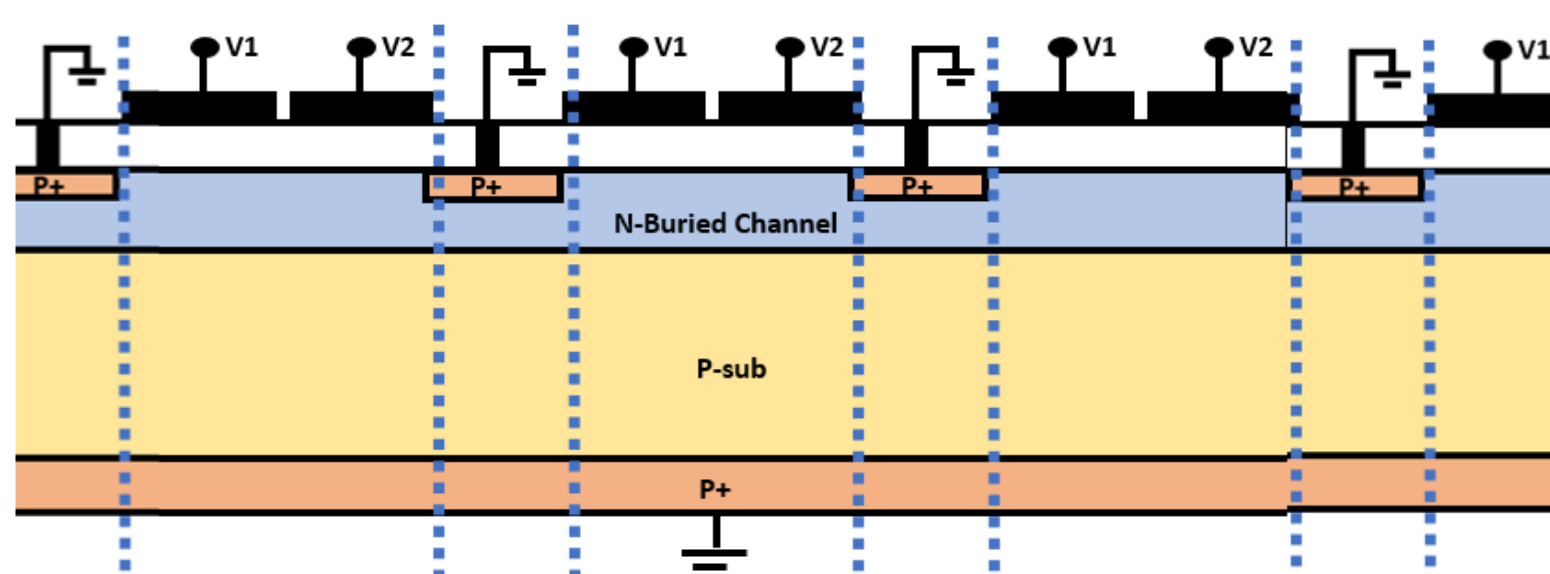


Complete Charge Transfer Operation of Pinned Photodiode

Virtual Phase Clock Operation Scheme became possible
by the 1975 invention of Pinned Photodiode by Hagiwara at Sony

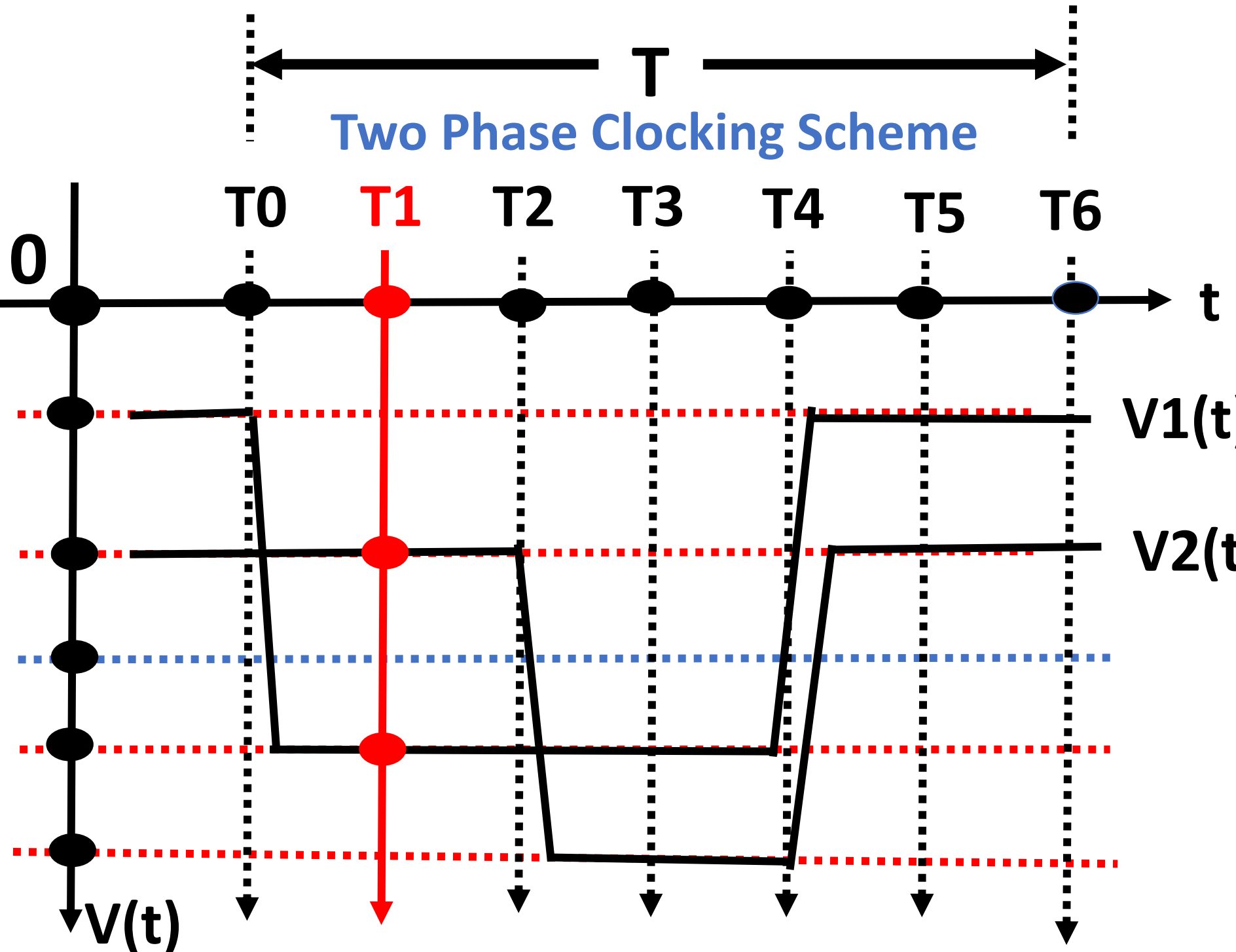
See three Japanese patent applications filed by Hagiwara in 1975
JPA1975-127646, JPA1975-127647 and JPA1975-134985.

Complete Charge Transfer Operation of Pinned Photodiode



Clock Phase 1 at $T=T1$

Two Phase Clocking Scheme

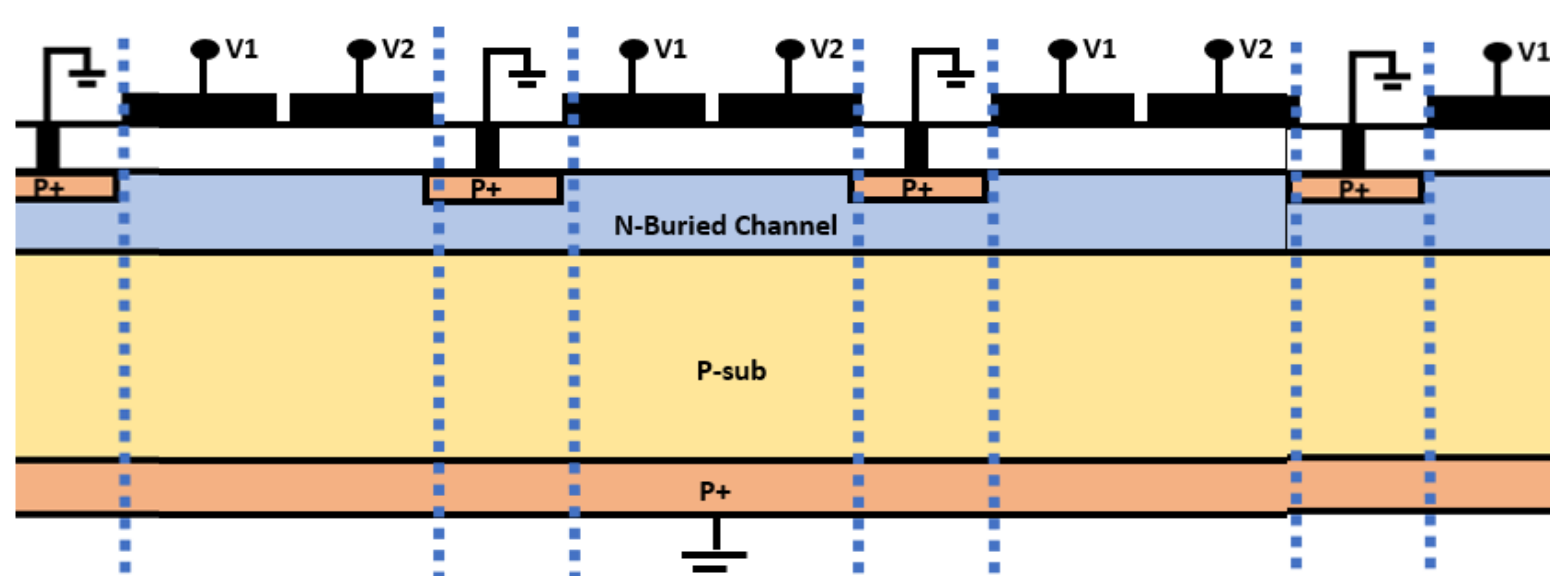


Complete Charge Transfer Operation of Pinned Photodiode

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by the 1975 invention of Pinned Photodiode by Hagiwara at Sony

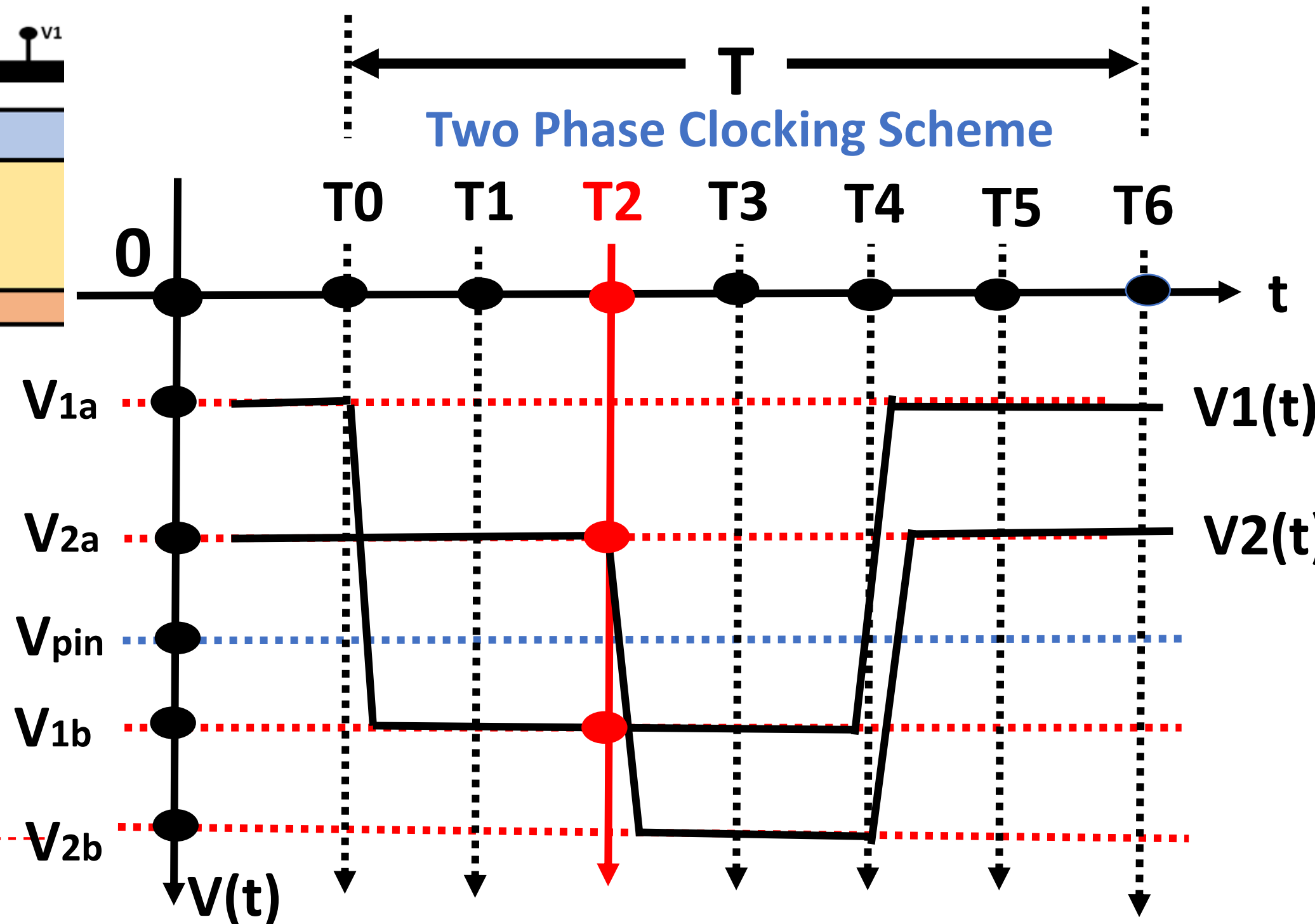
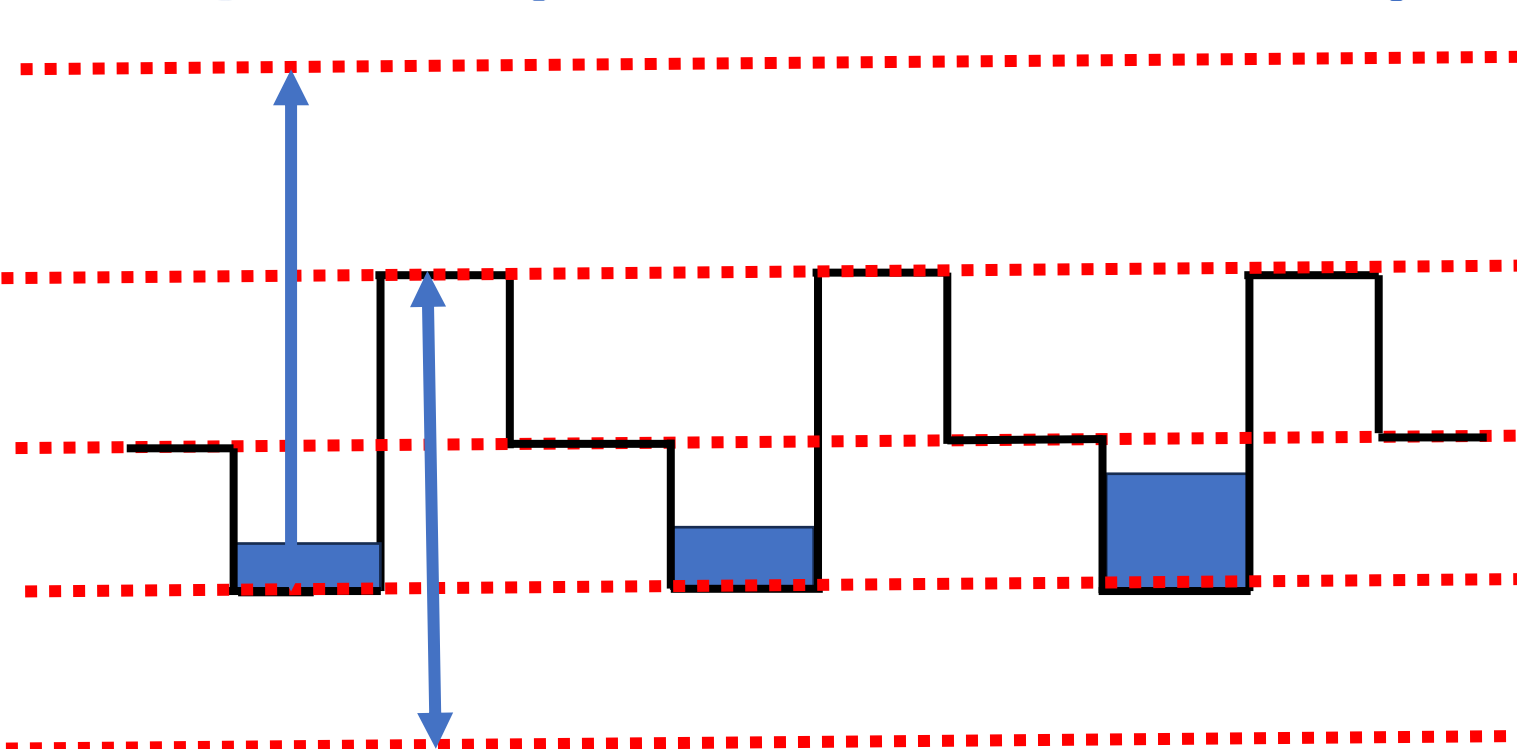
See three Japanese patent applications filed by Hagiwara in 1975
JPA1975-127646, JPA1975-127647 and JPA1975-134985.

Complete Charge Transfer Operation of Pinned Photodiode



Clock Phase 2 at $T=T2$

Two Phase Clocking Scheme

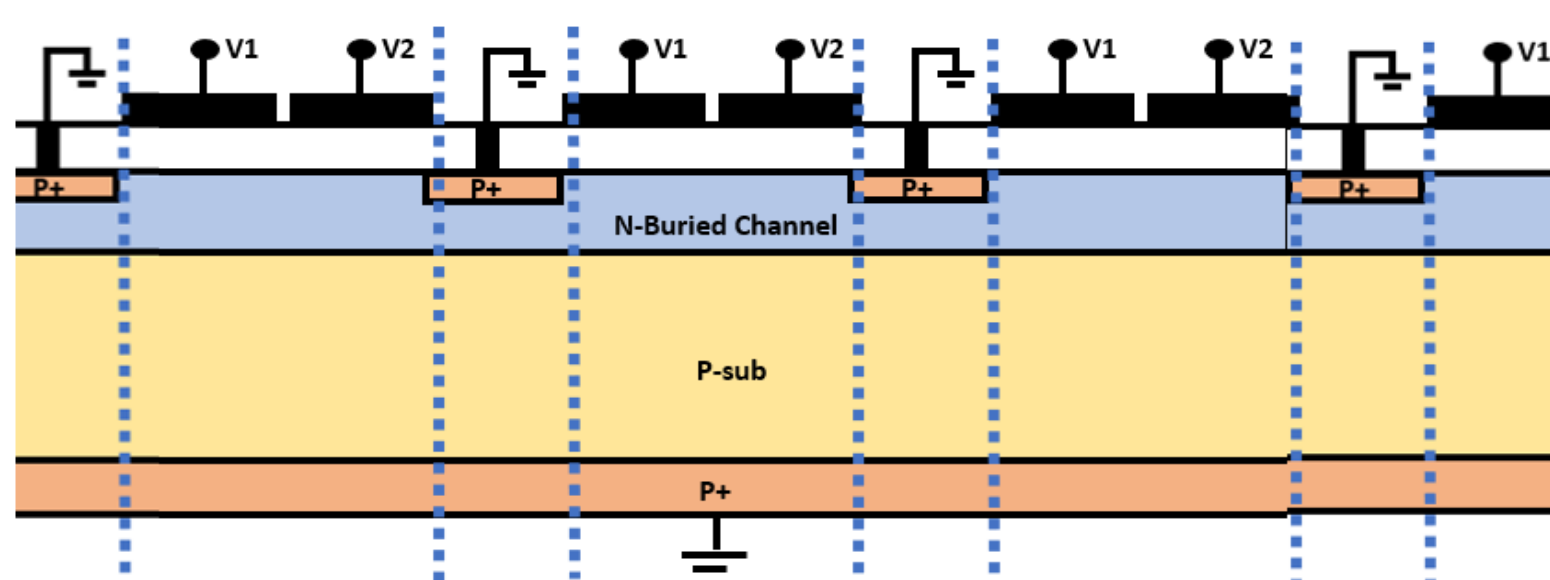


Complete Charge Transfer Operation of Pinned Photodiode

Virtual Phase Clock Operation Scheme became possible
by the 1975 invention of Pinned Photodiode by Hagiwara at Sony

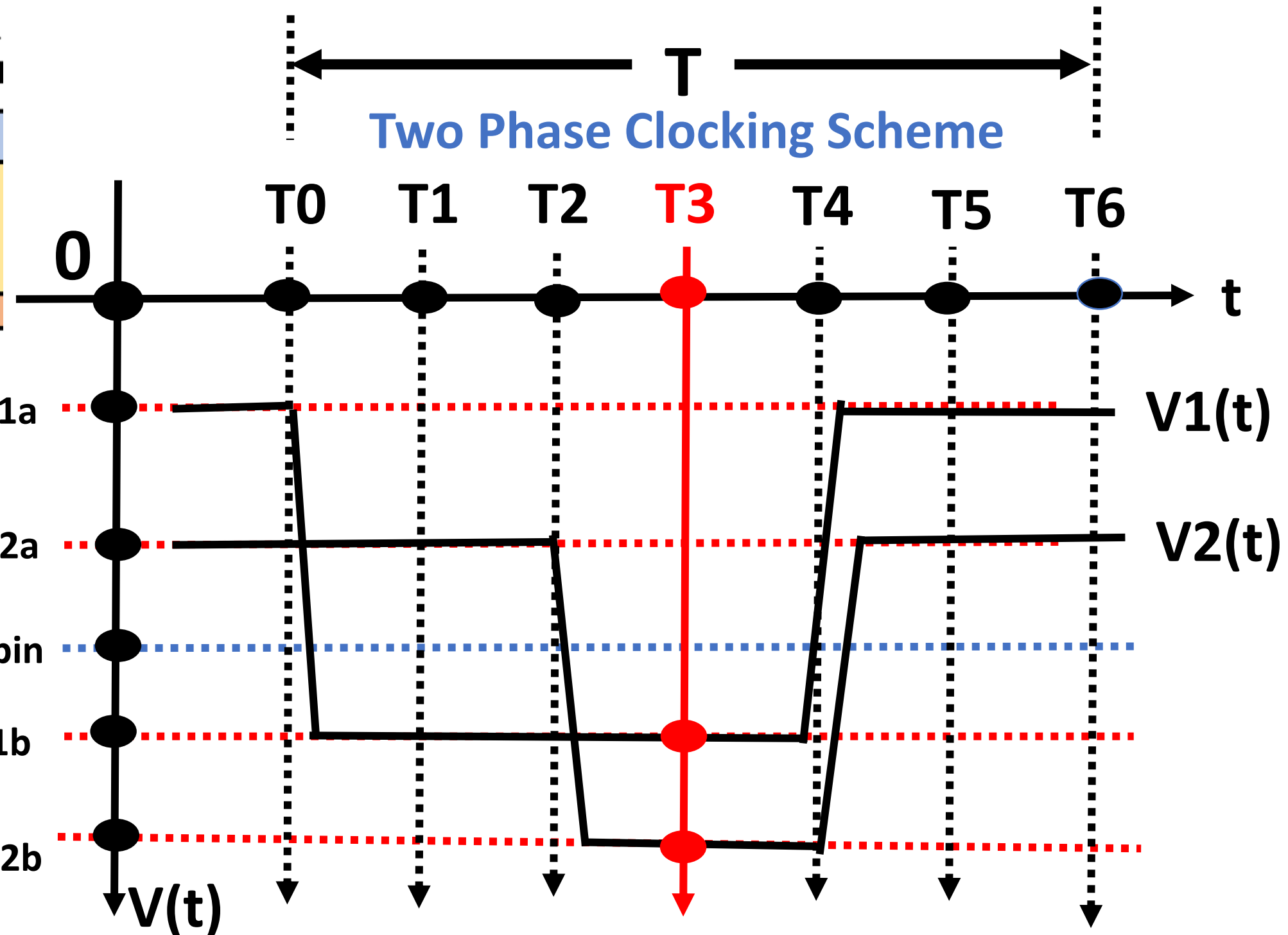
See three Japanese patent applications filed by Hagiwara in 1975
JPA1975-127646, JPA1975-127647 and JPA1975-134985.

Complete Charge Transfer Operation of Pinned Photodiode



Clock Phase 3 at $T=T3$

Two Phase Clocking Scheme

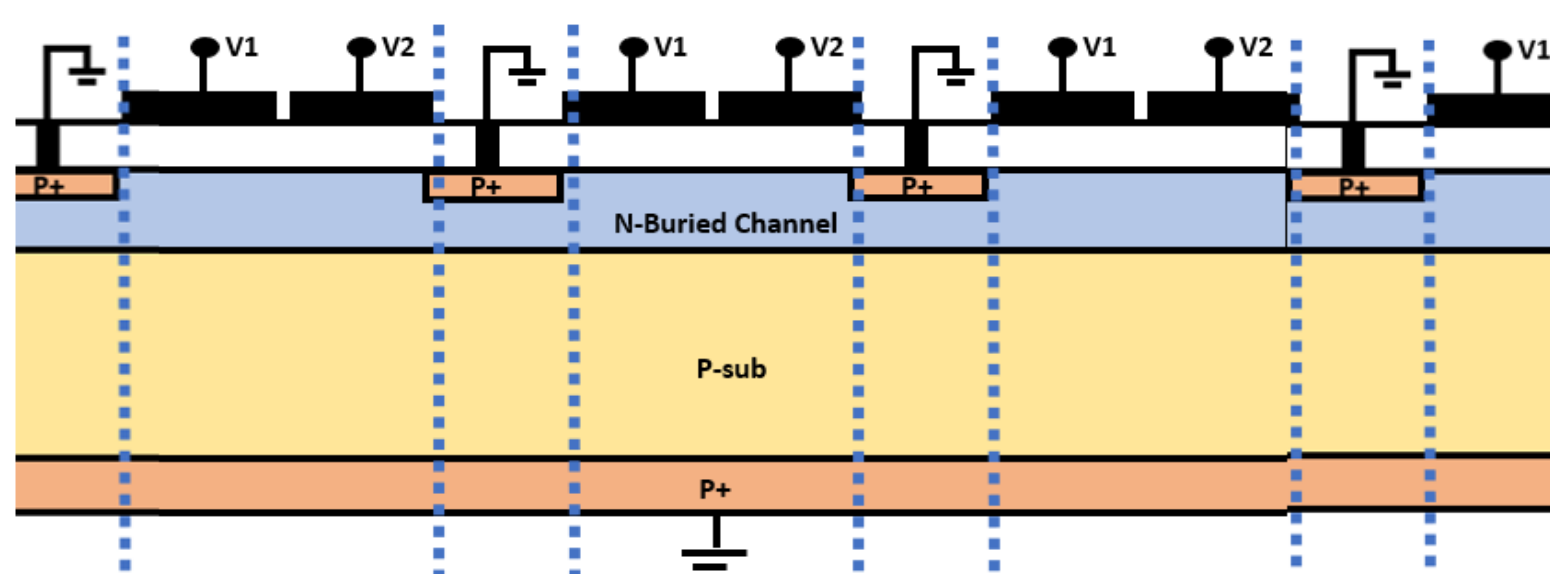


Complete Charge Transfer Operation of Pinned Photodiode

Virtual Phase Clock Operation Scheme became possible
by the 1975 invention of Pinned Photodiode by Hagiwara at Sony

See three Japanese patent applications filed by Hagiwara in 1975
JPA1975-127646, JPA1975-127647 and JPA1975-134985.

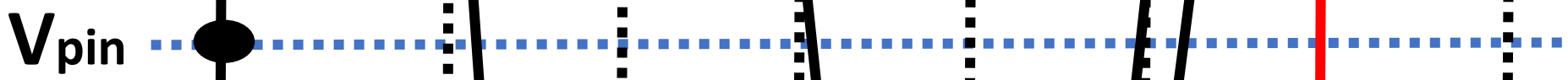
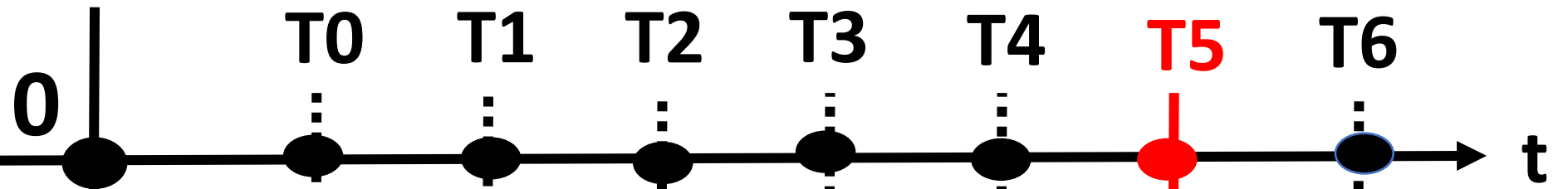
Complete Charge Transfer Operation of Pinned Photodiode



Clock Phase 5 at $T=T5$



Two Phase Clocking Scheme

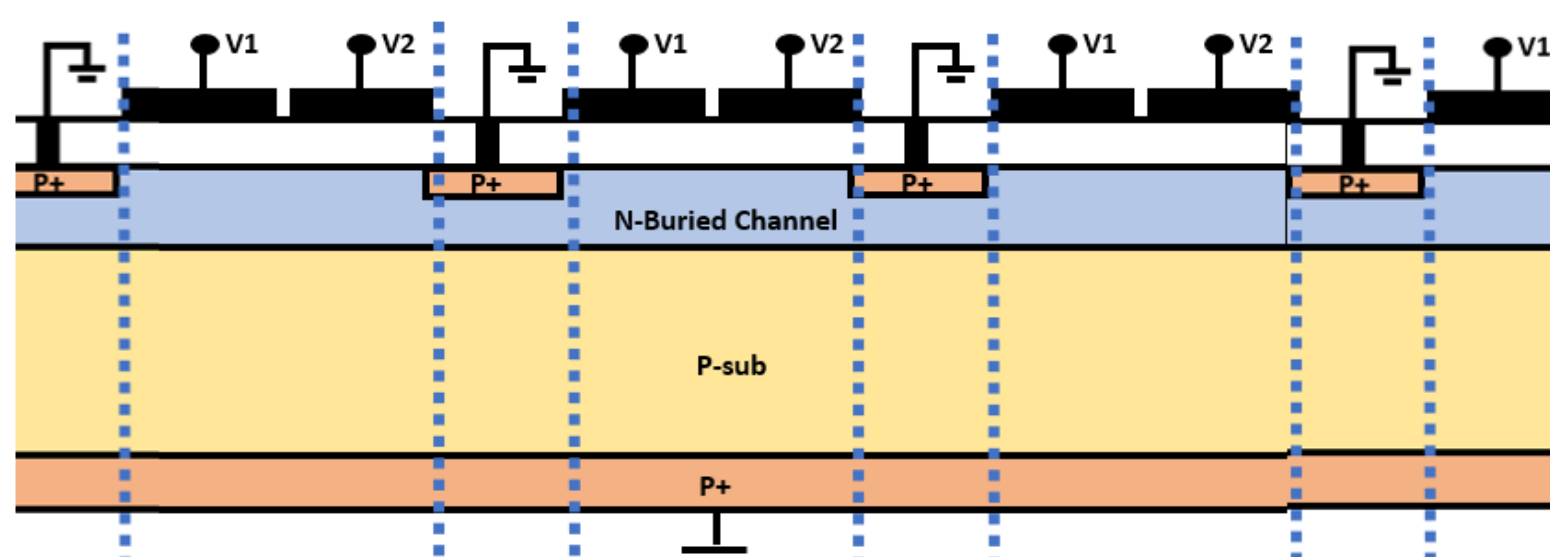


Complete Charge Transfer Operation of Pinned Photodiode

Virtual Phase Clock Operation Scheme became possible
by the 1975 invention of Pinned Photodiode by Hagiwara at Sony

See three Japanese patent applications filed by Hagiwara in 1975
JPA1975-127646, JPA1975-127647 and JPA1975-134985.

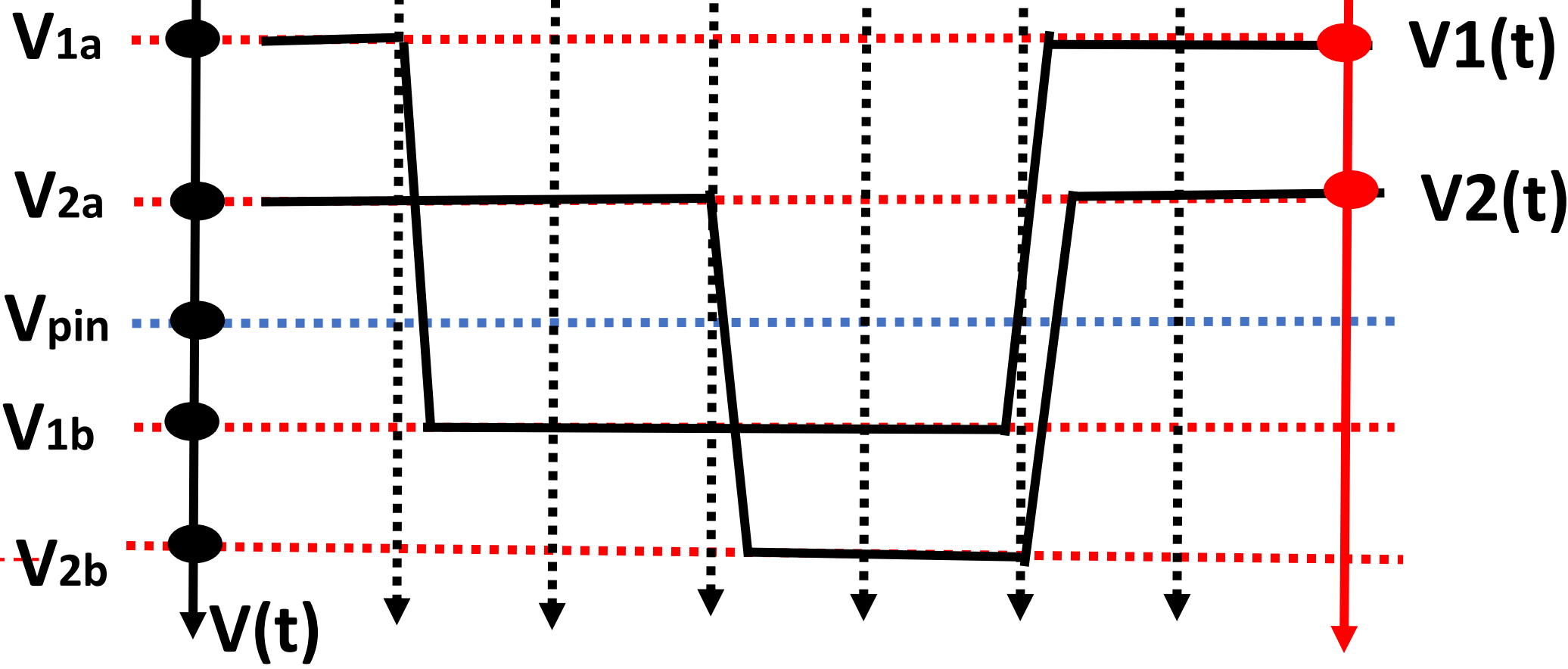
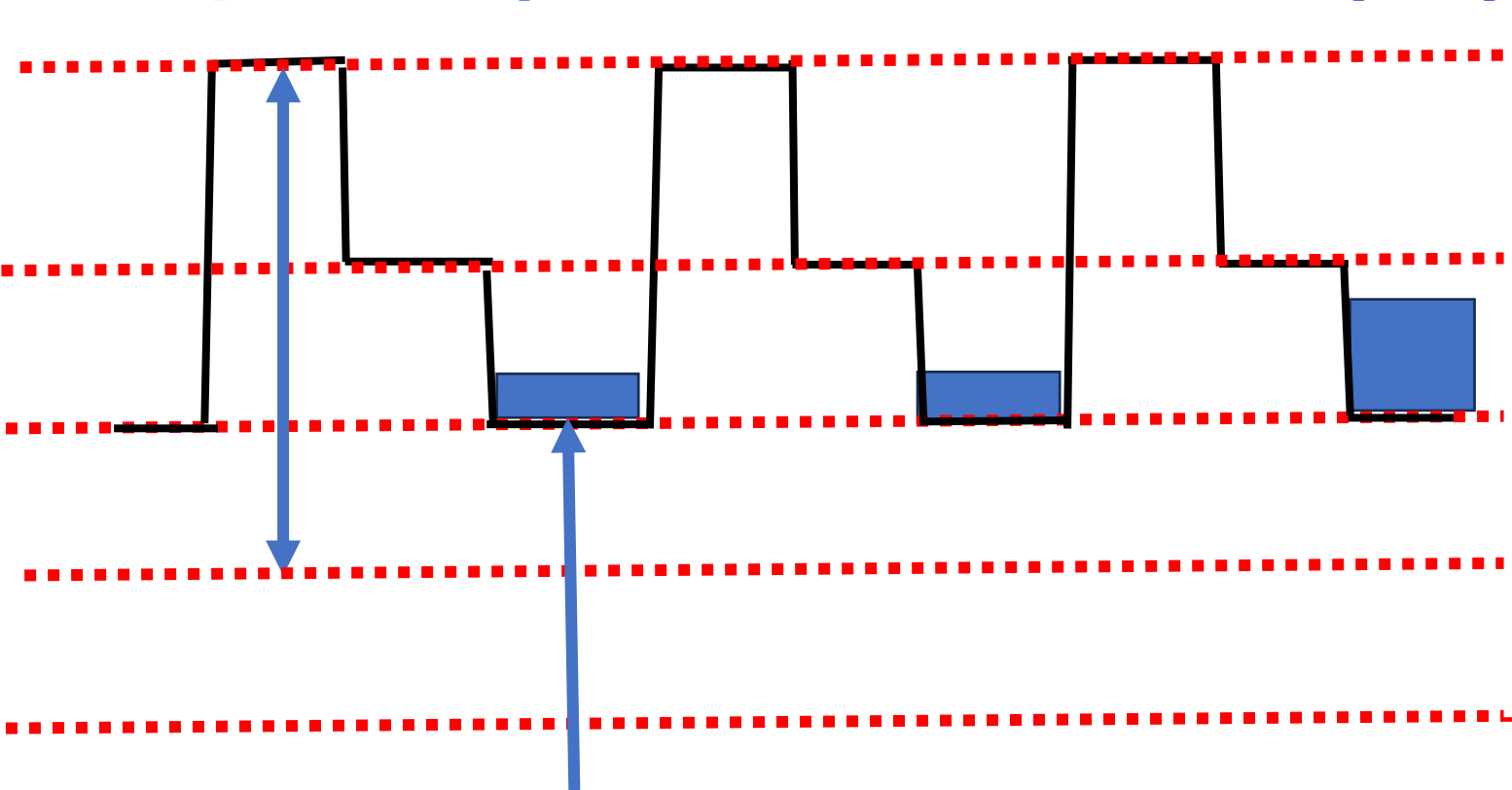
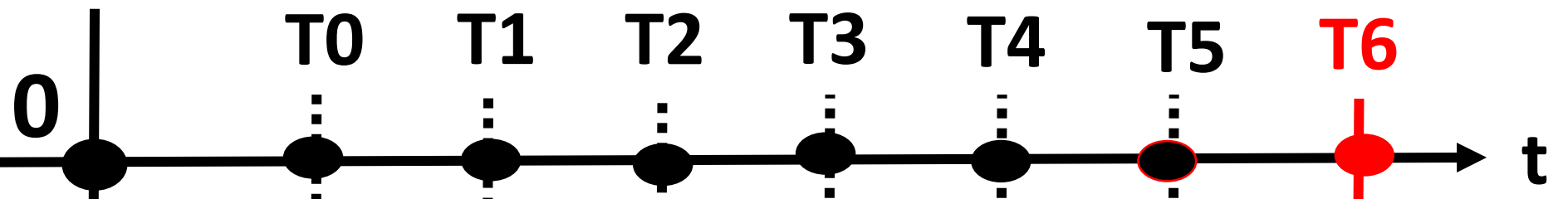
Complete Charge Transfer Operation of Pinned Photodiode



Clock Phase 6 at T=T6



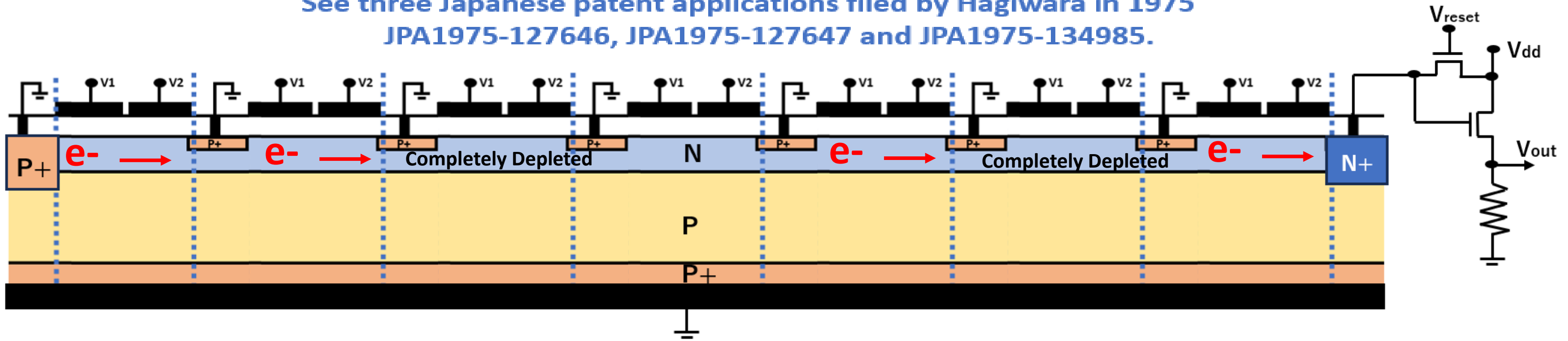
Two Phase Clocking Scheme



Complete Charge Transfer Operation of Pinned Photodiode

Virtual Phase Clock Operation Scheme became possible by the 1975 invention of Pinned Photodiode by Hagiwara at Sony

See three Japanese patent applications filed by Hagiwara in 1975
JPA1975-127646, JPA1975-127647 and JPA1975-134985.



P+PNPP+ Double Junction Pinned Photodiode type Solar Cell

See JPA2020-131313

Complete Charge Transfer Operation of Pinned Photodiode

