

# **Investigation of Harmonized Layers (HLs) Impact on Quantum Efficiency for N or P Type Emitter of Csi Solar Detector**

## **Abstract**

It is expected that passivation layer impact prominently on efficiency of solar detector and surface charges apparently varied on emitter types as well as passivation. In connection with the higher energy edge absorption of solar spectrum and photo current generation, compatible ( $\text{SiO}_2+\text{Si}_3\text{N}_4$ ) harmonized layers (HLs) are introduced for surface effect mitigation and better photon management. Emitter junction effect on responsivity and/or external quantum efficiency (EQE) are also studied for PN, NP, P+N, N+P, P+ iN and N+ iP detectors with and without optimized coating/HLs even compared with the bare detectors. With optimized HLs, very intense solar band response and EQE are realized for both emitters and its junction characteristics are also found to be varied. These influences on photo response are found specifically. For P emitter EQE is found relatively better at the higher energy edge of solar spectrum while for N type emitter, improvement of EQE at near IR is precisely observed. Due to insertion of harmonized (passivation and anti-reflection;  $\text{SiO}_2+\text{Si}_3\text{N}_4$ ) layers (HLs), surface charges effect for N or P emitter of Si detectors are not profoundly realized.