In photovoltaic solar cells manufacturing, we are confronted to the perpetual challenge for conversion efficiency enhancing. We propose in this work to quantify the back surface field aluminium (Al-BSF) rear contact effect deposited by screen printing metallization. Al-BSF numerical simulation has been performed by the use of softwares dedicated to photovoltaic like PC1D, SCAPS 2.7 and AFORS-HET. In this work, a SiNx/Si(n+)/ Si(p)/Si(p+) structure is studied. This means that we have a classical junction np passivated at the front face with SiNx anti-reflective coating (ARC) and at the rear face a screen printed Aluminum contact. The back Al-BSF, must to be thick (no least 10µm) and highly p-doped (holes concentration between 1018 and 1019 cm-3) in order to reduce effective rear recombination velocity, yielding to an enhancement of the Al layer performance. Were inserted in the software parameters data: the lifetime measured for the inner bulk (Tn=30 µs and Tp=90 µs) with Al diffusion (10.8 µm deep). For emitter doping equals to 1.5*1020 cm-3, front surface recombination velocity Sf=8600 cm/s and the effective minority diffusion length Leff=227 µm. After simulation of the input parameters, an efficiency of 18.0% is obtained by PC1D, in good accordance with the results presented in the literature. While the obtained efficiencies results with AFORS-HET and SCAPS 2.7 are 17.15% and 18.73% respectively. A rapprochement occurs between PC1D and SCAPS quantum efficiency curves with begin values ~ 70% QE while AFORS-HET is so far with ~ 34% QE