This paper extends the applicability of the micro four-point probe technique from the sheet resistance measurements on large areas toward narrow (<20 nm) semiconducting nanostructures with an elongated fin geometry. Using this technology, it is shown that the sheet resistance of boron-implanted and laser-annealed silicon fins with widths ranging from 500 down to 20 nm rises as the width is reduced. Drift-diffusion simulations show that the observed increase can be partially explained by the carrier depletion induced by interface states at the fin sidewalls.