18.10 (a) The drift velocity of electrons in Si may be determined using Equation 18.7. Since the room temperature mobility of electrons is 0.14 m^2/V-s (Table 18.3), and the electric field is 500 V/m (as stipulated in the problem statement),

$$v_d = \mu_e E$$

$$= (0.14\ \text{m}^2/\text{V-s})(500\ \text{V/m}) = 70\ \text{m/s}$$

(b) The time, t, required to traverse a given length, l (= 25 mm), is just

$$t = \frac{l}{v_d} = \frac{25\ \text{x}\ 10^{-3}\ \text{m}}{70\ \text{m/s}} = 3.6\ \text{x}\ 10^{-4}\ \text{s}$$