(c)

$$I_B = \frac{(15-1)}{470K} = 29.8\ \mu A$$

$$I_C = 100 \times 29.8\ \mu A = 2.98\ mA$$

$$V_{CE} = 15 - 2.98\ mA \times 3.6K\Omega$$

$$= 4.27\ V$$

Example

Find V_{CE} in the last example if $V_{BB} = 5V$

Reading Data Sheets

2N3904 $V_{CB} = 60V$, $V_{CEO} = 40V$

$V_{EB} = 6V$, $I_C = 200\ mA$ d.c.

$P_D = 250\ mW$ (for $T_A = 60°C$)

$P_D = 350\ mW$ (for $T_A = 25°C$)

$P_D = 1\ W$ (for $T_C = 60°C$)?

$$\alpha_{d.c} = \frac{I_c}{I_E}$$

$$I_E = I_c + I_B$$

$$\frac{I_E}{I_c} = 1 + \frac{I_B}{I_c}$$

or $$\frac{1}{\alpha_{d.c.}} = 1 + \frac{1}{\beta_{d.c.}}$$

$$\beta_{d.c} = \frac{\alpha_{d.c}}{1 - \alpha_{d.c.}}$$

$$\alpha_{d.c} = \frac{\beta_{d.c}}{\beta_{d.c} + 1}$$

if $\alpha_{d.c.} = 0.98$ $\beta_{d.c} = 49$

$\beta_{d.c.} = 100$ $\alpha_{d.c.} = 0.99$