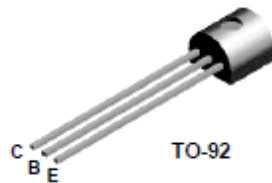


Aula prática 5 : “BJT (2 a)”.

Dr. José A. Chaljub Duarte

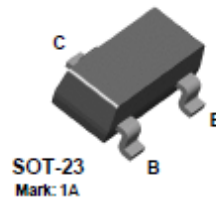
2N3904

2N3904



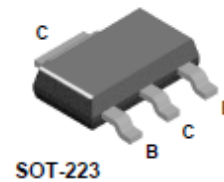
TO-92

MMBT3904



SOT-23
Mark: 1A

PZT3904



SOT-223

MBT3904 / PZT3904

NPN General Purpose Amplifier

This device is designed as a general purpose amplifier and switch. The useful dynamic range extends to 100 mA as a switch and to 100 MHz as an amplifier.

Absolute Maximum Ratings* T_A = 25°C unless otherwise noted

| Symbol | Parameter | Value | Units |
|-----------------------------------|--|-------------|-------|
| V _{CEO} | Collector-Emitter Voltage | 40 | V |
| V _{CBO} | Collector-Base Voltage | 60 | V |
| V _{EB0} | Emitter-Base Voltage | 6.0 | V |
| I _C | Collector Current - Continuous | 200 | mA |
| T _J , T _{stg} | Operating and Storage Junction Temperature Range | -55 to +150 | °C |

* These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

NOTES:

- 1) These ratings are based on a maximum junction temperature of 150 degrees C.
- 2) These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

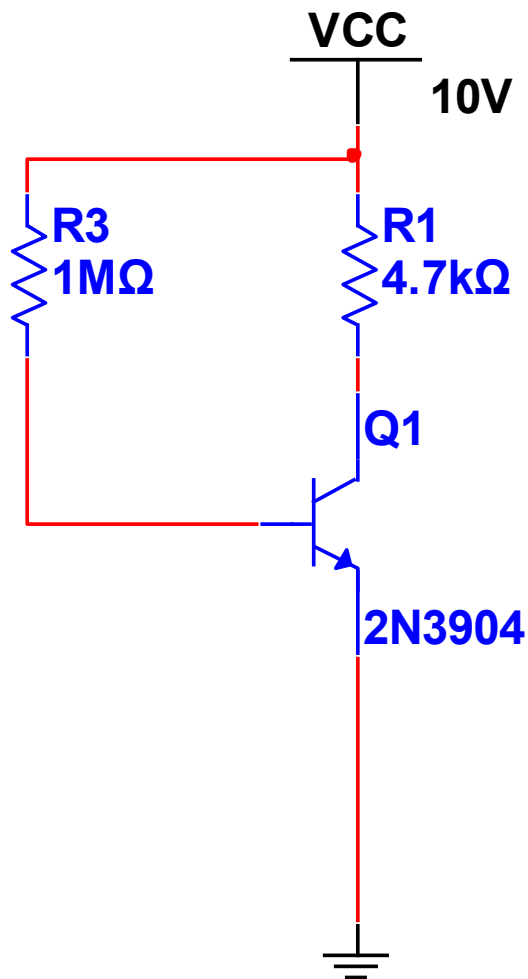
Thermal Characteristics

2N3904

ON CHARACTERISTICS*

| | | | | | |
|---------------|--------------------------------------|--|-----------------------------|--------------|--------|
| h_{FE} | DC Current Gain | $I_C = 0.1 \text{ mA}, V_{CE} = 1.0 \text{ V}$ $I_C = 1.0 \text{ mA}, V_{CE} = 1.0 \text{ V}$ $I_C = 10 \text{ mA}, V_{CE} = 1.0 \text{ V}$ $I_C = 50 \text{ mA}, V_{CE} = 1.0 \text{ V}$ $I_C = 100 \text{ mA}, V_{CE} = 1.0 \text{ V}$ | 40 70 100 80 30 | 300 | |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage | $I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$ $I_C = 50 \text{ mA}, I_B = 5.0 \text{ mA}$ | | 0.2 0.3 | V V |
| $V_{BE(sat)}$ | Base-Emitter Saturation Voltage | $I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$ $I_C = 50 \text{ mA}, I_B = 5.0 \text{ mA}$ | 0.65 | 0.85 0.95 | V V |

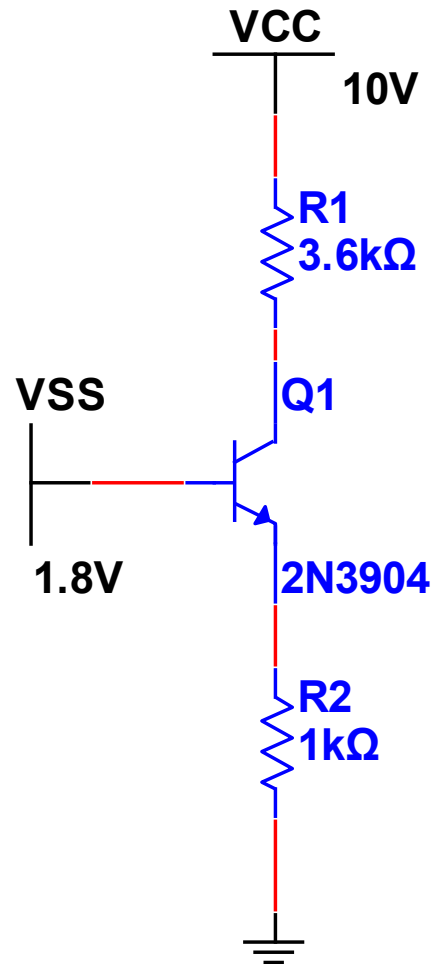
Exercicio 1: Determine I_c . justifique sua resposta



V: 3.75 V
V(p-p): 12.6 pV
V(rms): 3.75 V
V(dc): 3.75 V
I: 1.33 mA
I(p-p): 0 A
I(rms): 1.33 mA
I(dc): 1.33 mA
Freq.: 21.3 kHz

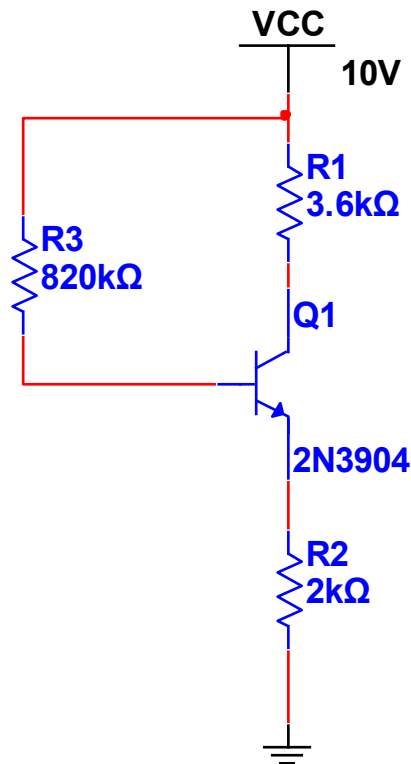
$$\beta \approx 140$$

Exercício 2 : Determine I_c . justifique sua resposta



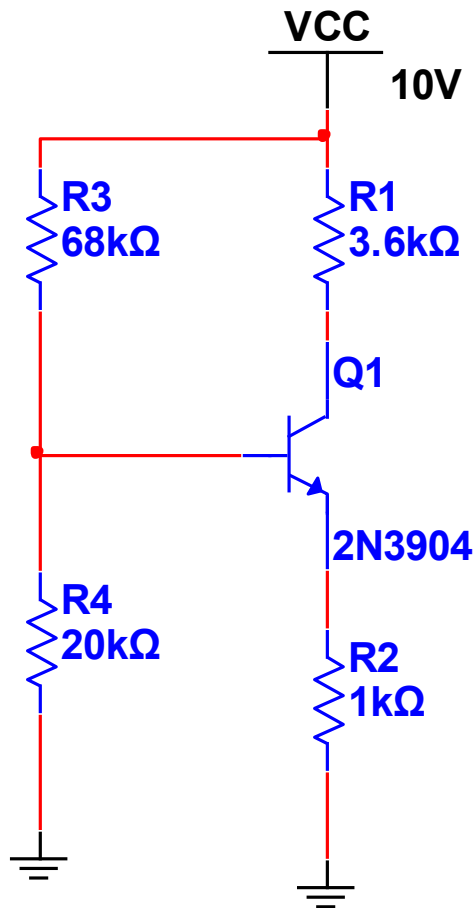
V: 5.95 V
V(p-p): 0 V
V(rms): 0 V
V(dc): 5.95 V
I: 1.12 mA
I(p-p): 0 A
I(rms): 0 A
I(dc): 1.12 mA
Freq.:

Exercício 3 : Determine I_c . justifique sua resposta



V: 5.73 V
V(p-p): 15.8 pV
V(rms): 5.73 V
V(dc): 5.73 V
I: 1.18 mA
I(p-p): 0 A
I(rms): 1.18 mA
I(dc): 1.18 mA
Freq.: 17.9 kHz

Exercício 4: Determine I_c . justifique sua resposta



V: 4.84 V
V(p-p): 0 V
V(rms): 4.84 V
V(dc): 4.84 V
I: 1.43 mA
I(p-p): 0 A
I(rms): 1.43 mA
I(dc): 1.43 mA
Freq.: