

# MAXIMUM RATINGS

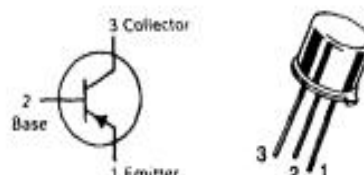
| Rating                                                                                     | Symbol         | 2N4032         | 2N4033         | Unit       |
|--------------------------------------------------------------------------------------------|----------------|----------------|----------------|------------|
| Collector-Emitter Voltage                                                                  | $V_{CE}$       | -60            | -80            | Vdc        |
| Collector-Base Voltage                                                                     | $V_{CB}$       | -60            | -80            | Vdc        |
| Emitter-Base Voltage                                                                       | $V_{EB}$       | -5.0           | -5.0           | Vdc        |
| Collector Current — Continuous                                                             | $I_C$          | 2N4032<br>-1.0 | 2N4033<br>-1.0 | Adc        |
| Total Device Dissipation (at $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ ) | $P_D$          | 0.8<br>4.56    | 0.8<br>4.56    | W<br>mW/°C |
| Total Device Dissipation (at $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ ) | $P_D$          | 4.0<br>22.8    | 4.0<br>22.8    | W<br>mW/°C |
| Operating and Storage Junction<br>Temperature Range                                        | $T_J, T_{stg}$ | -65 to +200    | -65 to +200    | °C         |

# THERMAL CHARACTERISTICS

| Characteristic                          | Symbol          | Max | Unit |
|-----------------------------------------|-----------------|-----|------|
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 140 | °C/W |
| Thermal Resistance, Junction to Case    | $R_{\theta JC}$ | 25  | °C/W |

# 2N4032 2N4033

CASE 79-04, STYLE 1  
TO-39 (TO-205AD)



GENERAL PURPOSE  
TRANSISTORS

PNP SILICON

Refer to 2N4405 for graphs.

# ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted.)

| Characteristic                                                                                                                                                                                                                                                                                                                            | Symbol        | Min                               | Max                          | Unit                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----------------------------------|------------------------------|-----------------------------|
| <b>OFF CHARACTERISTICS</b>                                                                                                                                                                                                                                                                                                                |               |                                   |                              |                             |
| Collector-Emitter Breakdown Voltage(1)<br>( $I_C = -10\text{ mA}$ )                                                                                                                                                                                                                                                                       | $V_{(BR)CEO}$ | -60<br>-80                        | —                            | V                           |
| Collector-Base Breakdown Voltage<br>( $I_C = -10\text{ }\mu\text{A}$ )                                                                                                                                                                                                                                                                    | $V_{(BR)CBO}$ | -60<br>-80                        | —                            | V                           |
| Emitter-Base Breakdown Voltage<br>( $I_E = -10\text{ }\mu\text{A}$ )                                                                                                                                                                                                                                                                      | $V_{(BR)EBO}$ | -5.0                              | —                            | V                           |
| Collector Cutoff Current<br>( $V_{CB} = -50\text{ V}$ )<br>( $V_{CB} = -60\text{ V}$ )<br>( $V_{CB} = -50\text{ V}, T_A = 150^\circ\text{C}$ )<br>( $V_{CB} = -60\text{ V}, T_A = 150^\circ\text{C}$ )                                                                                                                                    | $I_{CBO}$     | —<br>—<br>—<br>—                  | -50<br>-50<br>-50<br>-50     | nA<br><br><br>$\mu\text{A}$ |
| Emitter Cutoff Current<br>( $V_{EB} = -5.0\text{ V}$ )                                                                                                                                                                                                                                                                                    | $I_{EBO}$     | —                                 | -10                          | $\mu\text{A}$               |
| <b>ON CHARACTERISTICS</b>                                                                                                                                                                                                                                                                                                                 |               |                                   |                              |                             |
| DC Current Gain<br>( $I_C = -100\text{ mA}, V_{CE} = -5.0\text{ V}, \mu - 55^\circ\text{C}(1)$ )<br>( $I_C = -100\text{ }\mu\text{A}, V_{CE} = -5.0\text{ V}$ )<br>( $I_C = -100\text{ mA}, V_{CE} = -5.0\text{ V}(1)$ )<br>( $I_C = -500\text{ mA}, V_{CE} = -5.0\text{ V}(1)$ )<br>( $I_C = -1.0\text{ A}, V_{CE} = -5.0\text{ V}(1)$ ) | $h_{FE}$      | 40<br>75<br>100<br>70<br>40<br>25 | —<br>—<br>300<br>—<br>—<br>— | —                           |

## 2N4032 2N4033

### ELECTRICAL CHARACTERISTICS (continued) ( $T_A = 25^\circ\text{C}$ unless otherwise noted.)

| Characteristic                                                                                                                                                                                            | Symbol        | Min | Max                    | Unit |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----|------------------------|------|
| Collector-Emitter Saturation Voltage(1)<br>( $I_C = -150\text{ mA}$ , $I_B = -15\text{ mA}$ )<br>( $I_C = -500\text{ mA}$ , $I_B = -50\text{ mA}$ )<br>( $I_C = -1.0\text{ A}$ , $I_B = -100\text{ mA}$ ) | $V_{CE(sat)}$ | —   | -0.15<br>-0.50<br>-1.0 | V    |
| Base-Emitter Saturation Voltage(1)<br>( $I_C = -150\text{ mA}$ , $I_B = -15\text{ mA}$ )                                                                                                                  | $V_{BE(sat)}$ | —   | -0.9                   | V    |
| Base-Emitter On Voltage<br>( $I_C = -1.0\text{ A}$ , $V_{CE} = -1.0\text{ V}$ )<br>( $I_C = -500\text{ mA}$ , $V_{CE} = -0.5\text{ V}$ )(1)                                                               | $V_{BE(on)}$  | —   | -1.2<br>-1.1           | V    |
| <b>SMALL-SIGNAL CHARACTERISTICS</b>                                                                                                                                                                       |               |     |                        |      |
| Output Capacitance<br>( $V_{CE} = -10\text{ V}$ , $f = 1.0\text{ MHz}$ )                                                                                                                                  | $C_{obo}$     | —   | 20                     | pF   |
| Input Capacitance<br>( $V_{BE} = -0.5\text{ V}$ , $f = 1.0\text{ MHz}$ )                                                                                                                                  | $C_{ibo}$     | —   | 110                    | pF   |
| Small Signal Current Gain<br>( $I_C = -50\text{ mA}$ , $V_{CE} = -10\text{ V}$ , $f = 100\text{ MHz}$ )                                                                                                   | $h_{fe}$      | 1.5 | 5.0                    | —    |
| <b>SWITCHING CHARACTERISTICS</b>                                                                                                                                                                          |               |     |                        |      |
| Storage Time<br>( $I_C = -500\text{ mA}$ , $I_{B1} = I_{B2} = -50\text{ mA}$ )                                                                                                                            | $t_s$         | —   | 350                    | ns   |
| Turn-On Time<br>( $I_C = -500\text{ mA}$ , $I_{B1} = -50\text{ mA}$ )                                                                                                                                     | $t_{on}$      | —   | 100                    | ns   |
| Fall Time<br>( $I_C = -500\text{ mA}$ , $I_{B1} = I_{B2} = -50\text{ mA}$ )                                                                                                                               | $t_f$         | —   | 50                     | ns   |

(1) Pulse Width  $\approx 300\text{ }\mu\text{s}$ , Duty Cycle  $\approx 2.0\%$ .