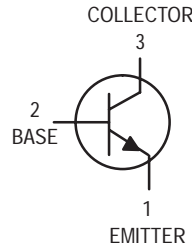


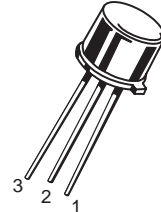
General Purpose Transistor

NPN Silicon



2N1893

2N1711
For Specifications,
See 2N1711 Data



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

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--|----------------|-------------|-------------------------------|
| Collector–Emitter Voltage | V_{CEO} | 80 | Vdc |
| Collector–Emitter Voltage | V_{CER} | 100 | Vdc |
| Collector–Base Voltage | V_{CBO} | 120 | Vdc |
| Emitter–Base Voltage | V_{EBO} | 7.0 | Vdc |
| Collector Current — Continuous | I_C | 0.5 | Adc |
| Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 0.8 4.57 | Watts mW/ $^\circ\text{C}$ |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C | P_D | 3.0 17.2 | Watts mW/ $^\circ\text{C}$ |
| Operating and Storage Junction Temperature Range | T_J, T_{stg} | –65 to +200 | $^\circ\text{C}$ |

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|---|-----------------|-----|---------------------------|
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 219 | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 58 | $^\circ\text{C}/\text{W}$ |

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

| Characteristic | Symbol | Min | Max | Unit |
|---|----------------|-----|------------|-----------------|
| OFF CHARACTERISTICS | | | | |
| Collector–Emitter Breakdown Voltage ($I_C = 100\text{ mAdc}$, $R_{BE} = 10\ \Omega$) ⁽¹⁾ | $V_{CER(sus)}$ | 100 | — | Vdc |
| Collector–Emitter Sustaining Voltage ($I_C = 30\text{ mAdc}$, $I_B = 0$) ⁽¹⁾ | $V_{CEO(sus)}$ | 80 | — | Vdc |
| Collector–Base Breakdown Voltage ($I_C = 100\ \mu\text{Adc}$, $I_E = 0$) | $V_{(BR)CBO}$ | 120 | — | Vdc |
| Emitter–Base Breakdown Voltage ($I_E = 100\ \mu\text{Adc}$, $I_C = 0$) | $V_{(BR)EBO}$ | 7.0 | — | Vdc |
| Collector Cutoff Current ($V_{CB} = 90\text{ Vdc}$, $I_E = 0$) ($V_{CB} = 90\text{ Vdc}$, $I_E = 0$, $T_A = 150^\circ\text{C}$) | I_{CBO} | — | 0.01 15 | μAdc |
| Emitter Cutoff Current ($V_{EB} = 5.0\text{ Vdc}$, $I_C = 0$) | I_{EBO} | — | 0.01 | μAdc |

ON CHARACTERISTICS

| | | | | |
|--|---------------|----------------------|--------------------|-----|
| DC Current Gain ($I_C = 0.1\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$) ($I_C = 10\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$) ⁽¹⁾ ($I_C = 10\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$, $T_A = -55^\circ\text{C}$) ⁽¹⁾ ($I_C = 150\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$) ⁽¹⁾ | h_{FE} | 20 35 20 40 | — — — 120 | — |
| Collector–Emitter Saturation Voltage ⁽¹⁾ ($I_C = 50\text{ mAdc}$, $I_B = 5.0\text{ mAdc}$) ($I_C = 150\text{ mAdc}$, $I_B = 15\text{ mAdc}$) | $V_{CE(sat)}$ | — — | 1.2 0.5 | Vdc |
| Base–Emitter Saturation Voltage ⁽¹⁾ ($I_C = 50\text{ mAdc}$, $I_B = 5.0\text{ mAdc}$) ($I_C = 150\text{ mAdc}$, $I_B = 15\text{ mAdc}$) | $V_{BE(sat)}$ | — — | 0.9 1.3 | Vdc |

1. Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2.0\%$.

REV 1



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

| Characteristic | Symbol | Min | Max | Unit |
|--|-----------|-----------|-------------|------------------|
| SMALL-SIGNAL CHARACTERISTICS | | | | |
| Current-Gain — Bandwidth Product ($I_C = 50\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$, $f = 20\text{ MHz}$) | f_T | 50 | — | MHz |
| Output Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$) | C_{obo} | — | 15 | pF |
| Input Capacitance ($V_{EB} = 0.5\text{ Vdc}$, $I_C = 0$, $f = 1.0\text{ MHz}$) | C_{ibo} | — | 85 | pF |
| Input Impedance ($I_C = 1.0\text{ mAdc}$, $V_{CB} = 5.0\text{ Vdc}$, $f = 1.0\text{ kHz}$) ($I_C = 5.0\text{ mAdc}$, $V_{CB} = 10\text{ Vdc}$, $f = 1.0\text{ kHz}$) | h_{ib} | 20 4.0 | 30 8.0 | Ω |
| Voltage Feedback Ratio ($I_C = 1.0\text{ mAdc}$, $V_{CB} = 5.0\text{ Vdc}$, $f = 1.0\text{ kHz}$) ($I_C = 5.0\text{ mAdc}$, $V_{CB} = 10\text{ Vdc}$, $f = 1.0\text{ kHz}$) | h_{rb} | — — | 1.25 1.5 | $\times 10^{-4}$ |
| Small-Signal Current Gain ($I_C = 1.0\text{ mAdc}$, $V_{CE} = 5.0\text{ Vdc}$, $f = 1.0\text{ kHz}$) ($I_C = 5.0\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$, $f = 1.0\text{ kHz}$) | h_{fe} | 30 45 | 100 — | — |
| Output Admittance ($I_C = 1.0\text{ mAdc}$, $V_{CB} = 5.0\text{ Vdc}$, $f = 1.0\text{ kHz}$) ($I_C = 5.0\text{ mAdc}$, $V_{CB} = 10\text{ Vdc}$, $f = 1.0\text{ kHz}$) | h_{ob} | — — | 0.5 0.5 | μmhos |

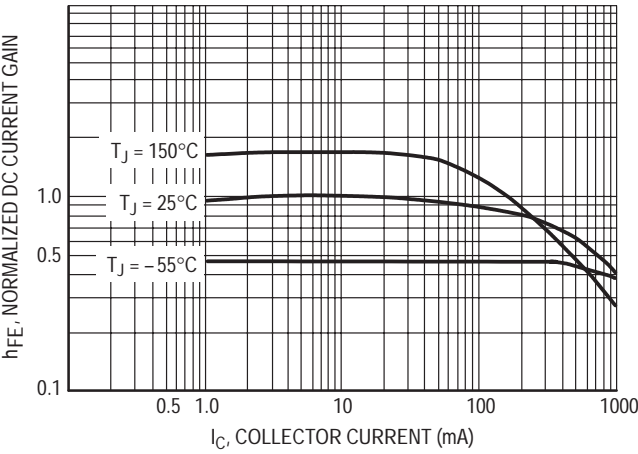


Figure 1. DC Current Gain

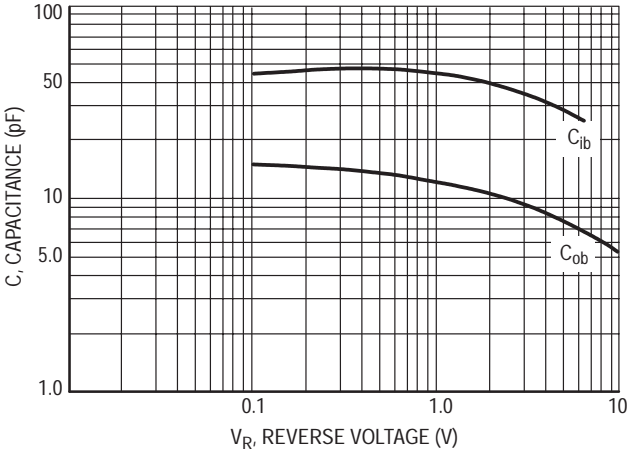


Figure 2. Capacitance

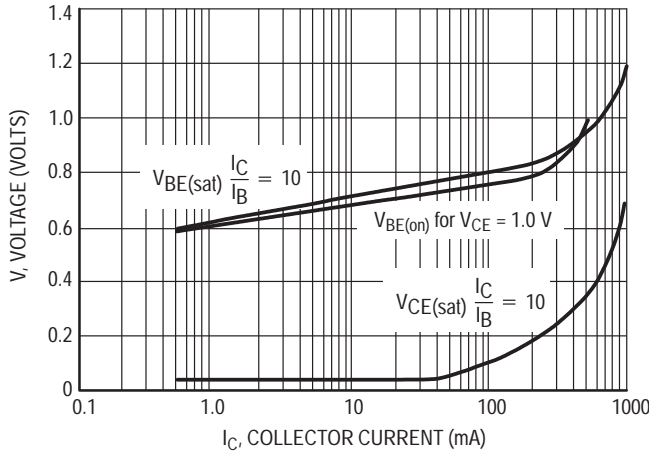


Figure 3. "On" Voltages

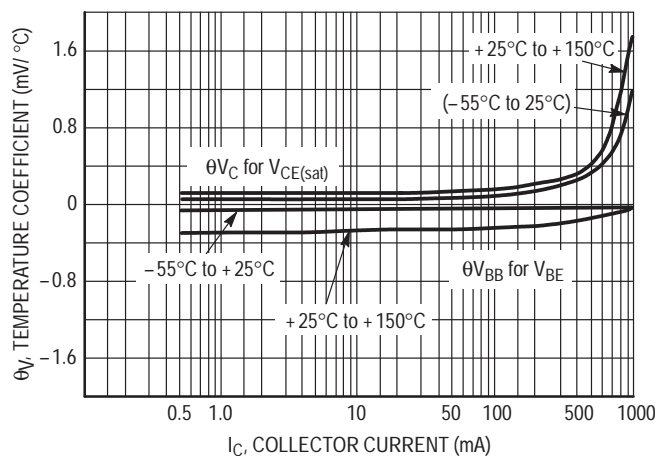


Figure 4. Temperature Coefficients

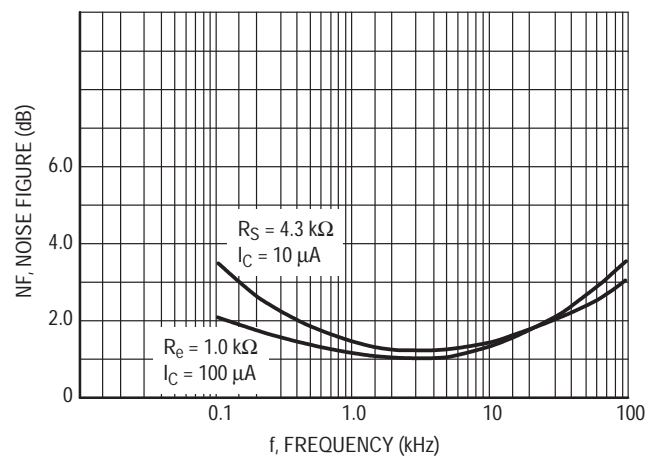


Figure 5. Frequency Effects

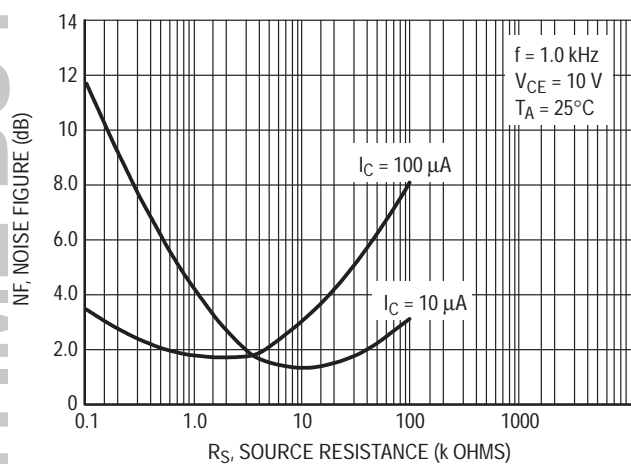


Figure 6. Source Resistance Effects

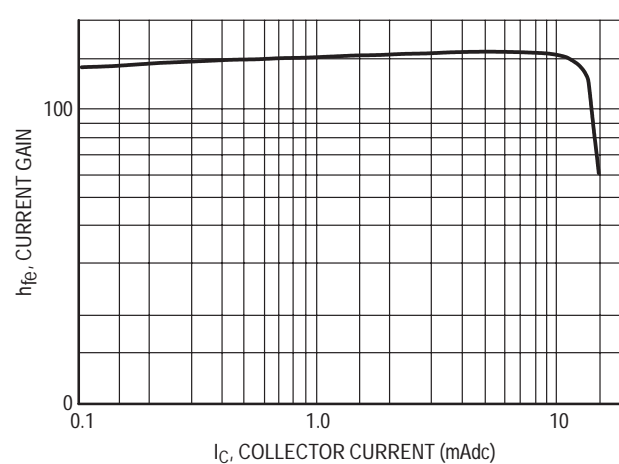
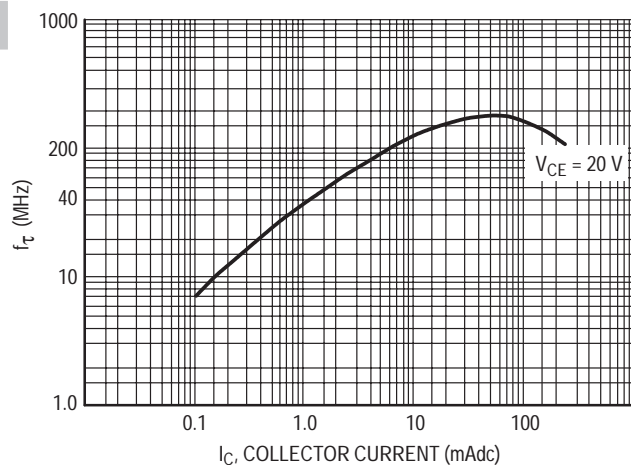
Figure 7. Current Gain Bandwidth Product versus Collector Current — 1.0 kHz h_{fe} 

Figure 8. Current Gain — Bandwidth Product

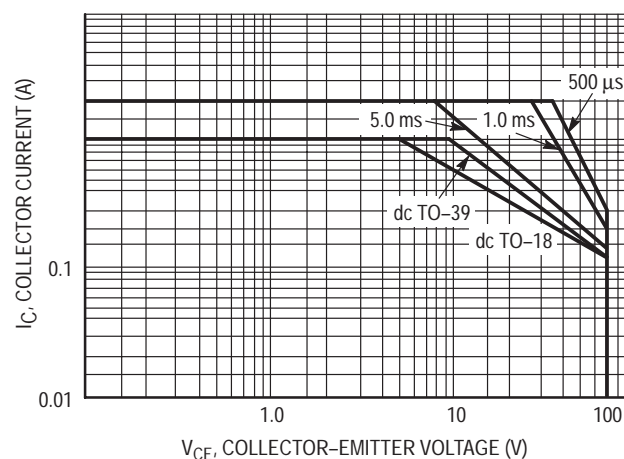
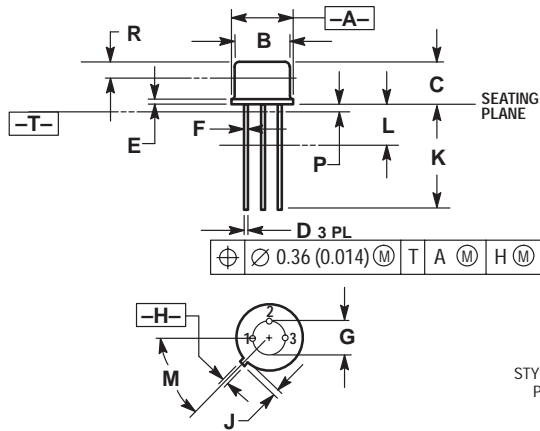


Figure 9. Active Region Safe Operating Area

PACKAGE DIMENSIONS



STYLE 1:
PIN 1. EMITTER
2. BASE
3. COLLECTOR

CASE 079-04
(TO-205AD)
ISSUE N

- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. DIMENSION J MEASURED FROM DIMENSION A MAXIMUM.
 4. DIMENSION B SHALL NOT VARY MORE THAN 0.25 (0.010) IN ZONE R. THIS ZONE CONTROLLED FOR AUTOMATIC HANDLING.
 5. DIMENSION F APPLIES BETWEEN DIMENSION P AND L. DIMENSION D APPLIES BETWEEN DIMENSION L AND K MINIMUM. LEAD DIAMETER IS UNCONTROLLED IN DIMENSION P AND BEYOND DIMENSION K MINIMUM.

| DIM | INCHES | | MILLIMETERS | |
|-----|-----------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.335 | 0.370 | 8.51 | 9.39 |
| B | 0.305 | 0.335 | 7.75 | 8.50 |
| C | 0.240 | 0.260 | 6.10 | 6.60 |
| D | 0.016 | 0.021 | 0.41 | 0.53 |
| E | 0.009 | 0.041 | 0.23 | 1.04 |
| F | 0.016 | 0.019 | 0.41 | 0.48 |
| G | 0.200 BSC | | 5.08 BSC | |
| H | 0.028 | 0.034 | 0.72 | 0.86 |
| J | 0.029 | 0.045 | 0.74 | 1.14 |
| K | 0.500 | 0.750 | 12.70 | 19.05 |
| L | 0.250 | --- | 6.35 | --- |
| M | 45° BSC | | 45° BSC | |
| P | --- | 0.050 | --- | 1.27 |
| R | 0.100 | --- | 2.54 | --- |

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