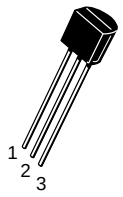
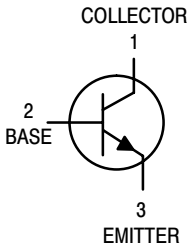
# Low Noise Transistors
## NPN Silicon

**BC549B,C**
**BC550B,C**




**CASE 29–04, STYLE 17**
**TO–92 (TO–226AA)**




**MAXIMUM RATINGS**

| Rating | Symbol | BC549 | BC550 | Unit |
|---|---|---|---|---|
| Collector–Emitter Voltage | $V_{CEO}$ | 30 | 45 | Vdc |
| Collector–Base Voltage | $V_{CBO}$ | 30 | 50 | Vdc |
| Emitter–Base Voltage | $V_{EBO}$ | 5.0 | | Vdc |
| Collector Current — Continuous | $I_C$ | 100 | | mAdc |
| Total Device Dissipation @ $T_A$ = 25°C<br>Derate above 25°C | $P_D$ | 625<br>5.0 | | mW<br>mW/°C |
| Total Device Dissipation @ $T_C$ = 25°C<br>Derate above 25°C | $P_D$ | 1.5<br>12 | | Watt<br>mW/°C |
| Operating and Storage Junction Temperature Range | $T_J$, $T_{stg}$ | –55 to +150 | | °C |

**THERMAL CHARACTERISTICS**

| Characteristic | Symbol | Max | Unit |
|---|---|---|---|
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 200 | °C/W |
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 83.3 | °C/W |

**ELECTRICAL CHARACTERISTICS** ($T_A$ = 25°C unless otherwise noted)

| Characteristic | | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| Collector–Emitter Breakdown Voltage<br>($I_C$ = 10 mAdc, $I_B$ = 0) | <br>BC549B,C<br>BC550B,C | $V_{(BR)CEO}$ | <br>30<br>45 | <br>—<br>— | <br>—<br>— | Vdc |
| Collector–Base Breakdown Voltage<br>($I_C$ = 10 μAdc, $I_E$ = 0) | <br>BC549B,C<br>BC550B,C | $V_{(BR)CBO}$ | <br>30<br>50 | <br>—<br>— | <br>—<br>— | Vdc |
| Emitter–Base Breakdown Voltage<br>($I_E$ = 10 μAdc, $I_C$ = 0) | | $V_{(BR)EBO}$ | 5.0 | — | — | Vdc |
| Collector Cutoff Current<br>($V_{CB}$ = 30 V, $I_E$ = 0)<br>($V_{CB}$ = 30 V, $I_E$ = 0, $T_A$ = +125°C) | | $I_{CBO}$ | <br>—<br>— | <br>—<br>— | <br>15<br>5.0 | <br>nAdc<br>μAdc |
| Emitter Cutoff Current<br>($V_{EB}$ = 4.0 Vdc, $I_C$ = 0) | | $I_{EBO}$ | — | — | 15 | nAdc |

**ELECTRICAL CHARACTERISTICS** ($T_A$ = 25°C unless otherwise noted) (Continued)

| Characteristic | | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **ON CHARACTERISTICS** | | | | | | |
| DC Current Gain | | $h_{FE}$ | | | | — |
| ($I_C$ = 10 μAdc, $V_{CE}$ = 5.0 Vdc) | BC549B/550B | | 100 | 150 | — | |
| | BC549C/550C | | 100 | 270 | — | |
| ($I_C$ = 2.0 mAdc, $V_{CE}$ = 5.0 Vdc) | BC549B/550B | | 200 | 290 | 450 | |
| | BC549C/550C | | 420 | 500 | 800 | |
| Collector–Emitter Saturation Voltage | | $V_{CE(sat)}$ | | | | Vdc |
| ($I_C$ = 10 mAdc, $I_B$ = 0.5 mAdc) | | | — | 0.075 | 0.25 | |
| ($I_C$ = 10 mAdc, $I_B$ = see note 1) | | | — | 0.3 | 0.6 | |
| ($I_C$ = 100 mAdc, $I_B$ = 5.0 mAdc, see note 2) | | | — | 0.25 | 0.6 | |
| Base–Emitter Saturation Voltage | | $V_{BE(sat)}$ | — | 1.1 | — | Vdc |
| ($I_C$ = 100 mAdc, $I_B$ = 5.0 mAdc) | | | | | | |
| Base–Emitter On Voltage | | $V_{BE(on)}$ | | | | Vdc |
| ($I_C$ = 10 μAdc, $V_{CE}$ = 5.0 Vdc) | | | — | 0.52 | — | |
| ($I_C$ = 100 μAdc, $V_{CE}$ = 5.0 Vdc) | | | — | 0.55 | — | |
| ($I_C$ = 2.0 mAdc, $V_{CE}$ = 5.0 Vdc) | | | 0.55 | 0.62 | 0.7 | |
| **SMALL–SIGNAL CHARACTERISTICS** | | | | | | |
| Current–Gain — Bandwidth Product | | $f_T$ | — | 250 | — | MHz |
| ($I_C$ = 10 mAdc, $V_{CE}$ = 5.0 Vdc, f = 100 MHz) | | | | | | |
| Collector–Base Capacitance | | $C_{cbo}$ | — | 2.5 | — | pF |
| ($V_{CB}$ = 10 Vdc, $I_E$ = 0, f = 1.0 MHz) | | | | | | |
| Small–Signal Current Gain | | $h_{fe}$ | | | | — |
| ($I_C$ = 2.0 mAdc, $V_{CE}$ = 5.0 V, f = 1.0 kHz) | BC549B/BC550B | | 240 | 330 | 500 | |
| | BC549C/BC550C | | 450 | 600 | 900 | |
| Noise Figure | | | | | | dB |
| ($I_C$ = 200 μAdc, $V_{CE}$ = 5.0 Vdc, $R_S$ = 2.0 kΩ, f = 1.0 kHz) | | $NF_1$ | — | 0.6 | 2.5 | |
| ($I_C$ = 200 μAdc, $V_{CE}$ = 5.0 Vdc, $R_S$ = 100 kΩ, f = 1.0 kHz) | | $NF_2$ | — | — | 10 | |

NOTES:
1. $I_B$ is value for which $I_C$ = 11 mA at $V_{CE}$ = 1.0 V.
2. Pulse test = 300 μs – Duty cycle = 2%.

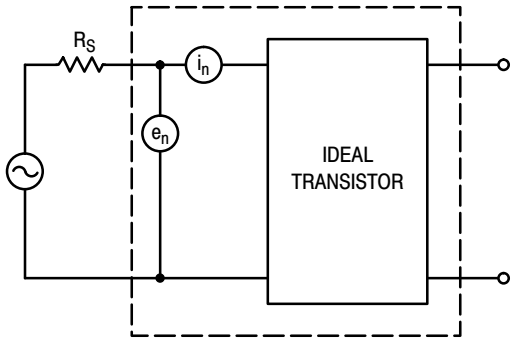



**Figure 1. Transistor Noise Model**

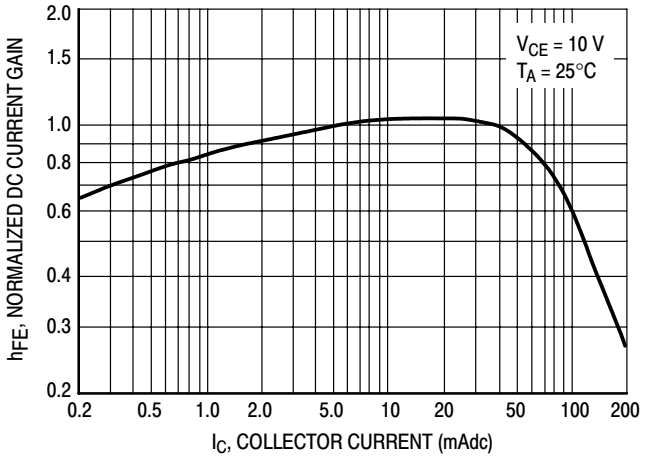



**Figure 2. Normalized DC Current Gain**

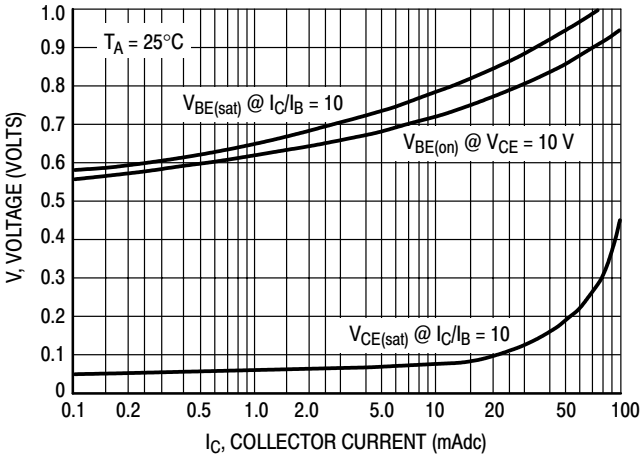



**Figure 3. “Saturation” and “On” Voltages**

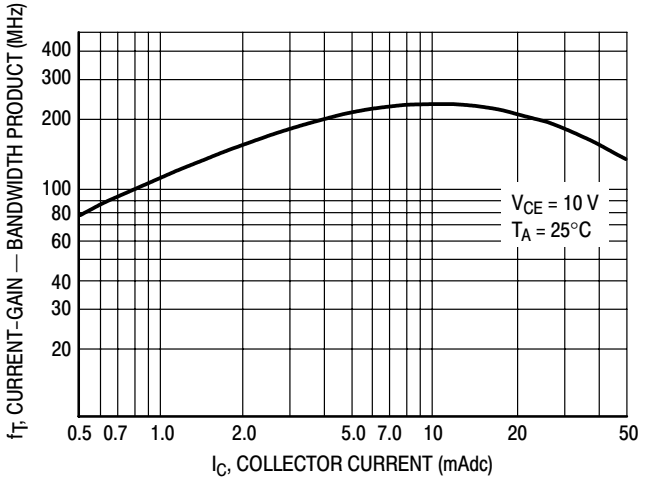



**Figure 4. Current−Gain — Bandwidth Product**

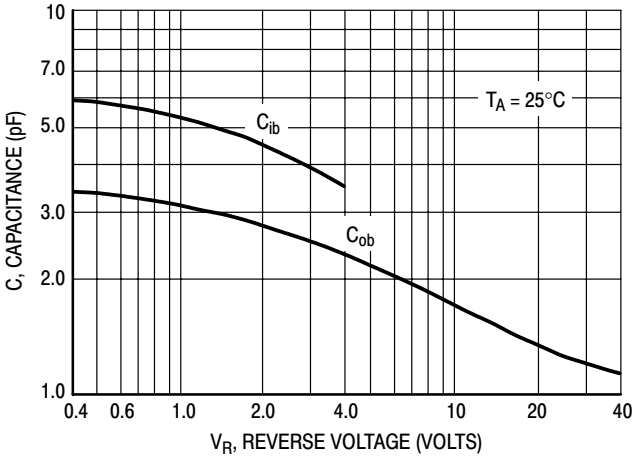



**Figure 5. Capacitance**

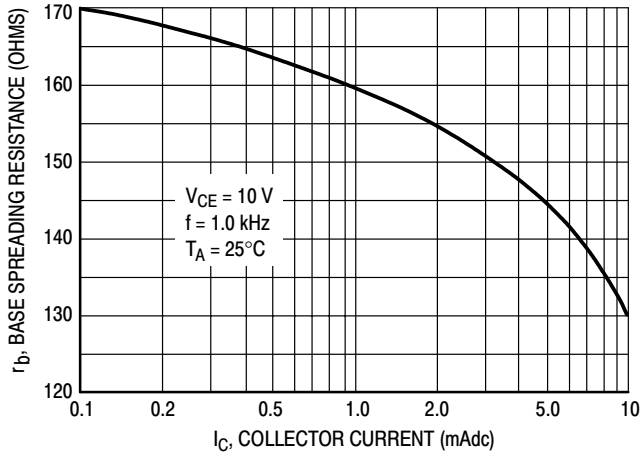
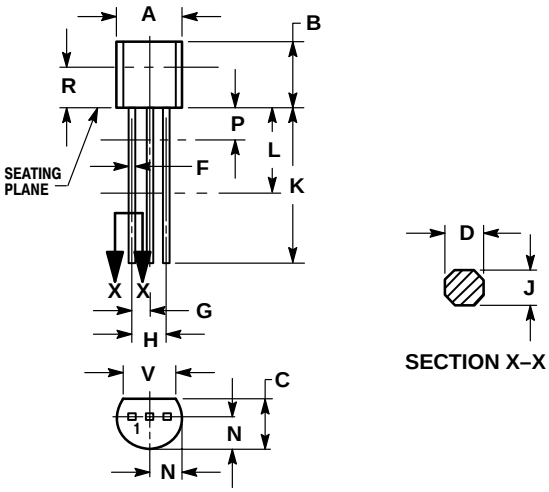



**Figure 6. Base Spreading Resistance**

## PACKAGE DIMENSIONS

**CASE 029–04**
**(TO–226AA)**
**ISSUE AD**




NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. DIMENSION F APPLIES BETWEEN P AND L. DIMENSION D AND J APPLY BETWEEN L AND K MINIMUM. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

| | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 0.175 | 0.205 | 4.45 | 5.20 |
| B | 0.170 | 0.210 | 4.32 | 5.33 |
| C | 0.125 | 0.165 | 3.18 | 4.19 |
| D | 0.016 | 0.022 | 0.41 | 0.55 |
| F | 0.016 | 0.019 | 0.41 | 0.48 |
| G | 0.045 | 0.055 | 1.15 | 1.39 |
| H | 0.095 | 0.105 | 2.42 | 2.66 |
| J | 0.015 | 0.020 | 0.39 | 0.50 |
| K | 0.500 | --- | 12.70 | --- |
| L | 0.250 | --- | 6.35 | --- |
| N | 0.080 | 0.105 | 2.04 | 2.66 |
| P | --- | 0.100 | --- | 2.54 |
| R | 0.115 | --- | 2.93 | --- |
| V | 0.135 | --- | 3.43 | --- |

STYLE 17:
PIN 1. COLLECTOR
2. BASE
3. EMITTER



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