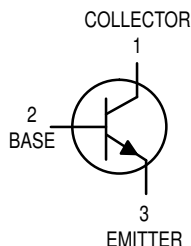


# Amplifier Transistors

## NPN Silicon

**BC546, B**  
**BC547, A, B, C**  
**BC548, A, B, C**



### MAXIMUM RATINGS

| Rating                                                                                 | Symbol         | BC 546      | BC 547 | BC 548 | Unit          |
|----------------------------------------------------------------------------------------|----------------|-------------|--------|--------|---------------|
| Collector–Emitter Voltage                                                              | $V_{CEO}$      | 65          | 45     | 30     | Vdc           |
| Collector–Base Voltage                                                                 | $V_{CBO}$      | 80          | 50     | 30     | Vdc           |
| Emitter–Base Voltage                                                                   | $V_{EBO}$      | 6.0         |        |        | Vdc           |
| Collector Current — Continuous                                                         | $I_C$          | 100         |        |        | mA dc         |
| Total Device Dissipation @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 625<br>5.0  |        |        | mW<br>mW/°C   |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 1.5<br>12   |        |        | Watt<br>mW/°C |
| Operating and Storage Junction<br>Temperature Range                                    | $T_J, T_{stg}$ | –55 to +150 |        |        | °C            |

### THERMAL CHARACTERISTICS

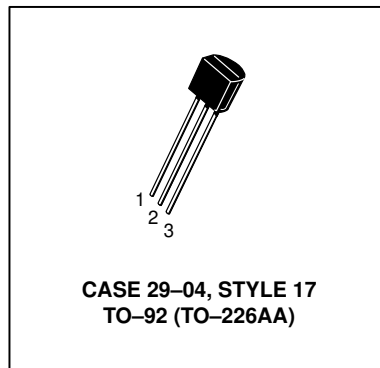
| Characteristic                          | Symbol          | Max  | Unit |
|-----------------------------------------|-----------------|------|------|
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 200  | °C/W |
| Thermal Resistance, Junction to Case    | $R_{\theta JC}$ | 83.3 | °C/W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

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

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

### OFF CHARACTERISTICS

|                                                                                                                                                                                                                           |                                          |               |                   |                        |                       |                             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|---------------|-------------------|------------------------|-----------------------|-----------------------------|
| Collector–Emitter Breakdown Voltage<br>( $I_C = 1.0\text{ mA}$ , $I_B = 0$ )                                                                                                                                              | BC546<br>BC547<br>BC548                  | $V_{(BR)CEO}$ | 65<br>45<br>30    | —<br>—<br>—            | —<br>—<br>—           | V                           |
| Collector–Base Breakdown Voltage<br>( $I_C = 100\text{ }\mu\text{A dc}$ )                                                                                                                                                 | BC546<br>BC547<br>BC548                  | $V_{(BR)CBO}$ | 80<br>50<br>30    | —<br>—<br>—            | —<br>—<br>—           | V                           |
| Emitter–Base Breakdown Voltage<br>( $I_E = 10\text{ }\mu\text{A}$ , $I_C = 0$ )                                                                                                                                           | BC546<br>BC547<br>BC548                  | $V_{(BR)EBO}$ | 6.0<br>6.0<br>6.0 | —<br>—<br>—            | —<br>—<br>—           | V                           |
| Collector Cutoff Current<br>( $V_{CE} = 70\text{ V}$ , $V_{BE} = 0$ )<br>( $V_{CE} = 50\text{ V}$ , $V_{BE} = 0$ )<br>( $V_{CE} = 35\text{ V}$ , $V_{BE} = 0$ )<br>( $V_{CE} = 30\text{ V}$ , $T_A = 125^\circ\text{C}$ ) | BC546<br>BC547<br>BC548<br>BC546/547/548 | $I_{CES}$     | —<br>—<br>—<br>—  | 0.2<br>0.2<br>0.2<br>— | 15<br>15<br>15<br>4.0 | nA<br><br><br>$\mu\text{A}$ |



**BC546, B BC547, A, B, C BC548, A, B, C****ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted) (Continued)

| Characteristic                                                                                                                                                                                           |                                                                             | Symbol               | Min                                    | Typ                              | Max                                    | Unit |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|----------------------|----------------------------------------|----------------------------------|----------------------------------------|------|
| ON CHARACTERISTICS                                                                                                                                                                                       |                                                                             |                      |                                        |                                  |                                        |      |
| DC Current Gain<br>(I <sub>C</sub> = 10 μA, V <sub>CE</sub> = 5.0 V)                                                                                                                                     | BC547A/548A<br>BC546B/547B/548B<br>BC548C                                   | h <sub>FE</sub>      | —<br>—<br>—                            | 90<br>150<br>270                 | —<br>—<br>—                            | —    |
| (I <sub>C</sub> = 2.0 mA, V <sub>CE</sub> = 5.0 V)                                                                                                                                                       | BC546<br>BC547<br>BC548<br>BC547A/548A<br>BC546B/547B/548B<br>BC547C/BC548C |                      | 110<br>110<br>110<br>110<br>200<br>420 | —<br>—<br>—<br>180<br>290<br>520 | 450<br>800<br>800<br>220<br>450<br>800 |      |
| (I <sub>C</sub> = 100 mA, V <sub>CE</sub> = 5.0 V)                                                                                                                                                       | BC547A/548A<br>BC546B/547B/548B<br>BC548C                                   |                      | —<br>—<br>—                            | 120<br>180<br>300                | —<br>—<br>—                            |      |
| Collector–Emitter Saturation Voltage<br>(I <sub>C</sub> = 10 mA, I <sub>B</sub> = 0.5 mA)<br>(I <sub>C</sub> = 100 mA, I <sub>B</sub> = 5.0 mA)<br>(I <sub>C</sub> = 10 mA, I <sub>B</sub> = See Note 1) |                                                                             | V <sub>CE(sat)</sub> | —<br>—<br>—                            | 0.09<br>0.2<br>0.3               | 0.25<br>0.6<br>0.6                     | V    |
| Base–Emitter Saturation Voltage<br>(I <sub>C</sub> = 10 mA, I <sub>B</sub> = 0.5 mA)                                                                                                                     |                                                                             | V <sub>BE(sat)</sub> | —                                      | 0.7                              | —                                      | V    |
| Base–Emitter On Voltage<br>(I <sub>C</sub> = 2.0 mA, V <sub>CE</sub> = 5.0 V)<br>(I <sub>C</sub> = 10 mA, V <sub>CE</sub> = 5.0 V)                                                                       |                                                                             | V <sub>BE(on)</sub>  | 0.55<br>—                              | —<br>—                           | 0.7<br>0.77                            | V    |
| SMALL–SIGNAL CHARACTERISTICS                                                                                                                                                                             |                                                                             |                      |                                        |                                  |                                        |      |
| Current–Gain — Bandwidth Product<br>(I <sub>C</sub> = 10 mA, V <sub>CE</sub> = 5.0 V, f = 100 MHz)                                                                                                       | BC546<br>BC547<br>BC548                                                     | f <sub>T</sub>       | 150<br>150<br>150                      | 300<br>300<br>300                | —<br>—<br>—                            | MHz  |
| Output Capacitance<br>(V <sub>CB</sub> = 10 V, I <sub>C</sub> = 0, f = 1.0 MHz)                                                                                                                          |                                                                             | C <sub>obo</sub>     | —                                      | 1.7                              | 4.5                                    | pF   |
| Input Capacitance<br>(V <sub>EB</sub> = 0.5 V, I <sub>C</sub> = 0, f = 1.0 MHz)                                                                                                                          |                                                                             | C <sub>ibo</sub>     | —                                      | 10                               | —                                      | pF   |
| Small–Signal Current Gain<br>(I <sub>C</sub> = 2.0 mA, V <sub>CE</sub> = 5.0 V, f = 1.0 kHz)                                                                                                             | BC546<br>BC547/548<br>BC547A/548A<br>BC546B/547B/548B<br>BC547C/548C        | h <sub>fe</sub>      | 125<br>125<br>125<br>240<br>450        | —<br>—<br>220<br>330<br>600      | 500<br>900<br>260<br>500<br>900        | —    |
| Noise Figure<br>(I <sub>C</sub> = 0.2 mA, V <sub>CE</sub> = 5.0 V, R <sub>S</sub> = 2 kΩ,<br>f = 1.0 kHz, Δf = 200 Hz)                                                                                   | BC546<br>BC547<br>BC548                                                     | NF                   | —<br>—<br>—                            | 2.0<br>2.0<br>2.0                | 10<br>10<br>10                         | dB   |

Note 1:  $I_B$  is value for which  $I_C = 11\ \text{mA}$  at  $V_{CE} = 1.0\ \text{V}$ .

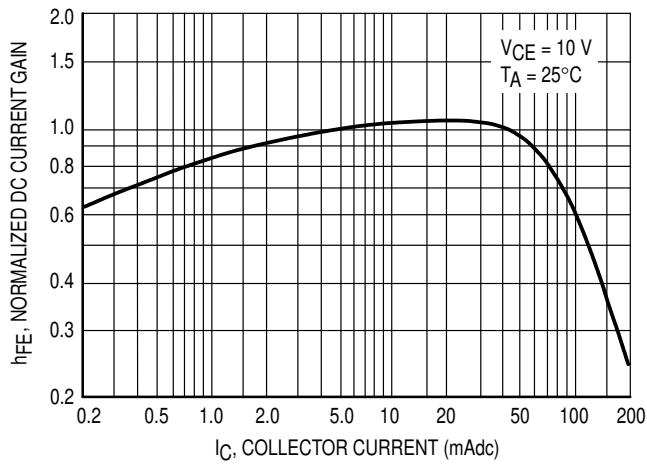


Figure 1. Normalized DC Current Gain

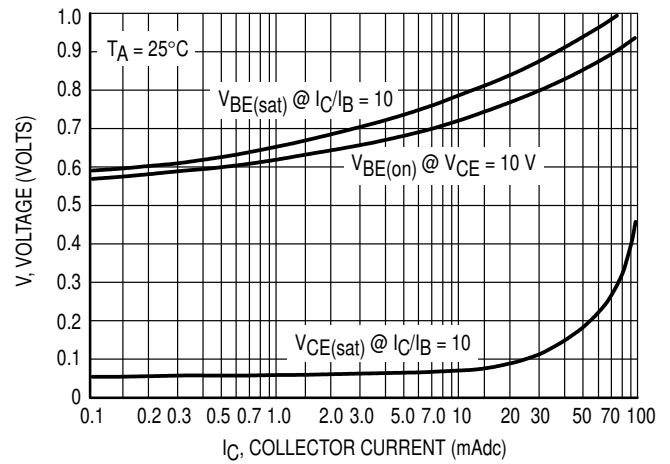


Figure 2. "Saturation" and "On" Voltages

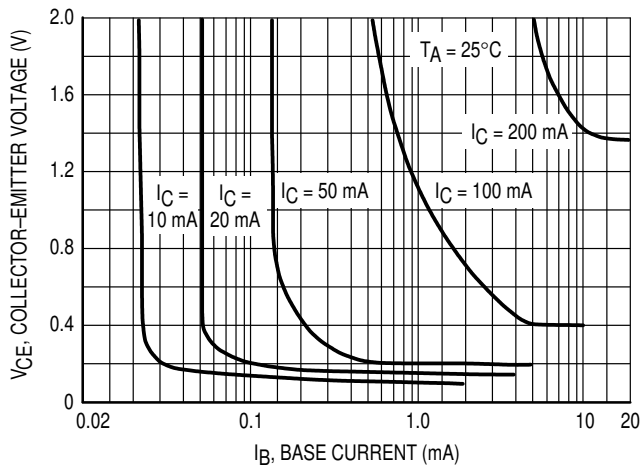


Figure 3. Collector Saturation Region

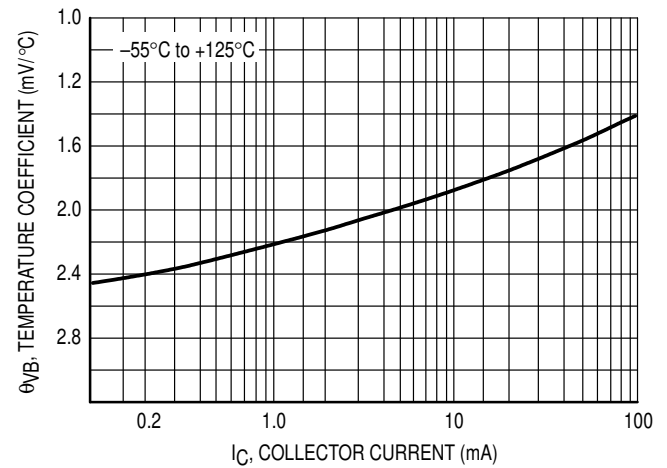


Figure 4. Base-Emitter Temperature Coefficient

### BC547/BC548

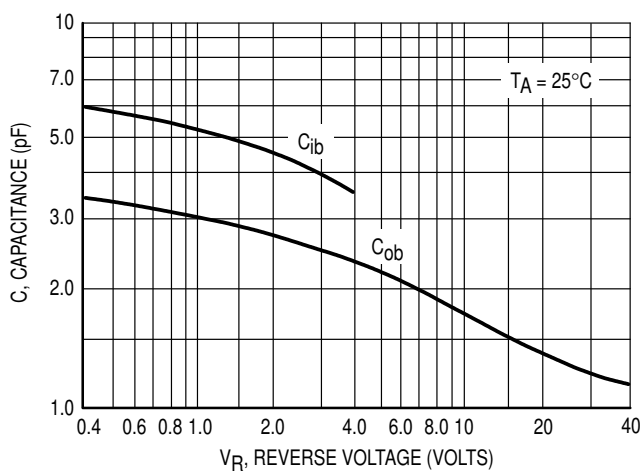


Figure 5. Capacitances

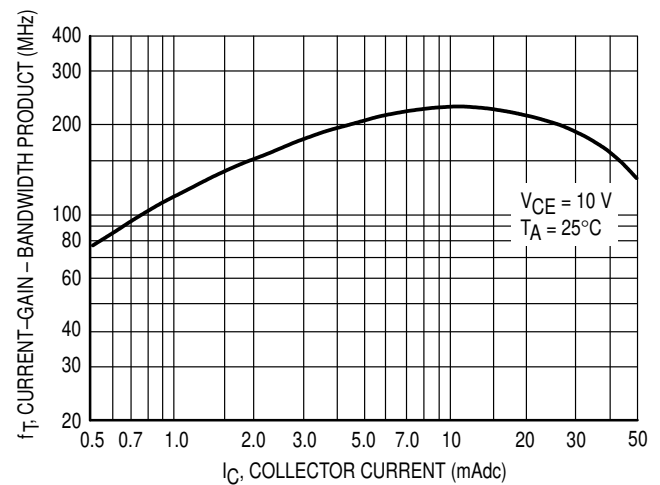


Figure 6. Current-Gain – Bandwidth Product

## BC547/BC548

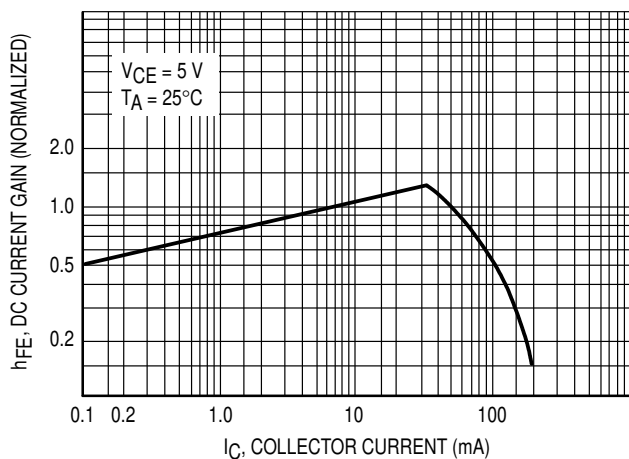


Figure 7. DC Current Gain

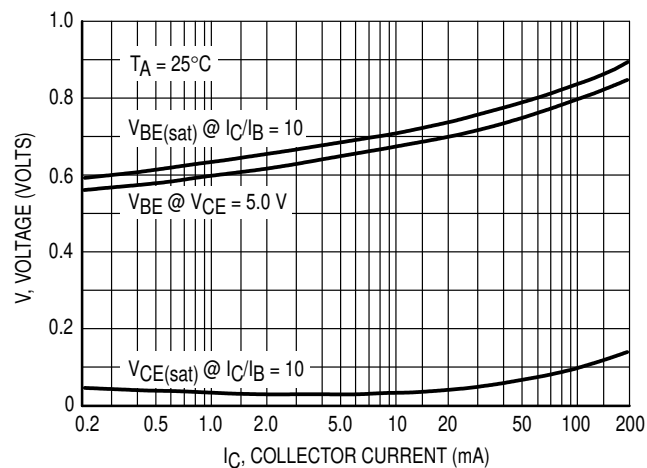


Figure 8. "On" Voltage

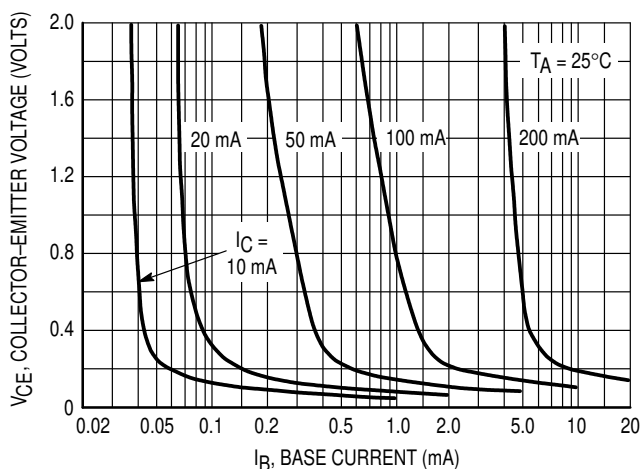


Figure 9. Collector Saturation Region

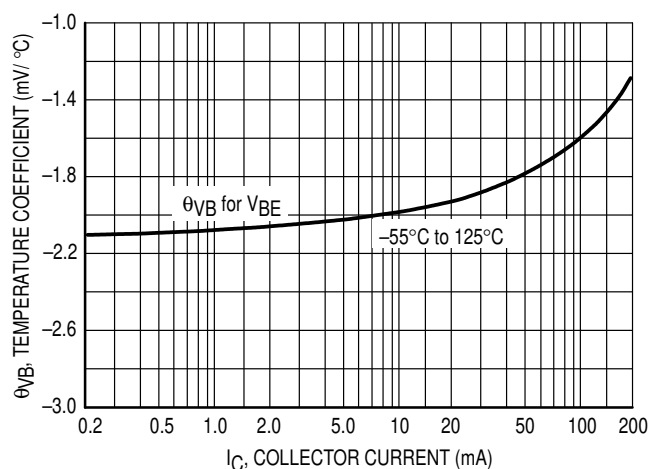


Figure 10. Base-Emitter Temperature Coefficient

## BC546

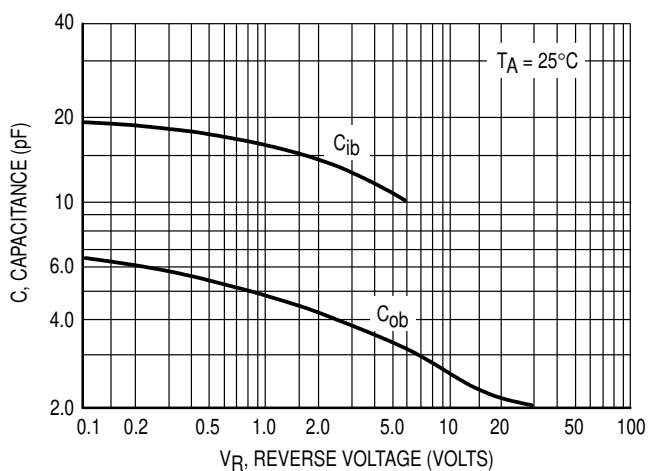


Figure 11. Capacitance

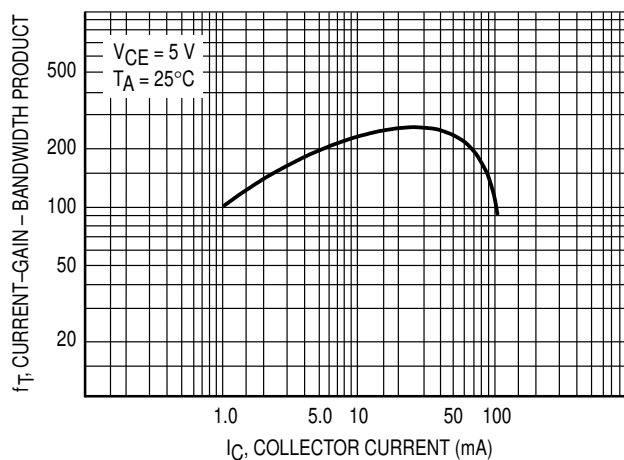
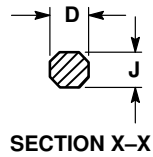
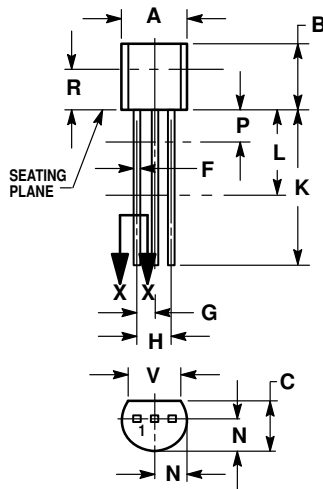


Figure 12. Current-Gain - Bandwidth Product

## 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.

| DIM | INCHES |       | MILLIMETERS |      |
|-----|--------|-------|-------------|------|
|     | 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
- BASE
- EMITTER

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**MFAX:** RMFAX0@email.sps.mot.com - TOUCHTONE (602) 244-6609  
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51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298

