

# Amplifier Transistors

## NPN Silicon

**BC546**  
**BC546B**  
**BC547A**  
**BC547B**  
**BC547C**  
**BC548B**  
**BC548C**

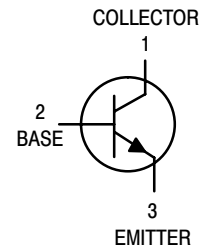
### MAXIMUM RATINGS

| Rating   | Symbol         | BC546       | BC547 | BC548 | 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         |       |       | mAdc                 |
| Total Device Dissipation @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 625         |       |       | mW                   |
|  |                | 5.0         |       |       | mW/ $^\circ\text{C}$ |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 1.5         |       |       | Watt                 |
|  |                | 12          |       |       | mW/ $^\circ\text{C}$ |
| Operating and Storage Junction<br>Temperature Range                                    | $T_J, T_{stg}$ | –55 to +150 |       |       | $^\circ\text{C}$     |



### THERMAL CHARACTERISTICS

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



### 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>( $I_C = 100\text{ }\mu\text{Adc}$ )  | 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 BC546B BC547A BC547B BC547C BC548B BC548C

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

| Characteristic   | Symbol               | Min  | Typ  | Max  | Unit |
|--|----------------------|------|------|------|------|
| <b>ON CHARACTERISTICS</b>  |                      |      |      |      |      |
| DC Current Gain<br>( $I_C = 10\ \mu\text{A}$ , $V_{CE} = 5.0\ \text{V}$ )  | $h_{FE}$             | —    | 90   | —    | —    |
|  | BC547A               | —    | 150  | —    | —    |
|  | BC546B/547B/548B     | —    | 270  | —    | —    |
|  | BC548C               | —    | 270  | —    | —    |
| ( $I_C = 2.0\ \text{mA}$ , $V_{CE} = 5.0\ \text{V}$ )  | BC546                | 110  | —    | 450  | —    |
|  | BC547                | 110  | —    | 800  | —    |
|  | BC548                | 110  | —    | 800  | —    |
|  | BC547A               | 110  | 180  | 220  | —    |
|  | BC546B/547B/548B     | 200  | 290  | 450  | —    |
|  | BC547C/BC548C        | 420  | 520  | 800  | —    |
| ( $I_C = 100\ \text{mA}$ , $V_{CE} = 5.0\ \text{V}$ )  | BC547A/548A          | —    | 120  | —    | —    |
|  | BC546B/547B/548B     | —    | 180  | —    | —    |
|  | BC548C               | —    | 300  | —    | —    |
| Collector–Emitter Saturation Voltage<br>( $I_C = 10\ \text{mA}$ , $I_B = 0.5\ \text{mA}$ )<br>( $I_C = 100\ \text{mA}$ , $I_B = 5.0\ \text{mA}$ )<br>( $I_C = 10\ \text{mA}$ , $I_B = \text{See Note 1}$ ) | $V_{CE(\text{sat})}$ | —    | 0.09 | 0.25 | V    |
|  |                      | —    | 0.2  | 0.6  |      |
|  |                      | —    | 0.3  | 0.6  |      |
| Base–Emitter Saturation Voltage<br>( $I_C = 10\ \text{mA}$ , $I_B = 0.5\ \text{mA}$ )  | $V_{BE(\text{sat})}$ | —    | 0.7  | —    | V    |
| Base–Emitter On Voltage<br>( $I_C = 2.0\ \text{mA}$ , $V_{CE} = 5.0\ \text{V}$ )<br>( $I_C = 10\ \text{mA}$ , $V_{CE} = 5.0\ \text{V}$ )   | $V_{BE(\text{on})}$  | 0.55 | —    | 0.7  | V    |
|  |                      | —    | —    | 0.77 |      |

## SMALL–SIGNAL CHARACTERISTICS

|  |                  |     |     |     |     |
|--|------------------|-----|-----|-----|-----|
| Current–Gain — Bandwidth Product<br>( $I_C = 10\ \text{mA}$ , $V_{CE} = 5.0\ \text{V}$ , $f = 100\ \text{MHz}$ )   | $f_T$            | 150 | 300 | —   | MHz |
|  | BC546            | 150 | 300 | —   |     |
|  | BC547            | 150 | 300 | —   |     |
|  | BC548            | 150 | 300 | —   |     |
| Output Capacitance<br>( $V_{CB} = 10\ \text{V}$ , $I_C = 0$ , $f = 1.0\ \text{MHz}$ )  | $C_{obo}$        | —   | 1.7 | 4.5 | pF  |
| Input Capacitance<br>( $V_{EB} = 0.5\ \text{V}$ , $I_C = 0$ , $f = 1.0\ \text{MHz}$ )  | $C_{ibo}$        | —   | 10  | —   | pF  |
| Small–Signal Current Gain<br>( $I_C = 2.0\ \text{mA}$ , $V_{CE} = 5.0\ \text{V}$ , $f = 1.0\ \text{kHz}$ )   | $h_{fe}$         | 125 | —   | 500 | —   |
|  | BC546            | 125 | —   | 900 | —   |
|  | BC547/548        | 125 | —   | 900 | —   |
|  | BC547A           | 125 | 220 | 260 | —   |
|  | BC546B/547B/548B | 240 | 330 | 500 | —   |
|  | BC547C/548C      | 450 | 600 | 900 | —   |
| Noise Figure<br>( $I_C = 0.2\ \text{mA}$ , $V_{CE} = 5.0\ \text{V}$ , $R_S = 2\ \text{k}\Omega$ ,<br>$f = 1.0\ \text{kHz}$ , $\Delta f = 200\ \text{Hz}$ ) | NF               | —   | 2.0 | 10  | dB  |
|  | BC546            | —   | 2.0 | 10  |     |
|  | BC547            | —   | 2.0 | 10  |     |
|  | BC548            | —   | 2.0 | 10  |     |

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

BC547/BC548

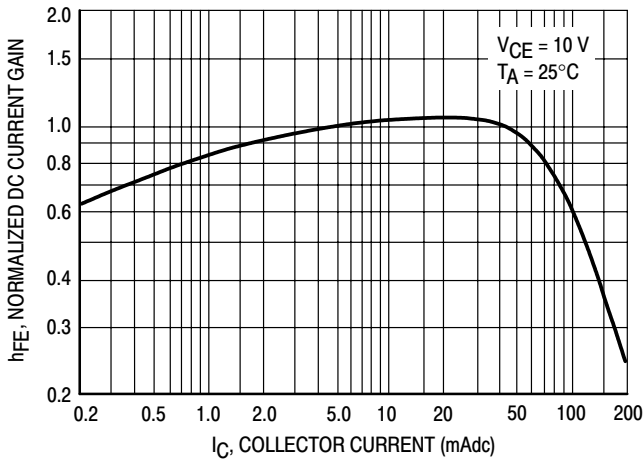


Figure 1. Normalized DC Current Gain

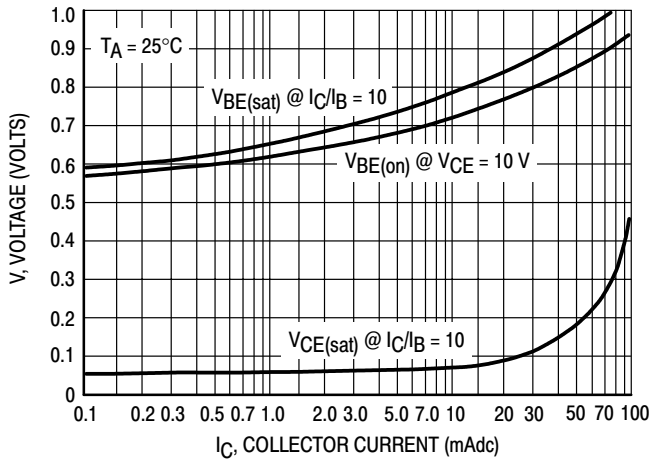


Figure 2. "Saturation" and "On" Voltages

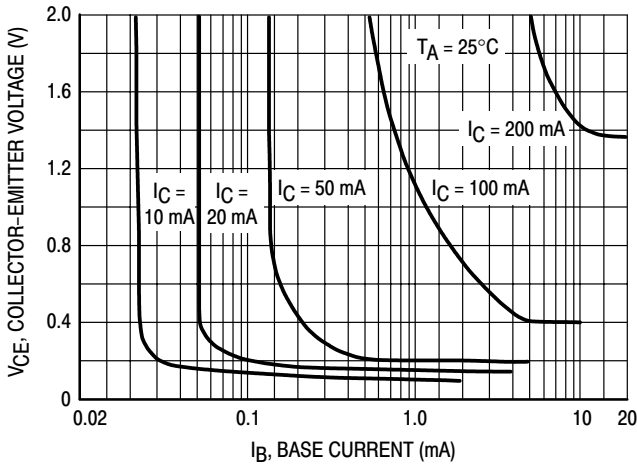


Figure 3. Collector Saturation Region

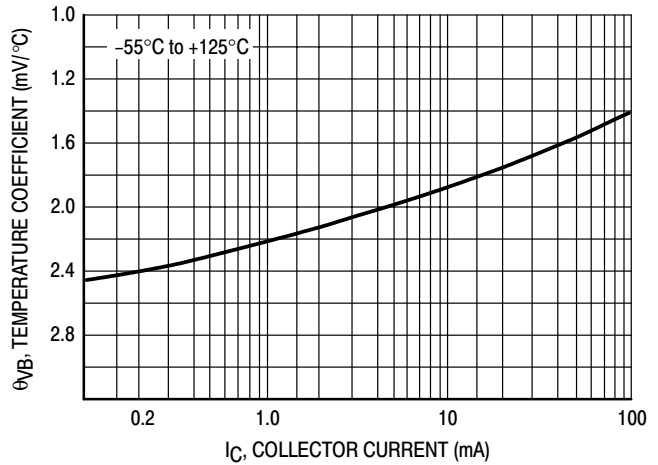


Figure 4. Base-Emitter Temperature Coefficient

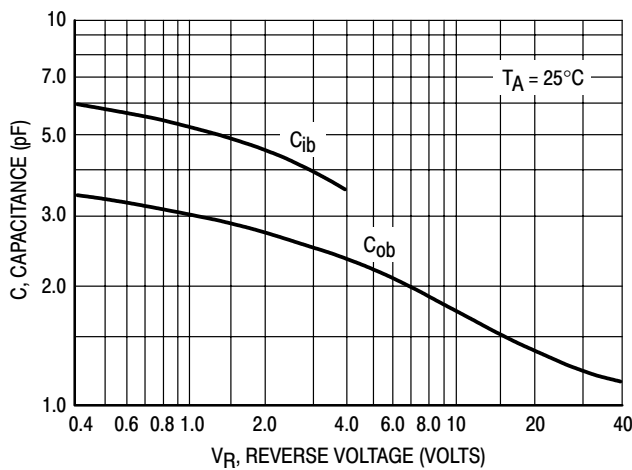


Figure 5. Capacitances

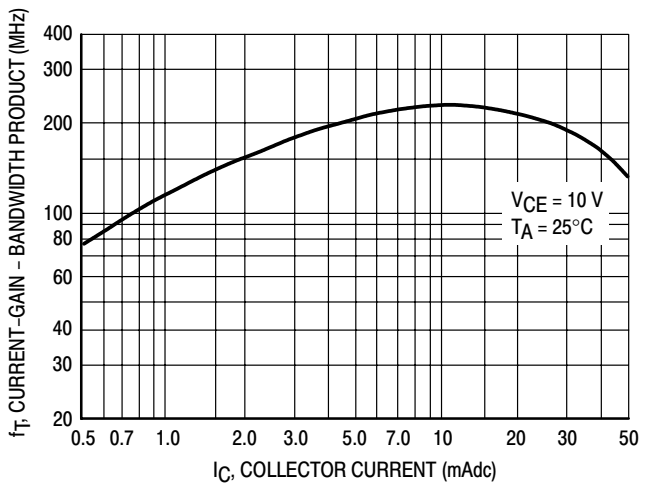


Figure 6. Current-Gain - Bandwidth Product

BC546

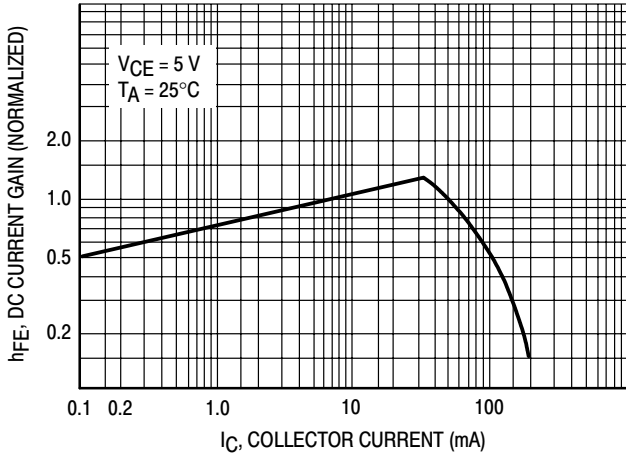


Figure 7. DC Current Gain

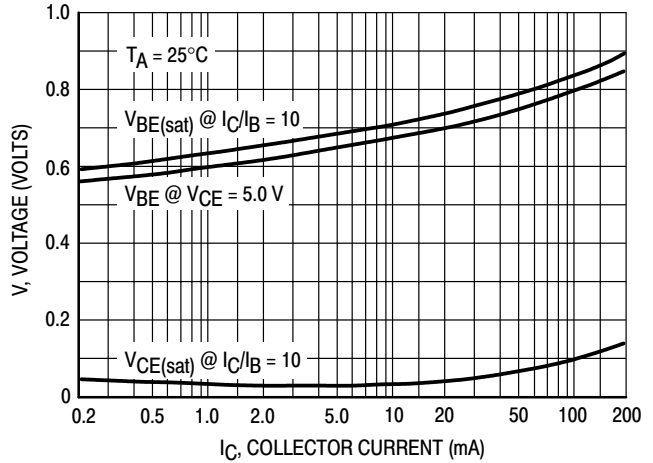


Figure 8. "On" Voltage

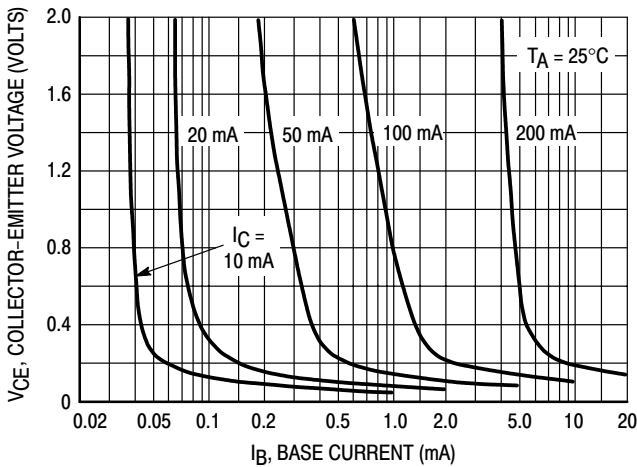


Figure 9. Collector Saturation Region

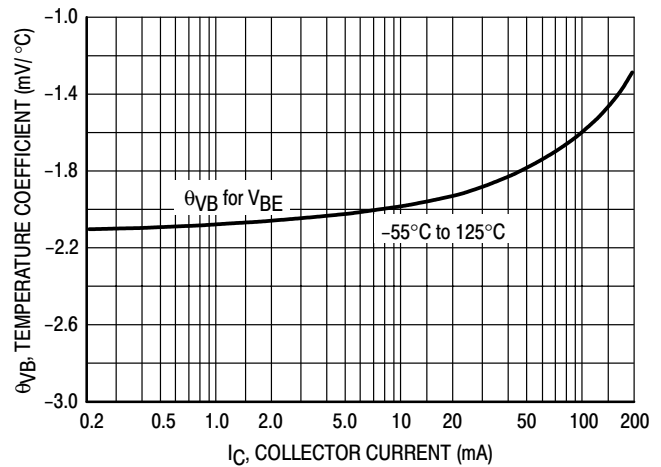


Figure 10. Base-Emitter Temperature Coefficient

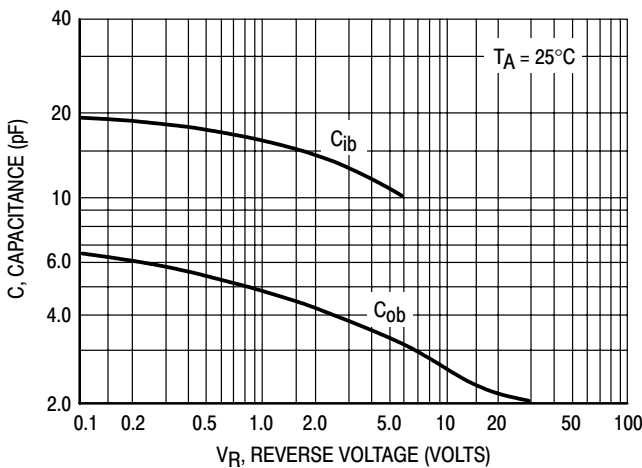


Figure 11. Capacitance

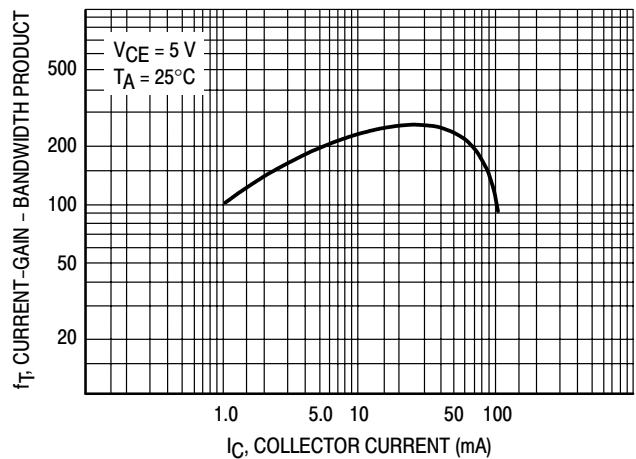
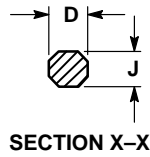
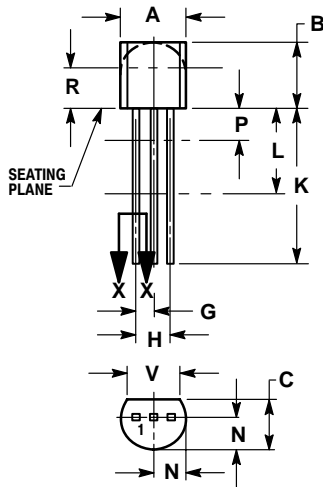


Figure 12. Current-Gain - Bandwidth Product

# BC546 BC546B BC547A BC547B BC547C BC548B BC548C

## PACKAGE DIMENSIONS

TO-92 (TO-226)  
CASE 29-11  
ISSUE AL




NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. 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  | 0.021 | 0.407       | 0.533 |
| 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        | ---   |

## Notes

## Notes

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