

MICRO ELECTRONICS

BC107,8,9
BC167,8,9
BC237,8,9
BC317,8,9

THE ABOVE TYPES ARE NPN SILICON PLANAR EPITAXIAL TRANSISTORS FOR USE IN AF SMALL SIGNAL AMPLIFIER STAGES AND DIRECT COUPLED CIRCUITS.

BC107, 8, 9 are complementary to BC177, 8, 9.

BC167, 8, 9 are complementary to BC257, 8, 9.

BC237, 8, 9 are complementary to BC307, 8, 9.

BC317, 8, 9 are complementary to BC320, 1, 2.

CASE

TO-18



BC107,8,9

TO-92B



BC167,8,9

TO-92F



BC237,8,9

TO-92A



BC317,8,9

ABSOLUTE MAXIMUM RATINGS

| TYPE | V _{CEO} (V) | V _{CES} (V) | V _{CE0} (V) | V _{EB0} (V) | I _C (DC) (mA) | P _{tot} (mW) * | T _j , T _{stg} |
|-------|-------------------------|-------------------------|-------------------------|-------------------------|-----------------------------|----------------------------|-----------------------------------|
| BC107 | 50 | 50 | 45 | 6 | 100 | 300 | -55 to 175°C |
| BC108 | 30 | 30 | 20 | 5 | 100 | 300 | |
| BC109 | 30 | 30 | 20 | 5 | 100 | 300 | |
| BC167 | 50 | 50 | 45 | 6 | 100 | 300 | -55 to 150°C |
| BC168 | 30 | 30 | 20 | 5 | 100 | 300 | |
| BC169 | 30 | 30 | 20 | 5 | 100 | 300 | |
| BC237 | 50 | 50 | 45 | 6 | 100 | 300 | -55 to 150°C |
| BC238 | 30 | 30 | 20 | 5 | 100 | 300 | |
| BC239 | 30 | 30 | 20 | 5 | 100 | 300 | |
| BC317 | 50 | | 45 | 6 | 150 | 310 | -55 to 150°C |
| BC318 | 45 | | 30 | 5 | 150 | 310 | |
| BC319 | 30 | | 20 | 5 | 150 | 310 | |

* Total Power Dissipation @ T_A ≤ 25°C



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

| PARAMETER | SYMBOL | MIN | TYP | MAX | UNIT | TEST CONDITIONS |
|--|------------------------|------------------|------|----------|---------------------|---|
| Collector-Base Breakdown Voltage | BVCBO | ↑ Note 1 ↓ | | | V | $I_C=10\mu\text{A}$ $I_E=0$ |
| Collector-Emitter Breakdown Voltage | LVCEO * | | | | V | $I_C=2\text{mA}$ $I_B=0$ |
| Emitter-Base Breakdown Voltage | BVEBO | | | | V | $I_E=1\mu\text{A}$ $I_C=0$ |
| Collector Cutoff Current BC107, 108, 109 } only BC167, 168, 169 } BC237, 238, 239 } | ICES | | | 15 4 | nA μA | $V_{CE}=V_{CES}$ $V_{BE}=0$ $V_{CE}=V_{CES}$ $V_{BE}=0$ $T_A=125^{\circ}\text{C}$ |
| Collector Cutoff Current BC317, 318, 319 only | ICBO | | | 30 15 | nA μA | $V_{CB}=20\text{V}$ $I_E=0$ $V_{CB}=20\text{V}$ $I_E=0$ $T_A=100^{\circ}\text{C}$ |
| Collector-Emitter Saturation Voltage BC107, 108, 109 } only BC167, 168, 169 } BC237, 238, 239 } | $V_{CE}(\text{sat})^*$ | | 0.07 | 0.25 | V | $I_C=10\text{mA}$ $I_B=0.5\text{mA}$ |
| | | | 0.22 | 0.6 | V | $I_C=100\text{mA}$ $I_B=5\text{mA}$ |
| BC317, 318, 319 only | $V_{CE}(\text{sat})^*$ | | 0.07 | 0.2 | V | $I_C=10\text{mA}$ $I_B=0.5\text{mA}$ |
| | | | 0.2 | 0.5 | V | $I_C=100\text{mA}$ $I_B=5\text{mA}$ |
| Base-Emitter Saturation Voltage BC107, 108, 109 } only BC167, 168, 169 } BC237, 238, 239 } | $V_{BE}(\text{sat})^*$ | | 0.7 | 0.83 | V | $I_C=10\text{mA}$ $I_B=0.5\text{mA}$ |
| | | | 0.9 | 1.05 | V | $I_C=100\text{mA}$ $I_B=5\text{mA}$ |
| Base-Emitter Voltage All types | V_{BE}^* | 0.55 | 0.63 | 0.7 | V | $I_C=2\text{mA}$ $V_{CE}=5\text{V}$ |
| BC317, 318, 319 only | | 0.68 | 0.77 | | V | $I_C=10\text{mA}$ $V_{CE}=5\text{V}$ |
| Current Gain-Bandwidth Product BC107, 108, 109 } only BC167, 168, 169 } BC237, 238, 239 } | f_T | 150 | 250 | | MHz | $I_C=10\text{mA}$ $V_{CE}=5\text{V}$ |
| Collector-Base Capacitance BC107, 108, 109 | Cob | | 3.2 | 6.0 | pF | $V_{CB}=10\text{V}$ $I_E=0$ $f=1\text{MHz}$ |
| BC167, 168, 169 | | | 2.7 | 4.5 | pF | |
| BC237, 238, 239 | | | 2.7 | 4.5 | pF | |
| BC317, 318, 319 | | | 2.7 | 4.0 | pF | |
| Noise Figure BC107, 108 | NF | | 2 | 10 | dB | $I_C=0.2\text{mA}$ $V_{CE}=5\text{V}$ $R_G=2\text{K}\Omega$ $f=1\text{kHz}$ $\Delta f=200\text{Hz}$ |
| BC167, 168 | | | 2 | 10 | dB | |
| BC237, 238 | | | 2 | 10 | dB | |
| BC317, 318 | | | 2 | 6 | dB | |

* Pulse Test : Pulse Width=0.3ms, Duty Cycle=1%

Note 1 : equal to the value of absolute maximum ratings.

- - - Continued - - -

| PARAMETER | SYMBOL | MIN | TYP | MAX | UNIT | TEST CONDITIONS |
|----------------|--------|-----|-----|-----|------|--|
| Noise Figure | NF | | 1.5 | 4 | dB | $I_C=0.2mA$ $V_{CE}=5V$ $R_G=2K\Omega$ $f=1kHz$ $\Delta f=200Hz$ |
| | | | | | | $I_C=0.2mA$ $V_{CE}=5V$ $R_G=2K\Omega$ $f=30Hz-15KHz$ |
| BC109 BC169 | } only | | | | | |
| BC239 BC319 | | | | | | |

D.C. CURRENT GAIN (HFE) @ $V_{CE}=5V$ $T_A=25^\circ C$

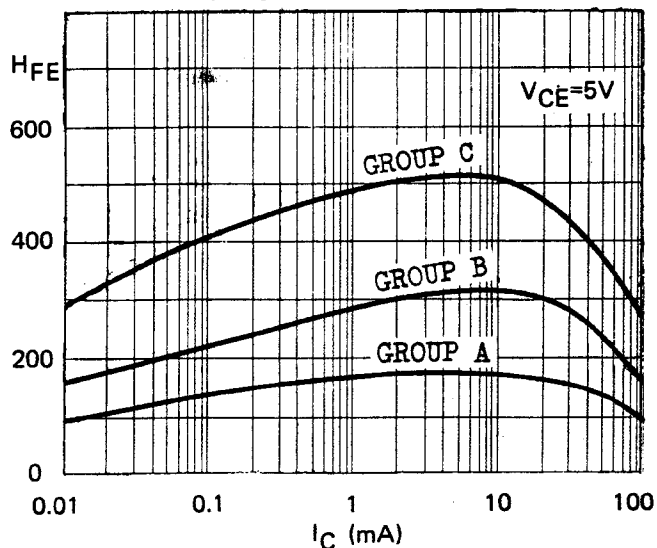
| at I_C (Pulsed) | HFE GROUP A | | | HFE GROUP B | | | HFE GROUP C | | |
|----------------------|-------------|-----|-----|-------------|-----|-----|-------------|-----|-----|
| | MIN | TYP | MAX | MIN | TYP | MAX | MIN | TYP | MAX |
| 0.01mA | 40 | 90 | | 40 | 170 | | 100 | 290 | |
| 2mA | 110 | 170 | 220 | 200 | 300 | 450 | 420 | 520 | 800 |
| 100mA | | 100 | | | 160 | | | 270 | |

h-PARAMETERS @ $I_C=2mA$ $V_{CE}=5V$ $f=1kHz$ $T_A=25^\circ C$

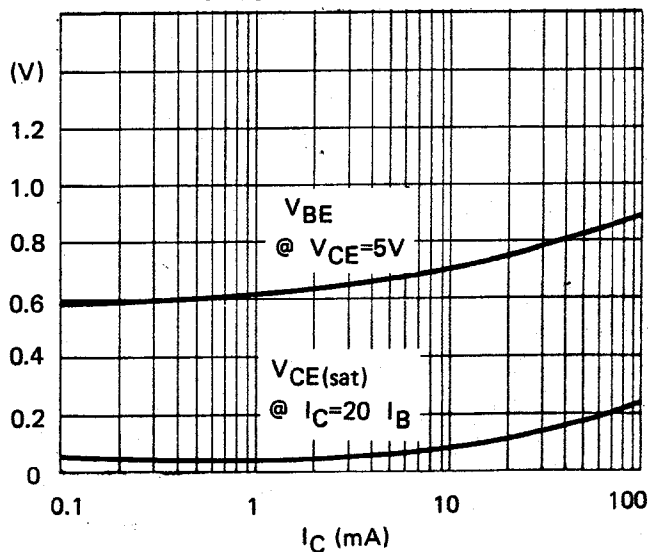
| h - PARAMETER | SYMBOL | HFE GROUP A | | | HFE GROUP B | | | HFE GROUP C | | | UNIT |
|---------------------------|----------|-------------|-----|-----|-------------|-----|-----|-------------|-----|-----|------------------|
| | | MIN | TYP | MAX | MIN | TYP | MAX | MIN | TYP | MAX | |
| Input Impedance | h_{ie} | 1.6 | 2.7 | 4.5 | 3.2 | 4.5 | 8.5 | 6 | 8.7 | 15 | $K\Omega$ |
| Voltage Feedback Ratio | h_{re} | | 1.5 | | | 2 | | | 3 | | $\times 10^{-4}$ |
| Small Signal Current Gain | h_{fe} | 125 | 190 | 260 | 240 | 330 | 500 | 450 | 580 | 900 | |
| Output Admittance | h_{oe} | | 18 | 30 | | 30 | 60 | | 60 | 110 | μS |

TYPICAL CHARACTERISTICS AT $T_A=25^\circ C$ (Pulse Test)

D.C. CURRENT GAIN
vs COLLECTOR CURRENT

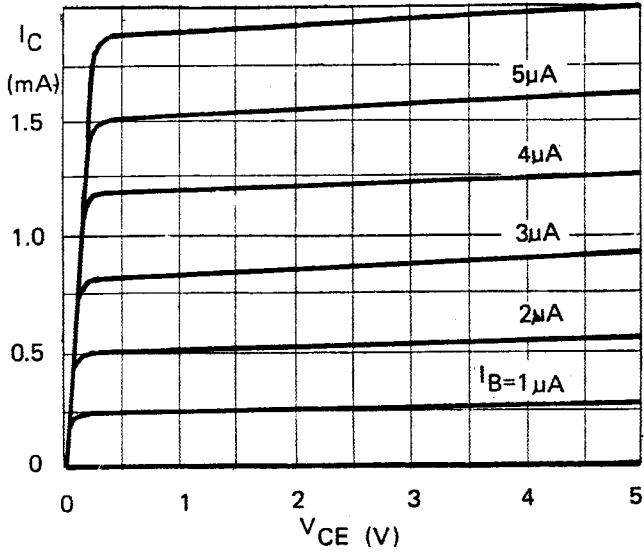


V_{BE} AND $V_{CE(sat)}$
vs COLLECTOR CURRENT

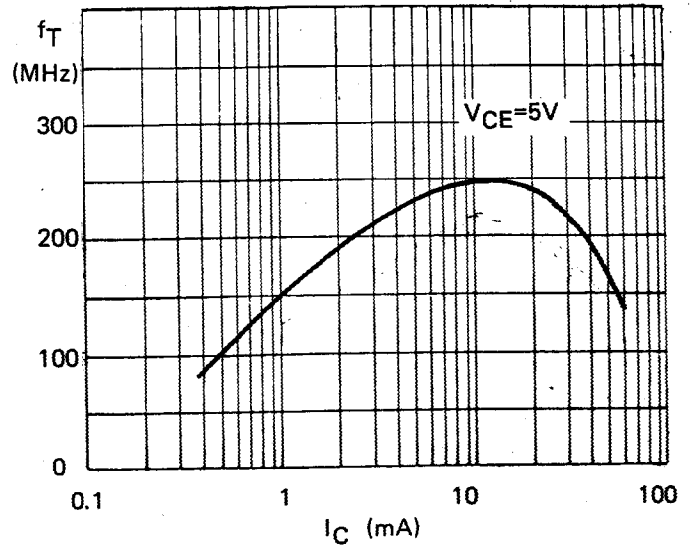


BC107 family
 TYPICAL CHARACTERISTICS ($T_A=25^\circ\text{C}$ UNLESS OTHERWISE SPECIFIED)

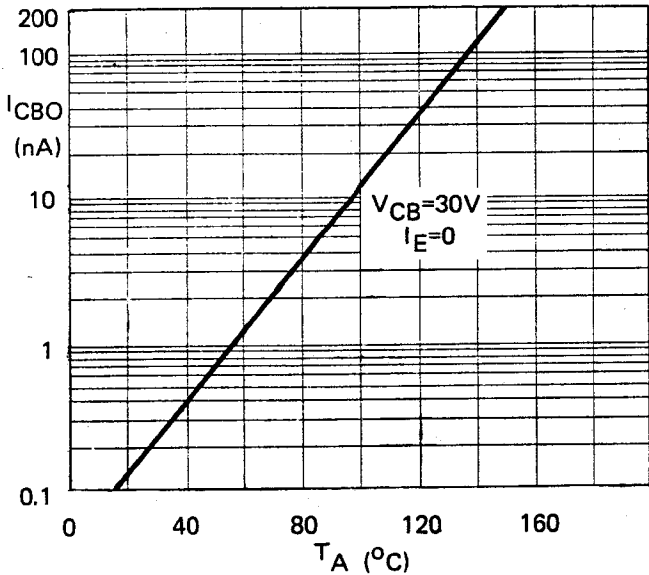
COMMON EMITTER
 OUTPUT CHARACTERISTICS



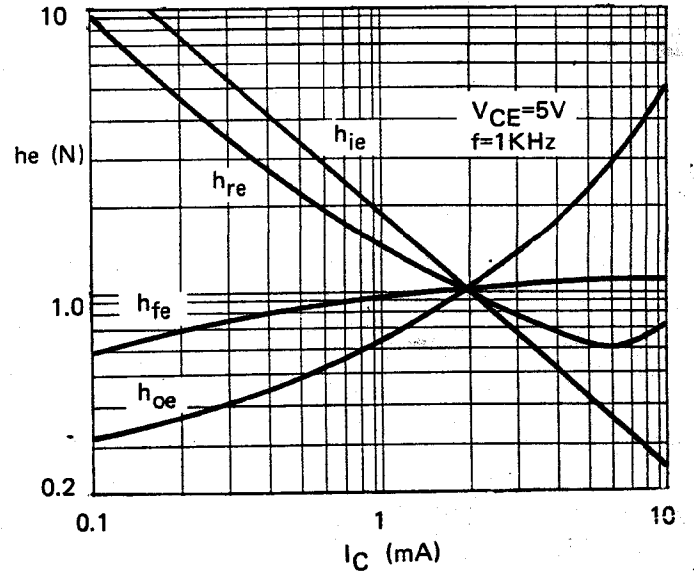
CURRENT GAIN - BANDWIDTH PRODUCT
 VS COLLECTOR CURRENT



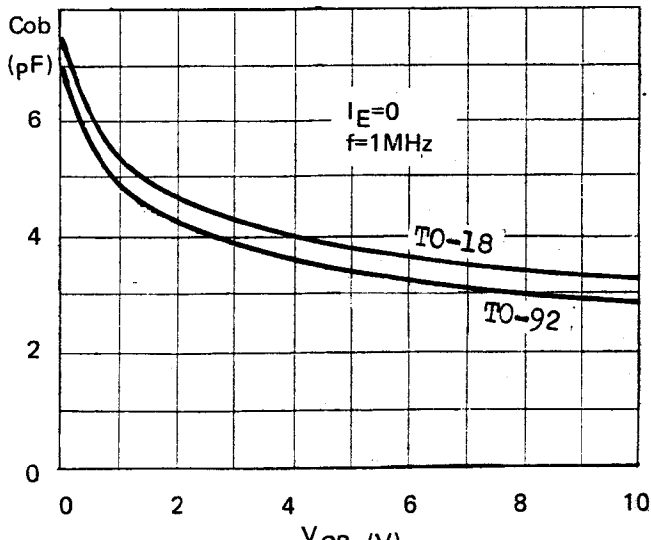
COLLECTOR CUTOFF CURRENT
 VS AMBIENT TEMPERATURE



h-PARAMETERS (NORMALIZED)
 VS COLLECTOR CURRENT



COLLECTOR-BASE CAPACITANCE
 VS COLLECTOR-BASE VOLTAGE



BROAD BAND NOISE FIGURE
 VS COLLECTOR CURRENT

