# 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


BC107,8,9


BC167,8,9


BC237,8,9


BC317,8,9

ABSOLUTE MAXIMUM RATINGS

| TYPE | $V_{CBO}$ (V) | $V_{CES}$ (V) | $V_{CEO}$ (V) | $V_{EBO}$ (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 @ $T_A \leq 25°C$

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

| PARAMETER | SYMBOL | MIN | TYP | MAX | UNIT | TEST CONDITIONS |
|---|---|---|---|---|---|---|
| Collector-Base Breakdown Voltage | $BV_{CBO}$ | | Note 1 | | V | $I_C$=10μA $I_E$=0 |
| Collector-Emitter Breakdown Voltage | $LV_{CEO}$ * | | Note 1 | | V | $I_C$=2mA $I_B$=0 |
| Emitter-Base Breakdown Voltage | $BV_{EBO}$ | | Note 1 | | V | $I_E$=1μA $I_C$=0 |
| Collector Cutoff Current | $I_{CES}$ | | | | | |
| BC107, 108, 109 } only | | | | 15 | nA | $V_{CE}$=$V_{CES}$ $V_{BE}$=0 |
| BC167, 168, 169 } only | | | | 4 | μA | $V_{CE}$=$V_{CES}$ $V_{BE}$=0 $T_A$=125°C |
| BC237, 238, 239 } only | | | | | | |
| Collector Cutoff Current | $I_{CBO}$ | | | | | |
| BC317, 318, 319 only | | | | 30 | nA | $V_{CB}$=20V $I_E$=0 |
| | | | | 15 | μA | $V_{CB}$=20V $I_E$=0 $T_A$=100°C |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$* | | | | | |
| BC107, 108, 109 } only | | | 0.07 | 0.25 | V | $I_C$=10mA $I_B$=0.5mA |
| BC167, 168, 169 } only | | | 0.22 | 0.6 | V | $I_C$=100mA $I_B$=5mA |
| BC237, 238, 239 } only | | | | | | |
| BC317, 318, 319 only | $V_{CE(sat)}$* | | 0.07 | 0.2 | V | $I_C$=10mA $I_B$=0.5mA |
| | | | 0.2 | 0.5 | V | $I_C$=100mA $I_B$=5mA |
| Base-Emitter Saturation Voltage | $V_{BE(sat)}$* | | | | | |
| BC107, 108, 109 } only | | | 0.7 | 0.83 | V | $I_C$=10mA $I_B$=0.5mA |
| BC167, 168, 169 } only | | | 0.9 | 1.05 | V | $I_C$=100mA IB=5mA |
| BC237, 238, 239 } only | | | | | | |
| Base-Emitter Voltage All types | $V_{BE}$ * | 0.55 | 0.63 | 0.7 | V | $I_C$=2mA $V_{CE}$=5V |
| BC317, 318, 319 only | | | 0.68 | 0.77 | V | $I_C$=10mA VCE=5V |
| Current Gain-Bandwidth Product | $f_T$ | | | | | |
| BC107, 108, 109 } only | | 150 | 250 | | MHz | $I_C$=10mA $V_{CE}$=5V |
| BC167, 168, 169 } only | | | | | | |
| BC237, 238, 239 } only | | | | | | |
| Collector-Base Capacitance | Cob | | | | | $V_{CB}$=10V $I_E$=0 |
| BC107, 108, 109 | | | 3.2 | 6.0 | pF | f=1MHz |
| 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 | NF | | | | | $I_C$=0.2mA $V_{CE}$=5V |
| BC107, 108 | | | 2 | 10 | dB | $R_G$=2KΩ f=1kHz |
| BC167, 168 | | | 2 | 10 | dB | Δf=200Hz |
| BC237, 238 | | | 2 | 10 | dB | |
| BC317, 318 | | | 2 | 6 | dB | |

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

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| PARAMETER | SYMBOL | MIN | TYP | MAX | UNIT | TEST CONDITIONS |
|---|---|---|---|---|---|---|
| Noise Figure BC109, BC169 only | NF | | 1.5 | 4 | dB | $I_C$=0.2mA $V_{CE}$=5V $R_G$=2KΩ f=1kHz Δf=200Hz |
| BC239, BC319 only | | | 1.2 | 4 | dB | $I_C$=0.2mA $V_{CE}$=5V $R_G$=2KΩ f=30Hz-15KHz |

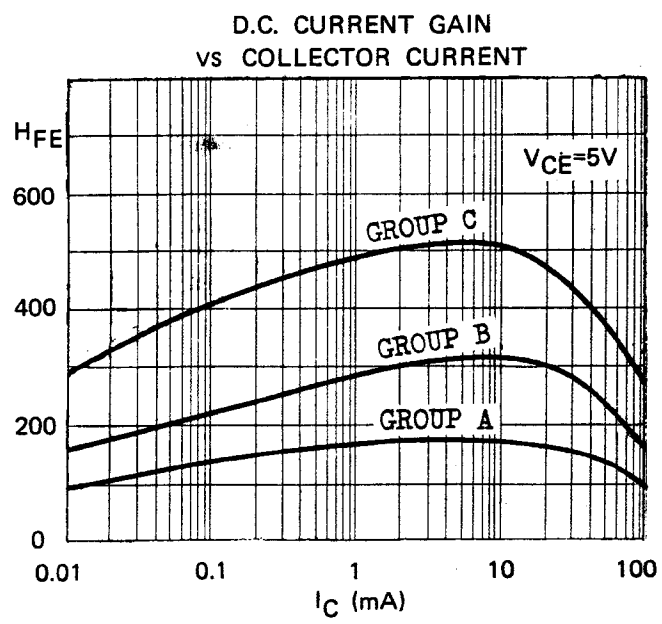
D.C. CURRENT GAIN ($H_{FE}$) @ VCE=5V $T_A$=25°C

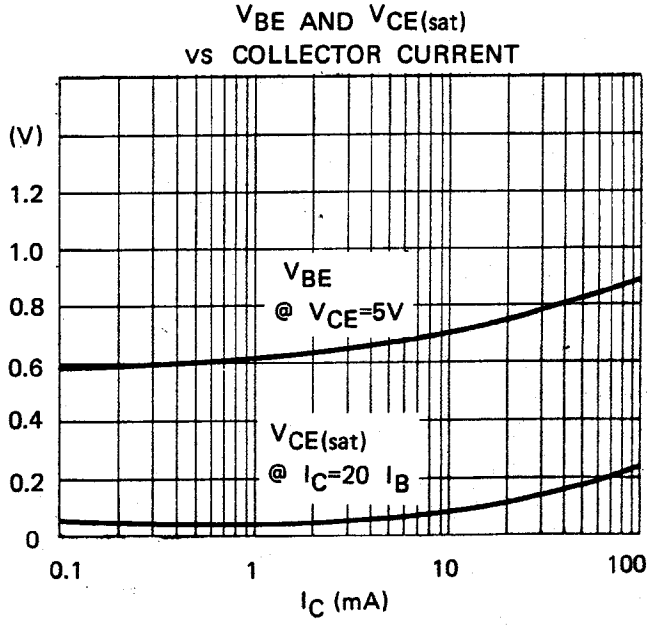
| at $I_C$ (Pulsed) | $H_{FE}$ GROUP A | | | $H_{FE}$ GROUP B | | | $H_{FE}$ GROUP C | | |
|---|---|---|---|---|---|---|---|---|---|
| | MIN | TYP | MAX | MIN | TYP | MAX | MIN | TYP | MAX |
| 0.01mA | 40 | 90 | | 40 | 170 | | 100 | 290 | |
| 2mA | 110 | 170 | 220 | 200 | 300 | 450 | 420 | 520 | 800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

h-PARAMETERS @ $I_C$=2mA VCE=5V f=1kHz $T_A$=25°C

| h - PARAMETER | SYMBOL | $H_{FE}$ GROUP A | | | $H_{FE}$ GROUP B | | | $H_{FE}$ 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 | KΩ |
| Voltage Feedback Ratio | $h_{re}$ | | 1.5 | | | 2 | | | 3 | | $x10^{-4}$ |
| 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 | μʊ |

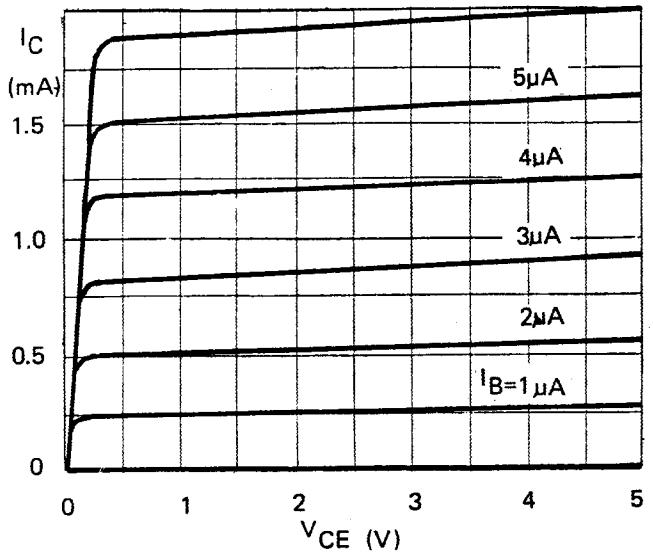
TYPICAL CHARACTERISTICS AT $T_A$=25°C (Pulse Test)



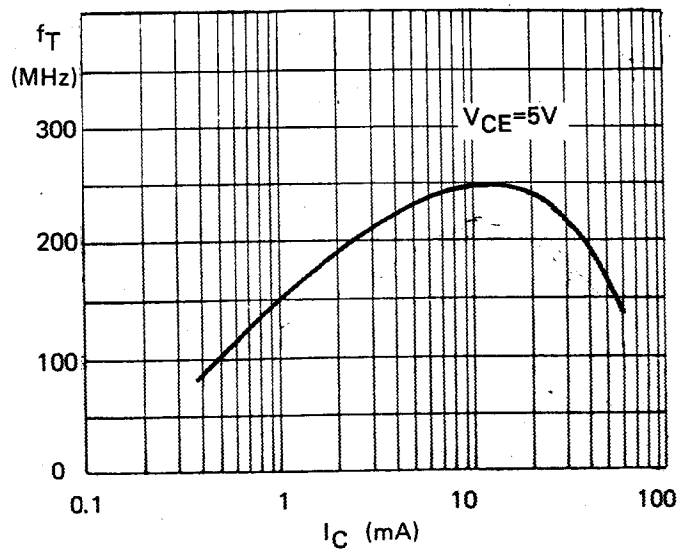



## TYPICAL CHARACTERISTICS ($T_A$=25°C UNLESS OTHERWISE SPECIFIED)

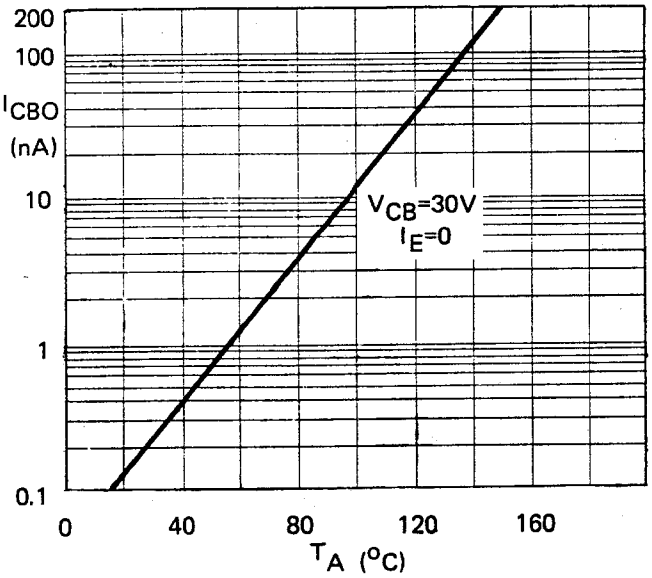
COMMON EMITTER
OUTPUT CHARACTERISTICS



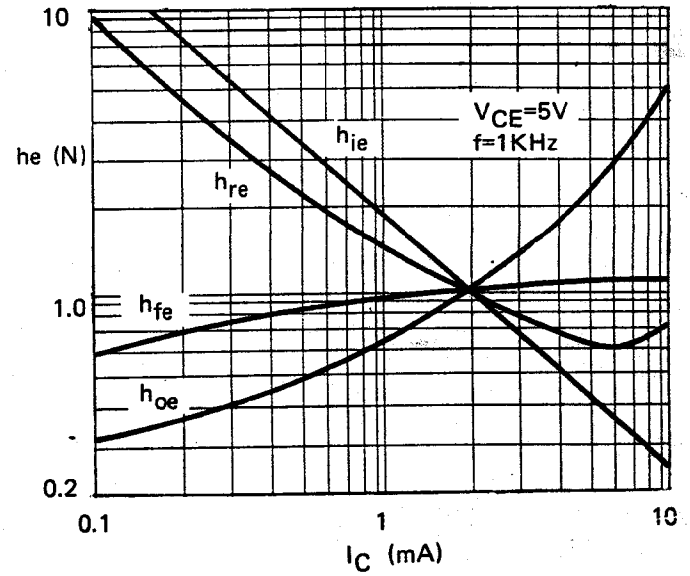

CURRENT GAIN – BANDWIDTH PRODUCT
VS COLLECTOR CURRENT



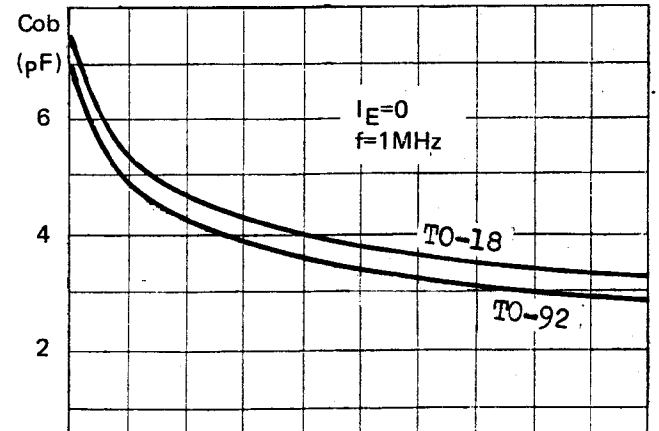

COLLECTOR CUTOFF CURRENT
VS AMBIENT TEMPERATURE




h–PARAMETERS (NORMALIZED)
VS COLLECTOR CURRENT




COLLECTOR–BASE CAPACITANCE
VS COLLECTOR–BASE VOLTAGE




BROAD BAND NOISE FIGURE
VS COLLECTOR CURRENT