

# New Jersey Semi-Conductor Products, Inc.

20 STERN AVE.  
SPRINGFIELD, NEW JERSEY 07081  
U.S.A.

**BC177,8,9**

**BC257,8,9**

**BC307,8,9**

**BC320,1,2**

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

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

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

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

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

CASE

TO-18



CBE

BC177,8,9

TO-92B



ECB

BC257,8,9

TO-92F



CEB

BC307,8,9

TO-92A



ECB

BC320,1,2

**ABSOLUTE MAXIMUM RATINGS**

| TYPE  | -V <sub>CB0</sub><br>(V) | -V <sub>CES</sub><br>(V) | -V <sub>CEO</sub><br>(V) | -V <sub>EBO</sub><br>(V) | -I <sub>C</sub> (DC)<br>(mA) | P <sub>tot</sub> *<br>(mW) | T <sub>j</sub> , T <sub>stg</sub> |
|-------|--------------------------|--------------------------|--------------------------|--------------------------|------------------------------|----------------------------|-----------------------------------|
| BC177 | 50                       | 50                       | 45                       | 5                        | 100                          | 300                        | -55 to 175°C                      |
| BC178 | 30                       | 30                       | 25                       | 5                        | 100                          | 300                        |                                   |
| BC179 | 25                       | 25                       | 20                       | 5                        | 100                          | 300                        |                                   |
| BC257 | 50                       | 50                       | 45                       | 5                        | 100                          | 300                        | -55 to 150°C                      |
| BC258 | 30                       | 30                       | 25                       | 5                        | 100                          | 300                        |                                   |
| BC259 | 25                       | 25                       | 20                       | 5                        | 100                          | 300                        |                                   |
| BC307 | 50                       | 50                       | 45                       | 5                        | 100                          | 300                        | -55 to 150°C                      |
| BC308 | 30                       | 30                       | 25                       | 5                        | 100                          | 300                        |                                   |
| BC309 | 25                       | 25                       | 20                       | 5                        | 100                          | 300                        |                                   |
| BC320 | 50                       |                          | 45                       | 6                        | 150                          | 310                        | -55 to 150°C                      |
| BC321 | 45                       |                          | 30                       | 5                        | 150                          | 310                        |                                   |
| BC322 | 30                       |                          | 20                       | 5                        | 150                          | 310                        |                                   |

\* Total Power Dissipation @ T<sub>A</sub> ≤ 25°C

NJ Semi-Conductors reserves the right to change test conditions, parameter limits and package dimensions without notice. Information furnished by NJ Semi-Conductors is believed to be both accurate and reliable at the time of going to press. However, NJ Semi-Conductors assumes no responsibility for any errors or omissions discovered in its use. NJ Semi-Conductors encourages customers to verify that datasheets are current before placing orders.

**Quality Semi-Conductors**

ELECTRICAL CHARACTERISTICS (TA=25°C unless otherwise noted)

| PARAMETER  | SYMBOL                  | MIN              | TYP  | MAX      | UNIT     | TEST CONDITIONS   |
|--|-------------------------|------------------|------|----------|----------|---|
| Collector-Base Breakdown Voltage   | -BV <sub>CB0</sub>      | ↑<br>Note 1<br>↓ |      |          | V        | -I <sub>C</sub> =10μA I <sub>E</sub> =0   |
| Collector-Emitter Breakdown Voltage  | -LV <sub>CEO</sub> *    |                  |      |          | V        | -I <sub>C</sub> =2mA I <sub>B</sub> =0  |
| Emitter-Base Breakdown Voltage   | -BV <sub>EB0</sub>      |                  |      |          | V        | -I <sub>E</sub> =1μA I <sub>C</sub> =0  |
| Collector Cutoff Current<br>BC177, 178, 179 }<br>BC257, 258, 259 } only<br>BC307, 308, 309 } | -I <sub>CES</sub>       |                  |      | 15<br>4  | nA<br>μA | V <sub>CE</sub> =V <sub>CES</sub> V <sub>BE</sub> =0<br>V <sub>CE</sub> =V <sub>CES</sub> V <sub>BE</sub> =0<br>T <sub>A</sub> =125°C |
| Collector Cutoff Current<br>BC320, 321, 322 only   | -I <sub>CBO</sub>       |                  |      | 30<br>15 | nA<br>μA | -V <sub>CB</sub> =20V I <sub>E</sub> =0<br>-V <sub>CB</sub> =20V I <sub>E</sub> =0<br>T <sub>A</sub> =100°C                           |
| Collector-Emitter Saturation Voltage<br><br>All types  | -V <sub>CE(sat)</sub> * |                  | 0.1  | 0.3      | V        | -I <sub>C</sub> =10mA -I <sub>B</sub> =0.5mA  |
|  |                         |                  | 0.25 |          | V        | -I <sub>C</sub> =100mA -I <sub>B</sub> =5mA   |
| Collector-Emitter Knee Voltage<br>BC177, 178, 179 } only<br>BC307, 308, 309 }                | -V <sub>CEK</sub>       |                  | 0.3  | 0.6      | V        | -I <sub>C</sub> =10mA, I <sub>B</sub> =value at<br>which -I <sub>C</sub> =11mA -V <sub>CE</sub> =1V                                   |
| Base-Emitter Saturation Voltage<br><br>All types   | -V <sub>BE(sat)</sub> * |                  | 0.72 |          | V        | -I <sub>C</sub> =10mA -I <sub>B</sub> =0.5mA  |
|  |                         |                  | 0.92 |          | V        | -I <sub>C</sub> =100mA -I <sub>B</sub> =5mA   |
| Base-Emitter Voltage All types   | -V <sub>BE</sub> *      | 0.6              | 0.65 | 0.75     | V        | -I <sub>C</sub> =2mA -V <sub>CE</sub> =5V   |
| BC320, 321, 322 only   | -V <sub>BE</sub> *      |                  | 0.7  | 0.77     | V        | -I <sub>C</sub> =10mA -V <sub>CE</sub> =5V  |
| Current Gain-Bandwidth Product   | f <sub>T</sub>          |                  | 180  |          | MHz      | -I <sub>C</sub> =10mA -V <sub>CE</sub> =5V  |
| Collector-Base Capacitance<br>BC177, 178, 179  | C <sub>ob</sub>         |                  | 3.6  | 7        | pF       | -V <sub>CB</sub> =10V I <sub>E</sub> =0<br>f=1MHz   |
| BC257, 258, 259  |                         |                  | 3.2  | 6        | pF       |   |
| BC307, 308, 309  |                         |                  | 3.2  | 6        | pF       |   |
| BC320, 321, 322  |                         |                  | 3.2  | 4        | pF       |   |
|  |                         |                  |      |          |          |   |
| Noise Figure<br>BC177, 178   | NF                      |                  | 2    | 10       | dB       | -I <sub>C</sub> =0.2mA -V <sub>CE</sub> =5V<br>R <sub>G</sub> =2KΩ f=1kHz<br>Δf=200Hz   |
|  |                         |                  |      |          | dB       |   |
| BC257, 258   |                         |                  | 2    | 10       | dB       |   |
| BC307, 308   |                         |                  | 2    | 10       | dB       |   |
| BC320, 321   |                         |                  | 2    | 6        | dB       |   |

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

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

| PARAMETER    |  | SYMBOL | MIN | TYP | MAX | UNIT | TEST CONDITIONS   |
|--------------|--|--------|-----|-----|-----|------|---|
| Noise Figure | BC179 }<br>BC259 }<br>BC309 }<br>BC322 } | NF     | 1.2 | 4   | 4   | dB   | -I <sub>C</sub> =0.2mA -V <sub>CE</sub> =5V<br>R <sub>C</sub> =2KΩ f=1KHz<br>Δf=200Hz |
|              |  |        |     |     |     |      | -I <sub>C</sub> =0.2mA -V <sub>CE</sub> =5V<br>R <sub>C</sub> =2KΩ f=30Hz-15KHz       |

D.C. CURRENT GAIN (H<sub>FE</sub>) @ -V<sub>CE</sub>=5V TA=25°C

| at -I <sub>C</sub><br>(Pulsed) | H <sub>FE</sub> GROUP VI |     |     | H <sub>FE</sub> GROUP A |     |     | H <sub>FE</sub> GROUP B |     |     | H <sub>FE</sub> GROUP C |     |     |
|--------------------------------|--------------------------|-----|-----|-------------------------|-----|-----|-------------------------|-----|-----|-------------------------|-----|-----|
|                                | MIN                      | TYP | MAX | MIN                     | TYP | MAX | MIN                     | TYP | MAX | MIN                     | TYP | MAX |
| 0.01mA                         |                          | 70  |     |                         | 110 |     |                         | 200 |     |                         | 330 |     |
| 2mA                            | 70                       | 110 | 140 | 110                     | 170 | 220 | 200                     | 300 | 450 | 420                     | 520 | 800 |
| 100mA                          |                          | 60  |     |                         | 80  |     |                         | 140 |     |                         | 240 |     |

h - PARAMETERS @ -I<sub>C</sub>=2mA -V<sub>CE</sub>=5V f=1kHz TA=25°C

| h - PARAMETER             | SYMBOL          | H <sub>FE</sub> GROUP VI |     |     | H <sub>FE</sub> GROUP A |     |     | H <sub>FE</sub> GROUP B |     |     | H <sub>FE</sub> GROUP C |     |     | UNIT              |
|---------------------------|-----------------|--------------------------|-----|-----|-------------------------|-----|-----|-------------------------|-----|-----|-------------------------|-----|-----|-------------------|
|                           |                 | MIN                      | TYP | MAX | MIN                     | TYP | MAX | MIN                     | TYP | MAX | MIN                     | TYP | MAX |                   |
| Input Impedance           | h <sub>ie</sub> |                          |     | 1.4 |                         |     | 2.7 |                         |     | 4.5 |                         |     | 8.7 | KΩ                |
| Voltage Feedback Ratio    | h <sub>re</sub> |                          |     | 2.5 |                         |     | 3   |                         |     | 3.5 |                         |     | 4   | x10 <sup>-4</sup> |
| Small Signal Current Gain | h <sub>fe</sub> | 75                       | 110 | 150 | 125                     | 190 | 260 | 240                     | 330 | 500 | 450                     | 580 | 900 |                   |
| Output Admittance         | h <sub>oe</sub> |                          |     | 20  |                         |     | 25  |                         |     | 35  |                         |     | 60  | μS                |

TYPICAL CHARACTERISTICS AT TA=25°C (Pulse Test)

