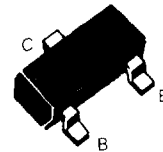


# SOT23 PNP SILICON PLANAR GENERAL PURPOSE TRANSISTORS

|       |       |
|-------|-------|
| BC856 | BC857 |
| BC858 | BC859 |
| BC860 |       |

## PARTMARKING DETAILS:-

|             |             |
|-------------|-------------|
| BC856A - 3A | BC858C - 3L |
| BC856B - 3B | BC859A - 4A |
| BC857A - 3E | BC859B - 4B |
| BC857B - 3F | BC859C - 4C |
| BC857C - 3G | BC860A - 4E |
| BC858A - 3J | BC860B - 4F |
| BC858B - 3K | BC860C - 4G |



## ABSOLUTE MAXIMUM RATINGS

| PARAMETER   | SYMBOL     | BC856         | BC857 | BC858 | BC859 | BC860 | UNIT             |
|---|------------|---------------|-------|-------|-------|-------|------------------|
| Collector-Base Voltage                            | $V_{CBO}$  | -80           | -50   | -30   | -30   | -50   | V                |
| Collector-Emitter Voltage                         | $V_{CES}$  | -80           | -50   | -30   | -30   | -50   | V                |
| Collector-Emitter Voltage                         | $V_{CEO}$  | -65           | -45   | -30   | -30   | -45   | V                |
| Emitter-Base Voltage                              | $V_{EBO}$  | -5            | -5    | -5    | -5    | -5    | V                |
| Collector Current                                 | $I_C$      | -100          | -100  | -100  | -100  | -100  | mA               |
| Peak Collector Current                            | $I_{EM}$   | -200          | -200  | -200  | -200  | -200  | mA               |
| Peak Base Current                                 | $I_{BM}$   | -200          | -200  | -200  | -200  | -200  | mA               |
| Peak Emitter Current                              | $I_{EM}$   | -200          | -200  | -200  | -200  | -200  | mA               |
| Power Dissipation at $T_{amb} = 25^\circ\text{C}$ | $P_{TOT}$  | 330           |       |       |       |       | mW               |
| Operating and Storage Temperature Range           | $t_j:tstg$ | - 55 to + 150 |       |       |       |       | $^\circ\text{C}$ |

## ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^\circ\text{C}$ unless otherwise stated)

| PARAMETER                            | SYMBOL        | BC856 | BC857 | BC858 | BC859 | BC860 | UNIT | CONDITIONS  |   |   |
|--------------------------------------|---------------|-------|-------|-------|-------|-------|------|---|---|---|
| Collector Cut-Off Current            | $I_{CBO}$     | Max.  | -15   | -15   | -15   | -15   | nA   | $V_{CB} = 30\text{V}$<br>$V_{CB} = -30\text{V}$<br>$T_{amb} = -150^\circ\text{C}$ |   |   |
|                                      |               | Max.  | -4    | -4    | -4    | -4    | -4   |   | $\mu\text{A}$   |   |
| Collector-Emitter Saturation Voltage | $V_{CE(SAT)}$ | Typ.  | -75   | -75   | -75   | -75   | -75  | mV  | $I_C = -10\text{mA}$<br>$I_B = -0.5\text{mA}$   |   |
|                                      |               | Max.  | -300  | -300  | -300  | -250  | -250 | mV  |   |   |
|                                      |               | Typ.  | -250  | -250  | -250  | -250  | -250 | mV  |   | $I_C = -100\text{mA}$<br>$I_B = -5\text{mA}$  |
|                                      |               | Max.  | -650  | -650  | -650  | -650  | -650 | mV  |   |   |
| Base-Emitter Saturation Voltage      | $V_{BE(SAT)}$ | Typ.  | -700  | -700  | -700  | -700  | -700 | mV  | $I_C = -10\text{mA}$<br>$I_B = -0.5\text{mA}$<br>$I_C = -100\text{mA}$<br>$I_B = -5\text{mA}$ |   |
|                                      |               | Typ.  | -850  | -850  | -850  | -850  | -850 | mV  |   |   |
| Base-Emitter Voltage                 | $V_{BE}$      | Min.  | -600  | -600  | -600  | -580  | -580 | mV  | $I_C = -2\text{mA}$<br>$V_{CE} = -5\text{V}$  |   |
|                                      |               | Typ.  | -650  | -650  | -650  | -650  | -650 | mV  |   |   |
|                                      |               | Max.  | -750  | -750  | -750  | -750  | -750 | mV  |   |   |
|                                      |               | Max.  | -820  | -820  | -820  | -820  | -820 | mV  |   | $I_C = -10\text{mA}$<br>$V_{CE} = -5\text{V}$ |

\* Collector-Emitter Saturation Voltage at  $I_C = 10\text{mA}$  for the characteristics going through the operating point  $I_C = 11\text{mA}$ ,  $V_{CE} = 1\text{V}$  at constant base current.

**CHARACTERISTICS (cont.)**

| PARAMETER                | SYMBOL   |          | BC856 | BC857 | BC858 | BC859 | BC860 | UNIT       | CONDITIONS   |  |
|--------------------------|----------|----------|-------|-------|-------|-------|-------|------------|--|--|
| Noise figure             | N        | Typ.     | 2     | 2     | 2     | 1     | 1     | dB         | $V_{CE} = -5V$<br>$I_C = -200\mu A$<br>$R_G = 2k\Omega$<br>$f = 1kHz$<br>$\Delta f = 200Hz$            |  |
|                          |          | Max.     | 10    | 10    | 10    | 4     | 4     |            |  |  |
|                          |          | Typ.     |       |       |       | 1.2   | 1     | dB         | $V_{CE} = -5V$<br>$I_C = -200\mu A$<br>$R_G = 2k\Omega$<br>$f = 30Hz$ to<br>$15kHz$ at<br>- 3dB points |  |
|                          |          | Max.     |       |       |       | 4     | 3     |            |  |  |
| Equivalent Noise Voltage | $e_n$    | Max.     |       |       |       | 110   | 110   | nV         | $V_{CE} = -5V$<br>$I_C = -200\mu A$<br>$R_G = 2k\Omega$<br>$f = 10$ to $50Hz$<br>at - 3dB<br>points    |  |
| Dynamic Characteristics  | Group VI | $h_{ie}$ | Min.  | 0.4   | 0.4   | 0.4   |       |            | k $\Omega$   | $V_{CE} = -5V$<br>$I_C = -2mA$<br>$f = 1kHz$ |
|                          |          |          | Typ.  | 1.2   | 1.2   | 1.2   |       |            | k $\Omega$   |  |
|                          |          | Max.     | 2.2   | 2.2   | 2.2   |       |       | k $\Omega$ |  |  |
|                          | Group A  | Min.     | 1.6   | 1.6   | 1.6   | 1.6   | 1.6   | k $\Omega$ |  |  |
|                          |          | Typ.     | 2.7   | 2.7   | 2.7   | 2.7   | 2.7   | k $\Omega$ |  |  |
|                          |          | Max.     | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | k $\Omega$ |  |  |
|                          | Group B  | Min.     | 3.2   | 3.2   | 3.2   | 3.2   | 3.2   | k $\Omega$ |  |  |
|                          |          | Typ.     | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | k $\Omega$ |  |  |
|                          |          | Max.     | 8.5   | 8.5   | 8.5   | 8.5   | 8.5   | k $\Omega$ |  |  |
|                          | Group C  | Min.     |       |       | 6     | 6     | 6     | k $\Omega$ |  |  |
|                          |          | Typ.     |       |       | 8.7   | 8.7   | 8.7   | k $\Omega$ |  |  |
|                          |          | Max.     |       |       | 15    | 15    | 15    | k $\Omega$ |  |  |
|                          | Group VI | $h_{re}$ | Typ.  | 2.5   | 2.5   | 2.5   |       |            | $\times 10^{-4}$   |  |
|                          | Group A  |          | Typ.  | 1.5   | 1.5   | 1.5   | 1.5   | 1.5        | $\times 10^{-4}$   |  |
|                          | Group B  |          | Typ.  | 2     | 2     | 2     | 2     | 2          | $\times 10^{-4}$   |  |
|                          | Group C  |          | Typ.  |       |       | 3     | 3     | 3          | $\times 10^{-4}$   |  |
|                          | Group VI | $h_{fe}$ | Min.  | 75    | 75    | 75    |       |            |  |  |
|                          |          |          | Typ.  | 110   | 110   | 110   |       |            |  |  |
|                          |          |          | Max.  | 150   | 150   | 150   |       |            |  |  |
|                          | Group A  |          | Min.  | 125   | 125   | 125   | 125   | 125        |  |  |
|                          |          | Typ.     | 220   | 220   | 220   | 220   | 220   |            |  |  |
|                          |          | Max.     | 260   | 260   | 260   | 260   | 260   |            |  |  |
| Group B                  |          | Min.     | 240   | 240   | 240   | 240   | 240   |            |  |  |
|                          |          | Typ.     | 330   | 330   | 330   | 330   | 330   |            |  |  |
|                          |          | Max.     | 500   | 500   | 500   | 500   | 500   |            |  |  |
| Group C                  |          | Min.     |       | 450   | 450   | 450   | 450   |            |  |  |
|                          |          | Typ.     |       | 600   | 600   | 600   | 600   |            |  |  |
|                          |          | Max.     |       | 900   | 900   | 900   | 900   |            |  |  |
| Group VI                 | $h_{oe}$ | Typ.     | 20    | 20    | 20    |       |       | $\mu S$    |  |  |
|                          |          | Max.     | 40    | 40    | 40    |       |       | $\mu S$    |  |  |
| Group A                  |          | Typ.     | 18    | 18    | 18    | 18    | 18    | $\mu S$    |  |  |
|                          |          | Max.     | 30    | 30    | 30    | 30    | 30    | $\mu S$    |  |  |
| Group B                  |          | Typ.     | 30    | 30    | 30    | 30    | 30    | $\mu S$    |  |  |
|                          |          | Max.     | 60    | 60    | 60    | 60    | 60    | $\mu S$    |  |  |
| Group C                  |          | Typ.     |       |       | 60    | 60    | 60    | $\mu S$    |  |  |
|                          |          | Max.     |       |       | 110   | 110   | 110   | $\mu S$    |  |  |

|              |              |
|--------------|--------------|
| <b>BC856</b> | <b>BC857</b> |
| <b>BC858</b> | <b>BC859</b> |
| <b>BC860</b> |              |

**CHARACTERISTICS (at  $T_{amb} = 25^{\circ}\text{C}$  unless otherwise stated)**

| PARAMETER                             | SYMBOL               |         | BC856 | BC857 | BC858 | BC859 | BC860 | UNIT  | CONDITIONS  |
|---------------------------------------|----------------------|---------|-------|-------|-------|-------|-------|---|---|
| Static Forward Current Transfer Ratio | Group VI<br>$h_{FE}$ | Min.    | 75    | 75    | 75    |       |       |   | $I_C = 2\text{mA}$<br>$V_{CE} = -5\text{V}$                                 |
|                                       |                      | Typ.    | 110   | 110   | 110   |       |       |   |   |
|                                       |                      | Max.    | 150   | 150   | 150   |       |       |   |   |
|                                       | Group A              | Typ.    | 90    | 90    | 90    |       |       |   | $I_C = -0.01\text{mA}$<br>$V_{CE} = -5\text{V}$                             |
|                                       |                      | Min.    | 125   | 125   | 125   | 125   | 125   | $I_C = -2\text{mA}$<br>$V_{CE} = -5\text{V}$      |   |
|                                       |                      | Typ.    | 180   | 180   | 180   | 180   | 180   |   |   |
|                                       |                      | Max.    | 250   | 250   | 250   | 250   | 250   |   |   |
|                                       |                      | Typ.    | 120   | 120   | 120   |       |       | $I_C = -100\text{mA}$<br>$V_{CE} = -5\text{V}$    |   |
|                                       |                      | Group B | Typ.  | 150   | 150   | 150   | 150   |   |   |
|                                       | Min.                 |         | 220   | 220   | 220   | 220   | 220   |   | $I_C = -2\text{mA}$<br>$V_{CE} = -5\text{A}$                                |
|                                       | Typ.                 |         | 290   | 290   | 290   | 290   | 290   |   |   |
|                                       |                      |         | Max.  | 475   | 475   | 475   | 475   | 475   |   |
|                                       |                      |         | Typ.  | 200   | 200   | 200   |       |   | $I_C = -100\text{mA}$<br>$V_{CE} = -5\text{V}$                              |
|                                       | Group C              | Typ.    |       | 270   | 270   | 270   | 270   | $I_C = -0.01\text{mA}$<br>$V_{CE} = -5\text{V}$   |   |
|                                       |                      | Min.    |       | 420   | 420   | 420   | 420   |   |   |
| Typ.                                  |                      |         | 500   | 500   | 500   | 500   |       |   |   |
|                                       |                      | Max.    | 800   | 800   | 800   | 800   |       |   |   |
|                                       |                      | Typ.    |       |       | 400   |       |       | $I_C = -100\text{mA}$<br>$V_{CE} = -5\text{V}$    |   |
| Transition Frequency                  | $f_T$                | Typ.    | 150   | 150   | 150   | 300   | 300   |   | MHz<br>$I_C = -10\text{mA}$<br>$V_{CE} = -5\text{V}$<br>$f = 100\text{MHz}$ |
|                                       |                      | Min.    |       |       |       |       |       |   |   |
|                                       |                      | Max.    |       |       |       |       |       |   |   |
| Collector-Base Capacitance            | $C_{obo}$            | Typ.    | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | pF<br>$V_{CB} = -10\text{V}$<br>$f = 1\text{MHz}$ |   |