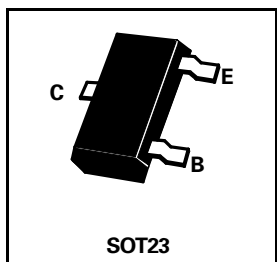


# SOT23 NPN SILICON PLANAR GENERAL PURPOSE TRANSISTORS

|       |       |
|-------|-------|
| BC846 | BC847 |
| BC848 | BC849 |
| BC850 |       |

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| PARTMARKING DETAILS |            | COMPLEMENTARY TYPES |       |
|---------------------|------------|---------------------|-------|
| BC846A-Z1A          | BC848B-1K  | BC846               | BC856 |
| BC846B-1B           | BC848C-Z1L | BC847               | BC857 |
| BC847A-Z1E          | BC849B-2B  | BC848               | BC858 |
| BC847B-1F           | BC849C-2C  | BC849               | BC859 |
| BC847C-1GZ          | BC850B-2FZ | BC850               | BC860 |
| BC848A-1JZ          | BC850C-Z2G |                     |       |



## ABSOLUTE MAXIMUM RATINGS.

| PARAMETER                                  | SYMBOL         | BC846       | BC847 | BC848 | BC849 | BC850 | 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                       | $V_{EBO}$      | 6           |       | 5     |       |       | V           |
| Continuous Collector Current               | $I_C$          | 100         |       |       |       |       | mA          |
| Peak Collector Current                     | $I_{CM}$       | 200         |       |       |       |       | mA          |
| Peak Base Current                          | $I_{BM}$       | 200         |       |       |       |       | mA          |
| Peak Emitter Current                       | $I_{EM}$       | 200         |       |       |       |       | mA          |
| Power Dissipation at $T_{amb}=25^{\circ}C$ | $P_{tot}$      | 330         |       |       |       |       | mW          |
| Operating and Storage Temperature Range    | $T_j; T_{stg}$ | -55 to +150 |       |       |       |       | $^{\circ}C$ |

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

| PARAMETER                            | SYMBOL        | BC846 | BC847 | BC848 | BC849 | BC850 | UNIT    | CONDITIONS.                                |
|--------------------------------------|---------------|-------|-------|-------|-------|-------|---------|--|
| Collector Cut-Off Current            | $I_{CBO}$     | Max   | 15    |       |       |       | nA      | $V_{CB} = 30V$                             |
|                                      |               | Max   | 5     |       |       |       | $\mu A$ | $V_{CB} = 30V$<br>$T_{amb} = 150^{\circ}C$ |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | Typ   | 90    |       |       |       | mV      | $I_C = 10mA,$<br>$I_B = 0.5mA$             |
|                                      |               | Max.  | 250   |       |       |       | mV      | $I_C = 100mA,$<br>$I_B = 5mA$              |
|                                      |               | Typ   | 200   |       |       |       | mV      | $I_C = 100mA,$<br>$I_B = 5mA$              |
|                                      |               | Max.  | 600   |       |       |       | mV      | $I_C = 10mA^*$                             |
| Base-Emitter Saturation Voltage      | $V_{BE(sat)}$ | Typ   | 700   |       |       |       | mV      | $I_C = 10mA,$<br>$I_B = 0.5mA$             |
|                                      |               | Typ   | 900   |       |       |       | mV      | $I_C = 100mA,$<br>$I_B = 5mA$              |
| Base-Emitter Voltage                 | $V_{BE}$      | Min   | 580   |       |       |       | mV      | $I_C = 2mA$                                |
|                                      |               | Typ   | 660   |       |       |       | mV      | $V_{CE} = 5V$                              |
|                                      |               | Max   | 700   |       |       |       | mV      |  |
|                                      |               | Max   | 770   |       |       |       | mV      | $I_C = 10mA$<br>$V_{CE} = 5V$              |

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

|              |              |
|--------------|--------------|
| <b>BC846</b> | <b>BC847</b> |
| <b>BC848</b> | <b>BC849</b> |
| <b>BC850</b> |              |

### ELECTRICAL CHARACTERISTICS (Continued)

| PARAMETER                    | SYMBOL    | BC846    | BC847 | BC848 | BC849 | BC850                  | UNIT | CONDITIONS.                     |   |
|------------------------------|-----------|----------|-------|-------|-------|------------------------|------|---------------------------------|---|
| Static Forward Current Ratio | Group VI  | $h_{FE}$ | Min   | 75    | 75    | 75                     | -    | -                               | $I_C=2mA, V_{CE}=5V$  |
|                              |           |          | Typ   | 110   | 110   | 110                    | -    | -                               |   |
|                              |           |          | Max   | 150   | 150   | 150                    | -    | -                               |   |
|                              | Group A   | $h_{FE}$ | Typ   | 90    | 90    | 90                     | -    | -                               | $I_C=0.01mA, V_{CE}=5V$   |
|                              |           |          | Min   | 110   | 110   | 110                    | -    | -                               | $I_C=2mA, V_{CE}=5V$  |
|                              |           |          | Typ   | 180   | 180   | 180                    | -    | -                               |   |
|                              | Group B   | $h_{FE}$ | Max   | 220   | 220   | 220                    | -    | -                               | $I_C=100mA, V_{CE}=5V$  |
|                              |           |          | Typ   | 120   | 120   | 120                    | -    | -                               |   |
|                              |           |          | Typ   | 150   |       |                        | -    | -                               |   |
| Group C                      | $h_{FE}$  | Min      | 200   |       |       | -                      | -    | $I_C=2mA, V_{CE}=5V$            |   |
|                              |           | Typ      | 290   |       |       | -                      | -    |                                 |   |
|                              |           | Max      | 450   |       |       | -                      | -    |                                 |   |
| Group C                      | $h_{FE}$  | Typ      | 200   | 200   | 200   | -                      | -    | $I_C=100mA, V_{CE}=5V$          |   |
|                              |           | Typ.     | -     | 270   | 270   | 270                    | 270  | $I_C=0.01mA, V_{CE}=5V$         |   |
|                              |           | Min      | -     | 420   | 420   | 420                    | 420  | $I_C=2mA, V_{CE}=5V$            |   |
| Typ                          | -         | 500      | 500   | 500   | 500   |                        |      |                                 |   |
| Max                          | -         | 800      | 800   | 800   | 800   |                        |      |                                 |   |
| Typ                          | -         | -        | 400   | -     | -     | $I_C=100mA, V_{CE}=5V$ |      |                                 |   |
| Transition Frequency         | $f_T$     | Typ      | 300   |       |       |                        | MHz  | $I_C=10mA, V_{CE}=5V, f=100MHz$ |   |
| Collector-Base Capacitance   | $C_{obo}$ | Typ      | 2.5   |       |       |                        | pF   | $V_{CB}=10V, f=1MHz$            |   |
|                              |           | Max      | 4.5   |       |       |                        | pF   |                                 |   |
| Emitter-Base Capacitance     | $C_{ib0}$ | Typ      | 9     |       |       |                        | pF   | $V_{EB}=0.5V, f=1MHz$           |   |
| Noise Figure                 | N         | Typ      | 2     | 2     | 2     | 1.2                    | 1    | dB                              | $V_{CE}=5V, I_C=200\mu A, R_C=2k\Omega, f=1kHz, \Delta f=200Hz$             |
|                              |           | Max      | 10    | 10    | 10    | 4                      | 4    |                                 |   |
| Noise Figure                 | N         | Typ      | -     | -     | -     | 1.2                    | 1    | dB                              | $V_{CE}=5V, I_C=200\mu A, R_C=2k\Omega, f=30Hz$ to $15kHz$ at $-3dB$ points |
|                              |           | Max      | -     | -     | -     | 4                      | 3    |                                 |   |
| Equivalent Noise Voltage     | $e_n$     | Max.     | -     | -     | -     | 110                    | 110  | nV                              | $V_{CE}=5V, I_C=200\mu A, R_C=2k\Omega, f=10Hz$ to $50Hz$ at $-3dB$ points  |

Spice parameter data is available upon request for this device

|              |              |
|--------------|--------------|
| <b>BC846</b> | <b>BC847</b> |
| <b>BC848</b> | <b>BC849</b> |
| <b>BC850</b> |              |

### ELECTRICAL CHARACTERISTICS (Continued)

| PARAMETER  | SYMBOL   | BC846 | BC847 | BC848 | BC849 | BC850 | UNIT | CONDITIONS.       |
|--|----------|-------|-------|-------|-------|-------|------|-------------------|
| Dynamic Characteristics<br>Group VI<br>Group A<br>Group B<br>Group C | $h_{ie}$ | Min   | 0.4   | 0.4   | 0.4   | –     | –    | k $\Omega$        |
|  |          | Typ   | 1.2   | 1.2   | 1.2   | –     | –    | k $\Omega$        |
|  |          | Max   | 2.2   | 2.2   | 2.2   | –     | –    | k $\Omega$        |
|  |          | Min   | 1.6   | 1.6   | 1.6   | –     | –    | k $\Omega$        |
|  |          | Typ   | 2.7   | 2.7   | 2.7   | –     | –    | k $\Omega$        |
| Group B  | $h_{ie}$ | Max   | 4.5   | 4.5   | 4.5   | –     | –    | k $\Omega$        |
|  |          | Min   | 3.2   |       |       |       |      | k $\Omega$        |
| Group C  | $h_{ie}$ | Typ   | 4.5   |       |       |       |      | k $\Omega$        |
|  |          | Max   | 8.5   |       |       |       |      | k $\Omega$        |
| Group VI<br>Group A<br>Group B<br>Group C                            | $h_{re}$ | Min   | –     | –     | 6     | 6     | 6    | k $\Omega$        |
|  |          | Typ   | –     | –     | 8.7   | 8.7   | 8.7  | k $\Omega$        |
|  |          | Max   | –     | –     | 15    | 15    | 15   | k $\Omega$        |
| Group VI<br>Group A<br>Group B<br>Group C                            | $h_{re}$ | Typ   | 2.5   | 2.5   | 2.5   | –     | –    | x10 <sup>-4</sup> |
|  |          | Typ   | 1.5   | 1.5   | 1.5   | –     | –    | x10 <sup>-4</sup> |
|  |          | Typ   | 2     | 2     | 2     | 2     | 2    | x10 <sup>-4</sup> |
|  |          | Typ   | –     | –     | 3     | 3     | 3    | x10 <sup>-4</sup> |
| Group VI<br>Group A<br>Group B<br>Group C                            | $h_{fe}$ | Min   | 75    | 75    | 75    | –     | –    |                   |
|  |          | Typ   | 110   | 110   | 110   | –     | –    |                   |
|  |          | Max   | 150   | 150   | 150   | –     | –    |                   |
|  |          | Min   | 125   | 125   | 125   | –     | –    |                   |
|  |          | Typ   | 220   | 220   | 220   | –     | –    |                   |
| Group B  | $h_{fe}$ | Max   | 260   | 260   | 260   | –     | –    |                   |
|  |          | Min   | 240   |       |       |       |      |                   |
| Group C  | $h_{fe}$ | Typ   | 330   |       |       |       |      |                   |
|  |          | Max   | 500   |       |       |       |      |                   |
| Group VI<br>Group A<br>Group B<br>Group C                            | $h_{fe}$ | Min   | –     | 450   | 450   | 450   | 450  |                   |
|  |          | Typ   | –     | 600   | 600   | 600   | 600  |                   |
|  |          | Max   | –     | 900   | 900   | 900   | 900  |                   |
| Group VI<br>Group A<br>Group B<br>Group C                            | $h_{oe}$ | Typ   | 20    | 20    | 20    | –     | –    | $\mu$ s           |
|  |          | Max   | 40    | 40    | 40    | –     | –    | $\mu$ s           |
|  |          | Typ   | 18    | 18    | 18    | –     | –    | $\mu$ s           |
|  |          | Max   | 30    | 30    | 30    | –     | –    | $\mu$ s           |
| Group B  | $h_{oe}$ | Typ   | 30    |       |       |       |      | $\mu$ s           |
|  |          | Max   | 60    |       |       |       |      | $\mu$ s           |
| Group C  | $h_{oe}$ | Typ   | –     | –     | 60    | 60    | 60   | $\mu$ s           |
|  |          | Max   | –     | –     | 110   | 110   | 110  | $\mu$ s           |

$V_{CE}=5V$   
 $I_C=2mA$