

## Features

- Halogen Free. "Green" Device (Note 1)
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

## Maximum Ratings @ 25°C Unless Otherwise Specified

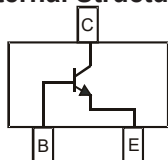
- Operating Junction Temperature Range: -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Maximum Thermal Resistance: 625°C/W Junction to Ambient

| Parameter                                                      | Symbol    | Rating | Unit |
|----------------------------------------------------------------|-----------|--------|------|
| Collector-Base Voltage                                         | $V_{CBO}$ |        | V    |
| BC846A-BC846C                                                  |           | 80     |      |
| BC847A-BC847C                                                  |           | 50     |      |
| BC848A-BC848C, BC849B-BC849C                                   |           | 30     |      |
| Collector-Emitter Voltage                                      | $V_{CEO}$ |        | V    |
| BC846A-BC846C                                                  |           | 65     |      |
| BC847A-BC847C                                                  |           | 45     |      |
| BC848A-BC848C, BC849B-BC849C                                   |           | 30     |      |
| Emitter-Base Voltage                                           | $V_{EBO}$ | 6      | V    |
| Collector Current                                              | $I_C$     | 100    | mA   |
| Collector Power Dissipation @ $T_A = 25^\circ\text{C}$ (Note2) | $P_C$     | 200    | mW   |

Note: 1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

2. Transistor mounted on an FR4 printed-circuit board

## Internal Structure

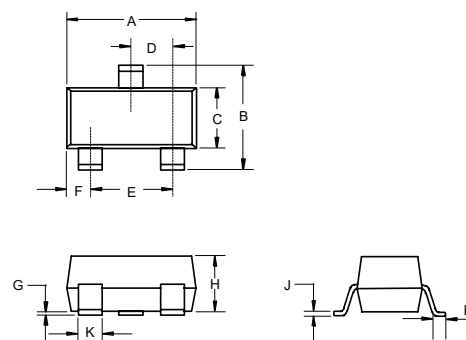


## Marking:

BC846A:1A; BC846B:1B; BC846C:1C;  
BC847A:1E; BC847B:1F; BC847C:1G;  
BC848A:1J; BC848B:1K; BC848C:1L;  
BC849B:49B; BC849C:49C;

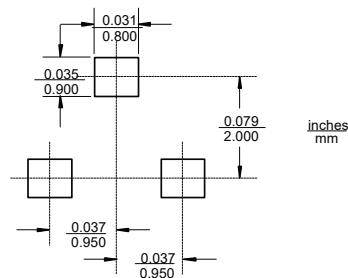
## NPN Plastic-Encapsulate Transistors

## SOT-23



| DIM | INCHES |       | MM   |      | NOTE |
|-----|--------|-------|------|------|------|
|     | MIN    | MAX   | MIN  | MAX  |      |
| A   | 0.110  | 0.120 | 2.80 | 3.04 |      |
| B   | 0.083  | 0.104 | 2.10 | 2.64 |      |
| C   | 0.047  | 0.055 | 1.20 | 1.40 |      |
| D   | 0.034  | 0.041 | 0.85 | 1.05 |      |
| E   | 0.067  | 0.083 | 1.70 | 2.10 |      |
| F   | 0.018  | 0.024 | 0.45 | 0.60 |      |
| G   | 0.0004 | 0.006 | 0.01 | 0.15 |      |
| H   | 0.035  | 0.043 | 0.90 | 1.10 |      |
| J   | 0.003  | 0.007 | 0.08 | 0.18 |      |
| K   | 0.014  | 0.020 | 0.35 | 0.51 |      |
| L   | 0.007  | 0.020 | 0.20 | 0.50 |      |

## Suggested Solder Pad Layout



Electrical Characteristics @  $T_A=25^\circ\text{C}$  Unless Otherwise Specified

| Parameter                            | Symbol        | Min  | Typ  | Max  | Units         | Conditions                                                                                                  |
|--------------------------------------|---------------|------|------|------|---------------|-------------------------------------------------------------------------------------------------------------|
| Collector-Base Breakdown Voltage     | $V_{(BR)CBO}$ |      |      |      |               |                                                                                                             |
| BC846A-BC846C                        |               | 80   |      |      | V             | $I_C=10\mu\text{A}$ , $I_E=0$                                                                               |
| BC847A-BC847C                        |               | 50   |      |      |               |                                                                                                             |
| BC848A-BC848C, BC849B-BC849C         |               | 30   |      |      |               |                                                                                                             |
| Collector-Emitter Breakdown Voltage  | $V_{(BR)CEO}$ |      |      |      |               |                                                                                                             |
| BC846A-BC846C                        |               | 65   |      |      | V             | $I_C=10\text{mA}$ , $I_B=0$                                                                                 |
| BC847A-BC847C                        |               | 45   |      |      |               |                                                                                                             |
| BC848A-BC848C, BC849B-BC849C         |               | 30   |      |      |               |                                                                                                             |
| Emitter-Base Breakdown Voltage       | $V_{(BR)EBO}$ | 6    |      |      | V             | $I_E=10\mu\text{A}$ , $I_C=0$                                                                               |
| Collector Cut-off Current            | $I_{CBO}$     |      |      |      |               |                                                                                                             |
| BC846A-BC846C                        |               |      |      | 0.1  | $\mu\text{A}$ | $V_{CB}=70\text{V}$ , $I_E=0$                                                                               |
| BC847A-BC847C                        |               |      |      |      |               | $V_{CB}=50\text{V}$ , $I_E=0$                                                                               |
| BC848A-BC848C, BC849B-BC849C         |               |      |      |      |               | $V_{CB}=30\text{V}$ , $I_E=0$                                                                               |
| Emitter Cutoff Current               | $I_{CEO}$     |      |      |      |               |                                                                                                             |
| BC846A-BC846C                        |               |      |      | 0.1  | $\mu\text{A}$ | $V_{CE}=60\text{V}$ , $I_B=0$                                                                               |
| BC847A-BC847C                        |               |      |      |      |               | $V_{CE}=45\text{V}$ , $I_B=0$                                                                               |
| BC848A-BC848C, BC849B-BC849C         |               |      |      |      |               | $V_{CE}=30\text{V}$ , $I_B=0$                                                                               |
| Emitter Cutoff Current               | $I_{EBO}$     |      |      | 0.1  | $\mu\text{A}$ | $V_{EB}=5\text{V}$ , $I_C=0$                                                                                |
| DC Current Gain                      | $h_{FE(1)}$   |      | 180  |      |               | $V_{CE}=5\text{V}$ , $I_C=10\mu\text{A}$                                                                    |
| BC846A/BC847A/BC848A                 |               |      |      |      |               |                                                                                                             |
| BC846B/BC847B/BC848B/BC849B          |               |      | 280  |      |               |                                                                                                             |
| BC846C/BC847C/BC848C/BC849C          |               |      | 400  |      |               |                                                                                                             |
| DC Current Gain                      | $h_{FE(2)}$   |      |      |      |               | $V_{CE}=5\text{V}$ , $I_C=2\text{mA}$                                                                       |
| BC846A/BC847A/BC848A                 |               | 110  |      | 220  |               |                                                                                                             |
| BC846B/BC847B/BC848B/BC849B          |               | 200  |      | 450  |               |                                                                                                             |
| BC846C/BC847C/BC848C/BC849C          |               | 420  |      | 800  |               |                                                                                                             |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ |      |      | 0.25 | V             | $I_C=10\text{mA}$ , $I_B=0.5\text{mA}$                                                                      |
|                                      |               |      |      | 0.5  | V             | $I_C=100\text{mA}$ , $I_B=5\text{mA}$                                                                       |
| Base-Emitter Saturation Voltage      | $V_{BE(sat)}$ |      | 0.7  |      | V             | $I_C=10\text{mA}$ , $I_B=0.5\text{mA}$                                                                      |
|                                      |               |      | 0.9  | 1.1  | V             | $I_C=100\text{mA}$ , $I_B=5\text{mA}$                                                                       |
| Base-Emitter On Voltage              | $V_{BE(on)}$  | 0.58 | 0.66 | 0.7  | V             | $V_{CE}=5\text{V}$ , $I_C=2\text{mA}$                                                                       |
|                                      |               |      |      | 0.77 | V             | $V_{CE}=5\text{V}$ , $I_C=10\text{mA}$                                                                      |
| Transition Frequency                 | $f_T$         | 100  |      |      | MHz           | $V_{CE}=5\text{V}$ , $I_C=10\text{mA}$ , $f=100\text{MHz}$                                                  |
| Collector Output Capacitance         | $C_{ob}$      |      |      | 4.5  | pF            | $V_{CB}=10\text{V}$ , $I_E=0$ , $f=0.1\text{MHz}$                                                           |
| Noise Figure                         | NF            |      |      | 10   | dB            | $I_C=0.2\text{mA}$ , $V_{CE}=5.0\text{V}$ , $R_S=2.0\text{k}\Omega$ , $f=1.0\text{kHz}$ , $BW=200\text{Hz}$ |

## Curve Characteristics

Fig. 1 - Static Characteristics

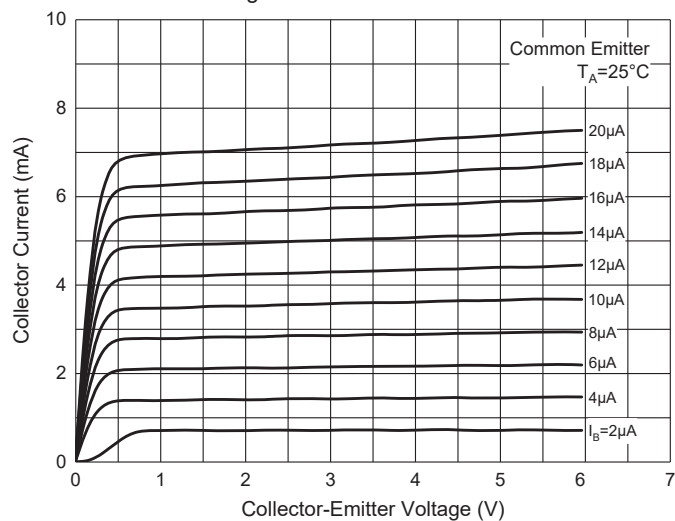


Fig. 2 - DC Current Gain Characteristics

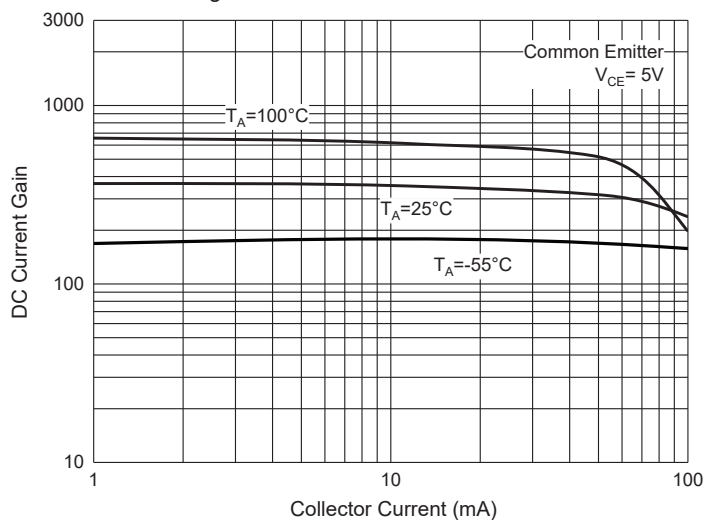


Fig. 3 - Base-Emitter Saturation Voltage Characteristics

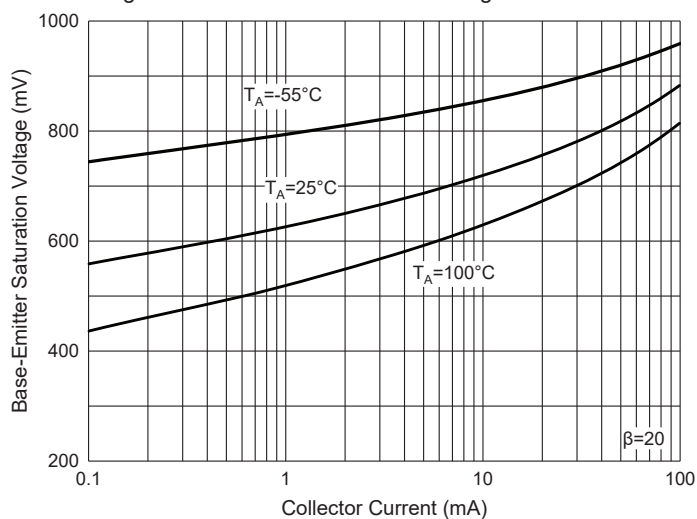


Fig. 4 - Collector-Emitter Saturation Voltage Characteristics

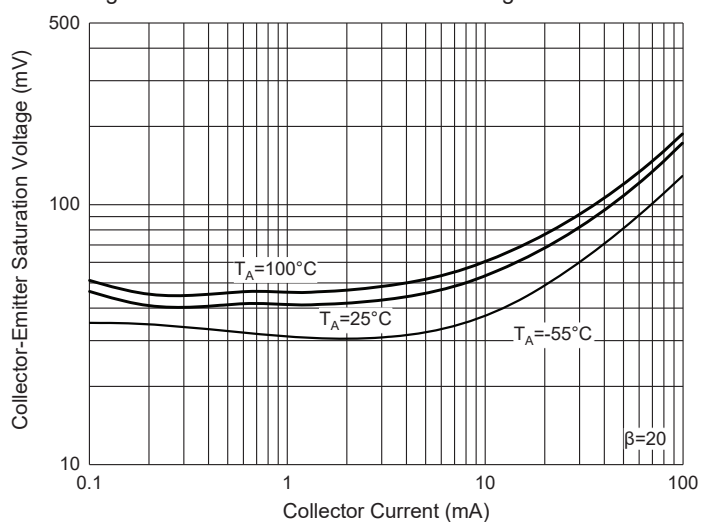


Fig. 5 - Base-Emitter Voltage Characteristics

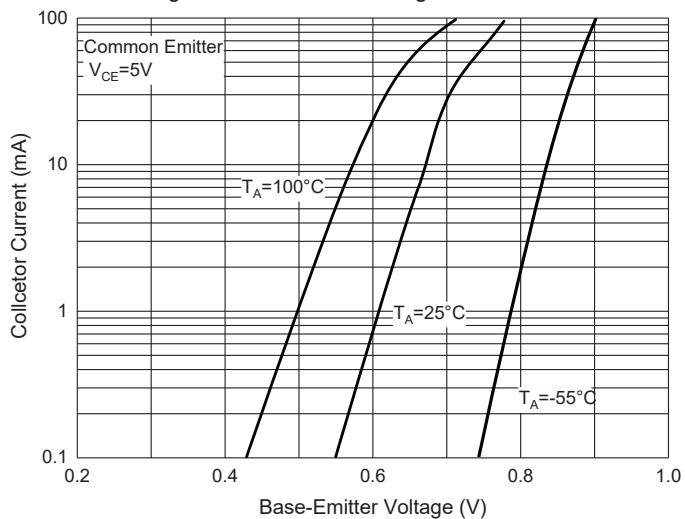
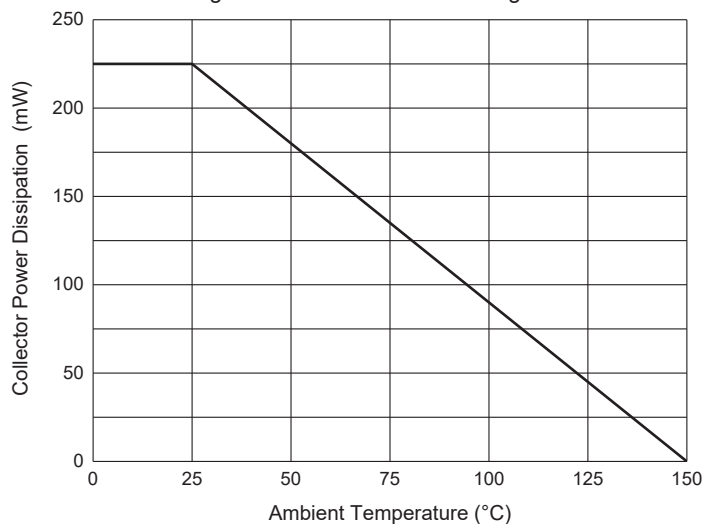


Fig. 6 - Collector Power Derating Curve



## Ordering Information

| Device          | Packing               |
|-----------------|-----------------------|
| Part Number-TP  | Tape&Reel:3Kpcs/Reel  |
| Part Number-13P | Tape&Reel:10Kpcs/Reel |

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