

## Features

- The Complementary PNP Types are the TIP32 Respectively
- Halogen Free Available Upon Request By Adding Suffix "-HF"
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant(Note 1) ("P" Suffix Designates RoHS Compliant. See Ordering Information)

## Maximum Ratings @ 25°C Unless Otherwise Specified

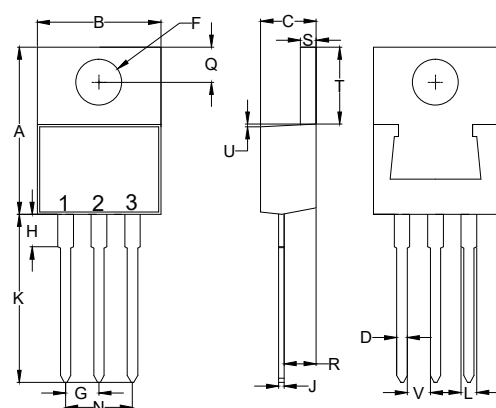
- Operating Junction Temperature Range: -65°C to +150°C
- Storage Temperature Range: -65°C to +150°C
- Thermal Resistance: 3.125°C/W Junction to Case
- Thermal Resistance: 62.5°C/W Junction to Ambient

| Parameter                                  | Symbol    | Rating | Unit |
|--------------------------------------------|-----------|--------|------|
| Collector-Base Voltage                     | TIP31     | 40     | V    |
|                                            | TIP31A    | 60     |      |
|                                            | TIP31B    | 80     |      |
|                                            | TIP31C    | 100    |      |
| Collector-Emitter Voltage                  | TIP31     | 40     | V    |
|                                            | TIP31A    | 60     |      |
|                                            | TIP31B    | 80     |      |
|                                            | TIP31C    | 100    |      |
| Emitter-Base Voltage                       | $V_{EBO}$ | 5      | V    |
| Continuous Collector Current               | $I_C$     | 3      | A    |
| Peak Collector Current                     | $I_{CM}$  | 5      | A    |
| Base Current                               | $I_B$     | 1      | A    |
| Power Dissipation @ $T_C=25^\circ\text{C}$ | $P_D$     | 40     | W    |
| Power Dissipation @ $T_A=25^\circ\text{C}$ | $P_D$     | 2      | W    |

Note: 1.High Temperature Solder Exemption Applied, see EU Directive Annex 7.

## NPN Silicon Power Transistors

### TO-220



1.BASE  
2.COLLECTOR  
3.EMITTER

| DIM | INCHES |       | MM    |       | NOTE |
|-----|--------|-------|-------|-------|------|
|     | MIN    | MAX   | MIN   | MAX   |      |
| A   | 0.560  | 0.625 | 14.22 | 15.88 |      |
| B   | 0.380  | 0.420 | 9.65  | 10.67 |      |
| C   | 0.140  | 0.190 | 3.56  | 4.82  |      |
| D   | 0.020  | 0.045 | 0.51  | 1.14  |      |
| F   | 0.139  | 0.161 | 3.53  | 4.09  | Φ    |
| G   | 0.090  | 0.110 | 2.29  | 2.79  |      |
| H   | -----  | 0.250 | ----- | 6.35  |      |
| J   | 0.012  | 0.025 | 0.30  | 0.64  |      |
| K   | 0.500  | 0.580 | 12.70 | 14.73 |      |
| L   | 0.045  | 0.060 | 1.14  | 1.52  |      |
| N   | 0.190  | 0.210 | 4.83  | 5.33  |      |
| Q   | 0.100  | 0.135 | 2.54  | 3.43  |      |
| R   | 0.080  | 0.115 | 2.04  | 2.92  |      |
| S   | 0.045  | 0.055 | 1.14  | 1.39  |      |
| T   | 0.230  | 0.270 | 5.84  | 6.86  |      |
| U   | -----  | 0.050 | ----- | 1.27  |      |
| V   | 0.045  | ----- | 1.15  | ----- |      |

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

| Parameter                            |        | Symbol        | Min | Typ | Max | Units         | Conditions                            |
|--------------------------------------|--------|---------------|-----|-----|-----|---------------|---------------------------------------|
| Collector-Emitter Breakdown Voltage  | TIP31  | $V_{(BR)CEO}$ | 40  |     |     | V             | $I_C=30\text{mA}, I_B=0$              |
|                                      | TIP31A |               | 60  |     |     |               |                                       |
|                                      | TIP31B |               | 80  |     |     |               |                                       |
|                                      | TIP31C |               | 100 |     |     |               |                                       |
| Collector Cutoff Current             | TIP31  | $I_{CES}$     |     |     | 200 | $\mu\text{A}$ | $V_{CE}=40\text{V}, V_{EB}=0$         |
|                                      | TIP31A |               |     |     | 200 | $\mu\text{A}$ | $V_{CE}=60\text{V}, V_{EB}=0$         |
|                                      | TIP31B |               |     |     | 200 | $\mu\text{A}$ | $V_{CE}=80\text{V}, V_{EB}=0$         |
|                                      | TIP31C |               |     |     | 200 | $\mu\text{A}$ | $V_{CE}=100\text{V}, V_{EB}=0$        |
| Collector Cutoff Current             | TIP31  | $I_{CEO}$     |     |     | 300 | $\mu\text{A}$ | $V_{CE}=30\text{V}, I_B=0$            |
|                                      | TIP31A |               |     |     | 300 | $\mu\text{A}$ | $V_{CE}=30\text{V}, I_B=0$            |
|                                      | TIP31B |               |     |     | 300 | $\mu\text{A}$ | $V_{CE}=60\text{V}, I_B=0$            |
|                                      | TIP31C |               |     |     | 300 | $\mu\text{A}$ | $V_{CE}=60\text{V}, I_B=0$            |
| Emitter Cutoff Current               |        | $I_{EBO}$     |     |     | 1   | mA            | $V_{EB}=5\text{V}, I_C=0$             |
| DC Current Gain                      |        | $h_{FE(1)}$   | 25  |     |     |               | $V_{CE}=4\text{V}, I_C=1\text{A}$     |
|                                      |        | $h_{FE(2)}$   | 10  |     | 75  |               | $V_{CE}=4\text{V}, I_C=3\text{A}$     |
| Collector-Emitter Saturation Voltage |        | $V_{CE(sat)}$ |     |     | 1.2 | V             | $I_C=3\text{A}, I_B=0.375\text{A}$    |
| Base-Emitter Voltage                 |        | $V_{BE}$      |     |     | 1.8 | V             | $V_{CE}=4\text{V}, I_C=3\text{A}$     |
| Transition Frequency                 |        | $f_T$         | 3   |     |     | MHz           | $V_{CE}=10\text{V}, I_C=500\text{mA}$ |

## Curve Characteristics

Fig. 1 - DC Current Gain Curve

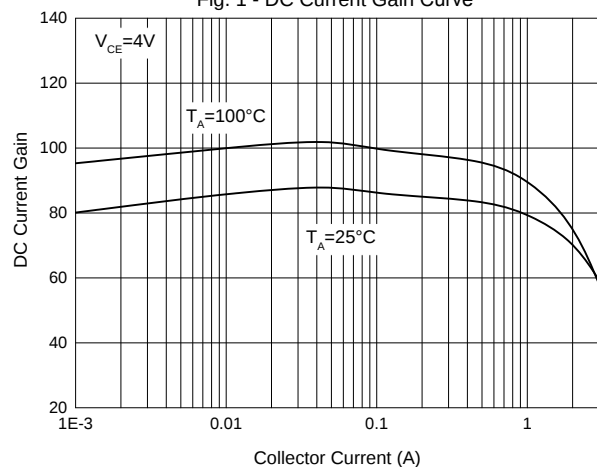


Fig. 2 - Collector-emitter Saturation Voltage Curve

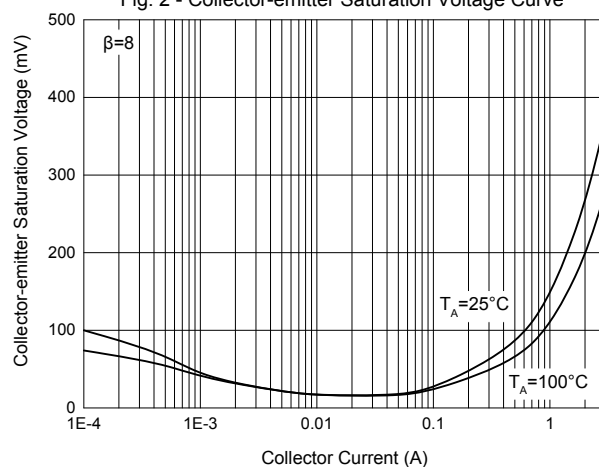


Fig. 3 - Base-emitter Voltage Curve

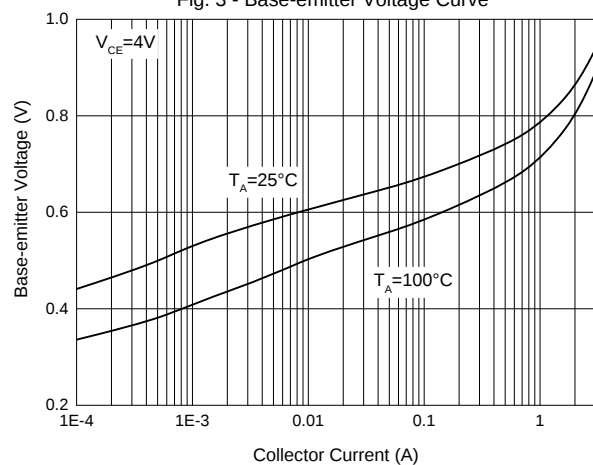
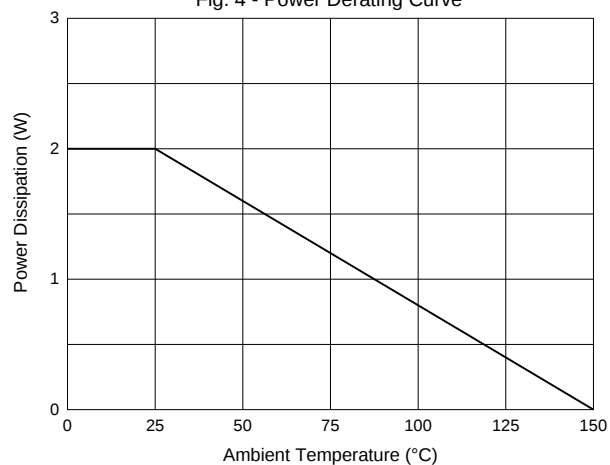


Fig. 4 - Power Derating Curve



## Ordering Information

| Device         | Packing                                  |
|----------------|------------------------------------------|
| Part Number-BP | Bulk:50pcs/Tube, 1Kpcs/Box, 5Kpcs/Carton |

Note : Adding "-HF" Suffix For Halogen Free, eg. Part Number-BP-HF

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