



**PLASTIC MEDIUM-POWER  
COMPLEMENTARY SILICON TRANSISTORS**

...designed for general-purpose amplifier and low speed switching applications

**FEATURES:**

\* Collector-Emitter Sustaining Voltage-

$V_{CE(SUS)} = 60 \text{ V (Min) - TIP130, TIP135}$

$= 80 \text{ V (Min) - TIP131, TIP136}$

$= 100 \text{ V (Min) - TIP132, TIP137}$

\* Collector-Emitter Saturation Voltage

$V_{CE(sat)} = 2.0 \text{ V (Max.) @ } I_C = 4.0 \text{ A}$

\* Monolithic Construction with Built-in Base-Emitter Shunt Resistor

**NPN**

**PNP**

**TIP130**

**TIP135**

**TIP131**

**TIP136**

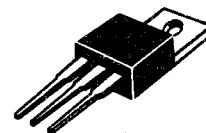
**TIP132**

**TIP137**

**8.0 AMPERE  
DARLINGTON  
COMPLEMENTARY SILICON  
POWER TRANSISTORS  
60-100 VOLTS  
70 WATTS**

**MAXIMUM RATINGS**

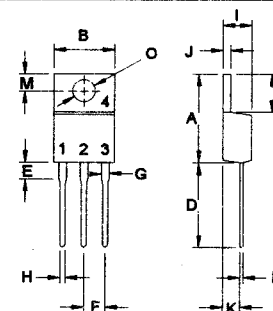
| Characteristic                                                                        | Symbol            | TIP130<br>TIP135 | TIP131<br>TIP136 | TIP132<br>TIP137 | Unit                     |
|---------------------------------------------------------------------------------------|-------------------|------------------|------------------|------------------|--------------------------|
| Collector-Emitter Voltage                                                             | $V_{CEO}$         | 60               | 80               | 100              | V                        |
| Collector-Base Voltage                                                                | $V_{CBO}$         | 60               | 80               | 100              | V                        |
| Emitter-Base Voltage                                                                  | $V_{EBO}$         | 5.0              |                  |                  | V                        |
| Collector Current-Continuous<br>-Peak                                                 | $I_C$<br>$I_{CM}$ | 8.0<br>12        |                  |                  | A                        |
| Base Current                                                                          | $I_B$             | 0.3              |                  |                  | mA                       |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$             | 70<br>0.56       |                  |                  | W<br>W/ $^\circ\text{C}$ |
| Operating and Storage Junction<br>Temperature Range                                   | $T_J, T_{STG}$    | - 65 to +150     |                  |                  | $^\circ\text{C}$         |



**TO-220**

**THERMAL CHARACTERISTICS**

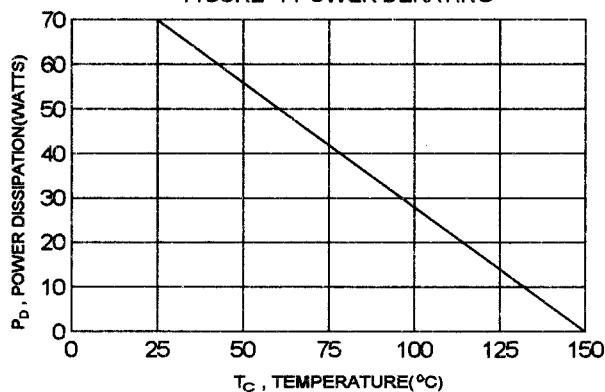
| Characteristic                      | Symbol          | Max   | Unit               |
|-------------------------------------|-----------------|-------|--------------------|
| Thermal Resistance Junction to Case | $R_{\theta jc}$ | 1.785 | $^\circ\text{C/W}$ |



PIN 1.BASE  
2.COLLECTOR  
3.EMITTER  
4.COLLECTOR(CASE)

| DIM | MILLIMETERS |       |
|-----|-------------|-------|
|     | MIN         | MAX   |
| A   | 14.68       | 15.31 |
| B   | 9.78        | 10.42 |
| C   | 5.01        | 6.52  |
| D   | 13.06       | 14.62 |
| E   | 3.57        | 4.07  |
| F   | 2.42        | 3.66  |
| G   | 1.12        | 1.36  |
| H   | 0.72        | 0.96  |
| I   | 4.22        | 4.98  |
| J   | 1.14        | 1.38  |
| K   | 2.20        | 2.97  |
| L   | 0.33        | 0.55  |
| M   | 2.48        | 2.98  |
| O   | 3.70        | 3.90  |

**FIGURE -1 POWER DERATING**



**TIP130, TIP131, TIP132 NPN / TIP135, TIP136, TIP137 PNP**

**ELECTRICAL CHARACTERISTICS** (  $T_c = 25^\circ\text{C}$  unless otherwise noted )

| Characteristic | Symbol | Min | Max | Unit |
|----------------|--------|-----|-----|------|
|----------------|--------|-----|-----|------|

**OFF CHARACTERISTICS**

|                                                                                                                                                                                                            |                |                 |                   |    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------------|-------------------|----|
| Collector - Emitter Sustaining Voltage (1)<br>( $I_C = 30\text{ mA}$ , $I_B = 0$ )<br>TIP130,TIP135<br>TIP131,TIP136<br>TIP132,TIP137                                                                      | $V_{CEO(sus)}$ | 60<br>80<br>100 |                   | V  |
| Collector Cutoff Current<br>( $V_{CE} = 30\text{ V}$ , $I_B = 0$ )<br>( $V_{CE} = 40\text{ V}$ , $I_B = 0$ )<br>( $V_{CE} = 50\text{ V}$ , $I_B = 0$ )<br>TIP130,TIP135<br>TIP131,TIP136<br>TIP132,TIP137  | $I_{CEO}$      |                 | 0.5<br>0.5<br>0.5 | mA |
| Collector Cutoff Current<br>( $V_{CB} = 60\text{ V}$ , $I_E = 0$ )<br>( $V_{CB} = 80\text{ V}$ , $I_E = 0$ )<br>( $V_{CB} = 100\text{ V}$ , $I_E = 0$ )<br>TIP130,TIP135<br>TIP131,TIP136<br>TIP132,TIP137 | $I_{CBO}$      |                 | 0.2<br>0.2<br>0.2 | mA |
| Emitter Cutoff Current<br>( $V_{EB} = 5.0\text{ V}$ , $I_C = 0$ )                                                                                                                                          | $I_{EBO}$      |                 | 5.0               | mA |

**ON CHARACTERISTICS (1)**

|                                                                                                                                            |               |             |            |   |
|--------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------|------------|---|
| DC Current Gain<br>( $I_C = 1.0\text{ A}$ , $V_{CE} = 4.0\text{ V}$ )<br>( $I_C = 4.0\text{ A}$ , $V_{CE} = 4.0\text{ V}$ )                | $h_{FE}$      | 500<br>1000 | 15000      |   |
| Collector-Emitter Saturation Voltage<br>( $I_C = 4.0\text{ A}$ , $I_B = 16\text{ mA}$ )<br>( $I_C = 6.0\text{ A}$ , $I_B = 30\text{ mA}$ ) | $V_{CE(sat)}$ |             | 2.0<br>3.0 | V |
| Base-Emitter On Voltage<br>( $I_C = 4.0\text{ A}$ , $V_{CE} = 4.0\text{ V}$ )                                                              | $V_{BE(on)}$  |             | 2.5        | V |

**DYNAMIC CHARACTERISTICS**

|                                                                                     |          |  |     |    |
|-------------------------------------------------------------------------------------|----------|--|-----|----|
| Output Capacitance<br>( $V_{CB} = 10\text{ V}$ , $I_E = 0$ , $f = 0.1\text{ MHz}$ ) | $C_{ob}$ |  | 250 | pF |
|-------------------------------------------------------------------------------------|----------|--|-----|----|

(1) Pulse Test: Pulse width =  $300\text{ }\mu\text{s}$  , Duty Cycle  $\leq 2.0\%$

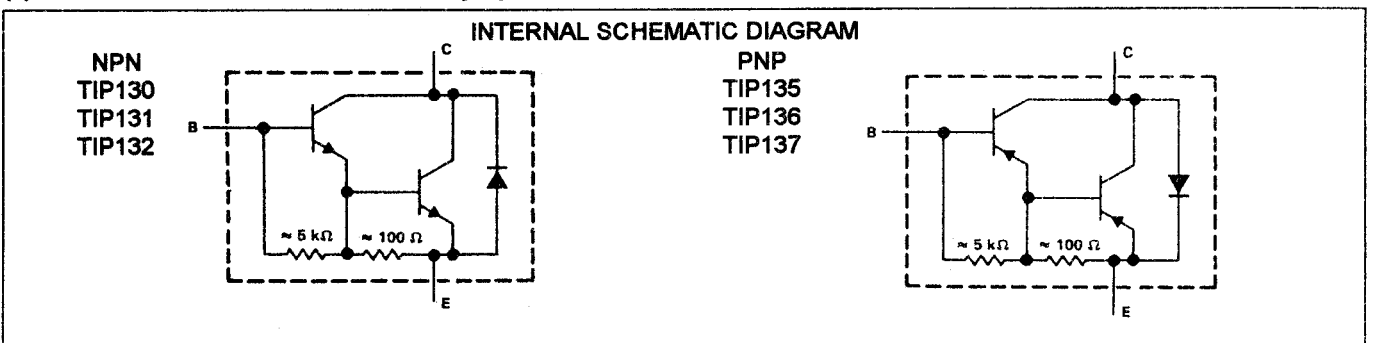


FIG-2 DC CURRENT GAIN

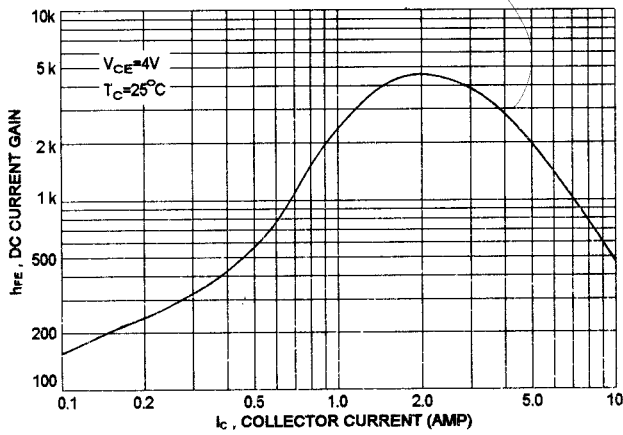


FIG-3 BASE-EMITTER VOLTAGE

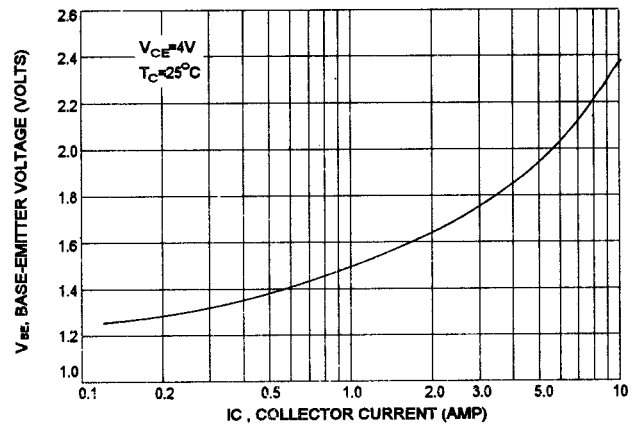


FIG-4 COLLECTOR-EMITTER SATURATION VOLTAGE

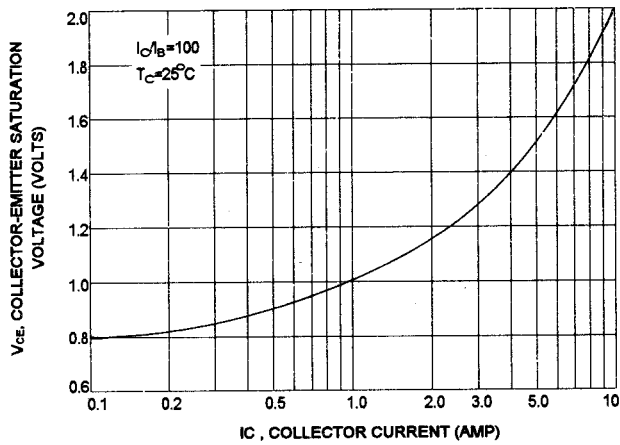


FIG-5 FORWARD VOLTAGE COMMUTATING DIODE

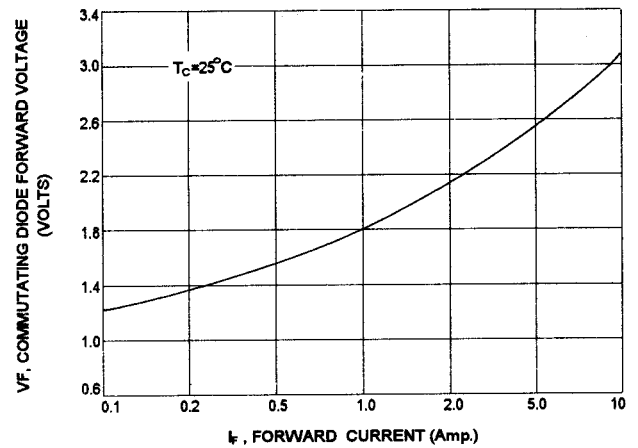
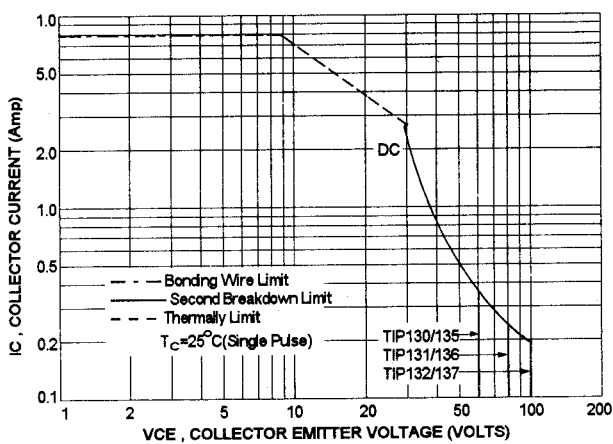


FIG-6 ACTIVE REGION SAFE OPERATING AREA



There are two limitation on the power handling ability of a transistor: average junction temperature and second breakdown safe operating area curves indicate  $I_C$ - $V_{CE}$  limits of the transistor that must be observed for reliable operation i.e., the transistor must not be subjected to greater dissipation than curves indicate.

The data of FIG-6 curve is base on  $T_{J(PK)}=150^\circ C$ ;  $T_C$  is variable depending on power level. second breakdown pulse limits are valid for duty cycles to 10% provided  $T_{J(PK)} \leq 150^\circ C$ . At high case temperatures, thermal limitation will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

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