

## PLASTIC MEDIUM-POWER COMPLEMENTARY SILICON TRANSISTORS

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

### FEATURES:

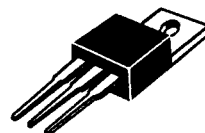
- \* Collector-Emitter Sustaining Voltage-  
 $V_{CE(SUS)} = 60 \text{ V (Min) - TIP100, TIP105}$   
 $= 80 \text{ V (Min) - TIP101, TIP106}$   
 $= 100 \text{ V (Min) - TIP102, TIP107}$
- \* Collector-Emitter Saturation Voltage  
 $V_{CE(sat)} = 2.0 \text{ V (Max.) @ } I_C = 3.0 \text{ A}$
- \* Monolithic Construction with Built-in Base-Emitter Shunt Resistor

| NPN    | PNP    |
|--------|--------|
| TIP100 | TIP105 |
| TIP101 | TIP106 |
| TIP102 | TIP107 |

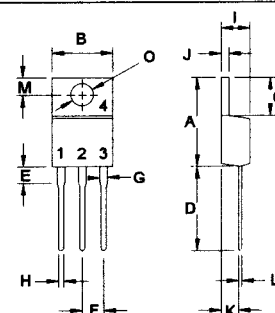
8 AMPERE  
DARLINGTON  
COMPLEMENTARY SILICON  
POWER TRANSISTORS  
60-100 VOLTS  
80 WATTS

### MAXIMUM RATINGS

| Characteristic                                                                        | Symbol            | TIP100<br>TIP105 | TIP101<br>TIP106 | TIP102<br>TIP107 | 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>15        |                  |                  | A                        |
| Base Current                                                                          | $I_B$             | 1.0              |                  |                  | A                        |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$             | 80<br>0.64       |                  |                  | 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

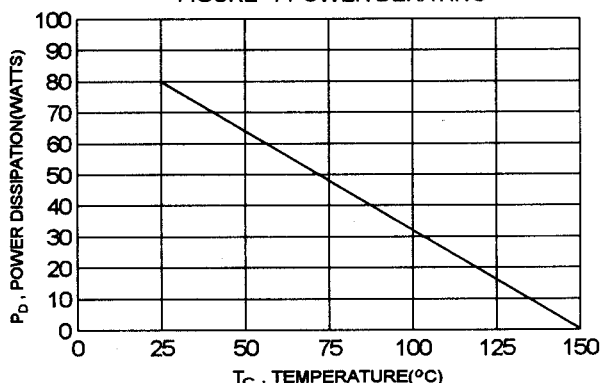


PIN 1.BASE  
2.COLLECTOR  
3.EMITTER  
4.COLLECTOR(CASE)

### THERMAL CHARACTERISTICS

| Characteristic                      | Symbol          | Max  | Unit               |
|-------------------------------------|-----------------|------|--------------------|
| Thermal Resistance Junction to Case | $R_{\theta jc}$ | 1.56 | $^\circ\text{C/W}$ |

FIGURE -1 POWER DERATING



| 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  |

**TIP100, TIP101, TIP102 NPN / TIP105, TIP106, TIP107 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>TIP100,TIP105<br>TIP101,TIP106<br>TIP102,TIP107                                                                      | $V_{CE(sus)}$ | 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>TIP100,TIP105<br>TIP101,TIP106<br>TIP102,TIP107  | $I_{CEO}$     |                 | 50<br>50<br>50 | $\mu\text{A}$ |
| 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>TIP100,TIP105<br>TIP101,TIP106<br>TIP102,TIP107 | $I_{CBO}$     |                 | 50<br>50<br>50 | $\mu\text{A}$ |
| Emitter Cutoff Current<br>( $V_{EB} = 5.0\text{ V}$ , $I_C = 0$ )                                                                                                                                          | $I_{EBO}$     |                 | 8.0            | mA            |

**ON CHARACTERISTICS (1)**

|                                                                                                                                             |               |             |            |   |
|---------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------|------------|---|
| DC Current Gain<br>( $I_C = 3.0\text{ A}$ , $V_{CE} = 4.0\text{ V}$ )<br>( $I_C = 8.0\text{ A}$ , $V_{CE} = 4.0\text{ V}$ )                 | $h_{FE}$      | 1000<br>200 | 20000      |   |
| Collector-Emitter Saturation Voltage<br>( $I_C = 3.0\text{ A}$ , $I_B = 6.0\text{ mA}$ )<br>( $I_C = 8.0\text{ A}$ , $I_B = 80\text{ mA}$ ) | $V_{CE(sat)}$ |             | 2.0<br>2.5 | V |
| Base-Emitter On Voltage<br>( $I_C = 8.0\text{ A}$ , $V_{CE} = 4.0\text{ V}$ )                                                               | $V_{BE(on)}$  |             | 2.8        | V |

**DYNAMIC CHARACTERISTICS**

|                                                                                                                                     |          |     |            |    |
|-------------------------------------------------------------------------------------------------------------------------------------|----------|-----|------------|----|
| Small-Signal Current Gain<br>( $I_C = 3.0\text{ A}$ , $V_{CE} = 4.0\text{ V}$ , $f = 1.0\text{ MHz}$ )                              | $h_{fe}$ | 4.0 |            |    |
| Output Capacitance<br>( $V_{CB} = 10\text{ V}$ , $I_E = 0$ , $f = 0.1\text{ MHz}$ )<br>TIP100,TIP101,TIP102<br>TIP105,TIP106,TIP107 | $C_{ob}$ |     | 300<br>250 | pF |

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

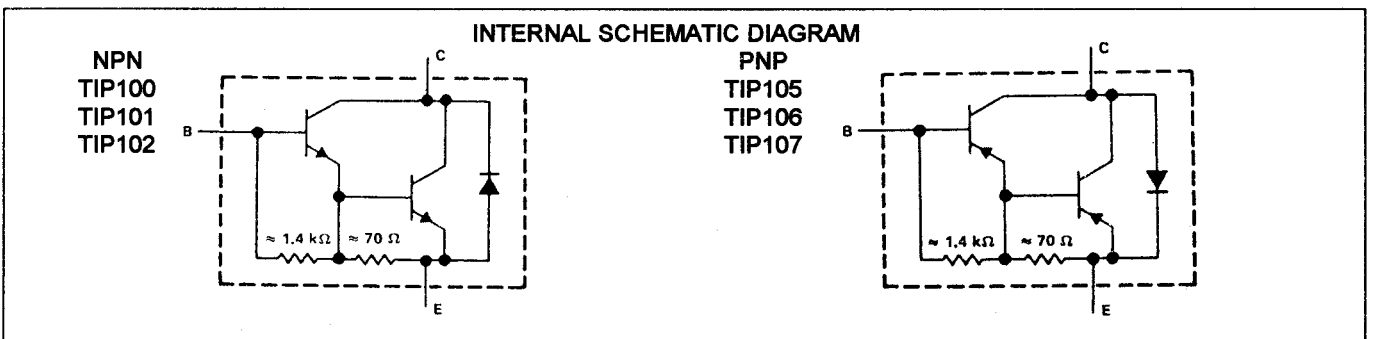


FIG-2 SWITCHING TIME

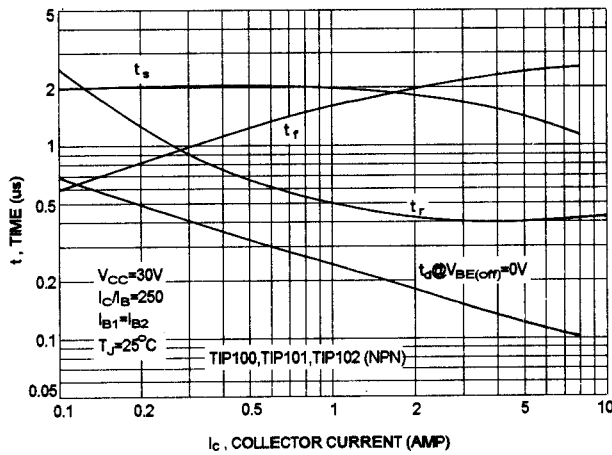


FIG-3 SWITCHING TIME

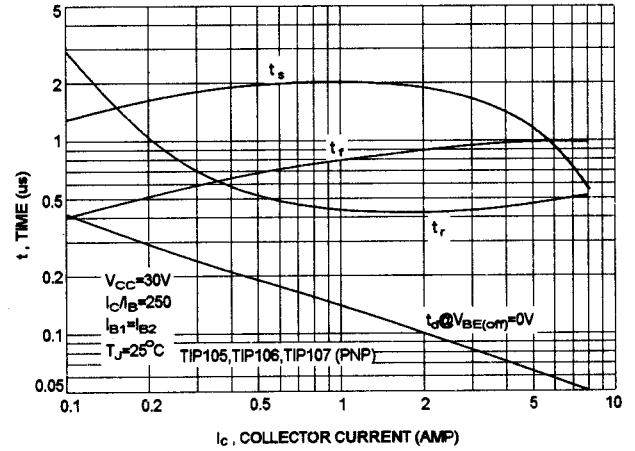


FIG-4 SMALL-SIGNAL CURRENT GAIN

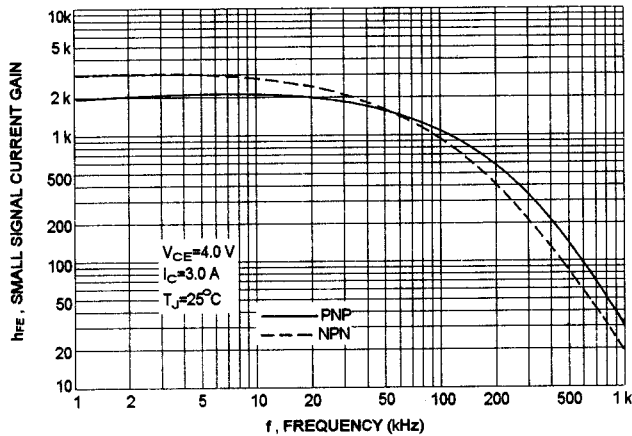


FIG-5 CAPACITANCES

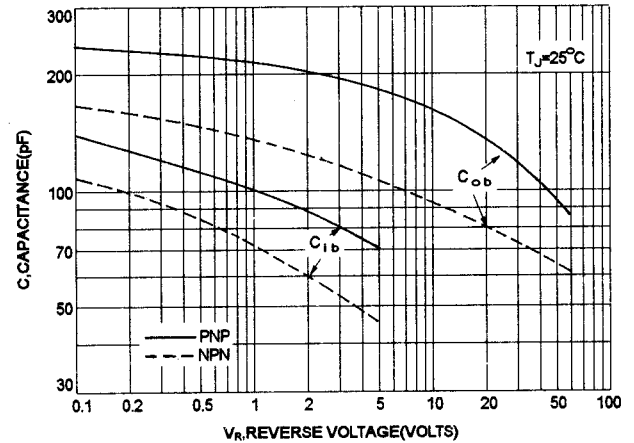
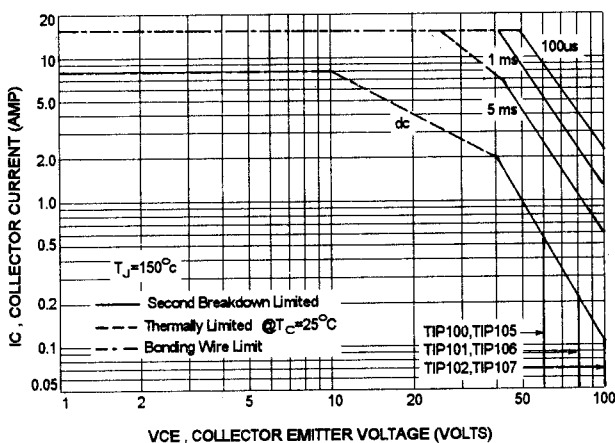


FIG-6 ACTIVE REGION SAFE OPERATING AREA



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 is based 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.

TIP100, TIP101, TIP102 NPN / TIP105, TIP106 TIP107 PNP

NPN TIP100,TIP101,TIP102

PNP TIP105,TIP106,TIP107

FIG-7 DC CURRENT GAIN

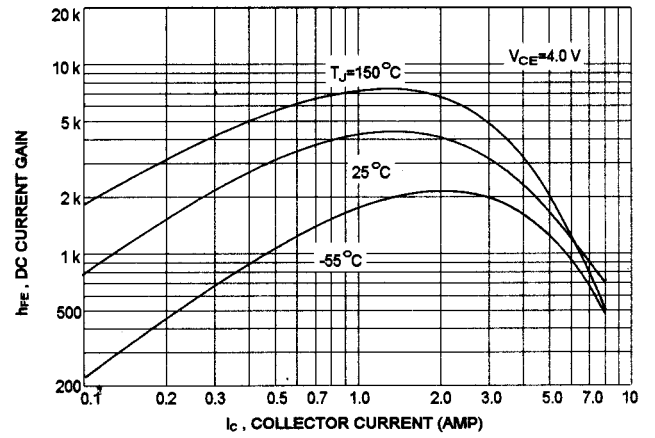
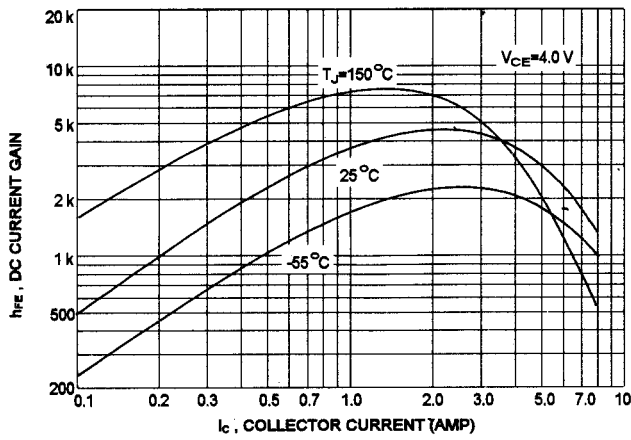


FIG-8 COLLECTOR SATURATION REGION

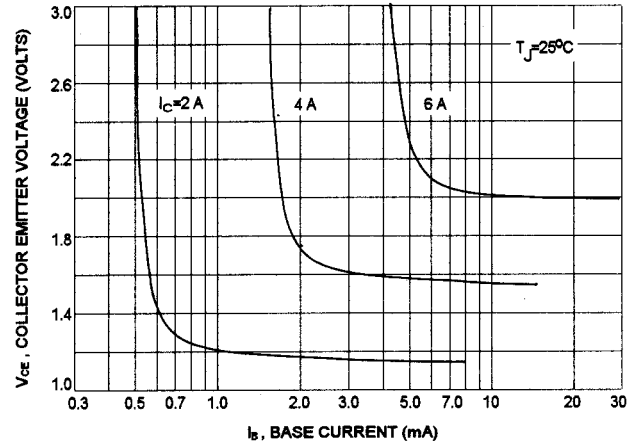
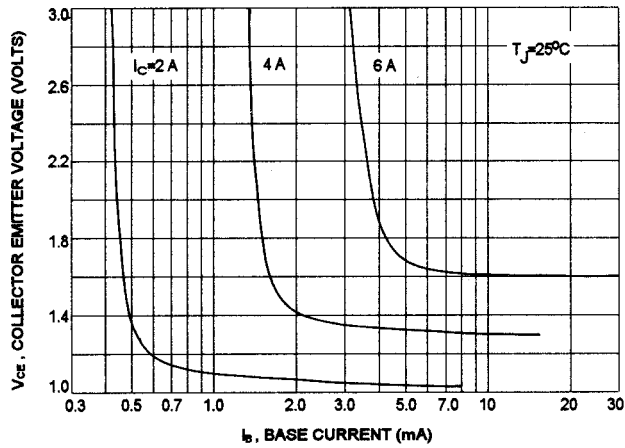


FIG-9 "ON" VOLTAGES

