



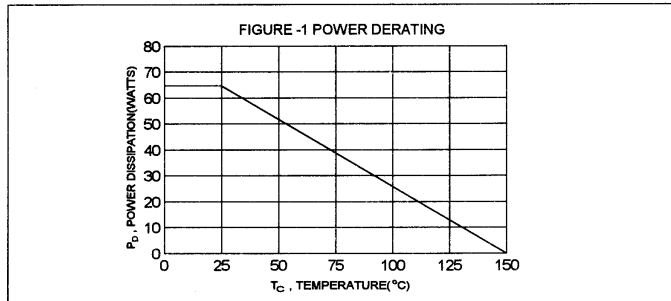
**PLASTIC MEDIUM-POWER  
COMPLEMENTARY SILICON TRANSISTORS**  
...designed for general-purpose amplifier and low speed switching applications  
**FEATURES:**  
\* Collector-Emitter Sustaining Voltage-  
 $V_{CE(sus)}$  = 60 V (Min) - TIP120,TIP125  
= 80 V (Min) - TIP121,TIP126  
= 100 V (Min) - TIP122,TIP127  
\* Collector-Emitter Saturation Voltage  
 $V_{CE(sat)}$  = 2.0 V (Max.) @  $I_C = 3.0$  A  
\* Monolithic Construction with Built-in Base-Emitter Shunt Resistor

#### MAXIMUM RATINGS

Characteristic	Symbol	TIP120 TIP125	TIP121 TIP126	TIP122 TIP127	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 -Peak	$I_C$ $I_{CM}$	5.0 8.0			A
Base Current	$I_B$	120			mA
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	65 0.52			W W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{STG}$	- 65 to +150			$^\circ\text{C}$

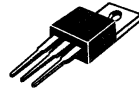
#### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance Junction to Case	$R_{\theta jc}$	1.92	$^\circ\text{C/W}$

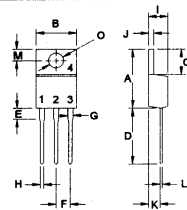


**NPN PNP  
TIP120 TIP125  
TIP121 TIP126  
TIP122 TIP127**

**5.0 AMPERE  
DARLINGTON  
COMPLEMENTARY SILICON  
POWER TRANSISTORS  
60-100 VOLTS  
65 WATTS**



TO-220



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

TIP120, TIP121, TIP122 NPN / TIP125, TIP126, TIP127 PNP

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

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector - Emitter Sustaining Voltage (1) ( $I_C = 30$ mA, $I_B = 0$ )	$V_{CE(sus)}$	60 80 100		V
Collector Cutoff Current ( $V_{CE} = 30$ V, $I_B = 0$ ) ( $V_{CE} = 40$ V, $I_B = 0$ ) ( $V_{CE} = 50$ V, $I_B = 0$ )	$I_{CEO}$		0.5 0.5 0.5	mA
Collector Cutoff Current ( $V_{CB} = 60$ V, $I_E = 0$ ) ( $V_{CB} = 80$ V, $I_E = 0$ ) ( $V_{CB} = 100$ V, $I_E = 0$ )	$I_{CBO}$		0.2 0.2 0.2	mA
Emitter Cutoff Current ( $V_{EB} = 5.0$ V, $I_C = 0$ )	$I_{EBO}$	2.0		mA

#### ON CHARACTERISTICS (1)

DC Current Gain ( $I_C = 0.5$ A, $V_{CE} = 3.0$ V) ( $I_C = 3.0$ A, $V_{CE} = 3.0$ V)	$h_{FE}$	1000 1000		
Collector-Emitter Saturation Voltage ( $I_C = 3.0$ A, $I_B = 12$ mA) ( $I_C = 5.0$ A, $I_B = 20$ mA)	$V_{CE(sat)}$		2.0 4.0	V
Base-Emitter On Voltage ( $I_C = 3.0$ A, $V_{CE} = 3.0$ V)	$V_{BE(on)}$	2.5		V

#### DYNAMIC CHARACTERISTICS

Small-Signal Current Gain ( $I_C = 3.0$ A, $V_{CE} = 4.0$ V, $f = 1.0$ MHz)	$h_{fe}$	4.0		
Output Capacitance ( $V_{CB} = 10$ V, $I_E = 0$ , $f = 0.1$ MHz)	$C_{ob}$		300 250	pF

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

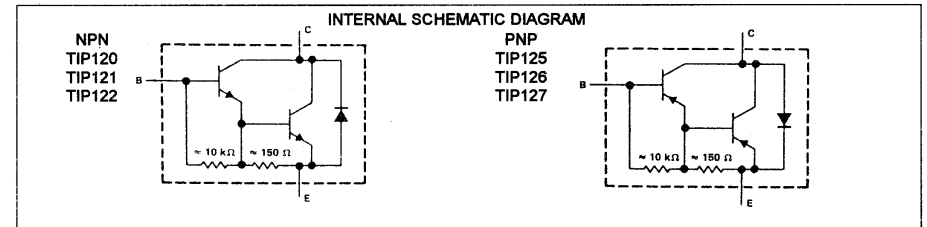


FIG-2 SWITCHING TIME

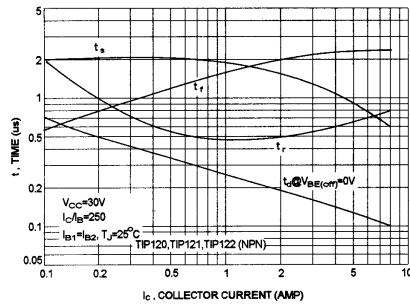


FIG-3 SWITCHING TIME

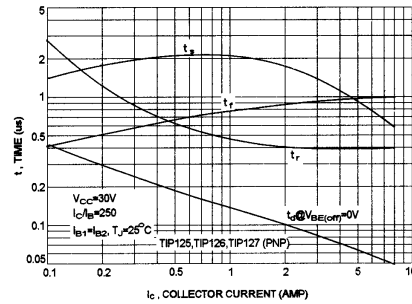


FIG-4 SMALL-SIGNAL CURRENT GAIN

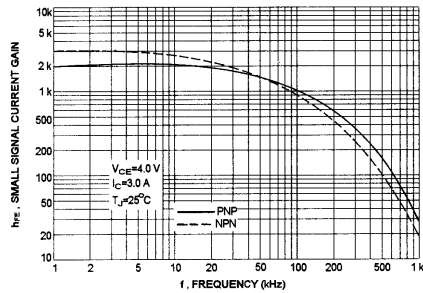


FIG-5 CAPACITANCES

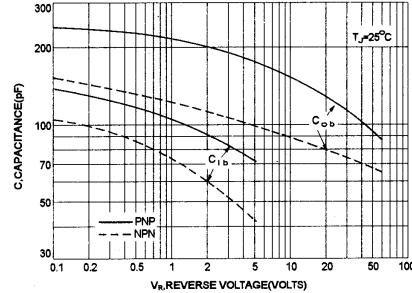
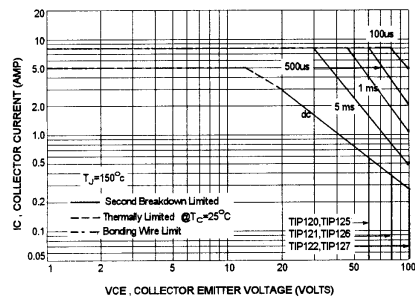


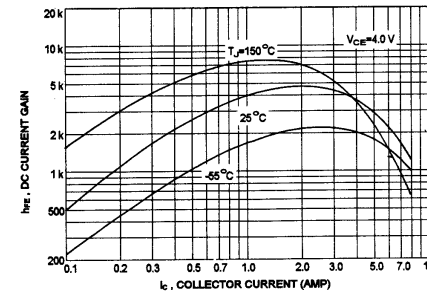
FIG-6 ACTIVE REGION SAFE OPERATING AREA



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

NPN TIP120, TIP121, TIP122



PNP TIP125, TIP126, TIP127

FIG-7 DC CURRENT GAIN

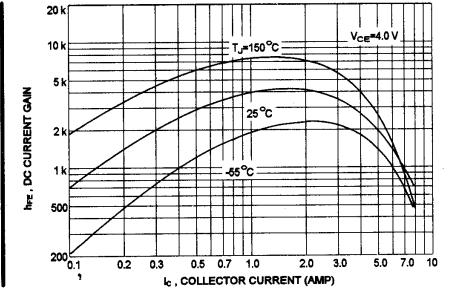


FIG-8 COLLECTOR SATURATION REGION

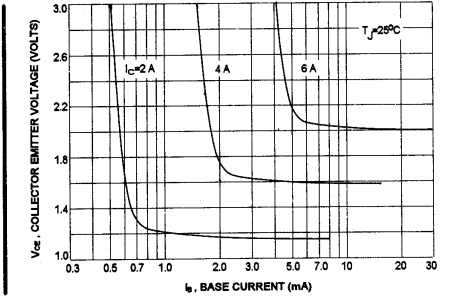
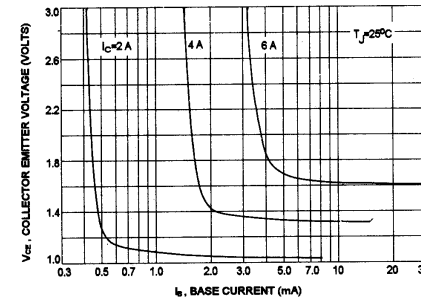


FIG-9 "ON" VOLTAGES

