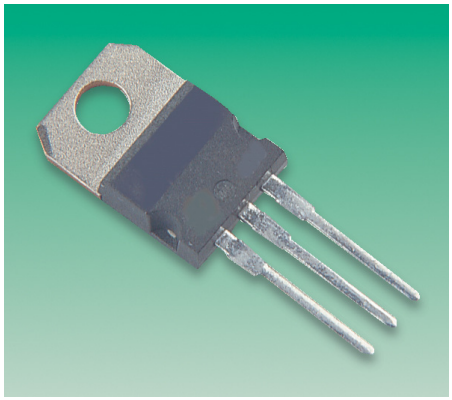
TIP120, 121, 122, 125, 126, 127

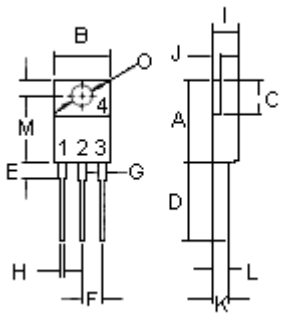
Darlington Transistors

multicomp



Features:

- Designed for general-purpose amplifier and low speed switching applications.
- Collector-Emitter sustaining voltage-$V_{CEO(sus)}$ = 60V (Minimum) - TIP120, TIP125
  80V (Minimum) - TIP121, TIP126
  100V (Minimum) - TIP122, TIP127.
- Collector-Emitter saturation voltage-$V_{CE(sat)}$ = 2.0V (Maximum) at I_C = 3.0A.
- Monolithic construction with built-in-base-emitter shunt resistors.



Pin 1. Base
2. Collector
3. Emitter
4. Collector (Case)

	Minimum	Maximum
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

Dimensions : Millimetres

NPN	PNP
TIP120	TIP 125
TIP121	TIP 126
TIP122	TIP 127

5.0 Ampere
Darlington
Complementary Silicon
Power Transistors
60 - 100 Volts
65 Watts

TO-220

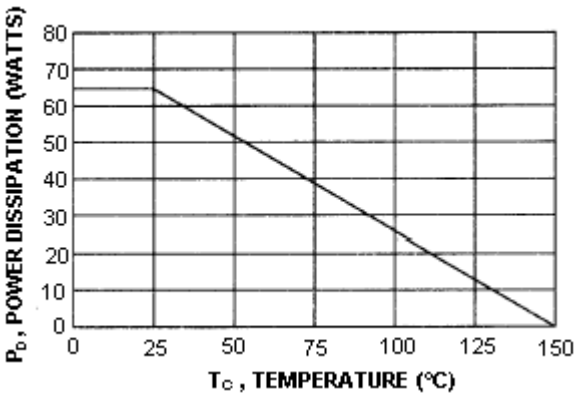
Maximum Ratings

Characteristic	Symbol	TIP120 / TIP125	TIP121 / TIP126	TIP122 / TIP127	Unit
Collector-Emitter Voltage	V_{CEO}	60	80	100	V
Collector-Base Voltage	V_{CBO}				
Emitter-Base Voltage	V_{EBO}	5.0			
Collector Current -Continuous -Peak	I_C I_{CM}	5.0 8.0			A
Base Current	I_B	120			mA
Total Power Dissipation at T_C = 25°C Derate above 25°C	P_D	65 0.52			W W/°C
Operating and Storage Junction Temperature Range	T_J, T_{STG}	-65 to +150			°C

Thermal Characteristics

Characteristic	Symbol	Maximum	Unit
Thermal Resistance Junction to Case	Rθjc	1.92	°C/W

FIGURE-1 POWER DERATING



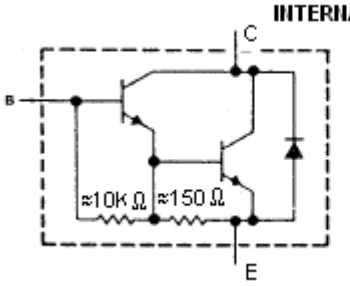
Electrical Characteristics (T_C = 25°C unless otherwise noted)

Characteristic		Symbol	Minimum	Maximum	Unit
OFF Characteristics					
Collector-Emitter Sustaining Voltage (1) (I_C = 30mA, I_B = 0)	TIP120, TIP125 TIP121, TIP126 TIP122, TIP127	$V_{CEO(sus)}$	60 80 100	-	V
Collector Cut off Current (V_{CE} = 30V, I_B = 0) (V_{CE} = 40V, I_B = 0) (V_{CE} = 50V, I_B = 0)	TIP120, TIP125 TIP121, TIP126 TIP122, TIP127	I_{CEO}	-	0.5 0.5 0.5	mA
Collector Cut off Current (V_{CB} = 60V, I_B = 0) (V_{CB} = 80V, I_B = 0) (V_{CB} = 100V, I_B = 0)	TIP120, TIP125 TIP121, TIP126 TIP122, TIP127	I_{CBO}	-	0.2 0.2 0.2	
Collector Cut off Current (V_{EB} =5.0V, I_C = 0)		I_{EBO}	-	2.0	
ON Characteristics (1)					
DC Current Gain (I_C = 0.5A, V_{CE} = 3.0V) (I_C = 3.0A, V_{CE} = 3.0V)		h_{FE}	1000 1000	-	-
Collector-Emitter Saturation Voltage (I_C = 3.0A, I_B = 12mA) (I_C = 5.0A, I_B = 20mA)		$V_{CE(sat)}$	-	2.0 4.0	V
Base-Emitter On Voltage (I_C = 3.0A, V_{CE} = 3.0V)		$V_{BE(on)}$	-	2.5	
Dynamic Characteristics					
Small-Signal Current Gain (I_C = 3.0A, V_{CE} = 4.0V, f = 1.0MHz)		h_{fe}	4.0	-	-
Output Capacitance (V_{CB} = 10V, I_E = 0, f = 0.1MHz)	TIP120, TIP121, TIP122 TIP125, TIP126, TIP127	C_{ob}	-	300 250	pF

(1) Pulse Test : Pulse Width = 300µs, Duty Cycle ≤2.0%

INTERNAL SCHEMATIC DIAGRAM

NPN
TIP120
TIP121
TIP122



PNP
TIP125
TIP126
TIP127

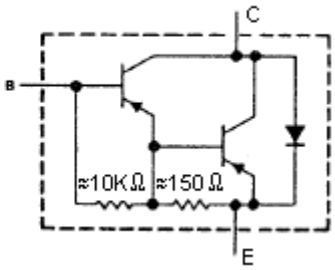


FIGURE - 2 SWITCHING TIME

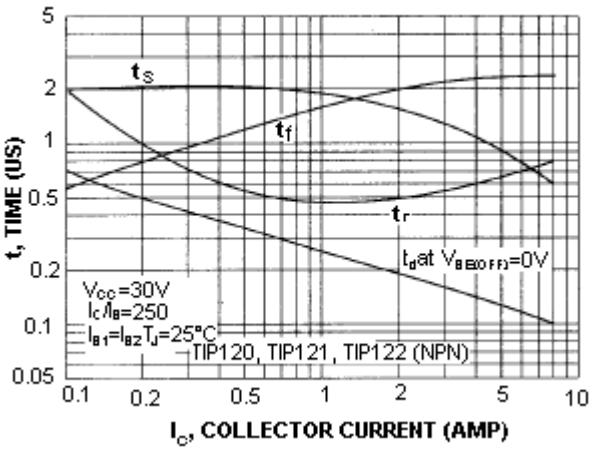


FIGURE - 3 SWITCHING TIME

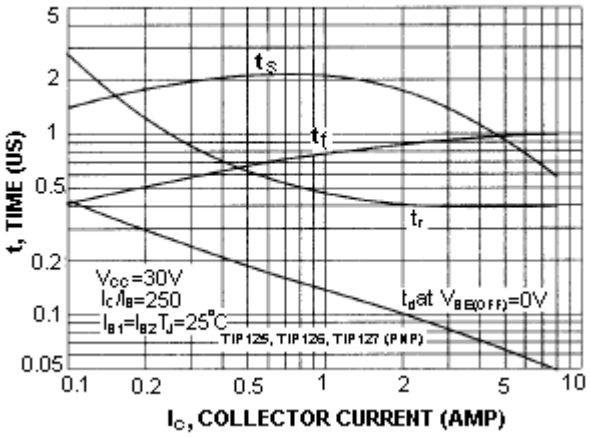


FIGURE - 4 SMALL SIGNAL CURRENT GAIN

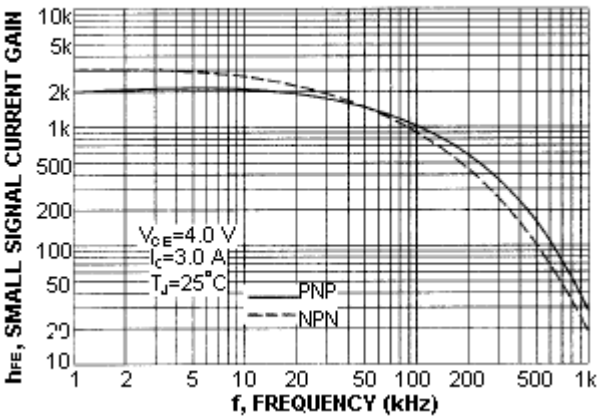


FIGURE - 5 CAPACITANCES

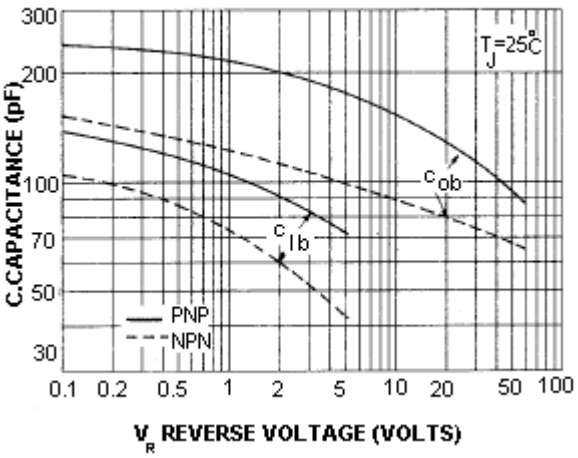
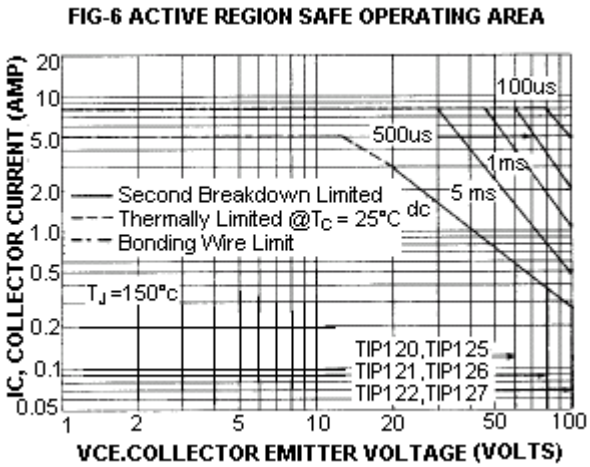


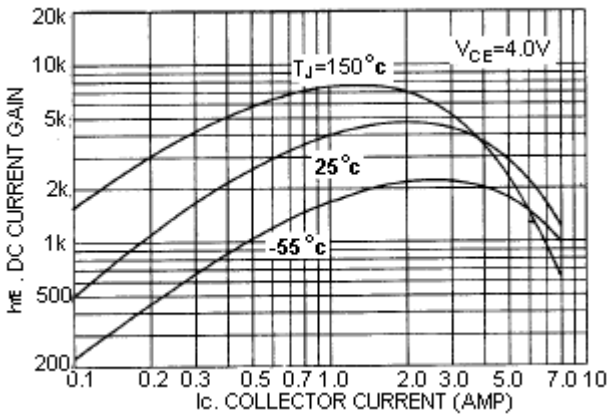
FIGURE - 6 ACTIVE REGION SAFE OPERATING AREA



There are two limitations 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 not be subjected to greater dissipation than the curves indicate.

The data of Figure - 6 is based on $T_{J(PK)}$ = 150°C;T_c is variable depending on power level. Second breakdown pulse limits are valid for duty cycles to 10% provided T_J(PK) ≤150°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.

FIGURE - 7 DC CURRENT GAIN



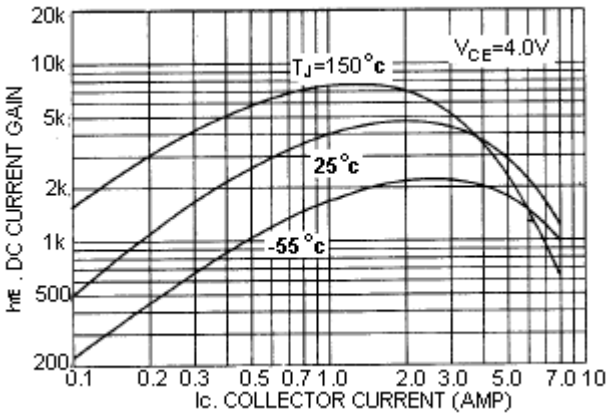
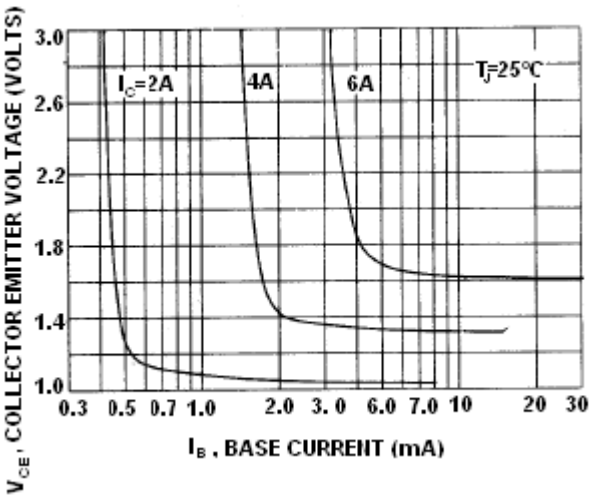


FIGURE - 8 COLLECTOR SATURATION REGION



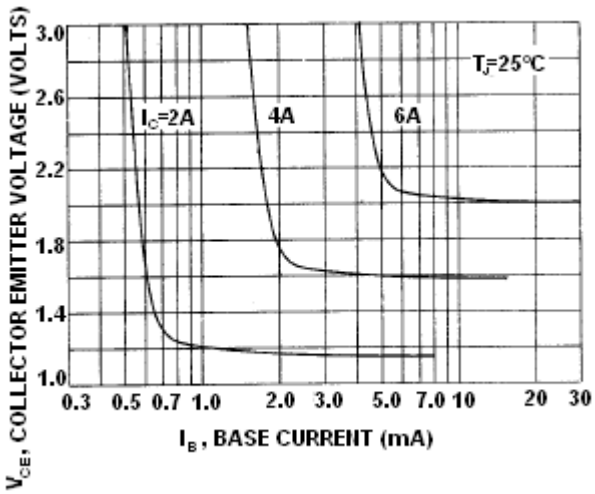
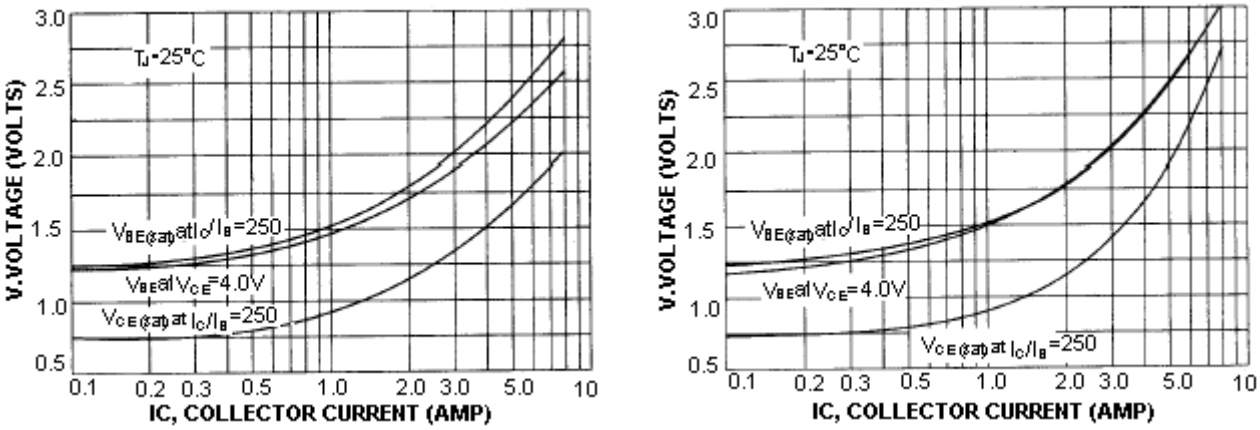


FIGURE - 9 "ON" VOLTAGES



Specifications

I_C A	V_{CEO} (maximum) V	h_{FE} minimum at I_c = 3A	P_{tot} at 25°C W	Package	Part Number	
					NPN	PNP
5	60	1000	65	TO-220	TIP120	TIP125
	80				TIP121	TIP126
	100				TIP122	TIP127

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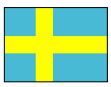

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