

TIP120, 121, 122, 125, 126, 127



Darlington Transistors



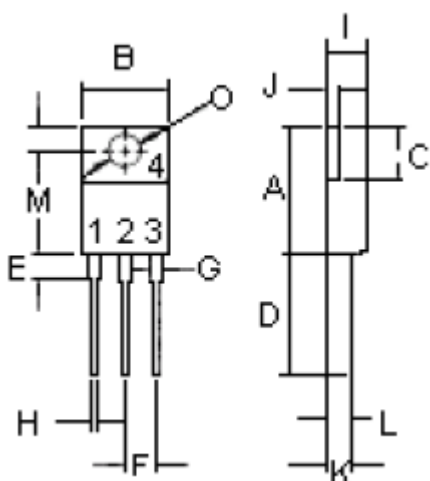
Features:

- Collector - emitter sustaining voltage - $V_{CEO(sus)} = 60\text{ V}$ (minimum) - TIP120, TIP125
80 V (minimum) - TIP121, TIP126
100 V (minimum) - TIP122, TIP127
- Collector - emitter saturation voltage - $V_{CE(sat)} = 2\text{ V}$ (maximum) at $I_C = 3\text{ A}$
- Monolithic construction with built-in-base-emitter shunt resistors

Application:

Designed for general-purpose amplifier and low speed switching applications

TO - 220



Pin

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

Dimensions	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	2.2	2.97
L	0.33	0.55
M	2.48	2.98
O	3.7	3.9

Dimensions : Millimetres

Maximum Ratings

Characteristic	Symbol	TIP120	TIP121	TIP122	Unit
		TIP125	TIP126	TIP127	
Collector - emitter voltage	V _{CEO}	60	80	100	V
Collector - base voltage	V _{CBO}				V
Emitter - base voltage	V _{EBO}	5			V
Collector current - continuous - peak	I _C	5 8			A
Base current	I _B	120			A
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

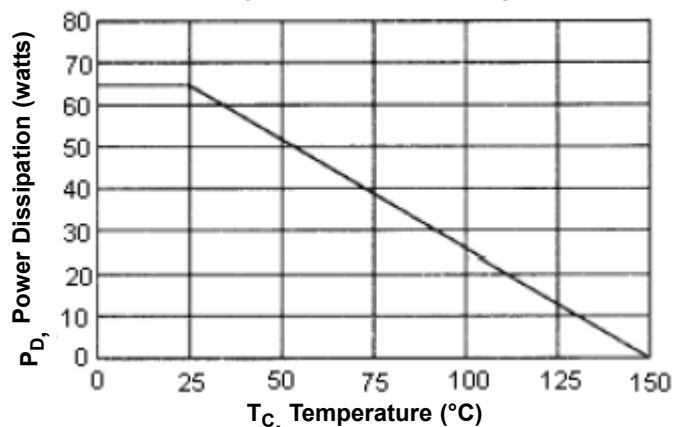
TIP120, 121, 122, 125, 126, 127

Darlington Transistors

Thermal Characteristics

Characteristic	Symbol	Maximum	Unit
Thermal resistance junction to case	$R_{\theta jc}$	1.92	°C/W

Figure - 1 Power Derating



Electrical Characteristics ($T_C = 25^\circ\text{C}$ Unless Otherwise noted)

Characteristics	Symbol	Minimum	Maximum	Units
Off Characteristics				
Collector - emitter sustaining voltage (1) ($I_C = 30\text{ mA}$, $I_B = 0$) TIP120, TIP125 TIP121, TIP126 TIP122, TIP127	$V_{CEO (SUS)}$	60 80 100	-	V
Collector cut off current ($V_{CE} = 30\text{ V}$, $I_B = 0$) ($V_{CE} = 40\text{ V}$, $I_B = 0$) ($V_{CE} = 50\text{ V}$, $I_B = 0$) TIP120, TIP125 TIP121, TIP126 TIP122, TIP127	I_{CEO}	-	0.5 0.5 0.5	mA
Collector cut off current ($V_{CB} = 60\text{ V}$, $I_B = 0$) ($V_{CB} = 80\text{ V}$, $I_B = 0$) ($V_{CB} = 100\text{ V}$, $I_B = 0$) TIP120, TIP125 TIP121, TIP126 TIP122, TIP127	I_{CBO}	-	0.2 0.2 0.2	mA
Collector cut off current ($V_{EB} = 5\text{ V}$, $I_C = 0$)	I_{EBO}	-	2	mA
On Characteristics (1)				
DC current gain ($I_C = 0.5\text{ A}$; $V_{CE} = 3\text{ V}$) ($I_C = 3\text{ A}$; $V_{CE} = 3\text{ V}$)	h_{FE}	1,000 1,000	-	-
Collector - emitter saturation voltage ($I_C = 3\text{ A}$; $I_B = 12\text{ mA}$) ($I_C = 5\text{ A}$; $I_B = 20\text{ mA}$)	$V_{CE(sat)}$	-	2 4	V
Base-emitter on voltage ($I_C = 3\text{ A}$; $V_{CE} = 3\text{ V}$)	$V_{BE (on)}$	-	2.5	V

TIP120, 121, 122, 125, 126, 127



Darlington Transistors

Electrical Characteristics ($T_c = 25^\circ\text{C}$ Unless Otherwise noted)

Characteristics	Symbol	Minimum	Maximum	Units
Dynamic characteristics				
Small signal current gain ($I_C = 3\text{ A}$; $V_{CE} = 4\text{ V}$, $f = 1\text{ MHz}$)	h_{fe}	4	-	-
Output capacitance ($V_{CB} = 10\text{ V}$; $I_E = 0$, $f = 0.1\text{ MHz}$) TIP120, TIP121, TIP122 TIP125, TIP126, TIP127	C_{ob}	-	300 200	pF

(1) Pulse test: Pulse width = 300 μs , duty cycle $\leq 2\%$

Internal Schematic Diagram

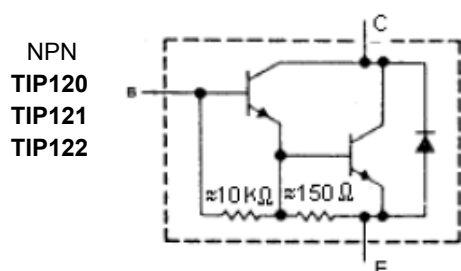


Figure-2 Switching Time

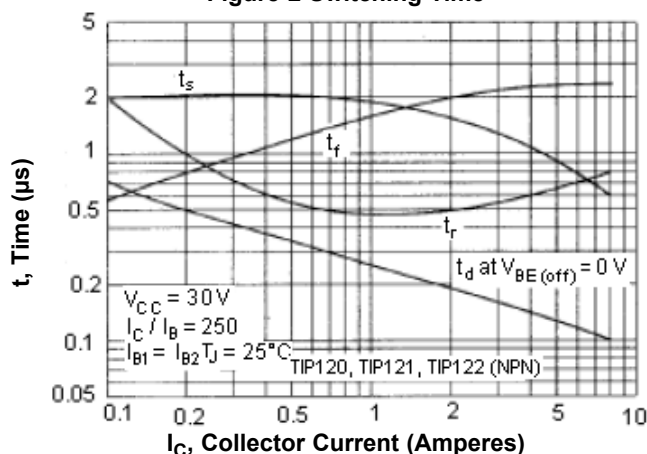


Figure-4 Small Signal Current Gain

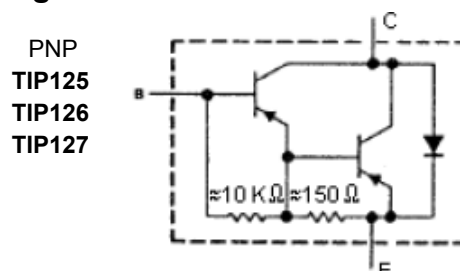
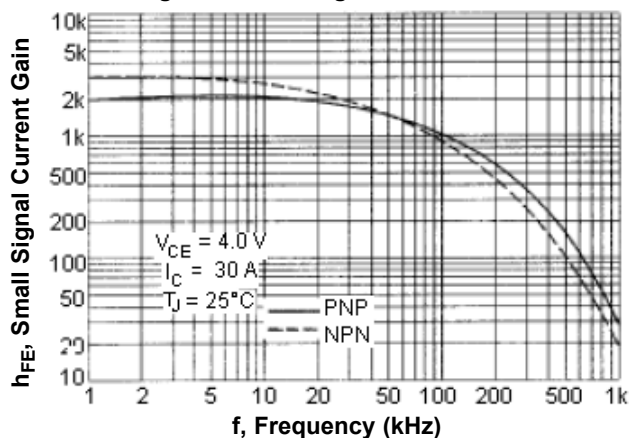


Figure-3 Switching Time

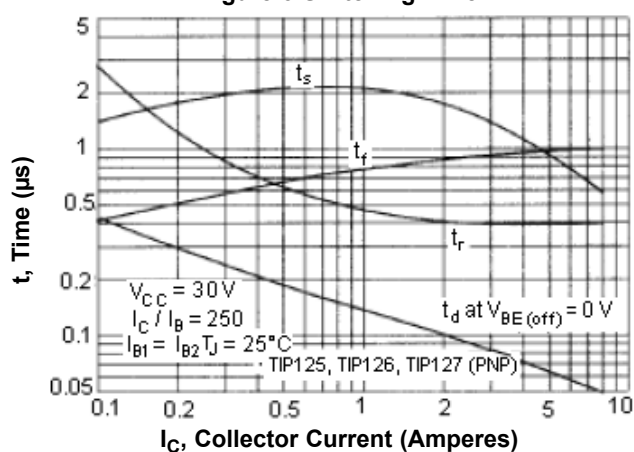
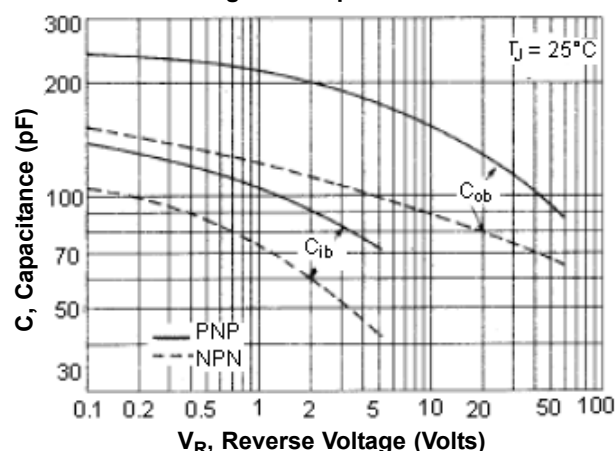


Figure-5 Capacitances

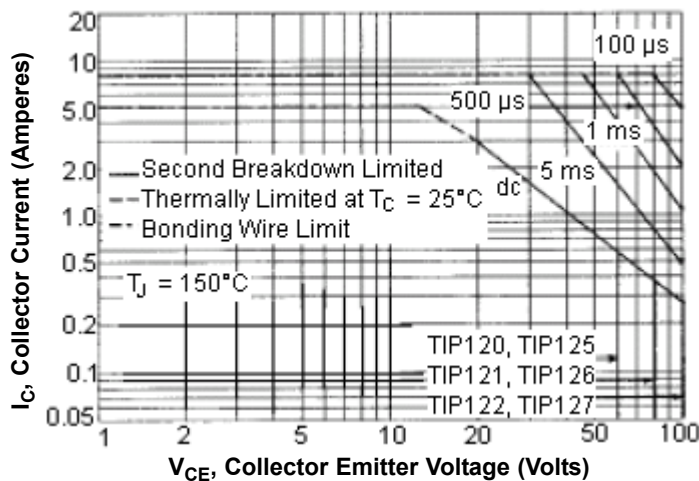


TIP120, 121, 122, 125, 126, 127



Darlington Transistors

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

Figure-7 DC Current Gain

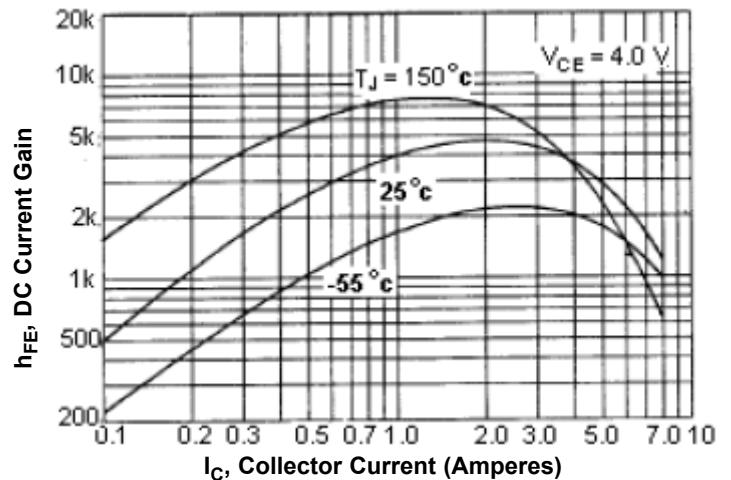
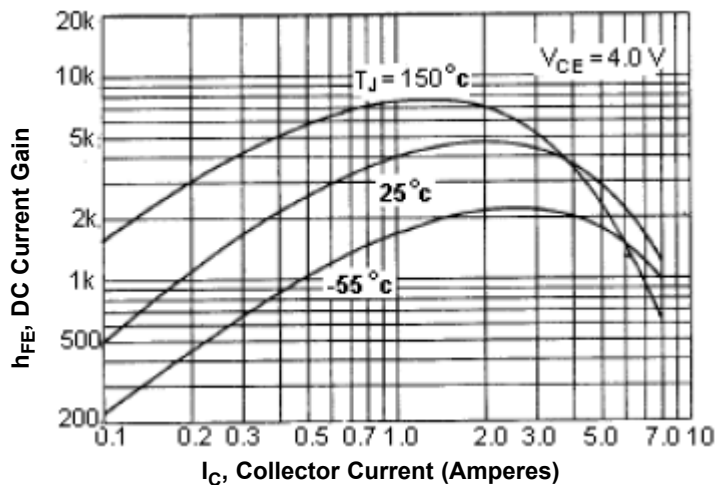
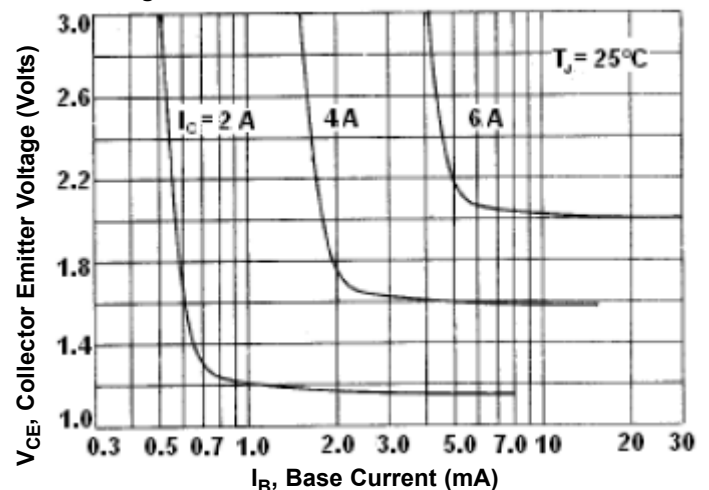
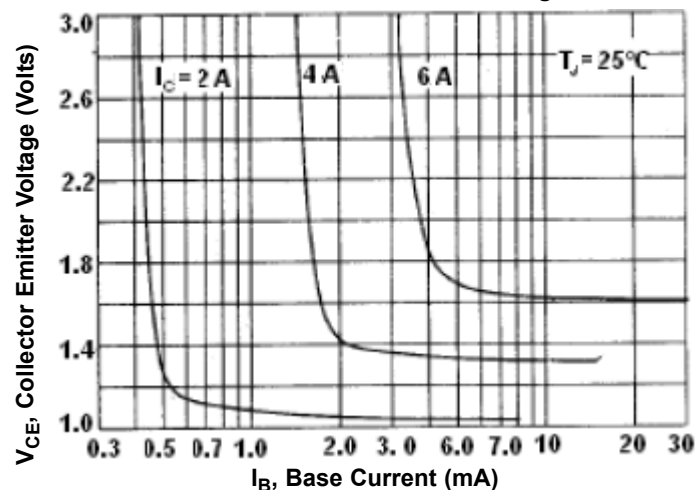


Figure-8 Collector Saturation Region

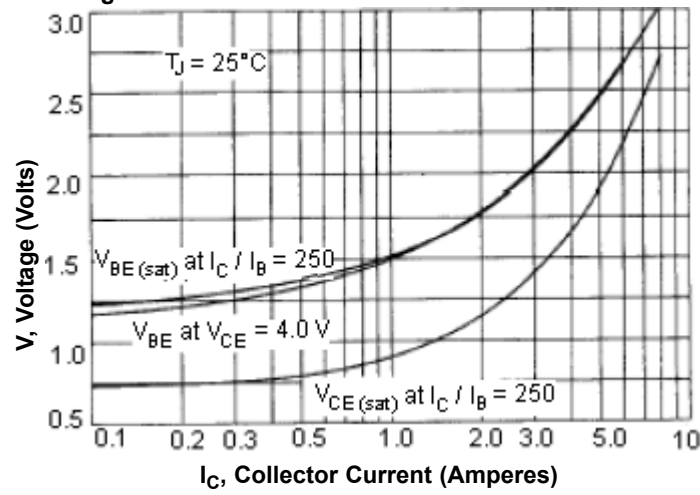
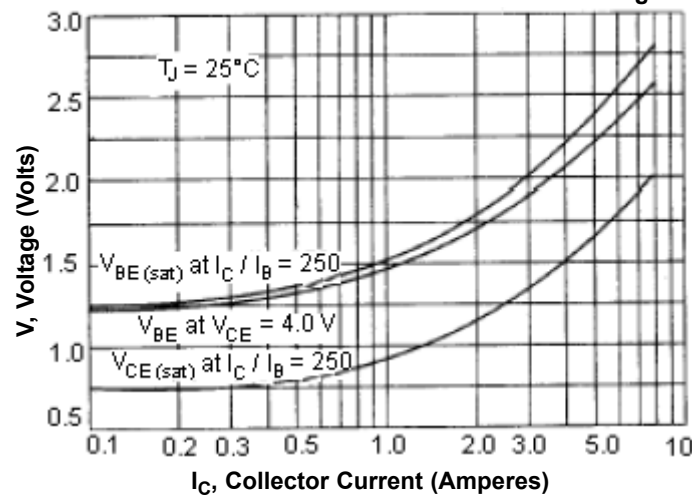


TIP120, 121, 122, 125, 126, 127



Darlington Transistors

Figure-9 "ON" Voltages



Specifications Table

I _C A	V _{CEO} maximum V	h _{FE} maximum at I _C = 3 A	P _{tot} at 25°C (W)	Part Number	
				NPN	PNP
5	60	1,000	65	TIP120	TIP125
	80			TIP121	TIP126
	100			TIP122	TIP127

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