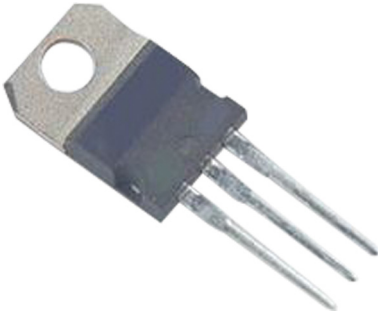


# Darlington Transistor



## Features:

- Collector-Emitter sustaining voltage-  
 $V_{CEO(sus)} = 80V$  (Min.) - TIP131, TIP136  
 $= 100V$  (Min.) - TIP132
- Collector-Emitter saturation voltage -  
 $V_{CE(sat)} = 2V$  (Max.) at  $I_C = 4A$
- Monolithic construction with Built-in Base-Emitter shunt resistor

## Maximum Ratings

Characteristic	Symbol	TIP131 TIP136	TIP132	Unit
Collector-Emitter Voltage	$V_{CEO}$	80	100	V
Collector-Base Voltage	$V_{CBO}$			
Emitter-Base Voltage	$V_{EBO}$	5		
Collector Current-Continuous -Peak	$I_C$ $I_{CM}$	8 12		A
Base Current	$I_B$	0.3		mA
Total Power Dissipation at $T_C = 25^\circ C$ Derate above $25^\circ C$	$P_D$	70 0.56		W W/ $^\circ C$
Operation and Storage Junction Temperature Range	$T_J, T_{STG}$	-65 to +150		$^\circ C$

## Thermal Characteristics

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

# Darlington Transistor



## Electrical Characteristics:

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

Characteristic	Symbol	Min.	Max.	Unit
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### Off Characteristics

Collector-Emitter Sustaining Voltage (1) $I_C = 30\text{mA}, I_B = 0$ TIP131, TIP136 TIP132	$V_{CEO(sus)}$	80 100	-	V
Collector Cut off Current $V_{CE} = 40\text{V}, I_B = 0$ $V_{CE} = 50\text{V}, I_B = 0$ TIP131, TIP136 TIP132	$I_{CEO}$	-	0.5 0.5	mA
Collector Cut off Current $V_{CB} = 80\text{V}, I_E = 0$ $V_{CB} = 100\text{V}, I_E = 0$ TIP131, TIP136 TIP132	$I_{CBO}$	-	0.2 0.2	
Emitter Cut off Current $V_{EB} = 5\text{V}, I_C = 0$	$I_{EBO}$	-	5	

### On Characteristics (1)

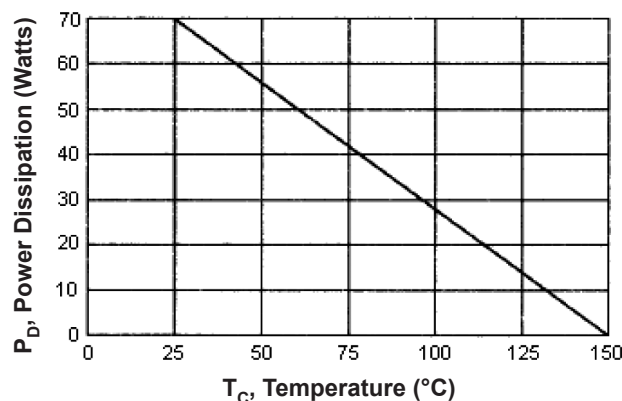
DC Current Gain $I_C = 1\text{A}, V_{CE} = 4\text{V}$ $I_C = 4\text{A}, V_{CE} = 4\text{V}$	$h_{FE}$	500 1,000	15,000	-
Collector-Emitter Saturation Voltage $I_C = 4\text{A}, I_B = 16\text{mA}$ $I_C = 6\text{A}, I_B = 30\text{mA}$	$V_{CE(sat)}$	-	2 3	V
Base-Emitter On Voltage $I_C = 4\text{A}, V_{CE} = 4\text{V}$	$V_{BE(on)}$	-	2.5	

### Dynamic Characteristics

Output Capacitance $V_{CB} = 10\text{V}, I_E = 0, f = 0.1\text{MHz}$	$C_{ob}$	-	250	pF
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(1) Pulse Test: Pulse Width = 300 $\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

Figure - 1 Power Derating



# Darlington Transistor



## Internal Schematic Diagram

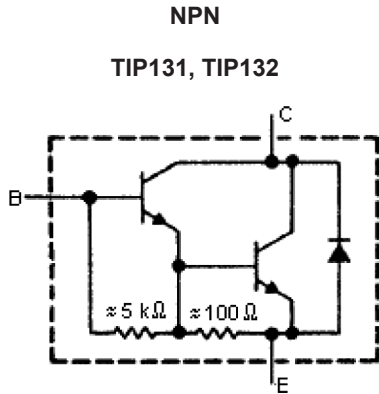


Figure - 2 DC Current Gain

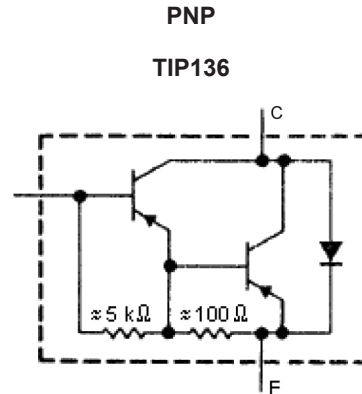


Figure - 3 Base-Emitter Voltage

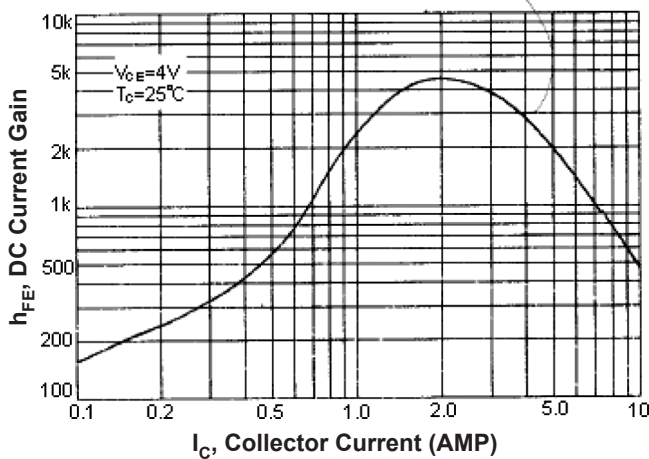


Figure - 4 Collector-Emitter Saturation Voltage

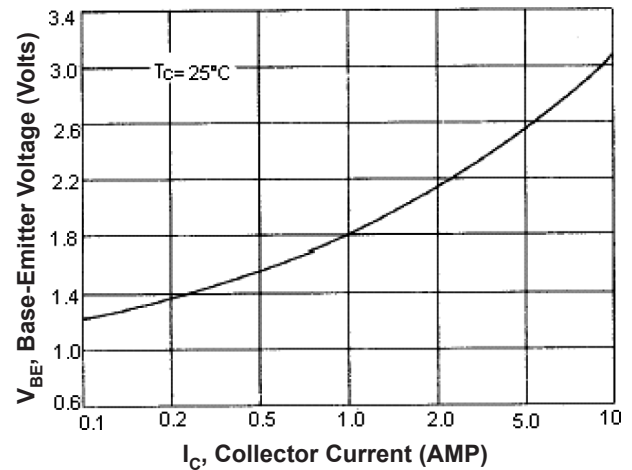
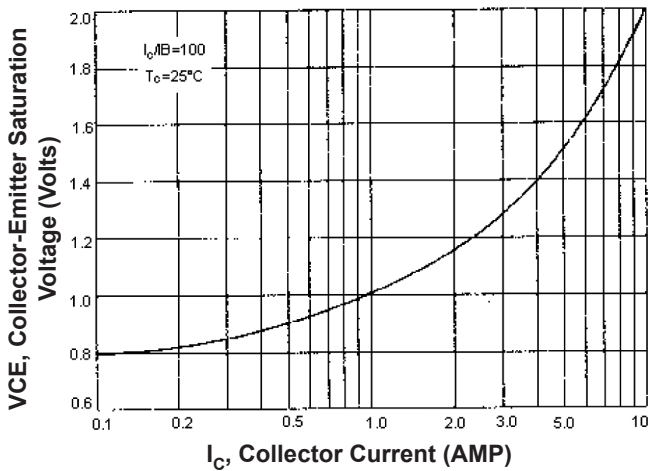
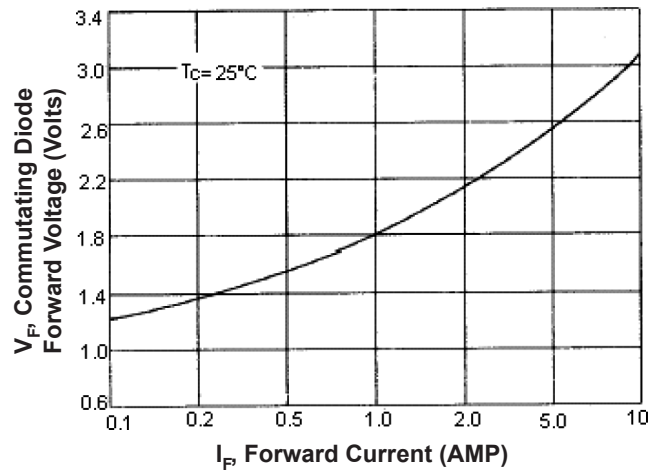


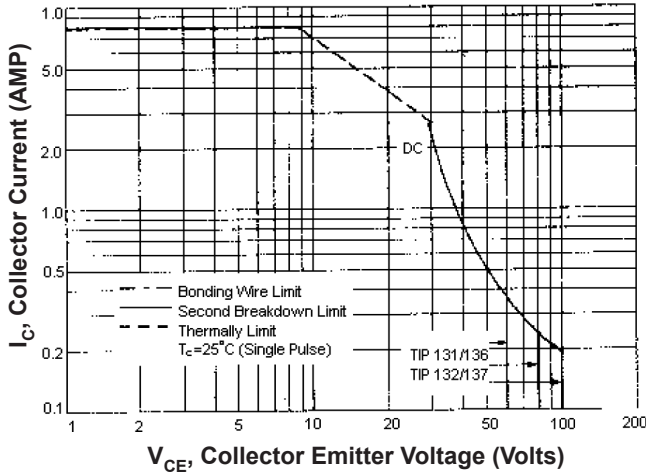
Figure - 5 Forward Voltage Commutating Diode



# Darlington Transistor

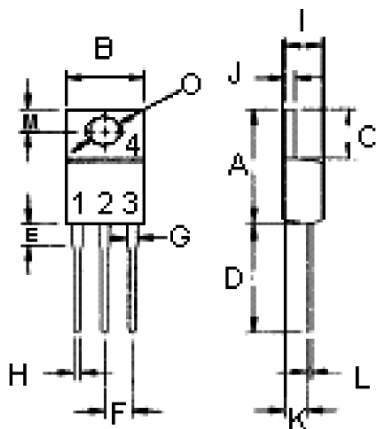


Figure - 6 Active Region Safe Operating Area



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 the curves indicate.

The data of Figure - 5 and 6 is base 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.



**Pin Configuration:**

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

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

Dimensions : Millimetres

**Part Number Table**

Description	Part Number
Darlington Transistor, NPN, TO-220	TIP131
	TIP132
Darlington Transistor, PNP, TO-220	TIP136

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