

# TIP131, TIP132 (NPN), TIP137 (PNP)

Preferred Devices

## Darlington Complementary Silicon Power Transistors

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

### Features

- High DC Current Gain –  
 $h_{FE} = 2500$  (Typ) @  $I_C$   
= 4.0 Adc
- Collector–Emitter Sustaining Voltage – @ 30 mAdc  
 $V_{CEO(sus)} = 80$  Vdc (Min) – TIP131  
= 100 Vdc (Min) – TIP132, TIP137
- Low Collector–Emitter Saturation Voltage –  
 $V_{CE(sat)} = 2.0$  Vdc (Max) @  $I_C = 4.0$  Adc  
= 3.0 Vdc (Max) @  $I_C = 6.0$  Adc
- Monolithic Construction with Built–In Base–Emitter Shunt Resistors
- Pb–Free Packages are Available\*

### MAXIMUM RATINGS

Rating	Symbol	TIP131	TIP132 TIP137	Unit
Collector–Emitter Voltage	$V_{CEO}$	80	100	Vdc
Collector–Base Voltage	$V_{CB}$	80	100	Vdc
Emitter–Base Voltage	$V_{EB}$	5.0		Vdc
Collector Current – Continuous Peak	$I_C$	8.0 12		Adc
Base Current	$I_B$	300		mAdc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$	$P_D$	70		W
Total Power Dissipation @ $T_A = 25^\circ\text{C}$	$P_D$	2.0		W
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	$R_{\theta JC}$	1.78	$^\circ\text{C/W}$
Thermal Resistance, Junction–to–Ambient	$R_{\theta JA}$	63.5	$^\circ\text{C/W}$

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

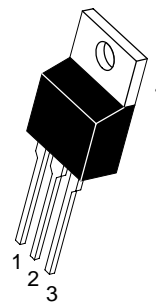
\*For additional information on our Pb–Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



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## DARLINGTON 8 AMPERE COMPLEMENTARY SILICON POWER TRANSISTORS 80–100 VOLTS, 70 WATTS



TO-220AB  
CASE 221A  
STYLE 1

### MARKING DIAGRAM



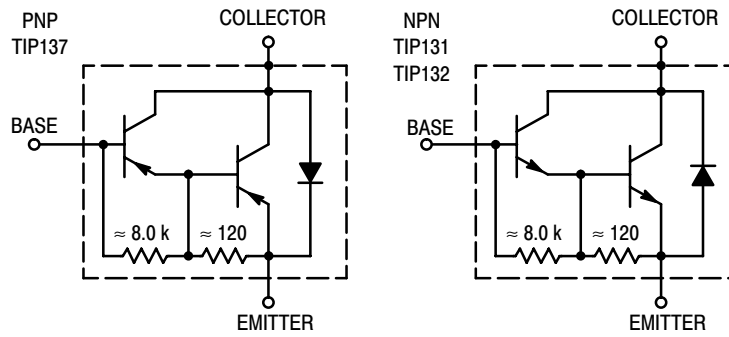
TIP13x = Device Code  
x = 1, 2, or 7  
A = Assembly Location  
Y = Year  
WW = Work Week  
G = Pb–Free Package

### ORDERING INFORMATION

Device	Package	Shipping
TIP131	TO–220	50 Units/Rail
TIP131G	TO–220 (Pb–Free)	50 Units/Rail
TIP132	TO–220	50 Units/Rail
TIP132G	TO–220 (Pb–Free)	50 Units/Rail
TIP137	TO–220	50 Units/Rail
TIP137G	TO–220 (Pb–Free)	50 Units/Rail

Preferred devices are recommended choices for future use and best overall value.

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**Figure 1. Darlington Circuit Schematic**

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

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector–Emitter Sustaining Voltage (Note 1) ( $I_C = 30 \text{ mAdc}$ , $I_B = 0$ )	$V_{CEO(sus)}$	80 100	– –	Vdc
Collector Cutoff Current ( $V_{CE} = 40 \text{ Vdc}$ , $I_B = 0$ ) ( $V_{CE} = 50 \text{ Vdc}$ , $I_B = 0$ )	$I_{CEO}$	– –	0.5 0.5	mAdc
Collector Cutoff Current ( $V_{CB} = 80 \text{ Vdc}$ , $I_E = 0$ ) ( $V_{CB} = 100 \text{ Vdc}$ , $I_E = 0$ )	$I_{CBO}$	– –	0.2 0.2	mAdc
Emitter Cutoff Current ( $V_{BE} = 5.0 \text{ Vdc}$ , $I_C = 0$ )	$I_{EBO}$	–	5.0	mAdc
<b>ON CHARACTERISTICS (Note 1)</b>				
DC Current Gain ( $I_C = 1.0 \text{ Adc}$ , $V_{CE} = 4.0 \text{ Vdc}$ ) ( $I_C = 4.0 \text{ Adc}$ , $V_{CE} = 4.0 \text{ Vdc}$ )	$h_{FE}$	500 1000	– 15000	–
Collector–Emitter Saturation Voltage ( $I_C = 4.0 \text{ Adc}$ , $I_B = 16 \text{ mAdc}$ ) ( $I_C = 6.0 \text{ Adc}$ , $I_B = 30 \text{ mAdc}$ )	$V_{CE(sat)}$	– –	2.0 3.0	Vdc
Base–Emitter On Voltage ( $I_C = 4.0 \text{ Adc}$ , $V_{CE} = 4.0 \text{ Vdc}$ )	$V_{BE(on)}$	–	2.5	Vdc

1. Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

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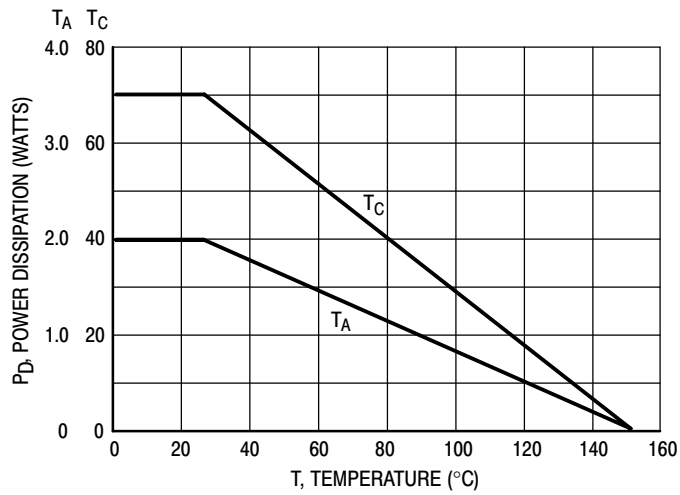


Figure 2. Power Derating

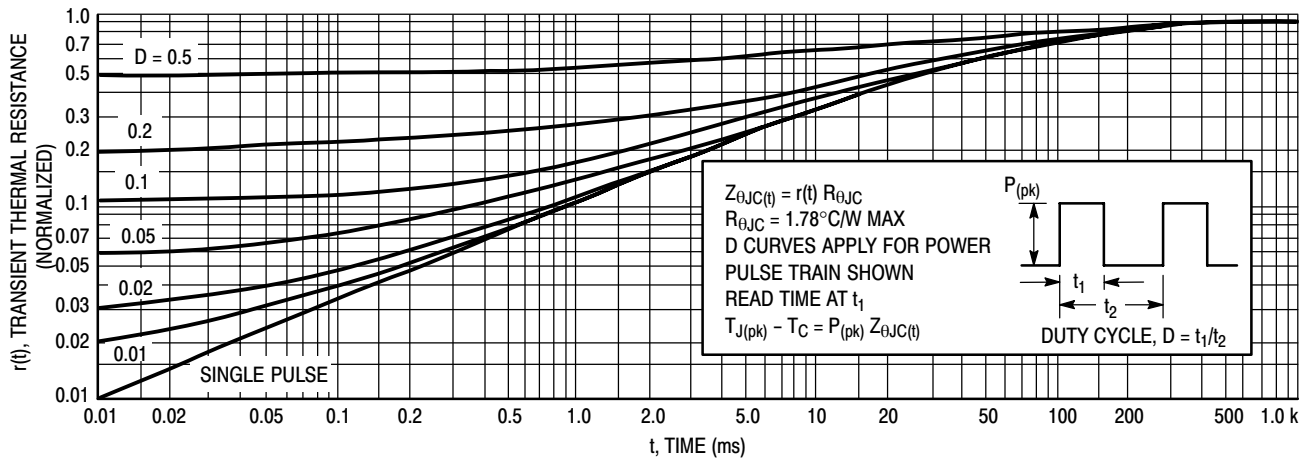
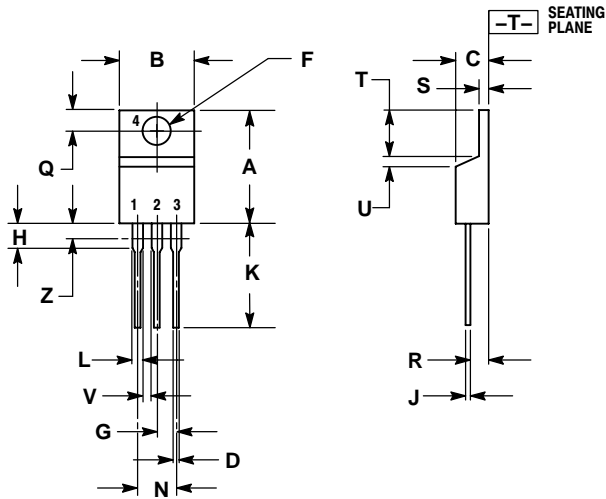


Figure 3. Thermal Response

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## PACKAGE DIMENSIONS

TO-220  
CASE 221A-09  
ISSUE AA



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.405	9.66	10.28
C	0.160	0.190	4.07	4.82
D	0.025	0.035	0.64	0.88
F	0.142	0.147	3.61	3.73
G	0.095	0.105	2.42	2.66
H	0.110	0.155	2.80	3.93
J	0.018	0.025	0.46	0.64
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.39
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	---	1.15	---
Z	---	0.080	---	2.04

STYLE 1:

- PIN 1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

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