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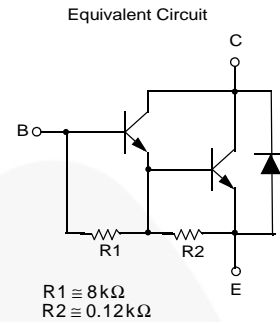
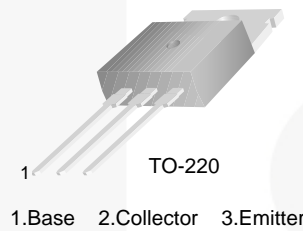
November 2014

# TIP120 / TIP121 / TIP122

## NPN Epitaxial Darlington Transistor

### Features

- Medium Power Linear Switching Applications
- Complementary to TIP125 / TIP126 / TIP127



### Ordering Information

Part Number	Top Mark	Package	Packing Method
TIP120	TIP120	TO-220 3L (Single Gauge)	Bulk
TIP120TU	TIP120	TO-220 3L (Single Gauge)	Rail
TIP121	TIP121	TO-220 3L (Single Gauge)	Bulk
TIP121TU	TIP121	TO-220 3L (Single Gauge)	Rail
TIP122	TIP122	TO-220 3L (Single Gauge)	Bulk
TIP122TU	TIP122	TO-220 3L (Single Gauge)	Rail

### Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at  $T_C = 25^\circ\text{C}$  unless otherwise noted.

Symbol	Parameter	Value	Unit
$V_{CBO}$	Collector-Base Voltage	TIP120	60
		TIP121	80
		TIP122	100
$V_{CEO}$	Collector-Emitter Voltage	TIP120	60
		TIP121	80
		TIP122	100
$V_{EBO}$	Emitter-Base Voltage	5	V
$I_C$	Collector Current (DC)	5	A
$I_{CP}$	Collector Current (Pulse)	8	A
$I_B$	Base Current (DC)	120	mA
$T_J$	Junction Temperature	150	$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-65 to 150	$^\circ\text{C}$

TIP120 / TIP121 / TIP122 — NPN Epitaxial Darlington Transistor

## Thermal Characteristics

Values are at  $T_C = 25^\circ\text{C}$  unless otherwise noted.

Symbol	Parameter	Value	Unit
$P_C$	Collector Dissipation ( $T_A = 25^\circ\text{C}$ )	2	W
	Collector Dissipation ( $T_C = 25^\circ\text{C}$ )	65	

## Electrical Characteristics

Values are at  $T_C = 25^\circ\text{C}$  unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Max.	Unit
$V_{CEO(sus)}$	Collector-Emitter Sustaining Voltage	TIP120	$I_C = 100\text{ mA}, I_B = 0$	60	V
		TIP121		80	
		TIP122		100	
$I_{CEO}$	Collector Cut-Off Current	TIP120	$V_{CE} = 30\text{ V}, I_B = 0$	0.5	mA
		TIP121	$V_{CE} = 40\text{ V}, I_B = 0$	0.5	
		TIP122	$V_{CE} = 50\text{ V}, I_B = 0$	0.5	
$I_{CBO}$	Collector Cut-Off Current	TIP120	$V_{CB} = 60\text{ V}, I_E = 0$	0.2	mA
		TIP121	$V_{CB} = 80\text{ V}, I_E = 0$	0.2	
		TIP122	$V_{CB} = 100\text{ V}, I_E = 0$	0.2	
$I_{EBO}$	Emitter Cut-Off Current	$V_{EB} = 5\text{ V}, I_C = 0$		2	mA
$h_{FE}$	DC Current Gain <sup>(1)</sup>	$V_{CE} = 3\text{ V}, I_C = 0.5\text{ A}$	1000		
		$V_{CE} = 3\text{ V}, I_C = 3\text{ A}$	1000		
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage <sup>(1)</sup>	$I_C = 3\text{ A}, I_B = 12\text{ mA}$		2.0	V
		$I_C = 5\text{ A}, I_B = 20\text{ mA}$		4.0	
$V_{BE(on)}$	Base-Emitter On Voltage <sup>(1)</sup>	$V_{CE} = 3\text{ V}, I_C = 3\text{ A}$		2.5	V
$C_{ob}$	Output Capacitance	$V_{CB} = 10\text{ V}, I_E = 0,$ $f = 0.1\text{ MHz}$		200	pF

### Note:

1. Pulse test:  $p_w \leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

## Typical Performance Characteristics

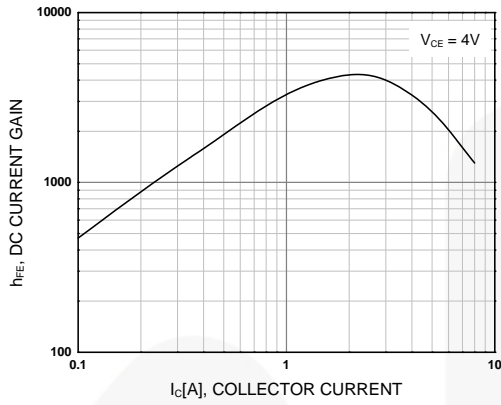


Figure 1. DC Current Gain

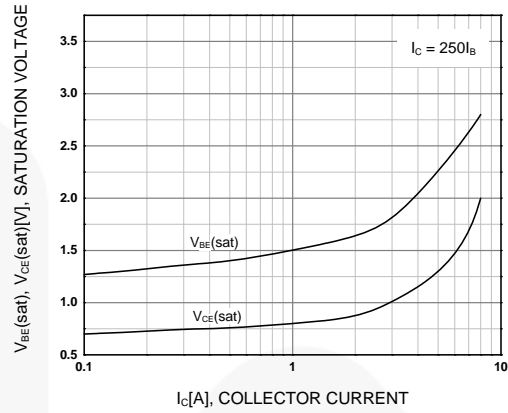


Figure 2. Base-Emitter Saturation Voltage and Collector-Emitter Saturation Voltage

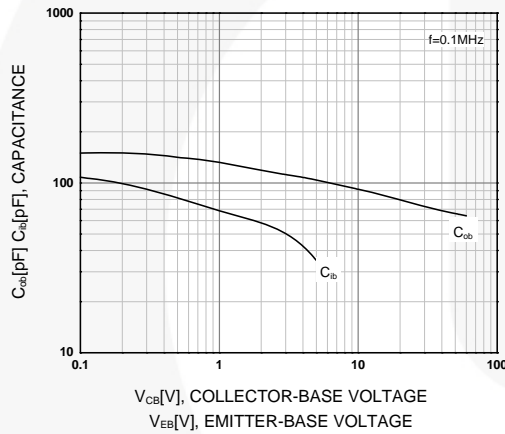


Figure 3. Output and Input Capacitance vs. Reverse Voltage

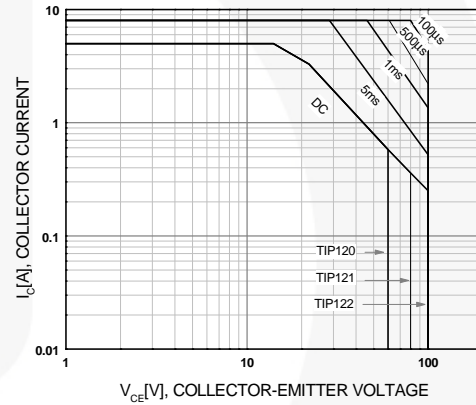


Figure 4. Safe Operating Area

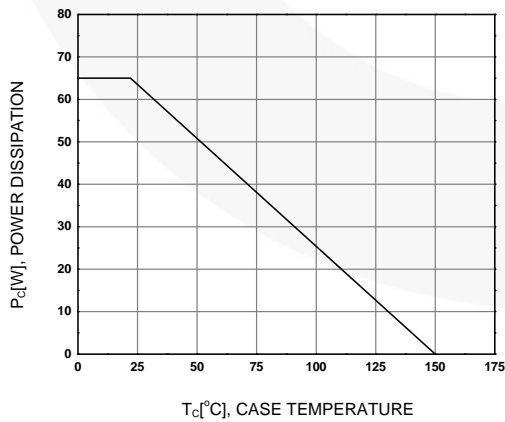
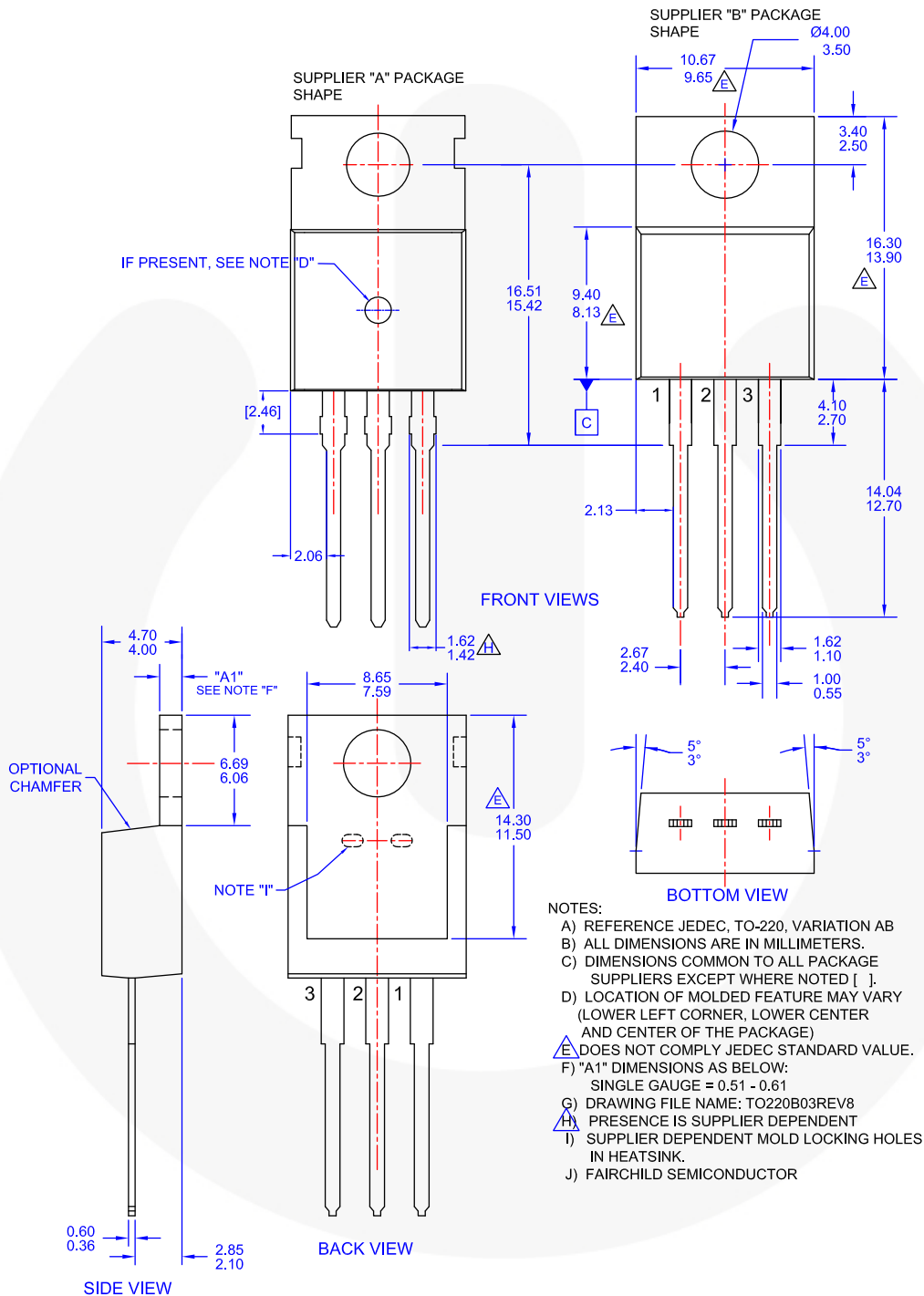


Figure 5. Power Derating

Physical Dimensions



- NOTES:
- A) REFERENCE JEDEC, TO-220, VARIATION AB
  - B) ALL DIMENSIONS ARE IN MILLIMETERS.
  - C) DIMENSIONS COMMON TO ALL PACKAGE SUPPLIERS EXCEPT WHERE NOTED [ ].
  - D) LOCATION OF MOLDED FEATURE MAY VARY (LOWER LEFT CORNER, LOWER CENTER AND CENTER OF THE PACKAGE)
  - E) DOES NOT COMPLY JEDEC STANDARD VALUE.
  - F) "A1" DIMENSIONS AS BELOW:  
SINGLE GAUGE = 0.51 - 0.61
  - G) DRAWING FILE NAME: TO220B03REV8
  - H) PRESENCE IS SUPPLIER DEPENDENT
  - I) SUPPLIER DEPENDENT MOLD LOCKING HOLES IN HEATSINK.
  - J) FAIRCHILD SEMICONDUCTOR

Figure 6. TO-220, MOLDED, 3LEAD, JEDEC VARIATION AB



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