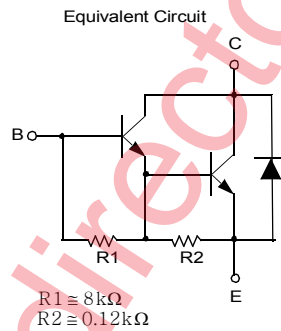
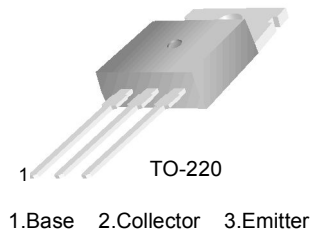


# TIP120/TIP121/TIP122

## NPN Epitaxial Darlington Transistor

- Medium Power Linear Switching Applications
- Complementary to TIP125/126/127



### Absolute Maximum Ratings\* $T_a = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Ratings	Units
$V_{CBO}$	Collector-Base Voltage : TIP120	60	V
	: TIP121	80	V
	: TIP122	100	V
$V_{CEO}$	Collector-Emitter Voltage : TIP120	60	V
	: TIP121	80	V
	: TIP122	100	V
$V_{EBO}$	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
$P_C$	Collector Dissipation ( $T_a=25^\circ\text{C}$ )	2	W
	Collector Dissipation ( $T_C=25^\circ\text{C}$ )	65	W
$T_J$	Junction Temperature	150	$^\circ\text{C}$
$T_{STG}$	Storage Temperature	- 65 ~ 150	$^\circ\text{C}$

\* These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

**Electrical Characteristics\***  $T_a = 25^\circ\text{C}$  unless otherwise noted

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

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

# Typical characteristics

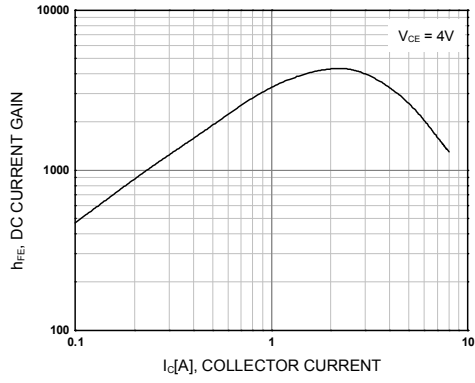


Figure 1. DC current Gain

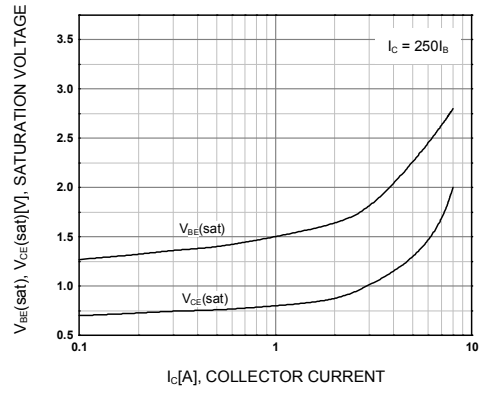


Figure 2. Base-Emitter Saturation Voltage  
Collector-Emitter Saturation Voltage

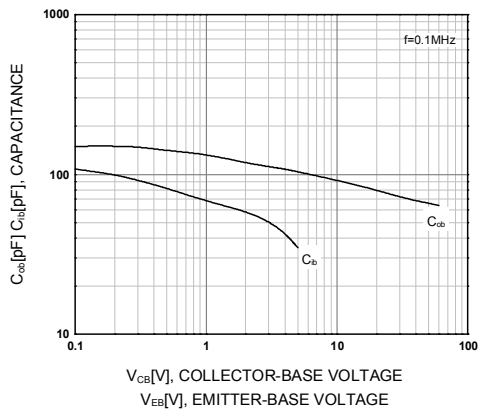


Figure 3. Output and Input Capacitance  
vs. Reverse Voltage

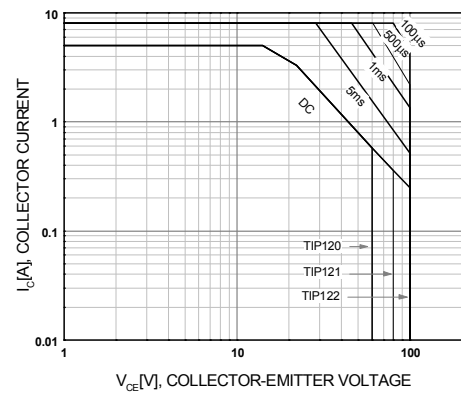


Figure 4. Safe Operating Area

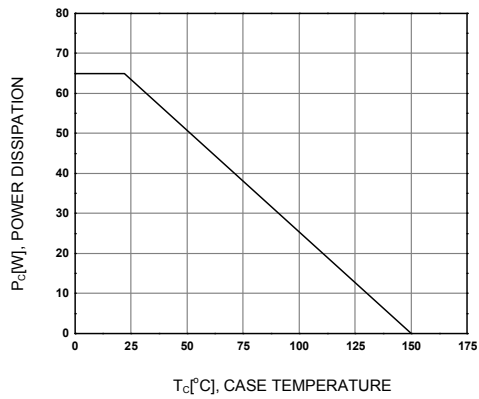
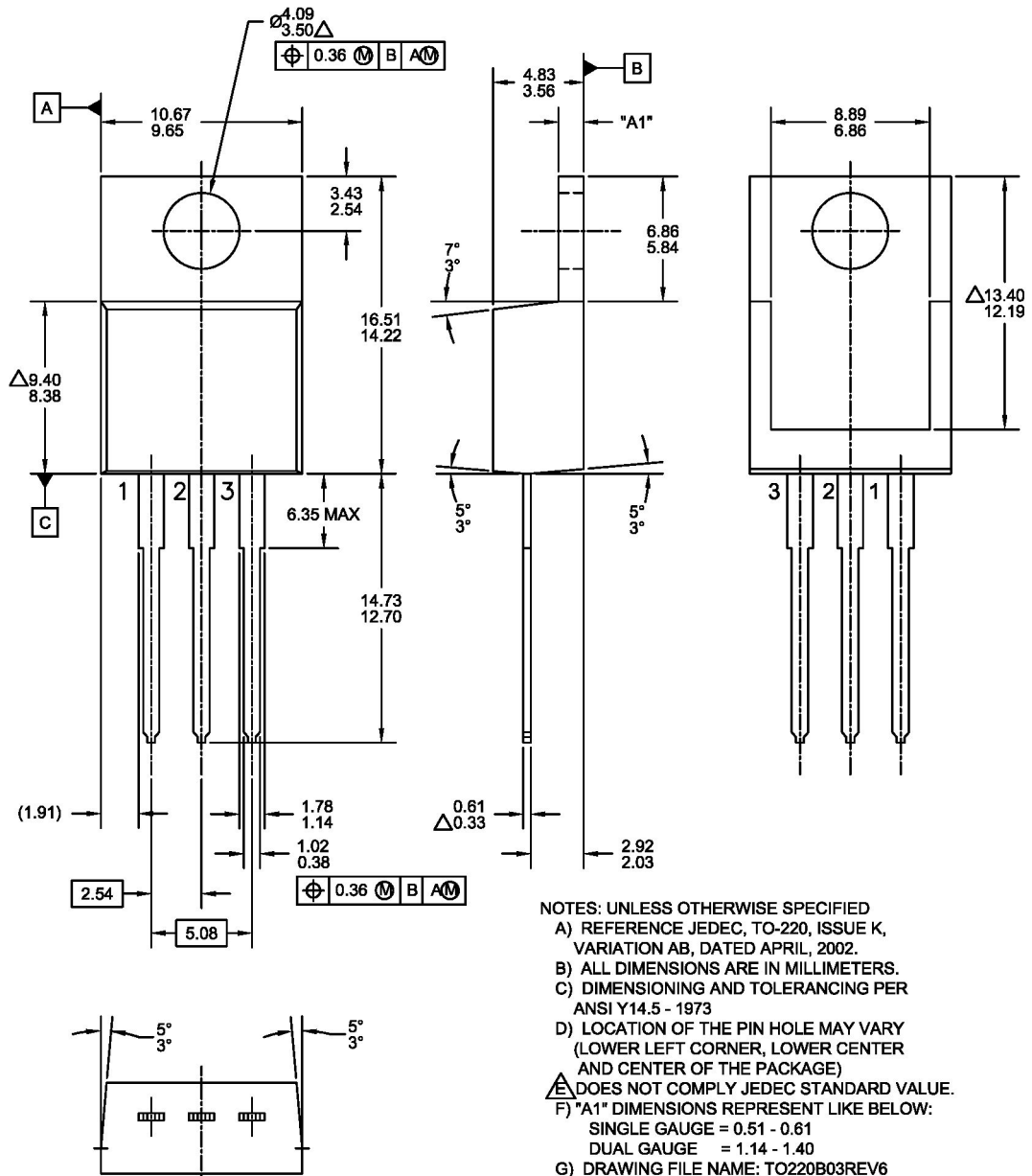


Figure 5. Power Derating

Mechanical Dimensions

TO220





**TRADEMARKS**

The following are registered and unregistered trademarks and service marks Fairchild Semiconductor owns or is authorized to use and is not intended to be an exhaustive list of all such trademarks.

- |                                      |  |  |                                  |
|--------------------------------------|--|--|----------------------------------|
| ACEX <sup>®</sup>                    | Green FPS <sup>™</sup>   | Power247 <sup>®</sup>                  | SuperSOT <sup>™</sup> -8         |
| Build it Now <sup>™</sup>            | Green FPS <sup>™</sup> e-Series <sup>™</sup>   | POWEREDGE <sup>®</sup>                 | SyncFET <sup>™</sup>             |
| CorePLUS <sup>™</sup>                | GTO <sup>™</sup>   | Power-SPM <sup>™</sup>                 | The Power Franchise <sup>®</sup> |
| CROSSVOLT <sup>™</sup>               | <i>i-Lo</i> <sup>™</sup>   | PowerTrench <sup>®</sup>               | <b>the power</b><br>franchise    |
| CTL <sup>™</sup>                     | IntelliMAX <sup>™</sup>  | Programmable Active Droop <sup>™</sup> | TinyBoost <sup>™</sup>           |
| Current Transfer Logic <sup>™</sup>  | ISOPLANAR <sup>™</sup>   | QFET <sup>®</sup>                      | TinyBuck <sup>™</sup>            |
| EcoSPARK <sup>®</sup>                | MegaBuck <sup>™</sup>  | QS <sup>™</sup>                        | TinyLogic <sup>®</sup>           |
| <b>F</b> <sup>®</sup>                | MICROCOUPLER <sup>™</sup>  | QT Optoelectronics <sup>™</sup>        | TINYOPTO <sup>™</sup>            |
| Fairchild <sup>®</sup>               | MicroFET <sup>™</sup>  | Quiet Series <sup>™</sup>              | TinyPower <sup>™</sup>           |
| Fairchild Semiconductor <sup>®</sup> | MicroPak <sup>™</sup>  | RapidConfigure <sup>™</sup>            | TinyPWM <sup>™</sup>             |
| FACT Quiet Series <sup>™</sup>       | MillerDrive <sup>™</sup>   | SMART START <sup>™</sup>               | TinyWire <sup>™</sup>            |
| FACT <sup>®</sup>                    | Motion-SPM <sup>™</sup>  | SPM <sup>®</sup>                       | μSerDes <sup>™</sup>             |
| FAST <sup>®</sup>                    | OPTOLOGIC <sup>®</sup>   | STEALTH <sup>™</sup>                   | UHC <sup>®</sup>                 |
| FastvCore <sup>™</sup>               | OPTOPLANAR <sup>®</sup>  | SuperFET <sup>™</sup>                  | UniFET <sup>™</sup>              |
| FPS <sup>™</sup>                     |  <sup>®</sup> | SuperSOT <sup>™</sup> -3               | VCX <sup>™</sup>                 |
| FRFET <sup>®</sup>                   | PDP-SPM <sup>™</sup>   | SuperSOT <sup>™</sup> -6               |                                  |
| Global Power Resource <sup>SM</sup>  | Power220 <sup>®</sup>  |  |                                  |

**DISCLAIMER**

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION, OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

**LIFE SUPPORT POLICY**

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION.

As used herein:

- Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.
- A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

**PRODUCT STATUS DEFINITIONS**

**Definition of Terms**

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only.