

# TIP120/121/122

**SemiHow**  
Know-How for Semiconductor

# TIP120/121/122

## Monolithic Construction With Built In Base-Emitter Shunt Resistors

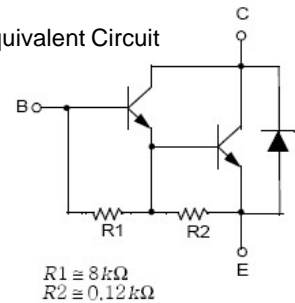
- High DC Current Gain :  $h_{FE}=1000$  @  $V_{CE}=4V, I_C=3A$  (Min.)
- Collector-Emitter Sustaining Voltage
- Low Collector-Emitter Saturation Voltage
- Industrial Use
- Complementary to TIP125/126/127

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

CHARACTERISTICS	SYMBOL	RATING	UNIT
Collector-Base Voltage : TIP120 : TIP121 : TIP122	$V_{CBO}$	60 80 100	V V V
Collector-Emitter Voltage : TIP120 : TIP121 : TIP122	$V_{CEO}$	60 80 100	V V V
Emitter-Base Voltage	$V_{EBO}$	5	V
Collector Current(DC)	$I_C$	5	A
Collector Current(Pulse)	$I_{CP}$	8	A
Base Current	$I_B$	120	mA
Collector Dissipation( $T_a=25^\circ\text{C}$ )	$P_C$	2	W
Collector Dissipation( $T_c=25^\circ\text{C}$ )	$P_C$	65	W
Junction Temperature	$T_J$	150	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-65~150	$^\circ\text{C}$

## PNP Epitaxial Silicon Darlington Transistor

Equivalent Circuit



TO-220

1. Base
2. Collector
3. Emitter



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

CHARACTERISTICS	SYMBOL	Test Condition	Min	Max	Unit
Collector-Emitter Sustaining Voltage : TIP120 : TIP121 : TIP122	$V_{CEO(SUS)}$	$I_C=100\text{mA}, I_B=0$	60 80 100		V V V
Collector Cut-off Current : TIP120 : TIP121 : TIP122	$I_{CEO}$	$V_{CE}=30\text{V}, I_B=0$ $V_{CE}=40\text{V}, I_B=0$ $V_{CE}=50\text{V}, I_B=0$		0.5 0.5 0.5	mA mA mA
Collector Cut-off Current : TIP120 : TIP121 : TIP122	$I_{CBO}$	$V_{CE}=60\text{V}, I_E=0$ $V_{CE}=80\text{V}, I_E=0$ $V_{CE}=100\text{V}, I_E=0$		0.2 0.2 0.2	mA mA mA
Emitter Cut-off Current	$I_{EBO}$	$V_{EB}=5\text{V}, I_C=0$		2	mA
DC Current Gain	$h_{FE}$	$V_{CE}=3\text{V}, I_C=0.5\text{A}$ $V_{CE}=3\text{V}, I_C=3\text{A}$	1000 1000		
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=3\text{A}, I_B=12\text{mA}$ $I_C=5\text{A}, I_B=20\text{mA}$		2 4	V V
Base-Emitter ON Voltage	$V_{BE(on)}$	$V_{CE}=3\text{V}, I_C=3\text{A}$		2.5	V
Output Capacitance	$C_{ob}$	$V_{CB}=10\text{V}, I_E=0, f=0.1\text{MHz}$		200	pF

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

# Typical Characteristics

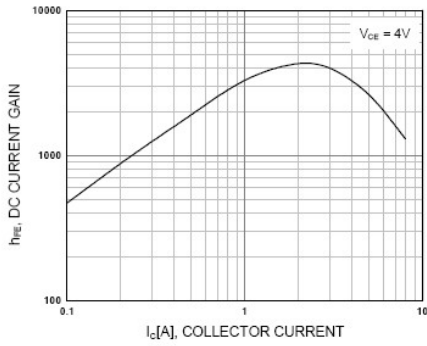


Figure 1. DC current Gain

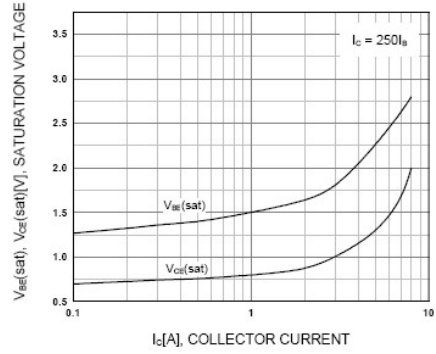


Figure 2. Base-Emitter Saturation Voltage  
Collector-Emitter Saturation Voltage

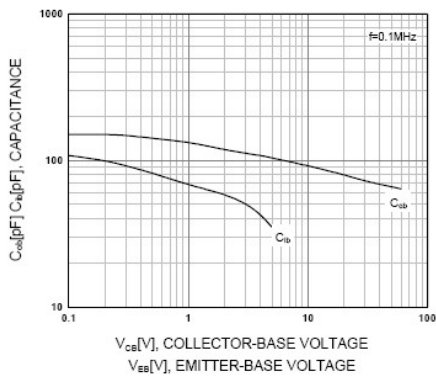


Figure 3. Output and Input Capacitance vs. Reverse Voltage

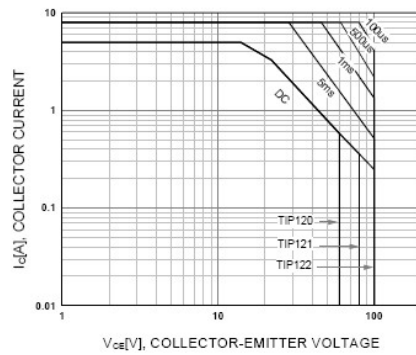


Figure 4. Safe Operating Area

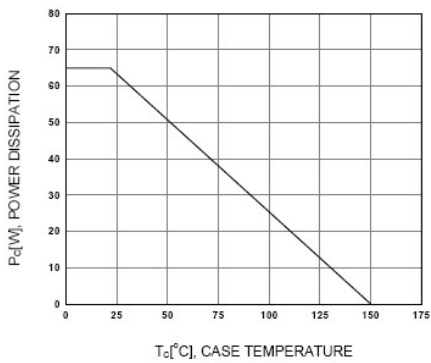
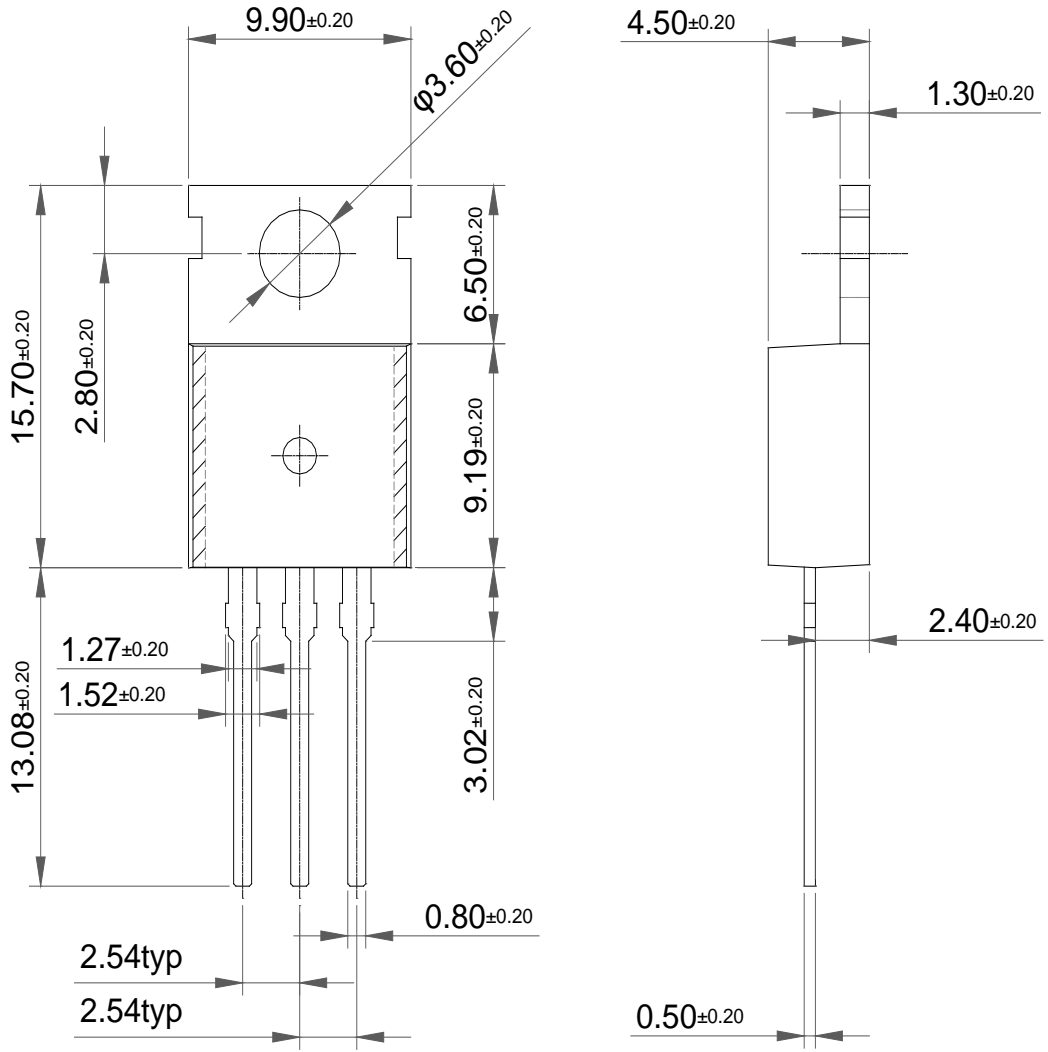


Figure 5. Power Derating

Package Dimension

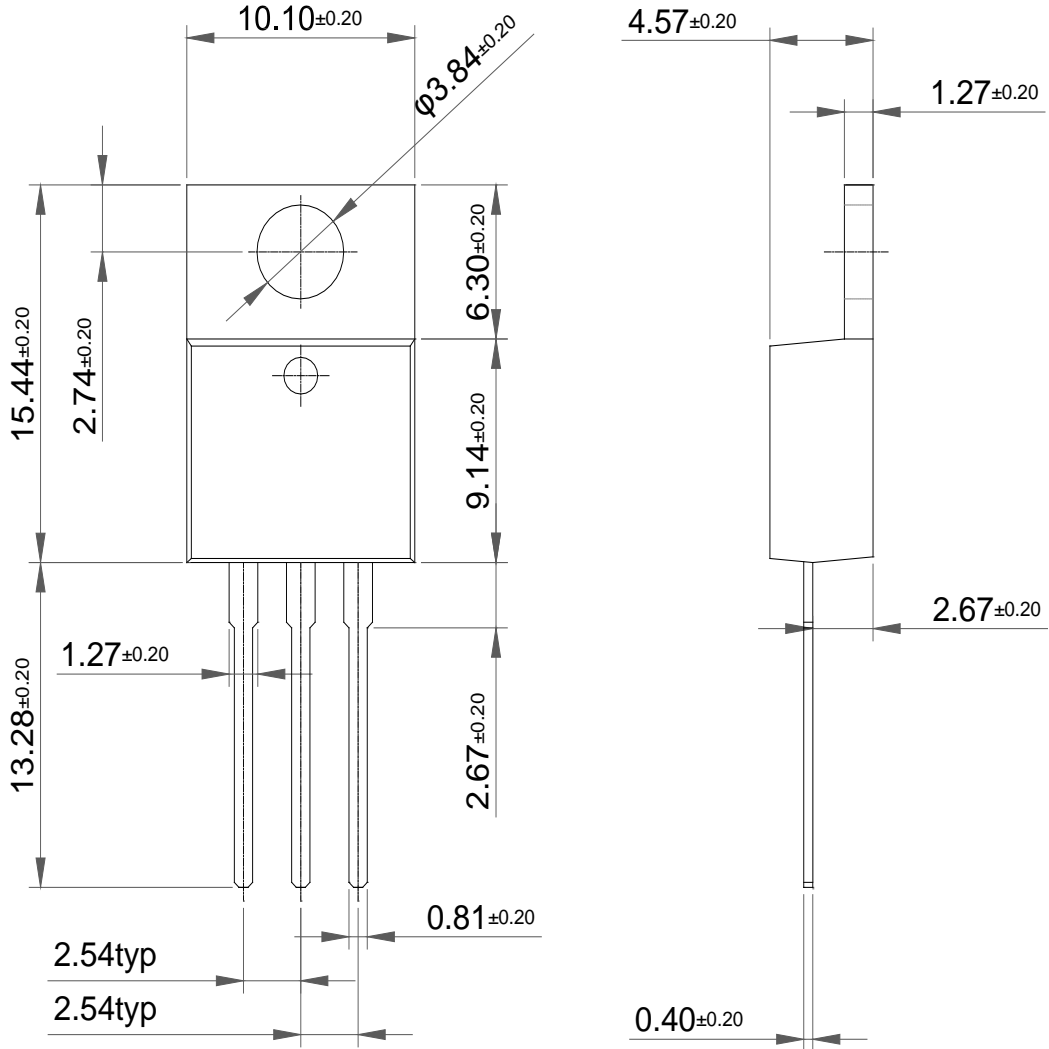
TO-220 (A)



Dimensions in Millimeters

Package Dimension

# TO-220 (B)



Dimensions in Millimeters