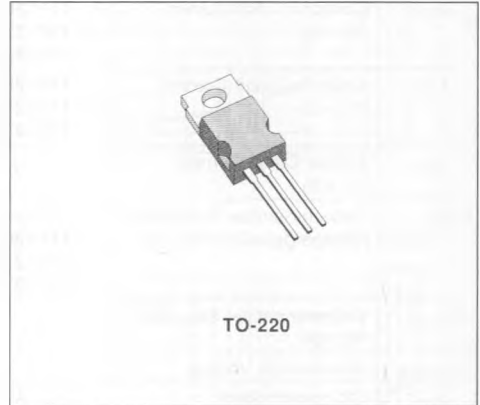


**POWER DARLINGTONS**
**DESCRIPTION**

The TIP120, TIP121 and TIP122 are silicon epitaxial-base NPN transistors in monolithic Darlington configuration in Jedec TO-220 plastic package, intended for use in power linear and switching applications. The complementary PNP types are the TIP125, TIP126 and TIP127 respectively.


**INTERNAL SCHEMATIC DIAGRAMS**

**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	NPN PNP*	Value			Unit
			TIP120 TIP125	TIP121 TIP126	TIP122 TIP127	
$V_{CBO}$	Collector-base Voltage ( $I_E = 0$ )		60	80	100	V
$V_{CEO}$	Collector-emitter Voltage ( $I_B = 0$ )		60	80	100	V
$V_{EBO}$	Emitter-base Voltage ( $I_C = 0$ )		5			V
$I_C$	Collector Current		5			A
$I_{CM}$	Collector Peak Current		8			A
$I_B$	Base Current		0.1			A
$P_{101}$	Total Power Dissipation at $T_{case} \leq 25^\circ\text{C}$ $T_{amb} \leq 25^\circ\text{C}$		65			W
$T_{stg}$	Storage Temperature		- 65 to 150			$^\circ\text{C}$
$T_j$	Junction Temperature		150			$^\circ\text{C}$

\* For PNP types voltage and current values are negative

**THERMAL DATA**

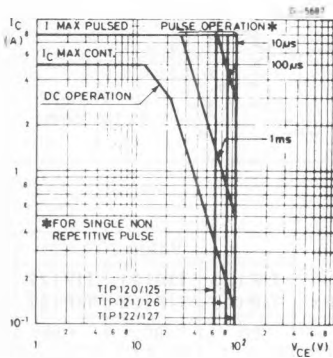
$R_{th(j)case}$	Thermal Resistance Junction-case	Max	1.92	$^{\circ}C/W$
$R_{th(j)amb}$	Thermal Resistance Junction-ambient	Max	62.5	$^{\circ}C/W$

**ELECTRICAL CHARACTERISTICS** ( $T_{case} = 25^{\circ}C$  unless otherwise specified)

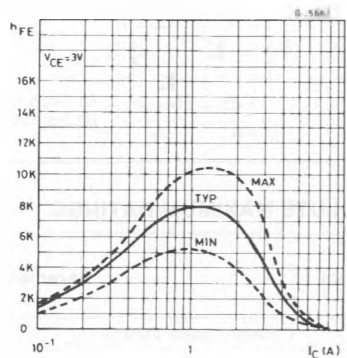
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{CEO}$	Collector Cutoff Current ( $I_B = 0$ )	for <b>TIP120/5</b> $V_{CE} = 30V$ for <b>TIP121/6</b> $V_{CE} = 40V$ for <b>TIP122/7</b> $V_{CE} = 50V$			0.5 0.5 0.5	mA mA mA
$I_{CBO}$	Collector Cutoff Current ( $I_E = 0$ )	for <b>TIP120/5</b> $V_{CB} = 60V$ for <b>TIP121/6</b> $V_{CB} = 80V$ for <b>TIP122/7</b> $V_{CB} = 100V$			0.2 0.2 0.2	mA mA mA
$I_{EBO}$	Emitter Cutoff Current ( $I_C = 0$ )	$V_{EB} = 5V$			2	mA
$V_{CE(sus)}^*$	Collector-emitter Sustaining Voltage ( $I_B = 0$ )	$I_C = 30mA$ for <b>TIP120/5</b> for <b>TIP121/6</b> for <b>TIP122/7</b>	60 80 100			V V V
$V_{CE(sat)}^*$	Collector-emitter Saturation Voltage	$I_C = 3A$ $I_B = 12mA$ $I_C = 5A$ $I_B = 20mA$			2 4	V V
$V_{BE(on)}^*$	Base-emitter Voltage	$I_C = 3A$ $V_{CE} = 3V$			2.5	V
$h_{FE}^*$	DC current Gain	$I_C = 0.5A$ $V_{CE} = 3V$ $I_C = 3A$ $V_{CE} = 3V$	1000 1000			

\* Pulsed : pulse duration = 300  $\mu s$ , duty cycle < 2 %.

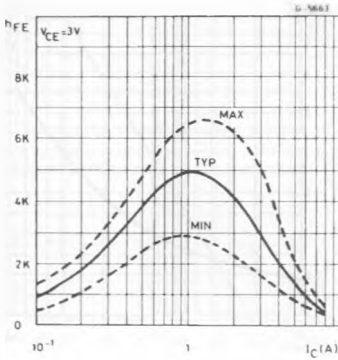
**Safe Operating Areas.**



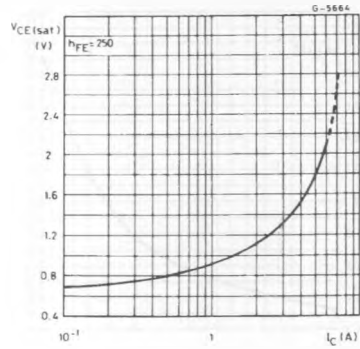
**DC Current Gain (NPN types).**



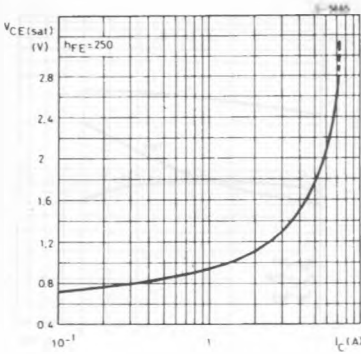
DC Current Gain (PNP types).



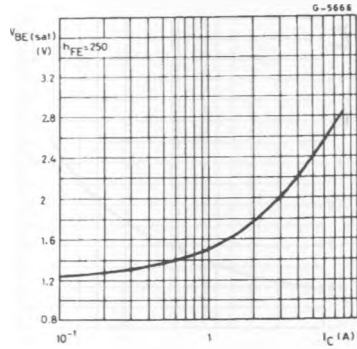
Collector-emitter Saturation Voltage (NPN types).



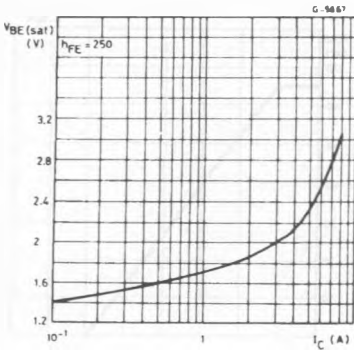
Collector-emitter Saturation Voltage (NPN types).



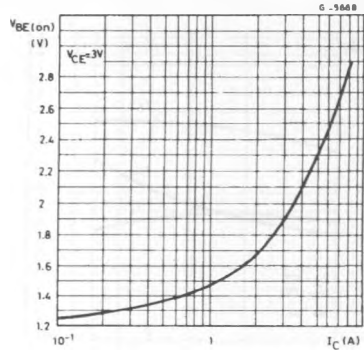
Base-emitter Saturation Voltage (NPN types).



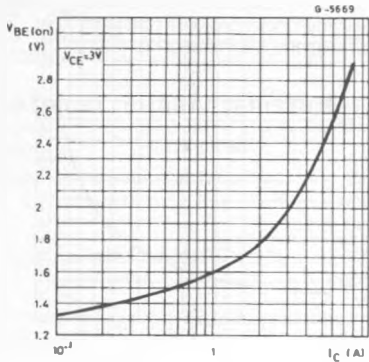
Base-emitter Saturation Voltage (PNP types).



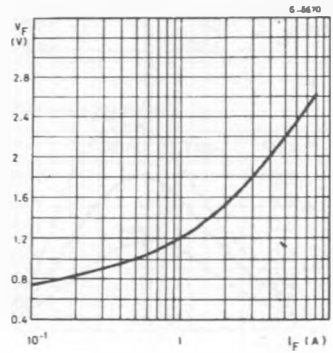
Base-emitter Voltage (NPN types).



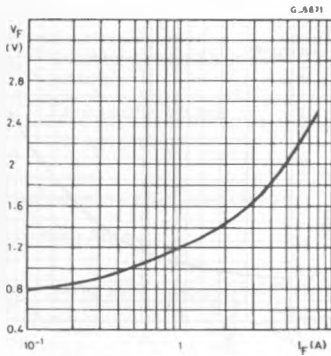
Base-emitter Voltage (PNP types).



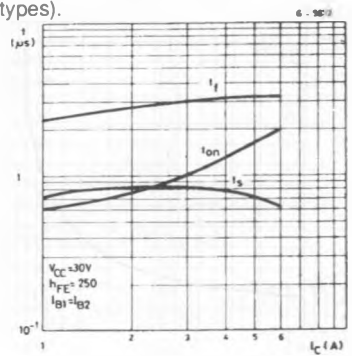
Freewheel Diode Forward Voltage (NPN types).



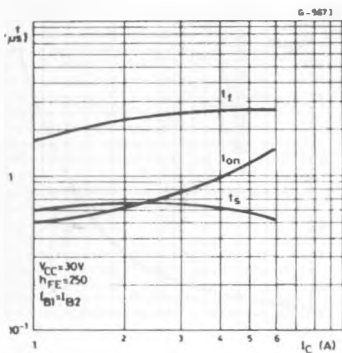
Freewheel Diode Forward Voltage (PNP types).



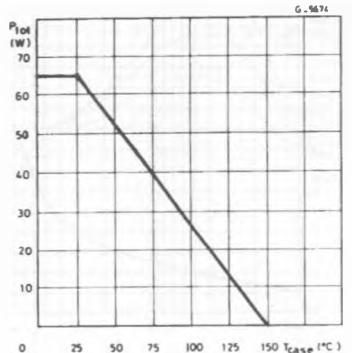
Switching Times vs.  $T_{case}$  Resistive Load (NPN types).



Switching Times vs.  $T_{case}$  Resistive Load (PNP types).



Derating Curve.



## Free-air Temperature Derating Curve.

