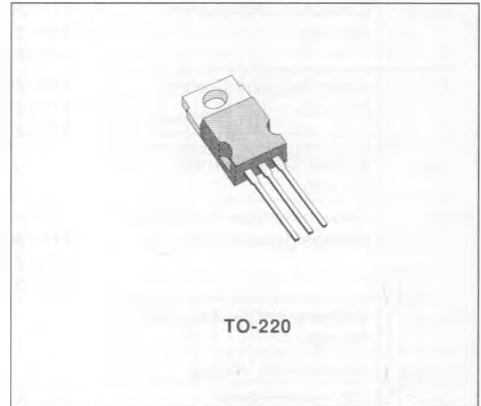


POWER DARLINGTONS
DESCRIPTION

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_{sig} | 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 | $^{\circ}C/W$ |

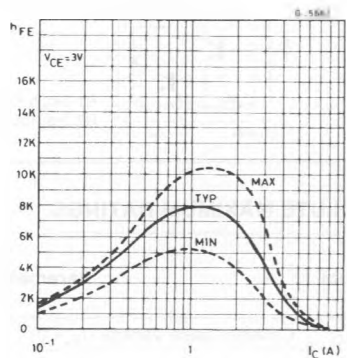
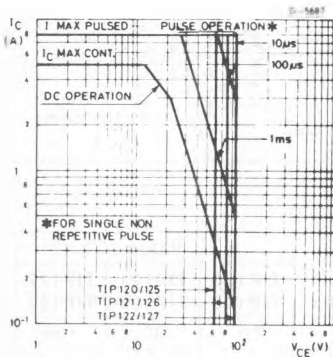
ELECTRICAL CHARACTERISTICS ($T_{case} = 25^{\circ}C$ unless otherwise specified)

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

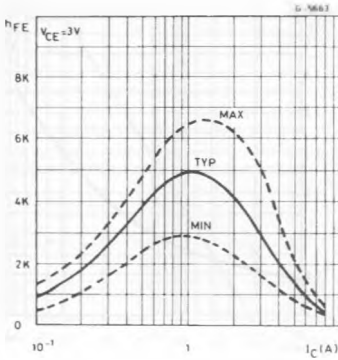
* Pulsed : pulse duration = 300 μs , duty cycle < 2 %.

Safe Operating Areas.

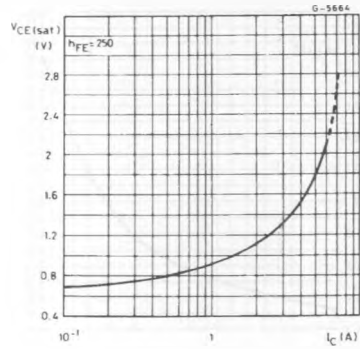
DC Current Gain (NPN types).



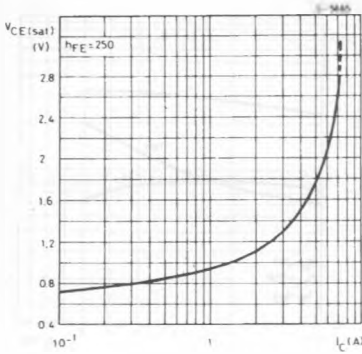
DC Current Gain (PNP types).



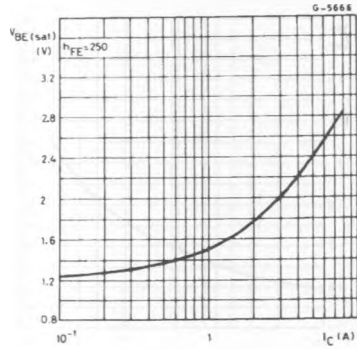
Collector-emitter Saturation Voltage (NPN types).



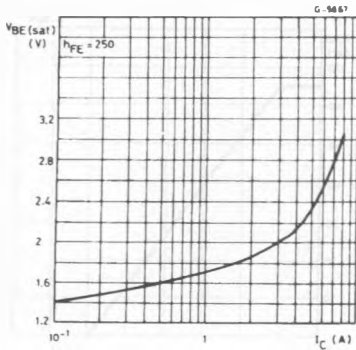
Collector-emitter Saturation Voltage (NPN types).



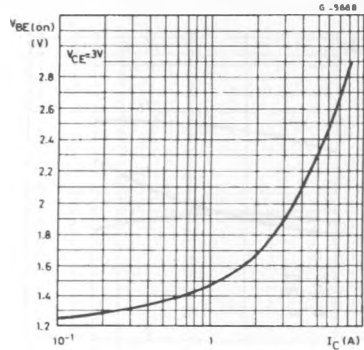
Base-emitter Saturation Voltage (NPN types).



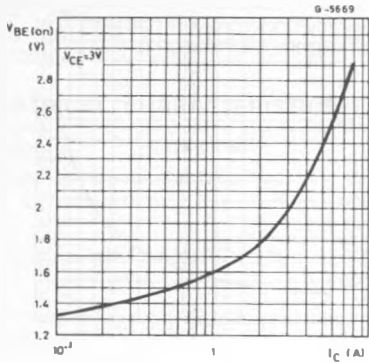
Base-emitter Saturation Voltage (PNP types).



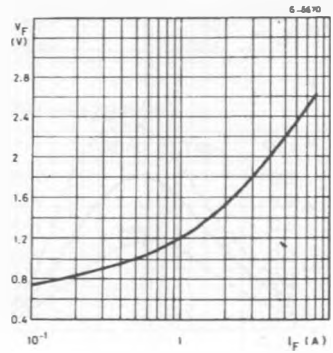
Base-emitter Voltage (NPN types).



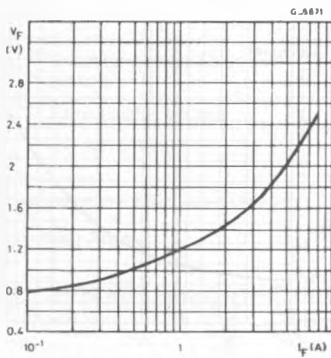
Base-emitter Voltage (PNP types).



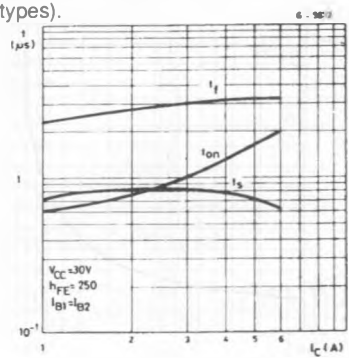
Freewheel Diode Forward Voltage (NPN types).



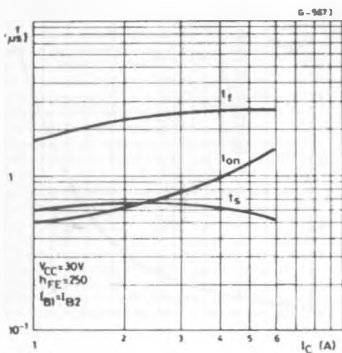
Freewheel Diode Forward Voltage (PNP types).



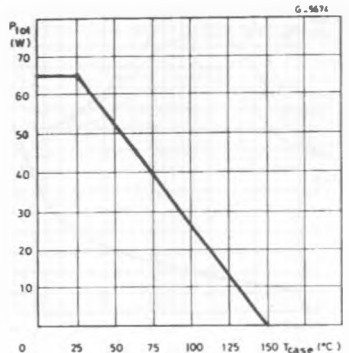
Switching Times vs. T_{case} Resistive Load (NPN types).



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



Derating Curve.



Free-air Temperature Derating Curve.

