

Description:

Darlington silicon power transistors are designed for general-purpose amplifier and low speed switching applications.

Features:

- Collector-Emitter Sustaining Voltage
 $V_{CE(sus)} = 80V$ (Minimum)
- Collector-Emitter Saturation Voltage
 $V_{CE(sat)} = 2V$ (Maximum) at $I_C = 5A$
- DC Current Gain $h_{FE} = 2,500$ (Typical) at $I_C = 4A$

Absolute Maximum Ratings:

| Characteristics | Symbol | Rating | Unit |
|--|-------------------|-------------|--------------------|
| Collector-Emitter Voltage | V_{CEO} | 80 | V |
| Collector Base Voltage | V_{CBO} | | |
| Emitter-Base Voltage | V_{EBO} | 5 | |
| Collector Current-Continuous -Peak | I_C I_{CM} | 10 15 | A |
| Base Current | I_B | 0.25 | |
| Total Power Dissipation at $T_C = 25^\circ C$ Derate above $25^\circ C$, P_D | P_D | 65 0.52 | W W/ $^\circ C$ |
| Operating and Storage Temperature | T_J T_{stg} | -65 to +150 | $^\circ C$ |

Thermal Characteristics

| | | | |
|-------------------------------------|-----------------|------|--------------|
| Thermal Resistance Junction to Case | $R_{\theta jc}$ | 1.92 | $^\circ C/W$ |
|-------------------------------------|-----------------|------|--------------|

Electrical Characteristics:

(T_a = +25°C unless otherwise specified)

| Characteristic | Symbol | Test Condition | Min. | Max. | Unit |
|----------------|--------|----------------|------|------|------|
|----------------|--------|----------------|------|------|------|

OFF Characteristics

| | | | | | |
|--|-----------------------|---|----|-----|----|
| Collector-Emitter Sustaining Voltage (1) | V _{CEO(sus)} | I _C = 200mA, I _B = 0 | 80 | - | V |
| Collector Cut off Current | I _{CEO} | V _{CE} = 80V, I _B = 0 | - | 1 | mA |
| Collector Cut off Current | I _{CEX} | V _{CE} = 80V, V _{BE(off)} = 1.5V | | 0.3 | |
| | | V _{CE} = 80V, V _{BE(off)} = 1.5V, T _C = 125°C | | 3 | |
| Emitter Cut off Current | I _{EBO} | V _{EB} = 5.0V, I _C = 0 | 5 | - | |

ON Characteristics (1)

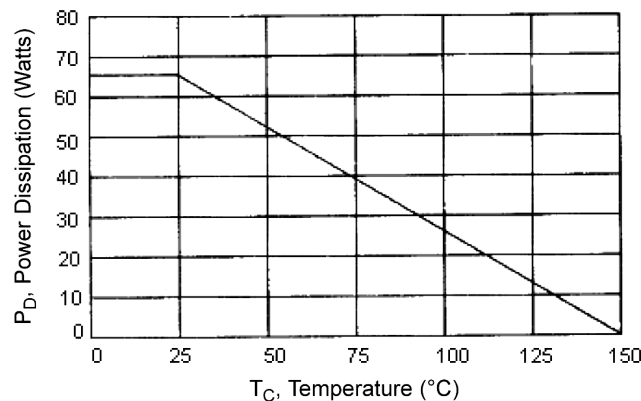
| | | | | | |
|--------------------------------------|----------------------|--|-------|--------|---|
| DC Current Gain | h _{FE} | I _C = 5A, V _{CE} = 3V | 1,000 | 20,000 | - |
| | | I _C = 10A, V _{CE} = 3V | 100 | | |
| Collector-Emitter Saturation Voltage | V _{CE(sat)} | I _C = 5A, I _B = 10mA | - | 2 | V |
| | | I _C = 10A, I _B = 100mA | | 3 | |
| Base-Emitter On Voltage | V _{BE(on)} | I _C = 5A, V _{CE} = 3V | | 2.8 | |
| | | I _C = 10A, V _{CE} = 3V | | 4.5 | |

Dynamic Characteristics

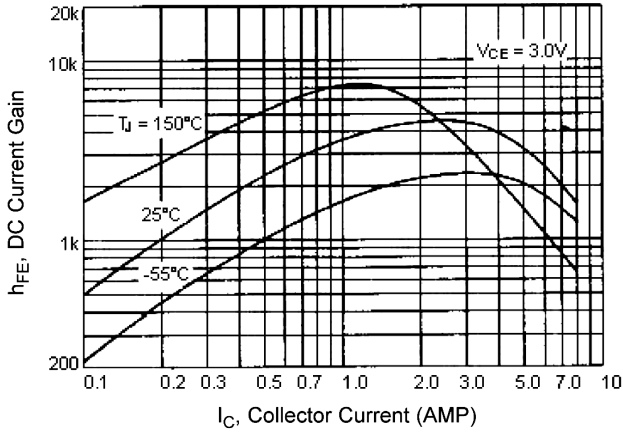
| | | | | | |
|---------------------------|-----------------|---|-------|-----|----|
| Small-Signal Current Gain | h _{fe} | I _C = 1A, V _{CE} = 5V, f = 1KHz | 1,000 | - | - |
| Output Capacitance | C _{ob} | (V _{CB} = 10V, I _E = 0, f = 1MHz) | - | 200 | pF |

(1) Pulse Test: Pulse Width = 300µs, Duty Cycle ≤2.0%

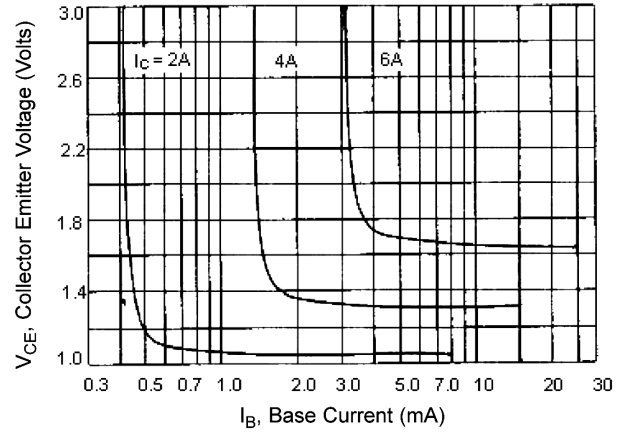
Figure - 1 Power Derating



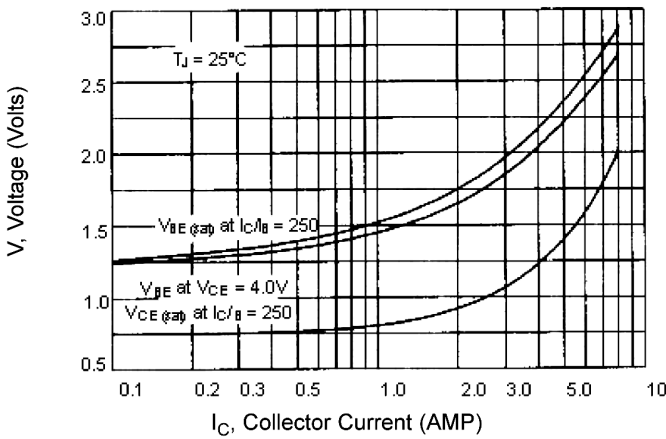
DC Current Gain



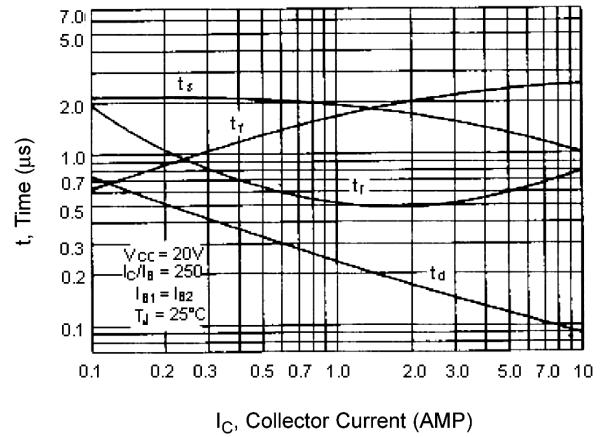
Collector Saturation Region



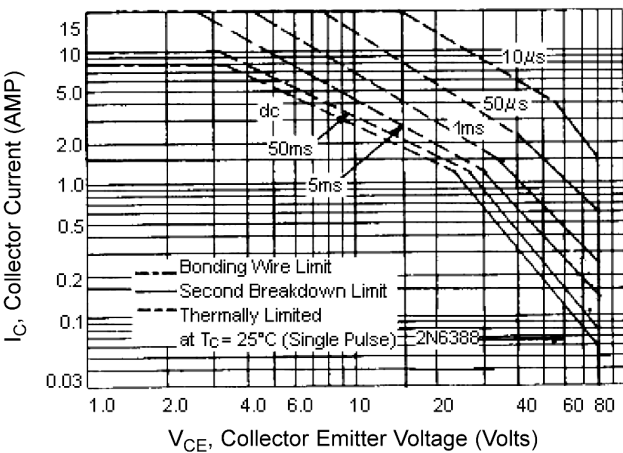
“ON” Voltages



Switching Time

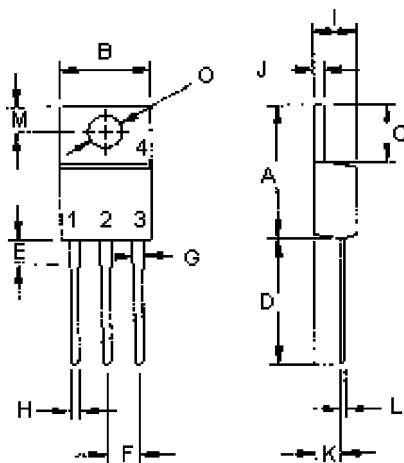
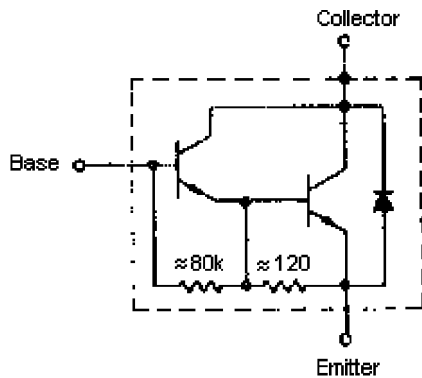


Active-Region Safe Operating Area (SOA)



There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown safe operating area curves indicate I_C - V_{CE} limits of the transistor that must be observed for reliable operation i.e., the transistor that must not be subjected to greater dissipation than the curves indicate.

The data of SOA curve is based on $T_{J(PK)} = 150^\circ\text{C}$; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(PK)} \leq 150^\circ\text{C}$. At high case temperatures, thermal limitation will reduce the power that can be handled to values less than the limitations imposed by second breakdown.



| Dim. | Min. | Max. |
|------|-------|-------|
| A | 14.68 | 15.31 |
| B | 9.78 | 10.42 |
| C | 5.01 | 6.52 |
| D | 13.06 | 14.62 |
| E | 3.57 | 4.07 |
| F | 2.42 | 3.66 |
| G | 1.12 | 1.36 |
| H | 0.72 | 0.96 |
| I | 4.22 | 4.98 |
| J | 1.14 | 1.38 |
| K | 2.2 | 2.97 |
| L | 0.33 | 0.55 |
| M | 2.48 | 2.98 |
| O | 3.7 | 3.9 |

Dimensions : Millimetres

Pin Configuration

1. Base
2. Collector
3. Emitter
4. Collector(Case)

Part Number Table

| Description | Part Number |
|-------------------------------|-------------|
| Darlington Transistor, TO-220 | 2N6388 |

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