

Plastic Medium-Power Silicon PNP Darlington

... for use as output devices in complementary general-purpose amplifier applications.

- High DC Current Gain —
 $h_{FE} = 750$ (Min) @ $I_C = 1.5$ and 2.0 Adc
- Monolithic Construction
- BD676, 676A, 678, 678A, 680, 680A, 682 are complementary with
 BD675, 675A, 677, 677A, 679, 679A, 681
- BD 678, 678A, 680, 680A are equivalent to MJE 700, 701, 702, 703

MAXIMUM RATING

| Rating | Symbol | BD676 BD676A | BD678 BD678A | BD680 BD680A | BD682 | Unit |
|---|----------------|-----------------|-----------------|-----------------|-------|------------------------------|
| Collector–Emitter Voltage | V_{CEO} | 45 | 60 | 80 | 100 | Vdc |
| Collector–Base Voltage | V_{CB} | 45 | 60 | 80 | 100 | Vdc |
| Emitter–Base Voltage | V_{EB} | 5.0 | | | | Vdc |
| Collector Current | I_C | 4.0 | | | | Adc |
| Base Current | I_B | 0.1 | | | | Adc |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C | P_D | 40 0.32 | | | | Watts W/ $^\circ\text{C}$ |
| Operating and Storage Junction Temperating Range | T_J, T_{stg} | –55 to +150 | | | | $^\circ\text{C}$ |

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|--------------------------------------|---------------|------|---------------------------|
| Thermal Resistance, Junction to Case | θ_{JC} | 3.13 | $^\circ\text{C}/\text{W}$ |

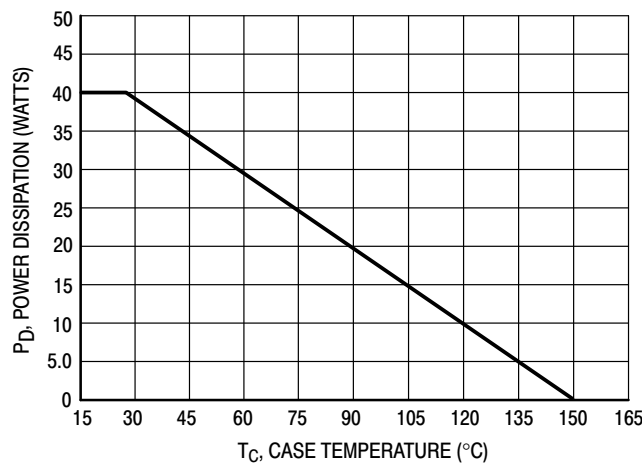
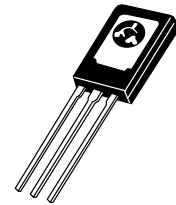


Figure 1. Power Temperature Derating

**BD676
BD676A
BD678
BD678A
BD680
BD680A
BD682**

**4.0 AMPERE
DARLINGTON
POWER TRANSISTORS
PNP SILICON
45, 60, 80, 100 VOLTS
40 WATTS**



**CASE 77-08
TO-225AA TYPE**

BD676 BD676A BD678 BD678A BD680 BD680A BD682

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic | | Symbol | Min | Max | Unit |
|--|--|------------|-----------------------|------------------|-----------------|
| OFF CHARACTERISTICS | | | | | |
| Collector–Emitter Breakdown Voltage ⁽¹⁾ ($I_C = 50\text{ mAdc}$, $I_B = 0$) | BD676, 676A BD678, 678A BD680, 680A BD682 | BV_{CEO} | 45 60 80 100 | — — — — | Vdc |
| Collector Cutoff Current ($V_{CE} = \text{Half Rated } BV_{CEO}$, $I_B = 0$) | | I_{CEO} | — | 500 | μAdc |
| Collector Cutoff Current ($V_{CB} = \text{Rated } BV_{CEO}$, $I_E = 0$) ($V_{CB} = \text{Rated } BV_{CEO}$, $I_E = 0$, $T_C = 100^\circ\text{C}$) | | I_{CBO} | — — | 0.2 2.0 | mAdc |
| Emitter Cutoff Current ($V_{BE} = 5.0\text{ Vdc}$, $I_C = 0$) | | I_{EBO} | — | 2.0 | mAdc |

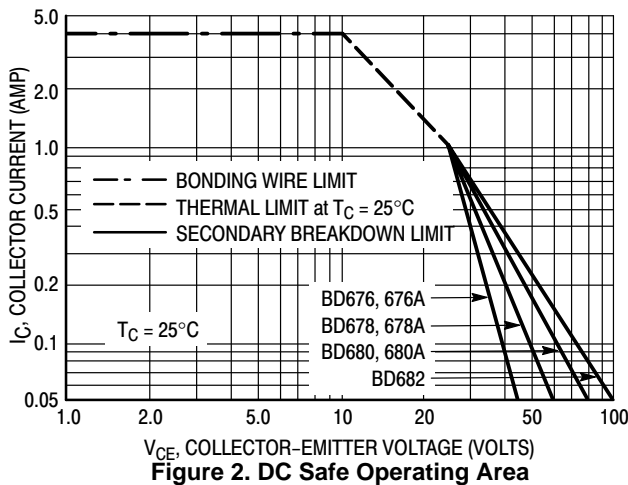
ON CHARACTERISTICS

| | | | | | |
|---|--|---------------|------------|------------|-----|
| DC Current Gain ⁽¹⁾ ($I_C = 1.5\text{ Adc}$, $V_{CE} = 3.0\text{ Vdc}$) ($I_C = 2.0\text{ Adc}$, $V_{CE} = 3.0\text{ Vdc}$) | BD676, 678, 680, 682 BD676A, 678A, 680A | h_{FE} | 750 750 | — — | |
| Collector–Emitter Saturation Voltage ⁽¹⁾ ($I_C = 1.5\text{ Adc}$, $I_B = 30\text{ mAdc}$) ($I_C = 2.0\text{ Adc}$, $I_B = 40\text{ mAdc}$) | BD678, 680, 682 BD676A, 678A, 680A | $V_{CE(sat)}$ | — — | 2.5 2.8 | Vdc |
| Base–Emitter On Voltage ⁽¹⁾ ($I_C = 1.5\text{ Adc}$, $V_{CE} = 3.0\text{ Vdc}$) ($I_C = 2.0\text{ Adc}$, $V_{CE} = 3.0\text{ Vdc}$) | BD678, 680, 682 BD676A, 678A, 680A | $V_{BE(on)}$ | — — | 2.5 2.5 | Vdc |

DYNAMIC CHARACTERISTICS

| | | | | |
|---|----------|-----|---|---|
| Small–Signal Current Gain ($I_C = 1.5\text{ Adc}$, $V_{CE} = 3.0\text{ Vdc}$, $f = 1.0\text{ MHz}$) | h_{fe} | 1.0 | — | — |
|---|----------|-----|---|---|

(1) Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2.0\%$.



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

At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by secondary breakdown.

BD676 BD676A BD678 BD678A BD680 BD680A BD682

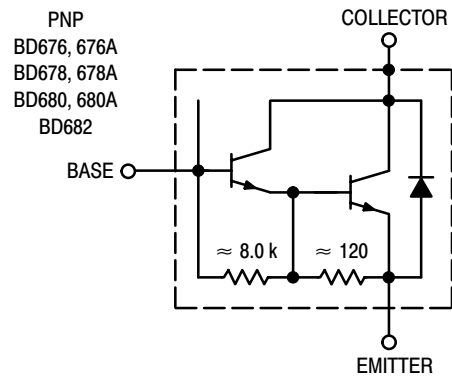
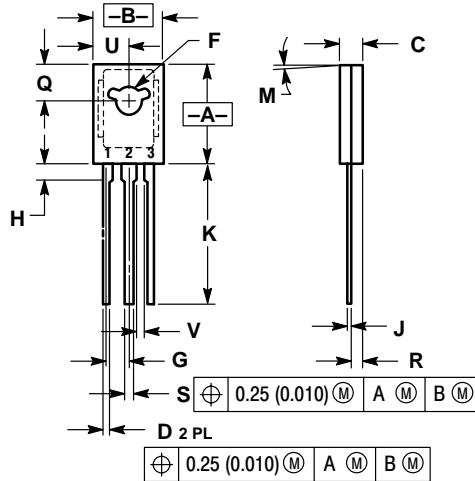


Figure 3. Darlington Circuit Schematic

PACKAGE DIMENSIONS

CASE 77-08
TO-225AA TYPE
ISSUE V



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

| DIM | INCHES | | MILLIMETERS | |
|-----|-----------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.425 | 0.435 | 10.80 | 11.04 |
| B | 0.295 | 0.305 | 7.50 | 7.74 |
| C | 0.095 | 0.105 | 2.42 | 2.66 |
| D | 0.020 | 0.026 | 0.51 | 0.66 |
| F | 0.115 | 0.130 | 2.93 | 3.30 |
| G | 0.094 BSC | | 2.39 BSC | |
| H | 0.050 | 0.095 | 1.27 | 2.41 |
| J | 0.015 | 0.025 | 0.39 | 0.63 |
| K | 0.575 | 0.655 | 14.61 | 16.63 |
| M | 5° TYP | | 5° TYP | |
| Q | 0.148 | 0.158 | 3.76 | 4.01 |
| R | 0.045 | 0.055 | 1.15 | 1.39 |
| S | 0.025 | 0.035 | 0.64 | 0.88 |
| U | 0.145 | 0.155 | 3.69 | 3.93 |
| V | 0.040 | --- | 1.02 | --- |

- STYLE 1:
PIN 1. EMITTER
2. COLLECTOR
3. BASE

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