

Plastic Medium-Power Silicon NPN 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
- BD675, 675A, 677, 677A, 679, 679A, 681 are complementary with BD676, 676A, 678, 678A, 680, 680A, 682
- BD 677, 677A, 679, 679A are equivalent to MJE 800, 801, 802, 803

MAXIMUM RATINGS

| Rating | Symbol | BD675 BD675A | BD677 BD677A | BD679 BD679A | BD681 | 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 | $^\circ\text{C}/\text{W}$ |

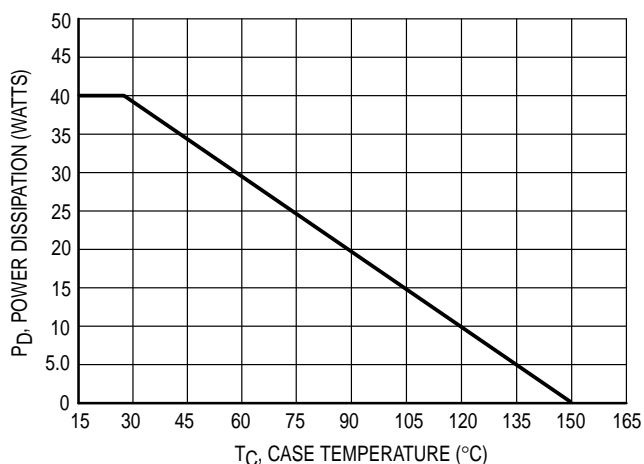


Figure 1. Power Temperature Derating

Preferred devices are Motorola recommended choices for future use and best overall value.

REV 7

BD675
BD675A
BD677
BD677A
BD679
BD679A
BD681*

*Motorola Preferred Device

4.0 AMPERE
DARLINGTON
POWER TRANSISTORS
NPN SILICON
60, 80, 100 VOLTS
40 WATTS

CASE 77-08
TO-225AA TYPE

BD675 BD675A BD677 BD677A BD679 BD679A BD681

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

| Characteristic | Symbol | Min | Max | Unit | |
|--|--|------------|-----------------------|------------------|-----------------|
| OFF CHARACTERISTICS | | | | | |
| Collector–Emitter Breakdown Voltage ⁽¹⁾ ($I_C = 50\text{ mAdc}$, $I_B = 0$) | BD675, 675A BD677, 677A BD679, 679A BD681 | 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⁾ ($I_C = 1.5\text{ Adc}$, $V_{CE} = 3.0\text{ Vdc}$) ($I_C = 2.0\text{ Adc}$, $V_{CE} = 3.0\text{ Vdc}$) | BD675, 677, 679, 681 BD675A, 677A, 679A | h_{FE} | 750 750 | — — | — |
| Collector–Emitter Saturation Voltage ⁽¹⁾ ($I_C = 1.5\text{ Adc}$, $I_B = 30\text{ mAdc}$) ($I_C = 2.0\text{ Adc}$, $I_B = 40\text{ mAdc}$) | BD677, 679, 681 BD675A, 677A, 679A | $V_{CE(\text{sat})}$ | — — | 2.5 2.8 | Vdc |
| Base–Emitter On Voltage ⁽¹⁾ ($I_C = 1.5\text{ Adc}$, $V_{CE} = 3.0\text{ Vdc}$) ($I_C = 2.0\text{ Adc}$, $V_{CE} = 3.0\text{ Vdc}$) | BD677, 679, 681 BD675A, 677A, 679A | $V_{BE(\text{on})}$ | — — | 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 $\leq 2.0\%$.

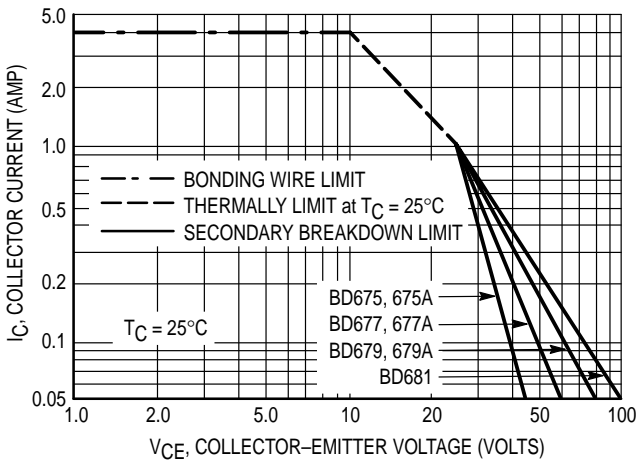


Figure 2. DC Safe Operating Area

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.

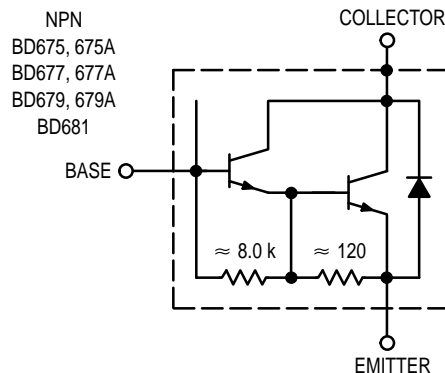
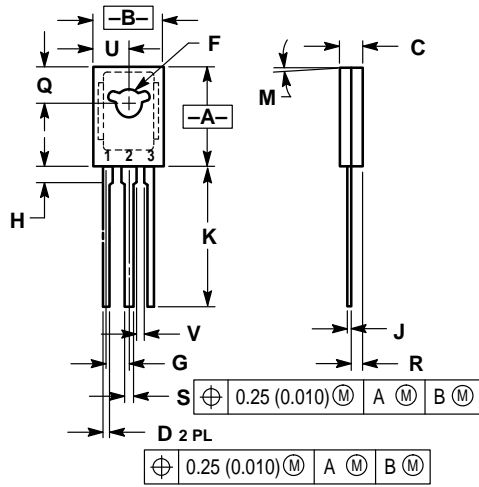


Figure 3. Darlington Circuit Schematic

BD675 BD675A BD677 BD677A BD679 BD679A BD681
PACKAGE DIMENSIONS




- 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

CASE 77-08
TO-225AA TYPE
ISSUE V

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