

BD675, BD675A, BD677, BD677A, BD679, BD679A, BD681

BD681 is a Preferred Device

Plastic Medium-Power Silicon NPN Darlington

This series of plastic, medium-power silicon NPN Darlington transistors can be used as output devices in complementary general-purpose amplifier applications.

Features

- High DC Current Gain:

$$h_{FE} = 750 \text{ (Min) @ } I_C$$

$$= 1.5 \text{ and } 2.0 \text{ Adc}$$
- Monolithic Construction
- BD675, 675A, 677, 677A, 679, 679A, 681 are complementary with BD676, 676A, 678, 678A, 680, 680A, 682
- BD677, 677A, 679, 679A are equivalent to MJE 800, 801, 802, 803
- Pb-Free Packages are Available*

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--|----------------|-----------------------|-----------|
| Collector-Emitter Voltage BD675, A BD677, A BD679, A BD681 | V_{CEO} | 45 60 80 100 | Vdc |
| Collector-Base Voltage BD675, A BD677, A BD679, A BD681 | V_{CBO} | 45 60 80 100 | Vdc |
| Emitter-Base Voltage | V_{EBO} | 5.0 | Vdc |
| Collector Current | I_C | 4.0 | Adc |
| Base Current | I_B | 1.0 | Adc |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C | P_D | 40 0.32 | W W/°C |
| Operating and Storage Junction Temperature Range | T_J, T_{stg} | -55 to +150 | °C |

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|---|---------------|------|------|
| Thermal Resistance, Junction-to-Case | θ_{JC} | 3.13 | °C/W |

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

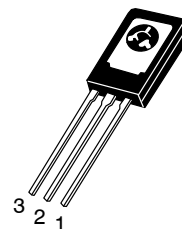
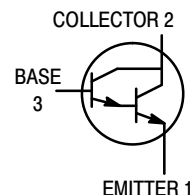
*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



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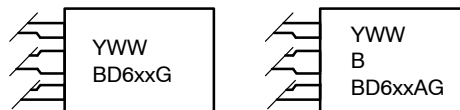
<http://onsemi.com>

**4.0 AMPERES
POWER TRANSISTORS
NPN SILICON
60, 80, 100 VOLTS, 40 WATTS**



TO-225AA
CASE 77
STYLE 1

MARKING DIAGRAMS



BD6xx = Device Code
 x = 75, 77, 79, 81
 Y = Year
 WW = Work Week
 G = Pb-Free Package

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

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

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, (Note 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, (Note 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, (Note 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 | $V_{CE(sat)}$ | - - | 2.5 2.8 | Vdc |
| Base-Emitter On Voltage, (Note 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 | $V_{BE(on)}$ | - - | 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 $\leq 2.0\%$.

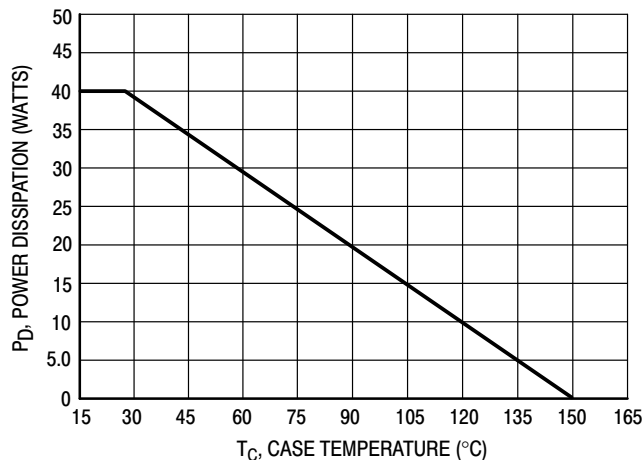


Figure 1. Power Temperature Derating

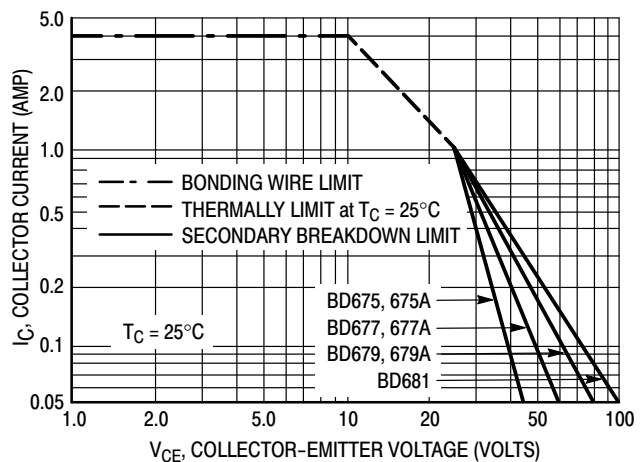


Figure 2. DC Safe Operating Area

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.

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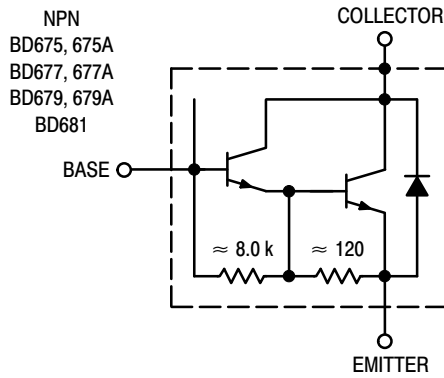


Figure 3. Darlington Circuit Schematic

ORDERING INFORMATION

| Device | Package | Shipping |
|---------|-----------------------|-----------------|
| BD675 | TO-225AA | 500 Units / Box |
| BD675G | TO-225AA (Pb-Free) | 500 Units / Box |
| BD675A | TO-225AA | 500 Units / Box |
| BD675AG | TO-225AA (Pb-Free) | 500 Units / Box |
| BD677 | TO-225AA | 500 Units / Box |
| BD677G | TO-225AA (Pb-Free) | 500 Units / Box |
| BD677A | TO-225AA | 500 Units / Box |
| BD677AG | TO-225AA (Pb-Free) | 500 Units / Box |
| BD679 | TO-225AA | 500 Units / Box |
| BD679G | TO-225AA (Pb-Free) | 500 Units / Box |
| BD679A | TO-225AA | 500 Units / Box |
| BD679AG | TO-225AA (Pb-Free) | 500 Units / Box |
| BD681 | TO-225AA | 500 Units / Box |
| BD681G | TO-225AA (Pb-Free) | 500 Units / Box |

BD675, BD675A, BD677, BD677A, BD679, BD679A, BD681

PACKAGE DIMENSIONS

TO-225AA
CASE 77-09
ISSUE Z



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 077-01 THRU -08 OBSOLETE, NEW STANDARD 077-09.

| 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 | 0.065 | 1.15 | 1.65 |
| 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:

1. EMITTER
2. COLLECTOR
3. BASE

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