# BD675G, BD675AG, BD677G, BD677AG, BD679G, BD679AG, BD681G

# Plastic Medium-Power Silicon NPN Darlingtons

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
- Monolithic Construction
- Complementary to BD676, 676A, 678, 678A, 680, 680A, 682
- BD677, 677A, 679, 679A are Equivalent to MJE 800, 801, 802, 803
- These Devices are Pb−Free and are RoHS Compliant*

### MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Collector−Emitter Voltage<br>BD675G, BD675AG<br>BD677G, BD677AG<br>BD679G, BD679AG<br>BD681G | $V_{CEO}$ | <br>45<br>60<br>80<br>100 | Vdc |
| Collector−Base Voltage<br>BD675G, BD675AG<br>BD677G, BD677AG<br>BD679G, BD679AG<br>BD681G | $V_{CBO}$ | <br>45<br>60<br>80<br>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<br>@ $T_C$ = 25°C<br>Derate above 25°C | $P_D$ | <br>40<br>0.32 | <br>W<br>W/°C |
| Operating and Storage Junction Temperature Range | $T_J$, $T_{stg}$ | −55 to +150 | °C |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

### THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|---|---|---|---|
| Thermal Resistance, Junction−to−Case | $R_{\theta JC}$ | 3.13 | °C/W |

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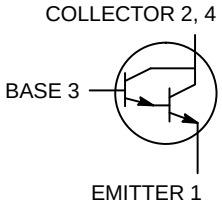
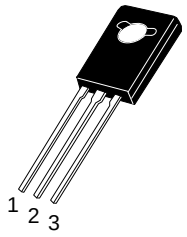
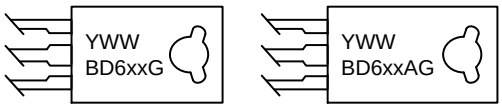
## 4.0 AMPERES POWER TRANSISTORS NPN SILICON 60, 80, 100 VOLTS, 40 WATTS




**TO−225**
**CASE 77−09**
**STYLE 1**

### MARKING DIAGRAMS




BD6xx/BD6xxA = 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.

**ELECTRICAL CHARACTERISTICS** ($T_C$ = 25°C unless otherwise noted)

| Characteristic | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | |
| Collector−Emitter Breakdown Voltage, (Note 1) ($I_C$ = 50 mAdc, $I_B$ = 0) | $BV_{CEO}$ | | | Vdc |
| BD675G, BD675AG | | 45 | − | |
| BD677G, BD677AG | | 60 | − | |
| BD679G, BD679AG | | 80 | − | |
| BD681G | | 100 | − | |
| Collector Cutoff Current ($V_{CE}$ = Half Rated $V_{CEO}$, $I_B$ = 0) | $I_{CEO}$ | − | 500 | μAdc |
| Collector Cutoff Current | $I_{CBO}$ | | | mAdc |
| ($V_{CB}$ = Rated $BV_{CEO}$, $I_E$ = 0) | | − | 0.2 | |
| ($V_{CB}$ = Rated $BV_{CEO}$, $I_E$ = 0, $T_C$ = 100'C) | | − | 2.0 | |
| Emitter Cutoff Current ($V_{BE}$ = 5.0 Vdc, $I_C$ = 0) | $I_{EBO}$ | − | 2.0 | mAdc |
| **ON CHARACTERISTICS** | | | | |
| DC Currert Gain, (Note 1) | $h_{FE}$ | | | − |
| ($I_C$ = 1.5 Adc,$V_{CE}$ = 3.0 Vdc) | | | | |
| BD675G, BD677G, BD679G, BD681G | | 750 | − | |
| ($I_C$ = 2.0 Adc, $V_{CE}$ = 3.0 Vdc) | | | | |
| BD675AG, BD677AG, BD679AG | | 750 | − | |
| Collector−Emitter Saturation Voltage, (Note 1) | $V_{CE(sat)}$ | | | Vdc |
| ($I_C$ = 1.5 Adc, $I_B$ = 30 mAdc) | | | | |
| BD677G, BD679G, BD681G | | − | 2.5 | |
| ($I_C$ = 2.0 Adc, $I_B$ = 40 mAdc) | | | | |
| BD675AG, BD677AG, BD679AG | | − | 2.8 | |
| Base−Emitter On Voltage, (Note 1) | $V_{BE(on)}$ | | | Vdc |
| ($I_C$ = 1.5 Adc, $V_{CE}$ = 3.0 Vdc) | | | | |
| BD677G, BD679G, BD681G | | − | 2.5 | |
| ($I_C$ = 2.0 Adc, $V_{CE}$ = 3 0 Vdc) | | | | |
| BD675AG, BD677AG, BD679AG | | − | 2.5 | |
| **DYNAMIC CHARACTERISTICS** | | | | |
| Small Signal Current Gain ($I_C$ = 1.5 Adc, $V_{CE}$ = 3.0 Vdc, f = 1.0 MHz) | $h_{fe}$ | 1.0 | − | − |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

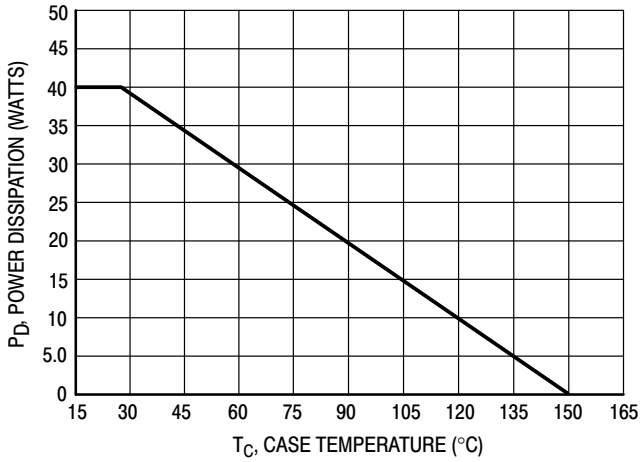



**Figure 1. Power Temperature Derating**

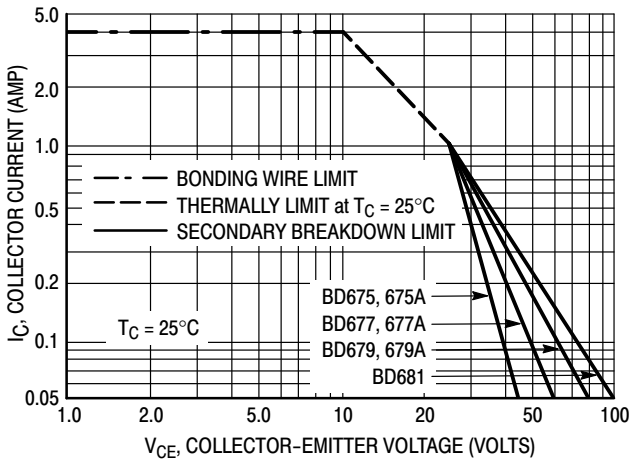



**Figure 2. DC Safe Operating Area**

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.

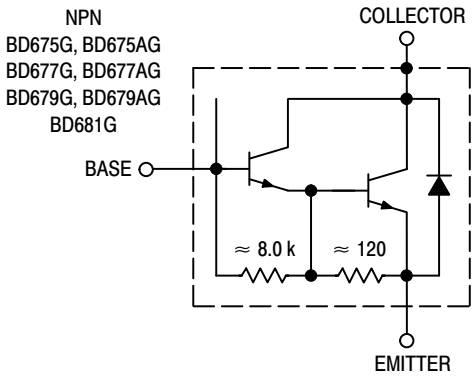



**Figure 3. Darlington Circuit Schematic**

**ORDERING INFORMATION**

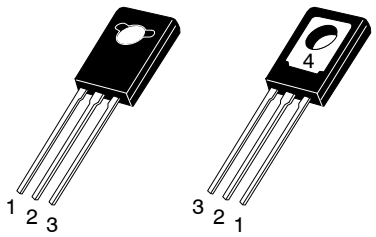
| Device | Package | Shipping |
|---|---|---|
| BD675G | TO−225 (Pb−Free) | 500 Units / Box |
| BD675AG | TO−225 (Pb−Free) | 500 Units / Box |
| BD677G | TO−225 (Pb−Free) | 500 Units / Box |
| BD677AG | TO−225 (Pb−Free) | 500 Units / Box |
| BD679G | TO−225 (Pb−Free) | 500 Units / Box |
| BD679AG | TO−225 (Pb−Free) | 500 Units / Box |
| BD681G | TO−225 (Pb−Free) | 500 Units / Box |

# MECHANICAL CASE OUTLINE
## PACKAGE DIMENSIONS

ON Semiconductor®

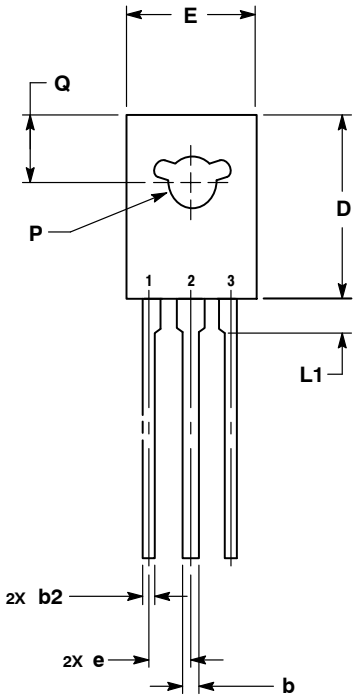
**TO−225**
CASE 77−09
ISSUE AD

DATE 25 MAR 2015

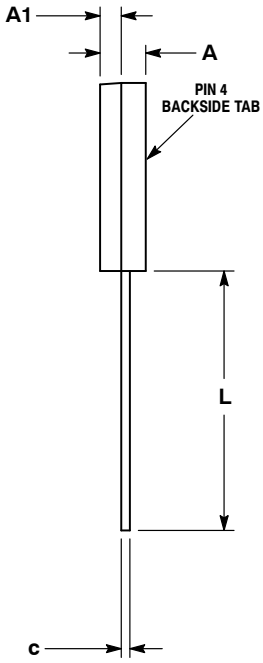



**FRONT VIEW** **BACK VIEW**

**SCALE 1:1**




**FRONT VIEW**

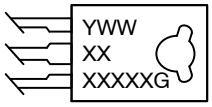



**SIDE VIEW**

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. NUMBER AND SHAPE OF LUGS OPTIONAL.

| | MILLIMETERS | |
|---|---|---|
| DIM | MIN | MAX |
| A | 2.40 | 3.00 |
| A1 | 1.00 | 1.50 |
| b | 0.60 | 0.90 |
| b2 | 0.51 | 0.88 |
| c | 0.39 | 0.63 |
| D | 10.60 | 11.10 |
| E | 7.40 | 7.80 |
| e | 2.04 | 2.54 |
| L | 14.50 | 16.63 |
| L1 | 1.27 | 2.54 |
| P | 2.90 | 3.30 |
| Q | 3.80 | 4.20 |

### GENERIC MARKING DIAGRAM*




Y = Year
WW = Work Week
XXXXX = Device Code
G = Pb−Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “ ▪”, may or may not be present.

STYLE 1:
PIN 1. EMITTER
2., 4. COLLECTOR
3. BASE

STYLE 2:
PIN 1. CATHODE
2., 4. ANODE
3. GATE

STYLE 3:
PIN 1. BASE
2., 4. COLLECTOR
3. EMITTER

STYLE 4:
PIN 1. ANODE 1
2., 4. ANODE 2
3. GATE

STYLE 5:
PIN 1. MT 1
2., 4. MT 2
3. GATE

STYLE 6:
PIN 1. CATHODE
2., 4. GATE
3. ANODE

STYLE 7:
PIN 1. MT 1
2., 4. GATE
3. MT 2

STYLE 8:
PIN 1. SOURCE
2., 4. GATE
3. DRAIN

STYLE 9:
PIN 1. GATE
2., 4. DRAIN
3. SOURCE

STYLE 10:
PIN 1. SOURCE
2., 4. DRAIN
3. GATE

| | | |
|---|---|---|
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| **DESCRIPTION:** | **TO−225** | **PAGE 1 OF 1** |

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