

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



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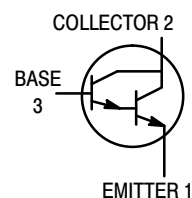
## Plastic Medium-Power Silicon NPN Darlington

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
- 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\*

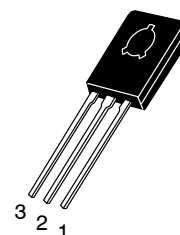
**4.0 AMPERES  
POWER TRANSISTORS  
NPN SILICON  
60, 80, 100 VOLTS, 40 WATTS**



### MAXIMUM RATINGS

Rating	Symbol	Value	Unit	
Collector-Emitter Voltage	BD675, A BD677, A BD679, A BD681	$V_{CE0}$	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 $25^\circ\text{C}$		$P_D$	40 0.32	W W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range		$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.



TO-225  
CASE 77  
STYLE 1

### MARKING DIAGRAMS



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

### THERMAL CHARACTERISTICS

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

### ORDERING INFORMATION

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

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

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

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

Characteristic	Symbol	Min	Max	Unit	
<b>OFF CHARACTERISTICS</b>					
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	$\mu\text{Adc}$
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	-	-
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1. Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

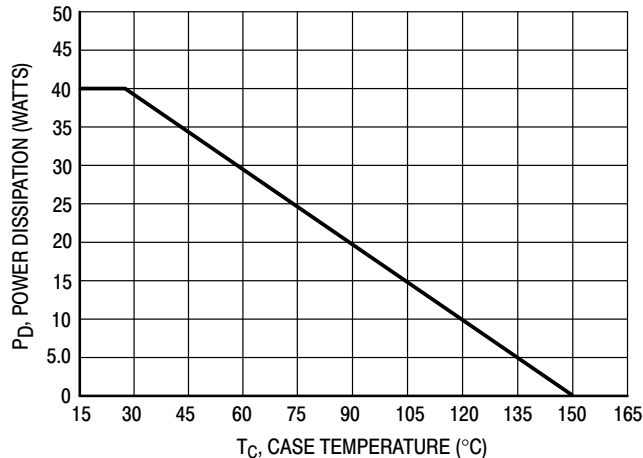


Figure 1. Power Temperature Derating

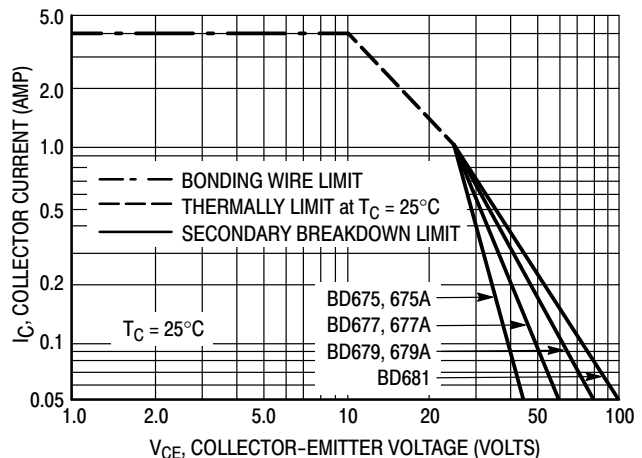
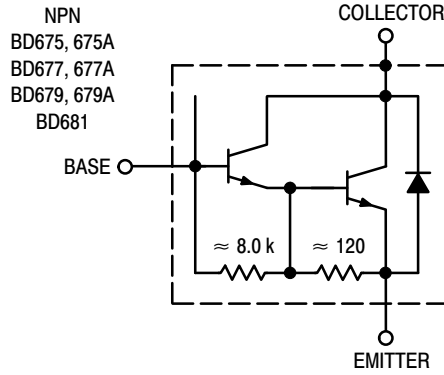


Figure 2. DC Safe Operating Area

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.

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



**Figure 3. Darlington Circuit Schematic**

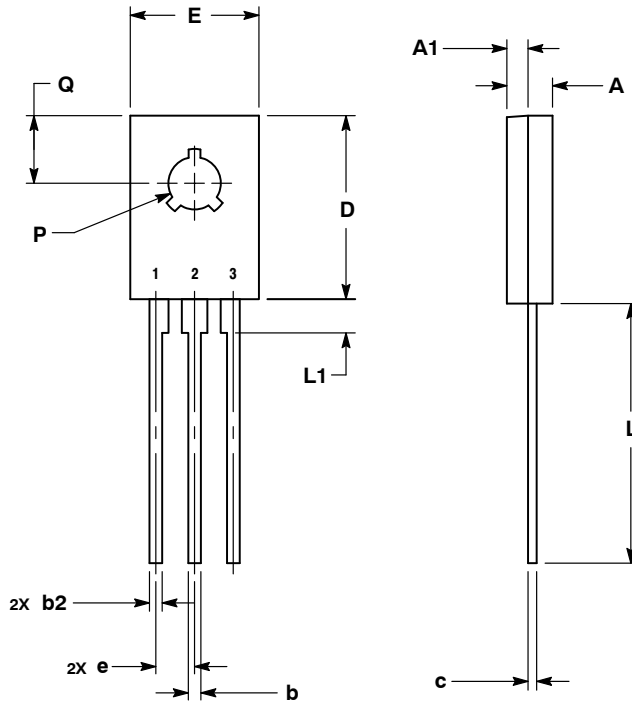
**ORDERING INFORMATION**

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

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

## PACKAGE DIMENSIONS


TO-225  
CASE 77-09  
ISSUE AA



NOTES:

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

DIM	MILLIMETERS	
	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

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