

# BD676, BD676A, BD678, BD678A, BD680, BD680A, BD682

## 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 RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage BD676, BD676A BD678, BD678A BD680, BD680A BD682	$V_{CEO}$	45 60 80 100	Vdc
Collector-Base Voltage BD676, BD676A BD678, BD678A BD680, BD680A BD682	$V_{CB}$	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 $25^\circ\text{C}$	$P_D$	40 0.32	W W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

### THERMAL CHARACTERISTICS

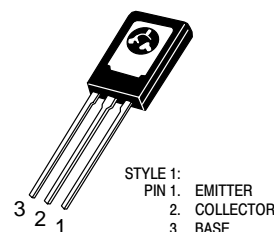
Characteristic	Symbol	Max	Unit
Thermal Resistance – Junction to Case	$R_{\theta JC}$	3.13	$^\circ\text{C}/\text{W}$



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



**TO-225AA  
CASE 77  
STYLE 1**

### MARKING DIAGRAM



Y = Year  
WW = Work Week  
BD6xxx = Specific Device Code  
xxx = 76, 76A, 78, 78A, 80, 80A or 82

### ORDERING INFORMATION

Device	Package	Shipping
BD676	TO-225AA	500 Units/Box
BD676A	TO-225AA	500 Units/Box
BD678	TO-225AA	500 Units/Box
BD678A	TO-225AA	500 Units/Box
BD680	TO-225AA	500 Units/Box
BD680A	TO-225AA	500 Units/Box
BD682	TO-225AA	500 Units/Box

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## 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) ( $I_C = 50\text{ mAdc}$ , $I_B = 0$ )	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	$\mu\text{A dc}$
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) ( $I_C = 1.5\text{ Adc}$ , $V_{CE} = 3.0\text{ Vdc}$ ) ( $I_C = 2.0\text{ Adc}$ , $V_{CE} = 3.0\text{ Vdc}$ )	BD676, 678, 680, 682 BD676A, 678A, 680A	$h_{FE}$	750 750	– –	
Collector–Emitter Saturation Voltage (Note 1) ( $I_C = 1.5\text{ Adc}$ , $I_B = 30\text{ mA dc}$ ) ( $I_C = 2.0\text{ Adc}$ , $I_B = 40\text{ mA dc}$ )	BD678, 680, 682 BD676A, 678A, 680A	$V_{CE(\text{sat})}$	– –	2.5 2.8	Vdc
Base–Emitter On Voltage (Note 1) ( $I_C = 1.5\text{ Adc}$ , $V_{CE} = 3.0\text{ Vdc}$ ) ( $I_C = 2.0\text{ Adc}$ , $V_{CE} = 3.0\text{ Vdc}$ )	BD678, 680, 682 BD676A, 678A, 680A	$V_{BE(\text{on})}$	– –	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	–	–
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1. Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

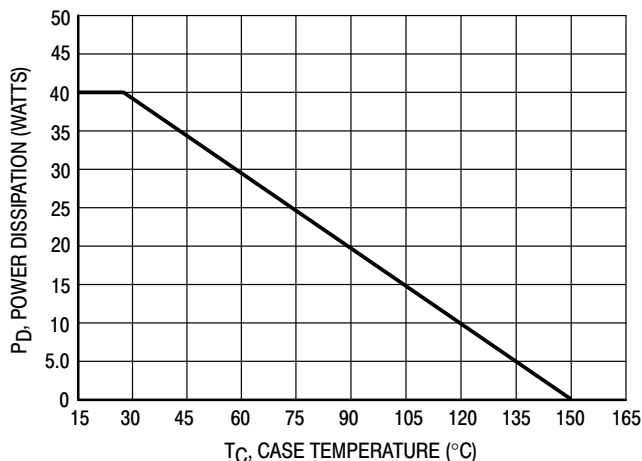
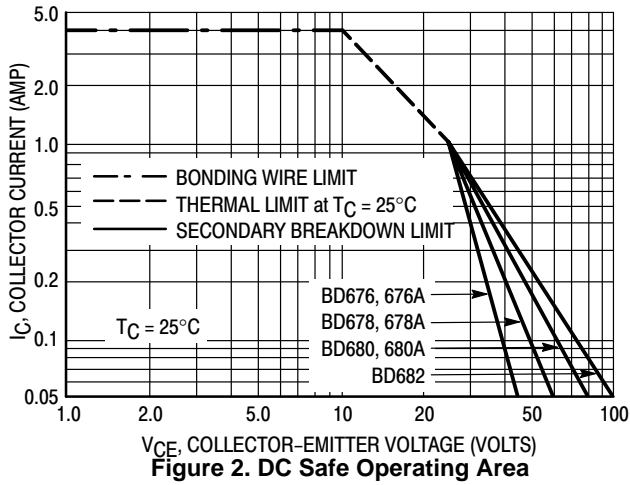


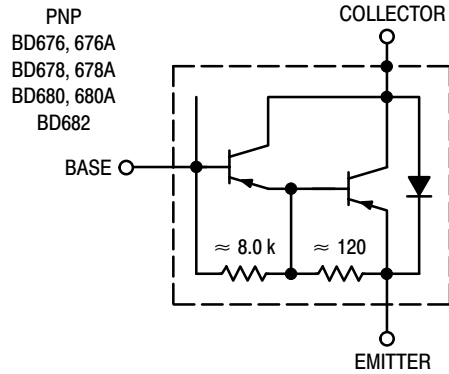
Figure 1. Power Temperature Derating

**BD676, BD676A, BD678, BD678A, BD680, BD680A, BD682**



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.

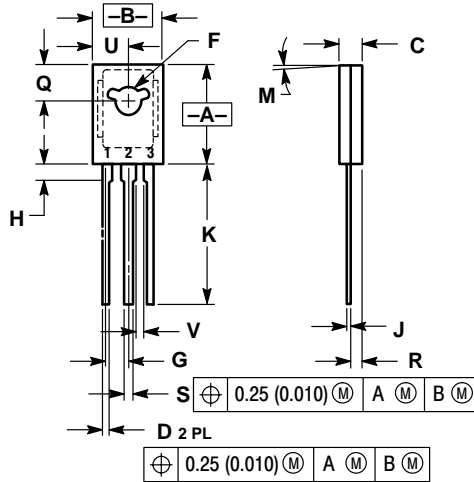


**Figure 3. Darlington Circuit Schematic**

# BD676, BD676A, BD678, BD678A, BD680, BD680A, BD682

## PACKAGE DIMENSIONS


TO-126  
TO-225AA  
CASE 77-09  
ISSUE W



- 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	0.065	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:  
PIN 1. EMITTER  
2. COLLECTOR  
3. BASE

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