

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 RATING

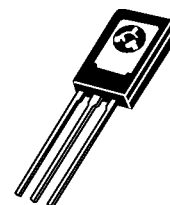
Rating	Symbol	BD676 BD676A	BD678 BD678A	BD680 BD680A	BD682	Unit
Collector-Emitter Voltage	V_{CEO}	45	60	80	100	Vdc
Collector-Base Voltage	V_{CB}	45	60	80	100	Vdc
Emitter-Base Voltage	V_{EB}	5.0				Vdc
Collector Current	I_C	4.0				Adc
Base Current	I_B	0.1				Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ 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	$^\circ\text{C}/\text{W}$

**BD676
BD676A
BD678
BD678A
BD680
BD680A
BD682**

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



**CASE 77-08
TO-225AA TYPE**

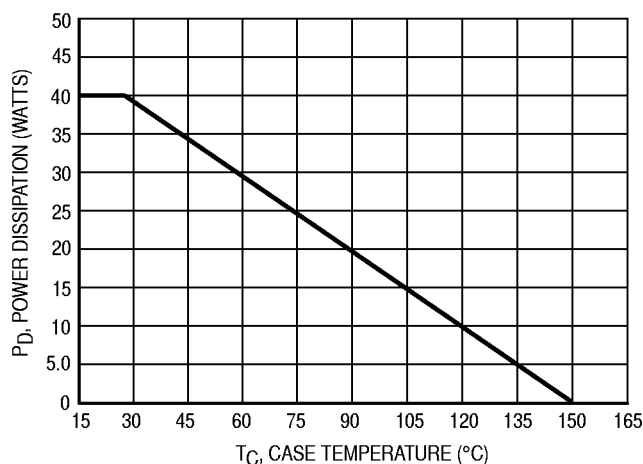


Figure 1. Power Temperature Derating

REV 7



BD676 BD676A BD678 BD678A BD680 BD680A BD682

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector–Emitter Breakdown Voltage ⁽¹⁾ ($I_C = 50\text{ mAdc}$, $I_B = 0$)	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⁾ ($I_C = 1.5\text{ Adc}$, $V_{CE} = 3.0\text{ Vdc}$) ($I_C = 2.0\text{ Adc}$, $V_{CE} = 3.0\text{ Vdc}$)	BD676, 676A BD678, 678A BD680, 680A BD682	h_{FE}	750 750	— —	
Collector–Emitter Saturation Voltage ⁽¹⁾ ($I_C = 1.5\text{ Adc}$, $I_B = 30\text{ mAdc}$) ($I_C = 2.0\text{ Adc}$, $I_B = 40\text{ mAdc}$)	BD678, 680, 682 BD676A, 678A, 680A	$V_{CE(sat)}$	— —	2.5 2.8	Vdc
Base–Emitter On Voltage ⁽¹⁾ ($I_C = 1.5\text{ Adc}$, $V_{CE} = 3.0\text{ Vdc}$) ($I_C = 2.0\text{ Adc}$, $V_{CE} = 3.0\text{ Vdc}$)	BD678, 680, 682 BD676A, 678A, 680A	$V_{BE(on)}$	— —	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 $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2.0\%$.

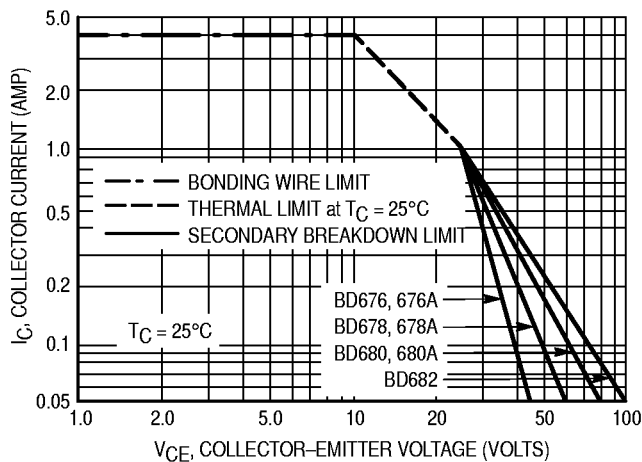


Figure 2. DC Safe Operating Area

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.

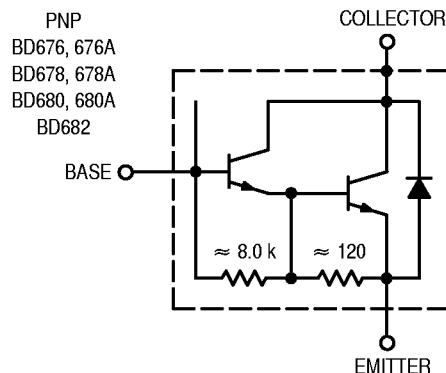
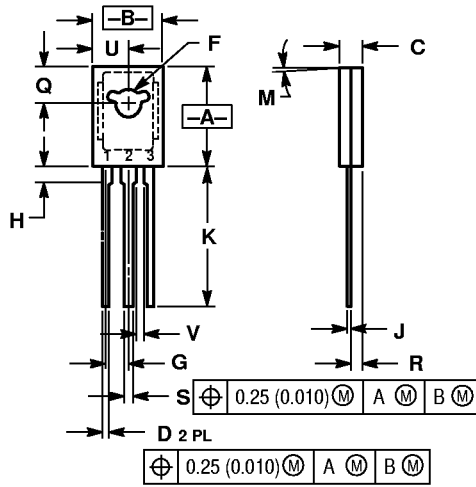


Figure 3. Darlington Circuit Schematic

BD676 BD676A BD678 BD678A BD680 BD680A BD682
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