

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°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

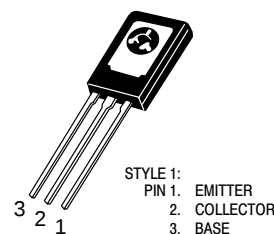
Characteristic	Symbol	Max	Unit
Thermal Resistance – Junction to Case	$R_{\theta JC}$	3.13	$^\circ\text{C/W}$



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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
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OFF CHARACTERISTICS

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 ($V_{CE} = \text{Half Rated } V_{CEO}$, $I_B = 0$)		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) ($I_C = 1.5\text{ Adc}$, $V_{CE} = 3.0\text{ Vdc}$) ($I_C = 2.0\text{ Adc}$, $V_{CE} = 3.0\text{ Vdc}$)	BD676, 678, 680, 682 BD676A, 678A, 680A	h_{FE}	750 750	– –	
Collector–Emitter Saturation Voltage (Note 1) ($I_C = 1.5\text{ Adc}$, $I_B = 30\text{ mAdc}$) ($I_C = 2.0\text{ Adc}$, $I_B = 40\text{ mAdc}$)	BD678, 680, 682 BD676A, 678A, 680A	$V_{CE(sat)}$	– –	2.5 2.8	Vdc
Base–Emitter On Voltage (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	$V_{BE(on)}$	– –	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 $\leq 2.0\%$.

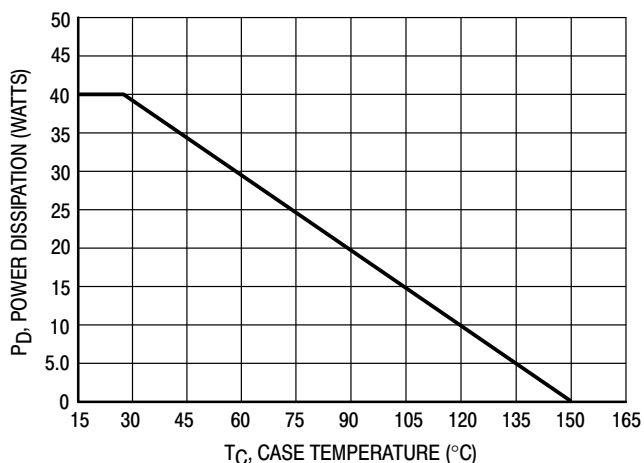
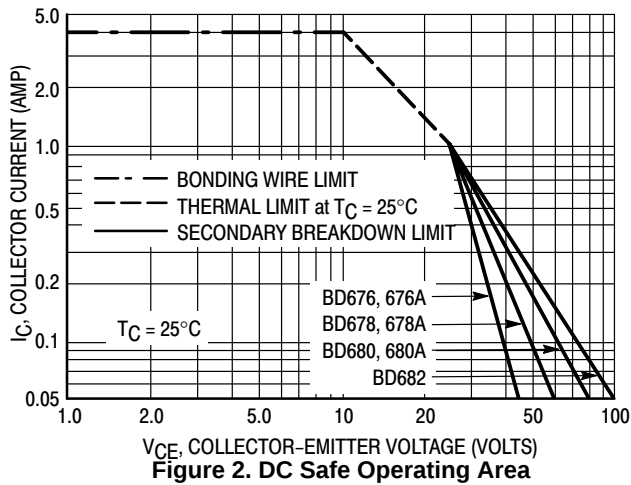


Figure 1. Power Temperature Derating

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.

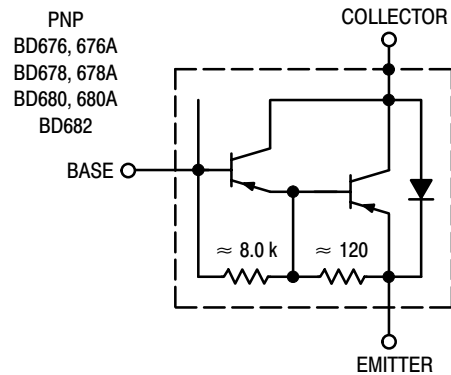
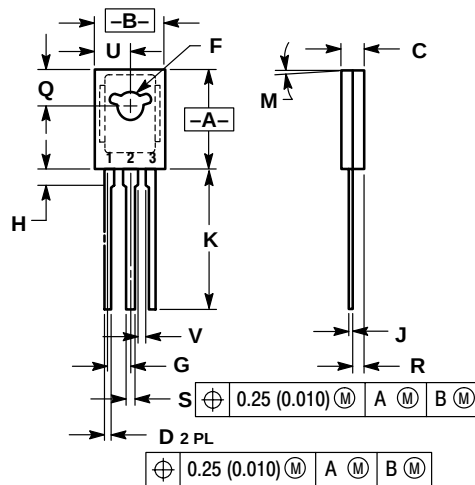


Figure 3. Darlington Circuit Schematic

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

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