

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	$^\circ\text{C/W}$

**BD676
BD676A
BD678
BD678A
BD680
BD680A
BD682**

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

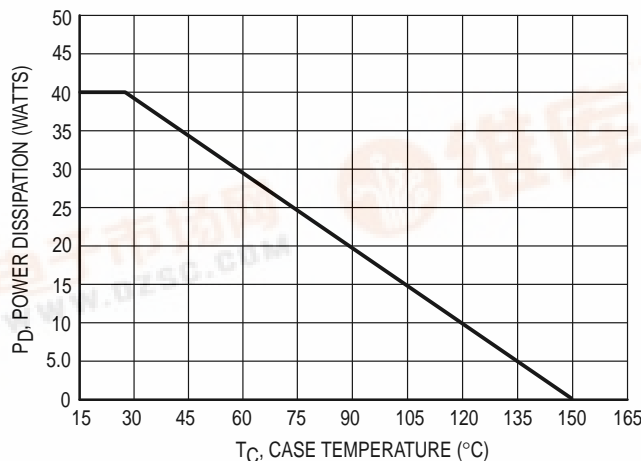
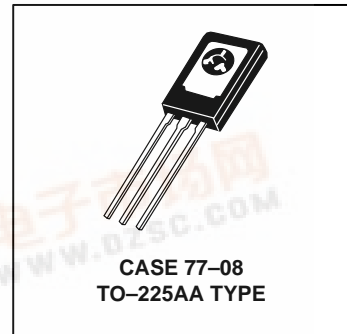


Figure 1. Power Temperature Derating

BD676 BD676A BD678 BD678A BD680 BD680A BD682

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

Characteristic	Symbol	Min	Max	Unit	
OFF CHARACTERISTICS					
Collector–Emitter Breakdown Voltage ⁽¹⁾ (I _C = 50 mAdc, I _B = 0)	BD676, 676A BD678, 678A BD680, 680A BD682	BV _{CEO}	45 60 80 100	— — — —	Vdc
Collector Cutoff Current (V _{CE} = Half Rated V _{CEO} , I _B = 0)		I _{CEO}	—	500	μAdc
Collector Cutoff Current (V _{CB} = Rated BV _{CEO} , I _E = 0) (V _{CB} = Rated BV _{CEO} , I _E = 0, T _C = 100°C)		I _{CBO}	— —	0.2 2.0	mAdc
Emitter Cutoff Current (V _{BE} = 5.0 Vdc, I _C = 0)		I _{EBO}	—	2.0	mAdc

ON CHARACTERISTICS

DC Current Gain ⁽¹⁾ (I _C = 1.5 Adc, V _{CE} = 3.0 Vdc) (I _C = 2.0 Adc, V _{CE} = 3.0 Vdc)	BD676, 678, 680, 682 BD676A, 678A, 680A	h _{FE}	750 750	— —	
Collector–Emitter Saturation Voltage ⁽¹⁾ (I _C = 1.5 Adc, I _B = 30 mAdc) (I _C = 2.0 Adc, I _B = 40 mAdc)	BD678, 680, 682 BD676A, 678A, 680A	V _{CE(sat)}	— —	2.5 2.8	Vdc
Base–Emitter On Voltage ⁽¹⁾ (I _C = 1.5 Adc, V _{CE} = 3.0 Vdc) (I _C = 2.0 Adc, V _{CE} = 3.0 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 Adc, V _{CE} = 3.0 Vdc, f = 1.0 MHz)	h _{fe}	1.0	—	—
--	-----------------	-----	---	---

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

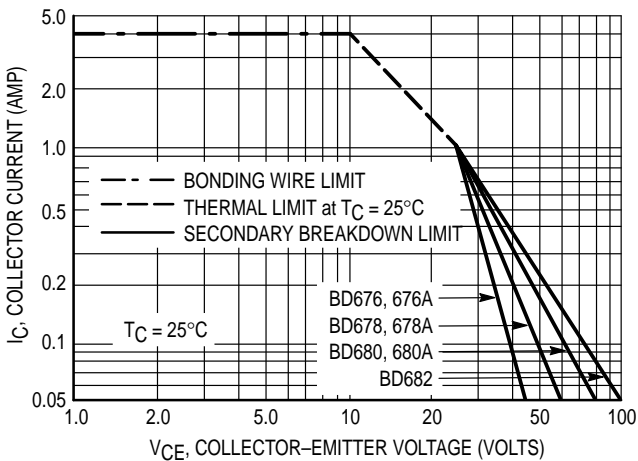


Figure 2. DC Safe Operating Area

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.

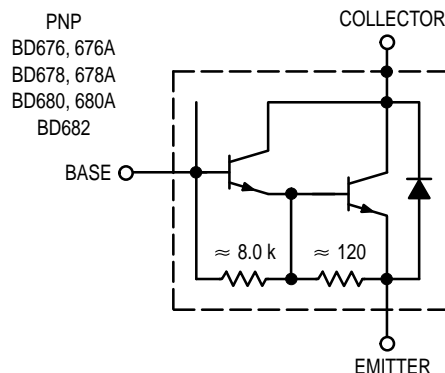
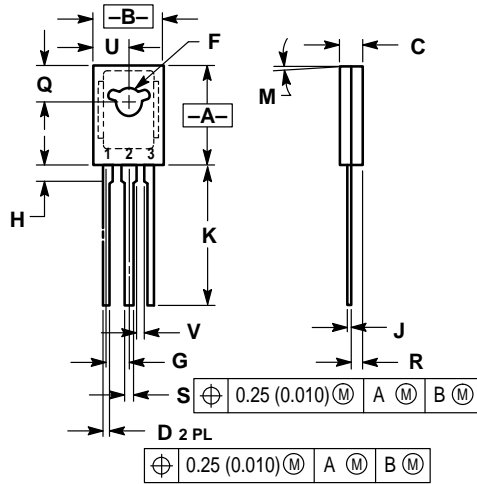


Figure 3. Darlington Circuit Schematic

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

BD676 BD676A BD678 BD678A BD680 BD680A BD682

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters can and do vary in different applications. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and  are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

How to reach us:

USA / EUROPE: Motorola Literature Distribution;
P.O. Box 20912; Phoenix, Arizona 85036. 1-800-441-2447

MFAX: RMFAX0@email.sps.mot.com – TOUCHTONE (602) 244-6609
INTERNET: <http://Design-NET.com>

JAPAN: Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, Toshikatsu Otsuki,
6F Seibu-Butsuryu-Center, 3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 03-3521-8315

HONG KONG: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298

