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

Plastic Medium-Power Silicon PNP Darlingtons

This series of plastic, medium−power silicon PNP Darlington transistors can be used as output devices in complementary general−purpose amplifier applications.

Features

- Pb−Free Package is Available*
- 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
- BD678, 678A, 680, 680A are equivalent to MJE 700, 701, 702, 703

MAXIMUM RATINGS

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

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

THERMAL CHARACTERISTICS

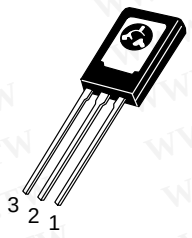
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction−to−Case	$R_{\theta JC}$	3.13	°C/W

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

ON Semiconductor®

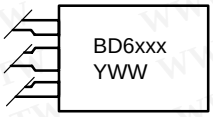
http://onsemi.com

4.0 A DARLINGTON POWER TRANSISTORS PNP SILICON 45, 60, 80, 100 V, 40 W



TO−225AA CASE 77 STYLE 1

MARKING DIAGRAM



xxx = 76, 76A, 78, 78A, 80, 80A or 82
Y = Year
WW = Work Week

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 3 of this data sheet.

June, 2004 − Rev. 11

Publication Order Number:
BD676/D

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

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector−Emitter Breakdown Voltage (Note 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 (Note 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 (Note 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 (Note 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%.

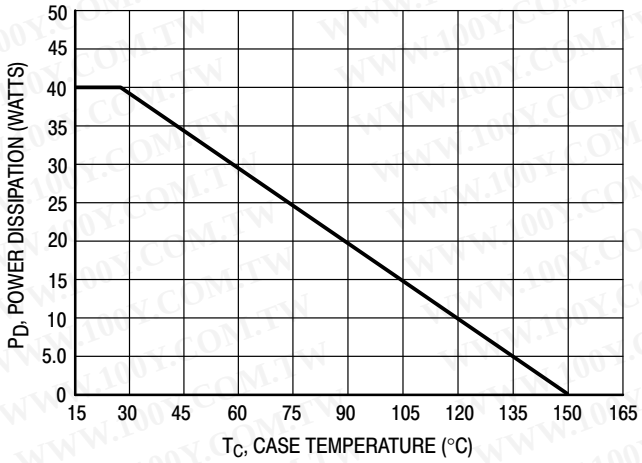


Figure 1. Power Temperature Derating

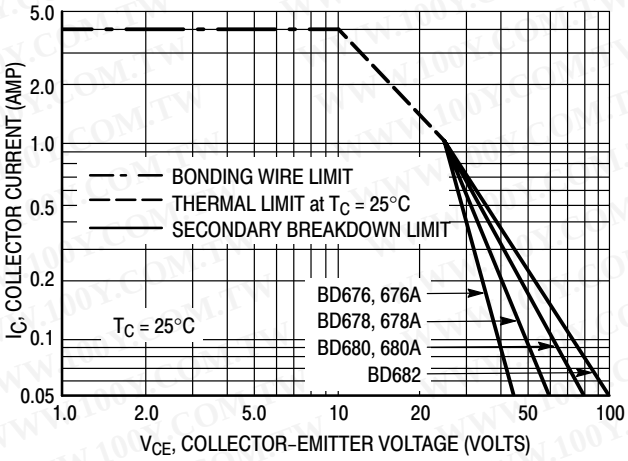


Figure 2. DC Safe Operating Area

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.

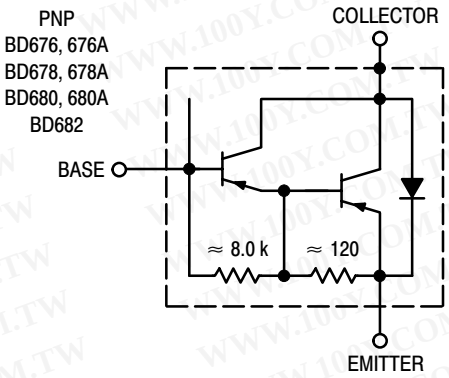


Figure 3. Darlington Circuit Schematic

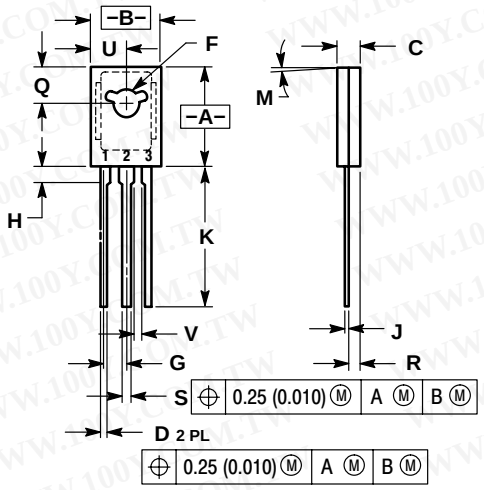
ORDERING INFORMATION

Device	Package	Shipping†
BD676	TO−225AA	500 Units / Box
BD676G	TO−225AA (Pb−Free)	
BD676A	TO−225AA	500 Units / Box
BD678	TO−225AA	500 Units / Box
BD678A	TO−225AA	
BD680	TO−225AA	500 Units / Box
BD680A	TO−225AA	
BD682	TO−225AA	500 Units / Box
BD682G	TO−225AA (Pb−Free)	
BD682T	TO−225AA	50 Units / Rail

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

PACKAGE DIMENSIONS

TO−225AA
CASE 77−09
ISSUE Z



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 077−01 THRU −08 OBSOLETE, NEW STANDARD 077−09.

	INCHES		MILLIMETERS	
DIM	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

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
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For additional information, please contact your local Sales Representative.