

# BD676G, BD676AG, BD678G, BD678AG, BD680G, BD680AG, BD682G, BD682TG



ON Semiconductor®

<http://onsemi.com>

## Plastic Medium-Power Silicon PNP Darlington

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

### Features

- High DC Current Gain
- 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
- These Devices are Pb-Free and are RoHS Compliant\*

### MAXIMUM RATINGS

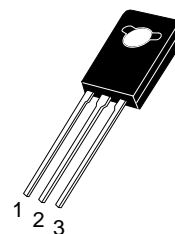
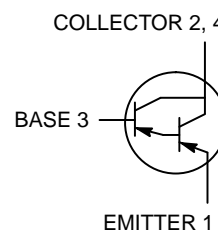
Rating	Symbol	Value	Unit
Collector-Emitter Voltage BD676G, BD676AG BD678G, BD678AG BD680G, BD680AG BD682G, BD682TG	$V_{CEO}$	45 60 80 100	Vdc
Collector-Base Voltage BD676G, BD676AG BD678G, BD678AG BD680G, BD680AG BD682G, BD682TG	$V_{CB}$	45 60 80 100	Vdc
Emitter-Base Voltage	$V_{EB}$	5.0	Vdc
Collector 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	$^\circ\text{C}$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

### THERMAL CHARACTERISTICS

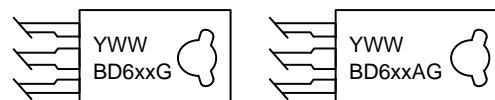
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.13	$^\circ\text{C}/\text{W}$

## 4.0 AMP DARLINGTON POWER TRANSISTORS PNP SILICON 45, 60, 80, 100 VOLT, 40 WATT



TO-225  
CASE 77-09  
STYLE 1

### MARKING DIAGRAMS



Y = Year  
WW = Work Week  
BD6xx = Device Code  
xx = 76, 78, 80, 82, or 82T  
G = Pb-Free Package

### ORDERING INFORMATION

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

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

# BD676G, BD676AG, BD678G, BD678AG, BD680G, BD680AG, BD682G, BD682TG

## 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) ( $I_C = 50\text{ mAdc}$ , $I_B = 0$ ) BD676G, BD676AG BD678G, BD678AG BD680G, BD680AG BD682G, BD682TG	$BV_{CEO}$	45 60 80 100	- - - -	Vdc
Collector Cutoff Current ( $V_{CE} = \text{Half Rated } BV_{CEO}$ , $I_B = 0$ )	$I_{CEO}$	-	500	$\mu\text{Adc}$
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) ( $I_C = 1.5\text{ Adc}$ , $V_{CE} = 3.0\text{ Vdc}$ ) BD676G, BD678G, BD680G, BD682G ( $I_C = 2.0\text{ Adc}$ , $V_{CE} = 3.0\text{ Vdc}$ ) BD676AG, BD678AG, BD680AG	$h_{FE}$	750 750	- -	-
Collector-Emitter Saturation Voltage (Note 1) ( $I_C = 1.5\text{ Adc}$ , $I_B = 30\text{ mAdc}$ ) BD678G, BD680G, BD682G ( $I_C = 2.0\text{ Adc}$ , $I_B = 40\text{ mAdc}$ ) BD676AG, BD678AG, BD680AG	$V_{CE(sat)}$	- -	2.5 2.8	Vdc
Base-Emitter On Voltage (Note 1) ( $I_C = 1.5\text{ Adc}$ , $V_{CE} = 3.0\text{ Vdc}$ ) BD678G, BD680G, BD682G ( $I_C = 2.0\text{ Adc}$ , $V_{CE} = 3.0\text{ Vdc}$ ) BD676AG, BD678AG, BD680AG	$V_{BE(on)}$	- -	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	-	-
--	----------	-----	---	---

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

1. Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

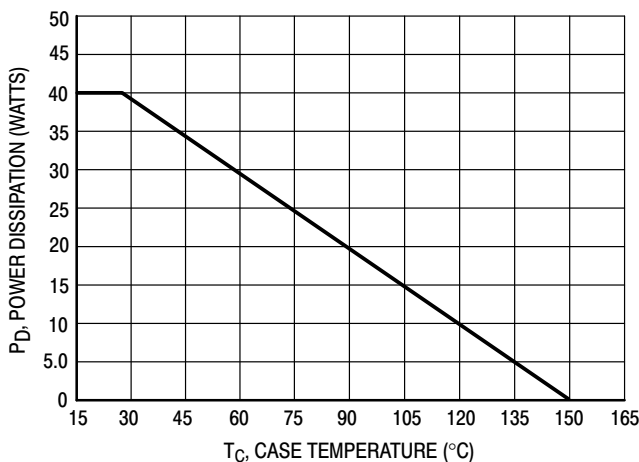


Figure 1. Power Temperature Derating

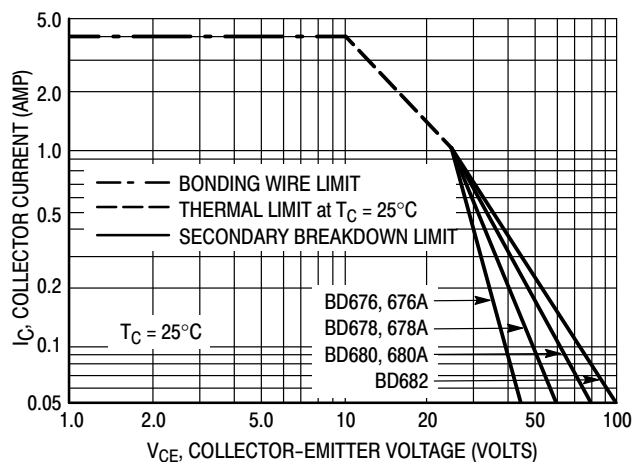


Figure 2. DC Safe Operating Area

# BD676G, BD676AG, BD678G, BD678AG, BD680G, BD680AG, BD682G, BD682TG

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.

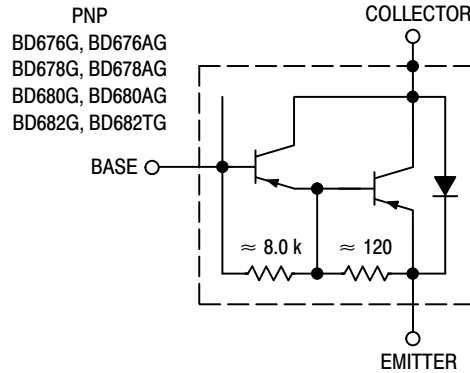
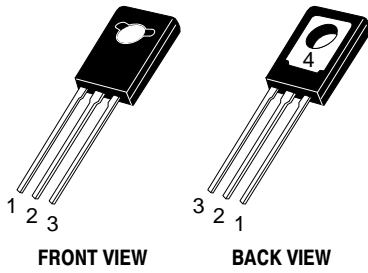


Figure 3. Darlington Circuit Schematic

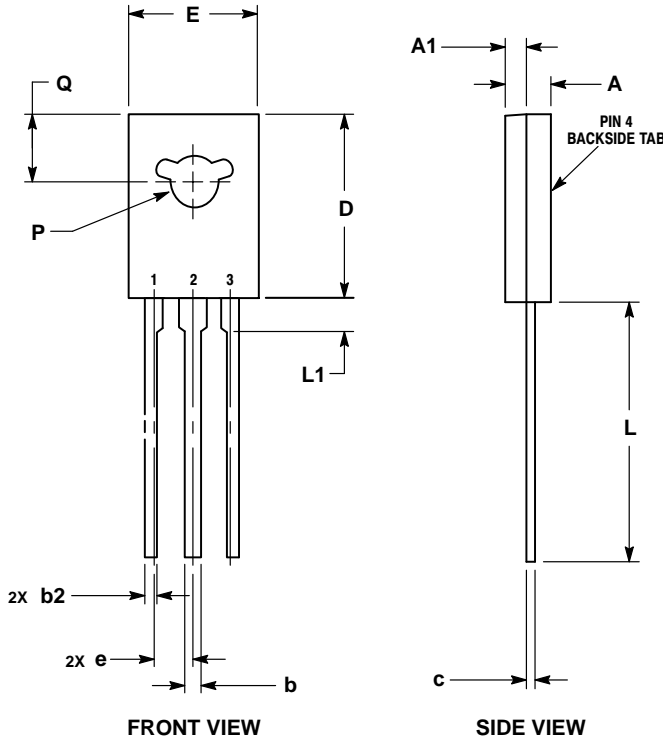
## ORDERING INFORMATION

Device	Package	Shipping
BD676G	TO-225 (Pb-Free)	500 Units / Box
BD676AG	TO-225 (Pb-Free)	500 Units / Box
BD678G	TO-225 (Pb-Free)	500 Units / Box
BD678AG	TO-225 (Pb-Free)	500 Units / Box
BD680G	TO-225 (Pb-Free)	500 Units / Box
BD680AG	TO-225 (Pb-Free)	500 Units / Box
BD682G	TO-225 (Pb-Free)	500 Units / Box
BD682TG	TO-225 (Pb-Free)	50 Units / Rail

PACKAGE DIMENSIONS



TO-225  
CASE 77-09  
ISSUE AC



- NOTES:  
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.  
2. CONTROLLING DIMENSION: MILLIMETERS.  
3. NUMBER AND SHAPE OF LUGS OPTIONAL.

DIM	MILLIMETERS	
	MIN	MAX
A	2.40	3.00
A1	1.00	1.50
b	0.60	0.90
b2	0.51	0.88
c	0.39	0.63
D	10.60	11.10
E	7.40	7.80
e	2.04	2.54
L	14.50	16.63
L1	1.27	2.54
P	2.90	3.30
Q	3.80	4.20

STYLE 1:  
PIN 1. EMITTER  
2., 4. COLLECTOR  
3. BASE

ON Semiconductor and are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of SCILLC's product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC 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 special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC 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 SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC 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 SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

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  
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada  
Email: [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

N. American Technical Support: 800-282-9855 Toll Free  
USA/Canada  
Europe, Middle East and Africa Technical Support:  
Phone: 421 33 790 2910  
Japan Customer Focus Center  
Phone: 81-3-5817-1050

ON Semiconductor Website: [www.onsemi.com](http://www.onsemi.com)  
Order Literature: <http://www.onsemi.com/orderlit>  
For additional information, please contact your local Sales Representative

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[ON Semiconductor:](#)

[BD676AG](#) [BD676G](#) [BD678AG](#) [BD678G](#) [BD680AG](#) [BD680G](#) [BD682G](#)