

# BD809 (NPN), BD810 (PNP)

## Plastic High Power Silicon Transistor

These devices are designed for use in high power audio amplifiers utilizing complementary or quasi complementary circuits.

### Features

- DC Current Gain -  $h_{FE} = 30$  (Min) @  $I_C = 2.0$  Adc
- Pb-Free Packages are Available\*

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	80	Vdc
Collector-Base Voltage	$V_{CBO}$	80	Vdc
Emitter-Base Voltage	$V_{EBO}$	5.0	Vdc
Collector Current	$I_C$	10	Adc
Base Current	$I_B$	6.0	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	90 720	W W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

### THERMAL CHARACTERISTICS

Characteristics	Symbol	Max	Unit
Thermal Resistance, Junction-to-Case	$\theta_{JC}$	1.39	$^\circ\text{C}/\text{W}$

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

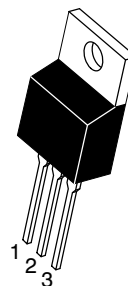
\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



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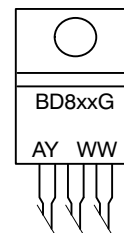
<http://onsemi.com>

10 AMPERE  
POWER TRANSISTORS  
80 VOLTS  
90 WATTS



TO-220AB  
CASE 221A-09  
STYLE 1

### MARKING DIAGRAM



BD8xx = Device Code  
          x = 09 or 10  
A      = Assembly Location  
Y      = Year  
WW    = Work Week  
G      = Pb-Free Package

### ORDERING INFORMATION

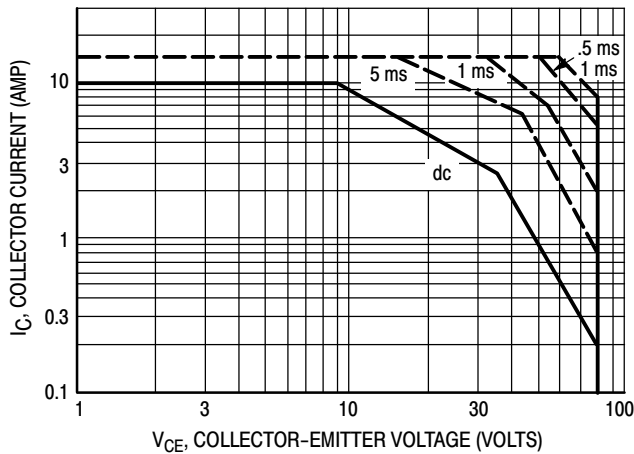
See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

# BD809 (NPN), BD810 (PNP)

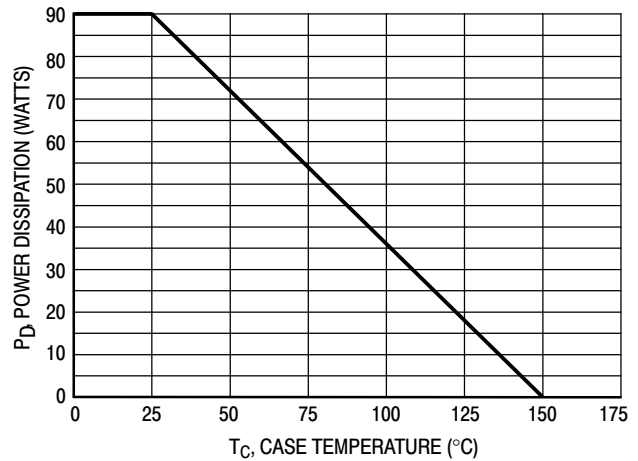
## ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
Collector-Emitter Sustaining Voltage (Note 1) ( $I_C = 0.1 \text{ A dc}$ , $I_B = 0$ )	$BV_{CEO}$	80	-	Vdc
Collector Cutoff Current ( $V_{CB} = 80 \text{ Vdc}$ , $I_E = 0$ )	$I_{CBO}$	-	1.0	mAdc
Emitter Cutoff Current ( $V_{BE} = 5.0 \text{ Vdc}$ , $I_C = 0$ )	$I_{EBO}$	-	2.0	mAdc
DC Current Gain ( $I_C = 2.0 \text{ A}$ , $V_{CE} = 2.0 \text{ V}$ ) ( $I_C = 4.0 \text{ A}$ , $V_{CE} = 2.0 \text{ V}$ )	$h_{FE}$	30 15	-	
Collector-Emitter Saturation Voltage (Note 1) ( $I_C = 3.0 \text{ A dc}$ , $I_B = 0.3 \text{ A dc}$ )	$V_{CE(sat)}$	-	1.1	Vdc
Base-Emitter On Voltage (Note 1) ( $I_C = 4.0 \text{ A dc}$ , $V_{CE} = 2.0 \text{ Vdc}$ )	$V_{BE(on)}$	-	1.6	Vdc
Current-Gain Bandwidth Product ( $I_C = 1.0 \text{ A dc}$ , $V_{CE} = 10 \text{ Vdc}$ , $f = 1.0 \text{ MHz}$ )	$f_T$	1.5	-	MHz

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

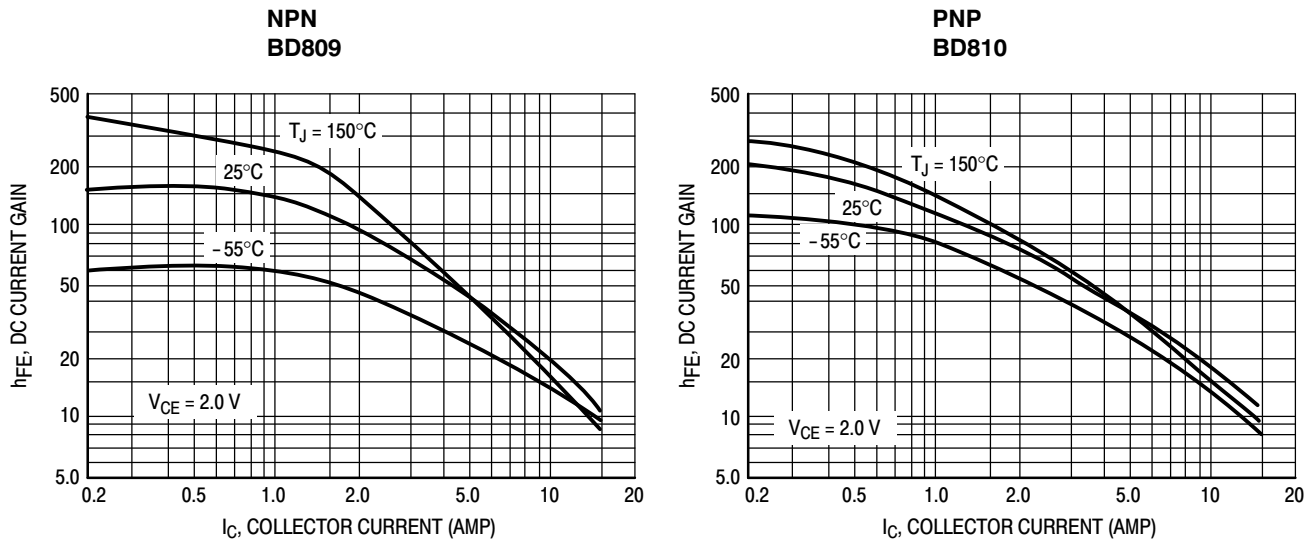


**Figure 1. Active Region DC Safe Operating Area (see Note 1)**

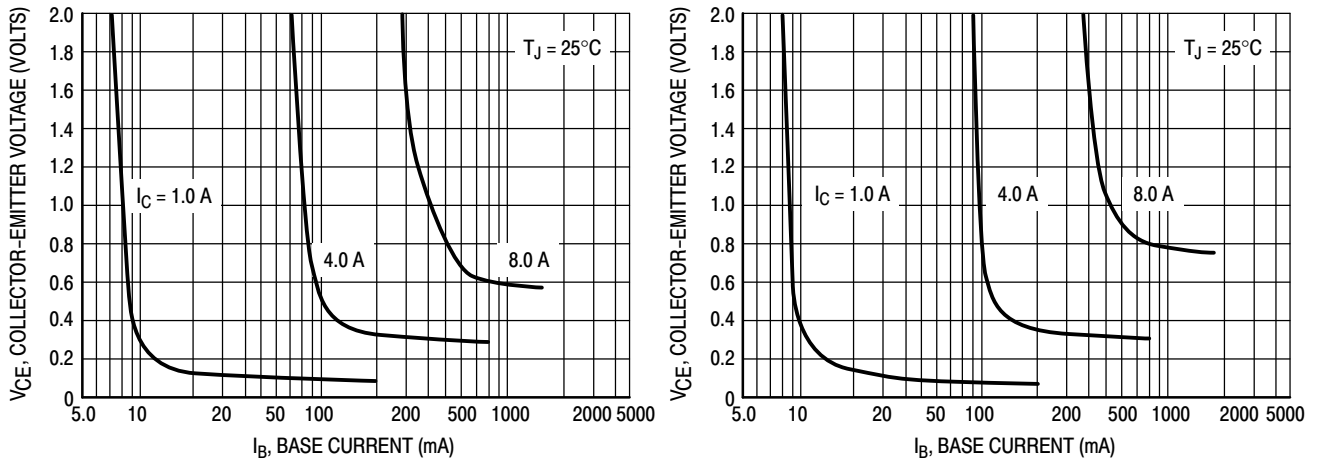


**Figure 2. Power-Temperature Derating Curve**

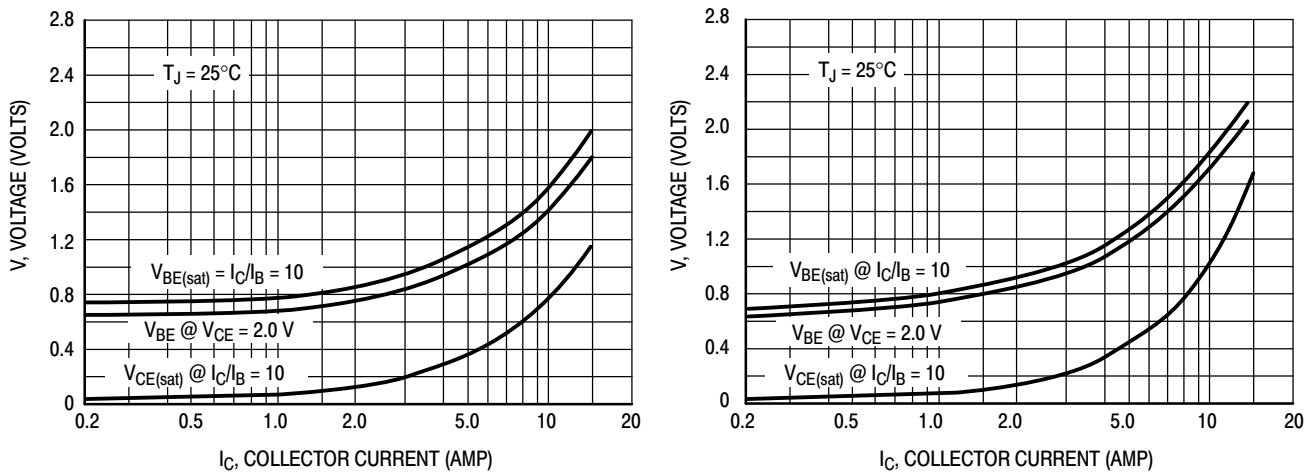
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**Figure 3. DC Current Gain**

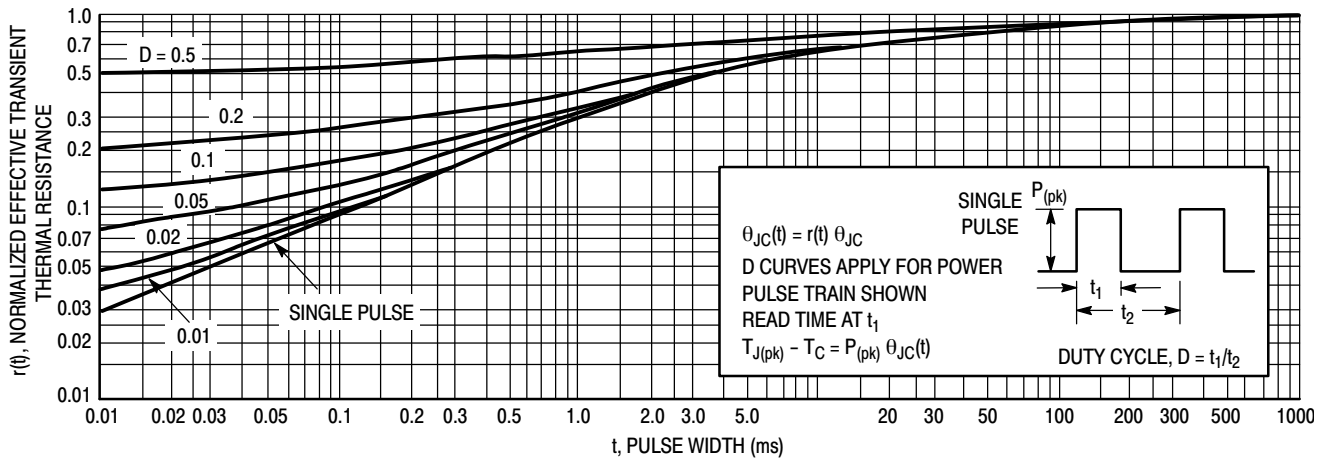


**Figure 4. Collector Saturation Region**



**Figure 5. "On" Voltages**

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**Figure 6. Thermal Response**

**Note 1:**

There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate  $I_C - V_{CE}$  limits of the transistor that must be observed for reliable operation, i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figure 1 is based on  $T_{J(pk)} = 150^\circ\text{C}$ ;  $T_C$  is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided  $T_{J(pk)} \leq 150^\circ\text{C}$ . At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

**ORDERING INFORMATION**

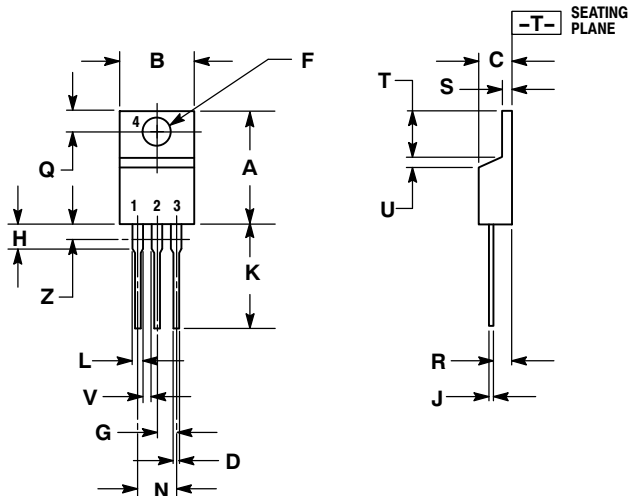
Device	Package	Shipping†
BD809	TO-220	50 Units / Rail
BD809G	TO-220 (Pb-Free)	
BD810	TO-220	50 Units / Rail
BD810G	TO-220 (Pb-Free)	

†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.

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## PACKAGE DIMENSIONS

### TO-220 CASE 221A-09 ISSUE AE



#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.405	9.66	10.28
C	0.160	0.190	4.07	4.82
D	0.025	0.035	0.64	0.88
F	0.142	0.161	3.61	4.09
G	0.095	0.105	2.42	2.66
H	0.110	0.155	2.80	3.93
J	0.014	0.025	0.36	0.64
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.39
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	---	1.15	---
Z	---	0.080	---	2.04

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