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BD787G (NPN), BD788G (PNP)

Complementary Plastic Silicon Power Transistors

These devices are designed for lower power audio amplifier and low current, high−speed switching applications.

Features

- Low Collector−Emitter Sustaining Voltage
- High Current−Gain − Bandwidth Product
- These Devices are Pb−Free and are RoHS Compliant*

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector−Emitter Voltage	V_{CEO}	60	Vdc
Collector−Base Voltage	V_{CBO}	80	Vdc
Emitter Base Voltage	V_{EBO}	6.0	Vdc
Collector Current − Continuous	I_C	4.0	Adc
Collector Current − Peak	I_{CM}	8.0	Adc
Base Current − Continuous	I_B	1.0	Adc
Total Power Dissipation @ T_C = 25°C Derate above 25°C	P_D	15 0.12	W mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	–65 to +150	°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	$R_{\theta JC}$	8.34	°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.

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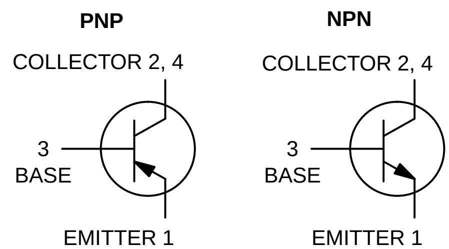
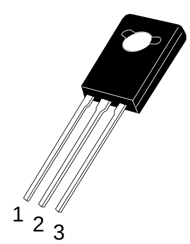
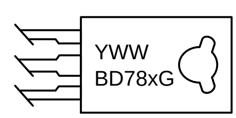
4 AMPERES POWER TRANSISTORS COMPLEMENTARY SILICON 60 VOLTS, 15 WATTS





TO−225 CASE 77−09 STYLE 1

MARKING DIAGRAM



Y = Year
WW = Work Week
BD78x = Device Code
x = 7 or 8
G = Pb−Free Package

ORDERING INFORMATION

Device	Package	Shipping
BD787G	TO−225 (Pb−Free)	500 Units/Box
BD788G	TO−225 (Pb−Free)	500 Units/Box

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector−Emitter Sustaining Voltage (Note 1) (I_C = 10 mAdc, I_B = 0)	$V_{CEO(sus)}$	60	−	Vdc
Collector Cutoff Current (V_{CE} = 20 Vdc, I_B = 0) (V_{CE} = 30 Vdc, I_B = 0)	I_{CEO}	−	100	μAdc
Collector Cutoff Current (V_{CE} = 80 Vdc, $V_{BE(off)}$ = 1.5 Vdc) (V_{CE} = 40 Vdc, $V_{BE(off)}$ = 1.5 Vdc, T_C = 125°C)	I_{CEX}	− −	1.0 0.1	μAdc mAdc
Emitter Cutoff Current (V_{EB} = 6.0 Vdc, I_C = 0)	I_{EBO}	−	1.0	μAdc
ON CHARACTERISTICS (Note 1)				
DC Current Gain (I_C = 200 mAdc, V_{CE} = 3.0 Vdc) (I_C = 1.0 Adc, V_{CE} = 3.0 Vdc) (I_C = 2.0 Adc, V_{CE} = 3.0 Vdc) (I_C = 4.0 Adc, V_{CE} = 3.0 Vdc)	h_{FE}	40 25 20 5.0	250 − − −	−
Collector−Emitter Saturation Voltage (I_C = 500 mAdc, I_B = 50 mAdc) (I_C = 1.0 Adc, I_B = 100 mAdc) (I_C = 2.0 Adc, I_B = 200 mAdc) (I_C = 4.0 Adc, I_B = 800 mAdc)	$V_{CE(sat)}$	− − − −	0.4 0.6 0.8 2.5	Vdc
Base−Emitter Saturation Voltage (I_C = 2.0 Adc, I_B = 200 mAdc)	$V_{BE(sat)}$	−	2.0	Vdc
Base−Emitter On Voltage (I_C = 2.0 Adc, V_{CE} = 3.0 Vdc)	$V_{BE(on)}$	−	1.8	Vdc
DYNAMIC CHARACTERISTICS				
Current−Gain − Bandwidth Product (I_C = 100 mAdc, V_{CE} = 10 Vdc, f = 10 MHz)	f_T	50	−	MHz
Output Capacitance (V_{CB} = 10 Vdc, I_C = 0) BD787G (f = 0.1 MHz) BD788G	C_{ob}	− −	50 70	pF
Small−Signal Current Gain (I_C = 200 mAdc, V_{CE} = 10 Vdc, f = 1.0 kHz)	h_{fe}	10	−	−

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.

*Indicates JEDEC Registered Data

1. Pulse Test; Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

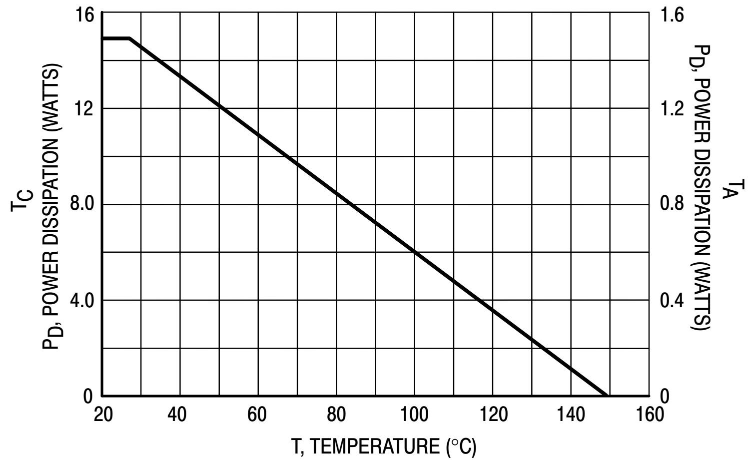


Figure 1. Power Derating

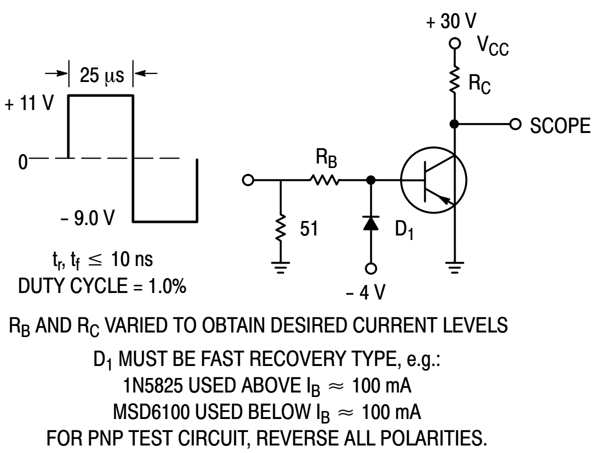


Figure 2. Switching Time Test Circuit

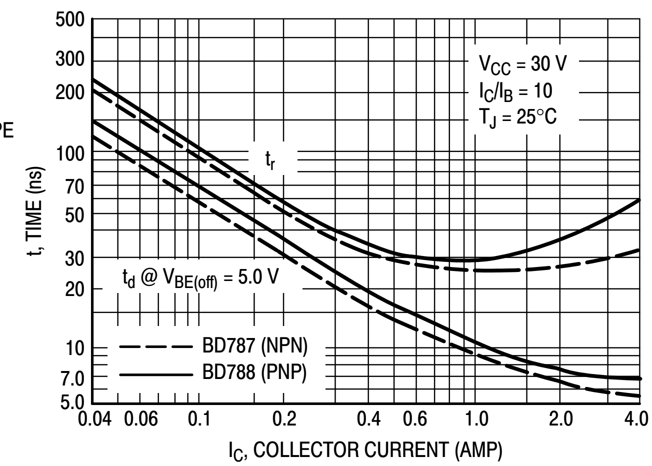


Figure 3. Turn−On Time

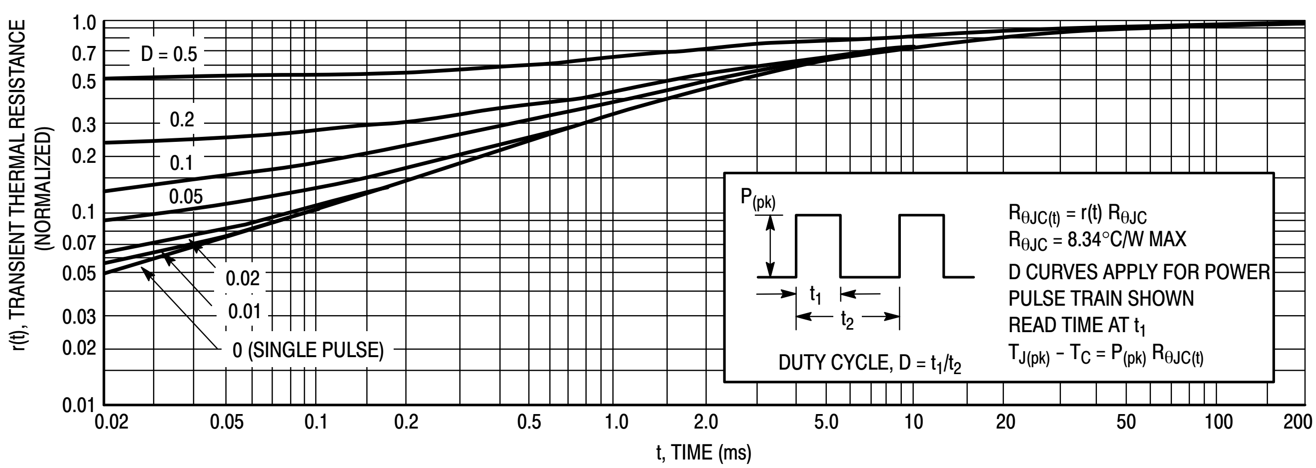


Figure 4. Thermal Response

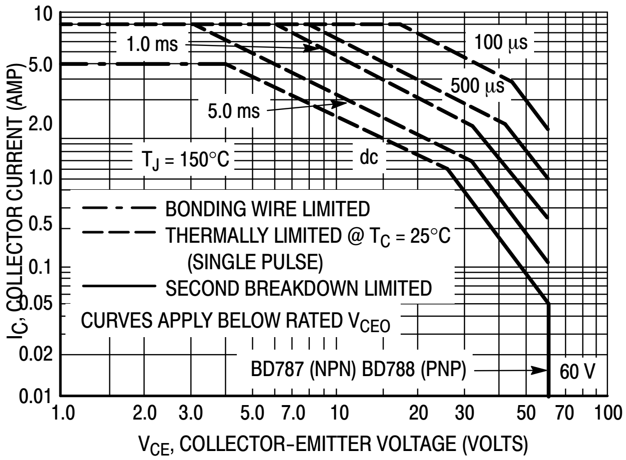


Figure 5. Active Region Safe Operating Area

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 5 is based on $T_{J(pk)} = 150°C$: T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} \le 150°C$, $T_{J(pk)}$ may be calculated from the data in Figure 4. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

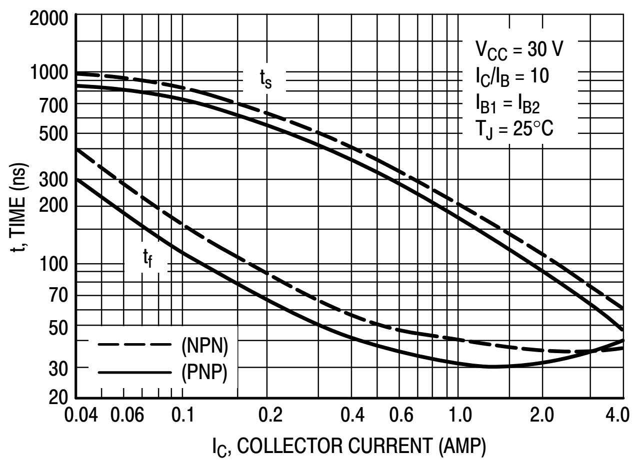


Figure 6. Turn−Off Time

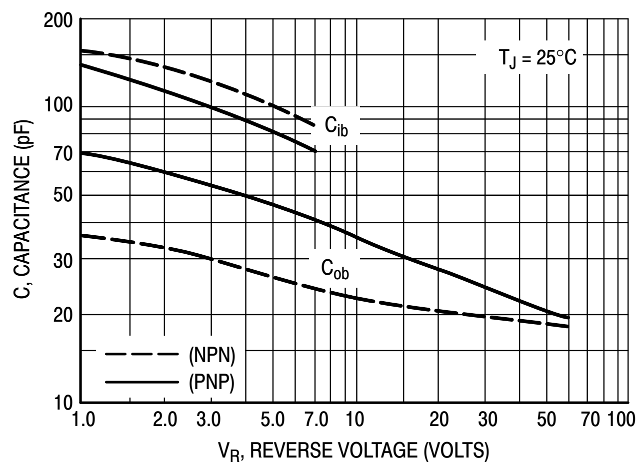


Figure 7. Capacitance

NPN
BD787

NPN
BD788

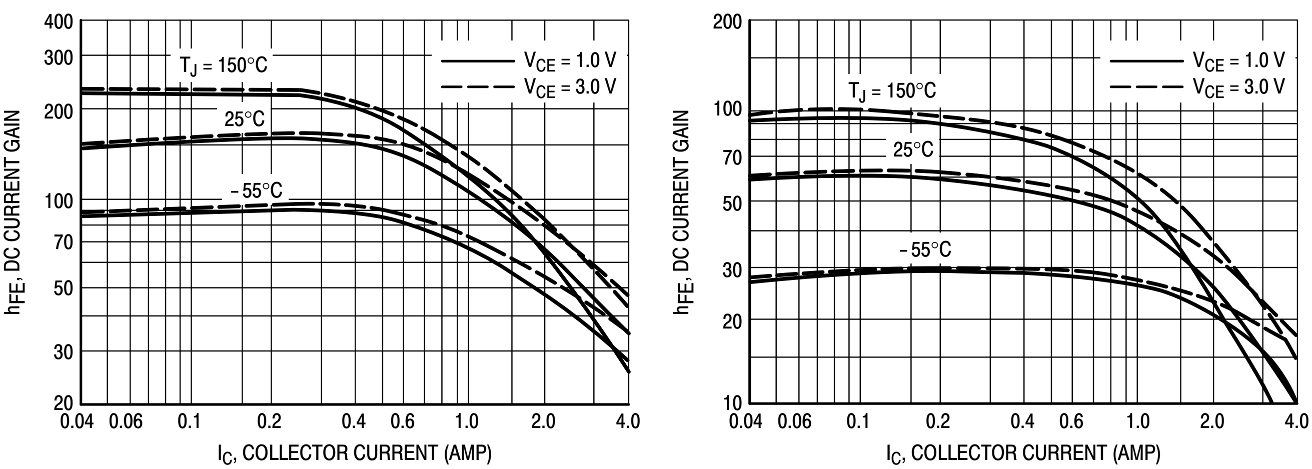


Figure 8. DC Current Gain

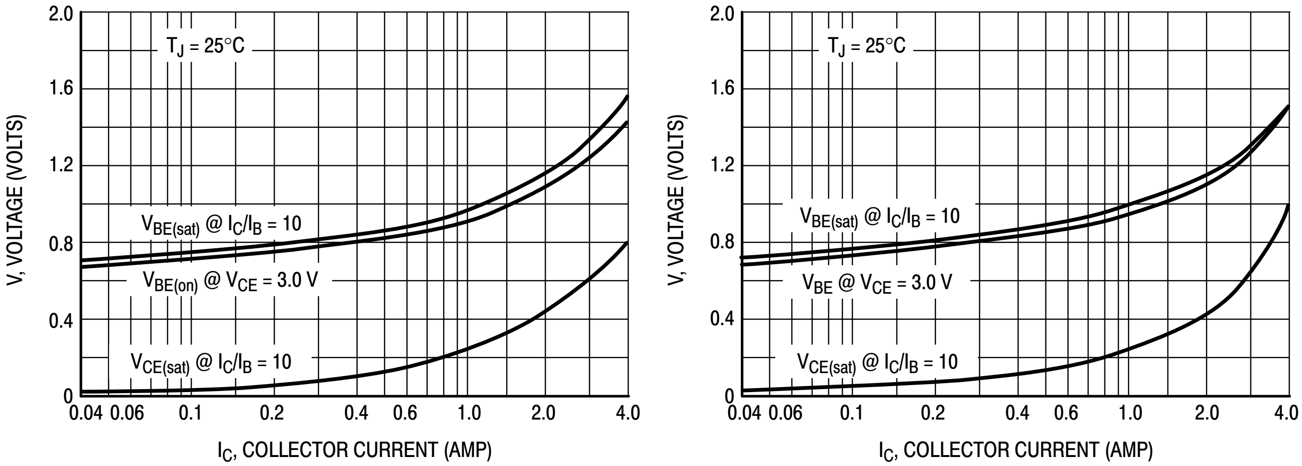


Figure 9. “On” Voltages

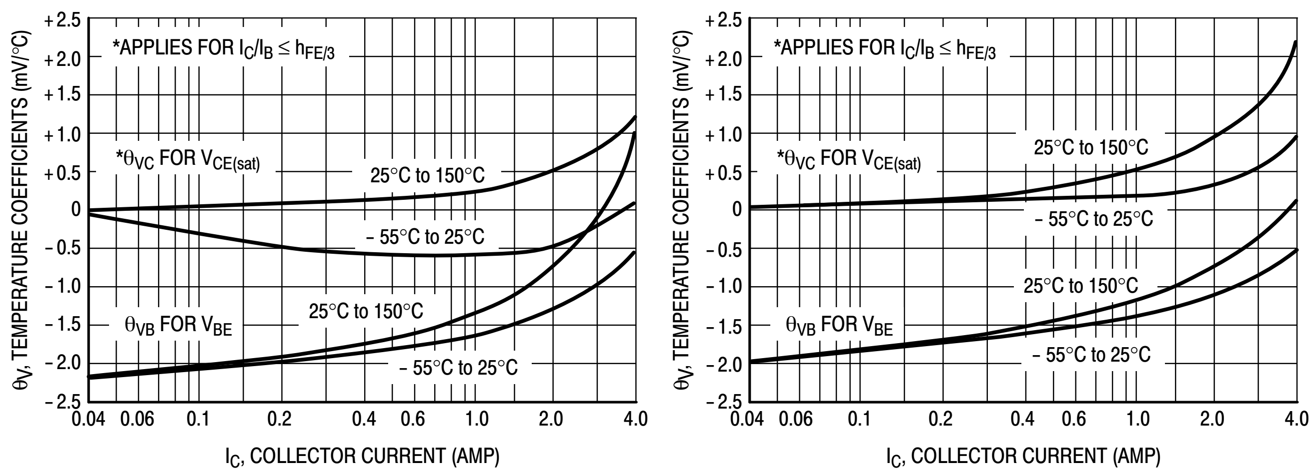
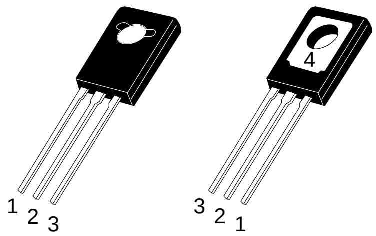


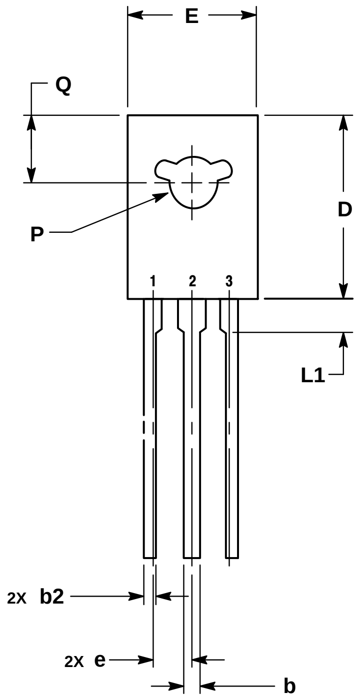
Figure 10. Temperature Coefficients

PACKAGE DIMENSIONS

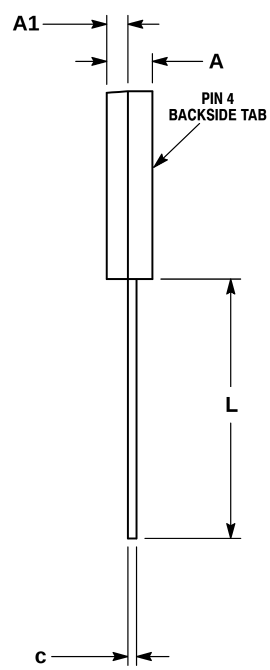


FRONT VIEW BACK VIEW

TO−225
CASE 77−09
ISSUE AC



FRONT VIEW



SIDE VIEW

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

	MILLIMETERS	
DIM	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

PUBLICATION ORDERING INFORMATION

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