

Complementary Plastic Silicon Power Transistors

... designed for lower power audio amplifier and low current, high-speed switching applications.

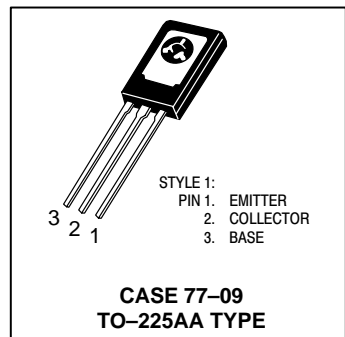
- Low Collector–Emitter Sustaining Voltage — $V_{CEO(sus)}$ 60 Vdc (Min) — BD787, BD788
- High Current–Gain — Bandwidth Product — $f_T = 50$ MHz (Min) @ $I_C = 100$ mAdc
- Collector–Emitter Saturation Voltage Specified at 0.5, 1.0, 2.0 and 4.0 Adc

**NPN
BD787
PNP
BD788**

**4 AMPERE
POWER TRANSISTORS
COMPLEMENTARY
SILICON
60 VOLTS
15 WATTS**

MAXIMUM RATINGS

| Rating | Symbol | BD787 BD788 | 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 — Peak | I_C | 4.0 8.0 | Adc Adc |
| Base Current | I_B | 1.0 | Adc |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate Above 25°C | P_D | 15 0.12 | Watts W/ $^\circ\text{C}$ |
| Operating and Storage Junction Temperature Range | T_J, T_{stg} | -65 to +150 | $^\circ\text{C}$ |



THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|--------------------------------------|-----------------|------|---------------------------|
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 8.34 | $^\circ\text{C}/\text{W}$ |

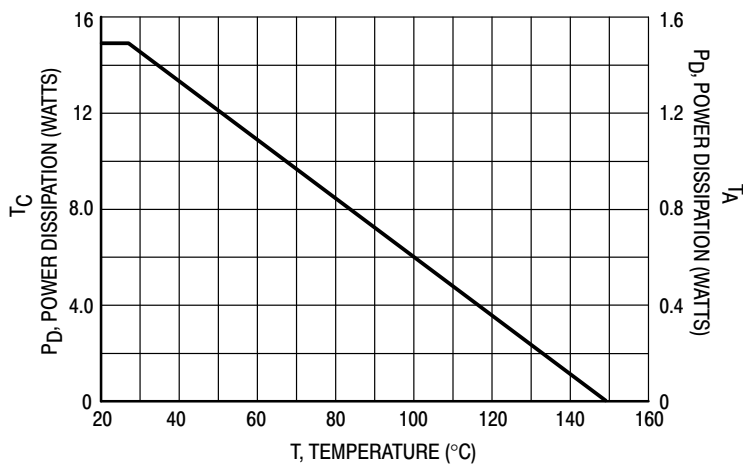


Figure 1. Power Derating

BD787 BD788

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

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

*Indicates JEDEC Registered Data

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

BD787 BD788

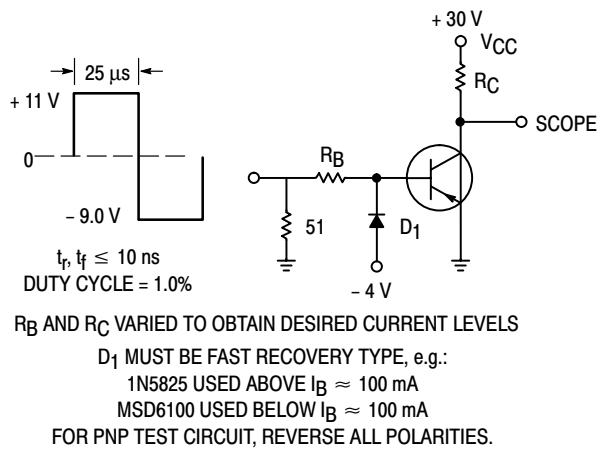


Figure 2. Switching Time Test Circuit

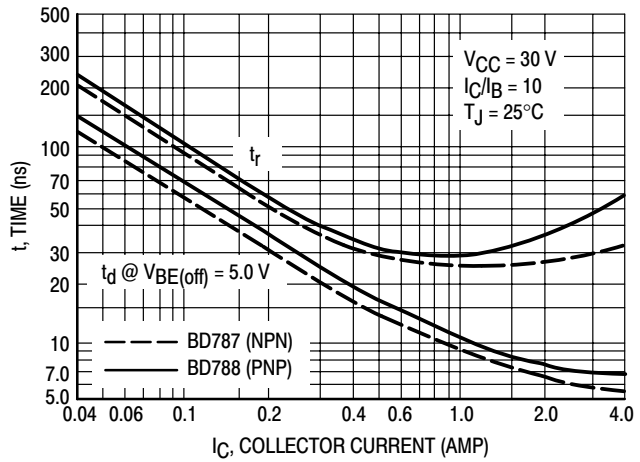


Figure 3. Turn-On Time

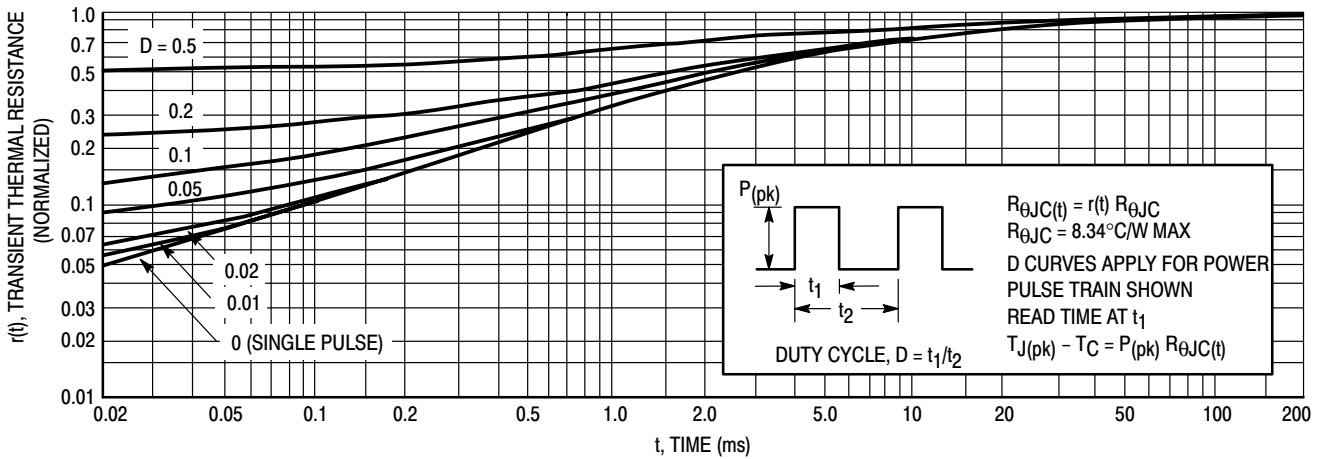


Figure 4. Thermal Response

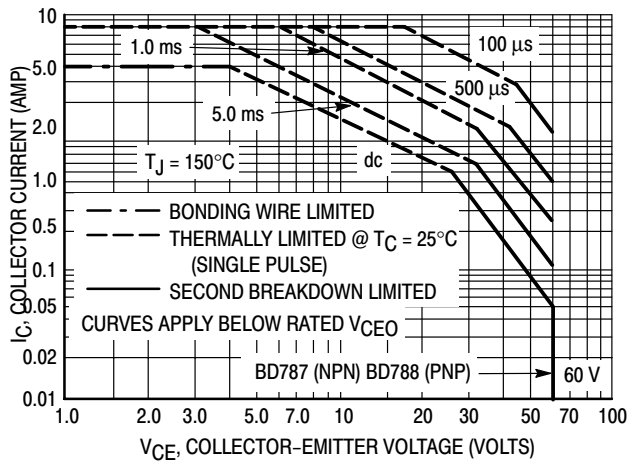


Figure 5. Active Region Safe Operating Area

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 $T_{J(pk)} = 150^\circ\text{C}$: T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} \leq 150^\circ\text{C}$, $T_{J(pk)}$ 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.

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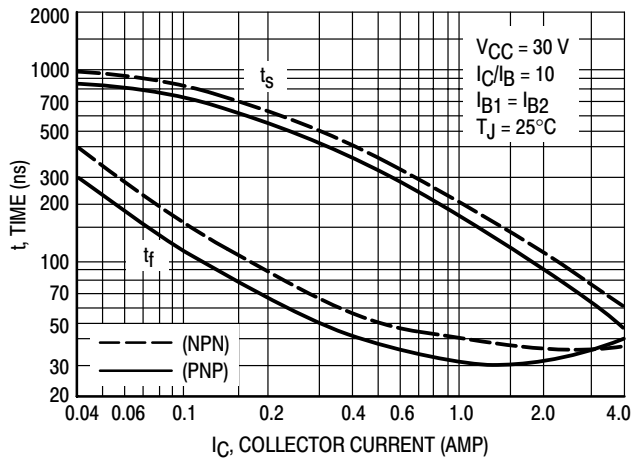


Figure 6. Turn-Off Time

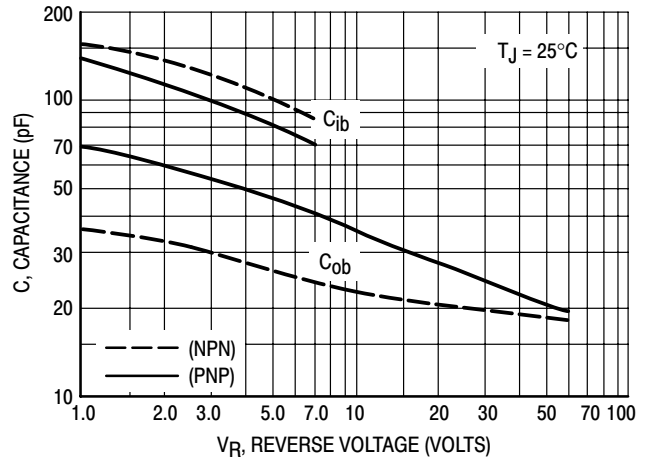


Figure 7. Capacitance

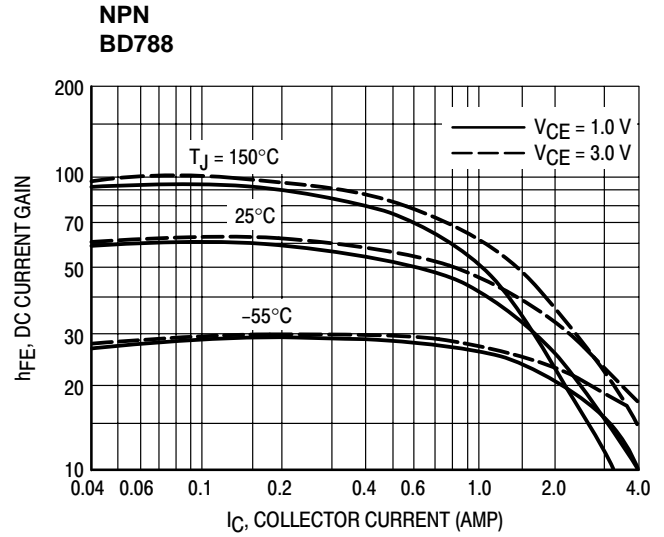
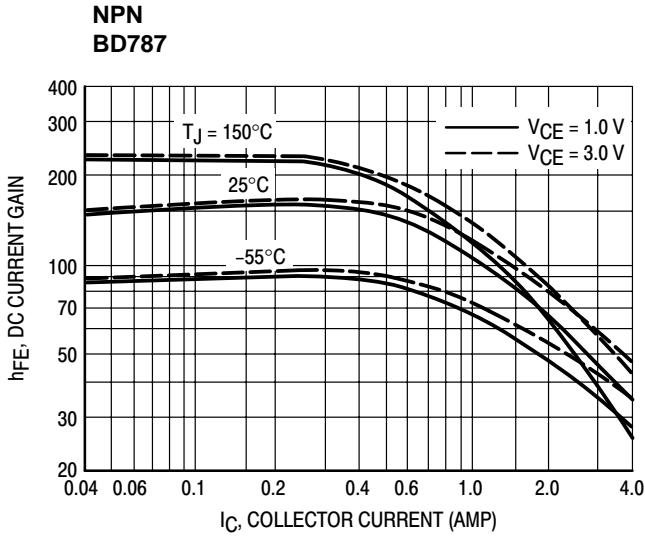


Figure 8. DC Current Gain

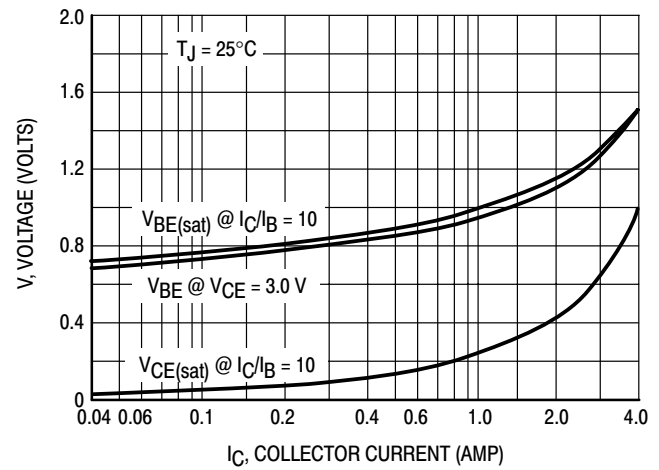
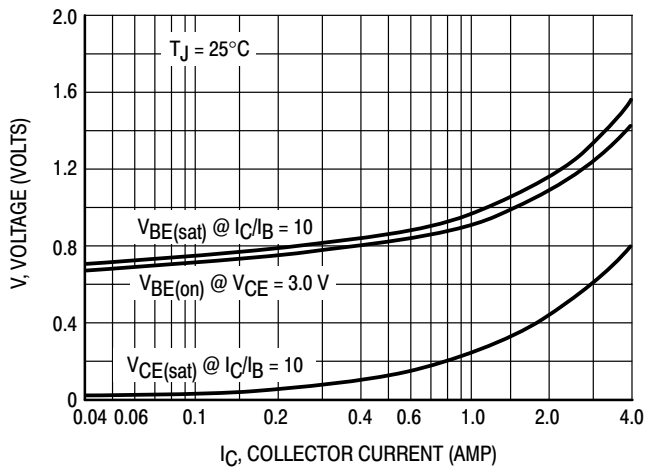


Figure 9. "On" Voltages

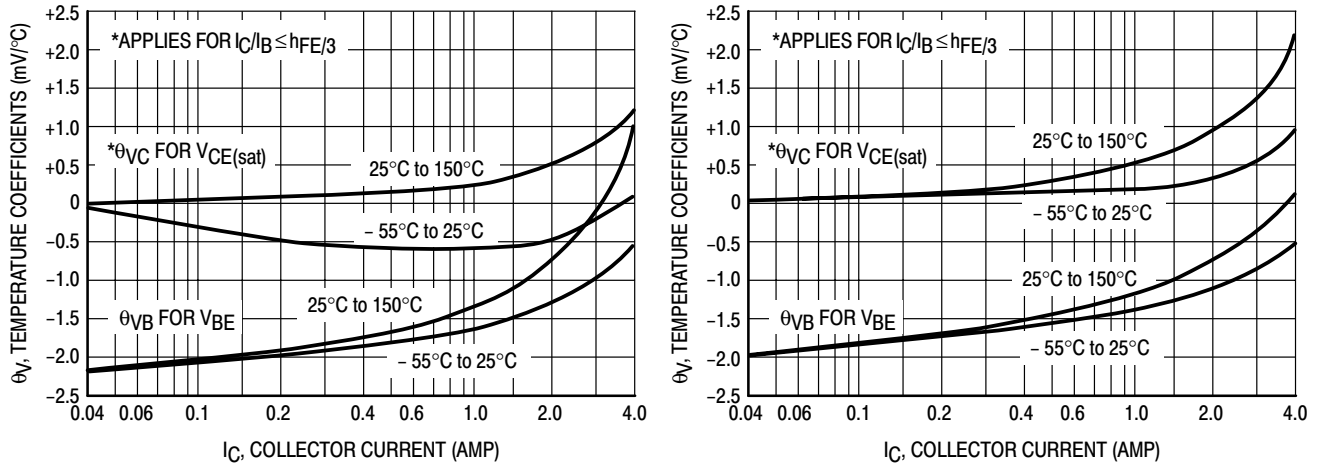
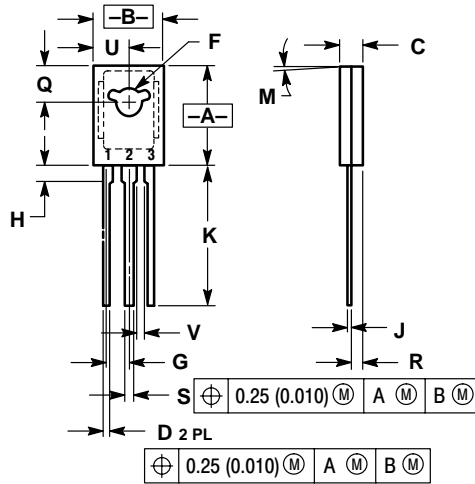


Figure 10. Temperature Coefficients

BD787 BD788

PACKAGE DIMENSIONS

TO-225AA
CASE 77-09
ISSUE W




- 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 | 0.065 | 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

Notes

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