MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

BD185
BD187
BD189

PLASTIC MEDIUM POWER
SILICON NPN TRANSISTOR

. . . designed for use in 5 to 10 Watt audio amplifiers utilizing complementary or quasi complementary circuits.

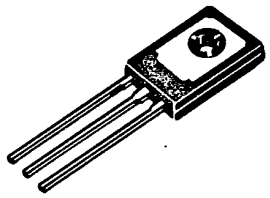
- DC Current Gain—h_{FE} = 40 (Min) @ I_C = 0.5 Adc
- BD 185, 187, 189 are complementary with BD 186, 188, 190

4 AMPERE
POWER TRANSISTOR

NPN SILICON

30, 45, 60 VOLTS
40 WATTS

MARCH 1970—E-003



MAXIMUM RANGS

Rating	Symbol	Type	Value	Unit
Collector-Emitter Voltage	V_{CEO}	BD 185 BD 187 BD 189	30 45 60	Vdc
Collector-Base Voltage	V_{CBO}	BD 185 BD 187 BD 189	40 55 70	Vdc
Emitter-Base Voltage	V_{EBO}		5	Vdc
Collector Current	I_C		4.0	Adc
Base Current	I_B		2.0	Adc
Total Device Dissipation T_C=25°C Derate above 25°C	P_D		40 320	Watts mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}		−65 to +150	°C

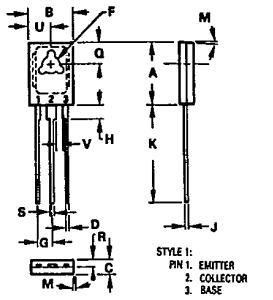
THERMAL CHARACTERISTICS

Characteristic	Symbol		Max	Unit
Thermal Resistance, Junction to Case	θ_{JC}		3.12	° C/W

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

Characteristic	Symbol	Type	Min	Max	Unit
Collector-Emitter Sustaining Voltage* (I_C = 0.1 Adc, I_B = 0)	BV_{CEO}*	BD 185 BD 187 BD 189	30 45 60	— — —	Vdc
Collector Cutoff Current (V_{CB} = 40 Vdc, I_E = 0) (V_{CB} = 55 Vdc, I_E = 0) (V_{CB} = 70 Vdc, I_E = 0)	I_{CBO}	BD 185 BD 187 BD 189	— — —	0.1 0.1 0.1	mAdc
Emitter Cutoff Current (V_{BE} = 5.0 Vdc, I_C = 0)	I_{EBO}		—	1.0	mAdc
DC current Gain (I_C = 0.5 A, V_{CE} = 2 V) (I_C = 2A, V_{CE} = 2 V)	h_{FE}*		40 15	— —	
Collector-Emitter Saturation Voltage* (I_C = 2Adc, I_B = 0.2 Adc)	$V_{CE(sat)}$*		—	1.0	Vdc
Base-Emitter On Voltage* (I_C = 2Adc, V_{CE} = 2.0 Vdc)	$V_{BE(on)}$*		—	1.5	Vdc
Current-Gain-Bandwidth Product (I_C = 1.0 Adc, V_{CE} = 10 Vdc, f = 1.0 MHz)	f_T		2.0	—	MHz

* Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.



NOTES
1. MT = MAIN TERMINAL.
2. LEADS, TRUE POSITIONED WITHIN 0.25mm (0.010) DIA TO DIM A & B AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	10.80	11.04	0.425	0.435
B	7.50	7.74	0.295	0.305
C	2.42	2.66	0.095	0.105
D	0.51	0.66	0.020	0.026
F	2.93	3.17	0.115	0.125
G	2.32	2.46	0.091	0.097
H	1.27	2.41	0.050	0.095
J	0.39	0.63	0.015	0.025
K	14.61	16.63	0.575	0.655
M	3° TYP		3° TYP	
Q	3.76	4.01	0.148	0.158
R	1.15	1.39	0.045	0.055
S	0.64	0.88	0.025	0.035
U	3.69	3.93	0.145	0.155
V	1.02	—	0.040	—

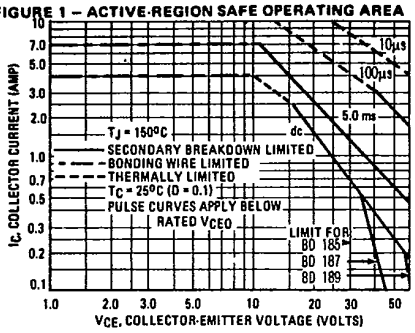
CASE 77-05
TO-126

3

BD185, BD187, BD189

T-33-11

FIGURE 1 – ACTIVE-REGION SAFE OPERATING AREA



The Safe Operating Area Curves indicate I_C–V_{CE} limits below which the device will not enter secondary breakdown. Collector load lines for specific circuits must fall within the applicable Safe Area to avoid causing a catastrophic failure. To insure operation below the maximum T_J, power-temperature derating must be observed for both steady state and pulse power conditions.

FIGURE 2 – COLLECTOR SATURATION REGION

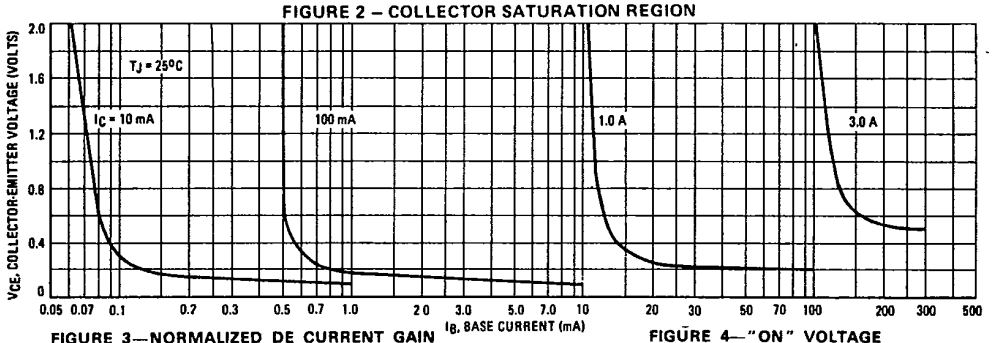


FIGURE 3—NORMALIZED DE CURRENT GAIN

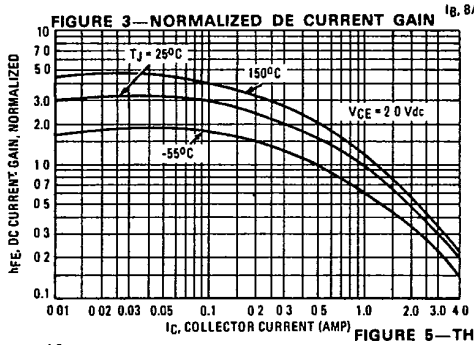


FIGURE 4—"ON" VOLTAGE

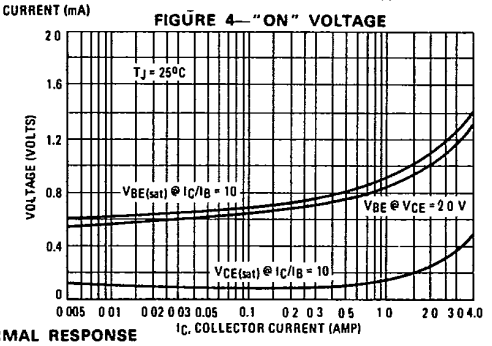


FIGURE 5—THERMAL RESPONSE

