

MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA
**PLASTIC MEDIUM POWER
SILICON NPN TRANSISTOR**

... designed for use as audio amplifiers and drivers utilizing complementary or quasi complementary circuits.

- DC Current Gain— $h_{FE} = 40$ (Min) @ $I_C = 0.15$ Adc
- BD 165, 167, 169 are complementary with BD 166, 168, 170

MAXIMUM RATINGS

Rating	Symbol	Type	Value	Unit
Collector-Emitter Voltage	V_{CEO}	BD 165	45	Vdc
		BD 167	60	
		BD 169	80	
Collector-Base Voltage	V_{CBO}	BD 165	45	Vdc
		BD 167	60	
		BD 169	80	
Emitter-Base Voltage	V_{EBO}		5	Vdc
Collector Current	I_C		1.5	Adc
Base Current	I_B		0.5	Adc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$	P_D		1.25	Watts
			8	mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$	P_D		20	Watt
			160	mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}		-65 to +150	$^\circ\text{C}$

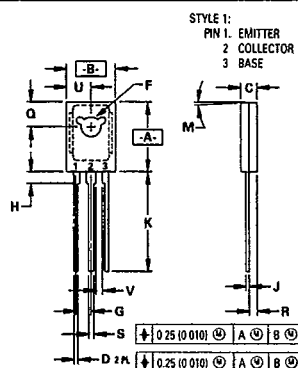
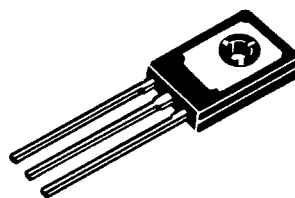
THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	θ_{JC}	6.25	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient	θ_{JA}	100	$^\circ\text{C/W}$

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

Characteristic	Symbol	Type	Min	Max	Unit
Collector-Emitter Sustaining Voltage* ($I_C = 0.1$ Adc, $I_B = 0$)	BV_{CEO}	BD 165	45	—	Vdc
		BD 167	60	—	
		BD 169	80	—	
Collector Cutoff Current ($V_{CB} = 45$ Vdc, $I_E = 0$) ($V_{CB} = 60$ Vdc, $I_E = 0$) ($V_{CB} = 80$ Vdc, $I_E = 0$)	I_{CBO}	BD 165	—	0.1	mAdc
		BD 167	—	0.1	
		BD 169	—	0.1	
Emitter Cutoff Current ($V_{BE} = 5.0$ Vdc, $I_C = 0$)	I_{EBO}		—	1.0	mAdc
DC current Gain ($I_C = 0.15$ A, $V_{CE} = 2$ V) ($I_C = 0.5$ A, $V_{CE} = 2$ V)	h_{FE}		40	—	
			15	—	
Collector-Emitter Saturation Voltage* ($I_C = 0.5$ Adc, $I_B = 0.05$ Adc)	$V_{CE(sat)}$		—	0.5	Vdc
Base-Emitter On Voltage* ($I_C = 0.5$ Adc, $V_{CE} = 2.0$ Vdc)	$V_{BE(on)}$		—	0.95	Vdc
Current-Gain-Bandwidth Product ($I_C = 500$ mAdc, $V_{CE} = 2$ Vdc, $f = 1.0$ MHz)	f_T		6.0	—	MHz

* Pulse Test: Pulse Width ≤ 300 μs , Duty Cycle $\leq 20\%$.

BD165
BD167
BD169
**1.5 AMPERE
POWER TRANSISTOR**
NPN SILICON
45, 60, 80 VOLTS
20 WATTS
**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION INCH

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	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	2.39	BSC	0.094	BSC
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 77-08
TO-225AA TYPE

T-33-09

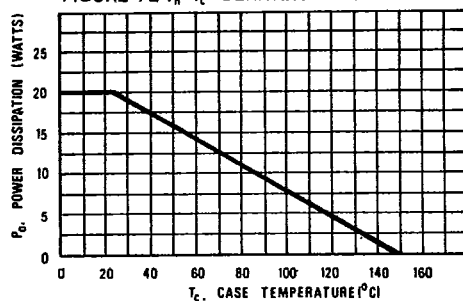
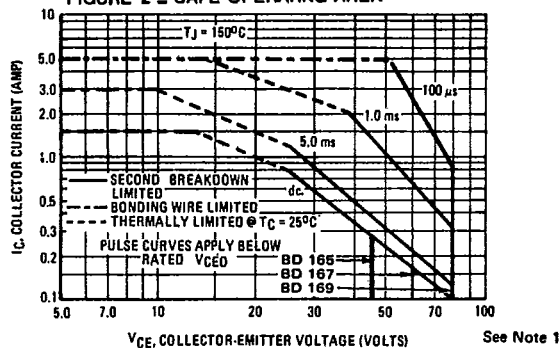
FIGURE 1 - P_D - T_C DERATING CURVE

FIGURE 2 - SAFE OPERATING AREA



See Note 1

FIGURE 3 - COLLECTOR SATURATION REGION

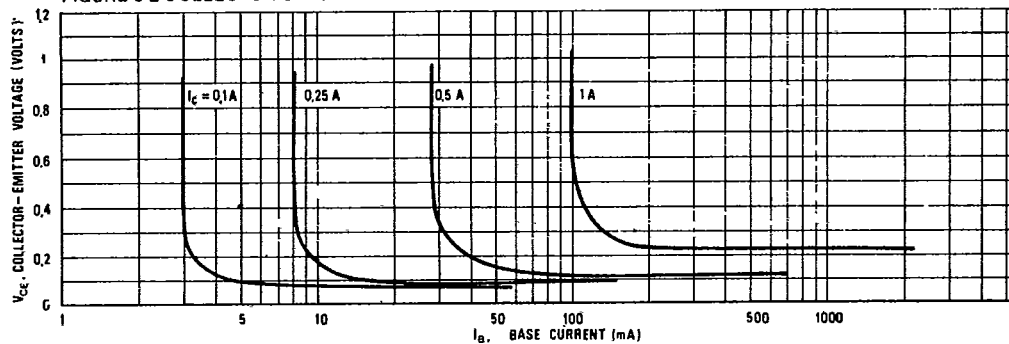


FIGURE 4 - CURRENT GAIN

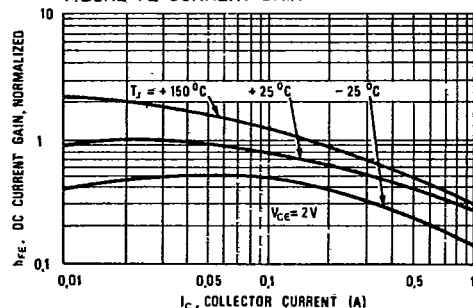
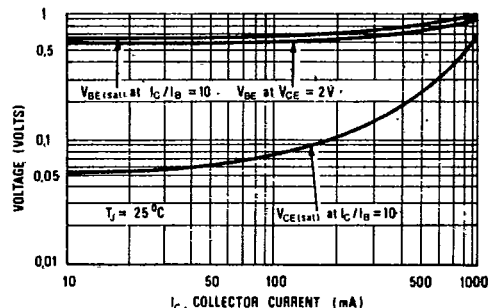


FIGURE 5 - "ON" VOLTAGE



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 2 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. (See AN-415)