

6367254 MOTOROLA SC (XSTRS/R F)

96D 80563

DT-33-11

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

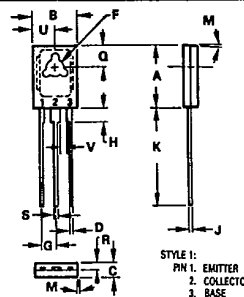
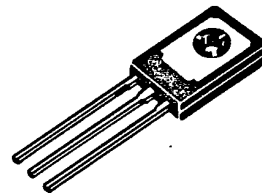
### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$\theta_{JC}$	3.12	°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 185	30	—	Vdc
		BD 187	45	—	
		BD 189	60	—	
Collector Cutoff Current ( $V_{CB} = 40$ Vdc, $I_E = 0$ ) ( $V_{CB} = 65$ Vdc, $I_E = 0$ ) ( $V_{CB} = 70$ Vdc, $I_E = 0$ )	$I_{CBO}$	BD 185	—	0.1	mA
		BD 187	—	0.1	
		BD 189	—	0.1	
Emitter Cutoff Current ( $V_{BE} = 5.0$ Vdc, $I_C = 0$ )	$I_{EBO}$		—	1.0	mA
DC current Gain ( $I_C = 0.5$ A, $V_{CE} = 2$ V) ( $I_C = 2$ A, $V_{CE} = 2$ V)	$h_{FE}$		40	—	
			15	—	
Collector-Emitter Saturation Voltage* ( $I_C = 2$ Adc, $I_B = 0.2$ Adc)	$V_{CE(sat)}$		—	1.0	Vdc
Base-Emitter On Voltage* ( $I_C = 2$ Adc, $V_{CE} = 2.0$ 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  $\leq 300$   $\mu$ s, Duty Cycle  $\leq 2.0\%$ .



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		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	0.65	0.020	0.026
E	2.93	3.17	0.115	0.125
F	2.32	2.46	0.091	0.097
G	1.27	2.41	0.050	0.095
H	0.39	0.63	0.015	0.025
J	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	3.89	3.93	0.153	0.155
V	1.02		0.040	

**CASE 77-05  
TO-126**

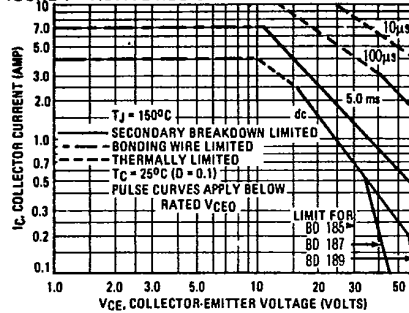
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BD185, BD187, BD189

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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

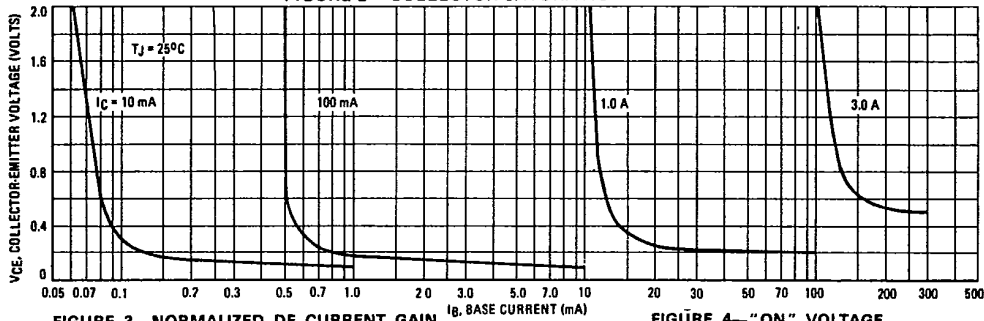


FIGURE 3 - NORMALIZED DC CURRENT GAIN

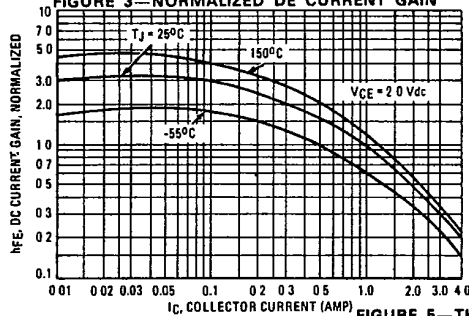


FIGURE 4 - "ON" VOLTAGE

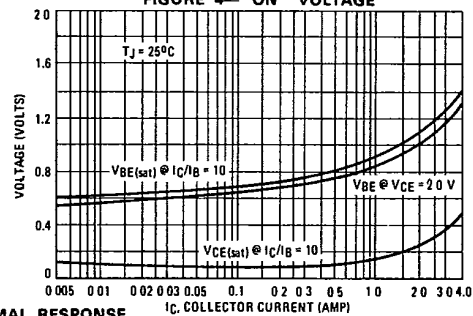


FIGURE 5 - THERMAL RESPONSE

