

6367254 MOTOROLA SC (XSTRS/R F)

96D 80565 DT-33-19

**MOTOROLA**  
**SEMICONDUCTOR**  
**TECHNICAL DATA**

**BD186**  
**BD188**  
**BD190**

**PLASTIC MEDIUM POWER  
SILICON PNP TRANSISTOR**

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

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

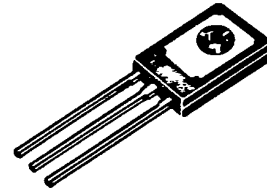
**4 AMPERE  
POWER TRANSISTOR**

**PNP SILICON**

**30, 45, 60 VOLTS  
40 WATTS**

**MAXIMUM RANGS**

Rating	Symbol	Type	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	BD 186 BD 188 BD 190	30 45 60	Vdc
Collector-Base Voltage	$V_{CBO}$	BD 186 BD 188 BD 190	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 $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$		40 320	Watts mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$		-65 to +150	$^\circ\text{C}$



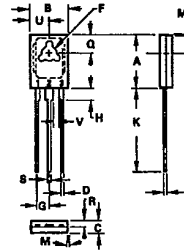
**THERMAL CHARACTERISTICS**

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$\theta_{JC}$	3.12	$^\circ\text{C/W}$

**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 186 BD 188 BD 190	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 186 BD 188 BD 190	— — —	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) ( $I_C = 2$ A, $V_{CE} = 2$ V)	$h_{FE}$		40 15	—	
Collector-Emitter Saturation Voltage* ( $I_C = 2.0$ Adc, $I_B = 0.2$ Adc)	$V_{CE(sat)}$		—	1.0	Vdc
Base-Emitter On Voltage* ( $I_C = 2.0$ 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  $\leq 300$   $\mu\text{s}$ . Duty Cycle  $\leq 2.0\%$ .



MILLIMETERS		INCHES		
DIM	MIN	MAX	MIN	MAX
A	5.00	11.00	0.20	0.43
B	2.98	3.74	0.29	0.35
C	2.42	2.86	0.09	0.11
D	0.11	0.26	0.00	0.01
E	2.92	3.17	0.11	0.13
F	2.32	2.48	0.09	0.09
G	1.27	1.41	0.05	0.06
H	0.30	0.32	0.01	0.01
I	10.41	10.92	0.41	0.43
J	—	—	—	—
K	0.25	0.41	0.01	0.16
L	0.15	0.20	0.01	0.01
M	0.15	0.20	0.01	0.01
N	0.10	0.15	0.01	0.01
V	1.02	—	0.04	—

STYLE 1  
1. PNP - EMITTER  
2. COLLECTOR  
3. BASE

NOTES:  
1. M1 - MAIN TERMINAL  
2. LEADS THREE POSITIONED WITHIN 8 DEGREE BE CH  
DIA TO DIM A & B AT MAXIMUM MATERIAL  
CONDITION.

**CASE 77-05  
TO-126**

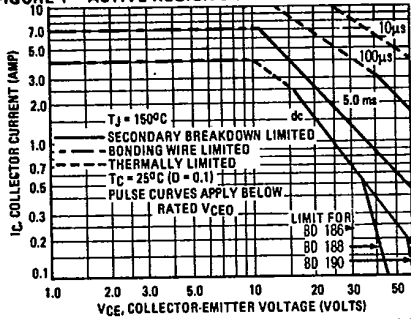
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96D 80566 D

BD186, BD188, BD190

T-33-19

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

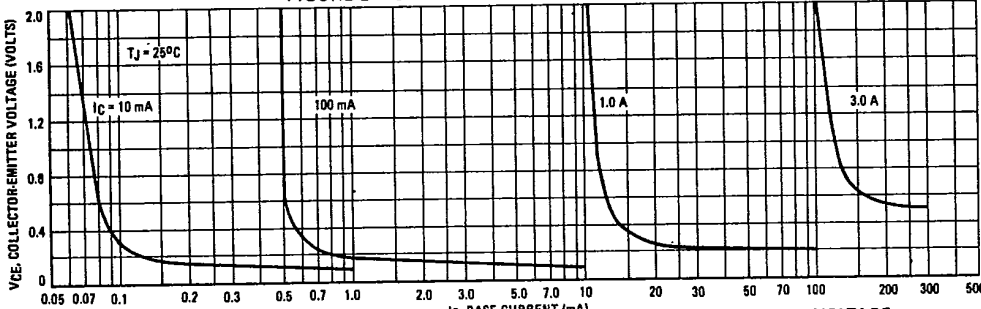


FIGURE 3 - NORMALIZED DC CURRENT GAIN

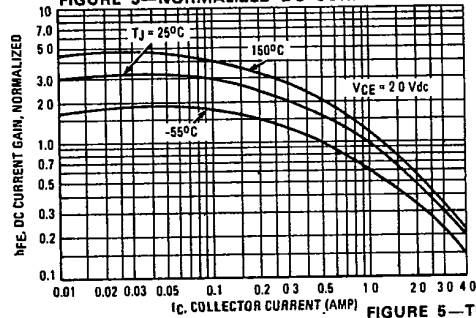


FIGURE 4 - "ON" VOLTAGE

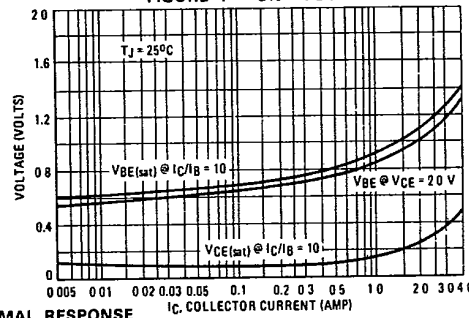


FIGURE 5 - THERMAL RESPONSE

