

6367254 MOTOROLA SC (XSTRS/R F)

96D 80599 D
T-33-07

MOTOROLA SEMICONDUCTOR TECHNICAL DATA

**BD505
BD507
BD509**

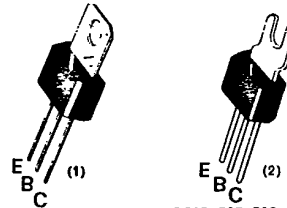
NPN SILICON ANNULAR TRANSISTORS

... designed for complementary symmetry audio circuits

- Excellent Current Gain Linearity — 1.0 mAdc to 1.0 Adc
- Low Collector-Emitter Saturation Voltage — $V_{CE(sat)} = 0.7 \text{ Vdc (Max) @ } I_C = 1.0 \text{ Adc}$
- Complements to PNP BD506, BD508, BD510
- Uniwatt[▲] Package for Excellent Thermal Properties —
1.0 Watt @ $T_A = 25^\circ\text{C}$
10.0 Watts @ $T_C = 25^\circ\text{C}$

NPN SILICON AUDIO TRANSISTORS

20 - 30 - 40 VOLTS
10 WATTS



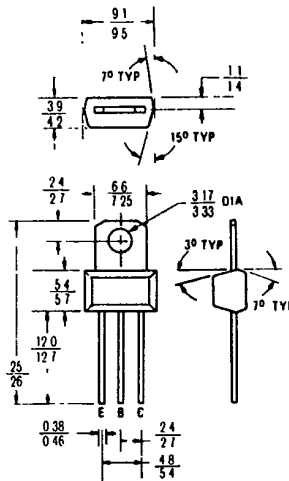
(1) Standard package: BD505, 507, 509
(2) Tab formed for flat mounting: BD505-1, 507-1, 509-1
Also available with leads formed to TO-5 configuration: BD505-5, 507-5, 509-5

MAXIMUM RATINGS

Rating	Symbol	BD505	BD507	BD509	Unit
Collector-Emitter Voltage	V_{CEO}	20	30	40	Vdc
Collector-Base Voltage	V_{CB}	30	40	50	Vdc
Emitter-Base Voltage	V_{EB}	5.0			Vdc
Collector Current - Continuous	I_C	2.0			Adc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	1.0			Watt
		8.0			mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	10			Watts
		80			mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-55 to +150			$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	θ_{JC}	12.5	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient	θ_{JA}	125	$^\circ\text{C/W}$



All dimensions in millimeters
Collector connected to tab

CASE 152

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BD505, BD507, BD509

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage ($I_C = 1.0 \text{ mA}$, $I_B = 0$)	BD505 BD507 BD509	20 30 40	— — —	— — —	Vdc
Emitter-Base Breakdown Voltage ($I_E = 100 \mu\text{A}$, $I_C = 0$)		5	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 20, 30, 40 \text{ Vdc}$, $I_E = 0$)	BD505 BD507 BD509	— — —	— — —	100 100 100	nA

ON CHARACTERISTICS

DC Current Gain (1) ($I_C = 250 \text{ mA}$, $V_{CE} = 2 \text{ Vdc}$) ($I_C = 1.0 \text{ A}$, $V_{CE} = 2 \text{ Vdc}$)	h_{FE}	60 40	160 90	— —	—
Collector-Emitter Saturation Voltage(1) ($I_C = 1.0 \text{ A}$, $I_B = 0.1 \text{ A}$)	$V_{CE(sat)}$	—	0.30	0.7	Vdc
Base-Emitter On Voltage (1) ($I_C = 1.0 \text{ A}$, $V_{CE} = 1.0 \text{ Vdc}$)	$V_{BE(on)}$	—	0.91	1.2	Vdc

SMALL-SIGNAL CHARACTERISTICS

Current-Gain-Bandwidth Product ($I_C = 50 \text{ mA}$, $V_{CE} = 5.0 \text{ Vdc}$, $f = 100 \text{ MHz}$)	f_T	50	250	—	MHz
Output Capacitance ($V_{CB} = 10 \text{ Vdc}$, $I_E = 0$, $f = 100 \text{ kHz}$)	C_{ob}	—	—	30	pF

(1) Pulse Test Pulse Width ~ 300 μs Duty Cycle ~ 20%

FIGURE 1 — DC CURRENT GAIN

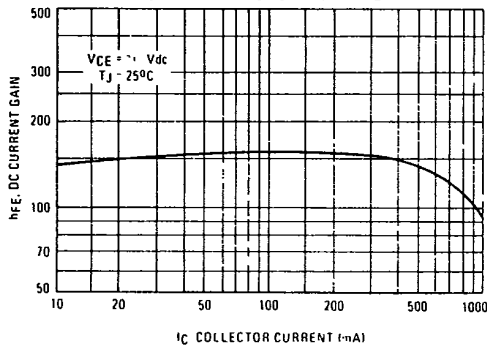


FIGURE 2 — "ON" VOLTAGES

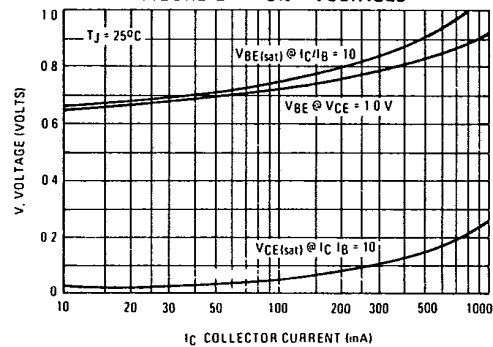
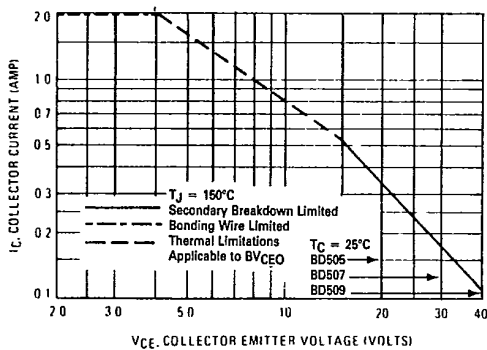


FIGURE 3 — DC SAFE OPERATING AREA



There are two limitations on the power handling ability of a transistor junction temperature and secondary 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 3 is based on $T_{J(pk)} = 150^\circ\text{C}$. T_C is variable depending on conditions. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by secondary breakdown.