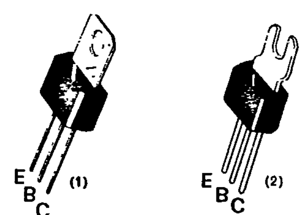
MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

BD505 BD507 BD509

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

NPN SILICON ANNULAR♦ TRANSISTORS

. . . designed for complementary symmetry audio circuits

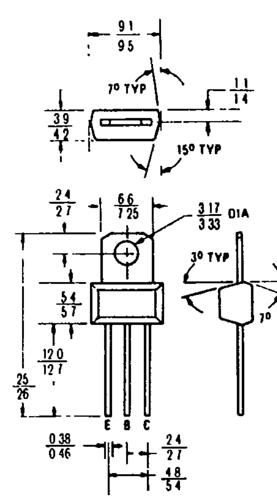
- Excellent Current Gain Linearity — 1 0 mAdc to 1 0 Adc
- Low Collector-Emitter Saturation Voltage — $V_{CE(sat)}$ = 0.7 Vdc (Max) @ I_C = 1 0 Adc
- Complements to PNP BD506, BD508, BD510
- Uniwatt▲ Package for Excellent Thermal Properties — 1 0 Watt @ T_A = 25°C, 10 0 Watts @ T_C = 25°C

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°C Derate above 25°C	P_D		1 0 8 0		Watt mW/°C
Total Device Dissipation @ T_C 25°C Derate above 25°C	P_D		10 80		Watts mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}		-55 to +150		°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	θ_{JC}	12 5	°C/W
Thermal Resistance, Junction to Ambient	θ_{JA}	125	°C/W



All dimensions in millimeters
Collector connected to tab

CASE 152

3

BD505, BD507, BD509

T-33-07

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

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Collector-Emitter Breakdown Voltage (I_C = 1.0 mAdc, I_B = 0)	BD505 BD507 BD509	BV_{CEO}	20 30 40	— — —	— — —	Vdc
Emitter-Base Breakdown Voltage (I_E = 100 μAdc, I_C = 0)		BV_{EBO}	5	—	—	Vdc
Collector Cutoff Current (VCB = 20, 30, 40 Vdc, I_E = 0)	BD505 BD507 BD509	I_{CBO}	— — —	— — —	100 100 100	nAdc
ON CHARACTERISTICS						
DC Current Gain (1) (I_C = 250 mAdc, V_{CE} = 2 Vdc) (I_C = 1 0 Adc, V_{CE} = 2 Vdc)		h_{FE}	60 40	160 90	— —	—
Collector-Emitter Saturation Voltage(1) (I_C = 1.0 Adc, I_B = 0 1 Adc)		$V_{CE(sat)}$	—	0 30	0.7	Vdc
Base-Emitter On Voltage (1) (I_C = 1.0 Adc, V_{CE} = 1.0 Vdc)		$V_{BE(on)}$	—	0.91	1.2	Vdc
SMALL-SIGNAL CHARACTERISTICS						
Current-Gain--Bandwidth Product (I_C = 50 mAdc, V_{CE} = 5 0 Vdc, f = 100 MHz)		f_T	50	250	—	MHz
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 100 kHz)		C_{ob}	—	—	30	pF

(1) Pulse Test Pulse Width ≤ 300 μs Duty Cycle ≤ 2 0%

FIGURE 1 — DC CURRENT GAIN

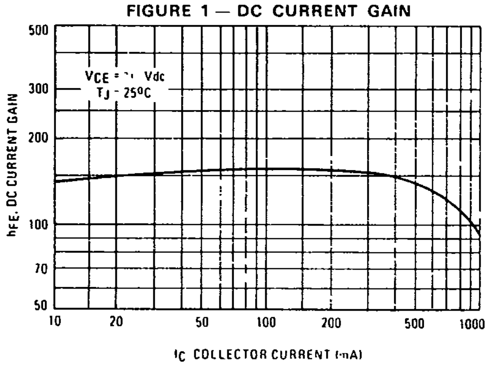


FIGURE 2 — "ON" VOLTAGES

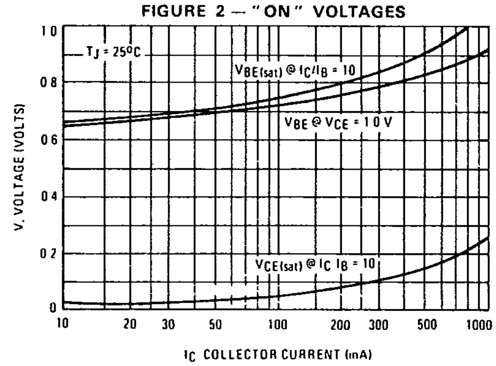
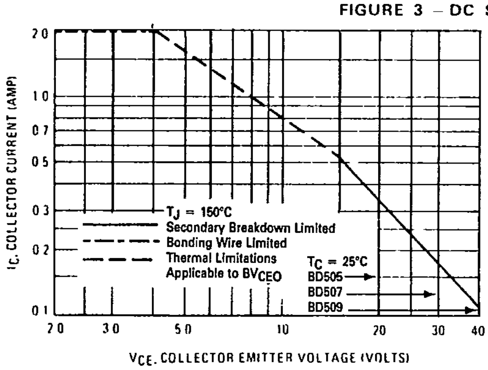


FIGURE 3 — DC SAFE OPERATING AREA



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°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

3