MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

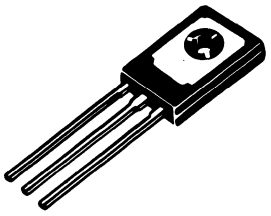
NPN
BD789, BD791
PNP
BD790, BD792

COMPLEMENTARY PLASTIC SILICON ANNULAR◆ POWER TRANSISTORS

. . . designed for low power audio amplifier and low-current, high speed switching applications.

- High Collector-Emitter Sustaining Voltage –
  $V_{CEO(sus)}$ = 80 Vdc (Min) – BD789, BD790
  = 100 Vdc (Min) –BD791, BD792
- High DC Current Gain @ I_C = 200 mAdc
  h_{FE} = 40-250
- Low Collector-Emitter Saturation Voltage –
  $V_{CE(sat)}$ = 0.5 Vdc (Max) @ I_C = 500 mAdc
- High Current Gain – Bandwidth Product –
  f_T = 40 MHz (Min) @ I_C = 100 mAdc)

4 AMPERE
POWER TRANSISTORS COMPLEMENTARY SILICON
80, 100 VOLTS
15 WATTS

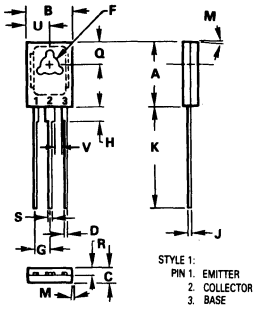


*MAXIMUM RATINGS

Rating	Symbol	BD789 BD790	BD791 BD792	Unit
Collector-Emitter Voltage	V_{CEO}	80	100	Vdc
Collector-Base Voltage	V_{CB}	80	100	Vdc
Emitter-Base Voltage	V_{EBO}	6.0		Vdc
Collector Current – Continuous – Peak	I_C	4.0 8.0		Adc
Base Current	I_B	1.0		Adc
Total Power Dissipation @ T_C = 25°C Derate above 25°C	P_D	15 0.12		Watts W/°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	$R_{\theta JC}$	8.34	°C/W



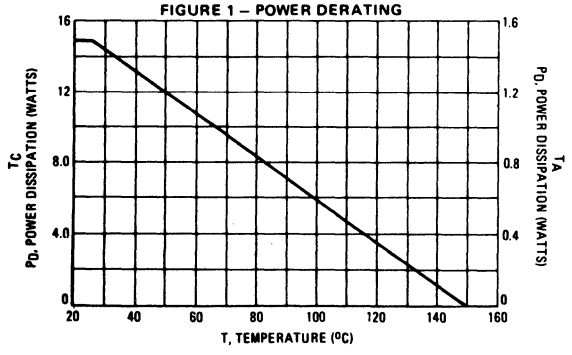
STYLE 1:
PIN 1. EMITTER
2. COLLECTOR
3. BASE

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 MIN	MAX	INCHES 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	2.32	2.46	0.091	0.097
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 77-05
TO-126

FIGURE 1 – POWER DERATING



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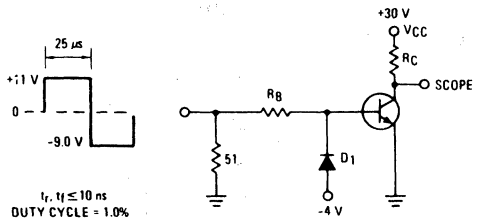
***ELECTRICAL CHARACTERISTICS** (T_C = 25°C unless otherwise noted.)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Sustaining Voltage (1)		$V_{CEO(sus)}$			Vdc
(I_C = 10 mAdc, I_B = 0)	BD789, BD790		80	–	
	BD791, BD792		100	–	
Collector Cutoff Current		I_{CEO}			μAdc
(V_{CE} = 40 Vdc, I_B = 0)	BD789, BD790		–	100	
(V_{CE} = 50 Vdc, I_B = 0)	BD791, BD792		–	100	
Collector Cutoff Current		I_{CEX}			
(V_{CE} = 80 Vdc, $V_{BE(off)}$ = 1.5 Vdc)	BD789, BD790		–	1.0	μAdc
(V_{CE} = 100 Vdc, $V_{BE(off)}$ = 1.5 Vdc)	BD791, BD792		–	1.0	
(V_{CE} = 40 Vdc, $V_{BE(off)}$ = 1.5 Vdc, T_C = 125°C)	BD789, BD790		–	0.1	mAdc
(V_{CE} = 50 Vdc, $V_{BE(off)}$ = 1.5 Vdc, T_C = 125°C)	BD791, BD792		–	0.1	
Emitter Cutoff Current		I_{EBO}	–	1.0	μAdc
(V_{EB} = 6.0 Vdc, I_C = 0)					
ON CHARACTERISTICS (1)					
DC Current Gain		h_{FE}			–
(I_C = 200 mAdc, V_{CE} = 3.0 Vdc)			40	250	
(I_C = 1.0 Adc, V_{CE} = 3.0 Vdc)			20	–	
(I_C = 2.0 Adc, V_{CE} = 3.0 Vdc)			10	–	
(I_C = 4.0 Adc, V_{CE} = 3.0 Vdc)			5.0	–	
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$			Vdc
(I_C = 500 mAdc, I_B = 50 mAdc)			–	0.5	
(I_C = 1.0 Adc, I_B = 100 mAdc)			–	1.0	
(I_C = 2.0 Adc, I_B = 200 mAdc)			–	2.5	
(I_C = 4.0 Adc, I_B = 800 mAdc)			–	3.0	
Base-Emitter Saturation Voltage		$V_{BE(sat)}$	–	1.8	Vdc
(I_C = 2.0 Adc, I_B = 200 mAdc)					
Base-Emitter On Voltage		$V_{BE(on)}$	–	1.5	Vdc
(I_C = 200 mAdc, V_{CE} = 3.0 Vdc)					
DYNAMIC CHARACTERISTICS					
Current-Gain – Bandwidth Product		f_T	40	–	MHz
(I_C = 100 mAdc, V_{CE} = 10 Vdc, f = 10 MHz)					
Output Capacitance		C_{ob}			pF
(V_{CB} = 10 Vdc, I_C = 0, f = 0.1 MHz	BD789, BD791		–	50	
	BD790, BD792		–	70	
Small-Signal Current Gain		h_{fe}	10	–	–
(I_C = 200 mAdc, V_{CE} = 10 Vdc, f = 1.0 kHz)					

*Indicates JEDEC Registered Data.
(1) Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

FIGURE 2 – SWITCHING TIME TEST CIRCUIT



R_B and R_C VARIED TO OBTAIN DESIRED CURRENT LEVELS

D_1 MUST BE FAST RECOVERY TYPE, eg:
MBD5300 USED ABOVE I_B ≈ 100 mA
MSD6100 USED BELOW I_B ≈ 100 mA

FOR PNP TEST CIRCUIT, REVERSE ALL POLARITIES

FIGURE 3 – TURN-ON TIME

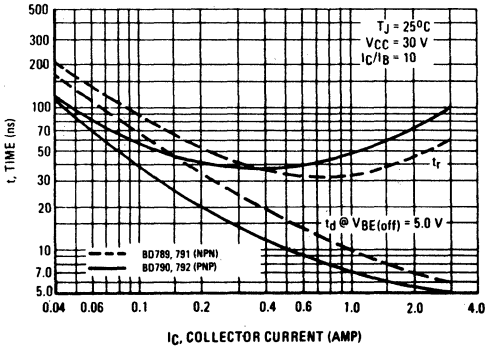


FIGURE 4 – THERMAL RESPONSE

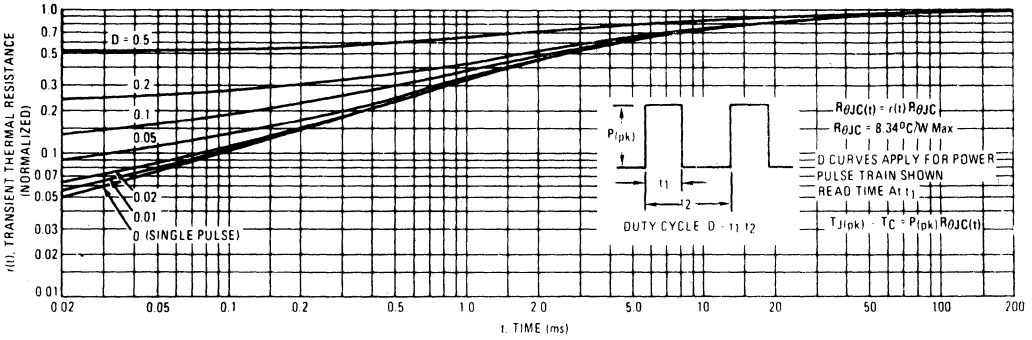
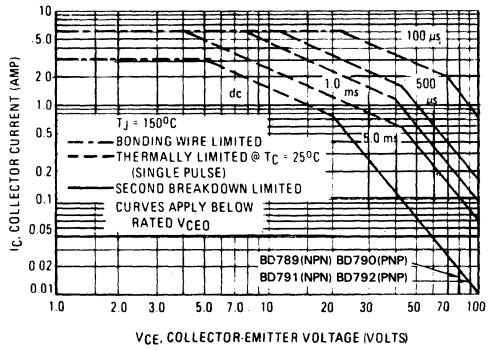


FIGURE 5 – ACTIVE REGION SAFE OPERATING AREA



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 5 is based on $T_{J(pk)}$ = 150°C; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} \leq 150^{\circ}C$. $T_{J(pk)}$ may be calculated from the data in Figure 4. 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-415A)

FIGURE 6 – TURN-OFF TIME

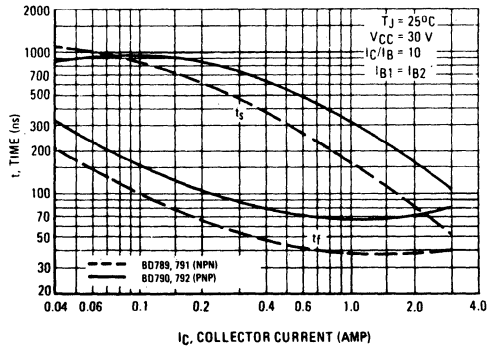


FIGURE 7 – CAPACITANCE

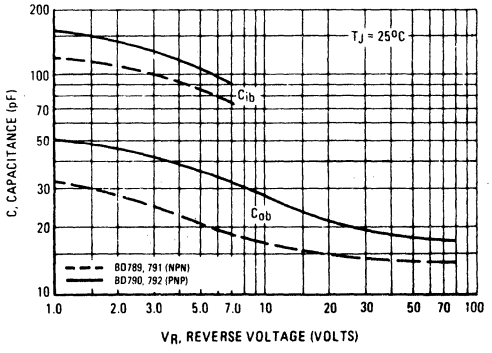


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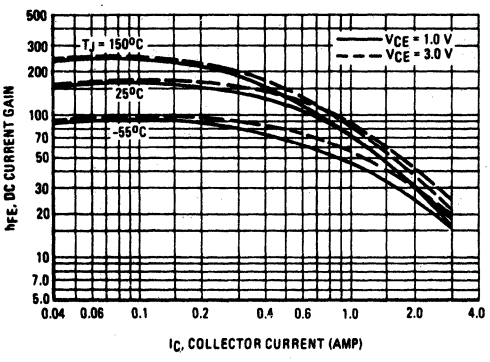
FIGURE 8 – DC CURRENT GAIN



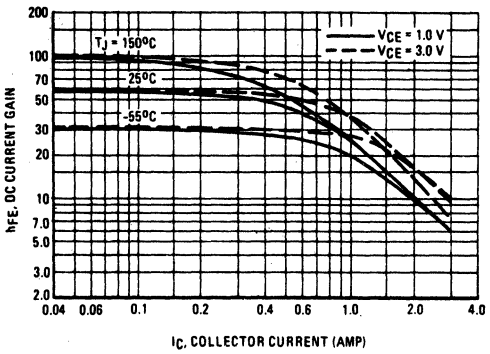
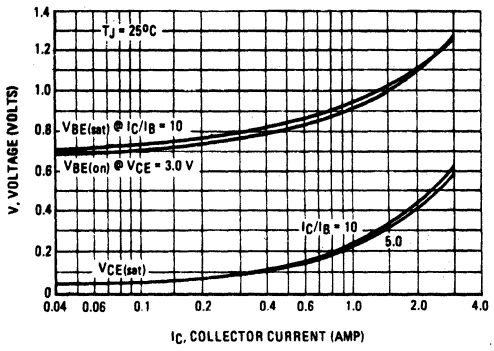


FIGURE 9 – "ON" VOLTAGES



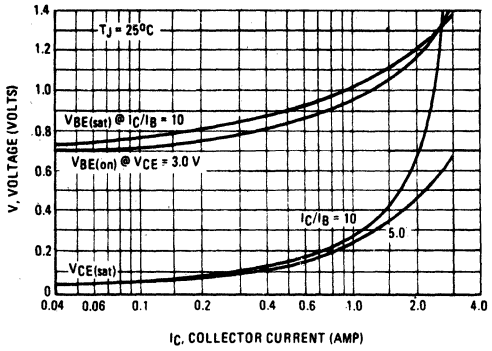


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FIGURE 10 – TEMPERATURE COEFFICIENTS