MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

2N5344

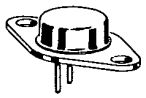
HIGH VOLTAGE POWER PNP SILICON TRANSISTOR

. . . designed for high-voltage switching and amplifier applications.

- High Voltage Rating — V_{CEO} = 250 Vdc
- Fast Switching Time — Typically Less Than 550 ns
  Total @ V_{CC} = 100 Vdc
- High Current-Gain-Bandwidth Product —
  f_T = 60 MHz (Min) @ I_C = 100 mAdc
- Packaged in the Compact, High-Efficiency TO-213AA Case

1 AMPERE
POWER TRANSISTOR
PNP SILICON

250-300 VOLTS
40 WATTS



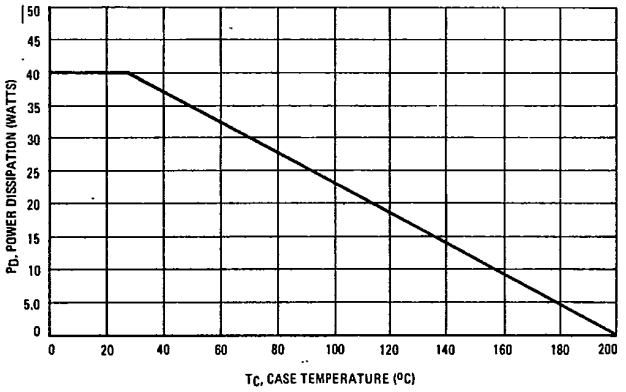
MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	250	Vdc
Collector-Base Voltage	V_{CB}	250	Vdc
Emitter-Base Voltage	V_{EB}	5.0	Vdc
Collector Current — Continuous	I_C	1.0	Adc
Base Current — Continuous	I_B	0.5	Adc
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	40 228	Watts mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200	°C

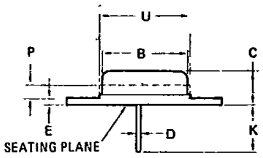
THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	θ_{JC}	4.38	°C/W

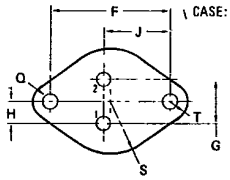
FIGURE 1 — POWER-TEMPERATURE DERATING CURVE



Safe Area Curves Are Indicated By Figure 5.
All Limits Are Applicable And Must Be Observed



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



DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
B	11.94	12.70	0.470	0.500
C	6.35	8.64	0.250	0.340
D	0.71	0.86	0.028	0.034
E	1.27	1.91	0.050	0.075
F	24.33	24.43	0.958	0.962
G	4.83	5.33	0.190	0.210
H	2.41	2.67	0.095	0.105
J	14.48	14.99	0.570	0.590
K	9.14	–	0.360	–
P	–	1.27	–	0.050
Q	3.61	3.86	0.142	0.152
S	–	8.89	–	0.350
T	–	3.68	–	0.145
U	–	15.75	–	0.620

All JEDEC Dimensions and and Notes Apply.

CASE 80-02
TO-213AA

2N5344

T-33-19

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

Characteristic		Fig. No.	Symbol	Min	Max	Unit
OFF CHARACTERISTICS						
Collector-Emitter Sustaining Voltage (1) (I_C = 10 mAdc, I_B = 0)	2N5344	5	$V_{CEO(sus)}$	250	—	Vdc
Collector Cutoff Current (V_{CE} = 225 Vdc, $V_{BE(off)}$ = 1.5 Vdc)	2N5344	10, 12	I_{CEX}	—	100	μAdc
(V_{CE} = 225 Vdc, $V_{BE(off)}$ = 1.5 Vdc, T_C = 150°C)	2N5344			—	1.0	mAdc
Collector Cutoff Current (V_{CB} = Rated V_{CB}, I_E = 0)		—	I_{CBO}	—	0.1	mAdc
Emitter Cutoff Current (V_{BE} = 5.0 Vdc, I_C = 0)		—	I_{EBO}	—	0.1	mAdc
ON CHARACTERISTICS						
DC Current Gain (1) (I_C = 500 mAdc, V_{CE} = 5.0 Vdc)		8	h_{FE}	25	150	—
(I_C = 1.0 Adc, V_{CE} = 5.0 Vdc)				7.0	—	
Collector-Emitter Saturation Voltage (I_C = 1.0 Adc, I_B = 0.2 Adc)		9, 11, 13	$V_{CE(sat)}$	—	3.0	Vdc
Base-Emitter Saturation Voltage (I_C = 1.0 Adc, I_B = 0.2 Adc)		11, 13	$V_{BE(sat)}$	—	1.5	Vdc
DYNAMIC CHARACTERISTICS						
Current-Gain—Bandwidth Product (I_C = 100 mAdc, V_{CE} = 20 Vdc, f = 10 MHz)		—	f_T	60	—	MHz
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0)		7	C_{ob}	—	200	pF
SWITCHING CHARACTERISTICS						
Turn-On	(V_{CC} = 100 Vdc, I_C = 500 mAdc, I_{B1} = I_{B2} = 50 mAdc)	2, 3	t_{on}	—	200	ns
Turn-Off	(V_{CC} = 100 Vdc, I_C = 500 mAdc, I_{B1} = I_{B2} = 50 mAdc)	2, 6	t_{off}	—	700	ns

(1) Pulse Test: Pulse Width ≈ 300 μs, Duty Cycle ≈ 2.0%

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FIGURE 2 – SWITCHING TIME TEST CIRCUIT

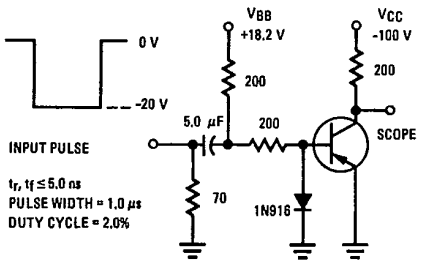


FIGURE 3 – TURN-ON TIME

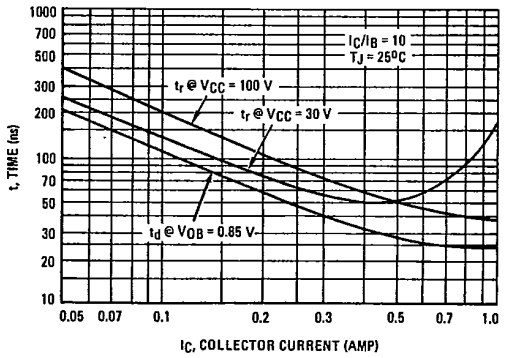


FIGURE 4 – THERMAL RESPONSE

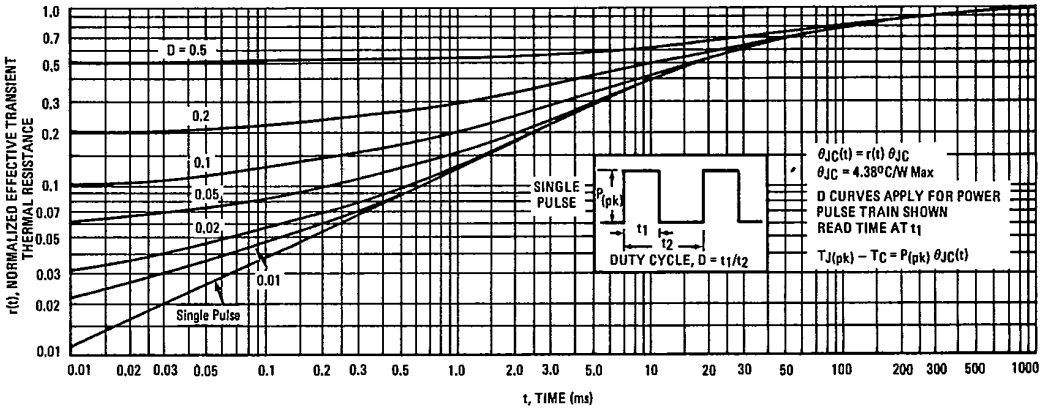
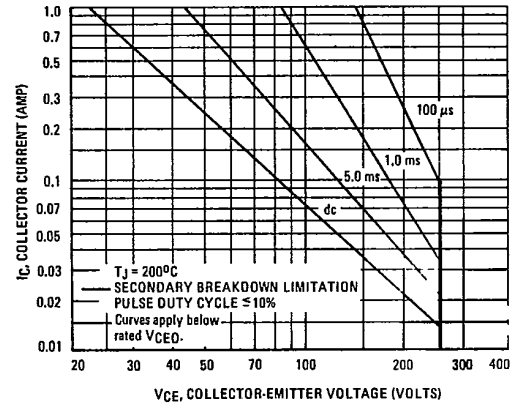


FIGURE 5 – ACTIVE-REGION SAFE OPERATING AREA



There are two limitations on the power handling ability of a transistor: 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 5 is based on $T_{J(pk)} = 200^oC$; T_C is variable depending on conditions. Pulse curves are valid for duty cycles of 10% provided $T_{J(pk)} \leq 200^oC$. $T_{J(pk)}$ 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 secondary breakdown.

FIGURE 6 – TURN-OFF TIME

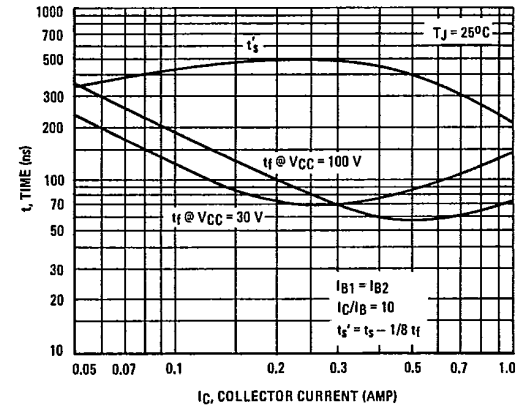
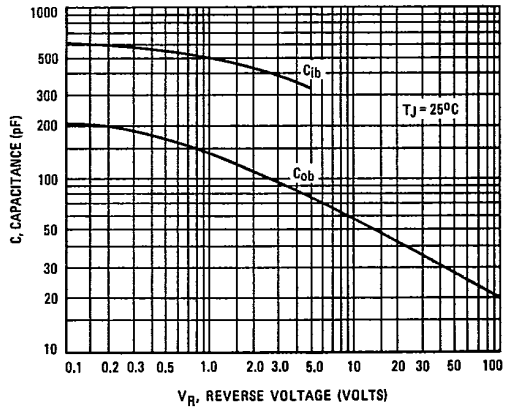


FIGURE 7 – CAPACITANCES



TYPICAL DC CHARACTERISTICS

FIGURE 8 – DC CURRENT GAIN

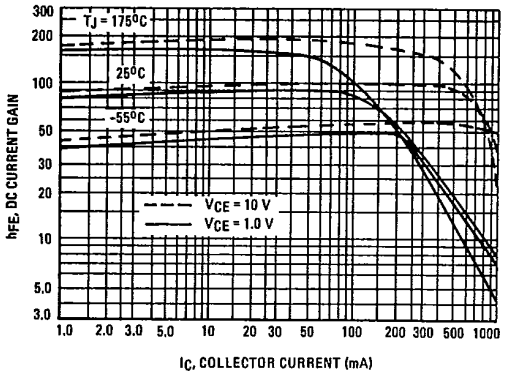


FIGURE 9 – COLLECTOR SATURATION REGION

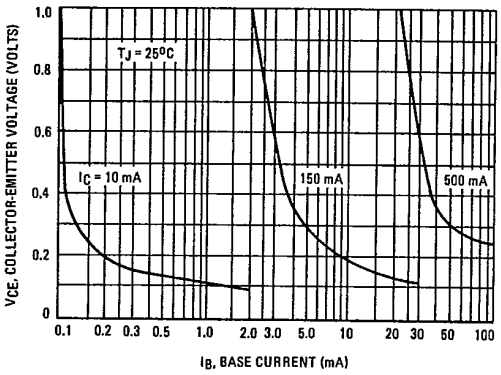


FIGURE 10 – EFFECTS OF BASE-EMITTER RESISTANCE

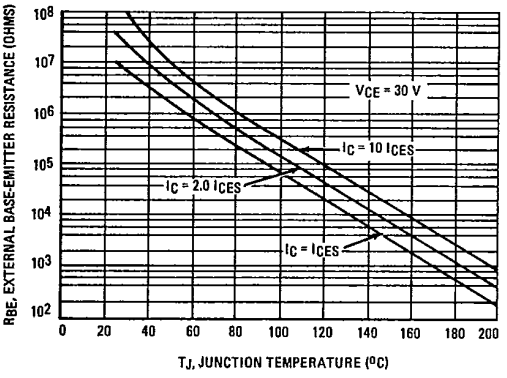


FIGURE 11 – "ON" VOLTAGES

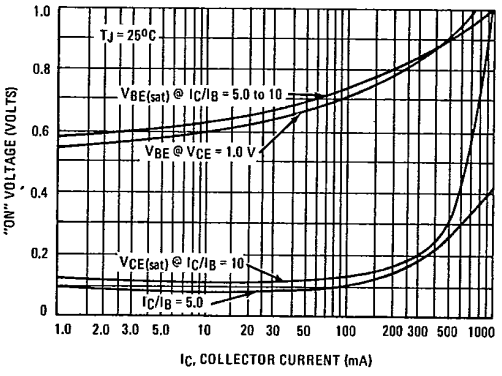


FIGURE 12 – COLLECTOR CUT-OFF REGION

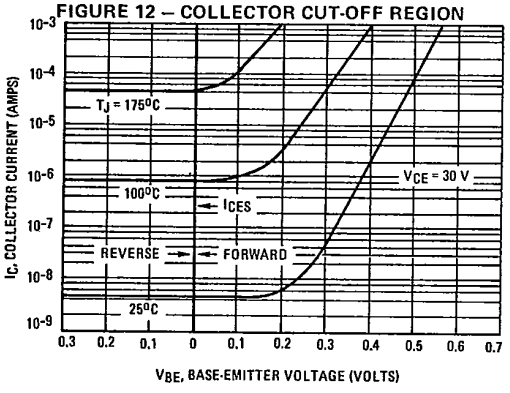


FIGURE 13 – TEMPERATURE COEFFICIENTS