

MOTOROLA SEMICONDUCTOR TECHNICAL DATA

2N3441

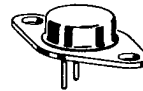
NPN SILICON POWER TRANSISTOR

... 2N3441 transistor is designed for use in general-purpose switching and linear amplifier applications requiring high breakdown voltages. It is characterized for use as:

- Driver for High Power Outputs
- Series and Shunt Regulators
- Audio and Servo Amplifiers
- Solenoid and Relay Drivers
- Power Switching Circuits

**3 AMPERES
NPN SILICON
POWER TRANSISTOR**

**140 VOLTS
25 WATTS**

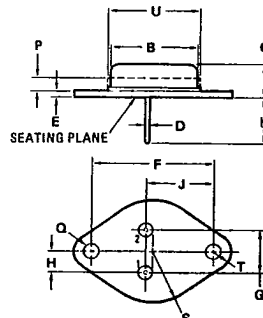


MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	140	Vdc
Collector-Base Voltage	V_{CBO}	160	Vdc
Emitter-Base Voltage	V_{EBO}	7	Vdc
Collector Current - Continuous	I_C	3	Adc
Base Current - Continuous	I_B	2	Adc
Total Power Dissipation @ $T_C = 25^\circ C$ Derate above $25^\circ C$	P_D	25 0.142	Watts W/ $^\circ C$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200	$^\circ C$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	7	$^\circ C/W$



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

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
B	11.94	12.70	0.470	0.500
C	6.35	6.64	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	14.93	0.570	0.590
K	9.14	-	0.360	-
P	-	1.27	-	0.050
Q	3.61	3.85	0.142	0.152
S	-	8.89	-	0.350
T	-	3.68	-	0.145
U	-	15.75	-	0.620

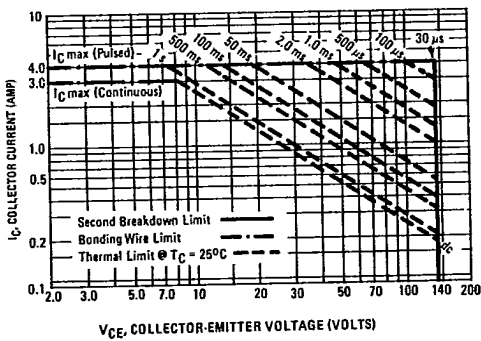
All JEDEC Dimensions and Notes Apply.
CASE 80-02
TO-213AA
(TO-66)

3

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Sustaining Voltage (1) ($I_C = 100 \text{ mA}$, $I_B = 0$)	$V_{CE(sus)}$	140	—	Vdc
Collector Cutoff Current ($V_{CE} = 140 \text{ Vdc}$, $I_B = 0$)	I_{CEO}	—	100	mA
Collector Cutoff Current ($V_{CE} = 140 \text{ Vdc}$, $V_{BE(off)} = 1.5 \text{ V}$) ($V_{CE} = 140 \text{ Vdc}$, $V_{BE(off)} = 1.5 \text{ V @ } 150^\circ\text{C}$)	I_{CEX}	—	5.0 6.0	mA
Emitter Cutoff Current ($V_{BE} = 7.0 \text{ Vdc}$, $I_C = 0$)	I_{EBO}	—	1.0	mA
ON CHARACTERISTICS				
DC Current Gain (1) ($I_C = 0.5 \text{ Adc}$, $V_{CE} = 4.0 \text{ V}$) ($I_C = 2.7 \text{ Adc}$, $V_{CE} = 4.0 \text{ V}$)	h_{FE}	25 5.0	100 —	—
Collector-Emitter Saturation Voltage (1) ($I_C = 2.7 \text{ Adc}$, $I_B = 0.9 \text{ Adc}$)	$V_{CE(sat)}$	—	6.0	Vdc
Base-Emitter On Voltage (1) ($I_C = 2.7 \text{ Adc}$, $V_{CE} = 4.0 \text{ Vdc}$)	$V_{BE(on)}$	—	6.7	Vdc
DYNAMIC CHARACTERISTICS				
Small-Signal Current Gain ($I_C = 0.5 \text{ Adc}$, $V_{CE} = 4.0 \text{ Vdc}$, $f_{test} = 1 \text{ kHz}$)	h_{fe}	15	75	—
Small-Signal Current Gain ($I_C = 0.5 \text{ Adc}$, $V_{CE} = 4.0 \text{ Vdc}$, $f_{test} = 0.4 \text{ MHz}$)	$ h_{fe} $	5.0	—	—

FIGURE 1 — 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 1 is based on $T_{J(pk)} = 200^\circ\text{C}$; 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 second breakdown.