



# SOLID STATE INC.

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## NPN SILICON POWER TRANSISTOR

...2N3441 transistor is designed for use in general purpose switching and linear amplifier application requiring high breakdown voltages.

### FEATURES

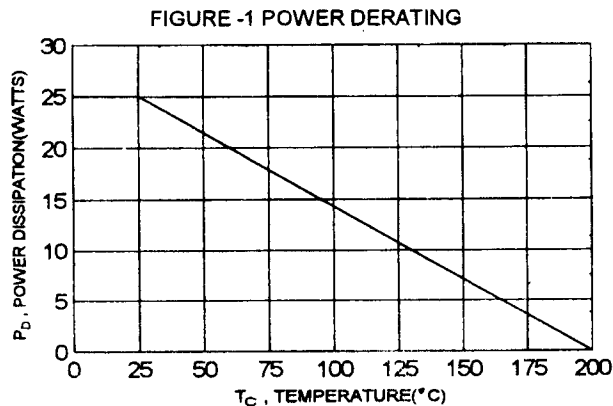
- \* Driver for High Power Outputs
- \* Series and Shunt Regulators
- \* Solenoid and Relay Drivers
- \* Power Switching Circuits

### MAXIMUM RATINGS

| Characteristic                                                                        | Symbol         | Rating      | Unit                     |
|---------------------------------------------------------------------------------------|----------------|-------------|--------------------------|
| Collector-Base Voltage                                                                | $V_{CBO}$      | 160         | V                        |
| Collector-Emitter Voltage                                                             | $V_{CEO}$      | 140         | V                        |
| Emitter-Base Voltage                                                                  | $V_{EBO}$      | 7.0         | V                        |
| Collector Current - Continuous                                                        | $I_C$          | 3.0         | A                        |
| Base Current-Continuous                                                               | $I_B$          | 2.0         | A                        |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 25<br>0.142 | W<br>W/ $^\circ\text{C}$ |
| Operating and Storage Junction Temperature Range                                      | $T_J, T_{STG}$ | -65 to +200 | $^\circ\text{C}$         |

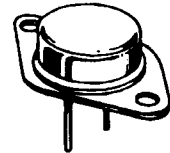
### THERMAL CHARACTERISTICS

| Characteristic                      | Symbol          | Max | Unit               |
|-------------------------------------|-----------------|-----|--------------------|
| Thermal Resistance Junction to Case | $R_{\theta JC}$ | 7.0 | $^\circ\text{C/W}$ |

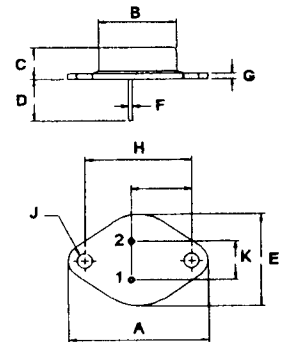


**NPN  
2N3441**

**3 AMPERE  
SILICON POWER  
TRANSISTORS  
140 VOLTS  
25 WATTS**



**TO-66**



PIN 1.BASE  
2.EMITTER  
COLLECTOR(CASE)

| DIM | MILLIMETERS |       |
|-----|-------------|-------|
|     | MIN         | MAX   |
| A   | 30.60       | 32.52 |
| B   | 13.85       | 14.16 |
| C   | 6.54        | 7.22  |
| D   | 9.50        | 10.50 |
| E   | 17.26       | 18.46 |
| F   | 0.76        | 0.92  |
| G   | 1.38        | 1.65  |
| H   | 24.16       | 24.78 |
| I   | 13.84       | 15.60 |
| J   | 3.32        | 3.92  |
| K   | 4.86        | 5.34  |

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

| Characteristic | Symbol | Min | Max | Unit |
|----------------|--------|-----|-----|------|
|----------------|--------|-----|-----|------|

## OFF CHARACTERISTICS

|                                                                                        |                |     |     |    |
|----------------------------------------------------------------------------------------|----------------|-----|-----|----|
| Collector-Emitter Sustaining Voltage(1)<br>( $I_C = 50\text{ mA}$ , $I_B = 0$ )        | $V_{CEO(sus)}$ | 140 |     | V  |
| Collector Cutoff Current<br>( $V_{CE} = 140\text{ V}$ , $I_B = 0$ )                    | $I_{CEO}$      |     | 50  | mA |
| Collector Cutoff Current<br>( $V_{CE} = 140\text{ V}$ , $V_{BE(off)} = 1.5\text{ V}$ ) | $I_{CEX}$      |     | 5.0 | mA |
| Emitter Cutoff Current<br>( $V_{EB} = 7.0\text{ V}$ , $I_C = 0$ )                      | $I_{EBO}$      |     | 1.0 | mA |

## ON CHARACTERISTICS (1)

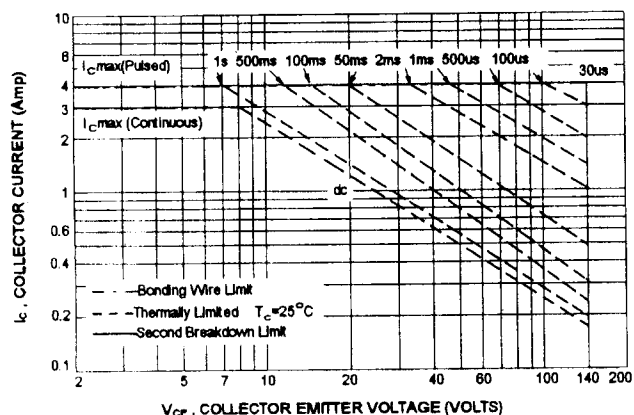
|                                                                                                                             |               |           |     |   |
|-----------------------------------------------------------------------------------------------------------------------------|---------------|-----------|-----|---|
| DC Current Gain<br>( $I_C = 0.5\text{ A}$ , $V_{CE} = 4.0\text{ V}$ )<br>( $I_C = 2.7\text{ A}$ , $V_{CE} = 4.0\text{ V}$ ) | $h_{FE}$      | 25<br>5.0 | 100 |   |
| Collector-Emitter Saturation Voltage<br>( $I_C = 2.7\text{ A}$ , $I_B = 0.9\text{ A}$ )                                     | $V_{CE(sat)}$ |           | 6.0 | V |
| Base-Emitter On Voltage<br>( $I_C = 2.7\text{ A}$ , $V_{CE} = 4.0\text{ V}$ )                                               | $V_{BE(on)}$  |           | 6.7 | V |

## DYNAMIC CHARACTERISTICS

|                                                                                                        |            |     |  |  |
|--------------------------------------------------------------------------------------------------------|------------|-----|--|--|
| Small-Signal Current Gain<br>( $I_C = 0.5\text{ A}$ , $V_{CE} = 4.0\text{ V}$ , $f = 1.0\text{ KHz}$ ) | $h_{fe}$   | 15  |  |  |
| Small-Signal Current Gain<br>( $I_C = 0.5\text{ A}$ , $V_{CE} = 4.0\text{ V}$ , $f = 0.4\text{ MHz}$ ) | $ h_{fe} $ | 5.0 |  |  |

(1) Pulse Test: Pulse width = 300  $\mu\text{s}$  , Duty Cycle  $\leq 2.0\%$ 

ACTIVE REGION SAFE OPERATING AREA (SOA)



There are two limitation 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 curves indicate.

The data of SOA curve is base on  $T_{J(PK)} = 200^\circ\text{C}$ ;  $T_C$  is variable depending on conditions. second breakdown pulse limits are valid for duty cycles to 10% provided  $T_{J(PK)} \leq 200^\circ\text{C}$ . At high case temperatures, thermal limitation will reduce the power that can be handled to values less than the limitations imposed by second breakdown.