

# Transistor, NPN TO-3



## Description:

High-power industrial transistor  
NPN silicon power transistor designed for applications in industrial and commercial equipment including high fidelity audio amplifiers, series and shunt regulators and power switches

## Features:

- The 2N3442 is a Silicon power base transistor for high power audio, series pass power supplies, disk-head positioners and other linear application. These devices can also be used in power switching circuits such as converters or inverters
- Higher safe operating area than 2N3442 at  $V_{CE} > 40V$
- Low saturation voltages
- High power dissipation capability

## Maximum Ratings

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	140	V DC
Collector-Base Voltage	$V_{CB}$	160	
Emitter-Base Voltage	$V_{EB}$	7	
Collector Current-Continuous -Peak	$I_C$	10 15	A DC
Base Current-Continuous -Peak	$I_B$	7 -	
Total Power Dissipation at $T_C = 25^\circ C$ Derate above $25^\circ C$ (Note 2)	$P_D$	117 0.67	W 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	$R_{\theta jc}$	1.17	$^\circ C/W$

Max. ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

1. Indicates JEDEC registered data.
2. This data guaranteed in addition to JEDEC registered data.

# Transistor, NPN T0-3



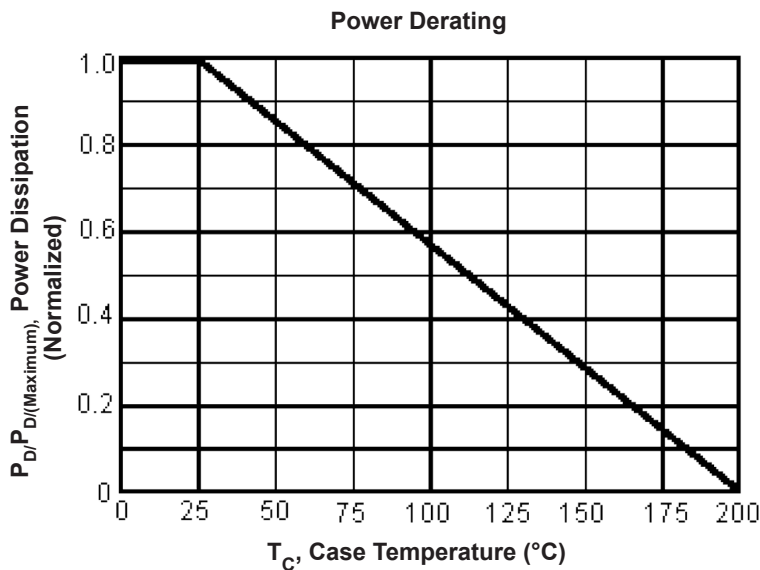
## Electrical Characteristics (TC = 25°C unless otherwise noted)

Characteristic	Symbol	Min.	Max.	Unit
<b>Off Characteristics</b>				
Collector-Emitter Sustaining Voltage ( $I_C = 200\text{mA DC}$ , $I_B = 0$ )	$V_{EO(sus)}$	140	-	V DC
Collector Cut off Current ( $V_{CE} = 140\text{V DC}$ , $I_B = 0$ )	$I_{CEO}$	-	200	mA DC
Collector Cut off Current ( $V_{CE} = 140\text{V DC}$ , $V_{BE(off)} = 1.5\text{V DC}$ ) ( $V_{CE} = 140\text{V DC}$ , $V_{BE(off)} = 1.5\text{V DC}$ , $T_C = 150^\circ\text{C}$ )	$I_{CEX}$	-	5 30	
Emitter Cut off Current ( $V_{EB} = 7\text{V DC}$ , $I_C = 0$ )	$I_{EBO}$	-	5	
<b>On Characteristic (Note 3)</b>				
DC Current Gain ( $I_C = 3\text{A DC}$ , $V_{CE} = 4\text{V DC}$ ) ( $I_C = 10\text{A DC}$ , $V_{CE} = 4\text{V DC}$ )	$h_{FE}$	2 7.5	70 -	-
Collector-Emitter Saturation Voltage ( $I_C = 10\text{A DC}$ , $I_B = 2\text{A DC}$ )	$V_{CE(sat)}$	-	5	V DC
Base-Emitter On Voltage ( $I_C = 10\text{A DC}$ , $V_{CE} = 4\text{V DC}$ )	$V_{BE(on)}$	-	5.7	
<b>Dynamic Characteristics</b>				
Current-Gain - Bandwidth Product (Note 4) ( $I_C = 2\text{A DC}$ , $V_{CE} = 4\text{V DC}$ , $f_{test} = 40\text{kHz}$ )	$f_T$	80	-	kHz
Small-Signal Current Gain ( $I_C = 2\text{A DC}$ , $V_{CE} = 4\text{V DC}$ , $f = 1\text{kHz}$ )	$h_{fe}$	12	72	-

### Note:

(3) Pulse Test : Pulse Width = 300 $\mu\text{s}$ , Duty Cycle  $\leq 2\%$

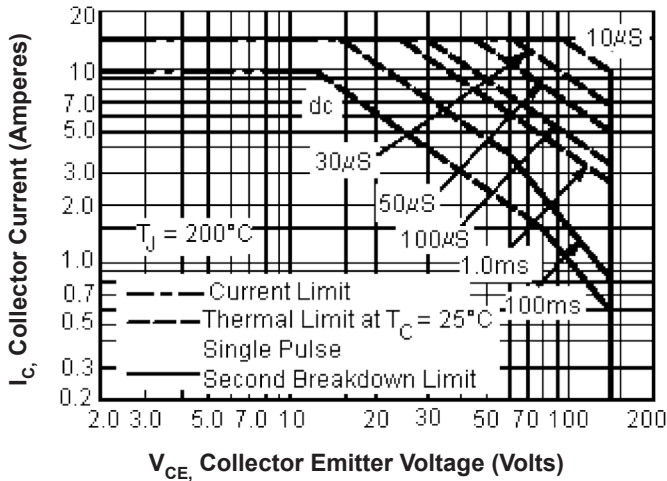
(4)  $f_T = |h_{fe}| \cdot f_{test}$



# Transistor, NPN T0-3



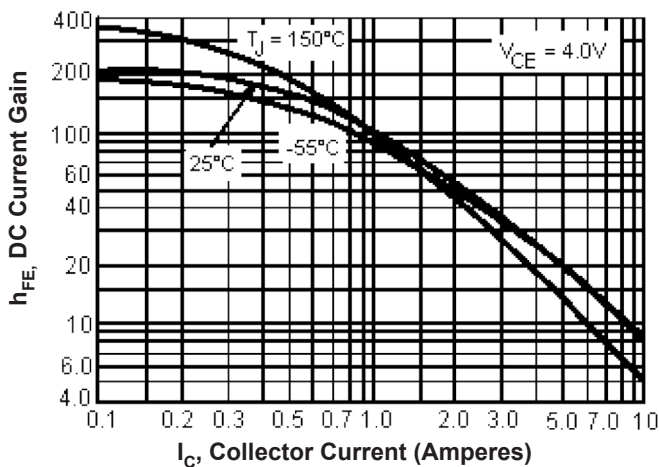
Active-Region Safe Operating Area Information



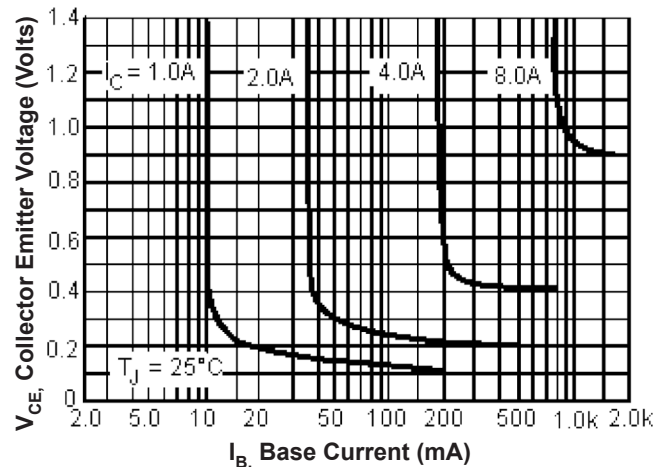
There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate  $I_C$ - $V_{CE}$  limits of the transistor that must be observed for reliable operation i.e., the transistor must not be subjected to greater dissipation than curves indicate.

The data 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.

DC Current Gain



Collector-Saturation Region

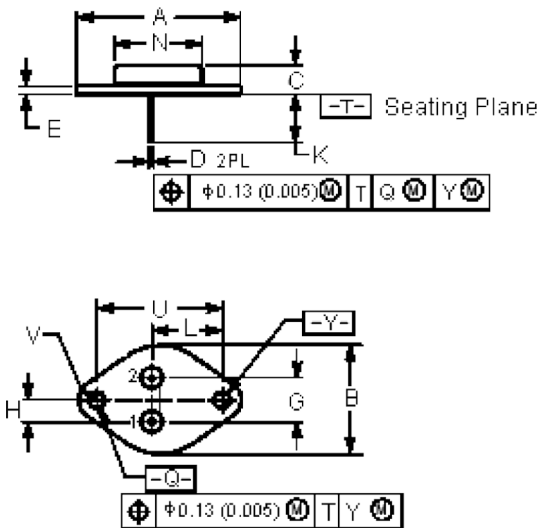


# Transistor, NPN TO-3



## Dimensions:

(TO-3)



Dimensions	Min.	Max.
A	1.55 (39.37)	Reference
B	-	1.05 (26.67)
C	0.25 (6.35)	0.335 (8.51)
D	0.038 (0.97)	0.043 (1.09)
E	0.055 (1.4)	0.07 (1.77)
G	0.43 (10.92) BSC	
H	0.215 (5.46) BSC	
K	0.44 (11.18)	0.48 (12.19)
L	0.665 (16.89) BSC	
N	-	0.83 (21.08)
Q	0.151 (3.84)	0.165 (4.19)
U	1.187 (30.15) BSC	
V	0.131 (3.33)	0.188 (4.77)

Dimensions : Inches (Millimetres)

## Pin Configuration:

- Pin 1. Base
- 2. Emitter
- Collector (Case)

## Part Number Table

Description	Part Number
Transistor, NPN, TO-3	2N3442

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