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°C Derate above 25°C (Note 2)	P_D	117 0.67	W W/°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	$R_{\theta jc}$	1.17	°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.

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

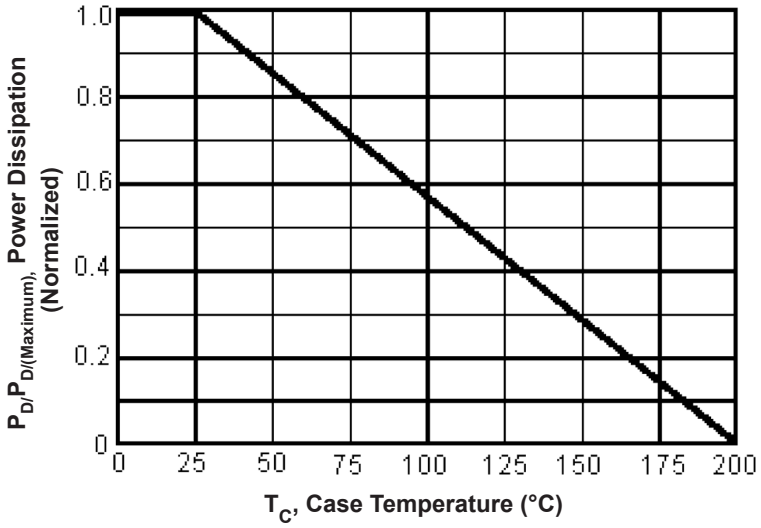
Characteristic	Symbol	Min.	Max.	Unit
Off Characteristics				
Collector-Emitter Sustaining Voltage (I_C = 200mA DC, I_B = 0)	$V_{EO\ (sus)}$	140	-	V DC
Collector Cut off Current (V_{CE} = 140V DC, I_B = 0)	I_{CEO}	-	200	mA DC
Collector Cut off Current (V_{CE} = 140 V DC, $V_{BE\ (off)}$ = 1.5 V DC) (V_{CE}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

Note:

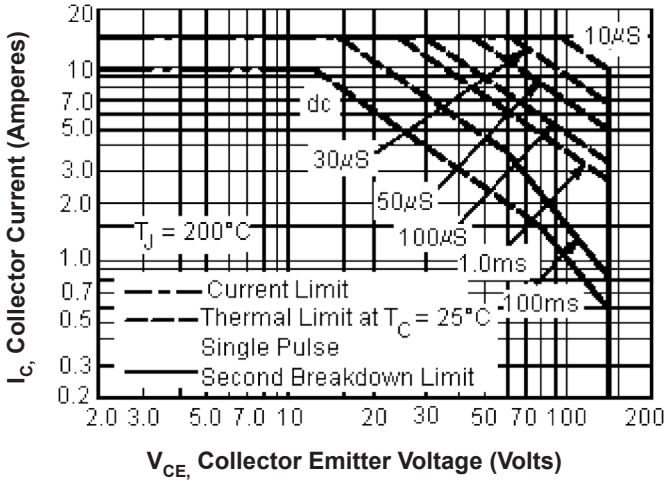
(3) Pulse Test : Pulse Width = 300µs, Duty Cycle ≤2%

(4) f_T = | hfe | • ftest

Power Derating



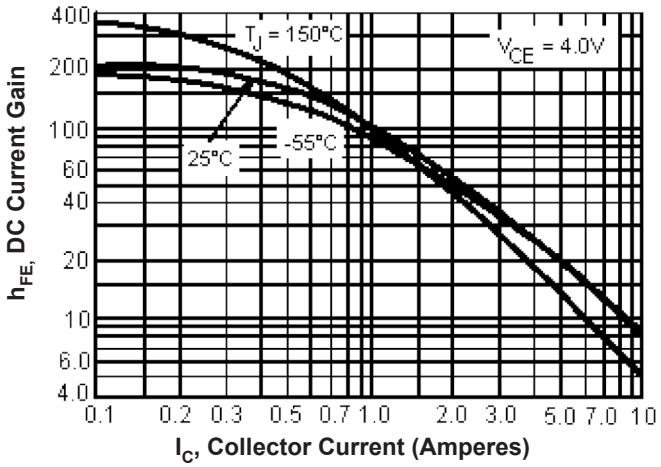
Active-Region Safe Operating Area Information



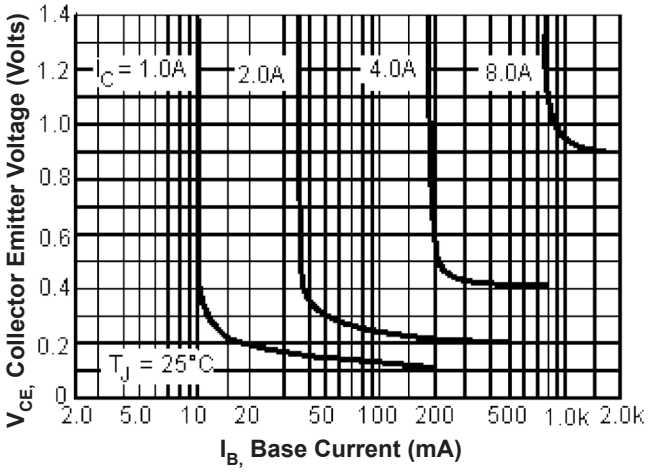
There are two limitation on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate I_C-V_{CE} limits of the transistor that must be observed for reliable operation i.e., the transistor must not be subjected to greater dissipation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

The data is based on $T_{J\,(PK)}$ = 200°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



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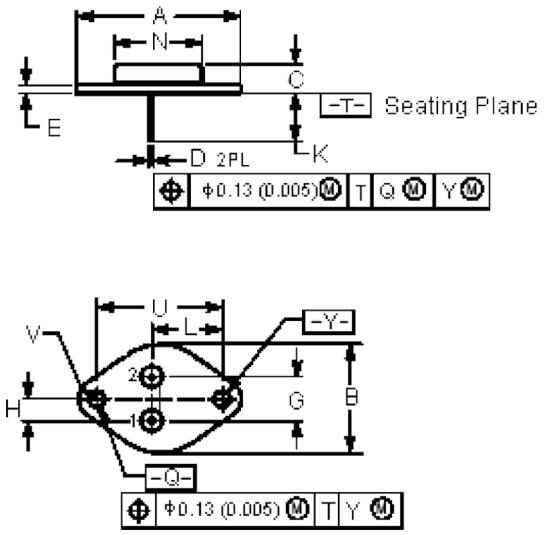
Dimensions:

(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