

Transistor, PNP TO-3



Description:

Complementary silicon power transistors are designed for general-purpose switching and amplifier applications.

Features:

- DC current gain - $h_{FE} = 20 - 70$ at $I_C = 4A$ DC
- Collector-emitter saturation voltage- $V_{CE(sat)} = 1.1V$ DC (max.) at $I_C = 4A$ DC
- Excellent safe operating area
- Pb-free packages

Maximum Ratings

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	60	V DC
Collector-Emitter Voltage	V_{CER}	70	
Collector-Base Voltage	V_{CB}	100	
Emitter-Base Voltage	V_{EB}	7	
Collector Current-Continuous	I_C	15	A DC
Base Current	I_B	7	
Total Power Dissipation at $T_C = 25^\circ C$ Derate above $25^\circ C$	P_D	115 0.657	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	$R_{\theta JC}$	1.52	$^\circ C/W$

Max. ratings are those values beyond which device damage can occur. Max. 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.

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

Characteristic	Symbol	Min.	Max.	Unit
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Off Characteristics*

Collector-Emitter Sustaining Voltage (Note 1) ($I_C = 200\text{mA DC}$, $I_B = 0$)	$V_{EO(sus)}$	60	-	V DC
Collector-Emitter Sustaining Voltage (Note 1) ($I_C = 200\text{mA DC}$, $R_{BE} = 100\Omega$)	$V_{CER(sus)}$	70	-	
Collector Cut off Current ($V_{CE} = 30\text{V DC}$, $I_B = 0$)	I_{CEO}	-	0.7	mA DC
Collector Cut off Current ($V_{CE} = 100\text{V DC}$, $V_{BE(off)} = 1.5\text{V DC}$) ($V_{CE} = 100\text{V DC}$, $V_{BE(off)} = 1.5\text{V DC}$, $T_C = 150^\circ\text{C}$)	I_{CEX}	-	1 5	
Emitter Cut off Current ($V_{BE} = 7\text{V DC}$, $I_C = 0$)	I_{EBO}	-	5	

On Characteristic* (Note 1)

DC Current Gain ($I_C = 4\text{A DC}$, $V_{CE} = 4\text{mA DC}$) ($I_C = 10\text{A DC}$, $V_{CE} = 4\text{V DC}$)	h_{FE}	20 5	70 -	-
Collector-Emitter Saturation Voltage ($I_C = 4\text{A DC}$, $I_B = 400\text{A DC}$) ($I_C = 10\text{A DC}$, $I_B = 3.3\text{A DC}$)	$V_{CE(sat)}$	-	1.1 3	V DC
Base-Emitter On Voltage ($I_C = 4\text{A DC}$, $V_{CE} = 4\text{V DC}$)	$V_{BE(on)}$	-	1.5	

Second Breakdown

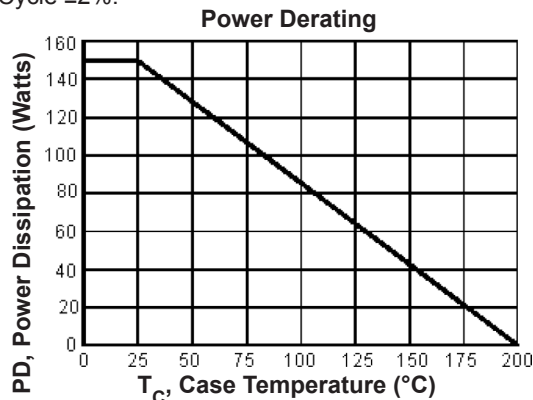
Second Breakdown Collector Current with Base Forward Biased ($V_{CE} = 40\text{V DC}$, $t = 1\text{s}$, Non Repetitive)	$I_{S/b}$	2.87	-	A DC
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Dynamic Characteristics

Current-Gain - Bandwidth Product ($I_C = 0.5\text{A DC}$, $V_{CE} = 10\text{V DC}$, $f = 1\text{MHz}$)	f_T	2.5	-	MHz
*Small-Signal Current Gain ($I_C = 1\text{A DC}$, $V_{CE} = 4\text{V DC}$, $f = 1\text{kHz}$)	h_{fe}	15	120	pF
*Small-Signal Current Gain Cut off Frequency ($V_{CE} = 4\text{V DC}$, $I_C = 1\text{A DC}$, $f = 1\text{kHz}$)	f_{hfe}	10	-	kHz

*Indicates Within JEDEC Registration. (MJ2955).

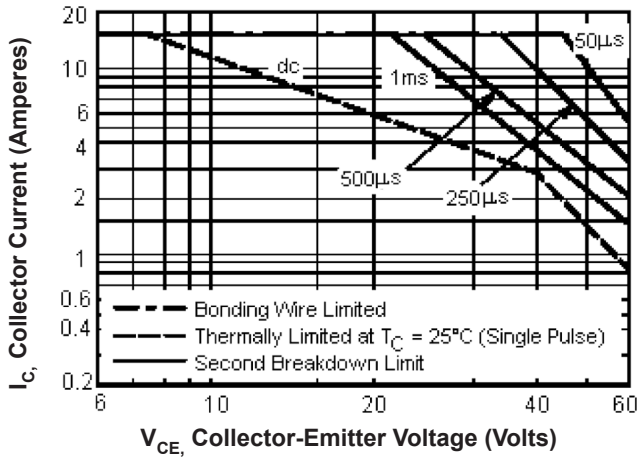
1. Pulse Test : Pulse Width = $300\mu\text{s}$, Duty Cycle $\leq 2\%$.



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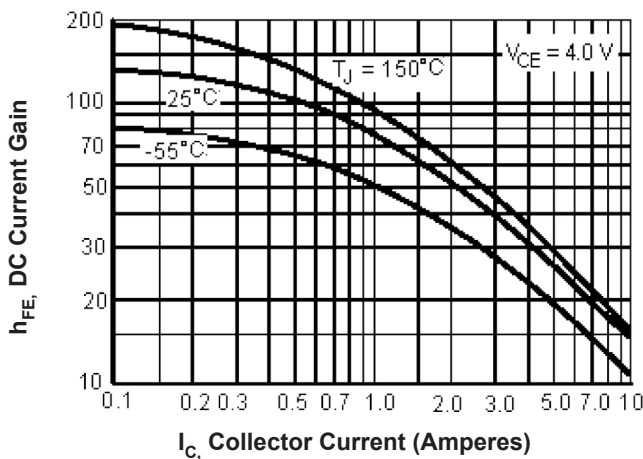
Active Region Safe Operating Area



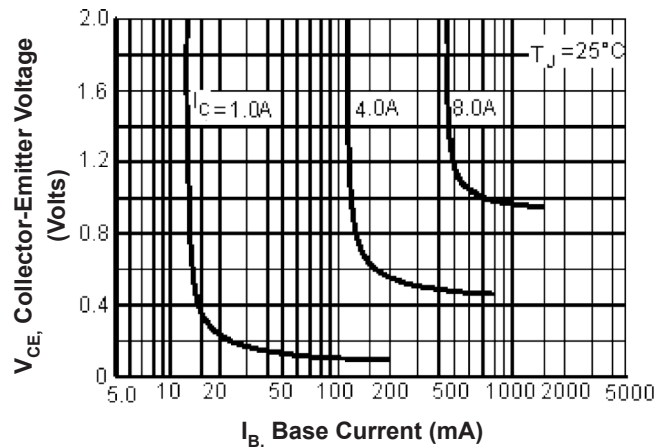
There are two limitation on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate $I_C - V_{CE}$ limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater dissipation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

The data is based on $T_C = 25^\circ\text{C}$; $T_{J(pk)}$ is variable depending on power level. Second breakdown pulse limits are valid for duty cycles to 10% but must be derated for temperature according.

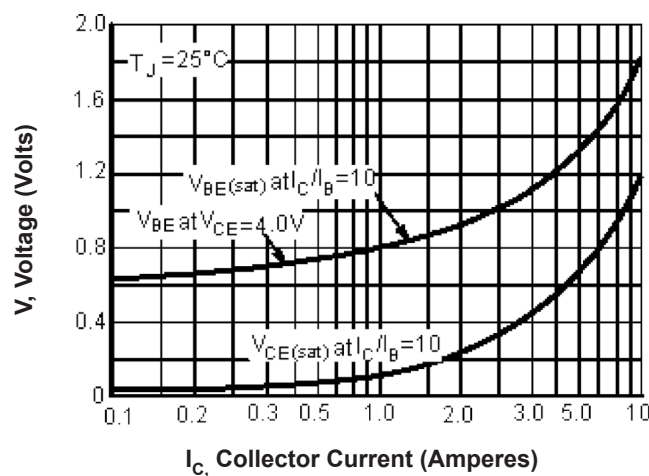
DC Current Gain



Collector Saturation Region



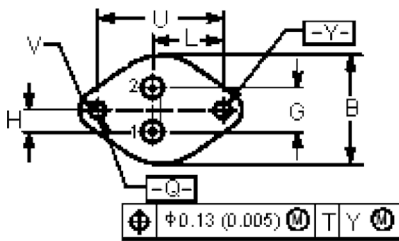
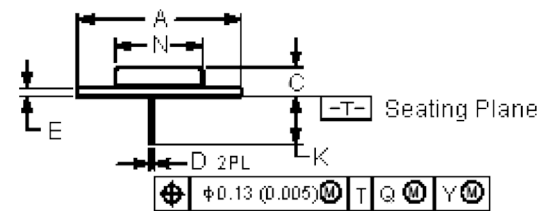
"On" Voltage



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Dimensions



Pin Configuration:

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

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)

Part Number Table

Description	Part Number
Transistor, PNP, TO-3	MJ2955

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