

## Description:

Switch mode Series NPN Power Transistors are designed for use in high-voltage, high-speed, power switching in inductive circuits, they are particularly suited for 115 and 220V switch mode applications such as switching regulator's, inverters, DC-DC converters, Motor controls, solenoid/relay drivers and deflection circuits.

## Features:

- Collector-Emitter Sustaining Voltage  
 $V_{CEO(sus)} = 400V$
- Collector-Emitter Saturation Voltage  
 $V_{CE(sat)} = 0.6$  (Max.) at  $I_C = 2A$
- Minimum Lot-to-Lot variations for robust device performance and reliable operation

## Maximum Ratings

Characteristic	Symbol	Rating	Unit
Collector-Emitter Voltage	$V_{CEO}$	400	V
Collector-Emitter Voltage	$V_{CEV}$	700	
Emitter-Base Voltage	$V_{EBO}$	9	
Collector Current-Continuous -Peak	$I_C$ $I_{CM}$	4 8	A
Base Current	$I_B$	2	
Total Power Dissipation at $T_C = 25^\circ C$ Derate above $25^\circ C$	$P_D$	75 0.6	W W/ $^\circ C$
Operating and Storage Junction Temperature Range	$T_J, T_{STG}$	-65 to +150	$^\circ C$

## Thermal Characteristics

Characteristic	Symbol	Max.	Unit
Thermal Resistance Junction to Case	$R_{\theta jc}$	1.67	$^\circ C/W$
Thermal Resistance, Junction to Ambient	$R_{th j-a}$	62.5	

## 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 $I_C = 10\text{mA}, I_B = 0$	$V_{CEO(sus)}$	400	-	V
Collector Cut off Current $V_{CE} = \text{Rated Value}, V_{BE(off)} = 1.5\text{V}$	$I_{CEV}$	-	1	mA
Emitter Cut off Current $V_{EB} = 9\text{V}, I_C = 0$	$I_{EBO}$	-	1	

### On Characteristics (1)

DC Current Gain $I_C = 1\text{A}, V_{CE} = 5\text{V}$ $I_C = 2\text{A}, V_{CE} = 5\text{V}$	hFE	10 8	60 40	-
Collector-Emitter Saturation Voltage $I_C = 1\text{A}, I_B = 200\text{mA}$ $I_C = 2\text{A}, I_B = 500\text{mA}$ $I_C = 4\text{A}, I_B = 1\text{A}$	$V_{CE(sat)}$	-	0.5 0.6 1	V
Base-Emitter Saturation Voltage $I_C = 1\text{A}, I_B = 200\text{mA}$ $I_C = 2\text{A}, I_B = 500\text{mA}$	$V_{BE(sat)}$	-	1.2 1.6	

### Dynamic Characteristics

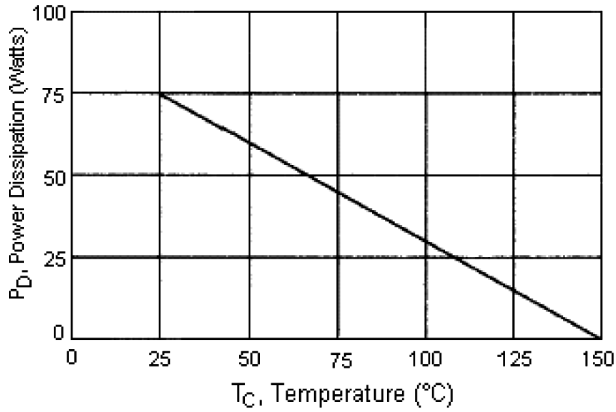
Current Gain-Bandwidth Product $I_C = 500\text{mA}, V_{CE} = 10\text{V}, f = 1\text{MHz}$	$f_T$	4	-	MHz
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### Switching Characteristics

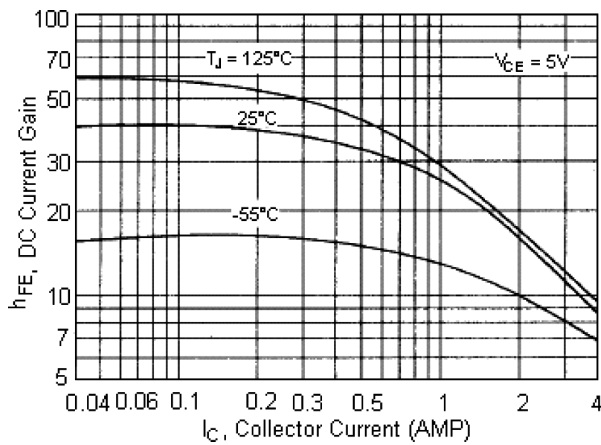
Delay Time	$V_{CC} = 125\text{V}, I_C = 2\text{A}$ $I_{B1} = -I_{B2} = 0.4\text{A}$ $t_p = 25\mu\text{s}$ Duty Cycle $\leq 1\%$	$t_d$	-	0.1	$\mu\text{s}$
Rise Time		$t_r$	-	0.7	
Storage Time		$t_s$	-	4	
Fall Time		$t_f$	-	0.9	

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

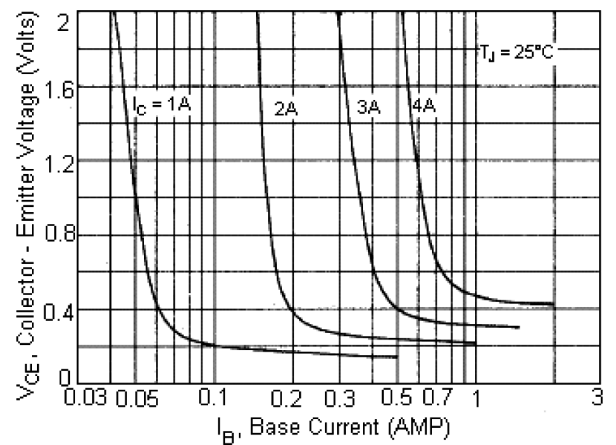
Figure - 1 Power Derating



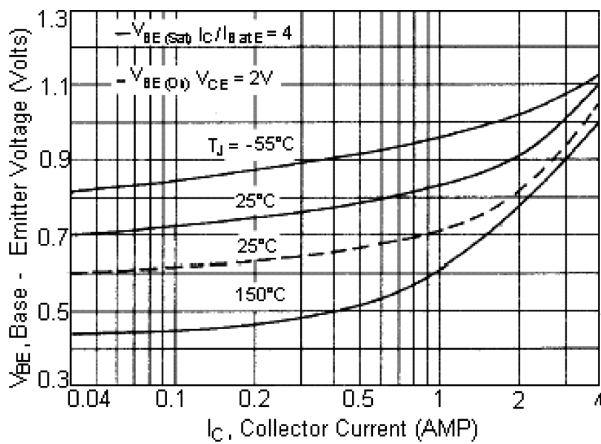
DC Current Gain



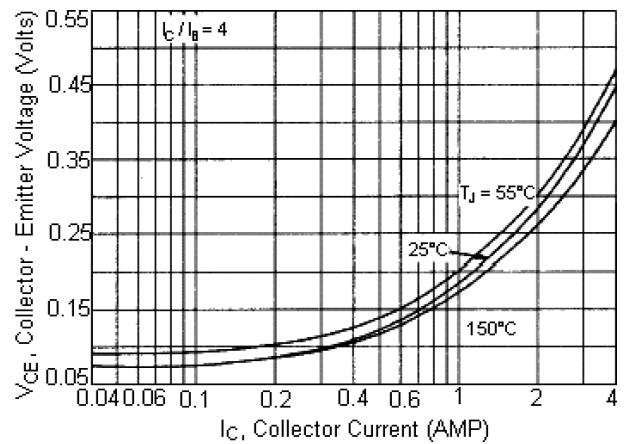
Collector Saturation Region



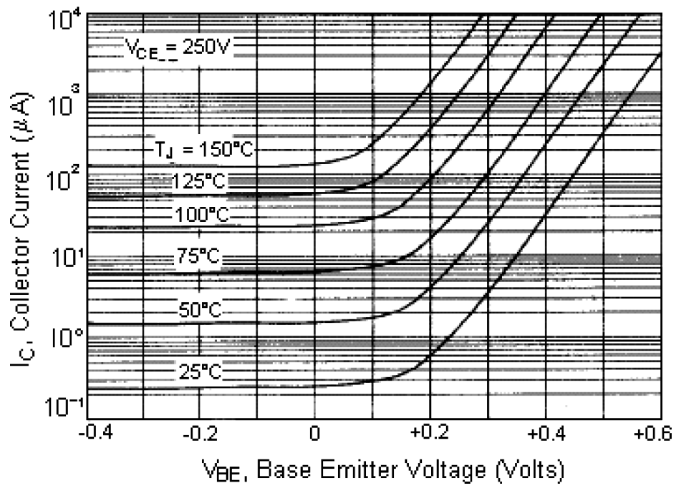
Base-Emitter Voltage



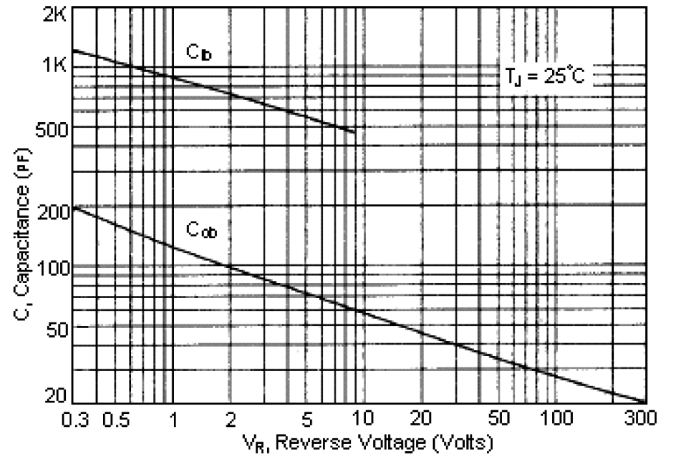
Collector-Emitter Saturation Voltage



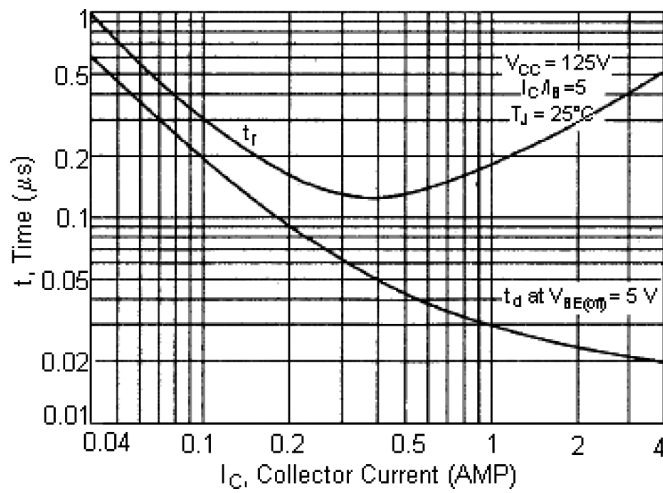
Collector Cut-Off Region



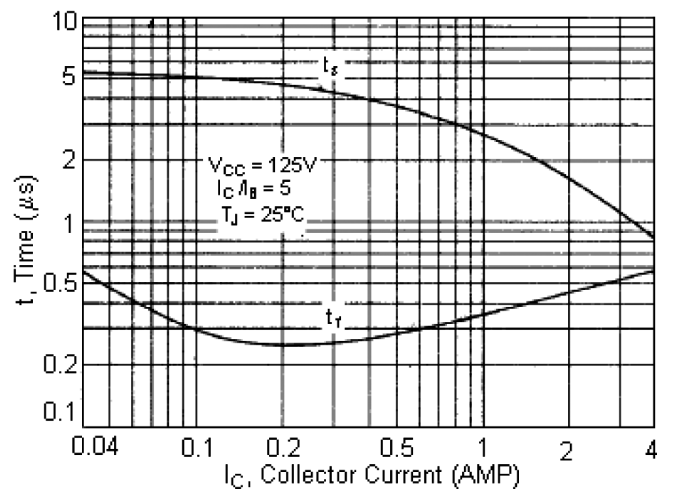
Capacitance



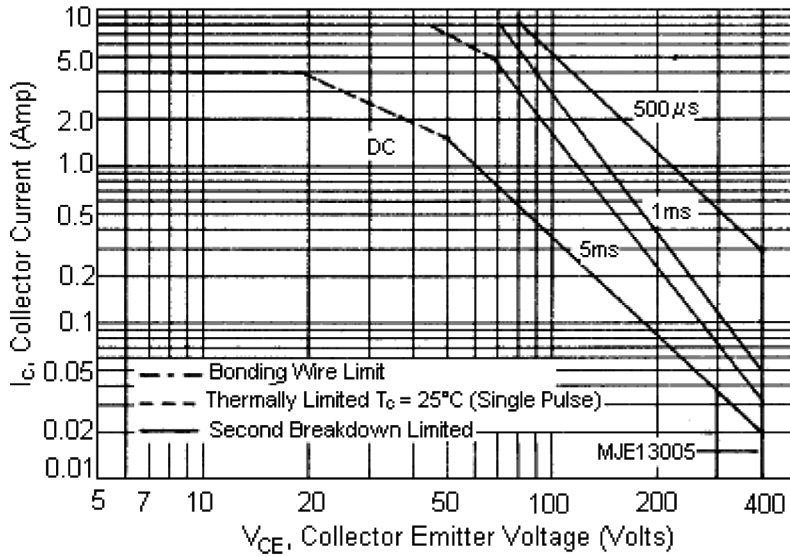
Turn-On Time



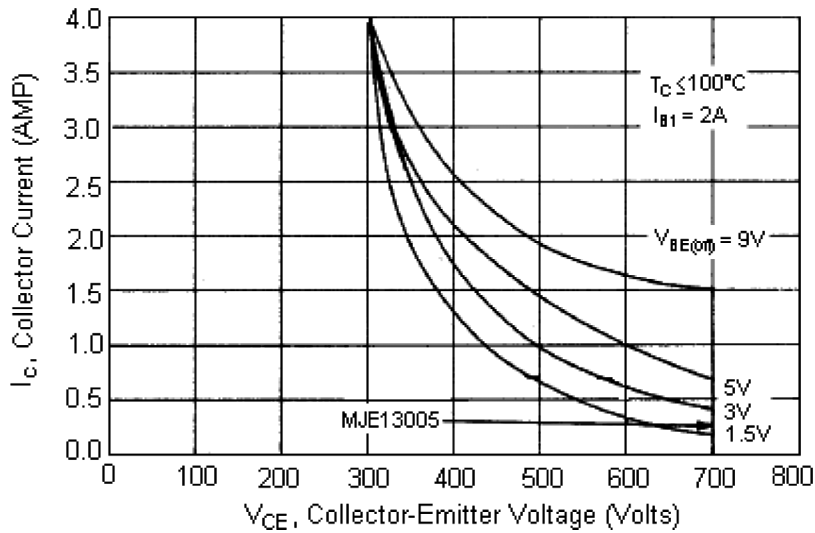
Turn-Off Time

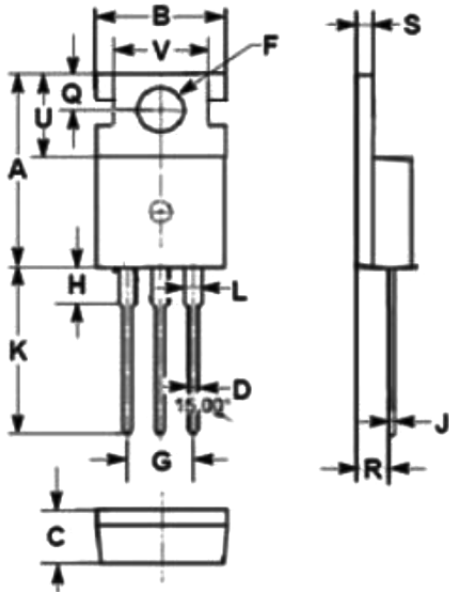


Active Region Safe Operating Area



Reverse Bias Switching Safe Operating Area





**Pin Configuration:**

1. Base
2. Collector
3. Emitter

Dimensions	Min.	Max.
A	15.5	15.9
B	9.8	10.2
C	4.2	4.5
D	0.7	0.9
F	3.4	3.7
G	4.98	5.18
H	2.68	2.9
J	0.44	0.6
K	12.8	13.4
L	1.2	1.45
O	2.7	2.9
R	2.3	2.7
S	1.29	1.35
U	6.45	6.65
V	8.66	8.86

Dimensions : Millimetres

**Part Number Table**

Description	Part Number
Transistor, NPN, TO-220	MJE13005

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