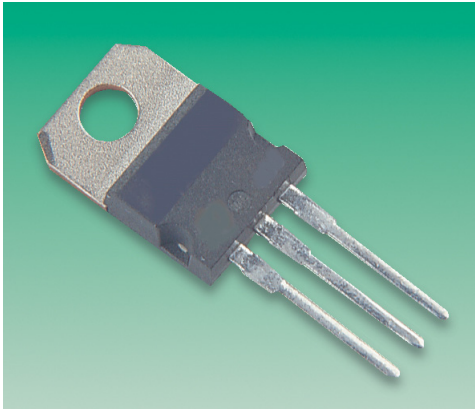


# MJE13005

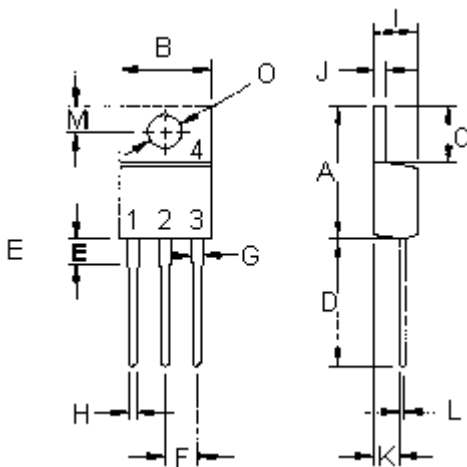
## Power Transistor



Switchmode 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 switchmode applications such as switching regulator's, inverters, DC-DC converters, Motor controls, solenoid/relay drivers and deflection circuits.

### Features:

- Collector-Emitter Sustaining Voltage -  
 $V_{CE(sus)} = 400V$ .
- Collector-Emitter Saturation Voltage -  
 $V_{CE(sat)} = 1.0V$  (Maximum) at  $I_C = 4.0A$ ,  $I_B = 1.0A$ .
- Switching Time-  $t_f = 0.9\mu s$  (Maximum) at  $I_C = 2.0A$ .



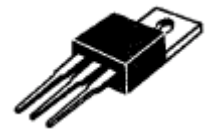
- Pin 1. Base  
2. Collector  
3. Emitter  
4. Collector(Case).

Dimensions	Minimum	Maximum
A	14.68	15.31
B	9.78	10.42
C	5.01	6.52
D	13.06	14.62
E	3.57	4.07
F	2.42	3.66
G	1.12	1.36
H	0.72	0.96
I	4.22	4.98
J	1.14	1.38
K	2.20	2.97
L	0.33	0.55
M	2.48	2.98
O	3.70	3.90

Dimensions : Millimetres

**NPN**  
**MJE13005**

4 Ampere  
Power  
Transistors  
400 Volts  
75 Watts



**TO-220**

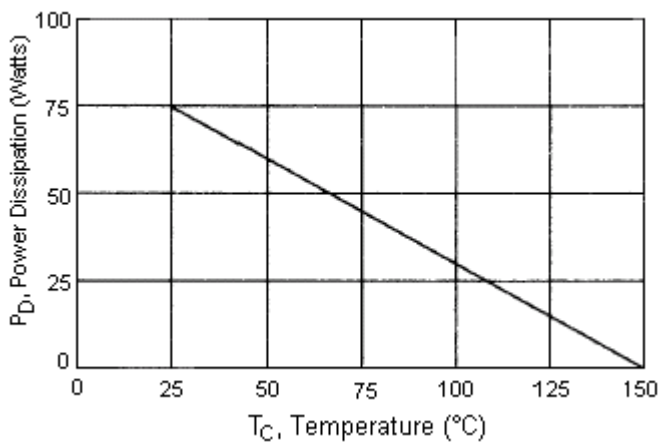
### Maximum Ratings

Characteristic	Symbol	Rating	Unit
Collector-Emitter Voltage	$V_{CEO}$	400	V
Collector-Emitter Voltage	$V_{CEV}$	700	
Emitter-Base Voltage	$V_{EBO}$	9.0	
Collector Current-Continuous -Peak	$I_C$ $I_{CM}$	4.0 8.0	A
Base Current	$I_B$	2.0	
Total Power Dissipation at $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	75 0.6	W W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{STG}$	-65 to +150	$^\circ\text{C}$

### Thermal Characteristics

Characteristic	Symbol	Maximum	Unit
Thermal Resistance Junction to Case	$R_{\theta jc}$	1.67	$^\circ\text{C}/\text{W}$

Figure - 1 Power Derating



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

Characteristic	Symbol	Minimum	Maximum	Unit
<b>OFF Characteristics</b>				
Collector-Emitter Sustaining Voltage ( $I_C = 10\text{mA}$ , $I_B = 0$ )	$V_{CEO(sus)}$	400	-	V
Collector Cut off Current ( $V_{CE} = \text{Rated Value}$ , $V_{BE(off)} = 1.5\text{V}$ ) ( $V_{CE} = \text{Rated Value}$ , $V_{BE(off)} = 1.5\text{V}$ , $T_C = 100^\circ\text{C}$ )	$I_{CEV}$	-	1.0 5.0	mA
Emitter Cut off Current ( $V_{EB} = 9.0\text{V}$ , $I_C = 0$ )	$I_{EBO}$	-	1.0	

<b>ON Characteristics (1)</b>				
DC Current Gain ( $I_C = 1.0\text{A}$ , $V_{CE} = 5.0\text{V}$ ) ( $I_C = 2.0\text{A}$ , $V_{CE} = 5.0\text{V}$ )	$h_{FE}$	10 8.0	60 40	-
Collector-Emitter Saturation Voltage ( $I_C = 1.0\text{A}$ , $I_B = 200\text{mA}$ ) ( $I_C = 2.0\text{A}$ , $I_B = 500\text{mA}$ ) ( $I_C = 4.0\text{A}$ , $I_B = 1.0\text{A}$ )	$V_{CE(sat)}$	-	0.5 0.6 1.0	V
Base-Emitter Saturation Voltage ( $I_C = 1.0\text{A}$ , $I_B = 200\text{mA}$ ) ( $I_C = 2.0\text{A}$ , $I_B = 500\text{mA}$ )	$V_{BE(sat)}$	-	1.2 1.6	
<b>Dynamic Characteristics</b>				
Current Gain-Bandwidth Product ( $I_C = 500\text{mA}$ , $V_{CE} = 10\text{V}$ , $f = 1.0\text{MHz}$ )	$f_T$	4.0	-	MHz

<b>Switching Characteristics</b>					
Delay Time	$V_{CC} = 125\text{V}$ , $I_C = 2.0\text{A}$ , $I_{B1} = -I_{B2} = 0.4\text{A}$ $t_p = 25\mu\text{s}$ , Duty Cycle $\leq 1.0\%$	$t_d$	-	0.1	$\mu\text{s}$
Rise Time		$t_r$	-	0.7	
Storage Time		$t_s$	-	4.0	
Fall Time		$t_f$	-	0.9	

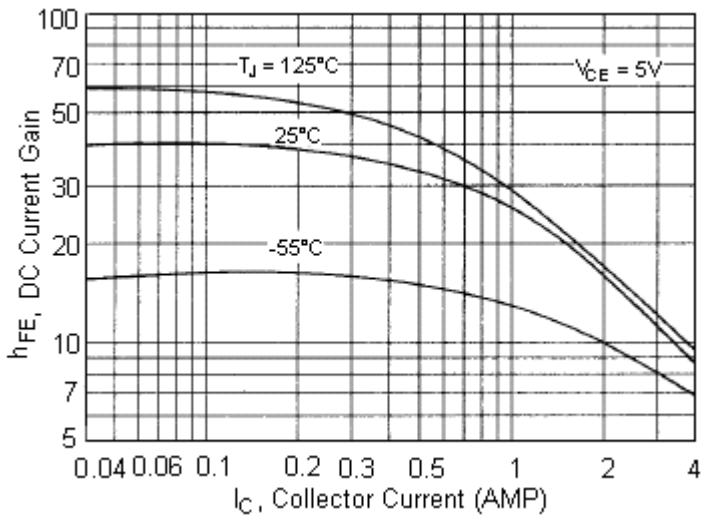
(1) Pulse Test: Pulse Width =  $300\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$

# MJE13005

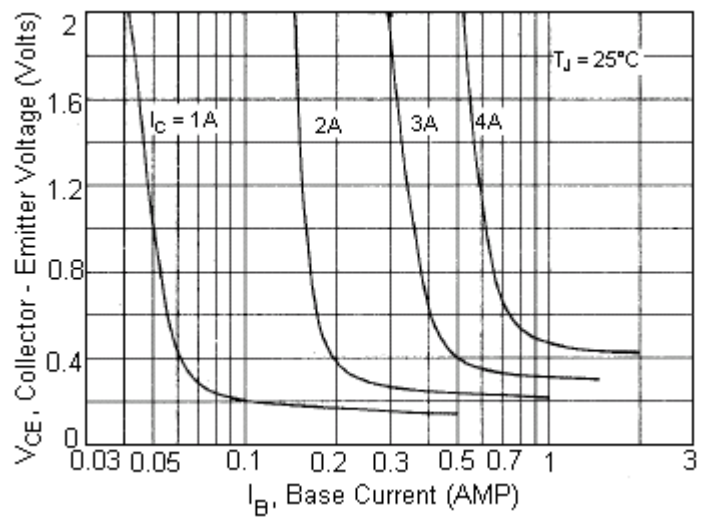
## Power Transistor



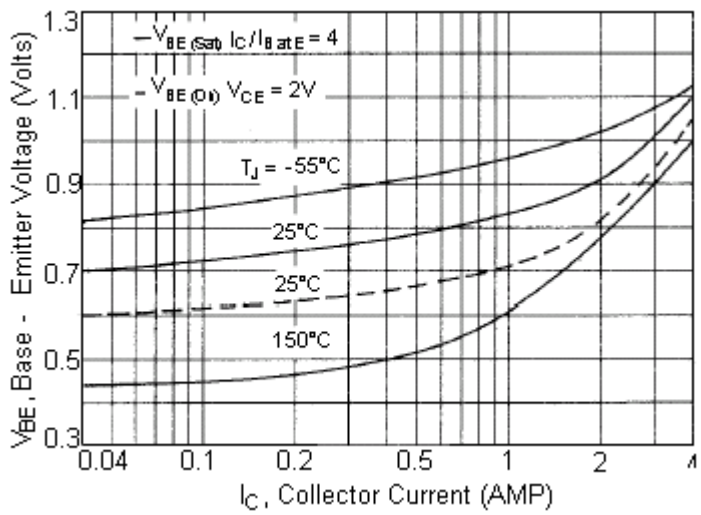
### DC Current Gain



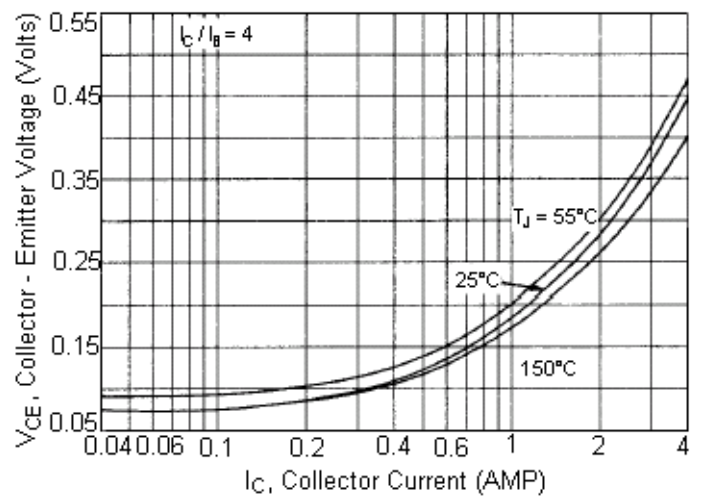
### Collector Saturation Region



### Base-Emitter Voltage



### Collector-Emitter Saturation Voltage

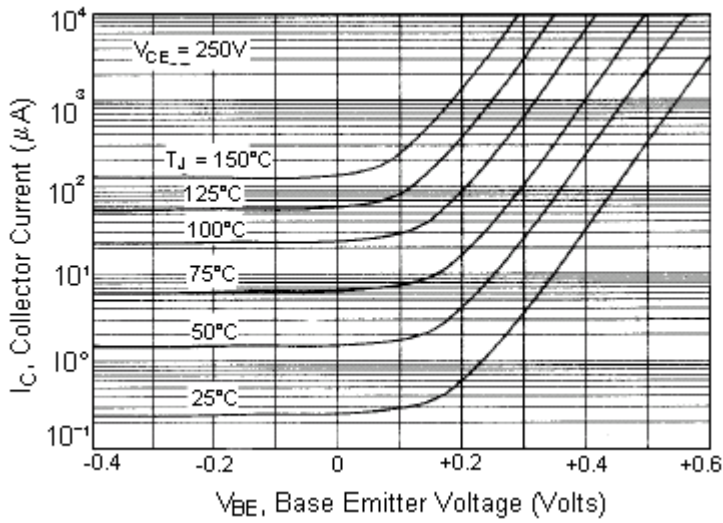


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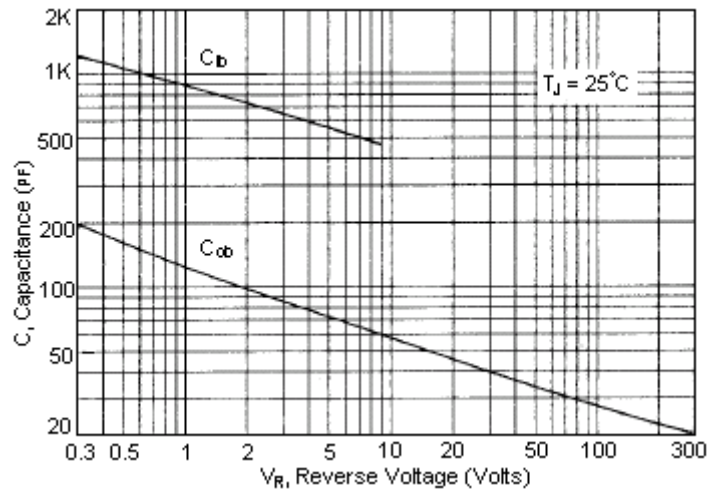
## Power Transistor



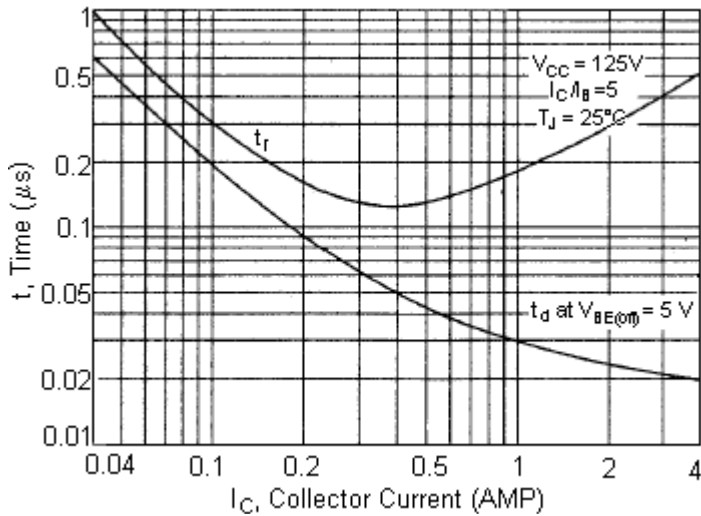
Collector Cut-Off Region



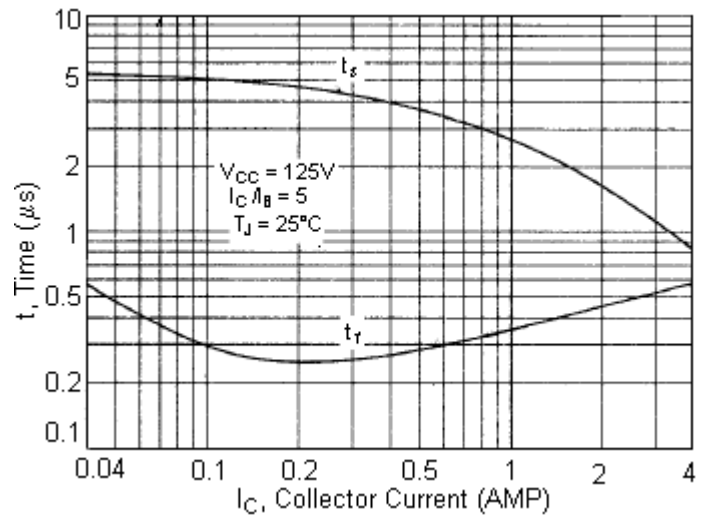
Capacitance



Turn-On Time



Turn-Off Time

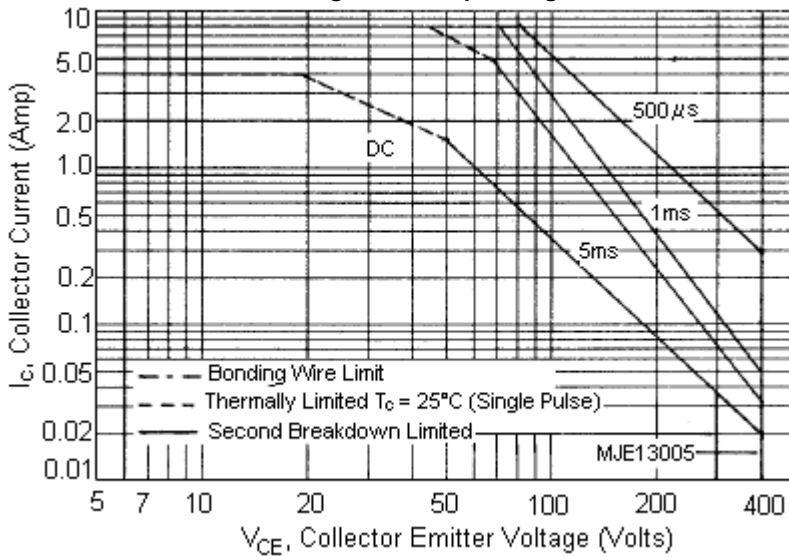


# MJE13005

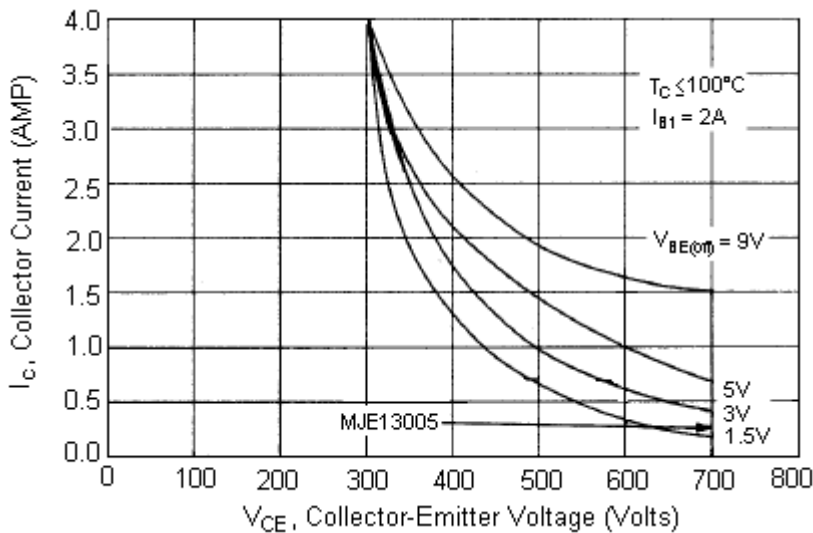
## Power Transistor



Active Region Safe Operating Area



Reverse Bias Switching Safe Operating Area



### Specifications

$I_{C(av)}$ maximum (A)	$V_{CE0}$ maximum (V)	$V_{CBO}$ maximum (V)	$V_{CE(Sat)}$ (V) at $I_C = 4A$	$t_f$ maximum ( $\mu s$ )	$P_{tot}$ at 25°C (W)	Package	Type	Part Number
4	400	700	1	0.9	75	TO-220	NPN	MJE13005



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