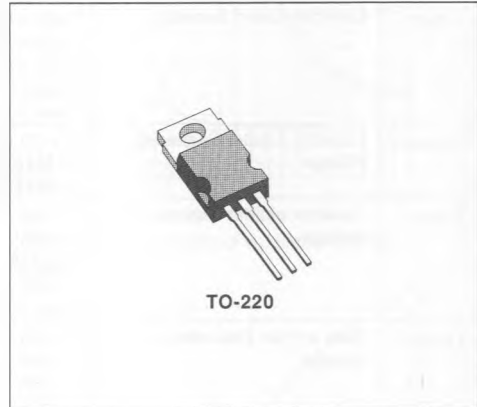


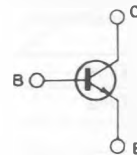
## HIGH VOLTAGE, HIGH SPEED, POWER SWITCHING

### DESCRIPTION

The MJE13008 and MJE13009 are silicon multiepitaxial mesa NPN transistors. They are mounted in Jedec TO-220 plastic package, intended for use in motor controls, switching regulators deflection circuits, etc.



### INTERNAL SCHEMATIC DIAGRAM



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		MJE13008	MJE13009	
$V_{CEO}$	Collector-emitter Voltage ( $I_B = 0$ )	300	400	V
$V_{CEV}$	Collector-emitter Voltage	600	700	V
$V_{EBO}$	Emitter-base Voltage ( $I_C = 0$ )	9		V
$I_C$	Collector Current	12		A
$I_{CM}$	Collector Peak Current ( $t_p \leq 10\text{ms}$ )	24		A
$I_B$	Base Current	6		A
$I_{BM}$	Base Peak Current ( $t_p \leq 10\text{ms}$ )	12		A
$I_E$	Emitter Current	18		A
$I_{EM}$	Emitter Peak Current	36		A
$P_{tot}$	Total Power Dissipation at $T_{case} \leq 25^\circ\text{C}$	100		W
$T_{stg}$	Storage Temperature	- 65 to 150		$^\circ\text{C}$
$T_j$	Junction Temperature	150		$^\circ\text{C}$

**THERMAL DATA**

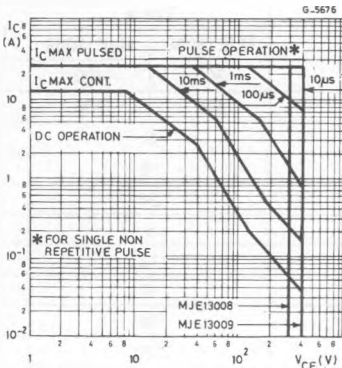
$R_{th(j-case)}$	Thermal Resistance Junction-case	Max	1.25	$^{\circ}C/W$
------------------	----------------------------------	-----	------	---------------

**ELECTRICAL CHARACTERISTICS** ( $T_{case} = 25^{\circ}C$  unless otherwise specified)

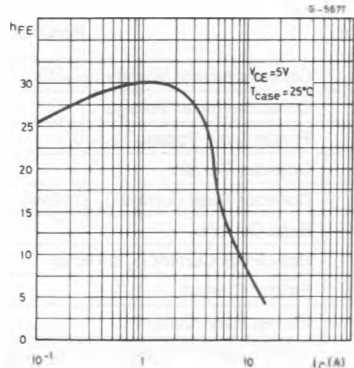
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{EBO}$	Emitter Cutoff Current ( $I_C = 0$ )	$V_{EB} = 9V$			1	mA
$I_{CEV}$	Collector Cutoff Current	$V_{CEV} = \text{rated value}$ $V_{BE(off)} = 1.5V$ $V_{CEV} = \text{rated value}$ $V_{EB(off)} = 1.5V$ $T_{case} = 100^{\circ}C$			1	mA
$V_{CE0(sus)}^*$	Collector-Emitter Sustaining Voltage	$I_C = 10mA$ $I_E = 0$ for <b>MJE13008</b> for <b>MJE13009</b>	300 400			V V
$V_{CE(sat)}^*$	Collector-emitter Saturation Voltage	$I_C = 5A$ $I_B = 1A$ $I_C = 8A$ $I_B = 1.6A$ $I_C = 12A$ $I_B = 3A$ $I_C = 8A$ $I_B = 1.6A$ $T_{case} = 100^{\circ}C$			1 1.5 3 2	V V V V
$V_{BE(sat)}^*$	Base-emitter Saturation Voltage	$I_C = 5A$ $I_B = 1A$ $I_C = 8A$ $I_B = 1.6A$ $I_C = 8A$ $I_B = 1.6A$ $T_{case} = 100^{\circ}C$			1.2 1.6 1.5	V V V
$h_{FE}^*$	DC Current Gain	$I_C = 5A$ $V_{CE} = 5V$ $I_C = 8A$ $V_{CE} = 5V$	8 6		40 30	
$f_T$	Transition Frequency	$I_C = 500mA$ $V_{CE} = 10V$	4			MHz
$C_{OB}$	Output Capacitance	$V_{CB} = 10V$ $I_E = 0$ $f = 0.1MHz$		180		pF
$t_{on}$	Turn-on Time	RESISTIVE LOAD $V_{CC} = 125V$ $I_C = 8A$ $I_{B1} = I_{B2} = 1.6A$ $I_P = 25\mu s$ Duty Cycle $\leq 1\%$			1.1	$\mu s$
$t_s$	Storage Time				3	$\mu s$
$t_f$	Fall Time				0.7	$\mu s$

\* Pulsed : pulse duration = 300 $\mu s$ , duty cycle  $\leq 2\%$ .

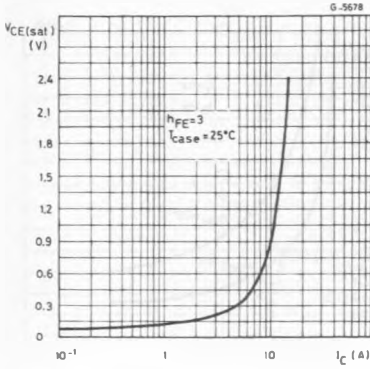
**Safe Operating Areas.**



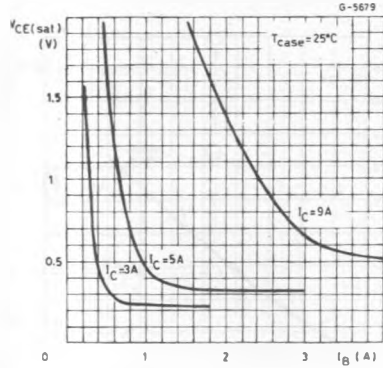
**DC Current Gain.**



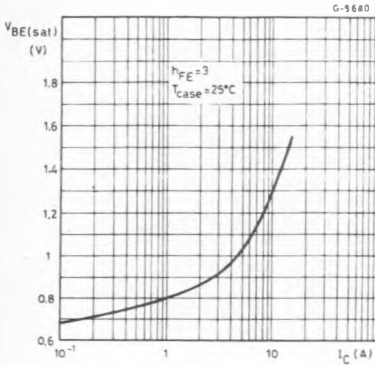
Collector-emitter Saturation Voltage.



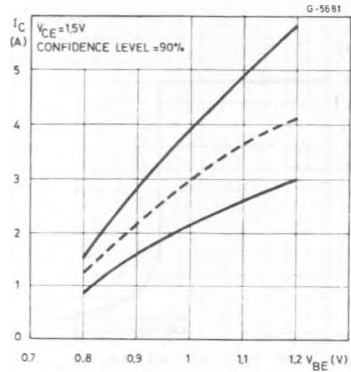
Collector-emitter Saturation Voltage.



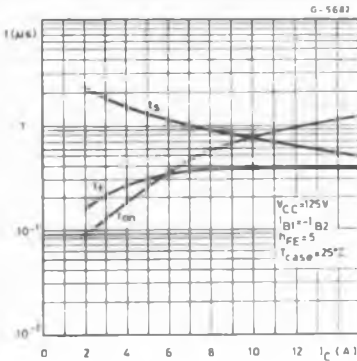
Base-emitter Saturation Voltage.



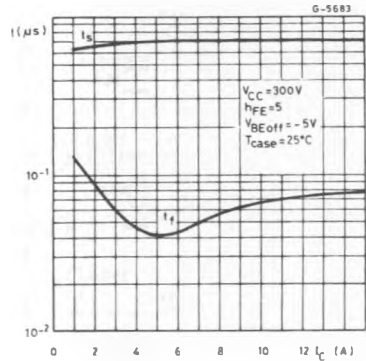
Collector Current Spread vs. Base-emitter Voltage.



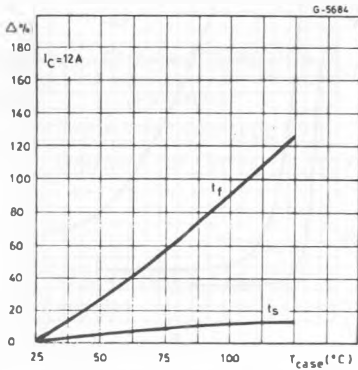
Switching Times Resistive Load (see fig. 2).



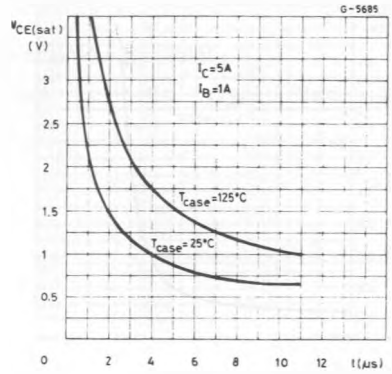
Switching Times Inductive Load (see fig. 1).



Switching Times vs.  $T_{case}$  Inductive Load.



Dynamic Collector-emitter Saturation Voltage (see fig. 2).



Clamped Reverse Bias Safe Operating Areas..

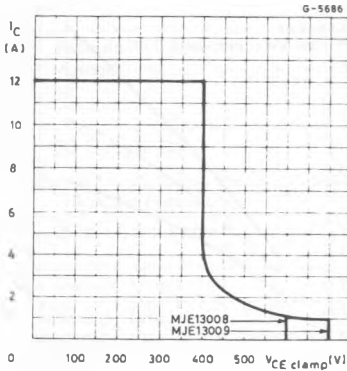


Figure 1 : Switching Times Test Circuit on Inductive Load.

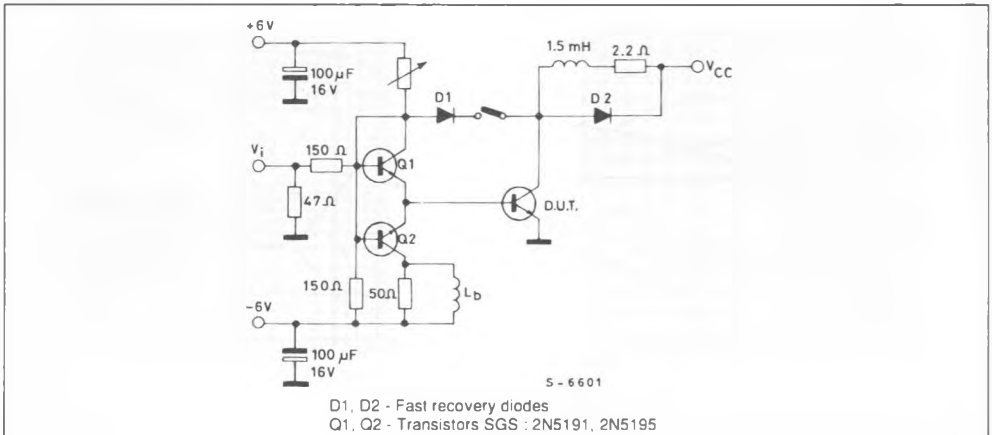


Figure 2 : Switching Times Test Circuit on Resistive Load and  $V_{CE(sat)}$  Dyn. Test Circuit.