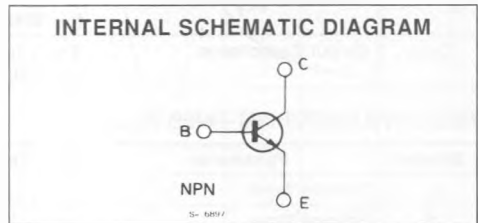
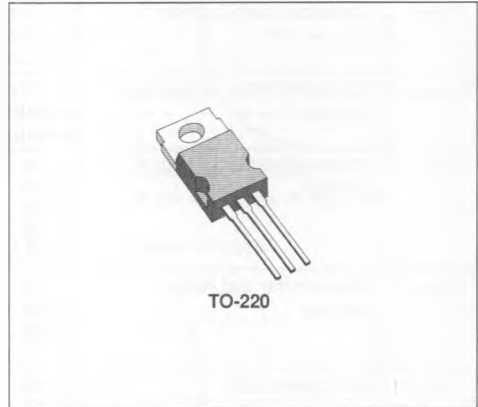


MOTOR CONTROL, SWITCH REGULATORS

DESCRIPTION

The MJE13006, MJE13007 and MJE13007A are silicon multiepitaxial mesa NPN transistors. They are mounted in Jedec TO-220 plastic package, intended for use in motor controls, switching regulator's etc.



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value			Unit
		MJE13006	MJE13007	MJE13007A	
V_{CE0}	Collector-emitter Voltage ($V_B = 0$)	300	400	400	V
V_{CEV}	Collector-emitter Voltage	600	700	850	V
V_{EBO}	Emitter-base Voltage ($I_C = 0$)	9			V
I_C	Collector Current	8			A
I_{CM}	Collector Peak Current	16			A
I_B	Base Current	4			A
I_{BM}	Base Peak Current	8			A
I_E	Emitter Current	12			A
I_{EM}	Emitter Peak Current	24			A
P_{Tot}	Total Power Dissipation at $T_{case} \leq 25^\circ C$	80			W
T_{stg}	Storage Temperature	- 65 to 150			$^\circ C$
T_J	Junction Temperature	150			$^\circ C$

THERMAL DATA

$R_{th(j-case)}$	Thermal Resistance Junction-case	Max	1.56	°C/W
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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 ($V_{BE} = 1.5V$)	$V_{CEV} = \text{rated value}$ $V_{CEV} = \text{rated value}$ $T_{case} = 100^{\circ}C$			1	mA	
					5	mA	
$V_{CEO(sus)}^*$	Collector-Emitter Sustaining Voltage ($I_B = 0$)	$I_C = 10\text{ mA}$ for MJE13006 for MJE13007/13007A	300 400			V V	
$V_{CE(sat)}^*$	Collector-emitter Saturation Voltage	$I_C = 2A$ $I_B = 0.4A$			1	V	
		$I_C = 5A$ $I_B = 1A$			1.5	V	
		$I_C = 8A$ $I_B = 2A$			3	V	
		$I_C = 5A$ $I_B = 1A$ $T_{case} = 100^{\circ}C$			2	V	
$V_{BE(sat)}^*$	Base-emitter Saturation Voltage	$I_C = 2A$ $I_B = 0.4A$			1.2	V	
		$I_C = 5A$ $I_B = 1A$			1.6	V	
		$I_C = 5A$ $I_B = 1A$					
		$T_{case} = 100^{\circ}C$			1.5	V	
h_{FE}^*	DC Current Gain	$I_C = 2A$ $V_{CE} = 5V$	8		40		
		$I_C = 5A$ $V_{CE} = 5V$	6		30		
f_T	Transition Frequency	$I_C = 500\text{mA}$ $V_{CE} = 10V$ $f = 1\text{MHz}$	4			MHz	
C_{CBO}	Output Capacitance	$V_{CB} = 10V$ $I_E = 0$ $f = 0.1\text{MHz}$		110		pF	

RESISTIVE SWITCHING TIMES (fig. 2)

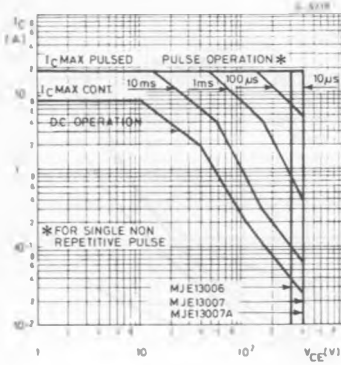
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_{on}	Turn-on Time	$V_{CC} = 125V$ $I_C = 5A$ $I_{B1} = -I_{B2} = 1A$ $t_p = 25\mu s$ Duty Cycle < 1%			0.7	μs
t_s	Storage Time				3	μs
t_f	Fall Time				0.7	μs

INDUCTIVE SWITCHING TIMES (fig. 1)

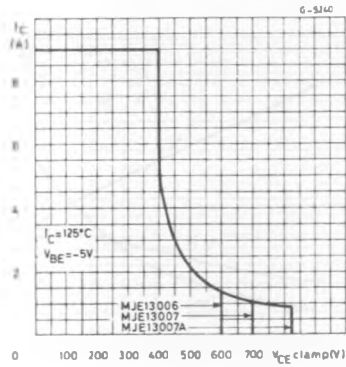
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_f	Fall Time	$V_{CC} = 125V$ $I_C = 5A$ $I_{B1} = 1A$ $t_p = 25\mu s$ Duty Cycle < 1% $T_{case} = 100^{\circ}C$			0.3	μs
		$V_{CC} = 125V$ $I_C = 5A$ $I_{B1} = 1A$ $t_p = 25\mu s$ Duty Cycle $\leq 1\%$			0.6	μs

* Pulsed : pulse duration $\leq 300 \mu s$, duty cycle < 1.5 %.

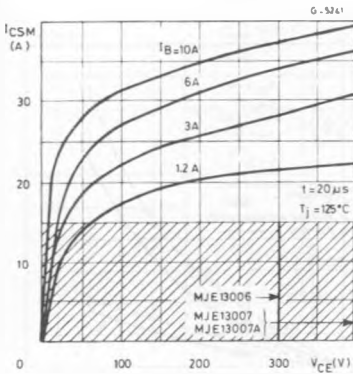
Safe Operating Areas.



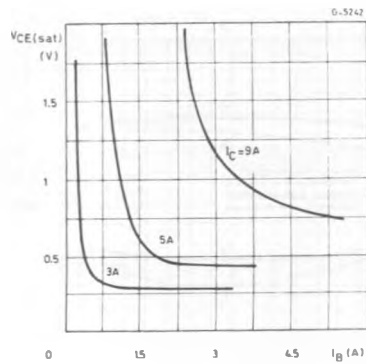
Clamped Reverse Bias operating Areas.



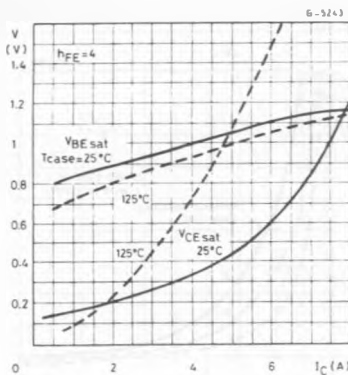
Forward Biased Accidental Overload Area (see fig. 3).



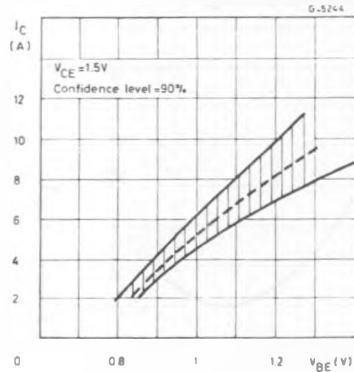
Collector Saturation Voltage.



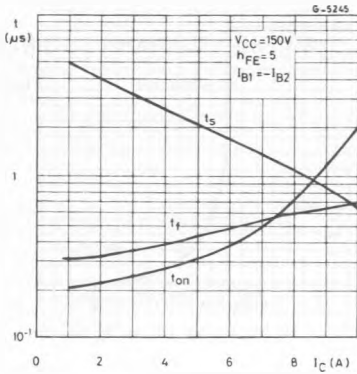
Saturation Voltages.



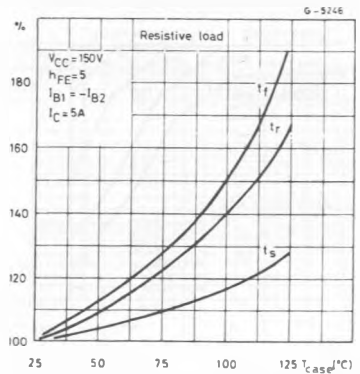
Collector Current Spread vs. Emitter Voltage.



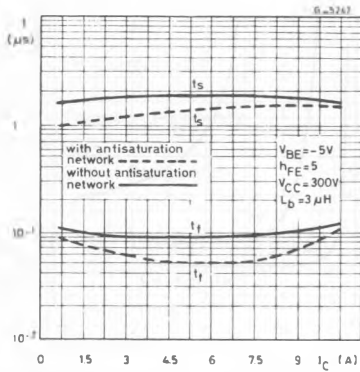
Switching Times Resistive Load (see fig. 2).



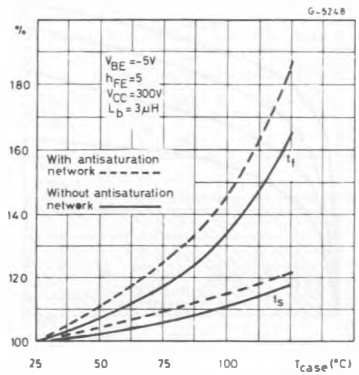
Switching Times Percentage Variation vs. Case Temperature.



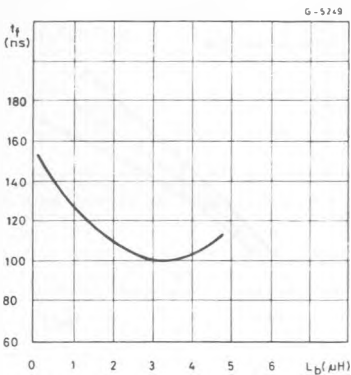
Switching Times Inductive Load (see fig. 1).



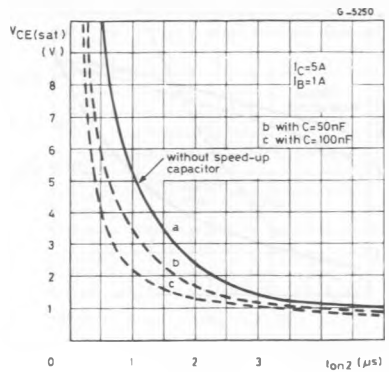
Switching Times Inductive Load vs. Case Temperature.



Fall Times vs. Lb (see fig. 1).



Dynamic Collector-emitter Saturation Voltage (see fig. 4).



DC Current Gain.

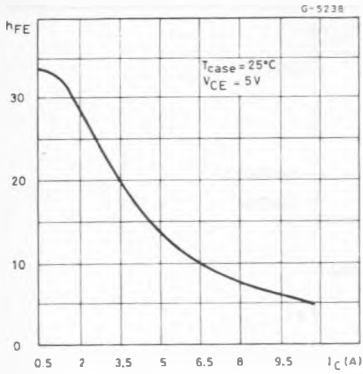


Figure 1 : Switching Times Test Circuit on Inductive Load, with and without Antisaturation Network.

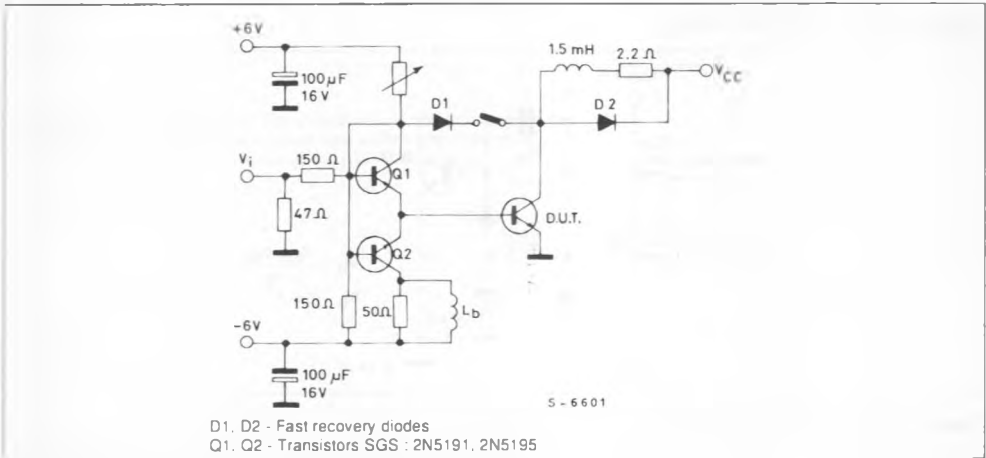


Figure 2 : Switching Times Test Circuit on Resistive Load.

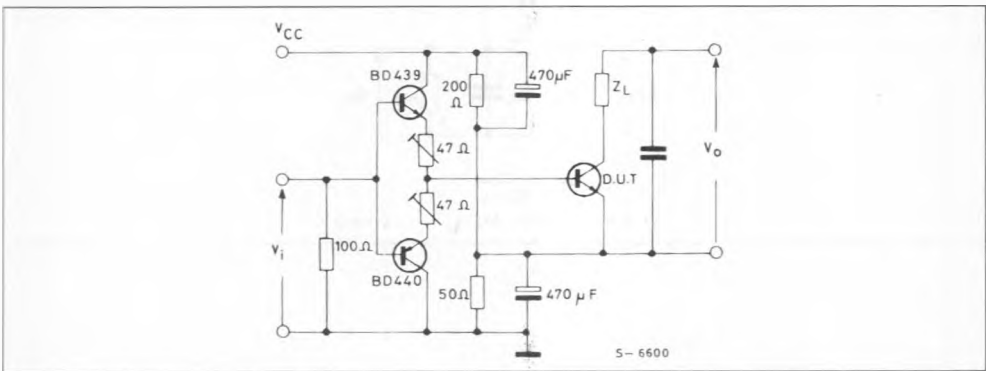


Figure 3 : Forward Biased Accidental Overload Area Test Circuit.

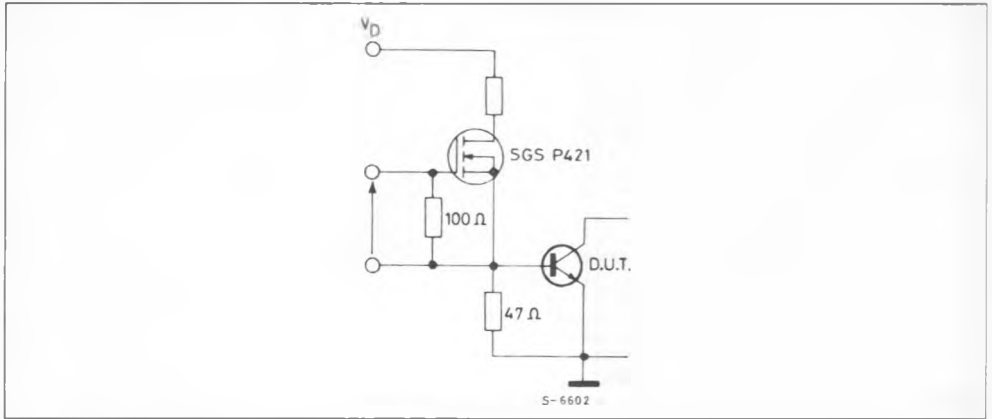


Figure 4 : $V_{CE(sat)}$ Dyn. Test Circuit.

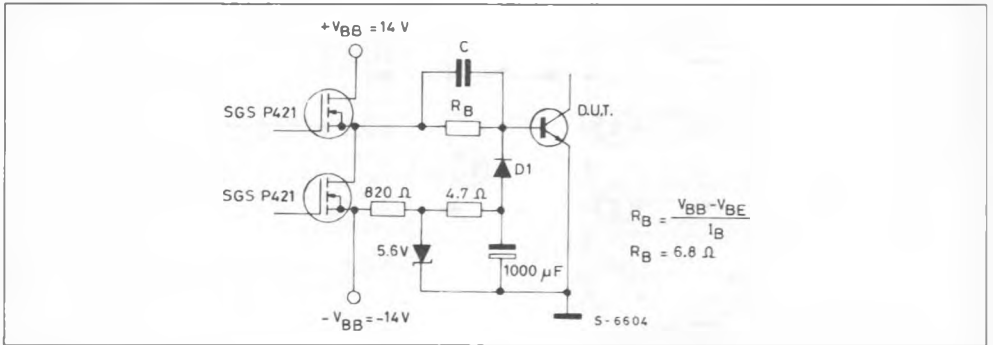


Figure 5 : Equivalent Input Schematic Circuit at Turn-on.

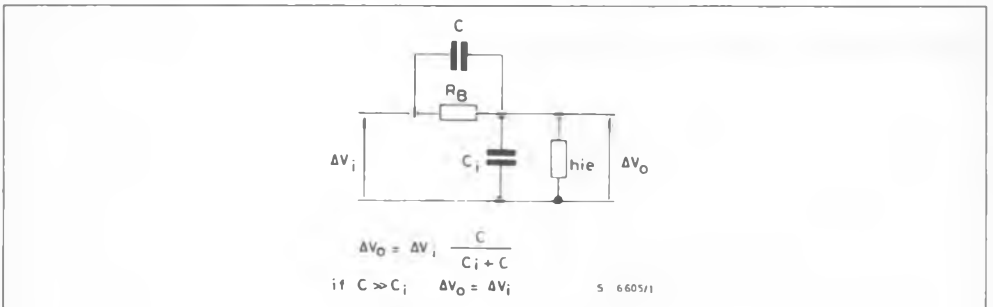
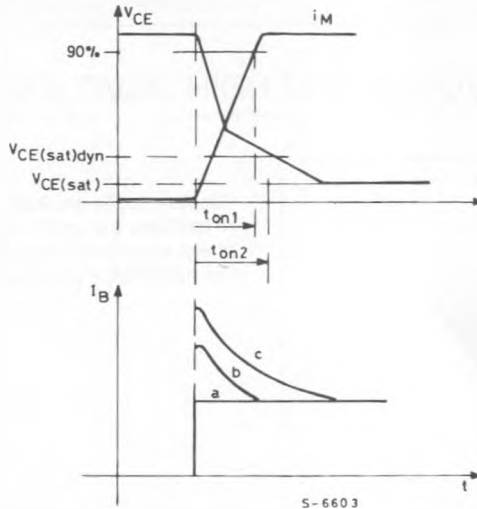


Figure 6 : Remarks to $V_{CE(sat)}$ Dyn. Test Circuit (fig. 4).



The speed-up capacitor decreases the $V_{CE(sat)}$ dyn. as shown in diagram (figure 6).
 The 50 nF capacitor modifies the shape of base current with a overshoot