SGS-THOMSON MICROELECTRONICS

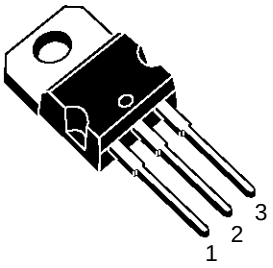
MJE13009

SILICON NPN SWITCHING TRANSISTOR

- SGS-THOMSON PREFERRED SALESTYPE

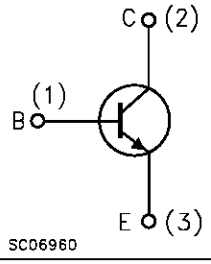
DESCRIPTION

The MJE13009 is a multiepitaxial mesa NPN transistor. It is mounted in Jedec TO-220 plastic package, intended for use in motor controls, switching regulators, deflection circuits, etc.



TO-220

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CEO}	Collector-Emitter Voltage (I_B = 0)	400	V
V_{CEV}	Collector-Emitter Voltage (V_{BE} = -1.5 V)	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 ms)	24	A
I_B	Base Current	6	A
I_{BM}	Base Peak Current ($t_p \leq$ 10 ms)	12	A
I_E	Emitter Current	18	A
I_{EM}	Emitter Peak Current	36	A
P_{tot}	Total Power Dissipation at $T_c \leq 25\ ^oC$	100	W
T_{stg}	Storage Temperature	-65 to 150	^oC
T_j	Max. Operating Junction Temperature	150	^oC

THERMAL DATA

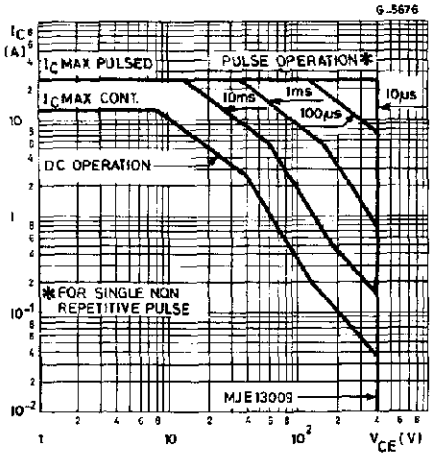
$R_{thj\text{-}case}$	Thermal Resistance Junction-case	Max	1.25	$^oC/W$

ELECTRICAL CHARACTERISTICS (T_{case} = 25 ^oC unless otherwise specified)

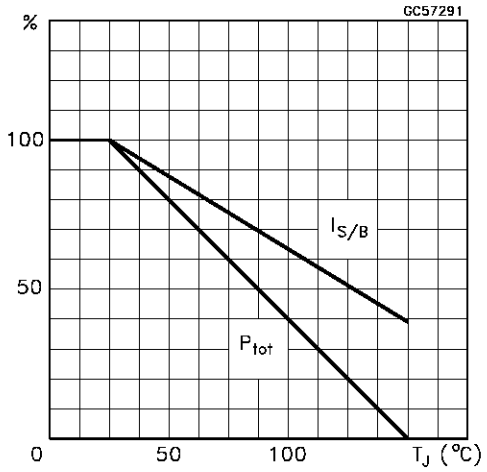
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
I_{CEV}	Collector Cut-off Current	V_{CEV} = rated value $V_{BE(off)}$ = 1.5 V V_{CEV} = rated value $V_{EB(off)}$ = 1.5 V T_{case} = 100^oC				1 5	mA mA
I_{EBO}	Emitter Cut-off Current (I_C = 0)	V_{EB} = 9 V				1	mA
$V_{CEO(sus)}$*	Collector-Emitter Sustaining Voltage	I_C = 10 mA	I_E = 0	400			V
$V_{CE(sat)}$*	Collector-Emitter Saturation Voltage	I_C = 5 A I_C = 8 A I_C = 12 A I_C = 8 A T_{case} = 100^oC	I_B = 1 A I_B = 1.6 A I_B = 3 A I_B = 1.6 A			1 1.5 3 2	V V V V
$V_{BE(sat)}$*	Base-Emitter Saturation Voltage	I_C = 5 A I_C = 8 A I_C = 8 A T_{case} = 100^oC	I_B = 1 A I_B = 1.6 A I_B = 1.6 A			1.2 1.6 1.5	V V V
h_{FE}*	DC Current Gain	I_C = 5 A I_C = 8 A	V_{CE} = 5 V V_{CE} = 5 V	8 6		40 30	
f_T	Transistor Frequency	I_C = 500 mA	V_{CE} = 10 V	4			MHz
C_{OB}	Output Capacitance	V_{CB} = 10 A f = 0.1 MHz	I_E = 0		180		pF
 t_{on} t_s t_f	 Turn-on Time Storage Time Fall Time	**RESISTIVE LOAD** V_{CC} = 125 V I_{B1} = -I_{B2} = 1.6 A Duty Cycle ≤ 1%	 I_C = 8A t_p = 25 µs			1.1 3 0.7	µs µs µs

* Pulsed: Pulse duration = 300µs, duty cycle ≤ 2 %

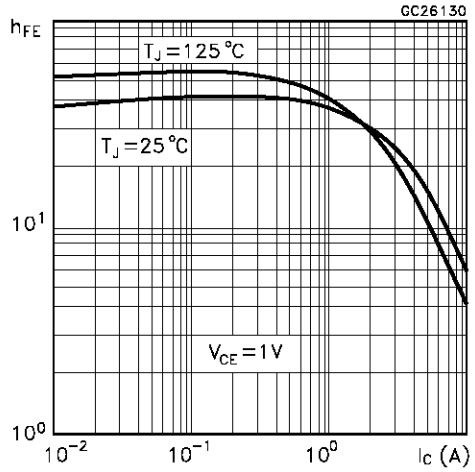
Safe Operating Areas



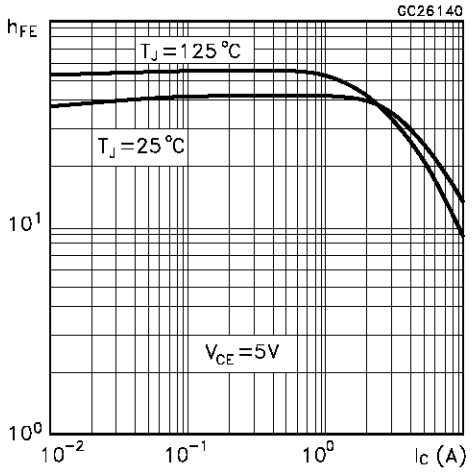
Derating Curve



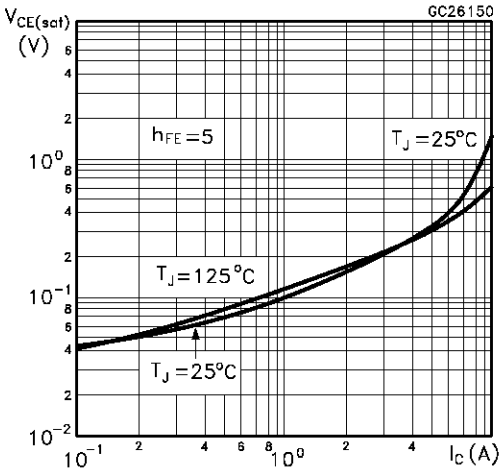
DC Current Gain



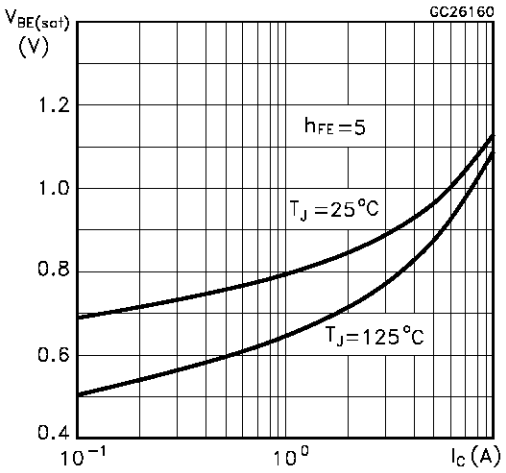
DC Current Gain



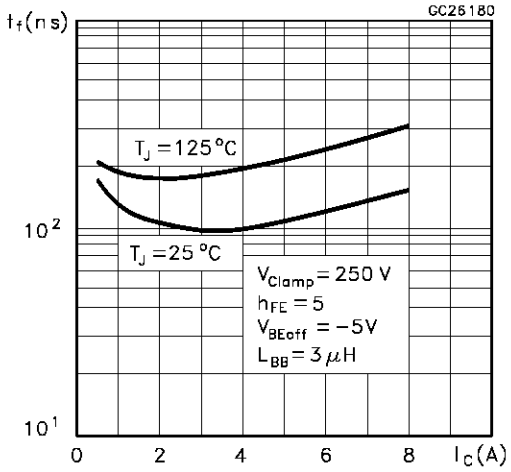
Collector Emitter Saturation Voltage



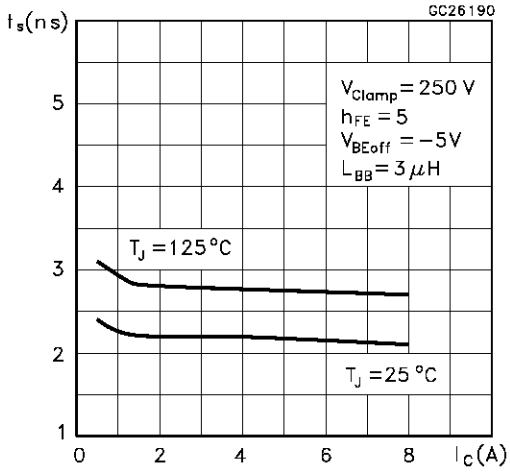
Base Emitter Saturation Voltage



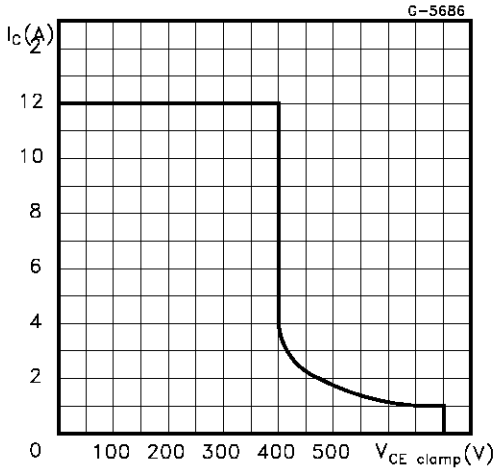
Inductive Fall Time



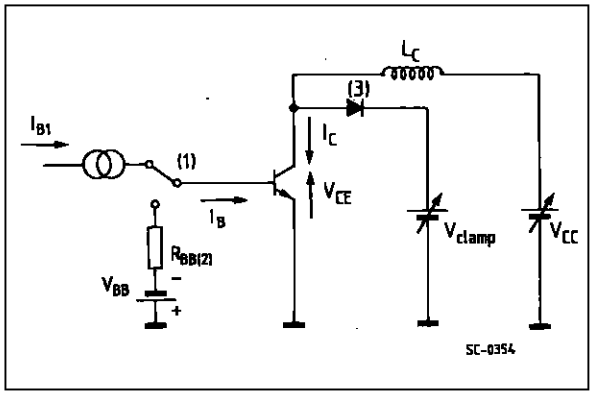
Inductive Storage Time



Reverse Biased SOA



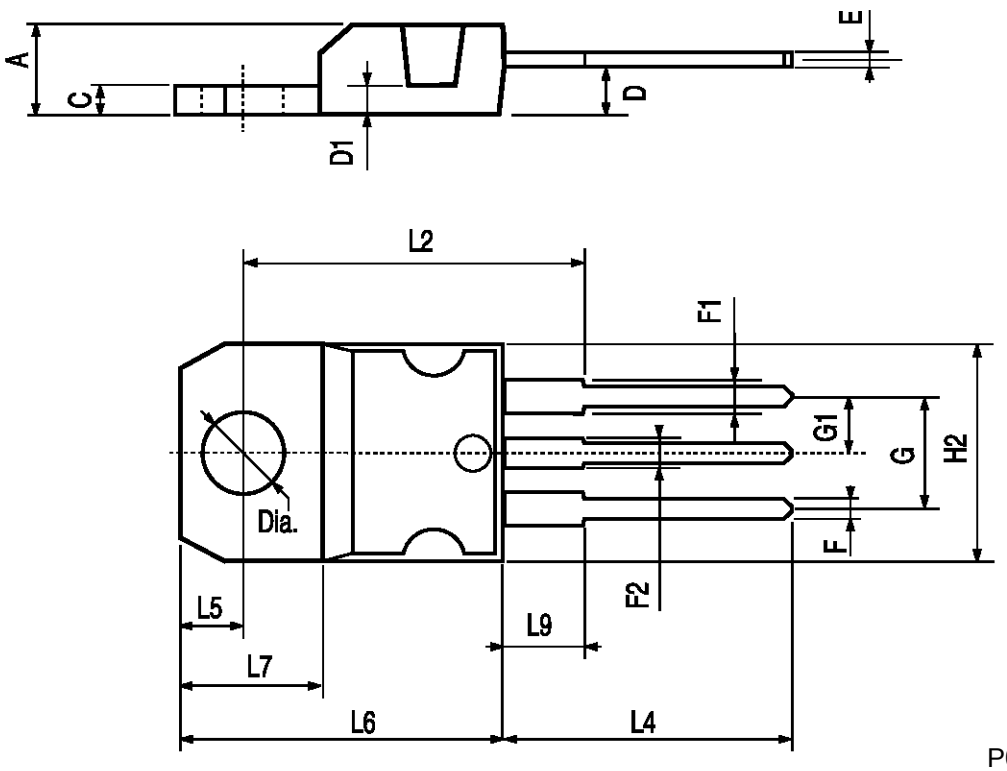
RBSOA and Inductive Load Switching Test Circuit



(1) Fast electronic switch
(2) Non-inductive Resistor
(3) Fast recovery rectifier

TO-220 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
C	1.23		1.32	0.048		0.051
D	2.40		2.72	0.094		0.107
D1		1.27			0.050	
E	0.49		0.70	0.019		0.027
F	0.61		0.88	0.024		0.034
F1	1.14		1.70	0.044		0.067
F2	1.14		1.70	0.044		0.067
G	4.95		5.15	0.194		0.203
G1	2.4		2.7	0.094		0.106
H2	10.0		10.40	0.393		0.409
L2		16.4			0.645	
L4	13.0		14.0	0.511		0.551
L5	2.65		2.95	0.104		0.116
L6	15.25		15.75	0.600		0.620
L7	6.2		6.6	0.244		0.260
L9	3.5		3.93	0.137		0.154
DIA.	3.75		3.85	0.147		0.151



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