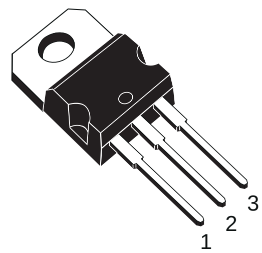
MJE13009

HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

- STMicroelectronics PREFERRED SALESTYPE
- HIGH VOLTAGE CAPABILITY
- MINIMUM LOT-TO-LOT SPREAD FOR RELIABLE OPERATION
- LOW BASE-DRIVE REQUIREMENTS
- VERY HIGH SWITCHING SPEED
- FULLY CHARACTERIZED AT 125 ^{o}C



TO-220

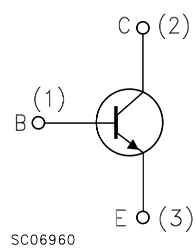
APPLICATIONS

- ELECTRONIC TRANSFORMER FOR HALOGEN LAMPS
- SWITCH MODE POWER SUPPLIES

DESCRIPTION

The MJE13009 is a high voltage Multiepitaxial Mesa NPN transistor mounted in Jedec TO-220 plastic package. It uses a Hollow Emitter structure to enhance switching speeds.

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)	25	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 $T_c \leq 25$ ^{o}C	110	W
T_{stg}	Storage Temperature	-65 to 150	^{o}C
T_j	Max. Operating Junction Temperature	150	^{o}C

THERMAL DATA

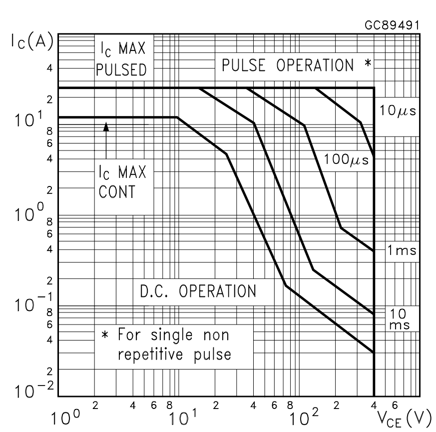
$R_{thj\text{-}case}$	Thermal Resistance Junction-case	Max	1.14	$^oC/W$

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

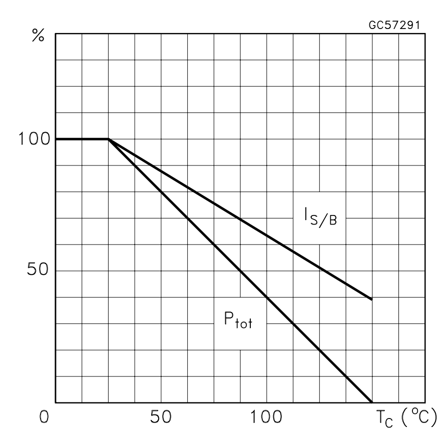
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CEV}	Collector Cut-off Current (V_{EB} = -1.5 V)	V_{CE} = 700 V V_{CE} = 700 V T_{case} = 100^oC			1 5	mA mA
I_{EBO}	Emitter Cut-off Current (I_C = 0)	V_{EB} = 9 V			1	mA
$V_{CEO(sus)}$*	Collector-Emitter Sustaining Voltage (I_B = 0)	I_C = 10 mA	400			V
$V_{CE(sat)}$*	Collector-Emitter Saturation Voltage	I_C = 5 A I_B = 1 A I_C = 8 A I_B = 1.6 A I_C = 12 A I_B = 3 A I_C = 8 A I_B = 1.6 A T_{case} = 100^oC			1 1.5 3 2	V V V V
$V_{BE(sat)}$*	Base-Emitter Saturation Voltage	I_C = 5 A I_B = 1 A I_C = 8 A I_B = 1.6 A I_C = 8 A I_B = 1.6 A T_{case} = 100^oC			1.2 1.6 1.5	V V V
h_{FE}*	DC Current Gain	I_C = 5 A V_{CE} = 5 V I_C = 8 A V_{CE} = 5 V	8 6		40 30	
f_T	Transition Frequency	I_C = 500 mA V_{CE} = 10 V	4			MHz
C_{OB}	Output Capacitance (I_E = 0)	V_{CB} = 10 V f = 0.1 MHz		180		pF
 t_{on} t_s t_f	RESISTIVE LOAD Turn-on Time Storage Time Fall Time	 V_{CC} = 125 V I_C = 8A I_{B1} = $-I_{B2}$ = 1.6 A t_p = 25 µs Duty Cycle ≤ 1 (see figure 2)			 1.1 3 0.7	 µs µs µs

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

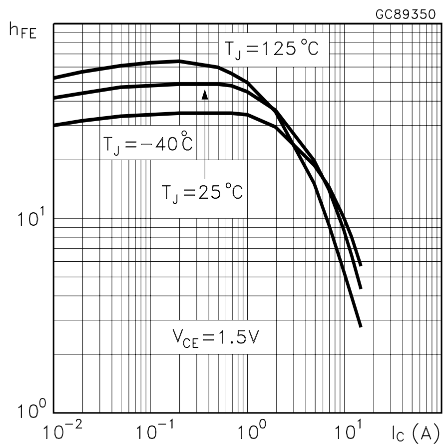
Safe Operating Areas



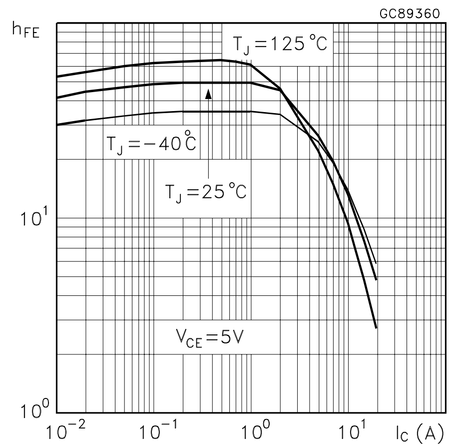
Derating Curve



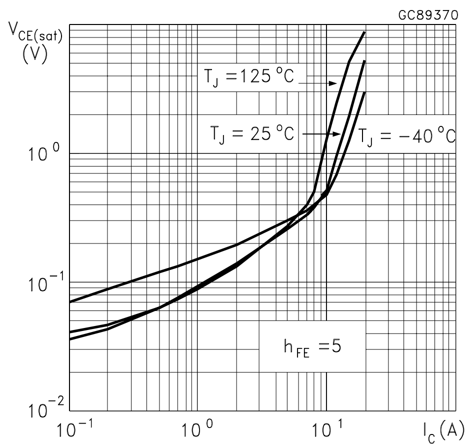
DC Current Gain



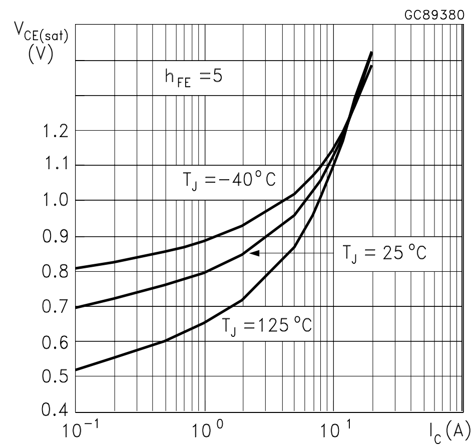
DC Current Gain



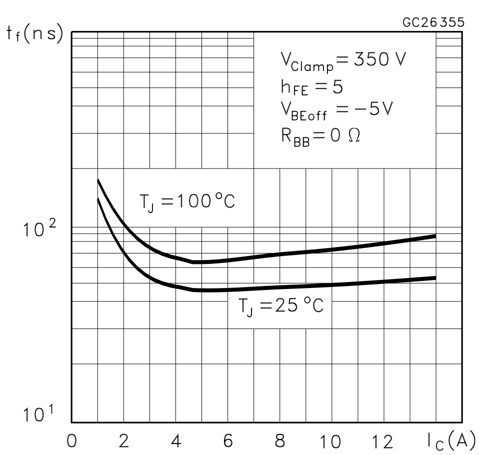
Collector Emitter Saturation Voltage



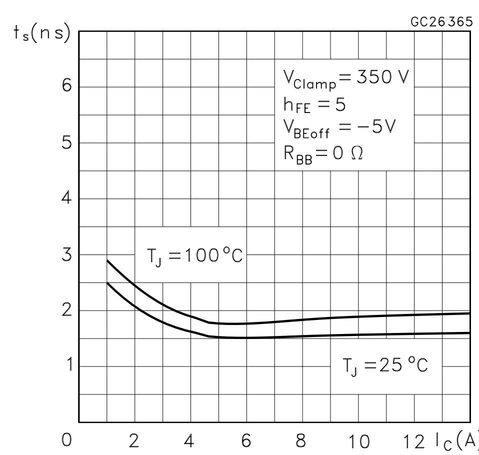
Base Emitter Saturation Voltage



Inductive Load Fall Time



Inductive Load Storage Time



Reverse Biased SOA

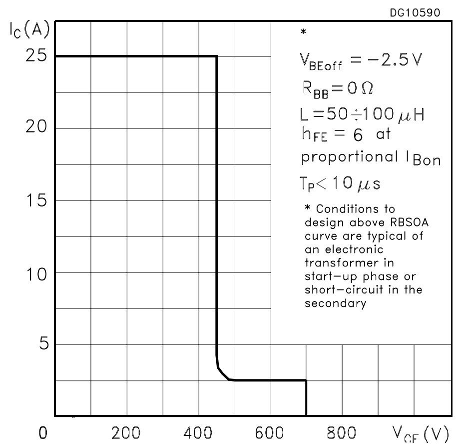


Figure 1: Inductive Load Switching Test Circuit

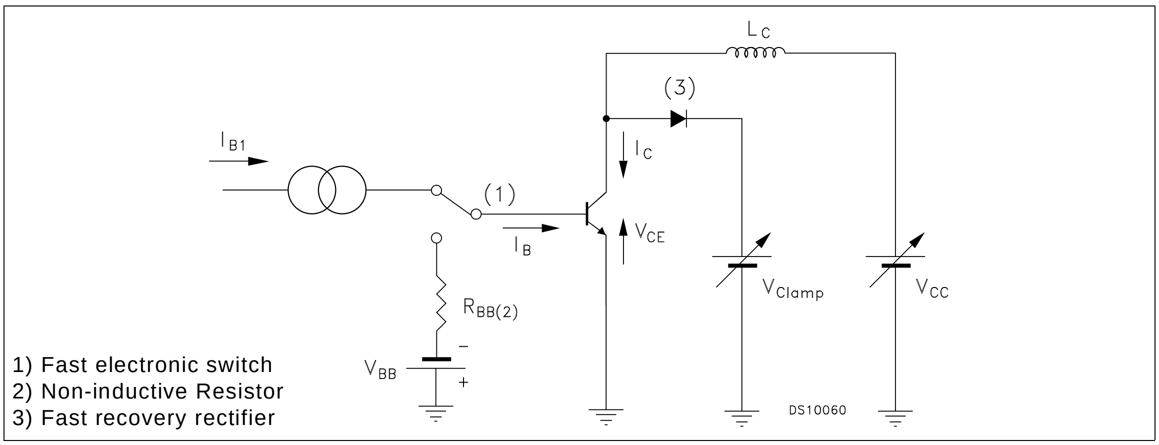
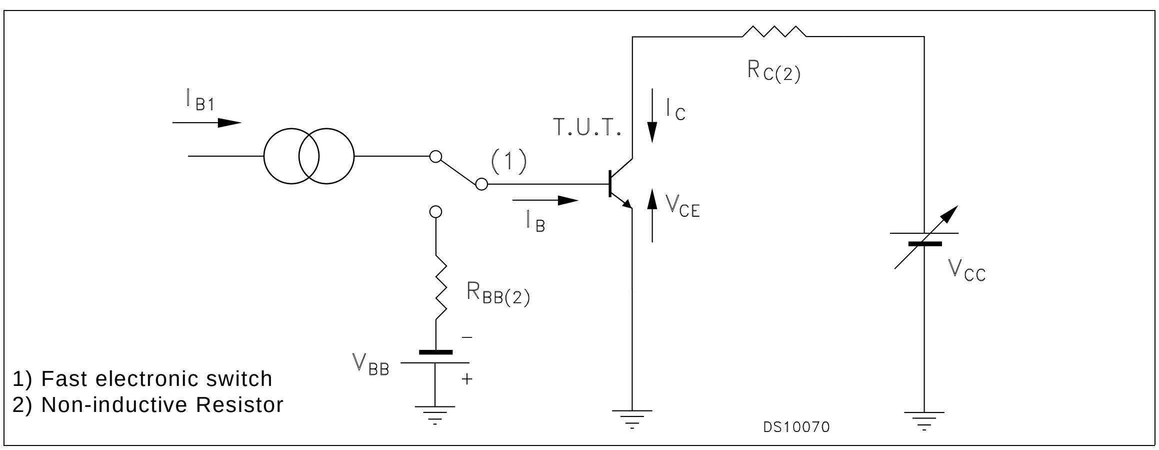
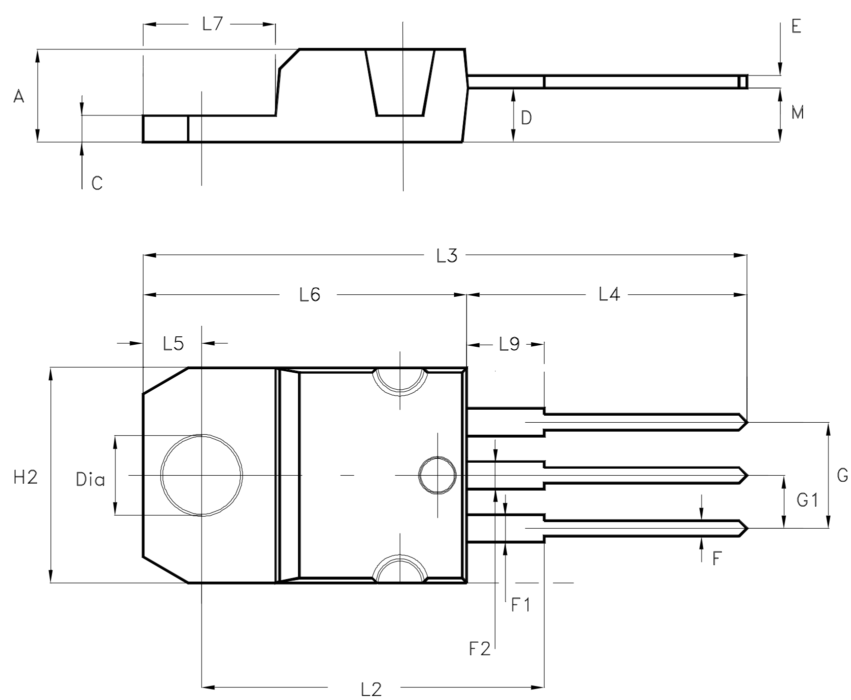


Figure 2: Resistive Load Switching Test Ciurcuit



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		0.052
D	2.40		2.72	0.094		0.107
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		0.202
G1	2.40		2.70	0.094		0.106
H2	10.00		10.40	0.394		0.409
L2		16.40			0.645	
L4	13.00		14.00	0.511		0.551
L5	2.65		2.95	0.104		0.116
L6	15.25		15.75	0.600		0.620
L7	6.20		6.60	0.244		0.260
L9	3.50		3.93	0.137		0.154
M		2.60			0.102	
DIA.	3.75		3.85	0.147		0.151



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