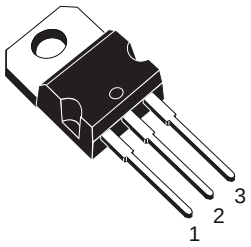
ST13007D

HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

- IMPROVED SPECIFICATION:
  - LOWER LEAKAGE CURRENT
  - TIGHTER GAIN RANGE
  - DC CURRENT GAIN PRESELECTION
  - TIGHTER STORAGE TIME RANGE
- HIGH VOLTAGE CAPABILITY
- INTEGRATED FREE-WHEELING DIODE
- LOW SPREAD OF DYNAMIC PARAMETERS
- MINIMUM LOT-TO-LOT SPREAD FOR RELIABLE OPERATION
- VERY HIGH SWITCHING SPEED
- FULLY CHARACTERIZED AT 125 ^{o}C
- LARGE RBSOA



TO-220

APPLICATIONS

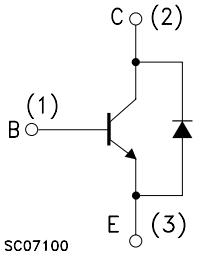
- UP TO 120W ELECTRONIC TRANSFORMERS FOR HALOGEN LAMPS
- SWITCH MODE POWER SUPPLIES

DESCRIPTION

The device is manufactured using high voltage Multi Epitaxial Planar technology for high switching speeds and high voltage capability.

It uses a Cellular Emitter structure to enhance switching speeds.

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CEV}	Collector-Emitter Voltage (V_{BE} = -1.5V)	700	V
V_{CEO}	Collector-Emitter Voltage (I_B = 0)	400	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
P_{tot}	Total Dissipation at $T_c \leq 25$ ^{o}C	80	W
T_{stg}	Storage Temperature	-65 to 150	^{o}C
T_j	Max. Operating Junction Temperature	150	^{o}C

THERMAL DATA

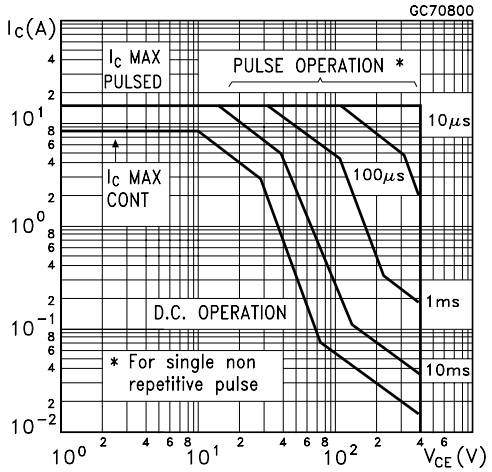
$R_{thj\text{-}case}$	Thermal Resistance Junction-case	Max	1.56	$^oC/W$
$R_{thj\text{-}amb}$	Thermal Resistance Junction-ambient	Max	62.5	$^oC/W$

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

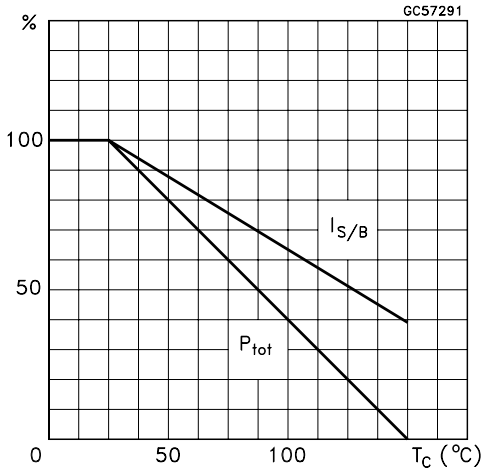
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CES}	Collector Cut-off Current (V_{BE} = 0)	V_{CE} = 700 V V_{CE} = 700 V T_c = 100 ^oC			10 0.5	µA mA
I_{CEO}	Collector Cut-off Current (I_B = 0)	V_{CE} = 400 V			100	µA
I_{EBO}	Emitter Cut-off Current (I_C = 0)	V_{EB} = 9 V			100	µA
$V_{CEO(sus)}$*	Collector-Emitter Sustaining Voltage (I_B = 0)	I_C = 10 mA	400			V
$V_{CE(sat)}$*	Collector-Emitter Saturation Voltage	I_C = 2 A I_B = 0.4 A I_C = 5 A I_B = 1 A I_C = 8 A I_B = 2 A I_C = 5 A I_B = 1 A T_c = 100 ^oC			0.8 1.5 2 3	V V V V
$V_{BE(sat)}$*	Base-Emitter Saturation Voltage	I_C = 2 A I_B = 0.4 A I_C = 5 A I_B = 1 A I_C = 5 A I_B = 1 A T_c = 100 ^oC			1.2 1.6 1.5	V V V
h_{FE}*	DC Current Gain	I_C = 2 A V_{CE} = 5 V I_C = 5 A V_{CE} = 5 V	18 8		40 25	
V_f	Diode Forward Voltage	I_C = 3 A			2.5	V
 t_s t_f	INDUCTIVE LOAD Storage Time Fall Time	I_C = 5 A V_{CL} = 250 V R_{BB} = 0Ω I_{B1} = 1 A $V_{BE(off)}$ = -5 V L = 200 µH (see figure 1)		 1.7 90	 2.3 150	 µs ns
 t_s t_f	INDUCTIVE LOAD Storage Time Fall Time	I_C = 5 A V_{CL} = 250 V R_{BB} = 0Ω I_{B1} = 1 A $V_{BE(off)}$ = -5 V L = 200 µH T_C = 125 ^oC (see figure 1)		 2.2 150		 µs ns

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

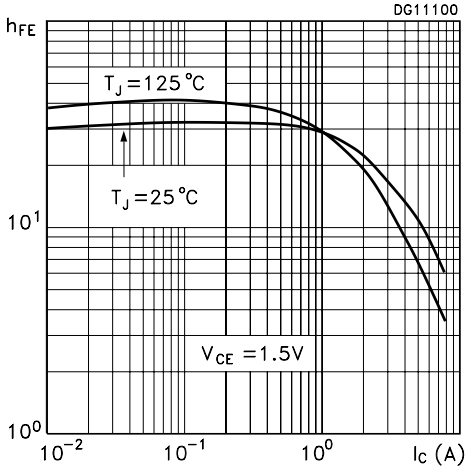
Safe Operating Area



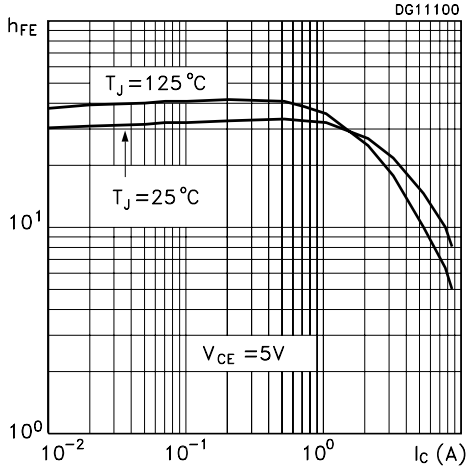
Derating Curve



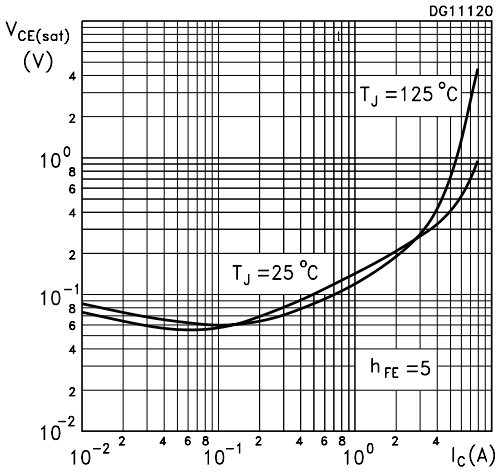
DC Current Gain



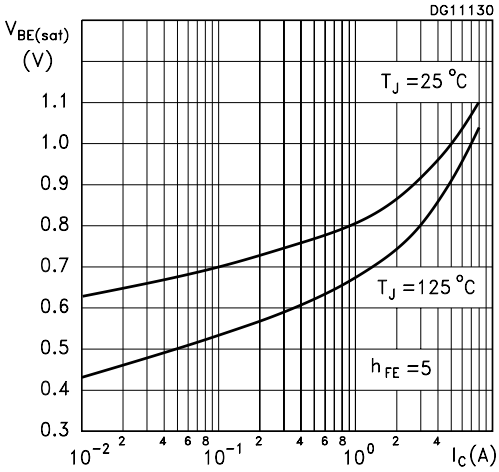
DC Current Gain



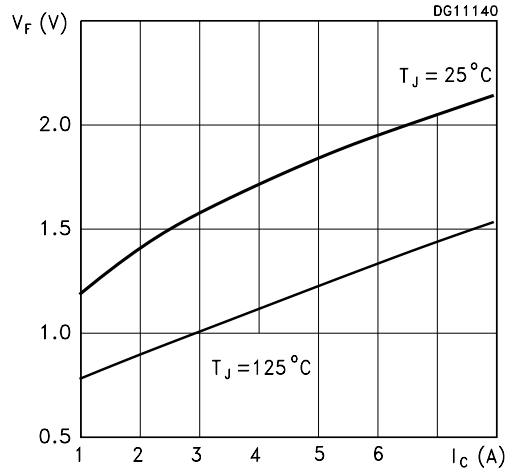
Collector Emitter Saturation Voltage



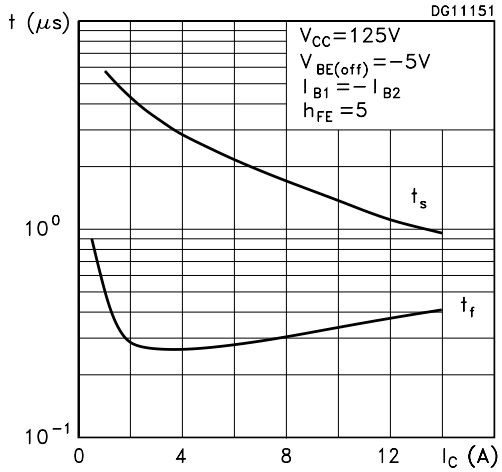
Base Emitter Saturation Voltage



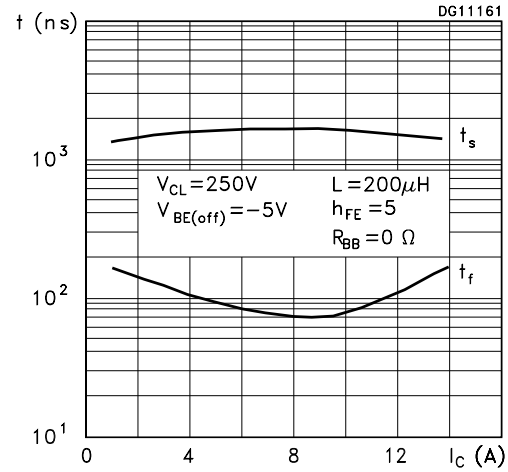
Diode Forward Voltage



Switching Time Resistive Load



Switching Time Inductive Load



Reverse Biased SOA

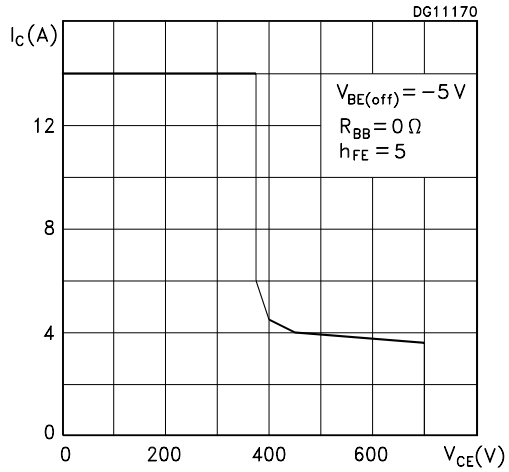


Figure 1: Inductive Load Switching Test Circuit.

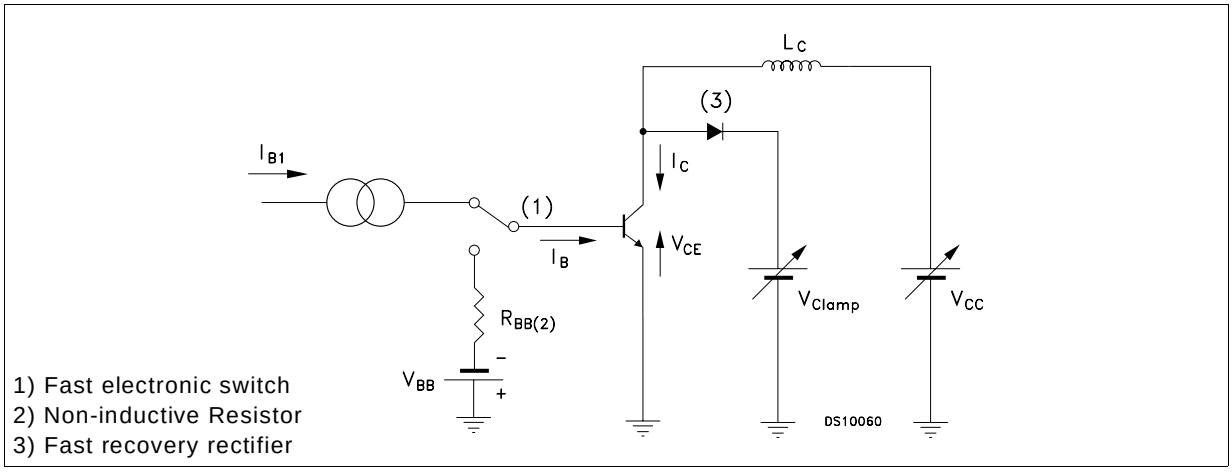
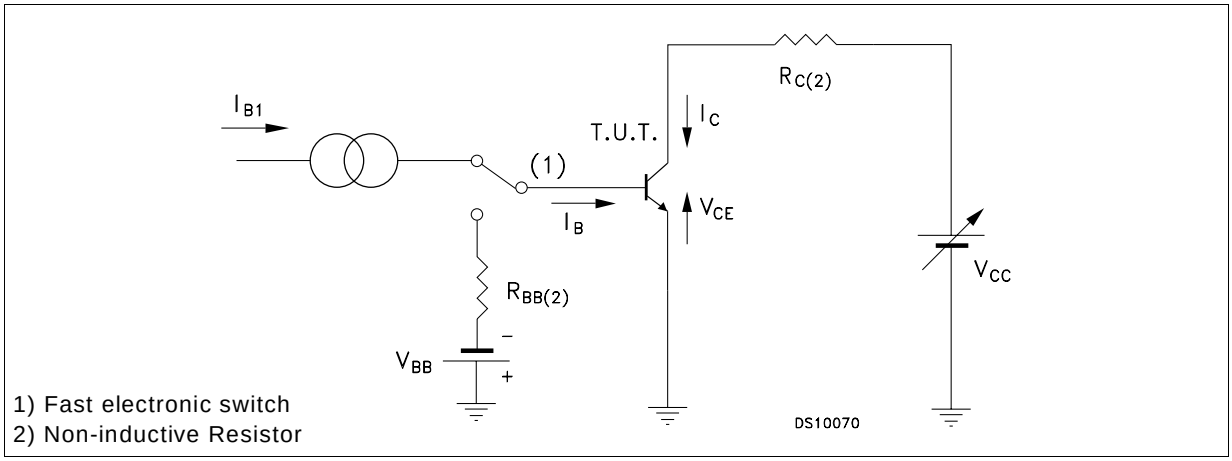
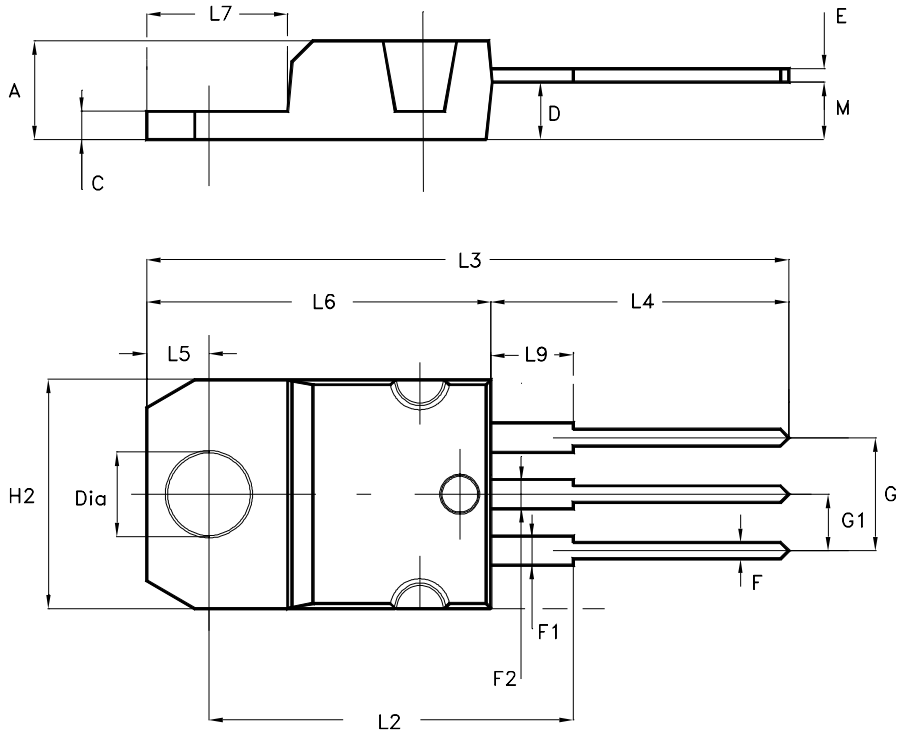


Figure 2: Resistive Load Switching Test Circuit.



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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