



BUL38D

HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

- STMicroelectronics PREFERRED SALESTYPE
- HIGH VOLTAGE CAPABILITY
- LOW SPREAD OF DYNAMIC PARAMETERS
- MINIMUM LOT-TO-LOT SPREAD FOR RELIABLE OPERATION
- LOW BASE-DRIVE REQUIREMENTS
- VERY HIGH SWITCHING SPEED
- FULLY CHARACTERISED AT 125°C
- HIGH RUGGEDNESS
- INTEGRATED ANTIPARALLEL COLLECTOR-EMITTER DIODE

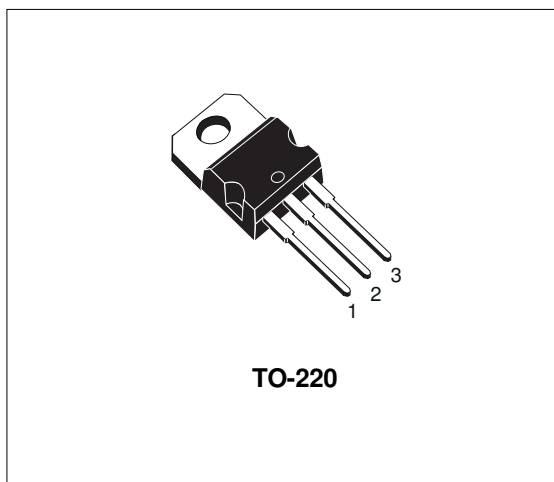
APPLICATIONS

- ELECTRONIC TRANSFORMERS FOR HALOGEN LAMPS
- SWITCH MODE POWER SUPPLIES

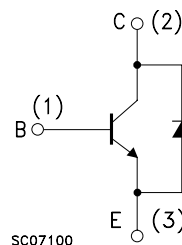
DESCRIPTION

The BUL38D is manufactured using high voltage Multi Epitaxial Planar technology for high switching speeds and high voltage withstand capability.

The BUL series is designed for use in lighting applications and low cost switch-mode power supplies.



INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CES}	Collector-Emitter Voltage ($V_{BE} = 0$)	800	V
V_{CEO}	Collector-Emitter Voltage ($I_B = 0$)	450	V
V_{EBO}	Emitter-Base Voltage ($I_C = 0$)	9	V
I_C	Collector Current	5	A
I_{CM}	Collector Peak Current ($t_p < 5$ ms)	10	A
I_B	Base Current	2	A
I_{BM}	Base Peak Current ($t_p < 5$ ms)	4	A
P_{tot}	Total Dissipation at $T_c = 25$ °C	80	W
T_{stg}	Storage Temperature	-65 to 150	°C
T_j	Max. Operating Junction Temperature	150	°C

BUL38D

THERMAL DATA

$R_{thj-case}$	Thermal Resistance Junction-Case	Max	1.56	$^{\circ}\text{C/W}$
$R_{thj-amb}$	Thermal Resistance Junction-Ambient	Max	62.5	$^{\circ}\text{C/W}$

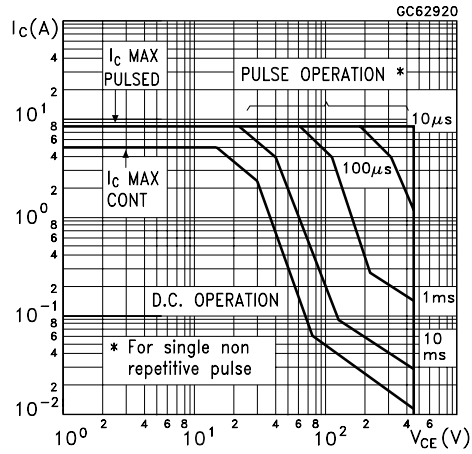
ELECTRICAL CHARACTERISTICS ($T_{case} = 25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CES}	Collector Cut-off Current ($V_{BE} = 0$)	$V_{CE} = 800\text{ V}$ $V_{CE} = 800\text{ V}$ $T_c = 125^{\circ}\text{C}$			100 500	μA μA
I_{CEO}	Collector Cut-off Current ($I_B = 0$)	$V_{CE} = 450\text{ V}$			250	μA
$V_{CEO(sus)}^*$	Collector-Emitter Sustaining Voltage ($I_B = 0$)	$I_C = 100\text{ mA}$ $L = 25\text{ mH}$	450			V
V_{EBO}	Emitter-Base Voltage ($I_C = 0$)	$I_E = 10\text{ mA}$	9			V
$V_{CE(sat)}^*$	Collector-Emitter Saturation Voltage	$I_C = 1\text{ A}$ $I_B = 0.2\text{ A}$ $I_C = 2\text{ A}$ $I_B = 0.4\text{ A}$ $I_C = 3\text{ A}$ $I_B = 0.75\text{ A}$			0.5 0.7 1.1	V V V
$V_{BE(sat)}^*$	Base-Emitter Saturation Voltage	$I_C = 1\text{ A}$ $I_B = 0.2\text{ A}$ $I_C = 2\text{ A}$ $I_B = 0.4\text{ A}$			1.1 1.2	V V
h_{FE}^*	DC Current Gain	$I_C = 10\text{ mA}$ $V_{CE} = 5\text{ V}$ $I_C = 0.5\text{ A}$ $V_{CE} = 5\text{ V}$ $I_C = 2\text{ A}$ $V_{CE} = 5\text{ V}$ Group A Group B	10 13 22		60 23 32	
t_s t_f	RESISTIVE LOAD Storage Time Fall Time	$I_C = 2.5\text{ A}$ $V_{CC} = 150\text{ V}$ $I_{B1} = -I_{B2} = 0.5\text{ A}$ $t_p = 30\text{ }\mu\text{s}$ (see figure 2)	1.0		2.2 0.8	μs μs
t_s t_f	INDUCTIVE LOAD Storage Time Fall Time	$I_C = 2\text{ A}$ $I_{B1} = 0.4\text{ A}$ $V_{BE(off)} = -5\text{ V}$ $R_{BB} = 0\text{ }\Omega$ $V_{CL} = 250\text{ V}$ $L = 200\text{ }\mu\text{H}$ (see figure 1)		1 55	1.8 100	μs ns
t_s t_f	INDUCTIVE LOAD Storage Time Fall Time	$I_C = 2\text{ A}$ $I_{B1} = 0.4\text{ A}$ $V_{BE(off)} = -5\text{ V}$ $R_{BB} = 0\text{ }\Omega$ $V_{CL} = 250\text{ V}$ $L = 200\text{ }\mu\text{H}$ $T_c = 125^{\circ}\text{C}$ (see figure 1)		1.3 100		μs ns
V_f	Diode Forward Voltage	$I_C = 2\text{ A}$			1.5	V

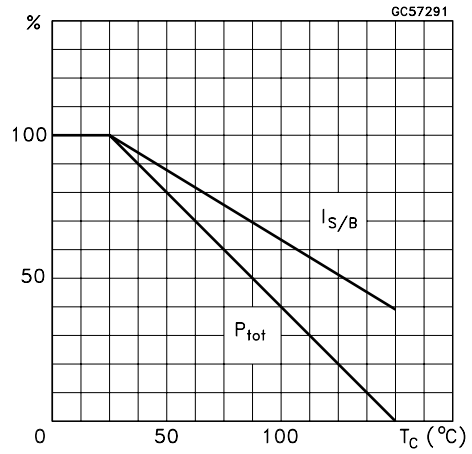
* Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %.

The product is pre-selected in DC current gain (Group A and Group B). STMicroelectronics reserves the right to ship either groups according to production availability. Please contact your nearest STMicroelectronics sales office for delivery details.

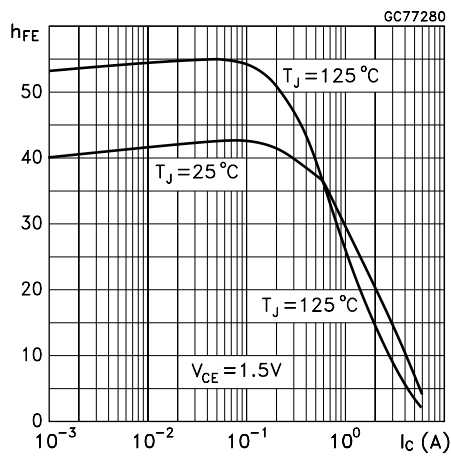
Safe Operating Area



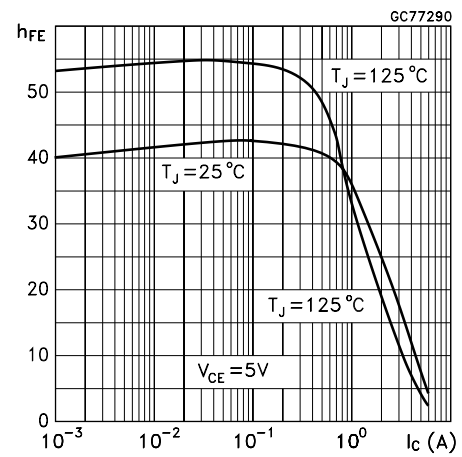
Derating Curve



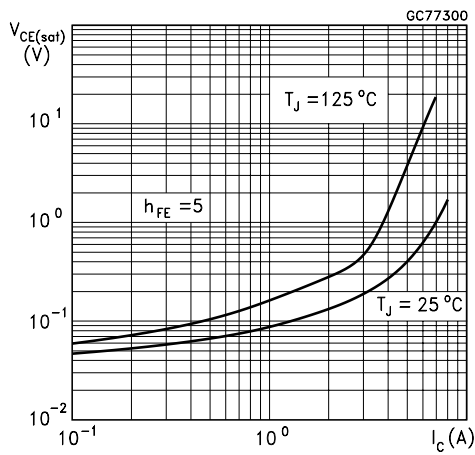
DC Current Gain



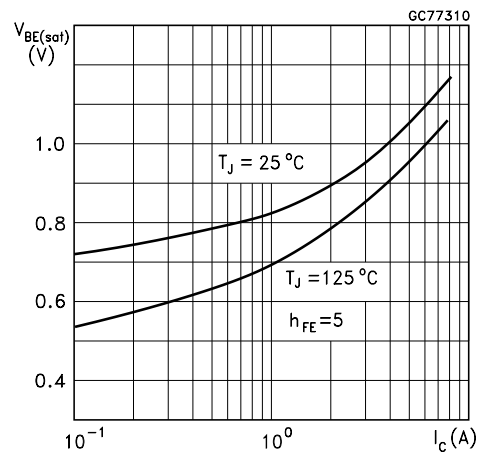
DC Current Gain



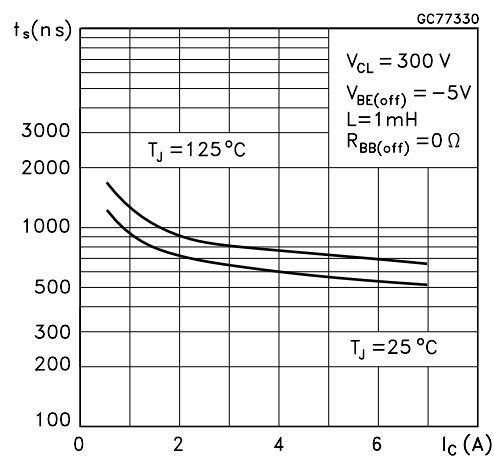
Collector-Emitter Saturation Voltage



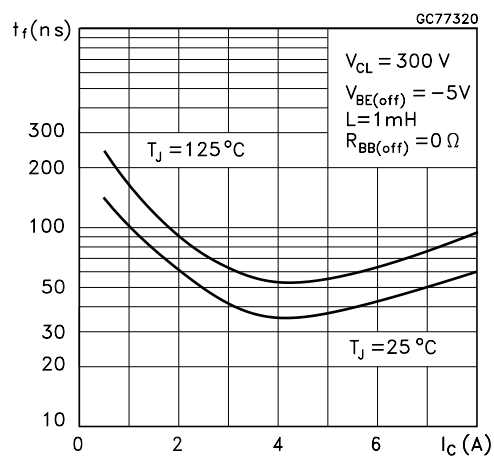
Base-Emitter Saturation Voltage



Inductive Load Storage Time



Inductive Load Fall Time



Reverse Biased SOA

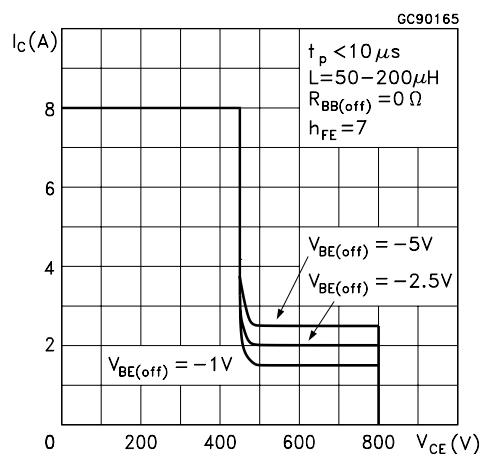


Figure 1: Inductive Load Switching Test Circuit.

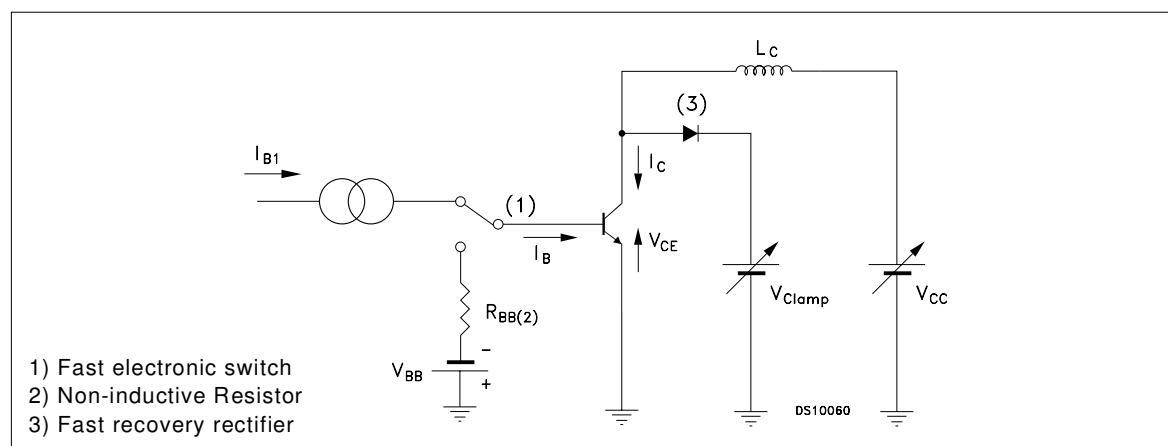
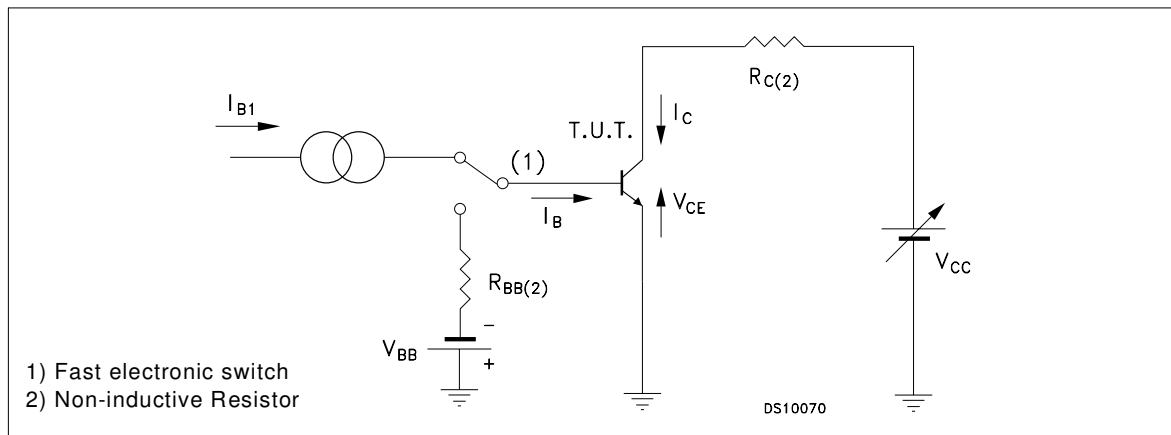
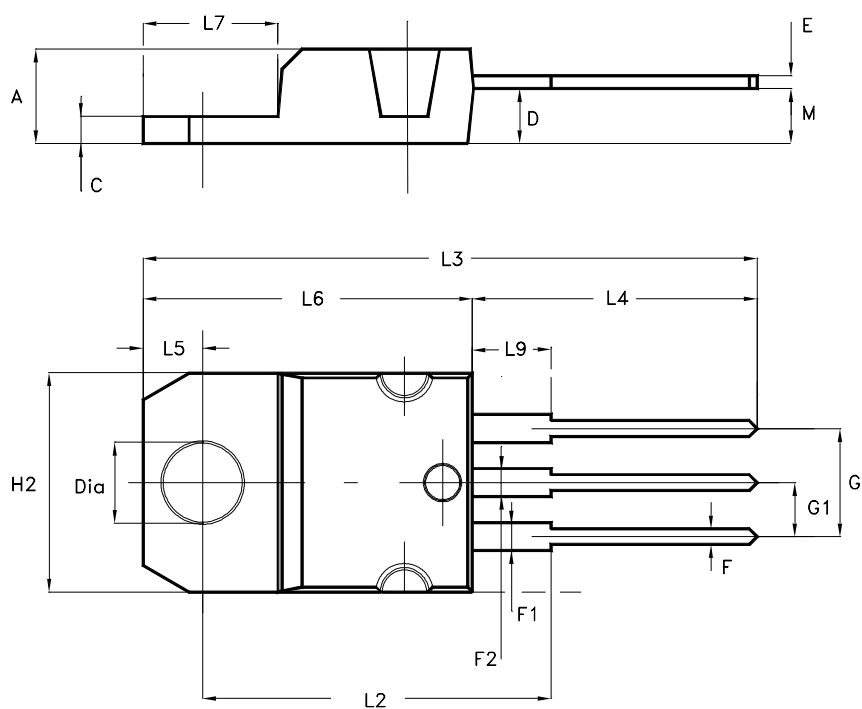


Figure 2: Resistive Load Switching Test Circuit.

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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