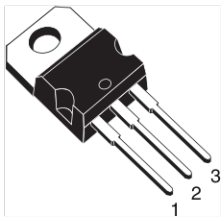
BUL38D

High voltage fast-switching NPN power transistor

Features

- High voltage capability
- Low spread of dynamic parameters
- Minimum lot-to-lot spread for reliable operation
- Very high switching speed
- High ruggedness
- Fully characterized at 125 °C
- Integrated antiparallel collector-emitter diode



TO-220

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 capability.

The device is designed for use in electronic transformer for halogen lamps.

Figure 1. Internal schematic diagram

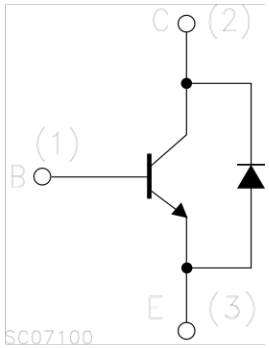


Table 1. Device summary

Order code	Marking [1]	Package	Packaging
BUL38D	BUL38D A or BUL38D B	TO-220	Tube

1. 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.

1 Electrical ratings

Table 2. 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

Table 3. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal resistance junction-case max	1.56	°C/W
R_{thJA}	Thermal resistance junction-ambient max	62.5	°C/W

2 Electrical characteristics

(T_{case} = 25°C unless otherwise specified)

Table 4. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CES}	Collector cut-off current (V_{BE} = 0)	V_{CE} = 800 V V_{CE} = 800 V T_c = 125 °C			100 500	µA µA
I_{CEO}	Collector cut-off current (I_B =0)	V_{CE} = 450 V			250	µA
$V_{CEO(sus)}$ (1)	Collector-emitter sustaining voltage (I_B = 0)	I_C =100 mA	450			V
V_{EBO}	Emitter-base voltage (I_C = 0)	I_E = 10 mA	9			V
$V_{CE(sat)}$ (1)	Collector-emitter saturation voltage	I_C = 1 A I_B = 0.2 A I_C = 2 A I_B = 0.4 A I_C = 3 A I_B = 0.75 A			0.5 0.7 1.1	V V V
$V_{BE(sat)}$ (1)	Base-emitter saturation voltage	I_C = 1 A I_B = 0.2 A I_C = 2 A I_B = 0.4 A			1.1 1.2	V V
h_{FE} (1)(2)	DC current gain	I_C = 10 mA V_{CE} = 5 V I_C = 0.5 A V_{CE} = 5 V I_C = 2 A V_{CE} = 5 V Group A Group B	10 13 22		 60 23 32	
t_s t_f	Resistive load Storage time Fall time	V_{CC} = 150 V I_C = 2.5 A $I_{B(on)}$ = -$I_{B(off)}$ = 0.5 A t_P = 30 µs	1		2.2 0.8	µs µs
t_s t_f	Inductive load Storage time Fall time	I_C = 2 A $I_{B(on)}$= 0.4 A $V_{BE(off)}$ = -5 V $R_{BB(off)}$ =0 V_{CL} = 250 V L = 200 µH		1 55	1.8 100	µs ns
t_s t_f	Inductive load Storage time Fall time	I_C = 2 A $I_{B(on)}$= 0.4 A $V_{BE(off)}$ = -5 V $R_{BB(off)}$ =0 V_{CL} = 250 V L = 200 µH T_C = 125 °C		1.3 100		µs ns
V_F	Diode forward voltage	I_F = 2 A			1.5	V

1. Pulsed duration = 300 µs, duty cycle ≤1.5%.
2. 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 STMicrolectronics sales office for delivery details.

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

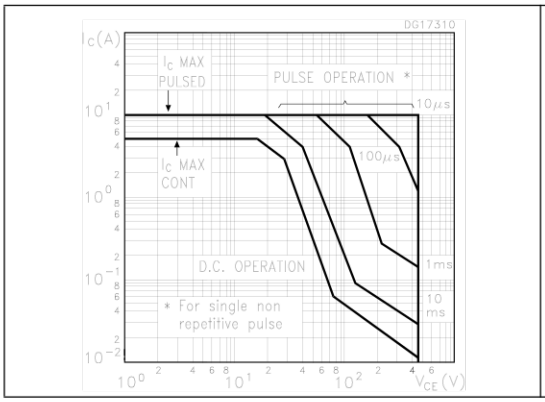


Figure 3. Derating curves

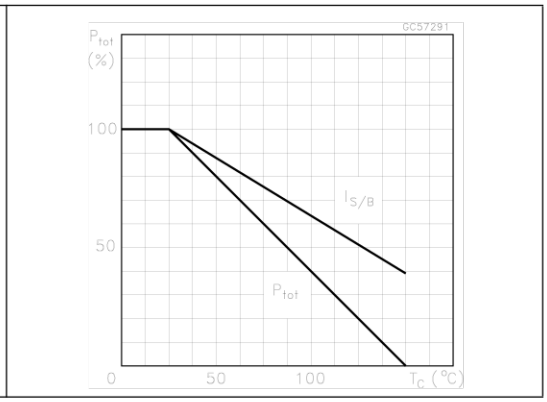


Figure 4. Output characteristics

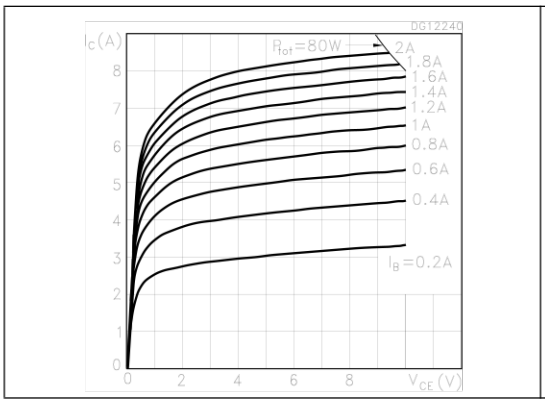


Figure 5. Reverse biased safe operating area

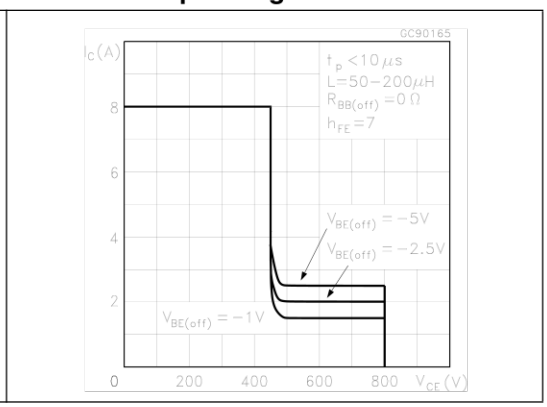


Figure 6. DC current gain (V_{CE} = 1.5 V)

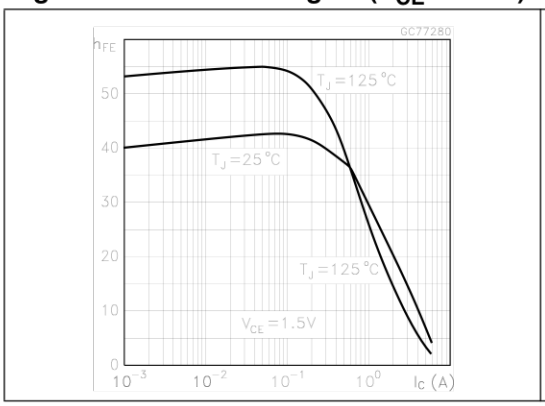


Figure 7. DC current gain (V_{CE} = 5 V)

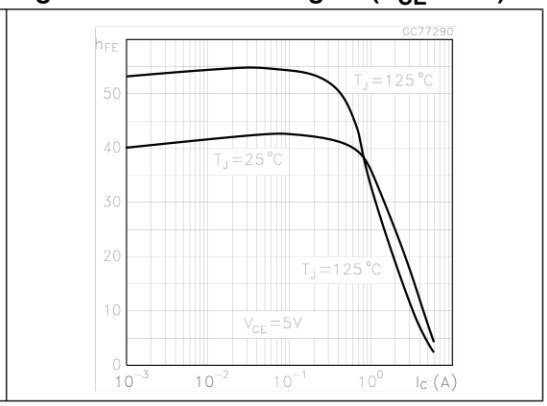


Figure 8. Collector-emitter saturation Voltage

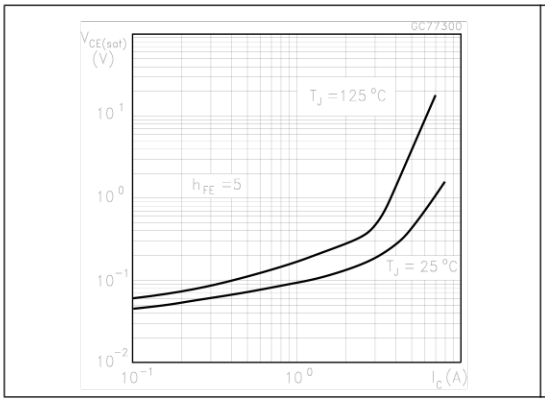


Figure 9. Base-emitter saturation voltage

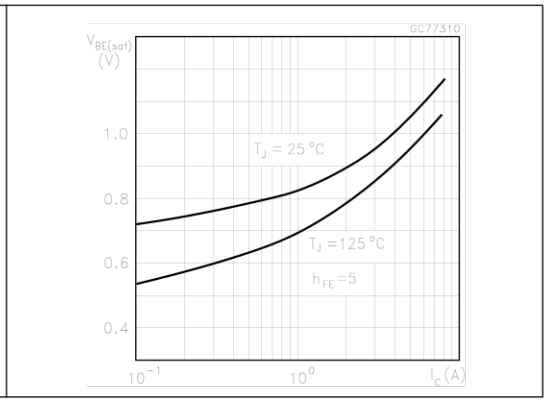


Figure 10. Inductive load storage time

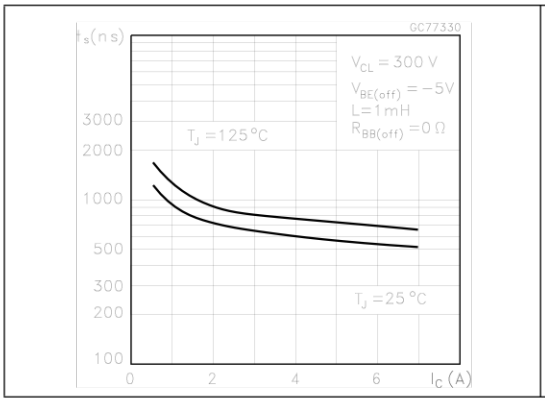
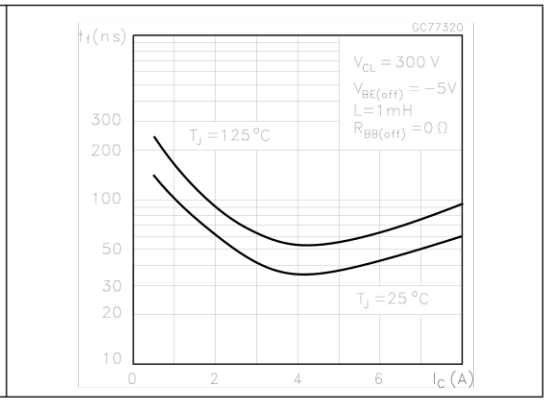
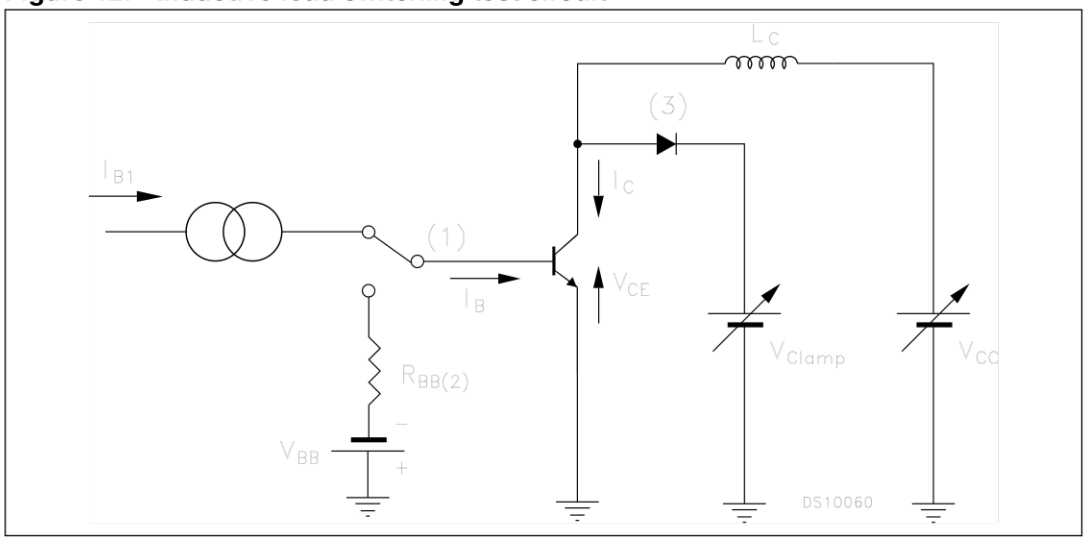


Figure 11. Inductive load fall time



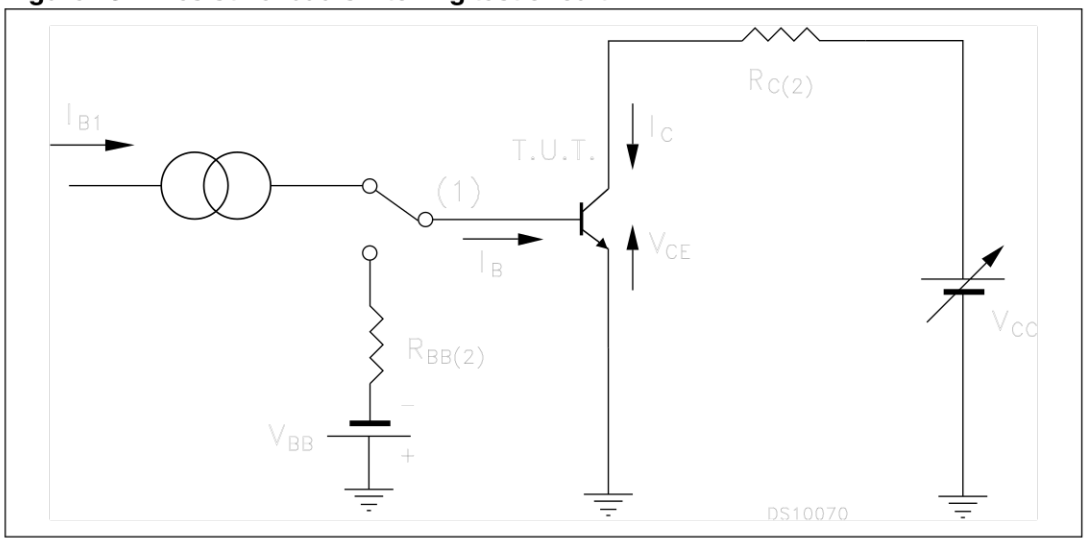
2.2 Test circuits

Figure 12. Inductive load switching test circuit



1. Fast electronic switch
2. Non-inductive resistor
3. Fast recovery rectifier

Figure 13. Resistive load switching test circuit



1. Fast electronic switch
2. Non-inductive resistor

3 Package mechanical data

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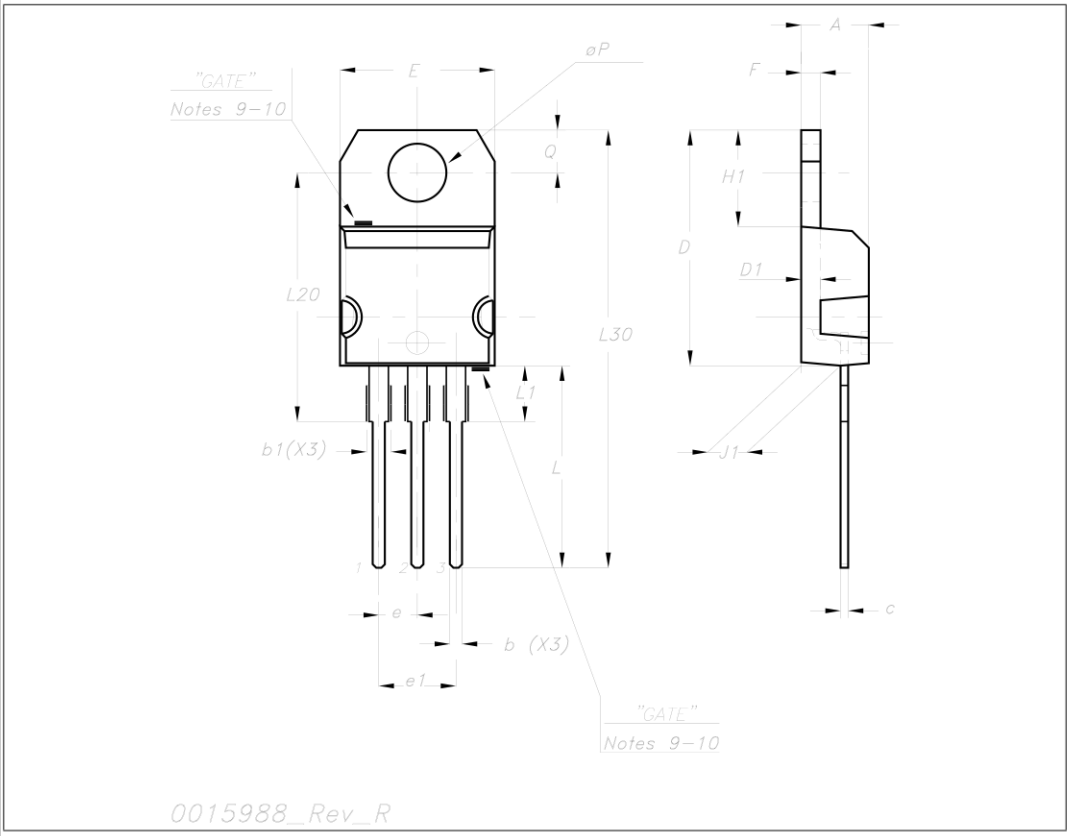
TO-220 mechanical data

Dim	mm			inch		
	Min	Typ	Max	Min	Typ	Max
A	4.40		4.60	0.173		0.181
b	0.61		0.88	0.024		0.034
b1	1.14		1.70	0.044		0.066
c	0.48		0.70	0.019		0.027
D	15.25		15.75	0.6		0.62
D1		1.27			0.050	
E	10		10.40	0.393		0.409
e	2.40		2.70	0.094		0.106
e1	4.95		5.15	0.194		0.202
F	1.23		1.32	0.048		0.051
H1	6.20		6.60	0.244		0.256
J1	2.40		2.72	0.094		0.107
L	13		14	0.511		0.551
L1	3.50		3.93	0.137		0.154
L20		16.40			0.645	
L30		28.90			1.137	
ØP	3.75		3.85	0.147		0.151
Q	2.65		2.95	0.104		0.116



4 Revision history

Table 5. Document revision history

Date	Revision	Changes
16-Jun-2004	2	Document migration, no content change.
23-Jun-2009	3	Updated TO-220 mechanical data.

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