

# **BUL381D**

# 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
- VERY HIGH SWITCHING SPEED
- LARGE RBSOA
- INTEGRATED ANTIPARALLEL COLLECTOR-EMITTER DIODE

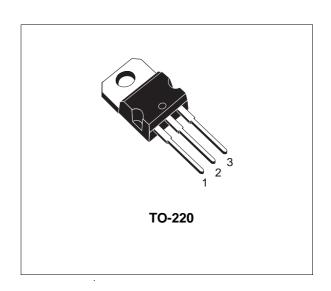
#### **APPLICATIONS**

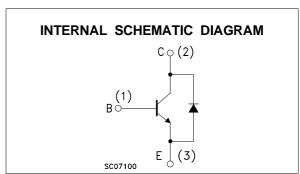
- ELECTRONIC TRANSFORMERS FOR HALOGEN LAMPS
- ELECTRONIC BALLASTS FOR FLUORESCENT LIGHTING
- SWITCH MODE POWER SUPPLIES



The BUL381D is manufactured using high voltage Multi Epitaxial Planar technology for high switching speeds and high voltage capability.

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





### **ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
V <sub>CES</sub>	Collector-Emitter Voltage (V <sub>BE</sub> = 0)	800	V
V <sub>CEO</sub>	Collector-Emitter Voltage (I <sub>B</sub> = 0)	400	V
$V_{EBO}$	Emitter-Base Voltage (I <sub>C</sub> = 0)	9	V
Ic	Collector Current	5	А
I <sub>CM</sub>	Collector Peak Current (t <sub>p</sub> < 5 ms)	8	А
I <sub>B</sub>	Base Current	2	А
I <sub>BM</sub>	Base Peak Current (t <sub>p</sub> < 5 ms)	4	А
P <sub>tot</sub>	Total Dissipation at T <sub>c</sub> = 25 °C	70	W
T <sub>stg</sub>	Storage Temperature	-65 to 150	°C
Tj	Max. Operating Junction Temperature	150	°C

July 2003 1/6

### THERMAL DATA

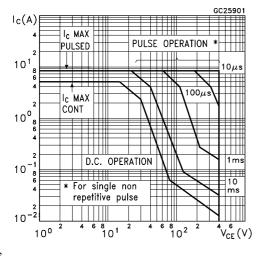
R <sub>thj-case</sub>	Thermal Resistance Junction-Ca	ise Max	1.78	°C/W
R <sub>thj-amb</sub>	Thermal Resistance Junction-An	nbient Max	62.5	°C/W

## **ELECTRICAL CHARACTERISTICS** (T<sub>case</sub> = 25 °C unless otherwise specified)

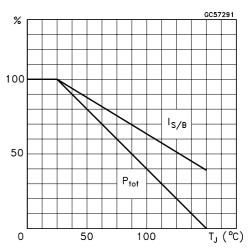
Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
Ices	Collector Cut-off Current (V <sub>BE</sub> = 0)	V <sub>CE</sub> = 800 V V <sub>CE</sub> = 800 V T <sub>j</sub> = 125 °C			100 500	μΑ μΑ
I <sub>CEO</sub>	Collector Cut-off Current (I <sub>B</sub> = 0)	V <sub>CE</sub> = 400 V			250	μΑ
V <sub>CEO(sus)*</sub>	Collector-Emitter Sustaining Voltage (I <sub>B</sub> = 0)	I <sub>C</sub> = 100 mA L = 25 mH	400			V
V <sub>EBO</sub>	Emitter-Base Voltage (I <sub>C</sub> = 0)	I <sub>E</sub> = 10 mA	9			٧
V <sub>CE(sat)</sub> *	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 <sub>BE(sat)</sub> *	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 <sub>FE</sub> *	DC Current Gain	$I_{C} = 2 A$ $V_{CE} = 5 V$ $I_{C} = 10 \text{ mA}$ $V_{CE} = 5 V$	8 10			
t <sub>s</sub>	RESISTIVE LOAD Storage Time Fall Time	$I_{C} = 2 \text{ A}$ $V_{CC} = 250 \text{ V}$ $t_{p} = 30 \mu\text{s}$ $I_{B1} = -I_{B2} = 0.4 \text{ A}$	1.5		2.5 0.8	μs μs
t <sub>s</sub>	INDUCTIVE LOAD Storage Time Fall Time	$\begin{array}{lll} I_{C} = 2 \; A & I_{B1} = 0.4 \; A \\ V_{BE(off)} = -5 \; V & R_{BB} = 0 \; \Omega \\ V_{CL} = 250 \; V & L = 200 \; \mu H \\ T_{j} = 125 \; ^{\circ}C \end{array}$		1.3 100		μs ns
Vf	Diode Forward Voltage	I <sub>C</sub> = 2 A			2.5	V

<sup>\*</sup> Pulsed: Pulse duration = 300 μs, duty cycle 1.5 %

### Safe Operating Area



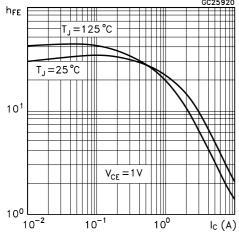
### **Derating Curve**



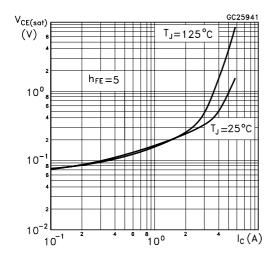
4

2/6

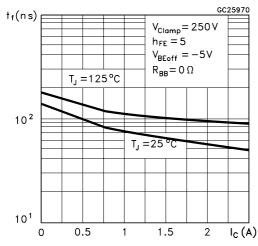
### DC Current Gain



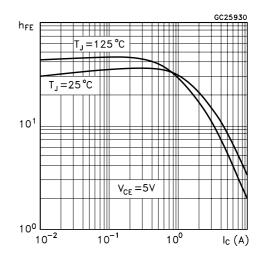
# Collector Emitter Saturation Voltage



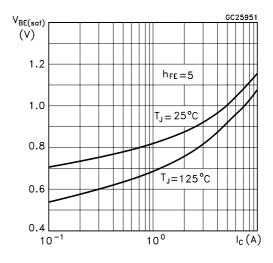
### Inductive Fall Time



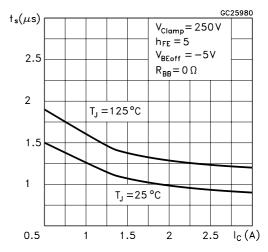
### DC Current Gain



### Base Emitter Saturation Voltage

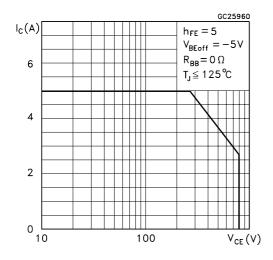


### Inductive Storage Time

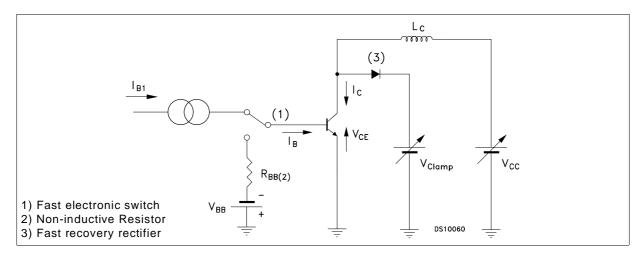


477

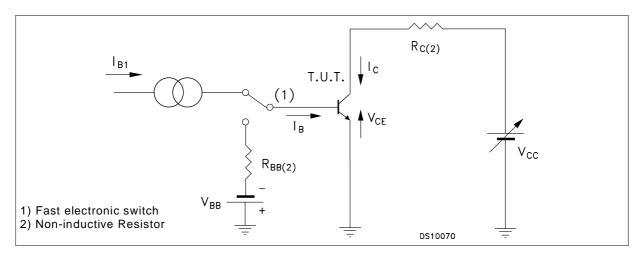
### Reverse Biased SOA



### Inductive Load Switching Test Circuit



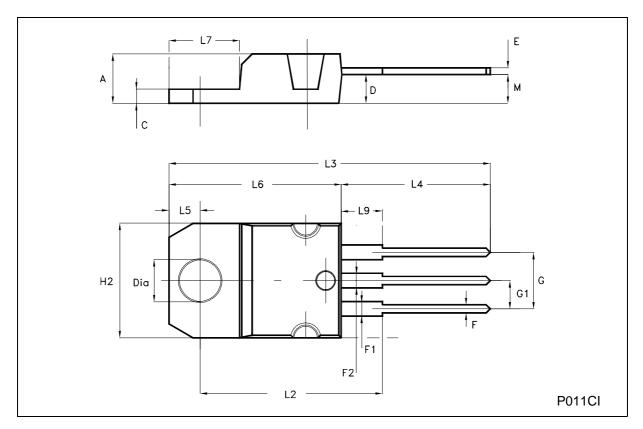
### Resistive Load Switching Test Ciurcuit



4/6

## **TO-220 MECHANICAL DATA**

DIM.	mm		inch			
DIIVI.	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
Α	4.40		4.60	0.173		0.181
С	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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47/