



**BUL381**  
**BUL382**

## HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

- STM PREFERRED SALESTYPES
- HIGH VOLTAGE CAPABILITY
- MINIMUM LOT-TO-LOT SPREAD FOR RELIABLE OPERATION
- VERY HIGH SWITCHING SPEED
- FULLY CHARACTERISED AT 125°C

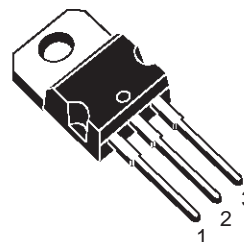
### APPLICATIONS

- ELECTRONIC BALLASTS FOR FLUORESCENT LIGHTING
- SWITCH MODE POWER SUPPLIES

### DESCRIPTION

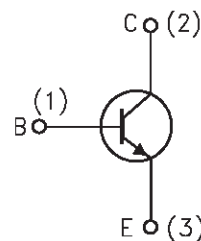
The BUL381 and BUL382 manufactured using high voltage Multiepitaxial Mesa technology for cost-effective high performance. They use a Hollow Emitter structure to enhance switching speeds.

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



TO-220

### INTERNAL SCHEMATIC DIAGRAM



SC06960

### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_{CES}$	Collector-Emitter Voltage ( $V_{BE} = 0$ )	800	V
$V_{CEO}$	Collector-Emitter Voltage ( $I_B = 0$ )	400	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)	8	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	70	W
$T_{stg}$	Storage Temperature	-65 to 150	°C
$T_j$	Max. Operating Junction Temperature	150	°C

## BUL381 / BUL382

### THERMAL DATA

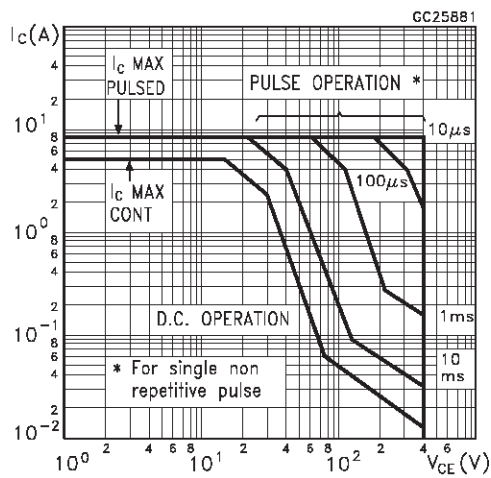
R <sub>thj-case</sub>	Thermal Resistance Junction-Case	Max	1.78	°C/W
R <sub>thj-amb</sub>	Thermal Resistance Junction-Ambient	Max	62.5	°C/W

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

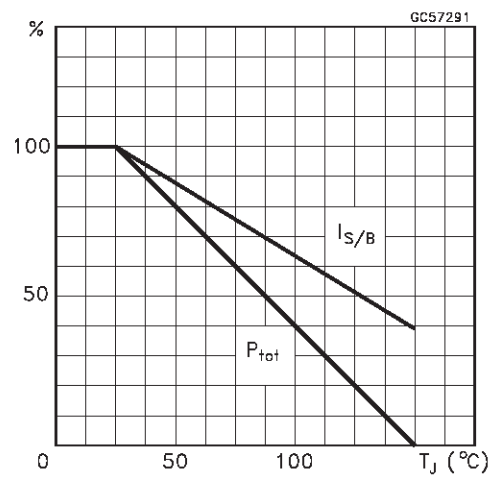
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I <sub>CES</sub>	Collector Cut-off Current (V <sub>BE</sub> = 0)	V <sub>CE</sub> = 800 V V <sub>CE</sub> = 800 V T <sub>j</sub> = 125 °C			100 500	μA μA
I <sub>CEO</sub>	Collector Cut-off Current (I <sub>B</sub> = 0)	V <sub>CE</sub> = 400 V			250	μA
V <sub>CEO(sus)</sub>	Collector-Emitter Sustaining Voltage	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			V
V <sub>CE(sat)*</sub>	Collector-Emitter Saturation Voltage	I <sub>C</sub> = 1 A I <sub>B</sub> = 0.2 A I <sub>C</sub> = 2 A I <sub>B</sub> = 0.4 A I <sub>C</sub> = 3 A I <sub>B</sub> = 0.8 A			0.5 0.7 1.1	V V V
V <sub>BE(sat)*</sub>	Base-Emitter Saturation Voltage	I <sub>C</sub> = 1 A I <sub>B</sub> = 0.2 A I <sub>C</sub> = 2 A I <sub>B</sub> = 0.4 A			1.1 1.2	V V
h <sub>FE*</sub>	DC Current Gain	I <sub>C</sub> = 2 A V <sub>CE</sub> = 5 V I <sub>C</sub> = 10 mA V <sub>CE</sub> = 5 V	8 10			
t <sub>ON</sub> t <sub>s</sub> t <sub>f</sub>	RESISTIVE LOAD Turn-on Time Storage Time Fall Time	V <sub>CC</sub> = 250 V I <sub>C</sub> = 2 A I <sub>B1</sub> = 0.4 A I <sub>B2</sub> = -0.4 A (for BUL381 only) t <sub>p</sub> = 30 μs	1.4		1 2.2 800	μs μs ns
t <sub>ON</sub> t <sub>s</sub> t <sub>f</sub>	RESISTIVE LOAD Turn-on Time Storage Time Fall Time	V <sub>CC</sub> = 250 V I <sub>C</sub> = 2 A I <sub>B1</sub> = 0.4 A I <sub>B2</sub> = -0.4 A (for BUL382 only) t <sub>p</sub> = 30 μs	1.7		1 2.5 800	μs μs ns
t <sub>s</sub> t <sub>f</sub>	INDUCTIVE LOAD Storage Time Fall Time	I <sub>C</sub> = 2 A V <sub>CL</sub> = 250 V I <sub>B1</sub> = 0.4 A I <sub>B2</sub> = -0.8 A L = 200 μH		1.7 75	2.6 120	μs ns
t <sub>s</sub> t <sub>f</sub>	INDUCTIVE LOAD Storage Time Fall Time	I <sub>C</sub> = 2 A V <sub>CL</sub> = 250 V I <sub>B1</sub> = 0.4 A I <sub>B2</sub> = -0.8 A L = 200 μH T <sub>j</sub> = 125 °C		2.6 150		μs ns

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

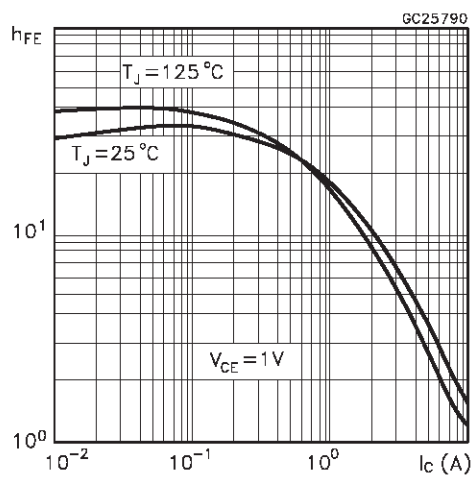
## Safe Operating Areas



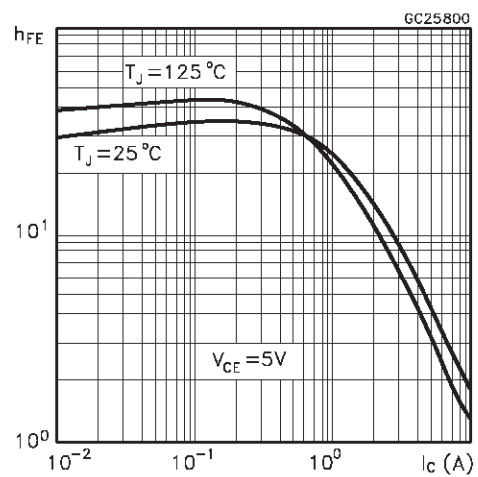
## Derating Curves



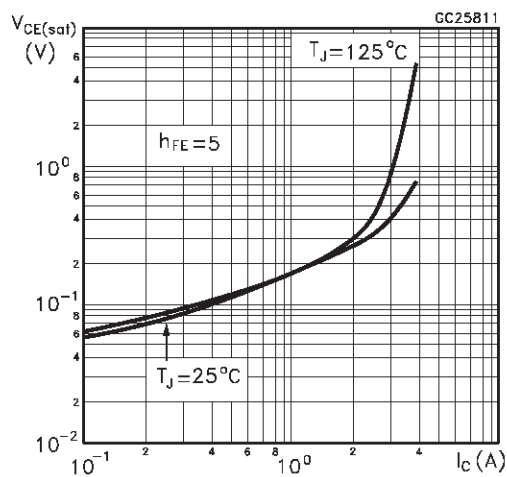
## DC Current Gain



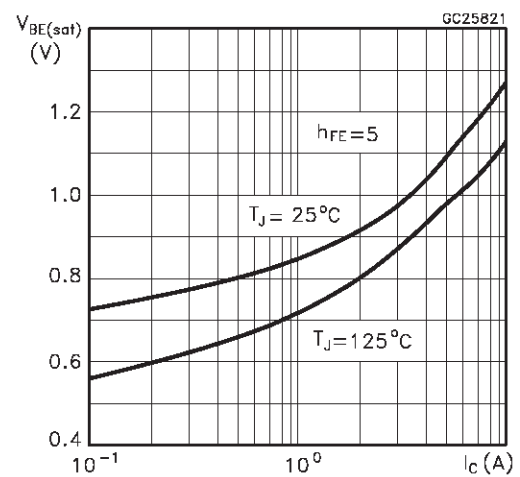
## DC Current Gain



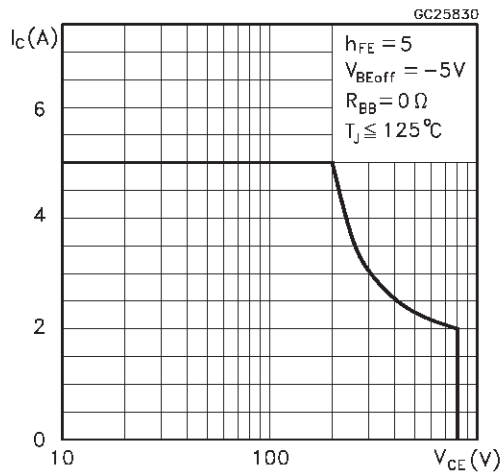
## Collector Emitter Saturation Voltage



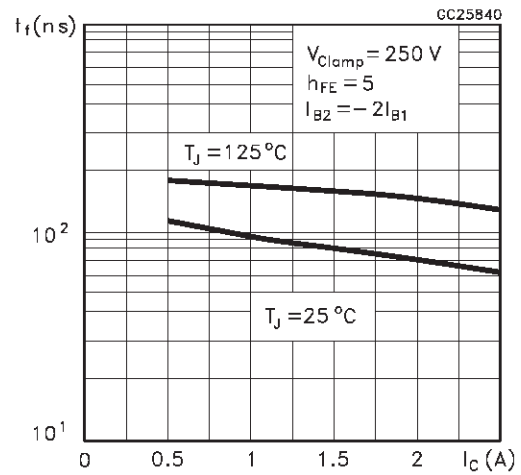
## Base Emitter Saturation Voltage



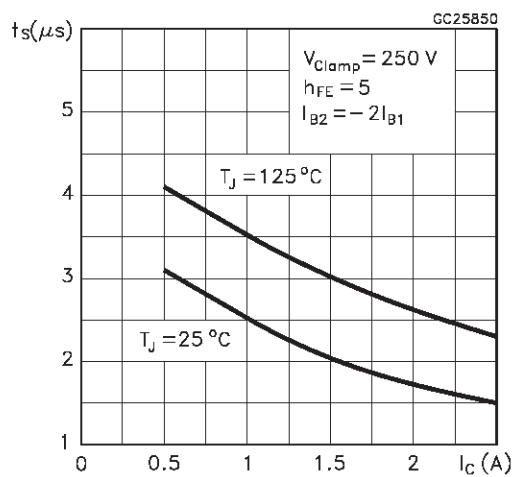
### Reverse Biased SOA



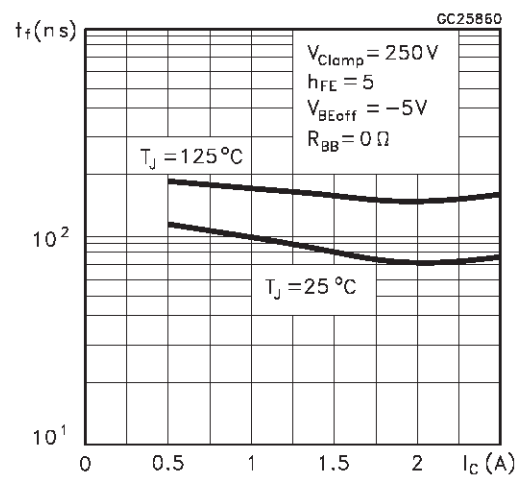
### Inductive Fall Time



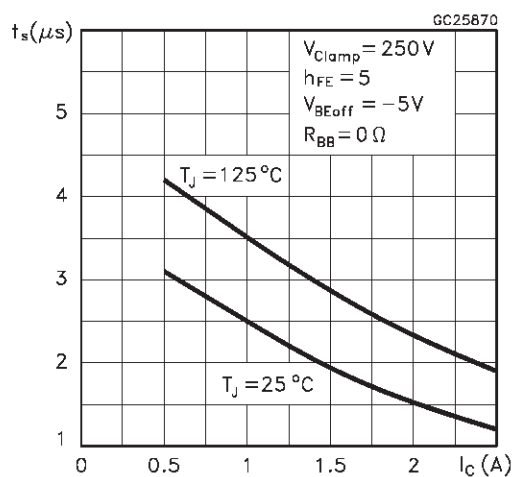
### Inductive Storage Time



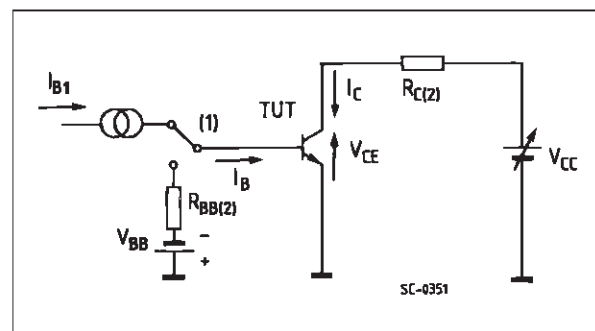
### Inductive Fall Time



### Inductive Storage Time

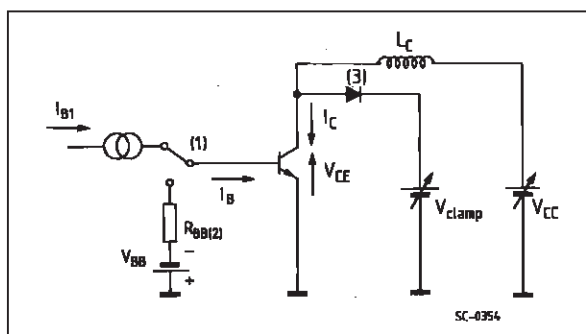


### Resistive Load Switching Test Circuit



- 1) Fast electronic switch
- 2) Non-inductive Resistor

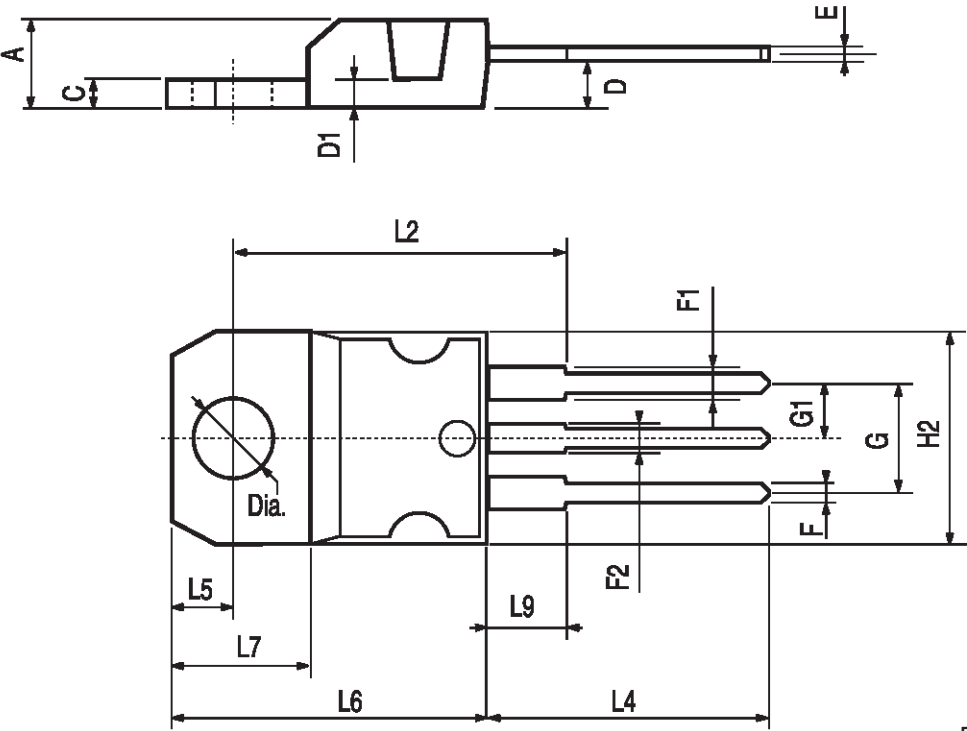
### Reverse BSOA and Inductive Load Switching Test Circuit



- 1) Fast electronic switch
- 2) Non-inductive Resistor
- 3) Fast recovery Rectifier

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		0.051
D	2.40		2.72	0.094		0.107
D1		1.27			0.050	
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		0.203
G1	2.4		2.7	0.094		0.106
H2	10.0		10.40	0.393		0.409
L2		16.4			0.645	
L4	13.0		14.0	0.511		0.551
L5	2.65		2.95	0.104		0.116
L6	15.25		15.75	0.600		0.620
L7	6.2		6.6	0.244		0.260
L9	3.5		3.93	0.137		0.154
DIA.	3.75		3.85	0.147		0.151



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