

HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

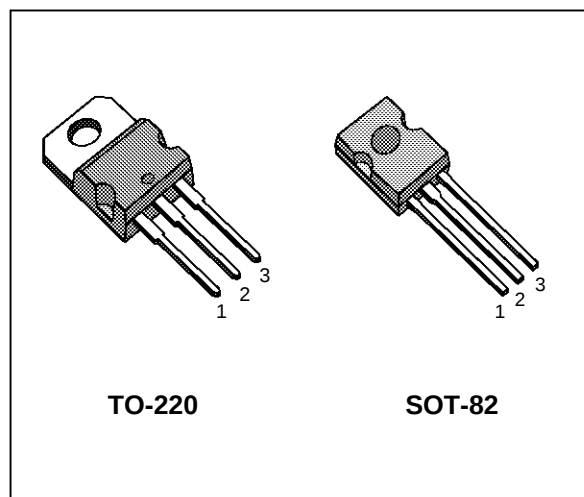
- SGS-THOMSON PREFERRED SALESTYPES
- HIGH VOLTAGE CAPABILITY
- MINIMUM LOT-TO-LOT SPREAD FOR RELIABLE OPERATION
- VERY HIGH SWITCHING SPEED
- FULLY CHARACTERISED AT 125°C

APPLICATIONS

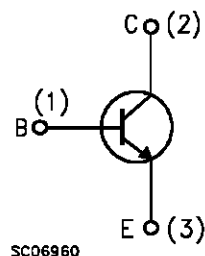
- ELECTRONIC BALLASTS FOR FLUORESCENT LIGHTING
- SWITCH MODE POWER SUPPLIES

DESCRIPTION

The BUL381, BUL382, BULK381 and BULK382 are 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.



INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		BUL381/382	BULK381/382	
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	60	W
T_{stg}	Storage Temperature Range	-65 to 150		°C
T_j	Max. Operating Junction Temperature	150		°C

BUL381/382 BULK381/382

THERMAL DATA

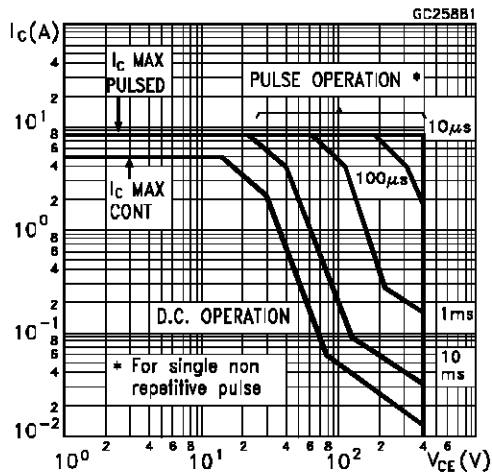
			TO220	SOT-82	
$R_{thj-case}$	Thermal Resistance Junction-Case	Max	1.78	2.08	$^{\circ}C/W$
$R_{thj-amb}$	Thermal Resistance Junction-Ambient	Max	62.5	80	$^{\circ}C/W$

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

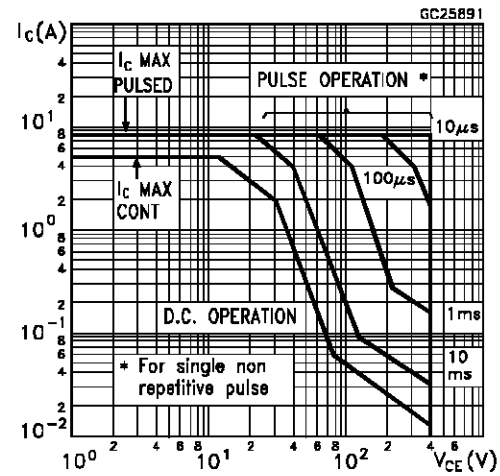
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CES}	Collector Cut-off Current ($V_{BE} = 0$)	$V_{CE} = 800\text{ V}$ $V_{CE} = 800\text{ V}$ $T_j = 125^{\circ}C$			100 500	μA μA
I_{CEO}	Collector Cut-off Current ($I_B = 0$)	$V_{CE} = 400\text{ V}$			250	μA
$V_{CEO(sus)}$	Collector-Emitter Sustaining Voltage	$I_C = 100\text{ mA}$ $L = 25\text{ mH}$	400			V
V_{EBO}	Emitter-Base Voltage ($I_C = 0$)	$I_E = 10\text{ mA}$	9			V
$V_{CE(sat)*}$	Collector-Emitter Saturation Voltage	$I_C = 1\text{ A}$ $I_B = 0.2\text{ A}$ $I_C = 2\text{ A}$ $I_B = 0.4\text{ A}$ $I_C = 3\text{ A}$ $I_B = 0.8\text{ A}$			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	$I_C = 2\text{ A}$ $V_{CE} = 5\text{ V}$ $I_C = 10\text{ mA}$ $V_{CE} = 5\text{ V}$	8 10			
t_{ON} t_s t_f	RESISTIVE LOAD Turn-on Time Storage Time Fall Time	$V_{CC} = 250\text{ V}$ $I_C = 2\text{ A}$ $I_{B1} = 0.4\text{ A}$ $I_{B2} = -0.4\text{ A}$ (for BUL381/BULK381 only)	1.4		1 2.2 800	μs μs ns
t_{ON} t_s t_f	RESISTIVE LOAD Turn-on Time Storage Time Fall Time	$V_{CC} = 250\text{ V}$ $I_C = 2\text{ A}$ $I_{B1} = 0.4\text{ A}$ $I_{B2} = -0.4\text{ A}$ (for BUL382/BULK382 only)	1.7		1 2.5 800	μs μs ns
t_s t_f	INDUCTIVE LOAD Storage Time Fall Time	$I_C = 2\text{ A}$ $V_{CL} = 250\text{ V}$ $I_{B1} = 0.4\text{ A}$ $I_{B2} = -0.8\text{ A}$ $L = 200\text{ }\mu H$		1.7 75	2.6 120	μs ns
t_s t_f	INDUCTIVE LOAD Storage Time Fall Time	$I_C = 2\text{ A}$ $V_{CL} = 250\text{ V}$ $I_{B1} = 0.4\text{ A}$ $I_{B2} = -0.8\text{ A}$ $L = 200\text{ }\mu H$ $T_j = 125^{\circ}C$		2.6 150		μs ns

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

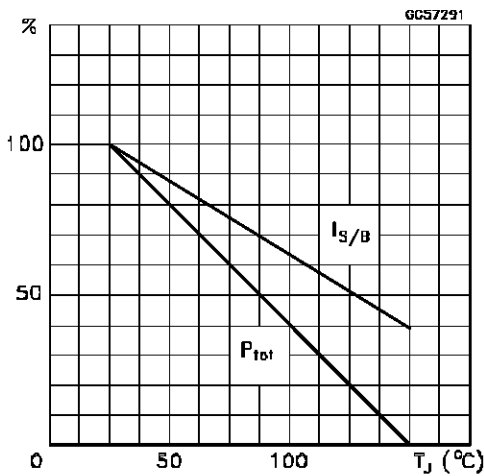
Safe Operating Areas for TO-220



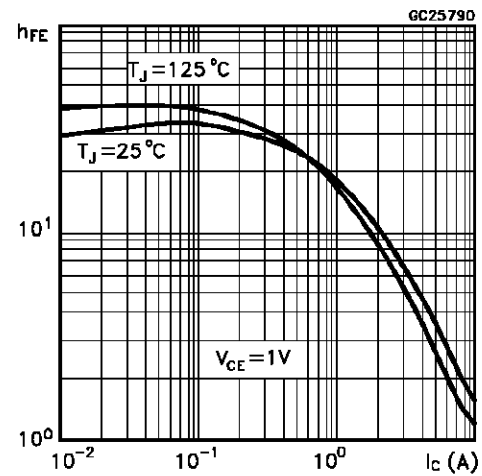
Safe Operating Areas for SOT-82



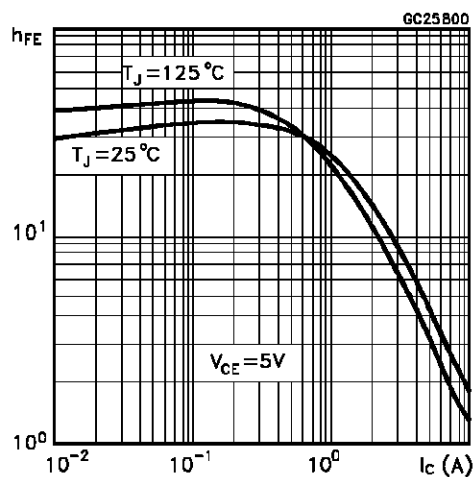
Derating Curves



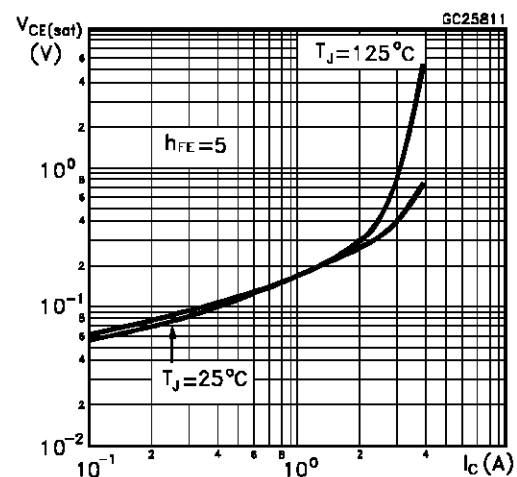
DC Current Gain



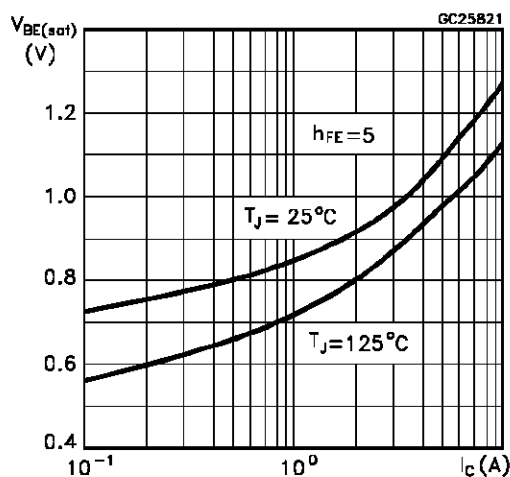
DC Current Gain



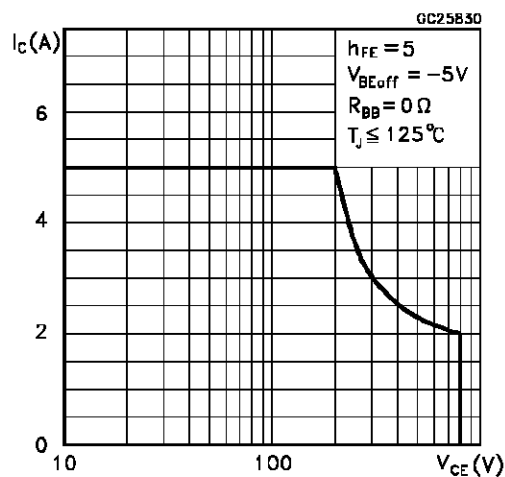
Collector Emitter Saturation Voltage



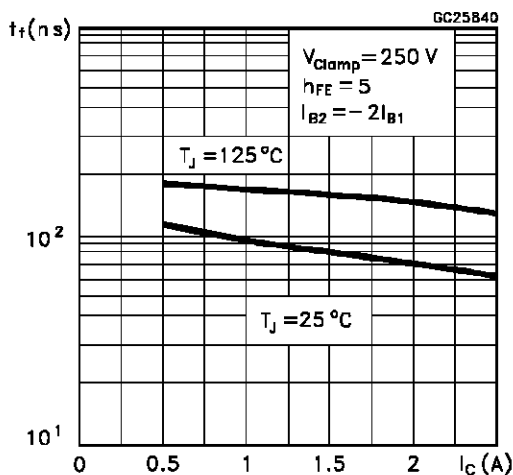
Base Emitter Saturation Voltage



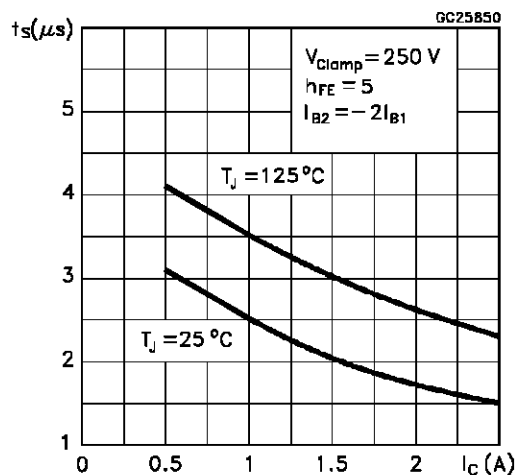
Reverse Biased SOA



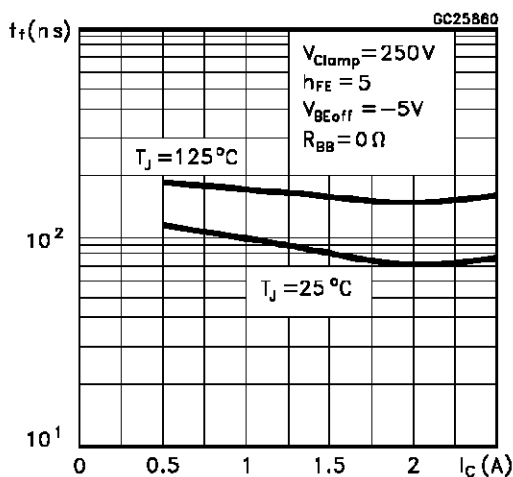
Inductive Fall Time



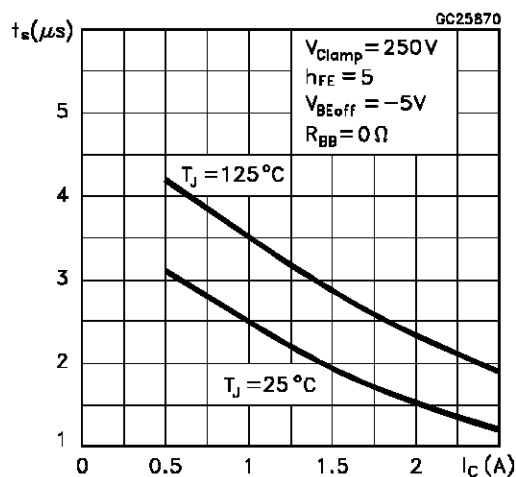
Inductive Storage Time



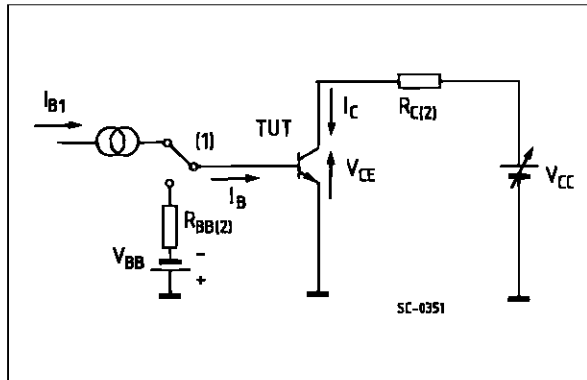
Inductive Fall Time



Inductive Storage Time

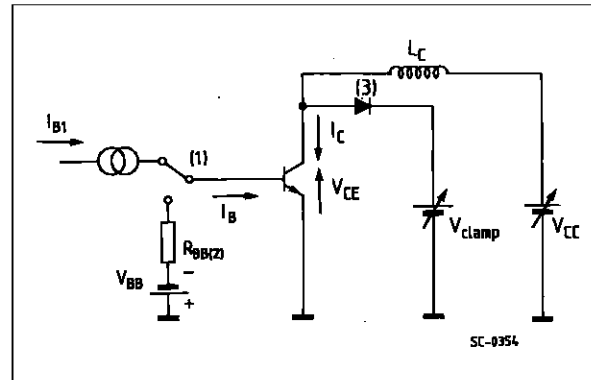


Resistive Load Switching Test Circuit



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

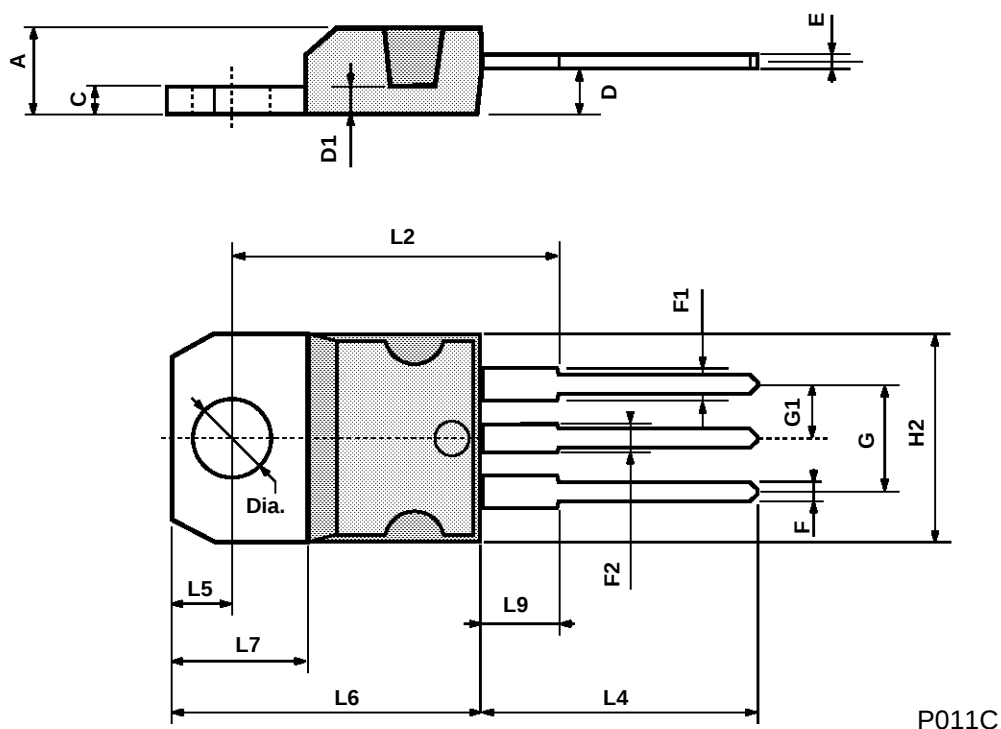
RBSOA and Inductive Load Switching Test Circuit



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

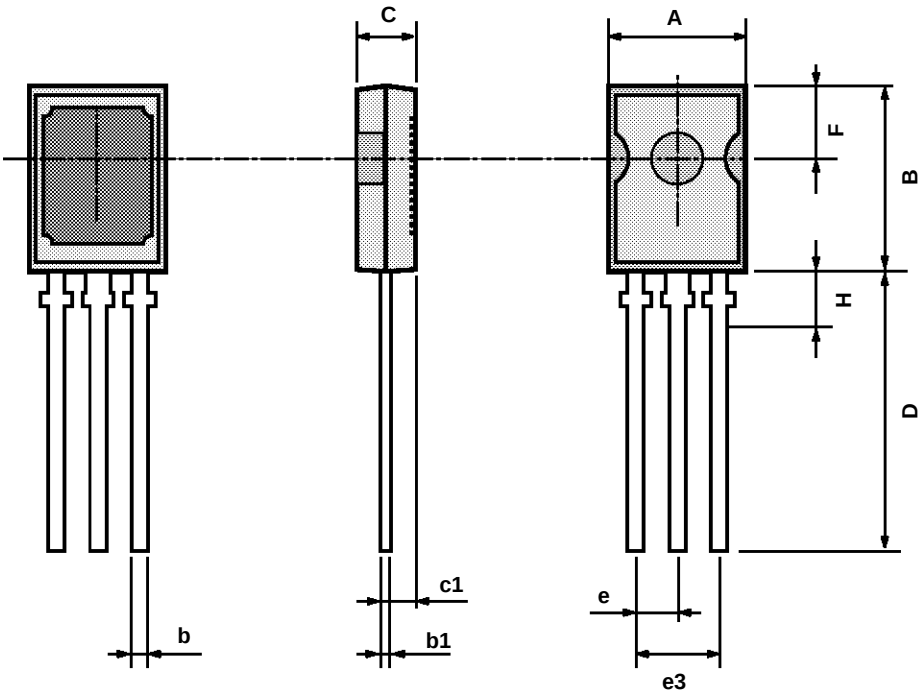
TO-220 MECHANICAL DATA

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



SOT-82 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	7.4		7.8	0.291		0.307
B	10.5		11.3	0.413		0.445
b	0.7		0.9	0.028		0.035
b1	0.49		0.75	0.019		0.030
C	2.4		2.7	0.04		0.106
c1		1.2			0.047	
D		15.7			0.618	
e		2.2			0.087	
e3		4.4			0.173	
F		3.8			0.150	
H			2.54		0.100	



P032A

Information furnished is believed to be accurate and reliable. However, SGS-THOMSON Microelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of SGS-THOMSON Microelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. SGS-THOMSON Microelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of SGS-THOMSON Microelectronics.

© 1994 SGS-THOMSON Microelectronics - All Rights Reserved

SGS-THOMSON Microelectronics GROUP OF COMPANIES

Australia - Brazil - France - Germany - Hong Kong - Italy - Japan - Korea - Malaysia - Malta - Morocco - The Netherlands -
Singapore - Spain - Sweden - Switzerland - Taiwan - Thailand - United Kingdom - U.S.A