

**HIGH VOLTAGE FAST-SWITCHING
NPN POWER TRANSISTOR**

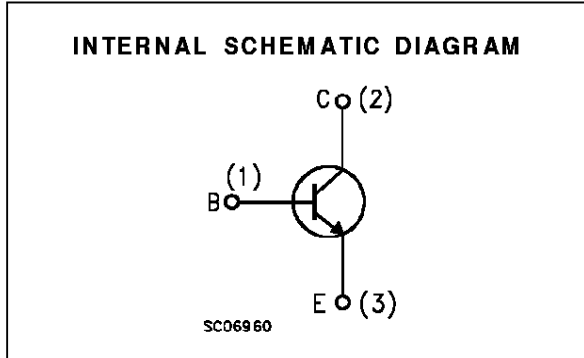
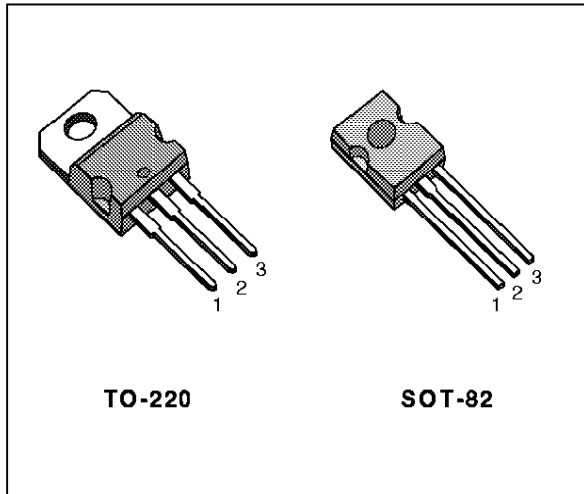
- SGS-THOMSON PREFERRED SALESTYPES
- HIGH VOLTAGE CAPABILITY
- MINIMUM LOT-TO-LOT SPREAD FOR RELIABLE OPERATION
- VERY HIGH SWITCHING SPEED
- FULLY CHARACTERISED AT 125°C

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.



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

THERMAL DATA

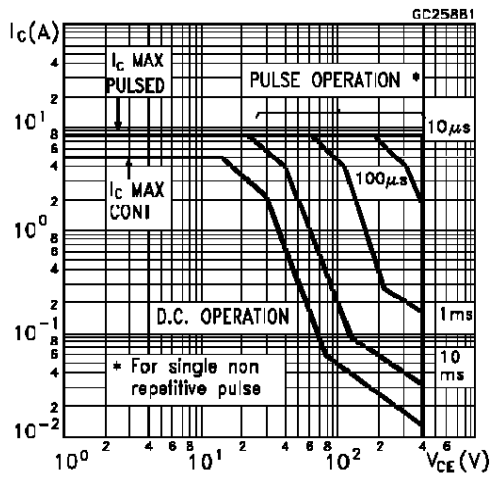
		TO220	SOT-82		
$R_{thj-case}$	Thermal Resistance Junction-Case	Max	1.78	2.08	$^{\circ}\text{C}/\text{W}$
$R_{thj-amb}$	Thermal Resistance Junction-Ambient	Max	62.5	80	$^{\circ}\text{C}/\text{W}$

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

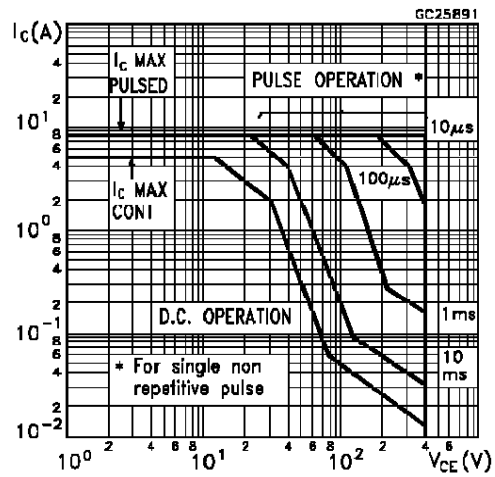
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CES}	Collector Cut-off Current ($V_{BE} = 0$)	$V_{CE} = 800\text{ V}$ $V_{CE} = 800\text{ V}$ $T_j = 125^{\circ}\text{C}$			100 500	μA μA
I_{CEO}	Collector Cut-off Current ($I_B = 0$)	$V_{CE} = 400\text{ V}$			250	μA
$V_{CEO(sus)}$	Collector-Emitter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

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

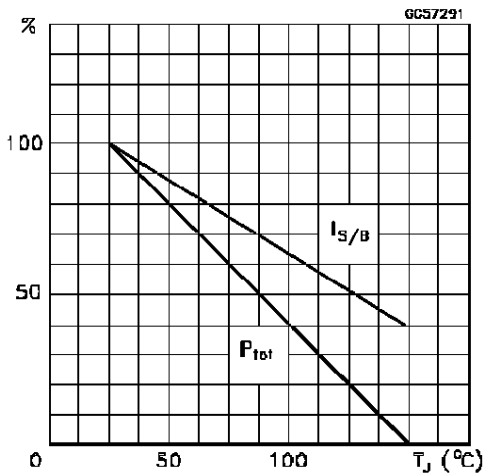
Safe Operating Areas for TO-220



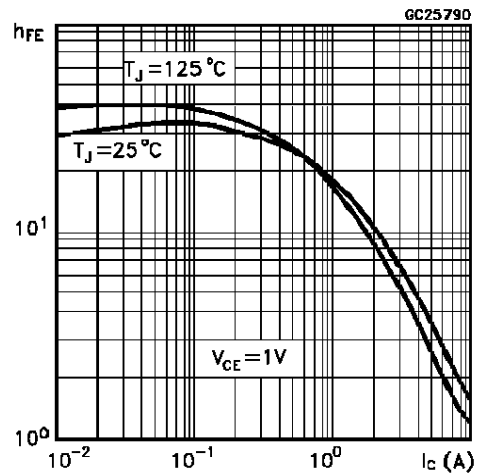
Safe Operating Areas for SOT-82



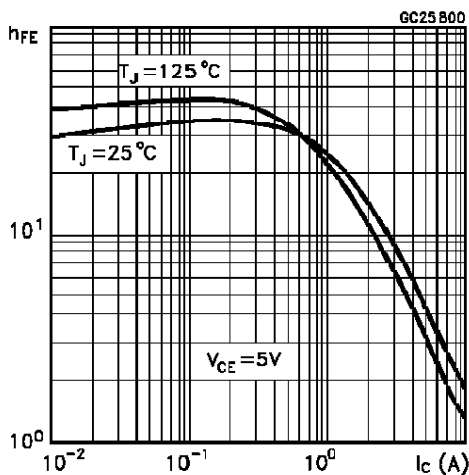
Derating Curves



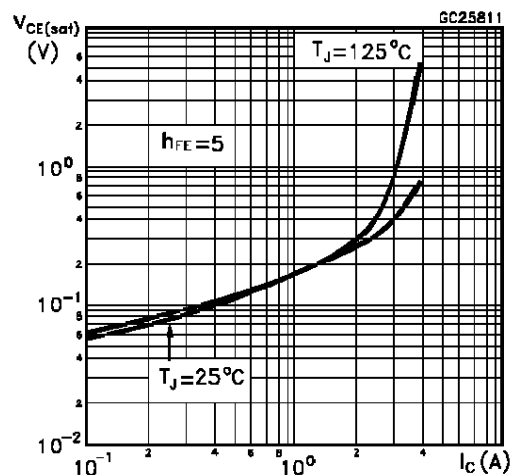
DC Current Gain



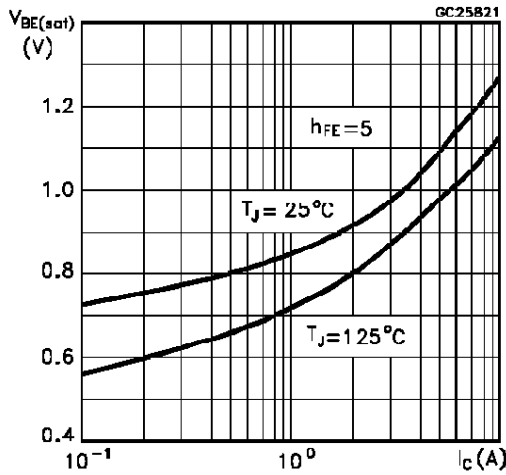
DC Current Gain



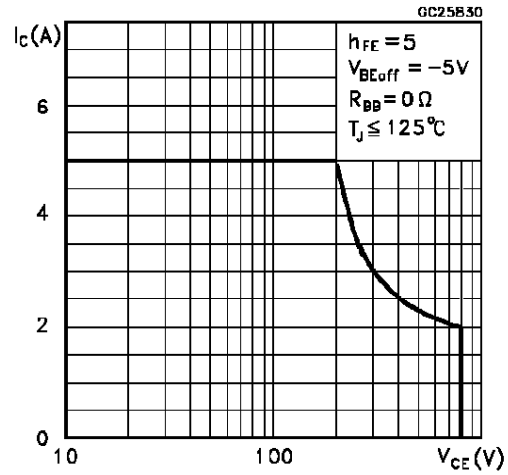
Collector Emitter Saturation Voltage



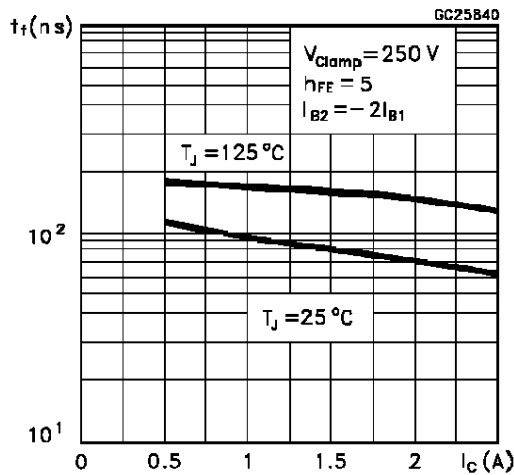
Base Emitter Saturation Voltage



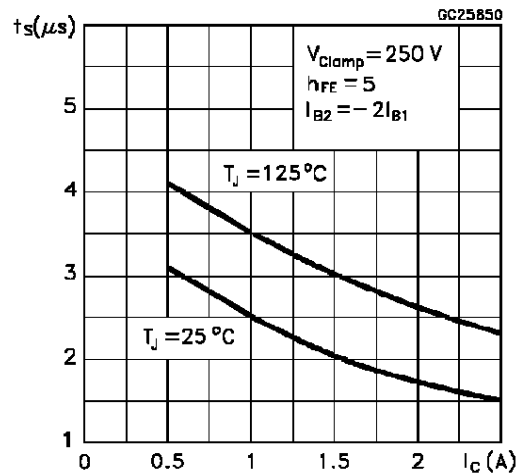
Reverse Biased SOA



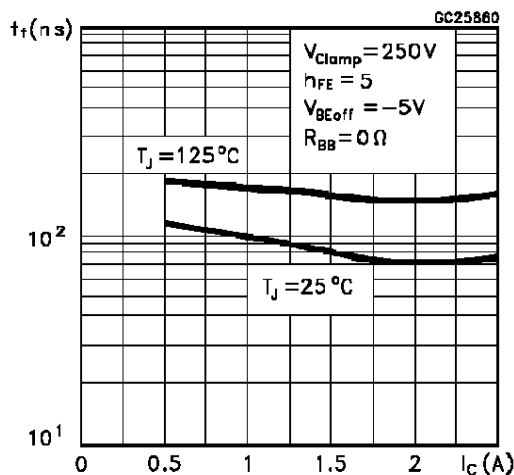
Inductive Fall Time



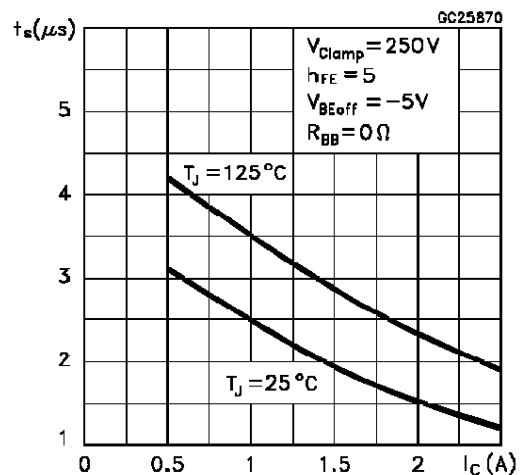
Inductive Storage Time



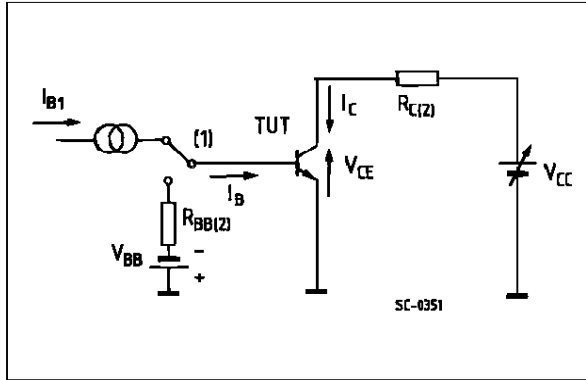
Inductive Fall Time



Inductive Storage Time

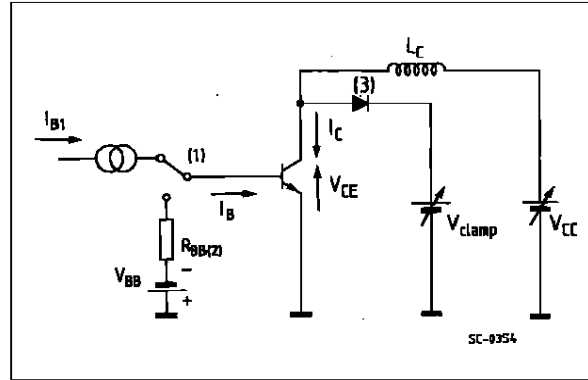


Resistive Load Switching Test Circuit



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

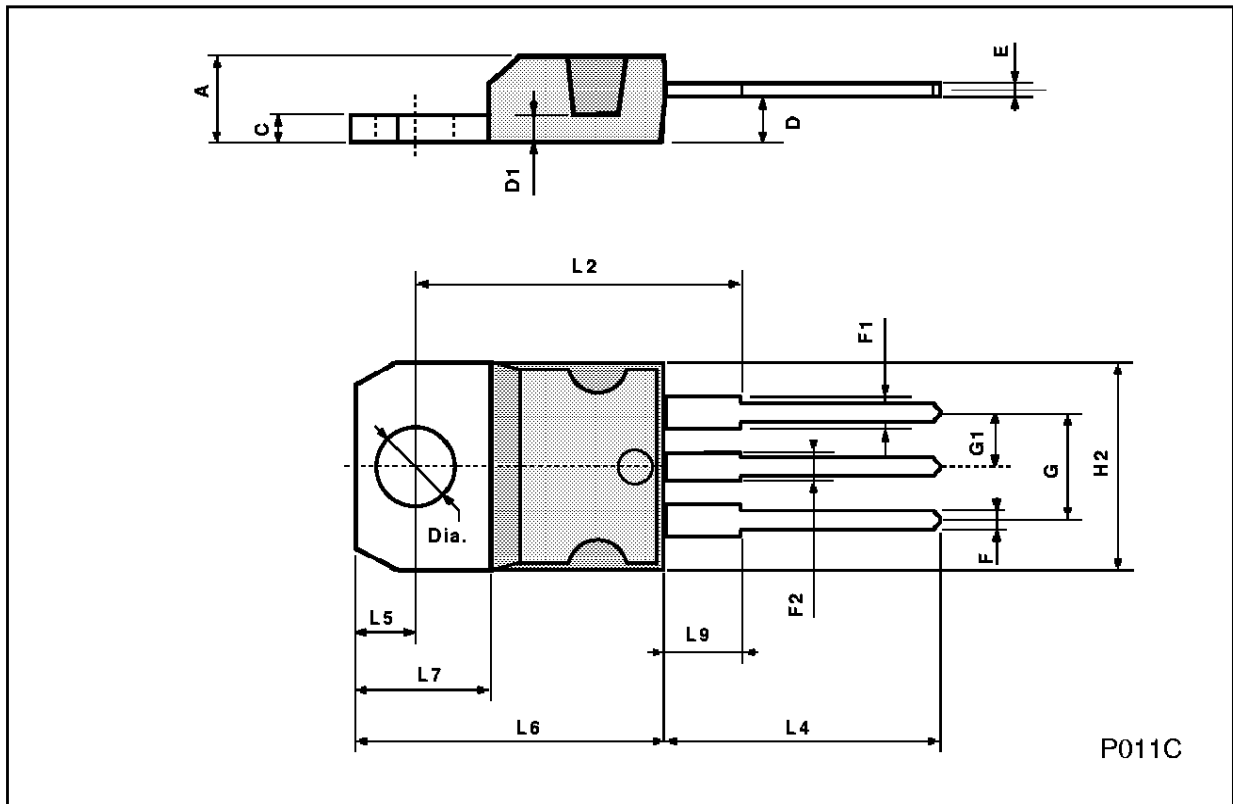
RBSOA and Inductive Load Switching Test Circuit



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

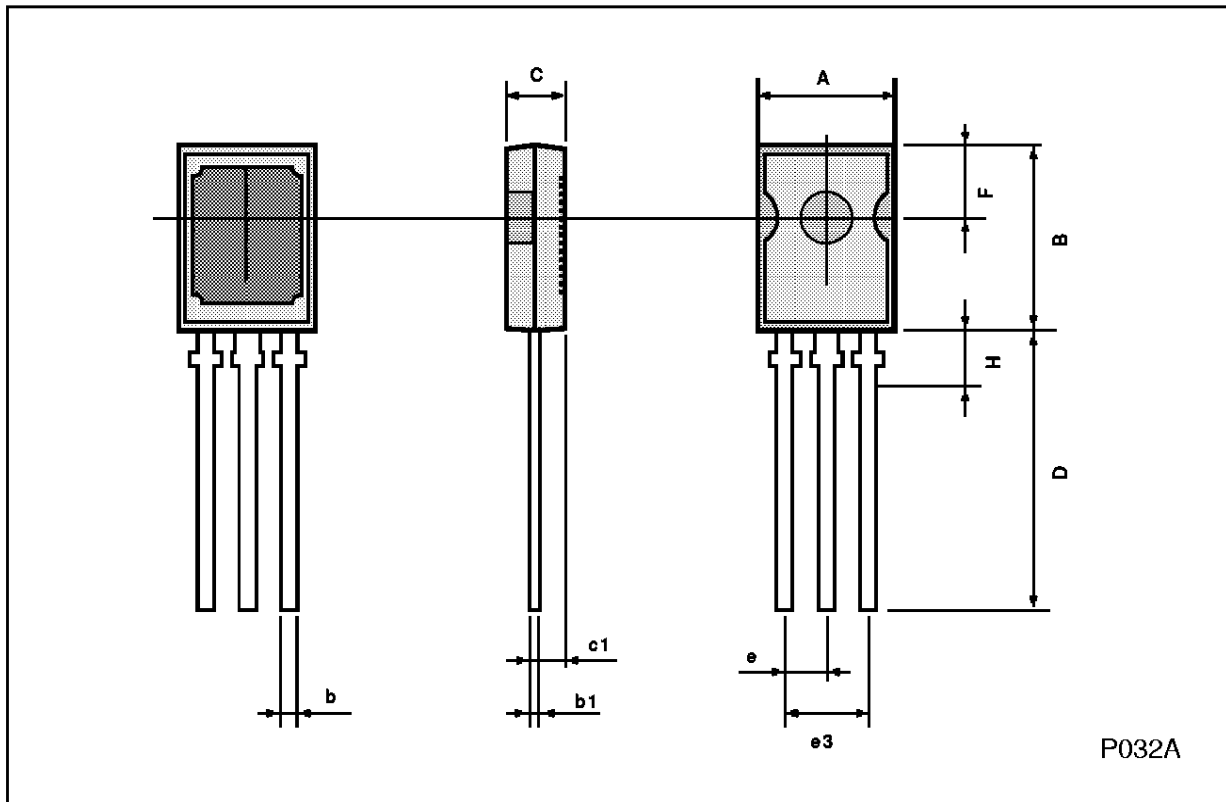
TO-220 MECHANICAL DATA

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	



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