DATA SHEET

BUJ100
Silicon Diffused Power Transistor

Product specification

September 1999

GENERAL DESCRIPTION

High-voltage, high-speed planar-passivated npn power switching transistor in the TO92 envelope intended for use in compact fluorescent lamps and low power electronic lighting ballasts, converters and inverters, etc.

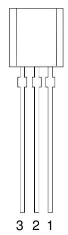
QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
V_{CESM}	Collector-emitter voltage peak value	V_{BE} = 0 V	-	700	V
V_{CBO}	Collector-Base voltage (open emitter)		-	700	V
V_{CEO}	Collector-emitter voltage (open base)		-	400	V
I_C	Collector current (DC)		-	1.0	A
I_{CM}	Collector current peak value		-	2.0	A
P_{tot}	Total power dissipation	$T_{lead} \leq 25$ ˚C	-	2	W
V_{CEsat}	Collector-emitter saturation voltage	I_C = 0.75 A;I_B = 150mA	0.24	1.0	V
h_{FE}		I_C = 0.75 A;V_{CE} = 5 V	14	20	
t_{fi}	Fall time (Inductive)	I_C = 1.0 A;I_{BON} = 200mA	50	70	ns

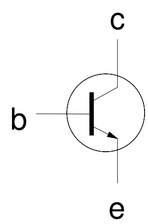
PINNING - TO92

PIN	DESCRIPTION
1	Emitter
2	Collector
3	Base

PIN CONFIGURATION



SYMBOL



LIMITING VALUES

Limiting values in accordance with the Absolute Maximum Rating System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CESM}	Collector to emitter voltage	V_{BE} = 0 V	-	700	V
V_{CEO}	Collector to emitter voltage (open base)		-	400	V
V_{CBO}	Collector to base voltage (open emitter)		-	700	V
I_C	Collector current (DC)		-	1.0	A
I_{CM}	Collector current peak value		-	2.0	A
I_B	Base current (DC)		-	0.5	A
I_{BM}	Base current peak value		-	1.0	A
P_{tot}	Total power dissipation	$T_{lead} \leq 25$ ˚C	-	2	W
T_{stg}	Storage temperature		-65	150	˚C
T_j	Junction temperature		-	150	˚C

THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
$R_{th\ j\text{-}lead}$	Thermal resistance junction to lead		-	60	K/W
$R_{th\ j\text{-}a}$	Thermal resistance Junction to ambient	pcb mounted; lead length = 4mm	150	-	K/W

STATIC CHARACTERISTICS

T_{lead} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CES},I_{CBO}	Collector cut-off current [1]	V_{BE} = 0 V; V_{CE} = $V_{CESMmax}$	-	0.8	100	µA
I_{CES}		V_{BE} = 0 V; V_{CE} = $V_{CESMmax}$; T_j = 125 ˚C	-	2.0	500	µA
I_{CEO}	Collector cut-off current	V_{CEO} = $V_{CEOMmax}$(400V)	-	-	100	µA
I_{EBO}	Emitter cut-off current	V_{EB} = 9 V; I_C = 0 A	-	0.05	100	µA
$V_{CEOsust}$	Collector-emitter sustaining voltage	I_B = 0 A; I_C = 10mA; L = 25 mH	400	-	-	V
V_{CEsat}	Collector-emitter saturation voltage	I_C = 0.75 A;I_B = 0.15 A	-	0.24	1.0	V
V_{BEsat}	Base-emitter saturation voltage	I_C = 0.75 A; I_B =0.15 A	-	0.93	1.3	V
h_{FE}	DC current gain	I_C = 10mA; V_{CE} = 5 V	11	20	27	
h_{FE}		I_C = 100mA; V_{CE} = 5 V	12.5	21	31	
h_{FE}		I_C = 0.75 A; V_{CE} = 5 V	9	14	20	

DYNAMIC CHARACTERISTICS

T_{lead} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
	Switching times (resistive load)	I_{Con} = 1.0 A; I_{Bon} = -I_{Boff} = 200mA; R_L = 75 ohms; V_{BB2} = 4 V;			
t_{on}	Turn-on time		0.65	0.88	µs
t_s	Turn-off storage time		0.88	1.2	µs
t_f	Turn-off fall time		250	338	ns
	Switching times (inductive load)	I_{Con} = 1.0 A; I_{Bon} = 200mA; L_B = 1 µH; -V_{BB} = 5 V			
t_s	Turn-off storage time		0.51	0.7	µs
t_f	Turn-off fall time		50	70	ns
	Switching times (inductive load)	I_{Con} = 1.0 A; I_{Bon} = 200mA; L_B = 1 µH; -V_{BB} = 5 V; T_j = 100 ˚C			
t_s	Turn-off storage time		-	1.4	µs
t_f	Turn-off fall time		-	130	ns

1 Measured with half sine-wave voltage (curve tracer).

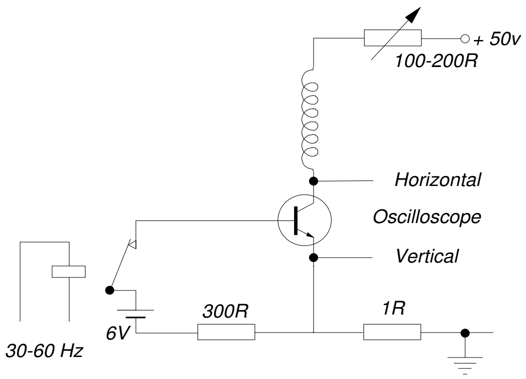


Fig.1. Test circuit for $V_{CEOsust}$.

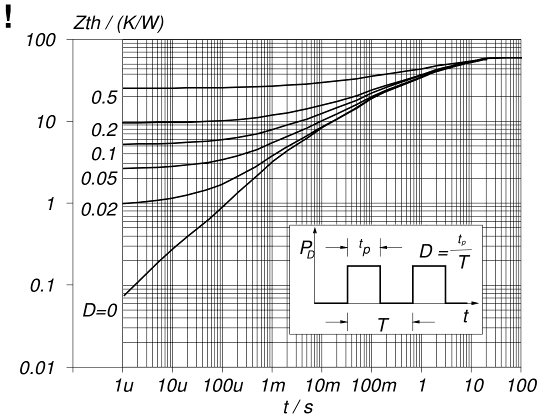


Fig.4. Transient thermal impedance.
$Zth_{j\text{-}lead} = f(t)$; parameter $D = t_p/T$

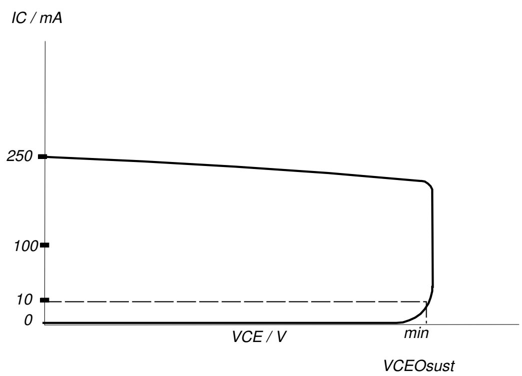


Fig.2. Oscilloscope display for $V_{CEOsust}$.

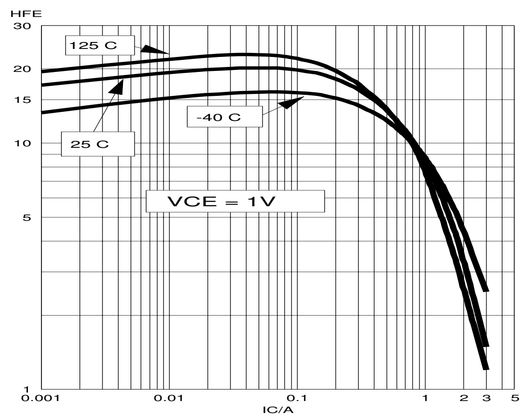


Fig.5. Typical DC current gain. $h_{FE} = f(I_C)$
parameter V_{CE}

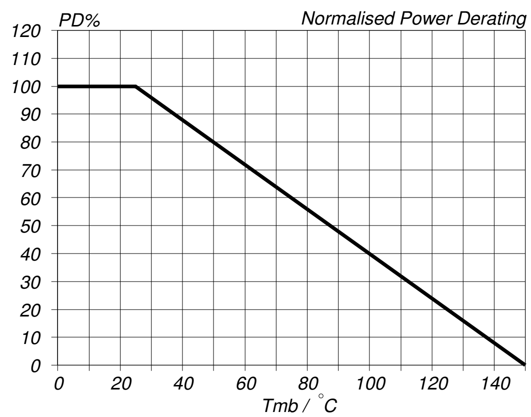


Fig.3. Normalised power dissipation.
$PD\% = 100 \cdot PD/PD_{25^\circ C} = f(T_{mb})$

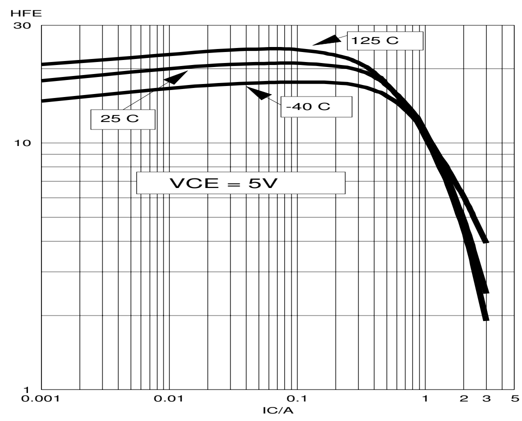


Fig.6. Typical DC current gain. $h_{FE} = f(I_C)$
parameter V_{CE}

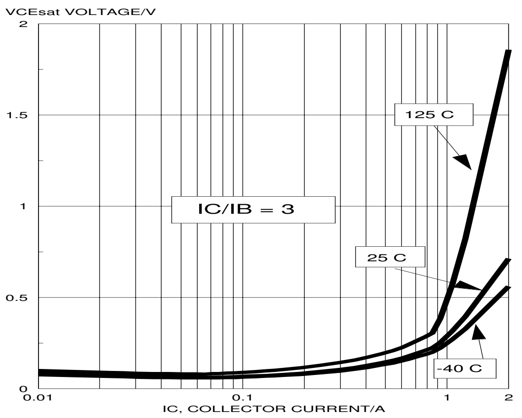


Fig.7. Collector-Emitter saturation voltage.
Solid Lines = typ values, $I_C/I_B = 3$

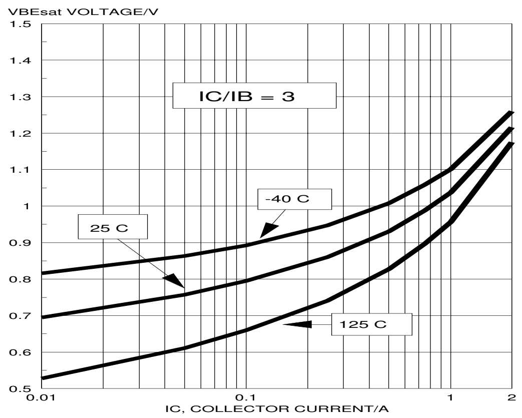


Fig.8. Base-Emitter saturation voltage.
Solid Lines = typ values, $I_C/I_B = 3$

INDUCTIVE SWITCHING

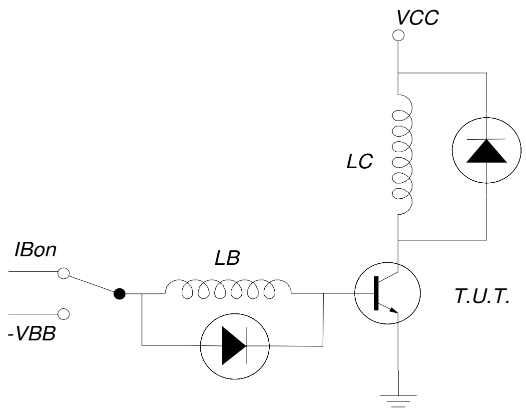


Fig.9. Test circuit inductive load.
V_{CC} = 300 V; -V_{BE} = 5 V, L_C = 200 μH; L_B = 1 μH

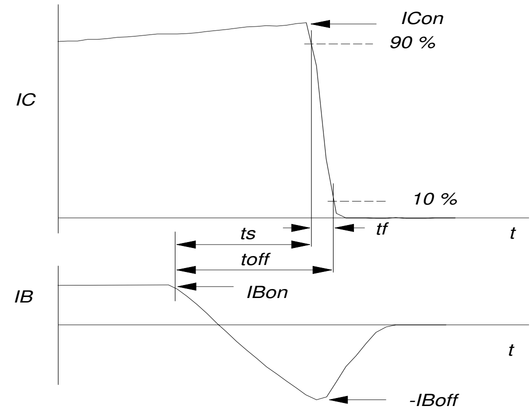


Fig.10. Switching times waveforms with inductive load.

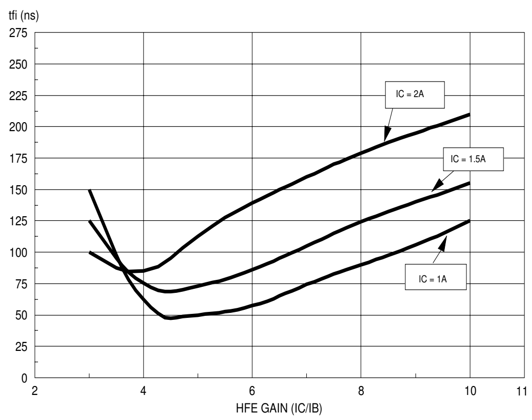


Fig.11. Inductive switching.
tfi = f(h_{FE})

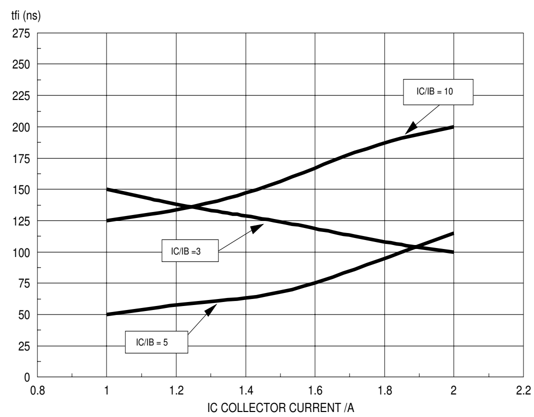


Fig.12. Inductive switching.
tfi = f(I_C)

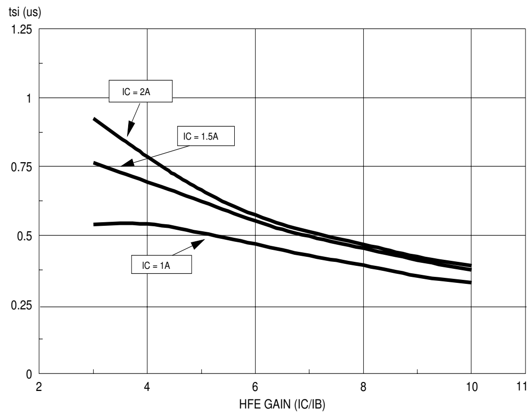


Fig.13. Inductive switching.
tsi = f(h_{FE})

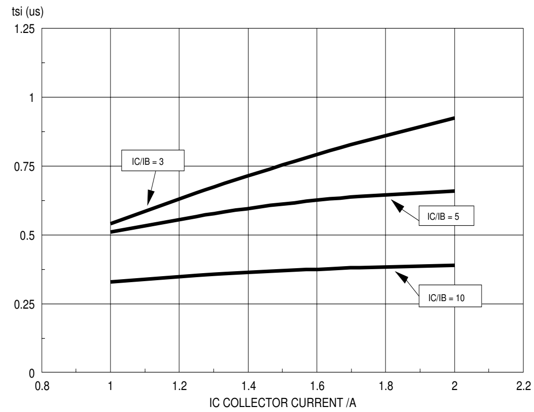


Fig.14. Inductive switching.
tsi = f(I_C)

RESISTIVE SWITCHING

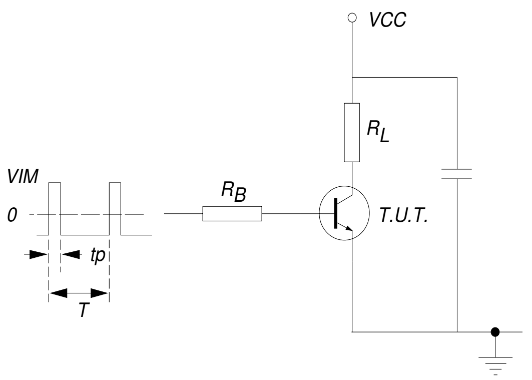


Fig.15. Test circuit resistive load. V_{IM} = -6 to +8 V
V_{CC} = 250 V; t_p = 20 μs; δ = t_p / T = 0.01.
R_B and R_L calculated from I_{Con} and I_{Bon} requirements.

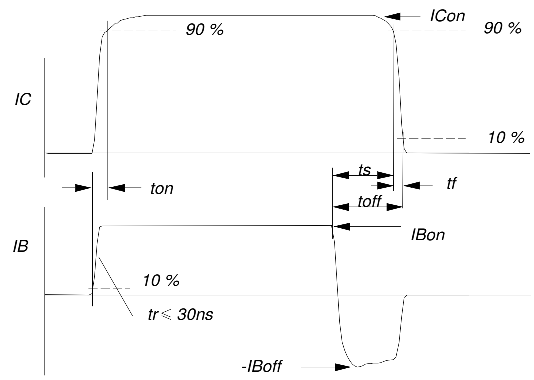


Fig.16. Switching times waveforms with resistive load.

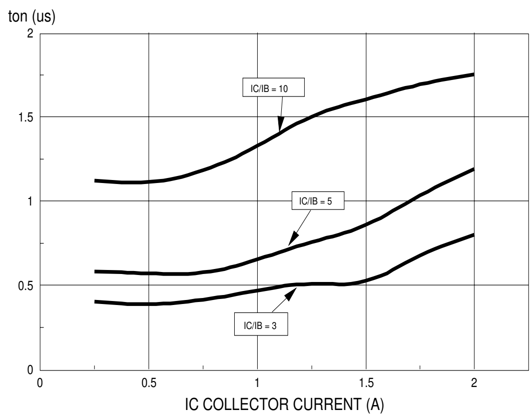


Fig.17. Resistive switching.
ton = f(I_C)

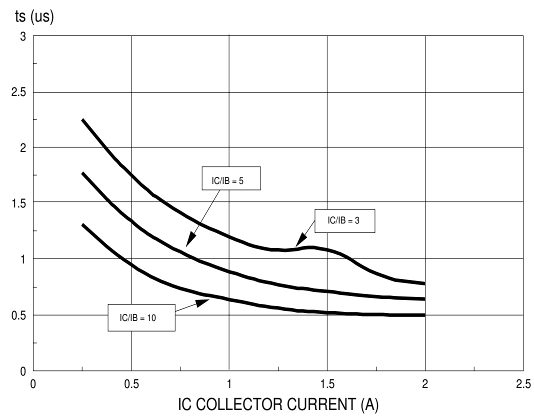


Fig.18. Resistive switching.
ts = f(I_C)

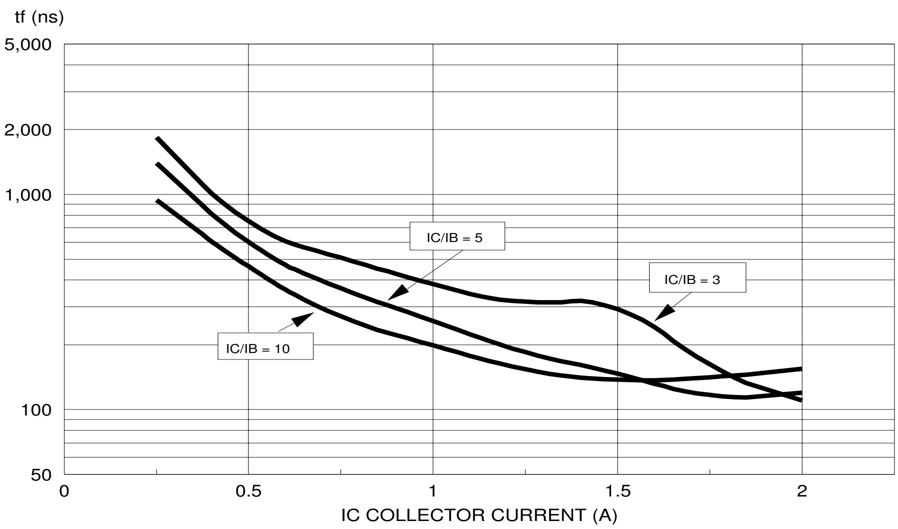


Fig.19. Resistive switching.
tf = f(I_C)

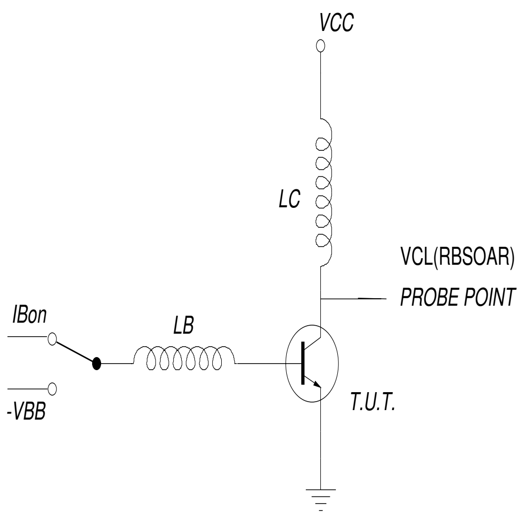


Fig.20. Test Circuit for the RBSOA test.
$V_{cl} \leq 700V$; $V_{cc} = 150V$; $L_B = 1\mu H$; $L_c = 200\mu H$

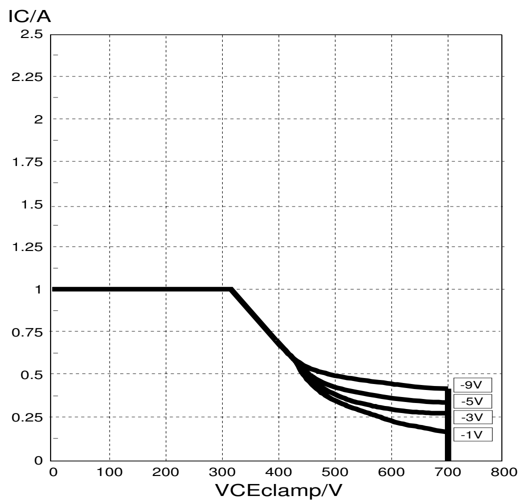
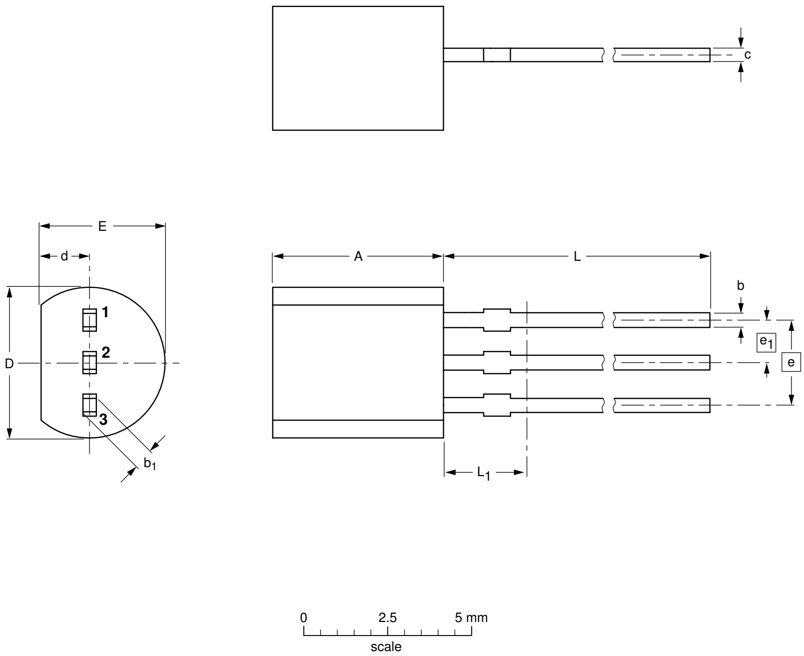


Fig.21. Reverse bias safe operating area $T_j \leq T_{jmax}$
for $-V_{BE}$ = 9V, 5V,3V & 1V

MECHANICAL DATA

Plastic single-ended leaded (through hole) package; 3 leads **SOT54**



DIMENSIONS (mm are the original dimensions)

UNIT	A	b	b_1	c	D	d	E	e	e_1	L	$L_1^{(1)}$
mm	5.2 5.0	0.48 0.40	0.66 0.56	0.45 0.40	4.8 4.4	1.7 1.4	4.2 3.6	2.54	1.27	14.5 12.7	2.5

Note

1. Terminal dimensions within this zone are uncontrolled to allow for flow of plastic and terminal irregularities.

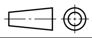
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT54		TO-92	SC-43			97-02-28

Fig.22. TO92 ; plastic envelope; Net Mass: 0.2 g

Notes

1. Epoxy meets UL94 V0 at 1/8".

Legal information

DATA SHEET STATUS

DOCUMENT STATUS[1]	PRODUCT STATUS[2]	DEFINITION
Objective data sheet	Development	This document contains data from the objective specification for product development.
Preliminary data sheet	Qualification	This document contains data from the preliminary specification.
Product data sheet	Production	This document contains the product specification.

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