

Silicon Diffused Power Transistor

BU1706AB

GENERAL DESCRIPTION

High-voltage, high-speed switching npn transistor in a plastic envelope suitable for surface mounting, intended for use in high frequency electronic lighting ballast applications.

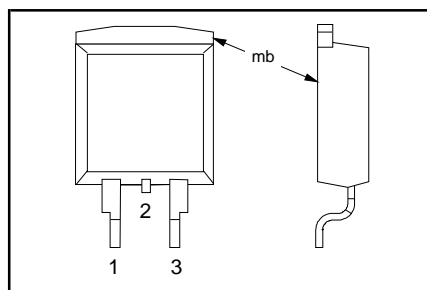
QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
V_{CESM}	Collector-emitter voltage peak value	$V_{BE} = 0\text{ V}$	-	1750	V
V_{CEO}	Collector-emitter voltage (open base)		-	850	V
I_C	Collector current (DC)		-	5	A
I_{CM}	Collector current peak value		-	8	A
P_{tot}	Total power dissipation	$T_{mb} \leq 25\text{ °C}$	-	100	W
V_{CESat}	Collector-emitter saturation voltage	$I_C = 1.5\text{ A}; I_B = 0.3\text{ A}$	-	1.0	V
I_{Csat}	Collector saturation current		1.5	-	A
t_f	Fall time	$I_{CM} = 1.5\text{ A}; I_{B(on)} = 0.3\text{ A}$	0.25	0.6	μs

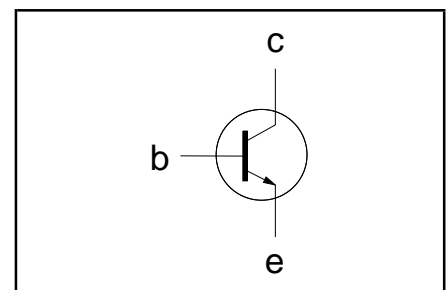
PINNING - SOT404

PIN	DESCRIPTION
1	base
2	collector
3	emitter
mb	collector

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-emitter voltage peak value	$V_{BE} = 0\text{ V}$	-	1750	V
V_{CEO}	Collector-emitter voltage (open base)		-	850	V
I_C	Collector current (DC)		-	5	A
I_{CM}	Collector current peak value		-	8	A
I_B	Base current (DC)		-	3	A
I_{BM}	Base current peak value		-	5	A
$-I_{B(AV)}$	Reverse base current	average over any 20ms period	-	100	mA
$-I_{BM}$	Reverse base current peak value		-	4	A
P_{tot}	Total power dissipation	$T_{mb} \leq 25\text{ °C}$	-	100	W
T_{stg}	Storage temperature		-65	150	$^{\circ}\text{C}$
T_j	Junction temperature		-	150	$^{\circ}\text{C}$

THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
$R_{th\ j-mb}$	Thermal resistance junction to mounting base		-	1.25	K/W
$R_{th\ j-a}$	Thermal resistance junction to ambient	minimum footprint, FR4 board	55	-	K/W

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STATIC CHARACTERISTICS

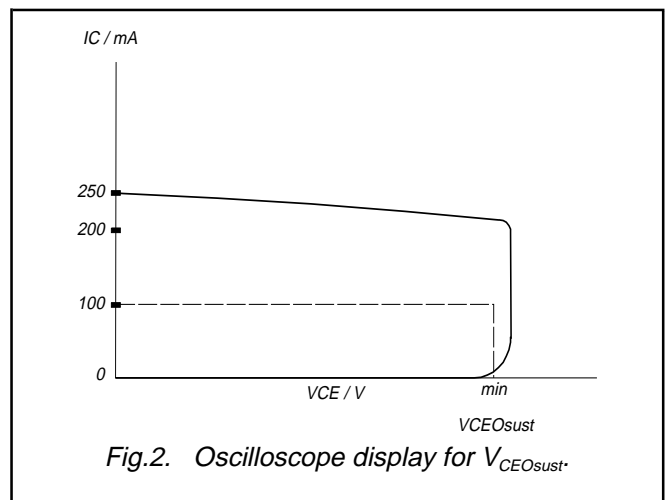
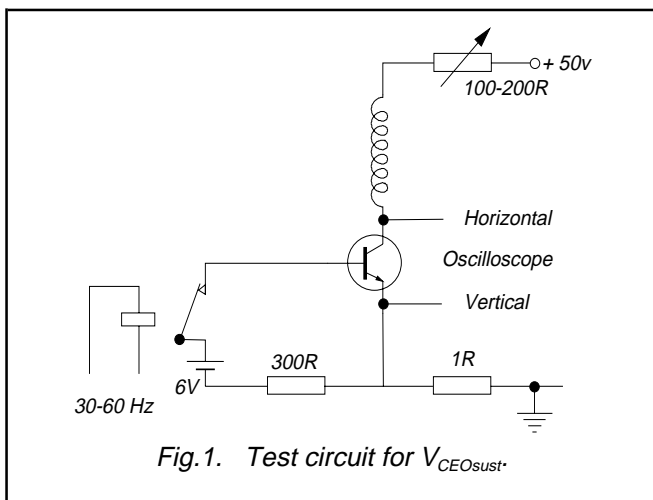
$T_{mb} = 25\text{ }^\circ\text{C}$ unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CES}	Collector cut-off current ¹	$V_{BE} = 0\text{ V}; V_{CE} = V_{CESMmax}$	-	-	1.0	mA
I_{CES}		$V_{BE} = 0\text{ V}; V_{CE} = 1500\text{ V}$	-	-	20	μA
I_{CES}		$V_{BE} = 0\text{ V}; V_{CE} = V_{CESMmax}; T_j = 125\text{ }^\circ\text{C}$	-	-	2.0	mA
I_{EBO}	Emitter cut-off current	$V_{EB} = 12\text{ V}; I_C = 0\text{ A}$	-	-	1	mA
$V_{CEOsust}$	Collector-emitter sustaining voltage	$I_B = 0\text{ A}; I_C = 100\text{ mA}; L = 25\text{ mH}$	750	-	-	V
V_{CEsat}	Collector-emitter saturation voltage	$I_C = 1.5\text{ A}; I_B = 0.3\text{ A}$	-	-	1.0	V
V_{BEsat}	Base-emitter saturation voltage	$I_C = 1.5\text{ A}; I_B = 0.3\text{ A}$	-	-	1.3	V
h_{FE}	DC current gain	$I_C = 5\text{ mA}; V_{CE} = 10\text{ V}$	8	-	-	
h_{FE}		$I_C = 400\text{ mA}; V_{CE} = 3\text{ V}$	12	18	35	
h_{FE}		$I_C = 1.5\text{ A}; V_{CE} = 1\text{ V}$	5	7	-	

DYNAMIC CHARACTERISTICS

$T_{mb} = 25\text{ }^\circ\text{C}$ unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
t_{on}	Switching times (resistive load) Turn-on time Turn-off storage time Turn-off fall time	$I_{Con} = 1.5\text{ A}; I_{Bon} = -I_{Boff} = 0.3\text{ A}$	1.1	1.5	μs
t_s			5	6.5	μs
t_f			0.75	1.0	μs
t_s	Switching times (inductive load) Turn-off storage time Turn-off fall time	$I_{Con} = 1.5\text{ A}; I_{Bon} = 0.3\text{ A}; L_B = 1\text{ }\mu\text{H}; -V_{BB} = 5\text{ V}$	2.0	3.0	μs
t_f			0.25	0.6	μs
t_s	Switching times (inductive load) Turn-off storage time Turn-off fall time	$I_{Con} = 1.5\text{ A}; I_{Bon} = 0.3\text{ A}; L_B = 1\text{ }\mu\text{H}; -V_{BB} = 5\text{ V}; T_j = 100\text{ }^\circ\text{C}$	2.2	3.3	μs
t_f			0.2	0.7	μs



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

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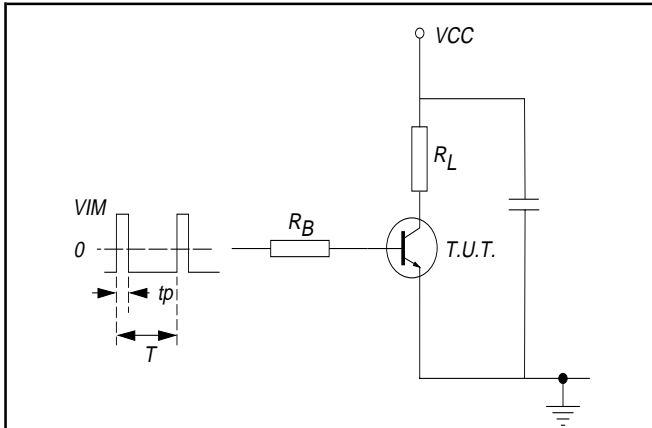


Fig. 3. Test circuit resistive load. $V_{IM} = -6$ to $+8$ V
 $V_{CC} = 250$ V; $t_p = 20 \mu s$; $\delta = t_p / T = 0.01$.
 R_B and R_L calculated from I_{Con} and I_{Bon} requirements.

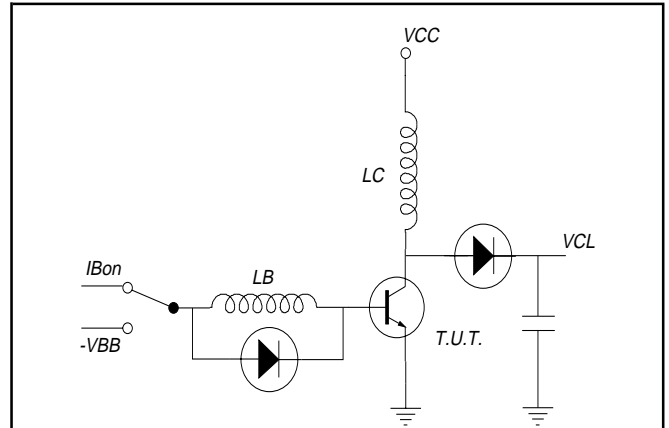


Fig. 6. Test Circuit RBSOA.
 $V_{CC} = 150$ V; $-V_{BB} = 5$ V; $L_C = 2$ mH; $V_{CL} \leq 1500$ V;
 $L_B = 1 \mu H$

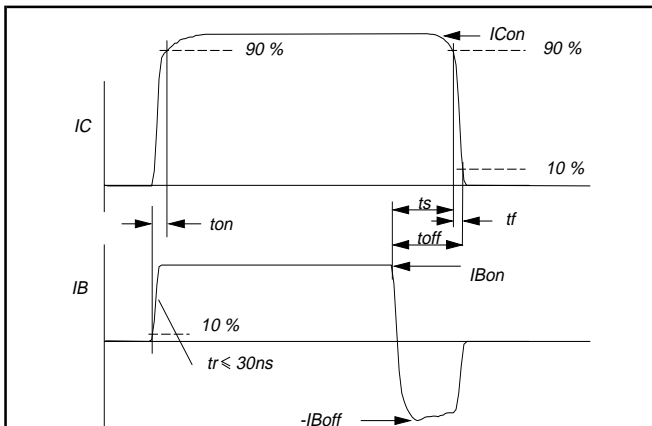


Fig. 4. Switching times waveforms with resistive load.

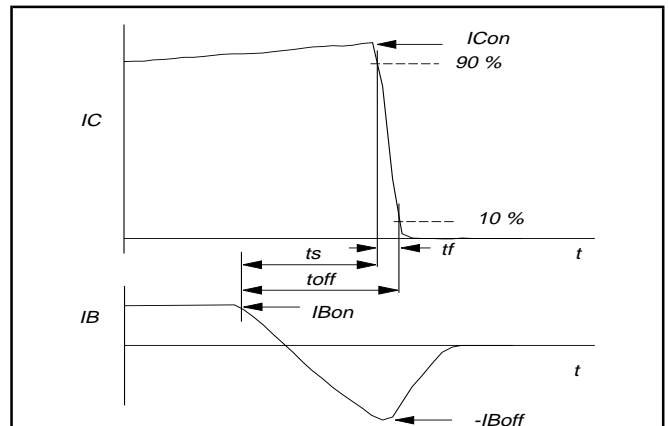


Fig. 7. Switching times waveforms with inductive load.

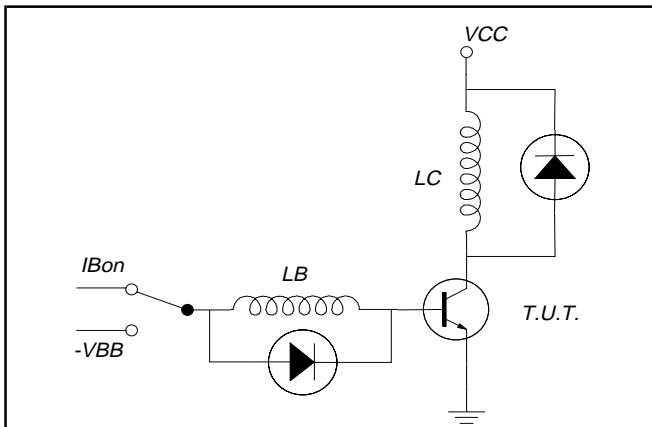


Fig. 5. Test circuit inductive load.
 $V_{CC} = 300$ V; $-V_{BE} = 5$ V; $L_B = 1 \mu H$

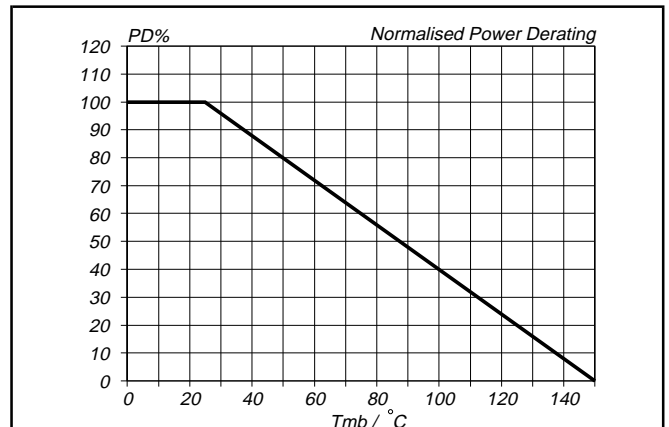
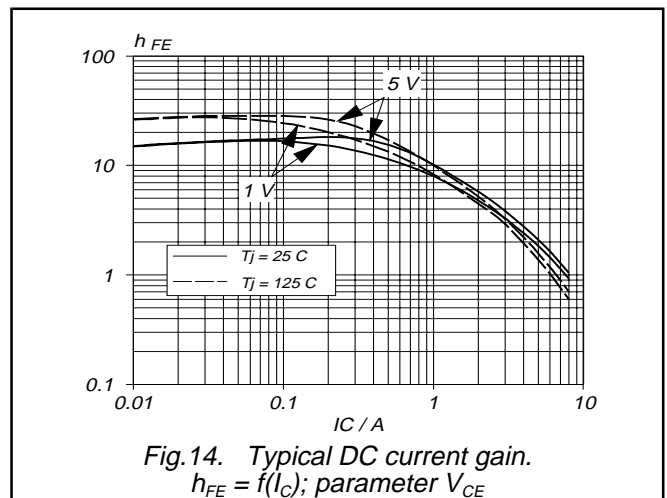
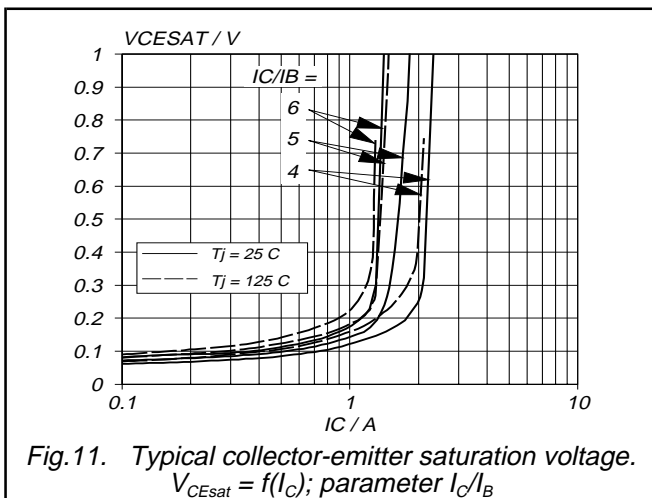
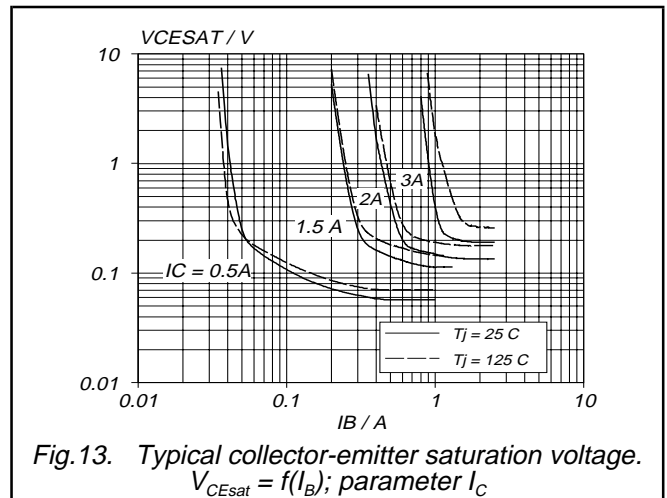
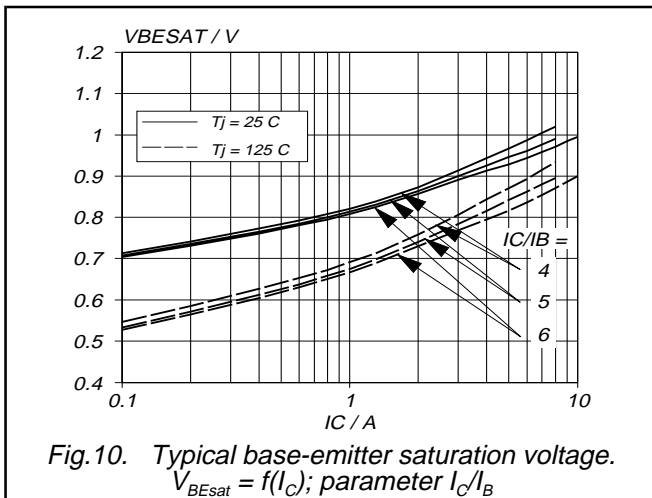
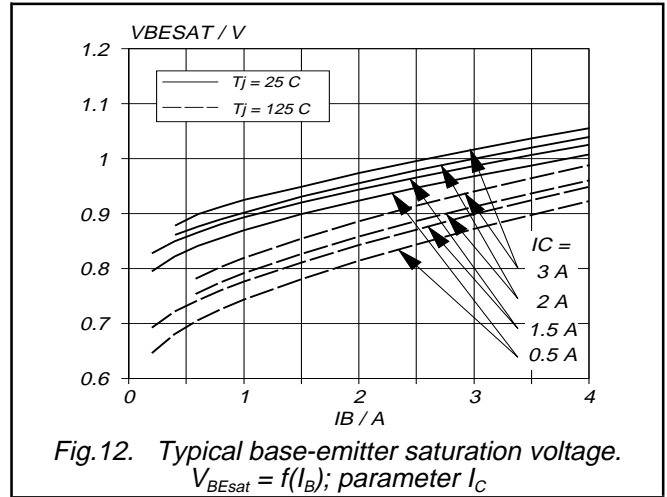
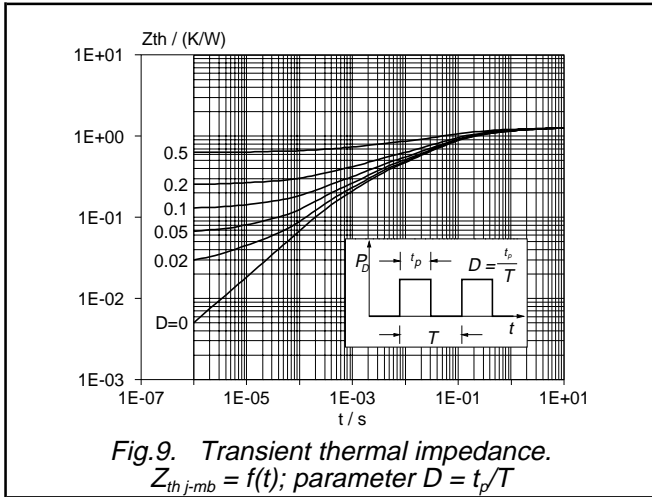


Fig. 8. Normalised power dissipation.
 $PD\% = 100 \cdot PD / PD_{25^\circ C} = f(T_{mb})$

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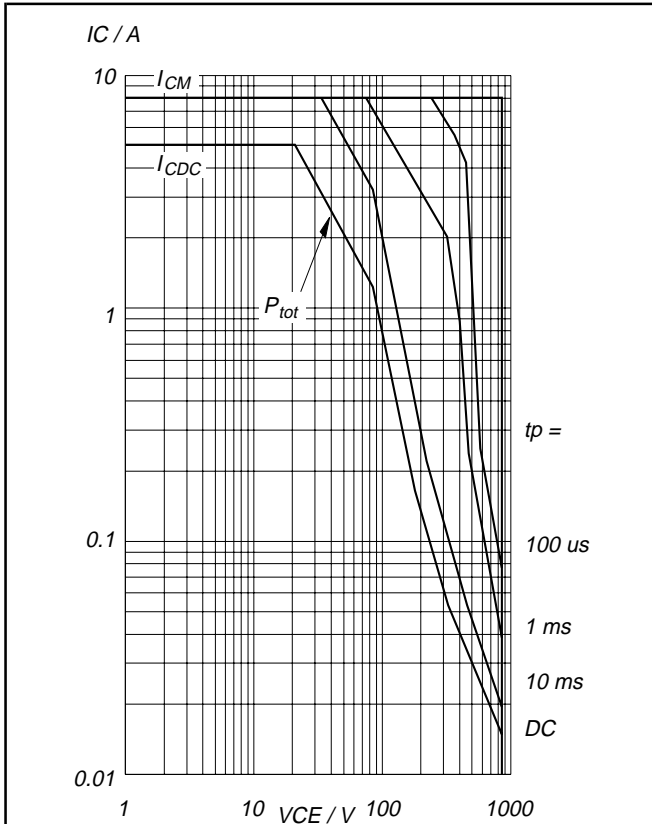


Fig. 15. Forward bias safe operating area. $T_{mb} = 25\text{ }^\circ\text{C}$

- I Region of permissible DC operation.
- II Extension for repetitive pulse operation.
- NB: Mounted with heatsink compound and 30 ± 5 newton force on the centre of the envelope.

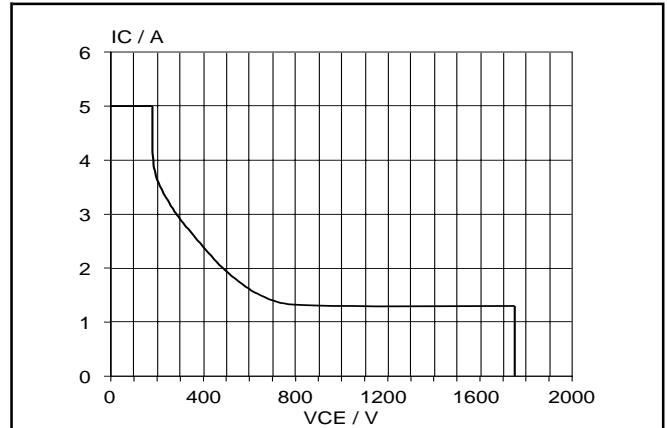
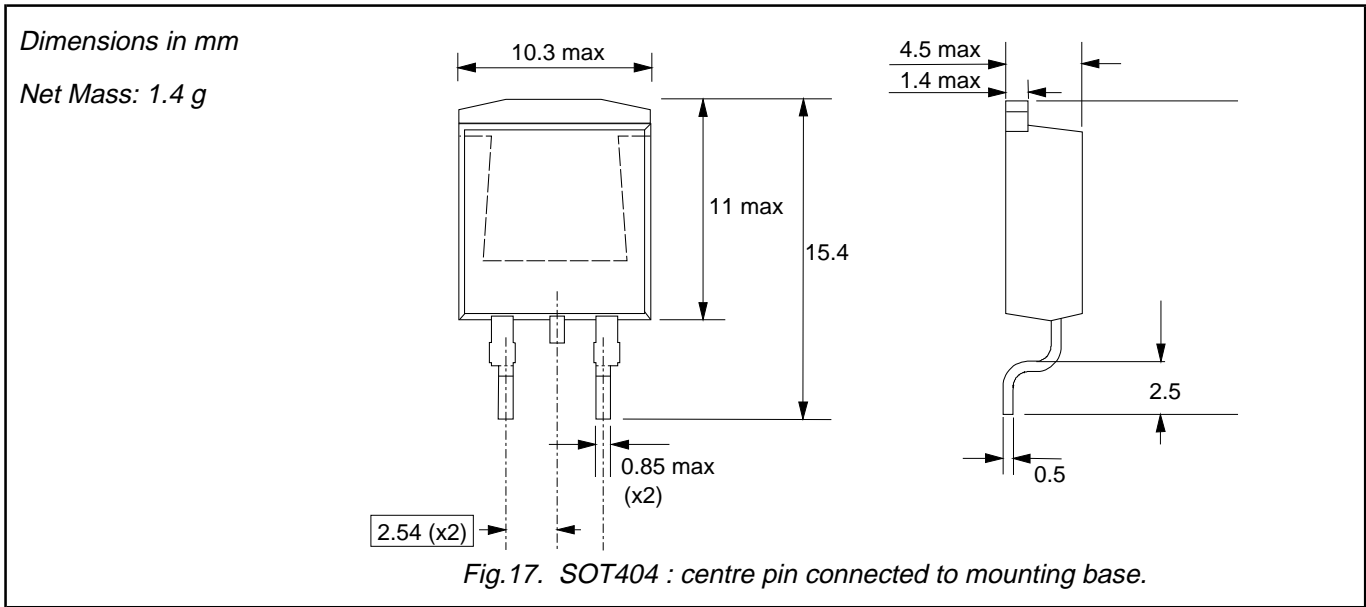


Fig. 16. Reverse bias safe operating area. $T_j \leq T_{jmax}$

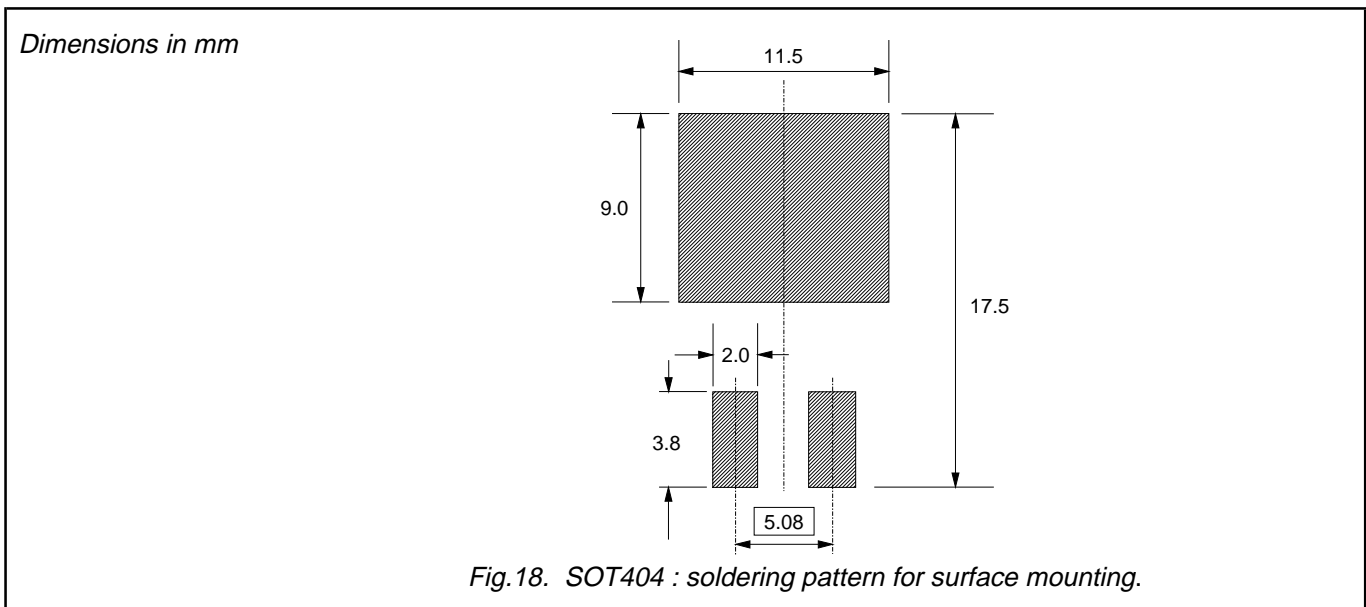
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MECHANICAL DATA



MOUNTING INSTRUCTIONS



Notes

- 1. Plastic meets UL94 V0 at 1/8".

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DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values are given in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of this specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	
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