

Silicon Diffused Power Transistor**BUT11AF****GENERAL DESCRIPTION**

High-voltage, high-speed glass-passivated npn power transistor in a SOT186 envelope with electrically insulated mounting base, intended for use in converters, inverters, switching regulators, motor control systems, etc.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
V_{CESM}	Collector-emitter voltage peak value	$V_{BE} = 0\text{ V}$	-	1000	V
V_{CEO}	Collector-emitter voltage (open base)		-	450	V
I_C	Collector current (DC)		-	5	A
I_{CM}	Collector current peak value	$T_{hs} \leq 25\text{ }^{\circ}\text{C}$	-	10	A
P_{tot}	Total power dissipation		-	20	W
V_{CESat}	Collector-emitter saturation voltage		-	1.5	V
I_{Csat}	Collector saturation current		2.5	-	A
t_f	Fall time		800	-	ns

[INCLUDE]**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	$V_{BE} = 0\text{ V}$	-	1000	V
V_{CEO}	Collector-emitter voltage (open base)		-	450	V
I_C	Collector current (DC)		-	5	A
I_{CM}	Collector current peak value	$T_{hs} \leq 25\text{ }^{\circ}\text{C}$	-	10	A
I_B	Base current (DC)		-	2	A
I_{BM}	Base current peak value		-	4	A
P_{tot}	Total power dissipation		-	20	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
$R_{th\ j-hs}$	Junction to heatsink	with heatsink compound	-	3.95	K/W
$R_{th\ j-a}$	Junction to ambient	in free air	55	-	K/W

ISOLATION LIMITING VALUE & CHARACTERISTIC

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	R.H. $\leq 65\%$; clean and dustfree	-		1500	V
C_{isol}	Capacitance from T2 to external heatsink	$f = 1\text{ MHz}$	-	12	-	pF

Silicon Diffused Power Transistor

BUT11AF

STATIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I _{CES}	Collector cut-off current ¹	V _{BE} = 0 V; V _{CE} = V _{CESMmax}	-	-	1.0	mA
I _{CES}		V _{BE} = 0 V; V _{CE} = V _{CESMmax} T _j = 125 °C	-	-	2.0	mA
I _{EBO}	Emitter cut-off current	V _{EB} = 9 V; I _C = 0 A	-	-	10	mA
V _{CEOsust}	Collector-emitter sustaining voltage	I _B = 0 A; I _C = 100 mA; L = 25 mH	450	-	-	V
V _{CEsat}	Collector-emitter saturation voltages	I _C = 2.5 A; I _B = 0.5 A	-	-	1.5	V
V _{BEsat}		I _C = 2.5 A; I _B = 0.5 A	-	-	1.3	V
h _{FE}	DC current gain	I _C = 5 mA; V _{CE} = 5 V	10	18	35	
h _{FE}		I _C = 500 mA; V _{CE} = 5 V	10	20	35	

DYNAMIC CHARACTERISTICS

T_{hs} = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
t _{on}	Switching times (resistive load)	I _{Con} = 2.5 A; I _{Bon} = -I _{Boff} = 0.5 A	-	1	μs
t _s	Turn-on time		-	4	μs
t _f	Turn-off storage time		-	0.8	μs
t _s	Switching times (inductive load)	I _{Con} = 2.5 A; I _{Bon} = 0.5 A; L _B = 1 μH; -V _{BB} = 5 V	1.1	1.4	μs
t _f	Turn-off storage time		80	150	ns
t _s	Switching times (inductive load)	I _{Con} = 2.5 A; I _{Bon} = 0.5 A; L _B = 1 μH; -V _{BB} = 5 V; T _j = 100 °C	1.2	1.5	μs
t _f	Turn-off storage time		140	300	ns

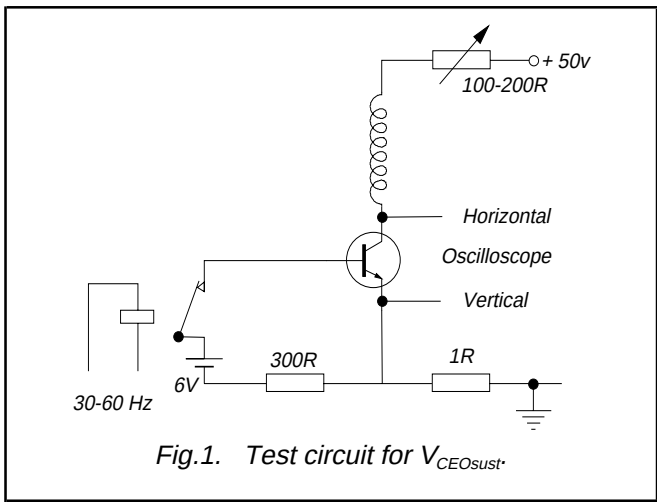


Fig.1. Test circuit for V_{CEOsust}

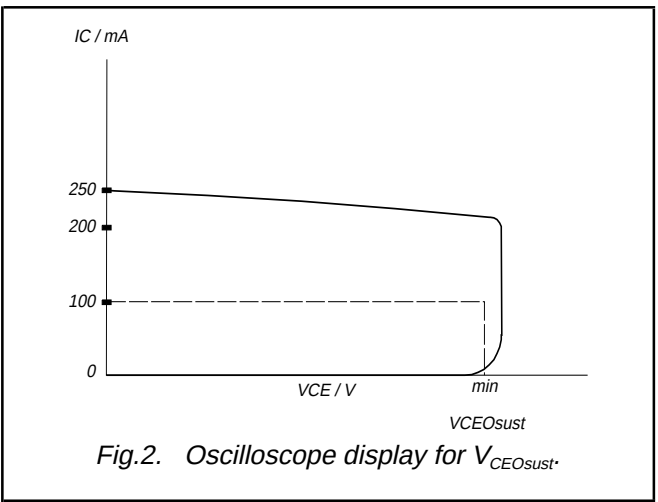
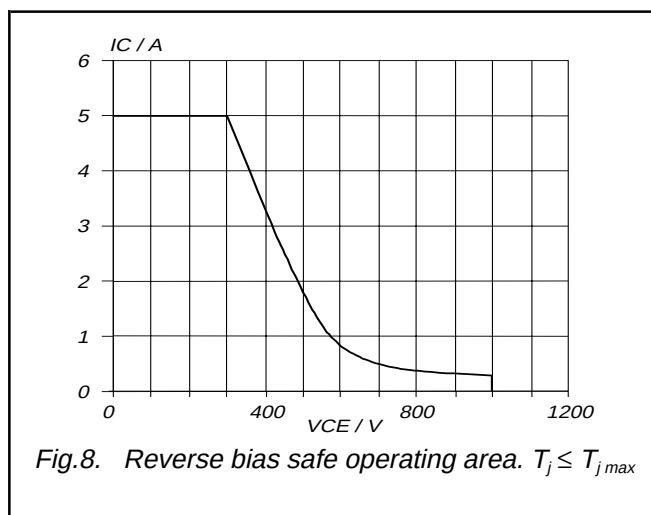
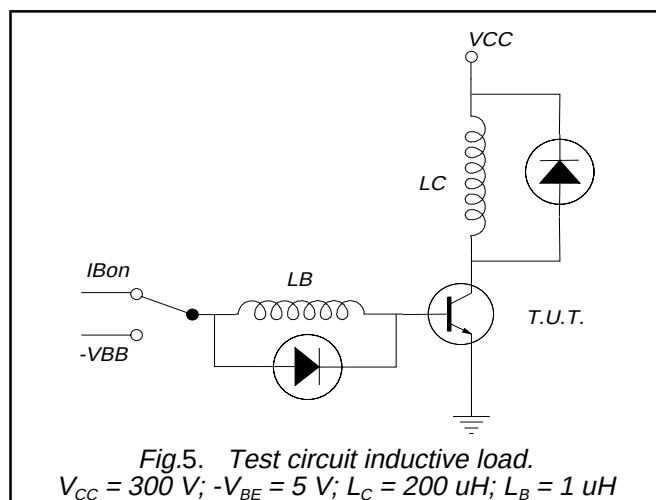
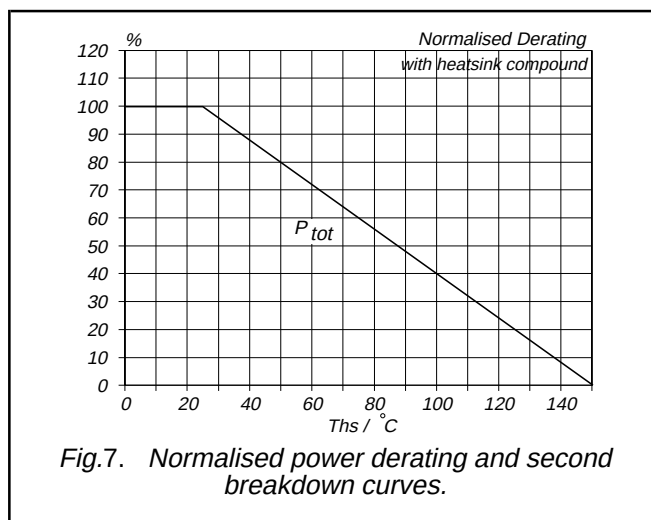
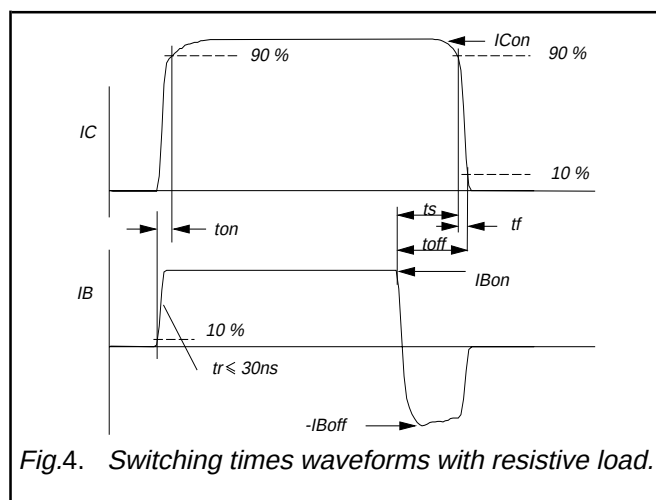
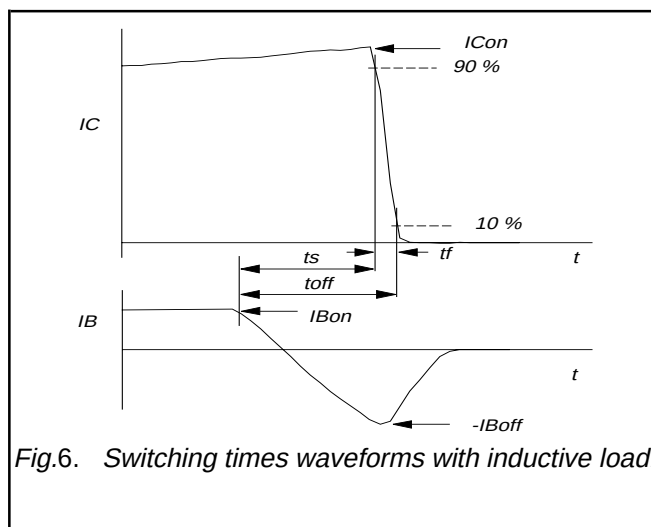
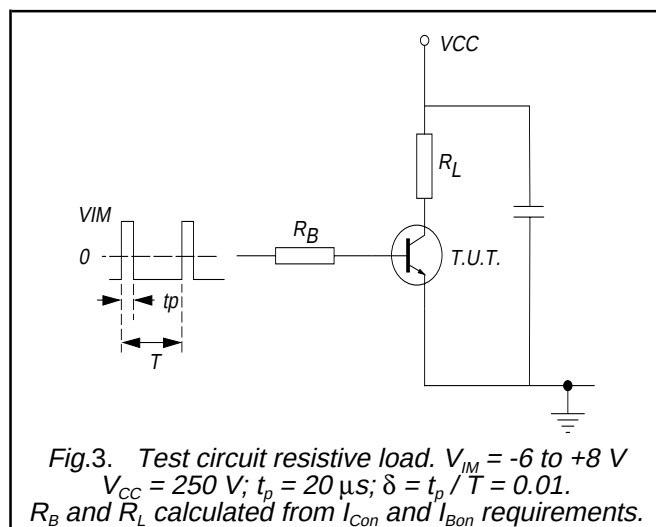


Fig.2. Oscilloscope display for V_{CEOsust}

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

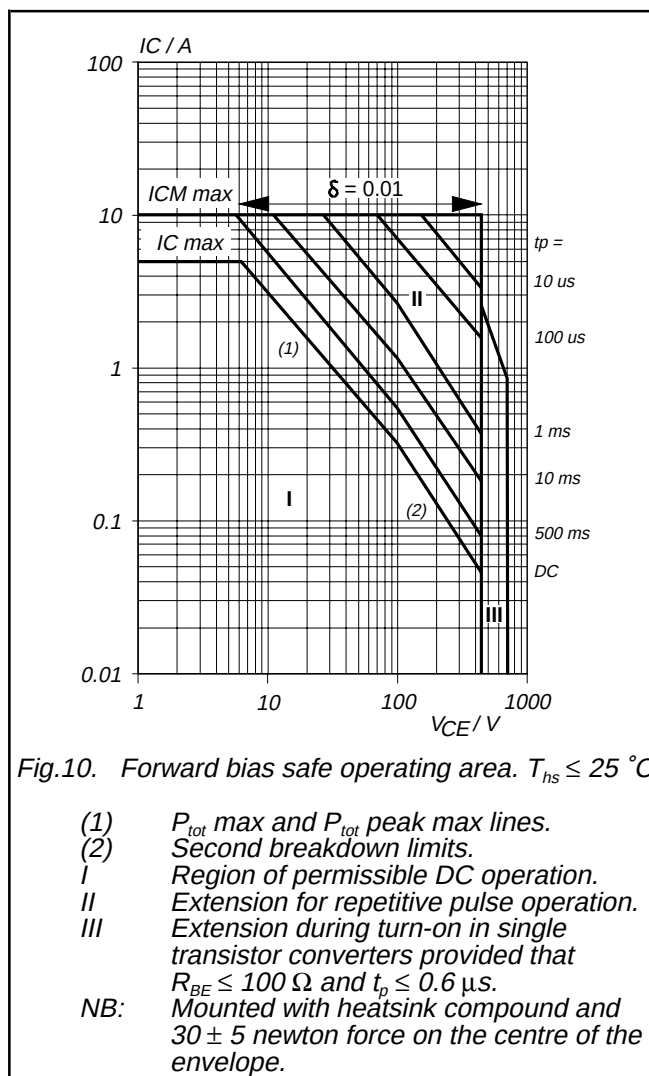
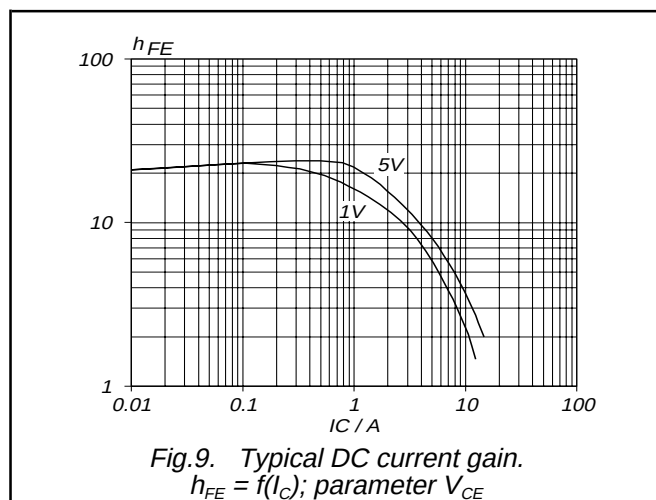
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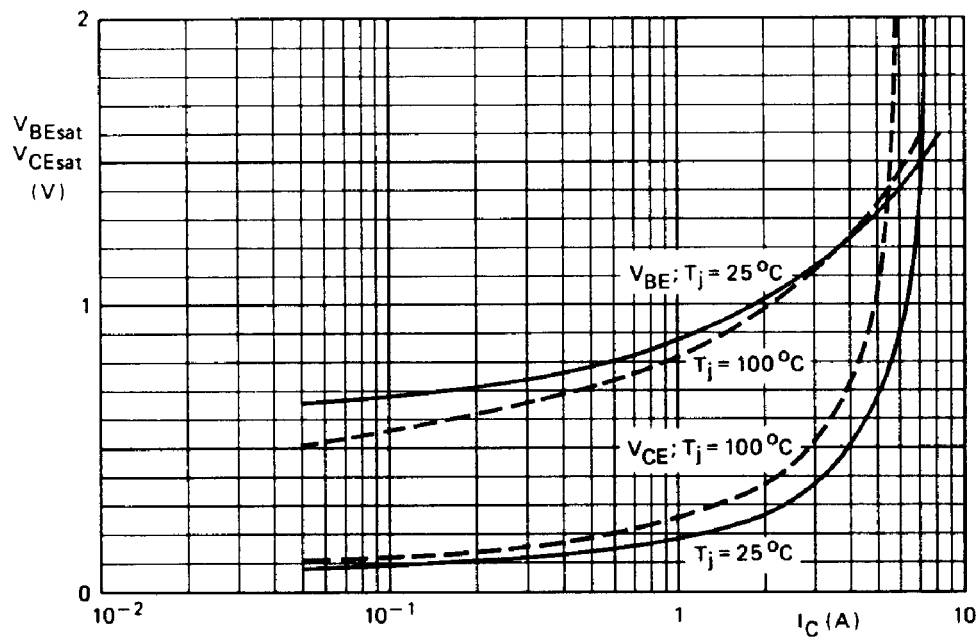


Fig.11. Typical base-emitter and collector-emitter saturation voltages.

$$V_{BEsat} = f(I_C); V_{CEsat} = f(I_C); I_C/I_B = 5$$

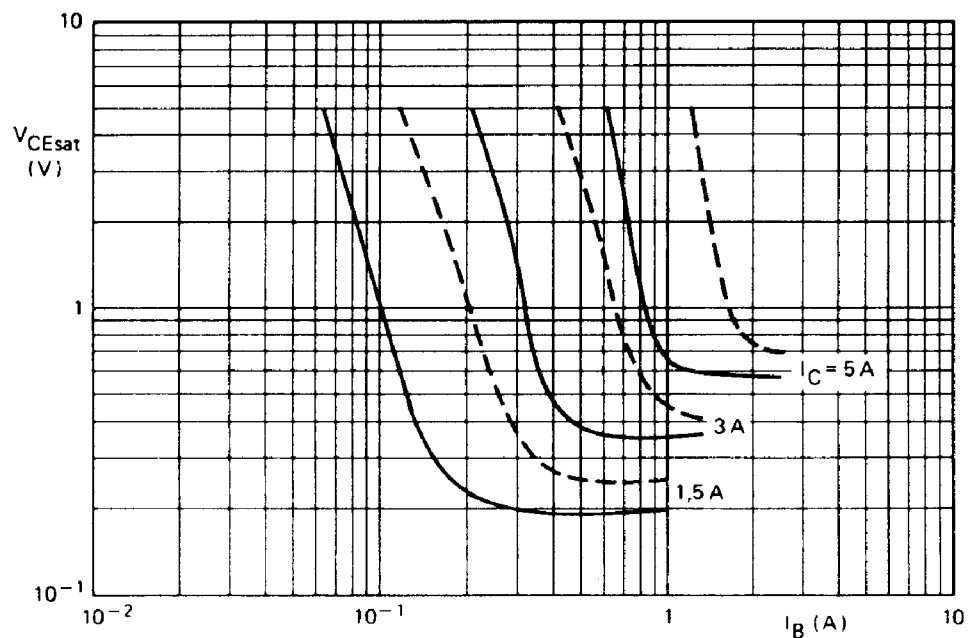


Fig.12. Collector-emitter saturation voltage. Solid lines = typ values, dotted lines = max values. $V_{CEsat} = f(I_B)$; parameter I_C

Silicon Diffused Power Transistor

BUT11AF

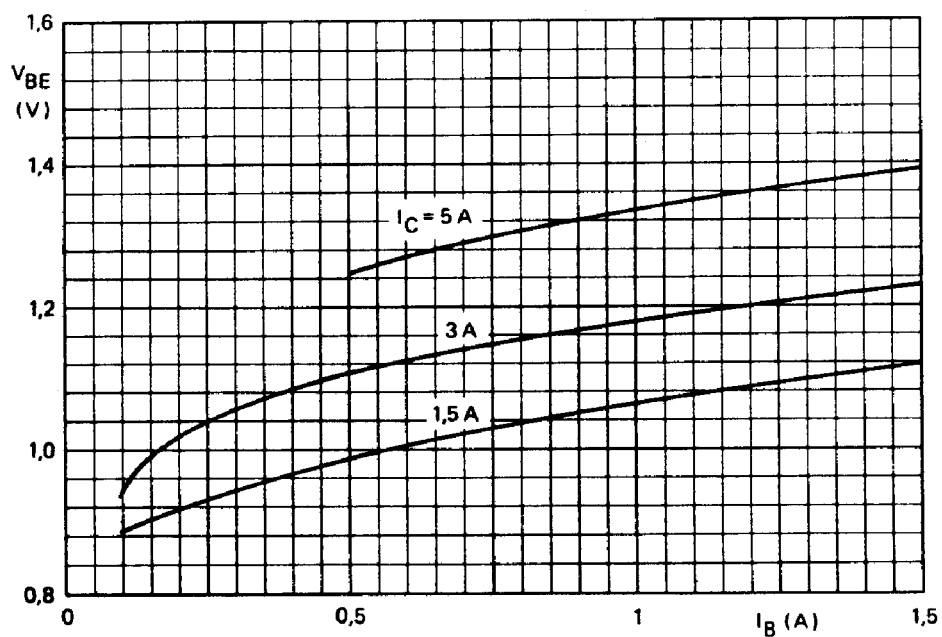


Fig.13. Typical base-emitter saturation voltage.
 $V_{BEsat} = f(I_B)$; parameter I_C

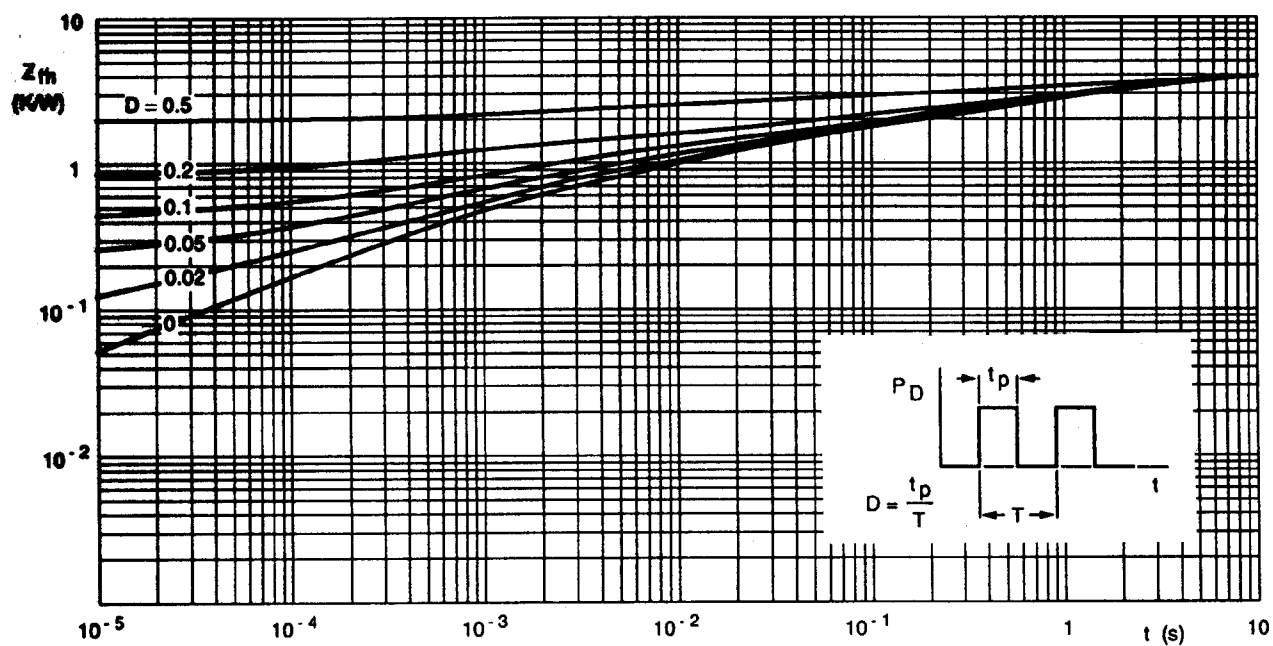


Fig.14. Transient thermal impedance.
 $Z_{thj-hs} = f(t)$; parameter $D = t_p/T$

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MECHANICAL DATA

Dimensions in mm

Net Mass: 2 g

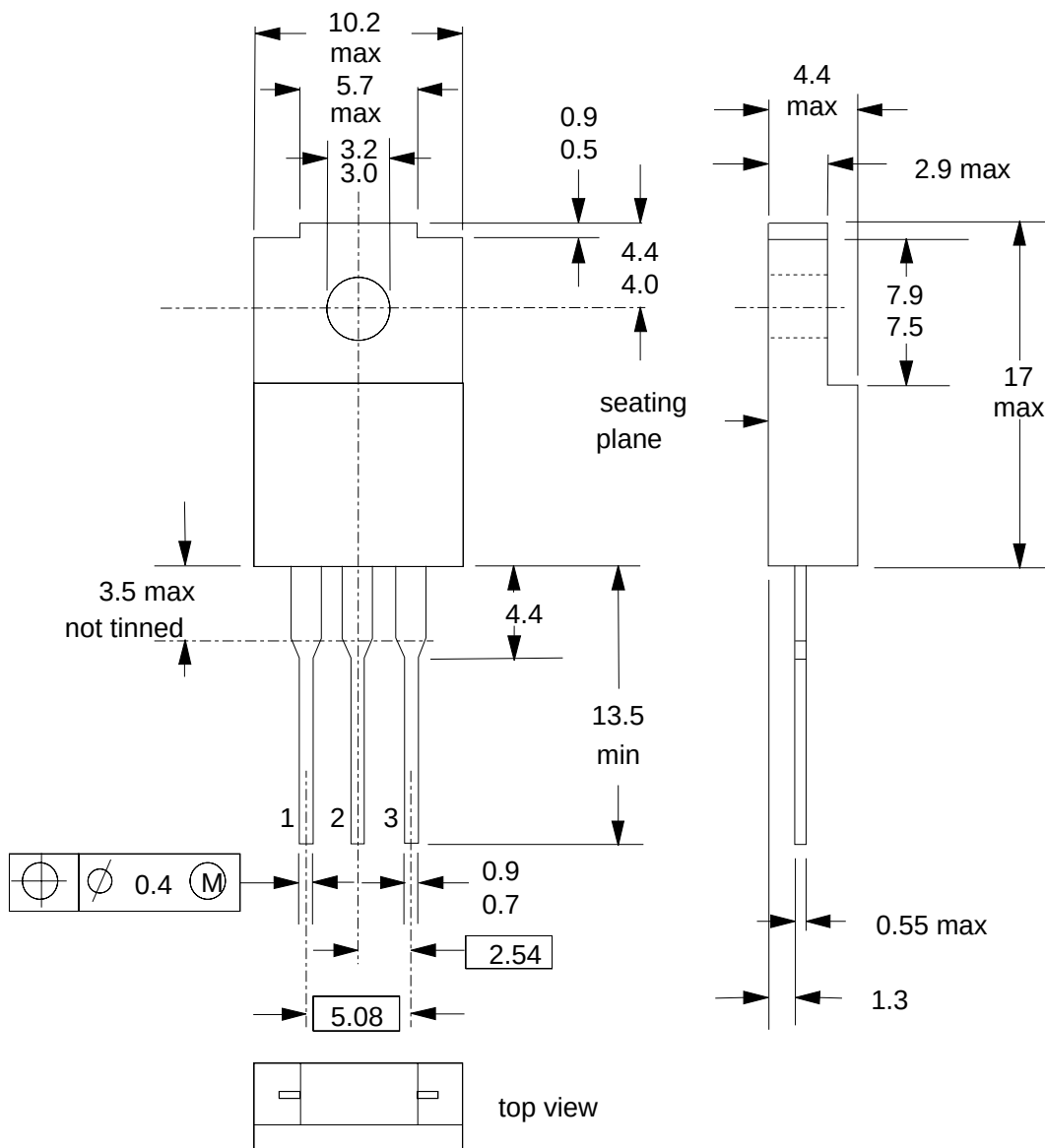


Fig.15. SOT186; The seating plane is electrically isolated from all terminals.

Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Refer to mounting instructions for F-pack envelopes.
3. Epoxy meets UL94 V0 at 1/8".