

Silicon Diffused Power Transistor

BU2508DF

GENERAL DESCRIPTION

Enhanced performance, new generation, high-voltage, high-speed switching npn transistor with an integrated damper diode in a plastic full-pack envelope intended for use in horizontal deflection circuits of colour television receivers. Features exceptional tolerance to base drive and collector current load variations resulting in a very low worst case dissipation.

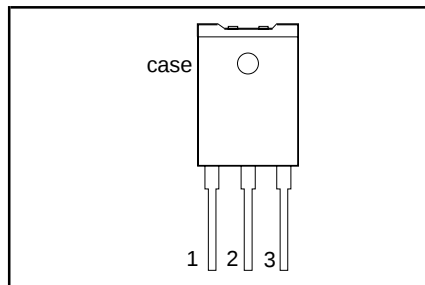
QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
V_{CESM}	Collector-emitter voltage peak value	$V_{BE} = 0\text{ V}$	-	1500	V
V_{CEO}	Collector-emitter voltage (open base)		-	700	V
I_C	Collector current (DC)		-	8	A
I_{CM}	Collector current peak value		-	15	A
P_{tot}	Total power dissipation	$T_{hs} \leq 25\text{ °C}$	-	45	W
V_{CESat}	Collector-emitter saturation voltage	$I_C = 4.5\text{ A}; I_B = 1.12\text{ A}$	-	1.0	V
I_{Csat}	Collector saturation current		4.5	-	A
V_F	Diode forward voltage	$I_F = 4.5\text{ A}$	1.6	2.0	V
t_f	Fall time	$I_{Csat} = 4.5\text{ A}; I_{B(end)} = 1.1\text{ A}$	0.4	0.6	μs

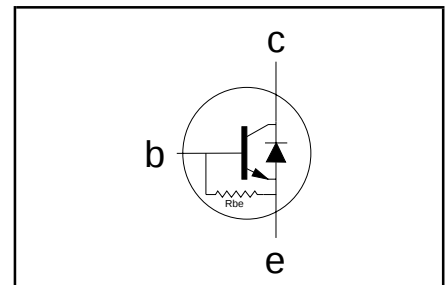
PINNING - SOT199

PIN	DESCRIPTION
1	base
2	collector
3	emitter
case	isolated

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	$V_{BE} = 0\text{ V}$	-	1500	V
V_{CEO}	Collector-emitter voltage (open base)		-	700	V
I_C	Collector current (DC)		-	8	A
I_{CM}	Collector current peak value		-	15	A
I_B	Base current (DC)		-	4	A
I_{BM}	Base current peak value		-	6	A
$-I_{B(AV)}$	Reverse base current	average over any 20 ms period	-	100	mA
$-I_{BM}$	Reverse base current peak value ¹		-	5	A
P_{tot}	Total power dissipation	$T_{hs} \leq 25\text{ °C}$	-	45	W
T_{stg}	Storage temperature		-65	150	°C
T_j	Junction temperature		-	150	°C

¹ Turn-off current.

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THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
$R_{th\ j-hs}$	Junction to heatsink	without heatsink compound	-	3.7	K/W
$R_{th\ j-hs}$	Junction to heatsink	with heatsink compound	-	2.8	K/W
$R_{th\ j-a}$	Junction to ambient	in free air	35	-	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	-		2500	V
C_{isol}	Capacitance from T2 to external heatsink	$f = 1\text{ MHz}$	-	22	-	pF

STATIC CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CES}	Collector cut-off current ²	$V_{BE} = 0\text{ V}$; $V_{CE} = V_{CESMmax}$	-	-	1.0	mA
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	$V_{EB} = 7.5\text{ V}$; $I_C = 0\text{ A}$	-	227	-	mA
BV_{EBO}	Emitter-base breakdown voltage	$I_B = 600\text{ mA}$	7.5	13.5	-	V
R_{be}	Base-emitter resistance	$V_{EB} = 7.5\text{ V}$	-	33	-	Ω
$V_{CEOsust}$	Collector-emitter sustaining voltage	$I_B = 0\text{ A}$; $I_C = 100\text{ mA}$; $L = 25\text{ mH}$	700	-	-	V
V_{CEsat}	Collector-emitter saturation voltage	$I_C = 4.5\text{ A}$; $I_B = 1.12\text{ A}$	-	-	1.0	V
V_{BEsat}	Base-emitter saturation voltage	$I_C = 4.5\text{ A}$; $I_B = 1.7\text{ A}$	-	-	1.1	V
h_{FE}	DC current gain	$I_C = 1\text{ A}$; $V_{CE} = 5\text{ V}$	-	13	-	
h_{FE}		$I_C = 4.5\text{ A}$; $V_{CE} = 1\text{ V}$	4	5.5	7.0	
V_F	Diode forward voltage	$I_F = 4.5\text{ A}$	-	1.6	2.0	V

DYNAMIC CHARACTERISTICS

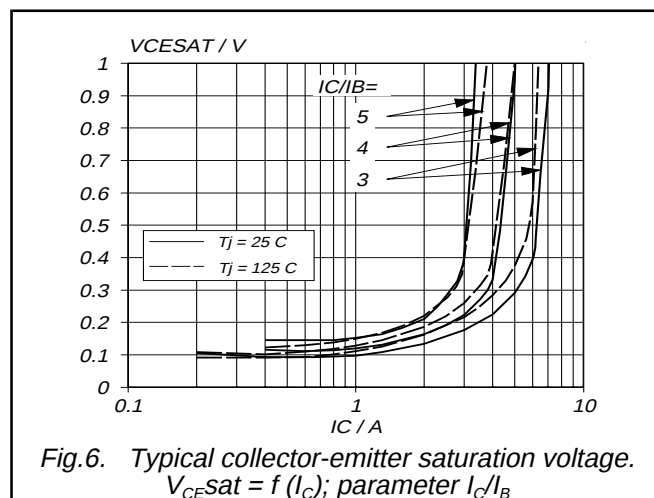
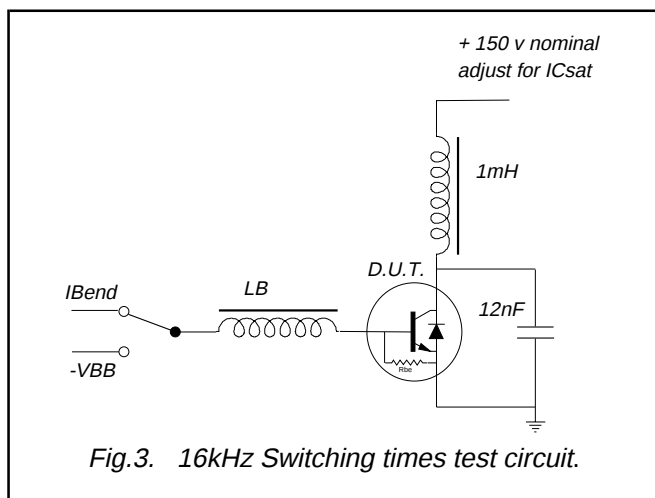
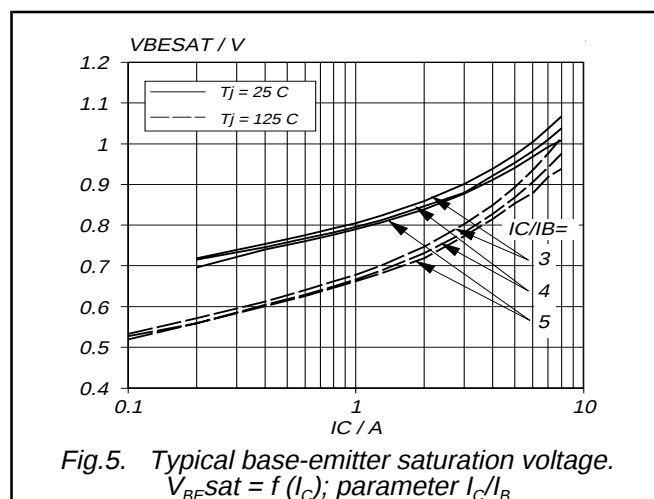
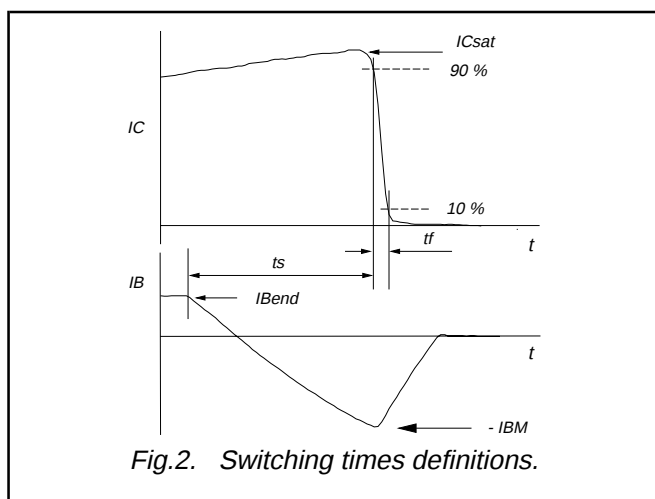
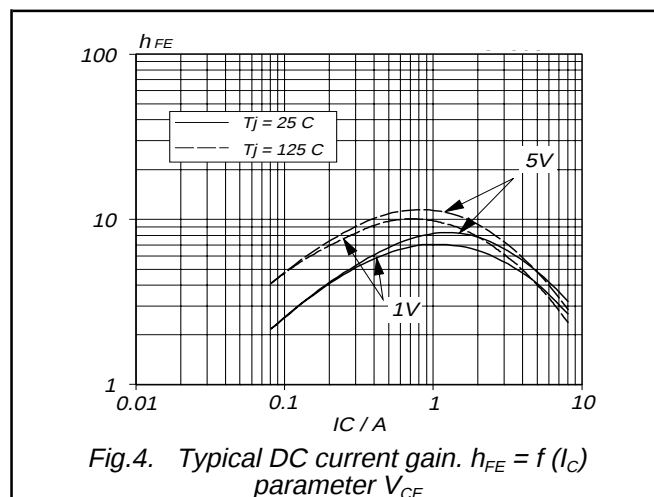
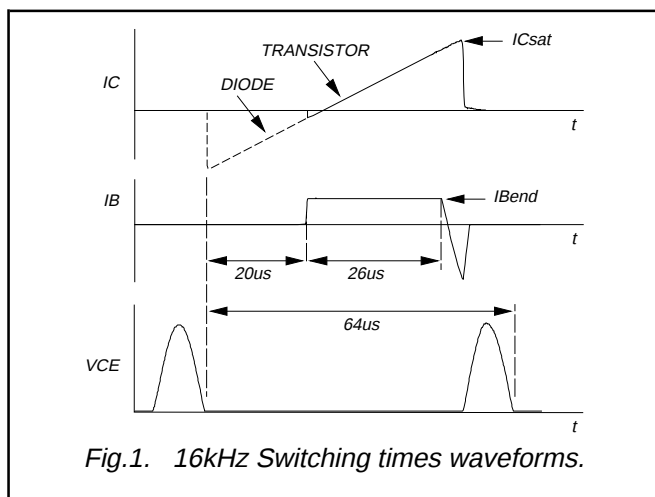
 $T_{hs} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
C_c	Collector capacitance	$I_E = 0\text{ A}$; $V_{CB} = 10\text{ V}$; $f = 1\text{ MHz}$	80	-	pF
t_s	Switching times (16 kHz line deflection circuit)	$I_{Csat} = 4.5\text{ A}$; $I_{B(end)} = 1.1\text{ A}$; $L_B = 6\text{ }\mu\text{H}$; $-V_{BB} = 4\text{ V}$; $(-di_B/dt = 0.6\text{ A}/\mu\text{s})$	5.0	6.0	μs
t_f	Turn-off storage time		0.4	0.6	μs
t_f	Turn-off fall time				
t_s	Switching times (38 kHz line deflection circuit)	$I_{Csat} = 4.0\text{ A}$; $I_{B(end)} = 0.9\text{ A}$; $L_B = 6\text{ }\mu\text{H}$; $-V_{BB} = 4\text{ V}$; $(-di_B/dt = 0.6\text{ A}/\mu\text{s})$	4.7	5.7	μs
t_f	Turn-off storage time		0.25	0.35	μs
t_f	Turn-off fall time				

² Measured with half sine-wave voltage (curve tracer).

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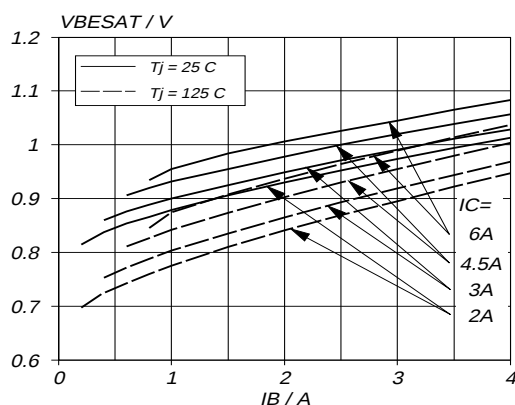


Fig. 7. Typical base-emitter saturation voltage.
 $V_{BEsat} = f(I_B)$; parameter I_C

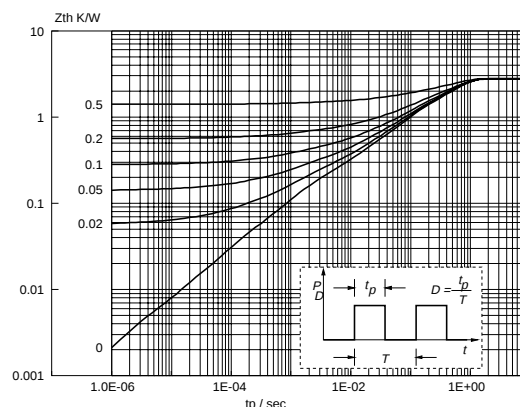


Fig. 10. Transient thermal impedance.
 $Z_{th j-hs} = f(t)$; parameter $D = t_p/T$

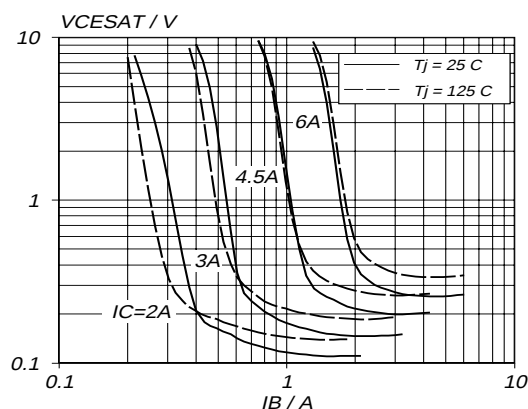


Fig. 8. Typical collector-emitter saturation voltage.
 $V_{CEsat} = f(I_B)$; parameter I_C

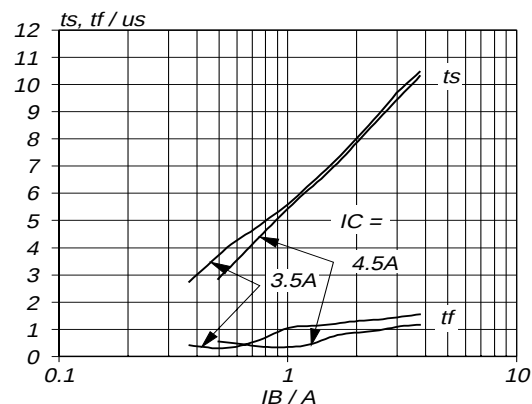


Fig. 11. Typical collector storage and fall time.
 $t_s = f(I_B)$; $t_f = f(I_B)$; parameter I_C ; $T_J = 85^\circ\text{C}$; $f = 16\text{ kHz}$

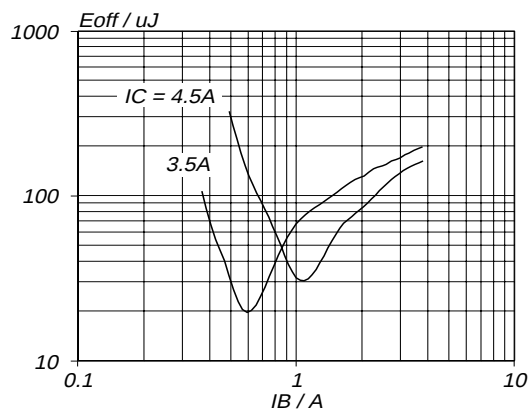


Fig. 9. Typical turn-off losses. $T_J = 85^\circ\text{C}$
 $E_{off} = f(I_B)$; parameter I_C ; $f = 16\text{ kHz}$

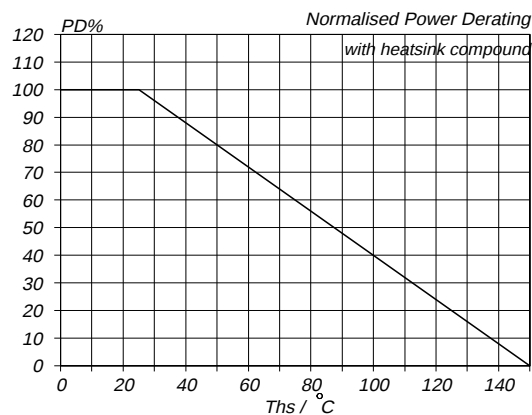
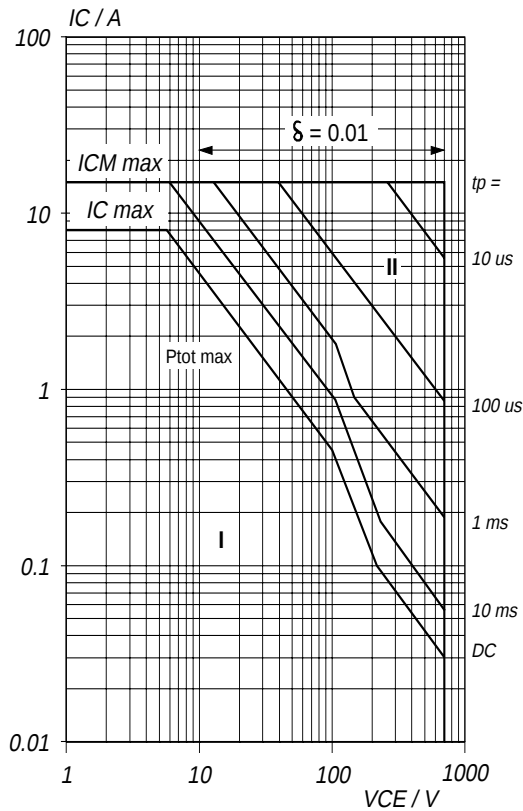


Fig. 12. Normalised power dissipation.
 $PD\% = 100 \cdot P_D / P_{D 25^\circ\text{C}} = f(T_{hs})$

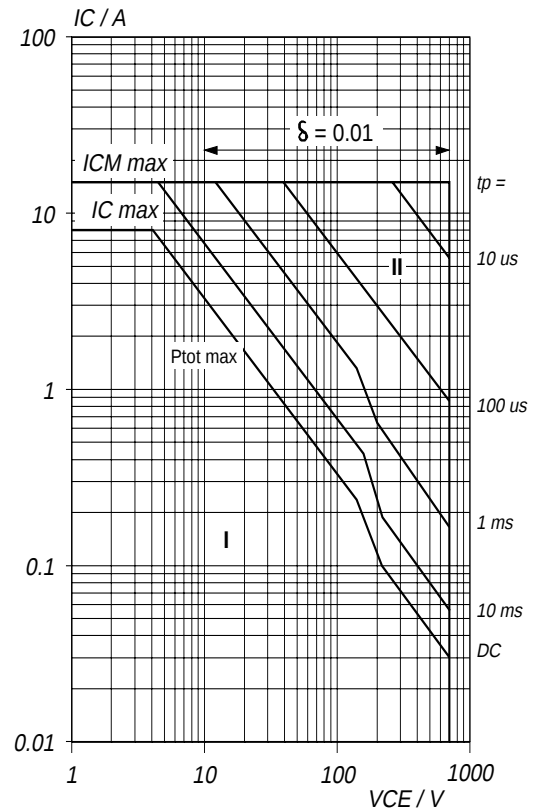
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Fig.13. Forward bias safe operating area. $T_{hs} = 25^{\circ}\text{C}$

- 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.14. Forward bias safe operating area. $T_{hs} = 25^{\circ}\text{C}$

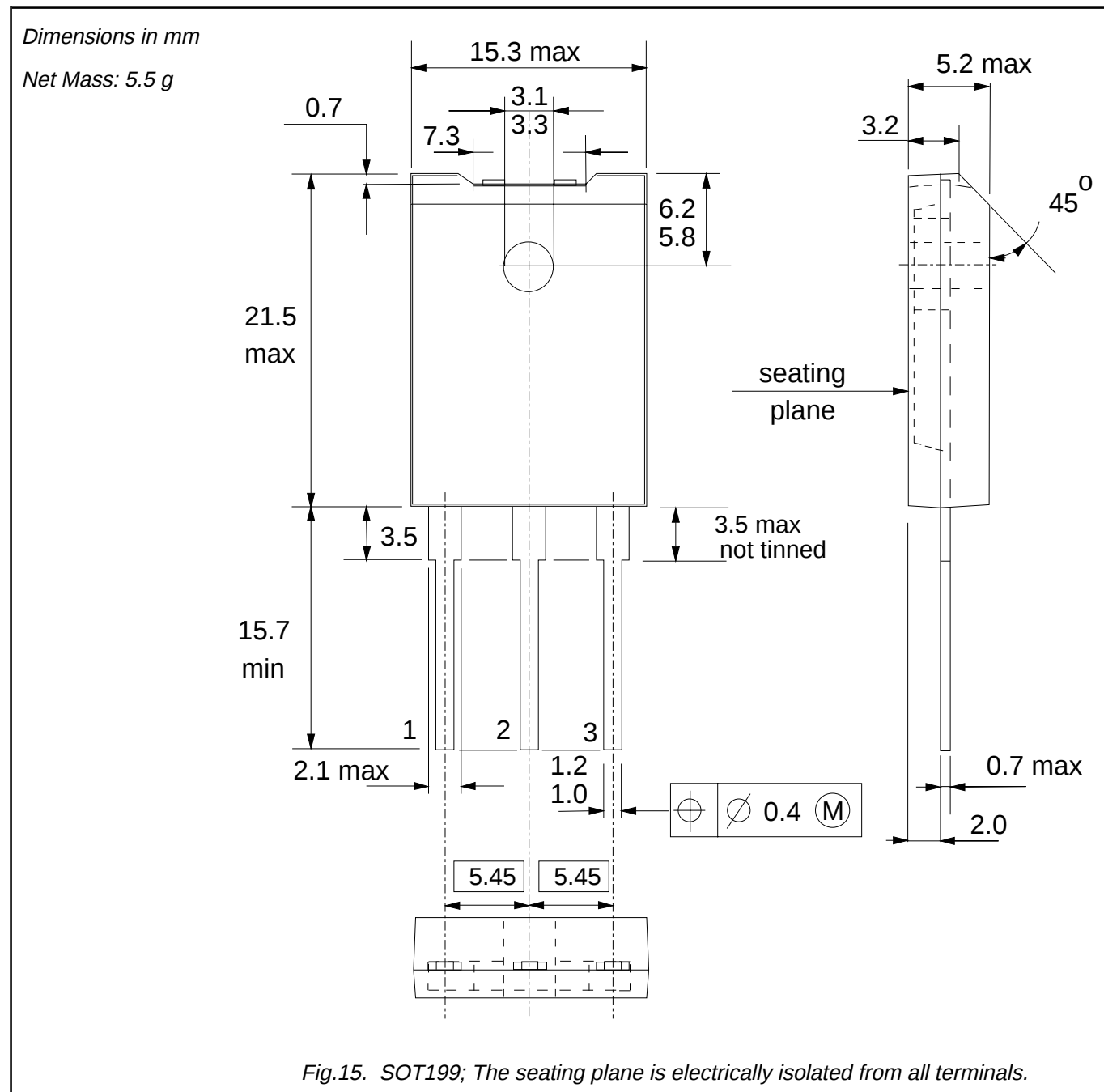
- I Region of permissible DC operation.
- II Extension for repetitive pulse operation.

NB: Mounted without heatsink compound and 30 ± 5 newton force on the centre of the envelope.

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MECHANICAL DATA



Notes

1. Refer to mounting instructions for F-pack envelopes.
2. Epoxy meets UL94 V0 at 1/8".