

Silicon diffused power transistors

BU508AF; BU508DF

High-voltage, high-speed switching npn transistors in a fully isolated SOT199 envelope (with integrated efficiency diode for the BU508DF), primarily intended for use in horizontal deflection circuits of colour television receivers.

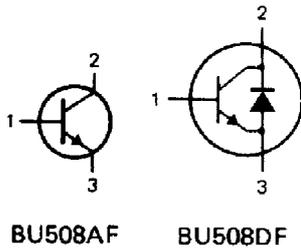
QUICK REFERENCE DATA

Collector-emitter voltage peak value; $V_{BE} = 0$ open base	V_{CESM}	max.	1500 V
	V_{CEO}	max.	700 V
Collector saturation current	I_{Csat}	max.	4,5 A
Collector current (DC)	I_C	max.	8 A
Collector current (peak value)	I_{CM}	max.	15 A
Total power dissipation up to $T_h = 25\text{ }^\circ\text{C}$	P_{tot}	max.	34 W
Collector-emitter saturation voltage	V_{CEsat}	max.	1 V
Diode forward voltage $I_F = 4,5\text{ A (BU508DF)}$	V_F	typ.	1,6 V
Fall time	t_f	typ.	0,7 μs

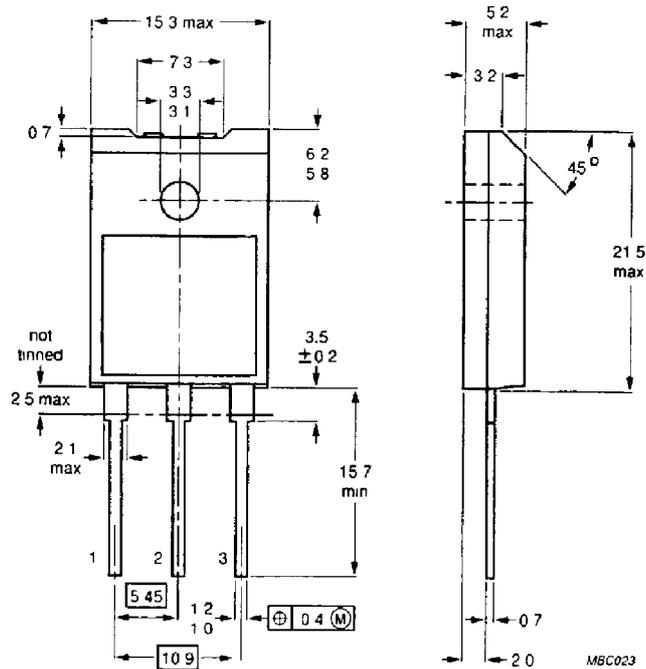
MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT199.



1 = base
2 = collector
3 = emitter
Mounting base is electrically isolated from all terminals.



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RATINGS

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

Collector-emitter voltage			
peak value; $V_{BE} = 0$	V_{CESM}	max.	1500 V
open base	V_{CEO}	max.	700 V
Collector current			
DC	I_C	max.	8 A
peak value	I_{CM}	max.	15 A
saturation	I_{Csat}	max.	4,5 A
Base current			
DC	I_B	max.	4 A
peak value	I_{BM}	max.	6 A
Total power dissipation			
up to $T_h = 25\text{ °C}$ *	P_{tot}	max.	34 W
Storage temperature	T_{stg}		-65 to + 150 °C
Junction temperature	T_j	max.	150 °C

THERMAL RESISTANCE

From junction to mounting base	R_{thj-mb}	=	1 K/W
From junction to external heatsink*	R_{thj-h}	=	3,7 K/W
From junction to external heatsink**	R_{thj-h}	=	2,8 K/W
From junction to ambient	R_{thj-a}	=	35 K/W

ISOLATION

Isolation voltage from all terminals to external heatsink (peak value)	V_{isol}	max.	1500 V
Isolation capacitance from collector to external heatsink	C_{isol}	typ.	21 pF

CHARACTERISTICS

 $T_j = 25\text{ °C}$ unless otherwise specified

Collector cut-off current			
$V_{CE} = V_{CESmax}; V_{BE} = 0$	I_{CES}	max.	1 mA
$V_{CE} = V_{CESmax}; V_{BE} = 0; T_j = 125\text{ °C}$	I_{CES}	max.	2 mA
Emitter cut-off current			
$V_{EB} = 6\text{ V}; I_C = 0$	I_{EBO}	max.	10 mA
DC current gain			
$I_C = 100\text{ mA}; V_{CE} = 5\text{ V}$	h_{FE}	min.	6
	h_{FE}	typ.	13
	h_{FE}	max.	30

* Mounted without heatsink compound and 30 ± 5 newtons pressure on centre of envelope.** Mounted with heatsink compound and 30 ± 5 newtons pressure on centre of envelope.

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Saturation voltages

$$I_C = I_{Csat}; I_B = 2 \text{ A}$$

V_{CEsat}	max.	1 V
V_{BEsat}	max.	1,3 V

Diode forward voltage

$$I_F = 4,5 \text{ A (BU508DF)}$$

V_F	max.	2 V
V_F	typ.	1,6 V

Collector-emitter sustaining voltage

$$I_C = 0,1 \text{ A}; I_B = 0; L = 25 \text{ mH}$$

V_{CEOsus}	min.	700 V
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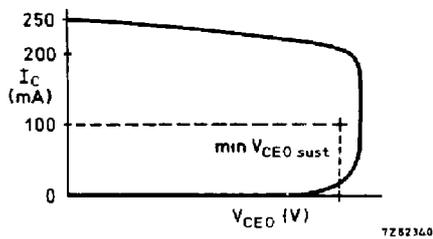


Fig. 2 Oscilloscope display for $V_{CEOsust}$.

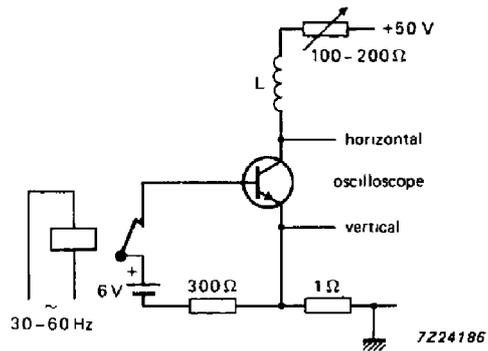


Fig. 3 Test circuit for $V_{CEOsust}$.

Second-breakdown current

$$V_{CE} = 120 \text{ V}; T = 200 \mu\text{s}$$

I_{SB}	min.	11 A
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Transition frequency at $f = 5 \text{ MHz}$

$$I_C = 0,1 \text{ A}; V_{CE} = 5 \text{ V}$$

f_T	typ.	7 MHz
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Collector capacitance at $f = 1 \text{ MHz}$

$$I_E = i_e = 0; V_{CB} = 10 \text{ V}$$

C_C	typ.	125 pF
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Switching times in horizontal deflection circuit

$$-V_{IM} = 4 \text{ V}; L_B = 6 \mu\text{H}$$

$$I_C = I_{Csat}; I_{B(end)} = 1,4 \text{ A}$$

$$(-dI_B/dt = 0,6 \text{ A}/\mu\text{s})$$

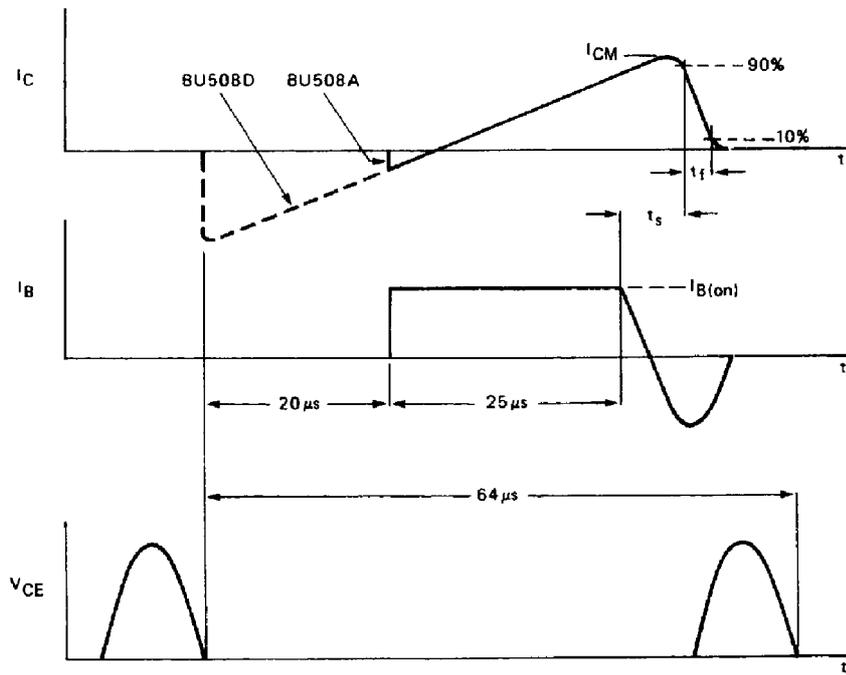
t_f	typ.	0,7 μs
t_s	typ.	6,5 μs

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Fig. 4 Switching times waveforms.

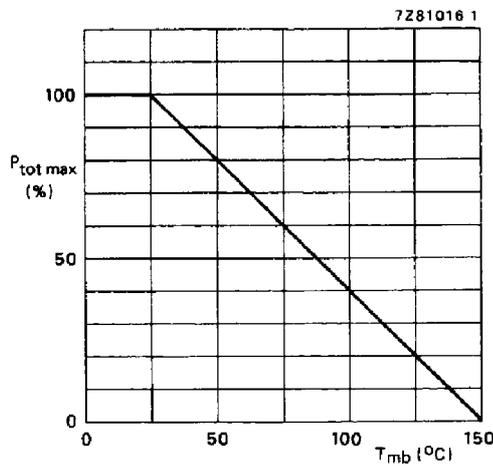


Fig. 5 Power derating curve.

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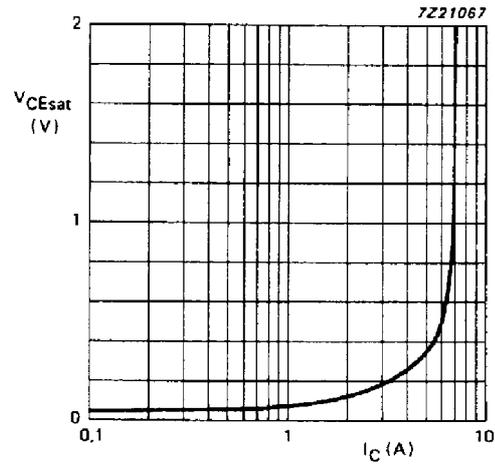


Fig. 6 Typical values $I_C/I_B = 2$; $T_j = 25\text{ }^\circ\text{C}$.

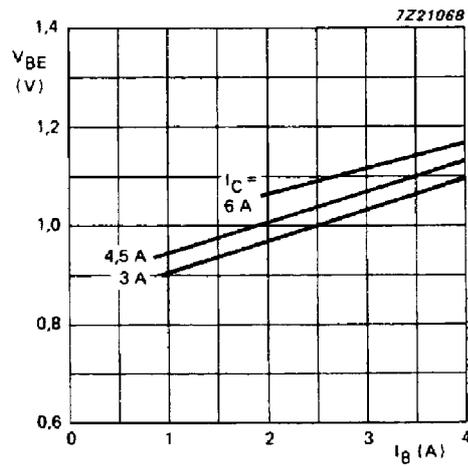


Fig. 7 Typical values base-emitter voltage at $T_j = 25\text{ }^\circ\text{C}$.

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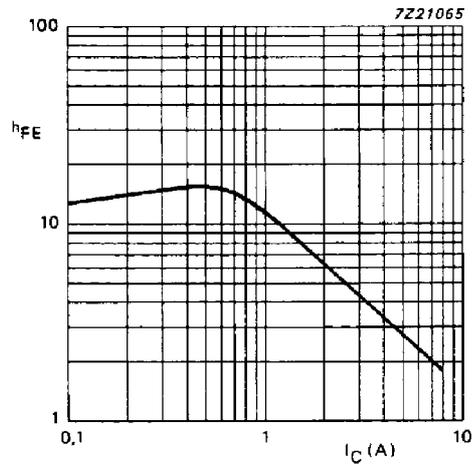


Fig. 8 Typical values DC current gain at $V_{CE} = 5\text{ V}$; $T_j = 25\text{ }^\circ\text{C}$.

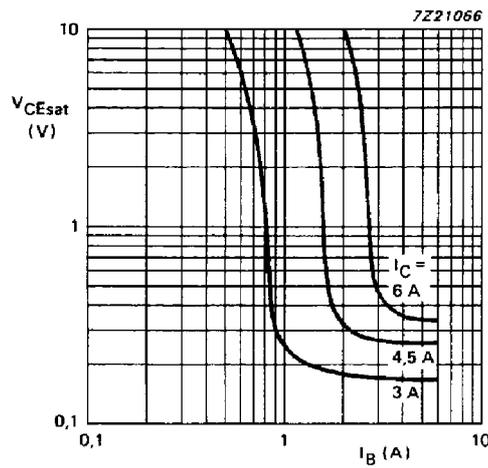
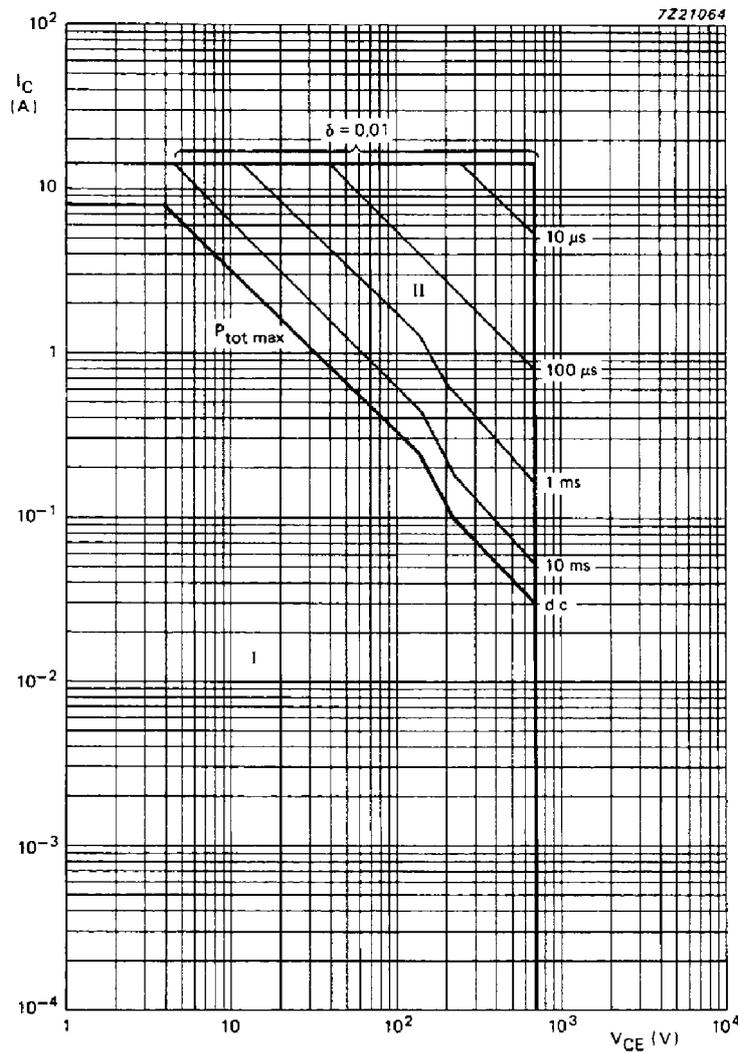


Fig. 9 Typical values collector-emitter voltage at $T_j = 25\text{ }^\circ\text{C}$.

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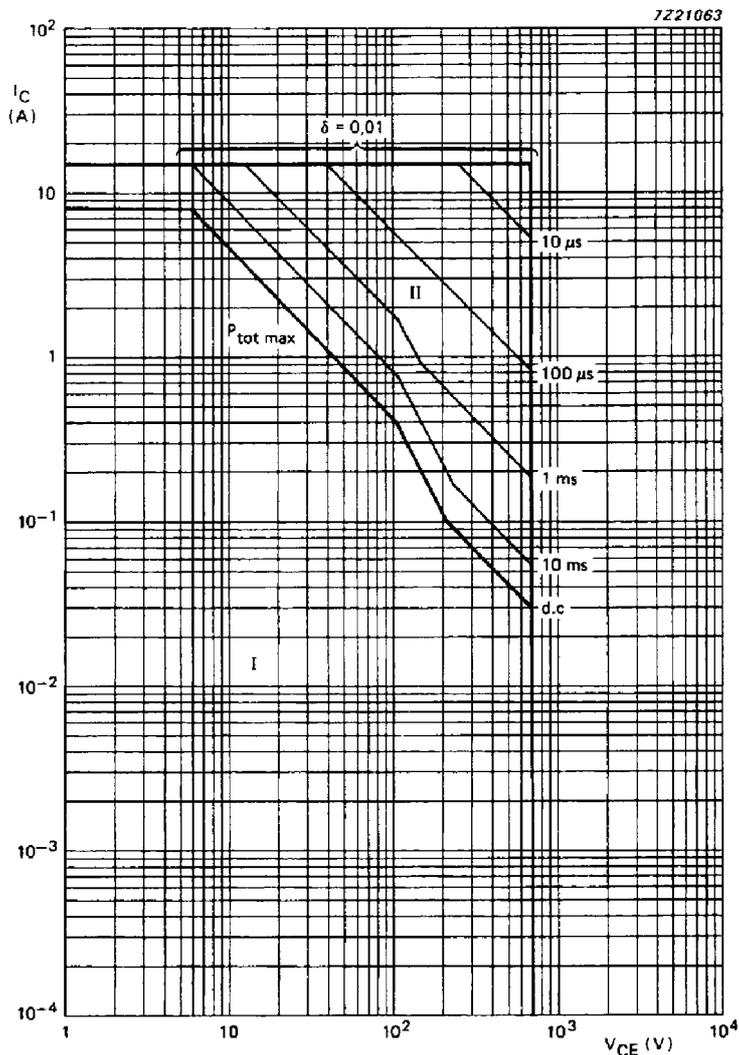
I Region of permissible DC operation.
 II Permissible extension for repetitive pulse operation.
 Note: Mounted without heatsink compound and 30 ± 5 newtons pressure on the centre of the envelope.

Fig. 10 Safe Operating Area; $T_h = 25^\circ\text{C}$.

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I Region of permissible DC operation.
 II Permissible extension for repetitive pulse operation.
 Note: Mounted with heatsink compound and 30 ± 5 newtons pressure on the centre of the envelope.

Fig. 11 Safe Operating Area; $T_h = 25^\circ\text{C}$.

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