Silicon Diffused Power Transistor — BU2708AF

GENERAL DESCRIPTION

High voltage, high speed switching npn transistor 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 low worst-case dissipation. Designed to withstand V_{CES} pulses up to 1700 V.

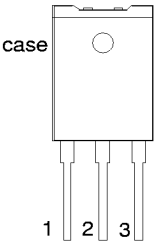
QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
V_{CESM}	Collector-emitter voltage peak value	V_{BE} = 0 V	-	1700	V
V_{CEO}	Collector-emitter voltage (open base)		-	825	V
I_C	Collector current (DC)		-	8	A
I_{CM}	Collector current peak value		-	15	A
P_{tot}	Total power dissipation	$T_{hs} \leq 25$ ˚C	-	45	W
V_{CEsat}	Collector-emitter saturation voltage	I_C = 4 A; I_B = 1.33 A	-	1.0	V
I_{Csat}	Collector saturation current	f = 16 kHz	4	-	A
t_s	Storage time	I_{Csat} = 4 A; f = 16 kHz	4.8	5.5	µs

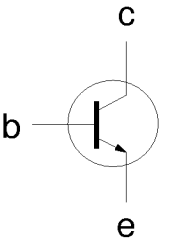
PINNING - SOT199

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 V	-	1700	V
V_{CEO}	Collector-emitter voltage (open base)		-	825	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
$-I_{BM}$	Reverse base current peak value [1]		-	5	A
P_{tot}	Total power dissipation	$T_{hs} \leq 25$ ˚C	-	45	W
T_{stg}	Storage temperature		-65	150	˚C
T_j	Junction temperature		-	150	˚C

ESD LIMITING VALUES

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_C	Electrostatic discharge capacitor voltage	Human body model (250 pF, 1.5 kΩ)	-	10	kV

1 Turn-off current.

THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
$R_{th\ j\text{-}hs}$	Junction to heatsink	without heatsink compound	-	3.7	K/W
$R_{th\ j\text{-}hs}$	Junction to heatsink	with heatsink compound	-	2.8	K/W
$R_{th\ j\text{-}a}$	Junction to ambient	in free air	35	-	K/W

ISOLATION LIMITING VALUE & CHARACTERISTIC

T_{hs} = 25 ˚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. ≤ 65 % ; clean and dustfree	-		2500	V
C_{isol}	Capacitance from T2 to external heatsink	f = 1 MHz	-	22	-	pF

STATIC CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CES}	Collector cut-off current [2]	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} = 6 V; I_C = 0 A	-	-	70	µA
BV_{EBO}	Emitter-base breakdown voltage	I_B = 1 mA	7.5	13.5	-	V
$V_{CEOsust}$	Collector-emitter sustaining voltage	I_B = 0 A; I_C = 100 mA; L = 25 mH	825	900	-	V
V_{CEsat}	Collector-emitter saturation voltage	I_C = 4 A; I_B = 1.33 A	-	-	1.0	V
V_{BEsat}	Base-emitter saturation voltage	I_C = 4 A; I_B = 1.33 A	0.83	0.91	1.00	V
h_{FE}	DC current gain	I_C = 100 mA; V_{CE} = 5 V	-	21	-	
h_{FE}		I_C = 4 A; V_{CE} = 1 V	3	6	7.3	

DYNAMIC CHARACTERISTICS

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
	Switching times (line deflection circuit 16 kHz)	I_{Csat} = 4 A; $I_{B(end)}$ = 0.8 A; $-I_{BM} = I_{CM}/2$; L_B = 6 µH; $-V_{BB}$ = 4 V; L_C = 1 mH; C_{FB} = 12.2 nF			
t_s	Turn-off storage time		4.8	5.5	µs
t_f	Turn-off fall time		0.4	0.52	µs

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

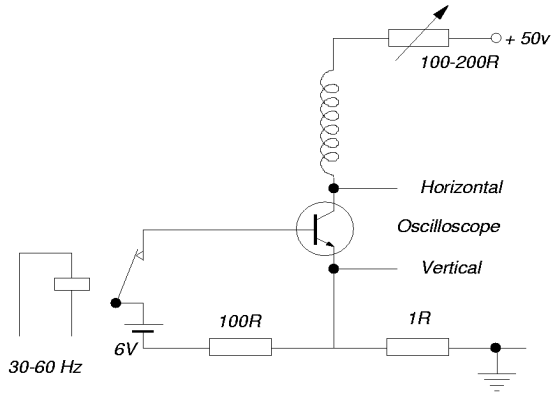


Fig.1. Test circuit for $V_{CEOsust}$.

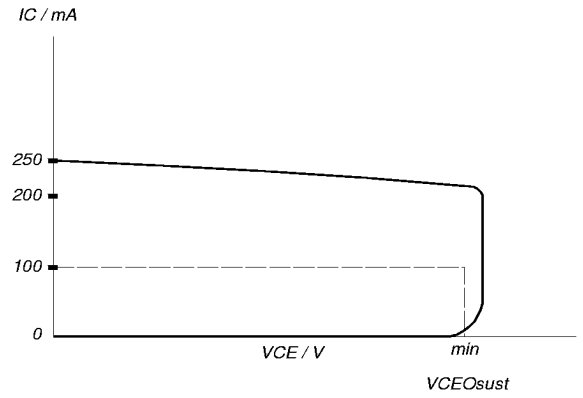


Fig.2. Oscilloscope display for $V_{CEOsust}$.

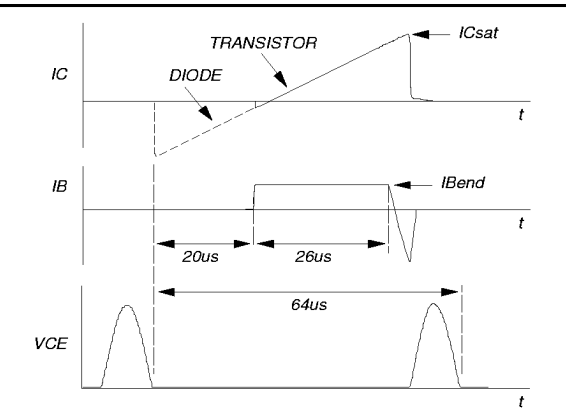


Fig.3. Switching times waveforms.

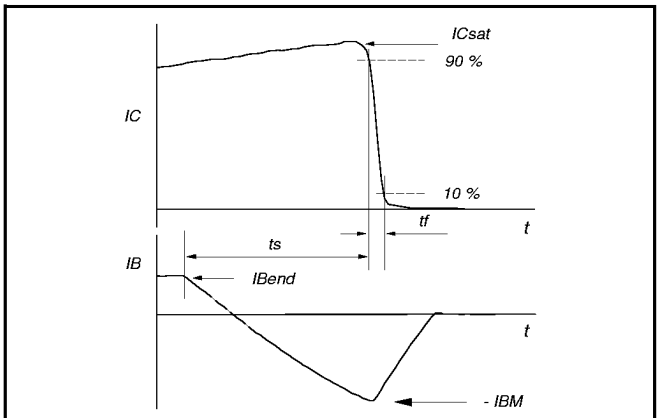


Fig.4. Switching times definitions.

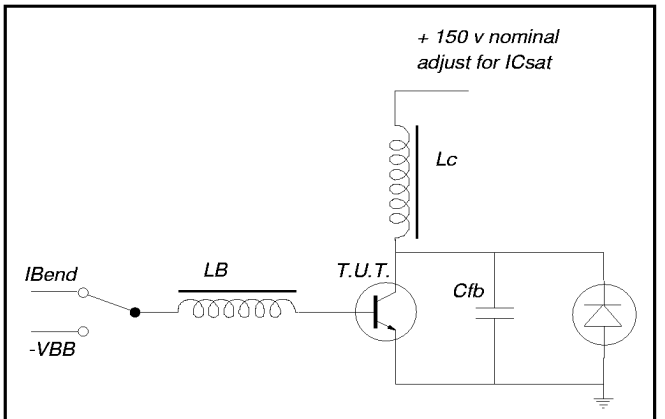


Fig.5. Switching times test circuit.

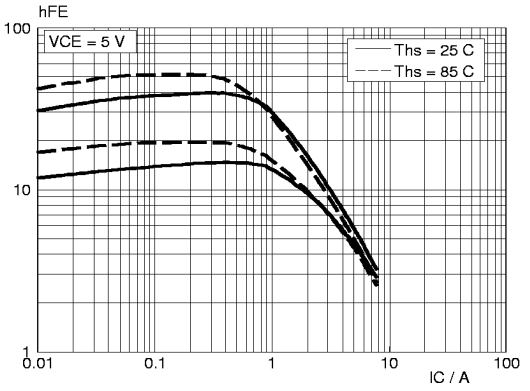


Fig.6. DC current gain. h_{FE} = f (I_C)
Parameter T_{hs}
(Low and high gain)

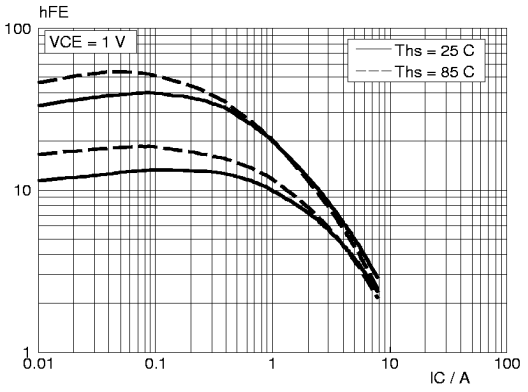


Fig.7. DC current gain. $h_{FE} = f(I_C)$
Parameter T_{hs}
(Low and high gain)

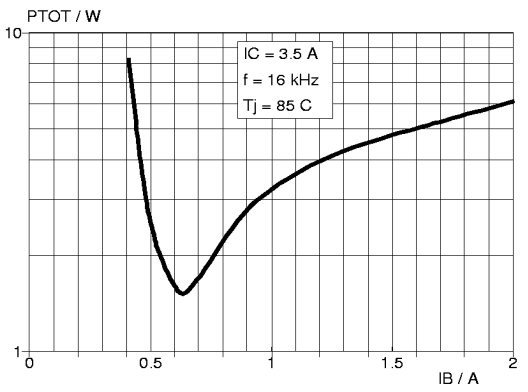


Fig.10. Limit P_{tot}; $T_j = 85^{\circ}C$
$P_{tot} = f(I_{B(end)})$; $I_C = 3.5$ A; f = 16 kHz

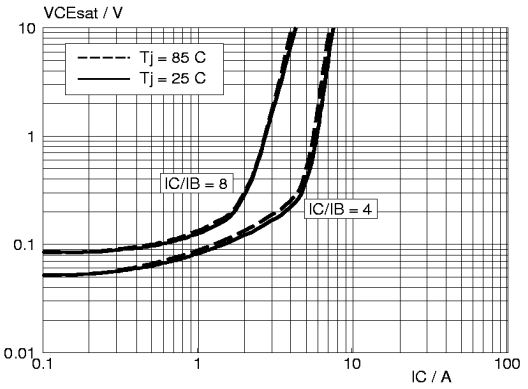


Fig.8. Typical collector-emitter saturation voltage.
$V_{CEsat} = f(I_C)$; parameter I_C/I_B

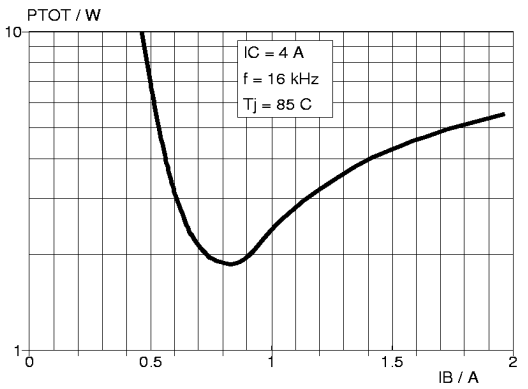


Fig.11. Limit P_{tot}; $T_j = 85^{\circ}C$
$P_{tot} = f(I_{B(end)})$; $I_C = 4.0$ A; f = 16 kHz

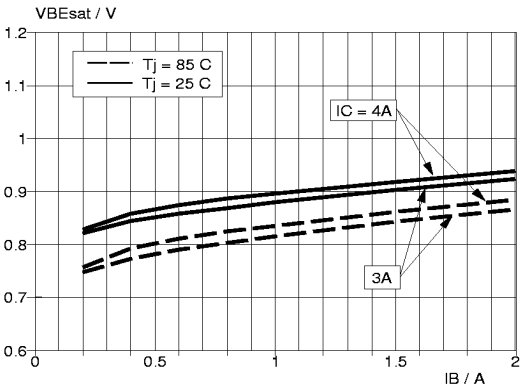


Fig.9. Typical base-emitter saturation voltage.
$V_{BEsat} = f(I_B)$; parameter I_C

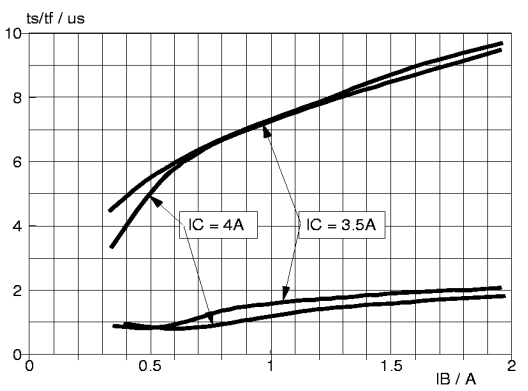


Fig.12. Limit storage and fall time.
$t_s = f(I_B)$; $tf = f(I_B)$; parameter I_C; $T_j = 85^{\circ}C$; f = 16 kHz

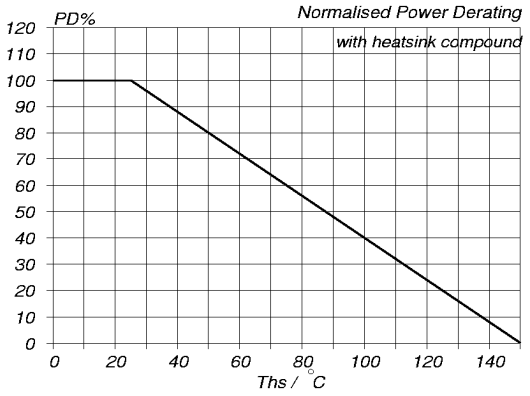


Fig.13. Normalised power dissipation.
PD% = 100·PD/PD 25˚C = f (T_{hs})

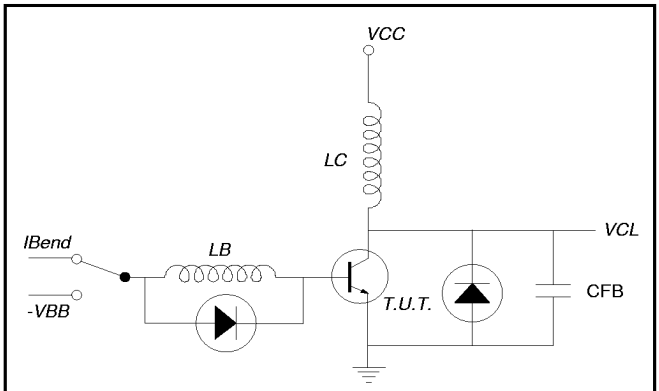


Fig.15. Test Circuit RBSOA. V_{CC} = 150 V;
$-V_{BB}$ = 1 - 4 V;
L_C = 1 mH; V_{CL} = 1500 V; L_B = 1 - 3 µH;
C_{FB} = 1 - 4 nF; $I_{B(end)}$ = 0.8 - 4 A

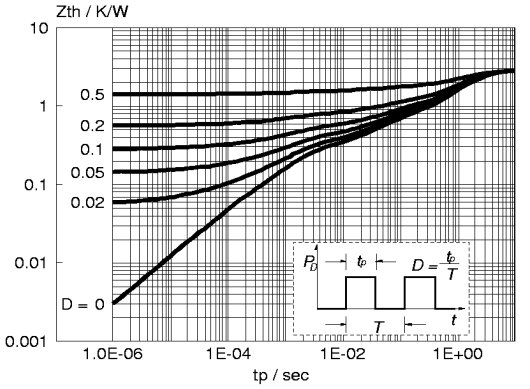


Fig.14. Transient thermal impedance.
$Z_{th\ j\text{-}hs}$ = f(t); parameter D = t_p/T

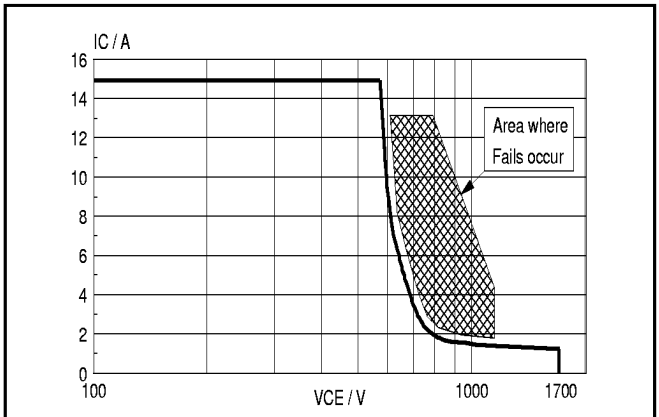


Fig.16. Reverse bias safe operating area. $T_j \leq T_{jmax}$

MECHANICAL DATA

Dimensions in mm

Net Mass: 5.5 g

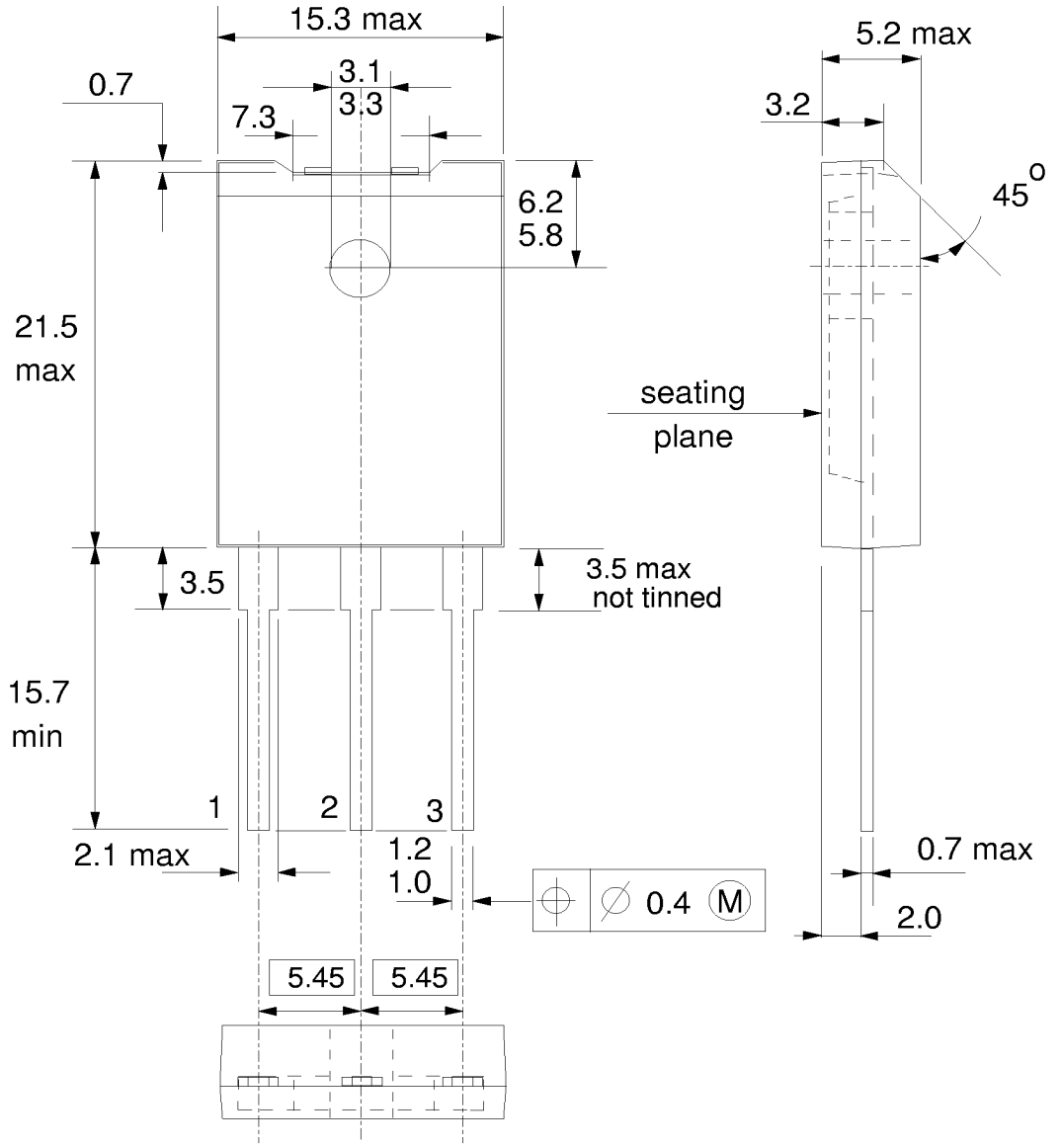


Fig.17. SOT199; The seating plane is electrically isolated from all terminals.

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