Silicon diffused power transistors BU705F; BU705DF

High-voltage, high-speed switching npn power transistors in a SOT199 envelope intended for use in horizontal deflection circuits of television receivers. The BU705DF has an integrated efficiency diode.

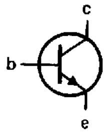
QUICK REFERENCE DATA

Collector-emitter voltage				
peak value; $V_{BE} = 0$	V_{CESM}	max.	1500	V
open base	V_{CEO}	max.	700	V
Collector-emitter saturation voltage	V_{CEsat}	max.	1.0	V
Collector current				
saturation	I_{Csat}	max.	2.0	A
DC	I_C	max.	2.5	A
peak value	I_{CM}	max.	4.0	A
Diode Forward voltage (BU705DF)	V_F	max.	1.8	V
Total power dissipation				
up to T_{mb} = 25 °C	P_{tot}	max.	29	W
Fall time; inductive load	t_f	typ.	0.9	μs

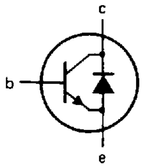
MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT199.



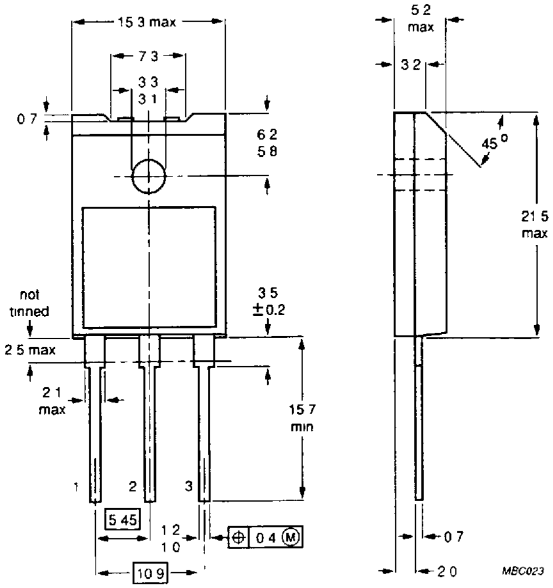
BU705F



BU705DF

Pinning:
1 = base
2 = collector
3 = emitter

Mounting base is electrically isolated from all terminals



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				
saturation	I_{Csat}		2.0	A
DC	I_C	max.	2.5	A
peak	I_{CM}	max.	4.0	A
Base current				
DC	I_B	max.	2.0	A
peak	I_{BM}	max.	4.0	A
Total power dissipation				
up to $T_h = 25$ °C	P_{tot}	max.	29	W
Storage temperature range	T_{stg}		−65 to + 150	°C
Junction temperature	T_j	max.	150	°C

THERMAL RESISTANCE

From junction to external heatsink (note 1)	$R_{th\,j\text{-}h}$	=	4.37	K/W
From junction to external heatsink (note 2)	$R_{th\,j\text{-}h}$	=	3.47	K/W
From junction to ambient	$R_{th\text{-}a}$	=	35	K/W

ISOLATION

Isolation voltage from all terminals to external heatsink (peak value) (note 3)	V_{isol}	max.	2000	V
Isolation capacitance from collector to external heatsink	C_{isol}	typ.	21	pF

Notes

1. Mounted without heatsink compound and 30 ± 5 newtons pressure on centre envelope.
2. Mounted with heatsink compound and 30 ± 5 newtons pressure on centre envelope.
3. Repetitive peak operation with RH $\leqslant$ 65% under clean and dust-free conditions.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current				
$V_{CE} = V_{CESmax}$; $V_{BE} = 0$	I_{CES}	max.	0.15	mA
$V_{CE} = V_{CESmax}$; $V_{BE} = 0$; $T_j = 125$ °C	I_{CES}	max.	1.0	mA
Emitter cut-off current				
$I_C = 0$; $V_{EB} = 5$ V	I_{EBO}	max.	1.0	mA
Saturation voltage				
$I_C = 2$ A; $I_B = 0.9$ A	V_{CEsat}	max.	1.0	V
	V_{BEsat}	max.	1.3	V
Diode forward voltage				
$I_F = 2.0$ A	V_F	max.	1.8	V
Collector saturation current				
$V_{CE} = 5$ V	I_{Csat}	typ.	2.0	A
DC current gain				
$I_C = 2$ A; $V_{CE} = 5$ V	h_{FE}	min.	2.2	
$I_C = 100$ mA; $V_{CE} = 5$ V	h_{FE}	min.	6	
	h_{FE}	typ.	13	
	h_{FE}	max.	30	
Second breakdown current				
$V_{CE} = 120$ V; $t = 200$ µs	I_{SB}	min.	2.0	A
Transition frequency at f = 5 MHz				
$I_C = 0.1$ A; $V_{CE} = 5$ V	f_T	typ.	7.0	MHz
Collector capacitance at f = 1 MHz				
$I_E = I_e = 0$; $V_{CB} = 10$ V	C_c	typ.	65	pF
Collector emitter sustaining voltage (Figs 2 and 3)				
$I_C = 100$ mA; $I_B = 0$; $L = 25$ mH	$V_{CEOsust}$	min.	700	V
Switching times in horizontal deflection circuit (Fig. 4)				
$I_{CM} = 2$ A; $L_B = 15$ µH				
$I_{B(end)} = 0.9$ A; $-V_{dr} = 4$ V				
	t_f	typ.	0.9	µs
	t_s	typ.	7.5	µs

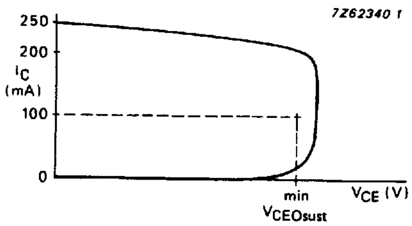


Fig. 2 Oscilloscope display for sustaining voltage.

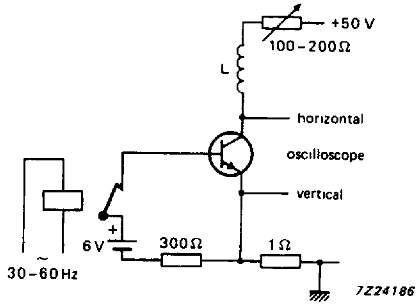


Fig. 3 Test circuit for $V_{CEOsust}$.

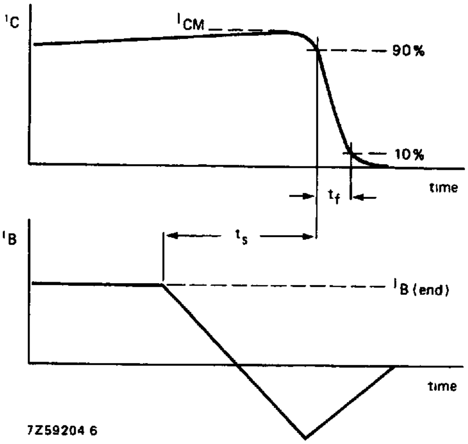


Fig. 4 Switching times waveforms.

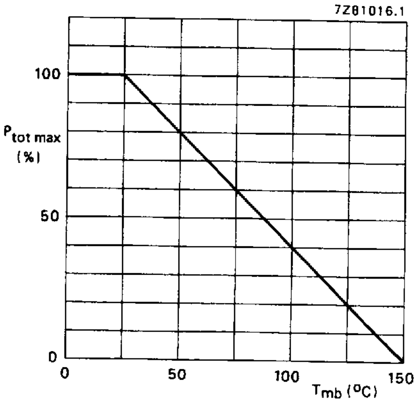
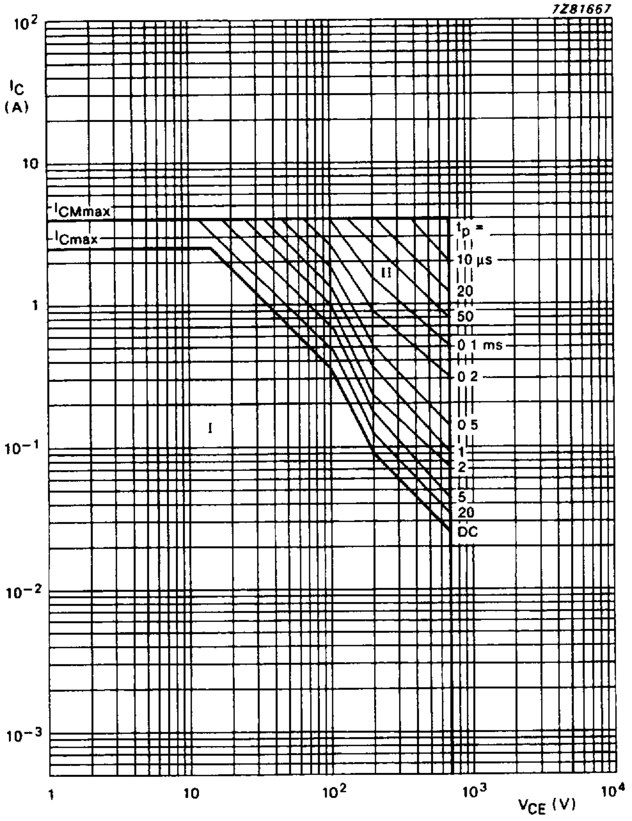


Fig. 5 Power derating curve.

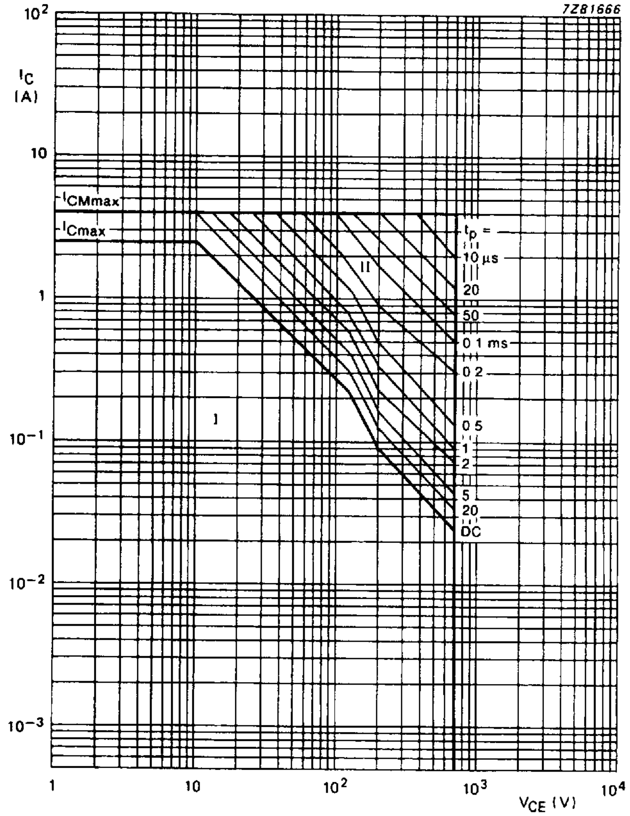


I Region of permissible DC operation.

II Permissible extension for repetitive pulse operation.

Note: mounted with heatsink compound and 30 ± 5 newtons pressure on centre of envelope.

Fig. 6 Safe operating area at $T_{mb} = 25\ ^oC$.



I Region of permissible DC operation.
II Permissible extension for repetitive pulse operation.

Note: mounted without heatsink compound and 30 ± 5 newtons pressure on centre of envelope.

Fig. 7 Safe operating area at T_{mb} = 25 °C.

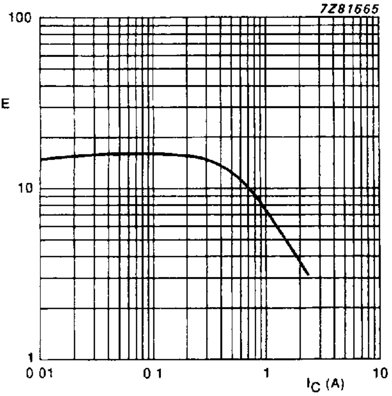


Fig. 8 Typical DC current gain; V_{CE} = 5 V; T_j = 25 °C.

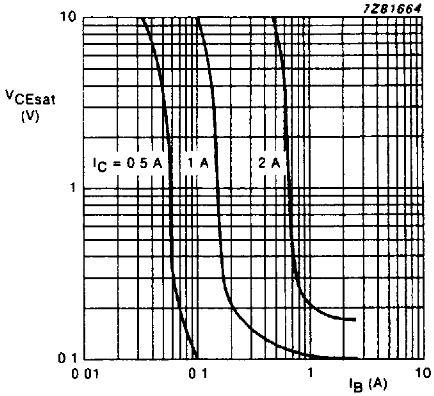


Fig. 9 Typical collector-emitter saturation voltage; T_j = 25 °C.

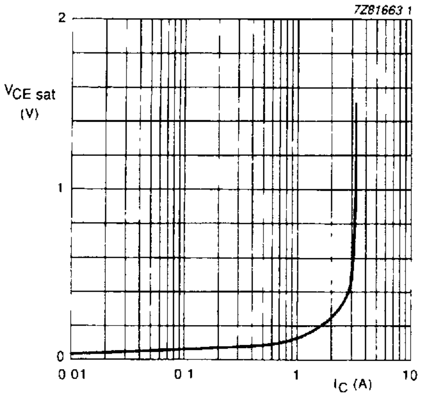


Fig. 10 Typical values V_{CEsat}; I_C/I_B = 2; T_j = 25 °C.

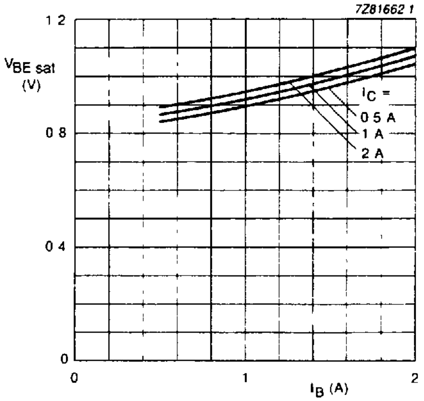


Fig. 11 Typical values V_{BEsat}; T_j = 25 °C.