SILICON DIFFUSED POWER TRANSISTORS

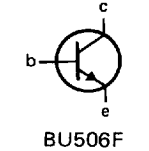
High-voltage, high-speed switching npn transistor in a SOT186 envelope, intended for use in horizontal deflection circuits of colour television receivers and in line-operated switch-mode applications. The BU506DF has an integrated efficiency diode.

QUICK REFERENCE DATA

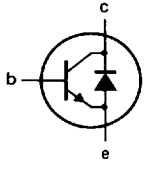
Collector-emitter voltage			
peak value; $V_{BE} = 0$	V_{CESM}	max.	1500 V
open base	V_{CEO}	max.	700 V
Collector-emitter saturation voltage	V_{CEsat}	max.	1.0 V
Collector current			
saturation	I_{Csat}	max.	3.0 A
DC	I_C	max.	5.0 A
peak value	I_{CM}	max.	8.0 A
Total power dissipation			
up to $T_h = 25$ °C	P_{tot}	max.	20 W
Diode forward voltage			
at $I_F = 3$ A (BU506DF)	V_F	typ.	1.5 V
Fall time; inductive load	t_f	typ.	0.7 μs

MECHANICAL DATA

Fig. 1 SOT186.



BU506F

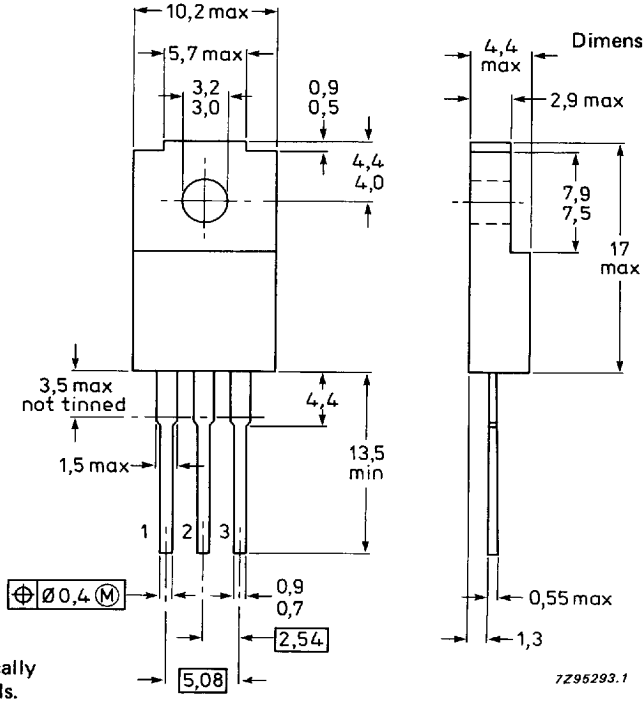


BU506DF

Pinning:

1 = base
2 = collector
3 = emitter

Mounting base is electrically isolated from all terminals.



Dimensions in mm

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}	max.	3.0 A
DC	I_C	max.	5.0 A
peak value	I_{CM}	max.	8.0 A
Base current			
DC	I_B	max.	3.0 A
peak value	I_{BM}	max.	5.0 A
Total power dissipation			
up to $T_h = 25\ ^oC$	P_{tot}	max.	20 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)	$R_{th\ j\text{-}h}$	=	6.35 K/W
From junction to external heatsink (note 2)	$R_{th\ j\text{-}h}$	=	3.85 K/W
From junction to ambient	$R_{th\text{-}a}$	=	55 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.	12 pF

Notes

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

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current			
$V_{CE} = V_{CESmax}$; $V_{BE} = 0$	I_{CES}	max.	0.5 mA
$V_{CE} = V_{CESmax}$; $V_{BE} = 0$; T_j = 125 °C	I_{CES}	max.	1.0 mA
Emitter cut-off current			
$I_C = 0$; $V_{EB} = 6$ V	I_{EBO}	max.	10 mA
Saturation voltage			
I_C = 3 A; I_B = 1.33 A	V_{CEsat}	max.	1.0 V
	V_{BEsat}	max.	1.3 V
Collector saturation current			
V_{CE} = 5 V	I_C	typ.	3.0 A
DC current gain			
I_C = 3 A; V_{CE} = 5 V	h_{FE}	min.	2.25
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} = 300 V; t_p = 200 μs	I_{SB}	min.	1.0 A
Collector emitter sustaining voltage (Figs 2 and 3)			
I_C = 100 mA; I_B = 0; L = 25 mH	$V_{CEOsust}$	min.	700 V
Diode forward voltage			
I_F = 3 A (BU506DF)	V_F	typ.	1.5 V
	V_F	max.	2.2 V
Switching times in horizontal deflection circuit (Fig. 4)			
I_{CM} = 3 A; L_B = 12 μH; $I_{B\,(end)}$ = 1 A; $\frac{-d\,I_B}{dt}$ = 0.33 A/μs	t_f	typ.	0.7 μs
	t_s	typ.	6.5 μs

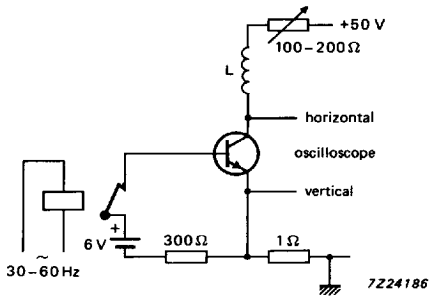


Fig. 2 Test circuit for $V_{CEOsust}$.

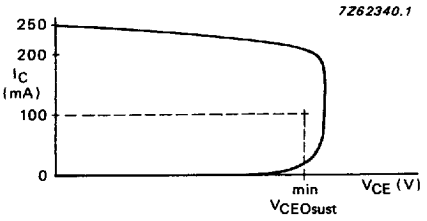


Fig. 3 Oscilloscope display for sustaining voltage.

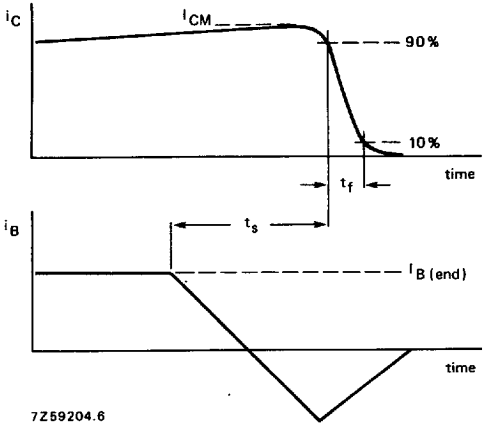


Fig. 4 Switching times waveforms.

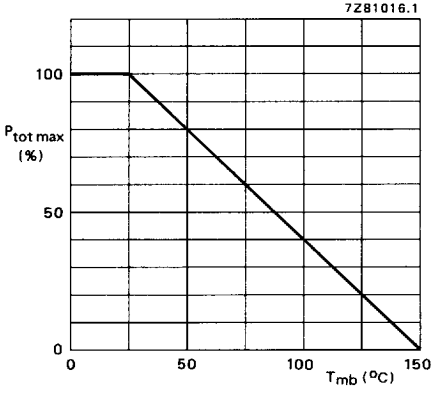


Fig. 5 Power derating curve.

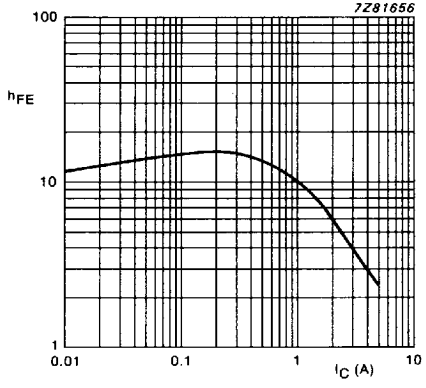
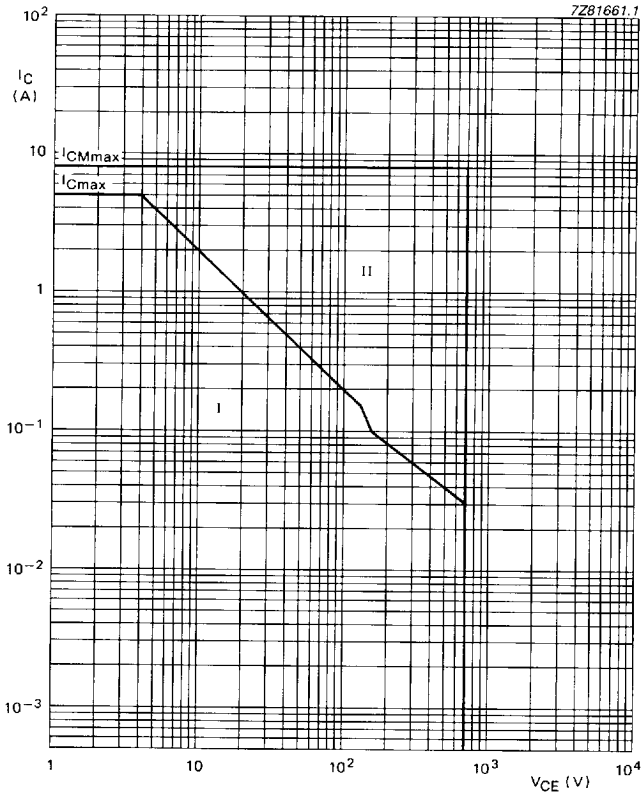
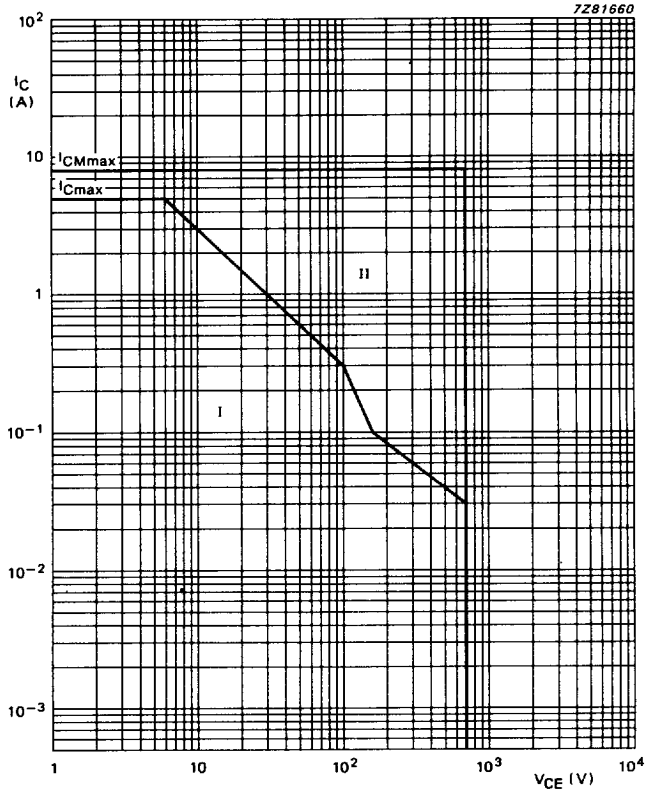


Fig. 6 Typical DC current gain; V_{CE} = 5 V; T_j = 25 °C.



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

Fig. 7 Safe operating area at T_{mb} = 25 °C; mounted without heatsink compound and 30 ± 5 newtons pressure on centre of envelope.



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

Fig. 8 Safe operating area at T_{mb} = 25 °C; mounted with heatsink compound and 30 ± 5 newtons pressure on centre of envelope.

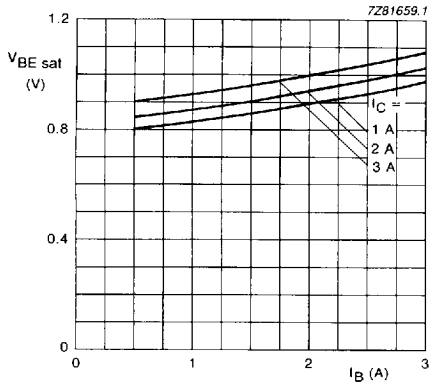


Fig. 9 Typical values V_{BEsat}; T_j = 25 °C.

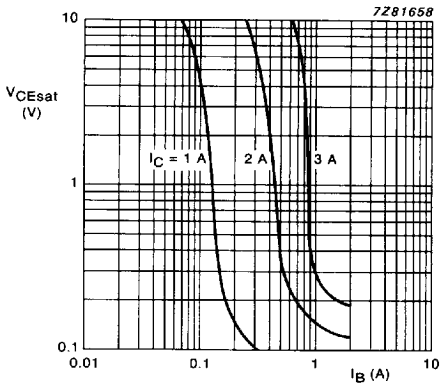


Fig. 10 Typical collector-emitter saturation voltage; T_j = 25 °C.

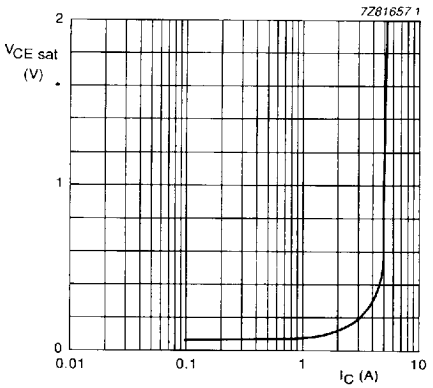


Fig.11 Typical values V_{CEsat}; I_C/I_B = 2; T_j = 25 °C.