PHILIPS INTERNATIONAL 56E D 7110826 0042798 076 PHIN

T-33-11

SILICON EPITAXIAL-BASE POWER TRANSISTORS

NPN transistors in a plastic envelope. With their PNP complements BD202, BD204 and BDX78 they are primarily intended for use in hi-fi equipment delivering an output of 15 to 25 W into a 4 Ω or 8 Ω load.

QUICK REFERENCE DATA

			BD201	BD203	BDX77	
Collector-emitter voltage (open base)	V_{CEO}	max.	45	60	80	V
Collector current (DC)	I_C	max.		8		A
Total power dissipation up to T_{mb} = 25 °C	P_{tot}	max.		60		W
Cut-off frequency I_C = 0.3 A; V_{CE} = 3 V	f_{hfe}	min.		25		kHz

MECHANICAL DATA

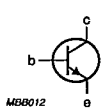
Dimensions in mm

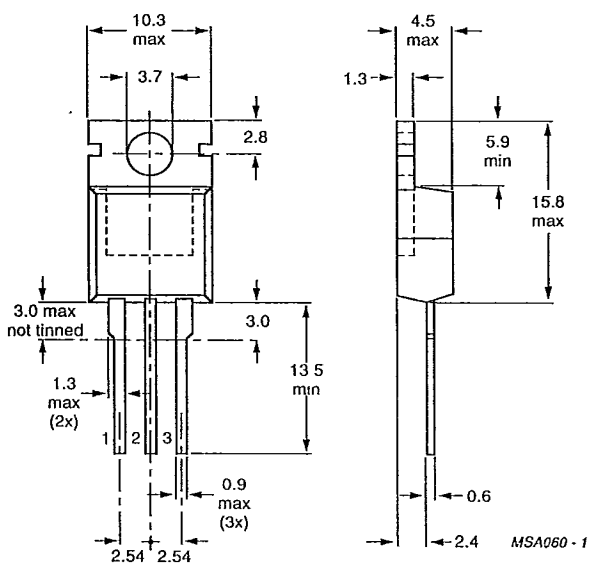
Fig.1 TO-220.

Collector connected to mounting base.

Pinning

1 = base
2 = collector
3 = emitter





See also chapters Mounting Instructions and Accessories.

RATINGS

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

T-33-11

			BD201	BD203	BDX77	
Collector-base voltage (open emitter)	V_{CBO}	max.	60	60	100	V
Collector-emitter voltage (open base)	V_{CEO}	max.	45	60	80	V
Emitter-base voltage (open collector)	V_{EBO}	max.	5	5	5	V
Collector current (DC)	I_C	max.		8		A
Collector current (peak value, t_p max. 10 ms)	I_{CM}	max.		12		A
Collector current (non-repetitive peak value, t_p max. 2 ms)	I_{CSM}	max.		25		A
Base current (DC)	I_B	max.		3		A
Total power dissipation up to T_{mb} = 25 °C	P_{tot}	max.		60		W
Storage temperature range	T_{stg}			−65 to + 150		°C
Junction temperature	T_j	max.		150		°C

THERMAL RESISTANCE

From junction to mounting base	$R_{th\ j\text{-}mb}$	=	2.08	K/W
From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	70	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current					
I_B = 0; V_{CE} = 30 V	I_{CEO}	max.	0.2		mA
I_E = 0; V_{CB} = 40 V; T_j = 150 °C	I_{CBO}	max.	1		mA
Emitter cut-off current					
I_C = 0; V_{EB} = 5 V	I_{EBO}	max.	0.5		mA
Base-emitter voltage *					
I_C = 3 A; V_{CE} = 2 V	V_{BE}	max.	1.5		V
Knee voltage*					
I_C = 3 A; I_B = value for which I_C = 3.3 A at V_{CE} = 2 V	V_{CEK}	typ.	1		V
Saturation voltage*					
I_C = 3 A; I_B = 0.3 A	V_{CEsat}	max.	1		V
I_C = 6 A; I_B = 0.6 A	V_{CEsat}	max.	1.5		V
	V_{BEsat}	max.	2		V
DC current gain*					
I_C = 3 A; V_{CE} = 2 V BD201	h_{FE}	min.	30		
I_C = 2 A; V_{CE} = 2 V BD203	h_{FE}	min.	30		
I_C = 1 A; V_{CE} = 2 V BDX77	h_{FE}	min.	30		
Cut-off frequency					
I_C = 0.3 A; V_{CE} = 3 V	f_{hfe}	min.	25		kHz

* Measured under pulse conditions: $t_p \leq 300\ \mu s$; δ = 2%.

Transition frequency at f = 1 MHz I_C = 0.3 A; V_{CE} = 3 V	f_T	min.	7 MHz
DC current gain ration of matched complementary pairs I_C = 1 A; V_{CE} = 2 V	h_{FE1}/h_{FE2}	max.	2.5
Forward bias second breakdown collector current V_{CE} = 40 V; t_p = 0.1 s; T_{amb} = 25 °C	$I_{(SB)}$	min.	1.5 A
Switching times I_{Con} = 2 A; I_{Bon} = $-I_{Boff}$ = 0.2 A			
turn-on time	t_{on}	max.	1 μs
turn-off time	t_{off}	max.	4 μs

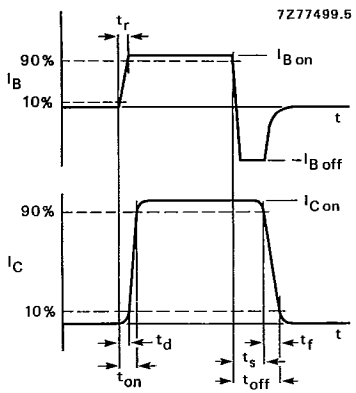


Fig.2 Switching waveforms.

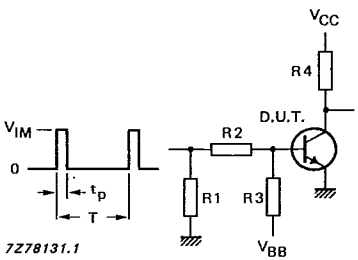


Fig.3 Switching times test circuit.

V_{IM} = 15 V	R3 = 22 Ω
V_{CC} = 20 V	R4 = 10 Ω
V_{BB} = −4 V	$t_r = t_f \leqslant$ 15 ns
R1 = —	t_p = 20 μs
R2 = 33 Ω	T = 500 μs

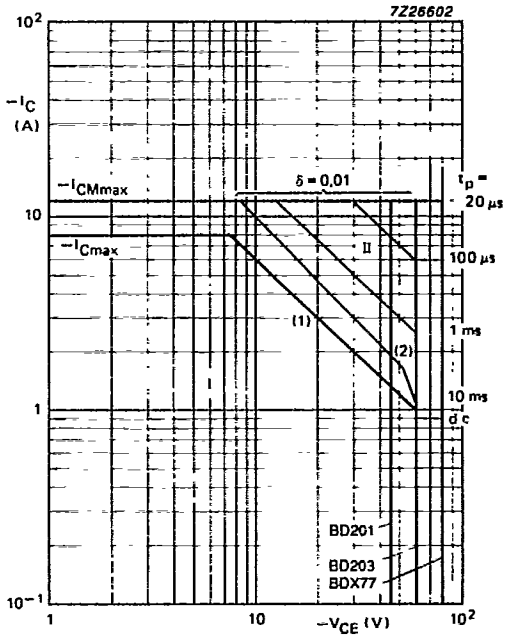


Fig.4 Safe Operating Area; $T_{mb} \leq 25\ ^{o}C$.

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

(1) $P_{tot\ max}$ and $P_{peak\ max}$ lines.
(2) Second-breakdown limits.

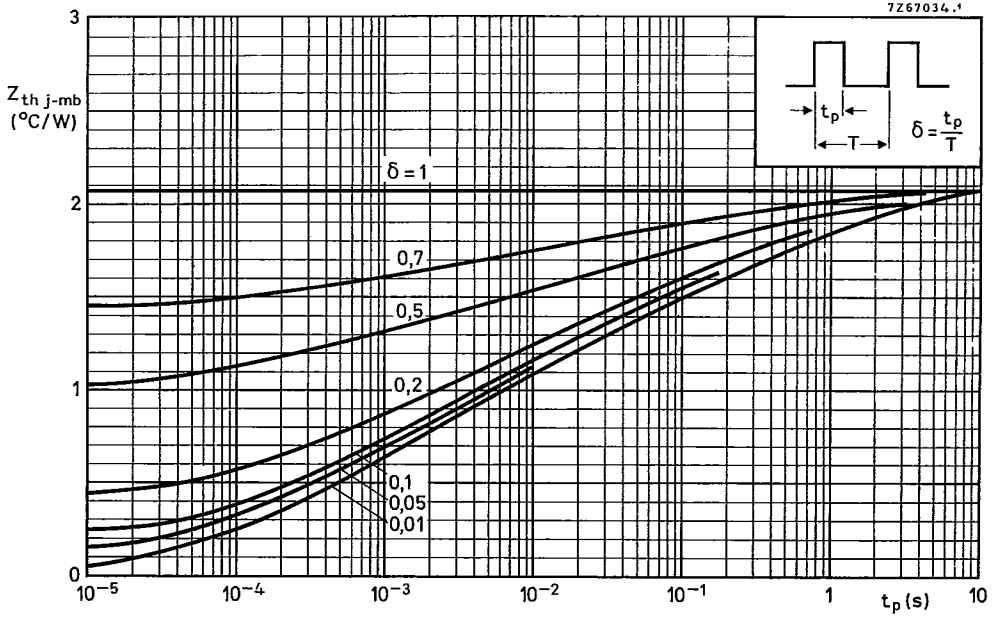


Fig.5 Pulse power rating chart.

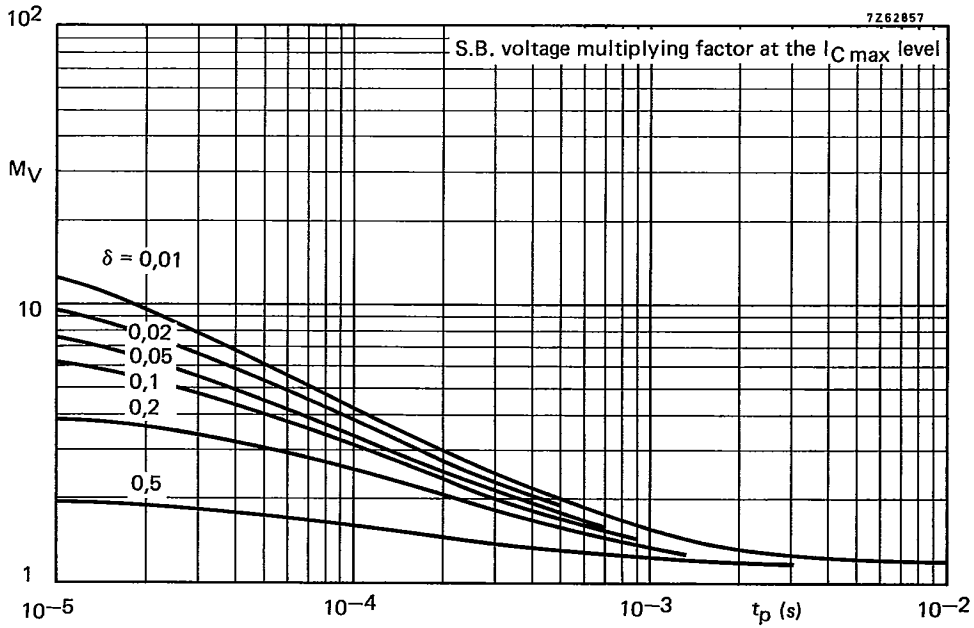


Fig.6 S.B. voltage multiplying factor at the I_{Cmax} level.

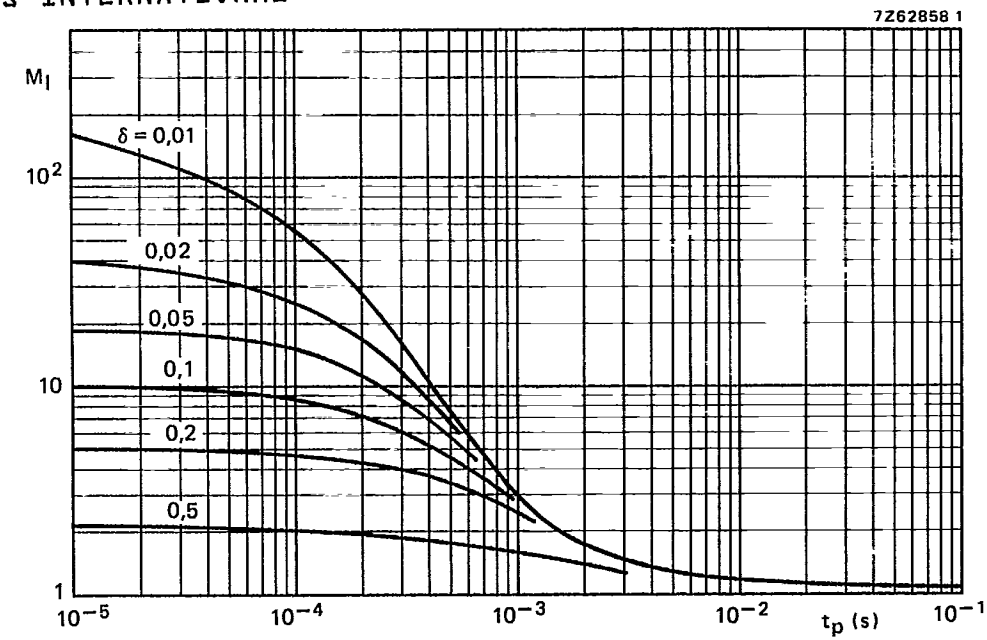


Fig.7 S.B. current multiplying factor at the V_{CEOmax} level.

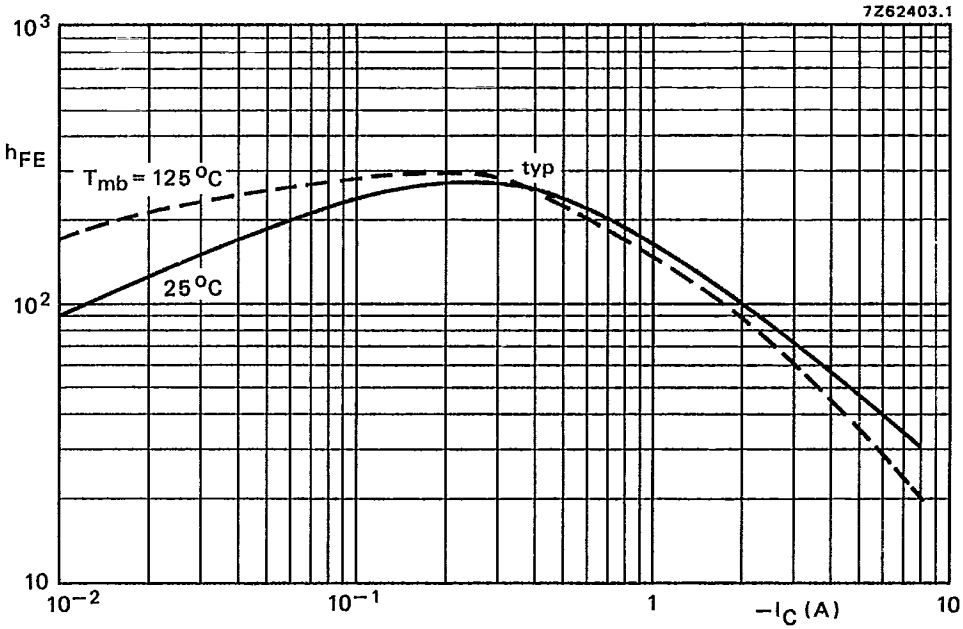


Fig.8 DC current gain. $V_{CE} = 2$ V.

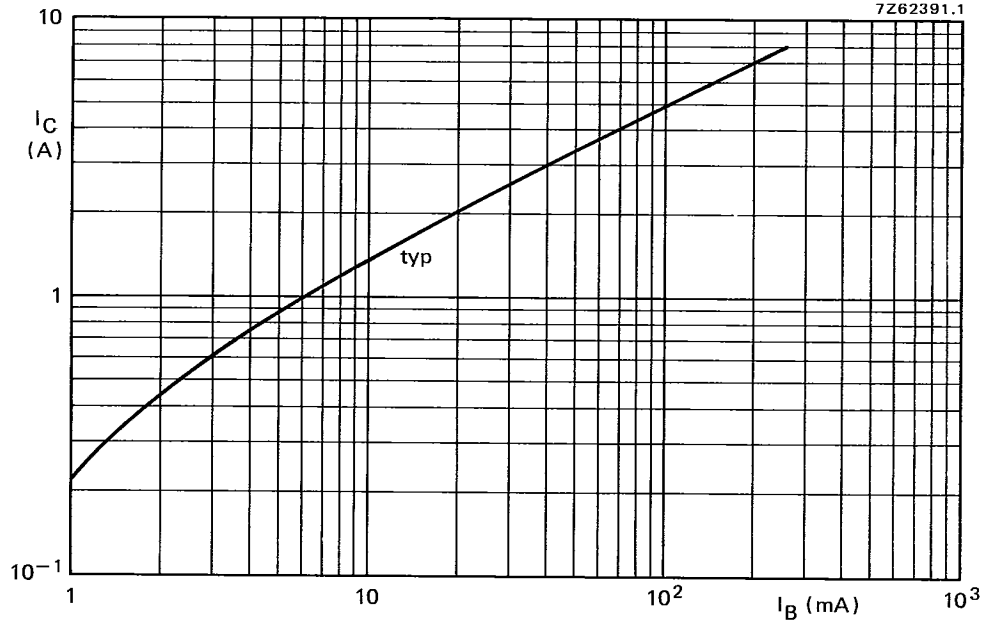


Fig. 9 Collector current as a function of base current. V_{CE} = 2 V; T_j = 25 °C.

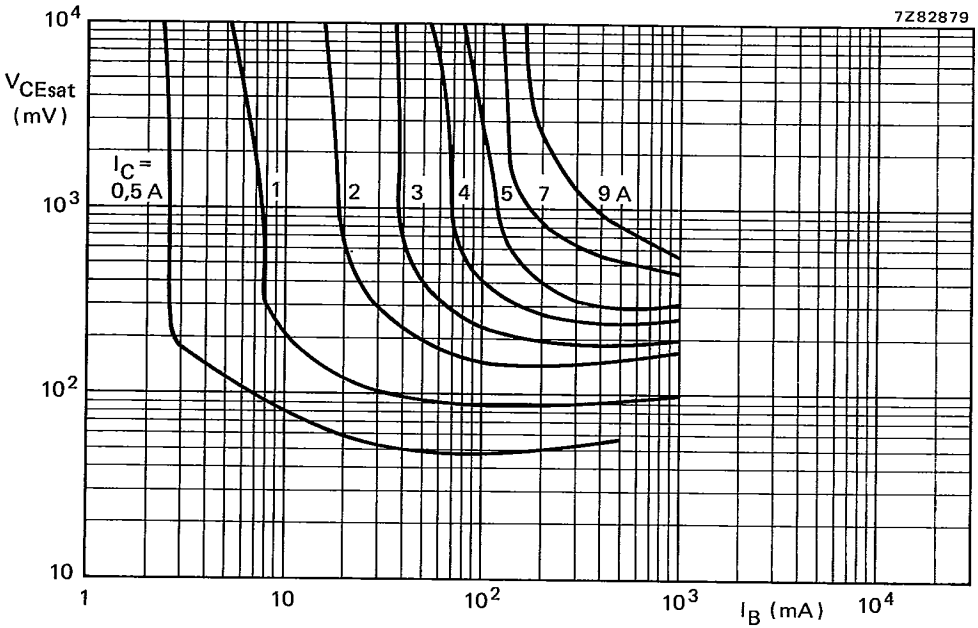


Fig. 10 Typical collector-emitter saturation voltage. T_j = 25 °C.

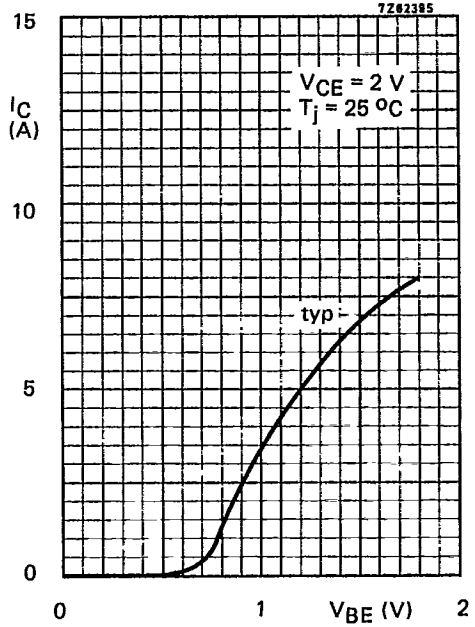


Fig.11.

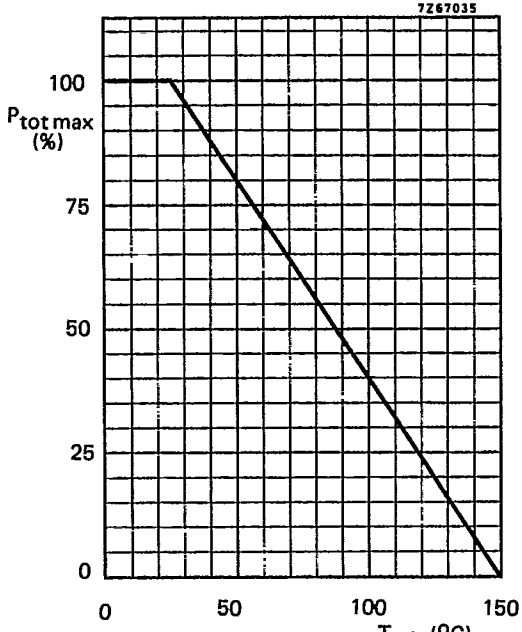


Fig.12.

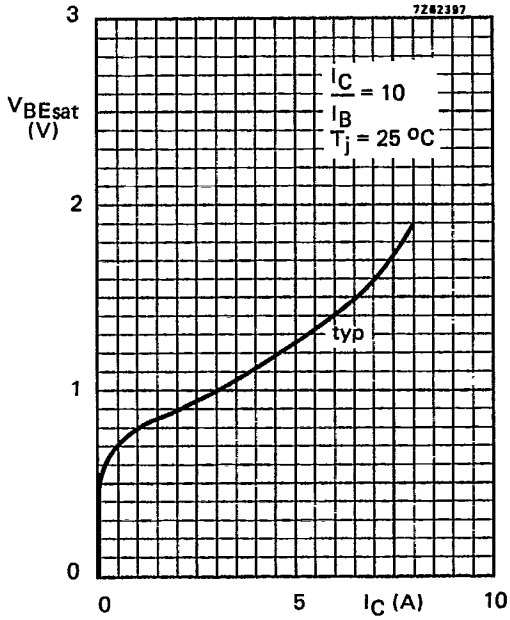


Fig.13.

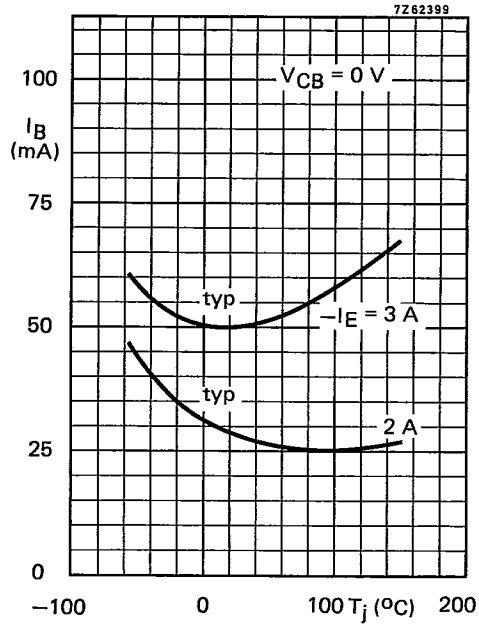


Fig.14.

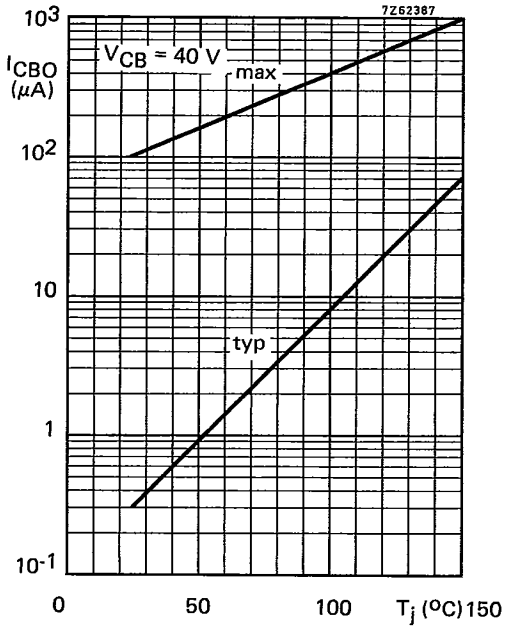


Fig.15.

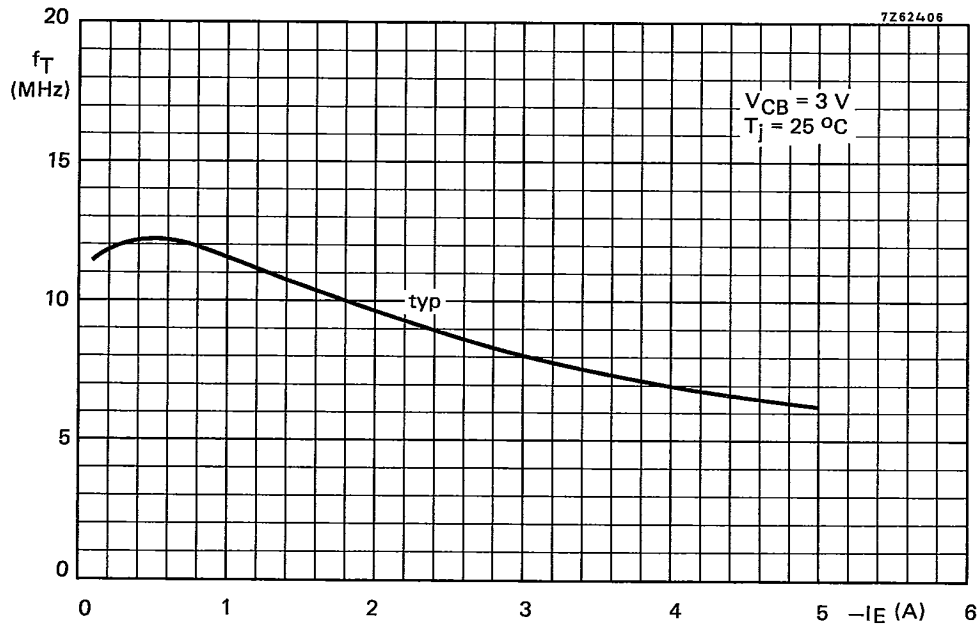


Fig.16.