SILICON EPITAXIAL BASE POWER TRANSISTORS

P-N-P transistors in a plastic TO-220 envelope. They are intended for use in a wide range of power amplifiers and for switching applications. The TIP32 series is an equivalent type. P-N-P complements are BDT31 series.

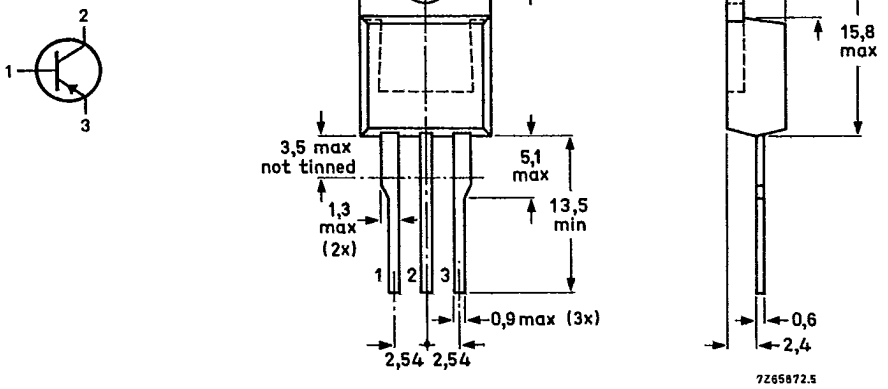
QUICK REFERENCE DATA

			BDT32	A	B	C	
Collector-base voltage (open emitter)	$-V_{CBO}$	max.	80	100	120	140	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	40	60	80	100	V
Collector current (d.c.)	$-I_C$	max.			3		A
Collector current (peak value)	$-I_{CM}$	max.			5		A
Total power dissipation up to T_{mb} = 25 °C	P_{tot}	max.			40		W
Junction temperature	T_j	max.			150		°C
D.C. current gain							
$-I_C$ = 1 A; $-V_{CE}$ = 4 V	h_{FE}	>			25		
$-I_C$ = 3 A; $-V_{CE}$ = 4 V	h_{FE}				10 to 50		

MECHANICAL DATA Dimensions in mm

Fig. 1 TO-220AB.

Collector connected to mounting base.



See also chapters Mounting Instructions and Accessories.

RATINGS

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

			BDT32	A	B	C	
Collector-base voltage (open emitter)	$-V_{CBO}$	max.	80	100	120	140	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	40	60	80	100	V
Emitter-base voltage (open collector)	$-V_{EBO}$	max.			5		V
Collector current (d.c.)	$-I_C$	max.			3		A
Collector current (peak value)	$-I_{CM}$	max.			5		A
Base current	$-I_B$	max.			1		A
Total power dissipation up to T_{mb} = 25 °C	P_{tot}	max.			40		W
Storage temperature	T_{stg}				−65 to 150		°C
Junction temperature	T_j	max.			150		°C

THERMAL RESISTANCE

from junction to mounting base	$R_{th\ j\text{-}mb}$	=	3,12	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

			BDT32; A	B; C	
Collector cut-off current					
I_B = 0; $-V_{CE}$ = 30 V	$-I_{CEO}$	<	0,1		mA
I_B = 0; $-V_{CE}$ = 60 V	$-I_{CEO}$	<		0,1	mA
V_{EB} = 0; $-V_{CE}$ = $-V_{CEO}$	$-I_{CES}$	<	0,2		mA
Emitter cut-off current					
I_C = 0; $-V_{EB}$ = 5 V	$-I_{EBO}$	<	0,2		mA
D.C. current gain *					
$-I_C$ = 1 A; $-V_{CE}$ = 4 V	h_{FE}	>	25		
$-I_C$ = 3 A; $-V_{CE}$ = 4 V	h_{FE}		10 to 50		
Base-emitter voltage * **					
$-I_C$ = 3 A; $-V_{CE}$ = 4 V	$-V_{BE}$	<	1,8		V
Collector-emitter saturation voltage					
$-I_C$ = 3 A; $-I_B$ = 0,375 A	$-V_{CEsat}$	<	1,2		V

			BDT32	A	B	C	
Collector-emitter breakdown voltage *							
I_B = 0; $-I_C$ = 30 mA	$-V_{(BR)CEO}$	>	40	60	80	100	V
Small signal current transfer ratio							
$-I_C$ = 0,5 A; $-V_{CE}$ = 10 V; f = 1 kHz	$\lvert h_{fe}\rvert$	>			20		
$-I_C$ = 0,5 A; $-V_{CE}$ = 10 V; f = 1 MHz	$\lvert h_{fe}\rvert$	>			3		
Turn-off breakdown energy							
L = 20 mH; I_{CC} = 1,22 A	$E_{(BR)}$	>			15		mJ

* Measured under pulse conditions: $t_p \leqslant 300\ \mu s$, $\delta < 2\%$.

** V_{EB} decreases by about 2,3 mV/K with increasing temperature.

Switching times
(between 10% and 90% levels)
$-I_{Con} = 1$ A; $-I_{Bon} = I_{Boff} = 0{,}1$ A
Turn-on time
Turn-off time

t_{on} typ. 0,3 μs
t_{off} typ. 1 μs

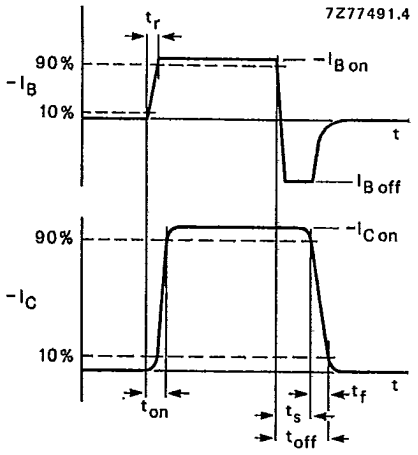
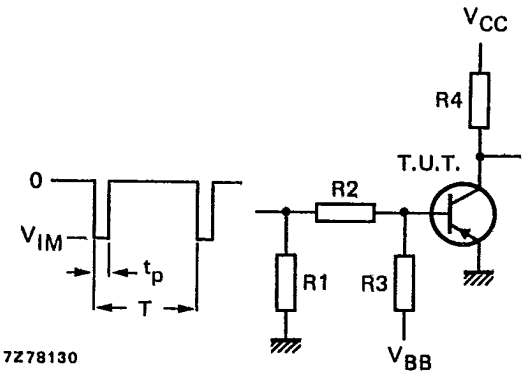


Fig. 2 Switching times waveforms.



$-V_{IM}$ = 30 V
$-V_{CC}$ = 20 V
V_{BB} = 3 V
R_1 = 56 Ω
R2 = 150 Ω
R3 = 33 Ω
R4 = 20 Ω
$t_r = t_f \leqslant$ 15 ns
t_p = 20 μs
T = 500 μs

Fig. 3 Switching times test circuit.

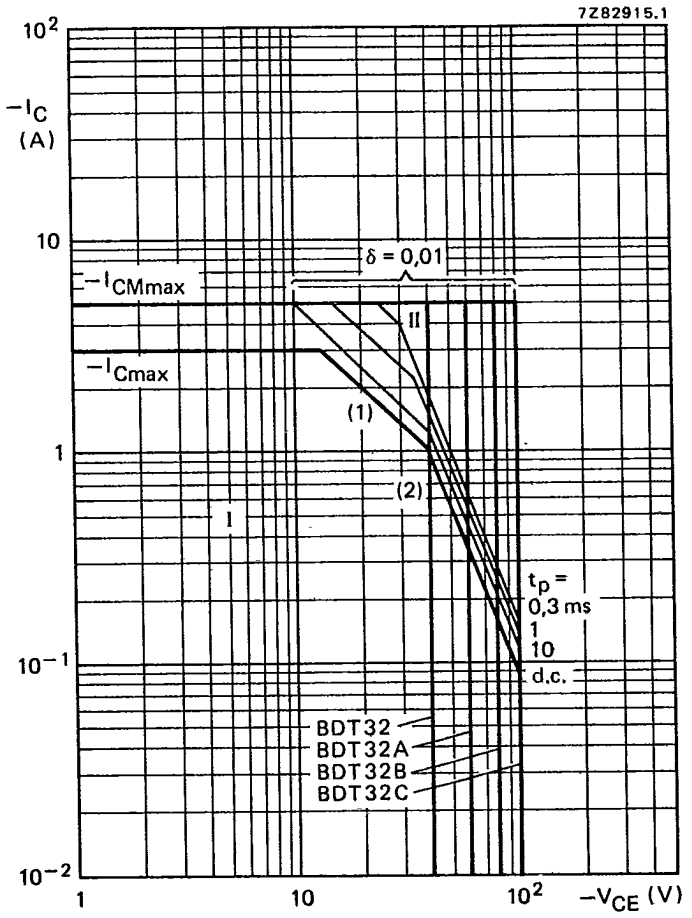


Fig. 4 Safe Operating ARea; $T_{mb} \leqslant 25\ ^oC$.

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

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

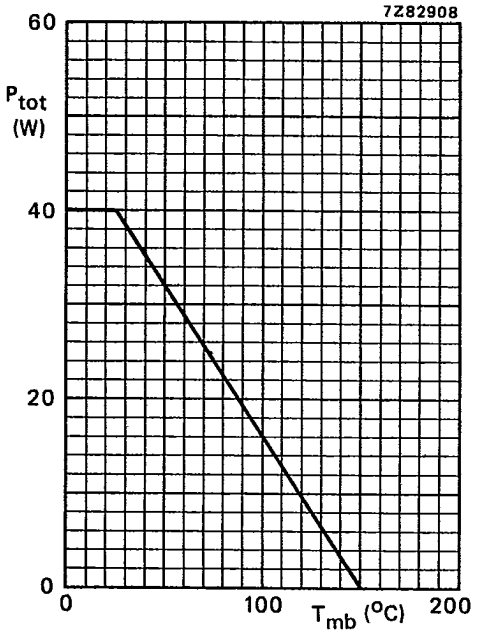


Fig. 5 Power derating curve.

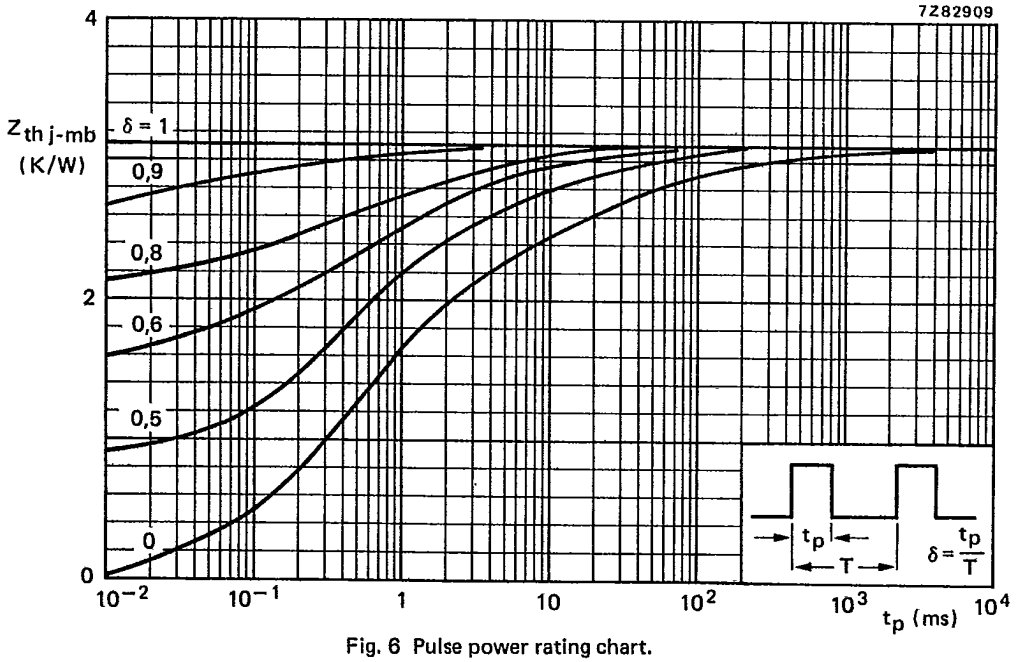


Fig. 6 Pulse power rating chart.

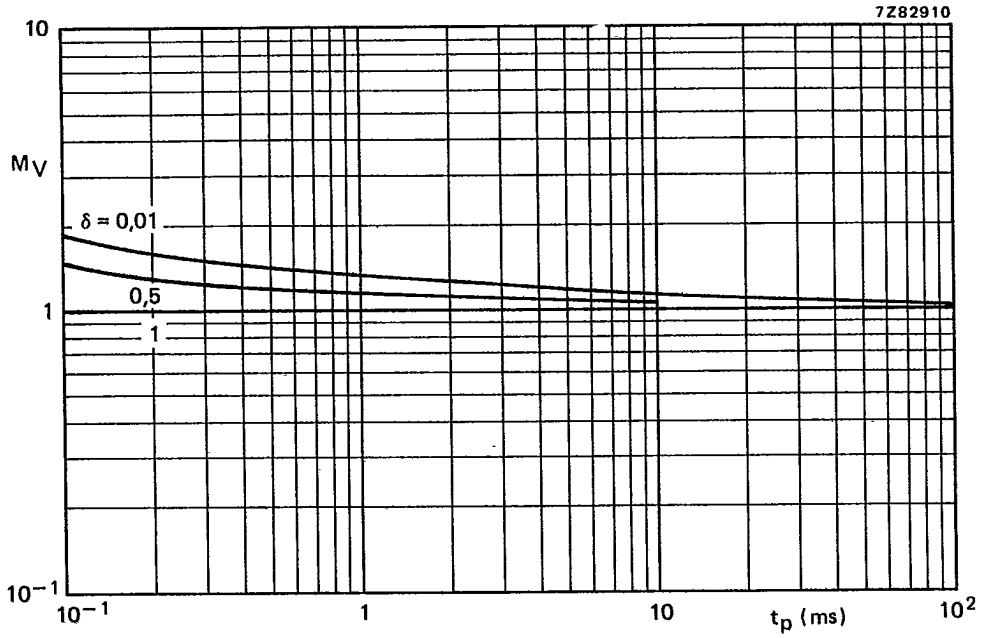


Fig. 7 S.B. voltage multiplying factor at the $-I_{Cmax}$ level.

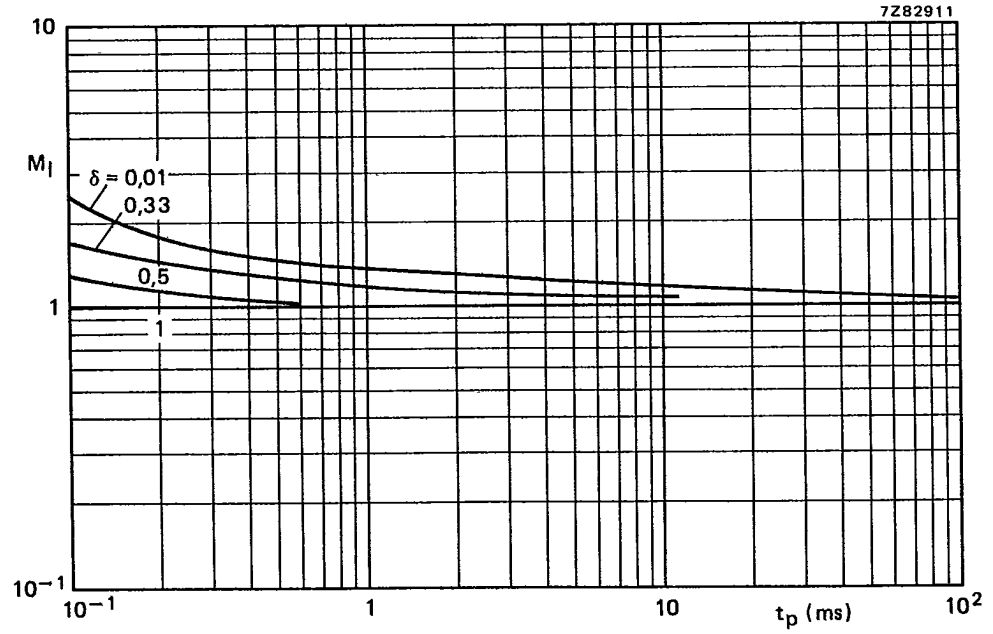


Fig. 8 S.B. current multiplying factor at the $-V_{CEOmax}$ level.

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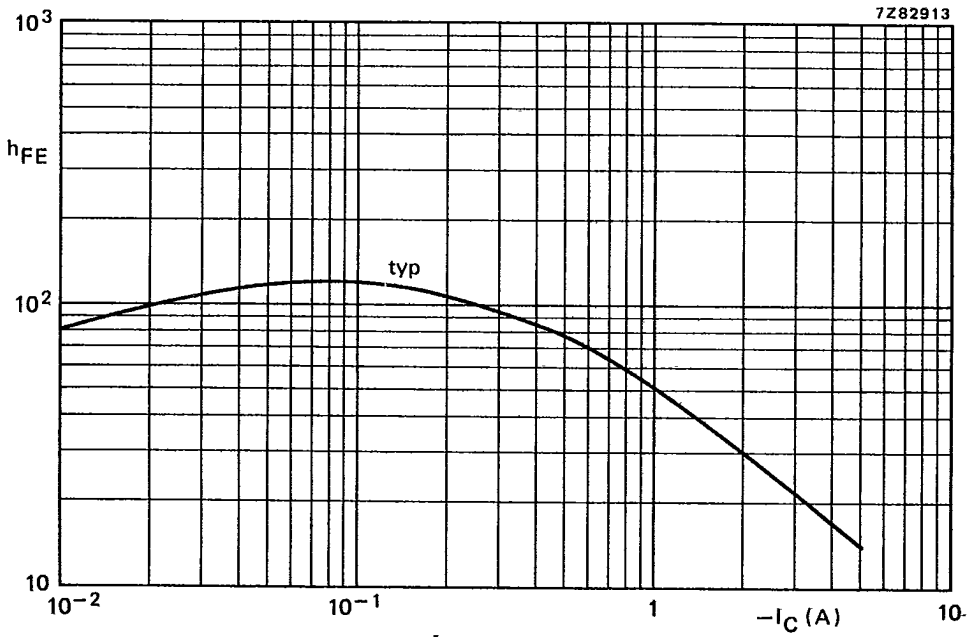

Fig. 9 Typical d.c. current gain at $-V_{CE}$ = 4 V; T_j = 25 °C.