SILICON DIFFUSED POWER TRANSISTORS

High-voltage, high-speed glass passivated npn power transistor in a TO-220 envelope, intended for use in switching regulators, inverters, motor controls, solenoid/relay drivers and deflection circuits.

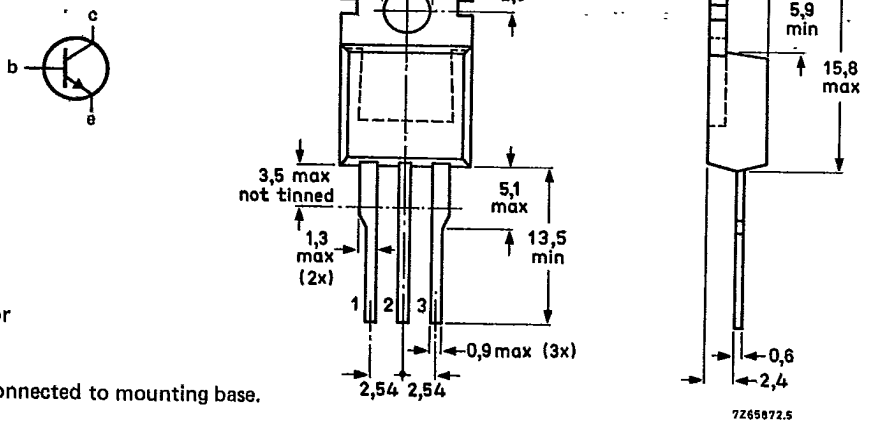
QUICK REFERENCE DATA

			MJE13004	13005	
Collector-emitter voltage peak value; V_{BE} = 0 V	V_{CESM}	max.	600	700	V
open base	V_{CEO}	max.	300	400	V
Collector-emitter saturation voltage	V_{CEsat}	max.		0.6	V
Collector current saturation	I_{Csat}	max.		2.0	A
DC	I_C	max.		4.0	A
peak value	I_{CM}	max.		8.0	A
Total power dissipation up to T_{mb} = 25 °C	P_{tot}	max.		75	W

MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-220AB.



Pinning:

1 = base
2 = collector
3 = emitter

Collector connected to mounting base.

RATINGS

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

			MJE13004	13005	
Collector-emitter voltage					
peak value; V_{BE} = 0 V	V_{CESM}	max.	600	700	V
open base	V_{CEO}	max.	300	400	V
Emitter-base current	V_{EBO}	max.	9.0		V
Collector current					
saturation	I_{Csat}	max.	2.0		A
DC	I_C	max.	4.0		A
peak value	I_{CM}	max.	8.0		A
Base current					
DC	I_B	max.	2.0		A
peak value	I_{BM}	max.	4.0		A
Emitter current					
DC	I_E	max.	6.0		A
peak value	I_{EM}	max.	12		A
Total power dissipation					
up to T_{amb} = 25 °C	P_{tot}	max.	2		W
derate above 25 °C			16		mW/K
Total power dissipation					
up to T_{mb} = 25 °C	P_{tot}	max.	75		W
derate above 25 °C			600		mW/K
Operating junction temperature range	T_j		−65 to + 150		°C
Storage temperature range	T_{stg}		−65 to + 150		°C

THERMAL RESISTANCE

From junction to mounting base	$R_{th\ j\text{-}mb}$	=	1.67	K/W
From junction to ambient	$R_{th\ j\text{-}a}$	=	62.5	K/W

T-33-13

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

			MJE13004	13005	
Collector-emitter sustaining voltage					
I_C = 10 mA; I_B = 0	$V_{CEOsust}$	min.	300	400	V
Collector cut-off current					
$V_{CE} = V_{CESMmax}$; V_{BE} = −1.5 V	I_{CEX}	max.	1.0		mA
$V_{CE} = V_{CESMmax}$; V_{BE} = −1.5 V; T_c = 100 °C	I_{CEX}	max.	5.0		mA
Emitter cut-off current					
V_{EB} = 9 V; I_C = 0	I_{EBO}	max.	1.0		mA
DC current gain					
I_C = 1 A; V_{CE} = 5 V	h_{FE}		10 to 60		
I_C = 2 A; V_{CE} = 5 V	h_{FE}		8 to 40		
Collector-emitter saturation voltage					
I_C = 1 A; I_B = 0.2 A	V_{CEsat}	max.	0.5		V
I_C = 2 A; I_B = 0.5 A	V_{CEsat}	max.	0.6		V
I_C = 4 A; I_B = 1.0 A	V_{CEsat}	max.	1.0		V
I_C = 2 A; I_B = 0.5 A; T_{mb} = 100 °C	V_{CEsat}	max.	1.0		V
Base-emitter saturation voltage					
I_C = 1 A; I_B = 0.2 A	V_{BEsat}	max.	1.2		V
I_C = 2 A; I_B = 0.5 A	V_{BEsat}	max.	1.6		V
I_C = 2 A; I_B = 0.5 A; T_{mb} = 100 °C	V_{BEsat}	max.	1.5		V
Transition frequency					
I_C = 0.5 A; V_{CE} = 10 V; f = 1 MHz	f_T	typ.	4.0		MHz
Collector capacitance					
V_{CB} = 10 V; I_E = 0	C_c	typ.	50		pF
Switching times, resistive load (Figs 2 and 3)					
V_{CC} = 125 V; I_C = 2 A; t_p = 25 μs; $I_{Bon} = I_{Boff}$ = 0.4 A	t_{on}	max.	0.8		μs
	t_s	max.	4.0		μs
	t_f	max.	0.9		μs
Switching times, inductive load (Figs 4 and 5)					
I_C = 2 A; V_{CL} = 300 V; T_{mb} = 100 °C; I_{Bon} = 0.4 A; V_{BEoff} = 5 V	t_s	typ.	0.9		μs
	t_s	max.	4.0		μs
	t_f	typ.	0.32		μs
	t_f	max.	0.9		μs

DEVELOPMENT DATA

V_{CC} = 125 V V_{IM} = 6 to 8 V

The values of R_B and R_L are selected in accordance with the I_{Con} and I_{Bon} requirements.

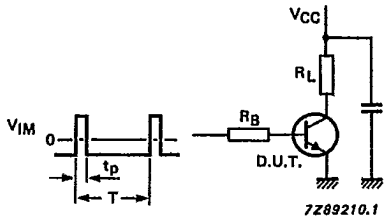


Fig. 2 Test circuit resistive load.

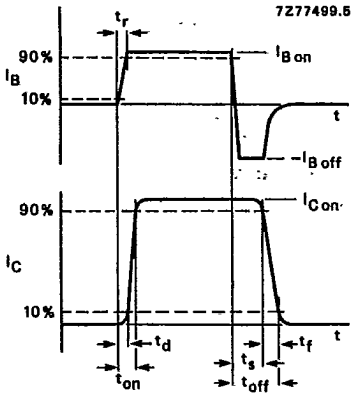


Fig. 3 Switching times waveforms with resistive load; $t_r \leqslant 30$ ns.

V_{CC} = 30 V
L_C = 200 μH
L_B = 1 μH

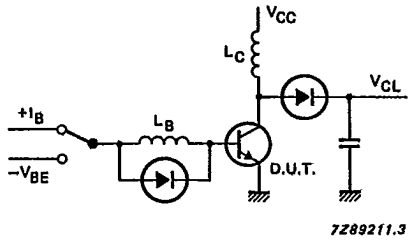


Fig. 4 Test circuit inductive load.

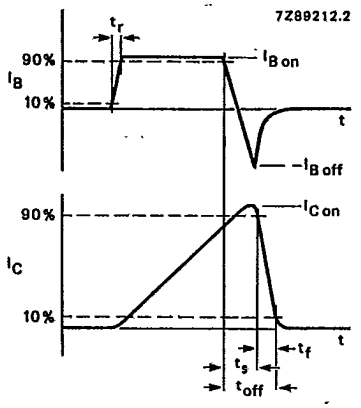


Fig. 5 Switching times waveforms with inductive load.