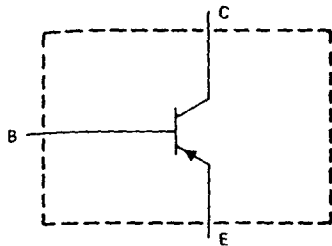


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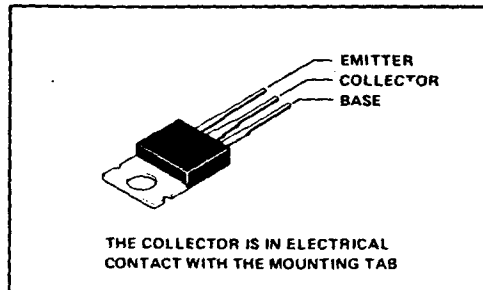
**TIP30, TIP30A, TIP30B, TIP30C,
TIP30D, TIP30E, TIP30F**
P-N-P SILICON POWER TRANSISTOR
JULY 1968 - REVISED OCTOBER 1984

- Designed for Complementary Use With TIP29 series
- 30 W at 25°C Case Temperature
- 1 A Continuous Collector Current
- 3 A Peak Collector Current
- Minimum f_T of 3 MHz at 10 V, 0.2 A
- Customer Specified Selections Available
- Designed for Power Amplifier and High-Speed Switching Applications

service schematic



TO-220AB PACKAGE



absolute maximum ratings at 25°C case temperature (unless otherwise noted)

	TIP30	TIP30A	TIP30B	TIP30C
Collector-base voltage	-80 V	-100 V	-120 V	-140 V
Collector-emitter voltage ($I_B = 0$)	-40 V	-60 V	-80 V	-100 V
Emitter-base voltage			-5 V	
Continuous collector current			-1 A	
Peak collector current (see Note 1)			-3 A	
Continuous base current			-0.4 A	
Safe operating area at 25°C case temperature			See Figure 4	
Continuous device dissipation at 25°C case temperature (see Note 2)			30 W	
Continuous device dissipation at (or below) 25°C free-air temperature (see Note 3)			2 W	
Unclamped inductive load energy (see Note 4)			32 mJ	
Operating collector junction and storage temperature range			-65°C to 150°C	
Lead temperature 3.2 mm (0.125 inch) from case for 10 seconds			250°C	

- NOTES:
1. This value applies for $t_w \leq 0.3$ ms, duty cycle $\leq 10\%$.
 2. Derate linearly to 150°C case temperature at the rate of 0.24 W/°C.
 3. Derate linearly to 150°C free-air temperature at the rate of 16mW/°C.
 4. This rating is based on the capability of the transistor to operate safely in the circuit in Figure 2.

TIP Devices 5

**TEXAS
INSTRUMENTS**

POST OFFICE BOX 225012 • DALLAS, TEXAS 75265

**TIP30, TIP30A, TIP30B, TIP30C,
TIP30D, TIP30E, TIP30F**
P-N-P SILICON POWER TRANSISTORS

absolute maximum ratings at 25°C case temperature (unless otherwise noted)

	TIP30D	TIP30E	TIP30F
Collector-base voltage	-160 V	-180 V	-200 V
Collector-emitter voltage ($I_B = 0$)	-120 V	-140 V	-160 V
Emitter-base voltage	-5 V	-1 A	-1 A
Continuous collector current	-3 A	-3 A	-3 A
Peak collector current (see Note 1)	-0.4 A	-0.4 A	-0.4 A
Continuous base current	See Figure 4	See Figure 4	See Figure 4
Safe operating area at 25°C case temperature	30 W	30 W	30 W
Continuous device dissipation at 25°C case temperature (see Note 2)	2 W	2 W	2 W
Continuous device dissipation at (or below) 25°C free-air temperature (see Note 3)	32 mJ	32 mJ	32 mJ
Unclamped inductive load energy (see Note 4)	-65°C to 150°C	-65°C to 150°C	-65°C to 150°C
Operating collector junction and storage temperature range			
Lead temperature 3.2 mm (0.125 inch) from case for 10 seconds	250°C	250°C	250°C

- NOTES: 1. This value applies for $t_w \leq 0.3$ ms, duty cycle $\leq 10\%$.
 2. Derate linearly to 150°C case temperature at the rate of 0.24 W/°C.
 3. Derate linearly to 150°C free-air temperature at the rate of 16 mW/°C.
 4. This rating is based on the capability of the transistor to operate safely in the circuit in Figure 2.

electrical characteristics at 25°C case temperature

PARAMETER	TIP30		TIP30A		TIP30B		TIP30C		UNIT
	MIN	TYP	MIN	TYP	MIN	TYP	MIN	TYP	
$V_{(BR)CEO}$	-40	-60	-80	-100	-80	-100	-80	-100	V
I_{CEO}	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	mA
I_{CES}	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	mA
I_{EBO}	-1	-1	-1	-1	-1	-1	-1	-1	mA
h_{FE}	20	75	15	75	15	75	15	75	
V_{BE}	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	V
$V_{CE(sat)}$	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	V
h_{FE}	20	20	20	20	20	20	20	20	
$ h_{FE} $	3	3	3	3	3	3	3	3	

- NOTES: 5. These parameters must be measured using pulse techniques, $t_w = 300 \mu s$, duty cycle $\leq 2\%$.
 6. These parameters are measured using voltage-sensing contacts separate from the current-carrying contacts.

**TIP30, TIP30A, TIP30B, TIP30C,
TIP30D, TIP30E, TIP30F**
P-N-P SILICON POWER TRANSISTORS

electrical characteristics at 25°C case temperature

PARAMETER	TIP30D		TIP30E		TIP30F		UNIT
	MIN	TYP	MIN	TYP	MIN	TYP	
$V_{(BR)CEO}$	-120	-140	-140	-140	-160	-160	V
I_{CEO}	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	mA
I_{CES}	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	mA
I_{EBO}	-1	-1	-1	-1	-1	-1	mA
h_{FE}	40	40	40	40	40	40	
V_{BE}	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	V
$V_{CE(sat)}$	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	V
h_{FE}	20	20	20	20	20	20	
$ h_{FE} $	3	3	3	3	3	3	

- NOTES: 5. These parameters must be measured using pulse techniques, $t_w = 300 \mu s$, duty cycle $\leq 2\%$.
 6. These parameters are measured with voltage-sensing contact separate from the current-carrying contacts.

thermal characteristics

PARAMETER	MIN	TYP	MAX	UNIT
$R_{\theta JC}$			4.17	°C/W
$R_{\theta JA}$			62.5	°C/W

resistive-load switching characteristics at 25°C case temperature

PARAMETER	TEST CONDITIONS ¹		MIN	TYP	MAX	UNIT
	I_B	I_C				
t_{on}	-1 A	-1 A	0.1	0.1	0.1	μs
t_{off}	4.3 V	4.3 V	30	30	30	μs

¹ Voltage and current values shown are nominal; exact values vary slightly with transistor parameters.

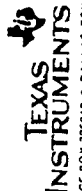


TABLE 2.1. SELECTED SMALL-SIGNAL TRANSISTORS*

	Metal			TO-5 ^e		TO-18 ^f		Plastic										
	V _{CE0} (V)	I _C max (mA)	h _{FE} typ ^b	I _C (mA)	C _{cb} typ ^c (pF)	f _T ^d (MHz)	Gain curve	TO-5 ^e		TO-18 ^f		TO-92 ^h						
								nnp	npn	nnp	npn	nnp	npn					
General purpose	20 25 40	500 200 200	100 200 200	150 2 10	16 1.8-2.8 1.8-2.8	200 300 300	4	- - -	- - -	- - -	- - -	- - -	- 4124 3904	- - 3904	- - 3906	- - -		
High gain, low noise	25 25 25 40 45 50	50 300 50 20 50 50	300 250 500 700 1000 350	10 50 5 1 10 5	2-7 4 1.5-4 14 1.5 1.8	150 300 500 200 300 400		- - - - - -	- - - - - -	- - - - - -	- - - - - -	- - - - - -	- - - - - -	- - - - - -	- - - - - -	- - - - - -	3391A ^h , 3707 ^h 4058 ^h 6008 ^h 5089 LM394 5962 4967, 5210 4965, 5087	
High current	30-60 50 60 75	600 1000 1000 2000	150 100 70 70	150 200 80 500	5 7 15 20	300 450 100 60	5	2219 3725 2102, 3107 5320	2905 5022 4036 5322	2222 4014	2907, 3251	4401	4403	-	-	-	-	
High voltage	150 300	600 1000	100 50	10 50	3-6 10	250 50	-	- 3439	4929 5416	- -	- -	- -	5550 -	- -	- -	- -	5401	
High speed	12 12 12	50 100 200	80 50 75	3 8 25	0.7 1.5 3	1500 900 500	6 8	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	3662 ^h 5179 918 2369 5770 2894 5769

(a) all transistors are 2Nxxx numbers, except for the LM394 dual transistor. Devices listed on a single row are similar in characteristics and in some cases are electrically identical. (b) see figure 2.76. (c) at V_{CE}=10V. (d) see figure 13.4. (e) or TO-39. (f) or TO-72, TO-46. (h) TO-92 and its variants have two basic pinouts: EBC and ECB. Transistors with superscript h are ECB; all others are EBC.