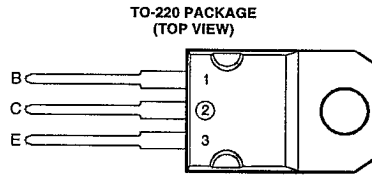


TIP30, TIP30A, TIP30B, TIP30C PNP SILICON POWER TRANSISTORS

JULY 1968 - REVISED MAY 1995

- Designed for Complementary Use with the TIP29 Series
- 30 W at 25°C Case Temperature
- 1 A Continuous Collector Current
- 3 A Peak Collector Current
- Customer-Specified Selections Available



Pin 2 is in electrical contact with the mounting base.

MDTRAC

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

RATING		SYMBOL	VALUE	UNIT
Collector-base voltage ($I_E = 0$)	TIP30	V_{CBO}	-80	V
	TIP30A		-100	
	TIP30B		-120	
	TIP30C		-140	
Collector-emitter voltage ($I_B = 0$)	TIP30	V_{CEO}	-40	V
	TIP30A		-60	
	TIP30B		-80	
	TIP30C		-100	
Emitter-base voltage		V_{EBO}	-5	V
Continuous collector current		I_C	-1	A
Peak collector current (see Note 1)		I_{CM}	-3	A
Continuous base current		I_B	-0.4	A
Continuous device dissipation at (or below) 25°C case temperature (see Note 2)		P_{tot}	30	W
Continuous device dissipation at (or below) 25°C free air temperature (see Note 3)		P_{tot}	2	W
Unclamped inductive load energy (see Note 4)		$\frac{1}{2}LI_C^2$	32	mJ
Operating junction temperature range		T_J	-65 to +150	°C
Storage temperature range		T_{stg}	-65 to +150	°C
Lead temperature 3.2 mm from case for 10 seconds		T_L	250	°C

- NOTES: 1. This value applies for $I_B \leq 0.3$ 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 a circuit of: $L = 20$ mH, $I_{B(on)} = -0.4$ A, $R_{BE} = 100 \Omega$, $V_{BE(off)} = 0$, $R_B = 0.1 \Omega$, $V_{CC} = -20$ V.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all the parameters.

**TEXAS
INSTRUMENTS**

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TIP30, TIP30A, TIP30B, TIP30C
PNP SILICON POWER TRANSISTORS

JULY 1968 - REVISED MAY 1995

electrical characteristics at 25°C case temperature

PARAMETER	TEST CONDITIONS			MIN	TYP	MAX	UNIT
$V_{(BR)CEO}$ Collector-emitter breakdown voltage	$I_C = -30 \text{ mA}$ (see Note 5)	$I_B = 0$	TIP30 TIP30A TIP30B TIP30C	-40 -60 -80 -100			V
I_{CES} Collector-emitter cut-off current	$V_{CE} = -80 \text{ V}$ $V_{CE} = -100 \text{ V}$ $V_{CE} = -120 \text{ V}$ $V_{CE} = -140 \text{ V}$	$V_{BE} = 0$ $V_{BE} = 0$ $V_{BE} = 0$ $V_{BE} = 0$	TIP30 TIP30A TIP30R TIP30C			-0.2 -0.2 -0.2 -0.2	mA
I_{CEO} Collector cut-off current	$V_{CE} = -30 \text{ V}$ $V_{CE} = -60 \text{ V}$	$I_B = 0$ $I_B = 0$	TIP30/30A TIP30B/30C			-0.3 -0.3	mA
I_{EEO} Emitter cut-off current	$V_{EB} = -5 \text{ V}$	$I_C = 0$				-1	mA
h_{FE} Forward current transfer ratio	$V_{CE} = -4 \text{ V}$ $V_{CE} = -4 \text{ V}$	$I_C = -0.2 \text{ A}$ $I_C = -1 \text{ A}$	(see Notes 5 and 6)	40 15		75	
$V_{CE(sat)}$ Collector-emitter saturation voltage	$I_B = -125 \text{ mA}$	$I_C = -1 \text{ A}$	(see Notes 5 and 6)			-0.7	V
V_{BE} Base-emitter voltage	$V_{CE} = -4 \text{ V}$	$I_C = -1 \text{ A}$	(see Notes 5 and 6)			-1.3	V
h_{fe} Small signal forward current transfer ratio	$V_{CE} = -10 \text{ V}$	$I_C = -0.2 \text{ A}$	$f = 1 \text{ kHz}$	20			
$ h_{fe} $ Small signal forward current transfer ratio	$V_{CE} = -10 \text{ V}$	$I_C = -0.2 \text{ A}$	$f = 1 \text{ MHz}$	3			

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

thermal characteristics

PARAMETER	MIN	TYP	MAX	UNIT
$R_{\theta JC}$ Junction to case thermal resistance			4.17	°C/W
$R_{\theta JA}$ Junction to free air thermal resistance			62.5	°C/W

resistive-load-switching characteristics at 25°C case temperature

PARAMETER	TEST CONDITIONS †			MIN	TYP	MAX	UNIT
t_{on} Turn-on time	$I_C = -1 \text{ A}$	$I_{B(on)} = -0.1 \text{ A}$	$I_{B(off)} = 0.1 \text{ A}$		0.3		μs
t_{off} Turn-off time	$V_{BE(off)} = 4.3 \text{ V}$	$R_L = 30 \Omega$	$t_p = 20 \mu\text{s}$, dc $\leq 2\%$		1		μs

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

TIP30, TIP30A, TIP30B, TIP30C
PNP SILICON POWER TRANSISTORS

JULY 1968, REVISED MAY 1995

TYPICAL CHARACTERISTICS

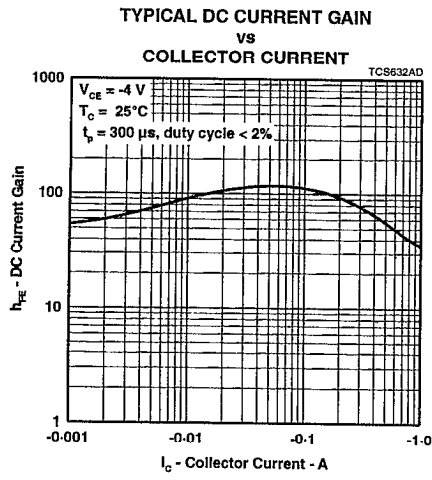


Figure 1.

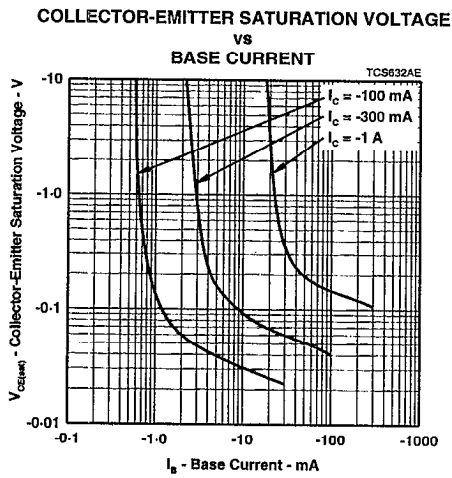


Figure 2.

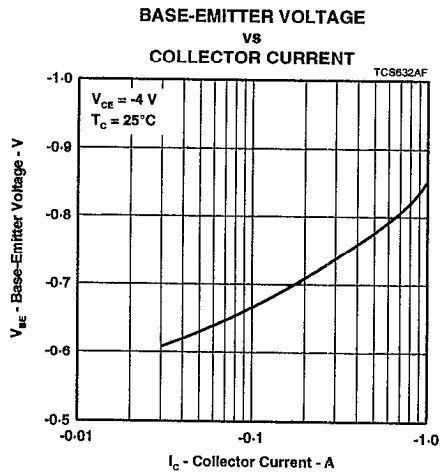


Figure 3.

TIP30, TIP30A, TIP30B, TIP30C
PNP SILICON POWER TRANSISTORS

JULY 1968 - REVISED MAY 1995

MAXIMUM SAFE OPERATING REGIONS

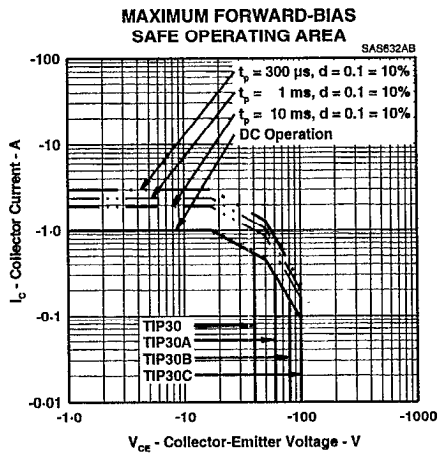


Figure 4.

THERMAL INFORMATION

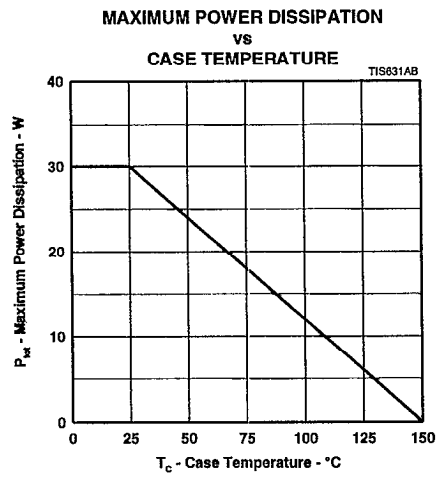
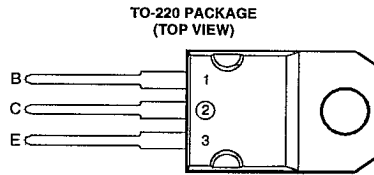


Figure 5.

TIP31, TIP31A, TIP31B, TIP31C NPN SILICON POWER TRANSISTORS

JULY 1968 - REVISED MAY 1995

- Designed for Complementary Use with the TIP32 Series
- 40 W at 25°C Case Temperature
- 3 A Continuous Collector Current
- 5 A Peak Collector Current
- Customer-Specified Selections Available



Pin 2 is in electrical contact with the mounting base.

MDTRAC

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

RATING		SYMBOL	VALUE	UNIT
Collector-base voltage ($I_E = 0$)	TIP31	V_{CBO}	80	V
	TIP31A		100	
	TIP31B		120	
	TIP31C		140	
Collector-emitter voltage ($I_B = 0$)	TIP31	V_{CEO}	40	V
	TIP31A		60	
	TIP31B		80	
	TIP31C		100	
Emitter-base voltage		V_{EBO}	5	V
Continuous collector current		I_C	3	A
Peak collector current (see Note 1)		I_{CM}	5	A
Continuous base current		I_B	1	A
Continuous device dissipation at (or below) 25°C case temperature (see Note 2)		P_{tot}	40	W
Continuous device dissipation at (or below) 25°C free air temperature (see Note 3)		P_{tot}	2	W
Unclamped inductive load energy (see Note 4)		$\frac{1}{2}L I_C^2$	32	mJ
Operating junction temperature range		T_J	-65 to +150	°C
Storage temperature range		T_{stg}	-65 to +150	°C
Lead temperature 3.2 mm from case for 10 seconds		T_L	250	°C

NOTES: 1. This value applies for $t_p \leq 0.3$ ms, duty cycle $\leq 10\%$.

2. Derate linearly to 150°C case temperature at the rate of 0.32 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 a circuit of: $L = 20$ mH, $I_{B(on)} = 0.4$ A, $R_{BE} = 100 \Omega$, $V_{BE(off)} = 0$, $R_S = 0.1 \Omega$, $V_{CC} = 20$ V.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all the parameters.



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TIP31, TIP31A, TIP31B, TIP31C
NPN SILICON POWER TRANSISTORS

JULY 1968 - REVISED MAY 1995

electrical characteristics at 25°C case temperature

PARAMETER	TEST CONDITIONS			MIN	TYP	MAX	UNIT
$V_{(BR)CEO}$ Collector-emitter breakdown voltage	$I_C = 30 \text{ mA}$ (see Note 5)	$I_B = 0$	TIP31 TIP31A TIP31B TIP31C	40 60 80 100			V
I_{CES} Collector-emitter cut-off current	$V_{CE} = 80 \text{ V}$ $V_{CE} = 100 \text{ V}$ $V_{CE} = 120 \text{ V}$ $V_{CE} = 140 \text{ V}$	$V_{BE} = 0$ $V_{BE} = 0$ $V_{BE} = 0$ $V_{BE} = 0$	TIP31 TIP31A TIP31B TIP31C			0.2 0.2 0.2 0.2	mA
I_{CEO} Collector cut-off current	$V_{CE} = 30 \text{ V}$ $V_{CE} = 60 \text{ V}$	$I_B = 0$ $I_B = 0$	TIP31/31A TIP31B/31C			0.3 0.3	mA
I_{EBO} Emitter cut-off current	$V_{EB} = 5 \text{ V}$	$I_C = 0$				1	mA
h_{FE} Forward current transfer ratio	$V_{CE} = 4 \text{ V}$ $V_{CE} = 4 \text{ V}$	$I_C = 1 \text{ A}$ $I_C = 3 \text{ A}$	(see Notes 5 and 6)	25 10		50	
$V_{CE(sat)}$ Collector-emitter saturation voltage	$I_B = 375 \text{ mA}$	$I_C = 3 \text{ A}$	(see Notes 5 and 6)			1.2	V
V_{BE} Base-emitter voltage	$V_{CE} = 4 \text{ V}$	$I_C = 3 \text{ A}$	(see Notes 5 and 6)			1.8	V
h_{fe} Small signal forward current transfer ratio	$V_{CE} = 10 \text{ V}$	$I_C = 0.5 \text{ A}$	$f = 1 \text{ kHz}$	20			
$ h_{fe} $ Small signal forward current transfer ratio	$V_{CE} = 10 \text{ V}$	$I_C = 0.5 \text{ A}$	$f = 1 \text{ MHz}$	3			

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

thermal characteristics

PARAMETER	MIN	TYP	MAX	UNIT
$R_{\theta JC}$ Junction to case thermal resistance			3.125	°C/W
$R_{\theta JA}$ Junction to free air thermal resistance			62.5	°C/W

resistive-load-switching characteristics at 25°C case temperature

PARAMETER	TEST CONDITIONS †			MIN	TYP	MAX	UNIT
t_{on} Turn-on time	$I_C = 1 \text{ A}$	$I_{B(on)} = 0.1 \text{ A}$	$I_{B(off)} = -0.1 \text{ A}$		0.5		μs
t_{off} Turn-off time	$V_{BE(off)} = -4.3 \text{ V}$	$R_L = 30 \Omega$	$t_p = 20 \mu\text{s}$, $dc \leq 2\%$		2		μs

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

TIP31, TIP31A, TIP31B, TIP31C
NPN SILICON POWER TRANSISTORS

JULY 1968 - REVISED MAY 1995

TYPICAL CHARACTERISTICS

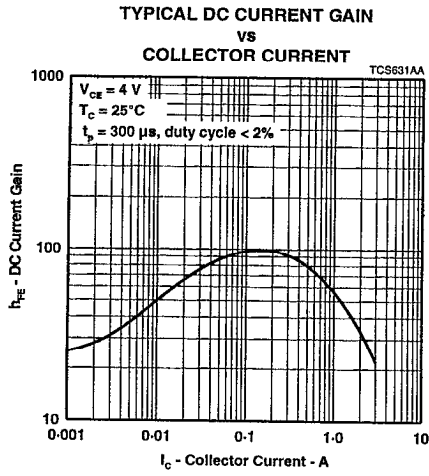


Figure 1.

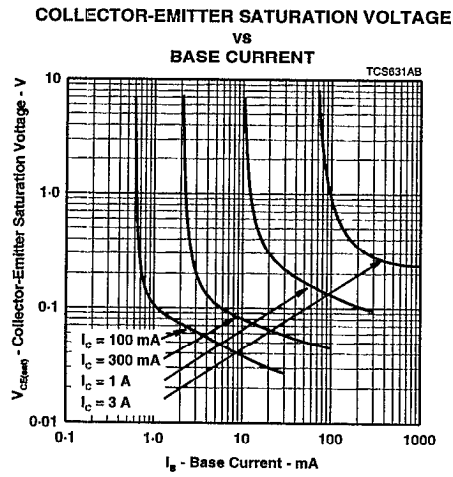


Figure 2.

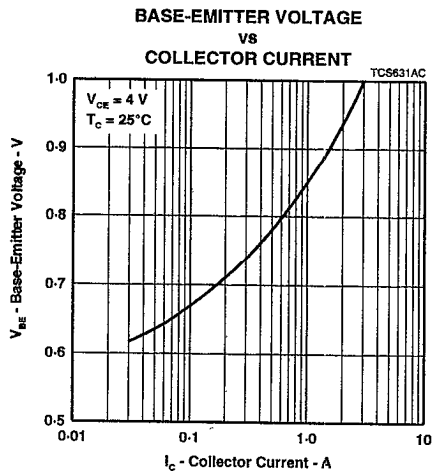


Figure 3.

TIP31, TIP31A, TIP31B, TIP31C
NPN SILICON POWER TRANSISTORS

JULY 1968 - REVISED MAY 1995

MAXIMUM SAFE OPERATING REGIONS

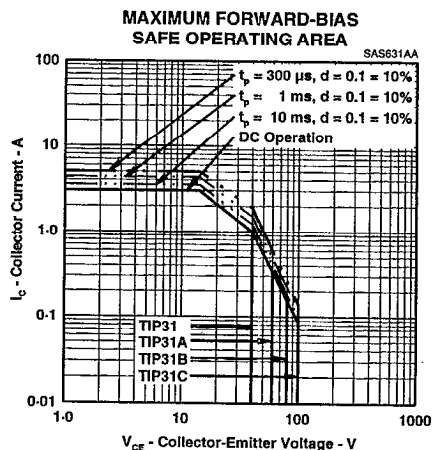


Figure 4.

THERMAL INFORMATION

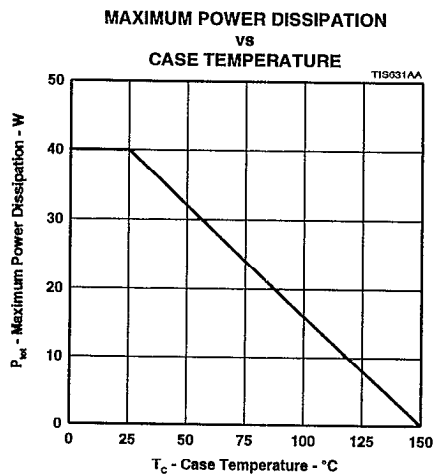


Figure 5.