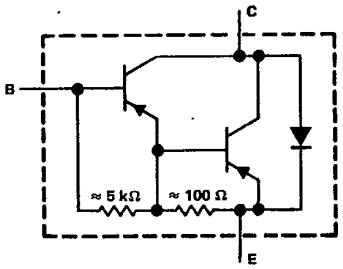
TIP135, TIP136, TIP137
P-N-P DARLINGTON SILICON POWER TRANSISTORS

REVISED OCTOBER 1984

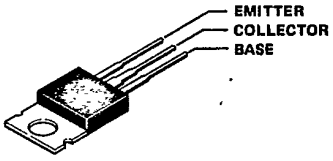
T-33-31

- Designed For Complementary Use With TIP130, TIP131, TIP132
- 70 W at 25°C Case Temperature
- 8 A Rated Collector Current
- Min h_{FE} of 1000 at 4 V, 4 A
- 75 mJ Reverse Energy Rating

device schematic



TO-220AB PACKAGE



THE COLLECTOR IS IN ELECTRICAL CONTACT WITH THE MOUNTING TAB

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

	TIP135	TIP136	TIP137
Collector-base voltage	−60 V	−80 V	−100 V
Collector-emitter voltage (I_B = 0)	−60 V	−80 V	−100 V
Emitter-base voltage	−5 V		
Continuous collector current	−8 A		
Peak collector current (see Note 1)	−12 A		
Continuous base current	−0.3 A		
Safe operating areas at (or below) 25°C case temperature	See Figure 7		
Continuous device dissipation at (or below) 25°C case temperature (see Note 2)	70 W		
Continuous device dissipation at (or below) 25°C free-air temperature (see Note 3)	2 W		
Unclamped inductive load energy (see Note 4)	75 mJ		
Operating collector junction and storage temperature range	−65°C to 150°C		

NOTES: 1. This value applies for $t_w \leq 0.3$ ms, duty cycle ≤ 10 %.
2. Derate linearly to 150°C case temperature at the rate of 0.56 W/°C or refer to Dissipation Derating Curve, Figure 8.
3. Derate linearly to 150°C free-air temperature at the rate of 20 mW/°C or refer to Dissipation Derating Curve.
4. This rating is based on the capability of the transistor to operate safely in the circuit in L = 20 mH, R_{BB2} = 100 Ω, V_{BB2} = 0 V, R_S = 0.1 Ω, V_{CC} = 20 V. Energy ≈ $I_C^2L/2$.

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SILICON POWER TRANSISTORS

electrical characteristics at 25°C case temperature (unless otherwise noted)

PARAMETER	TEST CONDITIONS		TIP135			TIP136			TIP137			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
$V_{(BR)CEO}$	$I_C = -30$ mA, See Note 5	$I_B = 0$,	−60			−80			−100			V
I_{CEO}	$V_{CE} = -30$ V,	$I_B = 0$			−0.5							mA
	$V_{CE} = -40$ V,	$I_B = 0$						−0.5				
	$V_{CE} = -50$ V,	$I_B = 0$									−0.5	
I_{CBO}	$V_{CB} = -60$ V,	$I_E = 0$,			−0.2							mA
	$V_{CB} = -80$ V,	$I_E = 0$,						−0.2				
	$V_{CB} = -100$ V,	$I_E = 0$,									−0.2	
I_{CBO}	$V_{CB} = -60$ V, $T_C = 100°C$	$I_E = 0$,			−0.1							mA
	$V_{CB} = -80$ V, $T_C = 100°C$	$I_E = 0$,						−0.1				
	$V_{CB} = -100$ V, $T_C = 100°C$	$I_E = 0$,									−0.1	
I_{EBO}	$V_{EB} = -5$ V,	$I_C = 0$			−5			−5			−5	mA
h_{FE}	$V_{CE} = -4$ V, See Notes 5 and 6	$I_C = -1$ A,	500			500			500			
	$V_{CE} = -4$ V, See Notes 5 and 6	$I_C = -4$ A,	1000		15000	1000		15000	1000		15000	
$V_{CE(sat)}$	$I_B = -16$ mA, See Notes 5 and 6	$I_C = -4$ A,			−2			−2			−2	V
	$I_B = -30$ mA, See Notes 5 and 6	$I_C = -6$ A,			−3			−3			−3	
V_{BE}	$V_{CE} = -4$ V, See Notes 5 and 6	$I_C = -4$ A,			−2.5			−2.5			−2.5	V
C_{obo}	$V_{CB} = -10$ V,	$I_E = 0$			200			200			200	pF
V_F	$I_F = 8$ A,	See Notes 5 and 6			3.5			3.5			3.5	V

NOTES: 5. These parameters must be measured using pulse techniques, $t_w = 300\,\mu s$, duty cycle ≤ 2 %.
6. These parameters are measured with voltage-sensing contacts separate from the current-carrying contacts located within 3,2 mm (0.125 inch) from the device body.

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SILICON POWER TRANSISTORS

TYPICAL CHARACTERISTICS

T-33-31

STATIC FORWARD CURRENT TRANSFER RATIO
vs
COLLECTOR CURRENT

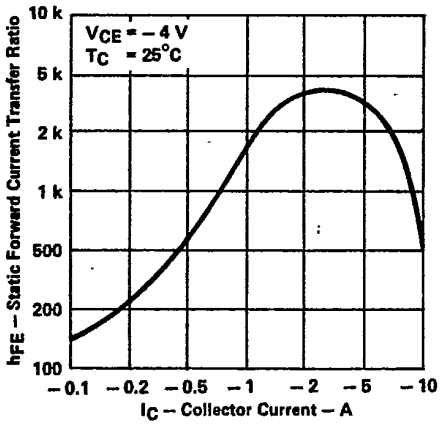

FIGURE 1

COLLECTOR-EMITTER SATURATION VOLTAGE
vs
COLLECTOR CURRENT

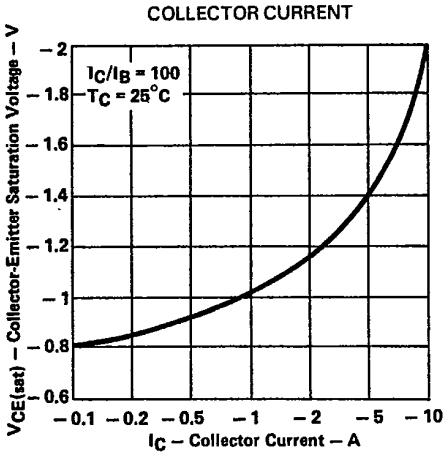

FIGURE 2

BASE-EMITTER VOLTAGE
vs
COLLECTOR CURRENT

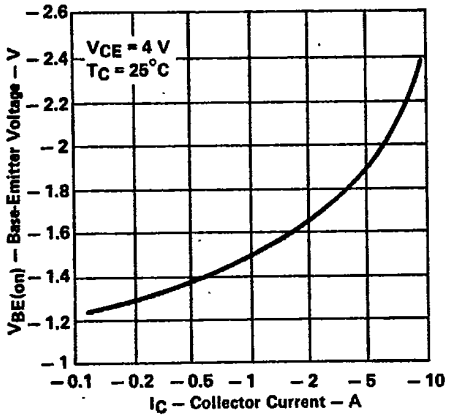

FIGURE 3

FORWARD VOLTAGE OF
COMMUTATING DIODE
vs
FORWARD CURRENT

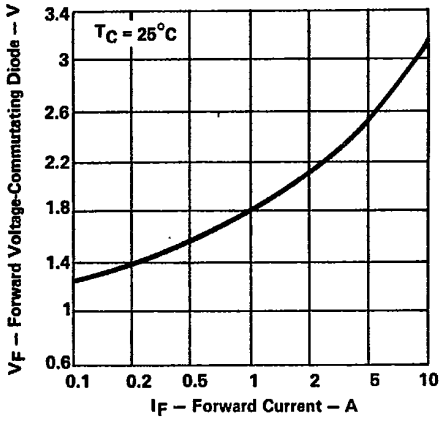

FIGURE 4

5 TIP Devices

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TYPICAL CHARACTERISTICS

COLLECTOR-EMITTER VOLTAGE
vs
COLLECTOR CURRENT

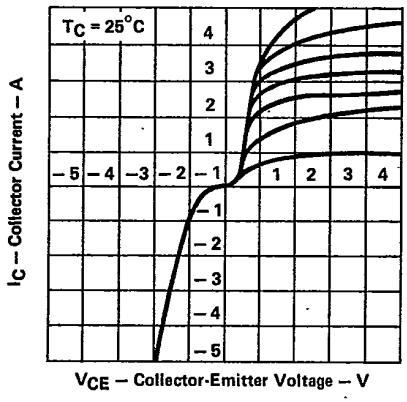

FIGURE 5

EMITTER-BASE CURRENT
vs
EMITTER-BASE VOLTAGE

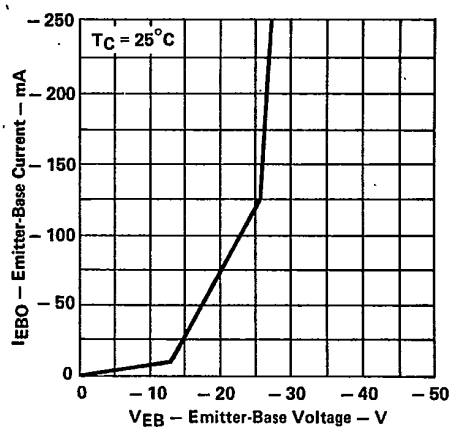

FIGURE 6

MAXIMUM SAFE OPERATING AREA

MAXIMUM COLLECTOR CURRENT
vs
COLLECTOR-EMITTER VOLTAGE

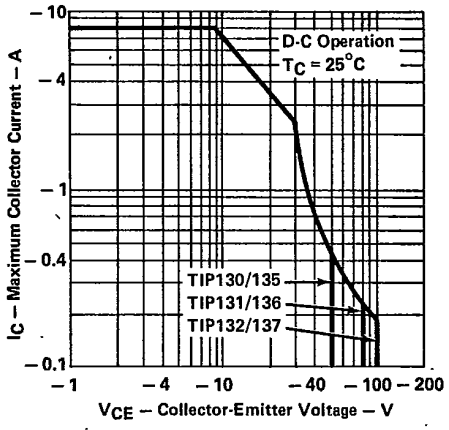

FIGURE 7

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THERMAL INFORMATION

T-33-31

DISSIPATION DERATING CURVE

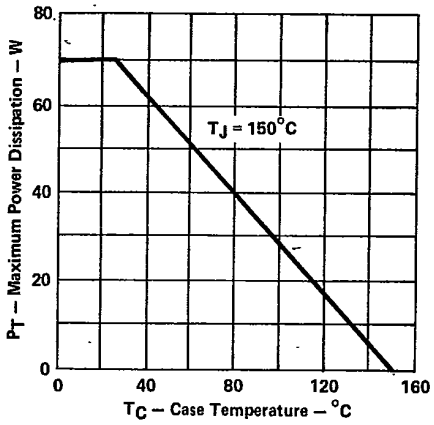

FIGURE 8