

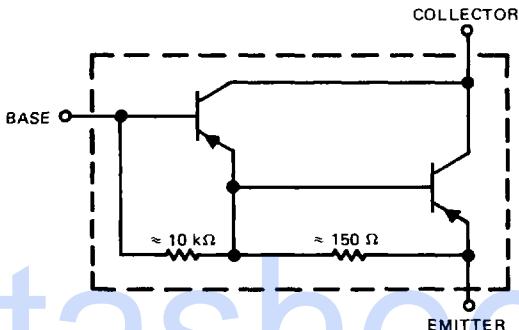
TYPES TIP125, TIP126, TIP127

P-N-P DARLINGTON-CONNECTED SILICON POWER TRANSISTORS

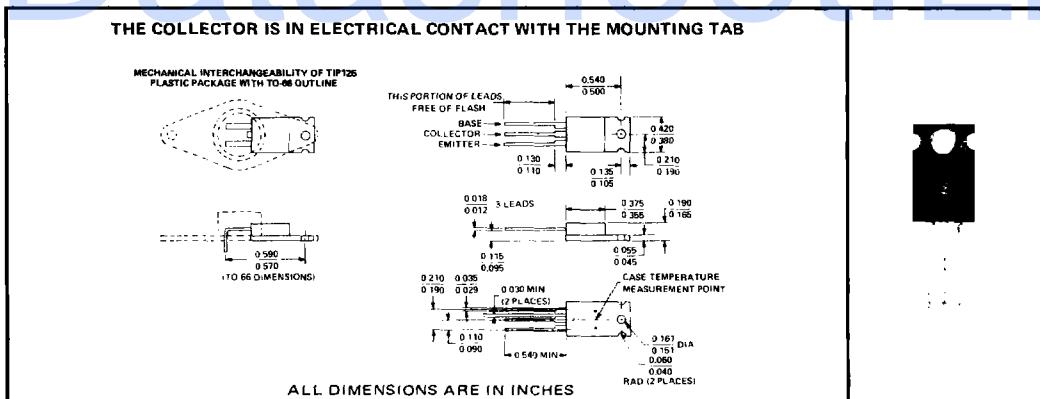
DESIGNED FOR COMPLEMENTARY USE WITH TIP120, TIP121, TIP122

- 65 W at 25°C Case Temperature
- Min h_{FE} of 1000 at 3 V, 3 A
- 5 A Rated Collector Current
- 50 mJ Reverse Energy Rating

device schematic



mechanical data



TYPES TIP125, TIP126, TIP127
BULLETIN NO. DL-S-7111611, DECEMBER 1971

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

	TIP125	TIP126	TIP127
Collector-Base Voltage	-60 V	-80 V	-100 V
Collector-Emitter Voltage (See Note 1)	-60 V	-80 V	-100 V
Emitter-Base Voltage	-5 V	-5 V	-5 V
Continuous Collector Current	5 A	8 A	8 A
Peak Collector Current (See Note 2)	0.1 A	0.1 A	0.1 A
Continuous Base Current	See Figures 7 and 8	65 W	65 W
Safe Operating Areas at (or below) 25°C Case Temperature	2 W	2 W	2 W
Continuous Device Dissipation at (or below) 25°C Case Temperature (See Note 3)	50 mJ	50 mJ	50 mJ
Continuous Device Dissipation at (or below) 25°C Free-Air Temperature (See Note 4)	-65°C to 150°C	-65°C to 150°C	-65°C to 150°C
Unclamped Inductive Load Energy (See Note 5)	260°C	260°C	260°C
Operating Collector Junction Temperature Range			
Storage Temperature Range			
Lead Temperature 1/8 Inch from Case for 10 Seconds			

- NOTES:
1. These values apply when the base-emitter diode is open-circuited.
 2. This value applies for $t_w \leq 0.3$ ms, duty cycle $\leq 10\%$.
 3. Derate linearly to 150°C case temperature at the rate of $0.52 \text{ W}/^{\circ}\text{C}$ or refer to Dissipation Derating Curve, Figure 9.
 4. Derate linearly to 150°C free-air temperature at the rate of $16 \text{ mW}/^{\circ}\text{C}$ or refer to Dissipation Derating Curve, Figure 10.
 5. This rating is based on the capability of the transistors to operate safely in the circuit of Figure 2. $L = 100 \text{ mH}$, $R_{BB2} = 100 \Omega$, $V_{BB2} = 0 \text{ V}$, $R_S = 0.1 \Omega$, $V_{CC} = 20 \text{ V}$. Energy $\approx I_C^2 L/2$.

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electrical characteristics at 25°C case temperature

PARAMETER	TEST CONDITIONS	TIP125	TIP126	TIP127	UNIT
		MIN	MAX	MIN	
$V_{(BR)CEO}$ Collector-Emitter Breakdown Voltage	$I_C = -30 \text{ mA}, I_B = 0, \text{ See Note 6}$	-60	-80	-100	V
I_{CEO} Collector Cutoff Current	$V_{CE} = -30 \text{ V}, I_B = 0$	-0.5			mA
	$V_{CE} = -40 \text{ V}, I_B = 0$		-0.5		
	$V_{CE} = -50 \text{ V}, I_B = 0$			-0.5	
I_{CBO} Collector Cutoff Current	$V_{CB} = -60 \text{ V}, I_E = 0$	-0.2			mA
	$V_{CB} = -80 \text{ V}, I_E = 0$		-0.2		
	$V_{CB} = -100 \text{ V}, I_E = 0$			-0.2	
I_{EBO} Emitter Cutoff Current	$V_{EB} = -5 \text{ V}, I_C = 0$	-2	-2	-2	mA
hFE Transfer Ratio	$V_{CE} = -3 \text{ V}, I_C = -0.5 \text{ A}$	1000	1000	1000	
	$V_{CE} = -3 \text{ V}, I_C = -3 \text{ A}$	1000	1000	1000	
V_{BE} Base-Emitter Voltage	$V_{CE} = -3 \text{ V}, I_C = -3 \text{ A}, \text{ See Notes 6 and 7}$	-2.5	-2.5	-2.5	V
$V_{CE(sat)}$ Collector-Emitter Saturation Voltage	$I_B = -12 \text{ mA}, I_C = -3 \text{ A}$	-2	-2	-2	V
	$I_B = -20 \text{ mA}, I_C = -5 \text{ A}$	See Notes 6 and 7	-4	-4	V

NOTES: 6. These parameters must be measured using pulse techniques. $t_w = 300 \mu\text{s}$, duty cycle $\leq 2\%$.

7. These parameters are measured with voltage-sensing contacts separate from the current-carrying contacts and located within 0.125 inch from the device body.

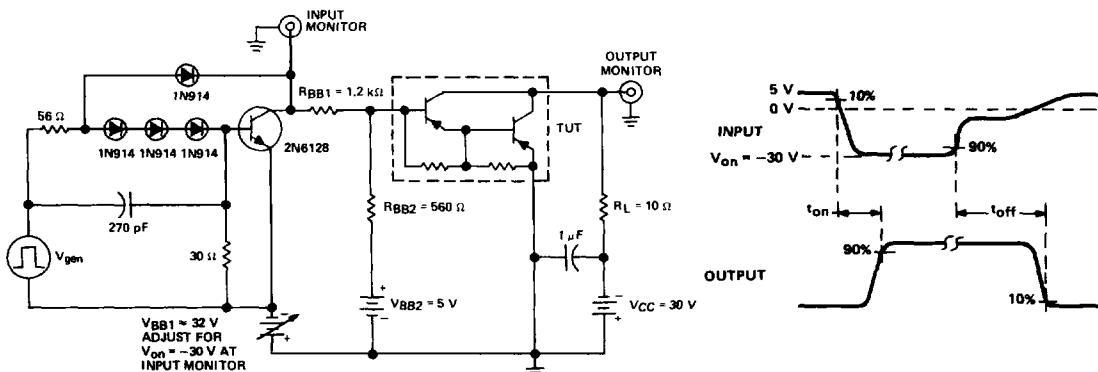
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switching characteristics at 25°C case temperature

PARAMETER	TEST CONDITIONS [†]	TYP	UNIT
		MIN	MAX
t_{on} Turn-On Time	$I_C = -3 \text{ A}, I_B(2) = -12 \text{ mA}, I_B(2) = 12 \text{ mA}, V_{BE(\text{off})} = 5 \text{ V}, R_L = 10 \Omega, \text{ See Figure 1}$	1.5	μs
t_{off} Turn-Off Time		8.5	

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

PARAMETER MEASUREMENT INFORMATION

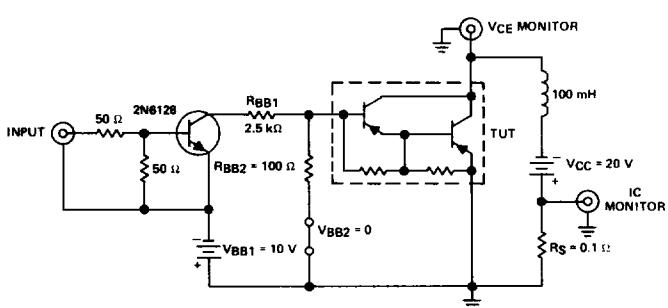


- NOTES:
- A. V_{gen} is a 30-V pulse (from 0 V) into a 50Ω termination.
 - B. The V_{gen} waveform is supplied by a generator with the following characteristics: $t_r \leq 15 \text{ ns}, t_f \leq 15 \text{ ns}, Z_{out} = 50 \Omega, t_w = 20 \mu\text{s}$, duty cycle $\leq 2\%$.
 - C. Waveforms are monitored on an oscilloscope with the following characteristics: $t_r \leq 15 \text{ ns}, R_{in} \geq 10 \text{ M}\Omega, C_{in} \leq 11.5 \text{ pF}$.
 - D. Resistors must be noninductive types.
 - E. The d-c power supplies may require additional bypassing in order to minimize ringing.

FIGURE 1

TYPES TIP125, TIP126, TIP127 P-N-P DARLINGTON-CONNECTED SILICON POWER TRANSISTORS

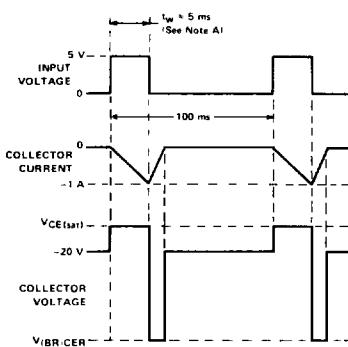
INDUCTIVE LOAD SWITCHING



TEST CIRCUIT

NOTE A: Input pulse width is increased until $I_{CM} = -1 \text{ A}$.

FIGURE 2



VOLTAGE AND CURRENT WAVEFORMS

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TYPICAL CHARACTERISTICS

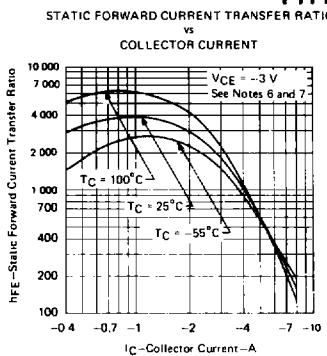


FIGURE 3

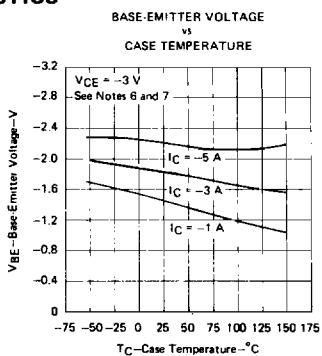


FIGURE 4

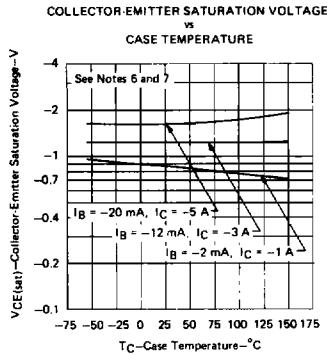


FIGURE 5

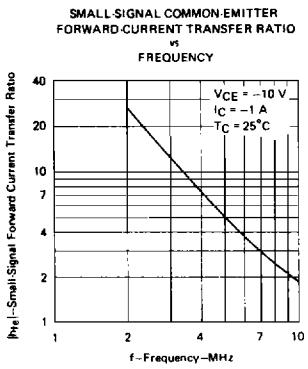


FIGURE 6

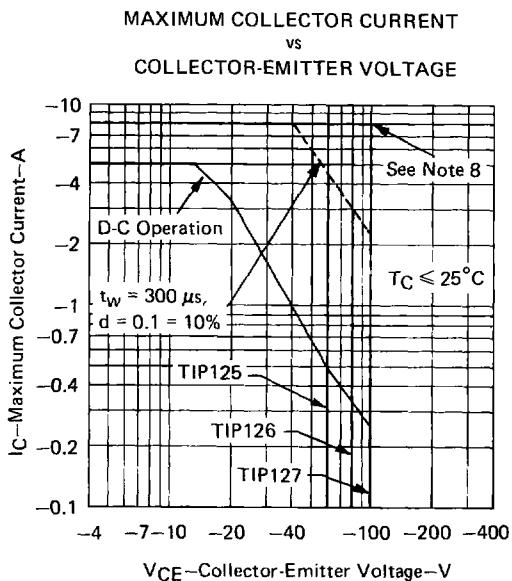
NOTES: 6. These parameters must be measured using pulse techniques. $t_W = 300 \mu\text{s}$, duty cycle $\leq 2\%$.

7. These parameters are measured with voltage-sensing contacts separate from the current-carrying contacts and located within 0.125 inch from the device body.

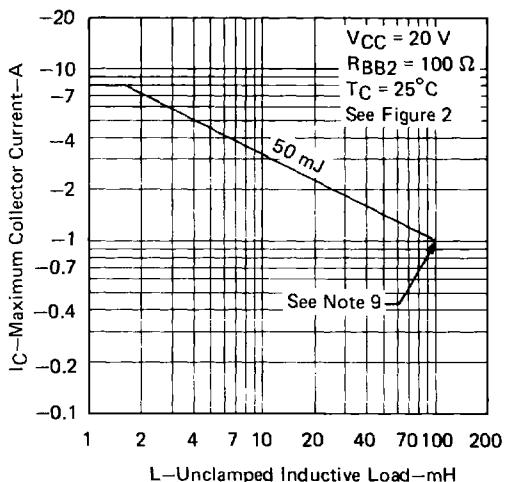
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P-N-P DARLINGTON-CONNECTED SILICON POWER TRANSISTORS

MAXIMUM SAFE OPERATING AREAS

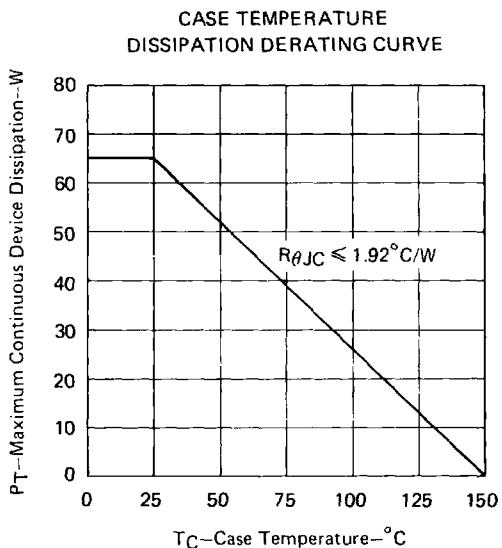


MAXIMUM COLLECTOR CURRENT
vs
UNCLAMPED INDUCTIVE LOAD



NOTES: 8. These combinations of maximum voltage and current may be achieved only when switching from saturation to cutoff with a clamped inductive load.
9. Above this point the safe operating area has not been defined.

THERMAL INFORMATION



FREE-AIR TEMPERATURE
DISSIPATION DERATING CURVE

