

8961726 TEXAS INSTR (OPT0)

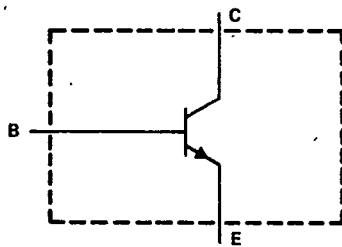
62C 36641 D

**BUX47, BUX47A, BUX47B  
N-P-N SILICON POWER TRANSISTORS**

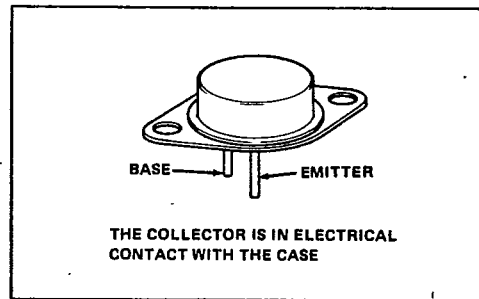
*T-33-13*  
REVISED OCTOBER 1984

- 125 W at 25°C Case Temperature
- 9 A Continuous Collector Current
- 15 A Peak Collector Current
- Series Features High-Voltage and Peak Current Ratings, Low Saturation Voltages, and a High Degree of Electrical Robustness
- Designed for Switching-Mode Power Supplies, CRT Scanning, Inverters, and Other Industrial Applications Where Rapid Switching of Inductive-Loads is Necessary

device schematic



TO-3 PACKAGE



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

	BUX47	BUX47A	BUX47B
Collector-emitter voltage ( $V_{BE} = -2.5\text{ V}$ )	850 V	1000 V	850 V
Collector-emitter voltage ( $R_{BE} = 10\ \Omega$ )	850 V	1000 V	850 V
Collector-emitter voltage ( $I_B = 0$ )	400 V	450 V	400 V
Continuous collector current	9 A		
Peak collector current (see Note 1)	15 A		
Base current	6 A		
Continuous device dissipation ( $T_C = 25^\circ\text{C}$ )	125 W		
Operating junction temperature	- 65°C to 200°C		

NOTE 1: These values apply for  $t_W = 5\text{ ms}$ , duty cycle  $\leq 2\%$ .



BD, BDW, BDY, BU, BUX, BUY Devices

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**BUX47, BUX47A, BUX47B**  
**N-P-N SILICON POWER TRANSISTORS**

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

PARAMETER	TEST CONDITIONS	BUX47			BUX47A			BUX47B			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V <sub>CEO(sus)</sub>	I <sub>C</sub> = 200 mA, L = 25 mH, See Note 2	400			450			400			V
V <sub>(BR)EBO</sub>	I <sub>E</sub> = 50 mA, I <sub>C</sub> = 0 A	7	30		7	30		7	30		V
I <sub>CER</sub>	V <sub>CE</sub> = 850 V, R <sub>BE</sub> < 10 Ω			0.4			0.4				mA
	V <sub>CE</sub> = 1000 V, R <sub>BE</sub> < 10 Ω						0.4				
	V <sub>CE</sub> = 850 V, R <sub>BE</sub> < 10 Ω, T <sub>C</sub> = 125°C			3						3	
	V <sub>CE</sub> = 1000 V, R <sub>BE</sub> < 10 Ω, T <sub>C</sub> = 125°C						3				
I <sub>CEX</sub>	V <sub>CE</sub> = 850 V, V <sub>BE</sub> = -2.5 V			0.15						0.15	mA
	V <sub>CE</sub> = 1000 V, V <sub>BE</sub> = -2.5 V						0.15				
	V <sub>CE</sub> = 850 V, V <sub>BE</sub> = -2.5 V, T <sub>C</sub> = 125°C			1.5						1.5	
	V <sub>CE</sub> = 1000 V, V <sub>BE</sub> = -2.5 V, T <sub>C</sub> = 125°C						1.5				
I <sub>EBO</sub>	V <sub>EB</sub> = 5 V, I <sub>C</sub> = 0 A			1			1			1	mA
V <sub>CE(sat)</sub>	I <sub>C</sub> = 6 A, I <sub>B</sub> = 1.2 A									1.5	V
	I <sub>C</sub> = 9 A, I <sub>B</sub> = 3 A									3	
	I <sub>C</sub> = 5 A, I <sub>B</sub> = 1 A			1.5			1.5				
	I <sub>C</sub> = 8 A, I <sub>B</sub> = 2.5 A			3							
V <sub>BE(sat)</sub>	I <sub>C</sub> = 5 A, I <sub>B</sub> = 1 A			1.6			1.6				V
	I <sub>C</sub> = 6 A, I <sub>B</sub> = 1.2 A									1.6	
f <sub>T</sub>	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 0.5 A, See Note 3		8		8			8			MHz
C <sub>obo</sub>	V <sub>CB</sub> = 20 V, I <sub>C</sub> = 0 A, f = 0.1 MHz		105		105			105			pF

NOTES: 2. These parameters must be measured using pulse techniques, t<sub>w</sub> = 5 ms, duty cycle < 2%.  
 3. To obtain f<sub>T</sub>, the |h<sub>fe</sub>| response is extrapolated at the rate of -6 dB per octave from f = 1 MHz to the frequency at which |h<sub>fe</sub>| = 1.

thermal characteristics

PARAMETER	MIN	TYP	MAX	UNIT
R <sub>θJC</sub>			1.4	°C/W

resistive-load switching characteristics at 25°C case temperature

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t <sub>on</sub>	I <sub>C</sub> = 5 A, V <sub>CC</sub> = 150 V, I <sub>B1</sub> = 1 A, I <sub>B2</sub> = -1 A, See Figure 1			1	μs
t <sub>s</sub>				3	μs
t <sub>f</sub>				0.8	μs
t <sub>on</sub>	I <sub>C</sub> = 6 A, V <sub>CC</sub> = 150 V, I <sub>B1</sub> = 1.2 A, I <sub>B2</sub> = -1.2 A, See Figure 1			1	μs
t <sub>s</sub>				3	μs
t <sub>f</sub>				0.8	μs

inductive-load switching characteristics at 100°C case temperature

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t <sub>s</sub>	I <sub>C</sub> = 5 A, V <sub>CC</sub> = 300 V, I <sub>B1</sub> = 1 A, V <sub>B</sub> = -5 V, L <sub>B</sub> = 3 μH, See Figure 2			4	μs
t <sub>f</sub>				0.4	μs
t <sub>s</sub>	I <sub>C</sub> = 6 A, V <sub>CC</sub> = 300 V, I <sub>B1</sub> = 1.2 A, V <sub>B</sub> = -5 V, L <sub>B</sub> = 3 μH, See Figure 2			4	μs
t <sub>f</sub>				0.4	μs

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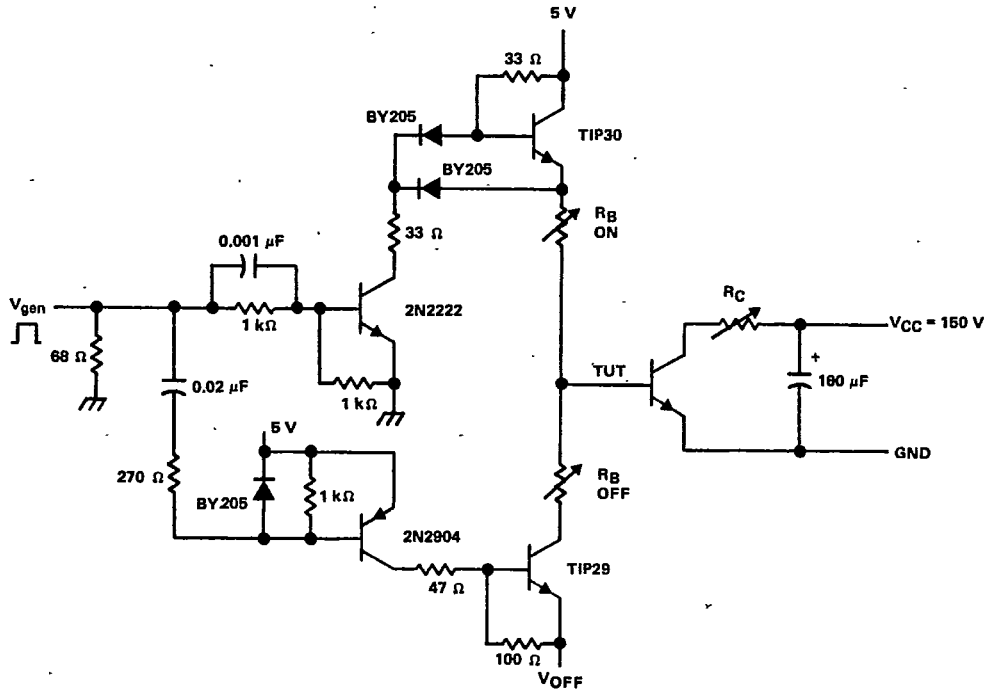
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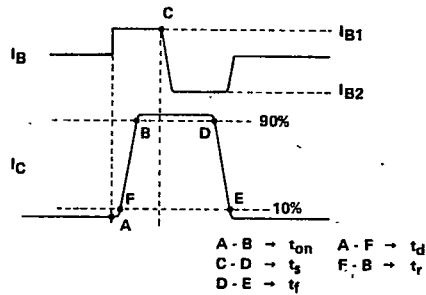
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PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT



VOLTAGE WAVEFORMS

- NOTES: A. The  $V_{gen}$  waveform is supplied by a generator with the following characteristics:  $t_r \leq 15$  ns,  $t_f \leq 15$  ns,  $Z_{out} = 50 \Omega$ ,  $t_w = 20 \mu$ s, duty cycle  $\leq 2\%$ .  
 B. Waveforms are monitored on an oscilloscope with the following characteristics:  $t_r \leq 15$  ns,  $R_{in} \geq 10$  M $\Omega$ ,  $C_{in} \leq 11.5$  pF.  
 C. Resistors must be noninductive types.

FIGURE 1. RESISTIVE-LOAD SWITCHING



BD, BDW, BDX, BU, BUX, BUY Devices

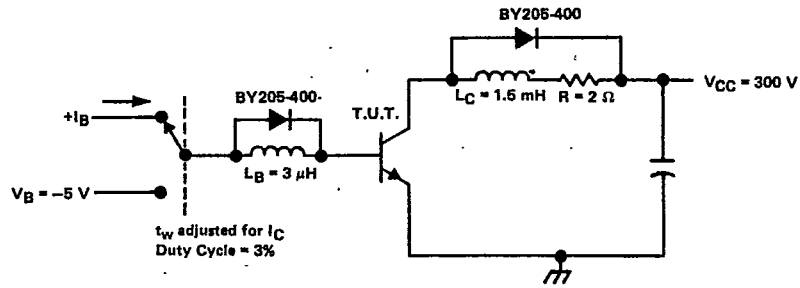
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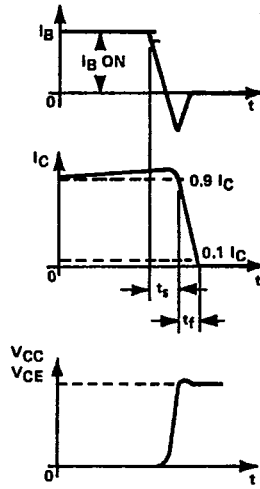
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PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT



VOLTAGE WAVEFORMS

FIGURE 2. INDUCTIVE-LOAD SWITCHING

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TYPICAL CHARACTERISTICS

RESISTIVE-LOAD TURN-ON TIME  
vs  
COLLECTOR CURRENT

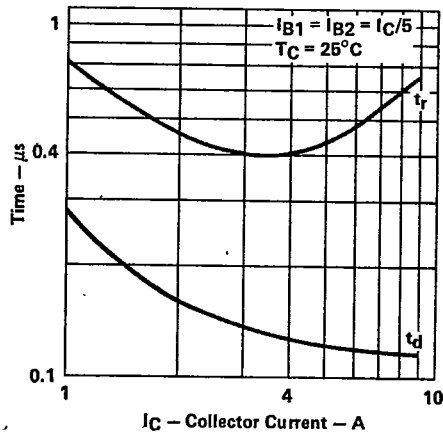


FIGURE 3

RESISTIVE-LOAD TURN-OFF TIME  
vs  
COLLECTOR CURRENT

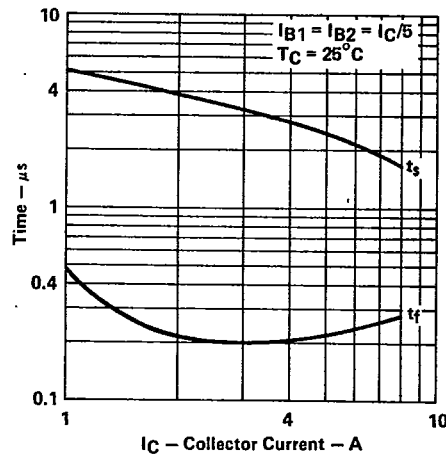


FIGURE 4

COLLECTOR CUTOFF CURRENT  
vs  
CASE TEMPERATURE

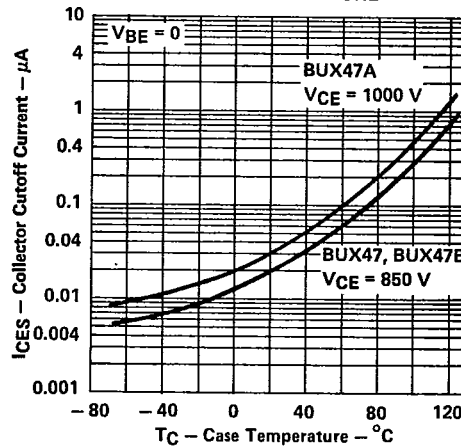


FIGURE 5



BD, BDW, BDY, BU, BUX, BUY Devices

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**TYPICAL CHARACTERISTICS**

FORWARD CURRENT TRANSFER RATIO  
vs  
COLLECTOR CURRENT

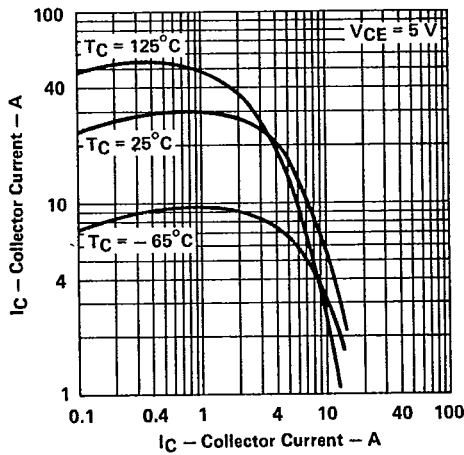


FIGURE 6

COLLECTOR-EMITTER SATURATION VOLTAGE  
vs  
BASE CURRENT

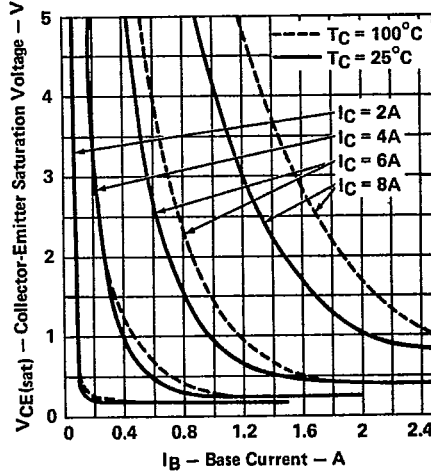


FIGURE 7

**MAXIMUM SAFE OPERATING AREA**

FORWARD-BIAS SAFE OPERATING AREA

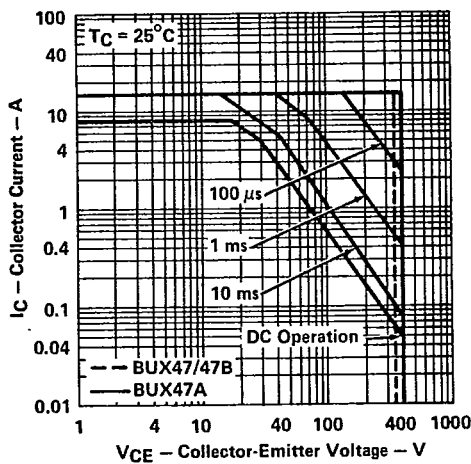


FIGURE 8

LIMITING CONDITIONS  
FOR POWER-DOWN TRANSIENT

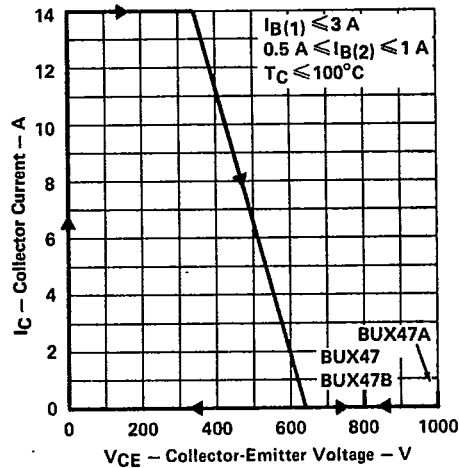


FIGURE 9

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THERMAL INFORMATION

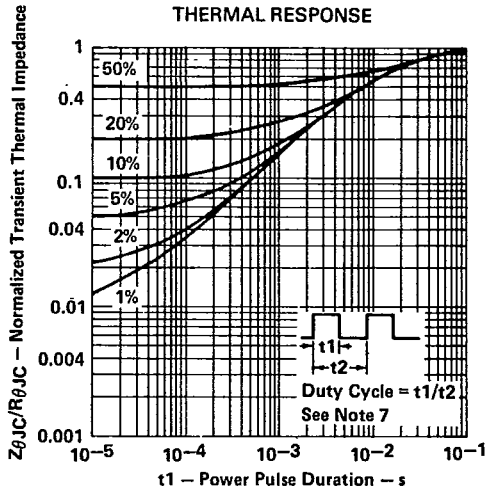


FIGURE 10

NOTE 7: Read time at end of  $t_1$ ,  $T_{J(max)} - T_C = P_{D(peak)} \cdot \left( \frac{Z_{\theta JC}}{R_{\theta JC}} \right) \cdot R_{\theta JC(max)}$ .

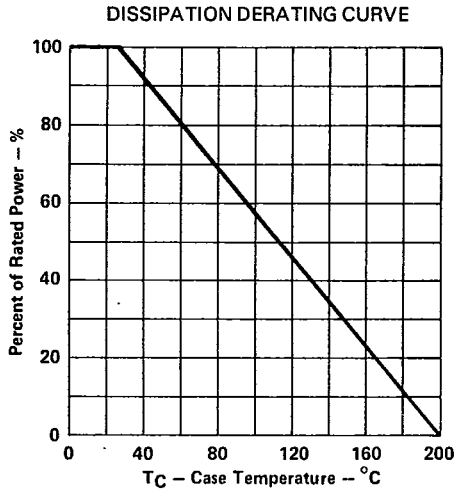


FIGURE 11



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