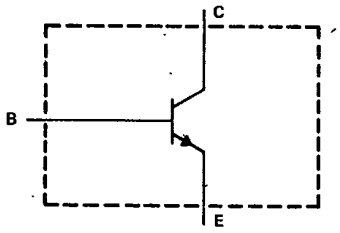
BUX80, BUX81
N-P-N SILICON POWER TRANSISTORS

T-33-13

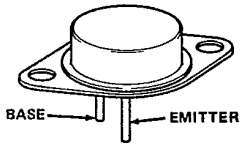
OCTOBER 1982 – REVISED OCTOBER 1984

- 150 W at 25°C Case Temperature
- 10 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



THE COLLECTOR IS IN ELECTRICAL CONTACT WITH THE CASE

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

	BUX80	BUX81
Collector-emitter voltage (V_{BE} = 0)	800 V	1000 V
Collector-emitter voltage (R_{BE} = 10 Ω)	500 V	500 V
Collector-emitter voltage (I_B = 0)	400 V	450 V
Continuous collector current	10 A	
Peak collector current (see Note 1)	15 A	
Continuous base current	4 A	
Peak base current (see Note 1)	6 A	
Continuous device dissipation (T_C = 25°C)	150 W	
Operating junction temperature	−65°C to 200 °C	

NOTE 1: These values apply for $t_w \leq 2$ ms, duty cycle ≤10%.

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

PARAMETER	TEST CONDITIONS			BUX80			BUX81			UNIT
				MIN	TYP	MAX	MIN	TYP	MAX	
$V_{CEO(sus)}$	I_C = 0.1 A,	L = 25 mH,	See Note 3	400			450			V
$V_{CER(sus)}$	I_C = 0.1 A, See Note 2	L = 15 mH,	R_{BE} = 50 Ω,	500			500			V
I_{CES}	V_{CE} = 800 V,	V_{BE} = 0				1				mA
	V_{CE} = 800 V,	V_{BE} = 0,	T_C = 125°C			3				
	V_{CE} = 1000 V,	V_{BE} = 0							1	
	V_{CE} = 1000 V,	V_{BE} = 0,	T_C = 125°C						3	
I_{EBO}	V_{EB} = 10 V,	I_C = 0				10			10	mA
$V_{CE(sat)}$	I_C = 5 A,	I_B = 1 A,	See Notes 3 and 4			1.5			1.5	V
	I_C = 8 A,	I_B = 2.5 A,	See Notes 3 and 4			3			3	
$V_{BE(sat)}$	I_C = 5 A,	I_B = 1 A,	See Notes 3 and 4			1.4			1.4	V
	I_C = 8 A,	I_B = 2.5 A,	See Notes 3 and 4			1.8			1.8	
f_T	V_{CE} = 10 V,	I_C = 0.5 A,	See Note 5		8			8		MHz
C_{obo}	V_{CB} = 20 V,	I_E = 0,	f = 0.1 MHz		105			105		pF

NOTES: 2. Inductive loop switching measurement.
3. These parameters must be measured using pulse techniques, t_w = 300 μs, duty cycle = 2%.
4. These parameters are measured with voltage-sensing contacts separated from the current-carrying contacts located within 3,2 mm (0.125 inch) from the device body.
5. To obtain f_T, the $|h_{fe}|$ response is extrapolated at the rate of −6 dB per octave from f = 1 MHz to the frequency at which $|h_{fe}|$ = 1.

thermal characteristics

PARAMETER	MIN	TYP	MAX	UNIT
$R_{\theta JC}$			1.17	°C/W

resistive-load switching characteristics at 25°C case temperature (unless otherwise noted)

PARAMETER	TEST CONDITIONS		MIN	TYP	MAX	UNIT
t_{on}	I_C = 5 A, V_{CC} = 250 V, I_{B1} = 1 A, I_{B2} = −2 A, See Figure 1	T_C = 25°C			0.5	μs
t_s					3.5	μs
t_f		T_C = 95°C			0.8	μs

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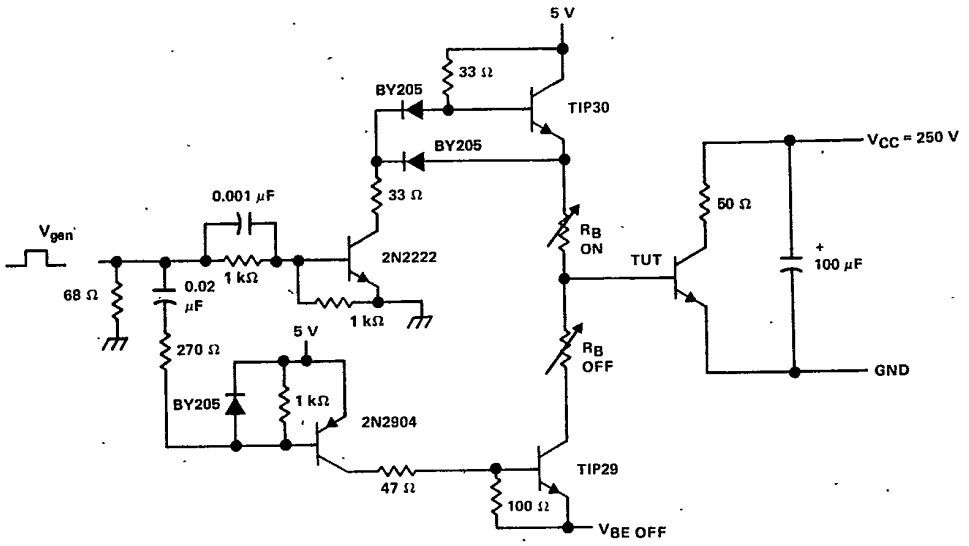
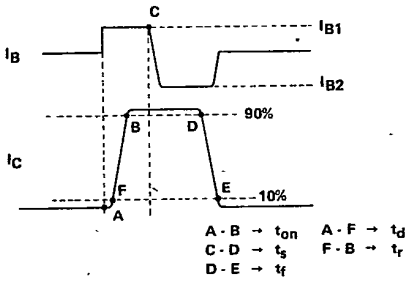
PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT

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



CURRENT WAVEFORMS

FIGURE 1. RESISTIVE-LOAD SWITCHING

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TYPICAL CHARACTERISTICS

TURN-OFF TIME
vs
COLLECTOR CURRENT

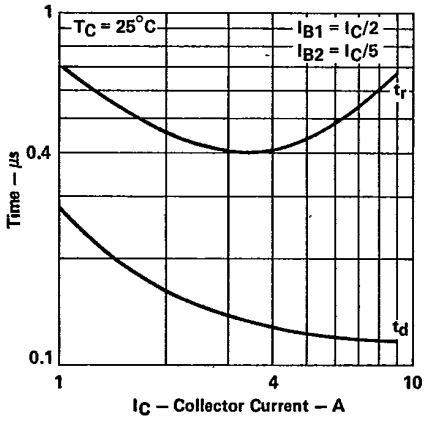

FIGURE 2

TURN-OFF TIME
vs
COLLECTOR CURRENT

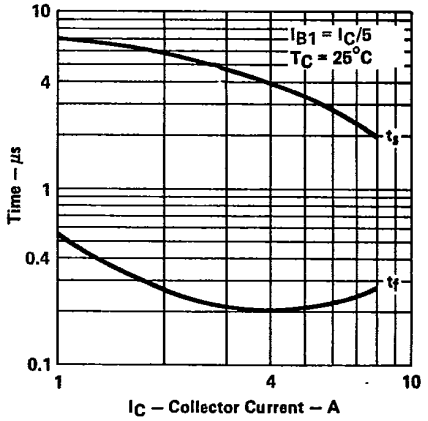

FIGURE 3

COLLECTOR CUTOFF CURRENT
vs
CASE TEMPERATURE

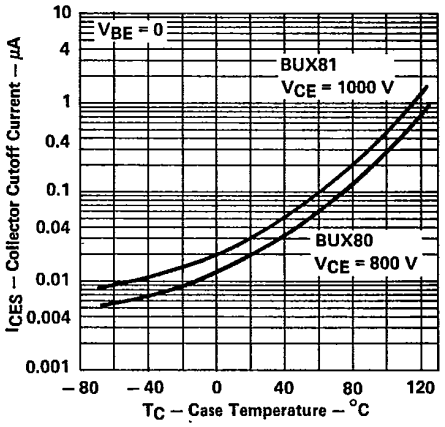

FIGURE 4

FORWARD CURRENT TRANSFER RATIO
vs
COLLECTOR CURRENT

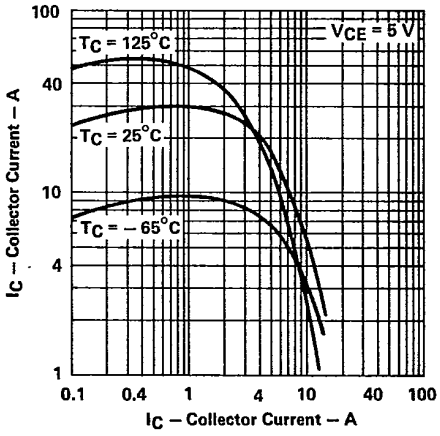

FIGURE 5

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TYPICAL CHARACTERISTICS

COLLECTOR-EMITTER SATURATION VOLTAGE vs BASE CURRENT

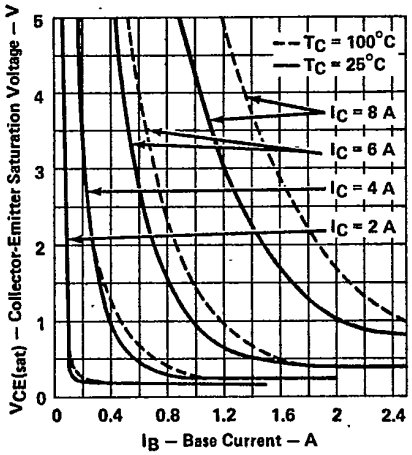

FIGURE 6

BASE-EMITTER SATURATION VOLTAGE vs BASE CURRENT

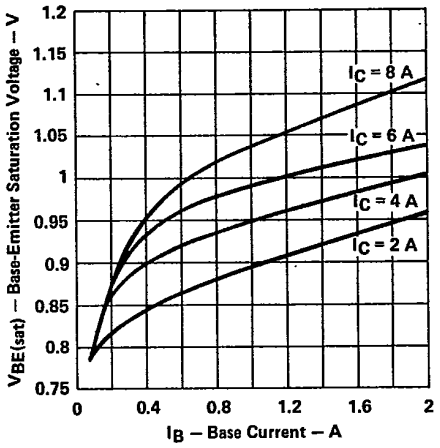

FIGURE 7

MAXIMUM SAFE OPERATING AREAS

FORWARD-BIAS SAFE OPERATING AREA

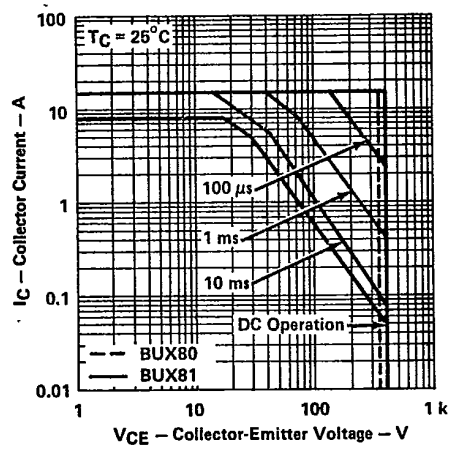

FIGURE 8

LIMITING CONDITIONS FOR POWER-DOWN TRANSIENT

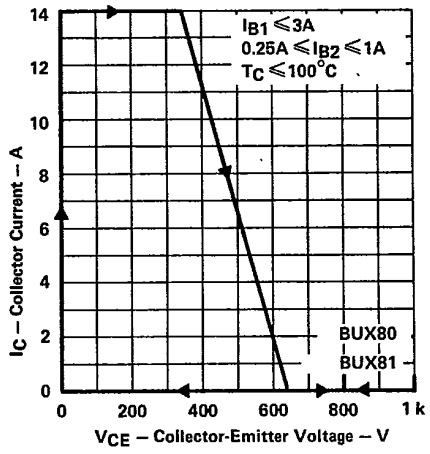

FIGURE 9

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MAXIMUM SAFE OPERATING AREA

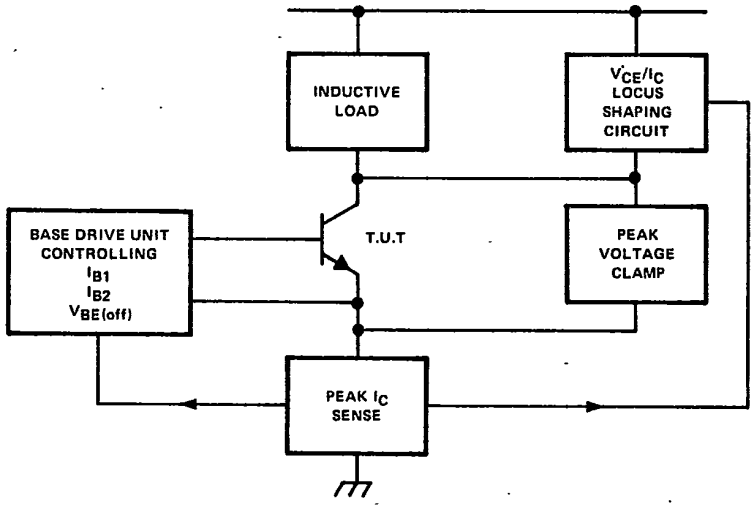

FIGURE 10. TEST CIRCUIT FOR POWER-DOWN TRANSIENT

THERMAL INFORMATION

THERMAL RESPONSE

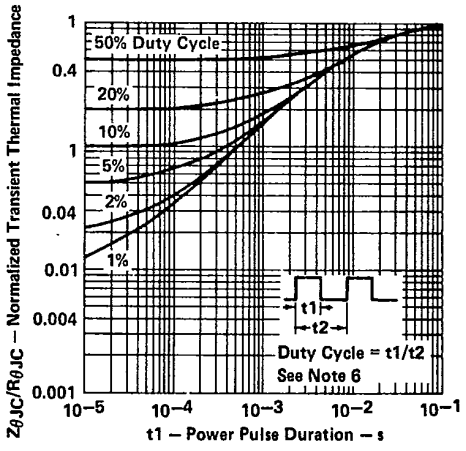

FIGURE 11

DISSIPATION DERATING CURVE

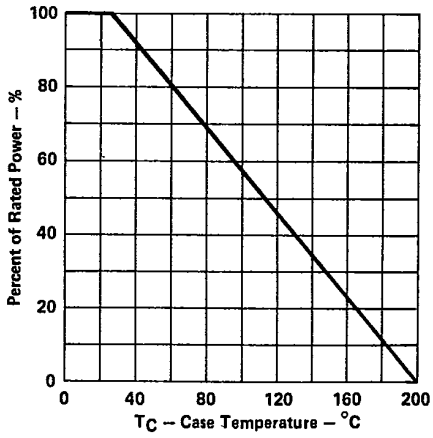

FIGURE 12

NOTE 6: Read time at end of t1, $T_J(max) - T_J(max) - T_C = P_{D(peak)} \cdot \left(\frac{Z_{\theta JC}}{R_{\theta JC}}\right) \cdot R_{\theta JC}(max)$.