

# SWITCHMODE™ Series

## NPN Silicon Power Transistor

... designed for high speed, high current, high power applications.

- High DC current gain:  
 $h_{FE}$  min. = 20 at  $I_C = 12$  A
- Low  $V_{CE(sat)}$ ,  $V_{CE(sat)}$   
max. = 0.6 V at  $I_C = 8$  A
- Very fast switching times:  
TF max. = 0.4  $\mu$ s at  $I_C = 25$  A

### MAXIMUM RATINGS

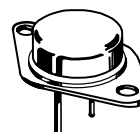
Rating	Symbol	Value	Unit
Collector–Emitter Voltage	$V_{CEO(sus)}$	200	Vdc
Collector–Base Voltage	$V_{CBO}$	250	Vdc
Emitter–Base Voltage	$V_{EBO}$	7	Vdc
Collector–Emitter Voltage ( $V_{BE} = -1.5$ V)	$V_{CEX}$	250	Vdc
Collector–Emitter Voltage ( $R_{BE} = 100 \Omega$ )	$V_{CER}$	240	Vdc
Collector–Current — Continuous	$I_C$	40	Adc
— Peak ( $PW \leq 10$ ms)	$I_{CM}$	50	Apk
Base–Current continuous	$I_B$	8	Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$	$P_D$	250	Watts
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	–65 to 200	$^\circ\text{C}$

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$\theta_{JC}$	0.7	$^\circ\text{C/W}$

## BUV21

**40 AMPERES  
NPN SILICON  
POWER  
METAL TRANSISTOR  
200 VOLTS  
250 WATTS**



**CASE 197A-05  
TO-204AE  
(TO-3)**

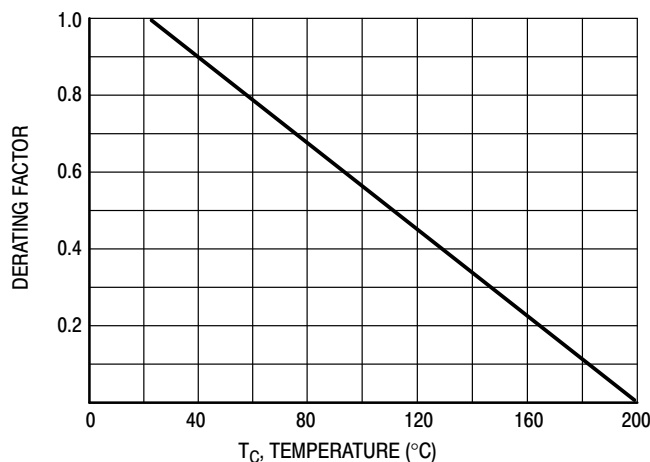


Figure 1. Power Derating

# BUV21

## ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
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### OFF CHARACTERISTICS<sup>1</sup>

Collector–Emitter Sustaining Voltage ( $I_C = 200\text{ mA}$ , $I_B = 0$ , $L = 25\text{ mH}$ )	$V_{CEO(sus)}$	200		Vdc
Collector Cutoff Current at Reverse Bias: ( $V_{CE} = 250\text{ V}$ , $V_{BE} = -1.5\text{ V}$ ) ( $V_{CE} = 250\text{ V}$ , $V_{BE} = -1.5\text{ V}$ , $T_C = 125^\circ\text{C}$ )	$I_{CEX}$		3.0 12.0	mAdc
Collector–Emitter Cutoff Current ( $V_{CE} = 160\text{ V}$ )	$I_{CEO}$		3.0	mAdc
Emitter–Base Reverse Voltage ( $I_E = 50\text{ mA}$ )	$V_{EBO}$	7		V
Emitter–Cutoff Current ( $V_{EB} = 5\text{ V}$ )	$I_{EBO}$		1.0	mAdc

### SECOND BREAKDOWN

Second Breakdown Collector Current with base forward biased ( $V_{CE} = 20\text{ V}$ , $t = 1\text{ s}$ ) ( $V_{CE} = 140\text{ V}$ , $t = 1\text{ s}$ )	$I_{S/b}$	12 0.15		Adc
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### ON CHARACTERISTICS<sup>1</sup>

DC Current Gain ( $I_C = 12\text{ A}$ , $V_{CE} = 2\text{ V}$ ) ( $I_C = 25\text{ A}$ , $V_{CE} = 4\text{ V}$ )	$h_{FE}$	20 10	60	
Collector–Emitter Saturation Voltage ( $I_C = 12\text{ A}$ , $I_B = 1.2\text{ A}$ ) ( $I_C = 25\text{ A}$ , $I_B = 3\text{ A}$ )	$V_{CE(sat)}$		0.6 1.5	Vdc
Base–Emitter Saturation Voltage ( $I_C = 25\text{ A}$ , $I_B = 3\text{ A}$ )	$V_{BE(sat)}$		1.5	Vdc

### DYNAMIC CHARACTERISTICS

Current Gain – Bandwidth Product ( $V_{CE} = 15\text{ V}$ , $I_C = 2\text{ A}$ , $f = 4\text{ MHz}$ )	$f_T$	8.0		MHz
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### SWITCHING CHARACTERISTICS (Resistive Load)

Turn-on Time	( $I_C = 25\text{ A}$ , $I_{B1} = I_{B2} = 3\text{ A}$ , $V_{CC} = 100\text{ V}$ , $R_C = 4\ \Omega$ )	$t_{on}$		1.0	$\mu\text{s}$
Storage Time		$t_s$		1.8	
Fall Time		$t_f$		0.4	

<sup>1</sup> Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

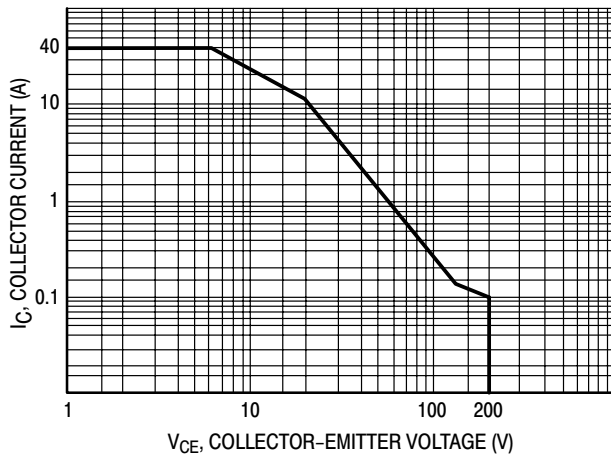


Figure 2. Active Region Safe Operating Area

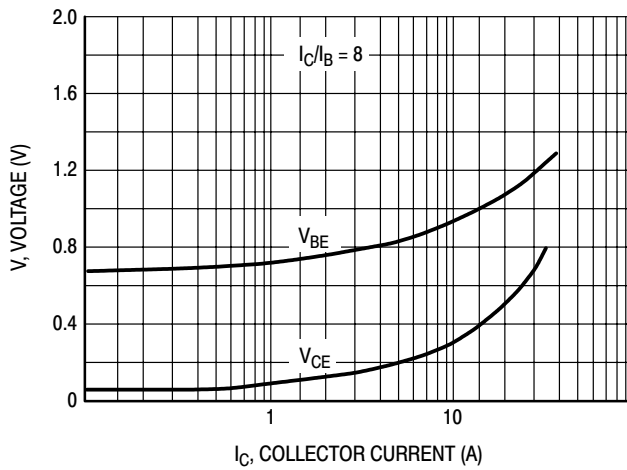


Figure 3. "On" Voltages

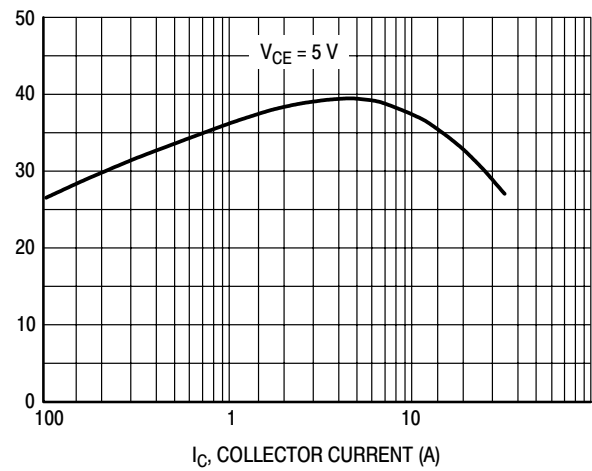


Figure 4. DC Current Gain

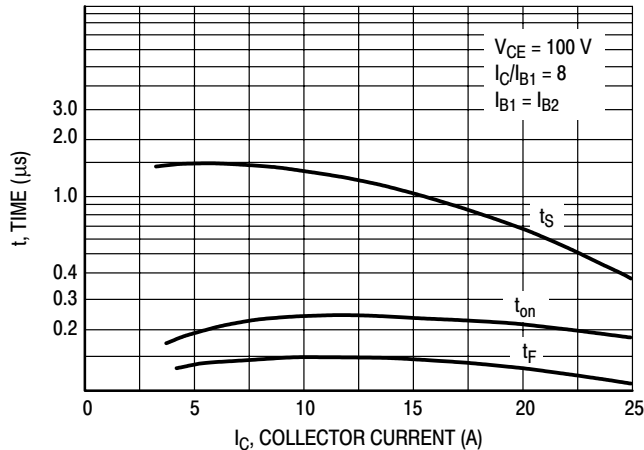


Figure 5. Resistive Switching Performance

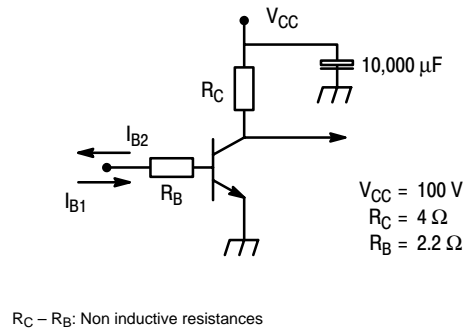
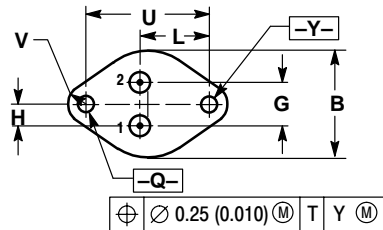
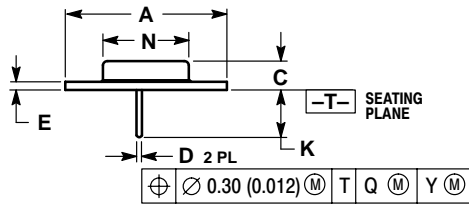


Figure 6. Switching Times Test Circuit

# BUV21

## PACKAGE DIMENSIONS


### TO-204 (TO-3) CASE 197A-05 ISSUE J



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	1.530	REF	38.86	REF
B	0.990	1.050	25.15	26.67
C	0.250	0.335	6.35	8.51
D	0.057	0.063	1.45	1.60
E	0.060	0.070	1.53	1.77
G	0.430	BSC	10.92	BSC
H	0.215	BSC	5.46	BSC
K	0.440	0.480	11.18	12.19
L	0.665	BSC	16.89	BSC
N	0.760	0.830	19.31	21.08
Q	0.151	0.165	3.84	4.19
U	1.187	BSC	30.15	BSC
V	0.131	0.188	3.33	4.77

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