

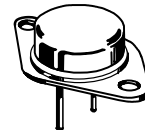
BUV22

SWITCHMODE Series
NPN Silicon Power Transistor

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

- High DC current gain: HFE min. = 20 at $I_C = 10\text{ A}$
- Low $V_{CE(sat)}$: $V_{CE(sat)}$ max. = 1.0 V at $I_C = 10\text{ A}$
- Very fast switching times:
 T_F max. = 0.35 μs at $I_C = 20\text{ A}$

40 AMPERES
NPN SILICON
POWER
METAL TRANSISTOR
250 VOLTS
250 WATTS



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

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--|----------------|------------|------------------|
| Collector-Emitter Voltage | $V_{CEO(sus)}$ | 250 | Vdc |
| Collector-Base Voltage | V_{CB0} | 300 | Vdc |
| Emitter-Base Voltage | V_{EB0} | 7 | Vdc |
| Collector-Emitter Voltage ($V_{BE} = -1.5\text{ V}$) | V_{CEX} | 300 | Vdc |
| Collector-Emitter Voltage ($R_{BE} = 100\ \Omega$) | V_{CER} | 290 | Vdc |
| Collector-Current — Continuous | I_C | 40 | Adc |
| — Peak ($p_w \leq 10\text{ ms}$) | 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 | θ_{JC} | 0.7 | $^\circ\text{C/W}$ |

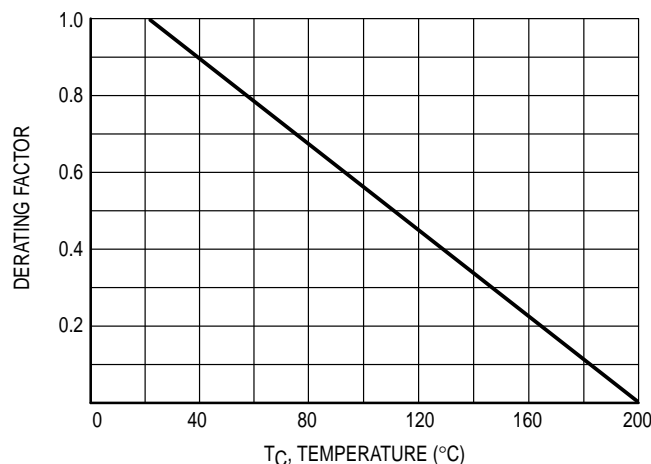


Figure 1. Power Derating

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REV 7

BUV22**ELECTRICAL CHARACTERISTICS** ($T_C = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic | Symbol | Min | Max | Unit |
|--|----------------|-----|-------------|------|
| OFF CHARACTERISTICS¹ | | | | |
| Collector–Emitter Sustaining Voltage ($I_C = 200\text{ mA}$, $I_B = 0$, $L = 25\text{ mH}$) | $V_{CEO(sus)}$ | 250 | | Vdc |
| Collector Cutoff Current at Reverse Bias ($V_{CE} = 300\text{ V}$, $V_{BE} = -1.5\text{ V}$) ($V_{CE} = 300\text{ V}$, $V_{BE} = -1.5\text{ V}$, $T_C = 125^\circ\text{C}$) | I_{CEX} | | 3.0 12.0 | mAdc |
| Collector–Emitter Cutoff Current ($V_{CE} = 200\text{ V}$) | 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 |
|--|-----------|------------|--|-----|

ON CHARACTERISTICS¹

| | | | | |
|--|---------------|----------|------------|-----|
| DC Current Gain ($I_C = 10\text{ A}$, $V_{CE} = 4\text{ V}$) ($I_C = 20\text{ A}$, $V_{CE} = 4\text{ V}$) | h_{FE} | 20 10 | 60 | |
| Collector–Emitter Saturation Voltage ($I_C = 10\text{ A}$, $I_B = 1\text{ A}$) ($I_C = 20\text{ A}$, $I_B = 2.5\text{ A}$) | $V_{CE(sat)}$ | | 1.0 1.5 | Vdc |
| Base–Emitter Saturation Voltage ($I_C = 40\text{ A}$, $I_B = 4\text{ A}$) | $V_{BE(sat)}$ | | 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 |
|--|-------|-----|--|-----|

SWITCHING CHARACTERISTICS (Resistive Load)

| | | | | |
|--------------|--|----------|------|---------------|
| Turn–on Time | $(I_C = 20\text{ A}$, $I_{B1} = I_{B2} = 2.5\text{ A}$, $V_{CC} = 100\text{ V}$, $R_C = 5\ \Omega$) | t_{on} | 0.8 | μs |
| Storage Time | | t_s | 2.0 | |
| Fall Time | | t_f | 0.35 | |

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

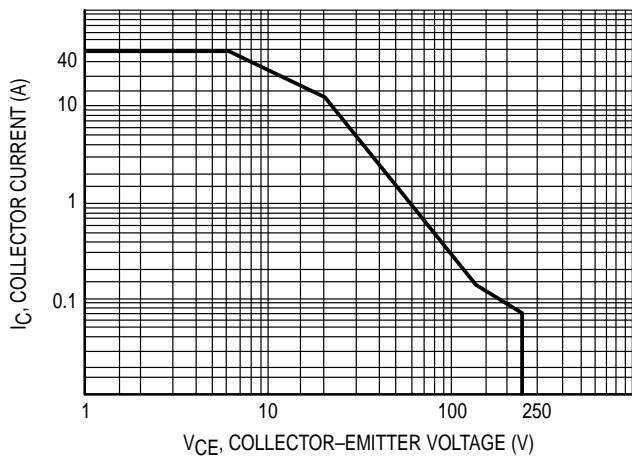


Figure 2. Active Region Safe Operating Area

There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate $I_C - V_{CE}$ limits of the transistor that must be observed for reliable operation i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figure 2 is based on $T_C = 25^\circ C$; $T_{J(pk)}$ is variable depending on power level. Second breakdown limitations do not derate the same as thermal limitations.

At high case temperatures, thermal limitations will reduce the power that can handled to values less than the limitations imposed by second breakdown.

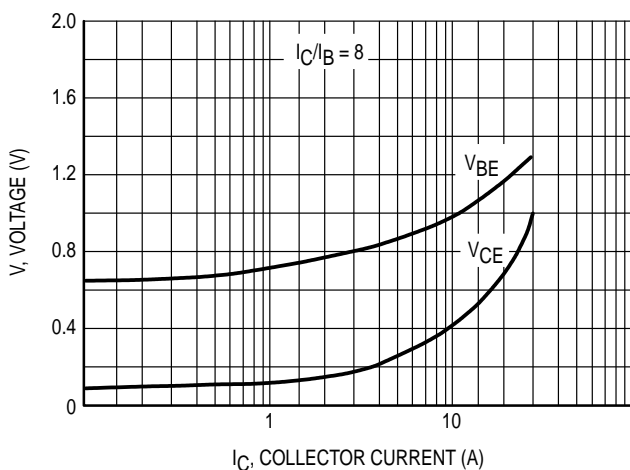


Figure 3. "On" Voltages

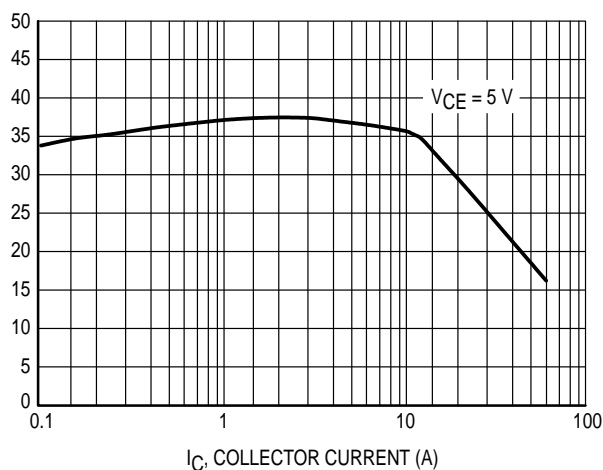


Figure 4. DC Current Gain

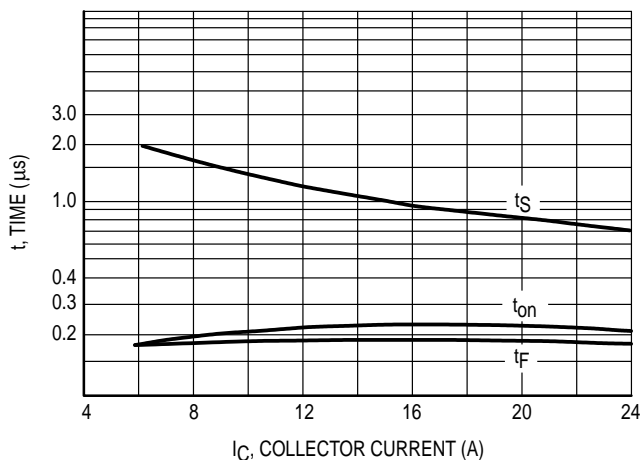


Figure 5. Resistive Switching Performance

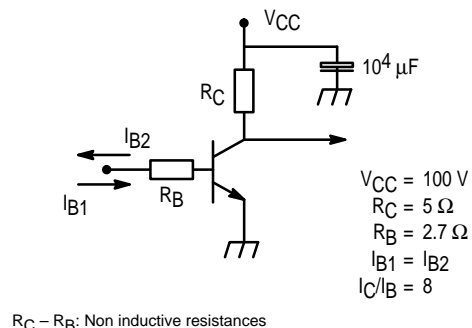
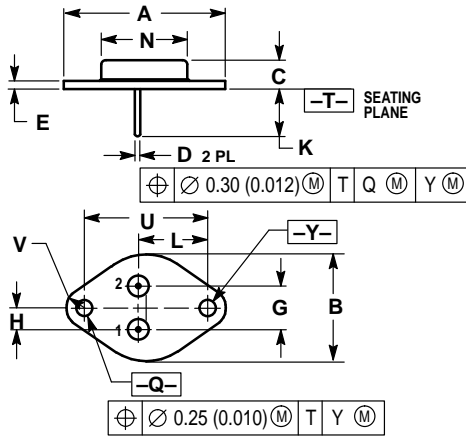


Figure 6. Switching Times Test Circuit

PACKAGE DIMENSIONS



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 |

STYLE 1:
 PIN 1. BASE
 2. EMITTER
 CASE: COLLECTOR

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

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