File Number 1199

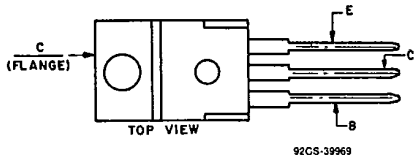
# BUW64A, BUW64B, BUW64C

## High-Current, Silicon N-P-N VERSAWATT Transistors

Switching Applications

**Features:**
- *Fast switching speed at temperatures up to 125° C*
- *Low $V_{CE}(sat)$*
- *VERSAWATT plastic package*

**TERMINAL DESIGNATIONS**




**JEDEC TO-220AB**

RCA-BUW64A, BUW64B, and BUW64C are epitaxial-base silicon n-p-n power transistors which feature fast switching speeds, low saturation voltages, and high safe-operating-area (SOA) ratings. They are specially designed for converters, inverters, pulse-width-modulated regulators and a variety of power switching circuits.

The BUW64A, BUW64B, and BUW64C transistors are supplied in the JEDEC TO-220AB (RCA VERSAWATT) plastic packages.

**MAXIMUM RATINGS,** *Absolute-Maximum Values:*

| | BUW64A | BUW64B | BUW64C | |
|---|---|---|---|---|
| $V_{CEV}$ | | | | |
| $V_{BE}$ = -1.5 V | 140 | 160 | 180 | V |
| $V_{CEO}$ | 90 | 110 | 130 | V |
| $V_{EBO}$ | | 7 | | V |
| $I_C(sat)$ | 5 | 5 | 4 | A |
| $I_C$ | | 7 | | A |
| $I_{CM}$ | | 10 | | A |
| $I_B$ | | 5 | | A |
| $P_T$ | | | | |
| $T_C$ up to 25° C | | 50 | | W |
| $T_C$ above 25° C ..... Derate Linearly | | 0.4 | | W/°C |
| $T_{stg}$, $T_J$ | | -65 to 150 | | °C |
| $T_L$ | | | | |
| At distance ≥ 1/8 in. (3.16 mm) from seating plane for 10 s max. | | 235 | | °C |

# BUW64A, 'BUW64B, BUW64C

**ELECTRICAL CHARACTERISTICS, at Case Temperature $T_C$ = 25°C Unless Otherwise Specified**

| CHARACTERISTIC | TEST CONDITIONS | | | | LIMITS | | | | | | UNITS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | VOLTAGE V dc | | CURRENT A dc | | BUW64A | | BUW64B | | BUW64C | | |
| | $V_{CE}$ | $V_{BE}$ | $I_C$ | $I_B$ | Min. | Max. | Min. | Max. | Min. | Max. | |
| $I_{CEV}$ | 140 | −1.5 | | | – | 100 | – | – | – | – | μA |
| | 160 | −1.5 | | | – | – | – | 100 | – | – | |
| | 180 | −1.5 | | | – | – | – | – | – | 100 | |
| $T_C$ = 125°C | 140 | −1.5 | | | – | 1 | – | – | – | – | mA |
| | 160 | −1.5 | | | – | – | – | 1 | – | – | |
| | 180 | −1.5 | | | – | – | – | – | – | 1 | |
| $I_{EBO}$ | | −7 | 0 | | – | 100 | – | 100 | – | 100 | μA |
| $V_{CEO(sus)}$[b] | | | 0.01[a] | 0 | 90 | – | 110 | – | 130 | – | V |
| $h_{FE}$ | 2 | | 0.2[a] | | 30 | – | 30 | – | 30 | – | |
| | 2 | | 4[a] | | – | – | – | – | 20 | – | |
| | 2 | | 5[a] | | 20 | – | 20 | – | – | – | |
| $V_{BE(sat)}$ | | | 4[a] | 0.4 | – | – | – | – | – | 1.4 | V |
| | | | 5[a] | 0.5 | – | 1.5 | – | 1.5 | – | – | |
| $V_{CE(sat)}$ | | | 4[a] | 0.4 | – | – | – | – | – | 0.7 | |
| | | | 5[a] | 0.5 | – | 0.8 | – | 0.8 | – | – | |
| | | | 7[a] | 0.7 | – | 1.5 | – | 1.5 | – | 1.5 | |
| $I_{S/b}$ | 20 | | 2.5 | | 1 | – | 1 | – | 1 | – | s |
| $\lvert h_{fe} \rvert$ f = 5 MHz | 10 | | 0.5 | | 10 | 40 | 10 | 40 | 10 | 40 | |
| $f_T$ | 10 | | 0.5 | | 50 | 200 | 50 | 200 | 50 | 200 | MHz |
| $C_{obo}$ f = 0.1 MHz | 10[c] | | | | 50 | 150 | 50 | 150 | 50 | 150 | pF |
| $t_d$[d] | | −4 | 4 | 0.4 | – | – | – | – | – | 0.1 | μs |
| | | | 5 | 0.5 | – | 0,1 | – | 0.1 | – | – | |
| $t_r$[d] | | −4 | 4 | 0.4 | – | – | – | – | – | 0.25 | |
| | | | 5 | 0.5 | – | 0.25 | – | 0.25 | – | – | |
| $t_s$[d] | | −4 | 4 | 0.4[e] | – | – | – | – | – | 1 | |
| | | | 5 | 0.5[e] | – | 1 | – | 1 | – | – | |
| $t_f$[d] | | −4 | 4 | 0.4[e] | – | – | – | – | – | 0.5 | |
| | | | 5 | 0.5[e] | – | 0.5 | – | 0.5 | – | – | |
| $R_{\theta JC}$ | 4 | | 5 | | – | 2.5 | – | 2.5 | – | 2.5 | °C/W |

[a] Pulsed: pulse duration = 300 μs, duty factor ≤ 2%.

[b] CAUTION: The sustaining voltage $V_{CEO(sus)}$ *MUST NOT* be measured on a curve tracer.

[c] $V_{CB}$ value.

[d] $V_{CC}$ = 70 V, $t_p$ = 20 μs

[e] $I_{B_1} = -I_{B_2}$.

## BUW64A, BUW64B, BUW64C

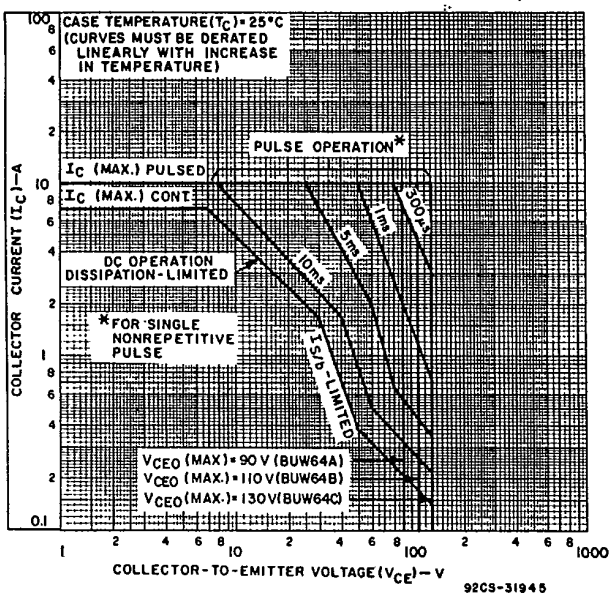



*Fig. 1 – Maximum operating areas for all types ($T_C$ = 25°C).*

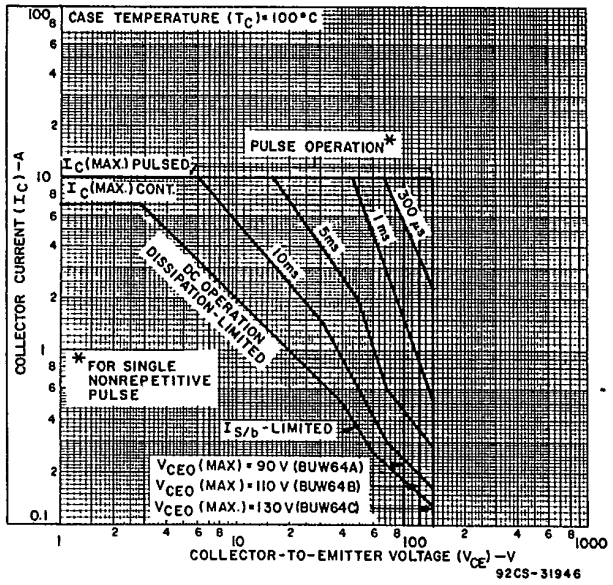



*Fig. 2 – Maximum operating areas for all types ($T_C$ = 100°C).*

# BUW64A, BUW64B, BUW64C

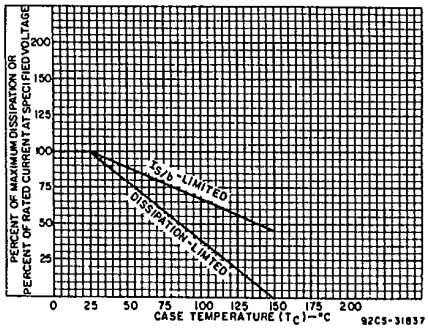



*Fig. 3 – Dissipation and $I_{S/b}$ derating curves for all types.*

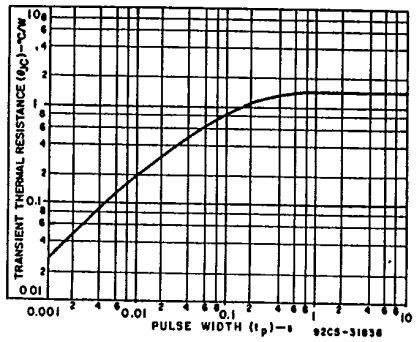



*Fig. 4 – Typical thermal-response characteristic for all types.*

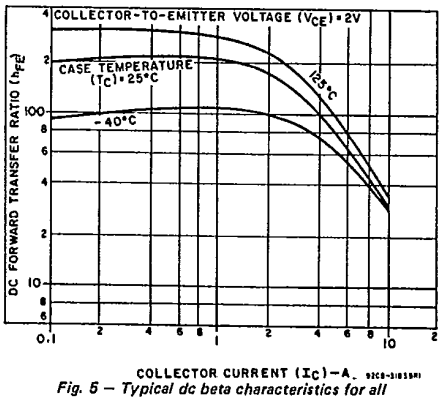



*Fig. 5 – Typical dc beta characteristics for all types.*

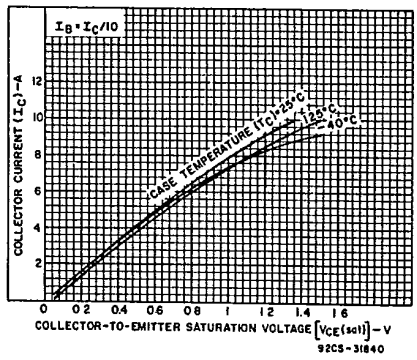



*Fig. 6 – Typical collector-to-emitter saturation voltage characteristics for all types.*

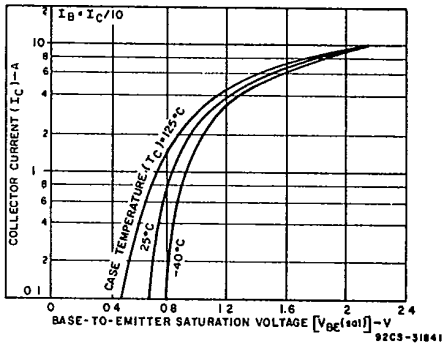



*Fig. 7 – Typical base-to-emitter saturation voltage characteristic for all types.*

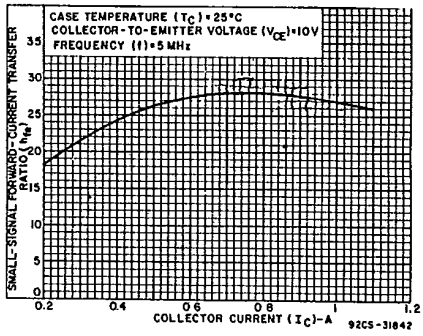



*Fig. 8 – Typical small-signal forward-current transfer ratio characteristic for all types (f = 5 MHz).*

# BUW64A, BUW64B, BUW64C

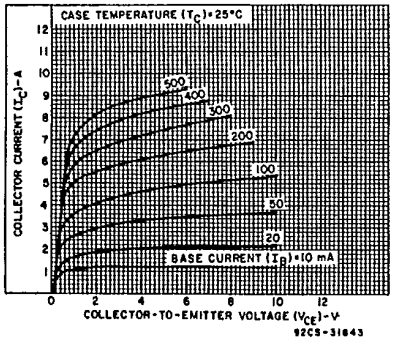



*Fig. 9 – Typical output characteristics for all types.*

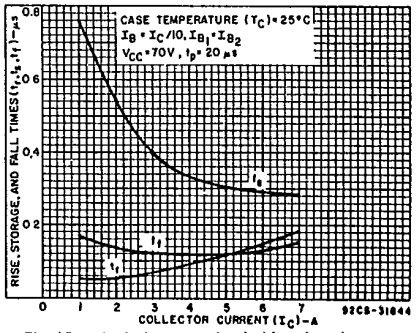



*Fig. 10 – Typical saturated-switching-time characteristics as a function of collector current for all types ($T_C$ = 25°C).*

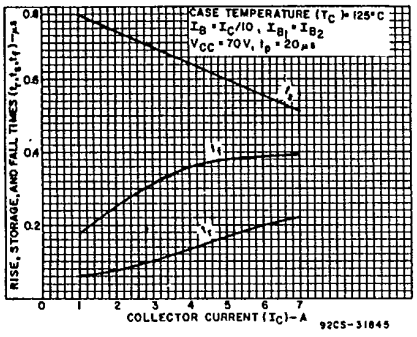



*Fig. 11 – Typical saturated-switching-time characteristics as a function of collector current for all types ($T_C$ = 125°C).*

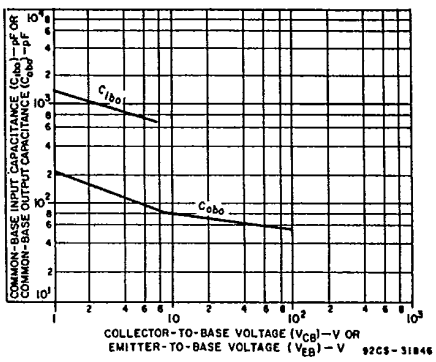



*Fig. 12 – Typical common-base input ($C_{ibo}$) or output ($C_{obo}$) capacitance characteristic for all types.*

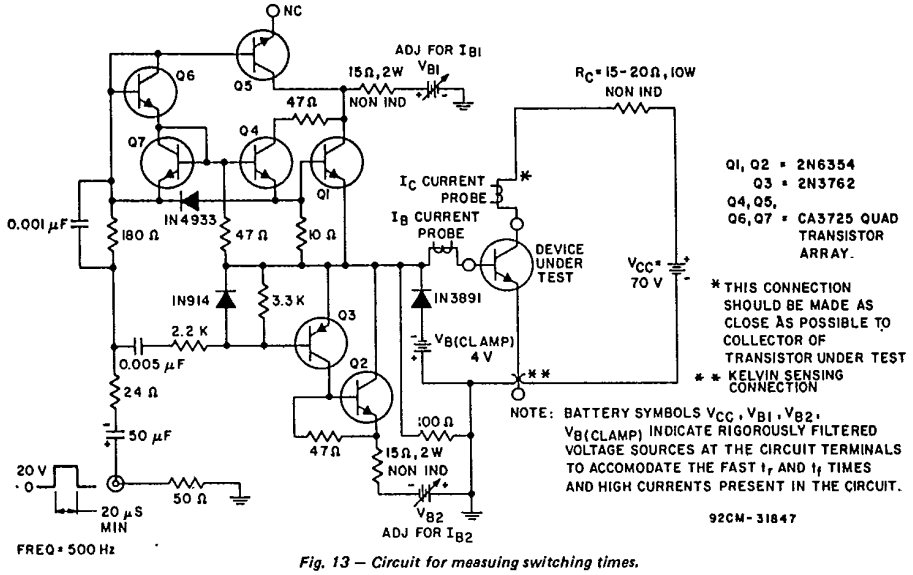



*Fig. 13 – Circuit for measuring switching times.*

## BUW64A, BUW64B, BUW64C

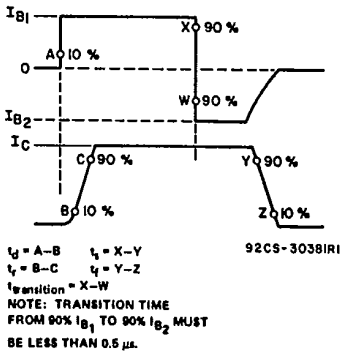



*Fig. 14 — Phase relationship between input and output currents showing reference points for specification of switching times.*