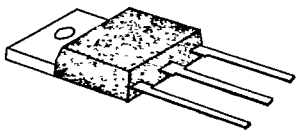
T-33-13



JUL 06 1988

SMLB

# SEMELAB

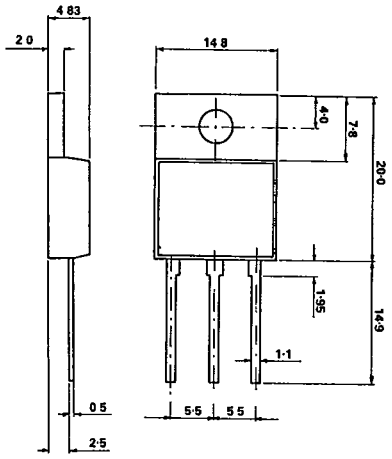
## BUW 51

# NPN MULTI-EPITAXIAL POWER TRANSISTOR

**Suitable for high current, high speed, low voltage applications**

**MECHANICAL DATA**

Dimensions in mm




**SOT93**
**(ALSO AVAILABLE IN CHIP FORM)**

## FEATURES

- LOW $V_{CE(SAT)}$
- FAST SWITCHING
- HIGH CURRENT
- HIGH RELIABILITY

## APPLICATIONS

- HIGH FREQUENCY AND EFFICIENCY CONVERTERS
- SWITCHING REGULATORS
- MOTOR CONTROLS

## ABSOLUTE MAXIMUM RATINGS ($T_{CASE}$ = 25°C unless otherwise stated)

| | | |
|---|---|---|
| $V_{CEX}$ | Collector-emitter voltage ($V_{BE}$ = −1·5V) | 300V |
| $V_{CEO}$ | Collector-emitter voltage ($I_B$ = 0) | 200V |
| $V_{EBO}$ | Emitter-base voltage | 7V |
| $I_C$ | Collector current | 20A |
| $I_{C(PK)}$ | Peak collector current | 28A |
| $I_B$ | Base current | 4A |
| $I_{B(PK)}$ | Peak base current | 7A |
| $P_{tot}$ | Total dissipation at $T_{CASE}$ = 25°C | 150W |
| $T_{stg}$ | Storage temperature | −55 to 200°C |
| $T_j$ | Maximum operating junction temperature | 200°C |
| $R_{th}$ | Thermal resistance (junction-case) | Max. 1·0°C/W |

T-33-13

# BUW 51

SEMELAB

## ELECTRICAL CHARACTERISTICS ($T_{CASE}$ = 25°C unless otherwise stated)

| Parameter | | Test Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| $V_{CEO(sus)}$ | Collector-emitter sustaining voltage | $I_B = 0, I_C = 0{\cdot}2A$ | $L = 25mH$ | 200 | | | V |
| $V_{(BR)EBO}$ | Emitter base breakdown voltage | $I_C = 0$ | $I_E = 50mA$ | 7 | | | V |
| $I_{CEX}$ | Collector cut-off current | $V_{BE} = -1{\cdot}5V$ | $V_{CE} = V_{CEX}$ | | | 0·5 | mA |
| | | | $T_j = 100°C$ | | | 2·0 | mA |
| $I_{CER}$ | Collector cut-off current | $R_{BE} = 10\Omega$ | $V_{CE} = V_{CEX}$ | | | 0·5 | mA |
| | | | $T_j = 100°C$ | | | 2·5 | mA |
| $I_{EBO}$ | Emitter cut-off current | $I_C = 0$ | $V_{BE} = -5V$ | | | 1·0 | mA |
| $V_{CE(sat)}$* | Collector-emitter saturation voltage | $I_C = 10A$ | $I_B = 1A$ | | 0·45 | 0·9 | V |
| | | | $T_j = 100°C$ | | 0·6 | 1·5 | V |
| | | $I_C = 5A$ | $I_B = 0{\cdot}25A$ | | 0·4 | 0·8 | V |
| | | | $T_j = 100°C$ | | 0·4 | 0·9 | V |
| $V_{BE(sat)}$* | Emitter-base saturation voltage | $I_C = 10A$ | $I_B = 1A$ | | 1·1 | 1·4 | V |
| | | | $T_j = 100°C$ | | 1·0 | 1·4 | V |

## SWITCHING CHARACTERISTICS ($T_{CASE}$ = 25°C unless otherwise stated)

| Parameter | | Test Conditions | | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|---|
| **SWITCHING TIMES ON RESISTIVE LOAD** | | | | | | | | |
| $t_r$ | Rise time | $I_C = 14A$ | $V_{CC} = 160V$ | | | 0·3 | 0·6 | µs |
| $t_s$ | Storage time | $V_{BB} = -5V$ | $R_{B2} = 1{\cdot}4\Omega$ | | | 0·6 | 1·4 | µs |
| $t_f$ | Fall time | $t_p = 30\mu s$ | $I_{B1} = 1{\cdot}7A$ | | | 0·12 | 0·3 | µs |
| **TURN-ON SWITCHING CHARACTERISTICS** | | | | | | | | |
| $di_c/dt$ | On state collector current rate of rise | $R_C = 0$ | $V_{CC} = 160V$ | | 35 | 75 | | A/µs |
| | | $I_{B1} = 1{\cdot}5A$ | | $T_j = 100°C$ | 30 | 65 | | A/µs |
| $V_{CE}(2\mu s)$ | Collector-emitter voltage after applied base drive | $V_{CC} = 160V$ | $R_C = 16\Omega$ | $T_j = 100°C$ | | 1·8 | 3·0 | V |
| | | $I_{B1} = 1A$ | | | | 3·0 | 5·0 | V |
| $V_{CE}(4\mu s)$ | | | | $T_j = 100°C$ | | 1·1 | 1·7 | V |
| | | | | | | 1·4 | 2·5 | V |
| **TURN-OFF SWITCHING CHARACTERISTICS - INDUCTIVE LOAD, WITH NEGATIVE BIAS** | | | | | | | | |
| $t_{si}$ | Carrier storage time | $I_C = 10A$ | $V_{clamp} = 200V$ | $T_j = 100°C$ | | 0·7 | 1·5 | µs |
| | | | | | | 1·1 | 2·0 | µs |
| $t_{fi}$ | Fall time | $I_B = 1A$ | $L_C = 0{\cdot}8mH$ | | | 0·06 | 0·2 | µs |
| | | $V_{CC} = 160V$ | $R_{B2} = 2{\cdot}5\Omega$ | $T_j = 100°C$ | | 0·12 | 0·3 | µs |
| $t_c$ | $V_{CE}/I_C$ Crossover time | $V_{BB} = -5V$ | | | | 0·13 | 0·3 | µs |
| | | | | $T_j = 100°C$ | | 0·24 | 0·5 | µs |
| **TURN-OFF SWITCHING CHARACTERISTICS - INDUCTIVE LOAD, WITHOUT NEGATIVE BIAS** | | | | | | | | |
| $t_{si}$ | Carrier storage time | $I_C = 10A$ | $V_{clamp} = 200V$ | | | 1·5 | | µs |
| | | $I_B = 1A$ | $L_C = 0{\cdot}8mH$ | $T_j = 100°C$ | | 2·7 | | µs |
| $t_{fi}$ | Fall time | $V_{CC} = 160V$ | $R_{B2} = 4{\cdot}7\Omega$ | | | 0·5 | | µs |
| | | $V_{BB} = 0V$ | | $T_j = 100°C$ | | 0·85 | | µs |

* Pulse test $t_p = 300\mu s$ $\delta \leq 2\%$