

Silicon diffused power transistors

BUV48; BUV48A

High-voltage, high-speed, glass-passivated npn power transistors in a SOT93 envelope, intended for use in converters, inverters, switching regulators, motor control systems etc.

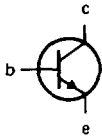
QUICK REFERENCE DATA

| | | BUV48 | BUV48A | |
|---|-------------|----------|--------|---------------|
| Collector-emitter voltage (peak value; $V_{BE} = 0$) | V_{CESM} | max. 850 | 1000 | V |
| Collector-emitter voltage (open base) | V_{CEO} | max. 400 | 450 | V |
| Collector current (DC) | I_C | max. | 15 | A |
| Collector current (peak value) | I_{CM} | max. | 30 | A |
| Total power dissipation up to $T_{mb} = 25\text{ }^\circ\text{C}$ | P_{tot} | max. | 150 | W |
| Collector-emitter saturation voltage | V_{CEsat} | max. 1.5 | — | V |
| $I_C = 10\text{ A}; I_B = 2\text{ A}$ | V_{CEsat} | max. — | 1.5 | V |
| $I_C = 8\text{ A}; I_B = 1.6\text{ A}$ | | | | |
| Fall time (resistive load) | t_f | max. 0.8 | — | μs |
| $I_{Con} = 10\text{ A}; I_{Bon} = -I_{Boff} = 2\text{ A}$ | t_f | max. — | 0.8 | μs |
| $I_{Con} = 8\text{ A}; I_{Bon} = -I_{Boff} = 1.6\text{ A}$ | | | | |

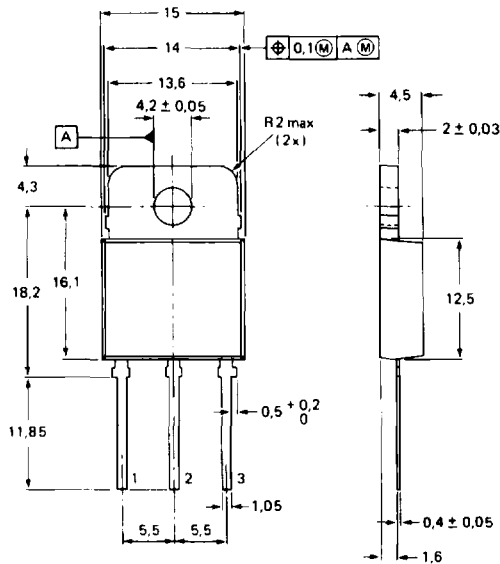
MECHANICAL DATA

Fig.1 SOT93.

Collector connected to mounting base.



Pinning:
 1 = base
 2 = collector
 3 = emitter



Dimensions in mm

7296696

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RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

| | | | BUV48 | BUV48A | |
|---|------------|------|-------------|--------|------------------|
| Collector-emitter voltage (peak value; $V_{BE} = 0$) | V_{CESM} | max. | 850 | 1000 | V |
| Collector-emitter voltage (open base) | V_{CEO} | max. | 400 | 450 | V |
| Emitter-base voltage | V_{EBO} | max. | 7 | | V |
| Collector current (DC) | I_C | max. | 15 | | A |
| Collector current (peak value) | I_{CM} | max. | 30 | | A |
| Base current (DC) | I_B | max. | 4 | | A |
| Base current (peak value) | I_{BM} | max. | 20 | | A |
| Total power dissipation up to $T_{mb} = 25\text{ }^\circ\text{C}$ | P_{tot} | max. | 150 | | W |
| Storage temperature | T_{stg} | | -65 to +175 | | $^\circ\text{C}$ |
| Junction temperature | T_j | max. | 175 | | $^\circ\text{C}$ |

THERMAL RESISTANCE

| | | | | | |
|--------------------------------|----------------|---|-----|--|-----|
| From junction to mounting base | $R_{th\ j-mb}$ | = | 1,0 | | K/W |
|--------------------------------|----------------|---|-----|--|-----|

CHARACTERISTICS

 $T_{mb} = 25\text{ }^\circ\text{C}$ unless otherwise specified

Collector cut-off current*

| | | | | | |
|--|-----------|------|-----|--|----|
| $V_{CE} = V_{CESMmax}; V_{BE} = 0$ | I_{CES} | max. | 0,2 | | mA |
| $V_{CE} = V_{CESMmax}; V_{BE} = 0; T_{mb} = 125\text{ }^\circ\text{C}$ | I_{CES} | max. | 2 | | mA |
| $V_{CE} = V_{CESMmax}; R_{BE} \leq 10\ \Omega$ | I_{CER} | max. | 0,5 | | mA |
| $V_{CE} = V_{CESMmax}; R_{BE} \leq 10\ \Omega; T_{mb} = 125\text{ }^\circ\text{C}$ | I_{CER} | max. | 4 | | mA |

Emitter cut-off current

| | | | | | |
|--------------------------------|-----------|------|---|--|----|
| $I_C = 0; V_{EB} = 5\text{ V}$ | I_{EBO} | max. | 1 | | mA |
|--------------------------------|-----------|------|---|--|----|

Emitter-base breakdown voltage

| | | | | | |
|-------------------------------|---------------|--|---------|--|---|
| $I_C = 0; I_B = 50\text{ mA}$ | $V_{(BR)EBO}$ | | 7 to 30 | | V |
|-------------------------------|---------------|--|---------|--|---|

Saturation voltages

| | | | BUV48 | BUV48A | |
|---|-------------|------|-------|--------|---|
| $I_C = 15\text{ A}; I_B = 4\text{ A}$ | V_{CEsat} | max. | 3,5 | — | V |
| $I_C = 10\text{ A}; I_B = 2\text{ A}$ | V_{CEsat} | max. | 1,5 | — | V |
| | V_{BEsat} | max. | 1,6 | — | V |
| $I_C = 12\text{ A}; I_B = 2,4\text{ A}$ | V_{CEsat} | max. | — | 5 | V |
| $I_C = 8\text{ A}; I_B = 1,6\text{ A}$ | V_{CEsat} | max. | — | 1,5 | V |
| | V_{BEsat} | max. | — | 1,6 | V |

* Measured with a half-sinewave voltage (curve tracer).

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Collector-emitter sustaining voltage
 $I_C = 200 \text{ mA}$; $I_{B\text{off}} = 0$; $L = 25 \text{ mH}$

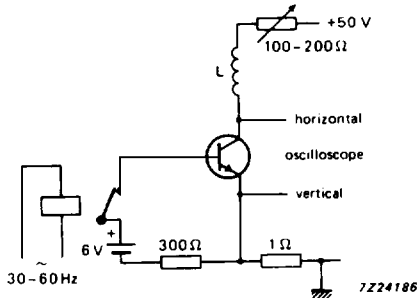


Fig. 2 Test circuit for $V_{CE\text{sust}}$.

| | BUV48 | BUV48A | |
|--------------------------|-------|--------|---|
| $V_{CE\text{sust}}$ min. | 400 | 450 | V |

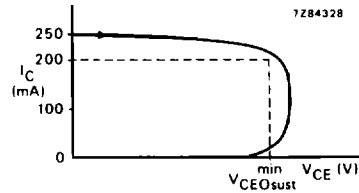


Fig. 3 Oscilloscope display for sustaining voltage.

Switching times resistive load (Figs 4 and 5)

$I_{C\text{on}} = 10 \text{ A}$; $I_{B\text{on}} = -I_{B\text{off}} = 2 \text{ A}$
 Turn-on time

Turn-off: Storage time

Fall time

$I_{C\text{on}} = 8 \text{ A}$; $I_{B\text{on}} = -I_{B\text{off}} = 1,6 \text{ A}$
 Turn-on time

Turn-off: Storage time

Fall time

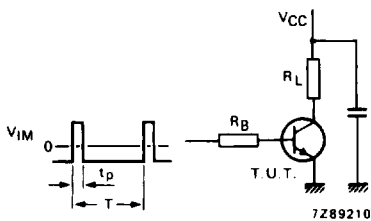


Fig. 4 Test circuit resistive load.
 $V_{CC} = 150 \text{ V}$; $V_{IM} = -6 \text{ to } +8 \text{ V}$;
 $t_p = 20 \mu\text{s}$; $\delta = t_p/T = 0,01$.

The values of R_B and R_L are selected in accordance with $I_{C\text{on}}$ and I_B requirements.

| | | BUV48 | BUV48A | |
|-----------------|------|-------|--------|---------------|
| t_{on} | typ. | 0,55 | — | μs |
| | max. | 1,0 | — | μs |
| t_s | typ. | 1,5 | — | μs |
| | max. | 3,0 | — | μs |
| t_f | typ. | 0,3 | — | μs |
| | max. | 0,8 | — | μs |
| t_{on} | typ. | — | 0,55 | μs |
| | max. | — | 1,0 | μs |
| t_s | typ. | — | 1,5 | μs |
| | max. | — | 3,0 | μs |
| t_f | typ. | — | 0,3 | μs |
| | max. | — | 0,8 | μs |

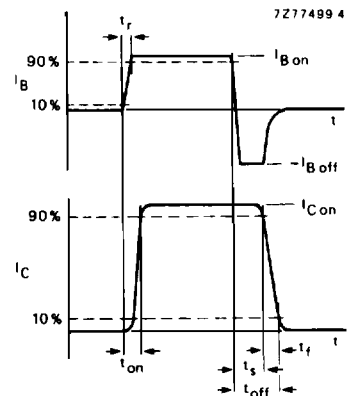


Fig. 5 Switching times waveforms with resistive load.

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Switching times inductive load (Figs 6 and 7)

$I_{Con} = 10\text{ A}; I_{Bon} = 2\text{ A};$

Turn-off: Storage time
Fall time

$I_{Con} = 10\text{ A}; I_{Bon} = 2\text{ A}; T_j = 100\text{ }^\circ\text{C}$

Turn-off: Storage time
Fall time

$I_{Con} = 8\text{ A}; I_{Bon} = 1,6\text{ A};$

Turn-off: Storage time
Fall time

$I_{Con} = 8\text{ A}; I_{Bon} = 1,6\text{ A}; T_j = 100\text{ }^\circ\text{C}$

Turn-off: Storage time
Fall time

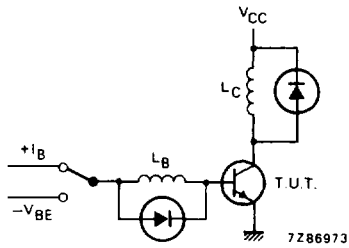


Fig. 6 Test circuit inductive load.

$V_{CC} = 300\text{ V}; -V_{BE} = 5\text{ V}; L_B = 3\text{ }\mu\text{H};$
 $L_C = 1\text{ mH}$

| | | BUV48 | BUV48A | |
|-------|------|-------|--------|---------------|
| t_s | typ. | 3,5 | — | μs |
| t_f | typ. | 0,08 | — | μs |
| t_s | max. | 5,0 | — | μs |
| t_f | max. | 0,4 | — | μs |
| t_s | typ. | — | 3,5 | μs |
| t_f | typ. | — | 0,08 | μs |
| t_s | max. | — | 5,0 | μs |
| t_f | max. | — | 0,4 | μs |

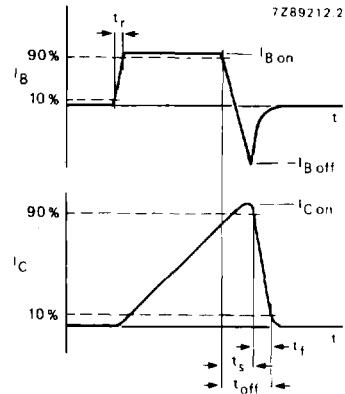
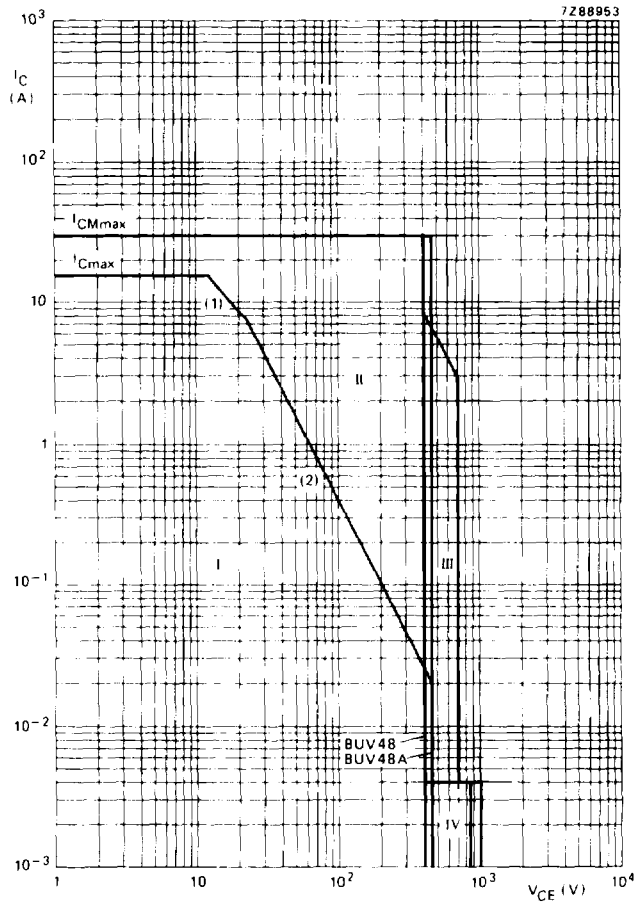


Fig. 7 Switching times waveforms with inductive load.

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- (1) P_{tot} max values.
 (2) Second-breakdown limits (independent of temperature).
- I Region of permissible DC operation.
 II Permissible extension for repetitive pulse operation.
 III Area of permissible operation during turn-on in single transistor converters, provided $R_{BE} \leq 100 \Omega$ and $t_p \leq 0,6 \mu s$.
 IV Repetitive pulse operation in this region is permissible provided $V_{BE} \leq 0$ and $t_p \leq 2$ ms.

Fig. 8 Safe Operating Area at $T_{mb} \leq 25$ °C.