

SILICON DIFFUSED POWER TRANSISTORS

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.

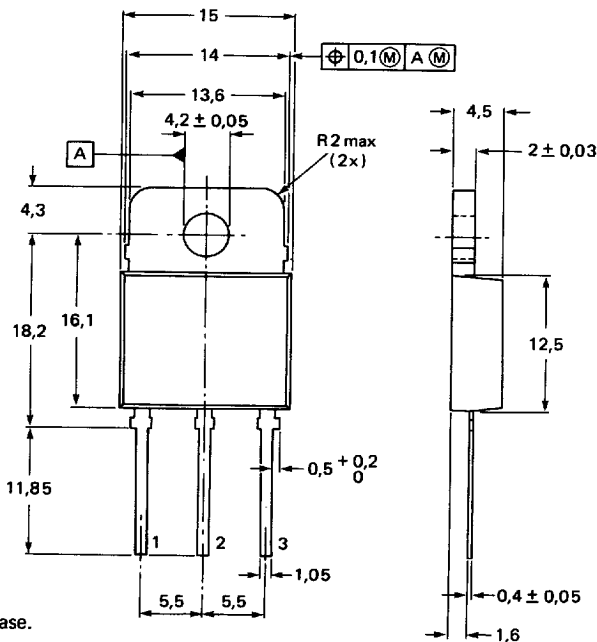
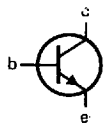
QUICK REFERENCE DATA

| | | BUW12 | BUW12A | |
|---|------------------|-------|--------|---------------|
| 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-emitter saturation voltage | V_{CESat} max. | 1.5 | | V |
| Collector current (DC) | I_C max. | | 8 | A |
| Collector current (peak value) | I_{CM} max. | | 20 | A |
| Total power dissipation up to $T_{mb} = 25^\circ\text{C}$ | P_{tot} max. | 125 | | W |
| Fall time (resistive load) | t_f max. | 0.8 | | μs |

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT93.



7296696

Pinning:
1 = base
2 = collector
3 = emitter

Collector connected to mounting base.

**BUW12
BUW12A**

RATINGS

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

| | | | BUW12 | BUW12A | |
|---|------------|------|-------------|--------|----|
| 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. | 8 | 8 | A |
| Collector current (peak value); $t_p < 2$ ms | I_{CM} | max. | 20 | 20 | A |
| Base current (DC) | I_B | max. | 4 | 4 | A |
| Base current (peak value); $t_p \leq 2$ ms | I_{BM} | max. | 6 | 6 | A |
| Total power dissipation up to $T_{mb} = 25$ °C | P_{tot} | max. | 125 | 125 | W |
| Storage temperature range | T_{stg} | | -65 to +150 | | °C |
| Junction temperature | T_j | max. | 150 | 150 | °C |

THERMAL RESISTANCE

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

CHARACTERISTICS

$T_j = 25$ °C unless otherwise specified

Collector cut-off current*

$V_{CE} = V_{CESMmax}; V_{BE} = 0$

$V_{CE} = V_{CESMmax}; V_{BE} = 0; T_j = 125$ °C

| | | | | |
|-----------|------|---|--|----|
| I_{CES} | max. | 1 | | mA |
| I_{CES} | max. | 3 | | mA |

Emitter cut-off current

$I_C = 0; V_{EB} = 9$ V

| | | | | |
|-----------|------|----|--|----|
| I_{EBO} | max. | 10 | | mA |
|-----------|------|----|--|----|

Saturation voltages

$I_C = 6$ A; $I_B = 1,2$ A

$I_C = 5$ A; $I_B = 1,0$ A

| | | BUW12 | BUW12A | |
|-------------|------|-------|--------|---|
| V_{CEsat} | max. | 1,5 | — | V |
| V_{BEsat} | max. | 1,5 | — | V |
| V_{CEsat} | max. | — | 1,5 | V |
| V_{BEsat} | max. | — | 1,5 | V |

Collector-emitter sustaining voltage

$I_C = 100$ mA; $I_{Boff} = 0$; $L = 25$ mH

| | | | | |
|----------------|------|-----|-----|---|
| $V_{CEO sust}$ | min. | 400 | 450 | V |
|----------------|------|-----|-----|---|

DC current gain

$I_C = 10$ mA; $V_{CE} = 5$ V

| | | | | |
|----------|------|----|--|--|
| h_{FE} | min. | 10 | | |
| h_{FE} | typ. | 18 | | |
| h_{FE} | max. | 35 | | |

$I_C = 1$ A; $V_{CE} = 5$ V

| | | | | |
|----------|------|----|--|--|
| h_{FE} | min. | 10 | | |
| h_{FE} | typ. | 20 | | |
| h_{FE} | max. | 35 | | |

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

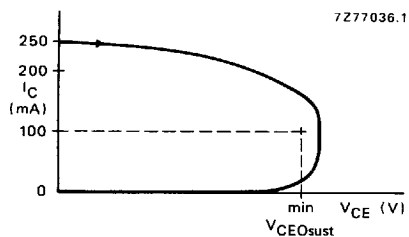


Fig. 2 Oscilloscope display for sustaining voltage.

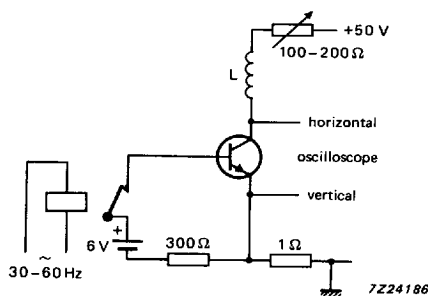


Fig. 3 Test circuit for $V_{CEO\text{sust}}$.

Switching times resistive load (Figs 4 and 5)

$I_{Con} = 6 \text{ A}; I_{Bon} = -I_{Boff} = 1,2 \text{ A}$

Turn-on time

Turn-off: Storage time

Fall time

$I_{Con} = 5 \text{ A}; I_{Bon} = -I_{Boff} = 1 \text{ A}$

Turn-on time

Turn-off: Storage time

Fall time

Switching times inductive load (Figs 6 and 7)

$I_{Con} = 6 \text{ A}; I_B = 1,2 \text{ A}$

Turn-off: Storage time

Fall time

$I_{Con} = 6 \text{ A}; I_B = 1,2 \text{ A}; T_j = 100 \text{ }^\circ\text{C}$

Turn-off: Storage time

Fall time

Switching times inductive load (Figs 6 and 7)

$I_{Con} = 5 \text{ A}; I_B = 1 \text{ A}$

Turn-off: Storage time

Fall time

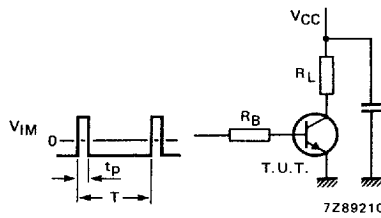
$I_{Con} = 5 \text{ A}; I_B = 1 \text{ A}; T_j = 100 \text{ }^\circ\text{C}$

Turn-off: Storage time

Fall time

| | | BUW12 | BUW12A | |
|----------|------|-------|--------|---------------|
| t_{on} | max. | 1 | — | μs |
| t_s | max. | 4 | — | μs |
| t_f | max. | 0,8 | — | μs |
| t_{on} | max. | — | 1 | μs |
| t_s | max. | — | 4 | μs |
| t_f | max. | — | 0,8 | μs |
| t_s | typ. | 1,6 | — | μs |
| | max. | 2,1 | — | μs |
| t_f | typ. | 80 | — | ns |
| | max. | 150 | — | ns |
| t_s | typ. | 1,8 | — | μs |
| | max. | 2,3 | — | μs |
| t_f | typ. | 140 | — | ns |
| | max. | 300 | — | ns |
| t_s | typ. | — | 1,6 | μs |
| | max. | — | 2,1 | μs |
| t_f | typ. | — | 80 | ns |
| | max. | — | 150 | ns |
| t_s | typ. | — | 1,8 | μs |
| | max. | — | 2,3 | μs |
| t_f | typ. | — | 140 | ns |
| | max. | — | 300 | ns |

BUW12
BUW12A



$V_{CC} = 250 \text{ V}$
 $V_{IM} = -6 \text{ to } +8 \text{ V}$
 $\frac{t_p}{T} = 0,01$
 $t_p = 20 \mu\text{s}$
 The values of R_B and R_L are selected in accordance with I_{Con} and I_B requirements.

Fig. 4 Test circuit resistive load.

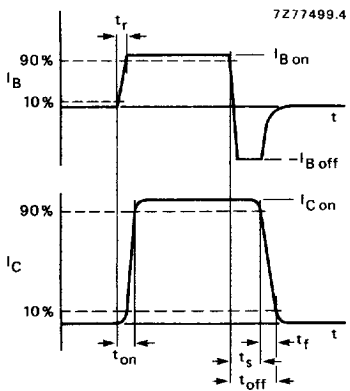


Fig. 5 Switching times waveforms with resistive load

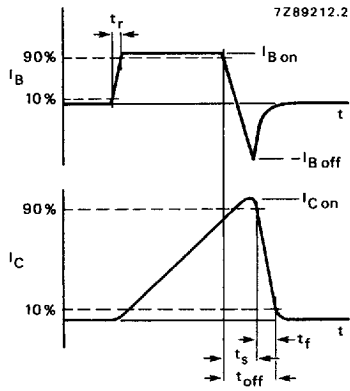
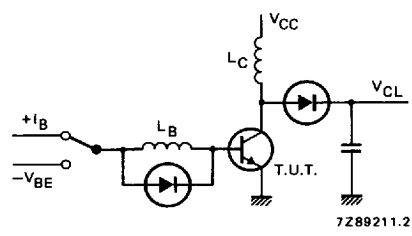


Fig. 6 Switching times waveforms with inductive load.

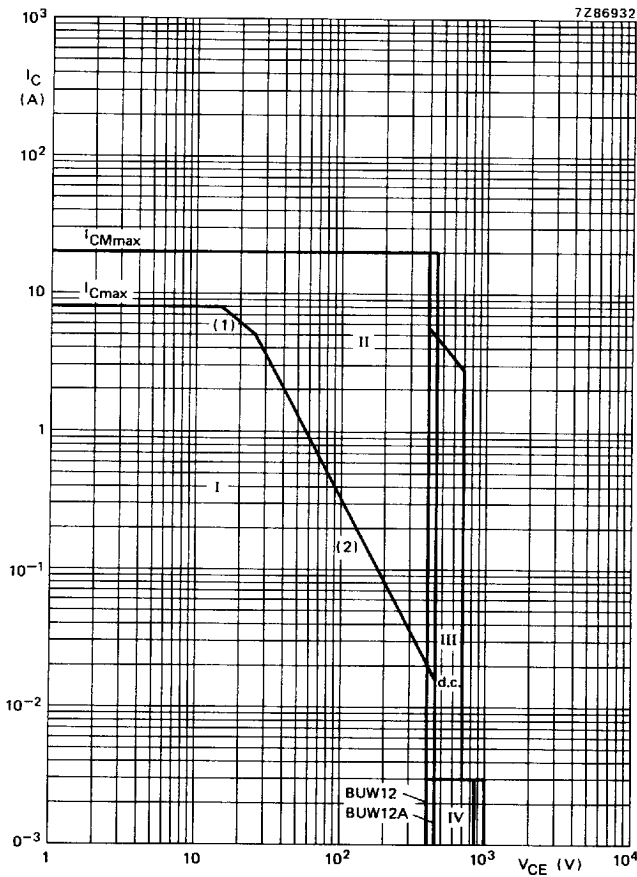


$V_{CL} = 300 \text{ V}$
 $V_{CC} = 30 \text{ V}$
 $-V_{BE} = 5 \text{ V}$
 $L_B = 1 \mu\text{H}$
 $L_C = 200 \mu\text{H}$

Fig. 7 Test circuit inductive load.

Silicon diffused power transistors

BUW12
BUW12A



- (1) P_{tot} max line.
- (2) Second-breakdown limits.
- 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 $T_{mb} \leq 25 \text{ }^\circ\text{C}$.

BUW12
BUW12A

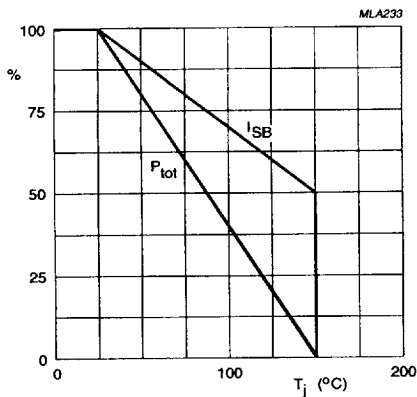


Fig. 9 Total power dissipation and second current breakdown curve.

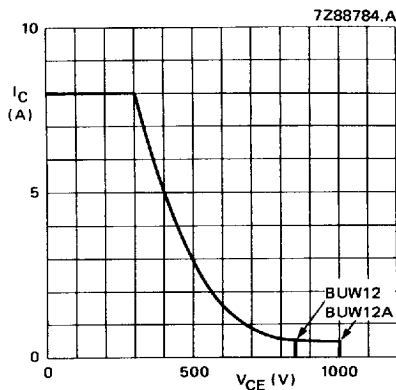


Fig. 10 Reverse bias SOAR.

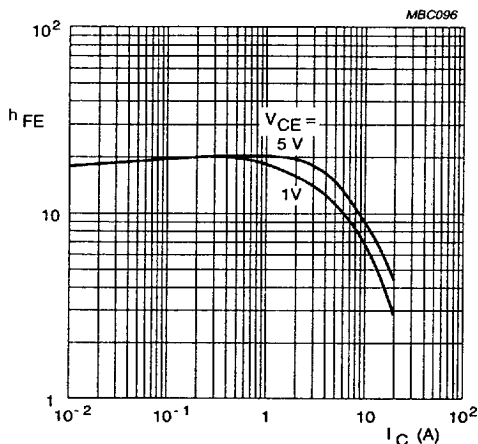


Fig. 11 Typical values DC current gain.

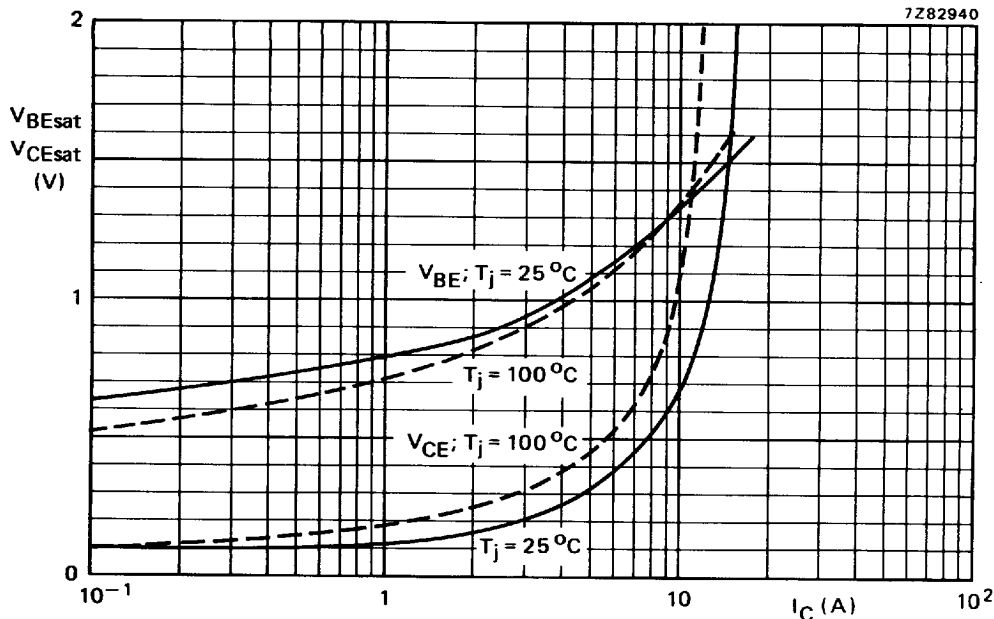


Fig. 12 Typical values base and collector voltage at $I_C/I_B = 5$.

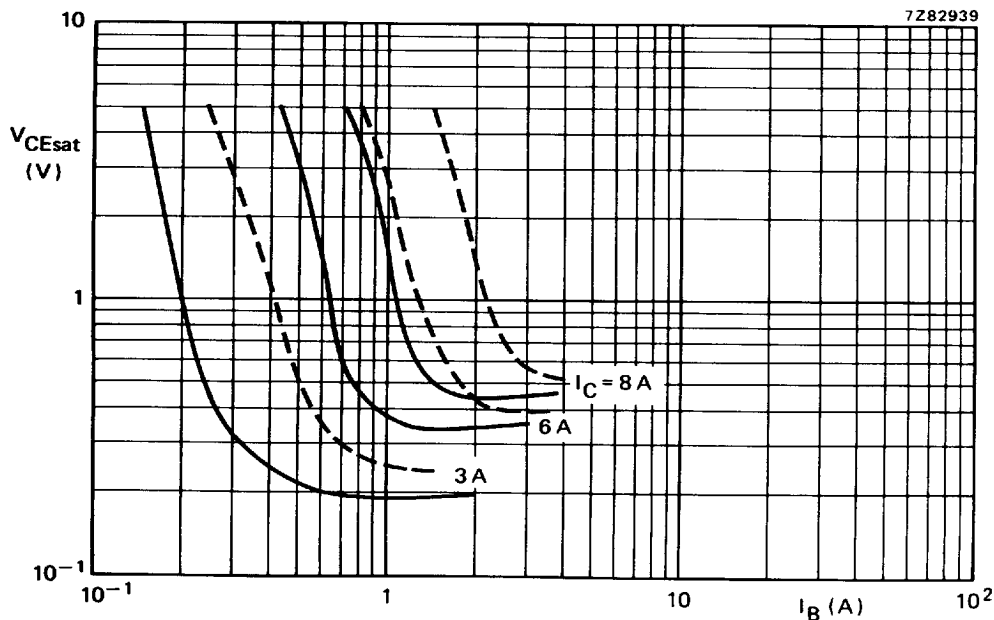


Fig. 13 Typ. (—) and max. (---) values collector-emitter saturation voltage at $T_j = 25^\circ C$.

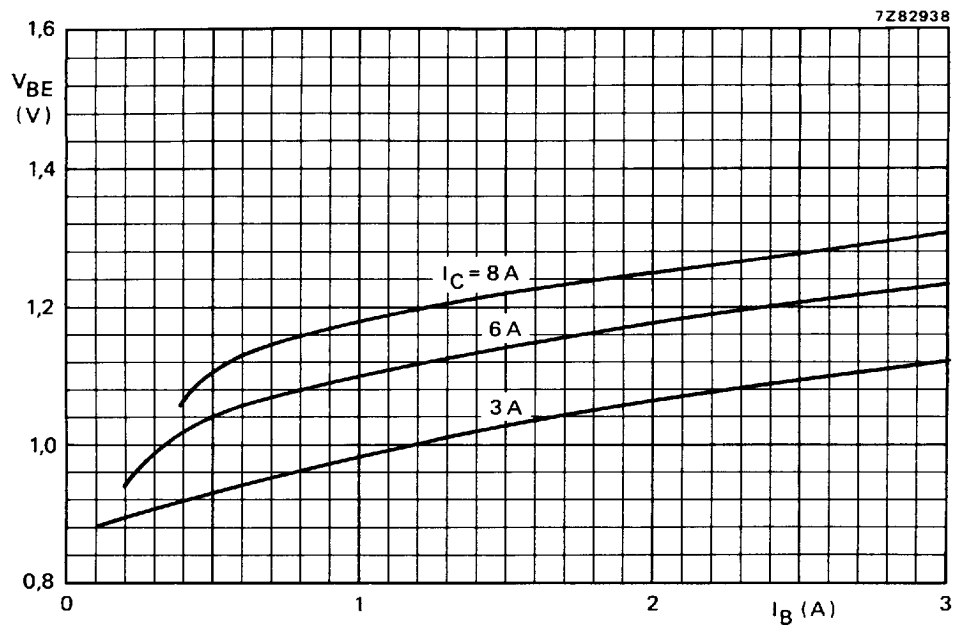


Fig. 14 Typical values base-emitter voltage at $T_j = 25^\circ\text{C}$.