

## High power NPN transistor

### Features

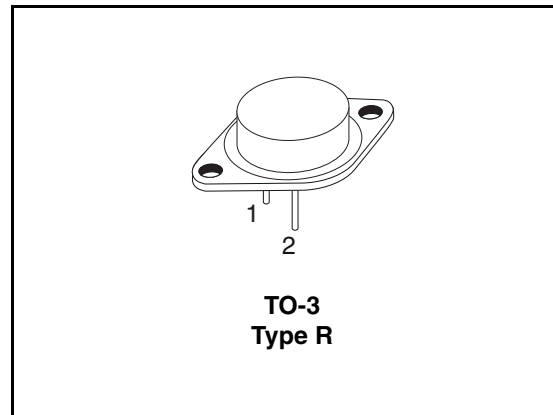
- High voltage capability
- High current capability
- Fast switching speed

### Applications

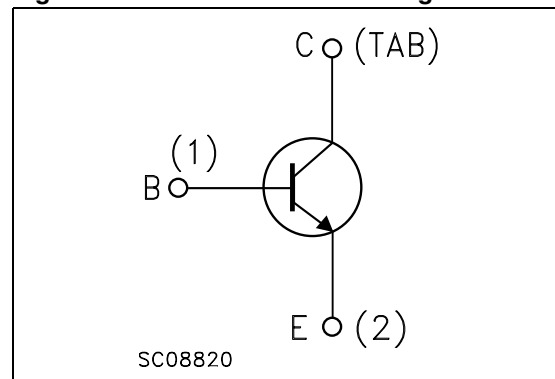
- High frequency and efficiency converters
- Linear and switching industrial equipment

### Description

The BUX98A is a multi-epitaxial mesa NPN transistor in TO-3 metal case, intended for industrial applications from single and three-phase mains operation.



**Figure 1. Internal schematic diagram**



**Table 1. Device summary**

| Order codes | Marking | Package | Packaging |
|-------------|---------|---------|-----------|
| BUX98A      | BUX98A  | TO-3    | Tray      |

## Content

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# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

| Symbol    | Parameter   | Value      | Unit             |
|-----------|---|------------|------------------|
| $V_{CER}$ | Collector-emitter voltage ( $R_{BE} \leq 10 \Omega$ )         | 1000       | V                |
| $V_{CES}$ | Collector-emitter voltage ( $V_{BE} = 0$ )                    | 1000       | V                |
| $V_{CEO}$ | Collector-emitter voltage ( $I_B = 0$ )                       | 450        | V                |
| $V_{EBO}$ | Emitter-base voltage ( $I_C = 0$ )                            | 7          | V                |
| $I_C$     | Collector current   | 30         | A                |
| $I_{CM}$  | Collector peak current ( $t_p \leq 5ms$ )                     | 60         | A                |
| $I_{CP}$  | Collector peak current non repetitive ( $t_p \leq 20 \mu s$ ) | 80         | A                |
| $I_B$     | Base current  | 8          | A                |
| $I_{BM}$  | Base peak current ( $t_p \leq 5ms$ )                          | 30         | A                |
| $P_{TOT}$ | Total power dissipation at $T_c = 25 \text{ }^\circ\text{C}$  | 250        | W                |
| $T_{stg}$ | Storage temperature   | -65 to 200 | $^\circ\text{C}$ |
| $T_J$     | Max. operating junction temperature                           | 200        |                  |

**Table 3. Thermal data**

| Symbol         | Parameter                             | Value | Unit                      |
|----------------|---------------------------------------|-------|---------------------------|
| $R_{thj-case}$ | Thermal resistance junction-case max. | 0.7   | $^\circ\text{C}/\text{W}$ |

## 2 Electrical characteristics

( $T_{\text{case}} = 25\text{ °C}$ ; unless otherwise specified)

**Table 4. Electrical characteristics**

| Symbol  | Parameter   | Test conditions  | Min. | Typ. | Max.          | Unit  |
|---|---|--|------|------|---------------|---|
| $I_{\text{CES}}$                                    | Collector cut-off current<br>( $V_{\text{BE}} = 0$ )                        | $V_{\text{CE}} = 1000\text{ V}$<br>$V_{\text{CE}} = 1000\text{ V}$ $T_{\text{C}} = 125\text{ °C}$                      |      |      | 400<br>4      | $\mu\text{A}$<br>$\text{mA}$                    |
| $I_{\text{CER}}$                                    | Collector cut-off current<br>( $R_{\text{BE}} = 10\ \Omega$ )               | $V_{\text{CE}} = 1000\text{ V}$<br>$V_{\text{CE}} = 1000\text{ V}$ $T_{\text{C}} = 125\text{ °C}$                      |      |      | 1<br>8        | $\mu\text{A}$<br>$\mu\text{A}$                  |
| $I_{\text{CEO}}$                                    | Collector cut-off current<br>( $I_{\text{B}} = 0$ )                         | $V_{\text{CE}} = 1000\text{ V}$  |      |      | 2             | $\text{mA}$                                     |
| $I_{\text{EBO}}$                                    | Emitter cut-off current<br>( $I_{\text{C}} = 0$ )                           | $V_{\text{EB}} = 5\text{ V}$   |      |      | 2             | $\text{mA}$                                     |
| $V_{\text{CEO(sus)}}^{(1)}$                         | Collector-emitter<br>sustaining voltage ( $I_{\text{B}} = 0$ )              | $I_{\text{C}} = 200\text{ mA}$   | 450  |      |               | $\text{V}$                                      |
| $V_{\text{CER(sus)}}^{(1)}$                         | Collector-emitter<br>sustaining voltage<br>( $R_{\text{BE}} = 10\ \Omega$ ) | $I_{\text{C}} = 1\text{ A}$ $L = 2\text{ mH}$  | 1000 |      |               | $\text{V}$                                      |
| $V_{\text{CE(sat)}}^{(1)}$                          | Collector-emitter<br>saturation voltage                                     | $I_{\text{C}} = 16\text{ A}$ $I_{\text{B}} = 3.2\text{ A}$<br>$I_{\text{C}} = 24\text{ A}$ $I_{\text{B}} = 5\text{ A}$ |      |      | 1.5<br>5      | $\text{V}$<br>$\text{V}$                        |
| $V_{\text{BE(sat)}}^{(1)}$                          | Base-emitter saturation<br>voltage  | $I_{\text{C}} = 16\text{ A}$ $I_{\text{B}} = 3.2\text{ A}$   |      |      | 1.6           | $\text{V}$                                      |
| $t_{\text{on}}$<br>$t_{\text{s}}$<br>$t_{\text{f}}$ | Resistive load<br>Turn-on time<br>Storage time<br>Fall time                 | $I_{\text{C}} = 16\text{ A}$ $V_{\text{CC}} = 150\text{ V}$<br>$I_{\text{B(on)}} = -I_{\text{B(off)}} = 3.2\text{ A}$  |      |      | 1<br>3<br>0.8 | $\mu\text{s}$<br>$\mu\text{s}$<br>$\mu\text{s}$ |

1. Pulsed duration = 300  $\mu\text{s}$ , duty cycle  $\leq 1.5\%$

## 2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

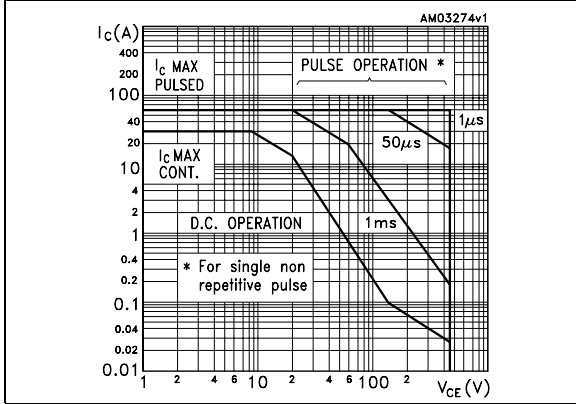


Figure 3. Derating curve

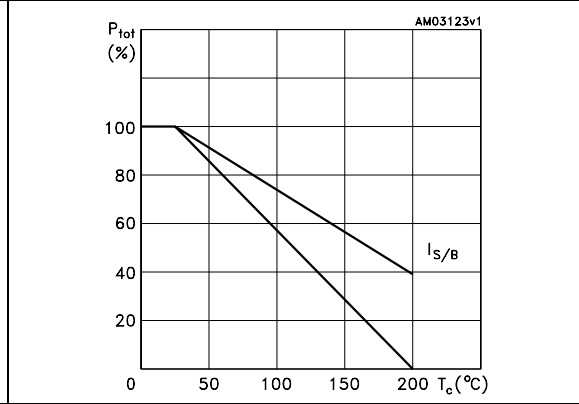


Figure 4. DC current gain

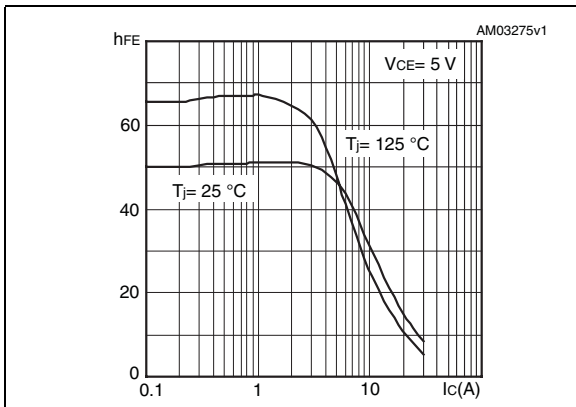


Figure 5. Collector-emitter saturation voltage

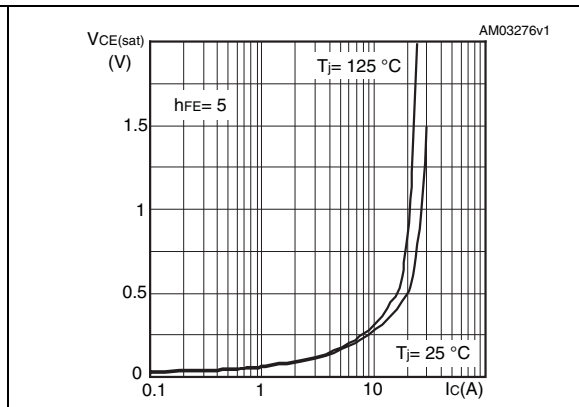


Figure 6. Base-emitter saturation voltage

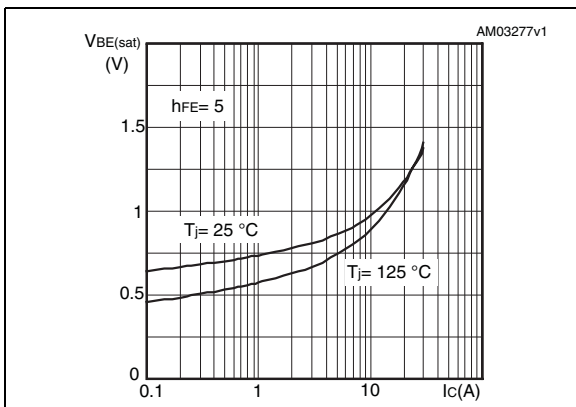


Figure 7. Resistive load switching times (on)

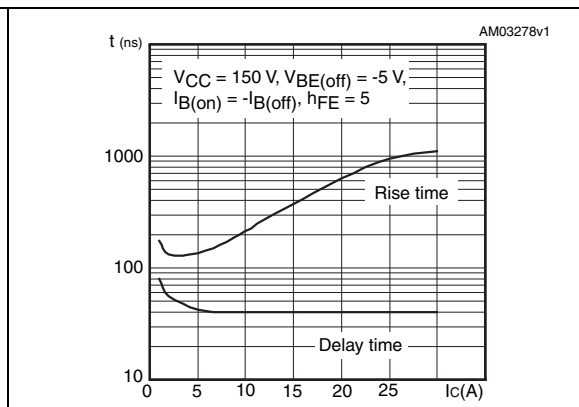
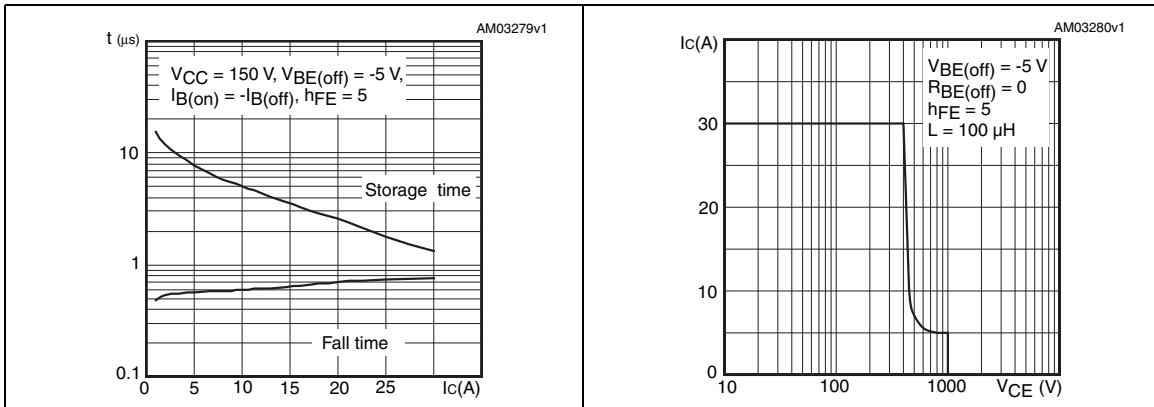
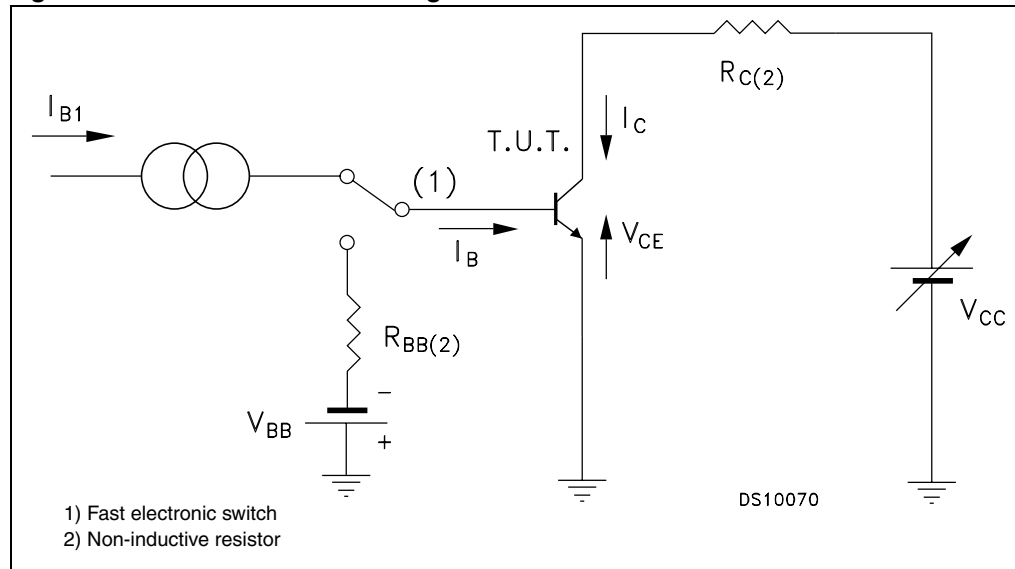


Figure 8. Resistive load switching times (off) Figure 9. Reverse biased SOA



### 3 Test circuits

Figure 10. Resistive load switching test circuit



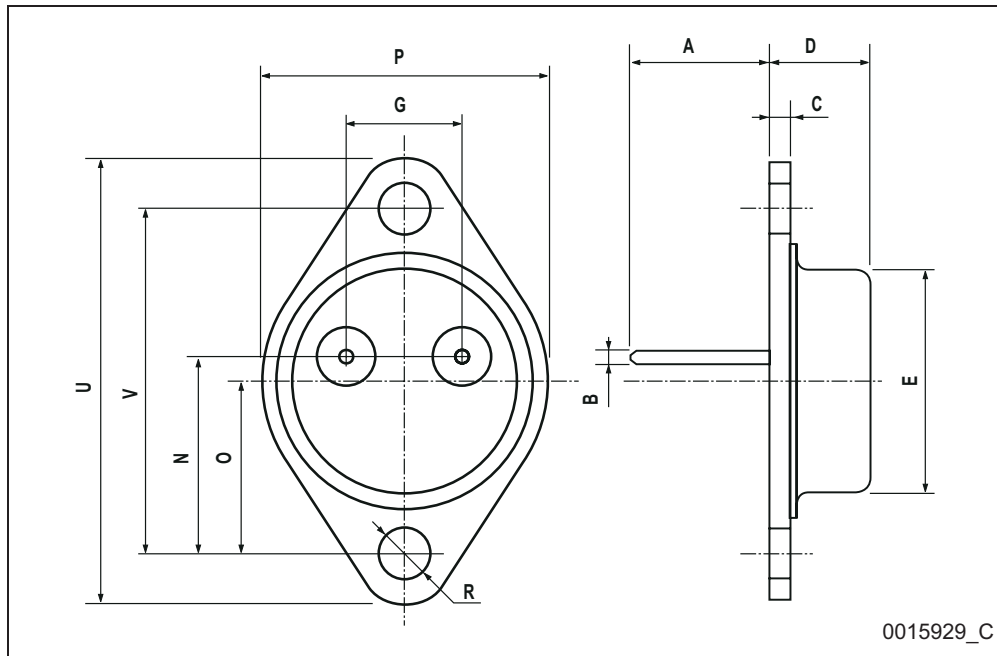
## 4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect . The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: [www.st.com](http://www.st.com)



**TO-3 type R Mechanical data**

| DIM. | mm   |       |       | inch  |       |       |
|------|------|-------|-------|-------|-------|-------|
|      | MIN. | TYP.  | MAX.  | MIN.  | TYP.  | MAX.  |
| A    |      | 11.7  |       |       | 0.460 |       |
| B    | 0.96 |       | 1.10  | 0.037 |       | 0.043 |
| C    |      |       | 1.70  |       |       | 0.066 |
| D    |      |       | 8.7   |       |       | 0.342 |
| E    |      |       | 20.0  |       |       | 0.787 |
| G    |      | 10.9  |       |       | 0.429 |       |
| N    |      | 16.9  |       |       | 0.665 |       |
| P    |      |       | 26.2  |       |       | 1.031 |
| R    | 3.88 |       | 4.09  | 0.152 |       | 0.161 |
| U    |      |       | 39.50 |       |       | 1.555 |
| V    |      | 30.10 |       |       | 1.185 |       |



## 5 Revision history

Table 5. Document revision history

| Date        | Revision | Changes   |
|-------------|----------|---|
| 21-Jun-2004 | 4        |   |
| 24-Nov-2008 | 5        | Inserted new <a href="#">Section 2.1: Electrical characteristics (curves)</a> |

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